FCC Test Report

Report No.: AGC02931221204FE10

FCC ID	:	2AWYH-G1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	GMRS TRANSCEIVER
BRAND NAME	:	Rugged Radios
MODEL NAME	:	G1
APPLICANT	:	Rugged Radios
DATE OF ISSUE	:	Jan. 15, 2023
STANDARD(S)	:	FCC Part 95 Rules
REPORT VERSION	:	V 1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 15, 2023	Valid	Initial Release

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1. GENERAL INFORMATION

Applicant	Rugged Radios
Address	509 Traffic Way, Arroyo Grande, California 93420, United States
Manufacturer	Rugged Radios
Address	509 Traffic Way, Arroyo Grande, California 93420, United States
Factory	Rugged Radios
Address	509 Traffic Way, Arroyo Grande, California 93420, United States
Product Designation	GMRS TRANSCEIVER
Brand Name	Rugged Radios
Test Model	G1
Deviation from Standard	No any deviation from the test method.
Date of receipt of test item	Dec. 26, 2022
Date of Test	Dec. 26, 2022~Jan. 15, 2023
Test Result	Pass

WE HEREBY CERTIFY THAT:
The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA-603-E-2016. The sample tested as described in this report is in compliance with the FCC Rules Part 95. The test results of this report relate only to the tested sample identified in this report.

Prepared By	Bibo Zhang (Project Engineer)	Jan. 15, 2023
Reviewed By	Calvin Liu (Reviewer)	Jan. 15, 2023
Approved By	Max Zhang Authorized Officer	Jan. 15, 2023

2. PRODUCT INFORMATION

2.1 PRODUCT TECHNICAL DESCRIPTION

Hardware Version	V1.3.5	
Software Version	V1.02	
Power Supply	DC 13.8V 12A	
Communication Type	Voice / Tone only	
Operation Frequency Range	462.5500MHz-462.7250MHz (GMRS 462 MHz main channels) 462.5625MHz-462.7125MHz (GMRS 462 MHz interstitial channels) 467.5500MHz-467.7250MHz (GMRS 467 MHz main channels)	
Modulation Type	FM	
Channel Separation	12.5 KHz/25 KHz	
Emission Bandwidth	10.51KHz-5W-12.5KHz	15.60KHz-5W-25KHz
	10.49KHz-25W-12.5KHz	15.68KHz-25W-25KH
	10.51KHz-45W-12.5KHz	15.63KHz-45W-25KHz
Emission Designator	11K0F3E/16K0F3E	
Number of Channels:	23 Channels	
Rated Output Power	5W/25W/45W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)	
Maximum Transmitter Power	35.816dBm-5W-12.5KHz	35.812dBm-5W- 25KHz
	43.396dBm-25W-12.5KHz	43.392dBm-25W-25KHz
	45.169dBm-45W-12.5KHz	46.163dBm-45W-25KHz
Antenna Designation	Detachable Antenna	
Antenna Gain	0dBi (Typical), 5dBi (Max)	
Frequency Tolerance	1.087ppm	

2.2 TEST FREQUENCY LIST

According to ANSI C63.26 section 5.1.2.1:
Measurements of transmitters shall be performed and, if required, reported for each frequency band in which the EUT can be operated with the device transmitting at the number of frequencies in each band specified in Table 2.

Frequency range Over which EUT operates	Number of Frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

Channel. No	CH. Freq	Rated Power	CH. No	CH. Freq	Rated Power
1	462.5625	5W	15	462.5500	45W/25W/5W
2	462.5875		16	462.5750	
3	462.6125		17	462.6000	
4	**462.6375**		18	462.6250	
5	462.6625		19	**462.6500**	
6	462.6875		20	462.6750	
7	462.7125		21	462.7000	
8	-	-	22	462.7250	
9	-		23	467.5500	45W/25W/5W
10	-		24	467.5750	
11	-		25	467.6000	
12	-		26	467.6250	
13	-		27	**467.6500**	
14	-		28	467.6750	
--			29	467.7000	
			30	467.7250	

2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **2AWYH-G1,** filing to comply with Part 2, Part 95 of the Federal Communication Commission rules.

2.4 TEST METHODOLOGY

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 95	Personal Radio Services
2	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
3	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
4	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
5	KDB 888861 D01	888861 D01 Part 95 GMRS FRS v01

2.5 CALCULATION OF EMISSION INDICATORS

FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth

For FM Mode (ChannelSpacing: 12.5kHz)
Emission Designator 11K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 2.5 kHz) = 11 kHz = 11K0
F3E portion of the designator represents an FM voice transmission.
Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

For FM Mode (Channel Spacing: 25kHz)
Emission Designator 16K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 5.0 kHz) = 16 kHz = 16K0
F3E portion of the designator represents an FM voice transmission.
Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

2.6 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.8 ANTENNA REQUIREMENT

Excerpt from §95.1787 of the FCC Rules/Regulations:

The antenna of each GMRS transmitter type must meet the following requirements.
(1) The antenna must be a non-removable integral part of the GMRS transmitter type.
(2) The non-detachable antenna is only for handheld portable GMRS equipment.

- This GMRS device has a fixed antenna port
- This GMRS equipment is a mobile station or a fixed station, which can be connected to an external antenna

Conclusion: The unit complies with the requirement of §95.1787.

3. TEST ENVIRONMENT

3.1 ADDRESS OF THE TEST LABORATORY

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 TEST FACILITY

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

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) 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: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) 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 with Registration 975832.

IC-Registration No.: 24842

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 ENVIRONMENTAL CONDITIONS

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range (℃)	15 - 35	-30 - 50
Relative humidty range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Power supply	DC 13.8V	LV DC 11.73V/HV DC 15.87V
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

3.4 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Test Items	Measurement Uncertainty
Frequency stability	±0.5%
Transmitter power conducted	±0.8dB
Transmitter power Radiated	±1.3dB
Conducted spurious emission 9kHz-40 GHz	±2.7dB
Conducted Emission	±3.2 dB
Radiated Emission below 1GHz	±3.9 dB
Radiated Emission above 1GHz	±4.8 dB
Occupied Channel Bandwidth	±2 %
FM deviation	±2 %
Audio level	±0.98dB
Low Pass Filter Response	±0.65dB
Modulation Limiting	0.42 %
Transient Frequency Behavior	6.8 %

3.5 LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Mar. 28, 2022	Mar. 27, 2023
EXA Signal Analyzer	Aglient	N9020A	MY53300860	Jun. 08, 2022	Jun. 07, 2023
EXA Signal Analyzer	Aglient	N9020A	MY52090123	Aug. 04, 2022	Aug. 03, 2023
Horn antenna	SCHWARZBECK	BBHA 9170	768	Oct. 31, 2021	Oct. 30, 2023
preamplifier	ChengYi	EMC184045SE	980508	Oct. 29, 2021	Oct. 28, 2023
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2023
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 05, 2022	Jun. 04, 2023
HORN ANTENNA	EM	EM-AH-10180	/	Feb.24, 2022	Feb.23, 2023
SIGNAL GENERATOR	AGILENT	E4421B	MY43351603	Mar. 04, 2022	Mar. 03, 2023
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 05, 2022	Jun. 04, 2023
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 08, 2021	Jan. 07, 2023
ANTENNA	SCHWARZBECK	VULB9168	D69250	Apr. 28, 2021	Apr. 27, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Modulation Domain Analyzer	HP	53310A	3121A02467	Jun. 08, 2022	Jun. 07, 2023
Small environmental tester	ESPEC	SH-242	--	Aug. 03, 2022	Aug. 02, 2024
RF Communication Test Set	HP	8920B	US35010161	Aug. 03, 2022	Aug. 02, 2023
Attenuator	Weinachel Corp	58-30-33	ML030	Oct. 22, 2022	Oct. 21, 2023
RF Cable	R&S	1#	--	Each time	N/A
RF Cable	R&S	2#	--	Each time	N/A
Fliter-UHF	Microwave	N25155M2	498705	May 07, 2022	May 06, 2023
Fliter-VHF	Microwave	N26460M1	498703	May 07, 2022	May 06, 2023

4. SYSTEM TEST CONFIGURATION

4.1 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.

4.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

4.4 EQUIPMENT USED IN TESTED SYSTEM

The Following Peripheral Devices And Interface Cables Were Connected During The Measurement:

☒ Test Accessories Come From The Laboratory

Item	Equipment	Model No.	Identifier	Note
1	Load Antenna	HG-E10	Terminator DC -3G 50W	Accessories

☒ Test Accessories Come From The Manufacturer

Item	Equipment	Model No.	Identifier	Note
1	GMRS TRANSCEIVER	G1	FCC ID: 2AWYH-G1	EUT
2	Hand microphone	N/A	N/A	Accessories

4.5 SUMMARY OF TEST RESULTS

Item	FCC Rules	Description Of Test	Result
1	FCC 47 CFR PART 95	Antenna Equipment	Pass
2	§ 95.1767& 2.1046(a)	Maximum Transmitter Power	Pass
3	§95.1755& 2.1047(a) (b)	Modulation Limit	Pass
4	§95.1755& 2.1047(a)	Audio Frequency Response	Pass
4	§95.1755(e)	Audio Low Pass Filter Response	Pass
5	§95.1779& 2.1049	Emission Bandwidth	Pass
6	§95.1779& 2.1049	Emission Mask	Pass
7	§95.1765& 2.1055(a) (1)	Frequency Stability	Pass
9	§95.1779& 2.1051	Spurious Emission on Antenna Port	Pass
10	§95.1779& 2.1053	Spurious Ratiated Emission	Pass

Note:

1) N/A: In this whole report not application.

5. DESCRIPTION OF TEST MODES

The EUT (**GMRS TRANSCEIVER**) has been tested under normal operating condition. (GMRS TX) are chosen for testing at each channel separation.

NO.	TEST MODE DESCRIPTION	CHANNEL SEPARATION
1	GMRS TX CHANNEL 4	12.5 kHz/25 kHz
2	GMRS TX CHANNEL 19	12.5 kHz/25 kHz
3	GMRS TX CHANNEL 27	12.5 kHz/25 kHz

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. The battery is full-charged during the test.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
4. Manufacturers use computer PC programming software to switch and operate frequency points, refer to the instructions for details

6. FREQUENCY STABILITY

6.1 PROVISIONS APPLICABLE

Standard Applicable [Part 95.1765] The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.
GMRS: The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth of 12.5 kHz or less must remain within 2.5 ppm
The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth greater than 12.5 kHz must remain within 5 ppm

6.2 MEASUREMENT PROCEDURE

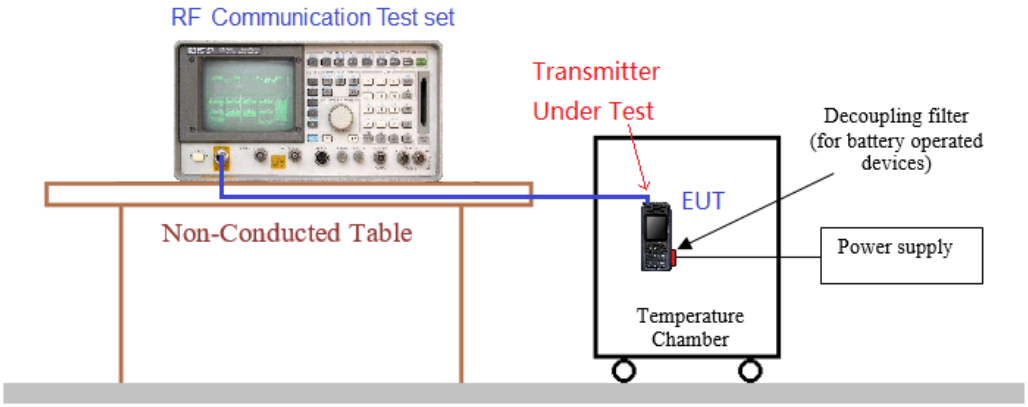
6.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1kHz and Video Resolution Bandwidth to 1kHz and Frequency Span to 50kHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

6.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 13.8V.
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 kHz and Video Resolution Bandwidth to 1kHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

6.3 MEASUREMENT SETUP



6.4 MEASUREMENT RESULTS

12.5 kHz Channel Separation, FM modulation, Assigned Frequency For GMRS						
Test conditions		Frequency error (ppm)			Limit (ppm)	Result
Voltage (V)	Temp (℃)	Test Frequency (MHz)				
		462.6375	462.6500	467.6500		
13.8	-30	0.509	0.939	0.755	2.5	Pass
	-20	1.084	1.009	0.759		
	-10	0.564	0.807	0.840		
	0	**1.087**	0.956	0.608		
	10	0.607	0.517	0.735		
	20	1.014	0.612	0.732		
	30	0.528	0.895	0.761		
	40	0.543	0.560	0.733		
	50	1.024	0.813	0.539		
15.87	20	1.043	1.082	0.785		
11.73	20	0.525	0.710	0.926		

25 kHz Channel Separation, FM modulation, Assigned Frequency For GMRS						
Test conditions		Frequency error (ppm)			Limit (ppm)	Result
Voltage (V)	Temp (℃)	Test Frequency (MHz)				
		462.6375	462.6500	467.6500		
13.8	-30	0.566	0.653	0.596	5	Pass
	-20	0.704	0.656	0.709		
	-10	0.523	0.757	0.787		
	0	0.897	0.878	1.034		
	10	1.046	0.841	0.946		
	20	0.855	0.903	0.510		
	30	0.707	**1.049**	0.716		
	40	0.507	0.693	0.868		
	50	0.600	0.885	0.865		
15.87	20	0.676	0.833	0.846		
11.73	20	0.882	0.643	0.622		

7. EMISSION BANDWIDTH

7.1 PROVISIONS APPLICABLE

FCC Part 95.1773: GMRS: Main channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz main channels, or any of the 467 MHz main channels.

Interstitial channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz interstitial channels, and is 12.5 kHz for GMRS transmitters operating on any of the 467 MHz interstitial channels.
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.

7.2 MEASUREMENT PROCEDURE

1.The EUT was modulated by 2.5kHz sine wave audio signal; the level of the audio signal employed is 16dB greater than that necessary to produce 50% of rated system deviation.

Rated system deviation is 2.5 kHz for 12.5kHz channel spacing).

2.Spectrum set as follow:

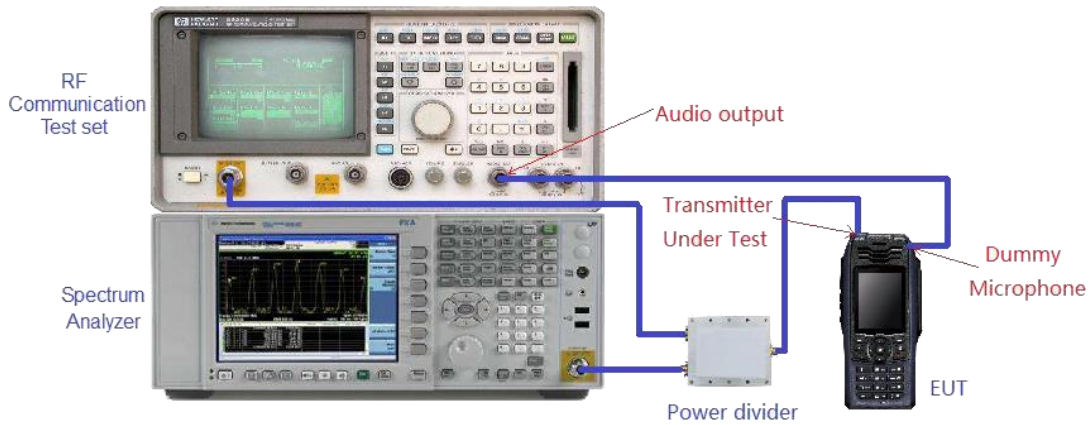
Centre frequency = fundamental frequency, span=50kHz for 12.5kHz channel spacing, RBW=300Hz, VBW=1KHz, Sweep = auto,

Detector function = peak, Trace = max hold

3.Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

4.Measure and record the results in the test report.

7.3 MEASUREMENT SETUP



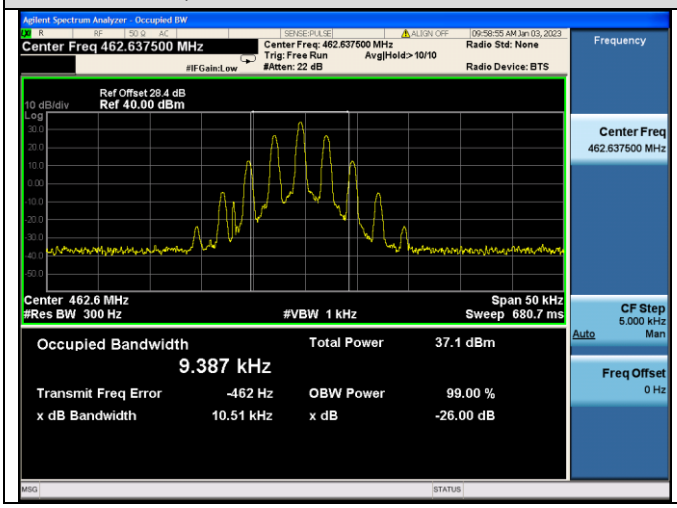
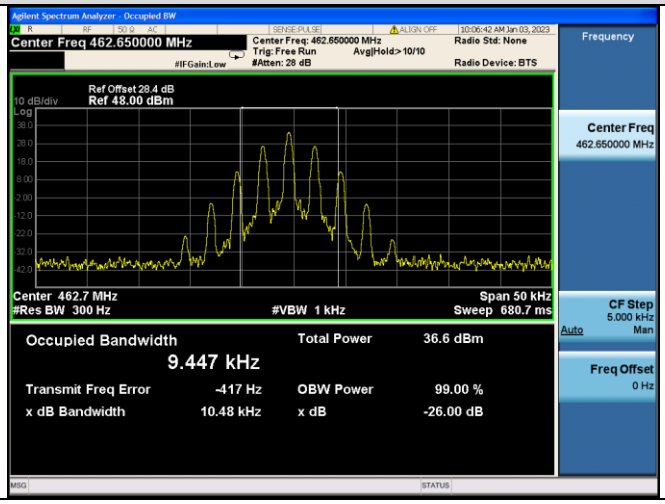
7.4 MEASUREMENT RESULTS

