



Nemko Test Report: 32513RUS4

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

**Equipment Under Test:
(E.U.T.)** TFAH-US6B

FCC Identifier: BCR-TFAHUS6

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:

David Light, Senior Wireless Engineer

DATE: 28 August 2009

APPROVED BY:

Tom Tidwell, Telecom Direct

DATE: 31 August 2009

Number of Pages: 30

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Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: TFAH-US6B

Serial No.: 7640480

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

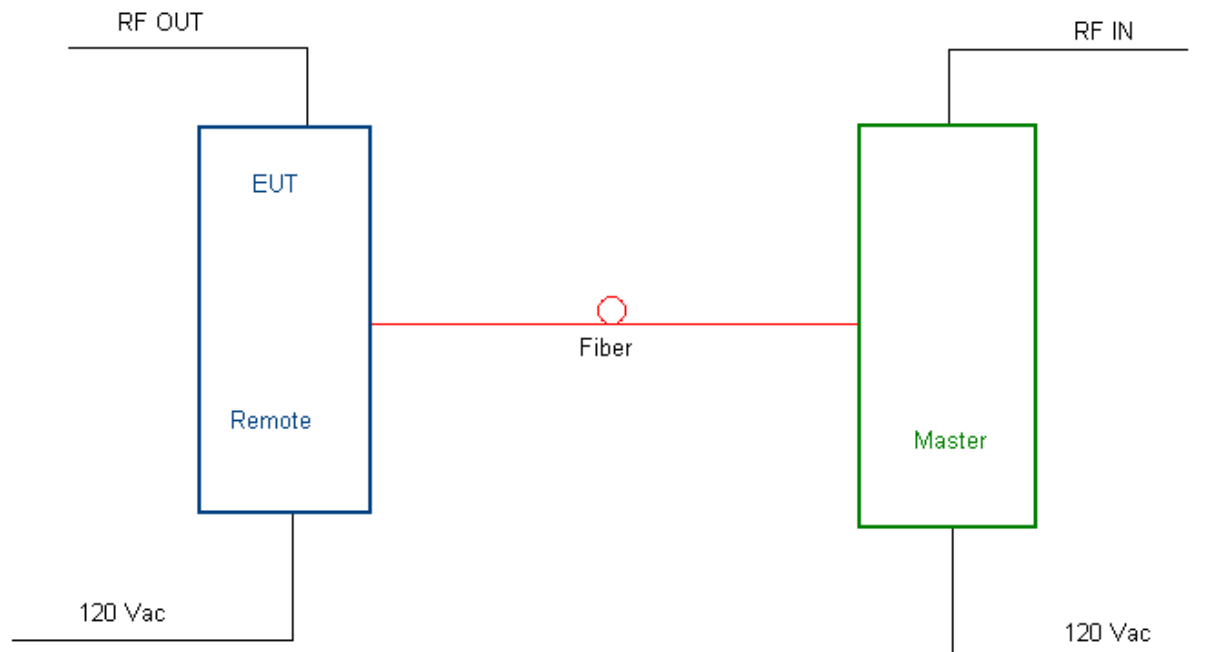
NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	27.50(d)	1640 Watts	Complies
Occupied Bandwidth	2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	27.53(g)	-13 dBm	Complies
Field Strength of Spurious Emissions	27.53(g)	-13 dBm E.I.R.P.	Complies
Frequency Stability	27.54	Must stay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

Section 2. General Equipment Specification

Supply Voltage Input:	120 Vac				
Frequency Bands: Downlink:	2110 to 2155 MHz				
Frequency Bands: Uplink:	NA				
Type of Modulation and Designator:	CDMA (F9W) ☒	GSM (GXW) ☐	NADC (DXW) ☐	W-CDMA (F9W) ☒	EDGE (G7W) ☐
System Gain:	47 dB				
Output Impedance:	50 ohms				
RF Output (Rated): Downlink	$\frac{1.0}{30.0} \frac{\text{W}}{\text{dBm}}$				
RF Output (Rated): Uplink	$\frac{\text{NA}}{\text{NA}} \frac{\text{W}}{\text{dBm}}$				
Frequency Translation:	F1-F1 ☒	F1-F2 ☐	N/A ☐		
Band Selection:	Software ☐	Duplexer ☐	Fullband ☒		

Description of EUT

The TFAH-US6B is a five band high power remote unit designed to distribute LMR700, LMR800, Cell850, LMR900, AWS and Extended PCS1900 band signals along the same fiber.

System Diagram

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 27.50
TESTED BY: David Light	DATE: 27 August 2009

Test Results: Complies.

Measurement Data:

Direction	Modulation	Composite Power (dBm)	RF Power (W)
Downlink	CDMA	30	1.0
	UMTS	30	1.0
Uplink	CDMA	NA	NA
	UMTS	NA	NA

Note: The EUT does not transmit over the air in the uplink direction.

Equipment Used: 1036-1082-1472-1469

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: 27 August 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1082-1472-1469

