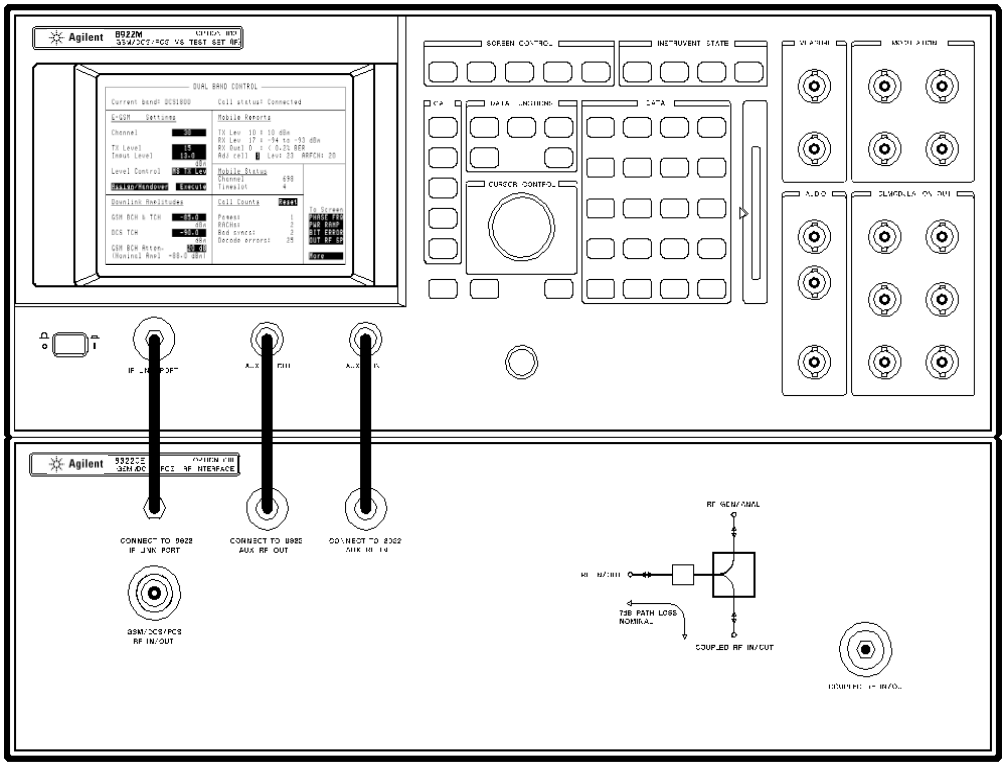
Agilent 8922P/X/R/Y
GSM Multiband Test Solutions

Data Sheet

- **8922P and 8922X**
  GSM Multiband Test Systems for Production Applications
- **8922R and 8922Y**
  GSM Multiband Test Systems for Service Applications



The first choice for GSM mobile service and repair

Troubleshoot and find faults fast with the Agilent Technologies 8922R and 8922Y GSM multiband test systems. Use them to reduce false failures with a test set that combines versatility with ease of use.

Serving the needs to the GSM mobile manufacturer

Maximize production throughput and minimize the cost per test with the 8922P and 8922X multi-band test systems. They offer the highest speed of test while guaranteeing accurate and repeatable measurements.

Test dual-band mobiles

Use the 8922 multiband test systems to verify the performance and functionality of both dual-band and conventional GSM900, DCS1800, and PCS1900 mobiles.

Agilent Technologies
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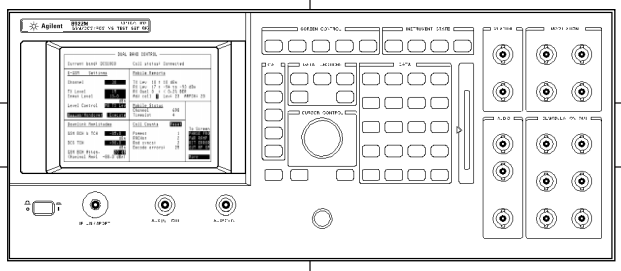
Switch on one of Agilent Technologies' GSM test sets and you'll find that your mobile finds service immediately. Now make a call and you're up and running; ready to perform all the key transmitter and receiver measurements.

Built into every test set you'll find:

Transmitter Tester
Transmitter measurements such as power versus time, modulation phase and frequency error, and burst timing are made using a fast DSP analyzer. There's also an accurate peak power meter to perform the GSM average Tx power measurement, taking samples only during the active part of the burst.

Receiver Tester
Receiver testing is done using an accurate 0.3 GMSK source. The wide dynamic range allows for low-level sensitivity measurements and high power tests to check for receiver saturation. Mobile receiver sensitivity is measured by making bit-error-rate measurements on Class Ia, Ib, and II bits in either raw or residual form.

Spectrum Analyzer
The optional spectrum analyzer completes the array of GSM measurements which can be made. It provides high dynamic range pulse on/off ratio measurements and output RF spectrum tests. The spectrum analyzer also makes an excellent diagnostic tool for tracing signals and finding problems.



