Shenzhen CTL Testing Technology Co., Ltd.
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FCC PART 90 Test Report

Report Reference No.....:	**CTL1504240995-WF**
FCC ID.....:	**AUJPXDZPD508**
Compiled by (position+printed name+signature)..:	File administrators Happy Guo
Name of the organization performing the tests (position+printed name+signature)..:	Test Engineer Happy Guo
Approved by (position+printed name+signature)..:	Manager Tracy Qi
Date of issue.....:	May 19, 2015
Testing Laboratory Name .....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address.....:	Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China.
Applicant's name.....:	**Xiamen Puxing Electronics Science & Technology Co., Ltd.**
Address.....:	FL3-4, No.11, Xianghong Road, Xiang'an, Xiamen City, Fujian, China
Test specification:	
Standard .....:	**FCC Part 90: PRIVATE LAND MOBILE RADIO SERVICES**
TRF Originator.....:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF.....:	Dated 2011-01

Test item description ..... :	**DPMR RADIO**
Trade Mark .....:	PUXING
Model/Type reference.....:	PD508
Modulation……..:	FM, 4FSK
Channel Separation.....	FM: 12.5KHz, 4FSK: 6.25KHz
Power Supply……:	DC 7.4V
Rated Power……:	4W
Operating Frequency Range…..……:	From 406.1 MHz to 470 MHz
Result.....:	**Positive**

TEST REPORT

Test Report No. :	CTL1504240995-WF	May 19, 2015 Date of issue

Equipment under Test	:	DPMR RADIO
Model /Type	:	PD508
Applicant	:	**Xiamen Puxing Electronics Science & Technology Co., Ltd.**
Address	:	FL3-4, No.11, Xianghong Road, Xiang'an, Xiamen City, Fujian, China
Manufacture	:	**Xiamen Puxing Electronics Science & Technology Co., Ltd.**
Address	:	FL3-4, No.11, Xianghong Road, Xiang'an, Xiamen City, Fujian, China

Test Result according to the standards on page 5:	**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.

** Modifited History **

Revison	Description	Issued Data	Remark
Revsion 1.0	Initial Test Report Release	2015-05-04	Tracy Qi

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.

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	:	Apr. 30, 2015
Testing commenced on	:	Apr. 30, 2015
Testing concluded on	:	May 19, 2012

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 7.4 V from battery

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

The Xiamen Puxing Electronics Science & Technology Co., Ltd's Model: PD508 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.

Name of EUT	**DPMR RADIO**	
Model Number	PD508	
FCC ID	AUJPXDZPD508	
Rated Output Power	4 Watts(36.02dBm)	
Support data rate	4.8kbps	
Modilation Type	FM for Analog Voice	
	4FSK for Digital Voice/Digital Data	
	4FSK for Digital Data	
	Analog	F3E for 12.5KHz Channel Separation
	Digital	F1E for 6.25KHz Channel Separation
		/
Channel Separation	Analog Voice	12.5KHz
	Digital Voice/Data	6.25KHz
	Digital Data	6.25KHz
Antenna Type	External	
Frequency Range	From 406.1 MHz to 470 MHz	
Maximum Output Power	Analog	4.44 W for 12.5 KHz Channel Separation
	Digital	4.36 W for 12.5 KHz Channel Separation

Note: The product has the same digital working characters when operating in both two digitized voice/data mode (4K00F1E). So only one set of test results for digital modulation modes are provided in this test report.

Test frequency list

Frequency Range (MHz)	Modulation Type	Channel Separation (KHz)	Test Frequency (MHz)
406.1-470	Analog/FM	12.5	406.5000
			435.0000
			469.5000
	Digital/4FSK	6.25	406.5000
			435.5000
			469.5000

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

406.1-470MHz DPMR RADIO (PD508).

For more details, refer to the user's manual of the EUT.

Serial number: Prototype

2.5. EUT operation mode

The EUT has been tested under typical operating condition.

2.6. EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

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

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

This submittal(s) (test report) is intended for FCC ID: AUJPXDZPD508 filing to comply with the FCC Part 90 Rules.

2.8. Modifications

No modifications were implemented to meet testing criteria.

2.9. Note

The EUT is is a U frequency band (406.1-470MHz) Two-way Radio, The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio	FCC Part 90	CTL1504240995-WF
SAR	ANSI C95.1–1999 47CFR §2.1093	CTL1504240995-EMF

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

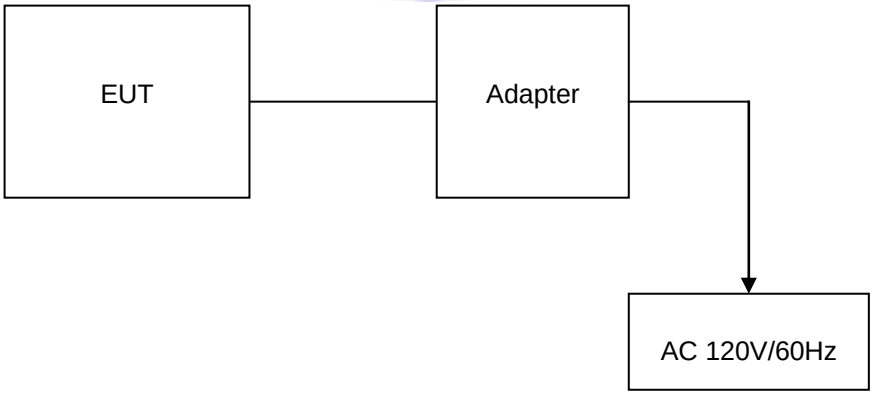


Table 2-1 Equipment Used in Tested System

Adapter: Model: 508-S
Input:100-240V～50/60Hz
Output: +8.4V DC 400~450mA
Power Cable: 160cm
◇ Shielded ◆ Unshielded

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 Testing 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 Shenzhen CTL Testing Technology Co., Ltd. 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

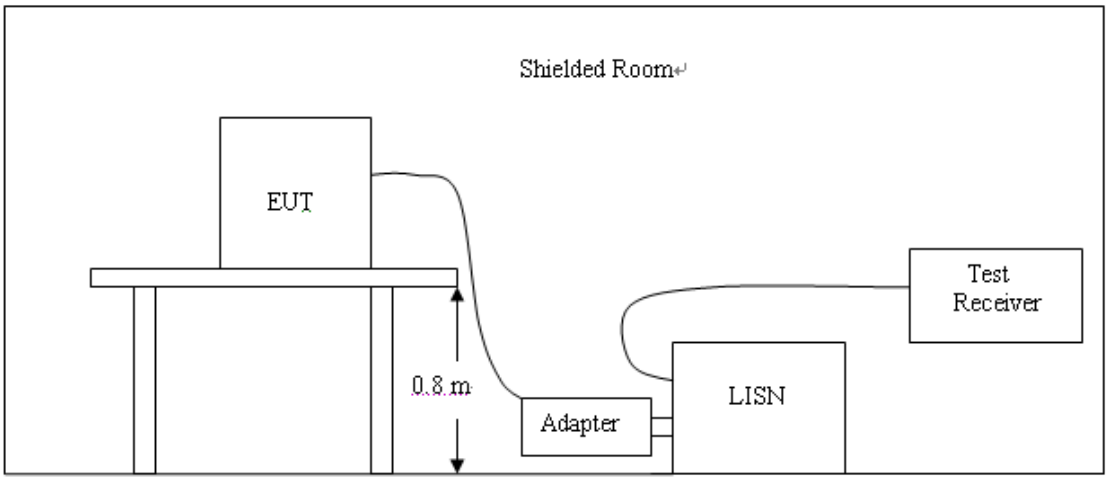
3.7. General Technical Requirements and Summary of Test Results

FCC Rules	Description of Test	Test Result
§ 90.205	Maximum Transmitter Power	Complies
§ 90.207	Modulation Characteristic	Complies
§ 90.209	Occupied Bandwidth	Complies
§ 90.210	Emission Mask	Complies
§ 90.213	Frequency Stability	Complies
§ 90.214	Transmitter Frequency Behavior	Complies
§ 90.210	Transmitter Radiated Spurious Emission	Complies
§ 90.210	Spurious Emission On Antenna Port	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

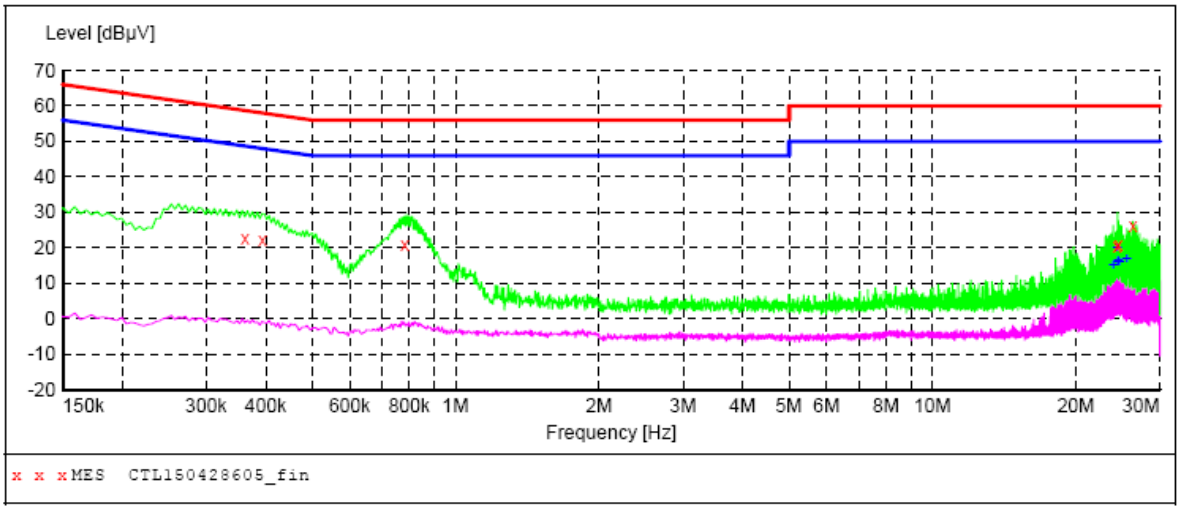
For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

TEST RESULTS

For FM Modulation @ 12.5 KHz

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150428605_fin"

4/30/2015 4:10PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.362000	22.50	10.2	59	36.2	QP	N	GND
0.394000	22.00	10.2	58	36.0	QP	N	GND
0.782000	20.70	10.2	56	35.3	QP	N	GND
24.428000	20.50	11.1	60	39.5	QP	N	GND
24.548000	20.70	11.1	60	39.3	QP	N	GND
26.354000	26.30	11.2	60	33.7	QP	N	GND

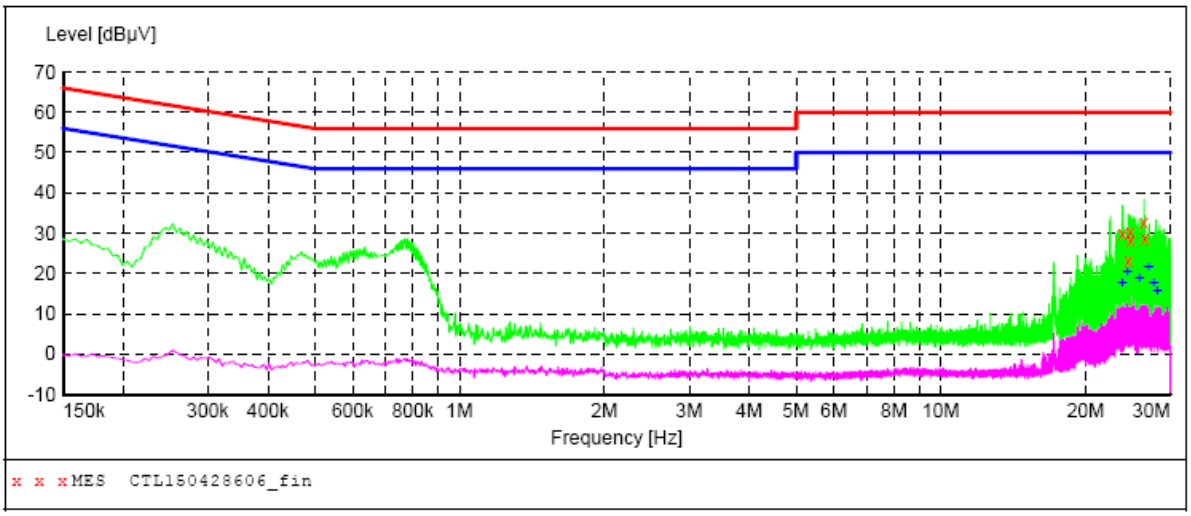
MEASUREMENT RESULT: "CTL150428605_fin2"

4/30/2015 4:10PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
23.948000	15.10	11.1	50	34.9	AV	N	GND
24.428000	19.70	11.1	50	30.3	AV	N	GND
24.488000	15.80	11.1	50	34.2	AV	N	GND
24.548000	16.40	11.1	50	33.6	AV	N	GND
24.668000	15.80	11.1	50	34.2	AV	N	GND
25.568000	16.90	11.1	50	33.1	AV	N	GND

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150428606_fin"

4/30/2015 4:13PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
23.822000	30.00	11.1	60	30.0	QP	L1	GND
24.494000	23.30	11.1	60	36.7	QP	L1	GND
24.728000	30.30	11.1	60	29.7	QP	L1	GND
24.788000	28.40	11.1	60	31.6	QP	L1	GND
26.414000	32.50	11.2	60	27.5	QP	L1	GND
26.534000	28.50	11.2	60	31.5	QP	L1	GND

MEASUREMENT RESULT: "CTL150428606_fin2"

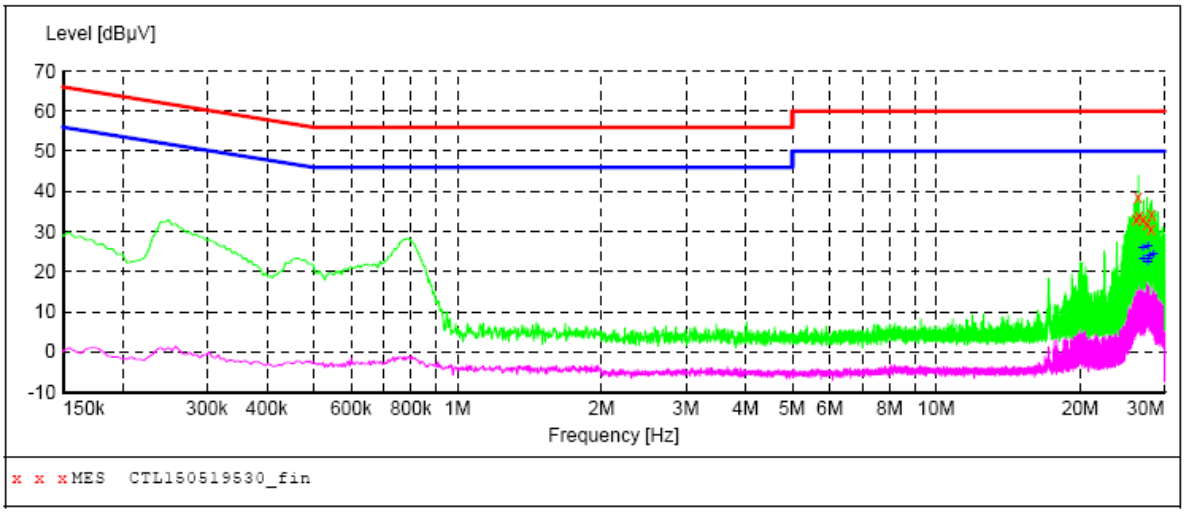
4/30/2015 4:13PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
23.828000	17.70	11.1	50	32.3	AV	L1	GND
24.428000	20.20	11.1	50	29.8	AV	L1	GND
25.868000	18.70	11.1	50	31.3	AV	L1	GND
27.014000	21.70	11.2	50	28.3	AV	L1	GND
27.674000	17.50	11.2	50	32.5	AV	L1	GND
28.160000	15.60	11.2	50	34.4	AV	L1	GND

For 4FSK Modulation @ 6.25 KHz

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150519530_fin"

5/19/2015 10:01AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
26.169000	32.90	11.2	60	27.1	QP	L1	GND
26.412000	38.40	11.2	60	21.6	QP	L1	GND
26.533500	34.00	11.2	60	26.0	QP	L1	GND
27.073500	33.20	11.2	60	26.8	QP	L1	GND
27.555000	31.80	11.2	60	28.2	QP	L1	GND
28.099500	30.50	11.2	60	29.5	QP	L1	GND

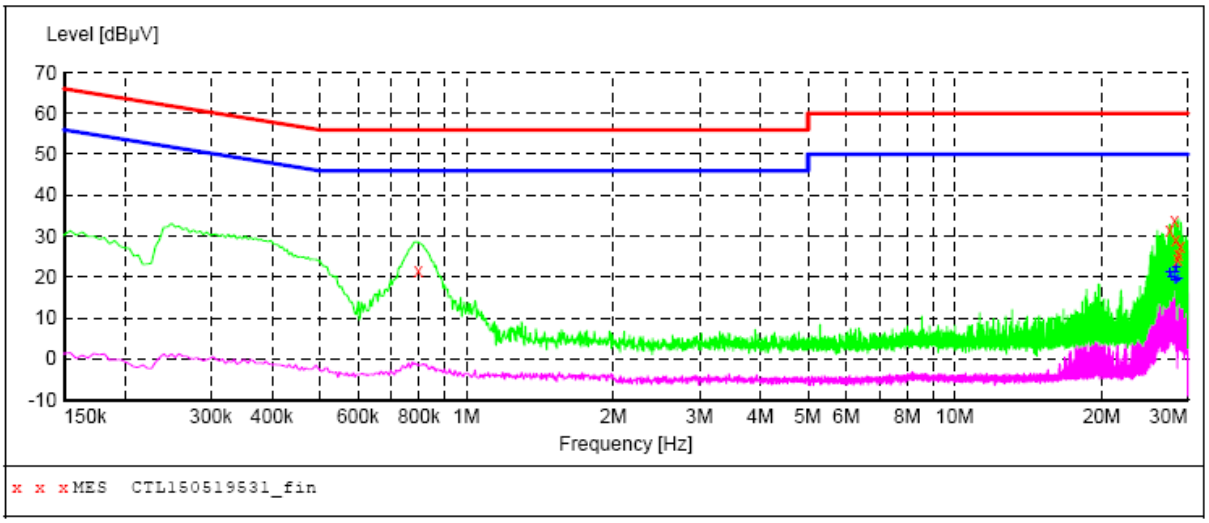
MEASUREMENT RESULT: "CTL150519530_fin2"

5/19/2015 10:01AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
27.015000	26.00	11.2	50	24.0	AV	L1	GND
27.073500	23.30	11.2	50	26.7	AV	L1	GND
27.618000	22.20	11.2	50	27.8	AV	L1	GND
27.676500	26.10	11.2	50	23.9	AV	L1	GND
27.735000	23.20	11.2	50	26.8	AV	L1	GND
27.915000	23.90	11.2	50	26.1	AV	L1	GND

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150519531_fin"

5/19/2015 10:06AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.798000	21.60	10.2	56	34.4	QP	N	GND
27.555000	31.40	11.2	60	28.6	QP	N	GND
28.158000	33.70	11.2	60	26.3	QP	N	GND
28.338000	29.10	11.2	60	30.9	QP	N	GND
28.635000	24.40	11.2	60	35.6	QP	N	GND
28.698000	25.30	11.2	60	34.7	QP	N	GND

MEASUREMENT RESULT: "CTL150519531_fin2"

5/19/2015 10:06AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
27.555000	21.00	11.2	50	29.0	AV	N	GND
27.798000	19.80	11.2	50	30.2	AV	N	GND
28.216500	21.20	11.2	50	28.8	AV	N	GND
28.275000	19.10	11.2	50	30.9	AV	N	GND
28.338000	19.30	11.2	50	30.7	AV	N	GND
28.396500	22.30	11.2	50	27.7	AV	N	GND

4.2. Occupied Bandwidth and Emission Mask

PROVISIONS APPLICABLE

(a). Occupied Bandwidth: The EUT was connected to the audio signal generator and the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer.

