



Nemko Test Report: 24842RUS1

Applicant: Andrew Corporation
620 N. Greenfield Parkway
Garner, NC 27529
USA

**Equipment Under Test:
(E.U.T.)** MR1718

In Accordance With: **CFR 47, Part 27, Subpart C**
Miscellaneous Wireless Communication Services

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

TESTED BY:

A handwritten signature in black ink, appearing to read 'David Light', written over a horizontal line.

David Light, Senior Wireless Engineer

DATE: 28 January 2009

APPROVED BY:

A handwritten signature in black ink, appearing to read 'Tom Tidwell', written over a horizontal line.

Tom Tidwell, Telecom Direct

DATE: 29 January, 2009

Number of Pages: 38

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Section 1. Summary of Test Results

Manufacturer Andrew Corporation

Model No.: MR1718

Serial No.: 7566417

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 27, Subpart C.



New Submission



Production Unit



Class II Permissive Change



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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Summary Of Test Data

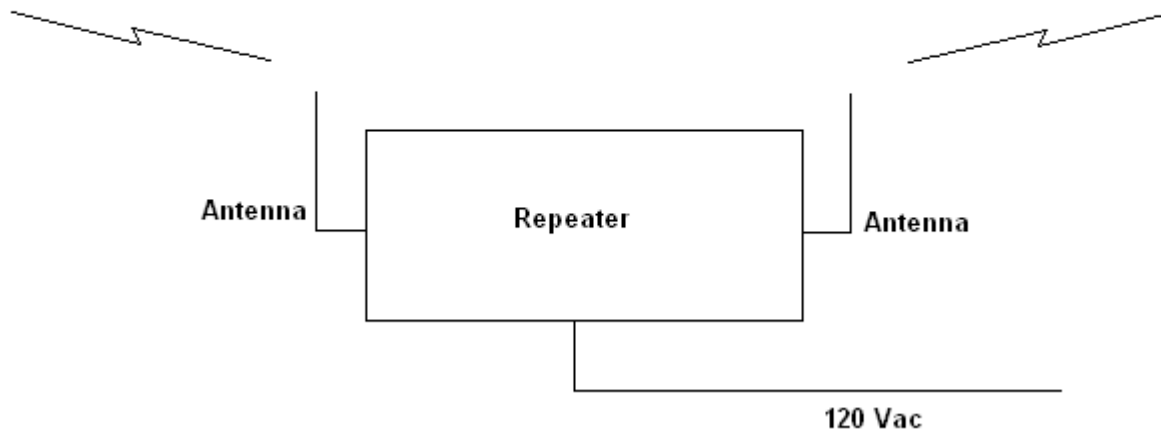
NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	27.50(d)	1640 Watts	Complies
Occupied Bandwidth	2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	27.53(g)	-13 dBm	Complies
Field Strength of Spurious Emissions	27.53(g)	-13 dBm E.I.R.P.	Complies
Frequency Stability	27.54	Must stay in band	NA

Section 2. General Equipment Specification

Supply Voltage Input:	120 Vac				
Frequency Bands: Downlink:	2110 to 2155 MHz				
Frequency Bands: Uplink:	1710 to 1755 MHz				
Type of Modulation and Designator:	CDMA (F9W) ☒	GSM (GXW) ☐	NADC (DXW) ☐	W-CDMA (F9W) ☒	EDGE (G7W) ☐
System Gain:	70 dB				
Output Impedance:	50 ohms				
RF Output (Rated): Downlink	$\frac{0.158}{22} \text{ W dBm}$				
RF Output (Rated): Uplink	$\frac{0.158}{22} \text{ W dBm}$				
Frequency Translation:	F1-F1 ☒	F1-F2 ☐	N/A ☐		
Band Selection:	Software ☒	Duplexer ☐	Fullband ☐		

Description of EUT

The miniRepeaters are bi-directional amplifiers used to enhance signals between a mobile and a base station in a wireless network. They have been designed to increase signal strength in small and medium sized areas such as offices, shops, basements and manufacturing facilities.

System Diagram

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 27.50
TESTED BY: David Light	DATE: 28 January 2009

Test Results: Complies.

Measurement Data:

Direction	Modulation	Composite Power (dBm)	RF Power (W)
Downlink	CDMA	22	0.158
	UMTS	22	0.158
Uplink	CDMA	22	0.158
	UMTS	22	0.158

Equipment Used: 1659-1082-1472

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 28 January 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1659-1082-1472

