



Nemko Test Report: 5L0279RUS1rev1

Applicant: Andrew Corporation

Equipment Under Test: MMR8L/9L
(E.U.T.)

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

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

Authorized By: 
Tom Tidwell, Frontline Manager

Date: 28 August 2005

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EQUIPMENT: MMR8L/9L

Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: MMR8L/9L

Serial No.: 11

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 FCC 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".

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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	90.205		Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A	N/A
Occupied Bandwidth	90.210	Plots	Complies
Spurious Emissions at Antenna Terminals	90.210	-13 dBm	Complies
Field Strength of Spurious Emissions	90.210	-13 dBm E.R.P.	Complies
Frequency Stability	90.213		N/A
Transient Frequency Behavior	90.214	N/A	N/A

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.

Section 2. General Equipment Specification

Transmitter

Supply Voltage Input: 115V AC, 60 Hz

Frequency Range: **Downlink:** 935 - 941MHz
851 - 869MHz

Frequency Range: **Uplink:** NA

Output Impedance: 50ohms

RF Output (Rated): **Downlink** +39dBm 900 Band / 43 dBm 800 Band

RF Output (Rated): **Uplink** NA

Frequency Translation:

Band Selection:

F1-F1



Software



F1-F2



**Duplexer
Change**



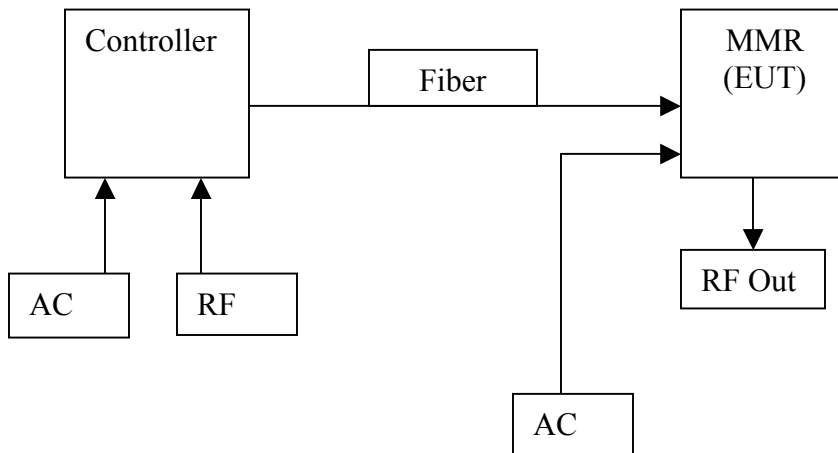
N/A



**Fullband
Coverage**



System Diagram



EQUIPMENT: MMR8L/9L**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Dustin Oaks	DATE: 06/13/2005

Test Results: Complies**Measurement Data:**

900 Band

Frequency (MHz)	Measured Power (dBm)	Measured Power (Watts)	Rated Power (dBm)
iDEN	39.04	8.02	39
ANALOG	39.10	8.13	39

800 Band

Frequency (MHz)	Measured Power (dBm)	Measured Power (Watts)	Rated Power (dBm)
iDEN	43.09	20.37	43
ANALOG	43	20.00	43

Equipment Used: 1036, 1053, 1627, 1471, 1973**Measurement Uncertainty:** +/- 1.6 dB**Temperature:** 21 °C**Relative Humidity:** 51 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: Dustin Oaks	DATE: 06/13/2005

Test Results: Complies

Test Data: See attached graph(s).

Equipment Used: 1036, 1053, 1627, 1471, 1973, 1092

Measurement Uncertainty: +/- 1.6 dB

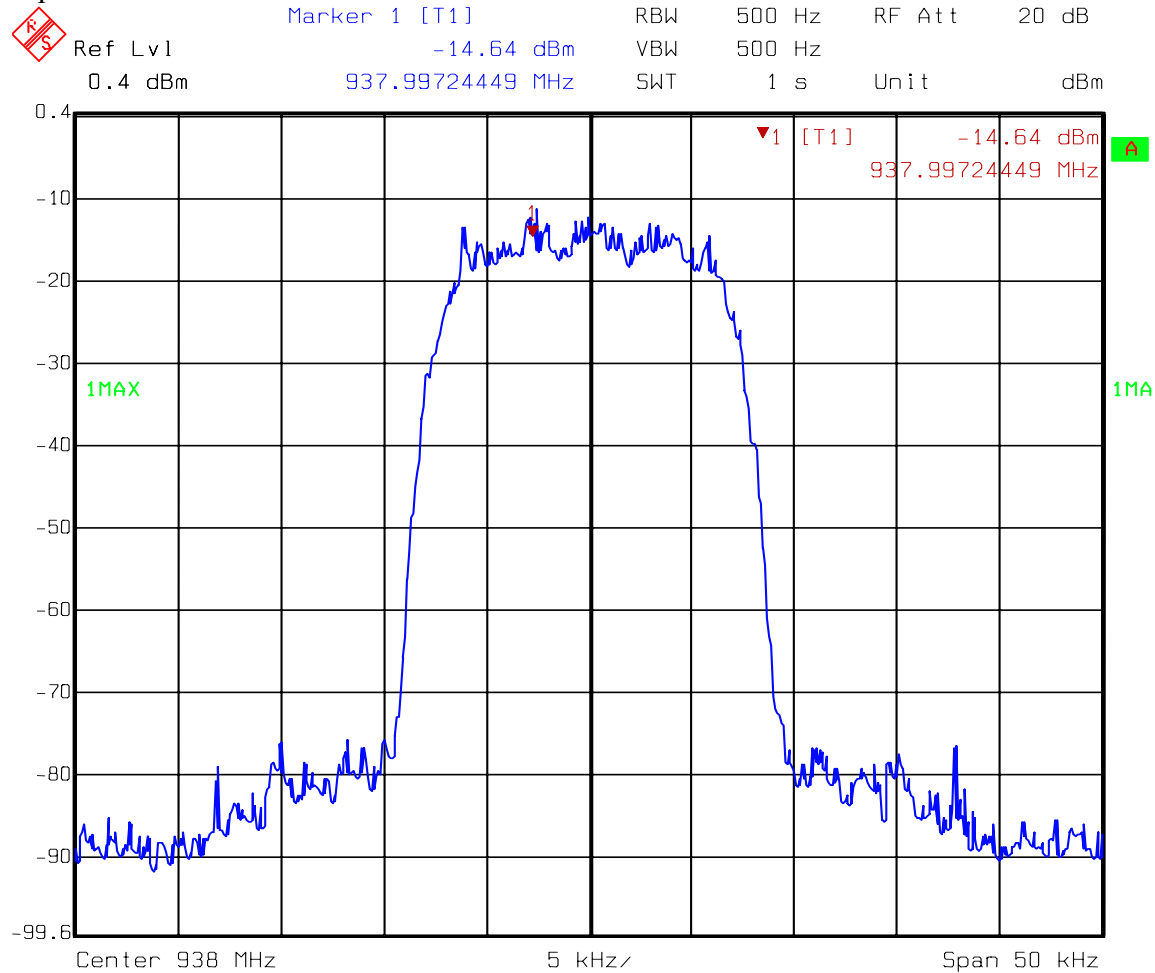
Temperature: 21 °C

Relative Humidity: 51 %

EQUIPMENT: MMR8L/9L

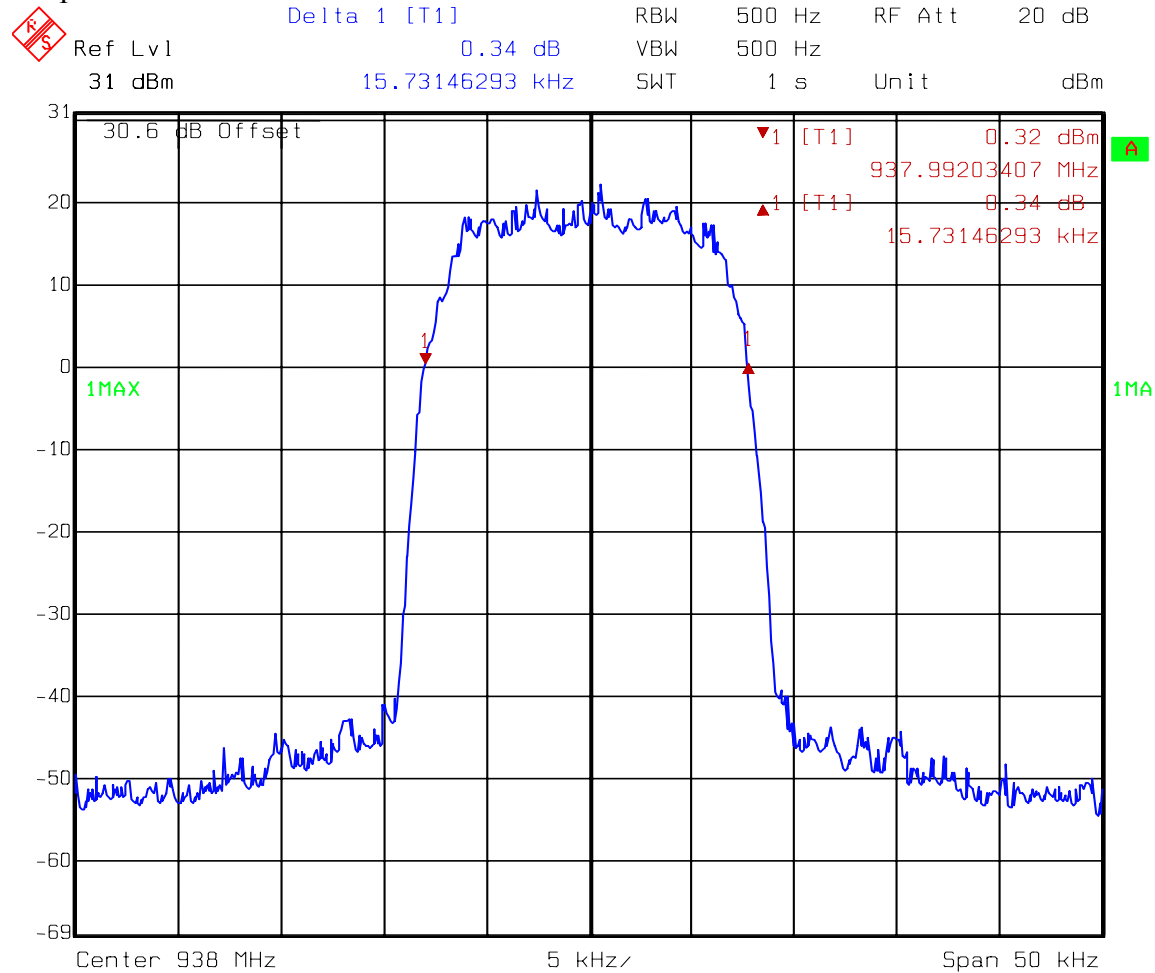
Band Width and Input/Output

Input 900MHz iDEN



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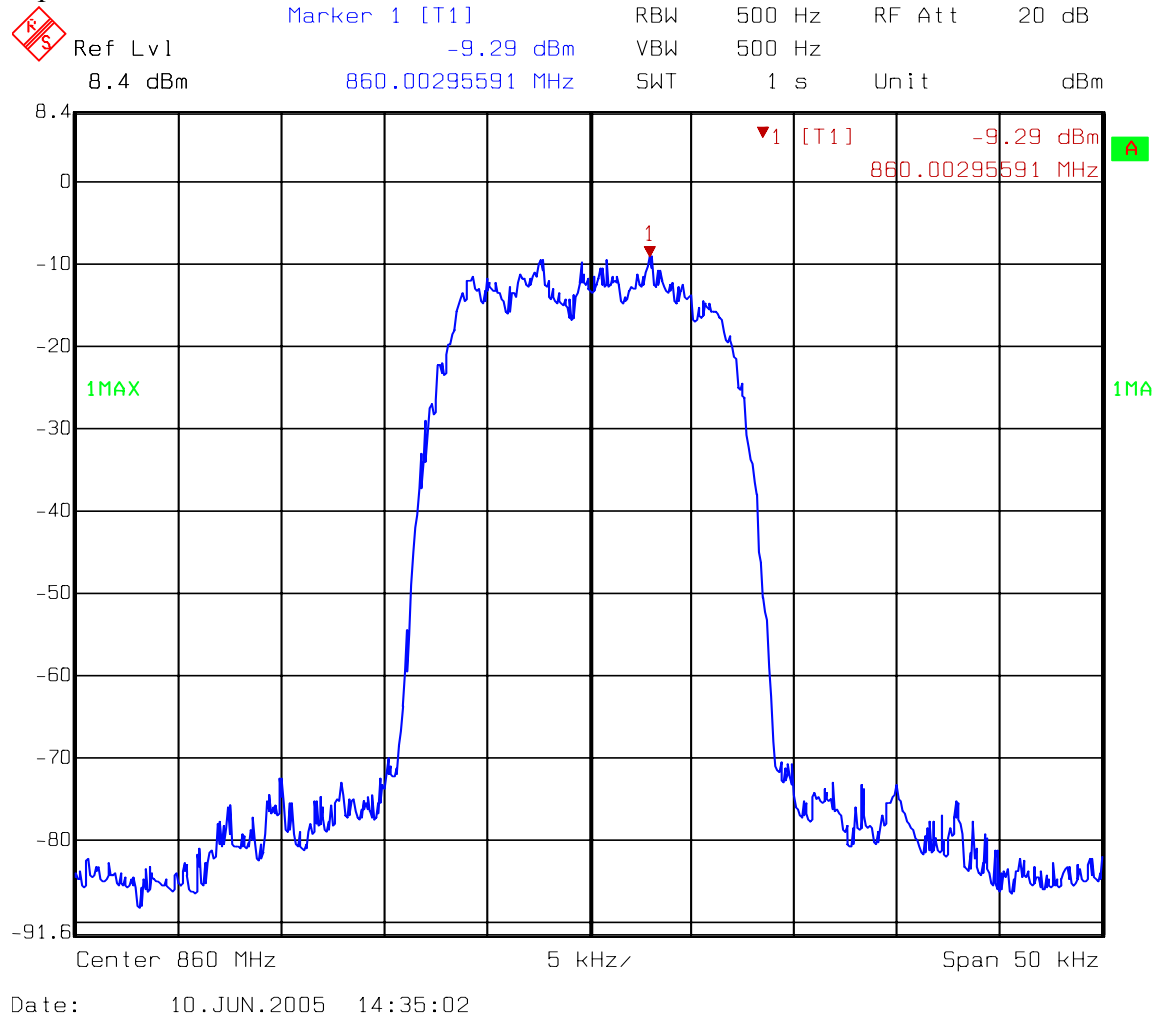
Output 900MHz iDEN



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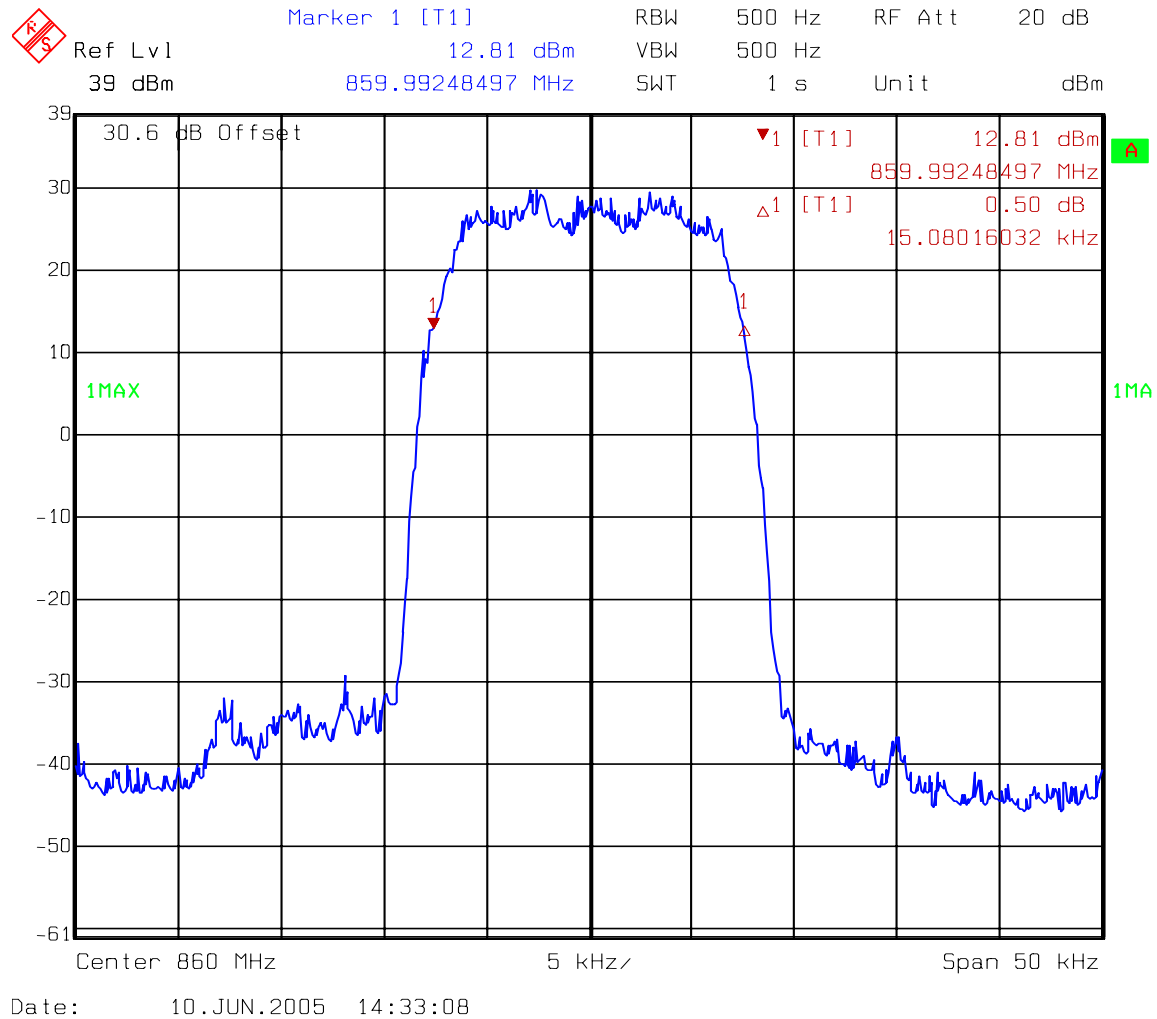
EQUIPMENT: MMR8L/9L

I/O Plots
Input 800 iDEN



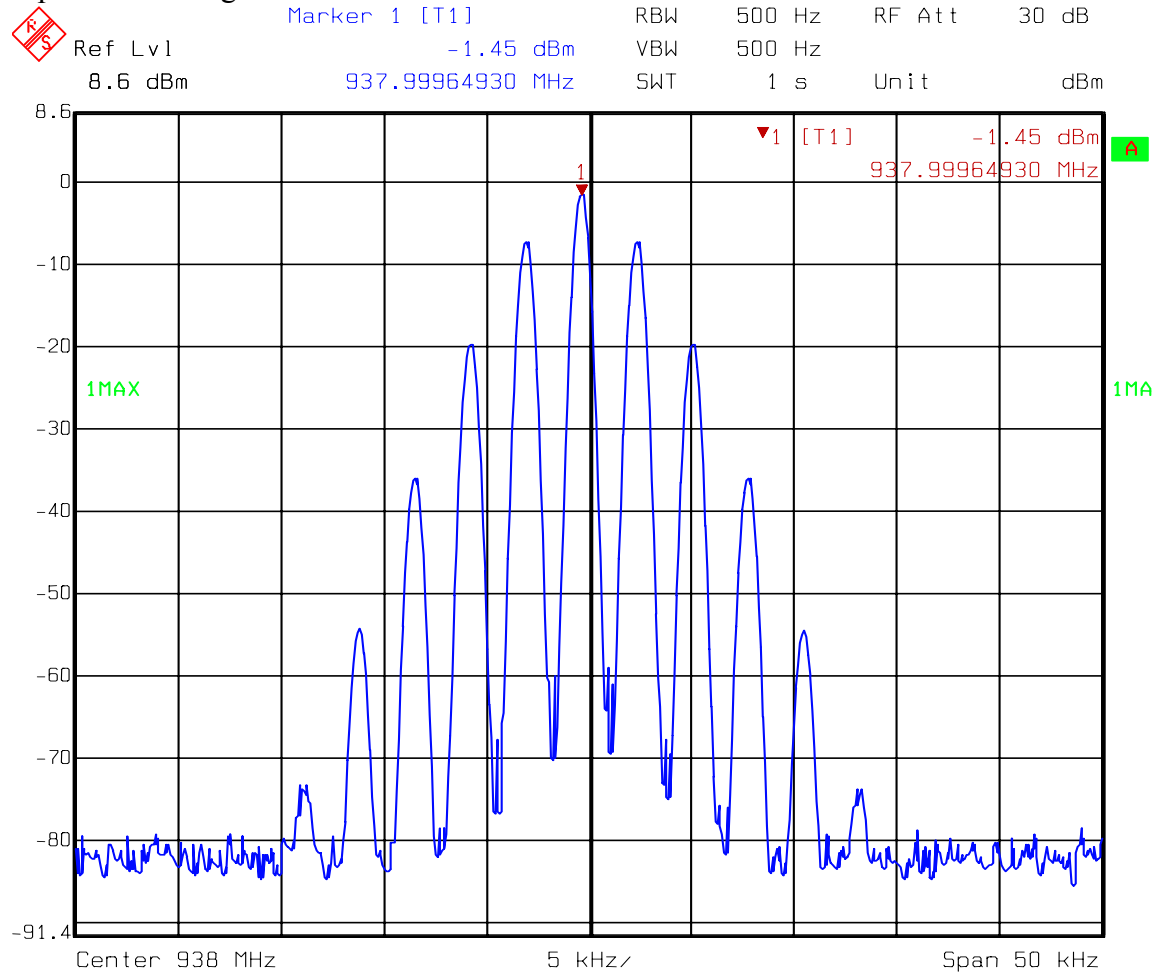
EQUIPMENT: MMR8L/9L

Output 800 iDEN



EQUIPMENT: MMR8L/9L

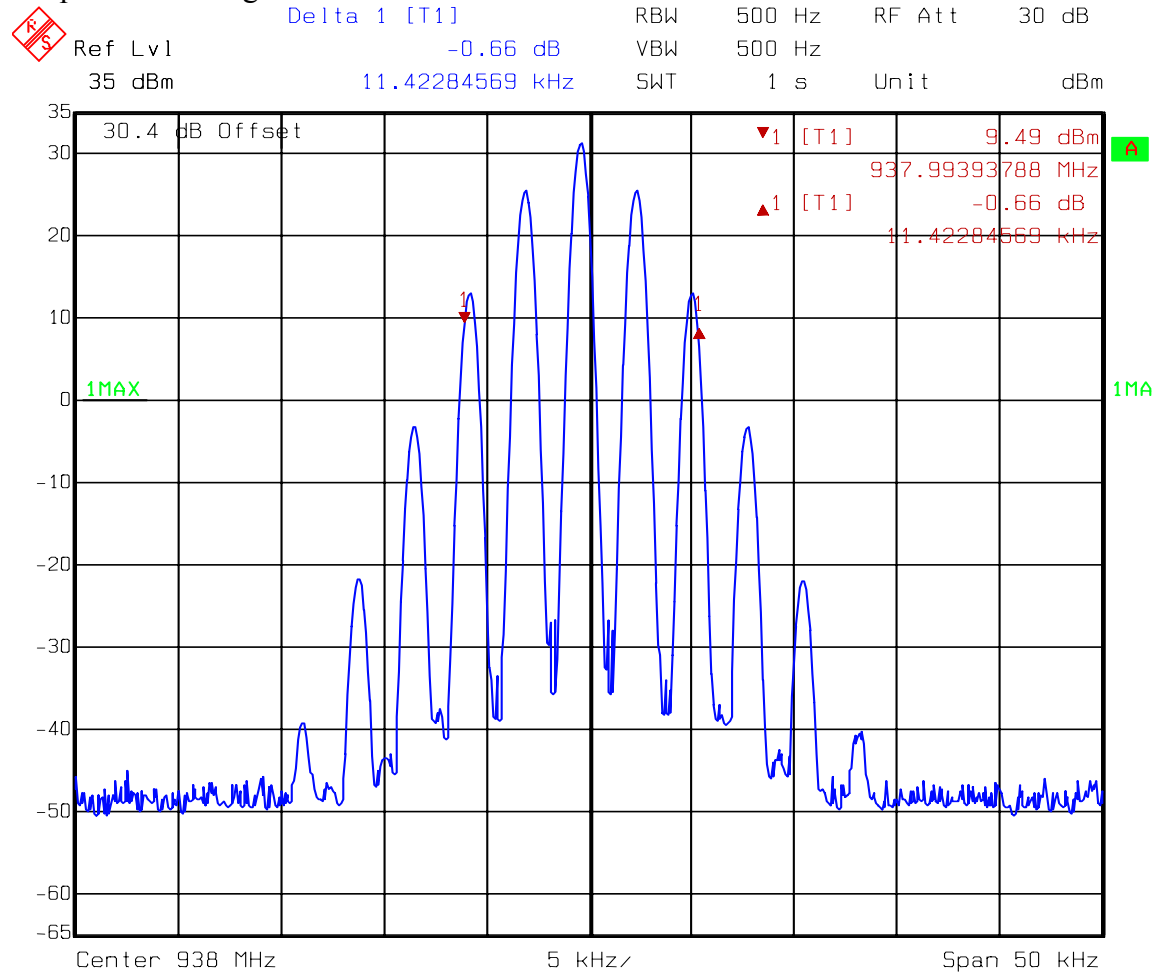
Input 900 Analog



Date: 13.JUN.2005 09:41:39

EQUIPMENT: MMR8L/9L

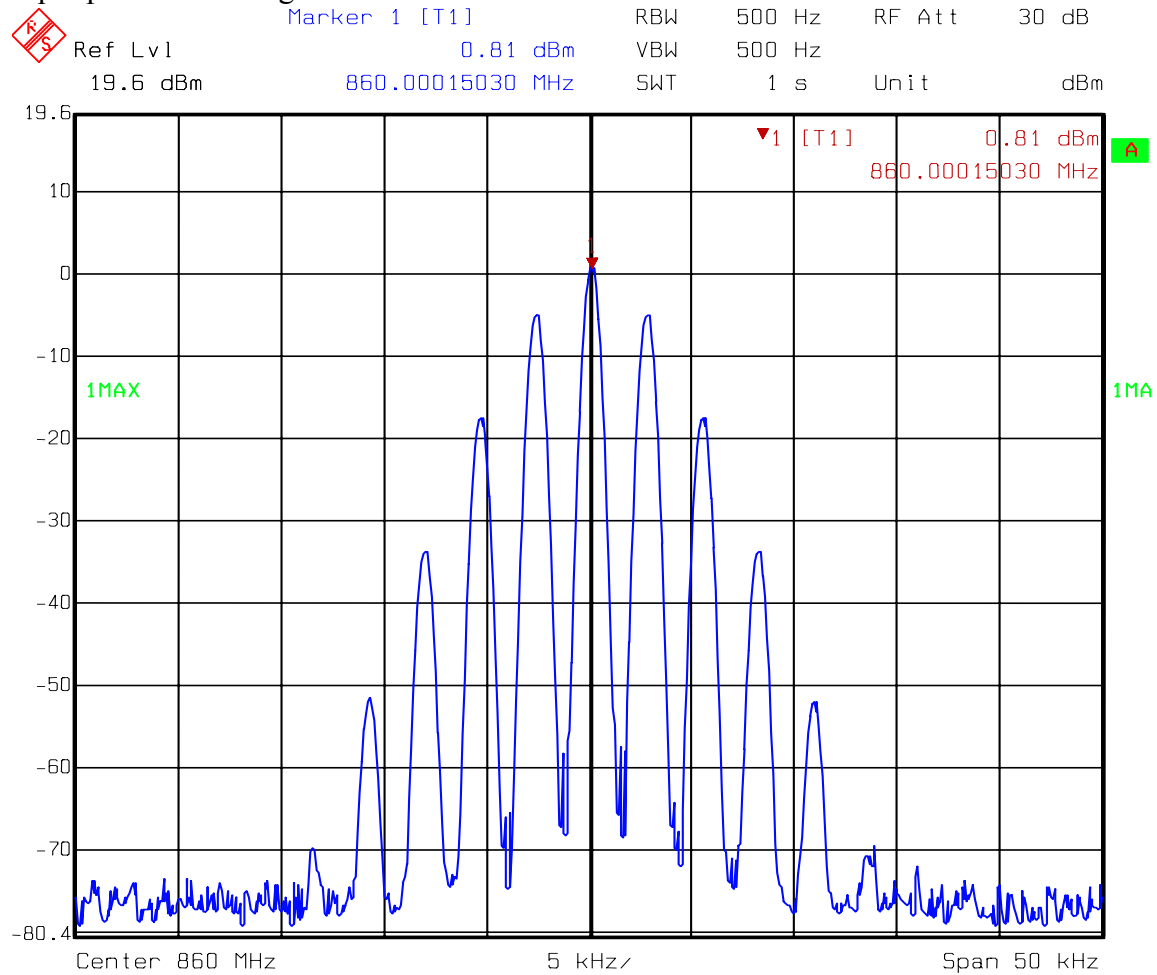
Output 900 Analog



Date: 13.JUN.2005 13:53:25

EQUIPMENT: MMR8L/9L

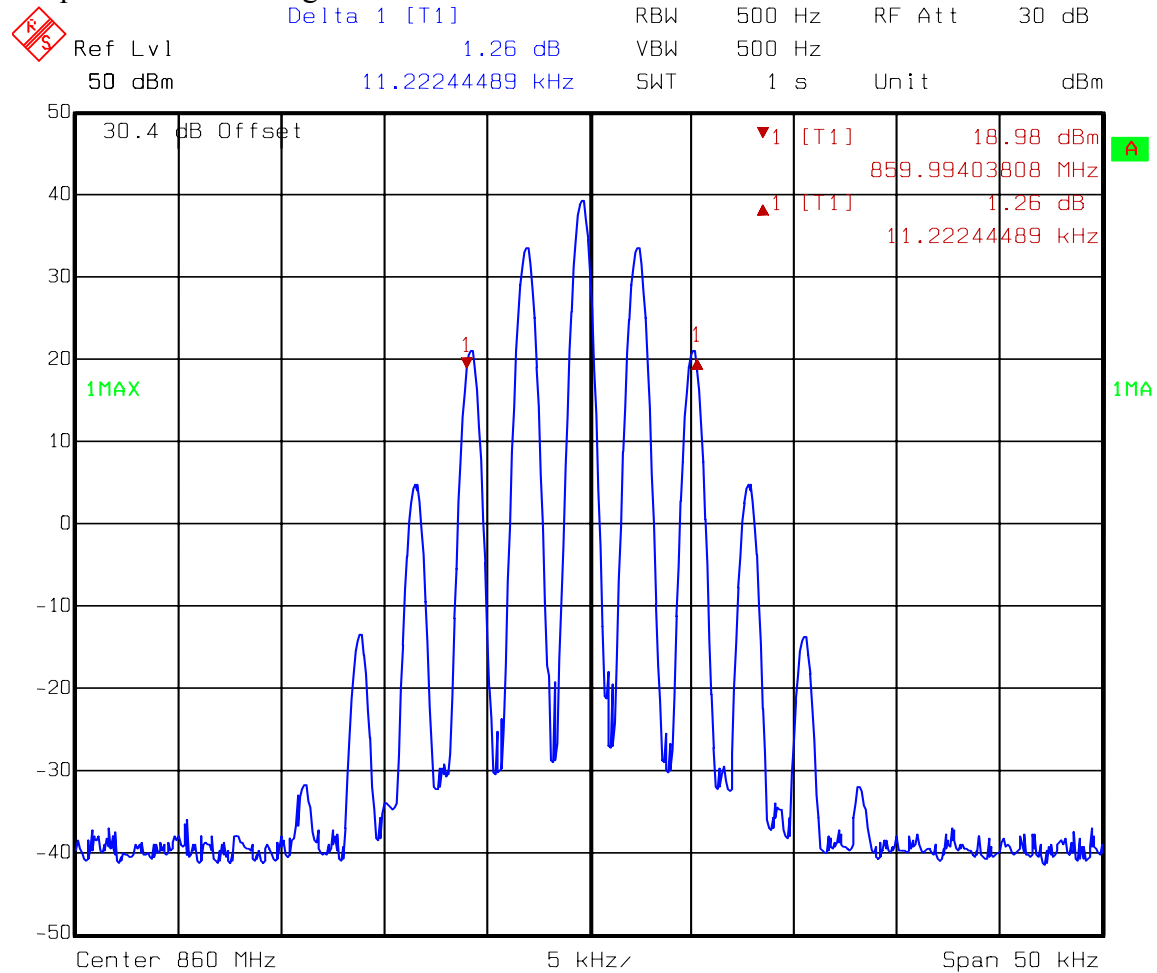
Input plot 800 Analog



Date: 13.JUN.2005 08:28:50

EQUIPMENT: MMR8L/9L

Output Plot 800 Analog



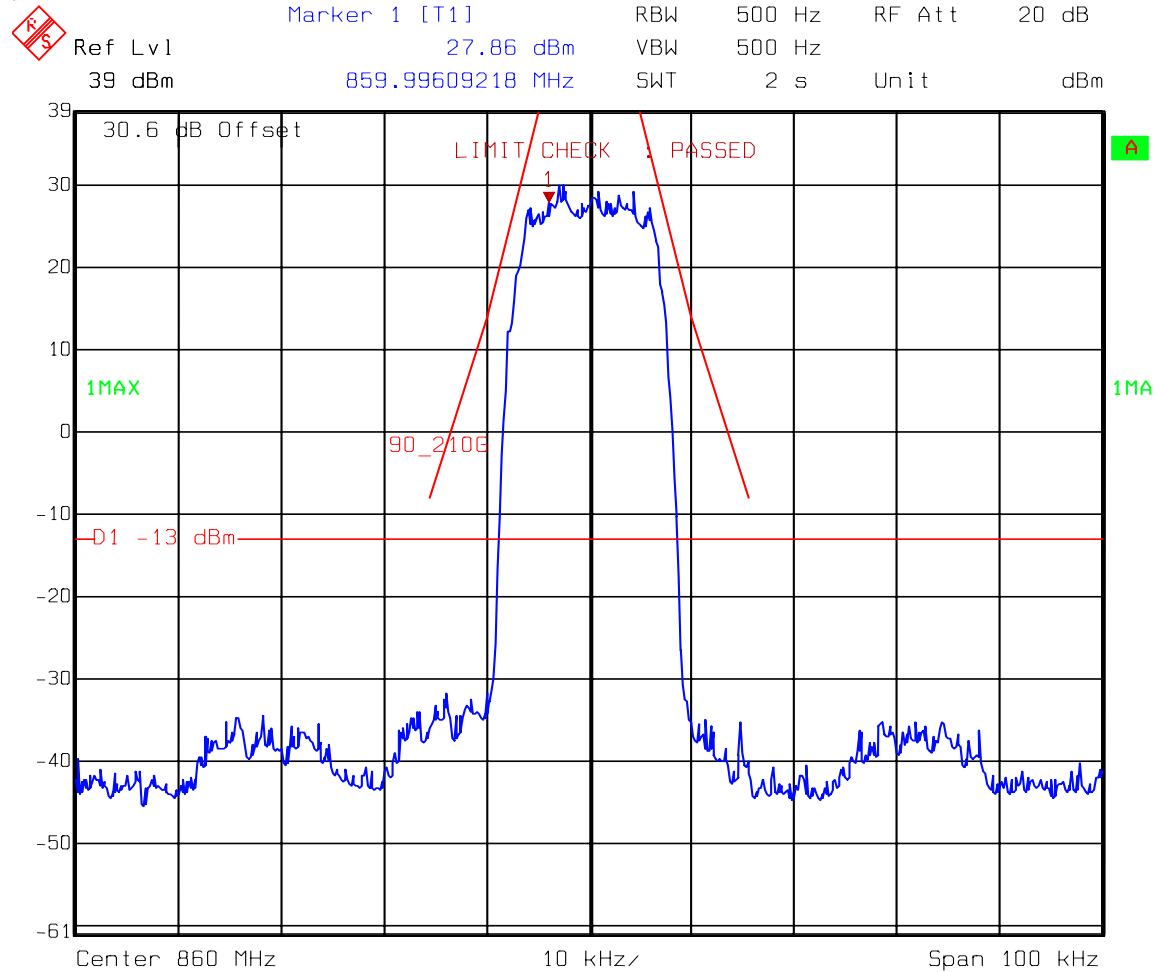
Date: 13.JUN.2005 13:50:59

EQUIPMENT: MMR8L/9L

Emissions Mask

800 iDEN power = 43.09dBm

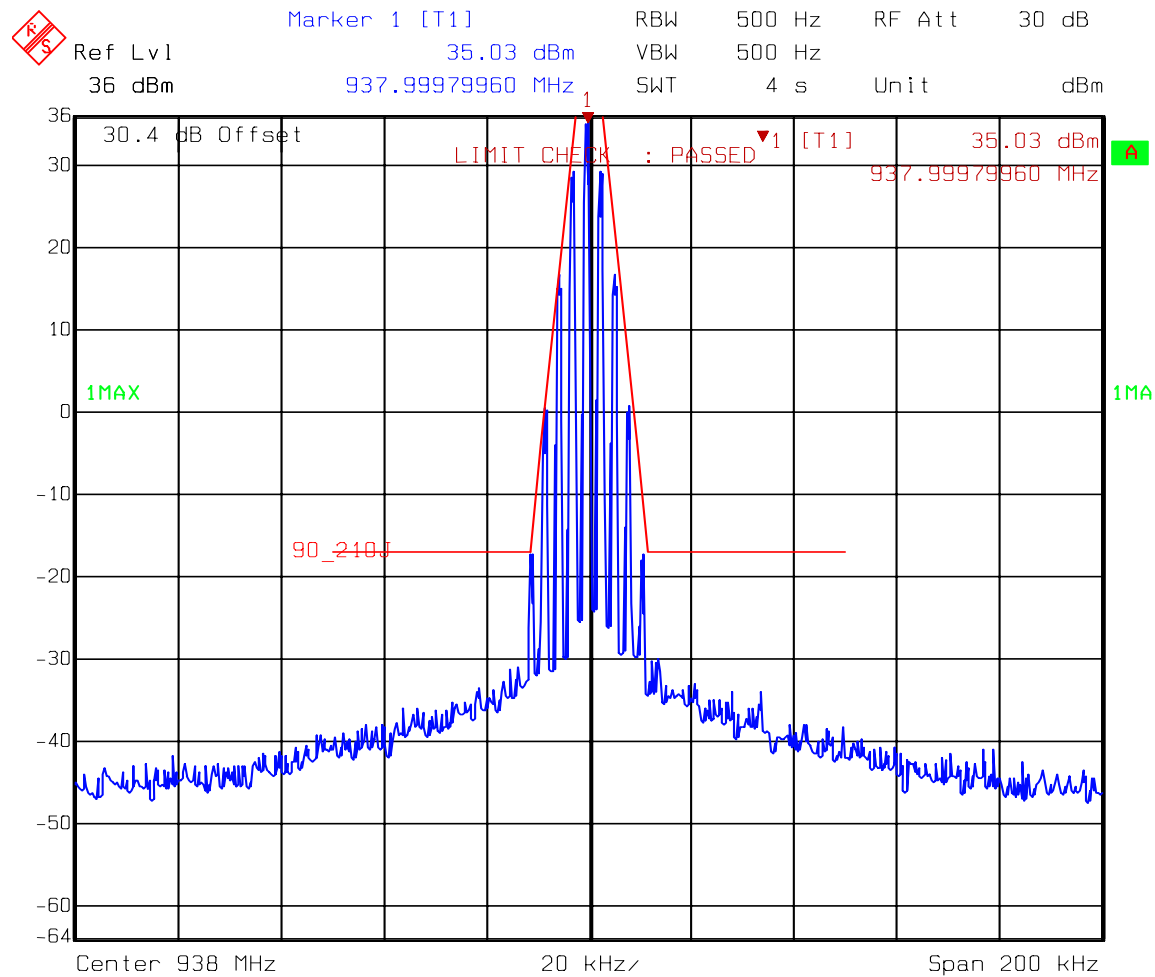
, Mask G



Date: 10.JUN.2005 14:28:34

EQUIPMENT: MMR8L/9L

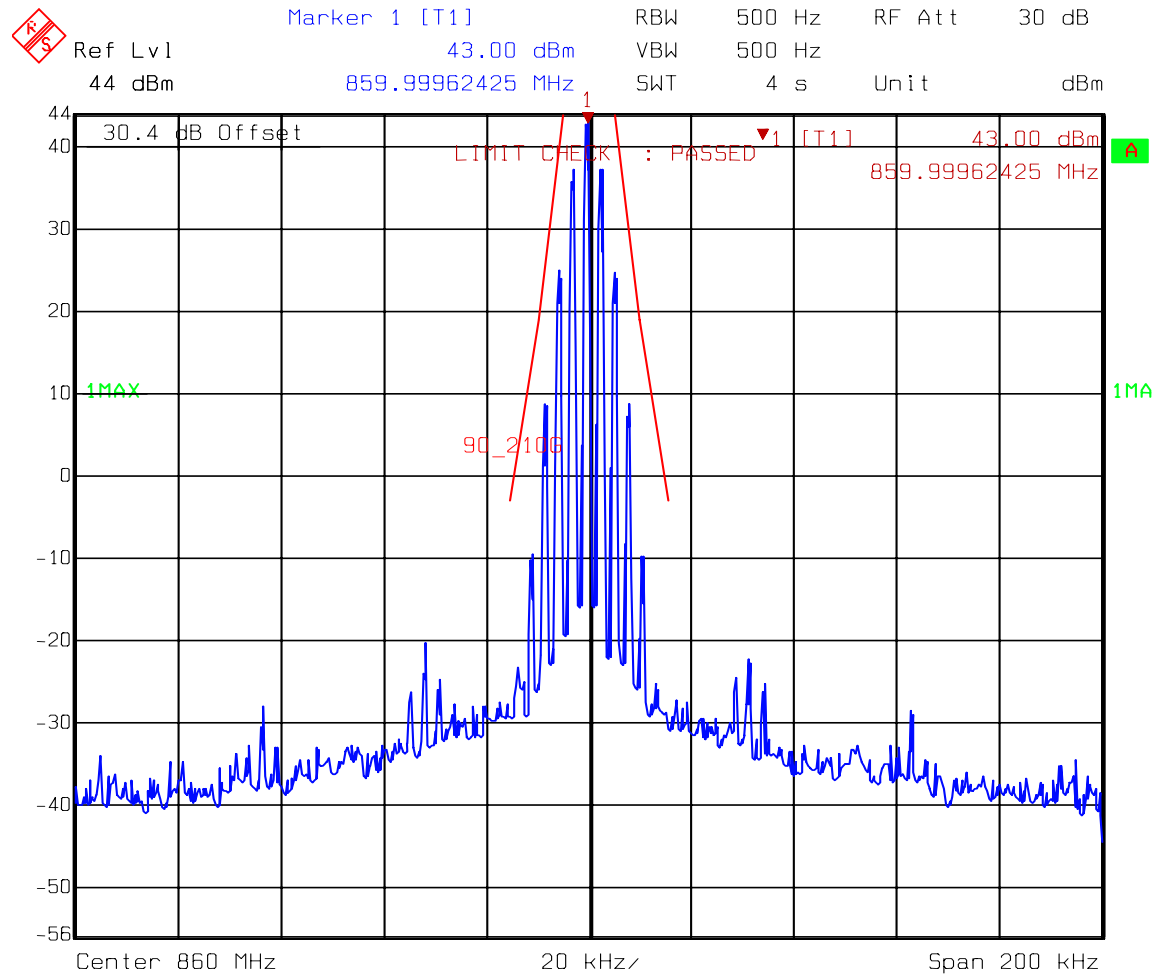
iDEN 900Band, Mask J



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EQUIPMENT: MMR8L/9L

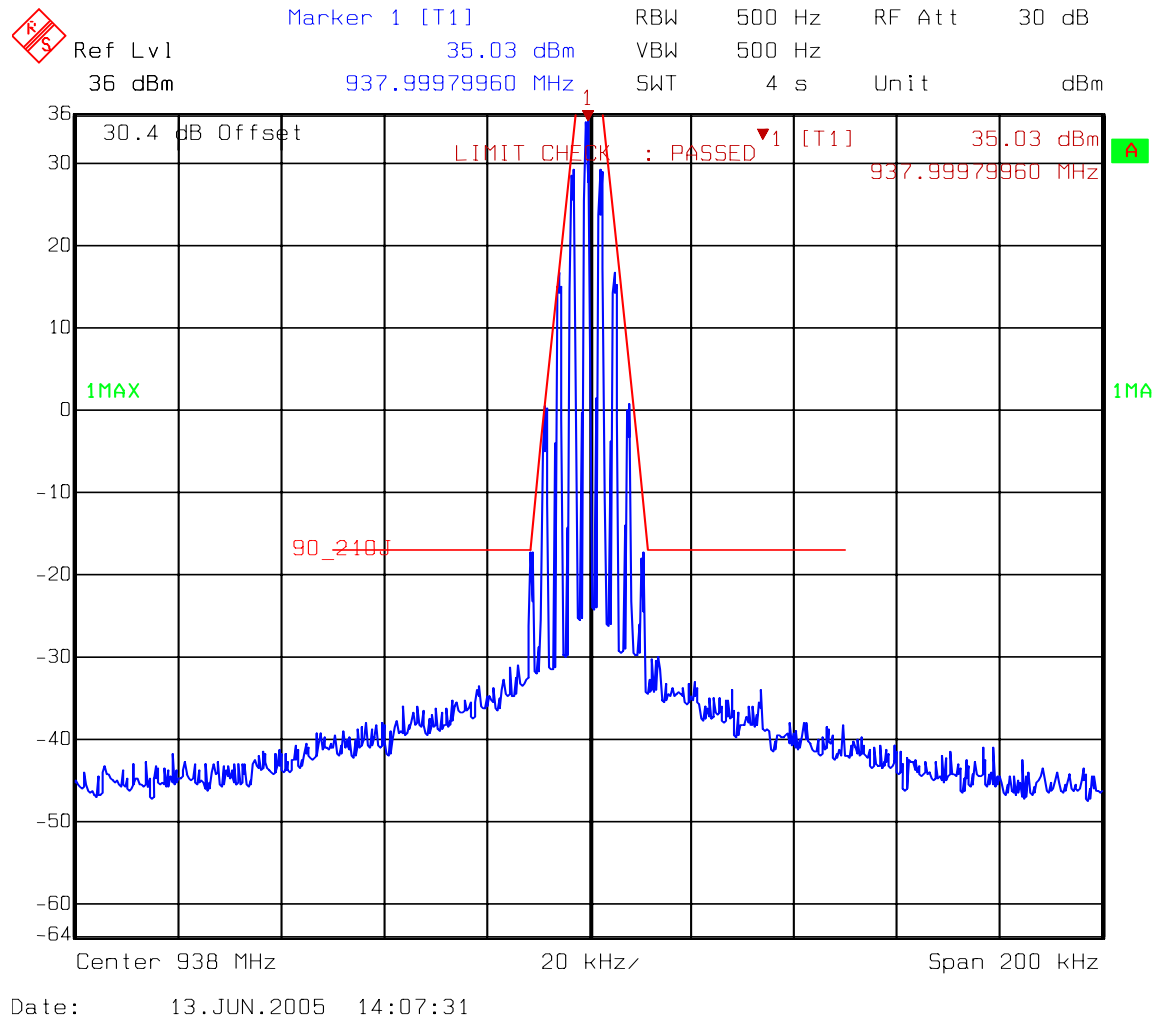
ANALOG 800Band, Mask G



Date: 13.JUN.2005 14:01:52

EQUIPMENT: MMR8L/9L

ANALOG 900Band, Mask J



Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: David Light	DATE: 9/28/2005

Test Results: Complies

Test Data: See attached graph(s).

Equipment Used: 1036, 1053, 1627, 1471, 1973, 1092

Measurement Uncertainty: +/- 1.6 dB

Temperature: 21 °C

Relative Humidity: 51 %

EQUIPMENT: MMR8L/9L

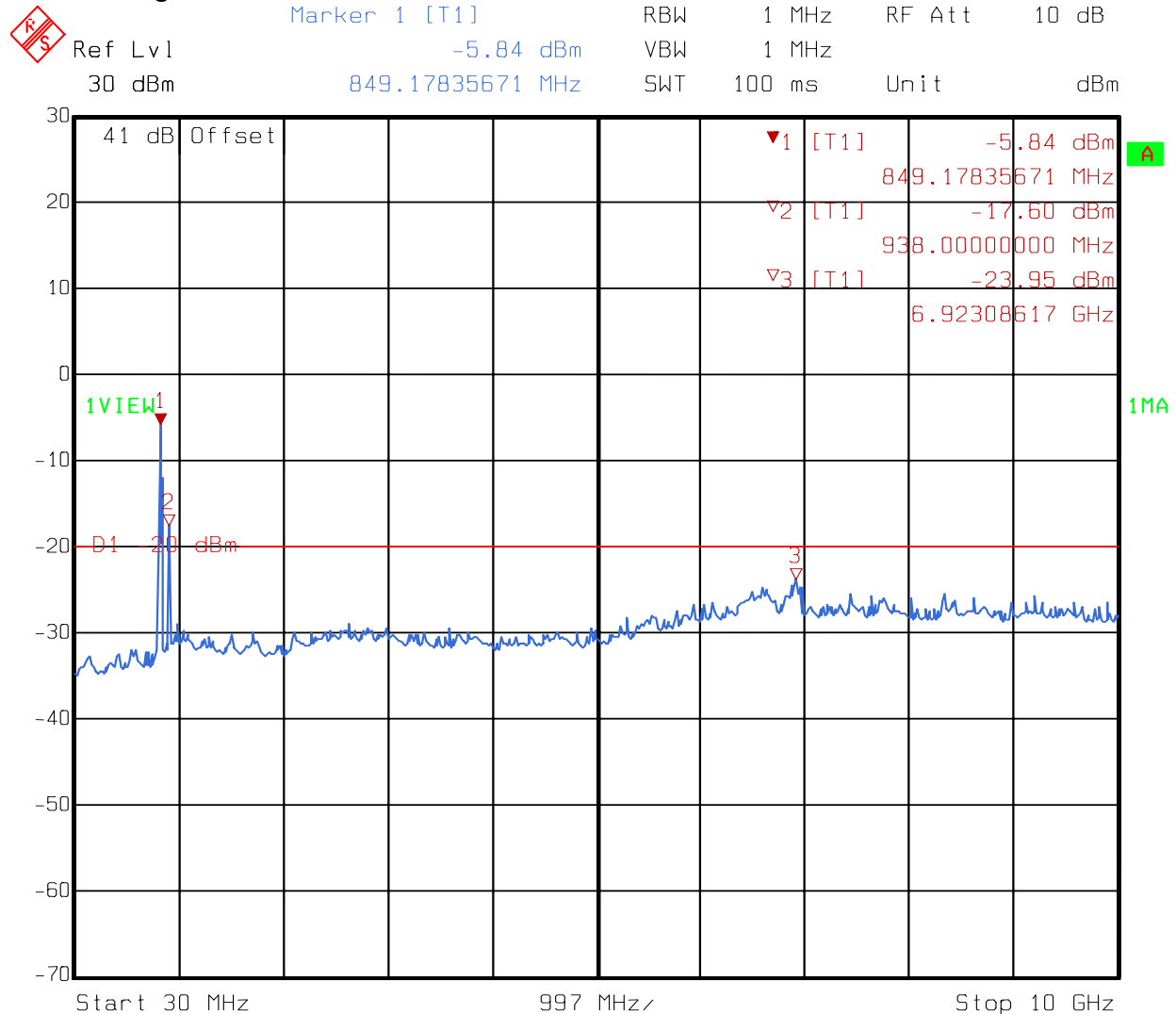
Tx 860 MHz

iDEN

Marker1=tx 43 dBm notched

Marker2=900 MHz band

Marker3=highest emission



Date: 28.SEP.2005 12:54:43

EQUIPMENT: MMR8L/9L

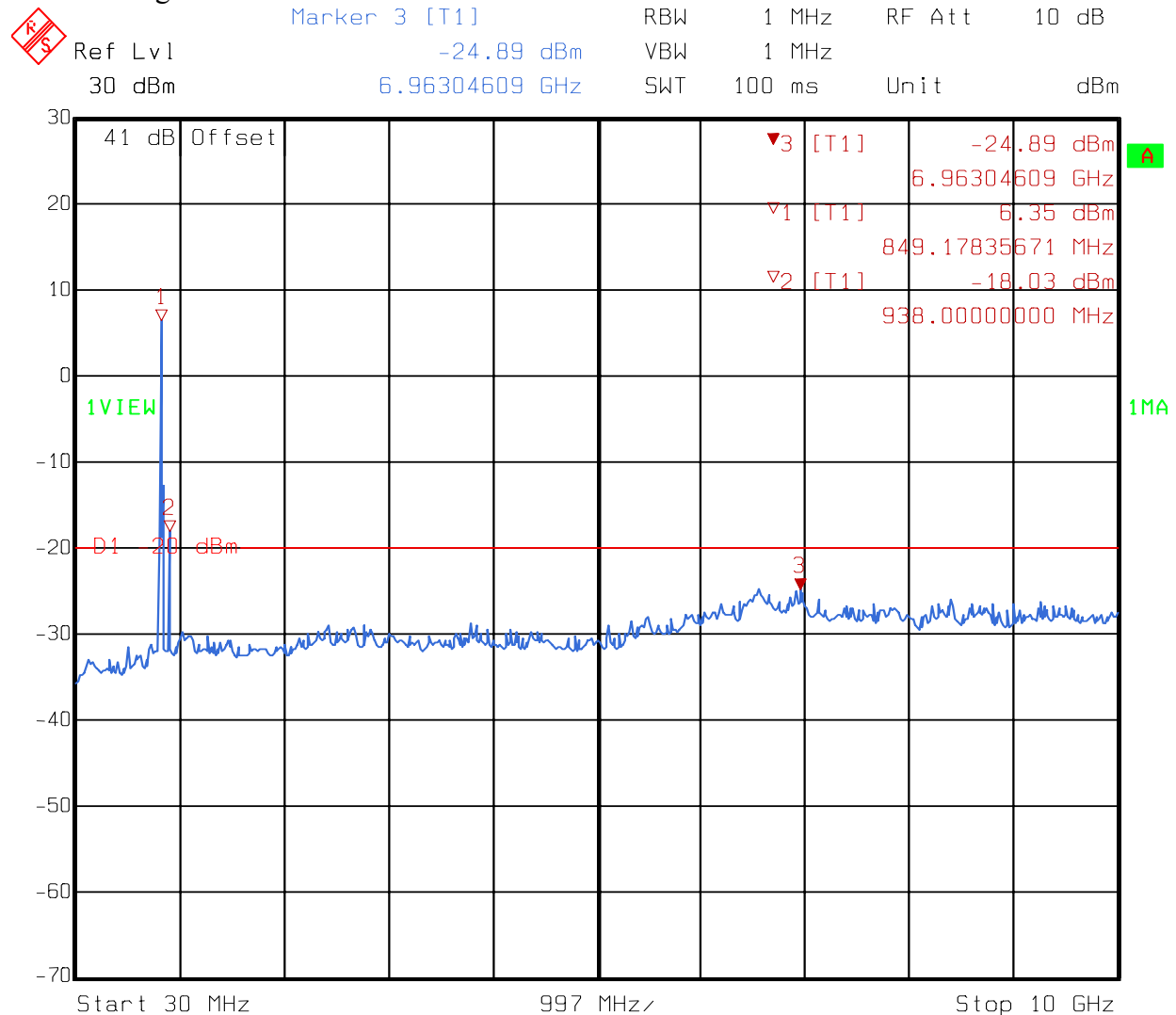
Tx 860 MHz

Analog

Marker1=tx 43 dBm notched

Marker2=900 MHz band

Marker3=highest emission



Date: 28.SEP.2005 12:58:25

EQUIPMENT: MMR8L/9L

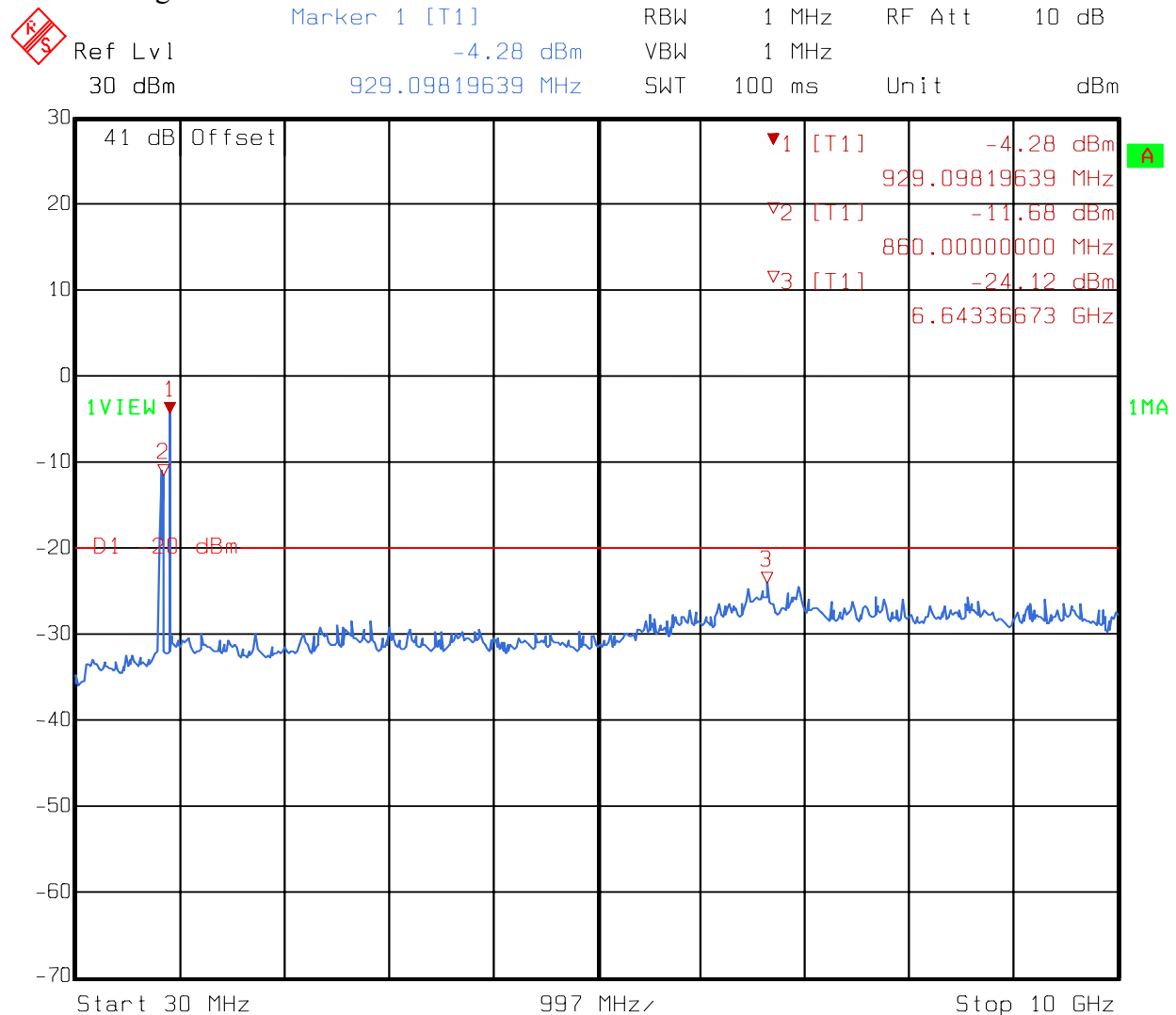
Tx 938 MHz

Analog

Marker1=tx 35 dBm notched

Marker2=800 MHz band

Marker3=highest emission



Date: 28.SEP.2005 13:01:21

EQUIPMENT: MMR8L/9L

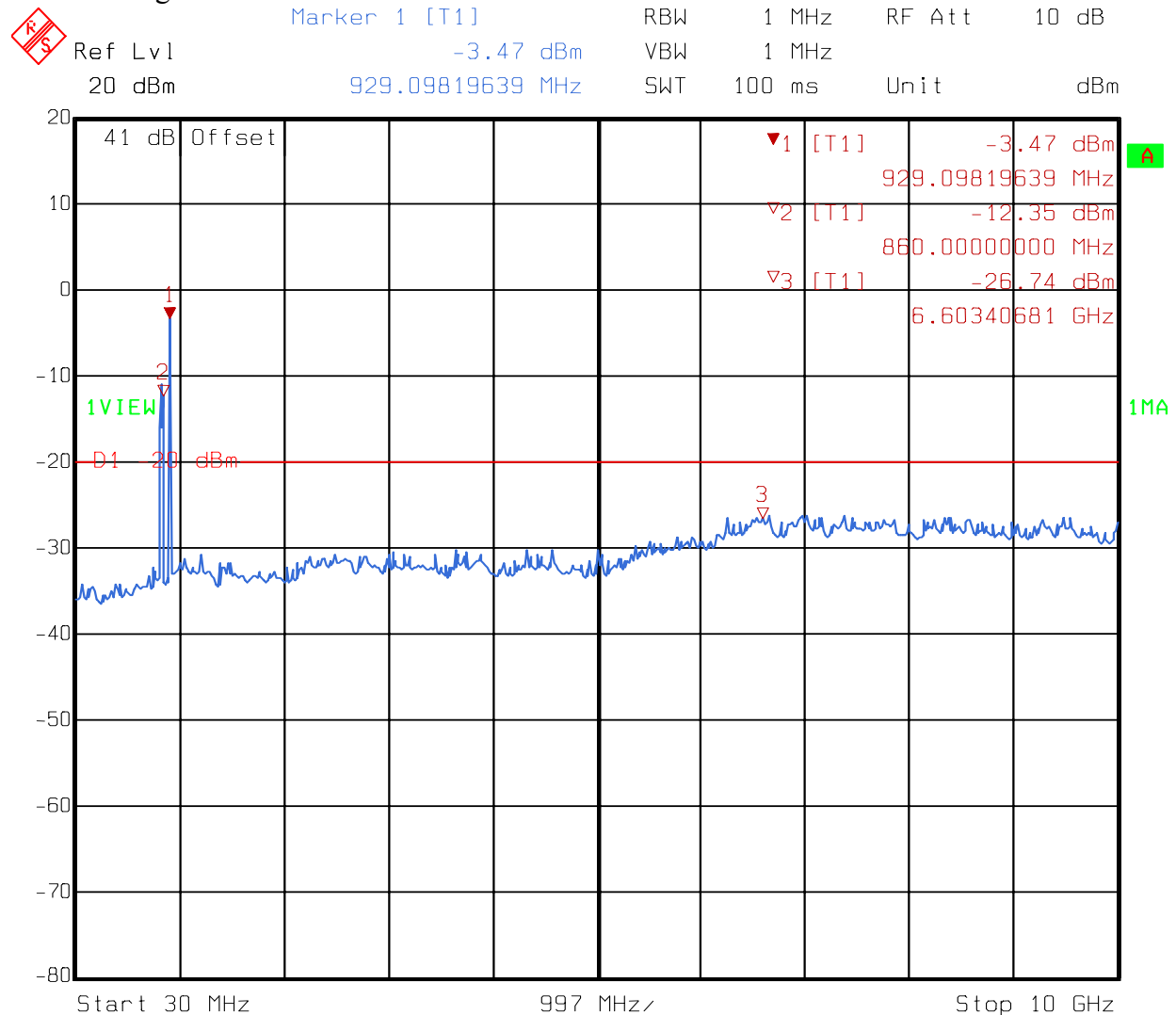
Tx 938 MHz

iDEN

Marker1=tx 35 dBm notched

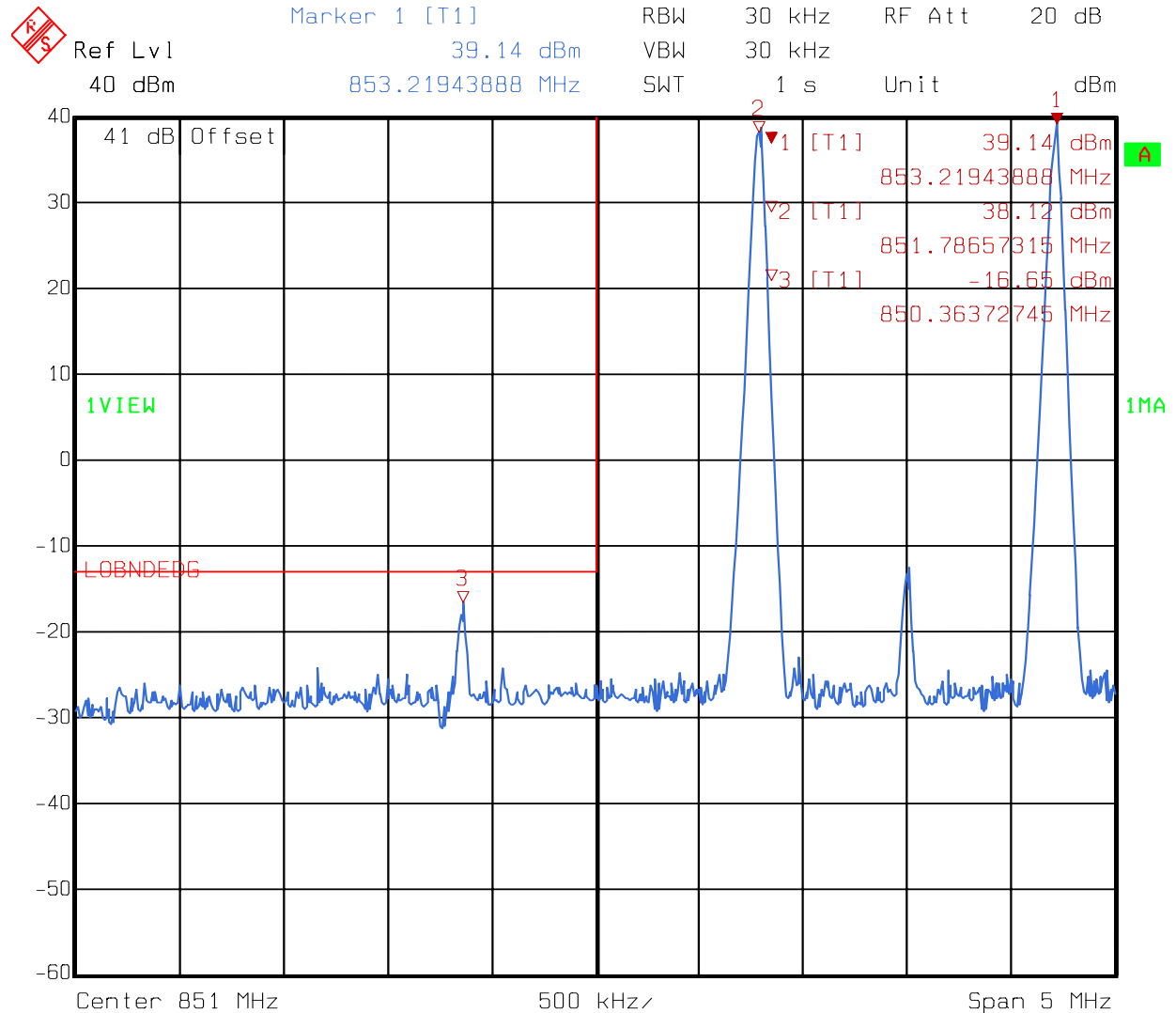
Marker2=800 MHz band

Marker3=highest emission



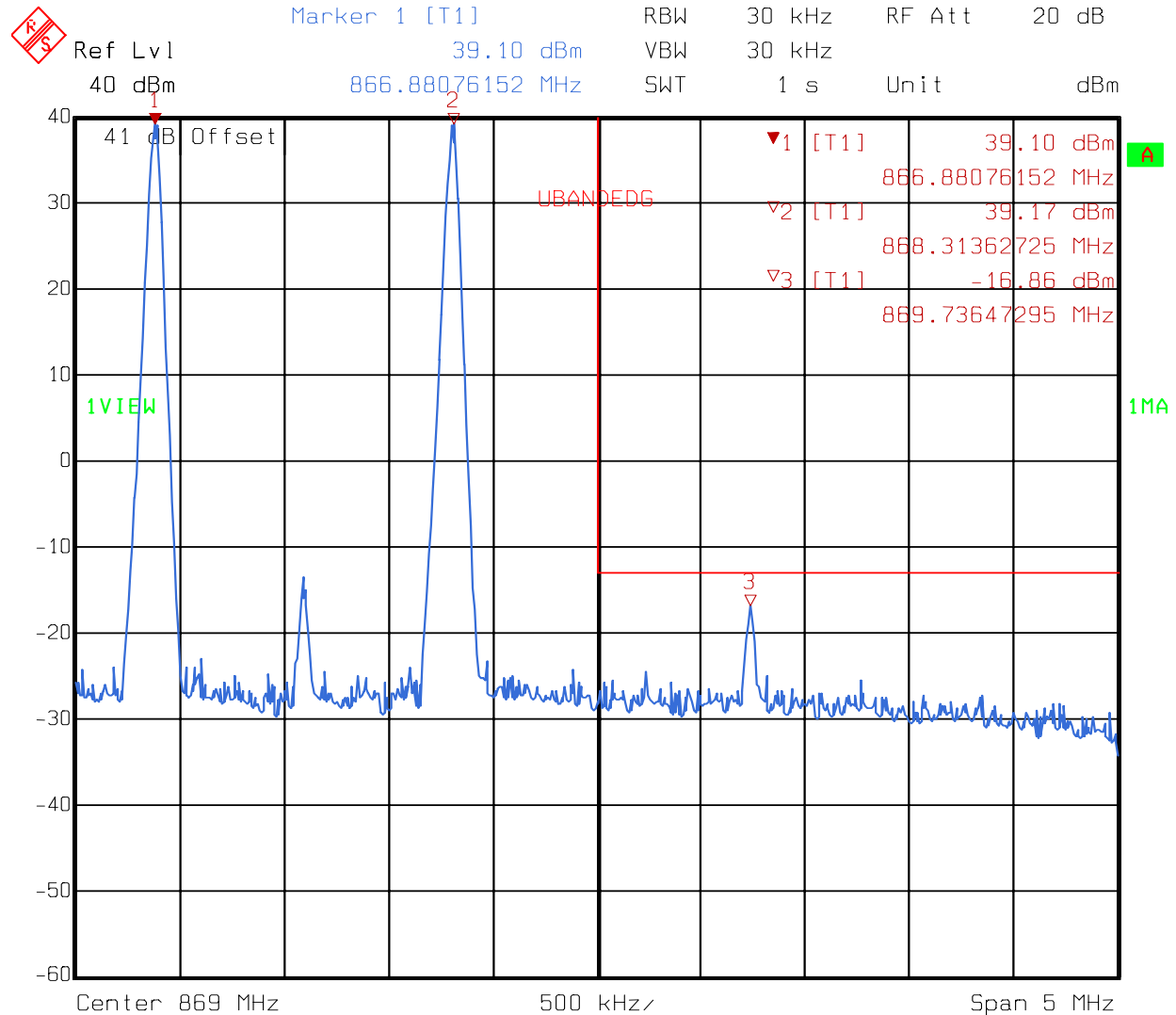
Date: 28.SEP.2005 13:05:21

iDEN IM



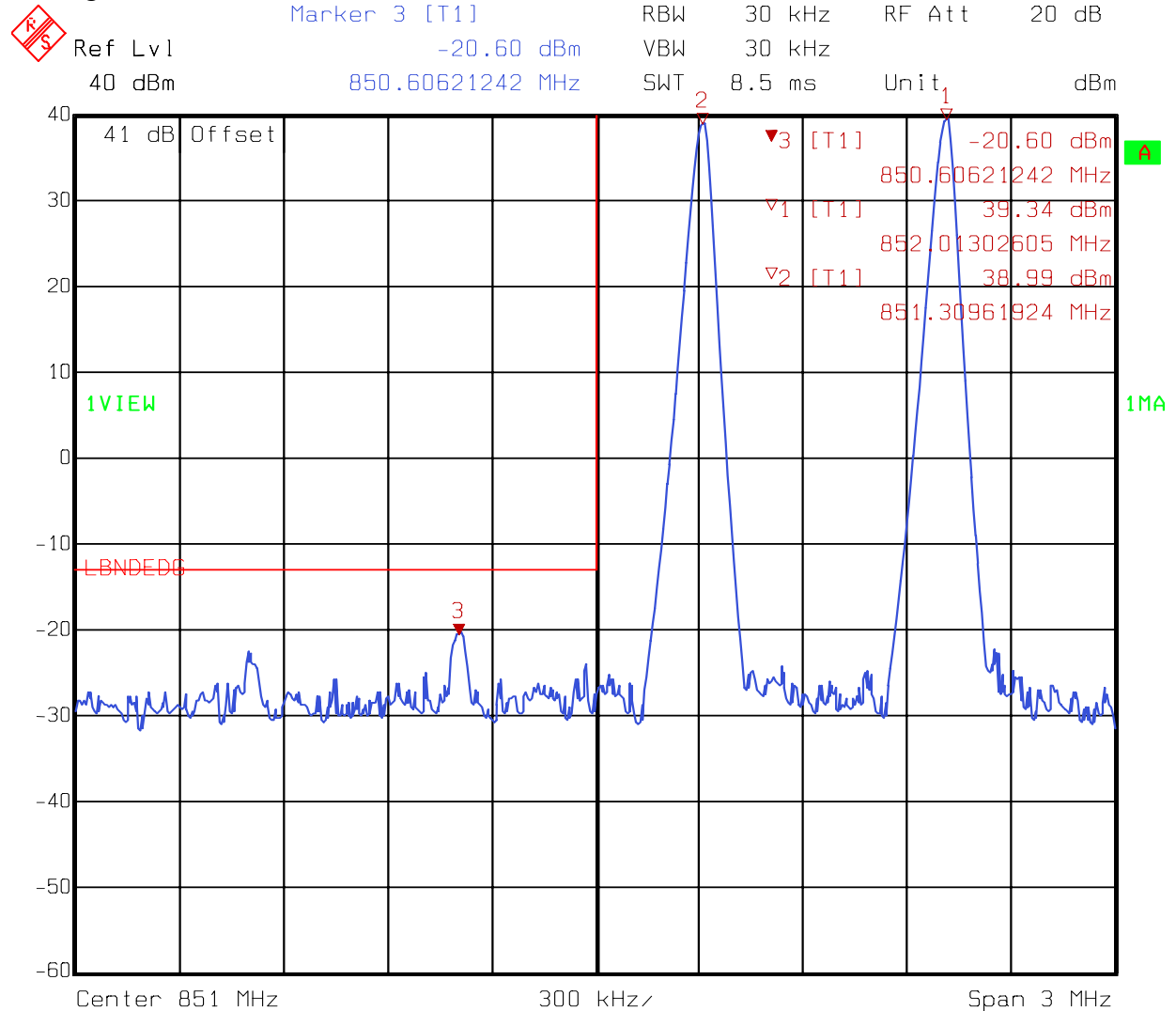
Date: 28.SEP.2005 13:35:09

iDEN IM



Date: 28.SEP.2005 13:37:45

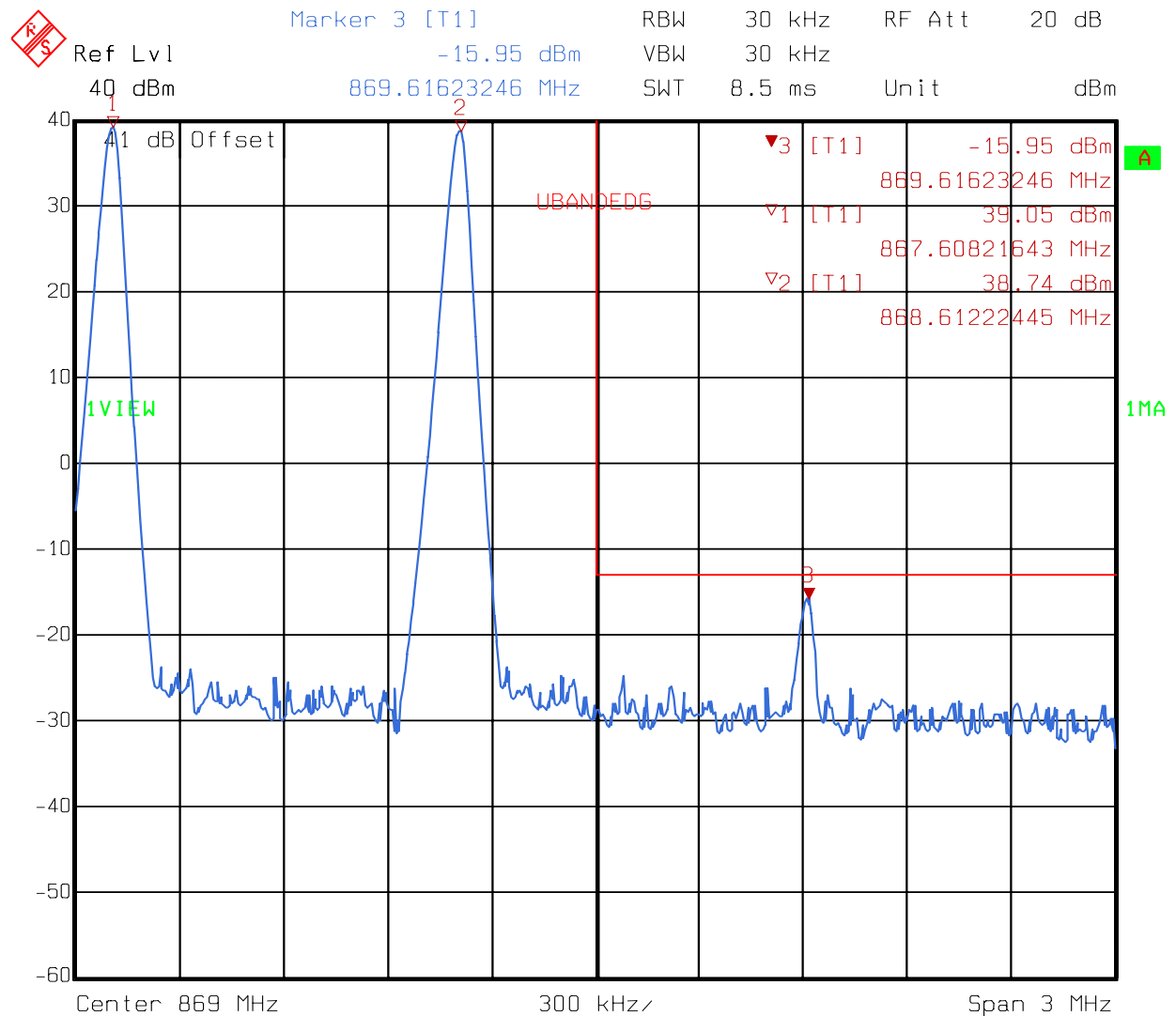
Analog IM



Date: 28.SEP.2005 14:36:36

EQUIPMENT: MMR8L/9L

Analog IM

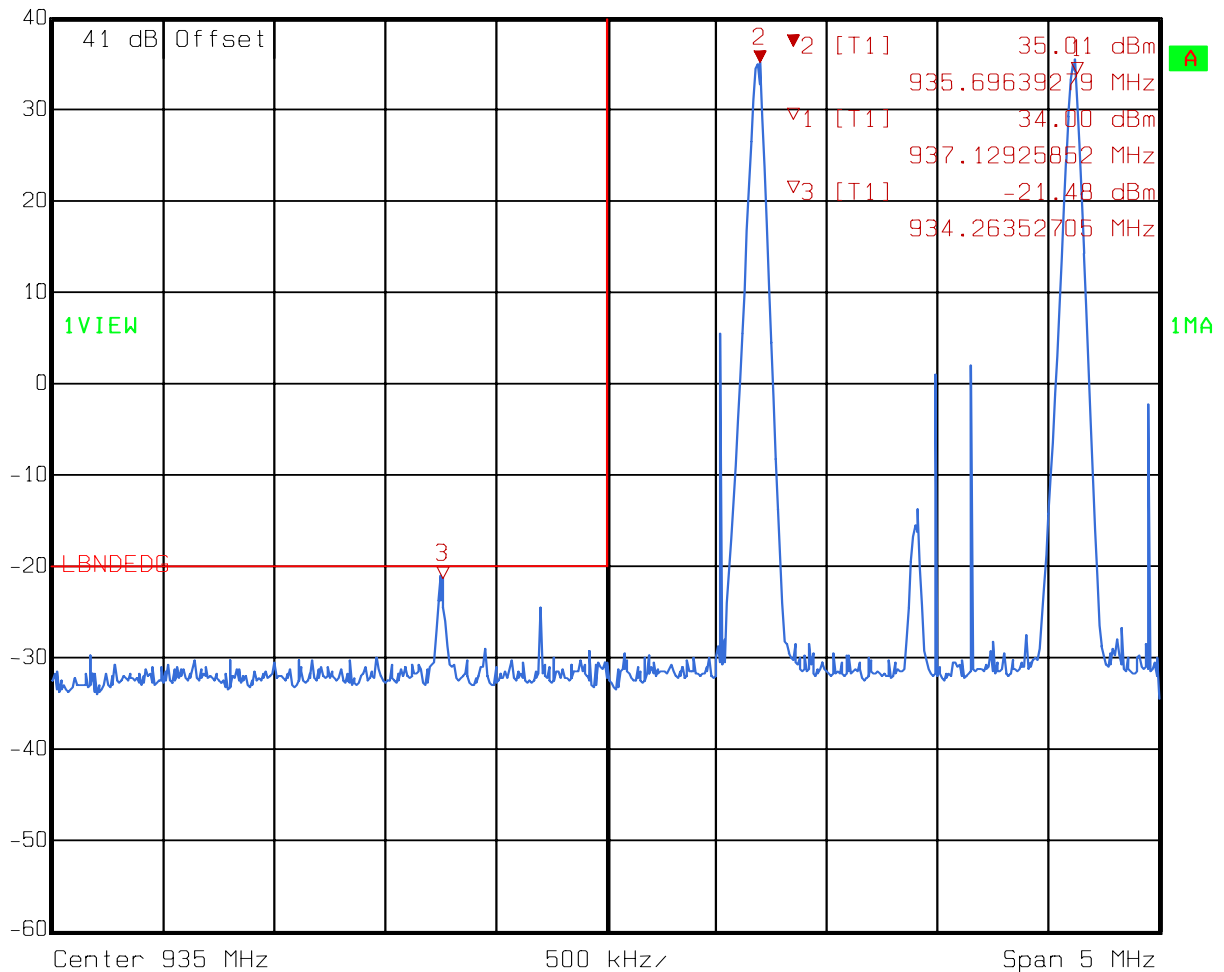


Date: 28.SEP.2005 14:10:58

iDEN IM

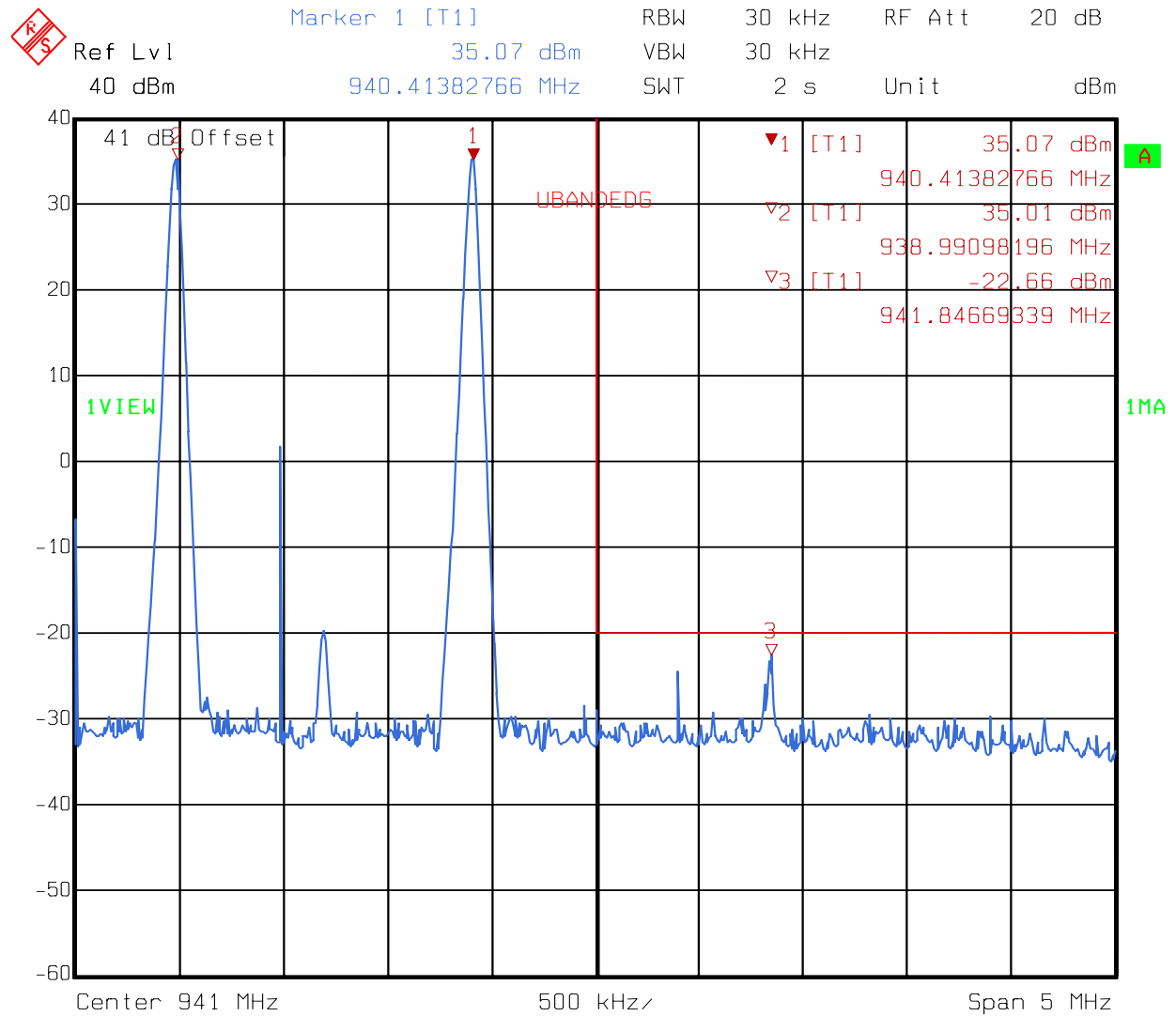


Marker 2 [T1] RBW 30 kHz RF Att 20 dB
Ref Lvl 35.01 dBm VBW 30 kHz
40 dBm 935.69639279 MHz SWT 2 s Unit dBm



Date: 28.SEP.2005 13:49:26

iDEN IM



Date: 28.SEP.2005 13:53:26

Analog IM



Marker 1 [T1]

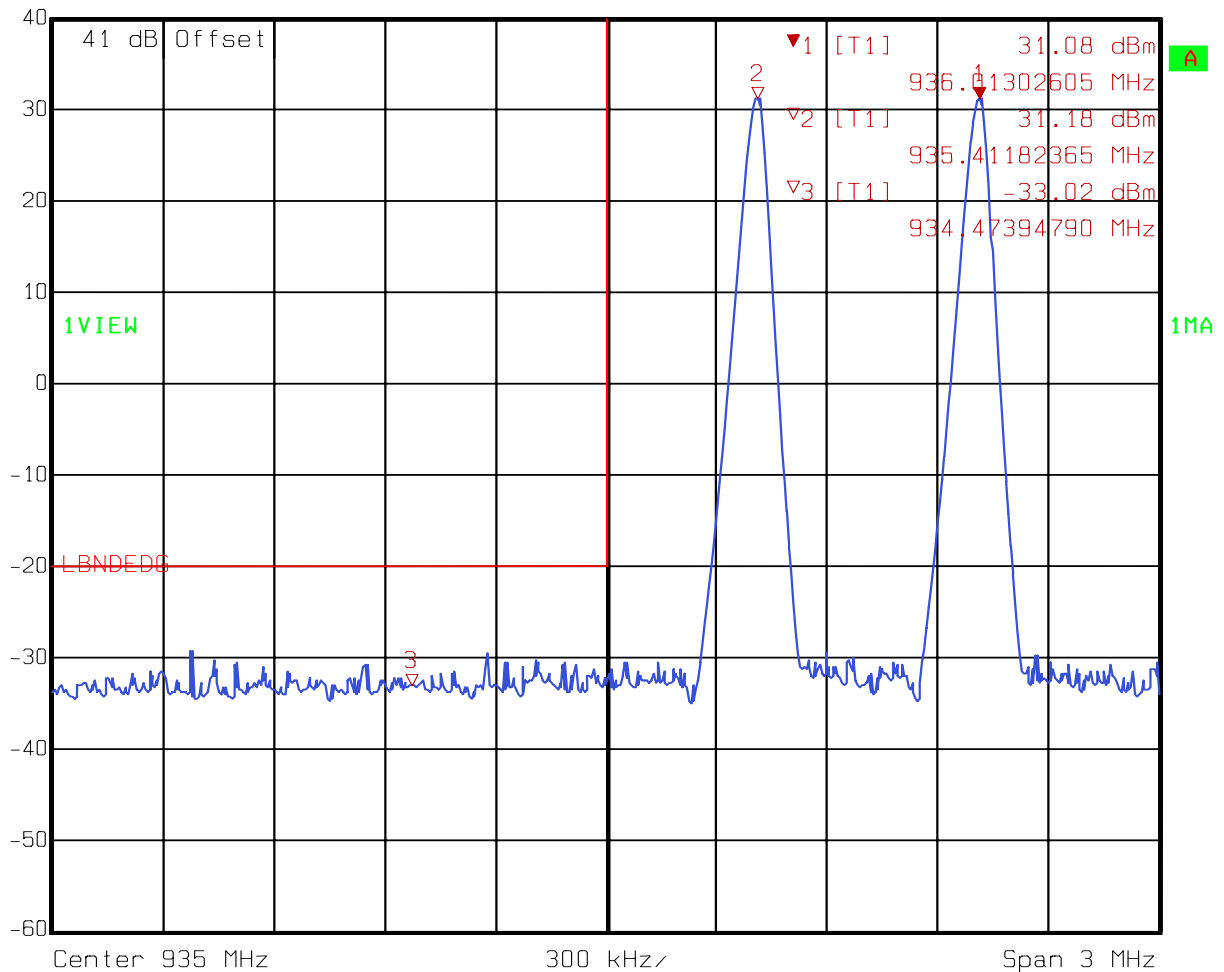
RBW 30 kHz RF Att 20 dB

Ref Lvl 31.08 dBm

VBW 30 kHz

40 dBm 936.01302605 MHz

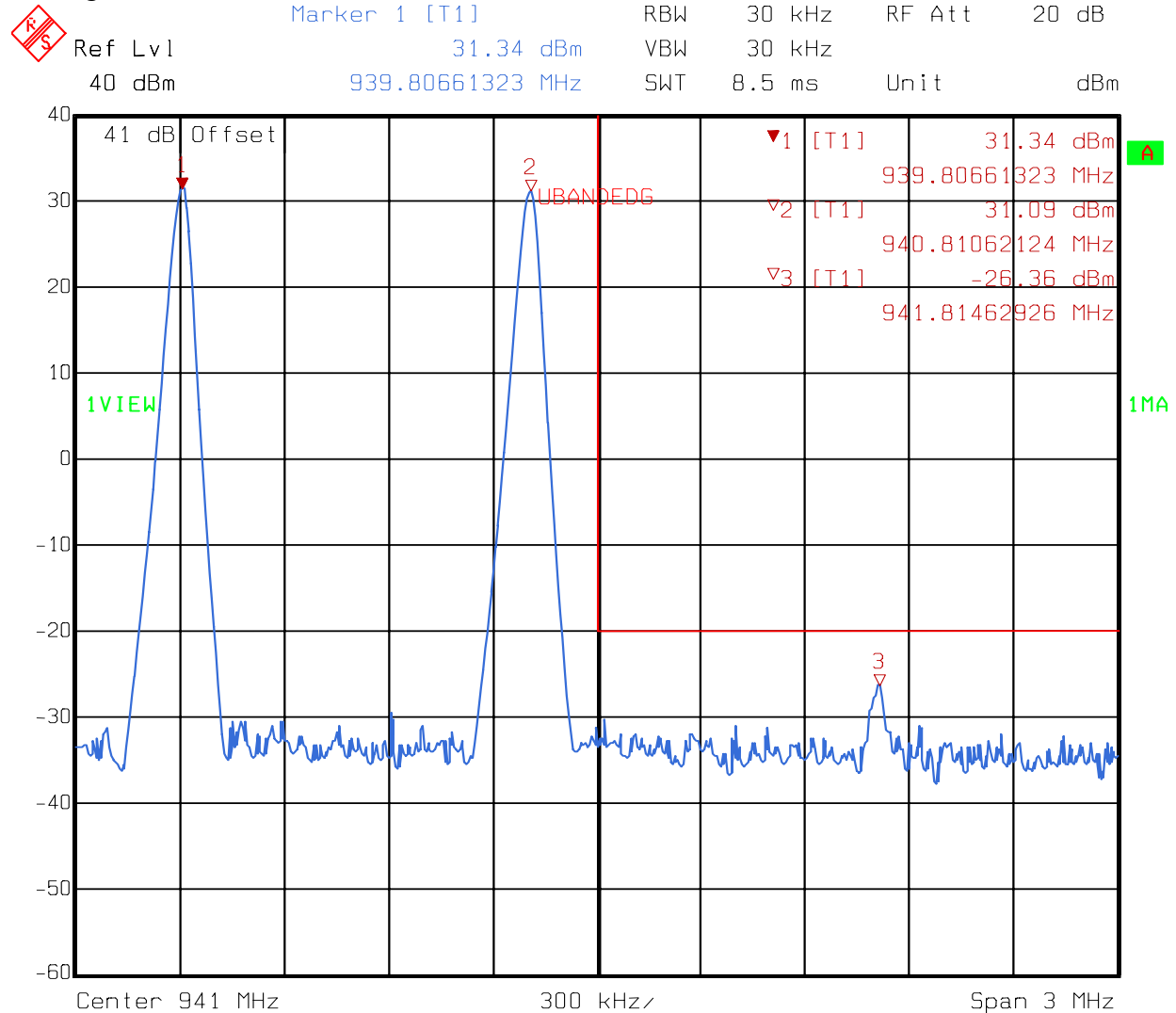
SWT 8.5 ms Unit dBm



Date: 28.SEP.2005 14:40:39

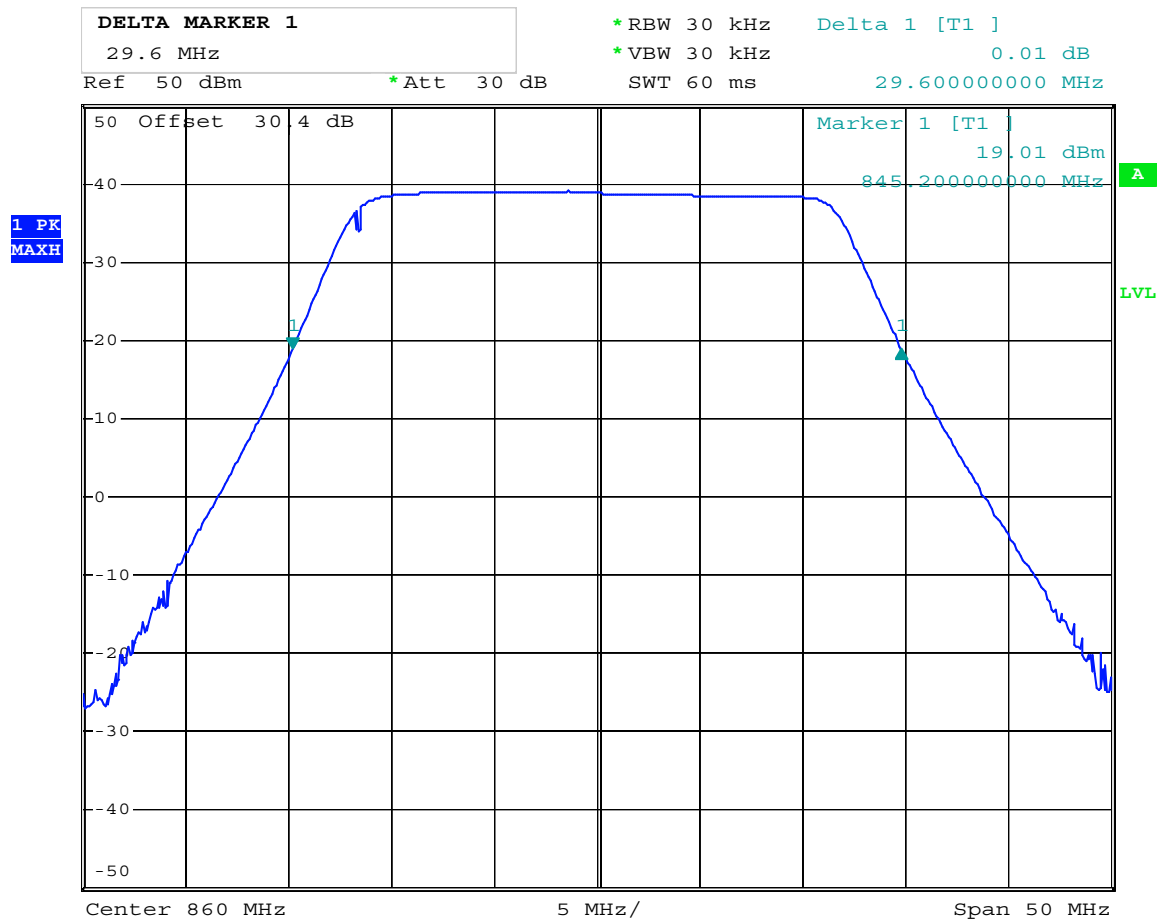
EQUIPMENT: MMR8L/9L

Analog IM



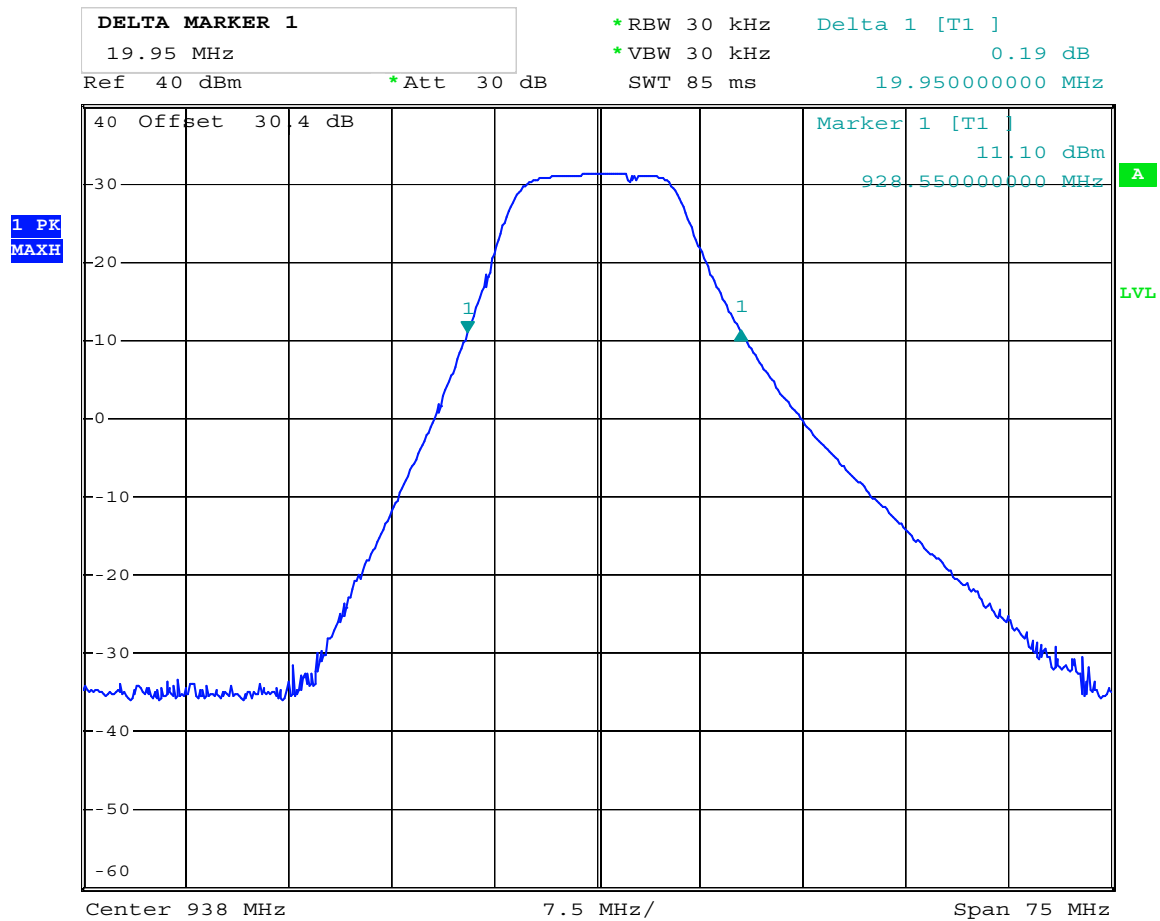
Date: 28.SEP.2005 14:04:29

EQUIPMENT: MMR8L/9L



Comment: Quasi Peak
Date: 9.JUN.2005 14:07:24

EQUIPMENT: MMR8L/9L



Comment: Quasi Peak
Date: 9.JUN.2005 14:40:38

Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: Kevin Rose	DATE: 6/28/05

Test Results: Complies**Test Data:** No Emissions found within 20dB of Limit. Noise floor was greater than 20dB below limit. Frequency range scanned from 30MHz to 20GHz**Note:** See page A5 for applicable limit.**Equipment Used:****Measurement Uncertainty:** +/- 3.6 dB**Temperature:** 21 °C**Relative Humidity:** 51 %

EQUIPMENT: MMR8L/9L

Photographs of Test Setup

FRONT VIEW



REAR VIEW



EQUIPMENT: MMR8L/9L**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	03/22/04	03/23/06
1471	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1626	CABLE, 5 ft	MEGAPHASE 10311 1GVT4	N/A	08/26/04	08/26/05
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	08/26/04	08/26/05
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/04	08/26/05
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	08/02/04	08/02/05
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
1476	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W4	NONE	CBU	N/A

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.

NAME OF TEST: Spurious Emissions at Antenna Terminals	PARA. NO.: 2.991
--	-------------------------

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

VBW = RBW

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

EQUIPMENT: **MMR8L/9L****NAME OF TEST: Occupied Bandwidth****PARA. NO.: 2.989****Minimum Standard:** Para. No. 90.210, see table 1 below for applicable mask.**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

NAME OF TEST: Field Strength of Spurious**PARA. NO.: 2.993****Minimum Standard:** Para. No. 90.210, see table 1 for applicable mask.

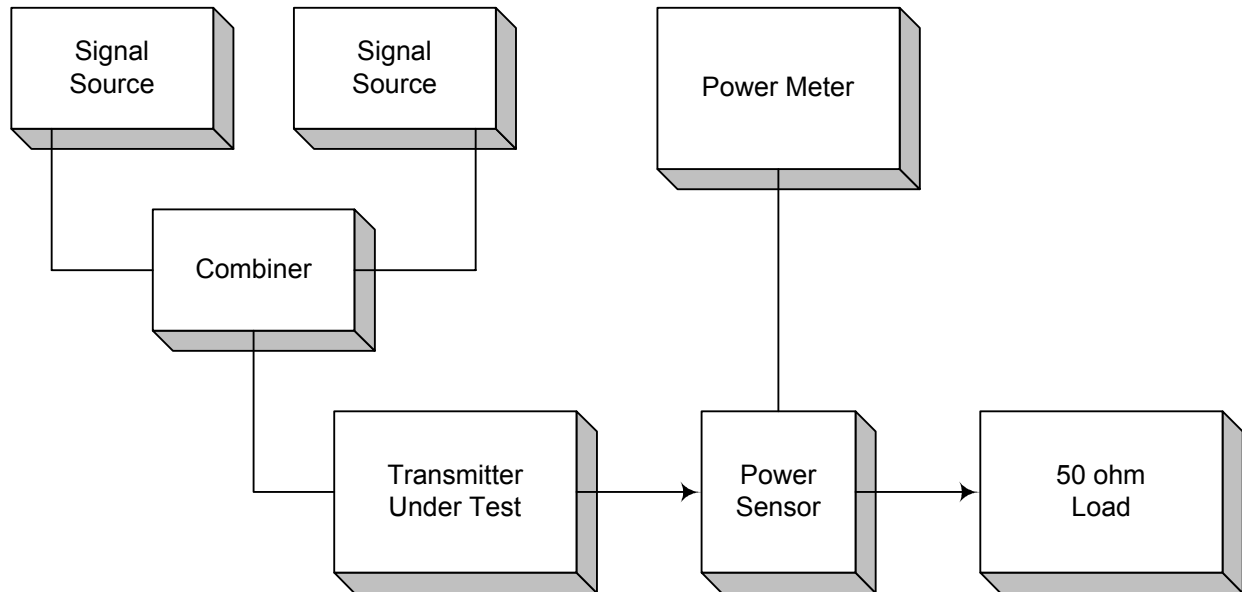
Test Method: The substitution antenna method was used to measure erp of spurious emissions. This method is described in EIA/TIA 603. The field strength of the emission is measured and recorded. The EUT is then replaced with a substitution antenna of known gain against a dipole. The substitution antenna is fed with a calibrated signal which is adjusted until the previously recorded value is repeated. The erp of the spurious signal is the level required to repeat the previously measured level. If the substitution antenna gain is calibrated and expressed as dBi (referenced to an isotropic radiator instead of a dipole), the result is adjusted by 2.15 dB so that the result is erp not eirp.

EQUIPMENT: MMR8L/9L**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**

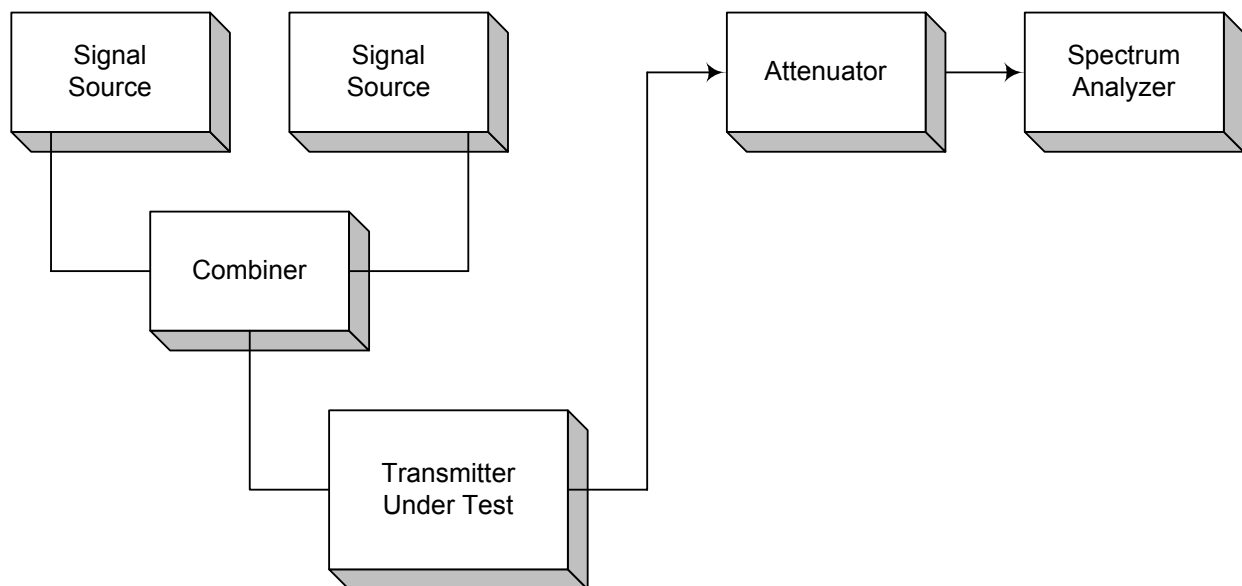
Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 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

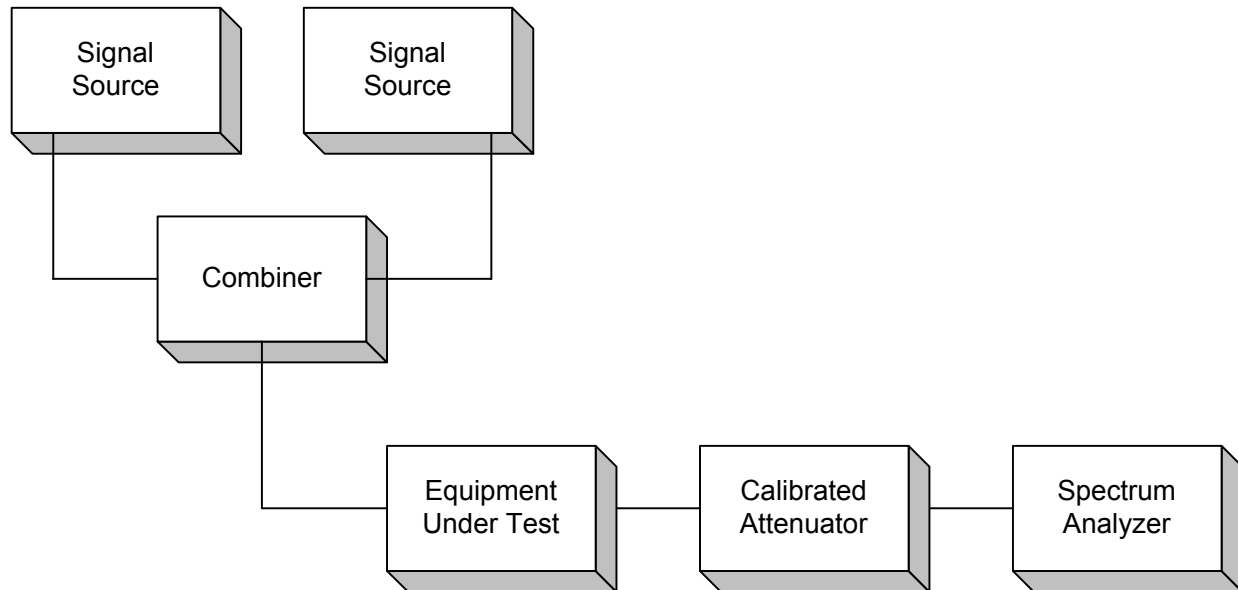
Para. No. 2.985 - R.F. Power Output



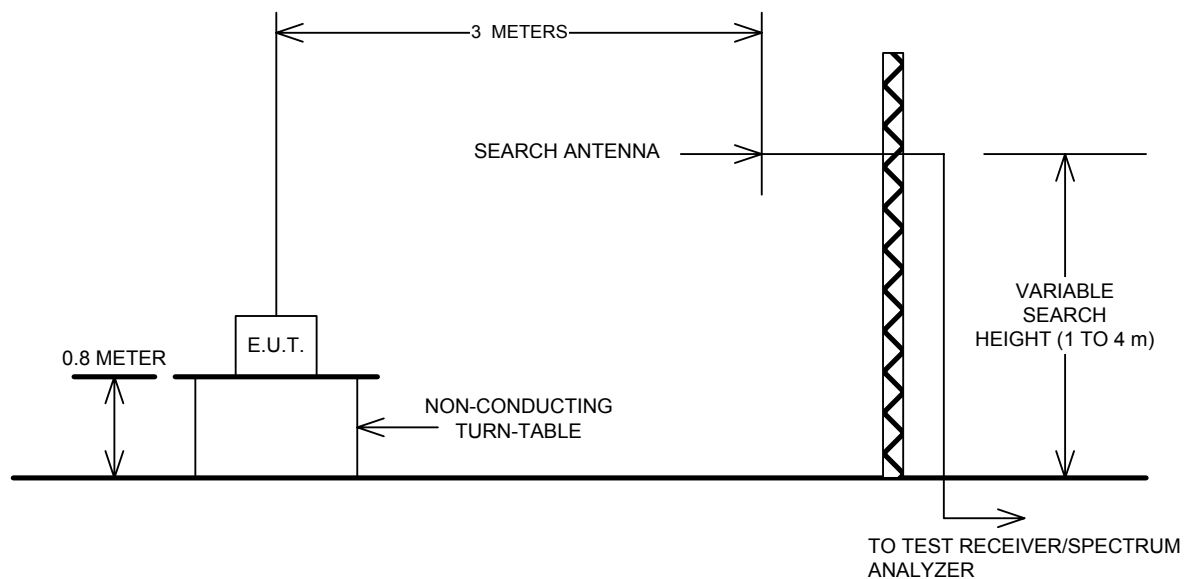
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 - Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

