Nemko Test Report: 5057RUS2

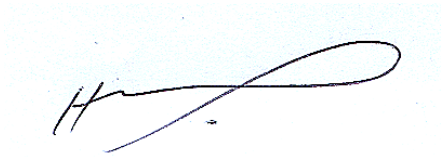
Applicant:
Andrew Corporation
108 Rand Park Drive
Garner, NC 27529
USA

Equipment Under Test: (E.U.T.) ION-M80/19P

In Accordance With: **CFR 47 Part 90, Subpart I**
Private Land Mobile Repeater

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

TESTED BY: _____ **DATE:** **29 June 2007**
David Light, Senior Wireless Engineer



APPROVED BY: _____ **DATE:** **29 June 2007**
Harry Ward, Verifier

Number of Pages: 31

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Section 1. Summary of Test Results

Manufacturer Andrew Corporation

Model No.: ION-M80/19P

Serial No.: 12

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 Part 90, Subpart I.

☒	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	90.635	Table	Complies
Occupied Bandwidth	90.210	Input/Output	Complies
Spurious Emissions at Antenna Terminals	90.210	-13 dBm	Complies
Field Strength of Spurious Emissions	90.210	-13 dBm	Complies
Frequency Stability	90.213		NA

Footnotes For N/A's:

(1) Since the E.U.T. does not contain modulation circuitry modulation testing was not performed.
(2) Since the E.U.T. is not a keyed carrier system, Transient Frequency Behavior was not performed.

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Section 2. General Equipment Specification

Transmitter

Supply Voltage Input:	120 Vac
Frequency Range:	851 to 869 MHz
Tunable Bands:	851 to 869 MHz

Type(s) of Modulation:

F3E / F1D (Analog)	D7W (QAM)	Other
☒	☒	☐

Gain:	40 dB
Output Impedance:	50 ohms
RF Power Output (rated):	10 W 40 dBm
Operator Selection of Operating Frequency:	Full band coverage

Frequency Translation:

F1-F1	F1-F2	N/A
☒	☐	☐

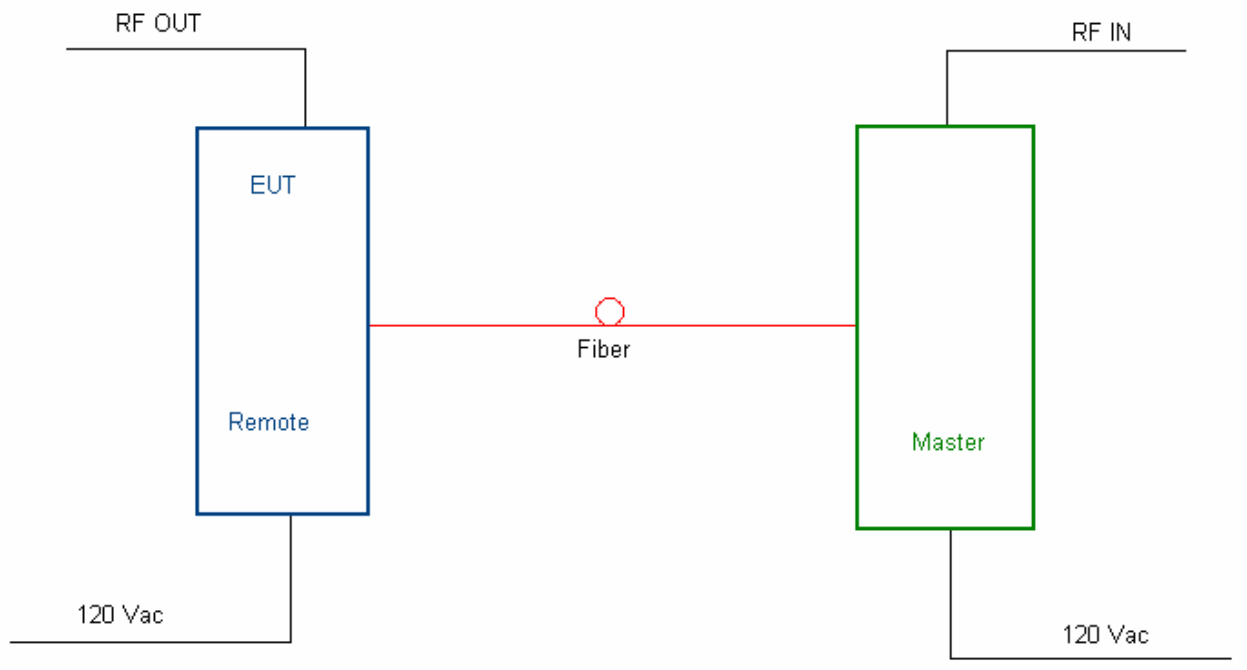
Band Selection:

Software	Duplexer Change	Fullband Coverage
☐	☐	☒

Description of EUT

Andrew ION-M80/19P 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 (800 MHz, 1900 MHz and AWS), providing a cost-efficient solution for distributing capacity from one or more base stations.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: David Light	DATE: 28 June 2007

Test Results: Complies.

Measurement Data:

Direction	Frequency (MHz)	Modulation	RF Power (dBm)	RF Power (W)
Downlink Only	851.0125	iDEN	40.13	10.3
	860.0000	iDEN	40.02	10.0
	868.9875	iDEN	40.11	10.3
	851.0125	Analog	40.03	10.1
	860.0000	Analog	40.02	10.0
	868.9875	Analog	40.02	10.0

Equipment Used: 1604-1064-1036-1082

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: David Light	DATE: 28 June 2007

