FCC Test Report

Report No.: AGC03393210201FE10

FCC ID	:	2AB4FMURS
PRODUCT DESIGNATION	:	Two way radio
BRAND NAME	:	HYDX
MODEL NAME	:	A518
APPLICANT	:	Fujian Juston Electronic Equiopment Co.,Ltd.
DATE OF ISSUE	:	Apr. 22, 2021
STANDARD(S)	:	FCC Part 95 Rules
REPORT VERSION	:	V 1.0

***A**ttestation of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 22, 2021	Valid	Initial Release

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1. GENERAL INFORMATION

Applicant	Fujian Juston Electronic Equiopment Co.,Ltd.
Address	No.66 Changtai Road,Shudou Industrial Park,Jiangnan Licheng District,Quanzhou ,China
Manufacturer	Fujian Juston Electronic Equiopment Co.,Ltd.
Address	No.66 Changtai Road,Shudou Industrial Park,Jiangnan Licheng District,Quanzhou ,China
Factory	Fujian Juston Electronic Equiopment Co.,Ltd.
Address	No.66 Changtai Road,Shudou Industrial Park,Jiangnan Licheng District,Quanzhou ,China
Product Designation	Two way radio
Brand Name	HYDX
Test Model	A518
Deviation from Standard	None
Date of Receipt	Feb. 27, 2021
Date of Test	Feb. 27, 2021~Apr. 22, 2021
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

Donjon Huang
(Project Engineer) Apr. 22, 2021

Reviewed By

Calvin Liu
(Reviewer) Apr. 22, 2021

Approved By

Forrest Lei
Authorized Officer Apr. 22, 2021

2. PRODUCT INFORMATION

2.1 PRODUCT TECHNICAL DESCRIPTION

Hardware Version	v1.0
Software Version	v1.0
Power Supply	DC 5.0V
Communication Type	Voice / Tone only
Operation Frequency Range	151.820MHz-154.600MHz
Modulation Type	F3E
Channel Separation	12.5 KHz
Emission Bandwidth	10.54KHz
Emission Designator	11K0F3E
Number of Channels:	5 Channels
Rated Output Power	2W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Maximum Transmitter Power	32.087dBm
Antenna Designation	Detachable Antenna
Antenna Gain	2.15dBi
Frequency Tolerance	1.053ppm

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
1	151.820	2W
2	151.880	
3	151.940	
4	154.570	
5	154.600	

2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **2AB4FMURS,** 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

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.

2.6 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

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	-20 - 50
Relative humidty range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Power supply	DC 3.7V	DC 3.15V/ DC 4.26V
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 %

3.5 LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9020A	W1312-60196	Aug. 21, 2020	Aug. 20, 2021
EXA Signal Analyzer	Aglient	N9020A	MY52090123	Sep. 03, 2020	Sep. 02, 2021
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.16, 2019	Sep.15, 2021
preamplifier	ChengYi	EMC184045SE	980508	Sep. 23, 2019	Sep. 22, 2021
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 09, 2020	Jun. 08, 2021
HORN ANTENNA	EM	EM-AH-10180	/	Feb. 26, 2021	Feb. 25, 2022
SIGNAL GENERATOR	AGILENT	E4421B	MY43351603	Jun. 09, 2020	Jun. 08, 2021
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 09, 2020	Jun. 08, 2021
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 08, 2021	Jan. 07, 2023
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 19, 2019	Sep.18, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 11, 2020	Jun. 10, 2021
Modulation Domain Analyzer	HP	53310A	3121A02467	Jul. 03, 2020	Jul. 02, 2022
Small environmental tester	ESPEC	SH-242	--	Feb. 21, 2021	Feb. 20, 2022
RF Communication Test Set	HP	8920B	--	Jun. 09, 2020	Jun. 08, 2021
Attenuator	Weinachel Corp	58-30-33	ML030	Oct. 26, 2020	Oct. 25, 2021
RF Cable	R&S	1#	--	Each time	N/A
RF Cable	R&S	2#	--	Each time	N/A
Fliter-VHF	Microwave	N26460M1	498703	May 11, 2020	May 10, 2021

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
☒ Test Accessories Come From The Manufacturer

Item	Equipment	Model No.	Identifier	Note
1	Two way radio	A518	FCC ID: 2AB4FMURS	EUT
2	Battery	A518	DC 3.7V 4400mAh	Accessories
3	Back clip	N/A	N/A	Accessories
5	USB Cable	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	§ 95.2767& 2.1046(a)	Maximum Transmitter Power	Pass
3	§95.2771& 2.1047(a) (b)	Modulation Limit	Pass
4	§95.2755& 2.1047(a)	Audio Frequency Response	Pass
4	§95.2755	Audio Low Pass Filter Response	Pass
5	§95.2773& 2.1049	Emission Bandwidth	Pass
6	§95.2779& 2.1049	Emission Mask	Pass
7	§95.2765& 2.1055(a) (1)	Frequency Stability	Pass
9	§95.2779& 2.1051	Spurious Emission on Antenna Port	Pass
10	§95.2779& 2.1053	Spurious Ratiated Emission	Pass
Note: The EUT is External Antenna.			

5. DESCRIPTION OF TEST MODES

The EUT (**Two-way radio**) has been tested under normal operating condition. (MURS TX) are chosen for testing at each channel separation.

NO.	TEST MODE DESCRIPTION	CHANNEL SEPARATION
1	MURS TX CHANNEL 2	12.5 kHz
2	MURS TX CHANNEL 4	12.5 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 95.2765] The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.
MURS: The carrier frequency of each MURS transmitter transmitting an emission with an occupied bandwidth of 6.25 kHz or less must remain within 2 ppm
The carrier frequency of each MURS transmitter transmitting an emission with an occupied bandwidth greater than 6.25 kHz must remain within 5 ppm

6.2 MEASUREMENT PROCEDURE

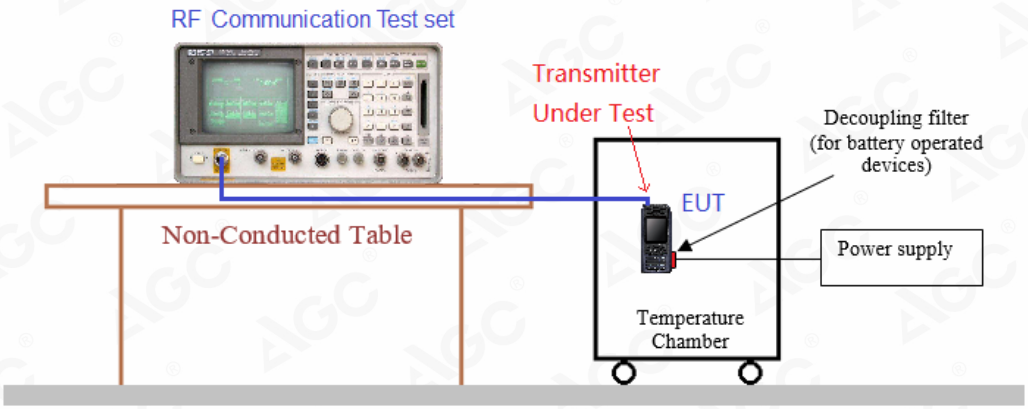
6.2.1 Frequency stability versus environmental temperature

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 5V.
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 MURS					
Test conditions		Frequency error (ppm)		Limit (ppm)	Result
Voltage (V)	Temp (℃)	Test Frequency (MHz)			
		151.820	154.570		
3.70	-30	0.453	0.653	5	Pass
	-20	0.568	0.555		
	-10	0.581	1.053		
	0	0.514	0.535		
	10	0.803	0.886		
	20	0.762	0.939		
	30	0.652	0.609		
	40	0.925	0.661		
	50	0.526	1.028		
4.26	20	0.740	0.851		
3.15	20	0.831	0.686		

7. EMISSION BANDWIDTH

7.1 PROVISIONS APPLICABLE

FCC Part 95.2773: MURS:

a) The occupied bandwidth of emissions transmitted on the center frequencies 151.820 MHz, 151.880 MHz, and 151.940 MHz must not exceed 11.25 kHz.

b) The occupied bandwidth of emissions transmitted on the center frequencies 154.570 MHz and 154.600 MHz must not exceed 20.0 kHz.

c) The occupied bandwidth of type A3E emissions must not exceed 8.0 kHz.