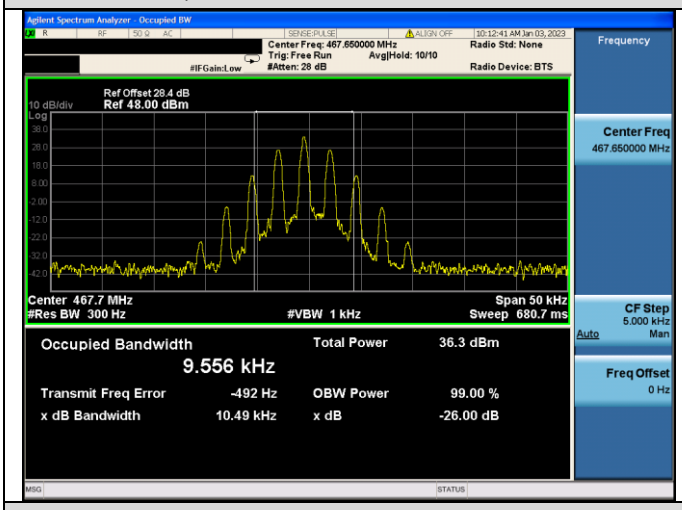
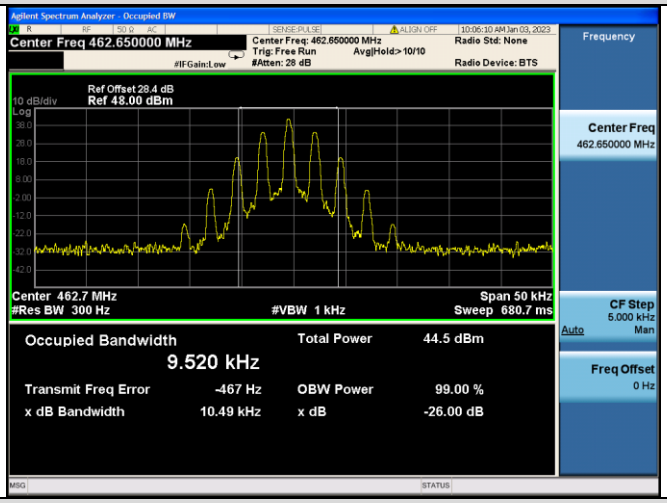
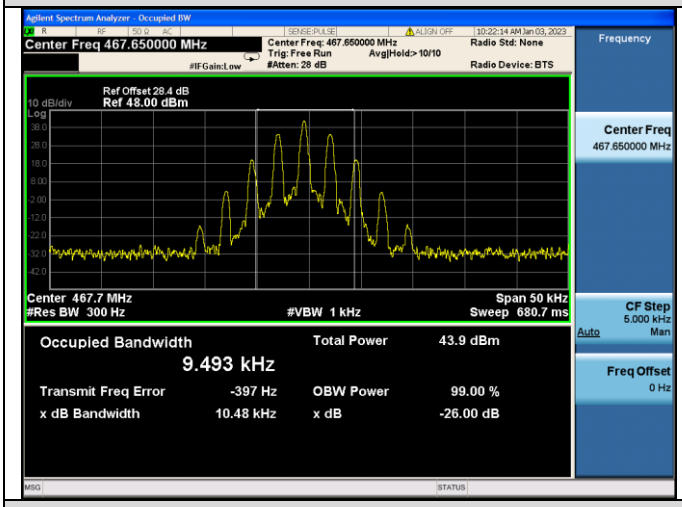
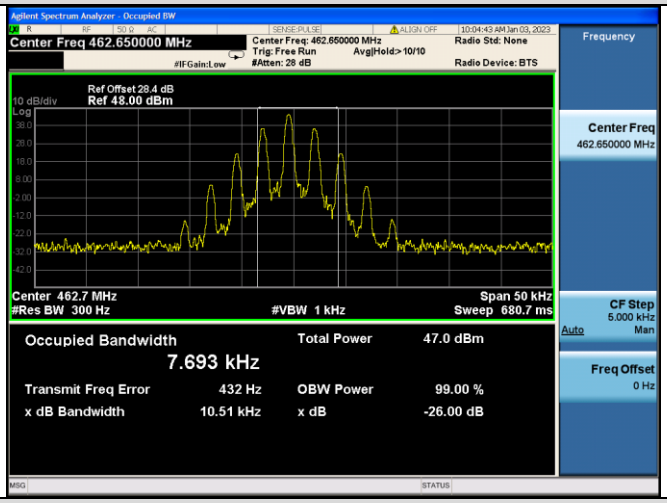
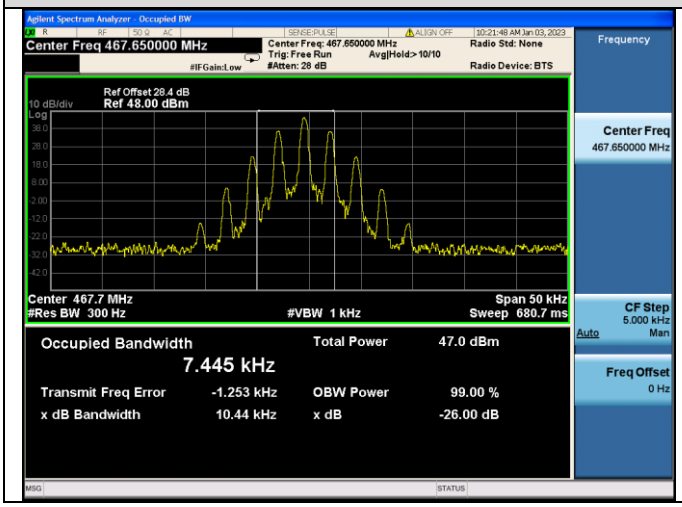
Emission Bandwidth Measurement Result-GMRS-5W				
Operating Frequency	12.5 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.6375 MHz	9.387 kHz	10.51 kHz	20.0 kHz	Pass
462.6500 MHz	9.447 kHz	10.48 kHz	20.0 kHz	Pass
467.6500 MHz	9.556 kHz	10.49 kHz	20.0 kHz	Pass

Emission Bandwidth Measurement Result-GMRS-25W				
Operating Frequency	12.5 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.6500 MHz	9.520 kHz	10.49 kHz	20.0 kHz	Pass
467.6500 MHz	9.493 kHz	10.48 kHz	20.0 kHz	Pass

Emission Bandwidth Measurement Result-GMRS-45W				
Operating Frequency	12.5 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.6500 MHz	7.693 kHz	10.51 kHz	20.0 kHz	Pass
467.6500 MHz	7.445 kHz	10.44 kHz	20.0 kHz	Pass

Test plot as follows:

12.5kHz, FM Modulation:462.6375MHz-5W	12.5kHz, FM Modulation:462.6500MHz-5W
	

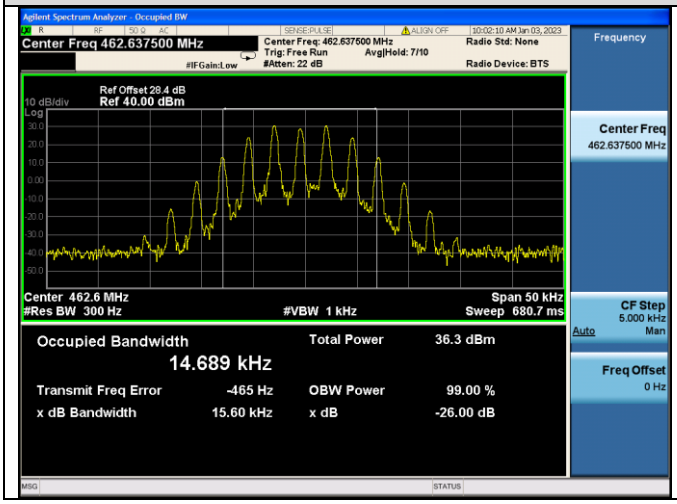
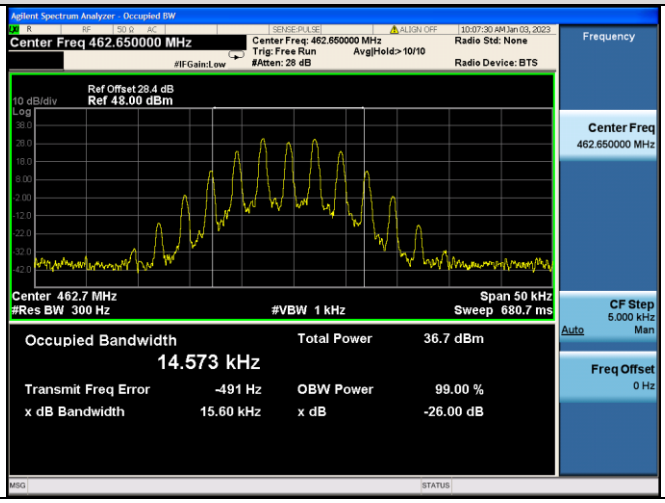
12.5kHz, FM Modulation:467.6500MHz-5W	12.5kHz, FM Modulation:462.6500MHz-25W
	
12.5kHz, FM Modulation:467.6500MHz-25W	**12.5kHz, FM Modulation:462.6500MHz-45W**
	
12.5kHz, FM Modulation:467.6500MHz-45W	
	

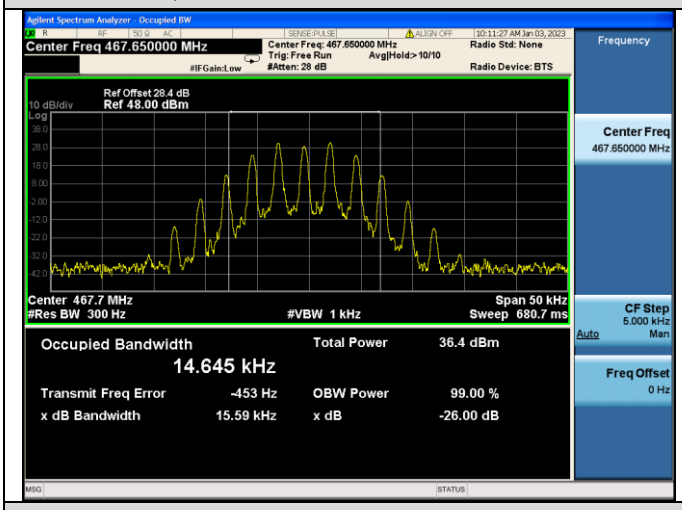
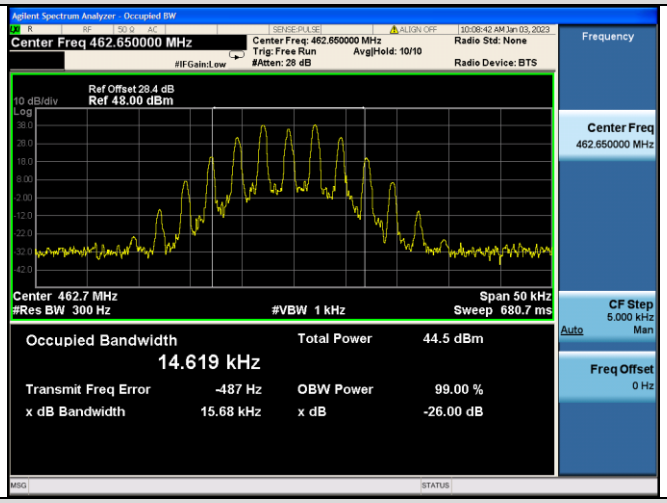
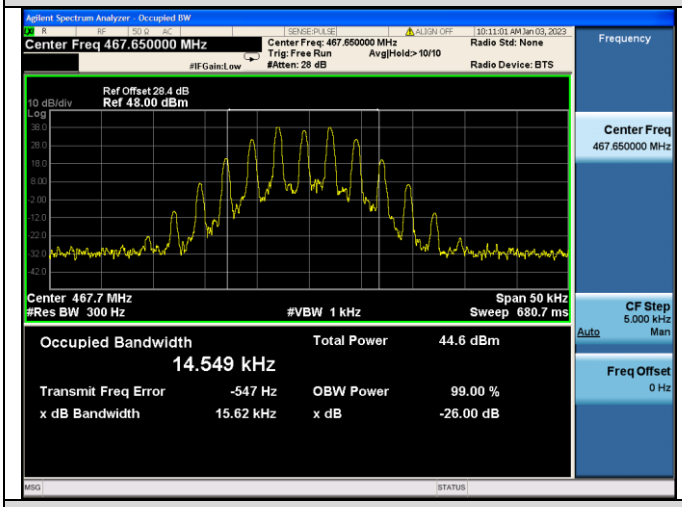
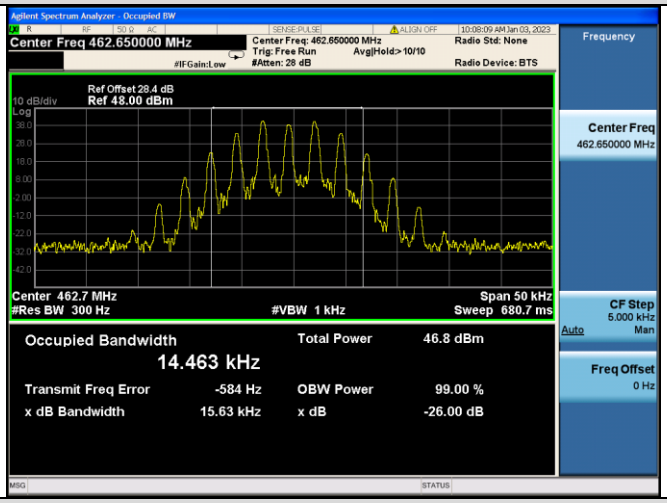
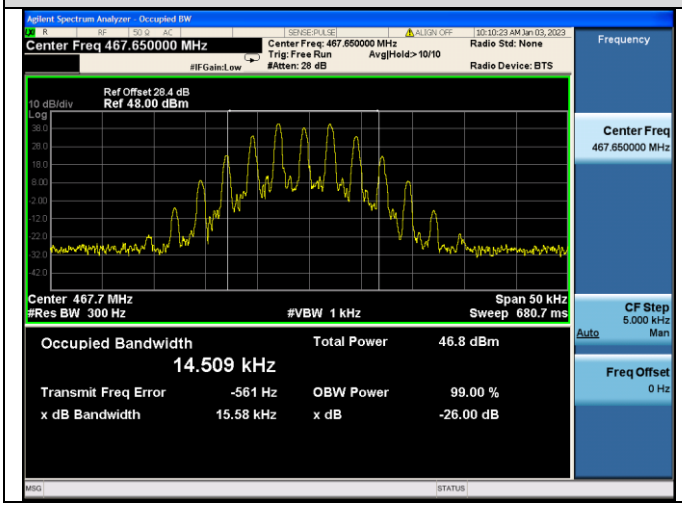
Emission Bandwidth Measurement Result-GMRS-5W				
Operating Frequency	25 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.6375 MHz	14.689 kHz	15.60 kHz	20.0 kHz	Pass
462.6500 MHz	14.573 kHz	15.60 kHz	20.0 kHz	Pass
467.6500 MHz	14.645 kHz	15.59 kHz	20.0 kHz	Pass

Emission Bandwidth Measurement Result-GMRS-25W				
Operating Frequency	25 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.6500 MHz	14.619 kHz	15.68 kHz	20.0 kHz	Pass
467.6500 MHz	14.549 kHz	15.62 kHz	20.0 kHz	Pass

Emission Bandwidth Measurement Result-GMRS-45W				
Operating Frequency	25 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.6500 MHz	14.463 kHz	15.63 kHz	20.0 kHz	Pass
467.6500 MHz	14.509 kHz	15.58 kHz	20.0 kHz	Pass

Test plot as follows:

25kHz, FM Modulation:462.6375MHz-5W	25kHz, FM Modulation:462.6500MHz-5W
	

25kHz, FM Modulation:467.6500MHz-5W	25kHz, FM Modulation:462.6500MHz-25W
	
25kHz, FM Modulation:467.6500MHz-25W	**25kHz, FM Modulation:462.6500MHz-45W**
	
25kHz, FM Modulation:467.6500MHz-45W	
	

8. SPURIOUS RATIATED EMISSION

8.1 PROVISIONS APPLICABLE

Standard Applicable [FCC Part 95.1779] According to FCC section 95.1779, the unwanted emission should be attenuated below TP by at least 43+10 log (Transmit Power) dB

8.2 MEASUREMENT PROCEDURE

Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

a) Emission masks. Emission masks applicable to transmitting equipment in the GMRS are defined by the requirements in the following table. The numbers in the attenuation requirements column refer to rule paragraph numbers under paragraph (b) of this section.

Emission types filter	Attenuation requirements
A1D, A3E, F1D, G1D, F2D, F3E, G3E with audio filter	(1), (2), (7)
A1D, A3E, F1D, G1D, F3E, G3E without audio filter	(3), (4), (7)
H1D, J1D, R1D, H3E, J3E, R2E	(5), (6), (7)

1) Filtering noted for GMRS transmitters refers to the requirement in §95.1775(e).

2) Unwanted emission power may be measured as either mean power or peak envelope power,provided that the transmitter output power is measured the same way.

b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

1) 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

2) 35 dB on any frequency removed from the center of the authorized bandwidth by more than100% up to and including 250% of the authorized bandwidth.

3) 83 log (fd ÷ 5) dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz up to and including 10 kHz.

4) 116 log (fd ÷ 6.1) dB or 50 + 10 log (P) dB, whichever is the lesser attenuation, on any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz), of more than 10 kHz up to and including 250% of the authorized bandwidth.

5) 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 150% of the authorized bandwidth.

6) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 150% up to and including 250% of the authorized bandwidth.

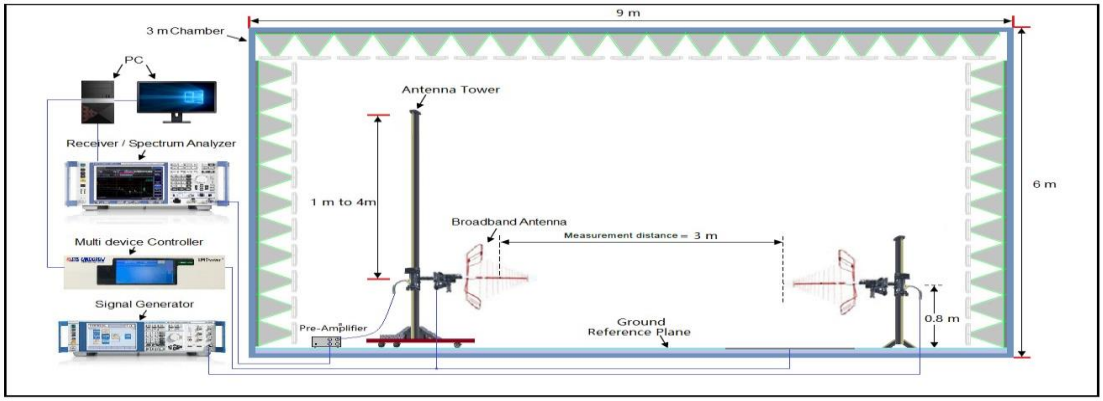
7) 43 + 10 log (P) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

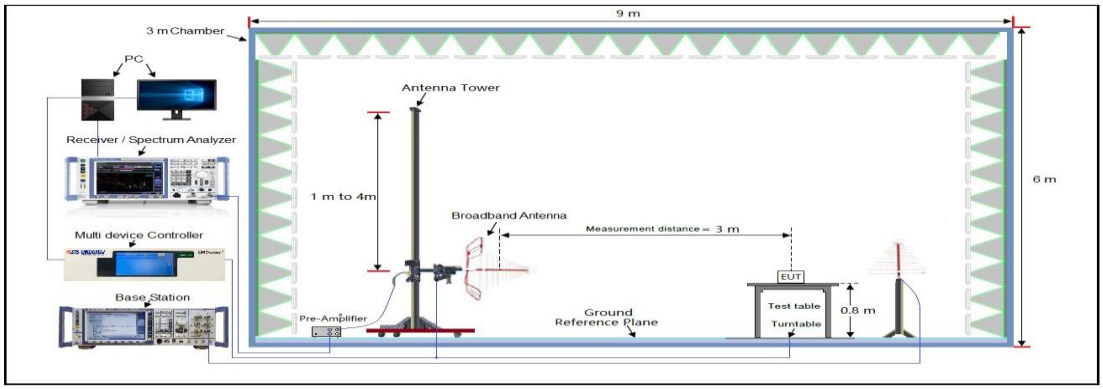
DETAILED OVERVIEW OF THE TEST METHOD IS AS FOLLOWS:

1) EUT was placed on a 0.8 or 1.5meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made. The radiated emission measurements of all transmit frequencies in all channels were measured with peak detector.
2) A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3) The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4) The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5) A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test
6) The measurement results are obtained as described below: Power(EIRP)=PMea- PAg - Pcl - Ga The measurement results are amend as described below:Power(EIRP)=PMea- Pcl - Ga
7) This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
8) ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
9) Test the EUT in the lowest channel, the middle channel the Highest channel

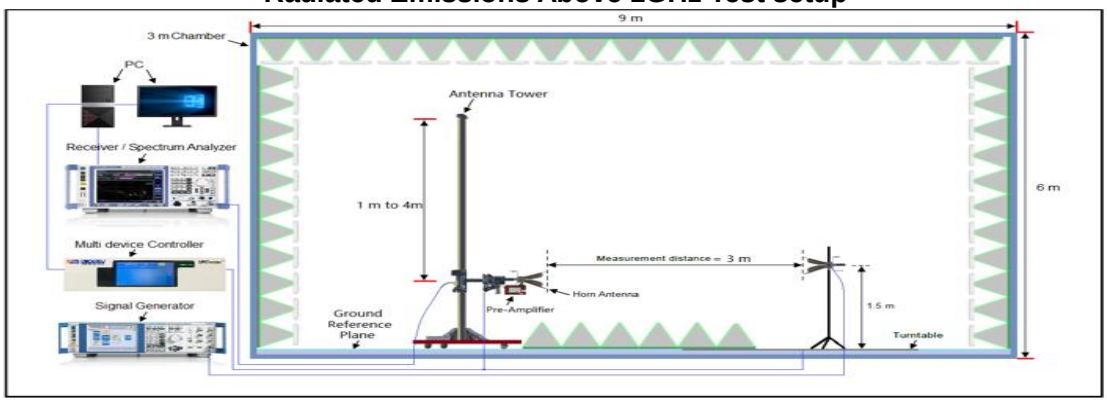
8.3 MEASUREMENT SETUP

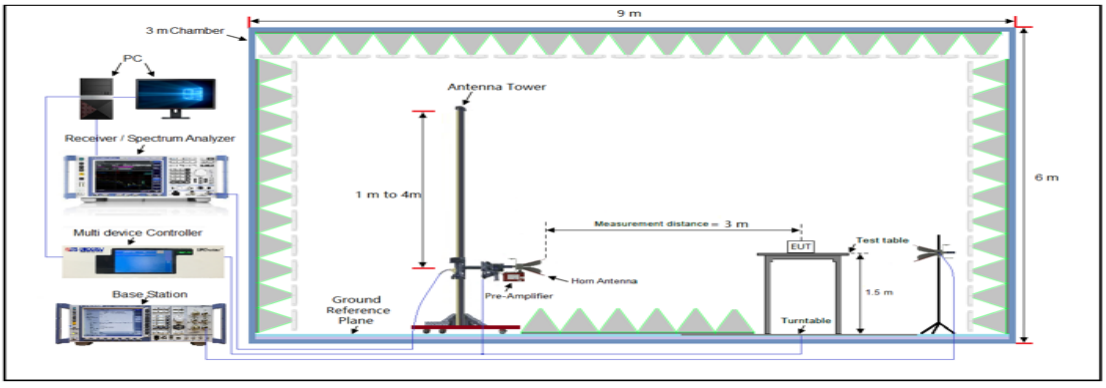
Radiated Emissions 30MHz to 1GHz Test setup





Radiated Emissions Above 1GHz Test setup



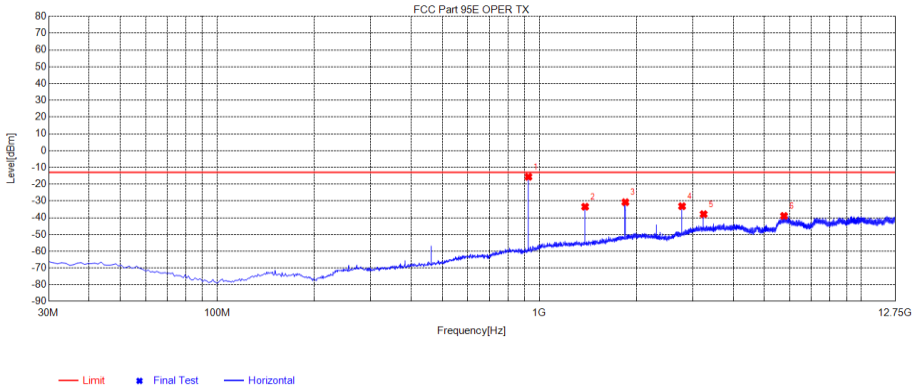


8.4 MEASUREMENT RESULTS

Preliminary calculation	Final Result
At least 43+10 log (P) =43+10log (5) =49.99 (dB)	Limit=P- Preliminary calculation=36.99-49.99=-13 dBm
At least 43+10 log (P) =43+10log (25) =56.98 (dB)	Limit=P- Preliminary calculation=43.98-56.98=-13 dBm
At least 43+10 log (P) =43+10log (45) =59.53 (dB)	Limit=P- Preliminary calculation=46.53-59.53=-13 dBm

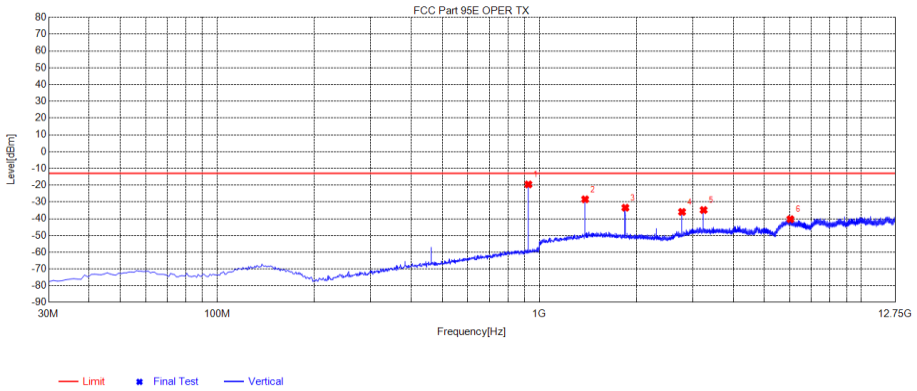
1. Factor=Antenna Factor + Cable loss. (Below 1GHz)
2. Factor=Antenna Factor+ Cable loss -Pre-amplifier. (Above 1 GHz)
3. Margin=Limit- Level
4. All test channels of the device are pre-scanned for the corresponding power levels, and only the highest power level is recorded in the report

Test Mode:	TX-CH4-12.5KHz-5W	Polarity:	Horizontal



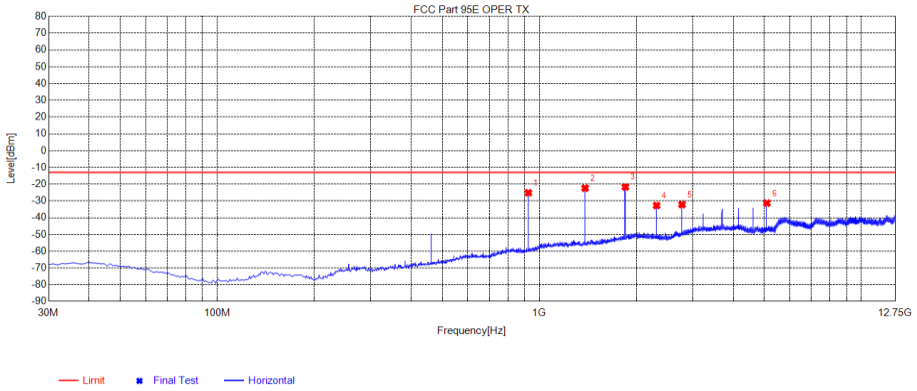
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-59.13	-15.64	-13.00	2.64	43.49	1	Horizontal
2	1387.7888	-30.02	-33.47	-13.00	20.47	-3.45	183	Horizontal
3	1850.7851	-30.20	-30.79	-13.00	17.79	-0.59	337	Horizontal
4	2775.6026	-34.36	-33.19	-13.00	20.19	1.17	128	Horizontal
5	3238.5989	-41.61	-37.90	-13.00	24.90	3.71	128	Horizontal
6	5754.5255	-48.85	-38.97	-13.00	25.97	9.88	231	Horizontal

Test Mode:	TX-CH4-12.5KHz-5W	Polarity:	Vertical



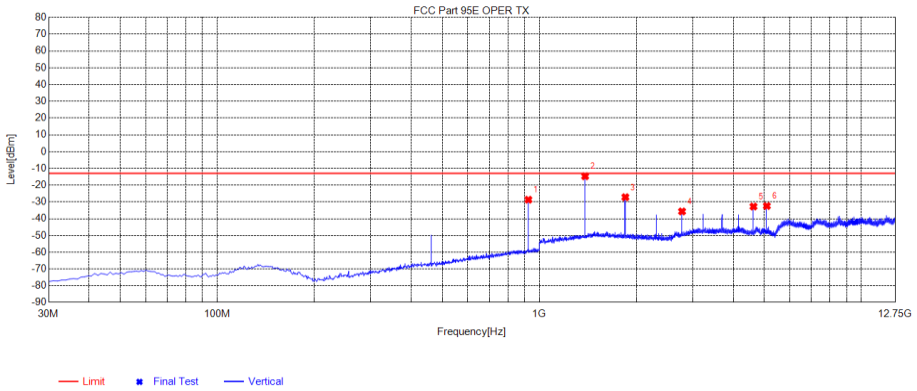
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-63.14	-19.57	-13.00	6.57	43.57	194	Vertical
2	1387.7888	-29.87	-28.46	-13.00	15.46	1.41	176	Vertical
3	1850.7851	-34.41	-33.48	-13.00	20.48	0.93	330	Vertical
4	2775.6026	-37.26	-35.98	-13.00	22.98	1.28	340	Vertical
5	3238.5989	-37.98	-34.84	-13.00	21.84	3.14	176	Vertical
6	6021.2771	-51.26	-40.30	-13.00	27.30	10.96	106	Vertical

Test Mode:	TX-CH19-12.5KHz-45W	Polarity:	Horizontal



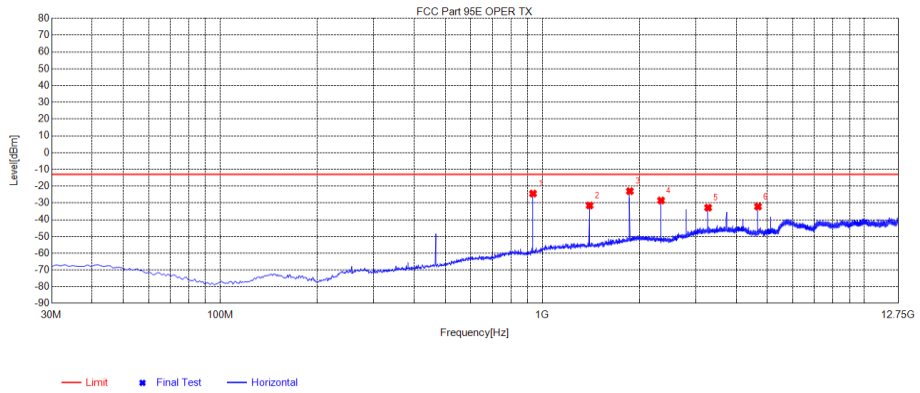
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-68.62	-25.13	-13.00	12.13	43.49	1	Horizontal
2	1387.7888	-18.95	-22.40	-13.00	9.40	-3.45	92	Horizontal
3	1850.7851	-21.11	-21.70	-13.00	8.70	-0.59	112	Horizontal
4	2313.7814	-32.04	-32.75	-13.00	19.75	-0.71	92	Horizontal
5	2775.6026	-33.37	-32.20	-13.00	19.20	1.17	120	Horizontal
6	5089.4089	-35.99	-31.32	-13.00	18.32	4.67	304	Horizontal

Test Mode:	TX-CH19-12.5KHz-45W	Polarity:	Vertical



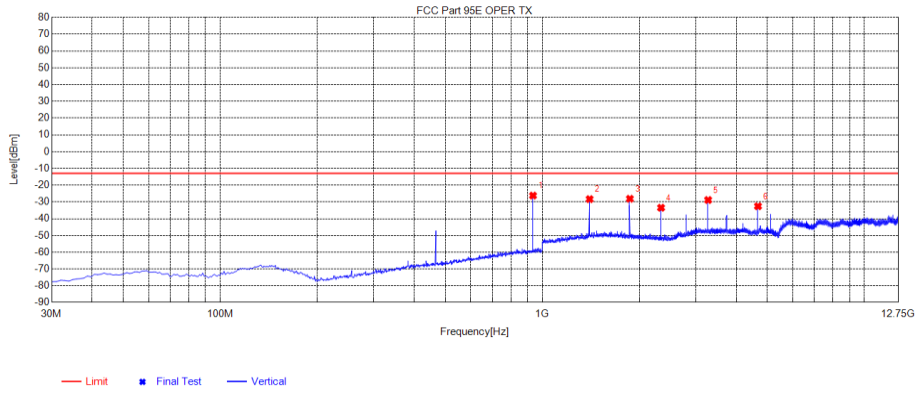
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-72.26	-28.69	-13.00	15.69	43.57	198	Vertical
2	1387.7888	-16.13	-14.72	-13.00	1.72	1.41	180	Vertical
3	1850.7851	-28.11	-27.18	-13.00	14.18	0.93	9	Vertical
4	2775.6026	-36.96	-35.68	-13.00	22.68	1.28	351	Vertical
5	4626.4126	-36.03	-32.76	-13.00	19.76	3.27	315	Vertical
6	5089.4089	-36.73	-32.44	-13.00	19.44	4.29	139	Vertical

Test Mode:	TX-CH27-12.5KHz-45W	Polarity:	Horizontal



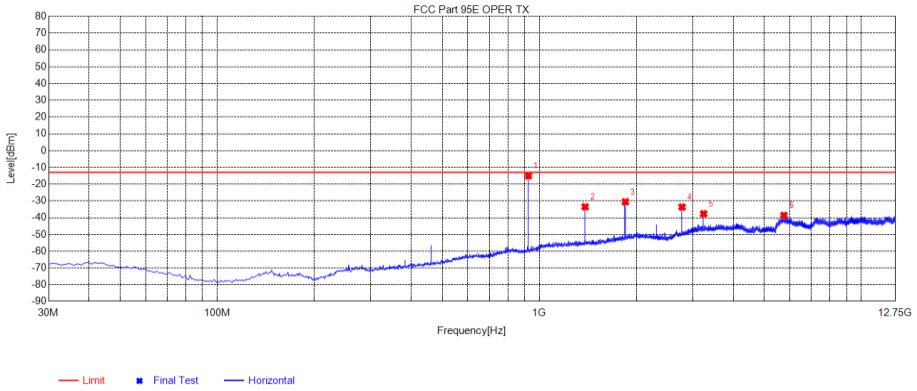
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	935.98	-68.16	-24.44	-13.00	11.44	43.72	128	Horizontal
2	1403.0653	-28.12	-31.53	-13.00	18.53	-3.41	184	Horizontal
3	1870.7621	-22.54	-22.98	-13.00	9.98	-0.44	110	Horizontal
4	2338.4588	-27.75	-28.55	-13.00	15.55	-0.80	100	Horizontal
5	3273.8524	-36.64	-32.86	-13.00	19.86	3.78	136	Horizontal
6	4676.9427	-35.75	-32.18	-13.00	19.18	3.57	291	Horizontal

Test Mode:	TX-CH27-12.5KHz-45W	Polarity:	Vertical



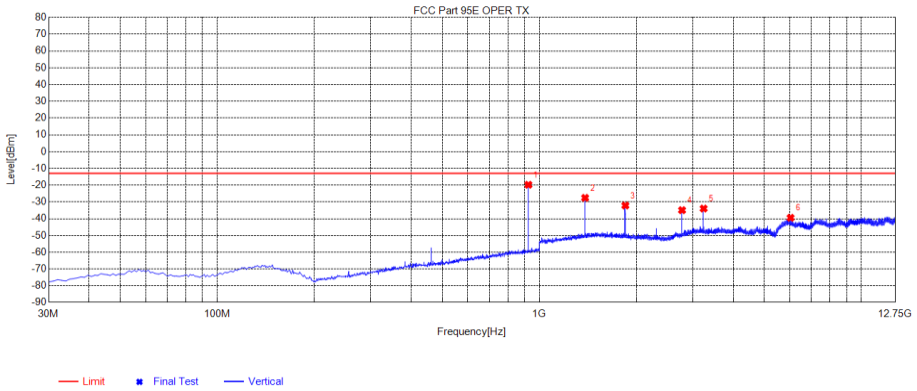
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	935.98	-69.90	-26.22	-13.00	13.22	43.68	197	Vertical
2	1403.0653	-29.87	-28.35	-13.00	15.35	1.52	197	Vertical
3	1870.7621	-28.99	-28.13	-13.00	15.13	0.86	171	Vertical
4	2338.4588	-32.88	-33.49	-13.00	20.49	-0.61	2	Vertical
5	3273.8524	-31.99	-28.86	-13.00	15.86	3.13	179	Vertical
6	4676.9427	-35.95	-32.59	-13.00	19.59	3.36	314	Vertical

Test Mode:	TX-CH4-25KHz-5W	Polarity:	Horizontal



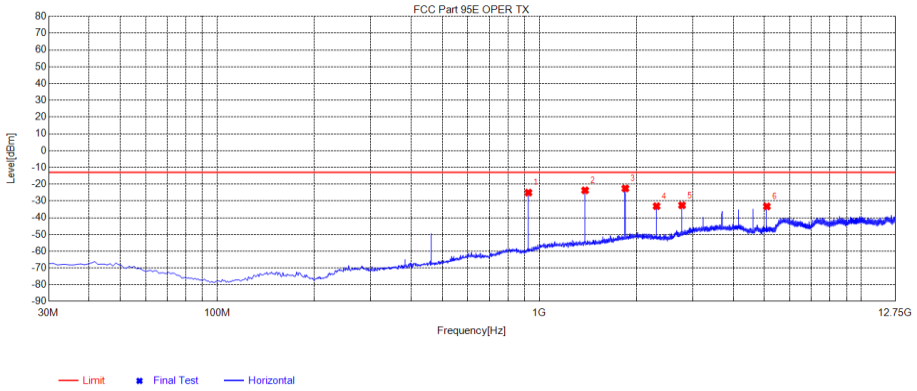
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-58.57	-15.08	-13.00	2.08	43.49	1	Horizontal
2	1387.7888	-30.08	-33.53	-13.00	20.53	-3.45	126	Horizontal
3	1850.7851	-29.97	-30.56	-13.00	17.56	-0.59	333	Horizontal
4	2775.6026	-34.83	-33.66	-13.00	20.66	1.17	110	Horizontal
5	3238.5989	-41.38	-37.67	-13.00	24.67	3.71	126	Horizontal
6	5751.0001	-48.56	-38.70	-13.00	25.70	9.86	126	Horizontal

Test Mode:	TX-CH4-25KHz-5W	Polarity:	Vertical



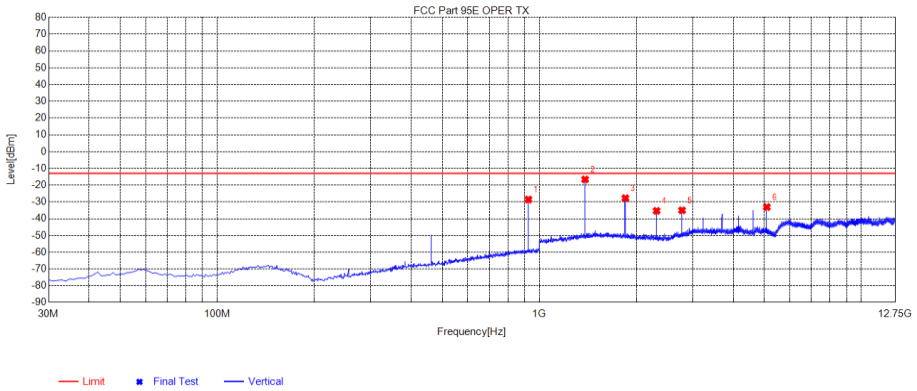
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-63.36	-19.79	-13.00	6.79	43.57	198	Vertical
2	1387.7888	-28.98	-27.57	-13.00	14.57	1.41	150	Vertical
3	1850.7851	-33.09	-32.16	-13.00	19.16	0.93	334	Vertical
4	2775.6026	-36.21	-34.93	-13.00	21.93	1.28	350	Vertical
5	3238.5989	-37.10	-33.96	-13.00	20.96	3.14	178	Vertical
6	6030.6781	-50.43	-39.46	-13.00	26.46	10.97	216	Vertical

Test Mode:	TX-CH19-25KHz-45W	Polarity:	Horizontal



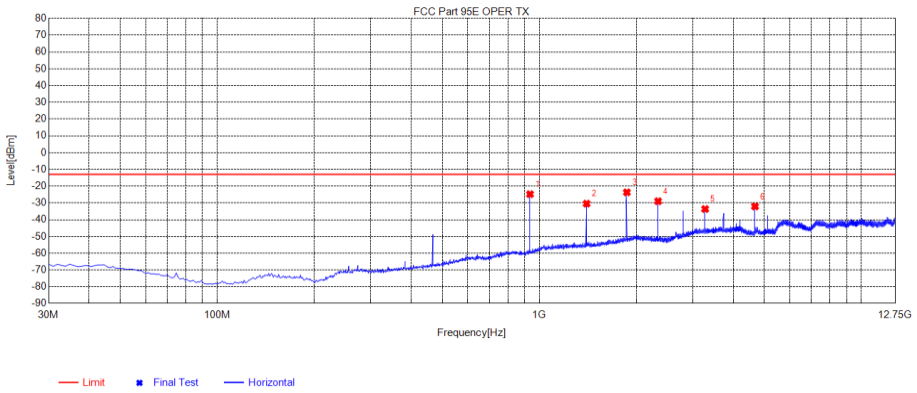
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-68.53	-25.04	-13.00	12.04	43.49	360	Horizontal
2	1387.7888	-20.24	-23.69	-13.00	10.69	-3.45	95	Horizontal
3	1850.7851	-21.97	-22.56	-13.00	9.56	-0.59	105	Horizontal
4	2313.7814	-32.43	-33.14	-13.00	20.14	-0.71	105	Horizontal
5	2775.6026	-33.79	-32.62	-13.00	19.62	1.17	115	Horizontal
6	5089.4089	-37.95	-33.28	-13.00	20.28	4.67	306	Horizontal

Test Mode:	TX-CH19-25KHz-45W	Polarity:	Vertical



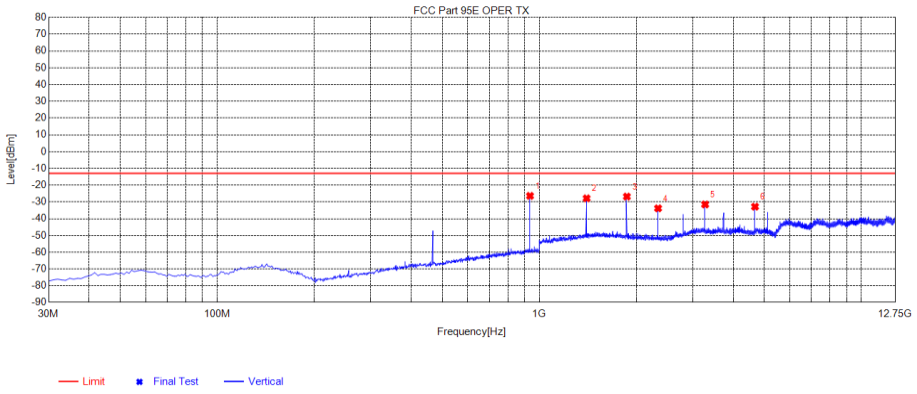
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-72.15	-28.58	-13.00	15.58	43.57	131	Vertical
2	1387.7888	-18.01	-16.60	-13.00	3.60	1.41	169	Vertical
3	1850.7851	-28.69	-27.76	-13.00	14.76	0.93	159	Vertical
4	2313.7814	-34.82	-35.35	-13.00	22.35	-0.53	121	Vertical
5	2775.6026	-36.30	-35.02	-13.00	22.02	1.28	343	Vertical
6	5089.4089	-37.38	-33.09	-13.00	20.09	4.29	131	Vertical

Test Mode:	TX-CH27-25KHz-45W	Polarity:	Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	935.98	-68.51	-24.79	-13.00	11.79	43.72	128	Horizontal
2	1403.0653	-27.04	-30.45	-13.00	17.45	-3.41	183	Horizontal
3	1870.7621	-23.26	-23.70	-13.00	10.70	-0.44	110	Horizontal
4	2338.4588	-28.19	-28.99	-13.00	15.99	-0.80	100	Horizontal
5	3273.8524	-37.43	-33.65	-13.00	20.65	3.78	138	Horizontal
6	4676.9427	-35.69	-32.12	-13.00	19.12	3.57	294	Horizontal

Test Mode:	TX-CH27-25KHz-45W	Polarity:	Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	935.98	-70.09	-26.41	-13.00	13.41	43.68	198	Vertical
2	1403.0653	-29.39	-27.87	-13.00	14.87	1.52	198	Vertical
3	1870.7621	-27.68	-26.82	-13.00	13.82	0.86	171	Vertical
4	2338.4588	-33.22	-33.83	-13.00	20.83	-0.61	125	Vertical
5	3273.8524	-34.66	-31.53	-13.00	18.53	3.13	181	Vertical
6	4676.9427	-36.21	-32.85	-13.00	19.85	3.36	314	Vertical

8.5 EMISSION MASK PLOT

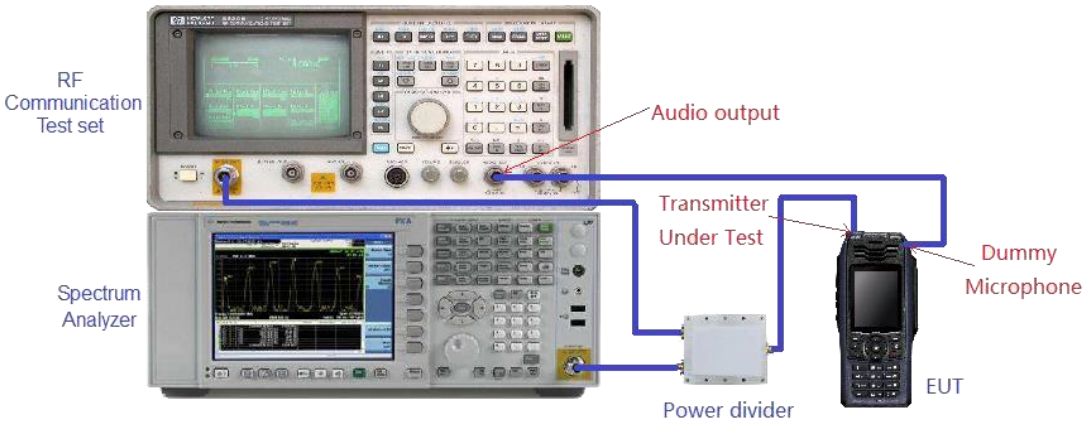
The detailed procedure employed for Emission Mask measurements are specified as following:

-Connect the equipment as illustrated.

-Spectrum set as follow:

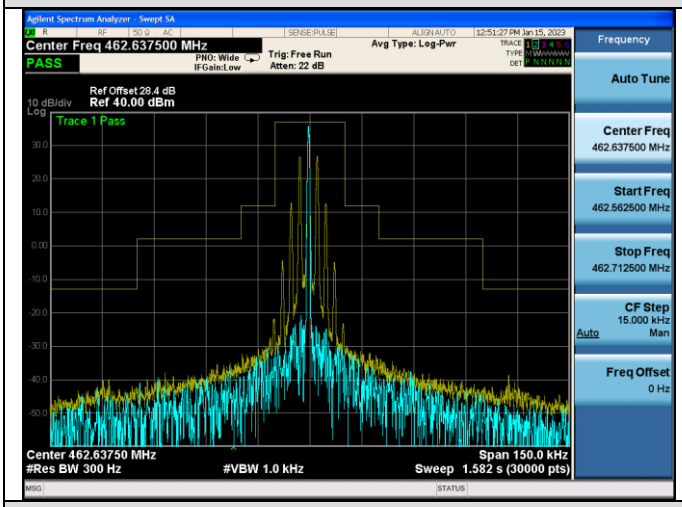
1. Centre frequency = fundamental frequency, Span=150kHz for 12.5kHz and 25kHz channel spacing, RBW=300Hz, VBW=1000Hz for 12.5kHz, RBW=300Hz, VBW=1000Hz for 25kHz, Sweep = auto, Detector function = peak, Trace = max hold
2. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0dB reference for the measurement.
3. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation (Rated system deviation is 2.5 kHz for 12.5kHz/25KHz channel spacing).

   The input level shall be established at the frequency of maximum response of the audio modulating circuit.
4. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.
5. Measure and record the results in the test report.

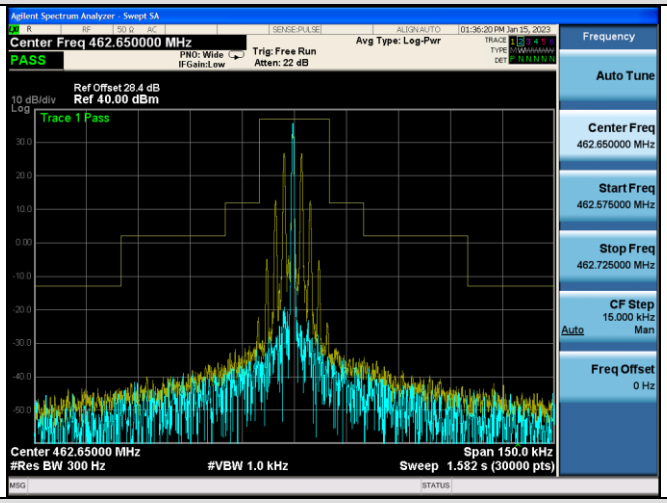


Test plot as follows:

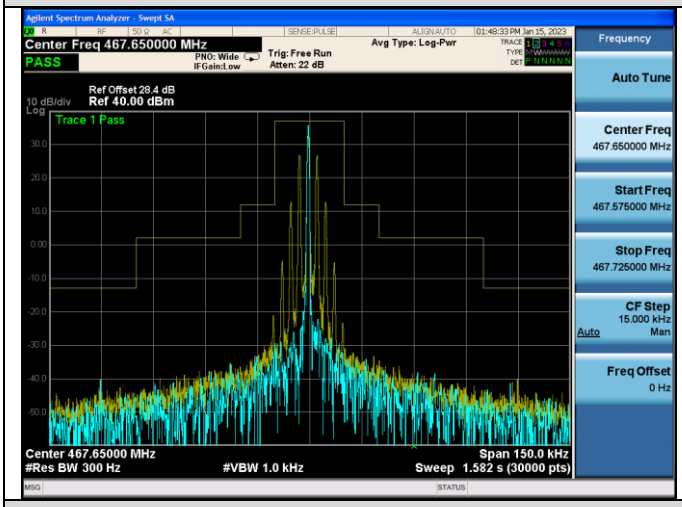
Emission Mask @ 462.6375MHz-12.5KHz-5W



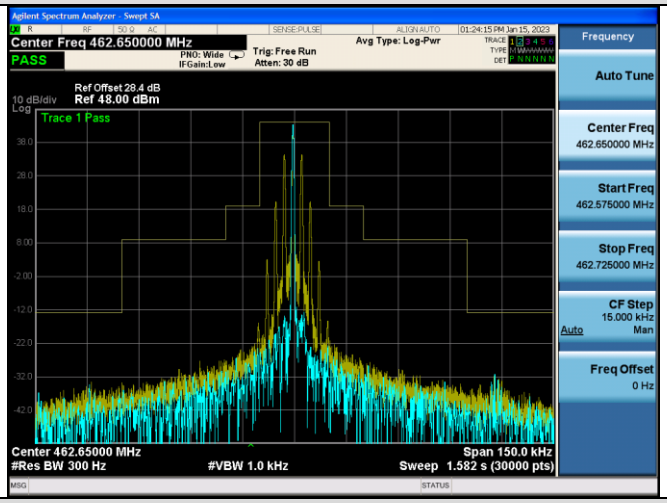
Emission Mask @ 462.6500MHz-12.5KHz-5W



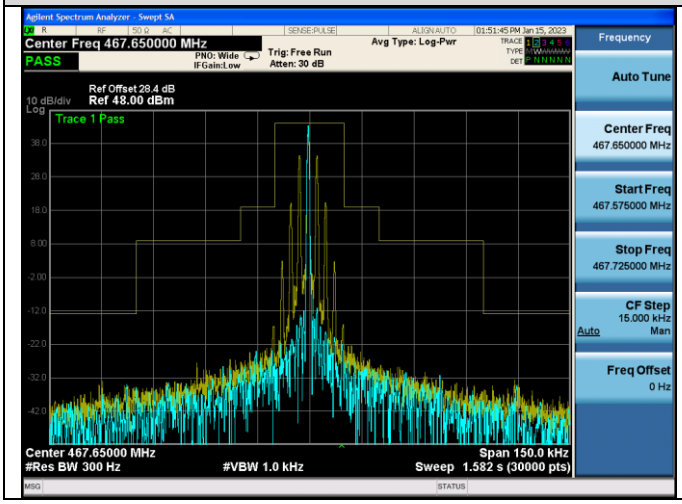
Emission Mask @ 467.6500MHz-12.5KHz-5W



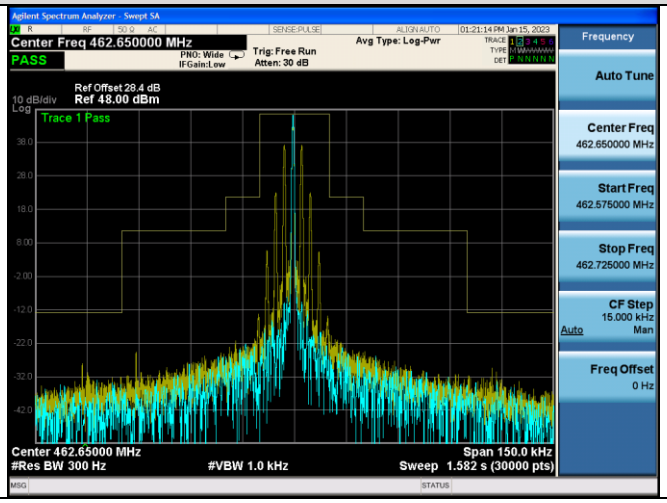
Emission Mask @ 462.6500MHz-12.5KHz-25W

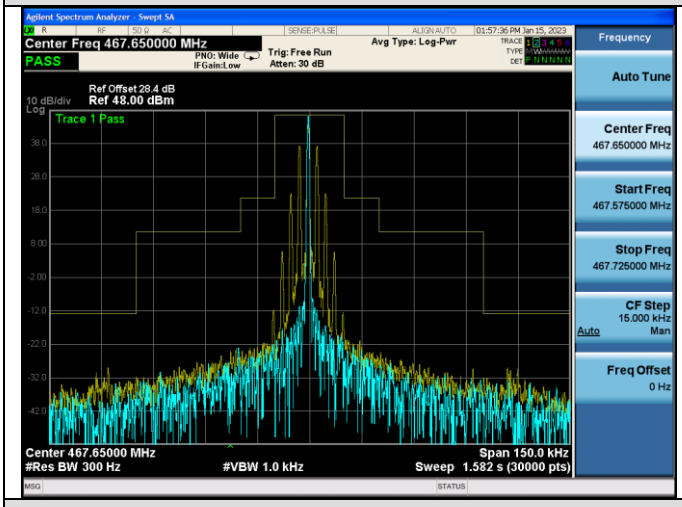
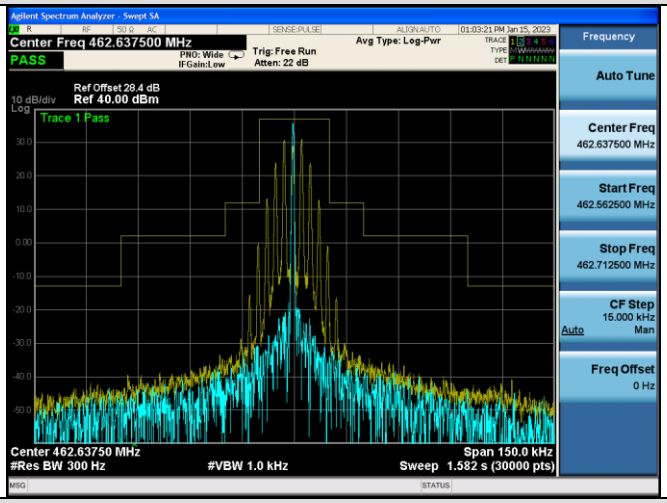
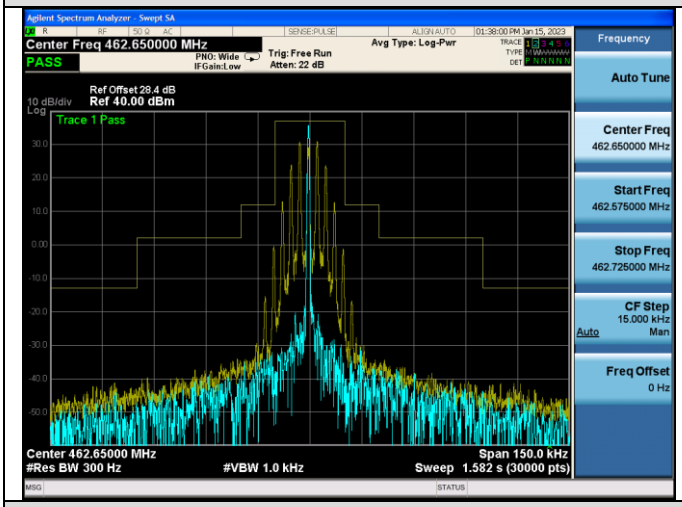
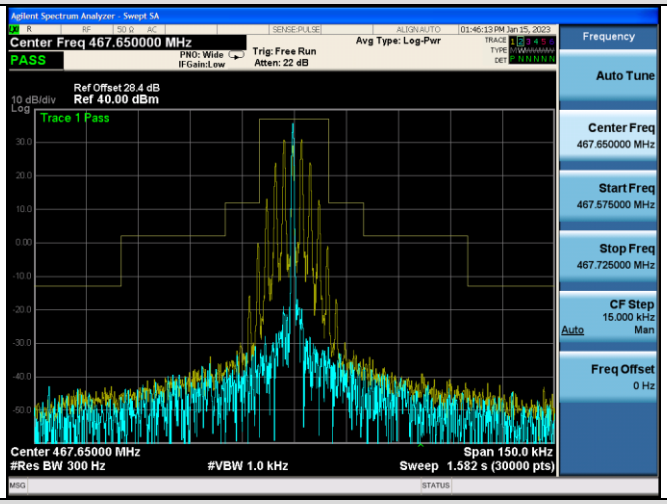
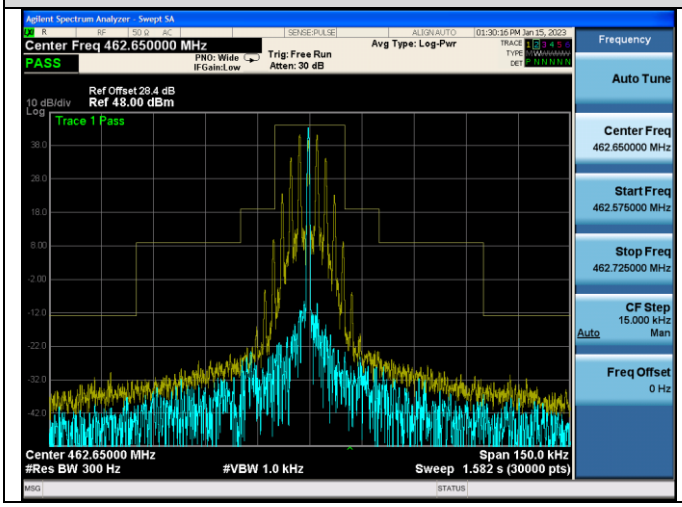
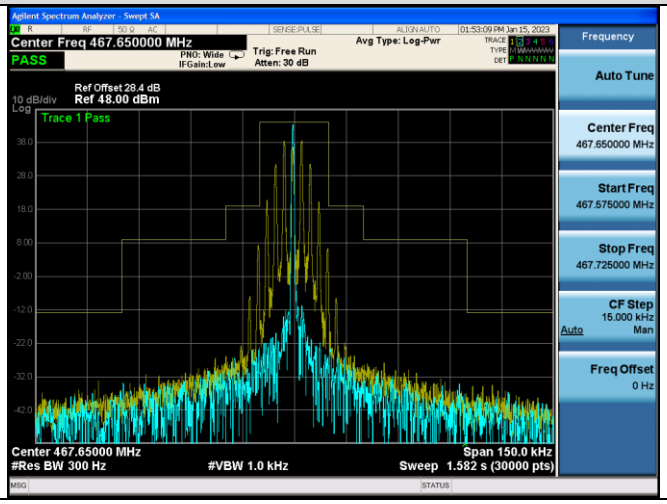


Emission Mask @ 467.6500MHz-12.5KHz-25W



Emission Mask @ 462.6500MHz-12.5KHz-45W



Emission Mask @ 467.6500MHz-12.5KHz-45W	Emission Mask @ 462.6375MHz-25KHz-5W
	
Emission Mask @ 462.6500MHz-25KHz-5W	**Emission Mask @ 467.6500MHz-25KHz-5W**
	
Emission Mask @ 462.6500MHz-25KHz-25W	**Emission Mask @ 467.6500MHz-25KHz-25W**
	

Emission Mask @ 462.6500MHz-25KHz-45W	Emission Mask @ 467.6500MHz-25KHz-45W