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1064-1604-1036-1082

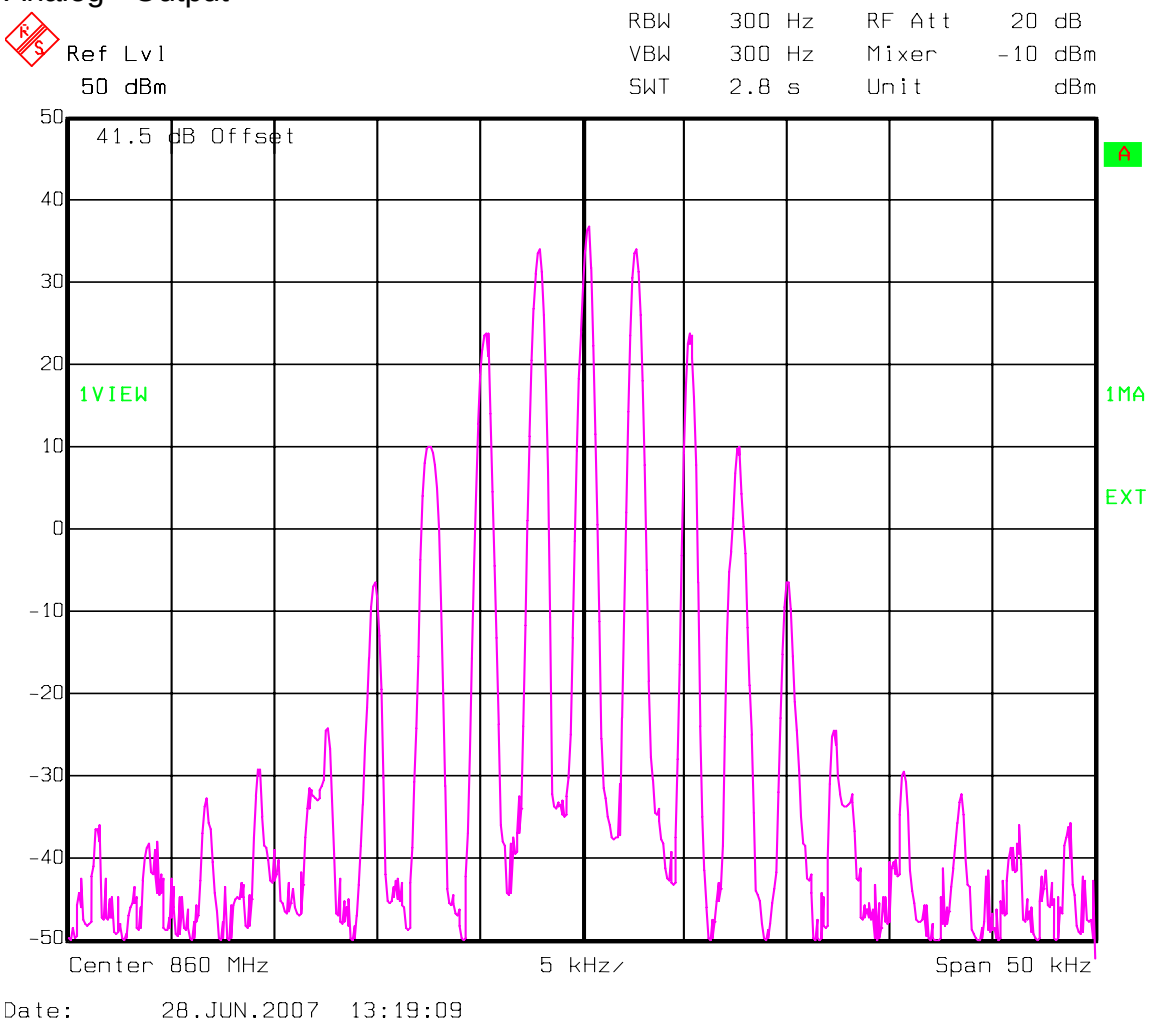
Measurement Uncertainty: $1X10^{-7}$ Ppm

Temperature: 22 °C

Relative Humidity: 48 %

Test Data – Occupied Bandwidth

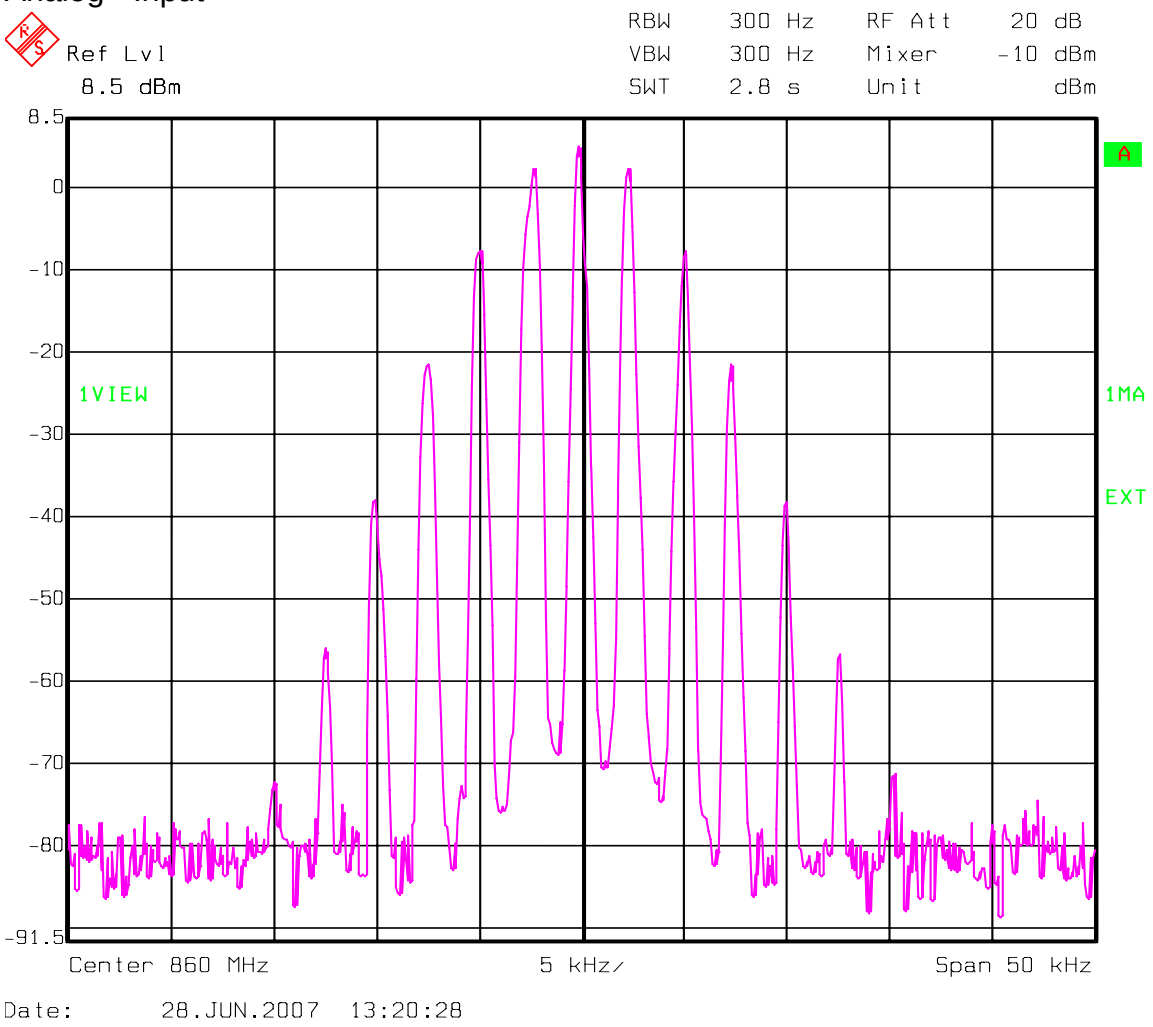
Analog - Output



2.5 kHz tone @ 3 kHz peak deviation

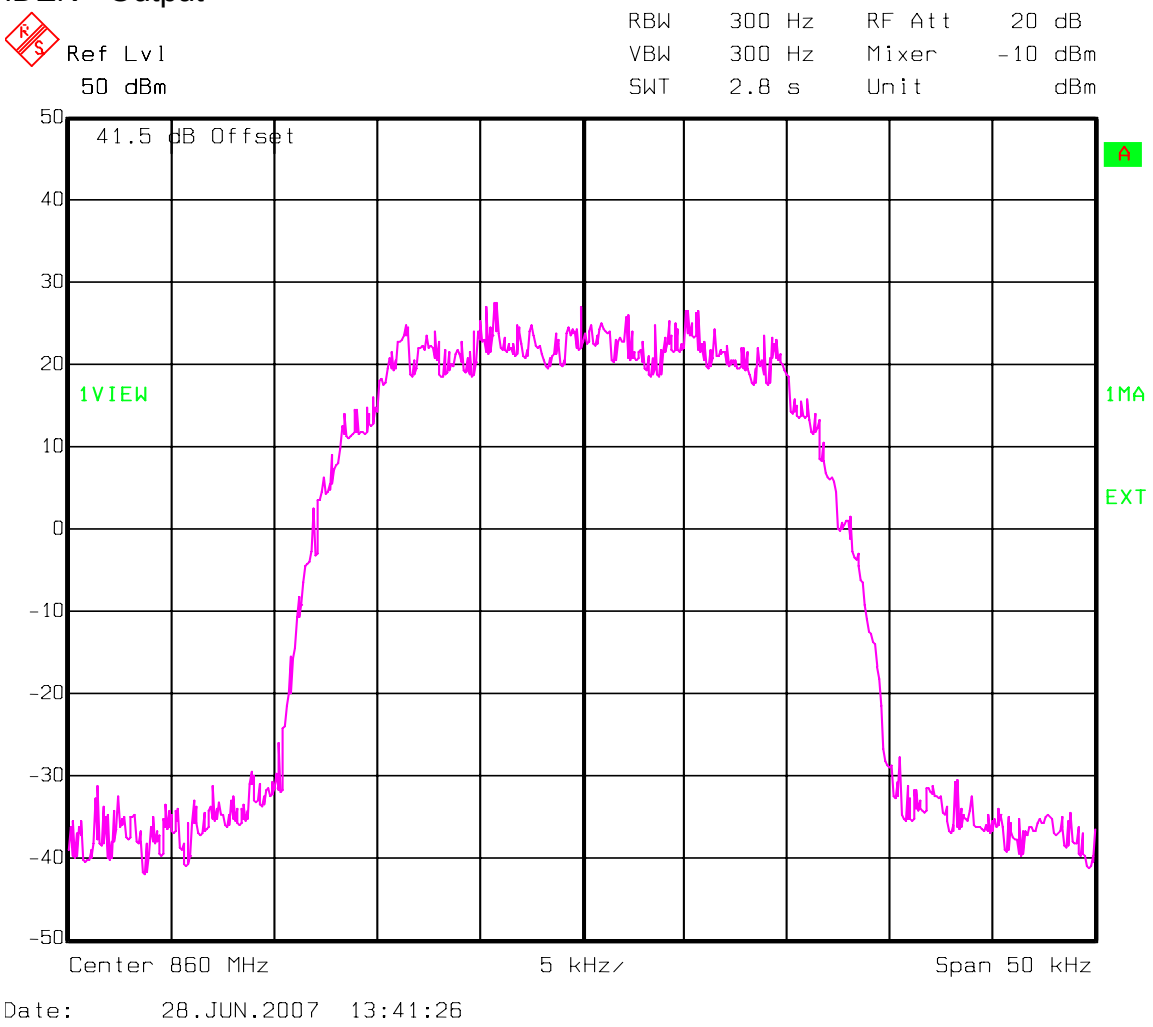
Test Data – Occupied Bandwidth

Analog - Input



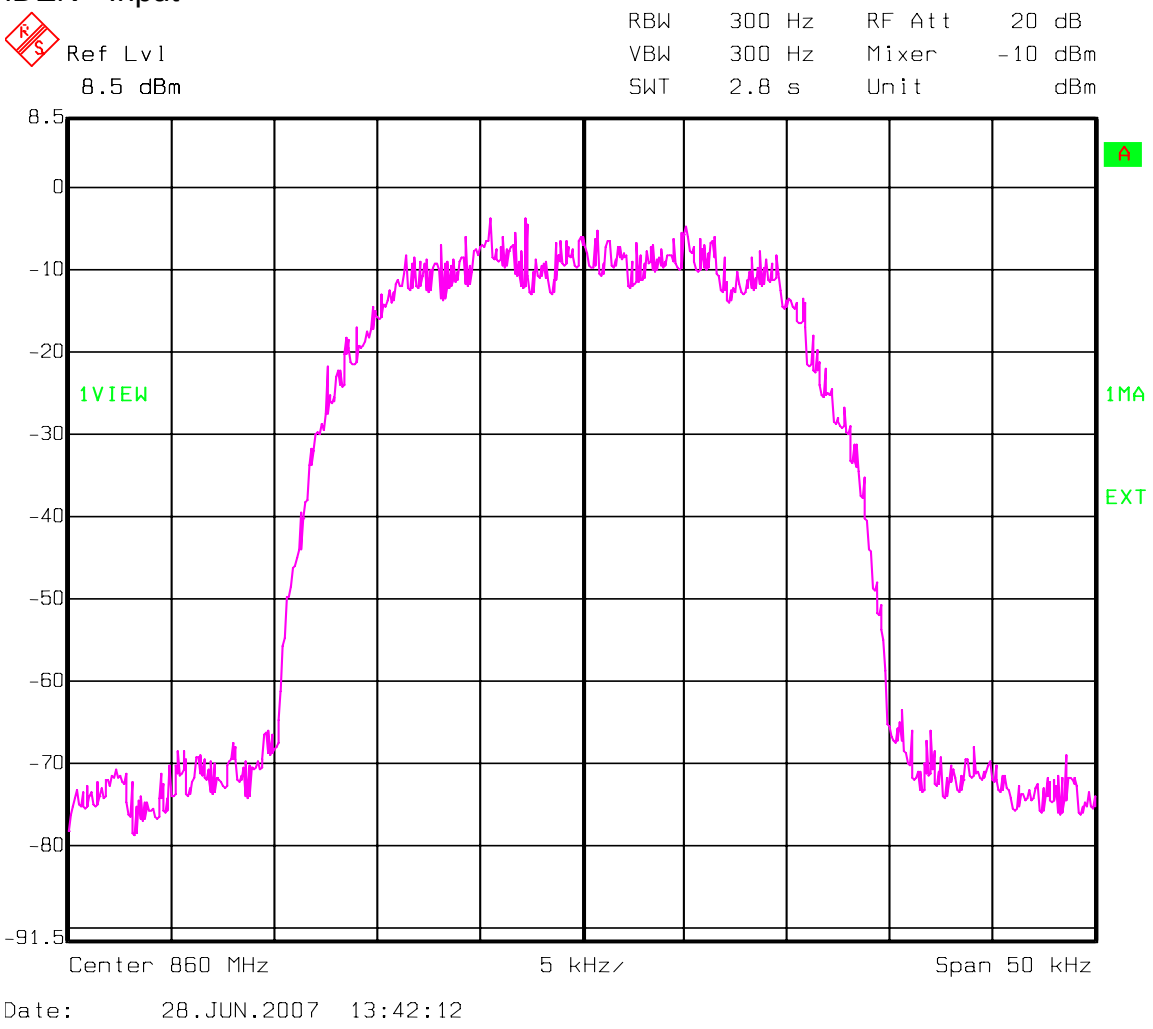
Test Data – Occupied Bandwidth

iDEN - Output



Test Data – Occupied Bandwidth

iDEN - Input



Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: David Light	DATE: 28 June 2007