Tool Kit
The full-featured tool kit includes a power meter, CW RF synthesizer, audio synthesizer, frequency counter, DVM, audio analyzer, oscilloscope, and DSP analyzer. These tools can be configured to measure just about any signal a GSM phone can produce, whether on a call or in test-mode.

Base Station Emulator
The GSM base station emulator creates a test network to which the mobile can camp and make calls. The emulator is capable of causing a "simple camp" so that receiver and transmitter functions can be verified separately. A speech coder is present to allow functional voice testing. A variety of basic call processing features test the mobile as if it were in a real network. These features include hopped traffic channels, call origination and termination (both mobile and base station), hand-overs, channel assignments, Tx power control commands, and a choice of control channel configurations.

Automatic Software
The optional automatic test software is easy to use, fast and simple to configure. With the flexibility to allow test sequences to be created and saved in minutes, automatic test software personalizes the test set for each part of the incoming inspection or repair process.

Troubleshoot in Test Mode

What if the mobile is unable to find service and make a call and you can't find the source of the problem? With a single key press, the test set can be put into a special test mode, allowing unsynchronized mobile operation. The transmit and receive portion of the mobile can then be measured separately.

Simplify Mobile Test

SIM (Subscriber Identity Module) cards are available to simplify mobile test by matching the information on the card (IMSI, MCC, MNC) with that on the test set. They also enable the mobile to be put into a special loop-back mode to perform the receiver bit-error-rate test.

Compatibility

If you already own an Agilent 8922S/M or 83220A/E test set, these can be upgraded to 8922 multiband test systems. Contact your Agilent representative for details. You can take advantage of the additional features without rewriting your production test code. Code written for the 8922S/M test set is compatible with the 8922 multiband test systems.

To facilitate traceable testing, the 8922 multiband test system generally follows the procedures as outlined in the associated GSM recommendations, but do not necessarily meet the exact requirements or cover all ranges, limits, or conditions required for type testing.

	Associated GSM Specifications
Agilent 8922 Multiband Test System	**11.10 Tests**
Transceiver spurious emissions[1]	12.1
Tx peak transmitted power	13.3
Tx RF spectrum due to switching[2]	13.4
Tx RF spectrum due to modulation[2]	13.4
Tx amplitude envelope (top 30 dB, and -70 dBc point)	13.3
Tx phase error and frequency error	13.1
Rx sensitivity	14.2
Rx usable input level range	14.3
Rx co-channel rejection[3]	14.4
Rx adjacent channel rejection (same frequency/different timeslot) (different frequency/same timeslot)[3]	14.5
Rx intermodulation rejection[3]	14.6
Rx blocking and spurious response[4]	14.7

1. The 8922 multiband test systems have limited capability for this measurement (<2 GHz, and limited resolution, bandwidth and spans).
2. The 8922 multiband test systems use a three pole resolution bandwidth filter to make these measurements.
3. An additional RF source, such as the ESG-D series of signal generators, is required to make this measurement.
4. An additional CW RF source (frequency range of 100 kHz to 12.75 GHz, no modulation needed) is required to make this measurement.

GSM Functionality and RF Generator Specifications

System Specifications
These specifications describe the system's warranted performance and apply after a 30 minute warm-up. These specifications are valid over its operating and environmental range, unless otherwise stated.

Supplemental Characteristics *(shown in italics)*
These are intended to provide additional information, useful in applying the instrument by giving typical (expected), but not warranted, performance parameters. These characteristics are shown in italics or labeled as "typical," "usable to," or "nominal."

NOTE: The following specifications are only applicable to firmware revision C.01.00 onwards.

GSM Functionality Specifications

Bit/frame error rate measurements: Class Ia, Ib, and Class II bits in both raw and residual form, burst-by-burst
MS power output level control:
1 to 19 for E-GSM900
1 to 15 for GSM900
0 to 15 for DCS1800
0 to 15, 30, 31 for PCS1900
Broadcast channel capability: BCCH + CCCH or BCCH + CCCH + SDCCH/4
Control channels (SDCCH, FACCH, SACCH):
BCCH + CCCH, BCCH +CCCH + SDCCH/4, SDCCH/8 (non-hopped), SACCH/FACCH
Call control capabilities: BS originated call (FS/EFS), MS originated call (FS/EFS), MS camp-on, BS call disconnect, MS call disconnect, hand-over, channel assignment, interband hand-over[1] and interband channel assignment[1]
Traffic channels: TCH (FS/EFS)
HSCSD: 2x1 and 2x2, 9.6 Kbps and 14.4 Kbps
Timing: Auto, manual, uplink-downlink and offset measurement
Hopping: Two independent, user definable MA tables with offsets. Intra band only.
Speech encoding/decoding: Full rate speech only
Speech echo mode: User selectable delay 0 to 5 seconds
Measurement coordination: Flexible control of burst type, ARFCN, and timeslot
SACCH MEAS result—servicing cell: RXLEV, RXQUAL, and timing advance
SACCH MEAS result—neighbor cell: RXLEV, ARFCN, BCC, and NCC

RF Generator Specifications

RF In/Output connector frequency
Range: 880 to 960 MHz and 1805 to 1990 MHz
Resolution: 1 Hz
Accuracy: Reference accuracy ±0.5 Hz
Stability: Same as reference

RF In/Output Connector Output
Level range for specified accuracy:
-14 to -127 dBm (880 to 960 MHz)
-19 to -127 dBm (1805 to 1990 MHz)
Typical maximum output power:
>-12 dBm (880 to 960 MHz)
>-19 dBm (1805 to 1990 MHz)
Level resolution: 0.1 dB
Level accuracy (880 to 960 MHz)[2]:
±1.1 dB (0°C to 10°C)
±1.0 dB (10°C to 35°C)
±1.05 dB (35°C to 45°C)
±1.1 dB (45°C to 55°C)
Level accuracy (1805 to 1880 MHz): ±1 dB
±1 dB typical (1880 to 1990 MHz)
±1 dB typical while hopping
Reverse power: 15 W peak, 8 W average
(880 to 960 MHz while in GSM900 and E-GSM900 mode)
2 W continuous for all other frequencies and modes
Typical SWR: *1.5:1*

Supplemental characteristics in E-GSM900 mode when BCH is in GSM900 band and TCH is in DCS1800 band
BCH level at 0 dB attenuation: *-60 dBm typical*
Attenuator resolution: *10 dB steps*
Attenuator range: *0 to 70 dB*
Attenuator accuracy: *±1.7% of setting or ±0.4 dB, whichever is greater*
Level resolution for GSM900 BCH:
0.1 dB (when TCH in GSM900 band)
10 dB (when TCH in DCS1800 band)
Level accuracy:
TCH: ±1 dB typical
BCH: ±1 dB typical (when TCH in GSM900 band)

1. Dual band operation only.
2. Level accuracy degrades 0.2 dB when using RF In/Out connector for both RF generator and RF analyzer.

Aux RF Out Connector and 0.3 GMSK Modulation Specifications

10 MHz to 1 GHz Aux RF Out Connector Specifications

Frequency
Range: 10 MHz to 1 GHz
Resolution: 1 Hz
Accuracy: Reference accuracy ±0.5 Hz
Stability: Same as reference

Output
Level range for specified accuracy[3]: +4 to -127 dBm
Level resolution: 0.1 dB
Level accuracy:
±1 dB (880 to 960 MHz)
±1 dB typical (50 MHz to 1 GHz)
±2 dB typical (10 MHz to 50 MHz)
Reverse power: 200 mW
SWR: 2.0:1 for level <-4 dBm

1710 to 1990 MHz Aux RF Out Connector Specifications (83220A only)[3]

Frequency
Range: 1710 to 1990 MHz
Resolution: 1 Hz
Accuracy: Reference accuracy ±0.5 Hz
Stability: Same as reference

Output
Level range for specified accuracy: +7 to -127 dBm
Level resolution: 0.1 dB
Level accuracy[3]:
±1 dB (1710 to 1880 MHz)
±1 dB typical (1880 to 1990 MHz)
Reverse power: 200 mW
SWR: 2.0:1 for level <-4 dBm

Spectral Purity
Spurious signals: (for ≤+1 dBm output level at Aux. RF out, or ≤-19 dBm output level at RF in/out)
Harmonics: <-25 dBc
Non-harmonics: <-50 dBc, >5 kHz offset from carrier

0.3 GMSK Modulation Specifications

After one timeslot, 577 µs, from an isolated RF generator trigger in the GSM frequency bands.
Error
Phase error: ≤1° rms
Peak phase error: ≤4° peak
Frequency error (880 to 960 MHz): ±[0.02 ppm (18 Hz) + reference accuracy], for normal bursts
Typically ±[0.03 ppm (27 Hz) + reference accuracy], for RACHs
Frequency error (1880 to 1990 MHz): ±[0.01 ppm (22 Hz) + reference accuracy], for normal bursts
Typically ±[0.02 ppm (32 Hz) + reference accuracy], for RACHs
Amplitude flatness: ±0.25 dB peak
Clock input frequency (8922M only): 270.833 kHz ±2 Hz (relative to reference)
Level: TTL
Data input format (8922M only): Nondifferentially encoded input
Level: TTL

3. Level accuracy degrades 0.2 dB when using RF In/Out connector for both RF generator and RF analyzer.

Pulse Modulation, RF Analyzer, and CW RF Frequency Measurement Specifications

Supplemental characteristics
After three timeslots, 1.73 ms, from an isolated RF generator trigger in the GSM frequency bands[5].
Phase error: *≤0.5° rms*
Peak phase error: *≤2.0° peak*
Frequency error (880 to 960 MHz): *±[0.01 ppm (9 Hz) + reference accuracy] for normal bursts*
Typically ±[0.02 ppm (18 Hz) + reference accuracy] for RACH bursts
Frequency error (1880 to 1990 MHz): *±[0.005 ppm (9 Hz) + reference accuracy] for normal bursts*
Typically ±[0.01 ppm (18 Hz) + reference accuracy] for RACH bursts

Pulse Modulation Specifications

Input levels (8922M only): TTL
Rise/fall time (10% to 90%): ≤5 µs

Supplemental characteristics
On/off ratio: *>80 dB*

30 dB Pulse Modulation Specifications

(8922M only)
All timeslots 30 dB higher than desired/active timeslot, to test adjacent timeslot rejection.
Input levels: TTL
Rise/fall time (10% to 90%): ≤5 µs

RF Analyzer Specifications

RF In/out Connector
Frequency range: 880 to 960 MHz and 1710 to 1990 MHz
Frequency resolution: 1 Hz
Hop mode resolution: 100 kHz
Input level range: -5 to +41 dBm (880 to 960 MHz)
-5 to +32 dBm (1710 to 1990 MHz)
Typical SWR: *1.5:1*

10 MHz to 1 GHz Aux RF In Connector (8922 connector)
Frequency range: 10 MHz to 1 GHz
Frequency resolution: 1 Hz
Hop mode resolution: 100 kHz
Input level range: -36 to +20 dBm

1710 to 1990 MHz Aux RF In Connector (83220A only)[4]
Frequency range: 1710 to 1990 MHz
Frequency resolution: 1 Hz
Hop mode resolution: 100 kHz
Input level range: -23 to +20 dBm

CW RF Frequency Measurement Specifications

Input frequency setting error: ±500 kHz
Accuracy: ±(1 Hz + reference accuracy)
Typical minimum resolution: *1 Hz*

4. 8922X and 8922Y systems only.
5. GSM frequency bands are 880 to 915 MHz and 925 to 960 MHz.

CW RF Power and Peak Transmitter Carrier Power Measurement Specifications

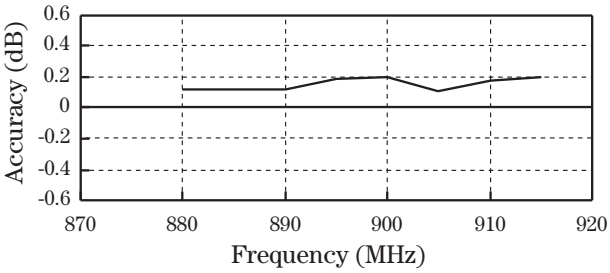
CW RF Power Measurement Specifications
(RF in/out only)
Input frequency setting range: ±500 kHz
Accuracy (880 to 960 MHz and +4 to +41 dBm): ±0.6 dB ±noise effects (0.2 mW)
Accuracy (1710 to 1880 MHz and 0 to +32 dBm): ±0.5 dB ±noise effects (0.015 mW)

Supplemental characteristics
Accuracy (880 to 960 MHz and -5 to +4 dBm): *±0.5 dB ±noise effects (0.2 mW)*
Accuracy (1710 to 1880 MHz and -5 to 0 dBm): *±0.5 dB ±noise effects (0.015 mW)*
Accuracy (1880 to 1990 MHz): *±0.5 dB ±noise effects (0.015 mW)*
Minimum resolution (>+4 dBm): *0.01 dB*

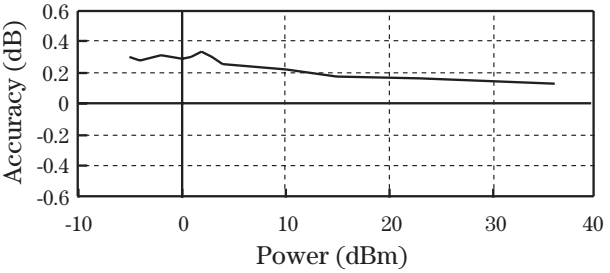
Peak Transmitter Carrier Power Measurement Specifications **(RF in/out only)**
Input frequency setting range: ±10 kHz
Input level setting error: ±3 dB
Accuracy (880 to 960 MHz and +4 to +41 dBm): ±0.7 dB ±noise effects (0.2 mW)
Accuracy (1710 to 1880 MHz and 0 to +32 dBm): ±0.6 dB ±noise effects (0.015 mW)

Supplemental characteristics
Accuracy (880 to 960 MHz and -5 to +4 dBm): *±0.6 dB ±noise effects (0.2 mW)*
Accuracy (1710 to 1880 MHz and -5 to 0 dBm): *±0.6 dB ±noise effects (0.015 mW)*
Accuracy (1880 to 1990 MHz): *±0.6 dB ±noise effects (0.015 mW)*
Minimum resolution (>+4 dBm): *0.2 dB*

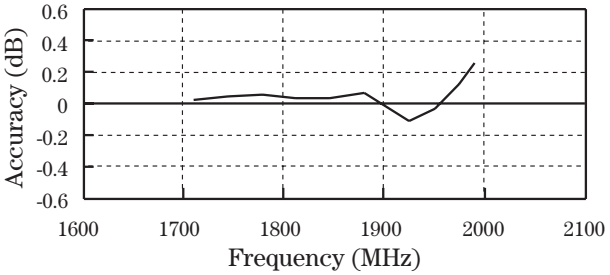
Refer to the following four graphs for typical power measurement accuracies.



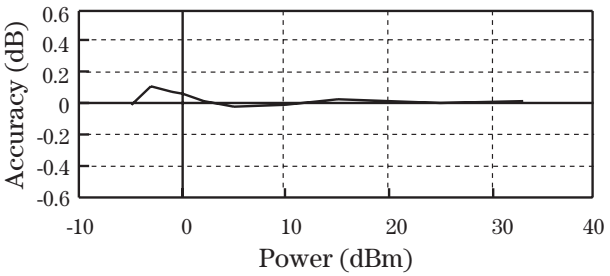
Measurement Power Level is +33 dBm



Measurement Frequency is 975 MHz



Measurement Power Level is 0 dBm



Measurement Frequency is 1880 MHz

Pulse On/Off Ratio, Amplitude Envelope, and Phase and Frequency Measurement Specifications

Pulse On/Off Ratio Measurement Specifications

(Requires Option 006)

"On" power is averaged over the useful part of the burst. "Off" is averaged over a one-bit interval centered at a user specified time.

Non-hopped Mode Only

Input frequency setting range: ±10 kHz

Input level setting range: ±3 dB

Timing accuracy: ±1.7 µs *(1.1 µs typical)*

Accuracy (On/off ≥40 dB, RF in/out only)

Off power (dBm)	On/off ratio accuracy	
-30 to -1	2.4 dB	*1.1 dB typically*
-37 to -30	2.9 dB	*1.3 dB typically*
-41 to -37	3.7 dB	*1.7 dB typically*
-47 to -42	4.2 dB	*2.1 dB typically*

Amplitude Envelope Measurement Specifications

After one timeslot, 577 µs from an isolated receiver hop trigger in the GSM frequency bands.

Input frequency setting range: ±10 kHz

Inaccuracy due to noise (for overshoots 1 dB)

	Input level setting error		
Relative level	±1 dB	±3 dB	±3 dB with 5 averages
0 dB	<±0.15 dB peak	<±0.2 dB peak	<±0.2 dB peak
-6 dB	<±0.2 dB	<±0.3 dB	<±0.3 dB
-30 dB	<+3.0 dB -3.8 dB	<+4.2 dB -7.5 dB	<+2.2 dB -2.6 dB

Phase and Frequency Measurement Specifications

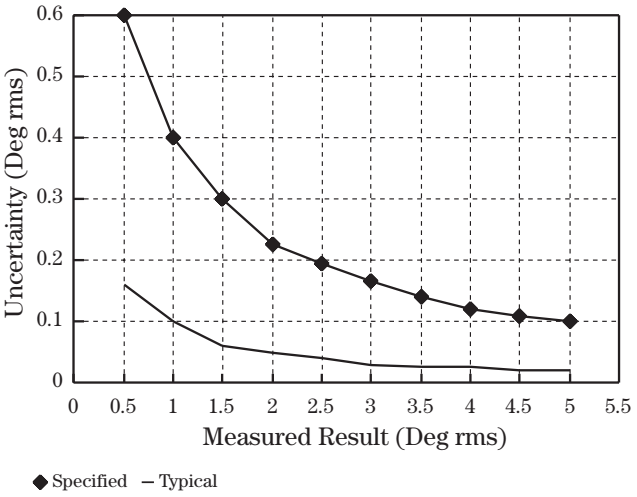
After one timeslot, 577 µs from an isolated hop trigger in the GSM/DCS/PCS frequency bands.

Input frequency setting range: ±10 kHz

Input level setting range: ±3 dB

RMS phase error accuracy: ≤1° rms

RMS phase error measurement versus measured value



Peak phase error accuracy: ≤4° peak

Frequency error accuracy: ±(22 Hz + reference accuracy), for normal bursts

Supplemental characteristics

Frequency error accuracy:

±(9 Hz + reference accuracy) for normal bursts

±(18 Hz + reference accuracy) for RACHs

0.3 GMSK Data Recovery, FM Demodulation Output, Pulse Demodulation Output, and Output RF Spectrum Measurement Specifications

0.3 GMSK Data Recovery Specifications

(8922M only)[6]

After one timeslot, 577 µs, from an isolated receiver hop trigger in the GSM frequency bands.

Input frequency setting error: ±100 Hz
Required input phase accuracy: ≤5° rms, ≤20° peak
Demodulation duty cycle: 1 timeslot per frame
Outputs: Data, clock and data valid
Data output clock: Clocked at 1 MHz rate
Delay, data: ≤1 frame (4.62 ms)
Output level: TTL

FM Demodulation Output Specifications

(8922M only)[6]

Sensitivity: 20 µV/Hz ±5% (into an open circuit)
Input frequency setting range: ±50 kHz, with ≤100 kHz peak deviation
Input level setting range: ±3 dB

Supplemental characteristics
3 dB bandwidth: *DC to 270 kHz*
Output impedance: *600 Ω*
DC offset: *≤5 mV*

Pulse Demodulation Output Specifications

(8922M only)[6]

Input frequency setting range: ±50 kHz
Input level setting range: ±3 dB
Rise time (10 to 90%): ≤2.5 µs

Output RF Spectrum Measurement Specifications

(Requires Option 006)

After one timeslot, 577 µs, from an isolated receiver hop trigger in the GSM frequency bands.

Input levels for optimum dynamic range (RF In/Out connector):
+7, +17, +27, +37 dBm
(from 880 to 960 MHz)
-3, +2, +7, +12, +17, +22, +27, +32 dBm
(from 1710 to 1990 MHz)
Input frequency setting range: ±10 kHz
Input level setting range: ±3 dB

Supplemental characteristics
Log linearity: *±0.4 dB*
Amplitude flatness: *±1.0 dB*
Amplitude resolution: *0.4 dB*
Dynamic range (dB): *This describes the spectrum analyzer resolution bandwidth filter used when measuring output RF spectrum. The dynamic range of the measurement will be a combination of this filter response and the modulation spectrum of the incoming signal.*

	Offset (kHz)					
	100	**200**	**300**	**400**	**600**	**800 to 1800**
Range (dB)	24	42	53	60	63	64

When using output RF spectrum due to the ramping measurement, the dynamic range is decreased by 12 dB (due to peak hold).

6. 8922P, 8922X systems

Spectrum Analyzer and Audio Source Specifications

Spectrum Analyzer Specifications
(Requires Option 006)

Frequency Span/Resolution Bandwidth (coupled)

Span	Bandwidth
<50 kHz	300 Hz
<200 kHz	1 kHz
<1.5 MHz	3 kHz
≤4 MHz	30 kHz

Display: Log, 10 dB/div
Display range: 80 dB
Log linearity: ±1.1 dB
Reference level range for (RF In/Out connector):
+44 to -24 dBm (880 to 960 MHz)
+35 to -45 dBm (1710 to 1990 MHz)
Non-harmonic spurious responses: -50 dBc max, for inputs ≤30 dBm
Residual responses: < -70 dBm (no input signal, 0 dB attenuation)
Image rejection: > 50 dB
In PCS1900 band only the ORFS and spectrum analyzer specifications do not apply over this range:
1904 to 1906 MHz, corresponding to ARFCN 781 to 791

Supplemental characteristics
Level accuracy: *±2.5 dB*
Frequency over range: *To 1015 MHz (GSM900, E-GSM900)*
Displayed average noise level: *<-116 dBm (0 dB attenuation, < 50 kHz spans)*

Frequency Span/Resolution Bandwidth (coupled)

Span	Bandwidth
<50 MHz	30 kHz

Audio Source Specifications
Frequency
Range: DC to 25 kHz
Accuracy: 0.025% of setting

Supplemental characteristics
Minimum resolution: *0.1 Hz*

Output Level
Range: 0.1 mV to 4 Vrms
Maximum output current: 20 mA peak
Output impedance: <1 Ω
Accuracy: ±(2% of setting + resolution)
Residual distortion (THD + noise, amplitude >200 mVrms):
0.1%, 20 Hz to 25 kHz in 80 kHz BW

Supplemental characteristics
Minimum resolution:
Level ≤0.01 V: 50 µV
Level ≤0.1 V: 0.5 mV
Level ≤1 V: 5 mV
Level >1 V: 50 mV
DC coupled offset: *<50 mV*

Audio Analyzer Specifications
Frequency Measurement
Range: 20 Hz to 400 kHz
Accuracy: ±(0.02% + 1 count + reference accuracy)
External input: 20 mV_{rms} to 30 V_{rms}

Supplemental characteristics
Minimum resolution:
f <10 kHz: 0.01 Hz
f <100 kHz: 0.1 Hz
f ≥100 kHz: 1 Hz

AC Voltage Measurement
Voltage range: 0 V to 30 V_{rms}
Accuracy (20 Hz to 15 kHz), input >1 mV_{rms}:
±3% of reading
Residual noise + THD (15 kHz BW): 175 µV

Audio Analyzer and Oscilloscope, Remote Programming, and Printer Support Specifications

Supplemental characteristics
3 dB bandwidth: *2 Hz to 100 kHz*
Input impedance: *1 MΩ, 145 pF at audio in*
Minimum resolution: *4 digits for inputs ≥100 mV 3 digits for inputs <100 mV*

DC Voltage Measurement
Voltage range: 100 mV to 42 V
Accuracy: ±(1.0% of reading + DC offset)
DC offset: ±45 mV

Supplemental characteristics
Minimum resolution: *1.0 mV*

Distortion Measurement
Fundamental frequency: 1 kHz ±5 Hz
Input level range: 30 mVrms to 30 Vrms
Display range: 0.1% to 100%
Accuracy: ±1 dB (0.5 to 100% distortion)
Residual THD + noise (15 kHz BW): The greater of -60 dB or +175 µV

Supplemental characteristics
Minimum resolution: *0.01% distortion*

Audio Filters
There are seven audio filters used in the 8922 test set:
50 Hz HPF, 300 Hz HPF, 300 Hz LPF, 3 kHz LPF, 15 kHz LPF, 750 µs de-emphasis, and 1 kHz notch.

Audio Detectors
The audio detectors available in the 8922 are:
Pk+, pk-, pk + hold, pk - hold, pk±/2, pk ±/2 hold, pk±max, pk±max hold, and RMS.

Oscilloscope Specifications
Frequency range (3 dB): 2 Hz to 50 kHz
Scale/division: 10 mV to 10 V in 1, 2, 5, and 10 steps
Amplitude accuracy (20 Hz to 10 kHz): ±1.5% of reading 0.1 division
Time/division: 10 µs to 100 ms in 1, 2, 5 and 10 steps
External trigger level: TTL
Maximum voltage scope in: 5 V_{peak}
Audio in: 30 V_{rms}

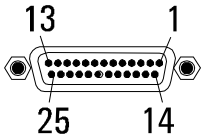
Supplemental characteristics
3 dB bandwidth: *Typically >100 kHz*
Internal DC offset: *≤0.1 division for ≤50 µV/div sensitivity*

Remote Programming
GPIB: Agilent's implementation of IEEE Standard 488.2
Functions implemented: SH1, AH1, T6, L4, SR1, RL1, LE0, TE0, PP0, DC1, DT1, C4, C11, E2
RS-232: 3 wire RJ-11 connector used for serial data transfer
Baud rates: 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 selectable

Printer Support
RS-232: 3-wire RJ-11 connector used for serial data transfer

Parallel Port
This port is used with printers requiring a parallel interface when printing. Use address 15 when sending data to this port from IBASIC Programs.

Pin assignments are as follows:



1	nStrobe
2	Data 1 (Least significant bit)
3	Data 2
4	Data 3
5	Data 4
6	Data 5
7	Data 6
8	Data 7
9	Data 1 (Most significant bit)
10	nAck
11	Busy
12	PError
13	Select
14	nAutoFd
15	nFault
16	nInit
17	nSelectIn
18	Signal Ground (nStrobe)
19	Signal Ground (Data 1 and Data 2)
20	Signal Ground (Data 3 and Data 4)
21	Signal Ground (Data 5 and Data 6)
22	Signal Ground (Data 7 and Data 8)
23	Signa Ground (Busy and nFault)
24	Signal Ground (PError, Select and nAck)
25	Signal Ground (nAutoFd, nSelectIn and nInit)

Reference and General Specifications

Reference Specifications

The accuracy needs for testing GSM radios require the unit to be operated with the high stability reference (Option 001) or an external high stability reference.
Accuracy (after warm up): ±[(Time since calibration x aging rate) + temperature effects + accuracy of calibration]
External reference input frequency: 13, 10, 5, 2 or 1 MHz, ±30 ppm
Level: 0 to +10 dBm

Supplemental characteristics
Nominal impedance: *50 Ω*
10 MHz out (rear panel BNC) level: *> +8.0 dBm nominal*
Impedance: *50 Ω nominal*
13 MHz out (rear panel BNC) level: *> +8.0 dBm nominal*
Impedance: *50 Ω nominal*

Fixed Reference Mode
Aging: < 2 ppm/year
Temperature stability: ±1 ppm (0° to 55°C)
Warm-up time: < 30 minutes, ±2 ppm of final frequency

Tunable Reference Mode
This allows offsetting the internal reference by a selected amount relative to the high stability reference (Option 001) or an external reference.
Required external reference accuracy: ±0.5 ppm
Tune range: ±30 ppm
Reference accuracy: ±1 ppm + accuracy of external reference or high stability (Option 001)
Temperature stability: ≤4 ppm, for selected offsets of up to ±30 ppm

General Specifications

Size: 8922 + 83220: 310H x 426W x 574D (mm) (12.25 x 16.75 x 23 inches)
Weight: 8922 + 83220: 48.8 kg, 107 lbs
Operating temperature: 0° to +55°C
Storage temperature: -40° to +70°C
Power: 100, 120, 220, 240 Vac, 48 to 440 Hz ±12% of line voltage, approximately 640 VA
Safety (8922): Certified to IEC 348:1978 and CSA-22.2, No. 231 Series M89
Safety (83220): Certified to IEC 348:1978 and CSA Bulletin 556B
EMI: Meets the requirements of the European, EMC directive 89/336/EEC
Video output: The video out connector on the rear panel outputs a 15 kHz PAL CVBS under-scanning compatible signal

Options, System Configurations, Printers, and Printer Accessories

8922P and 8922X
GSM Multiband Test System

Option 001: High stability timebase
Option 002: Transit protection (provides front panel cover, and extended rear feet)
Option 003: Protocol logging
Option 006: Spectrum analyzer
Option 007: Test SIM card
Option 008: Micro test SIM card
Option 012: Mobile station test software (83212C)
Option 0B0: Delete manual set
Option 0B1: Additional set of user guides and programming reference guide
Option 0B3: Service manual
Option AB0: Taiwan-Chinese localization
Option AX4: Rack mount flange kit
Option DB2: Add multiband calibration kit
Option UK6: Commercial calibration certificate with data

Multiband System Configuration
8922P = 8922M Option 010 + 83220E Option 010
8922X = 8922M Option 010 + 83220A Option 010
8922R = 8922S Option 010 + 83220E Option 010
8922Y = 8922S Option 010 + 83220A Option 010

Multiband System Upgrades
8922P/R/X/Y Option R01: Field upgrade of 8922S/M to 8922S/M Option 010.
Includes new 83220A/E Option 010.
8922P/R/X/Y Option R02: Field upgrade of 8922S/M to 8922S/M Option 010.
83220A/E is returned to factory for upgrade to 83220A/E Option 010.
8922U Option 104: Multiband test system calibration kit. This kit of parts is not included as standard with the 8922P/R/X/Y or the multiband upgrade Options R01/R02.

8922R and 8922Y
GSM Multiband Test System

Option 001: High stability timebase
Option 002: Transit protection (provides front panel cover, and extended rear feet)
Option 006: Spectrum analyzer
Option 007: Test SIM card
Option 008: Micro test SIM card
Option 012: Mobile station test software (83212C)
Option 0B0: Delete manual set
Option 0B1: Additional set of user guides and programming reference guide
Option 0B3: Service manual
Option AB0: Taiwan-Chinese localization
Option AX4: Rack mount flange kit
Option DB2: Add multiband calibration kit
Option UK6: Commercial calibration certificate with data

Supported Printers and Printer Accessories

HP DeskJet 500, 500C, 550C, and 560C
GPIB, RS-232, and Centronics* interfaces are supported.

*Operation with Centronics printers requires the following accessories:
ITEL–45CHVE: MicroPrint GPIB/Centronics bus converter
F1011A: AC/DC adapter
C2912B: 3m centronics cable
10833D: 0.5m GPIB cable
8922S/M test set (Special Option K06): Serial printer connector and cable (RJ11 to D-type RS-232)

Upgrade Information and Features Comparison

8922F/H to 8922S/M Test Set Upgrades

Keeping in line with our policy to offer continual enhancements for our instruments, customers who already have an 8922F or 8922H may upgrade them to the functionality of the 8922S or 8922M respectively. The electronic attenuator is not included in the upgrade.

The upgrades are in the form of retrofit kits which must be installed at an Agilent service center.

The upgrades are structured as options on an 8922U product. The 8922U does not exist as a product in its own right, only the options may be ordered.

Ordering Information

8922U Option 101: Upgrade 8922H test set to 8922M test set excluding electronic attenuator.
For 8922G Option R10, 8922G Option R72, and 8922H (all options).

8922U Option 102: Upgrade 8922F test set to 8922S test set excluding electronic attenuator.
For 8922E Option R12, 8922E Option R71, 8922E Option R73, and 8922F (all options).

General Comments

The 8922S/M are software compatible with the 8922F/H test set. There will still be an 8922G compatibility mode for backwards compatibility with existing test software.

Related Literature	Pub. Number
Agilent 8922M test set photocard	5964-6587E
Agilent 8922S test set photocard	5964-6585E
Agilent 8922S/M data sheet	5964-6586E

8922S and 8922F feature differences	8922S	8922F
Measurement speed	Approx. 10% increase in throughput	N/A
Multi-burst measurement capability	Yes	No
GSM phase II power levels	Yes	No
E-GSM frequency bands	Yes	No
Electronic attenuator	Yes	No
SMS cell broadcast	Yes	No
Peak carrier power meter range	-5 to +41 dBm	+4 to +41 dBm
RF generator power level range	-14 to -127 dBm	-13 to -127 dBm
Burst-by-burst BER measurement	Yes	No
Screen freeze facility	Yes	No
IMSI attach/detach function	Yes	No

8922M and 8922H feature differences	8922M	8922H
Measurement speed	10 to 20% increase in throughput	N/A
Multi-burst measurement capability	Yes	No
GSM phase II power levels	Yes	Yes with FW >B.06.00
E-GSM frequency bands	Yes	No
Electronic attenuator	Yes	No
SMS cell broadcast	Yes	Yes with FW >B.06.00
Peak carrier power meter range	-5 to +41 dBm	+4 to +41 dBm
RF generator power level range	-14 to -127 dBm	-13 to -127 dBm
Burst-by-burst BER measurement	Yes	No
Screen freeze facility	Yes	No
Flash firmware upgrades by GPIB	Yes	No
IMSI attach/detach function	Yes	Yes with FW >B.06.00

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Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

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Your Advantage

"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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(fax) (64 4) 495 8950

Asia Pacific:
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(fax) (852) 2506 9284

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