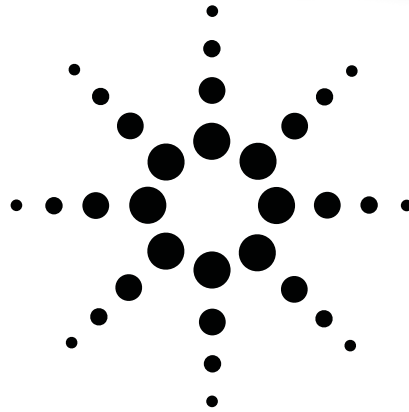# Agilent E6393A
CDMA/AMPS Mobile Station Test Set

For All Major CDMA and AMPS Frequency Bands
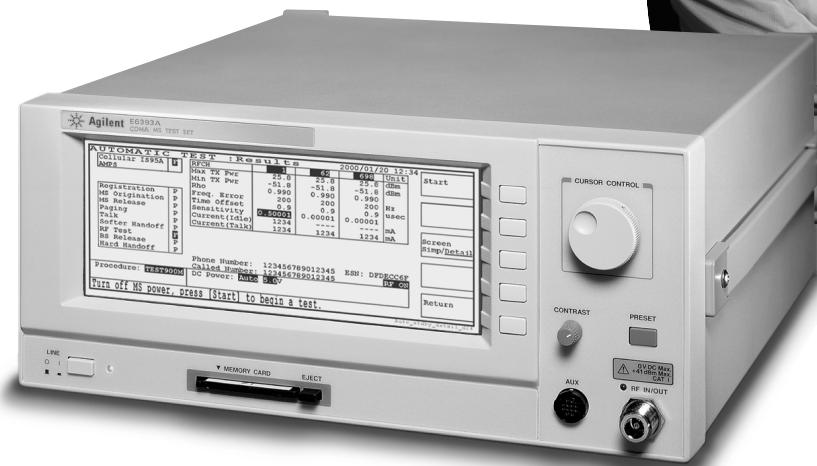
Product Overview

Packed with features for service and repair of CDMA mobile phones— all for a surprisingly affordable price

- Complete coverage of worldwide CDMA and AMPS cellular and PCS formats, plus upgrade capability for cdma2000

- Easy, comprehensive automated and manual testing, from go/no-go verification to module-level repair and calibration

- Key service measurements, including call tests, power, frequency, and rho

- Consistent, reliable test results comparable to a manufacturing test solution, with ±0.6 dB signal level and power measurement accuracy

- Comprehensive troubleshooting tools, including built-in automatic testing over 9 channels, CDMA/AMPS handoff test, programmable 12 V dc source, optional signal generator, and much more

- Point of service test software for flexible testing and database management

- The best value in its price class— a service and repair solution for about the price of an entry-level tester

Agilent Technologies

**The Agilent E6393A
CDMA/AMPS mobile-station test set**

Designed for today's mobile phone repair needs

Worldwide, the number of CDMA phones is growing—and so is the need for fast, cost efficient mobile phone service and repair.

The Agilent E6393A CDMA/AMPS mobile-station test set is designed to help you improve the effectiveness of your mobile phone service organization. This easy-to-use tool for inspection, repair, and calibration of CDMA mobile phones also offers the best combination of price, features, and performance on the market today.

The E6393A tests all major CDMA formats, including CDMA cellular (U.S., Korea, and Japan) and CDMA PCS (U.S. and Korea) as well as AMPS. With this capability, you can standardize your mobile service and repair operations on a single test platform that accommodates new multi-band CDMA phones with international roaming. And you protect your investment too, because you can upgrade the test set for cdma2000 testing.

Increased operational efficiency

The Agilent E6393A mobile station test set lets you increase the repair capability and effectiveness of your entire service network, extending coverage to local service shops and retail points of sale. By testing at these initial points of service, you will reduce the number of no-trouble-found phones that get sent into the repair pipeline. Faulty phones can be repaired at the module level and returned to customers more quickly.

