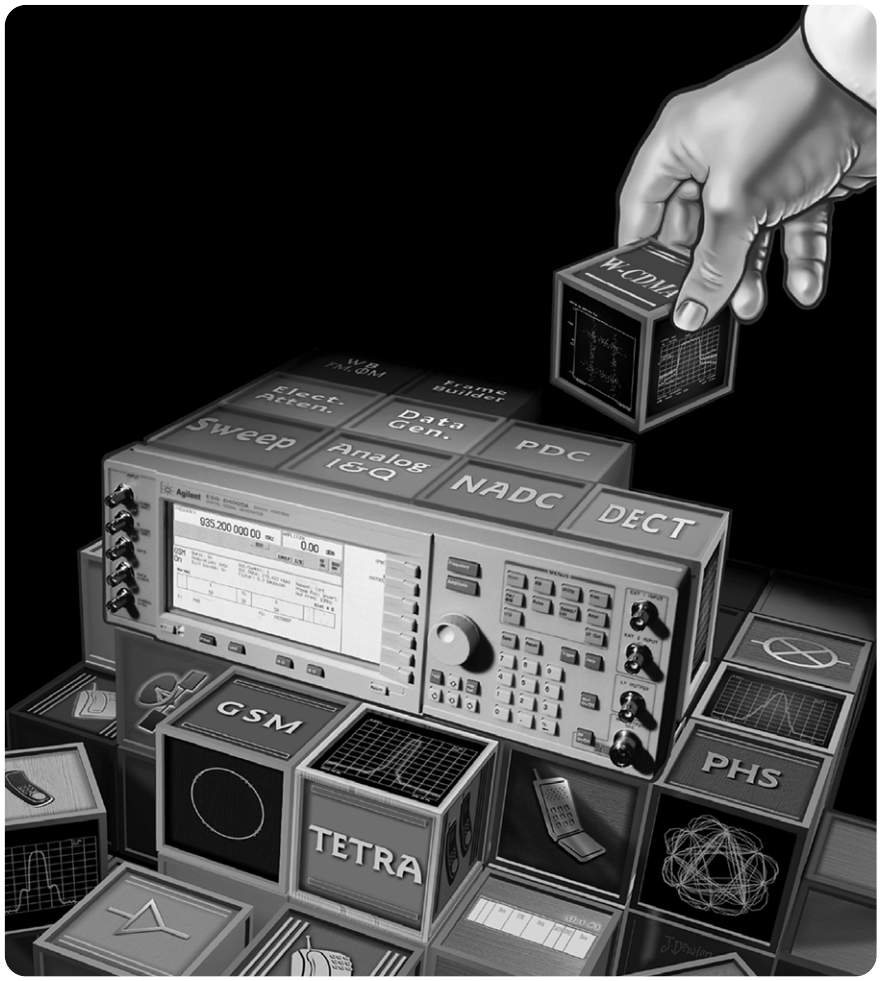
Agilent
ESG Series RF Signal Generators
Option 200 W-CDMA Personality for the Real-Time Baseband Generator

Product Overview



Fully-coded, multi-channel stimulus for W-CDMA mobiles and base stations

Option 200 W-CDMA personality adds a flexible solution for W-CDMA mobile and base station test to Agilent Technologies ESG-D and ESG-DP (high spectral purity) series RF signal generators. Conformance testing can be carried out as the W-CDMA signals generated comply with the 3GPP specification.

Signals are fully coded in both uplink and downlink modes to provide complete testing of receivers. This enables early design verification in R&D. Although it does not provide full protocol handling, it does enable testing of the physical layer for early manufacturing.

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Downlink features

Figure 1 is an example of Option 200 generating a downlink DPCH (Dedicated Physical Channel). It shows the extent of coding enabled and the wide variety of user control of input data. Coding parameters such as DTCH (dedicated Transport Channel) or DCCH (dedicated Control Channel) data bits, CRC and tail bits, convolutional/turbo coding, rate matching, and interleaving are user adjustable. This flexibility provides many ways of trouble shooting a design. Coding is done internally, eliminating the need to transfer files from a computer or a precomputed card to the signal generator. Data can be inserted at the transport layer (DTCH) or the physical layer (DPDCH). Power levels in each channel can be user controlled.

