Is your W-CDMA ESG Option 200 Compliant with the Latest Specifications?

- **Latest issue of the R99 3GPP specifications – December 2000**
- **Latest ESG firmware available – B.03.60 from November 17, 2000, download at:** http://www.agilent.com/find/esg
- **Latest issue of this document published in March of 2001, next issue expected in April of 2001**

General 3GPP Notes

The 3GPP organization defines the specifications for W-CDMA. The first major release of the W-CDMA specifications is called R99 or release 99 and contains the core feature set for this standard. Note, it is possible to have a 2001 version of the R99 specification. New feature sets will appear in Release 4 and Release 5. The industry, however, is currently focused on Release 99 and is the supported feature set in the ESG.

The 3GPP standards body occasionally publishes the latest R99 specifications, typically referred to as an issue. For example, the specifications published in March of 2000 are referred to as the March 2000 issue. However, each individual specification may have a different version number, even though they are published in the same issue. The March 2000 issue of the 25.104 specification was on revision V3.2.0, while the 25.141 specification was on revision V.3.1.0.

The two distinct types of conformance tests for user equipment and base stations are defined within the base specification. These are separately identified as core specifications and test specifications. The core specifications establish the minimum RF characteristics for a device. The test specifications specify the measurement procedures for the conformance tests. The test specifications (TS 34.121 for FDD UE & TS 25.141 for FDD BTS) usually reference previous issues of the core specifications (TS 25.101 for FDD UE & TS 25.104 for FDD BTS). The table below maps the type of specifications to equipment to be tested.
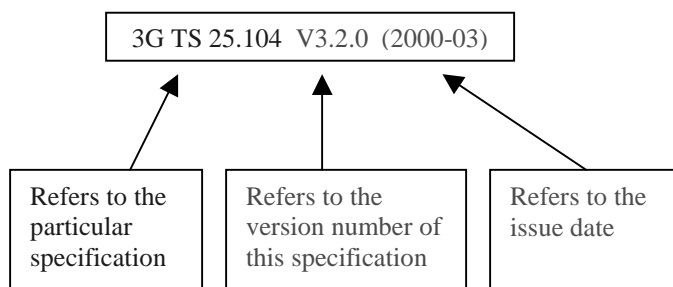
	Type of Specification	
	Core	Test
UE (Mobile)	TS 25.101 Note 1	TS 34.121
Base Station	TS 25.104	TS 25.141 Note 1

Note 1: The ESG manual for option 200 references these specifications.

There are three parts to the nomenclature of a 3GPP specification.
1. The specification number
2. The version number
3. Release date

A reference to a specification is technically accurate only when all three parts are referenced. An example is shown below:

The latest 3GPP W-CDMA specifications can be found at the following website: http://www.3gpp.org/ftp/Specs/

Notes About this Document
- This document assumes the latest ESG firmware is loaded into the instrument.
- The ESG can be used to generate the signals necessary to perform many of the receiver characteristics and performance requirements measurements for user equipment and base stations per the 3GPP standard.
- The following tables indicate which specifications the ESG is compliant to for both the core and test specifications.
- The numbers located in each cell reference the clause from the specification for each type of test.

<table>
<tr><td colspan="5">R99 UE Receiver Conformance Tests TS 25.101 / TS 34.121
Table valid for B.03.60 November 17, 2000 ESG Firmware</td></tr>
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UE Receiver Characteristics	March 2000 Issue		December 2000 Issue	
	25.101 V3.2.2 (2000-04)	34.121 V3.0.1 (2000-03)	25.101 V3.5.0 (2000-12) Note 3	34.121 V3.3.0 (2000-12) Note 3
Reference Sensitivity Level	7.3 No Note 1	6.2 No Note 1	7.3 Yes	6.2 Yes Note 8, 9
Maximum Input Level	7.4 No Note 1	6.3 No Note 1	7.4 No Note 4	6.3 No Note 4 ,9
Adjacent Channel Selectivity	7.5 No Note 1	6.4 No Note 1	7.5 Yes Note 5	6.4 Yes Note 5, 9
Blocking Characteristics	7.6 No Note 1	6.5 No Note 1	7.6 Yes Note 5, 6	6.5 Yes Note 5, 6, 9
Spurious Response	7.7 No Note 1	6.6 No Note 1	7.7 Yes Note 7	6.6 Yes Note 7, 9
Intermodulation Characteristics	7.8 No Note 1	6.7 No Note 1	7.8 Yes Note 5, 6	6.7 Yes Note 5, 6, 9
Spurious Emissions	7.9 Yes Note 2	6.8 Yes Note 2	7.9 Yes Note 2	6.8 Yes Note 2
UE Performance Requirements	The ESG can not generate the required signals for these tests at this time. This limitation is being investigated for a future firmware release.			

Yes – ESG can generate the required signal / **No** – ESG can not generate the required signal

Note 1: The ESG cannot comply with these tests because the parameters for the 12.2 kbps RMC channel are incorrect. The 12.2 kbps RMC channel specifies 344 bits per frame and 76 bits per frame for the DTCH and DCCH transport channels respectively. The ESG defaults to 343 bits per frame and 77 bits per frame for the DTCH and DCCH transport channels respectively. This cannot be changed on the ESG.

Note 2: Requires a vector signal analyzer or spectrum analyzer with a frequency range up to 12.75 GHz. Future versions of the specification may require a downlink signal to be applied to the UE.

Note 3: The default ESG parameters for 12.2 kbps RMC need to be changed. The following changes can be made on the ESG to make the RMC channel compliant with the specification.
   a.   The 12.2 kbps RMC defaults with a rate matching attribute of 1. Change the rate matching attribute to 256.
   b.   The position of the TrCH in the radio frame in the standard is defined to be fixed. The ESG indicates this position as flexible, the user can not change this parameter. However, the test is standards compliant when the other parameters are set according to the specification.
   c.   Puncturing for the DTCH is 14.7% in the specification. The ESG reports 14.68%. The value reported in the specification has been rounded.

Note 4: The ESG cannot generate the required channel configurations. Note, this issued is being investigated for future firmware releases.
   a.   16 OCNS channels with uncorrelated user data are required for this test along with a fully coded DPCH channel. The two-box ESG setup can generate only 4 OCNS channels. The ESG option 100 cannot be used because the channels are not fully coded.
   b.   The S-CPICH channel is required. The ESG does not support this channel.

Note 5: The modulated signal requires the generation of common channels along with 16 dedicated data channels. The output of the second ESG in the two-box option 200 configuration can not be used for this test. An ESG with option 100 can generate the required interfering signal because the channels do not need to be fully coded.

Note 6: Requires an Agilent 83712B synthesized CW generator (or another signal source capable of providing a CW signal at an amplitude range of –46 dBm to –15 dBm with an RF output frequency range of 2.11 GHz to 12.75 GHz)

Note 7: This test requires an interfering CW signal. The output of the second ESG in the two-box ESG configuration can be used to generate the required interferer.

Note 8: Must send continuous up power commands to the phone until the UE is at maximum power. This can be accomplished by setting the TPC Pattern to "All Up" in the physical channel setup for the DPCH channel.

Note 9: The system simulator is specified to measure BER of the DCH received from the UE. This is accomplished with the UE in a loopback mode. The ESG cannot measure the BER of a modulated RF signal directly. However, the ESG can accept a PN9 or a PN15 sequence supplied as a TTL bitstream for BER testing by using option UN7. A gate signal is required to recover the PN sequence from the packet or frame. Option UN7 requires a synchronous clock from the UE to operate correctly.

