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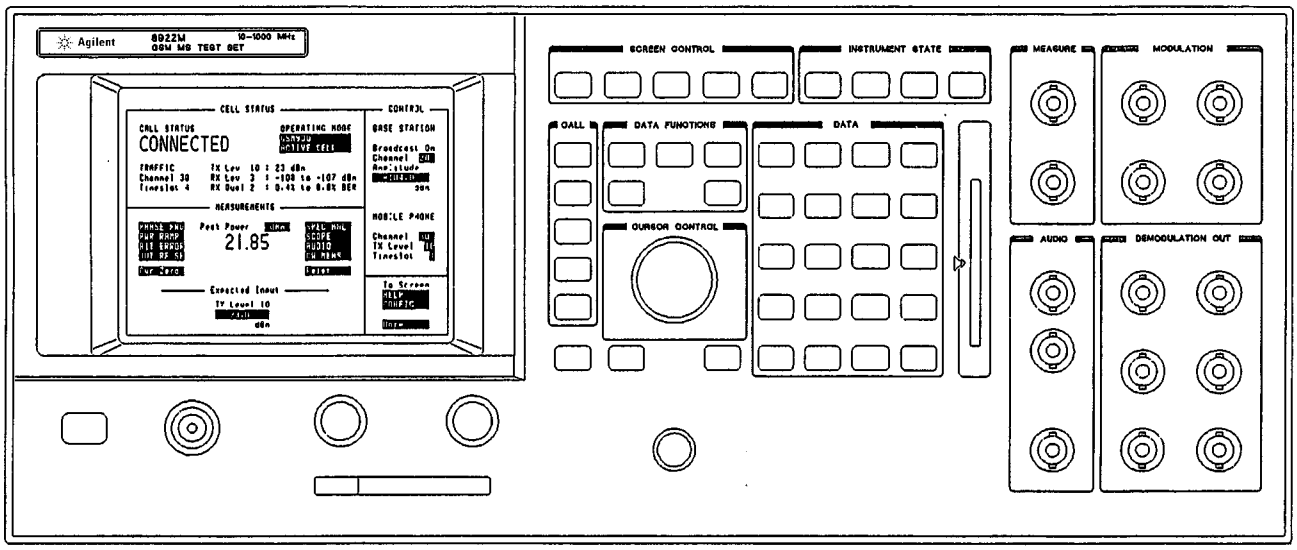
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Agilent 8922S, 8922M, 83220E
GSM mobile test solutions
Data Sheet



The first choice for GSM mobile service and repair
Troubleshoot and find faults fast with the Agilent Technologies 8922S GSM MS service test set. Use it to reduce false failures with a test set that combines versatility with ease-of-use.

Serving the needs of the GSM mobile manufacturer
Maximize production throughput and minimize the cost per test with the 8922M GSM MS test set. It offers the highest speed of test in its class while guaranteeing accurate and repeatable measurements.

Expand to DCS1800 or PCS1900
Add the 83220A/E test set to test DCS1800 and PCS1900 mobiles.

Agilent Technologies
Innovating the HP Way

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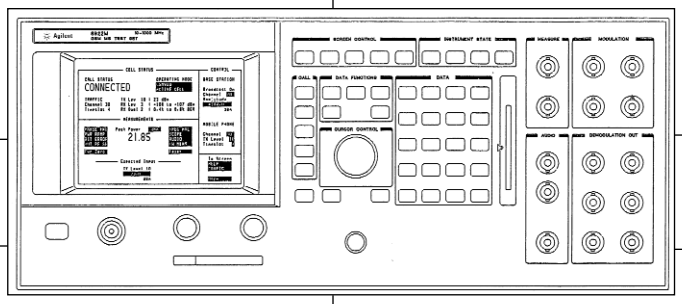
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Switch on one of Agilent Technologies' GSM test sets and you'll find your mobile finds service immediately. Now make a call and you're up and running; ready to perform all the key transmitter and receiver measurements. Built-in to every test set you'll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

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.

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.

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.



Toolkit
The full-featured tool-kit includes a power meter, CW RF synthesizer, audio synthesizer, frequency vounter, 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.

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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 un-synchronized 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 8922F/H test set, these can be upgraded to 8922S/M. Contact your Agilent Technologies representative for details. You can take advantage of the higher performance without re-writing your production test code. Code written for the 8922G or 8922H test set is compatible with the 8922M.

To facilitate traceable testing, the 8922S/M test sets generally follow 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.

Agilent 8922S/M tests	**Associated GSM specifications**
	11.10 tests
Transceiver frequency bands	II.2.1.1
Transceiver RF channels and numbering	II.2.1.2
Transceiver frequency hopping	II.2.1.3
Transceiver spurious emissions[1]	II.2.2
Tx peak transmitted power	II.3.3
Tx RF spectrum due to switching[2]	II.3.4
Tx RF spectrum due to modulation[2]	II.3.4
Tx amplitude envelope (top 30 dB, and –70 dBc point)	II.3.3
Tx phase error and frequency error	II.3.1
Rx sensitivity	II.4.2
Rx usable input level range	II.4.3
Rx co-channel rejection[3]	II.4.4
Rx adjacent channel rejection (same frequency/different timeslot) (different frequency/same timeslot)[3]	II.4.5
Rx intermodulation rejection[3]	II.4.6
Rx blocking and spurious response[4]	II.4.7
Timebase tuning range	Production test

1 The 8922S/M have limited capability for this measurement (< 1 GHz, and limited resolution bandwidth and spans).
2 The 8922S/M test set use a 3 pole resolution bandwidth filter to make these measurements.
3 8922M test set only; an additional RF source, such as the 8657 Option 022 0.3 GMSK signal generator, 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.

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Agilent 8922S/M test set specifictions

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

Supplemental characteristics *(shown in italics) 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,' 'useable to' or 'nominal.'*

GSM functionality

Bit/frame error rate measurements:	Class Ia, Ib, and Class II bits in both raw and residual form.
MS power output level control:	0 to 15 with RF analyzer auto adjust.
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 cell (FS/EFS), MS originated call (FS/EFS), MS camp-on, BS call disconnect, MS call disconnect.
Traffic channels:	TCH (FS/EFS)–HSCSD
Timing:	Auto, manual, uplink-downlink and offset measurement.
Hopping:	Two independent, user definable MA tables with offsets.
Speech encoding/decoding:	Full rate speech.
Speech echo mode:	User selectable delay 0 to 5 seconds.
Measurement coordination:	Flexible control of burst type, ARFCN and timeslot.
SACCH MEAS result:	RXLEV, RXQUAL and timing advance.

RF generator specifications

Frequency

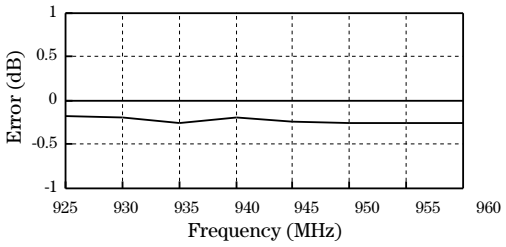
Range:	10 MHz to 1 GHz.
Resolution:	1 Hz.
Accuracy:	Reference accuracy ± 0.5 Hz.
Stability:	Same as reference.
Supplemental characteristics	
Frequency overrange:	*To 1015 MHz with uncalibrated output and modulation.*
Switching speed:	*577 ms over the GSM frequency bands[1] in hop mode (refer to 0.3 GMSK modulation specs).*

Output

RF in/out connector

Level range:	–14 to –127 dBm, max overrange power > -12 dBm max.
Level resolution:	0.1 dB.
Level accuracy[2]	
GSM bands:[1]	±1.0 dB, levels ≥ –127 dBm. *±1.0 dB, typically for levels ≥ –127 dBm while hopping.*
50 MHz to 1 GHz:	± 1.5 dB, levels ≥ -107 dBm; ± 2.0 dB, levels ≥ -127 dBm.
	10 MHz to 50 MHz: ± 2.0 dB, levels ≥ -107 dBm; ± 2.5 dB, levels ≥ -127 dBm.
Reverse power:	15 W continuous. 100 W for 10 seconds/minute.

Typical RF generator RF in/out level error at -104 dBm



SWR:	1.5:1.

Aux RF out connector

Level range:	+4 to –127 dBm.
Level resolution:	0.1 dB.
Level accuracy	
GSM bands:[5]	±1.0 dB, levels ≥ –107 dBm.*±1.0 dB, typically for levels ≥ –107 dBm while hopping.*
50 MHz to 1 GHz:	± 1.5 dB, levels ≥ -107 dBm; ± 2.0 dB, levels ≥ -127 dBm.
10 MHz to 50 MHz:	± 2.0 dB, levels ≥ -107 dBm; ± 2.5 dB, levels ≥ -127 dBm.
Reverse power:	200 mW.
SWR:	2.0:1, 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.

1 GSM frequency bands are 880 to 915 MHz and 925 to 960 MHz.
2 Level accuracy degrades 0.2 dB when using the RF in/out connector for both RF generator and RF analyzer. In 30 dB pulse mode, level accuracy specifications are typical.

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0.3 GMSK modulation

After one timeslot, 577 ms, from an isolated RF generator trigger in the GSM frequency bands.[1]

Phase error: ≤ 1° rms.
Peak phase error: ≤ 4° peak.
Frequency error: ± [0.02 ppm (18 Hz) + reference accuracy], for normal bursts. *Typically ± [0.03 ppm (27 Hz) + reference accuracy], for RACHs.*
Amplitude flatness: ± 0.25 dB peak.
Clock input (8922M test set only)
Frequency: 270.833 kHz ± 2 Hz (relative to reference).
Level: TTL.
Data input (8922M test set only)
Format: Non differentially encoded input.
Level: TTL.

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: *± [0.01 ppm (9 Hz) + reference accuracy] for normal bursts. Typically ± [0.02 ppm (18 Hz) + reference accuracy] for RACH bursts.*

Pulse modulation

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

Supplemental characteristics

On/off ratio: *> 80 dB.*

30 dB pulse modulation (8922M test set 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.

AM for level control (8922M test set only)

For output levels ≤ +1 dBm at aux RF out or ≤ -19 dBm at RF in/out.

Supplemental characteristics

Input
Range: *-1.0V to +0.6V.*
Impedance: *600 ohm nominal, dc coupled.*
Sensitivity: *100% AM per volt, nominal.*
Calibration: *0 Vdc input produces calibrated output from the RF generator.*
Rise/fall time (10 to 90%): *≤ 10 µs.*

RF analyzer specifications

Frequency

Range: 10 MHz to 1 GHz.
Resolution: 1 Hz.

Hop mode

Resolution: 100 kHz.
Offset frequency: ≤ 50 kHz.
Offset resolution: 1 Hz.
RF in/out SWR: < 1.5:1.

Supplemental characteristics

Frequency overrange: *To 1015 MHz.*
Offset resolution: *500 Hz for FM demodulation out.*

CW RF frequency measurement

Range: 10 MHz to 1 GHz.

Level range

RF in/out: -6 to +41 dBm.
Aux RF in: -36 to +20 dBm.
Input frequency setting range: ± 500 kHz.
Accuracy: ± (1 Hz + reference accuracy).

Supplemental characteristics

Minimum resolution: *1 Hz.*

CW RF power measurements (RF in/out only)

Range: 90 MHz to 1 GHz.
Level range: -5 to +41 dBm.
Input frequency setting range: ± 500 kHz.
Accuracy: (+4 to +41 dBm) ± 0.5 dB ± noise effects (0.2 mW).

Supplemental characteristics

Minimum resolution: *0.01 dB.*
Accuracy: *(-5 to +4 dBm) ± 0.5 dB ± noise effects (0.2 mW).*

Peak transmitter carrier power measurement

RF in/out only. After one timeslot, 577 µs, from an isolated receiver hop trigger in the GSM bands.[1]

Range: 90 MHz to 1 GHz.
Level range: -5 to +41 dBm.
Input frequency setting range: ± 10 kHz.
Input level setting range: ± 3 dB.
Accuracy: (+4 to +41 dBm) ± 0.6 dB ± noise effects (0.2 mW).

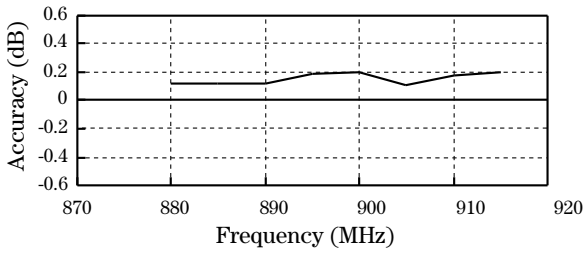
Supplemental characteristics

Minimum resolution: *0.2 dB.*
Accuracy: *(-5 to +4 dBm) ± 0.6 dB ± noise effects (0.2 mW).*

1. GSM frequency bands are 880 to 915 MHz and 925 to 960 MHz.

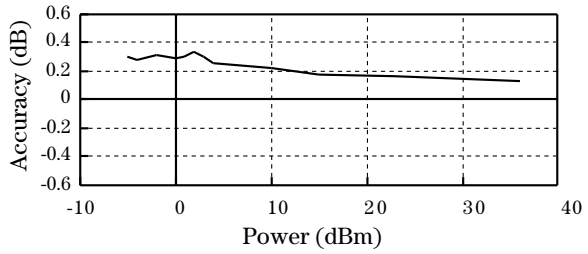
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Typical power measurement accuracy 880 to 915 MHz



Measurement Power Level is +33 dBm

Typical power measurement acuracy +41 to -5 dBm



Measurement Frequency is 975 MHz

Pulse on/off ratio measurement (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 ms 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

After one timeslot, 577 µs, from an isolated receiver hop trigger in the GSM frequency bands.[1]

Measurement range
RF in/out: -6 to +41 dBm.
Aux RF in: -36 to +20 dBm.
Input frequency setting range: ± 10 kHz.

Inaccuracy due to noise (for overshoots 1 dB):

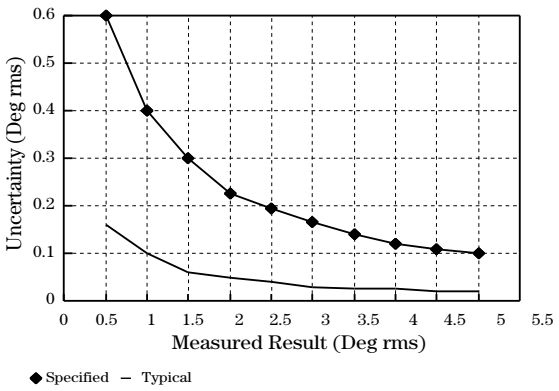
Relative level	Input level setting error		
	± 1 dB	± 3 dB	± 3 dB w/5 averages
0 dB	< ± 0.15 dB peak	< ± 0.2 dB peak	< ± 0.2 dB peak
–6 dB	< ± 0.2 dB	< ± 0.3 dB	< ± 0.3 dB
–30 dB	< +3.0 dB –3.8 dB	< +4.2 dB –7.5 dB	< +2.2 dB –2.6 dB

Phase and frequency measurements

After one timeslot, 577 µs, from an isolated receiver hop trigger in the GSM frequency bands.[1]

Range
RF in/out: -6 to +41 dBm.
Aux RF in: -36 to +20 dBm.
Input frequency setting range: ± 10 kHz.
Input level setting eange: ± 3 dB.
RMS phase error accuracy: ≤ 1° rms.

RMS phase error uncertainty versus measured value



Peak phase error accuracy: ≤ 4° peak.
Frequency error accuracy: ± [0.02 ppm (18 Hz) + reference accuracy], for normal bursts. *Typically ± [0.03 ppm (27 Hz) + reference accuracy] for RACH bursts.*

Supplemental characteristics

After three timeslots, 1.73 ms, from an isolated receiver hop trigger in the GSM frequency bands.[1]

RMS phase error accuracy: *≤ 0.5° rms.*
Peak phase error accuracy: *≤ 2° peak.*
Frequency error accuracy: *± [0.01 ppm (9 Hz) + reference accuracy], for normal bursts. ± [0.02 ppm (18 Hz) + reference accuracy], for RACH bursts.*

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0.3 GMSK data recovery (8922M test set only)

After one timeslot, 577 ms, from an isolated receiver hop trigger in the GSM frequency bands.[1]

Range

RF in/out:	-6 to +41 dBm.
Aux RF in:	-36 to +20 dBm.
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 (Agilent 8922M test set only)

Range

RF in/out:	-6 to +41 dBm.
Aux RF in:	-36 to +20 dBm.
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 ohm.*
DC offset:	*≤ 5 mV.*

Pulse demodulation output (8922M test set only)

Range

RF in/out:	-6 to +41 dBm.
Aux RF in:	-36 to +20 dBm.
Input frequency setting range:	± 50 kHz.
Input level setting range:	±3 dB.
Rise time (10 to 90%):	≤ 2.5 µs.
Fall time (90 to 10%):	≤ 2.5 µs.
Supplemental characteristics	
Output impedance:	*600 ohm, dc coupled.*
Output level:	*2 Vpeak into an open circuit.*

Output RF spectrum measurement (requires option 006)

After one timeslot, 577 ms, from an isolated receiver hop trigger in the GSM frequency bands.[1]

Range

RF in/out:	-6 to +41 dBm.
Aux RF in:	-36 to +20 dBm.

Input levels for optimum dynamic range

RF in/out:	+7, +17, +27, +37 dBm.
Aux RF in:	-23, -13, -3, +7 dBm.
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).

Spectrum analyzer specifications (option 006)

Frequency range: 10 MHz to 1 GHz.

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	
RF in/out:	+44 to -24 dBm.
Aux RF in:	+23 to -55 dBm.
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.
Supplemental characteristics	
Level accuracy:	*±2.5 dB.*
Frequency overrange:	*To 1015 MHz.*
Displayed average noise level:	*<-116 dBm (0 dB attenuation, < 50 kHz spans).*

1. GSM frequency bands are 880 to 915 MHz and 925 to 960 MHz.

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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 V_{rms}.
Maximum output current: 20 mA peak.
Output impedance: < 1 ohm.
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.
Supplemental characteristics
3 dB bandwidth: *2 Hz to 100 kHz.*
Input impedance: *1 Mohm, 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 mV_{rms} to 30 V_{rms}.
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 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, 1 kHz notch.

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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, 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 µs 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 in and out.
Baud rates: 1200, 2400, 4800, 960, and 19200 selectable.

Printer support

RS-232: 3 wire RJ-11 connector used for serial data in and out. Centronics parallel interface.

General specifications

Size: 177 H x 426 W x 574 D mm (7 x 16.75 x 23 inch).
Weight: 32 kg, 70 lbs.
Operating temperature: 0° to +55°C.
Storage temperature: -40° to +70°C.
Power: 100, 120, 220, 240 Vac, 48 to 440 Hz, ± 10% of line voltage, maximum 450 VA.
EMI: Meets the requirements of the European, EMC directive 89/336/EEC.
Safety: Certified to IEC 348:1978 and CSA-22.2, No. 231.
Video output: The video out connector on the rear panel outputs a 15 kHz PAL CVBS underscanning compatible signal.

Supplemental characteristics

Leakage: *At RF generator output levels < -40 dBm, typical leakage is < 1 µV induced in a resonant dipole antenna one inch away from any surface except the rear panel.*

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 ohm.*

10 MHz out (rear panel BNC)

Level: *> +8.0 dBm nominal.*
Impedance: *50 ohm nominal.*

13 MHz out (rear panel BNC)

Level: *> +8.0 dBm nominal.*
Impedance: *50 ohm 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

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.

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Product options

High stability timebase (option 001)

Option 001 adds a high stability timebase with the following specifications.

Aging:	< 5 x 10^{-4} ppm/day after 24 hour warm-up. < 0.1 ppm/year for continuous operation.
Temperature stability:	< 2.5 x 10^{-3} ppm/°C (0° to +55°C).
Warm-up time:	Within 5 x 10^{-4} ppm of final value 10 minutes after turn on, at 25°C.

