Maintenance Manual

Cell Master™ Compact Handheld Base Station Analyzer

MT8212E
2 MHz to 4 GHz Cable and Antenna Analyzer
100 kHz to 4 GHz Spectrum Analyzer
10 MHz to 4 GHz Power Meter

MT8213E
2 MHz to 6 GHz Cable and Antenna Analyzer
100 kHz to 6 GHz Spectrum Analyzer
10 MHz to 6 GHz Power Meter

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

Part Number: 10580-00255
Revision: A
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Manufacturer's Name: ANRITSU COMPANY

Manufacturer's Address: Microwave Measurements Division
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

declares that the product specified below:

Product Name: Cell Master

Model Number: MT8212E, MT8213E

conforms to the requirement of:

EMC Directive:	2004/108/EC
Low Voltage Directive:	2006/95/EC

Electromagnetic Compatibility: EN61326:2006

Emissions:	EN55011: 2007 Group 1 Class A	
Immunity:	EN 61000-4-2:1995 +A1:1998 +A2:2001	4kV CD, 8kV AD
	EN 61000-4-3:2006 +A1:2008	3V/m
	EN 61000-4-4:2004	0.5kV SL, 1kV PL
	EN 61000-4-5:2006	0.5kV L-L, 1kV L-E
	EN 61000-4-6: 2007	3V
	EN 61000-4-11: 2004	100% @ 20msec

Electrical Safety Requirement:

Product Safety: EN 61010-1:2001

Eric McLean, Corporate Quality Director

Morgan Hill, CA

23 DEC 2009
Date

European Contact: For Anritsu product EMC & LVD information, contact Anritsu LTD, Rutherford Close, Stevenage Herts, SG1 2EF UK, (FAX 44-1438-740202)

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N274

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印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他（电缆、风扇、连接器等） (Appended goods)	×	○	×	×	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。
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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

Symbols Used in Manuals

Danger

This indicates a very dangerous procedure that could result in serious injury or death, and possible loss related to equipment malfunction, if not performed properly.

Warning

This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution

This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

For Safety

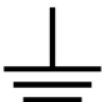
Warning

Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning

or



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning

This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Caution

Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Table of Contents

Chapter 1 — General Information

1-1 Introduction

This manual provides maintenance instructions for Anritsu Cell Master Models MT8212E and MT8213E.

This manual includes:

- General information in this chapter, including:
  - Lists of necessary test equipment to perform verification testing

    Table 1-1, "Test Equipment Required for Verifying Spectrum Analyzer Functions"

    Table 1-2, "Required Equipment for Cable and Antenna Analyzer Verification"

    Table 1-3, "Required Equipment for Power Meter Functions"

    Table 1-4, "Additional Test Equipment Required for Verifying Options"
  - Replaceable parts list (Table 1-5)
- Performance verification procedures:
  - Chapter 2, "Spectrum Analyzer Verification"
  - Chapter 3, "Cable and Antenna Analyzer Verification"
  - Chapter 4, "Power Meter Verification"
  - Chapter 5, "Option Verification"
- Battery pack information (Chapter 6, "Battery Information")
- Parts replacement procedures (Chapter 6, "Assembly Replacement")
- Blank test records are included in Appendix A.
  - Copy the blank test records from Appendix A and use them to record measured values. These test records form a record of the performance of your instrument. Anritsu recommends that you make a copy of the blank test records to document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which can allow you to observe trends.

Familiarity with the basic operation of the front panel keys (for example, how to change measurement mode, preset the unit, or the meaning of submenu key or **main menu** key) is assumed.

Caution	Before making any measurement, verify that all equipment has warmed up for at least 30 minutes.

1-2 Anritsu Customer Service Centers

For the latest service and sales information in your area, please visit the following URL:

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1-3 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining Anritsu Cell Master Models MT8212E and MT8213E. Table 1-1 is a list of test equipment that is required for verifying the spectrum analyzer functions. Table 1-2 is a list of test equipment that is required for verifying the spectrum analyzer functions. Table 1-3 is a list of test equipment that is required for verifying the power meter functions. Table 1-4 is a list of test equipment that is required for verifying the functions of installed options.

Table 1-1. Test Equipment Required for Verifying Spectrum Analyzer Functions

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Generator	Frequency: 0.1 Hz to 20 GHz, Power Output: +16 dBm, Step attenuator installed	Anritsu Model MG3692A or MG3692B with Options 2A, 4, 22, 15x[a]
Power Meter	Power Range: –70 dBm to +20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 100 kHz to 18 GHz Power Range: –30 dB to +20 dB	Anritsu Model MA2421D (Qty 2) or SC7816 (Qty 2)
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –67 dB to +20 dB	Anritsu Model MA2442D (Qty 2)
Frequency Reference	Frequency: 10 MHz	Symmetricom Model RubiSource T&M
Vector Network Analyzer	10 MHz to 9 GHz	Anritsu MS4624A, B, or D
Calibration Kit for VNA	10 MHz to 9 GHz	Anritsu Model 3753R
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10 (quantity 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz K(m) to N(f), 50 ohm	Anritsu Model 34RKNF50
50 ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-0.6B
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Anritsu Model 2000-1627-R

a. MG3692A models require Option 15 to achieve power of +16 dBm at 3.5 GHz. MG3692B models do not require Option 15 to achieve power of +16 dBm at 3.5 GHz.

Table 1-2. Required Equipment for Cable and Antenna Analyzer Verification

Instrument	Critical Specification	Recommended Manufacturer/Model
Frequency Counter	Frequency: 2 GHz	Anritsu Model MF2412B
Open/Short	Frequency: DC to 18 GHz	Anritsu Model 22N50
Termination	Frequency: DC to 18 GHz Return Loss: 40 dB min.	Anritsu Model 28N50-2
Termination	Frequency: DC to 18 GHz Return Loss: 40 dB min.	Anritsu Model 28NF50-2
Adapter	Frequency: DC to 6 GHz N(f) to K(m)	Anritsu Model 34NFK50
Adapter	Frequency: DC to 20 GHz N(m) to N(m)	Anritsu Model 34NN50A
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(f), 50 ohm	Anritsu Model 15NNF50-0.6B
6 dB Offset Termination	Frequency: DC to 6.0 GHz	Anritsu Model SC7424
20 dB Offset Termination	Frequency: DC to 6.0 GHz	Anritsu Model SC7423

Table 1-3. Required Equipment for Power Meter Functions

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Source	Frequency: 0.1 Hz to 20 GHz Power Output: +13 dBm	Anritsu Model MG3692A or B with options 2A, 4, 22, 15[a]
Power Meter	Power Range: −70 to +20 dBm	Anritsu Dual Channel Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: −67 dB to +20 dB	Anritsu Model MA2442D (quantity 2)
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz K(m) to N(f), 50 ohm	Anritsu Model 34RKNF50
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-0.6B
Frequency Reference	Frequency: 10 MHz	Symmetricom Model RubiSource T&M

a. Option 15 is required for MG3692A models to achieve power of +13 dBm. MG3692B models do not require Option 15.

Table 1-4. Additional Test Equipment Required for Verifying Options (1 of 2)

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesizer	Frequency: 0.1 Hz to 20 GHz Power Output: +16 dBm	Anritsu Model MG3692A or MG3692B with options 2A, 4, 15, and 22[a]
Vector Signal Generator	Frequency: 100 kHz to 3 GHz	Anritsu Model MG3700A with Options MG3700A-002 and MG3700A-021 b. Waveform licenses for TD-SCDMA (MX370001A) and LTE (MX370108A) are required and must be purchased.
Power Meter	Power Range: –70 to + 20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –60 to +20 dBm	Anritsu Model MA2482D with Option 1 (Qty 2)
Frequency Counter	Frequency: 20 GHz	Anritsu Model MF2412B
Programmable Attenuator	Frequency: DC to 2 GHz Attenuation:100 dB (1 dB and 10 dB steps)	Anritsu Model MN63A
Sonet Analyzer		Anritsu MP1570A with MP0121A and MP0122A modules
Cable T1 Bantam Plug to Bantam Plug		Anritsu PN 806-16 (Qty 2)
Cable 75 ohm BNC(m) to BNC(m)		Anritsu PN 3-806-169 (Qty 2)
Cable RJ48 to dual Bantam		Anritsu PN 806-117
Test Fixture (for Option 52)		Anritsu PN T3450
Digital Oscilloscope		LeCroy Model WaveRunner 62Xi with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set
Adapter	BNC	LeCroy PP090 75 ohm Telecom
Adapter		LeCroy AP120 120 ohm Telecom
Fixed Attenuator	Frequency Range: DC to 18 GHz Attenuation: 10 dB	Aeroflex/Weinschel Model 44-10 (Qty 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
RF Power Amplifier	Frequency:100 to 1000 MHz Gain: 35 dB min	Mini Circuits Model TIA-1000-1R8 (Qty 2 BNC(m) to N(f) Adapters required)
Adapter	Frequency: DC to 20 GHz N(m) to N(m), 50 ohm	Maury Microwave Model 8828B Quantity: 2 each [One each required only if Anritsu Coupler and Circulator are used]
Adapter	Frequency: DC to 20 GHz K(m) to N(f), 50 ohm	Anritsu Model 34RKNF50
Adapter	Frequency: 881.5 MHz BNC(m) to N(f), 50 ohm	ADT-2615-NF-BNM-02 (Qty 2)

Table 1-4. Additional Test Equipment Required for Verifying Options (2 of 2)

Instrument	Critical Specification	Recommended Manufacturer/Model
Adapter	Frequency: 881.5 MHz SMA(m) to N(f), 50 ohm	Midwest Microwave Model ADT-2582-NF-SMM-02 (Qty: 4) [Required only if Anritsu Coupler and Circulator are used.]
Adapter	Frequency: 881.5 MHz SMA(m) to SMA(m), 50 ohm	Midwest Microwave Model ADT-2594-MM-SMA-02 [Required only if Anritsu Coupler and Circulator are used.]
50 ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
High Power Load	DC to 18 GHz, 10W	Aeroflex/Weinschel Model M1418
Coupler	Frequency: 881.5 MHz Coupling Factor: 30 dB	Midwest Microwave Model CPW-5140-30-NNN-05 or CPW-5141-30-NNN-05 Alternative: Anritsu part number 1091-307 [Two SMA(m) to N(f) adapters required.]
Circulator	Frequency Range: 800 MHz to 1000 MHz Isolation: 20 dB min	Meca Electronics, Inc. part number CN-0.900 Alternative: Anritsu part number 1000-50 [Two SMA(m) to N(f) adapter and one SMA(m) to SMA(m) Adapter required.]
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-1.5B (Qty 3)
RF Coaxial Cable	Frequency: DC to 18 GHz N(m) to N(m), 50 ohm	Anritsu Model 15NN50-0.6B
Adapter	40 ohm Load	Anritsu Model T2904
Adapter	78 ohm Load	Anritsu Model T3536
Adapter	105 ohm Load	Anritsu Model T3377
Adapter	SMA to BNC(f)	Pomona 4290 or equivalent
Adapter	GPS Terminator	Amphenol B1004A1-ND3G-93R-0.05-1W or equivalent
GPS Antenna		Anritsu 2000-1528-R
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Any (Qty 2) Anritsu Model 2000-1627-R

a. Option 15 is required for MG3692A models to achieve power of +13 dBm. MG3692B models do not require Option 15.

1-4 Replaceable Parts

Table 1-5. List of Replaceable Parts

Part Number	Description
ND70944	MB/VNA/SPA PCB Assy, MT8212E[(b)]
ND71743	MB/VNA/SPA PCB Assy, MT8213E[(b)]
ND70945	T1 Assembly (Opt. 51)
ND70946	E1 Assembly (Opt. 52)
ND70947	T3/T1 Assembly (Opt. 53)
ND70320	GPS Module (Opt. 31)
3-15-147	LCD Display
3-66549-3	Inverter PCB Assembly for LCD Backlight
3-68736	Soft Carrying Case
3-69760	Case Assembly (excludes Model ID Label) Includes LCD, Touch screen, encoder, speaker and keypad assemblies.
3-67304-8	Model MT8212E ID Label
3-67304-10	Model MT8213E ID Label
742-36-R	Battery Door
633-44	Li-Ion Battery Pack
3-513-100	Adapter Type N(f) to SMP(m) RF bulkhead connector
40-168-R	AC to DC Power Converter
3-61360-2	Knob (excluding encoder)
742-37-R	Tilt Bail Assy
ND71741	Front Case with Gasket (excludes LCD, touch screen, encoder, and keypad assemblies.)
3-2000-1570	Back Case (Excludes Tilt Bail)
3-650-66	Fan Assembly
3-2000-1557	Main Numeric Keypad
3-440-43	Rubber Keypad
ND71732	Speaker
ND71733	Touch Screen with Gasket
3-410-103	Encoder (excluding knob)

b. When ordering the Main PCB Assembly, in order to ensure installation of correct options, all options that are installed on the instrument must be declared on the order. The options are listed and shown in the **System** / Status display.

Chapter 2 — Spectrum Analyzer Verification

2-1 Frequency Accuracy Verification

The following test is used to verify the CW frequency accuracy of the Spectrum Analyzer in the MT821xE Cell Master.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz Reference source to the Anritsu MG3692X Synthesized Signal Source.

Note	Do not connect the external 10 MHz Reference to the Cell Master.

2. Turn on the 10 MHz Reference Standard and the Anritsu MG3692X Synthesized Signal Source.
3. Set the MG3692X output to 1 GHz CW, with an RF Output Level of –30 dBm.
4. Connect the output of the source to the RF In of the Cell Master.
5. Turn on the Cell Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset the instrument to the default starting conditions.
8. Press the **Amplitude** main menu and then press the Reference Level submenu key.
9. Use the keypad to enter –10 and select the dBm submenu key.
10. Press the Span submenu key, use the keypad to enter 10, and select the kHz submenu key.
11. Press the BW submenu key and select the RBW submenu key.
12. Use the keypad to enter 100 and select the Hz submenu key.
13. Press the VBW submenu key, use the keypad to enter 30 and then select the Hz submenu key.
14. Press the **Freq** main menu key and select the Center Freq submenu key.
15. Use the keypad to enter 1 and select the GHz submenu key.
16. Press the **Marker** main menu, then the More submenu key, set Counter Marker to On, select the Back submenu key, and then press the Peak Search submenu key.

Note	Without the Counter Marker On the frequency resolution will not allow looking at the kHz accuracy.

17. Verify that the marker frequency is 1 GHz ± 1.5 kHz (± 1.5 ppm) and record in Table A-1, "Spectrum Analyzer Frequency Accuracy".

18. Set the MG3692X frequency to 3.9 GHz and then 5.9 GHz (for MT8213E only).

19. Set the MT821xE center freq to 3.9 GHz and then 5.9 GHz (for MT8213E only).

20. Press the **Marker** main menu, then the More submenu key, set Counter Marker to On, select the Back submenu key, and then press the Peak Search submenu key.

21. Verify that the marker frequency is 3.9 GHz ± 5.85 kHz (± 1.5 ppm) and then 5.9 GHz ± 8.85 kHz (± 1.5 ppm) for the MT8213E only and record in Table A-1.

Note	If the unit fails the Section 2-1 "Frequency Accuracy Verification" test contact your local Anritsu Service Center (http://www.anritsu.com/Contact.asp).

2-2 Single Side Band (SSB) Phase Noise Verification

This test is used to verify the single side band (SSB) phase noise of the spectrum analyzer in the MT821xE Spectrum Master.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Synthesized Signal Source.
2. Turn on the 10 MHz reference source and the Anritsu MG3692X Synthesized Signal Source.
3. Set the MG3692X output to 1.00 GHz CW, with an RF output level of +0 dBm.
4. Connect the output of the MG3692X Synthesized Signal Source to the RF In connector of the Spectrum Master.
5. Turn on the Cell Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions.
8. Press the **Amplitude** main menu key, then press the Reference Level submenu key.
9. Use the keypad to enter 0 and select the dBm submenu key.
10. Press the Atten Lvl submenu key, use the keypad to enter 15 and press the dB submenu key.
11. Press the **Freq** main menu key and select the Center Freq submenu key.
12. Use the keypad to enter 1.00 and press the GHz submenu key.
13. Press the Span submenu key, use the keypad to enter 110, and select the kHz submenu key.
14. Press the BW submenu key and select the RBW submenu key.
15. Use the keypad to enter 1 and select the kHz submenu key.
16. Press the VBW submenu key and use the keypad to enter 3, then select the Hz submenu key.
17. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
18. Press the # of Average submenu key, use the keypad to enter 7, then press the **Enter** key.
19. Wait until the Trace Count displays “7/7”.
20. Press the **Marker** key and select the Peak Search submenu key.
21. Press the Delta On/Off submenu key to turn Delta On.
22. Use the keypad to enter 10 and press the kHz submenu key.
23. Enter the measured value in Table A-2, “Spectrum Analyzer SSB Phase Noise Verification”.
24. Subtract 30 dB from the average value and verify that the result is less than –100 dBc/Hz (for 10 kHz offset) or –105 dBc/Hz (for 100 kHz offset) or –115 dBc/Hz (for 1 MHz offset) and record the Calculated Value results in Table A-2.

    For example: –70 dBc measured – 30 dB = –100 dBc/Hz
25. Repeat Step 15 through Step 24 for 100 kHz (set Span to 220 kHz) and 1 MHz offset (set Span to 2.04 MHz. Enter the test results and calculations in the appropriate rows of Table A-2.

2-3 Spurious Response (Second Harmonic Distortion) Verification

The following test is used to verify the input related spurious response of the spectrum analyzer in the MT821xE Cell Master.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Anritsu 1030-96 50 MHz Low Pass Filter
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Synthesized Signal Source.
2. Turn on the 10 MHz reference source and the Anritsu MG3692X Synthesized Signal Source.
3. Set the MG3692X output to 50.1 MHz CW, with an RF Output Level of –30 dBm.
4. Connect one end of the 50 MHz Low Pass Filter to the output of the source and the other end to the Spectrum Master RF In with the coaxial cable.
5. Turn on the Cell Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions.
8. Press the **Amplitude** main menu key and then press the Reference Level submenu key.
9. Use the keypad to enter –27 and press the dBm submenu key.
10. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
11. Press the **Freq** main menu key and select the Center Freq submenu key.
12. Use the keypad to enter 50.1 and press the MHz submenu key.
13. Press the Span submenu key, use the keypad to enter 100, and select the kHz submenu key.
14. Press the BW submenu key and select the RBW submenu key.
15. Use the keypad to enter 1 and select the kHz submenu key.
16. Press the VBW submenu key. Use the keypad to enter 10 and then select the Hz submenu key.
17. Press the **Shift** key and then press the **Sweep** (3) key.
18. Press the Detection submenu key, and then the Peak submenu key.
19. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
20. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.
21. Wait until the Trace Count displays “5/5”.
22. Press the **Marker** key and select the Peak Search submenu key.
23. Record the amplitude for 50.1 MHz. Use Table A-3, “Spectrum Analyzer Spurious Response (Second Harmonic Distortion)”.
24. Press the **Freq** main menu key and select the Center Freq submenu key.

25. Use the keypad to enter 100.2 and press the MHz submenu key.

26. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.

27. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.

28. Wait until the Trace Count displays "5/5".

29. Press the **Marker** key and select the Peak Search submenu key.

30. Record the amplitude for 100.2 MHz in the test records. Use Table A-3.

31. Calculate the 2nd Harmonic level in dBc by subtracting the 50.1 MHz amplitude from the 100.2 MHz amplitude using this formula:

Second Harmonic Level Amplitude @ 100.2 MHz = 100.2 MHz amplitude – 50.1 MHz amplitude = _____ dBc

32. Verify that the calculated Second Harmonic Level is ≤ –56 dBc and record in the test records. Use Table A-3.

2-4 Input Related Spurious (IRS) Signals Verification

The following test is used to verify the input related spurious signals of the spectrum analyzer in the MT821xE at different frequencies.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter or equivalent
- Anritsu 15NN50-1.5C RF Coaxial Cable or equivalent
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Synthesized Signal Source.
2. Connect the output of the Anritsu MG3692X Synthesized Signal Source to the MT821xE RF In.
3. Set the MG3692X RF Output Level to –30 dBm.
4. Turn on the MT821xE.
5. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions.

2072.5 MHz Input Related Spurious Check

7. Set the MG3692X frequency to 2072.5 MHz CW.
8. On the MT821xE, press the **Amplitude** key and then press the Reference Level submenu key.
9. Use the keypad to enter –27 and press the dBm submenu key.
10. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
11. Press the **Shift** key and then press the **Sweep** (3) key, then select the Detection submenu key and then the Peak soft key.
12. Press the **Freq** main menu key and select the Center Freq submenu key.
13. Use the keypad to enter 2072.5 and select the MHz submenu key.
14. Press the Span submenu key, use the keypad to enter 2, and select the MHz submenu key.
15. Press the BW submenu key and select the RBW submenu key.
16. Use the keypad to enter 10 and select the kHz submenu key.
17. Press the VBW submenu key. Use the keypad to enter 1 and then select the kHz submenu key.
18. Wait until one sweep is completed.
19. Press the **Marker** main menu and select the Peak Search submenu key.
20. Record the Marker 1 amplitude reading for 2072.5 MHz. Use the **Amplitude Reading for 2072.5 MHz** row of Table A-4, “Spectrum Analyzer Input Related Spurious (IRS) Signals”.

Note	Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.

21. Press the **Freq** main menu key and select the Start Freq submenu key.
22. Use the keypad to enter 1222.5 and select the MHz submenu key.

23. Press Stop Freq submenu key, enter 2072 and press the MHz submenu key. Wait until one sweep is completed.
24. Press the **Marker** main menu and select the Peak Search submenu key.
25. Record the Marker 1 amplitude reading as the Measured Value in the **1222.5 MHz to 2072 MHz** row of Table A-4.
26. Calculate the input related spurious level using the formula below, verify that it is ≤ –70 dBc, and record as the Calculated IRS in the **1222.5 MHz to 2072 MHz** row of Table A-4.

    Input Related Spurious = Marker 1 Reading – Amplitude Reading for 2072.5 MHz
27. Repeat Step 21 through Step 26 setting a start frequency of 2073 MHz and a stop frequency of 2922.5 MHz and record the results in the **2073 MHz to 2922.5 MHz** row of Table A-4.

1220 MHz Input Related Spurious Check

28. Set the MG3692X frequency to 1500 MHz CW.
29. On the MT821xE, press the **Freq** main menu key and select the Center Freq submenu key.
30. Use the keypad to enter 1500 and select the MHz submenu key.
31. Press the Span submenu key, use the keypad to enter 2, and select the MHz submenu key.
32. Press the **Trace** (5) key, then select the Trace A Operations submenu key.
33. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.
34. Wait until the Trace Count displays "5/5".
35. Press the **Marker** main menu and select the Peak Search submenu key.
36. Record the amplitude at 1500 MHz to the test records. Use the **Amplitude Reading at 1220 MHz** row of Table A-4.
37. Press the **Freq** main menu key and select the Start Freq submenu key.
38. Use the keypad to enter 1219 and select the MHz submenu key.
39. Press Stop Freq submenu key, enter 1221 and press the MHz submenu key.
40. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
41. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.
42. Wait until the Trace Count displays "5/5".
43. Press the **Marker** key and select the Peak Search submenu key.
44. Record the Marker 1 amplitude reading as the Measured Value in the **1219 MHz to 1221 MHz** row of Table A-4.
45. Calculate the input related spurious level using the formula below, verify that it is ≤ –52 dBc, and record as the Calculated IRS in the **1219 MHz to 1221 MHz** row of Table A-4.

    Input Related Spurious = Marker 1 reading – Amplitude reading for 1220 MHz

1690 MHz Input Related Spurious Check

46. Set the MG3692X frequency to 1500 MHz CW.
47. On the MT821xE, press the **Freq** main menu key and select the Center Freq submenu key.
48. Use the keypad to enter 1500 and select the MHz submenu key.
49. Press the Span submenu key, use the keypad to enter 2, and select the MHz submenu key.
50. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
51. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.
52. Wait until the Trace Count displays "5/5".

53. Press the **Marker** main menu and select the Peak Search submenu key.

54. Record the amplitude at 1500 MHz in the test records. Use the **Amplitude Reading at 1690 MHz** row of Table A-4.

55. Press the **Freq** main menu key and select the Start Freq submenu key.

56. Use the keypad to enter 1689.5 and select the MHz submenu key.

57. Press Stop Freq submenu key, enter 1691.5 and press the MHz submenu key.

58. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.

59. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.

60. Wait until the Trace Count displays "5/5".

61. Press the **Marker** main menu and select the Peak Search submenu key.

62. Record the Marker 1 amplitude reading as the Measured Value in the **1689.5 MHz to 1691.5 MHz** row of Table A-4.

63. Calculate the input related spurious level using the formula below, verify that it is ≤ –52 dBc, and record as the Calculated IRS in the **1689.5 MHz to 1691.5 MHz** row of Table A-4.

Input Related Spurious = Marker 1 Reading – Amplitude Reading for 1690 MHz

2822 MHz Input Related Spurious Check

64. Set the MG3692X frequency to 1500 MHz CW.

65. On the MT821xE, press the **Freq** main menu key and select the Center Freq submenu key.

66. Use the keypad to enter 1500 and select the MHz submenu key.

67. Press the Span submenu key, use the keypad to enter 2, and select the MHz submenu key.

68. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.

69. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.

70. Wait until the Trace Count displays "5/5".

71. Press the **Marker** main menu and select the Peak Search submenu key.

72. Record the amplitude at 1500 MHz in the test records. Use the **Amplitude Reading at 2822 MHz** row of Table A-4.

73. Press the **Freq** main menu key and select the Start Freq submenu key.

74. Use the keypad to enter 2821 and select the MHz submenu key.

75. Press Stop Freq submenu key, enter 2823 and press the MHz submenu key.

76. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.

77. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.

78. Wait until the Trace Count displays "5/5".

79. Press the **Marker** main menu key and select the Peak Search submenu key.

80. Record the Marker 1 amplitude reading as the Measured Value in the **2821 MHz to 2823 MHz** row of Table A-4.

81. Calculate the input related spurious level using the formula below, verify that it is ≤ –52 dBc, and record as the Calculated IRS in the **2821 MHz to 2823 MHz** row of Table A-4.

Input Related Spurious = Marker 1 Reading – Amplitude Reading for 2822 MHz

2506 MHz Input Related Spurious Check

82. Set the MG3692X frequency to 2421.5 MHz CW.

83. On the MT821xE, press the **Freq** main menu key and select the Center Freq submenu key.

84. Use the keypad to enter 2421.5 and select the MHz submenu key.

85. Press the Span submenu key, use the keypad to enter 2, and select the MHz submenu key.

86. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.

87. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.

88. Wait until the Trace Count displays "5/5".

89. Press the **Marker** main menu and select the Peak Search submenu key.

90. Record the amplitude at 2421.5 MHz in the test records. Use the **Amplitude Reading at 2506 MHz** row of Table A-4.

91. Press the **Freq** main menu key and select the Start Freq submenu key.

92. Use the keypad to enter 2505 and select the MHz submenu key.

93. Press Stop Freq submenu key, enter 2507 and press the MHz submenu key.

94. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.

95. Press the # of Average submenu key, use the keypad to enter 5 and then press the **Enter** key.

96. Wait until the Trace Count displays "5/5".

97. Press the **Marker** main menu and select the Peak Search submenu key.

98. Record the Marker 1 amplitude reading as the Measured Value in the **2505 MHz to 2507 MHz** row of Table A-4.

99. Calculate the input related spurious level using the formula below, verify that it is ≤ –39 dBc, and record as the Calculated IRS in the **2505 MHz to 2507 MHz** row of Table A-4.

Input Related Spurious = Marker 1 Reading – Amplitude Reading for 2506 MHz

2-5 Resolution Bandwidth Accuracy Verification

The following test is used to verify the resolution bandwidth accuracy of the spectrum analyzer in the MT821xE Cell Master.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692X Synthesized Signal Source and the MT821xE Cell Master.
2. Turn on the MG3692X, set the frequency to 1 GHz CW and level to –30 dBm.
3. Connect the output of the Anritsu MG3692X Synthesized Signal Source to the MT821xE Spectrum Analyzer RF In.
4. Turn on the MT821xE Cell Master.
5. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions.
7. Press the **Amplitude** main menu key and then press the Reference Level submenu key.
8. Use the keypad to enter –10 and press the dBm submenu key.
9. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
10. Press the Scale submenu key and enter 10, then press dB/div submenu key.
11. Press the **Freq** main menu key and select the Center Freq submenu key.
12. Use the keypad to enter 1 and select the GHz submenu key.

RBW Test

13. Press the Span submenu key, use the keypad to enter the span listed in the test records. Refer to the **Span** column of Table A-5, "Spectrum Analyzer Resolution Bandwidth Accuracy".
14. Press the BW submenu key and select the RBW submenu key.
15. Use the keypad to enter 3 and select the MHz submenu key.
16. Set the VBW from the value listed in the test records. Refer to the **VBW** column of Table A-5.
17. Press the **Shift** key, press the **Measure** (4) key and then press the OCC BW submenu key.
18. Press the dBc submenu key and enter 3, then press the **Enter** key.
19. Press the OCC BW On/Off submenu key to turn on occupied bandwidth.
20. Record the OCC BW reading in the test records. Use the **Measured Value** column of Table A-5.
21. Verify that the OCC BW reading frequency is within 10% of the RBW.
22. Repeat Step 13 through Step 21 for the other settings and record in Table A-5.

2-6 Spectrum Analyzer Absolute Amplitude Accuracy Verification

The tests in the following two sections verify the absolute amplitude accuracy of the Spectrum Analyzer in the MT821xE Cell Master. The two parts of this test are "50 MHz Amplitude Accuracy Verification" immediately below and "Amplitude Accuracy Across Frequency Verification" on page 2-14.

50 MHz Amplitude Accuracy Verification

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- Anritsu ML2438A Dual Channel Power Meter
- Anritsu MA2442D High Accuracy Power Sensors (2)
- Anritsu 34NN50A 50 ohm Adapter
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator

Setup

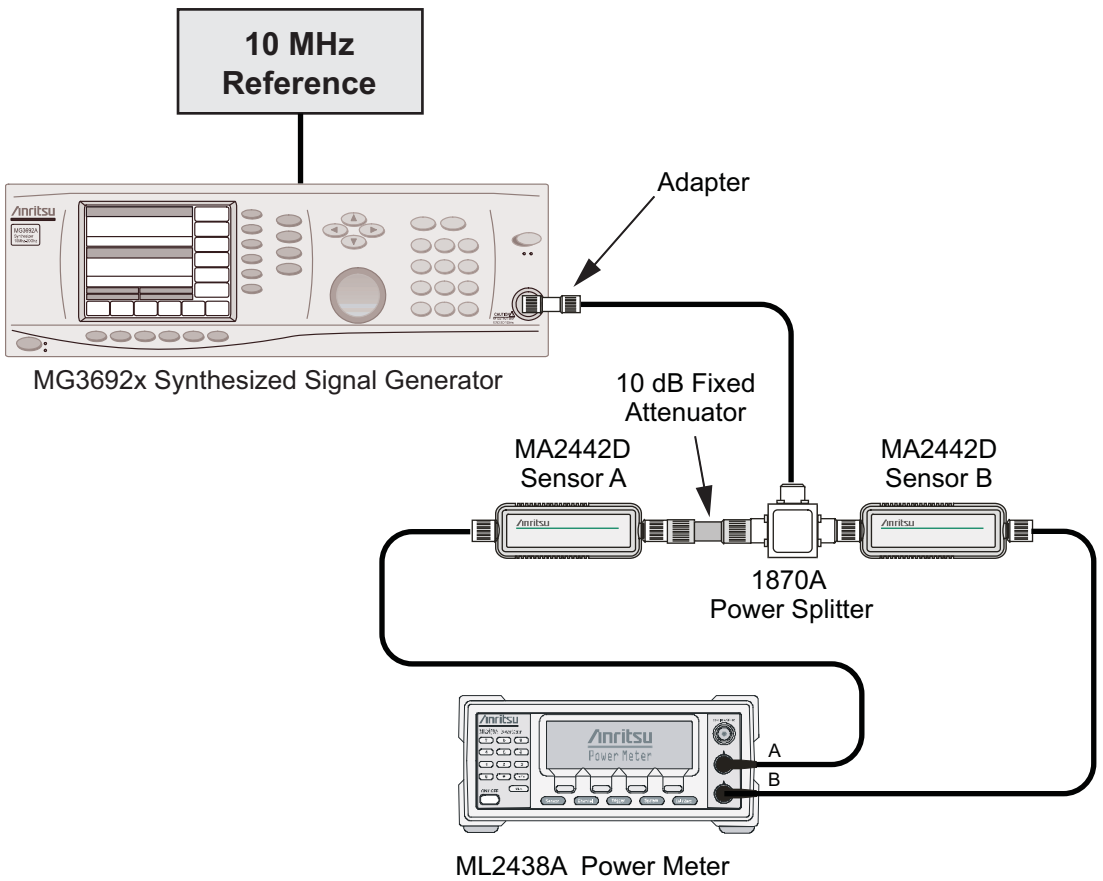

Figure 2-1. Absolute Amplitude Accuracy Verification Pretest Setup

Test Setup Components Characterization

1. Turn on the ML2438A Power Meter, the MG3692X Signal Source, and the MT821xE Cell Master.
2. On the power meter, press the Channel soft key, the Setup soft key and then the Channel soft key to display Channel 2 Setup menu.
   a. Press the **Input** key twice to set the Input Configuration to B.
   b. Press the **Sensor** key to display both Sensor A and Sensor B readings.
   c. Connect the power sensors to the power meter and calibrate the sensors.
   d. Connect the Power Splitter to the MG3692X Output and Sensor B to one of the Power Splitter Outputs.
3. Install the 10 dB Fixed Attenuator to the other Power Splitter Output and then connect Sensor A to the end of the attenuator as shown in Figure 2-1, "Absolute Amplitude Accuracy Verification Pretest Setup".
4. Set the MG3692X to a frequency of 50 MHz.
5. On the Power Meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key.
   a. Use the keypad to enter 50 MHz as the input signal frequency, do this for both sensor A and sensor B, which sets the power meter to the proper power sensor cal factor.
   b. Press the **Sensor** key on the power meter to display the power reading.
6. Starting with 0 dBm, adjust the power level of the MG3692x to get a reading on Sensor A that matches the power level in the **Test Power Level @ 50 MHz** column of Table A-6, "Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy Setup Table".
7. Record the Sensor B reading in the **Required Sensor B Reading** column of Table A-6.
8. Repeat Step 6 and Step 7 for the other input levels from –4 dBm to –50 dBm.

Note	Note Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.

Measuring the Unit for 50 MHz Amplitude Accuracy

1. Remove Sensor A, add the adapter and connect it to the Spectrum Analyzer RF In connector of the MT821xE Cell Master as shown in Figure 2-2.

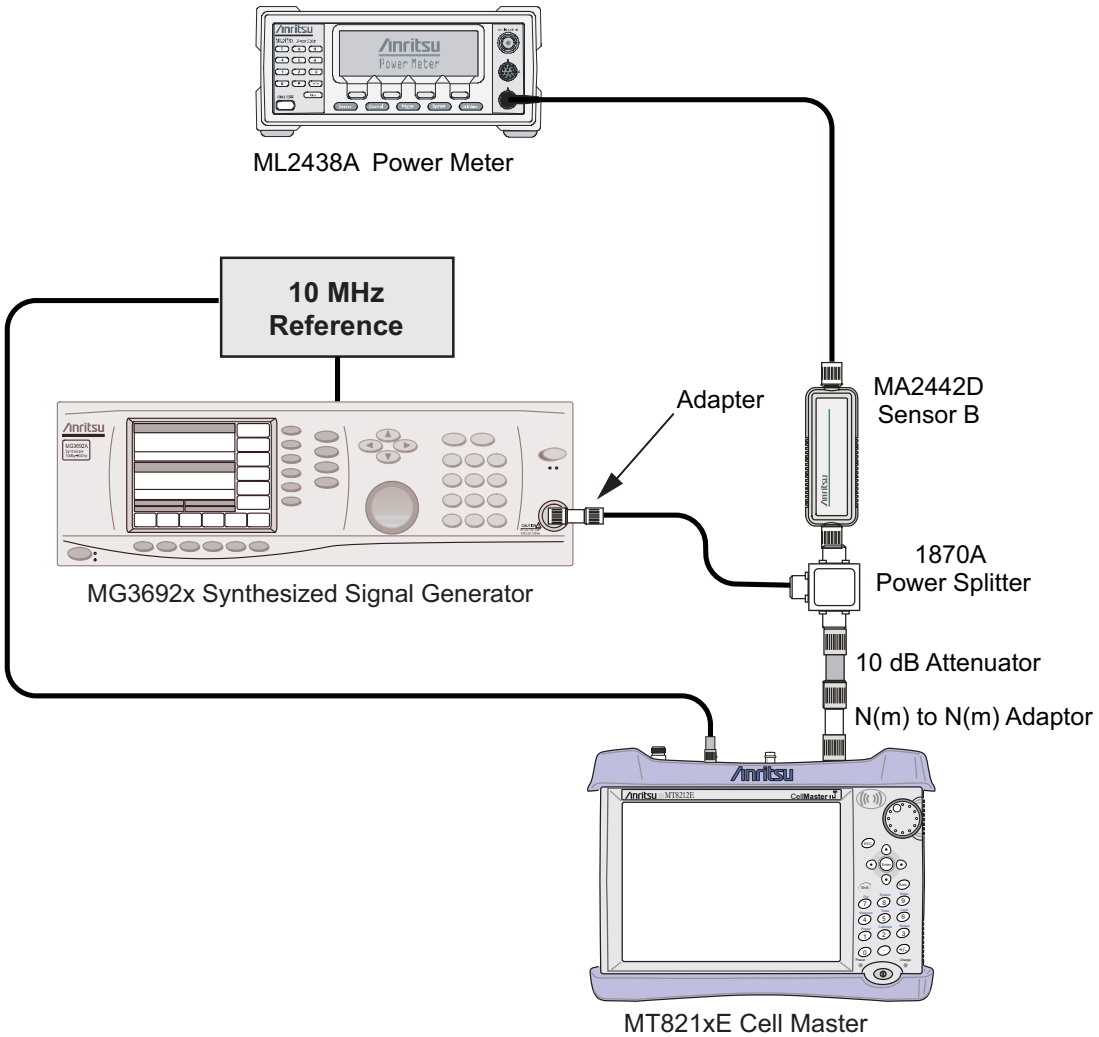

Figure 2-2. Absolute Amplitude Accuracy Verification Test Setup

2. On the MT821xE, press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
3. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions.
4. Press the **Freq** main menu key and select the Center Freq submenu key.
5. Use the keypad to enter 50 and select the MHz submenu key.
6. Press the BW submenu key and the RBW submenu key.
7. Use the keypad to enter 1 and select the kHz submenu key.
8. Press the VBW submenu key and use the keypad to enter 10, then select the Hz submenu key.
9. Press the Span submenu key, use the keypad to enter 10, and select the kHz submenu key.
10. Press the **Amplitude** main menu and then press the Reference Level submenu key.

11. Use the keypad to enter 10 and press the dBm submenu key.
12. Press the Atten Lvl submenu key and enter 30, then press the dB submenu key.
13. Adjust the source power so that the power meter displays the corresponding desired Sensor B reading as recorded for 0 dBm in the **Required Sensor B Reading** column of Table A-6.
14. Press the **Marker** main menu and select the Peak Search submenu key.
15. Record the Marker 1 amplitude reading in the **0 dBm** row of Table A-7, "Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy".
16. Verify that the Marker 1 amplitude reading is within the specification.
17. Repeat Step 13 through Step 16 for the other power level settings. Refer to Table A-6 for Required Sensor B Readings. Use Table A-7 to record test results.

Amplitude Accuracy Across Frequency Verification

This procedure is the second test used to verify the absolute amplitude accuracy of the Spectrum Analyzer in the MT821xE Cell Master. The first procedure test was described above in "50 MHz Amplitude Accuracy Verification" on page 2-11.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- Anritsu ML2438A Dual Channel Power Meter
- Anritsu MA2442D High Accuracy Power Sensors (2)
- Anritsu 34NN50A 50 ohm Adapter
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator

Test Setup Component Characterization

1. Connect both MA2442D power sensors to the power meter and calibrate the sensors.
2. Connect the equipment as shown in Figure 2-3.