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:

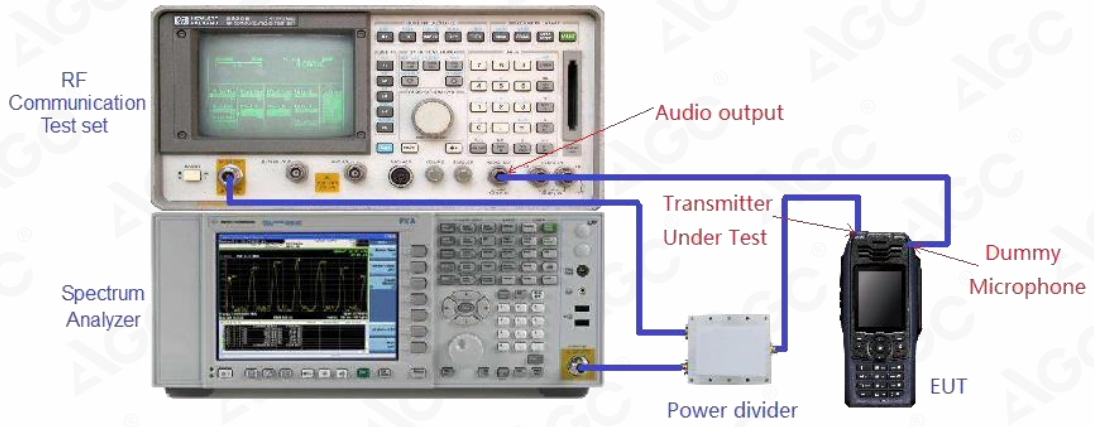
Centre frequency = fundamental frequency, span=50kHz for 12.5kHz channel spacing, RBW=300Hz, VBW=1KHz, Sweep = auto,

Detector function = peak, Trace = max hold

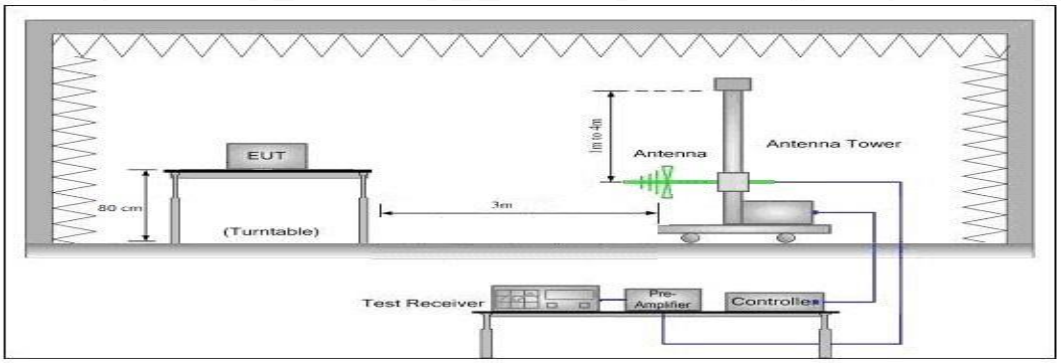
3.Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

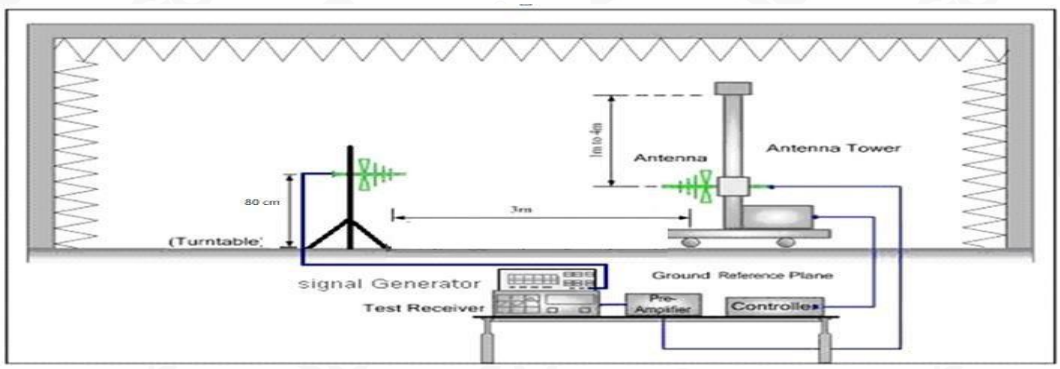
4.Measure and record the results in the test report.

7.3 MEASUREMENT SETUP

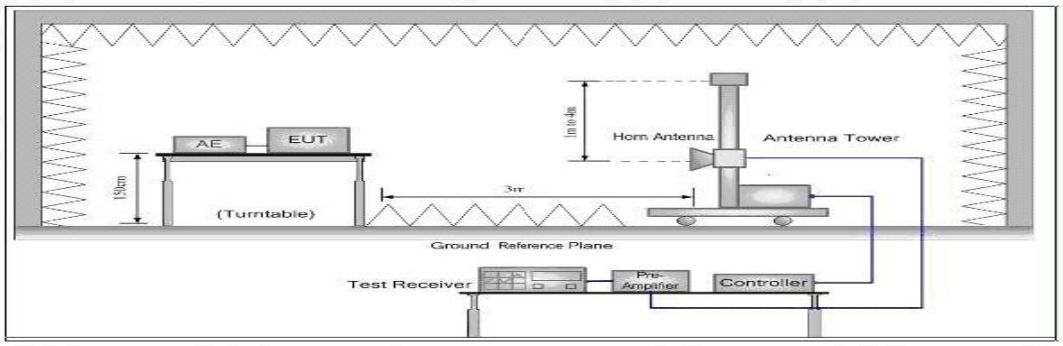


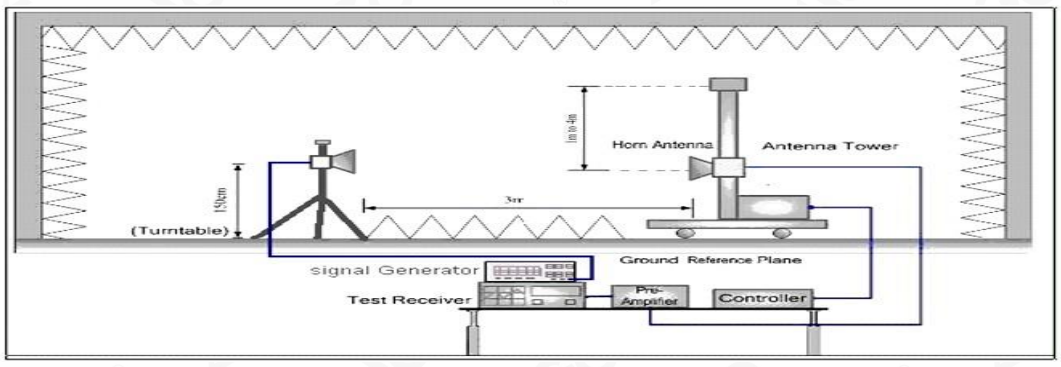
RADIATED BELOW1GHZ





RADIATED ABOVE 1 GHZ

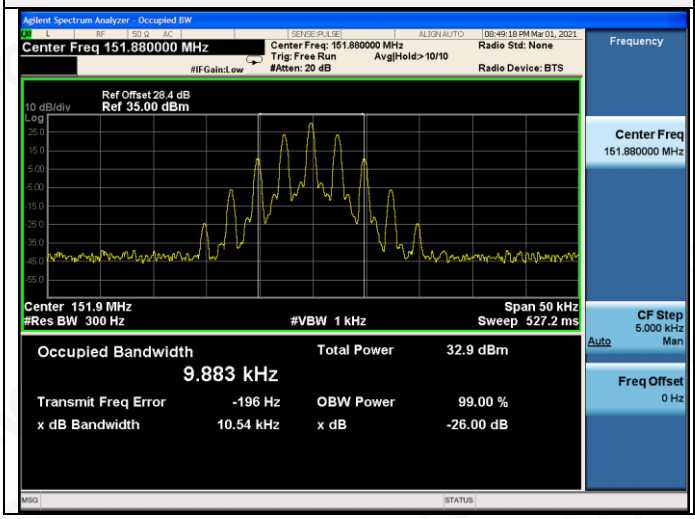
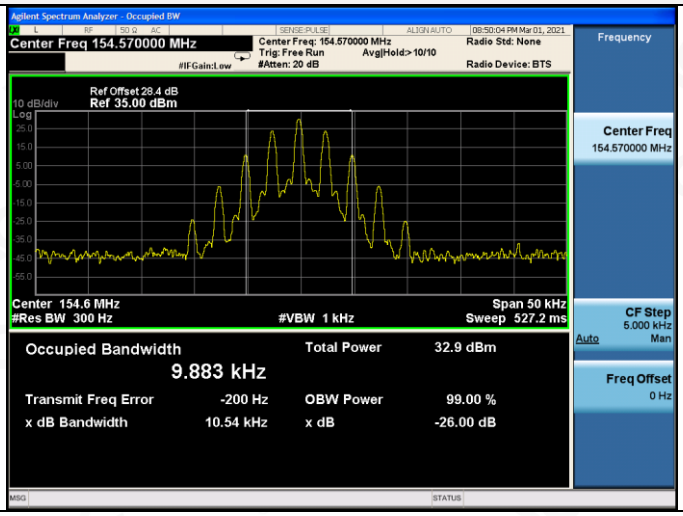




7.4 MEASUREMENT RESULTS

Emission Bandwidth Measurement Result-MURS				
Operating Frequency	12.5 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
151.880 MHz	9.883 kHz	10.54 kHz	11.25 kHz	Pass
154.570 MHz	9.883 kHz	10.54 kHz	20.0 kHz	Pass

Test plot as follows:

12.5kHz, FM Modulation:151.880MHz-2W	12.5kHz, FM Modulation:154.570MHz-5W
	

8. SPURIOUS RATIATED EMISSION

8.1 PROVISIONS APPLICABLE

Standard Applicable [FCC Part 95.2779]

8.2 MEASUREMENT PROCEDURE

Each MURS 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 MURS are defined by the requirements in the following table. The numbers in the paragraphs column refer to attenuation requirement rule paragraph numbers under paragraph (b) of this section. The words “audio filter” refer to the audio filter described in §95.2775.