Measurement Uncertainty: 1X10⁻⁷ ppm

Temperature: 22 °C

Relative Humidity: 48 %

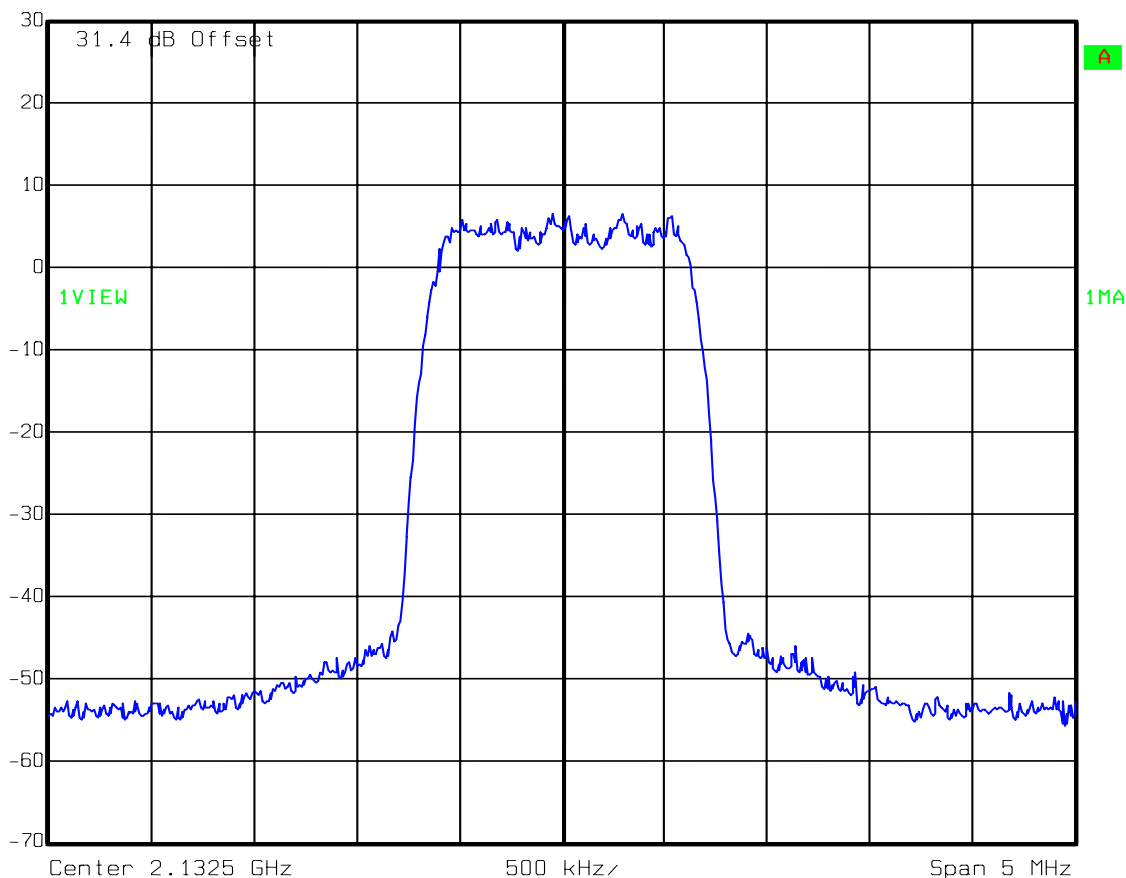
Test Data – Occupied Bandwidth

CDMA/EV-DO
OUTPUT



Ref Lvl
30 dBm

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



Date: 27.AUG.2009 13:09:46

Test Data – Occupied Bandwidth

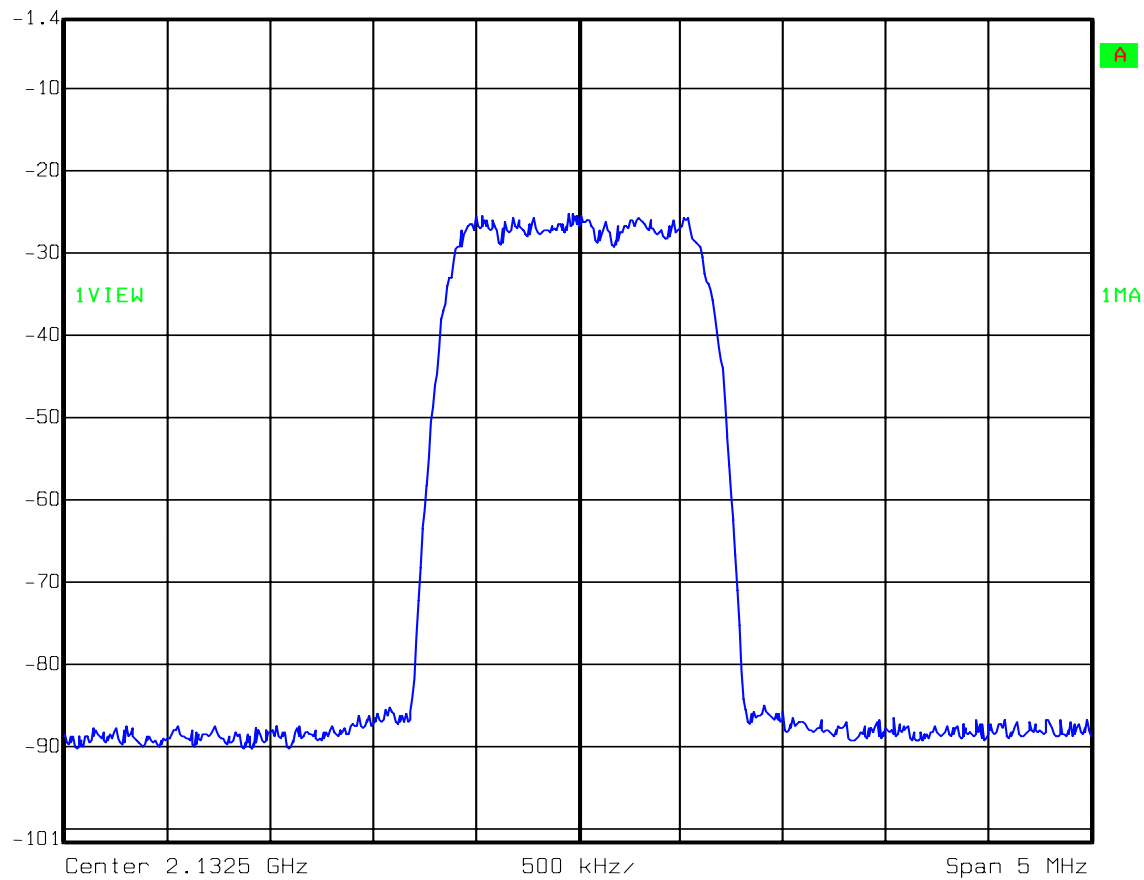
CDMA/EV-DO

INPUT



Ref Lvl
-1.4 dBm

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



Date: 27.AUG.2009 13:10:38

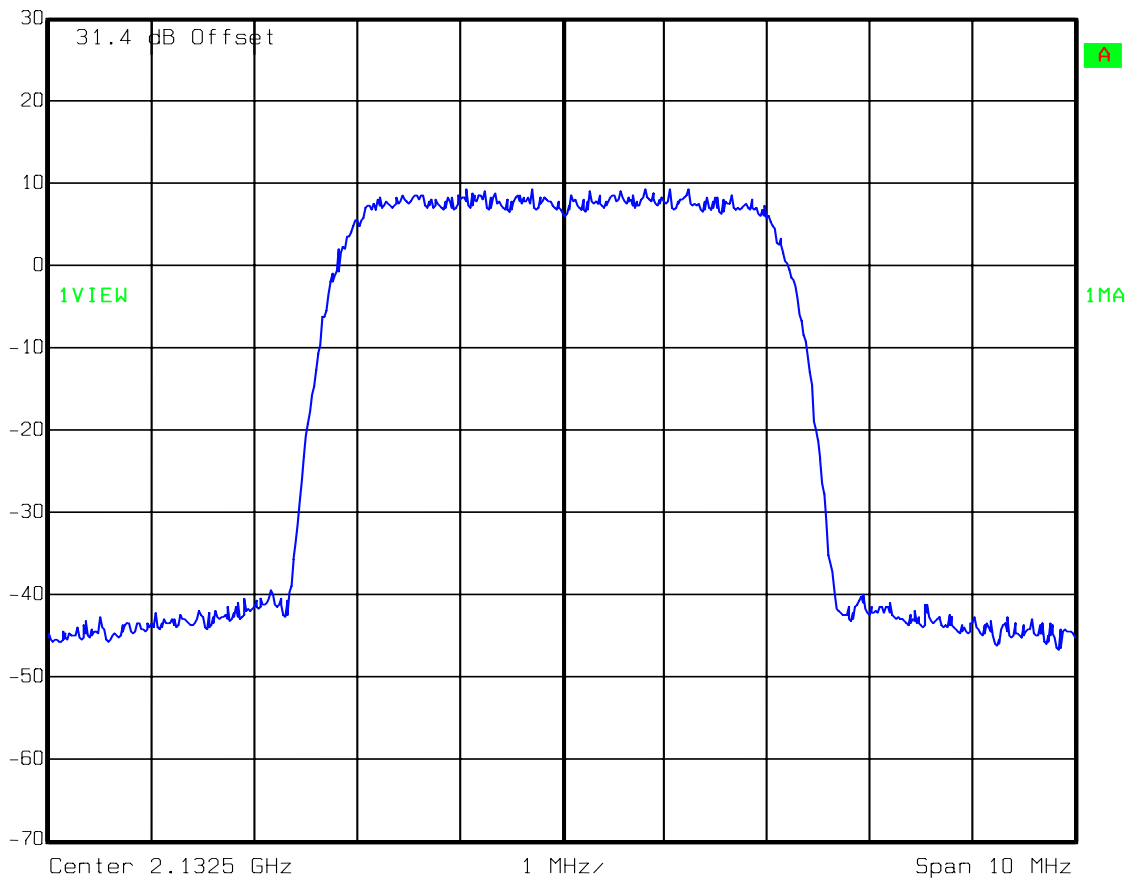
