



# **FCC 47 CFR PART 90**

## **TEST REPORT**

*For*

**Applicant :** Quanzhou Chierda Electronic Telecom Co.,Ltd

**Address :** NO.8,Zi,an Road,jiangnan high-tech industrial zone,licheng  
district,quanzhou,Fujian

**Product Name :** walkie-talkie

**Model Name :** CD-UV55, UA-600

**Brand Name :** chierda

**FCC ID :** OA8CDUV55

**Report No. :** MTE/EAH/D12040455

**Date of Issue :** April. 11, 2012

**Issued by :** Most Technology Service Co., Ltd.

**Address :** No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park,  
Nanshan, Shenzhen, Guangdong, China

**Tel :** 86-755-8617 0306

**Fax :** 86-755-8617 0310

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# 1. TEST RESULT CERTIFICATION

<b>Applicant Name:</b>	Quanzhou Chierda Electronic Telecom Co.,Ltd
<b>Address:</b>	NO.8,Zi,an Road,jiangnan high-tech industrial zone,licheng district,quanzhou,Fujian
<b>Manufacturer Name:</b>	Quanzhou Chierda Electronic Telecom Co.,Ltd
<b>Address:</b>	NO.8,Zi,an Road,jiangnan high-tech industrial zone,licheng district,quanzhou,Fujian
<b>Brand Name:</b>	chierda
<b>Equipment Under Test:</b>	walkie-talkie
<b>Model Number:</b>	CD-UV55
<b>Series Number:</b>	UA-600
<b>Series Model Difference description:</b>	All models are identical, only model name is different.
<b>FCC ID:</b>	OA8CDUV55
<b>Test Standard</b>	FCC 47 CFR Part 90
<b>File Number:</b>	MTE/EAH/D12040455
<b>Date of Test:</b>	March. 19, 2012- April. 09, 2012

We (MOST) hereby certify that the test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 90.

The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature):

*Dona*

Dona Liu

March 19- 30, 2012

Review by (+ signature):

*Elva*

Elva Wong

April.11, 2012



Approved by (+ signature):

*Yvette*

Yvette Zhou

April.12, 2012

## 2. Technical Information

Note: the following data is based on the information by the applicant.

### 2.1 EUT Description

<b>Product</b>	walkie-talkie
<b>Brand Name</b>	chierda
<b>Model Number</b>	CD-UV55
<b>Series Model Name:</b>	UA-600
<b>Series Model Difference description:</b>	All models are identical, only model name is different.
<b>Power Supply</b>	DC 10V by DC Adapter DC 7.4V by battery
<b>Frequency Range</b>	406.1-470MHz
<b>Modulation Technique</b>	FM
<b>Channel Spacing</b>	Narrowband:12.5kHz
<b>Channel numbers:</b>	128
<b>Antenna Gain</b>	1.5dBi
<b>Conducted Output Power:</b>	36.07dBm
<b>Temperature Range</b>	-30°C-60°C

**Note:**

1. This submittal(s) (test report) is intended for FCC ID: OA8CDUV55 filing to comply with the FCC Part 90, Subpart I Rules.
2. Please refer to Appendix B for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

## 2.2 Objective

The tests documented in this report were performed in accordance with ANSI C63.4 (2009) and FCC CFR 47 Rules Part 90 Subpart I.

No.	Identity	Document Title
1	47 CFR Part 2 (10-1-05 Edition)	Radio Frequency Devices
2	47 CFR Part 90 (10-1-09 Edition)	Private Land Mobile Radio Services

## 2.3 Test Standards and Results

Test items and the results are as bellow:

No	Test Type	Para. Number	Limit	Result
1	Power and Antenna High Limits	2.1046; 90.205	Refer to 90.205	PASS
2	Modulation Characteristic	2.1047; 90.207	Refer to 90.207	PASS
3	Occupied Bandwidth	2.1049; 90.209	Refer to 90.209	PASS
4	Emission Mask	2.1053; 90.210	Refer to 90.210	PASS
5	Frequency Stability vs. Temperature	2.1055; 90.213	Refer to 90.213	PASS
6	Frequency Stability vs. Voltage	2.1055; 90.213	Refer to 90.213	PASS
7	Transmitter Frequency Behavior	90.214	Refer to 90.214	PASS
8	Spurious Emission at antenna Terminal	2.1051;90.210	Refer to 90.210	PASS

## 2.4 Environmental Conditions

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

- Temperature: 15-35°C
- Humidity: 30-60%
- Atmospheric pressure: 86-106 k Pa

### 3. Details of Test

#### 3.1 Identification of the Responsible Testing Laboratory

Company: Most Technology Service Co., Ltd.  
Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China

#### 3.2 Identification of the Responsible Testing Location

Test Site: Most Technology Service Co., Ltd.  
Location: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China  
Description: There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009 and CISPR 16 requirements.  
The FCC Registration Number is **490827**.  
Site Filing: The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.  
Instrument Tolerance: All measuring equipment is in accord with ANSI C63.4:2009 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.  
Ground Plane: Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna.

### 3.3 List of Test Equipments

No.	Equipment	Manufacturer	Model No.	S/N	Calibration due date
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2013/03/14
2	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2013/03/14
3	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2013/03/14
4	Terminator	Hubersuhner	50Ω	No.1	2013/03/14
5	RF Cable	SchwarzBeck	N/A	No.1	2013/03/14
6	Storage Oscilloscope	Tektronix	TDS3054B	B033027	2013/10/23
7	8 Loop Antenna	ARA	PLA-1030/B	1029	2012/02/19
8	Bilog Antenna	Sunol	JB3	A121206	2013/03/14
9	Horn Antenna	SCHWARZBECK	BBHA9120D	756	2013/03/14
10	Horn Antenna	Penn Engineering	9034	8376	2013/03/14
11	Cable	Resenberger	N/A	NO.1	2013/03/14
12	DC Power Filter	DuoJi	DL2×30B	N/A	2013/03/14
13	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2013/03/14
14	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2013/03/14
15	Absorbing Clamp	Luthi	MDS21	3635	2013/03/14
16	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2013/03/14
17	AC Power Source	Kikusui	AC40MA	LM003232	2013/03/14
18	Test Analyzer	Kikusui	KHA1000	LM003720	2013/03/14
19	Line Impedence Network	Kikusui	LIN40MA-PCR-L	LM002352	2013/03/14
20	ESD Tester	Kikusui	KES4021	LM003537	2013/03/14
21	EMC PRO System	EM Test	UCS-500-M4	V0648102026	2013/03/14
22	Signal Generator	IFR	2032	203002/100	2013/03/14
23	Amplifier	A&R	150W1000	301584	2013/03/14
24	CDN	FCC	FCC-801-M3-25	107	2013/03/14
25	EM Injection Clamp	FCC	F-203I-23mm	403	2013/03/14
26	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2013/03/14
27	Audio Generator	MEILI	MFG-3005	200612187	2013/08/12
28	Climate Chamber	ESPEC	EL-10KA	05107008	2013/10/23
29	Modulation Analyzer	HP	8901A	3435A06868	2013/10/23

**NOTE:** Equipments listed above have been calibrated and are in the period of validation.

### 3.4 Environmental Conditions

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

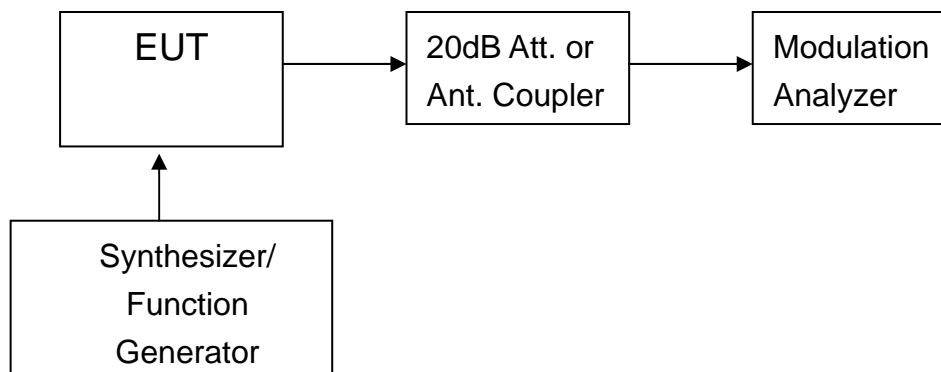
- Temperature: 15-35°C
- Humidity: 30-60%
- Atmospheric pressure: 86-106 k Pa

### 3.5 Configuration of Tested System

Radiation emission:



Audio Frequency Response:



### 3.6 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Identifier	Series No.	Note
1	AC Adapter	N/A	N/A	FCC DOC	N/A	EUT

## **4. Test Methodology**

### **4.1 General Test Procedures**

#### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirement in Section 13.1.4.1 of ANSI C63.4:2009. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

#### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4:2009.

### **4.2 Description of Test Modes**

The EUT has been tested under normal operating condition.

Three channels (The top channel, the middle channel and the bottom channel) are chosen for testing.

