



Agilent E7450A

RF Coverage Measurement System

Data Sheet



The Agilent Technologies E7450A RF coverage measurement system is used to obtain measurement versus location data to test the coverage of PCS communications networks. The E7450A system includes PC software, an E6450A PCS receiver, a cigarette

lighter power adapter, an ac/dc power adapter and an RS-232 cable. The system can be integrated with a GPS receiver (including Dead Reckoning) and mapping software.



Agilent Technologies
Innovating the HP Way

Specifications describe warranted performance over the temperature range of 0° to 55°C and include a 30-minute warm-up from ambient conditions.

Typical and **Characteristic** information provide useful information by giving non-warranted performance parameters. **Typical** refers to test data at the fiftieth percentile for a 25°C room temperature.

Characteristic information describes product information for parameters that are either not subject to variation, non-measurable, verifiable through functional pass/fail tests, or as a matter of routine not measured.

Computer Software Measurements

Spectrum Analyzer

The Agilent E7450A's spectrum analyzer display allows the user to set the following configuration settings:

Center/span or start/stop frequencies
Resolution bandwidth (10 kHz to 1 MHz)
Sweep time
Special display modes (group average, running average, single sweep)
Reference level
dB/div
Autoscaling

CW Power

The E7450A can repeatedly measure the power at specified frequencies within a specified resolution bandwidth. The user can set the frequencies to be measured in two different ways:

1. Manually input a list of frequencies
2. Set the start frequency, step size, and the "count". The system measures at the start frequency, at the (start + step) frequency, ... , (start + (count - 1)* step) frequency. For example, if the start frequency is set to 1900 MHz the step size is set to 1 MHz and the count is set to 4; then measurements are made at 1900 MHz, 1901 MHz, 1902 MHz and 1903 MHz

The user can also set the following configuration settings:

Resolution bandwidth (10 kHz to 1 MHz)
Measurement interval
Special display modes (group average, running average, single sweep)
Reference level
dB/div
Autoscaling

Channel Power

The E7450A can measure the total power within a user-defined bandwidth. The user can set the channels to be measured in two different ways:

1. Manually input a list of channels
2. Set the start channel, step size, and the "count". The system measures the channel power of the start channel, the (start + step) channel, ... , (start + (count - 1)*step) channel. For example, if the start channel is set to 75, the step size is set to 2 channels and the count is set to 4; then measurements are made at channels 75, 77, 79, and 81

The user can also set the following configuration settings:

Channel bandwidth (10 kHz to 60 MHz)
Measurement interval
Special display modes (group average, running average, single sweep)
Reference level
dB/div
Autoscaling

CDMA–Pilot Channel Power

The E7450A system is capable of measuring E_c , I_o , and E_c/I_o of IS-95 or J-Std-008 CDMA Pilot Channels. These measurements are independent of network parameter settings. The user can define the measurement using the following four measurement types:

All pilots: The system measures all 512 pilot channels

Top N: The system displays the top ‘N’ pilot channels received, where ‘N’ is a user definable integer from 1 to 20, in bar graph format

Zoomed pilots: The user sets the center/span or start/stop chip (or PN offset)

User list: The user manually inputs a list of up to 20 PN offsets to be measured. The measurements are displayed in bar graph format

The user can also set the following configuration settings:

Carrier frequency

Measurement interval

Special display modes (group average, running average, single sweep)

Reference level

dB/div

Autoscaling

Power display– E_c or E_c/I_o

CDMA–Pilot Channel Timing Offset

For Top ‘N’ and User List measurements, a timing offset is displayed on top of each bar. The timing offset is defined as the difference in time between when a pilot signal is received and when it *should* have been transmitted, as defined by GPS timing. For example, a base station transmitting PN offset 0 is expected to start a new short-code pattern synchronous with the GPS even second clock. If the signal is received 3 chips after the GPS even second clock, then the timing offset is said to be 3 chips (1 chip \approx 0.8 microseconds). Timing offsets can be due to both propagation delay and base station timing problems.

CDMA–Carrier Frequency Error

The system displays the difference between the measured carrier frequency and the user-specified carrier frequency. Carrier frequency error can be due to both base station carrier error and doppler shift (if moving).

Data Presentation/Handling

Data can be displayed while being collected or in “playback” mode using the following display types:

- Spectrum analyzer–trace display
- CW power–bar graph
- CW power–trace display
- Channel power–bar graph
- Channel power–trace display
- Pilot channel–trace display
- Pilot channel–bar graph
- Position

Data can be flexibly exported to a file for use in another application, such as mapping software or additional post-processing software. Data export formats are:

- MapInfo
- ArcView
- ASCII text file

As part of data export, data can be binned (a data-reduction process in which the driven area is overlaid by a grid of user-definable size, and the average of the datapoints in each square are reported). The system is designed to work with MapInfo in a seamless, integrated manner. The data that can be mapped or automatically compiled into a text report includes:

- Raw data (location, date, time, measurements, etc.)
- Maximum of all pilots (E_c or E_c/I_o)
- Maximum of top N pilots (E_c or E_c/I_o)
- Name or PN offset of base station broadcasting the strongest pilot signal received
- Number of pilots above a threshold (E_c or E_c/I_o)
- PN offset and power measurements (E_c or E_c/I_o)
- CW power
- Channel power
- Carrier frequency error
- I_o measurements
- Alert logs

Alerts

System alerts notify the user that the system has, or is about to, encounter the following:

- Insufficient disk space
- High CPU usage
- Absence of GPS fix
- High driving speed
- Low battery level
- No AC power connection

Measurement alerts allow the user to set criteria on measurement data. If data is collected that meets the criteria, then any combination of alert actions can be executed.