Measurement Uncertainty: 1X10⁻⁷ ppm

Temperature: 22 °C

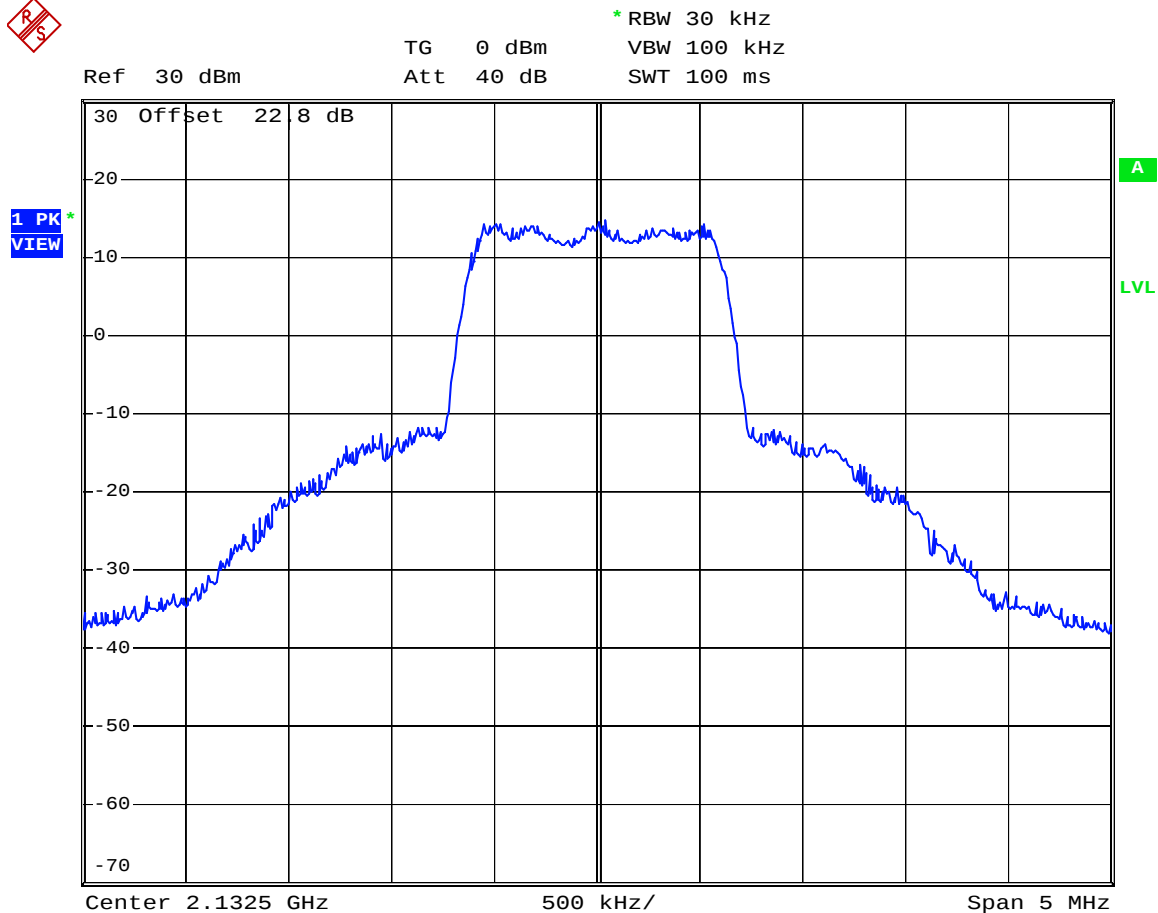
Relative Humidity: 48 %

Test Data – Occupied Bandwidth

CDMA/EV-DO

Output

Downlink



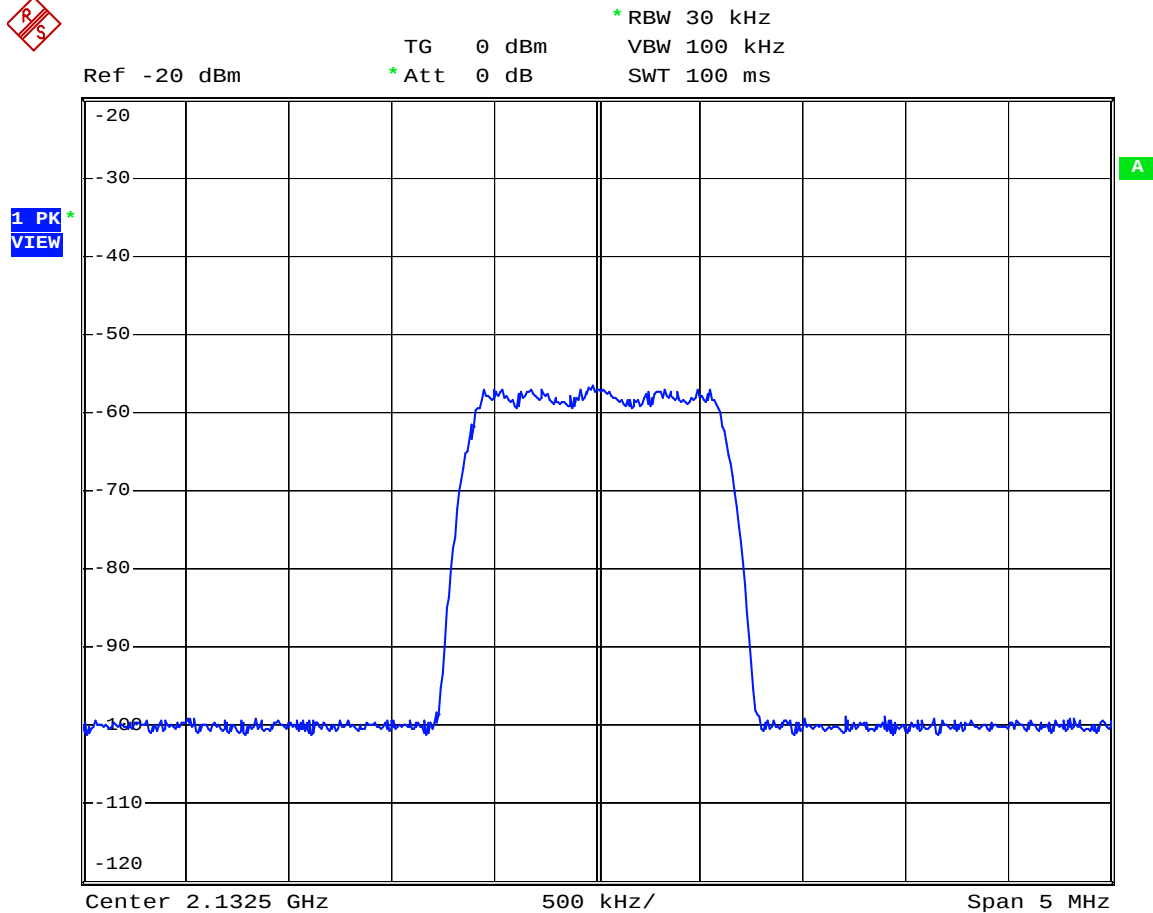
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Test Data – Occupied Bandwidth