The E6393A complements Agilent's E8285A and 8924 series CDMA manufacturing test sets, which can be used for more detailed component level testing and analysis at service-center hubs, enabling you to pursue a complete and cost effective mobile test strategy.

```
AUTOMATIC  TEST  :Results          2000/01/20 12:34
Cellular IS95A [F] RFCH        1        62        698  Unit    Start
AMPS               Max TX Pwr   25.8      25.8      25.8  dBm
                   Min TX Pwr  -51.8     -51.8     -51.8  dBm
                   Rho         0.990     0.990     0.990
Registration   P   Freq. Error   200       200       200  Hz
MS Origination P   Time Offset   0.9       0.9       0.9  usec
MS Release     P   Sensitivity 0.50001  0.00001  0.00001
Paging         P   Current(Idle) 1234     ----      ----  mA
Talk           P   Current(Talk) 1234     1234      1234  mA    Screen
Softer Handoff P                                              Simp/Detail
RF Test        [F]
BS Release     P
Hard Handoff   P
                   Phone Number:  123456789012345  ESN: DFDECC6F
                   Called Number: 123456789012345        RF ON
Procedure: TEST900M  DC Power: Auto 5.0V                       Return
Turn off MS power, press [Start] to begin a test.
```

Module-level repair at a go/no-go tester price!

The E6393A CDMA/AMPS mobile station test set packs substantial measurement capability and perform-ance into a compact, easy-to-use package that is easy to maintain and support. No other test set in its price range offers you this much value for the service and repair of CDMA mobile phones.

Flexible, with just enough functionality

A first level test set must be afford-able, but price isn't the only factor in your decision. Today, service centers require instruments with more than just "go/no-go" test capability. The E6393A mobile station test set has enough functionality and flexibility to make quick inspections of overall mobile phone performance, to locate mechanical and module faults, and to do module-level repairs.

All major CDMA service tests are included: call tests, power, frequency, and rho. The CDMA/AMPS handoff test speeds testing of dual-mode phones by allowing you to use a single test plan for both formats.

Automatic and manual testing

With the growing number of mobile phones coming into repair shops every month, inspections need to be quick and thorough. The E6393A's automatic CDMA measurements speed you through a comprehensive functionality check and provide consistent, repeatable results. Built-in automatic testing over nine channels lets you use a single test plan for CDMA, PCS, and AMPS dual-band/dual-mode phones—and execute measurements automatically, without software programming.

If you spot a fault in a phone, the test set's manual measurement tools let you adjust the measurement parame-ters to focus on the specific problem area and troubleshoot to the mechani-cal or module level.

The right amount of performance

Mobile service and repair doesn't require the performance of a manu-facturing test set, but you still need to obtain accurate and reliable results. The E6393A provides signal level and power measurement accuracy of ±0.6 dB. With optional capability for power measurement down to –60 dBm and signal output up to –20 dBm, this test set can fit into many levels of the repair process where traditionally more expensive manufacturing solutions have been used.
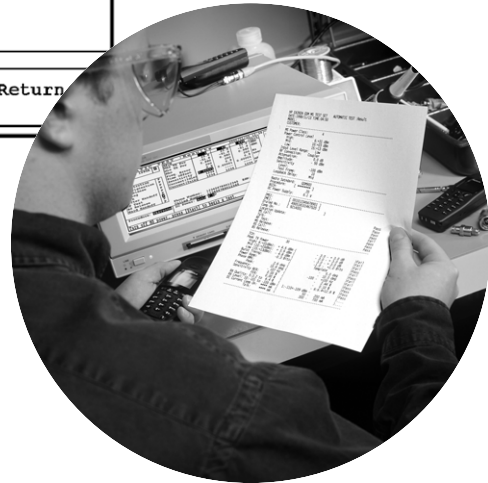
Fault-finding capability and more

