

FCC - TEST REPORT

Report Number : **68.960.15.002.01** Date of Issue: May 12, 2015

Model : MR F77B GPS, MR F77W GPS, MR F57B, MR F57W

Product Type : VHF Marine Radio

Applicant : Cobra Electronics Corporation

Address : 6500 West Cortland Street, Chicago, IL

Production Facility : Cobra Electronics Corporation

Address : 6500 West Cortland Street, Chicago, IL

Test Result : **Positive** **Negative**

Total pages including
Appendices : 68

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Contents

1.	<u>TEST STANDARDS</u>	3
2.	<u>DETAILS ABOUT THE TEST LABORATORY</u>	4
3.	<u>SUMMARY</u>	5
3.1.	General Remarks	5
3.2.	Product Description	5
3.3.	EquiFMent under Test	6
3.4.	Short description of the EquiFMent under Test (EUT)	6
3.5.	EUT Configuration	7
3.6.	EUT operation mode	7
3.7.	EUT configuration	7
3.8.	Related Submittal(s) / Grant (s)	7
3.9.	Modifications	7
3.10.	Note	7
3.11.	Environmental conditions	8
3.12.	Configuration of Tested System	8
3.13.	Discription of Tested Modes	8
3.14.	Statement of the measurement uncertainty	8
3.15.	Test Description	9
3.16.	EquiFMents Used during the Test	9
4.	<u>TEST CONDITIONS AND RESULTS</u>	11
4.1.	Occupied Bandwidth and Emission Mask Test	11
4.2.	Emission Mask	14
4.3.	Transmitter Radiated Spurious Emission	18
4.4.	Spurious Emssion on Antenna Port	23
4.5.	Modulation Charcateristics	37
4.6.	Audio Frequency Response	39
4.7.	The Audio Low Pass Filter	41
4.8.	Frequency Stability Test	42
4.9.	Maximum Transmitter Power	44
4.10.	Receiver Radiated Spurious Emssion	48
4.11.	Receiver Conducted Spurious Emssion	62

1. TEST STANDARDS

The tests were performed according to following standards:

Test Standards	
FCC Rules Part 80	Stations In The Maritime Services
TIA/EIA 603 D	Land Mobile FM Or FM 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

All tests according to the regulations cited on page 3 were

- Performed

- **Not** Performed

The EquipMent under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: May 04, 2015

Testing Start Date: May 04, 2015

Testing End Date: May 12, 2015

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

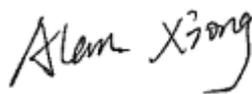
Reviewed by:

Prepared by:

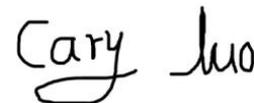
Tested by:



John Zhi
Project Manager



Alan Xiong
Project Engineer



Cary Luo
Test Engineer



2. Details about the Test Laboratory

Details about the Test Laboratory

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

Test Site 1
Company name: SHENZHEN HUATONGWEI INTERNATIONAL INSPECTIONAL CO., LTD.
Huatongwei Building, Kejinan 12 Road, High-tec Industrial Park,
Nanshan District, Shenzhen City,
Guangdong Province,
P.R.China

FCC Registration Number 317478

Telephone: +86-755-2942 6537
Fax: +86-755-2942 6537

3. SUMMARY

3.1. General Remarks

This submittal(s) (test report) is intended for FCC ID: BBOMRF77, complies with Section 15.107, 15.109, 80.205, 80.209, 80.209, 80.211, 80.213, 80.215 of the FCC Part 15 and FCC Part 80.

Remark: Reference to Type D DSC EN 301 025 or IEC 62238 test report No.: 68.960.15.003.01.

3.2. Product Description

Product:	VHF Marine Radio
Model no.:	MR F77B GPS, MR F77W GPS, MR F57B, MR F57W
FCC ID:	BBOMRF77
Brand Name:	Cobra
Options and accessories:	NIL
Rating:	13.8VDC (Supplied by Ship Power Supply)
RF Transmission Frequency:	156.050-157.425MHz
No. of Operated Channel:	88
Modulation:	Analog Voice: FM Digital Data: FSK
Emission Designator	Analog Voice: 16K0G3E, Digital Data: 16K0G2B
Channel Separation	Analog Voice: 25KHz, Digital Data: 25KHz
Rated Output Power:	25 Watts(43.74dBm)/1Watts(29.83dBm)
Antenna Type:	External (Marine Antenna vertically polarized on board ship)
Description of the EUT:	The Equipment Under Test (EUT) is a VHF transceiver for fixed mounting on the boat

3.3. EquipMent under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (DC 13.8V)	

Test frequency list

Modulation Type	Test Channel	Test Frequency
Analog/FM	Low Channel(CH1)	156.050 MHz
	Middle Channel(CH16)	156.800 MHz
	High Channel(CH88)	157.425 MHz

3.4. Short description of the EquipMent under Test (EUT)

156.05-157.425 MHz V frequency band A handheld marine transceiver without GPS function.

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

Serial number: Prototype

3.5. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.6. 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.

3.7. EUT configuration

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

- - supplied by the manufacturer
- - supplied by the lab

<input type="radio"/>	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
<input type="radio"/>	Multimeter	Manufacturer :	/
		Model No. :	/

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

This submittal(s) (test report) is intended for FCC ID: **BBOMRF77** filing to comply with FCC Part 80 Rules

3.9. Modifications

No modifications were implemented to meet testing criteria.

3.10. Note

1. The EUT is is a V frequency band (156.05-157.425MHz) A handheld marine transceiver without GPS function, The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio	FCC Part 80	TRE13030160

3.11. Environmental conditions

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

Item	Required
Ambient temperature	15°C~35°C
Relative humidity	25%~75%
Atmospheric pressure	86 kPa~106kPa

3.12. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

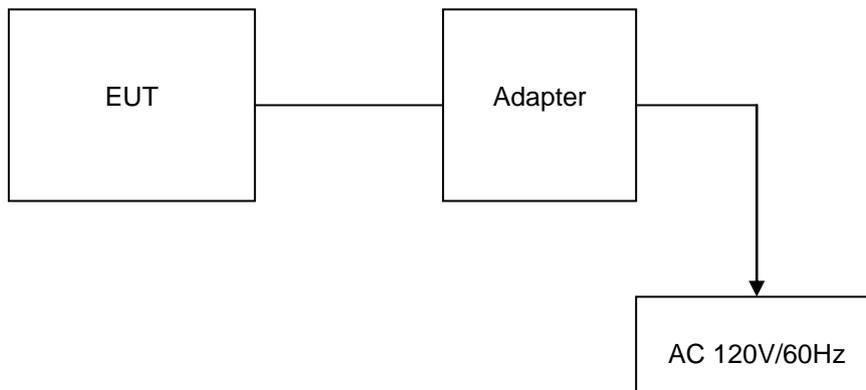


Table 2-1 EquipMent Used in Tested System

3.13. Discription of Tested Modes

The EUT (A handheld marine transceiver) has been tested under normal operating condition. Three channels (the high, the middle and the low) are chosen for testing at channel separation (25 KHz).

3.14. 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 alculated 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.

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	1.60 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 dB	(1)
Radiated Emission 30~1000MHz	2.20 dB	(1)
Radiated Emission 1~18GHz	2.20 dB	(1)
Radiated Emission 18-40GHz	2.20 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 $k=1.96$.

3.15. Test Description

FCC Rules	Description of Test	Test Result
§ 15.107	Conducted Emission	N/A
§ 15.109	Receiver Radiated Spurious Emission	Complies
§ 15.109	Receiver Conducted Spurious Emission	Complies
§ 80.215	Maximum Transmitter Power	Complies
§ 80.213	Modulation Characteristic	Complies
§ 80.205	Occupied Bandwidth	Complies
§ 80.211(f)	Emission Mask	Complies
§ 80.209	Frequency Stability	Complies
§ 80.211(f)(3)	Transmitter Radiated Spurious Emission	Complies
§ 80.211(f)(3)	Spurious Emission On Antenna Port	Complies

3.16. Equipments Used during the Test

Modulation Characteristic				
Name of EquipMent	Manufacturer	Model	Serial Number	Calibration Due
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015-11-01

Transient Frequency Behavior				
Name of EquipMent	Manufacturer	Model	Serial Number	Calibration Due
Signal Generator	Rohde&Schwarz	SMT03	100059	2015-11-01
Storage Oscilloscope	Tektronix	TDS3054B	B033027	2015-11-01
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015-11-01

Transmitter Radiated Spurious Emission & Receiver Radiated Spurious Emission				
Name of EquipMent	Manufacturer	Model	Serial Number	Calibration Due
Ultra-Broadband Antenna	Rohde&Schwarz	HL562	100015	2015-11-01
EMI Test Receiver	Rohde&Schwarz	ESI 26	100009	2015-11-01
RF Test Panel	Rohde&Schwarz	TS / RSP	335015/ 0017	2015-11-01
HORN ANTENNA	Rohde&Schwarz	HF906	100039	2015-11-01
Turntable	ETS	2088	2149	2015-11-01
Antenna Mast	ETS	2075	2346	2015-11-01
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	2015-11-01
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015-11-01
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2015-11-01
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2015-11-01
HORN ANTENNA	ShwarzBeck	9120D	1012	2015-11-01
HORN ANTENNA	ShwarzBeck	9120D	1011	2015-11-01
TURNTABLE	MATURO	TT2.0	----	2015-11-01
ANTENNA MAST	MATURO	TAM-4.0-P	----	2015-11-01

Frequency Stability				
Name of EquipMent	Manufacturer	Model	Serial Number	Calibration Due
Communication Test Set	HP	HP8920B	US35010135	2015-11-01
Signal Generator	Rohde&Schwarz	SMT03	100059	2015-11-01
Climate Chamber	ESPEC	EL-10KA	05107008	2015-11-01

Maximum Transmitter Power & Spurious Emission On Antenna Port & Occupied Bandwidth & Emission Mask				
Name of EquipMent	Manufacturer	Model	Serial Number	Calibration Due
Receiver	Rohde&Schwarz	ESI 26	100009	2015-11-01
Attenuator	R&S	ESH3-22	100449	2015-11-01
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015-11-01
High-Pass Filter	Anritsu	MP526B	6220875256	2015-11-01
High-Pass Filter	Anritsu	MP526D	6220878392	2015-11-01
Spectrum Analyzer	Aglient	E4407B	MY44210775	2015-11-01
Spectrum Analyzer	Rohde&Schwarz	FSP40	1164.4391.40	2015-11-01

The calibration interval was one year.

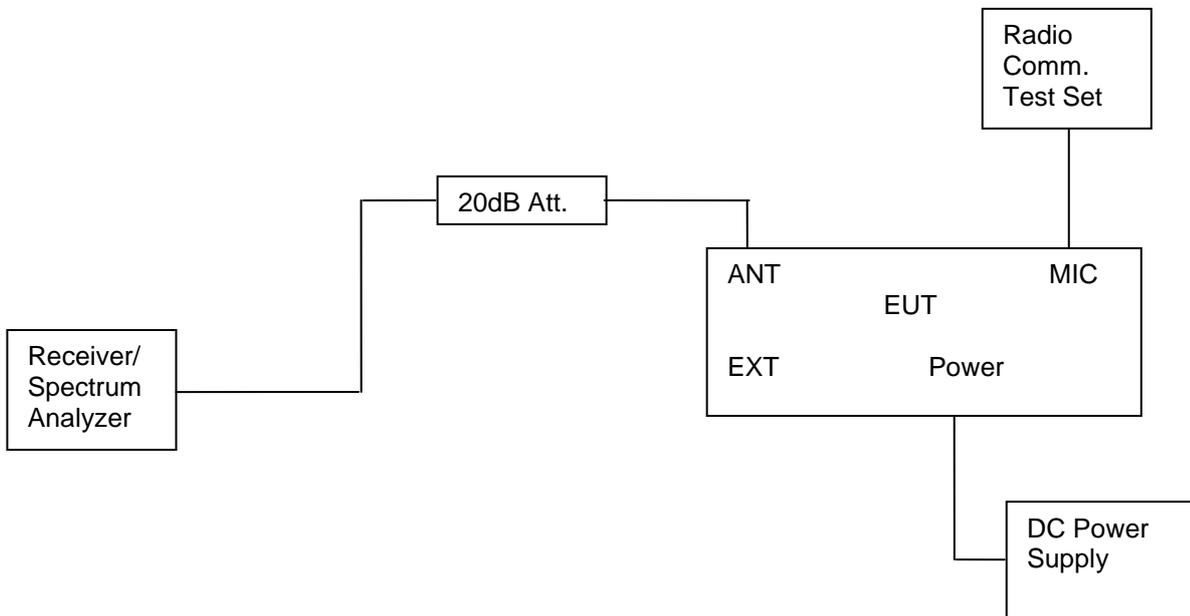
4. TEST CONDITIONS AND RESULTS

4.1. Occupied Bandwidth and Emission Mask Test

TEST 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 §80.211(f), 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, 25 KHz channel bandwidth equiFMENT: For transmitters designed to operate with a 25 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 (fd in kHz) of more than 5.625 kHz but no more than 25 KHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
 - (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 25 KHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.

TEST CONFIGURATION



TEST PROCEDURE

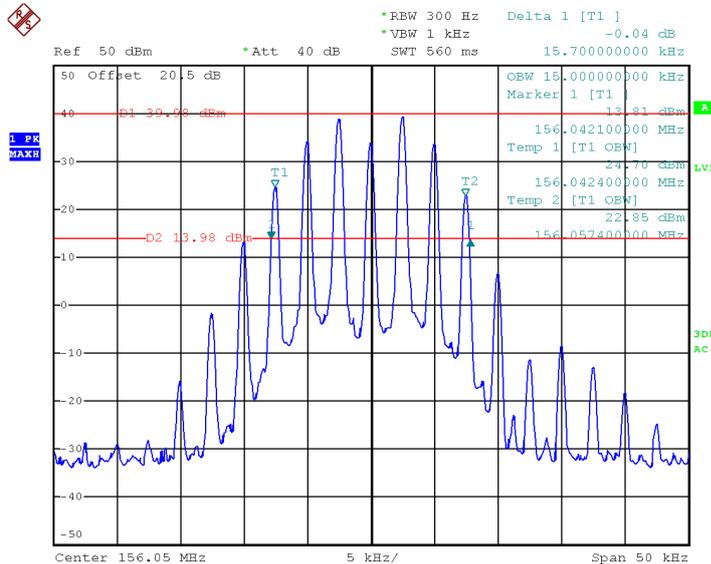
- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 The EUT was modulated by 2.5 KHz Sine wave audio signal; the level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (25 KHz channel spacing) and 5 kHz (25 kHz channel spacing).
- 3 Set EUT as normal operation.
- 4 Set SPA Center Frequency = fundamental frequency, RBW=300Hz, VBW= 3 KHz, span =50 KHz.
- 5 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.

TEST RESULTS

Modulation Type	Channel Separation	Test Channel	Test Frequency	99% Occupied Bandwidth	26dB Occupied Band width
FM	25KHz	Low	156.0500 MHz	15.00 KHz	15.70 KHz
		Middle	156.8000 MHz	15.10 KHz	15.70 KHz
		High	157.4250 MHz	15.10 KHz	15.70 KHz
Limit		20 KHz for 25KHz Channel Separation			
Test Results		Compliance			

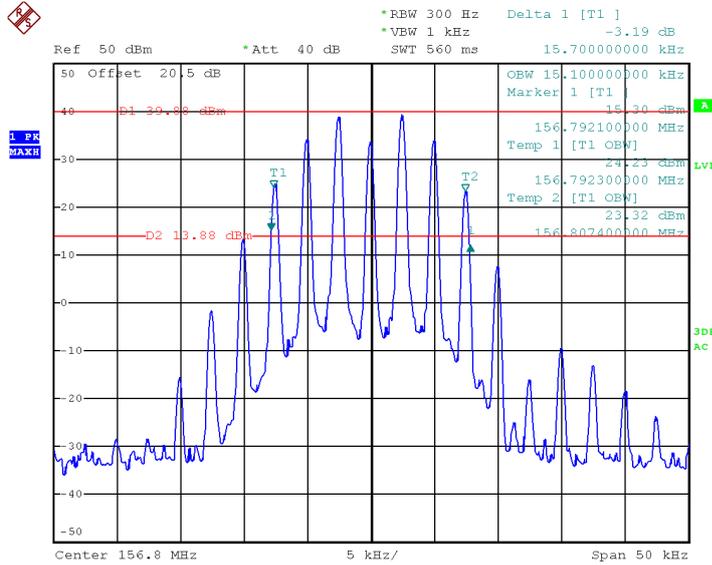
Plots of 99% and 26dB Bandwidth Measurement

Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
FM	25 KHz	156.0500	15.00	15.70	20	Complicance



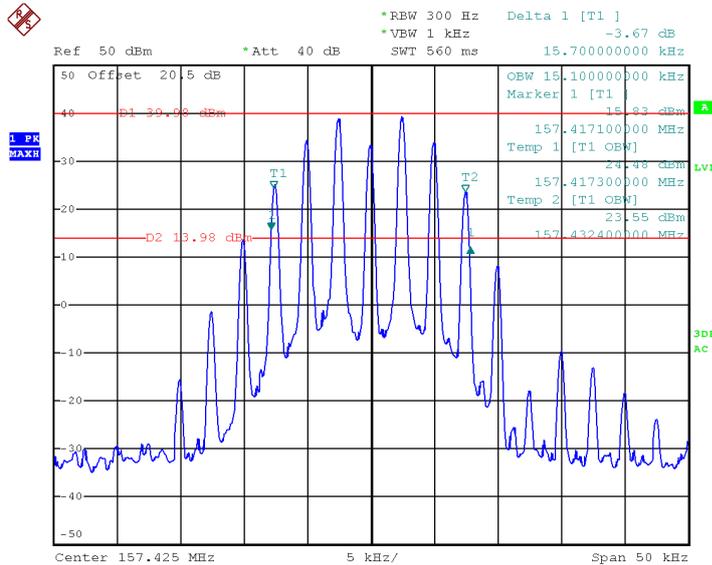
Date: 16.JAN.2015 09:51:32

Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
FM	25 KHz	156.8000	15.10	15.70	20	Compliance



Date: 16.JAN.2015 09:53:41

Modulation Type	Channel Separation	Freq.(MHz)	99% Bandwidth (KHz)	26dB Bandwidth (KHz)	FCC Limit (KHz)	Results
FM	25 KHz	157.4250	15.10	15.70	20	Compliance



Date: 16.JAN.2015 09:55:54

4.2. Emission Mask

Modulation Type	Channel Separation	Test Channel	Test Frequency	FCC Applicable Mask	RBW	Power
FM	25 KHz	Low	156.0500 MHz	B	300 Hz	25W
		Middle	156.8000 MHz	B	300 Hz	
		High	157.4250 MHz	B	300 Hz	
		Low	156.0500 MHz	B	300 Hz	1W
		Middle	156.8000 MHz	B	300 Hz	
		High	157.4250 MHz	B	300 Hz	
Test Results			Compliance			

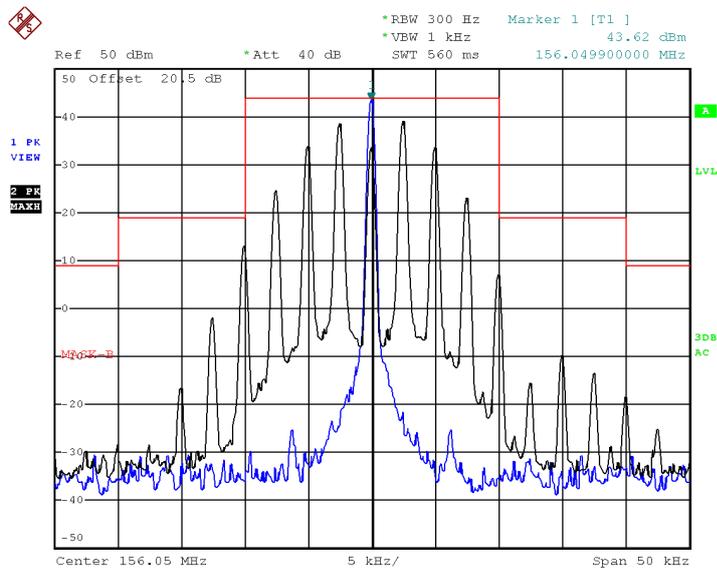
Plots of Emission Mask Measurement

Referred as the attached plot hereinafter

Note: The Blue curve represents unmodulated signal.
The Black curve represents modulated signal.