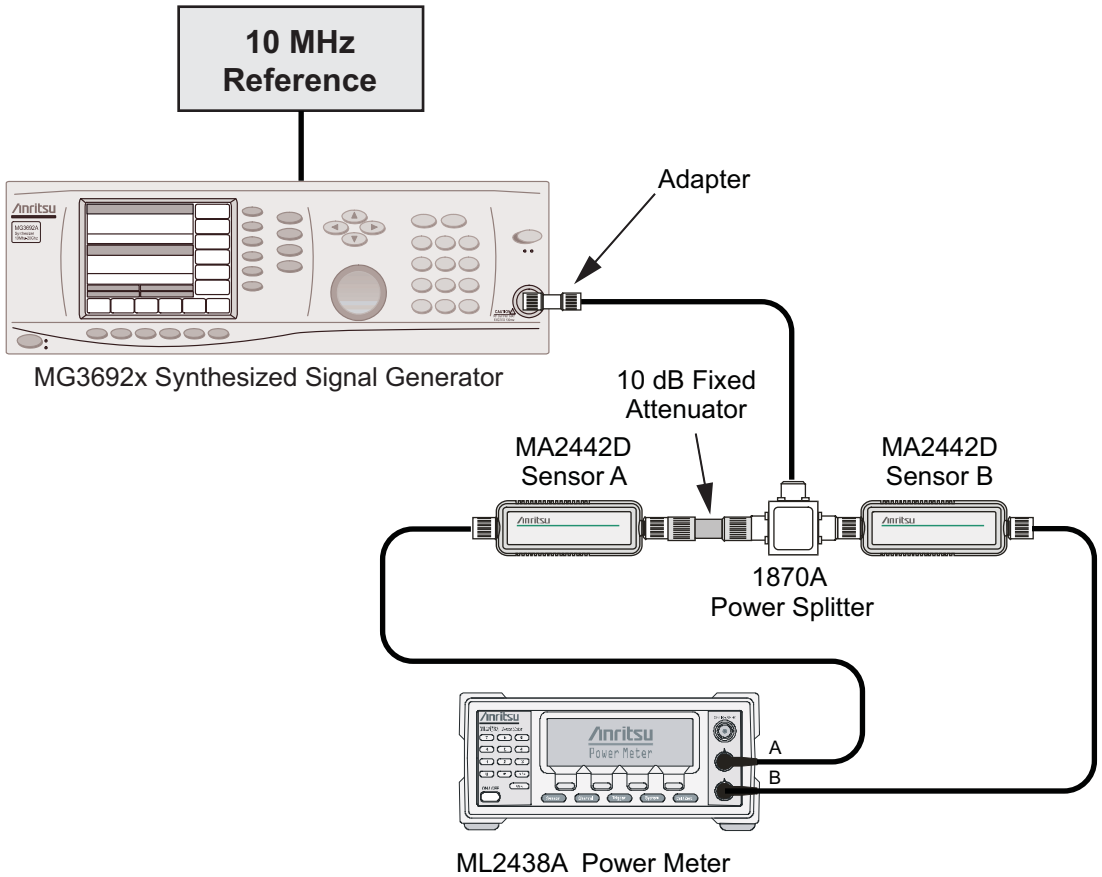

Figure 2-3. Fixed Level with Varying Frequency Setup

3. Set the MG3692x frequency to 10.1 MHz.
4. Set the power meter to display both Channel A and B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Repeat for Channel B. Press the **System** key to display the power reading.
5. Adjust the MG3692x output level so that Sensor A reading is –2 dBm ± 0.1 dB.
6. Record the Sensor B reading to the **–2 dBm** column of Table A-8, "Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency Setup Table".
7. Adjust the MG3692x output level so that Sensor A reading is –30 dBm ± 0.1 dB.
8. Record the Sensor B reading to the **–30 dBm** column of Table A-8.
9. Repeat Steps 3 through 8 for all the frequencies listed in Table A-8.

Note	Before continuing, allow a 30 minute warm up for the internal circuitry to stabilize.

Setup

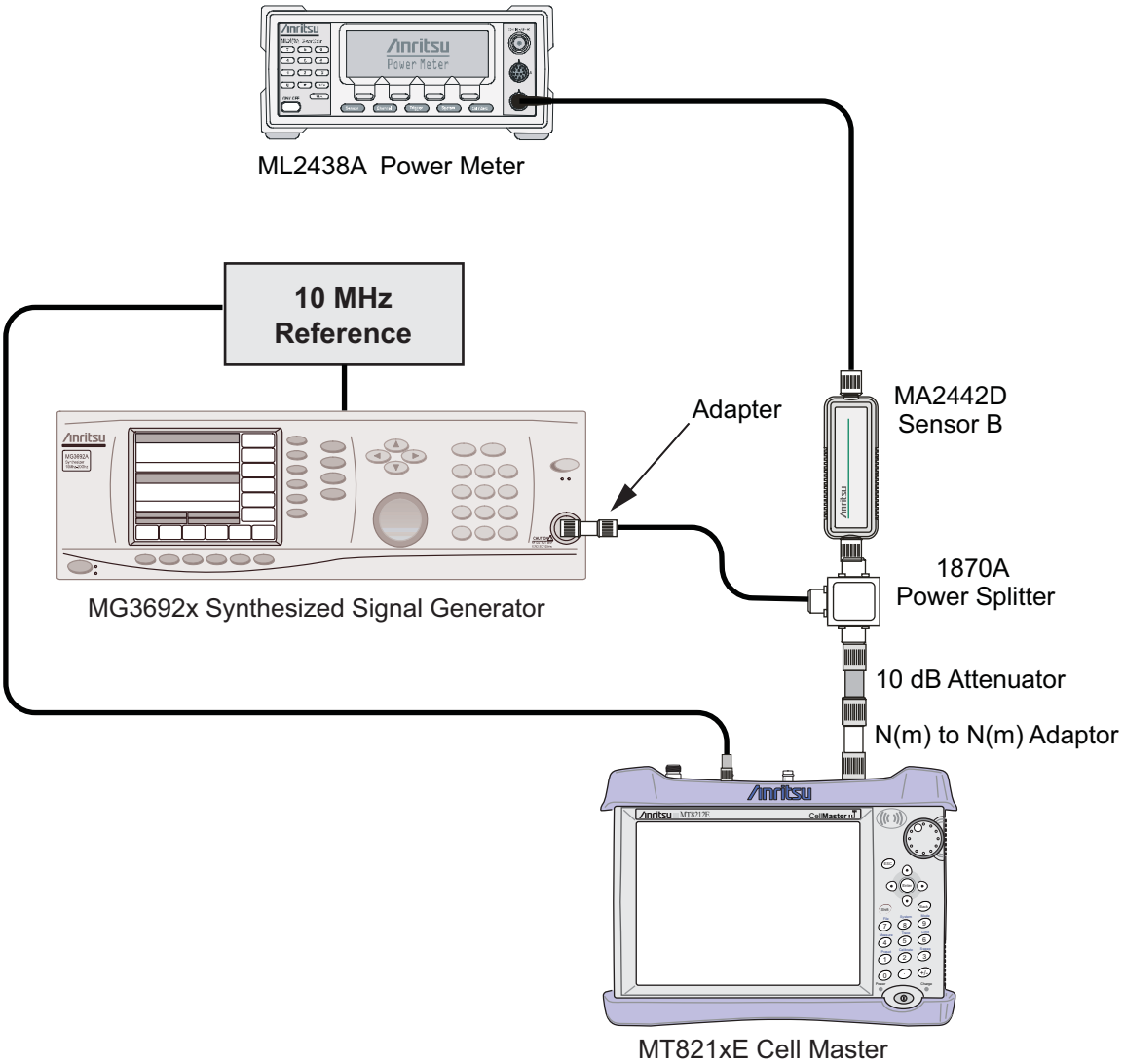

Figure 2-4. Absolute Amplitude Accuracy Across Frequency Verification Test Setup

Measuring Amplitude Accuracy Across Frequency

1. Connect the equipment as shown in Figure 2-4.

Note	To maintain test setup integrity, do not disconnect sensor B, the power splitter or the fixed attenuator.

2. Set the MT821xE to Spectrum Analyzer mode and then preset the unit.
3. Press the BW submenu key. Then set the RBW to 1 kHz and the VBW to 10 Hz.
4. Press the Span submenu key, set span to 10 kHz.
5. Set the MG3692x frequency to 10.1 MHz CW.
6. Set the MG3692x Output to –20 dBm.

7. Set the power meter to display Channel B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
8. Adjust the MG3692x output power so that the power meter displays a reading which matches the Sensor B reading for –30 dBm in Table A-8.
9. On the MT821xE, press the **Amplitude** main menu, then set the Reference Level to –20 dBm.
10. Press the **Freq** main menu key and select the Center Freq submenu key.
11. Enter 10.1 MHz (or the next frequency).
12. Press the **Amplitude** main menu, then set the Atten Lvl to 0 dB.
13. Press the **Marker** key and select the Peak Search submenu key.
14. Record the Marker 1 amplitude reading in Table A-9, "Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency".
15. Verify that the Marker 1 amplitude reading is within the specification.
16. Repeat Step 12 to Step 15 for Atten Lvl of 5 dB, 10 dB and 20 dB.
17. Adjust the MG3692x output power so that the power meter displays a reading which matches the Sensor B reading on the characterization chart for –2 dBm.
18. On the MT821xE, press the **Amplitude** main menu, then set the Reference Level to 10 dBm.
19. Repeat Steps 12 to Step 15 for Atten Lvl of 30 dB, 40 dB, 50 dB and 55 dB.
20. Repeat Steps 5 to Step 19 for all frequencies that are applicable for the unit under test. Record the results in Table A-9.

2-7 Residual Spurious Response Verification

The following two tests are used to verify the residual spurious response of the Spectrum Analyzer of the MT821xE Cell Master and is performed using the positive peak detection mode. The two parts to this test are the "Residual Spurious Response Test with Preamp Off" immediately below and "Residual Spurious Response Test with Preamp On" on page 2-19.

Residual Spurious Response Test with Preamp Off

Equipment Required

- Anritsu 28N50-2 50 ohm Termination

Procedure

1. Connect the 50 ohm Termination to the MT821xE Spectrum Analyzer RF In connector.
2. Press the **On/Off** key to turn on the MT821xE Cell Master.
3. On the MT821xE:
   a. Press the **Shift** key and then the **Mode** (9) key.
   b. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
4. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset the instrument to the default starting conditions.
5. Press the **Amplitude** main menu, then press the Reference Level submenu key.
6. Use the keypad to enter –40 and press the dBm submenu key.
7. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
8. Make sure that the Pre Amp On/Off submenu key is in the Off position.
   - If the preamp is on, press the Pre Amp On/Off submenu key to turn it off.
9. Press the **Shift** key and then press the **Sweep** (3) key, then select the Detection submenu key and then the Peak soft key.
10. Press the **Freq** main menu key and select the Start Freq submenu key.
11. Use the keypad to enter 10 and select the MHz submenu key.
12. Press the Stop Freq submenu key, enter 50 and press the MHz submenu key.
13. Press the BW submenu key and select the RBW submenu key.
14. Use the keypad to enter 1 and select the kHz submenu key.
15. Press the VBW submenu key, use the keypad to enter 300 and then select the Hz submenu key.
16. Wait until one sweep is completed.
17. Press the **Marker** main menu and select the Peak Search submenu key.
18. Verify that the Marker 1 amplitude reading is less than –90 dBm.

Note	If a spur larger than –90 dBm appears, wait another full sweep and observe whether the spur re-appears at the same point on the second sweep. If the spur does not appear at the same point on the second sweep, then the spur on the first sweep was not real.

19. Record the "Marker 1 amplitude" reading to Table A-10, "Spectrum Analyzer Residual Spurious with Preamp Off".
20. Repeat Step 10 through Step 19 for the other frequency band settings in Table A-10 as applicable to the unit under test.

Residual Spurious Response Test with Preamp On

Equipment Required

- Anritsu 28N50-2 50 ohm Termination

Procedure

1. Connect the 50 ohm Termination to the MT821xE Spectrum Analyzer RF In connector.
2. Press the **On/Off** key to turn on the MT821xE Cell Master.
3. On the MT821xE, press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
4. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset the instrument to the default starting conditions.

Note	Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.

5. Press the **Amplitude** main menu, then press the Reference Level submenu key.
6. Use the keypad to enter –50 and press the dBm submenu key.
7. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
8. Make sure that the Pre Amp On/Off submenu key is in the On position. If the preamp is off, press the Pre Amp On/Off submenu key to turn it On.
9. Press the **Shift** key and then press the **Sweep** (3) key, then select the Detection submenu key and then the Peak soft key.
10. Press the BW submenu key and select the RBW submenu key.
11. Use the keypad to enter 10 and select the kHz submenu key.
12. Press the VBW submenu key and use the keypad to enter 1, then select the kHz submenu key.
13. Press the **Freq** main menu key and select the Start Freq submenu key.
14. Use the keypad to enter 10 and select the MHz submenu key.
15. Press the Stop Freq submenu key, enter 1 and press the GHz submenu key.
16. Wait until one sweep is completed.
17. Press the **Marker** main menu and select the Peak Search submenu key.
18. Record the "Marker 1 amplitude" reading in the test records and verify that it is less than –90 dBm. Use Table A-11, "Spectrum Analyzer Residual Spurious with Preamp On".
19. Repeat Step 13 through Step 18 for the other Start and Stop frequencies as applicable for the unit under test and record in Table A-11.

Note	If a spur larger than –90 dBm appears, wait another full sweep and observe whether the spur re-appears at the same point on the second sweep. If the spur does not appear at the same point on the second sweep, then the spur on the first sweep was not real.

2-8 Displayed Average Noise Level (DANL)

The following test is used to verify the Displayed Average Noise Level (DANL) of the spectrum analyzer systems in the MT821xE Cell Master. This test is performed using the RMS detection mode.

Equipment Required

- Anritsu 28N50-2 50 ohm Termination

Procedure

1. Connect the 50 ohm Termination to the MT821xE Spectrum Analyzer RF In connector.
2. Press the **On/Off** key to turn on the MT821xE Cell Master.
3. On the MT821xE, press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
4. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset the instrument to the default starting conditions.

Note	Before continuing, allow a 30 minute warm up period for the internal circuitry to stabilize.

5. Press the **Amplitude** main menu, then press the Reference Level submenu key.
6. Use the keypad to enter –20 and press the dBm submenu key.
7. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
8. Make sure that the Preamp is Off.
9. Press the **Shift** key and then press the **Sweep** (3) key, then select the Detection submenu key and then the RMS/AVG soft key.
10. Press the BW submenu key and select the RBW submenu key.
11. Use the keypad to enter 100 and select the kHz submenu key.
12. Select the VBW submenu key.
13. Use the keypad to enter 1 and select the kHz submenu key.
14. Press the **Freq** main menu key and select the Start Freq submenu key.
15. Use the keypad to enter 10 and select the MHz submenu key.
16. Press the Stop Freq submenu key, enter 2.4 and press the GHz submenu key.
17. Wait until one sweep is completed.
18. Press the **Marker** main menu and then select Peak Search submenu key.
19. Record the Marker reading to the test records. Use the **Measured Value @ 100 kHz RBW** column of Table A-12, "Spectrum Analyzer DANL with Pre Amp Off".

Note	The noise floor consists of totally random signals where a spur is a fixed spike of varying amplitude that is always visible.

20. Repeat Step 14 through Step 19 for the other frequency settings in Table A-12 that are applicable for the unit under test. Change the VBW setting as indicated in the **VBW** column of Table A-12.
21. For each measured 100 kHz RBW value in the test record, convert it to 10 Hz RBW value by subtracting 40 dB.

    –100 dBm – 40 dB = –140 dBm

    For example, if the marker shows a value of –100 dBm at 100 kHz RBW, the calculated value at 10 Hz RBW is –140 dBm.

22. Enter the calculated values in the test records. Use the **Calculated for 10 Hz RBW** column of Table A-12.
23. Verify that the calculated value is less than or equal to the value in the **Specification** column of Table A-12.
24. Press the **Amplitude** main menu, then press the Reference Level submenu key.
25. Use the keypad to enter –50 and press the dBm submenu key.
26. Press the Preamp On/Off submenu key to turn the preamp On.
27. Repeat Step 10 through Step 23.
28. Record the Marker reading and calculated value in the test record using Table A-13, "Spectrum Analyzer DANL with Pre Amp On".

Chapter 3 — Cable and Antenna Analyzer Verification

3-1 Introduction

These tests verify that the Cable and Antenna Analyzer of the Model MT821xE Cell Master is functional. The functional tests include:

3-2 Frequency Accuracy Verification

The following test is used to verify the CW frequency accuracy of the RF source in the MT821xE in Cable and Antenna Analyzer mode.

Equipment Required

- Frequency Counter, Anritsu Model MF2412B
- RF Coaxial Cable, Anritsu Model 15NNF50-0.6B

Procedure

1. Verify that the MT821xE is in Cable and Antenna Analyzer mode and preset the unit.
2. Verify that no external 10 MHz reference is connected to the MT821xE.
3. Press **Shift** then the **Sweep** key.
4. Verify that the RF Immunity is set to High.
5. Press the **Freq/Dist** key and set both the Start Freq and Stop Freq to 2 GHz.
6. Connect the RF cable from the MT821xE VNA Reflection RF Out to the Frequency Counter.
7. Turn on the Frequency Counter and press the **Preset** key.
8. Record the frequency data in Table A-14, "VNA Frequency Accuracy" on page A-10.

3-3 Return Loss Accuracy Verification

The following test can be used to verify the accuracy of return loss measurements. Measurement calibration of MT821xE in Cable and Antenna Analyzer mode is required for this test.

Equipment Required

- Open/Short, Anritsu Model 22N50
- Termination, Anritsu Model 28N50-2
- 6 dB Offset Termination, Anritsu Model SC7424
- 20 dB Offset Termination, Anritsu Model SC7423

Procedure

1. Verify that the MT821xE is in Cable and Antenna Analyzer mode and preset the unit.
2. Press the **Measurement** key, then press the Return Loss submenu key.
3. Press the **Shift** key, then press the **Calibrate** (2) key.
4. Press the Start Cal submenu key. Follow the instructions on the screen to perform a calibration.
5. After the calibration is complete, install the 20 dB offset termination.
6. Press the **Amplitude** key, set Top to 17 dB, and Bottom to 23 dB.
7. Verify that the data display falls between 18.4 dB and 21.6 dB.
8. Press the **Marker** key and select the Marker to Peak submenu key. Record the marker value, then select the Marker to Valley submenu key and record the marker value. Record the worst case of the two values in Table A-15, “VNA Return Loss Accuracy Verification” on page A-10.
9. Remove the 20 dB offset and install the 6 dB offset.
10. Press the **Amplitude** key, set Top to 4.0 dB, and set Bottom to 8.0 dB.
11. Verify that the data display falls between 5 dB and 7 dB.
12. Press the **Marker** key and select the Marker to Peak submenu key. Record the marker value, then select the Marker to Valley submenu key and record the marker value. Record the worst case of the two values in Table A-15.

3-4 System Dynamic Range Verification

The following test can be used to verify the system dynamic range. Measurement calibration of the MT821xE in Cable and Antenna Analyzer mode is required.

Equipment Required

- Termination, Anritsu Model 28N50-2
- Termination, Anritsu Model 28NF50-2
- Adapter N(m) to N(m), Anritsu Model 34NN50A
- RF Coaxial Cable, Anritsu Model 15NNF50-0.6B

Procedure

1. Verify that the MT821xE is in Transmission Measurement mode and preset the unit.
2. Press the **Shift** key, then press the **Sweep** (3) key.
3. Verify that High Dynamic Range is set to On
4. Verify that the Output Power is set to High.
5. Press the Measure submenu key.
6. Press the Start Cal submenu key and follow the on screen instructions to perform calibration.
7. After the calibration is complete, disconnect one end of the cable and connect loads so that both the RF Out (Reflection In) and RF In ports are terminated.
8. Press the Sweep submenu key, and select Averaging. Confirm that Averaging Off is selected, indicated by the red dot in the top right hand corner.
9. Press the **Amplitude** main menu key and set the Top to –50 dB and Scale to 10 dB/div.
10. Press **Shift**, Limit (6), and set the Limit to On.
11. Press the Multi-Segment Edit submenu key and verify that the Point Frequency is set to 2 MHz.
12. Select Amplitude vertical submenu key and set the limit to –80 dB.
13. Select Add Point, select Point Frequency, and enter 4.0 GHz.
14. Select Amplitude vertical submenu key and enter –80 dB.

Perform steps 15 through 18 for MT8213E units only,

15. Select Add Point, select Point Frequency, and enter 4.01 GHz.
16. Select Amplitude vertical submenu key and enter –70 dB.
17. Select Add Point and select Point Frequency, and enter 6.00 GHz.
18. Select Amplitude vertical submenu key and enter –70 dB.
19. Verify the display of the system dynamic range is below the limit lines (the data will be unstable, but should remain below the limit lines.)
20. Use a marker to find the maximum peak of each frequency band and enter the value in dB in Table A-16, “VNA System Dynamic Range Verification” on page A-10.

Chapter 4 — Power Meter Verification

4-1 Power Meter Level Accuracy

The following test verifies the level accuracy of the Power Meter function in the MT821xE.

Equipment Required

- Anritsu MG3692X Synthesized Signal Source
- Anritsu ML2438A Dual Channel Power Meter
- Anritsu MA2442D High Accuracy Power Sensors (2)
- Anritsu 34NN50A 50 ohm Adapter
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator

Setup

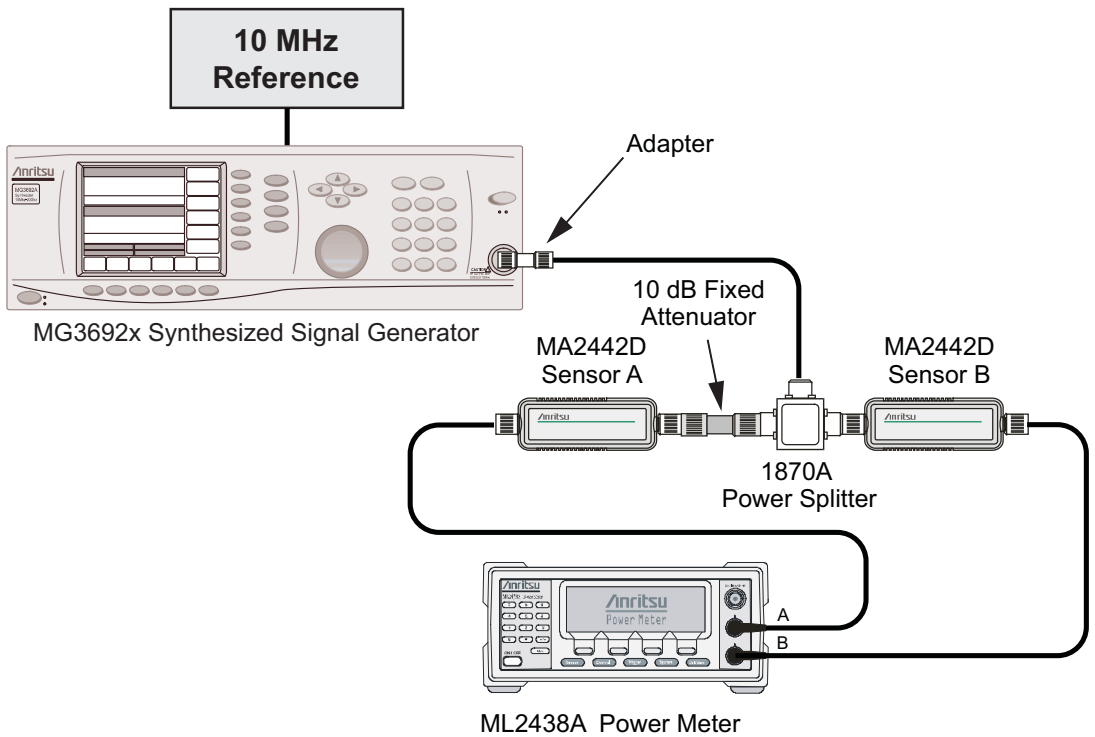

Figure 4-1. Power Meter Measurement Accuracy

Procedure Component Characterization:

1. Connect both MA2442D power sensors to the power meter and calibrate the sensors.
2. Connect the model 1870A power splitter to the MG3692A/B output and sensor B to one of the power splitter outputs as shown on the previous page. (Figure 4-1 on page 4-1).
3. Install the 10 dB Fixed Attenuator to the other power splitter output and then connect sensor A to the end of the Attenuator.
4. Set the power meter to display both Channels A and B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692A/B as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Repeat for Channel B. Press the **System** key to display the power reading.
5. Adjust the power level of the MG3692A/B to get a reading on sensor A that matches the power level (within ± 0.1 dB) in the first column of Table A-17, "Characterization Chart for Power Meter Verification" on page A-11.
6. Record the sensor B reading in the **Required Sensor B Reading** column of Table A-17.
7. Repeat Steps 5 and 6 for the other power level in the first column of Table A-17, recording the Sensor B reading in the second column.
8. Repeat the above steps for the next input frequency.

Power Meter Measurement Accuracy Procedure

1. Connect the equipment as shown in Figure 4-2.

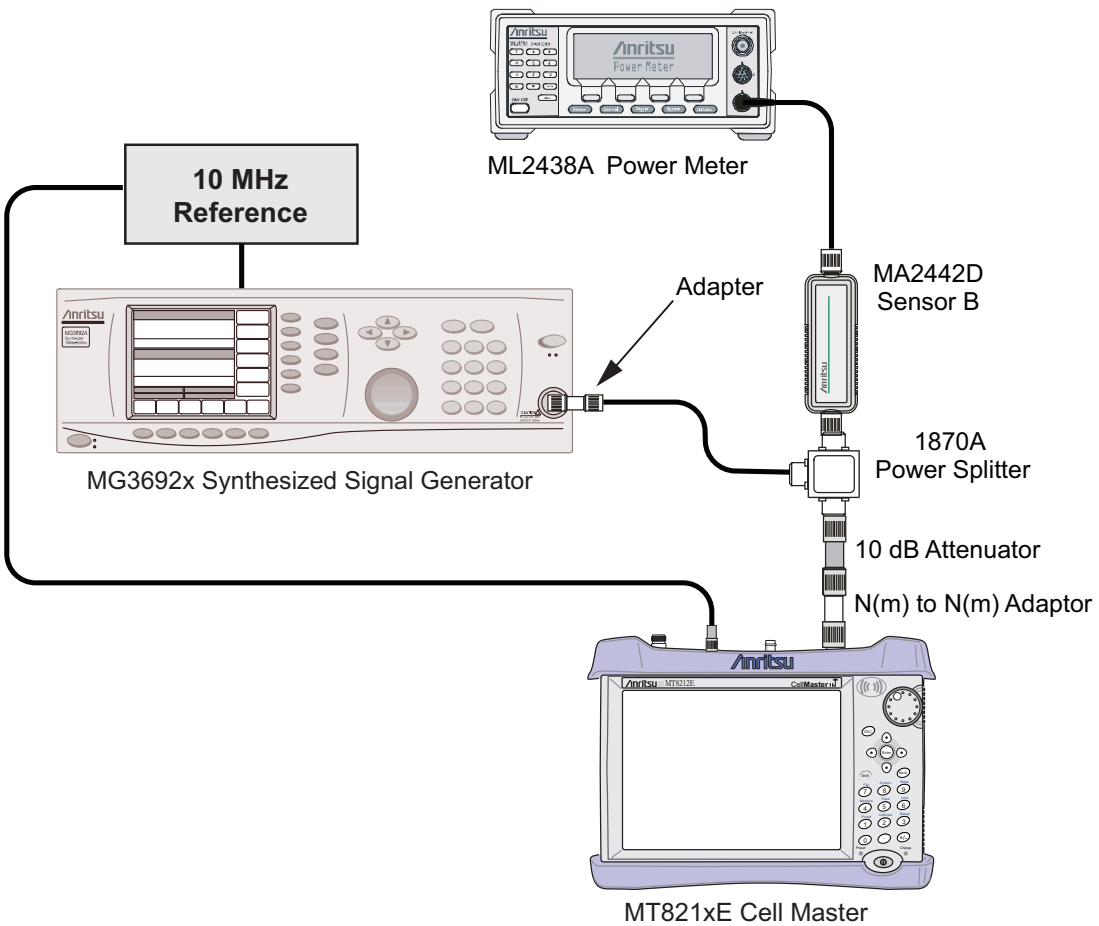

Figure 4-2. Power Meter Measurement Accuracy

2. Verify that the MT821xE is in the Power Meter mode and preset the unit.
3. Set the MT821xE span to 3 MHz.
4. Set the MT821xE center frequency to 50 MHz.
5. Adjust the MG3692A/B power so that the power meter sensor B matches the sensor B value shown in the Table A-17.
6. Record the reading on the MT821xE display in Table A-18, “Internal Power Meter Accuracy Verification” on page A-11.
7. Repeat steps 4 to 6 for the next test power level in Table A-17.
8. Repeat steps 4 to 6 for the next test frequency in Table A-17.

Chapter 5 — Option Verification

5-1 Introduction

This chapter describes the verification process for options available for the MT821xE Cell Master.

5-2 Option 10, Bias Tee Verification

This test verifies that the optional Bias Tee in Model MT821xE Spectrum Master is functional. These tests include:

Low Current Test Verification

The tests in this section verify the Bias-Tee Option 10 low current operation of the MT821xE in Cable and Antenna Analyzer mode.

Equipment Required

- Anritsu 40-168-R External Power Supply
- Anritsu T3377 105 ohm Load

Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT821xE Cell Master.
2. Press the **On/Off** key to turn on the MT821xE.
3. Set the MT821xE to Cable and Antenna Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (8) key, press the Applications Options submenu key.

Low Current Test

1. Press the Bias Tee Voltage submenu key and change voltage from 15 V to 12 V and confirm that the Current soft key is set to Low.
2. Connect the Anritsu T3377 105 ohm load to the RF In test port.
3. Press the Bias Tee On/Off submenu key to turn the Bias Tee On.
4. Record the Voltage and Current readings displayed on the left side of the screen in the **105 ohm Load Low Current** section of Table A-19, "Option 10 Bias-Tee". Verify the voltage and current readings are within the specifications.
5. Press the Bias Tee On/Off submenu key to turn the Bias Tee Off.
6. Repeat Steps 3 through Step 5, entering each of the voltage settings listed in the **105 ohm Load Low Current** section of Table A-19.

High Current Test Verification

The tests in this section verify the Bias-Tee Option 10 high current operation of the MT821xE in Cable and Antenna Analyzer mode.

Equipment Required

- Anritsu 40-168-R External Power Supply
- Anritsu T2904 40 ohm Load
- Anritsu T3536 78 ohm Load

Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT821xE Cell Master.
2. Press the **On/Off** key to turn on the MT821xE.
3. Set the MT821xE to Cable and Antenna Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (8) key, press the Applications Options submenu key.

High Current Test

1. Press the Bias Tee Voltage submenu key and verify the voltage setting is 15 V, confirm that the Current soft key is set to High.
2. Connect the Anritsu T2904 40 ohm load to the RF In test port.
3. Press the Bias Tee On/Off submenu key to turn the Bias Tee On.
4. Record the Voltage and Current readings displayed on the left side of the screen in the **40 ohm Load High Current** section of Table A-19. Verify the voltage and current readings are within the specifications.
5. Press the Bias Tee On/Off submenu key to turn the Bias Tee Off. Disconnect the Anritsu T2904 40 ohm load and connect the Anritsu T3536 78 ohm load to the RF In port.
6. Select the Bias Tee Voltage submenu key and enter 32 V.
7. Press the Bias Tee On/Off submenu key to turn the Bias Tee On.
8. Record the Voltage and Current readings displayed on the left side of the screen in the **78 ohm Load High Current** section of Table A-19. Verify the voltage and current readings are within the specifications.
9. Press the Bias Tee On/Off submenu key to turn the Bias Tee Off.

Fault Verification

The tests in this section verify the Bias-Tee Option 10 fault condition of the MT821xE in Cable and Antenna Analyzer mode.

Equipment Required

- Anritsu 40-168-R External Power Supply
- Anritsu T2904 40 ohm Load

Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT821xE Cell Master.
2. Press the **On/Off** key to turn on the MT821xE.
3. Set the MT821xE to Cable and Antenna Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (8) key, press the Applications Options submenu key.

Fault Test

5. Press the Bias Tee submenu key and confirm that the Current submenu key is set to Low.
6. Select the Bias Tee Voltage submenu key and enter 32 V.
7. Connect the Anritsu T2904 40 ohm load to the RF In port.
8. Press the Bias Tee On/Off submenu key to turn the Bias Tee On.
9. Verify that the instrument indicates a “Bias-T Fault Condition” and makes a clicking sound and the Bias Tee current reading displayed on the left side of the screen is 0 mA.
10. Press the Bias Tee On/Off submenu key to turn the Bias Tee Off.

5-3 Option 30, ISDB-T Verification

Introduction

The tests in this section verify the performance of the optional ISDB-T Signal Analyzer option of the MT821xE. These tests include:

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu MN63A Programmable Attenuator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensors (2)
- Anritsu 1N50C RF Limiter
- Anritsu 34NN50A Adapter
- Anritsu 15NNF50-1.5C RF Coaxial Cables (3)
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator
- Mini-Circuits TIA-1000-1R8 RF Power Amplifier
- Midwest Microwave ADT-2615-NF-BNM-02 Adapters (2)
- 10 MHz Reference Standard

Frequency Accuracy and Residual Modulation Error Ratio (MER) Verification

The test in this section can be used to verify the frequency accuracy of the MT821xE in ISDB-T Signal Analyzer mode.

Setup

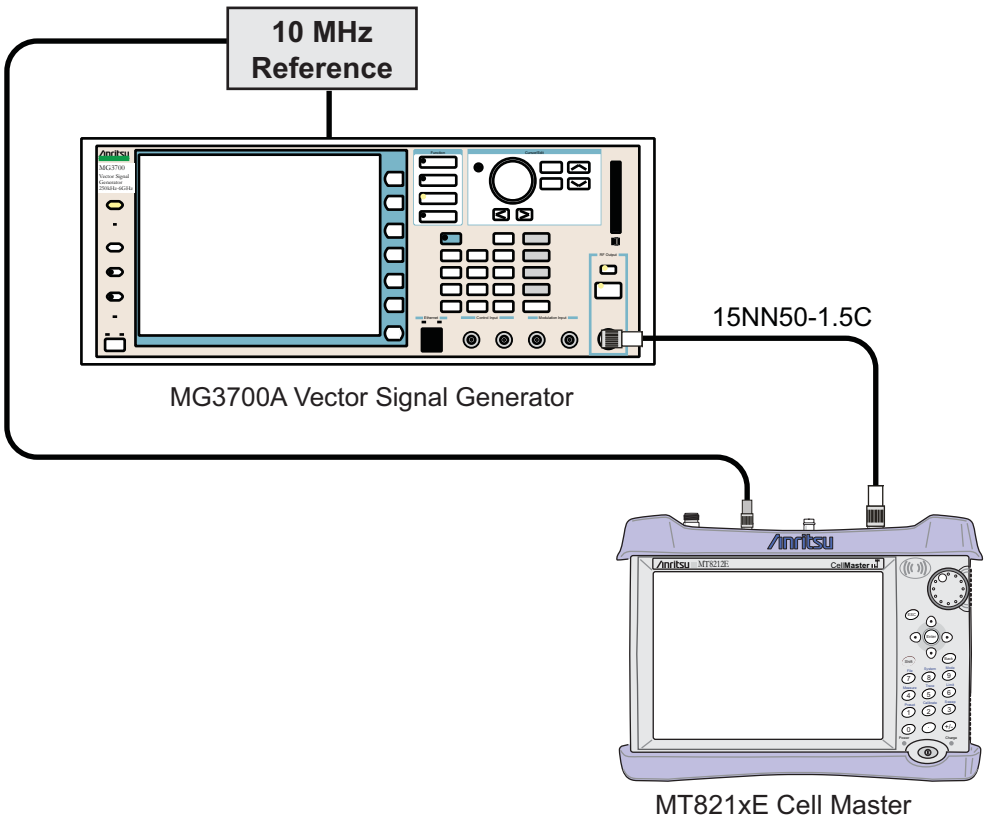

Figure 5-1. ISDB-T Signal Analyzer Test Setup

Procedure

1. Connect the equipment as shown in Figure 5-1.
2. On MG3700A press the **Preset** key (Yellow key on the upper left hand side)
3. Press the **Down Arrow** key to select Yes.
4. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

5. Press the (F1) soft key to select Load File to Memory.
6. Press the (F1) soft key again to select Select Package.
7. Using the Down Arrow key, step through the selection list until the “Digital_Broadcast” option is highlighted.
8. Press the **Set** key.
9. Press the (F6) soft key Return.

10. Press the **Set** key.
11. Using the **Down Arrow** key, step through the selection list until the "Digital_Broadcast" option is highlighted.
12. Press the **Set** key.
13. Using the **Down Arrow** key step through the selection list until the "ISDB-T_1layer_1ch" option is highlighted.
14. Press the **Set** key.
15. Set the frequency to 473.14285714 MHz.
16. Set the level to –20 dBm.
17. Confirm that the **Modulation On/Off** key and the Output key both have LEDs On.
18. Set the mode of the MT821xE to ISDB-T Signal Analyzer. Press the **Shift** key, the **Preset** (1) key and then select the Preset submenu key to reset the unit.
19. Confirm the Channel is set to 13.
20. Press the Meas Selection submenu key, then select Modulation Analysis.
21. On MT821xE press the **Frequency/Level** submenu key, set the Reference Level to –20dBm.
22. Press the Meas Setup submenu key and then the Meas Mode submenu key.
23. Use the rotary knob to highlight "Average" and then press the **Enter** key.
24. Set the Average Count to 10.
25. Wait until the Average (10/10) appears at the top of the display.
26. Record the frequency error as shown on the MT821xE display in Table A-20, "ISDB-T Signal Analyzer Frequency Accuracy" on page A-13.
27. Record the Total MER as shown on the MT821xE display in Table A-21, "ISDB-T Signal Analyzer Residual MER" on page A-13.
28. Under the Frequency/Level submenu key, set the MT821xE to Channel 38.
29. Set the frequency of the MG3700A to 623.14285714 MHz.
30. Press the Execute Measure submenu key.
31. Wait until the Average (10/10) appears at the top of the display.
32. Record the frequency error as shown on the MT821xE display in Table A-20.
33. Record the Total MER as shown on the MT821xE display in Table A-21.
34. Set the MT821xE to Channel 62.
35. Set the frequency of the MG3700A to 767.14285714 MHz.
36. Press the Execute Measure submenu key.
37. Wait until the Average (10/10) appears at the top of the display.
38. Record the frequency error as shown on the MT821xE display in Table A-20.
39. Record the Total MER as shown on the MT821xE display in Table A-21.
40. On the MG3700A, set the frequency to 473.14285714 MHz and the output level to –50 dBm.
41. On the MT821xE, press the Frequency/Level submenu key, then press the Pre Amp submenu key to turn Pre Amp On.
42. Set the Reference Level to –50dBm and change the channel to 13.
43. Press the Execute Measure submenu key.
44. Repeat steps 25 to 39 and record the results in Table A-20 and Table A-21.

Frequency Lock Range Verification

The test in this section can be used to verify the frequency lock range of the MT821xE in ISDB-T Signal Analyzer mode.

Procedure

1. Connect the equipment as shown in Figure 5-1.
2. Preset the MG3700A.
3. Load the "ISDB-T_1layer_1ch" pattern on the MG3700A. Refer to "Frequency Accuracy and Residual Modulation Error Ratio (MER) Verification" on page 5-5 if needing help on loading patterns.
4. Set the frequency to 473.23285714 MHz.
5. Set the level to –20 dBm.
6. Confirm the **Modulation On/Off** key and the **Output** key both have LEDs On.
7. Set the mode of the MT821xE to ISDB-T Signal Analyzer. Press the Shift key, the **Preset** (1) key and then select the Preset submenu key to reset the unit.
8. On MT821xE press the Frequency/Level submenu key, confirm Channel is set to 13.
9. Set the Reference Level to –20 dBm.
10. Press the Meas Selection submenu key and select Modulation Analysis.
11. Press the Meas Setup submenu key and then the Meas Mode submenu key.
12. Use rotary knob to highlight "Average" and press the **Enter** key.
13. Press the Average Count submenu key, then enter **10** and press the **Enter** key.
14. Wait until Average (10/10) appears at the top of the display.
15. Record the Frequency Error in Table A-22, "ISDB-T Signal Analyzer Frequency Lock Range" on page A-13.
16. On the MG3700A set the frequency to 473.05285714 MHz.
17. Press **Execute Measure** to read the new frequency.
18. Wait until Average (10/10) appears at the top of the display.
19. Record the frequency error in Table A-22.

Level Accuracy Verification

The tests in this section verify the level accuracy of the MT821xE in ISDB-T Signal Analyzer mode.

