

Agilent E4428C and E4438C ESG Signal Generators

Configuration Guide



Agilent Technologies

E4428C ESG Analog Signal Generator

Configuring your E4428C analog signal generator

The following steps will guide you through configuring your Agilent Technologies E4428C analog signal generator with the performance you need.

Step 1 Choose a frequency range (Mandatory)

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
E4428C-503	250 kHz to 3 GHz frequency range		506	
E4428C-506	250 kHz to 6 GHz frequency range *(Mechanical attenuator only—Option UNB performance is included with Option 506)		503	

Step 2 Choose an attenuator

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
E4428C-UNB	High output power with mechanical attenuator. Increase the output power up to 6 dB for higher power applications. (Option UNB performance is included with Option 506)	503	506	Data Sheet: 5989-1992EN

Step 3 Choose accessories or instrument connector configuration

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
E4428C-1EM	Moves all front panel connectors to rear panel			
E4428C-1CM	Rack mount without handle		1CP, 1CN	
E4428C-1CP	Rack mount kit with handles		1CM, 1CN	Catalog: 5980-0450E
E4428C-1CN	Front handle kit		1CP, 1CM	Catalog: 5980-0450E

Step 4 Choose a warranty and calibration plan

Ordering #	Description
R-51B-001-C	Standard 1-year Return-to-Agilent warranty and service
R-51B-001-3C	1 year Return-to-Agilent warranty extended to 3 years
R-51B-001-5C	1 year Return-to-Agilent warranty extended to 5 years
R-50C-001-3	Return-to-Agilent Calibration Upfront Support Plan 3 year coverage
R-50C-016-3	Return-to-Agilent 17025 Calibration Upfront Support Plan 3 year coverage
R-50C-021-3	Return-to-Agilent Z540 Calibration Upfront Support Plan 3 year coverage
E4428C-UK6	Commercial calibration certificate and test data

E4428C ESG Analog Signal Generator (Continued)

Step 5 Choose start up assistance options

Ordering #	Description
PS-S10	Remote scheduled assistance 1-999 hours
PS-S20	Daily productivity assistance
PS-T10-ASG	Signal generator and source basics; .05 day Max. 8 students on site
PS-X10	Custom services to be qualified by Agilent

Step 6 Choose documentation

Ordering #	Description	For more information go to: www.agilent.com/find/esg
E4428C-CD1	CD-ROM - English Documentation Set (<i>standard</i>)	
E4428C-0BW	Service documentation, assembly level (hardcopy)	
E4428C-UK6	Commercial calibration certificate with test data (hardcopy)	
E4428C-ABA	United States - English documentation set (hardcopy)	

List of available options

Ordering #	Description
E4428C-UNB	High output power with mechanical attenuator
E4428C-1CM	Rackmount flange kit
E4428C-1CN	Front handle kit
E4428C-1CP	Rackmount flange and front handle kit
E4428C-1EM	Moves all front panel connectors to the rear panel
E4428C-503	Frequency range from 250 kHz to 3 GHz
E4428C-506	Frequency range from 250 kHz to 6 GHz
E4428C-UK6	Hardcopy of the commercial calibration certificate and calibration test data
E4428C-0BW	Service documentation, assembly level
E4428C-ABA	Hardcopy of the English documentation set
E4428C-CD1	CD-ROM containing the English documentation set

E4438C ESG Vector Signal Generator

Configuring your E4438C vector signal generator

The following steps will guide you through configuring your Agilent Technologies E4438C vector signal generator with the performance you need.

Step 1 Choose a frequency range (Mandatory)

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
E4438C-501	250 kHz to 1 GHz frequency range		502, 503, 504, 506	
E4438C-502	250 kHz to 2 GHz frequency range		501, 503, 504, 506	
E4438C-503	250 kHz to 3 GHz frequency range		501, 502, 504, 506	
E4438C-504	250 kHz to 4 GHz frequency range		501, 502, 503, 506	
E4438C-506	250 kHz to 6 GHz frequency range *(Mechanical attenuator only— Option UNB performance is included with Option 506)	UNJ	UNB*, 300, 501, 502, 503, 504	

Step 2 Choose phase noise performance

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
<i>Standard</i>	Standard phase noise performance			Data Sheet: 5988-4039EN
E4438C-UNJ	Enhanced phase noise performance: Up to 20 dB single sideband (SSB) improvement over standard performance. (Option 1E5 performance is included)		300, 1E5	Data Sheet: 5988-4039EN