CDMA/EV-DO

Input

Downlink



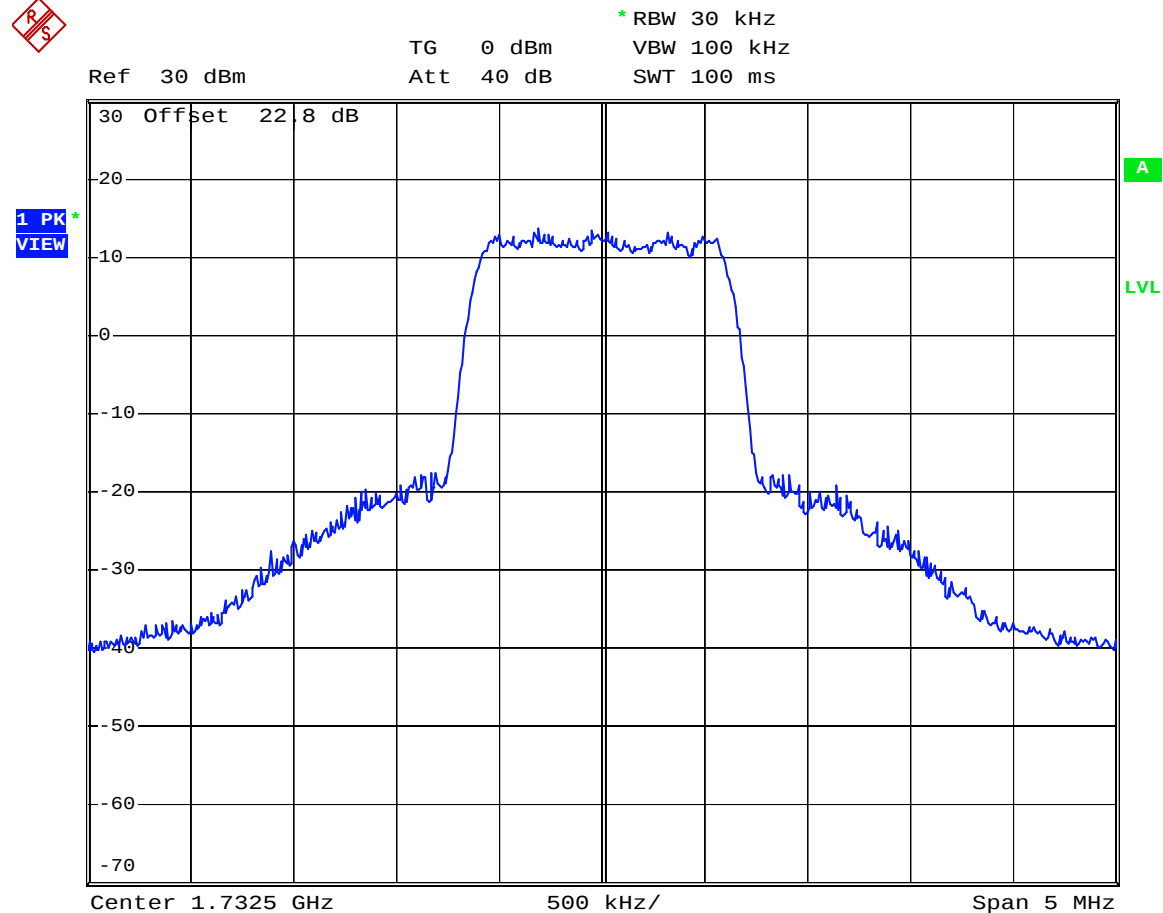
Date: 28.JAN.2009 12:24:10

Test Data – Occupied Bandwidth

CDMA/EV-DO

Output

Uplink



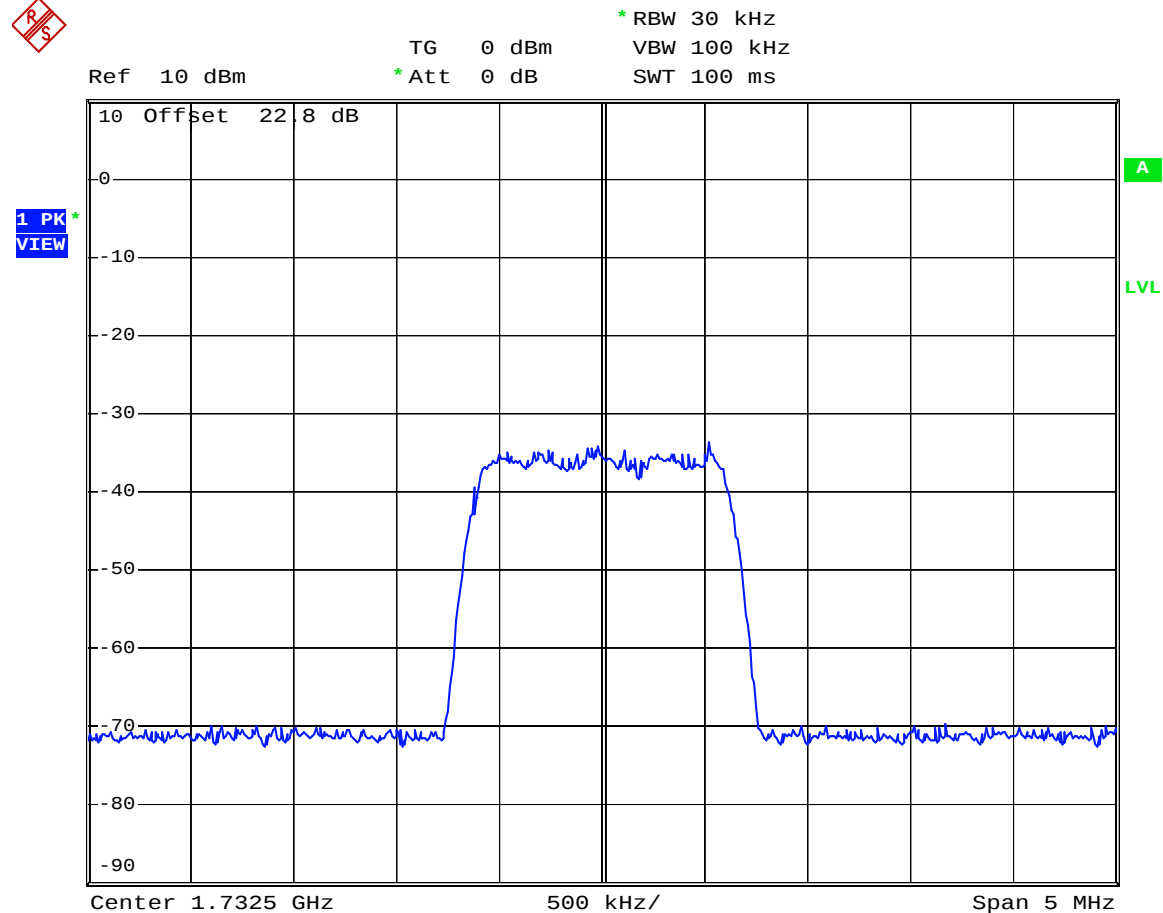
Date: 28.JAN.2009 12:34:49

Test Data – Occupied Bandwidth

CDMA/EV-DO

Input

Uplink



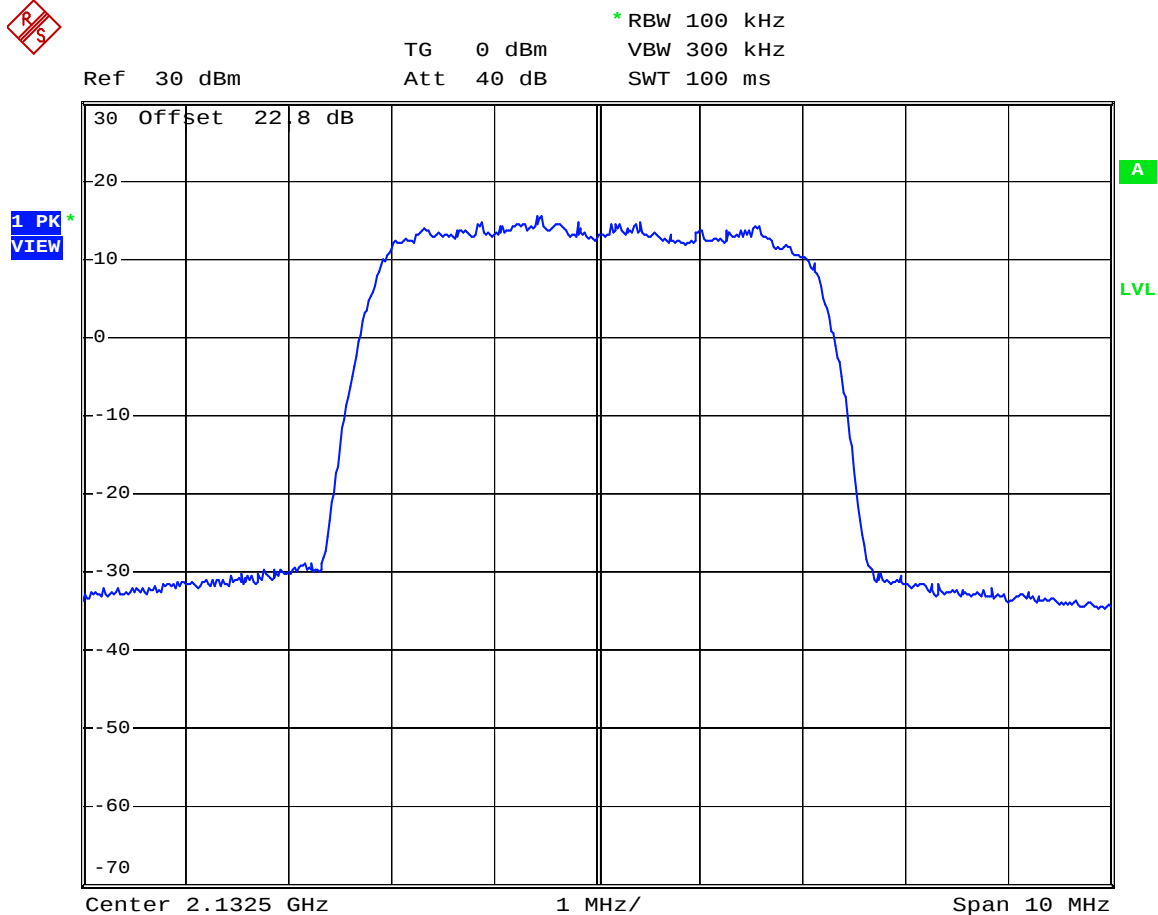
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Test Data – Occupied Bandwidth

WCDMA/UMTS

OUTPUT

Downlink



Date: 28.JAN.2009 13:00:53

Test Data – Occupied Bandwidth

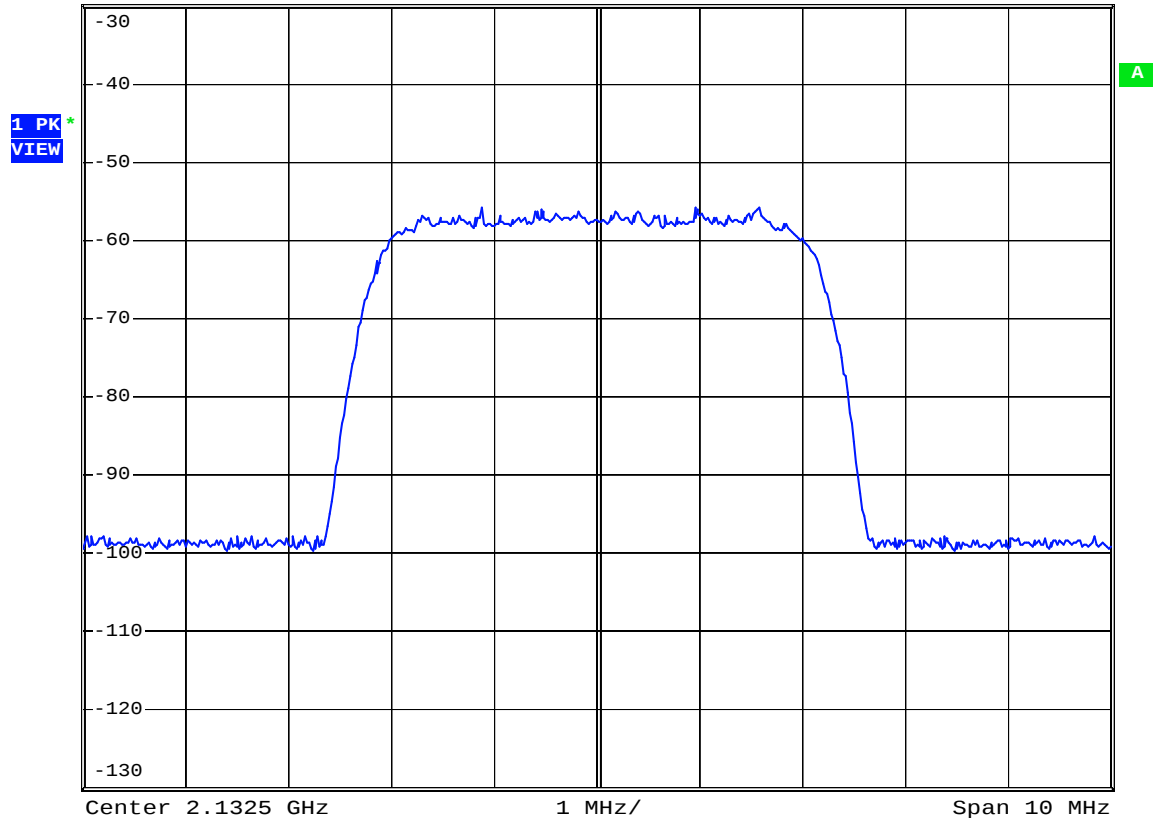
WCDMA/UMTS

INPUT

Downlink



Ref -30 dBm
 TG 0 dBm
 * Att 0 dB
 * RBW 100 kHz
 VBW 300 kHz
 SWT 100 ms



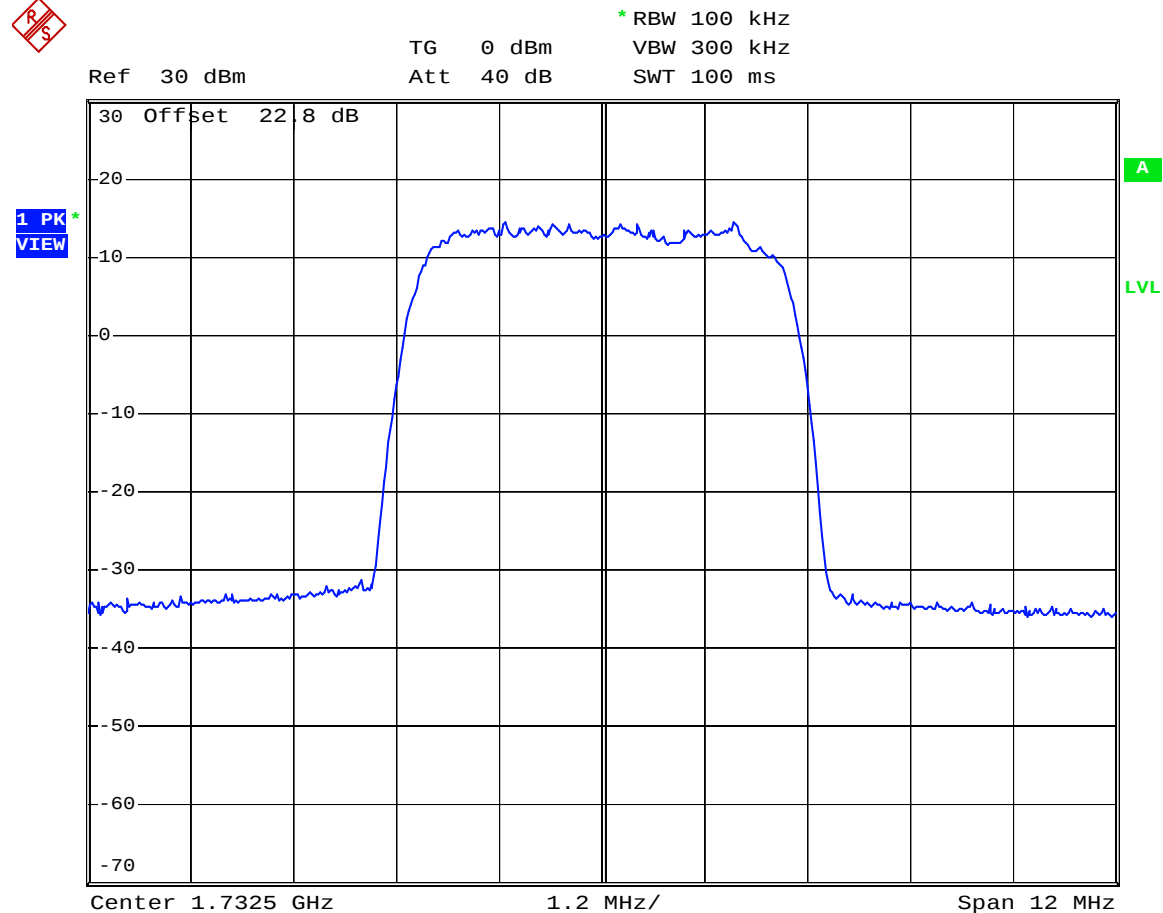
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Test Data – Occupied Bandwidth