### 4.3 FCC Part 15.205 Restricted Bands of Operations

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

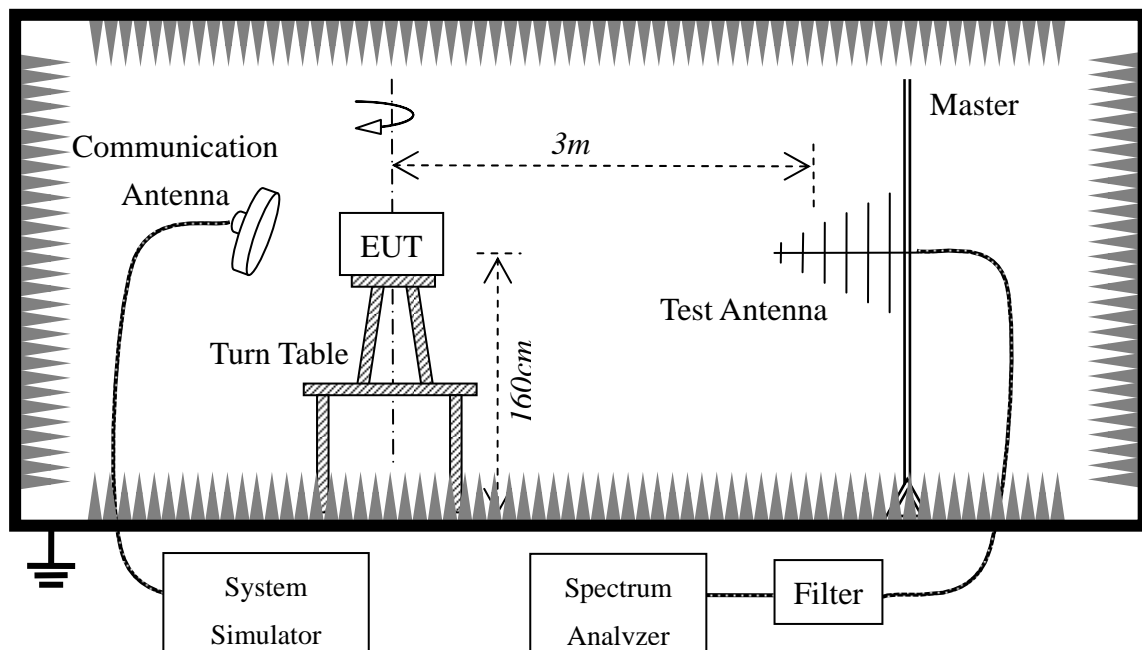
## 5. FCC Part 90 Requirements

### 5.1 Power and Antenna High Limits

#### LIMIT

According to CFR 47 section 90.205, Maximum ERP is dependent upon the station's antenna HAAT and required service area.

#### TEST CONFIGURATION



#### 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 indicated 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 then 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****Narrowband**

Channel	Freq.	Antenna	Reading	S.G	Cable Loss	AntennaGain	E.R.P
	(MHz)	Polarity	(dBm)	(dBm)	(dB)	(dB)	(dBm)
Low	406.100	V	6.59	40.6	5.68	1.15	36.07
	406.100	H	5.85	39.8	5.68	1.15	35.27
Middle	450.100	V	5.92	38.8	5.75	1.16	34.21
	450.100	H	5.47	39.2	5.75	1.16	34.61
High	470.000	V	5.89	37.9	5.82	1.17	33.25
	470.000	H	5.74	37.5	5.82	1.17	32.85

**Note:**

E.R.P(dBm) = SG output power (dBm) – Cable losses (dB) + Antenna gain (dB)

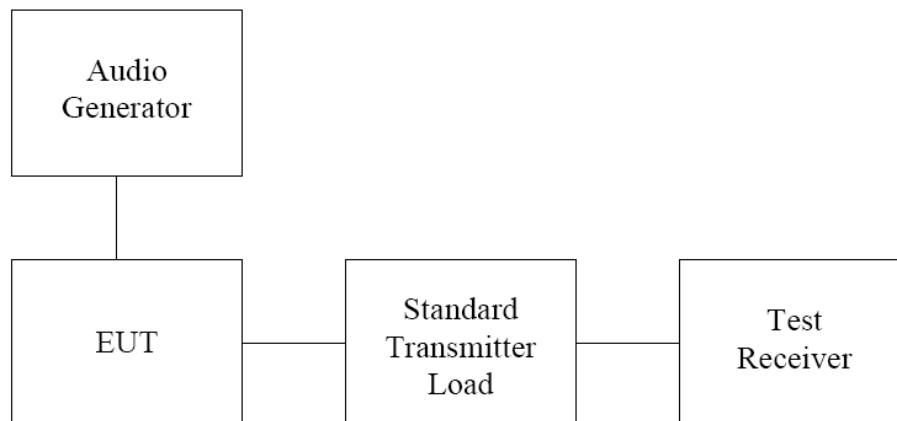
## 5.2 Modulation Characteristic

### LIMIT

According to CFR 47 section 2.1047 a, for Voice modulation communication equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 90.205, Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

### TEST CONFIGURATION



### TEST PROCEDURE

Modulation limits is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of rated system deviation.

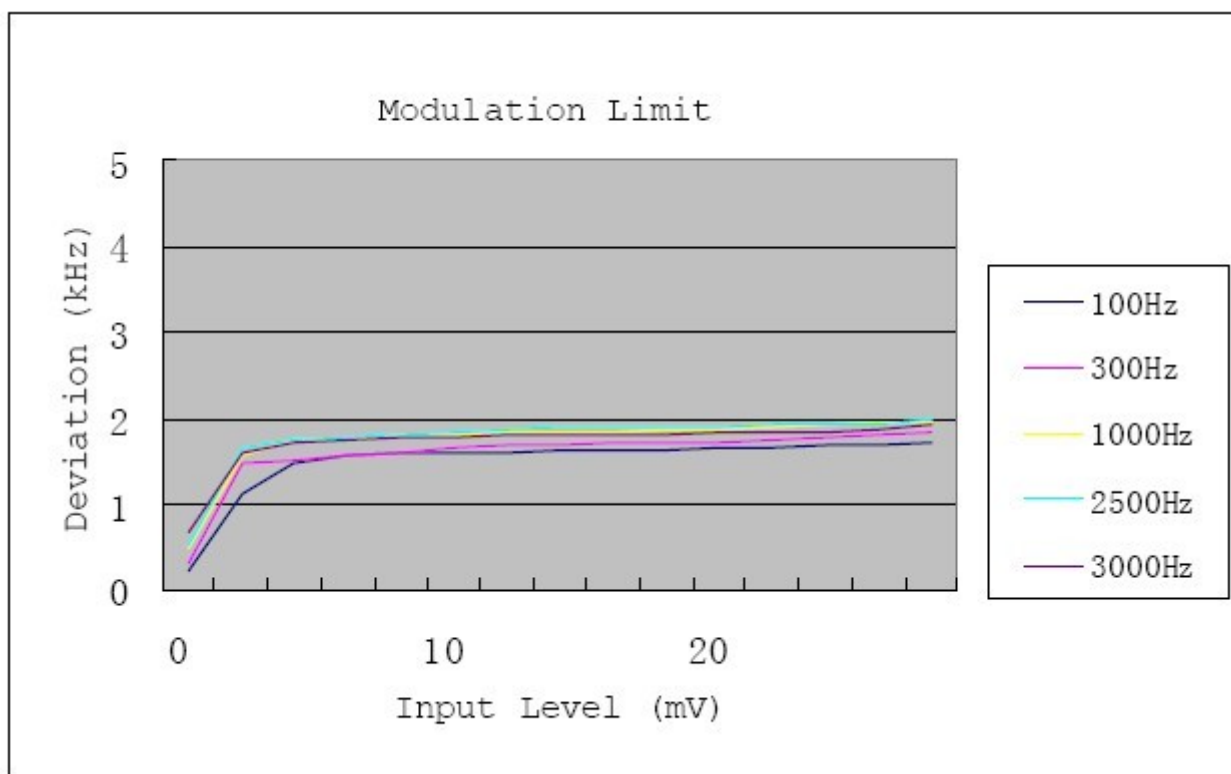
The audio signal generator is connected to the audio input of the EUT with its full rating.

The modulation response is measured at certain modulation frequencies, related to 1000 Hz reference signal.

Tests are performed for positive and negative modulation.

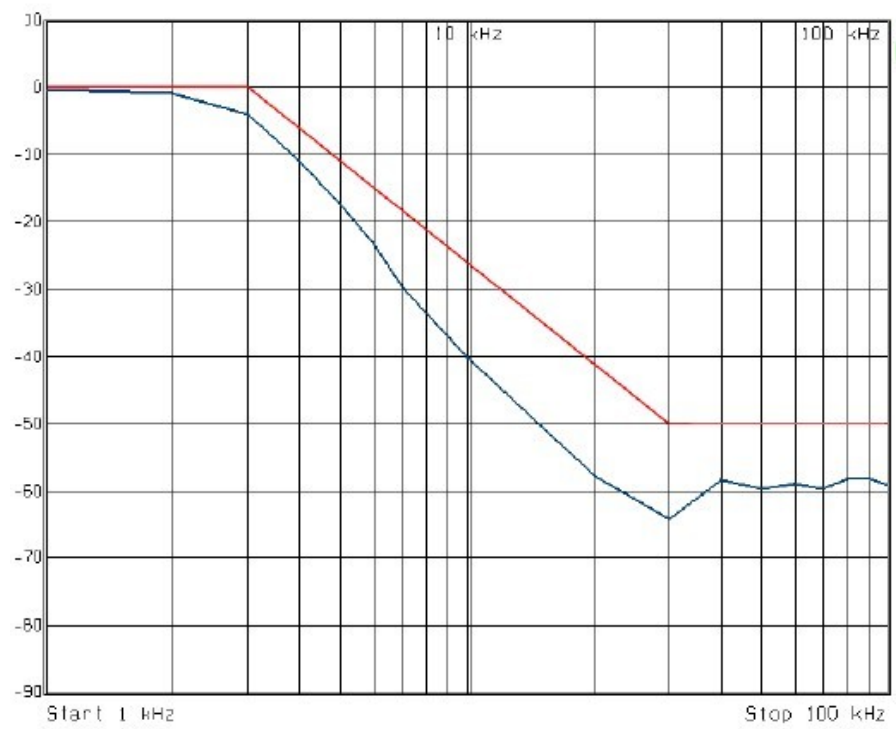
**TEST RESULTS****For UHF****For Narrowband Channel Separation 12.5kHz**

Modulation Level (dB)	Peak Frequency Deviation			
	At 100Hz Deviation(kHz)	At 300Hz Deviation(kHz)	At 1KHz Deviation(kHz)	At 3KHz Deviation(kHz)
0	100	300	1000	3000
2	0.24	0.31	0.5	0.53
4	1.12	1.47	1.58	1.66
6	1.49	1.51	1.74	1.74
8	1.57	1.56	1.76	1.78
10	1.59	1.59	1.80	1.81
12	1.60	1.67	1.82	1.83
14	1.61	1.68	1.83	1.88
16	1.63	1.70	1.83	1.89
18	1.63	1.71	1.85	1.90
20	1.64	1.73	1.87	1.91
24	1.65	1.73	1.88	1.91
28	1.66	1.75	1.89	1.92
32	1.68	1.78	1.92	1.92
36	1.70	1.81	1.95	1.94



#### Audio Low Pass Filter Characteristic Curve



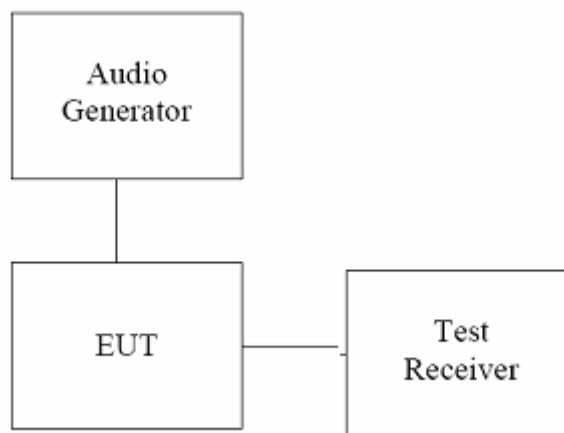


### 5.3 Occupied Bandwidth

#### LIMIT

According to FCC CFR 47 Part 90 Section 90.209, for other types of emissions, the maximum authorized bandwidth shall not be more than that normally authorized for voice operations.

#### TEST CONFIGURATION

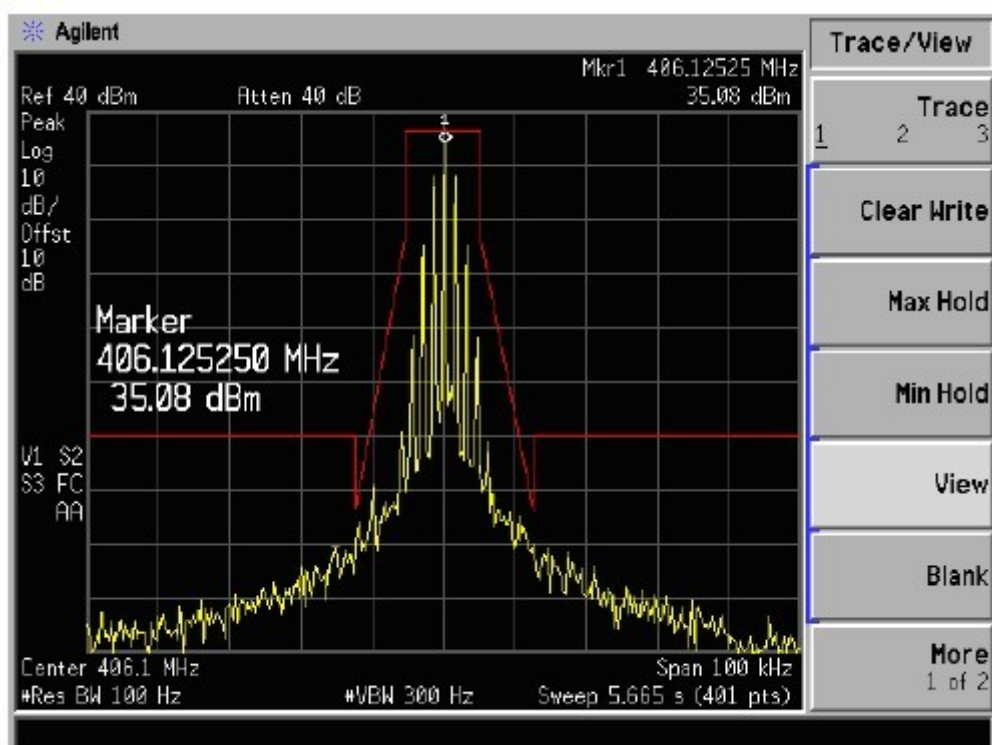
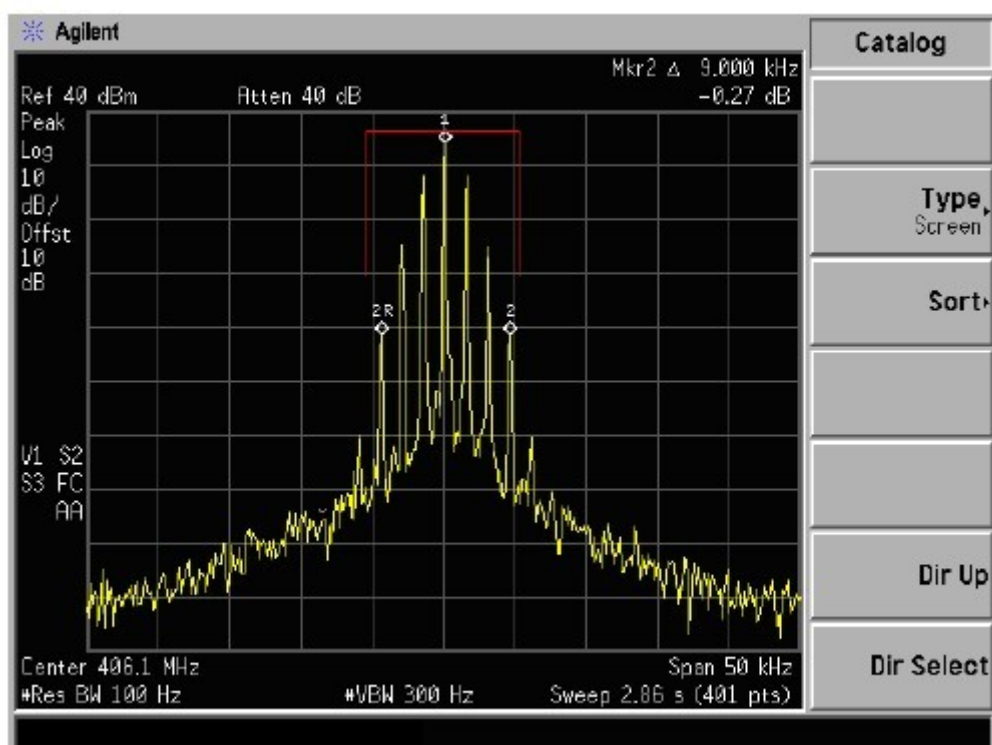


#### TEST PROCEDURE

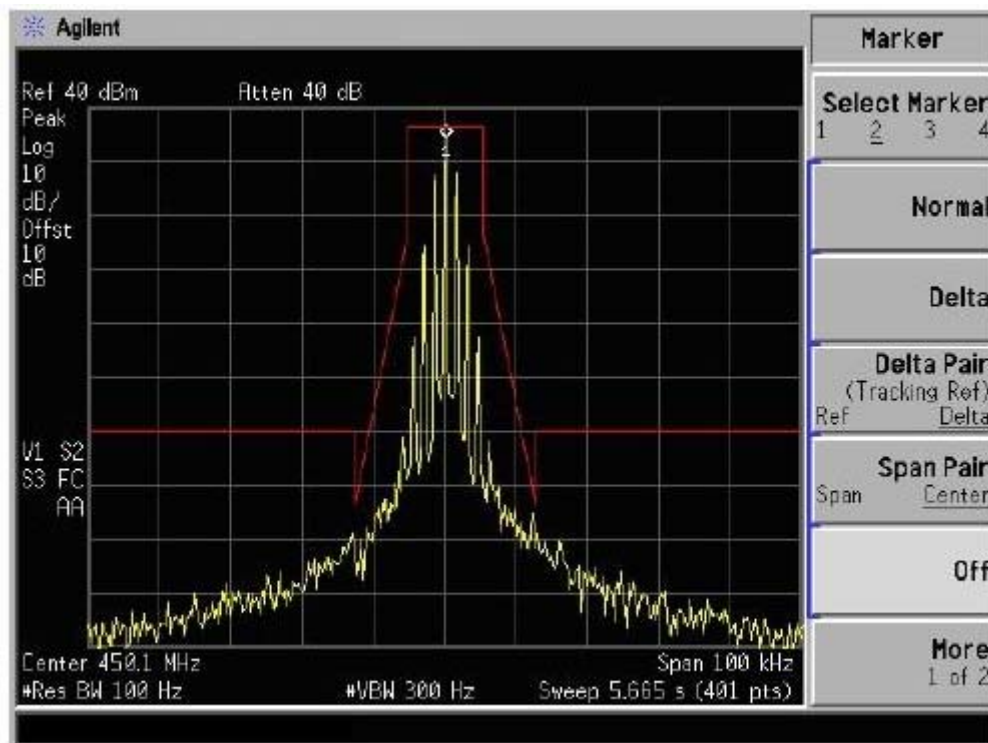
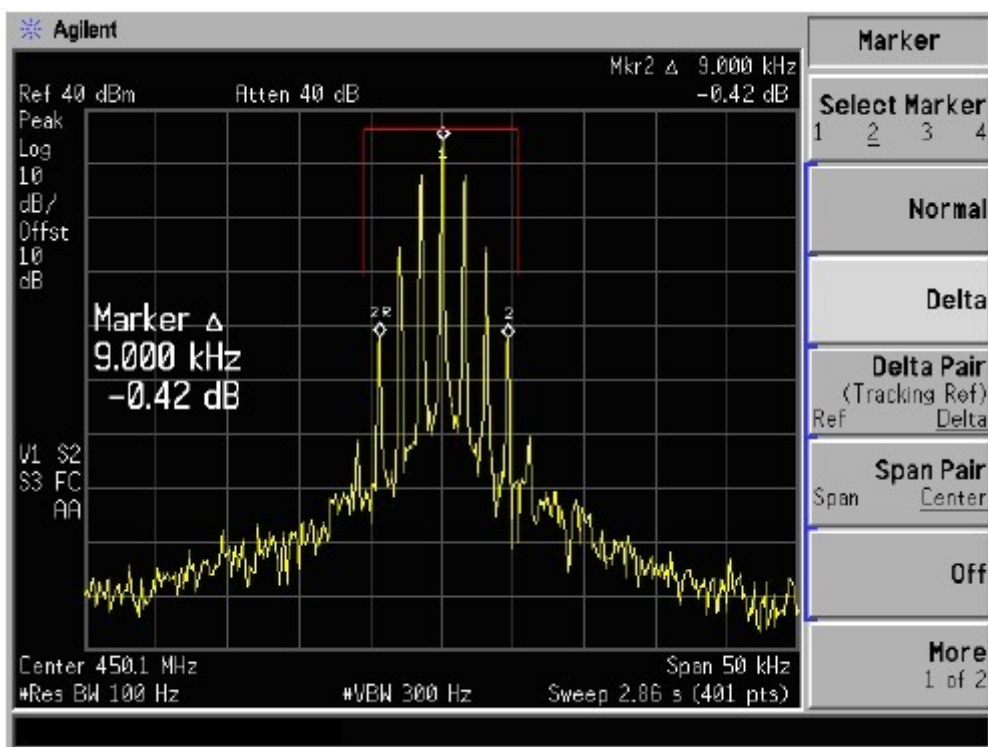
1. Set SPA center frequency=fundamental frequency, RBW=10 KHz, VBW=30 KHz, Span=200 KHz.
2. Set SPA max. Hold. Mark peak, -26dB
3. The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing) Audio reference levels for 1kHz deviation on both 12.5kHz and 25kHz channel spacing

#### TEST RESULTS

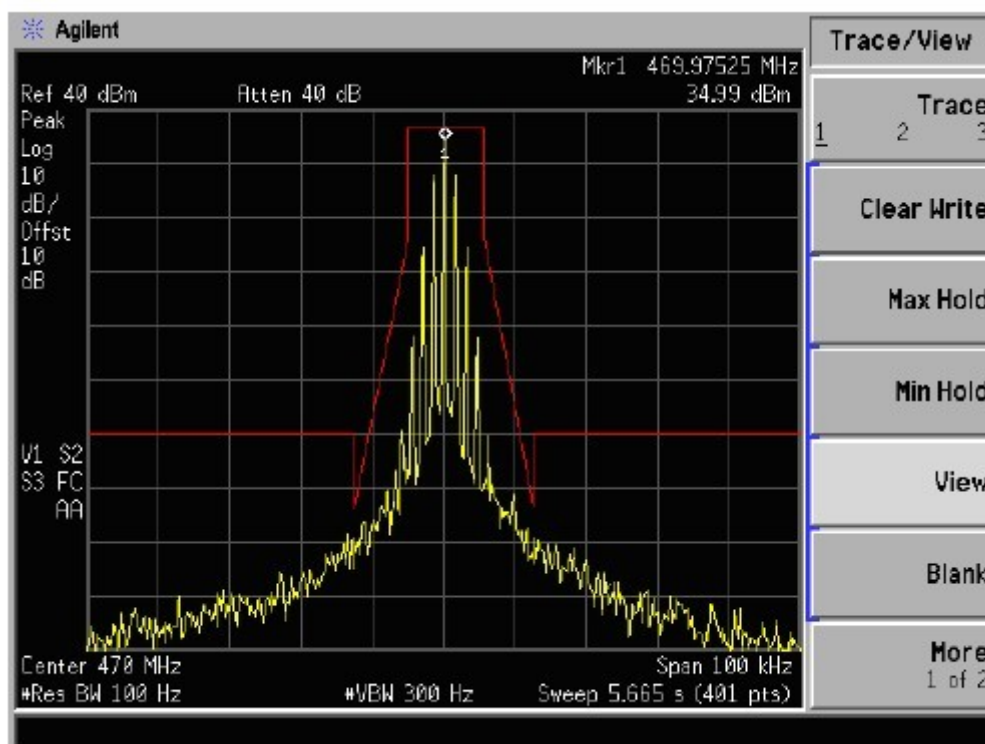
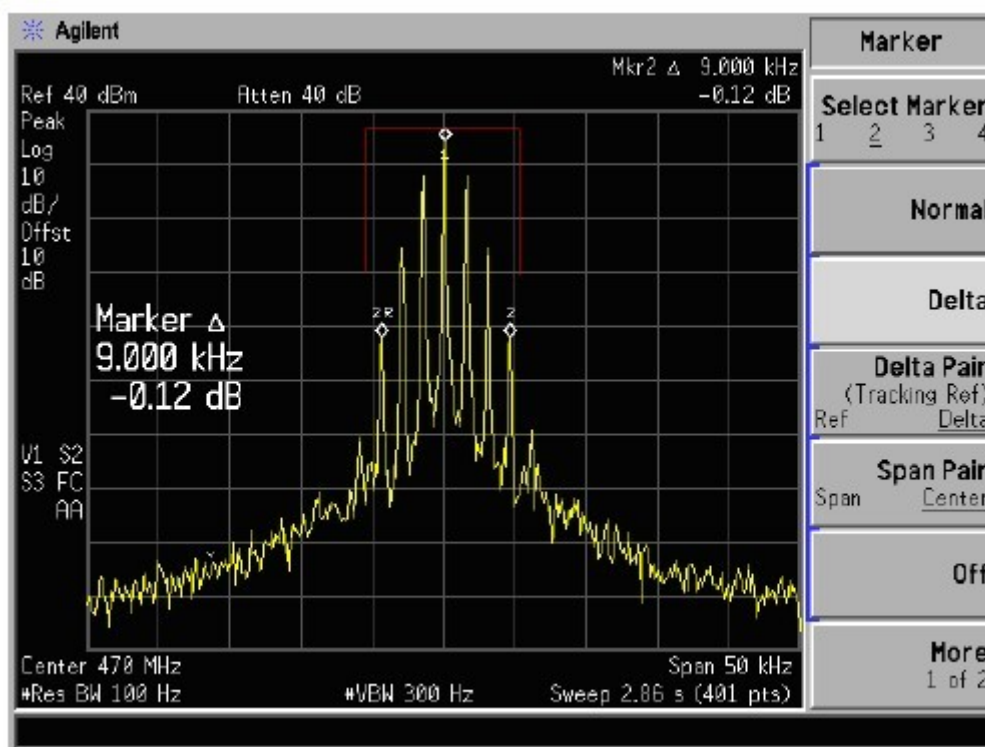
Emission: Narrow



## Low Channel

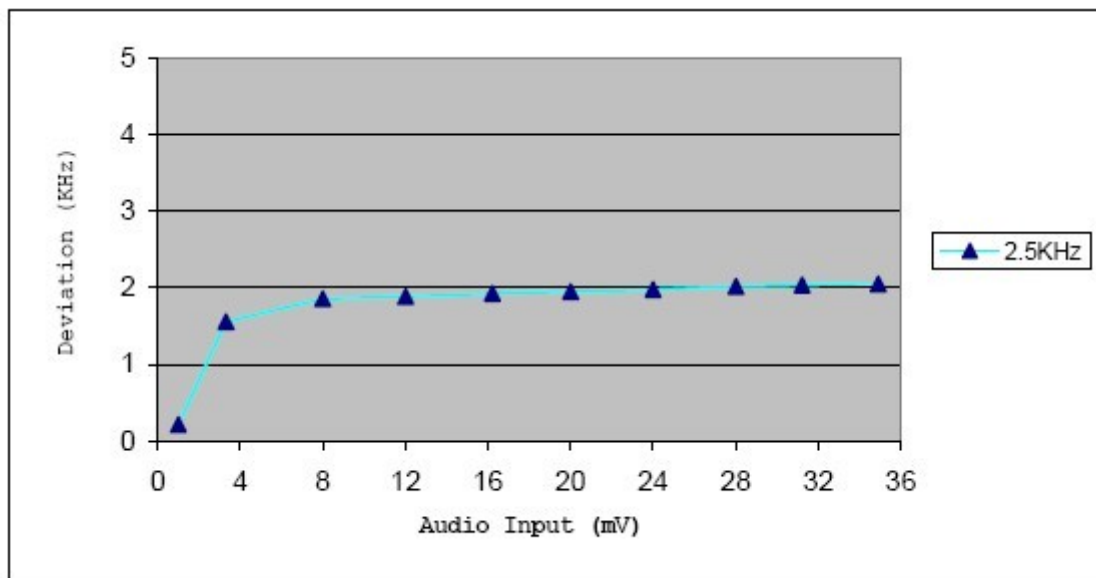


## Middle Channel



High Channel

Deviation Vs Audio Level with the worse case(Narrowband High channel)



## 5.4 Emission Mask

### LIMIT

According to CFR 47 section 90.210, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

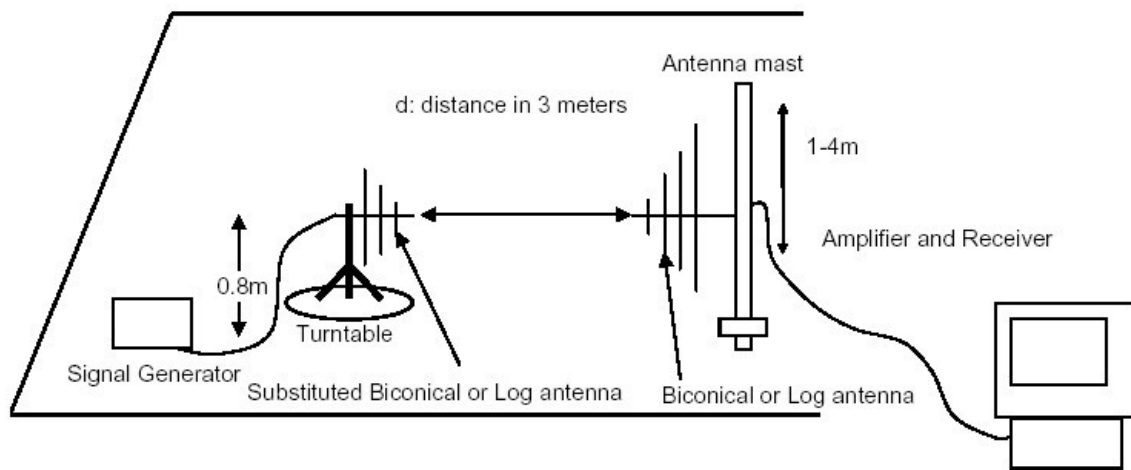
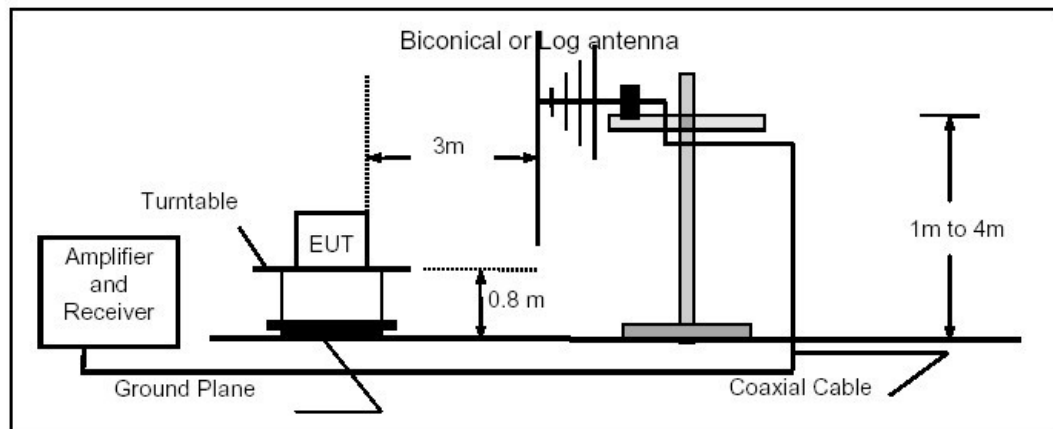
Emission Mask B For 25kHz bandwidth

- (1) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;
- (2) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;
- (3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least  $43 + 10 \log_{10} \text{ (mean output power in watts) dB}$ ;

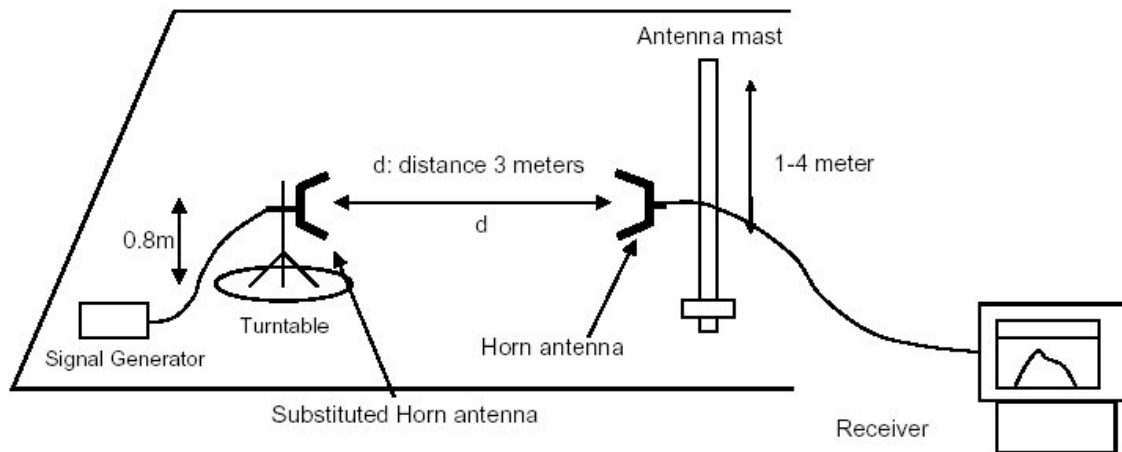
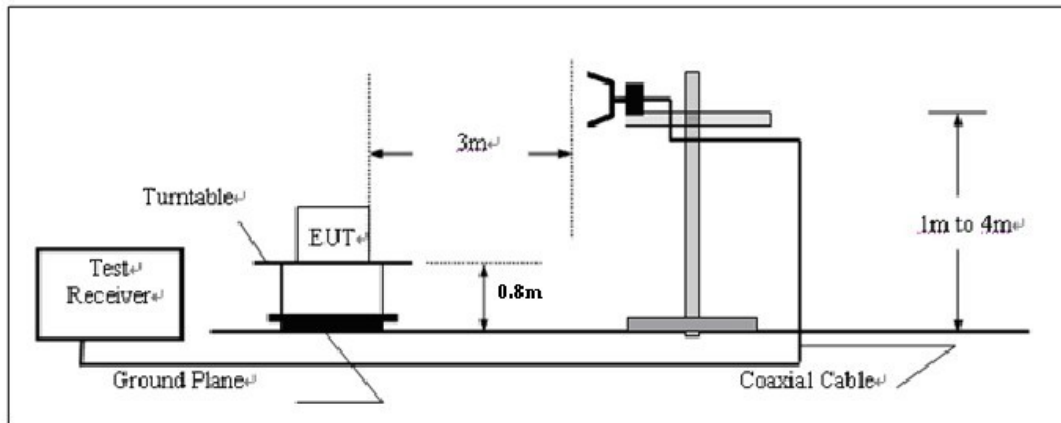
Emission Mask D For 12.5kHz bandwidth

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625kHz but no more than 12.5kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5kHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation

### TEST CONFIGURATION

**Below 1GHz**

## Above 1GHz



## 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 indicated 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**

### **The Unwanted Radiated Emission**

#### **The Low Channel (406.10 MHz)**

<b>Frequency (MHz)</b>	<b>Antenna Polarization</b>	<b>S.G. (dBm)</b>	<b>Cable loss (dB)</b>	<b>Ant.Gain (dB)</b>	<b>Emission level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
812.20	V	-17.37	10.69	8.31	-19.75	-13	-6.75
Other	V	--	--	--	--	-13	> 10 dB
--	V	--	--	--	--	-13	> 10 dB
812.20	H	-21.34	10.69	8.31	-23.72	-13	-10.72
Other	H	--	--	--	--	-13	> 10 dB
--	H	--	--	--	--	-13	> 10 dB

#### **The Middle Channel (450.100 MHz)**

Frequency (MHz)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
900.2	V	-18.95	10.72	8.35	-21.26	-13	-8.38
Other	V	--	--	--	--	-13	> 10 dB
--	V	--	--	--	--	-13	> 10 dB
900.2	H	-23.72	10.72	8.35	-26.00	-13	-13.00
Other	H	--	--	--	--	-13	> 10 dB
--	H	--	--	--	--	-13	> 10 dB

## The High Channel (470.000 MHz)

Frequency (MHz)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
940.08	V	-18.95	10.72	8.35	-21.32	-13	-8.32
Other	V	--	--	--	--	-13	> 10 dB
--	V	--	--	--	--	-13	> 10 dB
940.26	H	-23.72	10.72	8.35	-26.09	-13	-13.09
Other	H	--	--	--	--	-13	> 10 dB
--	H	--	--	--	--	-13	> 10 dB

## Notes:

(1) "--" in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

(2) Emission Level=S.G ourput power(dBm)-Cable loss(db)+Antenna Gain(dBi)

Maximum Transmitter Power (P)	36.07 dBm
Require attenuation	$43+10\log_{10} (0.738) = 41.68 \text{ dB}$
Emission Limits	$P-[43+10\log_{10} (0.738)] = -13 \text{ dBm}$

## 5.5 Maximum Transmitter Power

### LIMIT

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

### TEST PROCEDURE

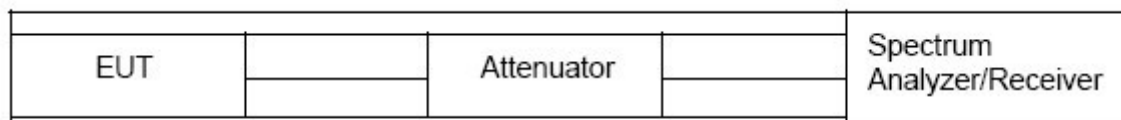
Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted below:

If the power output is adjustable, measurements shall be made for the highest and lowest power levels.