Test Data – Occupied Bandwidth

WCDMA/UMTS OUTPUT



Ref Lvl
30 dBm

RBW	50 kHz	RF Att	10 dB
VBW	50 kHz	Mixer	-10 dBm
SWT	10 ms	Unit	dBm



Date: 27.AUG.2009 13:00:57

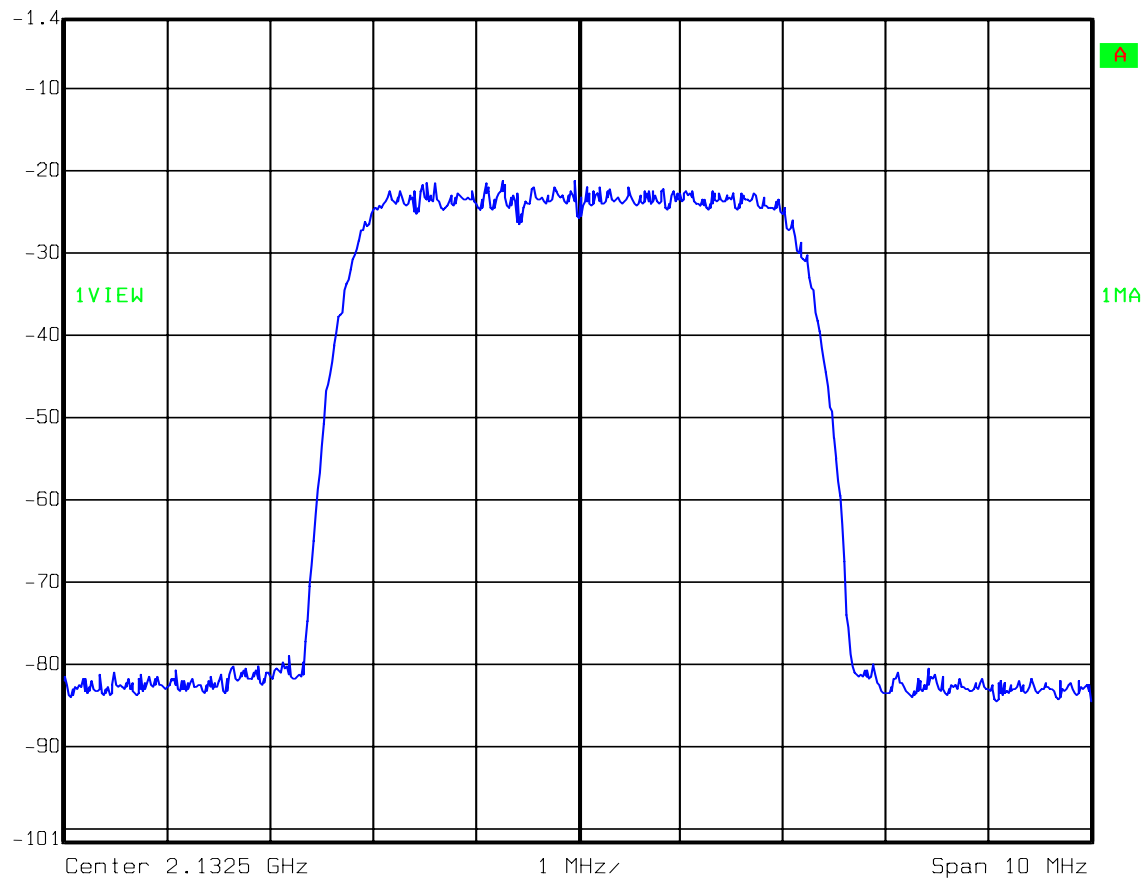
Test Data – Occupied Bandwidth

WCDMA/UMTS

INPUT

Ref Lvl
-1.4 dBm

RBW	50 kHz	RF Att	10 dB
VBW	50 kHz	Mixer	-10 dBm
SWT	10 ms	Unit	dBm



Date: 27.AUG.2009 13:01:41

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 27.53

TESTED BY: David Light

DATE: 27 August 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1082-1472-1469