WCDMA/UMTS

OUTPUT

Uplink



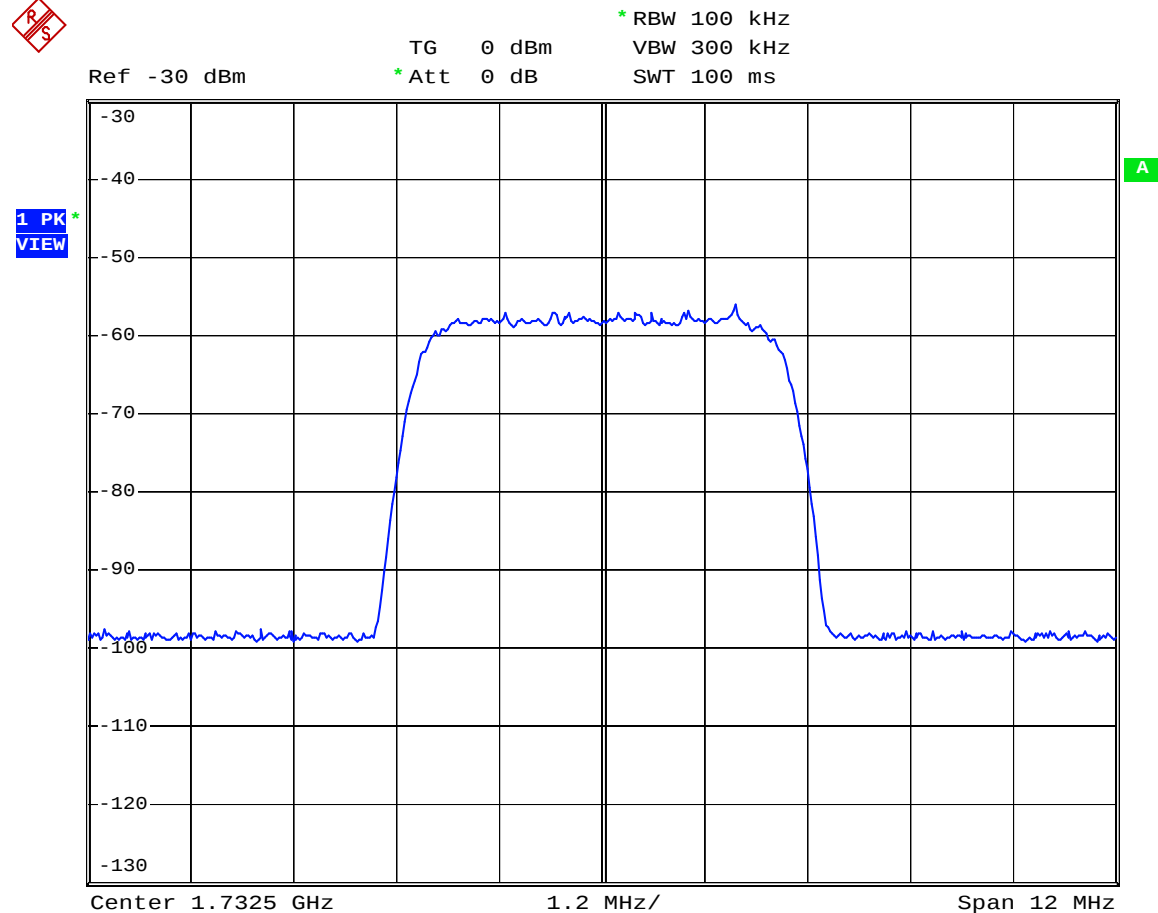
Date: 28.JAN.2009 12:50:43

Test Data – Occupied Bandwidth

WCDMA/UMTS

INPUT

Uplink



Date: 28.JAN.2009 12:51:52

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 27.53
TESTED BY: David Light	DATE: 28 January 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1659-1082-1472-1464