Setup

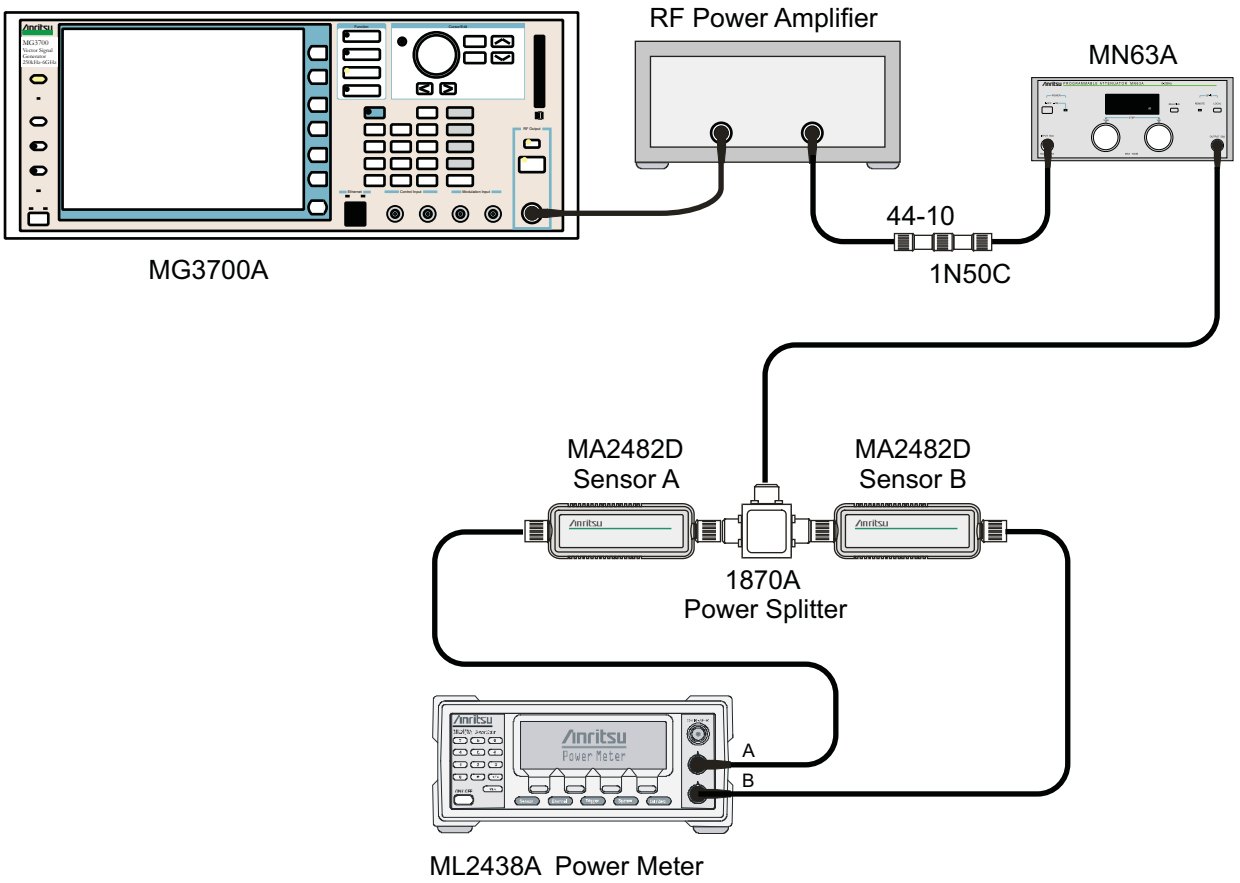

Figure 5-2. ISDB-T Level Accuracy and 1 dB Compression Level Pre-test Setup

Procedure

1. Perform Zero/Cal on Sensor A and Sensor B of the power meter. Set the cal factor of both sensors to 473 MHz.
2. Confirm that the Power Amplifier is off.
3. Connect the MG3700A Signal Generator, Power Amplifier with N(f)-BNC(m) adapters, RF Limiter, MN63A Programmable Attenuator, Power Divider, Power Meter and Power Sensors as shown in Figure 5-2.
4. Preset the MG3700A.
5. Load the "ISDB-T_1layer_1ch" pattern on the MG3700A. Refer to "Frequency Accuracy and Residual Modulation Error Ratio (MER) Verification" on page 5-5 if needing help on loading patterns.
6. Set the MG3700A frequency to 473.14285714 MHz.
7. Set the MG3700A level to –25 dBm.
8. Confirm the **Modulation On/Off** key and the **Output** key both have LEDs On.
9. Turn on the power amplifier and allow it to warm up for at least 5 minutes.

10. Adjust the MN63A attenuator so that Sensor A reading is –10 dBm ± 1 dB. Record the attenuation reading in the **AT(-10)** column of Table A-23, "Level Accuracy Verification, AT(-10)" on page A-13.

11. On the MG3700A, adjust the power level so that Power Meter Sensor A reading is –10.0 dBm ± 0.2 dB.

12. Record Power Meter Sensor A reading and Sensor B readings in Table A-23.

13. Subtract Sensor A reading from Sensor B reading and record the result in the Δ**AB(-10)** column of Table A-23.

14. Calculate the AT(set) values for Test Levels –10 dBm through –45 dBm and record the values to the **AT(set) column** of Table A-25, "ISDB-T Signal Analyzer Level Accuracy Measurement Channel = 13ch at 473.14285714 MHz" on page A-14.

15. Remove Sensor A from the Power Splitter and then connect the Power Splitter to the MT821xE Spectrum Analyzer RF In with an N male to N male adapter as shown in Figure 5-3.

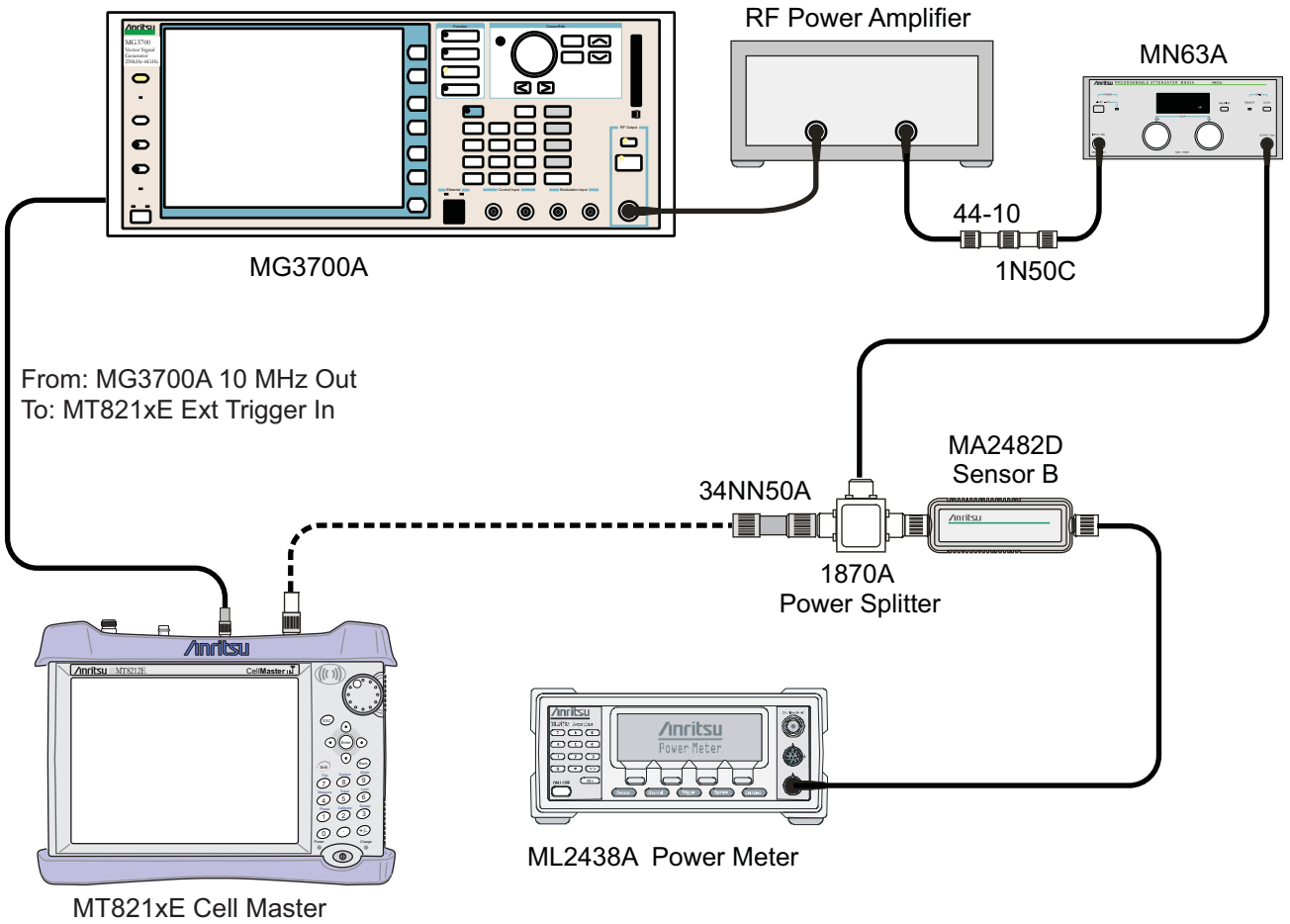

Figure 5-3. ISDB-T Level Accuracy and 1 dB Compression Level Post-test Setup

16. Record the new Power Meter Sensor B reading to the **SB(-10)** box in Table A-25.

17. On MT821xE, set the mode to ISDB-T Signal Analyzer and preset the unit.

18. Press the Meas Selection submenu key, confirm Field Strength is selected.

19. Press the Frequency/Level submenu key, ensure Channel is 13 and Pre Amp is Off.

20. Change the Reference Level to –10 dBm.

21. Press the Meas Setup submenu key and then the Meas Mode submenu key.

22. Use **Up**/**Down** arrow keys and highlight Average and press the **Enter** key.
23. Change the Average Count to 50.
24. After Average (50/50) appears at the top of the display, record the Channel Power from the MT821xE to the **M(Level)** column under **Pre Amp Off** in Table A-25.
25. Calculate the Deviation using the following formula:

    Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

Note	Since AT(-10) is the same as AT(set), [– AT(-10) + AT(set)] = 0

26. Record the result to the **Dev** column under **Pre Amp Off** in Table A-25 and verify that it is within specification.
27. Set the MN63A attenuation to the next **AT(set)** value in Table A-25.
28. Press the Frequency/Level submenu key and set the Reference Level of MT821xE to –15 dBm.
29. After Average (50/50) appears, record the –15 dBm channel power from the MT821xE to the **M(Level)** column under **Pre Amp Off** in Table A-25.
30. Calculate the Deviation using the following formula:

    Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

31. Record the result to the **Dev** column under **Pre Amp Off** in Table A-25 and verify that it is within specification.
32. Set the MN63A attenuation to the next **AT(set)** value in Table A-25.
33. Set the Reference Level of MT821xE to –20 dBm.
34. After Average (50/50) appears, record the –20 dBm Channel Power from the MT821xE in the **M(Level)** column under Pre Amp Off in Table A-25.
35. Calculate the Deviation using the following formula:

    Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

36. Record the result in the **Dev** column under **Pre Amp Off** in Table A-25 and verify that it is within specification.
37. Press the Frequency/Level submenu key and set Pre Amp to On. Change the Reference Level if required.
38. After Average (50/50) appears, record the –20 dBm Channel Power from the MT821xE in the **M(Level)** column under **Pre Amp On** in Table A-25.
39. Calculate the Deviation using the following formula:

    Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

40. Record the result to the **Dev** column under **Pre Amp On** in Table A-25 and verify that it is within specification.
41. Repeat steps 32 through 40 for test levels –25 dBm to –45 dBm. Change Reference Level and switch Pre Amp per the **Pre Amp On** or **Pre Amp Off** columns in test record.
42. Turn off the power amplifier, disconnect the power splitter from the MT821xE, re-connect Sensor A to the power splitter as shown in Figure 5-2 on page 5-8.
43. Set the MN63A attenuation to 10 dB.
44. Set the MG3700A level to –60 dBm.
45. Turn on the power amplifier and allow it to warm up for at least 5 minutes.
46. Adjust the MN63A attenuator so that Sensor A reading is –50 dBm ± 1 dB. Record the attenuation reading in Table A-24, “Level Accuracy Verification, AT(-50)” on page A-14 as AT(-50).
47. On MG3700A adjust power level so that Power Meter Sensor A reading is –50.0 dBm ± 0.2 dB.

48. Record Power Meter Sensor A and Sensor B readings in Table A-24.
49. Subtract Sensor A reading from Sensor B reading and record the result in the **ΔAB(-50)** column of Table A-24.
50. Calculate the **AT(set)** values for test levels –55 dBm through –84 dBm and record the values to the **AT(set)** column in Table A-25.
51. Remove Sensor A from the Power Splitter and then connect the Power Splitter to the MT821xE Spectrum Analyzer RF In with an N male to N male adapter.
52. Record the new Power Meter Sensor B reading to the **SB(-50)** box in Table A-25.
53. Repeat steps 32 through 40 for Test levels –50 dBm to –84 dBm. Change Reference Level and switch Pre Amp per the **Pre Amp On** or **Pre Amp Off** columns in test record. Use the following formula to calculate Deviation:

    Deviation = M(Level) – SB(-50) – ΔAB(-50) – AT(-50) + AT(set)
54. Repeat steps 5 through step 53 for frequencies 623.14285714 MHz (Ch 38) and 767.14285714 MHz (Ch 62). Set the cal factor of both power sensors to 623 MHz or 767 MHz as required.
55. Record the results in Table A-26, "ISDB-T Signal Analyzer Level Accuracy Measurement Channel = 38ch at 623.14285714 MHz" on page A-15 and Table A-27, "ISDB-T Signal Analyzer Level Accuracy Measurement Channel = 62ch at 767.14285714 MHz" on page A-16.

1 dB Compression Level Verification

The tests in this section verify the accuracy of the MT821xE is not degraded by compression when operating in the ISDB-T Signal Analyzer mode.

Procedure

1. Confirm that the Power Amplifier is off.
2. On the power meter, set Low Level Averaging to Low and Averaging to Moving with 50 averages. Also set the power meter to read True RMS, for both sensors.
3. Perform a Zero/Cal on both sensors of the power meter.
4. Connect the MG3700A Signal Generator, Power Amplifier with N(f)-BNC(m) adapters, RF Limiter, MN63A Programmable Attenuator, Power Divider, Power Meter and Power Sensors as shown in Figure 5-2 on page 5-8.
5. On the MG3700A, press the **MOD On/Off** button to turn Modulation Off (MOD On/Off LED is off).
6. Set the level output of the MG3700A to –25 dBm.
7. Set the MN63A attention to 20 dB.
8. Turn on the power amplifier and allow it to warm up at least five minutes.

473.14285714 MHz Tests

9. Set the cal factor of both sensors to 473 MHz.
10. Set the MG3700A frequency to 473.14285714 MHz.
11. Adjust the MN63A attention so that the power meter Sensor A reading is –25 dBm ± 1 dB. Record the MN63A attenuation readout in the **AT(-25)** column of Table A-28, "1 dB Compression Level Accuracy Verification" on page A-16.
12. Adjust the Level of the MG3700A so that the power meter (Sensor A) reads –25.0 dBm ± 0.05 dB. Record the Sensor A reading in the **M(Sa)** column in Table A-28.
13. Remove Sensor A from the splitter and connect the MT821xE RF In to the open end of the splitter using an adapter as shown in Figure 5-3.

14. Set the MT821xE to ISDB-T Signal Analyzer mode and preset the unit.
15. Press the Meas Selection submenu key, confirm that Field Strength is activated.
16. Press the Freq/Level submenu key and confirm that Channel is set to 13 and Pre Amp is Off.
17. Set the Reference Level to –25 dBm.
18. Record the MT821xE channel power reading, MeasCP(-25), to the **–25 dBm Test Level** row, **Meas. Value** column of Table A-29, "ISDB-T Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp Off" on page A-17.
19. Calculate the difference, Delta(-25), using the following formula:

    Delta(-25) = M(Sa) – MeasCP(-25)

20. Record the result to the **Delta** column in Table A-29. Verify that the result is less than 1 dB.
21. Calculate AT(-15) using the following formula:

    AT(-15) = AT(-25) –10

22. Set the MN63A attenuation to AT(-15).

Note	The Over Range message on the MT821xE is normal.

23. Record the MT821xE Channel Power reading, MeasCP(-15), in the **-15 dBm Test Level** row of the **Meas. Value** column in Table A-29.
24. Calculate the Delta at the -15 dBm input using the following formula:

    Delta(-15) = M(Sa) + 10 – MeasCP(-15) – Delta(-25)

25. Record the result to the **Delta** column Table A-29. Verify that it is less than 1 dB.
26. Calculate the value of AT(-50) using the following formula:

    AT(-50) = ATT(-25) + 25

27. Adjust the MN63A attention to AT(-50).
28. Set the Reference Level on the MT821xE to -50 dBm and turn Pre-Amp On.
29. Record the MT821xE Channel Power reading, MeasCP(-50), to the **-50 dBm Test Level** row in the **Meas. Value** column of Table A-30, "ISDB-T Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp On" on page A-17.
30. Calculate the Delta at -50 dBm Input, Delta(-50), using the following formula:

    Delta(-50) = M(Sa) – 25 – MeasCP(-50) – Delta(-25)

31. Record the result to the **Delta** column in Table A-30. Verify that it is less than 1 dB.
32. Calculate the AT(-43) using the following formula:

    AT(-43) = AT(-25) + 18

33. Set the MN63A attenuation to AT(-43).

Note	The Over Range message on the MT821xE is normal.

34. Record the MT821xE channel power reading, MeasCP(-43), in the **-43 dBm Test Level** row, **Meas. Value** column in Table A-30.
35. Calculate the Delta at -43 dBm Input, Delta(-43), using the following formula:

    Delta(-43) = M(Sa) – 18 – MeasCP(-43) – Delta(-50)

36. Record the result to the **Delta** column in Table A-30. Verify that it is less than 1 dB.

623.14285714 MHz Tests

37. Remove the MT821xE from the test setup and re-install Sensor A to the open splitter output as shown in Figure 5-2 on page 5-8.

38. Set the MG3700A Frequency to 623.14285714 MHz. Confirm the Mod On/Off LED is Off.

39. Set the cal factor of both sensors to 623 MHz.

40. Adjust the MN63A attention so that the power meter (Sensor A) reads –25 dBm ± 1 dB. Record the MN63A attenuation readout to the **AT(-25)** column in Table A-28, "1 dB Compression Level Accuracy Verification" on page A-16.

41. Adjust the Level of the MG3700A so that the power meter (Sensor A) reads –25.0 dBm ± 0.05 dB. Record the Sensor A reading to the **M(Sa)** column in Table A-28.

42. Remove Sensor A from the splitter and connect the MT821xE RF In to the open end of the splitter using an adapter as shown in Figure 5-3 on page 5-9.

43. Set the MT821xE channel to 38.

44. Set the Pre Amp to Off and the Reference Level to –25 dBm.

45. Repeat steps 18 through 36 and record the results in Table A-31, "ISDB-T Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp Off" on page A-17 and Table A-32, "ISDB-T Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp On" on page A-17.

767.14285714 MHz Tests

46. Remove the MT821xE from the test setup and re-install Sensor A to the open splitter output as shown in Figure 5-2 on page 5-8.

47. Set the MG3700A frequency to 767.14285714 MHz. Confirm the Mod On/Off LED is Off.

48. Set the cal factor of both sensors to 767 MHz.

49. Adjust the MN63A attention so that the power meter (Sensor A) reads –25 dBm ± 1 dB. Record the MN63A attenuation readout to the **AT(-25)** column in Table A-28.

50. Adjust the Level of the MG3700A so that the power meter (Sensor A) reads –25.0 dBm ± 0.05 dB. Record the Sensor A reading to the **M(Sa)** column in Table A-28.

51. Remove Sensor A from the splitter and connect the MT821xE RF In to the open end of the splitter using an adapter as shown in Figure 5-3 on page 5-9.

52. Set the MT821xE channel to 62.

53. Set the Pre Amp to Off and Reference Level to –25 dBm.

54. Repeat steps 18 through 36 and record the results in Table A-33, "ISDB-T Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp Off" on page A-17 and Table A-34, "ISDB-T Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp On" on page A-17.

Noise Floor Verification

The tests in this section verify the noise floor of the MT821xE in ISDB-T Signal Analyzer mode.

Procedure

1. Set the mode of the MT821xE to ISDB-T Signal Analyzer and preset the unit.
2. Install a 50 ohm termination to the Spectrum Analyzer RF In connector.
3. Press the Meas Selection submenu key, then select Field Strength.
4. Press the Freq/Level submenu key and confirm the channel is set to 13 and Pre Amp is Off.
5. Set the Reference Level to –25 dBm.
6. Press the Meas Setup submenu key. Change Meas Mode to Average and leave Average Count set to 50.
7. After Average (50/50) appears, record the Channel Power in Table A-35, "ISDB-T Signal Analyzer Noise Floor with Pre Amp Off" on page A-18.
8. Set the Reference Level to –50 dBm and the Pre Amp to On.
9. After Average (50/50) appears, record the Channel Power in Table A-36, "ISDB-T Signal Analyzer Noise Floor with Pre Amp On" on page A-18.
10. Change the channel to 38. Set the Pre Amp to Off.
11. Repeat steps 5 through 9 for Channel 38
12. Change the channel to 62. Set the Pre Amp to Off.
13. Repeat steps 5 through 9 for Channel 62.

Phase Noise Verification

This test verifies the phase noise of the MT821xE in the ISDB-T Signal Analyzer mode.

1. Connect the 10 MHz Frequency Reference signal to the MG3700A and the MT821xE.
2. Set the MG3700A frequency to 473.14285714 MHz. Set the level to -10 dBm.
3. Press the **Mod On/Off** key so that the LED is Off.
4. Input the RF signal from MG3700A into the MT821xE Spectrum Analyzer RF In.
5. Set the mode of the MT821xE to ISDB-T Signal Analyzer and preset the unit.
6. Press the Frequency/Level submenu key and confirm the unit is set to Channel 13. Change the Reference Level to -10 dBm and ensure that the Pre Amp is Off.
7. Press the Meas Selection submenu key and select Phase Noise (red dot appears on label).
8. Press the Meas Setup submenu key and then the Meas Mode submenu key. Use the **Down arrow** key to select Average and press the **Enter** key.
9. Wait until Average counter displays (10/10).
10. Record the 10 kHz and the 100 kHz phase noise readouts in Table A-37, "ISDB-T Signal Analyzer Phase Noise" on page A-18.
11. Record the Frequency Error in Table A-37.
12. Set the frequency of the MG3700A to 623.14285714 MHz and change the MT821xE Channel to 38.
13. Wait until Average counter displays (10/10).
14. Record the 10 kHz and the 100 kHz phase noise readouts in Table A-37.
15. Record the Frequency Error in Table A-37.
16. Set the frequency of the MG3700A to 767.14285714 MHz and change the MT821xE Channel to 62.

17. Wait until Average counter displays (10/10).

18. Record the 10 kHz and the 100 kHz phase noise readouts in Table A-37.

19. Record the Frequency Error in Table A-37.

5-4 Option 31, GPS Verification

This test verifies that the optional GPS of the Model MT821xE Spectrum is functional.

Frequency Accuracy Verification

The test in this section verifies the Spectrum Analyzer Frequency Accuracy with GPS Option 31 of the MT821xE in Spectrum Analyzer mode.

Equipment Required

- Anritsu MG3692X Signal Generator
- 10 MHz Reference Standard
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- Anritsu 2000-1528-R GPS Antenna

Procedure

1. Connect the GPS antenna to the GPS Antenna connector on the MT821xE. On the MT821xE, change the mode to Spectrum Analyzer and preset the unit.

Note	If a fixed GPS antenna is not available, the Anritsu 2000-1528-R GPS antenna can be used for this test. Confirm that the Anritsu 2000-1528-R GPS antenna is in direct line-of-sight relationship to the satellites or place the antenna outside without any obstructions.

2. Press the **Shift** key and then the **System** key.
3. Press the GPS submenu key, then press the GPS On/Off submenu key to turn the GPS On.
4. When the GPS fix is acquired, the GPS indicator at the top of the LCD display will turn green.
5. The latitude and the longitude will also be displayed next to the GPS indicator.
6. Wait for about three minutes after the Reference Source indicator in the lower left hand corner of the LCD display has changed to GPS High Accuracy.

Note	If GPS fix is acquired using the Anritsu 2000-1528-R GPS antenna placed outside, bringing the instrument inside will lose satellite tracking. A red cross will appear on the green GPS indicator and the Reference Source indicator will change to “Int Std Accy”. The following test will verify frequency accuracy to a lesser specification.

7. Connect the external 10 MHz Reference to the Anritsu MG3692x Signal Generator.

Note	Do not connect the external 10 MHz Reference to the MT821xE Cell Master.

8. Connect the output of the Signal Generator to the Spectrum Analyzer RF In of the MT821xE.
9. Set the MG3692x output to 4 GHz CW, with an RF output level of –30 dBm.
10. On the MT821xE, press the **Amplitude** key, and set the Reference Level to –10 dBm.
11. Press the **Freq** main menu key and set the center frequency to 4.0 GHz.
12. Press the Span submenu key and set the span to 10 kHz.
13. Press the BW submenu key and set RBW to 100 Hz.

14. Press the VBW submenu key and set to 30 Hz.
15. Press the **Marker** key, and select the Peak Search submenu key.
16. Note the Reference Source value and use the appropriate row to record the data in the following steps.
17. Record the marker frequency in the **Measured Value** column of Table A-38, "Option 31 GPS Receiver" on page A-19.
18. Subtract the marker value from 4 GHz and record the result in the **Error column** of Table A-38. Verify that it is within specification.
19. If the value of Reference Source indicates GPS High Accuracy, then remove the GPS antenna and wait until the Reference Source indicates "Int Std Accy" and repeat steps 16 through 18.

GPS Antenna Bias-Tee Verification

The tests in this section verify the GPS Antenna Bias-Tee Voltages of Option 31 in the MT821xE.

Equipment Required

- Adapter SMA to BNC(f), Pomona 4290 or equivalent
- Adapter GPS Terminator, Amphenol B1004A1-ND3G-93R-0.05-1W or equivalent

Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MT821xE Cell Master.
2. Press the **On/Off** key to turn on the MT821xE.
3. Set the MT821xE to Spectrum Analyzer mode and preset the unit.
4. Press the **Shift** key, and then the **System** (3) key.

3.3 V Test

5. Connect the 4290 Adapter to the GPS Antenna SMA connector.
6. Connect the GPS Terminator to the 4290 Adapter.
7. Confirm the 3.3 V setting on the GPS Voltage submenu key is selected (underlined)
8. Turn GPS On by toggling the GPS submenu key so that the On text is underlined.
9. Select the GPS Info submenu key. Record the GPS Antenna Current reading in the **Measured Value** column of Table A-39, "Option 31 GPS Receiver Bias-Tee Verification" on page A-19. Verify that it is within specification.

5 V Test

10. Press the **Escape** key to dismiss the GPS Info dialog.
11. Press the GPS Voltage submenu key and select 5 V.
12. Select the GPS Info submenu key. Record the GPS Antenna Current reading in the **Measured Value** column of Table A-39. Verify that it is within specification.

5-5 Option 32, ISDB-T SFN Verification

Introduction

The tests in this section verify the performance of the optional ISDB-T SFN Analyzer option of the MT821xE. These tests include:

- "Level Accuracy Verification" on page 5-19
- "1 dB Compression Level Verification" on page 5-23
- "Noise Floor Verification" on page 5-26

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu MN63A Programmable Attenuator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensors (2)
- Anritsu 1N50C RF Limiter
- Anritsu 34NN50A Adapter
- Anritsu 15NNF50-1.5C RF Coaxial Cables (3)
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator
- Mini-Circuits TIA-1000-1R8 RF Power Amplifier
- Midwest Microwave ADT-2615-NF-BNM-02 Adapters (2)

Level Accuracy Verification

The tests in this section verify the level accuracy of the MT821xE in ISDB-T SFN Signal Analyzer mode.

Setup

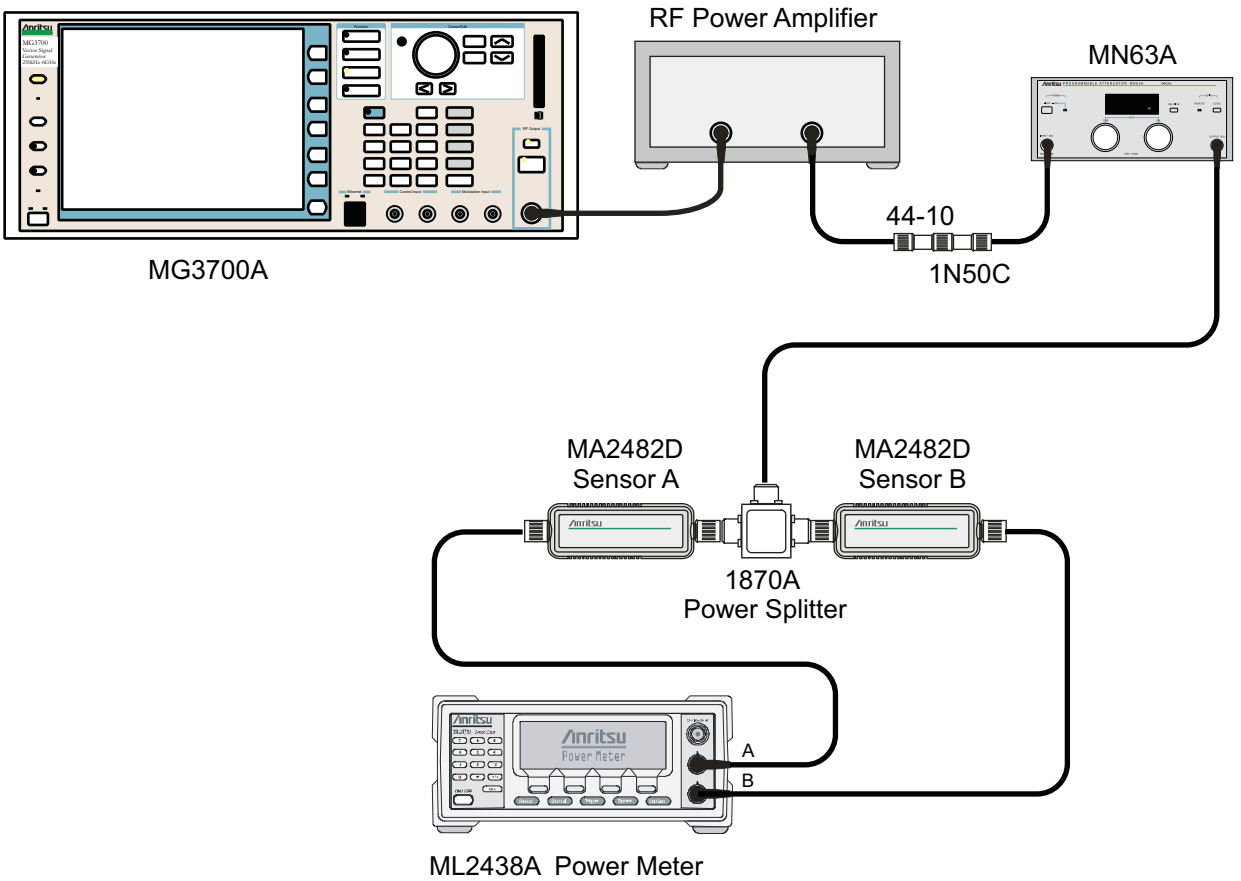

Figure 5-4. ISDB-T SFN Level Accuracy and 1 dB Compression Level Pre-test Setup

Procedure

1. Confirm that the Power Amplifier is off.
2. Perform a Zero/Cal on Sensor A and Sensor B of the power meter. Set the cal factor of both sensors to 473 MHz.
3. Connect the MG3700A Signal Generator, Power Amplifier with N(f)-BNC(m) adapters, RF Limiter, MN63A Programmable Attenuator, Power Divider, Power Meter and Power Sensors as shown in Figure 5-4.
4. On MG3700A press the **Preset** key (Yellow key on the upper left hand side).
5. Press the **Down Arrow** key to select Yes.
6. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

7. Press the (F1) soft key to select "Load File to Memory".

8. Press the (F1) soft key again to select “Select Package”.
9. Using the **Down Arrow** key step through the selection list until the “Digital_Broadcast” option is highlighted.
10. Press the **Set** key.
11. Press the (F6) soft key “Return”.
12. Press the **Set** key.
13. Using the **Down Arrow** key step through the selection list until the “Digital_Broadcast” option is highlighted.
14. Press the **Set** key.
15. Using the **Down Arrow** key step through the selection list until the “ISDB-T_1layer_1ch” option is highlighted.
16. Press the **Set** key.
17. Set the MG3700A frequency to 473.14285714 MHz.
18. Set the level to –25 dBm.
19. Confirm the **Modulation On/Off** key and the **Output** key both have LEDs ON.
20. Turn on the power amplifier and allow it to warm up for at least 5 minutes.
21. Adjust the MN63A attenuator so that Sensor A reading is –10 dBm ± 1 dB. Record the attenuation reading in as AT(-10) in Table A-40, “ISDB-T SFN Level Accuracy Verification, AT(-10)” on page A-20.
22. On MG3700A adjust power level so that Power Meter Sensor A reading is -10.0 dBm ± 0.2 dB.
23. Record Power Meter Sensor A and Sensor B readings in Table A-40.
24. Subtract Sensor A reading from Sensor B reading and record the result in the **ΔAB(-10)** column of Table A-40.
25. Calculate the AT(set) values for Test Levels -10 dBm through -45 dBm and record the values in the **AT(set)** column of Table A-41, “ISDB-T SFN Analyzer Level Accuracy Measurement Channel = 13ch at 473.14285714 MHz” on page A-20.
26. Remove Sensor A from the Power Splitter and then connect the Power Splitter to the MT821xE Spectrum Analyzer RF In with an N male to N male adapter as shown in Figure 5-5 on page 5-21.
27. Record the new Power Meter Sensor B reading to the **SB(-10)** box in Table A-41.
28. On MT821xE, set the mode to ISDB-T SFN Analyzer and preset the unit.
29. Press the Meas Setup submenu key, and change the mode to Continuous.
30. Press the Frequency/Level submenu key, confirm Channel is 13 and Pre Amp is Off.
31. Change the Reference Level to –10 dBm.
32. After the Measuring percentage gets to 100%, record the Channel Power from the MT821xE to the **M(Level)** column under **Pre Amp Off** in Table A-41.
33. Calculate the Deviation using the following formula:

    Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

Note	Since AT(-10) is the same as AT(set), [– AT(-10) + AT(set)] = 0

34. Record the result to the **Dev** column under **Pre Amp Off** in Table A-41 and verify that it is within specification.
35. Set the MN63A attenuation to the next AT(set) value in Table A-41.

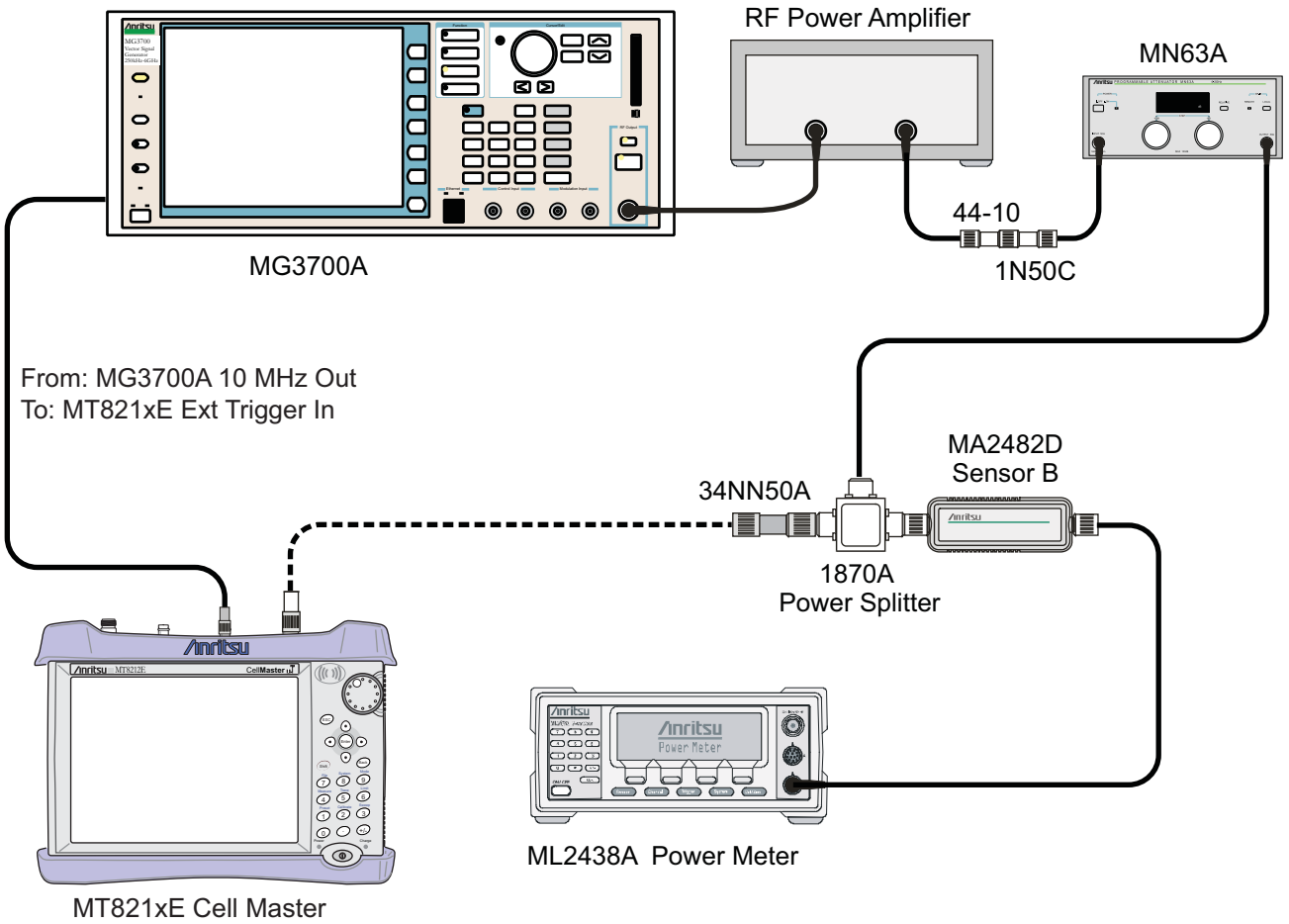

Figure 5-5. ISDB-T SFN Level Accuracy and 1 dB Compression Level Post-test Setup

36. Press the Frequency/Level submenu key and set the Reference Level of MT821xE to –15 dBm.

37. After the Measuring percentage gets to 100%, record the -15 dBm Channel Power from the MT821xE to the **M(Level)** column under **Pre Amp Off** in Table A-41.

38. Calculate the Deviation using the following formula:

Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

39. Record the result to the Dev column under **Pre Amp Off** in Table A-41 and verify that it is within specification.

40. Set the MN63A attenuation to the next AT(set) value in Table A-41.

41. Set the Reference Level of the MT821xE to –20 dBm.

42. After the Measuring percentage gets to 100%, record the -20 dBm Channel Power from the MT821xE in the **M(Level)** column under **Pre Amp Off** in Table A-41.

43. Calculate the Deviation using the following formula:

Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

44. Record the result to the **Dev** column under **Pre Amp Off** in Table A-41 and verify that it is within specification.

45. Press the Frequency/Level submenu key and set Pre Amp to On. Change Reference Level if required.

46. After the Measuring percentage gets to 100%, record the -20 dBm Channel Power from the MT821xE the **M(Level)** column under **Pre Amp On** in Table A-41.

47. Calculate the Deviation using the following formula:

Deviation = M(Level) – SB(-10) – ΔAB(-10) – AT(-10) + AT(set)

48. Record the result to the Dev column under **Pre Amp On** in Table A-41 and verify that it is within specification.

49. Repeat steps 43 through 51 for Test Levels -25 dBm to -45 dBm. Change Reference Level and switch Pre Amp per the **Pre Amp On** and **Pre Amp Off** columns in Table A-41.

50. Turn off the power amplifier, disconnect the power splitter from the MT821xE, re-connect Sensor A to the power splitter as shown in Figure 5-4 on page 5-19.

51. Set the MN63A attenuation to 10 dB.

52. Set the MG3700A level to –60 dBm.

53. Turn on power amplifier and allow it to warm up for at least 5 minutes.

54. Adjust the MN63A attenuator so that Sensor A reading is –50 dBm ± 1 dB. Record the attenuation reading as AT(-50) in Table A-42, "ISDB-T SFN Level Accuracy Verification, AT(-50)" on page A-21.

55. On MG3700A adjust power level so that Power Meter Sensor A reading is –50.0 dBm ± 0.2 dB.

56. Record Power Meter Sensor A and Sensor B readings in Table A-42.

57. Subtract Sensor A reading from Sensor B reading and record the result in the ΔAB(-50) column of Table A-42.

58. Calculate the AT(set) values for Test Levels -55 dBm through -84 dBm and record the values to the AT(set) column in Table A-41.

59. Remove Sensor A from the Power Splitter and then connect the Power Splitter to the MT821xE Spectrum Analyzer RF In with an N male to N male adapter.

60. Record the new Power Meter Sensor B reading to the **SB(-50)** box in Table A-41.

61. Repeat steps 43 through 51 for Test levels -50 dBm to -84 dBm. Change Reference Level and switch Pre Amp on or off per the **Pre Amp On** or **Pre Amp Off** column in Table A-41. Use the following formula to calculate Deviation:

Deviation = M(Level) – SB(-50) – ΔAB(-50) – AT(-50) + AT(set)

62. Repeat steps 16 through 61 for frequencies 623.14285714 MHz (Ch 38) and 767.14285714 MHz (Ch 62). Set the cal factor of both power sensors to 623 MHz or 767 MHz as required.