Key W-CDMA measurements

The fully coded signals generated by Option 200 simulate a base station to test a mobile. It allows the user to measure Bit Error Rate (BER) during the following tests: adjacent channel selectivity, spurious response, intermodulation response rejection, reference sensitivity level, maximum input level, and blocking. Continuous pseudorandom number sequences simulate real-world conditions. Option 200 can be used to verify functionality of W-CDMA mobiles and ensure that they conform to the 3GPP standard. The option includes user control of transport coding processes to accommodate future changes to the 3GPP specification, (e.g. rate matching).

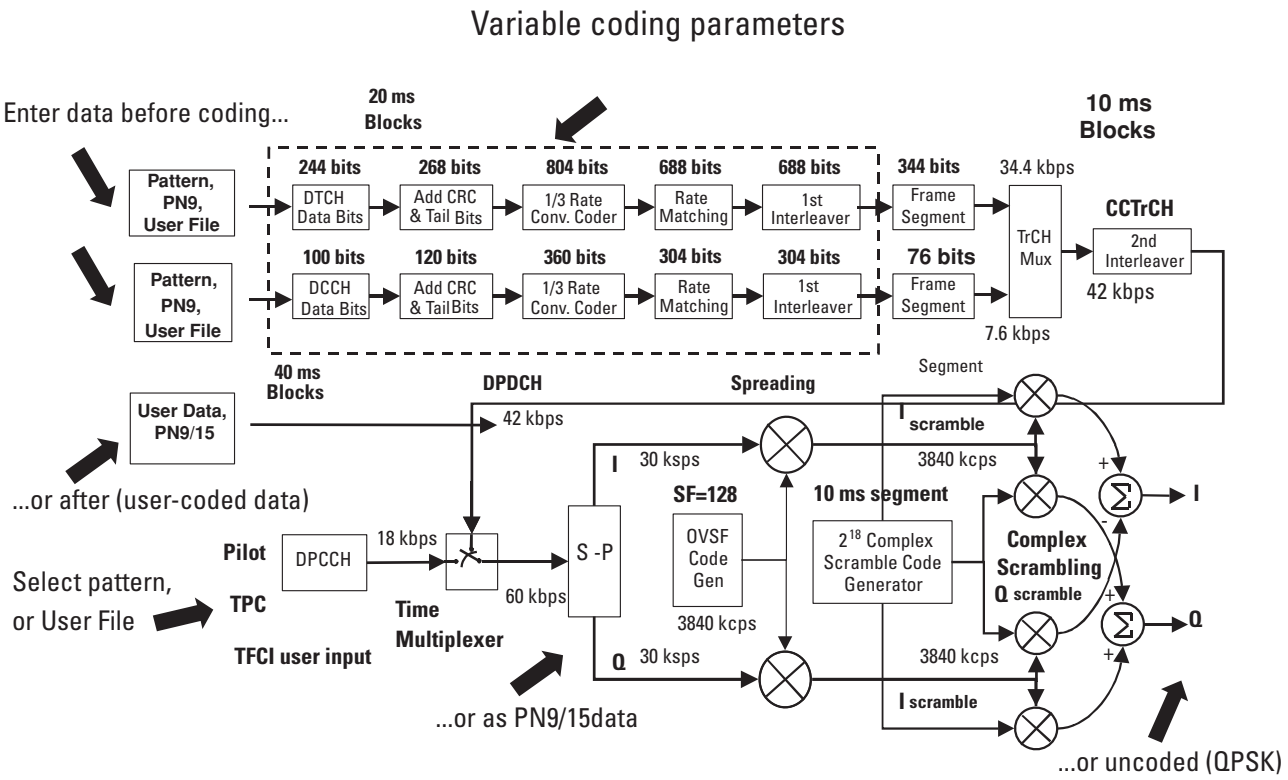


Figure 1. ESG data inputs for downlink DPCH coding (12.2 Reference Measurement Channel example)

