FCC Test Report

Report No.: AGC15705230888FR01

FCC ID	:	2BCOJ-MQ-21
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Wrist-shaped animal-shaped walkie-talkie
BRAND NAME	:	N/A
MODEL NAME	:	MQ-21
APPLICANT	:	QICHUANG TOYS FACTORY
DATE OF ISSUE	:	Sep. 13, 2023
STANDARD(S)	:	FCC Part 95 Subpart B
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 13, 2023	Valid	Initial Release

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1. General Information

Applicant	QICHUANG TOYS FACTORY
Address	5th Floor, NO.12 GouQian Road,XiaJiao JiaoNei Industrial Zone, ChengHua Street, ChengHai District, Shantou City,China
Manufacturer	QICHUANG TOYS FACTORY
Address	5th Floor, NO.12 GouQian Road,XiaJiao JiaoNei Industrial Zone, ChengHua Street, ChengHai District, Shantou City,China
Factory	QICHUANG TOYS FACTORY
Address	5th Floor, NO.12 GouQian Road,XiaJiao JiaoNei Industrial Zone, ChengHua Street, ChengHai District, Shantou City,China
Product Designation	Wrist-shaped animal-shaped walkie-talkie
Brand Name	N/A
Test Model	MQ-21
Date of receipt of test item	Aug. 28, 2023
Date of Test	Aug. 28, 2023~Sep. 13, 2023
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-FRS-V1

Note:The test results of this report relate only to the tested sample identified in this report.

Prepared By	Bibo Zhang (Project Engineer)	Sep. 13, 2023
Reviewed By	Calvin Liu (Reviewer)	Sep. 13, 2023
Approved By	Max Zhang Authorized Officer	Sep. 13, 2023

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2. Product Information

2.1 Product Technical Description

Communication Type	Voice / Tone only
Operation Frequency Range	462.5625 - 462.6125MHz
Hardware Version	V1.0
Software Version	V1.0
Modulation Type	FM
Channel Separation	12.5 kHz
Emission Bandwidth	10.46 kHz
Emission Designator	11K0F3E
Number of Channels:	3Channels
Rated Output Power	0.5W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Maximum Transmitter Power	25.68dBm
Antenna Designation	Inseparable
Antenna Gain	3.0dBi
Frequency Tolerance	1.099ppm
Power Supply	DC 4.5V

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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

Operation Frequency Each of Channel	
FRS	
Channel	Frequency
1	462.5625 MHz
2	462.5875 MHz
3	462.6125 MHz

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2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: **2BCOJ-MQ-21,** 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.

2.6 Special Accessories

Not available for this EUT intended for grant.

2.7 Equipment Modifications

Not available for this EUT intended for grant.

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2.8 Antenna Requirement

Excerpt from §95.587 of the FCC Rules/Regulations:

The antenna of each FRS transmitter type must meet the following requirements.
(1) The antenna must be a non-removable integral part of the FRS transmitter type.
(2) The gain of the antenna must not exceed that of a half-wave dipole antenna.
(3) The antenna must be designed such that the electric field of the emitted waves is vertically polarized when the unit is operated in the normal orientation.

- The antenna of this device is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion: The unit complies with the requirement of §95.587.

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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 follow 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 follow 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(CAB identifier: CN0063)

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.

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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 4.5V	LV DC 3.83V/HV DC 5.18V
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 %

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3.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E086	Spectrum Analyzer	KEYSIGHT	N9020A	MY53300860	2023-06-01	2024-05-31
☒	AGC-EM-E002	Wireless Connectivity Tester	HP	8920B	US35010106	2023-06-02	2024-06-01
☒	AGC-EM-A007	30dB Attenuator	Weinachel	58-30-33	ML030	2023-06-01	2024-05-31
☒	--	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	--	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2023-02-18	2024-02-17
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2023-06-01	2024-05-31
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2022-03-12	2024-03-11
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E005	Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	2023-01-05	2024-01-04
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2024-03-22
☒	AGC-EM-E102	Broadband Ridged Horn Antenna	ETS	3117	00154520	2023-06-03	2024-06-02
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03
☒	AGC-ER-E037	Signal Generator	Agilent	N5182A	MY50140530	2023-06-01	2024-05-31
☒	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☒	AGC-EM-A088	UHF Filter	N/A	N/A	N/A	2023-06-01	2024-05-31

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S011	RSE Test System	Tonscend	TS^+ Ver2.1(JS36-RSE)	4.0.0.0

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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

No.	Equipment	Model No.	Specification Information	Note
1	Battery	N/A	DC 1.5V(AAA)*3	Test Peripheral

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Specification Information	Note
1	Wrist-shaped animal-shaped walkie-talkie	MQ-21	DC 4.5V	EUT

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4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	FCC 47 CFR PART 95	Antenna Equipment	Pass
2	§ 95.567& 2.1046(a)	Maximum Transmitter Power	Pass
3	§95.575& 2.1047(a) (b)	Modulation Limit	Pass
4	§95.575& 2.1047(a)	Audio Frequency Response	Pass
5	§95.573	26dB Emission Bandwidth	Pass
6	§2.1049	99% Occupied Bandwidth	Pass
7	§95.579& 2.1049	Emission Mask	Pass
8	§95.565& 2.1055(a) (1)	Frequency Stability	Pass
9	§95.579& 2.1053	Spurious Radiated Emission	Pass

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5. Description of Test Modes

The EUT (**Wrist-shaped animal-shaped walkie-talkie**) has been tested under normal operating condition. (FRS TX) are chosen for testing at each channel separation.

No.	Test Mode Description	Channel Separation
1	FRS TX Channel 1	12.5 kHz
2	FRS TX Channel 2	12.5 kHz
3	FRS TX Channel 3	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

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6.Frequency Stability

6.1 Provisions Applicable

Each FRS transmitter type must be designed such that the carrier frequencies remain within ±2.5 parts-per-million (ppm) of the channel center frequencies specified in §95.563 during normal operating conditions.

