Shenzhen Huatongwei International Inspection Co., Ltd.
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone:86-755-26748019 Fax:86-755-26748089 http://www.szhtw.com.cn

TEST REPORT

Report Reference No. ..... :	**TRE1503009904** **R/C……: 30143**
FCC ID ..... :	**2AE6CEP8100U1**
Applicant's name ..... :	**Shenzhen Excera Technology Co., Ltd.**
Address.....:	Block K of 4F, Tower A of Junxiangda building,Zhongshanyuan WestRoad,Tongle Village,Nanshan,Shenzhen,China
Manufacturer.....:	**Shenzhen Excera Technology Co., Ltd.**
Address.....:	Block K of 4F, Tower A of Junxiangda building,Zhongshanyuan WestRoad,Tongle Village,Nanshan,Shenzhen,China
Test item description ..... :	**Digital Portable Radio**
Trade Mark .....:	EXCERA
Model/Type reference.....:	EP8100 U1
Listed Model(s) .....:	/
Standard ..... :	**FCC Part 90/FCC Part 2/ FCC Part 15B**
Date of receipt of test sample……..:	Mar 23, 2015
Date of testing……:	Mar 24, 2015- Apr 8, 2015
Date of issue……...:	Apr 9, 2015
Result..... ……..:	**PASS**

Compiled by (position+printed name+signature)..:	File administrators Shayne Zhu	Shayne Zhu
Supervised by (position+printed name+signature)..:	Project Engineer Cary Luo	Cary Luo
Approved by (position+printed name+signature)..:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address.....:	Bldg3, Hongfa Hi-tech Industrial Park, Genyu Road, Shenzhen, China

Contents

1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Test Standards

The tests were performed according to following standards:
FCC Rules Part 90 :2014 Private land mobile radio services.
TIA/EIA 603 D:June 2010 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
FCC Part 15 Subpart B:2014 Unintentional Radiators
FCC Part 2: 2014 Frequency allocations and radio treaty matters, general rules and regulations.
KDB579009 D01 v03r01: Questions and Answers on Re-farming Part 90 frequencies
KDB 579009 D02 v01r02 :Transition Summary Table

1.2. Test Description

Test specification clause	Test case	Verdict
FCC Part 15.207	Conducted Emission	PASS
FCC Part 90.205	Maximum Transmitter Power	PASS
FCC Part 90.207	Modulation Characteristic	PASS
FCC Part 90.209	Occupied Bandwidth	PASS
FCC Part 90.210	Emission Mask	PASS
FCC Part 90.213	Frequency Stability	PASS
FCC Part 90.214	Transmitter Frequency Behavior	PASS
FCC Part 90.210	Transmitter Radiated Spurious Emssion	PASS
FCC Part 90.210	Spurious Emssion On Antenna Port	PASS
FCC Part 15.109	Receiver Radiated Spurious Emssion	PASS

Remark: 1.The measurement uncertainty is not included in the test result.

2. SUMMARY

2.1. Client Information

Applicant:	Shenzhen Excera Technology Co., Ltd.
Address:	Block K of 4F, Tower A of Junxiangda building,Zhongshanyuan WestRoad,Tongle Village,Nanshan,Shenzhen,China
Manufacturer:	Shenzhen Excera Technology Co., Ltd.
Address:	Block K of 4F, Tower A of Junxiangda building,Zhongshanyuan WestRoad,Tongle Village,Nanshan,Shenzhen,China

2.2. Product Description

Name of EUT	Digital Portable Radio	
Trade Mark:	EXCERA	
Model/Type reference:	EP8100 U1	
Listed Model(s):	/	
Power supply:	DC 7.20V	
Charger information:	Model:ESC102L Input:12Vd.c.,1000mA Output:8.4Vd.c., 1000mA	
Battery information:	Model:EB242L 7.2Vd.c., 2400mAh	
Adapter information:	Model: HKA01212010-2F Input: 100-240Va.c., 50/60Hz, 500mA Output:12.0Vd.c., 1000mA	
Operation Frequency:	From 400MHz to 470MHz	
Rated Output Power:	High Power:4.2Watts(36.23dBm)/Low Power:1.2Watts(30.79dBm)	
Support data rate:	9.6kbps	
Modilation Type:	FM for Analog Voice	
	4FSK for Digital Voice / Digital Data	
Channel Separation:	Analog Voice	12.5kHz
	Digital Voice/Data	12.5kHz
	Digital Data	12.5kHz
Emission Designator:	Analog Voice:	9K91F3E for 12.5KHz Channel Separation
	Digital Voice:	6K77FXW
	Digital Data:	6K77FXD
Maximum Transmitter Power	Analog	4.27W for 12.5 KHz Channel Separation
	Digital	4.33W for 12.5 KHz Channel Separation
Antenna Type:	External	
Hard version:	E	
Soft version:	0.9.05.009	

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

2.3. Test frequency list

Modulation Type	Channel Separation	Test Frequency (MHz)
Analog/FM	12.5kHz	406.5
		421.5
		450.5
		469.5
Digital/4FSK	12.5kHz	406.5
		421.5
		450.5
		469.5

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above listed frequency for testing.

2.4. EUT operation mode

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

EUT operation mode no.	**Description of operation mode**	**Additional information**
Op 1	FM+BW12.5kHz+TX	The equipment is set with FM modulation and 12.5kHz bandwidth at maximum rated power for transmitter,powered by DC 7.20V
Op 2	FM+BW12.5kHz+TX	The equipment is set with FM modulation and 12.5kHz bandwidth at minimum rated power for transmitter,powered by DC 7.20V
Op 3	4FSK+BW12.5kHz+TX	The equipment is set with 4FSK modulation and 12.5kHz bandwidth at maximum rated power for transmitter,powered by DC 7.20V
Op 4	4FSK+BW12.5kHz+TX	The equipment is set with 4FSK modulation and 12.5kHz bandwidth at minimum rated power for transmitter,powered by DC 7.20V
Op 5	FM+BW12.5kHz+RX	The equipment is set with FM modulation and 12.5kHz bandwidth at receiver or standby,powered by AC 120V/60Hz from adapter
Op 6	4FSK+BW12.5kHz+RX	The equipment is set with 4FSK modulation and 12.5kHz bandwidth receiver or standby,powered by AC 120V/60Hz from adapter
Op 7	GPS	Gps Receiver Mode

2.5. 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) :	3.00
		Shield :	Unshielded
		Detachable :	Undetachable
○	Multimeter	Manufacturer :	/
		Model No. :	/

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

This submittal(s) (test report) is intended for FCC ID: 2AEFJEP8100U1 filing to comply with FCC Part 90 rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

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

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Feb. 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept 30, 2015.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection 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 662850, Renewal date Jul. 01, 2012, valid time is until Jun. 01, 2015.

FCC-Registration No.: 317478

Shenzhen Huatongwei International Inspection Co., Ltd. (Gongming 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 317478, Renewal date July 18, 2014, valid time is until July. 18, 2017.

IC-Registration No.: 5377A

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.

IC-Registration No.: 5377B

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. (Gongming EMC Laboratory) has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on September 3, 2014, valid time is until September 3, 2017.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.:R-2484. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 29, 2015.
Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.
Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Environmental conditions

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

Temperature:	15~35°C
lative Humidity:	30~60 %
Air Pressure:	950~1050mba

3.4. 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 Huatongwei International Inspection 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 Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.65 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.5. Equipments Used during the Test

AC&DC Power Conducted Emission				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Last Cal.**
Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2014/11/1
EMI Test Receiver	Rohde&Schwarz	ESCS 30	100038	2014/11/1
Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2014/11/1
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2014/11/1

Modulation Characteristic				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Last Cal.**
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2014/11/1

Frequency Stability				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Last Cal.**
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2014/11/1
Signal Generator	Rohde&Schwarz	SMT03	100059	2014/11/1
Climate Chamber	ESPEC	EL-10KA	05107008	2014/11/1

Transmitter Radiated Spurious Emssion				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Last Cal.**
Ultra-Broadband Antenna	Rohde&Schwarz	HL562	100015	2014/11/1
EMI Test Receiver	Rohde&Schwarz	ESI 26	100009	2014/11/1
RF Test Panel	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A
HORN ANTENNA	Rohde&Schwarz	HF906	100039	2014/11/1
Turntable	ETS	2088	2149	N/A
Antenna Mast	ETS	2075	2346	N/A
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2014/11/1
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2014/11/1
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2014/11/1
HORN ANTENNA	ShwarzBeck	9120D	1012	2014/11/1
HORN ANTENNA	ShwarzBeck	9120D	1011	2014/11/1
TURNTABLE	MATURO	TT2.0	----	N/A
ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A

Maximum Transmitter Power & Spurious Emssion On Antenna Port & Occupied Bandwidth & Emission Mask				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Last Cal.**
Receiver	Rohde&Schwarz	ESI 26	100009	2014/11/1
Attenuator	R&S	ESH3-22	100449	2014/11/1
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2014/11/1
High-Pass Filter	Anritsu	MP526B	6220875256	2014/11/1
High-Pass Filter	Anritsu	MP526D	6220878392	2014/11/1
Spectrum Analzyer	Aglient	E4407B	MY44210775	2014/11/1
Spectrum Analzyer	Rohde&Schwarz	FSP40	1164.4391.40	2014/11/1
SPECTRUM ANALYZER	Agilent	E4407B	MY44210775	2014/11/1

Transient Frequency Behavior				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Last Cal.**
Signal Generator	Rohde&Schwarz	SMT03	100059	2014/11/1
Storage Oscilloscope	Tektronix	TDS3054B	B033027	2014/11/1
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2014/11/1

The calibration interval was one year.

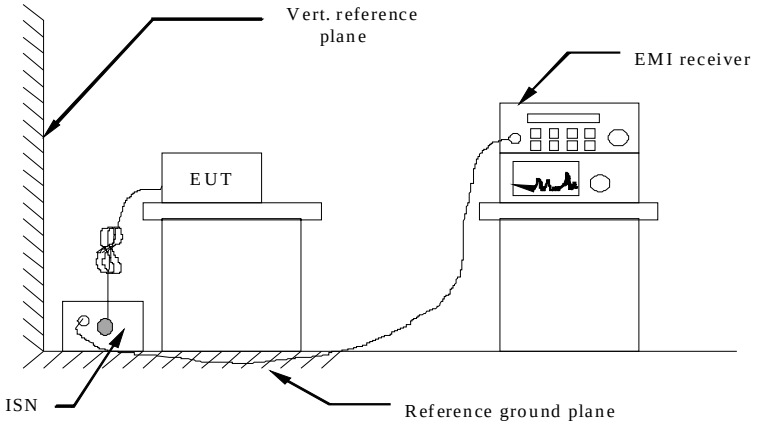
4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST APPLICABLE

The EUT was tested according to ANSI C63.4 - 2009. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u Henry as specified by section 5.1 of ANSI C63.4 - 2009. Cables and peripherals were moved to find the maximum emission levels for each frequency.

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 C63.4-2009.
2 Support equipment, if needed, was placed as per ANSI C63.4-2009.
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2009.
4 If a EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 If a EUT received DC 7.20V power through a Impedance Stabilization Network (ISN) which supplied power source and was grounded to the ground plane.
6 All support equipments received AC power from a second LISN, if any.
7 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.
8 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
9 During the above scans, the emissions were maximized by cable manipulation.

Conducted Power Line Emission Limit

For intentional device, according to § 15.207(a) and RSS-Gen for Conducted Emission Limits is as following:

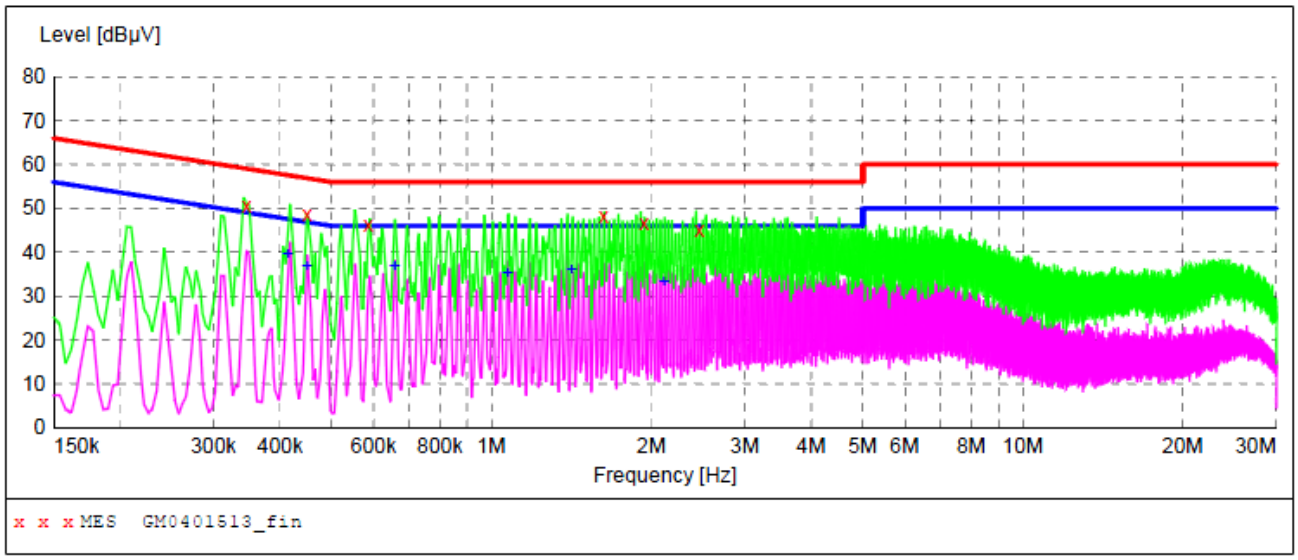
Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreasing linearly with the logarithm of the frequency
For intentional device, according to §15.207(a) and RSS-Gen Line Conducted Emission Limit is same as above table.

TEST RESULTS

Remark: we tested all Op 5 to Op 7, recorded worst case at Op 5 to Op 6(test Frequency: 450.5MHz) and Op 10.

Test mode:	Op 5	Polarization	L1



MEASUREMENT RESULT: "GM0401513_fin"

4/1/2015 3:17PM

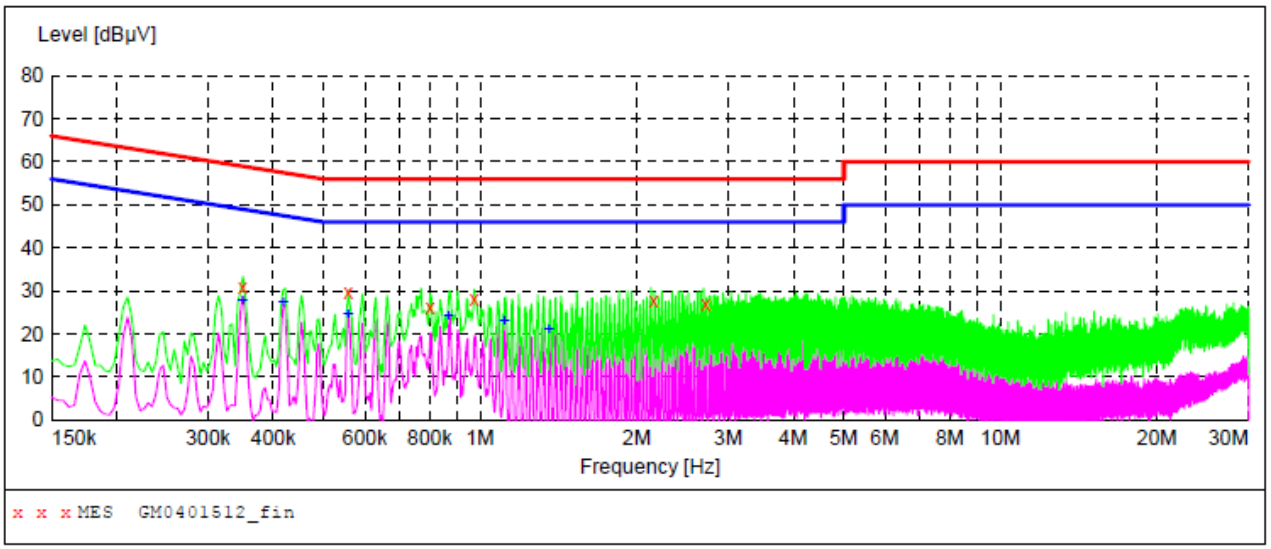
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.346000	50.70	10.2	59	8.4	QP	L1	GND
0.450000	48.50	10.2	57	8.4	QP	L1	GND
0.586000	46.20	10.2	56	9.8	QP	L1	GND
1.626000	48.20	10.2	56	7.8	QP	L1	GND
1.938000	46.80	10.2	56	9.2	QP	L1	GND
2.458000	45.20	10.3	56	10.8	QP	L1	GND

MEASUREMENT RESULT: "GM0401513_fin2"

4/1/2015 3:17PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.414000	39.40	10.2	48	8.2	AV	L1	GND
0.450000	36.80	10.2	47	10.1	AV	L1	GND
0.658000	36.80	10.2	46	9.2	AV	L1	GND
1.074000	35.40	10.2	46	10.6	AV	L1	GND
1.418000	36.20	10.2	46	9.8	AV	L1	GND
2.114000	33.10	10.2	46	12.9	AV	L1	GND

Test mode:	Op 5	Polarization	N



MEASUREMENT RESULT: "GM0401512_fin"

4/1/2015 3:13PM

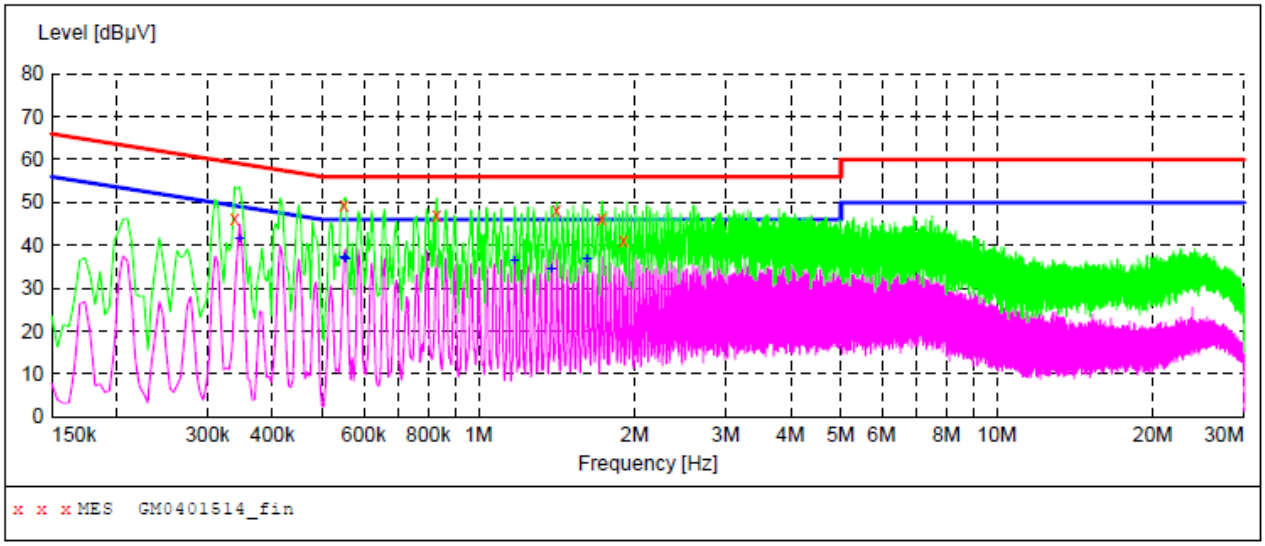
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.350000	30.80	10.2	59	28.2	QP	N	GND
0.558000	29.70	10.2	56	26.3	QP	N	GND
0.802000	26.20	10.2	56	29.8	QP	N	GND
0.974000	28.00	10.2	56	28.0	QP	N	GND
2.158000	27.90	10.2	56	28.1	QP	N	GND
2.714000	26.90	10.3	56	29.1	QP	N	GND

MEASUREMENT RESULT: "GM0401512_fin2"

4/1/2015 3:13PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.350000	27.80	10.2	49	21.2	AV	N	GND
0.418000	27.50	10.2	48	20.0	AV	N	GND
0.558000	24.60	10.2	46	21.4	AV	N	GND
0.870000	24.30	10.2	46	21.7	AV	N	GND
1.114000	23.00	10.2	46	23.0	AV	N	GND
1.358000	21.20	10.2	46	24.8	AV	N	GND

Test mode:	Op 6	Polarization	L1



MEASUREMENT RESULT: "GM0401514_fin"

4/1/2015 3:20PM

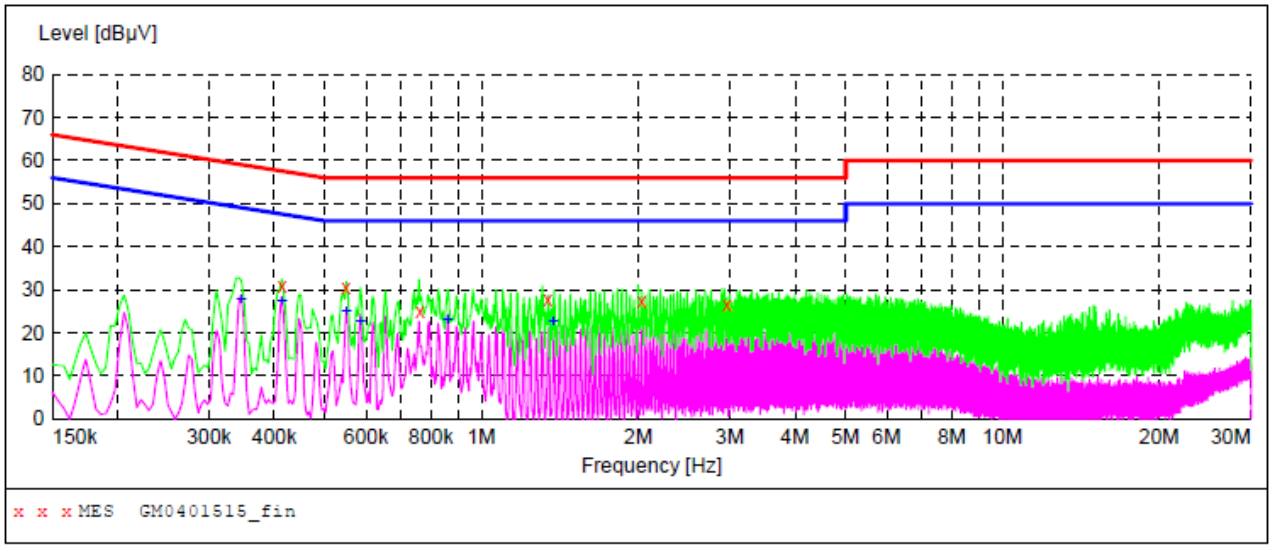
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.338000	46.40	10.2	59	12.9	QP	L1	GND
0.550000	49.50	10.2	56	6.5	QP	L1	GND
0.830000	47.10	10.2	56	8.9	QP	L1	GND
1.414000	48.10	10.2	56	7.9	QP	L1	GND
1.726000	46.10	10.2	56	9.9	QP	L1	GND
1.902000	41.20	10.2	56	14.8	QP	L1	GND

MEASUREMENT RESULT: "GM0401514_fin2"

4/1/2015 3:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.346000	41.60	10.2	49	7.5	AV	L1	GND
0.550000	37.30	10.2	46	8.7	AV	L1	GND
0.554000	36.60	10.2	46	9.4	AV	L1	GND
1.174000	36.40	10.2	46	9.6	AV	L1	GND
1.382000	34.60	10.2	46	11.4	AV	L1	GND
1.622000	37.00	10.2	46	9.0	AV	L1	GND

Test mode:	Op 6	Polarization	N



MEASUREMENT RESULT: "GM0401515_fin"

4/1/2015 3:24PM

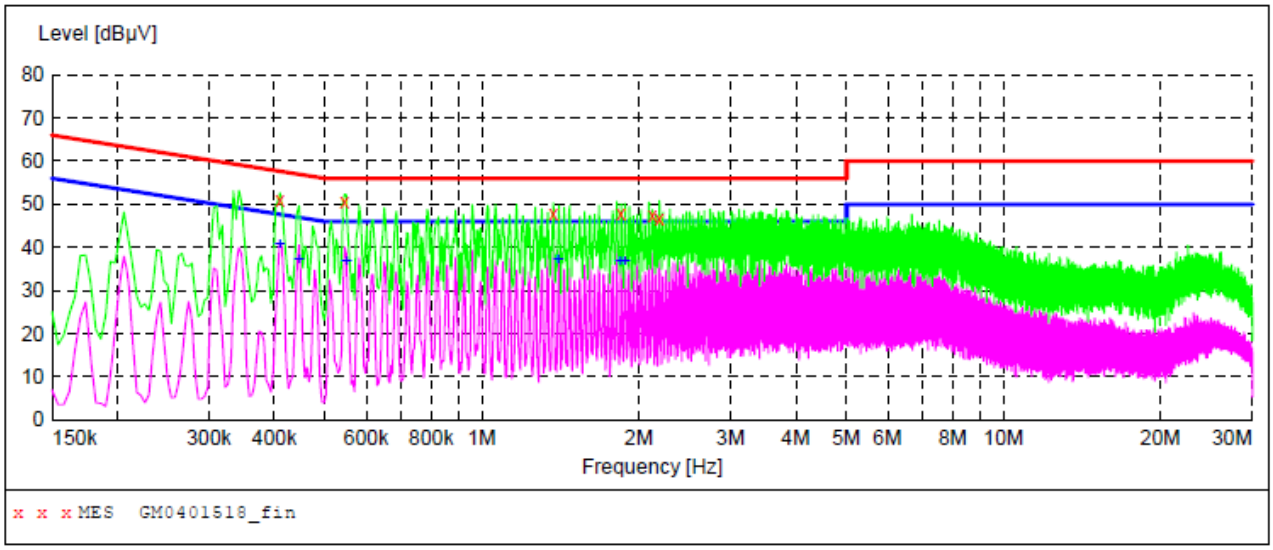
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.414000	30.90	10.2	58	26.7	QP	N	GND
0.550000	30.60	10.2	56	25.4	QP	N	GND
0.762000	24.90	10.2	56	31.1	QP	N	GND
1.342000	27.60	10.2	56	28.4	QP	N	GND
2.030000	27.20	10.2	56	28.8	QP	N	GND
2.958000	26.70	10.3	56	29.3	QP	N	GND

MEASUREMENT RESULT: "GM0401515_fin2"

4/1/2015 3:24PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.346000	27.70	10.2	49	21.4	AV	N	GND
0.414000	27.40	10.2	48	20.2	AV	N	GND
0.550000	25.10	10.2	46	20.9	AV	N	GND
0.586000	22.80	10.2	46	23.2	AV	N	GND
0.862000	23.10	10.2	46	22.9	AV	N	GND
1.374000	22.60	10.2	46	23.4	AV	N	GND

Test mode:	Op 7	Polarization	L1



MEASUREMENT RESULT: "GM0401518_fin"

4/1/2015 3:34PM

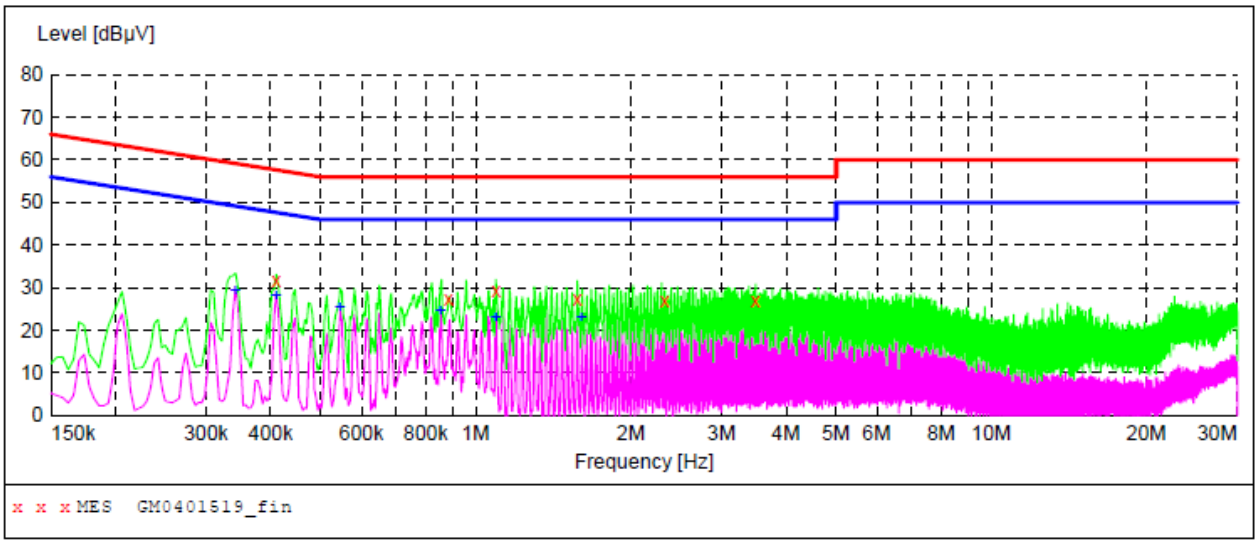
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.410000	51.10	10.2	58	6.5	QP	L1	GND
0.546000	50.70	10.2	56	5.3	QP	L1	GND
1.370000	47.90	10.2	56	8.1	QP	L1	GND
1.846000	47.90	10.2	56	8.1	QP	L1	GND
2.122000	47.50	10.2	56	8.5	QP	L1	GND
2.190000	46.70	10.2	56	9.3	QP	L1	GND

MEASUREMENT RESULT: "GM0401518_fin2"

4/1/2015 3:34PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.410000	40.70	10.2	48	6.9	AV	L1	GND
0.446000	37.30	10.2	47	9.6	AV	L1	GND
0.550000	36.80	10.2	46	9.2	AV	L1	GND
1.402000	37.20	10.2	46	8.8	AV	L1	GND
1.846000	36.60	10.2	46	9.4	AV	L1	GND
1.882000	37.00	10.2	46	9.0	AV	L1	GND

Test mode:	Op 7	Polarization	N



MEASUREMENT RESULT: "GM0401519_fin"

4/1/2015 3:37PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.410000	31.80	10.2	58	25.8	QP	N	GND
0.886000	27.40	10.2	56	28.6	QP	N	GND
1.094000	29.40	10.2	56	26.6	QP	N	GND
1.574000	27.20	10.2	56	28.8	QP	N	GND
2.326000	26.90	10.3	56	29.1	QP	N	GND
3.486000	26.90	10.3	56	29.1	QP	N	GND

MEASUREMENT RESULT: "GM0401519_fin2"

4/1/2015 3:37PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.342000	29.20	10.2	49	20.0	AV	N	GND
0.410000	28.20	10.2	48	19.4	AV	N	GND
0.546000	25.20	10.2	46	20.8	AV	N	GND
0.854000	24.70	10.2	46	21.3	AV	N	GND
1.094000	23.20	10.2	46	22.8	AV	N	GND
1.606000	23.20	10.2	46	22.8	AV	N	GND

4.2. Maximum Transmitter Power

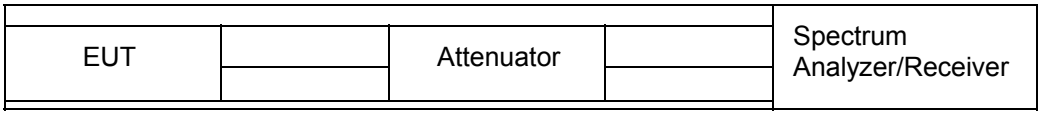
TEST APPLICABLE

Per FCC Part 2.1046 and Part 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.
Per RSS-119 Section 5.4 and 5.4.1: The output power shall be within ±1.0 dB of the manufacturer's rated power. 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 20 dB attenuator.
Measurement with Spectrum Analyzer E4407B conducted, external power supply with 7.20 V stabilized supply voltage.

TEST CONFIGURATION



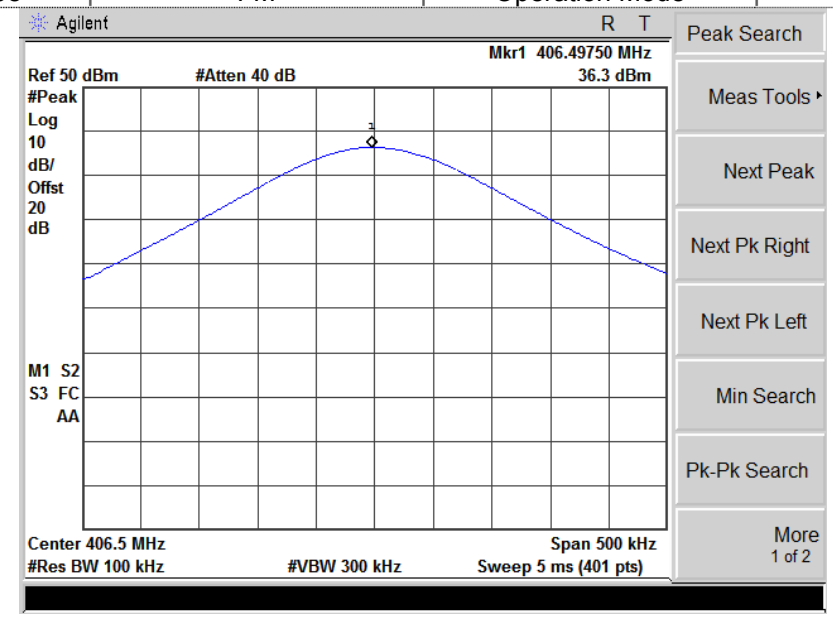
The EUT was directly connected to a RF Communication
Test set by a 20 dB attenuator

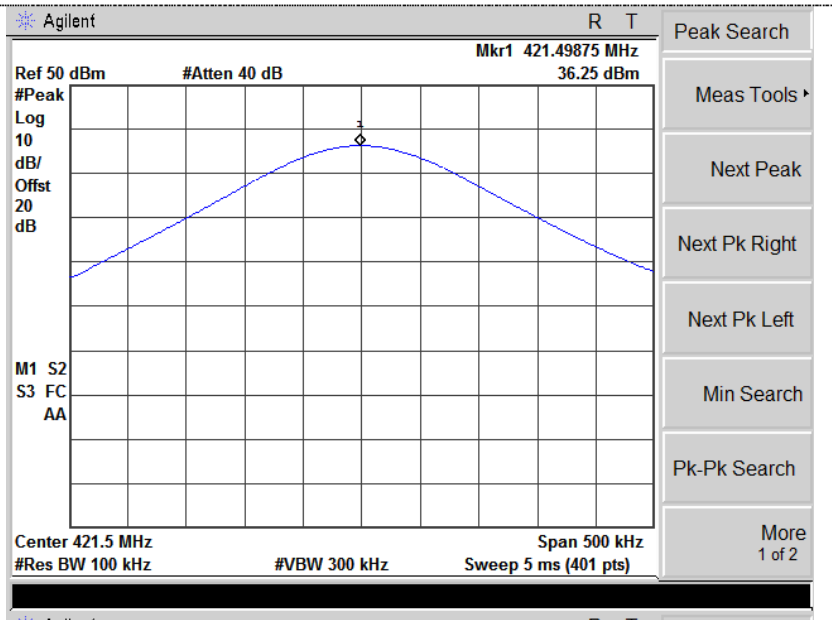
TEST RESULTS

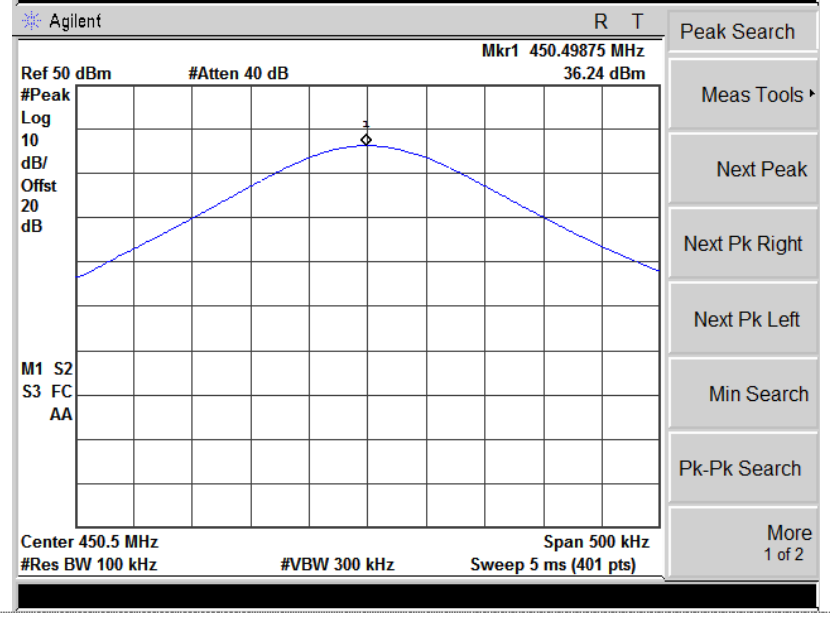
Operation Mode	Test Frequency (MHz)	Measured power (dBm)	Difference (dB)	Limit (dB)	Result
Op 1	406.5	36.30	0.07	-1 ~ +1	Pass
	421.5	36.25	0.02		
	450.5	36.24	0.01		
	469.5	36.01	-0.22		
Op 2	406.5	30.60	-0.19	-1 ~ +1	Pass
	421.5	30.64	-0.15		
	450.5	30.50	-0.29		
	469.5	30.11	-0.68		
Op 3	406.5	36.27	0.04	-1 ~ +1	Pass
	421.5	36.31	0.08		
	450.5	36.36	0.13		
	469.5	36.15	-0.08		
Op 4	406.5	30.63	-0.16	-1 ~ +1	Pass
	421.5	30.71	-0.08		
	450.5	30.57	-0.22		
	469.5	30.15	-0.64		

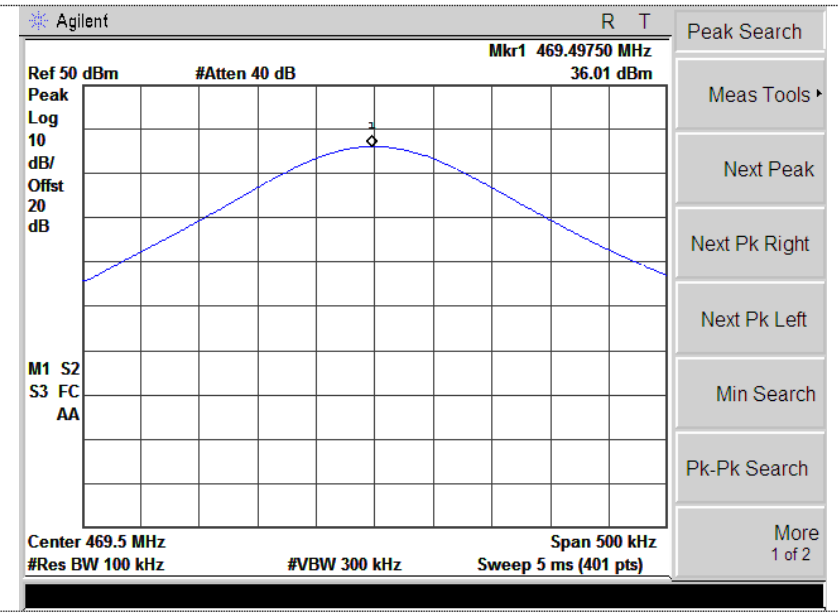
Test plot as follows:

Modulation Type	FM	Operation Mode	Op 1

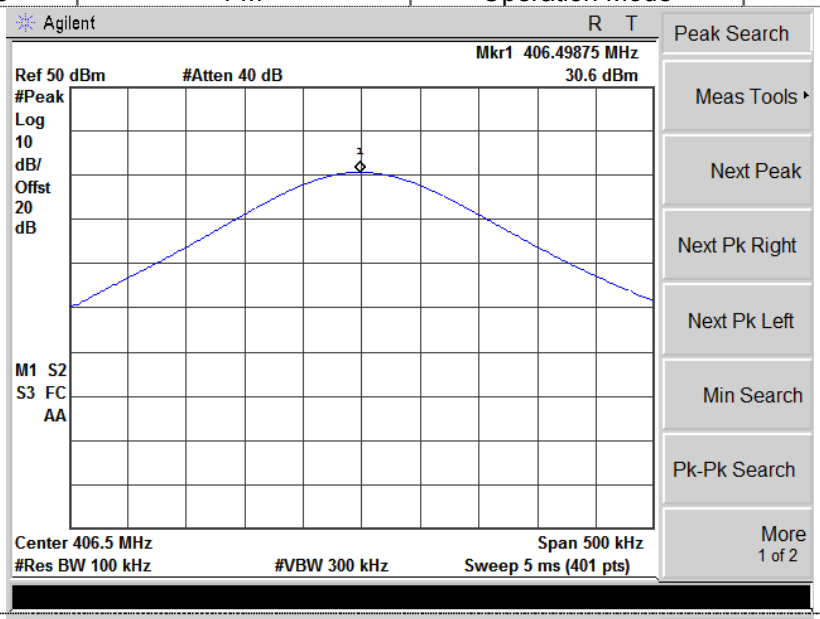


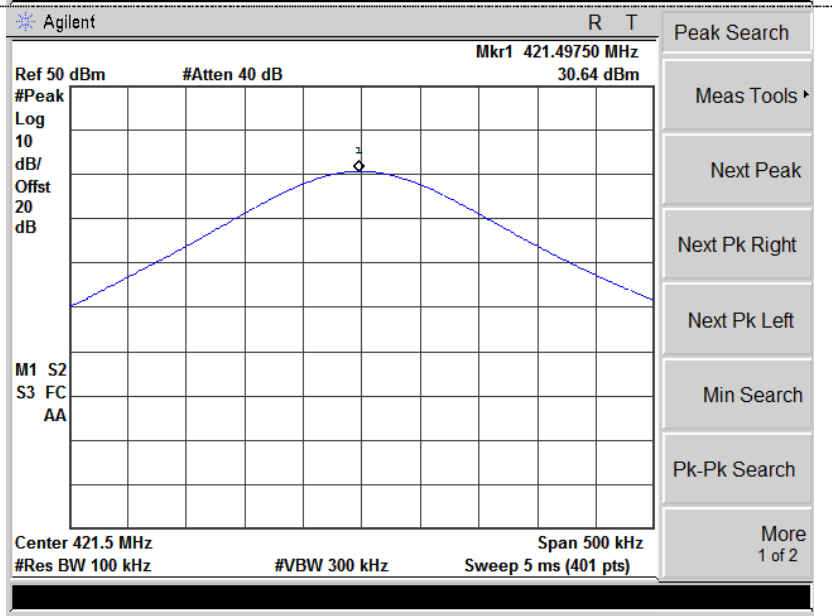


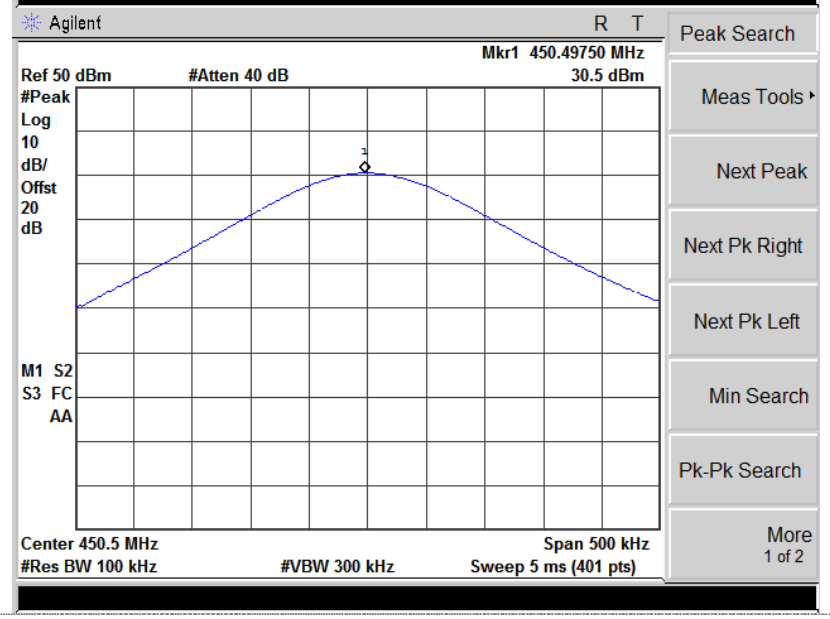


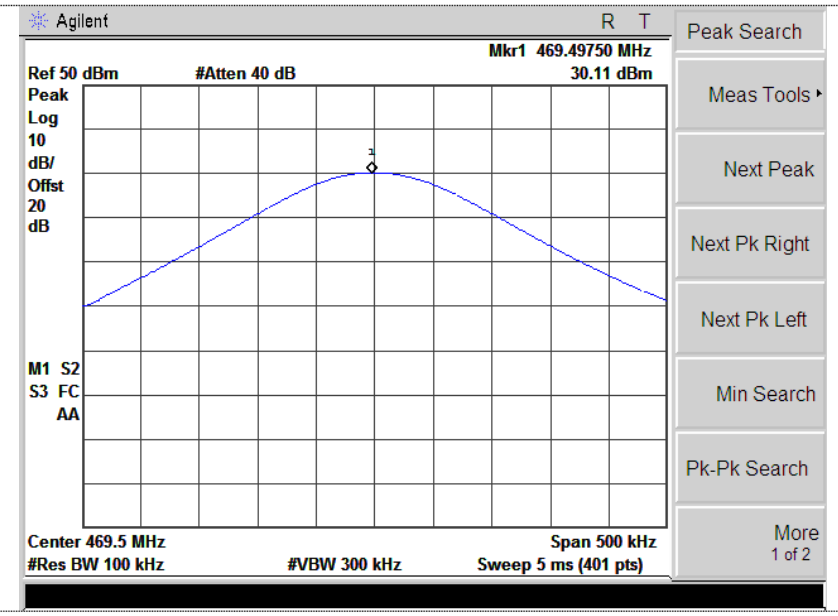

Agilent
R T
Mkr1 469.49750 MHz
Ref 50 dBm
#Atten 40 dB
36.01 dBm
Peak
Log
10
dB/
Offst
20
dB
M1 S2
S3 FC
AA
Center 469.5 MHz
Span 500 kHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

Modulation Type	FM	Operation Mode	Op 2

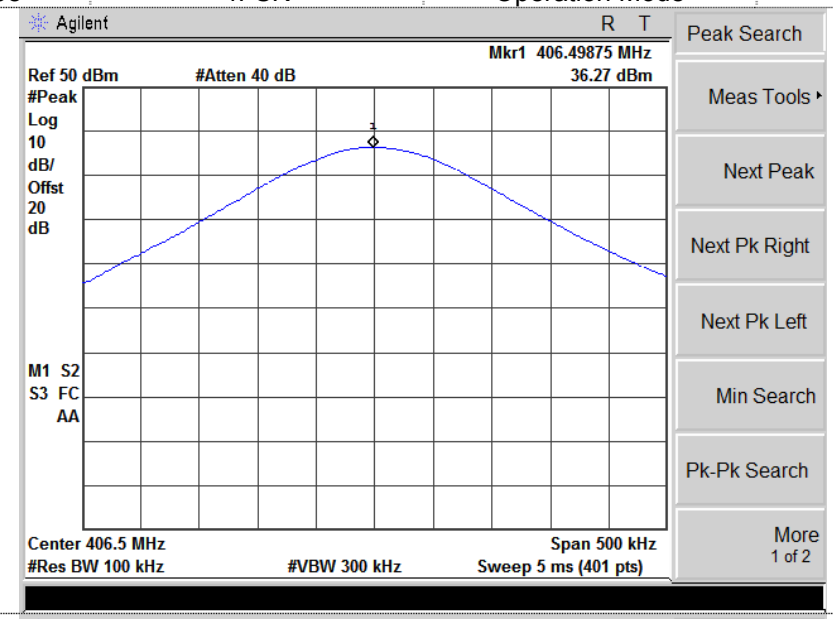


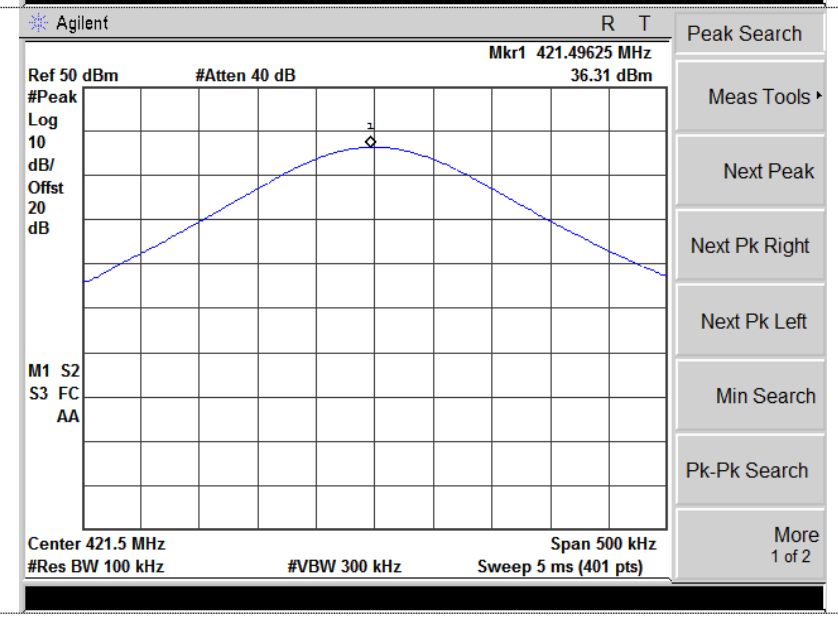


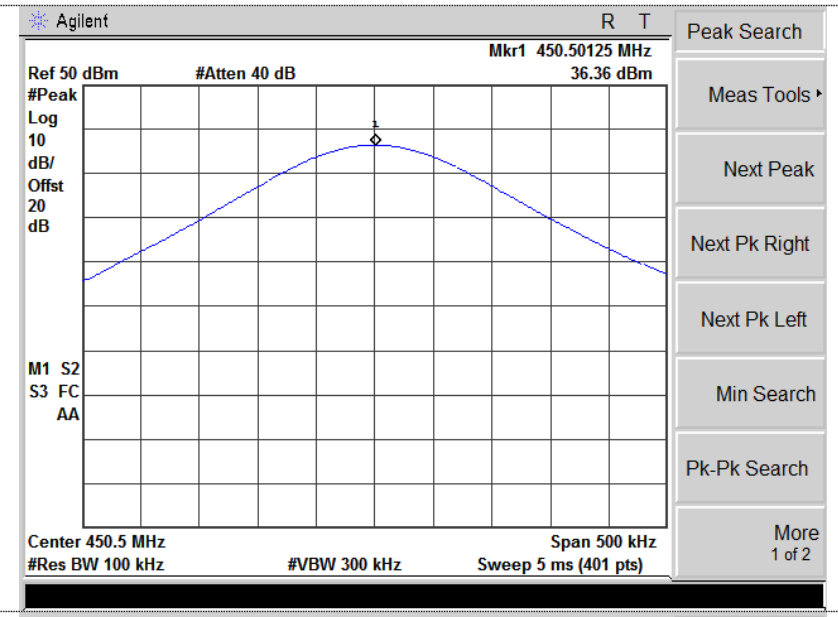


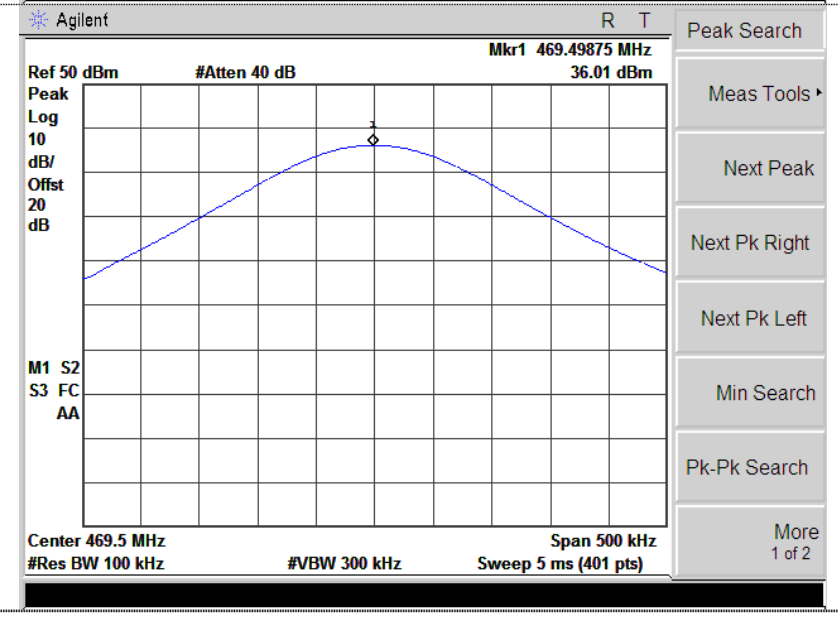


Modulation Type	4FSK	Operation Mode	Op 3

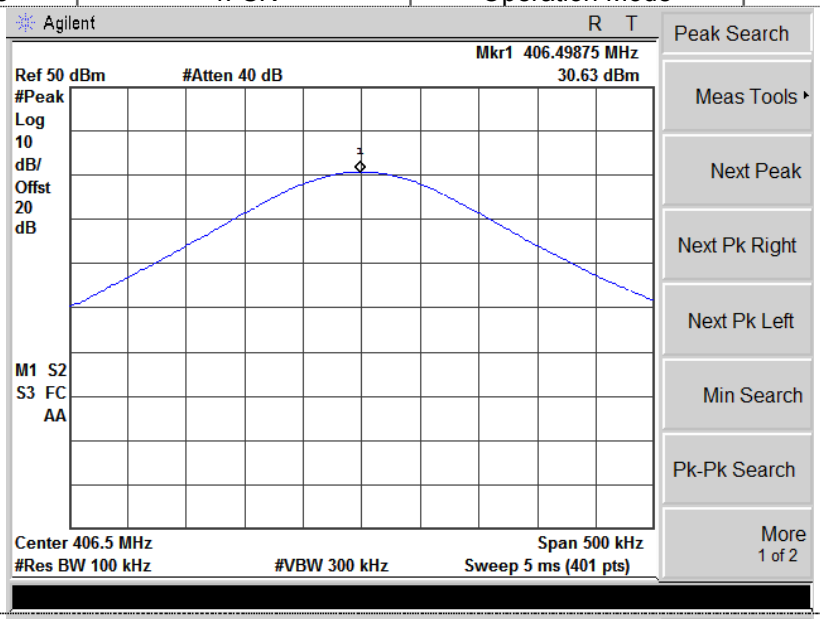


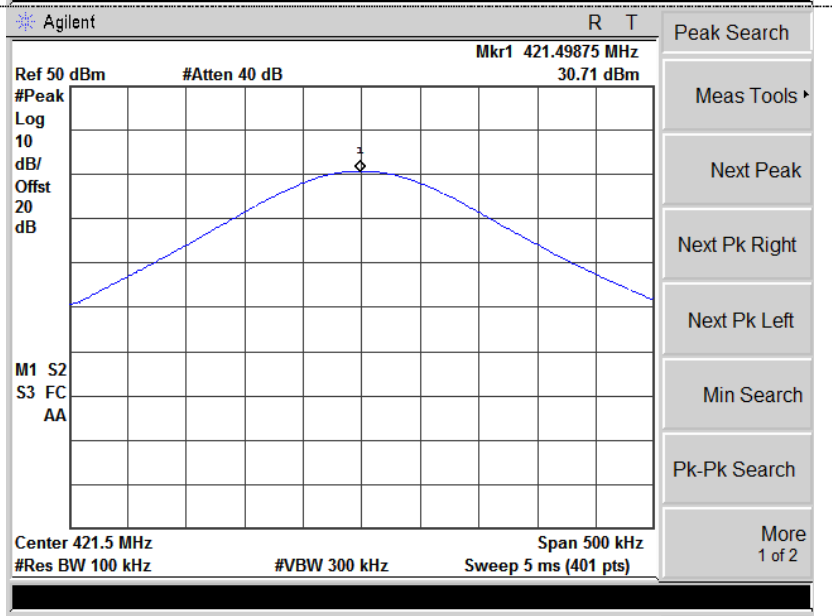


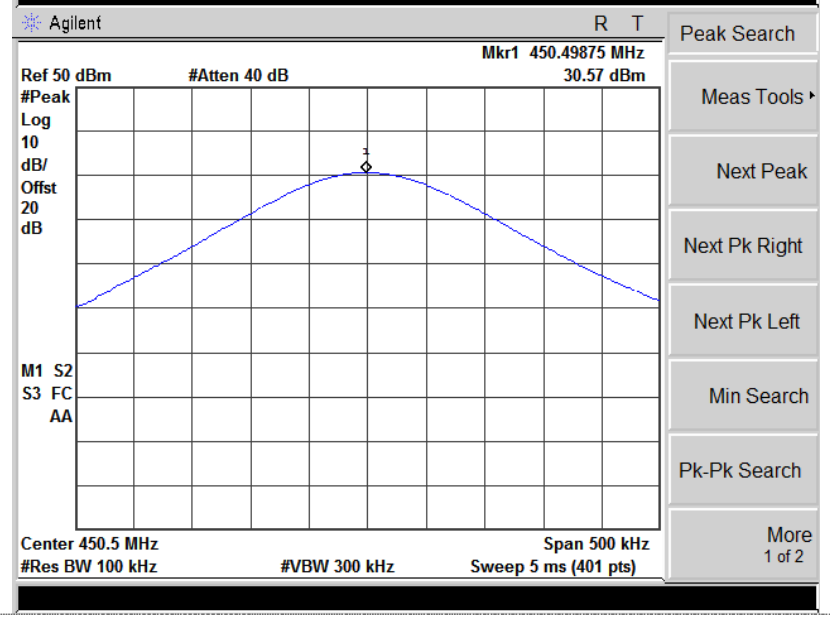

Agilent
R T
Mkr1 450.50125 MHz
Ref 50 dBm
#Atten 40 dB
36.36 dBm
#Peak
Log
10
dB/
Offst
20
dB
M1 S2
S3 FC
AA
Center 450.5 MHz
Span 500 kHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

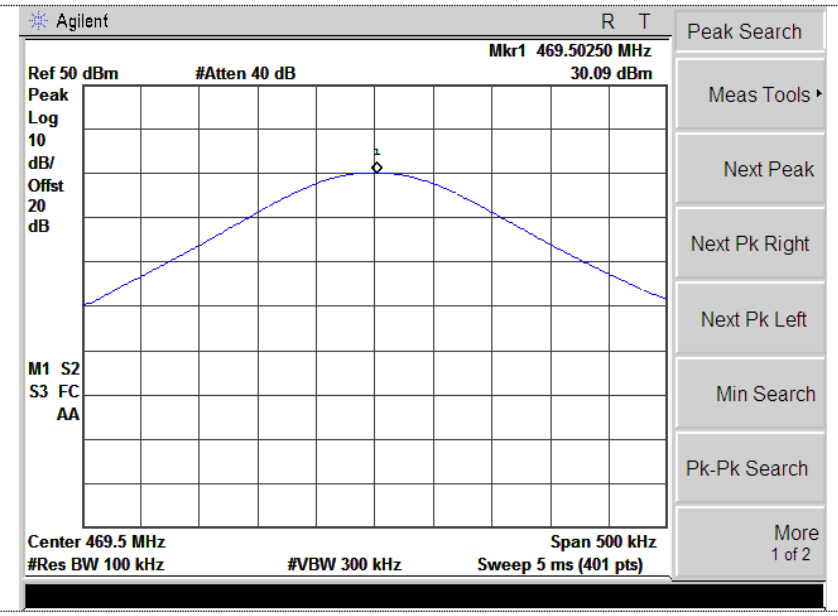

Agilent
R T
Mkr1 469.49875 MHz
Ref 50 dBm
#Atten 40 dB
36.01 dBm
Peak
Log
10
dB/
Offst
20
dB
M1 S2
S3 FC
AA
Center 469.5 MHz
Span 500 kHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

Modulation Type	4FSK	Operation Mode	Op 4







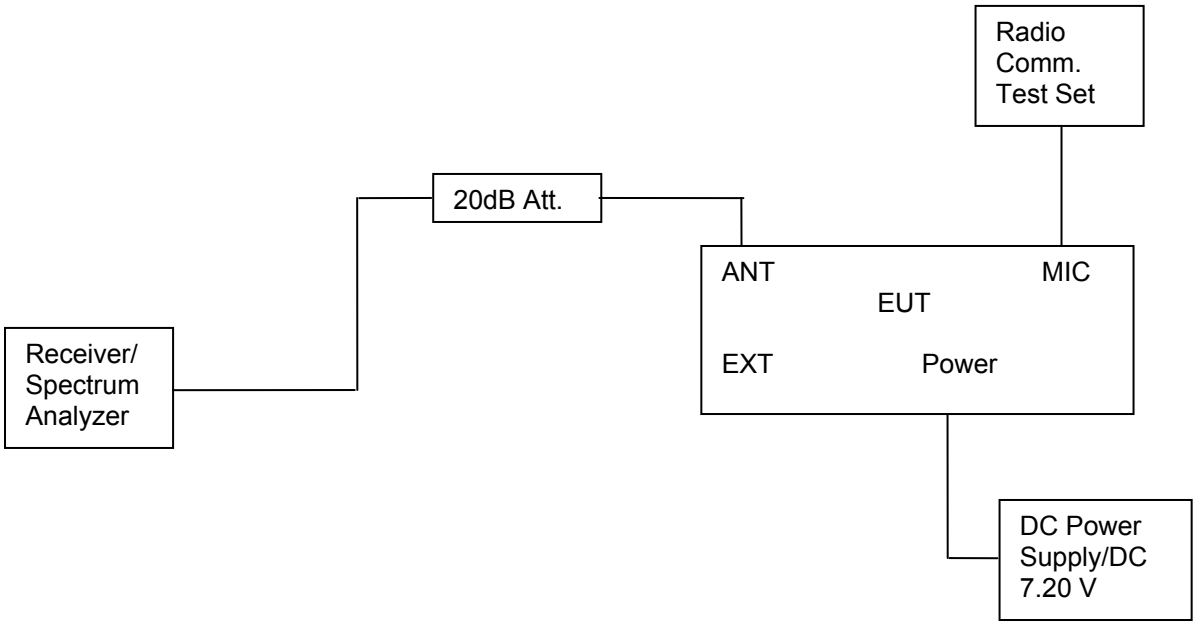

Agilent
R T
Mkr1 469.50250 MHz
Ref 50 dBm
#Atten 40 dB
30.09 dBm
Peak
Log
10
dB/
Offst
20
dB
M1 S2
S3 FC
AA
Center 469.5 MHz
Span 500 kHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

4.3. Occupied Bandwidth

TEST APPLICABLE

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.

TEST CONFIGURATION



TEST PROCEDURE

1 The EUT was modulated by 2.5kHz 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 (12.5kHz channel spacing).
2 Set EUT as normal operation.
1)Set SPA Center Frequency = fundamental frequency, RBW=100Hz, VBW=300Hz,span=50kHz for 12.5KHz channel spacing.
3 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.
4 Set SPA Center Frequency=fundamental frequency, set =100Hz, VBW=300Hz, span=50kHz for 12.5KHz channel spacing.

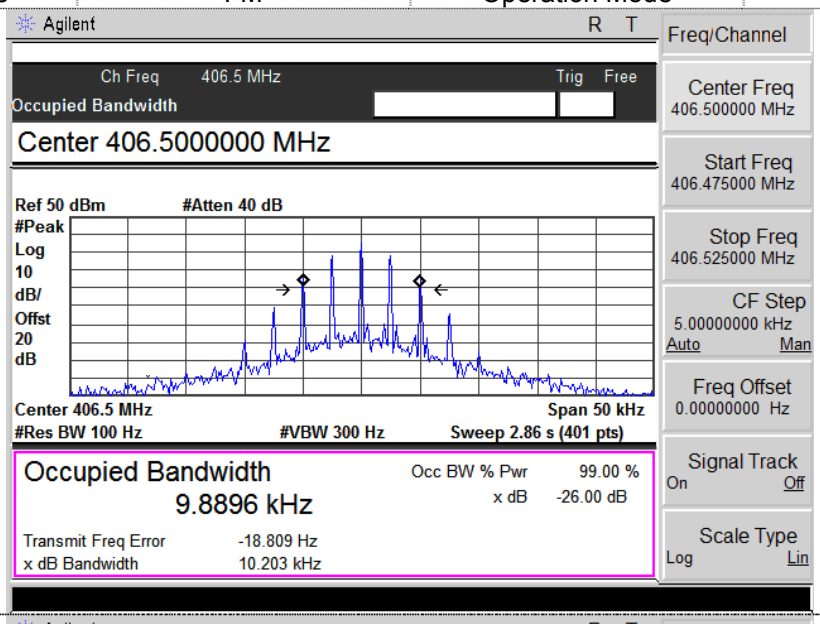
TEST RESULTS

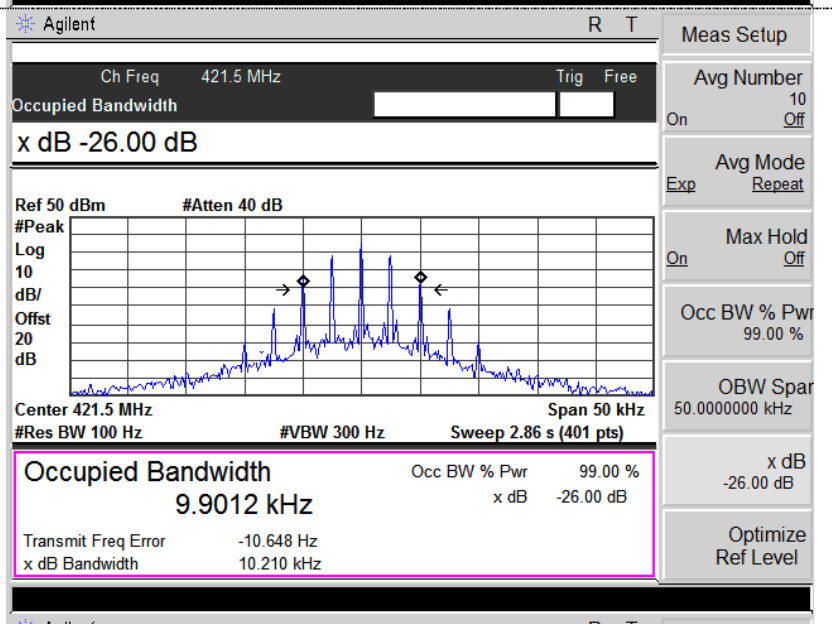
Remark:We tested Op 1 to Op 4,reocrded worst case at Op 1,Op 3.

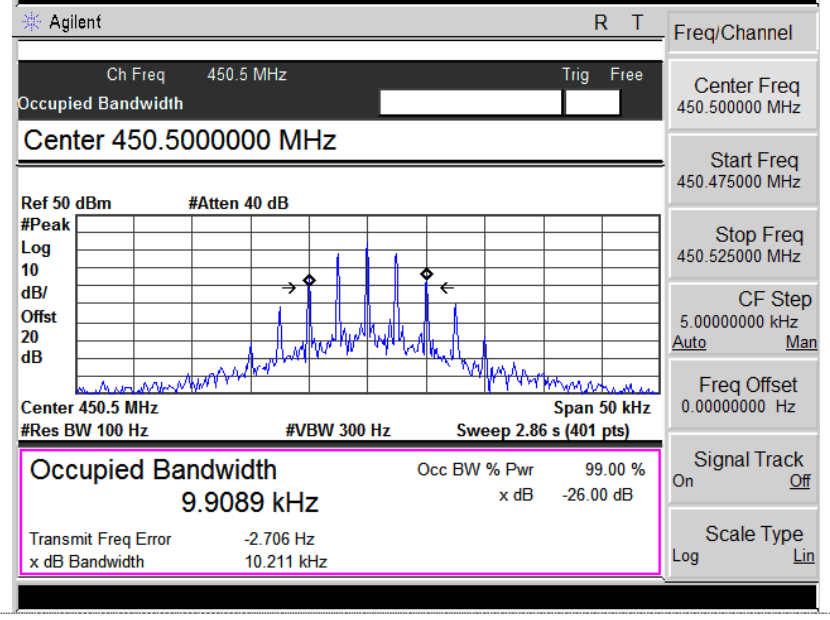
Operation Mode	Test Frequency (MHz)	Occupied Bandwidth (kHz)		Limit (kHz)	Result
		99%	26dB		
Op 1	406.5	9.89	10.20	⩽11.25	Pass
	421.5	9.90	10.21		
	450.5	9.91	10.21		
	469.5	9.89	10.20		
Op 3	406.5	6.77	9.16	⩽11.25	Pass
	421.5	6.37	8.98		
	450.5	6.66	8.82		
	469.5	6.74	9.10		

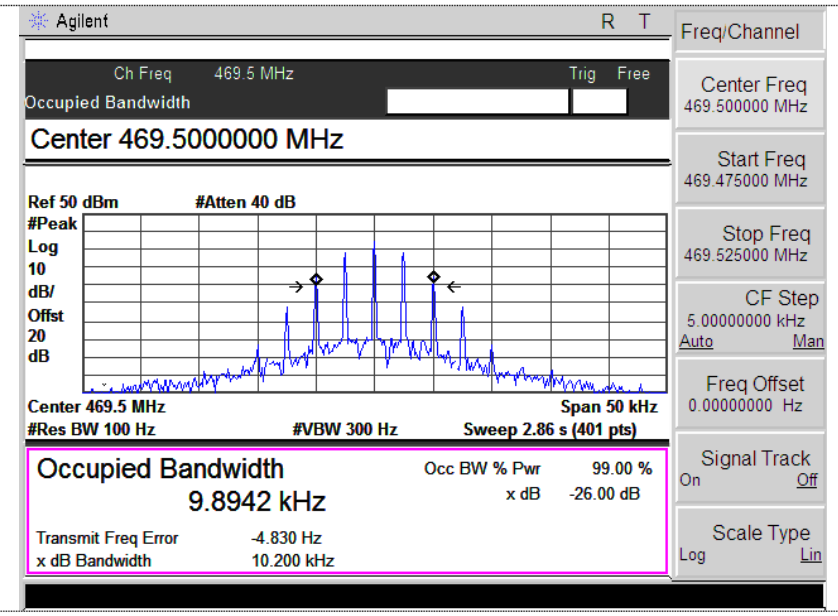
Test plot as follows:

Modulation Type	FM	Operation Mode	Op 1

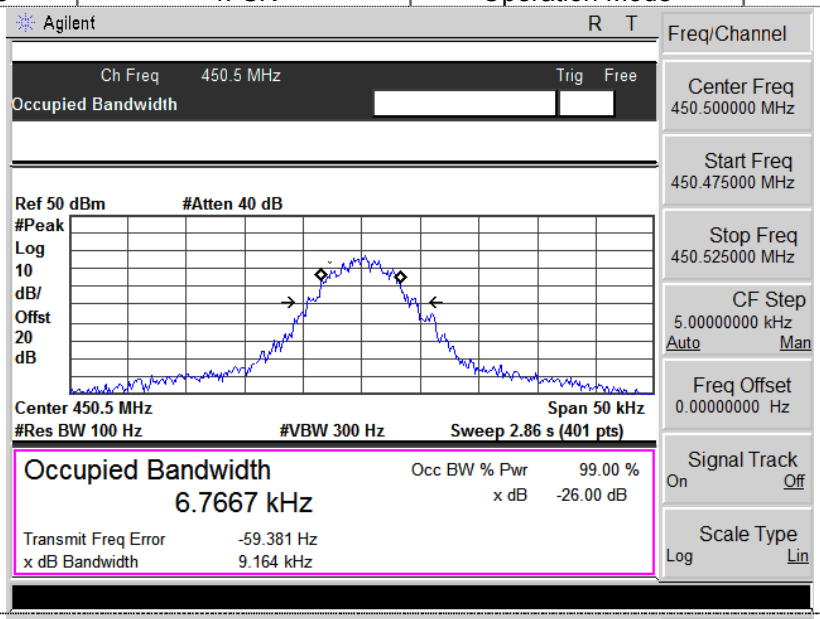


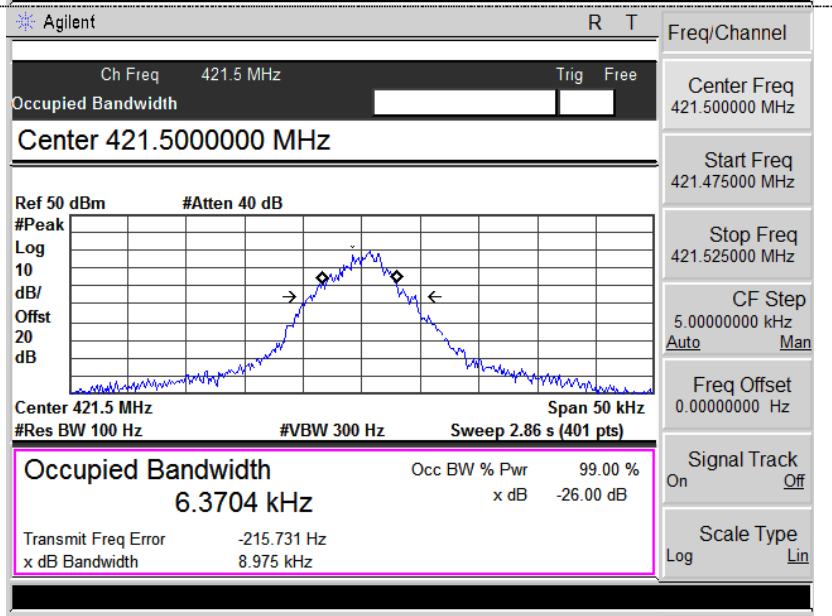


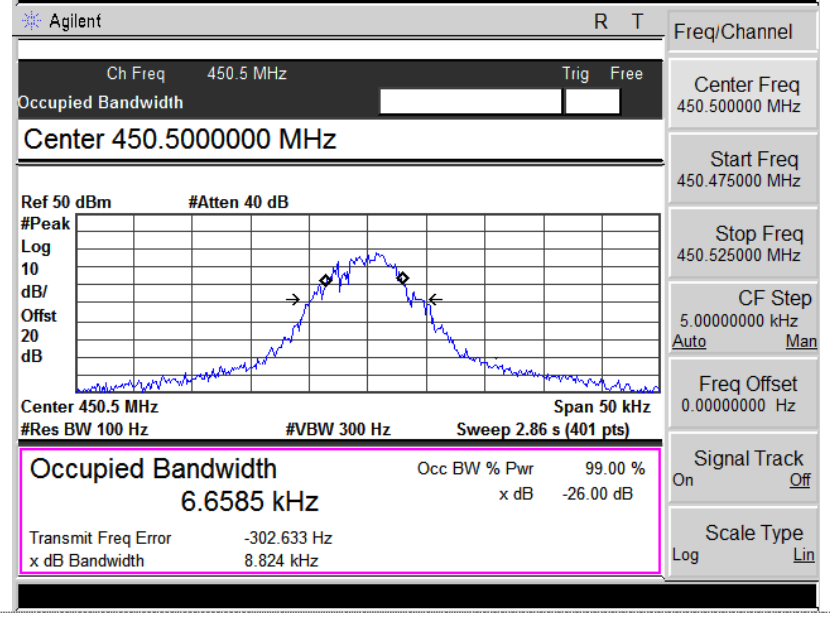


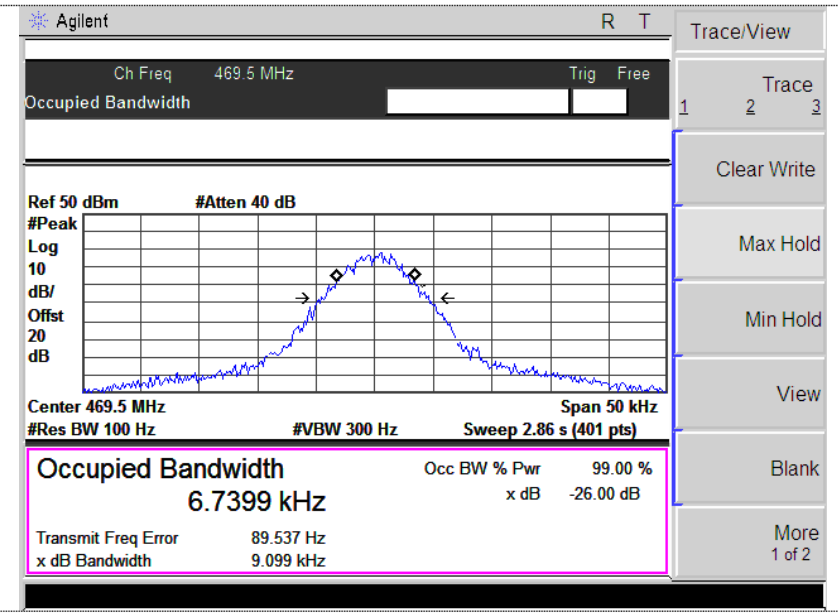

Agilent
R T
Ch Freq 469.5 MHz
Trig Free
Occupied Bandwidth
Center 469.5000000 MHz
Ref 50 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
20
dB
Center 469.5 MHz
Span 50 kHz
#Res BW 100 Hz
#VBW 300 Hz
Sweep 2.86 s (401 pts)
Occupied Bandwidth
9.8942 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -4.830 Hz
x dB Bandwidth 10.200 kHz
Freq/Channel
Center Freq
469.500000 MHz
Start Freq
469.475000 MHz
Stop Freq
469.525000 MHz
CF Step
5.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

Modulation Type	4FSK	Operation Mode	Op 3








Agilent
R T
Trace/View
Ch Freq 469.5 MHz
Trig Free
Occupied Bandwidth
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2
Ref 50 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
20
dB
Center 469.5 MHz
Span 50 kHz
#Res BW 100 Hz
#VBW 300 Hz
Sweep 2.86 s (401 pts)
Occupied Bandwidth
6.7399 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 89.537 Hz
x dB Bandwidth 9.099 kHz

4.4. Emission Mask

TEST APPLICABLE

According to §90.210

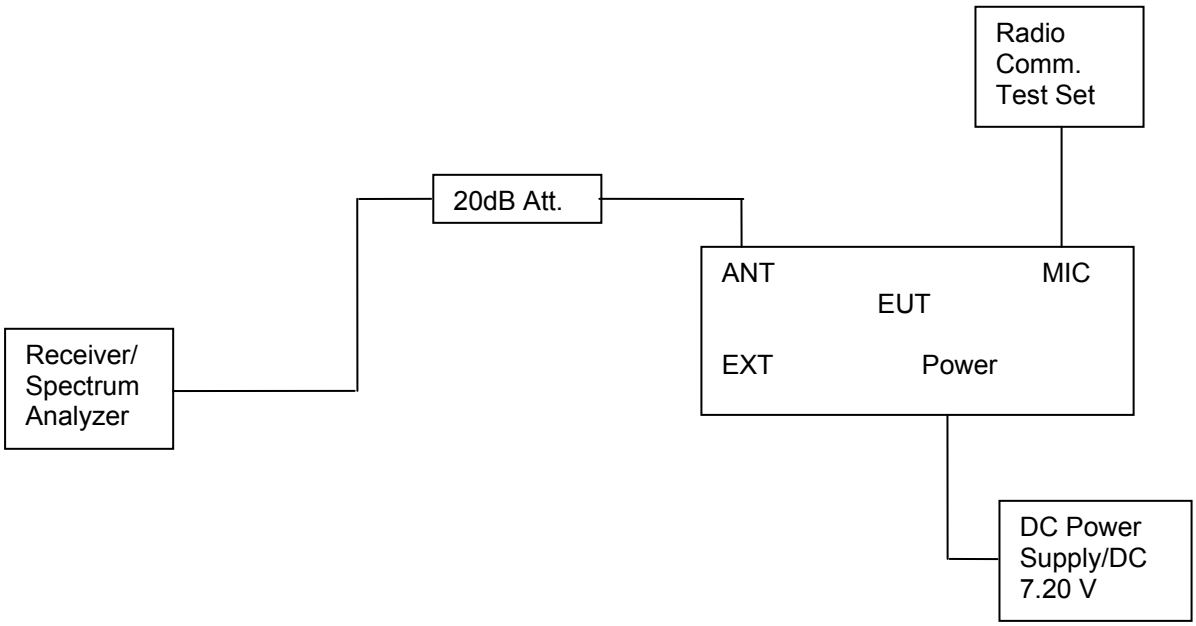
(b). Emission Mask D:12.5 kHz channel bandwidth equipment: For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0: Zero dB.

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

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

TEST CONFIGURATION



TEST PROCEDURE

1.The EUT was modulated by 2.5kHz 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 (12.5kHz channel spacing).

2.Set EUT as normal operation.

1)Set SPA Center Frequency = fundamental frequency, RBW=100Hz, VBW=300Hz,span=50kHz for 12.5KHz channel spacing.

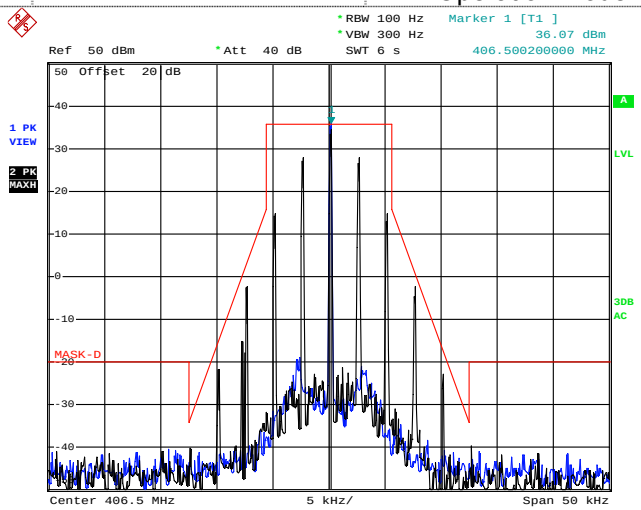
TEST RESULTS

Remark:We tested Op 1 to Op 4,reocrded worst case at Op 1,Op 3.

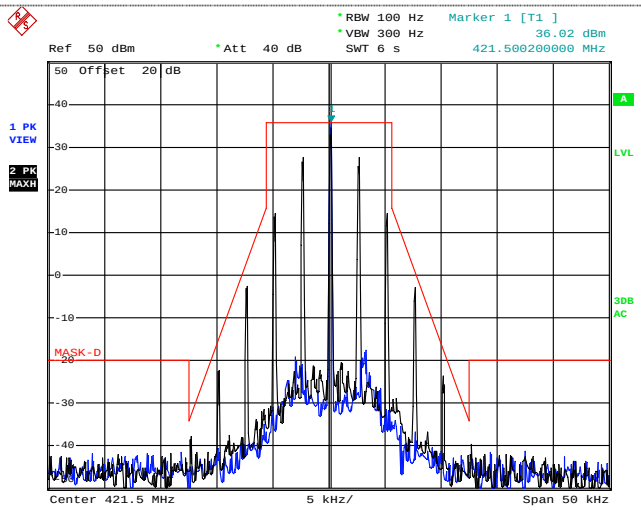
Operation Mode	Test Frequency (MHz)	RBW (Hz)	Applicable Mask	Result
Op 1	406.5	100.00	D	Pass
	421.5			
	450.5			
	469.5			
Op 3	406.5	100.00	D	Pass
	421.5			
	450.5			
	469.5			

Test plot as follows:

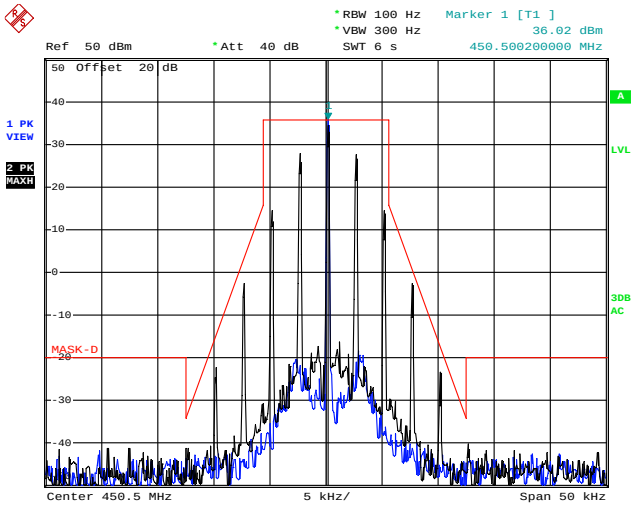
Modulation Type	FM	Operation Mode	Op 1



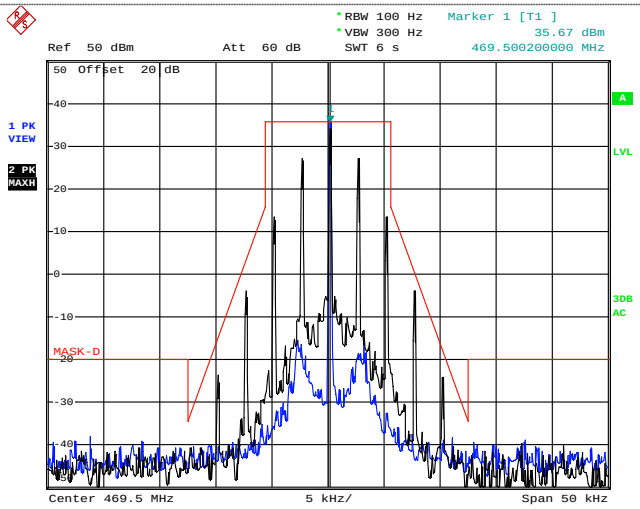
Date: 22.MAY.2015 14:41:23



Date: 22.MAY.2015 14:43:33

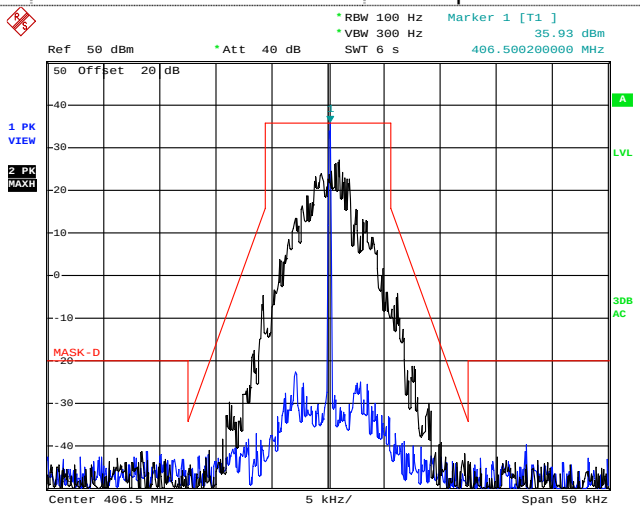


Date: 22.MAY.2015 14:53:48

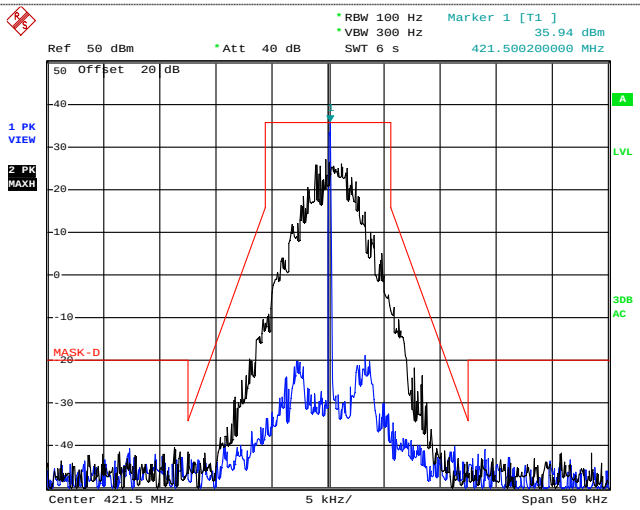


Date: 30.MAR.2015 17:19:15

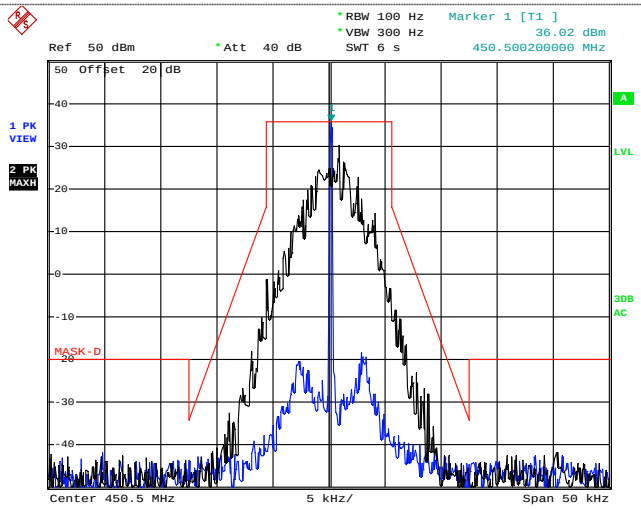
Modulation Type	4FSK	Operation Mode	Op 3



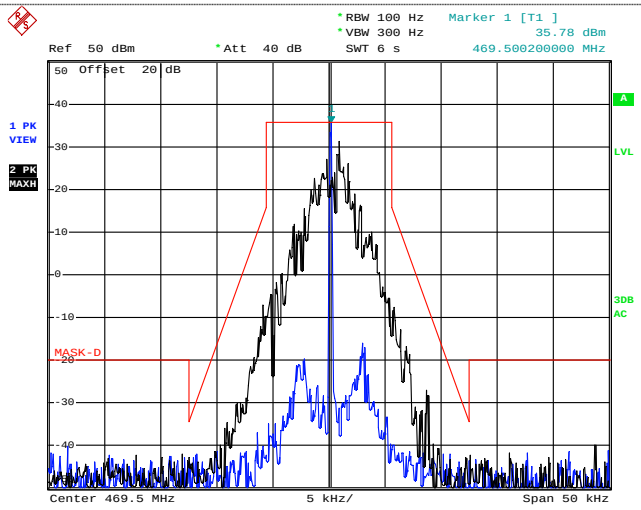
Date: 22.MAY.2015 14:59:55



Date: 22.MAY.2015 14:57:55



Date: 22.MAY.2015 14:55:07



Date: 30.MAR.2015 18:16:42

4.5. Modulation Charcateristics

TEST APPLICABLE

According to CFR47 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

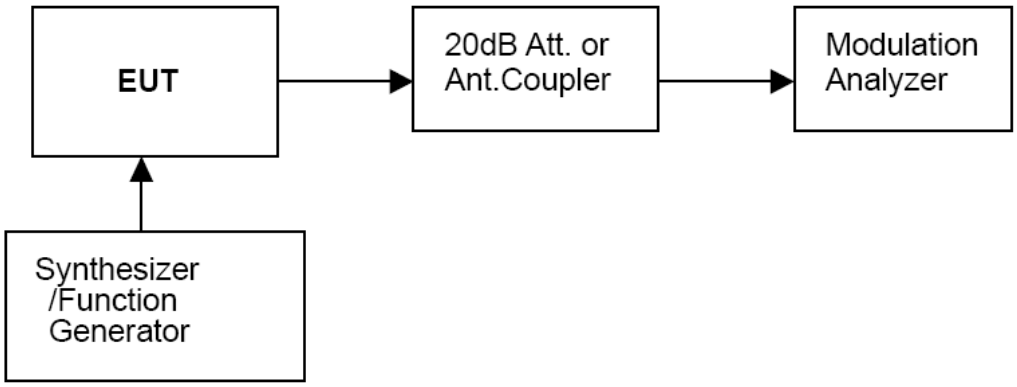
Modulation Limit

1 Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1kHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.
2 Repeat step 1 with input frequency changing to 300, 1004, 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 1kHz 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 1kHz reference).

TEST CONFIGURATION



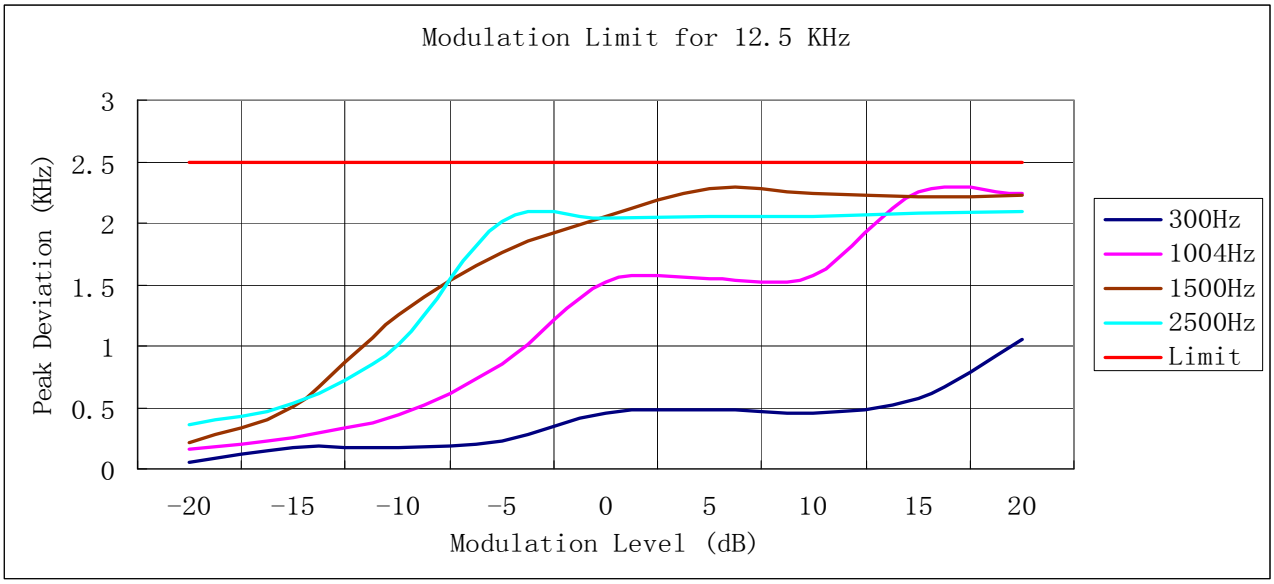
TEST RESULTS

Remark:We tested and recorded Op 1 for 450.5MHz.

a).Modulation Limit:

Op 1: 450.5MHz						
Modulation Level (dB)	Peak Freq. Deviation At 300Hz (kHz)	Peak Freq. Deviation At 1004Hz (kHz)	Peak Freq. Deviation At 1500Hz (kHz)	Peak Freq. Deviation At 2500 Hz (kHz)	Limit (kHz)	Result
-20	0.04	0.15	0.23	0.34	2.5	Pass
-15	0.19	0.23	0.52	0.51		
-10	0.17	0.45	1.23	1.01		
-5	0.22	0.84	1.75	2.03		
0	0.44	1.53	2.07	2.03		
5	0.48	1.55	2.28	2.05		
10	0.47	1.55	2.22	2.04		
15	0.54	2.23	2.23	2.07		
20	1.04	2.23	2.21	2.07		

Test plot as follows:



b). Audio Frequency Response:

Method of Measurement:

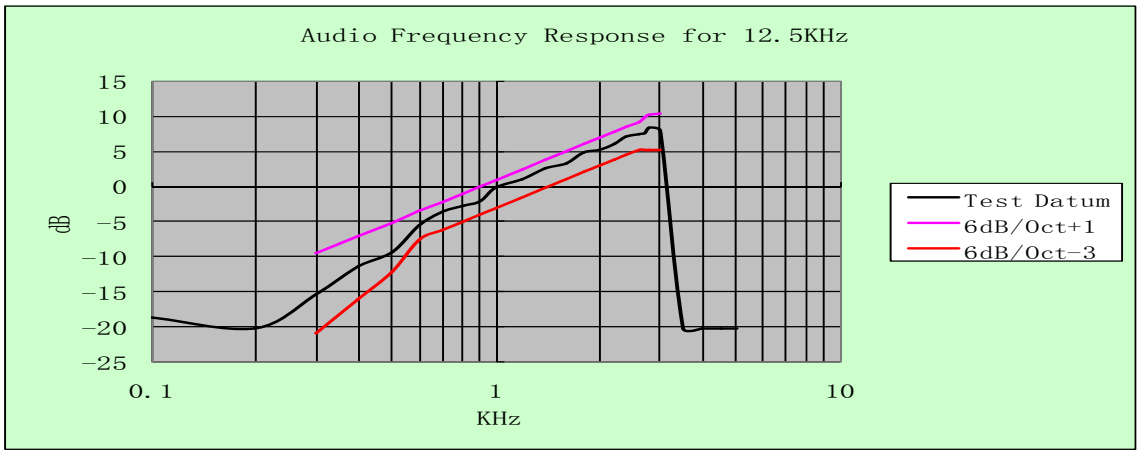
The audio frequency response was measured in accordance with TIA/EIA Specification 603 with no exception. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 300-3000Hz shall be submitted and Audio Post Limiter Low Pass Filter Response from 3.0kHz to 50kHz.However, the audio frequency response should test from 100Hz to 5.0 KHz according to FCC Part 2.1047(a).

Note:

1. The Audio Frequency Response is identical for 12.5 kHz channel separation

Op 1: 450.5MHz			
Frequency (kHz)	Frequency Deviation (kHz)	1kHz Refenerce Deviation (kHz)	Audio Frequency Response (dB)
0.1	0.05	0.48	-19.65
0.2	0.04	0.48	-21.58
0.3	0.08	0.48	-15.56
0.4	0.13	0.48	-11.35
0.5	0.19	0.48	-8.05
0.6	0.26	0.48	-5.33
0.7	0.35	0.48	-2.74
0.8	0.38	0.48	-2.03
0.9	0.42	0.48	-1.16
1	0.48	0.48	0.00
1.2	0.58	0.48	1.64
1.4	0.7	0.48	3.28
1.6	0.75	0.48	3.88
1.8	0.92	0.48	5.65
2	0.94	0.48	5.84
2.2	1.02	0.48	6.55
2.4	1.17	0.48	7.74
2.6	1.22	0.48	8.10
2.7	1.24	0.48	8.24
2.8	1.37	0.48	9.11
3	1.28	0.48	8.52
3.5	0.06	0.48	-18.06
4	0.04	0.48	-21.58
4.5	0.04	0.48	-21.58
5	0.04	0.48	-21.58

Test plot as follows:


Audio Frequency Response for 12.5KHz
15
10
5
0
−5
−10
−15
−20
−25
dB
0.1
1
10
KHz
Test Datum
6dB/Oct+1
6dB/Oct−3

4.6. Frequency Stability Test

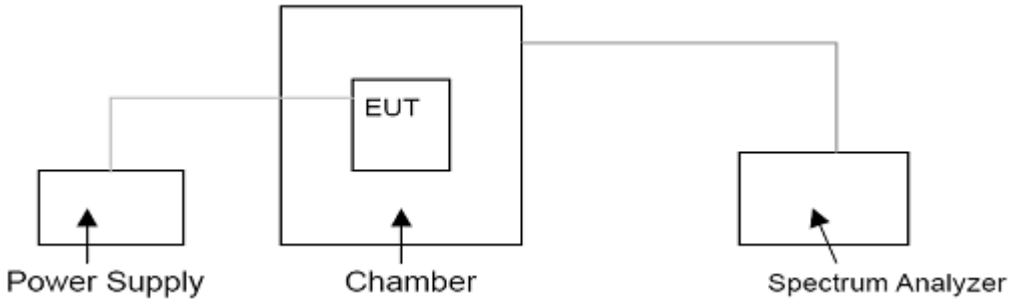
TEST APPLICABLE

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 (d) (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.
4 According to §90.213, the frequency stability limit is 2.5 ppm for 12.5kHz channel separation .
5 According to Section 5.3 of RSS-119, the frequency stability limit is 2.5 ppm for 12.5KHz 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 CONFIGURATION



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]	.....	.....	.....

According to section 5.3, Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Band (MHz)	**Channel Spacing (kHz)**	**Frequency Stability (ppm)**		
		Base/Fixed	**Mobile Station**	
			>2 watts	**≤ 2 watts**
27.41-28 and 29.7-50	20	20	20	50
72-76	20	5	20	50
138-174	30	5	5	5
	15	2.5	5	5
	7.5	1	2	5
217-218 and 219-220	12.5	1	5	5
220-222 (Note 1)	5	0.1	1.5	1.5
406.1-430 and 450-470 (Note 6)	25 (Note 2)	0.5	1	1
	25	2.5	5	5
	12.5	1.5	2.5	2.5
	6.25	0.5	1	1
764-776 and 794-806 (Note 3)	6.25 12.5 25	0.1	0.4 (Note 4)	0.4 (Note 4)
	50	1	1.25 (Note 5)	1.25 (Note 5)
806-821/851-866 and 821-824/866-869 (Note 6)	25 (Note2)	0.1	0.1	0.1
	25	1.5	2.5	2.5
	12.5	1	1.5	1.5
896-901/935-940 (Note 6)	12.5	0.1	1.5	1.5
929-930/931-932	25	1.5	N/A	N/A
928-929/952-953 and 932-932.5/941-941.5	25	1.5	N/A	N/A
	12.5	1	3 (for remote station)	N/A
932.5-935/941.5-944	25	2.5	N/A	N/A
	12.5	2.5	N/A	N/A

TEST RESULTS

Remark:We tested Op 1 to Op 4,recorded worst case at Op 1,Op 3.

Op 1							
Test conditions		Frequency error (ppm)				Limit (ppm)	Result
Voltage(V)	Temp(℃)	406.5MHz	421.5MHz	450.5MHz	469.5MHz		
7.2	-30	0.38	0.85	0.35	0.59	2.5	Pass
	-20	0.42	0.74	0.41	0.76		
	-10	0.57	0.67	0.39	0.77		
	0	0.26	0.59	0.44	0.74		
	10	0.75	0.55	0.51	0.71		
	20	0.52	0.47	0.47	0.63		
	30	0.47	0.68	0.39	0.57		
	40	0.66	0.55	0.29	0.44		
	50	0.58	0.79	0.42	0.66		
6.12 (85% Rated)	20	0.39	0.59	0.39	0.54		
8.25(115% Rated)	20	0.71	0.68	0.46	0.28		

Op 3							
Test conditions		Frequency error (ppm)				Limit (ppm)	Result
Voltage(V)	Temp(℃)	406.5MHz	421.5MHz	450.5MHz	469.5MHz		
7.2	-30	0.61	0.68	0.63	0.95	2.5	Pass
	-20	0.55	0.55	0.57	0.57		
	-10	0.59	0.54	0.42	0.54		
	0	0.63	0.63	0.38	0.52		
	10	0.52	0.57	0.44	0.36		
	20	0.57	0.55	0.38	0.21		
	30	0.83	0.63	0.71	0.84		
	40	0.74	0.51	0.52	0.46		
	50	0.68	0.74	0.39	0.28		
6.12 (85% Rated)	20	0.92	0.69	0.66	0.87		
8.25(115% Rated)	20	0.57	0.75	0.55	0.62		

4.7. Transmitter Frequency Behavior

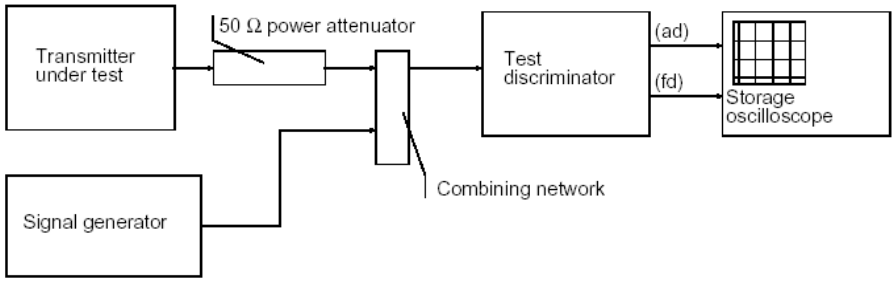
TEST APPLICABLE

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 CONFIGURATION



TEST PROCEDURE

According to TIA/EIA-603 2.2.19 requirement.As for the product different from PTT,we use test steps as follows:

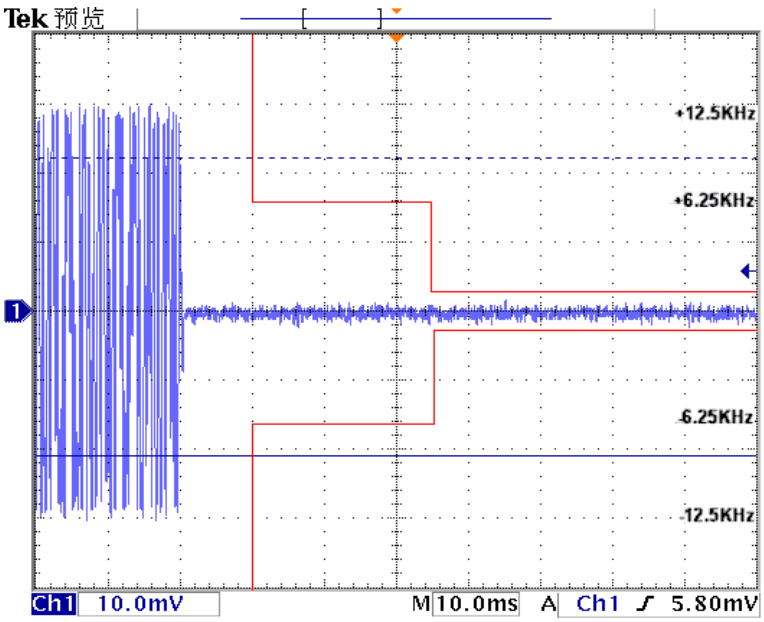
1. Connect DUT into Test discriminator and Storage Oscilloscope and keep DUT stats ON;
2. Input 1kHz signal into DUT;
3. Set the modulation domain analyzer to trigger on the rising edge of the waveform in order to capture a single-shot turn-on of the transmitter signals;
4. Keep DUT in OFF state and Key the PTT;
5. Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the periods t_1 and t_2,and shall also remain within limits following t_2;
6. Adjust the modulation domain anzlyzer to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transmitter of the transmitter signal.
7. Keep the digital portable radio in ON state and Unkey the PTT;
8. Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the period t_3.

TEST RESULTS

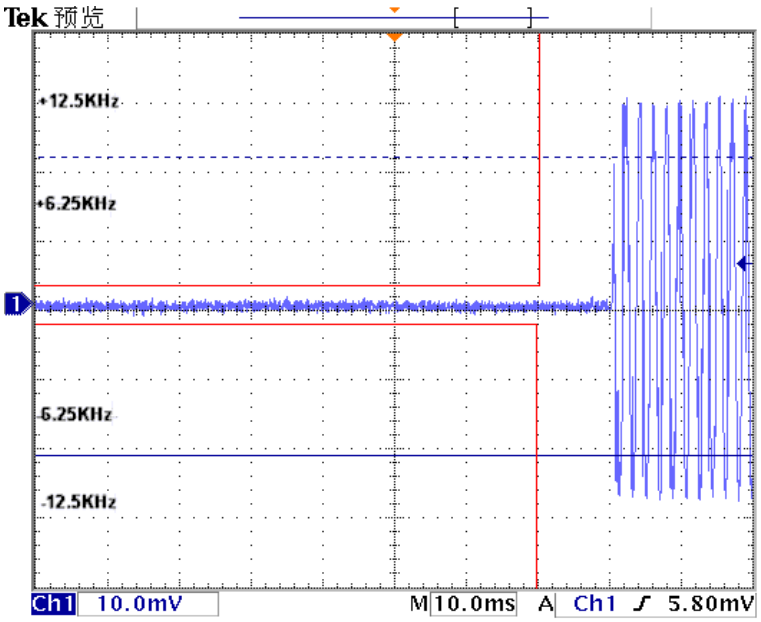
Remark:We tested Op 1 to Op 4,recorded worst case at Op 1,Op 3 for 450.5MHz.

Please refer to the following plots.
Modulation Type: FM

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

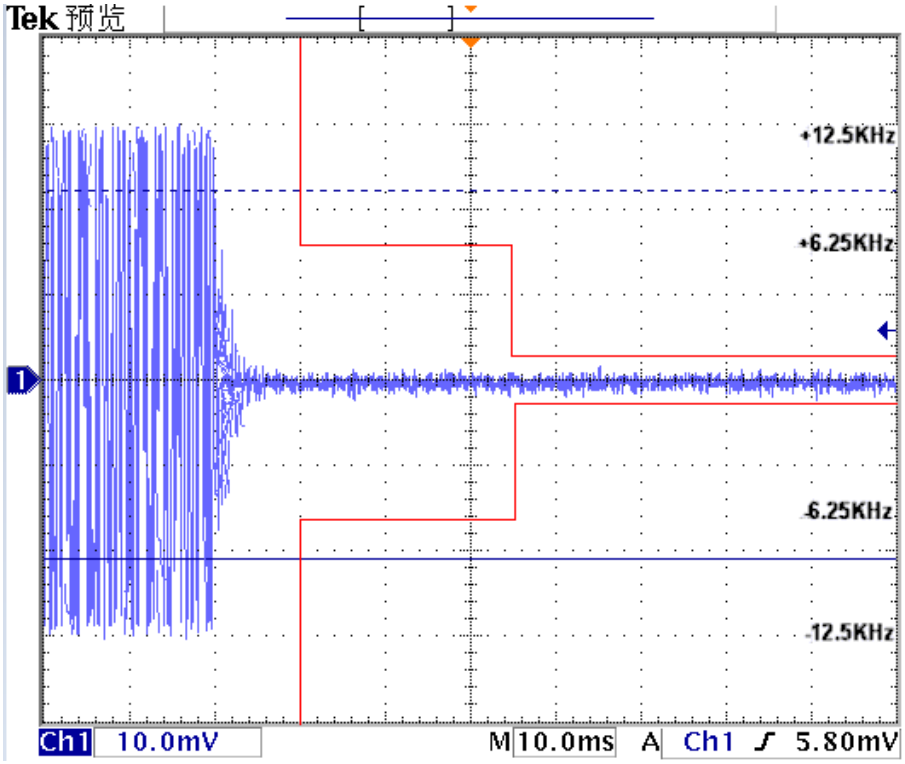


Transmitter Frequency Behaviour @ 12.5kHz Channel Separation------On – Off

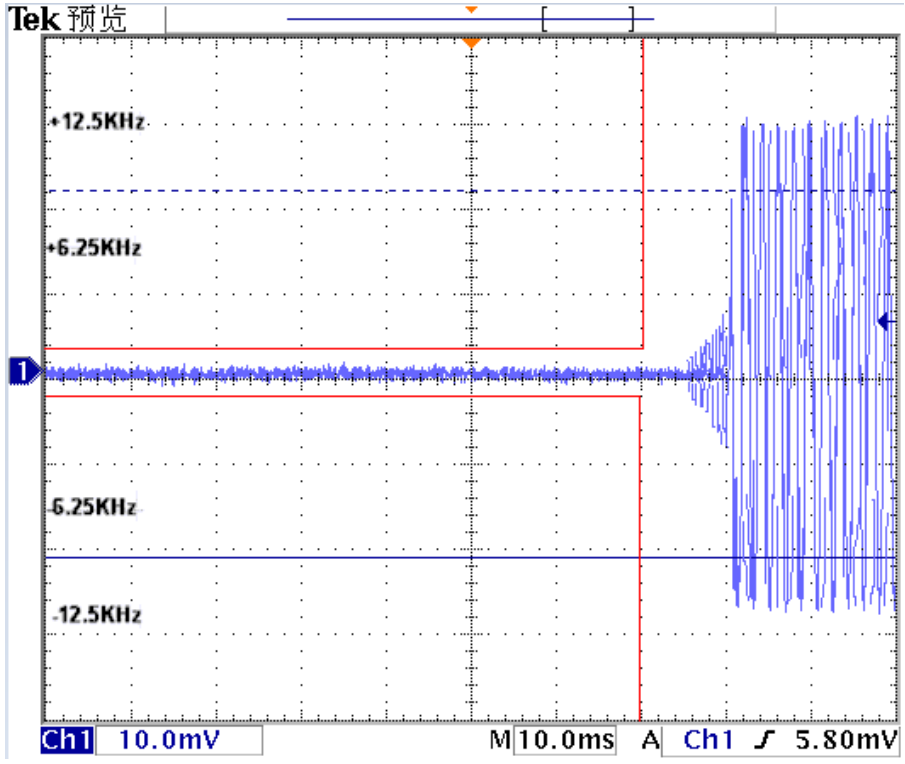


Modulation Type: 4FSK

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



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



4.8. Spurious Emssion on Antenna Port

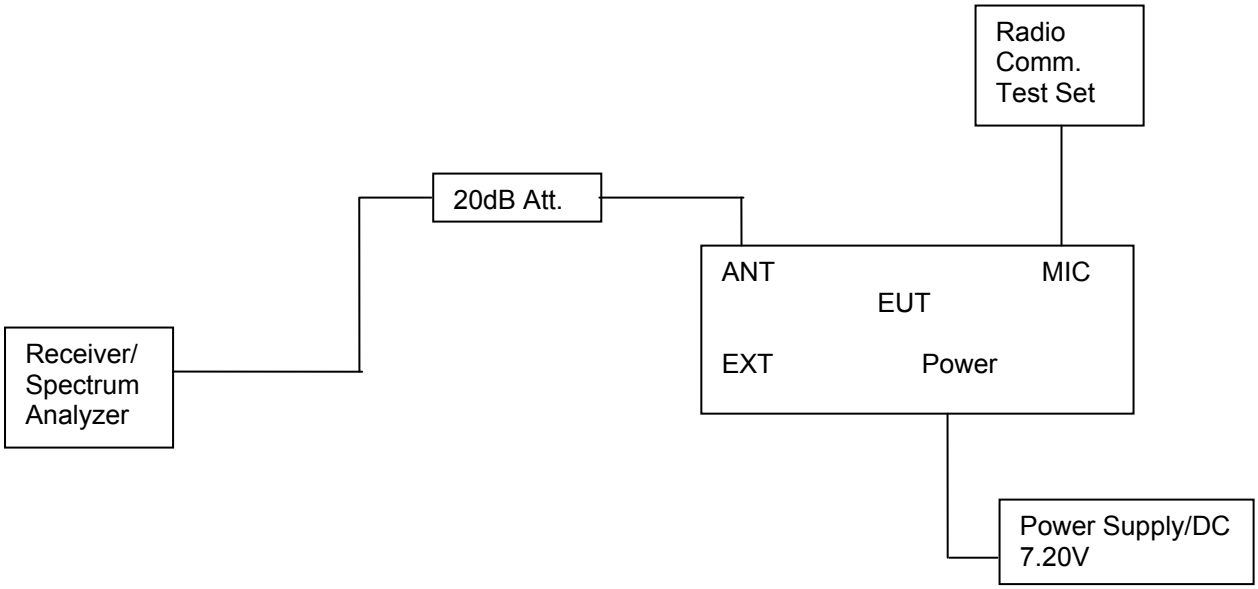
TEST APPLICABLE

The same as Section 4.4

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



LIMIT

Modulation Type: FM

FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 11 (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 + 10log (4.27) =56.30dB
High: 50 + 10 log (Pwatts) = 50 + 10log (3.99) =56.00 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 36.23dBm.
Limit (dBm) =36.23-50-10log$_{10}$(4.33) = -20 dBm

Modulation Type: 4FSK

FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 11 (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 + 10log (4.33) =56.36dB
High: 50 + 10 log (Pwatts) = 50 + 10log (4.12) =56.15dB

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 36.23 dBm.
Limit (dBm) =36.23-50-10log$_{10}$(4.33) = -20 dBm

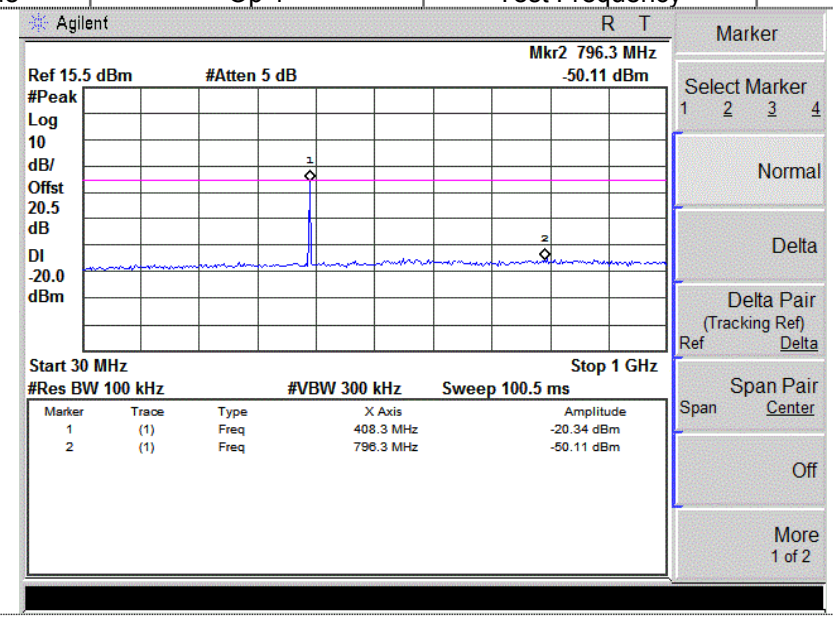
TEST RESULTS

Remark:We tested Op 1 to Op 4,recorded worst case at Op 1,Op 3.

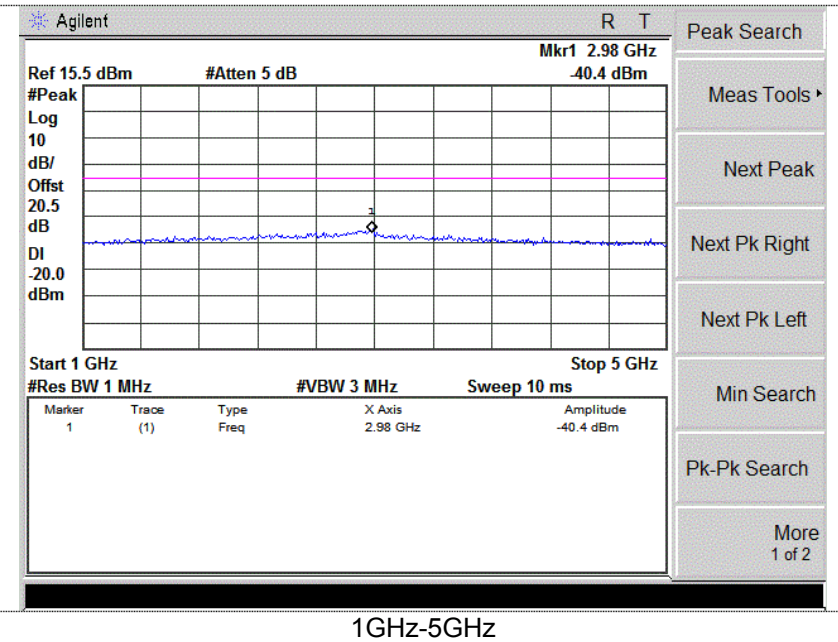
Note:
1. In general, the worse case attenuation requirement shown above was applied.
2. The measurement frequency range from 30 MHz to 5GHz.

Test plot as follows:

Operation Mode	Op 1	Test Frequency	406.5MHz

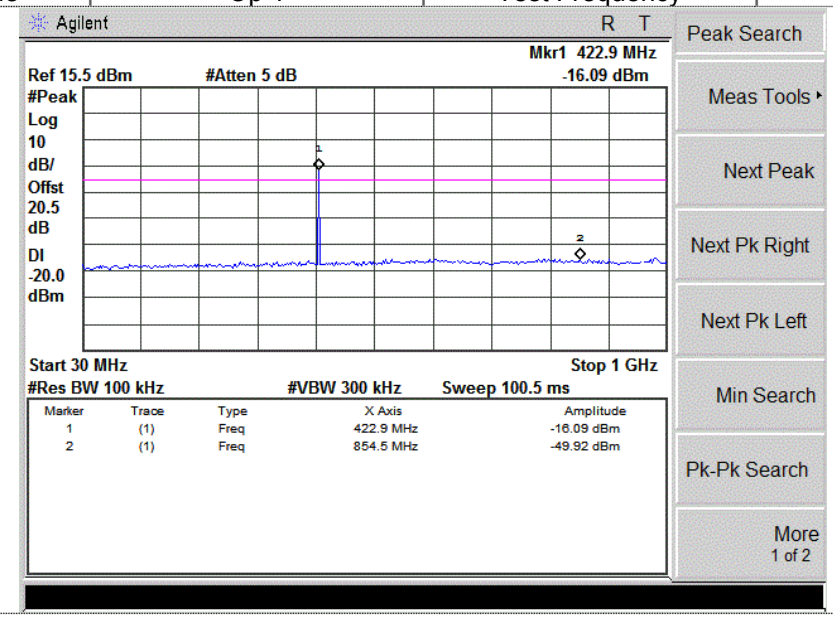


30MHz-1GHz

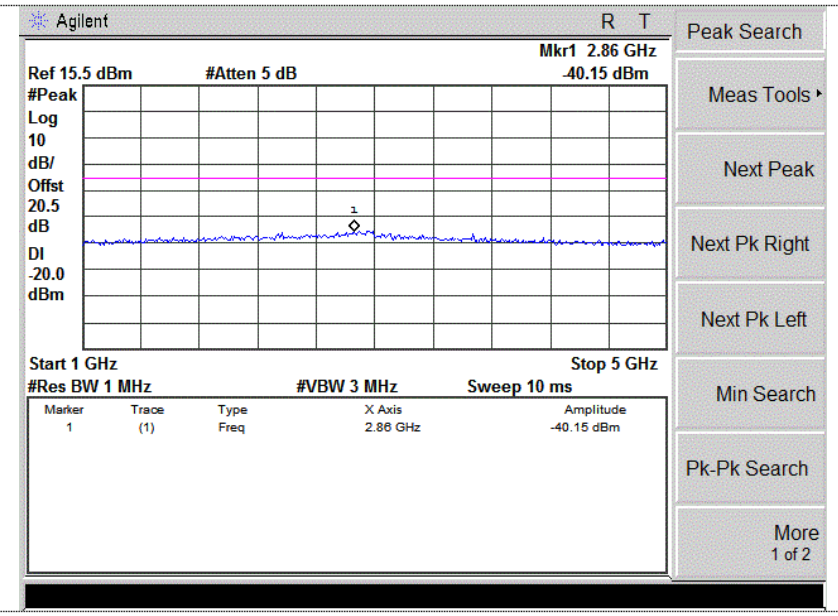


1GHz-5GHz

Operation Mode	Op 1	Test Frequency	421.5MHz

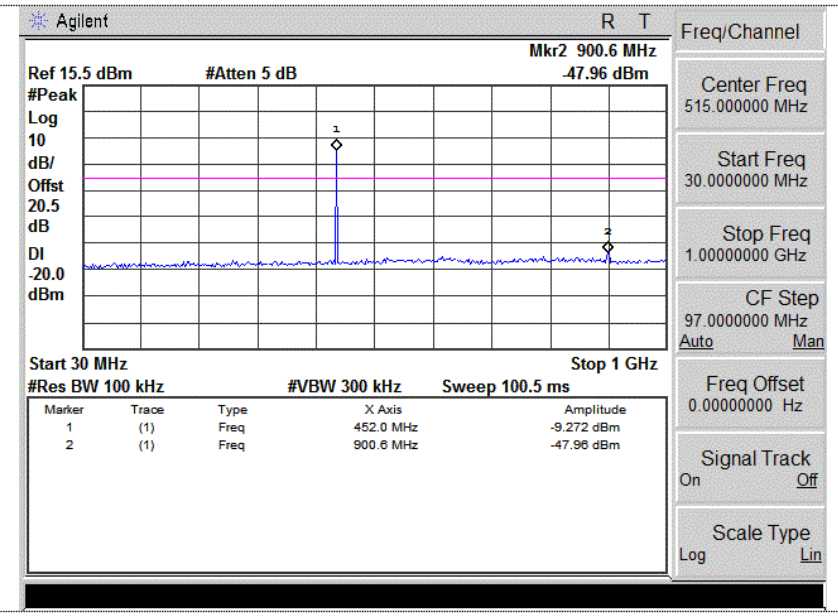


30MHz-1GHz

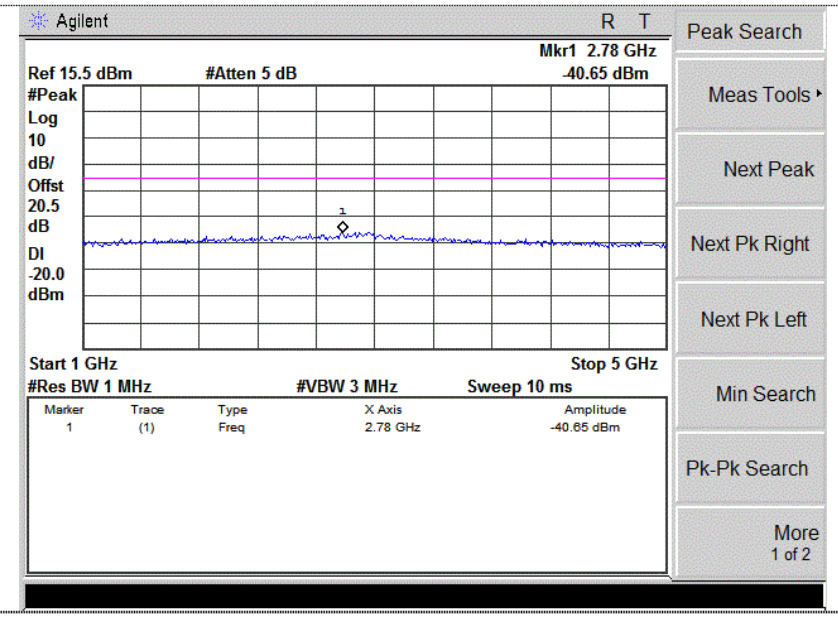


1GHz-5GHz

Operation Mode	Op 1	Test Frequency	450.5MHz

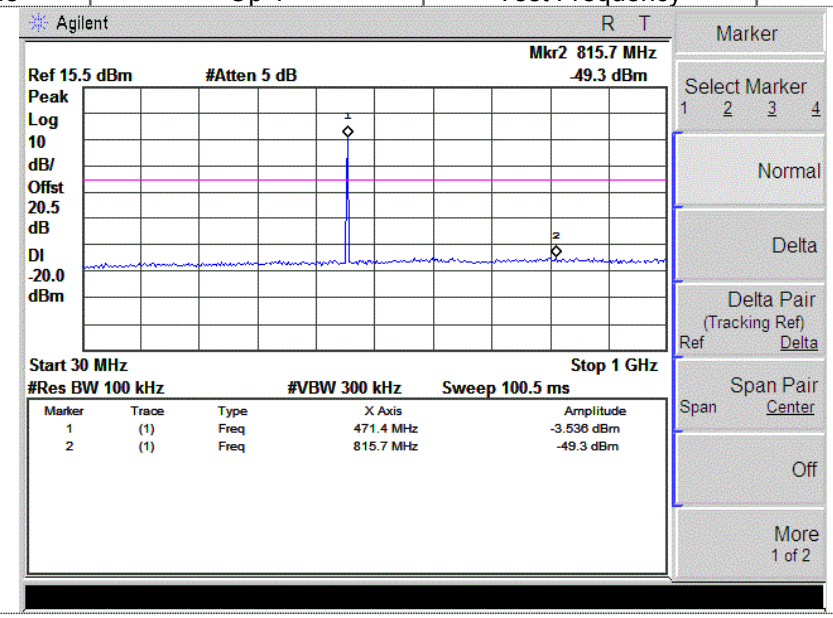


30MHz-1GHz

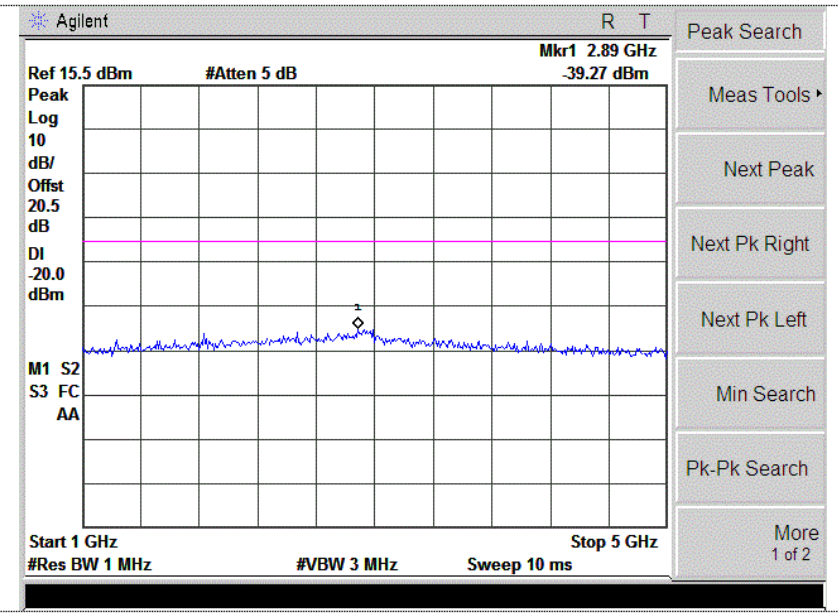


1GHz-5GHz

Operation Mode	Op 1	Test Frequency	469.5MHz

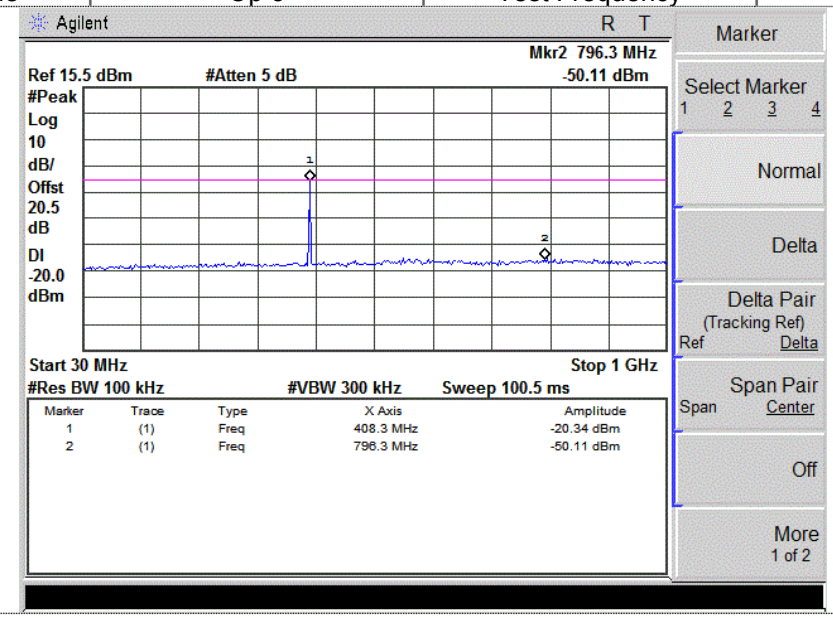


30MHz-1GHz

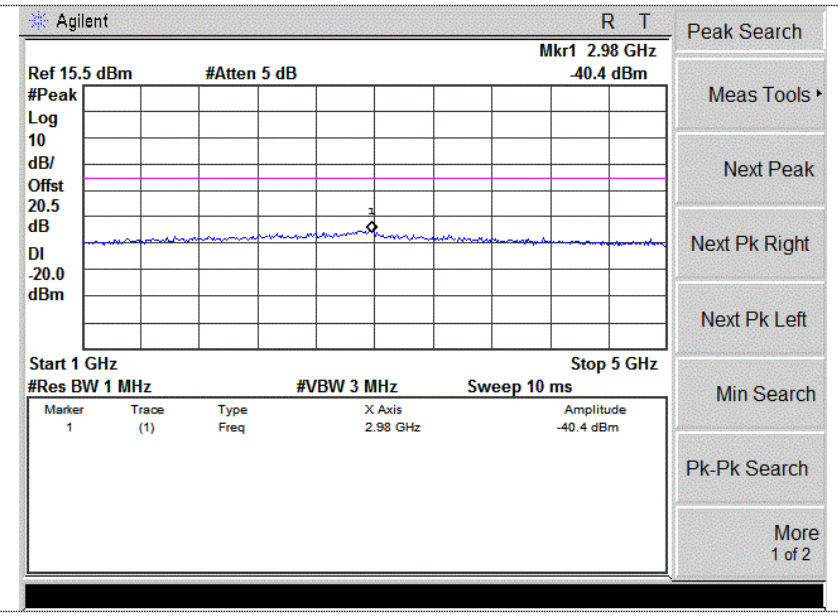


1GHz-5GHz

Operation Mode	Op 3	Test Frequency	406.5MHz

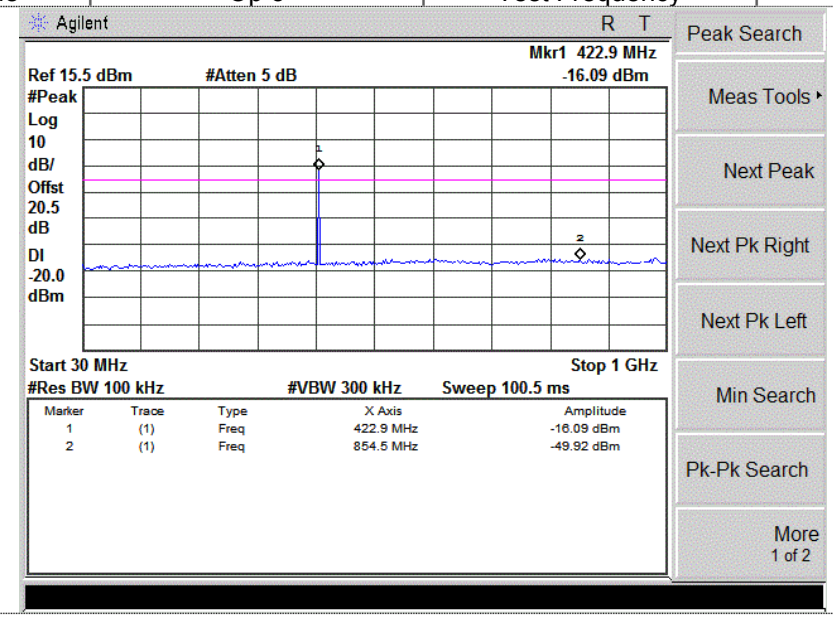


30MHz-1GHz

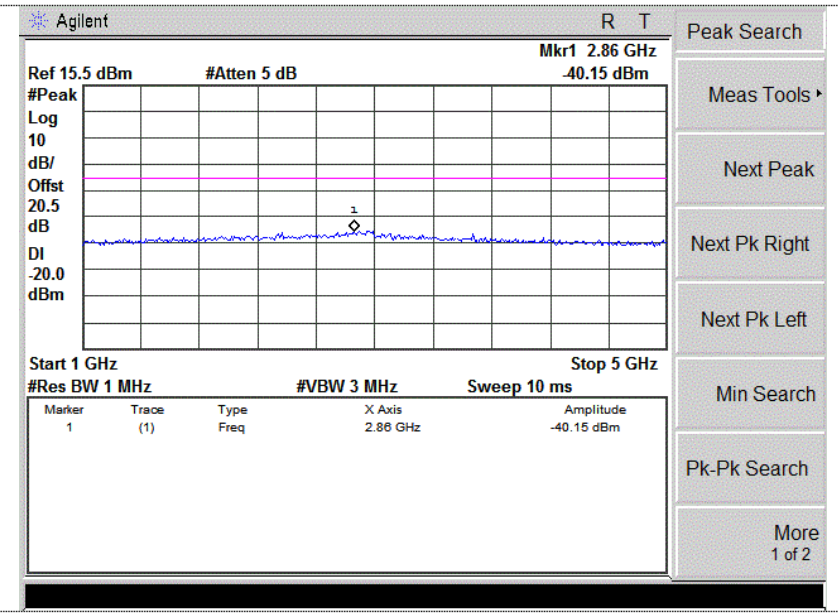


1GHz-5GHz

Operation Mode	Op 3	Test Frequency	421.5MHz

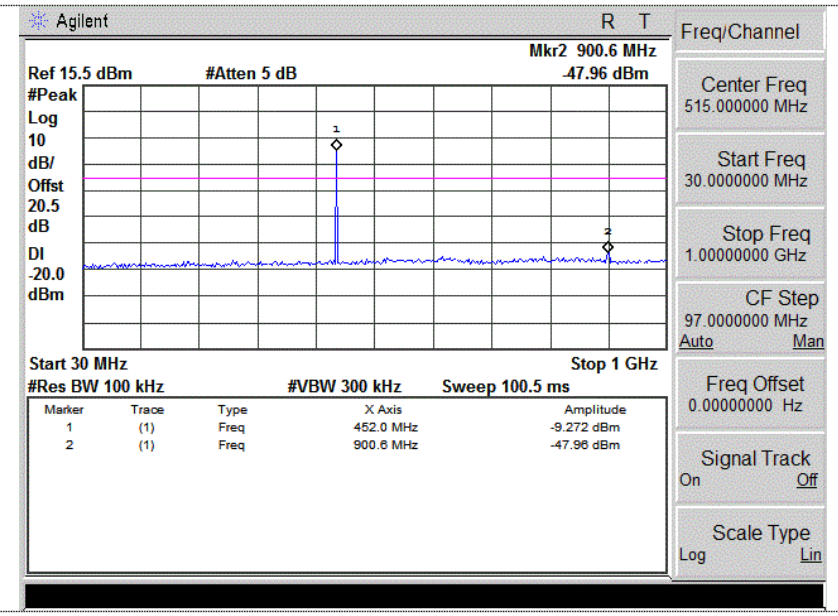


30MHz-1GHz

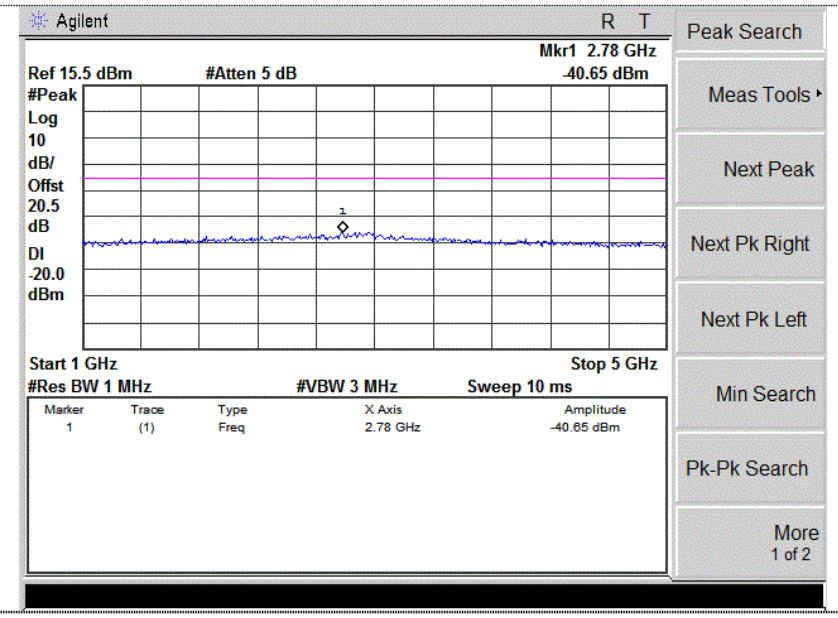


1GHz-5GHz

Operation Mode	Op 3	Test Frequency	450.5MHz

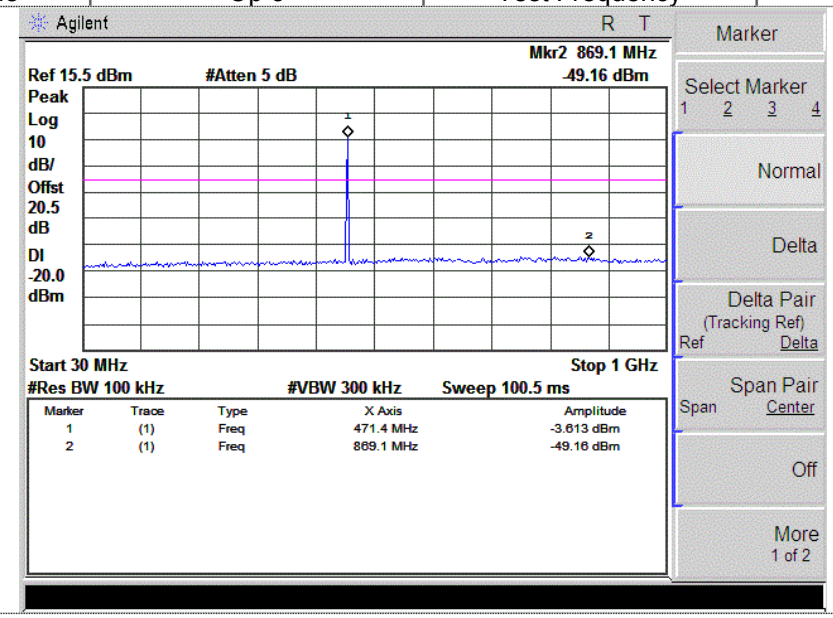


30MHz-1GHz

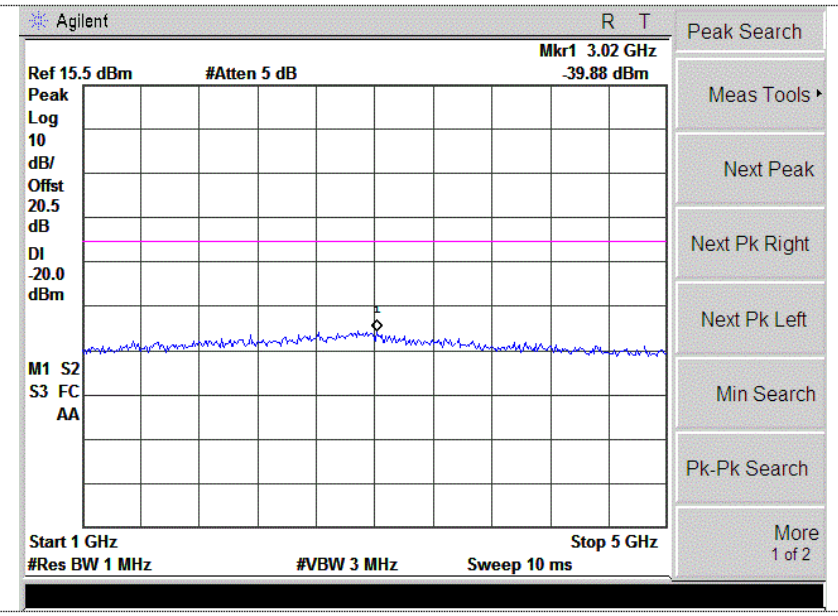


1GHz-5GHz

Operation Mode	Op 3	Test Frequency	469.5MHz



30MHz-1GHz



1GHz-5GHz

4.9. Transmitter Radiated Spurious Emssion

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 5.625kHz 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 5.625kHz 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 25kHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

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

TEST CONFIGURATION

Below 1GHz: