Standard Agilent Technologies ESG RF signal generators incorporate a broad array of capabilities for testing both analog and digital communications systems. Adding flexible options provides a test solution that will evaluate the performance of a communication system to the requirements of nearly all current and proposed air interface standards.

These options include:

- Internal dual arbitrary waveform generator, Option UND
- Real-time I/Q baseband generator, Option UN8
- Internal bit-error-rate analyzer, Option UN7
- Multichannel, multicarrier CDMA personality, Option UN5
- Multichannel W-CDMA 1.0 personality, Option 100
- Multichannel CDMA2000 personality, Option 101
- Alternate timeslot level control, Option UNA
- Higher power with a mechanical attenuator, Option UNB
- Improved ACP for W-CDMA, CDMA, and TETRA applications, Option H99

Together these options offer a level of flexibility that makes the Agilent ESG an excellent choice for testing wireless communications systems now and in the future.
3 Internal dual arbitrary waveform generator, Option UND
Option UND is one of two baseband generator cards for the Agilent ESG family. This dual
arbitrary waveform generator provides extremely flexible baseband generation for the most
complex RF waveforms. It is provided on a user-installable card that can be added to the
B version of any existing Agilent ESG or purchased with a new unit.

5 Real-time I/Q baseband generator, Option UN8
Option UN8 is one of two internal baseband generator cards for the Agilent ESG family.
This real-time I/Q baseband generator builds digitally modulated signals by mixing and
matching modulation types, symbol rates, and filters. Most TDMA standards are also
included. It is provided on a user-installable card that can be added to the B version of any
Agilent ESG or purchased with a new unit.

5 Add 7 Mbits RAM to Option UN8, Option UN9
Option UN9 adds 7 Mbits RAM to Option UN8 for handling large data patterns. It is provided
on a user-installable card that can be added to the B version of any existing Agilent ESG or
purchased with a new unit.

8 Internal bit-error-rate analyzer, Option UN7
Option UN7 offers generic BER analysis capabilities for demodulated data sequences.
It is provided on a user-installable card that can be added to the B version of any existing
Agilent ESG or purchased with a new unit.

10 Multichannel, multicarrier CDMA personality, Option UN5
Option UN5 is a firmware personality built upon the internal dual arbitrary waveform gener-
ator (Option UND). The firmware can be activated by purchasing a license key or purchased
with a new unit.

13 Multichannel W-CDMA 1.0 personality, Option 100
Option 100 is a firmware personality built on the internal dual arbitrary waveform generator
(Option UND). The firmware can be activated by purchasing a license key or purchased
with a new Agilent ESG signal generator.

14 Multichannel CDMA2000 personality, Option 101
Option 101 is a firmware personality built on the internal dual arbitrary waveform generator
(Option UND). The firmware can be activated by purchasing a license key or purchased
with a new Agilent ESG signal generator.

15 Alternate timeslot level control, Option UNA
Option UNA is an electronic attenuator optimized for controlling alternate timeslots in
TDMA frames. It is a factory-installed option.

15 Higher power with a mechanical attenuator, Option UNB
Option UNB is a mechanical attenuator optimized for higher power. It is a factory-installed
option.

15 Improved ACP for CDMA, W-CDMA, and TETRA, Option H99
Option H99 is an attenuator and output board combination optimized for ACP measure-
ments. It is a factory-installed option.

16 General information on the Agilent ESG family of RF signal generators

17 Application and product information
Internal dual arbitrary waveform generator, Option UND

Introduction
Adapt quickly to changing market needs with a completely flexible baseband generator. Download waveforms that simulate complex, non-standard or proprietary modulation schemes. Replay complex waveforms to simulate multicarrier CDMA and TDMA signals to easily characterize base station power amplifiers. Generate I/Q files from many different application programs, such as Omnisys, MATLAB™, and Mathcad™, and then download the waveform from an external computer through GPIB or RS-232.