Channel center frequencies(MHz)	Paragraphs
151.820, 151.880 and 151.940	(1), (2).
154.570 & 154.600, with audio filter	(3), (4), (7)
154.570 & 154.600, without audio filter	(5), (6), (7)

1) Each MURS transmitter type that transmits F3E or G3E emissions on 154.570 MHz or 154.600 MHz and incorporates an audio filter satisfying the requirements of §95.2775 in its design may comply with the less stringent unwanted emissions attenuation requirements set forth in paragraphs (b)(3), (4), and (7) of this section.
2) Each MURS transmitter type that transmits on 154.570 MHz or 154.600 MHz, but does not incorporate an audio filter satisfying the requirements of §95.2775 in its design, must comply with the unwanted emissions attenuation requirements set forth in paragraphs (b)(5) through (7) of this section.

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

1) 7.27(fd−2.88 kHz) dB on any frequency removed from the channel center frequency by a displacement frequency (fd in kHz) that is more than 5.625 kHz, but not more than 12.5 kHz.
2) 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation, on any frequency removed from the channel center frequency by more than 12.5 kHz.
3) 25 dB on any frequency removed from the channel center frequency by more than 10 kHz, but not more than 20 kHz.
4) 35 dB on any frequency removed from the channel center frequency by more than 20 kHz, but not more than 50 kHz.
5) 83 log (fd ÷ 5) dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) that is more than 5 kHz, but not more than 10 kHz.
6) 29 log (fd^2 ÷ 11) dB or 50 dB, whichever is the lesser attenuation on any frequency removed from the channel center frequency by a displacement frequency (fd in kHz) that is more than 10 kHz, but not more than 50 kHz.
7) 43 + 10 log(P) dB on any frequency removed from the channel center frequency by more than 50 kHz.

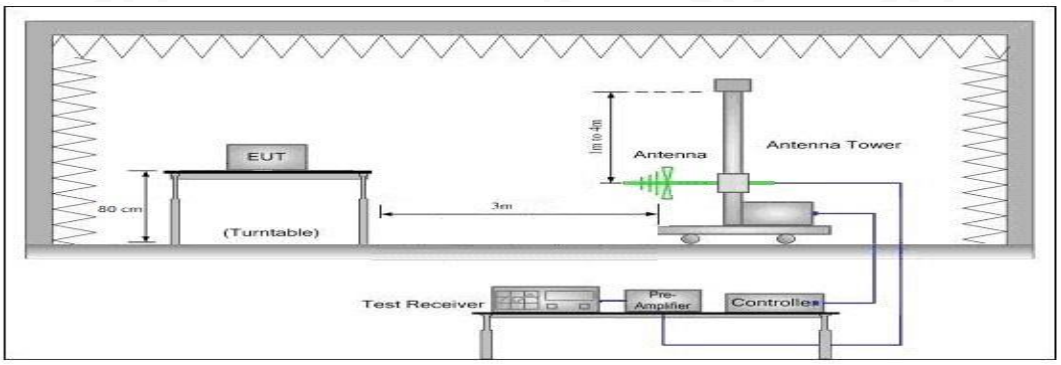
c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) and (3) through (6) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency ranges specified in paragraphs (b)(2) and (7) of this section is measured with a reference bandwidth of at least 30 kHz.

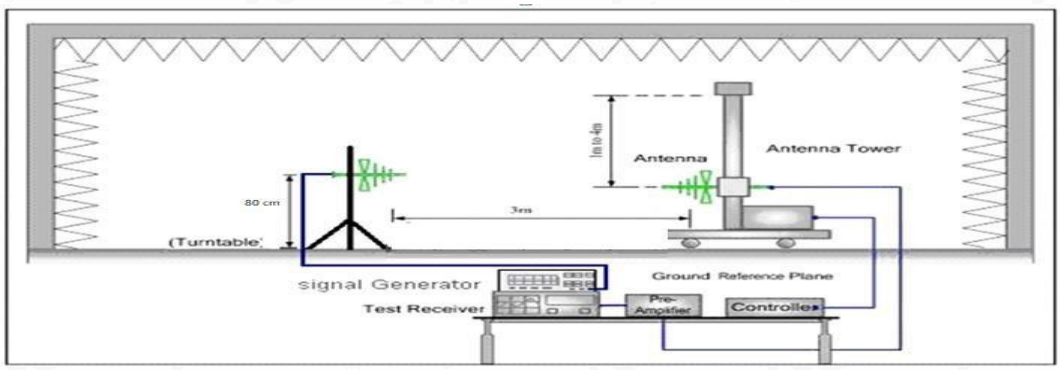
DETAILED OVERVIEW OF THE TEST METHOD IS AS FOLLOWS:

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

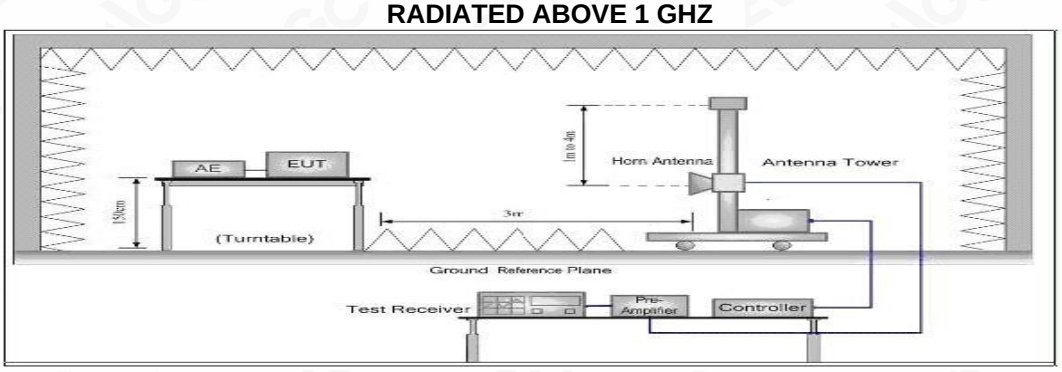
8.3 MEASUREMENT SETUP

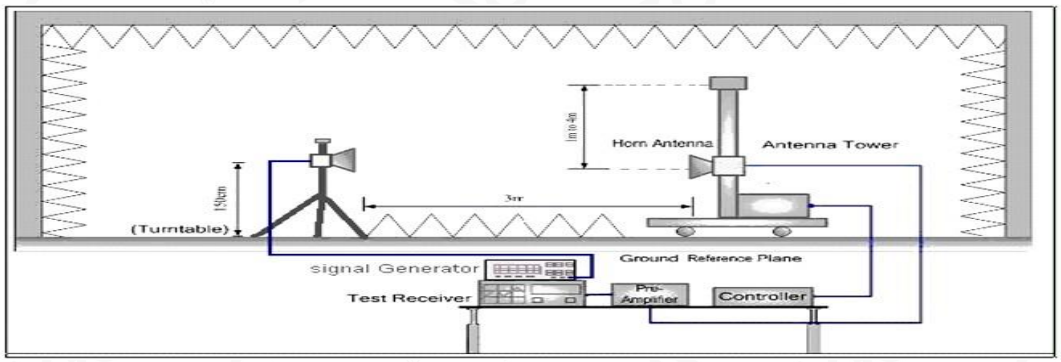
RADIATED BELOW1GHZ





RADIATED ABOVE 1 GHZ



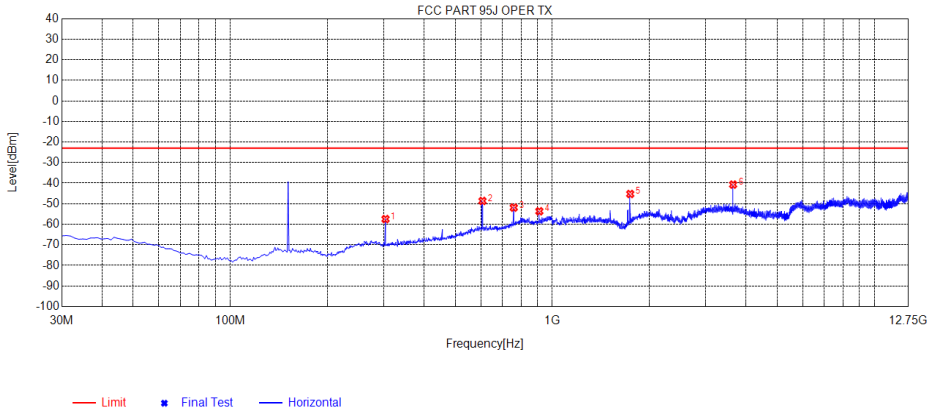


8.4 MEASUREMENT RESULTS

Preliminary calculation	Final Result
At least 50+10 log (P) =50+10log (2) =53.01dB)	Limit=P- Preliminary calculation=33.01-53.01=-20 dBm
At least 43+10 log (P) =43+10log (2) =46.01 (dB)	Limit=P- Preliminary calculation=33.01-46.01=-13 dBm