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

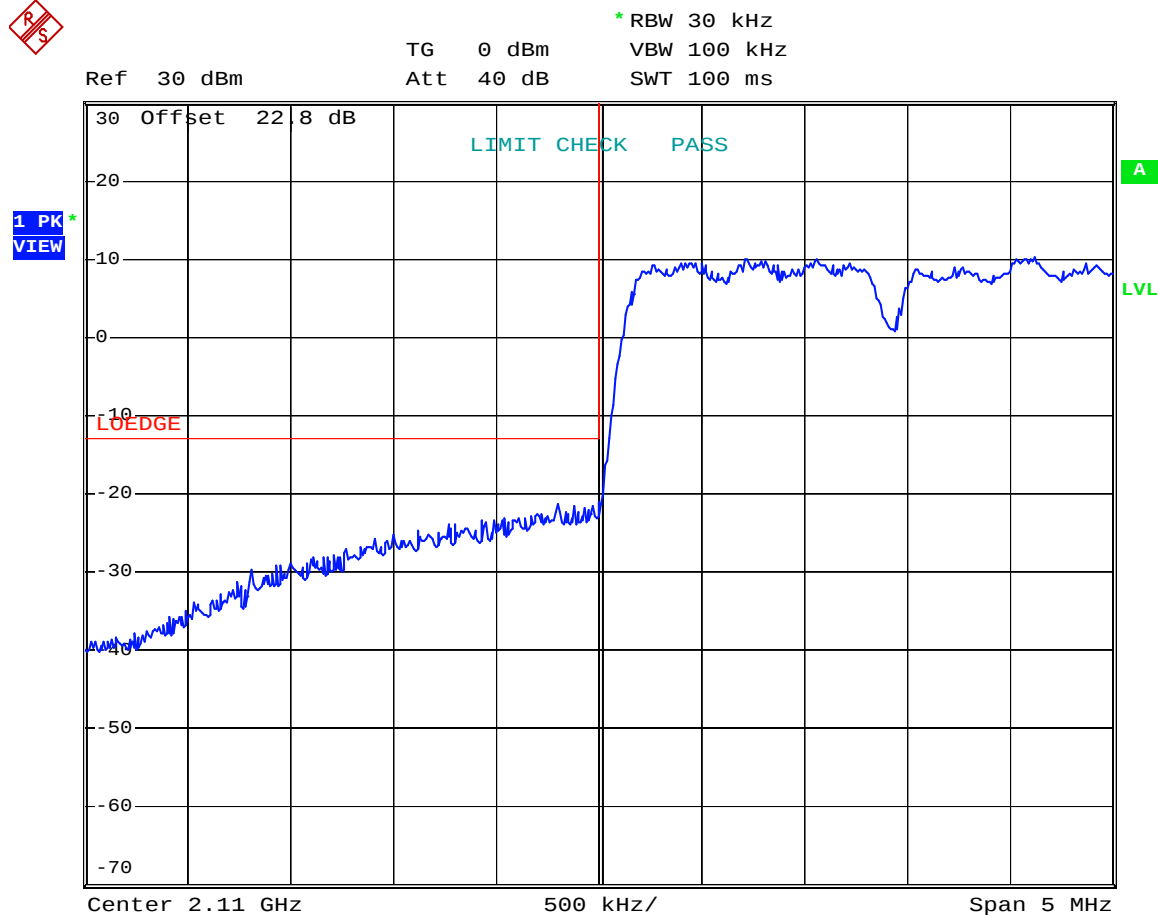
Relative Humidity: 48 %

Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

LOW BANDEDGE

Downlink



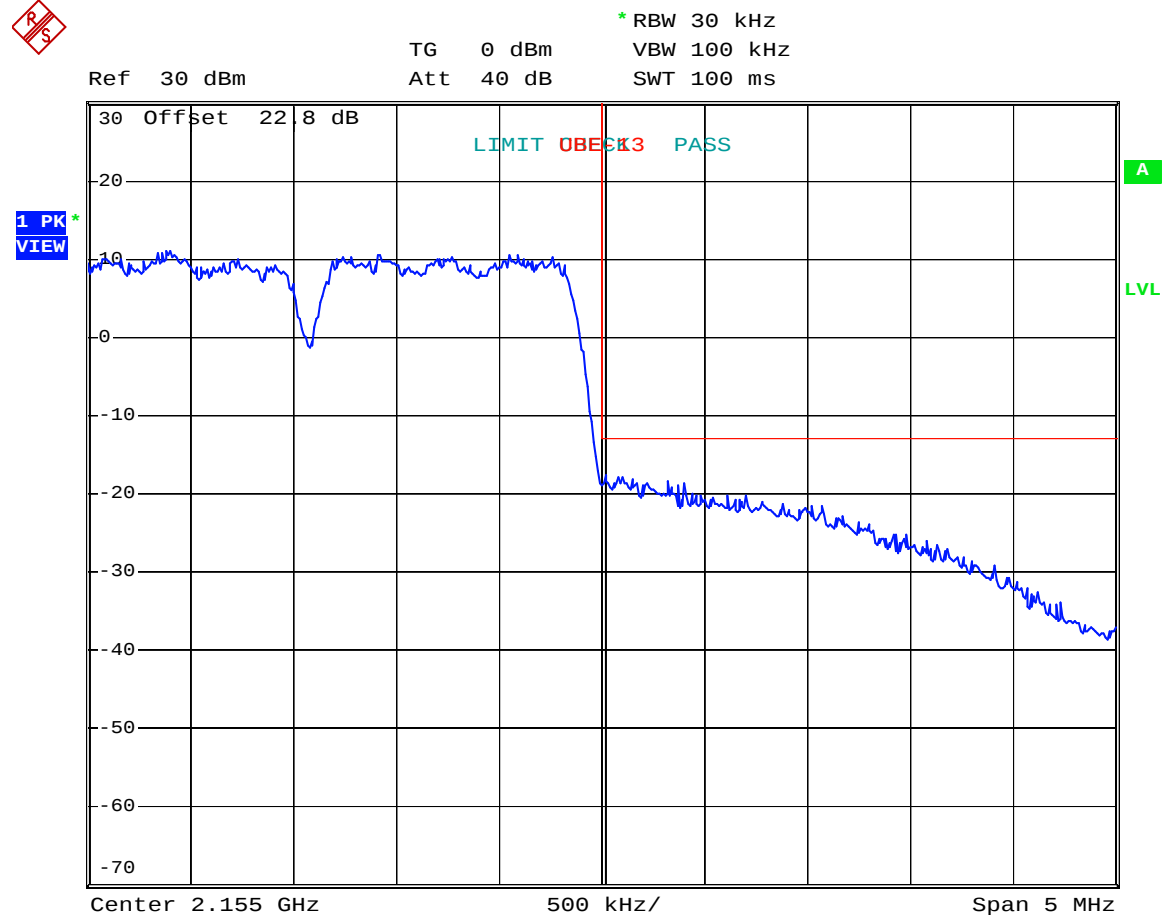
Date: 28.JAN.2009 12:20:04

Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

HIGH BAND EDGE

Downlink



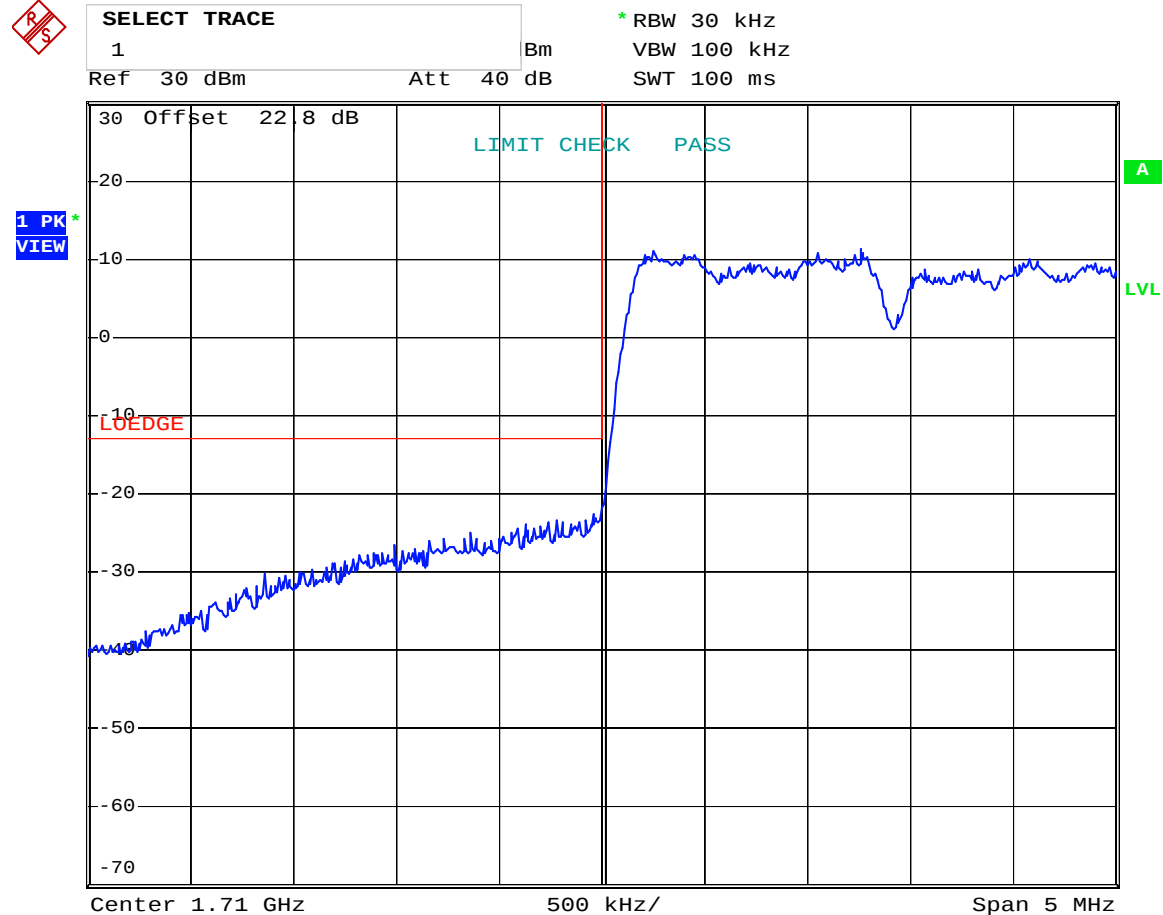
Date: 28.JAN.2009 12:28:12

Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

LOW BANDEDGE

Uplink



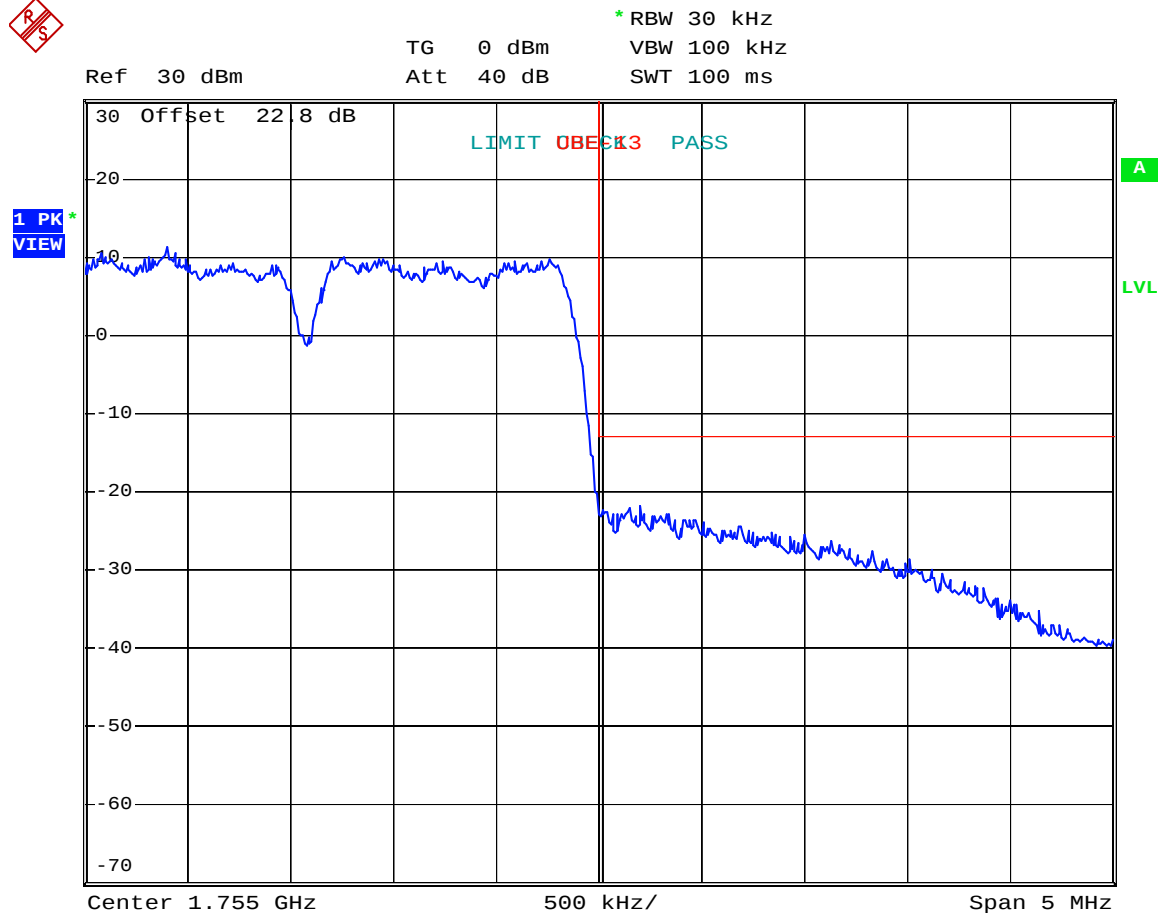
Date: 28.JAN.2009 12:38:19

Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

HIGH BAND EDGE

Uplink



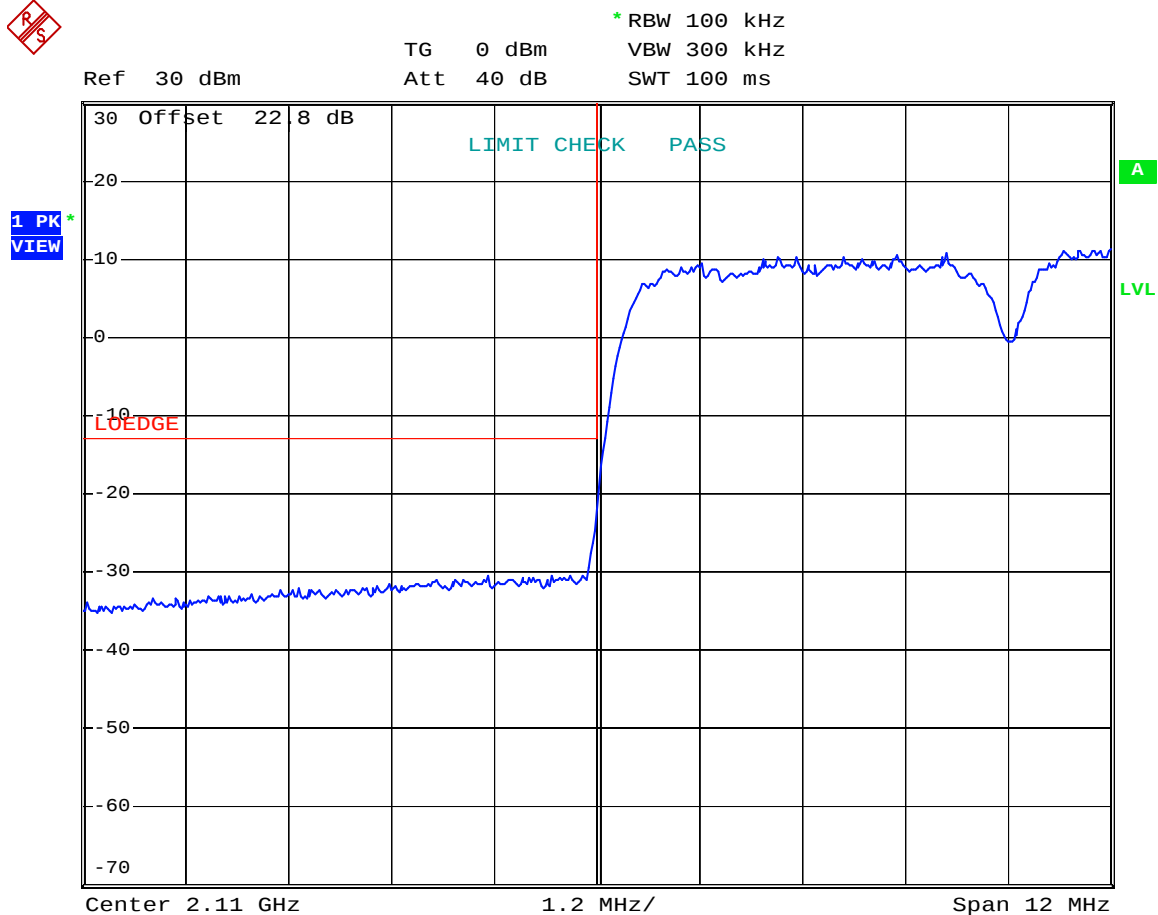
Date: 28.JAN.2009 12:33:58

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

LOW BANDEDGE

Downlink



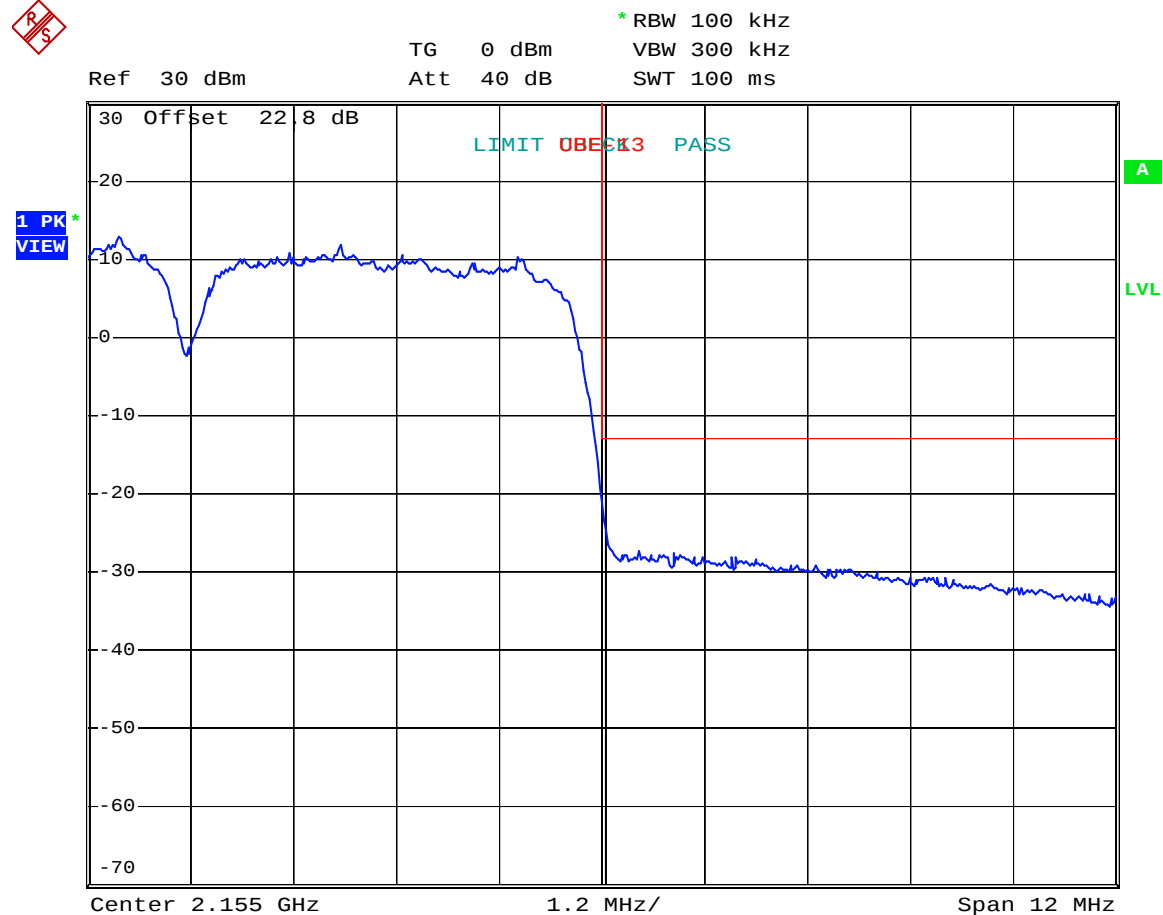
Date: 28.JAN.2009 12:59:12

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

HIGH BAND EDGE

Downlink



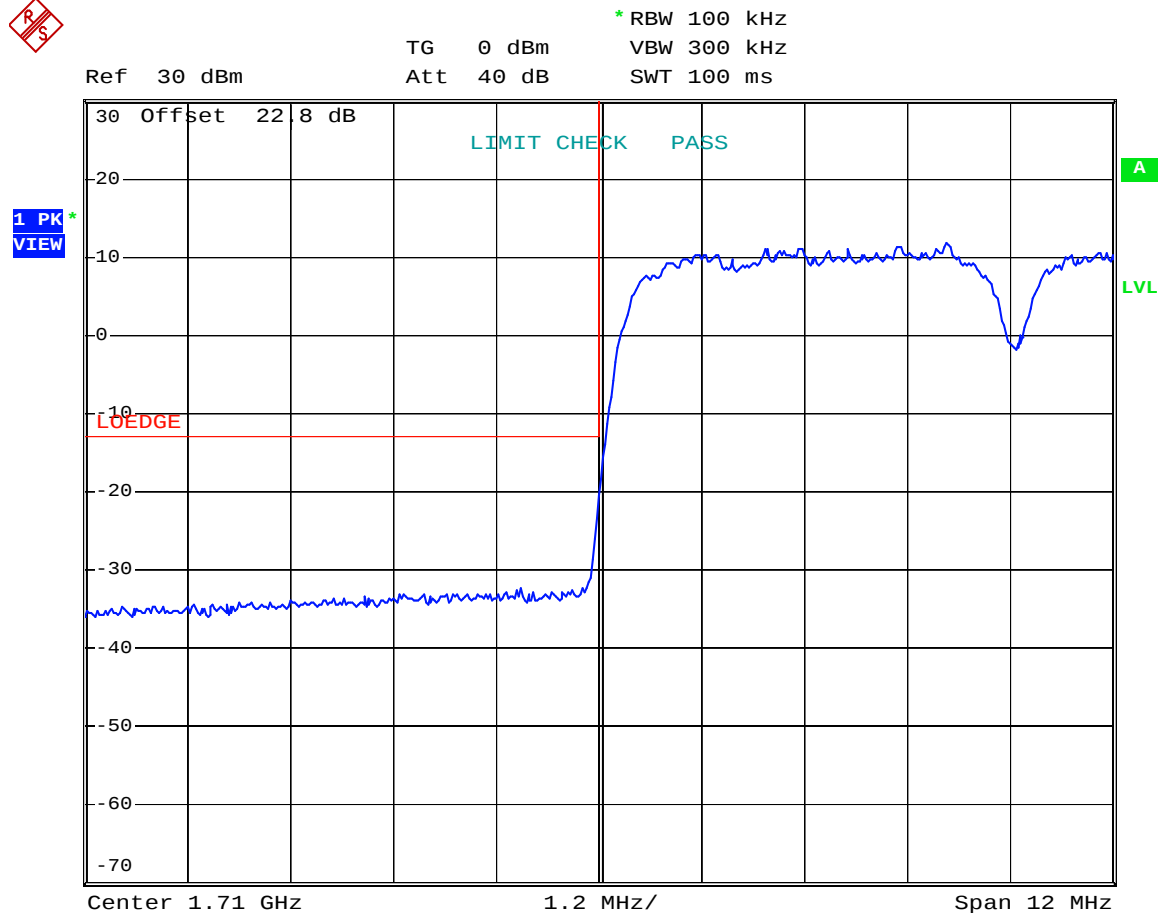
Date: 28.JAN.2009 12:57:32

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

LOW BANDEDGE

Uplink



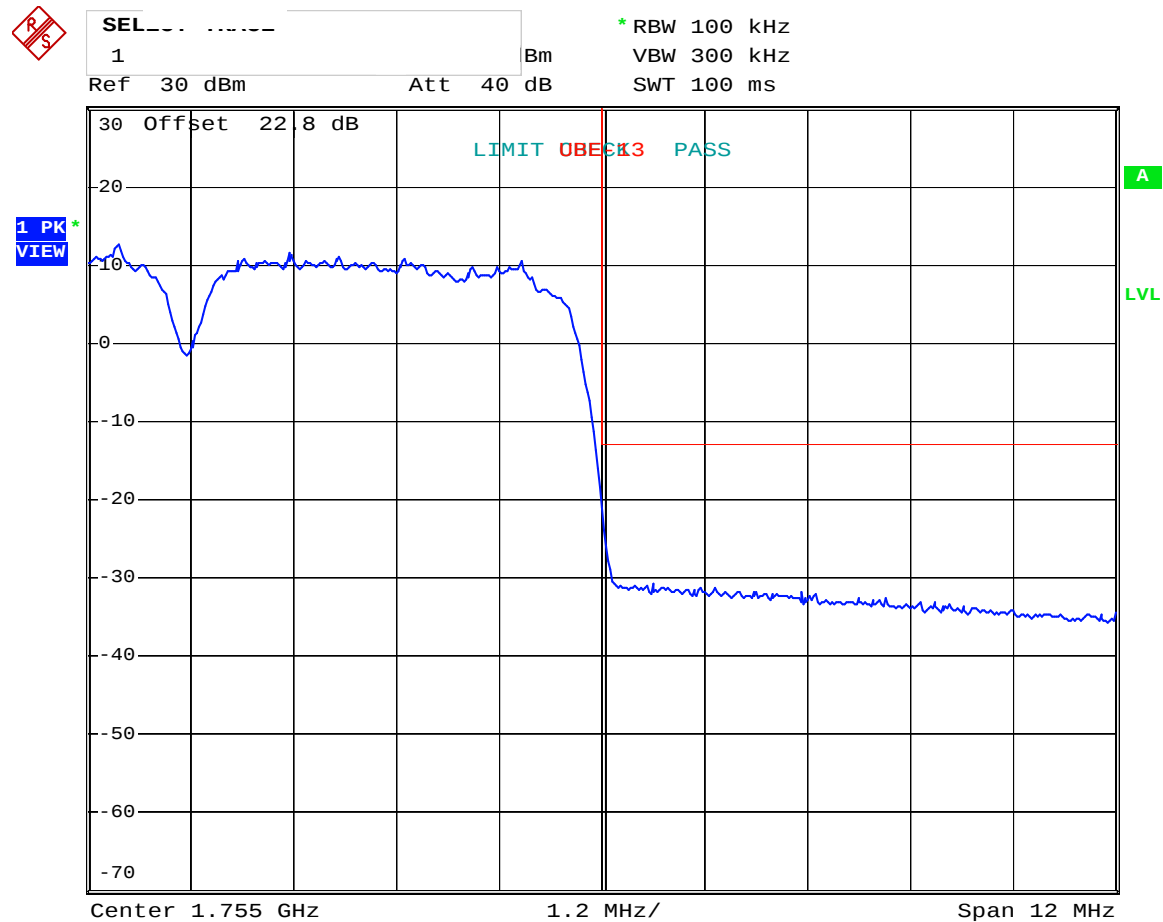
Date: 28.JAN.2009 12:49:30

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

HIGH BAND EDGE

Uplink



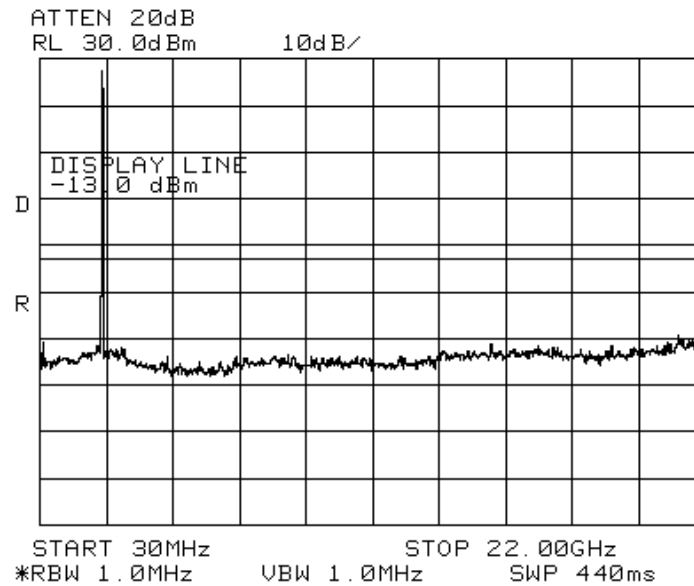
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Test Data – Spurious Emissions at Antenna Terminals

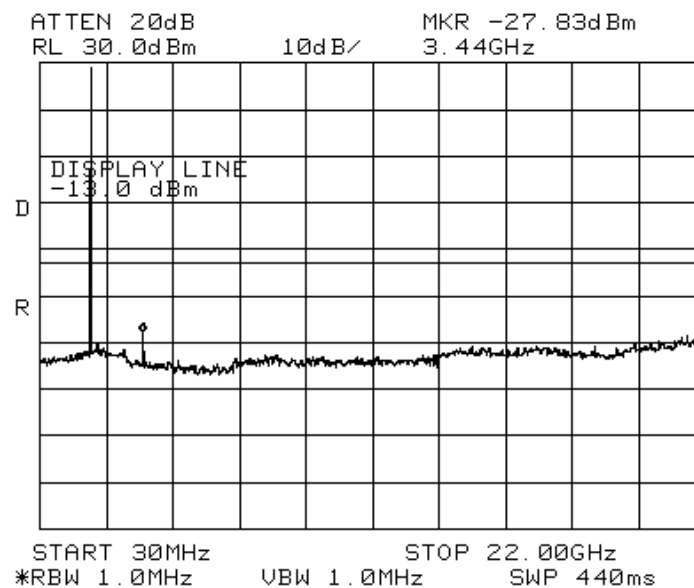
CDMA/EV-DO

SPURS

Downlink



Uplink

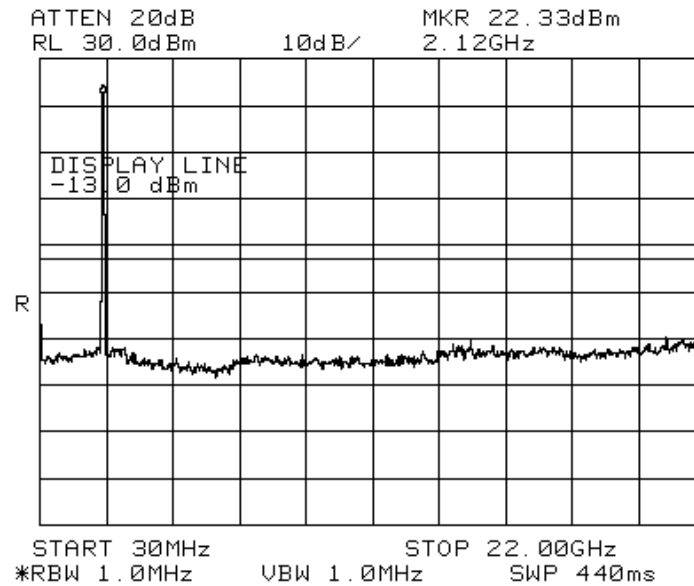


Test Data – Spurious Emissions at Antenna Terminals

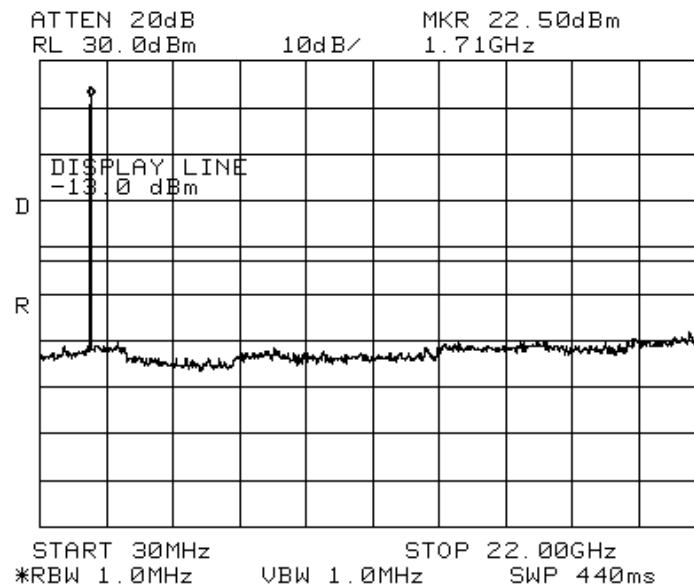
WCDMA/UMTS

SPURS

Downlink



Uplink



Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 27.53
TESTED BY: David Light	DATE: 28 January 2009

Test Results: Complies.

