Shenzhen CTL Testing Technology Co., Ltd.
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FCC PART 95 Test Report

Report Reference No.....:	**CTL1503030536-WF**
Compiled by (position+printed name+signature)..:	File administrators Jacky Chen
Name of the organization performing the tests (position+printed name+signature)..:	Test Engineer Tracy Qi
Approved by (position+printed name+signature)..:	Manager Tracy Qi
Date of issue.....:	Mar. 12, 2015
Testing Laboratory Name .....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address.....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Applicant's name.....:	**Alinco Incorporated, Electronics Division**
Address.....:	Yodoyabashi Dai Building 13F, 4-4-9 Koraibashi, Chuo-ku, Osaka 541-0043, Japan
Test specification:	
Standard .....:	**FCC Part 95: PERSONAL RADIO SERVICES**
TRF Originator.....:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF.....:	Dated 2011-01

Test item description ..... :	**FRS UHF FM HANDHELD TRANSCIVER**
FCC ID..... :	**PH3DJ-FX45**
Trade Mark .....:	ALINCO
Model/Type reference.....:	DJ-FX45
Modulation……..:	FM
Channel Separation.....	12.5KHz
Power Supply……:	DC 3.7V
Rated Power……:	0.5W
Operating Frequency Range…..……:	462.5625~462.7125 MHz(FRS CH1~ CH7) 467.5625~467.7125 MHz(FRS CH8~ CH14)
Result.....:	**Positive**

TEST REPORT

Test Report No. :	CTL1503030536-WF	Mar. 12, 2015 Date of issue

Equipment under Test	:	FRS UHF FM HANDHELD TRANSCIVER
Model /Type	:	DJ-FX45
Applicant	:	**Alinco Incorporated, Electronics Division**
Address	:	Yodoyabashi Dai Building 13F, 4-4-9 Koraibashi, Chuo-ku, Osaka 541-0043, Japan
Manufacture	:	**KONGTOP INDUSTRIAL (SHENZHEN) CO.,LTD.**
Address	:	Xinwuyuan, No.1, Difu Road, Gushu, Xixiang, Baoan, 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 95: PERSONAL RADIO SERVICES

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

47 CFR FCC Part 15 Subpart B - Unintentional Radiators

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Feb. 03, 2015
Testing commenced on	:	Feb. 03, 2015
Testing concluded on	:	Mar. 12, 2015

2.2. Equipment Under Test

Power supply system utilised

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

DC 3.7V from battery

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

The FRS UHF FM HANDHELD TRANSCIVER, Model: DJ-FX45 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

EUT* Name	:	FRS UHF FM HANDHELD TRANSCIVER
Model Number	:	DJ-FX45
Trade Mark	:	ALINCO
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 3.70V from battery
Operation frequency range	:	462.5625MHz to 462.7125MHz 467.5625MHz to 467.7150MHz
Modulation type	:	FM
RF Rated Output power (ERP)	:	FRS:0.5W
Max Tx deviation	:	2.5KHz
EmissionDesignator	:	11K0F3E
Antenna Type	:	Integrated
Date of Receipt	:	2015/02/03
Sample Type	:	Series production
Exposure category:	:	General population / Uncontrolled environment

Emission Designator: 11K0F3F
Bn = 2M +2DK
M = 3000
D= 2.5K
Bn = 2*(3000) + 2*(2500) = 11.0 k

Frequency List

CH #	FREQ (MHz)	TYPE	CH #	FREQ (MHz)	TYPE
1	462.5625	FRS	12	467.6625	FRS
2	462.5875	FRS	13	467.6875	FRS
3	462.6125	FRS	14	467.7125	FRS
4	**462.6375**	**FRS**			
5	462.6625	FRS			
6	462.6875	FRS			
7	462.7125	FRS			
8	467.5625	FRS			
9	467.5875	FRS			
10	467.6125	FRS			
11	**467.6375**	**FRS**			

Note: For Channel 1 to Channel 7 for FRS; Channel 8 to Channel 14 for FRS; we choose Channel 4 and Channel 11 for FRS test channel according to KDB447498 test channel required.

2.4. EUT configuration

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

Accessory name	Internal Identification	Model	Description	Remark
Antenna	A1	N/A	Integrated Antenna	performed
Battery	B1	EBP-900	Intrinsically Safe Li-ion Battery(1000mAh)	performed
Belt clip	BC2	EBC-40	Belt Clip	performed
Audio Accessories	AA1	EME-61	Earphone Microphone with VOX	performed
Audio Accessories	AA2	EMS-60	Speaker & Microphone	performed
Audio Accessories	AA3	EME-24	Earphone Microphone	Not performed

AE ID: is used to identify the test sample in the lab internally.
Audio Accessories EME-24(Internal Identification: AA3) is an Earphone Microphone without VOX function, which cannot control transmitter TX when work. So we not need test with this Audio Accessories.

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

This submittal(s) (test report) is intended for FCC ID: **PH3DJ-FX45** filing to comply with the FCC Part 95 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

3.2. Test Facility

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

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., 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 970318, December 19, 2013.

3.3. Environmental conditions

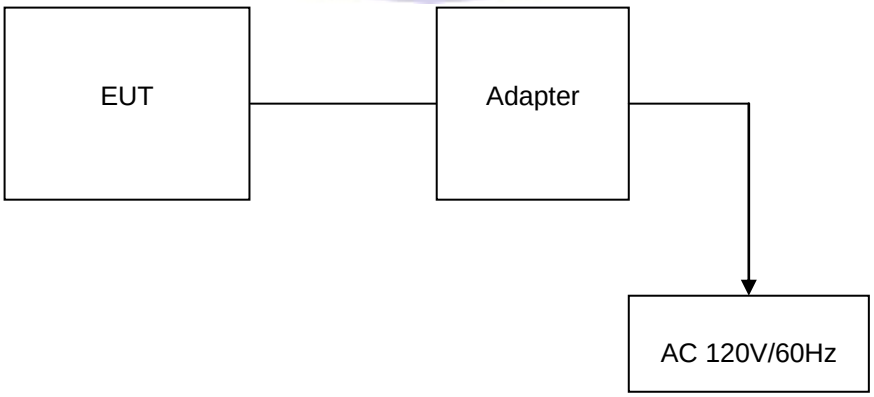
During the measurement the environmental conditions were within the listed ranges:

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

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



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 Shenzhen CTL Electromagnetic Technology Co., 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 CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	1~12.75GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(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

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2014/07/12	2015/07/11
EMI Test Receiver	R&S	ESCI	103710	2014/07/10	2015/07/09
Spectrum Analyzer	Agilent	E4407B	MY45108355	2014/07/06	2015/07/05
Controller	EM Electronics	Controller EM 1000	N/A	2014/07/06	2015/07/05
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2014/07/12	2015/07/11
Horn Antenna	SCHWARZBECK	BBHA9170	1562	2014/07/12	2015/07/11
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2014/07/12	2015/07/11
LISN	R&S	ENV216	101316	2014/07/10	2015/07/09
LISN	SCHWARZBECK	NSLK8127	8127687	2014/07/10	2015/07/09
Microwave Preamplifier	HP	8349B	3155A00882	2014/07/10	2015/07/09
Amplifier	HP	8447D	3113A07663	2014/07/10	2015/07/09
Transient Limiter	Com-Power	LIT-153	532226	2014/07/10	2015/07/09
Radio Communication Tester	R&S	CMU200	3655A03522	2014/07/06	2015/07/05
Temperature/Humidity Meter	zhicheng	ZC1-2	22522	2014/07/10	2015/07/09
SIGNAL GENERATOR	HP	8647A	3200A00852	2014/07/10	2015/07/09
Wideband Peak Power Meter	Anritsu	ML2495A	220.23.35	2014/07/06	2015/07/05
Climate Chamber	ESPEC	EL-10KA	A20120523	2014/07/06	2015/07/05
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	/	2014/07/06	2015/07/05
High-Pass Filter	K&L	41H10-1375/U12750-O/O	/	2014/07/06	2015/07/05
RF Cable	HUBER+SUHNER	RG214	/	2014/07/09	2015/07/08

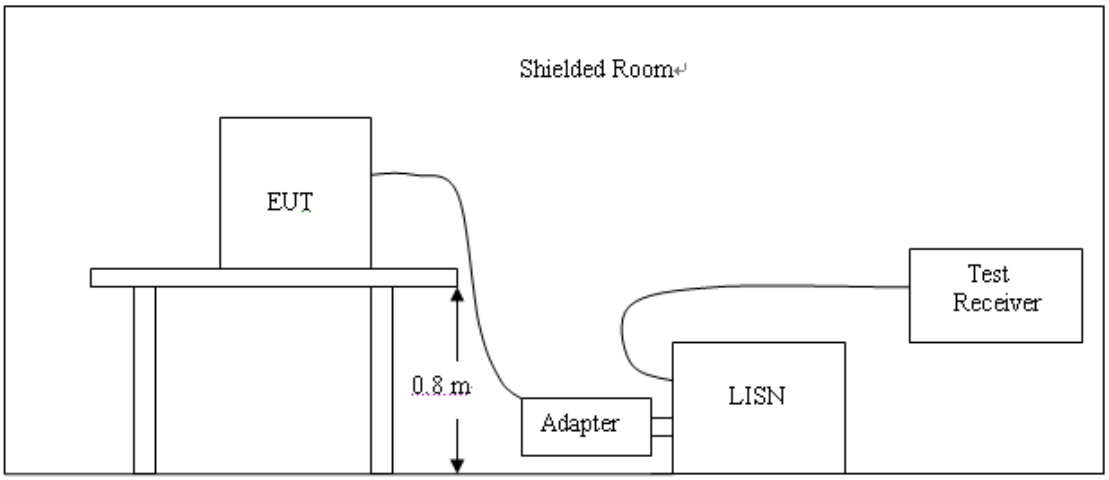
3.7. General Technical Requirements and Summary of Test Results

FCC Rules	Description of Test	Test Result
FCC Part 95.639	Maximum Transmitter Power	Complies
FCC Part 2.1047, FCC Part 95.637	Modulation Characteristics	Complies
FCC Part 2.1049, FCC Part 95.633, FCC Part 95.635	Occupied Bandwidth and Emission Mask	Complies
FCC Part 95.635	Radiated Spurious Emission	Complies
FCC Part 2.1055, FCC Part 95.621 FCC Part 95.626	Frequency Stability	Complies
FCC Part 15.107 ANSI C63.4: 2009	Power line conducted emissions	Complies

