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FCC PART 90 Test Report

FCC ID: XMHQM-790-U1

Report Reference No.....:	**VITE1008001R**
Compiled by (position+printed name+signature)..:	File administrators Tracy Qi
Name of the organization performing the tests (position+printed name+signature)..:	Test Engineer Kendy Wang
Approved by (position+printed name+signature)..:	Manager Andy Zhang
Date of issue.....:	Aug 20, 2010
Testing Laboratory Name .....:	**Shenzhen VITE Technology Co., Ltd**
Address.....:	Suite 2123, Building 4, Hongfa Centre, Central Area Baoan, Baoan District, Shenzhen, Guangdong, 518101, P.R. China
Applicant's name.....:	**Quantun Electronics, LLC**
Address.....:	1379 Shotgun Road Sunrise, Florida 33326, USA
Test specification:	
Standard .....:	**FCC Part 90: PRIVATE LAND MOBILE RADIO SERVICES**
TRF Originator.....:	Shenzhen VITE Technology Co., Ltd
Master TRF.....:	Dated 2009-03

Test item description ..... :	Two-way Mobile Radio
Trade Mark .....:	Quantun
Model/Type reference.....:	QM-790-U1
Listed Models .....:	/
Modulation……..:	FM
Emission Type……..:	16K0F3E for 25KHz; 11K0F3E for 12.5KHz
Power Supply……..:	DC 13.6V
Maximum Transmitter Power……..:	45W
Operating Frequency Range……..:	400MHz~470MHz
Result.....:	**Positive**

T E S T R E P O R T

Test Report No. :	VITE1008001R	Aug 20, 2010 Date of issue

Equipment under Test	:	Two-way Mobile Radio
Model /Type	:	QM-790-U1
Listed Models	:	/
Applicant	:	Quantun Electronics, LLC
Address	:	1379 Shotgun Road Sunrise, Florida 33326, USA
Manufacture	:	Shenzhen Surwave Technologies Co., LTD
Address	:	RM.602,No.535 Building East , Bagua RD.2, Bagualing, Futian District, Shenzhen, China

Test Result according to the standards on page 4:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Part 90: PRIVATE LAND MOBILE RADIO SERVICES

TIA/EIA 603: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample : Aug 06, 2010

Testing commenced on : Aug 08, 2010

Testing concluded on : Aug 17, 2010

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage : o 120V / 60 Hz o 115V / 60Hz
o 12 V DC o 24 V DC
o Other (specified in blank below)

DC13.6V

2.3. Short description of the Equipment under Test (EUT)

The Quantun Electronics, LLC's Model: QM-790-U1or the "EUT" as referred to in this report is a single channel Mobile Radio designed for voice communication. It is designed by way of utilizing the FM modulation achieves the system operating.

* The test data gathered are from typical production samples provided by the manufacturer.

A major technical description of EUT is described as following:

a). Modulation: FM
b). Rated Transmitter Power: 45W
c). Antenna Designation: Detachable
d). Power Supply: DC 13.60 V by battery
e). Operating Frequency Range: 400-470MHz
f). Maximum Transmitter Power: 45.19 W for 25 KHz channel separation
44.87 W for 12.5 KHz channel separation
For more details, refer to the user's manual of the EUT.
Serial number: Prototype

2.4. EUT operation mode

The EUT has been tested under typical operating condition.

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

o - supplied by the manufacturer

o - supplied by the lab

o Power Cable	Length (m) :	/
	Shield :	/
	Detachable :	/
o Multimeter	Manufacturer :	/
	Model No. :	/

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **XMHQM-790-U1** filing to comply with the FCC Part 90 Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Bontek Compliance Testing Laboratory Ltd
1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

The sites are constructed in conformance with the requirements
of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 338263

Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 24, 2008.

IC Registration No.: 7631A

The 3m alternate test site of Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on March, 2008.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

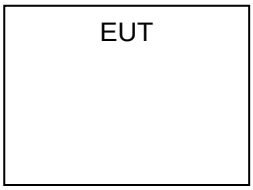


Table 2-1 Equipment Used in Tested System

No.	Product	Manufacturer	Model No.	Serial No.	

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Bontek Compliance Testing Laboratory Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Bontek laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	1~12.75GHz	4.32dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2010/04
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2010/04
3	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2010/04
4	TURNTABLE	ETS	2088	2149	2010/04
5	ANTENNA MAST	ETS	2075	2346	2010/04
6	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2010/04

3.7. General Technical Requirements and Summary of Test Results

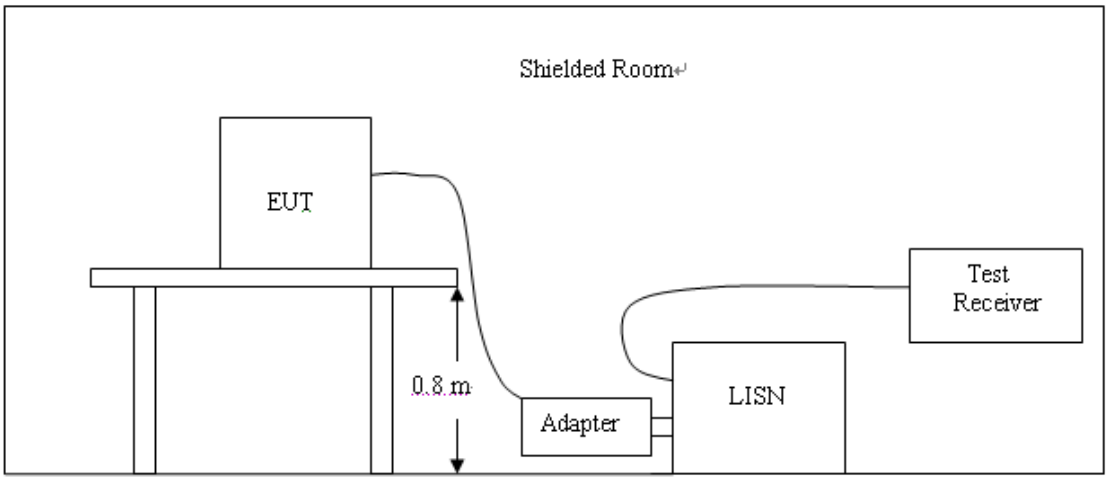
The EUT has been tested according to the following specifications:

FCC Rules	RS-119	Description Of Test	Result
§15.207	RS-Gen	Conducted Emission	N/A
§90.205	§5.4	Maximum Transmitter Power	Compliant
§90.207	§5.13	Modulation Characteristic	Compliant
§90.209	§5.5	Occupied Bandwidth	Compliant
§90.210	§5.8	Emission Mask	Compliant
§90.213	§5.3	Frequency Tolerance	Compliant
§90.214	§5.9	Transient Frequency Behavior	Compliant

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2 Support equipment, if needed, was placed as per ANSI C63.4.
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4 The EUT received DC13.6 V power from the battery.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

Conducted Power Line Emission Limit

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

TEST RESULTS

Owing to the DC operation of EUT, this test item is not performed.

4.2. Occupied Bandwidth and Emission Mask

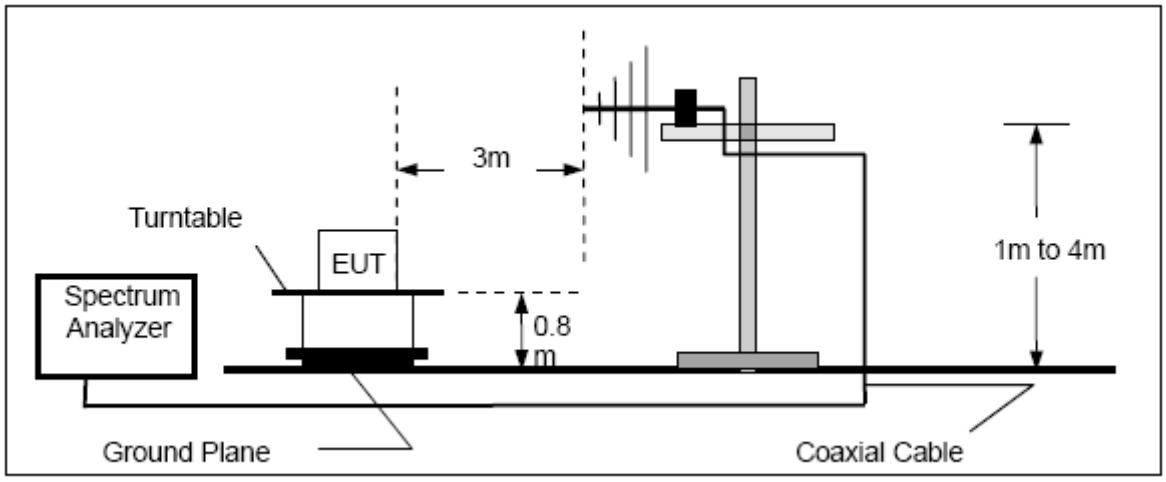
PROVISIONS APPLICABLE

According to FCC Part 90 Section 90.209: The authorized bandwidth shall be 11.25 KHz for 12.5 KHz and 20 KHz for 25 KHz.
For any frequency removed from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0, 0dB.
On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (fd 2.88 kHz) dB.
On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz at least:
50 + 10 log (Pwatts) = 50 + 10 log (44.87) =66.52 dB
For 25 KHz:
43 + 10 log (Pwatts) = 43 + 10 log (45.19) = 59.55 dB

MEASUREMENT PROCEDURE

1). The EUT was placed on a turn table which is 0.8m above ground plane.
2). Set EUT as normal operation
3). Set SPA Center Frequency = fundamental frequency, RBW=300Hz, VBW= 3 KHz, span =50 KHz.

TEST SETUP BLOCK DIAGRAM

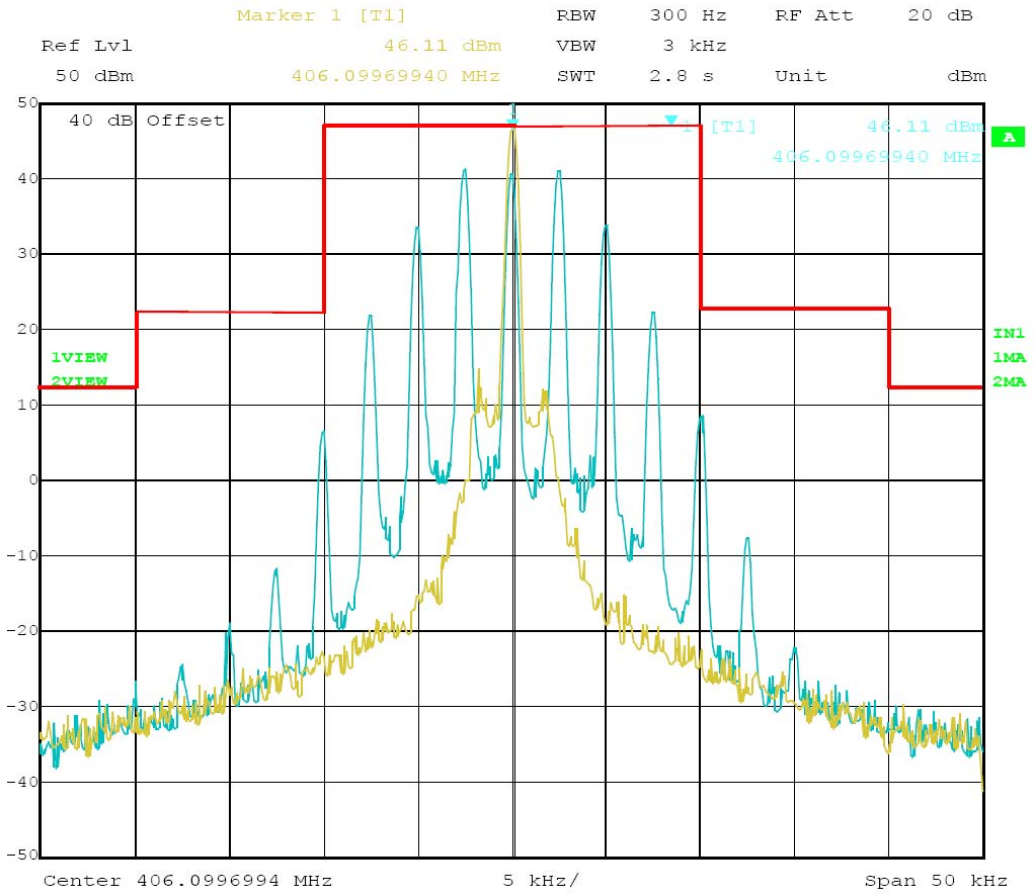


TEST RESULTS:

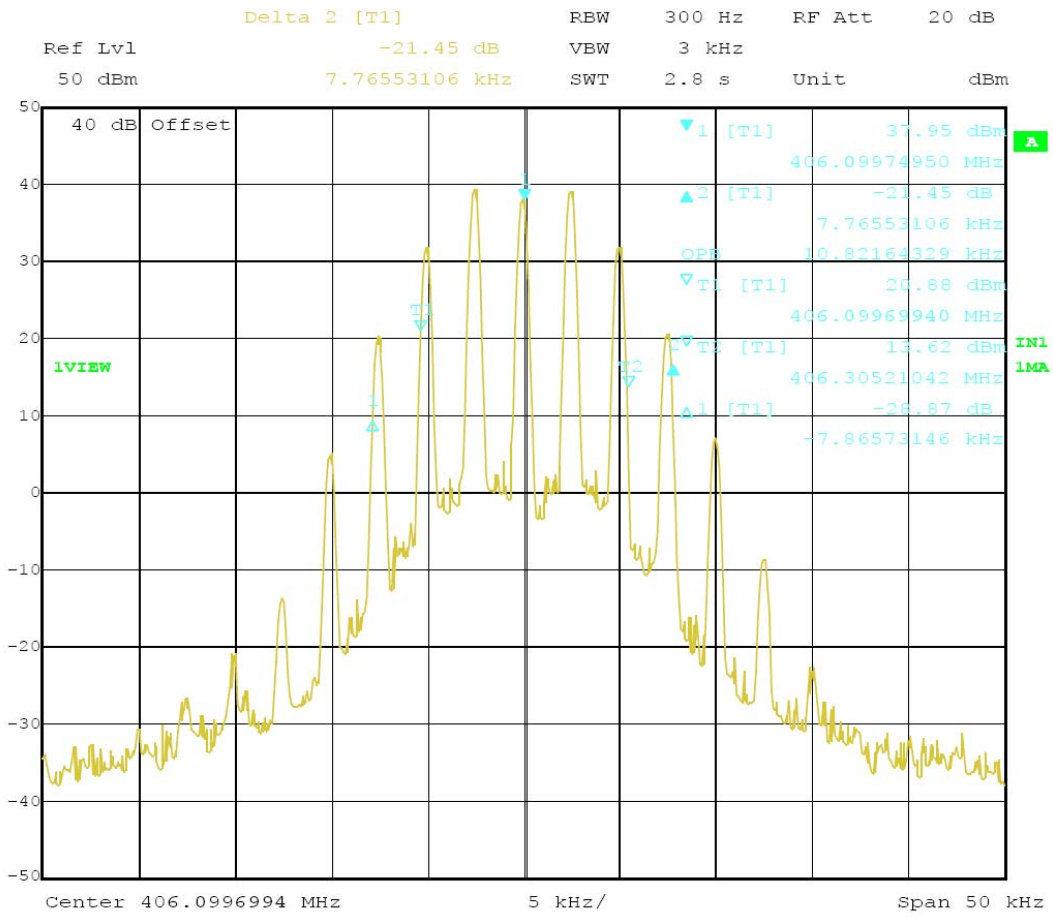
Referred as the attached plot hereinafter
Note: The blue curve represents unmodulated signal.
The black curve represents modulated signal.

For 25 KHz:

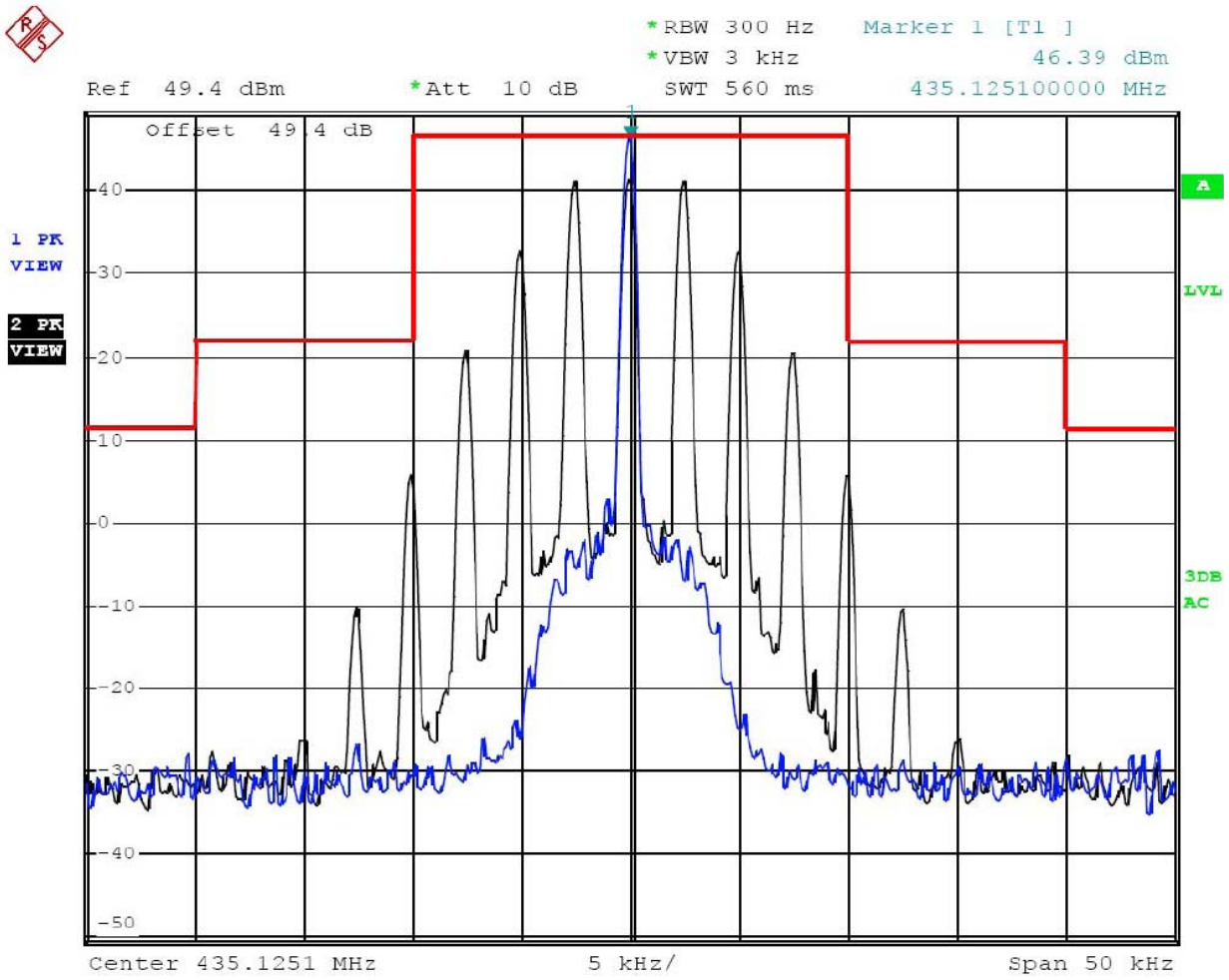
Occupied Bandwidth of Bottom Channel



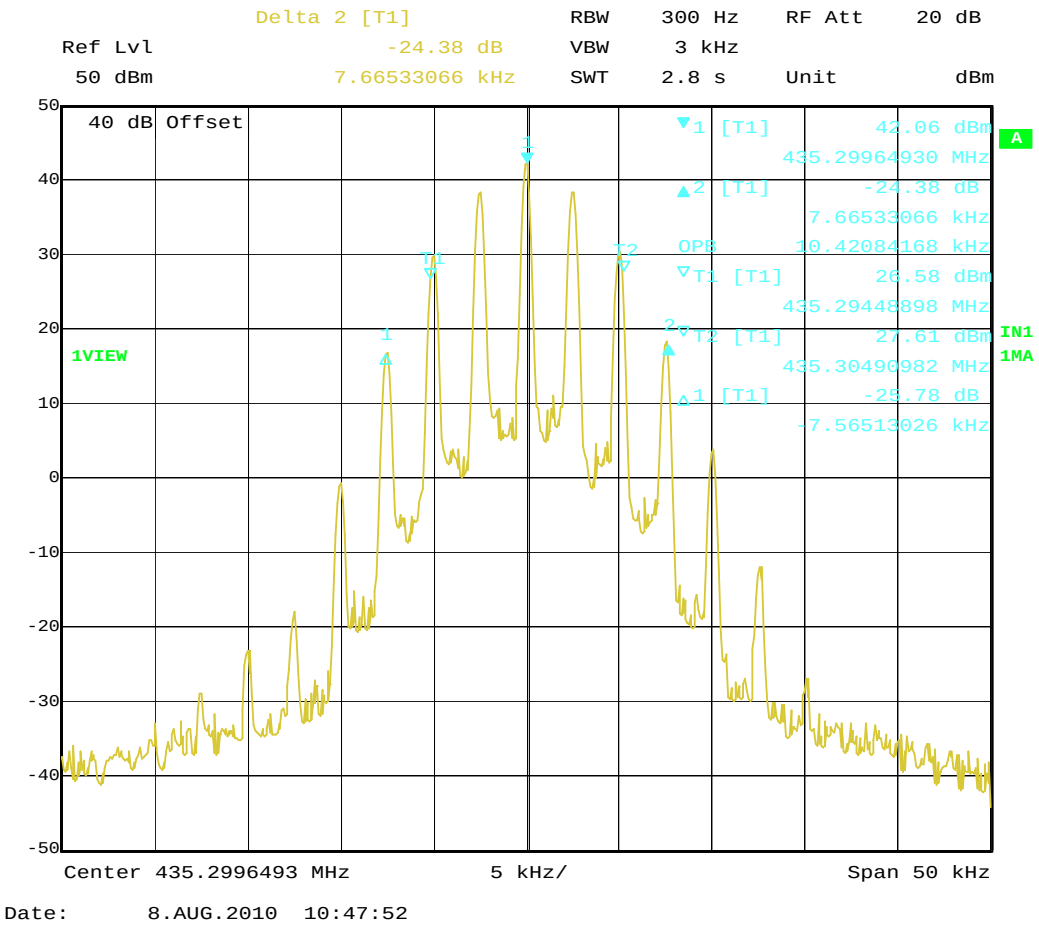
25 kHz Channel Spacing, 400MHz, 2500 Hz Audio Modulation Only



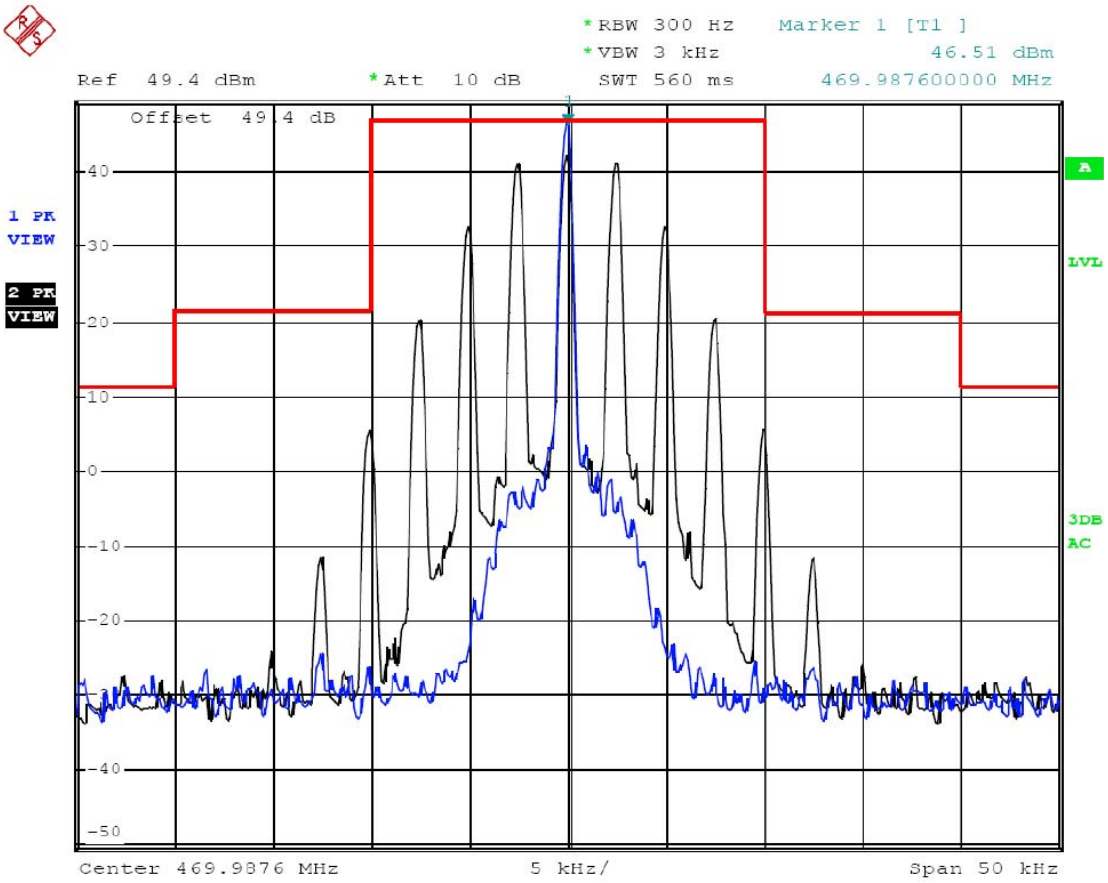
Occupied Bandwidth of Middle Channel



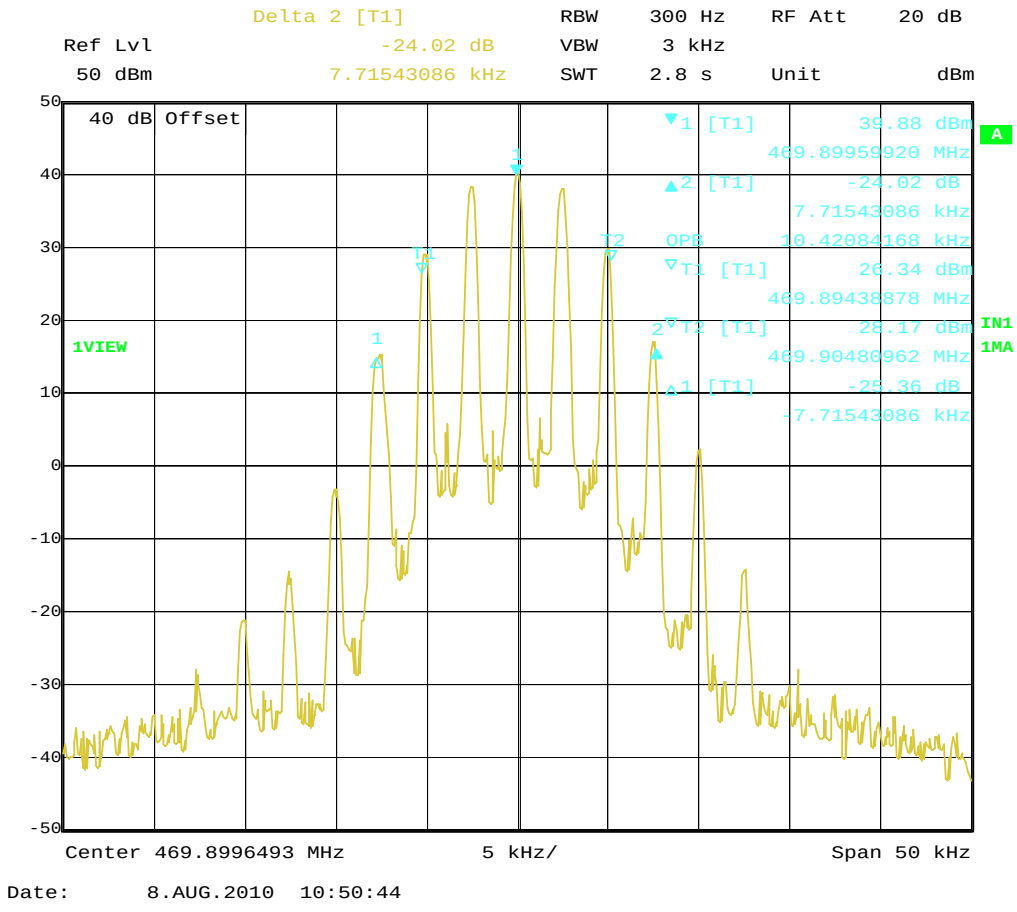
25 kHz Channel Spacing, 435 MHz, 2500 Hz Audio Modulation Only



Occupied Bandwidth of Top Channel

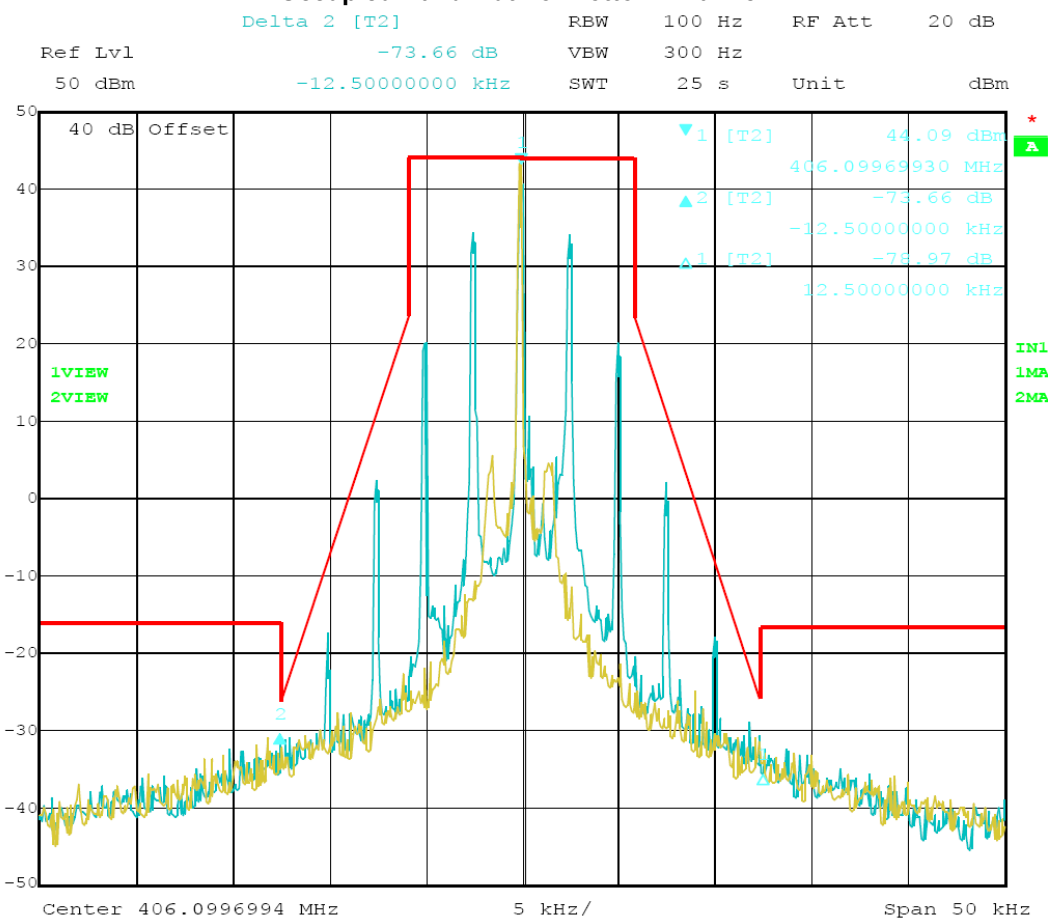


25 kHz Channel Spacing, 470 MHz, 2500 Hz Audio Modulation Only

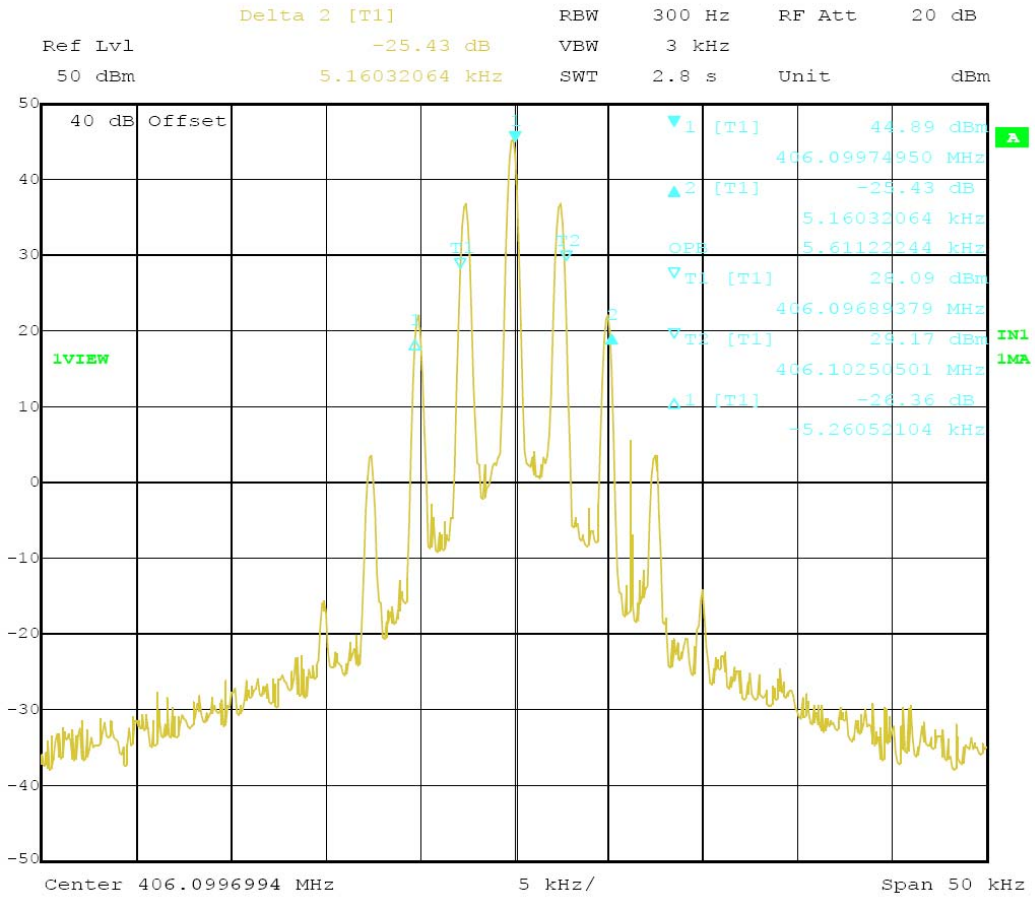


For 12.5 KHz

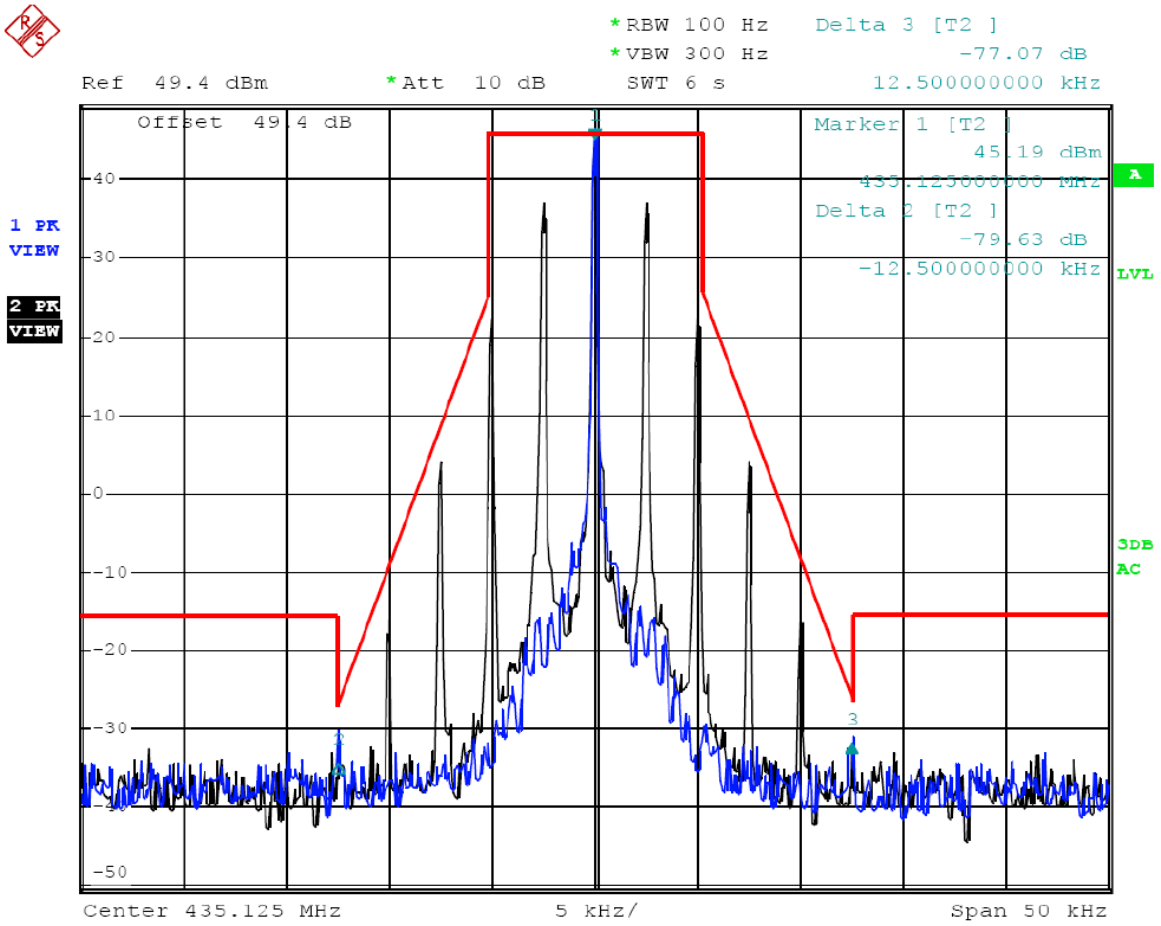
Occupied Bandwidth of Bottom Channel



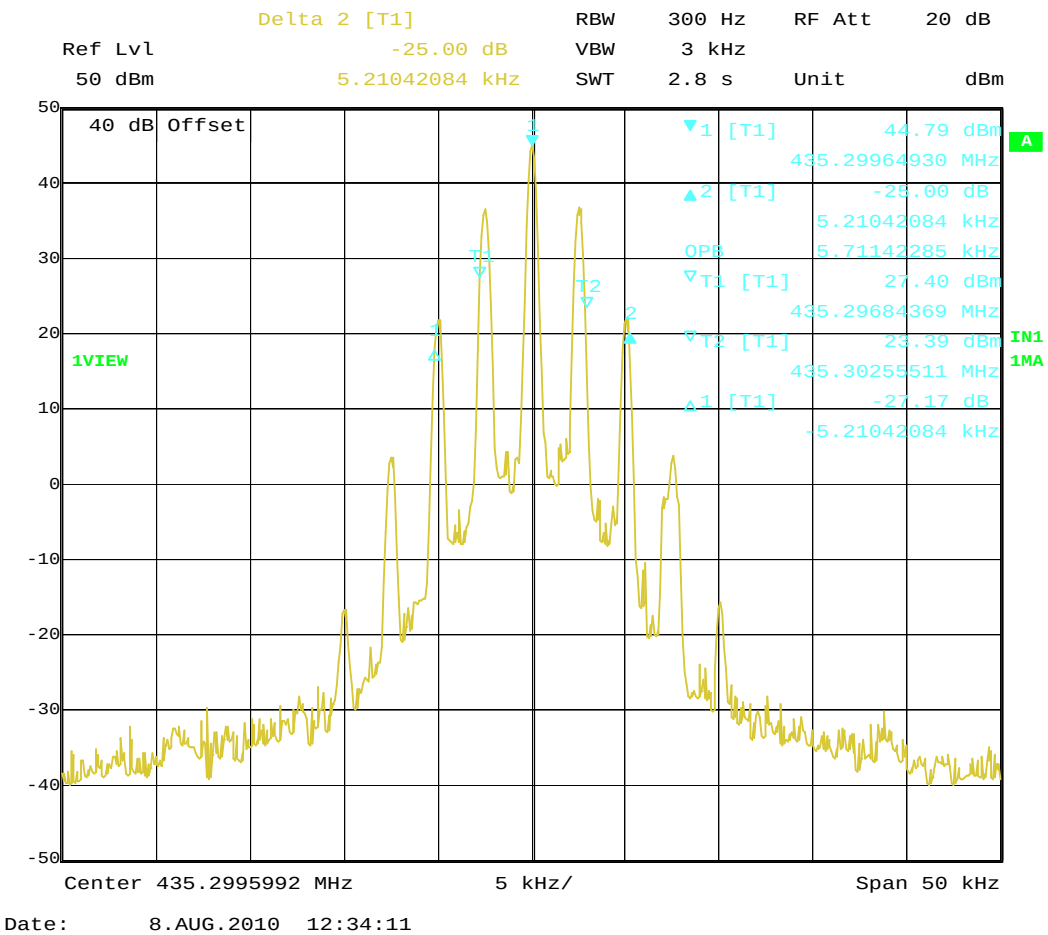
12.5 kHz Channel Spacing, 400 MHz, 2500 Hz Audio Modulation Only



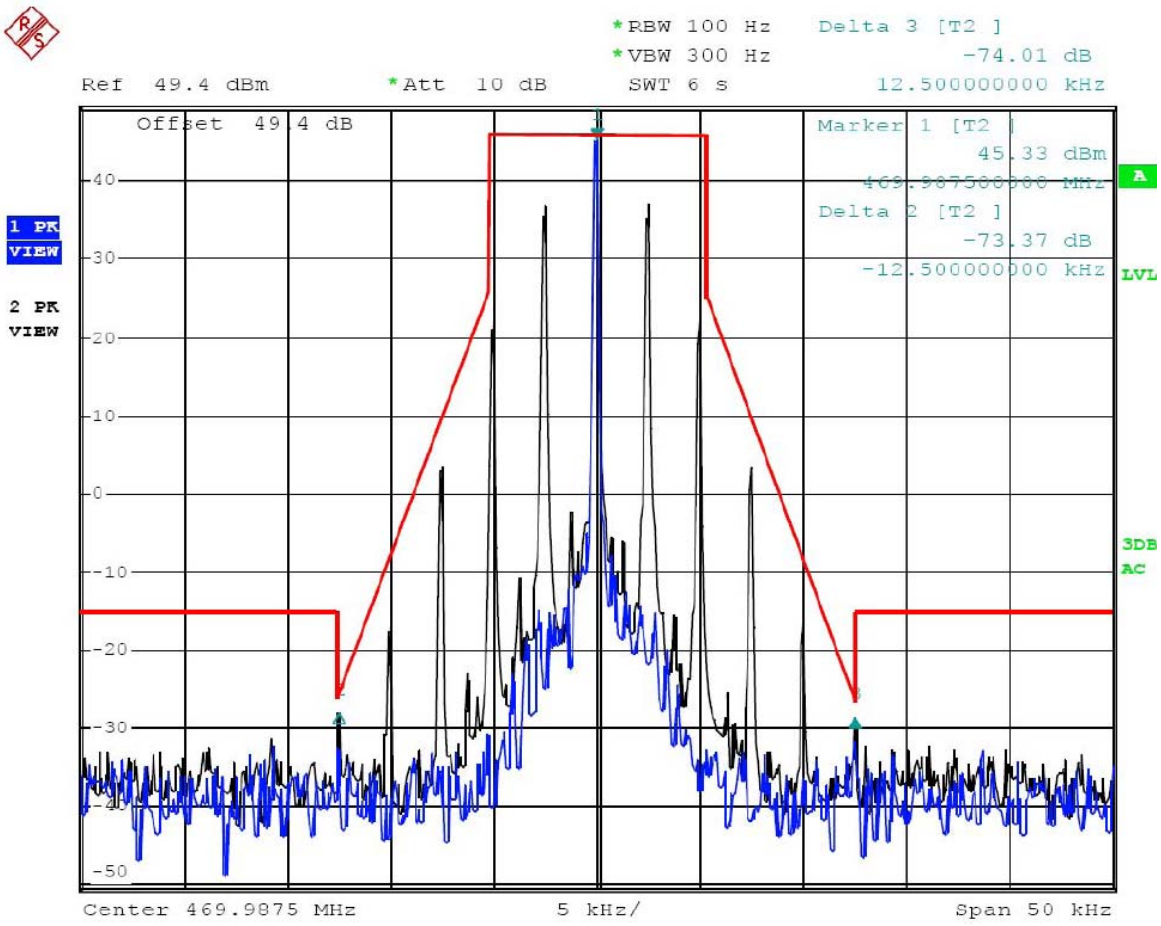
Occupied Bandwidth of Middle Channel



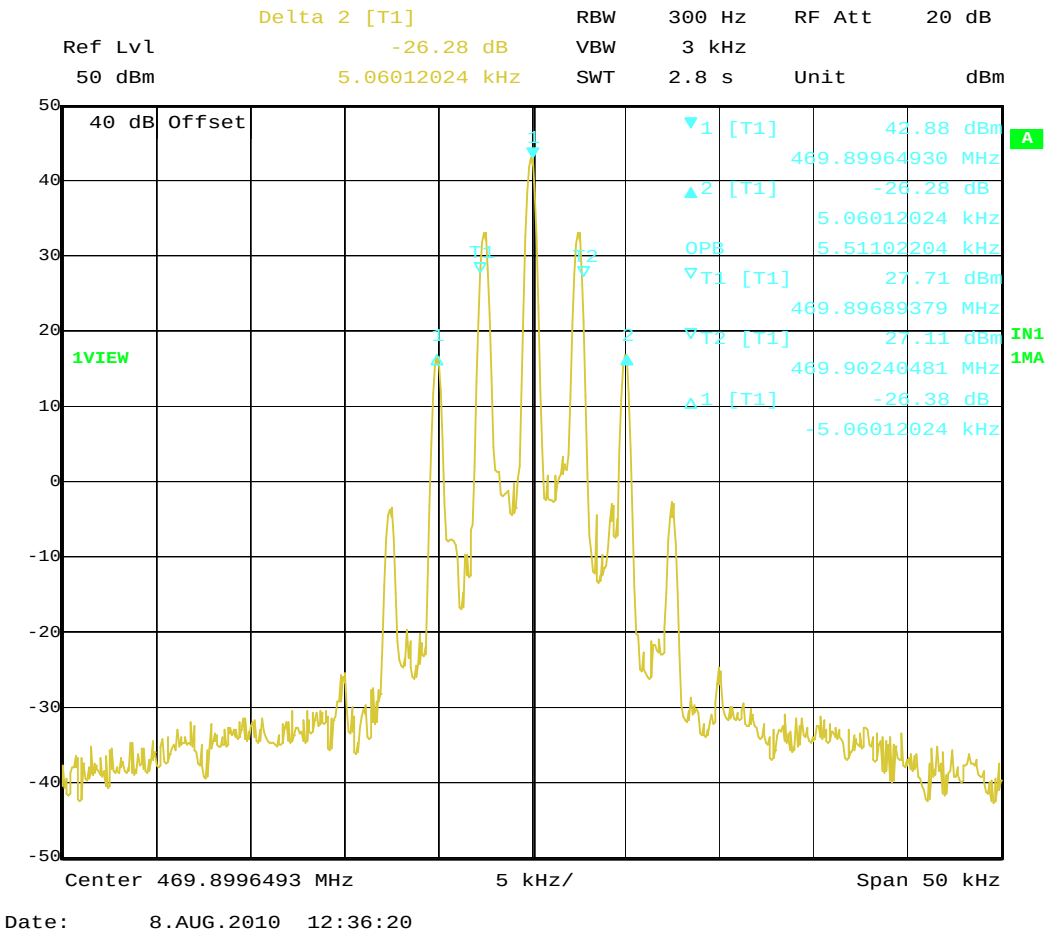
12.5 kHz Channel Spacing, 435 MHz, 2500 Hz Audio Modulation Only



Occupied Bandwidth of Top Channel



12.5 kHz Channel Spacing, 470 MHz, 2500 Hz Audio Modulation Only



4.3. Radiated Spurious Emission Test

PROVISIONS APPLICABLE

According to Section 90.210,, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

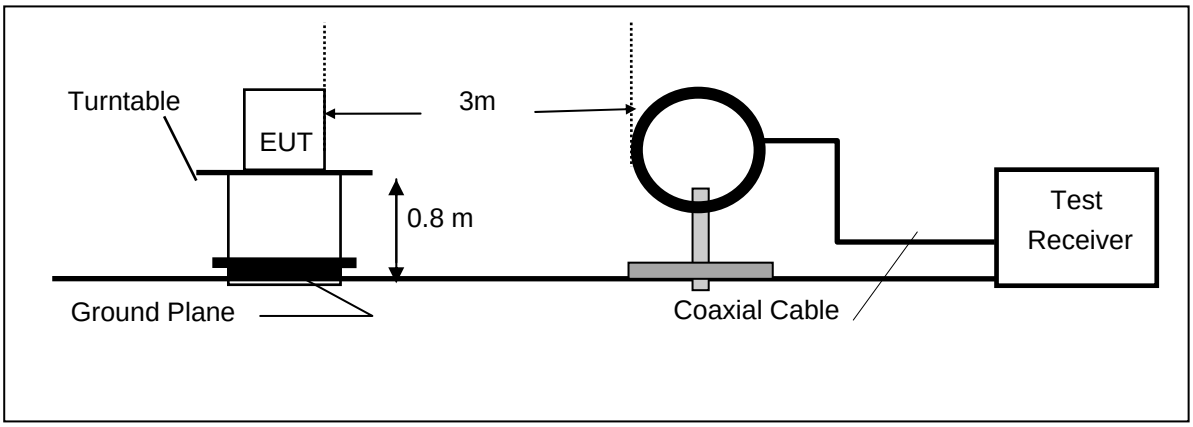
1).On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB
2). On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27dB
3). On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) fo of more than 12.5 KHz: At least 50+10 log (P) dB or 70 dB, which ever is lesser attenuation.

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

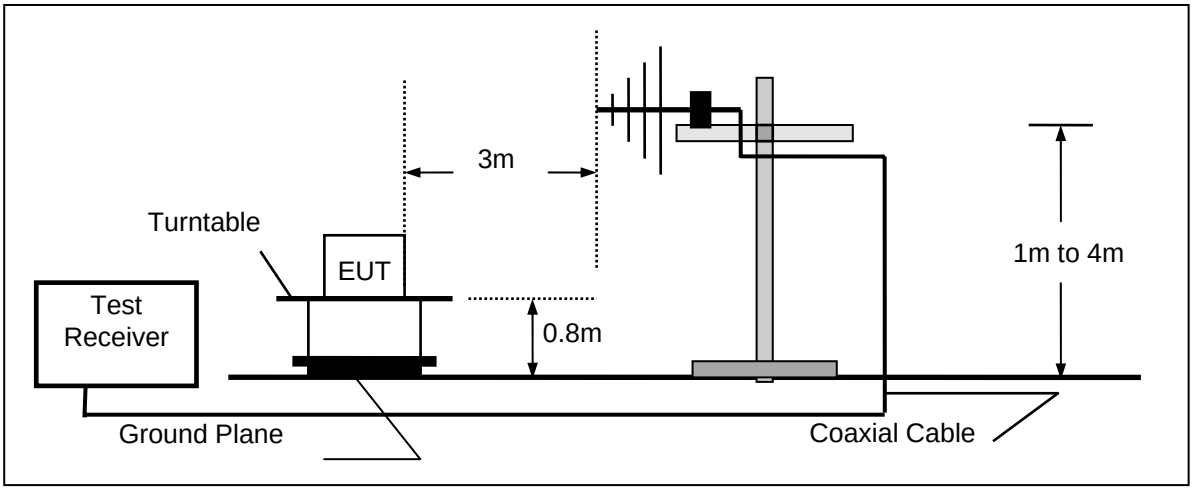
1). On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth: At least 25 dB.
2). On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth: At least 35 dB.
3). On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43+10Log (P) dB.

TEST CONFIGURATION

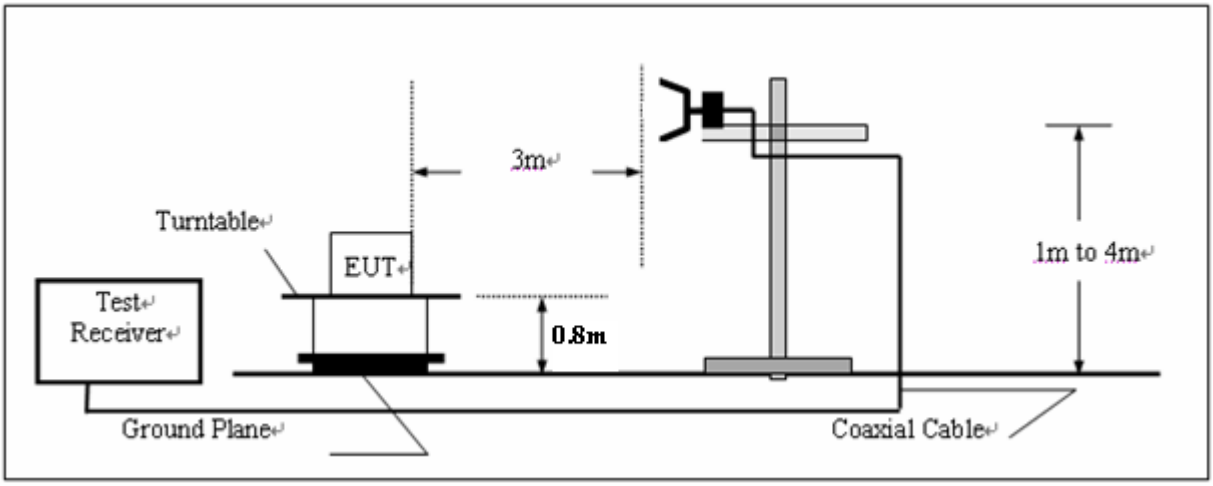
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

3). The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as in dicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4). The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

8). The maximum signal level detected by the measuring receiver shall be noted.

9). The measurement shall be repeated with the test antenna set to horizontal polarization.

10). Replace the antenna with a proper Antenna (substitution antenna).

11). The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

12). The substitution antenna shall be connected to a calibrated signal generator.

13). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

14). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

15). The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

16). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

17). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization

TEST RESULTS

FCC Part 22.359, 74.462, 80.211 and 90.210 (25 kHz bandwidth only):
On any frequency removed from the center of the assigned channel by more than 250 percent at least:
Low: 43 + 10 log (Pwatts) = 43 + 10 log (44.67) = 59.50 dB
High: 43 + 10 log (Pwatts) = 43 + 10 log (45.19) = 59.55 dB

FCC Part 90.210 (12.5 kHz Bandwidth only):
On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f d in kHz) of more than 12.5 kHz at least:
Low: 50 + 10 log (Pwatts) = 50 + 10 log (44.46) =66.48 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (44.87) =66.52 dB
Note: In general, the worse case attenuation requirement shown above was applied.

For 25 KHz
Calculation: Limit (dBm) =EL-43-10log10 (TP)
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 46.55 dBm.
Limit (dBm) =46.55-43-10log10 (45.19) = -13 dBm

The Bottom Channel

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	Transd (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
812.20	***	H		--	-13	
1218.30	***	H		--	-13	
***	--	H			-13	
812.20	***	V		--	-13	
1218.30	***	V		--	-13	
***	--	V			-13	

The Middle Channel

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	Transd (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
870.60	***	H		--	-13	
1305.90	***	H		--	-13	
***	--	H			-13	
870.60	***	V		--	-13	
1305.90	***	V		--	-13	
***	--	V			-13	

The Top Channel

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	Transd (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
939.80	***	H		--	-13	
1409.70	***	H		--	-13	
***	--	H			-13	
939.80	***	V		--	-13	
1409.70	***	V		--	-13	
***	--	V			-13	

***Note:**
***** means that the emission level is too low to be measured or at least 20 dB down than the limit.**

For 12.5 KHz

Calculation: Limit (dBm) =EL-50-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm, In this application, the EL is 46.52dBm.

Limit (dBm) =46.52-50-10log10 (44.87) = -20 dBm

The Bottom Channel

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	Transd (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
812.20	***	H		--	-13	
1218.30	***	H		--	-13	
***	--	H			-13	
812.20	***	V		--	-13	
1218.30	***	V		--	-13	
***	--	V			-13	

The Middle Channel

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	Transd (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
870.60	***	H		--	-13	
1305.90	***	H		--	-13	
***	--	H			-13	
870.60	***	V		--	-13	
1305.90	***	V		--	-13	
***	--	V			-13	

The Top Channel

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	Transd (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
939.80	***	H		--	-13	
1409.70	***	H		--	-13	
***	--	H			-13	
939.80	***	V		--	-13	
1409.70	***	V		--	-13	
***	--	V			-13	

***Note:**
***** means that the emission level is too low to be measured or at least 20 dB down than the limit.**

4.4. Spurious Emission On Antenna Port

PROVISIONS APPLICABLE

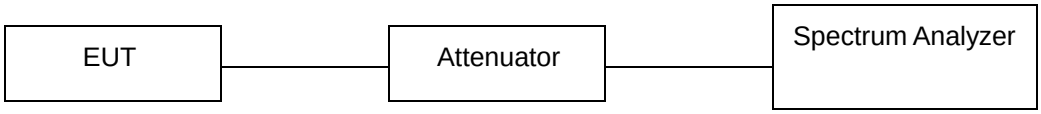
The same as Section 6.1.

MEASUREMENT PROCEDURE

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range.RBW 100 kHz, VBW 300 kHz,

The audio input was set to 0 to get the unmodulated carrier, the resulting picture is print out for each channel separation.

TEST SETUP BLOCK DIAGRAM



The EUT was directly connected to a RF Communication Test Set

TEST RESULTS:

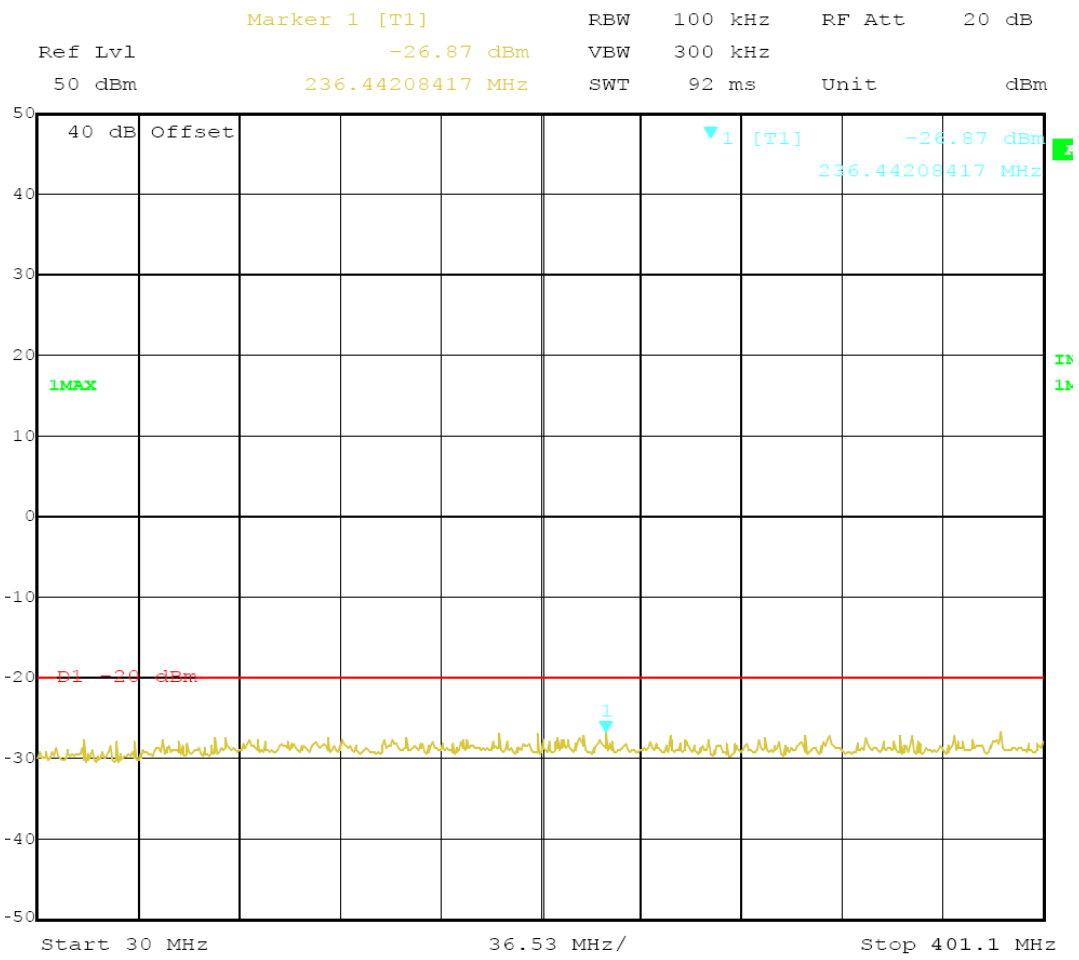
FCC Part 22.359, 74.462, 80.211, 90.210 and RSS Gen, RSS 119 Issue 9 section 5.8.1 (25 kHz bandwidth only):
On any frequency removed from the center of the assigned channel by more than 250 percent at least:
Low: 43 + 10 log (Pwatts) = 43 + 10 log (44.67) = 59.50 dB
High: 43 + 10 log (Pwatts) = 43 + 10 log (45.19) = 59.55 dB

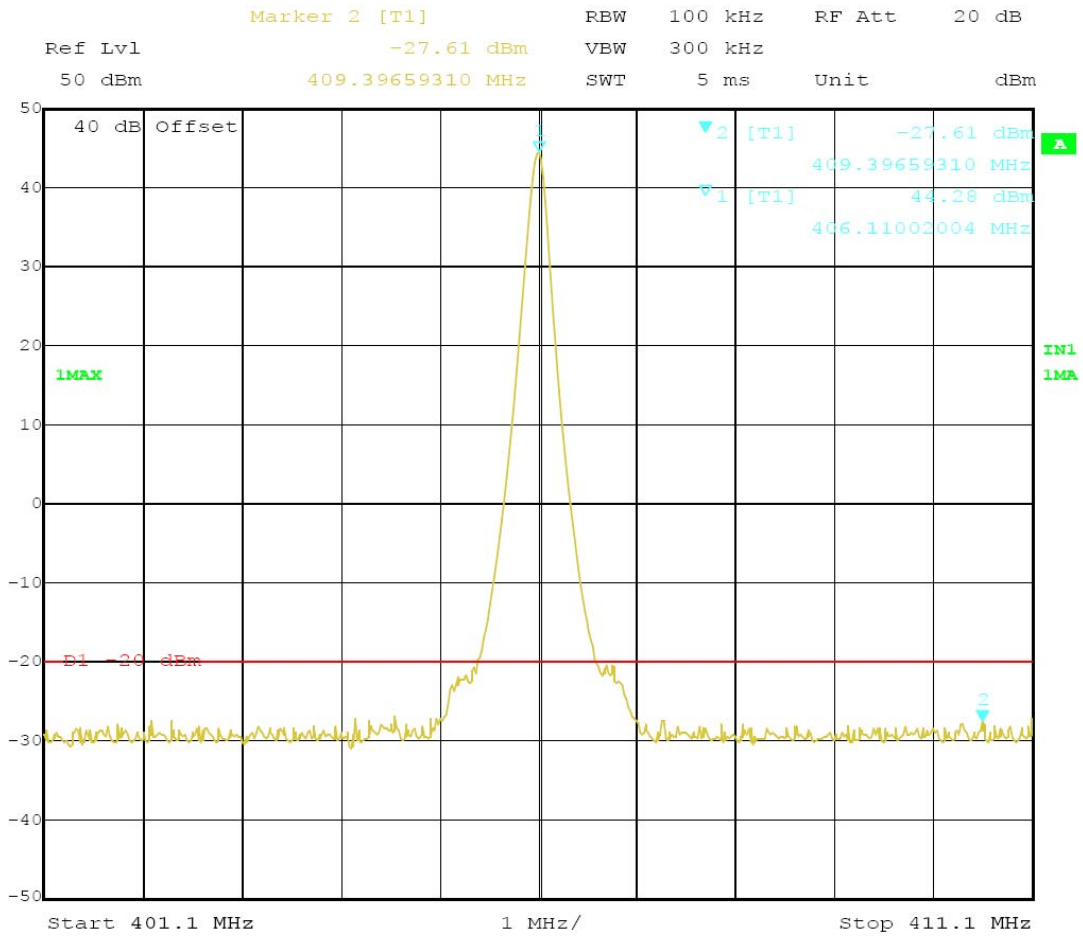
FCC Part 90.210 (12.5 kHz Bandwidth only):
On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f d in kHz) of more than 12.5 kHz at least:
Low: 50 + 10 log (Pwatts) = 50 + 10 log (44.46) =66.48 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (44.87) =66.52 dB

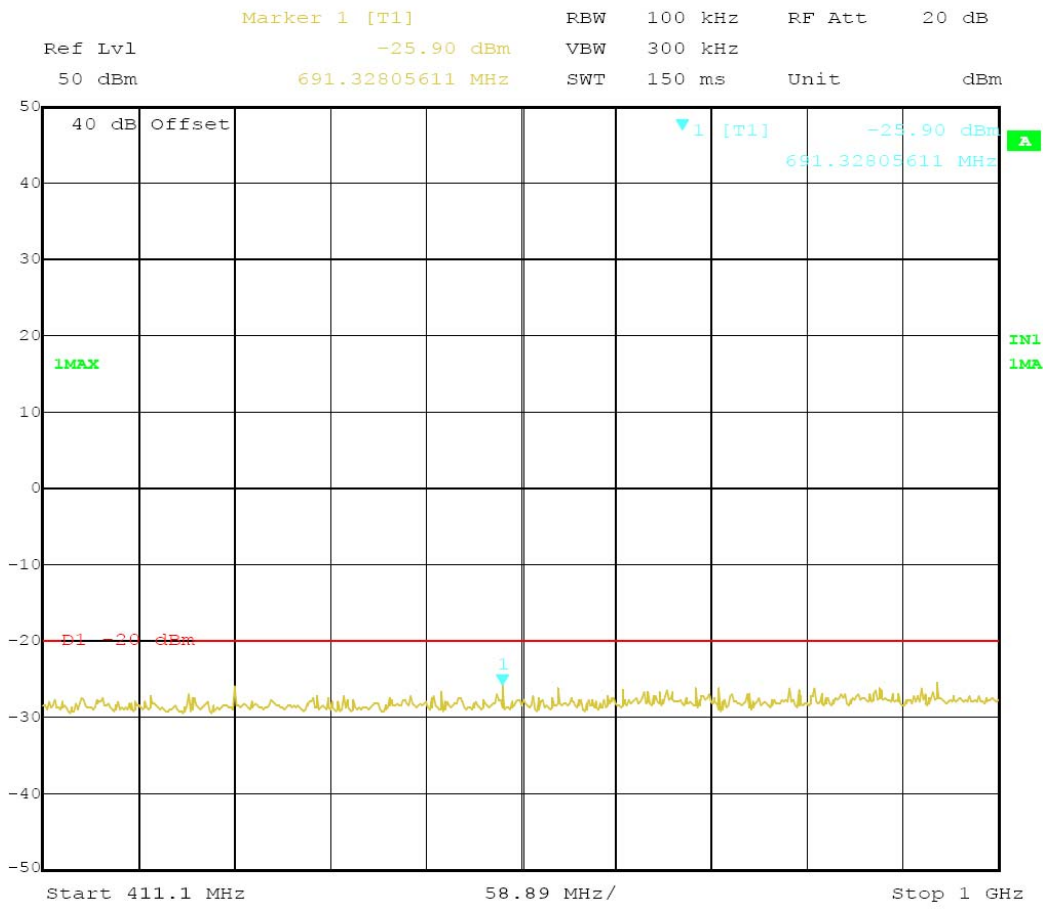
Note: In general, the worse case attenuation requirement shown above was applied.

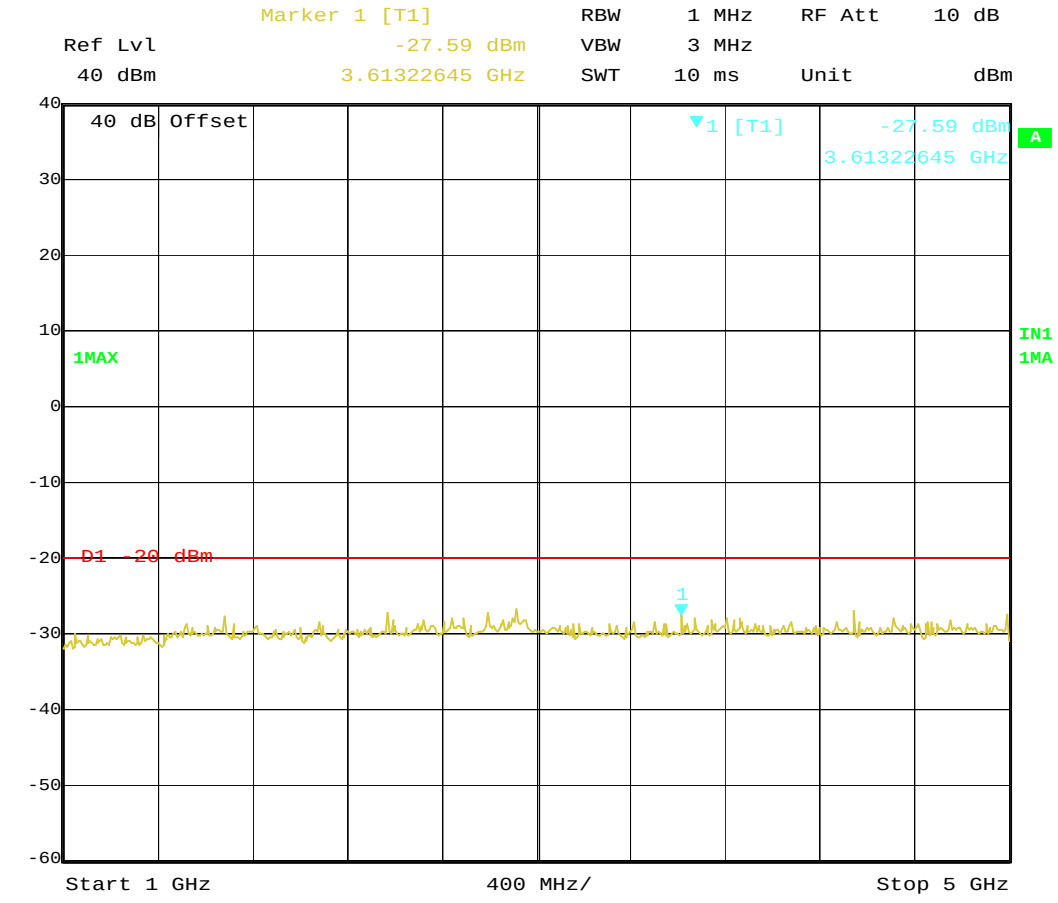
For 12.5 KHz

Product : Two-way Mobile Radio	Test Mode : 400 MHz
Test Item : Spurious Emission on Antenna Port	Temperatu: 25 ℃
Test Voltag: DC 13.6V (External Power Supply)	Humidity : 56%RH
Test Resul: **PASS**	


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-26.87 dBm
VBW 300 kHz
50 dBm
236.44208417 MHz
SWT 92 ms
Unit dBm
40 dB Offset
1 [T1] -26.87 dBm
236.44208417 MHz
1MAX
D1 -20 dBm
Start 30 MHz
36.53 MHz/
Stop 401.1 MHz


Marker 2 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-27.61 dBm
VBW 300 kHz
50 dBm
409.39659310 MHz
SWT 5 ms
Unit dBm
40 dB Offset
2 [T1] -27.61 dBm
409.39659310 MHz
1 [T1] 44.28 dBm
406.11002004 MHz
1MAX
D1 -20 dBm
Start 401.1 MHz
1 MHz/
Stop 411.1 MHz

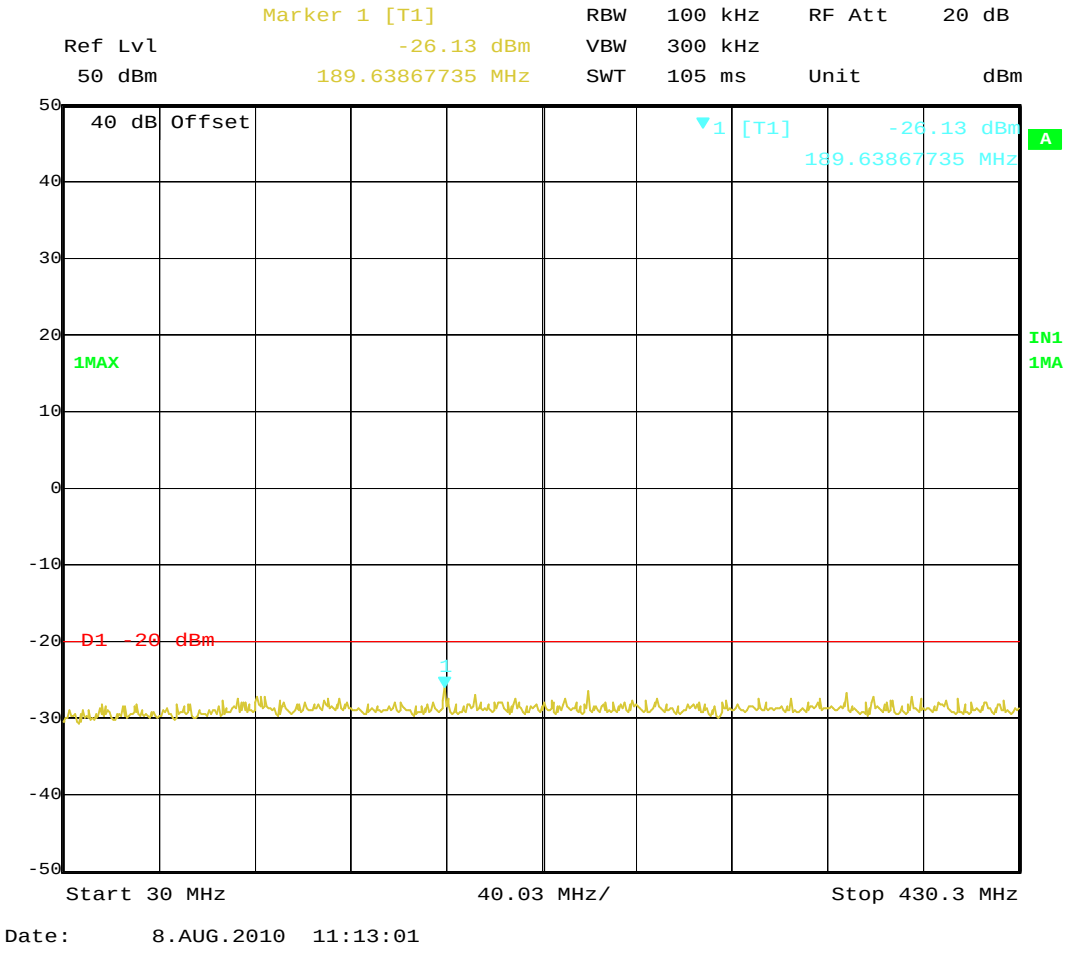


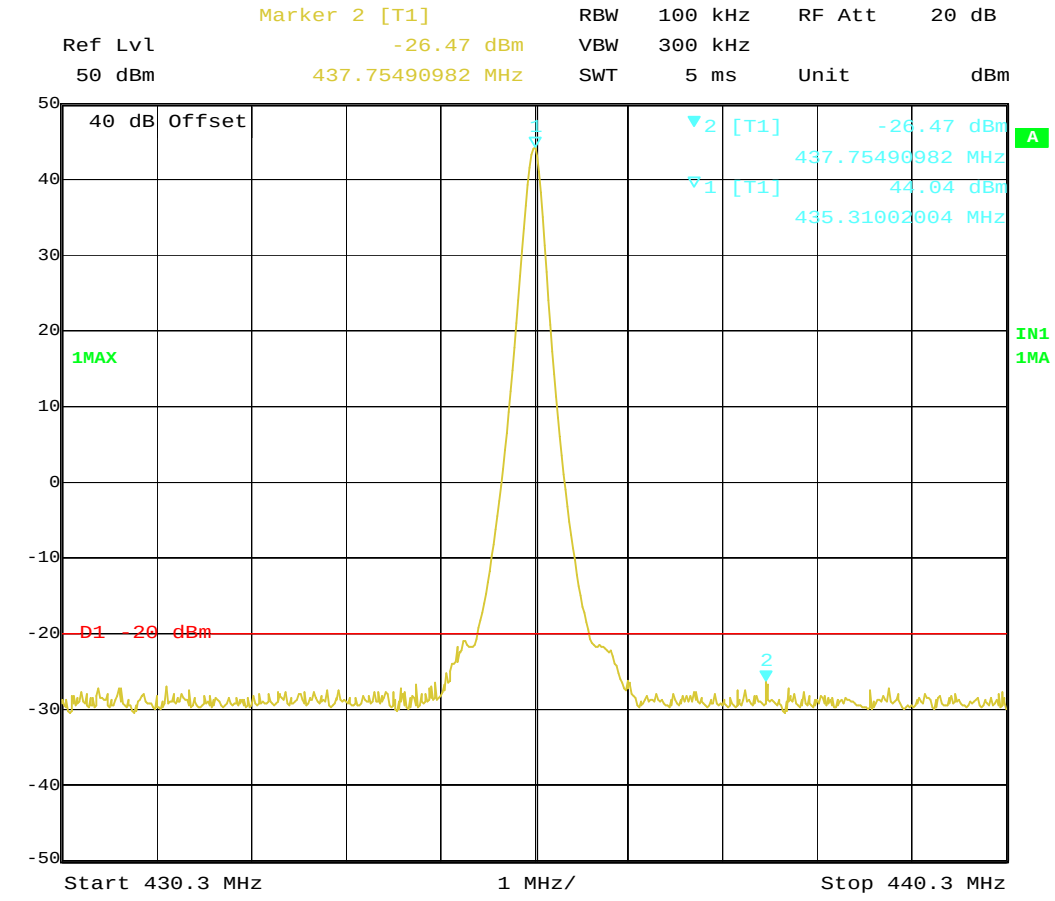


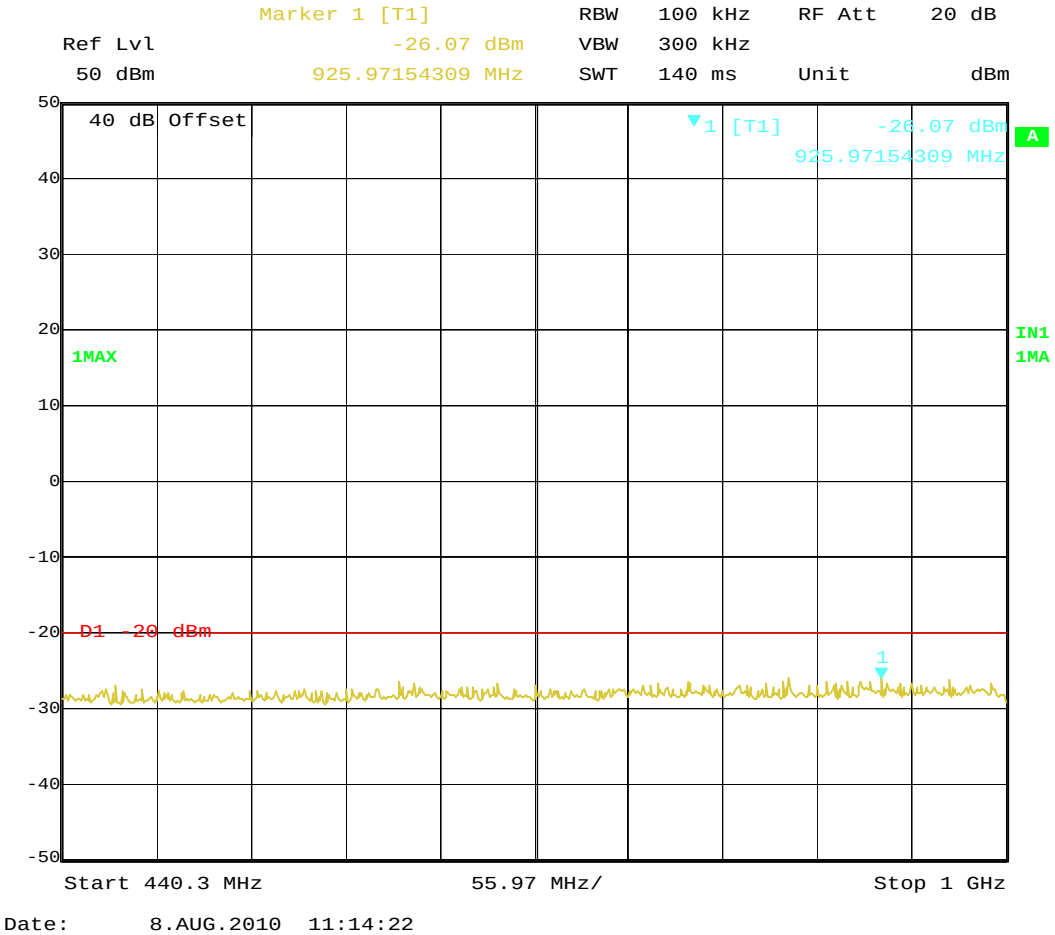
Date: 8.AUG.2010 11:10:40

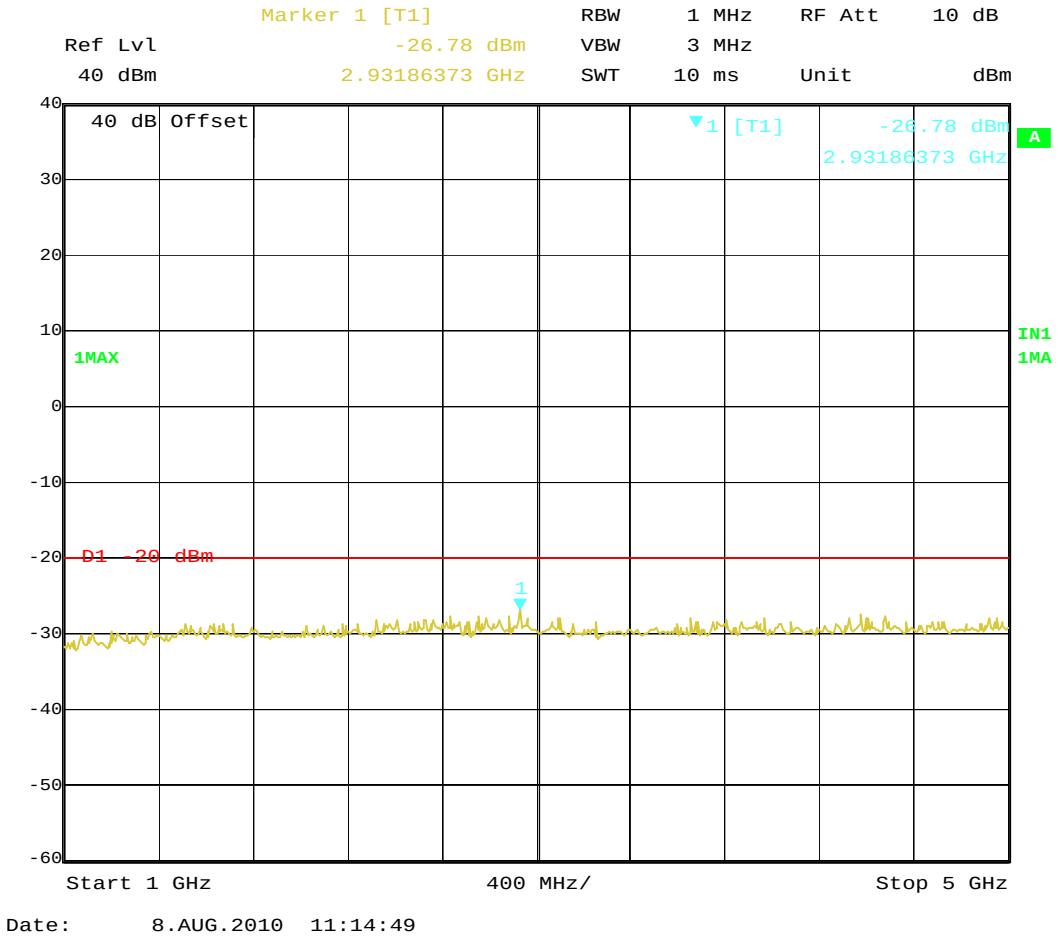
Product : Two-way Mobile Radio
Test Item : Spurious Emission on Antenna Port
Test Voltag: DC 13.6V (External Power Supply)
Test Resul: **PASS**

Test Mode : 435 MHz
Temperatu: 25 ℃
Humidity : 56%RH



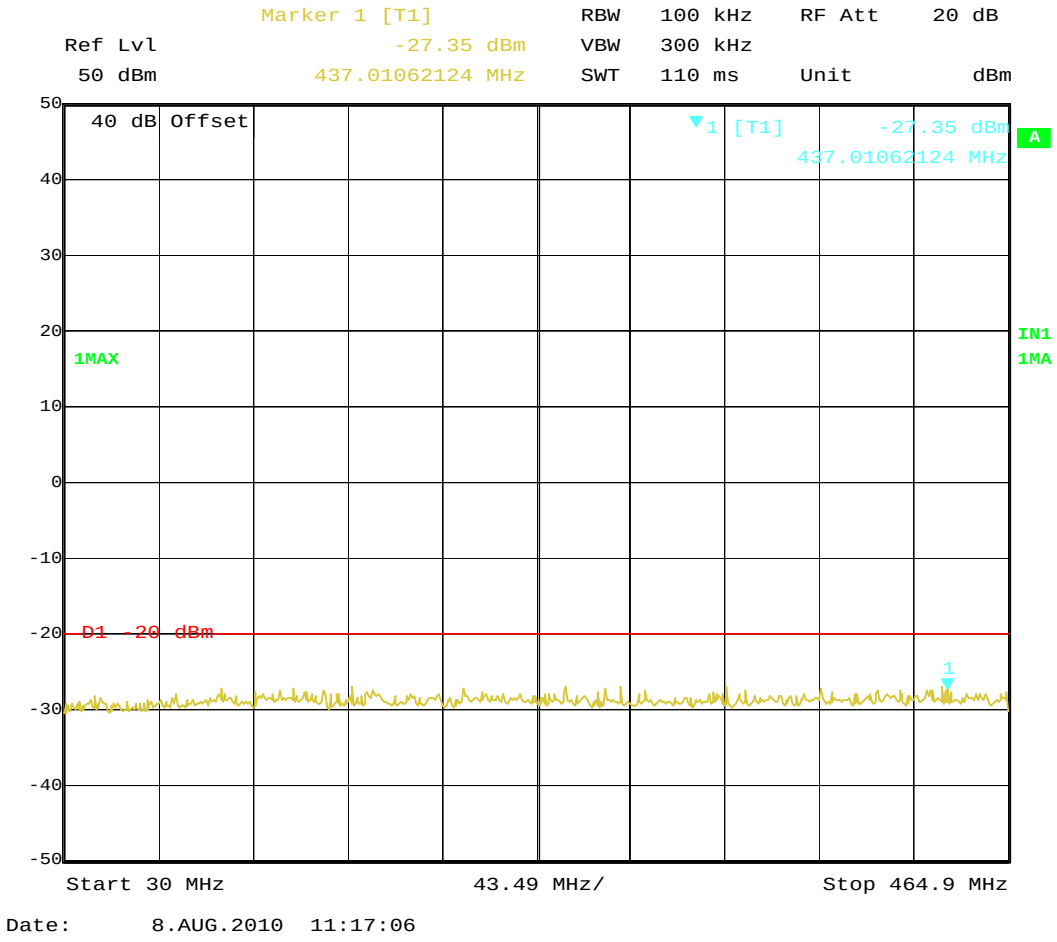

Marker 2 [T1]
-26.47 dBm
437.75490982 MHz
RBW 100 kHz
VBW 300 kHz
SWT 5 ms
RF Att 20 dB
Unit dBm
Ref Lvl
50 dBm
40 dB Offset
2 [T1] -26.47 dBm
437.75490982 MHz
1 [T1] 44.04 dBm
435.31002004 MHz
A
IN1
1MA
1MAX
D1 -20 dBm
Start 430.3 MHz
1 MHz/
Stop 440.3 MHz
Date: 8.AUG.2010 11:13:31

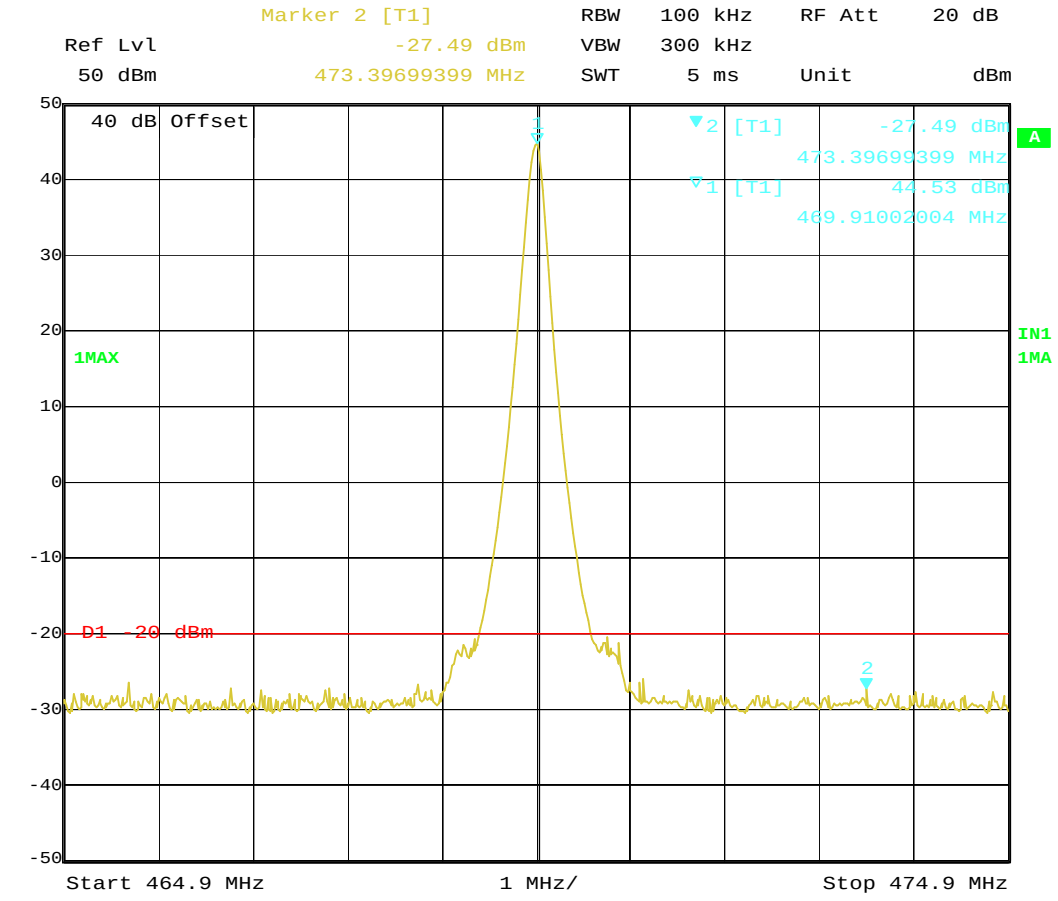

Marker 1 [T1]
-26.07 dBm
925.97154309 MHz
RBW 100 kHz
VBW 300 kHz
SWT 140 ms
RF Att 20 dB
Unit dBm
Ref Lvl
50 dBm
40 dB Offset
1 [T1] -26.07 dBm
925.97154309 MHz
A
IN1
1MA
1MAX
D1 -20 dBm
Start 440.3 MHz
55.97 MHz/
Stop 1 GHz
Date: 8.AUG.2010 11:14:22

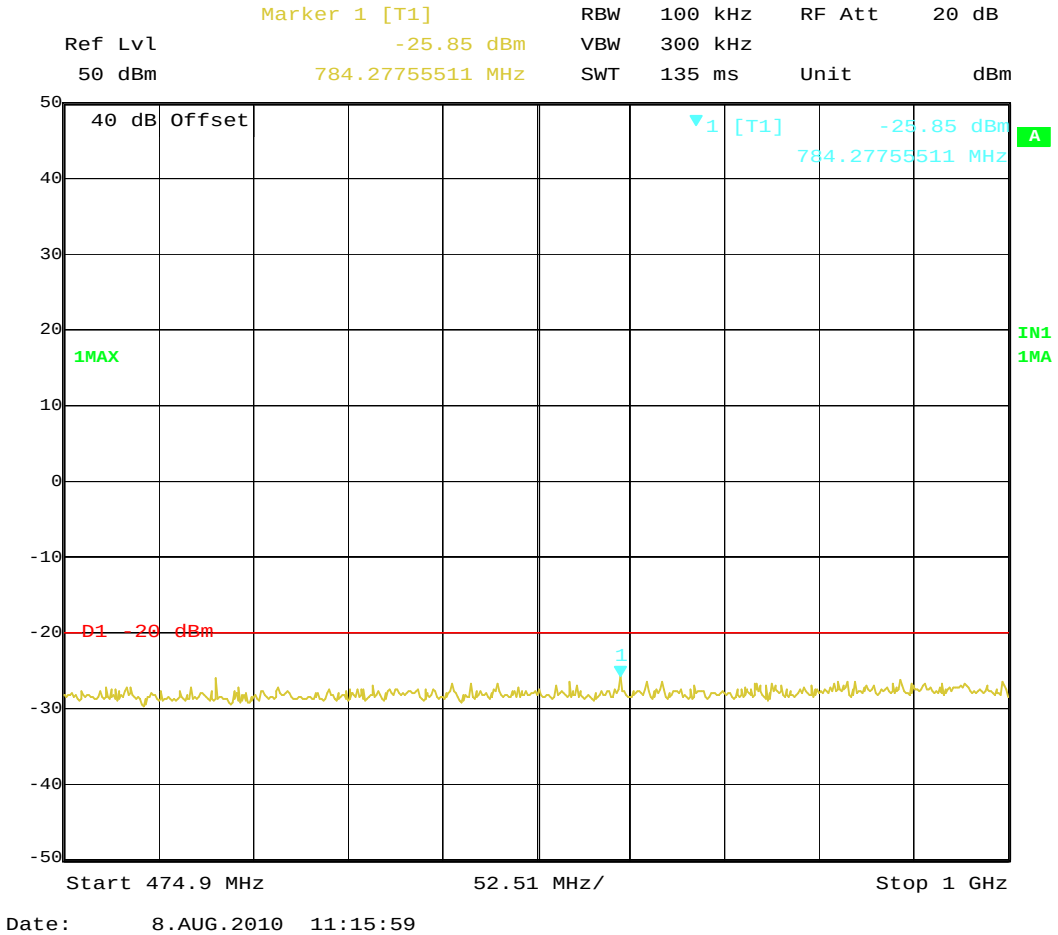

Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
-26.78 dBm
VBW 3 MHz
40 dBm
2.93186373 GHz
SWT 10 ms
Unit dBm
40 dB Offset
1 [T1]
-26.78 dBm
2.93186373 GHz
A
IN1
1MA
1MAX
D1 -20 dBm
Start 1 GHz
400 MHz/
Stop 5 GHz
Date: 8.AUG.2010 11:14:49

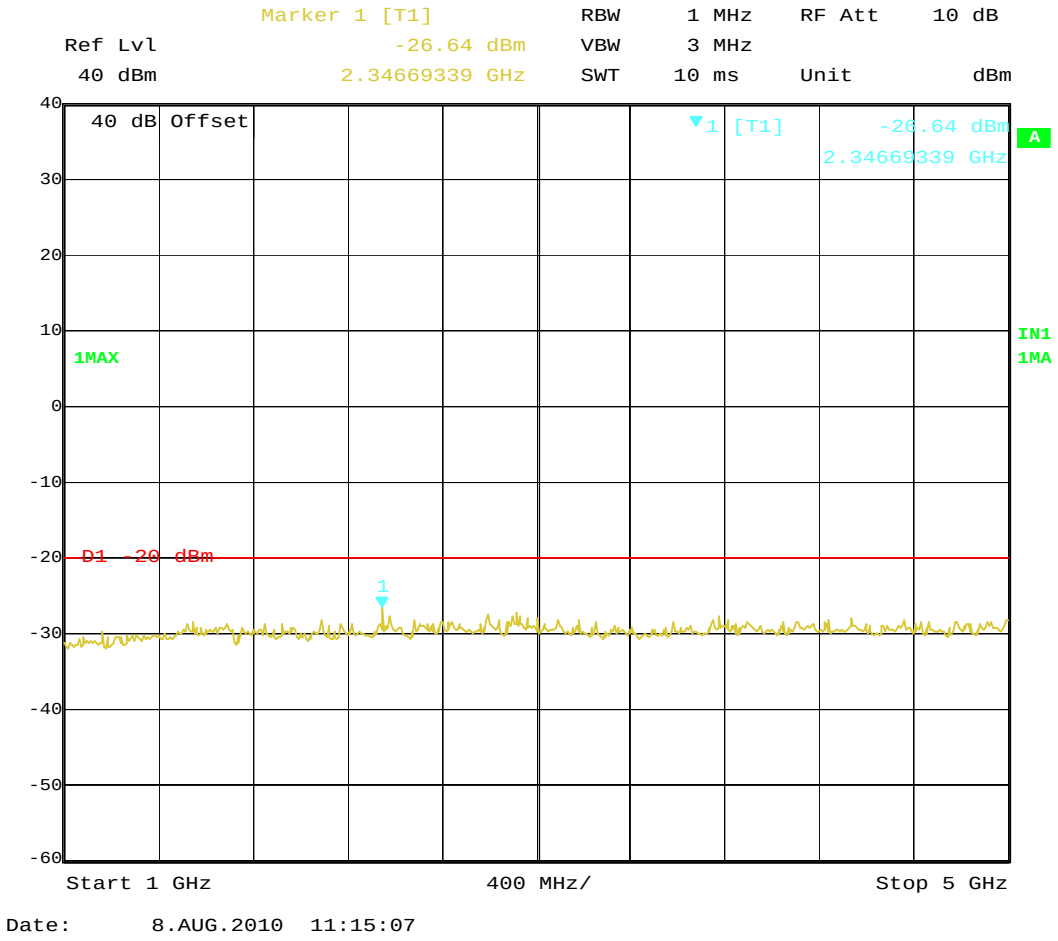
Product : Two-way Mobile Radio
Test Item : Spurious Emission on Antenna Port
Test Voltag: DC 13.6V (External Power Supply)
Test Resul: **PASS**

Test Mode : 470 MHz
Temperatu: 25 ℃
Humidity : 56%RH




Marker 2 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-27.49 dBm
VBW 300 kHz
50 dBm
473.39699399 MHz
SWT 5 ms
Unit dBm
40 dB Offset
2 [T1]
-27.49 dBm
473.39699399 MHz
1 [T1]
44.53 dBm
469.91002004 MHz
A
IN1
1MA
1MAX
D1 -20 dBm
50
40
30
20
10
0
-10
-20
-30
-40
-50
Start 464.9 MHz
1 MHz/
Stop 474.9 MHz
Date: 8.AUG.2010 11:16:45

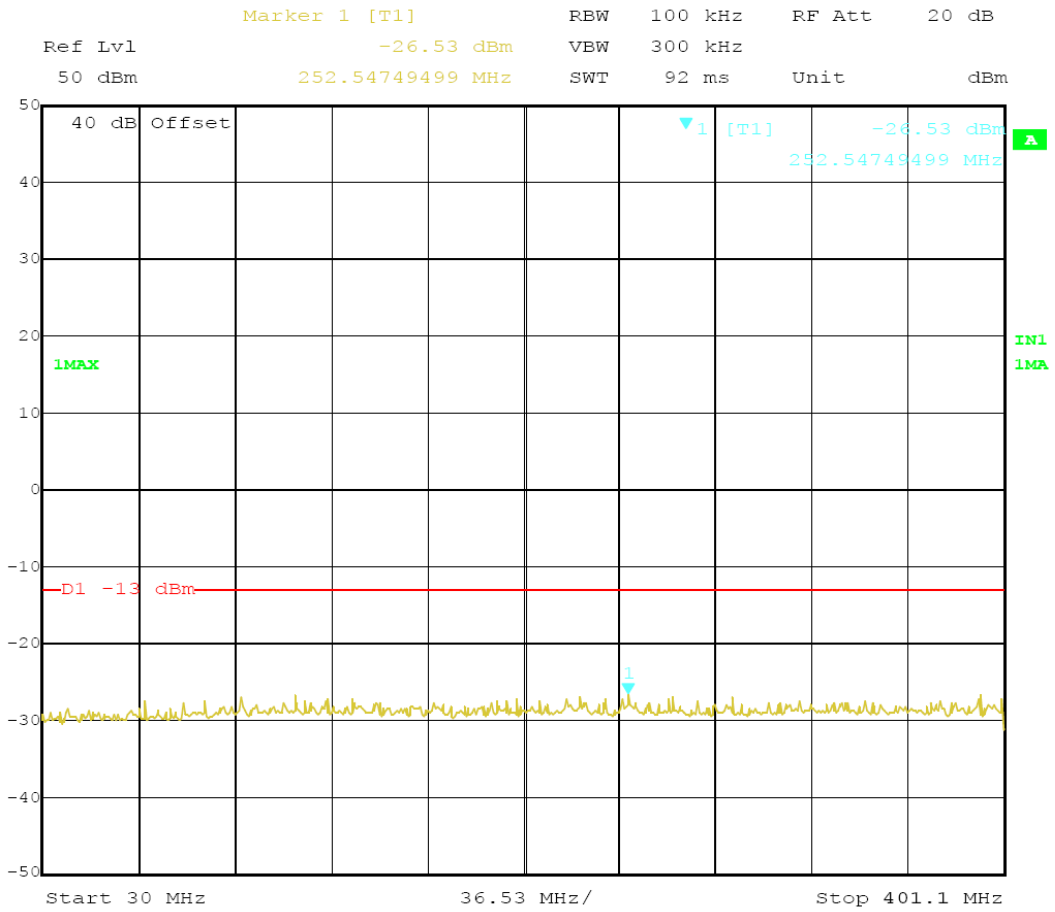

Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-25.85 dBm
VBW 300 kHz
50 dBm
784.27755511 MHz
SWT 135 ms
Unit dBm
40 dB Offset
1 [T1]
-25.85 dBm
784.27755511 MHz
A
IN1
1MA
1MAX
D1 -20 dBm
50
40
30
20
10
0
-10
-20
-30
-40
-50
Start 474.9 MHz
52.51 MHz/
Stop 1 GHz
Date: 8.AUG.2010 11:15:59

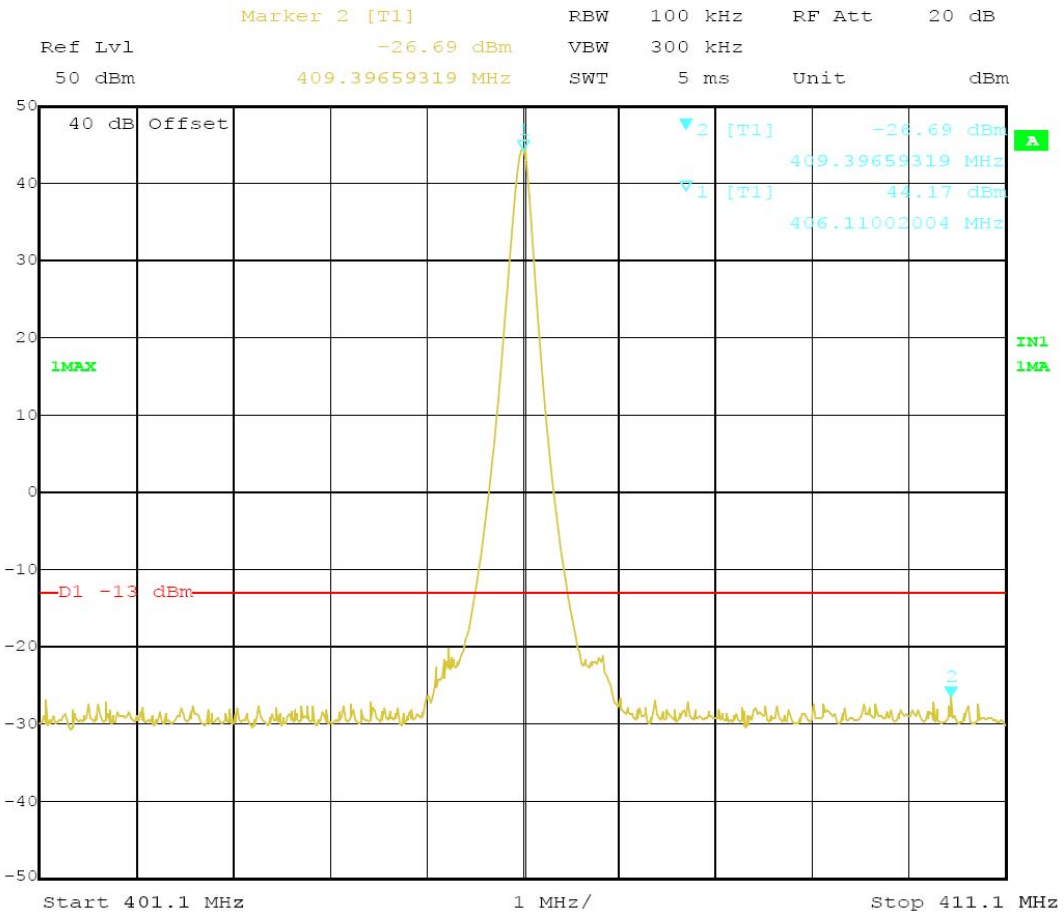

Marker 1 [T1]
Ref Lvl
40 dBm
-26.64 dBm
2.34669339 GHz
RBW 1 MHz
VBW 3 MHz
SWT 10 ms
RF Att 10 dB
Unit dBm
40 dB Offset
1 [T1]
-26.64 dBm
2.34669339 GHz
A
IN1
1MA
1MAX
D1 -20 dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 1 GHz
400 MHz/
Stop 5 GHz
Date: 8.AUG.2010 11:15:07

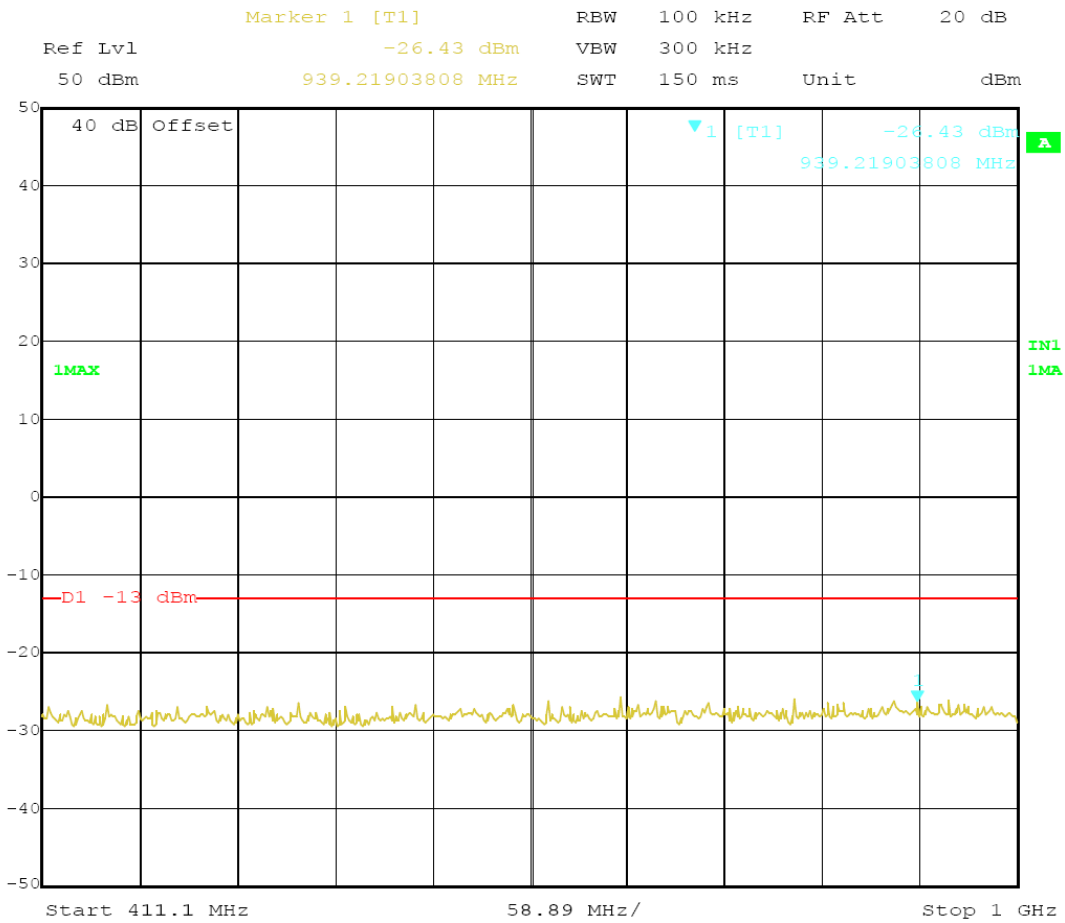
For 25 KHz

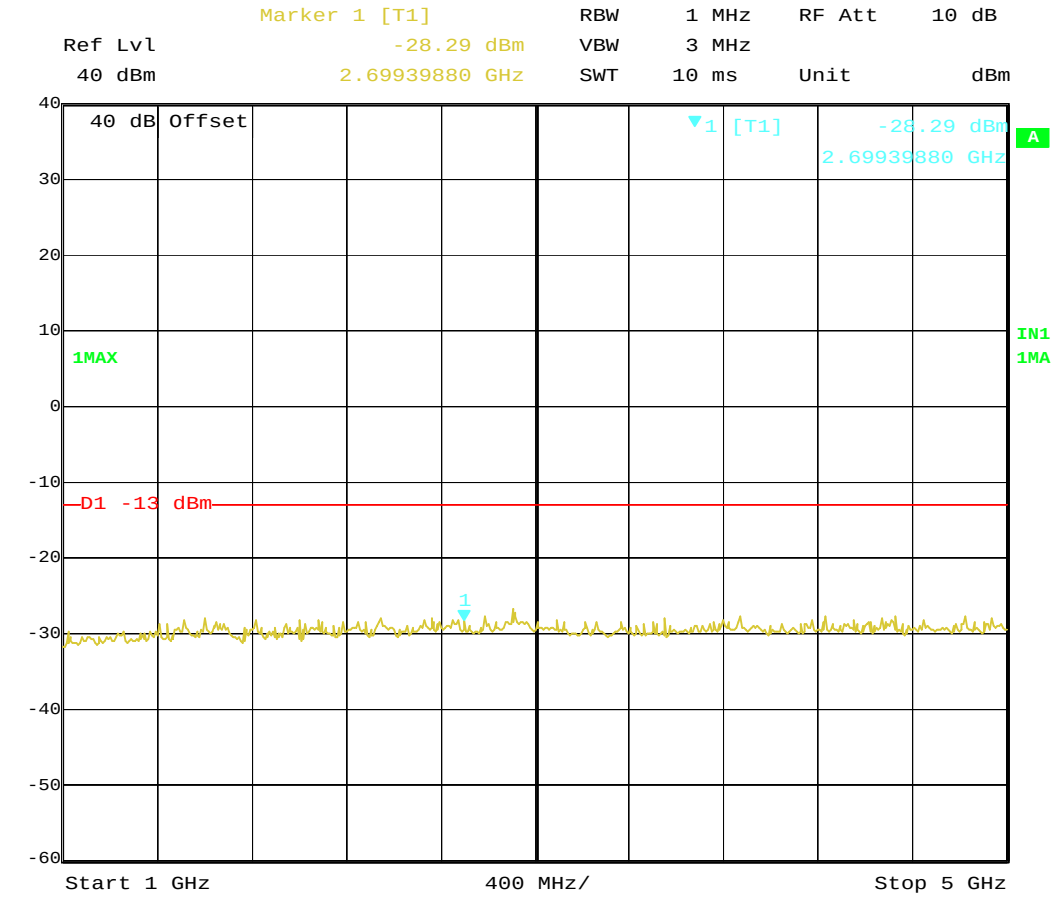
Product : Two-way Mobile Radio
Test Item : Spurious Emission on Antenna Port
Test Voltag: DC 13.6V (External Power Supply)
Test Resul: **PASS**

Test Mode : 400 MHz
Temperatu: 25 ℃
Humidity : 56%RH



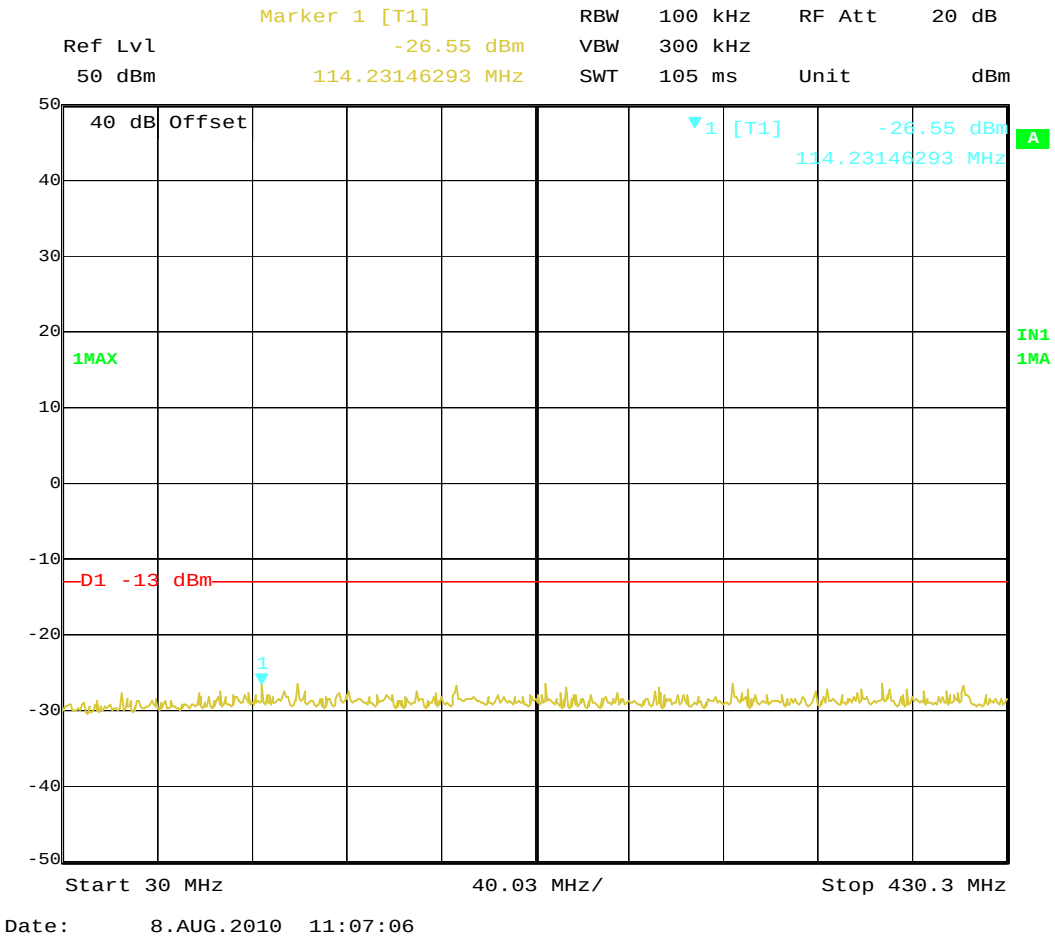

Marker 2 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-26.69 dBm
VBW 300 kHz
50 dBm
409.39659319 MHz
SWT 5 ms
Unit dBm
40 dB Offset
2 [T1] -26.69 dBm
409.39659319 MHz
1 [T1] 44.17 dBm
406.11002004 MHz
1MAX
D1 -13 dBm
IN1
1MA
Start 401.1 MHz
1 MHz/
Stop 411.1 MHz

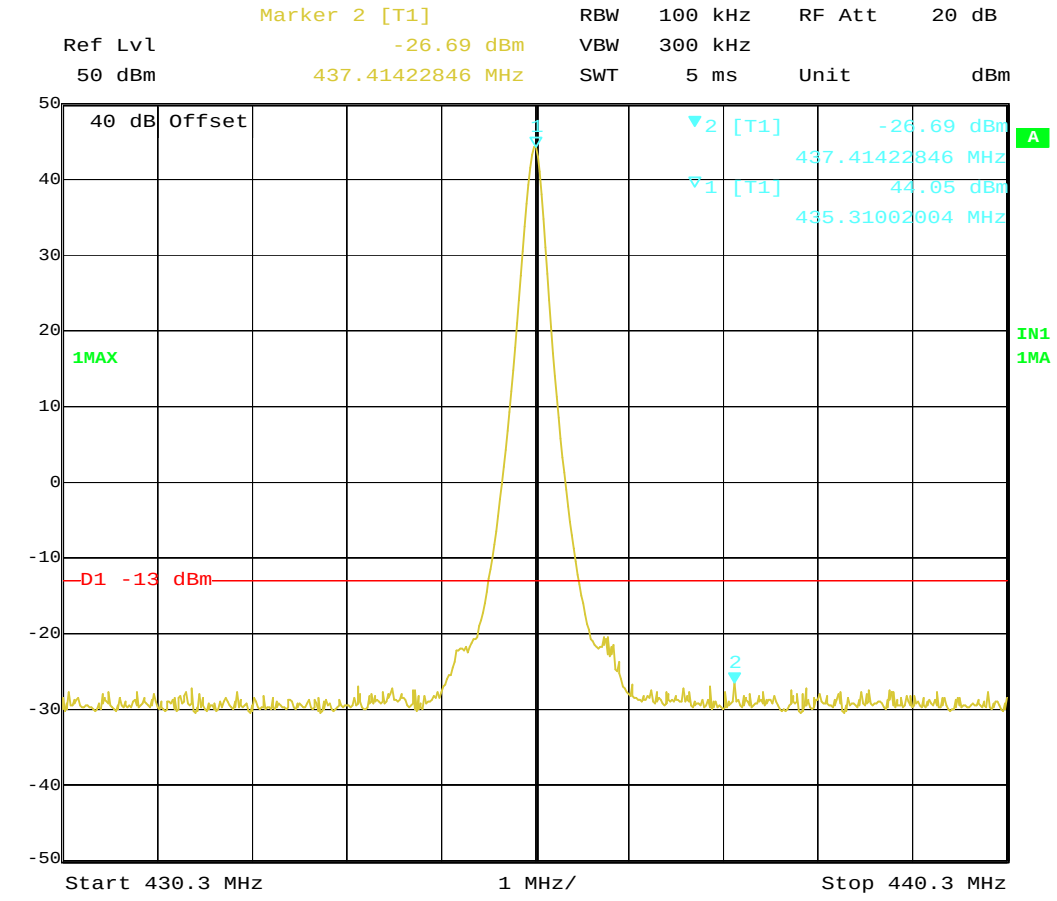

Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-26.43 dBm
VBW 300 kHz
50 dBm
939.21903808 MHz
SWT 150 ms
Unit dBm
40 dB Offset
1 [T1] -26.43 dBm
939.21903808 MHz
1MAX
D1 -13 dBm
IN1
1MA
Start 411.1 MHz
58.89 MHz/
Stop 1 GHz

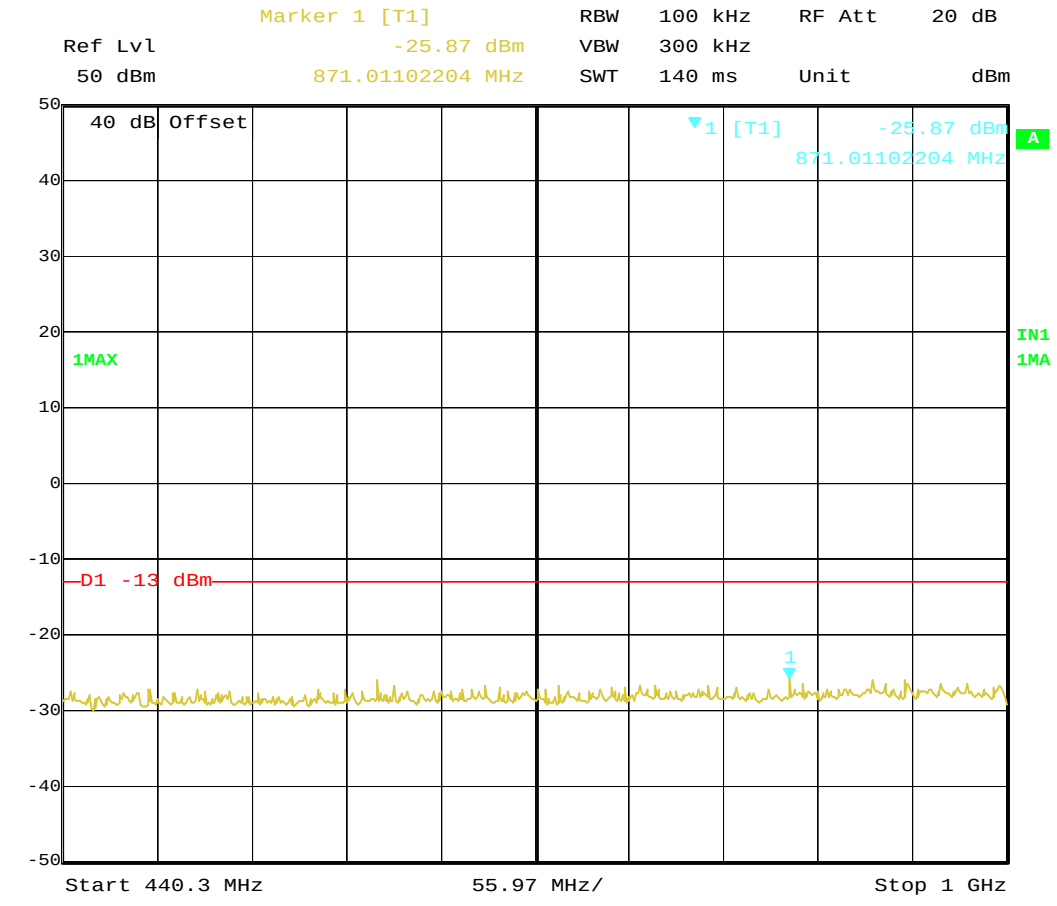

Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
-28.29 dBm
VBW 3 MHz
40 dBm
2.69939880 GHz
SWT 10 ms
Unit dBm
40 dB Offset
1 [T1]
-28.29 dBm
2.69939880 GHz
A
IN1
1MA
1MAX
D1 -13 dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 1 GHz
400 MHz/
Stop 5 GHz
Date: 8.AUG.2010 11:04:47

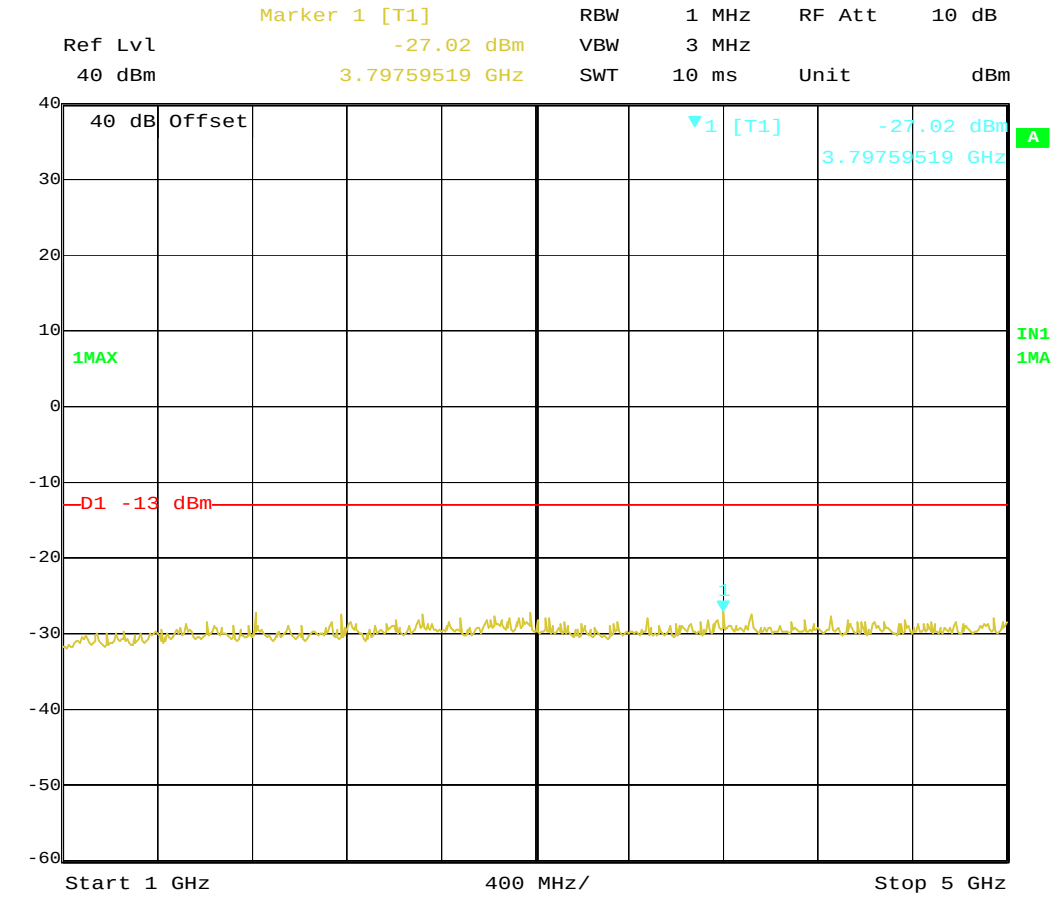
Product : Two-way Mobile Radio
Test Item : Spurious Emission on Antenna Port
Test Voltag: DC 13.6V (External Power Supply)
Test Resul: **PASS**

Test Mode : 435 MHz
Temperatu: 25 ℃
Humidity : 56%RH



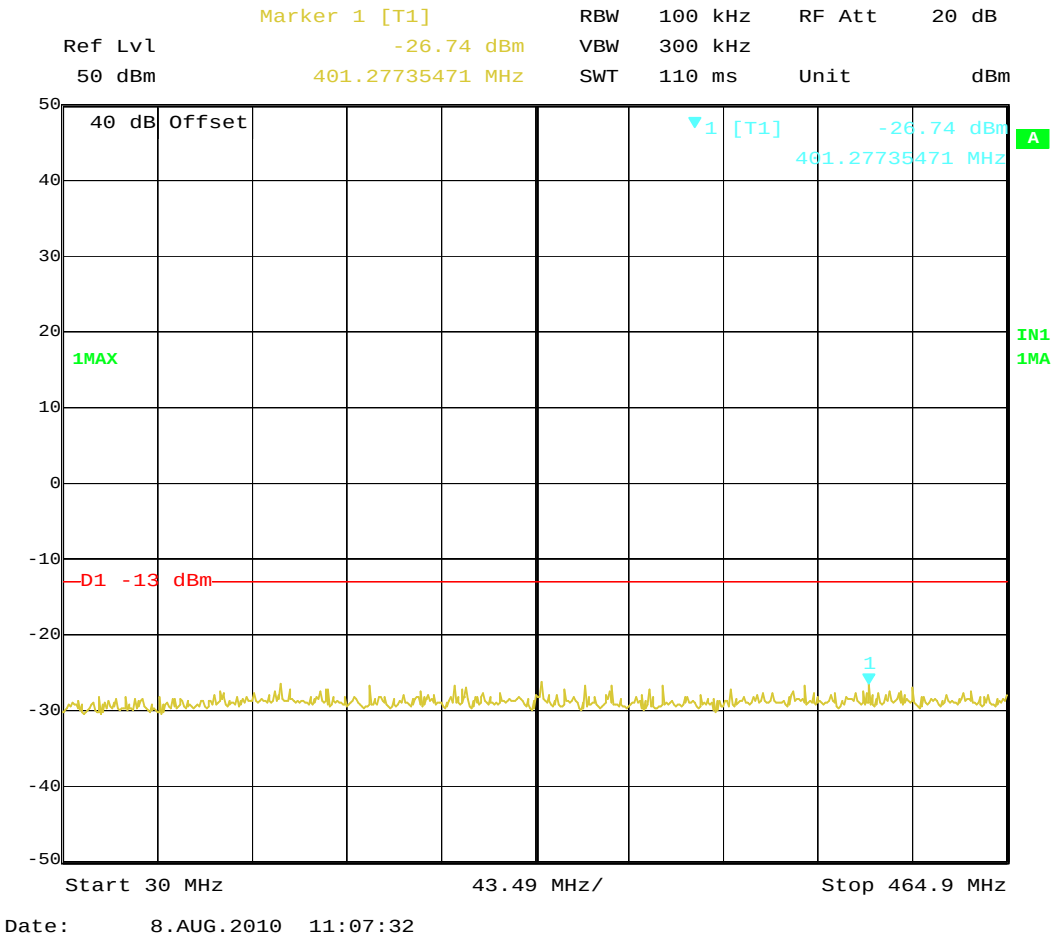

Marker 2 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-26.69 dBm
VBW 300 kHz
50 dBm
437.41422846 MHz
SWT 5 ms
Unit dBm
40 dB Offset
2 [T1] -26.69 dBm
437.41422846 MHz
1 [T1] 44.05 dBm
435.31002004 MHz
A
IN1
1MA
1MAX
D1 -13 dBm
Start 430.3 MHz
1 MHz/
Stop 440.3 MHz
Date: 8.AUG.2010 11:06:42

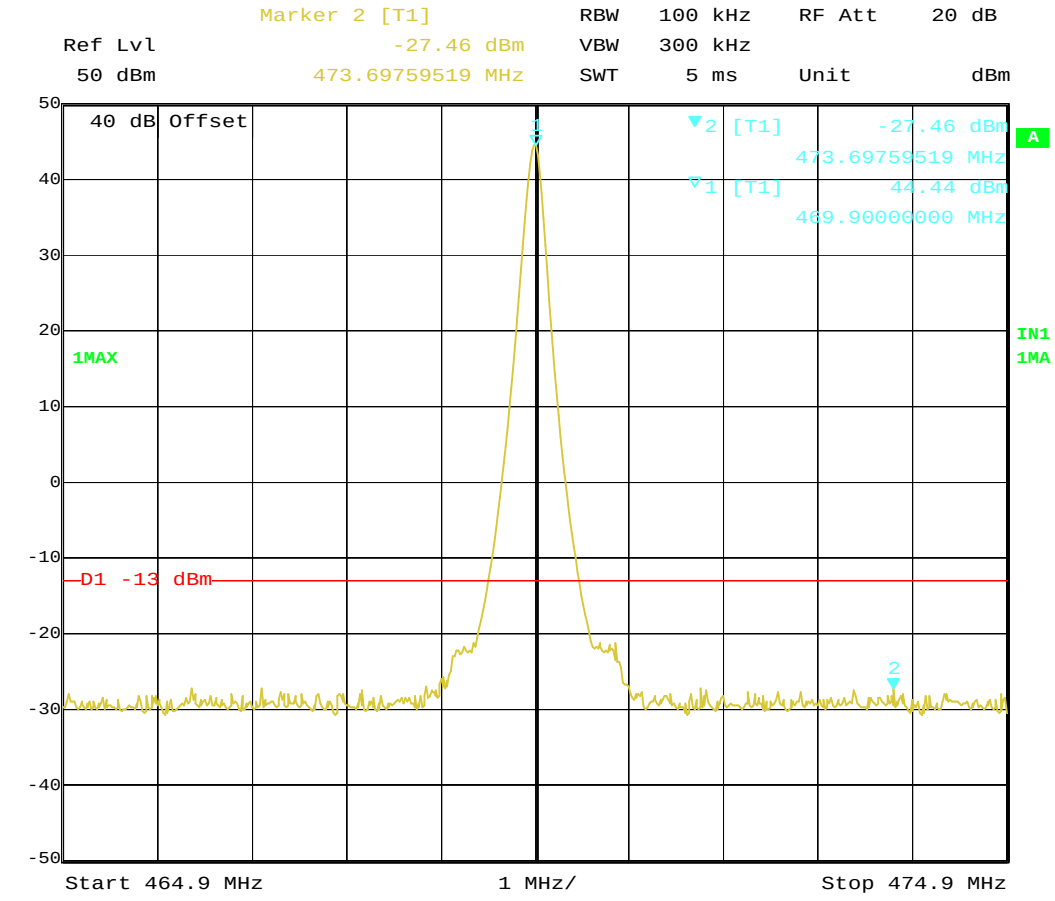

Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-25.87 dBm
VBW 300 kHz
50 dBm
871.01102204 MHz
SWT 140 ms
Unit dBm
40 dB Offset
1 [T1] -25.87 dBm
871.01102204 MHz
A
IN1
1MA
1MAX
D1 -13 dBm
Start 440.3 MHz
55.97 MHz/
Stop 1 GHz
Date: 8.AUG.2010 11:05:41


Marker 1 [T1]
Ref Lvl
40 dBm
-27.02 dBm
3.79759519 GHz
RBW 1 MHz
VBW 3 MHz
SWT 10 ms
RF Att 10 dB
Unit dBm
40 dB Offset
1 [T1]
-27.02 dBm
3.79759519 GHz
A
IN1
1MA
1MAX
D1 -13 dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 1 GHz
400 MHz/
Stop 5 GHz
Date: 8.AUG.2010 11:05:07

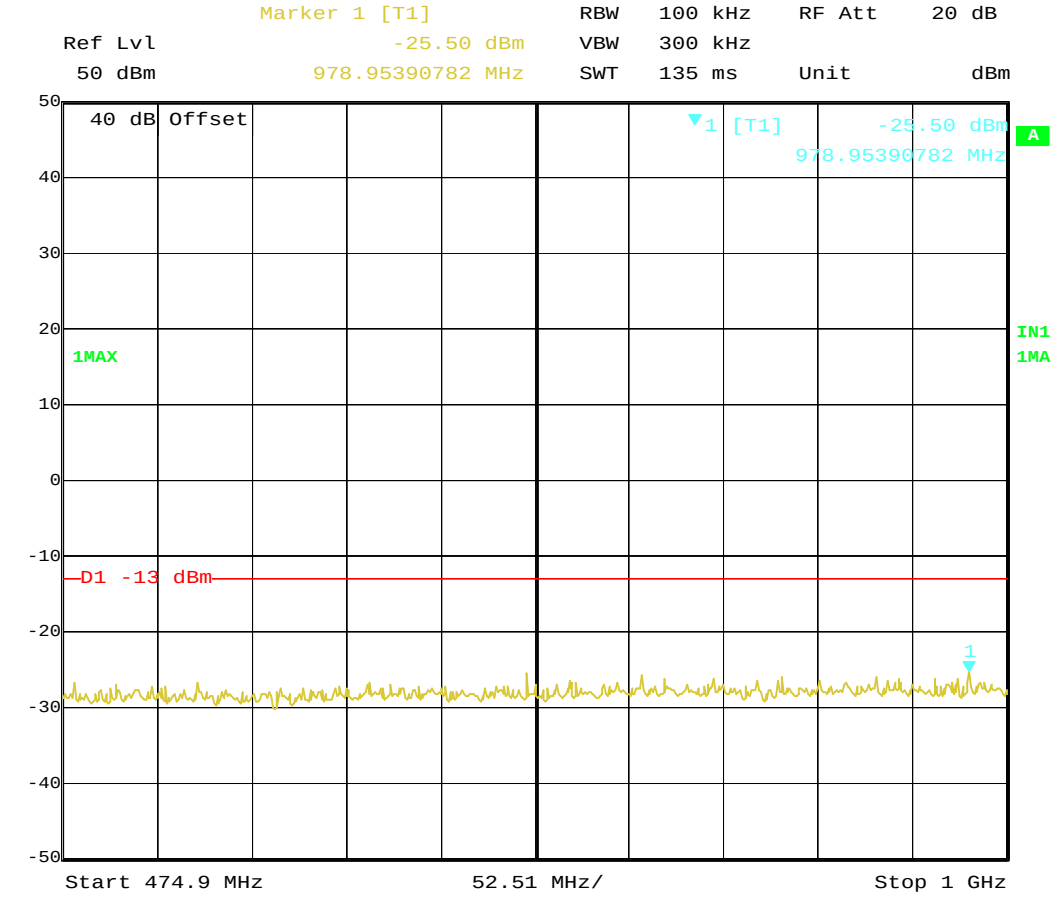
Product : Two-way Mobile Radio
Test Item : Spurious Emission on Antenna Port
Test Voltag: DC 13.6V (External Power Supply)
Test Resul: **PASS**

Test Mode : 470 MHz
Temperatu: 25 ℃
Humidity : 56%RH

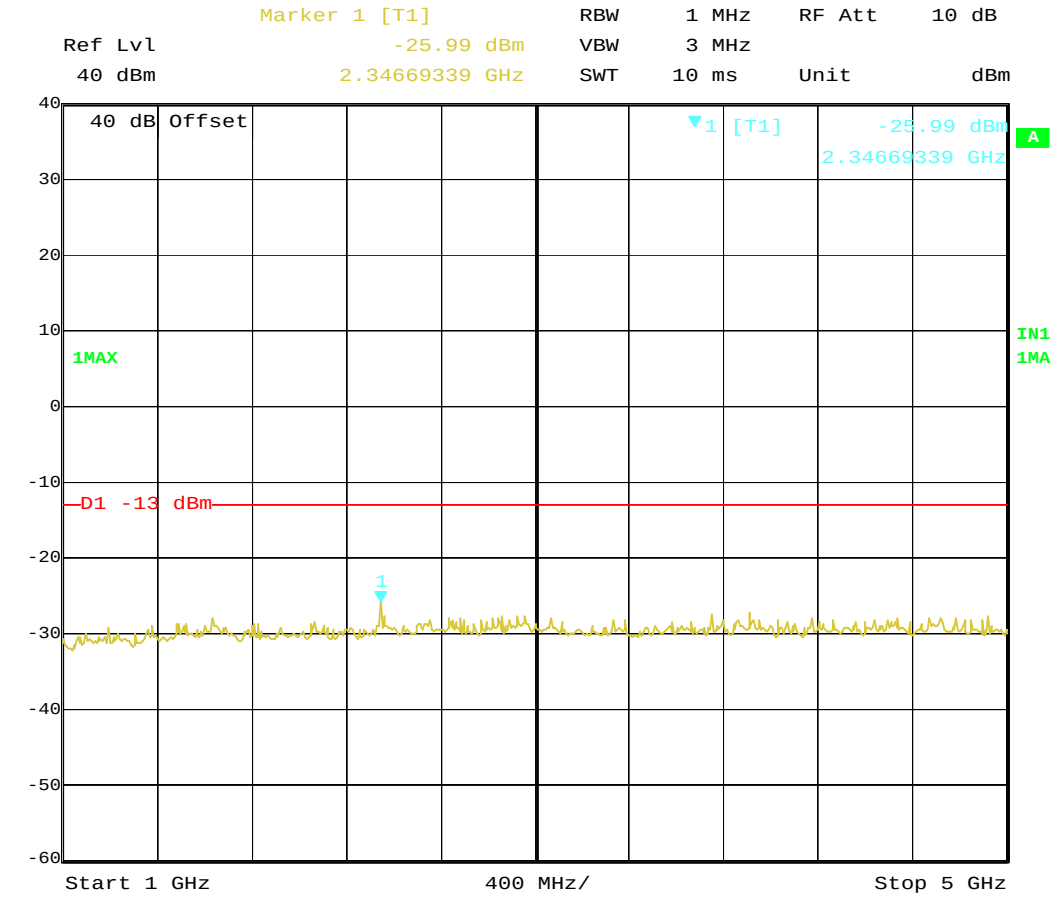




Date: 8.AUG.2010 11:08:07



Date: 8.AUG.2010 11:09:38


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
-25.99 dBm
VBW 3 MHz
40 dBm
2.34669339 GHz
SWT 10 ms
Unit dBm
40 dB Offset
1 [T1]
-25.99 dBm
2.34669339 GHz
A
IN1
1MA
1MAX
D1 -13 dBm
1
40
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 1 GHz
400 MHz/
Stop 5 GHz
Date: 8.AUG.2010 11:10:17

4.5. Modulation Characteristics

PROVISIONS APPLICABLE

According toCFR47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

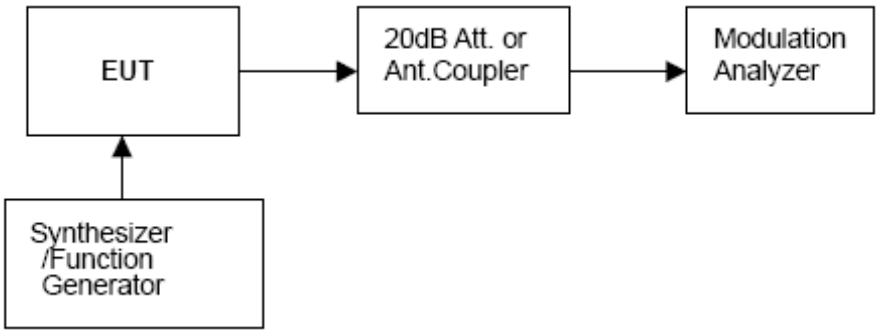
MEASUREMENT METHOD

Modulation Limit

1). Configure the EUT as shown in figure 1, adjust the audio input for60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.
2). Repeat step 1 with input frequency changing to 300, 1004, and 2500Hz in sequence.

Audio Frequency Response

1). Configure the EUT as shown in figure 1.
2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0dB).
3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.
4) Audio Frequency Response =20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

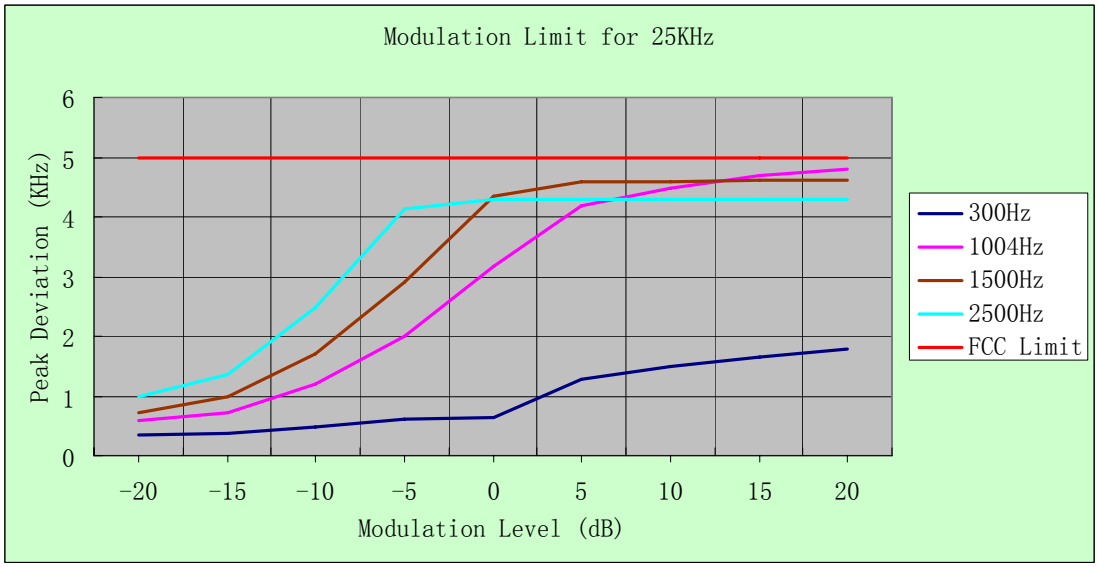


TEST RESULTS:

a). Modulation Limit:

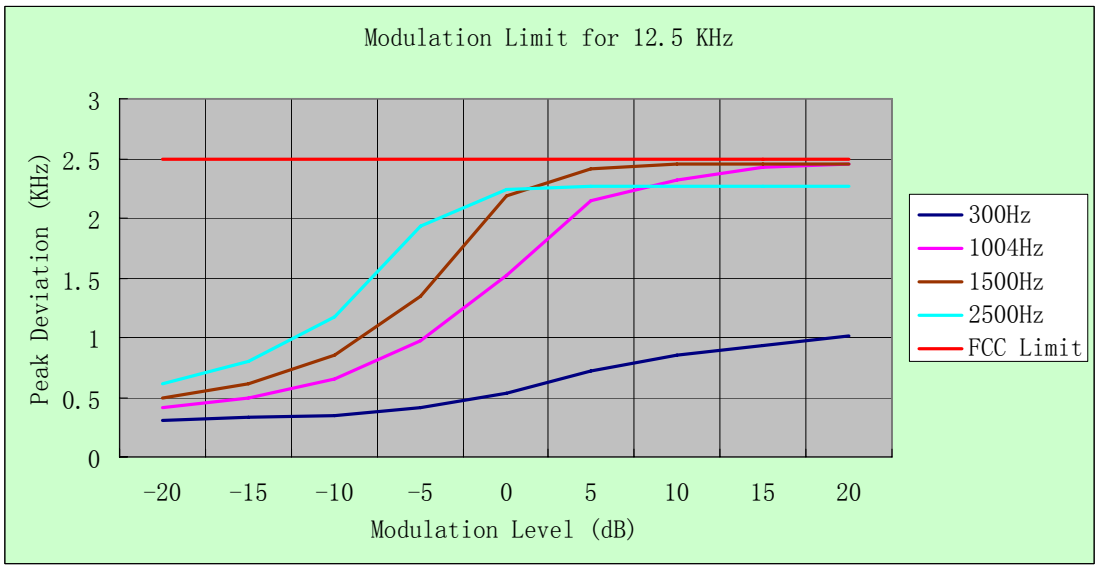
25 KHz Channel Separation

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz (KHz)	Peak Freq. Deviation At 1004 Hz (KHz)	Peak Freq. Deviation At 1500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)
-20	0.35	0.59	0.73	1
-15	0.38	0.73	0.98	1.37
-10	0.48	1.2	1.71	2.48
-5	0.61	1.99	2.91	4.13
0	0.63	3.18	4.34	4.3
+5	1.28	4.2	4.58	4.3
+10	1.5	4.49	4.6	4.3
+15	1.65	4.69	4.62	4.3
+20	1.79	4.79	4.62	4.3



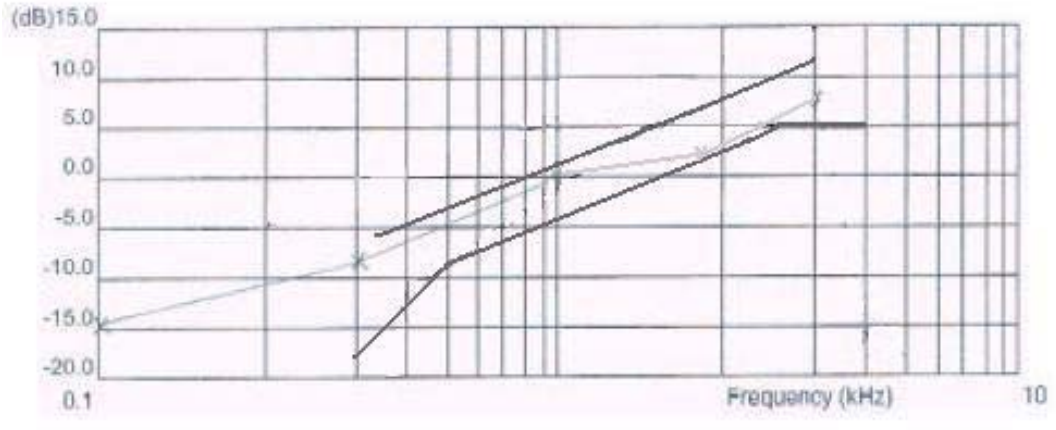
12.5 KHz Channel Separation

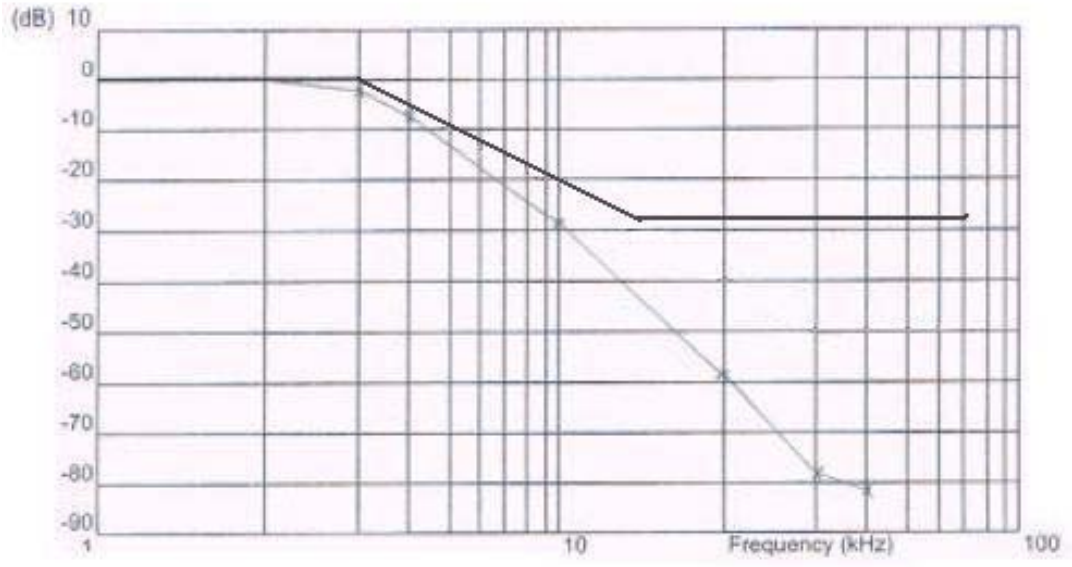
Modulation Level (dB)	Peak Freq. Deviation At 300 Hz (KHz)	Peak Freq. Deviation At 1004 Hz (KHz)	Peak Freq. Deviation At 1500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)
-20	0.31	0.41	0.5	0.62
-15	0.33	0.49	0.62	0.8
-10	0.35	0.65	0.86	1.18
-5	0.42	0.97	1.35	1.94
0	0.53	1.52	2.19	2.24
+5	0.72	2.15	2.42	2.27
+10	0.86	2.32	2.45	2.27
+15	0.93	2.43	2.45	2.27
+20	1.02	2.46	2.45	2.27



b). Audio Frequency Response:

Note: The Audio Frequency Response is identical for 12.5 KHz and 25 KHz channel separation





4.6. Frequency Stability Measurement

PROVISIONS APPLICABLE

a). According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +60℃ centigrade.

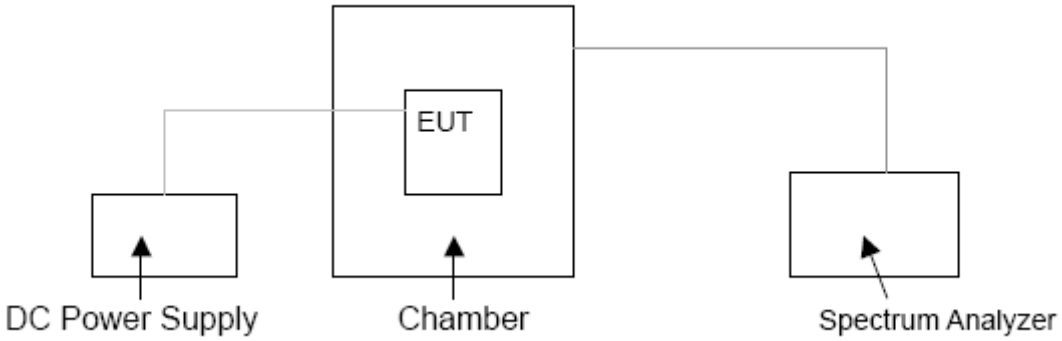
b). According to FCC Part 2 Section 2.1055 (a)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.

c). According to §90.213, the frequency stability limit is 2.5 ppm for 12.5KHz channel separation and 5 ppm for 25KHz channel separation.

MEASUREMENT PROCEDURE

The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Spectrum Analyzer ESI 26. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to an DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST SETUP BLOCK DIAGRAM



TEST RESULTS:

a. Frequency stability versus input voltage (battery operation end point voltage is 11.8 V)

For 25 KHz:

Channel	Reference Frequency (MHz)	Frequency Measured at end point	Frequency Deviation (%)	Limit (%)
01	406.10000	406.10051	0.00013	0.0005
02	435.30000	435.30052	0.00012	0.0005
03	469.90000	469.90053	0.00011	0.0005

For 12.5 KHz:

Channel	Reference Frequency (MHz)	Frequency Measured at end point	Frequency Deviation (%)	Limit (%)
07	406.10000	406.10044	0.00011	0.00025
08	435.30000	435.30049	0.00011	0.00025
09	469.90000	469.90050	0.00011	0.00025

b. Frequency stability versus ambient temperature
For 25 KHz:

The Bottom Channel

Reference Frequency: 406.10000 MHz			Limit: 0.0005%
Environment Temperature (℃)	Power Supply (DC)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	13.6V	406.10025	0.00006
40	13.6V	406.10020	0.00005
30	13.6V	406.10010	0.00003
20	13.6V	406.10000	0.00000
10	13.6V	406.10010	0.00003
0	13.6V	406.10020	0.00005
-10	13.6V	406.10020	0.00005
-20	13.6V	406.10025	0.00006
-30	13.6V	406.10025	0.00006

The Middle Channel

Reference Frequency: 435.30000 MHz			Limit: 0.0005%
Environment Temperature (℃)	Power Supply (DC)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	13.6V	435.30030	0.00007
40	13.6V	435.30025	0.00006
30	13.6V	435.30025	0.00006
20	13.6V	435.30000	0.00000
10	13.6V	435.30010	0.00002
0	13.6V	435.30020	0.00004
-10	13.6V	435.30025	0.00006
-20	13.6V	435.30025	0.00006
-30	13.6V	435.30030	0.00007

The Top Channel

Reference Frequency:469.90000 MHz		Limit: 0.0005%	
Environment Temperature (℃)	Power Supply (DC)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	13.6V	469.90030	0.00006
40	13.6V	469.90025	0.00005
30	13.6V	469.90015	0.00003
20	13.6V	469.90000	0.00000
10	13.6V	469.90015	0.00003
0	13.6V	469.90020	0.00004
-10	13.6V	469.90025	0.00005
-20	13.6V	469.90025	0.00005
-30	13.6V	469.90035	0.00007

For 12.5 KHz:

The Bottom Channel

Reference Frequency:406.10000 MHz		Limit: 0.00025%	
Environment Temperature (℃)	Power Supply (DC)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	13.6V	406.10025	0.00006
40	13.6V	406.10022	0.00005
30	13.6V	406.10020	0.00004
20	13.6V	406.10000	0.00000
10	13.6V	406.10010	0.00002
0	13.6V	406.10015	0.00003
-10	13.6V	406.10020	0.00004
-20	13.6V	406.10025	0.00006
-30	13.6V	406.10028	0.00007

The Middle Channel

Reference Frequency: 435.30000 MHz			Limit: 0.00025%
Environment Temperature (℃)	Power Supply (DC)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	13.6V	435.30026	0.00006
40	13.6V	435.30020	0.00005
30	13.6V	435.30020	0.00005
20	13.6V	435.30000	0.00000
10	13.6V	435.30015	0.00003
0	13.6V	435.30015	0.00003
-10	13.6V	435.30020	0.00005
-20	13.6V	435.30020	0.00005
-30	13.6V	435.30030	0.00007

The Top Channel

Reference Frequency: 469.90000 MHz			Limit: 0.00025%
Environment Temperature (℃)	Power Supply (DC)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	13.6V	469.90025	0.00005
40	13.6V	469.90020	0.00004
30	13.6V	469.90015	0.00003
20	13.6V	469.90000	0.00000
10	13.6V	469.90010	0.00002
0	13.6V	469.90010	0.00002
-10	13.6V	469.90015	0.00003
-20	13.6V	469.90020	0.00004
-30	13.6V	469.90025	0.00005

4.7. Conducted Output Power

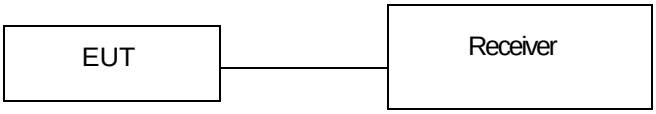
PROVISIONS APPLICABLE

Per FCC <<2.1046 and <<90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

TEST PROCEDURE

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels.
The EUT connect to the Receiver through 20 dB attenuator.
Measurement with Spectrum Analyzer ESI 26 conducted, external power supply with 13.6V stabilized supply voltage.

TEST SETUP BLOCK DIAGRAM

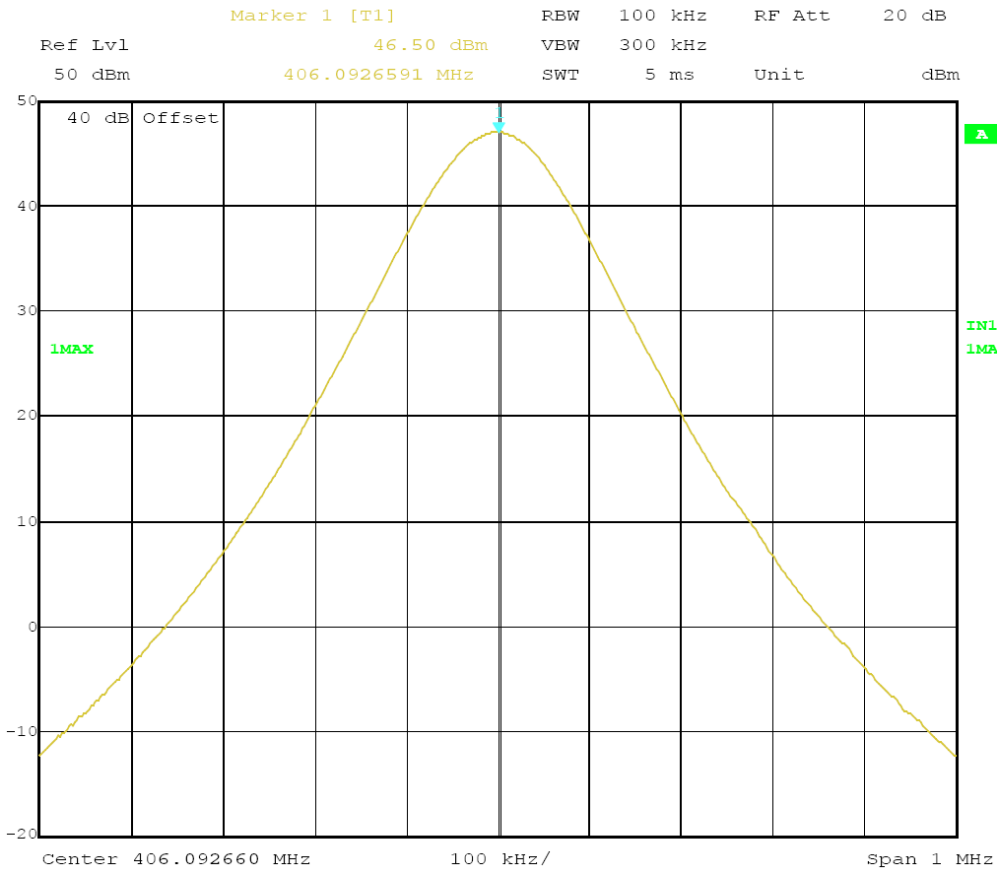


The EUT was directly connected to a RF Communication Test Set

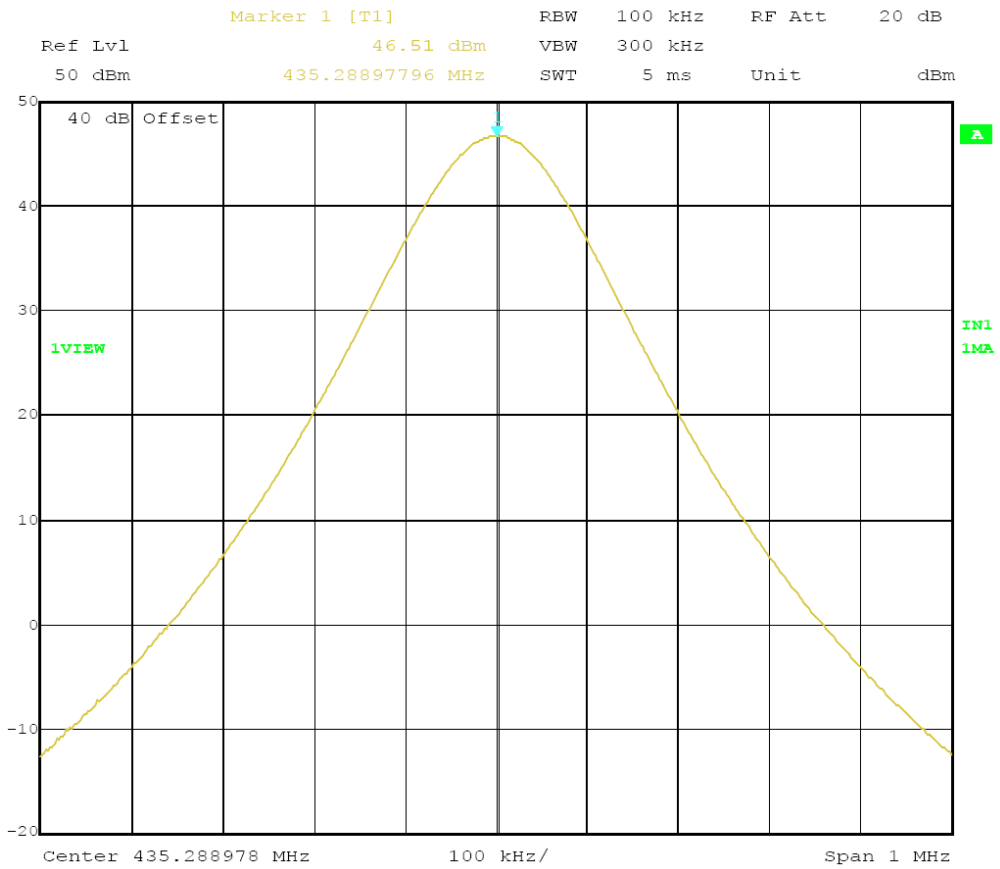
TEST RESULTS:

For 25 KHz

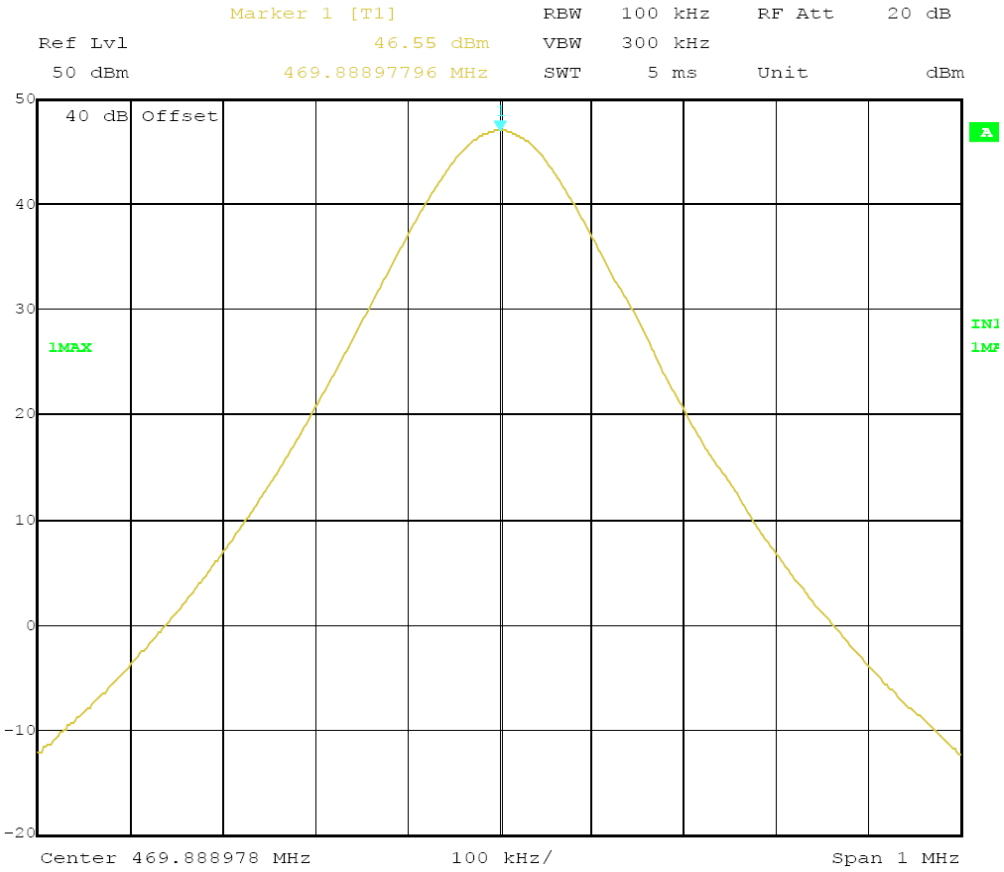
Freq.(MHz)	Measurement (dBm)	FCC Limit
406.100	46.50	Varies



Freq. (MHz)	Measurement (dBm)	FCC Limit
435.000	46.51	Varies

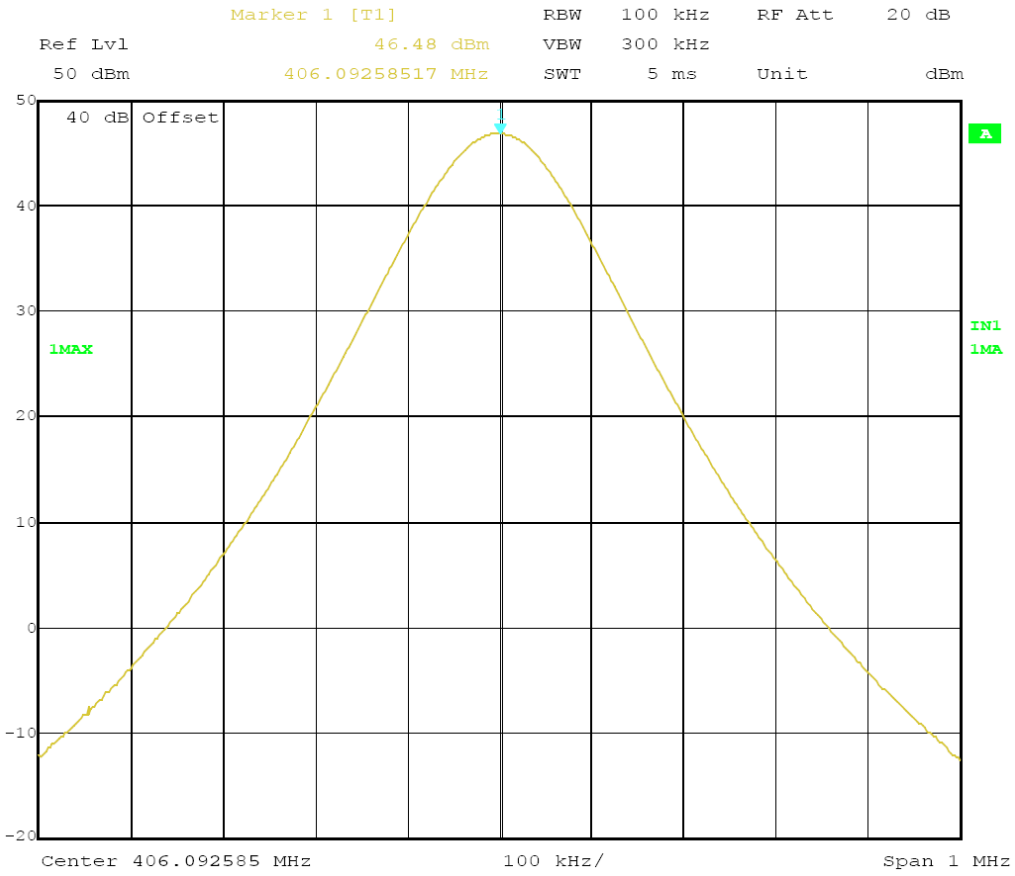


Freq. (MHz)	Measurement (dBm)	FCC Limit
469.900	46.55	Varies

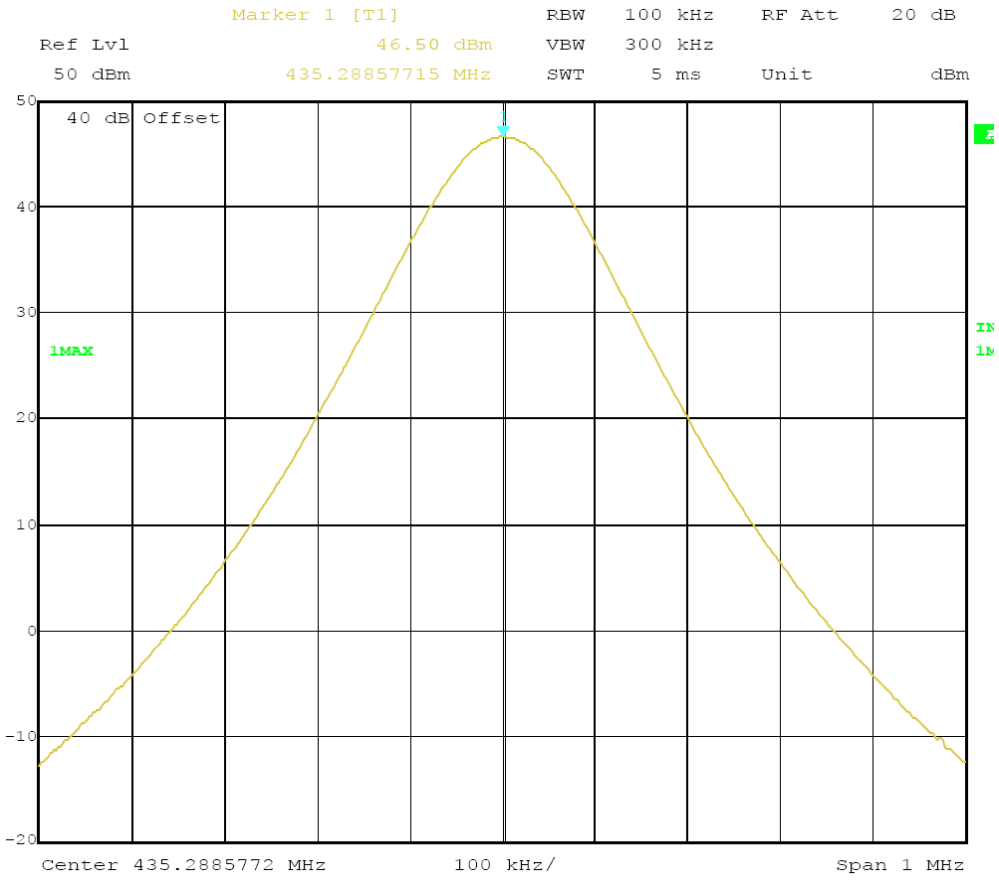


For 12.5 KHz

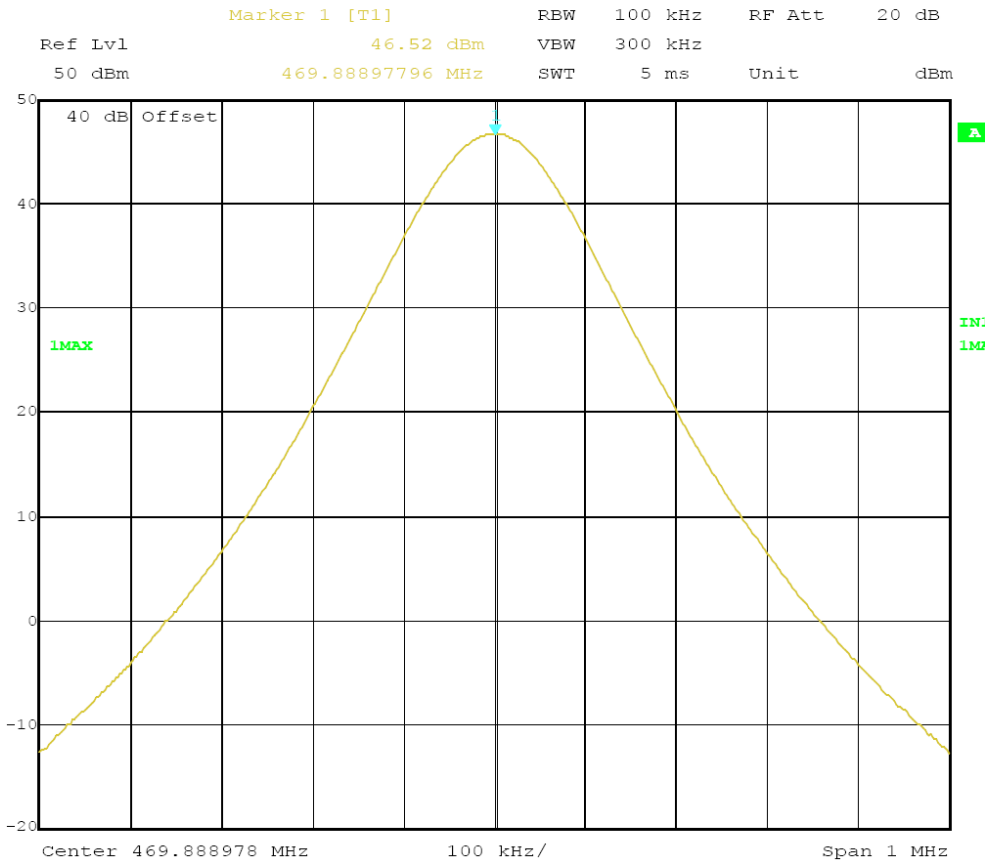
Freq. (MHz)	Measurement (dBm)	FCC Limit
406.100	46.48	Varies



Freq. (MHz)	Measurement (dBm)	FCC Limit
435.000	46.50	Varies



Freq. (MHz)	Measurement (dBm)	FCC Limit
469.900	46.52	Varies



4.8. Transmitter Frequency Behavior

PROVISIONS APPLICABLE

Section 90.214
The transient periods are given in following table:

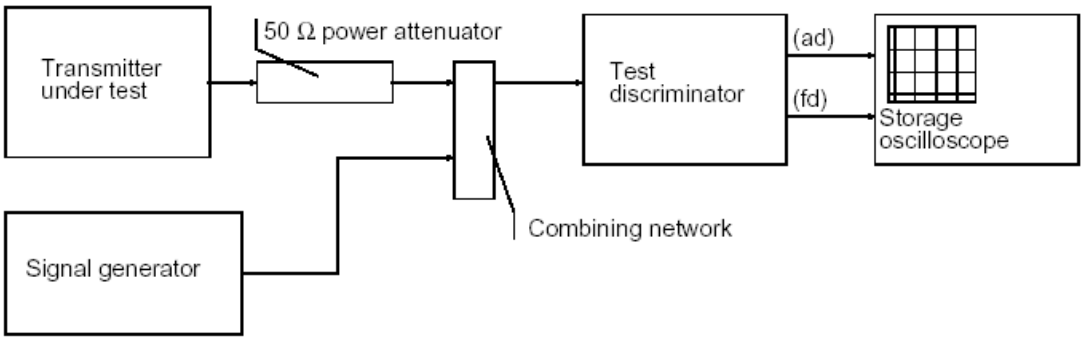
Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 KHz Channels			
t_1 [4]	± 25.0 KHz	5.0 ms	10.0 ms
t_2	± 12.5 KHz	20.0 ms	25.0 ms
t_3 [4]	± 25.0 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 KHz Channels			
t_1 [4]	± 12.5 KHz	5.0 ms	10.0 ms
t_2	± 6.25 KHz	20.0 ms	25.0 ms
t_3 [4]	± 12.5 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 KHz Channels			
t_1 [4]	±6.25 KHz	5.0 ms	10.0 ms
t_2	±3.125 KHz	20.0 ms	25.0 ms
t_3 [4]	±6.25 KHz	5.0 ms	10.0 ms

1. t_{on} is the instant when a 1 KHz test signal is completely suppressed, including any capture time due to phasing.
   t_1 is the time period immediately following t_{on}.
   t_2 is the time period immediately following t_1.
   t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
   t_{off} is the instant when the 1 KHz test signal starts to rise.
2. During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in § 90.213.
3. Difference between the actual transmitter frequency and the assigned transmitter frequency.
4. If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

TEST METHOD

TIA/EIA-603 2.2.19

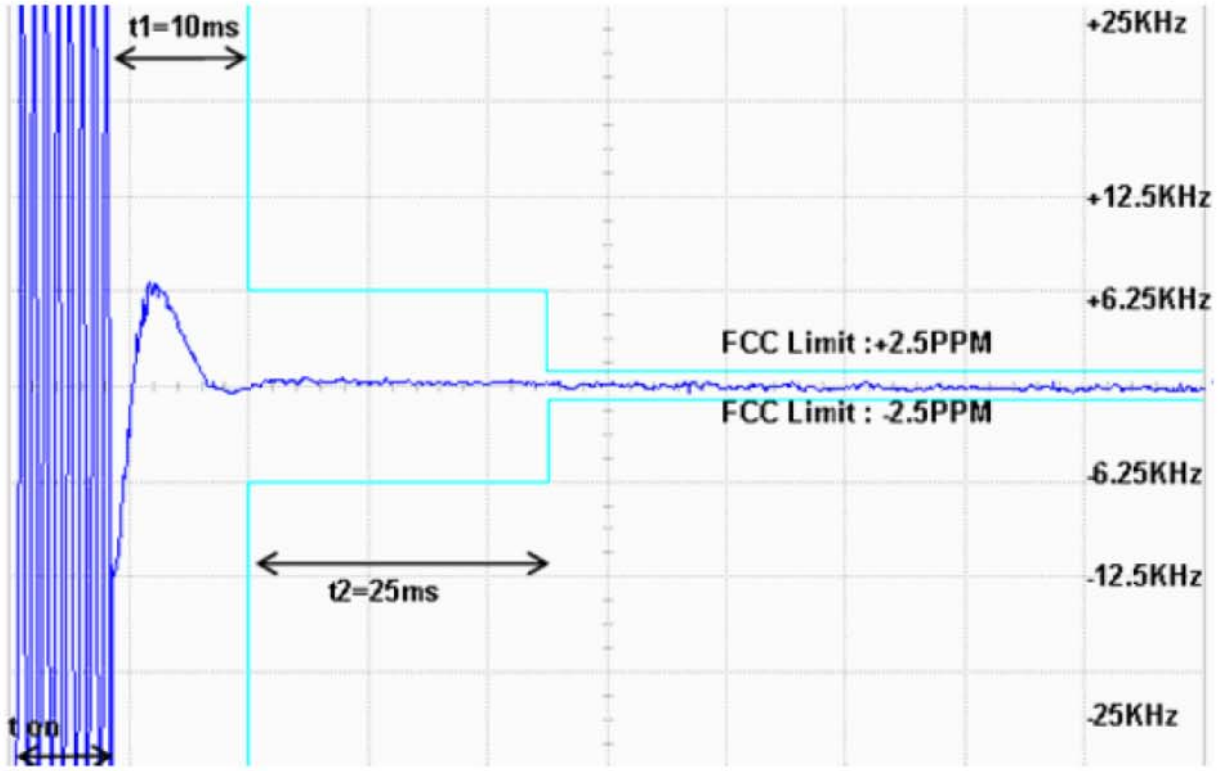
TEST SETUP BLOCK DIAGRAM



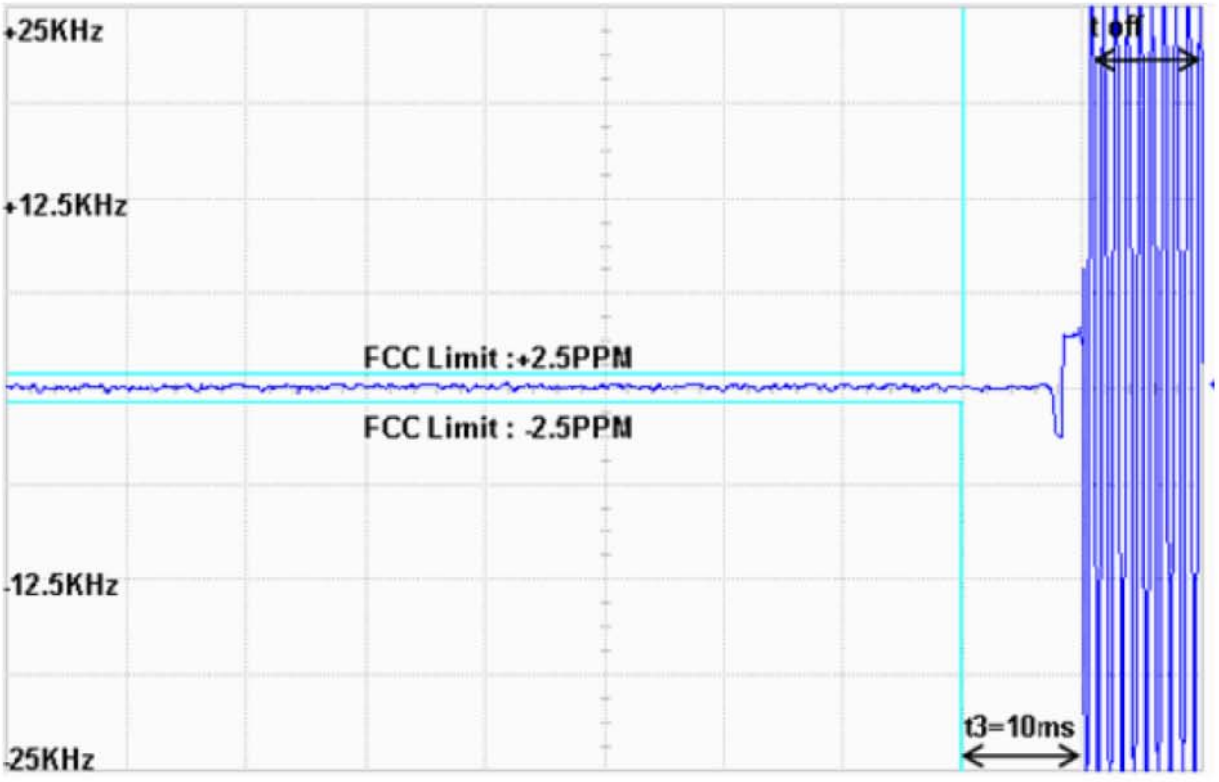
TEST RESULTS:

Please refer to the following plots.

Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------Off – On

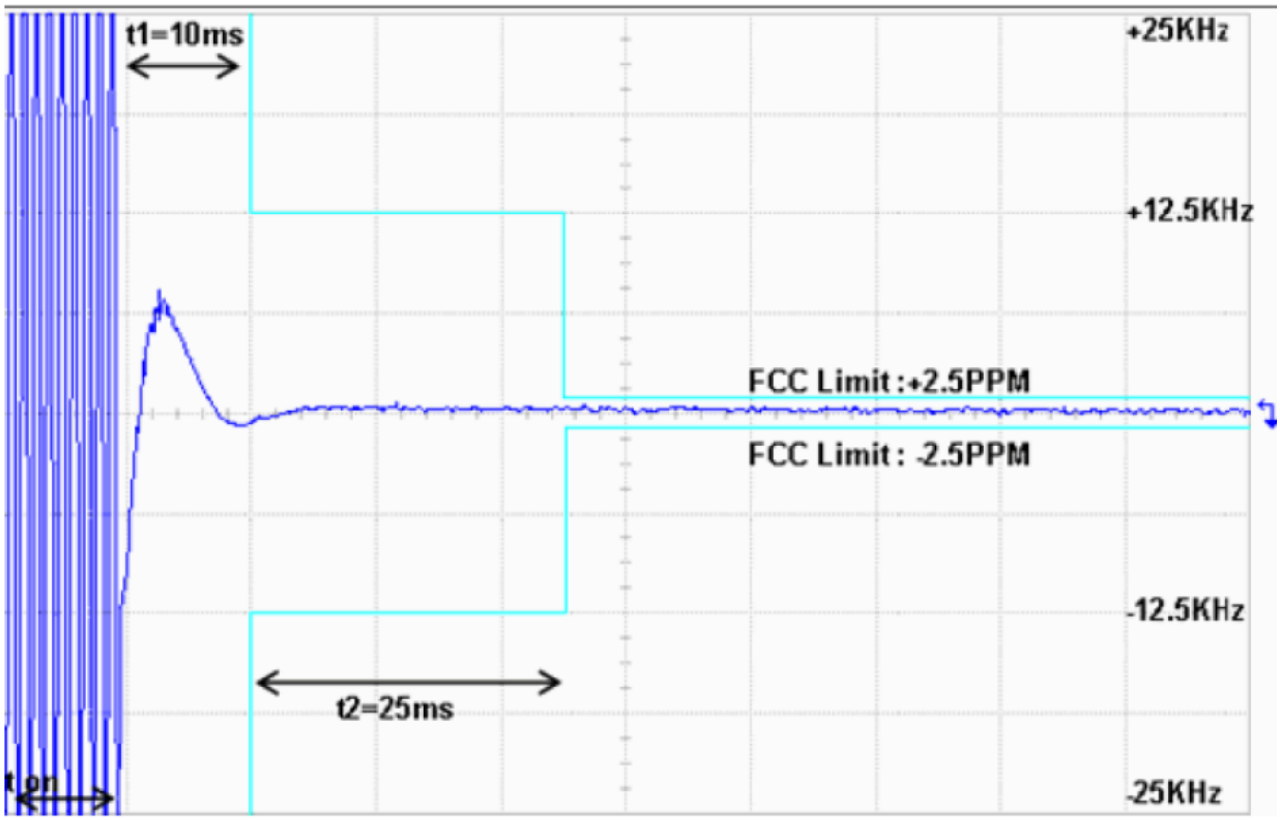


Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------On - Off

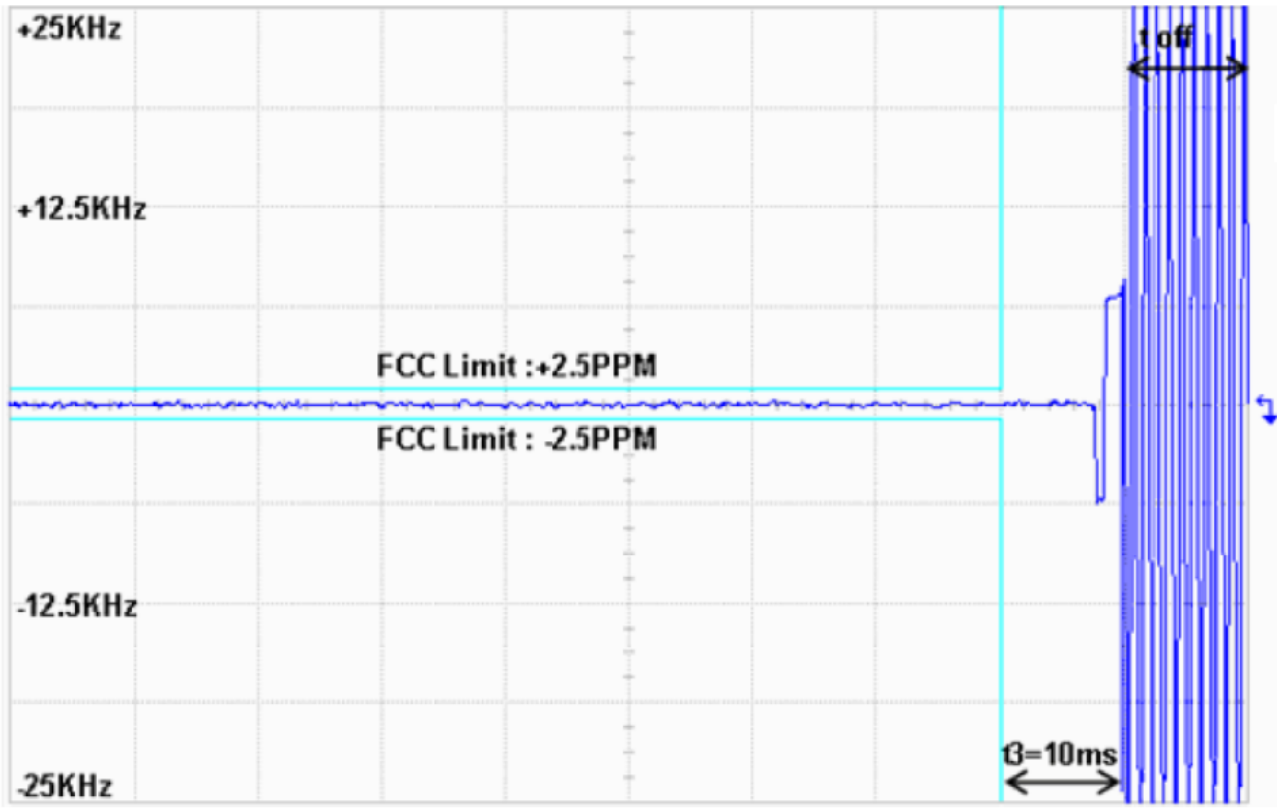


Transmitter Frequency Behaviour @ 25 KHz Channel Separation------Off – On

Transmitter Frequency Behaviour @ 25 KHz Channel Separation------Off – On



Transmitter Frequency Behaviour @ 25 KHz Channel Separation------On - Off

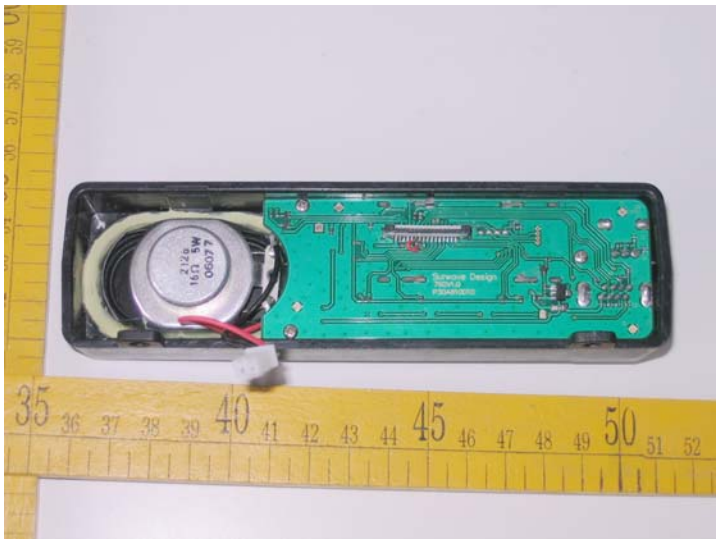


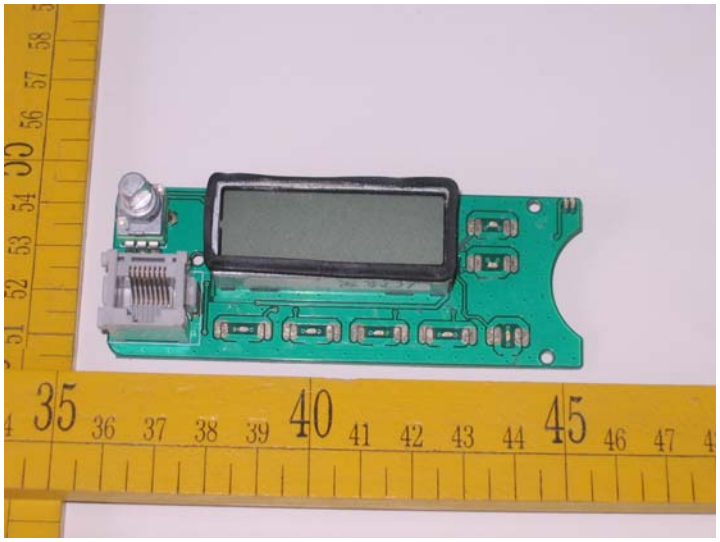
5. Test Setup Photos of the EUT

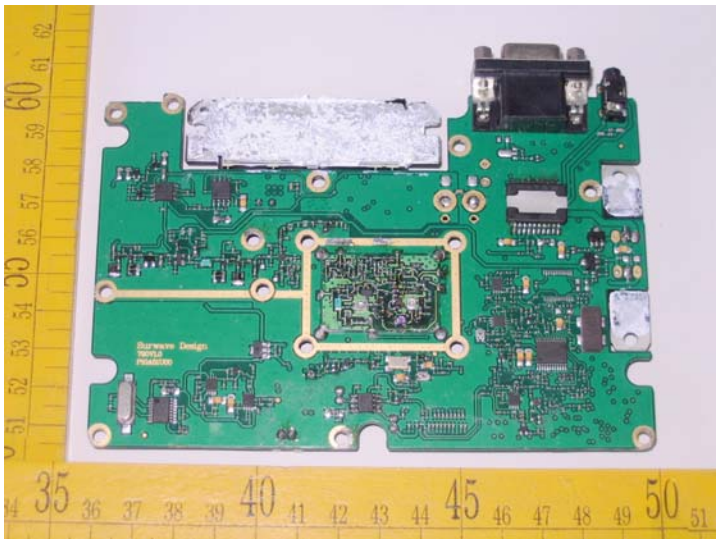
6. External and Internal Photos of the EUT

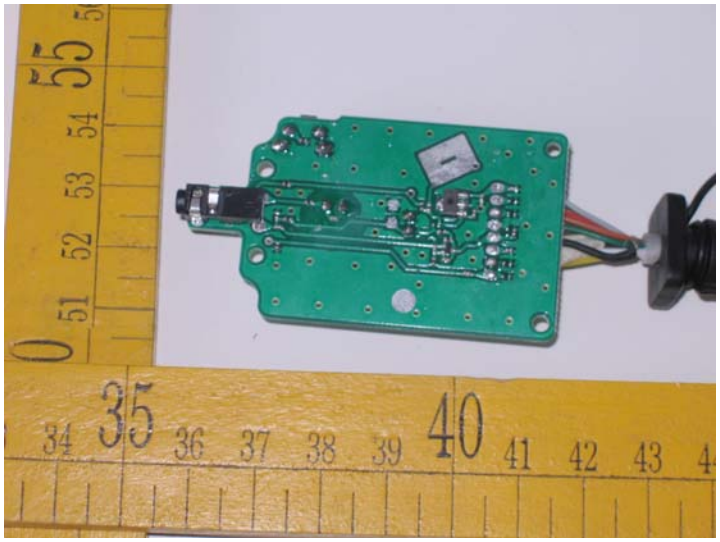
External Photos

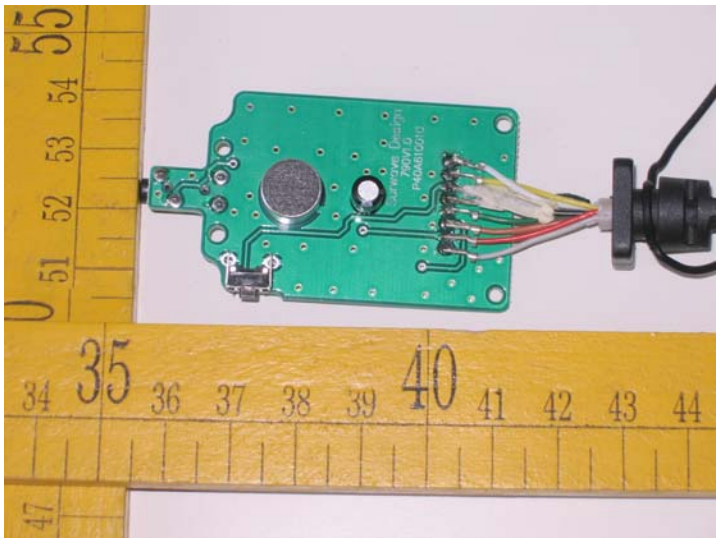
Internal Photos











.....End of Report.....