

HP 8924C
HP 8924E



HP 8924C

HP 8924C CDMA Mobile Station Test Set



The HP 8924C CDMA Mobile Station Test Set provides the key set of measurements to verify the performance of dual-mode CDMA mobile phones operating from 500 to 1000 MHz. With the HP 83236B PCS Interface, the HP 8924C additionally offers CDMA mobile testing from 1700 to 2000 MHz. Acting as a calibrated, high performance CDMA base station, the HP 8924C verifies not only the parametric characteristics of CDMA phones, but also the functional aspects of phone performance.

The HP 8924C's full AMPS, NAMPS, EAMPS, TACS, NTACS, ETACS and JTACS test capability saves you space, cost, and training expenses by allowing you to make both analog and CDMA digital measurements with the same instrument.

For complete, call processing verification, the HP 8924C supports both mobile and base station initiated call connect and disconnect. Once a phone call is established, verifying the overall functionality of a CDMA mobile is simple using the HP 8924C's voice echo mode. For testing a variety of protocol formats, the HP 8924C offers six user selectable protocol stacks: IS-95, IS-95A, TSB-74, J-STD-008, ARIB T53, and KOREAN PCS. The HP 8924C also supports a number of service options, including 9600 BPS and 14,400 BPS traffic channel configurations.

High Accuracy CDMA Source for CDMA Receiver Test

Active cell site emulation in the HP 8924C is supplied by Sector A. The Sector A source supports the following CDMA channels: Pilot, Sync, Paging, Traffic, and Orthogonal Channel Noise Source (OCNS). In addition, the HP 8924C has a second sector for testing softer hand-offs. Sector B is a partial sector that has a Pilot channel, a Traffic channel, and an OCNS channel. An Additive White Gaussian Noise (AWGN) Source is also included to provide the interference generated by adjacent cells in a working CDMA network. The HP 8924C measures receiver Frame-Error-Rate (FER) at all four data rates used in the CDMA system: full, half, quarter, and one-eighth. Confidence limit technology is used to reduce receiver test time to an absolute minimum.

CDMA Transmitter Measurements

The HP 8924C provides an average power measurement based on DSP technology. A DSP based channel power measurement enables the HP 8924C to achieve accurate low level CDMA power measurements. Access probe power measurements are also available. The HP 8924C measures transmitted waveform quality by using the IS-98A/J-STD-018 recommended correlated power method, also known as the rho measurement. In addition, the rho measurement reports the frequency error, modulation phase and amplitude error, and the carrier feedthrough.

Handoff Verification

To speed testing, the HP 8924C supports hard hand-offs between RF channels. CDMA to analog hand-offs from both cellular and PCS bands are also supported. With two configurable CDMA sectors, the HP 8924C can verify the ability of a CDMA mobile to support softer hand-offs. Two HP 8924C test sets can be synchronized for complete idle and soft hand-off testing.

Authentication and Short Message Service Support

The HP 8924C provides the necessary features for testing a CDMA mobile station's ability to perform call processing functions with Authentication for Korea and the United States. Also, the HP 8924C supports mobile terminated SMS.

Automated Software

The new HP E8290A PoST (Point of Service Test) Software makes the HP 8924E an automated CDMA test solution. The HP E8290A quickly provides accurate phone performance and quality data at the point of sale. This PC-based solution is very easy to use, reduces churn, reduces NTF (No Trouble Found), and improves customer care.

The HP 83217A CDMA Dual Mode Mobile Station Test Software can also be used to automate CDMA and analog mobile phone measurements. The HP 83217A solution does not require a PC. Rather, automatic tests can be completely set up using the front panel of the HP 8924E. Options are available to meet your test needs for CDMA, AMPS, NAMPS, JTACS, NTACS, U.S PCS and Korean PCS phones.

HP 8924E CDMA Mobile Station Service Test Set

Like the HP 8924C, the HP 8924E CDMA MS Service Test Set acts as calibrated, high performance base station to provide the essential set of measurements required to test the parametric and functional characteristics of cellular, dual-mode CDMA phones.

There are key differences between the HP 8924C and HP 8924E:

- The HP 8924E's spectrum analyzer is optional.
- The HP 8924E has no second sector for softer handoffs.
- Two HP 8924E Test Sets cannot be synchronized for testing soft handoffs.
- The HP 8924E does not have access to certain general purpose analog screens.
- The HP 8924E generally takes twice as long to make the same measurement.
- The HP 8924E only supports the AUTO MS ID.
- The HP 8924E does not support:
 - closed loop power control changes
 - mobile parameter retrieval and setting
- There are rear panel differences between the HP 8924C and the HP 8924E.
- There are technical specification differences between the HP 8924C and the HP 8924E.

Even though it has reduced flexibility and functionality, and slower measurement speed, the HP 8924E CDMA Mobile Station Service Test Set does not sacrifice the quality, thoroughness, repeatability, and accuracy of the HP 8924C. The HP 8924E has a user-friendlier interface optimized for manual operation. It is a lower cost product designed for the CDMA mobile phone service market. The HP 8924E is optimized for the following applications:

- Incoming inspection for service providers
- Failure and repair verification for service organizations

Ordering Information

HP 8924C CDMA Mobile Station Test Set

HP 8924E CDMA Mobile Station Service Test Set

Opt 001 HP E8290A PoST Software

Opt 011 ETACS CCITT Filter

Opt OBW Service Documentation

Opt OB1 Add Manual Set

Opt AX4 Rack Flange Kit

Opt W30 3 Years of Customer Return Repair Service

Opt W50 3 Years of Customer Return Repair Service

Opt 102 Add Spectrum Analyzer with tracking generator (standard on HP 8924C)

Opt 601 Adds PCS Interface

HP 83217A CDMA Dual Mode MS Test Software

Must order one and only one option

per unit HP 83217A

Opt 001 AMPS/NAMPS/CDMA

Opt 003 JTACS/CDMA

HP E3290A Point of Service Test Software

HP 83236B PCS Interface

Opt 004 PCS CDMA/NAMPS/AMPS

Analog Mode Specification Summary**Signal Generator****RF Frequency Range**

Standard: 30 MHz to 1000 MHz
With Option 601: 800 MHz to 960 MHz, 1710 MHz to 1990 MHz

Output**RF In/Out Connector****Level Range**

Standard: -127 to -10.5 dBm into 50 ohms
With Option 601: -130 to -20 dBm into 50 ohms

Level Accuracy

Standard: ± 1.2 dB (Level ≥ -127 dBm)
With Option 601: ± 1.8 dB @ 25° C $\pm 10^\circ$ C

Reverse Power

Standard: 3 watts continuous
With Option 601: 10 watts continuous

Duplex Out/RF Out Only Connector**Level Range**

Standard: -127 to +3.5 dBm into 50 ohms
With Option 601: -130 to -10 dBm into 50 ohms

Level Accuracy

Standard: ± 1.0 dB (Level ≥ -127 dBm)
With Option 601: ± 1.8 dB @ 25° C $\pm 10^\circ$ C
Reverse Power: 200 mW maximum

Maximum FM Deviation (rates > 25 Hz)

Standard: 100 kHz; 501 MHz to 1000 MHz
With Option 601: 100 kHz; 800 to 960 MHz, 1710 to 1990 MHz

RF Analyzer**Frequency Measurement Range**

Standard: 30 MHz to 1000 MHz
With Option 601: 800 MHz to 960 MHz, 1710 MHz to 1990 MHz

RF Power Measurement (RF in/out connector only)**Measurement Range**

Standard: -10 dBm to +35 dBm (0.1 mW to 3 W)
With Option 601: -13 dBm to +40 dBm (50 μ W to 10 W)

Accuracy

Standard: $\pm 5\%$ of reading 1 μ W from 15° C to 35° C
With Option 601: $\pm 5\%$ of reading ± 2.5 μ W from 13° C to 33° C

Spectrum Analyzer**Frequency Range:**

Standard: 30 MHz to 1000 MHz
With Option 601: 800 MHz to 960 MHz, 1710 MHz to 1990 MHz

Resolution Bandwidth (coupled to span): 300 Hz to 300 kHz**Display Range:** 80 dB**AF Analyzer****Frequency Measurement**

Measurement Range: 20 Hz to 400 kHz
Accuracy: $\pm 0.02\%$ + resolution + reference oscillator accuracy

SINAD Measurement

Fundamental Frequency Range: 300 Hz to 10 kHz $\pm 5\%$
Accuracy: ± 1 dB for $F_c = 300$ to 1500 Hz, using the 15 kHz LPF
Residual THD+Noise: -60 dB or 150 μ V, whichever is greater

Oscilloscope**Frequency Range** (-3 dB BW): 2 Hz to 50 kHz**Scale/Division:** 10 mV to 10 V**Time/Division:** 10 μ s to 100 ms**Remote Programming**

HP-IB: Hewlett-Packard's implementation of IEEE Standard 488.2

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

Centronics Port: Industry standard parallel printer port

Ovenized Reference

Aging Rate: <0.005 ppm pk-pk/day, $\leq \pm 0.1$ ppm per year

CDMA Mode Specification Summary**CDMA Call Processing Functionality**

Protocol Stack: IS-95, IS-95A, TSB-74, J-STD-008, and ARIB-T53
Service Option Modes: SO 001, SO 002 (9600 bps loopback), SO 003, SO 009 (14400 bps loopback), SO 32768, SO 006, and SO 014

Traffic Channel Data Rates: 9.6 kbps or 14.4 kbps

Call Control: BS call originate, BS call disconnect, MS call originate, MS call disconnect

Hand-off Support: CDMA to CDMA Hard (RF Frequency), CDMA Softer (HP 8924C only), CDMA to Analog (intradband), and CDMA PCS to Analog Cellular CDMA Soft (requires 2 units) (HP 8924C only)

CDMA Signal Generator**CDMA Channels****Additive White Gaussian Noise**

Sector A – includes the following channels: Pilot Channel, Sync Channel, Paging Channel, Traffic Channel, and OCNS Channel

Sector B – includes the following channels: Pilot Channel, Traffic Channel, and OCNS Channel (HP 8924C only)

Frequency Range

Standard: 501 MHz to 1000 MHz, usable from 30 to 248.9 MHz
With Option 601: 800 MHz to 960 MHz, 1710 MHz to 1990 MHz

Composite Signal Output Level Range**Standard:**

RF In/Out: -109 dBm/1.23 MHz to -21.5 dBm/1.23 MHz
Duplex Out: -109 dBm/1.23 MHz to -7.5 dBm/1.23 MHz

With Option 601:

RF In/Out: -109 dBm/1.23 MHz to -20.01 dBm/1.23 MHz
RF Out Only: -109 dBm/1.23 MHz to -10.01 dBm/1.23 MHz

Composite Signal Output Level Accuracy (AWGN off)

Standard: ± 1.5 dB, typically ± 1.0 dB
With Option 601: ± 1.8 dB at 25° C $\pm 10^\circ$ C, typically ± 1.0 dB

Relative CDMA Channel Level Accuracy: 0.2 dB**CDMA Analyzer****CDMA Average Power Measurement****Input Frequency Range:**

Standard: 30 MHz to 1000 MHz
With Option 601: 800 MHz to 960 MHz, 1710 MHz to 1990 MHz

Measurement Range (RF in/out connector only):

Standard: -10 dBm to +35 dBm (0.1 mW to 3 W)
With Option 601: -13 dBm to +37 dBm (50 μ W to 5 W)

Measurement Accuracy

Standard: $\pm 5\%$ of reading ± 1 μ W from 15° C to 35° C
With Option 601: $\pm 5\%$ of reading ± 2.5 μ W from 13° C to 33° C

CDMA Channel Power and Access Probe Measurements

Measurement Range: -50 to +30 dBm/1.23 MHz
Calibration: Must be cross calibrated to Average Power Meter

Access Probe Measurement

Triggering: Auto-trigger above -55 dBm

CDMA Modulation Measurement**Input Level Range:**

Standard: -20 dBm to +35 dBm, usable to -25 dBm
With Option 601: -25 dBm to +37 dBm, usable to -28 dBm

" ρ " Measurement Accuracy: " ρ " ± 0.003 .

Frequency Error Measurement Accuracy: ± 30 Hz

Other Reported Parameter with " ρ " Measurement: Transmit Time (τ , time offset), Frequency Error, Carrier Feedthrough, Amplitude Error, Phase Error

CDMA Frame Error Rate Measurement

FER Measurement Method: Data loopback using Service Option 002 or 009 supporting Confidence limits per TIA/EIA-98-B

FER Reported Parameters: Measured FER, Number of Errors, Number of Frames tested, Pass or Failed Confidence limit

General Specifications**Dimensions (HxWxD)**

Standard: 177 H x 426 W x 629 D mm (7 x 16.75 x 24.75 inches)
With Option 601: 254 H x 426 W x 629 D mm (12 x 16.75 x 24.75 inches)

Weight

Standard: 27 kg, 59 lbs
With Option 601: 32.6 kg, 72 lbs

Operating Temperature: 0° C to +55° C

Power

HP 8924C: 100 V to 240 V, 50/60 Hz, nominally 400 VA
HP 83236B: 90 V to 132 V, 198 V to 264 V, 47 to 63 Hz, 100 VA