For Rated High Power: 25W

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	25 KHz	156.0500	B	300	2.5	Compliance

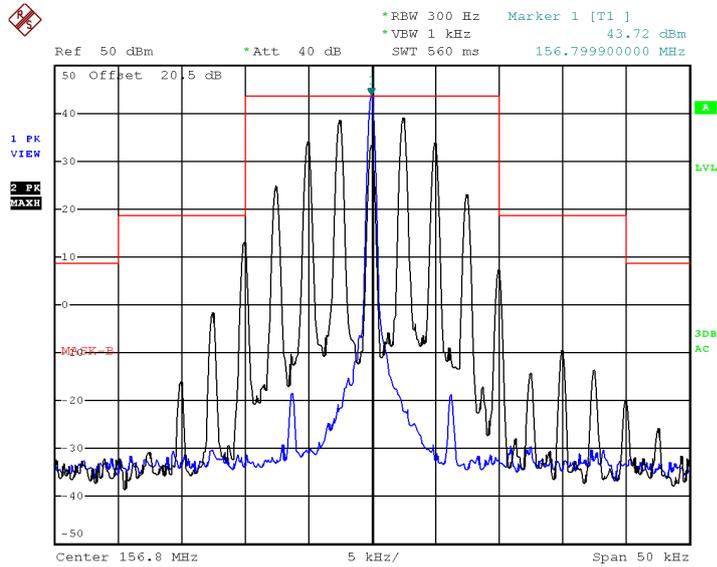


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25 KHz Channel Spacing, 156.0500 MHz, 2500 Hz Audio Modulation Only



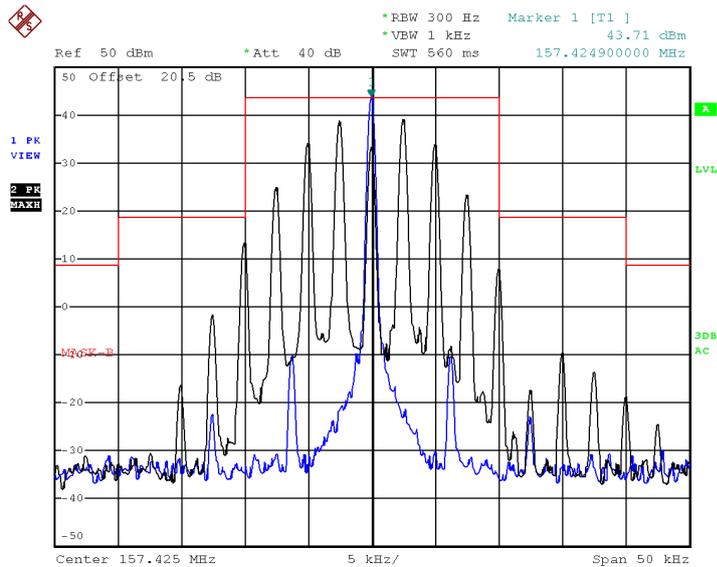
Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	25 KHz	156.8000	B	300Hz	2.5	Compliance



Date: 17.JAN.2015 16:27:22

25 KHz Channel Spacing, 156.8000 MHz, 2500 Hz Audio Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	25 KHz	157.4250	B	300Hz	2.5	Compliance

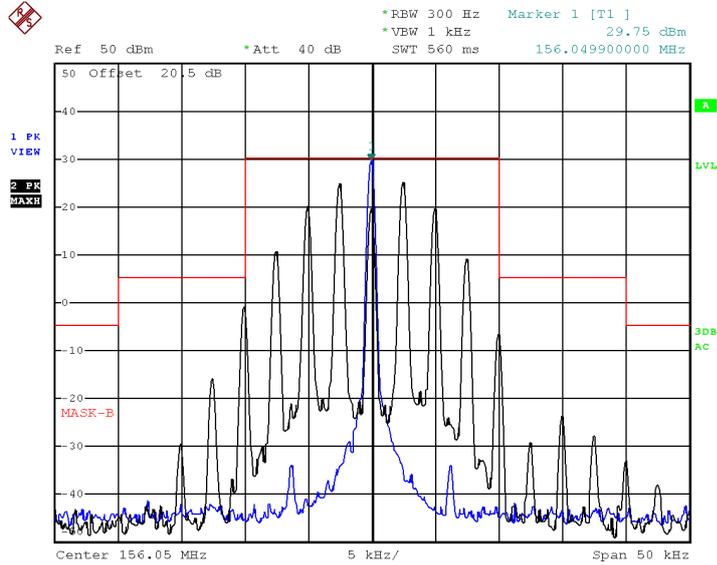


Date: 17.JAN.2015 16:28:41

25 KHz Channel Spacing, 157.4250 MHz, 2500 Hz Audio Modulation Only

For Rated Low Power: 1W

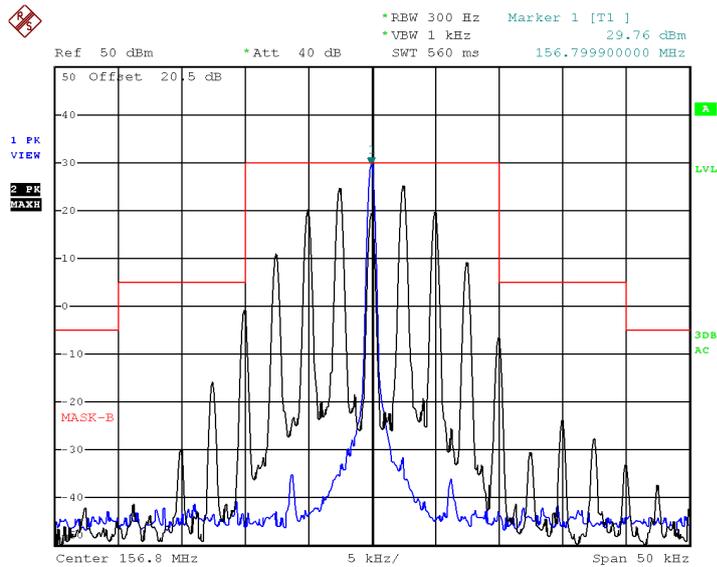
Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	25 KHz	156.0500	B	300	2.5	Compliance



Date: 17.JAN.2015 16:24:47

25 KHz Channel Spacing, 156.0500 MHz, 2500 Hz Audio Modulation Only

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	25 KHz	156.8000	B	300Hz	2.5	Compliance



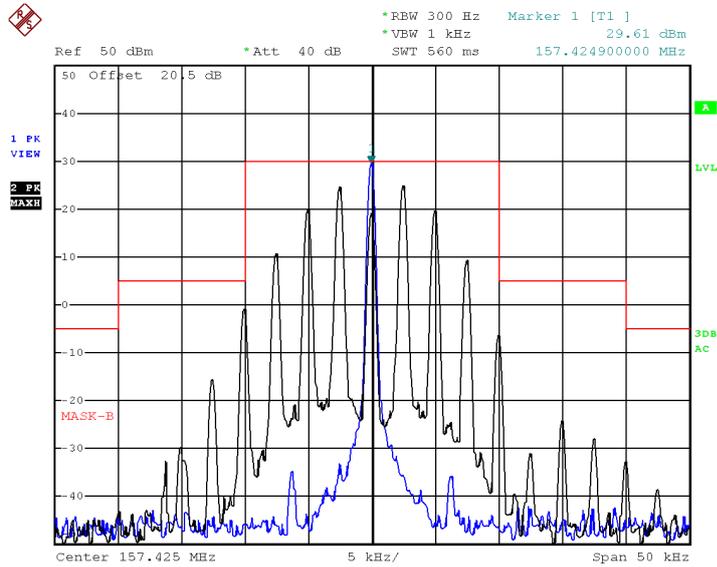
Date: 17.JAN.2015 16:26:17

25 KHz Channel Spacing, 156.8000 MHz, 2500 Hz Audio Modulation Only



China

Modulation Type	Channel Separation	Freq.(MHz)	FCC Applicable Mask	RBW	Audio Freq. (KHz)	Results
FM	25 KHz	157.4250	B	300Hz	2.5	Compliance



Date: 17.JAN.2015 16:29:37

25 KHz Channel Spacing, 157.4250 MHz, 2500 Hz Audio Modulation Only

4.3. Transmitter Radiated Spurious Emission

TEST APPLICABLE

According to the TIA/EIA 603 test method, and according to Section 80.211, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 25 KHz channel bandwidth:

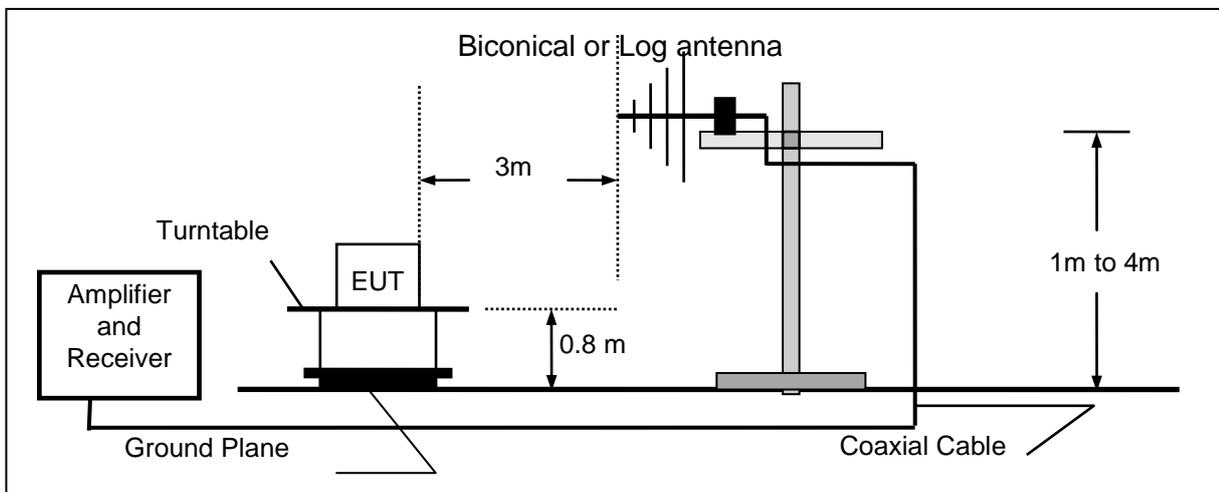
- 1 On any frequency removed from the center of the authorized bandwidth f_0 to 5.625 KHz removed from f_0 : Zero dB
- 2 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in KHz) f_0 of more than 5.625 KHz but no more than 25 KHz: At least 7.27dB
- 3 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in KHz) f_0 of more than 25 KHz: At least $50+10 \log (P)$ dB or 70 dB, which ever is lesser attenuation.

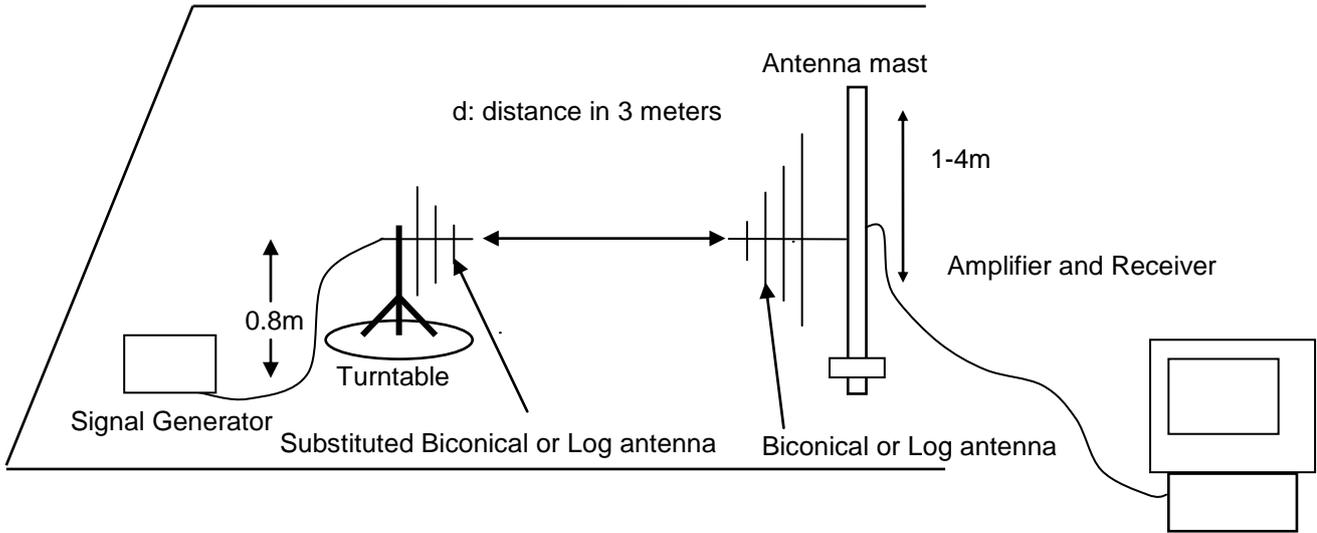
For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

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

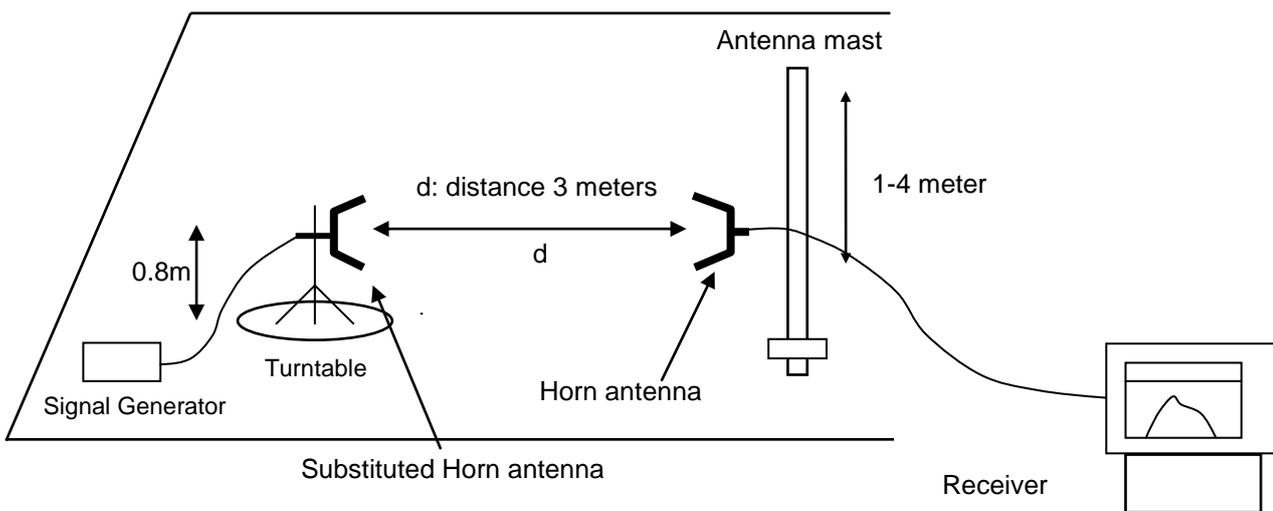
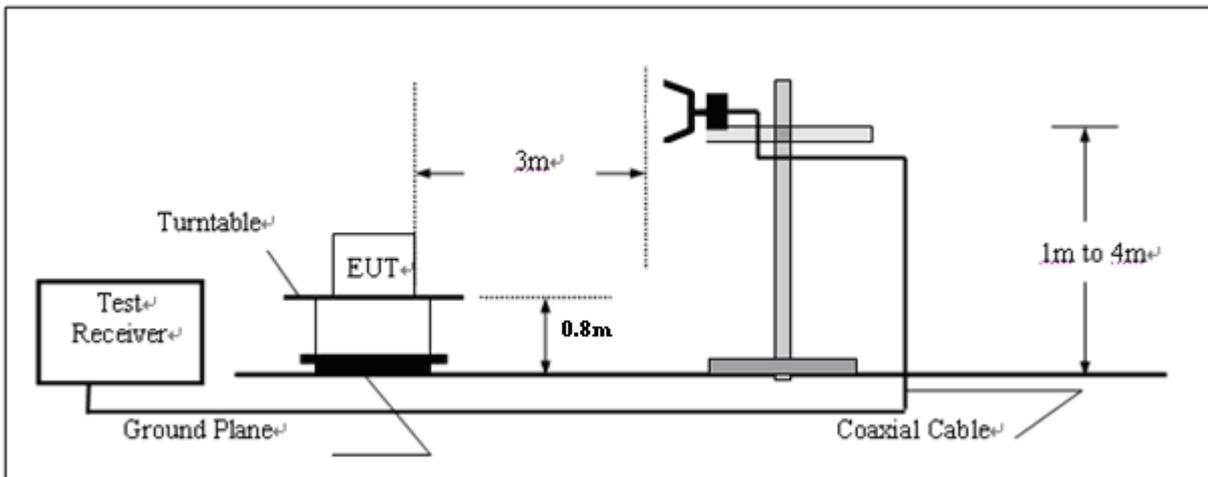
TEST CONFIGURATION

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
 $E \text{ (dBuV/m)} = \text{Reading (dBuV)} + \text{Total Correction Factor (dB)}$
 - 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 360o 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:
 $P = P_1 - L_1 = (P_2 + L_2) - L_1 = P_3 + A + L_2 - L_1$
 $EIRP = P + G_1 = P_3 + L_2 - L_1 + A + G_1$
 $ERP = EIRP - 2.15 \text{ dB}$
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.
 - P₁: Power output from the signal generator
 - P₂: Power measured at attenuator A input
 - P₃: 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

The Transmitter Radiated Spurious Emission was performed to the Rated high power (25Watt) and Rated low power (1Watt) the datum that reported below is the **worst** case (Rated high power) of the two rated power conditions.

Modulation Type: FM

FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 11 (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 25 KHz at least:

Low: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (4.67) = 49.69 \text{ dB}$

High: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (4.48) = 49.51 \text{ dB}$

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

Calculation: Limit (dBm) = $EL - 43 - 10 \log_{10} (TP)$

Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 36.69 dBm.

Limit (dBm) = $36.69 - 43 - 10 \log_{10} (4.67) = -13 \text{ dBm}$

Note: 1. In general, the worse case attenuation requirement shown above was applied.

2. The measurement frequency range from 30 MHz to 2 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	25 KHz	
Test Channel	Low Channel		Test Frequency	156.0500 MHz	
Frequency (MHz)	EMI Detector (Peak/QP)	Antenna Polarization	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
626.07	Peak	H	-47.61	-13	34.61
781.33	Peak	H	-60.57	-13	47.57
938.10	Peak	H	-56.82	-13	43.82
1248.33	Peak	H	-50.04	-13	37.04
626.07	Peak	V	-56.01	-13	43.01
781.33	Peak	V	-61.12	-13	48.12
938.10	Peak	V	-60.61	-13	47.61
1248.33	Peak	V	-45.92	-13	32.92

Modulation	FM		Channel Separation	25 KHz	
Test Channel	Middle Channel		Test Frequency	156.8000 MHz	
Frequency (MHz)	EMI Detector (Peak/QP)	Antenna Polarization	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
628.27	Peak	H	-45.18	-13	32.18
786.85	Peak	H	-46.47	-13	33.47
941.41	Peak	H	-51.98	-13	38.98
1254.40	Peak	H	-51.68	-13	38.68
628.27	Peak	V	-59.09	-13	46.09
786.85	Peak	V	-59.10	-13	46.1
941.41	Peak	V	-58.53	-13	45.53
1412.25	Peak	V	-48.07	-13	35.07

Modulation	FM		Channel Separation	25 KHz	
Test Channel	High Channel		Test Frequency	157.4250 MHz	
Frequency (MHz)	EMI Detector (Peak/QP)	Antenna Polarization	ERP measured by Substitution Method (dBm)	Limit (dBm)	Margin (dB)
630.49	Peak	H	-47.05	-13	34.05
789.62	Peak	H	-49.20	-13	36.2
944.72	Peak	H	-54.08	-13	41.08
1417.16	Peak	H	-50.91	-13	37.91
630.49	Peak	V	-60.02	-13	47.02
789.62	Peak	V	-59.61	-13	46.61
944.72	Peak	V	-58.21	-13	45.21
1417.16	Peak	V	-47.20	-13	34.2

4.4. Spurious Emission on Antenna Port

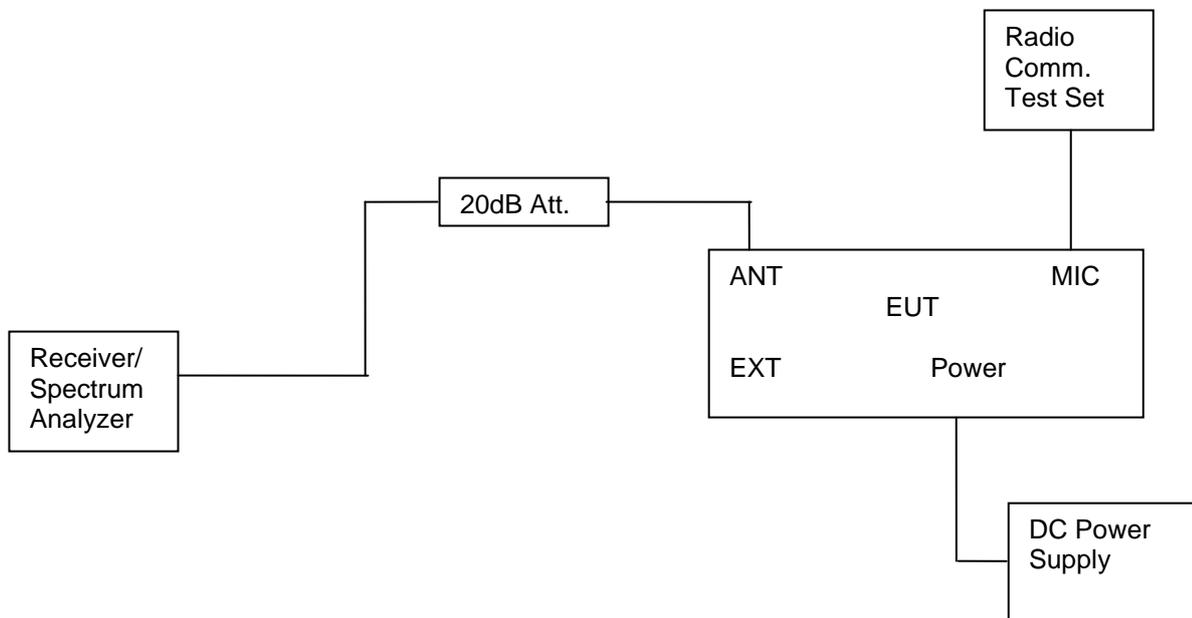
TEST APPLICABLE

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 10th 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 RSS Gen, RSS 119 Issue 11 (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 25 KHz at least:

Low: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (4.67) = 49.69 \text{ dB}$

High: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (4.48) = 49.51 \text{ dB}$

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

Calculation: Limit (dBm) = EL - 43 - 10 log₁₀ (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 36.69 dBm.

Limit (dBm) = 36.69 - 43 - 10 log₁₀ (4.67) = -13 dBm

Note: 1. In general, the worse case attenuation requirement shown above was applied.