Alert Criteria

Measurement [$<$, $>$, \leq , \geq , $=$, \neq] Value
 Min (Measurement) [$<$, $>$, \leq , \geq , $=$, \neq] Value
 Max (Measurement) [$<$, $>$, \leq , \geq , $=$, \neq] Value

Alert Actions

Play a .wav audio file
 Display text message
 Stop
 Pause

Agilent E6450A Receiver

Frequency

Frequency range 1850-1910 MHz
 1930-1990 MH
 Frequency accuracy ± 1 ppm ($20^\circ - 30^\circ\text{C}$)
 ± 2 ppm ($0^\circ - 55^\circ\text{C}$)

w/GPS time
 synchronization $\pm .05$ ppm characteristic
 IF bandwidth 1.25 MHz characteristic
 Aging of TCXO ± 1 ppm/year

Amplitude

Accuracy	± 1 dB (20° - 30°C) ± 2 dB (0° - 55°C)
Noise figure	8.5 dB typical
Maximum safe input level	+10 dBm , 20V DC characteristic
1 dB compression point	-25 dBm characteristic
**Adjacent channel desensitization	-20 dBm typical

Input/Output

RF input	50 Ω Type-N
----------	-------------

Connectors

Computer	RS-232 (DB9) Male
GPS	RS-232 (DB9) Male
Power	DC power jack 100 mils, positive center

Miscellaneous

Operating temp range	0° - 55°C
Storage temp range	-40° - 70°C
Dimensions	6 in x 3-5/8 in x 8 in
Weight	4.5 lbs
Power	9 to 34 V DC, 9W

**Adjacent channel desensitization: 1 dB compression of tuned signal with interfering signal ±1.25 MHz from tuned signal.

Computer Hardware

The E7450A can be used with existing computer hardware, provided the computer meets the following minimum requirements:

Pentium processor
Windows 95 or Windows NT
RS-232 (DB9) serial port
16 MB RAM if using Windows 95
32 MB RAM if using Windows NT
6 MB disk space for software installation
200 MB disk space recommended for data
CD-ROM drive recommended if using Mapping SW
800 x 600 display resolution.

If you wish to purchase a laptop computer with the system, Option 010 adds an HP Omnibook with the following specifications to the system:

Pentium processor
32 MB RAM
CD-ROM drive
Enhanced lithium ion battery pack
12.1 inches active matrix display

More information on the HP Omnibook can be found at www.hp.com.

GPS

The E7450A system has the ability to work with several different types of GPS interfaces, providing flexibility by allowing the integration of existing GPS receivers. The system is compatible with multiple communications protocols. The minimum requirements for the GPS receiver used are:

Interface: RS-232 (DB9)
Protocol: NMEA, TSIP or TAIP

If you wish to purchase a GPS receiver with the system, Option 210 adds a Trimble Placer/DR Model 455 GPS receiver, a GPS antenna, and interconnection cables. The Trimble Place/DR Model 455 has the ability to use Dead Reckoning in situations when the GPS signal can not be received.

External GPS receivers used with the E7450A system must output the GPS 1 pulse/second signal for CDMA measurements. To use this signal, a special adapter is required. If a user wishes to integrate an existing Trimble Placer/DR Model 400 GPS receiver, Option 211 should be ordered. For other models of external GPS receivers, consult an Agilent representative for adapter availability.

Mapping Software

MapInfo can be launched from within the E7450A, providing transparent integration between mapping information and measurement data. In addition, the E7450A can output data in ASCII format, allowing the user to import data into other applications (see Software Specifications). MapInfo can be purchased with the system as Option 310, and if a laptop computer is ordered, the software will be installed on the laptop.

Antennas

E6450A receiver RF input specifications:
Input Impedance: 50 Ω
Connector Type: Type-N connector

Option 410 PCS Antenna

Manufacturer: Antenna Specialists
Manufacturer Part Number: ASPM1954T
Mounting Type: Magnetic

Portability Accessories

The Agilent E7450A is a highly portable system which can be mounted in several different configurations. The following options are offered with the system:

Option 500

Rackmount chassis

Width: 19 in

Height: 4 in

Capacity: up to four E6450A receivers

Option 510

Vehicle mounting kit

Brackets and screws for mounting an E6450 PCS receiver

Option 530

Briefcase carrier

For transporting an E7450A system

System is not intended to be operated from within case

Dimensions: 17 in. x 14 in. x 5 in.

Warranty

One year warranty on hardware components, and one year of application support is included with the system.

Additional Literature

Awareness Brochure	5965-7426E
Configuration Guide	5965-8219E

Agilent Technologies' Test and Measurement Support, Services, and Assistance

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.

By internet, phone, or fax, get assistance with all your test and measurement needs.

Online Assistance

www.agilent.com/find/assist

Phone or Fax

United States:

(tel) 1 800 452 4844

Canada:

(tel) 1 877 894 4414

(fax) (905) 206 4120

Europe:

(tel) (31 20) 547 2323

(fax) (31 20) 547 2390

Japan:

(tel) (81) 426 56 7832

(fax) (81) 426 56 7840

Latin America:

(tel) (305) 267 4245

(fax) (305) 267 4286

Australia:

(tel) 1 800 629 485

(fax) (61 3) 9272 0749

New Zealand:

(tel) 0 800 738 378

(fax) (64 4) 495 8950

Asia Pacific:

(tel) (852) 3197 7777

(fax) (852) 2506 9284

Product specifications and descriptions in this document subject to change without notice.

Copyright © 1997, 2000 Agilent Technologies

Printed in U.S.A. 6/00

5965-8220E



Agilent Technologies

Innovating the HP Way