63. Record the results in Table A-43, "ISDB-T SFN Analyzer Level Accuracy Measurement Channel = 38ch at 623.14285714 MHz" on page A-21 and Table A-44, "ISDB-T SFN Signal Analyzer Level Accuracy Measurement Channel = 62ch at 767.14285714 MHz" on page A-22.

1 dB Compression Level Verification

The tests in this section verify the accuracy of the MT821xE is not degraded by compression when operating in the ISDB-T SFN Signal Analyzer mode.

Procedure

1. Confirm that the Power Amplifier is off.
2. On the power meter, set Low Level Averaging to Low and Averaging to Moving with 50 averages. Also set the power meter to read True RMS, for both sensors.
3. Perform a Zero/Cal on both sensors of the power meter.
4. Connect the MG3700A Signal Generator, Power Amplifier with N(f)-BNC(m) adapters, RF Limiter, MN63A Programmable Attenuator, Power Divider, Power Meter and Power Sensors as shown in Figure 5-4 on page 5-19.
5. On the MG3700A, press the **MOD On/Off** button to turn Modulation Off (MOD On/Off LED is off).
6. Set the level output of the MG3700A to –25 dBm.
7. Set the MN63A attention to 20 dB.
8. Turn on the power amplifier and allow it to warm up at least five minutes.

473.14285714 MHz Tests

9. Set the cal factor of both sensors to 473 MHz.
10. Set the MG3700A frequency to 473.14285714 MHz.
11. Adjust the MN63A attention so that the power meter Sensor A reading is –25 dBm ± 1 dB. Record the MN63A attenuation readout in the **AT(-25)** column of Table A-45, "ISDB-T SFN 1 dB Compression Level Accuracy Verification" on page A-22.
12. Adjust the Level of the MG3700A so that the power meter (Sensor A) reads –25.0 dBm ± 0.05 dB. Record the Sensor A reading in the **M(Sa)** column in Table A-45.
13. Remove Sensor A from the splitter and connect the MT821xE RF In to the open end of the splitter using an adapter as shown in Figure 5-5.
14. Set the MT821xE to ISDB-T SFN Signal Analyzer mode and preset the unit.
15. Press the Meas Selection submenu key and change Meas Mode to Continuous.
16. Confirm that the MT821xE Channel is set to 13 and Pre Amp is Off.
17. Set the Reference Level to –25 dBm.
18. Record the MT821xE channel power reading, MeasCP(-25), to the **–25 dBm Test Level** row, **Meas. Value** column of Table A-46, "ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp Off" on page A-23.
19. Calculate the difference, Delta(-25), using the following formula:

    Delta(-25) = M(Sa) – MeasCP(-25)

20. Record the result to the **Delta** column in Table A-46. Verify that the result is less than 1 dB.
21. Calculate AT(-15) using the following formula:

    AT(-15) = AT(-25) –10

22. Set the MN63A attenuation to AT(-15).

Note	The Over Range message on the MT821xE is normal.

23. Record the MT821xE Channel Power reading, MeasCP(-15), in the **-15 dBm Test Level** row of the **Meas. Value** column in Table A-46.

24. Calculate the Delta at the -15 dBm input using the following formula:

Delta(-15) = M(Sa) + 10 – MeasCP(-15) – Delta(-25)

25. Record the result to the **Delta** column in Table A-46. Verify that it is less than 1 dB.

26. Calculate the value of AT(-50) using the following formula:

AT(-50) = ATT(-25) + 25

27. Adjust the MN63A attention to AT(-50).

28. Set the Reference Level on the MT821xE to -50 dBm and turn Pre-Amp On.

29. Record the MT821xE Channel Power reading, MeasCP(-50), to the **-50 dBm Test Level** row in the **Meas. Value** column of Table A-47, "ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp On" on page A-23.

30. Calculate the Delta at -50 dBm Input, Delta(-50), using the following formula:

Delta(-50) = M(Sa) – 25 – MeasCP(-50) + Delta(-25)

31. Record the result to the **Delta** column in Table A-47. Verify that it is less than 1 dB.

32. Calculate the AT(-43) using the following formula:

AT(-43) = AT(-25) + 18

33. Set the MN63A attenuation to AT(-43).

Note	The Over Range message on the MT821xE is normal.

34. Record the MT821xE channel power reading, MeasCP(-43), in the -**43 dBm Test Level** row, **Meas. Value** column in Table A-47.

35. Calculate the Delta at -43 dBm Input, Delta(-43), using the following formula:

Delta(-43) = M(Sa) – 18 – MeasCP(-43) – Delta(-50)

36. Record the result to the **Delta** column in Table A-47. Verify that it is less than 1 dB.

623.14285714 MHz Tests

37. Remove the MT821xE from the test setup and re-install Sensor A to the open splitter output as shown in Figure 5-4 on page 5-19.

38. Set the MG3700A Frequency to 623.14285714 MHz. Confirm the Mod On/Off LED is Off.

39. Set the cal factor of both sensors to 623 MHz.

40. Adjust the MN63A attention so that the power meter (Sensor A) reads -25 dBm ± 1 dB. Record the MN63A attenuation readout to the **AT(-25)** column in Table A-45, "ISDB-T SFN 1 dB Compression Level Accuracy Verification" on page A-22.

41. Adjust the Level of the MG3700A so that the power meter (Sensor A) reads -25.0 dBm ± 0.05 dB. Record the Sensor A reading to the **M(Sa)** column in Table A-45.

42. Remove Sensor A from the splitter and connect the MT821xE RF In to the open end of the splitter using an adapter as shown in Figure 5-5 on page 5-21.

43. Set the MT821xE channel to 38.

44. Set the Pre Amp to Off and the Reference Level to -25 dBm.

45. Repeat steps 18 through 36 and record the results in Table A-48, "ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp Off" on page A-23 and Table A-49, "ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp On" on page A-23.

767.14285714 MHz Tests

46. Remove the MT821xE from the test setup and re-install Sensor A to the open splitter output as shown in Figure 5-4 on page 5-19.

47. Set the MG3700A frequency to 767.14285714 MHz. Confirm the Mod On/Off LED is Off.

48. Set the cal factor of both sensors to 767 MHz.

49. Adjust the MN63A attention so that the power meter (Sensor A) reads -25 dBm ± 1 dB. Record the MN63A attenuation readout to the **AT(-25)** column in Table A-45.

50. Adjust the Level of the MG3700A so that the power meter (Sensor A) reads -25.0 dBm ± 0.05 dB. Record the Sensor A reading to the **M(Sa)** column in Table A-45.

51. Remove Sensor A from the splitter and connect the MT821xE RF In to the open end of the splitter using an adapter as shown in Figure 5-5 on page 5-21.

52. Set the MT821xE channel to 62.

53. Set the Pre Amp to Off and Reference Level to -25dBm.

54. Repeat steps 18 through 36 and record the results in Table A-50, "ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp Off" on page A-23 and Table A-51, "ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp On" on page A-23.

Noise Floor Verification

The tests in this section verify the noise floor of the MT821xE in ISDB-T SFN Signal Analyzer mode.

Procedure

1. Set the mode of the MT821xE to ISDB-T SFN Signal Analyzer and preset the unit.
2. Install a 50 ohm termination to the Spectrum Analyzer RF In connector.
3. Confirm the channel is set to 13 and Pre Amp is Off.
4. Set the Reference Level to –25 dBm.
5. Press the Meas Setup submenu key. Change Meas Mode to Continuous.
6. After Measuring percentage gets to 100%, record the Channel Power in Table A-52, "ISDB-T SFN Analyzer Noise Floor with Pre Amp Off" on page A-24.
7. Set the Reference Level to –50 dBm and the Pre Amp to On.
8. After Average (50/50) appears, record the Channel Power in Table A-53, "ISDB-T SFN Analyzer Noise Floor with Pre Amp On" on page A-24.
9. Change the channel to 38. Set the Pre Amp to Off.
10. Repeat steps 5 through 9 for Channel 38
11. Change the channel to 62. Set the Pre Amp to Off.
12. Repeat steps 5 through 9 for Channel 62.

5-6 Option 40 and/or 41, GSM/GPRS/EDGE Signal Analyzer Verification

The tests in this section verify that the optional GSM/GPRS/EDGE Signal Analyzer functions correctly in Anritsu Model MT821xE Cell Master. There are tests for the following:

GSM Signal Analyzer Option Verification (Option 40 and/or 41)

The tests in this section verify the function of the optional GSM Signal Analyzer in Model MT821xE Spectrum Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

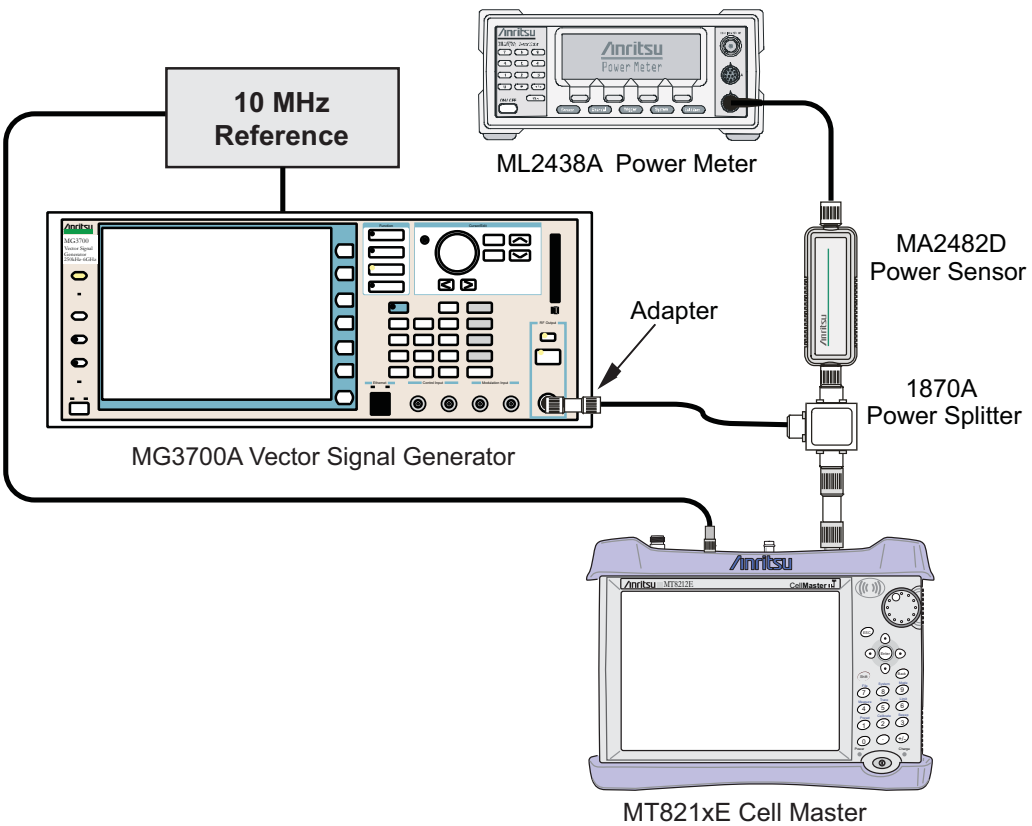

Figure 5-6. GSM/EDGE Signal Analyzer Option Verification

Procedure

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 5-6.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. On the power meter, press the **Sensor** key, and the Mode soft key until Measurement MODE is Mod average. Press the **System** key to display the power reading.
5. Set the MT821xE mode to GSM/GPRS/EDGE Signal Analyzer. Press **Shift** and press **Preset** (1) to preset the MT821xE.
6. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
7. Press the **Down Arrow** key or turn the knob to select Yes.
8. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

9. Press the (F1) soft key to select Load File to Memory.
10. Press the (F1) soft key again to select Select Package.
11. Using the **Down Arrow** key, step through the selection list until the "GSM" option is highlighted.
12. Press the **Set** key.
13. Press the (F6) soft key Return.
14. Press the **Set** key. The Select Package box will appear. Use the rotary knob to highlight GSM and press the **Set** key to select.
15. Another File List will appear. Use the rotary knob to select GsmBurst_1slot and press the **Set** key to select.
16. Press the **MOD On/Off** key to turn the Modulation LED On and verify that the "Playing" indicator in the center of the LCD is flashing.
17. Press the **Frequency** key and enter 850 MHz.
18. Press the **Level** key, enter –10, and press the dBm submenu key.
19. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB.
20. On the MT821xE, press the Frequency submenu key and enter 850 MHz as the Center Frequency.
21. Press the Measurements submenu key and select GSM/EDGE Summary (a red dot will appear on the label).
22. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 9.2 dB, now take this value and subtract from the power meter reading in Step 19. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz, –10 dBm Level, TCH Pattern** in Table A-54, "Option 40 GSM/GPRS/EDGE RF Measurements".
23. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 850 MHz, –10 dBm Level, TCH Pattern** in Table A-55, "Option 41 GSM/GPRS/EDGE Demodulator".
24. Verify that the measured values in Step 22 and/or Step 23 (or both) are within specifications.
25. On the MG3700A, change the selected signal pattern to GsmBurst_8slot.
26. Adjust the Level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Then wait 15 seconds to allow the MT821xE to update its measured results.

27. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 0.2 dB, now take this value and subtract from the power meter reading in Step 26. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz, –50 dBm Level, TCH ALL Pattern** in Table A-54".

28. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 850 MHz, –50 dBm Level, TCH ALL Pattern** in Table A-55".

29. Verify that the measured values in Step 27 and/or Step 28 (or both) are within specifications.

30. Change the frequency of MG3700A to 1800 MHz.

31. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 1800 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.

32. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dB.

33. On the MT821xE, set the Center Freq to 1800 MHz. Then wait 15 seconds to allow the MT821xE to update its measured results.

34. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 0.2 dB, now take this value and subtract from the power meter reading in Step 32. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz, –10 dBm Level, TCH ALL Pattern** in Table A-54.

35. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 1800 MHz, –10 dBm Level, TCH ALL Pattern** in Table A-55.

36. Verify that the measured values in Step 34 and/or Step 35 (or both) are within specifications.

37. On the MG3700A, change the selected pattern to GsmBurst_1slot.

38. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Then wait 15 seconds to allow the MT821xE to update its measured results.

39. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 9.2 dB, now take this value and subtract from the power meter reading in Step 37. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz, –50 dBm Level, TCH Pattern** in Table A-54.

40. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) in section **At 1800 MHz, –50 dBm Level, TCH Pattern** in Table A-55.

41. Verify that the measured values in Step 39 and/or Step 40 (or both) are within specifications.

EDGE Burst Power, Frequency Error, and Residual Error Tests (Option 40 and/or 41)

The tests in this section verify the function of the optional GSM Signal Analyzer in Model MT821xE Spectrum Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Procedure

1. Confirm that the equipment settings are unchanged from the previous test. Refer to Figure 5-6 on page 5-27.
2. On the MG3700A, change the selected pattern to DL_MCS-9_1SLOT.
3. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Then wait 15 seconds to allow the MT821xE to update its measured results.
4. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 9 dB, now take this value and subtract from the power meter reading in Step 3. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern** in Table A-54.
5. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern** in Table A-55.
6. Verify that the measured values in Step 4 or Step 5 (or both) are within specifications.
7. On the MG3700A, change the selected pattern to DL_MCS-9_4SLOT.
8. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dB. Then wait 15 seconds to allow the MT821xE to update its measured results.
9. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 3 dB, now take this value and subtract from the power meter reading in Step 8. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern** in Table A-54.
10. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern** in Table A-55.
11. Verify that the measured values in Step 9 or Step 10 (or both) are within specifications.
12. Change the frequency of MG3700A to 850 MHz.
13. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
14. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB.
15. On the MT821xE, set the Center Freq to 850 MHz. Then wait 15 seconds to allow the MT821xE to update its measured results.
16. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 3 dB, now take this value and subtract from the power meter reading in Step 14. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern** in Table A-54.
17. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern** in Table A-55.
18. Verify that the measured values in Step 9 or Step 10 (or both) are within specifications.
19. On the MG3700A, change the selected pattern to DL_MCS-9_1SLOT.
20. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dB. Then wait 15 seconds to allow the MT821xE to update its measured results.
21. For MT821xE with Option 40 (GSM/GPRS/EDGE RF Measurements), take the displayed Burst Power value and subtract an offset of 9 dB, now take this value and subtract from the power meter reading in Step 20. Then record the calculated Burst Power error and the displayed value of Freq Error in section **At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern** in Table A-54.
22. For MT821xE with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) in section **At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern** in Table A-55.
23. Verify that the measured values in Step 21 or Step 22 (or both) are within specifications.

5-7 Option 42 and/or 43, CDMA Signal Analyzer Verification

The tests in this section verify the optional CDMA Signal Analyzer functions in Anritsu Model MT821xE Cell Master. There are tests for the following:

- "cdmaOne Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)"
- "CDMA2000 Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)"

cdmaOne Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

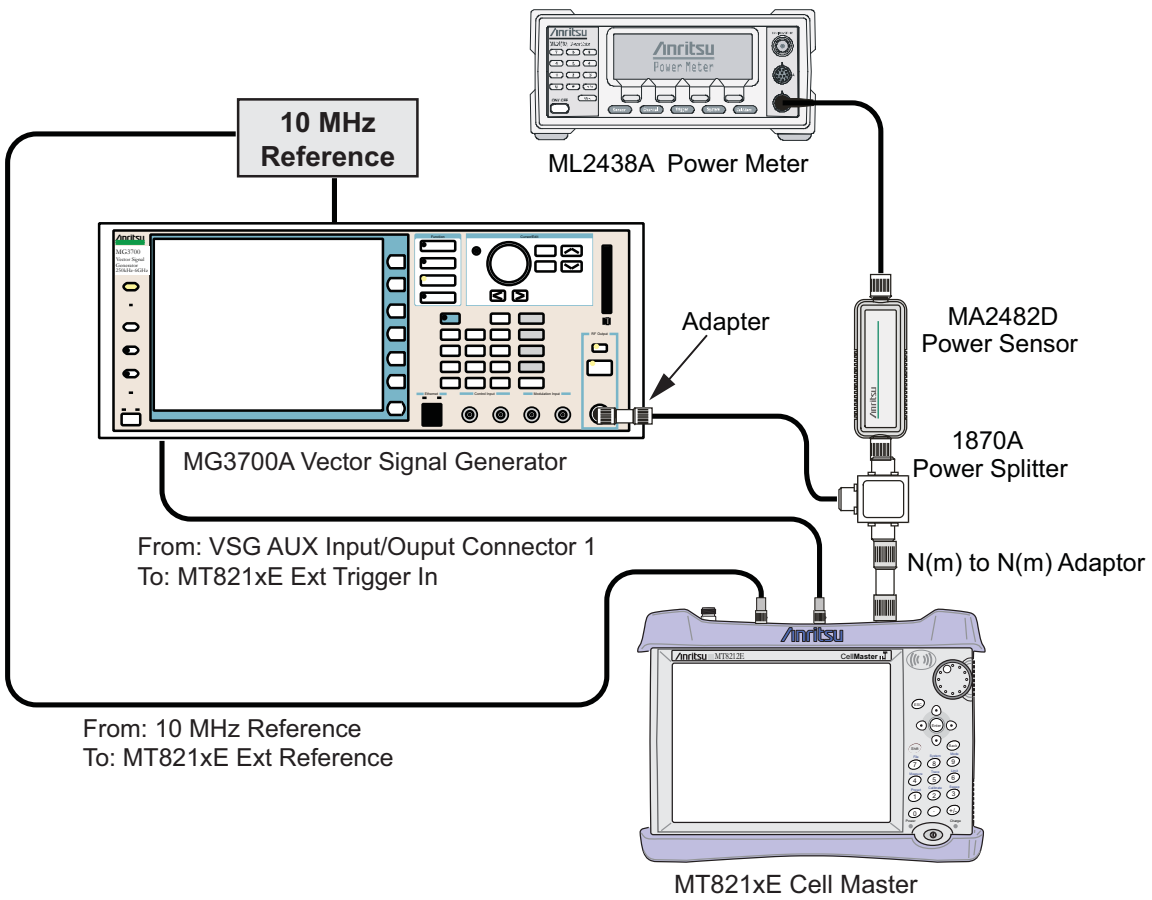

Figure 5-7. CDMA Signal Analyzer Option Verification

Procedure

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 5-7.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.3 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MT821xE mode to CDMA Signal Analyzer. Press **Shift** and press **Preset** (1) to preset the MT821xE.
5. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select Yes.
7. Press the **Set** key.

> **Note** The MG3700A has two **Set** keys, and that they both have the same function.

8. Press the (F1) soft key to select Load File to Memory.
9. Press the (F1) soft key again to select Select Package.
10. Using the **Down Arrow** key step through the selection list until the "CDMA2000" option is highlighted.
11. Press the **Set** key.
12. Press the (F6) soft key Return.
13. Press the **Set** key. The Select Package box will appear. Use the rotary knob to highlight "CDMA2000" and press the **Set** key to select.
14. Another File List will appear. Use the rotary knob to select "FWD_RC1-2_9channel" and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED On and verify that the "Playing" indicator in the center of the LCD is flashing.
16. Press the **Frequency** key, enter 870.03 MHz.
17. Press the **Level** key, enter –30 and press the dBm submenu key.
18. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB.
19. On the MT821xE, press the Frequency submenu key and enter 870.03 MHz as Center Frequency.
20. Press the Measurements submenu key and select CDMA Summary (a red dot will appear on the label).
21. Press the Setup submenu key and select PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger submenu key twice. Then wait 15 seconds to allow the MT821xE to update its measured results.
22. For MT821xE with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 18. Then record the calculated Channel Power error in section **At 870.03 MHz, –30 dBm Level, cdmaOne** in Table A-56, "Option 42 CDMA RF Measurements".
23. For MT821xE with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau in section **At 870.03 MHz, –30 dBm Level, cdmaOne** in Table A-57, "Option 43 cdmaOne and CDMA2000 1xRTT Demodulator".
24. Verify that the measured values in Step 22 and/or Step 23 (or both) are within specifications.
25. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
26. Set the MG3700A frequency to 1930.05 MHz.
27. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB.

28. On the MT821xE, press the Frequency submenu key and enter 1930.05 MHz as Center Frequency. Then wait 15 seconds to allow the MT821xE to update its measured results.
29. For MT821xE with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 27. Then record the calculated Channel Power error in the test record in section **At 1930.05 MHz, –30 dBm Level, cdmaOne** in Table A-56.
30. For MT821xE with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau in section **At 1930.05 MHz, –30 dBm Level, cdmaOne** in Table A-57.
31. Verify that the measured values in Step 29 and/or Step 30 (or both) are within specifications.

CDMA2000 Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)

The tests in this section verify the function of the optional CDMA Signal Analyzer in Model MT821xE Spectrum Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Procedure

1. Confirm that the equipment settings are unchanged from the previous test. Refer to Figure 5-7 on page 5-31.
2. On the MG3700A, change the selected pattern to “FWD_RC3-5_9channel”.
3. Adjust the level of the MG3700A so that the power meter reads –30 dBm ± 0.2 dB. Then wait 15 seconds to allow the MT821xE to update its measured results.
4. For MT821xE with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 3. Then record the calculated Channel Power error in section **At 1930.05 MHz, –30 dBm Level, CDMA2000** in Table A-56.
5. For MT821xE with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau in section **At 1930.05 MHz, –30 dBm Level, CDMA2000** in Table A-57.
6. Verify that the measured values in Step 4 and/or Step 5 (or both) are within specifications.
7. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Set the MG3700A frequency to 870.03 MHz.
9. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB.
10. On the MT821xE, press the Frequency submenu key and enter 870.03 MHz as Center Frequency. Then wait 15 seconds to allow the MT821xE to update its measured results.

11. For MT821xE with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 9. Then record the calculated Channel Power error in section **At 870.03 MHz, –30 dBm Level, CDMA2000** in Table A-56.
12. For MT821xE with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau into the test record in section **At 870.03 MHz, –30 dBm Level, CDMA2000** in Table A-57.
13. Verify that the measured values in Step 11 and/or Step 12 (or both) are within specifications.

5-8 Option 44, 45 and/or 65, WCDMA/HSDPA Signal Analyzer Verification

The tests in this section verify the optional WCDMA Signal Analyzer functions in Anritsu Model MT821xE Cell Master. There are tests for the following:

WCDMA Absolute Power Accuracy Verification (Option 44)

This test verifies the WCDMA absolute power accuracy in WCDMA/HSDPA Signal Analyzer Mode in the Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Mini Circuits Model TIA-1000-1R8 RF Power Amplifier
- Anritsu PN 1000-50 Circulator
- Aeroflex/Weinschel Model M1418 High Power Load
- Anritsu PN 1091-307 Coupler
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu Model MN63A Programmable Attenuator

Setup

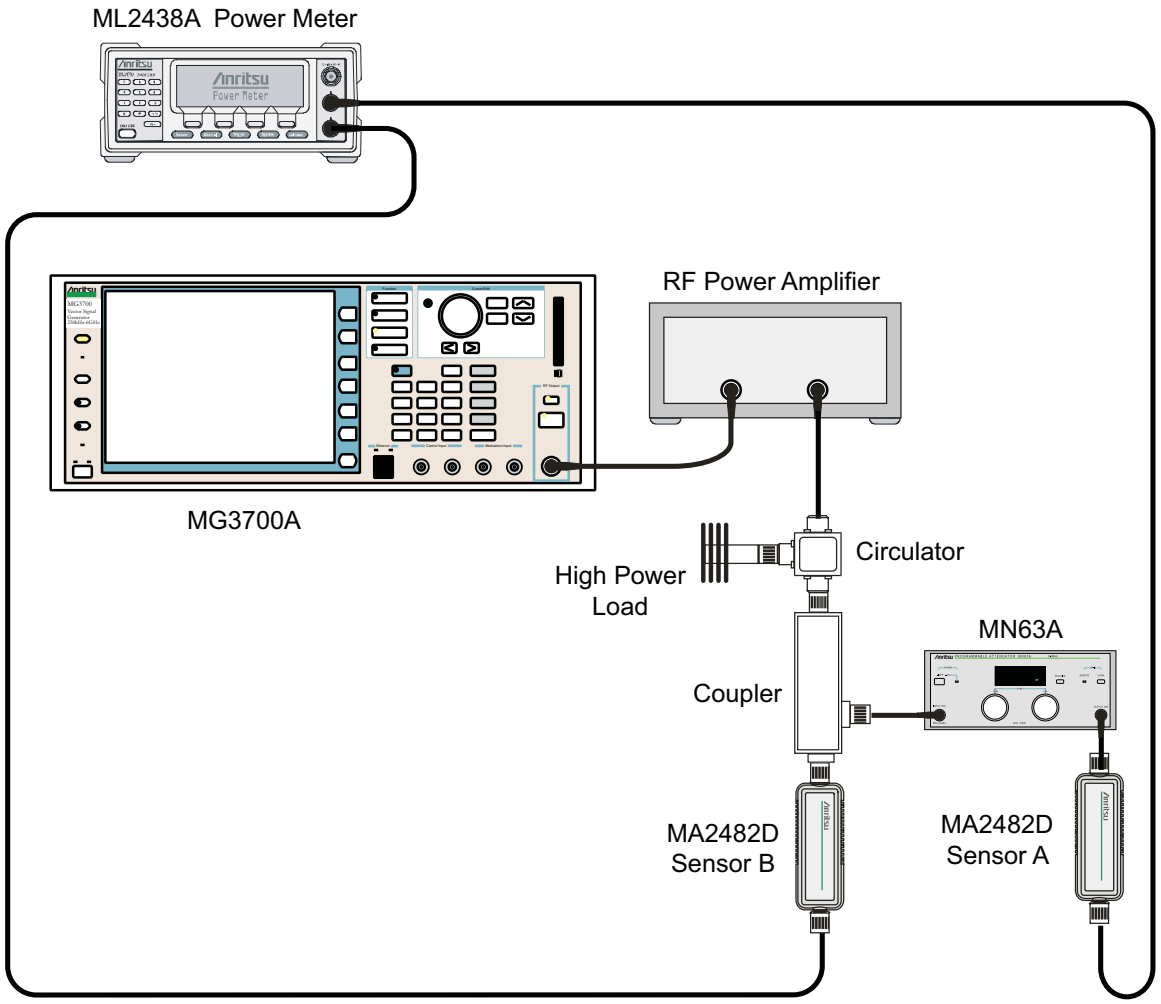

Figure 5-8. WCDMA Signal Analyzer Option Verification (Setup 1)

Procedure

1. Connect the power sensors to the power meter and then calibrate the sensors.
2. Connect the MG3700A, RF power amplifier, attenuator, power meter, and sensors as shown in Figure 5-8.
3. Turn on the MG3700A, RF amplifier, attenuator and the power meter.
4. Press the **On/Off** key to turn on the MT821xE and wait until the measurement display appears then press the **Shift** key and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box will appear. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list will appear, using the **Down Arrow** key step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, enter 881.5 MHz then press the MHz submenu key.
20. Press the **Level** key, enter –28 and press the dBm submenu key.
21. Use the knob to adjust the power level so sensor B reads +10 dBm.
22. Set the MN63A attenuator to 0 dB.
23. Record the sensor A reading (PMA.10) in Table A-58, "Option 44, Sensor A and B Reading Components Characterization Table". This should be around –20 dBm.
24. Record the sensor B reading (PMB.10) in Table A-58.
25. Calculate Delta 1 which is the error of the coupler output port deviation from ideal +10 dBm using the following formula:

    Delta 1 (dBm) = (10 dBm – PMB.10)
26. Record the Delta 1 value in Table A-58.
27. Calculate the accurate value of sensor A reading for coupler port output of +10 dBm (PMA.10C) using the following formula:

    PMA.10C = PMA.10 + Δ1
28. Record the calculated value in Table A-58.
29. Set the MN63A attenuator to 10 dB and record sensor A reading (PMA.20) in Table A-58.
30. Calculate the accurate attenuation value using the following formula:

    ATT.10 = (PMA.10 – PMA.20)
31. Record the calculated value in Table A-58.
32. Turn off the RF output of the MG3700A.
33. Disconnect the coupler from sensor B and connect the coupler to the MT821xE SPA RF In connector. Refer to Figure 5-9

.

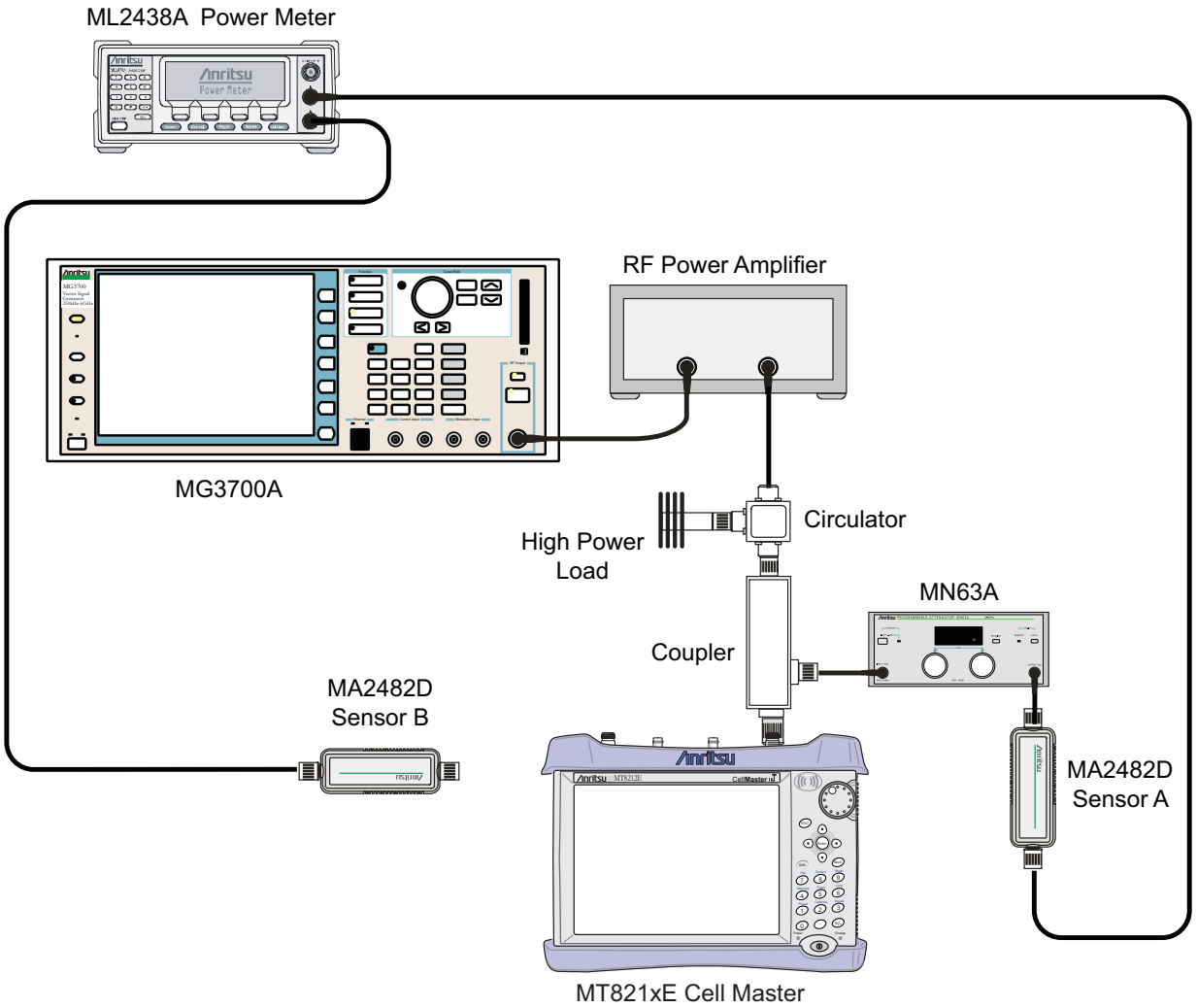

Figure 5-9. WCDMA Signal Analyzer Option Verification (Setup 2)

34. Set the MN63A attenuator to 0 dB.

35. On the MT821xE press the Center Freq submenu key, enter 881.5 and then press the MHz submenu key.

36. Press the Measurements submenu key, then the RF Measurement submenu key, then the Channel Spectrum submenu key.

37. On the MG3700A turn on the RF output and use the knob to adjust power level to read the value of PMA.10C on sensor A.

38. Record the MG3700A power level setting (MG3700A.10) in Table A-59, "Option 44, Power Level Setting Components Characterization Table".

39. On the MT821xE press the **Amplitude** key and then press the Adjust Range submenu key.

40. Record the channel power reading in the **Measured Power** column of the **+10 dBm** row of Table A-60, "Option 44, WCDMA Absolute Power Accuracy".

41. Use the following formula to calculate the absolute power accuracy of the MT821xE at +10 dBm:

Error = Measured Power –10

42. Record the calculated value in the **Error** column of the **+10 dBm** row of Table A-60 and verify that it is within specification.

43. Turn off the RF output of the MG3700A.

44. Set the MN63A attenuator to 10 dB.

45. Calculate the value of the MG3700A setting (MG3700A.20) for +20 dBm Test Level using the following formula:

MG3700A.20 = MG3700A.10 + ATT.10

46. Record the calculated value in Table A-59.

47. On the MG3700A turn on the RF output and use the knob to adjust power level to the recorded MG3700A.20 value in the Table A-59.

48. On the MT821xE press the **Amplitude** key and then press the Adjust Range submenu key.

49. Record channel power reading in the **Measured Power** column of the **+20 dBm** row of Table A-60.

50. Use the following formula to calculate the absolute power accuracy of the MT821xE at +20 dBm:

Error = Measured Power –20

51. Record the calculated value in the **Error** column of the **+20 dBm** row of Table A-60 and verify that it is within specification.

52. Turn off the RF output of the MG3700A.

53. Set the MN63A attenuator to 0 dB.

54. Set power level of the MG3700A to –38 dBm.

55. Calculate the value of sensor A reading (PMA.10) for –10 dBm Test Level using the following formula:

PMA.10 = PMA.10C – 30

56. Record the calculated value in Table A-59.

57. Turn on the RF output and use the knob to adjust power level to read the value of PMA.10 on sensor A.

58. On the MT821xE press the **Amplitude** key and then press the Adjust Range submenu key.

59. Record channel power reading in the **Measured Power** column of the **–10 dBm** row of Table A-60.

60. Use the following formula to calculate the absolute power accuracy of the MT821xE at –10 dBm:

Error = Measured Power – (-10)

61. Record the calculated value in the **Error** column of the **–10 dBm** row of Table A-60 and verify that it is within specification.

62. Turn off the RF output of the MG3700A.

63. Decrease power level of the MG3700A by 10 dB.

64. Calculate the value of sensor A reading (PMA.20) for –20 dBm Test Level using the following formula:

PMA.20 = PMA.10C – 30

65. Record the calculated value in Table A-59.

66. Turn on the RF output and use the knob to adjust power level to read the value of PMA.20 on sensor A.

67. On the MT821xE press the **Amplitude** key and then press the Adjust Range submenu key.

68. Record channel power reading in the **Measured Power** column of the **–20 dBm** row of Table A-60.

69. Turn off the RF output of the MG3700A.

70. Use the following formula to calculate the absolute power accuracy of MT821xE at –20 dBm:

Error = Measured Power – (-20)

71. Record the calculated value in the **Error** column of the **–20 dBm** row of Table A-60 and verify that it is within specification.

WCDMA Occupied Bandwidth (OBW) Verification (Option 44)

The tests in this section verify the function of the WCDMA occupied bandwidth in WCDMA/HSDPA Signal Analyzer Mode on Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

Setup

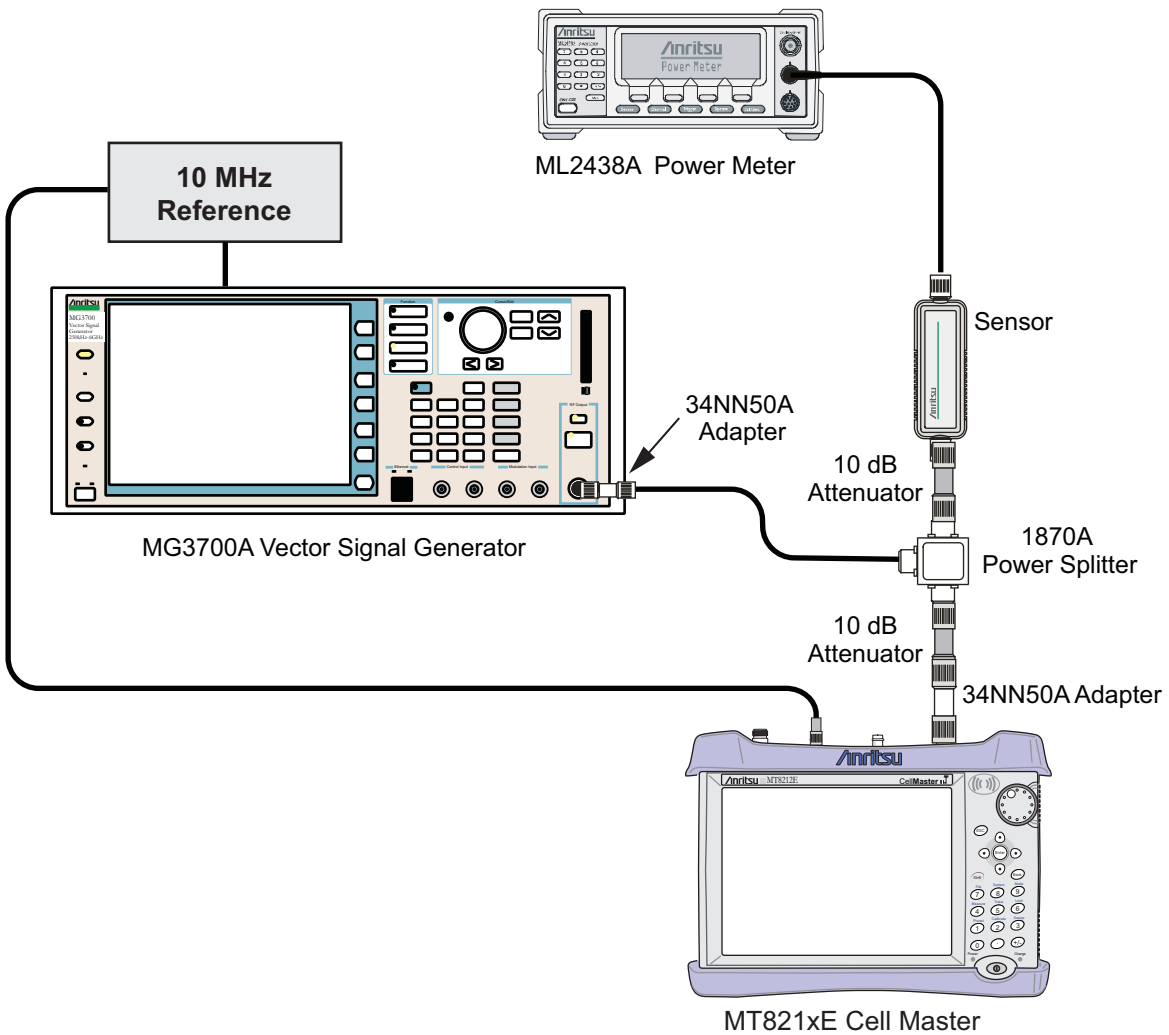

Figure 5-10. WCDMA Occupied Bandwidth (OBW) Verification

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 5-10.
4. Press the **On/Off** key to turn on the MT821xE and wait until the measurement display appears then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box will appear. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list will appear, using the **Down Arrow** key step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter the frequencies from the WCDMA Occupied Bandwidth (OBW) Table A-61, “Option 44, WCDMA Occupied Bandwidth (OBW)” starting with 881.5 and press the MHz submenu key.
20. Press the **Level** key, then enter –2 and press the dBm submenu key.
21. Use the knob to adjust the power level so the power meter reads –20 dBm, record reading in the **Power Meter Reading** column of Table A-61.
22. On MT821xE press the Center Frequency submenu key, enter frequencies from Table A-61 starting with 881.5 then press the **Enter** key.
23. Press the Measurements submenu key, then the RF Measurement submenu key and select Channel Spectrum soft key.
24. Press the **Amplitude** key, then press the Adjust Range submenu key.
25. Record the OBW reading in the **OBW** column of Table A-61 and verify that it is within 4.2 MHz ± 100 kHz.
26. Repeat Step 19 to Step 25 for the other frequencies listed Table A-61.