2. The measurement frequency range from 30MHz to 2 GHz.

For Rated High Power (25Watt)

Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz	
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)
FM	25 KHz	Low	156.0500	342.8	-35.99	1617.5	-26.92
		Middle	156.8000	342.8	-36.17	1875.0	-27.99
		High	157.4250	357.4	-35.44	1985.0	-26.61
Limit		-13dBm for 25 KHz Channel Separation					
Test Results		Compliance					

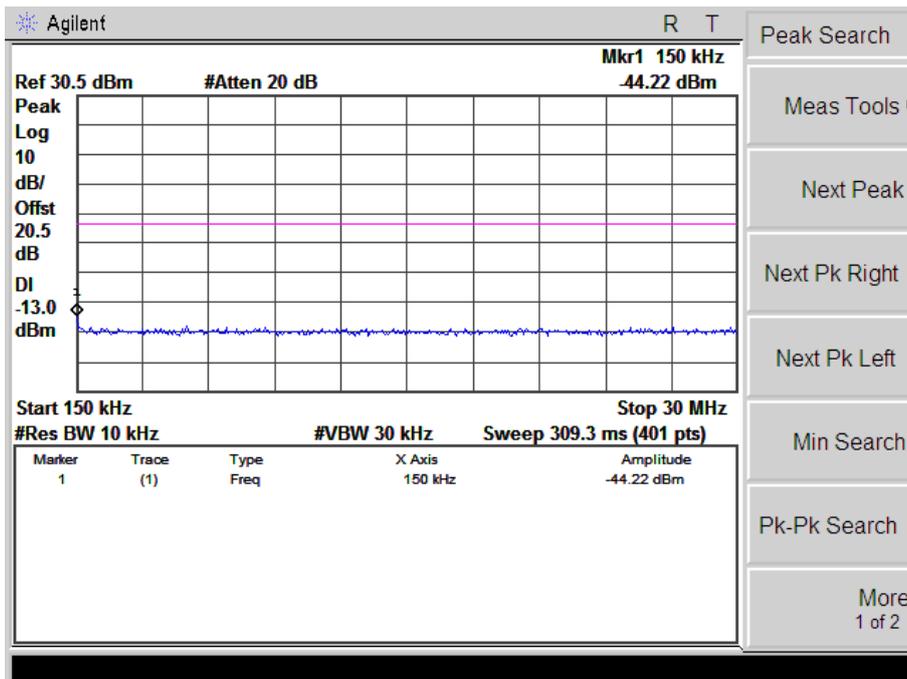
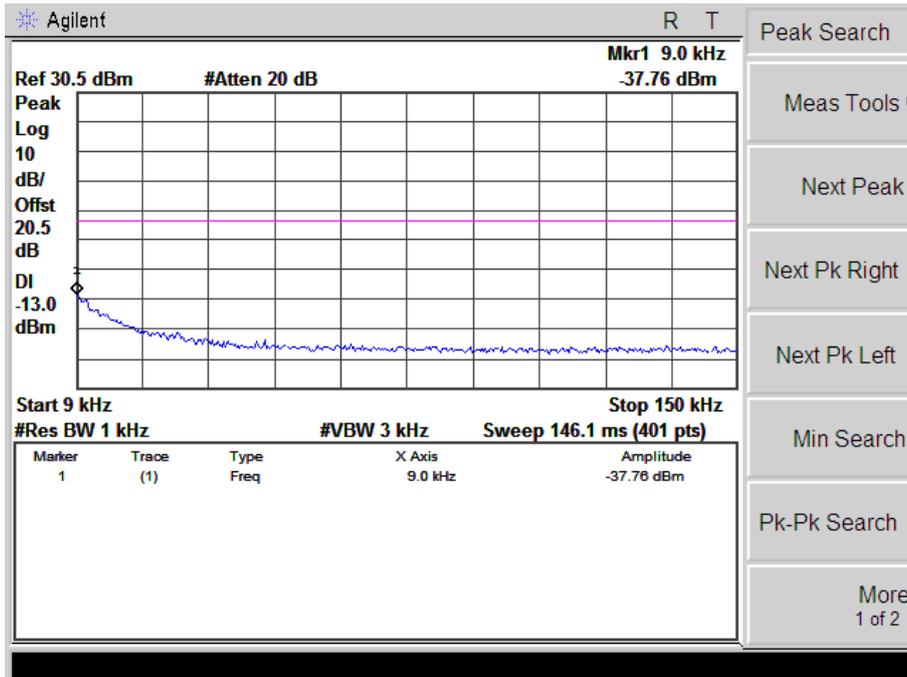
For Rated Low Power (1Watt)

Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz	
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)
FM	25 KHz	Low	156.0500	350.1	-36.23	1815.00	-27.65
		Middle	156.8000	352.5	-35.49	1902.50	-26.20
		High	157.4250	323.4	-37.09	1990.00	-27.52
Limit		-13dBm for 25 KHz Channel Separation					
Test Results		Compliance					

Plots of Spurious Emission on Antenna Port Measurement

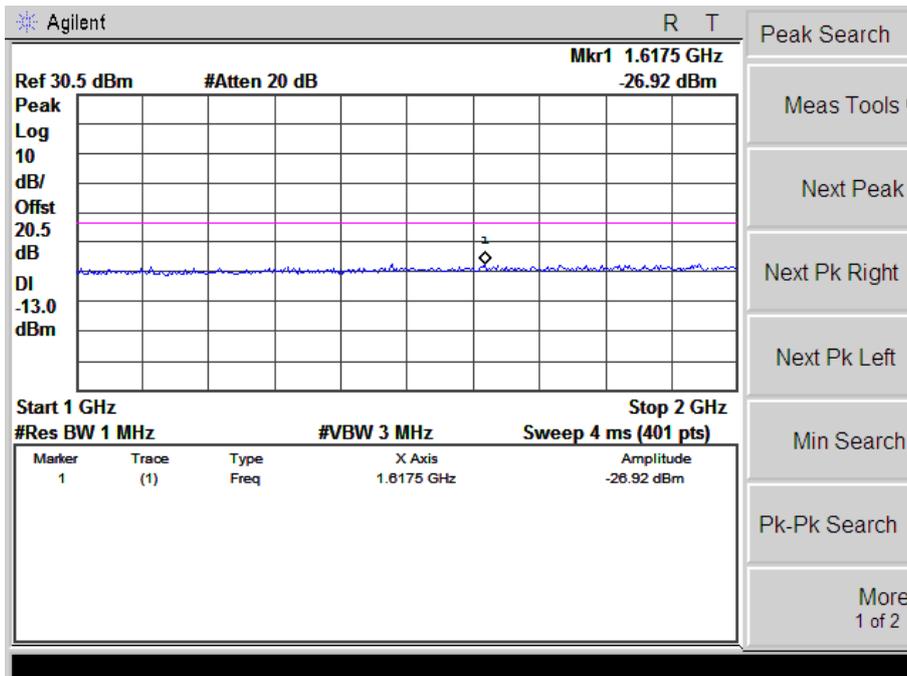
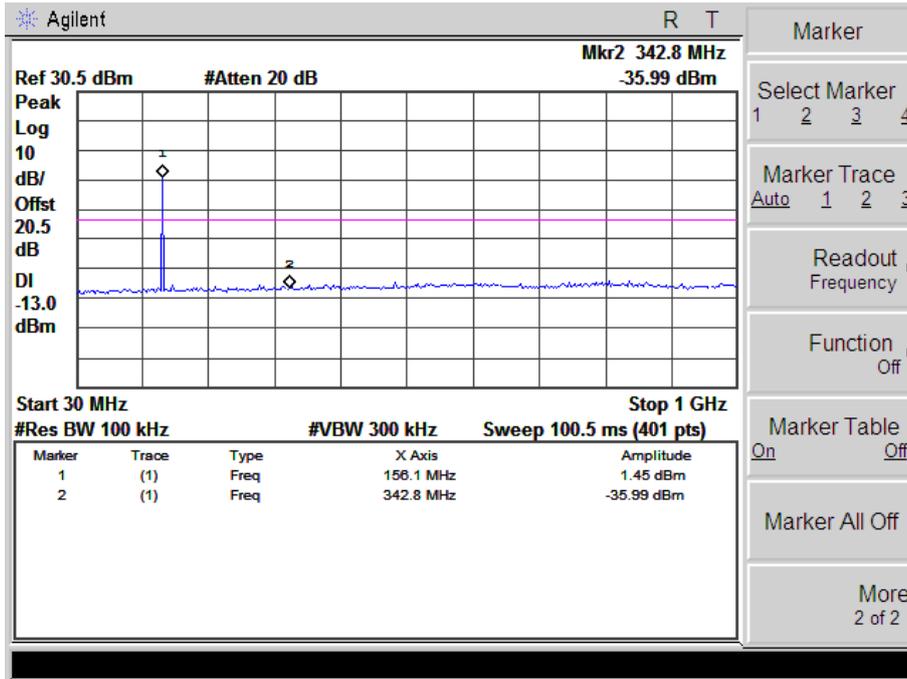
For Rated High Power (25Watt)

Modulation Type	Channel Sparation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Low	156.0500	342.8	-35.99	1617.5	-26.92	-13dBm
Test Results				Compliance				



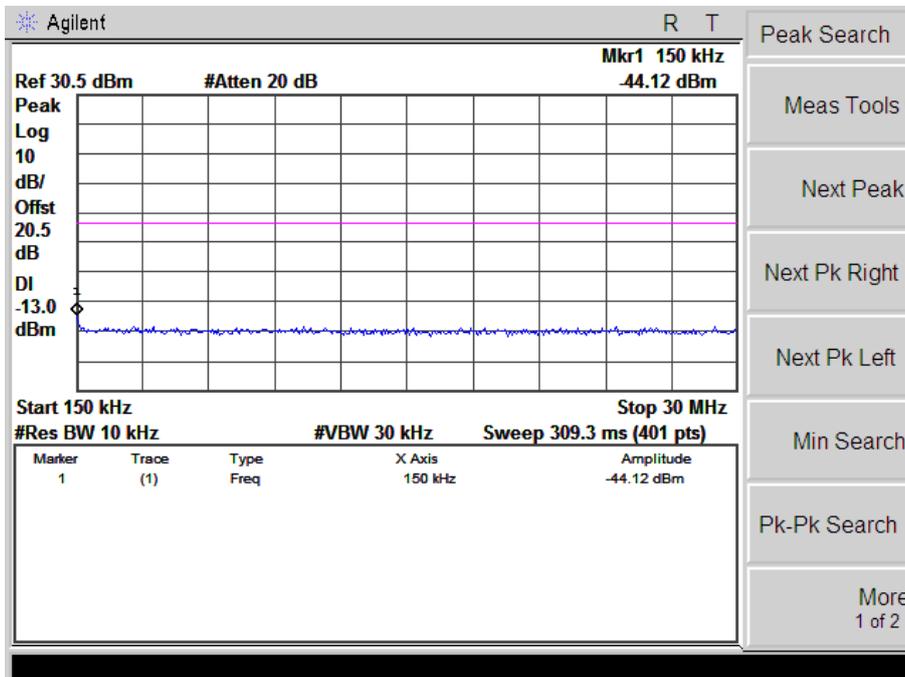
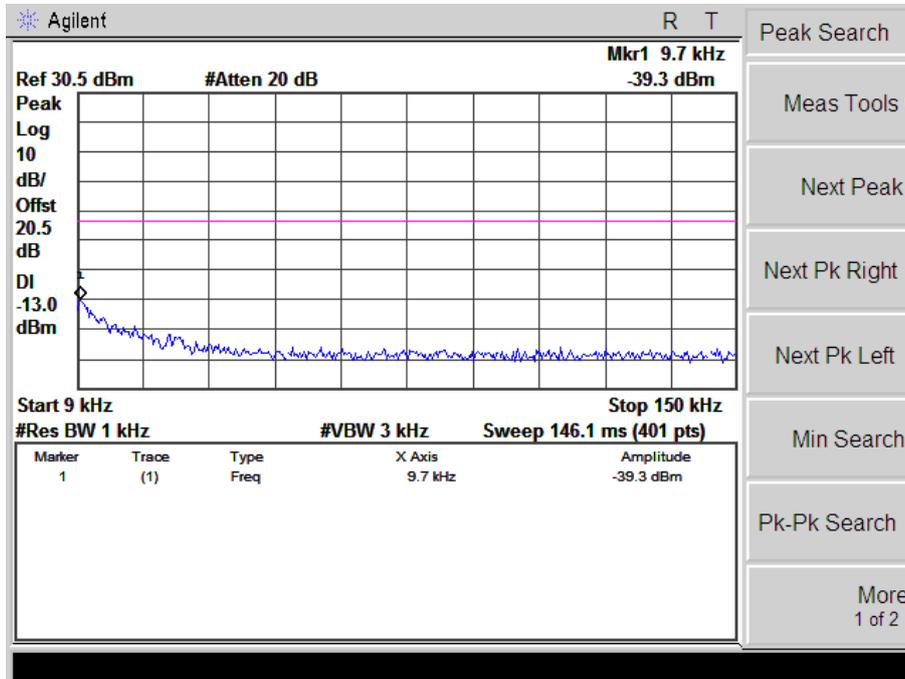


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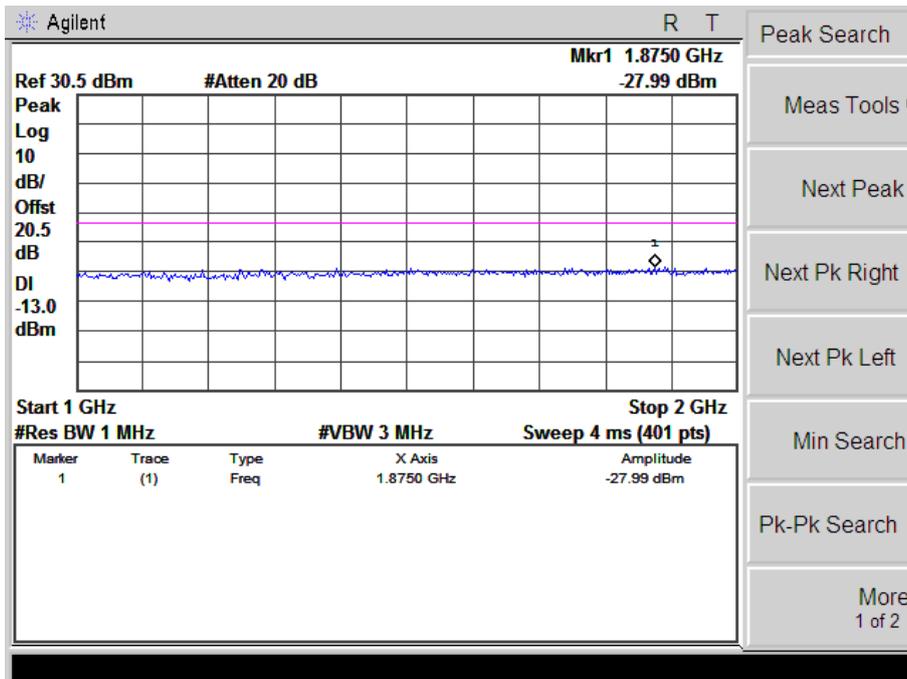
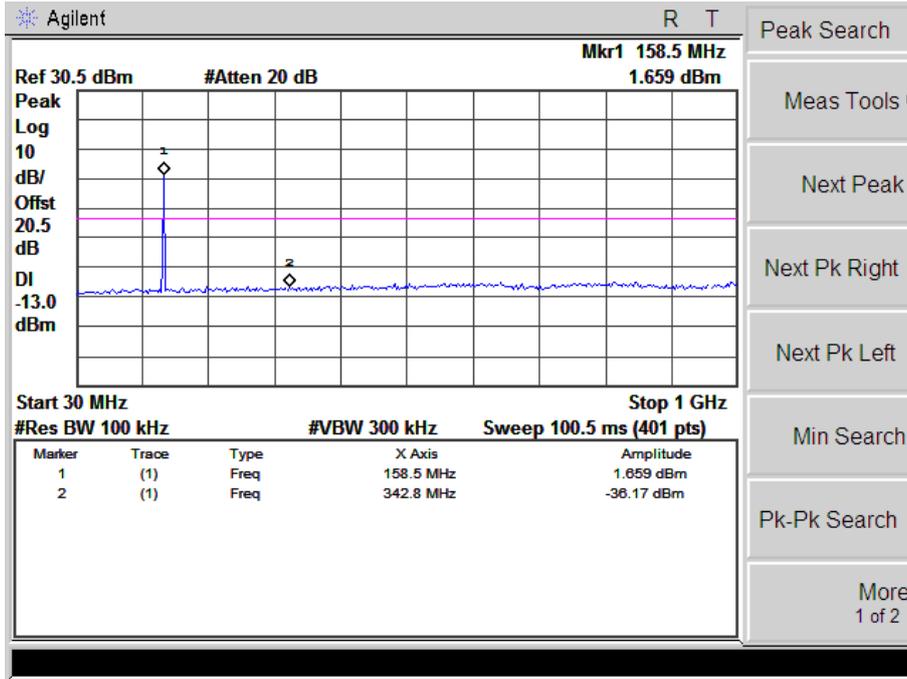


Modulation Type	Channel SpARATION	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Middle	156.8000	342.8	-36.17	1875.0	-27.99	-13dBm
Test Results				Compliance				



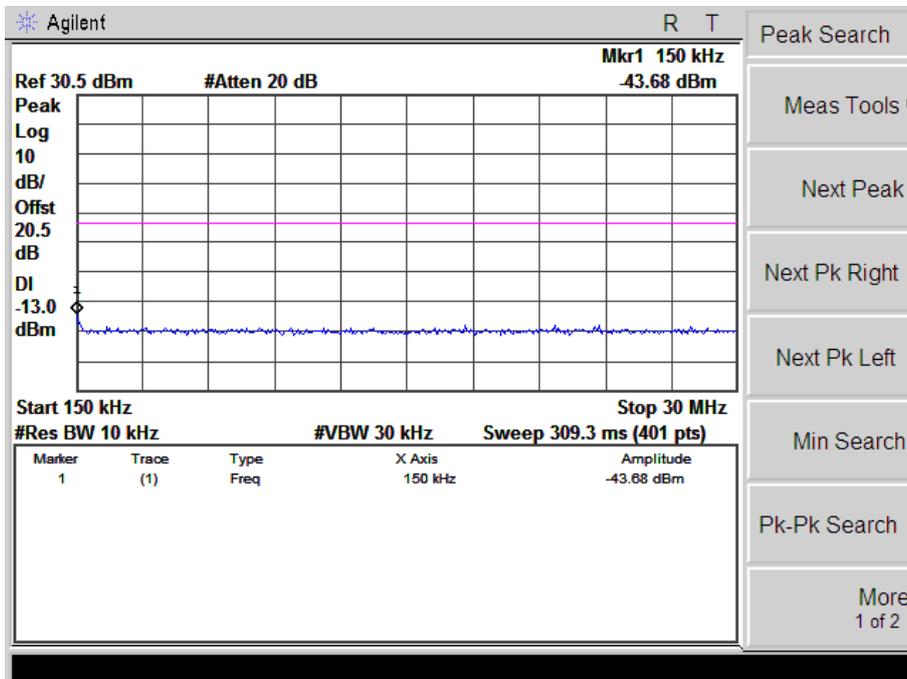
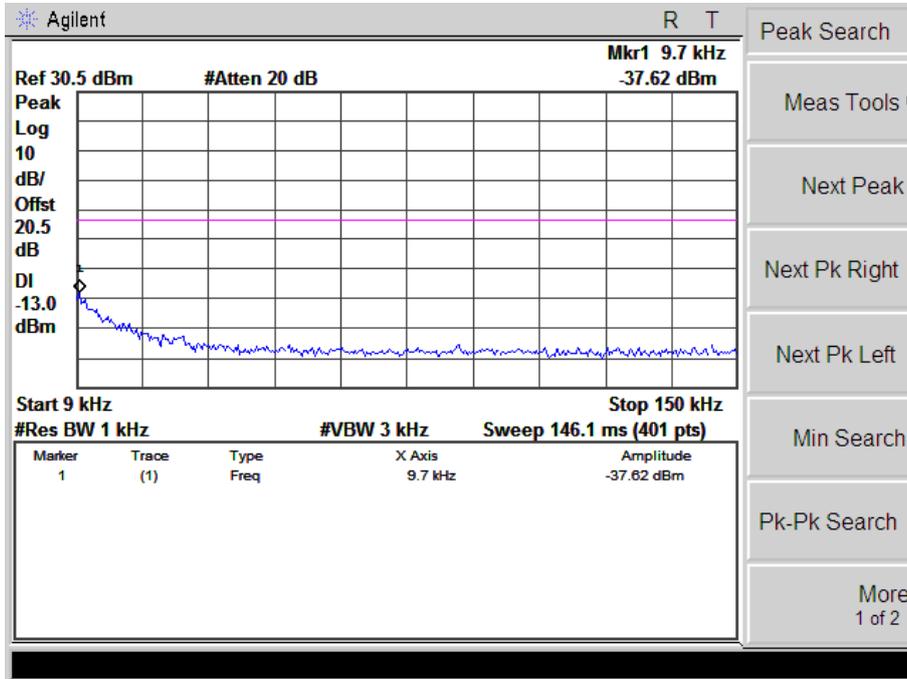


China



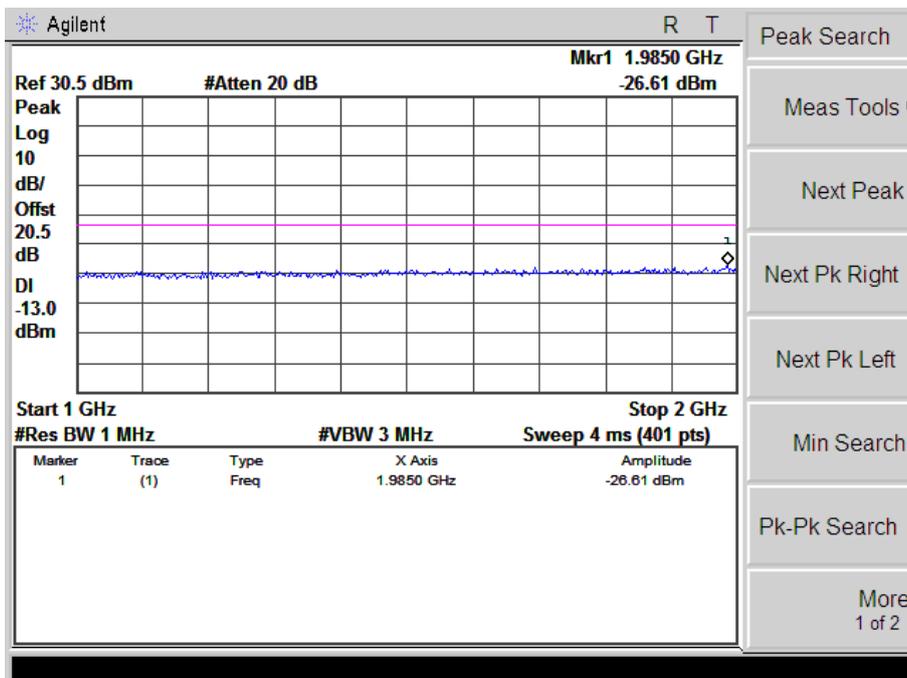
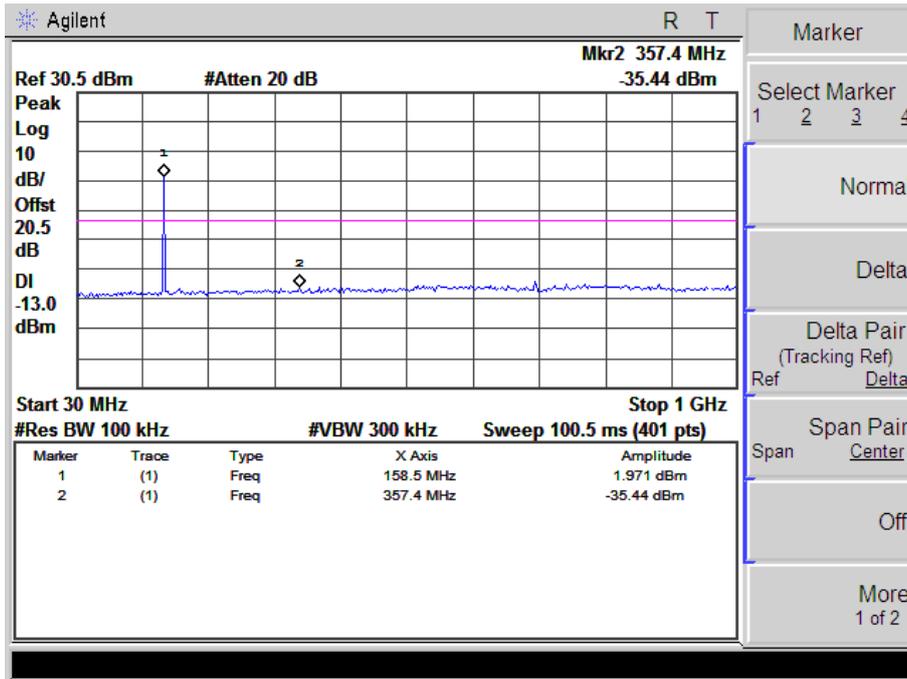


Modulation Type	Channel SpARATION	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	High	157.4250	357.4	-35.44	1985.0	-26.61	-13dBm
Test Results				Compliance				





