



**Nemko Test Report:** 4287RUS1

**Applicant:** Communication Components  
89 Leuning Street  
2<sup>nd</sup> Floor  
South Hackensack, NJ 07606  
USA

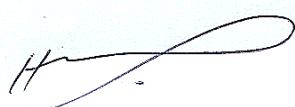
**Equipment Under Test:  
(E.U.T.)** CE-1819-10G2

**In Accordance With:** **CFR 47, Part 24, Subpart E**  
Broadband PCS Repeaters

**Tested By:** Nemko USA, Inc.  
802 N. Kealy  
Lewisville, TX 75057-3136

**TESTED BY:**   
\_\_\_\_\_  
David Light, Senior Wireless Engineer

**DATE:** 01 May 2007

**APPROVED BY:**   
\_\_\_\_\_

**DATE:** 2<sup>nd</sup> May 2007

**Number of Pages: 36**

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**EQUIPMENT: CE-1819-10G2**

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**Section 1. Summary of Test Results**

Manufacturer: Communication Components

Model No.: CE-1819-10G2

Serial No.: 031016 (Lower Band) and 031026 (Upper Band)

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47, Part 24, Subpart E.

- |                                     |                            |                                     |                     |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input checked="" type="checkbox"/> | New Submission             | <input checked="" type="checkbox"/> | Production Unit     |
| <input type="checkbox"/>            | Class II Permissive Change | <input type="checkbox"/>            | Pre-Production Unit |

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



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**EQUIPMENT: CE-1819-10G2**

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**Summary Of Test Data**

<b>NAME OF TEST</b>	<b>PARA. NO.</b>	<b>SPEC.</b>	<b>RESULT</b>
RF Power Output	24.232	100W	Complies
Occupied Bandwidth	2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.235		NA

**Footnotes:**

- (1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.
- (2) Frequency stability was not tested since the E.U.T has no frequency conversion capabilities.

**Section 2. General Equipment Specification**

<b>Supply Voltage Input:</b>	120 Vac				
<b>Frequency Bands: Downlink:</b>	<input checked="" type="checkbox"/>	Block A :	1930 – 1945 MHz		
	<input checked="" type="checkbox"/>	Block D :	1945 – 1950 MHz		
	<input checked="" type="checkbox"/>	Block B :	1950 – 1965 MHz		
	<input checked="" type="checkbox"/>	Block E :	1965 – 1970 MHz		
	<input checked="" type="checkbox"/>	Block F :	1970 – 1975 MHz		
	<input checked="" type="checkbox"/>	Block C :	1975 – 1990 MHz		
<b>Frequency Bands: Uplink:</b>	<input type="checkbox"/>	Block A :	1850 – 1865 MHz		
	<input type="checkbox"/>	Block B :	1865 – 1870 MHz		
	<input type="checkbox"/>	Block C :	1870 – 1885 MHz		
	<input type="checkbox"/>	Block D :	1885 – 1890 MHz		
	<input type="checkbox"/>	Block E :	1890 – 1895 MHz		
	<input type="checkbox"/>	Block F :	1895 – 1910 MHz		
<b>Type of Modulation and Designator:</b>	<b>CDMA (F9W)</b>	<b>GSM (GXW)</b>	<b>NADC (DXW)</b>	<b>W-CDMA (F9W)</b>	<b>EDGE (G7W)</b>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>System Gain:</b>	10 dB				
<b>Output Impedance:</b>	50 ohms				
<b>RF Output (Rated): Uplink</b>			<u>NA</u> W		
			NA	dBm	
<b>RF Output (Rated): Downlink</b>			<u>20</u> W		
			43	dBm	
<b>Frequency Translation:</b>	<b>F1-F1</b>	<b>F1-F2</b>	<b>N/A</b>		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Band Selection:</b>	<b>Software</b>	<b>Duplexer</b>	<b>Fullband</b>		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

### **Description of EUT**

The device is a booster amplifier for use in the PCS band. The device works in either a GSM, EDGE or CDMA network.

### **System Diagram**

Pleas refer to separate exhibit.

EQUIPMENT: **CE-1819-10G2**

**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 24.232
TESTED BY: David Light	DATE: 01 May 2007

**Test Results:** Complies.

**Measurement Data:**

Direction	Modulation	Power (dBm)	Power (W)
Uplink	CDMA	NA	NA
Downlink	CDMA	43.07	20.28
Uplink	EDGE	NA	NA
Downlink	EDGE	43.09	20.37
Uplink	GSM	NA	NA
Downlink	GSM	43.09	20.37

**Equipment Used:** 1053-1036-1529-1604-1064

**Measurement Uncertainty:** +/- 1.7 dB

**Temperature:** 20 °C

**Relative Humidity:** 48 %

*EQUIPMENT:* **CE-1819-10G2**

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**Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 01 May 2007