E4438C ESG Vector Signal Generator (Continued)

Step 3 Choose an attenuator

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
<i>Standard</i> with Options 501, 502, 503, 504	State-of-the-art <u>electronic attenuator</u> . Includes excellent adjacent channel performance (ACP) for CDMA application (previously Option H99). Also provides alternate timeslot power control ideal for GSM receiver and transmitter designs (previously Option UNA).		506	Data Sheet: 5988-4039EN
E4438C-UNB	High output power with <u>mechanical attenuator</u> . Increase the output power up to 6 dB for higher power applications. (Option UNB performance is included with Option 506)		300, 506	Data Sheet: 5988-4039EN

Step 4 Choose baseband generator with memory

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
<i>Standard</i>	External I/Q inputs only. No built-in digital modulation.			Data Sheet: 5988-4039EN
E4438C-601	Internal baseband generator, 8 MSa memory with digital bus capability; used to produce arbitrary and real-time I/Q waveforms. A variety of standard compliant firmware and software is available.		602	Data Sheet: 5988-4039EN
E4438C-602	Internal baseband generator, 64 MSa memory with digital bus capability; extra memory for when longer waveform playback is desired. Used to produce arbitrary and real-time I/Q waveforms. A variety of standard-compliant firmware and software is available.		601	Data Sheet: 5988-4039EN
E4438C-005	6 GB hard drive for non-volatile waveform storage			Data Sheet: 5988-4039EN

E4438C ESG Vector Signal Generator (Continued)

Standard with Options 601 & 602

- Generates arbitrary waveforms and real-time I/Q symbols.
- Includes custom modulation, multitone, and the PSG/ESG download assistant for MATLAB®.

Step 5 Choose signal creation software for your internal baseband generator

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg www.agilent.com/find/signalstudio
E4438C-400	3GPP W-CDMA FDD Personality	601 or 602		Technical Overview: 5988-4449EN
E4438C-401	cdma2000® and IS-95-A Personality	601 or 602		Technical Overview: 5988-4430EN
E4438C-402	TDMA Personality (GSM, EDGE, GPRS, EGPRS, NADC, PDC, PHS, DECT, TETRA)	601 or 602		Technical Overview: 5988-4431EN
E4438C-403	Calibrated Noise (AWGN) Personality	601 or 602		
E4438C-407	Signal Studio for S-DMB	601 or 602		Technical Overview: 5989-0861EN
E4438C-409	Multi-satellite GPS Personality	601 or 602		Technical Overview: 5988-6256EN
E4438C-419	Signal Studio for 3GPP WCDMA HSPA	601 or 602		
E4438C-SP1	Signal Studio for Jitter Injection	601 or 602		
E4438C-221	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-222	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-223	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-224	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-225	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-226	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-227	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-228	Waveform 5 Pack License	601 or 602		View online documentation
E4438C-229	Waveform 5 Pack License	601 or 602		View online documentation
N7600B*	Signal Studio for 3GPP W-CDMA FDD	601 or 602		View online documentation
N7601B*	Signal Studio for 3GPP2 CDMA	601 or 602		View online documentation
N7602B*	Signal Studio for GSM/EDGE	601 or 602		View online documentation
N7606B*	Signal Studio for Bluetooth	601 or 602		View online documentation
N7611B*	Signal Studio for Broadcast Radio	601 or 602		View online documentation
N7612B*	Signal Studio for TD-SCDMA	601 or 602		View online documentation
N7613A*	Signal Studio for 802.16-2004 (WiMAX™)	601 or 602		View online documentation
N7615B*	Signal Studio for 802.16 Mobile WiMAX	601 or 602		View online documentation
N7616B*	Signal Studio for T-DMB	601 or 602		View online documentation
N7617B*	Signal Studio for 802.11 WLAN	601 or 602		View online documentation
N7620A	Signal Studio for Pulse Building	601 or 602		View online documentation
N7621B*	Signal Studio for Multitone Distortion	601 or 602		View online documentation
N7622A	Signal Studio toolkit (free download)	601 or 602		Technical Overview: 5989-1606EN
N7623B*	Signal Studio for Digital Video	601 or 602		Technical Overview: 5989-2575EN
N7624B*	Signal studio for 3GPP LTE	601 or 602		View online documentation

*For factory installation of Signal Studio fixed perpetual licenses, Signal Studio model-number software must be ordered under the E4438C configuration.

E4438C ESG Vector Signal Generator (Continued)

Step 6 Choose a bit-error-rate (BER) analyzer

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
E4438C-UN7	Internal bit-error-rate analyzer			
E4438C-300	GSM/EDGE basestation loopback BER test capability	601 or 602, 402, UN7	UNJ, UNB, 506	

Step 7 Choose accessories or instrument connector configuration

Ordering #	Description	Requires	Not compatible	For more information go to: www.agilent.com/find/esg
E4438C-003	Enables ESG digital <u>output</u> connectivity with N5102A	601 or 602		Technical Overview: 5988-9495EN
E4438C-004	Enables ESG digital <u>input</u> connectivity with N5102A Baseband Studio digital signal interface module	601 or 602		Technical Overview: 5988-9495EN
E4438C-1EM	Moves all front panel connectors to rear panel			
E4438C-1CM	Rack mount without handles		1CN, 1CP	
E4438C-1CP	Rack mount kit with handles		1CM, 1CN	Catalog: 5980-0450E
E4438C-1CN	Handle kit		1CM, 1CP	Catalog: 5980-0450E

Step 8 Choose a warranty and calibration plan

Ordering #	Description
R-51B-001-C	Standard 1 year Return-to-Agilent warranty and service
R-51B-001-3C	1 year Return-to-Agilent warranty extended to 3 years
R-51B-001-5C	1 year Return-to-Agilent warranty extended to 5 years
R-50C-001-3	Return-to-Agilent Calibration Upfront Support Plan 3 year coverage
R-50C-016-3	Return-to-Agilent 17025 Calibration Upfront Support Plan 3 year coverage
R-50C-021-3	Return-to-Agilent Z540 Calibration Upfront Support Plan 3 year coverage
E4438C-UK6	Commercial calibration certificate and test data

Step 9 Choose start up assistance options

Ordering #	Description
PS-S10	Remote scheduled assistance 1-999 hours
PS-S20	Daily productivity assistance
PS-X10	Custom services to be qualified by Agilent

E4438C ESG Vector Signal Generator (Continued)

Step 10 Choose any documentation

Ordering #	Description	For more information go to: www.agilent.com/find/esg
E4438C-CD1 <i>(standard)</i>	CD-ROM - English documentation set	
E4438C-OBW	Service documentation, assembly level (hardcopy)	
E4438C-OBV	Service documentation, component level (hardcopy)	
E4438C-UK6	Commercial calibration certificate with test data (hardcopy)	
E4438C-ABA	United States - English documentation set (hardcopy)	
E4438C-AB0	Taiwan - Chinese localization (hardcopy)	
E4438C-AB1	Korean - Korean localization (hardcopy)	
E4438C-AB2	China - Chinese localization (hardcopy)	
E4438C-ABF	French - French localization (hardcopy)	
E4438C-ABJ	Japanese - Japanese localization (hardcopy)	

Related Products

Ordering #	Description	For more information go to: www.agilent.com/find/basebandstudio
N5115B	Baseband Studio for fading. Provides channel simulation of signals generated from the E4438C ESG vector signal generator or the E5515C wireless communications test set.	
N5110B	Baseband Studio for waveform capture and playback. Allows capture of digital IQ waveforms directly from a device or playback of IQ waveforms as digital or RF stimulus	
N5102A	Baseband Studio digital signal interface module. Enables digital outputs from, and digital inputs to, the E4438C ESG and E8267D PSG vector signal generators. Also works with N5110B Baseband Studio for waveform capture and playback.	
N5101A	Baseband Studio PCI card. Required to operate N5115A Baseband Studio for fading, N5110B Baseband Studio for waveform capture and playback, or N5120A Baseband Studio for CPRI RE Test software.	
N5103A	High speed serial interface card. Required for the N5120A Baseband Studio for CPRI RE Test software.	
N5120A	Baseband Studio for CPRI RE test. Emulate a radio equipment controller to test radio equipment downlink and uplink paths using the CPRI interface.	

E4438C ESG Vector Signal Generator (Continued)

Upgradeable Options^{1,2,3}

Ordering #	Upgrade description	Information required with order
E4438CK-601	Complete upgrade kit with installation guide ⁴	Serial # and host ID of instrument. Customer's email address.
E4438CK-602	Complete upgrade kit with installation guide ⁴	Serial # and host ID of instrument. Customer's email address.
E4438CK-005	Complete upgrade kit with installation guide	Serial # and host ID of instrument. Customer's email address.
E4438CK-1E5	Complete upgrade kit with installation guide	Serial # and host ID of instrument. Customer's email address.
E4438CK-UN7	Complete upgrade kit with installation guide	Serial # and host ID of instrument. Customer's email address.
E4438CK-003	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-004	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-400	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-401	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-402	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-403	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-407	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-409	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-419	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-221	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-222	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-223	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-224	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-225	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-226	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-227	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-228	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
E4438CK-229	License key (alphanumeric code)	Serial # and host ID of instrument. Customer's email address.
N76xxx	Signal Studio model number software can be ordered after initial purchase by ordering the standalone model number.	

¹ Option UNB, 1EM, and 300 must be returned to the Agilent factory for an upgrade. These can not be upgraded by the customer.

² Latest firmware is recommended for upgrades. Firmware can be found at www.agilent.com/find/upgradeassistant.

³ License key options require Option 001, 002, 601, or 602.

⁴ Upgrade kit is not compatible for instruments with Option 1EM installed.

List of Available Options

E4438C ESG Custom	E4438C ESG custom enhancements for the following applications: polar modulation, multiple input multiple output (MIMO), 802.11n, phase coherency, radar simulation
Call for details	
E4438C-003	Enables ESG digital outputs with N5102A
E4438C-004	Enables ESG digital inputs with N5102A
E4438C-005	6 GB internal hard drive
E4438C-221	Waveform 5 pack
E4438C-222	Waveform 5 pack
E4438C-223	Waveform 5 pack
E4438C-224	Waveform 5 pack
E4438C-225	Waveform 5 pack
E4438C-226	Waveform 5 pack
E4438C-227	Waveform 5 pack
E4438C-228	Waveform 5 pack
E4438C-229	Waveform 5 pack
E4438C-1CM	Rackmount flange kit
E4438C-1CN	Front handle kit
E4438C-1CP	Rackmount flange and front handle kit
E4438C-1E5	High-stability time-base - <i>Now free!</i>
E4438C-1EM	Moves all front panel connectors to the rear panel
E4438C-300	GSM/EDGE basestation loopback BER test capability
E4438C-400	3GPP W-CDMA FDD Personality
E4438C-401	cdma2000® and IS-95-A Personality
E4438C-402	TDMA Personality (GSM, EDGE, GPRS, EGPRS, NADC, PDC, PHS, DECT, TETRA)
E4438C-403	Calibrated Noise (AWGN) Personality
E4438C-407	Signal Studio for S-DMB
E4438C-408	Signal Studio for enhanced multitone
E4438C-409	Multi-satellite GPS Personality
E4438C-419	Signal Studio for 3GPP WCDMA HSPA
E4438C-501	Frequency range from 250 kHz to 1 GHz
E4438C-502	Frequency range from 250 kHz to 2 GHz
E4438C-503	Frequency range from 250 kHz to 3 GHz
E4438C-504	Frequency range from 250 kHz to 4 GHz
E4438C-506	Frequency range from 250 kHz to 6 GHz
E4438C-601	Internal baseband generator, 8 MSa memory with digital bus capability
E4438C-602	Internal baseband generator, 64 MSa memory with digital bus capability
E4438C-SP1	Signal Studio for Jitter Injection
E4438C-UK6	Commercial calibration certificate with test data (hardcopy)
E4438C-UN7	Internal bit error rate (BER) analyzer
E4438C-UNB	High output power with mechanical attenuator
E4438C-UNJ	Enhanced phase noise performance
N7600B	Signal Studio for 3GPP W-CDMA FDD
N7601B	Signal Studio for 3GPP CDMA
N7602B	Signal Studio for GSM/EDGE
N7606B	Signal Studio for Bluetooth
N7611B	Signal Studio for Broadcast Radio
N7612B	Signal Studio for TD-SCDMA
N7613A	Signal Studio for 802.16-2004 (WiMAX)
N7615B	Signal Studio for 802.16 MobileWiMAX
N7616B	Signal Studio for T-DMB
N7617B	Signal Studio for 802.11 WLAN
N7620A	Signal Studio for Pulse Building
N7621B	Signal Studio for Multitone Distortion
N7622A	Signal Studio Toolkit
N7623B	Signal Studio for Digital Video
N7624B	Signal Studio for 3GPP LTE