WCDMA RF Channel Power Accuracy and Adjacent Channel Leakage Ratio (ACLR) Verification (Option 44)

The tests in this section verify the function of the WCDMA RF Channel Power Accuracy and ACLR Accuracy in WCDMA/HSDPA Signal Analyzer Mode on Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 5-10.
4. Press the **On/Off** key to turn on the MT821xE and wait until the measurement display appears then press the **Shift** key, then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box will appear. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list will appear, using the **Down Arrow** key step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 881.5 and press the MHz submenu key.

20. Press the **Level** key, then enter –2 and press the dBm submenu key.
21. Use the knob to adjust the power meter to read –20 dBm and record the Power Meter reading in the **Power Meter Reading** column of Table A-62, "Option 44, WCDMA RF Channel Power Accuracy".
22. On the MT821xE press the Center Frequency submenu key, enter 881.5, and then press the **Enter** key.
23. Press the Measurements submenu key, then the RF Measurement submenu key and select ACLR.
24. Press the **Amplitude** key, then press the Adjust Range submenu key.
25. Record the measured CH 1 power in dBm in the **Measured RF Channel Power** column Table A-62.
26. Calculate the RF Channel Power Error using the following formula:

    RF Channel Power Error (dB) = Measured RF Channel Power – 0.246 – Power Meter reading
27. Record calculated value to the **RF CH Power Error** column of Table A-62 and verify that it is within specification (± 1.25 dB).
28. Record all four measured Adjacent Channel Leakage Ratios in dB to the **Measured ACLR** column of the following rows in Table A-63, "Option 44, WCDMA ACLR Accuracy"

    881.5 / –10 MHz
    881.5 / –5 MHz
    881.5 / 5 MHz,
    881.5 / 10 MHz
29. Calculate the ACLR Error at –10 and 10 MHz Offset using the following formula:

    ACLR Error at –10 or 10 MHz Offset = $10\ LOG10(10^{(-50/10)} + 10^{(Measured\_ACLR/10)}) – (–50)$ dB
30. Record in the calculated results to the corresponding cells in the **Calculated ACLR Error** column of Table A-63 and verify that it is within specification.
31. Calculate the ACLR Error at 5 MHz Offset using the following formula:

    ACLR Error at –5 or 5 MHz Offset = $10\ LOG10(10^{(-45/10)}) + 10^{(Measured\_ACLR/10)}) – (–45)$ dB
32. Record in the calculated results to the corresponding cells in the **Calculated ACLR Error** column of Table A-63 and verify that it is within specification.
33. Repeat Steps 19 to 32 for the other frequencies and offsets listed in Table A-63.

HSDPA RF Channel Power Accuracy and Adjacent Channel Leakage Ratio (ACLR) Verification (Option 44)

The tests in this section verify the function of the RF Channel Power Accuracy and ACLR Accuracy for HSDPA signal in WCDMA/HSDPA Signal Analyzer Mode on Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to Figure 5-10.
4. Press the **On/Off** key to turn on the MT821xE and wait until the measurement display appears then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the **W-CDMA(BS Tx test)** option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box will appear. Again select **W-CDMA(BS Tx test)** and then press the **Set** key.
16. Another file list will appear, using the **Down Arrow** key step through the selection list until the **TestModel_5_8HSPDSCH** option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 2680.5 and press the MHz submenu key.
20. Press the **Level** key, then enter –2 and press the dBm submenu key.
21. Use the knob to adjust the power meter to read –20 dBm and record the Power Meter reading in the **Power Meter Reading** column of Table A-64, "Option 44, HSDPA RF Channel Power Accuracy".
22. On the MT821xE, press the **Freq** main menu key, then the Center Freq submenu key, enter 2680.5, and then press the MHz submenu key.
23. Press the Measurements submenu key, then the RF Measurement submenu key and select ACLR.
24. Press the **Amplitude** key, then press the Adjust Range submenu key.
25. Record the measured CH 1 power in dBm to the **Measured RF Channel Power** column Table A-64.
26. Calculate the RF Channel Power Error using the following formula:

    RF Channel Power Error (dB) = Measured RF Channel Power – 0.246 – Power Meter reading

27. Record calculated value to the **RF CH Power Accuracy** column of Table A-64 and verify that it is within specification (± 1.25 dB).
28. Record all four measured Adjacent Channel Leakage Ratios in dB at –10 MHz Offset, –5 MHz Offset, 5 MHz Offset and 10 MHz Offset in the **Measured ACLR** column of Table A-65, "Option 44, HSDPA ACLR Accuracy".

29. Calculate the ACLR Error at –10 and 10 MHz Offset using the following formula:

    ACLR Error at –10 or 10 MHz Offset = 10 LOG10($10^{(-50/10)}$ + $10^{(Measured\_ACLR/10)}$) – (–50) dB

30. Record in the calculated results to the corresponding cells in the **Calculated ACLR Error** column of Table A-65 and verify that it is within specification.
31. Calculate the ACLR Error at 5 MHz Offset using the following formula:

    ACLR Error at –5 or 5 MHz Offset = 10 LOG10($10^{(-45/10)}$ + $10^{(Measured\_ACLR/10)}$) – (–45) dB

32. Record in the calculated results to the corresponding cells in **Calculated ACLR Error** column of Table A-65 and verify that it is within specification.

Error Vector Magnitude (EVM) Verification (Options 45 or 65)

The tests in this section can be used to verify the functionality of the WCDMA and/or HSDPA Demodulator of the WCDMA/HSDPA Signal Analyzer Mode on Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- Aeroflex/Weinschel Model 44-10 Attenuator (2)
- 10 MHz Reference Standard

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 5-10.
4. Press the **On/Off** key to turn on the MT821xE and wait until the measurement display appears then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.

14. Press the (F6) soft key Return.
15. Press the **Set** key. The Select Package list box will appear. Again select W-CDMA(BS Tx test) and then press the **Set** key.
16. Another file list will appear, using the **Down Arrow** key step through the selection list until the TestModel_4_opt option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 1962.5 and press the MHz submenu key.
20. Press the **Level** key, then enter –2 and press the dBm submenu key.
21. Use the knob to adjust the power meter to read -20 dBm.
22. On the MT821xE, press the Center Frequency submenu key, enter 1962.5 and then press the MHz submenu key.
23. Press the Measurements submenu key, then press the Demodulator submenu key and select the Modulation Summary submenu key.
24. Press the Setup submenu key, then press the Auto Scrambling submenu key to turn it on.
25. Press the Max Spreading Factor submenu key to set it to 512.
26. Press the **Amplitude** key, then press the Adjust Range submenu key.
27. Record the EVM reading in Table A-66, "Option 45 or 65, WCDMA Error Vector Magnitude (Test Model 4)" and verify that it is within 2.5%.
28. This completes the EVM test for MT821xE with Option 45 and the first EVM test for MT821xE with Option 65.

Continue Here For MT821xE with Option 65

29. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
30. Press the **Down Arrow** key to select Yes.
31. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

32. Press the (F1) soft key to select Load File to Memory.
33. Press the (F1) soft key again to select Select Package.
34. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
35. Press the **Set** key.
36. Press the (F6) soft key Return.
37. Press the **Set** key. The Select Package list box will appear. Again select W-CDMA(BS Tx test) and then press the **Set** key.
38. Another file list will appear, using the **Down Arrow** key step through the selection list until the TestModel_5_8HSPDSCH option is highlighted.
39. Press the **Set** key.
40. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
41. Press the **Frequency** key, then enter 1962.5 and press the MHz submenu key.
42. Press the **Level** key, then enter –2 and press the dBm submenu key.

43. Use the knob to adjust the power meter to read –20 dBm.
44. On the MT821xE, press the Center Frequency submenu key, enter 1962.5 and then press the MHz submenu key.
45. Press the Measurements submenu key, then press the Demodulator submenu key and select the Modulation Summary submenu key.
46. Press the Setup submenu key, and verify the Scrambling Code is set to Auto.
47. Verify the Max Spreading Factor submenu key to set it to 512.
48. Press the **Amplitude** key, then press the Adjust Range submenu key.
49. Record the EVM reading in Table A-67, "Option 65, HSDPA Error Vector Magnitude (Test Model 5)" and verify that it is within 2.5%.

This completes the two EVM tests for MT821xE with Option 65.

5-9 Option 46 and/or 47, Fixed WiMAX Signal Analyzer Verification

The tests in this section verify the performance of the optional Fixed WiMAX Signal Analyzer of the MT821xE Cell Master. There are tests for the following:

Fixed WiMAX Signal Analyzer Option Verification (Options 46)

The tests in this section verify the Channel Power Accuracy of the optional Fixed WiMAX Signal Analyzer in Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

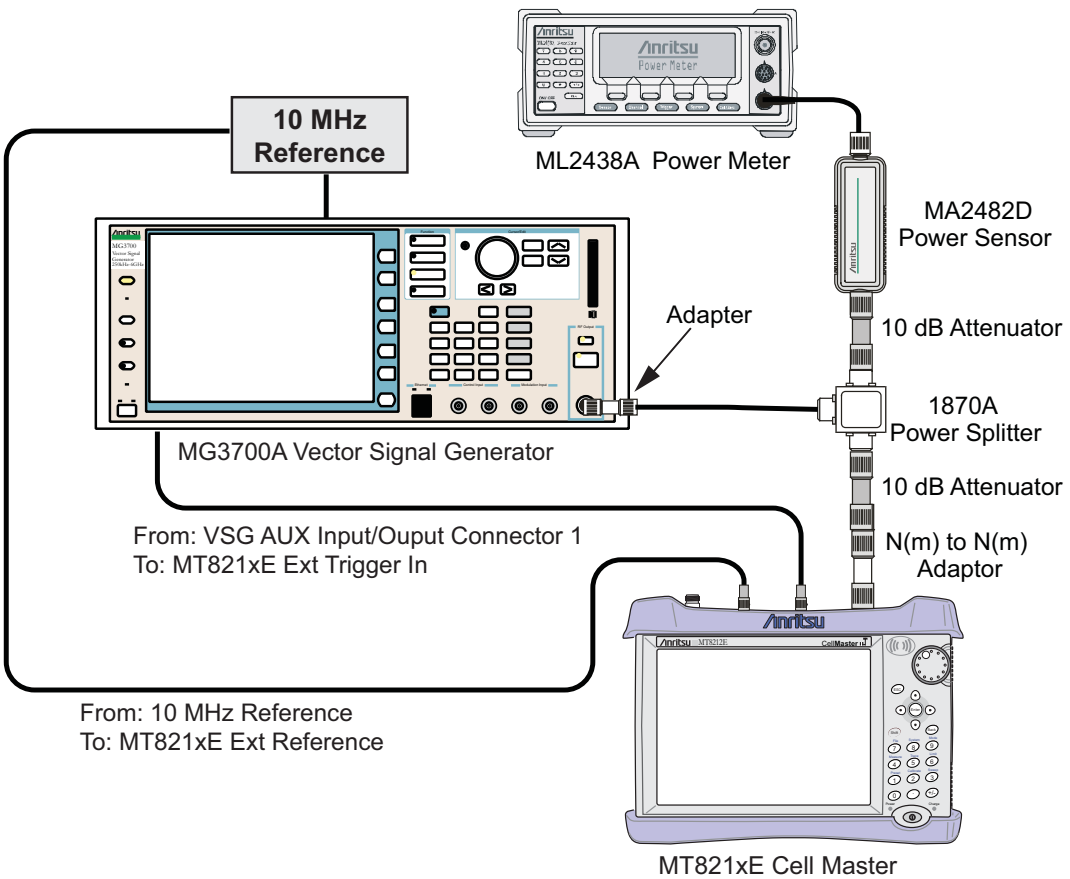

Figure 5-11. Fixed WiMAX Signal Analyzer Option Verification

Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the cal factor frequency of the power sensor to 2600.5 MHz.
3. Connect the equipment as shown in Figure 5-11.
4. Set the MG3700A as follows:
   a. Press the yellow **Preset** key (answer yes to the question).
   b. Press the **Set** key.
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until WiMax is highlighted.
   f. Press the **Set** key.
   g. Press the Return (F6) soft key.
   h. Press the **Set** key. The Select Package list box will appear. Again select WiMax and the **Set** key.
   i. Another file list will appear. Select (highlight) Mx10g32.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is on. Confirm that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
5. Adjust the MG3700A level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB.
6. Set the MT821xE to Fixed WiMax Signal Analyzer mode and preset the unit.
7. Set the MT821xE as follows:
   a. Press the **Freq** main menu key and set the center frequency to 2600.5 MHz.
   b. Press the Setup submenu key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio submenu key (under the Setup submenu key) and set the CP Ratio to 1/32.
   d. Press the Measurements submenu key and select RF, then select Power vs. Time.
8. Record the MT821xE Channel Power (RSSI) reading in the **Measured Channel Power (RSSI)** column of Table A-68, "Option 46, Fixed WiMAX Channel Power Accuracy".
9. Calculate the Channel Power Error by subtracting the MT821xE Channel Power (RSSI) reading from the power meter reading in Step 5. Record the result in the **Error** column of Table A-68.
10. Verify that the error is within specification.
11. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm.
12. Record the MT821xE Channel Power (RSSI) reading in the **Measured Channel Power (RSSI)** column of Table A-68.
13. Calculate the Channel Power Error by subtracting the MT821xE Channel Power (RSSI) reading from the power meter reading in step 11. Record the result to the **Error** column of Table A-68.
14. Verify that the error is within specification.
15. Set the cal factor frequency of the power sensor to 3600.5 MHz.
16. Set the MG3700A frequency to 3600.5 MHz.
17. Change the MT821xE center frequency to 3600.5 MHz.
18. Measure the Channel Power (RSSI) for both –15 and –50 dBm and then record the measured result and calculated error in Table A-68.

19. Verify that the error is within specification.
20. Set the cal factor frequency of the power sensor to 5600.5 MHz.
21. Set the MG3700A frequency to 5600.5 MHz.
22. Change the MT821xE center frequency to 5600.5 MHz.
23. Repeat steps 18 to 19.

Fixed WiMAX Signal Analyzer Option Verification (Option 47)

The tests in this section verify the Residual EVM and Frequency Error of the optional Fixed WiMAX Signal Analyzer in Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the cal factor frequency of the power sensor to 2600.5 MHz.
3. Connect the equipment as shown in Figure 5-11.
4. Set the MG3700A as follows:
   a. Press the yellow **Preset** key (answer yes to the question).
   b. Press the **Set** key.
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until WiMax is highlighted.
   f. Press the **Set** key.
   g. Press the Return (F6) soft key.
   h. Press the **Set** key. The Select Package list box will appear. Again select WiMax and the **Set** key.
   i. Another file list will appear. Select (highlight) Mx10g32.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is on. Confirm that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
5. Adjust the MG3700A level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB.

6. Set the MT821xE to Fixed WiMax Signal Analyzer mode and preset the unit.
7. Set the MT821xE as follows:
   a. Press the **Freq** main menu key and set the center frequency to 2600.5 MHz.
   b. Press the Setup submenu key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio submenu key (under the Setup submenu key) and set the CP Ratio to 1/32.
   d. Press the Measurements submenu key and select Demodulator, then select Modulation Summary.
8. Record the MT821xE EVM(rms) reading in Table A-69, "Option 47, Fixed WiMAX Residual EVM".
9. Verify that the measured EVM is within specification.
10. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB.
11. Record the MT821xE EVM(rms) reading in Table A-69.
12. Verify that the measured EVM is within specification.
13. Record the MT821xE Freq Error reading in Table A-70, "Option 47, Fixed WiMAX Frequency Error".
14. Verify that the measured frequency error is within specification.
15. Set the cal factor frequency of the power sensor to 3600.5 MHz.
16. Set the MG3700A frequency to 3600.5 MHz.
17. Change the center frequency of the MT821xE to 3600.5 MHz.
18. Measure the EVM(rms) for both –15 dBm and –50 dBm, record the measured results in Table A-69.
19. Verify that the measured EVM is within specification.
20. Set the cal factor frequency of the power sensor to 5600.5 MHz.
21. Set the MG3700A frequency to 5600.5 MHz.
22. Adjust the MG3700A level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dBm.
23. Change the center frequency of the MT821xE to 5600.5 MHz.
24. Record the MT821xE EVM(rms) reading in Table A-69.
25. Verify that the measured EVM is within specification.
26. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB.
27. Record the MT821xE EVM(rms) reading in Table A-69.
28. Verify that the measured EVM is within specification.
29. Record the MT821xE frequency error reading in Table A-70.
30. Verify that the measured frequency error is within the specification.

5-10 Option 51, T1 Analyzer Verification

These tests verify the functionality of the T1 Analyzer in the Model MT821xE Cell Master. These tests include:

- "T1 Clock Frequency Test Verification"
- "T1 Transmit Level Test Verification"

Equipment Required

- Anritsu MP1570A Sonet Analyzer with MP0121A and MP0122A modules
- Anritsu PN 806-16 Cable T1 Bantam Plug to Bantam Plug (Quantity 2)
- LeCroy Model WaveRunner 62Xi Digital Oscilloscope with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set

T1 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.
2. On the MT821xE, press **Shift**, **Mode** (9), and use the **Up**/**Down** keys to select T1 Analyzer.
3. Press **Shift**, **Preset** (1). Select the Preset soft key to preset the unit.

Note

Basic Instructions for Operation of MP1570A:

The Test Menu, Result, and Analyze keys all should be pressed so their LEDs are on.

The green Start/Stop key should also be pressed so its LED is on.

The Setup key toggles between two displays. You will need to change Parameters under both these displays.

If the required parameter is not visible under the present display, press the **Setup** key, and the required parameter will appear on the new display.

Changing the Setup Parameters:

Use the arrow keys to highlight different parameters that will need to be changed. Use the **Set** key to display the menu of choices for each parameter.

Use the **Up**/**Down** arrow keys to highlight the desired setting, then press the **Set** key to accept the highlighted setting.

4. Set up the MP1570A as follows:

   Mapping set to Tx&Rx
   Configuration set to SDH/PDH
   Meas. Mode set to Out_of_service
   Bit Rate set to 1.5M
   MUX/DEMUX: set to OFF (not present on all units).
   Frame set to ON
   1.5M Code set to B8ZS
   Framed set to ESF
   DSX set to 0 ft.
   Clock set to internal
   Monitor Mode is set to OFF

5. Change to the other Setup display (press the Setup key again) and set as follows:

   Test Pattern set to PRBS15
   Invert mode set to OFF
   Analyze set to Freq. monitor.

6. Using an 806-16 bantam cable, connect the MT8222A TX connector to the MP1570A AMI/B8ZS Input (on the MP0122A module).

7. Using another 806-16 bantam cable, connect the MT821xE RX connector to the MP1570A AMI/B8ZS Output (on the MP0122A module).

8. On the MT821xE, press the Configuration soft key near the bottom left corner of the display and verify that "Tx Clock" is set to Internal, "Line Code" is set to B8ZS and "Framing" is set to ESF. Then set "Tx LBO" to 0 dB and "Pattern " to PRBS-15.

9. The MT821xE T1 frequency and ppm error will appear on the MP1570A. Record the ppm error value in the **Internal Clock Error** row of Table A-71, "Option 51, T1 Frequency Clock".

10. On the MP1570A, change "Pattern" to "All One".

11. On the MT821xE, press the Configuration soft key.

12. Use the rotary knob to select Tx Clock and set Tx Clock to Recovered.

13. Press the Measurements soft key and select Rx Signal.

14. Press the Start/Stop soft key so "Measure On" is displayed.

15. Record the Frequency value on the MT821xE in the **Recovered Clock Frequency** row of Table A-71.

T1 Transmit Level Test Verification

The tests in this section verify the transmit level of the T1 signal from the MT821xE in T1 Analyzer mode.

Procedure

1. Install the LeCroy AP100 100 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.

2. Connect the bantam to bantam cable from the Tx port on the T1 interface of the MT821xE to the input of the LeCroy AP100 adapter on the Oscilloscope.

3. Set the MT821xE to T1 Analyzer Mode and preset the unit.

4. Press the Configuration soft key and set up the MT821xE as follows:

   Test Mode - DS1
   Line code - B8ZS
   Tx Clock - Internal
   Receive Input - Terminate
   Framing - ESF
   Payload Type - 1.544Mb
   Tx LBO - 0dB

5. Press the Pattern/Loop soft key and select All Ones.

6. On the LeCroy Oscilloscope, use the stylus to tap on File on the Toolbar. Select Recall Setup… and then tap the Recall Default button to reset the Oscilloscope.

7. Press the **Auto Setup** key and then tap the "Confirm" button. Wait until the oscilloscope displays a stable trace.

8. Tap on Measure on the Toolbar and select Std Vertical.

9. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of Table A-72, "T1 Transmitted Level Voltage".

10. Verify that the measured peak to peak voltage is between 4.8 and 7.6 volts.

11. Change “Tx LBO” to –7.5 dB on the MT821xE.
12. Record the displayed peak to peak voltage in the **Tx LBO: –7.5 dB** row of Table A-72 and verify that it is between 1.9 and 3.1 volts.
13. Change “Tx LBO” to –15 dB on the MT821xE.
14. Record the displayed peak to peak voltage in the **Tx LBO: –15 dB** row of Table A-72 and verify that it is between 0.5 and 1.7 volts.
15. Disconnect the bantam cable from the Oscilloscope and connect it to the Rx port on the MT821xE.
16. On the MT821xE, press the Measurements soft key and select Rx Signal.
17. Press the Start/Stop soft key to turn measurement on.
18. Read the Vpp value from the displayed table and record it in the **Tx LBO: –15 dB** row of Table A-73, “T1 Transmitted Level Vpp Reading”.
19. Verify that the measured Vpp value is between 0.5 and 1.7 volts.
20. Change “Tx LBO” to –7.5 dB on the MT821xE.
21. Record the displayed peak to peak voltage in the **Tx LBO: –7.5 dB** row of Table A-73 and verify that it is between 1.9 and 3.1 volts.
22. Change “Tx LBO” to 0 dB on the MT821xE.
23. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of Table A-73 and verify that it is between 4.8 and 7.6 volts.

5-11 Option 52, E1 Analyzer Verification

These tests verify the functionality of the E1 Analyzer in the Model MT821xE Cell Master. These tests include:

E1 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

Equipment Required

- Anritsu MP1570A Sonet Analyzer with MP0121A and MP0122A modules
- Anritsu PN 3-806-169 Cable 75 ohm BNC(m) to BNC(m) (Quantity 2)
- Anritsu PN 806-117 Cable RJ48 to dual Bantam
- Anritsu PN T3450 Test Fixture
- LeCroy Model WaveRunner 62Xi Digital Oscilloscope with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set

Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.

Note

Basic Instructions for Operation of MP1570A:

The Test Menu, Result, and Analyze keys all should be pressed so their LEDs are on.

The green Start/Stop key should also be pressed so its LED is on.

The Setup key toggles between two displays. You will need to change Parameters under both these displays.

If the required parameter is not visible under the present display, press the **Setup** key, and the required parameter will appear on the new display.

Changing the Setup Parameters:

Use the arrow keys to highlight different parameters that will need to be changed. Use the **Set** key to display the menu of choices for each parameter.

Use the **Up**/**Down** arrow keys to highlight the desired setting, then press the **Set** key to accept the highlighted setting.

2. Set up the MP1570A as follows:

Set Mapping to Tx&Rx
Set Config. to SDH/PDH
Set Bit Rate to 2M
Set Frame to ON
Set Channel to 30ch
Set CRC4 to ON
Set Signalling to OFF
Set Interface to Unbalanced
Set Clock to internal
Set Monitor Mode to OFF

3. Press the **Test Menu** key and set up the MP1570A as follows:

   Set Test menu to Manual
   Set Test Pattern to PRBS15
   Set Invert mode to OFF
   Set Analyze to Freq. monitor

4. Set the Mode of the instrument to E1 Analyzer and preset the unit.
5. Press the "Configuration" soft key (below the display)
6. Confirm that "Tx Clock" is set to Internal.
7. Use the down arrow key to highlight Input Connector.
8. Select BNC 75 Ohms soft key.
9. Press the Pattern soft key. Use the rotary knob to highlight "PRBS15" and press the Select Pattern soft key.
10. Connect a 75 ohm BNC cable (part number 3-806-169) between Tx port of the MT821xE and the CMI/HDB3 Input of the MP0121A Module on the MP1570A.
11. Connect a 75 ohm BNC cable (part number 3-806-169) between Rx port of the MT821xE and the CMI/HDB3 Output of the MP0121A Module on the MP1570A.
12. On the MP1570A, allow the status bar on the bottom of the display to complete at least one sweep.
13. Record the ppm reading in the **Internal Clock Error** row of Table A-74, "Option 52, E1 Frequency Clock".
14. On the MT821xE, press the Measurements soft key and then the Rx Signal soft key.
15. Press the Start/Stop soft key to turn measurement on, "Measure ON" appears in the lower left corner of the display.
16. Record the Frequency reading on the display in the **Recover Clock Frequency** row of Table A-74.
17. Press the Start/Stop soft key to stop the measurement.

E1 Transmit Level Test Verification

The tests in this section verify the transmit level of the E1 signal from the MT821xE in T1 Analyzer mode.

Procedure

BNC (75 Ohm unbalanced [Single End]) Interface Check:

1. Install the LeCroy PP090 75 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.
2. Connect the 75 ohm BNC cable (part number 3-806-169) from the Tx port on the E1 interface of the MT821xE to the 75 ohm adapter on the Oscilloscope.
3. Set the MT821xE to E1 Analyzer mode and preset the unit.
4. Use the rotary knob to highlight Input Connector and then press the BNC 75 Ohms soft key to switch the input connector.
5. Press the Pattern soft key and use the right arrow key to highlight All Ones. Press the Select Pattern soft key.
6. On the LeCroy Oscilloscope, use the stylus to tap on File on the Toolbar. Select Recall Setup… and then tap the Recall Default button to reset the Oscilloscope.
7. Press the **Auto Setup** key and then tap the Confirm button. Wait until the oscilloscope displays a stable trace.
8. Tap on Measure on the Toolbar and select Std Vertical.

9. Record the displayed P1 peak to peak voltage in the **75 ohm** row of Table A-75, "Option 52, E1 Transmitted Level Voltage".
10. Verify that the measured peak to peak voltage is between 4.2 and 5.2 volts.
11. Disconnect the BNC cable from the Oscilloscope and connect it to the Rx port on the MT821xE .
12. On the MT821xE, press the Measurements soft key and select Rx Signal.
13. Press the Start/Stop soft key to turn measurement on ("Measure ON" appears in the lower left corner of the display).
14. Read the Vpp value from the displayed table it in the **75 ohm** row of Table A-76, "Option 52, E1 Transmitted Level Vpp Reading".

RJ48 (120 Ohm balanced [Differential Pair]) Interface Check:

15. Install the LeCroy AP120 120 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.
16. Connect the RJ48 end of the Bantam "Y" Plug (part number 806-117) the E1 RJ48 interface of the MT821xE .
17. Connect the Transmit Bantam plug of the Bantam "Y" cable to the T3450 Test Fixture and then connect a bantam plug to Siemens jack adapter cable between the open Bantam jack on the T3450 Test Fixture and the Siemens connector of the Telecom adapter on the Oscilloscope.
18. Set the MT821xE to E1 Analyzer mode and preset the unit.
19. Use the rotary knob to highlight Input Connector and then press the RJ48 120 Ohms soft key to switch the input connector.
20. Press the Pattern soft key and use the right arrow key to highlight All Ones. Press the Select Pattern soft key.
21. On the LeCroy Oscilloscope, use the stylus to tap on File on the Toolbar. Select Recall Setup… and then tap the Recall Default button to reset the Oscilloscope.
22. Press the **Auto Setup** key and then tap the Confirm button. Wait until the oscilloscope displays a stable trace.
23. Tap on Measure on the Toolbar and select Std Vertical.
24. Record the displayed P1 peak to peak voltage in the **120 ohm** row of Table A-75.
25. Verify that the measured peak to peak voltage is between 5.4 and 6.6 volts.
26. On the T3450 Test Fixture, disconnect the Bantam plug end of the cable from the Oscilloscope.
27. Connect the Receive Bantam plug of the Bantam "Y" Plug to RJ48 cable to the open jack of T3450 Test Fixture.
28. On the MT821xE, press the Measurements soft key and select Rx Signal.
29. Press the Start/Stop soft key to turn measurement on ("Measure ON" appears in the lower left corner of the display).
30. Read the Vpp value from the displayed table and record it in the **120 ohm** row of Table A-76.

5-12 Option 53, T1/T3 Analyzer Verification

These tests verify the functionality of the T1/T3 Analyzer in the Model MT821xE Cell Master. These tests include:

Equipment Required

- Anritsu MP1570A Sonet Analyzer with MP0121A and MP0122A modules
- Anritsu PN 806-16 Cable T1 Bantam Plug to Bantam Plug (Qty 2)
- LeCroy Model WaveRunner 62Xi Digital Oscilloscope with ET-PMT Electrical Telecom Mask software and TF-ET Telecom Adapter Set
- Anritsu PN 3-806-169 Cable 75 ohm BNC(m) to BNC(m) (Qty 2)

T1 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.
2. On the MT821xE, press **Shift**, **Mode**, and use the up/down keys to select **T1/T3 Analyzer**.
3. Press **Shift**, **Preset**. Select the Preset soft key to preset the unit.

Note

Basic Instructions for Operation of MP1570A:

The Test Menu, Result, and Analyze keys all should be pressed so their LEDs are on.

The green Start/Stop key should also be pressed so its LED is on.

The Setup key toggles between two displays. You will need to change Parameters under both these displays.

If the required parameter is not visible under the present display, press the **Setup** key, and the required parameter will appear on the new display.

Changing the Setup Parameters:

Use the arrow keys to highlight different parameters that will need to be changed. Use the **Set** key to display the menu of choices for each parameter.

Use the **Up**/**Down** arrow keys to highlight the desired setting, then press the **Set** key to accept the highlighted setting.

4. Set up the MP1570A as follows:

   Mapping set to Tx&Rx
   Configuration set to SDH/PDH
   Meas. Mode set to Out_of_service
   Bit Rate set to 1.5M
   MUX/DEMUX: set to OFF (not present on all units).
   Frame set to ON
   1.5M Code set to B8ZS
   Framed set to ESF
   DSX set to 0 ft.
   Clock set to internal
   Monitor Mode is set to OFF

5. Change to the other Setup display (press the **Setup** key again) and set as follows:

   Test Pattern set to PRBS15
   Invert mode set to OFF
   Analyze set to Freq. monitor.

6. Using an 806-16 bantam cable, connect the MT821xE TX connector to the MP1570A AMI/B8ZS Input (on the MP0122A module).

7. Using another 806-16 bantam cable, connect the MT821xE RX connector to the MP1570A AMI/B8ZS Output (on the MP0122A module).

8. On the MT821xE, press the Configuration soft key near the bottom left corner of the display and verify that "Tx Clock" is set to Internal, "Line Code" is set to B8ZS and "Framing" is set to ESF. Then set "Tx LBO" to 0 dB and "Pattern/Loop" to PRBS-15.

9. The MT821xE T1 frequency and ppm error will appear on the MP1570A. Record the ppm error in the **Internal Clock Error** row of Table A-77, "Option 53, T1/T3 Frequency Clock".

10. On the MP1570A, change "Pattern" to All One.

11. On the MT821xE, press the Configuration soft key.

12. Use the rotary knob to select Tx Clock and set Tx Clock to Recovered.

13. Press the Measurements soft key and select Rx Signal.

14. Press the Start/Stop soft key so Measure On is displayed on the lower left corner of the monitor screen.

15. Record the Frequency value on the MT821xE in the Recovered Clock Frequency row of Table A-77.

T1 Transmit Level Test Verification

The tests in this section verify the transmit level of the T1 signal from the MT821xE in T1/T3 Analyzer mode.

Procedure

1. Install the LeCroy AP100 100 ohm Telecom Adapter to Channel 1 input of LeCroy Oscilloscope.

2. Connect the bantam to bantam cable from the Tx port on the T1 interface of the MT821xE to the input of the LeCroy AP100 adapter on the Oscilloscope.

3. Set the MT821xE to T1/T3 Analyzer Mode and preset the unit.

4. Press the Configuration soft key and set up the MT821xE as follows:

   Test Mode - DS1
   Line code - B8ZS
   Tx Clock - Internal
   Tx LBO - 0dB
   Rx Input - Terminate
   Framing - ESF
   Payload Type - 1.544Mb

5. Press the Pattern/Loop soft key and select All Ones.
6. On the LeCroy Oscilloscope, use the stylus to tap on File on the Toolbar. Select Recall Setup… and then tap the Recall Default button to reset the Oscilloscope.
7. Press the **Auto Setup** key and then tap the Confirm button. Wait until the oscilloscope displays a stable trace.
8. Tap on Measure on the Toolbar and select Std Vertical.
9. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of Table A-78, "Option 53, T1 Transmitted Level Voltage".
10. Verify that the measured peak to peak voltage is between 4.8 and 7.6 volts.
11. Change "Tx LBO" to –7.5 dB on the MT821xE.
12. Record the displayed peak to peak voltage in the **Tx LBO: –7.5 dB** row of Table A-78 and verify that it is between 1.9 and 3.1 volts.
13. Change "Tx LBO" to –15 dB on the MT821xE.
14. Record the displayed peak to peak voltage in the **Tx LBO: –15 dB** row of Table A-78 and verify that it is between 0.5 volts and 1.7 volts.
15. Disconnect the bantam cable from the Oscilloscope and connect it to the Rx port on the MT821xE.
16. On the MT821xE, press the Measurements soft key and select Rx Signal.
17. Press the Start/Stop soft key to turn measurement on.
18. Read the Vpp value from the displayed table and record it in the **Tx LBO: –15 dB** row of Table A-79, "Option 53, T1 Transmitted Level Vpp Reading".
19. Verify that the measured Vpp value is between 0.5 volts and 1.7 volts.
20. Change "Tx LBO" to –7.5 dB on the MT821xE.
21. Record the displayed peak to peak voltage in the **Tx LBO: –7.5 dB** row of Table A-79 and verify that it is between 1.9 and 3.1 volts.
22. Change "Tx LBO" to 0 dB on the MT821xE.
23. Record the displayed peak to peak voltage in the **Tx LBO: 0 dB** row of Table A-79 and verify that it is between 4.8 volts and 7.2 volts.

T3 Clock Frequency Test Verification

This test will verify that the internal signal is being clocked at the correct frequency and verify that the clock recovery circuit can generate the correct frequency.

Procedure

1. Connect the External 10 MHz Reference Signal to the rear panel of the MP1570A.
2. On the MT821xE, confirm the mode is set to T1/T3 Analyzer. Preset the unit.
3. Under the Configuration soft key, highlight Test Mode and press the DS3 soft key.
4. Set "Tx Clock" to Internal.
5. Set "Tx LBO" to DSX.
6. Press the Pattern/Loop soft key and then select All Ones pattern.
7. Set up the MP1570A as follows:

   Set Mapping to Tx&Rx
   Set Config. to SDH/PDH
   Set Meas. Mode to Out_of_service
   Set Bit Rate to 45M
   Set MUX/DEMUX to OFF (not present on all units)
   Set Frame to ON
   Set 45M Framed to C-bit
   Set X-Bit to 11
   Set DSX to 0 ft
   Set Clock to internal
   Set Monitor Mode to OFF
8. Change to the other Setup display and set the Test Pattern to All 1.
9. Set Analyze to Freq Monitor.
10. Using a 75 ohm BNC cable (part number 3-806-169), connect the MT821xE Tx connector to the MP1570A B3ZS Input (on the MP0122xB module).
11. Using a second 75 ohm BNC cable, connect the MT821xE Rx connector to the MP1570A B3ZS Output (on the MP0122xB module).
12. Allow the status bar on the bottom of the display to complete at least one sweep.
13. View the ppm error shown on the MP1570A and record in the Internal Clock Error row of Table A-80, "Option 53, T3 Frequency Clock".
14. On the MT821xE, change the "Tx Clock" setting to Recovered.
15. Under the Measurements soft key, activate Rx Signal (red dot appears on label).
16. Press the Start/Stop soft key to turn the measurement on ("Measure ON" appears in the lower left corner of the display).
17. Record the Frequency reading (center of display) in the **Recovered Clock Frequency** low in Table A-80.

T3 Transmit Level Test Verification

The tests in this section verify the transmit level of the T3 signal from the MT8221B in T1/T3 Analyzer mode.

Procedure

1. Preset the MT821xE. Under the Configuration soft key, highlight Test Mode and press the DS3 soft key.
2. Confirm "Tx LBO" is set to "Low".
3. Press the Pattern/Loop soft key and then select "All Ones" pattern.
4. Connect the PP090 75 ohm adapter to the oscilloscope Channel 1 input.
5. Install a 75 ohm BNC-BNC cable between the T3 Tx output and the 75 ohm adapter on the oscilloscope.
6. On the oscilloscope, press the blue **Auto Setup** button. Confirm the Touch Screen button is activated.
7. View the Channel 1 peak-to-peak voltage and record it the **LOW** row of Table A-81, "Option 53, T3 Transmitted Level Voltage". (Horizontal instability of the signal is normal.)
8. On the MT821xE, change the "Tx LBO" setting to DSX.
9. Record the "DSX" Measured Voltage (peak-to-peak) in the **DSX** row of Table A-81.
10. Press the Measurements soft key and select Rx Signal.
11. Disconnect the BNC cable from the oscilloscope and use the cable to connect the T3 Tx and Rx connectors together.
12. Press the Start/Stop soft key to turn the measurement on ("Measure ON" appears in the lower left corner of the display).
13. Record the Vpp measurement shown on the MT821xE display in the **DSX** row of Table A-82, "Option 53, T3 Transmitted Level Vpp Reading".
14. Change the "Tx LBO" (Configuration soft key) to Low.
15. Under the Measurements soft key, view the Vpp value and record in the **LOW** row of Table A-82.