Measurement Uncertainty: +/- 1.7 dB

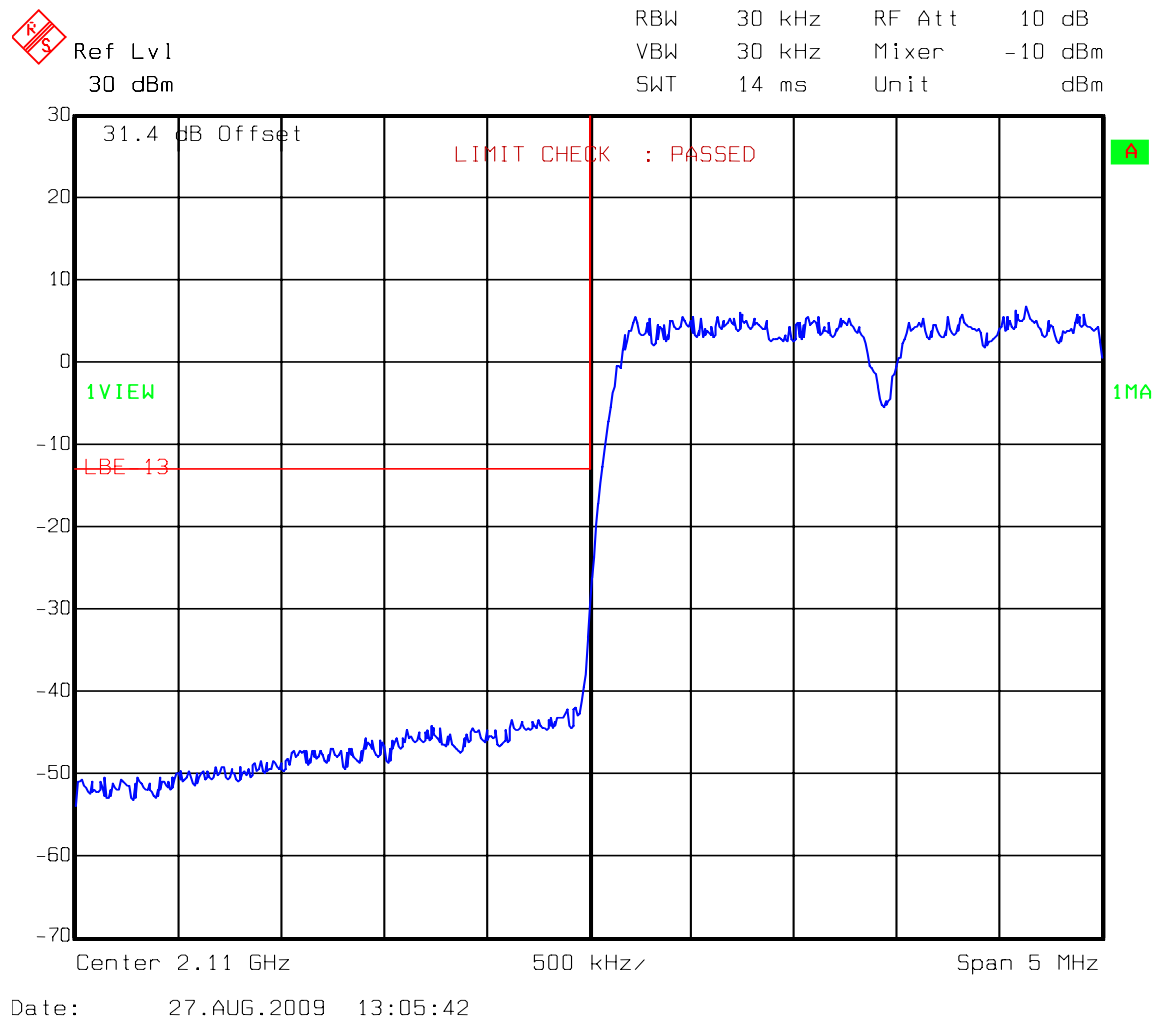
Temperature: 22 °C

Relative Humidity: 48 %

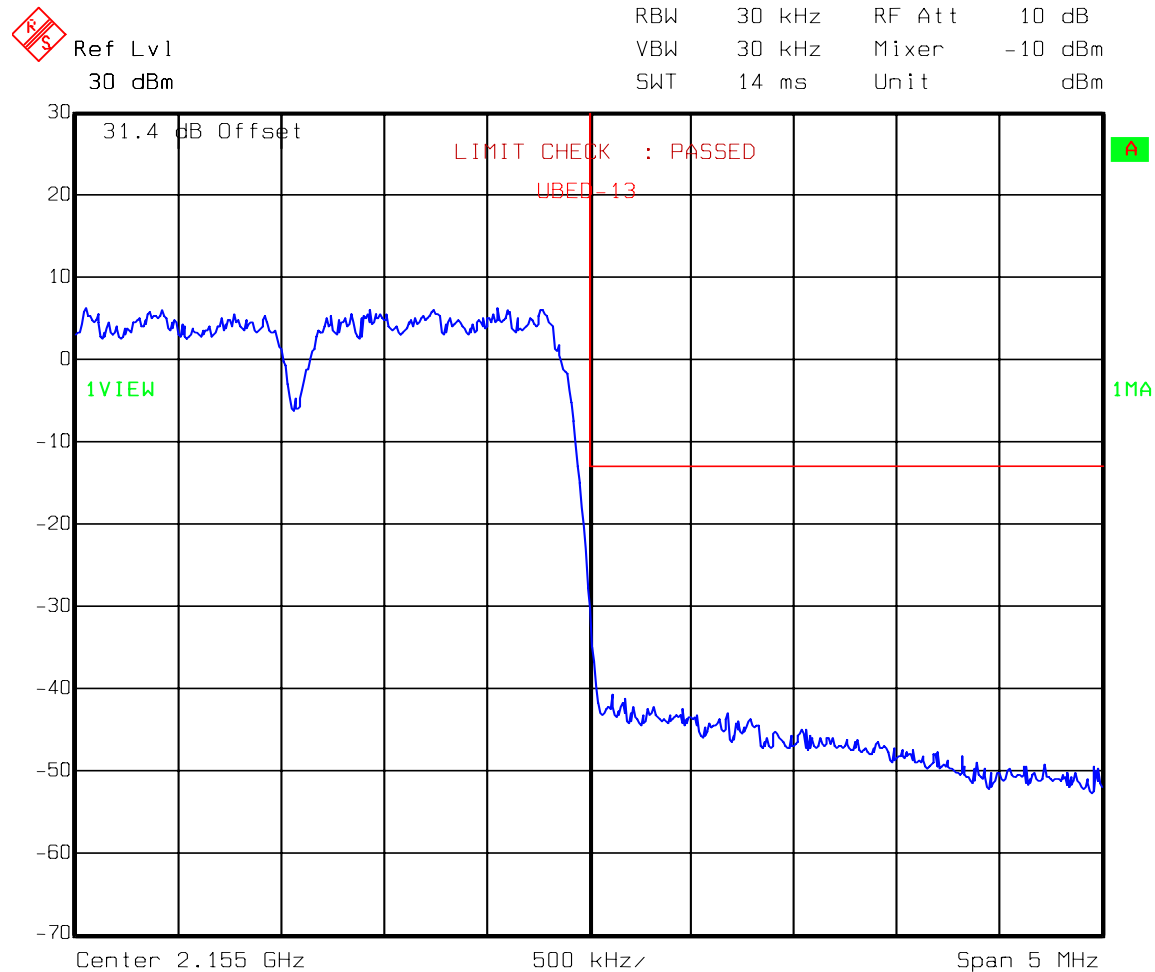
Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

LOW BANDEDGE



Test Data – Spurious Emissions at Antenna Terminals

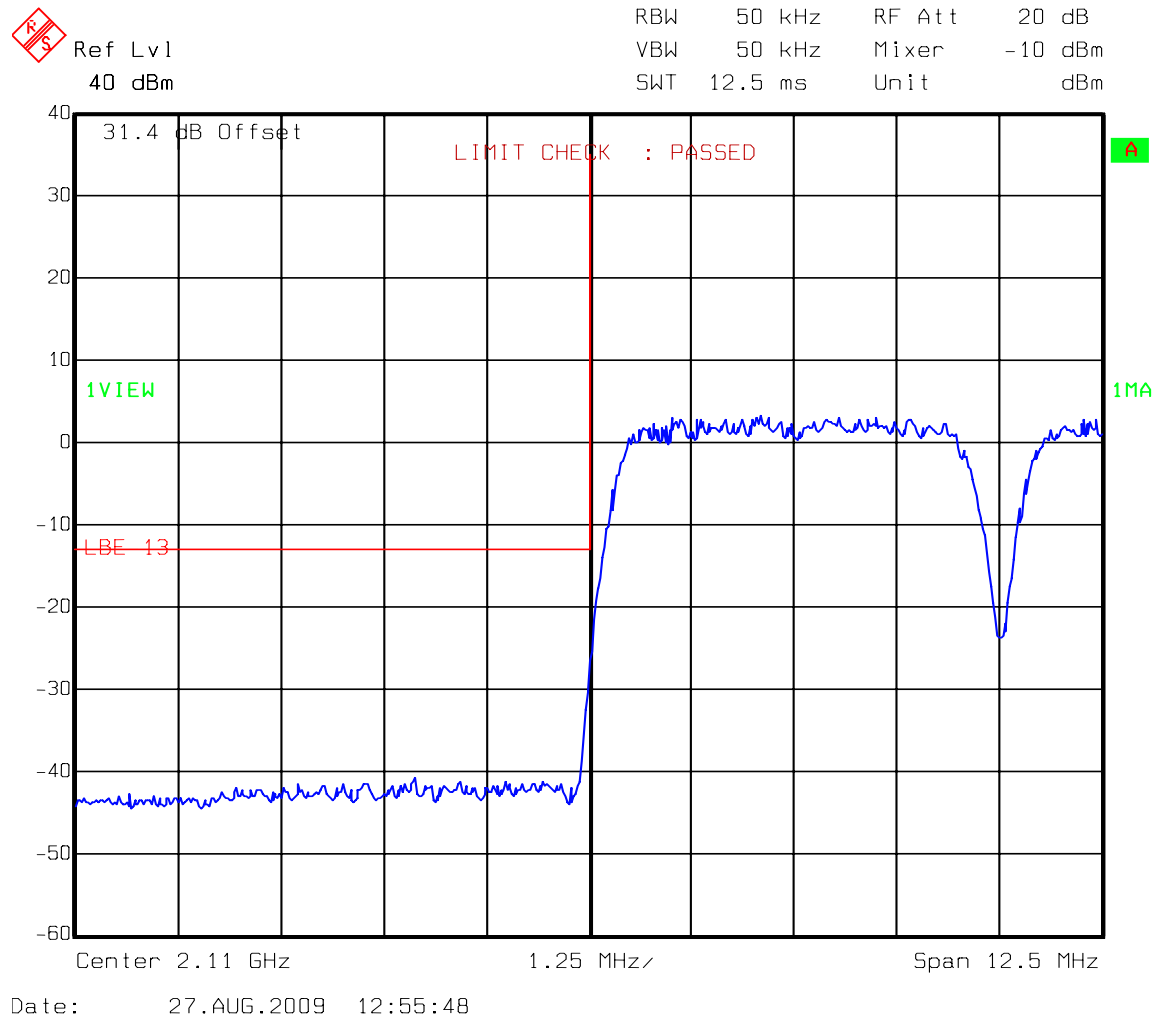
CDMA/EV-DO
HIGH BAND EDGE

Date: 27.AUG.2009 13:06:33

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

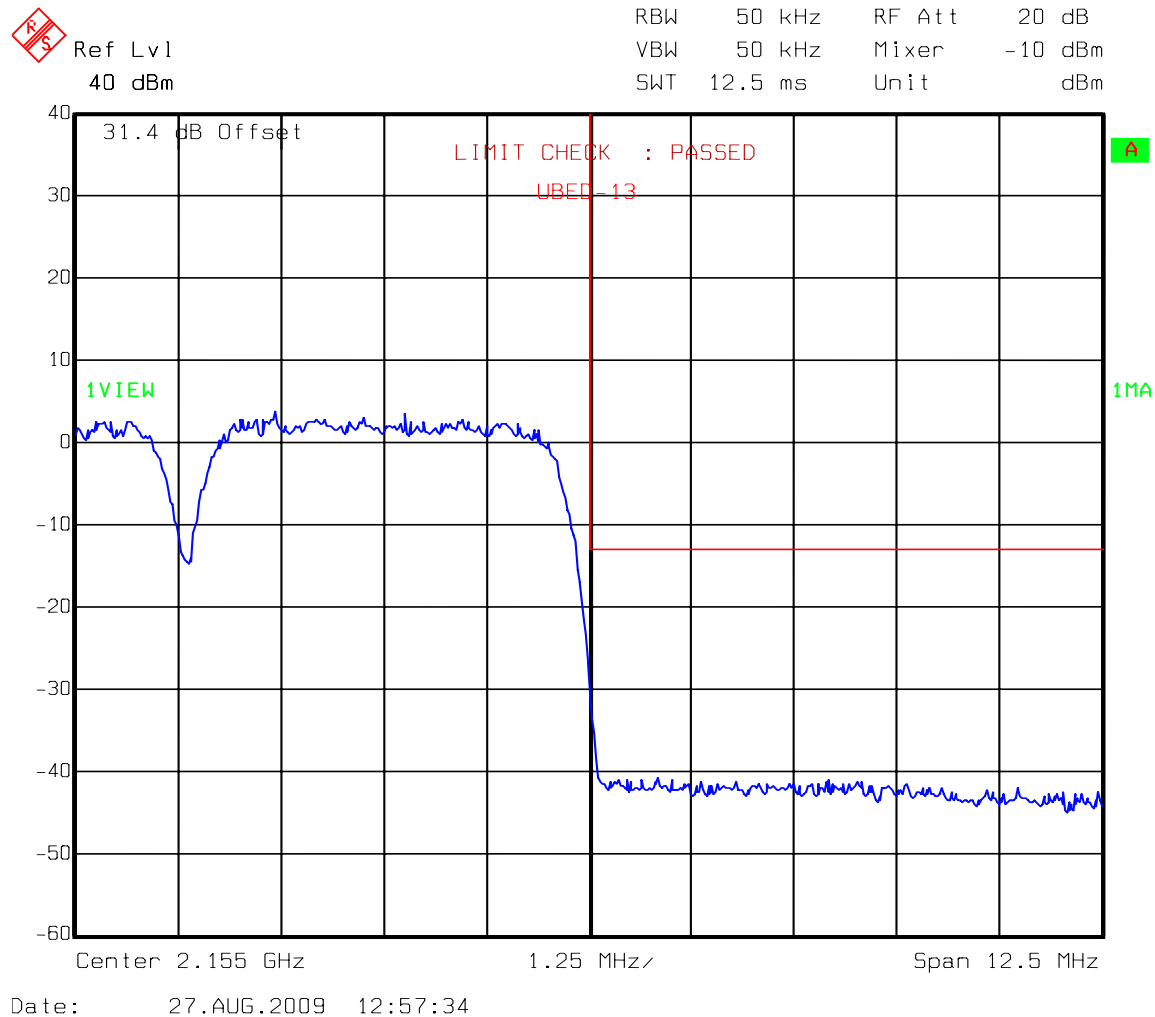
LOW BANDEDGE



Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

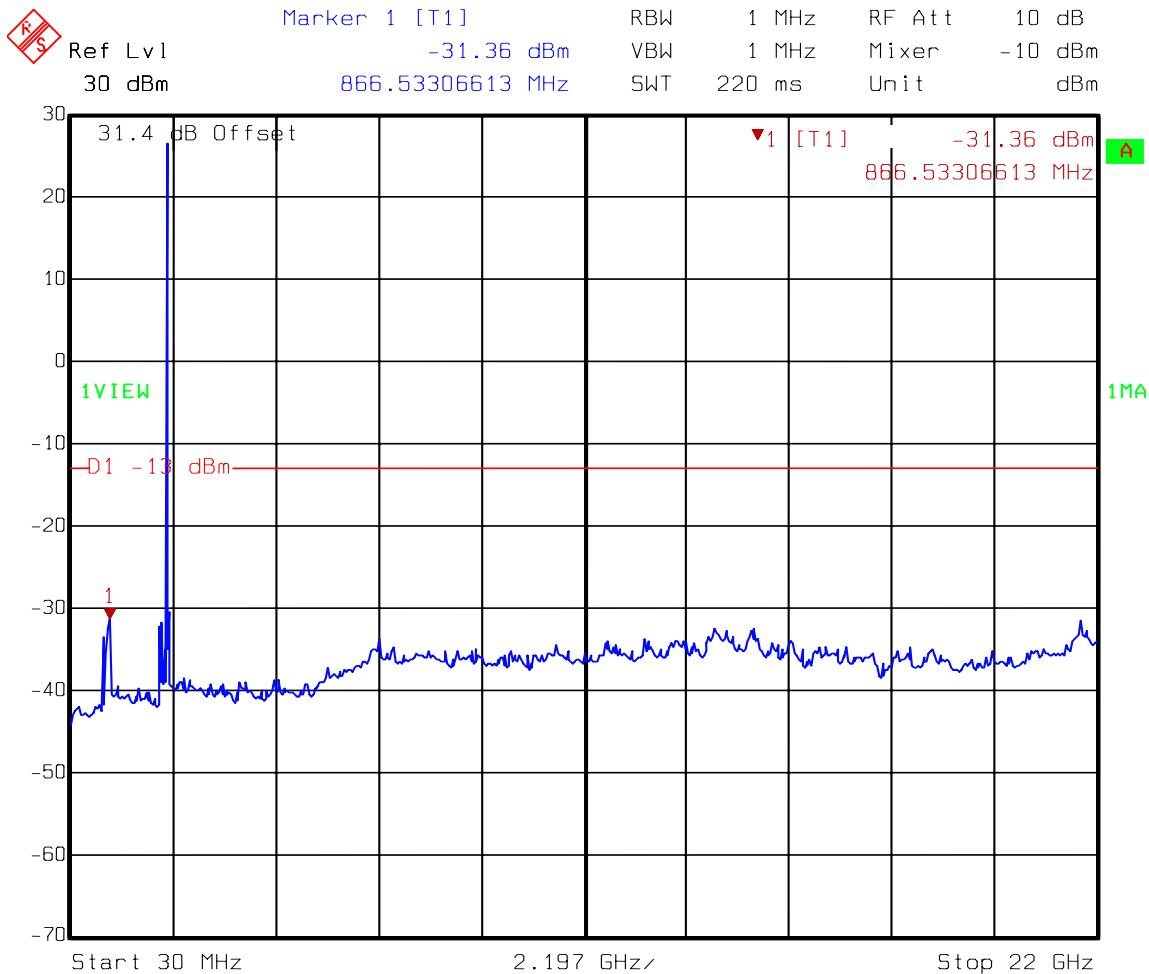
HIGH BAND EDGE



Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

SPURS

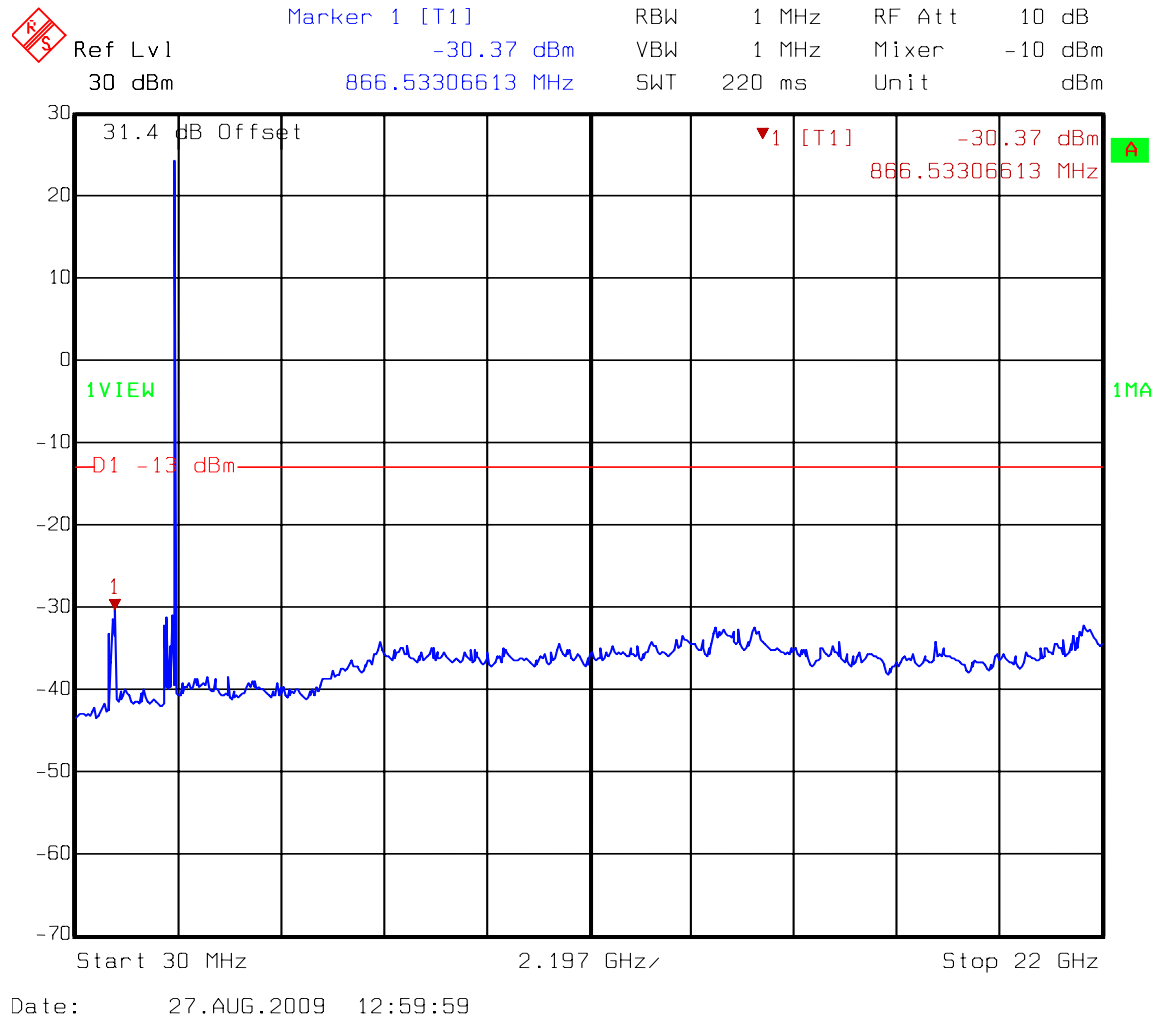


Date: 27.AUG.2009 13:07:33

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/UMTS

SPURS



Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 27.53
TESTED BY: David Light	DATE: 27 August 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.

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
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	01/19/09	01/20/11
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
1469	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/27/09	02/28/11
1484	Cable	Storm PR90-010-072	N/A	06/23/09	06/23/10
1485	Cable	Storm PR90-010-216	N/A	06/23/09	06/23/10
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	06/23/09	06/23/10
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/28/09	05/28/10
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09

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.