**Test Results:** Complies.

**Test Data:** See attached plot(s).

**Equipment Used:** 1053-1036-1529-1604-1064

**Measurement Uncertainty:** 1X10<sup>-7</sup> ppm

**Temperature:** 20 °C

**Relative Humidity:** 48 %



EQUIPMENT: CE-1819-10G2

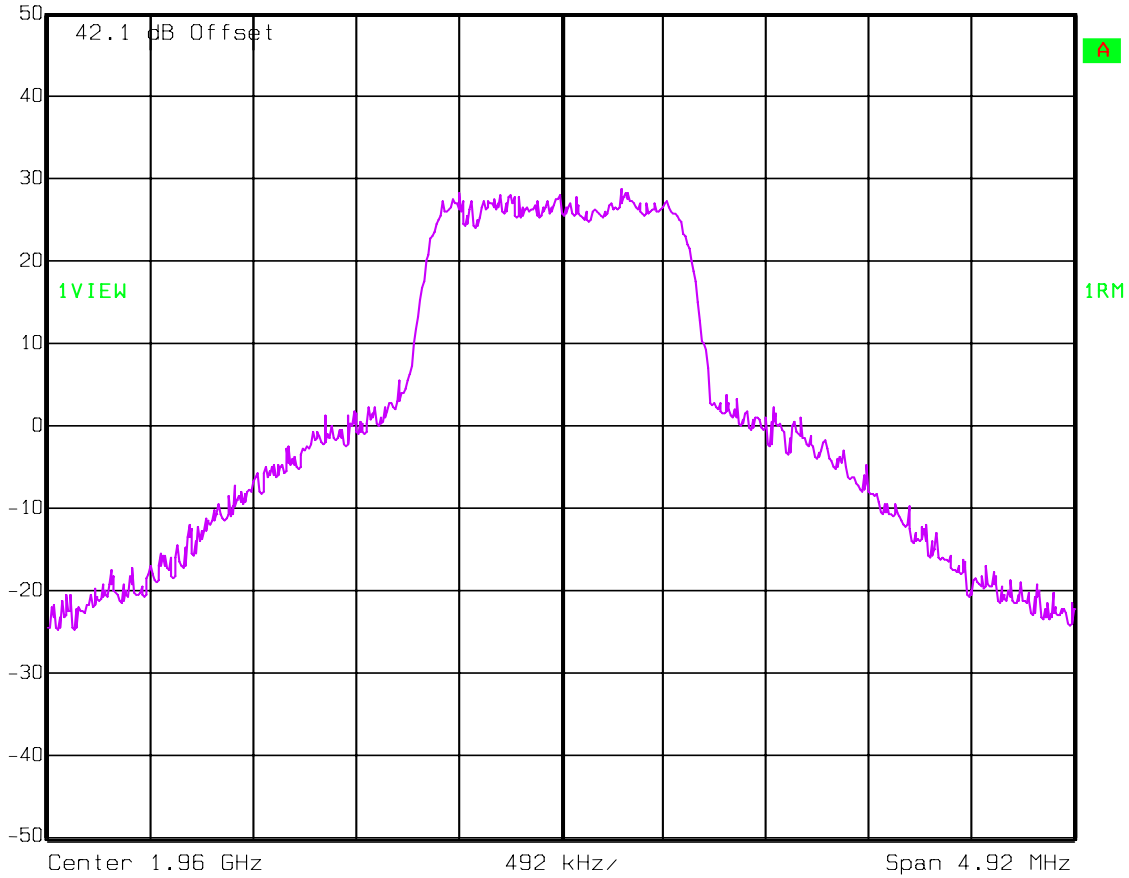
Test Data – Occupied Bandwidth

CDMA - Output



Ref Lvl  
50 dBm

RBW	30 kHz	RF Att	20 dB
VBW	300 kHz	Mixer	-10 dBm
SWT	14 ms	Unit	dBm



Date: 01.MAY 2007 10:06:18

EQUIPMENT: CE-1819-10G2

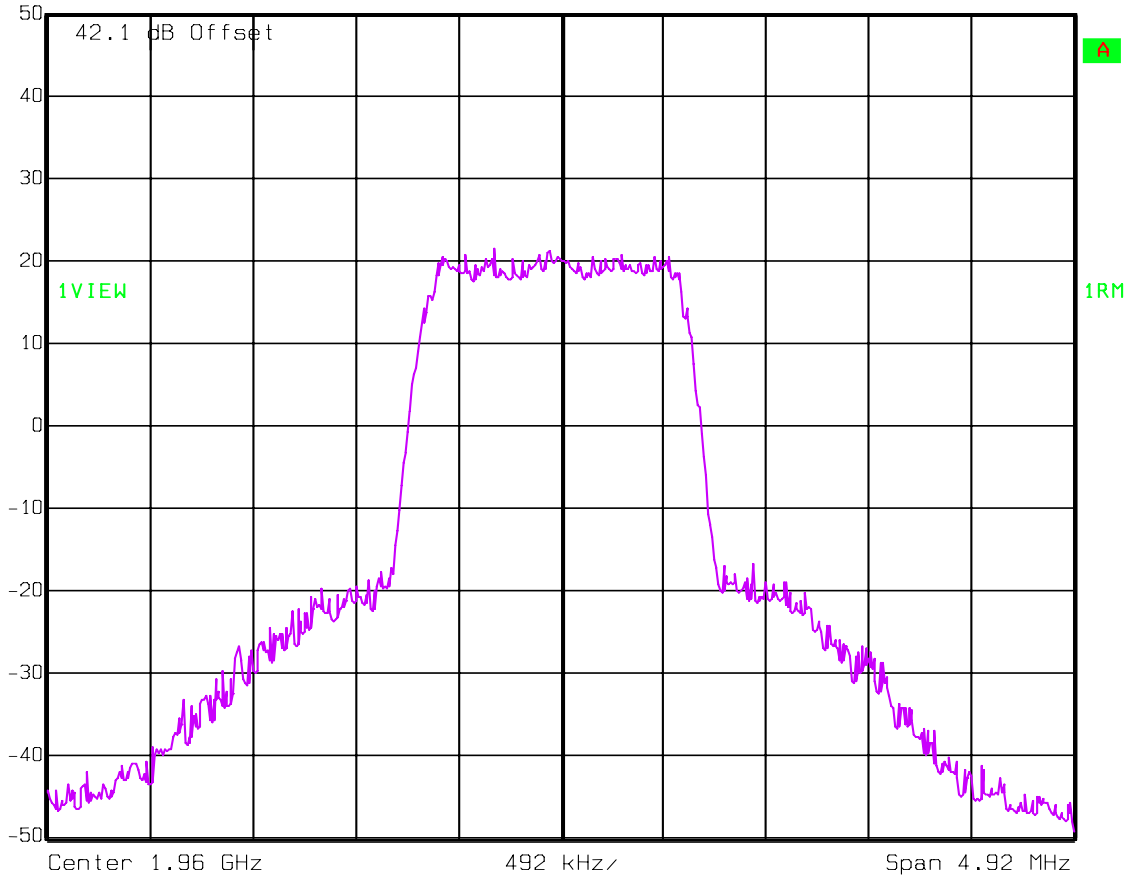
Test Data – Occupied Bandwidth

CDMA - Input



Ref Lvl  
50 dBm

RBW	30 kHz	RF Att	20 dB
VBW	300 kHz	Mixer	-10 dBm
SWT	14 ms	Unit	dBm



Date: 01.MAY 2007 10:20:11

EQUIPMENT: CE-1819-10G2

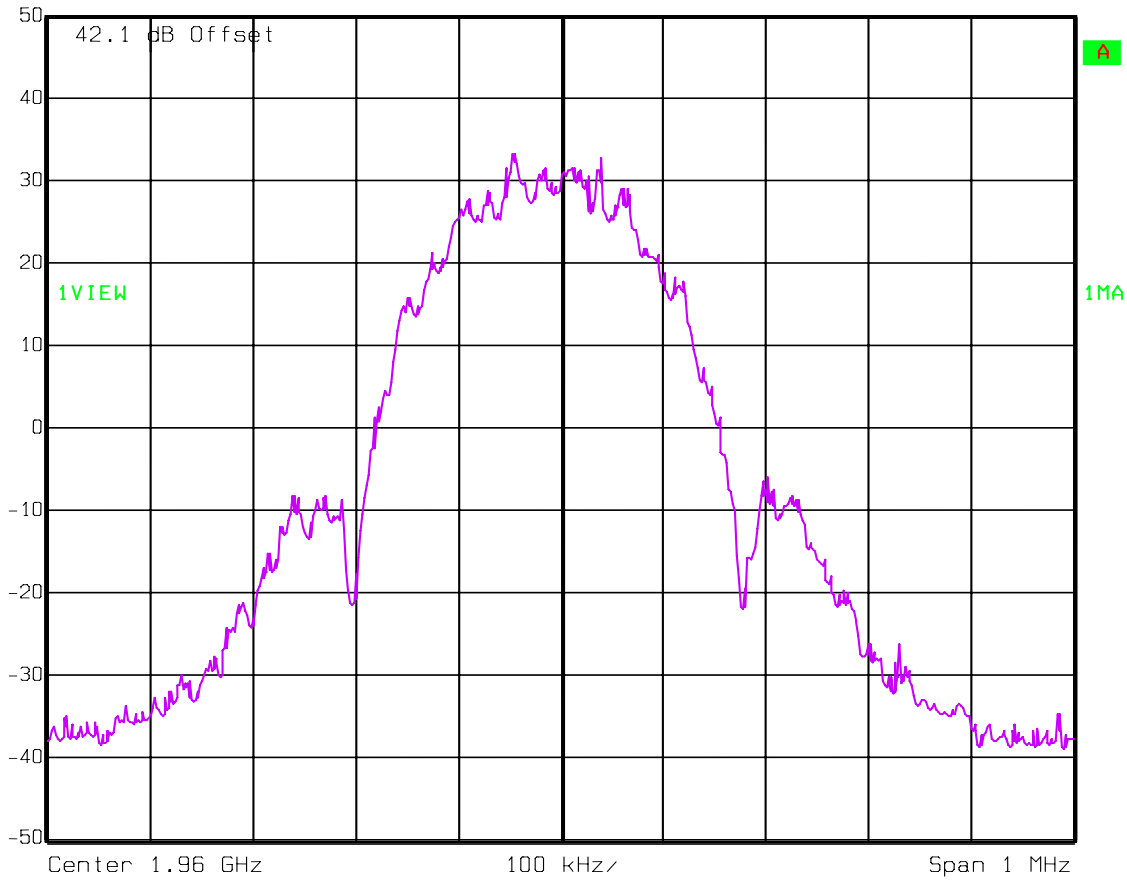
Test Data – Occupied Bandwidth

EDGE - Output



Ref Lvl  
50 dBm

RBW 3 kHz RF Att 30 dB  
VBW 3 kHz  
SWT 280 ms Unit dBm



Date: 01.MAY 2007 10:01:32

EQUIPMENT: CE-1819-10G2

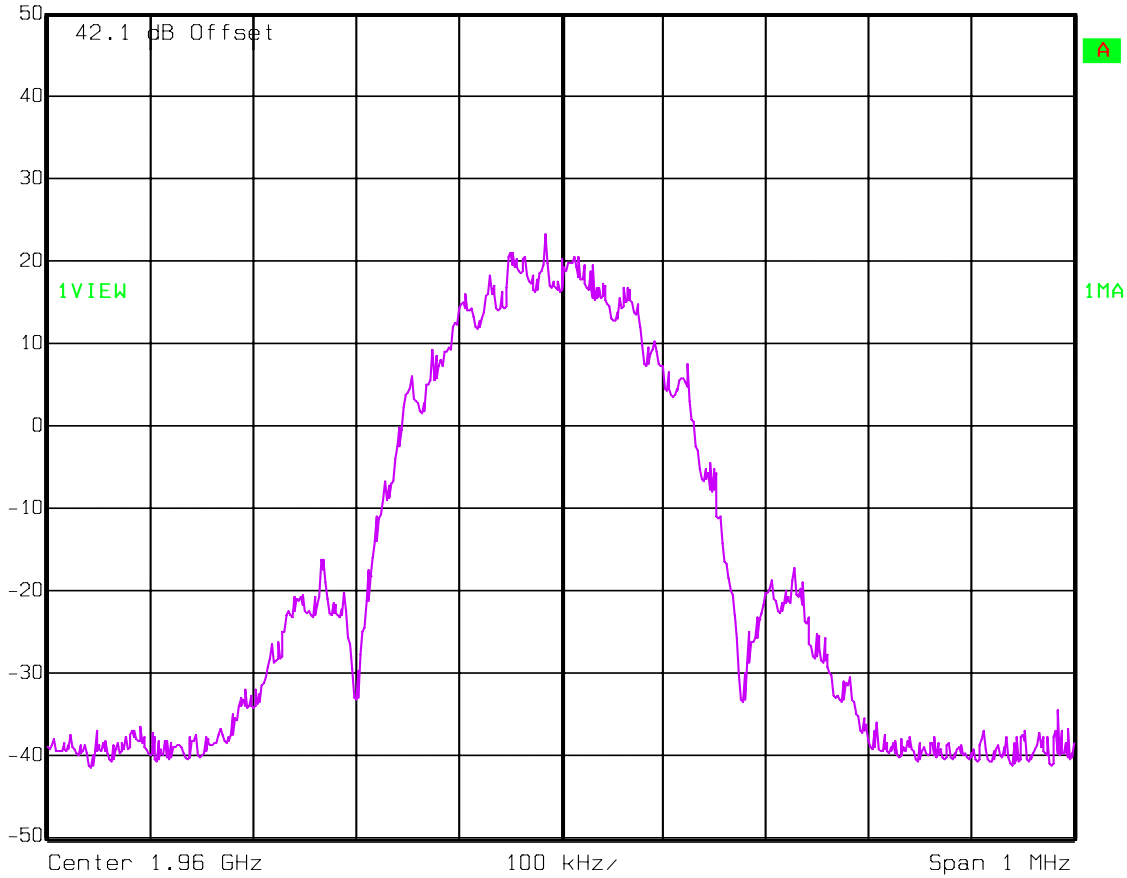
Test Data – Occupied Bandwidth

EDGE - Input



Ref Lvl  
50 dBm

RBW 3 kHz RF Att 30 dB  
VBW 3 kHz  
SWT 280 ms Unit dBm



Date: 01.MAY 2007 10:02:31

EQUIPMENT: CE-1819-10G2

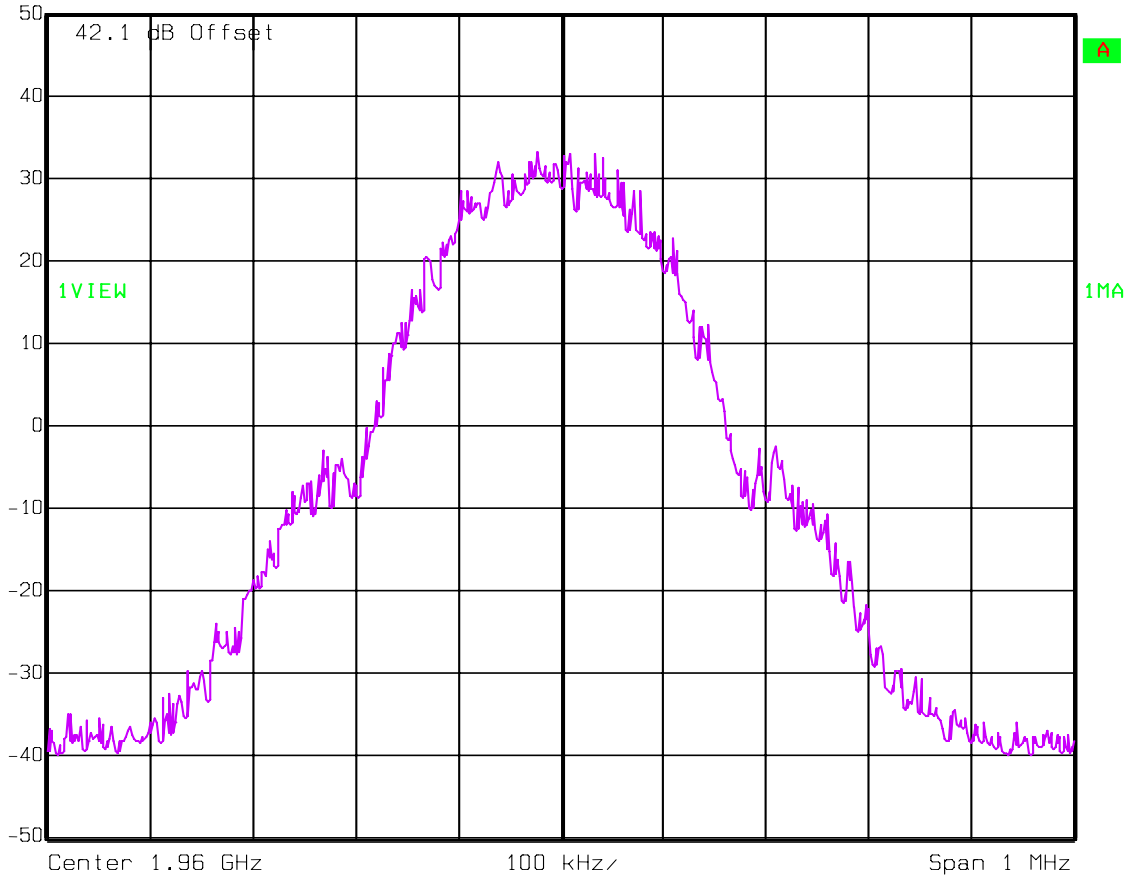
Test Data – Occupied Bandwidth

GSM - Output



Ref Lvl  
50 dBm

RBW 3 kHz RF Att 30 dB  
VBW 3 kHz  
SWT 280 ms Unit dBm



Date: 01.MAY 2007 09:50:09

EQUIPMENT: CE-1819-10G2

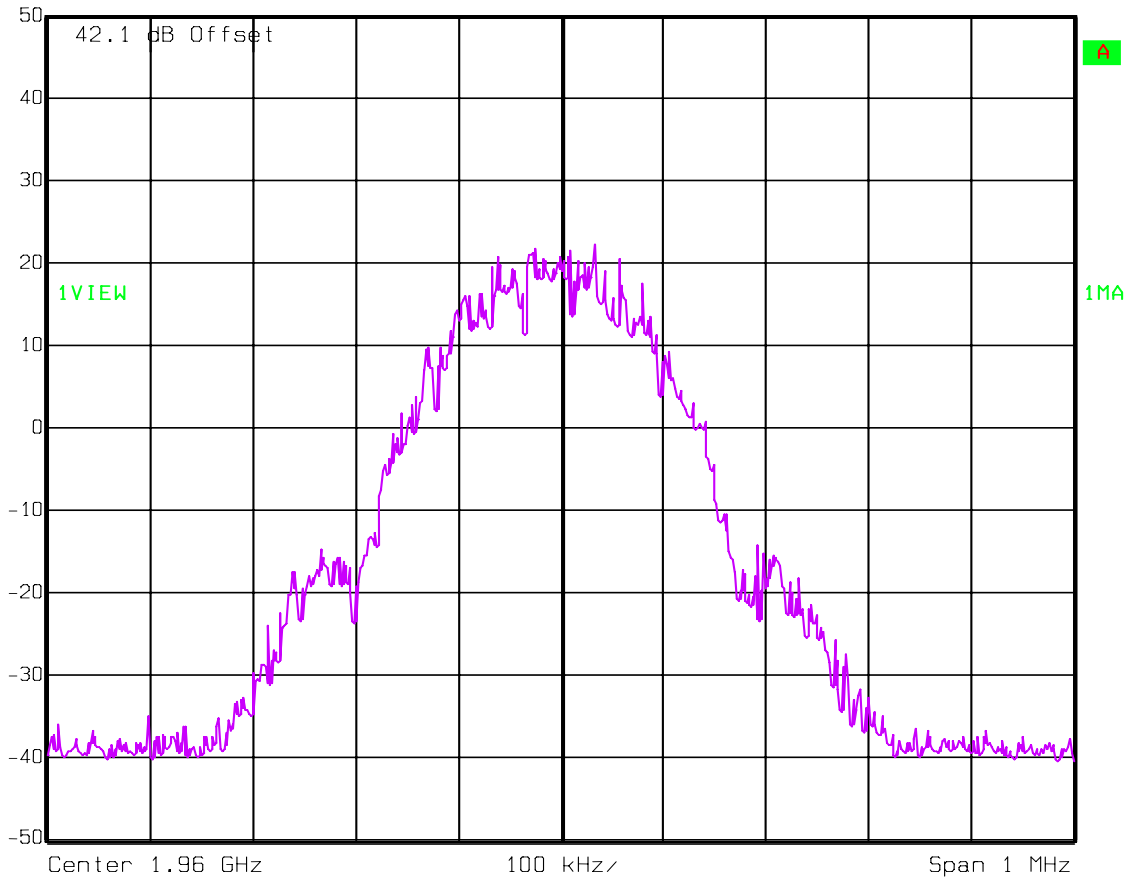
Test Data – Occupied Bandwidth

GSM - Input



Ref Lvl  
50 dBm

RBW 3 kHz RF Att 30 dB  
VBW 3 kHz  
SWT 280 ms Unit dBm



Date: 01.MAY 2007 09:51:51

*EQUIPMENT:* **CE-1819-10G2**

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**Section 5. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 01 May 2007

**Test Results:** Complies.

**Test Data:** See attached plot(s).

**Equipment Used:** 1053-1036-1529-1604-1064-1059-1054-1055-1058-1684

**Measurement Uncertainty:** +/- 1.7 dB

**Temperature:** 20 °C

**Relative Humidity:** 48 %

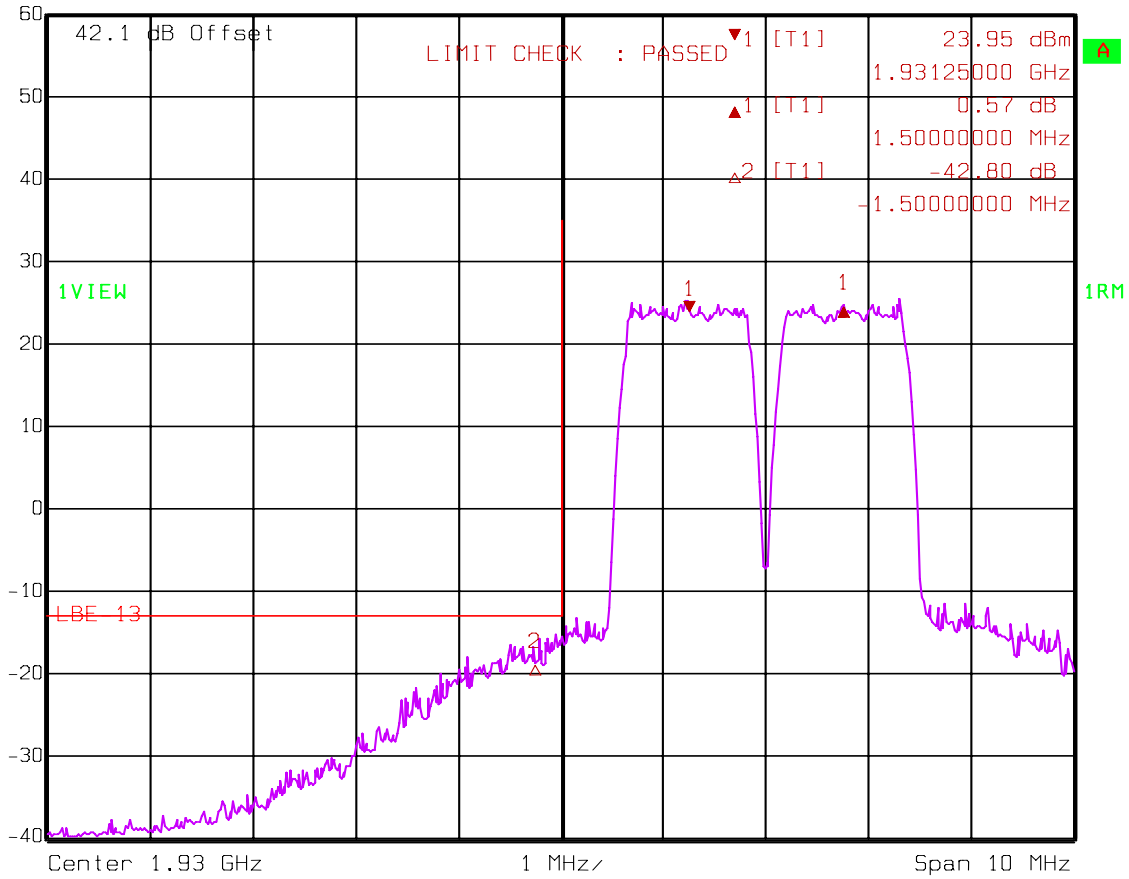
EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation  
 CDMA  
 Downlink



Delta 1 [T1] RBW 30 kHz RF Att 30 dB  
 Ref Lvl 0.57 dB VBW 300 kHz Mixer -10 dBm  
 60 dBm 1.50000000 MHz SWT 28 ms Unit dBm



Date: 01.MAY 2007 11:47:07

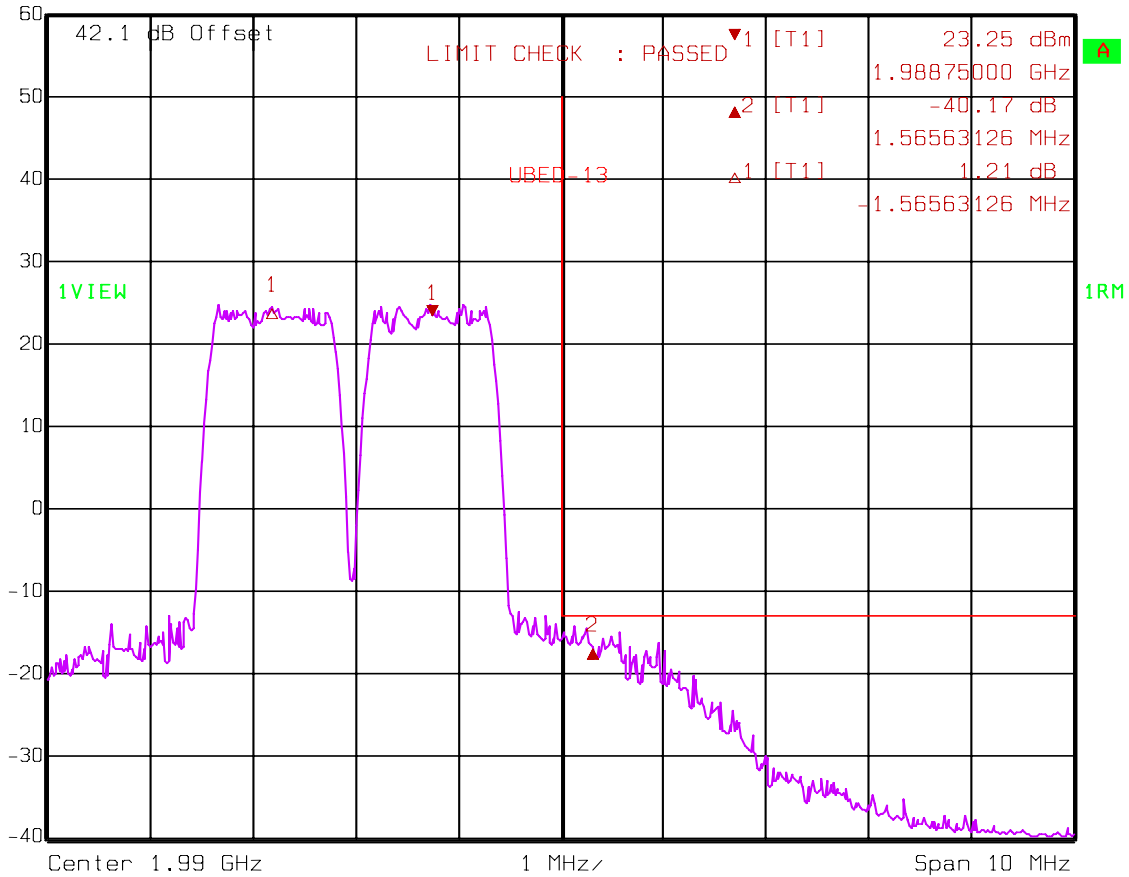


EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation  
 CDMA  
 Downlink

	Delta 2 [T1]	RBW	30 kHz	RF Att	30 dB	
	Ref Lvl	-40.17 dB	VBW	300 kHz	Mixer	-10 dBm
	60 dBm	1.56563126 MHz	SWT	28 ms	Unit	dBm



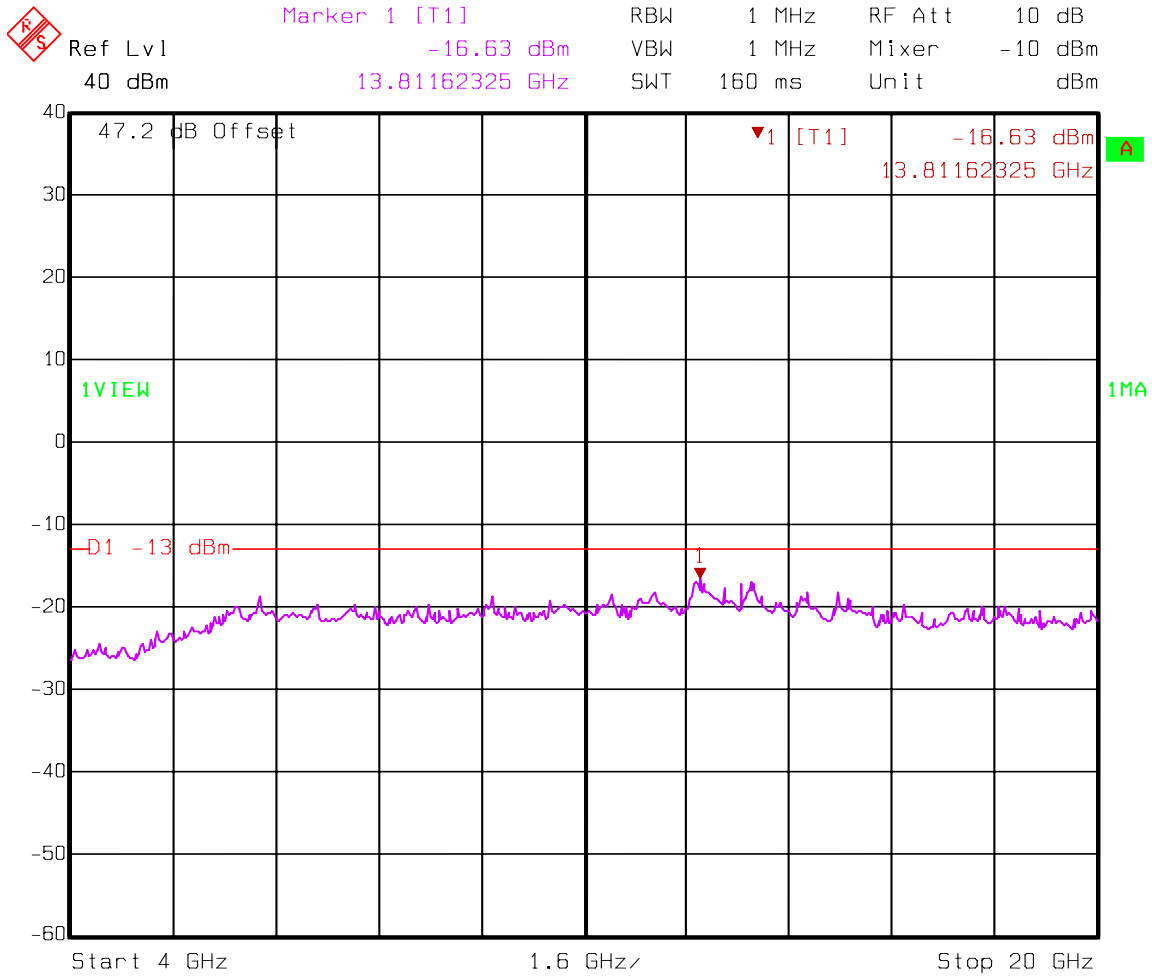
Date: 01.MAY 2007 11:41:04

EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Spurs – CDMA – Downlink

Carrier Notched



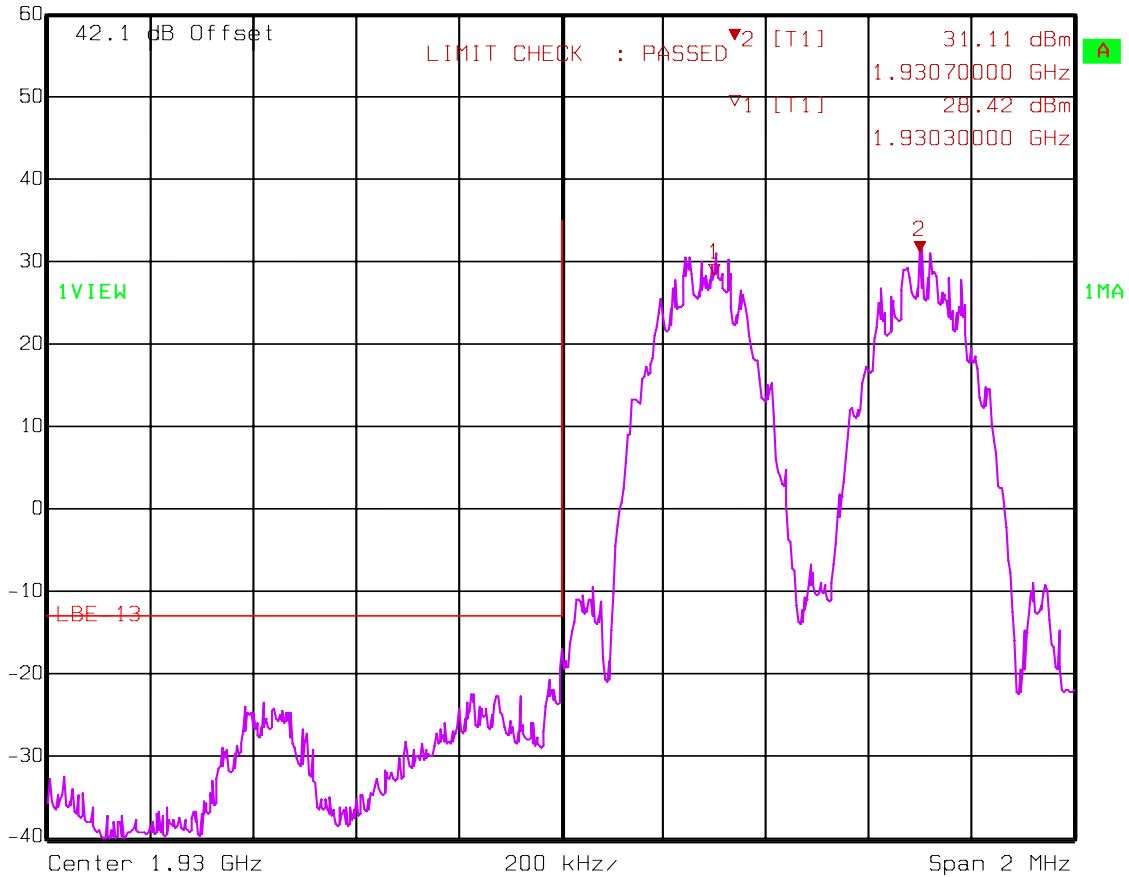
Date: 01.MAY 2007 11:14:44

EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation  
EDGE  
Downlink

Marker 2 [T1] RBW 3 kHz RF Att 30 dB  
Ref Lvl 31.11 dBm VBW 3 kHz Mixer -10 dBm  
60 dBm 1.93070000 GHz SWT 560 ms Unit dBm



Date: 01.MAY 2007 11:52:27

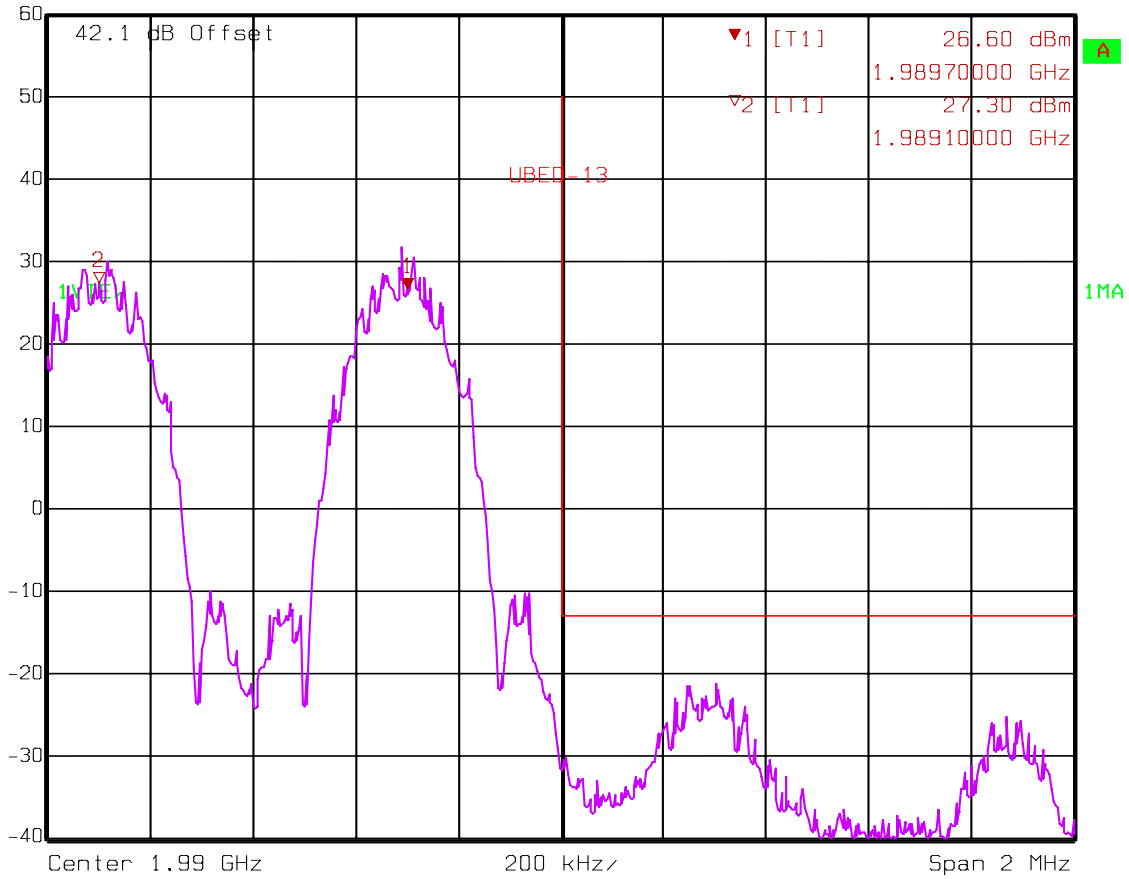
EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation  
EDGE  
Downlink



Marker 1 [T1] RBW 3 kHz RF Att 30 dB  
Ref Lvl 26.60 dBm VBW 3 kHz Mixer -10 dBm  
60 dBm 1.98970000 GHz SWT 560 ms Unit dBm



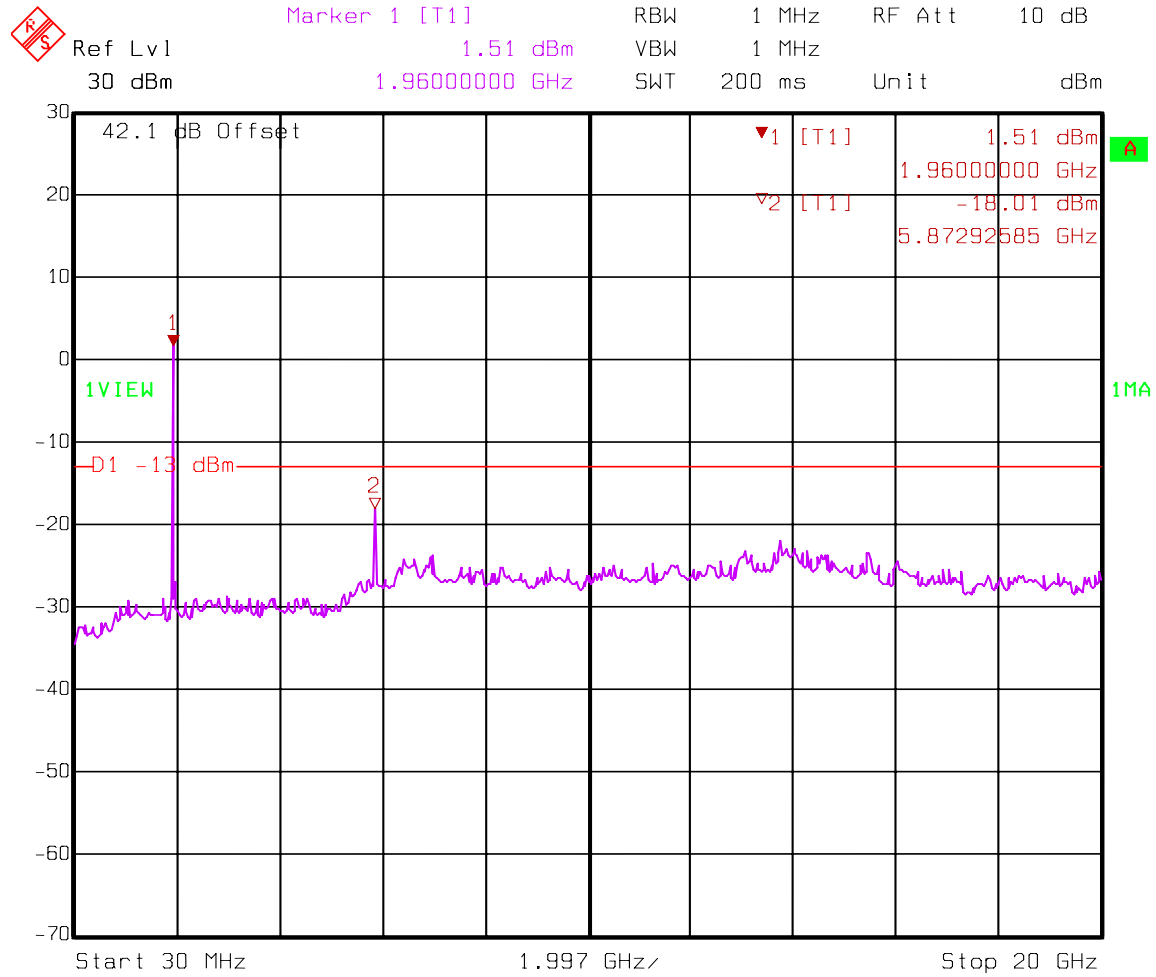
Date: 01.MAY 2007 11:30:41

EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Spurs – EDGE – Downlink

Carrier Notched



Date: 01.MAY 2007 10:00:28

EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

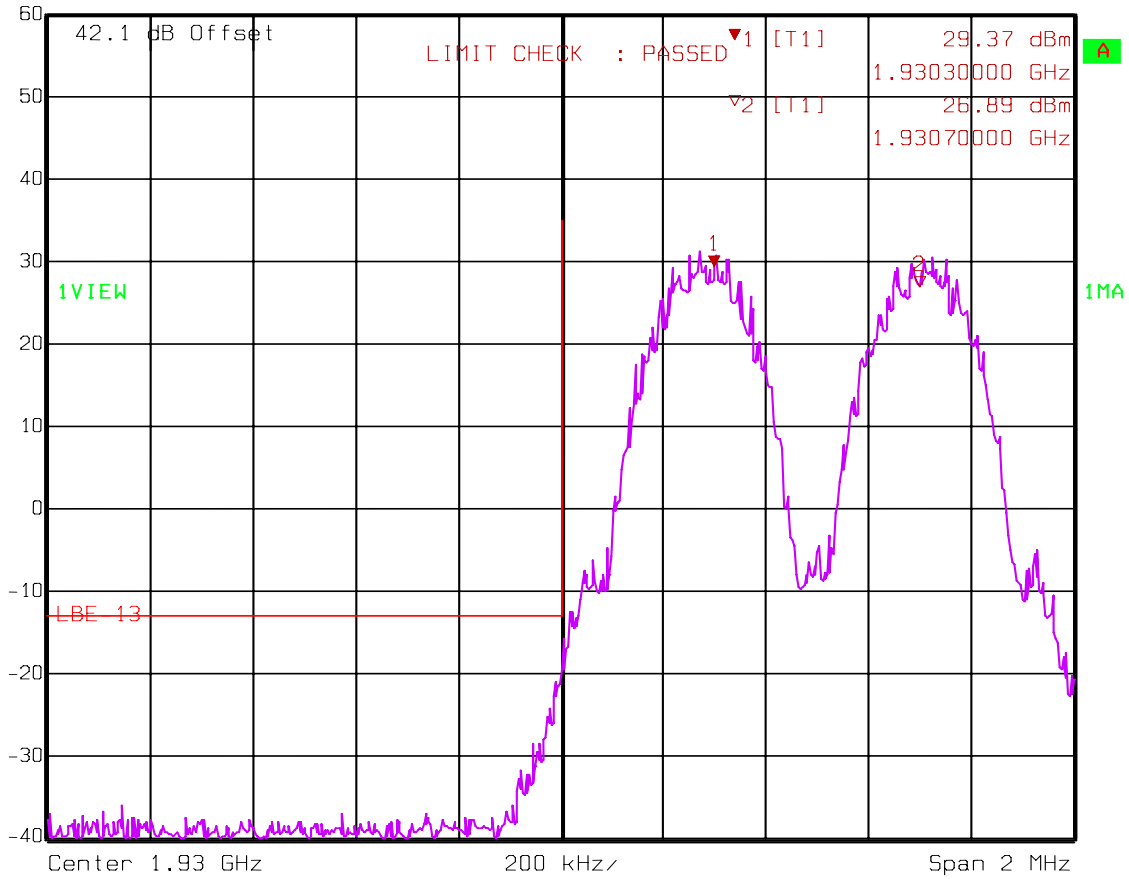
Lower Bandedge Intermodulation

GSM

Downlink



Marker 1 [T1] RBW 3 kHz RF Att 30 dB  
Ref Lvl 29.37 dBm VBW 3 kHz Mixer -10 dBm  
60 dBm 1.93030000 GHz SWT 560 ms Unit dBm



Date: 01.MAY 2007 11:50:39

EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

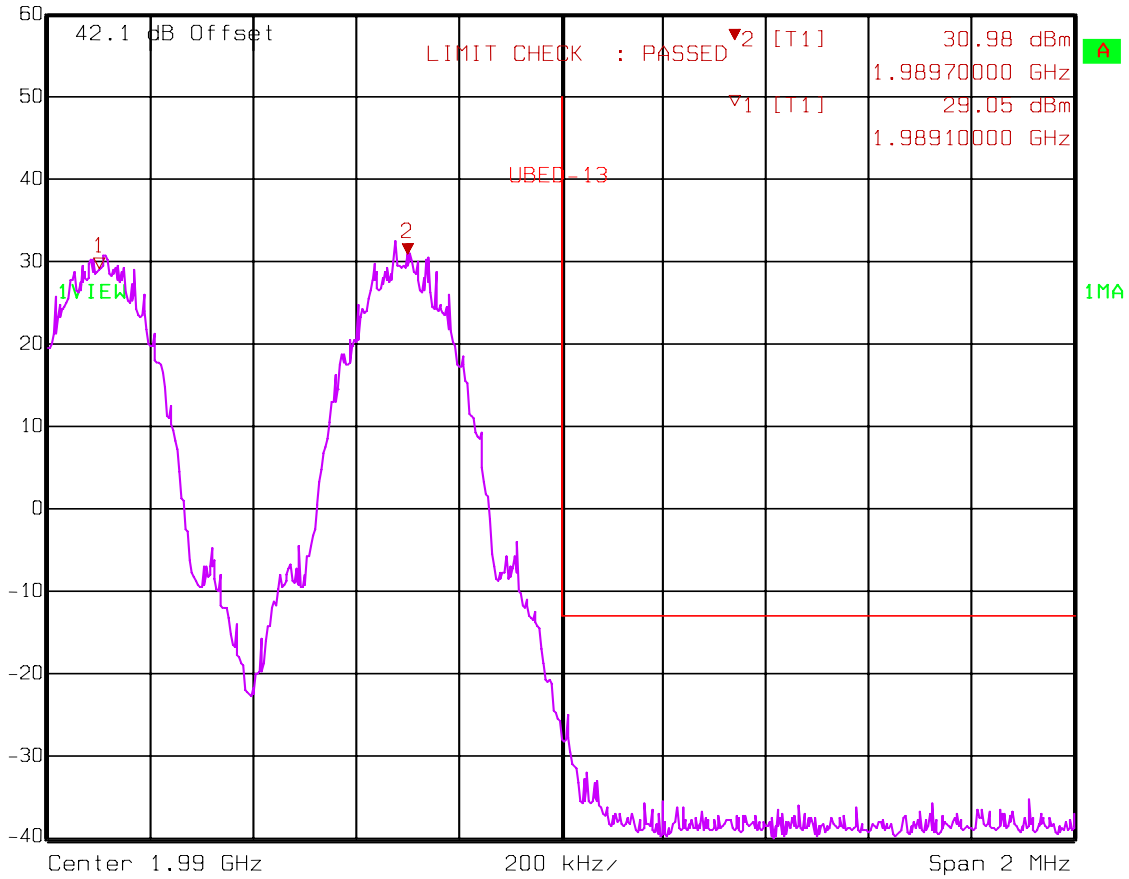
Upper Bandedge Intermodulation

GSM

Downlink



Ref Lvl 60 dBm  
Marker 2 [T1] 30.98 dBm  
1.98970000 GHz  
RBW 3 kHz  
RF Att 30 dB  
VBW 3 kHz  
Mixer -10 dBm  
SWT 560 ms  
Unit dBm



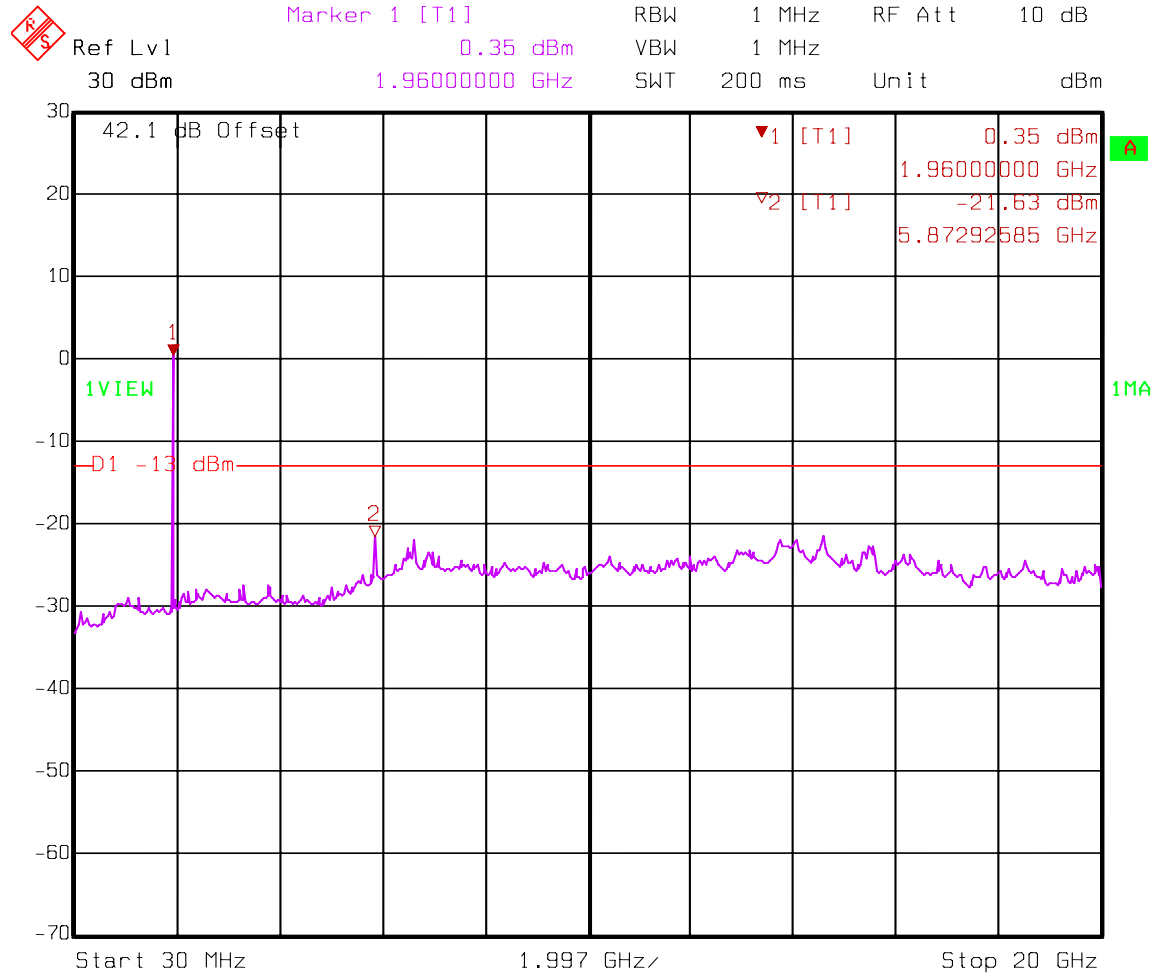
Date: 01.MAY 2007 11:27:36

EQUIPMENT: CE-1819-10G2

Test Data – Spurious Emissions at Antenna Terminals

Spurs – GSM – Downlink

Carrier Notched



Date: 01.MAY 2007 09:58:00



EQUIPMENT: **CE-1819-10G2**

**Section 6. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 01 May 2007

**Test Results:** Complies.

**Test Data:** There were no emissions detected within 20 dB of the specification limit. The spectrum was searched from 30 MHz to 20 GHz.

**Analyzer Settings:** Below 1000 MHz RBW=VBW=100 kHz Peak detector  
Above 1000 MHz RBW=VBW=1 MHz Peak detector

**Equipment Used:** 1684-1529-759-760-993-1016-791-1484-1485-1464

**Measurement Uncertainty:** +/-1.7 dB

**Temperature:** 20 °C

**Relative Humidity:** 48 %

EQUIPMENT: CE-1819-10G2

**Section 7. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1053	VECTOR SIGNAL GENERATOR 300 KHz	ROHDE & SCHWARZ SMIQ 03	DE22081	09/29/06	09/30/08
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	05/26/06	05/26/08
1529	CABLE 4M 2.0-18.0 Ghz	Storm PR90-010-144	00-07-002	10/02/06	10/02/07
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1059	TUNABLE NOTCH FILTER	K&L 3TNF-1000/2000-N/N	144	CBU	N/A
1055	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	Cal Not Req	N/A
1058	DUAL DIRECTIONAL COUPLER	HEWLETT PACKARD 11692D	1212A03366	Cal Not Req	N/A
1054	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	Cal Not Req	N/A
1684	Signal Generator	R&S SMIQ03	DE24568	01/31/07	01/31/09
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	03/30/07	03/29/08
760	Antenna biconical	Electro Metrics MFC-25	477	01/19/07	01/19/08
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/01/07	05/01/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/01/07	05/01/08
1484	Cable	Storm PR90-010-072	N/A	10/02/06	10/02/07
1485	Cable	Storm PR90-010-216	N/A	10/02/06	10/02/07
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09

## **ANNEX A - TEST DETAILS**

**NAME OF TEST: RF Power Output**

**PARA. NO.: 2.1046**

**Minimum Standard:** Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

**Method Of Measurement:**

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter or spectrum analyzer. Power output is measured with the maximum rated input level.

Integral Antenna:

The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic radiator.

*EQUIPMENT:* **CE-1819-10G2**

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**NAME OF TEST: Occupied Bandwidth**

**PARA. NO.: 2.1049**

**Minimum Standard:** Input/Output

**Method Of Measurement:**

CDMA

Spectrum analyzer settings:

RBW=VBW=30 kHz

Span: 5 MHz

Sweep: Auto

GSM / EDGE

RBW=VBW= 3 kHz

Span: 1 MHz

Sweep: Auto

TDMA

RBW=VBW= 1 kHz

Span: 1 MHz

Sweep: Auto

W-CDMA

RBW=VBW= 100 kHz

Span: 10 MHz

Sweep: Auto

**NAME OF TEST: Spurious Emission at Antenna Terminals    PARA. NO.: 24.238**

**Minimum Standard:**                      Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

**Method Of Measurement:**

Spectrum analyzer settings:

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 30 kHz (< 1MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

GSM / EDGE

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: Disabled

TDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: Disabled

W-CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 100 kHz (< 1MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

EQUIPMENT: CE-1819-10G2

**NAME OF TEST: Field Strength of Spurious Radiation      PARA. NO.: 24.238**

**Minimum Standard:**                      Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least  $43 + 10 \log (P)$  dB.

**Method of Measurement**                      TIA/EIA-603-1992

The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic radiator.

**NAME OF TEST: Frequency Stability**

**PARA. NO.: 2.1055**

**Minimum Standard:** Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**Method Of Measurement:**

Frequency Stability With Voltage Variation

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

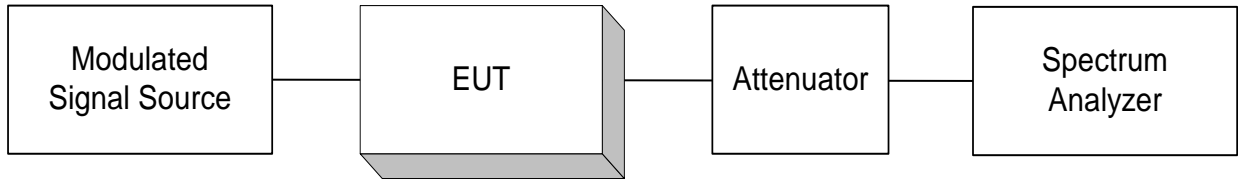


## **ANNEX B - TEST DIAGRAMS**

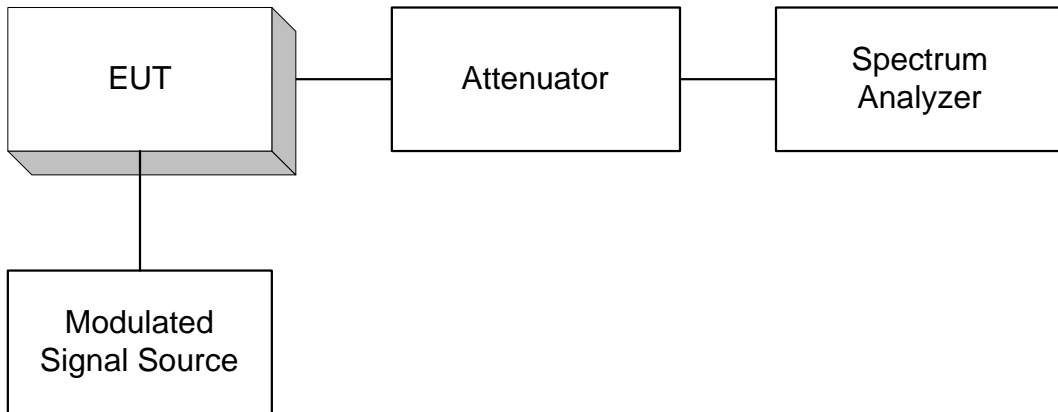
EQUIPMENT: CE-1819-10G2

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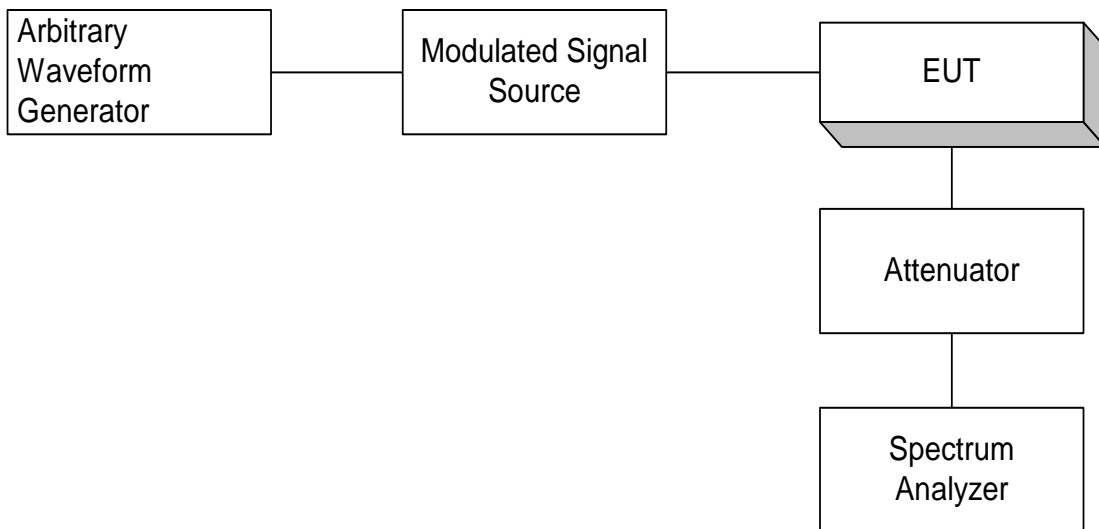
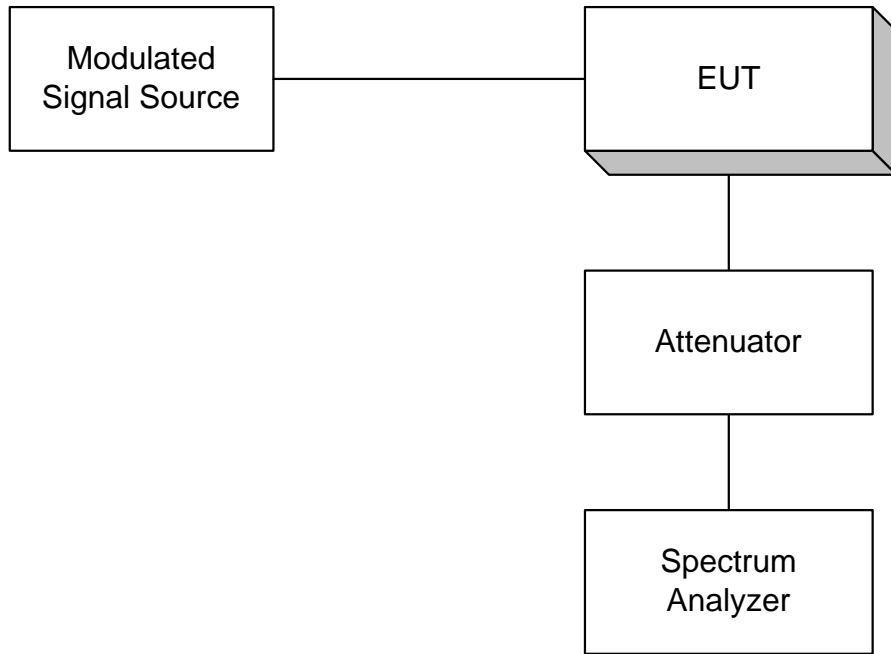
**Para. No. 2.985 - R.F. Power Output**



**Para. No. 2.989 - Occupied Bandwidth**

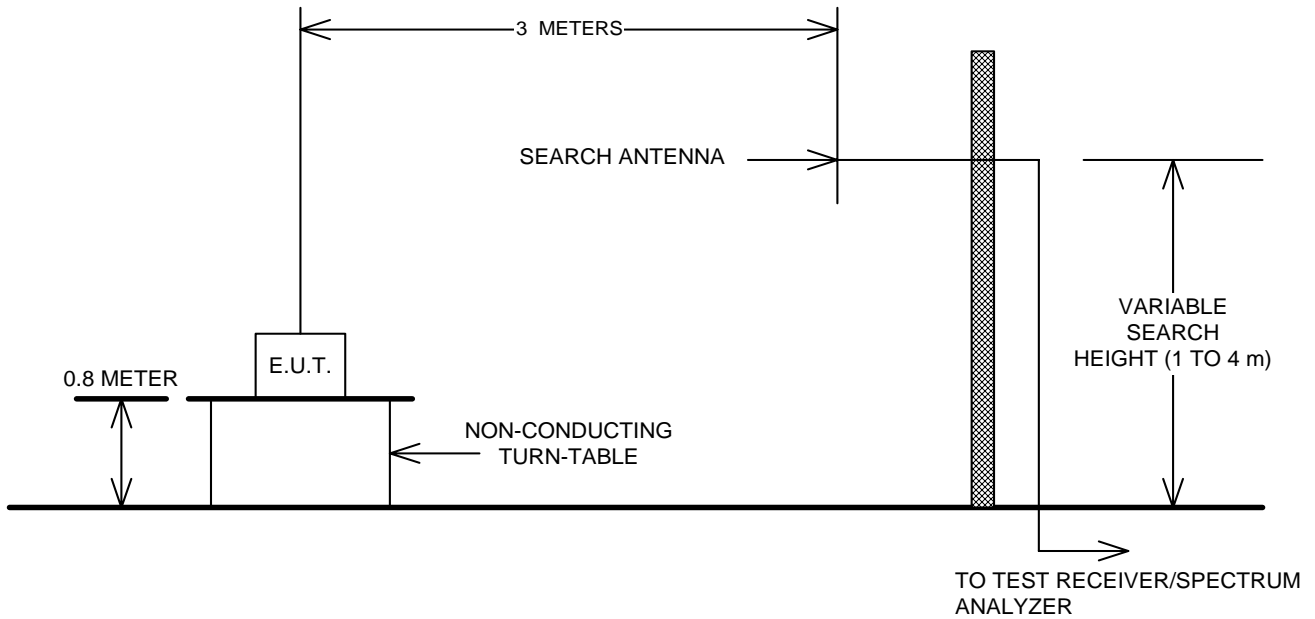


Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: CE-1819-10G2

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