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1064-1604-1082-1036

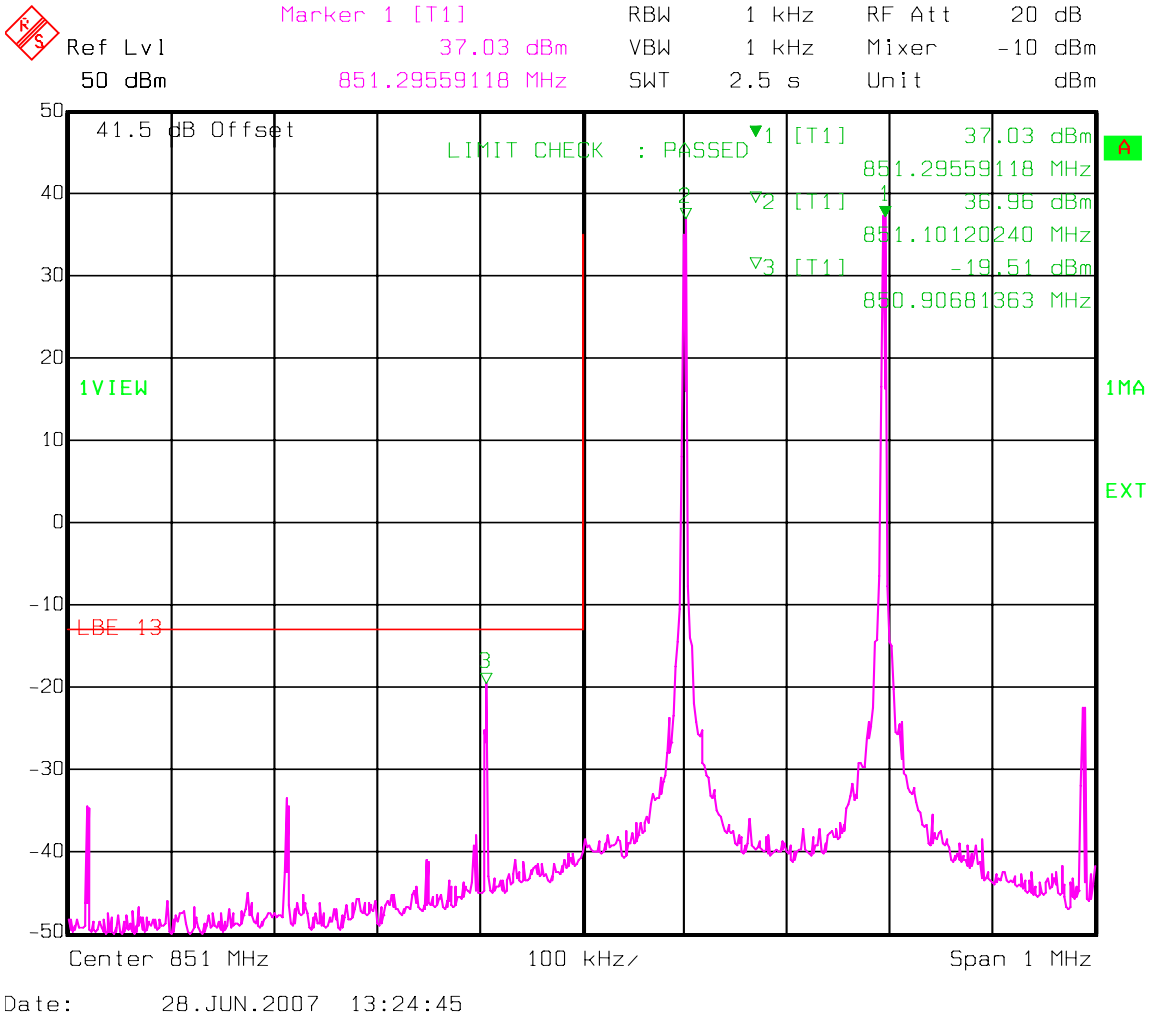
Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

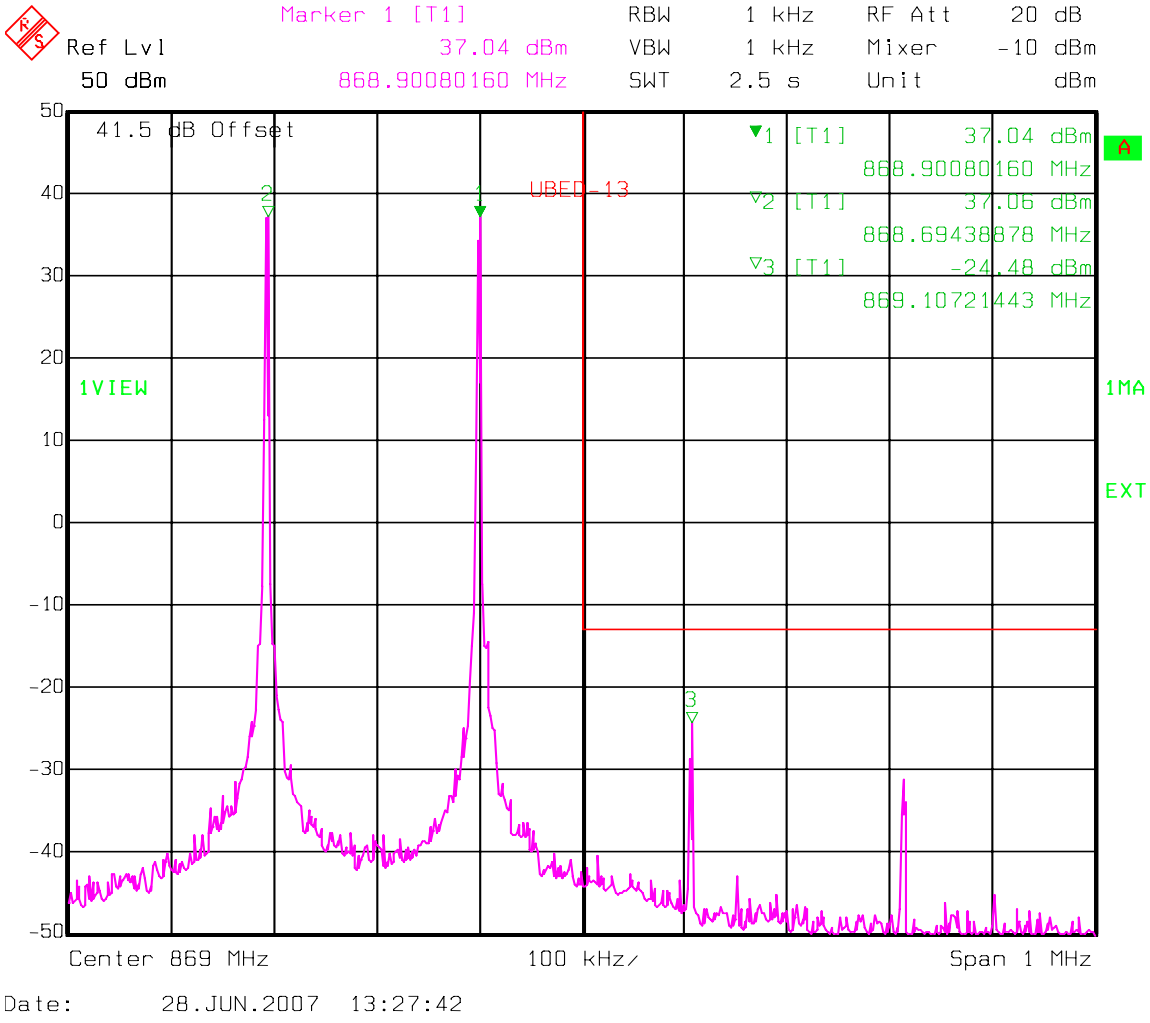
Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
Analog
Downlink