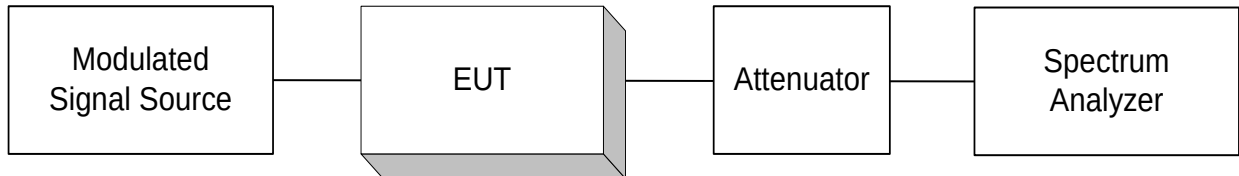
Method of Measurement

TIA/EIA-603-1992

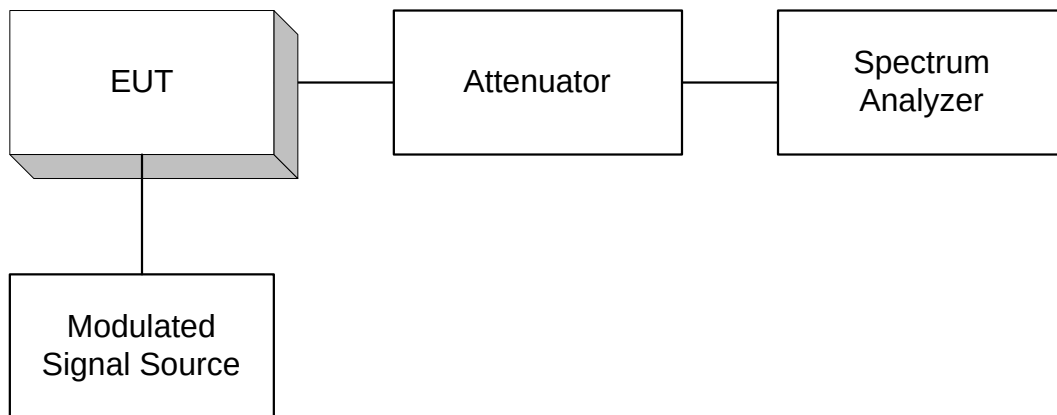
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna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

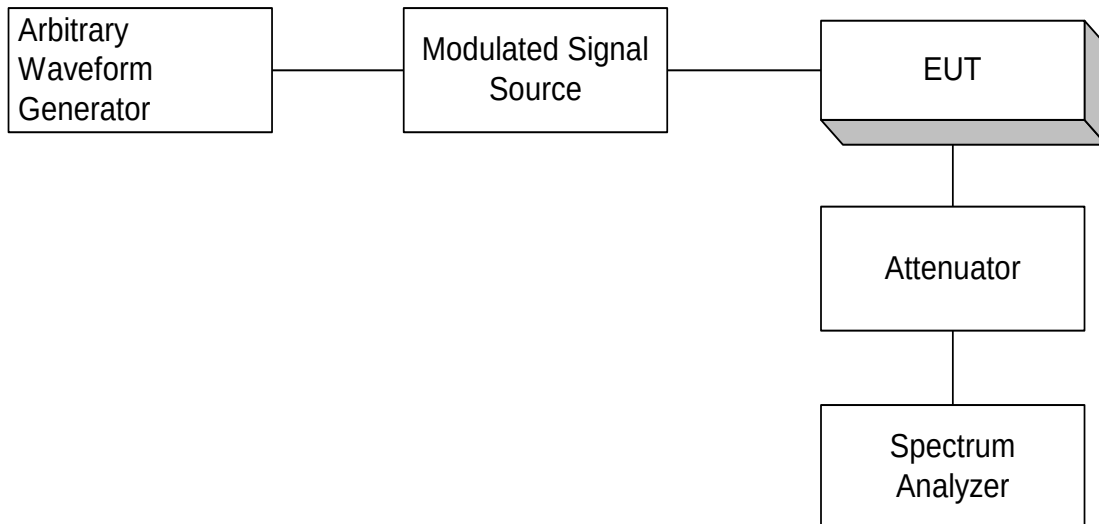
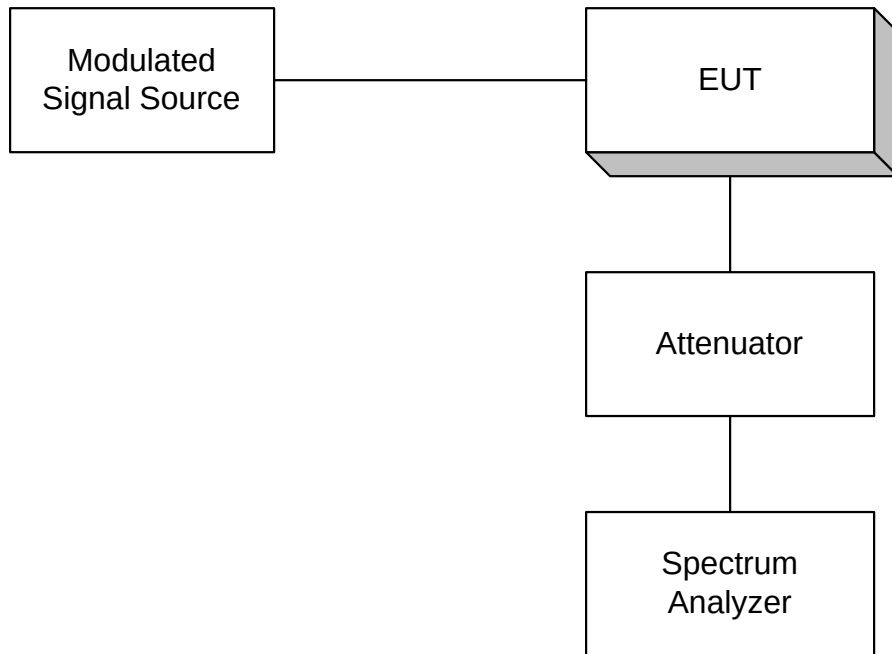
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation

