| | |
|---|---|
| **Nemko Test Report:** | 19864RUS1 |
| **Applicant:** | Andrew Corporation<br>108 Rand Park Drive<br>Garner, NC 27529<br>USA |
| **Equipment Under Test: (E.U.T.)** | AF1727 |
| **In Accordance With:** | **CFR 47, Part 27, Subpart C**<br>Miscellaneous Wireless Communication Services |
| **Tested By:** | Nemko USA, Inc.<br>802 N. Kealy<br>Lewisville, TX 75057-3136 |

**TESTED BY:** _____ **DATE:** **23 October, 2008**

David Light, Senior Wireless Engineer

**APPROVED BY:** _____ **DATE:** **29 October, 2008**

Tom Tidwell, Telecom Direct

**Number of Pages: 38**

# Table of Contents

## Section 1. Summary of Test Results

Manufacturer Andrew Corporation

Model No.: AF1727

Serial No.: 14

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".

NVLAP®
LAB CODE: 100426-0

**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 |

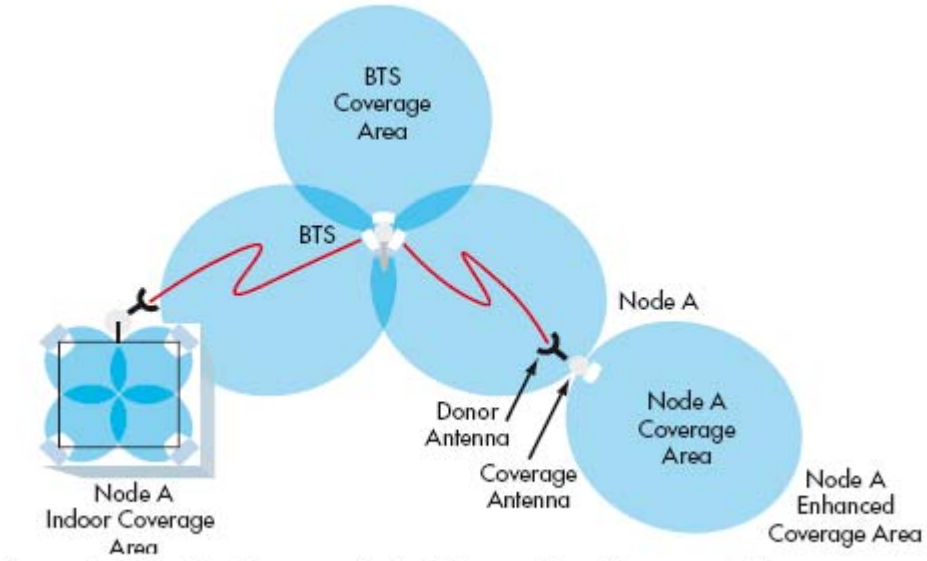
## Section 2. General Equipment Specification

| | | | | | | |
|---|---|---|---|---|---|---|
| **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:** | | 84 dB | | | | |
| **Output Impedance:** | | 50 ohms | | | | |
| **RF Output (Rated):** | **Uplink** | 1.0 W<br>30 dBm | | | | |
| **RF Output (Rated):** | **Downlink** | 0.5 W<br>27 dBm | | | | |
| **Frequency Translation:** | | **F1-F1** ☒ | **F1-F2** ☐ | **N/A** ☐ | | |
| **Band Selection:** | | **Software** ☒ | **Duplexer** ☐ | **Fullband** ☐ | | |

**Description of EUT**

The Node A is an RF enhancer which is capable of filtering and amplifying a multitude of distinct sub-bands up to 120 MHz in total anywhere within multiple frequency bands. It is designed to be part of the primary infrastructure

**System Diagram**




*Scenario: Extending Coverage for buildings and small coverage holes*

## Section 3. RF Power Output

| NAME OF TEST: RF Power Output | PARA. NO.: 27.50 |
|---|---|
| TESTED BY: David Light | DATE: 23 October 2008 |

**Test Results:** Complies.

**Measurement Data:**

| Direction | Modulation | Composite Power (dBm) | RF Power (W) |
|---|---|---|---|
| Downlink | CDMA | 27 | 0.50 |
| | UMTS | 25 | 0.32 |
| Uplink | CDMA | 30 | 1.0 |
| | UMTS | 28 | 0.63 |

**Equipment Used:** 1663-1604-1065-1082

**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: 23 October 2008 |

**Test Results:** Complies.

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

**Equipment Used:** 1663-1604-1065-1082

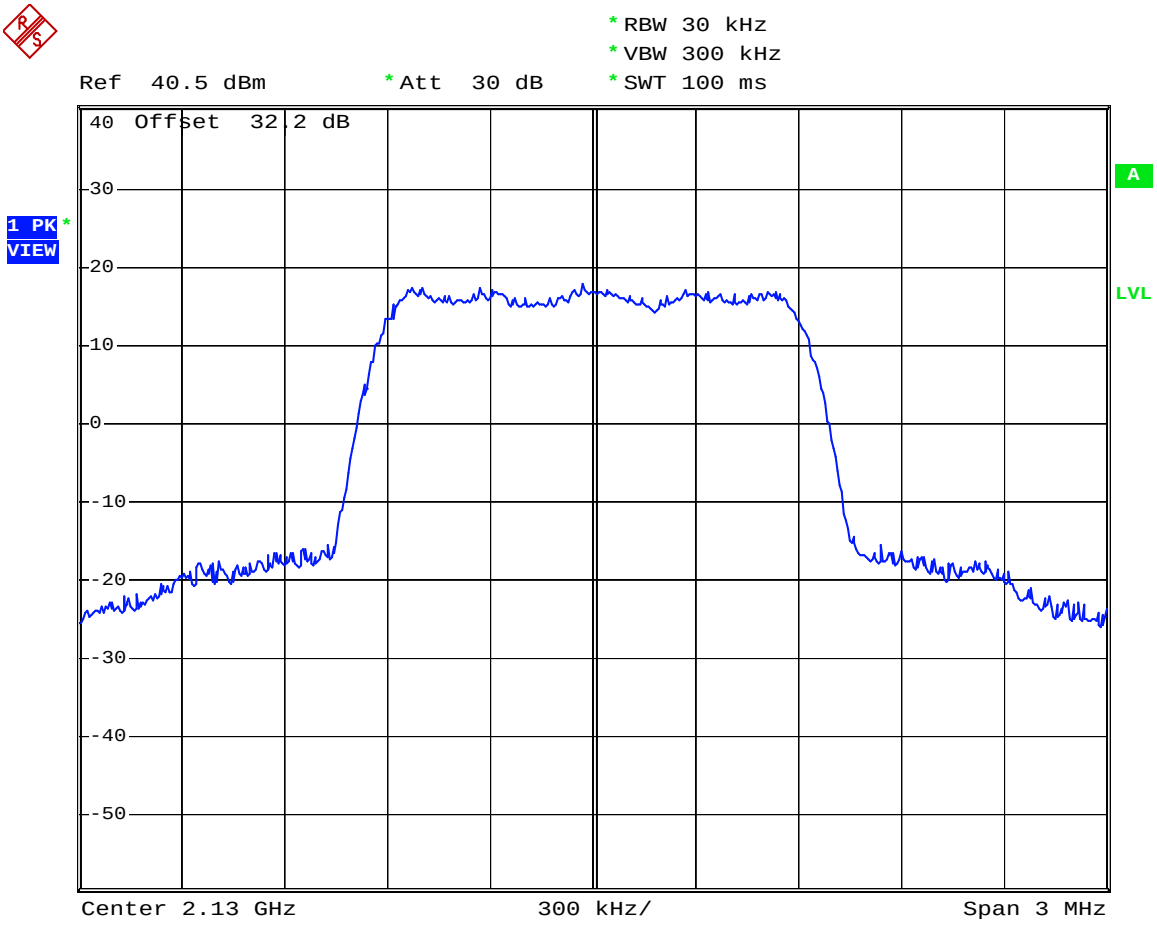
**Measurement Uncertainty:** $1X10^{-7}$ ppm

**Temperature:** 22 °C

**Relative Humidity:** 48 %

## Test Data – Occupied Bandwidth

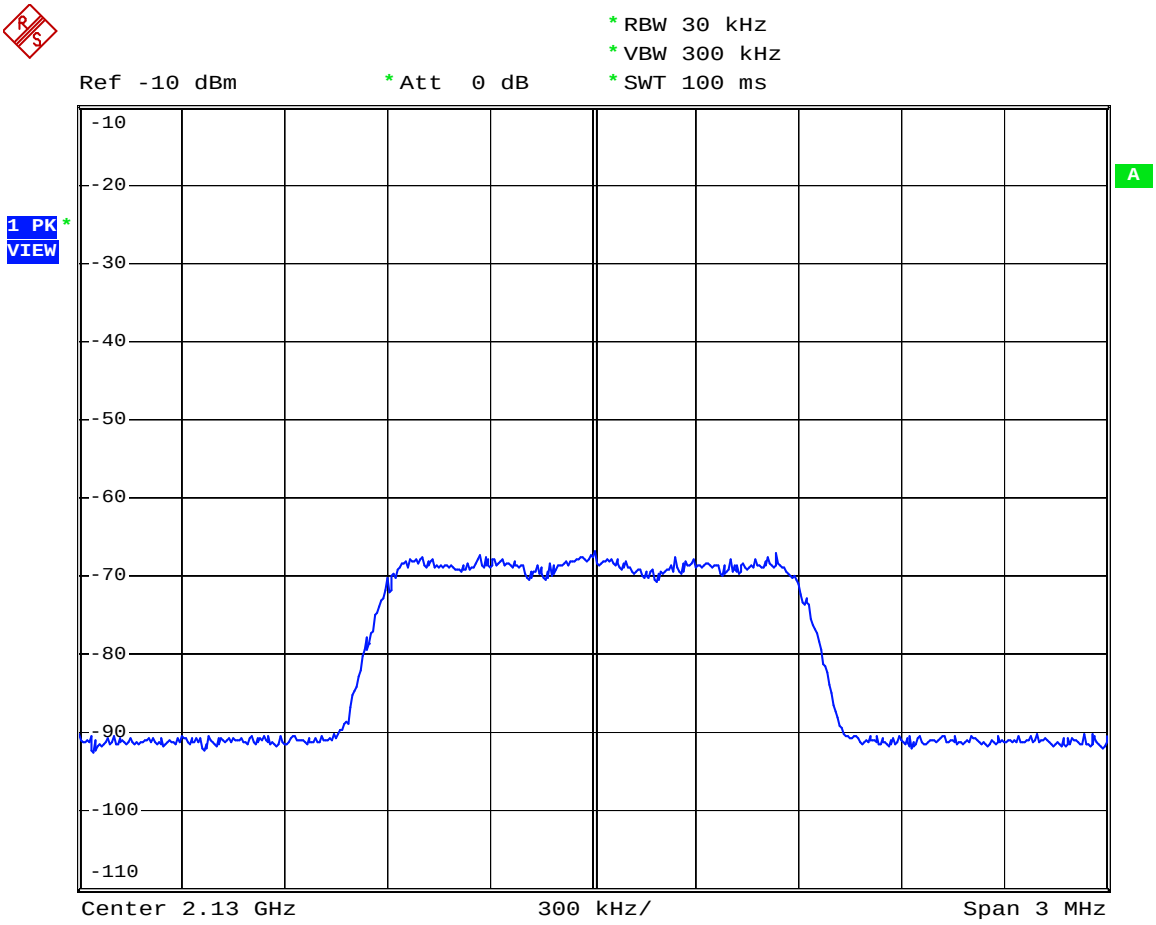
CDMA/EV-DO
Downlink
OUTPUT




Date: 23.OCT.2008 13:10:20

**Test Data – Occupied Bandwidth**

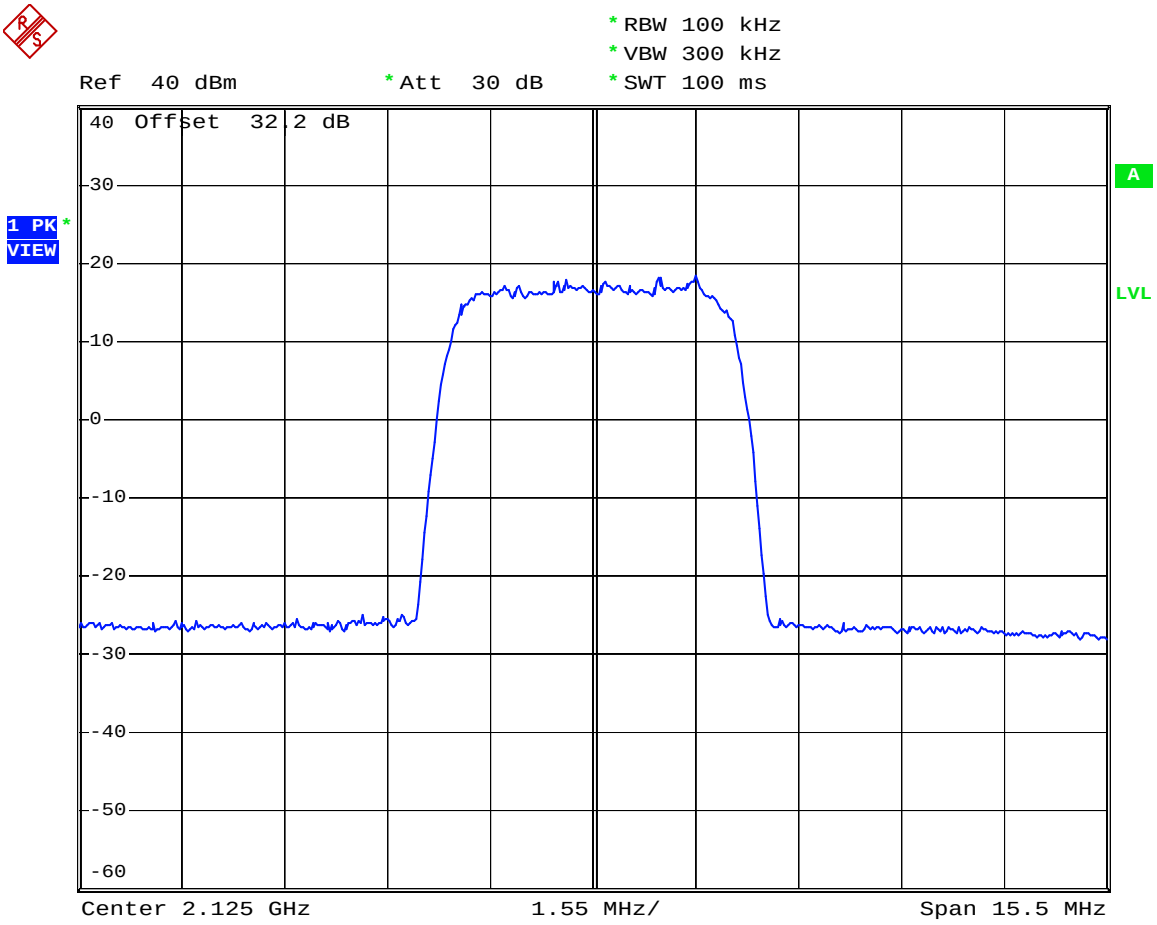
CDMA/EV-DO
Downlink
INPUT




Date: 23.OCT.2008 13:11:34

**Test Data – Occupied Bandwidth**

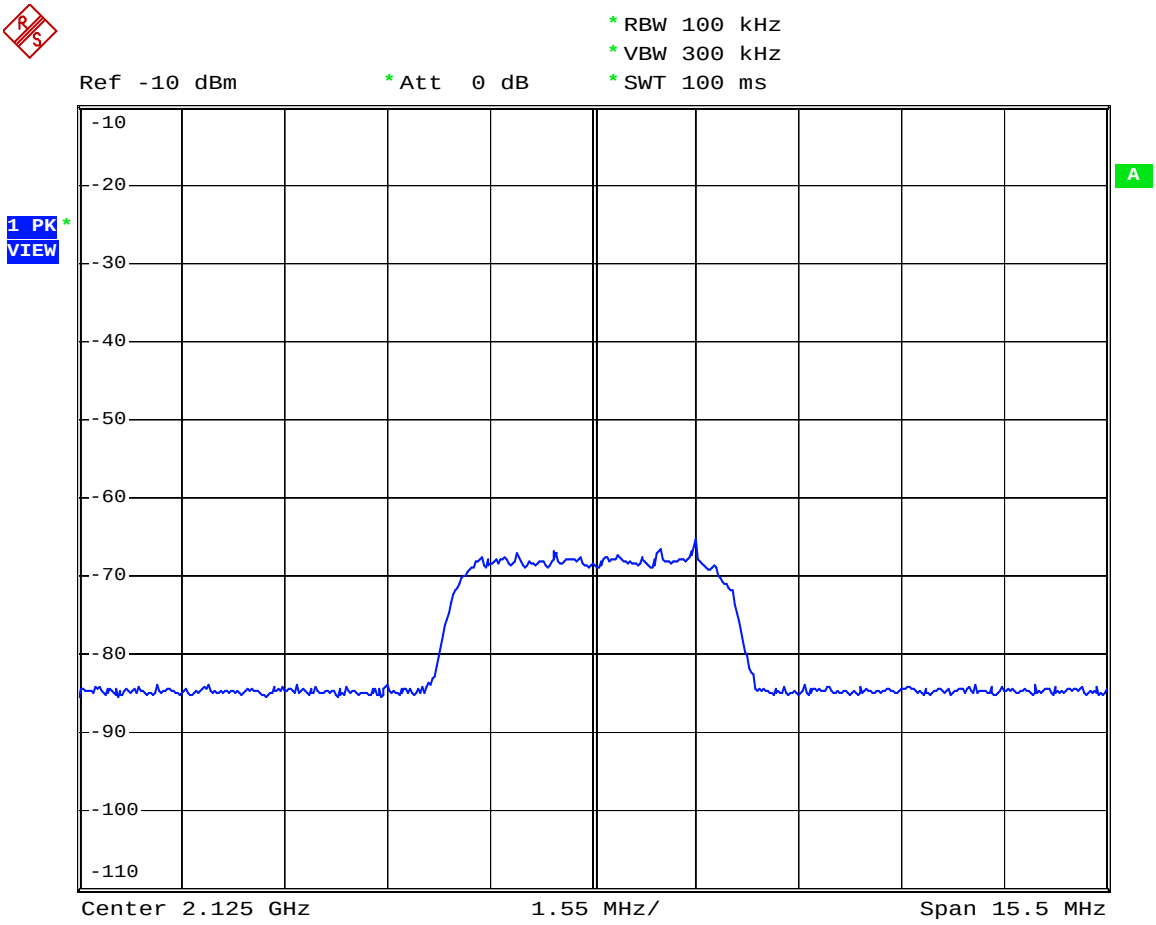
WCDMA/UMTS
Downlink
OUTPUT




Date: 23.OCT.2008 14:52:00

## Test Data – Occupied Bandwidth

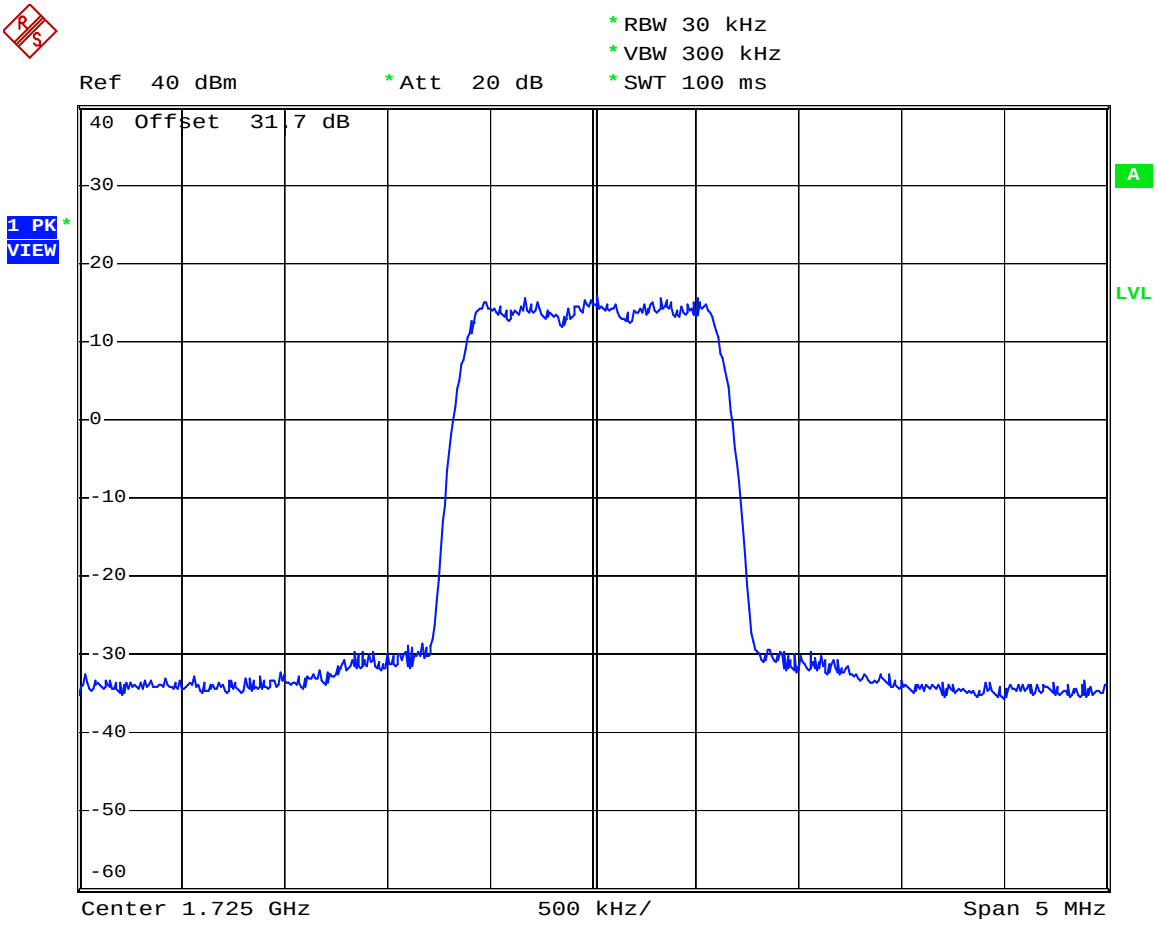
WCDMA/UMTS
Downlink
INPUT




Date: 23.OCT.2008 14:57:10

## Test Data – Occupied Bandwidth

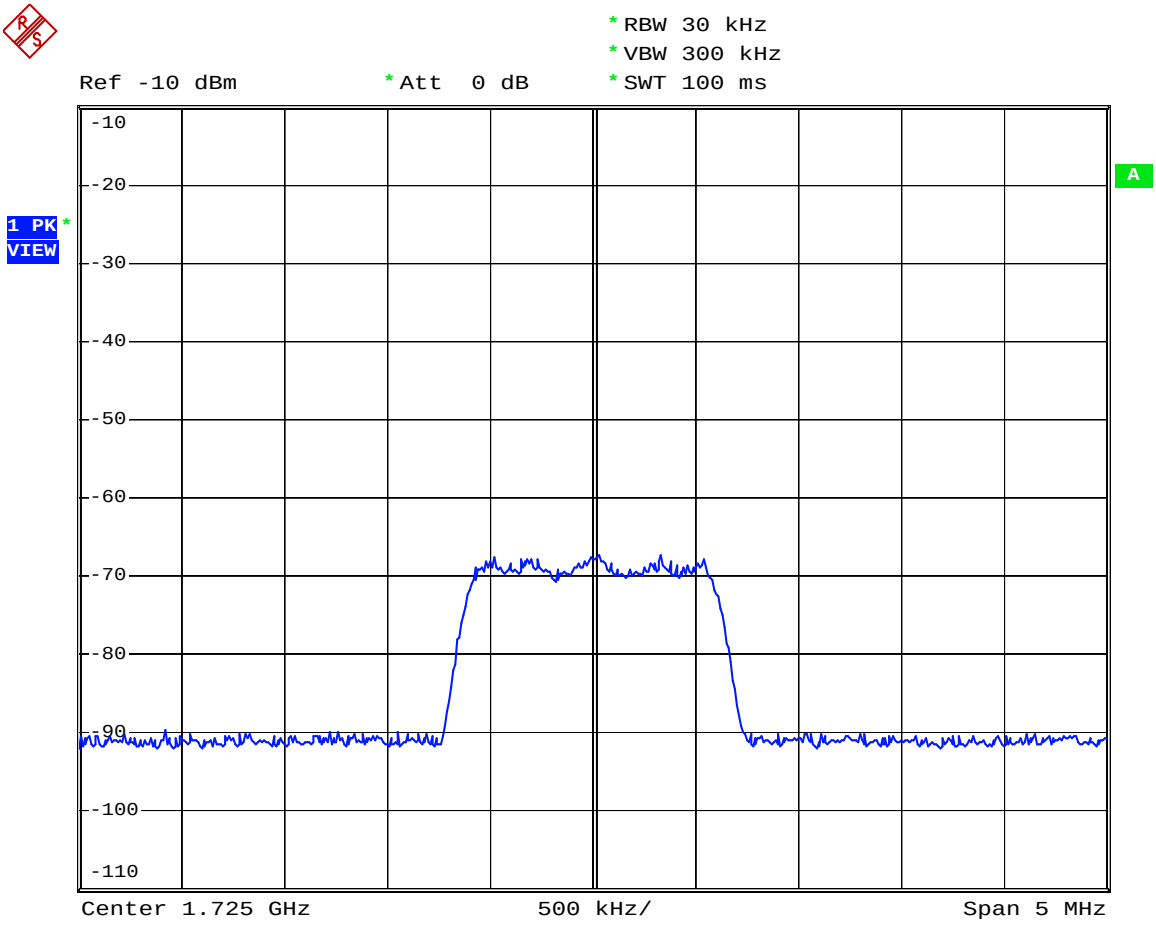
CDMA/EV-DO
Uplink
OUTPUT




Date: 23.OCT.2008 12:52:16

## Test Data – Occupied Bandwidth

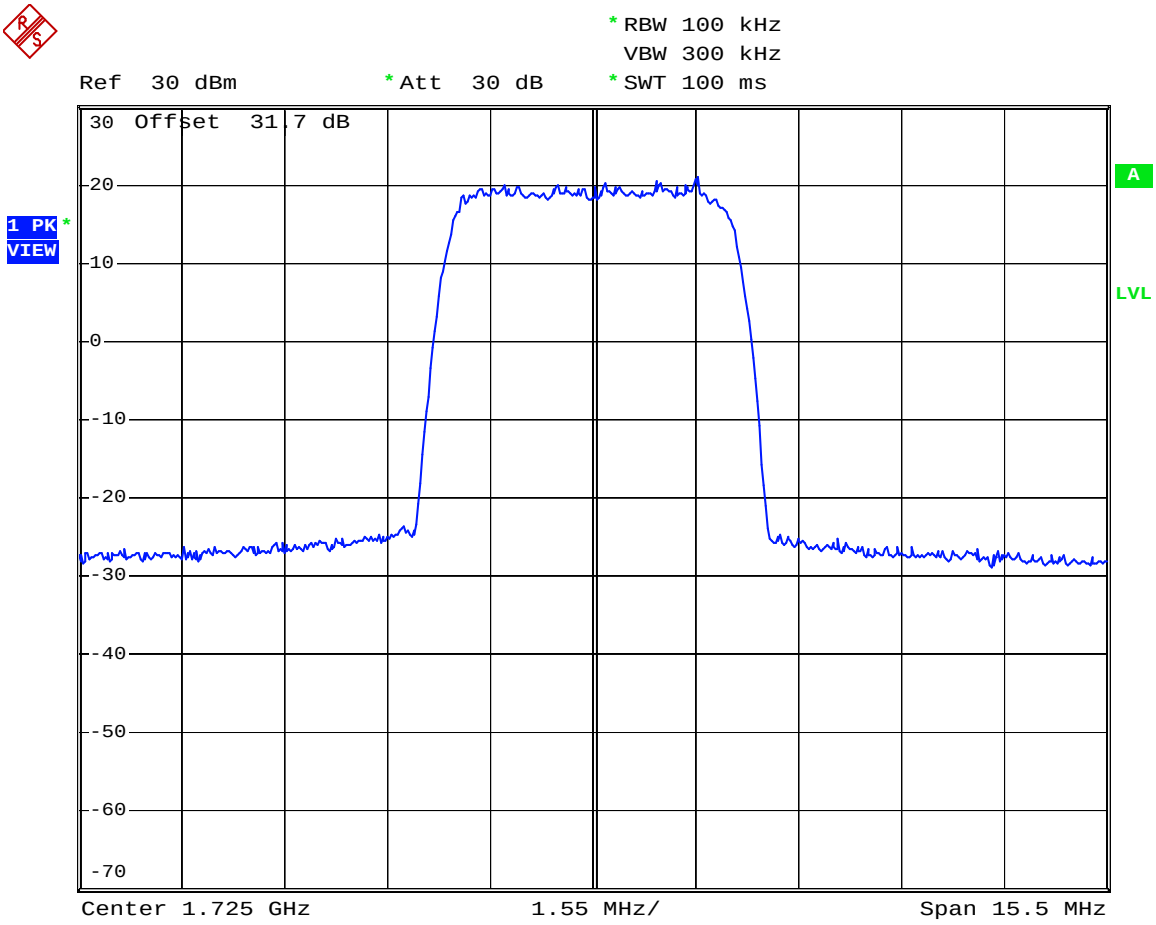
CDMA/EV-DO
Uplink
INPUT




Date: 23.OCT.2008 12:53:47

## Test Data – Occupied Bandwidth

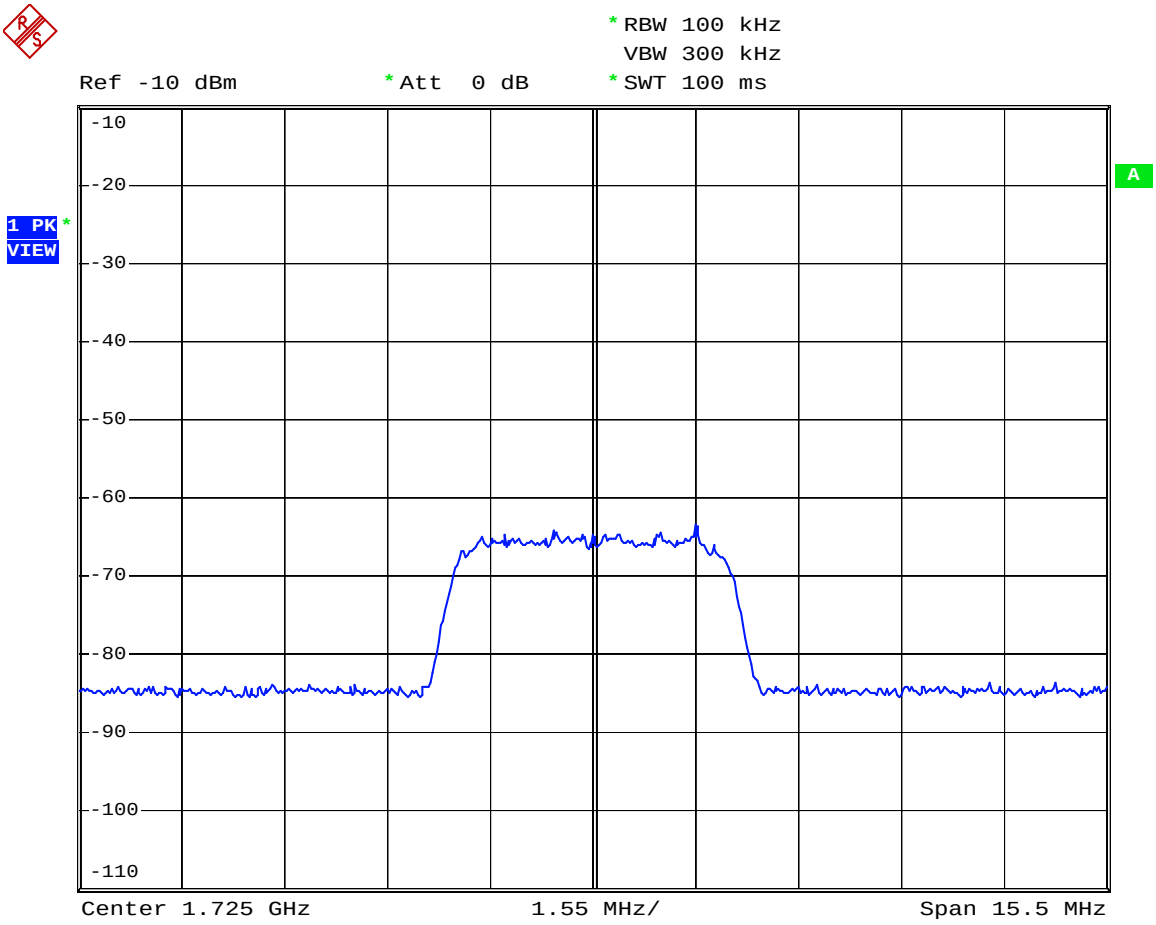
WCDMA/UMTS
Uplink
OUTPUT




Date: 23.OCT.2008 15:01:37

## Test Data – Occupied Bandwidth

WCDMA/UMTS
Uplink
INPUT




Date: 23.OCT.2008 15:06:01

## Section 5. Spurious Emissions at Antenna Terminals

| NAME OF TEST: Spurious Emissions @ Antenna Terminals | PARA. NO.: 27.53 |
|---|---|
| TESTED BY: David Light | DATE: 23 October 2008 |

**Test Results:** Complies.

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

**Equipment Used:** 1663-1604-1065-1082-1464

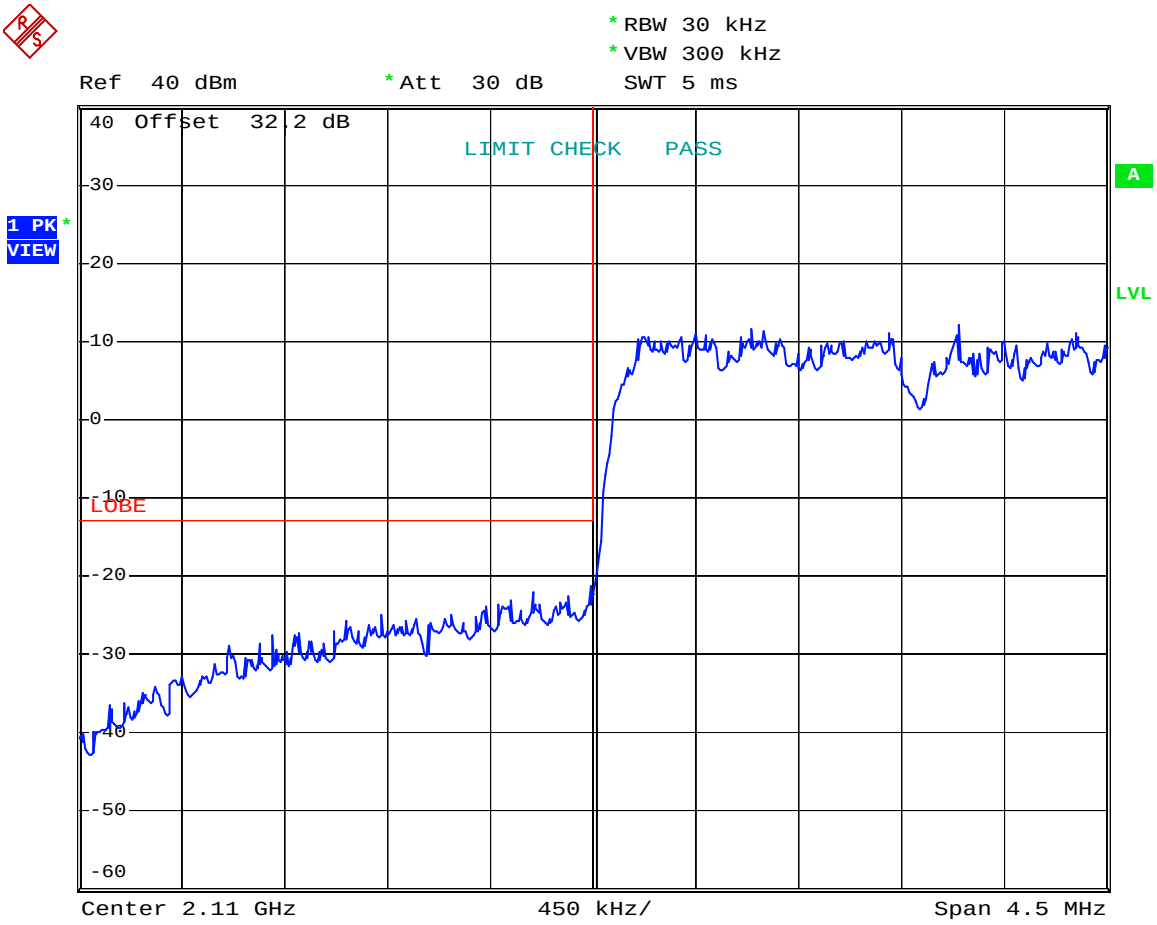
**Measurement Uncertainty:** +/- 1.7 dB

**Temperature:** 22 °C

**Relative Humidity:** 48 %

**Test Data – Spurious Emissions at Antenna Terminals**

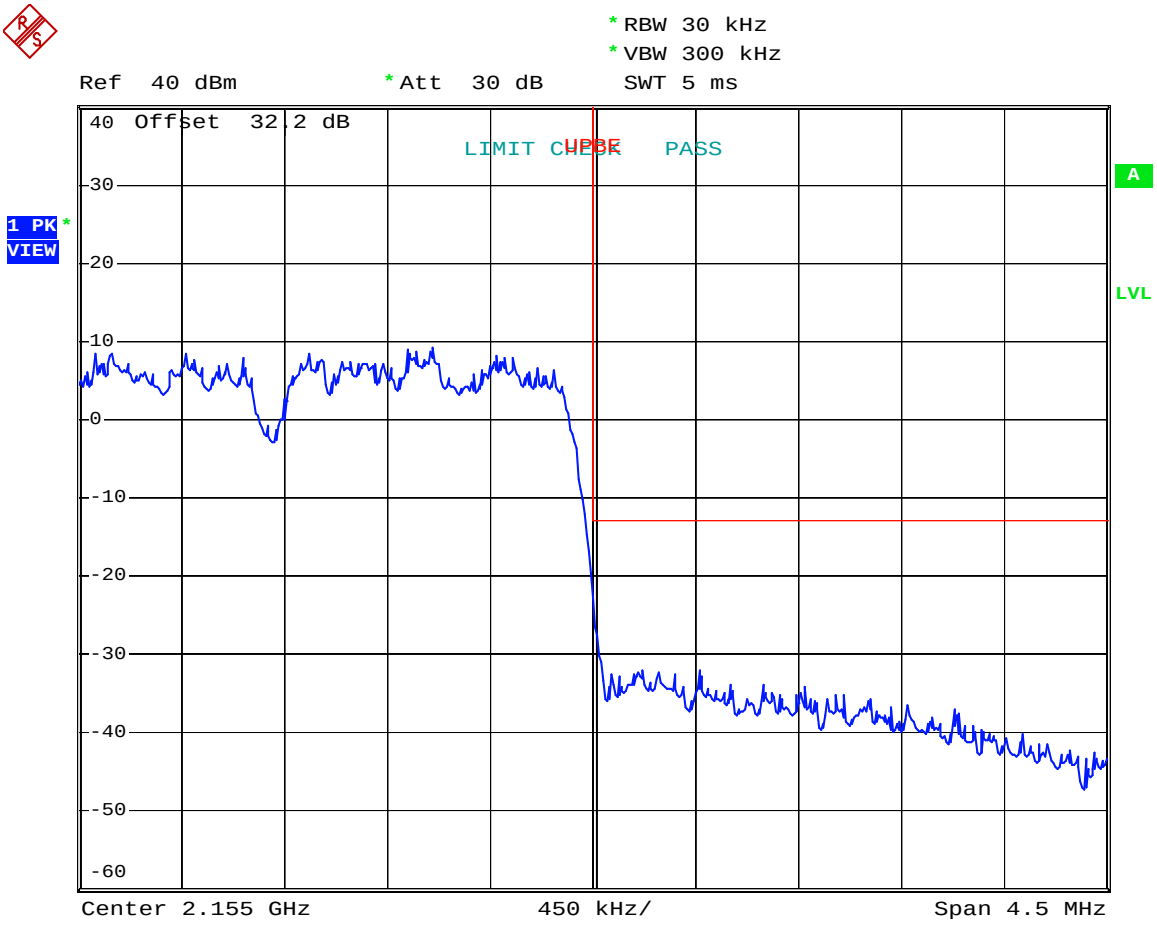
CDMA/EV-DO
LOW BANDEDGE
Downlink




Date: 23.OCT.2008 13:19:23

**Test Data – Spurious Emissions at Antenna Terminals**

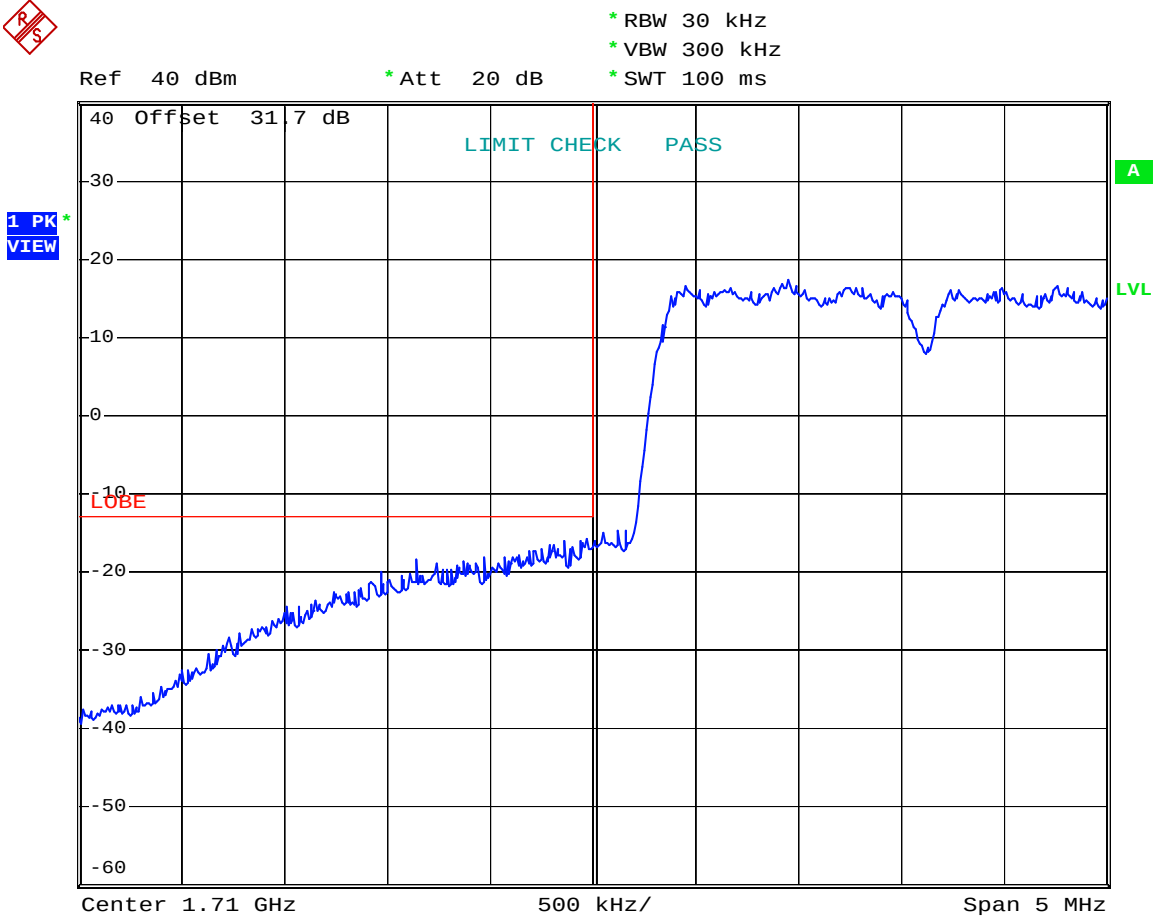
CDMA/EV-DO
HIGH BAND EDGE
Downlink




Date: 23.OCT.2008 13:17:50

## Test Data – Spurious Emissions at Antenna Terminals

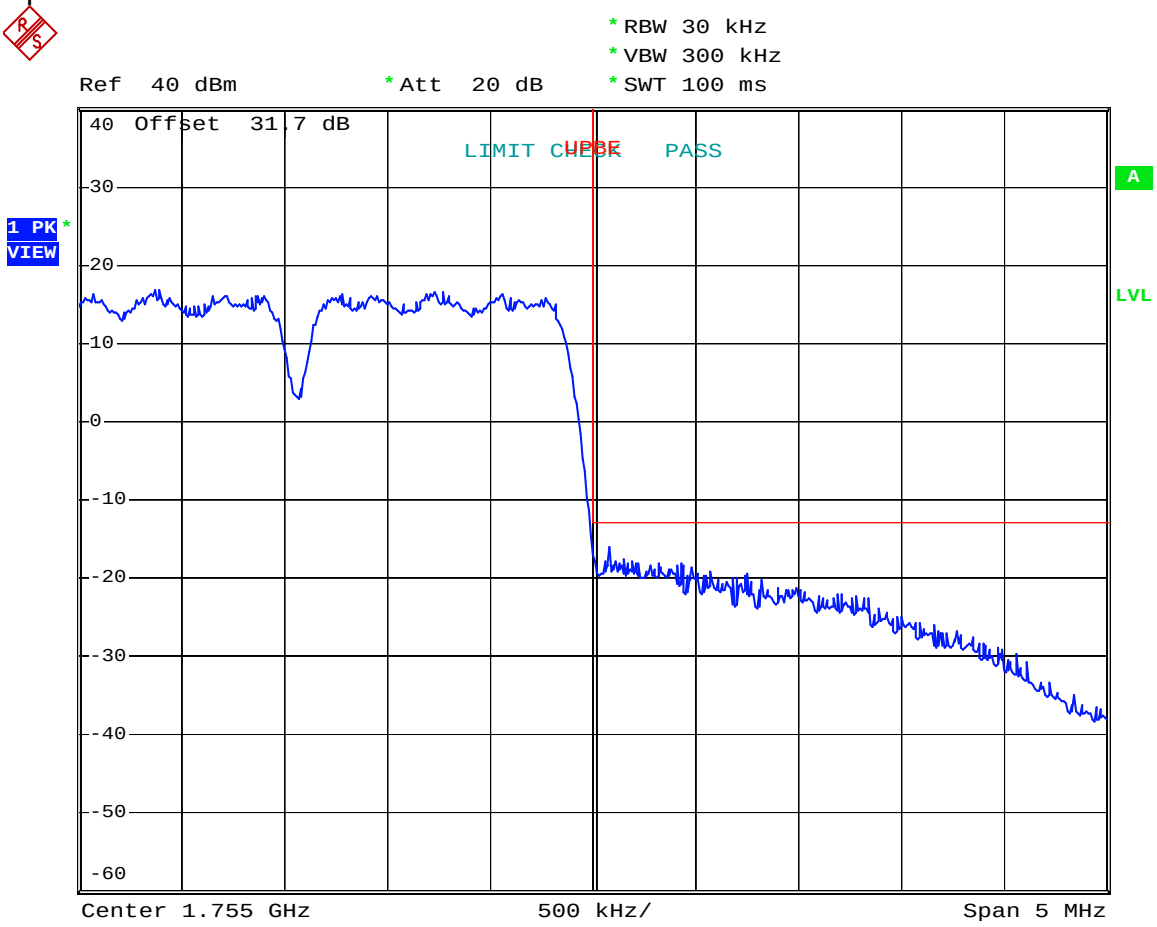
CDMA/EV-DO
LOW BANDEDGE
Uplink




Date: 23.OCT.2008 12:47:57

**Test Data – Spurious Emissions at Antenna Terminals**

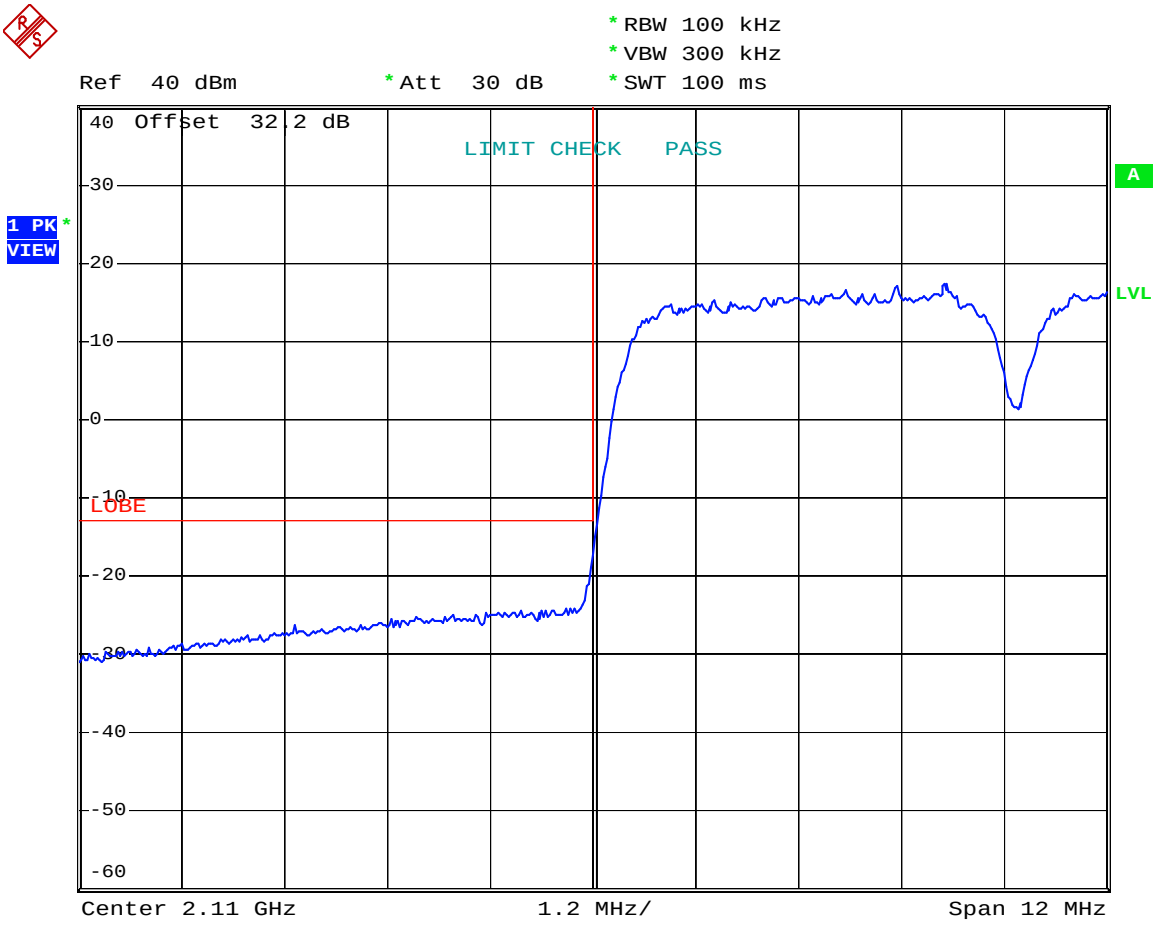
CDMA/EV-DO
HIGH BAND EDGE
Uplink




Date: 23.OCT.2008 12:50:22

**Test Data – Spurious Emissions at Antenna Terminals**

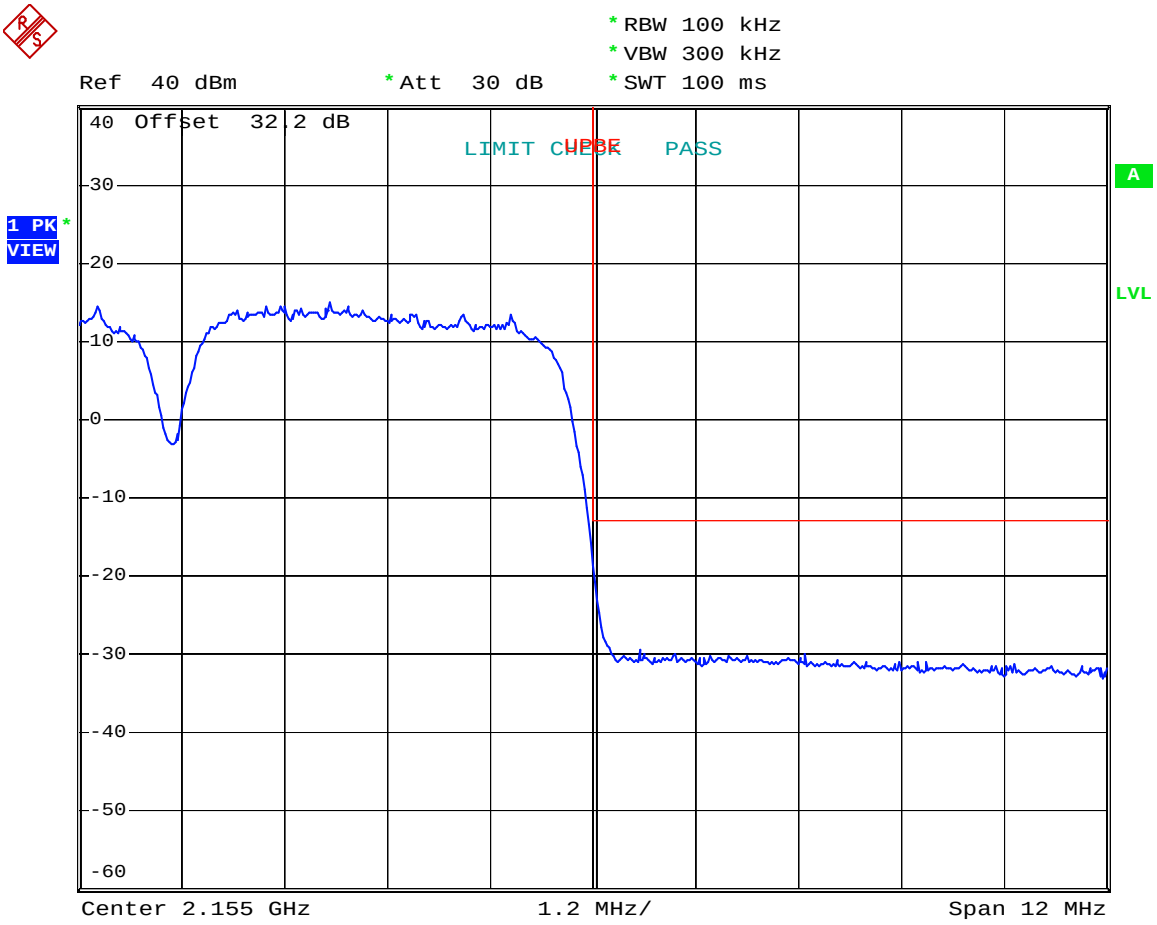
WCDMA/UMTS
LOW BANDEDGE
Downlink




Date: 23.OCT.2008 14:47:56

**Test Data – Spurious Emissions at Antenna Terminals**

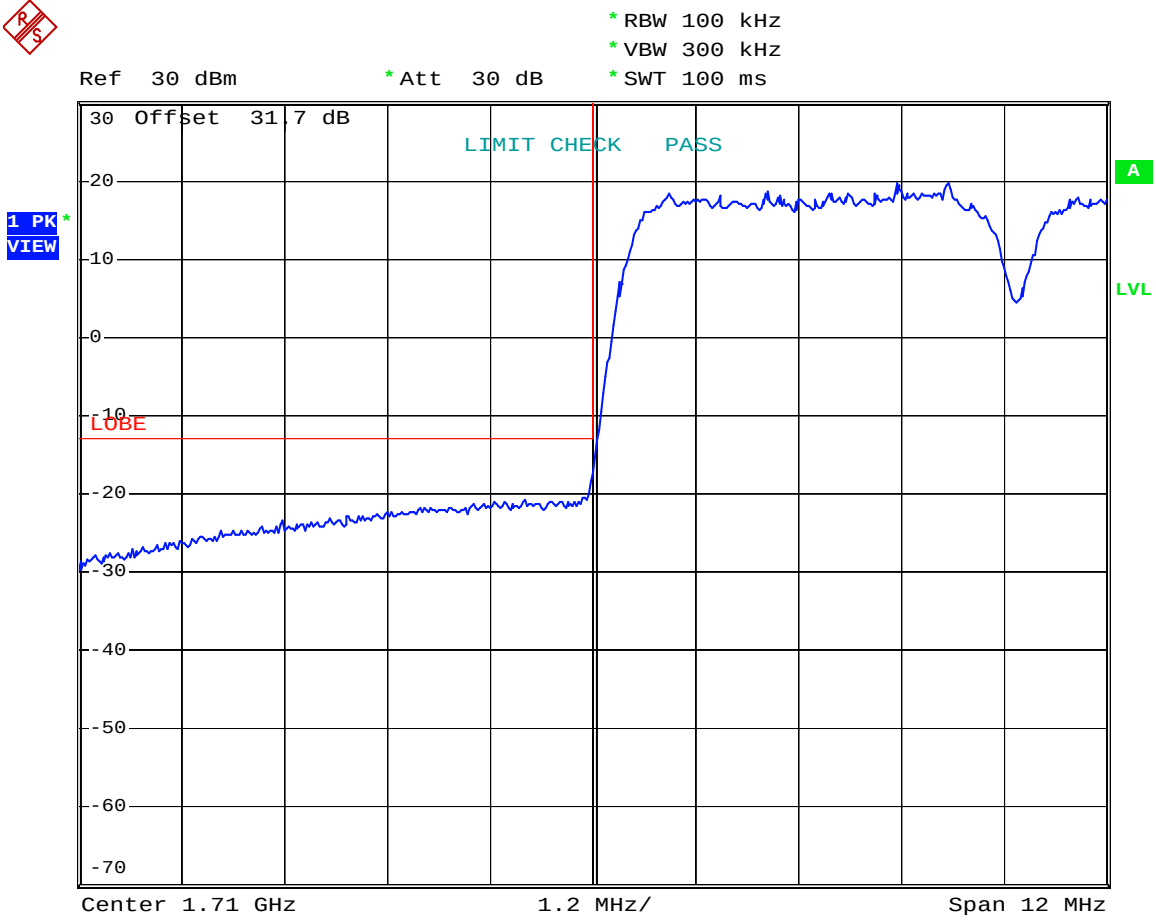
WCDMA/UMTS
HIGH BAND EDGE
Downlink




Date: 23.OCT.2008 14:49:19

## Test Data – Spurious Emissions at Antenna Terminals

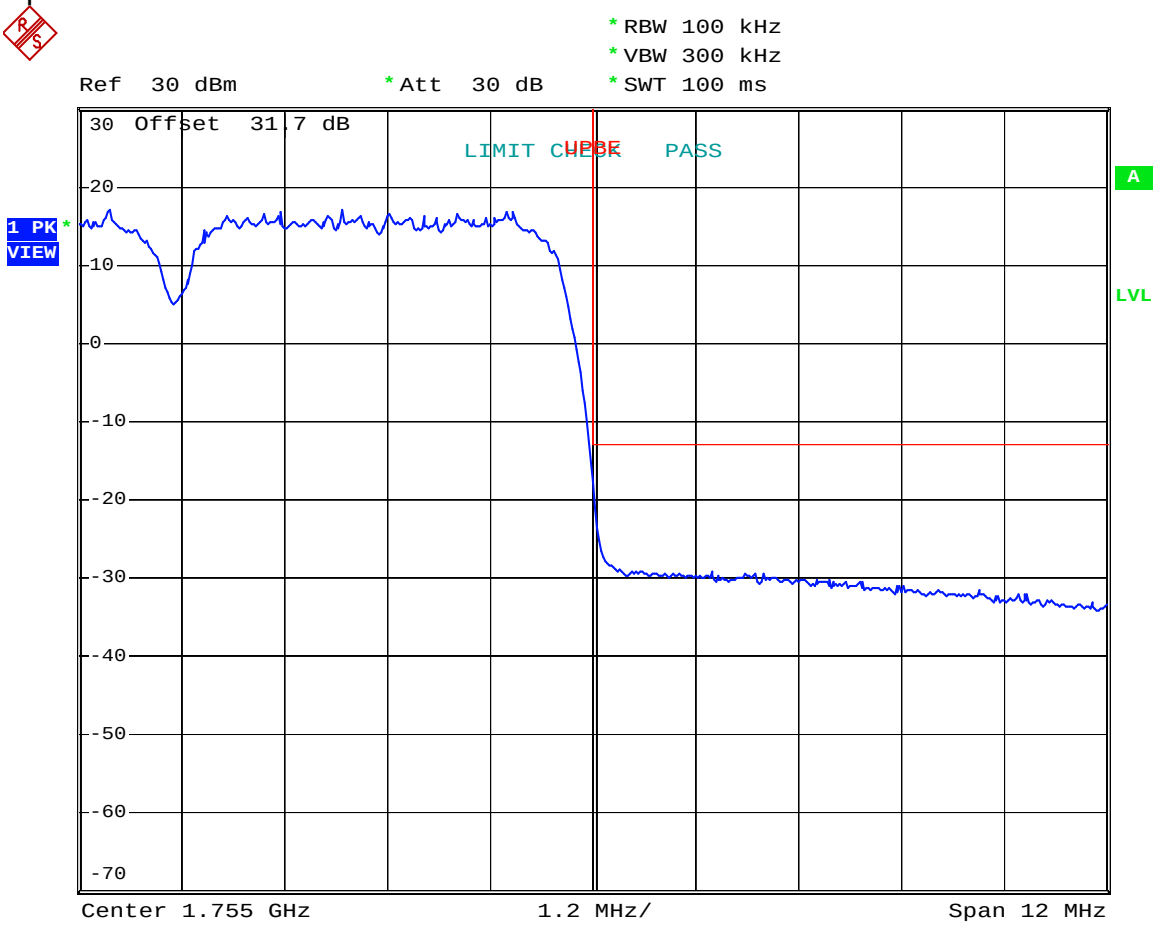
WCDMA/UMTS
LOW BANDEDGE
Uplink




Date: 23.OCT.2008 15:14:55

**Test Data – Spurious Emissions at Antenna Terminals**

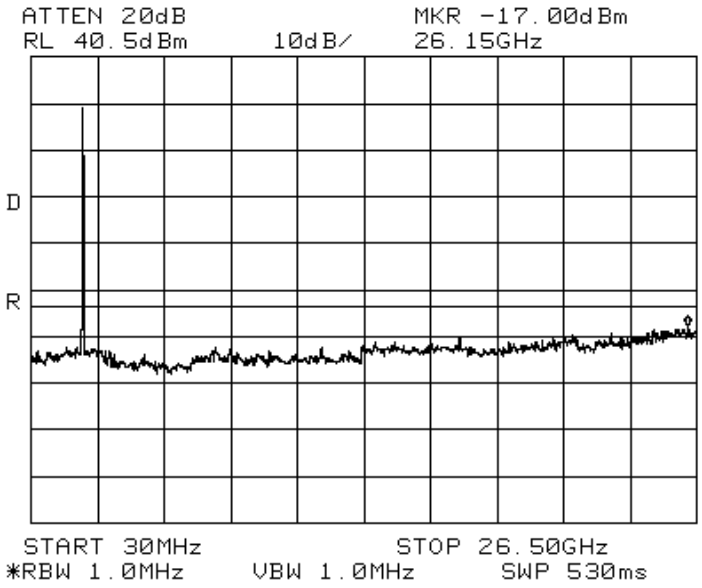
WCDMA/UMTS
HIGH BAND EDGE
Uplink



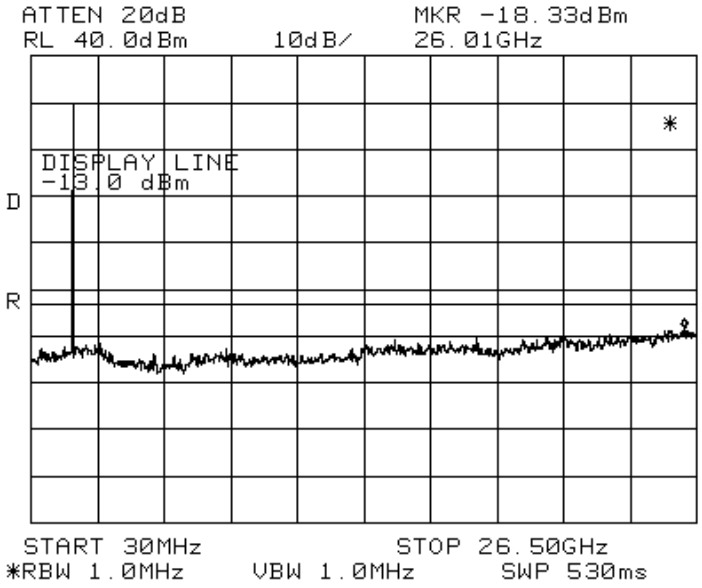

Date: 23.OCT.2008 15:13:31

**Test Data – Spurious Emissions at Antenna Terminals**

CDMA/EV-DO
SPURS
Downlink

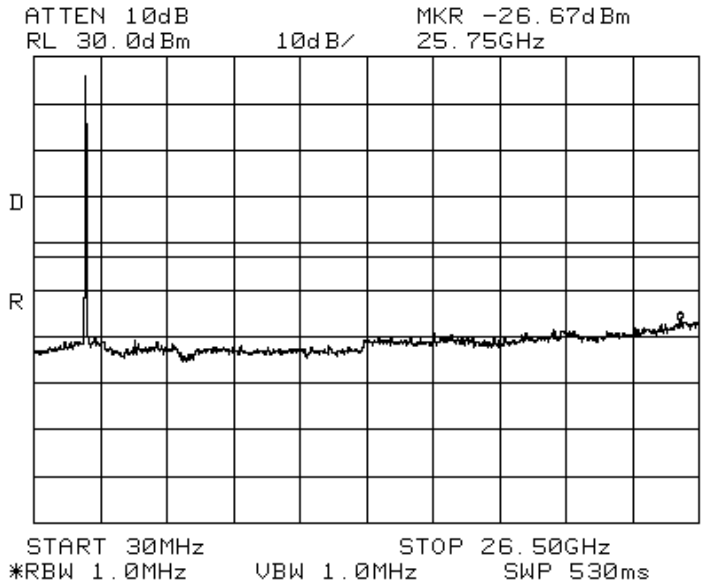



CDMA/EV-DO
SPURS
Uplink

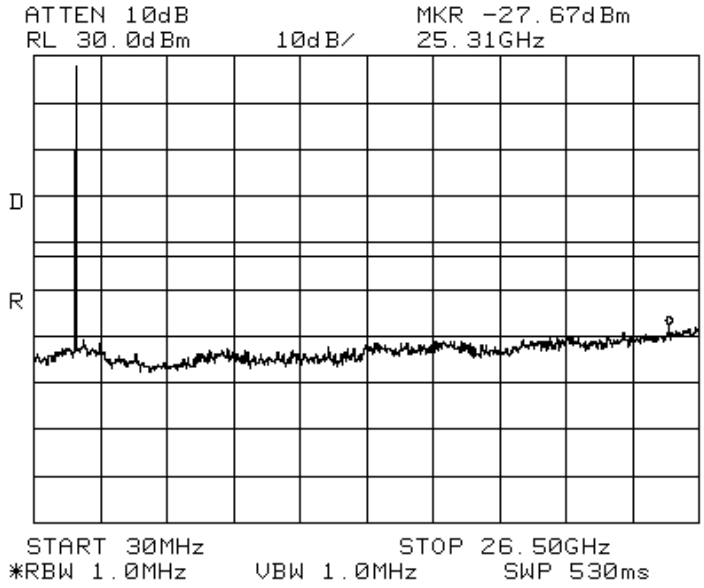


**Test Data – Spurious Emissions at Antenna Terminals**

WCDMA/UMTS
SPURS
Downlink




WCDMA/UMTS
SPURS
Uplink



## Section 6. Field Strength of Spurious

| | |
|---|---|
| NAME OF TEST: Field Strength of Spurious Emissions | PARA. NO.: 27.53 |
| TESTED BY: David Light | DATE: 23 October 2008 |

**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 |
|---|---|---|---|---|---|
| 1464 | Spectrum analyzer | Hewlett Packard 8563E | 3551A04428 | 01/24/07 | 01/24/09 |
| 1663 | Spectrum Analyzer | Rhode & Schwarz FSP3 | 100073 | 06/03/08 | 06/03/09 |
| 1604 | ATTENUATOR | NARDA 776B-20 | NONE | CBU | N/A |
| 1065 | ATTENUATOR | NARDA 776B-10 | NONE | CBU | N/A |
| 1082 | CABLE 2m | Astrolab 32027-2-29094-72TC | N/A | CBU | N/A |
| 1484 | Cable | Storm PR90-010-072 | N/A | 05/07/08 | 05/07/09 |
| 1485 | Cable | Storm PR90-010-216 | N/A | 05/07/08 | 05/07/09 |
| 993 | Horn antenna | A.H. Systems SAS-200/571 | XXX | 08/31/07 | 08/30/08 |
| 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 |
| 1763 | Bilog Antenna | Schaffner CBL 6111D | 22926 | 10/25/08 | 10/25/09 |

# 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 log10 (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: 50 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.

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

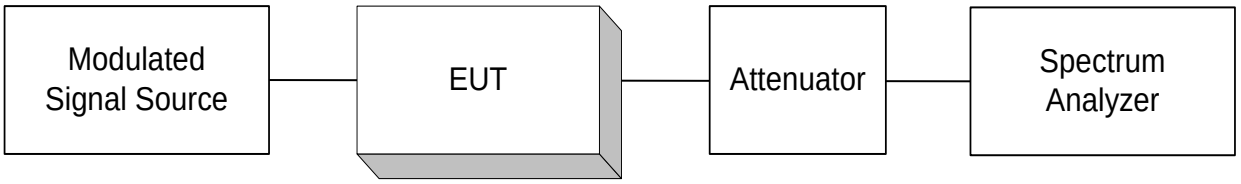
**Minimum Standard:** Para. No.27.53(g) For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.

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

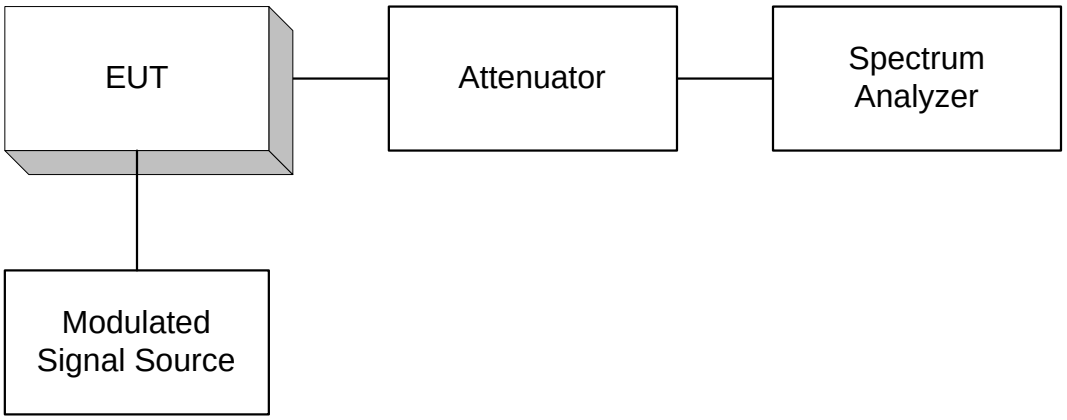
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna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

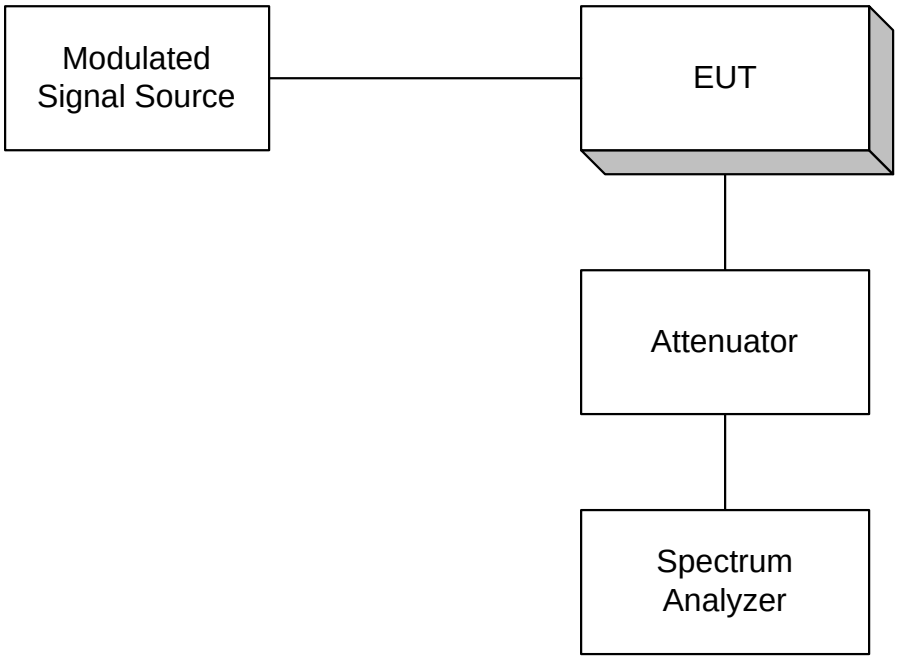
**Para. No. 2.985 - R.F. Power Output**

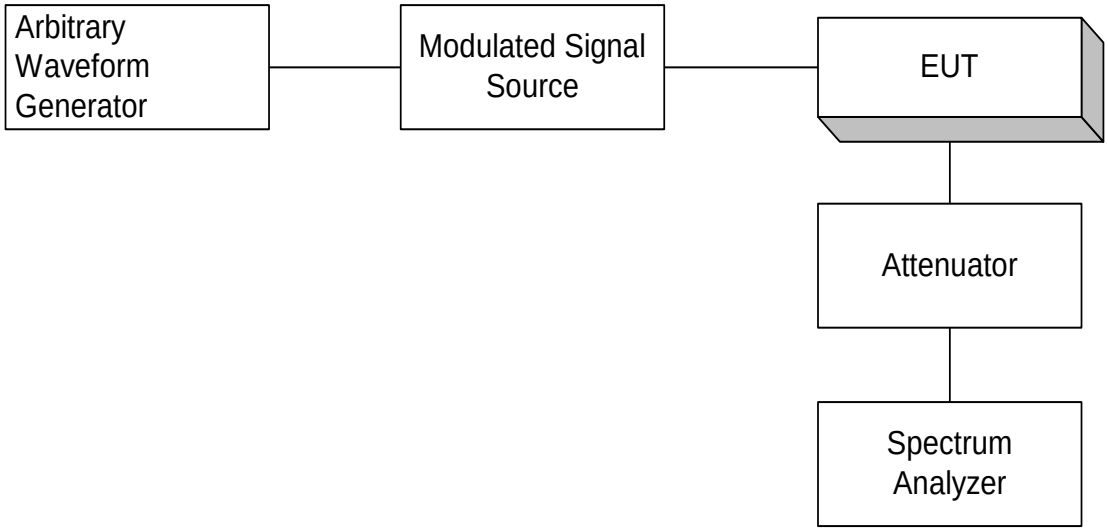



**Para. No. 2.989 - Occupied Bandwidth**



**Para. No. 2.991 Spurious Emissions at Antenna Terminals**



**Para. No. 2.993 - Field Strength of Spurious Radiation**