Manuals and printed options

E4438C-UK6

Hardcopy of the commercial calibration certificate and calibration test data

E4438C-0BV

Hardcopy of the component level service manual

E4438C-0BW

Hardcopy of the assembly level service manual

E4438C-AB0

Hardcopy of the Chinese (Taiwan) user's guide

E4438C-AB1

Hardcopy of the Korean user's guide

E4438C-AB2

Hardcopy of the Chinese (China) user's guide

E4438C-ABA

Hardcopy of the English documentation set

E4438C-ABF

Hardcopy of the French user's guide

E4438C-ABJ

Hardcopy of the Japanese user's guide

E4438C-CD1

CD-ROM containing the English documentation set

Additional Agilent Literature

Application notes

RF Source Basics, a self-paced tutorial (CD-ROM)
#5980-2060E

Digital Modulation in Communications Systems – An Introduction
Application Note 1298
#5965-7160E

Using Vector Modulation Analysis in the Integration, Troubleshooting, and Design of Digital RF Communications Systems
Application Note 89400-8
#5091-8687E

Testing CDMA Base Station Amplifiers,
Application Note 1307
#5967-5486E

Understanding GSM/EDGE Transmitter and Receiver Measurements for Base Transceiver Stations and Their Components
Application Note 1312
#5968-2320E

Understanding CDMA Measurements for Base Stations and Their Components
Application Note 1311
#5968-0953E

Testing and Troubleshooting Digital RF Communications Receiver Designs
Application Note 1314
#5968-3579E

Bluetooth® RF Measurements Fundamentals
Application Note 1333-1
#5988-3760EN

Designing and Testing 3GPP W-CDMA Base Transceiver Stations
Application Note 1355
#5980-1239E

Designing and Testing 3GPP W-CDMA User Equipment
Application Note 1356
#5980-1238E

Designing and Testing cdma2000 Base Stations
Application Note 1357
#5980-1303E

Designing and Testing cdma2000 Mobile Stations
Application Note 1358
#5980-1237E

Product literature

E4428C ESG Analog Signal Generator
Data Sheet
#5989-1992EN

E4438C ESG Vector Signal Generator
Brochure
#5988-3935EN

E4438C ESG Vector Signal Generator
Data Sheet
#5988-4039EN

IntuiLink Software
Data Sheet
#5980-3115EN

Additional Resources

See the ESG Web page

Get the latest news, product and support information, application literature and more. The Agilent Technologies Internet address for the ESG family is:
<http://www.agilent.com/find/esg>

See the Signal Creation Software Web page

Simplifying complex signal simulation, Signal Studio software runs on a PC and embedded software runs directly on the signal generator. The Agilent Technologies Internet address for the Signal Creation Software is:
<http://www.agilent.com/find/signalstudio>

See the Baseband Studio Web page

Baseband Studio is a suite of baseband signal applications and accessories that simplify the creation and verification of cellular, wireless networking, and aerospace/defense component and subsystem designs. The Agilent Technologies Internet address for Baseband Studio is:
<http://www.agilent.com/find/basebandstudio>

New trade-up program

Ask your local sales representative about instrument trade-up opportunities for all ESG models.

IntuiLink PC software

Transfer screen data and images easily into Microsoft® Excel and Microsoft® Word. Save and restore instrument states. Download arbitrary waveform files. For more information visit our website at:
<http://www.agilent.com/find/IntuiLink>



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Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.



LXI

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Remove all doubt

Our repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Agilent equipment throughout its lifetime. Your equipment will be serviced by Agilent-trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.

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www.agilent.com

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

www.agilent.com/find/contactus

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Canada	(877) 894-4414
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Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Thailand	1 800 226 008

Europe & Middle East

Austria	01 36027 71571
Belgium	32 (0) 2 404 93 40
Denmark	45 70 13 15 15
Finland	358 (0) 10 855 2100
France	0825 010 700*
	*0.125 €/minute
Germany	07031 464 6333**
	**0.14 €/minute
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
Switzerland	0800 80 53 53
United Kingdom	44 (0) 118 9276201

Other European Countries:

www.agilent.com/find/contactus

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