Channels supported

Option 200 supports

- Reference measurement channels 12.2 k, 64 k, 144 k and 384 k (preconfigured; user editable) for conformance testing
  per 3GPP (25.101 V3.2 downlink) (25.141 V3.2 uplink)
- Service verification channels 64 k UDI (1B ISDN) and AMR speech
- Physical channels with many user configurable fields
- Each of the 6 transport channels on one DPCH can be unique
- BCH with incrementing System Frame Number

User control of channels

One ESG can support up to four W-CDMA channels simultaneously. For example, the four synchronization channels (P-SCH, S-SCH, CPICH and PCCPCH) can be generated on one ESG. A second ESG can generate DPCH, OCNS and PICH. Combining the two ESG outputs supports downlink conformance testing. Internal software aids the user in determining the power level of channels on each ESG.

Dual output stimulus for 3GPP receiver test

By using two ESG's a stimulus can be provided to perform bit error rate analysis of user equipment (UE) designs based on the requirements outlined in the 3GPP specification. Baseband signals are combined to provide the required 3GPP conformance test channels. The amplitude and carrier frequency of each ESG are independent to allow for adjacent channel selectivity, intermodulation response rejection and blocking tests. With the same configuration two phones could be tested simultaneously for increased throughput. The example in Figure 2 shows an ACS performance test being performed on a UE.

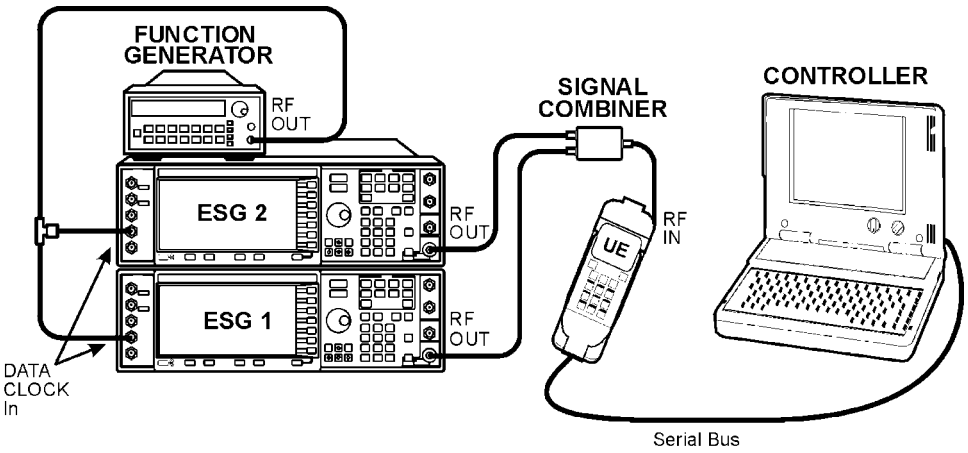
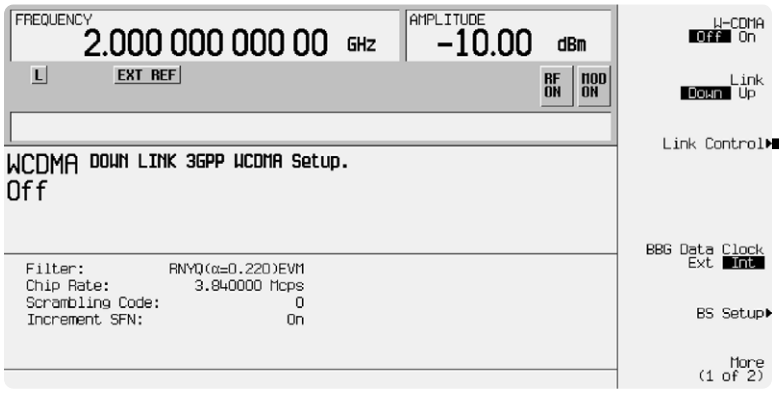
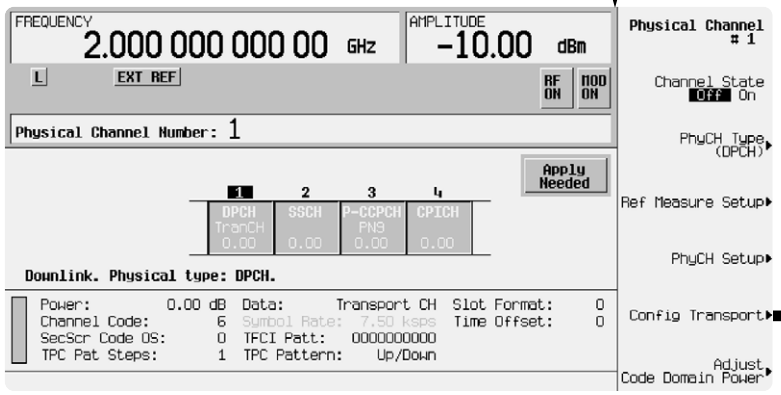