(b). Emission Mask B: For transmitters that are equipped with an audio low-pass filter pursuant to §90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not 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 not 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 + 10 log (P) dB.

(c). Emission Mask D, 12.5 kHz channel bandwidth equipment: For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd -2.88 kHz) dB.

(3) 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 (P) dB or 70 dB, whichever is the lesser attenuation.

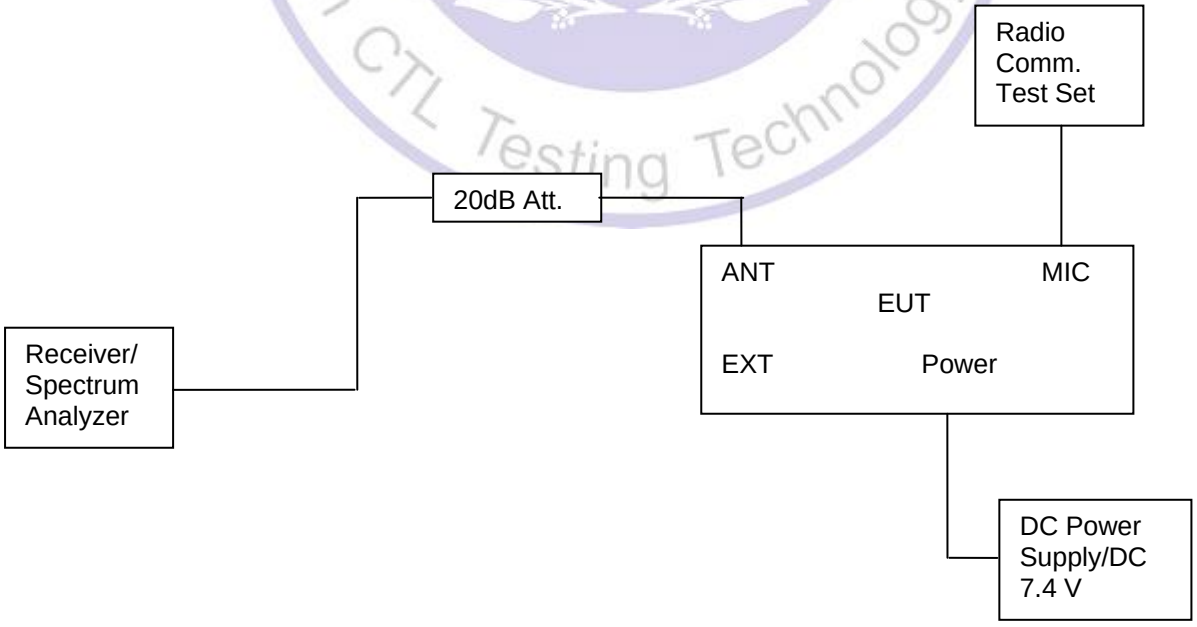
(d). Emission Mask E—6.25 kHz or less channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emis-sion must be attenuated below the power (P) of the highest emission con-tained within the authorized band-width as follows:

(1) On any frequency from the center of the authorized bandwidth f0to 3.0 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fdin kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least 30 + 16.67(fd¥3 kHz) or 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.

(3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least 55 + 10log (P) or 65 dB, whichever is the lesser attenuation.

TEST CONFIGURATION



TEST PROCEDURE

1 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)
2 Set EUT as normal operation.
3 Set SPA Center Frequency = fundamental frequency, RBW=300Hz, VBW= 3 KHz, span =50 KHz.
4 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.
6 Set SPA Center Frequency=fundamental frequency, set =100Hz, VBW=1 KHz, span=50 KHz for 12.5 channel spacing and set =100Hz, VBW=1 KHz, span=50 KHz for 6.25 channel spacing

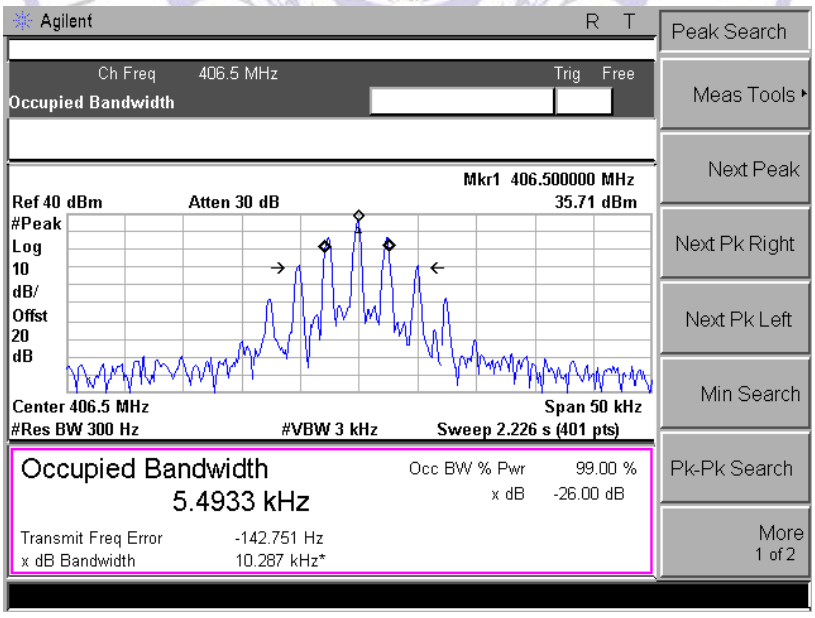
TEST RESULTS:

4.2.1 Occupied Bandwidth

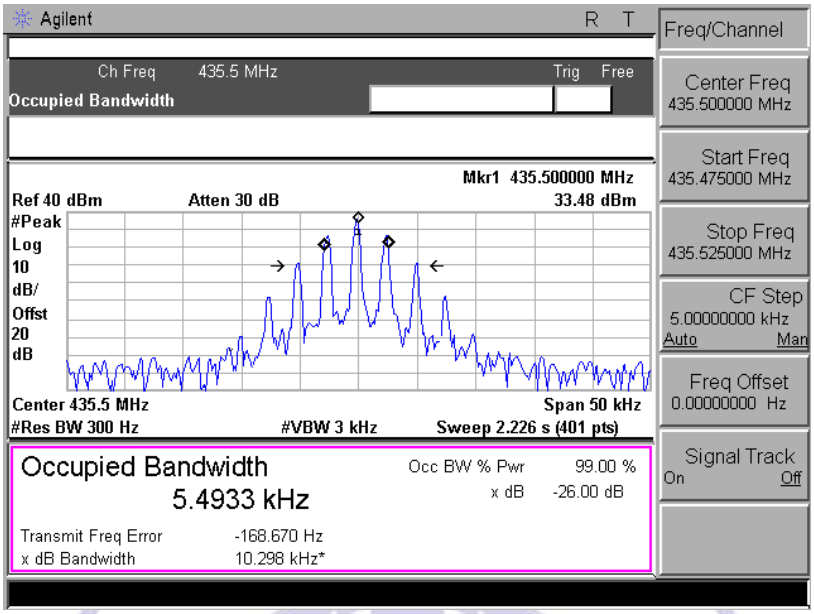
Modulation Type	Channel Separation	Test Channel	Test Frequency	99% Occupied Bandwidth	26dB Occupied Band width
FM	12.5KHz	Low	406.5000 MHz	5.4933 KHz	10.287 KHz
		Middle	435.5000 MHz	5.4933 KHz	10.298 KHz
		High	469.5000 MHz	5.5462 KHz	10.298 KHz
4FSK	6.25KHz	Low	406.5000 MHz	3.9647 KHz	4.435 KHz
		Middle	435.5000 MHz	2.9479 KHz	3.959 KHz
		High	469.5000 MHz	3.4299 KHz	3.955 KHz
Limit		11.25KHz for 12.5KHz Channel Separation			
		6.00KHz for 6.25KHz Channel Separation			
Test Results		Compliance			

Plots of 99% and 26dB Bandwidth Measurement

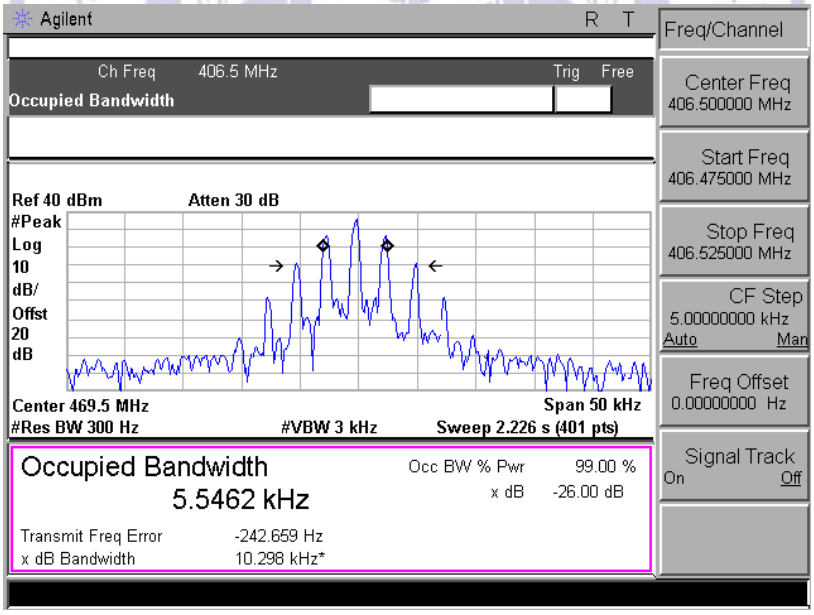
Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
FM	12.5 KHz	406.5000	5.4933	10.287	11.25	Compliance



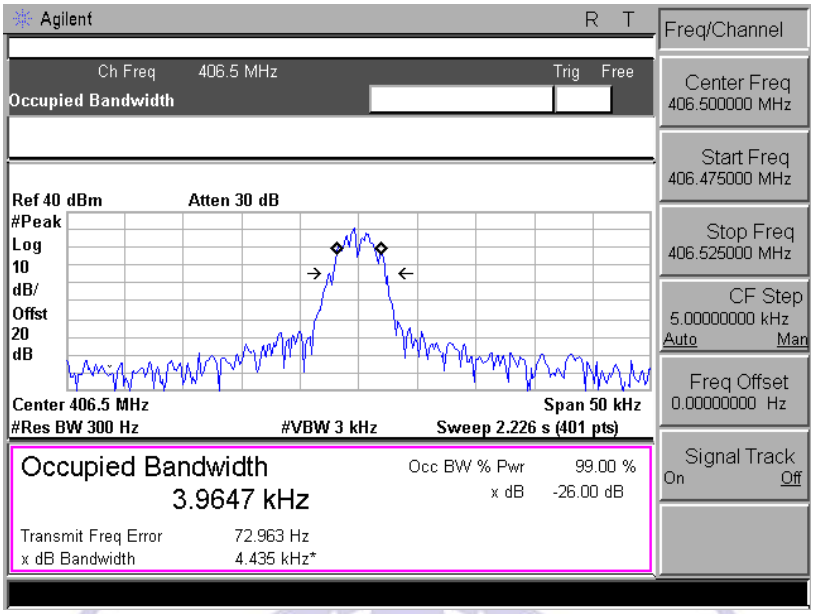
Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
FM	12.5 KHz	435.5000	5.4933	10.298	11.25	Compliance



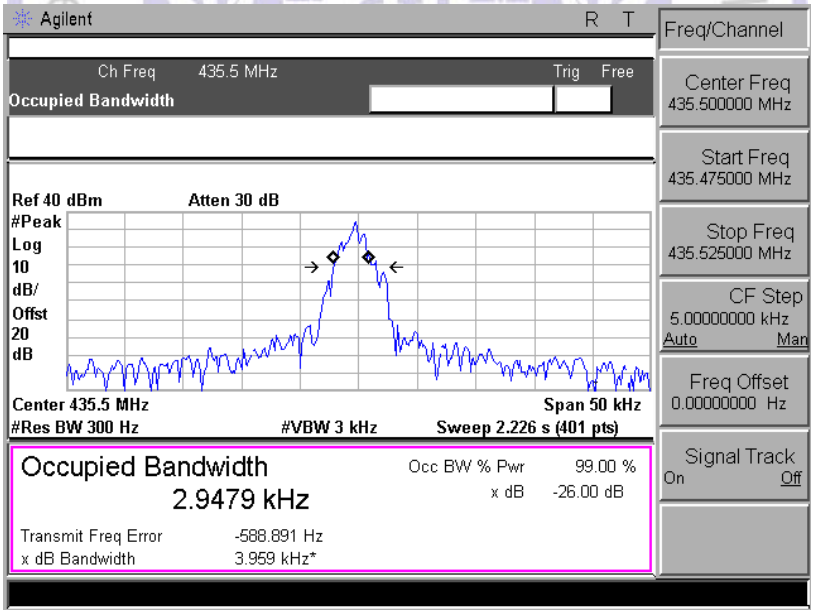
Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
FM	12.5 KHz	469.5000	5.5462	10.298	11.25	Compliance



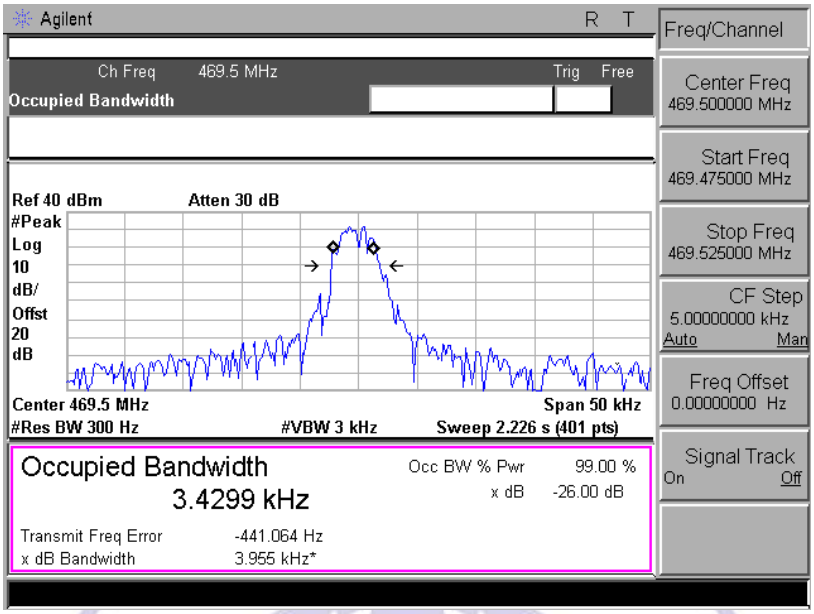
Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
4FSK	6.25 KHz	406.5000	3.9647	4.435	6.00	Compliance



Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
4FSK	6.25 KHz	435.5000	2.9479	3.959	6.000	Compliance



Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
4FSK	6.25 KHz	469.5000	3.4299	3.955	6.000	Compliance

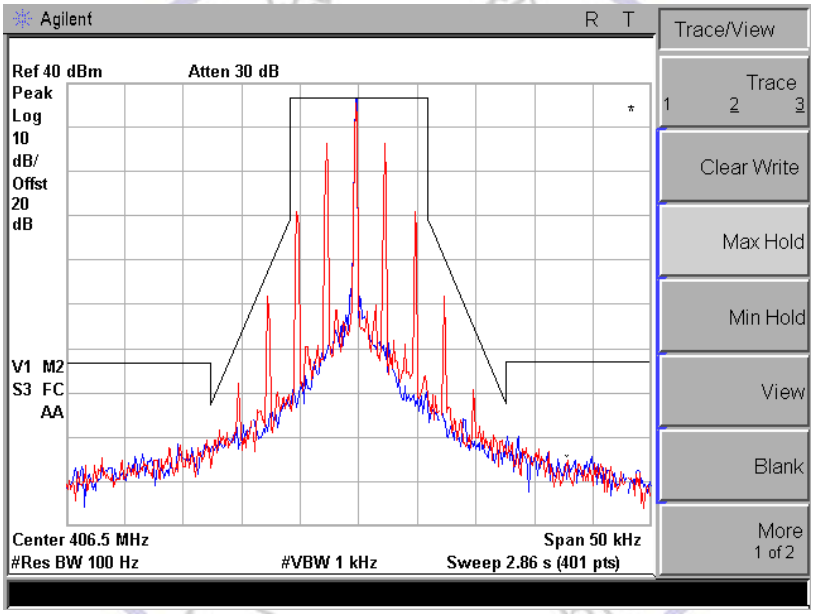


4.2.2 Emission Mask

Modulation Type	Channel Separation	Test Channel	Test Frequency	FCC Applicable Mask	RBW
FM	12.5KHz	Low	406.5000 MHz	D	100 Hz
		Middle	435.5000 MHz	D	100 Hz
		High	469.5000 MHz	D	100 Hz
4FSK	6.25KHz	Low	406.5000 MHz	E	100 Hz
		Middle	435.5000 MHz	E	100 Hz
		High	469.5000 MHz	E	100 Hz
Test Results		Compliance			

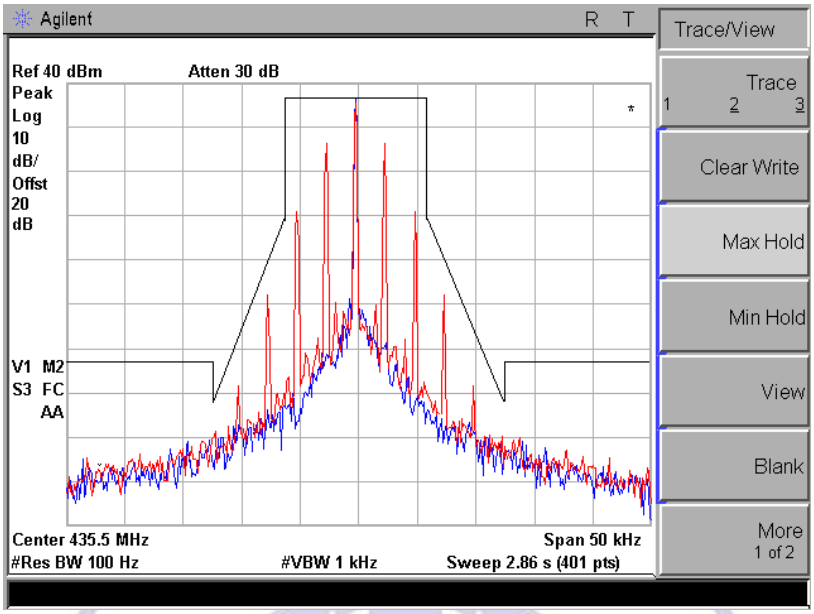
Referred as the attached plot hereinafter
Note: The blue curve represents unmodulated signal.
The red curve represents modulated signal.

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	12.5 KHz	406.5000	D	100Hz	2.5	Compliance



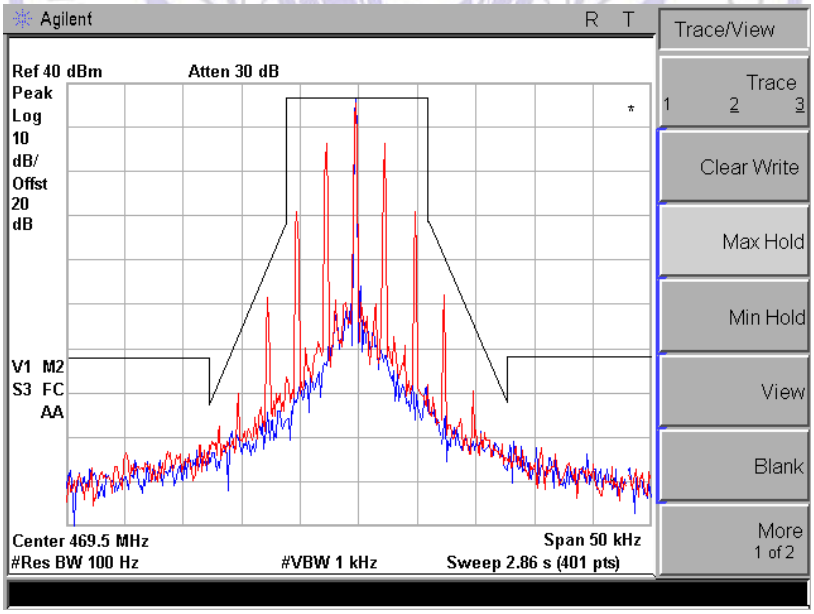
12.5 kHz Channel Spacing, 406.5000 MHz, 2500 Hz Audio Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	12.5 KHz	435.5000	D	100Hz	2.5	Compliance



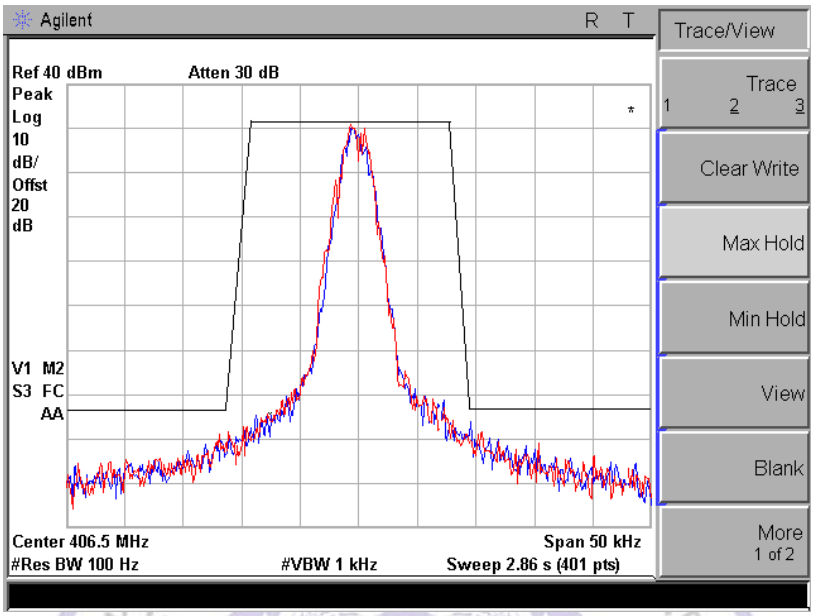
12.5 kHz Channel Spacing, 435.5000 MHz, 2500 Hz Audio Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	12.5 KHz	469.5000	D	100Hz	2.5	Compliance



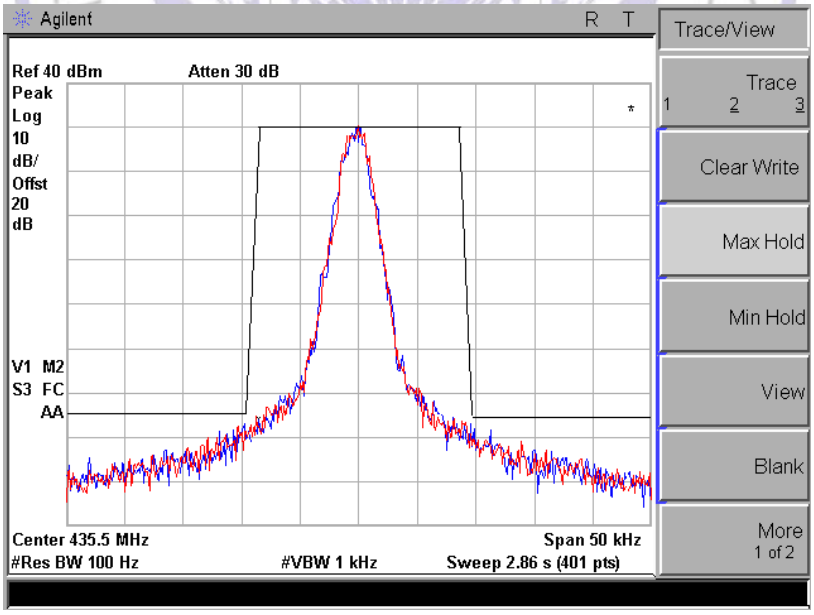
12.5 kHz Channel Spacing, 469.5000 MHz, 2500 Hz Audio Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
4FSK	6.25 KHz	406.5000	E	100Hz	/	Compliance



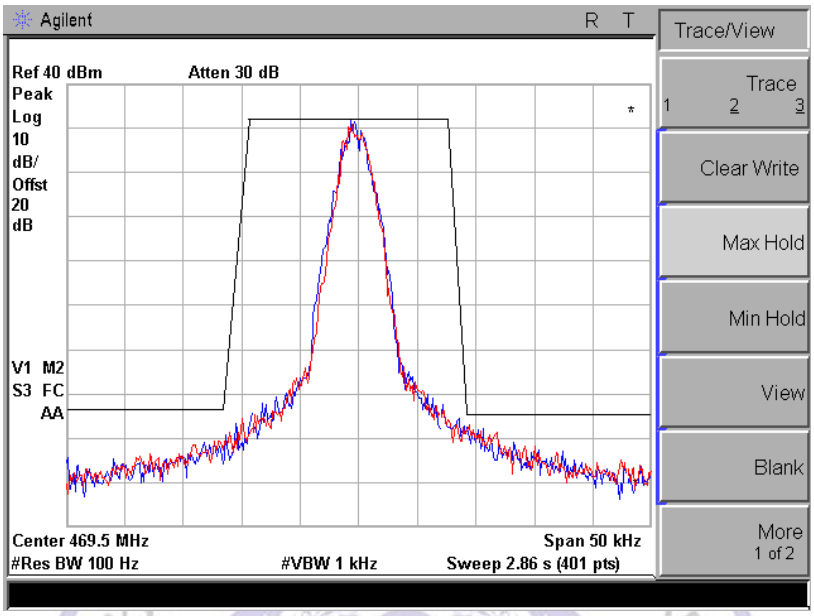
6.25 kHz Channel Spacing, 406.5000 MHz, 4FSK Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
4FSK	6.25 KHz	435.5000	E	100Hz	/	Compliance



6.25 kHz Channel Spacing, 435.5000 MHz, 4FSK Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
4FSK	6.25 KHz	469.5000	E	100Hz	/	Compliance



6.25 kHz Channel Spacing, 469.5000 MHz, 4FSK Modulation Only

4.3. Radiated Spurious Emission Test

TEST APPLICABLE

According to the TIA/EIA 603 test method, and 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:

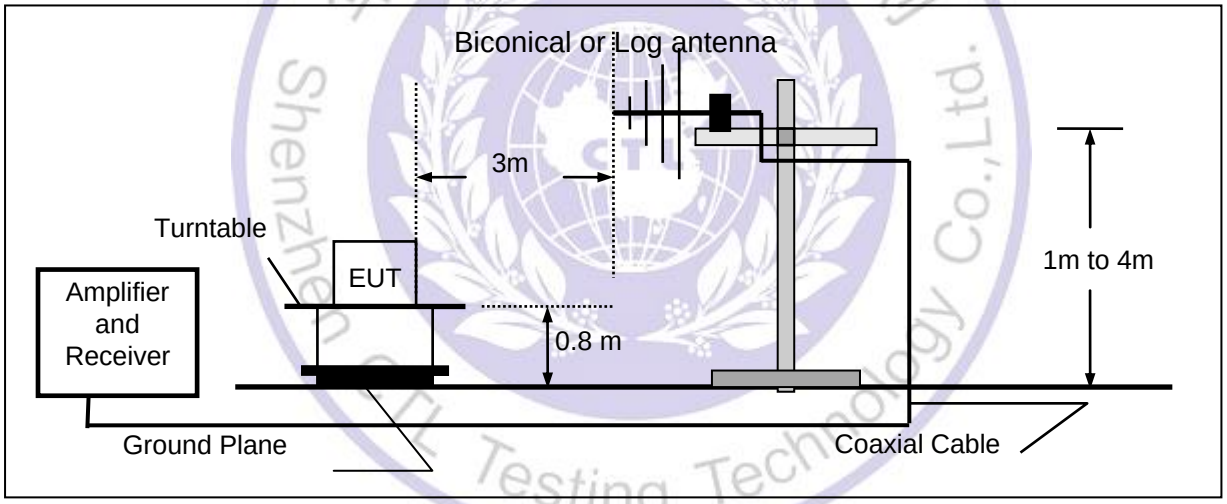
1 On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB
2 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27dB
3 On any 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.

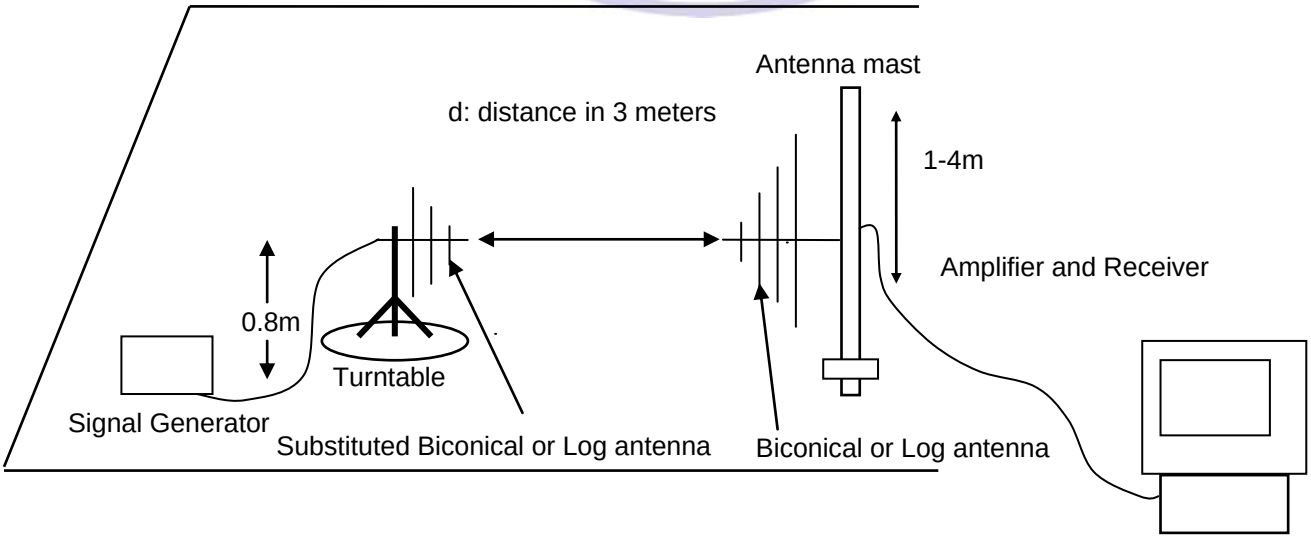
For transmitters designed to transmit with 6.25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

1 On any frequency from the center of the authorized bandwidth f0 to 3.0 kHz removed from f0: Zero dB.
2 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least 30 + 16.67(fd−3 kHz) or 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.
3 On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.

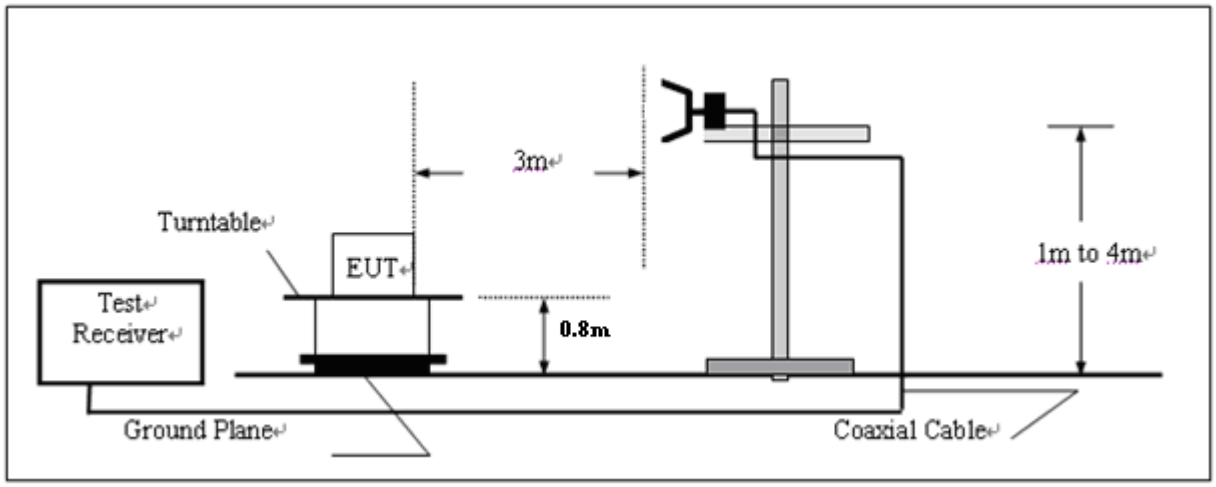
TEST CONFIGURATION

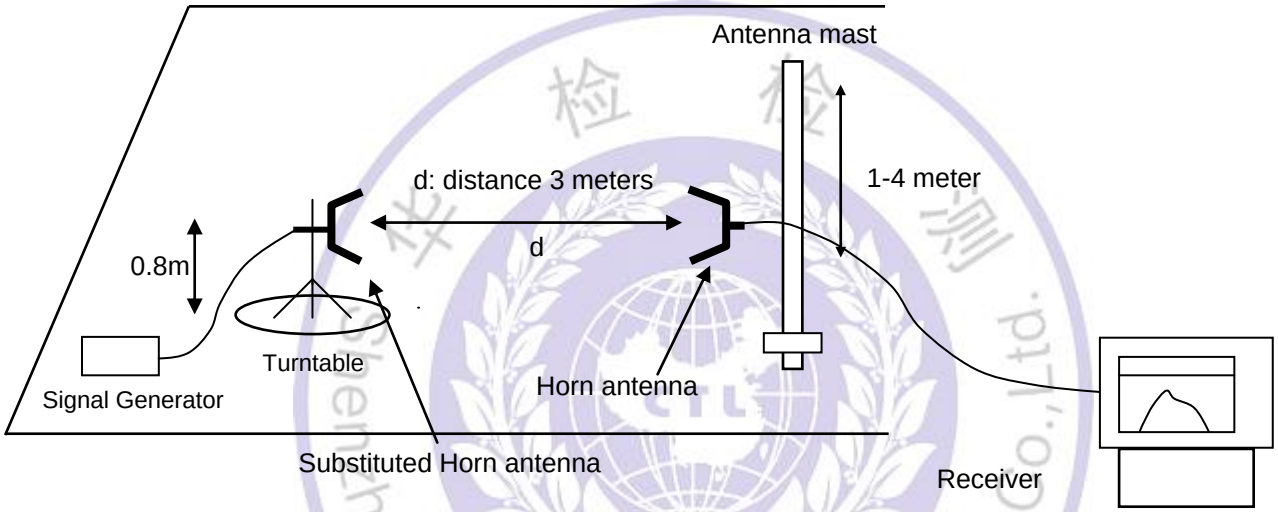
Below 1GHz





Above 1GHz





TEST PROCEDURE

1 Set the EMI Receiver (for measuring E-Field) and Receiver (for measuring EIRP) as follows:
Center Frequency: equal to the signal source
Resolution BW: 100 KHz
Video BW: VBW > RBW
Detector Mode: positive
Average: off
Span: 3 x the signal bandwidth

2 Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor+Amplifier Gain
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB)

3 The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)

4 Substitute the EUT by a signal generator and one of the following transmitting antenna (substitution antenna):
DIPOLE antenna for frequency from 30-1000 MHz or
HORN antenna for frequency above 1 GHz}.

5 Mount the transmitting antenna at 1.0 meter high from the ground plane.

6 Use one of the following antenna as a receiving antenna:
DIPOLE antenna for frequency from 30-1000 MHz or
HORN antenna for frequency above 1 GHz}.

7 If the DIPOLE antenna is used, tune it's elements to the frequency as specified in the calibration manual.

8 Adjust both transmitting and receiving antenna in a VERTICAL polarization.

9 Tune the EMI Receivers to the test frequency.

10 Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.

11 The transmitter was rotated through 360^{o} about a vertical axis until a higher maximum signal was received.

12 Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.

13 Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.
14 Record the power level read from the Average Power Meter and calculate the ERP/EIRP as follows:
$P = P_1 - L_1 = (P_2 + L_2) – L_1 = P_3 + A + L_2 - L_1$
$EIRP = P + G1 = P_3 + L_2 - L_1 + A + G_1$
$ERP = EIRP – 2.15$ dB
Total Correction factor in EMI Receiver = $L_2 – L_1 + G_1$
Where:
P: Actual RF Power fed into the substitution antenna port after corrected.
P_1: Power output from the signal generator
P_2: Power measured at attenuator A input
P_3: Power reading on the Average Power Meter
EIRP: EIRP after correction
ERP: ERP after correction
15 Adjust both transmitting and receiving antenna in a Horizontal polarization, then repeat step (11) to (14).
16 Repeat step (4) to (16) for different test frequency
17 Repeat steps (3) to (12) with the substitution antenna oriented in horizontal polarization.
18 Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.

TEST RESULTS

Modulation Type: FM

FCC Part 22.359, 74.462, 80.211 and 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 (4.27) =56.30 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (4.44) =56.47 dB
Note: In general, the worse case attenuation requirement shown above was applied.
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 36.02 dBm.
Limit (dBm) =36.02-50-10log10 (4.44) = -20 dBm

Modulation Type: 4FSK

FCC Part 22.359, 74.462, 80.211 and 90.210 (6.25 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 4.6 kHz at least:
Low: 55 + 10 log (Pwatts) = 55 + 10 log (4.25) =61.28 dB
High: 55 + 10 log (Pwatts) = 55 + 10 log (4.36) =61.39 dB
Note: In general, the worse case attenuation requirement shown above was applied.
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 36.02 dBm.
Limit (dBm) =36.02-55-10log10 (4.26) = -25 dBm

Note: 1. In general, the worse case attenuation requirement shown above was applied.
2. The measurement frequency range from 30 MHz to 5 GHz.
3. ******* means that the emission level is too low to be measured or at least 20 dB down than the limit.

Modulation		FM		Channel Separation		12.5KHz		
Test Channel		Low Channel		Test Frequency		406.5000 MHz		
Frequency (MHz)	E-Field Level (dBuv/m)	EMI Detector (Peak/QP)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
813.000	60.23	Peak	H	300	234	-35.57	-20	15.50
2439.000	62.70	Peak	H	100	175	-34.08	-20	14.38
4878.000	68.55	Peak	H	200	301	-27.11	-20	8.11
…			H					
813.000	55.13	Peak	V	100	342	-40.93	-20	20.90
2439.000	64.76	Peak	V	100	106	-31.68	-20	12.63
4878.000	66.08	Peak	V	100	89	-29.90	-20	9.95
…	…							

Modulation		FM		Channel Separation		12.5KHz		
Test Channel		Middle Channel		Test Frequency		435.5000 MHz		
Frequency (MHz)	E-Field Level (dBuv/m)	EMI Detector (Peak/QP)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
871.000	60.13	Peak	H	100	351	-35.90	-20	15.98
1742.500	56.37	Peak	H	200	356	-39.12	-20	20.12
3484.500	58.36	Peak	H	200	227	-37.81	-20	17.87
…			H					
871.000	58.59	Peak	V	100	98	-37.47	-20	17.96
1742.500	59.61	Peak	V	100	304	-36.36	-20	16.33
3484.500	61.76	Peak	V	200	127	-34.69	-20	14.82
…	…							

Modulation		FM		Channel Separation		12.5KHz		
Test Channel		High Channel		Test Frequency		469.5000 MHz		
Frequency (MHz)	E-Field Level (dBuv/m)	EMI Detector (Peak/QP)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
939.000	56.62	Peak	H	400	195	-39.47	-20	19.98
1878.000	65.39	Peak	H	100	208	-30.01	-20	10.82
3756.000	69.07	Peak	H	100	79	-26.16	-20	7.11
…			H					
939.000	53.15	Peak	V	100	334	-42.06	-20	23.06
1878.000	68.28	Peak	V	100	147	-28.41	-20	8.42
3756.000	70.07	Peak	V	100	128	-25.92	-20	6.52
…	…		V					

Modulation		4FSK		Channel Separation		6.25KHz		
Test Channel		Low Channel		Test Frequency		406.5000 MHz		
Frequency (MHz)	E-Field Level (dBuv/m)	EMI Detector (Peak/QP)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
813.000	60.49	Peak	H	300	281	-35.91	-25	10.99
2439.000	62.52	Peak	H	200	37	-34.05	-25	9.23
4878.000	68.01	Peak	H	200	176	-28.17	-25	3.17
…	…		H					
813.000	55.36	Peak	V	100	345	-40.43	-25	15.59
2439.000	64.47	Peak	V	200	94	-32.14	-25	7.64
4878.000	67.48	Peak	V	100	123	-28.09	-25	3.96
…	…		V					

Modulation		4FSK		Channel Separation		6.25KHz		
Test Channel		Middle Channel		Test Frequency		435.5000 MHz		
Frequency (MHz)	E-Field Level (dBuv/m)	EMI Detector (Peak/QP)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
871.000	60.89	Peak	H	200	305	-35.15	-25	10.18
1742.500	59.06	Peak	H	100	156	-37.26	-25	12.28
3484.500	60.04	Peak	H	200	99	-36.97	-25	11.96
…	…		H					
871.000	58.38	Peak	V	100	40	-38.82	-25	13.02
1742.500	62.21	Peak	V	100	299	-34.59	-25	9.06
3484.500	59.46	Peak	V	100	147	-37.16	-25	12.10
…	…		V					

Modulation		4FSK		Channel Separation		6.25KHz		
Test Channel		High Channel		Test Frequency		469.5000 MHz		
Frequency (MHz)	E-Field Level (dBuv/m)	EMI Detector (Peak/QP)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
939.000	55.93	Peak	H	100	302	-40.38	-25	15.46
1878.000	65.28	Peak	H	200	78	-30.57	-25	5.68
3756.000	67.46	Peak	H	200	149	-28.91	-25	3.96
…	…		H					
939.000	53.41	Peak	V	100	274	-42.06	-25	17.47
1878.000	67.52	Peak	V	200	105	-29.48	-25	4.32
3756.000	69.07	Peak	V	100	43	-27.08	-25	2.36
…	…		V					

4.4. Spurious Emission On Antenna Port

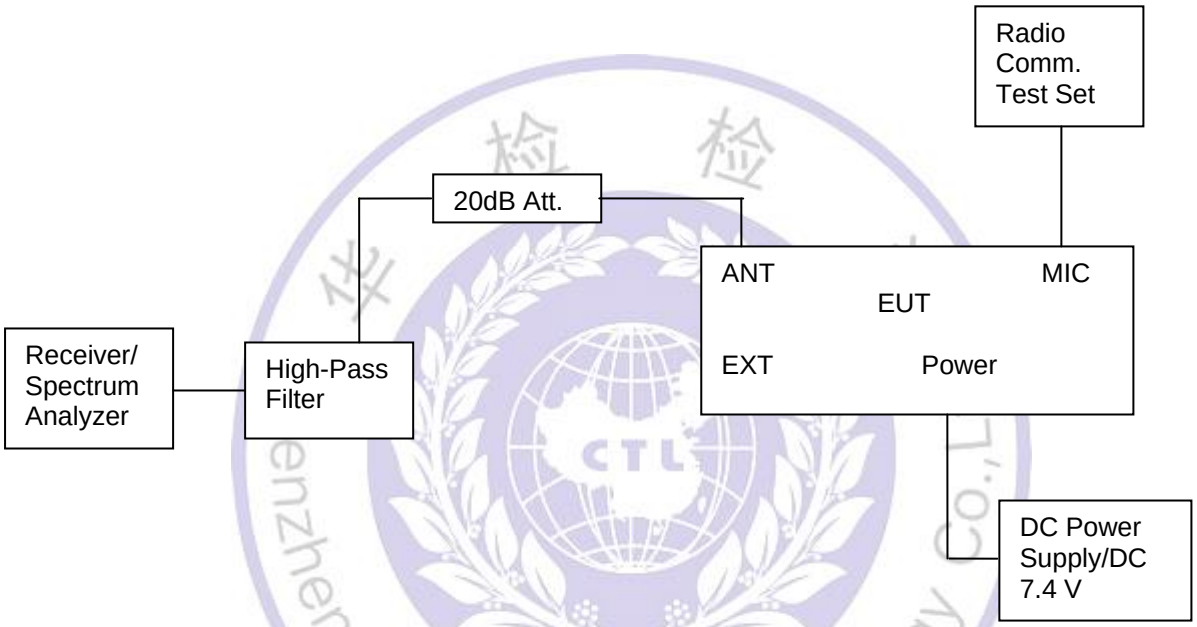
TEST APPLICABLE

The same as Section 4.3

TEST 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. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz.VBW=3MHz from the 1GHz to 10^{th} Harmonic.
The audio input was set to 0 to get the unmodulated carrier, the resulting picture is print out for each channel separation.

TEST CONFIGURATION



TEST RESULTS:

Modulation Type: FM

FCC Part 22.359, 74.462, 80.211 and 90.210 and (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 (4.27) =56.30 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (4.44) =56.47 dB
Note: In general, the worse case attenuation requirement shown above was applied.
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 36.02 dBm.
Limit (dBm) =36.02-50-10log10 (4.44) = -20 dBm

Modulation Type: 4FSK

FCC Part 22.359, 74.462, 80.211 and 90.210 and (6.25 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 4.6 kHz at least:
Low: 55 + 10 log (Pwatts) = 55 + 10 log (4.25) =61.28 dB
High: 55 + 10 log (Pwatts) = 55 + 10 log (4.36) =61.39 dB
Note: In general, the worse case attenuation requirement shown above was applied.
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 36.02 dBm.
Limit (dBm) =36.02-55-10log10 (4.36) = -25 dBm

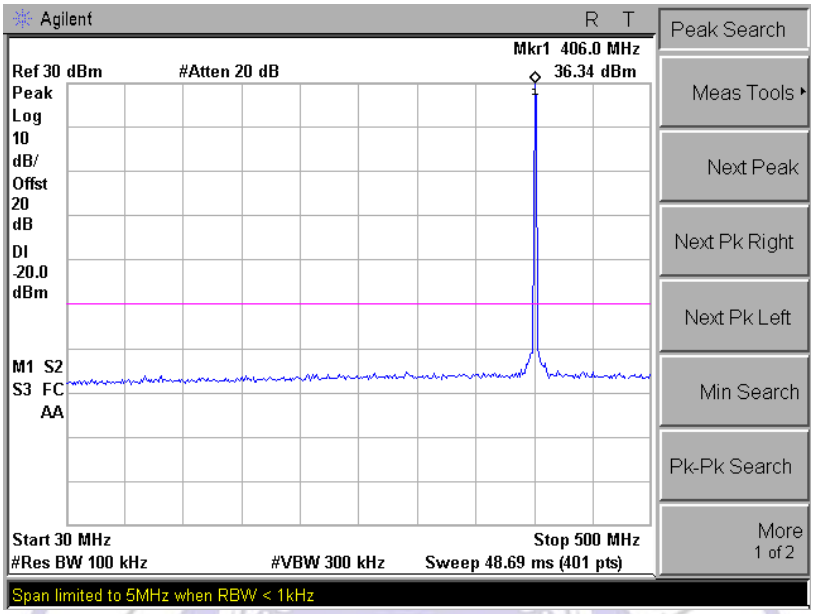
Note: 1. In general, the worse case attenuation requirement shown above was applied.
2. The measurement frequency range from 30 MHz to 5 GHz.

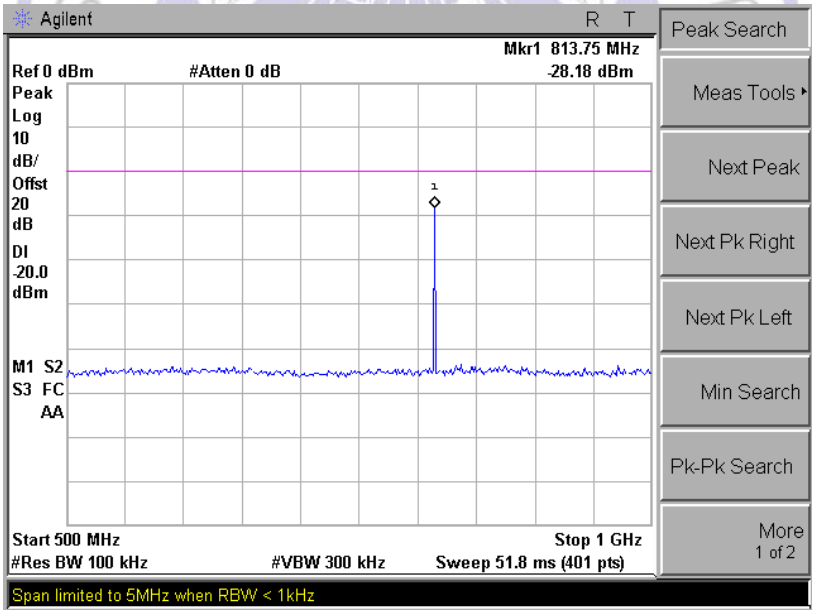
Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz	
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)
Analog/FM	12.5KHz	Low	406.5000	813.75	-28.18	1220.00	-29.91
		Middle	435.5000	871.25	-31.89	1310.00	-36.01
		High	469.5000	940.00	-26.31	1880.00	-41.25
Digital/4FSK	6.25KHz	Low	406.5000	813.75	-28.29	1220.00	-29.96
		Middle	435.5000	871.25	-32.48	1310.00	-36.11
		High	469.5000	940.00	-26.42	1880.00	-41.41
Limit		-20dBm for 12.5KHz Channel Separation					
		-25dBm for 6.25KHz Channel Separation					
Test Results		Compliance					

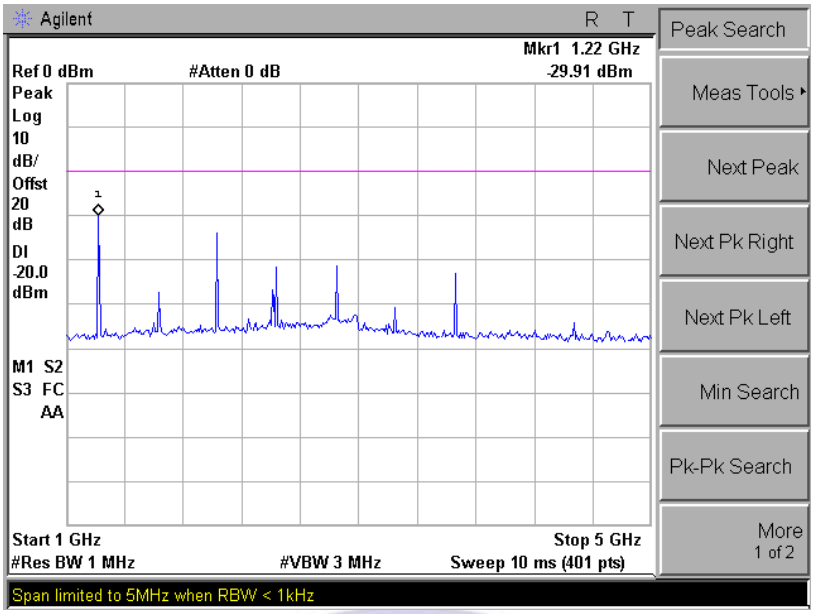
Plots of Spurious Emission on Antenna Port Measurement

See next pages.

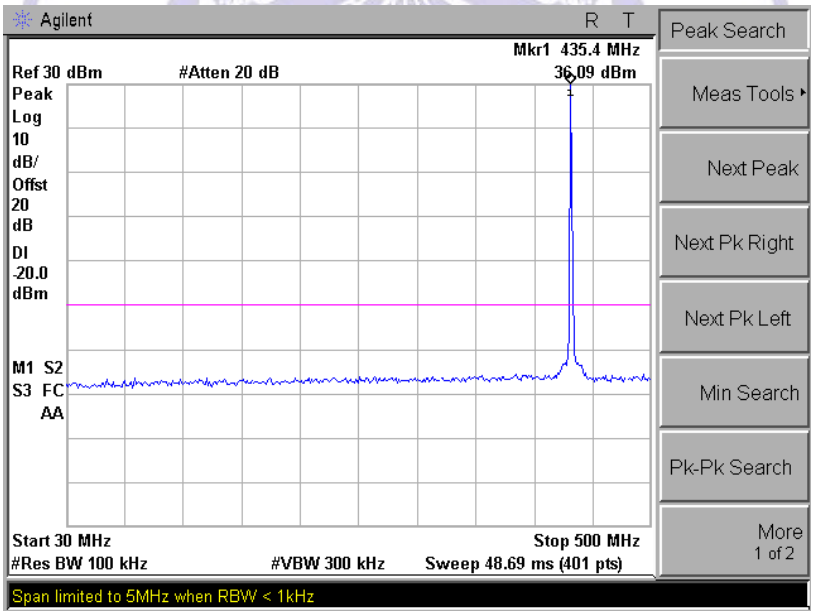
Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above1GHz		FCC Limit
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)	
FM	12.5KHz	Low	406.5000	813.75	-28.18	1220.00	-29.91	-20dBm
Test Results				Compliance				

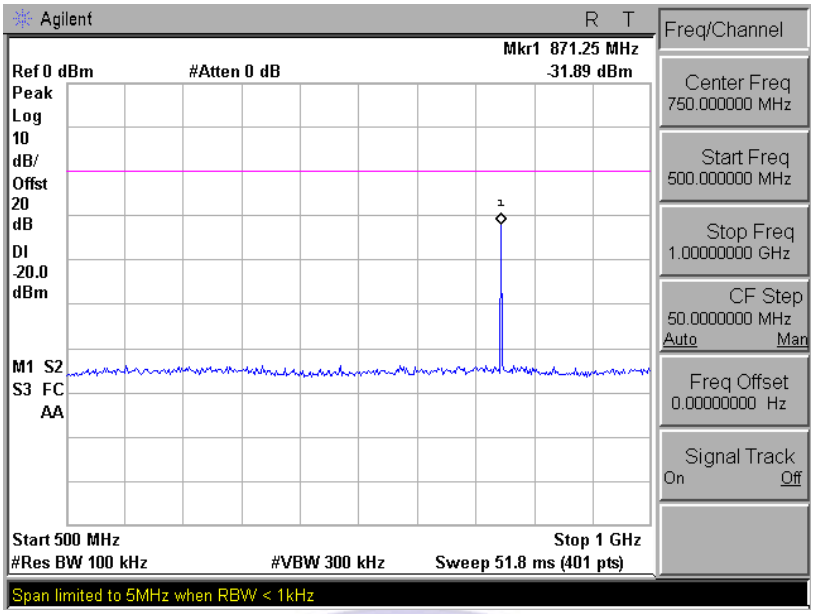


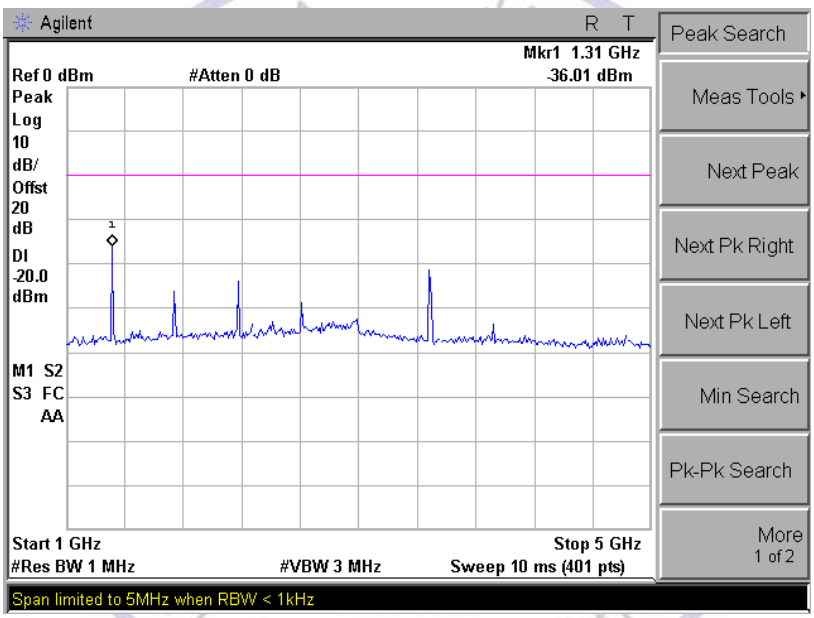




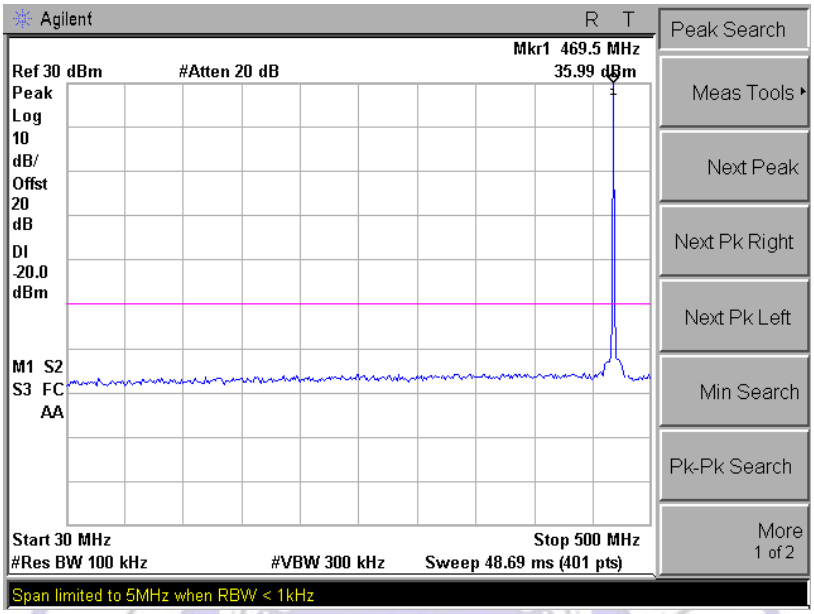
Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above1GHz		FCC Limit
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)	
FM	12.5KHz	Middle	435.5000	871.25	-31.89	1310.00	-36.01	-20dBm
Test Results				Compliance				

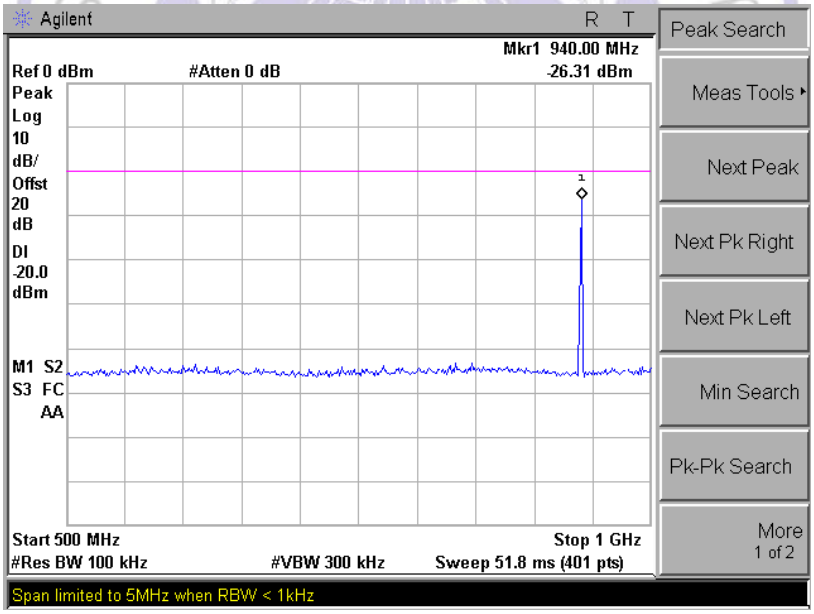


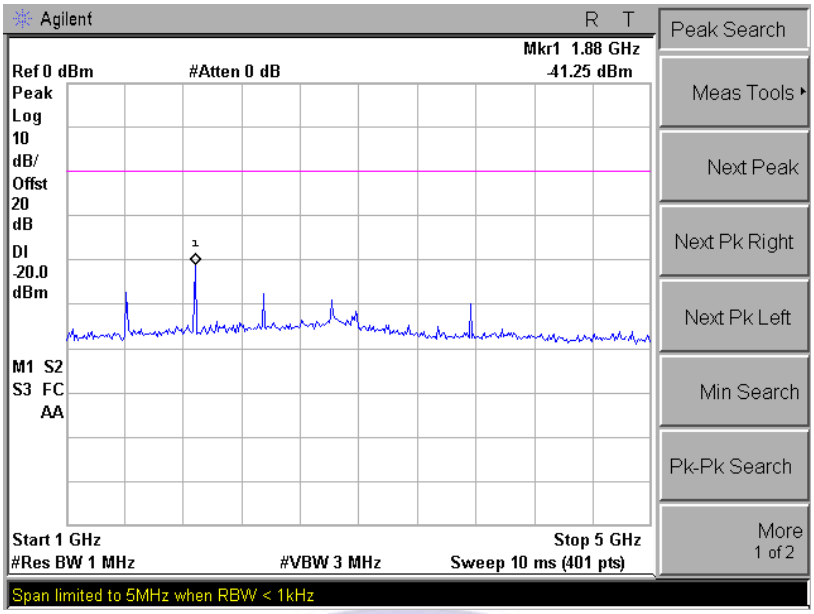

Agilent
R T
Mkr1 871.25 MHz
Ref 0 dBm
#Atten 0 dB
-31.89 dBm
Peak
Log
10
dB/
Offst
20
dB
Dl
-20.0
dBm
M1 S2
S3 FC
AA
Start 500 MHz
Stop 1 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 51.8 ms (401 pts)
Span limited to 5MHz when RBW < 1kHz
Freq/Channel
Center Freq
750.000000 MHz
Start Freq
500.000000 MHz
Stop Freq
1.00000000 GHz
CF Step
50.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
R T
Mkr1 1.31 GHz
Ref 0 dBm
#Atten 0 dB
-36.01 dBm
Peak
Log
10
dB/
Offst
20
dB
Dl
-20.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
Stop 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (401 pts)
Span limited to 5MHz when RBW < 1kHz
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

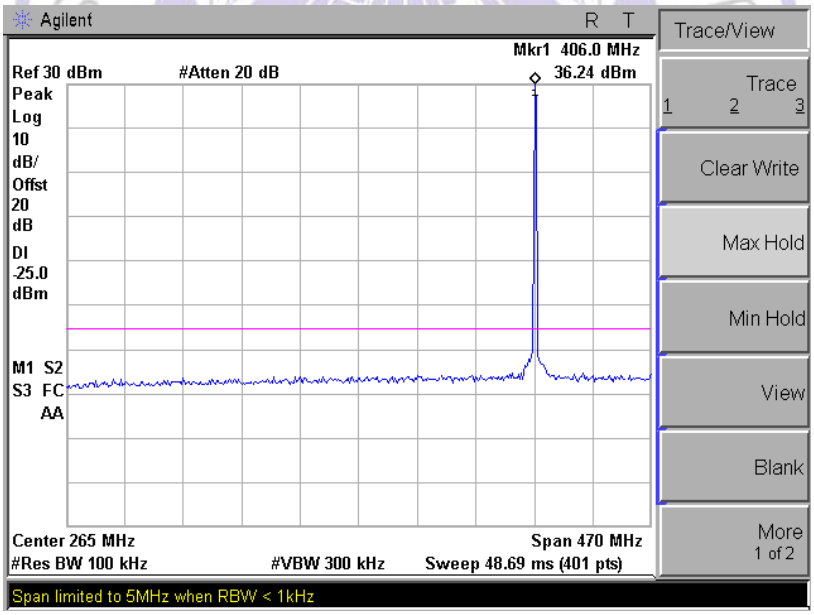
Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above1GHz		FCC Limit
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)	
FM	12.5KHz	High	469.5000	940.00	-26.31	1880.00	-41.25	-20dBm
Test Results				Compliance				

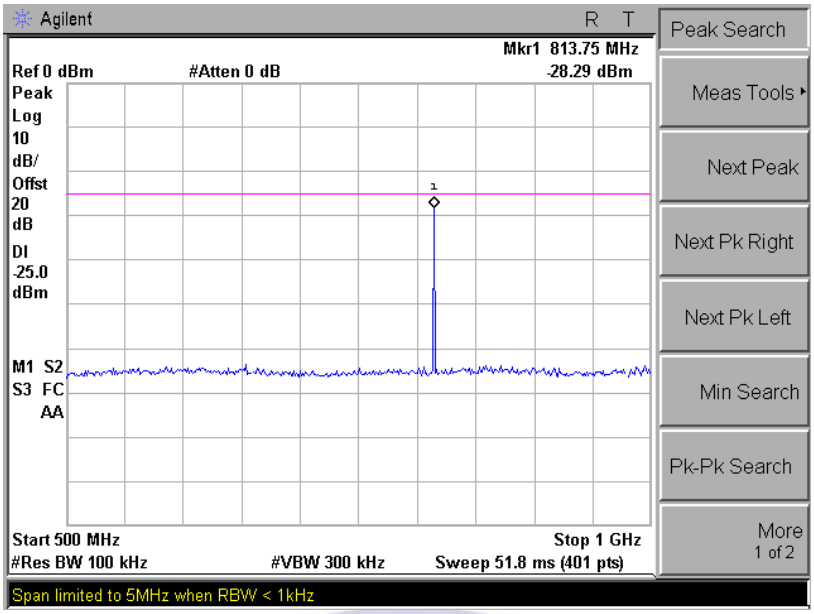


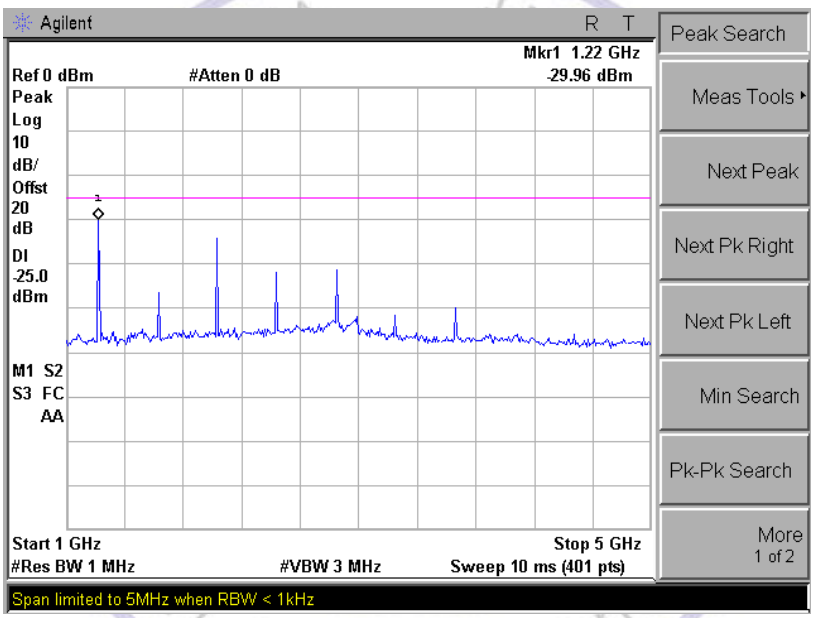




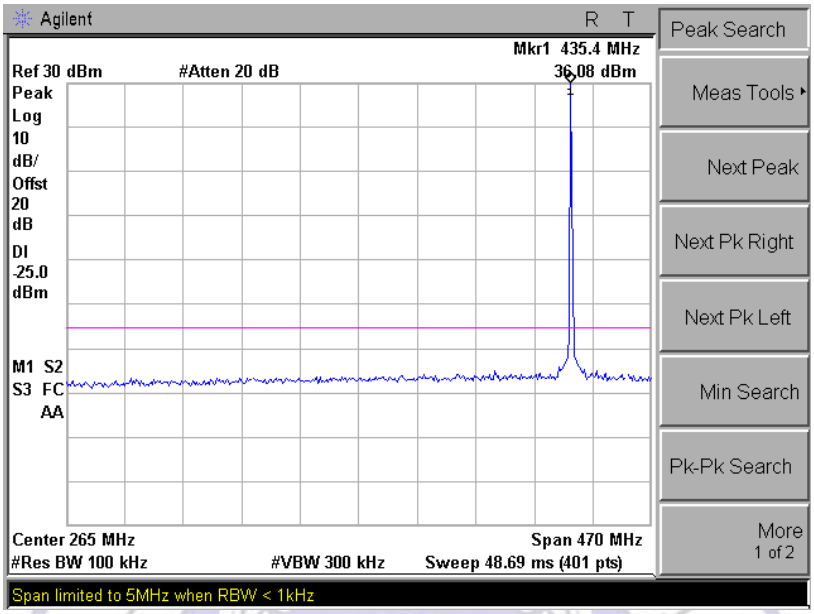
Modulation Type	Channel Sparation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above1GHz		FCC Limit
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)	
4FSK	6.25KHz	Low	406.5000	813.75	-28.29	1220.00	-29.96	-25dBm
Test Results				Compliance				

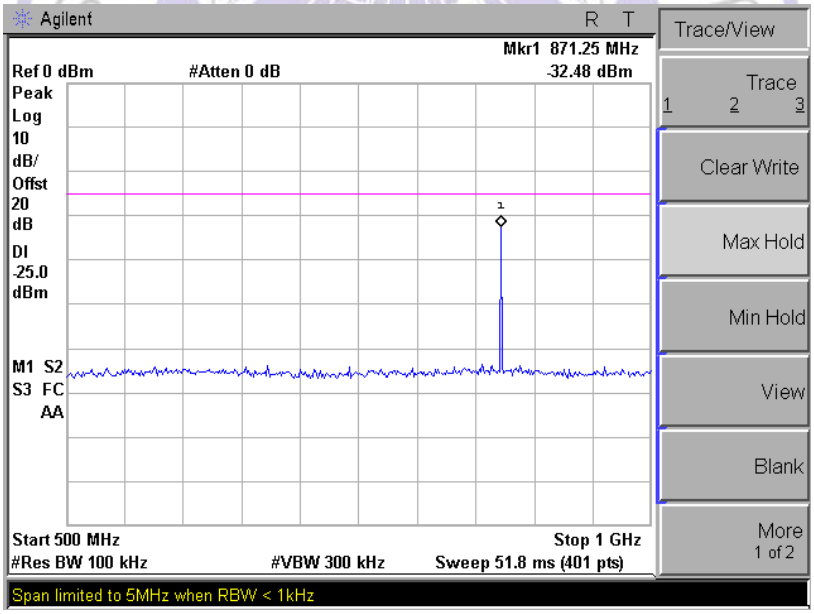


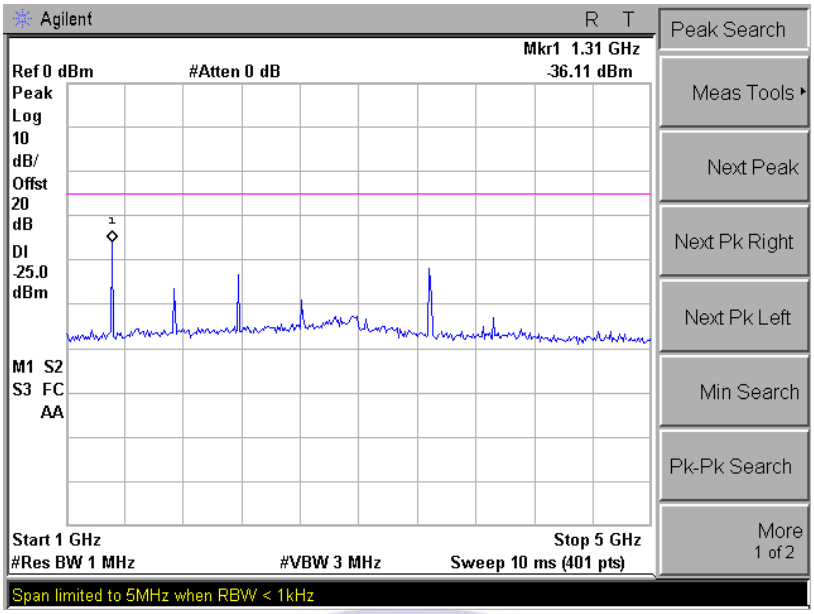

Agilent
R T
Mkr1 813.75 MHz
Ref 0 dBm
#Atten 0 dB
-28.29 dBm
Peak
Log
10
dB/
Offst
20
dB
Dl
-25.0
dBm
M1 S2
S3 FC
AA
Start 500 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1 GHz
Sweep 51.8 ms (401 pts)
Span limited to 5MHz when RBW < 1kHz
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
R T
Mkr1 1.22 GHz
Ref 0 dBm
#Atten 0 dB
-29.96 dBm
Peak
Log
10
dB/
Offst
20
dB
Dl
-25.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 5 GHz
Sweep 10 ms (401 pts)
Span limited to 5MHz when RBW < 1kHz
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

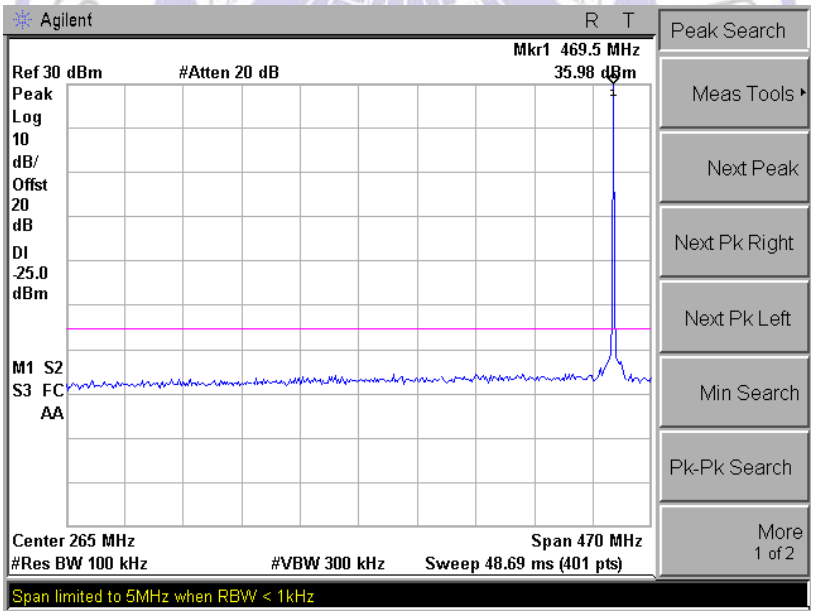
Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above1GHz		FCC Limit
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)	
4FSK	6.25KHz	Middle	435.5000	871.25	-32.48	1310.00	-36.11	-25dBm
Test Results				Compliance				

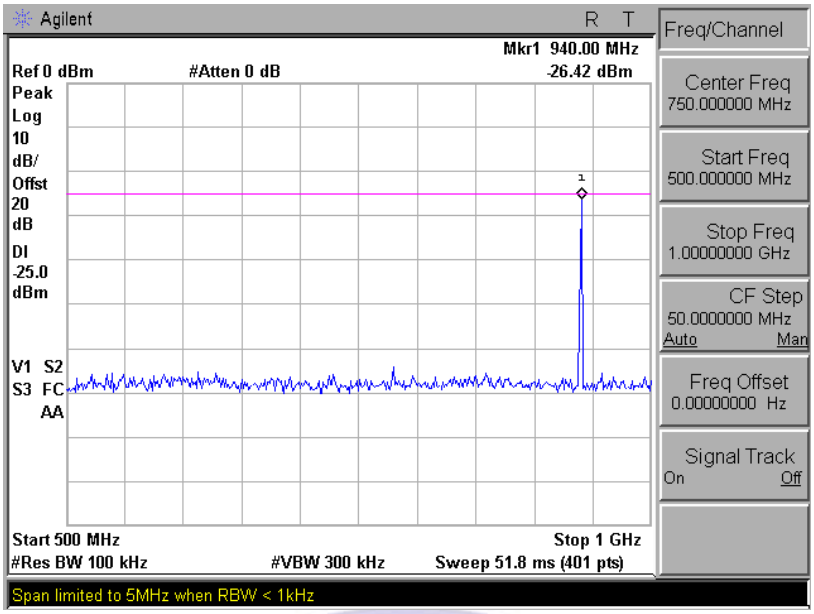


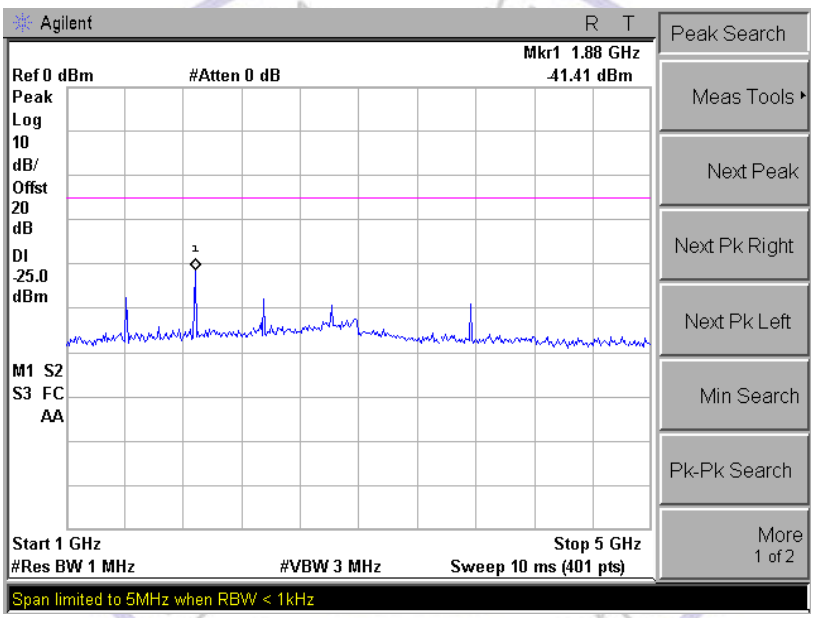




Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above1GHz		FCC Limit
				Frequency (MHz)	Results (dBm)	Frequency (MHz)	Results (dBm)	
4FSK	6.25KHz	High	469.5000	940.00	-26.42	1880.00	-41.41	-25dBm
Test Results				Compliance				




Agilent
R T
Mkr1 940.00 MHz
Ref 0 dBm
#Atten 0 dB
-26.42 dBm
Peak
Log
10
dB/
Offst
20
dB
Dl
-25.0
dBm
V1 S2
S3 FC
AA
Start 500 MHz
Stop 1 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 51.8 ms (401 pts)
Span limited to 5MHz when RBW < 1kHz
Freq/Channel
Center Freq
750.000000 MHz
Start Freq
500.000000 MHz
Stop Freq
1.00000000 GHz
CF Step
50.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
R T
Mkr1 1.88 GHz
Ref 0 dBm
#Atten 0 dB
-41.41 dBm
Peak
Log
10
dB/
Offst
20
dB
Dl
-25.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
Stop 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (401 pts)
Span limited to 5MHz when RBW < 1kHz
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

4.5. Modulation Characteristics

TEST 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.

TEST PROCEDURE

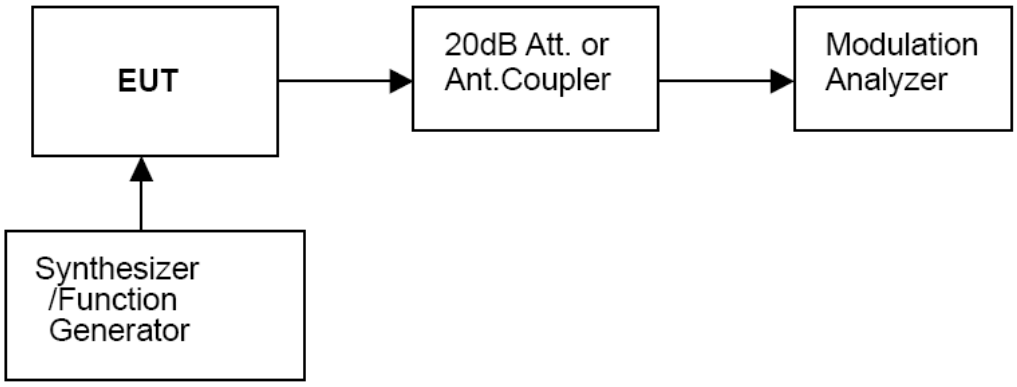
Modulation Limit

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 300, 1004, 1500 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 3 KHz and record the frequency deviation.
4 Audio Frequency Response =20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

TEST CONFIGURATION

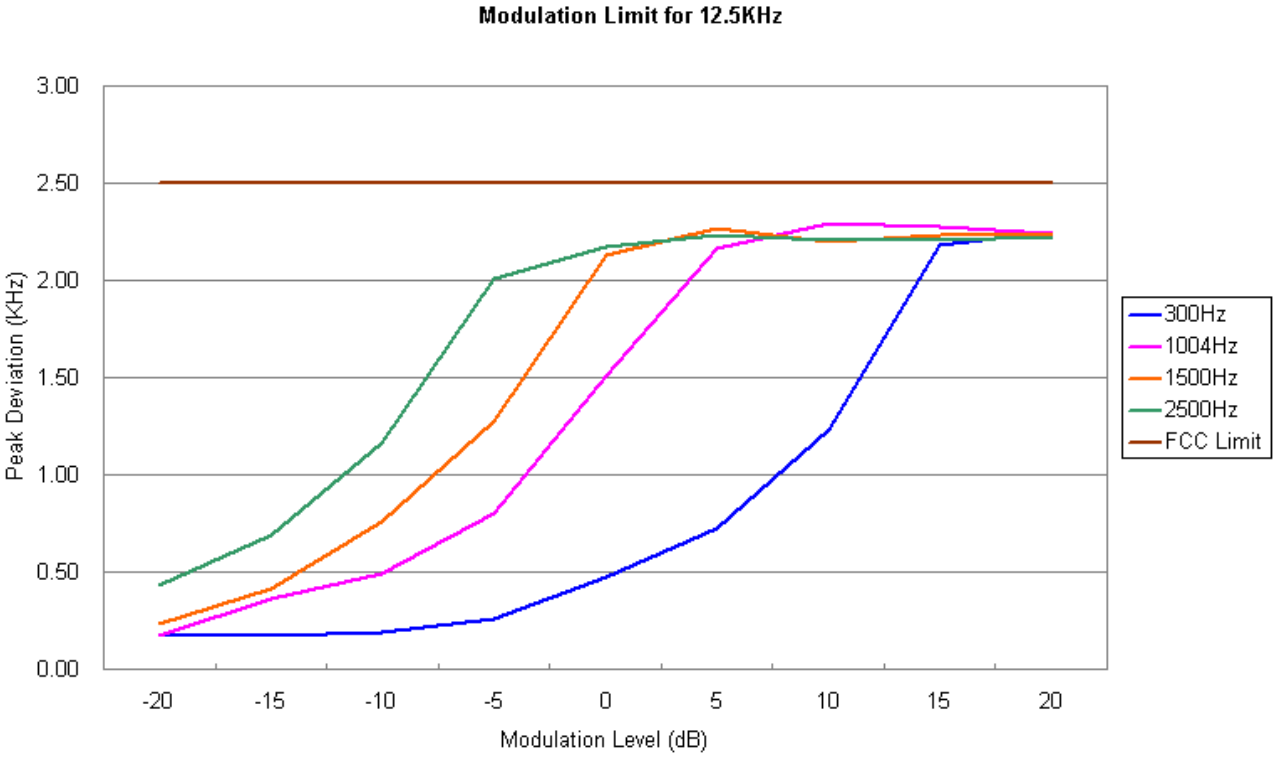


TEST RESULTS

Modulation Type: FM

12.5 KHz Channel Separation

Modulation Level(dB)	Peak Freq. Deviation At 300 Hz(KHz)	Peak Freq. Deviation At 1004 H(KHz)	Peak Freq. Deviation At 1500 Hz(KHz)	Peak Freq. Deviation At 2500 Hz(KHz)
-20	0.18	0.17	0.23	0.43
-15	0.17	0.36	0.41	0.69
-10	0.19	0.49	0.76	1.16
-5	0.26	0.80	1.28	2.01
0	0.47	1.51	2.13	2.17
+5	0.72	2.16	2.27	2.23
+10	1.23	2.29	2.20	2.21
+15	2.18	2.28	2.23	2.21
+20	2.25	2.24	2.23	2.22



Modulation type: 4FSK

Channel bandwidth: 12.5 kHz

It is not applicable for devices which operate with the digitized voice/data modulation type.

b). Audio Frequency Response:

Rule Part No.: Part 2.1407(a) (b)

Method of Measurement:

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with no exception. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 300-3000Hz shall be submitted and Audio Post Limiter Low Pass Filter Response from 3.0 KHz to 50KHz.However, the audio frequency response should test from 100Hz to 5.0 KHz according to FCC Part 90.

Modulation Type: FM

The audio frequency response curve is show below.and

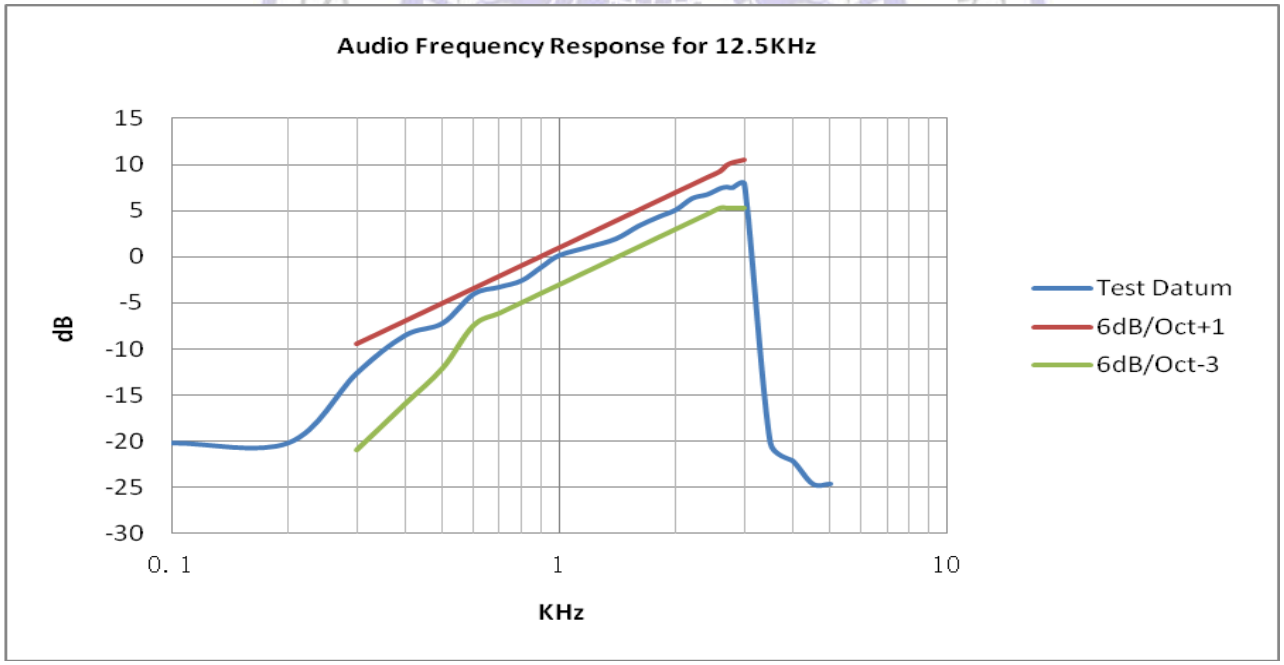
Test Audio Level (1 KHz and 20% maximum deviation) is 2.90mv for 12.5 KHz channel separation.

Note:

1 Not applicable to new standard. However, tests are conducted under FCC's recommendation.
2 The Audio Frequency Response is identical for 12.5 KHz channel separation

12.5 KHz Channel Separation

Frequency (KHz)	Frequency Deviation (KHz)	1KHz Reference Deviation (KHz)	Audio Frequency Response (dB)
0.1	0.04	0.51	-20.18
0.2	0.05	0.51	-20.22
0.3	0.16	0.51	-12.61
0.4	0.29	0.51	-8.53
0.5	0.28	0.51	-7.17
0.6	0.31	0.51	-4.02
0.7	0.37	0.51	-3.28
0.8	0.38	0.51	-2.55
0.9	0.45	0.51	-1.04
1.0	0.50	0.51	0.13
1.2	0.54	0.51	1.12
1.4	0.68	0.51	1.97
1.6	0.75	0.51	3.35
1.8	0.89	0.51	4.33
2.0	0.91	0.51	5.12
2.2	1.03	0.51	6.35
2.4	1.15	0.51	6.77
2.6	1.20	0.51	7.44
2.7	1.22	0.51	7.59
2.8	1.21	0.51	7.51
3.0	1.27	0.51	7.93
3.5	0.05	0.51	-20.15
4.0	0.04	0.51	-22.13
4.5	0.03	0.51	-24.61
5.0	0.03	0.51	-24.61



Modulation type: 4FSK

Channel bandwidth: 6.25 kHz

It is not applicable for devices which operate with the digitized voice/data modulation type.

4.6. Frequency Stability Measurement

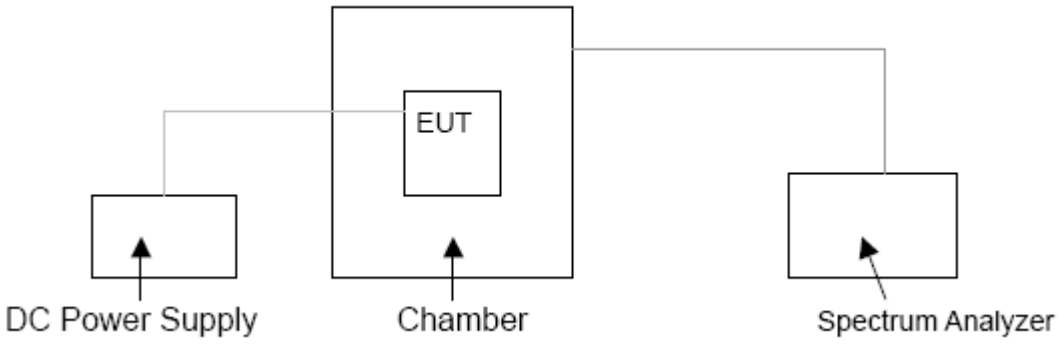
TEST APPLICABLE

1 According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.
2 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.
3 Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and tested end point voltage.
4 According to §90.213, the frequency stability limit is 2.5 ppm for 12.5 KHz channel separation and 1.0 ppm for 6.25KHz channel separation.

TEST 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 a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST SETUP BLOCK DIAGRAM



TEST LIMITS

According to 90.213, Transmitters used must have minimum frequency stability as specified in the following table.

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3] 100	100	200
25–50	20	20	50
72–76	5	.....	50
150–174	[5,11] 5	[6] 5	[4,6] 50
216–220	1.0	.....	1.0
220–222 [12]	0.1	1.5	1.5
421–512	[7,11,14] 2.5	[8] 5	[8] 5
806–809	[14] 1.0	1.5	1.5
809–824	[14] 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14] 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 [13]	2.5	2.5	2.5
929–930	1.5	.....	.....
935–940	0.1	1.5	1.5
1427–1435	[9] 300	300	300
Above 2450 [10]	.....	.....	.....

Modulation Type	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(℃)	406.5000 (MHz)	435.5000 (MHz)	469.5000 (MHz)
Analog/FM	12.5KHz	7.40	-30	-0.73	-0.70	-0.71
			-20	-0.71	-0.68	-0.70
			-10	-0.64	-0.68	-0.72
			0	-0.53	-0.53	-0.54
			10	-0.48	-0.41	-0.40
			20	-0.25	-0.22	-0.26
			30	-0.37	-0.36	-0.35
			40	-0.41	-0.47	-0.42
			50	-0.63	-0.48	-0.57
		6.25 (End Point)	25	-0.39	-0.35	-0.36
		6.29 (85% Rated)	20	-0.37	-0.36	-0.34
		8.51 (115% Rated)	20	-0.31	-0.35	-0.31
Limit				2.50	2.50	2.50
Conclusion			Complies			

Modulation Type	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(℃)	406.5000 (MHz)	435.5000 (MHz)	469.5000 (MHz)
Digital/4FSK	6.25KHz	7.40	-30	-0.63	-0.65	-0.60
			-20	-0.61	-0.65	-0.64
			-10	-0.58	-0.57	-0.50
			0	-0.47	-0.50	-0.48
			10	-0.41	-0.43	-0.38
			20	-0.17	-0.16	-0.19
			30	-0.36	-0.35	-0.35
			40	-0.45	-0.40	-0.45
			50	-0.65	-0.45	-0.52
		6.25 (End Point)	25	-0.60	-0.98	-0.69
		6.29 (85% Rated)	20	-0.34	-0.30	-0.28
		8.51 (115% Rated)	20	-0.27	-0.25	-0.22
Limit				1.00	1.00	1.00
Conclusion			Complies			

4.7. Conducted Output Power

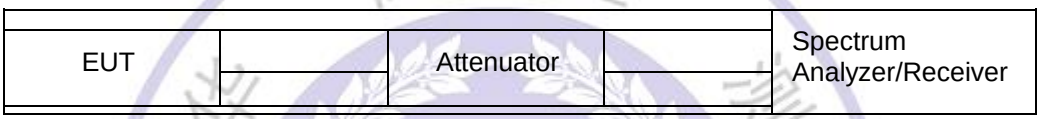
TEST APPLICABLE

Per FCC «2.1046 and «90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.
Typical transmitter output powers are 110 watts for base and/or fixed stations (paging transmitters excepted), and 30 watts for mobile stations. Higher powers may be certified, but it should be noted that mobile stations are normally only licensed up to 30 watts. See the SRSP relevant to the operating frequency for equipment power limits.

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 40 dB attenuator.
Measurement with Spectrum Analyzer FSP40 or Aglient E4407B conducted, external power supply with 12.50 V stabilized supply voltage.

TEST CONFIGURATION



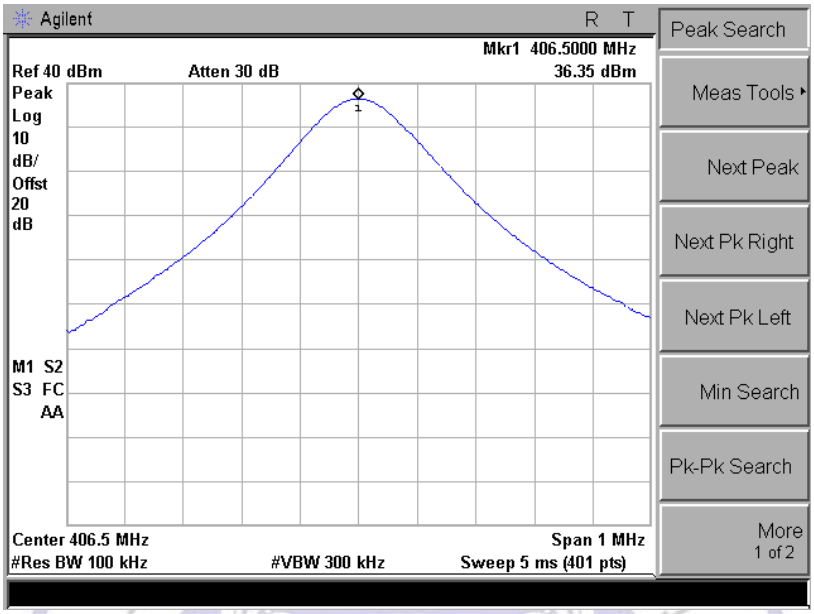
The EUT was directly connected to a RF Communication Test set by a 20 dB attenuator

TEST RESULTS

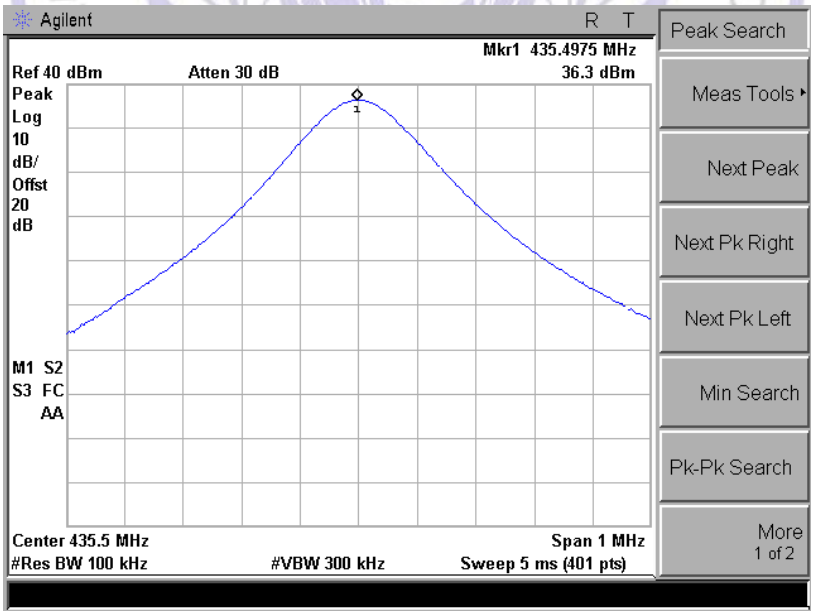
Frequency Range (MHz)	Modulation Type	Channel Separation (KHz)	Test Channel	Maximum Output Power Test Results (dBm)
406.1-470	Analog/FM	12.5	Low	36.28
			Middle	36.31
			High	36.39
406.1-470	Digital/4FSK	6.25	Low	36.35
			Middle	36.30
			High	36.47
Limit	The limit is dependent upon the station's antenna HAAT and required service area.			
Test Results	Compliance			

Plots of Maximum Transmitter Power Measurement

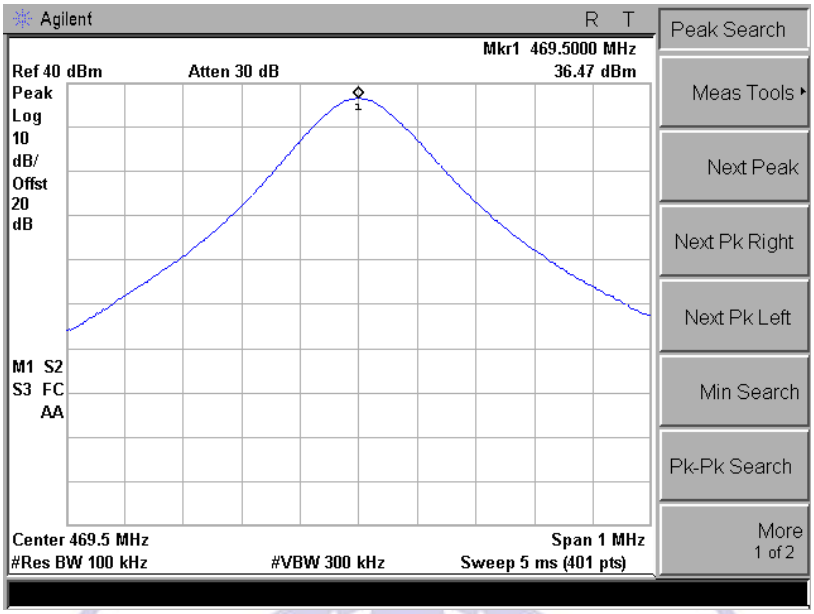
Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
4FSK	6.25 KHz	406.5000	4	36.35	Varies	Compliance



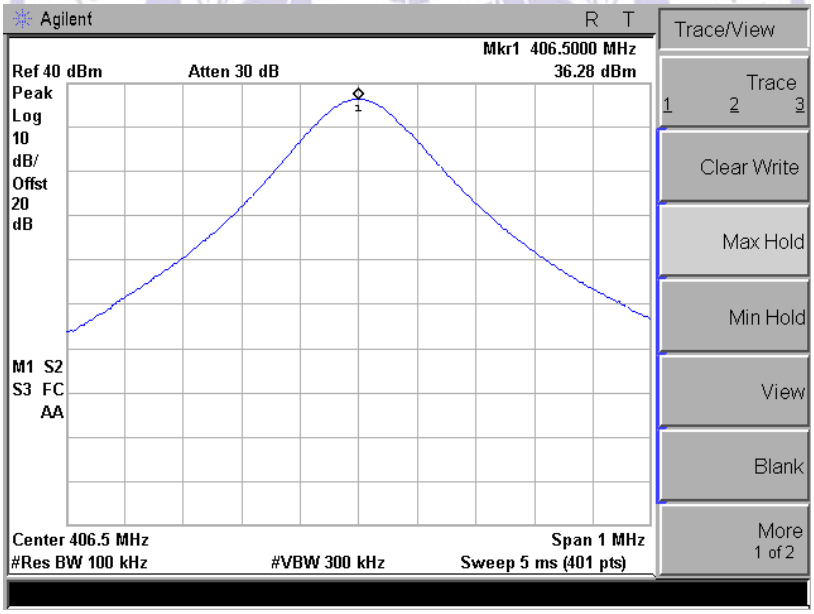
Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
4FSK	6.25 KHz	435.5000	4	36.30	Varies	Compliance



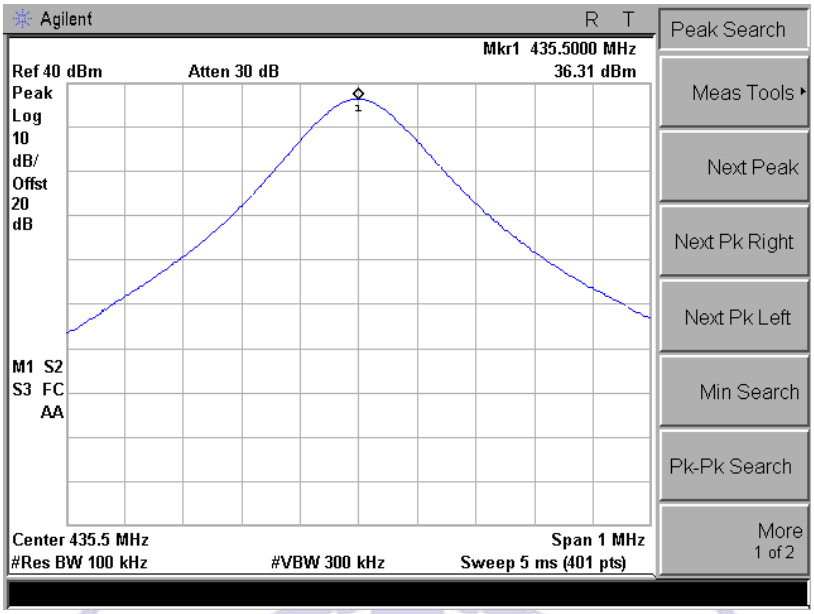
Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
4FSK	6.25 KHz	469.5000	4	36.47	Varies	Compliance



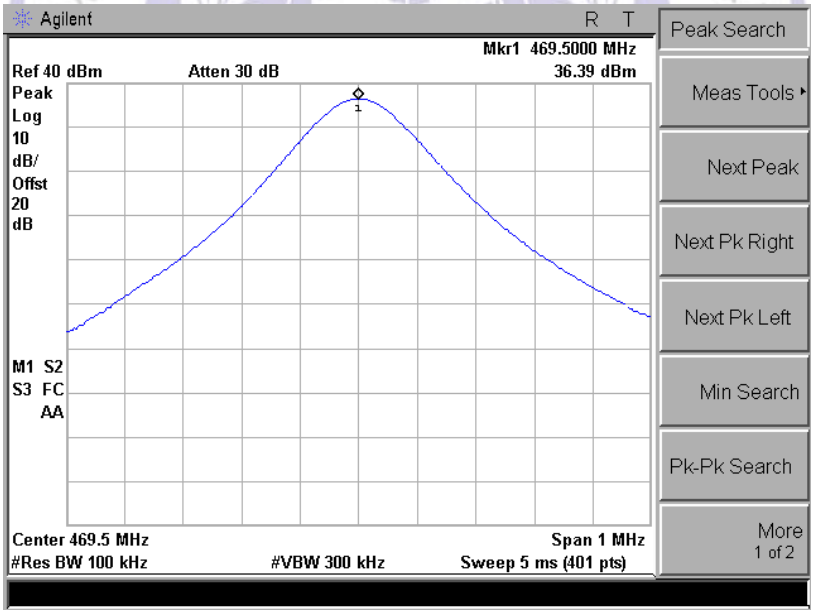
Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	12.5 KHz	406.5000	4	36.28	Varies	Compliance



Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	12.5 KHz	435.5000	4	36.31	Varies	Compliance



Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	12.5 KHz	469.5000	4	36.39	Varies	Compliance



4.8. Transmitter Frequency Behaviour

TEST APPLICABLE

Section 90.214
Transient frequencies must be within the maximum frequency difference limits during the time intervals indicated:

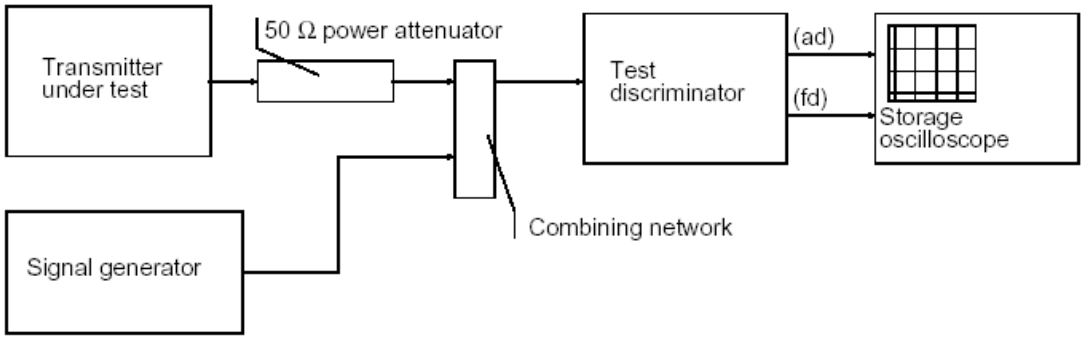
Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 KHz Channels			
t_1 [4]	± 25.0 KHz	5.0 ms	10.0 ms
t_2	± 12.5 KHz	20.0 ms	25.0 ms
t_3 [4]	± 25.0 KHz	5.0 ms	10.0 ms
Transient Frequency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

TIA/EIA-603 2.2.19

TEST CONFIGURATION

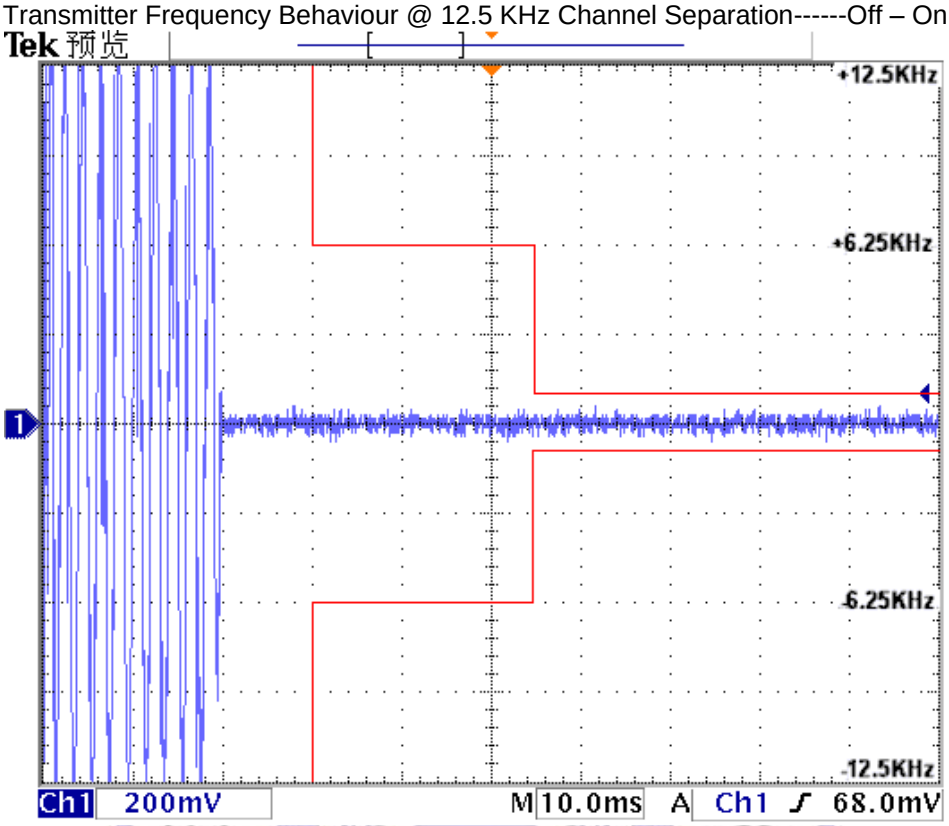


TEST RESULTS

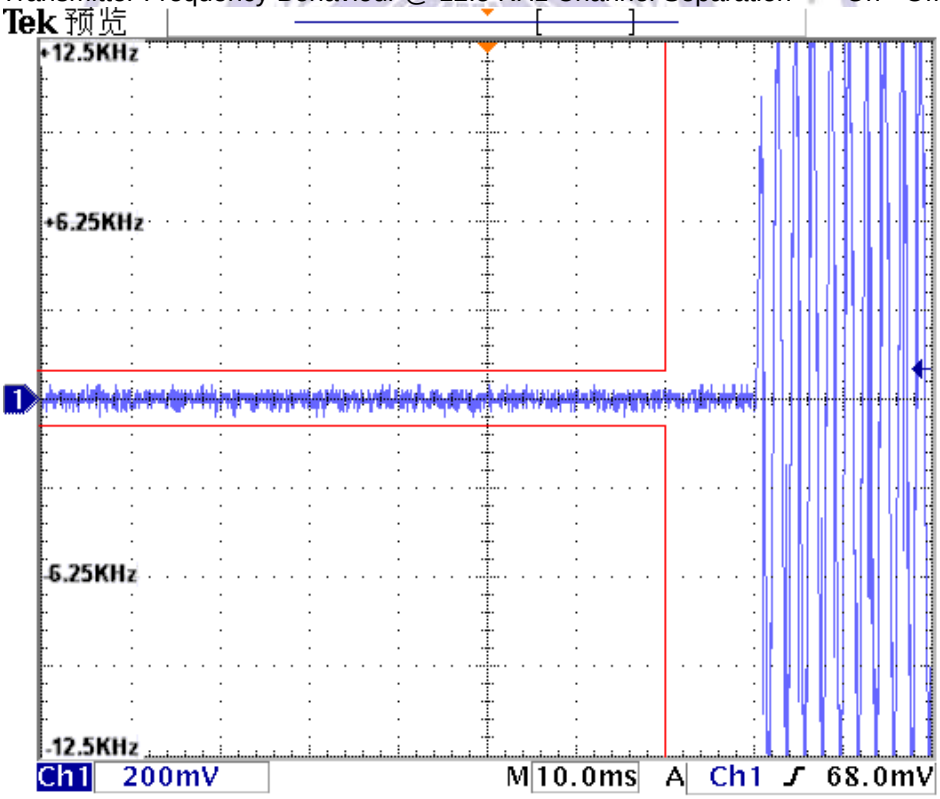
Please refer to the following plots.

Modulation Type: FM

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

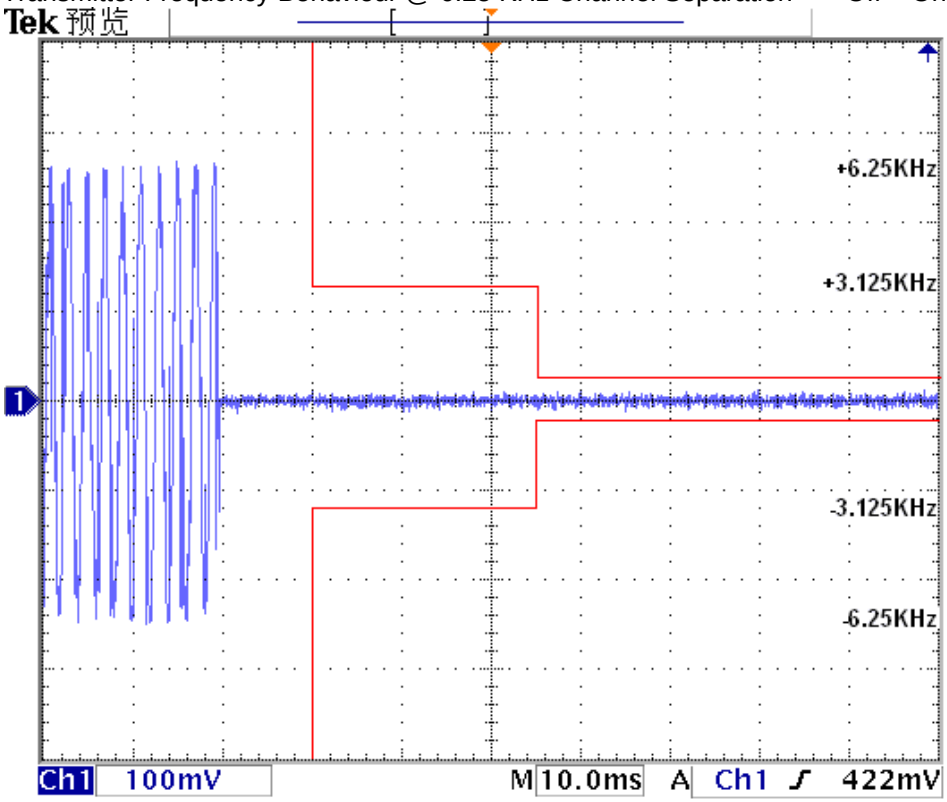


Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------On - Off

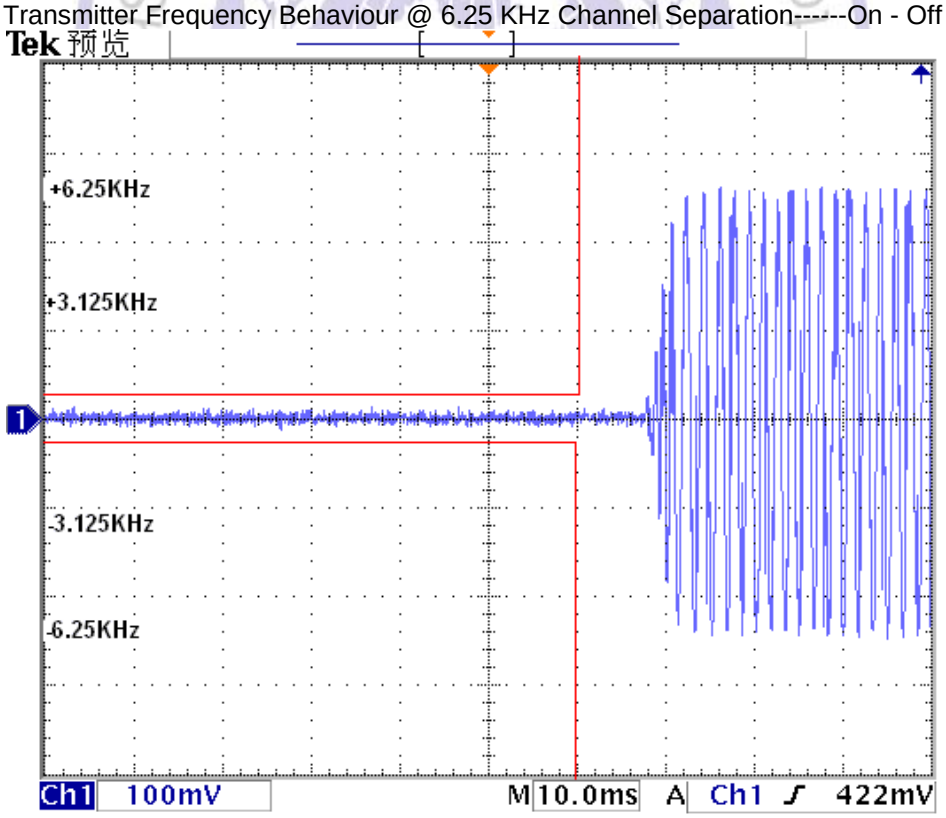


Modulation Type: 4FSK

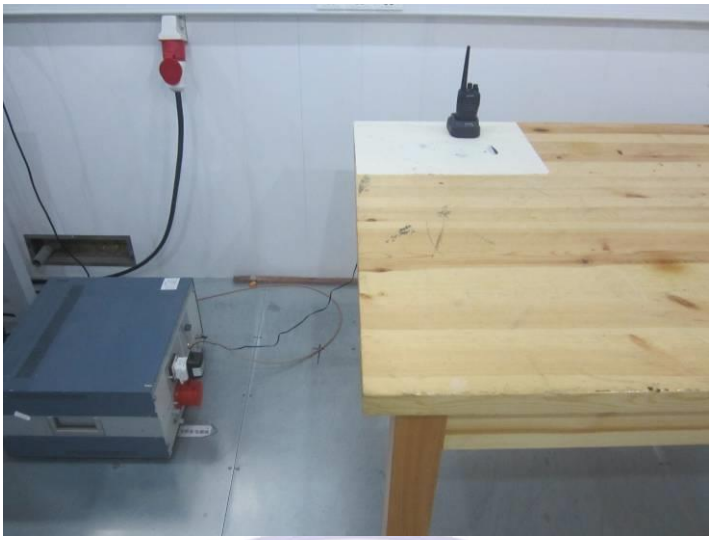
Transmitter Frequency Behaviour @ 6.25 KHz Channel Separation------Off – On

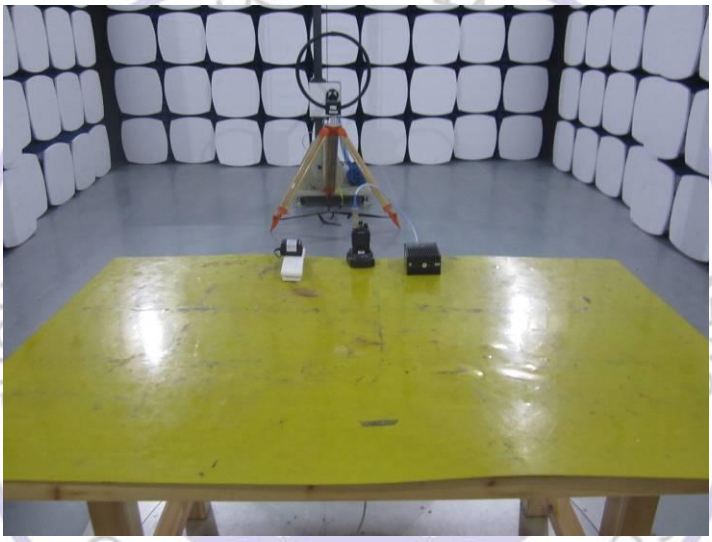


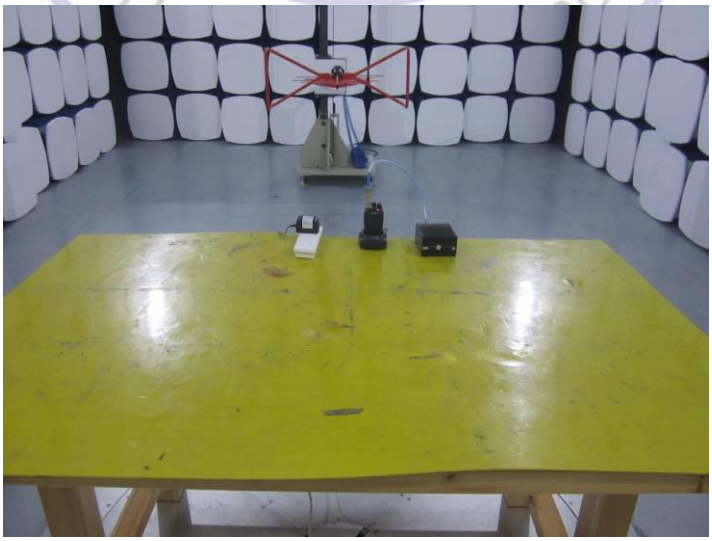
Transmitter Frequency Behaviour @ 6.25 KHz Channel Separation------On - Off



5. Test Setup Photos of the EUT



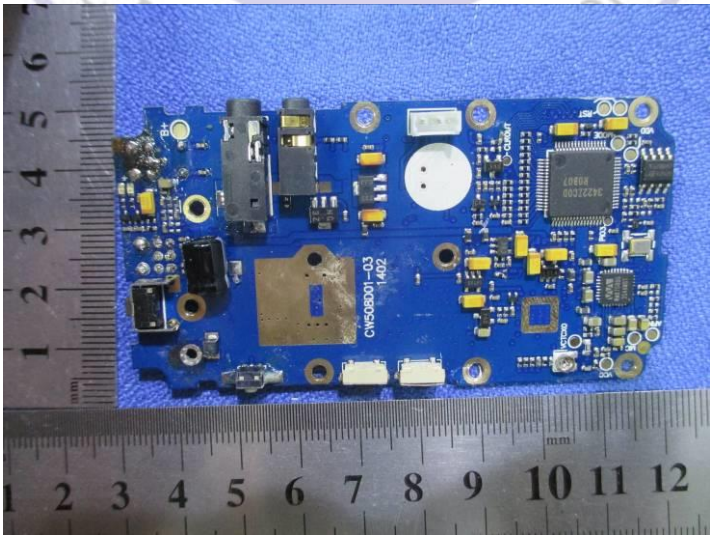


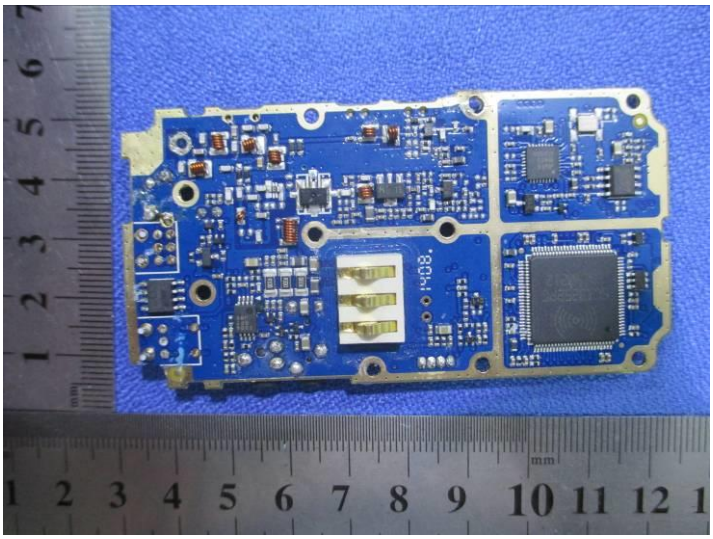


6. External and Internal Photos of the EUT

External Photos

Internal Photos





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