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

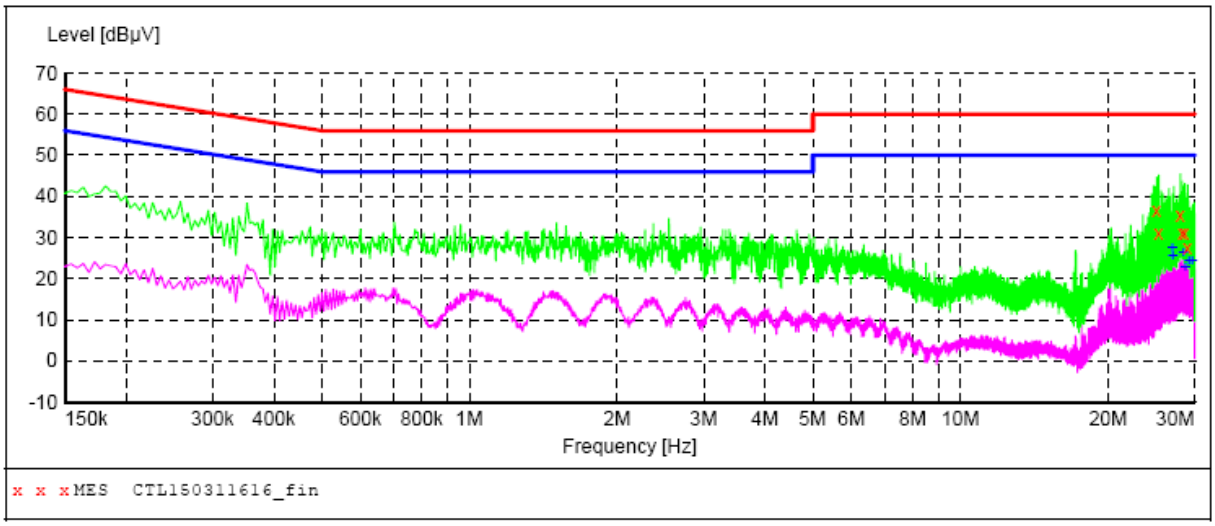
* Decreasing linearly with the logarithm of the frequency

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

TEST RESULTS

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150311616_fin"

3/11/2015 3:47PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
25.088000	36.50	11.1	60	23.5	QP	N	GND
25.334000	30.90	11.1	60	29.1	QP	N	GND
28.034000	35.40	11.2	60	24.6	QP	N	GND
28.274000	31.00	11.2	60	29.0	QP	N	GND
28.634000	30.90	11.2	60	29.1	QP	N	GND
29.006000	27.60	11.2	60	32.4	QP	N	GND

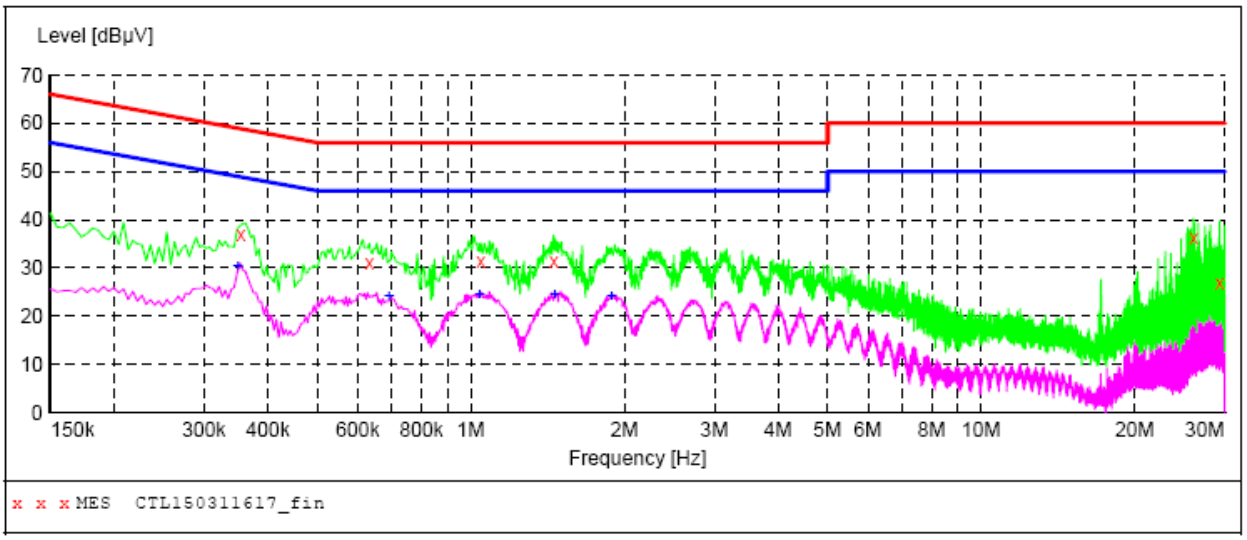
MEASUREMENT RESULT: "CTL150311616_fin2"

3/11/2015 3:47PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
27.014000	27.50	11.2	50	22.5	AV	N	GND
27.074000	25.70	11.2	50	24.3	AV	N	GND
28.460000	26.10	11.2	50	23.9	AV	N	GND
28.700000	22.60	11.2	50	27.4	AV	N	GND
29.180000	24.40	11.2	50	25.6	AV	N	GND
29.660000	24.20	11.3	50	25.8	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150311617_fin"

3/11/2015 3:51PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.354000	36.80	10.2	59	22.1	QP	L1	GND
0.632000	31.10	10.2	56	24.9	QP	L1	GND
1.046000	31.40	10.3	56	24.6	QP	L1	GND
1.454000	31.30	10.3	56	24.7	QP	L1	GND
26.054000	36.40	11.2	60	23.6	QP	L1	GND
29.306000	26.90	11.3	60	33.1	QP	L1	GND

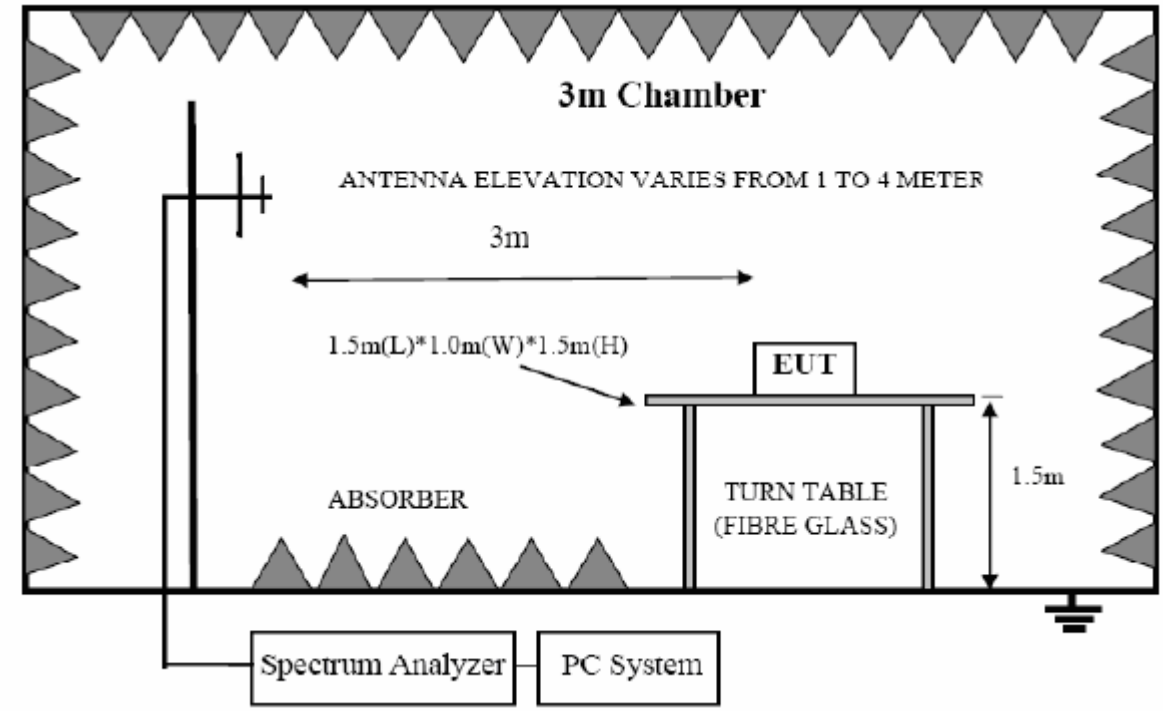
MEASUREMENT RESULT: "CTL150311617_fin2"

3/11/2015 3:51PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.350000	30.20	10.2	49	18.8	AV	L1	GND
0.692000	24.20	10.2	46	21.8	AV	L1	GND
1.040000	24.60	10.3	46	21.4	AV	L1	GND
1.460000	24.50	10.3	46	21.5	AV	L1	GND
1.886000	24.20	10.3	46	21.8	AV	L1	GND

4.2. Maximum Transmitter Power

4.2.1. Block diagram of test setup



4.2.2. Limits

According to FCC Part 95.639: Power output shall not exceed 0.50 Watts effective radiated power for the FRS channels. There can be no provisions for increasing the power or varying the power. No GMRS channel, under any condition of modulation, shall exceed:

(1) 50W Carrier power (average TP during one modulated RF cycle) when transmitting emissions type A1D, F1D, G1D, A3E, F3E, or G3E.
(2) 50W peak envelope TP when transmitting emission type H1D, J1D, R1D, H3E, J3E or R3E.

4.2.3. Test Procedure

(1) On a test site, the EUT shall be placed at 1.5m height on a wooden turntable, and in the position closest to normal use as declared by the applicant.
(2) The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
(3) The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
(4) The transmitter shall be switched on , if possible, without modulation and the measuring 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 a maximum signal level is detected by the measuring receiver.
(6) The transmitter shall then the rotated through 360° in the horizontal plane, until a maximum signal level is detected by the measuring receiver.
(7) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
(8) The maximum signal level detected by the measuring receiver shall be noted.
(9) The transmitter shall be replaced by a tuned dipole (substitution antenna).
(10) The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
(11) The substitution antenna shall be connected to a calibrated signal generator.
(12) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

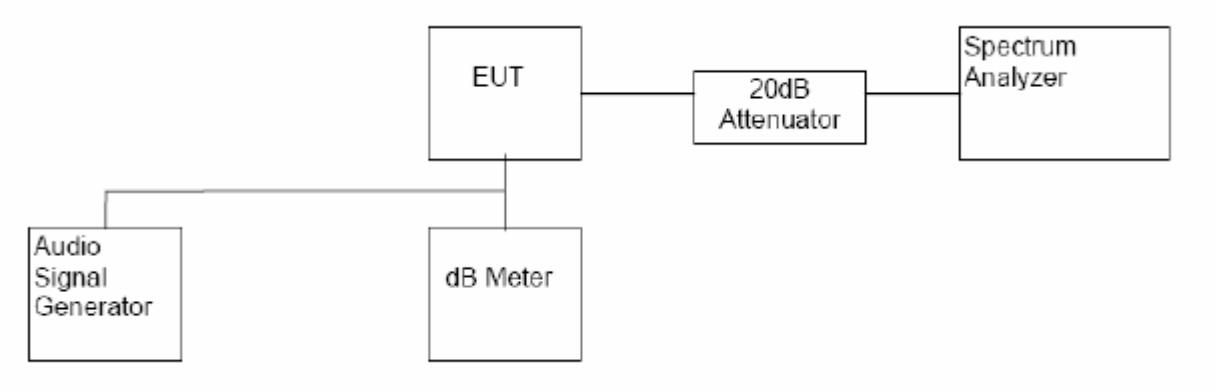
(13) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver
(14) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver. (15) The input signal to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
(16) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
(17) The measure of the ERP is the larger of the two levels recorded, at the input to the substitution antenna, corrected the gain of the substitution antenna if necessary.

