



Nemko Test Report: 23827RUS2

Applicant: Andrew Corporation
108 Rand Park Drive
Garner, NC 27529
USA

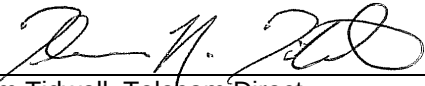
**Equipment Under Test:
(E.U.T.)** ION-M85P/19P

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: 11 December, 2008

APPROVED BY: 
Tom Tidwell, Telecom Direct

DATE: 12 December, 2008

Number of Pages: 38

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EQUIPMENT: ION-M85P/19P

Section 1. Summary of Test Results

Manufacturer Andrew Corporation

Model No.: ION-M85P/19P

Serial No.: 98

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.



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	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 performed because the device under test uses a common oscillator for down-conversion of the signal to an intermediate frequency and up-conversion of the signal from IF to the transmit frequency. The output frequency is the same as the input frequency.

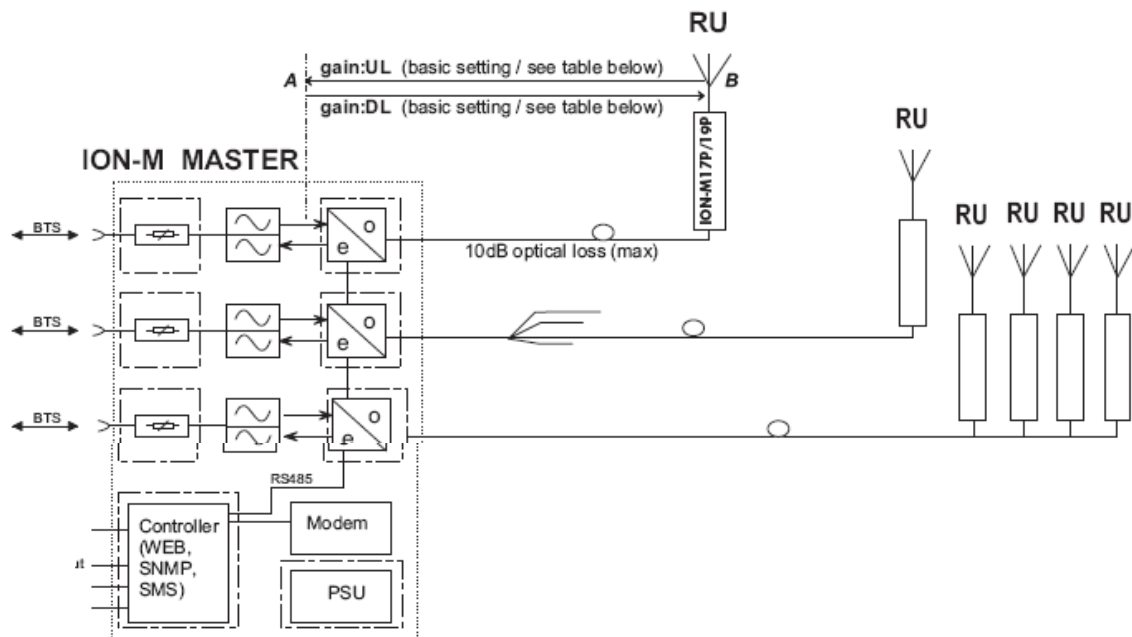
Section 2. General Equipment Specification

Supply Voltage Input:	120 Vac		
Frequency Bands: Downlink:	1930 to 1995 MHz		
Frequency Bands: Uplink:	NA		
Type of Modulation and Designator:	CDMA (F9W) ☒	GSM (GXW) ☒	W-CDMA (F9W) ☒
			EDGE (G7W) ☒
System Gain:	47 dB		
Output Impedance:	50 ohms		
RF Output (Rated): Downlink	$\frac{20}{43} \begin{matrix} \text{W} \\ \text{dBm} \end{matrix}$		
RF Output (Rated): Uplink	$\frac{\text{NA}}{\text{NA}} \begin{matrix} \text{W} \\ \text{dBm} \end{matrix}$		
Frequency Translation:	F1-F1 ☒	F1-F2 ☐	N/A ☐
Band Selection:	Software ☒	Duplexer ☐	Fullband ☐

Description of EUT

Andrew ION-M85P/19P is a multiband multi-operator remote unit with various extension units. It is used in conjunction with a master unit in the ION optical distribution system. This system transports multiple frequency bands simultaneously

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 24.232
TESTED BY: David Light	DATE: 10 December 2008

Test Results: Complies.**Measurement Data:**

Direction	Modulation	Composite Power (dBm)	RF Power (W)
Downlink	CDMA	43	20
	GSM	43	20
	EDGE	43	20
Uplink	WCDMA	42	15.8
	CDMA	NA	NA
	GSM	NA	NA
	EDGE	NA	NA
	WCDMA	NA	NA

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

Equipment Used: 1604-1064-1082-1659**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 22 °C**Relative Humidity:** 48 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 10 December 2008

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1064-1604-1082-1659

Measurement Uncertainty: 1X10⁻⁷ ppm

Temperature: 22 °C

Relative Humidity: 48 %

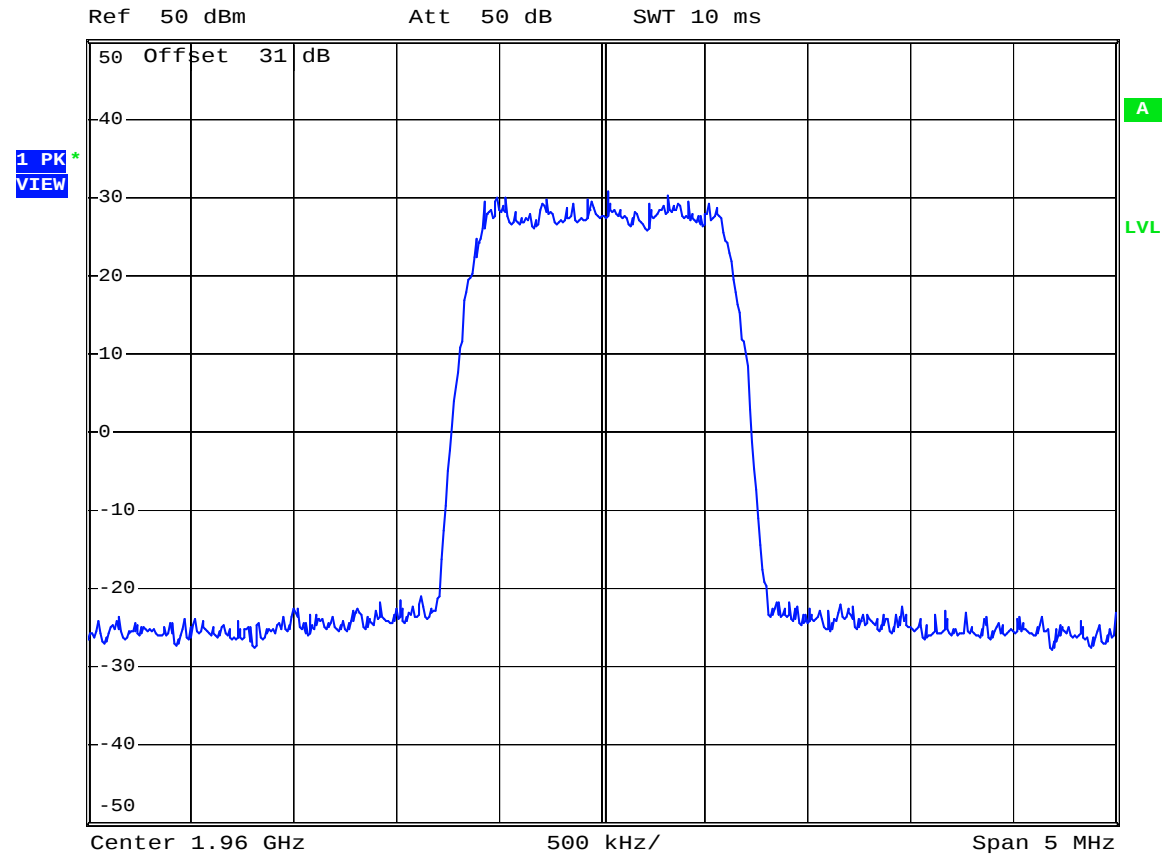
EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

Output
CDMA / EVDO



* RBW 30 kHz
VBW 100 kHz
SWT 10 ms



Date: 10.DEC.2008 08:58:54

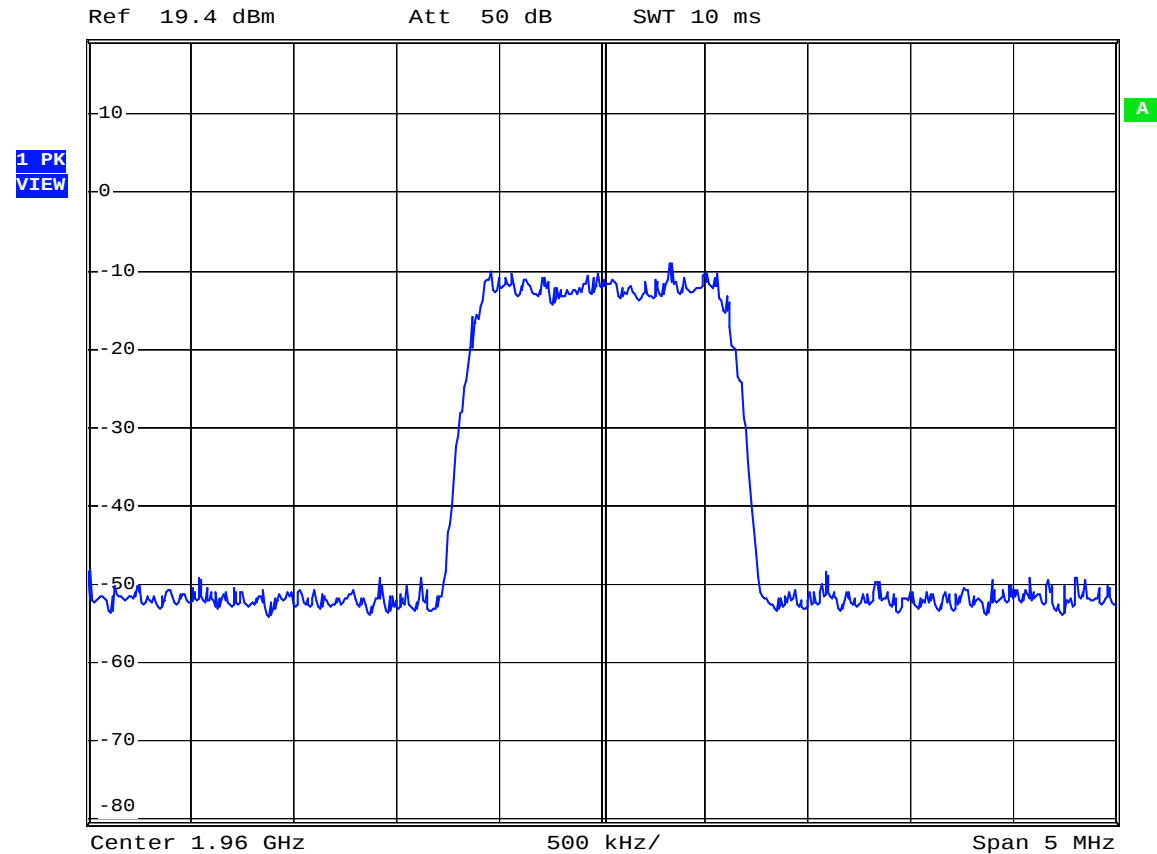
EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

Input
CDMA / EVDO



* RBW 30 kHz
VBW 100 kHz
SWT 10 ms



Date: 10.DEC.2008 11:05:13

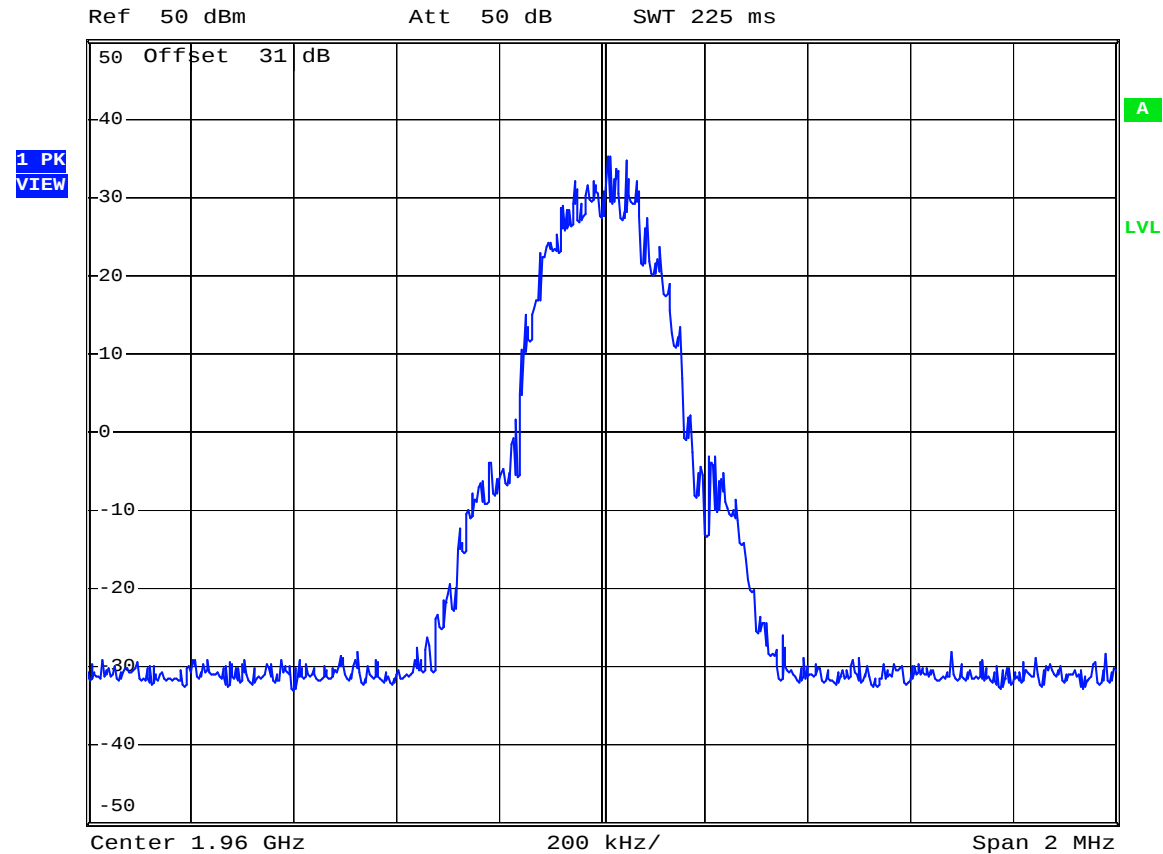
EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

GSM
Output



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 09:06:44

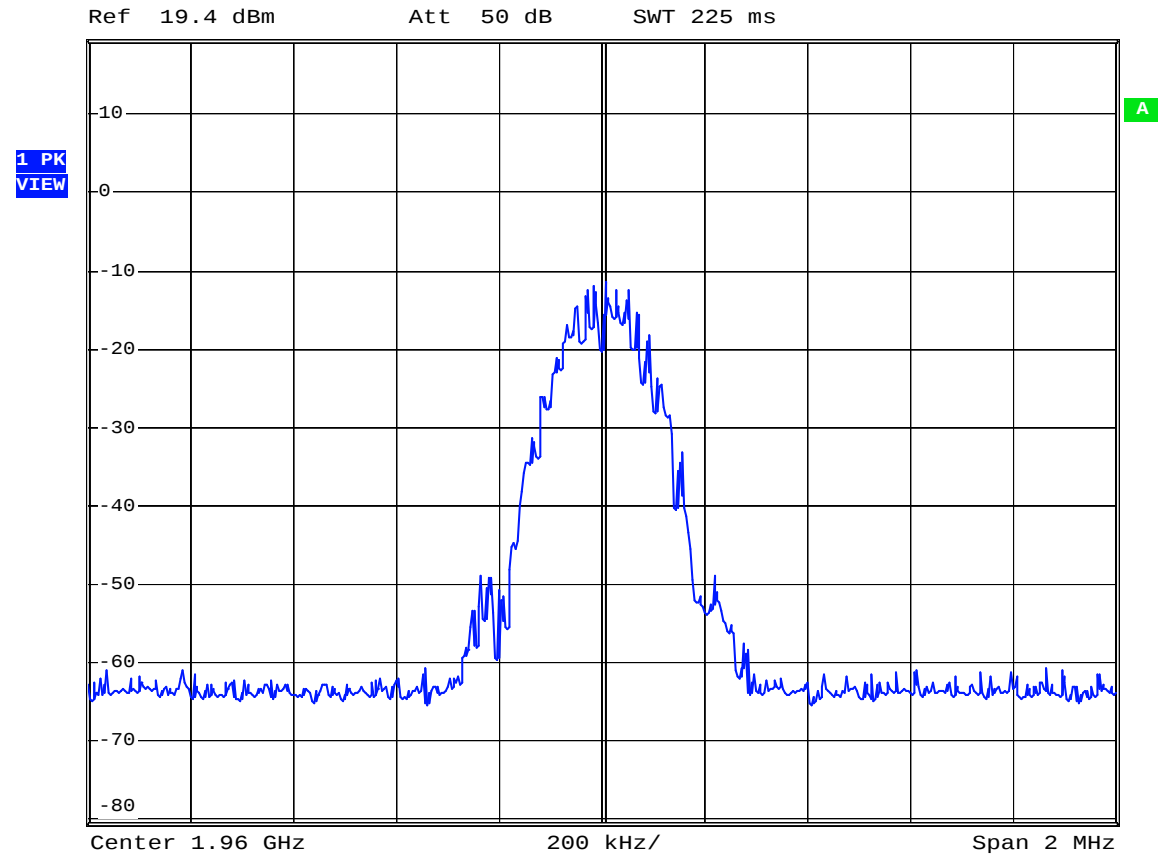
EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

GSM
Input



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 11:06:13

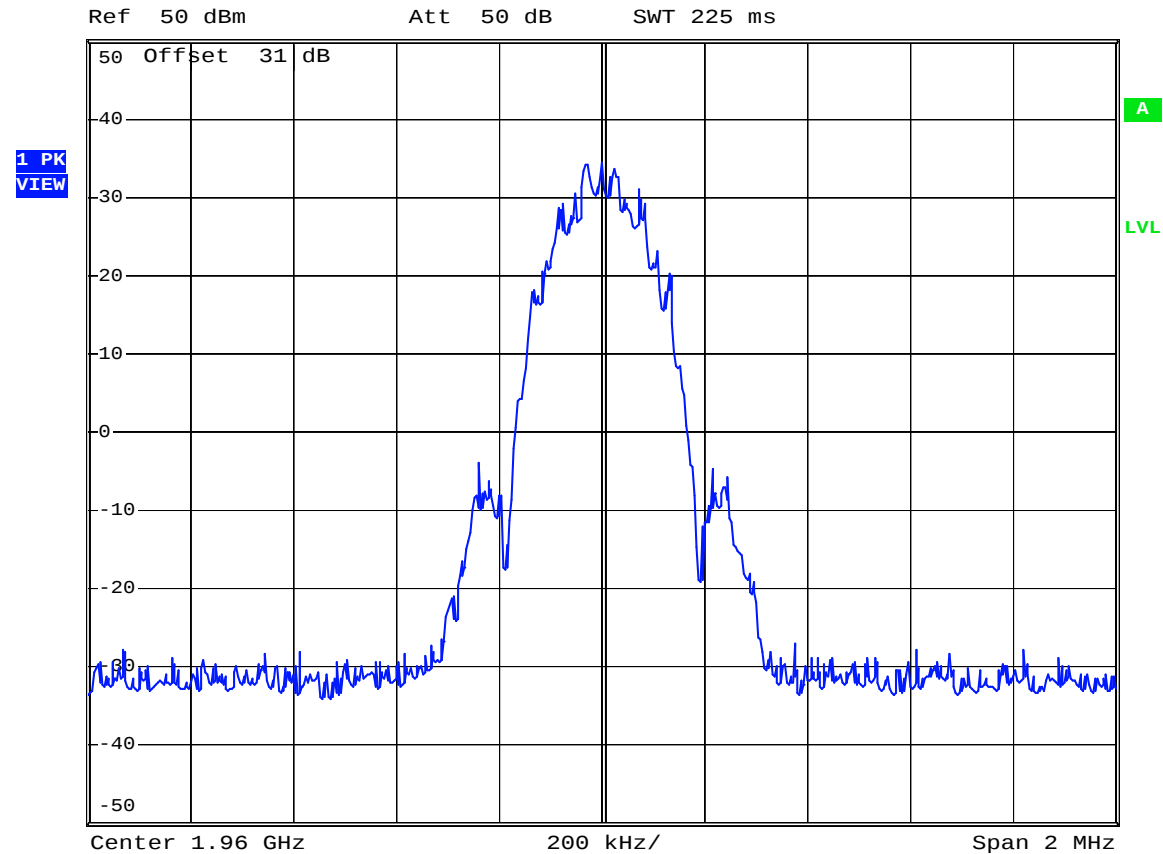
EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

EDGE
Output



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 09:14:18

EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

EDGE
Input



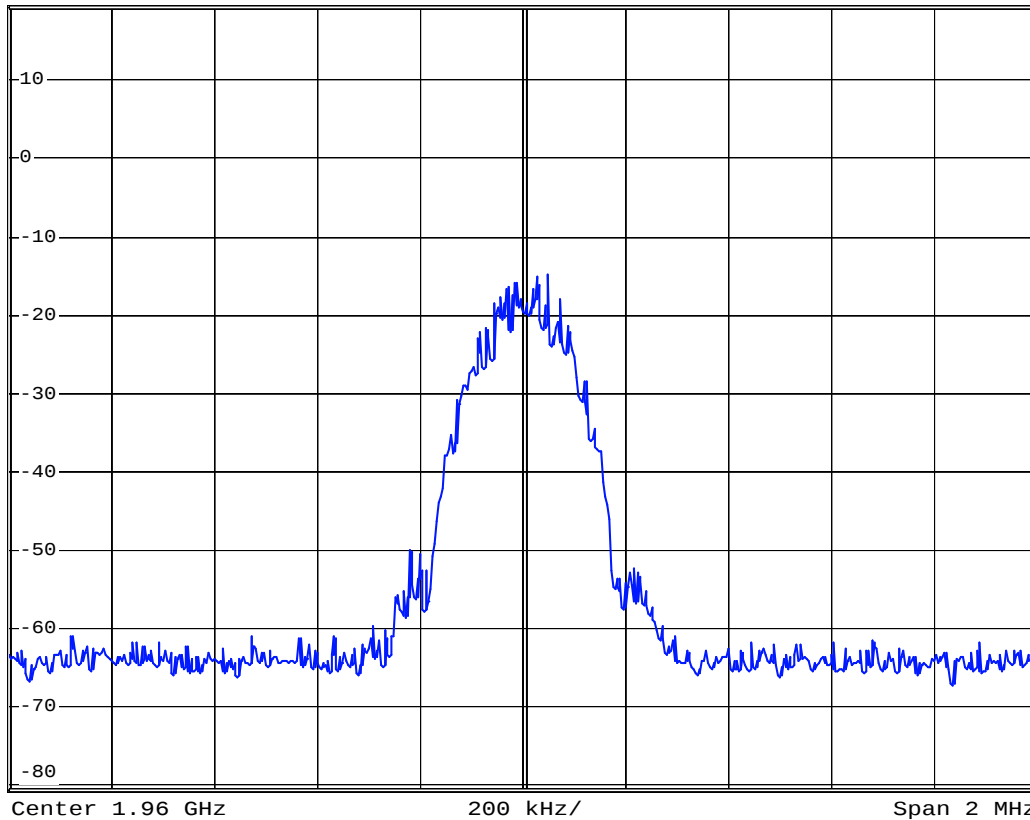
* RBW 3 kHz
VBW 10 kHz
SWT 225 ms

Ref 19.4 dBm

Att 50 dB

SWT 225 ms

1 PK
VIEW



Date: 10.DEC.2008 11:06:43

EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

W-CDMA

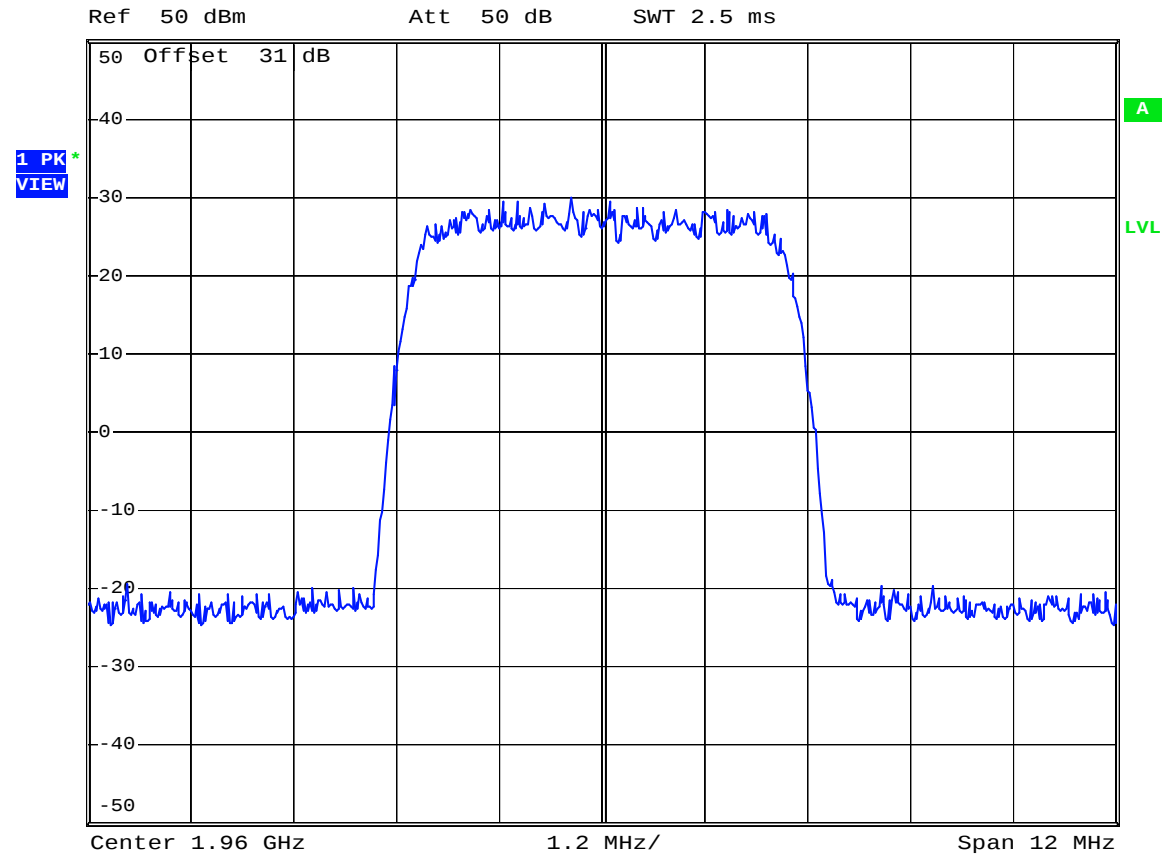
Output



* RBW 100 kHz

VBW 300 kHz

SWT 2.5 ms



Date: 10.DEC.2008 09:22:44

EQUIPMENT: ION-M85P/19P

Test Data – Occupied Bandwidth

W-CDMA

Input



* RBW 100 kHz

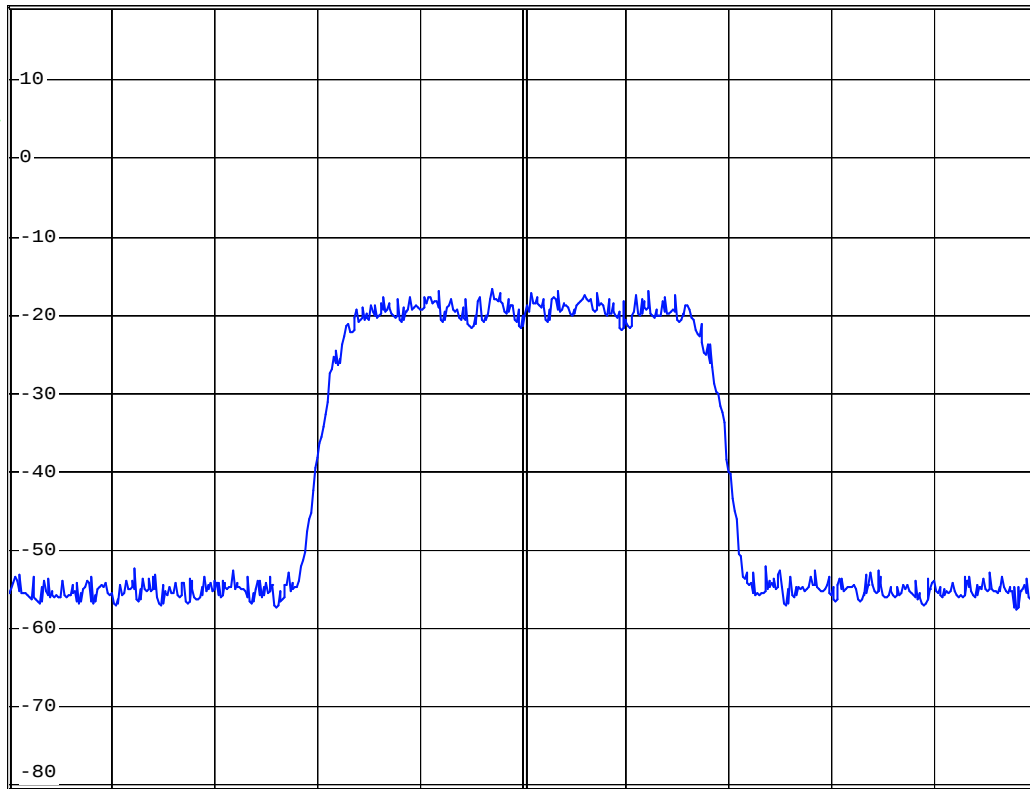
VBW 300 kHz

SWT 2.5 ms

Ref 19.4 dBm

Att 50 dB

1 PK
VIEW



Center 1.96 GHz

1.2 MHz/

Span 12 MHz

Date: 10.DEC.2008 11:07:50

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 10 December 2008

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1064-1604-1082-1659-1464

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

EQUIPMENT: ION-M85P/19P

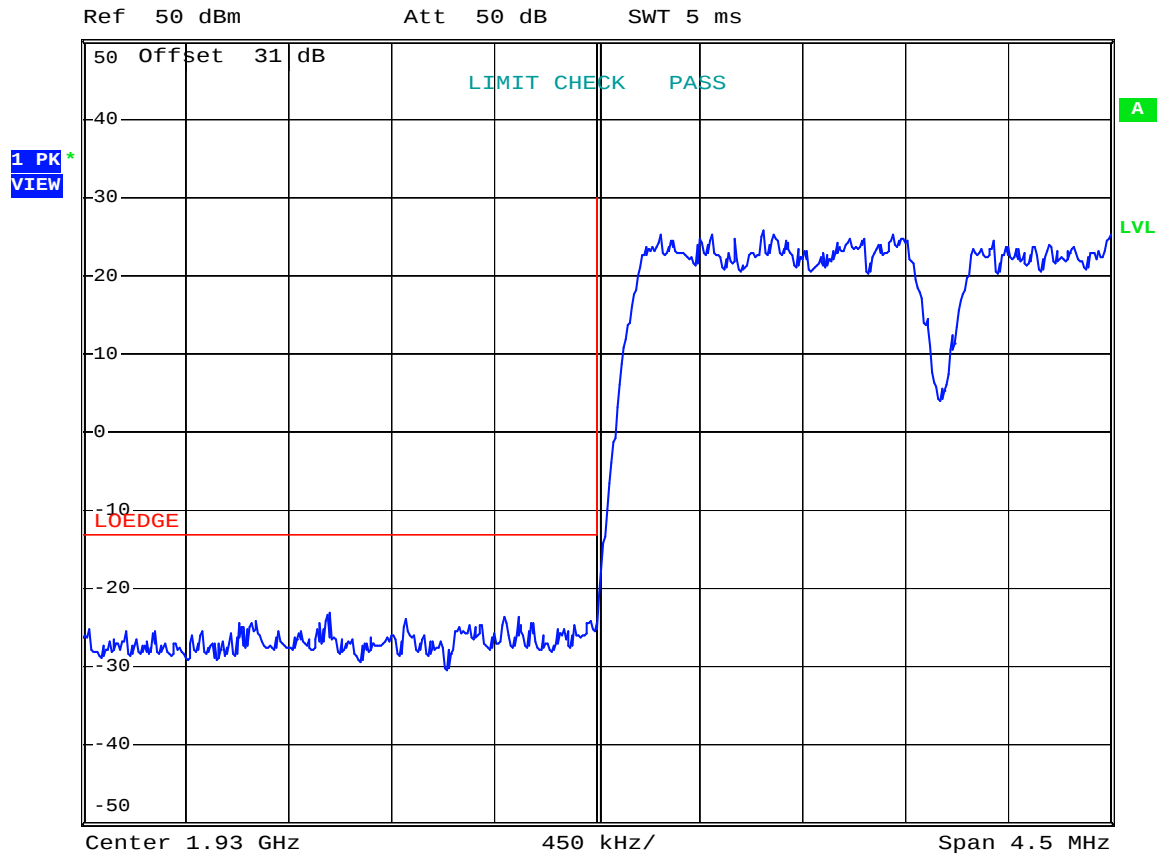
Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO

LOW BANDEDGE INTERMOD



* RBW 30 kHz
VBW 100 kHz
SWT 5 ms



Date: 10.DEC.2008 08:56:04

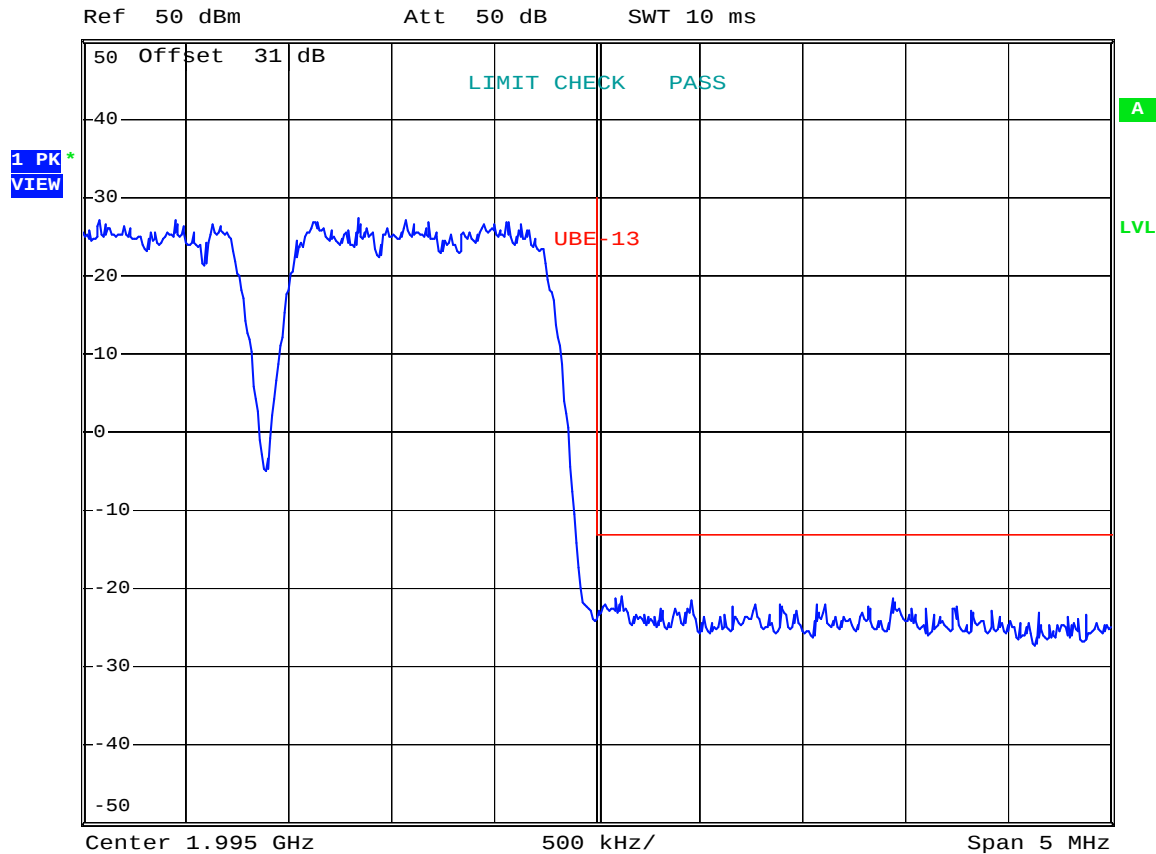
EQUIPMENT: ION-M85P/19P

Test Data – Spurious Emissions at Antenna Terminals

CDMA/EV-DO
HIGH BAND EDGE



* RBW 30 kHz
VBW 100 kHz
SWT 10 ms



Date: 10.DEC.2008 08:57:44

EQUIPMENT: ION-M85P/19P

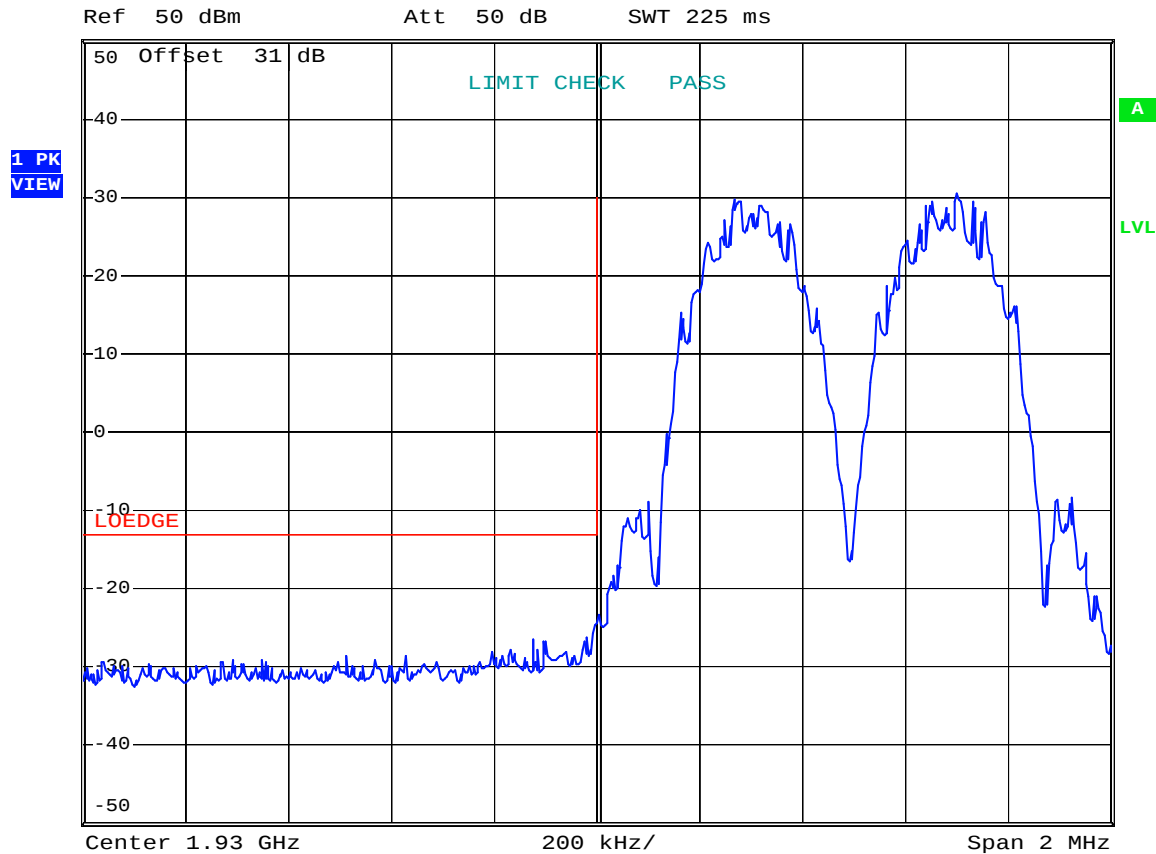
Test Data – Spurious Emissions at Antenna Terminals

EDGE

LOW BANDEDGE INTERMOD



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 09:12:13

EQUIPMENT: ION-M85P/19P

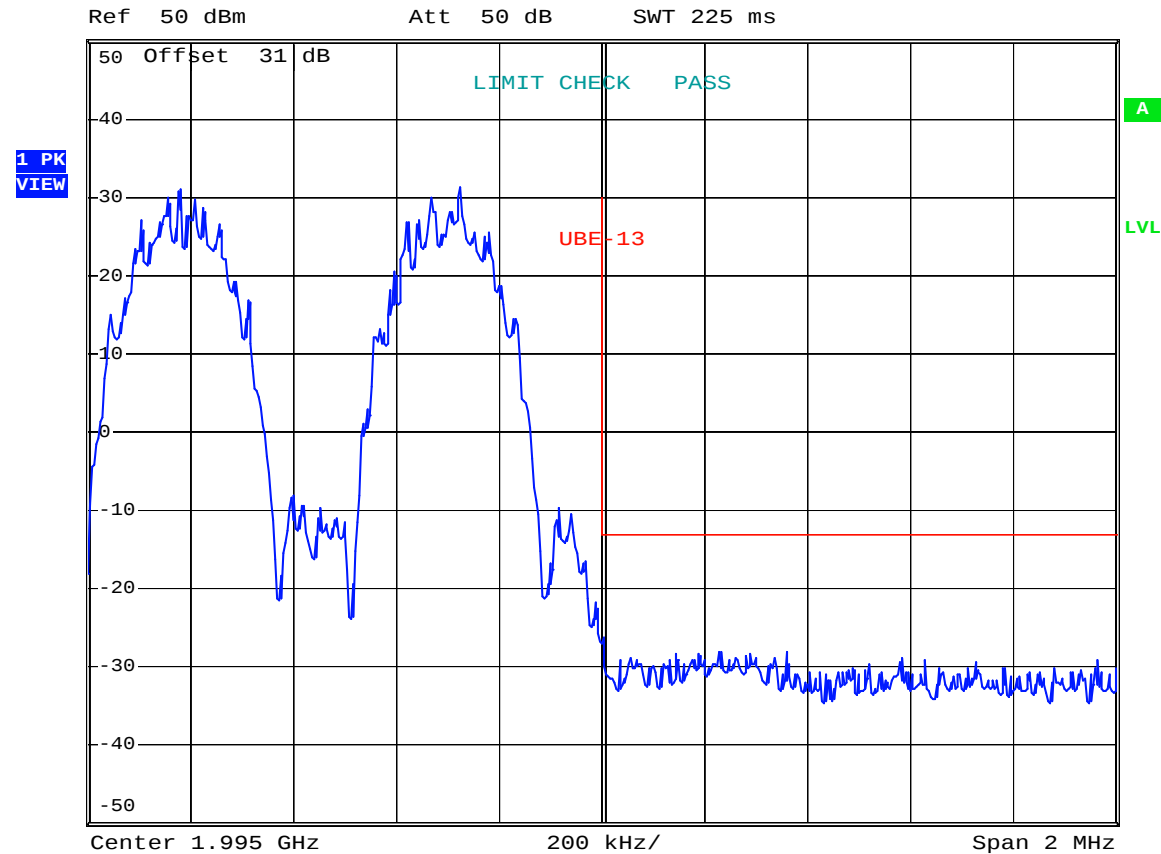
Test Data – Spurious Emissions at Antenna Terminals

EDGE

HIGH BAND EDGE



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 09:13:22

EQUIPMENT: ION-M85P/19P

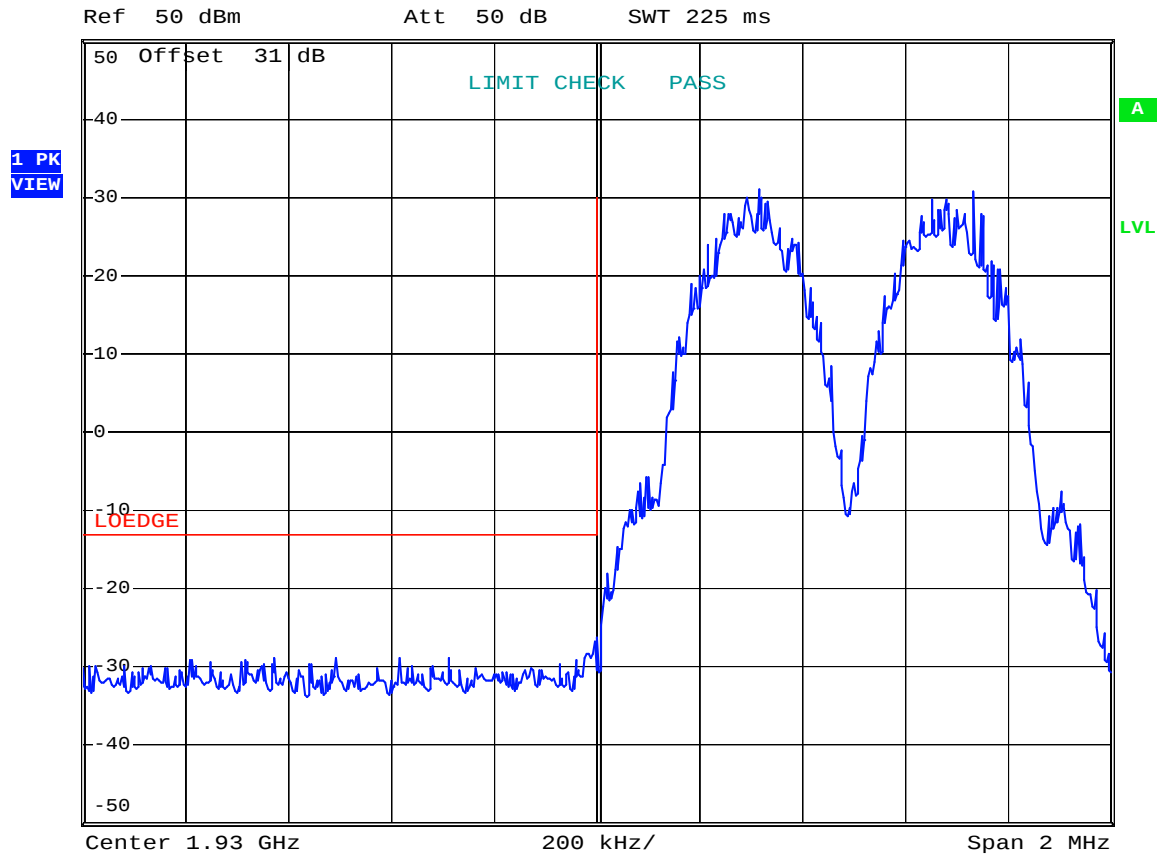
Test Data – Spurious Emissions at Antenna Terminals

GSM

LOW BANDEDGE INTERMOD



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 09:04:03

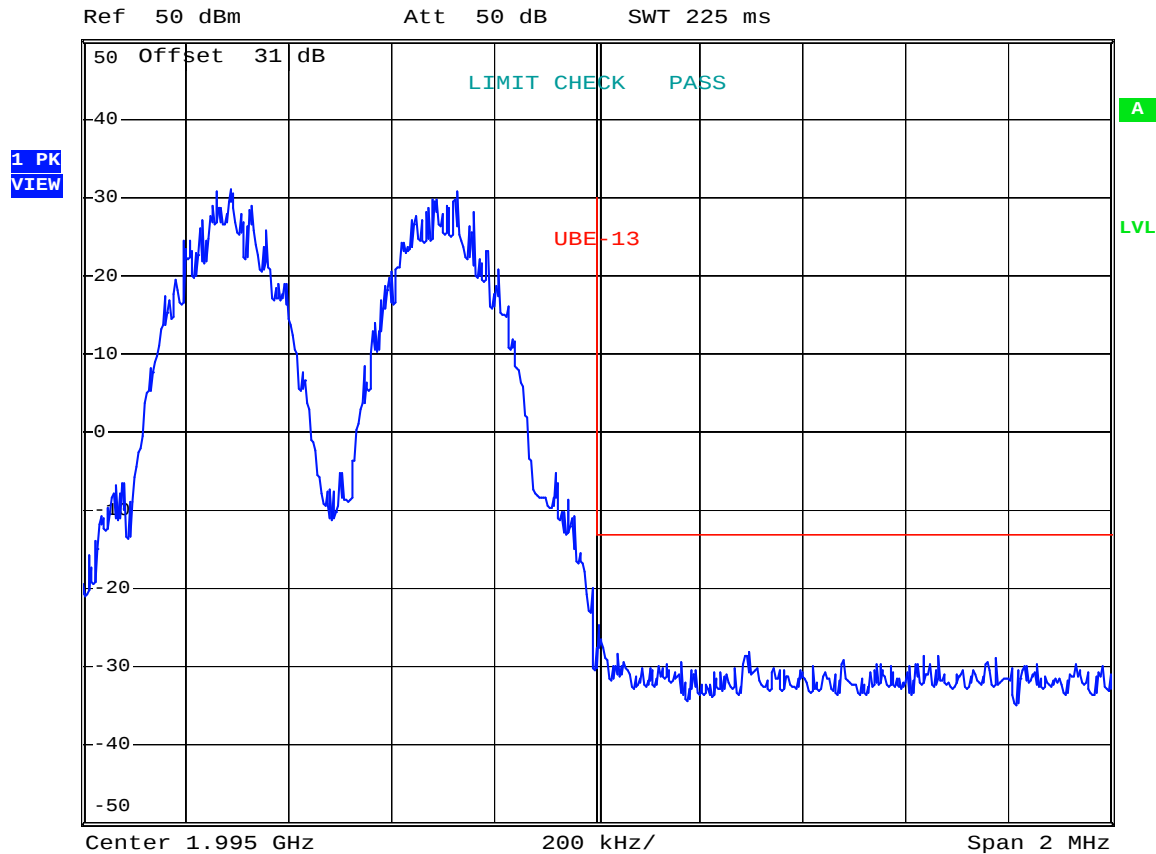
EQUIPMENT: ION-M85P/19P

Test Data – Spurious Emissions at Antenna Terminals

GSM
HIGH BAND EDGE



* RBW 3 kHz
VBW 10 kHz
SWT 225 ms



Date: 10.DEC.2008 09:05:05

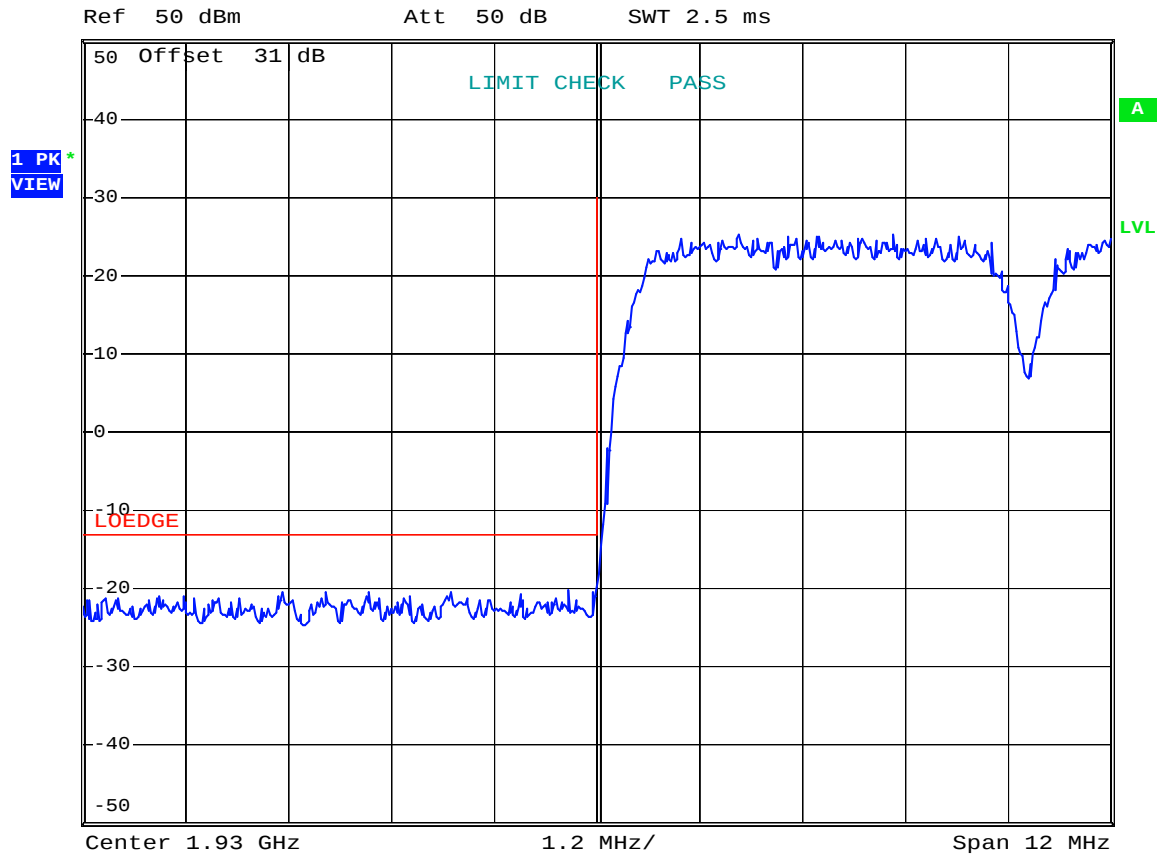
EQUIPMENT: ION-M85P/19P

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/HSDPA
LOW BANDEDGE INTERMOD



* RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms



Date: 10.DEC.2008 09:20:29

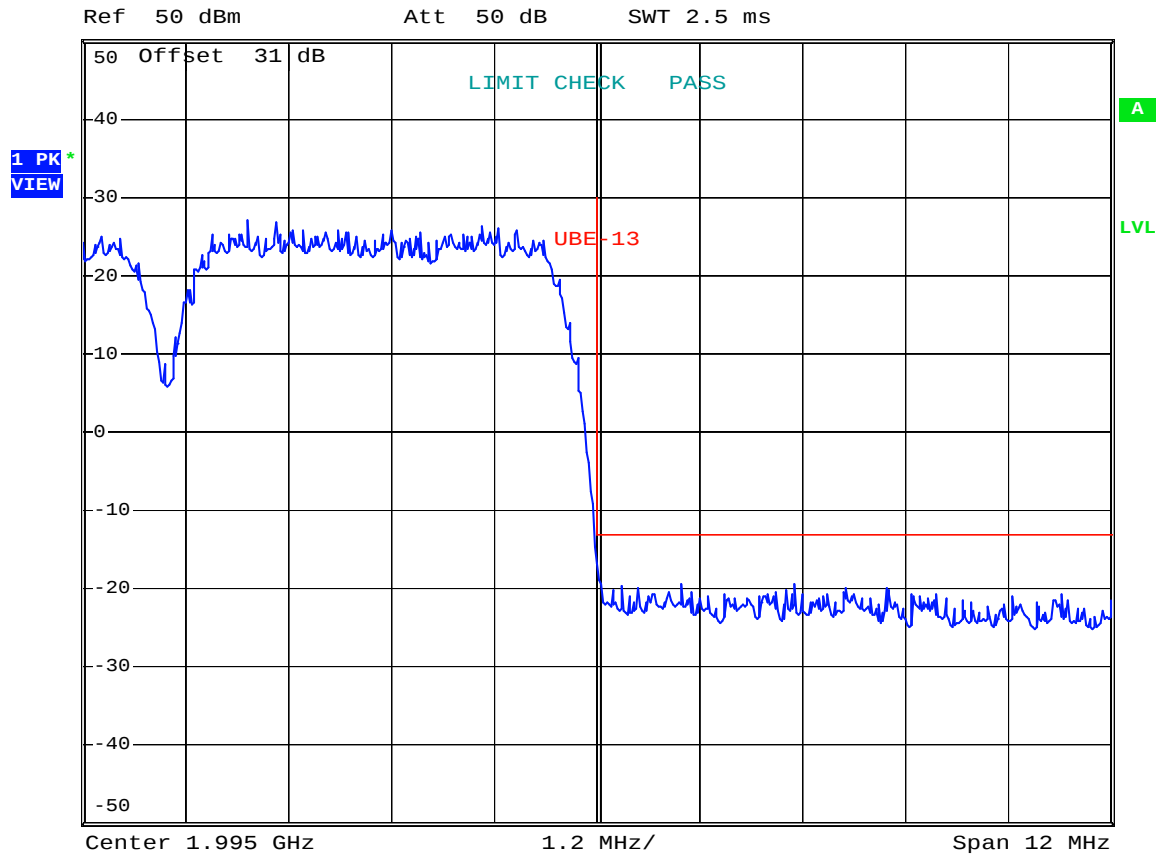
EQUIPMENT: ION-M85P/19P

Test Data – Spurious Emissions at Antenna Terminals

WCDMA/HSDPA
HIGH BAND EDGE



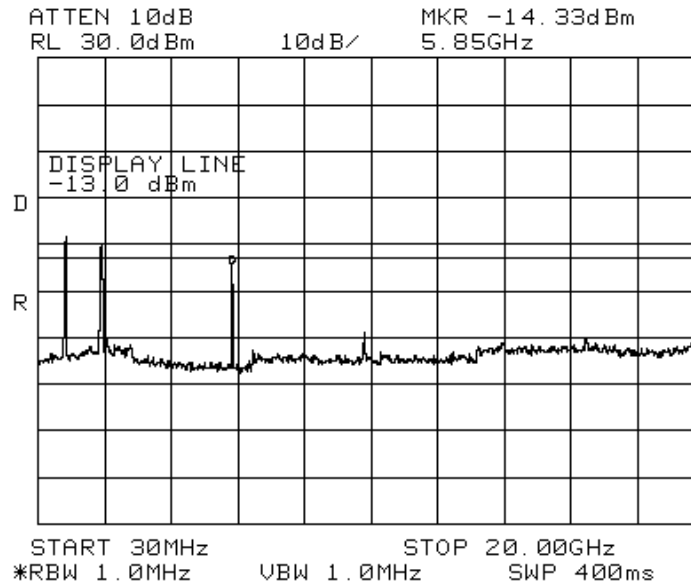
* RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms



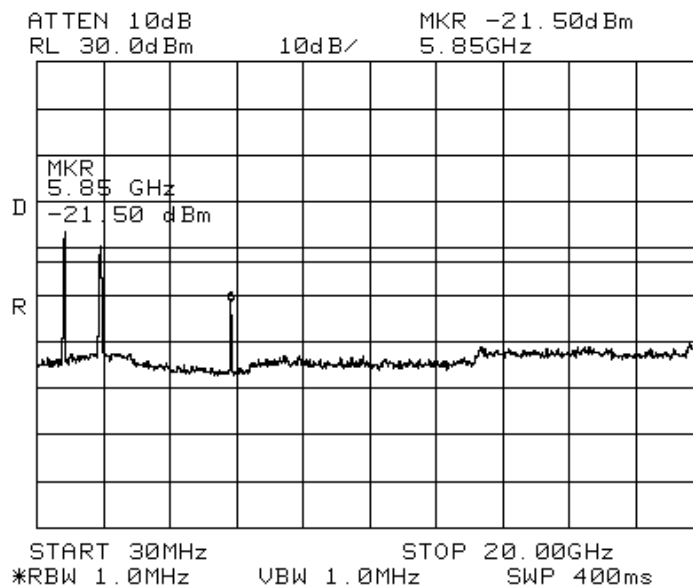
Date: 10.DEC.2008 09:21:51

EQUIPMENT: ION-M85P/19P**Test Data – Spurious Emissions at Antenna Terminals**

CDMA/EV-DO



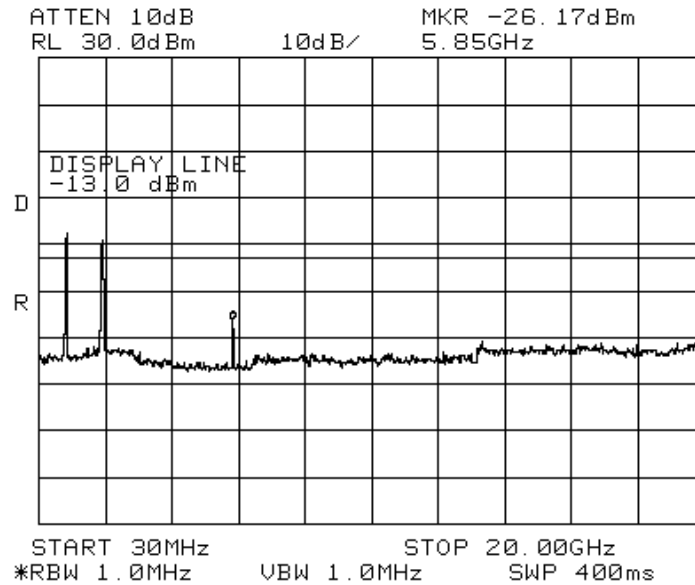
EDGE



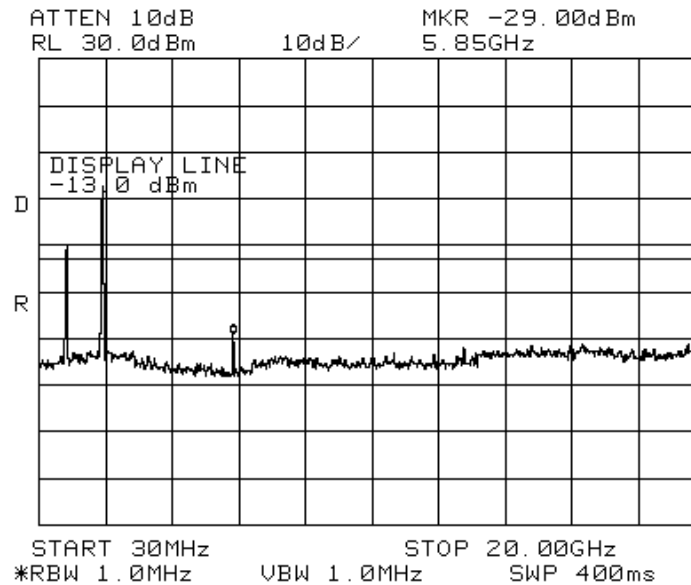
EQUIPMENT: ION-M85P/19P

Test Data – Spurious Emissions at Antenna Terminals

GSM



WCDMA/HSDPA
SPURS



Carriers notched out.

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 11 December 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.**Analyzer Settings:** RBW = VBW = 1 MHz / Peak detector**Equipment Used:** 1464-1484-1485-1016-993-791-1763**Measurement Uncertainty:** +/-1.7 dB**Temperature:** 22 °C**Relative Humidity:** 48 %

EQUIPMENT: ION-M85P/19P**Section 7. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1065	ATTENUATOR	NARDA 776B-10	NONE	CBU	N/A
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1659	Spectrum Analyzer	Rhode & Schwarz FSP	973353	01/24/07	01/24/09
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09
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
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/07/08	05/07/09
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/30/09
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09
1763	Bilog Antenna	Schaffner CBL 6111D	22926	10/21/07	10/20/08

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.

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: $\geq$ 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: 100 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.: 24.238
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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.

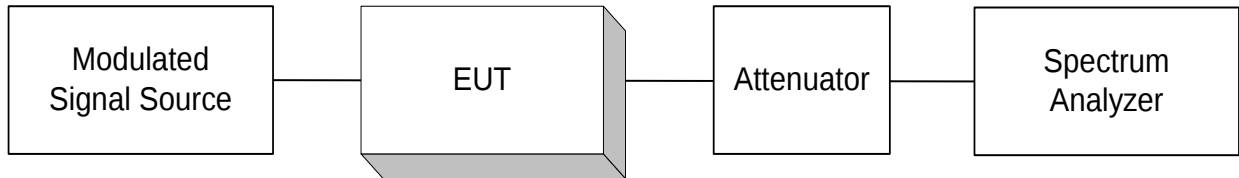
Method of Measurement TIA/EIA-603-1992

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.

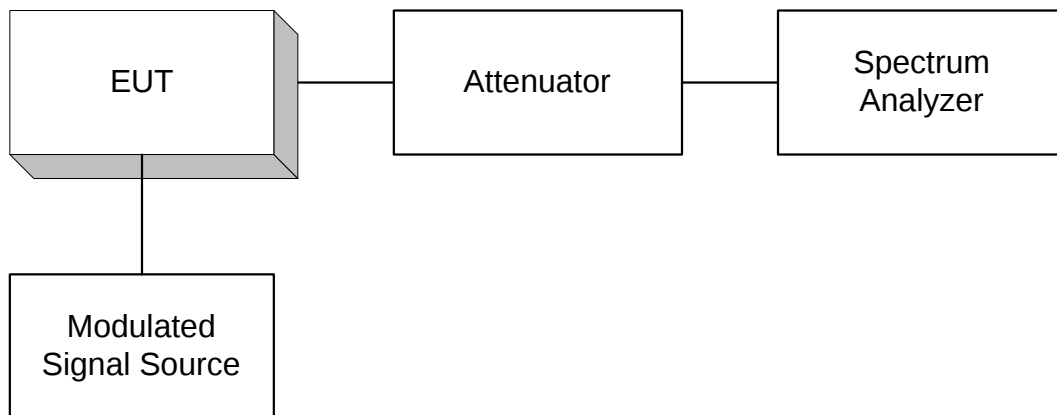
ANNEX B - TEST DIAGRAMS

EQUIPMENT: ION-M85P/19P

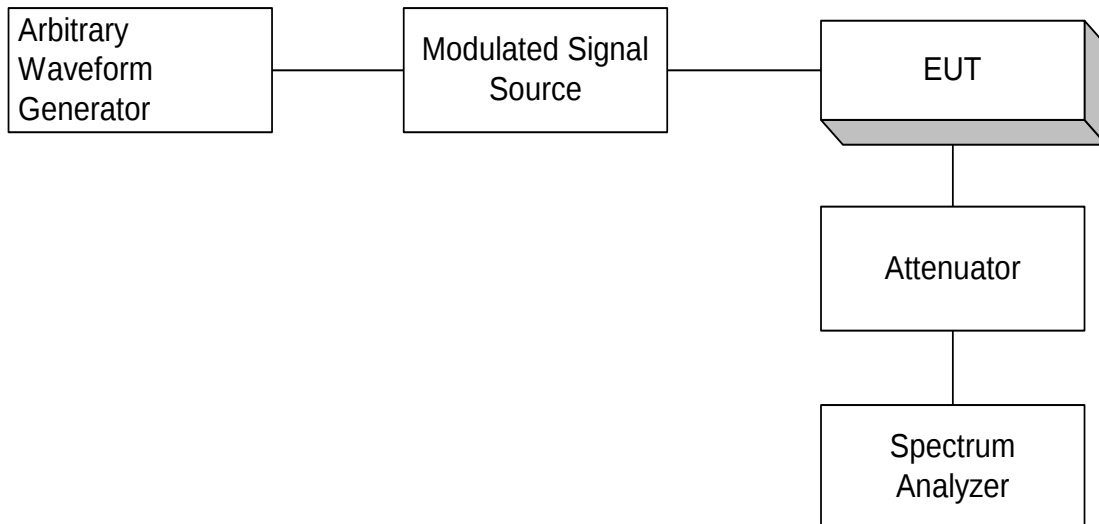
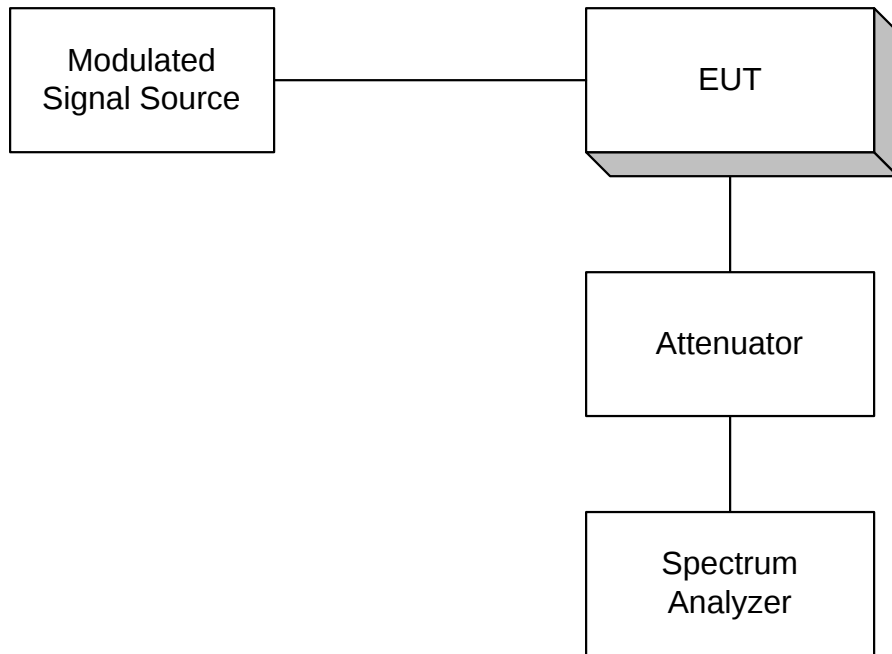
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth

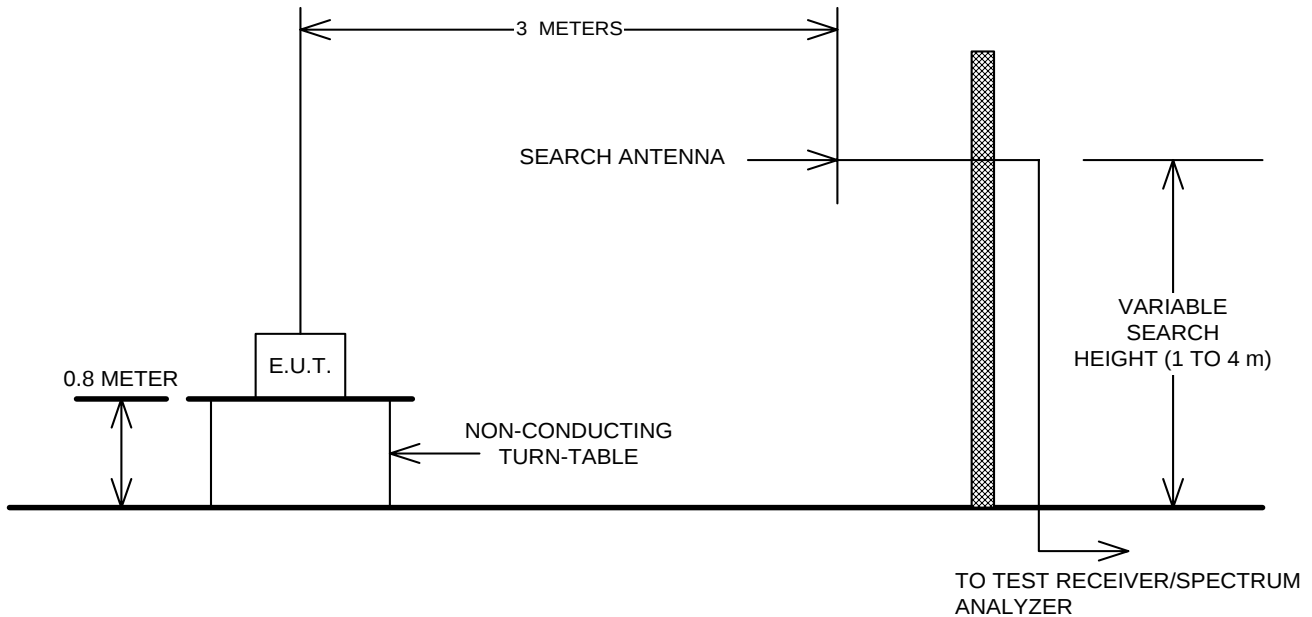


Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: ION-M85P/19P

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