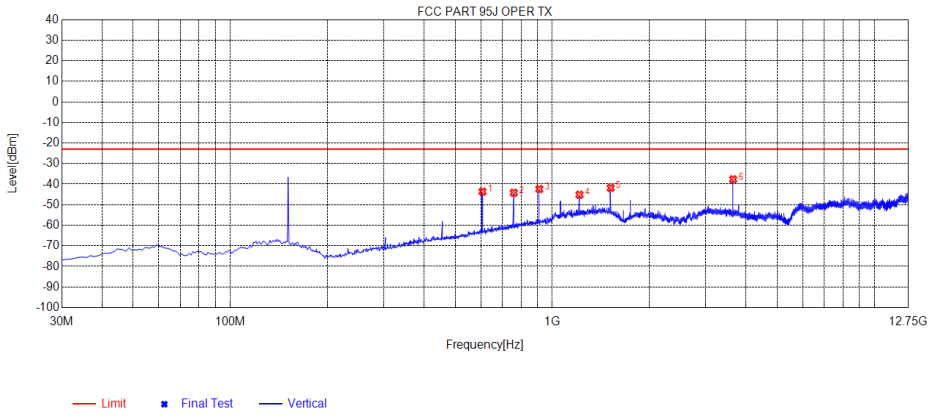
Note:
1. Factor=Antenna Factor + Cable loss. (Below 1GHz)
2. Factor=Antenna Factor+ Cable loss -Pre-amplifier. (Above 1 GHz)
3. Margin=Limit- Level

Test Mode:	TX:151.88MHz	Polarity:	Horizontal



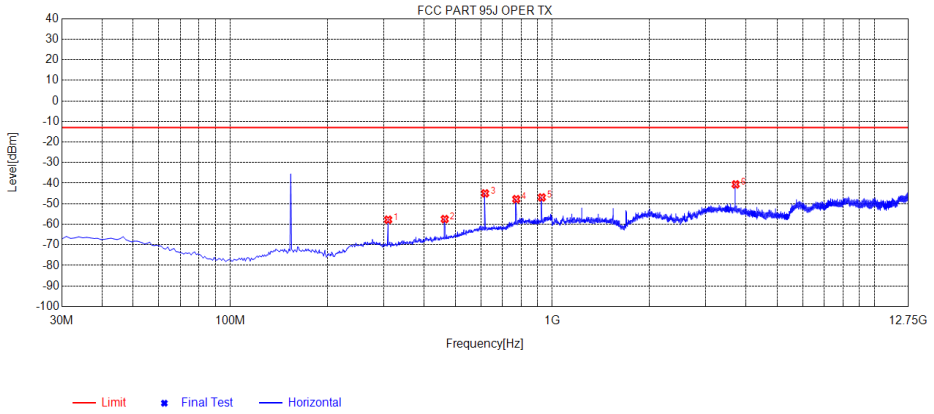
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	303.5400	-89.51	-57.46	-20.00	37.46	32.05	120	Horizontal
2	607.1500	-88.53	-48.66	-20.00	28.66	39.87	288	Horizontal
3	759.4400	-93.97	-51.89	-20.00	31.89	42.08	9	Horizontal
4	911.7300	-96.86	-53.67	-20.00	33.67	43.19	214	Horizontal
5	1746.1996	-43.89	-45.26	-20.00	25.26	-1.37	344	Horizontal
6	3644.0144	-45.04	-40.70	-20.00	20.70	4.34	316	Horizontal

Test Mode:	TX:151.88MHz	Polarity:	Vertical



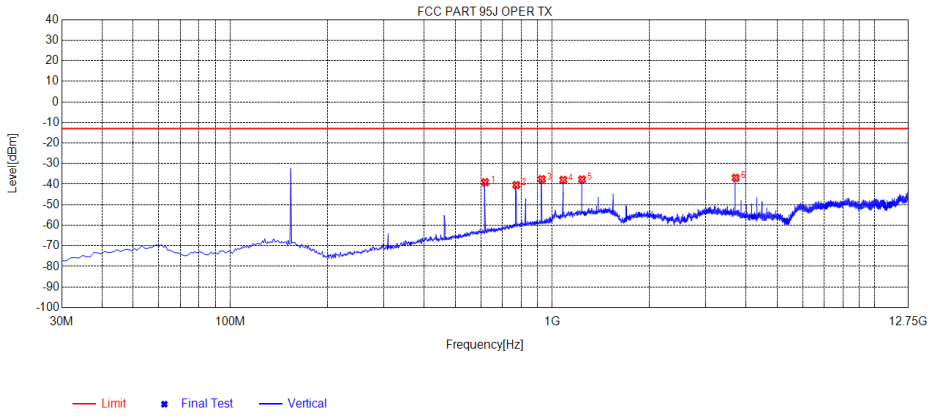
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	607.1500	-82.48	-43.64	-20.00	23.64	38.84	36	Vertical
2	759.4400	-85.78	-44.18	-20.00	24.18	41.60	0	Vertical
3	911.7300	-85.79	-42.36	-20.00	22.36	43.43	240	Vertical
4	1215.0465	-45.40	-45.13	-20.00	25.13	0.27	359	Vertical
5	1518.2268	-43.93	-41.83	-20.00	21.83	2.10	147	Vertical
6	3644.0144	-40.82	-37.69	-20.00	17.69	3.13	342	Vertical

Test Mode:	TX:.154.570MHz	Polarity:	Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	309.3600	-89.96	-57.77	-20.00	37.77	32.19	279	Horizontal
2	463.5900	-93.11	-57.48	-20.00	37.48	35.63	140	Horizontal
3	618.7900	-84.87	-44.97	-20.00	24.97	39.90	279	Horizontal
4	773.0200	-90.31	-47.78	-20.00	27.78	42.53	325	Horizontal
5	928.2200	-90.51	-46.96	-20.00	26.96	43.55	130	Horizontal
6	3710.9961	-45.03	-40.61	-20.00	20.61	4.42	288	Horizontal

Test Mode:	TX:154.570MHz	Polarity:	Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	618.7900	-78.10	-39.06	-20.00	19.06	39.04	11	Vertical
2	773.0200	-82.30	-40.44	-20.00	20.44	41.86	216	Vertical
3	928.2200	-81.19	-37.59	-20.00	17.59	43.60	179	Vertical
4	1082.2582	-37.33	-37.94	-20.00	17.94	-0.61	160	Vertical
5	1237.3737	-38.15	-37.73	-20.00	17.73	0.42	48	Vertical
6	3710.9961	-40.11	-36.95	-20.00	16.95	3.16	332	Vertical