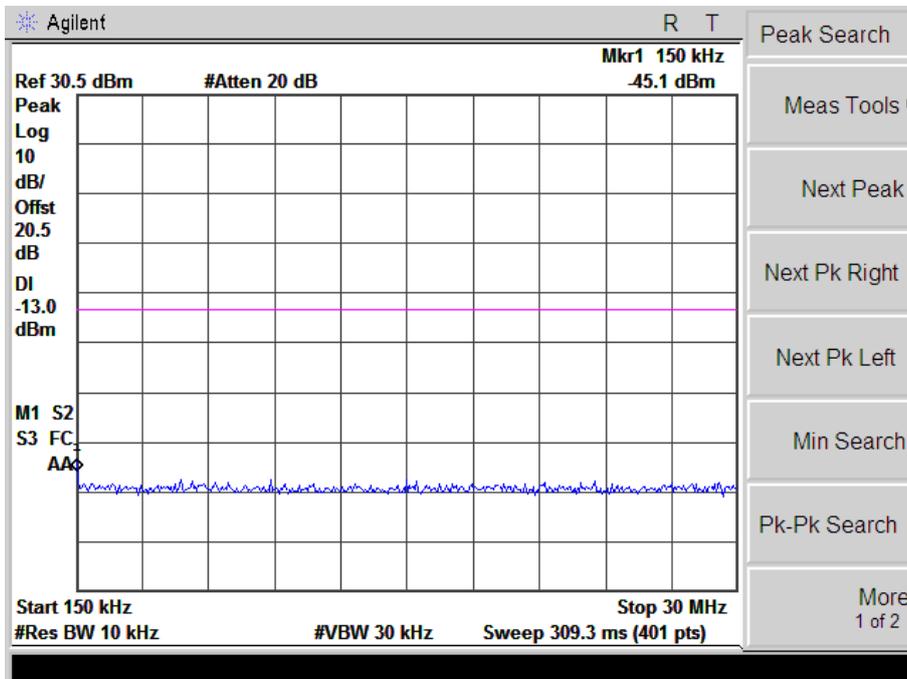
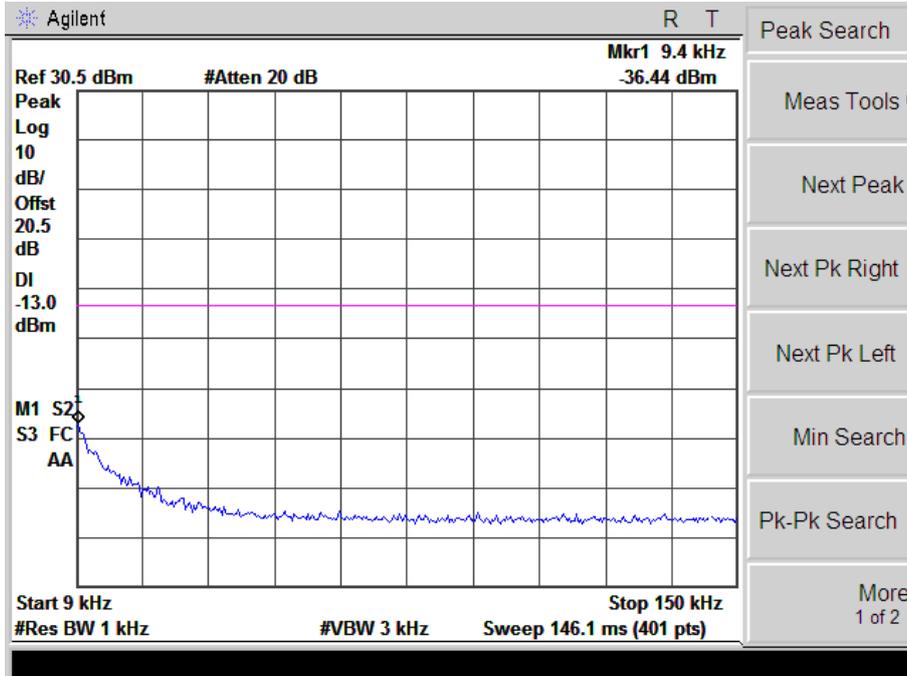
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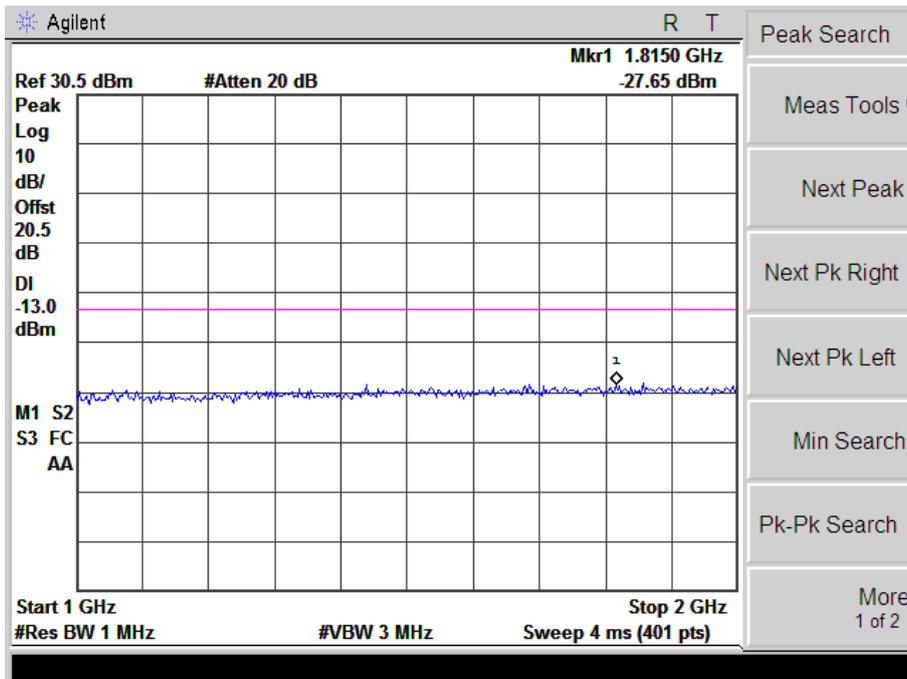
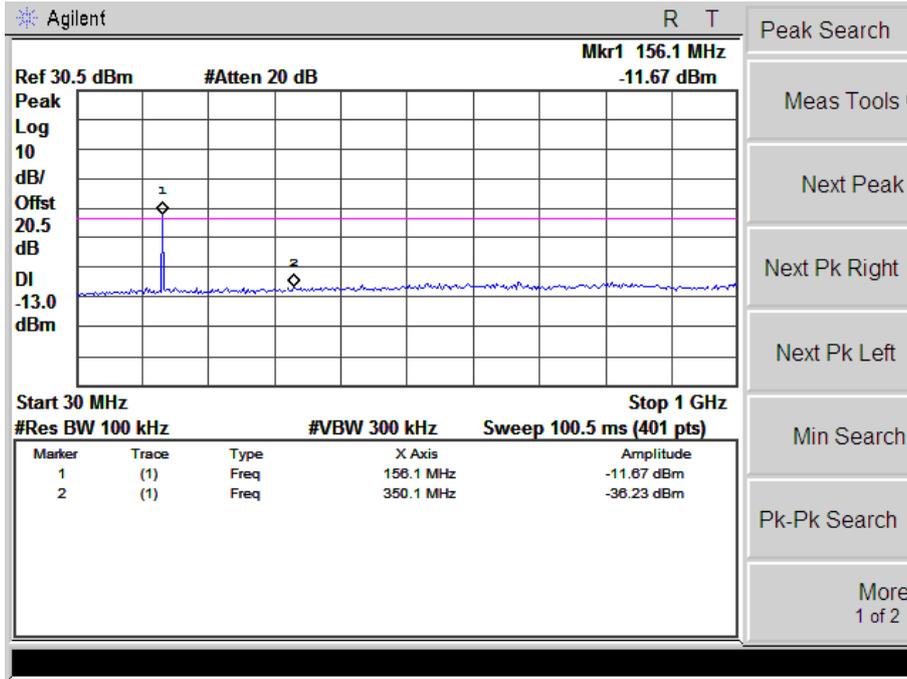




For Rated Low Power (1Watt)

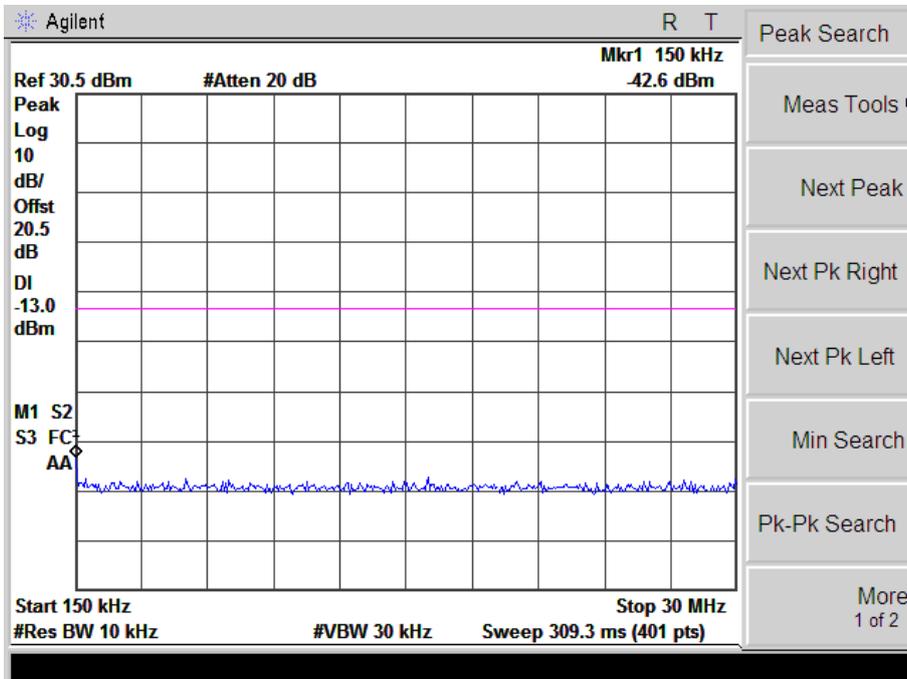
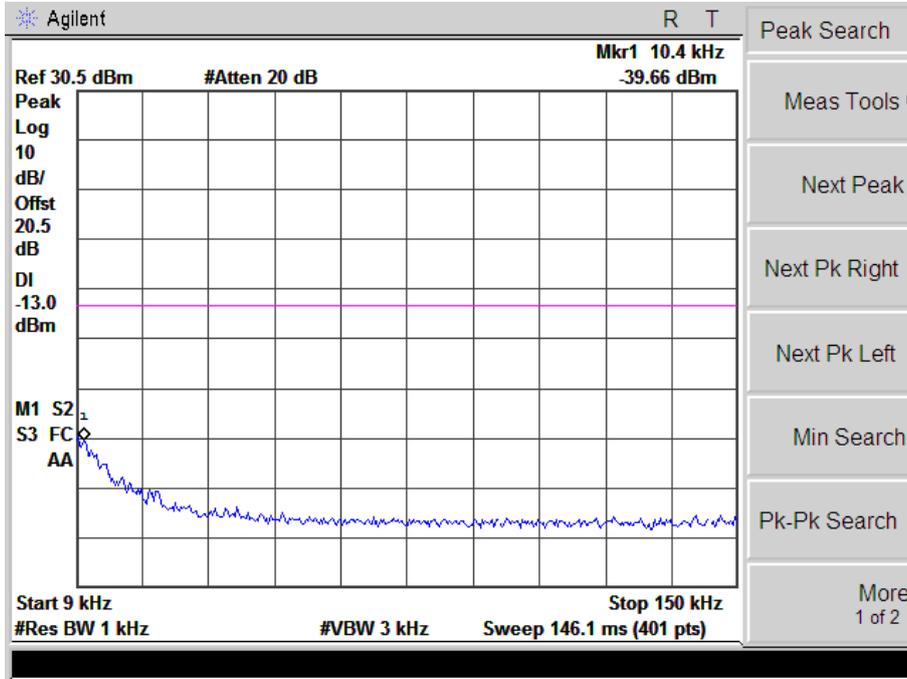
Modulation Type	Channel Sparation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Low	156.0500	350.1	-36.23	1815.00	-27.65	-13dBm
Test Results				Compliance				





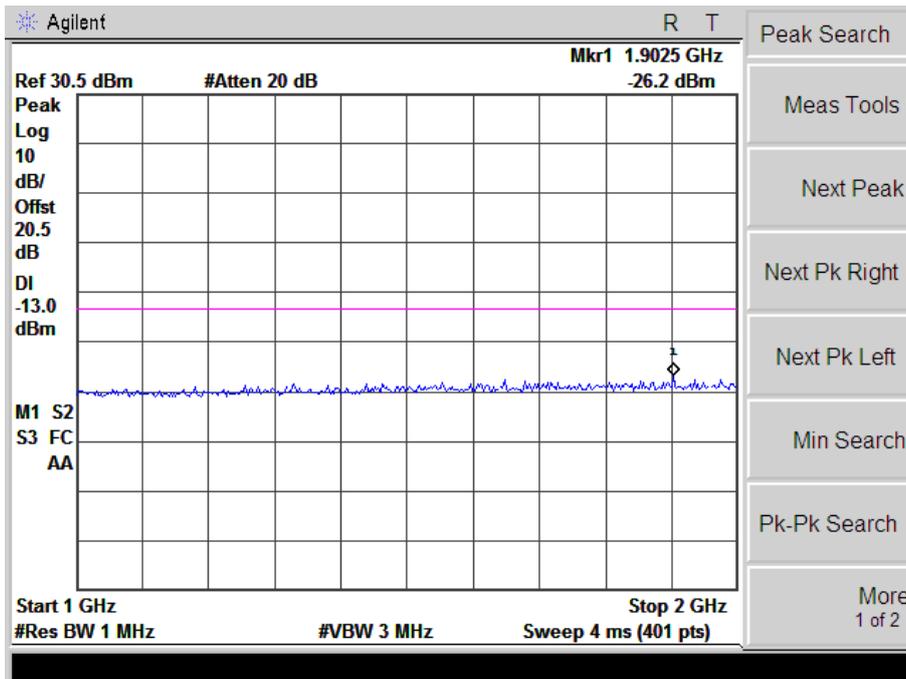
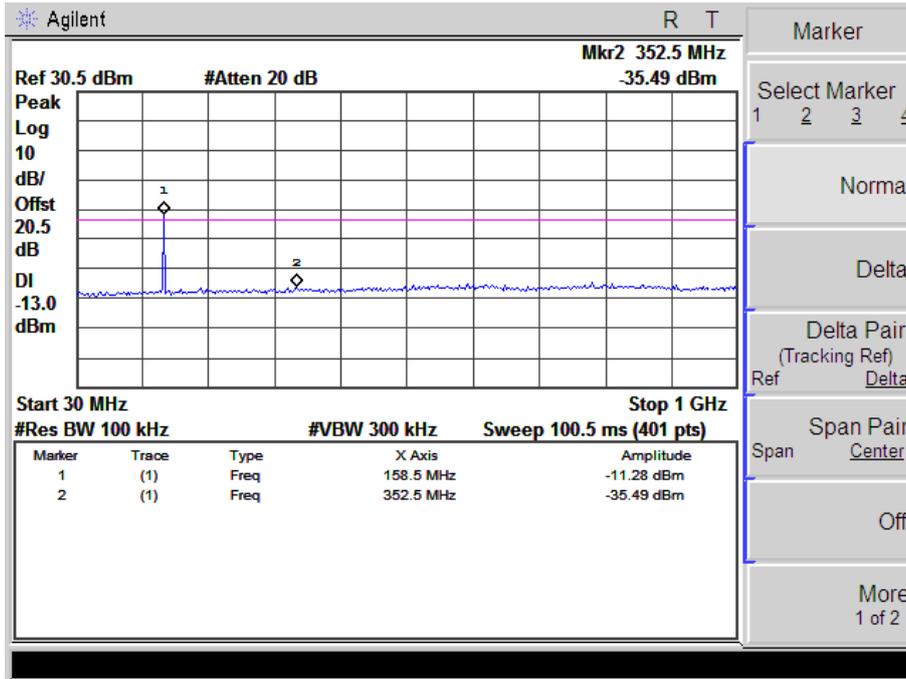


Modulation Type	Channel SpARATION	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Middle	156.8000	352.5	-35.49	1902.5	-26.20	-13dBm
Test Results				Compliance				

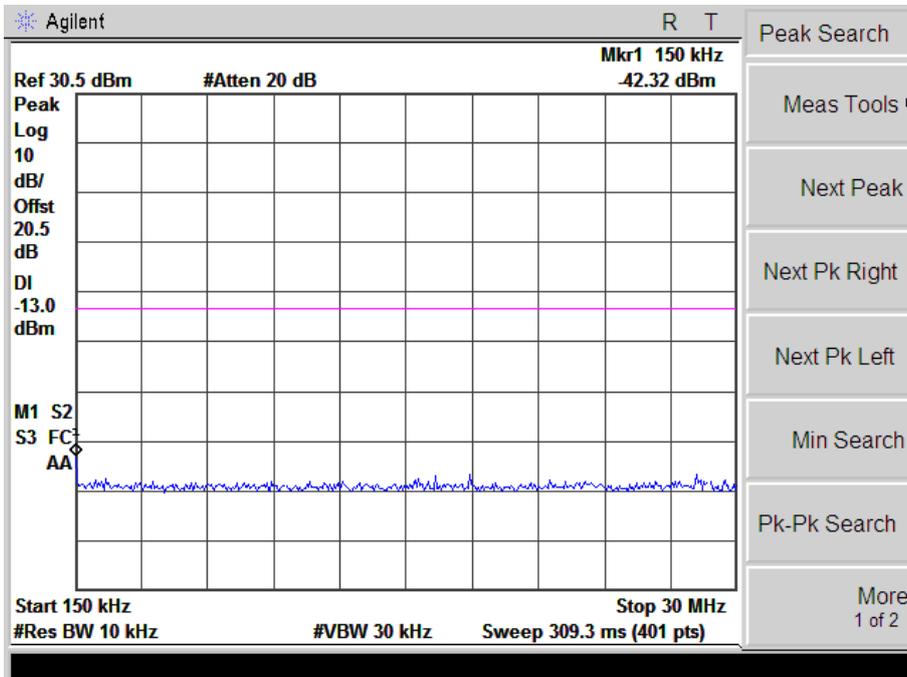
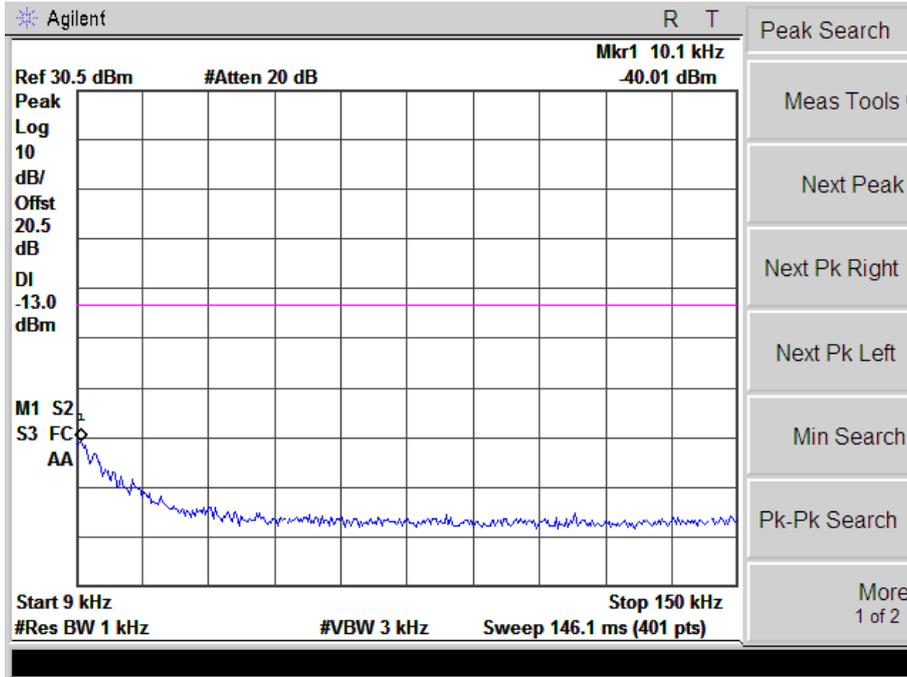




China

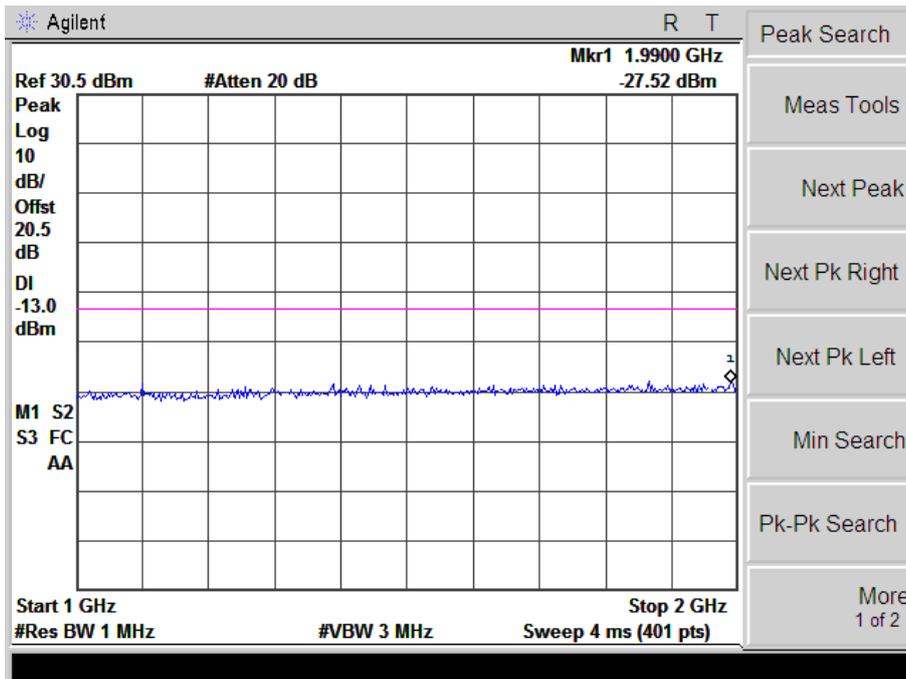
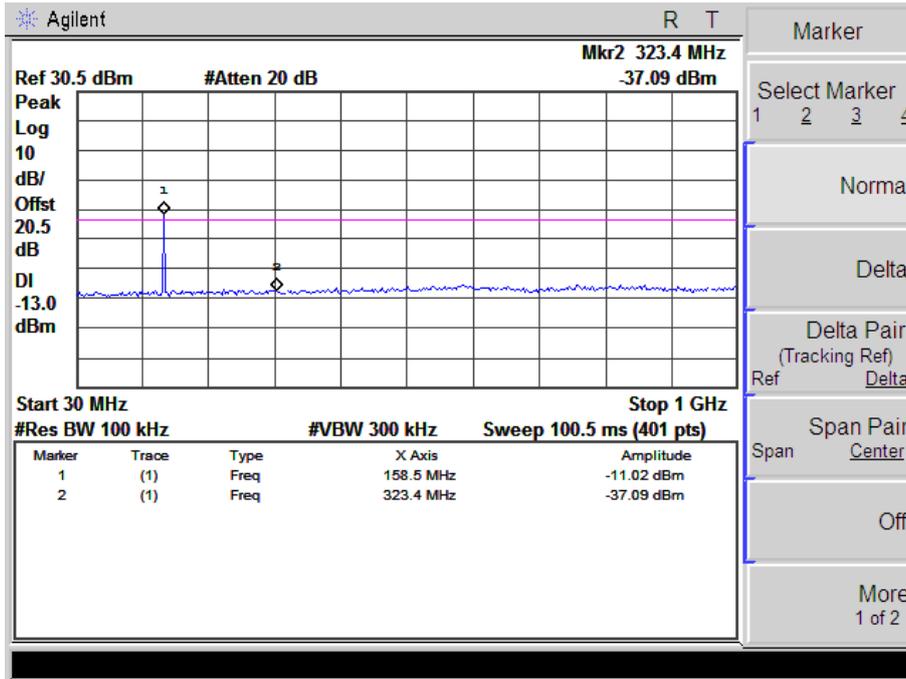


Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Middle	157.4250	323.4	-37.09	1990.00	-27.52	-13dBm
Test Results				Compliance				





China



4.5. Modulation Characteristics

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.

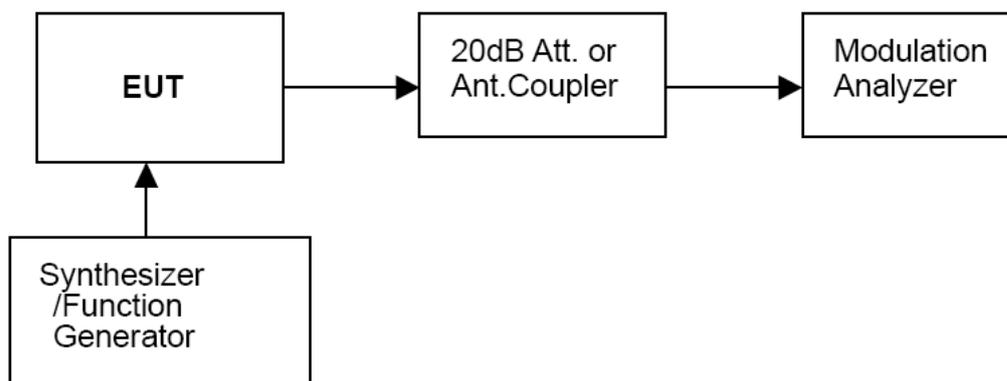
Test Limit

- 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, 1000, 1500 and 2500Hz in sequence.

TEST PROCEDURE

- 1 Configure the EUT as shown.
- 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 = $20\log_{10}$ (Deviation of test frequency/Deviation of 1 KHz reference).

TEST CONFIGURATION

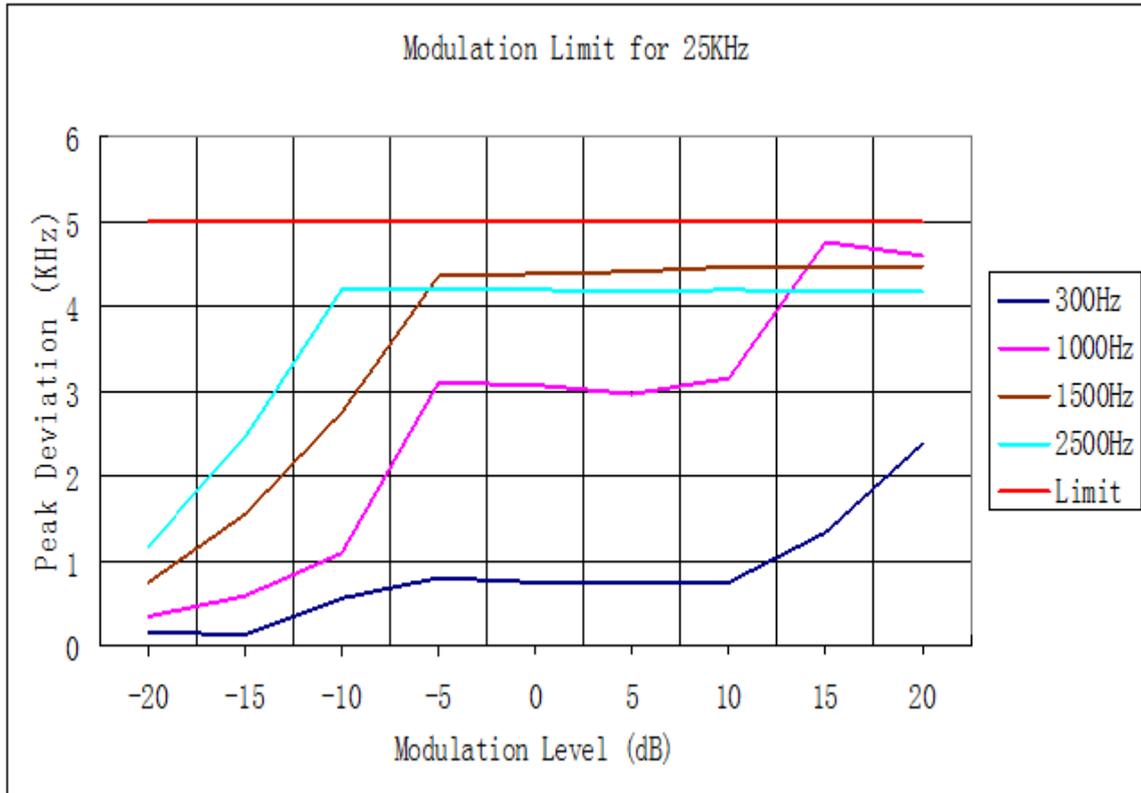


TEST RESULTS

Modulation Type: FM

25 KHz Channel Separation

Modulation Level(dB)	Peak Freq. Deviation At 300 Hz(KHz)	Peak Freq. Deviation At 1000 H(KHz)	Peak Freq. Deviation At 1500 Hz(KHz)	Peak Freq. Deviation At 2500 Hz(KHz)
-20	0.14	0.34	0.74	1.16
-15	0.12	0.56	1.55	2.44
-10	0.53	1.07	2.74	4.17
-5	0.77	3.08	4.33	4.15
0	0.75	3.06	4.32	4.14
+5	0.73	2.94	4.38	4.13
+10	0.72	3.13	4.44	4.19
+15	1.35	4.72	4.43	4.16
+20	2.37	4.57	4.42	4.14



4.6. 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 80.

Modulation Type: FM

The audio frequency response curve is show below.and

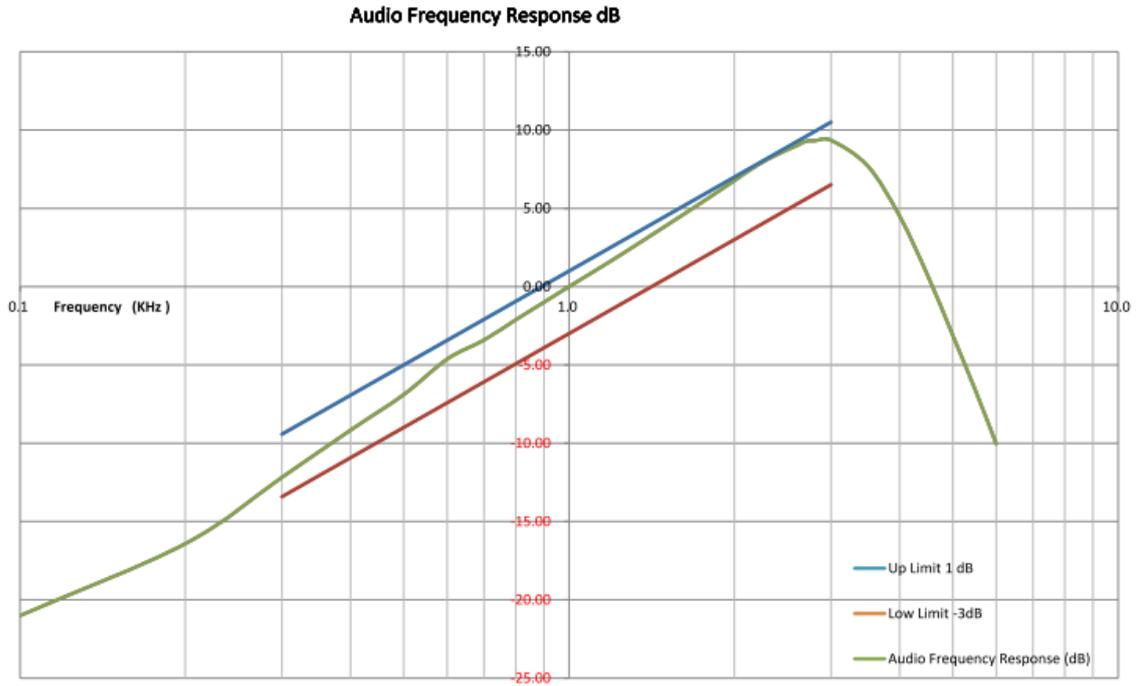
Test Audio Level (1 KHz and 20% maximum deviation) is 2.70mv for 25 KHz channel separation.

Note:

- 1 Not applicable to new standard. However, tests are conducted under FCC's recommendation.
- 2 The Audio Frequency Response is identical for 25 KHz channel separation

25 KHz Channel Separation

Frequency (KHz)	Frequency Deviation (KHz)	1KHz Refenerce Deviation (KHz)	Audio Frequency Response (dB)
0.1	0.09	1.00	-21.01
0.2	0.15	1.00	-16.42
0.3	0.25	1.00	-12.18
0.4	0.35	1.00	-9.17
0.5	0.45	1.00	-6.90
0.6	0.59	1.00	-4.63
0.7	0.68	1.00	-3.41
0.8	0.78	1.00	-2.11
0.9	0.89	1.00	-1.00
1.0	1.00	1.00	0.00
1.2	1.22	1.00	1.70
1.4	1.45	1.00	3.20
1.6	1.68	1.00	4.51
1.8	1.93	1.00	5.69
2.0	2.18	1.00	6.77
2.2	2.44	1.00	7.74
2.4	2.65	1.00	8.45
2.6	2.82	1.00	9.00
2.7	2.91	1.00	9.28
2.8	2.92	1.00	9.31
3.0	2.93	1.00	9.35
3.5	2.43	1.00	7.71
4.0	1.68	1.00	4.51
4.5	1.09	1.00	0.72
5.0	0.70	1.00	-3.11
5.5	0.47	1.00	-6.63
6.0	0.32	1.00	-10.03



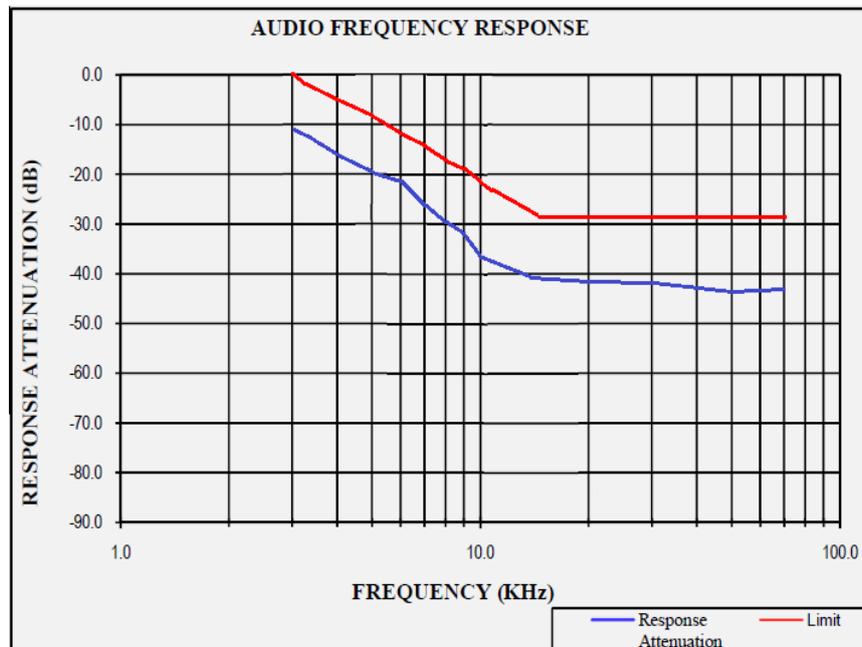
4.7. The Audio Low Pass Filter

TEST APPLICABLE

80.213 (e) Coast station transmitters operated in the 156–162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20 kHz it must have an attenuation greater than at 1 kHz by at least $60\log_{10}(f/3)$ dB where “f” is the audio frequency in kilohertz. At frequencies above 20 kHz the attenuation must be at least 50 dB greater than at 1 kHz.

TEST RESULTS

Frequency (KHz)	1KHz Reference attenuation (dB)	Limit (dB)
3.0	-11.50	0.00
3.5	-14.76	-2.68
4.0	-17.80	-5.00
5.0	-19.85	-8.87
6.0	-21.85	-12.04
7.0	-25.93	-14.72
8.0	-29.90	-17.04
9.0	-32.01	-19.08
10.0	-36.15	-20.92
15.0	-40.55	-28.00
20.0	-41.84	-28.00
30.0	-42.70	-28.00
50.0	-44.87	-28.00
70.0	-44.73	-28.00



4.8. Frequency Stability Test

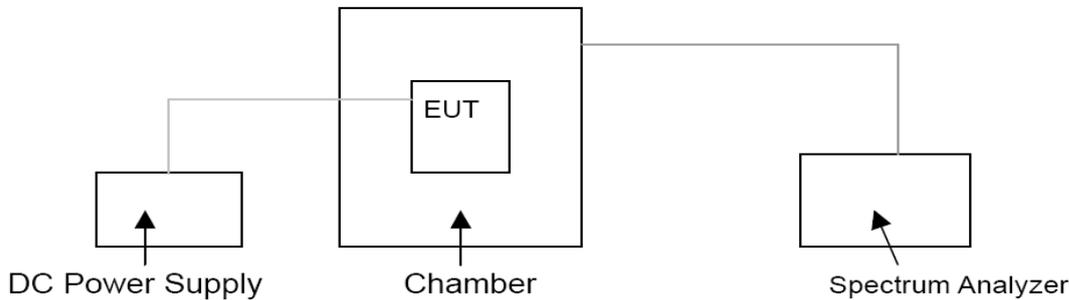
TEST APPLICABLE

- 1 According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C 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 the end voltage point was 6.67V.
- 4 According to §90.213, the frequency stability limit is 2.5 pFM for 25 KHz 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 80.209, Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Band	Coast stations		Ship stations
	Below 3W	3 to 100W	
156-162 MHz	10pFM	5 ¹ pFM	10 ² pFM

1 For transmitters operated at private coast stations with antenna heights less than 6 meters (20 feet) above ground and output power of 25 Watts or less the frequency tolerance is 10 parts in 10⁶

2 For transmitters in the radiolocation and associated telecommand service operating on 154.585 MHz, 159.480 MHz, 160.725 MHz and 160.785 MHz the frequency tolerance is 15 parts in 10⁶



TEST RESULTS

Modulation Type	Channel Separation	Test conditions		Frequency error (pFM)		
		Voltage(V)	Temp(°C)	156.050MHz	156.800 MHz	157.425MHz
Analog/FM	25 KHz	13.80	-30	-0.9292	-0.9885	-1.264
			-20	-0.9291	-0.9885	-1.264
			-10	-0.9291	-0.9885	-1.264
			0	-0.9292	-0.9885	-1.2641
			10	-0.9291	-0.9885	-1.2641
			20	-0.9292	-0.9885	-1.2641
			30	-0.9291	-0.9885	-1.2641
			40	-0.9291	-0.9885	-1.264
			50	-0.9291	-0.9885	-1.264
		11.73 (85% Rated)	20	-1.2432	-1.2372	-1.2704
		15.87(115% Rated)	20	-1.0766	-1.0332	-1.0989
Limit		5 pFM				
Conclusion		Complies				

4.9. Maximum Transmitter Power

TEST APPLICABLE

80.215(e)(1) Ship stations 156–162 MHz - 25W^{1,2}

Marine utility stations and hand-held portable transmitters: 156–162 MHz -10W

1 Reducible to 1 watt or less, except for transmitters limited to public correspondence channels and used in an automated system.

2 The frequencies 156.775 and 156.825 MHz are available for navigation-related port operations or ship movement only, and all precautions must be taken to avoid harmful interference to channel 16. Transmitter output power is limited to 1 watt for ship stations, and 10 watts for coast stations.

TEST PROCEDURE

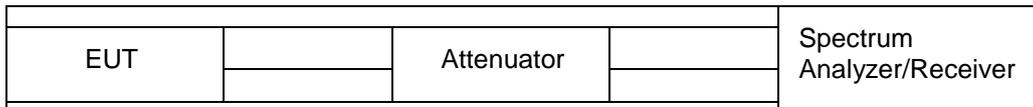
Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted below:

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

The EUT connect to the Receiver through 20 dB attenuator.

Measurement with Spectrum Analyzer FSP40 conducted, external power supply with 7.4 V stabilized supply voltage.

TEST CONFIGURATION



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

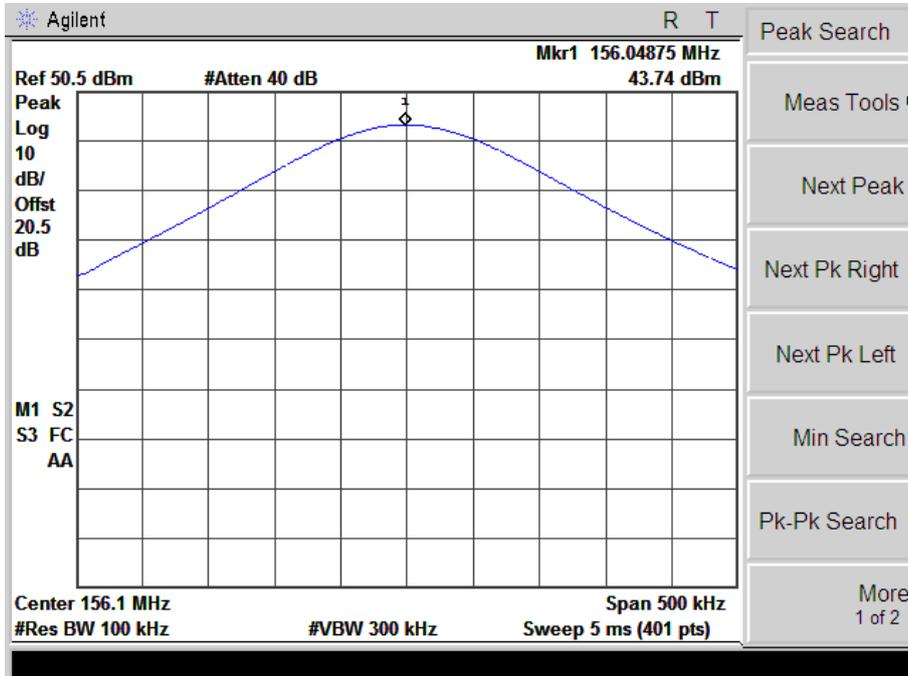
TEST RESULTS

Modulation Type	Channel Separation	Test Channel	Test Frequency	Maximum Transmitter Power at Rated High Power Level(dBm)	Maximum Transmitter Power at Rated Low Power Level(dBm)
Analog/FM	25 KHz	Low	156.0500 MHz	43.74	29.83
		Middle	156.8000 MHz	43.65	29.41
		High	157.4250 MHz	43.71	29.68
Limit		High rating power 25W, Low rating power 1W			
Test Results		Compliance			

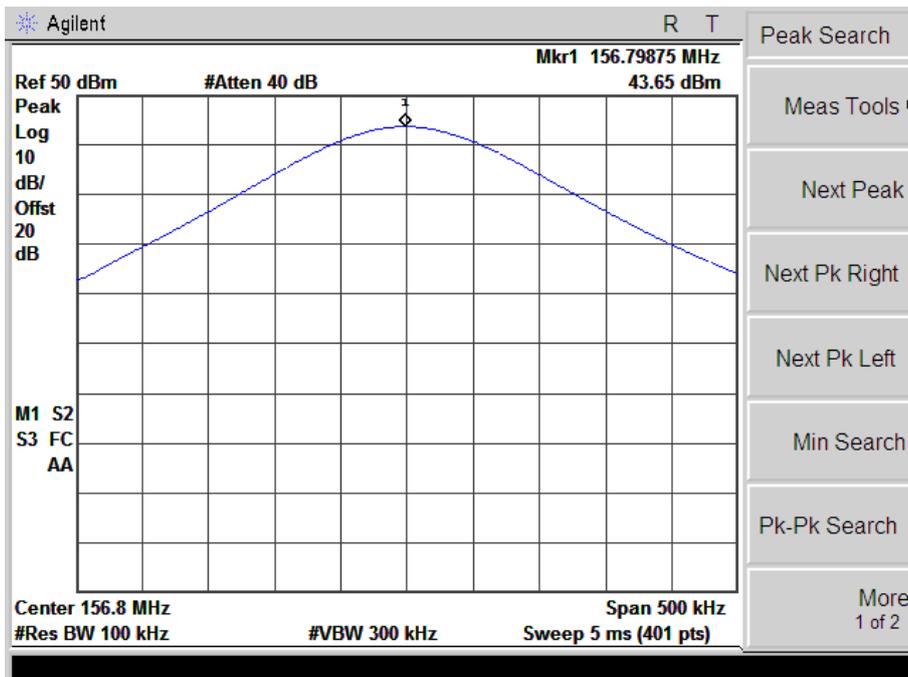
Plots of Maximum Transmitter Power Measurement



Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	25 KHz	156.0500	25	43.74	Varies	Compliance

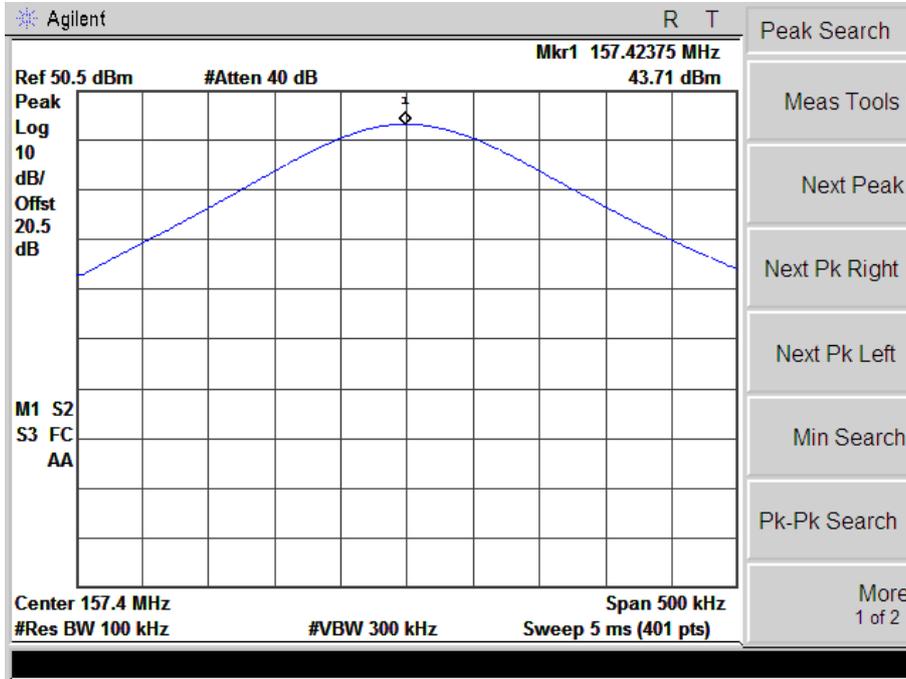


Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	25 KHz	156.8000	25	43.65	Varies	Compliance

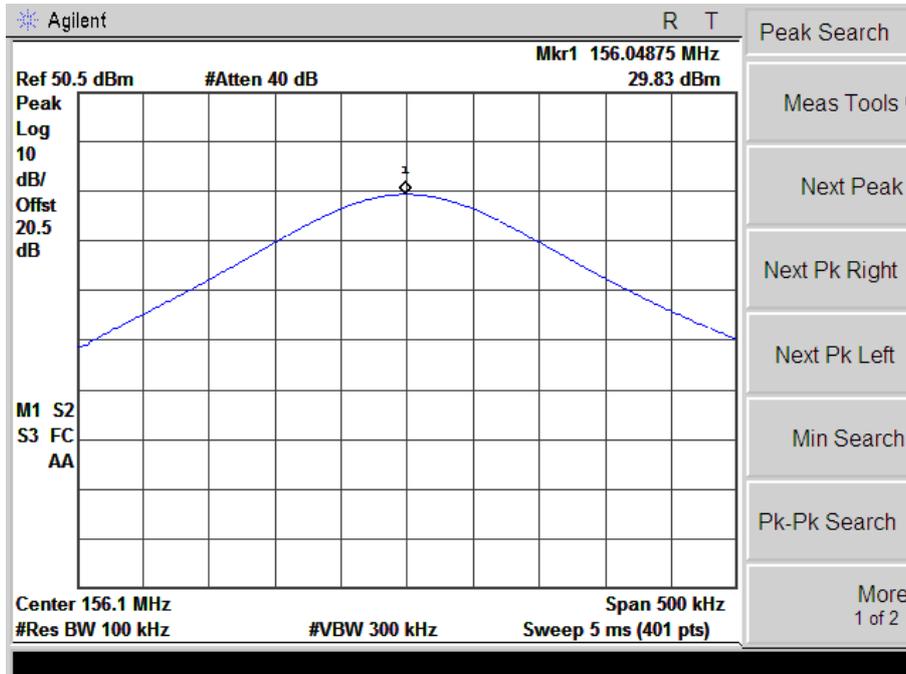




Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	25 KHz	157.4250	25	43.71	Varies	Compliance