4.2.4. Test Result

CH	Antenna	Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Measure ERP (dBm)	Measure ERP (mW)	Limit (mW)	Detector
4	V	462.6375	8.22	18.21	26.43	**439.54**	500	**PK**
	H	462.6375	6.50	18.21	24.71	**295.80**	500	**PK**
11	V	467.6375	8.44	18.24	26.68	**465.59**	500	**PK**
	H	467.6375	5.15	18.24	23.39	**218.27**	500	**PK**

4.3. Occupied bandwidth and emission mask

4.3.1. Block diagram of test setup



4.3.2. Limits

According to FCC 95.633: (c) The authorized bandwidth for emission type F3E or F2D transmitted by a FRS unit is 12.5 kHz.
According to FCC 95.635: At least 25dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50 % up to and including 100 % of the authorized bandwidth. At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100 % up to and including 250 % of the authorized bandwidth. At least 43 + 10 log10(T) dB on any frequency removed from the center of the authorized bandwidth by more than 250 %.

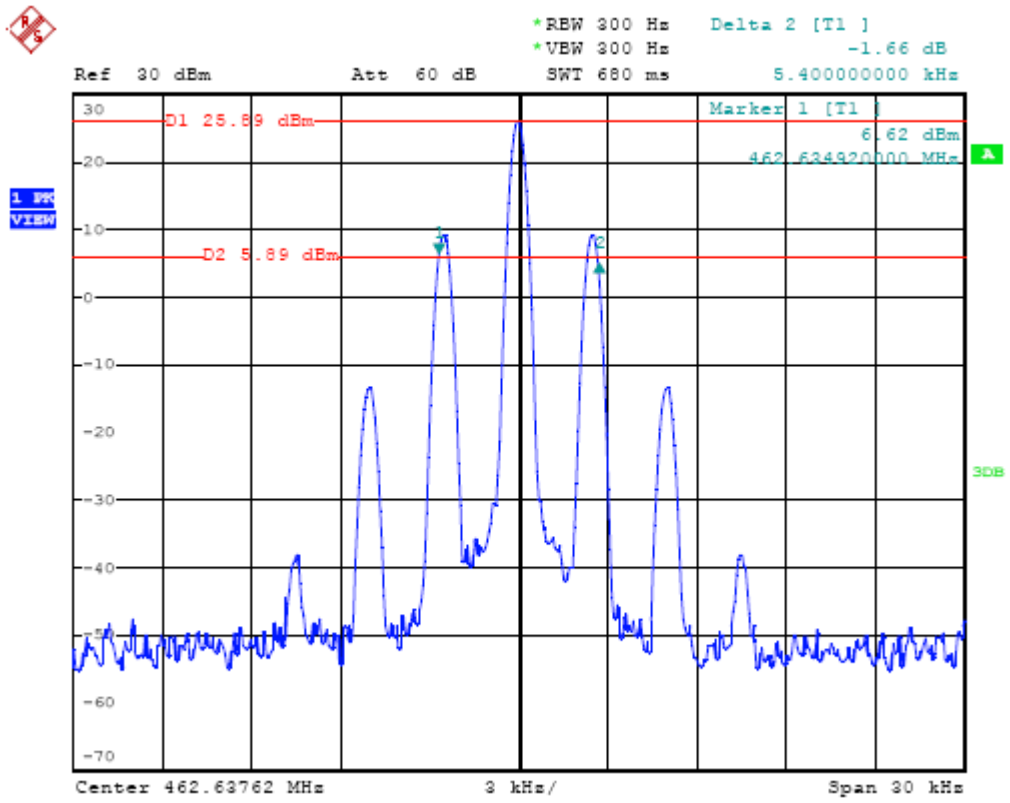
4.3.3. Test Procedure

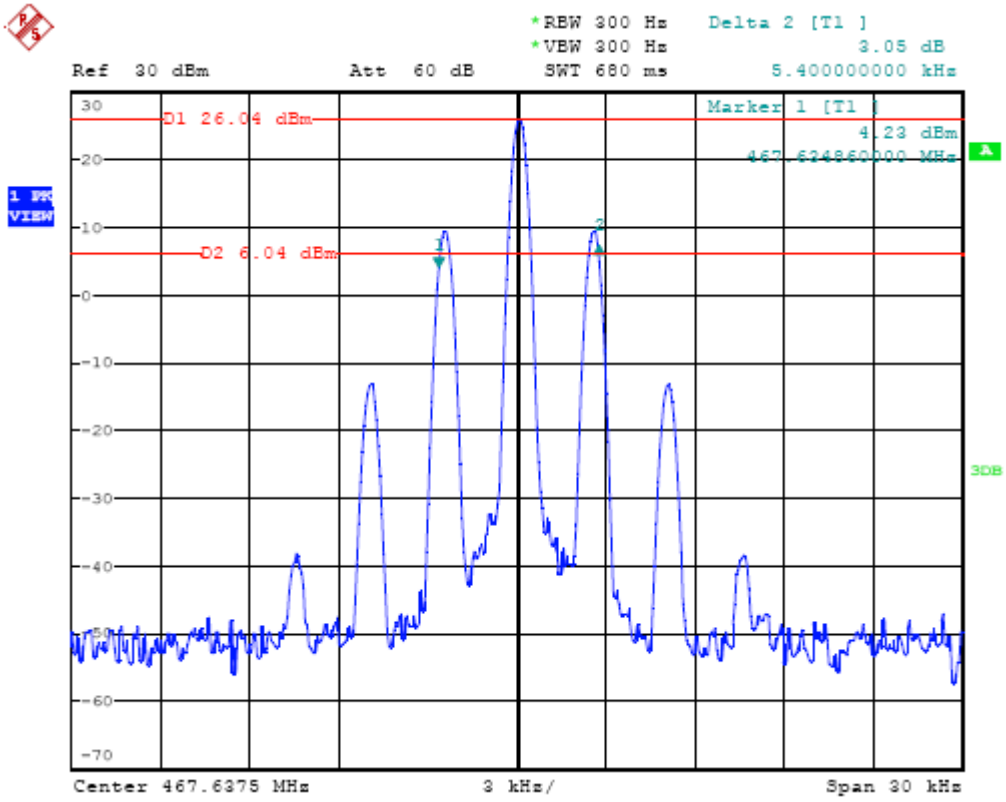
(1). Configure EUT and assistant system according clause 4.2
(2). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing).
(3). Set SPA Center Frequency = fundamental frequency, RBW=VBW= 300 Hz, Span =20 KHz.
(4). Measure the -20 dB bandwidth of modulated signal.

4.3.4. Test Result

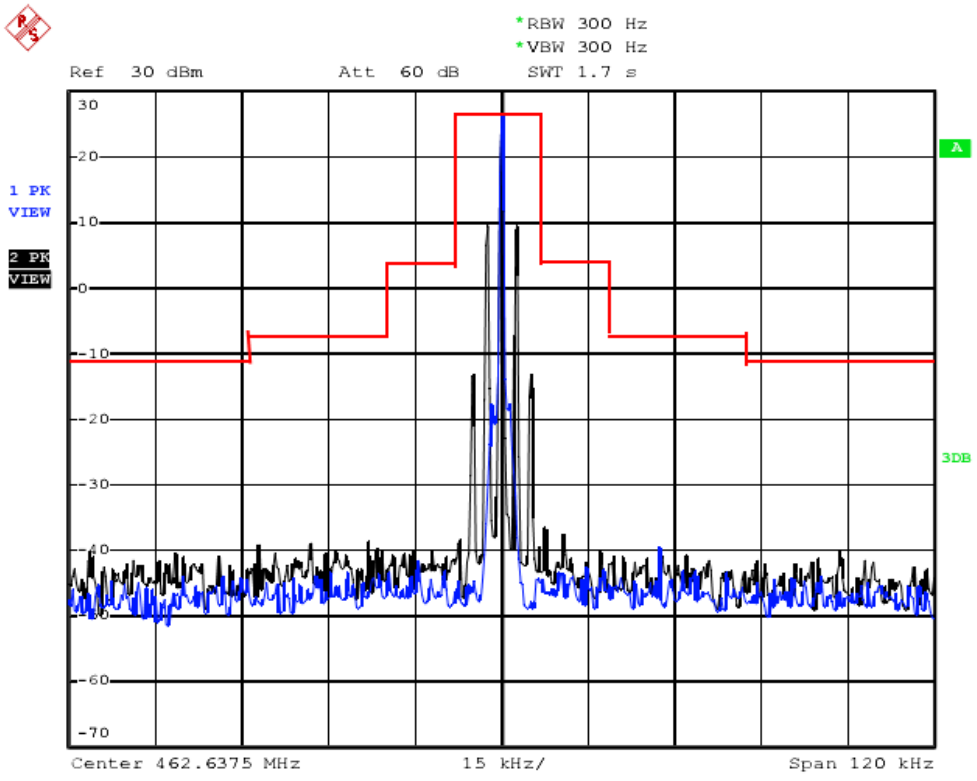
See next pages.

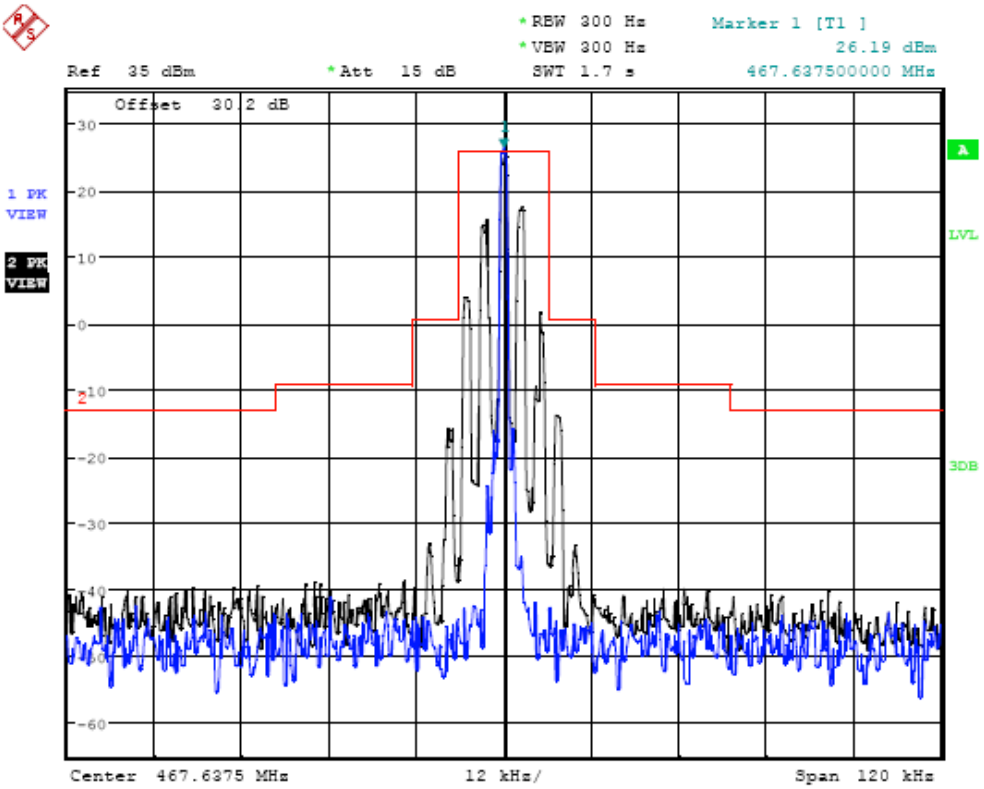
Occupied Bandwidth:





Emission mask:


*RBW 300 Hz
*VBW 300 Hz
Ref 30 dBm
Att 60 dB
SWT 1.7 s
1 PK VIEW
2 PK VIEW
A
3DB
Center 462.6375 MHz
15 kHz/
Span 120 kHz


*RBW 300 Hz
*VBW 300 Hz
Marker 1 [T1]
26.19 dBm
467.637500000 MHz
Ref 35 dBm
*Att 15 dB
SWT 1.7 s
Offset 30.2 dB
1 PK VIEW
2 PK VIEW
A
LVL
3DB
Center 467.6375 MHz
12 kHz/
Span 120 kHz

4.4. Modulation Characteristics

4.4.1. Block diagram of test setup

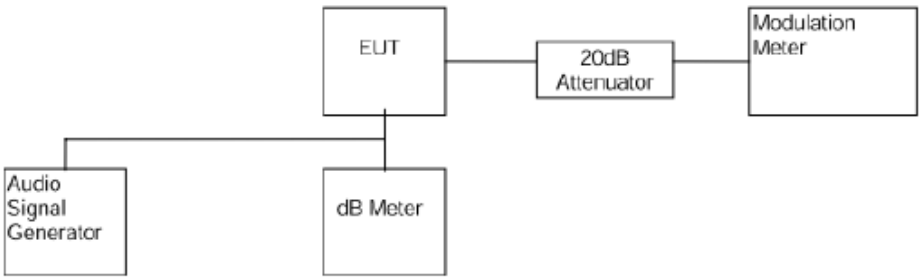
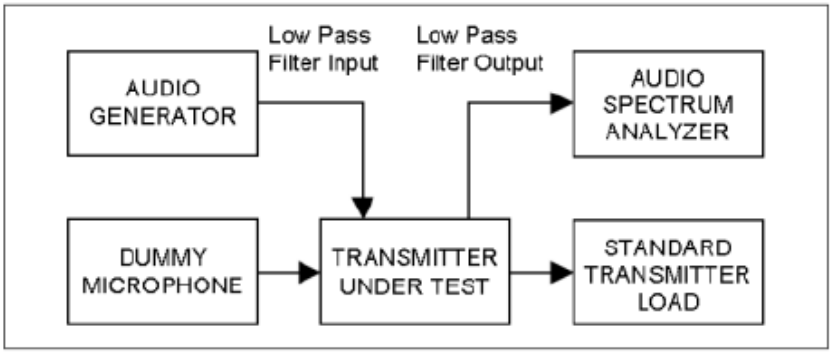


Figure 1



4.4.2. Limits

According to FCC 95.637:
(a) A GMRS transmitter that transmits emission types F1D, G1D, or G3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A GMRS transmitter that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 2.5 kHz, and the audio frequency response must not exceed 3.125 kHz .
(b) Each GMRS transmitter, except a mobile station transmitter with a power output of 2.5 W or less, must automatically prevent a greater than normal audio level from causing overmodulation. The transmitter also must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of §95.631 (without filtering.) The filter must be between the modulation limiter and the modulated stage of the transmitter. At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least 60 log10 (f/3) dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

According to FCC 2.1047:
(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

4.4.3. Test Procedure

Frequency deviation:
(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1 KHz 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 300Hz, 1KHz and 3Kz in sequence.

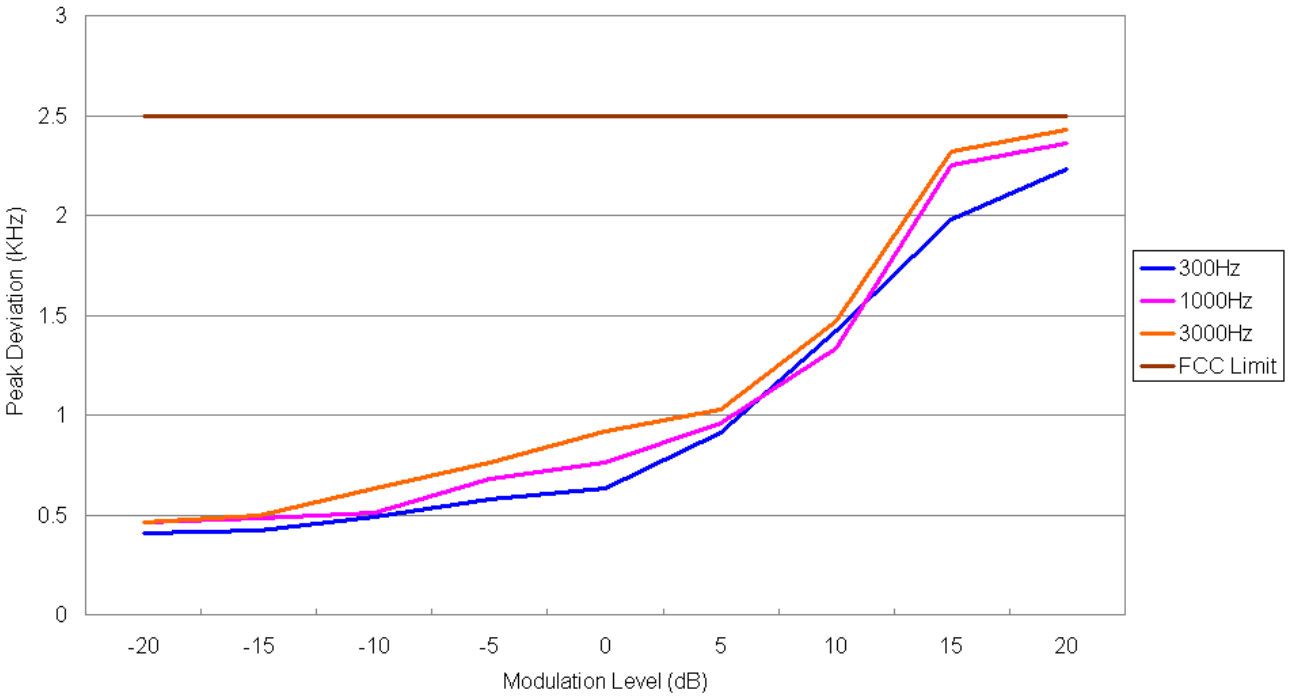
Audio Low Pass Filter Response:
(1) Connect the equipment in figure 2.
(2) Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.
(3) Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.
(4) Apply a 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.
(5) Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV1 .
(6) Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.
(7) Record audio spectrum analyzer levels, at the test frequency in step (6).
(8) Record the dB level on the audio spectrum analyzer as LEV2 . Method of Measurement for Transmitters.

4.4.4. Test Result

Frequency deviation:

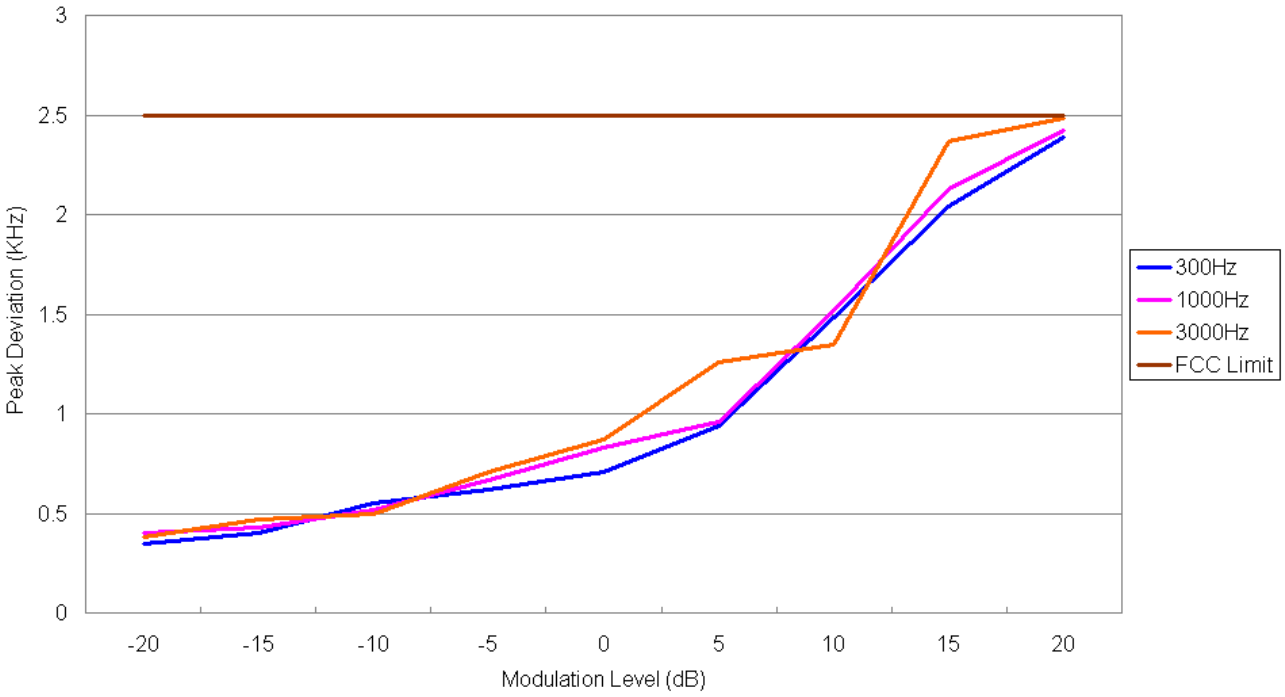
CH4 (462.6375MHz)

Modulation Level(dB)	Peak Freq. Deviation At 300 Hz(KHz)	Peak Freq. Deviation At 1000 H(KHz)	Peak Freq. Deviation At 1500 Hz(KHz)	FCC limit Hz(KHz)
	300Hz	1000Hz	3000Hz	FCC Limit
-20	0.41	0.46	0.46	2.5
-15	0.42	0.48	0.50	2.5
-10	0.49	0.51	0.63	2.5
-5	0.58	0.68	0.76	2.5
0	0.63	0.76	0.92	2.5
5	0.91	0.96	1.03	2.5
10	1.42	1.33	1.47	2.5
15	1.98	2.25	2.32	2.5
20	2.23	2.36	2.43	2.5



CH11 (467.6375MHz)

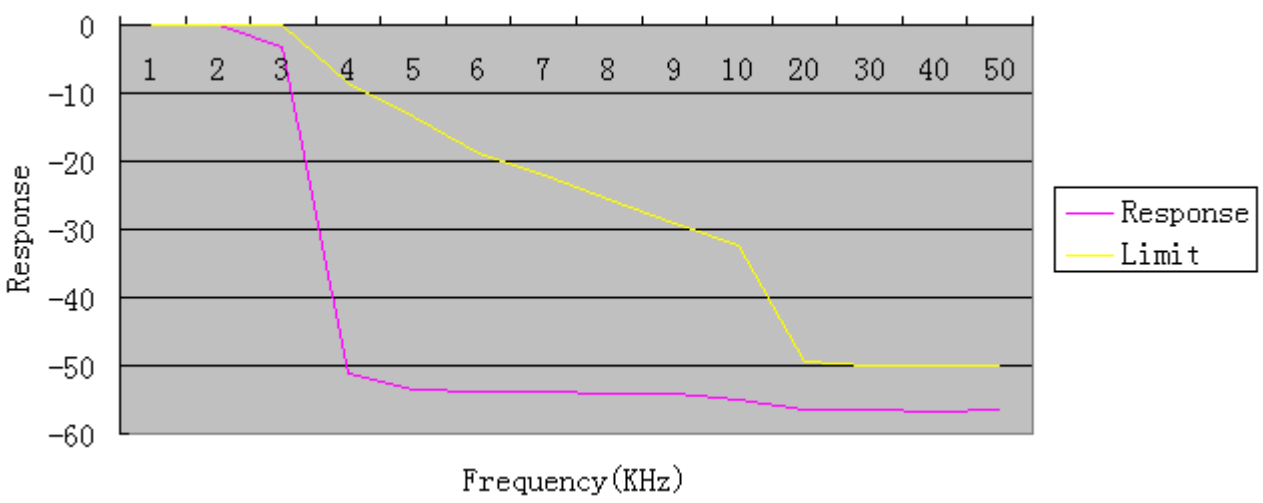
Modulation Level(dB)	Peak Freq. Deviation At 300 Hz(KHz)	Peak Freq. Deviation At 1000 H(KHz)	Peak Freq. Deviation At 1500 Hz(KHz)	FCC limit Hz(KHz)
	300Hz	1000Hz	3000Hz	FCC Limit
-20	0.35	0.40	0.38	2.5
-15	0.40	0.43	0.47	2.5
-10	0.55	0.52	0.50	2.5
-5	0.62	0.67	0.71	2.5
0	0.71	0.83	0.87	2.5
5	0.94	0.96	1.26	2.5
10	1.48	1.52	1.35	2.5
15	2.04	2.13	2.37	2.5
20	2.39	2.42	2.48	2.5



Audio Low Pass Filter Response:

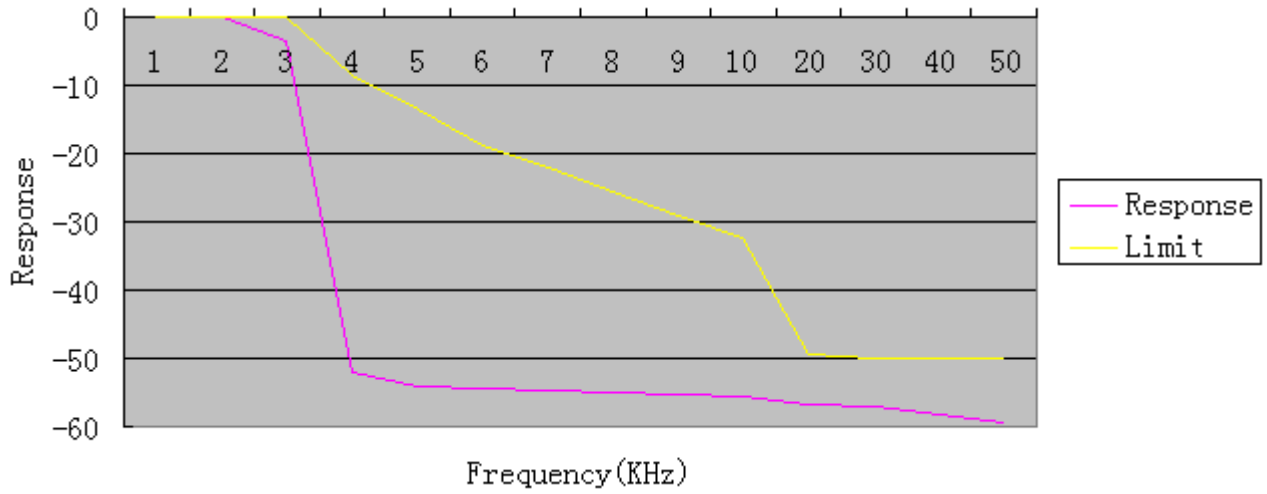
CH4 (462.6375MHz)

Frequency(KHz)	Response	Limit
1	0	0
2	0	0
3	-3.27	0
4	-51.06	-8.62
5	-53.39	-13.64
6	-53.68	-18.75
7	-53.94	-22.16
8	-54.17	-25.57
9	-54.26	-28.98
10	-55.08	-32.39
20	-56.38	-49.43
30	-56.54	-50.00
40	-56.89	-50.00
50	-56.57	-50.00



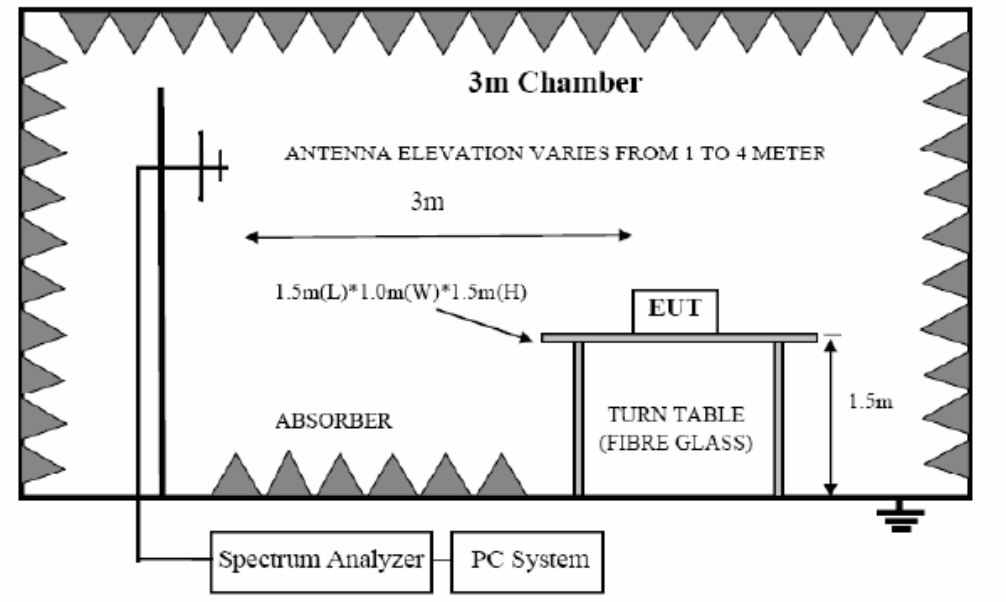
CH11 (467.6375MHz)

Frequency(KHz)	Response	Limit
1	0	0
2	0	0
3	-3.48	0
4	-52.13	-8.62
5	-54.02	-13.64
6	-54.39	-18.75
7	-54.76	-22.16
8	-55.03	-25.57
9	-55.18	-28.98
10	-55.61	-32.39
20	-56.91	-49.43
30	-57.04	-50.00
40	-57.23	-50.00
50	-57.49	-50.00



4.5. Radiated Spurious Emission

4.5.1. Block diagram of test setup



4.5.2. Limits

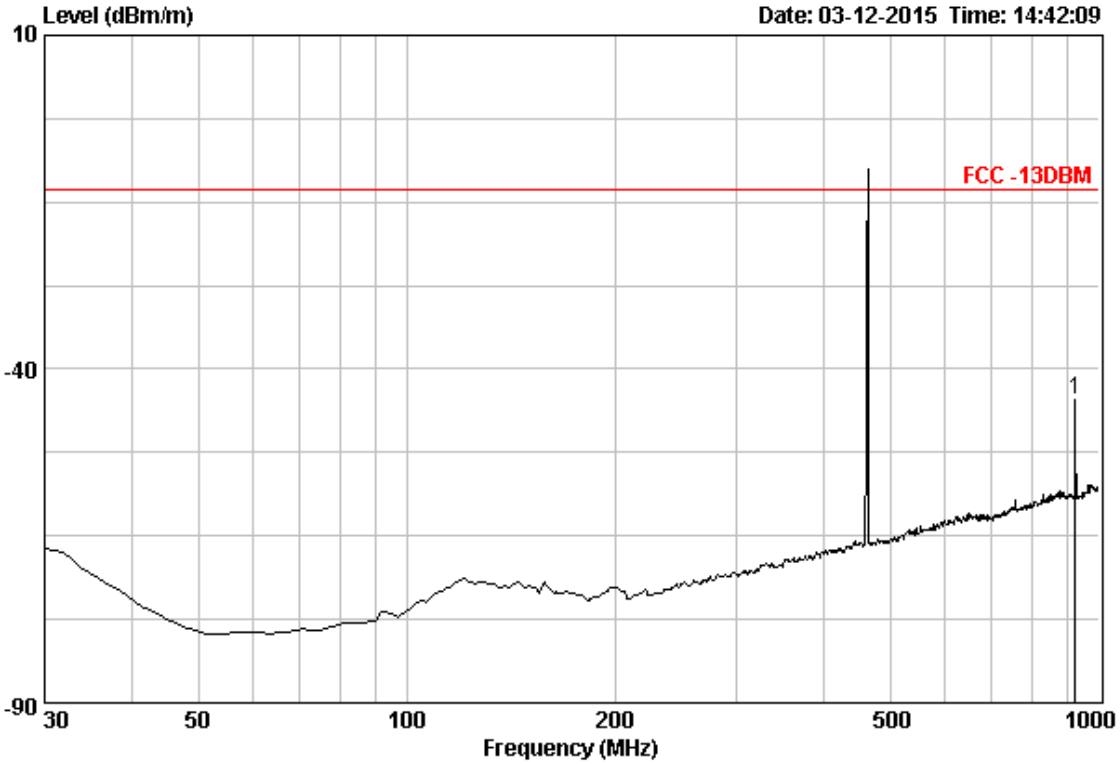
The unwanted emission should be attenuated below TP by at least 43+10log(Transmit Power) dB

4.5.3. 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.

4.5.4. Test Result

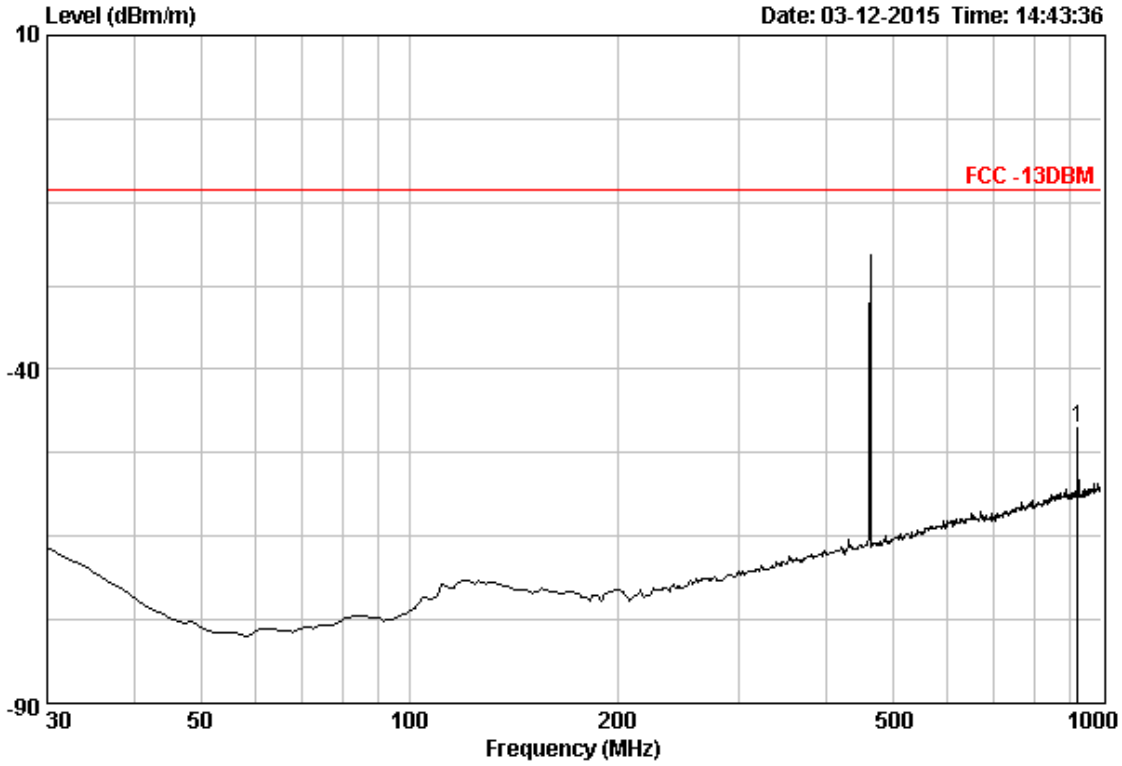
CH4 (462.6375MHz)