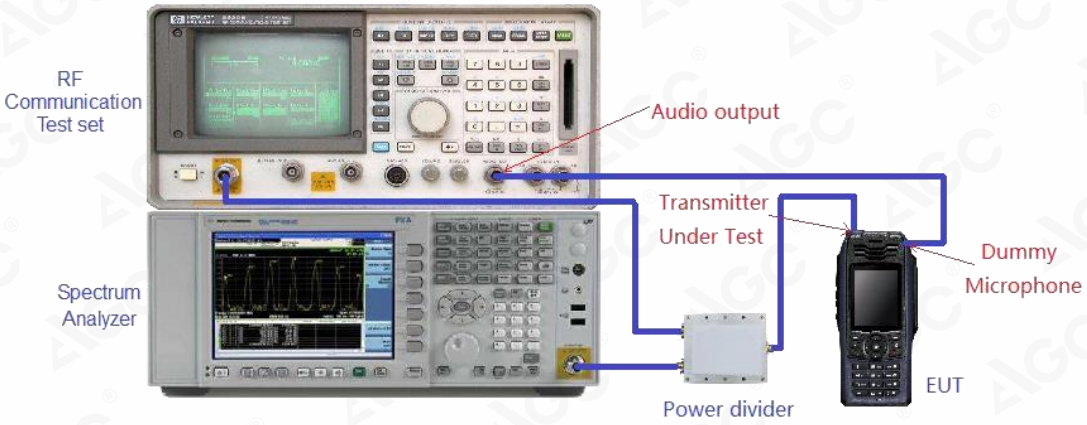
8.5 EMISSION MASK PLOT

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

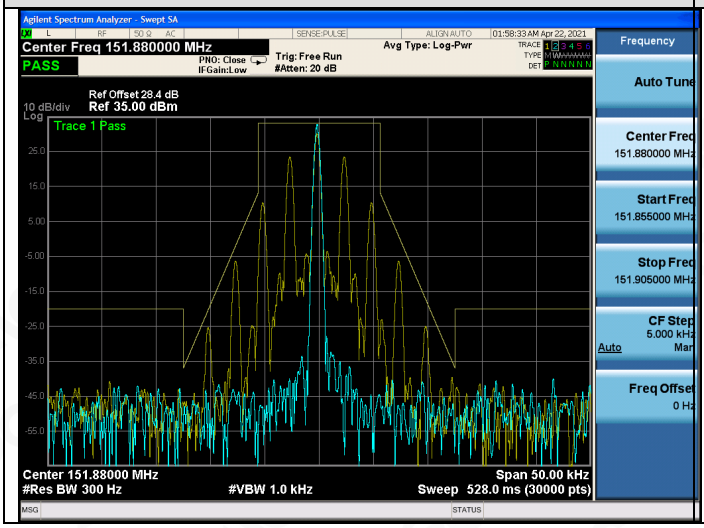
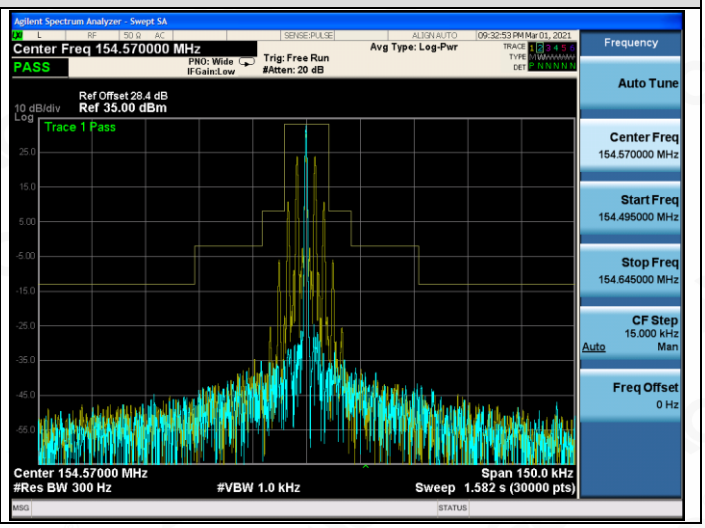
-Connect the equipment as illustrated.

-Spectrum set as follow:

1. Centre frequency = fundamental frequency, Span=50kHz for 12.5kHz and 25kHz channel spacing, RBW=300Hz, VBW=1000Hz, 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 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 @ 151.880MHz-2W	Emission Mask @ 154.570MHz-2W
	

9. MAXIMUMN TRANSMITTER POWER

9.1 PROVISIONS APPLICABLE

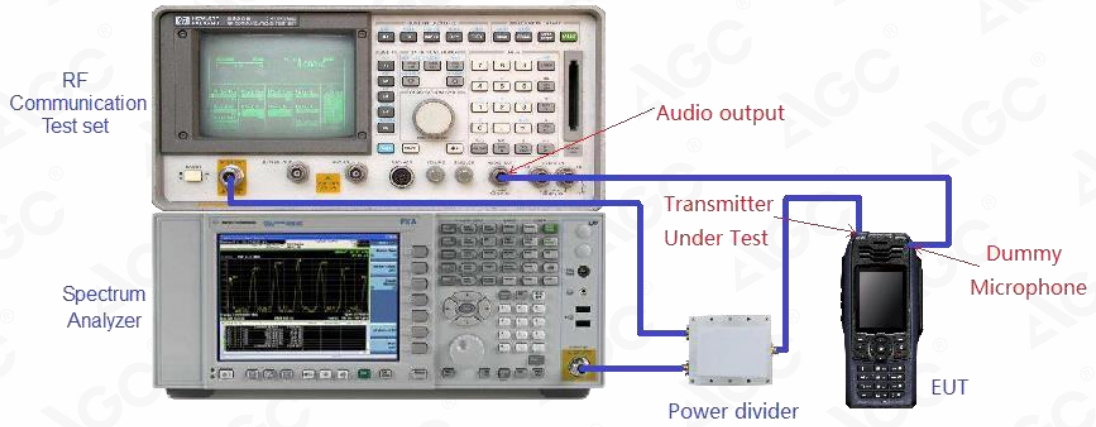
Standard Applicable [Part 95.2767], Each MURS transmitter type must be designed such that the transmitter power output does not exceed 2 Watts under normal operating conditions.

9.2 MEASUREMENT METHOD

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

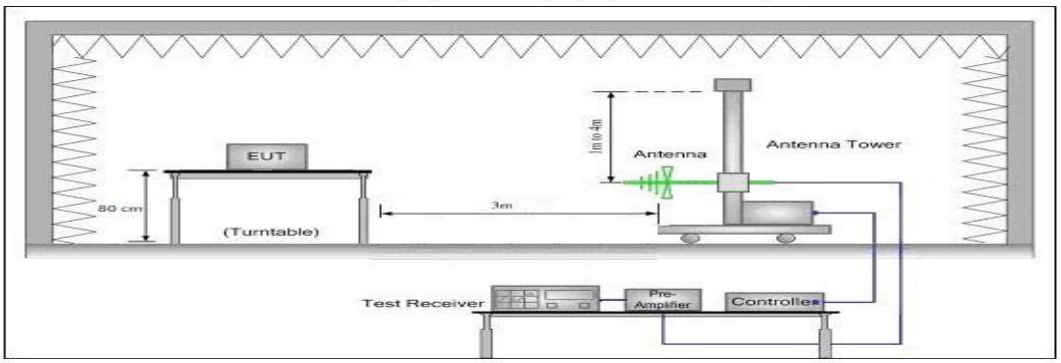
9.3 MEASUREMENT SETUP

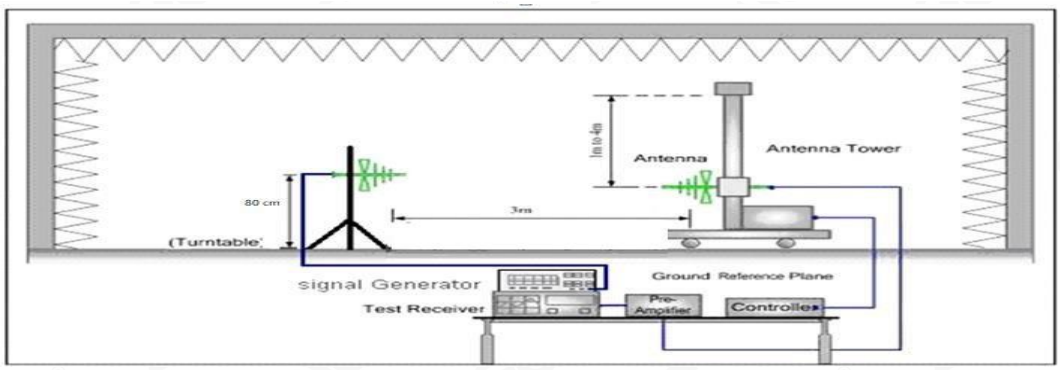
CONDUCTED OUTPUT POWER:



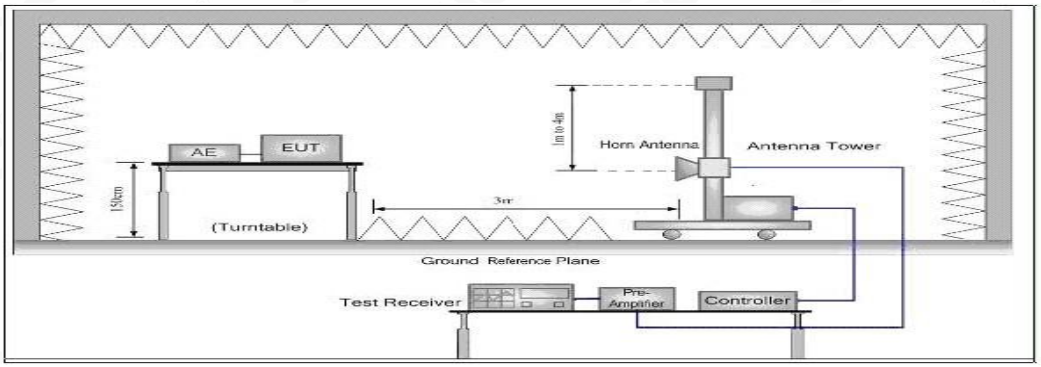
EFFECTIVE RADIATED POWER:

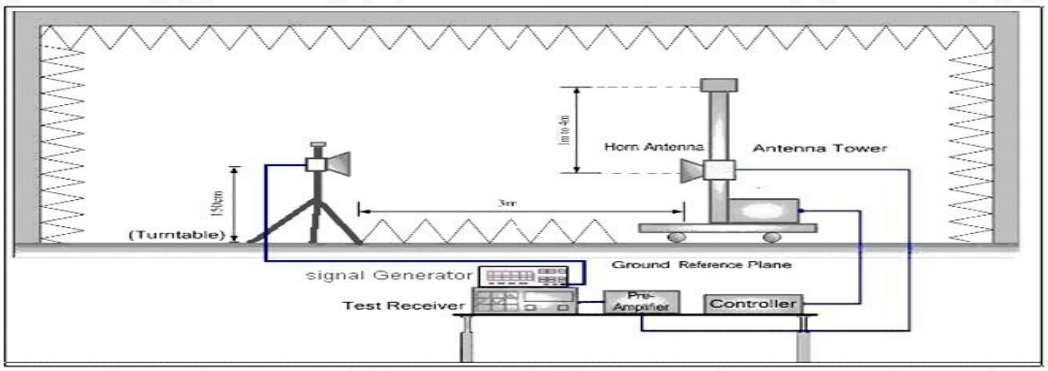
Radiated Below1GHz





Radiated Above 1 GHz





9.4 MEASUREMENT RESULTS

The maximum Power (CP) for VHF is
Analog: 2W for 12.5 KHz Channel Separation
Calculation Formula: CP = R + A + L
***** Note:
CP: The final Conducted Power
R : The reading value from spectrum analyzer
A : The attenuation value of the used attenuator
L : The loss of all connection cables

Conducted Power Measurement Results			
Mode	Channel Separation	Test Channel	Measurement Result (dBm)
MURS TX	12.5 kHz	151.880MHz	32.087
		154.570MHz	32.067

10. SPURIOUS EMISSION ON ANTENNA PORT

10.1 PROVISIONS APPLICABLE

Please refer to FCC 47 CFR 2.1051, 2.1057, 95.2779 for specification details.
Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules § 95.2779	
Preliminary calculation	Final Result
At least 43+10 log (P)	Limit = -13 dBm
At least 50+10 log (P)	Limit = -20 dBm

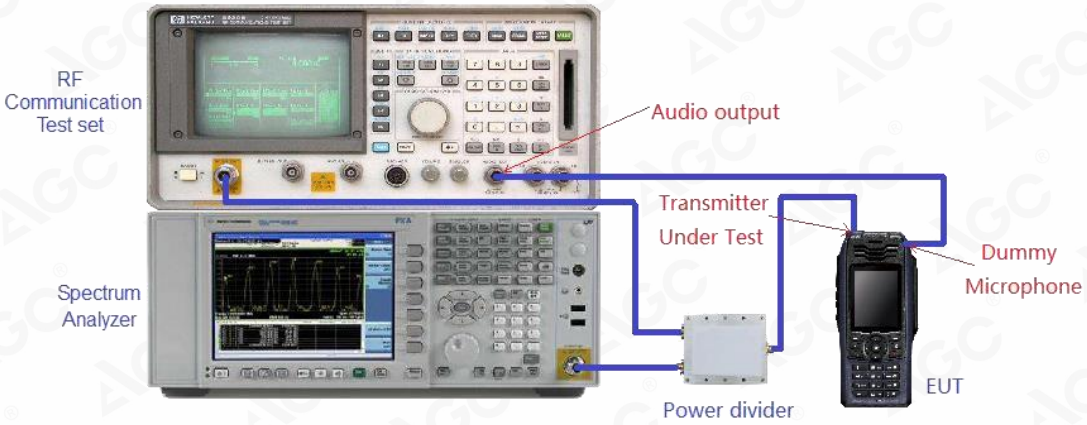
50 +10 log (Pwatts)
Note: In general, the worse case attenuation requirement shown above was applied.
Calculation: Limit (dBm) =EL-50-10log10 (TP)
EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P(dBm)
Limit (dBm) = P(dBm)-50-10 log (Pwatts) = -20dBm

43 + 10 log (Pwatts)
Calculation: Limit (dBm) =EL-43-10log10 (TP)
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P(dBm).
Limit (dBm) = P(dBm)-43-10 log (Pwatts) = -13 dBm

10.2 MEASUREMENT METHOD

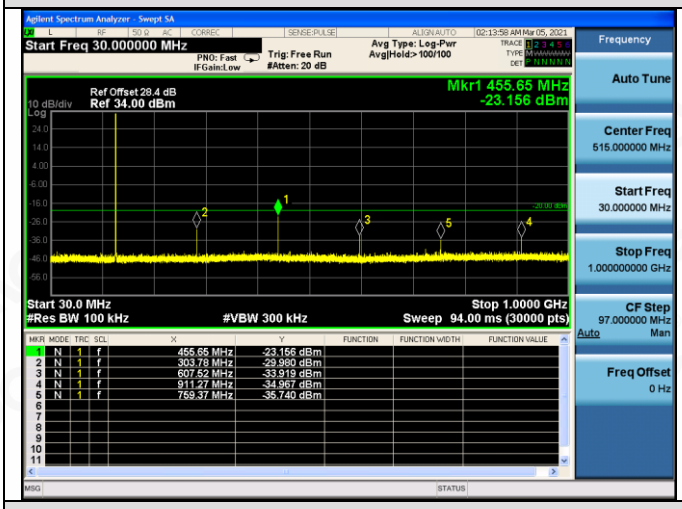
1. The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th . Harmonic for the lower and the highest frequency range.
3. 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.
4. The audio input was set the unmodulated carrier, the resulting picture is print out for each channel separation.

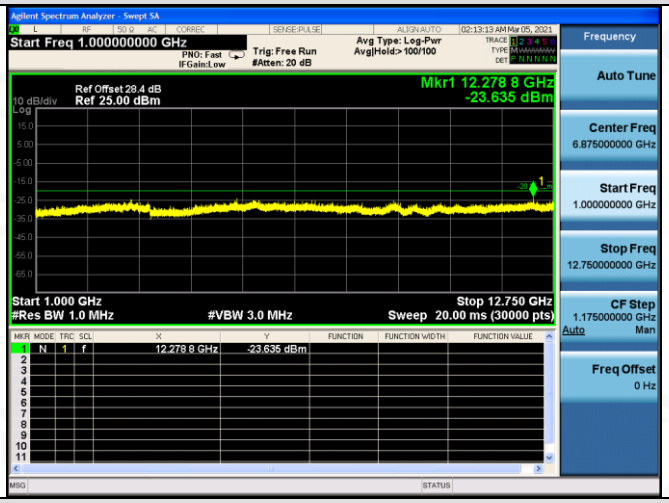
10.3 MEASUREMENT SETUP



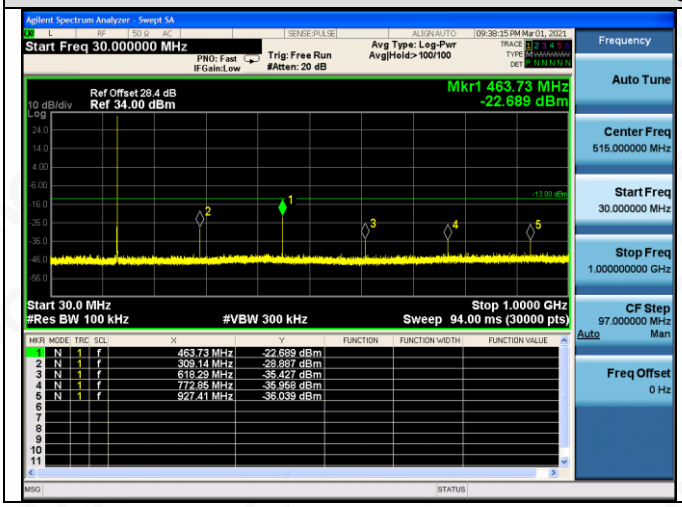
10.4 MEASUREMENT RESULTS

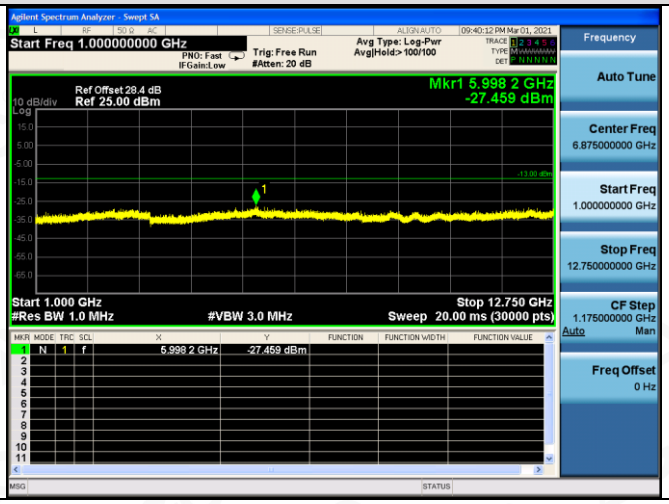
12.5kHz, FM modulation, Assigned Frequency:151.880MHz, 2W





12.5kHz, FM modulation, Assigned Frequency:154.570MHz, 2W





11. AUDIO LOW PASS FILTER RESPONSE

11.1 PROVISIONS APPLICABLE

§95.2775 MURS modulation requirements

Audio filter. Each MURS transmitter type must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of §95.2779 (without filtering).

a) The audio filter must be between the modulation limiter and the modulated stage of the transmitter.

b) At any frequency (f in kHz) between 3 and 15 kHz, the filter must have an attenuation of at least 40 log (f/3) dB more than the attenuation at 1 kHz. Above 15 kHz, it must have an attenuation of at least 28 dB more than the attenuation at 1 kHz.