Description
Option UND is one of two internal baseband generator cards for the Agilent ESG family. This dual arbitrary waveform generator provides an extremely flexible baseband generation for the most complex RF waveforms. It is provided on a user-installable card that can be added to the B version of any existing ESG or any new instrument.

Models
Option UND is available with the following Agilent ESG models:
E4430B
E4431B
E4432B
E4433B

Key features
High performance 14-bit digital to analog converters (DAC)
Improve simulation and reduce noise floor.
The state-of-the-art 14-bit DACs have only 25% of the quantization error of an ordinary 12-bit arbitrary waveform generation.

Deep 1 megasample/channel arbitrary waveform memory
Download or store extremely long or numerous waveforms.
Both the volatile and nonvolatile RAM have 1 Megasample of memory per channel. Switch between multiple waveforms instantaneously to minimize valuable download time in a manufacturing environment.

Multitone¹
Measure intermodulation distortion of an amplifier by applying a multitone waveform.
Select up to 64 equally spaced tones, with the option of turning off any combination of tones. Adjust the frequency spacing between the tones and the phase of each individual tone to maximize measurement accuracy. Figure 1 illustrates the multitone setup. Figure 2 depicts the resulting multitone signal.

Figure 1. Multitone editor

Figure 2. Resulting 64 tone signal resulting from configuration shown in Figure 1

1. New features available with firmware revision B.02.21 and higher. Triggers require a hardware upgrade. For more information consult the ESG web page at www.agilent.com/find/esg
Three reconstruction filters
Minimize D/A spurs by matching reconstruction filters to sample rates.
Select from 250 kHz, 2.5 MHz, or 8.0 MHz reconstruction filters, or provide your own external filter.

External triggers
Synchronize the playback of waveforms with external test equipment.
Select from continuous, single, gated, or segment advance triggering with up to a one-hour delay time.

Markers
Trigger other events at specific points in the playback of a waveform.
Define marker locations in a segment during the waveform-generation process, or from the front panel. Activate or deactivate markers for each segment using the sequence table editor. A marker can also be tied to the RF blanking feature of the ESG to simulate bursted signals.

Additive white Gaussian noise
Simulate background noise in a transmission.
Create additive white Gaussian noise waveforms up to 15 MHz in bandwidth with variable waveform lengths.

Available personalities
Multichannel CDMA, Option UN5
Experimental W-CDMA, Option H97

Figure 3. High-performance internal dual arbitrary waveform generator block diagram

1. New features available with firmware revision B.02.21 and higher. Triggers require a hardware upgrade. For more information consult the ESG web page at www.agilent.com/find/esg
Introduction
Simulate mobile or base-station transmissions of common digital communication standards. The real-time I/Q baseband generator supports DECT, GSM, NADC, PDC, PHS, and TETRA communication standards. Data for these standards can be generated internally or supplied externally. After setting the frequency and amplitude of your signal, TDMA standards are available with the touch of one button. Alternatively, you can mix and match modulation types, symbol rates, and filters to create custom platforms for developing new or proprietary communication standards.

Models
Option UN8 is available with the following Agilent ESG models:
- E4430B
- E4431B
- E4432B
- E4433B

Key features
Intuitive menu
Easy selection of predefined standards. Common communication standards (NADC, GSM, PDC, PHS, DECT, TETRA) are introduced at the first menu level. The second level provides flexible access for basic configuring of data, timeslots, and framing.

Mix and match modulation types, symbol rates and filters
Create custom platforms for developing new or proprietary communication standards. The real-time I/Q baseband generator (Option UN8) enables simple generation of complex signals. It is easy to mix and match a modulation type from one standard with a filter type from another. For example, generate a CDPD signal by selecting an NADC format and substitute a 0.5 GMSK modulation instead of the standard π/4 DQPSK modulation or generate PWT, a DECT variant, by substituting π/4 DQPSK modulation in the DECT standard. Implement and recall non-standard solutions easily.

Unlimited modulation types using FSK, I/Q and differential table editors
Define modulation formats specific to application needs or impair the standard modulation formats for stress testing. Select modulations from a menu of PSK, MSK, QAM, or FSK modulation types. Build asymmetric FSK formats such as FLEX with the FSK table editor (Figure 4).

Figure 4. FSK table editor
Customize modulations or perform margin testing with the I/Q table editor (Figure 5). Define the constellation of your choice with up to 16 values of I and Q. Add impairments such as noise at the origin, EVM, phase error, and quadrature error to the I/Q definition to test design robustness. Before generating the modulated signal, display the I/Q state map for a quick visual check (Figure 6).

Symbol rates up to 12.5 MHz
Specify rates to cover the existing communications systems and new third-generation systems.
If you want to create a new modulation scheme, the real-time I/Q baseband generator symbol rate can be specified from 50 Hz to 12.5 MHz. This range covers existing communications systems such as GSM at 270.833 Ksps and NADC at 24.3 Ksps and new emerging wideband communication systems.

Internal data generator
Generate PN (pseudo-random noise) sequences or repeating patterns. Internally generate PN9, PN11, PN15, PN20, and PN23 (pseudo-random noise) sequences or fixed 4- to 64-bit repeating patterns. Other data patterns can be downloaded into memory or generated in real-time through the data/clock/sync inputs.

Burst shaping
Create custom burst to simulate unique traffic patterns. Adjust burst rise/fall time and delay through softkeys under the chosen TDMA protocol. Customized or standard bursts may also be provided externally through the Ext 1 input.

Unlimited baseband filtering
Select or build your own filters to control bandwidth and modulation quality. Nyquist, root Nyquist, Gaussian FIR filters, and IS-95 are all available. Specify the filter alpha from 0 to 1 or the BT (bandwidth time product) for a Gaussian filter from 0.1 to 1.

The FIR table editor (Figure 7) enables you to build your own filters or add impairments such as static fading in the channel. Test new designs in the manufacturing environment by using the same filter and signal impairments. Changing the filter factor can also be used to intentionally change signal characteristics such as EVM. This is a useful tool to test receivers under real-life conditions (Figure 8).

Figure 5. I/Q table editor
Figure 6. The customized constellation generated in the I/Q table editor can be displayed to check for input errors.
Figure 7. Implement custom FIR filters via the FIR table editor.
Figure 8. Displayed FFT response of custom filter
Flexible frames and timeslots
Stimulate real TDMA transmissions. Independently configure and enable each timeslot. Adjust timeslot type, data type, and control field information. You may also customize a timeslot by downloading a specific data sequence into memory and then inserting the user file into a custom timeslot.

Frame triggering and delay
Synchronize multiple signal generators and other test equipment to simulate a complex TDMA environment. Frame externally generated real-time data by multiplexing the signal with the internally generated framing. When frame triggering is selected, you can choose whether to respond immediately upon receipt of a trigger or delay the response.

Block diagram
Option UN8 provides a flexible way to access digital modulation building blocks for building custom signals or to impair standard signals.

Figure 9. Option UN8 conceptual menu structure block diagram
Introduction
Simplify hardware configurations and measurement procedures. Minimize benchtop equipment and expense with the optional built-in BER analysis capabilities of the Agilent ESG-D series signal generators. The straightforward user interface makes it easy to quickly setup measurements (Figure 10).

Description
Option UN7 offers generic analysis capabilities for demodulated data sequences. It is provided on a user-installable card that can be added to the B version of any existing ESG or any new instrument.

Models
Option UN7 is available with the following Agilent ESG models:
E4430B
E4431B
E4432B
E4433B

Key features
Data rates up to 10 Mbps
Choose the data rate that meets your test requirements.
Use the 2 Mbps data rate to test BER of common wireless communications systems, subsystems and components.
Offering continuous update of total bits measured, bit count and BER, the 2 Mbps mode provides constant feedback on measurement status.
Select the 10 Mbps mode for higher data rate digital communications applications.

Pass/Fail indicators
Quickly and consistently determine Pass/Fail conditions.
Use the 2 Mbps mode of operation to continuously display pass or fail status according to a user-defined maximum BER limit.

Long 4 Gbit measurement capability
Test BER of continuously repeating PN sequences.
With the capability of testing bit sequences up to 4 Gbits long, the ESG-D series can measure a PN15 sequence that has been repeated over 100,000 times. In addition, this capability allows measurement of data sequences with bit error rates <0.001 ppm.

Automatic check of data and clock validity
Avoid erroneous measurements caused by invalid data or clock inputs.
The BER analyzer will automatically indicate when either the data and/or clock signals are lost or not valid.

Figure 10. Bit-error-rate user interface
**Standalone BERT capabilities**

Test any PN9 or PN15 sequence, whether internally or externally generated.

Use Option UN7 to measure BER of externally generated PN sequences. The ESG-D with the BER analysis option will automatically synchronize on PN9 or PN15 sequences clocked in at the appropriate data rate.

**Continuously updated BERT results**

Instantly determine the current status of the bit-error-rate test. Efficiently measure BER with a continuous update of total bits counted, total bit errors detected, and the current bit-error-rate ratio.

**Automatic measurement re-synchronization**

Increase measurement productivity in noisy test environments.

Noisy test conditions can cause loss of synchronization during a measurement, thus generating incorrect results. A user-defined re-synchronization limit is available to reset all counters and restart the measurement automatically when synchronization is lost.

**TTL or 75Ω impedance**

Select the impedance that meets your measurement needs.

Set the CLOCK IN, DATA IN, and CLOCK GATE IN to either TTL compatible or 75 ohm to match (or replace) other test equipment.

**Block diagram**

Since Option UN7 cannot demodulate RF, loopback measurements are not supported. Note the signal generator must have an internal I/Q baseband generator (Option UN8) installed to support the BER analysis option.

Two input signals are required for BER measurements:

- **Data**: the demodulated PN9 or PN15 bit stream from the device under test.
- **Clock**: used to clock in data at the appropriate rate.

The clock gate is needed for bursted data or when analyzing demodulated framed (data and control) bit sequences.

A user-supplied interface box is also required when the device under test does not output the correct TTL signal levels or to generate synchronized data and clock signals for framed transmissions.

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**Figure 11. Common setup for bit-error-rate measurement of mobile phones**
Introduction
Generate multichannel CDMA signals with Option UN5. These CDMA signals can be used for base station and mobile tests at system or component level. Testing with Walsh-coded channels accurately simulates the actual signal power a component experiences. The power statistics of the IS-95 waveforms produced by the ESG-D series compared to average Gaussian white noise (AWGN) are shown in Figure 12.

Description
Option UN5 is a firmware personality built upon the internal dual arbitrary waveform generator (Option UND). The firmware can be activated or downloaded by purchasing a license key. Firmware updates can be found at: www.agilent.com/find/esg

Models
Option UN5 is available with the following Agilent ESG models:
E4430B
E4431B
E4432B
E4433B

Key features
Pre-configured channel setups
Easily perform CDMA measurements. Choose from five channel configurations including:
- pilot channel
- 9 channel forward (IS-97)
- 32 channel forward
- 64 channel forward
- reverse channel

Use the pilot for performing mobile turn-on or waveform quality tests. The nine-channel arrangement is configured according to IS-97 specifications. The 32-channel configuration provides a realistically loaded base station for typical base-station testing. Simulate a fully loaded base station by choosing the 64 forward-channel configuration (Figure 13). This Walsh-coded signal simulates a maximum capacity transmission for an IS-95 CDMA base station. Use the reverse-channel selection to characterize CDMA mobile components.

256 configurable channels
Customize channel setup to realistically test components. Define channel type, Walsh code, power, PN offset, and data for each specified channel. Channel power level can be set individually, adjusted to meet the IS-97 standard, or set to equal power. Figure 14 shows the CDMA channel editor. The configuration limits are:

| Channel type | pilot, paging, traffic, sync up to 256 channels |
| Walsh Code | 0 to 63 |
| PN offset | 0 to 511 |
| Data | 0, repeating, pattern, random |

Figure 12. Peak/average cumulative distribution function of IS-95 waveforms
Figure 13. 64 forward channels with IS-95 waveforms

Multichannel, multicarrier CDMA personality, Option UN5
Multicarriers
Stress active components by generating multicarrier CDMA configurations.
Place up to 12 carriers within a 15 MHz bandwidth, each with a custom configuration of channels.
Tailor a test to specific requirements like the complementary cumulative distribution function (CCDF) by selecting pre-defined multicarrier CDMA configurations or explicitly defining the characteristics of each channel on each carrier. Figure 15 illustrates the multicarrier CDMA setup. Figure 16 depicts the resulting signal.

Definable custom filters
Define your unique filter. Choose from IS-95 (standard or modified, with or without equalization) filters, Nyquist, Root Nyquist, or Gaussian filters. Define your own FIR filter to meet specific (non-standard) test requirements. Figure 17 depicts the FIR table editor used to build custom filters.

Chip rates to 10 Msps
Support W-CDMA applications and experimentation.
Chip rates up to 10 Mega-symbols/sec support W-CDMA applications as well as many other unique applications.
Code domain power display

Visually check channel configuration. Prevent mistakes and costly delays by checking the expected channel setup (Figure 18) before producing the RF signal.

Block diagram

Option UN5 partially coded IS-95 provides the highlighted section of the physical layer in Figure 19 for forward traffic channels. Option UN5 also includes a single reverse channel beginning with short code spreading.

Figure 18. Code domain power

Figure 19. Physical layer of CDMA standard block diagram
Multichannel W-CDMA 1.0 personality, Option 100

Introduction
Generate multichannel forward and reverse link signals according to developing W-CDMA international standards with Option 100. Spreading and frame structure of these signals are according to ARIB 1.0-1.2 submission to 3GPP. These W-CDMA signals can be used for base-station, mobile, component, and subsystem tests. A table-based channel editor maximizes flexibility.

Description
Option 100 is a firmware personality built upon the internal dual arbitrary waveform generator (Option UND). The firmware can be activated or downloaded by purchasing a license key. Firmware updates can be found on our ESG web page at www.agilent.com/find/esg

Models
Option 100 is available with the following Agilent ESG-D models:
- E4430B
- E4431B
- E4432B
- E4433B

Key features
- OCQPSK (HPSK) spreading/modulation type used in reverse link
- Baseband clipping; clip the peak-to-average of signals prior to FIR filtering
- For reverse link assign DPDCH to I or Q
- Typically better than 63-dBc adjacent channel power (ACP) for one DPCH

Pre-defined channel set ups
Choose from the following channel configurations:

- **Forward link**
  - 1 DPCH
  - 3 DPCH
  - Perch
  - Perch + 1 DPCH
  - Perch + 3 DPCH
  - Perch + 50 DPCH

- **Reverse link**
  - DPCCH
  - DPCCH + 1 DPDCH
  - DPCCH + 2 DPDCH
  - DPCCH + 3 DPDCH

Table editor features
Use the table editor to fully configure a W-CDMA signal waveform per your requirements. Modify each W-CDMA channel by choosing:

- spread code
- scramble code
- power
- symbol rate
- symbol offset
- data pattern
- TFCI, TPC, and Pilot power offsets

Power level control
Control the power level of TFCI, TPC, and Pilot symbols relative to data (Figure 20). Available range is from –20 dB to +20 dB relative to channel power.

Definable custom filters
Select from W-CDMA, Gaussian, Nyquist, and root Nyquist filters. Define your own FIR filter to meet specific (nonstandard) test requirements. Figure 21 depicts the FIR table editor used to build custom filters.

Chip rates up to 16.384 Mcps
Available chip rates consist of 4.096, 8.192 or 16.384 Mchips/sec to support your W-CDMA applications.

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Figure 20. Transmission power setting for DPCH. There may be transmission power offsets PO1, PO2, respectively PO3 of the DPCCH fields pilot, TPC, respectively TFCI. These power offsets are relative to the DPDCH power settings.

![Figure 20](image)

Figure 21. FIR table allows custom modulation filtering

![Figure 21](image)
Multichannel CDMA2000 personality, Option 101

Introduction
Generate multichannel forward and reverse link signals according to developing CDMA2000 standard with Option 101. These 1X or 3X chip rate, direct or multicarrier spread signals can be used for base station, mobile, component, and subsystem tests. A table based channel editor maximizes flexibility.

Description
Option 101 is a firmware personality built on the internal dual arbitrary waveform generator (Option UND). The firmware can be activated or downloaded by purchasing a license key for users who already own UND.

Models
Option 101 is available with the following Agilent ESG-D models:
- E4430B
- E4431B
- E4432B
- E4433B

Key features
- Multichannel CDMA2000 forward and reverse link signals, either 1X or 3X chip rate
- Choose multicarrier or direct spreading type in forward link
- HPSK spreading/modulation type used in reverse link for IS95C radio configuration
- Select from predefined or use the table editor to fully configure a CDMA2000 channel configuration per your requirements
- Forward link channel types include, pilot, paging, synchronization, fundamental code and supplemental code, channels
- Reverse link channel types include, pilot, dedicated control channel, fundamental code and supplemental code, channel
- Each channel can be set to a separate code domain power level

Table editor features
The table editor allows you to:
- Modify CDMA2000 forward link by choosing data rate, Walsh code, power, PN offset, and data pattern for each channel
- Modify CDMA2000 reverse link by choosing data rate, power, and data pattern for each channel
- Use your own FIR filters or select from predefined filters. Filtering consists of Gaussian, IS-95, IS-95 modified ACP filters, Nyquist, and root Nyquist
Introduction
Choose the performance that best meets your application needs. The Agilent ESG family has four choices to optimize performance: standard electronic attenuator, optional mechanical attenuator, optional timeslot control, and optional improved ACP (adjacent channel power) performance.

Description
The ESG family has three options for attenuators. The standard attenuator is an electronic attenuator. Option UNB is a mechanical attenuator that provides approximately 4 dB more output power than the electronic attenuator. Option UNA is also an electronic attenuator but it is optimized for controlling alternate timeslots in TDMA frames. Option H99 is an attenuator and output board combination optimized for ACP and out of channel measurements in CDMA, W-CDMA, and TETRA applications. Each of these attenuators is mutually exclusive and must be specified at the time of ordering. Some attenuators do not have upgrade paths. Consult your Agilent sales representative for more information if you would like to change attenuators.

Models
Option UNB is available with the following Agilent ESG models:
- E4400B
- E4420B
- E4421B
- E4422B
- E4430B
- E4431B
- E4432B
- E4433B

Option UNA is available with the following models:
- E4430B
- E4431B
- E4432B
- E4433B

Option H99 is available with the following models:
- E4432B
- E4433B

Key features
State-of-the-art electronic attenuator
Reliably cycle output power for receiver sensitivity or amplifier compression tests.
The patented all-electronic attenuator design maximizes dependability.
Standard on all Agilent ESG series models, it easily handles continuous output power cycling with highly repeatable results at frequencies up to 4 GHz.

Higher power
Increase the output power up to 6 dB for higher power applications.
An optional mechanical attenuator provides increased output power for overcoming insertion losses from cabling and switching matrices or for components requiring high drive levels. Option UNB also has up to 7 dB improved ACP performance over the standard electronic attenuator in CDMA applications.

Vary timeslots power levels
Simulate a TDMA mobile or base station for reference sensitivity or switching transient measurements.
Test TDMA designs by varying the power level of transmitted digital data in timeslot of a frame. This control is required in GSM receiver and transmitter design.

Optimize ACP
Meet CDMA performance requirements.
Option H99 offers up to 15 dB improvement over the standard electronic attenuator in ACP performance for CDMA and W-CDMA applications. It is the recommended choice for CDMA and W-CDMA component test environments.

Figure 22. Mechanical and electronic attenuator performance
The family consists of eight instruments: four analog instruments and four analog and digital instruments. These instruments have a frequency range from 250 kHz to 4 GHz.

To keep pace with ever-changing digital communication standards, Agilent is the leading-edge supplier of the latest signal-generator technology. To meet your evolving needs, Agilent constantly enhances the ESG family feature set. The latest features released are available as firmware for you to download from the Web. In most cases firmware upgrades can be done without any hardware modification. If a hardware modification is required, instructions are given on the web page, www.agilent.com/find/esg. Here you will find the latest news on the ESG including firmware upgrades, frequently asked questions, and new options.

Please consult the Agilent ESG Series RF Digital and Analog Signal Generators brochure, data sheet, and configuration guide for more information. For your reference, a list of related literature is shown at the end of this profile.

Key standard features for entire series
- Expandable architecture
- Broad frequency coverage
- Choice of electronic or mechanical attenuator
- Superior level accuracy
- Wideband FM and ΦM
- Step sweep (frequency, power and list)
- Built-in function generator
- Lightweight, rack-mountable
- 3-year warranty
- 2-year calibration cycle

Standard features only in the digital series
- Broadband analog I/Q inputs
- I/Q adjustment capabilities and internal calibration
- Excellent modulation accuracy and stability
- Coherent carrier output

Options available only with the digital series
- Built-in dual arbitrary waveform generator
- Multichannel CDMA personality
- Internal bit-error-rate analyzer
- Versatile timeslot, data and burst generation
- Adjustable symbol rates, filter factors and burst shape
- Digital modulation formats for DECT, GSM, NADC, PDC, PHS, and TETRA
Application notes and product notes

- *Digital Modulation in Communications Systems—An Introduction*, literature number 5965-7160E.
- *Using the Agilent ESG-D Series of RF signal generators and the Agilent 8922 GSM Test Set for GSM Applications*, literature number 5965-7158E.
- *Generating and Downloading Data to the ESG-D RF Signal Generator for Digital Modulation*, literature number 5966-1010E.
- *Using Vector Modulation Analysis in the Integration, Troubleshooting, and Design of Digital Communications Systems*, literature number 5091-8687E.
- *Controlling TDMA Timeslot Power Levels in the ESG-D Series, Option UNA Product Note*, literature number 5966-4472E.
- *Testing CDMA Base Station Amplifiers*, literature number 5967-5486E.
- *Generating Digital Modulation with the Agilent ESG-D Series Dual Arbitrary Waveform Generator, Option UND Product Note*, literature number 5966-4097E.
- *Customize Digital Modulation with the Agilent ESG-D Series Real-Time I/Q Baseband Generator, Option UN8 Product Note*, literature number 5966-4096E.
- *Using the Agilent ESG-D RF Signal Generators Multicarrier, Multichannel CDMA Personality for Component Test Option UN5 Product Note*, literature number 5968-2981E.

Product literature

- *Agilent ESG Series RF Signal Generators Brochure*, literature number 5966-3696E.
- *Agilent ESG Series RF Signal Generators Data Sheet*, literature number 5965-3096E.
- *Agilent ESG Series Signal Generators Configuration Guide*, literature number 5965-4973E.
- *Agilent Signal Generator Selection Guide*, literature number 5965-3094E.

See Agilent’s ESG internet page for the latest information

Get the latest news, product and support information, application literature, firmware upgrades, and more. Agilent’s Internet address for the ESG series is: www.agilent.com/find/esg
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

“Our 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) 269 7500 (fax) (305) 269 7599
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

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