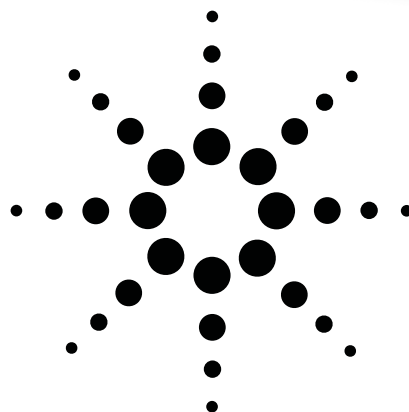


Agilent E6393B cdma2000/AMPS Mobile Station Test Set

For All Major CDMA and AMPS
Frequency Bands

Product Overview



Packed with features for service and repair of cdma2000 mobile phones—all for a surprisingly affordable price

- Complete coverage of worldwide CDMA and AMPS cellular and PCS formats, including cdma2000 1x
- 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 single code rho, multi code rho and TDSO FER Measurement
- 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

Please contact local Agilent office for E6393B testing details of cdmaOne and AMPS.



Agilent Technologies



The Agilent E6393B
cdma2000/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 E6393B cdma2000/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 E6393B tests all major CDMA formats, including IS-2000 (U.S., Korea and Japan), 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 E6393B 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 E6393B complements Agilent's 8960 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		2001/10/17 12:34			
Cell US/IS2K	F	RFCH	1	62	698
Cellr/IS95A	-	Max TX Power	+24.8	+25.2	+25.5
AMPS	-	Min TX Power	-51.8	-52.3	-51.9
		Frequency Error	200	202	201
Registration	P	Multi-code Rho	0.990	0.991	0.990
MS Origination	P	Time Offset	+0.15	+0.15	+0.05
Voice Echo	P	Sensitivity/FER	0.50010	0.00000	0.00000
MS Release	P	DC Current (Idle)	125	----	----
Paging	P	DC Current (Talk)	685	705	725
RF Test	F				
Softer Handoff	P				
Hard Handoff	P				
BS Release	-				
RF On		Phone Number:	0002345		
		Dialed Number:	12345		
		ESN:	D1234C56		
		DC Power: Auto	5.0V		
Procedure: Test2000					
Press [Start] to begin a test.					

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

The E6393B cdma2000/AMPS mobile station test set packs substantial measurement capability and performance 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 affordable, 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 E6393B 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, single code rho, multi code rho and TDSO FER measurement. 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 E6393B'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/Tri-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 parameters to focus on the specific problem area and troubleshoot to the mechanical or module level.

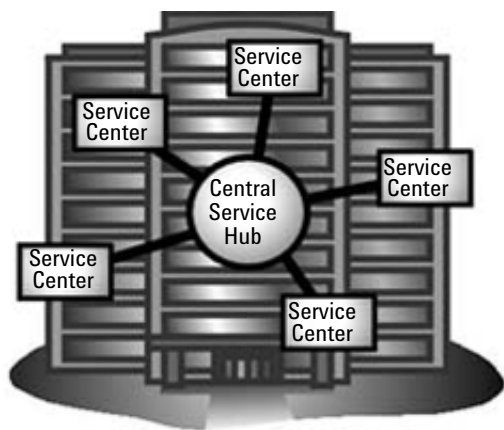
The right amount of performance

Mobile service and repair doesn't require the performance of a manufacturing test set, but you still need to obtain accurate and reliable results. The E6393B provides signal level and power measurement accuracy of ± 0.6 dB. With the 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 E6393B 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 asynchronous test mode provide even more troubleshooting capability.



Micro service network

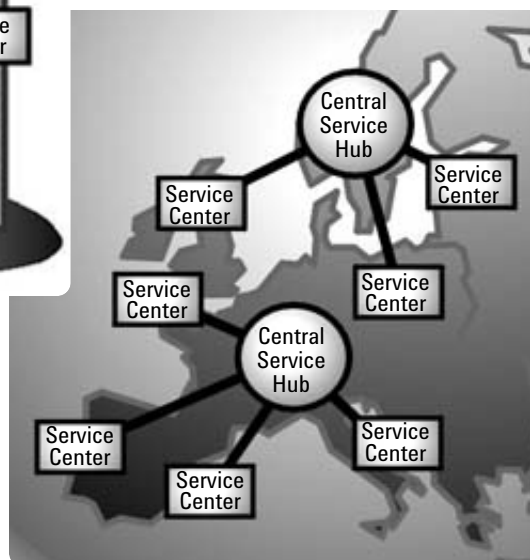
After-repair adjustments and calibration

Equipped with a 3 through 12 V dc source, the cdma2000/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 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.

Macro service network



With the hub-and-spoke* approach, use the low-end E6393B 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 8960 series test set for manufacturing quality measurements, troubleshooting, failure analysis, and final checkout.

*Spoke service centers and stations = Low end phone test solution with the E6393B

Hub service centers = High-end board and phone calibration solution with the 8960 series, in conjunction with the E6393B

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 E6393B with the factory-level quality of the 8960 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 E6393B 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 E6393B test set for incoming inspection and final calibration, and the manufacturing test sets for the most detailed component level measurements, troubleshooting, and failure analysis.

Easy-to-use, easy to manage

With the E6393B, 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 E6393B, Agilent will provide firmware updates for the cdma2000/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 cdma2000/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 E6393B 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.

E6393B technical specifications

Specifications describe the E6393B warranted performance and apply after a 30 minute warm-up. These specifications are valid over the E6393B'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-2000 (US, Korea and Japan), 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:

IS-95A: 1, 2, 3, 9, and 32768

IS-2000: 1, 2, 3, 9, 17, 32 and 32768

IS-2000 Radio Configuration:

Forward: 1 to 5

Reverse: 1 to 4

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 between Cellular/TSB-74 and PCS US, between IS-2000 and IS-95

CDMA signal generator

CDMA channels:

IS-95A:

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

Sector B: Pilot, Traffic, OCNS

IS-2000:

Sector A: Pilot, Sync, Paging, FCH, SCH, OCNS

Sector B: Pilot, FCH, 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 –20 dBm

Accuracy:

±1.0 dB (typically ± 0.6dB) at ≤–50 dBm

±2.0 dB (typically ± 1.2dB) at >–50 dBm

Resolution: 0.1 dB

CDMA modulation:

Type: QPSK based on IS-95A and cdma2000

Residual rho: ≥ 0.912 (typically > 0.95)

Data generation patterns: PN9 for loopback, Single Byte Pattern for TDSO

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: -60 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: -60 dBm to +39 dBm

Modulation type: OQPSK based on IS-95A and cdma2000 RC1,2
HPSK based on cdma2000 RC3,4

Rho measurement:

Mode:

Single Code Rho:

IS-95 and cdma2000 RC1,2

Multi Code Rho:

cdma2000 RC3,4

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: $\pm (30 \text{ Hz} + \text{frequency reference accuracy})$
at average of 4 measurements

Resolution: 1 Hz

Transmit time error measurement (supplemental characteristic)

CDMA frame error rate measurement (loopback):

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)

CDMA frame error rate measurement (TDSO):

Method: Test Data Service Option per Service Option 32 supporting confidence limits (95% or off)

Range: 0% to 100%

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

Connector: 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: $\pm[(\text{time since calibration} \times \text{aging rate}) + \text{temperature effects} + \text{accuracy of calibration}]$

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 E6393B 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 013):

See Audio source, RF analyzer, and Audio analyzer (Option 013)

Signal generator

Frequency: See CDMA signal generator and AMPS signal generator (Option 013)

Amplitude: See CDMA signal generator and AMPS signal generator (Option 013)

Modulation: QPSK based on IS-95A and cdma2000, frequency modulation (Option 013), and Off (CW)

Option 013 E6393B AMPS mode specification

AMPS call processing functionality

Radio system support: 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

IS-2000(US Cellular and US PCS) 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)

Rate: 1.004 kHz +/- 0.025%

Deviation Range: 8 kHz and 2.9 kHz

Deviation Accuracy: 10% (6% typically)

Note: Either of 8kHz and 2.9kHz is automatically selected in the performed Audio

Analyzer measurement. The 8kHz is selected in SINAD and RX distortion

measurements. The 2.9 kHz is selected in Audio level measurement.

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: 4 mVrms (–48 dBV) to 4 Vrms (12 dBV)

Level accuracy:

±1 dB at 0 dBv to –30 dBv

±2 dB (*typically ±1.2 dB*) at ≤ –31 dBv

±2 dB (*typically ±1.2 dB*) at >0 dBV

Level resolution: 1 dB

Output Impedance: <10 ohm

RF analyzer

Input frequency range: 824 MHz to 849 MHz

Input level range: -60 dBm to +39 dBm

Frequency error measurement:

Range: ± 12.5 ppm

Accuracy: $\pm(0.01 \text{ ppm} + \text{frequency accuracy of reference oscillator})$

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: -60 dBm to +39 dBm

Accuracy:

$\pm 1.0 \text{ dB}$ (*typically $\pm 0.6 \text{ dB}$*) at $\geq 0 \text{ dBm}$

$\pm 2.0 \text{ dB}$ (*typically $\pm 1.2 \text{ dB}$*) at $< 0 \text{ dBm}$

$\pm 3 \text{ dB}$ (*typically $\pm 1.8 \text{ dB}$*) at $< -40 \text{ dBm}$

Resolution: 0.2 dB

FM measurement:

Frequency measurement:

Range: 1.004 kHz $\pm 5\%$, 6 kHz $\pm 5\%$, 10 kHz $\pm 5\%$

Accuracy: $\pm(0.02\%$ of reading + resolution + frequency accuracy of reference oscillator)

Resolution: 0.1 Hz

Deviation measurement:

Range: 2 kHz to 25 kHz

Accuracy:

Audio and ST

0.0~ 5.9 kHz Dev. $\pm(200\text{Hz}+4\%)$

6.0~25.0 kHz Dev. $\pm 4\%$

SAT

0.0~ 5.9 kHz Dev. $\pm(90\text{Hz}+4\%)$

6.0~25.0 kHz Dev. $\pm 4\%$

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: $\pm 1.0 \text{ dB}$ (*typically $\pm 0.6 \text{ dB}$*)

Resolution: 0.1 dB

Audio Level measurement:

Frequency: 1.004 kHz

Audio input range: 30 mVrms to 3 Vrms

Accuracy: 12% of reading (*typically 7.2%*) at 100 mVrms $\pm 50 \text{ mVrms}$

Filter: C-message filter

Resolution: 1 mV

Note: The audio level measurement is performed during RX distortion measurement. The measured value (RMS) is only obtained by a remote command. The display of the measured value is not available on the front panel screen.

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

E6393B:

Option 001

Option 002

Option 005

Option 006

Option 010

Option 013

Option 150

Option 202

cdma2000/AMPS MS test set:

Antenna coupler

TX analyzer and signal generator

SRAM card

DC power / audio test adapter

High level signal output and low power measurement

AMPS test capability

PoST CDMA/AMPS software

RF Cable for Nokia 51xx,61xx,71xx phones

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 engineering 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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