Test Data: The spectrum was searched from 30 MHz to the tenth harmonic of the carrier. There were no emissions detected above the noise floor, which was at least 20 dB below the specification limit of -13 dBm.

Equipment Used: 1464-1484-1485-1016-993-791-1763

Measurement Uncertainty: +/-1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

RBW=VBW=100 kHz below 1000 MHz
RBW=VBW=1 MHz above 1000 MHz
Peak detector

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1659	Spectrum Analyzer	Rhode & Schwarz FSP	973353	01/24/07	01/24/09
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/30/07	01/30/09
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
1484	Cable	Storm PR90-010-072	N/A	05/07/08	05/07/09
1484	Cable	Storm PR90-010-072	N/A	05/07/08	05/07/09
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/30/08
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/07/08	05/07/09
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09

ANNEX A - TEST DETAILS

NAME OF TEST: RF Power Output**PARA. NO.: 2.1046**

Minimum Standard: Para. No.27.53(d)(1). The power of each fixed or base station transmitting in the 2110-2155 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to a peak equivalent isotropically radiated power (EIRP) of 3280 watts. The power of each fixed or base station transmitting in the 2110-2155 MHz band from any other location is limited to a peak EIRP of 1640 watts. A licensee operating a base or fixed station utilizing a power of more than 1640 watts EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. Operations above 1640 watts EIRP must also be coordinated in advance with the following licensees within 120 kilometers (75 miles) of the base or fixed station: all Broadband Radio Service (BRS) licensees authorized under Part 27 in the 2155-2160 MHz band and all AWS licensees in the 2110-2155 MHz band.

Method Of Measurement:Detachable Antenna:

The channel power integrated across the carrier's bandwidth at antenna terminals is measured using a 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.

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= 50 kHz

Span: 10 MHz

Sweep: Auto

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 27.53

Minimum Standard: Para. No.27.53(g) For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

Method Of Measurement:

Spectrum analyzer settings:

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 30 kHz (< 1MHz from Band Edge)
VBW: $\geq$ 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: $\geq$ RBW
Sweep: Auto
Video Avg: Disabled

TDMA

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

W-CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 50 kHz (< 1MHz from Band Edge)
VBW: $\geq$ 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.

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 27.53
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Minimum Standard:

Para. No.27.53(g) For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.

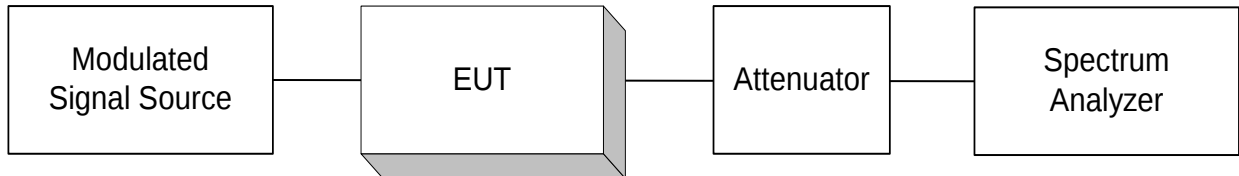
Method of Measurement

TIA/EIA-603-1992

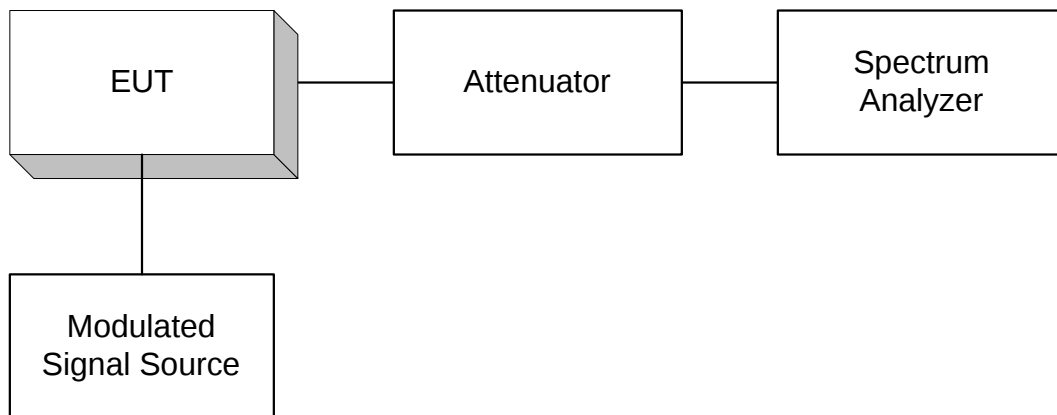
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna 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.

ANNEX B - TEST DIAGRAMS

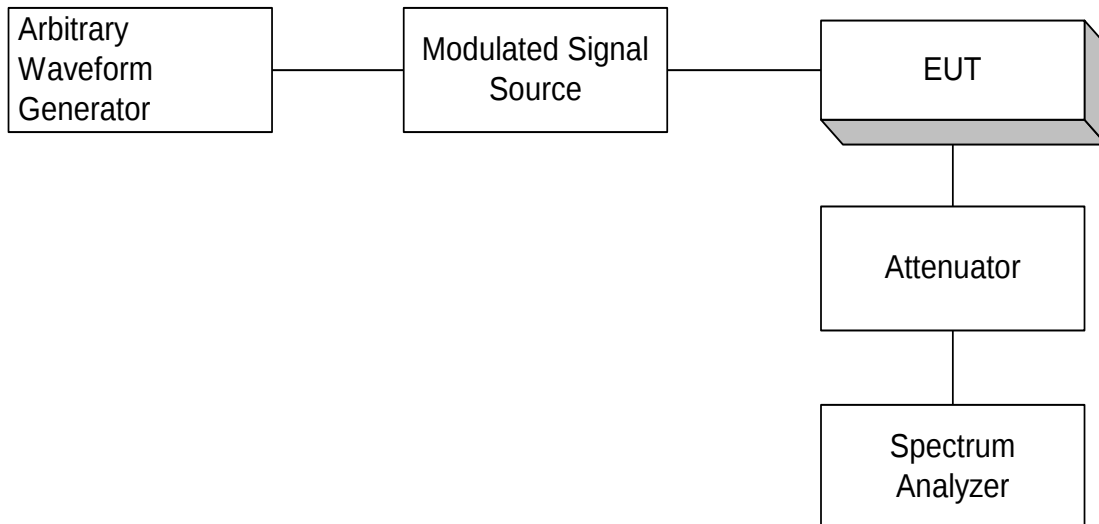
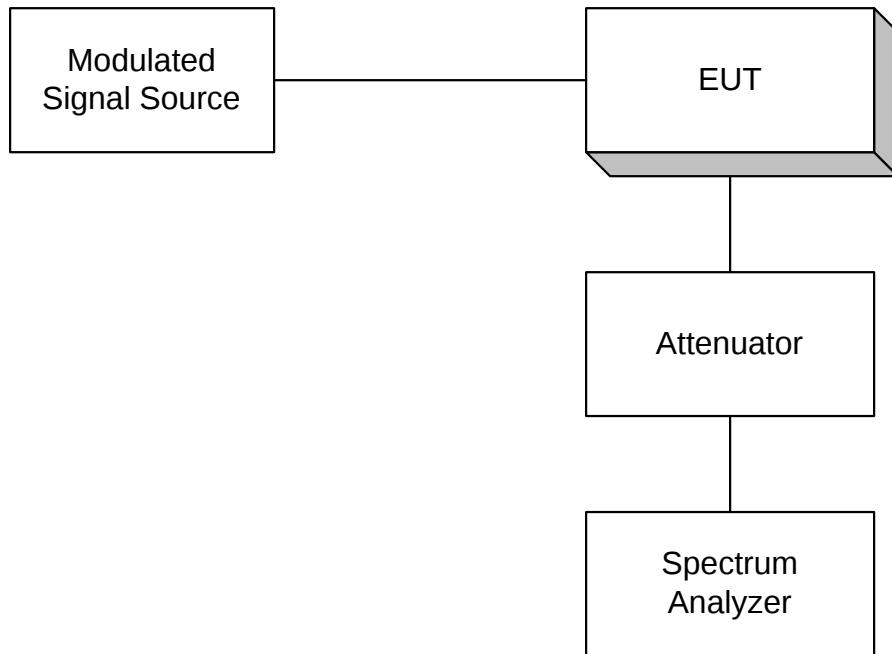
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation