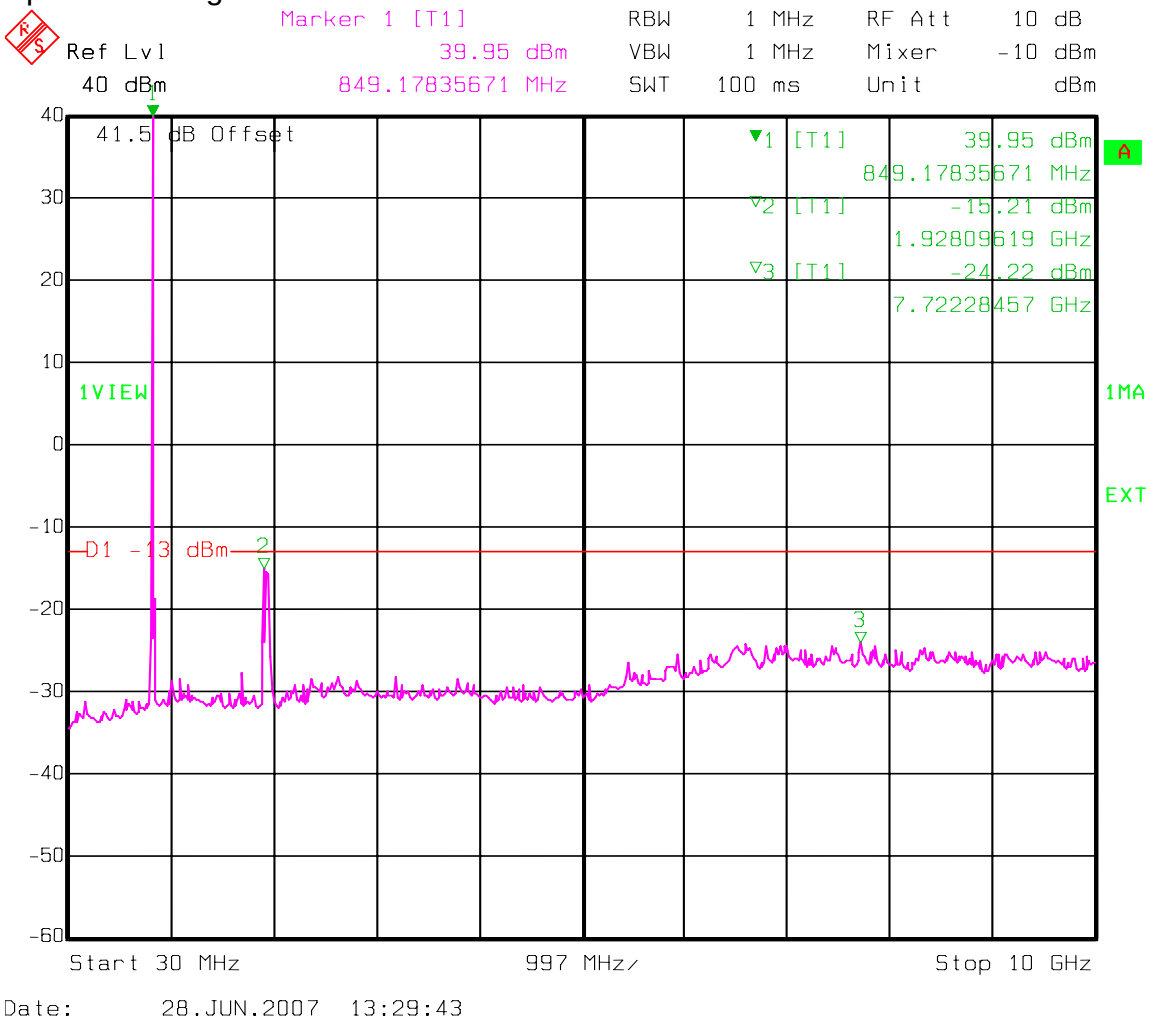
Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
Analog
Downlink



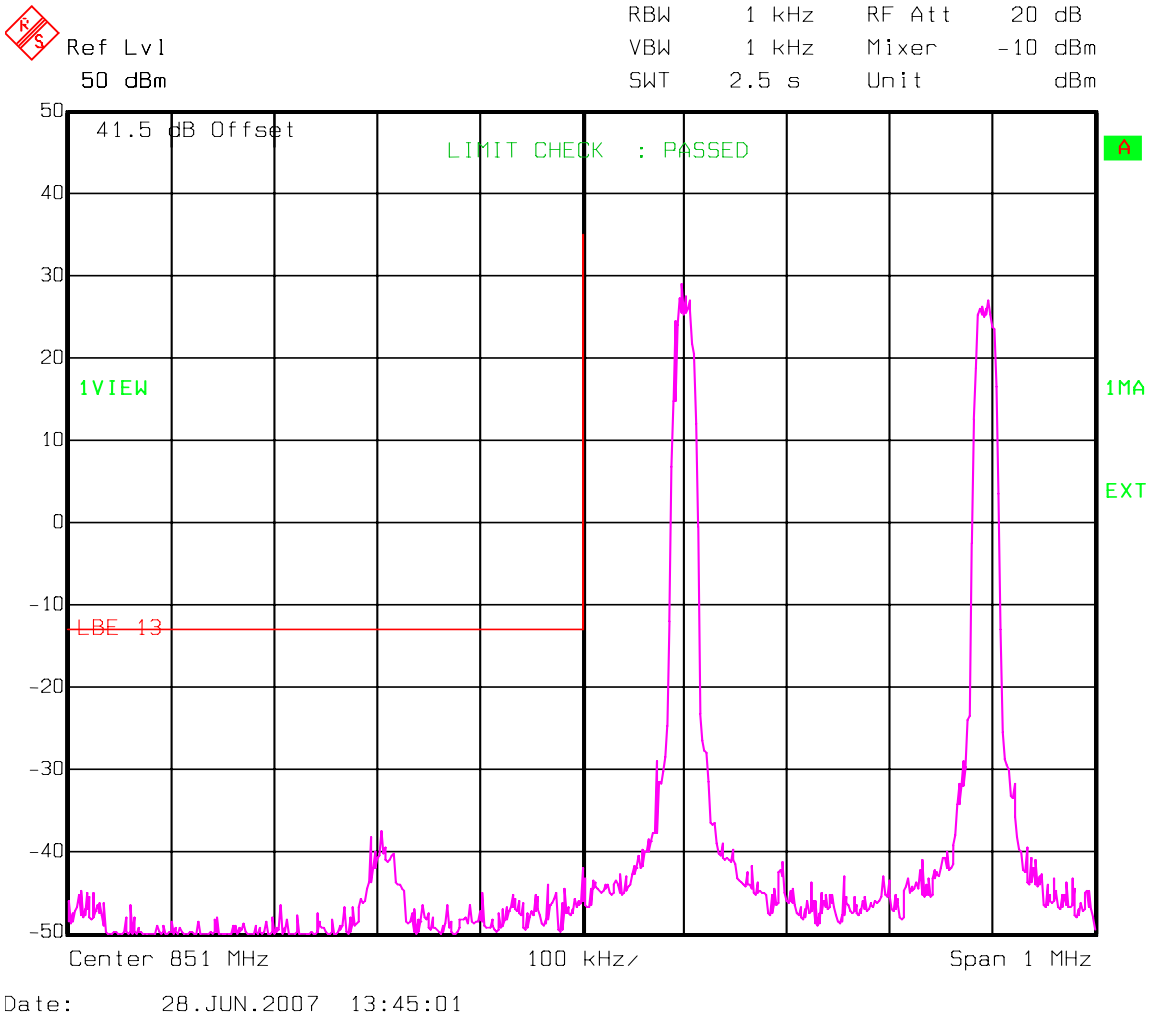
Test Data – Spurious Emissions at Antenna Terminals

Spurs – Analog - Downlink



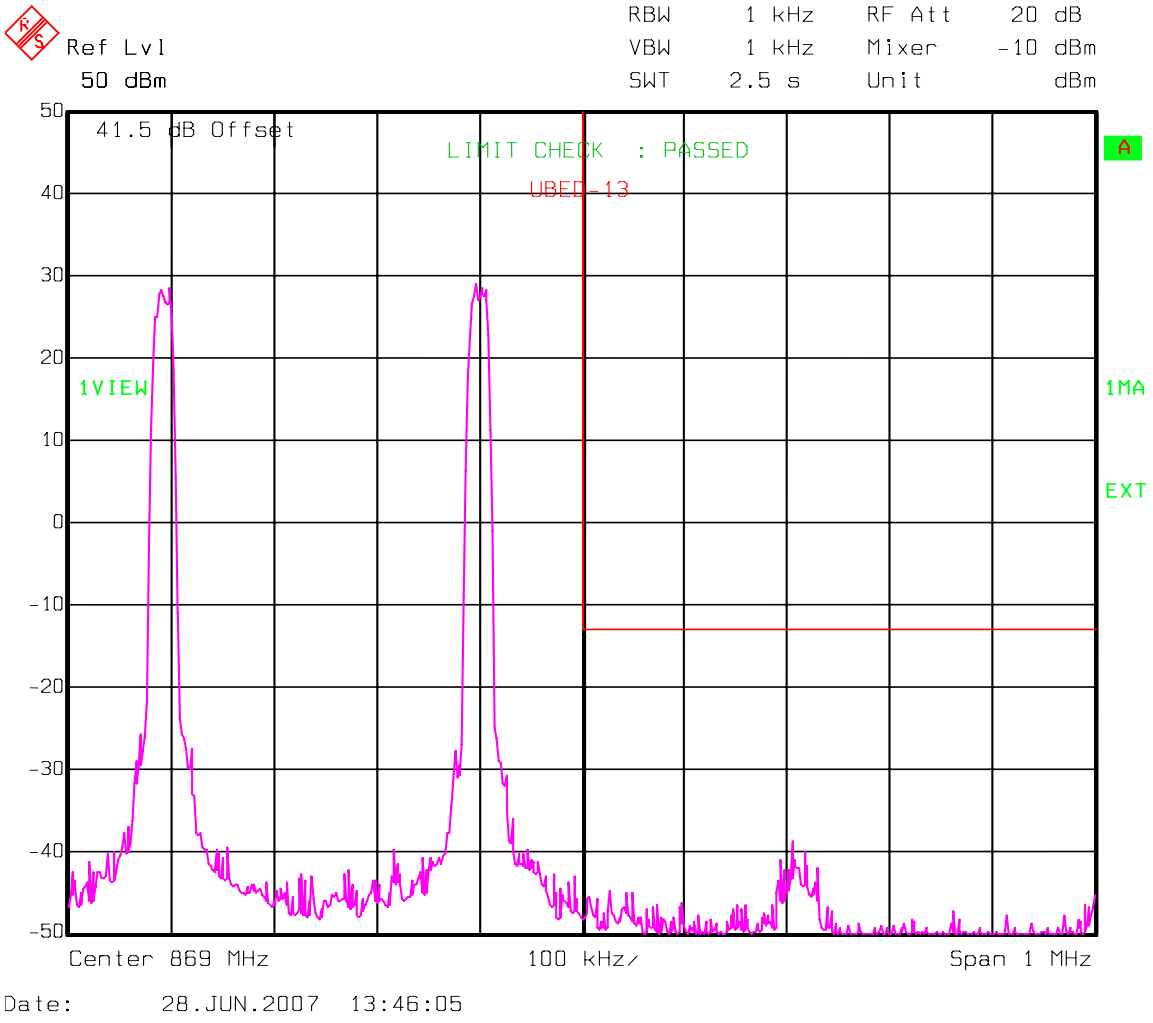
Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
iDEN
Downlink



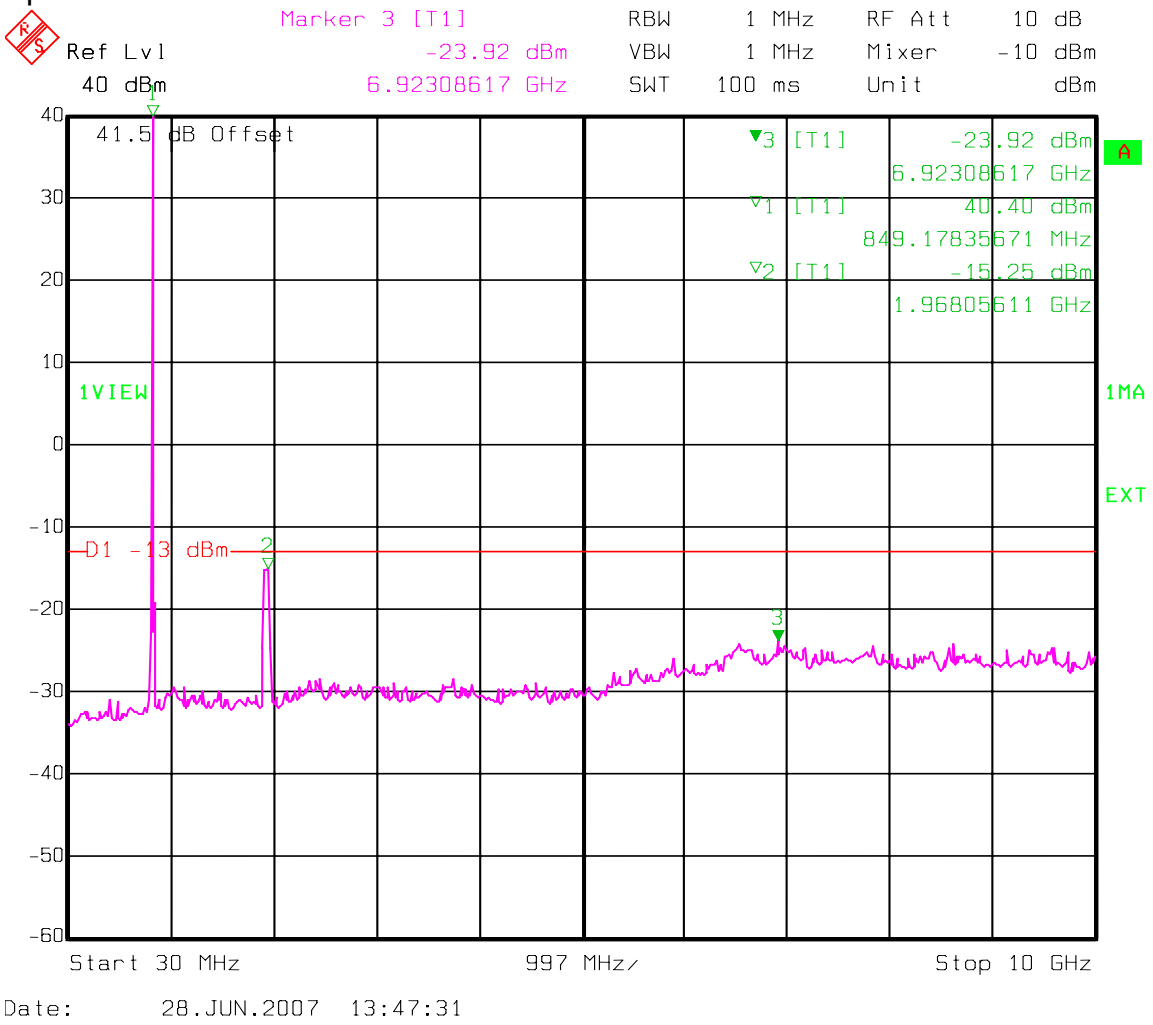
Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
iDEN
Downlink



Test Data – Spurious Emissions at Antenna Terminals

Spurs – iDEN - Downlink



Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: David Light	DATE: 28 June 2007

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.

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

Measurement Uncertainty: +/-1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

Note: See page A5 for applicable limit.

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	05/26/06	05/26/08
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09
1484	Cable	Storm PR90-010-072	N/A	05/02/07	05/01/08
1485	Cable	Storm PR90-010-216	N/A	05/02/07	05/01/08
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/01/07	04/30/08
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/01/07	04/30/08
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

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output PARA. NO.: 2.985

Minimum Standard: Para. No. 90.205(a). The maximum allowable station ERP is dependent upon the stations HAAT and required service area and will be authorized in accordance with Table 1 of 90.205(d).

Method Of Measurement:

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter. 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: Spurious Emissions at Antenna Terminals **PARA. NO.: 2.991**

Minimum Standard: 90.210, Table 1

Table 1

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

MASK	Spurious Limit	FS Limit Below 1 GHz	FS Limit Above 1 GHz
A,B,C,G,H,I	-13dBm	84.4 dBμV/m@3m	82.2 dBμV/m@3m
D,J	-20dBm	77.4 dBμV/m@3m	75.2 dBμV/m@3m
E,F,K	-25dBm	72.4 dBμV/m@3m	70.2 dBμV/m@3m

Test Method: RBW: 1% of emission bandwidth in the 0 - 1 GHz range.
1 MHz at frequencies above 1 GHz.
VBW: $\Rightarrow$ RBW

The spectrum is searched up to 10 times the fundamental frequency.

NAME OF TEST: Occupied Bandwidth **PARA. NO.: 2.989**

Minimum Standard: Not defined. Input/Output

Method Of Measurement:

Analog

Spectrum analyzer settings:
RBW=VBW=300 Hz
Span: 100 kHz
Sweep: Auto

iDEN

RBW=VBW= 300 Hz
Span: 100 kHz
Sweep: Auto

NAME OF TEST: Field Strength of Spurious PARA. NO.: 2.993

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

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.

MASK	Spurious Limit	FS Limit Below 1 GHz	FS Limit Above 1 GHz
A,B,C,G,H,I	-13dBm	84.4 dBμV/m@3m	82.2 dBμV/m@3m
D,J	-20dBm	77.4 dBμV/m@3m	75.2 dBμV/m@3m
E,F,K	-25dBm	72.4 dBμV/m@3m	70.2 dBμV/m@3m

NAME OF TEST: Frequency Stability **PARA. NO.: 2.995**

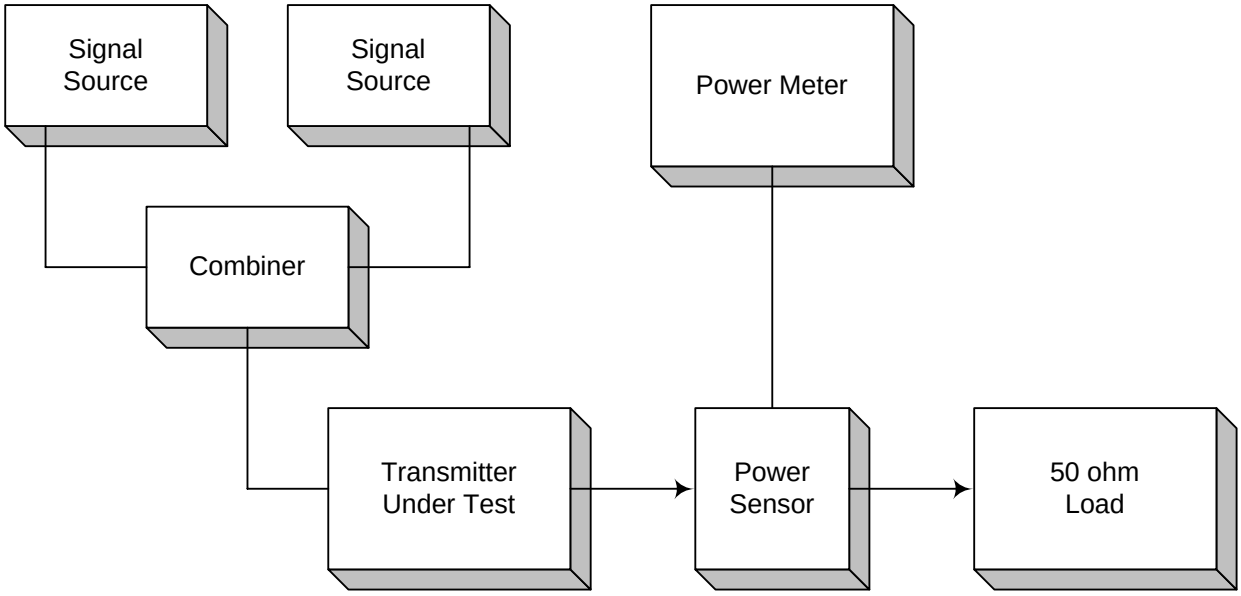
Minimum Standard: Para. No. 990.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Table 2