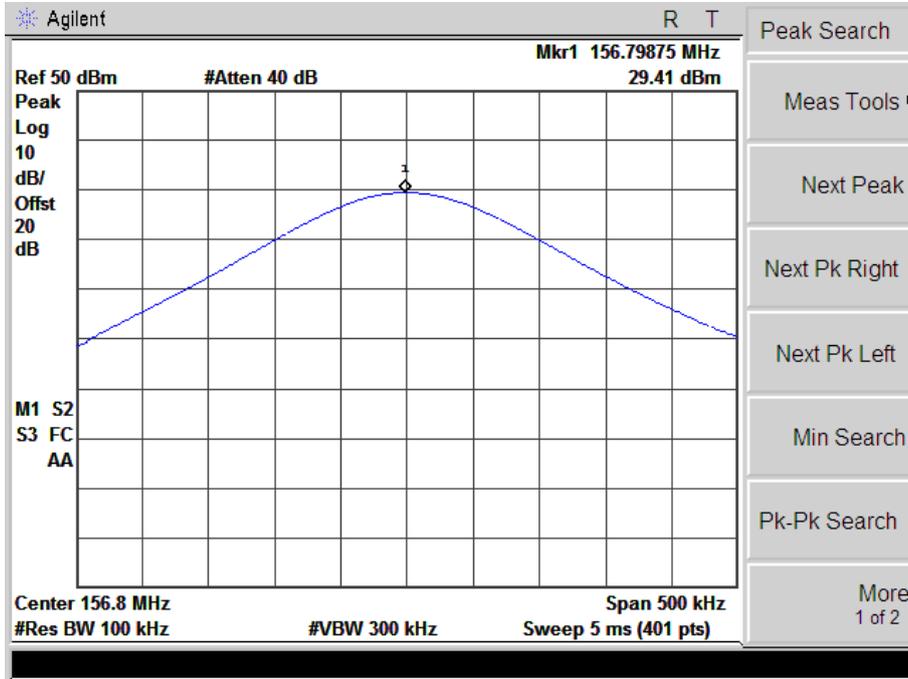


Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	25 KHz	156.0500	1	29.83	Varies	Compliance

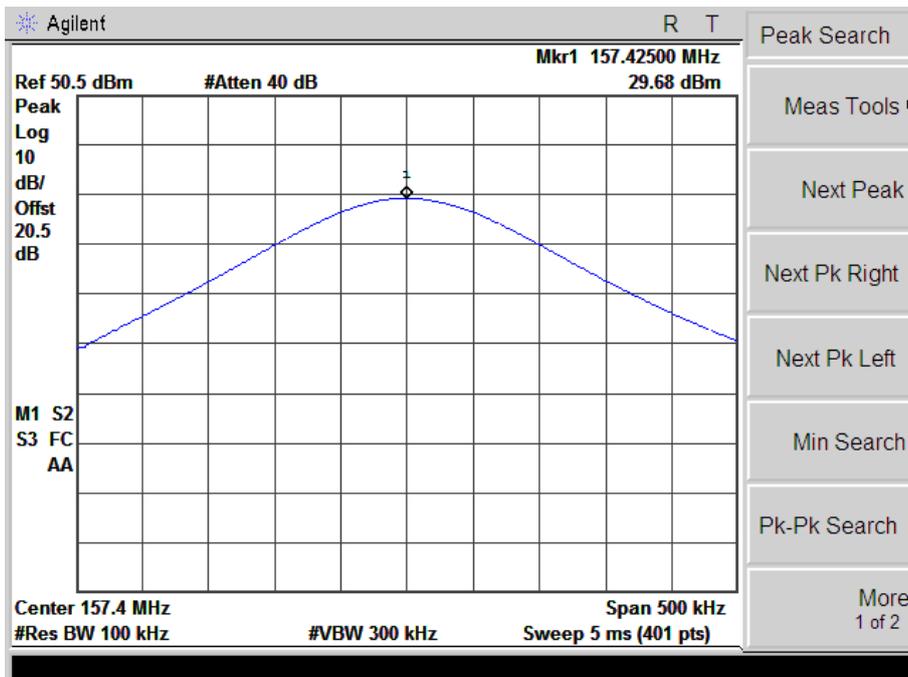




Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	25 KHz	156.8000	1	29.41	Varies	Compliance



Modulation Type	Channel Separation	Freq.(MHz)	Rated Power (Watt)	Measurement (dBm)	FCC Limit	Results
FM	25 KHz	157.4250	1	29.68	Varies	Compliance



4.10. Receiver Radiated Spurious Emission

TEST APPLICABLE

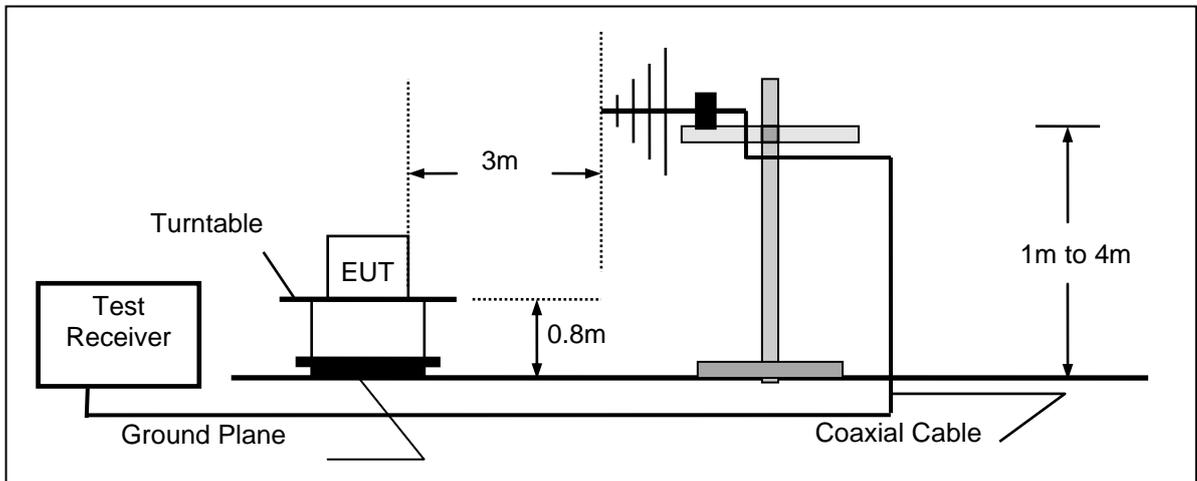
The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

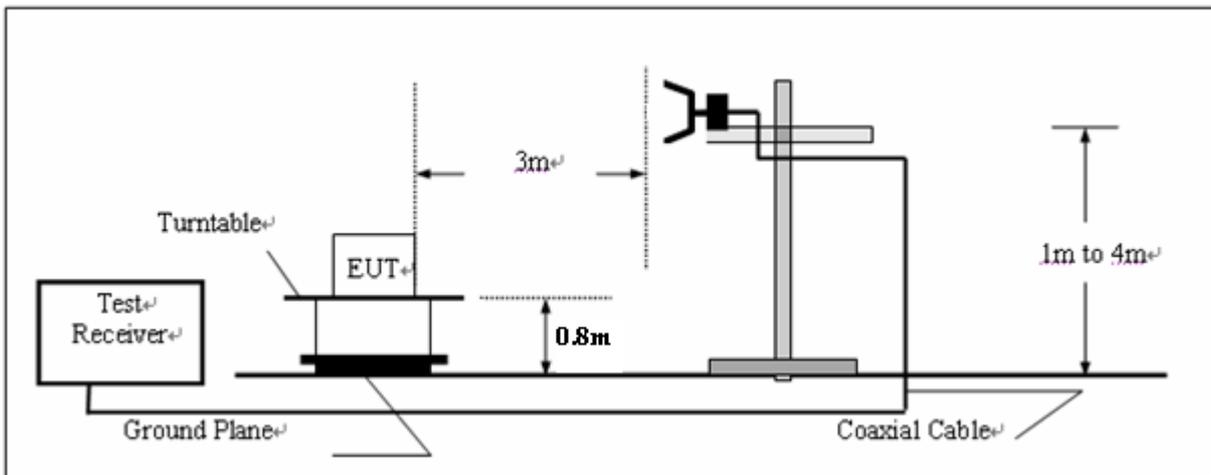
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

TEST CONFIGURATION

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



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



TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
- 3 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4 Repeat above procedures until all frequency measurements have been completed.

RECEIVER RADIATED SPOUIOUS LIMIT

For unintentional device, according to § 15.109(a) and RSS-Gen, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

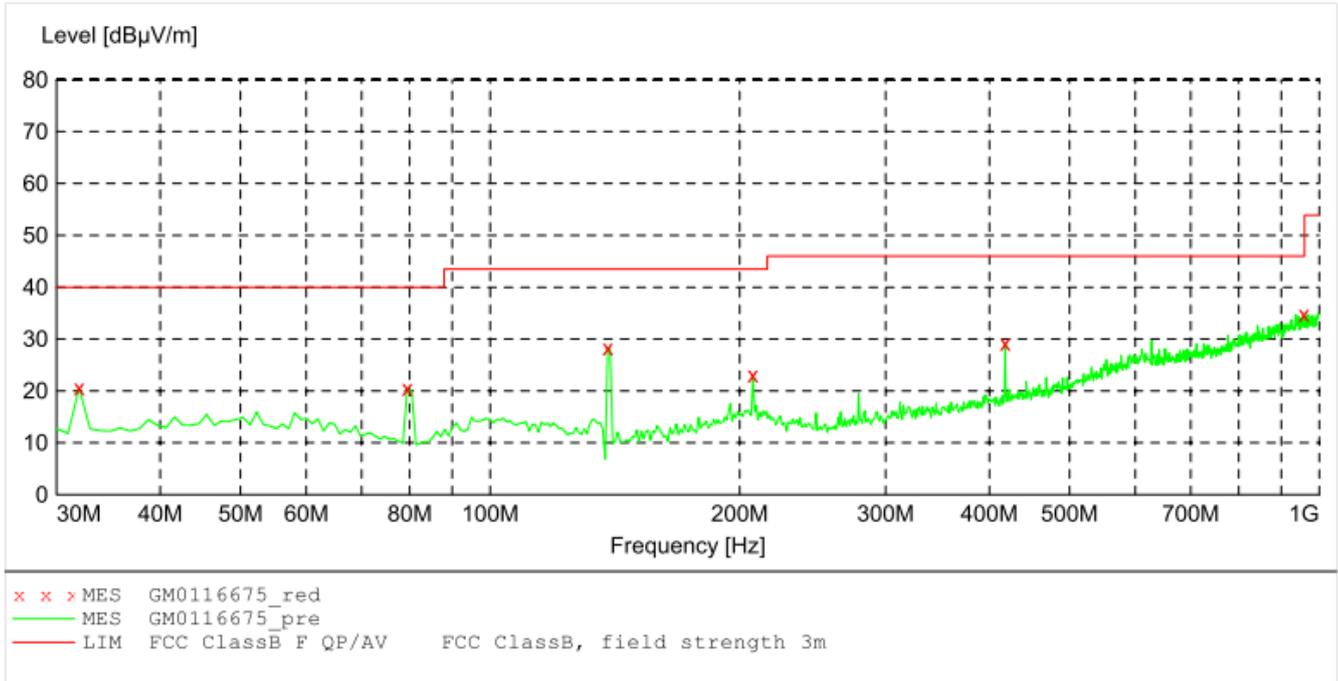
Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

TEST RESULTS

The Radiated Measurement are performed to the six channels including High Power (the top channel, the middle channel and the bottom channel) and Low Power (the top channel, the middle channel and the bottom channel) the datum recorded below is the worst case for each channel separation; and the EUT shall be scanned from 30 MHz to the 5th harmonic of the highest oscillator frequency in the digital devices or 1GHz whichever is higher.

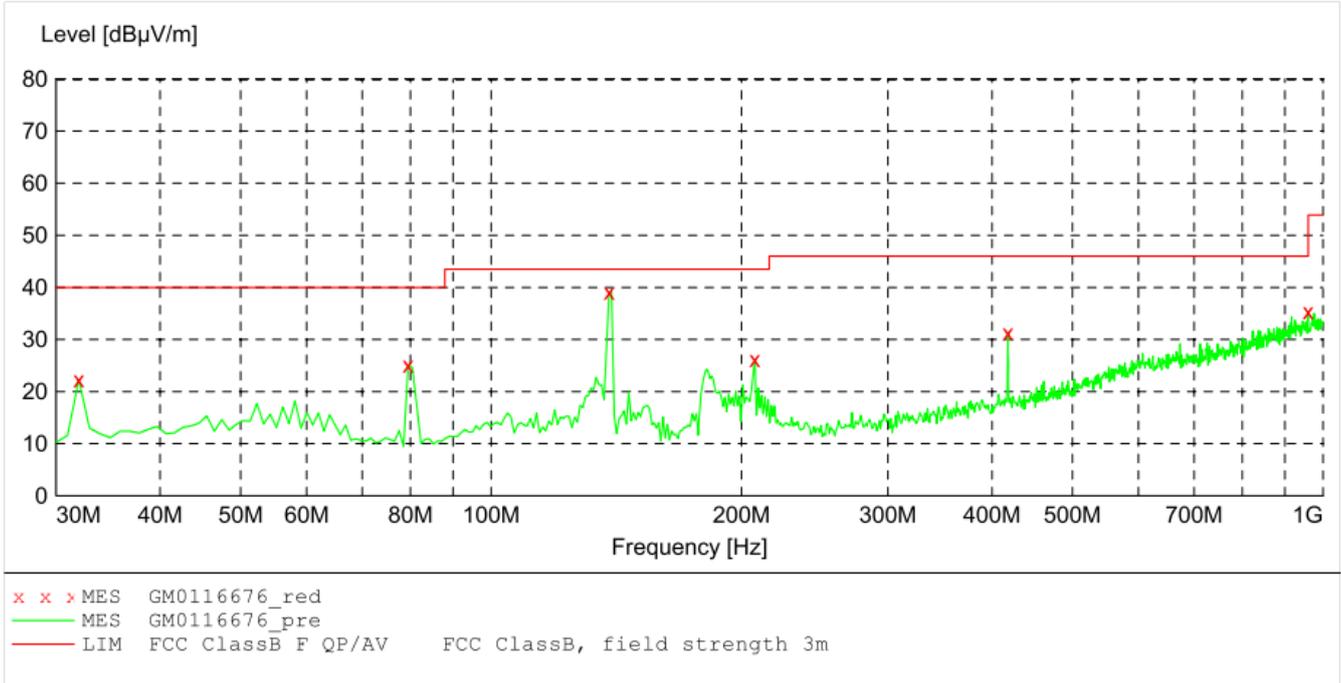
Operating Condition: High Power- the top channel
 Test Specification: Horizontal
 Comment: 30MHz-1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	20.60	-16.5	40.0	19.4	QP	300.0	55.00	HORIZONTAL
79.470000	20.50	-18.6	40.0	19.5	QP	300.0	360.00	HORIZONTAL
138.640000	28.30	-18.1	43.5	15.2	QP	300.0	55.00	HORIZONTAL
207.510000	23.10	-13.9	43.5	20.4	QP	100.0	325.00	HORIZONTAL
418.000000	29.20	-10.1	46.0	16.8	QP	100.0	125.00	HORIZONTAL
958.290000	34.80	3.8	46.0	11.2	QP	100.0	267.00	HORIZONTAL

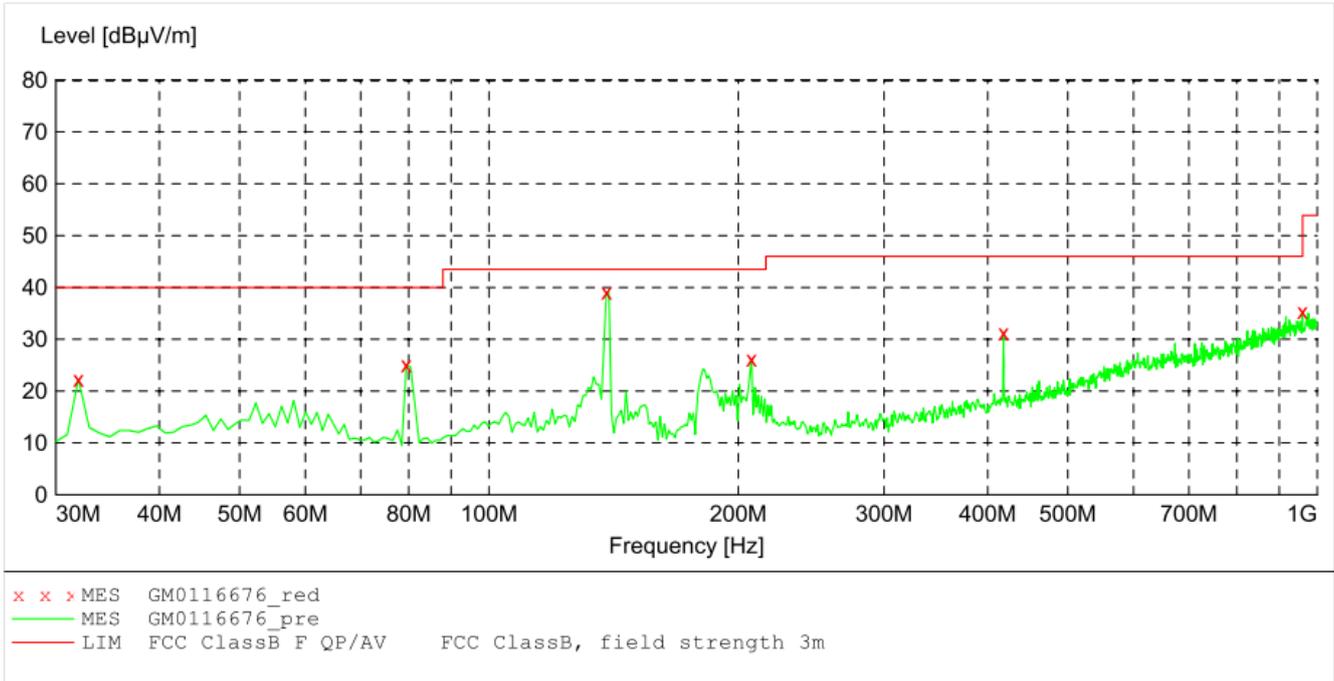


Operating Condition: High Power- the top channel
 Test Specification: Vertical
 Comment: 30MHz-1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	22.30	-16.5	40.0	17.7	QP	100.0	127.00	VERTICAL
79.470000	25.10	-18.6	40.0	14.9	QP	100.0	328.00	VERTICAL
138.640000	39.10	-18.1	43.5	4.4	QP	100.0	360.00	VERTICAL
207.510000	26.20	-13.9	43.5	17.3	QP	100.0	266.00	VERTICAL
418.000000	31.30	-10.1	46.0	14.7	QP	100.0	346.00	VERTICAL
959.260000	35.40	3.9	46.0	10.6	QP	100.0	127.00	VERTICAL

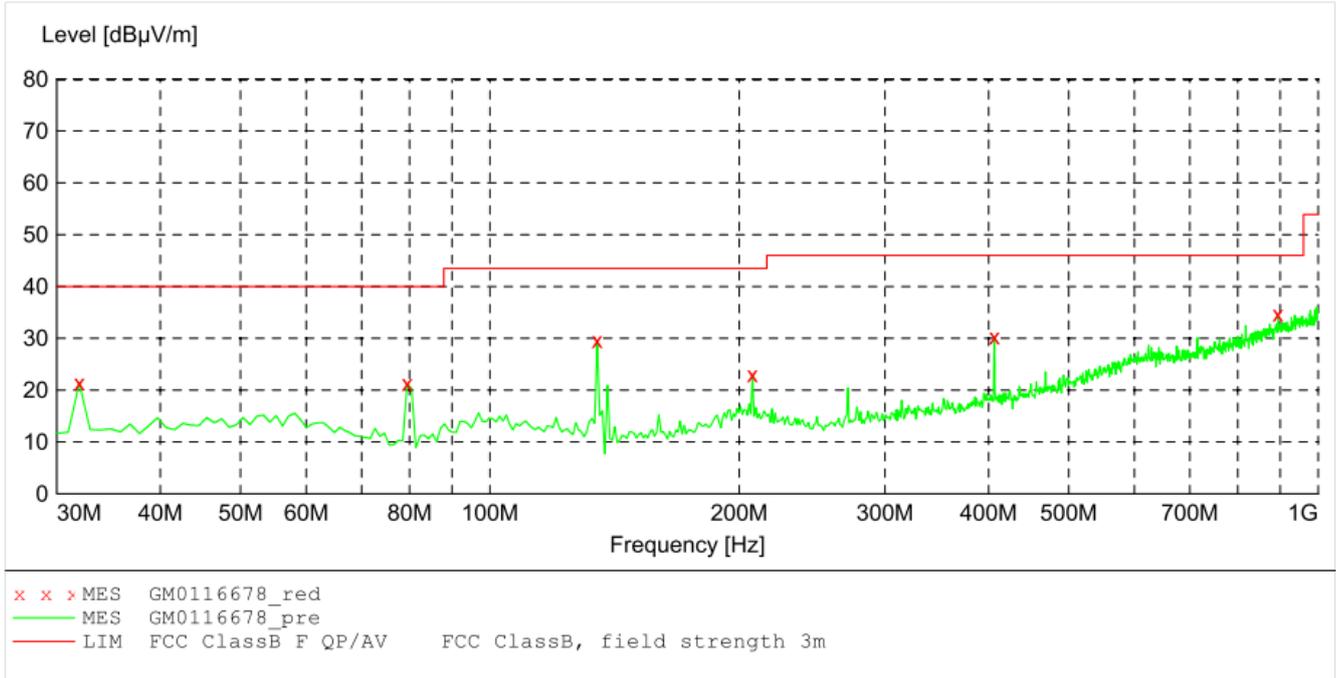
Operating Condition: High Power- the Middle channel
 Test Specification: Vertical
 Comment: 30MHz-1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	22.30	-16.5	40.0	17.7	QP	100.0	127.00	VERTICAL
79.470000	25.10	-18.6	40.0	14.9	QP	100.0	328.00	VERTICAL
138.640000	39.10	-18.1	43.5	4.4	QP	100.0	360.00	VERTICAL
207.510000	26.20	-13.9	43.5	17.3	QP	100.0	266.00	VERTICAL
418.000000	31.30	-10.1	46.0	14.7	QP	100.0	346.00	VERTICAL
959.260000	35.40	3.9	46.0	10.6	QP	100.0	127.00	VERTICAL