The E6393A includes a complete set of measurement tools for inspection, troubleshooting, repair of faulty modules, and adjustment after repair. These tools include a power consumption check (dc current measurement), transmitter and receiver measurements, and built-in dc power supply. An optional signal generator and optional asynchro-nous test mode provide even more troubleshooting capability.
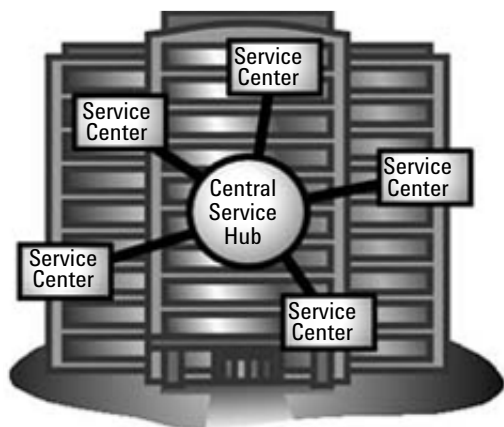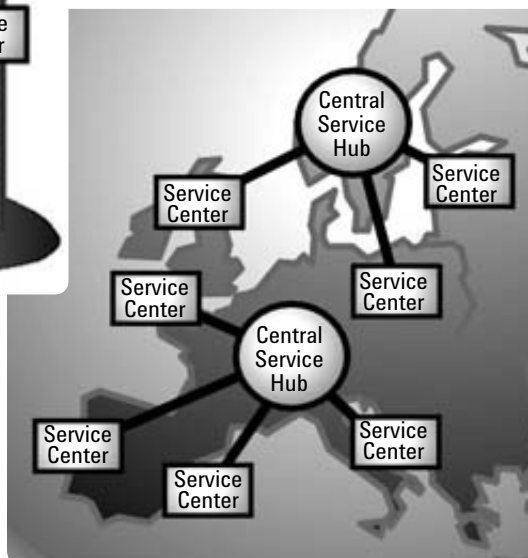
Micro service network

After-repair adjustments and calibration

Equipped with a 3 through 12 V dc source, the CDMA/AMPS mobile station test set can perform after-repair adjustments, such as calibration of battery chargers, without the need for an external power supply and current meter.

You can use the manual async TX power test for transmitter calibration. For receiver calibration, use the signal generator to output a signal from the test set to the mobile phone.

With Option 010 for power measurement down to −60 dBm and signal output up to −20 dBm, you will have a cost effective tool for accurate calibration even after component level repair.

The foundation of a cost effective service-repair strategy

To optimize a distributed repair strategy and facilitate fast turnaround of mobile phone repairs, you can combine the cost advantages of the E6393A with the factory-level quality of the E8285A or 8924 series mobile station test sets.

Following a hub-and-spoke approach, you can delegate module-level repairs to remote (spoke) service centers or retail phone stores, using the E6393A service test set for incoming inspection, troubleshooting, repair, and final adjustments of the mobile phones. With this test set's economical price, you will want to put one on every test bench!

At central or hub service centers, you can use the E6393A test set for incoming inspection and final calibration, and the manufacturing test sets for the most detailed component level measurements, troubleshooting, and failure analysis.

With the hub-and-spoke* approach, use the low-end E6393A for incoming inspection, troubleshooting, and module level repair at remote "spoke" service centers and stations.

Component-level repairs can be made at the central service "hub" using the high-end 8924 series test set for manufacturing quality measurements, trouble-shooting, failure analysis, and final checkout.

*Spoke service centers and stations = Low end phone test solution with the E6393A

Hub service centers = High-end board and phone calibration solution with the 8924 series, in conjunction with the E6393A

Easy-to-use, easy to manage

With the E6393A, you will cut the time and costs of training. About 30 minutes is all it takes to learn how to use this test set. An intuitive user interface and PCMCIA memory card reader help make the test set especially easy to set up and operate. For example, all tests—Automatic, Manual, Signal Generator, and Configuration—are selected from a top screen.

All settings, including configuration settings and cable losses, can be saved to a file. Different test conditions can be stored on a PCMCIA card for easy uploading into the instrument. Measurements can be selected and run by simply rotating a knob and pressing a few keys.

Firmware updates through the Internet or PCMCIA card

To significantly reduce the time and effort it takes to update the E6393A, Agilent will provide firmware updates for the CDMA/AMPS test set on PCMCIA cards and via the Internet. You simply insert the PCMCIA card into the test set and follow the simple instructions. With one card, you can efficiently update all the test sets in your service center.