11.2 MEASUREMENT METHOD

(1) The DUT transmitter output port was connected to Modulation Analyzer.

(2) Path loss for the measurement included.

(3) Press 23.1SPCL on modulation analyzer to enable the external LO from SIgen.

(4) Set the Sigen frequency to Fc + 1.5MHz, RF output level to 0dBm without modulation.

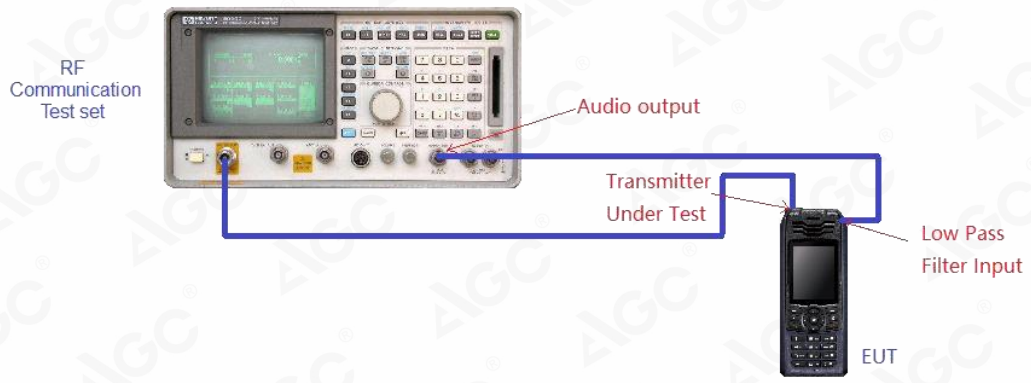
(5) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the maximum deviation.

(6) Up the amplitude by 20dB.

(7) On DSA, get the reference point to 0dB.

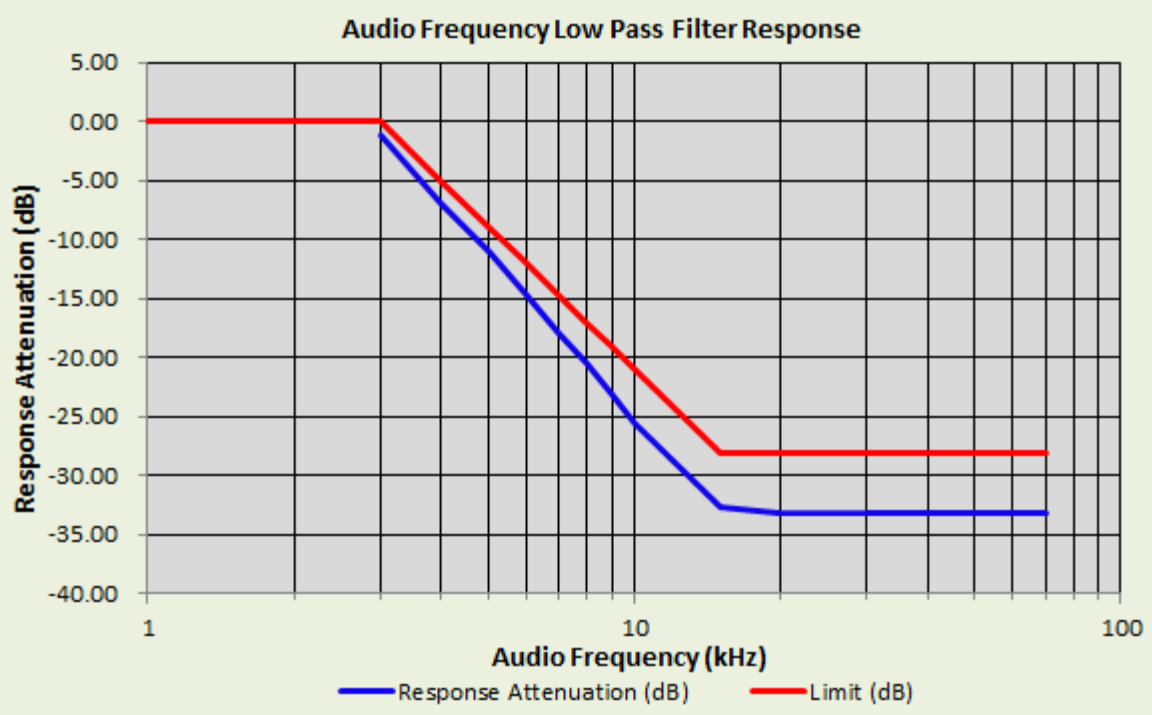
(8) Vary the frequency on audio analyzer from 3 kHz to 30 kHz, record the audio tone from DSA.

11.3 MEASUREMENT SETUP



11.4 MEASURET RESULTS

12.5kHz, FM modulation, Assigned Frequency:151.880MHz-2W		
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1	0	/
3	-1.16	0.00
4	-6.96	-5.00
5	-11.01	-8.87
6	-14.68	-12.04
7	-17.98	-14.72
8	-20.51	-17.04
9	-23.11	-19.08
10	-25.58	-20.92
15	-32.63	-28.00
20	-33.13	-28.00
30	-33.12	-28.00
50	-33.12	-28.00
70	-33.12	-28.00



Note: All the test frequencies was tested, but only the worst data be recorded in this part.

12.MODULATION CHARACTERISTICS

12.1 PROVISIONS APPLICABLE

According to FCC§2.1047 and §95.2771, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

12.2 MEASUREMENT METHOD

12.2.1 Modulation Limit

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

(2). Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

12.2.2 Audio Frequency Response

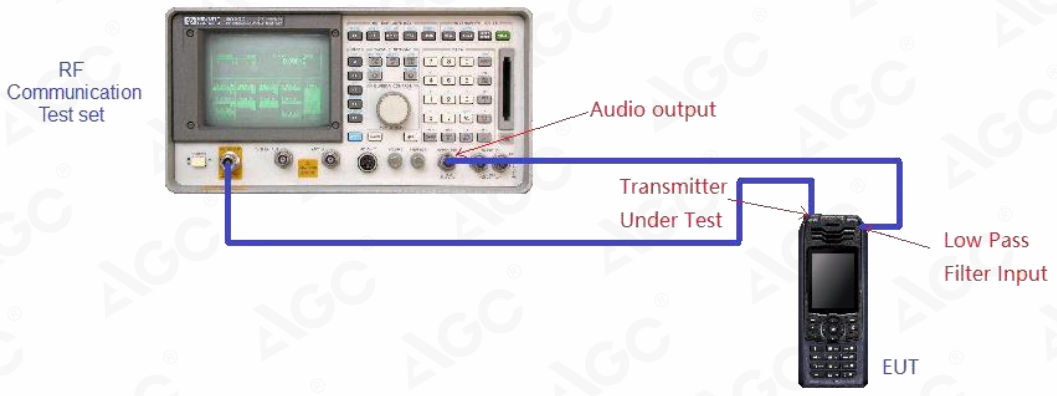
(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 kHz using this level as a reference (0 dB).

(3). Vary the Audio frequency from 100 Hz to 10 kHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 kHz reference).

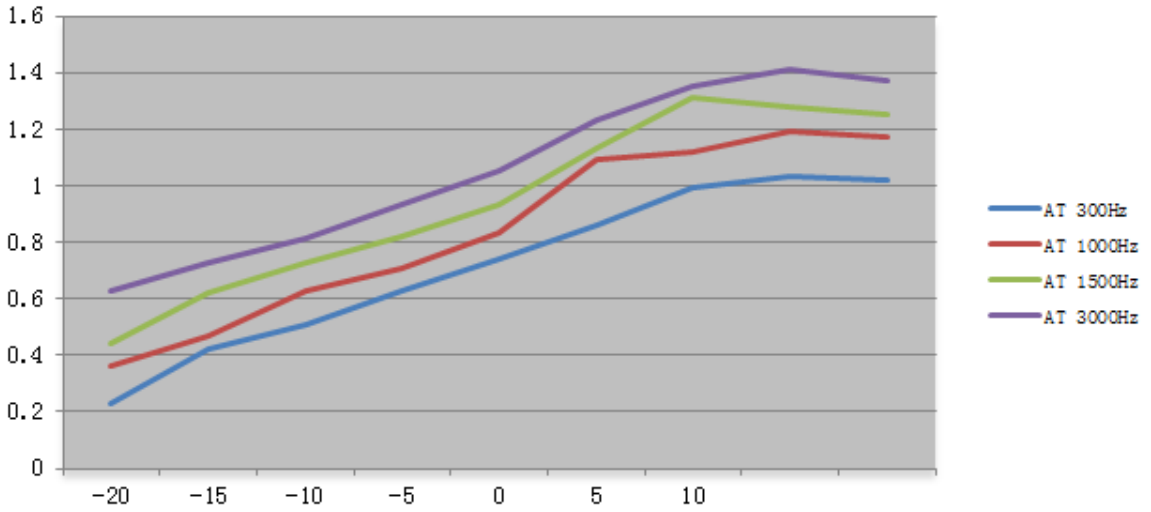
12.3 MEASUREMENT SETUP



12.4 MEASUREMENT RESULTS

(A). MODULATION LIMIT:

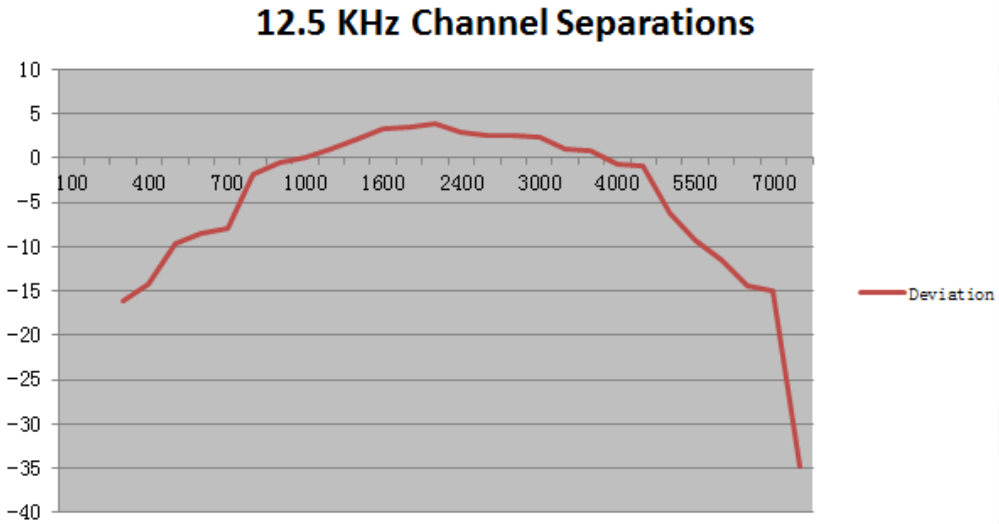
12.5kHz, FM modulation, Assigned Frequency:151.880MHz-2W				
Modulation Level (dB)	Peak Freq. Deviation At 300 Hz (kHz)	Peak Freq. Deviation At 1000 Hz (kHz)	Peak Freq. Deviation At 1500 Hz (kHz)	Peak Freq. Deviation At 3000 Hz (kHz)
-20	0.23	0.36	0.44	0.63
-15	0.42	0.47	0.62	0.73
-10	0.51	0.63	0.73	0.81
-5	0.63	0.71	0.82	0.93
0	0.74	0.83	0.93	1.05
+5	0.86	1.09	1.13	1.23
+10	0.99	1.12	1.31	1.35
+15	1.03	1.19	1.28	1.41
+20	1.02	1.17	1.25	1.37



Note: All the modes had been tested, but only the worst data recorded in the report

(B). AUDIO FREQUENCY RESPONSE:

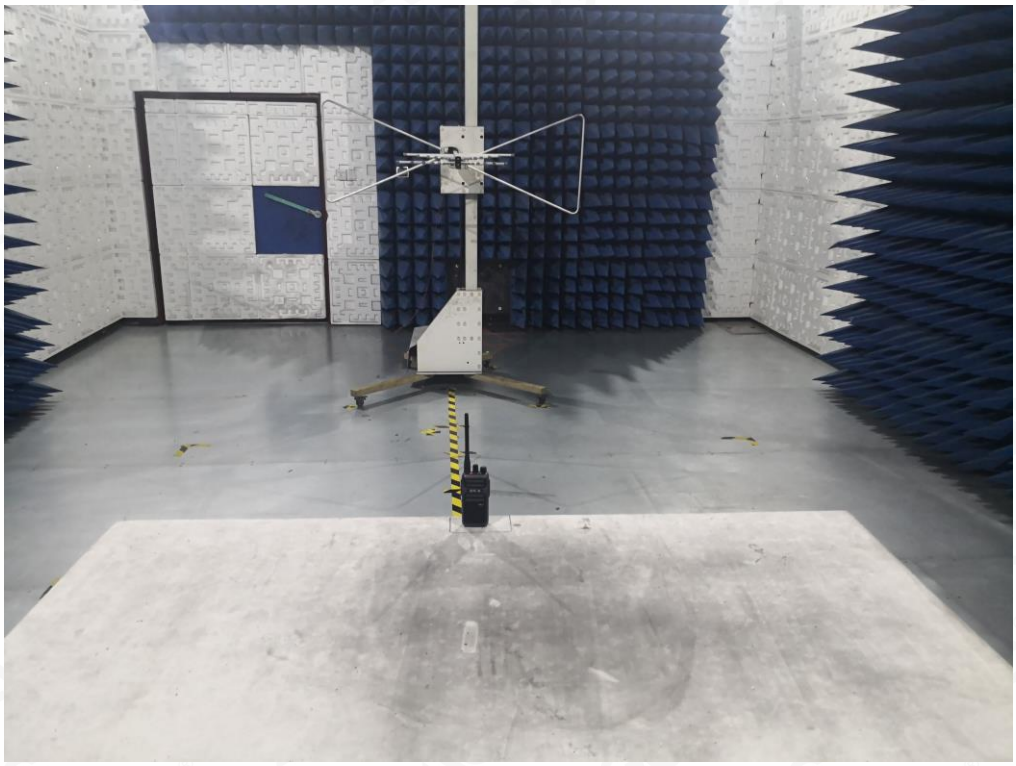
12.5kHz, Analog modulation, Assigned Frequency:151.880MHz-2W		
Frequency (Hz)	Deviation (kHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.43	-16.18
400	0.54	-14.20
500	0.91	-9.67
600	1.03	-8.59
700	1.12	-7.87
800	2.25	-1.81
900	2.63	-0.45
1000	2.77	0.00
1200	3.12	1.03
1400	3.53	2.11
1600	4.03	3.26
1800	4.15	3.51
2000	4.34	3.90
2400	3.86	2.88
2500	3.74	2.61
2800	3.69	2.49
3000	3.65	2.40
3200	3.13	1.06
3600	3.06	0.86
4000	2.54	-0.75
4500	2.49	-0.93
5000	1.35	-6.24
5500	0.96	-9.20
6000	0.74	-11.46
6500	0.53	-14.36
7000	0.49	-15.05
7500	0.05	-34.87



Note: All the modes had been tested, but only the worst data recorded in the report.

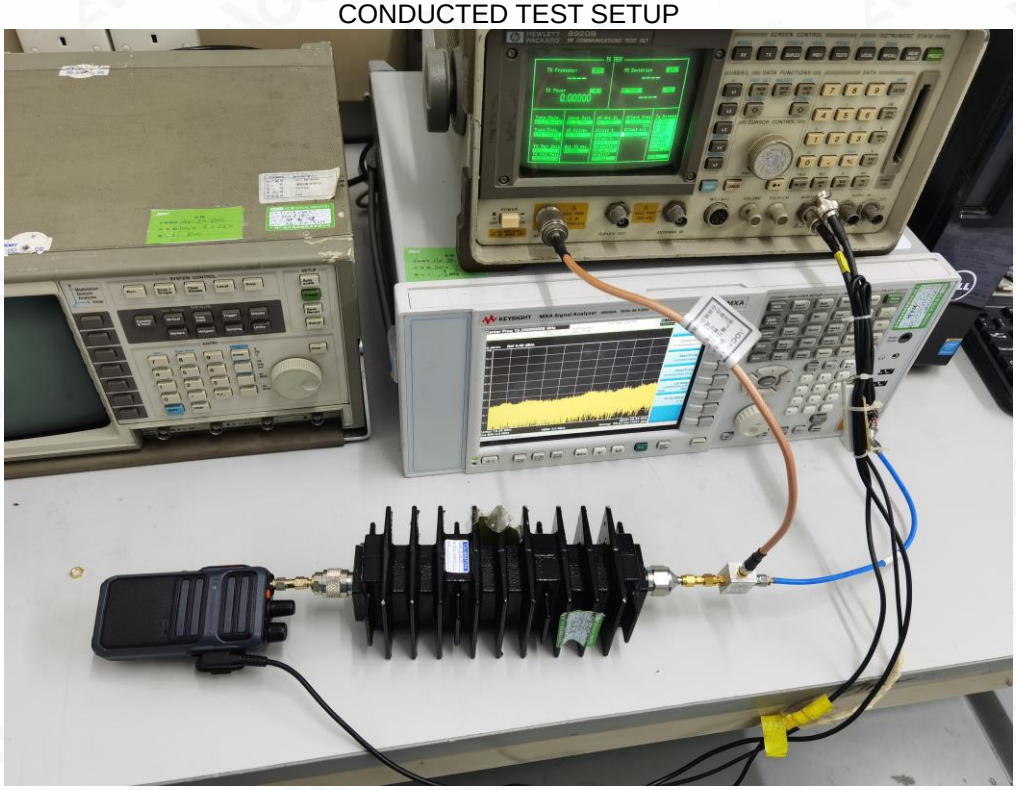
APPENDIX I: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP

CONDUCTED TEST SETUP



APPENDIX II: PHOTOGRAPHS OF TEST EUT

Refer to the Report No.: AGC03393210201AP01

-----END OF REPORT-----

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.