5-13 Option 60 and/or 61, TD-SCDMA Signal Analyzer Verification

The tests in this section verify the performance of the optional TD-SCDMA Signal Analyzer option of the MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

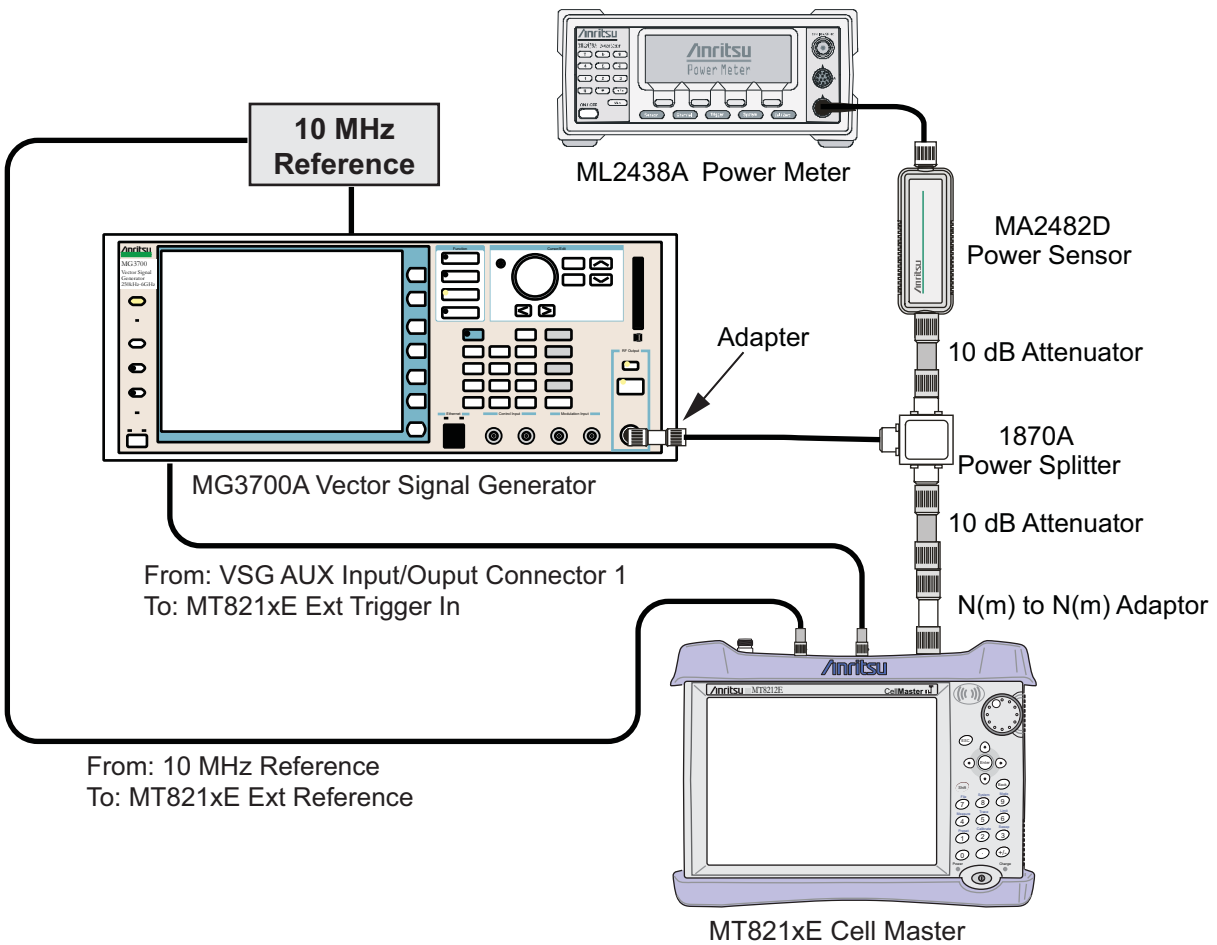

Figure 5-12. TD-SCDMA Signal Analyzer Option Verification

Procedure

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 5-12.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 2010 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the power meter to Averaging, Moving and 256 samples.
5. Set the MT821xE to TD-SCDMA Signal Analyzer mode and preset the unit.
6. On the MG3700A, press the **Preset** key (yellow key on the upper left hand side).
7. Press the down arrow key or turn the knob to select Yes.
8. Press the **Set** key.

Note	The TD-SCDMA pattern requires a Waveform Data license MX370001A that must be purchased.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

9. Press the F1 submenu key to select Load File to Memory.
10. Press the F1 submenu key again to select Select Package.
11. Using the down arrow key step through the selection list until the TD-SCDMA(MX370001A) option is highlighted.
12. Press the **Set** key.
13. Press the Return (F6) soft key.
14. Press the **Set** key. The Select Package box will appear. Use the rotary knob to highlight TD-SCDMA(MX370001A) and press the **Set** key to select.
15. Another file list will appear. Use the rotary knob to select rmc-P-CCPCH_bs_dl and press the **Set** key to select.
16. Press the **MOD On/Off** key to turn the Modulation LED On and verify the "Playing" indicator in the center of the LCD is flashing.
17. Press the **Frequency** key, enter 2010 MHz.
18. Press the **Level** key, enter –20 and press the dBm submenu key.
19. Adjust the MG3700A output so that the power meter reads –45 dBm ± 0.5 dB.
20. On the MT821xE, press the Frequency submenu key and enter 2010 MHz as center frequency.
21. Press the Measurements submenu key and select TD-SCDMA Summary (a red dot will appear on the label).
22. Press the Setup submenu key and select Trigger. Then change Trigger Type to Ext by pressing the Trigger Type submenu key twice. Then wait 15 seconds to allow the MT821xE to update its measured results.
23. For MT821xE with Option 60 (TD-SCDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in step 19. Then record the calculated Channel Power Error in Table A-83, "Option 60, 61, TD-SCDMA Verification (at 2010 MHz, -45 dBm Level, TD-SCDMA)".
24. For MT821xE with Option 61 (TD-SCDMA Demodulator), record the displayed Freq error, EVM and Tau values in Table A-83.
25. Verify that the measured values in step 23 and/or step 24 are within specifications.

5-14 Option 62 and/or 63, EVDO Signal Analyzer Verification

The tests in this section verify the optional EVDO Signal Analyzer functions in Anritsu Model MT821xE Spectrum Master. There are tests for the following:

- "8-PSK Modulation Channel Power, Frequency Error, Rho and Tau Verification" on page 5-66
- "QPSK Modulation Channel Power, Frequency Error, Rho and Tau Verification" on page 5-67
- "16-QAM Modulation Channel Power, Frequency Error, Rho and Tau Verification " on page 5-67
- "Idle Slot Channel Power, Frequency Error, Rho and Tau Verification – (Option 62 and/or 63)" on page 5-68

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

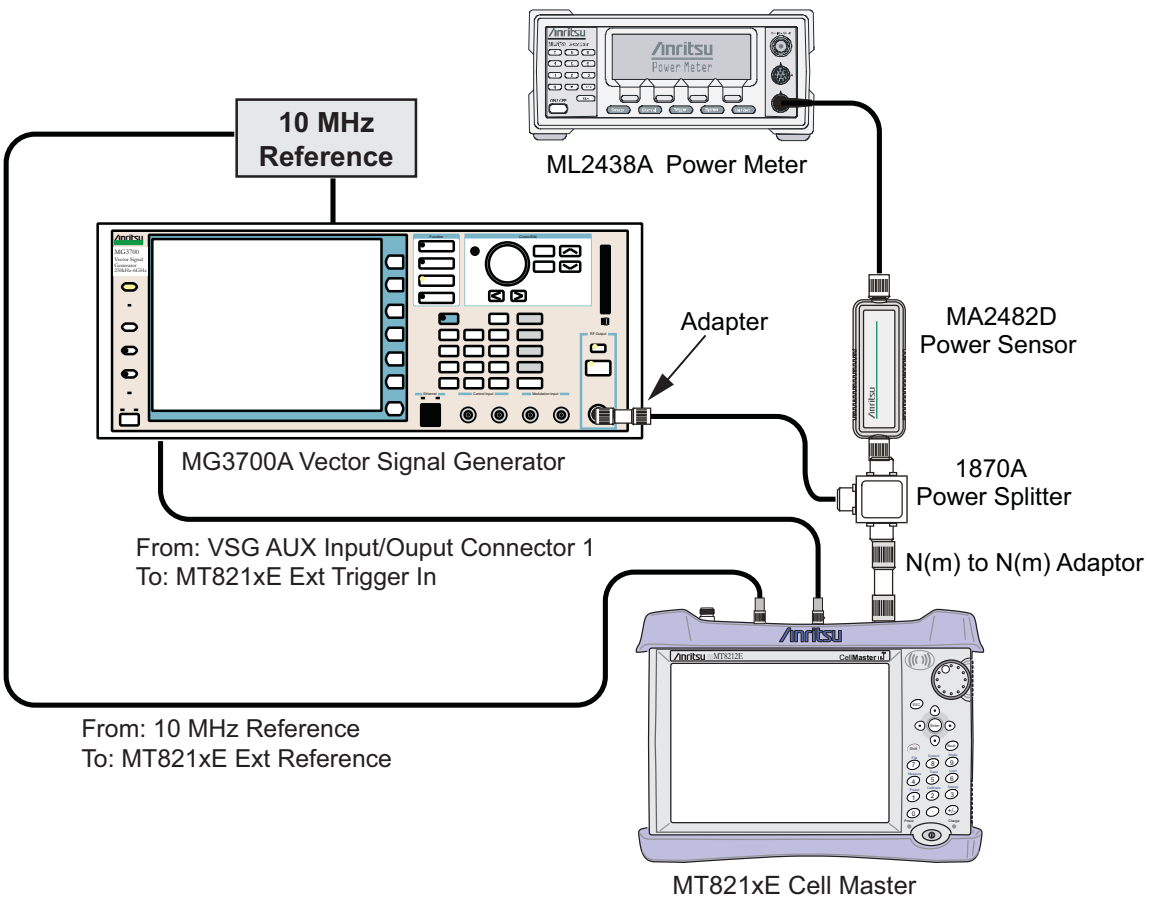

Figure 5-13. EVDO Signal Analyzer Option Verification

8-PSK Modulation Channel Power, Frequency Error, Rho and Tau Verification

The tests in this section verify the function of the optional EVDO Signal Analyzer in the Model MT821xE Spectrum Master.

Procedure

1. Calibrate the power sensor.
2. Connect the equipment as shown in Figure 5-13.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the MT821xE mode to EVDO Signal Analyzer. Preset the unit.
5. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select Yes.
7. Press the **Set** key.

Note	The MG3700A has two **Set** keys, and that they both have the same function.

8. Press the (F1) soft key to select Load File to Memory.
9. Press the (F1) soft key again to select Select Package.
10. Using the **Down Arrow** key step through the selection list until the CDMA2000_1xEV-DO option is highlighted.
11. Press the **Set** key.
12. Press the (F6) soft key Return.
13. Press the **Set** key. The Select Package box will appear. Use the rotary knob to highlight CDMA2000_1xEVDO and press the **Set** key to select.
14. Another File List will appear. Use the rotary knob to select FWD_921_6KBPS_2SLOT and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED On and verify the "Playing" indicator in the center of the LCD is flashing.
16. Press the **Frequency** key, enter 870.03 MHz.
17. Press the **Level** key, enter –40 and press the dBm submenu key.
18. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB.
19. On the MT821xE, press the Frequency submenu key and enter 870.03 MHz as Center Frequency.
20. Press the Measurements submenu key and select EVDO Summary (red dot will appear on the label).
21. Press the Setup submenu key and select PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger submenu key twice. Then wait 15 seconds to allow the MT821xE to update its measured results.
22. For MT821xE with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in step 18. Then record the calculated Channel Power Error in the **At 870.03 MHz, -50 dBm Level, 921.6kps 8-PSK Modulation** section of Table A-84, "Option 62, EVDO RF Measurements".
23. For MT821xE with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot and Tau in the **870.03 MHz, -50 dBm Level, 921.6kps 8-PSK Modulation** section of Table A-85, "Option 63, EVDO Demodulator".
24. Verify that the measured values in step 22 and/or step 23 are within specifications.

QPSK Modulation Channel Power, Frequency Error, Rho and Tau Verification

The tests in this section verify the function of the optional EVDO Signal Analyzer in Model MT821xE Spectrum Master.

Procedure

1. Confirm that the equipment settings are unchanged from the previous test.
2. On the MG3700A, change the selected pattern to "FWD_38_4KBPS_16SLOT".
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the MG3700A frequency to 1930.05 MHz.
5. Adjust the MG3700A output so that the power meter reads 0 dBm ± 0.2 dB.
6. On the MT821xE, press the Frequency submenu key and enter 1930.05 MHz as Center Frequency. Then wait 15 seconds to allow the MT821xE to update its measured results.
7. For MT821xE with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in step 5. Then record the calculated Channel Power error to the **At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation** section of Table A-84.
8. For MT821xE with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot and Tau to the **At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation** section of Table A-85.
9. Verify that the measured values in step 7 and/or step 8 are within specifications.

16-QAM Modulation Channel Power, Frequency Error, Rho and Tau Verification

The tests in this section verify the function of the optional EVDO Signal Analyzer in Model MT821xE Spectrum Master.

Procedure

1. Confirm that the equipment settings are unchanged from the previous test. The power sensor Cal Factor frequency should still be at 1930 MHz, the MG3700A frequency and MT821xE Center Frequency should still be at 1930.05 MHz.
2. On the MG3700A, change the selected pattern to FWD_2457_6KBPS_1SLOT.
3. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB.
4. Then wait 15 seconds to allow the MT821xE to update its measured results.
5. For MT821xE with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in step 3. Then record the calculated Channel Power error in the **At 1930.05 MHz, –50 dBm Level, 2457.6kps 16-QAM Modulation** section of Table A-84.
6. For MT821xE with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot and Tau in the **At 1930.05 MHz, –50 dBm Level, 2457.6kps 16-QAM Modulation** section of Table A-85.
7. Verify that the measured values in step 5 and/or step 6 are within specifications.

Idle Slot Channel Power, Frequency Error, Rho and Tau Verification – (Option 62 and/or 63)

The tests in this section verify the function of the optional EVDO Signal Analyzer in Model MT821xE Spectrum Master.

Procedure

1. Confirm that the equipment settings are unchanged from the previous test. The power sensor Cal Factor frequency should still be at 1930 MHz, the MG3700A frequency and MT821xE Center Frequency should still be at 1930.05 MHz.
2. On the MG3700A, change the selected pattern to FWD_IDLE.
3. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB.
4. Then wait 15 seconds to allow the MT821xE to update its measured results.
5. For MT821xE with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in step 3. Then record the calculated Channel Power error in the **At 1930.05 MHz, –50 dBm Level, IDLE SLOT** section of Table A-84.
6. For MT821xE with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot and Tau in the **At 1930.05 MHz, –50 dBm Level, IDLE SLOT** section of Table A-85.
7. Verify that the measured values in step 5 and/or step 6 are within specifications.
8. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
9. Set the MG3700A frequency to 870.03 MHz.
10. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB.
11. On the MT821xE, press the Frequency submenu key and enter 870.03 MHz as Center Frequency. Then wait 15 seconds to allow the MT821xE to update its measured results.
12. For MT821xE with Option 62 (EVDO RF Measurements), subtract the displayed Channel Power value from the power meter reading in step 10. Then record the calculated Channel Power error in the **At 870.03 MHz, –10 dBm Level, IDLE SLOT** section of Table A-84.
13. For MT821xE with Option 63 (EVDO Demodulator), record the displayed Freq Error, Rho Pilot and Tau in the **At 870.03 MHz, –10 dBm Level, IDLE SLOT** section of Table A-85.
14. Verify that the measured values in step 12 and/or step 13 are within specifications.

5-15 Option 66 and/or 67, Mobile WiMAX Signal Analyzer Verification

The tests in this section verify the functionality of the Mobile WiMAX Signal Analyzer of the MT821xE. There are tests for the following:

- "Mobile WiMAX Channel Power Accuracy Tests (Option 66)"
- "Mobile WiMAX Residual EVM and Frequency Error Tests (Option 67)" on page 5-72

Mobile WiMAX Channel Power Accuracy Tests (Option 66)

The tests in this section verify the function of the optional Mobile WiMAX Signal Analyzer in Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

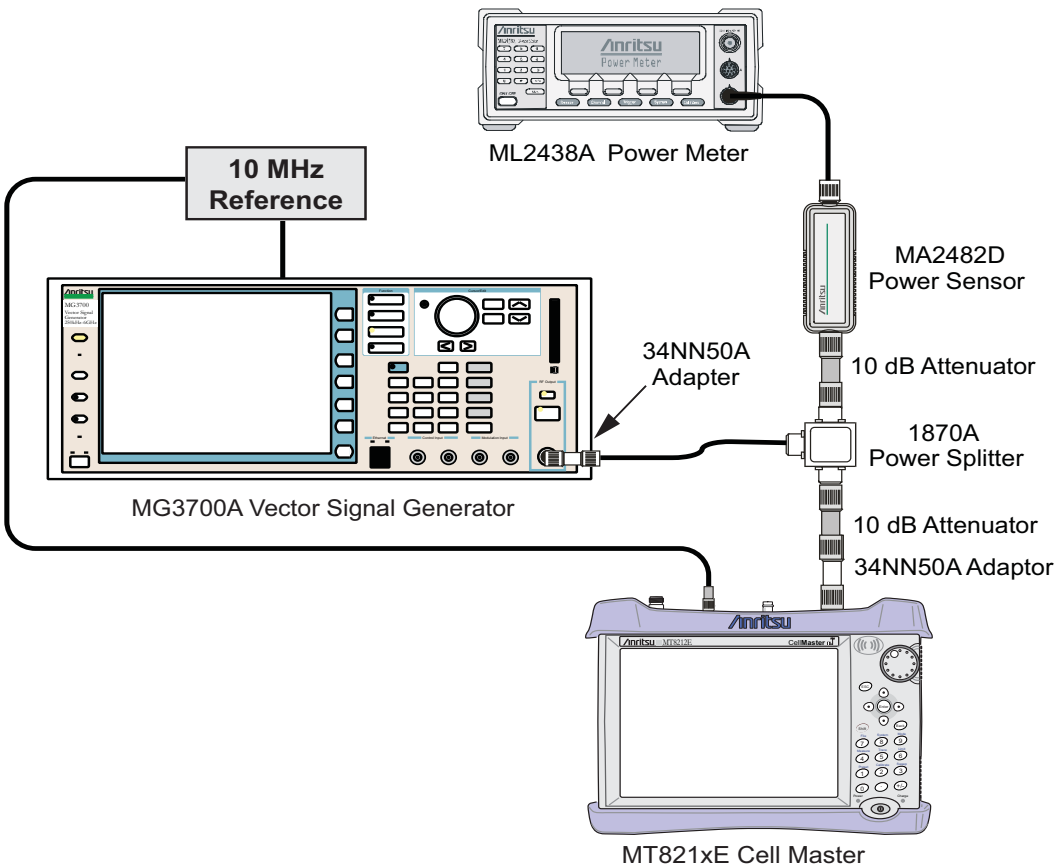

Figure 5-14. Mobile WiMAX Signal Analyzer Option Verification

Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
4. Connect the equipment as shown in Figure 5-14.

Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

5. Set the MG3700A as follows:
   a. Press the yellow button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until "mWiMax" is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key Return.
   h. Press the **Set** key. The Select Package list box will appear. Again select mWiMax and **Set**.
   i. Another file list will appear. Select (highlight) 10m1024g8_0_10_cap.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the "playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
6. Adjust the MG3700A level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB.
7. Set the MT821xE to Mobile WiMax Signal Analyzer mode and preset the unit.
8. Set the MT821xE as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
   b. Press the Setup submenu key and set the Bandwidth to 10 MHz.
   c. Press the Frame Length submenu key and set the Frame Length to 10 ms.
   d. Press the Measurements submenu key and select RF, then select Power vs. Time.
9. Record the MT821xE Channel Power (RSSI) reading in the **Measured Channel Power (RSSI)** column, **2600.5 MHz, –15 dBm** row of Table A-86, "Option 66, Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)".
10. Calculate the Channel Power Error by subtracting the MT821xE "Channel Power (RSSI)" reading from the power meter reading in Step 6. Record the result into the test record in the **Error** column, **2600.5 MHz, –15 dBm** row of Table A-86.
11. Verify that the error is within specification.
12. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB.
13. Record the MT821xE Channel Power (RSSI) reading in the **2600.5 MHz, –50 dBm** row of Table A-86.
14. Calculate the Channel Power Error by subtracting the MT821xE "Channel Power (RSSI)" reading from the power meter reading that was recorded in Step 13. Record the result in Table A-86.

15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
17. Set the MG3700A frequency to 3600.5 MHz.
18. Change the MT821xE center frequency to 3600.5 MHz.
19. Measure the Channel Power (RSSI) for both –15 dBm and – 50 dBm and then record the measured result and calculated error in Table A-86.
20. Verify that the error is within specification.

Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

21. Set the MG3700A as follows:
    a. Press the yellow **Preset** button (answer yes to the question).
    b. Press the **Set** key
    c. Press the (F1) soft key to select Load File to Memory.
    d. Press the (F1) soft key again to select Select Package.
    e. Using the **Down Arrow** key step through the selection list until mWiMax is highlighted.
    f. Press the **Set** key.
    g. Press the (F6) soft key Return.
    h. Press the **Set** key. The Select Package list box will appear. Again select mWiMax and **Set**.
    i. Another file list will appear. Select (highlight) 5m512g8_2_5_cap.
    j. Press the **Set** key.
    k. Press the **MOD On/Off** key and verify that the LED is on. Confirm that the "playing" indicator is displaying the moving pattern.
    l. Press the **Frequency** key, then enter 2600.5 MHz.
    m. Press the **Level** key, then enter 2 dBm. Turn the output On.
22. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
23. Adjust the MG3700A level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB.
24. Set the MT821xE to Mobile WiMax Signal Analyzer mode and preset the unit.
25. Set the MT821xE as follows:
    a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
    b. Press the Setup submenu key and set the Bandwidth to 5 MHz.
    c. Press the Frame Length submenu key and set the Frame Length to 5 ms.
    d. Press the Measurements submenu key and select RF, then select Power vs. Time.
26. Repeat Step 9 through Step 20, recording the results into the test record in Table A-87, "Option 66, Mobile WiMAX Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)".

Mobile WiMAX Residual EVM and Frequency Error Tests (Option 67)

The tests in this section verify the function of the optional Mobile WiMAX Signal Analyzer in Model MT821xE Cell Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Anritsu PN 3-806-169 Coaxial Cable
- 10 MHz Reference Standard

Setup

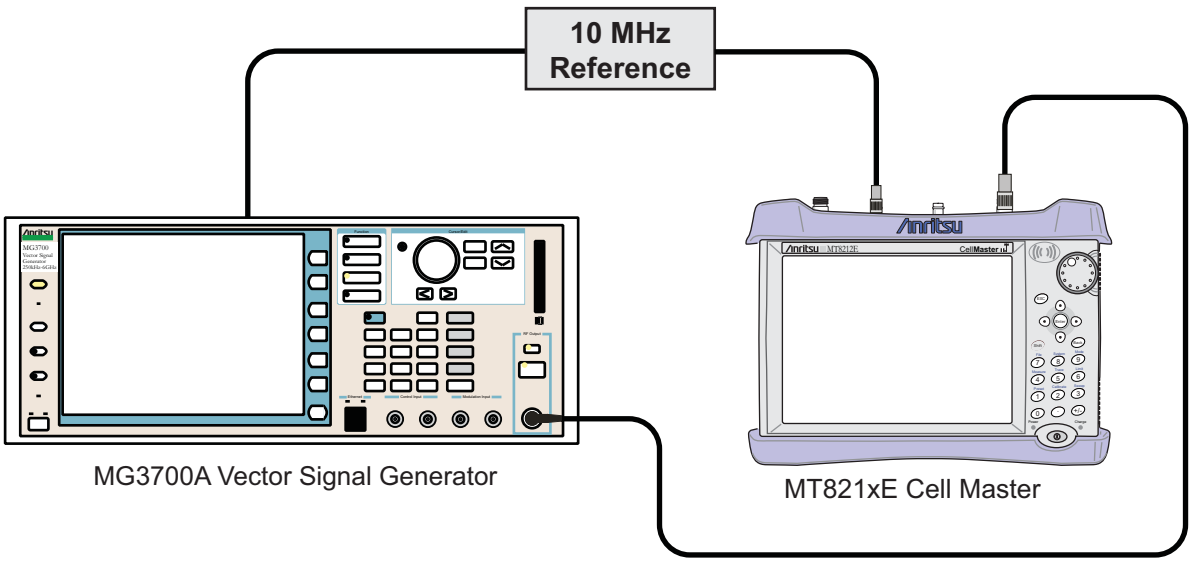

Figure 5-15. Mobile WiMAX Residual EVM and Frequency Error Test Setup

Procedure

1. Connect the equipment as shown in Figure 5-15.
2. Connect the RF Out of the MG3700A to the Spectrum Analyzer RF In connector of the MT821xE.

Residual EVM and Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

3. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until mWiMax is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key Return.
   h. Press the **Set** key. The Select Package list box will appear. Again select mWiMax and Set.

i. Another file list will appear. Select (highlight) 10m1024g8_0_10_cap.

j. Press the **Set** key.

k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the "playing" indicator is displaying the moving pattern.

l. Press the **Frequency** key, then enter 2600.5 MHz.

m. Press the **Level** key, then enter –15 dBm. Turn the output On.

4. Set the MT821xE to Mobile WiMax Signal Analyzer mode and preset the unit.
5. Set the MT821xE as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
   b. Press the Setup submenu key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio submenu key (under the Setup submenu key) and set the CP Ratio to 1/8.
   d. Press the Frame Length submenu key and set the Frame Length to 10 ms.
   e. Press the Demod submenu key and set Demod to FCH.
   f. Press the Measurements submenu key and select Demodulator, then select Modulation Summary.
6. Record the MT821xE EVM (rms) reading in the 2600.5 MHz, –15 dBm row of Table A-88, "Option 67, Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)" .
7. Verify that the measured EVM is within specification.
8. Set the MG3700A level to –50.0 dBm.
9. Record the MT821xE EVM (rms) reading in the **2600.5 MHz, –50 dBm** row of Table A-88.
10. Verify that the measured EVM is within specification.
11. On the MT821xE, press the Setup submenu key and set Demod to Auto.
12. Record the MT821xE Freq Error reading in 2600.5 MHz, –50 dBm row of Table A-89, "Option 67, Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)".
13. Verify that the measured Freq Error is within specification.
14. Set the MG3700A frequency to 3600.5 MHz.
15. On the MT821xE, change the Center Frequency to 3600.5 MHz.
16. Press the Setup submenu key and set Demod to FCH.
17. Measure the EVM (rms) for both –15 dBm and – 50 dBm and then record the measured results in Table A-88.
18. Verify that the measured EVM is within specification.
19. Repeat Step 11 through Step 13 to measure the Frequency Error at – 50 dBm, record the results in Table A-89.

Residual EVM and Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

20. Set the MG3700A as follows:
    a. Press the yellow **Preset** button (answer yes to the question).
    b. Press the **Set** key
    c. Press the (F1) soft key to select Load File to Memory.
    d. Press the (F1) soft key again to select Select Package.
    e. Using the **Down Arrow** key step through the selection list until "mWiMax" is highlighted.
    f. Press the **Set** key.
    g. Press the (F6) soft key Return.

h. Press the **Set** key. The Select Package list box will appear. Again select mWiMax and **Set**.

i. Another file list will appear. Select (highlight) 5m512g8_2_5_cap.

j. Press the **Set** key.

k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the "playing" indicator is displaying the moving pattern.

l. Press the **Frequency** key, then enter 2600.5 MHz.

21. Press the **Level** key, then enter –15 dBm. Turn the output On.

a. Set the MT821xE as follows:

b. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz

c. Press the Setup submenu key and set the Bandwidth to 5 MHz.

d. Press the CP Ratio submenu key (under the Setup submenu key) and set the CP Ratio to 1/8.

e. Press the Frame Length submenu key and set the Frame Length to 5 ms.

f. Press the Demod submenu key and set Demod to FCH.

22. Press the Measurements submenu key and select Demodulator, then select Modulation Summary.

23. Repeat Step 6 through Step 19, recording the MT821xE EVM (rms) in Table A-90, "Option 67, Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)" and the Frequency Error readings in Table A-91, "Option 67, Mobile WiMAX Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)".

5-16 Option 541 and/or 542, LTE Signal Analyzer Verification

The tests in this section verify the functionality of the LTE Signal Analyzer of the MT821xE Cell Master. There are tests for the following:

- "LTE Channel Power Accuracy Tests (Option 541)" on page 5-76
- "LTE Residual EVM and Frequency Error Tests (Option 542)" on page 5-77

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cable
- 10 MHz Reference Standard

Procedure

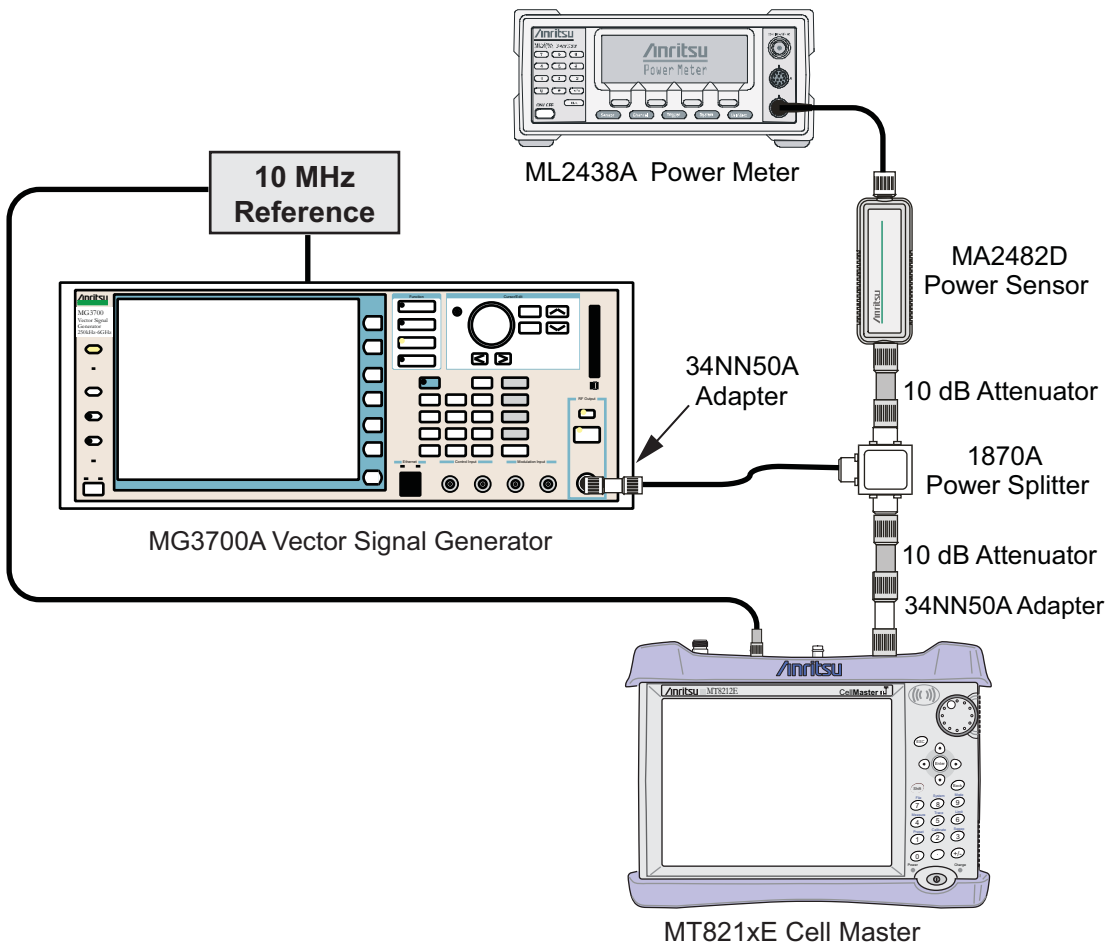

Figure 5-16. LTE Signal Analyzer Option Verification

LTE Channel Power Accuracy Tests (Option 541)

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MT821xE Spectrum Master.

Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the equipment as shown in Figure 5-16.

Note	The LTE pattern requires a Waveform Data license MX370108A that must be purchased.

Note	Both **Set** keys on the MG3700A perform the same function.

5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until "LTE_DL_E-TM" is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key Return.
   h. Press the **Set** key. The Select Package list box will appear. Again select LTE_DL_E-TM and then the **Set** key.
   i. Another file list will appear. Select (highlight) E-TM_1-1_10M.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the "playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 750 MHz.
   m. Press the **Level** key, then enter 2 dBm.
   n. Turn the output on.
6. Adjust the MG3700A level setting with the knob so that the power meter reads –10.0 dBm ± 0.5 dB.
7. Set the MT821xE to LTE Signal Analyzer mode and preset the unit.
8. Set the MT821xE as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
   b. Press the Measurements submenu key and select RF, then select Channel Spectrum.
9. Record the MT821xE Channel Power reading in the **750 MHz, –10 dBm** row, **Measured Channel Power** column of Table A-92, "Option 541, LTE Channel Power Accuracy".
10. Calculate the Channel Power Error by subtracting the MT821xE "Channel Power" reading from the power meter reading in Step 6. Record the result in the **750 MHz, –10 dBm** row, **Error** column of Table A-92.
11. Verify that the error is within specification.

12. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.5 dB.
13. Record the MT821xE Channel Power reading in the **750 MHz, –50 dBm** row, **Measured Channel Power** column of Table A-92.
14. Calculate the Channel Power Error by subtracting the MT821xE "Channel Power" reading from the power meter reading that was recorded in Step 13. Record the result in the **750 MHz, –50 dBm** row, **Error** column of Table A-92.
15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 2150 MHz.
17. Set the MG3700A frequency to 2150 MHz. Press the **Set** key.
18. Change the MT821xE center frequency to 2150 MHz.
19. Measure the Channel Power for –10 dBm and –50 dBm and then record the measured result in the **Measured Channel Power** column and the calculated error in the **Error** column of Table A-92 .
20. Verify that the error is within specification.

LTE Residual EVM and Frequency Error Tests (Option 542)

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MT821xE Spectrum Master.

Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the equipment as shown in Figure 5-16.

Note	The LTE pattern requires a Waveform Data license MX370108A that must be purchased.

Note	Both **Set** keys on the MG3700A perform the same function.

5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until LTE_DL_E-TM is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key Return.
   h. Press the **Set** key. The Select Package list box will appear. Again select LTE_DL_E-TM and press **Set**.
   i. Another file list will appear. Select (highlight) E-TM_3-1_10M.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Confirm that the "playing" indicator is displaying the moving pattern.

l. Press the **Frequency** key, then enter 750 MHz.

m. Press the **Level** key, then enter 2 dBm.

n. Turn the output On.

6. Adjust the MG3700A level setting with the knob so that the power meter reads –10.0 dBm ± 0.5 dB.
7. Set the MT821xE to LTE Signal Analyzer mode and preset the unit.
8. Set the MT821xE as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
   b. Press the Measurements submenu key and select Modulation Measurements.
   c. Press the Constellation submenu key.
9. Record the MT821xE Residual EVM and Frequency Error reading in the **750 MHz, –10 dBm** section of Table A-93, "Option 542, LTE Residual EVM and Frequency Accuracy".
10. Verify that the values are within specification.
11. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.5 dB.
12. Record the MT821xE Residual EVM and Frequency Error reading into the **750 MHz, –50 dBm** section of Table A-93.
13. Verify that the values are within specification.
14. Set the calibration factor frequency of the power sensor to 2150 MHz.
15. Set the MG3700A frequency to 2150 MHz. Press the **Set** key.
16. Adjust the MG3700A level setting with the knob so that the power meter reads –10.0 dBm ± 0.5 dB.
17. Change the MT821xE center frequency to 2150 MHz.
18. Record the MT821xE Residual EVM and Frequency Error reading into the **2150 MHz, –10 dBm** section of Table A-93.
19. Verify that the values are within specification.
20. Adjust the MG3700A level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.5 dB.
21. Record the MT821xE Residual EVM and Frequency Error reading in the **2150 MHz, –50 dBm** section of Table A-93.
22. Verify that the values are within specification.

Chapter 6 — Battery Information

6-1 Introduction

The following information relates to the care and handling of the Anritsu 633-44 battery pack and Lithium-Ion batteries in general.

- The battery supplied with the Cell Master may need charging before use. Before using the instrument, the internal battery may be charged either in the instrument, using either the AC-DC Adapter (40-168-R) or the 12-Volt DC adapter (806-141-R), or separately in the optional Dual Battery Charger (2000-1374).
- Use only Anritsu approved battery packs.
- Recharge the battery only in the Cell Master or in an Anritsu approved charger.
- When the Cell Master or the charger is not in use, disconnect it from the power source.
- Do not charge batteries for longer than 24 hours; overcharging may shorten battery life.
- If left unused a fully charged battery will discharge itself over time.
- Temperature extremes affect the ability of the battery to charge: allow the battery to cool down or warm up as necessary before use or charging.
- Discharge the battery from time to time to improve battery performance and battery life.
- The battery can be charged and discharged hundreds of times, but it will eventually wear out.
- The battery may need to be replaced when the operating time between charging becomes noticeably shorter than normal.
- Never use a damaged or worn out charger or battery.
- Storing the battery in extreme hot or cold places will reduce the capacity and lifetime of the battery.
- Never short-circuit the battery terminals.
- Do not drop, mutilate or attempt to disassemble the battery.
- Do not dispose of batteries in a fire!
- Batteries must be recycled or disposed of properly. Do not place batteries in household garbage.
- Always use the battery for its intended purpose only.

6-2 Battery Pack Removal and Replacement

This section provides instructions for the removal and replacement of the Cell Master battery pack.

1. Locate the battery access door as illustrated in Figure 6-1.

Figure 6-1. Battery Access Door Location

2. Place a finger in the battery access door notch and push the door latch down towards the bottom of the instrument, as illustrated in Figure 6-2.

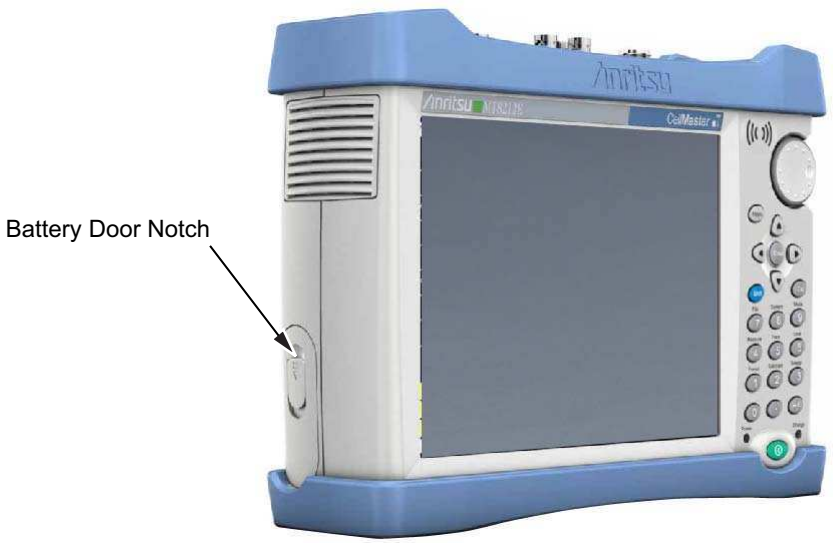

Figure 6-2. Battery Access Door Notch

3. Remove the battery access door, the top will pop out a bit and then pull it up out of the access enclosure.

4. With the battery access door completely removed, grasp the battery lanyard and pull the battery straight out of the unit, as illustrated in Figure 6-3.

Figure 6-3. Removing the Battery

5. Replacement is the opposite of removal. Note the orientation of the battery contacts, and be sure to insert the new battery with the contacts facing the front of the unit, as illustrated in Figure 6-4.

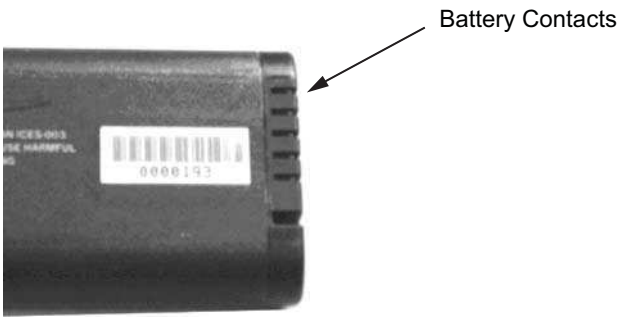

Figure 6-4. Battery Contacts

Chapter 7 — Assembly Replacement

7-1 Replaceable Parts List

Refer to Table 1-5, "List of Replaceable Parts" on page 1-6 for the list of replaceable parts. Refer to the following sections for basic replacement instructions.

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may not match your instrument.

Caution	Only qualified personnel should open the case and replace internal assemblies. Assemblies shown in Table 1-5 are typically the only items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without specialized training. Removing RF shields from PC boards or adjustment of screws on or near the shields may detune sensitive RF circuits and will result in degraded instrument performance. All work should be performed in a static-safe work area.

7-2 Opening the Cell Master Case

Caution	Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty. The Cell Master contains components that can be easily damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the instrument.

This procedure provides instructions for opening the Cell Master case. With the case opened, the internal assemblies can be removed and replaced, as detailed in the following sections.

1. Remove the battery door and battery as shown in Section 6-2 "Battery Pack Removal and Replacement " on page 6-2.
2. Remove the top and bottom bumpers (Figure 7-1) to expose the screw holes on the back of the unit.

Figure 7-1. Top Bumper and Option 31

3. Place the Cell Master face down on a stable work surface that will not scratch the display.
4. Use a Phillips screwdriver to remove the six screws securing the two halves of the Cell Master case together (Figure 7-2).

Figure 7-2. Remove the Four Screws

5. Carefully lift up on the side of the case indicated above and begin to separate the two halves.
6. Lay the Cell Master flat and remove the battery connector cable between the two halves (Figure 7-3).