R99 Base Station Conformance Tests TS 25.141 / TS 25.104				
Table valid for B.03.60 November 17, 2000 ESG Firmware				
	March 2000 Issue		**December 2000 Issue**	
Base Station Receiver Characteristics	**25.104 V3.2.0 (2000-03)**	**25.141 V3.1.0 (2000-03) Note 1**	**25.104 V3.5.0 (2000-12) Note 9**	**25.141 V3.4.1 (2000-12) Note 9**
Reference Sensitivity Level	7.2 Yes	7.2 Yes	7.2 Yes	7.2 Yes
Dynamic Range	7.3 Yes Note 2	7.3 Yes Note 2	7.3 Yes Note 2	7.3 Yes Note 2
Adjacent Channel Selectivity	7.4 Yes Note 10	7.4 Yes Note 3	7.4 Yes Note 10	7.4 Yes Note 3
Blocking Characteristics	7.5 Yes Note 4, 5	7.5 Yes Note 4, 5	7.5 Yes Note 4, 5	7.5 Yes Note 4, 5
Intermodulation Characteristics	7.6 Yes Note 5, 6	7.6 Yes Note 5, 6	7.6 Yes Note 5, 6	7.6 Yes Note 5, 6
Spurious Emissions	7.7 Yes Note 7	7.7 Yes Note 7	7.7 Yes Note 7	7.7 Yes Note 7
Verification of Internal BER calc	N/A	7.8 Yes Note 8	N/A	7.8 Yes Note 8
Base Station Performance Requirements	**25.104 V3.2.0 (2000-03) Note 2**	**25.141 V3.1.0 (2000-03) Note 1**	**25.104 V3.5.0 (2000-12) Note 2, 9**	**25.141 V3.4.1 (2000-12) Note 9**
Demodulation in Static Propagation Conditions	8.2 Yes	8.2 Yes Note 2	8.2 Yes	8.2 Yes Note 2
Demodulation of DCH in Multipath Fading Conditions	8.3 Yes Note 11	8.3 Yes Note 2, 11	8.3 Yes Note 11	8.3 Yes Note 2,11
Demodulation of DCH in Moving Propagation Conditions	8.4 Yes Note 11	8.4 Yes Note 2, 11	8.4 Yes Note 11	8.4 Yes Note 2, 11
Demodulation of DCH in Birth/Death Propagation Conditions	8.5 Yes Note 11	8.5 Yes Note 2, 11	8.5 Yes Note 11	8.5 Yes Note 2, 11
Verification of the Internal BLER Calculation	N/A	8.6 Yes Note 12	N/A	8.6 Yes

YES – ESG can generate the required signal / **NO** – ESG can not generate the required signal

Note 1:   The ESG manual states compliance with the 3GPP TS 25.141 V3.2.2 (2000-04) specification. This should reference the 3GPP TS 25.141 V3.1.0 (2000-03) specification.

Note 2:   A signal source capable of generating AWGN signal is required for this test. A second ESG with option UND can generate the required signal.

Note 3:   This test requires a signal generator capable of generating a single channel W-CDMA signal with an ACLR of 63 dB. A second ESG with option H99 can perform this function.

Note 4:   Requires an Agilent 83712B synthesized CW generator (or another signal source capable of providing a CW signal at an amplitude –15 dBm with an RF output frequency range of 1 MHz GHz to 12.75 GHz)

Note 5:   This test requires a signal generator capable of generating a single channel W-CDMA signal. Another ESG with option 100 or option 200 can perform this function.

Note 6:   This test requires a source capable of providing a CW signal at an amplitude of –48 dBm across a frequency range of 1920 to 1980 MHz. Another ESG can generate this signal.

Note 7:   This test requires an Agilent 8563E spectrum analyzer or vector signal analyzer or spectrum analyzer with a frequency range up to 12.75 GHz.

Note 8:   The procedure for making this test is not specified in the ESG manual. However, the ESG can generate the appropriate signals with the required bit rate errors. Note, the transport channel configuration is not completely defined in this revision of the 3GPP specification.

Note 9:   The 12.2, 64, 144, 384 kbps reference measurement channel configurations have changed from previous 3GPP revisions. The ESG is compliant with the reference measurement channels if the following are changed:
   a.   Set the block size for the DCCH to 100 bits
   b.   Set the DCCH CRC to 12 bits

Note 10: This test requires a second signal source capable of generating a modulated interfering signal.

Note 11: This test requires a multi-path fading simulator.

Note 12: The ESG cannot generate the 2048 kbps reference measurement channel required for this test. This issue is being investigated for a future firmware release. Note, this RMC is currently undergoing modifications in the specification.