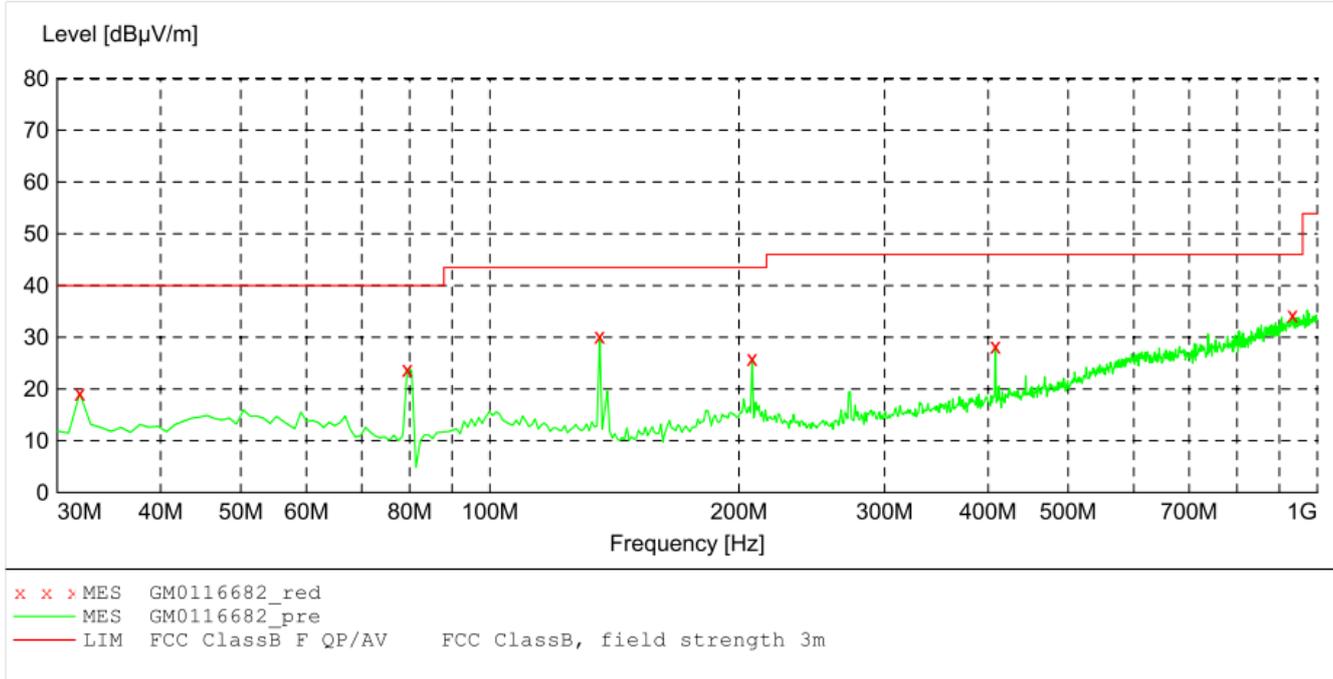


Operating Condition: High Power- the Middle channel
 Test Specification: Horizontal
 Comment: 30MHz-1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	21.40	-16.5	40.0	18.6	QP	300.0	74.00	HORIZONTAL
79.470000	21.30	-18.6	40.0	18.7	QP	300.0	13.00	HORIZONTAL
134.760000	29.60	-17.7	43.5	13.9	QP	300.0	53.00	HORIZONTAL
207.510000	23.00	-13.9	43.5	20.5	QP	100.0	289.00	HORIZONTAL
406.360000	30.30	-10.5	46.0	15.7	QP	100.0	310.00	HORIZONTAL
894.270000	34.70	2.6	46.0	11.3	QP	100.0	270.00	HORIZONTAL

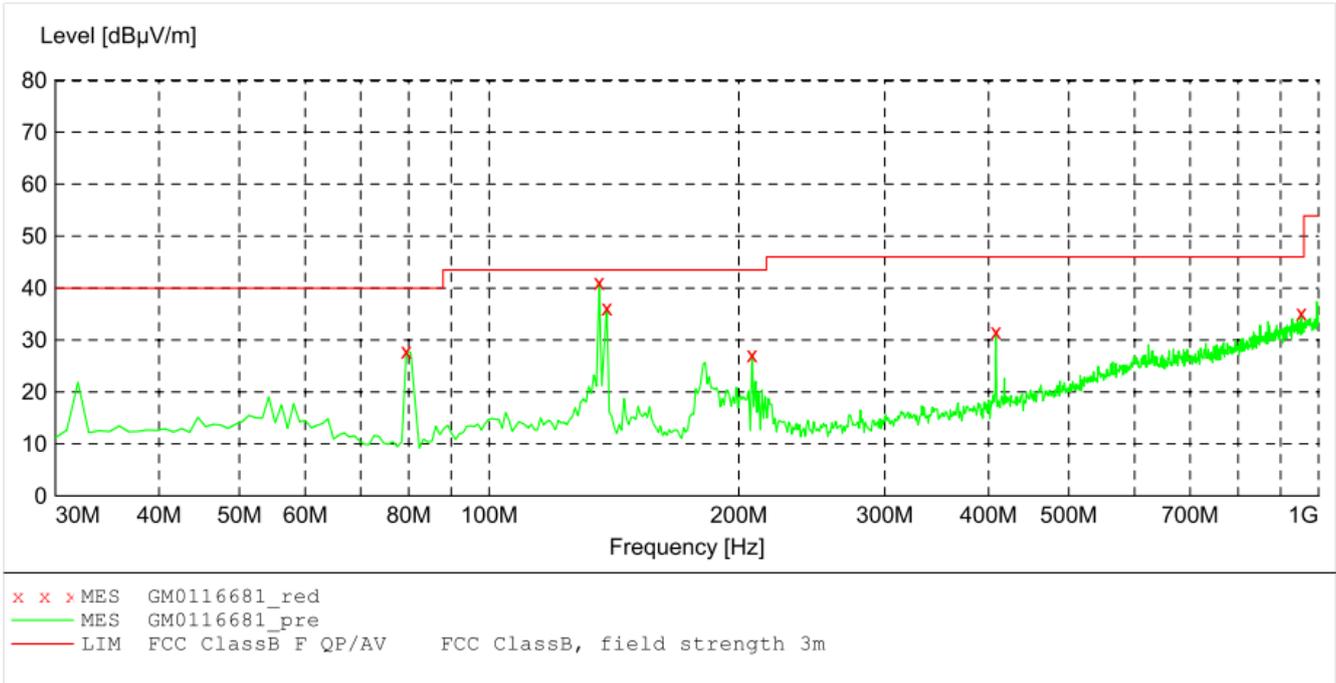
Operating Condition: High Power- the bottom channel
 Test Specification: Horizontal
 Comment: 30MHz-1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	19.20	-16.5	40.0	20.8	QP	300.0	271.00	HORIZONTAL
79.470000	23.80	-18.6	40.0	16.2	QP	300.0	26.00	HORIZONTAL
135.730000	30.20	-17.8	43.5	13.3	QP	300.0	51.00	HORIZONTAL
207.510000	25.90	-13.9	43.5	17.6	QP	100.0	317.00	HORIZONTAL
408.300000	28.30	-10.5	46.0	17.7	QP	100.0	317.00	HORIZONTAL
933.070000	34.30	3.4	46.0	11.7	QP	100.0	57.00	HORIZONTAL

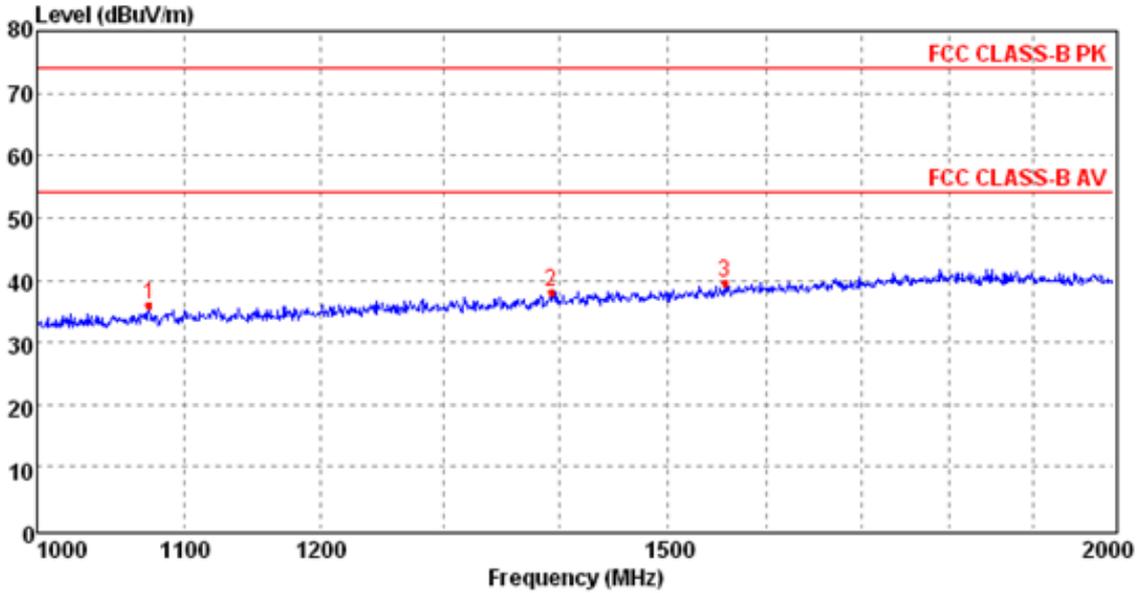


Operating Condition: High Power- the bottom channel
 Test Specification: Vertical
 Comment: 30MHz-1GHz



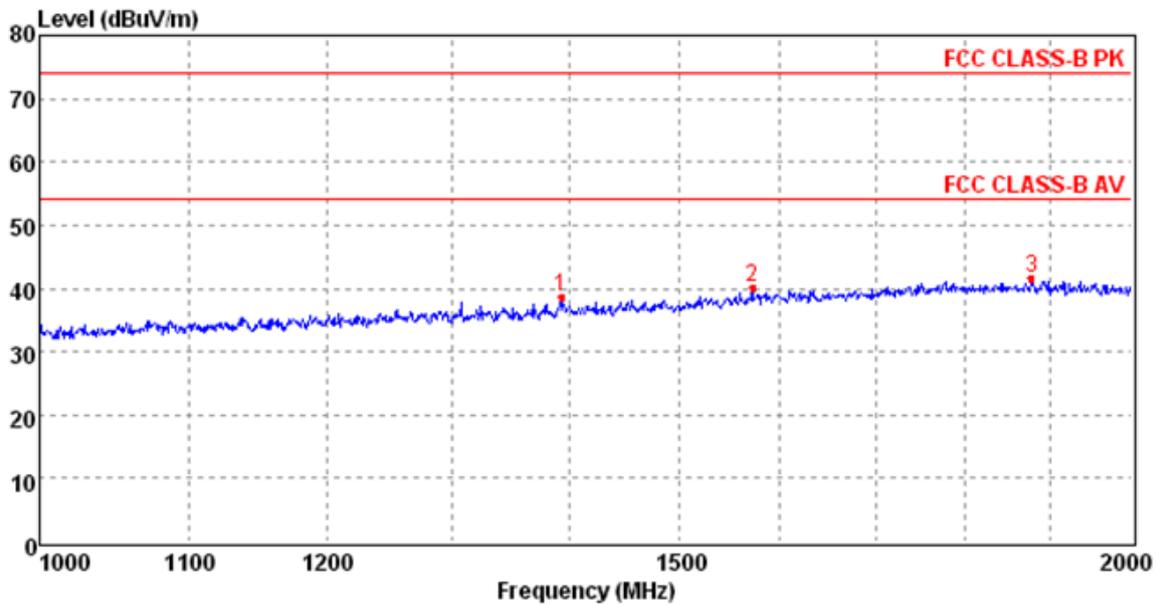
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
79.470000	27.90	-18.6	40.0	12.1	QP	100.0	10.00	VERTICAL
135.730000	40.10	-17.8	43.5	3.4	QP	100.0	31.00	VERTICAL
138.640000	36.20	-18.1	43.5	7.3	QP	100.0	31.00	VERTICAL
207.510000	27.20	-13.9	43.5	16.3	QP	100.0	156.00	VERTICAL
408.300000	31.60	-10.5	46.0	14.4	QP	100.0	342.00	VERTICAL
953.440000	35.20	3.7	46.0	10.8	QP	100.0	10.00	VERTICAL

Operating Condition: High Power- the top channel
 Test Specification: Horizontal
 Comment: 1GHz-2GHz



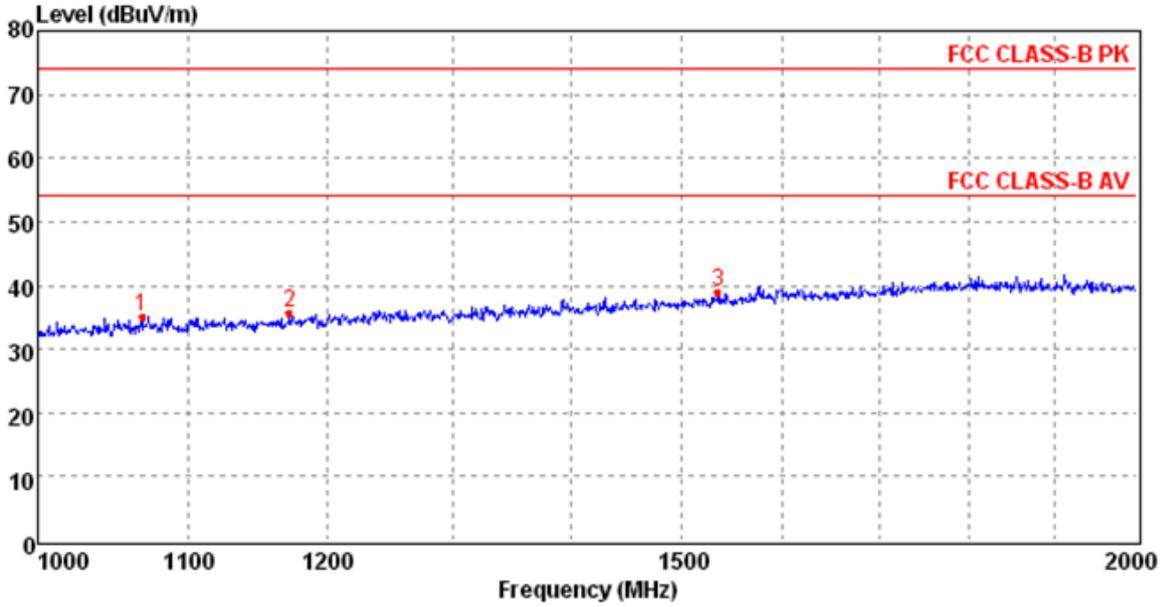
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1074.75	37.13	23.22	3.83	28.29	35.89	74.00	-38.11	Peak
2	1392.81	36.42	25.34	4.54	28.18	38.12	74.00	-35.88	Peak
3	1557.25	36.07	26.91	4.82	28.13	39.67	74.00	-34.33	Peak

Operating Condition: High Power- the top channel
 Test Specification: Vertical
 Comment: 1GHz-2GHz



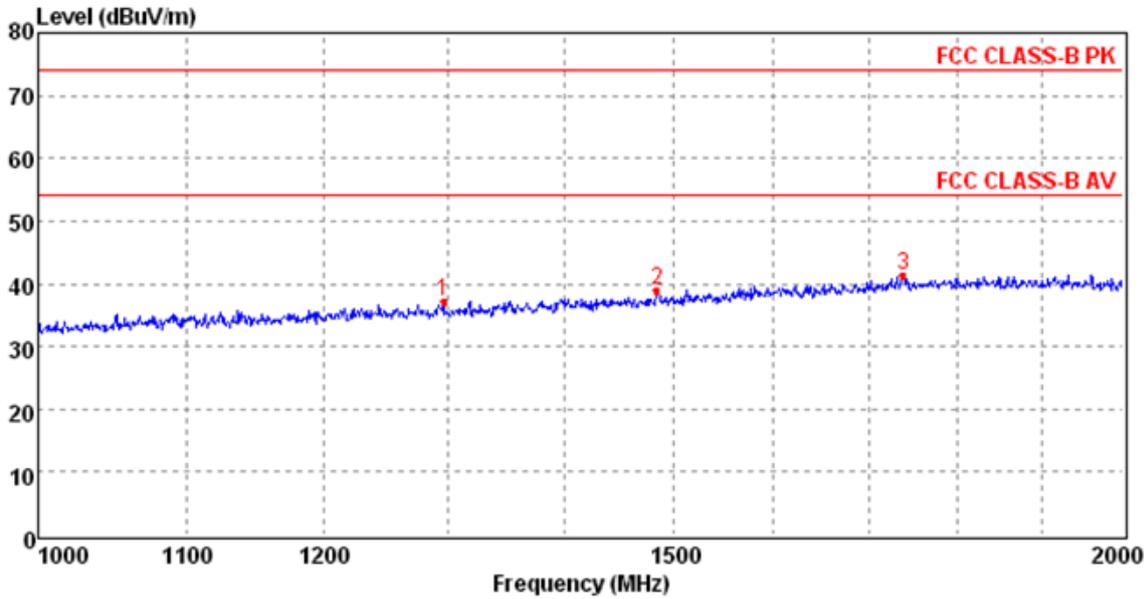
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1392.81	36.98	25.34	4.54	28.18	38.68	74.00	-35.32	Peak
2	1572.44	36.44	27.05	4.86	28.13	40.22	74.00	-33.78	Peak
3	1877.74	35.90	28.50	5.38	28.06	41.72	74.00	-32.28	Peak

Operating Condition: High Power- the Middle channel
 Test Specification: Horizontal
 Comment: 1GHz-2GHz



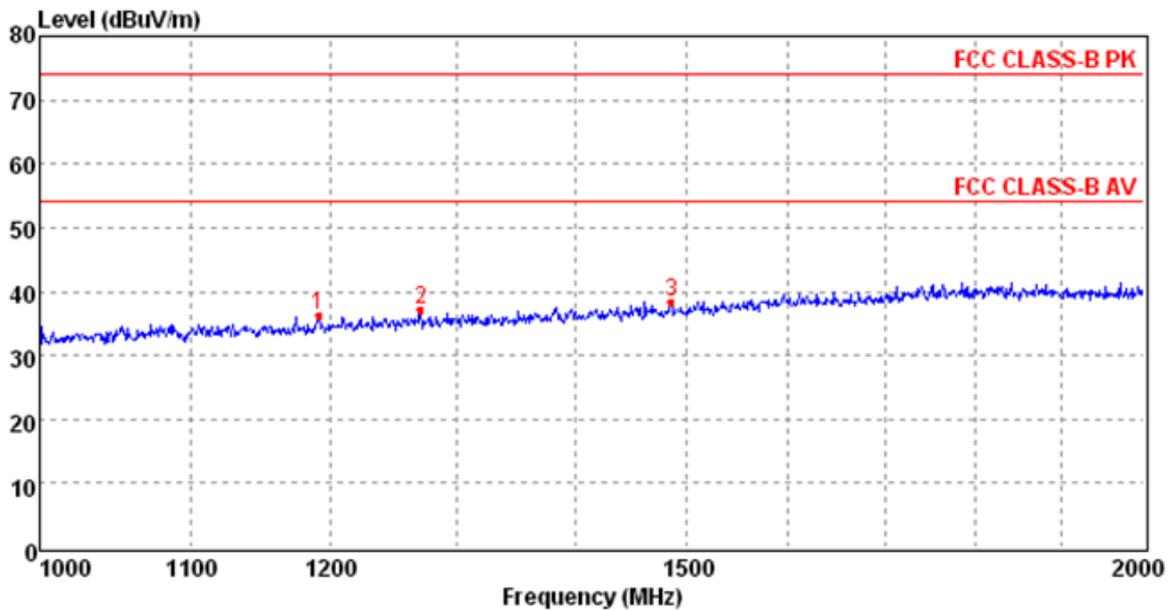
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1068.07	36.38	23.18	3.83	28.29	35.10	74.00	-38.90	Peak
2	1172.02	35.86	23.91	4.07	28.25	35.59	74.00	-38.41	Peak
3	1535.81	35.65	26.71	4.78	28.14	39.00	74.00	-35.00	Peak

Operating Condition: High Power- the Middle channel
 Test Specification: Vertical
 Comment: 1GHz-2GHz



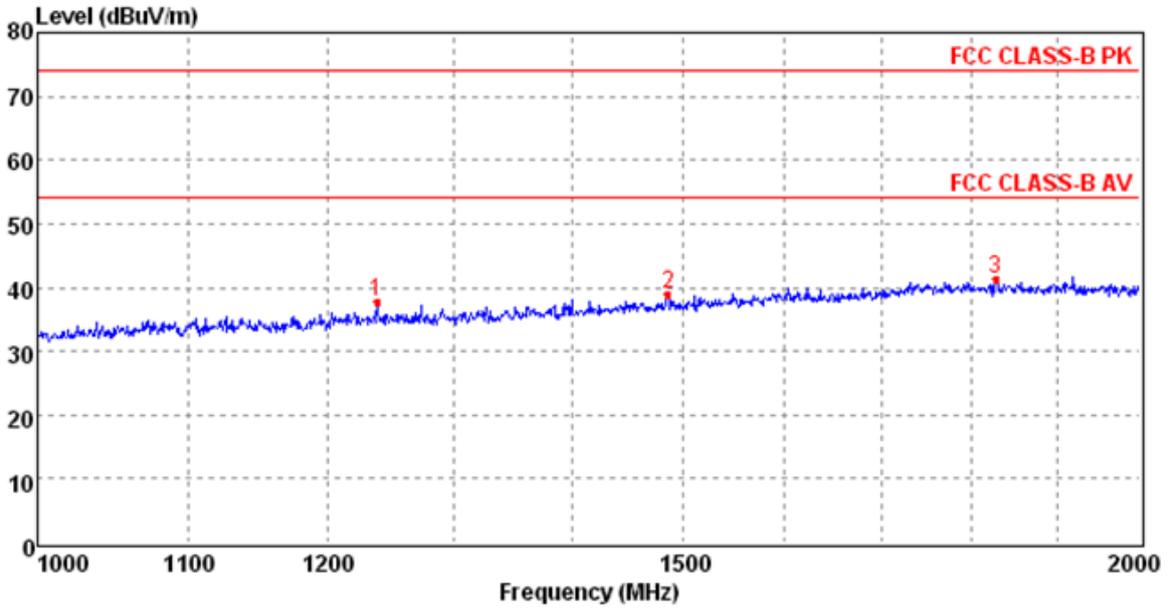
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1295.94	36.35	24.74	4.34	28.21	37.22	74.00	-36.78	Peak
2	1485.55	36.23	26.18	4.71	28.15	38.97	74.00	-35.03	Peak
3	1738.69	36.17	28.23	5.16	28.09	41.47	74.00	-32.53	Peak

Operating Condition: High Power- the bottom channel
 Test Specification: Horizontal
 Comment: 1GHz-2GHz



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1191.68	36.40	24.06	4.10	28.25	36.31	74.00	-37.69	Peak
2	1270.15	36.60	24.55	4.27	28.22	37.20	74.00	-36.80	Peak
3	1486.58	35.48	26.27	4.71	28.15	38.31	74.00	-35.69	Peak

Operating Condition: High Power- the bottom channel
 Test Specification: Vertical
 Comment: 1GHz-2GHz



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1237.99	37.31	24.35	4.20	28.23	37.63	74.00	-36.37	Peak
2	1486.58	36.25	26.27	4.71	28.15	39.08	74.00	-34.92	Peak
3	1827.66	35.57	28.57	5.31	28.07	41.38	74.00	-32.62	Peak

4.11. Receiver Conducted Spurious Emission

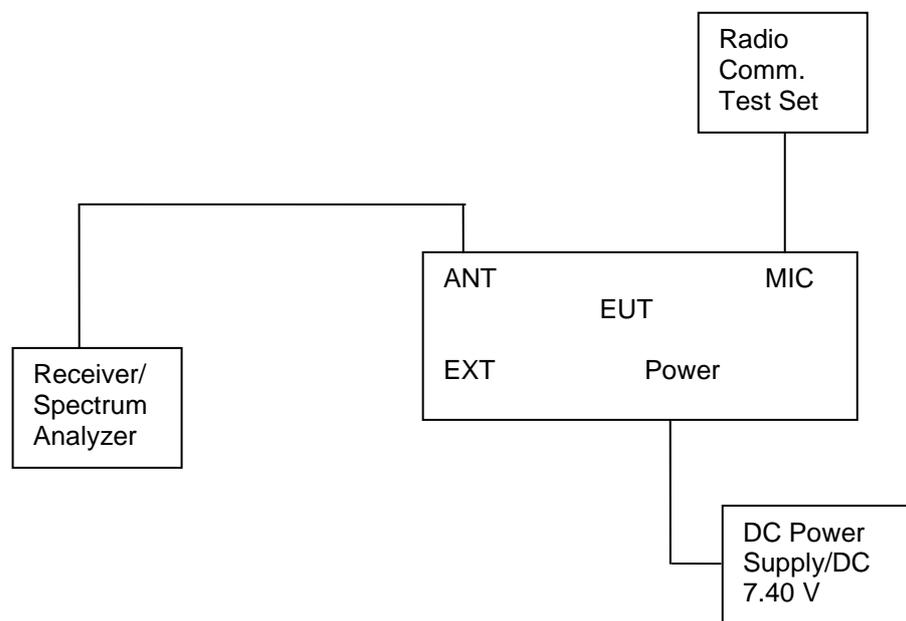
TEST APPLICABLE

The same as Section 4.3

TEST PROCEDURE

The spectrum analyzer was connected to the RF output power of the EUT, the EUT was setup in receiving mode; The RBW of the spectrum analyzer was set to 100 kHz and the VBW set to 300 KHz below the test frequency 1GHz. While the RBW of the spectrum analyzer was set to the 1MHz and VBW set to the 3MHz from 1GHz to the 10th harmonic.

TEST CONFIGURATION



LIMIT

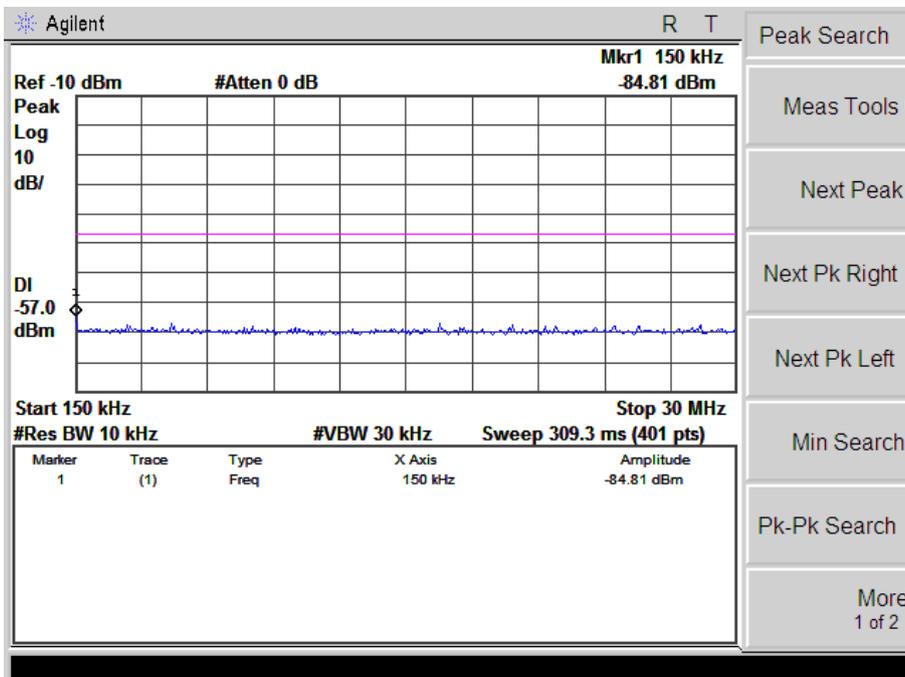
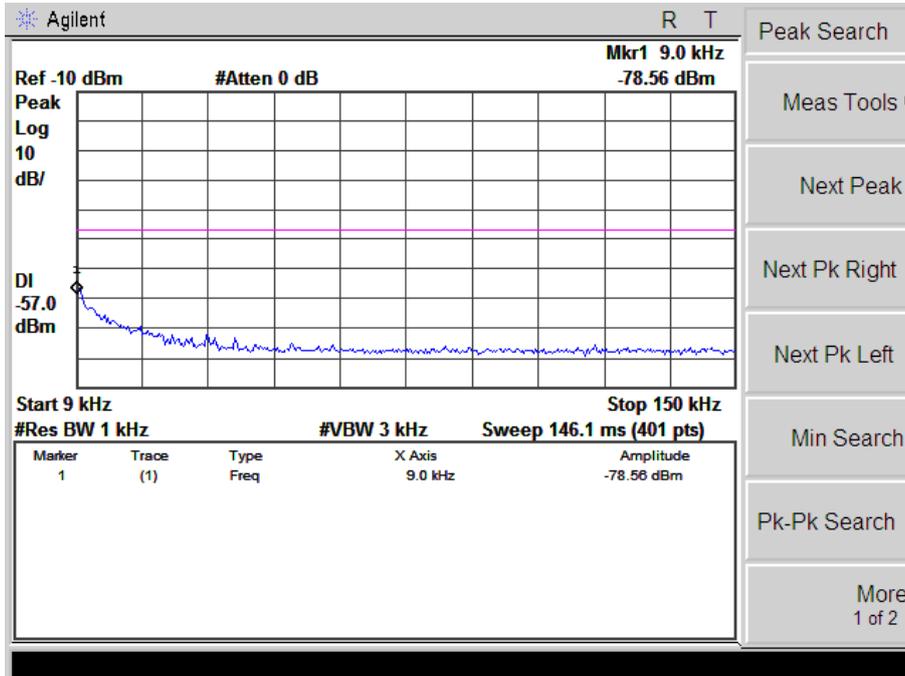
The power at the antenna terminal shall not exceed 2.0 nanowatts (-57dBm).

TEST RESULTS

The Receiver Conducted Spurious Emissions Measurement is performed to the five channels (the top channel, the middle channel and the bottom channel), the datums recorded below were for the five channels; and the EUT shall be scanned from 30 MHz to the 2 GHz.

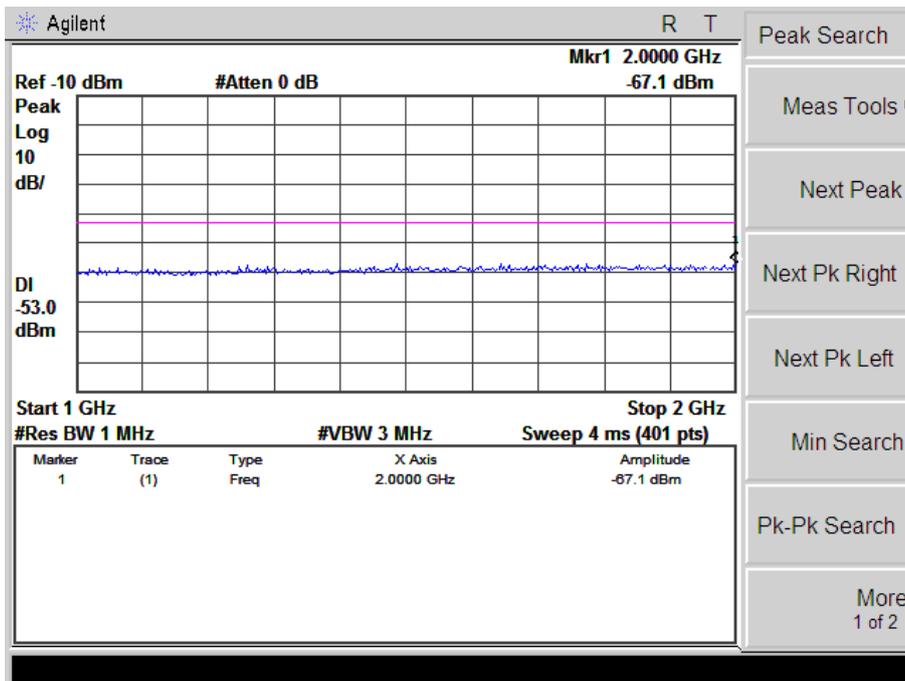
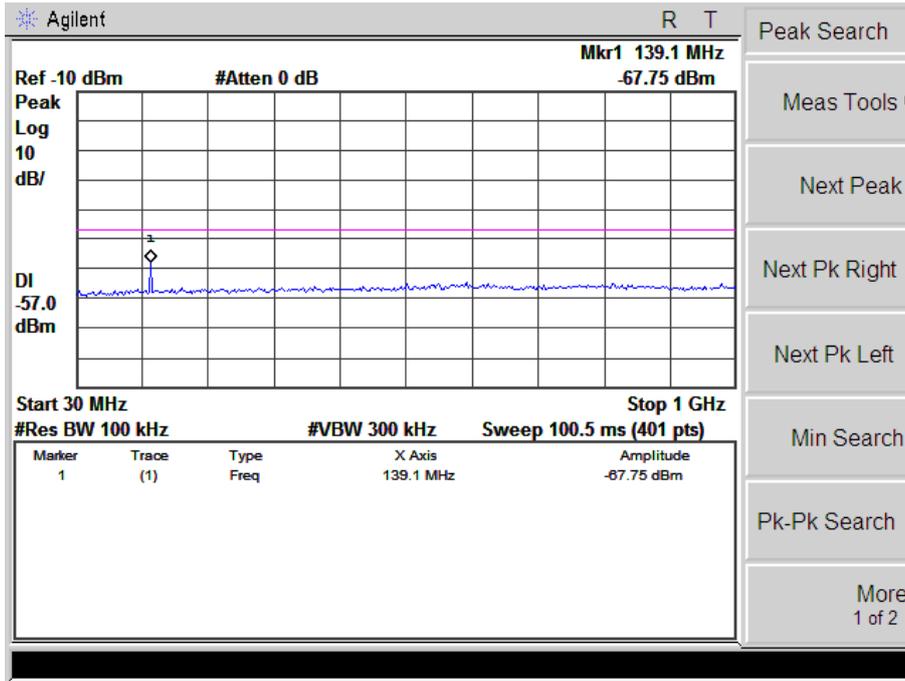


Modulation Type	Channel SpARATION	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Low	156.0500	139.1	-67.75	2000	-67.10	-57dBm
Test Results				Compliance				



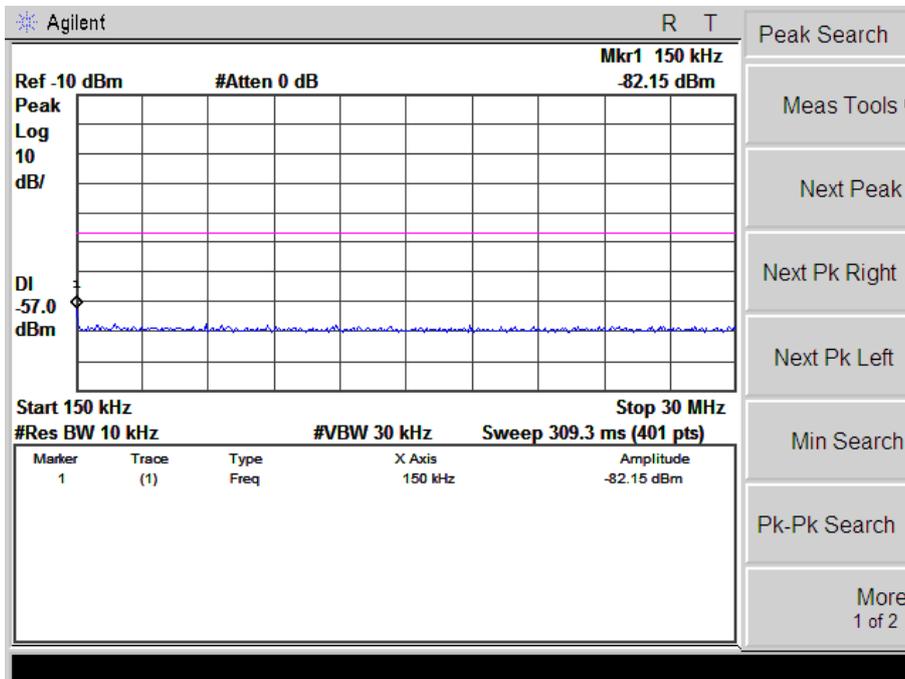
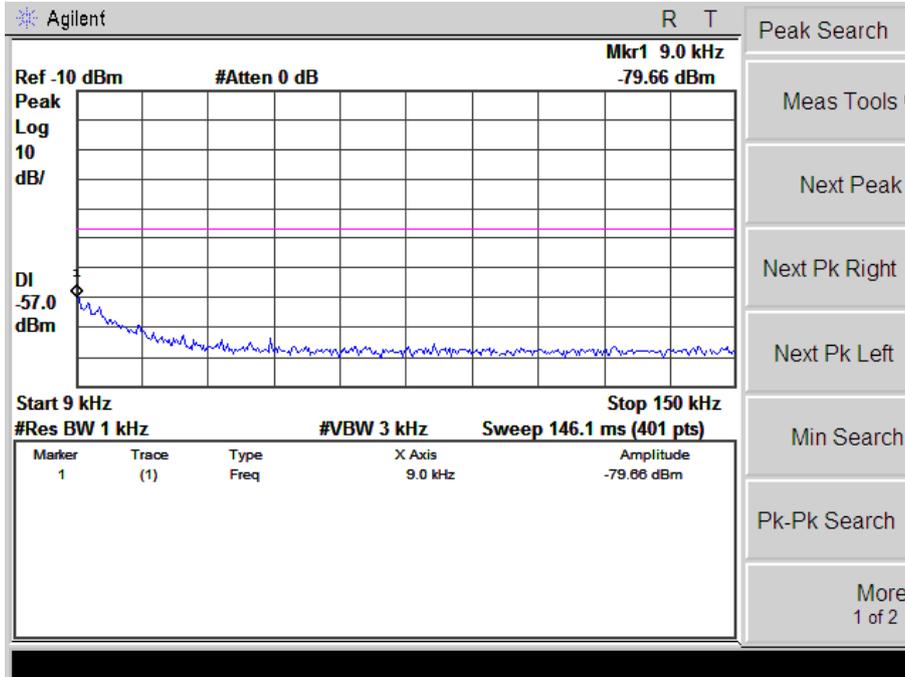


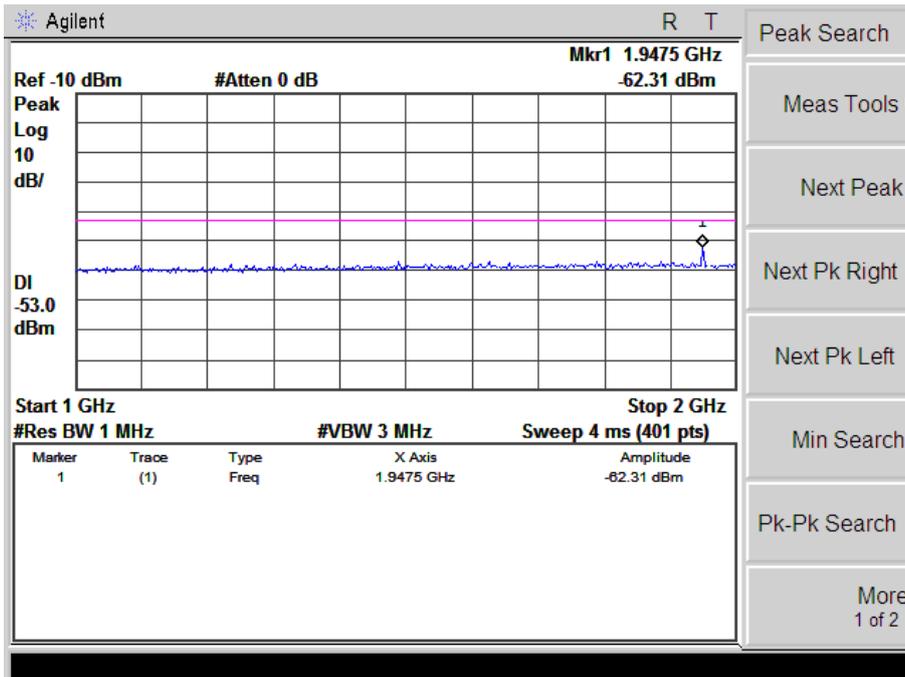
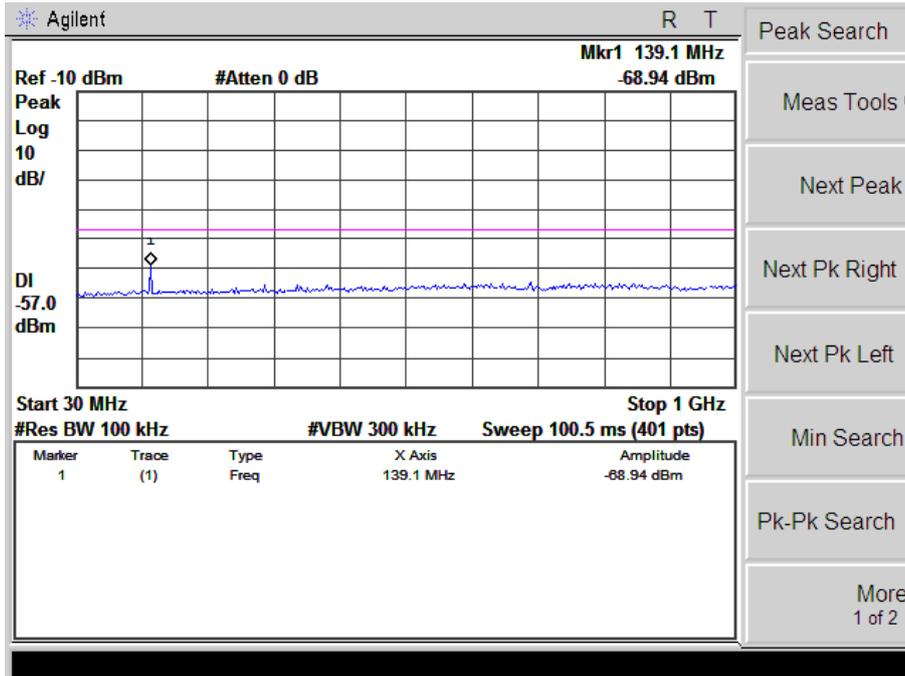
China





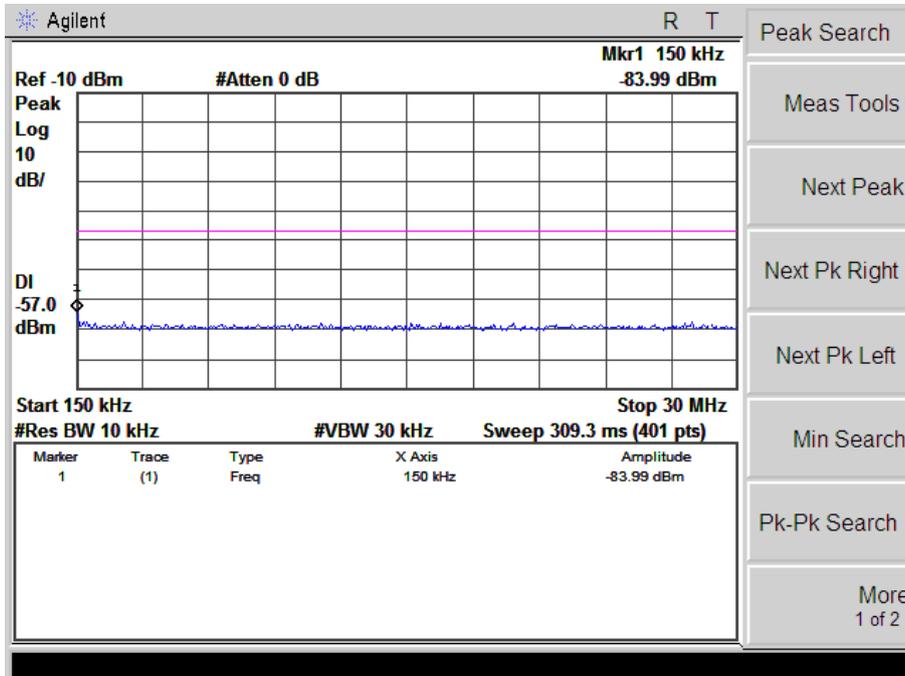
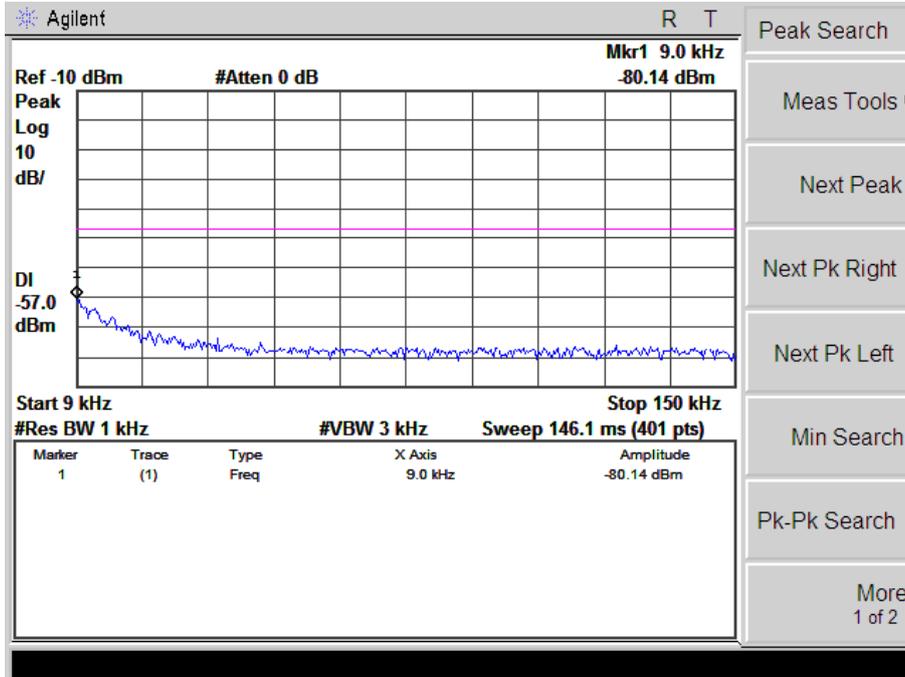
Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	Middle	156.8000	139.1	-768.94	1947.5	-62.31	-57dBm
Test Results				Compliance				







Modulation Type	Channel SpARATION	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		FCC Limit
				Frequency (MHz)	Datum (dBm)	Frequency (MHz)	Datum (dBm)	
FM	25 KHz	High	157.4250	139.1	-68.54	1360	-67.71	-57dBm
Test Results				Compliance				





China