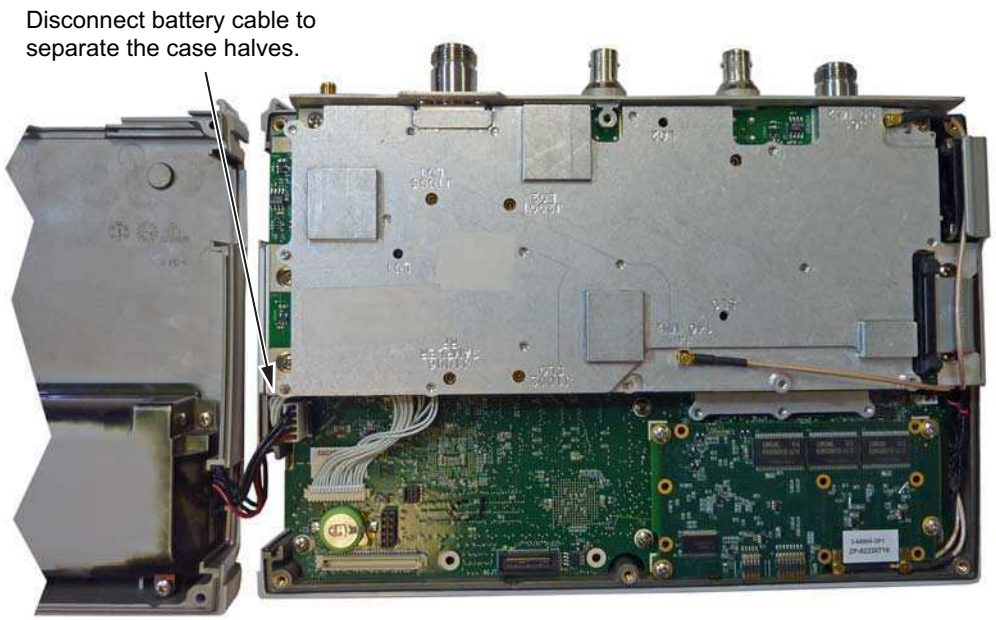

Figure 7-3. Cell Master Opened 180 Degrees

7. Closing the case is the reverse of opening.

7-3 PCB Assembly Replacement

Note	Procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may not match your instrument.

This section describes the removal and replacement of the SPA and MB/VNA boards which are attached to each other and attached to the Cell Master Case.

1. Open the case as described in Section 7-2 "Opening the Cell Master Case".
2. Disconnect the Keypad PCB connector, the Fan Assembly connector, and the LCD connector.
3. Use a Phillips screwdriver to remove the 8 screws securing the Assemblies to the Case (Figure 7-4).

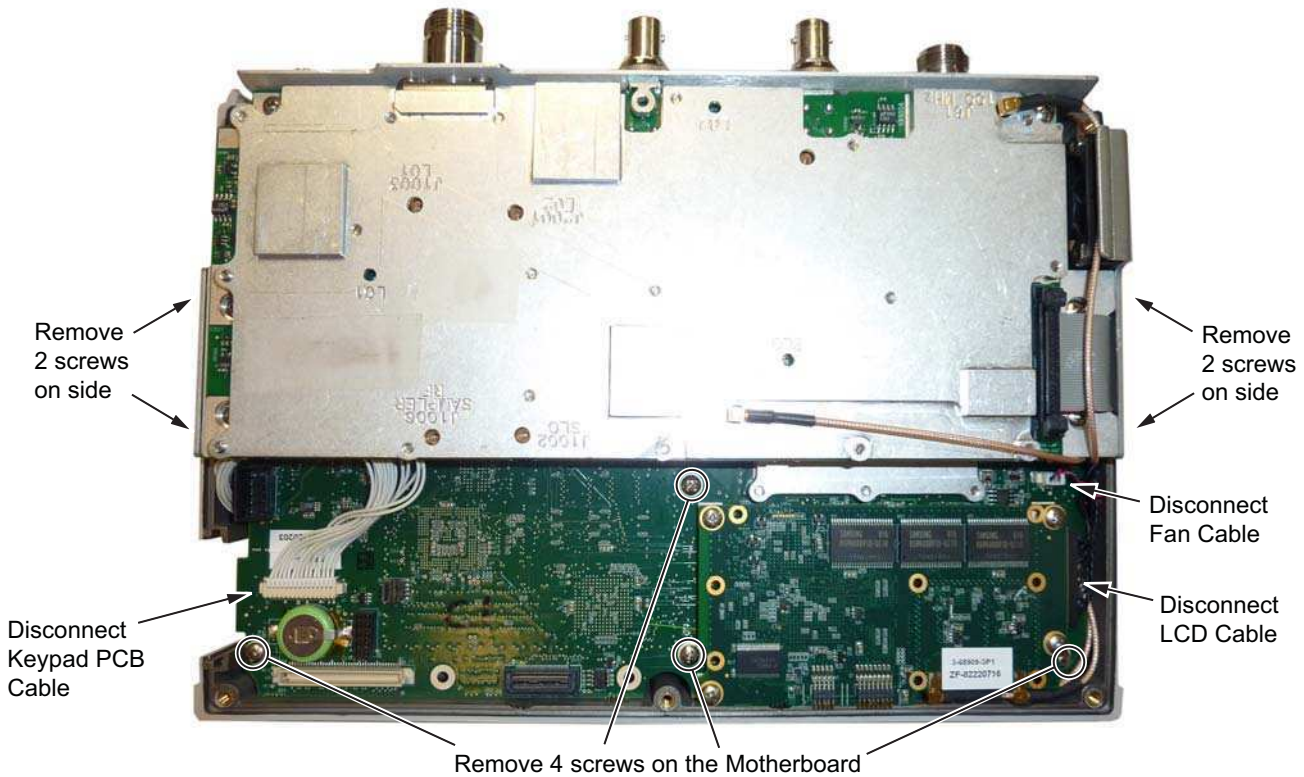

Figure 7-4. Removing the PCB Assemblies out of the Case

4. After the screws are removed the entire Assembly including the top connector panel will slide out of the case.
5. Installation is the reverse of removal. Take care to properly fit the connector panel into the grooves in the top of the case and confirm that none of the cables will be pinched when the back case is replaced.

7-4 SPA Assembly Replacement

This section describes the removal of the SPA Assembly board.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the PCB Assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Remove the castle nuts from the External Reference connector and the External Trigger connector (Figure 7-5).
4. Remove the motherboard ribbon connector.
5. Remove the 2 MCX connectors between the SPA board and the DSP board.
6. Remove the 6 screws retaining the SPA board.
7. Slide the SPA board out of the top panel.
8. Installation is the reverse of removal.

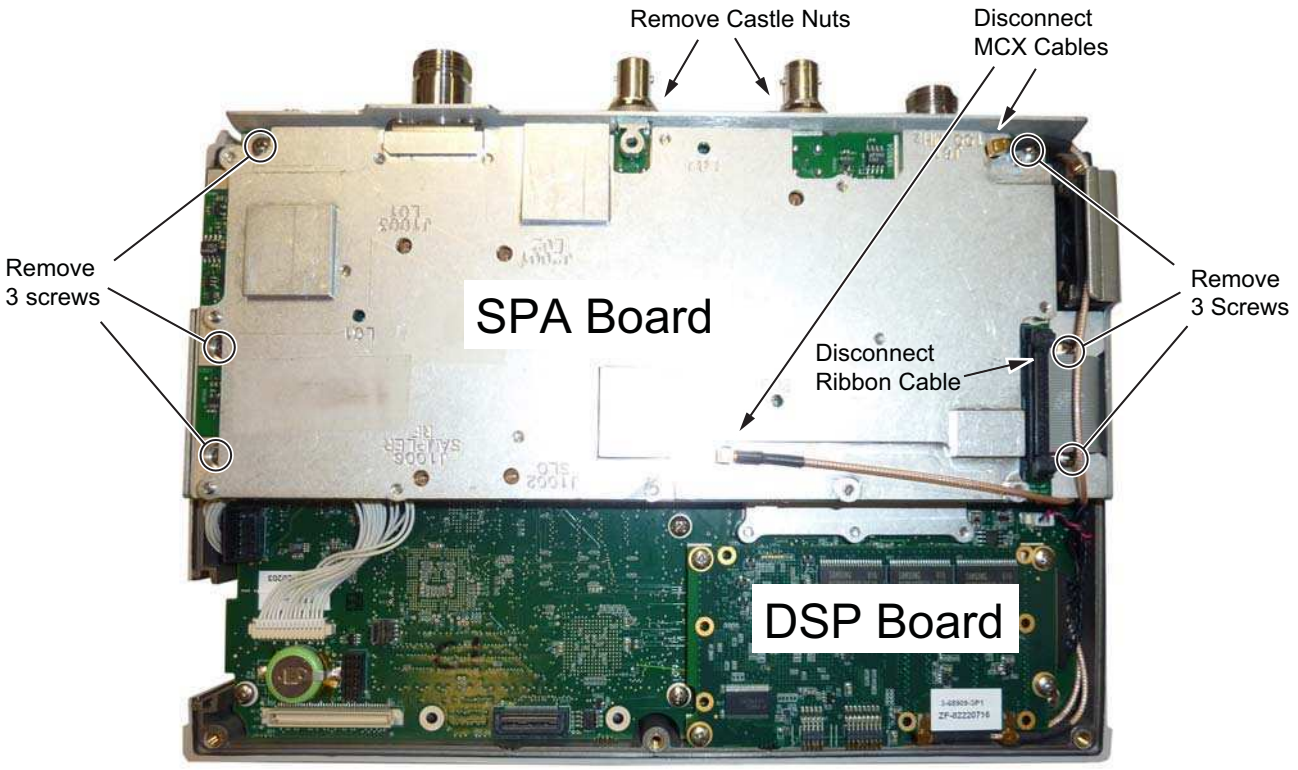

Figure 7-5. Removing the SPA Assemblies

7-5 GPS (Option 31) Replacement

This procedure provides instructions for removing and replacing the GPS Module.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the PCB Assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Remove the SPA board as described in Section 7-4 “SPA Assembly Replacement”.

Note	The SPA board cables, connector and the DSP board do not need to be removed when replacing the GPS Module. Remove the screws and move the SPA board to the side.

4. Use a 5/16 inch wrench to remove the nut and washer from the GPS SMA connector. Push the connector through the top panel.
5. Remove the 2 screws retaining the GPS module to the Motherboard.
6. Carefully lift straight up on the GPS module to remove. The back of the GPS module board is directly connected to the Motherboard.
7. Installation is the reverse of removal.

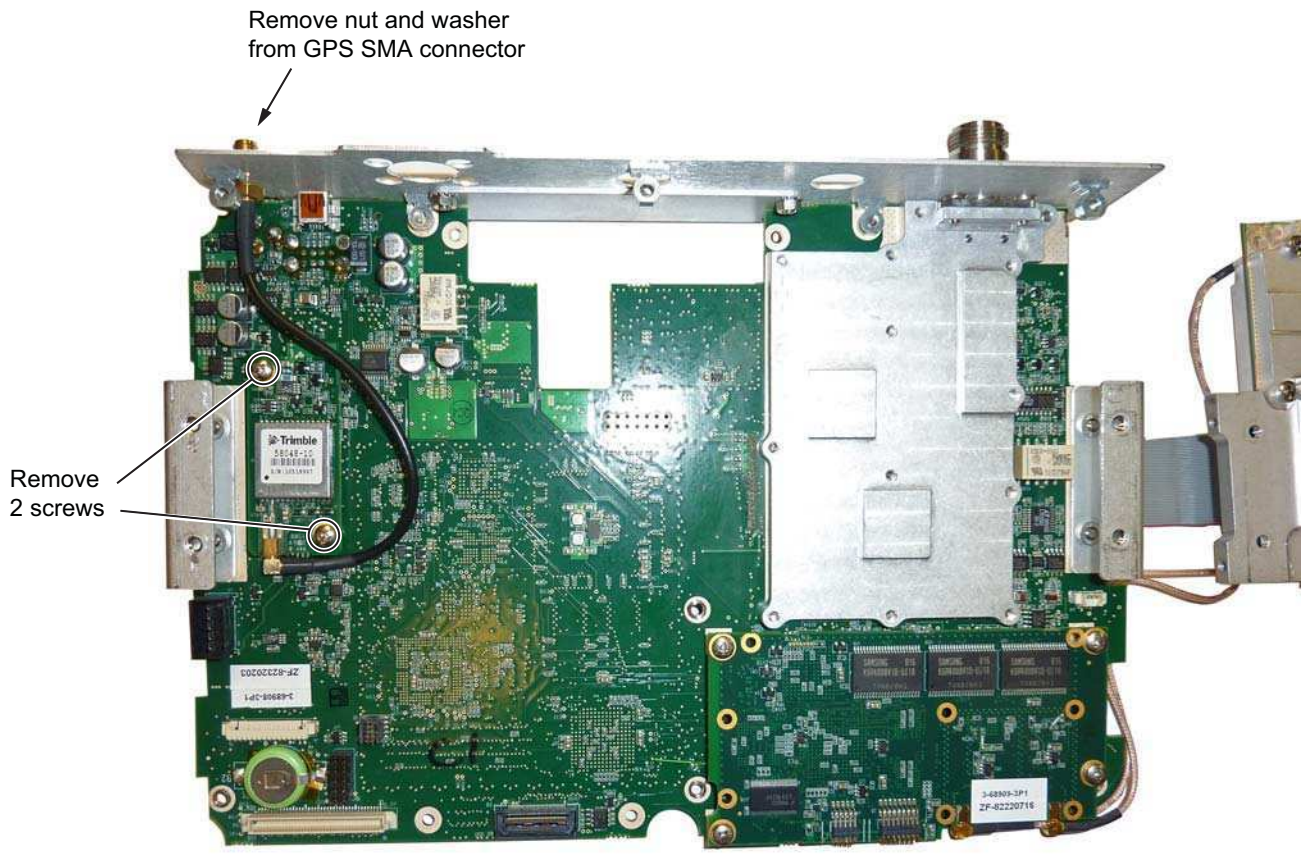

Figure 7-6. Removing the GPS Module from the Motherboard (SPA board set to the side)

7-6 Motherboard/VNA PCB Assembly Replacement

This procedure provides instructions for removing and replacing the Motherboard/VNA Assembly.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the PCB Assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Remove the SPA board as described in Section 7-4 “SPA Assembly Replacement”.
4. Remove the GPS board as described in Section 7-5 “GPS (Option 31) Replacement”.

Note	When ordering the Main/VNA PCB Assembly all options that are installed on the instrument must be stated on the order.

5. Installation is the reverse of removal.

7-7 Fan Assembly Replacement

This procedure provides instructions for removing and replacing the Fan Assembly.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the Main VNA/PCB assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Remove the 3 screws and nuts holding the Fan Assembly to the LCD Assembly housing. Refer to (Figure 7-7).

Note	The fan connector cable is routed through the LCD Assembly housing

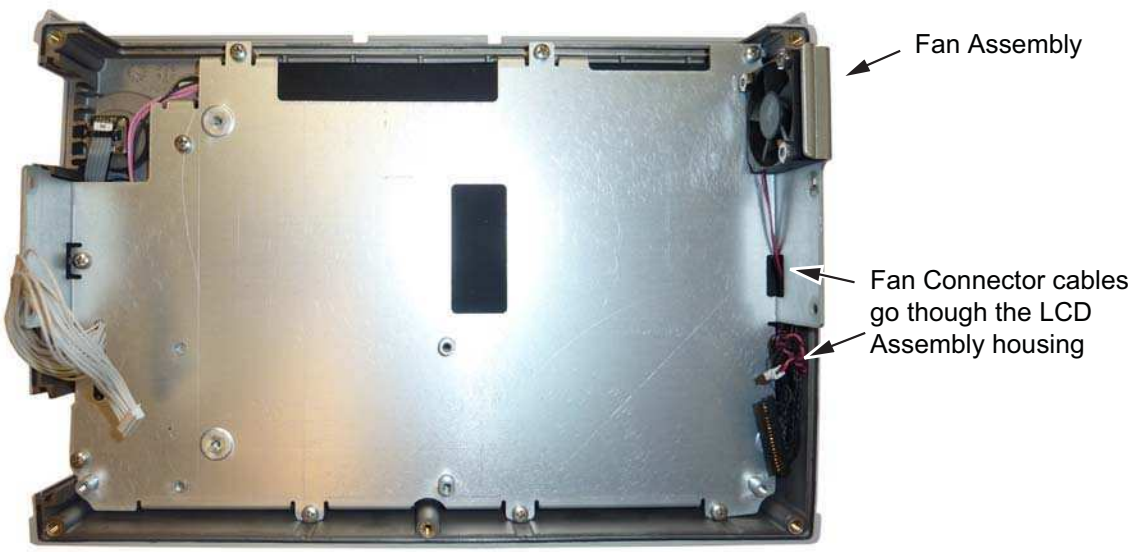

Figure 7-7. Front Panel Keypad Bezel

4. Reverse the above steps to install the replacement Fan Assembly.

7-8 LCD Assembly Replacement

This procedure provides instructions for removing and replacing the Liquid Crystal Display (LCD) once the Main PCB assembly has been separated from the Cell Master.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the Main PCB assembly as described in Section 7-3 “PCB Assembly Replacement”.
3. Remove the 9 screws connecting the LCD Assembly to the front half of the case (Figure 7-8).

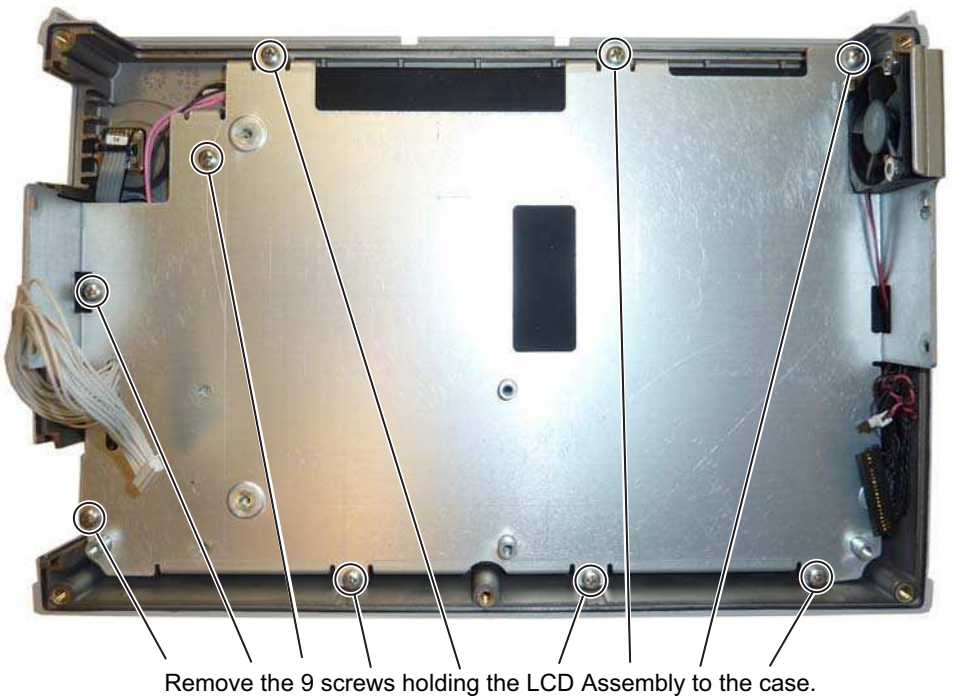

Figure 7-8. Removing the LCD Assembly

4. Turn the LCD assembly over and disconnect the front half of the case from the LCD Assembly (Figure 7-9).

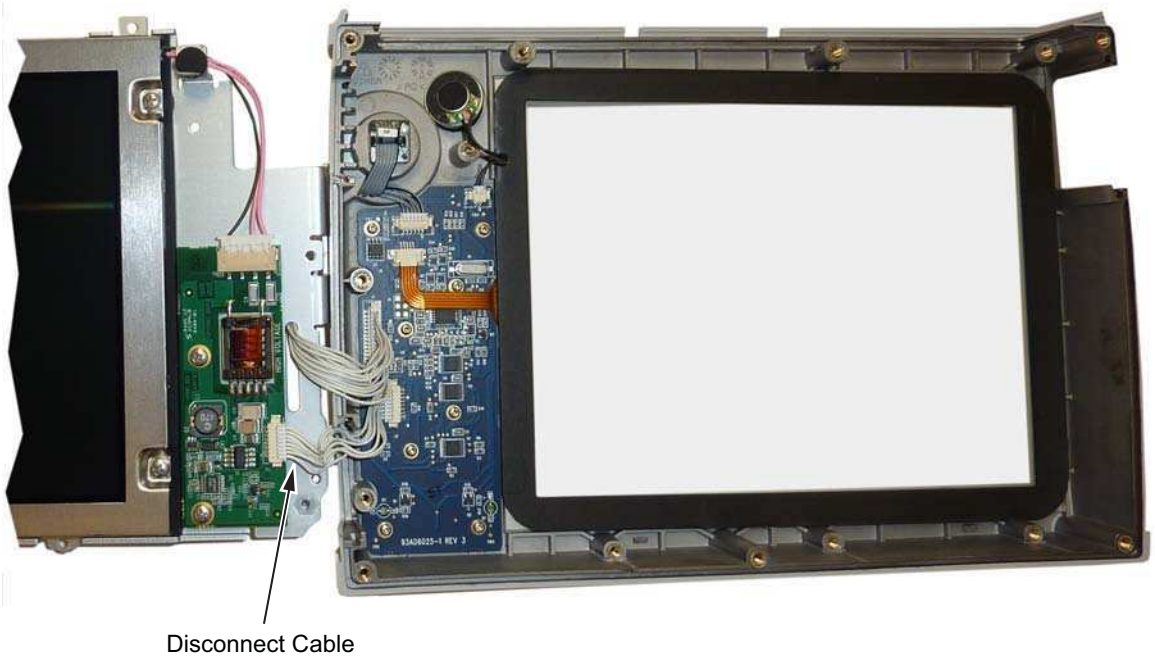

Figure 7-9. Replacing the LCD Assembly

5. Use a Phillips screw driver to remove the four screws securing the LCD to the housing (Figure 7-10).

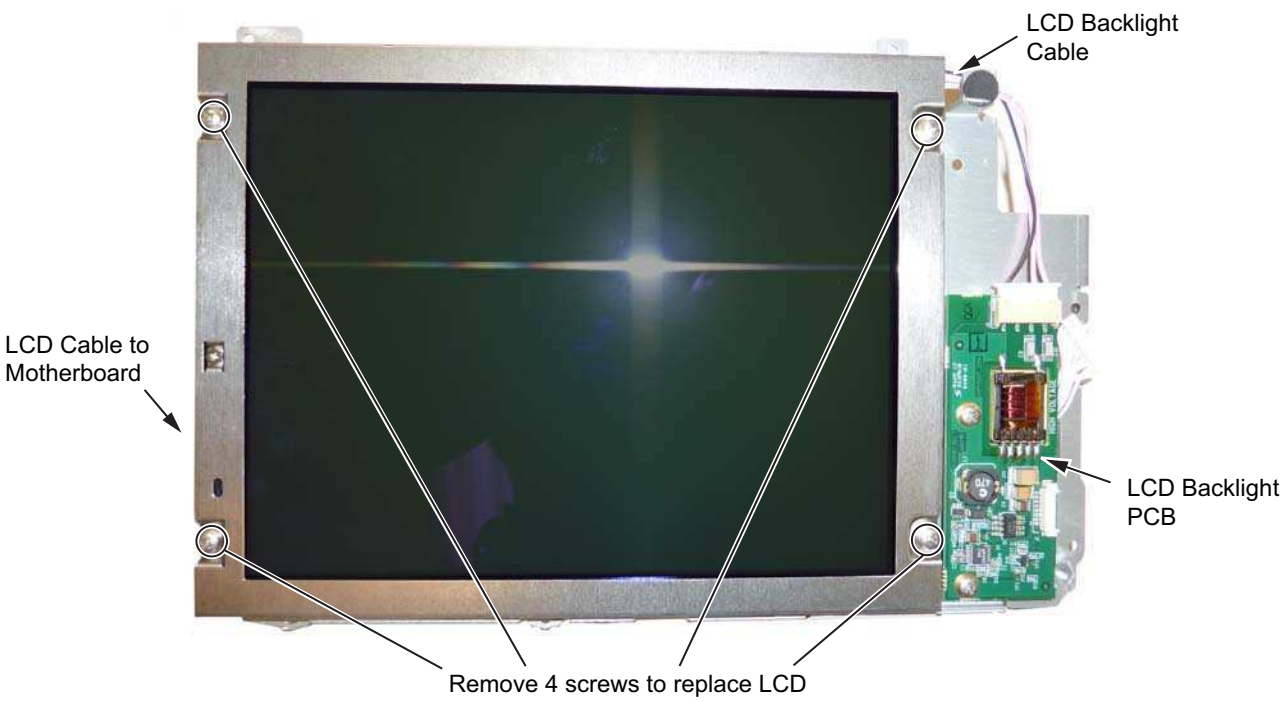

Figure 7-10. Replacing the LCD

6. Disconnect the LCD backlight cable from the LCD backlight PCB.
7. Disconnect the LCD cable from the side of the LCD.
8. Carefully remove the LCD.
9. Reverse the above steps to install the replacement LCD.

Note	Pay attention to the routing of the LCD Backlight Cable. The cable must be positioned so it is not pinched when the unit is reassembled.

7-9 LCD Backlight PCB Removal and Replacement

This procedure provides instructions for removing and replacing the Cell Master LCD backlight PCB.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the Main PCB assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Perform Step 1 through Step 4 of Section 7-8 “LCD Assembly Replacement”.
4. Disconnect the LCD backlight cable from the LCD backlight PCB.
5. Use a Phillips screw driver to remove the two screws securing the LCD backlight PCB to the Main PCB assembly (Figure 7-11).

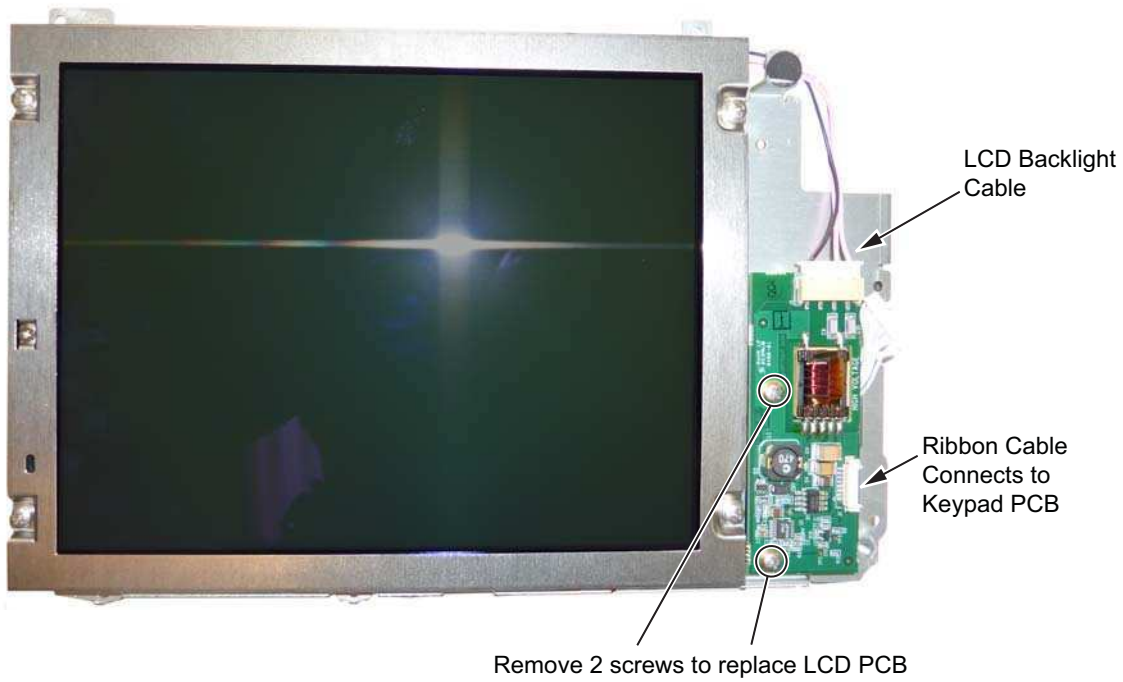

Figure 7-11. Replacing the LCD PCB

6. Carefully remove the LCD Backlight PCB.
7. Reverse the above steps to install the replacement LCD backlight PCB.

Note	Pay attention to the routing of the LCD Backlight Cable. The cable must be positioned so it is not pinched when the unit is reassembled.

7-10 Keypad and Keypad PCB Replacement

This procedure provides instructions for removing and replacing the keypad and the keypad PCB.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the Main VNA/PCB assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Perform Step 1 through Step 4 of Section 7-8 “LCD Assembly Replacement”.
4. Remove the 8 screws and the cable connectors to remove the Keypad PCB (Figure 7-12). The Rubber Keypad is located under the Keypad PCB.

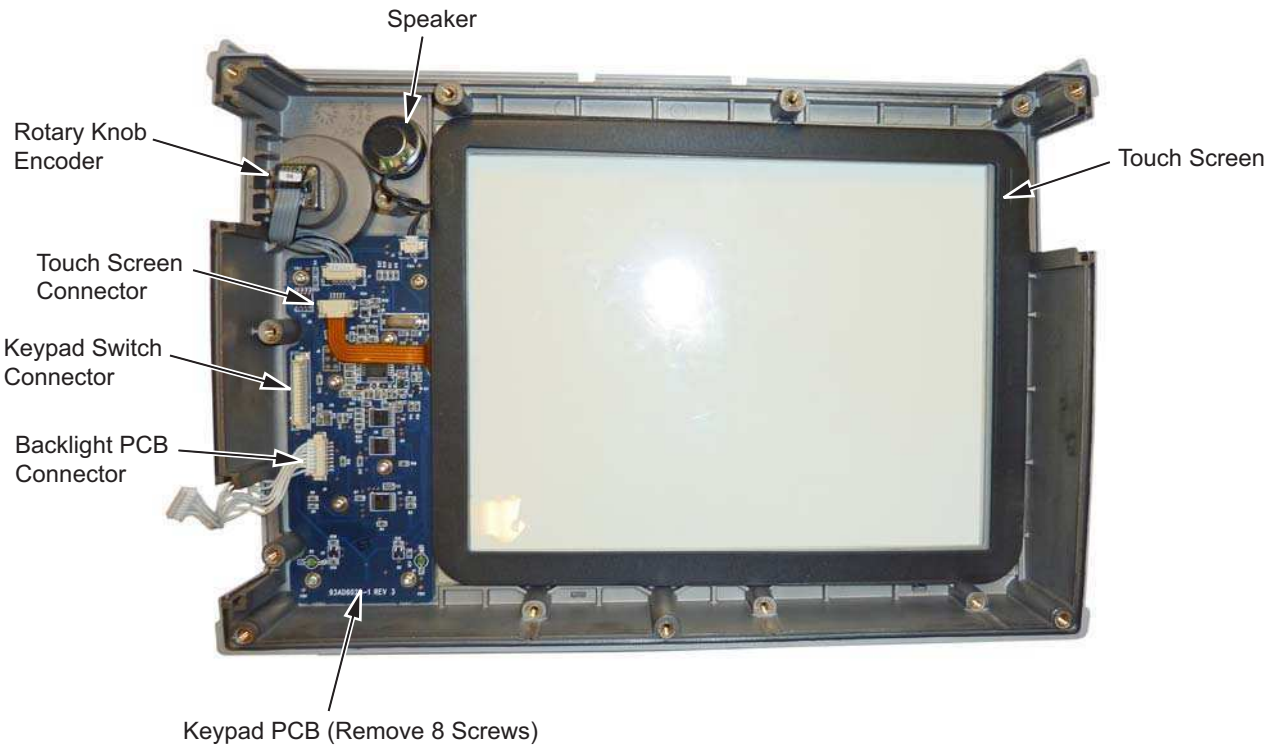

Figure 7-12. Front Panel Keypad Bezel

5. Reverse the above steps to install the replacement Keypad and/or Keypad PCB.

7-11 Touch Screen Replacement

This procedure provides instructions for removing and replacing the touch screen.

1. Open the case as described in Section 7-2 “Opening the Cell Master Case”.
2. Remove the Main VNA/PCB assembly from the front panel as described in Section 7-3 “PCB Assembly Replacement”.
3. Perform Step 1 through Step 4 of Section 7-8 “LCD Assembly Replacement”.
4. Remove the touch screen flex circuit connector from the Keypad PCB by pulling the tabs on each side of the connector away from the connector and in the direction of the flex circuit. Refer to Figure 7-13.
5. Pull the Touch Screen cable out of the connector housing.
6. Remove the Touch Screen from the Bezel by pulling it straight up.

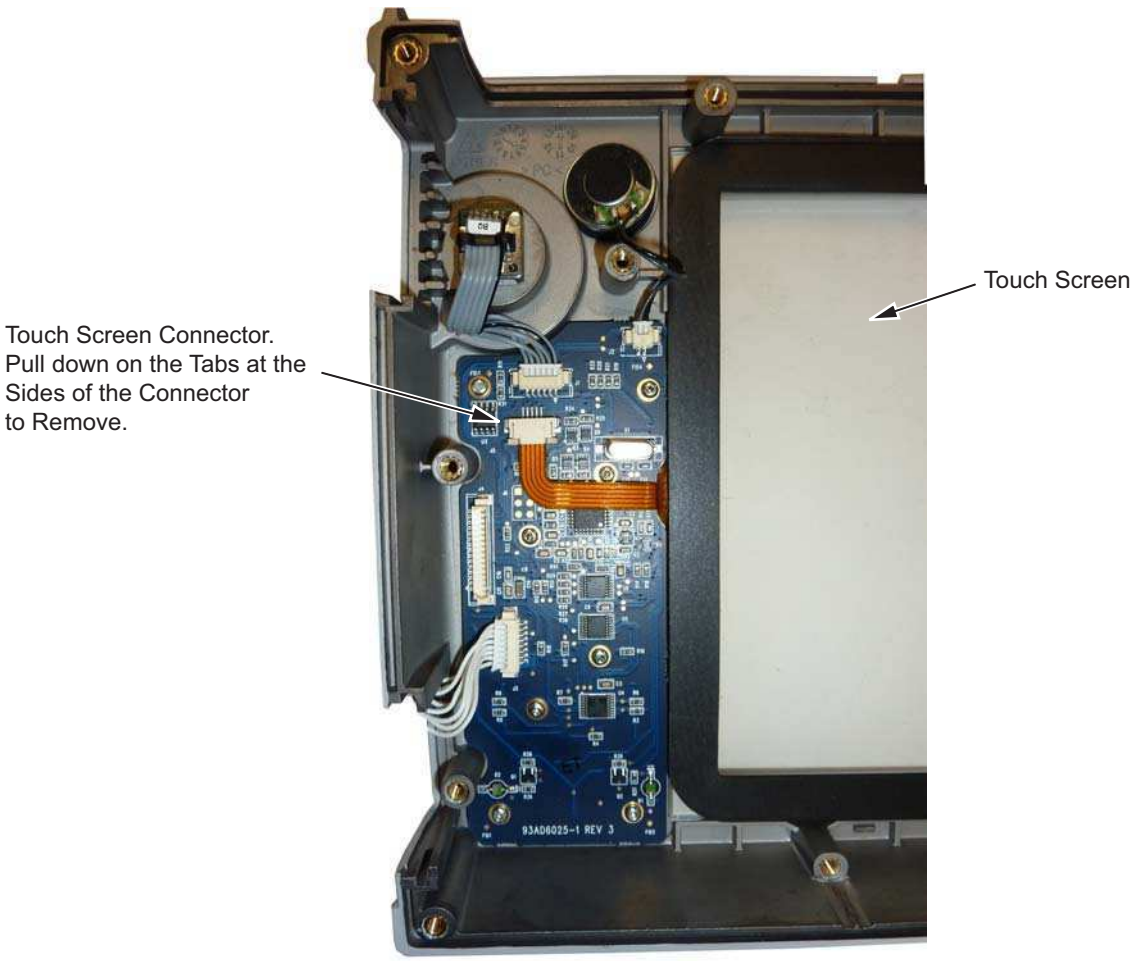

Figure 7-13. Replacing the Touch Screen

7. Reverse the above steps to install the replacement Touch Screen.

Chapter 8 — Troubleshooting

This chapter describes the primary troubleshooting operations that can be performed by all Anritsu Service Centers. Perform the troubleshooting suggestions in the order they are listed. Operators of the MT821xE should refer to the User Guide for troubleshooting help.

Only qualified Anritsu personnel should replace internal assemblies. Major subassemblies shown in Table 1-5, "List of Replaceable Parts" on page 1-6 are typically the items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without special training. Removal of RF shields from PC boards or adjustment of screws on or near the shields will detune sensitive RF circuits and will result in degraded instrument performance.

Turn-on Problems

Unit cannot boot-up, no activity occurs when the On/Off key is pressed:

1. Battery may be fully discharged. Confirm the battery is installed into the unit and connect the AC to DC converter (Anritsu part number 40-168-R) to the unit allowing the battery to charge.
2. Battery may be the wrong type. Use only Anritsu approved battery packs. Some non-approved battery packs will fit into the MT821xE, but are electrically incompatible and will not charge correctly.
3. External power supply may have failed or be the wrong type. Replace the external power supply.
4. On/Off switch is damaged. Replace the keypad PCB or rubber keypad.
5. Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly.

Unit begins the boot process, but does not complete boot-up:

1. Using Master Software Tools, perform the Emergency Repair procedure, then update the system software (via the Tools menu).
2. Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly.

Unit makes normal boot-up sounds, but the display has a problem:

1. If the display is dim, check the brightness setting under the System Menu / System Options.
2. Replace the Backlight Driver PCB.
3. Replace the LCD assembly.
4. The Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly.

Boot-up Self Test fails:

1. Perform a Master Reset.

   If the message relates to the RTC battery, replace the RTC battery on the Main PCB.
2. The Main PCB has failed. Replace the Main PCB/Spectrum Analyzer assembly

Other Problems

Battery Pack Charging Problems: refer to Chapter 6, "Battery Information".

Lock Error messages:

1. This message normally appears for 2 to 3 seconds when an external 10 MHz Reference is applied.
2. Spectrum Analyzer PCB has failed. Replace the Main/Spectrum Analyzer assembly.

Spectrum Analyzer Problems:

1. Inspect the Spectrum Analyzer RF In connector for damage.
2. Refer to the User Guide.
3. Update system software using Master Software Tools (via Tools menu).
4. Spectrum Analyzer PCB has failed. Replace the Main/Spectrum Analyzer assembly.

Cable and Antenna Analyzer Problems:

1. Inspect the VNA RF In and VNA Reflection connectors for damage.
2. Inspect the Open, Short, Load and cable(s) for damage. Verify their operation on a suitable measurement instrument.
3. Refer to the User Guide.
4. Update system software using Master Software Tools (via Tools menu).
5. VNA module has failed. Replace the VNA module. No recalibration is required.

Option 51, 52 or 53 Problems:

1. Replace the Option 51, 52, or 53 PCB (see Table 1-5, “List of Replaceable Parts” on page 1-6). No recalibration is required.

Other Issues:

1. Perform a Master Reset.
2. Refer to the User Guide.
3. Update system software using Master Software Tools (via Tools menu).
4. Replace the Main PCB/Spectrum Analyzer assembly.

Appendix A — Test Records

This appendix provides test records that can be used to record the performance of the MT8212E and MT8213E. Anritsu recommends that you make a copy of the following test record pages and document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which can allow you to observe trends.

MT821_E Firmware Rev: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-1 Test Records for Spectrum Analyzer Verification

Table A-1. Spectrum Analyzer Frequency Accuracy

Frequency	Measured Value	Deviation	Specification (Typical)
1 GHz	GHz	kHz	± 1.5 kHz (± 1.5 ppm)
3.9 GHz	GHz	kHz	± 5.85 kHz (± 1.5 ppm)
5.9 GHz	GHz	kHz	± 8.85 kHz (± 1.5 ppm)

Table A-2. Spectrum Analyzer SSB Phase Noise Verification

Frequency	Measured Value	Calculated Value	Specification
10 kHz	dBc/Hz	dBc/Hz	≤ –100 dBc/Hz
100 kHz	dBc/Hz	dBc/Hz	≤ –105 dBc/Hz
1 MHz	dBc/Hz	dBc/Hz	≤ –115 dBc/Hz

Table A-3. Spectrum Analyzer Spurious Response (Second Harmonic Distortion)

Frequency	Measured Value	2nd Harmonic Distortion	Specification
50.1 MHz			
100.2 MHz		dBc	≤ –56 dBc

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-4. Spectrum Analyzer Input Related Spurious (IRS) Signals

Amplitude Reading at 2072.5 MHz _____ dBm			
Frequency	**Measured Values**	**Calculated IRS**	**Specification**
1222.5 MHz to 2072 MHz	dBm	dBc	≤ –70 dBc
2073 MHz to 2922.5 MHz	dBm	dBc	≤ –70 dBc
Amplitude Reading at 1220 MHz _____ dBm			
Frequency	**Measured Values**	**Calculated IRS**	**Specification**
1219 MHz to 1221 MHz	dBm	dBc	≤ –52 dBc
Amplitude Reading at 1690 MHz _____ dBm			
Frequency	**Measured Values**	**Calculated IRS**	**Specification**
1689.5 MHz to 1691.5 MHz	dBm	dBc	≤ –52 dBc
Amplitude Reading at 2822 MHz _____ dBm			
Frequency	**Measured Values**	**Calculated IRS**	**Specification**
2821 MHz to 2823 MHz	dBm	dBc	≤ –52 dBc
Amplitude Reading at 2506 MHz _____ dBm			
Frequency	**Measured Values**	**Calculated IRS**	**Specification**
2505 MHz to 2507 MHz	dBm	dBc	≤ –39 dBc

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-5. Spectrum Analyzer Resolution Bandwidth Accuracy

BW Setting	Span	VBW	Lower Limit	Measured Values	Upper Limit
3 MHz	4.5 MHz	Auto	2.7 MHz	Hz	3.3 MHz
1 MHz	1.5 MHz	Auto	900 kHz	Hz	1.1 MHz
300 kHz	450 kHz	Auto	270 kHz	Hz	330 kHz
100 kHz	150 kHz	Auto	90 kHz	Hz	110 kHz
30 kHz	45 kHz	Auto	27 kHz	Hz	33 kHz
10 kHz	15 kHz	Auto	9 kHz	Hz	11 kHz
3 kHz	4.5 kHz	Auto	2.7 kHz	Hz	3.3 kHz
1 kHz	2 kHz	Auto	900 Hz	Hz	1.1 kHz
300 Hz	450 Hz	Auto	270 Hz	Hz	330 Hz
100 Hz	150 Hz	Auto	90 Hz	Hz	110 Hz
30 Hz	50 Hz	3 Hz	27 Hz	Hz	33 Hz
10 Hz	30 Hz	3 Hz	9 Hz	Hz	11 Hz

Table A-6. Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy Setup Table

Test Power Level @ 50 MHz	Required Sensor B Reading
0 dBm	dBm
-4 dBm	dBm
-10 dBm	dBm
-14 dBm	dBm
-20 dBm	dBm
-24 dBm	dBm
-30 dBm	dBm
-34 dBm	dBm
-40 dBm	dBm
-44 dBm	dBm
-50 dBm	dBm

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-7. Spectrum Analyzer 50 MHz Absolute Amplitude Accuracy

Input Power Level	Reference Level	Input Atten. Level	Measured Reading	Specification
0 dBm	10 dBm	30 dB	dBm	± 1.25 dB
-4 dBm	10 dBm	30 dB	dBm	± 1.25 dB
-10 dBm	0 dBm	20 dB	dBm	± 1.25 dB
-14 dBm	0 dBm	20 dB	dBm	± 1.25 dB
-20 dBm	-10 dBm	10 dB	dBm	± 1.25 dB
-24 dBm	-10 dBm	10 dB	dBm	± 1.25 dB
-30 dBm	-20 dBm	0 dB	dBm	± 1.25 dB
-34 dBm	-20 dBm	0 dB	dBm	± 1.25 dB
-40 dBm	-30 dBm	0 dB	dBm	± 1.25 dB
-44 dBm	-30 dBm	0 dB	dBm	± 1.25 dB
-50 dBm	-40 dBm	0 dB	dBm	± 1.25 dB

Table A-8. Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency Setup Table

Frequency	Required Sensor B reading for –2 dBm @ Attenuator output	Required Sensor B reading for –30 dBm @ Attenuator output
10.1 MHz	dBm	dBm
50 MHz	dBm	dBm
100 MHz	dBm	dBm
500 MHz	dBm	dBm
1000 MHz	dBm	dBm
2000 MHz	dBm	dBm
3000 MHz	dBm	dBm
4000 MHz	dBm	dBm
5000 MHz	dBm	dBm
6000 MHz	dBm	dBm

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-9. Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency (1 of 2)

Freq (MHZ)	Input Power (dBm)	Atten. Level	Marker 1 Reading (dB)	Spec (dB)	Freq (MHZ)	Input Power (dBm)	Attn. Level	Marker 1 Reading (dB)	Spec (dB)
10.1	-30	0		±1.25	50	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	55		±1.25		-2	55		±1.25
100	-30	0		±1.25	500	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	55		±1.25		-2	55		±1.25
1000	-30	0		±1.25	2000	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	55		±1.25		-2	55		±1.25

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-9. Spectrum Analyzer Absolute Amplitude Accuracy Across Frequency (2 of 2)

Freq (MHZ)	Input Power (dBm)	Atten. Level	Marker 1 Reading (dB)	Spec (dB)	Freq (MHZ)	Input Power (dBm)	Attn. Level	Marker 1 Reading (dB)	Spec (dB)
3000	-30	0		±1.25	4000	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	55		±1.25		-2	55		±1.25
5000	-30	0		±1.25	6000	-30	0		±1.25
	-30	5		±1.25		-30	5		±1.25
	-30	10		±1.25		-30	10		±1.25
	-30	20		±1.25		-30	20		±1.25
	-2	30		±1.25		-2	30		±1.25
	-2	40		±1.25		-2	40		±1.25
	-2	50		±1.25		-2	50		±1.25
	-2	55		±1.25		-2	55		±1.25

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-10. Spectrum Analyzer Residual Spurious with Preamp Off

Start Freq.	Stop Freq.	RBW	VBW	Measured Values	Specification
10 MHz	50 MHz	1 kHz	300 Hz	dBm	≤ –90 dBm
50 MHz	2.0 GHz	3 kHz	10 kHz	dBm	≤ –90 dBm
2.0 GHz	4.0 GHz	1 kHz	1 kHz	dBm	≤ –90 dBm
4.0 GHz	5.0 GHz	1 kHz	100 Hz	dBm	≤ –90 dBm
5.0 GHz	5.2 GHz	1 kHz	1 kHz	dBm	≤ –90 dBm
5.2 GHz	5.7 GHz	10 kHz	300 Hz	dBm	≤ –90 dBm
5.7 GHz	5.9 GHz	30 kHz	1 kHz	dBm	≤ –90 dBm
5.9 GHz	6.0 GHz	1 kHz	100 Hz	dBm	≤ –90 dBm

Table A-11. Spectrum Analyzer Residual Spurious with Preamp On

Start Freq.	Stop Freq.	Measured Values	Specification
10 MHz	1.0 GHz	dBm	≤ –90 dBm
1.0 GHz	4.0 GHz	dBm	≤ –90 dBm
4.0 GHz	6.0 GHz	dBm	≤ –90dBm

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-12. Spectrum Analyzer DANL with Pre Amp Off

Start Freq	Stop Freq	RBW	VBW	Measured Value at 100 kHz RBW	Calculated for 10 Hz RBW	Specification
10 MHz	2.4 GHz	100 kHz	1 kHz	dBm	dBm	≤ –131 dBm
2.4 GHz	4.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –127 dBm
4.0 GHz	5.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –124 dBm
5.0 GHz	6.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –116 dBm

Table A-13. Spectrum Analyzer DANL with Pre Amp On

Start Freq	Stop Freq	RBW	VBW	Measured Value at 100 kHz RBW	Calculated for 10 Hz RBW	Specification
10 MHz	2.4 GHz	100 kHz	1 kHz	dBm	dBm	≤ –147 dBm
2.4 GHz	4.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –144 dBm
4.0 GHz	5.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –140 dBm
5.0 GHz	6.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –133 dBm

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-2 Test Records for Cable and Antenna Analyzer Verification

Table A-14. VNA Frequency Accuracy

Frequency	Measured Value	Specification
2 GHz (2000 MHz)	MHz	± 6.0 kHz (± 3 ppm)

Table A-15. VNA Return Loss Accuracy Verification

Frequency	Measured Value	Specification
6 dB	dB	5 dB ≤ x ≤ 7 dB
20 dB	dB	18.4 dB ≤ x ≤ 21.6 dB

Table A-16. VNA System Dynamic Range Verification

Frequency	Measured Value	Specification
400 MHz to 3 GHz	dB	≤ –80 dB
> 3 GHz to 4 GHz	dB	≤ –70 dB

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-3 Test Records for Power Meter Verification

Table A-17. Characterization Chart for Power Meter Verification

Test Power Level @ 50 MHz	Required Sensor B Reading
0 dBm	dBm
–50 dBm	dBm
Test Power Level @ 4000 MHz	**Required Sensor B Reading**
0 dBm	dBm
–50 dBm	dBm
Test Power Level @ 6000 MHz	**Required Sensor B Reading**
0 dBm	dBm
–50 dBm	dBm

Table A-18. Internal Power Meter Accuracy Verification

Frequency	Input Power	Measured Values	Specification
50 MHz	0 dBm	dBm	± 1.25 dB
	–50 dBm	dBm	± 1.25 dB
4.0 GHz	0 dBm	dBm	± 1.25 dB
	–50 dBm	dBm	± 1.25 dB
6.0 GHz	0 dBm	dBm	± 1.50 dB
	–50 dBm	dBm	± 1.50 dB

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-4 Test Records for Options Verification

Option 10, Bias-Tee Verification

Table A-19. Option 10 Bias-Tee

Voltage Setting	Measured Values		Voltage Specification	Current Specification
105 ohm Load, Low Current				
12 V	V	mA	± 1.2 V	85 mA to 145 mA
18 V	V	mA	± 1.8 V	142 mA to 202 mA
24 V	V	mA	± 2.4 V	199 mA to 259 mA
40 ohm Load, High Current				
15 V	V	mA	± 1.5 V	325 mA to 425 mA
78 ohm Load, High Current				
32 V	V	mA	± 3.2 V	370 mA to 450 mA

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 30, ISDB-T Verification

Table A-20. ISDB-T Signal Analyzer Frequency Accuracy

Channel	Frequency	Ref Level	Pre Amp Off Freq Error	Spec.	Ref Level	Pre Amp On Freq Error	Spec.
13	473.14285714 MHz	–20 dBm	Hz	± 0.3 Hz	–50 dBm	Hz	± 0.3 Hz
38	623.14285714 MHz	–20 dBm	Hz	± 0.3 Hz	–50 dBm	Hz	± 0.3 Hz
62	767.14285714 MHz	–20 dBm	Hz	± 0.3 Hz	–50 dBm	Hz	± 0.3 Hz

Table A-21. ISDB-T Signal Analyzer Residual MER

Channel	Frequency	Total MER Pre Amp Off	Spec.	Total MER Pre Amp On	Spec.
13	473.14285714 MHz	dB	≥ 42 dB	dB	≥ 37 dB
38	623.14285714 MHz	dB	≥ 42 dB	dB	≥ 37 dB
62	767.14285714 MHz	dB	≥ 42 dB	dB	≥ 37 dB

Table A-22. ISDB-T Signal Analyzer Frequency Lock Range

Channel	Frequency	Measured Frequency Error	Specification
13	473.23285714 MHz	Hz	90,000 ± 0.3 Hz
13	473.05285714 MHz	Hz	-90,000 ± 0.3 Hz

Table A-23. Level Accuracy Verification, AT(-10)

Frequency (Channel)	Sensor A Reading	Sensor B Reading	∆AB(-10)	MN63A Attenuation Reading, AT(-10)
473.14285714 MHz (Ch 13)				
623.14285714 MHz (Ch 38)				
767.14285714 MHz (Ch 62)				

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-24. Level Accuracy Verification, AT(-50)

Frequency (Channel)	Sensor A Reading	Sensor B Reading	∆AB(-50)	MN63A Attenuation Reading, AT(-50)
473.14285714 MHz (Ch 13)				
623.14285714 MHz (Ch 38)				
767.14285714 MHz (Ch 62)				

Table A-25. ISDB-T Signal Analyzer Level Accuracy Measurement Channel = 13ch at 473.14285714 MHz

Test Level (dBm)	AT(set) (dB)	SB(–10) or SB(–50) (dBm)	Input Level (dBm)	Ref Level Pre Amp Off / On (dBm)	Pre Amp Off		Pre Amp On		Spec (dB)
					M(Level) (dBm)	Dev (dB)	Pre Amp On M(Level) (dBm)	Dev (dB)	
–10	AT(–10) =			–10 / NA			– NA –	– NA –	± 2.0
–15	AT(–10) + 5 =	– NA –		–15 / NA			– NA –	– NA –	± 2.0
–20	AT(–10) + 10 =	– NA –		–20 / –20					± 2.0
–25	AT(–10) + 15 =	– NA –		–25 / –20					± 2.0
–30	AT(–10) + 20 =	– NA –		–25 / –30					± 2.0
–35	AT(–10) + 25 =	– NA –		–25 / –30					± 2.0
–40	AT(–10) + 30 =	– NA –		–25 / –40					± 2.0
–45	AT(–10) + 35 =	– NA –		–25 / –40					± 2.0
–50	AT(–50) =			–25 / –50					± 2.0
–55	AT(–50) + 5 =	– NA –		–25 / –50					± 2.0
–60	AT(–50) + 10 =	– NA –		–25 / –50					± 2.0
–65	AT(–50) + 15 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–70	AT(–50) + 20 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–75	AT(–50) + 25 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–80	AT(–50) + 30 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–84	AT(–50) + 34 =	– NA –		NA / –50	– NA –	– NA –			± 2.0

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-26. ISDB-T Signal Analyzer Level Accuracy Measurement Channel = 38ch at 623.14285714 MHz

Test Level (dBm)	AT(set) (dB)	SB(−10) or SB(−50) (dBm)	Input Level (dBm)	Ref Level Pre Amp Off / On (dBm)	Pre Amp Off		Pre Amp On		Spec (dB)
					M(Level) (dBm)	Dev (dB)	Pre Amp On M(Level) (dBm)	Dev (dB)	
−10	AT(−10) =			−10 / NA			– NA –	– NA –	± 2.0
−15	AT(−10) + 5 =	– NA –		−15 / NA			– NA –	– NA –	± 2.0
−20	AT(−10) + 10 =	– NA –		−20 / −20					± 2.0
−25	AT(−10) + 15 =	– NA –		−25 / −20					± 2.0
−30	AT(−10) + 20 =	– NA –		−25 / −30					± 2.0
−35	AT(−10) + 25 =	– NA –		−25 / −30					± 2.0
−40	AT(−10) + 30 =	– NA –		−25 / −40					± 2.0
−45	AT(−10) + 35 =	– NA –		−25 / −40					± 2.0
−50	AT(−50) =			−25 / −50					± 2.0
−55	AT(−50) + 5 =	– NA –		−25 / −50					± 2.0
−60	AT(−50) + 10 =	– NA –		−25 / −50					± 2.0
−65	AT(−50) + 15 =	– NA –		NA / −50	– NA –	– NA –			± 2.0
−70	AT(−50) + 20 =	– NA –		NA / −50	– NA –	– NA –			± 2.0
−75	AT(−50) + 25 =	– NA –		NA / −50	– NA –	– NA –			± 2.0
−80	AT(−50) + 30 =	– NA –		NA / −50	– NA –	– NA –			± 2.0
−84	AT(−50) + 34 =	– NA –		NA / −50	– NA –	– NA –			± 2.0

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-27. ISDB-T Signal Analyzer Level Accuracy Measurement Channel = 62ch at 767.14285714 MHz

Test Level (dBm)	AT(set) (dB)	SB(–10) or SB(–50) (dBm)	Input Level (dBm)	Ref Level Pre Amp Off / On (dBm)	Pre Amp Off		Pre Amp On		Spec (dB)
					M(Level) (dBm)	Dev (dB)	Pre Amp On M(Level) (dBm)	Dev (dB)	
–10	AT(–10) =			–10 / NA			– NA –	– NA –	± 2.0
–15	AT(–10) + 5 =	– NA –		–15 / NA			– NA –	– NA –	± 2.0
–20	AT(–10) + 10 =	– NA –		–20 / –20					± 2.0
–25	AT(–10) + 15 =	– NA –		–25 / –20					± 2.0
–30	AT(–10) + 20 =	– NA –		–25 / –30					± 2.0
–35	AT(–10) + 25 =	– NA –		–25 / –30					± 2.0
–40	AT(–10) + 30 =	– NA –		–25 / –40					± 2.0
–45	AT(–10) + 35 =	– NA –		–25 / –40					± 2.0
–50	AT(–50) =			–25 / –50					± 2.0
–55	AT(–50) + 5 =	– NA –		–25 / –50					± 2.0
–60	AT(–50) + 10 =	– NA –		–25 / –50					± 2.0
–65	AT(–50) + 15 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–70	AT(–50) + 20 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–75	AT(–50) + 25 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–80	AT(–50) + 30 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–84	AT(–50) + 34 =	– NA –		NA / –50	– NA –	– NA –			± 2.0

Table A-28. 1 dB Compression Level Accuracy Verification

Frequency (Channel)	Sensor A Reading M(Sa)	MN63A Attenuation Reading, AT(-25)	MN63A Attenuation Reading, AT(-15)	MN63A Attenuation Reading, AT(-50)	MN63A Attenuation Reading, AT(-43)
473.14285714 MHz (Ch 13)					
623.14285714 MHz (Ch 38)					
767.14285714 MHz (Ch 62)					

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-29. ISDB-T Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp Off

Test Level	Reference Level	Measured Value	Delta	Specification
−25 dBm	−25 dBm	dBm	dB	Δ < 1 dB
−15 dBm	−25 dBm	dBm	dB	Δ < 1 dB

Table A-30. ISDB-T Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp On

Test Level	Reference Level	Measured Value	Delta	Specification
−50 dBm	−50 dBm	dBm	dB	Δ < 1 dB
−43 dBm	−50 dBm	dBm	dB	Δ < 1 dB

Table A-31. ISDB-T Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp Off

Test Level	Reference Level	Measured Value	Delta	Specification
−25 dBm	−25 dBm	dBm	dB	Δ < 1 dB
−15 dBm	−25 dBm	dBm	dB	Δ < 1 dB

Table A-32. ISDB-T Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp On

Test Level	Reference Level	Measured Value	Delta	Specification
−50 dBm	−50 dBm	dBm	dB	Δ < 1 dB
−43 dBm	−50 dBm	dBm	dB	Δ < 1 dB

Table A-33. ISDB-T Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp Off

Test Level	Reference Level	Measured Value	Delta	Specification
−25 dBm	−25 dBm	dBm	dB	Δ < 1 dB
−15 dBm	−25 dBm	dBm	dB	Δ < 1 dB

Table A-34. ISDB-T Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp On

Test Level	Reference Level	Measured Value	Delta	Specification
−50 dBm	−50 dBm	dBm	dB	Δ < 1 dB
−43 dBm	−50 dBm	dBm	dB	Δ < 1 dB

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-35. ISDB-T Signal Analyzer Noise Floor with Pre Amp Off

Channel	Frequency	Ref Level	Measured Value	Specification
13	473.14285714 MHz	−25 dBm	dBm	≤ −70 dBm
38	623.14285714 MHz	−25 dBm	dBm	≤ −70 dBm
62	767.14285714 MHz	−25 dBm	dBm	≤ −70 dBm

Table A-36. ISDB-T Signal Analyzer Noise Floor with Pre Amp On

Channel	Frequency	Ref Level	Measured Value	Specification
13	473.14285714 MHz	−50 dBm	dBm	≤ −94 dBm
38	623.14285714 MHz	−50 dBm	dBm	≤ −94 dBm
62	767.14285714 MHz	−50 dBm	dBm	≤ −94 dBm

Table A-37. ISDB-T Signal Analyzer Phase Noise

Channel	Frequency (MHz)	at 10 kHz Offset (dBc / Hz)	Phase (10 kHz)	at 100 kHz Offset (dBc/Hz)	Phase (100 kHz)	Freq Error Spec.	Freq Error
13	473.14285714	≤ −103	dBc/Hz	≤ −105	dBc/Hz	± 0.2 Hz	Hz
38	623.14285714	≤ −103	dBc/Hz	≤ −105	dBc/Hz	± 0.2 Hz	Hz
62	767.14285714	≤ −103	dBc/Hz	≤ −105	dBc/Hz	± 0.2 Hz	Hz

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 31, GPS Receiver

Table A-38. Option 31 GPS Receiver

Frequency	Measured Value	Error	Specification
Spectrum Analyzer Frequency Accuracy with GPS High Frequency Accuracy			
4.0 GHz	GHz	Hz	± 350 Hz (± 50 ppb)
Spectrum Analyzer Frequency Accuracy with Internal Standard Frequency Accuracy			
4.0 GHz	GHz	Hz	± 1.2 kHz (± 0.3 ppm)

Table A-39. Option 31 GPS Receiver Bias-Tee Verification

Voltage Setting	Measured Value	Specification
3.3 V	mA	32 mA ± 15 % (27.2 mA to 36.8 mA)
5.0 V	mA	55.6 mA ± 15 % (47.3 mA to 63.9 mA)

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 32, ISDB-T SFN Analyzer Verification

Table A-40. ISDB-T SFN Level Accuracy Verification, AT(-10)

Frequency (Channel)	Sensor A Reading	Sensor B Reading	∆AB(-10)	MN63A Attenuation Reading, AT(-10)
473.14285714 MHz (Ch 13)				
623.14285714 MHz (Ch 38)				
767.14285714 MHz (Ch 62)				

Table A-41. ISDB-T SFN Analyzer Level Accuracy Measurement Channel = 13ch at 473.14285714 MHz

Test Level (dBm)	AT(set) (dB)	SB(–10) or SB(–50) (dBm)	Input Level (dBm)	Ref Level Pre Amp Off / On (dBm)	Pre Amp Off		Pre Amp On		Spec (dB)
					M(Level) (dBm)	Dev (dB)	M(Level) (dBm)	Dev (dB)	
–10	AT(–10) =			–10 / NA			– NA –	– NA –	± 2.0
–15	AT(–10) + 5 =	– NA –		–15 / NA			– NA –	– NA –	± 2.0
–20	AT(–10) + 10 =	– NA –		–20 / –20					± 2.0
–25	AT(–10) + 15 =	– NA –		–25 / –20					± 2.0
–30	AT(–10) + 20 =	– NA –		–25 / –30					± 2.0
–35	AT(–10) + 25 =	– NA –		–25 / –30					± 2.0
–40	AT(–10) + 30 =	– NA –		–25 / –40					± 2.0
–45	AT(–10) + 35 =	– NA –		–25 / –40					± 2.0
–50	AT(–50) =			–25 / –50					± 2.0
–55	AT(–50) + 5 =	– NA –		–25 / –50					± 2.0
–60	AT(–50) + 10 =	– NA –		–25 / –50					± 2.0
–65	AT(–50) + 15 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–70	AT(–50) + 20 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–75	AT(–50) + 25 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–80	AT(–50) + 30 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–84	AT(–50) + 34 =	– NA –		NA / –50	– NA –	– NA –			± 2.0

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-42. ISDB-T SFN Level Accuracy Verification, AT(-50)

Frequency (Channel)	Sensor A Reading	Sensor B Reading	∆AB(-50)	MN63A Attenuation Reading, AT(-50)
473.14285714 MHz (Ch 13)				
623.14285714 MHz (Ch 38)				
767.14285714 MHz (Ch 62)				

Table A-43. ISDB-T SFN Analyzer Level Accuracy Measurement Channel = 38ch at 623.14285714 MHz

Test Level (dBm)	AT(set) (dB)	SB(–10) or SB(–50) (dBm)	Input Level (dBm)	Ref Level Pre Amp Off / On (dBm)	Pre Amp Off		Pre Amp On		Spec (dB)
					M(Level) (dBm)	Dev (dB)	Pre Amp On M(Level) (dBm)	Dev (dB)	
–10	AT(–10) =			–10 / NA			– NA –	– NA –	± 2.0
–15	AT(–10) + 5 =	– NA –		–15 / NA			– NA –	– NA –	± 2.0
–20	AT(–10) + 10 =	– NA –		–20 / –20					± 2.0
–25	AT(–10) + 15 =	– NA –		–25 / –20					± 2.0
–30	AT(–10) + 20 =	– NA –		–25 / –30					± 2.0
–35	AT(–10) + 25 =	– NA –		–25 / –30					± 2.0
–40	AT(–10) + 30 =	– NA –		–25 / –40					± 2.0
–45	AT(–10) + 35 =	– NA –		–25 / –40					± 2.0
–50	AT(–50) =			–25 / –50					± 2.0
–55	AT(–50) + 5 =	– NA –		–25 / –50					± 2.0
–60	AT(–50) + 10 =	– NA –		–25 / –50					± 2.0
–65	AT(–50) + 15 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–70	AT(–50) + 20 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–75	AT(–50) + 25 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–80	AT(–50) + 30 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–84	AT(–50) + 34 =	– NA –		NA / –50	– NA –	– NA –			± 2.0

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-44. ISDB-T SFN Signal Analyzer Level Accuracy Measurement Channel = 62ch at 767.14285714 MHz

Test Level (dBm)	AT(set) (dB)	SB(–10) or SB(–50) (dBm)	Input Level (dBm)	Ref Level Pre Amp Off / On (dBm)	Pre Amp Off		Pre Amp On		Spec (dB)
					M(Level) (dBm)	Dev (dB)	Pre Amp On M(Level) (dBm)	Dev (dB)	
–10	AT(–10) =			–10 / NA			– NA –	– NA –	± 2.0
–15	AT(–10) + 5 =	– NA –		–15 / NA			– NA –	– NA –	± 2.0
–20	AT(–10) + 10 =	– NA –		–20 / –20					± 2.0
–25	AT(–10) + 15 =	– NA –		–25 / –20					± 2.0
–30	AT(–10) + 20 =	– NA –		–25 / –30					± 2.0
–35	AT(–10) + 25 =	– NA –		–25 / –30					± 2.0
–40	AT(–10) + 30 =	– NA –		–25 / –40					± 2.0
–45	AT(–10) + 35 =	– NA –		–25 / –40					± 2.0
–50	AT(–50) =			–25 / –50					± 2.0
–55	AT(–50) + 5 =	– NA –		–25 / –50					± 2.0
–60	AT(–50) + 10 =	– NA –		–25 / –50					± 2.0
–65	AT(–50) + 15 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–70	AT(–50) + 20 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–75	AT(–50) + 25 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–80	AT(–50) + 30 =	– NA –		NA / –50	– NA –	– NA –			± 2.0
–84	AT(–50) + 34 =	– NA –		NA / –50	– NA –	– NA –			± 2.0

Table A-45. ISDB-T SFN 1 dB Compression Level Accuracy Verification

Frequency (Channel)	Sensor A Reading M(Sa)	MN63A Attenuation Reading, AT(-25)	MN63A Attenuation Reading, AT(-15)	MN63A Attenuation Reading, AT(-50)	MN63A Attenuation Reading, AT(-43)
473.14285714 MHz (Ch 13)					
623.14285714 MHz (Ch 38)					
767.14285714 MHz (Ch 62)					

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-46. ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp Off

Test Level	Reference Level	Measured Value	Delta	Specification
−25 dBm	−25 dBm	dBm	dB	Δ < 1 dB
−15 dBm	−25 dBm	dBm	dB	Δ < 1 dB

Table A-47. ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 13 with Pre Amp On

Test Level	Reference Level	Measured Value	Delta	Specification
−50 dBm	−50 dBm	dBm	dB	Δ < 1 dB
−43 dBm	−50 dBm	dBm	dB	Δ < 1 dB

Table A-48. ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp Off

Test Level	Reference Level	Measured Value	Delta	Specification
−25 dBm	−25 dBm	dBm	dB	Δ < 1 dB
−15 dBm	−25 dBm	dBm	dB	Δ < 1 dB

Table A-49. ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 38 with Pre Amp On

Test Level	Reference Level	Measured Value	Delta	Specification
−50 dBm	−50 dBm	dBm	dB	Δ < 1 dB
−43 dBm	−50 dBm	dBm	dB	Δ < 1 dB

Table A-50. ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp Off

Test Level	Reference Level	Measured Value	Delta	Specification
−25 dBm	−25 dBm	dBm	dB	Δ < 1 dB
−15 dBm	−25 dBm	dBm	dB	Δ < 1 dB

Table A-51. ISDB-T SFN Signal Analyzer 1 dB Compression Level Channel 62 with Pre Amp On

Test Level	Reference Level	Measured Value	Delta	Specification
−50 dBm	−50 dBm	dBm	dB	Δ < 1 dB
−43 dBm	−50 dBm	dBm	dB	Δ < 1 dB

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-52. ISDB-T SFN Analyzer Noise Floor with Pre Amp Off

Channel	Frequency	Ref Level	Measured Value	Specification
13	473.14285714 MHz	−25 dBm	dBm	≤ −70 dBm
38	623.14285714 MHz	−25 dBm	dBm	≤ −70 dBm
62	767.14285714 MHz	−25 dBm	dBm	≤ −70 dBm

Table A-53. ISDB-T SFN Analyzer Noise Floor with Pre Amp On

Channel	Frequency	Ref Level	Measured Value	Specification
13	473.14285714 MHz	−50 dBm	dBm	≤ −94 dBm
38	623.14285714 MHz	−50 dBm	dBm	≤ −94 dBm
62	767.14285714 MHz	−50 dBm	dBm	≤ −94 dBm

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-54. Option 40 GSM/GPRS/EDGE RF Measurements

Error Type	Measured Value	Specification
At 850 MHz, –10 dBm Level, TCH Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 850 MHz, –50 dBm Level, TCH ALL Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –10 dBm Level, TCH ALL Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –50 dBm Level, TCH Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-55. Option 41 GSM/GPRS/EDGE Demodulator

Measurement	Measured Value	Specification
At 850 MHz, –10 dBm Level, TCH Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 850 MHz, –50 dBm Level, TCH ALL Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 1800 MHz, –10 dBm Level, TCH ALL Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 1800 MHz, –50 dBm Level, TCH Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern		
EVM RMS	%	≤ 2.5%
At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern		
EVM RMS	%	≤ 2.5%
At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern		
EVM RMS	%	≤ 2.5%
At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern		
EVM RMS	%	≤ 2.5%

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-56. Option 42 CDMA RF Measurements

Measurement	Measured Value	Specification
At 870.03 MHz, –30 dBm Level, cdmaOne		
Channel Power	dB	±1.5 dB
At 1930.05 MHz, –30 dBm Level, cdmaOne		
Channel Power	dB	±1.5 dB
At 1930.05 MHz, –30 dBm Level, CDMA2000		
Channel Power	dB	±1.5 dB
At 870.03 MHz, –30 dBm Level, CDMA2000		
Channel Power	dB	±1.5 dB

Table A-57. Option 43 cdmaOne and CDMA2000 1xRTT Demodulator

Measurement	Measured Value	Specification
At 870.03 MHz, –30 dBm Level, cdmaOne		
Frequency Error	Hz	± 20 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 1930.05 MHz, –30 dBm Level, cdmaOne		
Frequency Error	Hz	± 20 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 1930.05 MHz, –30 dBm Level, CDMA2000		
Frequency Error	Hz	± 20 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 870.03 MHz, –30 dBm Level, CDMA2000		
Frequency Error	Hz	± 20 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

MT821_E **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-58. Option 44, Sensor A and B Reading Components Characterization Table

Frequency	PMA.10 (dBm)	PMB.10 (dBm)	Δ1 (dBm)	PMA.10C (dBm)	PMA.20 (dBm)	ATT.10 (dB)
881.5 MHz						

Table A-59. Option 44, Power Level Setting Components Characterization Table

Frequency	MG3700A.10 Setting (dBm)	MG3700A.20 Setting (dBm)	PMA.10 (dBm)	PMA.20 (dBm)
881.5 MHz				

Table A-60. Option 44, WCDMA Absolute Power Accuracy

Test Level	Measured Power	Error	Specification
+20 dBm	dBm	dB	± 1.25 dB
+10 dBm	dBm	dB	± 1.25 dB
–10 dBm	dBm	dB	± 1.25 dB
–20 dBm	dBm	dB	± 1.25 dB

Table A-61. Option 44, WCDMA Occupied Bandwidth (OBW)

Frequency	Power Meter Reading	OBW	Specification
881.5 MHz	dBm		4.2 MHz ± 100 kHz
1962.5 MHz	dBm		4.2 MHz ± 100 kHz
2680.5 MHz	dBm		4.2 MHz ± 100 kHz

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-62. Option 44, WCDMA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF Channel Power Error	Specification
881.5 MHz				±1.25 dB max
1962.5 MHz				±1.25 dB max
2680.5 MHz				±1.25 dB max

Table A-63. Option 44, WCDMA ACLR Accuracy

Frequency/Offset (MHz)	Measured ACLR	Calculated ACLR Error	Specification
881.5 / –10			± 0.8 dB
881.5 / –5			± 0.8 dB
881.5 / 5			± 0.8 dB
881.5 / 10			± 0.8 dB
1962.5 / –10			± 0.8 dB
1962.5 / –5			± 0.8 dB
1962.5 / 5			± 0.8 dB
1962.5 / 10			± 0.8 dB
2680.5 / –10			± 0.8 dB
2680.5 / –5			± 0.8 dB
2680.5 / 5			± 0.8 dB
2680.5 / 10			± 0.8 dB

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-64. Option 44, HSDPA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF Channel Power Accuracy	Specification
2680.5 MHz				± 1.25 dB max

Table A-65. Option 44, HSDPA ACLR Accuracy

Frequency/Offset (MHz)	Measured ACLR	Calculated ACLR Error	Specification
2680.5 / –10			± 0.8 dB
2680.5 / –5			± 0.8 dB
2680.5 / 5			± 0.8 dB
2680.5 / 10			± 0.8 dB

Option 45 WCDMA Demodulator and Option 65 WCDMA/HSDPA Demodulator

Table A-66. Option 45 or 65, WCDMA Error Vector Magnitude (Test Model 4)

Frequency (MHz)	Measured Value		Specification
1962.5	EVM	%	≤ 2.5 %

Table A-67. Option 65, HSDPA Error Vector Magnitude (Test Model 5)

Frequency (MHz)	Measured Value		Specification
1962.5	EVM	%	≤ 2.5 %

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 46 Fixed WiMAX RF Measurements

Table A-68. Option 46, Fixed WiMAX Channel Power Accuracy

Frequency	Input Power	Measured Channel Power (RSSI)	Error	Specification
2600.5 MHz	–15 dBm	dBm	dB	± 1.5 dB
2600.5 MHz	–50 dBm	dBm	dB	± 1.5 dB
3600.5 MHz	–15 dBm	dBm	dB	± 1.5 dB
3600.5 MHz	–50 dBm	dBm	dB	± 1.5 dB
5600.5 MHz	–15 dBm	dBm	dB	± 1.5 dB
5600.5 MHz	–50 dBm	dBm	dB	± 1.5 dB

Option 47 Fixed WiMAX Demodulator

Table A-69. Option 47, Fixed WiMAX Residual EVM

Frequency	Power	BW	EVM (RMS)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
2600.5 MHz	–50 dBm	10 MHz	%	≤ 3.5%
3600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
3600.5 MHz	–50 dBm	10 MHz	%	≤ 3.5%
5600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
5600.5 MHz	–50 dBm	10 MHz	%	≤ 3.5%

Table A-70. Option 47, Fixed WiMAX Frequency Error

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	± 260.05 Hz
5600.5 MHz	–50 dBm	Hz	± 560.05 Hz

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 51 T1 Analyzer Verification

Table A-71. Option 51, T1 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		± 5 ppm
Recovered Clock Frequency		1543992 to 1544008 Hz

Table A-72. T1 Transmitted Level Voltage

Measurement	Measured Value	Specification
Tx LBO: 0 dB		4.8 to 7.6 Vp-p
Tx LBO: –7.5 dB		1.9 to 31 Vp-p
Tx LBO: –15 dB		0.5 to 1.7 Vp-p

Table A-73. T1 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
Tx LBO: 0 dB		4.8 to 7.6 Vp-p
Tx LBO: –7.5 dB		1.9 to 3.1 Vp-p
Tx LBO: –15 dB		0.5 to 1.7 Vp-p

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 52 E1 Analyzer Verification

Table A-74. Option 52, E1 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		± 5 ppm
Recovered Clock Frequency		204790 to 2048010 Hz

Table A-75. Option 52, E1 Transmitted Level Voltage

Measurement	Measured Value	Specification
120 ohm (RJ48 Interface)		5.4 to 6.6 Vp-p
75 ohm (BNC Interface)		4.2 to 5.2 Vp-p

Table A-76. Option 52, E1 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
120 ohm (RJ48 Interface)		5.4 to 6.6 Vp-p
75 ohm (BNC Interface)		4.2 to 5.2 Vp-p

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 53 T1/T3 Analyzer Verification

Table A-77. Option 53, T1/T3 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		± 5 ppm
Recovered Clock Frequency		1543992 to 1544008 Hz

Table A-78. Option 53, T1 Transmitted Level Voltage

Measurement	Measured Value	Specification
Tx LBO: 0 dB		4.8 to 7.2 Vp-p
Tx LBO: –7.5 dB		1.9 to 3.1 Vp-p
Tx LBO: –15 dB		0.5 to 1.7 Vp-p

Table A-79. Option 53, T1 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
Tx LBO: 0 dB		4.8 to 7.2 Vp-p
Tx LBO: –7.5 dB		1.9 to 3.1 Vp-p
Tx LBO: –15 dB		0.5 to 1.7 Vp-p

Table A-80. Option 53, T3 Frequency Clock

Measurement	Measured Value	Specification
Internal Clock Error		± 5 ppm
Recovered Clock Frequency		44735776 to 44736224 Hz

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-81. Option 53, T3 Transmitted Level Voltage

Measurement	Measured Value	Specification
DSX		0.72 to 1.7 V p-p
LOW		0.72 to 1.7 V p-p

Table A-82. Option 53, T3 Transmitted Level Vpp Reading

Measurement	Vpp Reading	Specification
DSX		0.72 to 1.7 V p-p
LOW		0.72 to 1.7 V p-p

Option 60, 61 TD-SCDMA

Table A-83. Option 60, 61, TD-SCDMA Verification (at 2010 MHz, -45 dBm Level, TD-SCDMA)

Measurement	Measured Value	Specification
Channel Power (Error)		± 1 dB
EVM		< 3%
Frequency Error		± 20 Hz
Tau		± 0.1 μs

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 62 EVDO RF Measurements

Table A-84. Option 62, EVDO RF Measurements

Measurement	Measured Value	Specification
At 870.03 MHz, –50 dBm Level, 921.6kps 8-PSK Modulation		
Channel Power Error	dB	± 1.5 dB
At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation		
Channel Power Error	dB	± 1.5 dB
At 1930.05 MHz, –50 dBm Level, 2457.6kps 16-QAM Modulation		
Channel Power Error	dB	± 1.5 dB
At 1930.05 MHz, –50 dBm Level, Idle Slot		
Channel Power Error	dB	± 1.5 dB
At 870.03 MHz, –10 dBm Level, Idle Slot		
Channel Power Error	dB	± 1.5 dB

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 63 EVDO Demodulator

Table A-85. Option 63, EVDO Demodulator

Measurement	Measured Value	Specification
At 870.03 MHz, –50 dBm Level, 921.6kps 8-PSK Modulation		
Frequency Error	Hz	± 20 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 1930.05 MHz, 0 dBm Level, 38.4kps QPSK Modulation		
Frequency Error	Hz	± 20 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 1930.05 MHz, –50 dBm Level, 2457.6kps 16-QAM Modulation		
Frequency Error	Hz	± 20 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 1930.05 MHz, –50 dBm Level, Idle Slot		
Frequency Error	Hz	± 20 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs
At 870.03 MHz, –10 dBm Level, Idle Slot		
Frequency Error	Hz	± 20 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 66 Mobile WiMAX RF Measurements

Table A-86. Option 66, Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

Frequency (MHz)	Input Power (dBm)	Measured Channel Power (RSSI)	Error	Specification
2600.5	–15	dBm	dB	± 1.5 dB
2600.5	–50	dBm	dB	± 1.5 dB
3600.5	–15	dBm	dB	± 1.5 dB
3600.5	–50	dBm	dB	± 1.5 dB

Table A-87. Option 66, Mobile WiMAX Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

Frequency (MHz)	Input Power (dBm)	Measured Channel Power (RSSI)	Error	Specification
2600.5	–15	dBm	dB	± 1.5 dB
2600.5	–50	dBm	dB	± 1.5 dB
3600.5	–15	dBm	dB	± 1.5 dB
3600.5	–50	dBm	dB	±1.5 dB

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 67 Mobile WiMAX Demodulator

Table A-88. Option 67, Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)

Frequency (MHz)	Power (dBm)	BW (MHz)	EVM (rms)	Specification
2600.5	–15	10	%	≤ 3.0%
2600.5	–50	10	%	≤ 3.0%
3600.5	–15	10	%	≤ 3.0%
3600.5	–50	10	%	≤ 3.0%

Table A-89. Option 67, Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

Frequency (MHz)	Power (dBm)	Freq Error	Specification
2600.5	–50	Hz	± 52.01 Hz
3600.5	–50	Hz	± 72.01 Hz

Table A-90. Option 67, Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)

Frequency (MHz)	Power (dBm)	BW (MHz)	EVM (rms)	Specification
2600.5	–15	5	%	≤ 3.0%
2600.5	–50	5	%	≤ 3.0%
3600.5	–15	5	%	≤ 3.0%
3600.5	–50	5	%	≤ 3.0%

Table A-91. Option 67, Mobile WiMAX Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

Frequency (MHz)	Power (dBm)	Freq Error	Specification
2600.5	–50	Hz	± 52.01 Hz
3600.5	–50	Hz	± 72.01 Hz

MT821_E Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 541, 542 LTE Measurements

Table A-92. Option 541, LTE Channel Power Accuracy

Frequency (MHz)	Input Power (dBm)	Measured Channel Power	Error	Specification
750	–10	dBm	dB	± 1.5 dB
750	–50	dBm	dB	± 1.5 dB
2150	–10	dBm	dB	± 1.5 dB
2150	–50	dBm	dB	± 1.5 dB

Table A-93. Option 542, LTE Residual EVM and Frequency Accuracy

Measurement	Measured Value	Specification
750 MHz @ –10 dBm		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.5 %
750 MHz @ –50 dBm		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.5 %
2150 MHz @ –10 dBm		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.5 %
2150 MHz @ –50 dBm		
Frequency Error	Hz	± 10 Hz
EVM (rms)	%	< 2.5 %

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