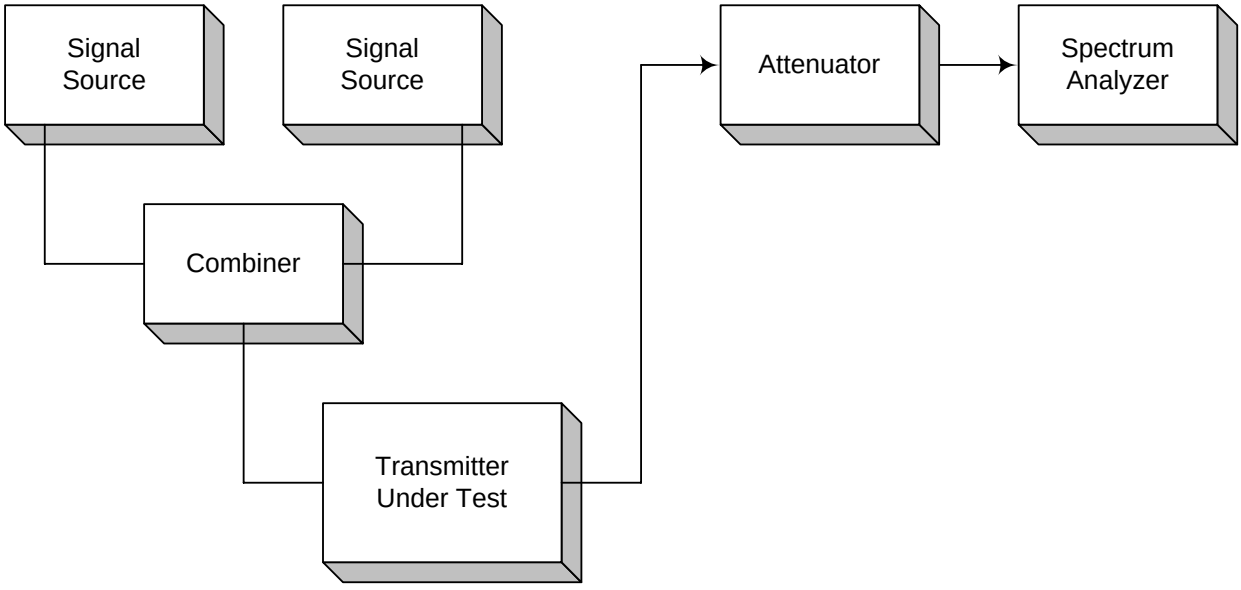
Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 901	0.1	1.5	1.5
902 - 928	2.5	2.5	2.5
929 - 930	1.5	-	-
935 - 940	0.1	1.5	1.5
1427 - 1435	300	300	300
Above 2450	-	-	-

ANNEX B - TEST DIAGRAMS

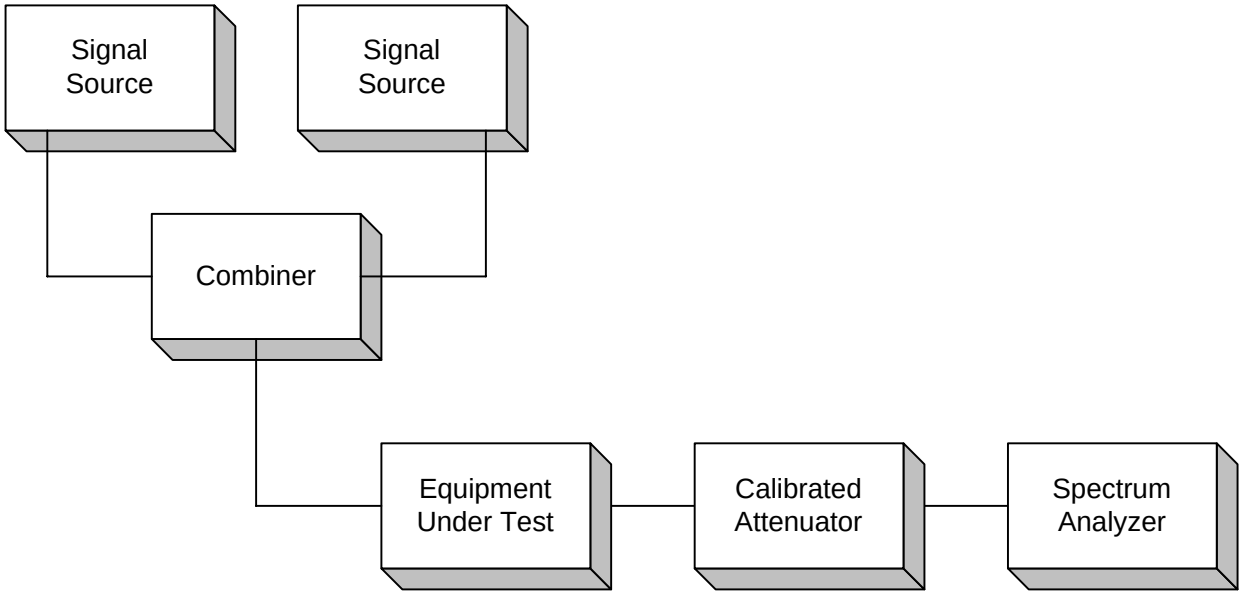
Para. No. 2.985 - R.F. Power Output



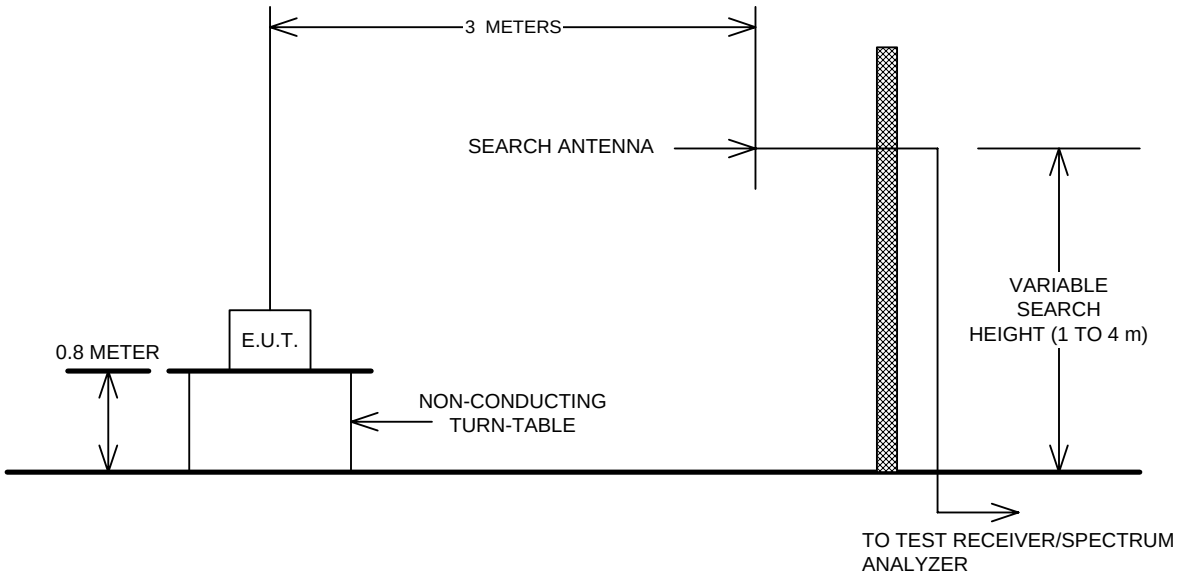
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 - Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability