ADVANTEST®

ADVANTEST CORPORATION

R3132/62

Spectrum Analyzer

Maintenance Manual

MANUAL NUMBER FME-8339635A00

Applicable models

R3132

R3132N

R3162

First printing January 2000
Printed in Japan

Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

■ Warning Labels

Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

■ Basic Precautions

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. Grounding will be defeated if you use an extension cord which does not include a safety ground terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.

- Do not place objects on top of this product. Also, do not place flower pots or other containers containing liquid such as chemicals near this product.
- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

■ Caution Symbols Used Within this Manual

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

■ Safety Marks on the Product

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

■ Precautions when Disposing of this Instrument

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances:
(1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in sol der).

Example : fluorescent tubes, batteries

TABLE OF CONTENTS

LIST OF ILLUSTRATION

LIST OF TABLES

1. GENERAL INFORMATION

This chapter contains following information,

1.1 Introduction

This manual provides information to perform unit or assembly level troubleshooting included removal/Installation procedures of instrument's module assemblies and a parts list.
This manual is intended for use by trained service personnel only.

Detailed operation and programming information is excluded from this manual.
Including only sufficient information for service purpose. For more detailed operation information, refer to the R3132/3162/3132N spectrum analyzer operation manual.

WARNING!

The information in this manual is for use of Service Trained Personnel only.
To avoid electrical shock, to do not perform any procedures in this manual or do any servicing to the R3132/3162/3132N, unless you are qualified to do so.

This manual has information the following five chapters.

1. GENERAL INFORMATION

It provides description of this manual and brief product information,
Specification and Test equipment required for performance verification.

2. THEORY OF OPERATION

It provides the theory of operation based on replaceable assemblies.

3. PERFORMANCE VERIFICATION PROCEDURE

It provides the procedures for performance verification and performance verification test record sheet.

4. TROUBLESHOOTING

It provides the diagnostic procedure including the removal of defective module and installation procedures.

5. PARTS LIST

It provides the replaceable parts list.

1.2 Outline of Product

The R3132/R3162/3132N are spectrum analyzers that provides the user with highly stable spectrum analysis using the synthesized local method.
They operate in the following frequency and input.

	R3132	R3162	R3132N
Input Impedance	50 Ω	50 Ω	75 Ω
Frequency Range	9 kHz to 3 GHz	9 kHz to 8 GHz	9 kHz to 2.2 GHz (Capable up to 3 GHz)
Frequency Span	1 kHz to 3 GHz and zero span	1 kHz to 8 GHz and zero span	1 kHz to 3 GHz and zero span
Residual FM	≤ 60 Hz p-p / 100 msec	≤ 60 Hz p-p / 100 msec	≤ 60 Hz p-p / 100 msec
Maximum Input Level Preamplifier OFF	(Input attenuator ≥ 10 dB) + 30 dBm ± 50VDC max.	(Input attenuator ≥ 10 dB) + 30 dBm 0VDC max.	(Input attenuator ≥ 10 dB) + 134 dBuV 0VDC max.
Preamplifier ON	+13 dBm ± 50 VDC max	+13 dBm 0 VDC max	+ 120 dBuV ± 50 VDC
Displayed Averaged Noise Level	with RBW 1kHz, VBW 10 Hz and Input attenuator 0 dB, f>1 MHz	with RBW 1kHz, VBW 10 Hz and Input attenuator 0 dB, f>1 MHz	with RBW 1kHz, VBW 10 Hz and Input attenuator 0 dB, f>1 MHz
Preamplifier OFF	-117 dBm + 2f (GHz)dB	1 MHz <f<3.3 GHz -117 dBm + 2f(GHz) dB	-6 dBuV + 2f(GHz) dB
		3.2 GHz <f< 8 GHz -115 dBm+ 0.5 f(GHz) dB	
Preamplifier ON	-132 dBm + 3f (GHz)dB	-132 dBm + 3f(GHz)dB	-21 dBuV + 3f(GHz) dB
Noise Sidebands	Freq. ≤ 2.6 GHz	Freq. ≤ 2.6 GHz	Freq. ≤ 2.6 GHz
	≤ -100 dBc/Hz at 10 kHz offset ≤ -105 dBc/Hz at 20 kHZ offset	≤ -100 dBc/Hz at 10 kHz offset ≤ -105 dBc/Hz at 20 kHZ offset	≤ -100 dBc/Hz at 10 kHz offset ≤ -105 dBc/Hz at 20 kHZ offset
	Freq.> 2.6 GHz	Freq.> 2.6 GHz	Freq.> 2.6 GHz
	≤ -98 dBc/Hz at 10 kHz offset ≤ -130 dBc/Hz at 20 kHz offset	≤ -98 dBc/Hz at 10 kHz offset ≤ -103 dBc/Hz at 20 kHz offset	≤ -98 dBc/Hz at 10 kHz offset ≤ -103 dBc/Hz at 20 kHz offset

The analyzer provides the following additional features;

1. Faster, more real time analysis.
   Refresh rate: 20 traces per second.
2. 50 μsec high-speed zero span sweep(Option)

3. Application -ready measurement function.

   1). Digital mobile communications measurement function, OBW,ACP, total/Channel/average power measurement.

   2). EMC measurement function.

   6 dB RBW: 9 kHz/120 kHz/1 MHz supported.(200 Hz available as option)
   Built-in QP detector, Built-in antenna correction factor table and AM/FM audio demodulation function.

   3). Frequency counter function

   1 Hz resolution frequency counter

4). Additional general purpose measurement functions

Noise/Hz measurement with PBW calibration, %AM measurement, Third-order measurement and X dB down measurement.

4. Easy-to-use standard function

Auto tuning, pass/fail testing, multi screen, multi marker, large character display, trace computation function, TV trigger, and more.

5. Standard with I/O interfaces to ease automatic system implementation task.

GPIB, RS232, printer interfaces and Floppy Disk Drive

1.3 Specification

This section provides R3132, R3162 and R3132N specifications.

1.3.1. R3132 Specifications

Frequency

Frequency range	9 kHz to 3 GHz
Frequency readout accuracy (Start,Stop,CF,Marker)	± (Frequency readout x freq. reference error +SPAN x 1% + RBW x 15% + 60 Hz)
Count frequency marker Resolution Counter Accuracy	 1 Hz to 1 kHz ± (marker frequency x freq. reference accuracy+ 1LSD) (S/N ≥ 25 dB, SPAN ≤ 200 MHz)
Frequency reference Aging Rate Temperature stability	 $\pm 2 \times 10^{-6}$ / year $\pm 1 \times 10^{-5}$ (from 0 °C to 50 °C)
Frequency span Range Accuracy	 1 kHz to 3 GHz and 0 Hz (zero span) ± 1% of Span
Residual FM Zero Span	≤ 60 Hz p-p / 100 msec
Noise Sidebands	freq. ≤ 2.6GHz ≤ - 100 dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ - 105 dBc/Hz at 20 kHz offset freq. >2.6 GHz ≤ - 98 dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ - 103 dBc/Hz at 20 kHz offset

Resolution Bandwidth At 3 dB Range: RBW Accuracy Selectivity 60 dB : 3 dB QP (at 6 dB) Range:	 1 kHz to 3 MHz 1-3-10 sequence ± 20% from 1 kHz to 1 MHz ± 25% for 3 MHz < 15:1 1 MHz, 120 kHz, 9 kHz
Video Bandwidth	10 Hz to 3 MHz (1-3-10 sequence)

Amplitude Range

Measurement range	+ 30 dBm to displayed Average Noise Level
Maximum input level Preamplifier OFF Preamplifier ON	(Input attenuator ≥ 10 dB) + 30 dBm ± 50 VDC max. + 13 dBm ± 50 VDC max.
Display range Log Linear	 10 x 10 div 10, 5, 2, 1 dB/DIV 10% of reference level/div
Reference level range Preamplifier OFF Log Linear Preamplifier ON Log Linear	 (Input attenuator 0 to 50 dB) -64 dBm to +40 dBm (0.1 dB step) 141.1 μV to 22.36V (Input attenuator 0 to 30 dB) -82 dBm to +10 dBm (0.1 dB step) 17.76 μV to 707.1 mV
Input attenuator range	0 to 50 dB (5 dB step)

Dynamic Range

Displayed Average Noise Level	with RBW 1 kHz, VBW 10 Hz and input attenuator 0 dB, f ≥ 10MHz
Preamplifier OFF	- 117 dBm + 2 f (GHz)dB
Preamplifier ON	- 132 dBm + 3 f (GHz)dB
Gain compression (1 dB)	frequency ≥ 200 MHz
Preamplifier OFF	> 0 dBm (mixer input level)
Preamplifier ON	> -25 dBm (RF input level)
Spurious Response	Preamplifier OFF, Mixer level -30 dBm
Second harmonic distortion	≤ -70 dBc freq = 100 MHz to 800 MHz ≤ -80 dBc freq ≥ 800 MHz
Third order intermodulation distortion	≤ -80 dBc freq ≥ 200 MHz, 2-signal difference > 50 kHz
Residual responses	(input terminated 50Ω, input attenuator 0 dB, freq ≥ 1 MHz)
Preamplifier OFF	≤ -100 dBm
Preamplifier ON	≤ -105 dBm

Amplitude Accuracy

Frequency Response	(after Calibration)
Preamplifier OFF	± 0.5 dB (100 kHz to 3 GHz , Attenuator =10 dB) ± 1 dB (100 kHz to 2.7 GHz) ± 2 dB (9 kHz to 3 GHz)
Preamplifier ON	± 1 dB (100 kHz to 2.7 GHz) ± 2 dB (9 kHz to 3 GHz)
Calibration Signal Accuracy	-20 dBm ± 0.3 dB
IF Gain Error	(after automatic calibration) ± 0.5 dB
Scale Fidelity	(after automatic calibration)
Log	± 1 dB / 10 dB ± 1.5 dB / 90 dB ± 0.2 dB / 1 dB
Linear	± 5 % of reference level
Input attenuator switching accuracy	± 0.3 dB (0 to 50 dB settings) in reference to an attenuation of 10 dB at 30 MHz
Resolution bandwidth switching uncertainty	(after automatic calibration) ± 0.5 dB
Overall level accuracy	± 1.5 dB (REF = -50 to 0 dBm, ATT = 10 dB, 2 dB/div, RBW = 300 kHz, f > 100 kHz, after automatic calibration)

Sweep

Sweep time	20 msec to 1000 sec
Accuracy	± 2 %
Trigger mode	FREE RUN, LINE, VIDEO, EXT, TV
Sweep Mode	REPEAT, SINGLE

Inputs & Outputs

RF Input	
Connector	N type
Impedance	50 Ω (nominal)
VSWR	
Preamplifier OFF	< 1.5: 1 (100 kHz to 2 GHz) (characteristic) with input attenuator 10 dB to 50 dB < 2 : 1 (9 kHz to 3 GHz) (characteristic) with input attenuator 5 dB to 50 dB
Preamplifier ON	< 2.5:1 (9 kHz to 3 GHz) (characteristic)
Probe power	± 12V (nominal), 4-pin connector
Calibration output signal	BNC female, 50 Ω (nominal) 30 MHz, -20 dBm
10 MHz reference input	BNC female, 50 Ω (nominal) -10 dBm to +10 dBm
External trigger input	BNC female
Phone output	Small size monophonic female
GPIB interface	IEEE-488 bus connector
Serial interface	D-sub 9 pin,
Printer interface	D-sub 25pin, ESC/P, ESC/P-R, PCL
Video output	VGA(15pin ,female)
Floppy drive	3.5 inch, MS-DOS format

General

Operating environment range	0 °C to +50 °C, Relative humidity 85% or less (without condensation)
Storage environment range	-20 °C to +60 °C, Relative humidity 85% or less
AC input power source	Automatic switching to 100VAC or 200VAC 100VAC: 100V - 120V, 50Hz / 60Hz 200VAC: 220V - 240V, 50Hz / 60Hz
Power consumption	< 200VA
Mass	< 14 kg
Dimensions	approximately 424(W) x177(H) x300(D) mm (not including projections such as rubber feet and connectors)

1.3.2. R3162 Specifications

Frequency

Frequency range	9 kHz to 8 GHz Frequency band 9 kHz to 3.3 GHz band 0 3.2 GHz to 6.6 GHz band 1- 6.5 GHz to 8 GHz band 1+
Frequency readout accuracy (Start, Stop, CF, Marker)	± (Frequency readout x freq. reference error +SPAN x 1% +15% x RBW + 60 Hz)
Count frequency marker Resolution Count Accuracy	 1 Hz to 1 kHz ± (marker frequency x freq. reference accuracy + 1LSD) (S/N ≥ 25 dB, SPAN ≤ 200 MHz)
Frequency reference Aging Rate Temperature stability	 ± 2 x 10^{-6} / year ± 1 X 10^{-5} (from 0 °C to 50 °C)
Frequency span Range Accuracy	 1 kHz to 8 GHz and 0 Hz (zero span) ± 1% of Span
Residual FM Zero Span	≤ 60 Hz p-p/100 msec
Noise Sidebands	freq. ≤ 2.6 GHz ≤ - 100 dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ - 105 dBc/Hz at 20 kHz offset freq. >2.6 GHz ≤ - 98 dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ - 103 dBc/Hz at 20 kHz offset

Resolution Bandwidth At 3 dB Range: RBW Accuracy Selectivity 60 dB : 3 dB QP (at 6 dB) Range:	 1 kHz to 3 MHz ,1-3-10 sequence ± 20% from 1 kHz to 1 MHz ± 25% for 3 MHz < 15:1 1 MHz, 120 kHz, 9 kHz
Video Bandwidth	10 Hz to 3 MHz (1 -3-10 sequence)

Amplitude Range

Measurement range	+ 30 dBm to displayed Average Noise Level
Maximum input level Preamplifier OFF Preamplifier ON	(Input attenuator ≥ 10 dB) + 30 dBm 0 VDC max. + 13 dBm 0 VDC max.
Display range Log Linear	 10 x 10 div 10, 5, 2, 1 dB/DIV 10% of reference level/div
Reference level range Preamplifier OFF Log Linear Preamplifier ON Log Linear	 (Input attenuator 0 to 75 dB) -64 dBm to +65 dBm (0.1 dB step) 141.1 µV to 397.63V (Input attenuator 0 to 30 dB) -82 dBm to +10 dBm (0.1 dB step) 17.76 µV to 707.1 mV

Input attenuator range	0 to 75 dB (5 dB step)

Dynamic Range

Displayed Average Noise Level	with RBW 1 kHz, VBW 10 Hz and input attenuator 0 dB, f ≥ 10 MHz
Preamplifier OFF	band 0 : - 117 dBm + 2 f (GHz)dB band 1- : - 115 dBm + 0.5 f (GHz)dB band 1+ : - 115 dBm + 0.5 f (GHz)dB
Preamplifier ON	- 132 dBm + 3 f (GHz)dB Frequency.Range 1 MHz to 3.3 GHz
Gain compression (1 dB)	frequency ≥ 200 MHz
Preamplifier OFF	> 0 dBm (mixer input level)
Preamplifier ON	> -25 dBm (RF input level)
Spurious Response	Preamplifier OFF
Second harmonic distortion	Freq. range / mixer level / distortion level 100 MHz to 800 MHz / -30 dBm / ≤ -70 dBc ≥ 800 MHz (band 0) / -30 dBm / ≤ -80 dBc ≥ 3.3GHz / -10 dBm / ≤ -100 dBc
Third order intermodulation distortion	≤ -80 dBc (Mixer input level –30 dBm, 2-signal difference > 50 kHz f ≥ 200 MHz)
Image/Multiple/Out-of-band response	< -70 dBc up to 8 GHz,
Residual responses	(input terminated 50Ω, input attenutor 0 dB)
	band 0(f=1 MHz) / band 1-,1+
Preamplifier OFF	≤ -100 dBm / ≤ -90 dBm
Preamplifier ON	≤ -105 dBm / not applicable

Amplitude Accuracy

Frequency Response	(after Calibration and Preselector peak)
Preamplifier OFF	±0.5 dB (100 kHz to 3 GHz, Att=10 dB) ±1 dB (100 kHz to 2.7 GHz) ±2 dB (9 kHz to 3.3 GHz) ±2 dB (3.2 GHz to 8 GHz)
Preamplifier ON	±1 dB (100 kHz to 2.7 GHz) ±2 dB (9 kHz to 3.3 GHz)
Calibration Signal Accuracy	-20 dBm ± 0.3 dB
IF Gain Error	(after automatic calibration) ± 0.5 dB
Scale Fidelity	(after automatic calibration)
Log	± 1 dB / 10 dB ± 1.5 dB / 90 dB ± 0.2 dB / 1 dB
Linear	± 5 % of reference level
Input attenuator switching accuracy	± 0.3 dB (0 to 50 dB settings) reference to an attenuation of 10 dB at 30 MHz
Resolution bandwidth switching uncertainty	after automatic calibration) ± 0.5 dB
Overall level accuracy	±1.5 dB (REF = -50 to 0 dBm, ATT = 10 dB, 2 dB/div, RBW = 300 kHz, f=100 kHz to 3 GHz, after automatic calibration)

Sweep

Sweep time Accuracy	20 msec to 1000 sec ± 2 %
Trigger mode	FREE RUN, LINE, VIDEO, EXT, TV
Sweep Mode	REPEAT, SINGLE

Inputs & Outputs

RF Input	
Connector	N type
Impedance	50 Ω (nominal)
VSWR (at tuned frequency)	
Preamplifier OFF	< 2: 1 (9 kHz to 3.3 GHz) (characteristic)
(input attenuator=10 dB)	< 2 : 1 (3.2 GHz to 8 GHz) (characteristic)
Preamplifier ON	< 2.5:1 (9 kHz to 3.3 GHz) (characteristic)
Probe power	± 12V (nominal), 4-pin connector
Calibration output signal	BNC female, 50Ω (nominal) 30 MHz, -20 dBm
10 MHz reference input	BNC female, 50 Ω(nominal) -10 dBm to +10 dBm
External trigger input	BNC female
Phone output	Small size monophonic female
GPIB interface	IEEE-488 bus connector
Serial interface	D-sub 9 pin,
Printer interface	D-sub 25 pin, ESC/P, ESC/P-R, PCL
Video output	VGA(15 pin ,female)
Floppy drive	3.5 inch , MS-DOS format

General

Operating environment range	0 °C to +50 °C, Relative humidity 85% or less (without condensation)
Storage environment range	-20 °C to +60 °C, Relative humidity 85% or less
AC input power source	Automatic switching to 100VAC or 200VAC 100VAC: 100V - 120V, 50Hz / 60Hz 200VAC: 220V - 240V, 50Hz / 60Hz
Power consumption	< 200VA
Mass	< 15 kg
Dimensions	approximately 424(W) x177(H) x 300(D) mm (not including projections such as rubber feet and connectors)

1.3.3. R3132N Specifications

Frequency

Frequency range	9 kHz to 3.0 GHz
Frequency readout accuracy (Start,Stop,CF,Marker)	± (Frequency readout x freq. reference error +SPAN x 1% + RBW x 15% + 60 Hz)
Count frequency marker Resolution Count Accuracy	 1 Hz to 1 kHz ± (marker frequency x freq. reference accuracy +1LSD) (S/N ≥ 25 dB, SPAN ≤ 200 MHz)
Frequency reference Aging Rate Temperature stability	 ± 2 x 10^{-6} / year ± 1 x 10^{-5} (from 0 °C to 50 °C)
Frequency span Range Accuracy	 1 kHz to 3 GHz and 0 Hz (zero span) ±1% of Span
Residual FM Zero Span	≤ 60 Hz p-p / 100 msec
Noise Sidebands	frequency. ≤ 2.6 GHz ≤ - 100 dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ - 105 dBc/Hz at 20 kHz offset frequency. >2.6 GHz ≤ - 98 dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ - 103 dBc/Hz at 20 kHz offset

Resolution Bandwidth At 3 dB Range: RBW Accuracy Selectivity 60 dB : 3 dB QP (at 6 dB) Range:	 1 kHz to 3 MHz ,1-3-10 sequence ± 20% from 1 kHz to 1 MHz ± 25% for 3 MHz < 15:1 1 MHz, 120 kHz, 9 kHz
Video Bandwidth	10 Hz to 3 MHz (1 -3-10 sequence)

Amplitude Range

Measurement range	+ 134 dBμV to displayed Average Noise Level
Maximum input level Preamplifier OFF Preamplifier ON	(Input attenuator ≥ 10 dB) + 134 dBμV ± 50VDC max. + 120 dBμV ± 50 VDC max .
Display range Log Linear	 10 x 10 div 10, 5, 2, 1 dB/DIV 10% of reference level/div
Reference level range Preamplifier OFF Log Linear Preamplifier ON Log Linear	 (Input attenuator 0 to 50 dB) +44.8 dBμV to +148.8 dBμV (0.1 dB step) 172.8 μV to 27.39V (Input attenuator 0 to 30 dB) +26.8 dBμV to +118.8 dBμV (0.1 dB step) 21.75 μV to 866 mV
Input attenuator range	0 to 50 dB (5 dB step)

Dynamic Range

Displayed Average Noise Level	with RBW 1 kHz, VBW 10 Hz and input attenuator 0 dB, f ≥ 10 MHz
Preamplifier OFF	- 6 dBμV + 2 f (GHz)dB
Preamplifier ON	- 21 dBμV + 3 f (GHz)dB
Gain compression (1 dB)	frequency ≥ 200 MHz
Preamplifier OFF	> +107 dBμV (mixer input level)
Preamplifier ON	> +82 dBμV (RF input level)
Spurious Response	Preamplifier OFF, Mixer level +77 dBμV
Second harmonic distortion	≤-70 dBc frequency = 100 MHz to 800 MHz ≤-80 dBc frequency ≥ 800 MHz
Third order intermodulation distortion	≤-80 dBc frequency ≥ 200 MHz, 2-signal difference > 50 KHz
Residual responses	(input terminated 75Ω, input attenuator 0 dB, f ≥1 MHz)
Preamplifier OFF	≤+7 dBμV
Preamplifier ON	≤+2 dBμV

Amplitude Accuracy

Frequency Response	(after automatic calibration)
Preamplifier OFF	± 0.5 dB (100 kHz to 2.2 GHz , Attenuator=10dB) ± 2 dB (9 kHz to 2.2 GHz)
Preamplifier ON	±1 dB (100 kHz to 2.2 GHz) ±2 dB (9 kHz to 2.2 GHz)
Calibration Signal Accuracy	-20 dBm ± 0.3 dB
IF Gain Error	(after automatic calibration) ± 0.5 dB
Scale Fidelity	(after automatic calibration)
Log	± 1 dB / 10 dB ± 1.5 dB / 90 dB ± 0.2 dB / 1 dB
Linear	± 5 % of reference level
Input attenuator switching accuracy	± 0.3 dB (0 to 50 dB settings) reference to an attenuation of 10 dB at 30 MHz
Resolution bandwidth switching uncertainty	(after automatic calibration) ± 0.5 dB
Overall level accuracy	± 1.5 dB (REF = -50 to 0 dBm, Attenuator = 10 dB, 2 dB/div, RBW = 300 kHz, f = 100 kHz to 2.2 GHz, after automatic calibration)

Sweep

Sweep time Accuracy	20 msec to 1000 sec ± 2 %
Trigger mode	FREE RUN, LINE, VIDEO, EXT, TV
Sweep Mode	REPEAT, SINGLE

Inputs & Outputs

RF Input Connector Impedance VSWR Preamplifier OFF Preamplifier ON	 N type 75 Ω (nominal) < 1.5: 1 (100 kHz to 2.2 GHz) (characteristic) with input attenuator. 10 dB to 50 dB < 2 : 1 (9 kHz to 2.2 GHz) (characteristic) with input attenuator. 5 dB to 50 dB < 2.5:1 (9 kHz to 2.2 GHz) (characteristic)
Probe power	±12V (nominal) , 4-pin connector
Calibration output signal	BNC female, 75 Ω (nominal) 30 MHz, -20 dBm
10 MHz reference input	BNC female, 50 Ω(nominal) -10 dBm to +10 dBm
External trigger input	BNC female
Phone output	Small size monophonic female
GPIB interface	IEEE-488 bus connector
Serial interface	D-sub 9 pin,
Printer interface	D-sub 25 pin, ESC/P, ESC/P-R, PCL
Video output	VGA(15 pin ,female)
Floppy drive	3.5 inch , MS-DOS format

General

Operating environment range	0 °C to +50 °C, Relative humidity 85% or less (without condensation)
Storage environment range	-20 °C to +60 °C, Relative humidity 85% or less
AC input power source	Automatic switching to 100VAC or 200VAC 100VAC: 100V - 120V, 50Hz / 60Hz 200VAC: 220V - 240V, 50Hz / 60Hz
Power consumption	< 200VA
Mass	< 14 kg
Dimensions	approximately 424(W) x177(H) x300(D) mm (not including projections such as rubber feet and connectors)

1.3.4 Tracking Generator Specifications (Option 74)

1.3.4.1 For R3132/3162

Items	Specifications
Frequency Range	100 kHz to 3.0 GHz
Output Level Range	0 to -59.9 dBm
Absolute Output Accuracy	± 0.5 dB (30 MHz, -10 dBm, 20 °C to 30 °C)
Output Level Flatness	± 1.0 dB (100 kHz to 1 GHz) ± 1.5 dB (100 kHz to 3 GHz) (Reference to -10 dBm, 30 MHz)
Output Level Switching Accuracy	±1.0 dB (100 kHz to 1 GHz) (output level ≥ -30 dBm) ± 2.0 dB (100 kHz to 2.6 GHz) ± 3.0 dB (100 kHz to 3 GHz) (Reference to -10 dBm)
Output Spurious Harmonic Non-harmonic	 ≤ -20 dBc (output level ≥ -10 dBm) ≤-30 dBc (output level ≥ -10 dBm)
TG Leakage	≤-100 dBm (Input ATT = 0 dB)
Output Impedance	50 Ω (Nominal)

	VSWR(Output Level =-10 dBm) < 2 (characteristics)
Maximum Output Level	+15 dBm ± 10V
Mass	1 kg or less

1.3.4.2 For R3132N

Items	Specifications
Frequency Range	100 kHz to 3.0 GHz
Output Level Range	105 to 45.1 dBμV
Absolute Output Level Accuracy	± 0.5 dB (30 MHz, 95 dBμV, 20 °C to 30 °C)
Output Level Flatness	± 1.0 dB (100 kHz to 1 GHz) ± 1.5 dB (100 kHz to 2.2 GHz) (Reference to 95 dBμV, 30 MHz)
Output Level Switching Accuracy	± 1.0 dB (100 kHz to 1 GHz) (output level = 75 dBμV) ± 2.0 dB (100 kHz to 2.2 GHz) (Reference to 95 dBμV)
Output Spurious Harmonic Non harmonic	 ≥-20 dBc (output level = 95 dBμV) ≥ -30 dBc (output level = 95 dBμV)
TG Leakage	≤ 7dBμV (Input ATT = 0d B)
Output Impedance	75 Ω (Nominal) VSWR (Output Level = 95dBμV) ≤ 2 (100 kHz to 2.2 GHz) (characteristics)
Maximum Output Level	122 dBμV ± 10V
Mass	1 kg or less

1.4. Service Concept.

The troubleshooting concept of this manual is based on self-test result approach. Approach by Performance verification test result and phenomenon observed are provided additionally.
Replaceable assemblies listed in chapter 5 are no required adjustment after replace.

1.5. Test Equipment Required for Performance Verification

Table 1-1 lists the recommended equipment for performance verification and adjustment.
In the usage column, P.V and Adj are abbreviation of Performance Verification and Adjustment.
The equipment needed to perform all of the performance test.
Equipment lists for individual tests are provided in each performance verification.
Any equipment that meets the critical specifications given in the table can be substituted for the recommended models.

Table 1-1 Equipment List (1/2)

No.	Description	Critical Specification	Model Recommended	Manufacturer	Usage	Notes
1	Frequency Standard	Output Frequency: 10MHz Output Level: 1Vp-p or more Stability: 5 x 10exp -10/day or more	R3031	Advantest	P.V, Adj.	Freq.STD
2	Signal Generator	Frequency Range: 10MHz to 18GHz Output Level: +10dBm to -5dBm Frequency Stability: 1 x 10exp-6/year	SMP02(B11)	Rohde & Schwarz	P.V	SG1
3	Signal Generator	Frequency Range:10MHz to 27GHz, Output Level: +10dBm to -5dBm Frequency Stability: 1 x 10exp-6/year	SMP03(B11)	Rohde & Schwarz	P.V	SG2
4	Signal Generator	Frequency Range:10MHz to 27GHz, Output Level: +10dBm to -5dBm Frequency Stability: 1 x 10exp-6/year	SMP03(B11)	Rohde & Schwarz	P.V	SG3
5	Signal Generator	Frequency Range: 10MHz to 30MHz Output Level: +13dBm to -10dBm Frequency Stability: 1 x 10 exp-6/year Squrewave Generation required	HP3325B	HP	P.V	SG4
6	RF Power Meter /RF Power Sensor	Frequency Range:10MHz to 26.5GHz Measurement Power Range: +10dBm to -30dBm	NRVS / NRVS-Z52	Rohde & Schwarz	P.V	PM/P.S50
7	Step Attenuator	Frequency Range: DC to 18GHz Attenuation: 0dB to 12dB by 1dB step Accuracy: 0.1dB	HP8494H	HP	P.V	ATT1
8	Step Attenuator	Frequency Range: DC to 18GHz Attenuation: 0dB to 70dB by 10dB step Accuracy: 0.1dB	HP8495H	HP	P.V	ATT2
9	Attenuator Driver	Compatible with HP 8494H and 8496H Programmable step attenuators	HP11713A	HP	P.V	
10	Terminator	Impedance: 50 Ω Type: N(m)	RNA	Rohde & Schwarz	P.V	TERM50
11	Fixed Attenuator	Attenuation:3dB, Impedance:50Ω, Type:SMA(m)-SMA(f)	DEE-000685-1	Advantest	P.V	ATT3
12	Fixed Attenuator	Attenuation:20dB, Impedance:50Ω, Type: SMA(m)-SMA(f)	DEE-000480-1	Advantest	P.V	ATT4
13	Power Splitter	Frequency Range: 10MHz to 26.5GHz, Impedance: 50Ω Type: SMA(f)-SMA(f)-SMA(f)	1579	Weinshel	P.V	
14	Power Divider	Frequency Range: 20MHz to 1.5GHz Isolation: >18dB	DDUL-20A-100	Merrimac	P.V	Divider1
15	Power Divider	Frequency Range: 2GHz to 18GHz Isolation: >18dB	DDUL-24M-10G	Merrimac	P.V	Divider2
16	Low Pass Filter	Cut off: 2.2GHz Attenuation at 3GHz: >40dB Attenuation at 3.8GHz: >80dB	DEE-001172-1	Advantest	P.V	L.P.F-1
17	RF Cable	Impedance: 50Ω, Type: BNC(m)-BNC(m)	MI-09	Advantest	P.V	-
18	RF Cable	Impedance:50Ω, Type: SMA(m)-SMA(m)	A01002	Advantest	P.V	-
19	Adapter	Impedance: 50Ω Type: N(m)-SMA(f)	HRM-554S	Advantest	P.V	-
20	Adapter	Impedance: 50Ω Type: SMA(f)-SMA(f)	HRM-501	Advantest	P.V	-
21	Adapter	Impedance: 50Ω Type: N(f)-BNC(m)	NJ-BNCP	Advantest	P.V	-
22	Adapter	Impedance: 50Ω Type: N(m)-BNC(f)	JUG-201A-U	Advantest	P.V	-

Table 1-1 Equipment List (2/2)

No.	Description	Critical Specification	Model Recommended	Manufacturer	Usage	Notes
23	Spectrum Analyzer	Frequency Range: up to 8 GHz	R3267	Advantest	P.V for TG Option	SPA
24	Impedance Converter	50Ω Type-N (f) to 75Ω Type-N (m) Frequency Range: DC to 3.0 GHz	HP11852B	HP	P.V for R3132N	CONV
25	Terminator	Impedance: 75Ω Frequency Range: DC to 2 GHz Type: BNC(m)	8583B	Maury	P.V for R3132N	TERM75
26	RF Power Sensor	Impedance:75Ω Frequency Range: Up to 2.2 GHz Measurement Power Range:	NRVZ3	Rohde & Schwarz	P.V for R3132N	P.S75
27	Low Pass Filter	Cut off: 1 GHz Attenuation at 1.5 GHz: > 30 dB	TR14204	Advantest	P.V for R3132N	L.P.F-2
28	Adapter	Impedance: 75Ω Type BNC(m)-N(f)	33BNC-N-75-1	SUHNER	P.V for R3132N	TERM75
29	Adapter	Impedance: 75Ω Type N(m)-BNC(f)	33NBNC-75	SUHNER	P.V for R3132N	-
30	Adapter	Impedance: 75Ω Type: N(f)-N(f)	31N-75-0-2	SUHNER	P.V for R3132N	-
31	RF Cable	Impedance: 75Ω BNC(m)-BNC(m)	-	Generic	P.V for R3132N	-
24	Impedance Converter	50Ω Type-N (f) to 75Ω Type-N (m) Frequency Range: DC to 3.0 GHz	HP11852B	HP	P.V for R3132N	CONV
28	Adapter	Impedance: 75Ω Type BNC(m)-N(f)	33BNC-N-75-1	SUHNER	P.V for R3132N	-
29	RF Cable	Impedance: 75Ω BNC(m)-BNC(m)	-	Generic	P.V for R3132N	-

2. THEORY OF OPERATION

2.1. Introduction

This section provides theory of operation of module basis, which is replaceable with no adjustment.

Module basis operation of theory is provided by module by module.

R3132/3162/3132N consist of RF Block, IF/LOG Block, AD/CPU Block, SYNTHESIZER Block, FRONT Block, Power Supply Block and TG Block.

Tracking Generator is optional.

The simplified block diagram as shown in Figure 2-1.

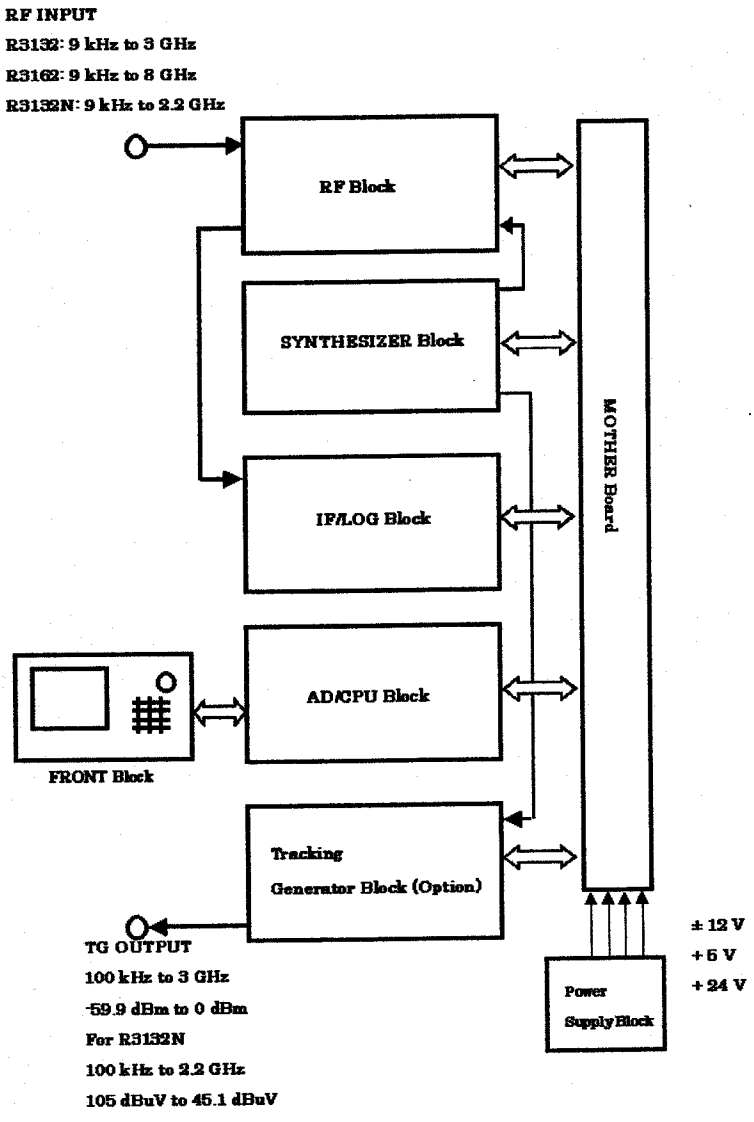

Figure 2-1 Simplified Block Diagram of R3132/3162/3132N

2.2. Over All Theory of Operation

R3132/3162/3132N convert the input signal into 21.4 MHz intermediate frequency (Hereafter: IF) signal.
The input signal must be in the range 9 kHz to 3 GHz for R3132, 9 kHz to 8 GHz for R3162 and 9 kHz to 2.2 GHz for R3132N.
The signal is then filtered with variable resolution bandwidth filters.
The detector detects the signal, and digitized and displayed on the screen.

2.3. RF Block

RF block is a frequency converter.
It consists of input attenuator, 1st mixer, 2nd mixers, 3rd mixer and band pass filters.

2.3.1. R3132/3132N

R3132N has 75 Ω input impedance.
In the range from 9 kHz to 3 GHz (2.2 GHz for R3132N), the signal is fed through the input attenuator, which can attenuate 0 dB to 50dB in 10 dB step.
The input signals, which range from 9 kHz to 3 GHz (2.2 GHz for R3132N) is fed into the 1st mixer.
The input signal then mixes with signal of 1st local oscillator signal of 4 GHz to 8 GHz to create 1st IF signal 4261.4 MHz.

The 1st IF signal passes through the band-pass filter to eliminate spurious signal generated by 1st mixer.
After the band-pass filter, the IF signal is fed into 2nd mixer.
The 2nd mixer mixes 1st IF signal with the signal of 2nd local oscillator of 3840 MHz to create 2nd IF signal 421.4 MHz.

The 2nd IF signal is fed into 3rd mixer.
The 3rd mixer mixes 2nd IF signal with the 3rd local oscillator of 400 MHz to create 3rd IF signal of 21.4 MHz.
The 3rd IF signal of 21.4 MHz is output to IF/LOG Block.

2.3.2. R3162

In the range from 9 kHz to 8 GHz, the signal is fed through the input attenuator, which can attenuate 0 dB to 75 dB in 5 dB steps and YIG tuned filter.
The input signals, which range from 9 kHz to 3.6 GHz passes to the base-band mixer.
In the range 3.6 GHz to 8 GHz, the signal passes through YTF and high-band mixer.
In the base-band mixer, the input signal then mixes with signal of 1st local oscillator signal of 4 GHz to 8 GHz to create 1st IF signal 4261.4 MHz.
The 1st IF signal passes through the band-pass filter to eliminate spurious signal generated by 1st mixer.
After the band-pass filter, the IF signal is fed into 2nd mixer.
The 2nd mixer mixes 1st IF signal with the signal of 2nd local oscillator of 3840 MHz to create 2nd IF signal 421.4 MHz.

The 2nd IF signal is fed into 3rd mixer.
The 3rd mixer mixes 2nd IF signal with the 3rd local oscillator of 400 MHz to create 3rd IF signal of 21.4 MHz.
The 3rd IF signal of 21.4 MHz is output to IF/LOG Block.

2.4. IF /LOG Block

IF/LOG block consists of IF functional block and logarithm (LOG) functional block.

2.4.1. IF Functional Block

IF functional block consists of variable resolution bandwidth (RBW) filter from 1 kHz to 3 MHz and step amplifiers.
When installed option 27, it can expand to 30 Hz, 100 Hz and 300 Hz.
The RBW 3 MHz consists of 21.4 MHz LC filters.
The RBW from 10 kHz to 1 MHz consists of 3.58 MHz LC filters.
The RBW 1 kHz and 3 kHz consist of 100 kHz active filters.

The signal from RF block is fed into RBW filter to characterize input signal by setting of RBW on the controls.
The signal specified from IF filter is fed into step amplifier circuit.
The step amplifier has gain 50 dB by 0.1 dB step, which controls by REFRENCE LEVEL setting on the control.
The signal characterized in IF filter and step amplifier is fed into LOG functional block.

2.4.2. LOG Functional Block

LOG Block consists of logarithm (Hereafter: LOG) amplifier, linear amplifier and detector circuit.
The signal from IF functional block is fed through LOG amplifier, which provides 100 dB dynamic range display in dB display mode.
In the linear display mode, the signal passes through linear amplifier and detector circuit.

2.5. AD/CPU Block

AD/CPU Block consists of AD functional block and CPU functional block.

2.5.1. AD Functional Block

LOG Block consists of logarithm (Hereafter: LOG) amplifier, linear amplifier and detector circuit.
After signal detected, the signal is fed into A/D converter to digitize.
The digitized signal is computed by CPU Block and display on the screen.
In the linear display mode, the signal passes through linear amplifier and detector circuit.

2.5.2. CPU Block

It consist of CPU main processor, Graphic processor and its peripheral circuit, such as GPIB interface, RS232 Interface and display.
On the CPU Block compute the digitized signal for the display.

2.6. SYNTHESIZER Block

SYNTHE Block consists of local oscillator and phase locked loop circuit.

2.7. FRONT Block

FRONT Block consists of TFT display unit and key control circuit.

2.8. Power Supply Block

It consists of switching power supply unit, cooling fan, AC inlet and power switch.
It can be connected 90vac to 240vac directly.
Output DC voltages are +5 V, ±12 V, +24 V and supply to each block through Mother board.

2.9. TG Block

It generates frequency 100 kHz to 3 GHz and output level 0 dBm to – 59.9 dBm by 1 dB step.

3. PERFORMANCE VERIFICATION

3.1. General

1. Introduction

This chapter provides R3132/3162/3132N performance verification procedures, item by item as listed on Table 3-1.

Additional performance verification items are listed on Table 3-2 for Tracking Generator Option 74.

Performance verification will be carried out under following condition.

Temperature range: 20 °C to 30 °C

Relative Humidity: 85 % or less

Table 3-1 Performance Verification Items

No.	Items	Applicable Model		
		R3132	R3162	R3132N
3.2.1	Reference Oscillator Accuracy	O	O	O
3.2.2	CAL OUT Amplitude Accuracy	O	O	O
3.2.3	Displayed Average Noise	O	O	O
3.2.4	RBW Switching Error	O	O	O
3.2.5	RBW Accuracy	O	O	O
3.2.6	IF Gain Uncertainty	O	O	O
3.2.7	Attenuator Switching Accuracy	O	O	O
3.2.8	Scale Fidelity	O	O	O
3.2.9	Residual FM	O	O	O
3.2.10	Noise sideband	O	O	O
3.2.11	Image, Multiple, Out of Band Response	X	O	X
3.2.12	Frequency Read Out Accuracy	O	O	O
3.2.13	Second Harmonic Distortion	O	O	O
3.2.14	Frequency Response for R3132/3162	O	O	X
3.2.15	Frequency Response for R3132N	X	X	O
3.2.16	Span Accuracy	O	O	O
3.2.17	Third Intermodulation Distortion	O	O	O
3.2.18	Gain Compression	O	O	O
3.2.19	Sweep Time Accuracy	O	O	O
3.2.20	Residual Response	O	O	O

O: Apply
X: Not Apply

Table 3-2 Additional Performance Verification Items for Tracking Generator

No.	Items	Applicable Model		
		R3132	R3162	R3132N
3.3.1	Absolute Output Level Accuracy	O	O	O
3.3.2	Output Flatness	O	O	O
3.3.3	Output Level Switching Accuracy	O	O	O
3.3.4	Harmonic Distortion	O	O	O
3.3.5	Non-harmonic Distortion	O	O	O
3.3.6	TG Leakage	O	O	O

O Apply
X Not Apply

2. Test Equipment

The table of recommended test equipment in General information lists the equipment needed to perform all of the performance test.
Equipment lists for individual tests are provided in each performance verification, includes R3132N equipment as additional equipment.

CAUTION
Use only 75Ω cables, connectors, or adapters on R3132N with 75Ω connectors, or damage to the connector will occur.

NOTE
1. The R3132/3162/3132N to be tested should be warmed up for at least 60 minutes before starting tests. Any additional equipment used for this performance verification tests should be warmed up as appropriate..
2. Make sure that the test equipment used meets its own published specifications and that all connectors are clean, before starting test.
3. Any equipment that meets critical specifications given in the Table can substituted for recommended models.

3. Calibration Cycle

The performance verifications should be used to check the spectrum analyzer against its specifications every once a year recommended.

4. Performance Verification Test Record Sheets

The performance verification test record sheets at the end of this chapter is provided the value measured in each performance verification.
The test record lists test specification and acceptable limits.
Performance verification test record sheet for R3132N is provided separately.
Recommend that make a copy of this table, record the complete test results on the copy, and keep the copy for calibration test record.
This record could prove invaluable in tracking gradual changes in test result over long periods of the time.

5. Performance Verification Procedures

1).Typeface conventions used in this manual.

*Panel keys and soft keys are printed in a contrasting typestyle to make them stand out form the text as follows:

Panel keys: Boldface type Example: **FREQ, FORMAT**
Soft keys: Boldface and Italic Example: ***Center, Trace Detector***

*When a series of key operations are described using a comma between two keys.

*There are various soft menus used to switch between two states such as ON/OFF and AUTO/MNL.

For example, when turning off the ***Display ON/OFF*** function, the annotation " ***Display ON/OFF*** (OFF)" is used.
When switching the RBW AUTO/MNL function to MNL, the annotation ***"RBW AUTO/MNL (MNL)"*** is used.

2). Procedure for R3132N

Most of the procedure are the same as R3132/3162.
When the condition of setting different, describes in parallel
with (..... for R3132N)

In case of taking different method for performance verification test from R3132/3162, provides procedure separately.

3.2 PERFORMANCE VERIFICATION PROCEDURE

3.2.1. Frequency Reference Source Accuracy.

Description

Apply 1 GHz output of signal generator referenced external signal standard
Then measure 1 GHz signal using R3132/3162 frequency counter function
R3132/3162's frequency counter measurement accuracy is referenced to 10 MHz reference oscillator.

Specification

Apply for R3132/3162

Stability	:± 2 x 10exp-6/year
	:± 1 x 10 exp-7/year (Option 20 Installed)
	:± 1 x 10 exp-5 (0 °C to 50 °C)

Equipment used

Signal Generator	:SG1
Frequency Standard	:Freq.STD.
RF Cable	:BNC (m)-BNC (m), 50 Ω
RF Cable	:SMA (m)-SMA (m)
Adapter	:Type N (m)-SMA(f), 50Ω

Additional Equipment for R3132N

Impedance Converter	:CONV
RF Cable	:BNC (m)-BNC (m), 75 Ω
Adapter	:Type N (m) to BNC (f), 75 Ω

Setup

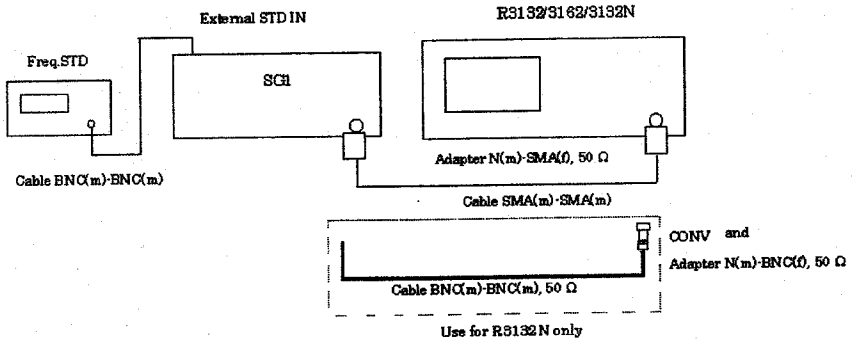

Figure 3-1 Setup of Frequency Reference Source Accuracy Test

Procedure

1. Connect the equipment as shown in Figure 3-1.
2. On the SG1, set controls as follows:

FREQUENCY REFERENCE	:EXT
Frequency	:1 GHz
Output level:	:-10 dBm

3. On the R3132/3162/3132N, set controls as follows:

Center Frequency	:1 GHz
Span	:5 MHz
Counter	:ON
Counter Resolution	:1 Hz

4. Read the frequency counter display, then record on the performance verification test record sheets.

3.2.2. Calibration Signal Amplitude Accuracy

Description

The amplitude accuracy of the analyzer's CAL OUT signal is checked for -20 dm ± 0.3 dB for R3132/3162/3132N.

Specification

Calibration Signal Output Level Accuracy :-20 dBm ± 0.3 dB

Equipment used

RF Power Meter	:P.M
PF Power Sensor	:P.S50Ω
Adapter	:Type N (f)-BNC (m),50Ω
	:Type N (m)-SMA (f)

Additional Equipment for R3132N

RF Power Sensor	:P.S75Ω
Adapter	:Type BNC (m)-N (f),75Ω

Setup

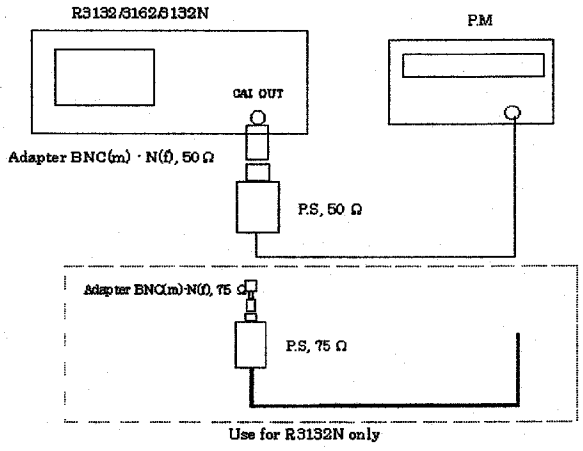

Figure 3-2 Setup of CAL OUT Level Accuracy Test

Procedure

1. On the P.M with P.S50Ω, perform zeroing and calibration.
   (On the P.M with P.S75Ω, perform zeroing and calibration for R3132N)
2. On the P.M, set a correction data to 30 MHz.
3. Connect equipment as shown in Figure 3-2.
4. Read P.M display and record it on the performance verification test record sheets.

3.2.3. Displayed Average Noise Level

Description

This test measures the displayed average noise level in all frequency.
The spectrum analyzer's input is terminated in 50Ω for R3132/3162.
R3132N is terminated in 75Ω
The test measures the average noise at several discrete frequencies in a zero span.

Specification

RBW 1 kHz, VBW 10 Hz, input attenuator 0 dB, f>1 MHz

Apply for R3162

Frequency	Frequency Band	Average Noise Level
10 MHz to 3.3 GHz	0	-117+2f(GHz) dBm (Preamplifier :OFF)
3.2 GHz to 6.6 GHz	1-	-115 + 0.5f(GHz) dBm (Preamplifier :OFF)
6.5 GHz to 8 GHz	1+	-115 + 0.5f(GHz) dBm (Preamplifier :OFF)
10 MHz to 3.3 GHz	0	-132 + 3f(GHz) dBm (Preamplifier :ON)

Apply for R3132

Frequency	Frequency Band	Average Noise Level
1 MHz to 3.0 GHz	0	-117+2f(GHz) dBm(Preamplifier :OFF)
		-132 + 3f(GHz) dBm (Preamplifier: ON)

Apply for R3132N

-6 dBμV + 2 f (GHz) dB (Preamplifier :OFF)
-21 dBμV + 3 f (GHz) dB (Preamplifier :ON)

Equipment used

Terminator 50Ω :TERM50

Additional Equipment for R3132N

Adapter :Type N (m)-BNC (f), 75Ω
Terminator :TERM75

Setup

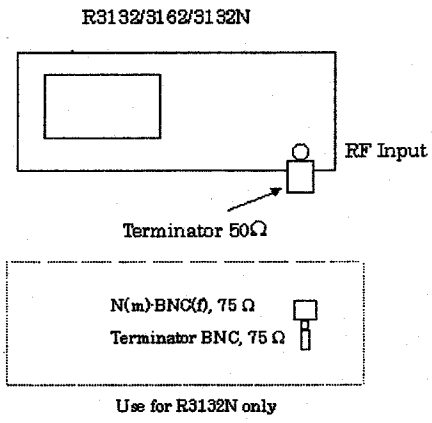

Figure 3-3 Setup of Displayed Average Noise Level Test

Procedure

1. Connect Terminator to INPUT of R3132/3162/3132N as shown in Figure 3-3.
2. On the R3132/3162/R3132N, after preset, set controls as follows:

Center Frequency	:10 MHz
Span	:Zero
Attenuator	:0 dB
Reference Level	:-60 dBm
	:(+48.8 dBμV)
RBW	:1 kHz
VBW	:10 Hz
Sweep Time	:1 sec

3. On the R3132/3162, press as follows to set average mode and average time to 10 times.

TRACE, 1/2 more, *AVG A*, 1, 0, Hz

4. On the R3132/3162, after average has completed, press **PKSRCH** to s capture the highest noise signal.
5. Record the level of peak search marker on the performance verification test record sheets.
6. Repeat steps 3 through 5 for each center frequency and preamplifier setting listed on Table 3-3.

Table 3-3 Center Frequencies Setting for Displayed Average Noise Level Test

Preamplifier	R3132/3162 Center Frequency(MHz)	R3132N Center Frequency(MHz)
OFF	1	10
	100	100
	500	500
	1000	1000
	1500	1500
	2000	2000
	3000	2200
ON	1	10
	100	100
	500	500
	1000	1000
	1500	1500
	2000	2000
	2500	2200
	3000	
(Apply for R3162 only)		
OFF	5000	
	6000	
	7000	
	8000	

3.2.4. Resolution Bandwidth Switching Uncertainty

Description

This set utilizes the Cal. Signal for measuring the switching uncertainty between resolution bandwidth. At each resolution bandwidth setting, the displayed amplitude variation of the signal in measured using delta marker mode.
All measurements are reference to the 300 kHz bandwidth.
RBW 30 Hz to 300 Hz are the option, if the unit is installed option-27, perform verification.

Specification

Apply for R3132/3162/3132N

Reference to 300 kHz RBW after auto calibration

< ± 0.5 dB, RBW: 30 Hz to 3 MHz
30 Hz to 300 Hz (Option)

Equipment used

Adapter	:Type N (m)-BNC (f), 50Ω
RF Cable	:BNC (m)-BNC (m), 50Ω

Additional Equipment

Adapter	:Type N (m)-BNC (f), 75 Ω
RF Cable	:BNC (m)-BNC (m), 75 Ω

Setup

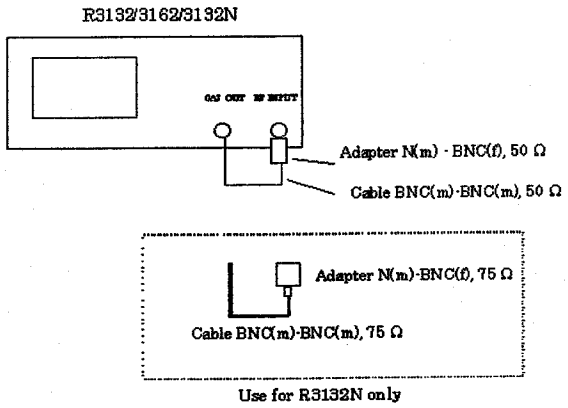

Figure 3-4 Setup of RBW Switching Uncertainty Test

Procedure:

1. Connect the equipment as shown in Figure 3-4.
2. On the R3132/3162/3132N, after preset, press as follows to perform auto calibration function.

   SHIFT, 7(CAL), *Each Item* and ***RBW Switch***

3. On the R3132/3162/3132N, after RBW SWITCH auto calibration has completed, set controls as follows:

Center Frequency	:30 MHz
Span	:1 MHz
Reference Level	:-15 dBm
	:(+93.8 dBμV for R3132N)
dB/div	:1 dB/div
RBW	:300 kHz
Sweep Mode	:SINGLE

4. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
5. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture signal peak.
6. On the R3132/3162/3132N, press as follows to set fixed marker mode to on.

   MKR, *1/2 more, Fixed Marker ON/OFF* *(ON)*

7. On the R3132/3162/3132N, set controls as follows:

   RBW :3 MHz
   Span :5 MHz

8. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
9. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture signal peak.
10. Record the level of the delta marker on the performance verification test record sheets.
11. Repeat steps 7 through 10 for each RBW and span setting listed on Table 3-4.

Table 3-4 Setting for RBW Switching Uncertainty Test

Setting of R3132/3162/3132N	
RBW(Hz)	Span (Hz)
1M	2M
100k	200k
30k	50k
10k	20k
3k	5k
1k	2k
300(Option)	200
100(Option)	200

3.2.5. Resolution Bandwidth Accuracy and Selectivity

Description

This test measures the 3 dB down of RBW accuracy and selectivity.
Selectivity is specified the 3 dB and the 60 dB down bandwidth of RBW.
To measure bandwidth of RBW, use continuous X dB down marker function.
RBW 30 Hz to 300 Hz are the option, when the unit is installed option-27, perform verification.

Specification

Apply for R3132/3162/3132N

Range: 1 kHz to 3 MHz (1,3,10 sequence)
30 Hz to 300 Hz (Option)

Accuracy : ± 20% (RBW 30 Hz to 1 MHz)
: ± 25% (RBW 3 MHz)
Selectivity: <15:1 (RBW 1 kHz to 3 MHz)

Equipment used

Adapter	:Type N (m)-BNC (f), 50Ω
RF Cable	:BNC (m)-BNC (m), 50 Ω

Additional Equipment for R3132N

Adapter	:Type N (m)-BNC (f), 75Ω
RF Cable	:BNC (m)-BNC(m), 75Ω

Setup

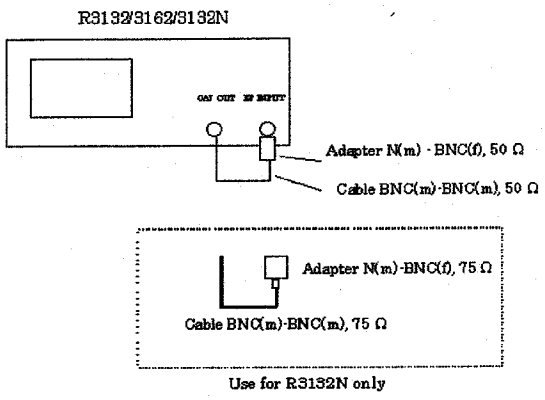

Figure 3-5 Setup of RBW Accuracy and Selectivity Test

Procedure:

[Accuracy of RBW]

1. Connect equipment as shown in Figure 3-5.
2. On the R3132/3162/3132N, after preset, set controls as follows;

Center Frequency	:30 MHz
Span	:10 MHz
Reference Level	:-15 dBm
	:(+93.8 dBμV for R3132N)
dB/div	:1 dB/div
Sweep Mode	:SINGLE
Trace Detector	Sample

(Press **TRACE**, ***Detector***, and ***Sample***)

3. On the R3132/3162/3132N, press as follows to set continuous 3 dB down marker mode.

MEAS, *X dB Down*, 3, dB, *X dB Down* and ***Conti Down ON/OFF*** (ON).

4. On the R3132/3162/3132N, set controls as follows:

RBW	:3 MHz
Span	:5 MHz

5. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
6. On the R3132/3162/3132N, after the single sweep has completed, record the frequency of the X dB down marker reading on the performance verification test record sheets.
7. Repeat steps 5 through 6 for each RBW and frequency span setting listed on Table 3-5.

Table 3-5 Setting for RBW and Span for 3 dB Down Band Width Accuracy Test

Setting of R3132/3162/3132N	
RBW (Hz)	Span (Hz)
1M	2M
300k	500k
100k	200k
30k	50k
10k	20k
3k	5k
1k	2k
300(Option)	1k
100(Option)	1k

[Selectivity]

8. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:30 MHz
Span	:50 MHz
Reference Level	:-10 dBm
	:(+98.8 dBμV for R3132N)
VBW	:10 kHz
Trace Detector	:Sample
(Press **TRACE**, ***Detector, Sample***)	
Sweep Mode	:SINGLE

9. On the R3132/3162/3132N, press as follows to set continuous 60 dB down marker mode.

   MEAS, ***X dB Down***, **6**, **0**, ***dB***, ***X dB Down*** and ***Conti Down ON/OFF*** (ON)

10. On the R3132/3162/3132N, set controls as follows:

    RBW :3 MHz
    Span :25 MHz

11. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
12. On the R3132/3162/3132N, after the single sweep has completed, record the frequency of the X dB down marker reading on the performance verification test record sheets.
13. Repeat steps 11 through 12 for each RBW and frequency span setting listed in Table 3-6.

Table 3-6 Setting for RBW Selectivity Test

Setting of R3132/3162/3132N	
RBW (Hz)	Span (Hz)
1M	20M
300k	5M
100k	1M
30k	500k
10k	200k
3k	50k
1k	20k
300(Option)	5k
100(Option)	2k

14. Calculate selectivity for each RBW using the following formula, then record its result on performance verification test record sheets.

    Selectivity = (60 dB down width data) / (3 dB down width data)

3.2.6. IF Gain Uncertainty

Description

This test measures IF gain error in resolution bandwidth 3 MHz, 300 kHz and 1 kHz.
The input signal level is decreased by external attenuator as the R3132/3162's reference level is decreased (IF gain increased).
Since the signal level is decreased in precise steps, any error between the reference level
and the signal level is caused by analyzer's IF gain.
To measure IF gain error, use Fixed marker mode.

Specification

± 0.5 dB

Equipment used

Signal Generator	:SG4
1 dB Step Attenuator	:ATT1
10 dB Step Attenuator	:ATT2
Attenuator/Switch Driver	:HP11713A
RF Cable	:BNC (m)-BNC (m), 50Ω
Adapter	:Type N (m)-BNC (f), 50 Ω

Additional Equipment

Impedance Converter	:CONV
Adapter	:Type N (m)-BNC (f),75 Ω
RF Cable	:BNC (m)-BNC (m),75 Ω

Setup

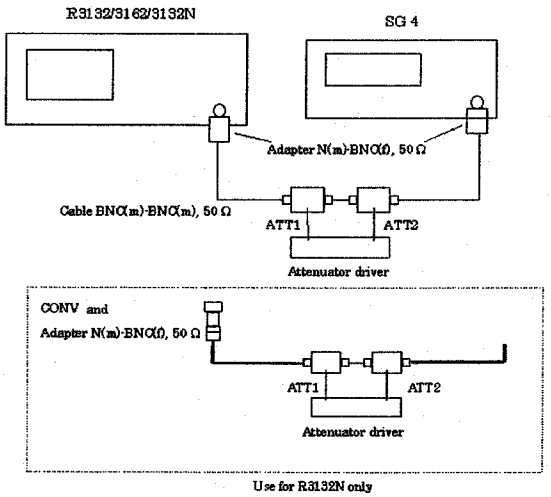

Figure 3-6 Setup of IF Gain Fidelity Test

Procedure

1. Connect CAL OUT signal to INPUT using N (m)-BNC (f), 50 Ω adapter and BNC (m)-BNC (m), 50 Ω cable.
   (Connect CAL OUT signal to INPUT using N (m)-BNC (f), 75 Ω adapter and BNC (m)-BNC (m), 75 Ω cable for R3132N)
2. On the R3132/3162/3132N, press as follows to perform AUTO CAL function.

   SHIFT, CAL, *CAL ALL*

3. On the R3132/3162/3132N, after AUTO CAL function has completed, connect equipment as shown in Figure 3-6.
4. On the SG4, set controls as follows:

Frequency	:11 MHz
Output Level	:-5 dBm
	:(0 dBm for R3132N)
10 MHz Reference	:External

5. On the ATT1 and ATT2, set value to 0 dB.

6. On the R3132/3162/R3132N, after preset, set controls as follows:

Center Frequency	:11 MHz
Span	:2 kHz
Reference Level	:0 dBm
	:(+108.8 dBμV for R3132N)
dB/div	:1 dB/div
RBW	:3 MHz
VBW	:10 Hz
Trace Detector	:Sample

(Press **TRACE**, ***Detector***, ***Sample***)

7. On the SG4, adjust output level to place the signal 5 dB below the R3132/3162/3132N's reference level.
8. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
9. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture signal peak, and record the marker reading as reference value on the performance verification record sheets.
10. On the R3132/3162/3132N, press as follows to set Fixed marker mode to on.

MKR, ***1/2 more***, ***Fixed MKR ON/OFF***(ON)

11. On the ATT, increase attenuation to 1 dB, and decrease R3132/3162's reference level to -1 dBm.
12. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
13. On the R3132/3162/3132N, after single sweep has completed, press **PKSRCH** to capture signal peak.
14. Record the level of delta marker reading on the performance verification test record sheets.
15. Repeat steps 11 through 13 for each attenuation level setting listed on the Table 3-7.

Table 3-7 Setting for IF Gain Uncertainty Test

Setting	
RBW(Hz)	External Attenuator(dB)
3 M	1
	2
	3
	4
	5
	6
	7
	8
	9
	10
	20
	30
	40
	50

16. For RBW 1 MHz and 300 kHz, change the setting of RBW in step 6, then repeat steps 5 through 15.

3.2.7. Input Attenuator Switching Accuracy

Description

This test measures the input attenuator's switching accuracy over the full 75 dB for R3162 and 50 dB for R3132/3132N.
The input attenuator switching accuracy is referenced to 10 dB attenuator setting at 30 MHz.

Specification

With reference to 10 dB input attenuation, at 30 MHz
Apply for R3132/3162/3132N

< ± 0.3 dB (0 dB to 50 dB)

Equipment used

Signal Generator	:SG4
1 dB Step Attenuator	:ATT1
10 dB Step Attenuator	:ATT2
Attenuator/Switch Driver	:HP11713A
RF Cable	:BNC (m)-BNC (m), 50Ω
Adapter	:Type N (m)-BNC (f), 50 Ω

Additional Equipment

Impedance Converter	:CONV

Setup

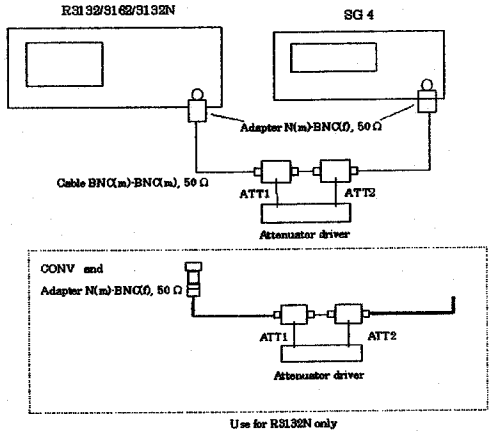

Figure 3-7 Setup of Input Attenuator Switching Accuracy Test

Procedure

1. Connect equipment as shown in Figure 3-7.
2. On the SG4, set controls as follows:

Frequency	:30 MHz
Output Level	:+5 dBm
	:(+10 dBm for R3132N)

3. On the external attenuator, set attenuation to 50 dB.

4. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:30 MHz
Span	:10 kHz
Reference Level	:-40 dBm
	:(+68.8 dB μV for R3132N)
Input Attenuator	:0 dB
dB/div:	1 dB/div
RBW	:3 kHz
VBW	:10 Hz
Sweep Time	:1 sec

5. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
6. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture the signal peak.
7. Read the level of marker reading and record the value on the performance verification test record sheets.
8. On the R3132/3132N, repeat steps 5 through 7 for each setting listed on the Table 3-8.

Table 3-8 Setting for R3132/3132N Input Attenuator Switching Accuracy Test

R3132/3132NSetting			
Attenuator (dB)	Reference Level(dBm) of R3132	Refrence Level(dBμV) of R3132N	External Attenuator(dB)
0	-40	+68.8	50
10	-30	+78.8	40
20	-20	+88.8	30
30	-10	+98.8	20
40	0	+108.8	10
50	+10	+118.8	0

9. On the R3162, repeat steps 5 through 7 for each setting listed on Table 3-9.

Table 3-9 Setting for R3162 Input Attenuator Switching Accuracy Test

R3162 Setting		External Attenuator(dB)
Attenuator (dB)	Reference Level(dBm)	
0	-40	50
5	-35	45
10	-30	40
15	-25	35
20	-20	30
25	-15	25
30	-10	20
35	-5	15
40	0	10
45	+5	5
50	+10	0

10. Calculate the actual error by following formula, and record the result on the performance verification test record sheets. as Actual(dB).

Actual (dB) = (Measured Value in step 7) – (Measured Value at Input Attenuator 10 dB) –(Value of Input Attenuator Setting) + 10 dB.

3.2.8. Scale Fidelity

Description

The 10 dB/div, 1 dB/div, and linear scales are tested for fidelity. The 1 dB/div scale is tested in RBW setting of 1 MHz.
The 10 dB/div scale is tested in RBW setting of 3 kHz.
A signal is set to the reference level for each scale. As the signal amplitude is decreased
using external step attenuators, the displayed signal amplitude is compared to the reference level.

Specification

Apply R3132/3162

Log Scale Fidelity :± 0.2 dB/ 1dB
:± 1.0 dB/ 10 dB
Linear Scale Fidelity :± 5% of reference level

Equipment used

Signal Generator	:SG4
1 dB Step Attenuator	:ATT1
10 dB Step Attenuator	:ATT2
Attenuator/Switch Driver	:HP11713A
RF Cable	:BNC (m)-BNC (m),50Ω
Adapter	:Type N (m)-BNC (f), 50 Ω

Additional Equipment for R3132N

Impedance Converter :CONV

Setup

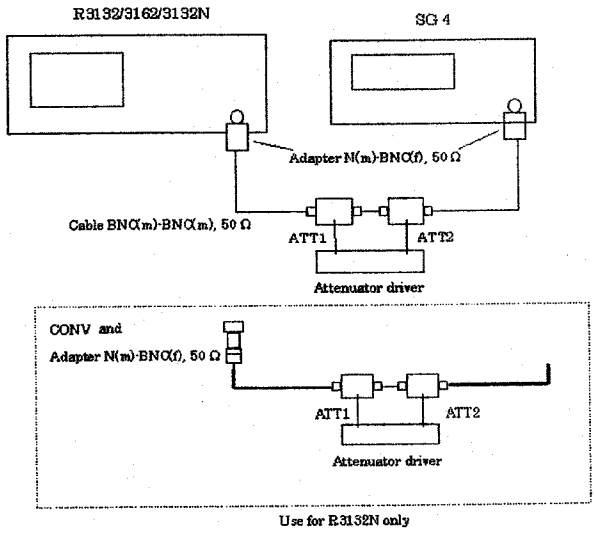

Figure 3-8 Setup for Scale Fidelity Test

Procedures:

[Log Linearity]

1. Connect equipment as shown Figure 3-8
2. On the SG4, set the controls as follows:

   Frequency :11 MHz
   Output Level :0 dBm
   :(+5 dBm for R3132N)

3. On the R3132/3162/3132N, after preset, set controls as follows:

   Center Frequency :11 MHz
   Span :2 kHz
   Reference Level :0 dBm
   :(+108.8 dBμV for R3132N)
   RBW :1 MHz
   VBW :10 Hz
   dB/div :1 dB/div
   Trace Detector :Sample
   (Press **TRACE**, ***Detector, Sample***)

4. On the ATT1 and ATT2, set the value to 0 dB.
5. On the R3132/3162/3132N, press **PKSRCH** to capture the signal peak.
6. On the SG4, adjust the output level so that the marker reading is 0.0 dBm ± 0.0 1dB (+108.8 dBμV ± 0.01 dB for R3132N).
7. On the R3132/3162/3132N, press **SINGLE** for single sweep.
8. On the R3132/3162/3132N, press as follows to set fixed marker to on.

   MKR, *1/2 more, Fixed MKR ON/OFF* (ON)

9. On the ATT1, lower by 1 dB.
10. On the R3132/3162/3132N, press **SINGLE** for a single sweep.

11. On the R3132/3162/3132N, after the single sweep has completed, record the level of fixed marker level in the Measured Data column in the performance verification test data sheets.

    Calculate the incremental error by following formula and record the result in the Incremental Error in the column in the performance verification test record sheets.

    Incremental Error = (Current delta marker level)-(previous delta marker level) +1 dB

12. Repeat steps 9 through 11 each value of external step attenuator is listed in Table 3-10.

Table 3-10 Setting for 1 dB/div Scale Fidelity Test

dB from Reference level (dB)	Setting of ATT1(dB)
0	0
-1	1
-2	2
-3	3
-4	4
-5	5
-6	6
-7	7
-8	8
-9	9
-10	10

13. On the R3132/3162/3132N, after preset , set controls as follows:

Center Frequency	:11 MHz
Span	:2 kHz
Reference Level	:0 dBm
	:(+108.8 dB μ V for R3132N)
RBW	:3 kHz
VBW	:10 Hz
dB/div	:10 dB/div

14. On the ATT1 and ATT2, set the value to 0 dB.
15. On the R3132/3162/3132N, press **PKSRCH** to capture the signal peak.
16. On theSG4, adjust the output level so that the marker reading is 0.0 dBm ± 0.01 dB (+108.8 dBμV ± 0.01 dB)

17. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
18. On the R3132/3162/3132N, press as follows to set fixed marker mode to on.

    MKR, ***1/2 more, Fixed MKR ON/OFF*** (ON)

19. On the ATT2, lower by 10 dB.
20. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
21. On the R3132/3162/3132N, after the single sweep has completed, record the level of fixed marker level in the Measured Data column in the performance verification test record sheets.

    Calculate the incremental error by following formula and record the result in the Incremental Error in the column in the performance verification test record sheets.

    Incremental Error = (Current delta marker level)-(previous delta marker level) +10dB

22. Repeat steps 19 through 21 for each value of external step attenuator is listed in Table 3-11

Table 3-11 Setting for 10 dB/div Scale Fidelity Test

dB from Reference level (dB)	Setting of ATT2(dB)
0	0
-10	10
-20	20
-30	30
-40	40
-50	50
-60	60
-70	70
-80	80
-90	90

[Linear Scale Fidelity]

23. On the SG4, set controls as follows:

Frequency	:11 MHz
Output Level	:0 dBm
	:(+5 dBm for R3132N)

24. On the ATT1 and ATT2, set the value to 0 dB.
25. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:11 MHz
Span	:10 kHz
Reference Level	:0 dB
	:(+108.8 dBμV for R3132N)
RBW	:1 kHz
VBW	:1 kHz
Attenuator	:20 dB

26. On the R3132/3162, press as follows, to set vertical display mode to Linear.

    LEVEL, ***Linear***

27. On the R3132/3162, press as follows to set continuous peak search mode.

    MKR, ***Peak Menu*** and ***Conti Peak ON/OFF***(ON)

28. On the SG2, precisely set output level to the R3132/3162/3132N reference level while reading the marker level on the screen.
29. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
30. On the R3132/3162/3132N, after the single sweep has completed, read the level value displayed on the SG2 and set the value as the reference value(Ref.).
31. Then set level of SG2 level to the 0.92 dB lower than the reference value.
32. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
33. On the R3132/3162/3132N, after the single sweep has completed, read the marker level and record it in the performance verification test record sheets.
34. Repeat steps 31 through 33 for each value listed on Table 3-12.

Table 3-12 Setting for Linear Scale Fidelity Test

div. from Reference Level	Signal Level (Nominal)	
	(dBm)	(mV)
0	0	223.6
1	-0.92	201.24
2	-1.94	178.88
3	-3.10	156.52
4	-4.44	134.16
5	-6.02	111.8
6	-7.96	89.44
7	-10.46	67.08
8	-13.98	44.72
9	-20.00	22.36

3.2.9. Residual FM

Description

This test measures the inherent short term instability of the spectrum analyzer. A stable signal is applied to the spectrum analyzer input. The analyzer is set to zero span and the signal is slope detected on the skirt of the RBW. Any instability in the spectrum analyzer's Local Oscillator system is transferred to the IF in the mixing process.

The test determines the slope of IF filter in Hz/dB and measures the signal amplitude variation caused by the residual FM. Multiplying these two values residual FM in Hz.

Specification

Apply for R3132/3162/3132N

Residual FM: ≤ 60 Hzp-p/0.1 sec.

Equipment used

Signal Generator	:SG1
RF Cable	:SMA(m)-SMA(m)
RF Cable	:BNC(m)-BNC (m),50Ω
Adapter	:Type N (m)-BNC (f), 50 Ω

Additional Equipment for R3132N

Impedance Converter :CONV

Setup

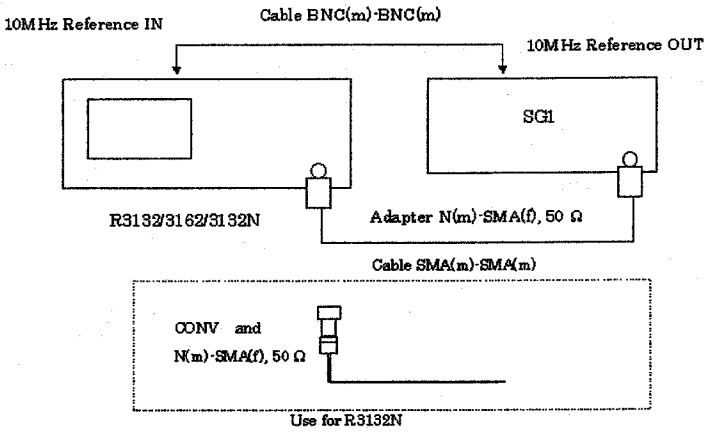

Figure 3-9 Setup of Residual FM Test

Procedure

[Determining the IF filter slope]

1. Connect the equipment as shown in Figure 3-9
2. On the SG1, set controls as follows:

Frequency	:2.5 GHz
	:(2 GHz for R3132N)
Output Level	:-10 dBm
	:(-5 dBm for R3132N)

3. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:2.5 GHz
	:(2 GHz for R3132N)
Span	:100 kHz

4. On the R3132/3162/3132N, press **PKSRCH** to capture the signal peak.
5. On the R3132/3162/3132N, press as follow to set signal track mode to on.

   MKR, *more 1/2, Signal Track ON/OFF(ON)*

6. On the R3132/3162/3132N, set controls as follows:

Span	:1 kHz
RBW	:1 kHz

7. On the R3132/3162/3132N, press as follows to set signal track mode to off.

   MKR, *more 1/2, Signal Track ON/OFF(OFF)*

8. On the R3132/3162/3132N, set controls as follows:

Reference Level	:-5 dBm
	:(+103.8 dBμV for R3132N)
dB/div	:1 dB/div
Span	:1 kHz

9. On the R3132/3162/3132N, press **PKSRCH** to capture the signal peak.
10. On the R3132/3162/3132N, press as follows to set signal peak to reference level.

    MKR→, *MKR→REF*

11. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
12. On the R3132/3162/3132N, press as follows to set delta marker mode to on.

    MKR, *Delta*

13. On the R3132/3162/3132N, rotate data knob clockwise until the marker reads -3 dB ± 0.1 dB.
14. On the R3132/3162/3132N, press as follows to set delta marker mode to on.

    MKR, *Delta*

15. On the R3132/3162, rotate data knob clockwise until the marker reads -6 dB ± 0.1 dB.
16. Record the frequency and the level of the delta marker reading on the performance verification test record sheets.
17. Calculate the slope using the following formula on the performance verification test record sheets.

Slope = (the frequency of the delta marker reading)/ (the level of the delta marker reading)

[Measuring Residual FM]

18. On the R3132/3162/3132N, press **REPEAT** for continuous sweep.
19. On the R3132/3162/3132N, set controls as follows:

Span	:Zero
Sweep Time	:100 msec

20. On the R3132/3162/3132N, press **FREQ** and rotate data knob clockwise to place trace displayed peak about six divisions below reference level.
21. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
22. On the R3132/3162/3132N, after the single sweep has completed, press as follows to set peak search and delta marker mode.

PKSRCH, MKR, *Delta*

23. On the R3132/3162/3132N, press as follows to capture minimum peak signal.

PKSRCH, *Peak Menu*, *Min Peak*

24. Record the level of delta marker reading as Delta Level on the performance verification record sheets.

[Calculation residual FM]

25. Calculate the Residual FM using the following formula,

Residual FM [Hz] = Slope [Hz/dB] x Delta Level[dB]

Record the result on the performance verification test record sheets.

3.2.10. Noise Sidebands

Description

The noise sidebands of a 1.0 GHz signal is measured at offset of 20 kHz from the carrier.

The noise marker (dBc/Hz) and averaging functions are used to average the noise sidebands.

Specification

Apply for R3132/3162/3132N

≤ -103 dBc/ Hz at 20 kHz offset: Frequency Range > 2.6 GHz

≤ -105 dBc/Hz at 20 kHz offset; Frequency range< 2.6 GHz

≤ -98 dBc/Hz at 10 kHz offset, RBW 300 Hz: Frequency Range>2.6 GHz

≤ -100 dBc/Hz at 10 kHz offset, RBW 300 Hz: Frequency Range < 2.6 GHz.

Equipment used

Signal Generator	:SG1
RF Cable	:SMA (m)-SMA (m)
RF Cable	:BNC (m)-BNC (m), 50Ω
Adapter	:Type N (m)-SMA (f)

Additional Equipment for R3132N

Impedance Converter :CONV

Setup

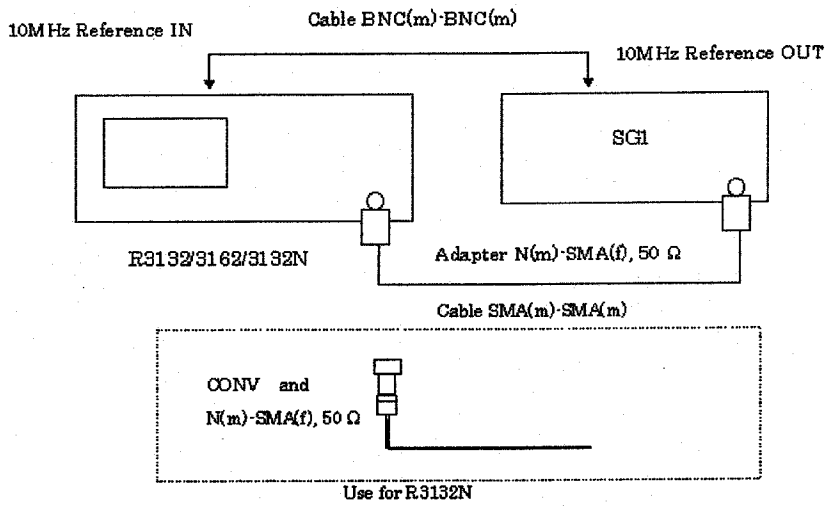

Figure 3-10 Setup of Noise Sidebands Test

Procedure

1. Connect equipment as shown in Figure 3- 10.
2. On the SG1, set controls as follows:

Frequency	:1 GHz
Output Level	:-5 dBm
	:(0 dBm for R3132N)

3. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:1 GHz
Span	:50 kHz

4. On the R3132/3162/3132N, press as follows to set noise marker mode to on:

PKSRCH, MKR→, *MKR→REF*, PKSRCH, MEAS, *NOISE/Hz, dBc/Hz*

5. On the R3132/3162/3132N, put the noise marker at 20 kHz offset using data knob or press **2,0, kHz**.

6. On the R3132/3162/3132N, set the reference level by 20 dB and press as follows to perform averaging for 20 samples:

   TRACE, *more 1/2*, *AVG A*, 2, 0, Hz(ENTR)

7. Record the level of marker reading on the performance verification test record sheets.

3.2.11. Image, Multiple, and Out-of-Band Responses

Description

This performance verification applies for R3162 only.
Image, multiple, and out-of-band responses are tested in all frequency bands. A signal is applied to the signal analyzer's INPUT 50Ω, then a reference amplitude measurement is made. The signal source is then tuned to a frequency which causes either an image, multiple, or out-of-band response. The amplitude displayed on the spectrum analyzer is measured and recorded.

Specification

< 70 dBc: Frequency Range up to 8 GHz

Equipment used

Signal Generator	:SG2
RF Power Meter	:P.M
RF Power Sensor	:P.S50Ω
Power Splitter	:1579
RF Cable	:SMA (m)-SMA (m)
Adapter	:Type SMA (m)-SMA (f)

Setup

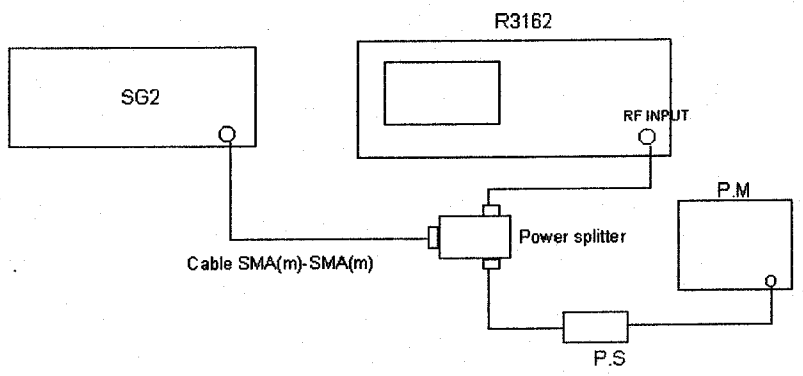

Figure 3-11 Setup of a Image, Multiple, Out of Band Responses Test

Procedure

1. On the P.M, perform the zeroing and calibration with P.S50Ω.
   Set into dBm mode, after calibration has completed.
2. On the P.M, set a correction data to 1 GHz.
3. Connect equipment as shown Figure 3-11.
4. On the SG2, set controls as follows:

Frequency	:1 GHz
Output Level	:0 dBm

5. On the R3162, after preset, set controls as follows:

Center Frequency	:1 GHz
Span	:5 MHz
RBW	:100 kHz
VBW	:300 Hz

6. On the SG2, adjust the output level so that P.M reading is
   0 dBm ± 0.1 dB.
7. On the R3162, press **SINGLE** for a single sweep.
8. On the R3162, after the single sweep has completed, press **PKSRCH** to capture signal peak.
9. On the R3162, press as follows to set fixed marker to on.
   MKR, *1/2 more, Fixed MKR ON/OFF* (ON)

10. On the R3162, press **REPEAT** to set continuous sweep.
11. On the SG2, set control as follow:

    Frequency :6261.4 MHz

12. On the P.M, set the correction data to 6.26 GHz
13. On the R3162, press **SINGLE** for a single sweep.
14. On the R3162, after the single sweep has completed, press **PKSRCH** to capture the signal peak.
15. Record the delta marker reading on the performance verification test record sheets.
16. Repeat steps 10 through 15 for each frequency listed on Table 3-13.

Table 3-13 Setting for Image, Multiple, Out of Band Response Test

Center Frequency(MHz)	Frequency of SG2(MHz)	Correction Data for P.M
3500	4342.8	4.34
3500	7421.4	7.42
7000	6578.6	6.57

3.2.12. Accuracy of Frequency Readout and Frequency Count Marker

Description

The accuracy of the spectrum analyzer frequency readout and frequency count marker is tested with an input signal of known frequency.
Test at the points 2 GHz, 5 GHz, and 7 GHz. The points 5 GHz and 7 GHz are applied for R3162 only.
For the points of frequencies above 5 GHz are required to tune pre-selector peak.

3. PERFORMANCE VERIFICATION

Specification

Apply for R3132/3162/3132N

Accuracy of Frequency Readout

± (Center Frequency x Frequency Reference Accuracy +
Frequency span x Frequency Span Accuracy + 0.15 x Resolution band width + 60 Hz)

Span Accuracy :< ± 1%

Accuracy of Frequency Counter Marker

± (Marker Frequency x Frequency Reference Accuracy + 1 LSD)
Span < 200 MHz: S/N >25 dB

Equipment used

Frequency Standard	:Freq.STD
Signal Generator	:SG2
RF Cable	:BNC(m)-BNC(m),50Ω
RF Cable	:SMA(m)-SMA(m)
Adapter:Type	:N(m)-SMA(f), 50Ω

Additional Equipment for R3132N

Impedance Converter	:CONV

Setup

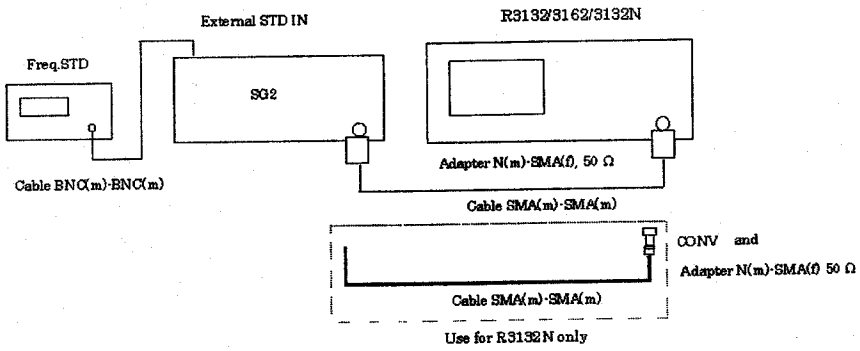

Figure 3-12 Setup of a Frequency Readout Accuracy and Frequency Counter Marker Test

Procedures:

1. Connect equipment as shown in Figure 3-12
2. On the SG2, set controls as follows:

Frequency	:2 GHz
Output Level	:-10 dBm
	:(-5 dBm for R3132N)
10 MHz Reference	:External

3. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:2 GHz
Span	:1 MHz

4. Above frequency 5 GHz on the R3162, press as follows to tune pre-selector peak.

   REPEAT, PKSRCH, FREQ, *more1/2, Presel Tune, Auto Tune*

   Wait till auto tuning has completed.

5. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
6. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture signal peak.

7. Record the frequency of marker reading on the performance verification test record sheets.
8. Repeat steps 2 through 7 for each frequency setting listed on Table 3-14.

Table 3-14 Setting for Frequency Readout Accuracy Test

Setting of R3132/3162/3132N		
Center Frequency(GHz)	Span (MHz)	RBW (auto) (MHz)
2	1	0.01
2	10	0.1
2	20	0.3
2	100	1
2	1000	3
Apply for R3162 only		
5	1	0.01
5	10	0.1
5	20	0.3
5	100	1
5	1000	3
7	1	0.01
7	10	0.1
7	20	0.3
7	100	1

[Frequency Counter Marker Accuracy]

9. On the SG2, set controls as follows:

Frequency :2 GHz
Output Level :-10 dBm
:(-5 dBm for R3132N)
10 MHz Reference :External

10. On the R3132/3162/3132N, set controls as follows:

Center Frequency :2 GHz
Span :1 MHz

11. Above frequency 5 GHz on the R3162, press as follows to tune pre-selector peak.

REPEAT, PKSRCH, FREQ, *more1/2, Presel Tune, Auto Tune*

12. On the R3132/3162/3132N, after auto tuning has completed, press as follows to set frequency counter mode to on.

Counter, Resolution 1Hz

13. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
14. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture the signal peak.
15. Record the frequency of the counter reading on the performance verification record sheets.
16. Repeat steps 9 through 15 for each setting listed on Table 3-15.

Table 3-15 Setting for Frequency Counter Marker Accuracy Test

Setting of R3132/3162/3132N	
Center Frequency(GHz)	Span (MHz)
2	1
Apply for R3162 only	
5	1
7	1

3.2.13. Second Harmonic Distortion

Description

A synthesized signal generator and low-pass filter provide the signal for measuring second harmonic distortion. The low-pass filter eliminates any harmonic distortion originating at the signal source. The R3132/3162/3132N frequency response is calibrated.

The R3132/3162/3132N is phase-locked to the signal generator's 10 MHz reference.

Test will be done the points of 1.5 GHz and 1.9 GHz as fundamental signal.

For R3132N, test at 1.0 GHz fundamental signal only.

Test of R3132N is not use power splitter, adjust signal generator level then apply to R3132N.

To measure second harmonics distortion, use Fixed Marker in Delta Marker function.

Specification

Apply for R3132/3132N

≤ -70 dBc:(Fundamental Frequency 100 MHz to 800 MHz, -30 dBm mixer input level)

≤ -80 dBc: (Fundamental Frequency > 800 MHz

Apply for R3162

≤ - 70 dBc :(Fundamental Frequency 100 MHz to 800 MHz ,-30 dBm mixer input level)

≤ -100 dBc: (Fundamental Frequency > 3.3 GHz, -10 dBm mixer input level)

Equipment used

Signal Generator	:SG2
RF Power Meter	:P.M
RF Power Sensor	:P.S50Ω
Power Splitter	:1579
Low-pass Filter	:L.P.F-1
RF Cable	:SMA(m)-SMA(m)
RF Cable	:BNC(m)-BNC(m),50 Ω
Adapter	:Type N(m)-SMA(f)

Additional Equipment

RF Power Sensor	:P.S75Ω
Impedance Converter	:CONV
Adapter	:Type N(f)-N(f),75Ω
Low-pass Filter	:L.P.F-2

Setup

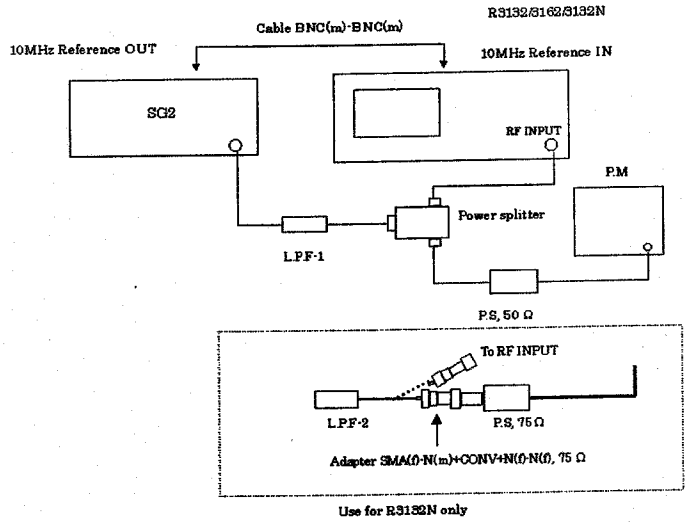

Figure 3-13 Setup of a Second Harmonics Distortion Test

Procedure

1. On the P.M, perform the zeroing and calibration with P.S50Ω.
   (with P.S 75 Ω for R3132N)
   Set into dBm mode, after calibration has done.
2. On the P.M, set a correction data to 1.5 GHz
   (On the P.M, set a correction data to 1 GHz for R3132N)
3. Connect equipment as shown in Figure 3-13.
4. On the SG2, set controls as follows:

Frequency	:1.5 GHz
	:(1 GHz for R3132N)
Output Level	:0 dBm
	:(+5 dBm for R3132N)

5. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:1.5 GHz
	:(1 GHz for R3132N)
Span	:10 kHz
Attenuator	:20 dB
Reference Level	:-10 dBm
	:(+97 dBμV for R3132N)
VBW	:30 Hz

6. On the SG2, adjust output level so that the P.M reading is -10 dBm ± 0.09 dB (+97 dBμV for R3132N)
7. For R3132N, disconnect P.S75Ω and then connect SG2 output to R3132N input.
8. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
9. On the R3132/3162, after the single sweep has completed, press **PKSRCH** to capture signal peak.
10. On the R3132/3162/3132N, press as follows to set fixed marker to on.

    MKR, *1/2 more, Fixed MKR ON/OFF*(ON)

11. On the R3132/3162/3132N, set center frequency to 3 GHz (2 GHz for R3132N)
12. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
13. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture signal peak.
14. Record the level of the delta marker reading on the performance verification test record sheets.

[Measurement for 3.3 GHz or higher]

Following procedure is applied for R3162 only.

15. Remove the low-pass filter and connect the RF cable between SG2 and the R3162.
16. On the SG2, set controls as follows:

Frequency	:3.8 GHz
Output Level	:-10 dBm

17. On the R3162, set controls as follows:

Center Frequency	:3.8 GHz
Span	:500 kHz

18. On the R3162, press as follows to tune pre-selector peak.

    PKSRCH, FREQ, *more1/2, Presel Tune* and ***Auto Tune***

19. On the R3162, after auto tuning has completed, set SG2 controls as follows:

Frequency	:1.9 GHz
Output Level	:0 dBm

20. Reconnect SG2 as shown Figure 3-13.
21. On the P.M, set the correction data to 1.9 GHz.
22. On the SG2, adjust output level so that P.M reading is -10 dBm ± 0.09 dB.
23. On the R3162, set controls as follows;

Center Frequency	:1.9 GHz
Span	:1 kHz

24. On the R3162, press as follows to set fixed marker mode to on.

MKR, *1/2 more, Fixed MKR ON/OFF*(ON)

25. On the R3162,set controls as follows;

Center Frequency	:3.8 GHz
Reference Level	:-40 dBm

26. On the R3162, press as follows to set average mode for 20 samples.

TRACE, *1/2 more, AVG A*, 2,0 and **Hz(ENTER)**

27. On the R3162, after average has completed, press **PKSRCH** to capture signal peak.
28. Record the level of the delta marker reading on the performance verification test record sheets.

3.2.14. Frequency Response for R3132/3162

Description

The output of the signal generator is fed through a power splitter to a power sensor, then to the spectrum analyzer. The signal generator's power level is adjusted at 30 MHz to place the displayed signal at the center horizontal graticule line of the spectrum analyzer. The power meter is placed in relative mode. At each new signal generator frequency and spectrum analyzer center frequency, the signal generator's power level is adjusted to place the signal at the center horizontal graticule line. The RF power meter displays the inverse of the frequency response relative to the signal of CAL OUT.

The R3132/3162 is phase locked to the signal generator's 10 MHz reference.

Specification

Apply for R3132

± 0.5 dB, Frequency Range: 100 kHz to 3 GHz, ATT=10 dB, Pre-Amp. OFF
± 1.0 dB, Frequency Range: 100 kHz to 2.7 GHz
± 2.0 dB, Frequency Range: 9 kHz to 3 GHz

Apply for R3162

± 0.5 dB, Frequency Range: 100 kHz to 3 GHz, ATT=10 dB, Pre-Amp. OFF
± 1.0 dB, Frequency Range: 100 kHz to 2.7 GHz } Pre Amp ON/OFF 両方とも同じスペック
± 2.0 dB, Frequency Range: 9 kHz to 3.3 GHz
± 2.0 dB, Frequency Range: 3.2 GHz to 8 GHz, Pre-Amp. OFF

Equipment used

Signal Generator	:SG2
RF Power Meter	:P.M
RF Power Sensor	:P.S50Ω
Power Splitter	:1579
RF Cable	:SMA(m)-SMA(m)
RF Cable	:BNC(m)-BNC(m),50Ω

Setup

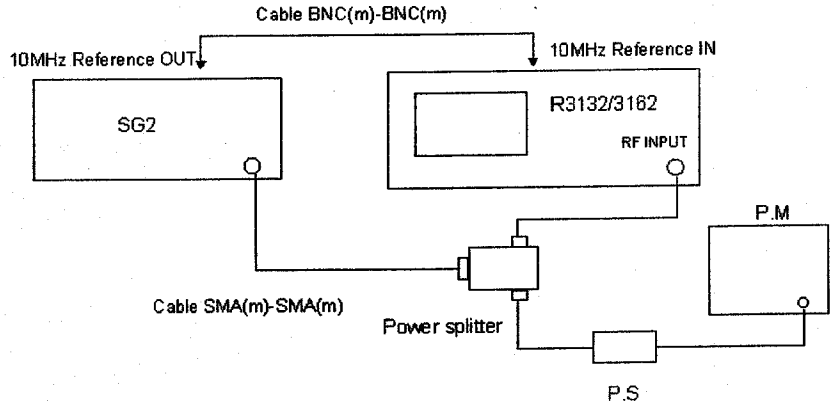

Figure 3-14. Setup of Frequency Response Test for R3132/3162

Procedure

1. Perform the zeroing and calibration of PM with PS50Ω.
   Set into dBm mode, after calibration has done.
2. Connect equipment as shown in Figure 3-14.
3. On the SG2, set the SG2 controls as follows:

Frequency	:30 MHz
Frequency Step	:100 MHz
Output Level	:-4 dBm

4. On the R3132/3162, after preset, set controls as follows:

Center Frequency	:30 MHz
Center Frequency Step	:100 MHz
Span	:40 MHz
Reference Level	:-5 dBm
Attenuator	:10 dB
dB/div	:1 dB/div
RBW	:3 MHz
VBW	:1 kHz

5. Press **MKR, *Peak Menu*** and ***Cont Peak ON/OFF***(ON) to set continuous peak search mode.
6. On the SG2, adjust output level so that reading of peak search marker is -10 dBm ± 0.09 dB.

7. On the RF power meter, set correction data for 30 MHz and relative measurement mode.

[Measuring frequency response in the frequency range: 100 Hz to 3.3 GHz for R3162]
[Measuring frequency response in the frequency range: 100 Hz to 3 GHz for R3132]

8. On the SG2, set frequency to 100 MHz
9. On the R3132/3162, set center frequency to 10 MHz.
10. On the RF power meter, set correction data for 100 MHz.
11. Adjust output level of SG2 so that reading of peak search marker is -10 dBm ± 0.09 dB.
12. Record the display of RF power meter reading with reverse sign in performance verification test record sheets.
13. On the R3132/3162, press **FREQ**, and Δ to increase center frequency by 100 MHz step.
14. On the SG2, increment the frequency of output by 100 MHz.
15. On the RF power meter, set the correction data for the frequency by 100 MHz step.
16. Repeat steps 11 through 14 for every center frequency by 100 MHz step up the center frequency to 3.2 GHz(for R3132 up to 3 GHz) listed in performance verification test record sheets.

[Measuring frequency response in the frequency range 3.1 GHz to 8 GHz for R3162]

For testing this frequency range, pre selector tune is required.

17. On the R3162, set center frequency to 3.4 GHz.
18. On the SG2, set the frequency to 3.4 GHz.
19. On the RF power meter set the correction data for 3.4 GHz.
20. On the R3162, press as follows to tune the pre selector.

    FREQ, ***more1/2, Presel*** and ***Auto Tune***.

21. After the auto tuning has completed, adjust SG2 output level so that the marker reading is -10.0 dBm ± 0.09 dB.
22. Record the display of RF power meter reading with reverse sign in performance verification data sheets.

23. On the R3132/3162, press **FREQ** and Δ to set center frequency by 100 MHz step.
24. On the SG2, increment the frequency of output by 100 MHz.
25. On the RF power meter, set the correction data for the frequency by 100 MHz step.
26. Repeat steps 20 through 25 for every center frequency by 100 MHz step up the center frequency to 8.0 GHz listed in performance verification test record sheets.

[Measuring frequency response under Hi-sens Mode On]

27. On the RF power meter, set into dBm mode.
28. On the SG2, set SG2 controls as follows:

Frequency	:30 MHz
Frequency Step	:100 MHz
Output Level	:-14 dBm

29. On the R3132/3162, after preset, set R132/3162 controls as follows:

Center Frequency	:30 MHz
Center Frequency Step	:100 MHz
Span	:40 MHz
Reference Level	:-15 dBm
Hi-sens	:ON
Attenuator	:10 dB
dB/div	:1 dB/div
RBW	:3 MHz
VBW	:1 kHz

30. Press **MKR, *Peak*** Menu and ***Cont Peak ON/OFF***(ON) to set continuous peak search mode.
31. On the SG2, adjust output level so that the reading of peak search marker is -20 dBm ± 0.09 dB.
32. On the RF power meter, set correction data for 30 MHz and relative measurement mode.
33. On the SG2, set frequency to 100 MHz.
34. On the R3132/3162, set center frequency to 100 MHz.
35. On the PF power meter, set correction data for 100 MHz.

36. On the SG2, adjust output level so that reading of peak search marker is -20 dBm ± 0.09 dB.
37. Record the display of RF power meter reading with reverse sign in performance verification test record sheets.
38. On the R3132/3162, press **FREQ** and Δ to increase center frequency by 100 MHz step.
39. On the SG2, increment the center frequency of output by 100 MHz.
40. On the RF power meter, set the correction data for the frequency by 100 MHz step.
41. Repeat steps 36 through 40 for every center frequency by 100 MHz step up the center frequency to 3.2 GHz.(for R3132 up to 3 GHz) listed in the performance verification test record sheets.

3.2.15. Frequency Response for R3132N

Description

The signal generator output is fed through 75Ω to 50 Ω impedance converter with adapters then to the R3132N.
Adjust signal generator output level to place signal peak at center of horizontal graticule, and record the setting of signal generator output level at several points.
Connect 75 Ω RF power sensor to signal generator output, and then set the value of recorded. Measure level deviation of all the points reference to 30 MHz point.
Record each deviation with reverse sign as frequency response.
The R3132N is phase locked to the signal generator's 10 MHz reference.

Specification

(after Calibration)

± 0.5 dB, Frequency Range: 100 kHz to 2.2 GHz, ATT=10 dB, Pre-Amp: OFF
± 2 dB, Frequency Range: 9 kHz to 2.2 GHz

± 1 dB, Frequency Range: 100 kHz to 2.2 GHz, ATT=10 dB, Pre-Amp: ON
± 2 dB, Frequency Range: 9 kHz to 2.2 GHz

Equipment used

Signal Generator	:SG2
RF Power Meter	:P.M
RF Power Sensor	:P.S75Ω
Impedance Converter	:CONV
RF Cable	:SMA (m)-SMA (m)
RF Cable	:BNC (m)-BNC (m),50Ω
Adapter	:Type N (m)-N (m), 75 Ω
Adapter	:Type SMA (f)-N (m)

Setup

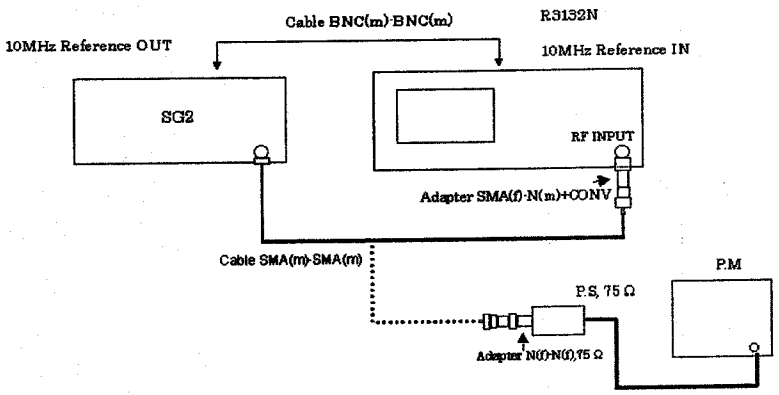

Figure 3-15. Setup of Frequency Response Test for R3132N

Procedure

1. Perform the zeroing and calibration of P.M with P.S75Ω.
   Set into dBm mode, after calibration has done.
2. Connect equipment as shown in Figure 3-15.
3. On the SG2, set the SG2 controls as follows:

Frequency	:30 MHz
Frequency Step	:100 MHz
Output Level	:-4 dBm

4. On the R3132N, after preset, set controls as follows:

Center Frequency	:30 MHz
Center Frequency Step	:100 MHz
Span	:40 MHz
Reference Level	:+103.8 dBμV
Attenuator	:10 dB
dB/div	:1 dB/div
RBW	:3 MHz
VBW	:1 kHz

5. Press **MKR**, ***Peak Menu*** and ***Cont Peak ON/OFF*** (ON) to set continuous peak search mode.
6. On the SG2, adjust output level so that reading of peak search marker is +98.8 dBμV ± 0.09 dB.
7. Record the setting value of SG2 output level in the performance verification test record sheets as SG2 level.
8. On the SG2, set frequency to 100 MHz
9. On the R3132N, set center frequency to 100 MHz.
10. On the SG2, adjust output level so that reading of peak search marker is -98.8 dBμV ± 0.09 dB.
11. Record the setting value of SG2 output level in the performance verification test record sheets as SG level.
12. On the R3132N, press **FREQ**, and Δ to increase center frequency by 100 MHz step.
13. On the SG2, increment the frequency of output by 100 MHz.
14. Repeat steps 10 through 13 for every center frequency by 100 MHz step up the center frequency to 2.2 GHz in performance verification test record sheets.
15. Remove CONV from RF input, and then connect to P.S75Ω via adapter N (f)-N (f), 75Ω.
16. On the SG2, set controls as follows:

Frequency	:30 MHz
Output Level	:(Recorded Value in the performance Verification test record sheets)

17. On the PM, set a correction data to 30 MHz, then set to relative measurement mode.

18. On the SG2, set frequency to 100 MHz by 100 MHz step.
19. On the P.M, set a correction data to 100 MHz by 100 MHz step.
20. Read P.M measurement value and record it with reverse sign in the performance verification test record sheets as Measured Value (dB).
21. Repeat steps 18 through 20 for up to 2.2 GHz.

[Measuring frequency response under Hi-sens Mode On]

22. On the SG2, set controls as follow:

Frequency	:30 MHz
Output Level	:-14 dBm

23. On the R3132N, after preset set controls as follows:

Center Frequency	:30 MHz
Center Frequency Step	:100 MHz
Span	:40 MHz
Reference Level	:+93.8 dBμV
Hi-sens	:ON
Attenuator	:10 dB
dB/div	:1 dB/div
RBW	:3 MHz
VBW	:1 kHz

24. Press **MKR, *Peak Menu*** and ***Cont Peak ON/OFF*** (ON) to set continuous peak search mode.
25. On the SG2, adjust output level so that the reading of peak search marker is +88.8 dBμV.
26. Record the setting value of SG2 output level in the performance verification test record sheets as SG2 level.
27. On the SG2, set frequency to 100 MHz
28. On the R3132N, set center frequency to 100 MHz.
29. On the SG2, adjust output level so that reading of peak search marker is -88.8 dBμV ± 0.09 dB.

30. Record the setting value of SG2 output level in the performance verification test record sheets as SG2 level.

31. On the R3132N, press **FREQ**, and Δ to increase center frequency by 100 MHz step.
32. On the SG2, increment the frequency of output by 100 MHz.
33. Repeat steps 10 through 13 for every center frequency by 100 MHz step up the center frequency to 2.2 GHz in performance verification test record sheets.
34. Remove CONV from RF input, and then connect to P.S75Ω via adapter N (f)-N (f), 75Ω.
35. On the SG2, set controls as follows:

Frequency	:30 MHz
Output Level	:(Recorded Value in the performance Verification test record sheets)

36. On the PM, set a correction data to 30 MHz, then set to relative measurement mode.
37. On the SG2, set frequency to 100 MHz by 100 MHz step.
38. On the P.M, set a correction data to 100 MHz by 100 MHz step.
39. Read P.M measurement value and record it with reverse sign in the performance verification test record sheets as Measured Value(dB).
40. Repeat steps 37 through 39 for up to 2.2 GHz.

3.2.16. Frequency Span Accuracy

Description

Set the signal frequency twice with the signal generator and measure the difference between signal frequencies with the analyzer.
Check the span accuracy using the signal frequency difference measured with the delta marker function.
The R3132/3162/3132N is phase-locked to the signal generator's 10 MHz reference.

Specification

< ± 1% of the frequency span setting.

Equipment used

Signal Generator	:SG2
RF Cable	:SMA(m)-SMA(m)
RF Cable	:BNC(m)-BNC(m),50Ω
Adapter	:Type N(m)-SMA(f)

Additional Equipment for R3132N

Impedance Converter :CONV

Setup

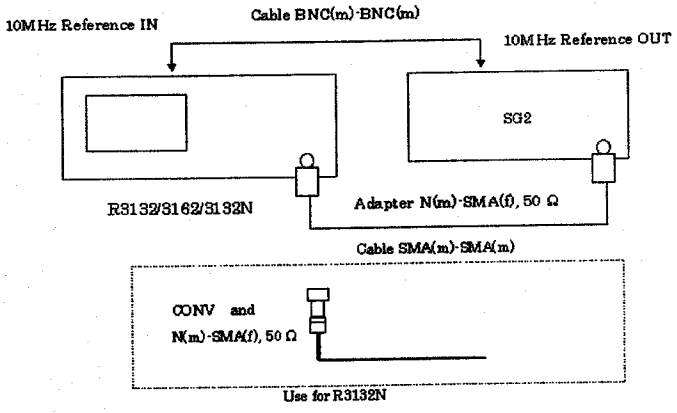

Figure 3-16 Setup for a Frequency Span Accuracy Test

Procedures:

1. Connect equipment as shown in Figure 3-16
2. On the SG2, set controls as follows:

   Output Level :-5 dBm
   :(0 dBm for R3132N)

3. On the R3132/3162/3132N, preset.
4. On the SG2, set controls as follow for 1st frequency.

   Frequency :1.49996 GHz

5. On the R3132/3162/3132N, set controls as follows:

   Center Frequency :1.5 GHz
   Span :100 kHz

6. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
7. On the R3132/3162/3132N, after the sweep has completed, press **PKSRCH** to capture signal peak.
8. On the R3132/3162/3132N, press as follows to set delta marker to on.

   MKR, *Delta*

9. On the SG2, set output frequency as follow for 2nd frequency.

   Frequency :1.50004 GHz

10. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
11. On the R3132/3162/3132N, after the sweep has completed, press **PKSRCH** to capture signal peak.
12. Record the frequency of delta marker on the performance verification data sheets.
13. Repeat steps 4 through 12 for each frequency setting listed on Table 3-16. Span 4 GHz and 8 GHz are applied for R3162 only.

Table 3-16 Setting for Span Accuracy Test

SG2 Setting		R3132/3162 Setting	
1st Frequency(GHz)	2nd Frequency(GHz)	Center Frequency (GHz)	Span(Hz)
1.49996	1.50004	1.5	100 k
1.4996	1.5004	1.5	1 M
1.496	1.504	1.5	10 M
1.46	1.54	1.5	100 M
1.1	1.9	1.5	1 G
0.3	2.7	1.5	3 G
Apply for R3162 only			
2.4	5.6	4.0	4 G
0.8	7.2	4.0	8 G

3.2.17. Third Order Intermodulation Distortion

Description

Two Signal generators provide the signals required for measuring third order intermodulation.
It is difficult when the input level is low because of being buried to the noise, to measure the spectrum generated by the distortion. Third ordered inter-modulation is raised by 20 dB if the input level is raised by 10 dB. Then, examine with mixer input level set in -20 dBm after the specification is converted into a value, which is 20 dB larger.
Here provides procedure at -20 dBm for a total mixer input level. The test points of center frequencies are 200 MHz, 1500 MHz, 3000 MHz, 3600 MHz and 7000 MHz.
The points of 3600 MHz and 7000 MHz are applied for R3162 only.
For R3132N, test points are 200 MHz and 1500 MHz only.

Specification

Total mixer input level: -30 dBm, two signal difference > 50 kHz

Apply for R3132/3132N

≤ -80 dBc, Frequency Range: 200 MHz to 3 GHz Band

Apply for R3162

≤ -80 dBc, Frequency Range: 200 MHz to 8 GHz Band

Equipment used

Signal Generator	:SG2
Signal Generator	:SG3
RF Power Meter	:P.M
RF Power Sensor	:P.S50Ω
Power Divider	:Divider1
Power Divider	:Divider2
RF Cable	:SMA(m)-SMA(m)
Adapter	:Type N(m)-SMA(f)
	:Type SMA(f)-SMA(f)

Additional Equipment for R3132N

RF Power Sensor	:P.S75Ω
Impedance Converter	:CONV
Adapter	:Type N(f)-N(f), 75 Ω

Setup

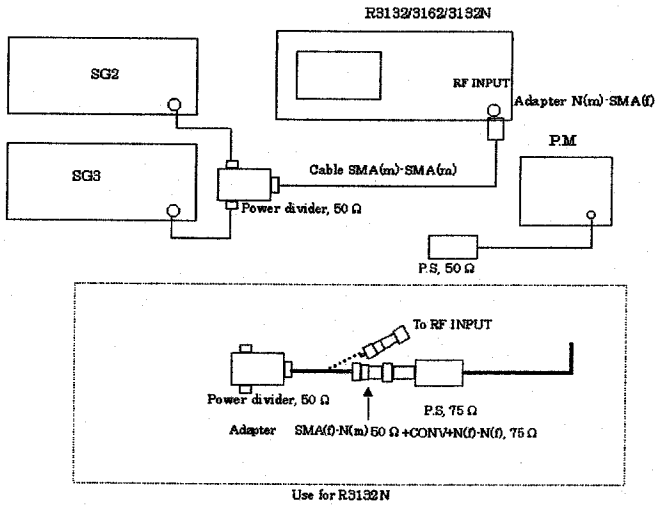

Figure 3-17 Setup of Third Order Intermodulation Test

Procedure

[Third Order Intermodulation (< 1 GHz)]

1. On the P.M, perform the zeroing and calibration with P.S50Ω.
   (with P.S75Ω for R3132N).
   Set into dBm mode, after calibration has done.
2. On the P.M, set a correction data to 200 MHz
3. Connect P.S50Ω to divider1 output.
   (Connect P.S 75Ω with adapter SMA(f)-N(m)+N(f)-N(f),75 Ω
   to divider 1 for R3132N)
4. On the both of signal generator, set controls as follows:

SG2

Frequency	:200 MHz
Output Level	:-10 dBm
	:(-5 dBm for R3132N)
RF Output	:Off

SG3

Frequency	:200.05 MHz
Output Level	:-10 dBm
	:(-5 dBm for R3132N)
RF Output	:Off

5. Turn RF output on of SG2.
6. On the SG2, adjust output level so that P.M reading is -10.0 dBm ± 0.1 dB (+97.8 dBμV ± 0.1 dB for R3132N).
7. Turn RF output off of SG2, and turn RF output on of SG3.
8. On the SG3, adjust output level so that P.M reading is -10.0 dBm ± 0.1 dB (+97.8 dBμV ± 0.1 dB for R3132N) then turn RF output to off.
9. Remove P.S50Ω from divider, then connect divider output to R3132/3162 input. (Remove P.S75Ω from adapter SMA(f)-N(m)+N(f)-N(f),75 Ω, then connect to R3132N input as shown in Figure 3-17.)
10. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:200 MHz
Span	:500 kHz
Attenuator	:10 dB
Reference Level	:-10 dBm
	:(+97 dBμV for R3132N)
RBW	:3 kHz
VBW	:300 Hz

11. Turn RF output on for both of signal generator.
12. On the R3162, this procedures are required for the frequency above 3.6 GHz. Press as follows to tune pre-selector peak.

    FREQ, *more1/2, Presel Tune, Auto Tune*

    Wait till auto tuning has completed.

13. On the R3132/3162/3132N, press as follows to set signal peak to reference level.

    PKSRCH, MKR→, *Marker →Ref*

14. On the R3132/3162,press as follows to set 3rd order Measure mode.

    MEAS, *3rd Order Meas*

15. Record the level of delta marker reading in dBc on the performance verification test record sheets.
16. Repeat steps 2 through 15 for each frequency setting listed on Table 3-17.

Table 3-17 Setting for Third Order Intermodulation Test

Frequency of SG2(MHz)	Frequency of SG3(MHz)	R3132/3162/3132N Center Frequency(MHz)	Power Divider
100	100.05	100	Divider 1
1500	1500.05	1500	Divider 1
3000	3000.05	3000	Divider 2
Apply for R3162 only			
3600	3600.05	3600	Divider 2
7000	7000.05	7000	Divider 2

3.2.18. Gain Compression

Description

This test measures the analyzer's gain compression using two signals that are 1 MHz apart. First the test places a –30 dBm signal at the input of the R3132/3162(the R3132/3162's reference level is also set to –30 dBm).
Then the specified signal level is input to the R3132/3162, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.
This test measures gain compression at the point of 200.5 MHz and 3600.5 MHz.
The point of 3600.5 MHz is applied for R3162 only and required pre-selector tuning.

Specification:

Apply for R3132/3162

< 0 dBm (mixer input level):Frequency ≥ 200 MHz

Apply for R3132N

>+107 dBμV (mixer input level): Frequency > 200 MHz

Equipment used

Signal Generator	:SG2
Signal Generator	:SG3
RF Power Meter	:P.M
RF Power Sensor	:P.S50Ω
Power Splitter	:1579
3 dB Attenuator	:ATT3
10 dB Attenuator	:ATT4
RF Cable	:SMA(m)-SMA(m)
Adapter	:Type N(m)-SMA(f)

Additional Equipment for R3132N

RF Power Sensor	:P.S75Ω
Impedance Converter	:CONV
Adapter	:Type N(f)-N(f), 75 Ω

Setup

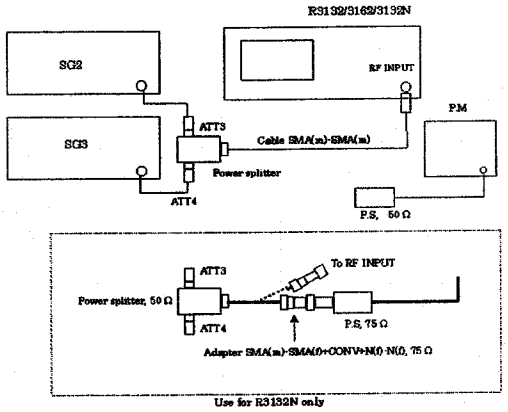

Figure 3-18 Setup of a Gain Compression Test

Procedure

1. On the P.M, perform the zeroing and calibration with P.S50Ω (P.S75Ω for R3132N).
   Set P.M into dBm mode, after calibration has done.
2. Connect equipment as shown in Figure 3-18
3. Set both of signal generators controls as follows:

   SG2

Frequency	:201 MHz
Output Level	:-2 dBm
	:(+3 dBm for R3132N)

   SG3

Frequency	:200 MHz
Output Level	:-4 dBm
	:(+1 dBm for R3132N)

4. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:200.5 MHz
Span	:2 MHz
Attenuator	:0 dB
Reference Level	:-30 dBm
	:(+78.8 dBμV for R3132N)
dB/div	:1 dB/div

5. On the SG2, turn output level off.
6. On the SG3, adjust the output level for a displayed signal of –30 dBm ± 0.1 dB (+78.8 dBμV ± 0.1 dB for R3132N) on the R3132/3162/3132N screen.
7. On the SG2, turn output level on.
8. On the SG2, adjust output level until the signal level at 2.5 division in the left hand part on the R3132/3162/R3132N screen is lowed by 1 dB from -30 dBm (+78.8 dBμV forR3132N).
9. Remove the RF cable from the input terminal of R3132/3162/3132N, connect P.S50Ω there(connect P.S 75Ω for R3132N).
10. On the P.M, set correction data for 200.5 MHz.
11. Record the level of the P.M reading on the performance verification record sheets.

Following procedure is applied for R3162 only.

12. On the R3162, set both of signal generator controls as follows:

SG1

Frequency	:3600 MHz
Output Level	:-2 dBm

SG2

Frequency	:3601 MHz
Output Level	:-4 dBm

13. On the R3162, after preset, set controls as follows:

Center Frequency	:3600.5 MHz
Span	:2 MHz
Attenuator	:0 dB
Reference Level	:-10 dBm
dB/div	:10 dB/div

14. On the R3162, press as follows to tune preselector peak.

PKSRCH, FREQ, *more1/2, Presel Tune, Auto Tune*

15. On the R3162, set controls as follows:

dB/div	:1 dB/div
Reference Level	:-30 dBm

16. On the SG2, turn output level off.
17. On the SG3, adjust the output level for a displayed signal of -30 dBm ± 0.1 dB on the R3162 screen.
18. On the SG2, turn output level on.
19. On the SG2, adjust output level until the signal level at 2.5 division in the left hand part on the R3162 screen is lowed by 1 dB from –30 dBm.
20. Remove the RF cable from the input terminal of R3162, connect P.S50Ω there.

21. On the P.M, set a correction data for 3600.5 MHz.
22. Record the level of the P.M reading on the performance verification record sheets.

3.2.19. Sweep Time Accuracy

Description

A low frequency signal(Square Wave) is displayed on the R3132/3162/3132N in ZERO span mode, and measure the sweep time of the displayed signal using Video trigger.

Specification

Apply for R3132/3162/3132N

≤ ± 2 % of sweep time setting

Equipment used

Signal Generator	:SG4
RF Cable	:BNC(m)-BNC(m)
Adapter	:Type N(m)-BNC(f)

Additional Equipment for R3132N

Impedance Converter :CONV

Setup

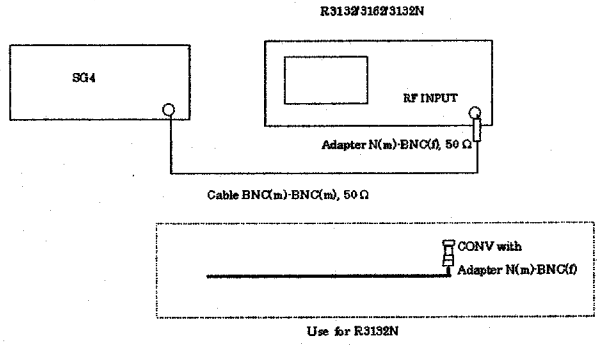

Figure 3-19 Setup of a Sweep Time Accuracy Test

Procedure

1. Connect equipment as shown in Figure 3-19.
2. On the SG4, set controls as follows:

   Frequency :0.022 Hz
   Output Level :-10 dBm
   Waveform :Square

3. On the R3132/3162/3132N, after preset, set controls as follows:

   Center Frequency :0 MHz
   Span :Zero
   Reference Level :-10 dBm
   dB/div :1 dB/div
   Sweep Time :50 sec

4. On the R3132/3162/3132N, press as follows to set the trigger mode to VIDEO.

   TRIG, *Trig Source, Video Trig*

5. On the R3132/3162/3132N, adjust trigger level for sweep using data knob.
6. On the R3132/3162/3132N, press **SINGLE** for single sweep.
7. On the R3132/3162/3132N after sweep has completed, press **MKR** then move it to leading edge on the waveform.
8. Record the time of the marker reading on the performance verification test record sheets.
9. Repeat steps 6 through 8 for each sweep time setting listed on Table 3-18.

Table 3-18 Setting for Sweep Time Accuracy Test

Sweep Time Setting(sec)	Setting of SG4(Hz)	Test Data(sec)
50	0.022	45
5	0.22	4.5
500 m	2.2	450 m
50 m	22	45 m
5 μ(Option)	220	4.5 μ
500 μ(Option)	2.2 k	450 μ
50 μ(Option)	22 k	45 μ

3.2.20. Residual Response

Description

This test checks for residual responses under pre amplifier on and off cases.
Any response located above the display line is measured in a narrow frequency span and RBW.
The RF INPUT is terminated in 50Ω.
For R3132N, RF INPUT is terminated in 75Ω.

Specification

Input Terminated 50 Ω and 0 dB input attenuation

Apply for R3132

≤ -100 dBm, Frequency Range: 1 MHz to 3 GHz, Pre Amp OFF
≤ -105 dBm, Frequency Range: 1 MHz to 3 GHz, Pre Amp ON

Apply for R3162

≤ -100 dBm, Frequency Range: 1 MHz to 3.3 GHz, Pre Amp OFF
≤ -90 dBm, Frequency Range: 3.2 GHz to 8 GHz, Pre Amp OFF
≤ -105 dBm, Frequency Range: 1 MHz to 3.3 GHz, Pre Amp ON

Input terminated 75Ω and 0 dB input attenuation

Apply for R3132N

≤+7 dBμV, Frequency Range: 1 MHz to 2.2 GHz, Pre Amp OFF
≤+2 dBμV, Frequency Range: 1 MHz to 2.2 GHz, Pre Amp ON

Equipment used

Terminator	:TERM50
Adapters:	:Type N(m) - SMA(f)
	:Type N(m) – BNC(f), 50 Ω
RF Cable	:BNC(m)-BNC(m), 50Ω

Additional Equipment for R3132N

Terminator	:TERM75
Adapter	:Type N(m)-BNC(f), 75Ω

Setup

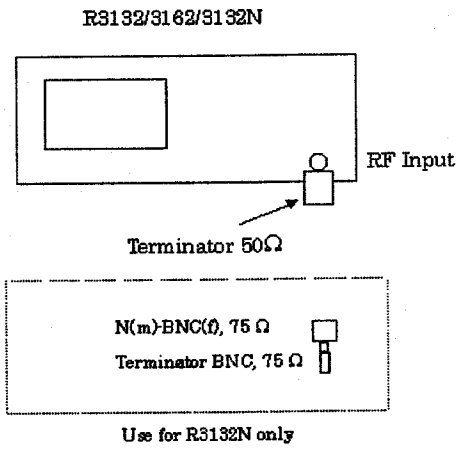

Figure 3-20 Setup of Residual Response Test

Procedure

Under pre-amplifier off condition

[Frequency Range: 1 MHz to 3.3 GHz for R3162]

[Frequency Range: 1 MHz to 3 GHz for R3132]

1. Connect between the CAL OUT and RF INPUT by adapter N(m)-BNC(f) and BNC(m)-BNC(m) cable.
(Connect between the CAL OUT and RF INPUT by adapter N(m)-BNC(f),75Ω and BNC(m)-BNC(m) ,75 Ω cable for R3132N)

2. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:30 MHz
Span	:10 kHz
Reference Level	:-20 dBm
	:(+88.8 dBμV for R3132N)
RBW	:300 Hz
Input Attenuator	:0 dB
Pre Amp	:OFF

3. On the R3132/3162/3132N, press **PKSRCH** to capture signal peak.
4. Check that the marker amplitude is within -20.0 dBm ± 1.0 dB (+88.8 dBμV ± 1.0 dB for R3132N)

If it is out of range, press as follows to perform CAL ALL:

SHIFT, 7(CAL), *Cal All*

After Cal All has completed, check that the marker amplitude is within -20.0 dBm ± 0.3 dB (+88.8 dBμV ± 0.3 dB).

5. Remove the BNC(m)-BNC(m) cable and adapter from the INPUT. Install the Type N(m) to SMA (f)adapter and 50 Ω termination on the INPUT. (Install the Type N(m) to BNC(f), 75Ω adapter and 75 Ω termination on the INPUT for R3132 as shown in Figure 3-20.)

6. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:1.3 MHz
Span	:2 MHz
CF Step Size	:1.9 MHz
Reference Level	:-50 dBm
	:(+58.8 dBμV for R3132N)
ATT	:0 dB
RBW	:10 kHz
VBW	:300 Hz

7. Press the **DISPLAY, *Disp*** Line ***ON OFF***(ON) ,**1,0,0** and **MHz(-dBm)** to place display line at -100 dBm position .
   (Press the **DISPLAY, *Disp Line ON OFF***(ON) ,**7** and **dVμV** to place display line at +7 dBμV position for R3132N) .
8. Press the **SINGLE** for a single sweep.
   The noise level should be at least 3dB below the display line. If it is not, it will be necessary to reduce the Span and RBW to reduce the noise level. If the span is reduced, reduce the CF Step to no more than 95% of the Span.
9. If a residual is suspected, press the **SINGLE** again.
   A residual response will persist, but a noise peak will not. Record the frequency and amplitude of any responses above the display line.
10. If a response is marginal, verify the response amplitude as follows :

    1). Press **SHIFT, RECALL(SAVE) ,1,Hz(ENTR)** and ***SAVE*** to save the setting condition.
    2). Press the **REPEAT** to set continuous sweep mode.
    3). Place the marker on the peak of the response in the question.
    4). Press the **MKR→** and ***MKR→ CF*** key to set marker frequency to center.
    5). Press **BW** and ***RBW AUTO/MNL***(AUTO) to set RBW auto mode.

    6). Continue to reduce the Span until a RBW of 1 kHz is reached.
    Press **MKR→** and ***Peak → CF*** to set peak to center.
    7). Record the frequency and amplitude of any residual response above the display line.
    8). Press **RECALL** and ***Recall*** to recall the setting condition.

11. Check for residuals up to center frequency 3.29 GHz(for R3132 up to 3 GHz and for R3132N up to 2.2 GHz) using the procedure of step 9 through 11 above.
    To change the center frequency, then press the **FREQ** and Δ keys.

[Under Pre-Amplifier On Condition]

12. On the R3132/3162/3132N, press **LEVEL** and ***Hi Sens ON*** to set pre-amplifier to on.

13. On the R3132/3162, press **DISPLAY, *Disp Line ON/ OFF***(ON) ,**1,0,5** and **MHz(-dBm)** to place display line at -105 dBm position.
    (On the R3132N, press **DISPLAY**, ***Disp LIne ON/OFF***(ON), **2**, and **dBμV** to set display line at +2 dBμV position.)
14. Repeat steps 5. through 10.

Following steps are applied for R3162 only.

[Under Pre-Amplifier OFF Condition]

[Residual response in the band 3.3 GHz to 7.5 GHz]

15. On the R3162, set controls as follows

Center Frequency	:3.325 GHz
Span	:50 MHz
CF Step	:47.5 MHz
RBW	:100 kHz
VBW	:300 Hz

16. On the R3162, press **DISPLAY, *Disp Line ON/OFF***(ON), **9,0** and **MHz(-dBm)** to place display line at -90 dBm position.
17. Repeat steps 9 through 11 until the center frequency of 7.975 GHz.

3.3. Tracking Generator Performance Verification Procedure

This section provides tracking generator performance verification procedure.

3.3.1 Absolute Output Level Accuracy

Description

A calibrated power sensor is connected to the tracking generator output directly to measure the power level at 30 MHz and output level -10 dBm.
For R3132N, test at frequency 30 MHz and output level 95 dBμV.

Specification

Apply for R3132/3162

≤ ± 0.5 dB at Frequency 30 MHz, output level –10 dBm.

Apply for R3132N

≤ ± 0.5 dB at Frequency 30 MHz and output Level 95 dBμV

Equipment used

RF Power meter :P.M
RF Power sensor :P.S50Ω

Additional Equipment

RF Power Sensor :PS75Ω

Setup

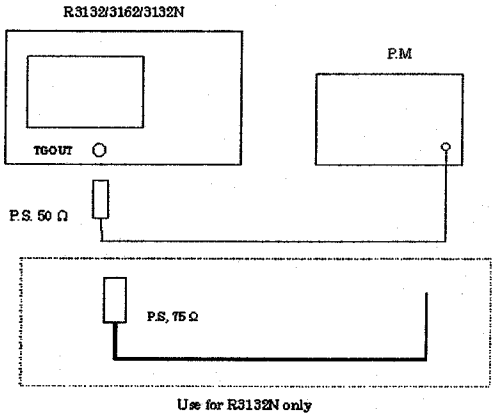

Figure 3-21 Setup of Absolute Output Level Accuracy Test

Procedure

1. On the PM, perform zeroing and calibration with P.S 50Ω (P.S75Ω for R3132N).
2. Connect the equipment as shown Figure 3-21
3. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:30 MHz
Span	:0 Hz
TG Output Level	:-10 dBm
	:(+95 dBμV for R3132N)
TG	:ON

4. On the PM, set correction data to 30 MHz.
5. Record the measurement value of the P.M on the performance verification test record sheets.

3.3.2. Output Level Flatness

Description

Output level flatness is measured by using RF power meter in relative mode referenced to center frequency at 30 MHz, output level -10 dBm.
TG is stepped to several frequencies throughout its range.

Specification

Apply for R3132/3162
Reference to 30 MHz and -10.0 dBm

Apply for R3132/3162

≤ ± 1.0 dB, Frequency Range: 100 kHz to 1 GHz
≤ ± 1.5 dB, Frequency Range: 100 kHz to 3 GHz

Apply for R3132N
Reference to 30 MHz and 95 dBμV

≤ ±1.0 dB Frequency Range: 100 kHz to 1 GHz
≤ ±1.5 dB Frequency Range: 100 kHz to 2.2 GHz

Equipment used

Power meter :P.M
Power sensor :P.S50Ω

Additional Equipment for R3132N

Power Sensor :P.S75Ω

Setup

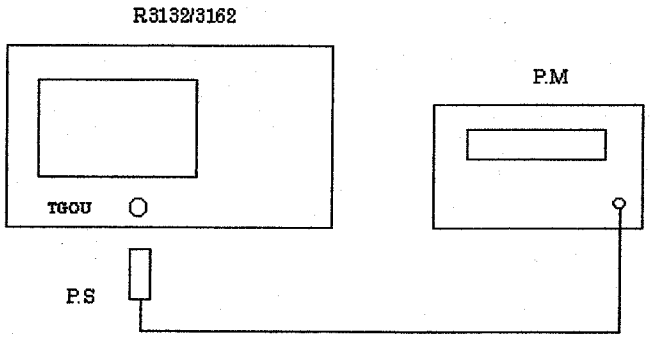

Figure 3-22 Setup of Output Level Flatness Test.

Procedure

1. On the P.M, perform ZERO and calibration with P.S50Ω (P.S75Ω for R3132N).
2. Connect equipment as shown in Figure 3-22.
3. On the R3132/3162/3132N, set controls as follows:

Center Frequency	:30 MHz
Span	:0 Hz
TG level	:-10 dBm
	:(+95 dBμV for R3132N)
TG	:ON

4. On the PM, set a correction data for 30 MHz.
5. On the PM, set relative measurement mode.
6. On the R3132/3162/3132N, set center frequency to 100 kHz.
7. On the P.M, set correction data for 100 kHz.
8. Record P.M reading on the performance verification test record sheets.
9. Repeat steps 6 through 8 for each center frequency listed on Table 3-19.

Table 3-19 Setting for Output Flatness Test

Test Data for R3132/3162	Test Data for R3132N
Center Frequency(Hz)	Center Frequency(Hz)
30 M	30 M
100 k	100 k
300 k	300 k
1 M	1 M
3 M	3 M
10 M	10 M
100 M	100 M
200 M	200 M
400 M	400 M
600 M	600 M
800 M	800 M
1 G	1 G
1.2 G	1.2 G
1.4 G	1.4 G
1.6 G	1.6 G
1.8 G	1.8 G
2 G	2 G
2.2 G	2.2 G
2.4 G	
2.6 G	
2.8 G	
3.0 G	

3.3.3. Output Level Switching Accuracy

Description

Measure switching accuracy of TG output attenuator, after CAL ALL performed.
Measure level of several frequencies against output level -10.0 dBm as reference.
The measurement of deviation from -10 dBm point using normalize function.
When change TG output level, reference level setting also change for trace data to stay center of vertical on the screen.
For R3132N, measure level deviation reference to +95 dBμV.

Specification

Apply for R3132/3162

Reference to –10 dBm at 30 MHz

± 1.0 dB, Frequency Range: 100 kHz to 1 GHz, TG output level ≥ -30 dBm
± 2.0 dB, Frequency Range: 100 kHz to 2.6 GHz
± 3.0 dB, Frequency range: 100 kHz to 3 GHz

Apply for R3132N

Reference to +95 dBμV at 30 MHz

± 1.0 dB, Frequency Range: 100 kHz to 1 GHz, TG output level ≥ +75 dBμV
± 2.0 dB, Frequency Range: 100 kHz to 2.2 GHz

Equipment used

RF Cable	:SMA (m)-SMA (m)
Adapter	:Type N (m)-SMA (f)

Additional Equipment for R3132N

RF Cable	:BNC(m)-BNC(m), 75 Ω
Adapter	:Type N(m)-BNC(f), 75 Ω

Setup

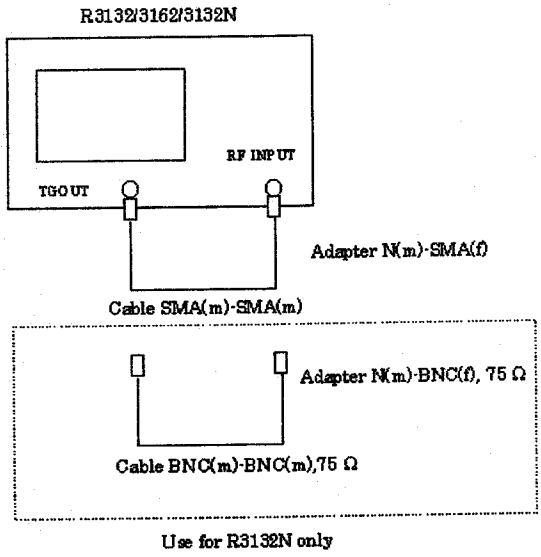

Figure 3-23. Setup of Output Switching Accuracy Test

Procedure

1. Connect equipment as shown in Figure 3-23.
2. On the R3132/3162/3132N, press as follows to perform TG frequency cal auto.

   TG, *Freq Adj Auto*

3. On the R3132/3162/3132N, after calibration done, set controls as follows:

Center Frequency	:30 MHz
Span	:50 kHz
Reference level	:-5 dBm
	:(+100 dBμV for R3132N)
dB/div	:1 dB/div
RBW	:1 MHz
VBW	:10 kHz
TG level	:-10 dBm
	:(+95 dBμV for R3132N)

4. On the R3132/3162/3132N, press as follows to set normalized mode to on.

   TG, *Execute Normalize*

5. On the R3132/3162, set TG output level to 0 dBm and reference level to 5 dBm. (On the R3132N, set TG output level to +105 dBμV and reference level to +110 dBμV)
6. On the R3132/3162/3132N, press **MARKER** to activate marker.
7. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
8. On the R3132/3162/3132N, after the single sweep has completed, record the level of marker on the performance verification test record sheets.
9. Repeat 5 through 8 each TG output level and reference level listed On Table 3-20

Table 3-20 Setting for TG output Level Switching Accuracy Test

Setting of R3132/3162			Setting of R3132N	
Center Frequency(Hz)	Output Level(dBm)	Reference Level(dBm)	Output Level(dBμV)	Reference Level(dBμV)
30 MHz	-10.0	-5.0	+95	+100
	0	5.0	+96	+110
	-14.9	-9.9	+97	+95.1
	-15.0	-10.0	+98	+95
	-19.9	-14.9	+99	+90.1
	-20.0	-15.0	+100	+90
	-30.0	-25.0	+101	+80
	-40.0	-35.0	+102	+70
	-50.0	-45.0	+103	+60

10. Repeat steps 3 through 9 for each frequency listed on Table 3-21

Table 3-21 Setting for Output Level Switching Accuracy Test

Setting of R3132/3162	Setting of R3132N
Center Frequency(Hz)	Center Frequency(Hz)
100 k	100 k
1 M	1 M
10 M	10 M
200 M	200 M
400 M	400 M
600 M	600 M
800 M	800 M
1 G	1 G
1.5 G	1.5 G
2.0 G	2.0 G
2.5 G	2.2 G
3.0 G	

3.3.4. Harmonic distortion

Description

The measurement for tracking generator harmonic spurious outputs.

The tracking generator output is connected to the input of a spectrum analyzer, and then set to several different frequencies as the amplitude of the second harmonics relative to the fundamental is measured at each frequency.

Specification

Apply for R3132/3162

≤ -20 dBc, Output level: -10 dBm

Apply for R3132N

≤-20 dBc, Output level: +95 dBμV

Equipment used

Spectrum analyzer	:SPA
Adapter	:Type N (m) to SMA (f)
RF Cable	:SNA (m)-SMA (m)

Additional Equipment for R3132N

Impedance Converter	:CONV

Setup

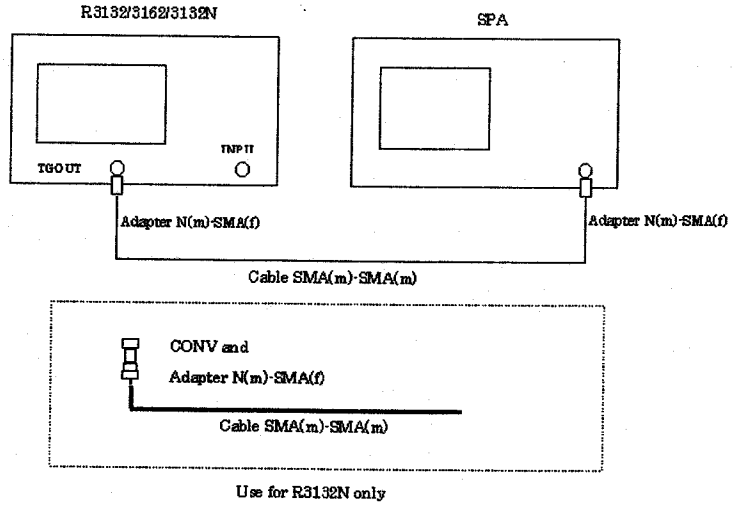

Figure 3-24 Setup of Harmonic Distortion Test

Procedure

1. Connect equipment as shown in Figure 3-24
2. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:100 kHz
Span	:0 Hz
RBW	:1 kHz
TG	:ON
TG level	:-10 dBm
	:(+95 dBμV for R3132N)

3. On the SPA, after preset, set controls as follows:

Center Frequency	:350 kHz
Span	:600 kHz
Reference level	:0 dBm

4. On the SPA, press **SINGLE** for a single sweep.
5. On the SPA, after the single sweep has completed, measure the level difference of signal between fundamental and second harmonic signal.
6. Record measured level difference on the performance verification test record sheets.

7. Repeat steps 2 through 6 for each setting listed on Table 3-22.
8. Record maximum data on the performance verification test record sheets as result.

Table 3-22 Setting for Harmonic Distortion Test

Setting of R3132/3162	Setting of R3132N	SPA Setting	
Center Frequency	Center Frequency	Center Frequency	Span
100 kHz	100 kHz	350 kHz	600 kHz
200 kHz	200 kHz	350 kHz	600 kHz
500 kHz	500 kHz	750 kHz	600 kHz
1 MHz	1 MHz	3.5 MHz	6 MHz
2 MHz	2 MHz	3.5 MHz	6 MHz
5 MHz	5 MHz	7.5 MHz	6 MHz
10 MHz	10 MHz	35 MHz	60 MHz
20 MHz	20 MHz	35 MHz	60 MHz
50 MHz	50 MHz	75 MHz	60 MHz
100 MHz	100 MHz	350 MHz	600 MHz
200 MHz	200 MHz	350 MHz	600 MHz
500 MHz	500 MHz	750 MHz	600 MHz
1 GHz	1 GHz	3.5 GHz	6 GHz
1.5 GHz	1.5 GHz	3.5 GHz	6 GHz
2 GHz	2 GHz	3.5 GHz	6 GHz
2.5 GHz	2.2 GHz	3.5 GHz	6 GHz
3 GHz	NA	3.5 GHz	6 GHz

3.3.5. Non harmonic Distortion

Description

Measure the level difference between fundamental and signal, except for second harmonic using SPA.

Specification

Apply for R3132/3162

≤-30 dBc, Output level: -10 dBm

Apply for R3132N

≤-30 dBc, Output level: +95 dBμV

Equipment used

Spectrum analyzer	:SPA
Adapter	:Type N (m) to SMA (f)
RF Cable	:SNA (m)-SMA (m)

Additional Equipment for R3132N

Impedance Converter	:CONV

Setup

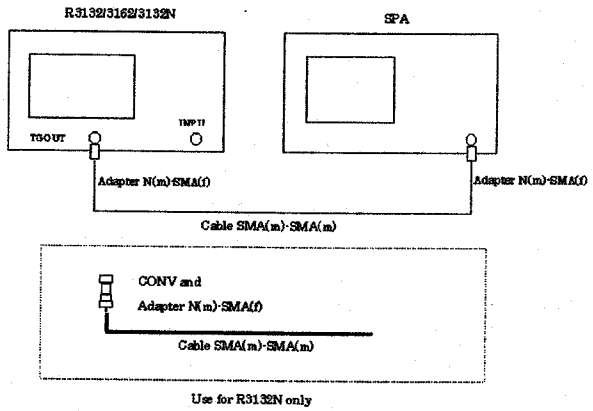

Figure 3-25 Setup of Non-Harmonic Distortion Test

Procedure

1. Connect equipment as shown in Figure 3-25.
2. On the R3132/3162/3132N, after preset, set controls as follows:

Center Frequency	:0 Hz
Span	:0 Hz
Center Frequency step	:10 MHz
TG	:ON
TG level	:-10 dBm
	:(+95 dBμV for R3132N)

3. On the SPA, after preset, set control as follow:

Stop Frequency	:6 GHz

4. On the R3132/3162/3132N, press Δ key, to set center frequency by 10 MHz step upto 3 GHz.
5. Capture the biggest harmonic signal except second harmonic signal.
6. Record the level difference between fundamental and biggest harmonic signal in the performance verification test record sheets.

3.3.6. TG Leakage

Description

Measure the leakage of TG signal by measuring R3132/3162/3132N noise level.
TG output and RF input are terminated in 50 Ω
For R3132N, TG output and input are terminated in 75 Ω

Specification

Apply for R3132/3162

≤ -100 dBm, Input ATT: 0 dB

Apply for R3132N

≤ 7 dBμ, Input ATT: 0 dB

Equipment used

Terminator :TERM50

Additional Equipment for R3132N

Terminator :TERM75

Setup

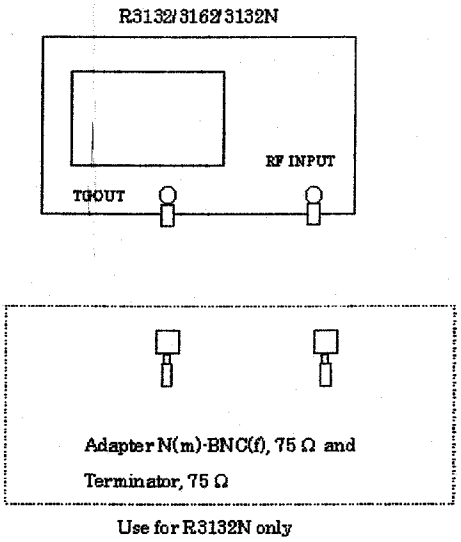

Figure 3-26 Setup of TG Leakage Test

Procedure

1. Connect equipment as shown in Figure 3-26.
2. On the R3132/3162/3132N, after preset, set controls as follows:

Start Frequency	:30 MHz
Stop Frequency	:3.0 GHz
Sweep Time	:20 sec
RBW	:1 kHz
VBW	:10 Hz
Reference Level	:-60 dBm
	:(+48.8 dBμV for R3132N)
Input Attenuator	:0 dB
TG Output Level	:0 dBm
	:(+105 dBμV for R3132N)
TG	:ON

(Ignore UNCAL message under above setting condition)

3. On the R3132/3162/3132N, press **SINGLE** for a single sweep.
4. On the R3132/3162/3132N, after the single sweep has completed, press **PKSRCH** to capture the peak signal.
5. Record the measurement data on the performance verification test record sheets.

3.4. Performance Verification Test Record Sheet for R3132/3162

Performance Verification Test Record

Report Number :
Customer Name :
Address :

Description :
Model Number :
Serial Number :
Asset Number :

Testing Environment : °C± °C / % ± % RH
Verification Date:
Due Date:

Equipment Used:

Model No.	Description	Trace No.	Cal Due Date

Test Officer
Date:

Head of Laboratory
Date:

Performance Verification Test Record Sheet

Model : R3132/3162
Serial Number :

Date: _____

1. Frequency Reference Output Accuracy

	Specification			Result
Test Data	Min. (GHz)	Measured Value (GHz)	Max (GHz)	Pass/Fail
1 GHz	0.999 999 000		1.000 001 000	
1 GHz (Option 21)	0.999 999 900		1.000 000 100	

2. Calibration Signal Amplitude Accuracy

	Specification			Result
Test Data	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
-20dBm	-20.3		-19.7	

3.Displayed Average Noise Level

Test Data		Specification			Result
Preamplifier	Center Frequency (MHz)	Min. (dBm)	Measured Value (dBm)	Max. (dBm)	Pass/Fail
OFF	1	N/A		-117.0	
	100	N/A		-116.8	
	500	N/A		-116.0	
	1000	N/A		-115.0	
	1500	N/A		-114.0	
	2000	N/A		-113.0	
	3000	N/A		-111.0	
ON	1	N/A		-131.9	
	100	N/A		-131.7	
	500	N/A		-130.5	
	1000	N/A		-129.0	
	1500	N/A		-127.5	
	2000	N/A		-126.0	
	2500	N/A		-124.5	
	3000	N/A		-123.0	
(Apply for R3162 only)					
OFF	4000	N/A		-113.0	
	5000	N/A		-112.5	
	6000	N/A		-112.0	
	7000	N/A		-111.5	
	8000	N/A		-111.0	

4.Resolution Band width Switching Accuracy

Test Data	Specification			Result
RBW (Hz)	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
300k	Ref.	0(Ref.)	Ref.	
3M	-0.5		+0.5	
1M	-0.5		+0.5	
100k	-0.5		+0.5	
30k	-0.5		+0.5	
10k	-0.5		+0.5	
3k	-0.5		+0.5	
1k	-0.5		+0.5	
300(Option)	-0.5		+0.5	
100(Option)	-0.5		+0.5	
30(Option)	-0.5		+0.5	

5. Resolution Bandwidth Accuracy and Selectivity

5.1 Resolution Band Width Accuracy

Test Data	Specification			Result
RBW (Hz)	Min. (Hz)	Measured Value (Hz)	Max. (Hz)	Pass/Fail
3M	2.4M		3.6M	
1M	0.8M		1.2M	
300k	240k		360k	
100k	80k		120k	
30k	24k		36k	
10k	8k		12k	
3k	2.4k		3.6k	
1k	0.8k		1.2k	
300(Option)	240		360	
100(Option)	80		120	
30(Option)	24		36	

5.2 Resolution Bandwidth Selectivity

Test Data	Measured Value (Hz)		Specification			Result
RBW (Hz)	60dB	3dB	Min.	Actual	Max.	Pass/Fail
3M			N/A		15	
1M			N/A		15	
300k			N/A		15	
100k			N/A		15	
30k			N/A		15	
10k			N/A		15	
3k			N/A		15	
1k			N/A		15	
300(Option)			N/A		15	
100(Option)			N/A		15	
30(Option)			N/A		15	

6. IF Gain Uncertainty

6.1 RBW = 3 MHz

Setting	Test Data	Specification			Result
RBW (Hz)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
3 M	-1.0	-0.5		+0.5	
	-2.0	-0.5		+0.5	
	-3.0	-0.5		+0.5	
	-4.0	-0.5		+0.5	
	-5.0	-0.5		+0.5	
	-6.0	-0.5		+0.5	
	-7.0	-0.5		+0.5	
	-8.0	-0.5		+0.5	
	-9.0	-0.5		+0.5	
	-10.0	-0.5		+0.5	
	-20.0	-0.5		+0.5	
	-30.0	-0.5		+0.5	
	-40.0	-0.5		+0.5	
	-50.0	-0.5		+0.5	

6.2 RBW = 1 MHz

Setting	Test Data	Specification			Result
RBW (Hz)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
1 M	-1.0	-0.5		+0.5	
	-2.0	-0.5		+0.5	
	-3.0	-0.5		+0.5	
	-4.0	-0.5		+0.5	
	-5.0	-0.5		+0.5	
	-6.0	-0.5		+0.5	
	-7.0	-0.5		+0.5	
	-8.0	-0.5		+0.5	
	-9.0	-0.5		+0.5	
	-10.0	-0.5		+0.5	
	-20.0	-0.5		+0.5	
	-30.0	-0.5		+0.5	
	-40.0	-0.5		+0.5	
	-50.0	-0.5		+0.5	

6.3 RBW = 300 kHz

Setting	Test Data	Specification			Result
RBW (Hz)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
300 k	-1.0	-0.5		+0.5	
	-2.0	-0.5		+0.5	
	-3.0	-0.5		+0.5	
	-4.0	-0.5		+0.5	
	-5.0	-0.5		+0.5	
	-6.0	-0.5		+0.5	
	-7.0	-0.5		+0.5	
	-8.0	-0.5		+0.5	
	-9.0	-0.5		+0.5	
	-10.0	-0.5		+0.5	
	-20.0	-0.5		+0.5	
	-30.0	-0.5		+0.5	
	-40.0	-0.5		+0.5	
	-50.0	-0.5		+0.5	

Performance Verification Test Record Sheet

7. Input Attenuator Switching Accuracy

7.1 For R3132

R3132 Setting		Measured Value (dBm)	Specification			Result
Attenuator (dB)	Reference Level (dBm)		Min (dB)	Actual Value (dB)	Max (dB)	Pass/Fail
0	-40		-0.3		+0.3	
10	-30		-	0(Ref)	-	
20	-20		-0.3		+0.3	
30	-10		-0.3		+0.3	
40	0		-0.3		+0.3	
50	+10		-0.3		+0.3	

7.2 For R3162

R3162 Setting			Specification			Result
Attenuator (dB)	Reference Level (dBm)	Measured Value (dBm)	Min (dB)	Actual Value (dB)	Max (dB)	Pass/Fail
0	-40		-0.3		+0.3	
5	-35		-0.3		+0.3	
10	-30		-	0(Ref)	-	
15	-25		-0.3		+0.3	
20	-20		-0.3		+0.3	
25	-15		-0.3		+0.3	
30	-10		-0.3		+0.3	
35	-5		-0.3		+0.3	
40	0		-0.3		+0.3	
45	+5		-0.3		+0.3	
50	+10		-0.3		+0.3	

8. Scale Fidelity

8.1 1dB/div Scale Fidelity

Setting	Specification			Incremental Error Specification			Result
dB from Reference level (dB)	Min (dB)	Measured Value (dB)	Max (dB)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
0	-	0(Ref)	-	-	0(Ref)	-	
-1	-0.5		+0.5	-0.2		+0.2	
-2	-0.5		+0.5	-0.2		+0.2	
-3	-0.5		+0.5	-0.2		+0.2	
-4	-0.5		+0.5	-0.2		+0.2	
-5	-0.5		+0.5	-0.2		+0.2	
-6	-0.5		+0.5	-0.2		+0.2	
-7	-0.5		+0.5	-0.2		+0.2	
-8	-0.5		+0.5	-0.2		+0.2	
-9	-0.5		+0.5	-0.2		+0.2	
-10	-0.5		+0.5	-0.2		+0.2	

8.2 10 dB/div Scale Fidelity

Setting	Specification			Incremental Error Specification			Result
dB from Reference level (dB)	Min (dB)	Measured Value (dB)	Max (dB)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
0	-	0(Ref)	-	-	0(Ref)	-	
-10	-0.5		+0.5	-1.0		+1.0	
-20	-0.5		+0.5	-1.0		+1.0	
-30	-1.5		+1.5	-1.0		+1.0	
-40	-1.5		+1.5	-1.0		+1.0	
-50	-1.5		+1.5	-1.0		+1.0	
-60	-1.5		+1.5	-1.0		+1.0	
-70	-1.5		+1.5	-1.0		+1.0	
-80	-1.5		+1.5	-1.0		+1.0	
-90	-1.5		+1.5	-1.0		+1.0	

8.3 Linear Scale Fidelity

Signal Level (Nominal)			Specification			Result
div. from Reference Level	(dBm)	(mV)	Min (mV)	Measured Value (mV)	Max (mV)	Pass/Fail
0	0	223.6	-		-	
1	-0.92	201.24	190.06		212.42	
2	-1.94	178.88	167.70		190.06	
3	-3.10	156.52	145.34		167.70	
4	-4.44	134.16	122.98		145.34	
5	0-6.02	111.8	100.62		122.98	
6	-7.96	89.44	78.26		100.62	
7	-10.46	67.08	55.90		78.26	
8	-13.98	44.72	33.54		55.90	
9	-20.00	22.36	11.18		33.54	

Performance Verification Test Record Sheet

9. Residual FM

Measured Value				Specification			Result
Marker Reading		3dB Slope	FM Deviation	Min (Hz)	Calculated Value (Hz)	Max (Hz)	Pass/Fail
Δ f =	Δ level =			N/A		60	

10.Noise Sideband

Test Data			Specification			Result
Center Frequency (Hz)	Span (Hz)	Offset Frequency (Hz)	Min (dBc/Hz)	Measured Value (dBc/Hz)	Max (dBc/Hz)	Pass/Fail
1.0 G	50 k	20 k	N/A		-105	

11. Image, Multiple, and Out of Band Response

Test Data		Specification			Result
Center Frequency (MHz)	Frequency of SG2(MHz)	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
1000	6261.4	N/A		-70	
3500	4342.8	N/A		-70	
3500	7421.4	N/A		-70	
7000	6578.6	N/A		-70	

12. Frequency Readout Accuracy and Frequency Counter Accuracy

12.1 Frequency Readout Accuracy

Test Data	Specification			Result
Center Frequency (GHz)	Min. (GHz)	Measured Value (GHz)	Max. (GHz)	Pass/Fail
2	1.999988		2.000012	
2	1.99988		2.00012	
2	1.99975		2.00025	
2	1.9988		2.0012	
2	1.990		2.010	
Apply for R3162 only				
5	4.999988		5.000012	
5	4.99988		5.00012	
5	4.99975		5.0025	
5	4.9988		5.0012	
5	4.990		5.010	
7	6.999988		7.000012	
7	6.99988		7.00012	
7	6.99975		7.00025	
7	6.9988		7.0012	
7	6.990		7.010	

12.2 Frequency Counter Accuracy

Setting of R3132/3162		Specification			Result
Center Frequency (GHz)	Span (MHz)	Min. (GHz)	Measured Value (GHz)	Max. (GHz)	Pass/Fail
2	1	1.999996000		2.000004000	
Apply for R3162 only					
5	1	4.999990000		5.000010000	
7	1	6.999986000		7.000014000	

13. Second Harmonic Distortion

Test Data		Specification			Result
Fundamental Frequency (GHz)	Second Harmonic Frequency (GHz)	Min. (dBc)	Measured Value (dBc)	Max. (dBc)	Pass/Fail
1.5	3.0	N/A		-70	
1.9	3.8	N/A		-70	

14. Frequency Response

14.1 Frequency Range 100 kHz to 3 GHz

Pre-Amplifier	Test Data (MHz)	Specification			Result
		Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
OFF	100	-0.5		+0.5	
	200	-0.5		+0.5	
	300	-0.5		+0.5	
	400	-0.5		+0.5	
	500	-0.5		+0.5	
	600	-0.5		+0.5	
	700	-0.5		+0.5	
	800	-0.5		+0.5	
	900	-0.5		+0.5	
	1000	-0.5		+0.5	
	1100	-0.5		+0.5	
	1200	-0.5		+0.5	
	1300	-0.5		+0.5	
	1400	-0.5		+0.5	
	1500	-0.5		+0.5	
	1600	-0.5		+0.5	
	1700	-0.5		+0.5	
	1800	-0.5		+0.5	
	1900	-0.5		+0.5	
	2000	-0.5		+0.5	
	2100	-0.5		+0.5	
	2200	-0.5		+0.5	
	2300	-0.5		+0.5	
	2400	-0.5		+0.5	
	2500	-0.5		+0.5	
	2600	-0.5		+0.5	
	2700	-0.5		+0.5	
	2800	-0.5		+0.5	
	2900	-0.5		+0.5	
	3000	-0.5		+0.5	
	3100	-0.5		+0.5	
	3200	-0.5		+0.5	
	3300	-0.5		+0.5	

14.2 Frequency Range 3.1 GHz to 8 GHz for R3162

Pre-amplifier	Test Data (MHz)	Specification			Result
		Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
OFF	3400	-2.0		+2.0	
	3500	-2.0		+2.0	
	3600	-2.0		+2.0	
	3700	-2.0		+2.0	
	3800	-2.0		+2.0	
	3900	-2.0		+2.0	
	4000	-2.0		+2.0	
	4100	-2.0		+2.0	
	4200	-2.0		+2.0	
	4300	-2.0		+2.0	
	4400	-2.0		+2.0	
	4500	-2.0		+2.0	
	4600	-2.0		+2.0	
	4700	-2.0		+2.0	
	4800	-2.0		+2.0	
	4900	-2.0		+2.0	
	5000	-2.0		+2.0	
	5100	-2.0		+2.0	
	5200	-2.0		+2.0	
	5300	-2.0		+2.0	
	5400	-2.0		+2.0	
	5500	-2.0		+2.0	
	5600	-2.0		+2.0	
	5700	-2.0		+2.0	
	5800	-2.0		+2.0	
	5900	-2.0		+2.0	
	6000	-2.0		+2.0	
	6100	-2.0		+2.0	
	6200	-2.0		+2.0	
	6300	-2.0		+2.0	
	6400	-2.0		+2.0	
	6500	-2.0		+2.0	
	6600	-2.0		+2.0	
Cont'd	6700	-2.0		+2.0	

	6800	-2.0		+2.0	
	6900	-2.0		+2.0	
	7000	-2.0		+2.0	
	7100	-2.0		+2.0	
	7200	-2.0		+2.0	
	7300	-2.0		+2.0	
	7400	-2.0		+2.0	
	7500	-2.0		+2.0	
	7600	-2.0		+2.0	
	7700	-2.0		+2.0	
	7800	-2.0		+2.0	
	7900	-2.0		+2.0	
	8000	-2.0		+2.0	

14.3 Frequency Range 100 kHz to 3 GHz (High-sense)

		Specification			Result
Pre-amplifier	Test Data (MHz)	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
ON	100	-1.0		+1.0	
	200	-1.0		+1.0	
	300	-1.0		+1.0	
	400	-1.0		+1.0	
	500	-1.0		+1.0	
	600	-1.0		+1.0	
	700	-1.0		+1.0	
	800	-1.0		+1.0	
	900	-1.0		+1.0	
	1000	-1.0		+1.0	
	1100	-1.0		+1.0	
	1200	-1.0		+1.0	
	1300	-1.0		+1.0	
	1400	-1.0		+1.0	
	1500	-1.0		+1.0	
	1600	-1.0		+1.0	
	1700	-1.0		+1.0	
	1800	-1.0		+1.0	
	1900	-1.0		+1.0	
	2000	-1.0		+1.0	
	2100	-1.0		+1.0	
	2200	-1.0		+1.0	
	2300	-1.0		+1.0	
	2400	-1.0		+1.0	
	2500	-1.0		+1.0	
	2600	-1.0		+1.0	
	2700	-1.0		+1.0	
	2800	-2.0		+2.0	
	2900	-2.0		+2.0	
	3000	-2.0		+2.0	
	3100	-2.0		+2.0	
	3200	-2.0		+2.0	
	3300	-2.0		+2.0	

15. Span Accuracy

		Specification			Result
Span (Hz)	Test Data (Hz)	Min (Hz)	Measured Value (Hz)	Max (Hz)	Pass/Fail
100 k	80 k	79.2 k		80.8 k	
1 M	800 k	792 k		808 k	
10 M	8 M	7.92 M		8.08 M	
100 M	80 M	79.2 M		80.08 M	
1 G	800 M	792 M		808 M	
3 G	2.4 G	2.376 G		2.424 G	
Apply for R3162 only					
4 G	3.2 G	3.168 G		3.232 G	
8 G	6.4 G	6.336 G		6.464 G	

Performance Verification Test Record Sheet

16. Third Order Intermodulation test

Test Data			Specification			Result
Frequency of SG2(MHz)	Frequency of SG3(MHz)	R3132/3162 Center Frequency (MHz)	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
100	100.05	200	N/A		-80	
1500	1500.05	1500	N/A		-80	
3000	3000.05	3000	N/A		-80	
Apply for R3162 only						
3600	3600.05	3600	N/A		-80	
7000	7000.05	7000	N/A		-80	

17. Gain Compression

Test Data			Specification			Result
Setting of SG2(MHz)	Setting of SG3(MHz)	Center Frequency (MHz)	Min. (dBm)	Measured Value (dBm)	Max. (dBm)	Pass/Fail
201	200	200.5				
Apply for R3162 only						
3601	3600	3600.5				

18. Sweep Time Accuracy

Sweep Time Setting (sec)	Test Data (sec)	Specification			Result
		Min. (sec)	Measured Value (sec)	Max. (sec)	Pass/Fail
50	45	44.1		45.9	
5	4.5	4.41		4.59	
500 m	450 m	441 m		459	
50 m	45 m	441 m		45.9 m	
5 m (Option)	4.5 m	4.41 m		4.59 m	
500 µ (Option)	450 µ	441µ		459 µ	
50 µ (Option)	45 µ	44.1µ		45.9 µ	

19. Residual response

19 -1. R3132

Test Data		Specification				Result
			Measured Value			
Pre-Amplifier	Frequency Range	Min. (dBm)	Level (dBm)	Frequency (Hz)	Max. (dBm)	Pass/Fail
OFF	1 MHz to 3 GHz	N/A			-100	
ON	1 MHz to 3 GHz	N/A			-105	

19.2 R3162

Test Data		Specification				Result
			Measured Value			
Pre-Amplifier	Frequency Range	Min. (dBm)	Level (dBm)	Frequency (Hz)	Max. (dBm)	Pass/Fail
OFF	1 MHz to 3.3 GHz	N/A			-100	
ON	1 MHz to 3.3 GHz	N/A			-105	
OFF	3.3 GHz to 8 GHz	N/A			-90	

Tracking Generator

20. Absolute Output Level Accuracy

	Specification			Result
Test Data	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
-10 dBm	-10.5		-9.5	

21. Output Level Flatness

Test Data	Specification			Result
Center Frequency (Hz)	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
30 M	-	0(Ref.)	-	
100 k	-1.0		+1.0	
300 k	-1.0		+1.0	
1 M	-1.0		+1.0	
3 M	-1.0		+1.0	
10 M	-1.0		+1.0	
100 M	-1.0		+1.0	
200 M	-1.0		+1.0	
400 M	-1.0		+1.0	
600 M	-1.0		+1.0	
800 M	-1.0		+1.0	
1 G	-1.0		+1.0	
1.2 G	-1.5		+1.5	
1.4 G	-1.5		+1.5	
1.6 G	-1.5		+1.5	
1.8 G	-1.5		+1.5	
2 G	-1.5		+1.5	
2.2 G	-1.5		+1.5	
2.4 G	-1.5		+1.5	
2.6 G	-1.5		+1.5	
2.8 G	-1.5		+1.5	
3.0 G	-1.5		+1.5	

22. Output Level Switching Accuracy

Setting of R3132/3162			Specification			Result
Center Frequency (Hz)	Output Level (dBm)	Reference Level (dBm)	Min. (dB)		Max. (dB)	Pass/Fail
100 k	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
1 M	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
10 M	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
200 M	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
400 M	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
Cont'd	-50.0	-45.0	-2.0		+2.0	

600 M	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
800 M	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
1 G	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-1.0		+1.0	
	-14.9	-9.9	-1.0		+1.0	
	-15.0	-10.0	-1.0		+1.0	
	-19.9	-14.9	-1.0		+1.0	
	-20.0	-15.0	-1.0		+1.0	
	-30.0	-25.0	-1.0		+1.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
1.5 G	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-2.0		+2.0	
	-14.9	-9.9	-2.0		+2.0	
	-15.0	-10.0	-2.0		+2.0	
	-19.9	-14.9	-2.0		+2.0	
	-20.0	-15.0	-2.0		+2.0	
	-30.0	-25.0	-2.0		+2.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
2.0 G	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-2.0		+2.0	
	-14.9	-9.9	-2.0		+2.0	
	-15.0	-10.0	-2.0		+2.0	
	-19.9	-14.9	-2.0		+2.0	
	-20.0	-15.0	-2.0		+2.0	
	-30.0	-25.0	-2.0		+2.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
2.5 G	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-2.0		+2.0	
	-14.9	-9.9	-2.0		+2.0	
	-15.0	-10.0	-2.0		+2.0	
	-19.9	-14.9	-2.0		+2.0	
	-20.0	-15.0	-2.0		+2.0	
	-30.0	-25.0	-2.0		+2.0	
	-40.0	-35.0	-2.0		+2.0	
	-50.0	-45.0	-2.0		+2.0	
3.0 G	-10.0	-5.0	N/A	Reference	N/A	
	0	5.0	-3.0		+3.0	
	-14.9	-9.9	-3.0		+3.0	
	-15.0	-10.0	-3.0		+3.0	
	-19.9	-14.9	-3.0		+3.0	
	-20.0	-15.0	-3.0		+3.0	
	-30.0	-25.0	-3.0		+3.0	
	-40.0	-35.0	-3.0		+3.0	
	-50.0	-45.0	-3.0		+3.0	

23. Harmonic Distortion

Test Data	Specification			Result
Frequency Range	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
100 kHz to 3 GHz				

24. Non harmonic Distortion

Test Data	Specification			Result
Frequency Range	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
100 kHz to 3 GHz				

25. TG Leakage

Test Data	Specification			Result
Frequency Range	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
100 kHz to 3 GHz				

3.5. Performance Verification Test Record Sheet for R3132N

Performance Verification Test Record

Report Number :

Customer Name :

Address :

Description :

Model Number :

Serial Number :

Asset Number :

Testing Environment : °C ± °C / % ± % RH

Verification Date:

Due Date:

Equipment Used:

Model No.	Description	Trace No.	Cal Due Date

Test Officer
Date:

Head of Laboratory
Date:

Performance Verification Test Record Sheet

Model: R3132N
Serial Number :

Date: _____

1. Frequency Reference Output Accuracy

	Specification			Result
Test Data	Min.(GHz)	Measured Value (Hz)	Max(GHz)	Pass/Fail
1 GHz	0.999 999 000		1.000 001 000	
1 GHz(Option 21)	0.999 999 900		1.000 000 100	

2. Calibration Signal Amplitude Accuracy

	Specification			Result
Test Data	Min(dBm)	Measured Value(dBm)	Max(dBm)	Pass/Fail
-20 dBm	-20.3		-19.7	

3. Displayed Average Noise Level

Test Data		Specification			Result
Preamplifier	Center Frequency (MHz)	Min.(dBμV)	Measured Value (dBμV)	Max.(dBμV)	Pass/Fail
OFF	10	N/A		-5.98	
	100	N/A		-5.8	
	500	N/A		-5.0	
	1000	N/A		-4.0	
	1500	N/A		-3.0	
	2000	N/A		-2.0	
	2200	N/A		-1.6	
ON	10	N/A		-20.97	
	100	N/A		-20.7	
	500	N/A		-19.5	
	1000	N/A		-18.0	
	1500	N/A		-16.5	
	2000	N/A		-15.0	
	2200	N/A		-14.4	

4. Resolution Band width Switching Accuracy

Test Data	Specification			Result
RBW (Hz)	Min. (dB)	Measured Value (dB)	Max. (dB)	Pass/Fail
300k	Ref.	0(Ref.)	Ref.	
3M	-0.5		+0.5	
1M	-0.5		+0.5	
100k	-0.5		+0.5	
30k	-0.5		+0.5	
10k	-0.5		+0.5	
3k	-0.5		+0.5	
1k	-0.5		+0.5	
300(Option)	-0.5		+0.5	
100(Option)	-0.5		+0.5	
30(Option)	-0.5		+0.5	

Performance Verification Test Record Sheet

5. Resolution Bandwidth Accuracy and Selectivity

5.1 Resolution Band Width Accuracy

Test Data	Specification			Result
RBW (Hz)	Min.(Hz)	Measured Value(Hz)	Max.(Hz)	Pass/Fail
3M	2.4M		3.6M	
1M	0.8M		1.2M	
300k	240k		360k	
100k	80k		120k	
30k	24k		36k	
10k	8k		12k	
3k	2.4k		3.6k	
1k	0.8k		1.2k	
300(Option)	240		360	
100(Option)	80		120	
30(Option)	24		36	

5.2 Resolution Bandwidth Selectivity

Test Data	Measured Value(Hz)		Specification			Result
RBW (Hz)	60dB	3dB	Min.	Actual	Max.	Pass/Fail
3M			N/A		15	
1M			N/A		15	
300k			N/A		15	
100k			N/A		15	
30k			N/A		15	
10k			N/A		15	
3k			N/A		15	
1k			N/A		15	
300(Option)			N/A		15	
100(Option)			N/A		15	
30(Option)			N/A		15	

6. IF Gain Uncertainty

6.1 RBW = 3 MHz

Setting	Test Data	Specification			Result
RBW(Hz)	Reference Level(dBμV)	Min(dB)	Measured Value(dB)	Max.(dB)	Pass/Fail
3 M	+107.8	-0.5		+0.5	
	+106.8	-0.5		+0.5	
	+105.8	-0.5		+0.5	
	+104.8	-0.5		+0.5	
	+103.8	-0.5		+0.5	
	+102.8	-0.5		+0.5	
	+101.8	-0.5		+0.5	
	+100.8	-0.5		+0.5	
	+98.8	-0.5		+0.5	
	+88.8	-0.5		+0.5	
	+78.8	-0.5		+0.5	
	+68.8	-0.5		+0.5	
	+58.8	-0.5		+0.5	
	+48.8	-0.5		+0.5	

6.2 RBW = 1 MHz

Setting	Test Data	Specification			Result
RBW(Hz)	Reference Level(dBμV)	Min(dB)	Measured Value(dB)	Max.(dB)	Pass/Fail
1 M	+107.8	-0.5		+0.5	
	+106.8	-0.5		+0.5	
	+105.8	-0.5		+0.5	
	+104.8	-0.5		+0.5	
	+103.8	-0.5		+0.5	
	+102.8	-0.5		+0.5	
	+101.8	-0.5		+0.5	
Cont'd	+100.8	-0.5		+0.5	

	+98.8	-0.5		+0.5	
	+88.8	-0.5		+0.5	
	+78.8	-0.5		+0.5	
	+68.8	-0.5		+0.5	
	+58.8	-0.5		+0.5	
	+48.8	-0.5		+0.5	

6.3. RBW = 300 kHz

Setting	Test Data	Specification			Result
RBW(Hz)	Reference Level(dBμV)	Min(dB)	Measured Value(dB)	Max.(dB)	Pass/Fail
300 k	+107.8	-0.5		+0.5	
	+106.8	-0.5		+0.5	
	+105.8	-0.5		+0.5	
	+104.8	-0.5		+0.5	
	+103.8	-0.5		+0.5	
	+102.8	-0.5		+0.5	
	+101.8	-0.5		+0.5	
	+100.8	-0.5		+0.5	
	+98.8	-0.5		+0.5	
	+88.8	-0.5		+0.5	
	+78.8	-0.5		+0.5	
	+68.8	-0.5		+0.5	
	+58.8	-0.5		+0.5	
	+48.8	-0.5		+0.5	

7. Input Attenuator Switching Accuracy

R3132 Setting		Measured Value(dB)	Specification			Result
Attenuator (dB)	Reference Level(dBμV)		Min(dB)	Actual Value(dB)	Max(dB)	Pass/Fail
0	+68.8		-0.3		+0.3	
10	+78.8		-	0(Ref)	-	
20	+88.8		-0.3		+0.3	
30	+98.8		-0.3		+0.3	
40	+108.8		-0.3		+0.3	
50	+118.8		-0.3		+0.3	

8. Scale Fidelity

8.1 1dB/div Scale Fidelity

Setting	Specification			Incremental Error Specification			Result
dB from Reference level (dB)	Min(dB)	Measured Value(dB)	Max(dB)	Min(dB)	Measured Value(dB)	Max(dB)	Pass/Fail
0	-	0(Ref)	-	-	0(Ref)	-	
-1	-0.5		+0.5	-0.2		+0.2	
-2	-0.5		+0.5	-0.2		+0.2	
-3	-0.5		+0.5	-0.2		+0.2	
-4	-0.5		+0.5	-0.2		+0.2	
-5	-0.5		+0.5	-0.2		+0.2	
-6	-0.5		+0.5	-0.2		+0.2	
-7	-0.5		+0.5	-0.2		+0.2	
-8	-0.5		+0.5	-0.2		+0.2	
-9	-0.5		+0.5	-0.2		+0.2	
-10	-0.5		+0.5	-0.2		+0.2	

Performance Verification Test Record Sheet

8.2 10 dB/div Scale Fidelity

Setting	Specification			Incremental Error			
				Specification			Result
dB from Reference level (dB)	Min(dB)	Measured Value(dB)	Max(dB)	Min(dB)	Measured Value(dB)	Max(dB)	Pass/Fail
0	-	0(Ref)	-	-	0(Ref)	-	
-10	-0.5		+0.5	-1.0		+1.0	
-20	-0.5		+0.5	-1.0		+1.0	
-30	-1.5		+1.5	-1.0		+1.0	
-40	-1.5		+1.5	-1.0		+1.0	
-50	-1.5		+1.5	-1.0		+1.0	
-60	-1.5		+1.5	-1.0		+1.0	
-70	-1.5		+1.5	-1.0		+1.0	
-80	-1.5		+1.5	-1.0		+1.0	
-90	-1.5		+1.5	-1.0		+1.0	

8.3 Linear Scale Fidelity

Signal Level(Nominal)			Specification			Result
div. from Reference Level	(dBμV)	(mV)	Min(mV)	Measured Value(mV)	Max(mV)	Pass/Fail
0	0	223.6	-		-	
1	-0.92	201.24	190.06		212.42	
2	-1.94	178.88	167.70		190.06	
3	-3.10	156.52	145.34		167.70	
4	-4.44	134.16	122.98		145.34	
5	0-6.02	111.8	100.62		122.98	
6	-7.96	89.44	78.26		100.62	
7	-10.46	67.08	55.90		78.26	
8	-13.98	44.72	33.54		55.90	
9	-20.00	22.36	11.18		33.54	

9. Residual FM

Measured Value				Specification			Result
Marker Reading		3dB Slope	FM Deviation	Min(Hz)	Calculated Value(Hz)	Max(Hz)	Pass/Fail
Δ f =	Δ level =			N/A		60	

10.Noise Sideband

Test Data		Specification			Result
Center Frequency(Hz)	Offset Frequency(Hz)	Min (dBc/Hz)	Measured Value(dBc/Hz)	Max (dBc/Hz)	Pass/Fail
1.0 G	20 k	N/A		-105	

11. Frequency Readout Accuracy and Frequency Counter Accuracy

11.1 Frequency Readout Accuracy

Test Data	Specification			Result
Center Frequency(GHz)	Min.(GHz)	Measured Value(GHz)	Max.(GHz)	Pass/Fail
2	1.999988		2.000012	
2	1.99988		2.00012	
2	1.99975		2.00025	
2	1.9988		2.0012	
2	1.990		2.010	

11.2 Frequency Counter Accuracy

Setting of R3132N		Specification			Result
Center Frequency(GHz)	Span (MHz)	Min.(GHz)	Measured Value(GHz)	Max.(GHz)	Pass/Fail
2.0	1.0	1.999996000		2.000004000	

12. Second Harmonic Distortion

Test Data		Specification			Result
Fundamental Frequency(GHz)	Second Harmonic Frequency(Hz)	Min. (dBc)	Measured Value(dBc)	Max. (dBc)	Pass/Fail
1.0	2.0 G	N/A		-70	

13. Frequency Response

13.1 Pre-amplifier OFF

Test Data			Specification			Result
Pre-amplifier	Frequency(Hz)	Setting Value of SG2(dBm)	Min(dB)	Measured Value (dB)	Max(dB)	Pass/Fail
OFF	30 M		-	0 dB(Ref.)	-	
	100 M					
	200 M					
	300 M					
	400 M					
	500 M					
	600 M					
	700 M					
	800 M					
	900 M					
	1000 M					
	1100 M					
	1200 M					
	1300 M					
	1400 M					
	1500 M					
	1600 M					
	1700 M					
	1800 M					
	1900 M					
	2000 M					
	2100 M					
	2200 M					

13.2 Pre-amplifier ON

Test Data			Specification			Result
Pre-amplifier	Frequency(Hz)	Setting Value of SG2(dBm)	Min(dB)	Measured Value (dB)	Max(dB)	Pass/Fail
ON	30 M					
	100 M					
	200 M					
	300 M					
	400 M					
	500 M					
	600 M					
	700 M					
	800 M					
	900 M					
	1000 M					
	1100 M					
	1200 M					
	1300 M					
	1400 M					
	1500 M					
	1600 M					
	1700 M					
	1800 M					
	1900 M					
	2000 M					
	2100 M					
	2200 M					

Performance Verification Test Record Sheet

14. Span Accuracy

Span(Hz)	Test Data (Hz)	Specification			Result
		Min (Hz)	Measured Value(Hz)	Max(Hz)	Pass/Fail
100 k	80 k	79.2 k		80.8 k	
1 M	800 k	792 k		808 k	
10 M	8 M	7.92 M		8.08 M	
100 M	80 M	79.2 M		80.08 M	
1 G	800 M	792 M		808 M	
3 G	2.4 G	2.376 G		2.424 G	

15 .Third Order Intermodulation

Test Data			Specification			Result
Frequency of SG2(MHz)	Frequency of SG3(MHz)	R3132N Center Frequency(MHz)	Min.(dB)	Measured Value(dB)	Max.(dB)	Pass/Fail
200	200.5	200	N/A		-80	
1500	1500.05	1500	N/A		-80	

16. Gain Compression

Test Data			Specification			Result
Setting of SG2(MHz)	Setting of SG3(MHz)	Center Frequency(MHz)	Min.(dBμV)	Measured Value(dBuV)	Max.(dBμV)	Pass/Fail
201	200	200.5				

17. Sweep Time Accuracy

Sweep Time Setting (sec)	Test Data(sec)	Specification			Result
		Min. (sec)	Measured Value(sec)	Max.(sec)	Pass/Fail
50	45	44.1		45.9	
5	4.5	4.41		4.59	
500 m	450 m	441 m		459	
50 m	45 m	441 m		45.9 m	
5 m(Option)	4.5 m	4.41 m		4.59 m	
500 u(Option)	450 u	441 u		459 u	
50 u(Option)	45 u	44.1 u		45.9 u	

18. Residual Response

Test Data		Specification				Result
			Measured Value			
Pre-Amplifier	Frequency Range	Min.(dBμV)	Level(dBμV)	Frequency (Hz)	Max.(dBμV)	Pass/Fail
OFF	1 MHz to 3 GHz	N/A			+7	
ON	1 MHz to 3 GHz	N/A			+2	

Tracking Generator

19. Absolute Output Level Accuracy

Test Data	Specification			Result
	Min (dBμV)	Measured Value(dB)	Max(dBμV)	Pass/Fail
95 dBμV(-13.78 dBm)	94.5		95.5	

20. Output Level Flatness

Test Data	Specification			Result
Center Frequency(Hz)	Min.(dB)	Measured Value(dB)	Max.(dB)	Pass/Fail
30 M	-	0(Ref.)	-	
100 k	-1.0		+1.0	
300 k	-1.0		+1.0	
1 M	-1.0		+1.0	
3 M	-1.0		+1.0	
10 M	-1.0		+1.0	
100 M	-1.0		+1.0	
200 M	-1.0		+1.0	
400 M	-1.0		+1.0	
600 M	-1.0		+1.0	
800 M	-1.0		+1.0	
1 G	-1.0		+1.0	
1.2 G	-1.5		+1.5	
1.4 G	-1.5		+1.5	
1.6 G	-1.5		+1.5	
1.8 G	-1.5		+1.5	
2 G	-1.5		+1.5	
2.2 G	-1.5		+1.5	

21. Output Level Switching Accuracy

Setting of R3132N			Specification			Result
Center Frequency(Hz)	Output Level(dBμV)	Reference Level(dBμV)	Min.(dB)	Measured Value(dB)	Max.(dB)	Pass/Fail
100 k	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
1 M	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
10 M	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
200 M	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
Cont'd	+103	+60	-2.0		+2.0	

Performance Verification Test Record Sheet

400 M	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
600 M	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
800 M	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
1 G	+95	+100	N/A	Reference	N/A	
	+96	+110	-1.0		+1.0	
	+97	+95.1	-1.0		+1.0	
	+98	+95	-1.0		+1.0	
	+99	+90.1	-1.0		+1.0	
	+100	+90	-1.0		+1.0	
	+101	+80	-1.0		+1.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
1.5 G	+95	+100	N/A	Reference	N/A	
	+96	+110	-2.0		+2.0	
	+97	+95.1	-2.0		+2.0	
	+98	+95	-2.0		+2.0	
	+99	+90.1	-2.0		+2.0	
	+100	+90	-2.0		+2.0	
	+101	+80	-2.0		+2.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
2.0 G	+95	+100	N/A	Reference	N/A	
	+96	+110	-2.0		+2.0	
	+97	+95.1	-2.0		+2.0	
	+98	+95	-2.0		+2.0	
	+99	+90.1	-2.0		+2.0	
	+100	+90	-2.0		+2.0	
	+101	+80	-2.0		+2.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	
2.2 G	+95	+100	N/A	Reference	N/A	
	+96	+110	-2.0		+2.0	
	+97	+95.1	-2.0		+2.0	
	+98	+95	-2.0		+2.0	
	+99	+90.1	-2.0		+2.0	
	+100	+90	-2.0		+2.0	
	+101	+80	-2.0		+2.0	
	+102	+70	-2.0		+2.0	
	+103	+60	-2.0		+2.0	

22. Harmonic Distortion

Test Data	Specification			Result
Frequency Range	Min.(dB)	Measured Value(dBc)	Max.(dB)	Pass/Fail
100 kHz to 3 GHz	NA		-20 dBc	

23. Non harmonic Distortion

Test Data	Specification			Result
Frequency Range	Min.(dB)	Measured Value(dBc)	Max.(dB)	Pass/Fail
100 kHz to 3 GHz	NA		-30 dBc	

24. TG Leakage

Test Data	Specification			Result
Frequency Range	Min.(dB)	Measured Value(dBμV)	Max.(dB)	Pass/Fail
100 kHz to 3 GHz	NA		+ 7dBμV	

4. TROUBLESHOOTING

This chapter provides information of troubleshooting as followings:

4.1. Preventive Maintenance

This section provides cleaning procedure of display (TFT) filter.
Cleaning the outer surface of the filter is sufficient.
If after cleaning the outer surface of the filter, the display appears dark or dirty or unfocused, clean the inner surface of display filter and the surface of TFT following procedures.

CAUTION!

Do not touch the LCD display with your finger when the filter removed.
Do not use any chemical solvent such as benzene, toluene, xylene, aceton for cleaning

1. Remove the 2 pieces of screws, referring Figure 4 -1.

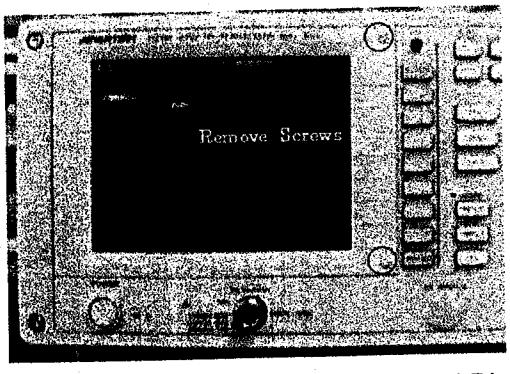

Figure 4-1 Location of Screws fixed Bezel Display

2. Remove the display bezel assembly, referring Figure 4 -2.

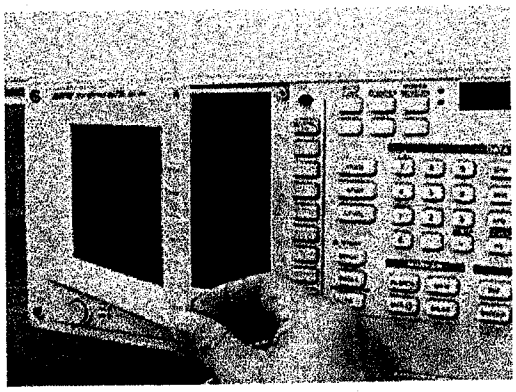

Figure 4 –2 Removal of Bezel Display

3. Clean the inner surface of display filter and the surface of TFT with a soft cloth dampened water with mild soap.
   Do not use any chemical solvent such as benzene, toluene, xylene, aceton for cleaning.
   Allow the surface to dry and then reassemble the display bezel.

4.2. Preparation

4.2.1. Introduction

This section provides general information for handling replaceable assemblies.

WARNING!

Only personnel with knowledge of electronic circuitry and awareness with hazards involved should remove and install any printed circuit board assemblies.

CAUTION!

To prevent equipment circuit damage, always remove the ac line power cord before removing or replacing any assembly.
To prevent static zap of ICs, always observe anti-static techniques when assemblies are handled or serviced.

4.2.2. General Caution for Handling Replaceable Assemblies

STATIC HANDLING

Static electricity is familiar phenomenon which, except for an occasional Shock, does not seems very serious. However, it has been proven that in the electronics industry electrostatic discharge (ESD) is major cause of component failure. In many cases, the component damaged may not immediately fail, causing low instrument reliability and future repair. ESD damage can occur at static level below human perception. It has also been shown that ESD can affect both passive and active devices. The following guidelines are the minimum requirements for a static safe service environment.

- The workbench should be equipped with a conductive tablemat. The mat should be grounded to the earth ground through a 1M-ohm resistor. The mat should be equipped with at least one swivel connector for connecting wrist strap.
- All service and handling personnel should wear a conductive wrist strap in contact with bare skin.
  This strap should be connected to the swivel connector on the conductive tablemat through a 1M-ohm resistor.
- All the metal equipment at workstation must be grounded. This includes soldering irons, soldering removers, and equipment stand.
- Only one common ground should be provided at the workstation.
- The workstation should be kept free of nonconductors. No common plastics, polybags, cardboard, cigarette or candy wrappers should be allowed. There should not be rugs or carpet on the floor, shelving, or bench top.
- Only proper containers should be used for shipping, storing or transporting assemblies.
  This is required on any assembly shipped to ADVANTEST for repair.

CLEAN HANDLING

Due to the high performance of the U3661, use the following clean handling techniques when removing and installing assemblies.

- Handle the assemblies only by their edges.
  Be sure to place them on clean workbench away from dirty or dusty conditions.

4.3. Isolation of Failure Block

4.3.1. Introduction

This section provides information for isolating failure block.
To isolate failure block uses information of the self-test function and the performance verification test.

4.3.2. Isolation of Failure Block

4.3.2.1 Approach by Self Test Function

R3132/3162/3132N equipped self-test function.
It can isolate failure block, automatically.
This section provides information of self-test function.

1. Enter the Self-Test Function.
   On the R3132/3162/3132N, press as follows:

   SHIFT, 0

2. Then, you can see self test function display as shows Figure 4-3.

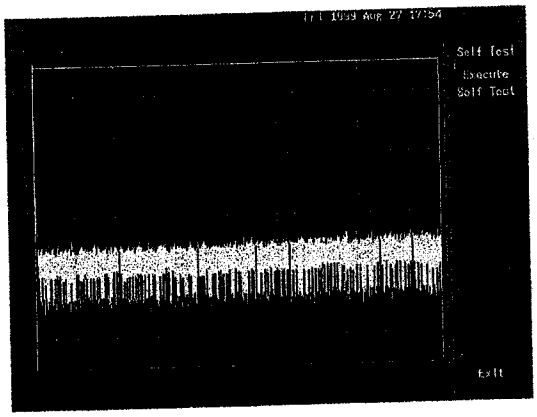

Figure 4-3 Display of Self-Test Function Display

3. Press ***Execute Self Test*** to execute self-test function.
4. Figure 4-4 shows result display.

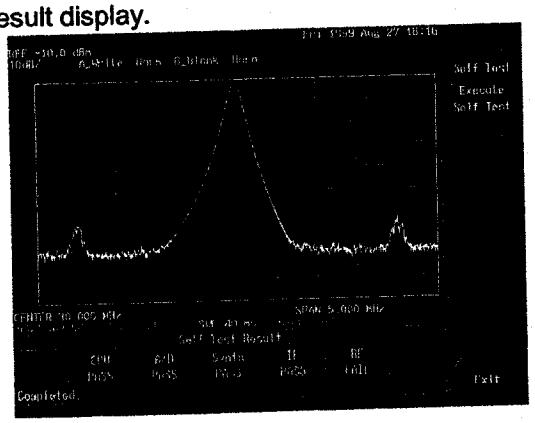

Figure 4-4 Display of Self-Test Result

5. To exit from self-test function, press ***Exit***.

Table 4-1 lists correspondence between self-test result and failure block.

Once confirm failure block, take a proper action to solve.

Table 4-1 Correspondence between Self-Test Result and Failure Block

Self Test Items	Failure Block	Parts Code	Action to be Taken
CPU	CPU/AD	BLL-024439	Replace CPU/AD Block follow Section 5.3.3
A/D	CPU/AD	BLL-024439	Replace CPU/AD Block follow Section 5.3.3
IF	IF/LOG	BLG-024527	Replace IF/LOG Block follow Section 5.3.4
Synth	SYNTHESIZER	WBL-R31X2*SYN	Replace SYNTHESIZER Block follow Section 5.3.5
RF	RF	WBL-R3132*RF	Replace RF Block follow Section 5.3.6
		WBL-R3162*RF	Replace RF Block follow Section 5.3.6

4.3.2.2. Approach by Performance Verification Test Result

Isolation of the Tracking Generator option failure, use information of performance verification test result described Section 3.3.1 through 3.3.6

Any result in failure found, take a procedure described Section 4.3.7 to replace TG Block

4.3.2.3 Approach by Observed Phenomenon

Isolation of power supply block, use information of phenomenon observed. Following phenomenon are observed, replace power supply block referring removal and installation procedure described Section 4.3.8.

1) AC power line fuse blow.

After check the rating of fuse, and then replace fuse.
Fuse blow again.

2) No fan motor is running.

4.4. Procedure of Removal and Installation

4.4.1 Introduction

This section provides removal and installation procedures, after determined failure block.

4.4.2 Tools Required

Following tools are required for removal and Installation

M4 phillips screwdriver	x1
M2.6 Phillips Screw Driver	x1
SMA Spanner	x1
14mm Hexagonal box spanner	x1
Allen Wrench	x1

4.4.3. CPU/AD Removal and Installation Procedure

1. Turn off the power switch on the R3132/3162/3132N, and then remove the main power supply cable.
2. Remove 4 pieces hexagonal screws, 3 pieces 14 mm hexagonal nuts and 8 pieces screws on the rear panel to remove rear flame, referring Figure 4-5.

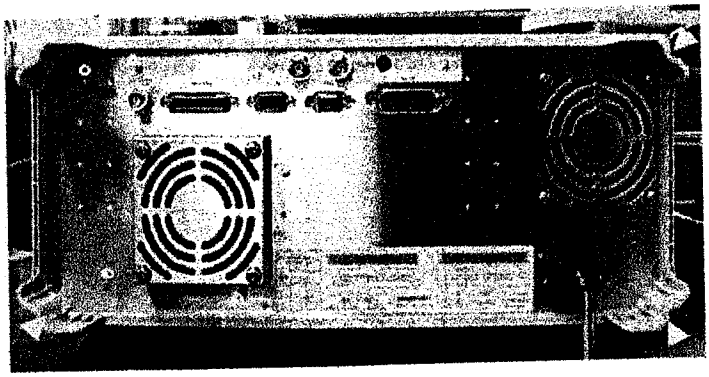

Figure 4-5 Locations of Screws

3. After remove rear flame and shield cover, pull CPU/AD block out by using ejectors on the both sides, refer to Figure 4-6.

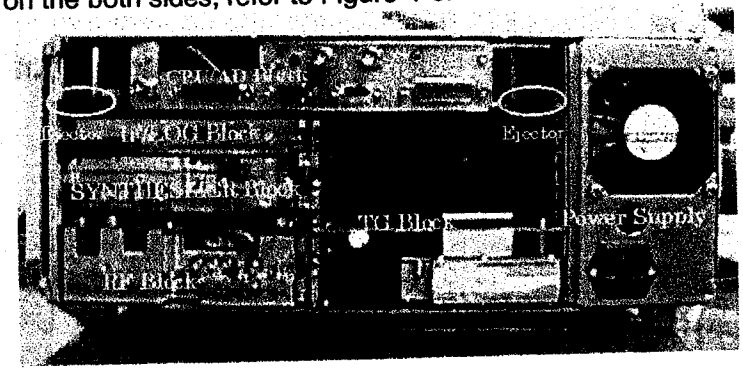

Figure 4-6 Locations of Blocks

4. Replace defective block with new one, then take reverse procedure for fixing back.

4.4.4. IF/LOG Block Removal and Installation Procedure

1. Take procedure step 1 through 2 described in section 4.4.3.
2. Remove IF/LOG block by using ejector, location of block shown in Figure 4-6.
3. Replace defective block with new one, then take reverse procedure for fixing back.

4.4.5. SYNTHESIZER Block Removal and Installation Procedure

1. Take procedure step 1 through 2 described in section 4.4.3.
2. Remove SYNTHESIZER Block, location of block shown in Figure 4-6.
3. Replace defective block with new one, then take reverse procedure for fixing back.

4.4.6 RF Block Removal and Installation Procedure

1. Take procedure step 1 through 2 described in section 4.4.3.
2. Remove 6 pieces screws on the bottom of main case, refer to Figure 4-7.

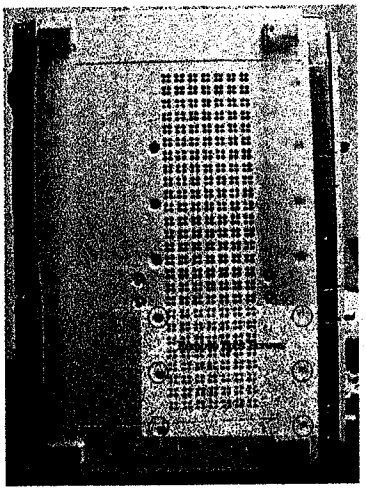

Figure 4-7 Location of Screws on the bottom

3. Remove cables connected to RF Block, referring Figure 4-8.

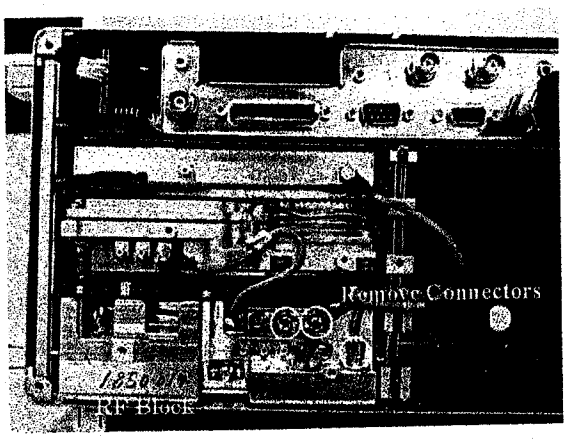

Figure 4-8 Locations of Connectors

4. Pull RF block out for removing, then replace defective block with new one.
5. Take reverse procedure for fixing back.

4.4.7 Tracking Generator Block Removal and Installation Procedure

1. Take procedure step 1 through 2 described in section 4.4.3.
2. Remove 4 pieces screws on the bottom of main case, referring Figure 4-6.

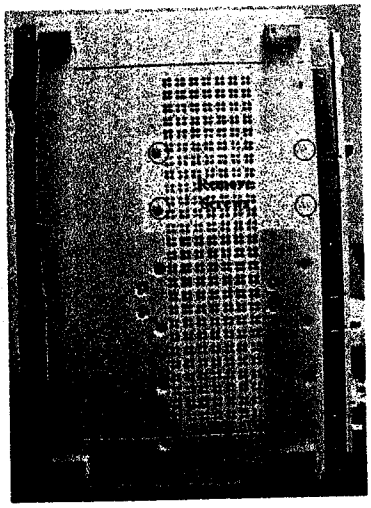

Figure 4-9 Locations of Screws (TG)

3. Remove connectors as shown in Figure 4-8, then pull TG block out.

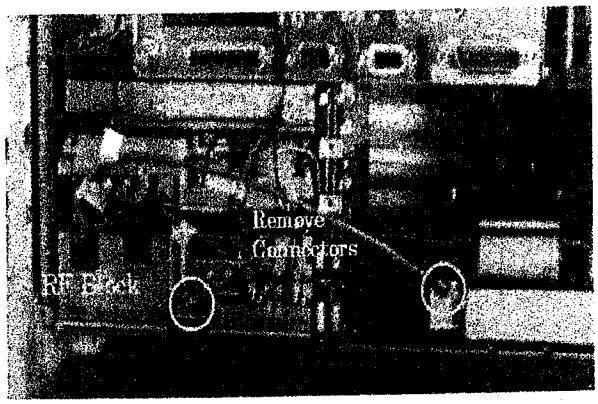

Figure 4-10 Locations of Connectors for TG Block

4. After pull out TG block, remove 4 pieces screws and connector cable to separate TG interface board and TG block, referring Figure 4-11.

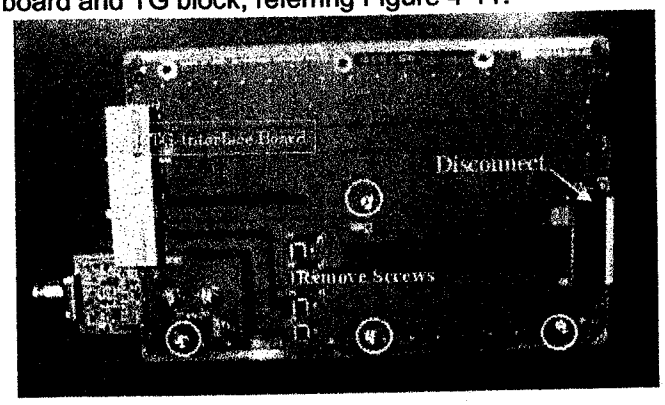

Figure 4-11 Locations of Screws and Connector

5. Replace defective TG block with new one, then take reverse procedure for fixing back.

4.4.8. Power Supply Block removal and Installation

1. Remove CPU/AD block and TG block (when installed) refer to Section 4.4.3 and 4.4.7.
2. Remove 2 pieces screws on the bottom of main case, referring Figure 4-12.

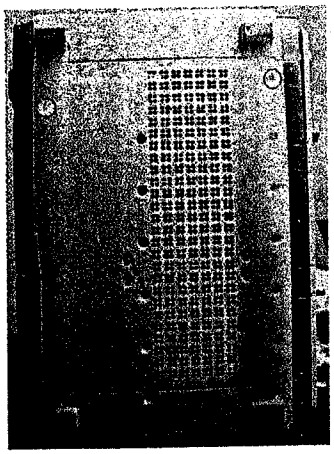

Figure 4-12 Locations of Screws (Power Supply)

3. Pull power supply block, referring Figure 4-13.

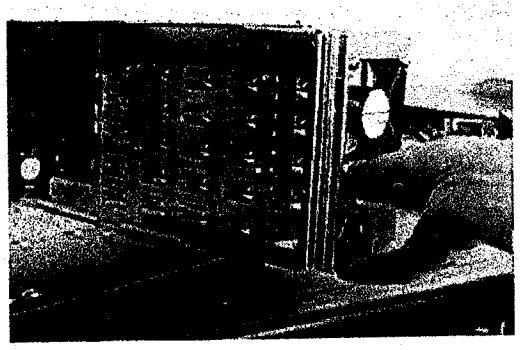

Figure 4-13 Removal of Power Supply Block

4. Replace defective power supply block with new one, then take reverse procedure for fixing back.

5. REPLACEABLE PARTS

5.1. Introduction

This chapter provides information for ordering replaceable parts.

5.2. Ordering Information

To order a part listed in the replaceable parts list, quote Advantest part number, indicate the description, quantity required, including your Model Number and serial number.
Then address the order to the nearest Advantest office or representatives of Advantest in your region.
The offices are listed in back of this manual.

5.3. Replaceable Parts List

The replaceable parts are listed on the Table 5-1.
All the parts are replaceable with no adjustment.

Table 5-1 Replaceable Parts List

No.	Description	Parts Code	Remarks
1	CPU/AD Block	BLL-024439	
2	IF/LOG Block	BLG-024527	
3	SYNTHE Block	WBL-R31X2*SYN	
4	Power Supply Block	WBL-R31X2*POWER	
5	RF Block	WBL-R3132*RF	For R3132 only
6	RF Block	WBL-R3162*RF	Fo rR3162 only
7	TG Block	WUN-R31X2*TG	

Mechanical Parts

No.	Description	Parts Code	Remarks
1	Foot	MME-F6695A001A-2	
2	Frame Rear	MME-E0197A001A-2	
3	Frame Front	MME-E0198A001A-2	
4	Bezel Display	MME-F6768A004A	For R3132
5	Bezel Display	MME-F6768A005A	For R3162
6	Cover Guard (rear,front)	MME-F6773A001B-2	

WARRANTY

ADVANTEST product is warranted against defects in material and workmanship for a period of one year from the date of delivery to original buyer.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by buyer, unauthorized modification or misuse, accident or abnormal conditions of operations.

No other warranty is expressed or implied. ADVANTEST specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

ADVANTEST shall not be liable for any special incidental or consequential damages, whether in contract, tort or otherwise.

Any and all warranties are revoked if the product is removed from the country in which it was originally purchased.

SERVICE

During the warranty period, ADVANTEST will, at its option, either repair or replace products which prove to be defective.

When trouble occurs, buyer should contact his local supplier or ADVANTEST giving full details of the problem and the model name and serial number.

For the products returned to ADVANTEST for warranty service, buyer shall prepay shipping and transportation charges to ADVANTEST and ADVANTEST shall pay shipping and transportation charges to return the product to buyer. However, buyer shall pay all charges, duties, and taxes incurred in his country for products returned from ADVANTEST.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL BUYER

The product should be thoroughly inspected immediately upon original delivery to buyer. All material in the container should be checked against the enclosed packing list or the instruction manual alternatively. ADVANTEST will not be responsible for shortage unless notified immediately.

If the product is damaged in any way, a claim should be filed by the buyer with carrier immediately. (To obtain a quotation to repair shipment damage, contact ADVANTEST or the local supplier.) Final claim and negotiations with the carrier must be completed by buyer.

SALES & SUPPORT OFFICES

Advantest(Singapore)Pte.Ltd.
438A Alexandra Road
#08-03/06 Alexandra Technopark Singapore 119967
Phone : 65-274-3100 Facsimile : 65-274-4055

ROHDE & SCHWARZ Engineering and Sales GmbH
Mühldorfstr. 15 (P.O.B. 80 1429, D-81614 Munich)
D-81671 Munich, Germany
Phone : 49-89-4129-3711 Facsimile : 49-89-4129-3723

TEKTRONIX INC.
P.O. Box 500, M/S 39-520, Beaverton, Oregon 97077-0001
or
Howard Vollum Industrial Park, M/S 58-743, Beaverton, OR, 97077, U.S.A.
Inside the U.S. 1-800-426-2200
Outside the U.S. 1-503-627-1933

—— Technology Support on the Leading Edge ——

ADVANTEST®

ADVANTEST CORPORATION

Shinjuku-NS Building 4-1 Nishi-Shinjuku 2-chome Shinjuku-ku Tokyo 163-0880 Japan