Alternatively, you can download the software and the latest firmware files from the Internet using a Windows®-based PC, and update your test set through the RS-232 connection.

Useful accessories

When speed and convenience count, it's important to have the right test accessories within easy reach. For example, you'll want the correct RF cable to connect the test set to the handset of the mobile phone. Agilent offers a growing family of optional accessories for the new CDMA/AMPS test set that includes RF cables, RF and dc power adapters, couplers, and a shield box for testing in open, spectrally noisy environments.

Automatic testing with PoST software

With the addition of the Agilent E8294A Point of Service Test (PoST) Windows®-based PC software, the E6393A increases its capability to quickly and easily screen customer returned phones by automating test sequences. This practical test solution's mouse-driven, Graphical User Interface (GUI) enables any operator to make fast, accurate measurements regarding the performance of CDMA and AMPS mobile phones. The detailed performance data provided by the PoST software can be saved in PC database and spreadsheet formats for use in trend-analysis and customer care programs. Technicians can also use PoST to easily customize test plans for testing mobile phones according to their individual needs.

E6393A technical specifications

Specifications describe the E6393A warranted performance and apply after a 30 minute warm-up. These specifications are valid over the E6393A's entire operating environmental range unless otherwise noted, Specifications are subject to change without notice.

Supplemental characteristics (shown in italics) are intended to provide additional information, useful in applying the instrument by giving typical expected, but non-warranted performance.

CDMA mode specifications

CDMA call processing functionality

Radio system support:

IS-95A (Cellular/IS-95A), TSB-74 (Cellular/TSB-74), ARIB T53 (Cellular/T53), J-STD-008 (PCS US, PCS Korea P0, and PCS Korea P1)

Call processing support:

Registration, MS origination, MS release, Paging, BS release

Service option support:

1, 2, 3, 9, and 32768

Handoff support:

Softer handoff between two sectors A and B
Hard handoff between any two RF channels
Multi-mode hard handoff between Cellular/IS-95A and PCS US and between Cellular/TSB-74 and PCS US

CDMA signal generator

CDMA channels:

Sector A: Pilot, Sync, Paging, Traffic, OCNS
Sector B: Pilot, Traffic, OCNS

Frequency:

Range:
    869 MHz to 894 MHz (Cellular/IS-95A and Cellular/TSB-74),
    832 MHz to 834 MHz, 843 MHz to 846 MHz, and 860 MHz to 870 MHz (Cellular/T53),
    1805 MHz to 1870 MHz (PCS Korea P0 and P1),
    1930 MHz to 1990 MHz (PCS US)
Resolution:
    30 kHz (Cellular/IS-95A and Cellular/TSB-74),
    12.5 kHz (Cellular/T53),
    50 kHz (PCS US, PCS Korea P0 and P1)
Accuracy: Same as reference oscillator

Amplitude:

Note: To achieve the specified signal output level accuracy when inputting power at RF IN/OUT port of the E6393A, the input power level must be less than or equal to (– Composite Signal Output Level) –25 dB. For example, the input power level must be less than or equal to –5 dBm at composite signal output level of –20 dBm.

Range: –110 dBm to –40 dBm
Accuracy:
    ±1.0 dB at <=–50 dBm
    ±2.0 dB at >–50 dBm
Resolution: 0.1 dB

CDMA modulation:

Type: QPSK based on IS-95A
Residual rho: >=0.912 (typically >0.95)
Data generation patterns: PN9
Power control bit: Always up, always down, open loop

CDMA analyzer

Input frequency range:

824 MHz to 849 MHz (Cellular/IS-95A and Cellular/TSB-74),
887 MHz to 889 MHz, 898 MHz to 901 MHz, and 915 MHz to 925 MHz (Cellular/T53),
1715 MHz to 1780 MHz (PCS Korea P0 and P1),
1850 MHz to 1910 MHz (PCS US)

CDMA power measurement:

Range: –20 dBm to +39 dBm
Accuracy:
    ±1 dB *(typically ±0.6 dB)* at >=0 dBm
    ±2 dB *(typically ±1.2 dB)* at <0 dBm
Resolution: 0.2 dB

CDMA modulation measurement:

Input range: –20 dBm to +39 dBm
Modulation type: OQPSK based on IS-95A
Rho measurement:
    Range: 0.9 to 1.0
    Accuracy:
    ±0.01 at >=0.95
    ±0.02 at <0.95
    Resolution: 0.001
Frequency error measurement:
    Range: ±10 kHz
    Accuracy: ±(30 Hz + frequency reference accuracy) at average of 4 measurements
    Resolution: 1 Hz
Transmit time error measurement (supplemental characteristic)

CDMA frame error rate measurement:

Method: Data loop back at full rate per service option 002 or service option 009 supporting confidence limits (95% or off) as outlined in TIA/EIA-98A Appendix A.1.

Range: 0% to 100%

Resolution: 0.00001%

Displayed results: Measured FER, number of errors, number of frames tested, and one of the following: pass, fail, or (pass/fail not applicable)

dc power supply

Range: 3 Vdc to 12 Vdc at 0.1 Vdc step
Voltage accuracy:
    0.1 V at <=100 mA
    0.3 V at <=300 mA
    0.6 V at <=1000 mA
Maximum current: 1 A
Connector: D-SUB 9 pin connector or Banana plug

dc current measurement

Range: 0 mA to 1000 mA

Accuracy:
    ±3 mA at <=100 mA
    ±30 mA at >100 mA

Resolution: 1 mA

Memory card

Card compatibility: PCMCIA (U.S.)

Memory size: <=32 Mbyte RAM

Capability:
    Parameters: storage/retrieval
    Firmware: upgrade

Remote programming

Interface: EIA RS-232C

Baud Rate: 9600 bps, 19200 bps

Connector: D-Sub 9 pin

Printer interface

Interface: Centronics

Connecter: D-SUB 25 pin female

Printable output: test results and screen dumps

RF input/output

Maximum safe reverse power: +41 dBm (12.6W, CW; supplemental characteristic)

Impedance: 50 ohm nominal, Input SWR: <1.5:1

Connector: N-type (f)

Reference oscillator

Frequency: 10 MHz

Frequency accuracy: ±[(time since calibration x aging rate) + temperature effects + accuracy of calibration]

Aging rate: ±0.1 ppm per year

Temperature stability: ±0.1 ppm at 0 deg. C to 40 deg. C

Reference output level: +3 dBm, 50 ohm

Reference input level: 0 dBm to 10 dBm, 50 ohm

Connector: BNC (f) connector

Option 002 E6393A TX analyzer and signal generator

The TX analyzer provides power, frequency error, and rho measurements without call setup. The signal generator provides CW signal in addition to CDMA modulated and FM signal based on IS-95A (AMPS).

TX analyzer

CDMA mode:

Input frequency range: See CDMA analyzer.

CDMA average power measurement: See CDMA analyzer

CDMA modulation measurement: See CDMA analyzer

Rho measurement: See CDMA analyzer

Frequency error measurement: See CDMA analyzer

Transmit time error measurement: See CDMA analyzer

AMPS mode, (Option 003):

See Audio source, RF analyzer, and Audio analyzer (Option 003)

Signal generator

Frequency: See CDMA signal generator and AMPS signal generator (Option 003)

Amplitude: See CDMA signal generator and AMPS signal generator (Option 003)

Modulation: QPSK based on IS-95A, frequency modulation (Option 003), and Off (CW)

Option 003 E6393A AMPS mode specification

AMPS call processing functionality

Radio system support: IS-95A (AMPS)

AMPS call processing support:
    Registration, MS origination, MS release, paging, and BS release

Handoff support:

    Hard handoff between two RF channels within AMPS

    Hard handoff between two radio systems:
        Cellular/IS-95A to AMPS
        Cellular/TSB-74 to AMPS
        PCS US to AMPS

AMPS signal generator:

Frequency:

Range: 869 MHz to 894 MHz

Accuracy: same as reference oscillator

Resolution: 30 kHz

Amplitude:

Range: –120 dBm to –40 dBm

Accuracy:
    ±1.0 dB at >–110 dBm
    ±2.0 dB at <=–110 dBm

Resolution: 0.1dB

Modulation: Frequency modulation (FM)

FM distortion (THD+Noise, C-message filter): <1% at 8 kHz deviation and 1.004 kHz rate

Audio source

Frequency: 1.004 kHz ± 0.025%

Level range: 1 mV (–60 dBv) to 1 Vrms (0 dBv)

Level accuracy:
±1 dB at 0 dBv to –30 dBv
±2 dB *(typically ±1.2 dB)* at <= –31 dBv

Level resolution: 1 dB

Output Impedance: <10 ohm

RF analyzer

Input frequency range: 824 MHz to 849 MHz

Input level range: –20 dBm to +39 dBm

Frequency error measurement:

Range: ±12.5 ppm

Accuracy: ±(0.01 ppm + frequency accuracy of reference oscillator)

Resolution: 0.01 ppm

Power measurement:

Note: To achieve the specified accuracy when measuring power at RF IN/OUT port of the E6393A, the AMPS signal generator level must be less than –50 dBm.

Range: –20 dBm to +39 dBm

Accuracy:
±1.0 dB *(typically ±0.6 dB)* at >=0 dBm
±2.0 dB *(typically ±1.2 dB)* at <0 dBm

Resolution: 0.2 dB

FM measurement:

Frequency measurement:

Range: 1.004 kHz ±5%, 6 kHz ±5%, 10 kHz ±5%

Accuracy: ±(0.02% of reading + resolution + frequency accuracy of reference oscillator)

Resolution: 0.1 Hz

Deviation measurement:

Range: 2 kHz to 25 kHz

Accuracy: ±4% at 8 kHz deviation

Resolution: 0.01 kHz

Displayed value: (+peak to –peak)/2

Audio analyzer

SINAD measurement:

Frequency: 1.004 kHz

Audio input range: 30 mV to 3 Vrms

Range: 0 dB to 40 dB

Accuracy: ±1.0 dB *(typically ±0.6 dB)*

Resolution: 0.1 dB

Option 010 High level signal output and low power measurement

CDMA signal generator amplitude

Note: To achieve the specified signal output level accuracy when inputting power at RF IN/OUT port of the E6393A, the input power level must be less than or equal to (–Composite Signal Output Level) –25 dB. For example, the input power level must be less than or equal to –5 dBm at Composite signal output level of –20 dBm.

Range: –110 dBm to –20 dBm

Accuracy:
±1.0 dB at <= –50 dBm
±2.0 dB at >–50 dBm

Resolution: 0.1 dB

CDMA analyzer power measurement

Range: –60 dBm to +39 dBm

Accuracy:
±1 dB *(typically ±0.6 dB)* at >=0 dBm
±2 dB *(typically ±1.2 dB)* at >=–40 dBm and <0 dBm
±3 dB *(typically ±1.8 dB)* at <–40 dBm

General specifications

Dimensions: 350 W x 150 H x 400 D mm

Weight: <15 kg

Operating temperature: 0 deg. C to +40 deg. C

Storage temperature: –20 deg. C to +60 deg. C

Operating humidity: 15% RH to 95% RH at +40 deg. C

Power: 88 VAC to 264 VAC, 47 Hz to 63 Hz, <250 VA

Safety:
European Council Directive 73/23/EEC
IEC 61010-1:1990+A1+A2 / EN 61010-1:1993+A2
CAN/CSA C22.2 No. 1010.1-92

EMC:
European Council Directive 89/336/EEC
EN 61326-1:1997+A1
CISPR 11:1997+A1 / EN 55011:1998 Group 1, Class A
AS/NZS 2064.1/2 Group 1, Class A

Altitude: <2000 meters

Ordering information

E6393A:	CDMA MS test set:
Option 001	Antenna coupler
Option 002	TX analyzer and signal generator
Option 003	AMPS test capability
Option 005	SRAM card
Option 006	PC power / audio test adapter
Option 010	High level signal output and low power measurement
Option 150	PoST CDMA/AMPS software
Option 202	RF Cable for Nokia 51xx,61xx,71xx phones

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