Figure 2. shows a ACS performance test being performed on a UE

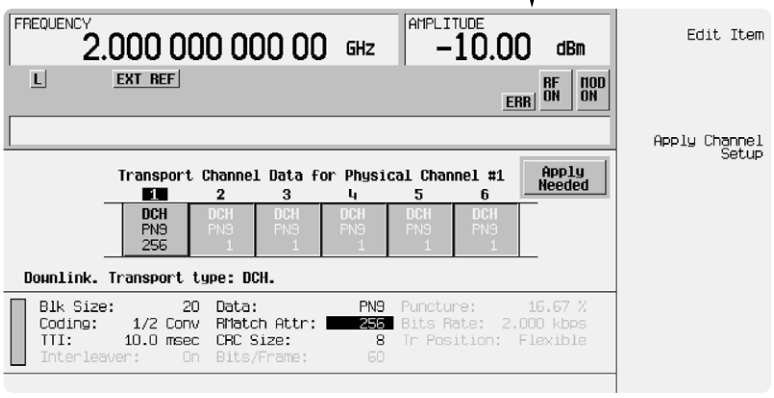
Downlink simulation



Choose W-CDMA downlink



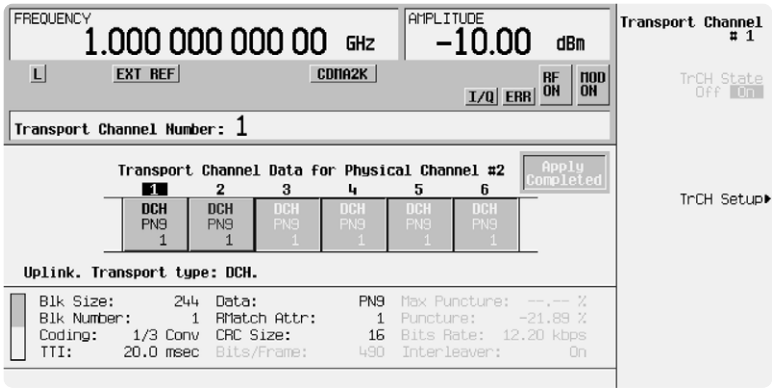
Select DPCH (Dedicated Physical Channel)



Configure the downlink transport channel

Uplink features

The uplink signal simulates a mobile in order to test a base station. Figure 3 is an example of Option 200 generating an uplink DPCH (Dedicated Physical Channel). It shows the extent of coding enabled and the wide variety of user control of input data. User adjustable coding parameters from the front panel (convolutional/turbo coding, rate matching, interleaving, etc.) provide ways of trouble shooting a design. Synchronization between the ESG and BS can be established by Frame Synch or System Frame Number reset.



