



Nemko Test Report: 10220130RUS1

Applicant: Sirit Corporation
1321 Valwood Parkway
Carrollton, TX 75006

Equipment Under Test: ID 4100-90
(E.U.T.)

FCC Identifier: M4ZID4100-90

In Accordance With: **FCC Part 90, Subpart I**
LMS Transmitter

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

TESTED BY:

David Light, Senior Wireless Engineer

DATE: 12 Feb 2012

APPROVED BY:

Mike Cantwell

DATE: 20 Mar 2012

Total Number of Pages: 40

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Section 1. Summary of Test Results

Manufacturer: Sirit Corporation
Model No.: ID 4100-90
Serial No.: 08469F01E8467AF6

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. NONE
See "Summary of Test Data".

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Modifications:

Rev	Description
1	Original release
2	Changed ID 4100-3 to ID 4100-90 on page 6
	Changed channel frequency to 911.2 MHz and added band edge limit line on page 18.
	Replaced photo on page 28

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	90.205	30 Watts ERP	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	Plots	Complies
Field Strength of Spurious Emissions	90.210	-25 dBm	Complies
Frequency Stability	90.213		
Transient Frequency Behavior	90.214	N/A	N/A

Footnotes:

- (1) The radio does not support audio modulation.
- (2) Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge are not subject to frequency stability restrictions. The device however was measured to show compliance to Part 2 requirements.

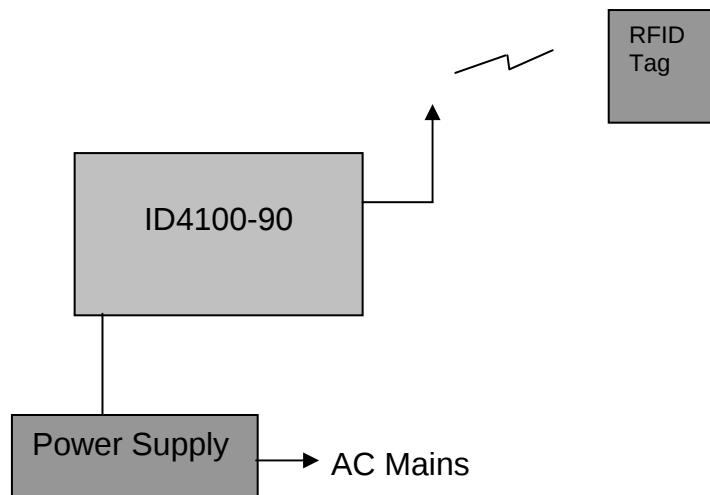
Section 2. General Equipment Specification**Transmitter****Supply Voltage Input:** 120 Vac**Frequency Range:** 909.75 to 921.75 MHz**Tunable Bands:** 911.20 to 920.45 MHz

Type(s) of Modulation:	F3E (Voice)	F1D	F2D	D7W (QAM)	Other K1D
	☐	☐	☐	☐	☒

Output Impedance: 50 ohms**Operator Selection of Operating Frequency:** Software controlled**Power Output Adjustment Capability:** Software controlled

Description of EUT

ID 4100-90 is a 900 MHz RFID reader operating in the non-multilateral services. The IDentity 4100-90 is equipped with one 50 Ohm external RFID antenna port and also can operate with its internal antenna. Only one port is active at any given time.

System Diagram

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 90.205
TESTED BY: D. Light	DATE: 10 Feb 2012

Test Results: Complies.

Measurement Data:

FLEX modulation 911.20 – 920.45 MHz

Frequency (MHz)	Measured Power (dBm)	Measured Power (Watts)
911.20	34.6	2.9
920.45	34.0	2.5

Title 21 modulation 911.20 – 920.45 MHz

Frequency (MHz)	Measured Power (dBm)	Measured Power (Watts)
911.20	34.5	2.8
920.45	34.0	2.5

The rf power output level must be adjusted when using antennas with gain in order to insure that the radio does not transmit above the 30 watt erp limit. The installer is advised in the User Guide to set the antenna gain and cable loss in the installation software. The reader is then automatically set to the appropriate power output level. As supplied the reader can only achieve a maximum of 2 watts rf power at the reader output port. For the purposes of this testing a special manufacturer access code was used to adjust the power to the absolute maximum as this gives the worst-case measurement results.

Test Equipment Used: 1036 -1627-1589-1064

Test Conditions:

Temperature: 22°C

Relative Humidity: 30%

Spectrum analyzer settings:

RBW: 3 MHz

VBW 3 MHz

Detector: Peak

Sweep time: Auto

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 90.210
TESTED BY: D. Light	DATE: 10 Feb 2012

Test Results: Complies.

Test Data: See attached graph(s).

Test Equipment Used: 1036 -1627-1589-1064

Test Conditions:

Temperature: 22°C

Relative Humidity: 30%

Spectrum analyzer settings:

RBW: 100 kHz

VBW 100 kHz

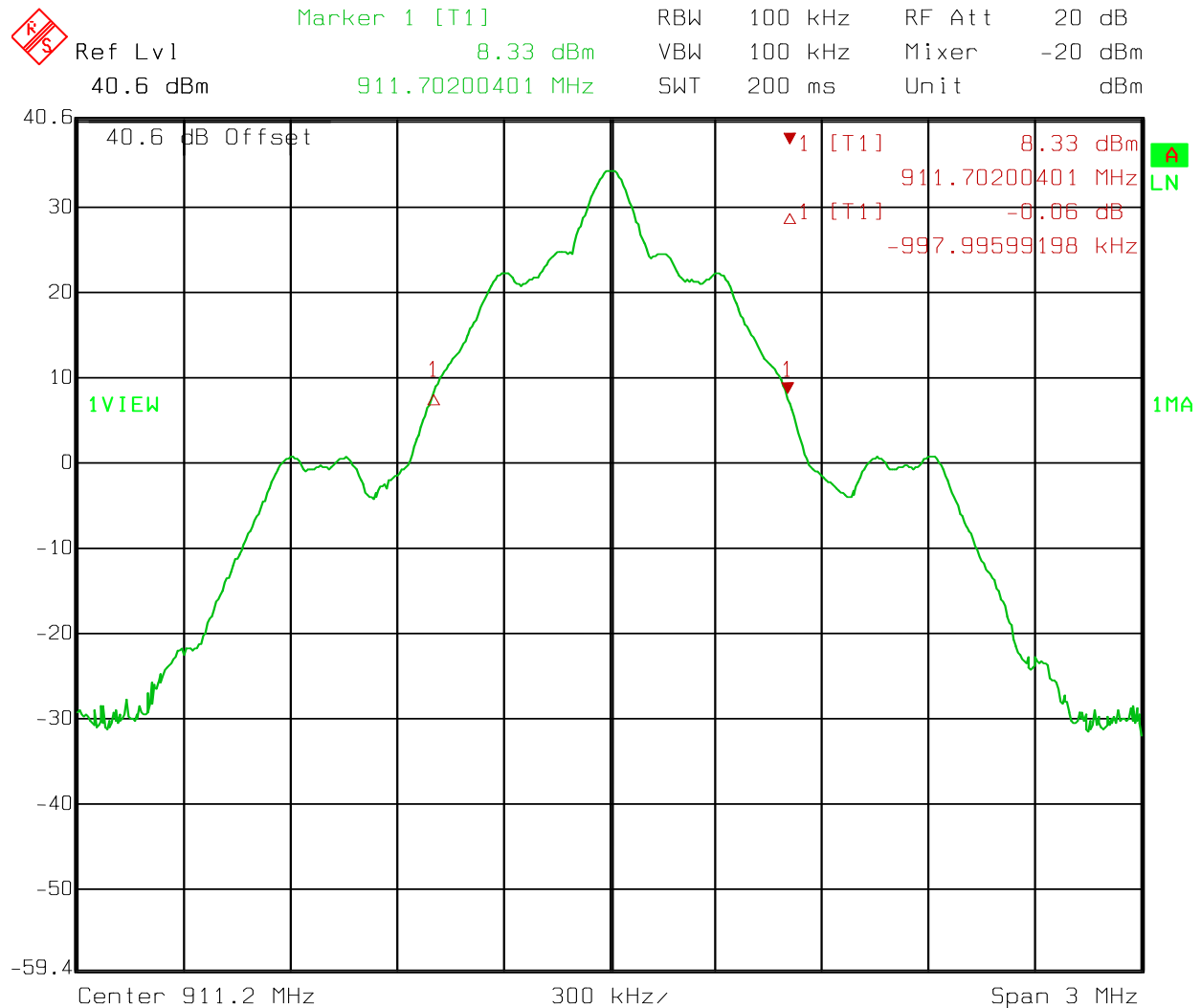
Detector: Peak

Sweep time: Auto

Test Data – Occupied Bandwidth

26 dB Bandwidth

Modulation mode Title 21



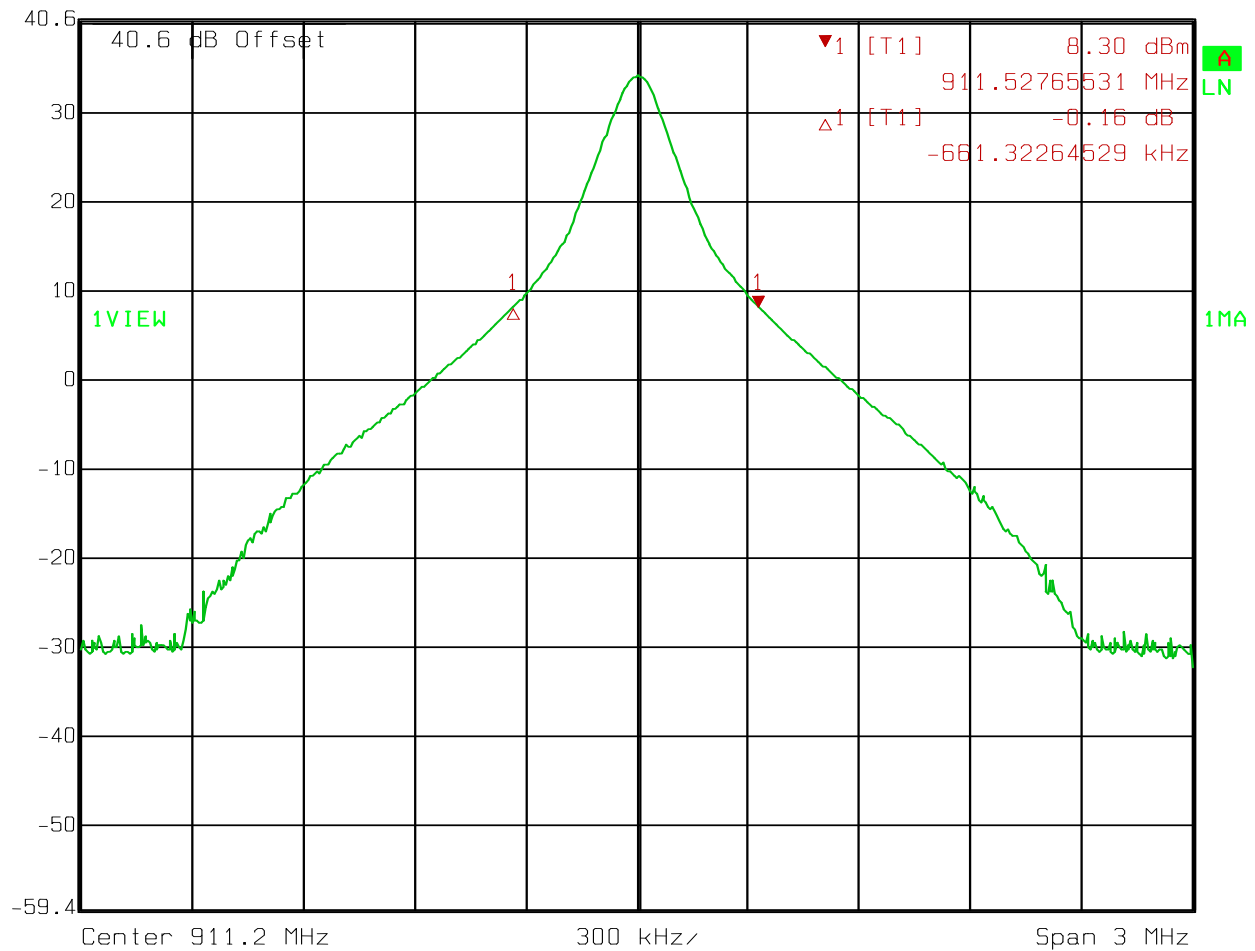
Date: 10.FEB.2012 14:35:40

26 dB Bandwidth

Modulation mode FLEX



Ref Lvl 40.6 dBm
Marker 1 [T1] 8.30 dBm
911.52765531 MHz
RBW 100 kHz RF Att 20 dB
VBW 100 kHz Mixer -20 dBm
SWT 200 ms Unit dBm



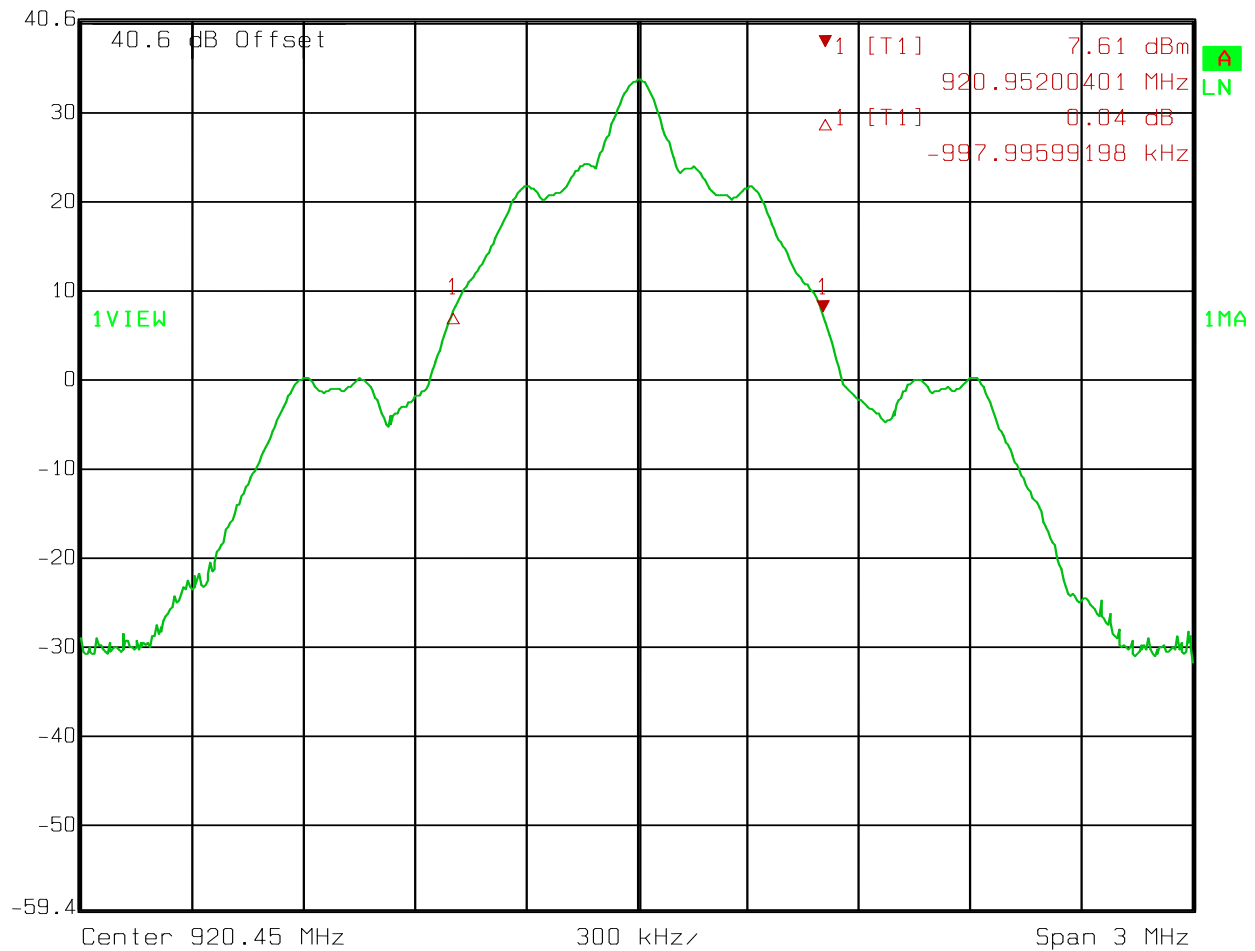
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26 dB Bandwidth

Modulation mode Title 21



Ref Lvl 40.6 dBm
Marker 1 [T1] 7.61 dBm
920.95200401 MHz
RBW 100 kHz
VBW 100 kHz
SWT 200 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm



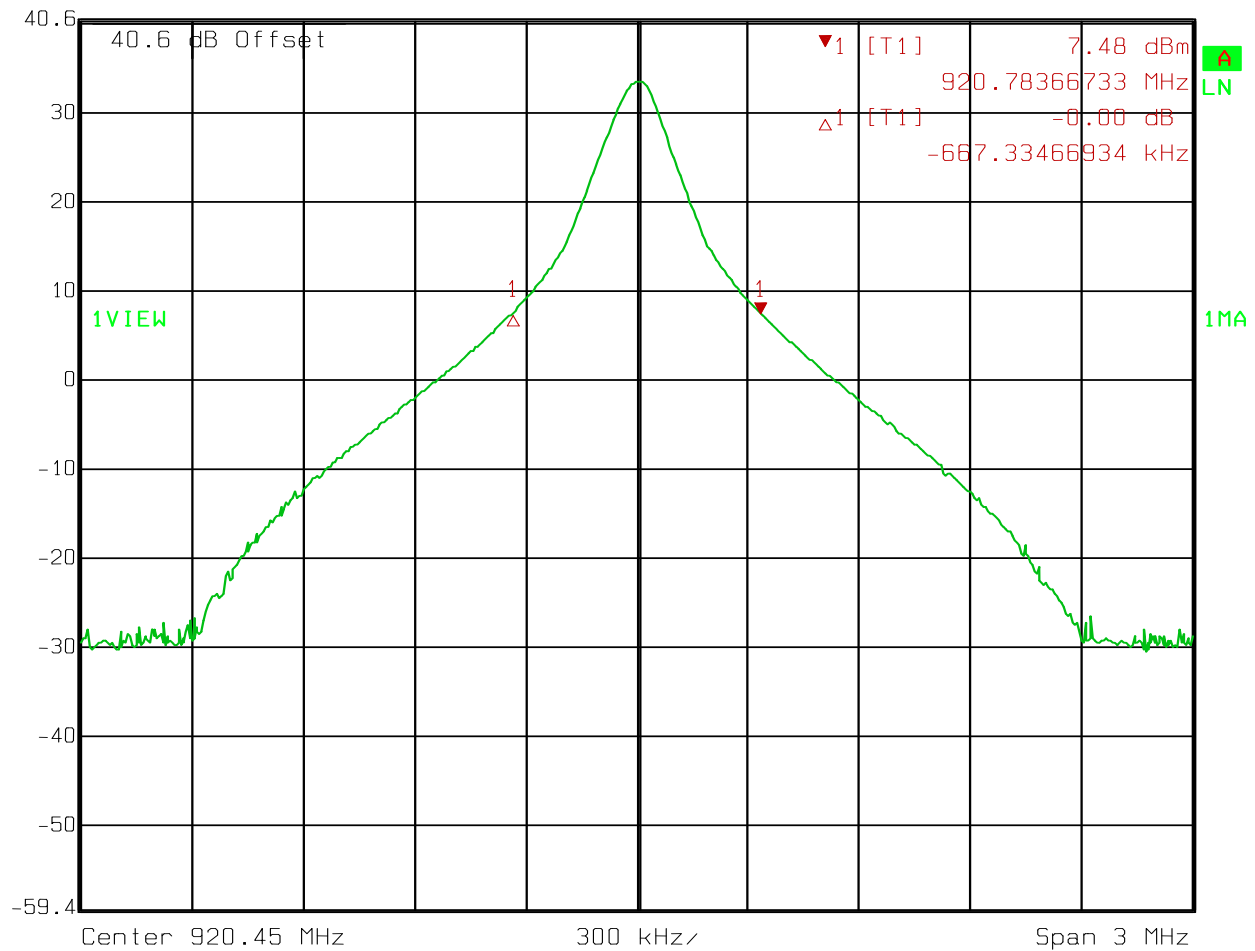
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26 dB Bandwidth

Modulation mode FLEX



Ref Lvl 40.6 dBm
Marker 1 [T1] 7.48 dBm
920.78366733 MHz
RBW 100 kHz
VBW 100 kHz
SWT 200 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm



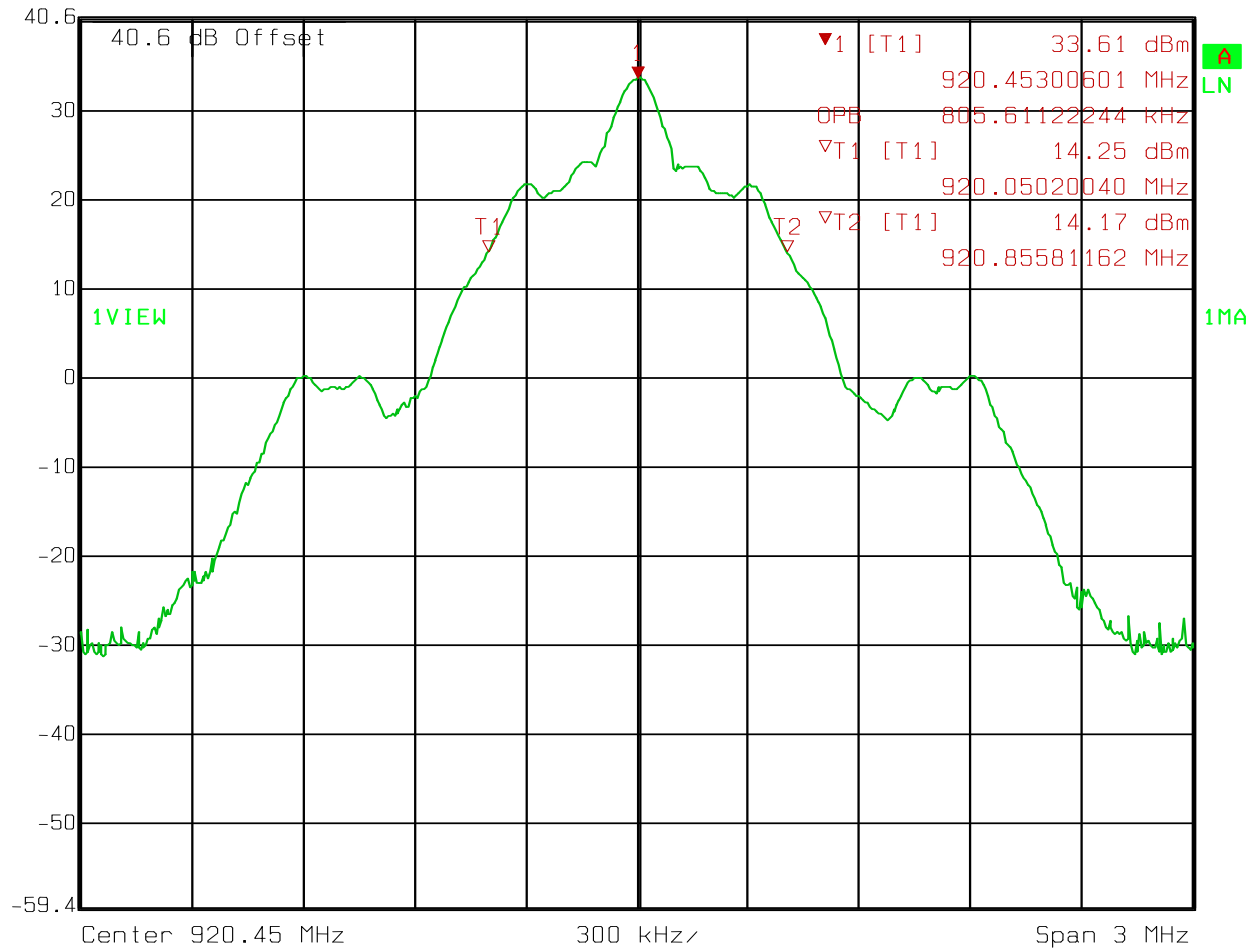
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99% OBW

Title 21



Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 33.61 dBm VBW 100 kHz Mixer -20 dBm
40.6 dBm 920.45300601 MHz SWT 200 ms Unit dBm



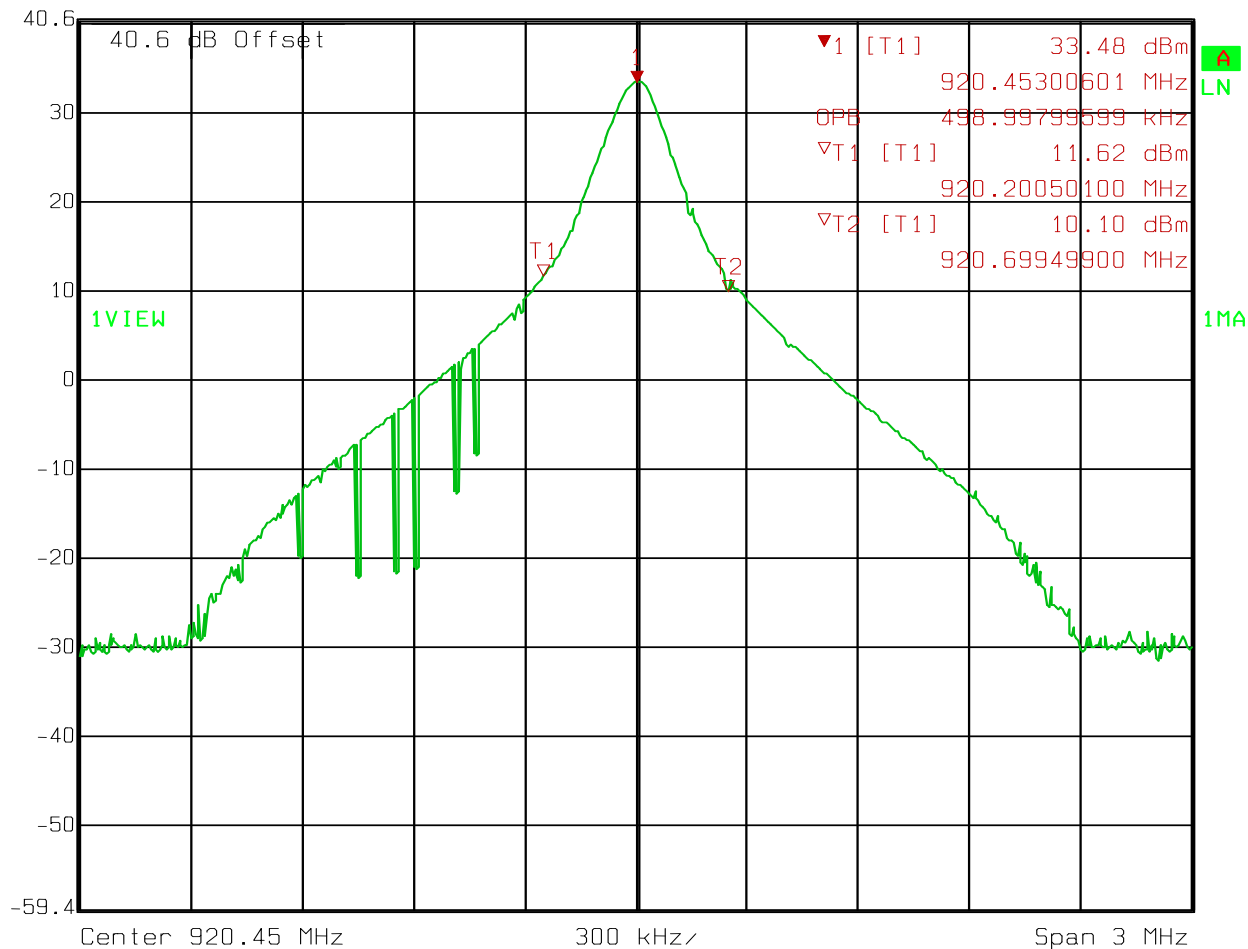
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99% OBW

FLEX



Marker 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl 33.48 dBm VBW 100 kHz Mixer -20 dBm
 40.6 dBm 920.45300601 MHz SWT 200 ms Unit dBm



Date: 10.FEB.2012 14:44:50

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 90.210
TESTED BY: D. Light	DATE: 10 Feb 2012

Test Results: Complies.

Test Data: See attached graph(s).

Test Equipment Used: 1036 -1627-1589-1064

Test Conditions:

Temperature: 21°C

Relative Humidity: 30%

Spectrum analyzer settings:

RBW: 100 kHz

VBW 100 kHz

Detector: Peak

Sweep time: Auto

Test Data – Spurious Emissions at Antenna Terminals

Lower Band Edge

Title 21 modulation mode

911.2 MHz



Ref Lvl

40.6 dBm

Marker 1 [T1]

-35.25 dBm

909.41933868 MHz

RBW 100 kHz

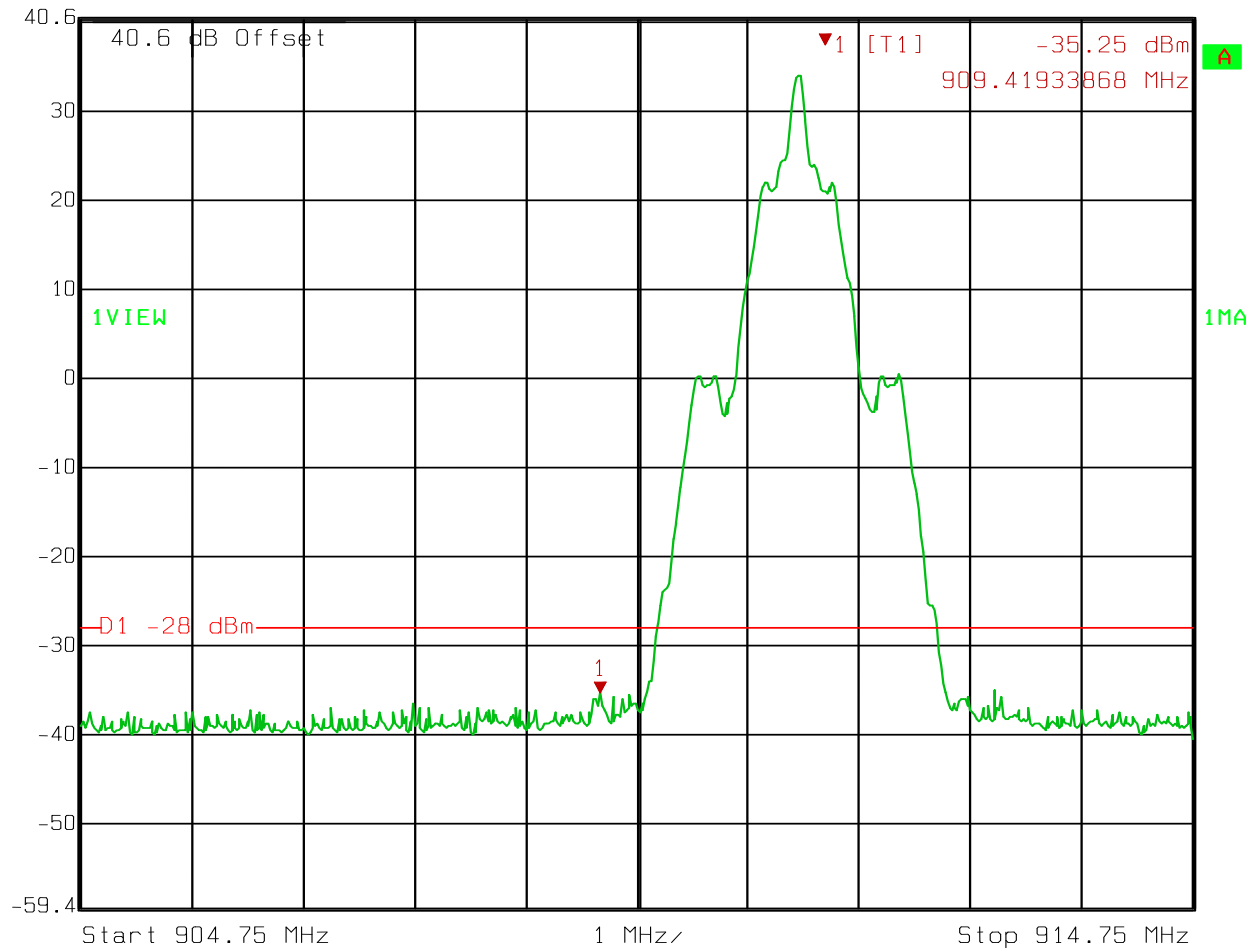
VBW 100 kHz

SWT 200 ms

RF Att 10 dB

Mixer -20 dBm

Unit dBm



Date: 10.FEB.2012 14:49:30

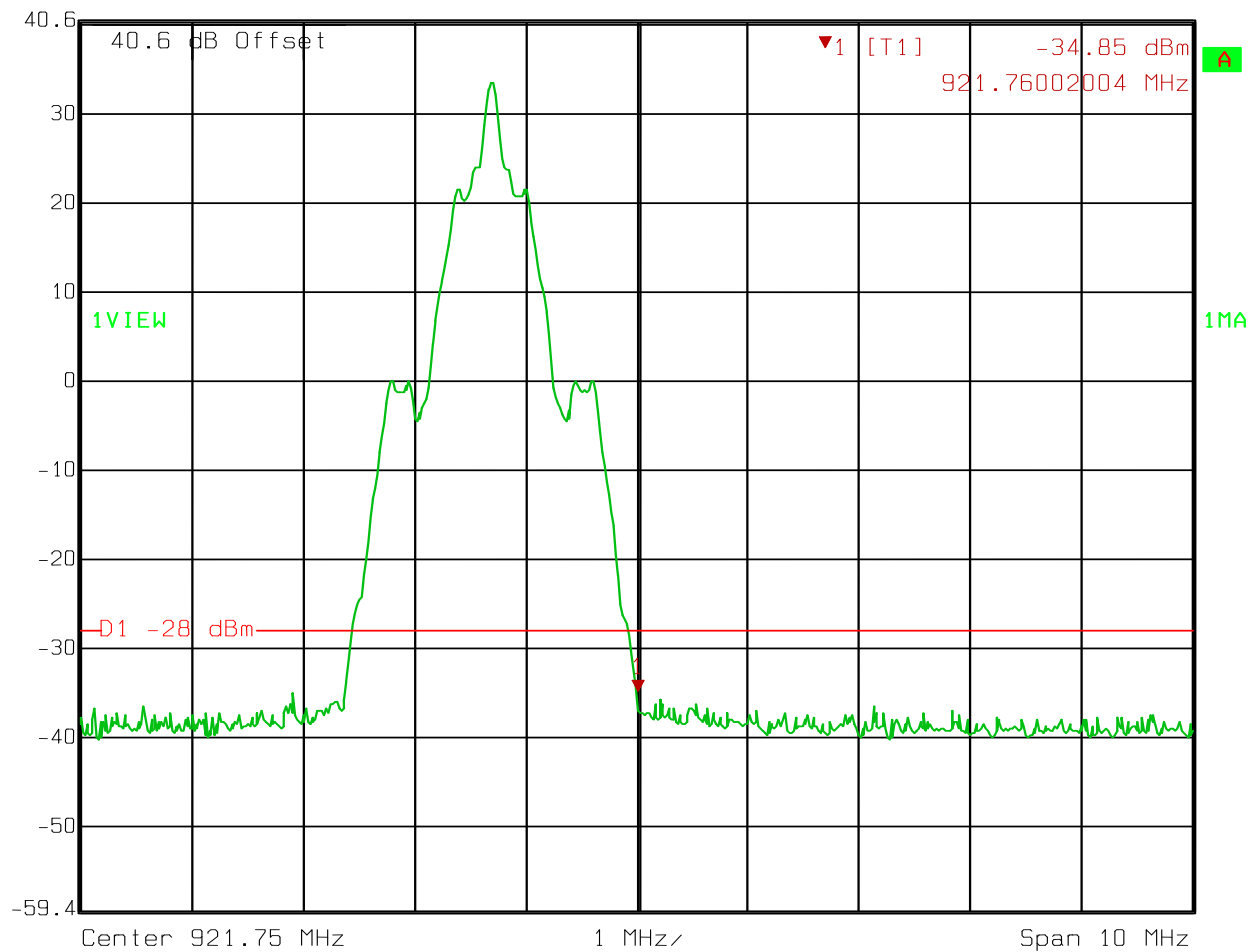
Upper Band Edge

Title modulation mode

920.45 MHz



Marker 1 [T1] RBW 100 kHz RF Att 10 dB
Ref Lvl -34.85 dBm VBW 100 kHz Mixer -20 dBm
40.6 dBm 921.76002004 MHz SWT 200 ms Unit dBm



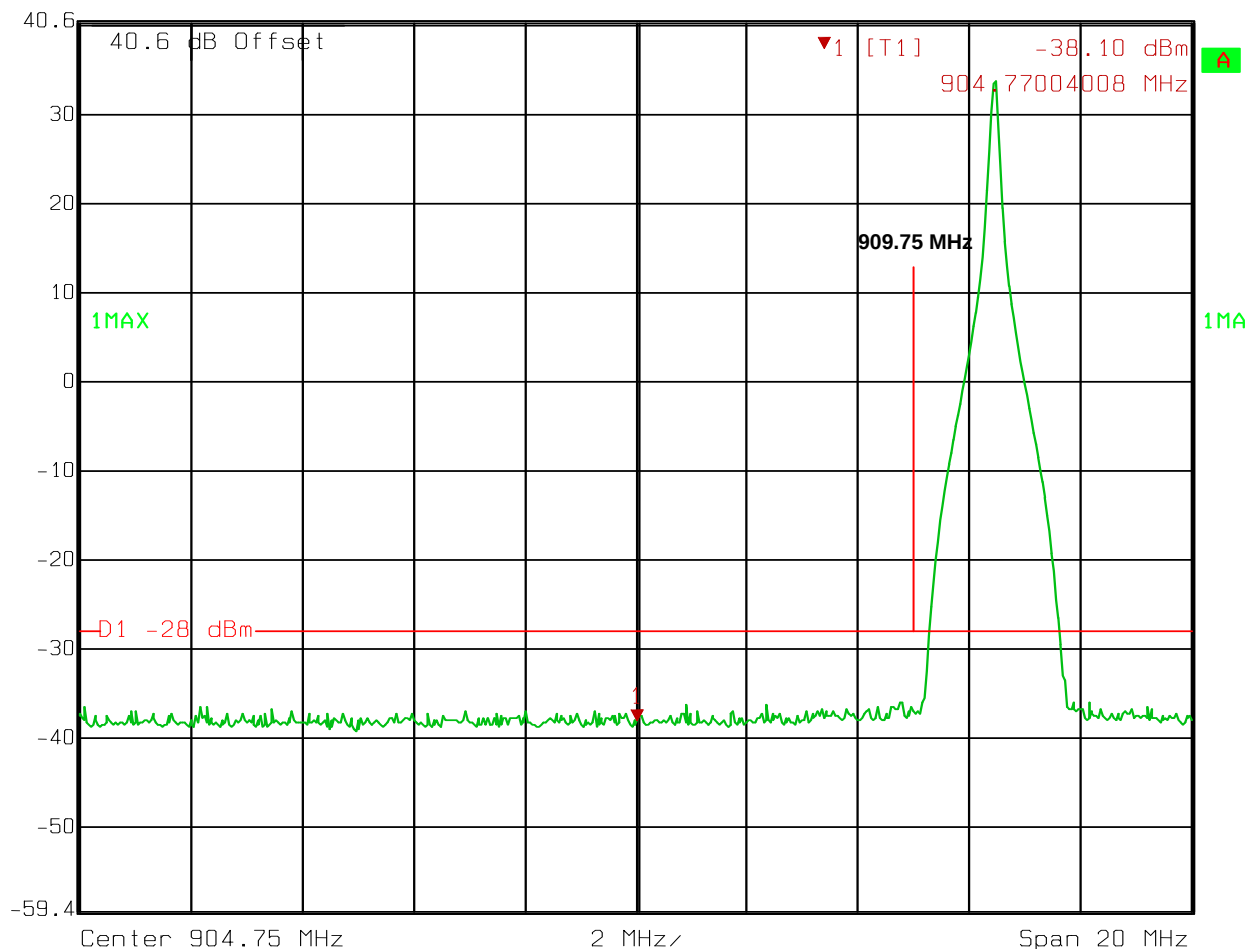
Date: 10.FEB.2012 14:50:49

Lower Band Edge

FLEX modulation mode

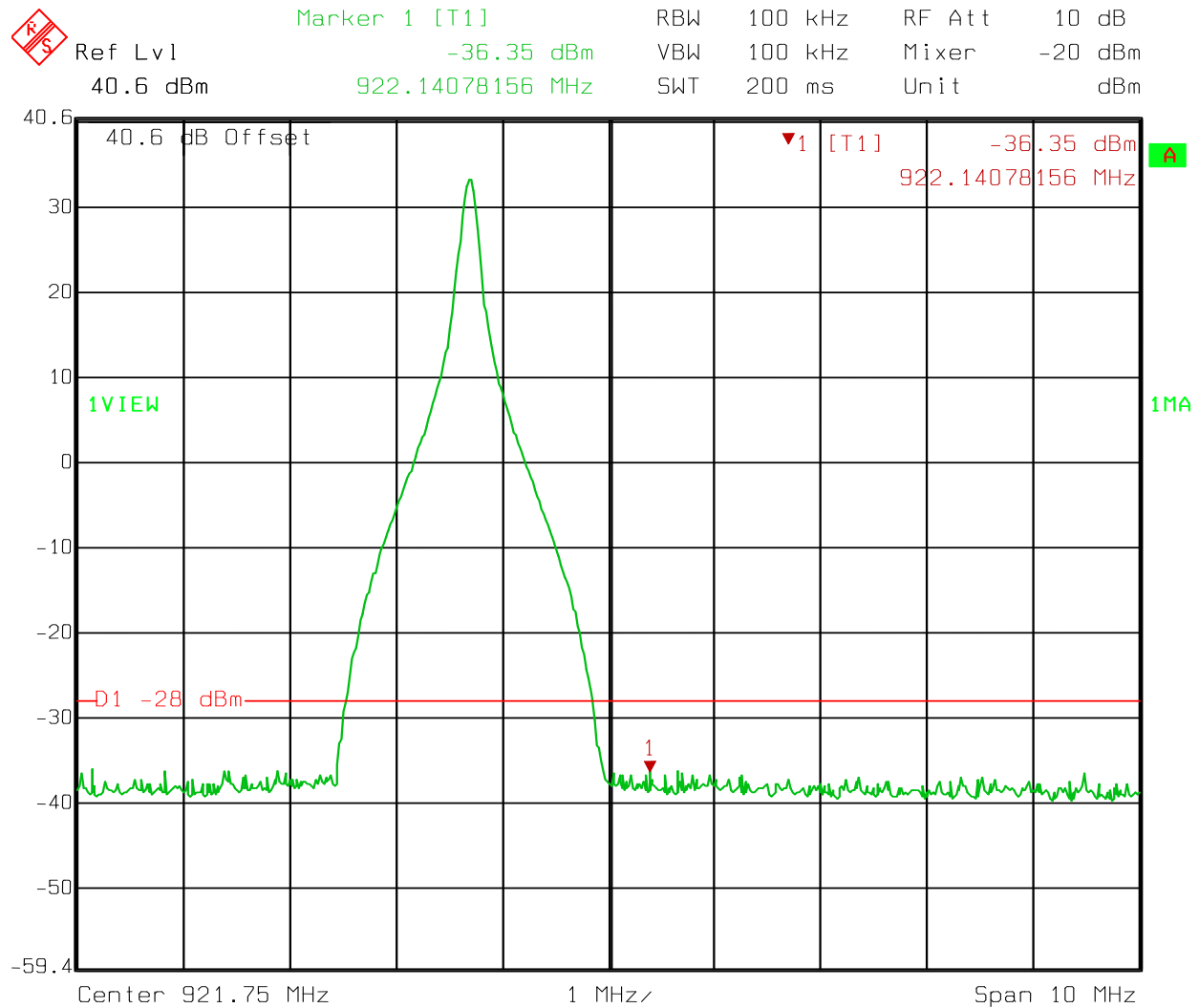
911.2 MHz


 Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl -38.10 dBm VBW 100 kHz Mixer -20 dBm
 40.6 dBm 904.77004008 MHz SWT 200 ms Unit dBm



Date: 10.FEB.2012 14:55:09

Upper Band Edge
FLEX modulation mode
920.45 MHz



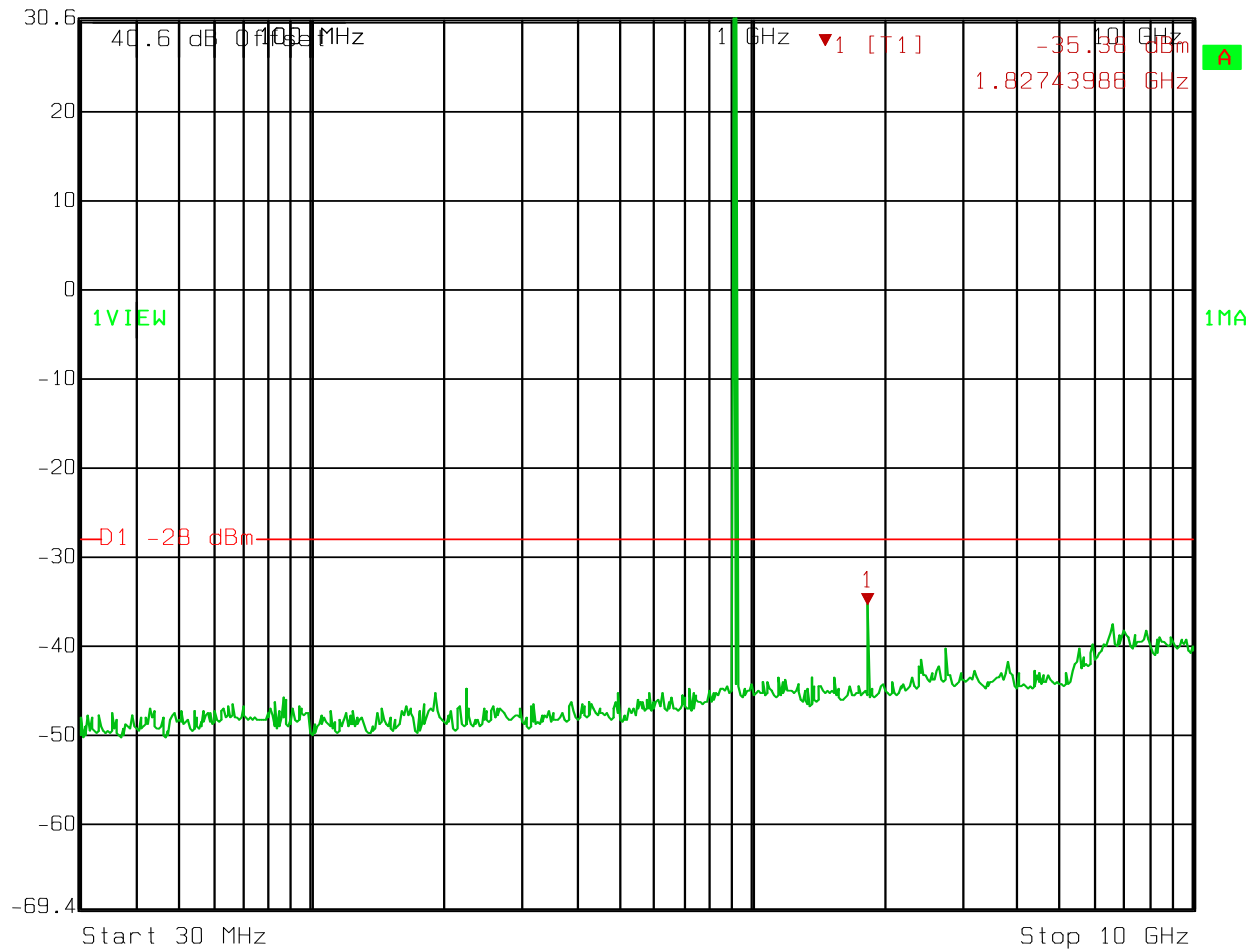
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Test Data – Spurious Emissions at Antenna Terminals

Mask K(3)(ii)

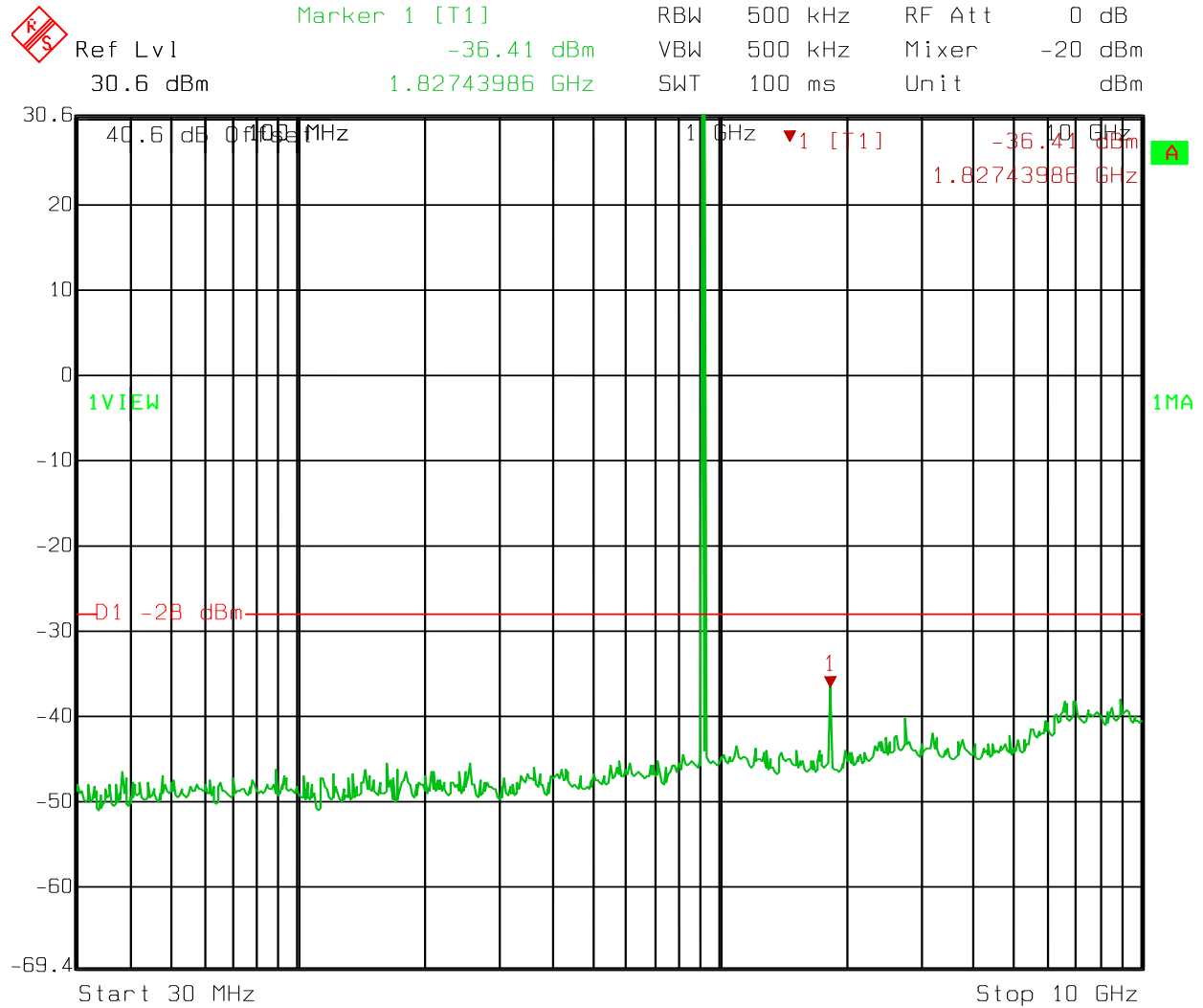
FLEX

 Ref Lvl 30.6 dBm
Marker 1 [T1] 1.82743986 GHz -35.38 dBm
RBW 500 kHz RF Att 0 dB
VBW 500 kHz Mixer -20 dBm
SWT 100 ms Unit dBm



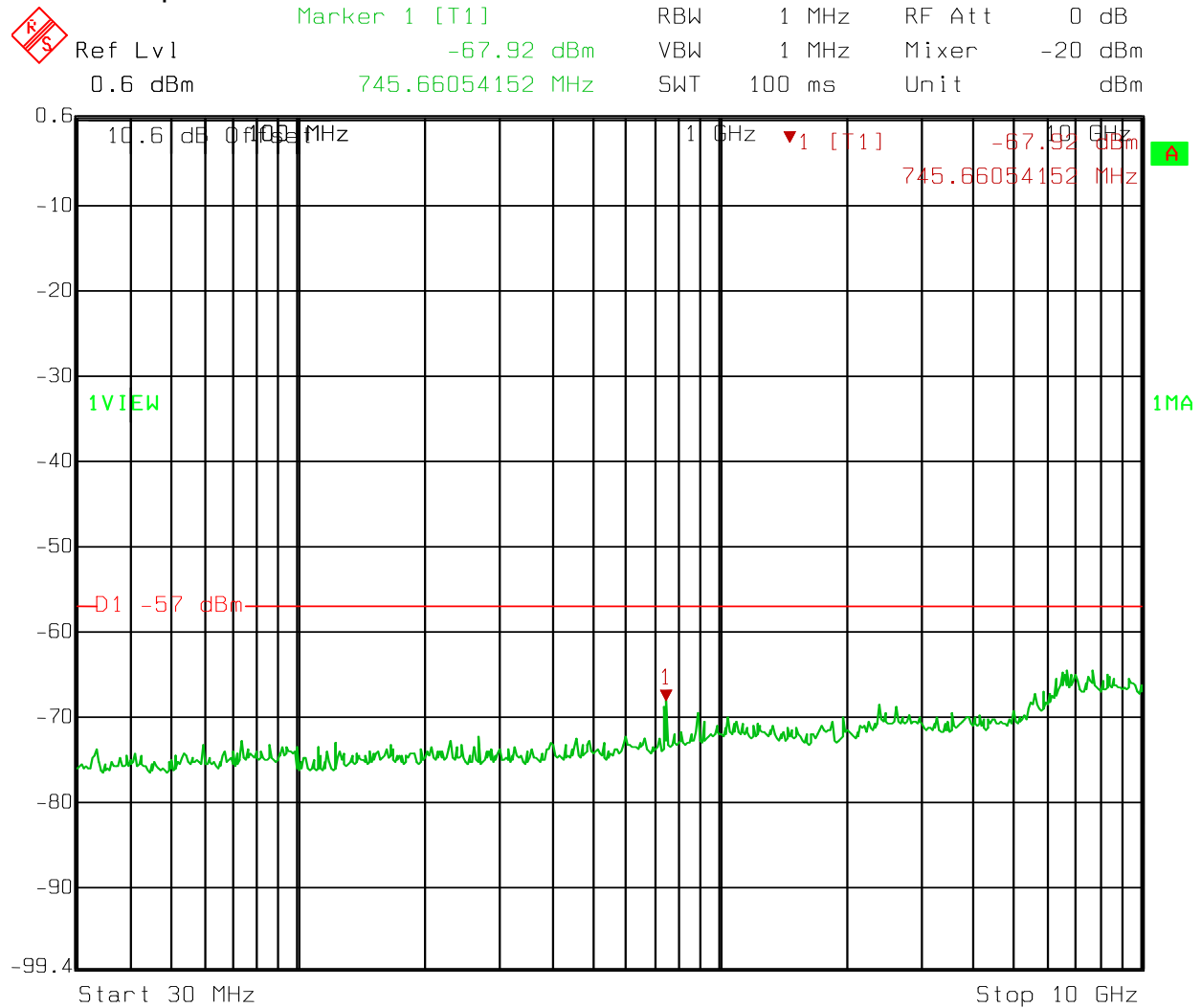
Date: 10.FEB.2012 14:58:33

Title 21



Date: 10.FEB.2012 14:59:13

Receiver Spurious Emissions



Date: 10.FEB.2012 15:01:36

Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 90.210
TESTED BY: D. Light	DATE: 10 Feb 2012

Test Results: Complies.

Test Data: There were no emissions detected. The ambient threshold of sensitivity is sufficient to measure emissions within 13.6 dB of the specification limit of -25 dBm.

Note: Limit applied was 90.210 Mask K(3)(ii).

Test Equipment Used: 1464-993-1783-791-1016

Test Conditions:

Temperature: 23°C

Relative Humidity: 36%

Spectrum analyzer settings:

RBW: 1 MHz

VBW 1 MHz

Detector: Peak

Sweep time: Auto

Test Data

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
1831.50	-91.3	-57.8		0	6.2	-51.6	-25.0	-26.6	H	Ambient
1831.50	-90.9	-59.8		0	6.2	-53.6	-25.0	-28.6	V	Ambient
2747.25	-91.8	-58.2		0	7.1	-51.1	-25.0	-26.1	H	Ambient
2747.25	-92.0	-55.1		0	7.1	-48.0	-25.0	-23.0	V	Ambient
3663.00	-91.9	-58.0		0	8.0	-50.1	-25.0	-25.1	H	Ambient
3663.00	-92.3	-49.8		0	8.0	-41.9	-25.0	-16.9	V	Ambient
4578.80	-92.0	-57.0		0	9.1	-47.9	-25.0	-22.9	H	Ambient
4578.80	-91.9	-50.5		0	9.1	-41.4	-25.0	-16.4	V	Ambient
5494.5	-89.8	-51.7		0	8.5	-43.2	-25.0	-18.2	H	Ambient
5494.5	-89.2	-47.2		0	8.5	-38.7	-25.0	-13.7	V	Ambient
6410.25	-89.0	-51.6		0	9.1	-42.5	-25.0	-17.5	H	Ambient
6410.25	-88.7	-48.5		0	9.1	-39.4	-25.0	-14.4	V	Ambient
7326	-90.5	-51.1		0	9.5	-41.7	-25.0	-16.7	H	Ambient
7326	-90.0	-49.2		0	9.5	-39.8	-25.0	-14.8	V	Ambient
8241.75	-90.5	-48.4		0	9.5	-38.9	-25.0	-13.9	H	Ambient
8241.75	-90.5	-48.1		0	9.5	-38.6	-25.0	-13.6	V	Ambient
9157.5	-90.5	-48.9		0	9.8	-39.1	-25.0	-14.1	H	Ambient
9157.5	-90.5	-49.3		0	9.8	-39.5	-25.0	-14.5	V	Ambient
Notes:										

There were no emissions detected. The ambient threshold of sensitivity is sufficient to measure emissions within 13.6 dB of the specification limit of -25 dBm.

Spectrum analyzer settings:

RBW: 1 MHz

VBW 1 MHz

Detector: Peak

Sweep time: Auto

Photographs of Test Setup



Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 90.213
TESTED BY: David Light	DATE: 11 Feb 2012

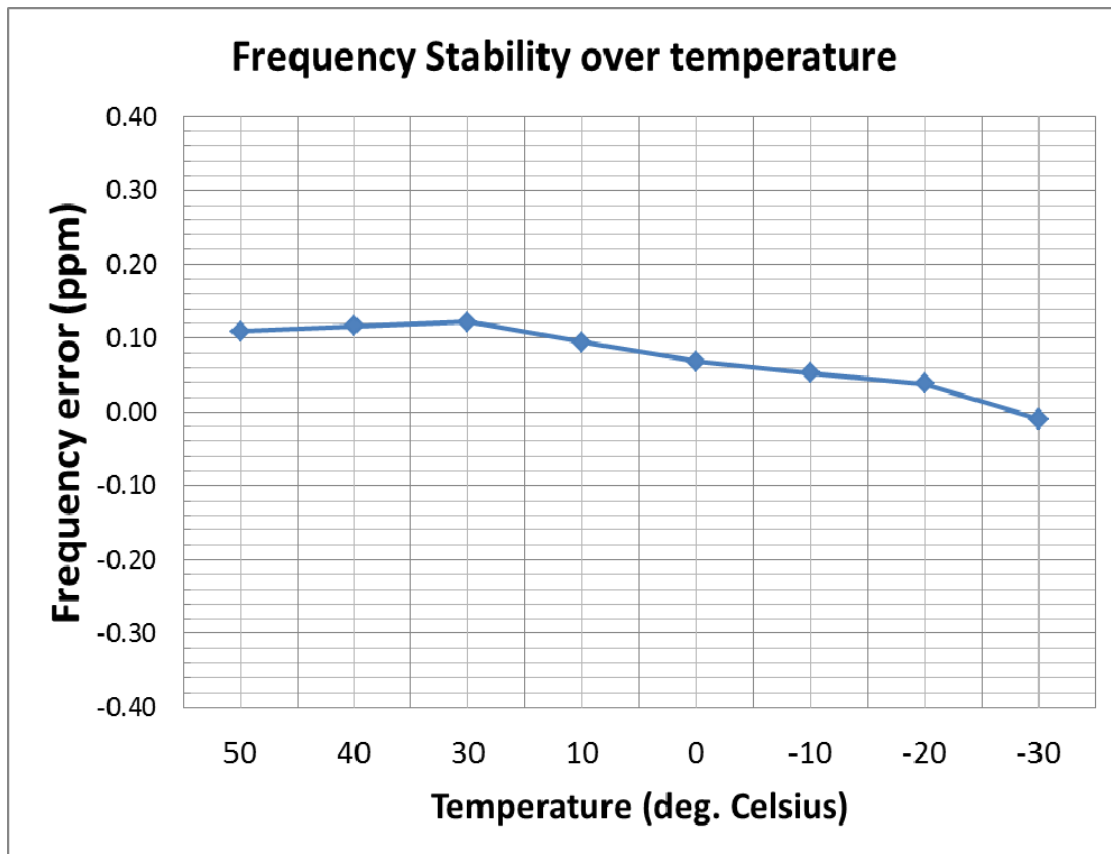
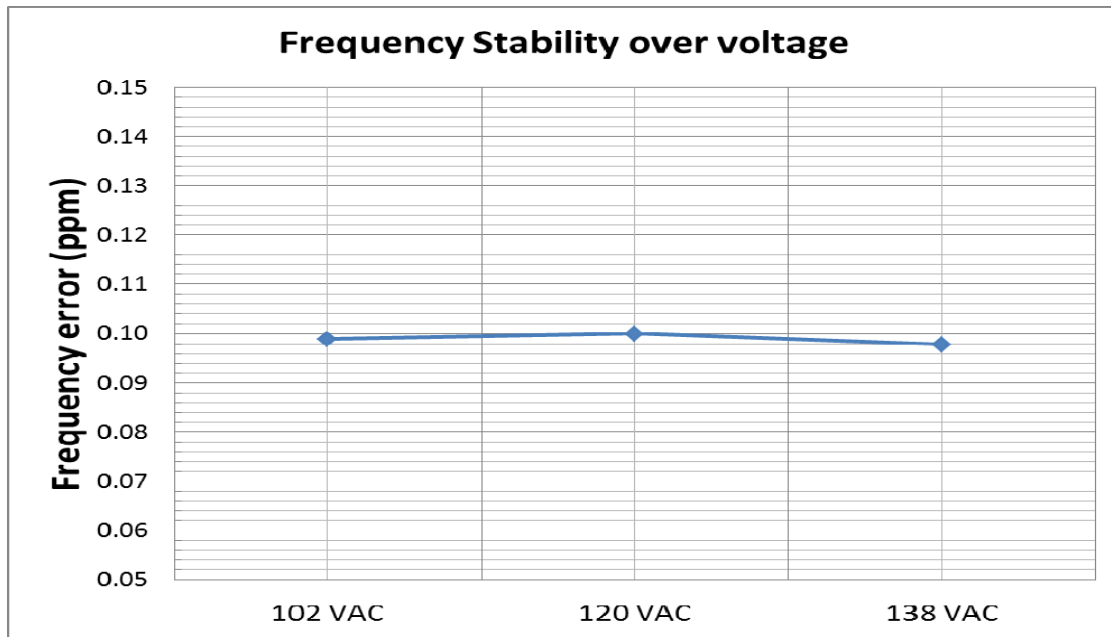
Test Results: Complies.

Measurement Data: See attached table.

Test Equipment Used: 1464 -1627-1474-1893-619

Test Data – Frequency Stability

Measurement Uncertainty:	1x10 ⁻¹⁷ ppm				Standard Test Frequency	920.450000	MHz
Temp (°C)	Measured Frequency (MHz)		Test Voltage	Frequency Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	920.450091		102 VAC	91	920.5	0.10	
20	920.450092		120 VAC	92	920.5	0.10	
20	920.450090		138 VAC	90	920.5	0.10	
50	920.450100		120 VAC	100	920.5	0.11	
40	920.450107		120 VAC	107	902.8	0.12	
30	920.450112		120 VAC	112	920.5	0.12	
10	920.450087		120 VAC	87	920.5	0.09	
0	920.450063		120 VAC	63	920.5	0.07	
-10	920.450049		120 VAC	49	920.5	0.05	
-20	920.450035		120 VAC	35	920.5	0.04	
-30	920.449991		120 VAC	-9	920.5	-0.01	
Notes:							



Section 8. Test Equipment List

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
993	Antenna, Horn	A.H. Systems	SAS-200/571	162	22-Sep-2011	22-Sep-2013
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	20-Jul-2011	20-Jul-2012
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	23-Dec-2011	23-Dec-2013
1064	Attenuator	Narda	776B-20		N/R	
1464	Spectrum Analyzer	Hewlett Packard	8563E	3551A04428	16-May-2011	16-May-2013
1474	Attenuator, 20dB, DC 18 Ghz	MCL Inc.	BW-S20W2		N/R	
1589	Attenuator, 10db	Narda	773-10-04		N/R	
1627	Cable, 5 ft	Megaphase	10312 1GVT4		N/R	
1783	Cable Assy, 3m Chamber	Nemko	Chamber		26-Sep-2011	26-Sep-2012
1839	Environmental Chamber (Temperature only)	Tenney	T-14	14	N/R	
791	Watkins Johnson 30MHz to 1GHz Pre Amplifier	Nemko, USA	CRA69 321003 9605	119	19-May-2011	19-May-2012
619	Digital Thermometer	Fluke	51	4520028	29-Sep-2011	29-Sep-2012

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output	PARA. NO.: 90.205
--------------------------------------	--------------------------

Minimum Standard: Para. No. 90.205(l). 902–928 MHz. LMS systems operating pursuant to subpart M of this part in the 902–927.25 MHz band will be authorized a maximum of 30 watts ERP. LMS equipment operating in the 927.25–928 MHz band will be authorized a maximum of 300 watts ERP

Method Of Measurement:

The peak power at antenna terminals is measured using an in-line peak power meter or spectrum analyzer set with sufficient RBW (RBW > 20 dB bandwidth of measured waveform). Power output is measured with the maximum rated input level.

NAME OF TEST: Spurious Emissions at Antenna Terminals	PARA. NO.: 90.210
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Test Method:

RBW: As specified by applicable FCC rule part or 1% of emission bandwidth in the 0 - 1 GHz range, 1 MHz at frequencies above 1 GHz.

VBW: $\geq$ RBW

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

NAME OF TEST: Occupied Bandwidth**PARA. NO.: 90.210****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.: 90.210
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Minimum Standard:

Para. No. 90.210, see table 1 for applicable mask.

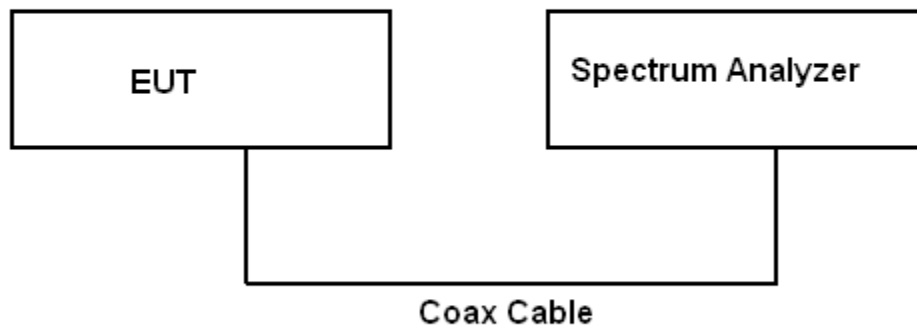
The field strength of spurious emissions is measured using the reference antenna method as described in EIA/TIA 603C. The detected emission is maximized by rotating the turntable and adjusting the height of the receive antenna. The EUT is then replaced by a signal generator and a reference antenna. The rf level fed from the signal generator to the reference antenna is adjusted until the previously measured field strength level is reached. The erp is the rf level required from the signal generator plus the gain of the reference antenna relative to a dipole.

NAME OF TEST: Frequency Stability**PARA. NO.: 90.213****Minimum Standard:**
shall remainPara. No. 990.213. The transmitter carrier frequency
within the assigned frequency below in ppm.**Table 2**

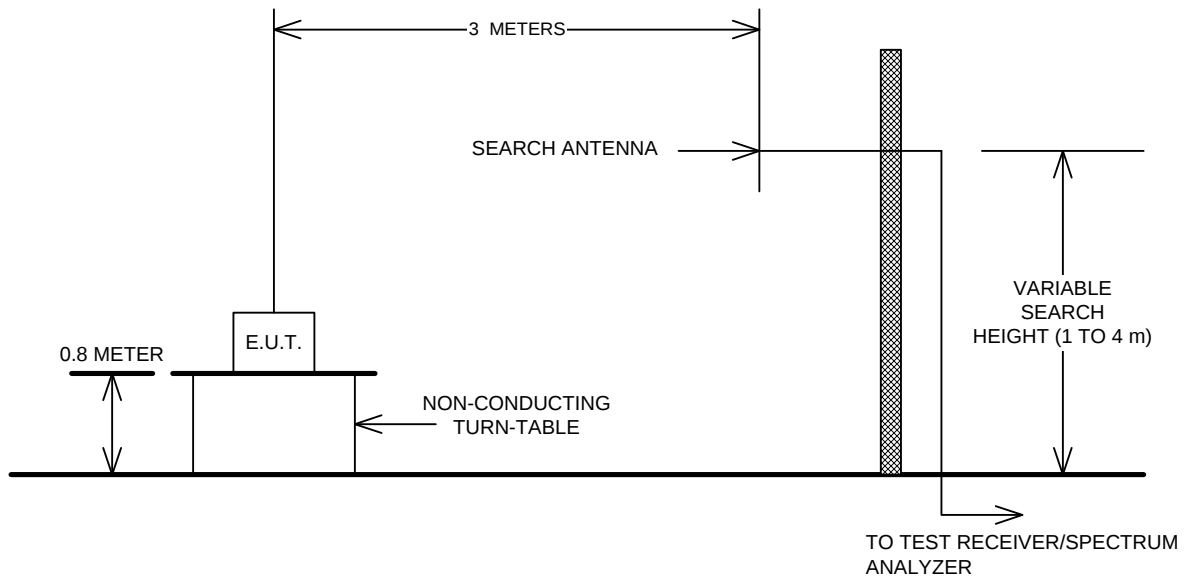
Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 -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

**R.F. Power Output
Occupied Bandwidth
Spurious Emissions**



Para. No. 2.993 - Field Strength of Spurious Radiation



Frequency Stability