The EUT connect to the receiver through 20Db attenuator.

Measurement with Spectrum Analyzer ESI 26 conducted, external power supply with 7.4V stabilized supply voltage.

### TEST PROCEDURE



The EUT was directly connected to a RF Communication  
Test set by a 20 dB attenuator

### TEST RESULTS

Modulation Type	Channel Separation	Test Frequency (MHz)	Conducted Output Power(dBm)	Average Output Power(dBm)
FM	12.5kHz	406.1	35.58	32.68
		438.1	35.62	32.73
		470.0	35.53	32.65
Limit		The limit is dependent upon the station's antenna HAAT and requirement service area		
Test Result		Complicance		

## 5.6 Frequency Stability vs. Temperature

### LIMIT

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade.

b). According to FCC Part 2 Section 2.1055(d)(1), vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

c). According to FCC Part 90 Section 90.213, for output power > 2Watts, the limits is 2.5 ppm.

### TEST PROCEDURE

The EUT power was supplied by DC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. The DC leads and the RF output cable, exited the chamber through an opening made for that purpose.

After the temperature stabilized the frequency output was recorded from the counter.

### RESULTS

Temperature ( $^{\circ}\text{C}$ )	PPM Error			Limit (ppm)
	406.100MHz	450.100 MHz	470.000 MHz	
-30	+0.24	+0.22	+0.23	$\pm 2.5$
-20	+0.21	+0.22	+0.25	$\pm 2.5$
-10	+0.25	+0.24	+0.26	$\pm 2.5$
0	+0.21	+0.24	+0.27	$\pm 2.5$
10	+0.25	+0.26	+0.31	$\pm 2.5$
20	+0.18	+0.24	+0.25	$\pm 2.5$
30	-0.19	-0.23	-0.27	$\pm 2.5$
40	-0.22	-0.19	-0.18	$\pm 2.5$
50	-0.18	-0.18	-0.21	$\pm 2.5$

## 5.7 Frequency Stability vs. Voltage

### LIMIT

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade.

b). According to FCC Part 2 Section 2.1055(d)(1), vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

c). According to FCC Part 90 Section 90.213, for output power  $> 2\text{Watts}$ , the limits is 2.5 ppm.

### TEST PROCEDURE

An external variable DC power supply was connected to the EUT.

For hand carried, The DC power equipment primary supply voltage was reduced to the end point as specified by the manufacturer. The output frequency was recorded for highest and lowest voltage.

### RESULTS

Voltage (V)	PPM Error			Limit (%)r
	406.100MHz	450.100MHz	470.000MHz	
6.3V	0.36	0.32	0.35	$\pm 2.5$
7.4V	0.29	0.24	0.31	$\pm 2.5$
8.5V	0.36	0.33	0.36	$\pm 2.5$

## 5.8 Transmitter Frequency Behavior

### Provisions Applicable

Time intervals <sup>1, 2</sup>	Maximum frequency difference <sup>3</sup>	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t <sub>1</sub> <sup>4</sup> .....	± 25.0 kHz	5.0 ms	10.0 ms
t <sub>2</sub> .....	± 12.5 kHz	20.0 ms	25.0 ms
t <sub>3</sub> <sup>4</sup> .....	± 25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t <sub>1</sub> <sup>4</sup> .....	± 12.5 kHz	5.0 ms	10.0 ms
t <sub>2</sub> .....	± 6.25 kHz	20.0 ms	25.0 ms
t <sub>3</sub> <sup>4</sup> .....	± 12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t <sub>1</sub> <sup>4</sup> .....	± 6.25 kHz	5.0 ms	10.0 ms
t <sub>2</sub> .....	± 3.125 kHz	20.0 ms	25.0 ms
t <sub>3</sub> <sup>4</sup> .....	± 6.25 kHz	5.0 ms	10.0 ms

<sup>1</sup>  $t_{off}$  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  $t_{off}$ .

$t_2$  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.

<sup>2</sup> 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.

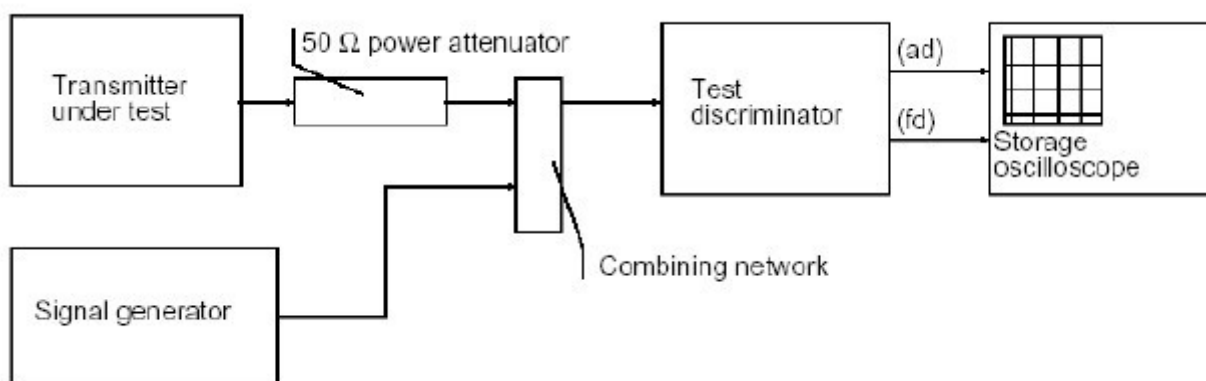
<sup>3</sup> Difference between the actual transmitter frequency and the assigned transmitter frequency.

<sup>4</sup> 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 PROCEDURE

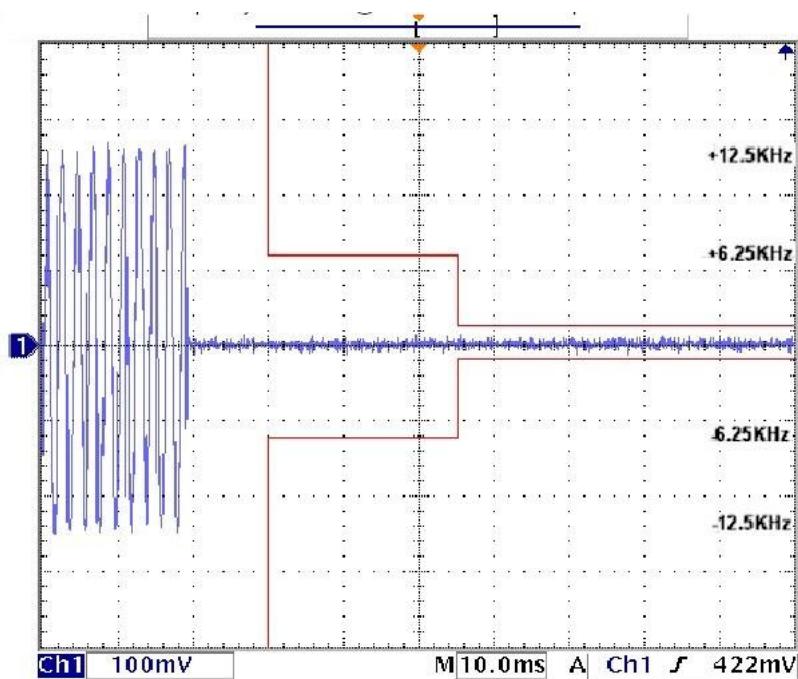
- 1、 Used the variable attenuator the transmitter was set to 40dB below the test receivers maximum input level, then the transmitter was turned off.
- 2、 With the transmitter off the signal generator was set 20 dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
- 3、 Reduce the attenuation between the transmitter and the RF detector by 30 dB. With the levels set as above the transient frequency behavior was observed & recorded.

### TEST CONFIGURATION

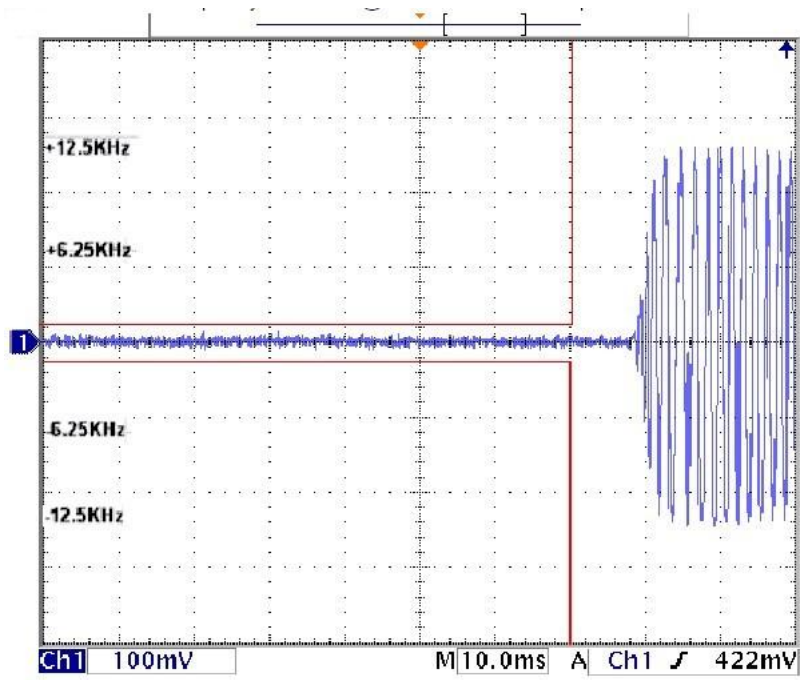


## TEST RESULTS

*Transmitter Frequency Behaviour@12.5kHz channel separation-off to on*



*Transmitter Frequency Behaviour@12.5kHz channel separation-on to off*



**Conclusion: PASS**

## **5.9 Spurious Emissions At Antenna Terminals**

### **Standard Applicable**

According to FCC 2.1051 and 90.210

For 12.5 kHz bandwidth

On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz ) of more than 12.5KHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.

### **Test Procedure**

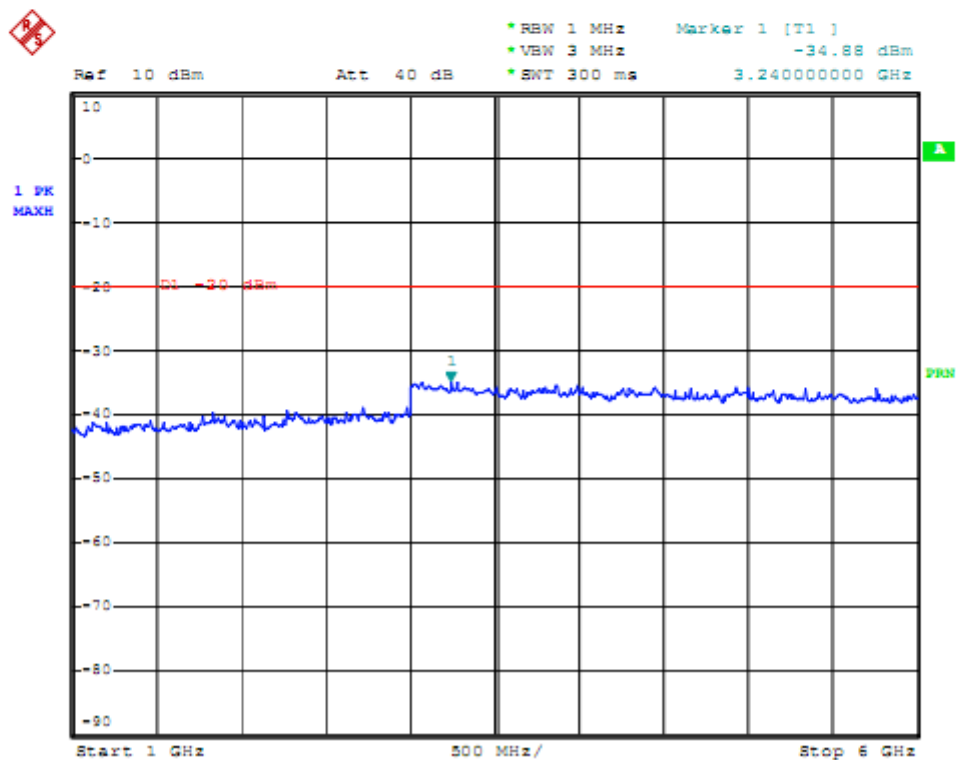
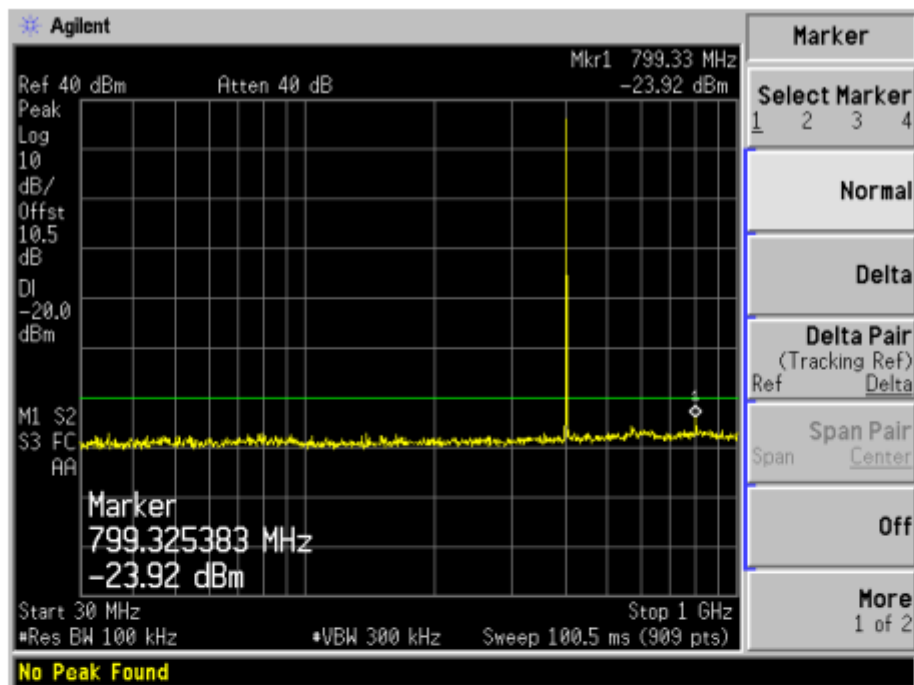
Connect a suitable artificial antenna properly, set the Low, Middle and High Transmitting Channel observed the spurious emissions from antenna port, and then mark the higher-level emission for comparing with the rules.

### **Summary of Test Results**

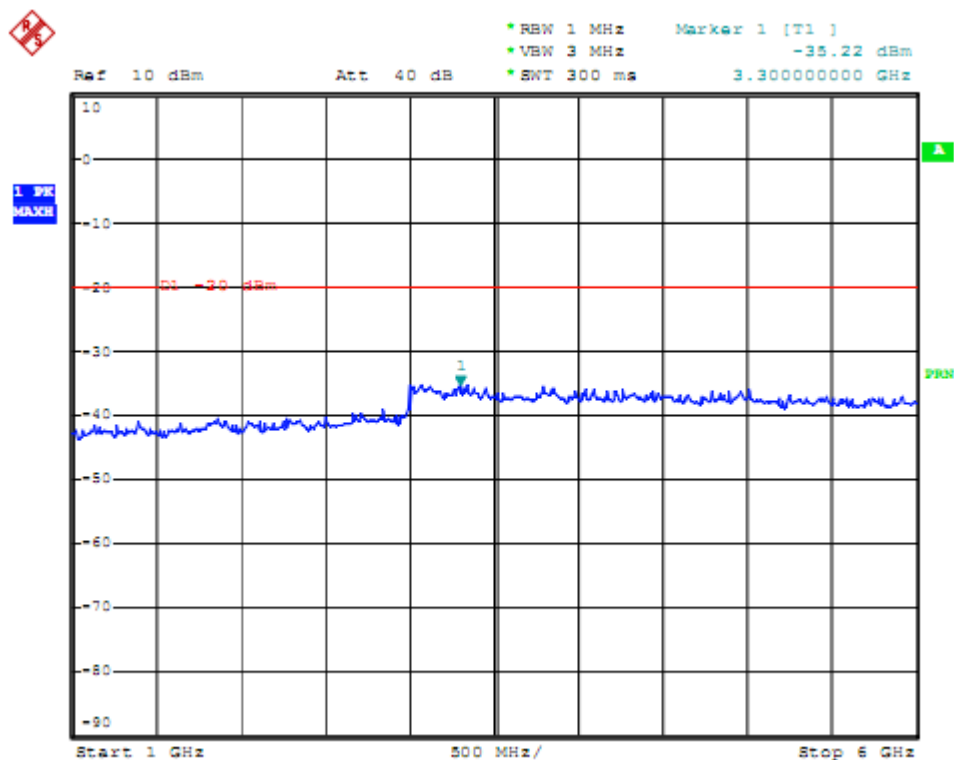
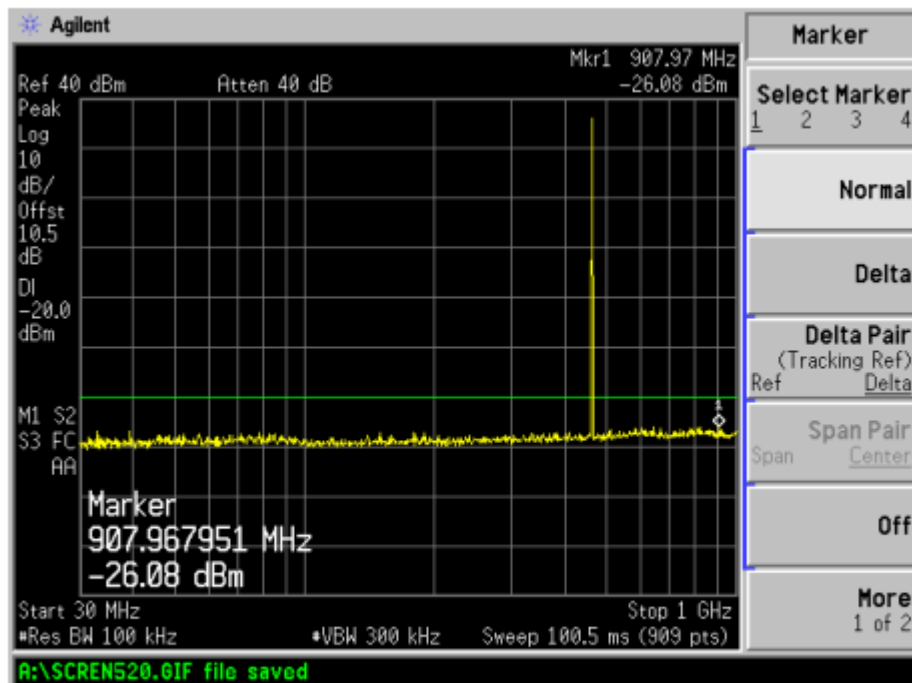
Refer to the attached plots.

For UHF band

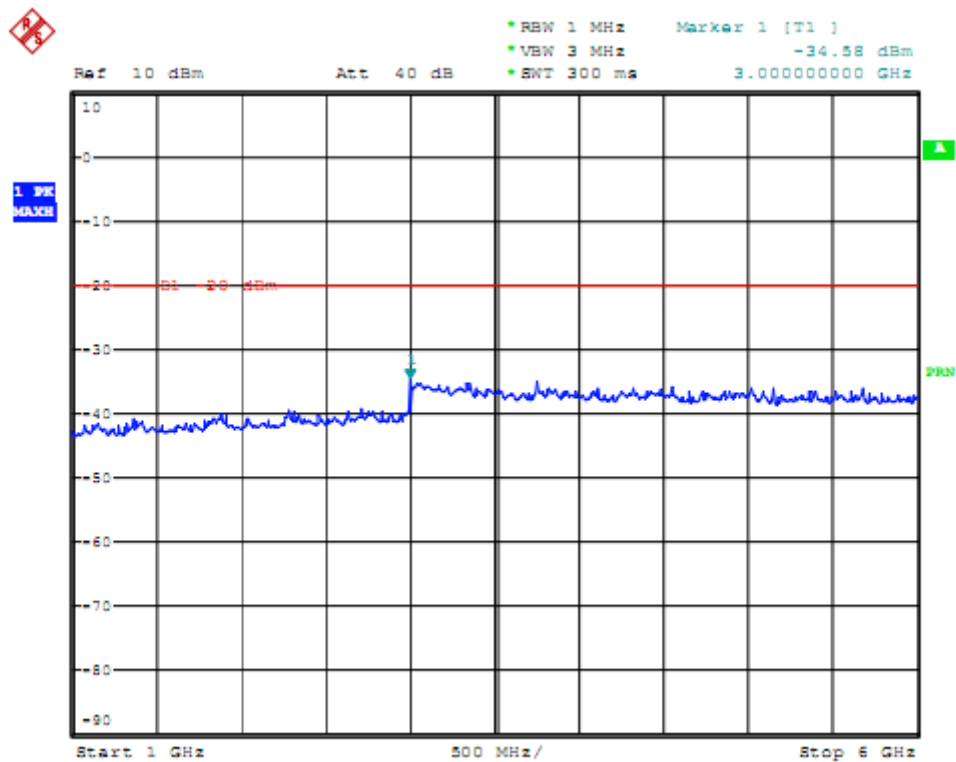
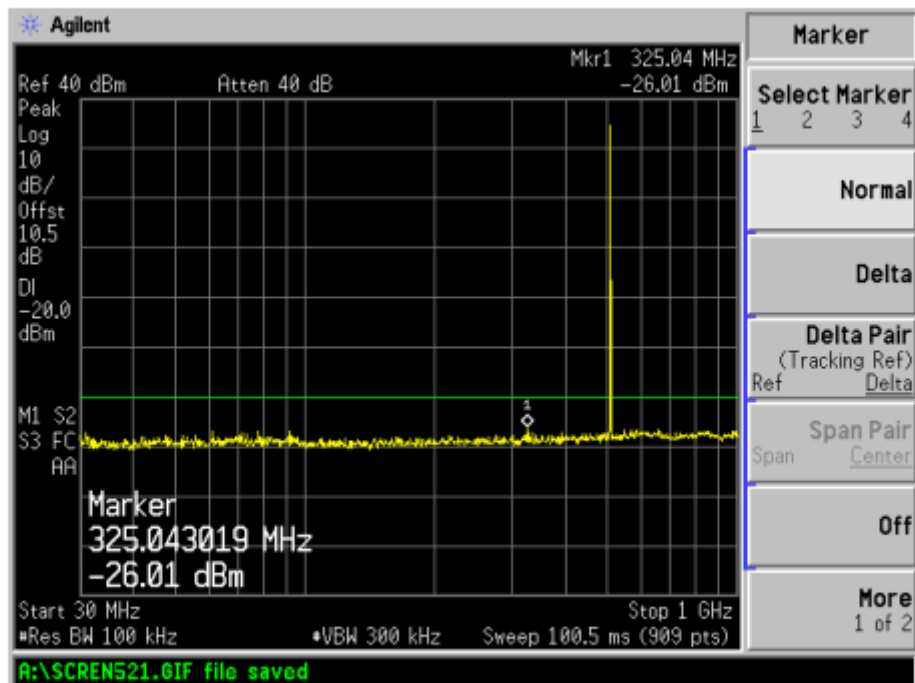
Narrowband-Low Channel:



Narrowband-Middle Channel:



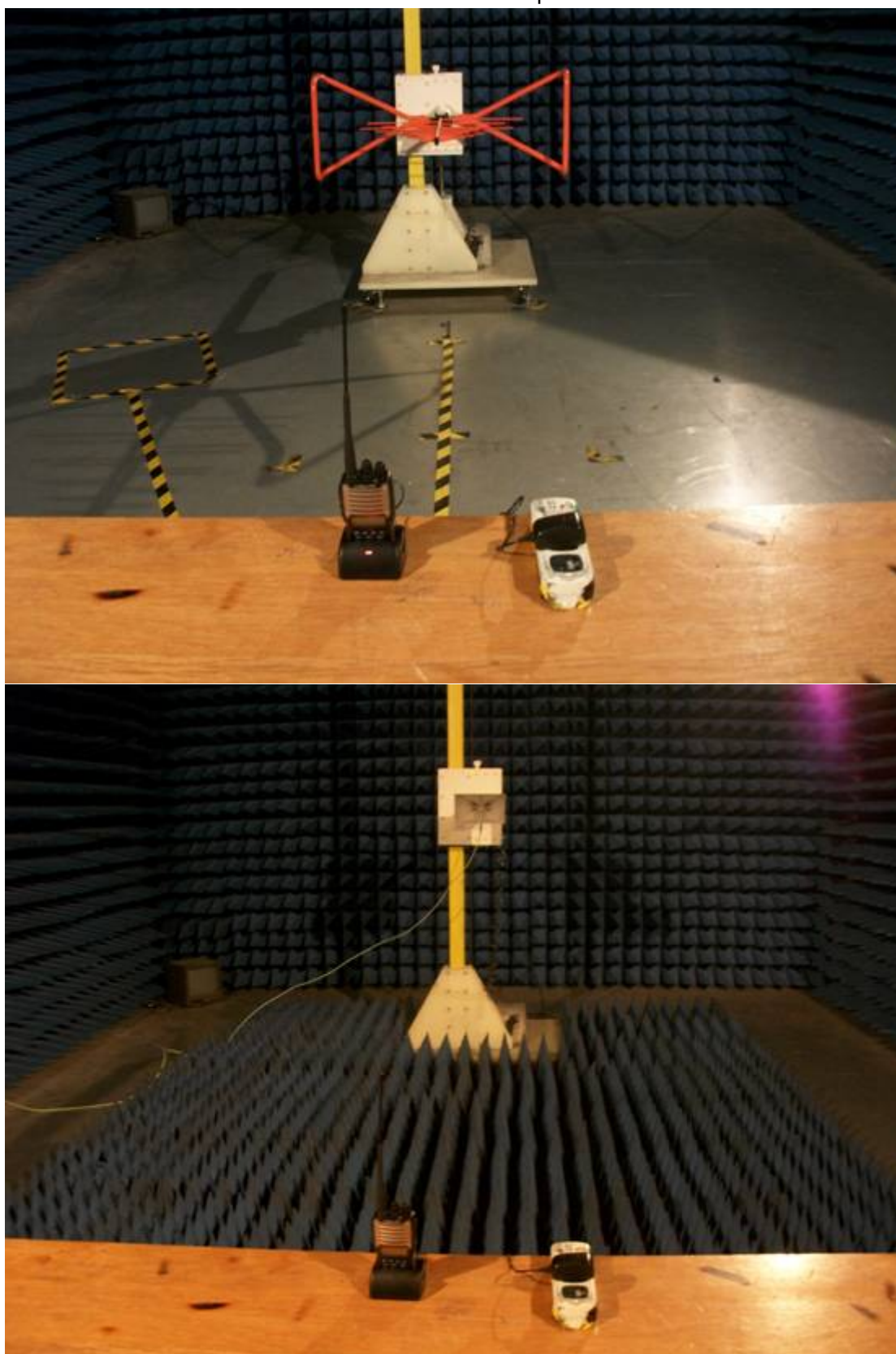
## Narrowband-High Channel:



## **Annex A**

### **Photographs of the Test Setup and EUT**

Radiated Emission Setup Photo



Conducted Emission Setup Photo



\*\*\* End of the Reports\*\*\*