An uplink transport channel being configured

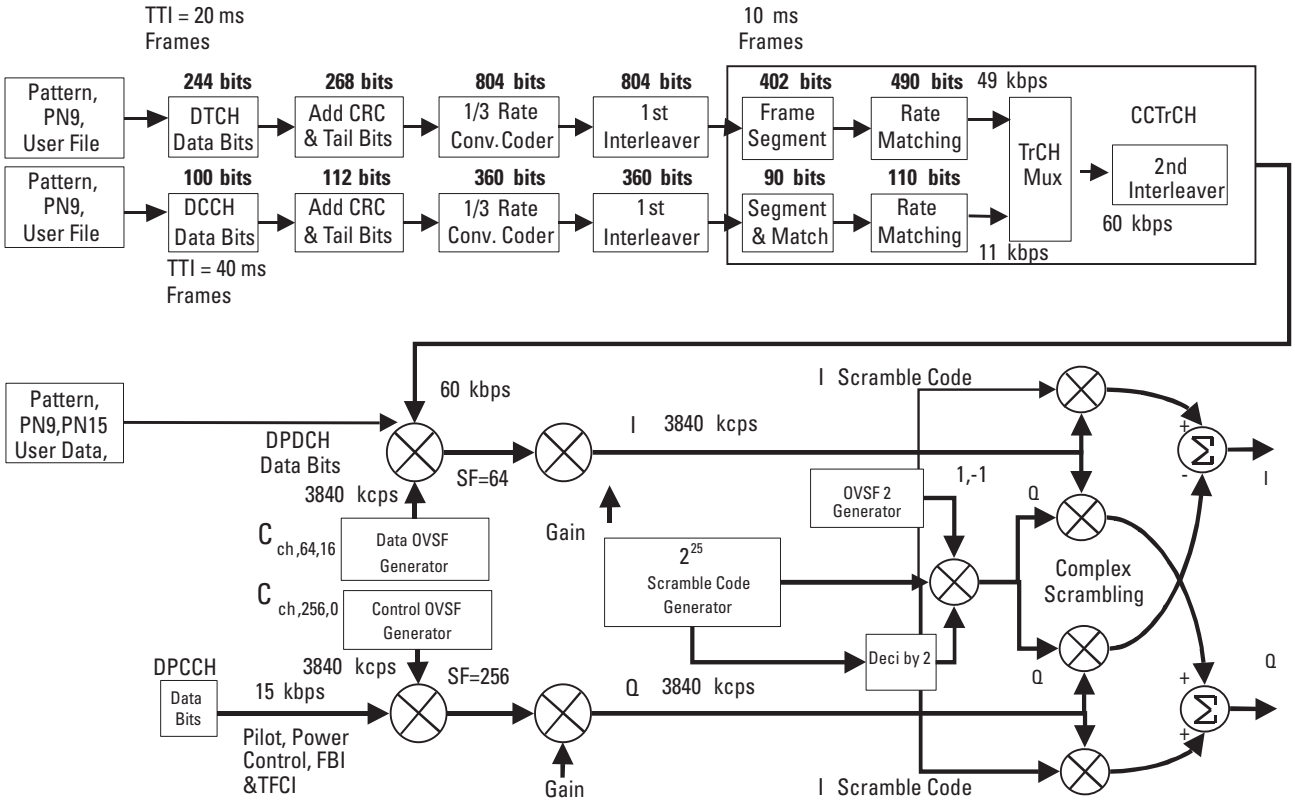


Figure 3. ESG data inputs for uplink DPCH coding (12.2 Reference Measurement Channel example)

Agilent's W-CDMA solutions

Agilent provides a range of test solutions for W-CDMA. The existing multichannel W-CDMA personality, Option 100 is an arbitrary waveform based solution for W-CDMA testing to the harmonized specification and supports versions 1.0-1.2 (ARIB) and 3GPP Release 99 v3.2. The key differences are:

- Option 100 includes Test Models 1, 2, 3, and 4.
- Option 100 can generate up to 6 DPDCH. Option 200 generates a single DPDCH on UL, up to 4 DPDCH on DL.
- Option 200 generates fully coded signals. Option 100 generates partially coded signals. Figure 4 outlines the difference between the two solutions.
- Option 200 can accept user files. Option 100 is limited to 4 bit pattern or random data.
- Option 200 can perform BER/BLER verification.
- Option 100 supports multi-carrier generation. Option 200 is single carrier.

Models and hardware requirements

Option 200 is a firmware personality that requires the real-time baseband generator Option UN8, (hardware Revision C or greater) to be installed in the ESG. The firmware can be activated by purchasing a license key. Firmware updates can be found on the Agilent ESG Web page at http://www.agilent.com/find/esg

Option 200, W-CDMA personality is available with all the Agilent ESG-D and ESG-DP (high spectral purity) series models:

E4430B 1 GHz ESG-D series RF signal generator

E4431B 2 GHz ESG-D series RF signal generator

E4432B 3 GHz ESG-D series RF signal generator

E4433B 4 GHz ESG-D series RF signal generator

E4434B 1 GHz ESG-DP series RF signal generator

E4435B 2 GHz ESG-DP series RF signal generator

E4436B 3 GHz ESG-DP series RF signal generator

E4437B 4 GHz ESG-DP series RF signal generator

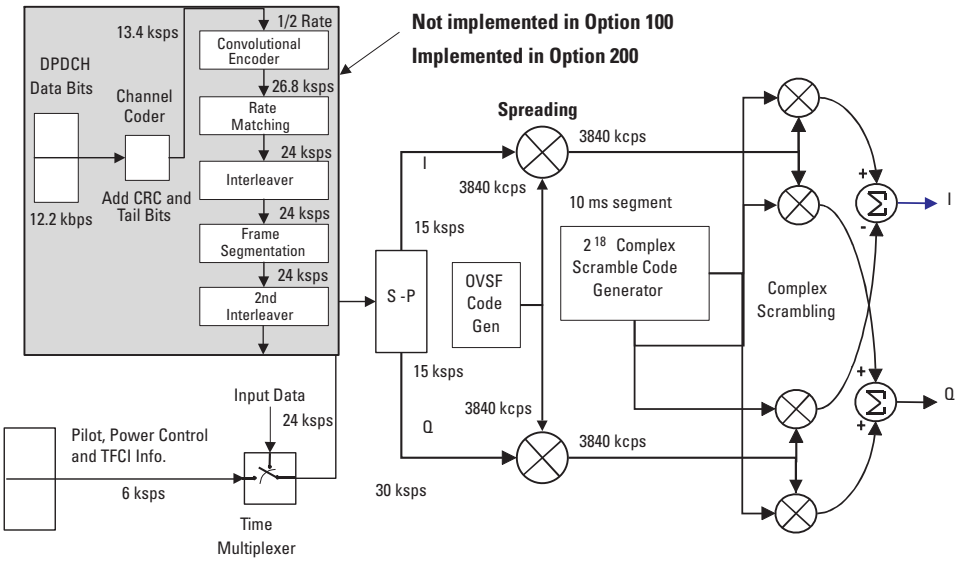


Figure 4. Difference between Option 100 and 200 downlink.

Channel types generated

Downlink

PSCH (Primary Synchronization Channel)
SSCH (Secondary Synchronization Channel)
P-CCPCH (Primary Common Control PhysicalChannel)
CPICH (Common Pilot Indication Channel)
DPCH (Dedicated Physical Channel) with transport channel
PICH (Paging Indication Channel)
OCNS (Orthogonal Coded Noise Source)

Uplink

DPCCH (Dedicated Physical Control Channel)
DPDCH (Dedicated Physical Data Channel) with transport channel

Supplemental specifications

A wide range of configurations are available for each uplink and downlink channel listed above. Refer to the Agilent *ESG Family of RF Signal Generators*, Data Sheet, literature number 5965-3096E for a complete list of these configurations and base instrument specifications.

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(fax) (61 3) 9210 5947

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(fax) 64 4 495 8950

Asia Pacific:
(tel) (852) 3197 7777
(fax) (852) 2506 9284

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