Supplemental characteristics

Opt 001 ref out (rear panel BNC to be connected to ref in).

Frequency:	*10 MHz nominally.*
Level:	*+7.5 dBm nominally.*

Transit protection (option 002)

Option 002 adds accessories which protect the Agilent 8922S/M test set during handling and transport. This option adds a rugged front panel cover, extended rear feet, and accessory pouch. The snap-on front cover protects the CRT and front panel from impact damage. The extended rear feet allow the unit to stand vertically with cables attached to the rear panel.

Spectrum analyzer (option 006)

Option 006 adds a 10 to 1000 MHz spectrum analyzer to the 8922S/M test set. This provides output RF spectrum (due to modulation or switching) and pulse on/off measurements as well as general purpose capabilities.

Test SIM card (option 007)

Option 007 adds a credit-card size test SIM (subscriber identity module).

Micro test SIM card (option 008)

Option 008 adds a micro-size test SIM (subscriber identity module).

Protocol logging (special option H03)

Special option H03 provides software and a connecting cable that enables GSM layer 2 and 3 messages to be logged to an ASCII file. The software runs on an MS-DOS® compatible PC.

Protocol monitoring (option 003)

Option 003 provides an interface for connecting the 8922M test set to the 37900D protocol analyzer.

The 37900D protocol analyzer may be used to continuously monitor the protocol link in real time between the mobile and 8922 base station simulator.

Agilent 83212D GSM/DCS1800/PCS1900 MS test software (option 012)

Option 012 includes a copy of the 83212B GSM/DCS1800/PCS1900/MS test software with the 8922S/M test set. This software runs on the 8922S/M I-BASIC controller to provide automatic testing of mobiles. For DCS1800/PCS1900 testing, the 83220A/E DCS/PCS test set is also needed.

Associated equipment

83210A service kit: Includes extender boards, cables and service manual (08922-90108).
85700A: 32 kbyte static RAM memory card.
85702A: 128 kbyte static RAM memory card.
85704A: 256 kbyte static RAM memory card.
85705A: 512 kbyte static RAM memory card.
85701A:128 kbyte OTP ROM memory card.
85703A: 256 kbyte OTP ROM memory card.
08922-61062: High stability reference (option 001) retrofit kit.
08922-61070: Transit protection (option 002) retrofit kit.
08922-61845: Spectrum analyzer (option 006) retrofit kit.
9211-2661: Transit case for the 83220E test set.
9211-2662: Transit case for the 8922S/M test set.
8657A/B: Synthesized signal generator
(Option 022): 0.3 GMSK modulator.
11759C: RF channel simulator.
8590E-Series: Spectrum analyzers.
85715B: GSM900 transmitter measurements personality.
85722B: DCS1800 transmitter measurements personality.

Recommended accessories

10438A: Miniature oscilloscope probe (high impedance/40 pF 1:1 probe).
54006A: 6 GHz resistive divider probe kit.
34118B: Test lead kit.
1250-1263: BNC (male) to single banana plug.
08920-61060: Antenna.

Agilent systems engineering assistance

Extra assistance from Agilent Technologies in the form of system installation, productivity assistance, programmer or user training, or solution consulting are available. Call for a quote.

The 83220E test set extends the 8922S/M test set to test DCS1800 and PCS1900 mobiles. Specifications are identical to the 8922S/M test set with the following exceptions:

MS-DOS is a US registered trademark of Microsoft Corporation.

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83220E DCS/PCS test set specifications

RF generator specifications

Frequency

Range: 1805 to 1990 MHz. 1710 to 1785 MHz (83220A test set only)

Output

RF in/out connector

Level range: -19 to -127 dBm.

Level accuracy: ± 1.0 dB, levels ≥ -127 dBm. *± 1.0 dB, typically for levels ≥ -127 dBm while hopping.*

Reverse power: 2 W continuous.

SWR: <1.5:1.

Aux RF output connector (83220A test set only)

Level Range: +5 to -127 dBm

Level Resolution: 0.1dB.

Level Accuracy: ±1.0 dB, levels≥-127 dBm. *±1.0 dB, typically for levels ≥ -127 dBm while hopping.*

Reverse power: 200 milliwatts.

SWR: 2.0:1.

0.3 GMSK modulation

Frequency error: ± (0.01 ppm (22 Hz) + reference accuracy), for normal bursts. *Typically ± (0.02 ppm (32 Hz) + reference accuracy), for RACHs.*

Supplemental characteristics

Frequency error: *± (0.005 ppm (9 Hz) + reference accuracy), for normal bursts. ±(0.01 ppm (18 Hz) + reference accuracy), for RACH bursts.*

AM for level control (8922M test set only)

For output levels ≤ -25 dBm at RF in/out.

Rise/fall time (10 to 90%): *< 20 µs.*

RF analyzer specifications

Frequency

Range: 1710 to 1990 MHz.

CW RF frequency measurement

Range: 1710 to 1990 MHz.

Level Range

RF in/out: -13 to +32 dBm.

Aux/RF in: - 23 to +20dBm (83220A test set only).

CW RF power measurement

Range: -5 to +32 dBm.

Accuracy: (≥ 0 dBm, 1710 to 1880 MHz) ± 0.5 dB ± noise effects (0.015 mW).

Supplemental characteristics

Accuracy (-5 to 0 dBm, 1880 to 1990 MHz): ± 0.5 dB ± noise effects (0.015 mW).

Accuracy (-5 to +32 dBm, 1710 to 1990 MHz): *See graph.*

Minimum resolution (> 0 dBm): *0.01 dB.*

Peak transmitter carrier power measurement

(RF in/out only)

Range: -5 to +32 dBm.

Accuracy: (≥ 0 dBm, 1710 to 1880 MHz) ± 0.6 dB ± noise effects (0.015 mW).

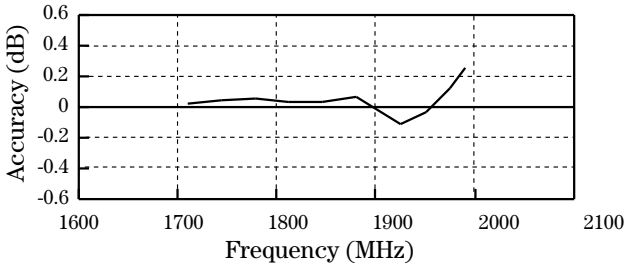
Supplemental characteristics

Accuracy (-5 to 0 dBm, 1880 to 1990 MHz): *± 0.6 dB ± noise effects (0.015 mW).*

Accuracy (-5 to +32 dBm, 1710 to 1990 MHz): *See graph.*

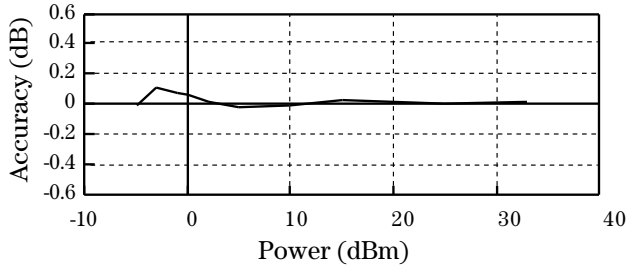
Minimum resolution (≥ 0 dBm): *0.2 dB.*

Power measurement accuracy 1710 to 1990 MHz



Measurement Power Level is 0 dBm

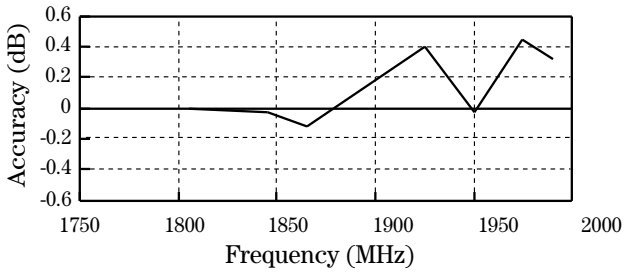
Power measurement accuracy +32 to -5 dBm



Measurement Frequency is 1880 MHz

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RF generator level accuracy 1710 to 1990 MHz



Measurement Power Level is -127 dBm

Pulse on/off ratio measurements

Off power (dBm)	On/off ratio accuracy
-48 to -19	± 2.4 dB (± 1.1 dB typically)
-55 to -48	± 2.9 dB (± 1.3 dB typically)

Amplitude envelope measurement

Measurement range

RF in/out: -13 to +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

Phase and frequency measurement

Measurement range

RF in/out: -13 to +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).
Frequency error accuracy: ± (0.01 ppm (22 Hz) + reference accuracy), for normal bursts.
Typically ± (0.02 ppm (32 Hz) + reference accuracy), for RACHs.

Supplemental characteristics

Frequency error accuracy: *± (0.005 ppm (9 Hz) + reference accuracy), for normal bursts.*
± (0.01 ppm (18 Hz) + reference accuracy), for RACH bursts.

0.3 GMSK data recovery

Range

RF in/out: -13 to +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

FM demodulation output (8922M test set only)

Range

RF in/out: 13 to +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

Pulse demodulation output (8922M test set only)

Range

RF in/out: -13 to +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

Output RF spectrum measurement

Range

RF in/out: -13 to +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

Input levels for optimum dynamic range

RF In/Out: -3, +2, +7, +12, +17, +22, +27, +32 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

Spectrum analyzer specifications

Frequency range: 1710 to 1990 MHz.
Reference level range
RF in/out: +35 to -45 dBm.
AUX/RF in: -23 to +23 (83220A test set only).

General specifications

Size

83220E: 133 H x 426 W x 574 D mm
(5.25 x 16.75 x 23 inch).
83220A/E + 8922: 310 H x 426 W x 574 D mm
(12.25 x 16.75 x 23 inch).

Weight

83220E: 16.3 kg, 36 lbs.
83220A/E + 8922S/M: 48.3 kg, 106 lbs.
Safety: Meets IEC 348 and CSA 556B.
Power: 100, 120, 220, 240 Vac, 48 to 440 Hz, ± 12% of line voltage, approximately 200 VA (83220A/E test set) or 640 VA (83220A/E + 8922 test sets).

Reference specifications

External reference input

Supplemental characteristics

10 MHz out (rear panel BNC)

Level: > +9.0 dBm nominal.

13 MHz out (rear panel BNC)

Level: > +9.0 dBm nominal.

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Ordering Information

8922S GSM MS service test set

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.
Option 0B1: Provides a total of two sets of user's guides (08922-90211), service manuals (08922-90213) and programmers reference guide (08922-90212).
Option 0B3: Adds service manual (08922-90213).
Option AX4: Rack mount flange kit (5062-4072).

8922M GSM MS test set

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.
Option 0B1: Provides a total of two sets of user's guides (08922-90211), service manuals (08922-90213) and programmers reference guide (08922-90212).
Option 0B3: Adds service manual (08922-90213).
Option AX4: Rack mount flange kit (5062-4072).

83220E DCS1800 MS test set

Option 022: Bundle discount when ordered with 8922S/M test set.
Option 0B1: Provides one additional user's guide, part number 83220-90027 (83220A/E test set)
Option AX4: Rack mount flange kit (5062-4071).

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).

For more information on GSM test solutions from Agilent Technologies, see the 8922S/M test set photocards (p/n 5964-6587E and 5964-6585E), 83212B test set product overview (p/n 5962-0196E) and the 8590E-Series technical data sheet (p/n 5091-9025E).

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Differences between the 8922S/M test sets and 8922F/H test sets

8922F/H to 8922S/M test sets 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 the 8922G option R10, 8922G option R72, 8922H (all options).

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

Agilent 8922S and 8922F test set differences

Feature	8922S test set	8922F test set
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

Agilent 8922M and 8922H test set differences

Feature	8922M test set	8922H test set
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

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.

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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."

Our Promise

"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

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) (31 20) 547 2390

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(fax) (81) 426 56 7840

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(fax) (305) 269 7599

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