Site no. : 3m Chamber
Dis. / Ant. : 3m JB1
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 698
Ant. pol. : HORIZONTAL

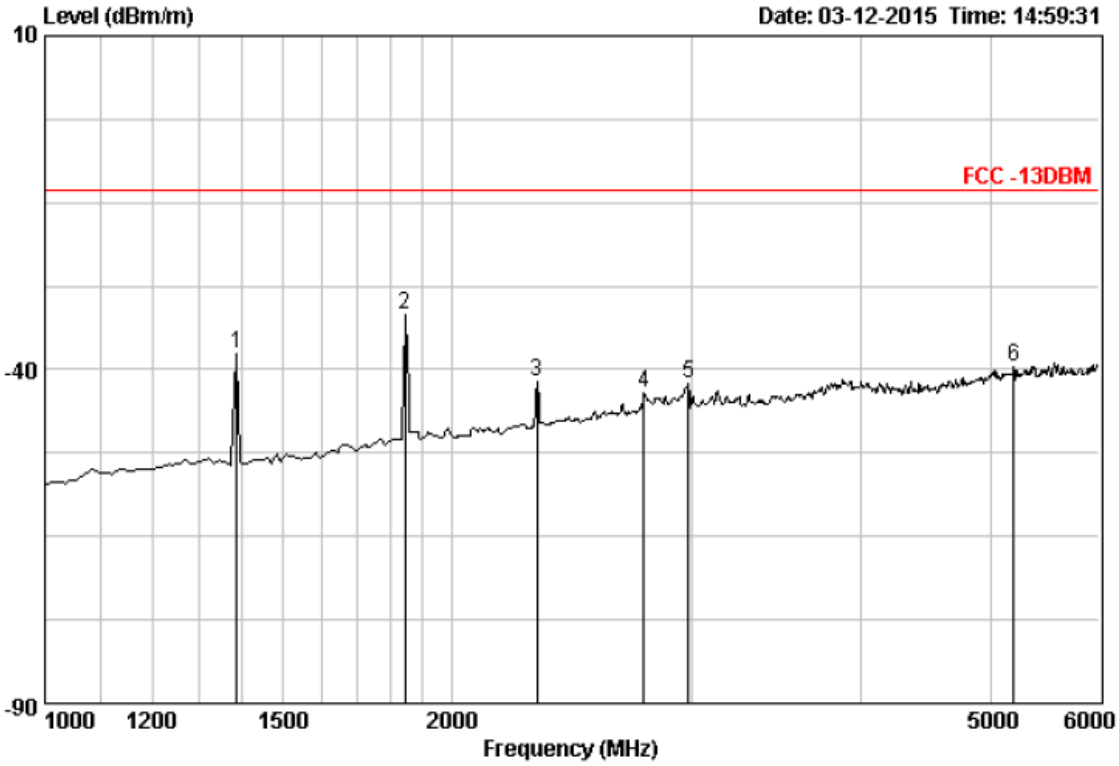
	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	924.34	22.59	3.65	-42.61	-44.50	-13.00	31.50	Peak



Site no. : 3m Chamber
Dis. / Ant. : 3m JB1
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 699
Ant. pol. : VERTICAL

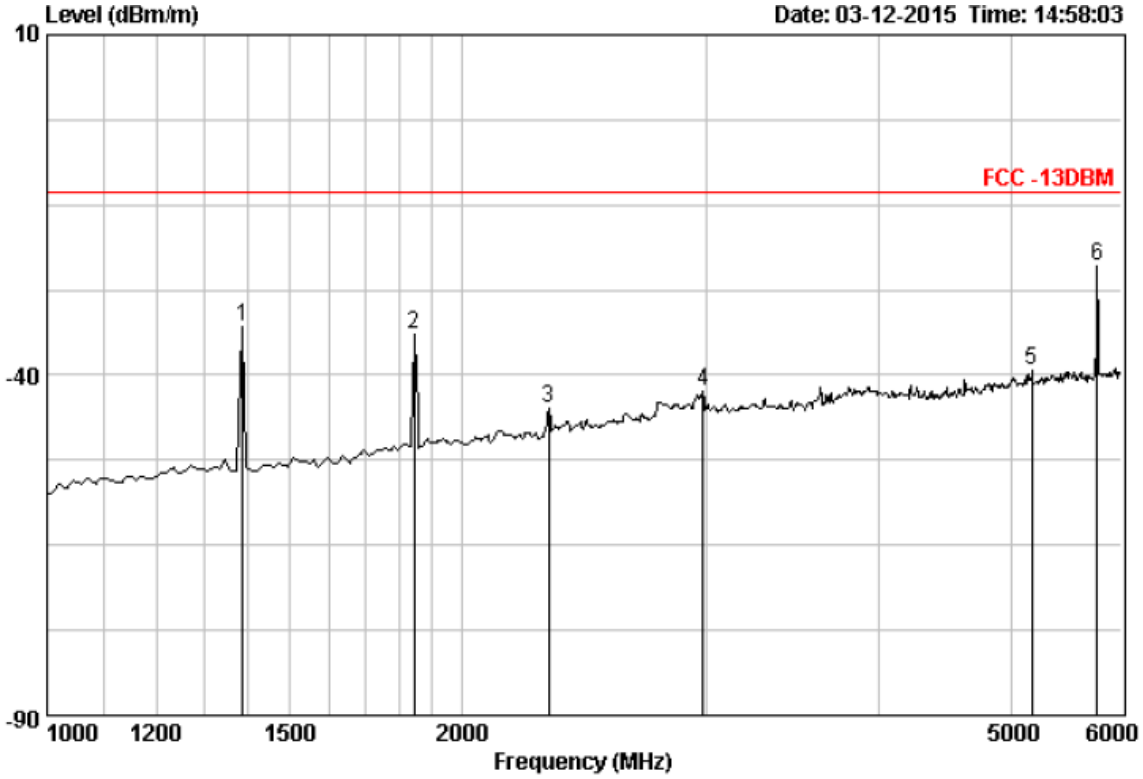
	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	924.34	22.59	3.65	-46.81	-48.70	-13.00	35.70	Peak



Site no. : 3m Chamber
Dis. / Ant. : 3m DRH-118
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 706
Ant. pol. : HORIZONTAL

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	1385.00	25.58	3.64	-31.10	-37.72	-13.00	24.72	Peak
2	1845.00	27.42	4.05	-27.71	-31.65	-13.00	18.65	Peak
3	2310.00	28.26	4.52	-39.17	-41.73	-13.00	28.73	Peak
4	2770.00	29.55	5.01	-42.57	-43.45	-13.00	30.45	Peak
5	2985.00	30.48	5.24	-42.35	-42.12	-13.00	29.12	Peak
6	5195.00	34.54	7.14	-47.10	-39.72	-13.00	26.72	Peak



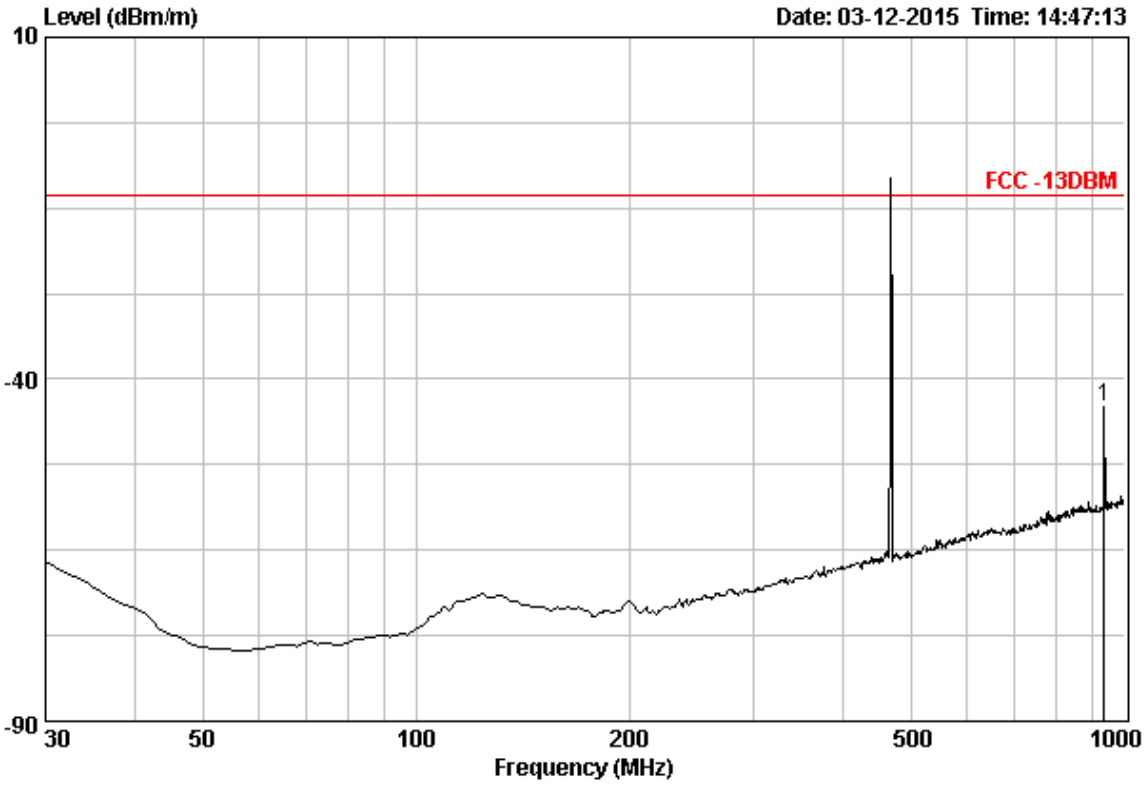
Site no. : 3m Chamber
Dis. / Ant. : 3m DRH-118
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 705
Ant. pol. : VERTICAL

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	1385.00	25.58	3.64	-26.15	-32.77	-13.00	19.77	Peak
2	1845.00	27.42	4.05	-30.00	-33.94	-13.00	20.94	Peak
3	2310.00	28.26	4.52	-42.37	-44.93	-13.00	31.93	Peak
4	2985.00	30.48	5.24	-42.60	-42.37	-13.00	29.37	Peak
5	5170.00	34.47	7.12	-46.54	-39.24	-13.00	26.24	Peak
6	5760.00	34.80	7.46	-31.82	-24.06	-13.00	11.06	Peak

Note 1: According explorer test, this configuration have worst emission.
Note 2:Limit= 26.43dBm- (43+10log(Transmit Power)) = -13dBm

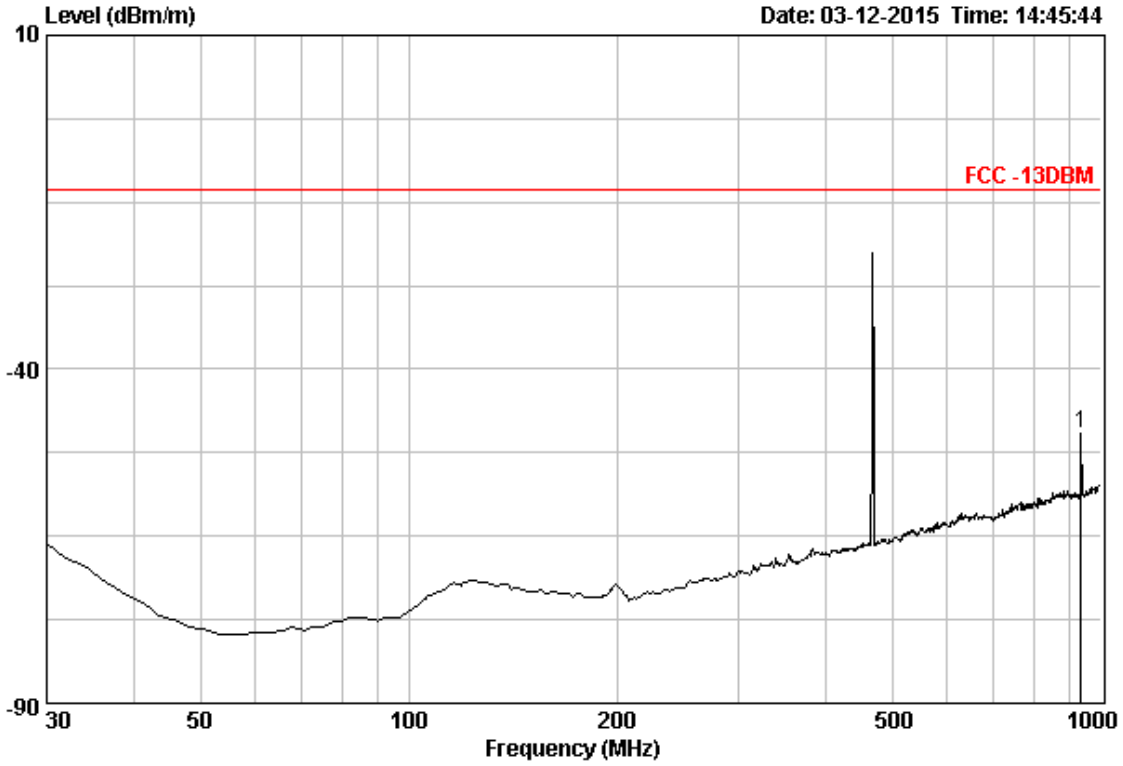
CH11 (467.6375MHz)



Site no. : 3m Chamber
Dis. / Ant. : 3m JB1
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 701
Ant. pol. : HORIZONTAL

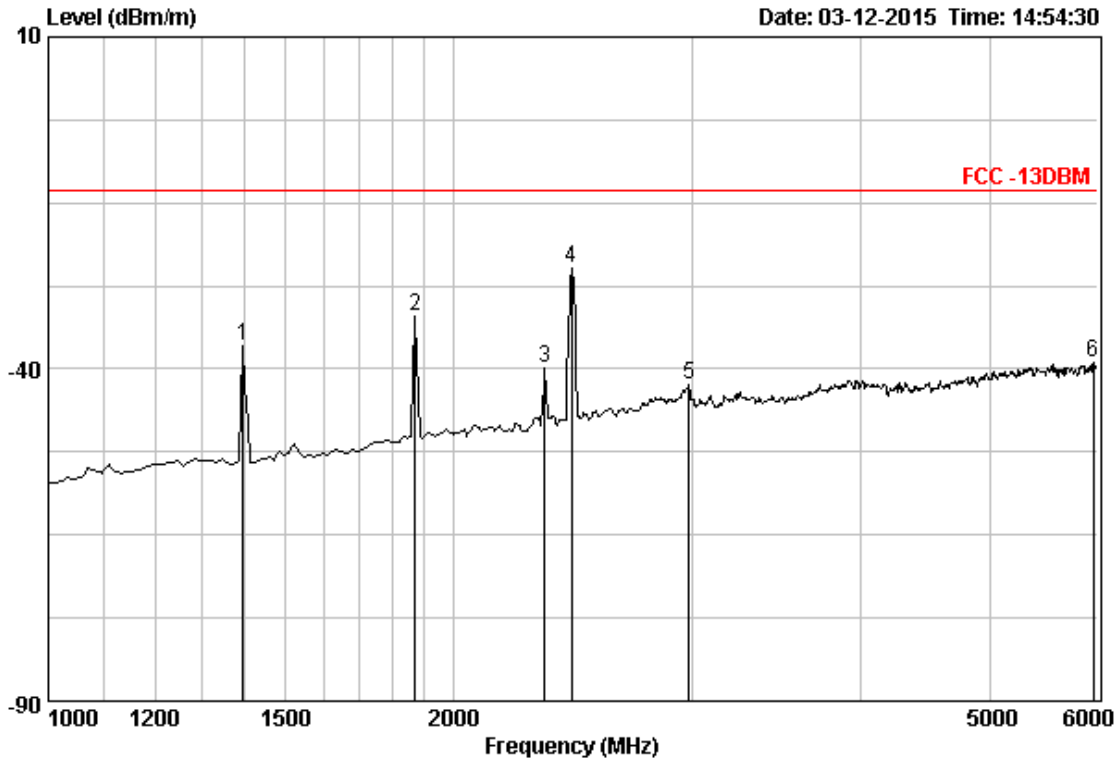
	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	935.98	22.69	3.67	-42.21	-43.97	-13.00	30.97	Peak



Site no. : 3m Chamber
Dis. / Ant. : 3m JB1
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 700
Ant. pol. : VERTICAL

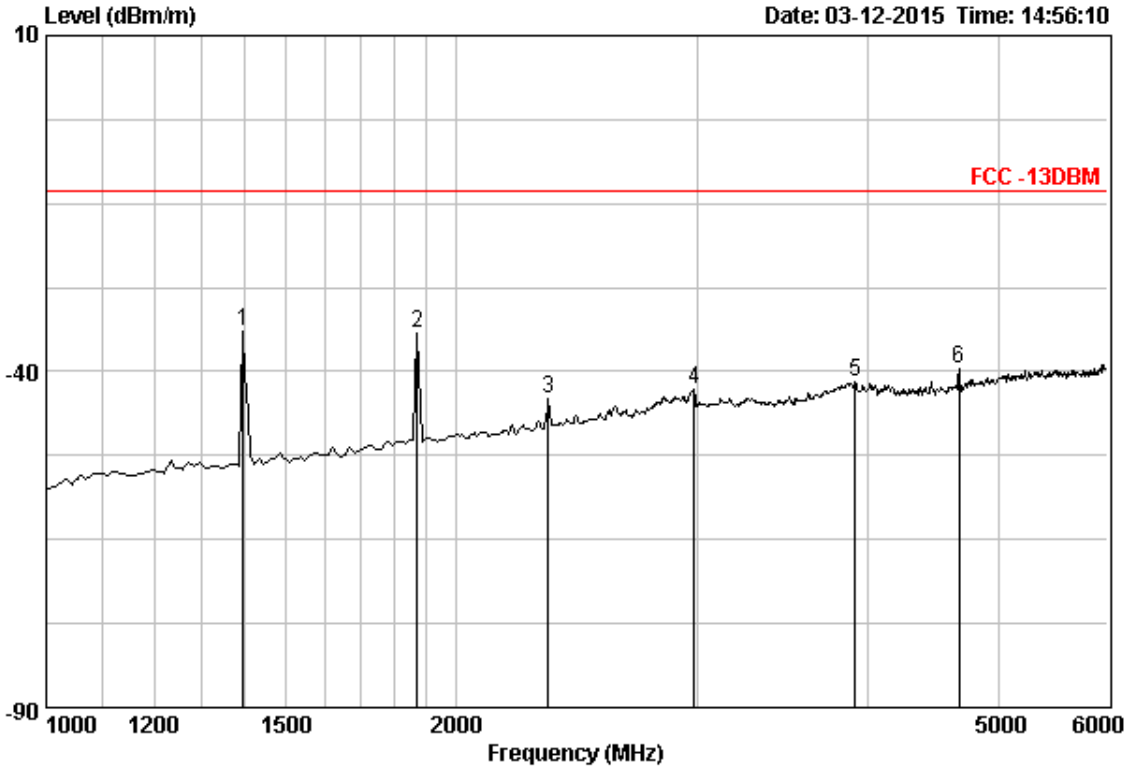
	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	935.98	22.69	3.67	-47.85	-49.61	-13.00	36.61	Peak



Site no. : 3m Chamber
Dis. / Ant. : 3m DRH-118
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

Data no. : 703
Ant. pol. : HORIZONTAL

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	1395.00	25.58	3.64	-29.92	-36.53	-13.00	23.53	Peak
2	1870.00	27.51	4.07	-28.25	-32.06	-13.00	19.06	Peak
3	2335.00	28.47	4.55	-37.65	-39.97	-13.00	26.97	Peak
4	2445.00	28.87	4.66	-23.11	-24.95	-13.00	11.95	Peak
5	2985.00	30.48	5.24	-42.54	-42.31	-13.00	29.31	Peak
6	5960.00	35.02	7.57	-46.96	-38.95	-13.00	25.95	Peak



Site no. : 3m Chamber
Dis. / Ant. : 3m DRH-118
Limit : FCC -13DBM
Env. / Ins. : 23*C/54%
Engineer :
EUT :
Power :
M/N :
Test Mode :

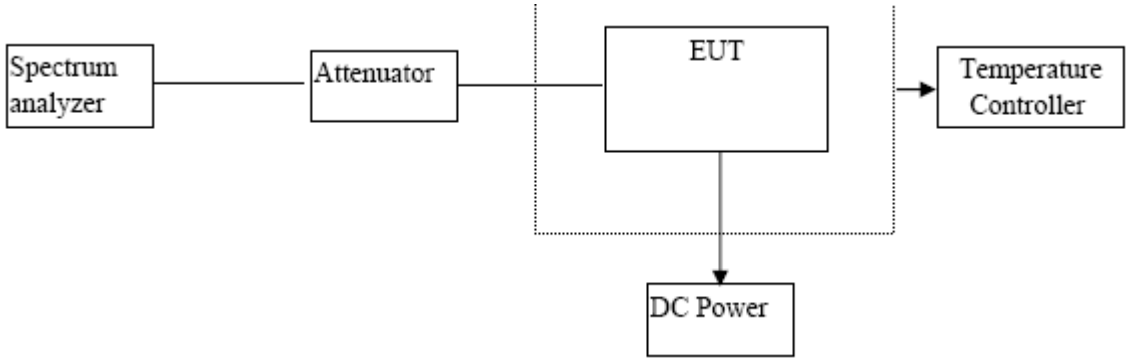
Data no. : 704
Ant. pol. : VERTICAL

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBm)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
1	1395.00	25.58	3.64	-27.33	-33.94	-13.00	20.94	Peak
2	1870.00	27.51	4.07	-30.47	-34.28	-13.00	21.28	Peak
3	2335.00	28.47	4.55	-41.64	-43.96	-13.00	30.96	Peak
4	2985.00	30.48	5.24	-42.76	-42.53	-13.00	29.53	Peak
5	3920.00	33.25	6.31	-46.15	-41.45	-13.00	28.45	Peak
6	4670.00	33.17	6.82	-45.13	-39.56	-13.00	26.56	Peak

Note 1: According explorer test, this configuration have worst emission.
Note 2:Limit= 26.68dBm- (43+10log(Transmit Power)) = -13dBm

4.6. Frequency Stability

4.6.1. Block diagram of test setup



4.6.2. Limits

According to FCC 95.627 (b) Each FRS unit must be maintained within a frequency tolerance of 0.000 25%.

4.6.3. Test Procedure

Frequency stability versus environmental temperature:

(1). Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.

(2). Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.

(3). Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

(4). Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

Frequency stability versus input voltage:

(1). Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 4.5 V

(2). Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.

(3). Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

4.6.4. Test Result

CH4 (462.6375MHz)

Frequency Stability under Temperature

Temperature Interval (℃)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	462.6375	33	± 1156.59375
-20	462.6375	49	± 1156.59375
-10	462.6375	-27	± 1156.59375
0	462.6375	-12	± 1156.59375
10	462.6375	18	± 1156.59375
20	462.6375	-19	± 1156.59375
30	462.6375	-23	± 1156.59375
40	462.6375	33	± 1156.59375
50	462.6375	27	± 1156.59375

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
3.5	462.6375	-28	± 1156.59375
3.7	462.6375	26	± 1156.59375
4.2	462.6375	-33	± 1156.59375

CH11 (467.6375MHz)

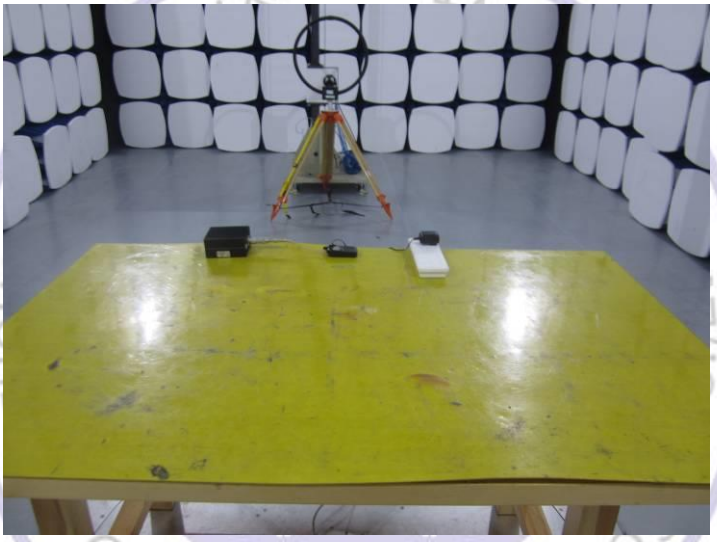
Frequency Stability under Temperature

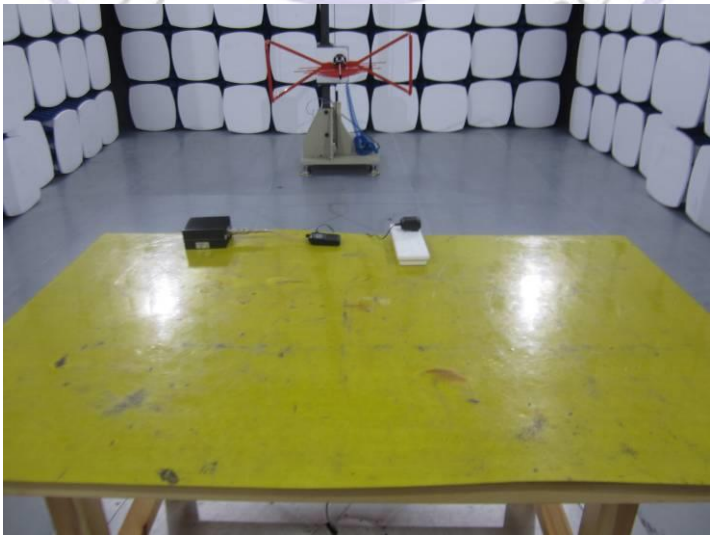
Temperature Interval (℃)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	467.6375	38	± 1169.09375
-20	467.6375	57	± 1169.09375
-10	467.6375	-28	± 1169.09375
0	467.6375	-23	± 1169.09375
10	467.6375	36	± 1169.09375
20	467.6375	-18	± 1169.09375
30	467.6375	-42	± 1169.09375
40	467.6375	31	± 1169.09375
50	467.6375	27	± 1169.09375

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
3.5	467.6375	-28	± 1169.09375
3.7	467.6375	43	± 1169.09375
4.2	467.6375	-31	± 1169.09375

5. Test Setup Photos of the EUT

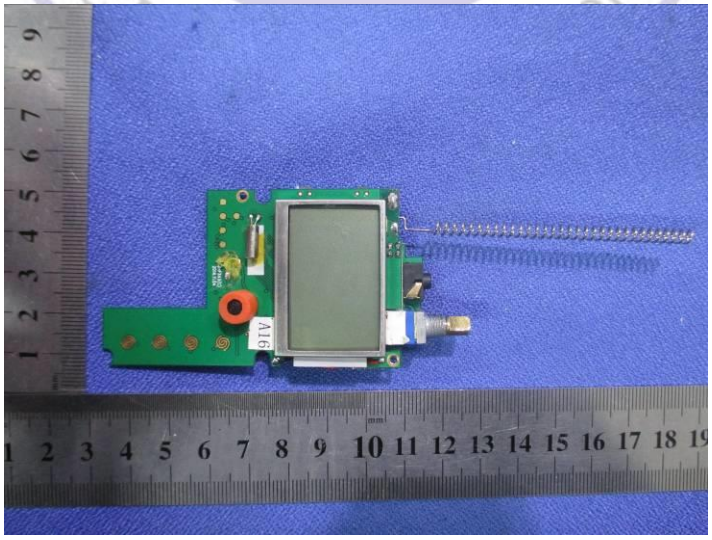


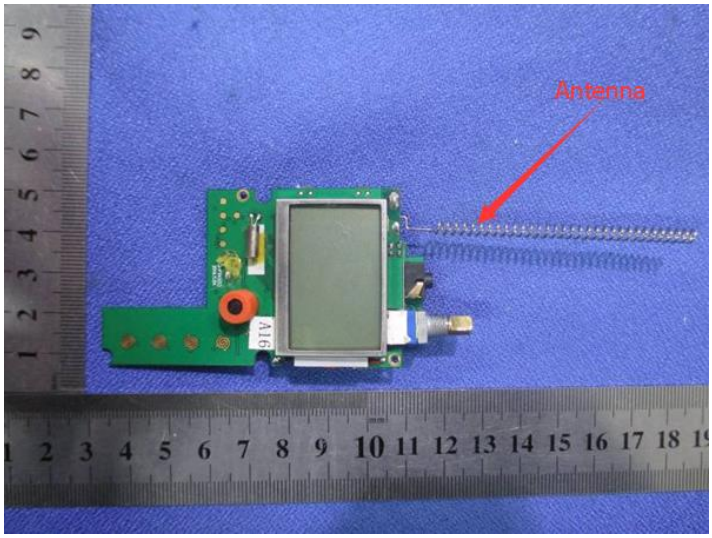


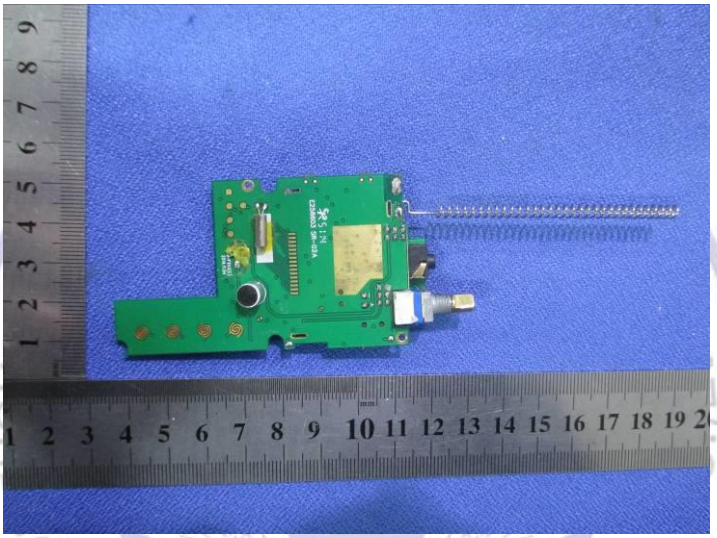
6. External and Internal Photos of the EUT

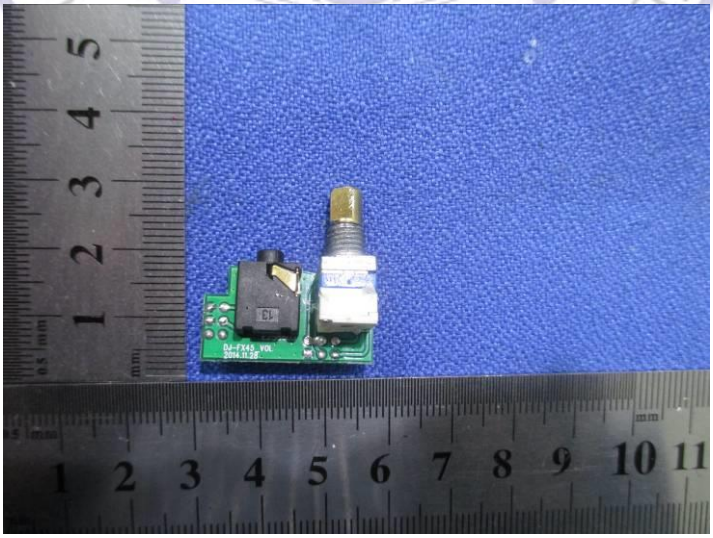
External Photos

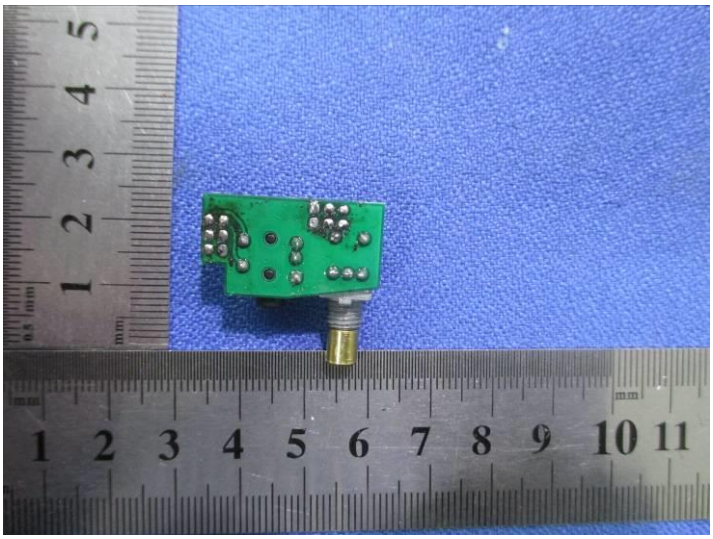
Internal Photos




Antenna







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