6.2 Measurement Procedure

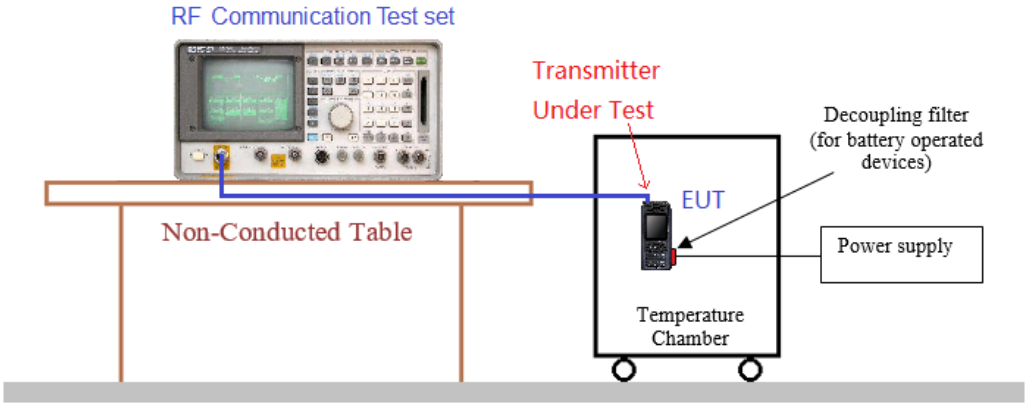
6.2.1 Frequency stability versus environmental temperature

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 4.5V.
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



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6.4 Measurement Results

12.5 kHz Channel Separation, FM modulation, Assigned Frequency For FRS						
Test conditions		Frequency error (ppm)			Limit (ppm)	Result
Voltage (V)	Temp (℃)	Test Frequency (MHz)				
		462.5625	462.5875	462.6125		
4.50	-30	0.774	0.653	1.099	2.5	Pass
	-20	1.025	0.556	0.962		
	-10	1.033	0.956	1.084		
	0	0.779	0.660	0.849		
	10	0.769	0.578	0.895		
	20	0.766	0.502	0.776		
	30	0.635	0.529	0.762		
	40	0.651	1.025	1.045		
	50	0.920	0.901	0.855		
5.18	20	1.018	1.059	0.880		
3.83	20	0.993	0.648	0.685		

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7. Emission Bandwidth and 99% Occupied Bandwidth

7.1 Provisions Applicable

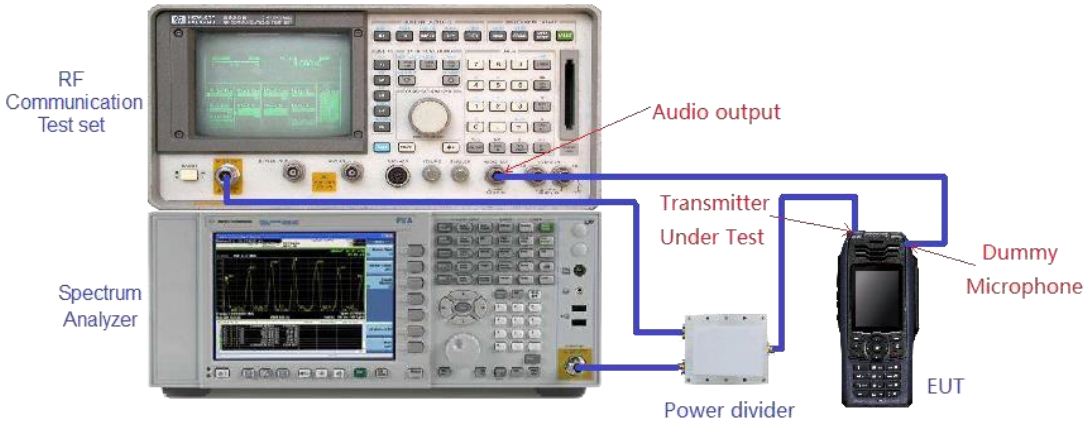
FCC Part 95.573: FRS: The authorized bandwidth for an FRS unit is 12.5 kHz.

Occupied Bandwidth (Section 2.1049, 95.573): 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.
2. Rated system deviation is 2.5 kHz for 12.5kHz channel spacing).
3. Spectrum set as follow:
4. Centre Frequency = Fundamental Frequency,
5. Span=50kHz for 12.5kHz channel spacing, RBW=300Hz, VBW=1kHz, Sweep = Auto,
6. Detector Function = Peak, Trace = Max hold
7. Set 99% Occupied Bandwidth and 26dB Emission Bandwidth.
8. Measure and record the results in the test report.

7.3 Measurement Setup



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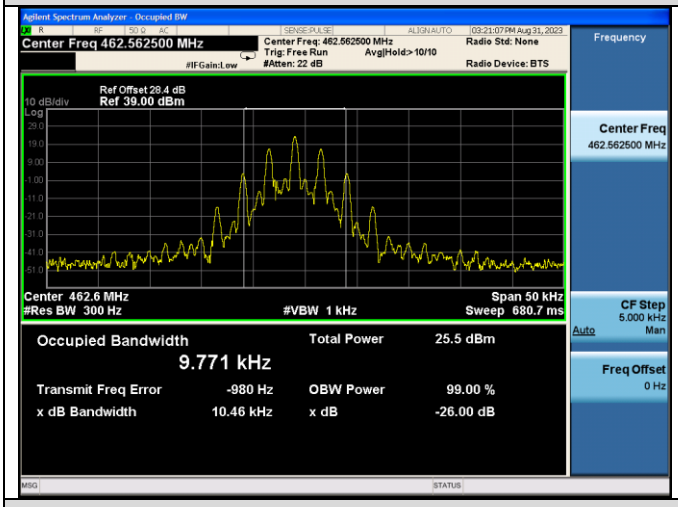
7.4 Measurement Results

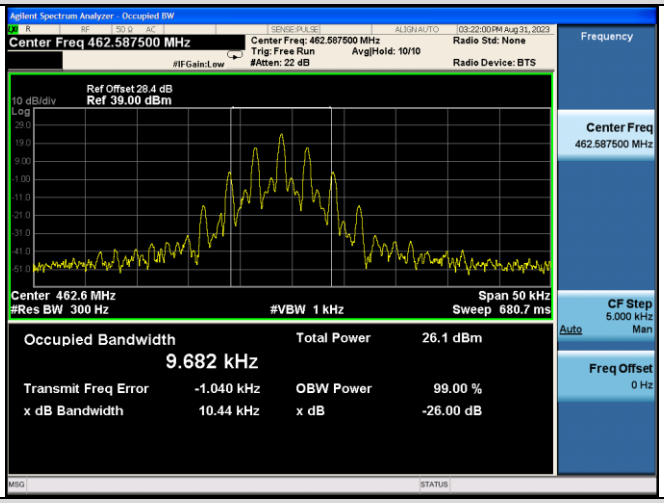
Emission Bandwidth Measurement Result-FRS				
Operating Frequency	12.5 kHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
462.5625 MHz	9.771 kHz	10.46 kHz	12.5 kHz	Pass
462.5875 MHz	9.682 kHz	10.44 kHz	12.5 kHz	Pass
462.6125 MHz	9.721 kHz	10.46 kHz	12.5 kHz	Pass

Test plot as follows:

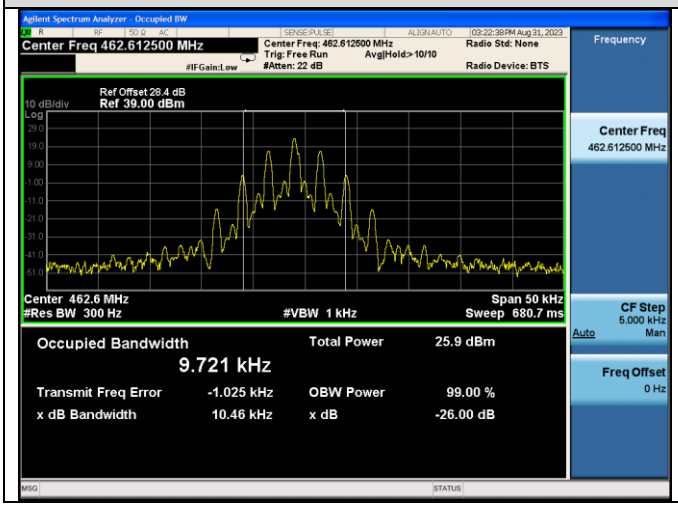
12.5kHz, FM Modulation:462.5625MHz



12.5kHz, FM Modulation:462.5875MHz



12.5kHz, FM Modulation:462.6125MHz



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8. Spurious Radiated Emission

8.1 Provisions Applicable

Standard Applicable [FCC Part 95.579] According to FCC section 95.579, the unwanted emission should be attenuated below TP by at least 43+10 log (Transmit Power) dB.

Each FRS transmitter type must be designed to satisfy the applicable unwanted emissions limits in this paragraph.

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

(1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.

(2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.

(3) 43 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 31.25 kHz

8.2 Measurement Procedure

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 (P_r).
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 (P_{Mea}) 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 (P_{Mea}) 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 (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (PAg) should be recorded after test

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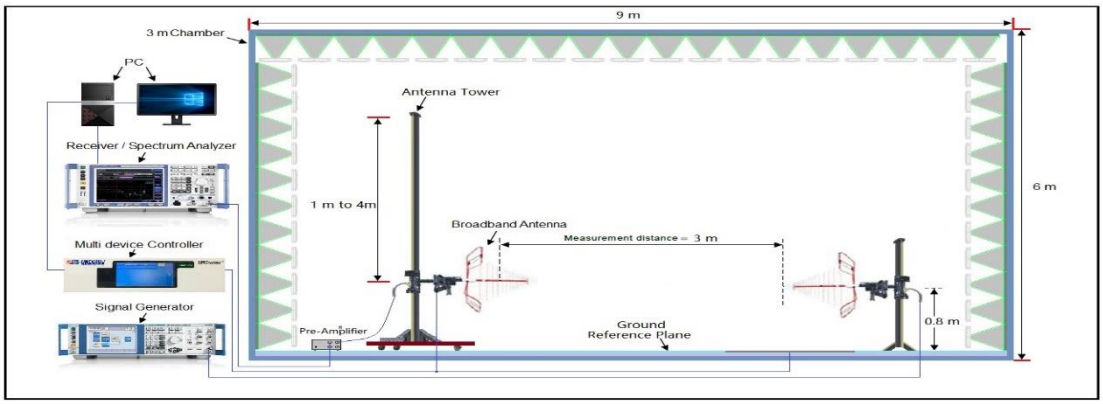
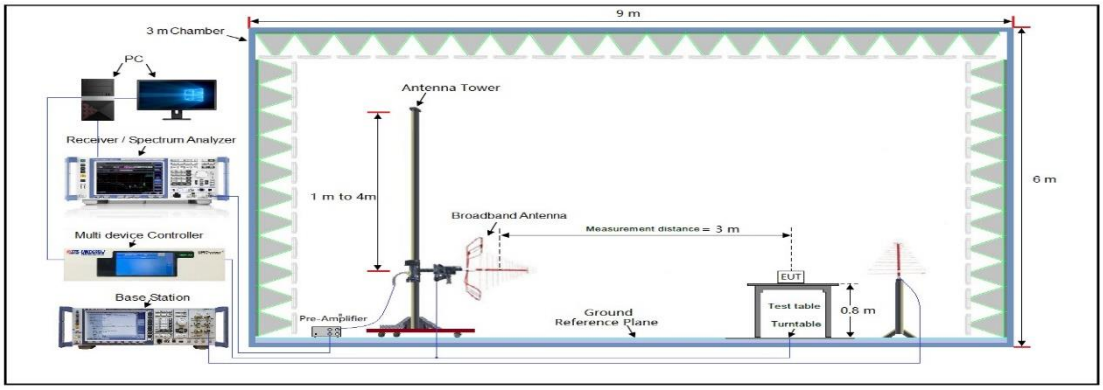
6) The measurement results are obtained as described below: Power(EIRP)=P_{Mea} - P_{Ag} - P_{cl} - G_a The measurement results are amend as described below: Power(EIRP)=P_{Mea} - P_{cl} - G_a
7) This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known 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

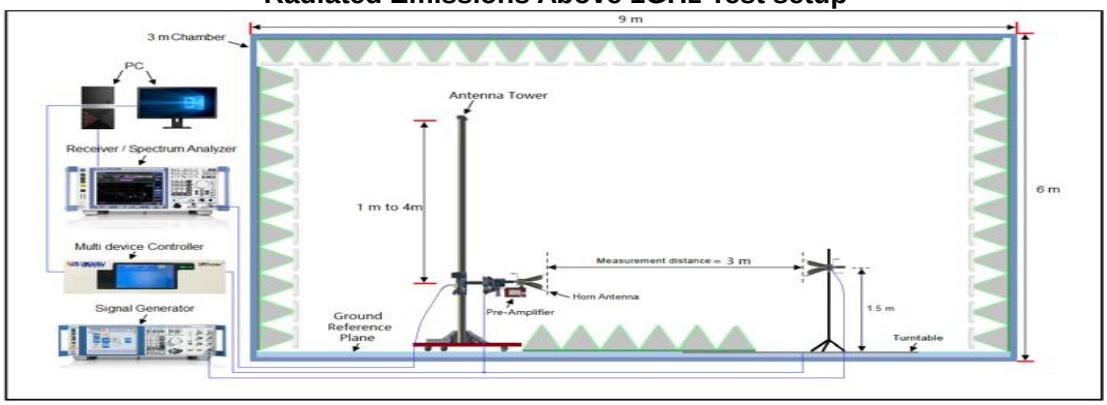
8.3 Measurement Setup

Radiated Emissions 30MHz to 1GHz Test setup





Radiated Emissions Above 1GHz Test setup



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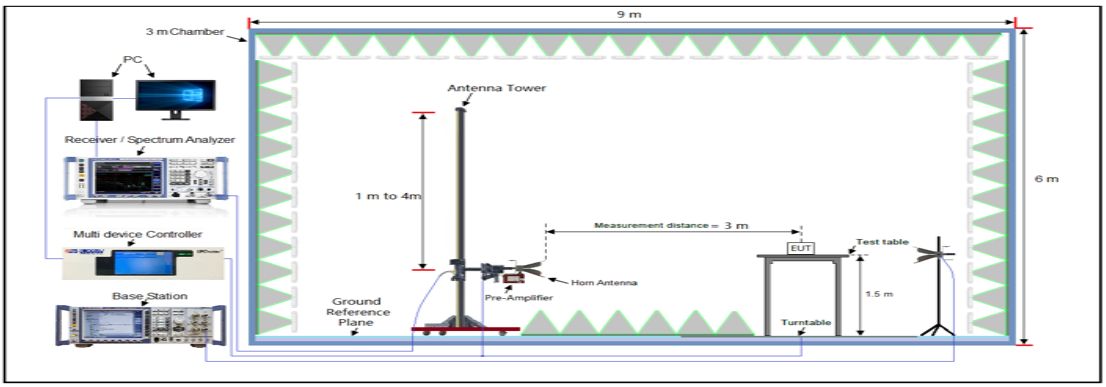

8.4 Measurement Results

Preliminary calculation	Final Result
At least 43+10 log (P) =43+10log (0.5) =39.99 (dB)	Limit=P- Preliminary calculation=26.99-39.99=-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

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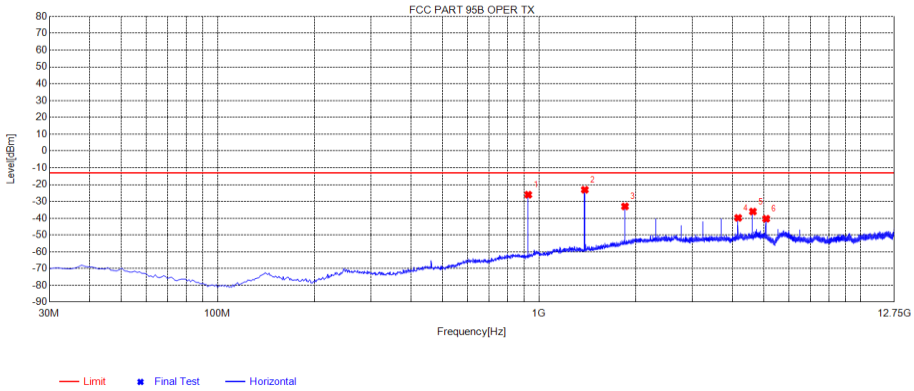
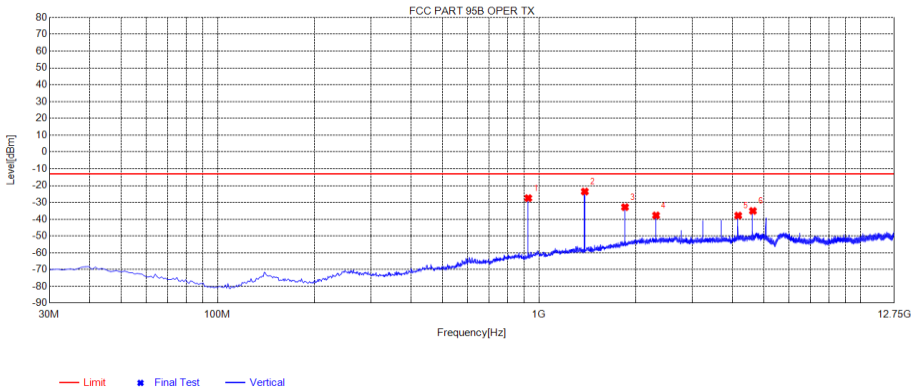
Test Mode:	TX-462.5625MHz	Polarity:	Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-65.60	-26.04	-13.00	13.04	39.56	265	Horizontal
2	1387.7888	-20.39	-23.09	-13.00	10.09	-2.70	237	Horizontal
3	1850.7851	-34.02	-32.97	-13.00	19.97	1.05	19	Horizontal
4	4163.4163	-45.45	-39.82	-13.00	26.82	5.63	275	Horizontal
5	4626.4126	-43.44	-36.05	-13.00	23.05	7.39	67	Horizontal
6	5088.2338	-48.61	-40.34	-13.00	27.34	8.27	171	Horizontal

Test Mode:	TX-462.5625MHz	Polarity:	Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-67.03	-27.47	-13.00	14.47	39.56	342	Vertical
2	1387.7888	-20.88	-23.58	-13.00	10.58	-2.70	1	Vertical
3	1850.7851	-33.87	-32.82	-13.00	19.82	1.05	9	Vertical
4	2312.6063	-41.10	-37.76	-13.00	24.76	3.34	47	Vertical
5	4163.4163	-43.48	-37.85	-13.00	24.85	5.63	245	Vertical
6	4626.4126	-42.48	-35.09	-13.00	22.09	7.39	9	Vertical

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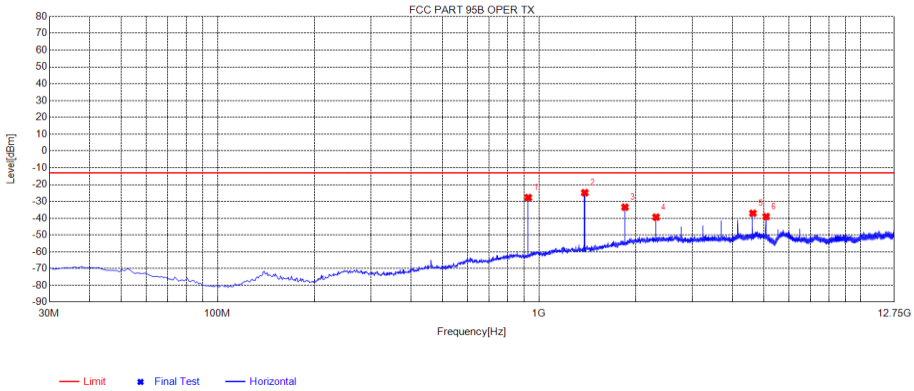
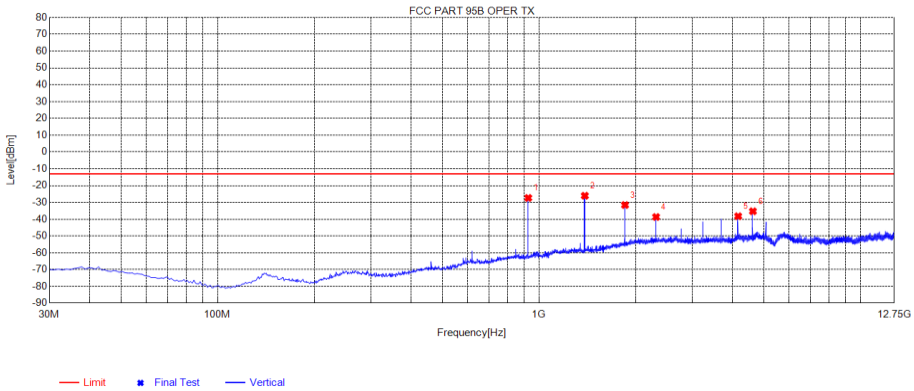
Test Mode:	TX-462.5875MHz	Polarity:	Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-67.31	-27.75	-13.00	14.75	39.56	115	Horizontal
2	1387.7888	-22.15	-24.85	-13.00	11.85	-2.70	201	Horizontal
3	1850.7851	-34.50	-33.45	-13.00	20.45	1.05	31	Horizontal
4	2312.6063	-42.73	-39.39	-13.00	26.39	3.34	12	Horizontal
5	4626.4126	-44.47	-37.08	-13.00	24.08	7.39	67	Horizontal
6	5088.2338	-47.32	-39.05	-13.00	26.05	8.27	181	Horizontal

Test Mode:	TX-462.5875MHz	Polarity:	Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-66.91	-27.35	-13.00	14.35	39.56	177	Vertical
2	1387.7888	-23.36	-26.06	-13.00	13.06	-2.70	9	Vertical
3	1850.7851	-32.61	-31.56	-13.00	18.56	1.05	360	Vertical
4	2312.6063	-42.05	-38.71	-13.00	25.71	3.34	327	Vertical
5	4163.4163	-43.87	-38.24	-13.00	25.24	5.63	253	Vertical
6	4626.4126	-42.70	-35.31	-13.00	22.31	7.39	9	Vertical

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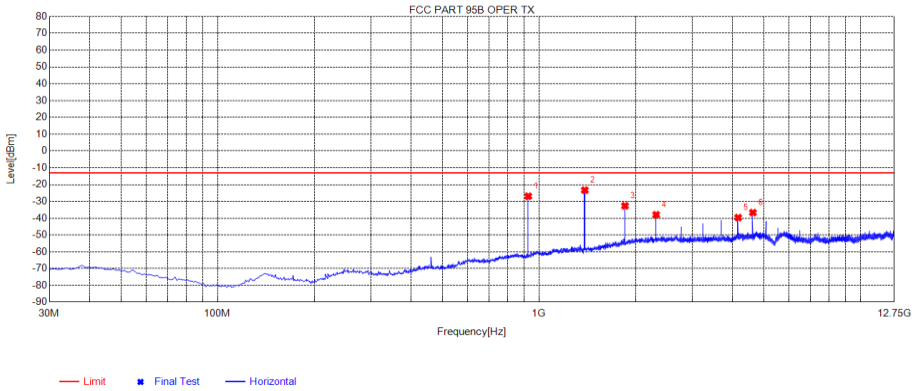
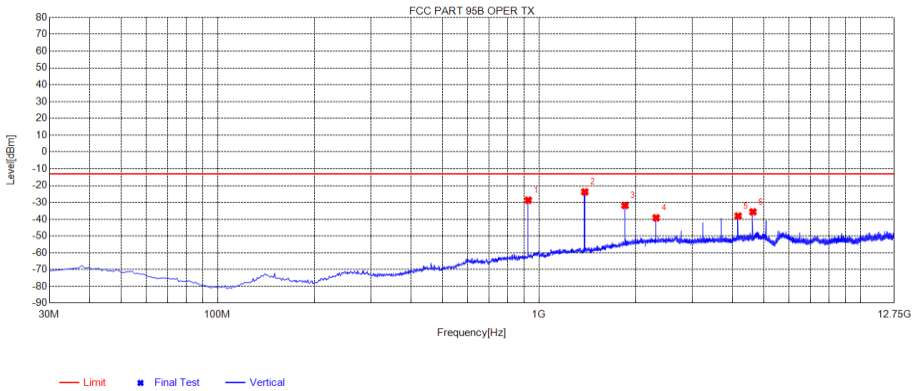
Test Mode:	TX-462.6125MHz	Polarity:	Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-66.48	-26.92	-13.00	13.92	39.56	259	Horizontal
2	1387.7888	-20.62	-23.32	-13.00	10.32	-2.70	241	Horizontal
3	1850.7851	-33.70	-32.65	-13.00	19.65	1.05	17	Horizontal
4	2313.7814	-41.29	-37.95	-13.00	24.95	3.34	359	Horizontal
5	4163.4163	-45.29	-39.66	-13.00	26.66	5.63	277	Horizontal
6	4626.4126	-44.05	-36.66	-13.00	23.66	7.39	61	Horizontal

Test Mode:	TX-462.6125MHz	Polarity:	Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	925.31	-68.28	-28.72	-13.00	15.72	39.56	157	Vertical
2	1387.7888	-21.06	-23.76	-13.00	10.76	-2.70	205	Vertical
3	1850.7851	-32.87	-31.82	-13.00	18.82	1.05	336	Vertical
4	2313.7814	-42.54	-39.20	-13.00	26.20	3.34	318	Vertical
5	4163.4163	-43.72	-38.09	-13.00	25.09	5.63	244	Vertical
6	4626.4126	-43.04	-35.65	-13.00	22.65	7.39	360	Vertical

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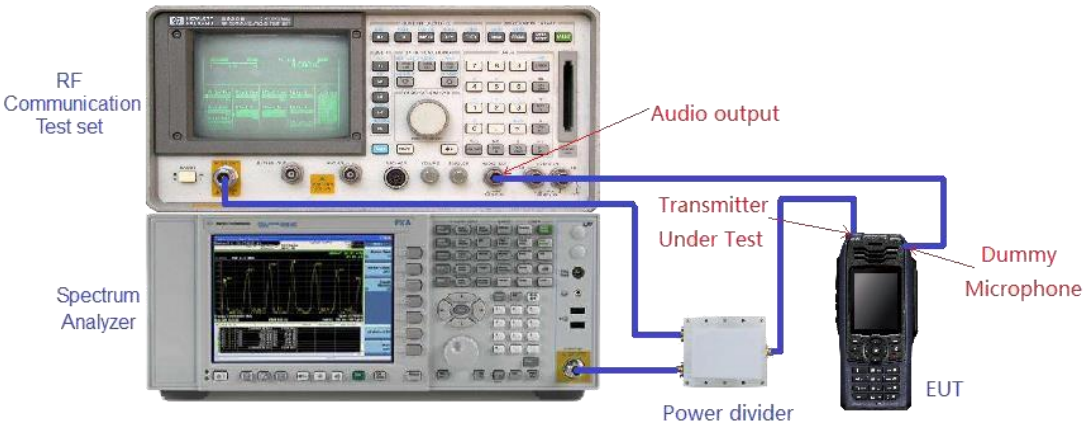
8.5 Emission Mask Measurement Part

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 , RBW=300Hz, VBW=1000Hz ;
2. Sweep = auto, Detector function = peak, Trace = max hold
3. 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.
4. 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.
5. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.
6. Measure and record the results in the test report.



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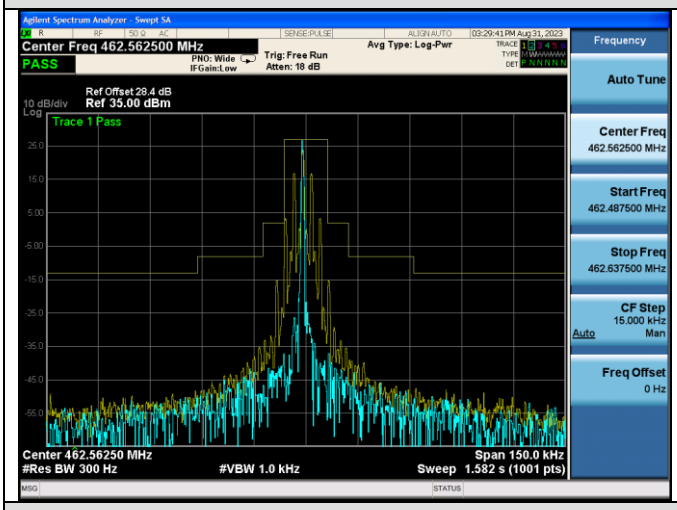
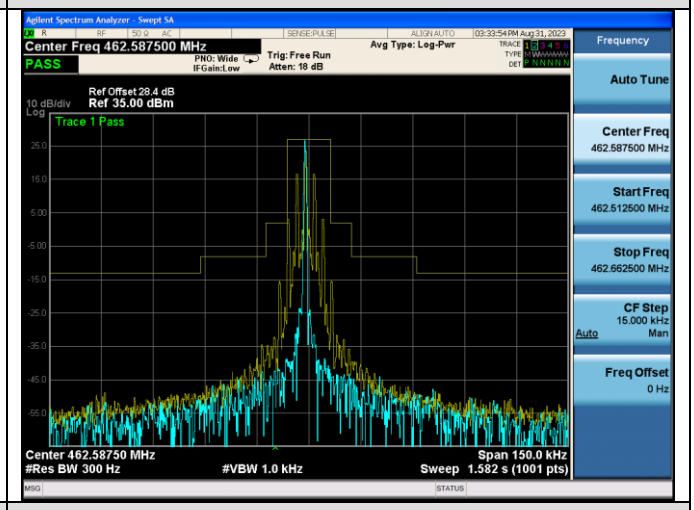
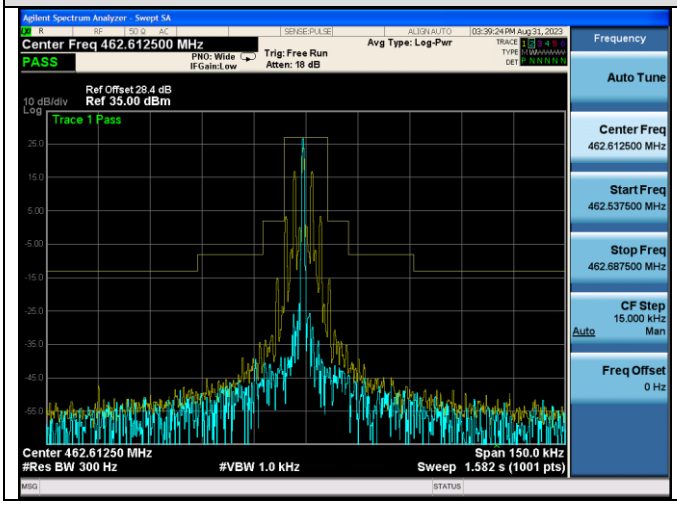
Test plot as follows:

Emission Mask @ 462.5625MHz	Emission Mask @ 462.5875MHz
	
Emission Mask @ 467.6500MHz	
	

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9. Maximum Transmitter Power

9.1 Provisions Applicable

Each FRS transmitter type must be designed such that the effective radiated power (ERP) on channels 8 through 14 does not exceed 0.5 Watts and the ERP on channels 1 through 7 and 15 through 22 does not exceed 2.0 Watts.

9.2 Measurement Procedure

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

☒Effective Radiated Power:

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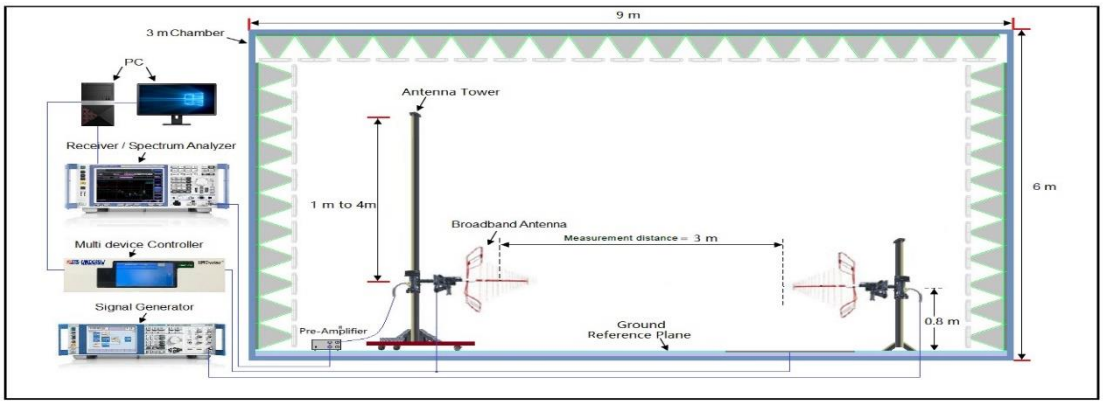
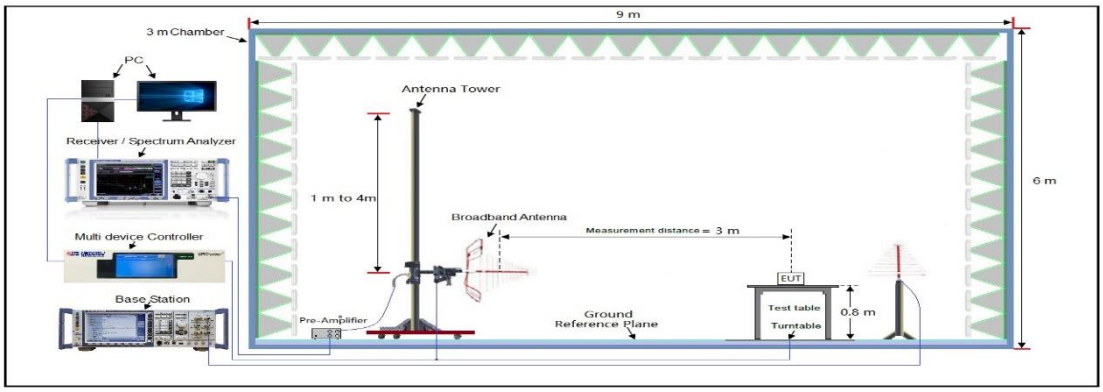
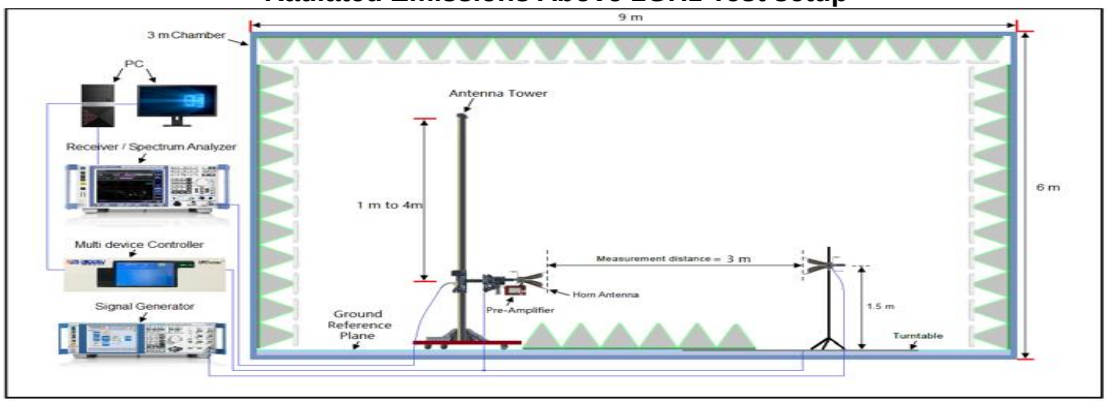
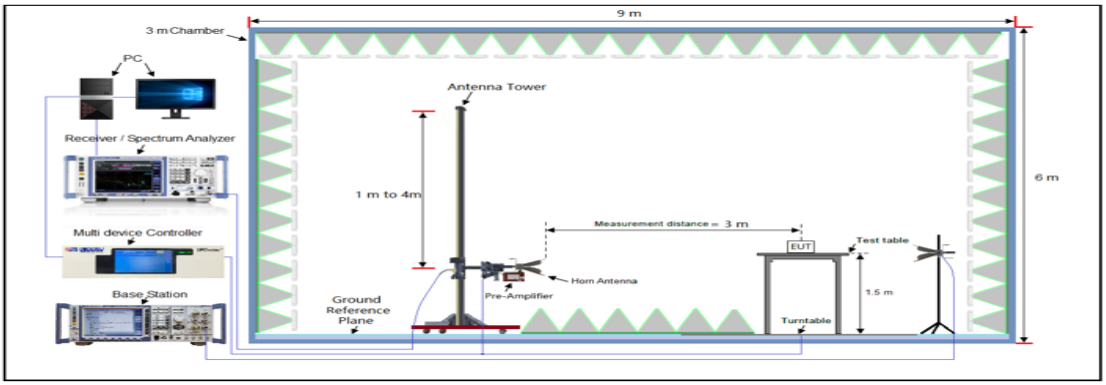
Radiated Emissions 30MHz to 1GHz Test setup





Radiated Emissions Above 1GHz Test setup





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9.4 Measurement Results

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	ERP Result	ERP Result	Limit	Margin
(MHz)	(dBuv/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(W)	(W)	(W)
ChannelSeparation:12.5kHz									
462.5625	94.66	V	19.46	0.38	6.6	**25.68**	0.37	2.0	1.63
462.5625	94.55	H	19.35	0.38	6.6	25.57	0.36	2.0	1.64
462.5875	94.51	V	19.31	0.38	6.6	25.53	0.36	2.0	1.64
462.5875	94.39	H	19.19	0.38	6.6	25.41	0.35	2.0	1.65
462.6125	94.60	V	19.40	0.38	6.6	25.62	0.36	2.0	1.64
462.6125	94.53	H	19.33	0.38	6.6	25.55	0.36	2.0	1.64

Note:

1. Calculation Formula: Emission Level(dBm) = S.G. (dBm)- Cable Loss(dB)+ Ant.Gain(dBi)
2. The Ant. Gain including the correct factor 2.15
3. Margin (dB) = Limit(dBm)- Emission Level(dBm)

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10.Modulation Characteristics

10.1 Provisions Applicable

According to FCC§2.1047 and §95.575, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

Each FRS transmitter type must be designed such that the peak frequency deviation does not exceed 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

10.2 Measurement Procedure

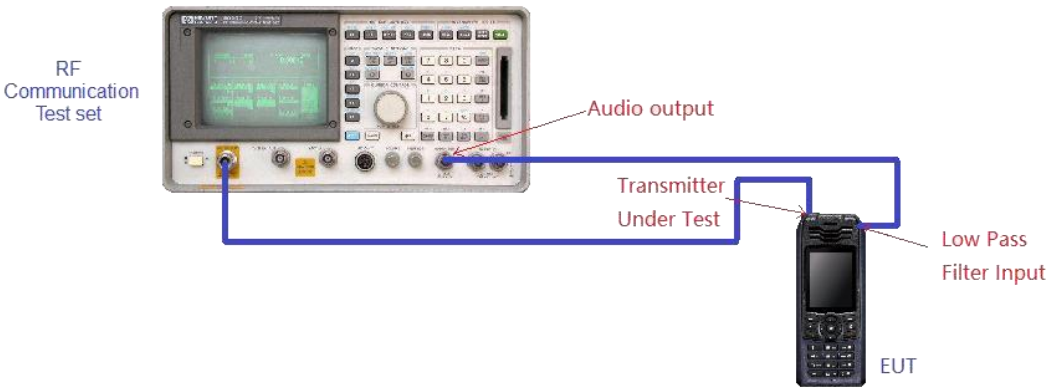
- **Modulation Limit**

1. Test layout and build equipment as shown below.
2. adjust the audio input for 60% of rated system deviation at 1kHz using this level as a reference (0dB).
3. Vary the input level from –20 to +20dB.
4. Record the frequency deviation obtained as a function of the input level.
5. Repeat step 2 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

- **Audio Frequency Response**

1. Test layout and build equipment as shown below.
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).

10.3 Measurement Setup



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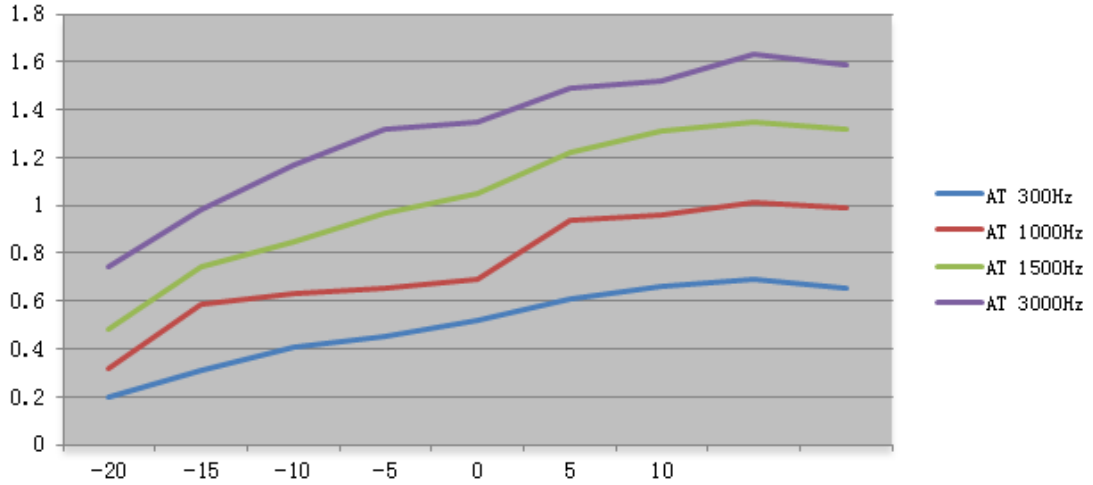
10.4 Measurement Results

A. Modulation Limit:

12.5kHz, FM modulation, Assigned Frequency:462.5875MHz				
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	0.20	0.32	0.48	0.74
-15	0.31	0.59	0.74	0.98
-10	0.41	0.63	0.85	1.17
-5	0.45	0.65	0.97	1.32
0	0.52	0.69	1.05	1.35
+5	0.61	0.94	1.22	1.49
+10	0.66	0.96	1.31	1.52
+15	0.69	1.01	1.35	1.63
+20	0.65	0.99	1.32	1.59



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

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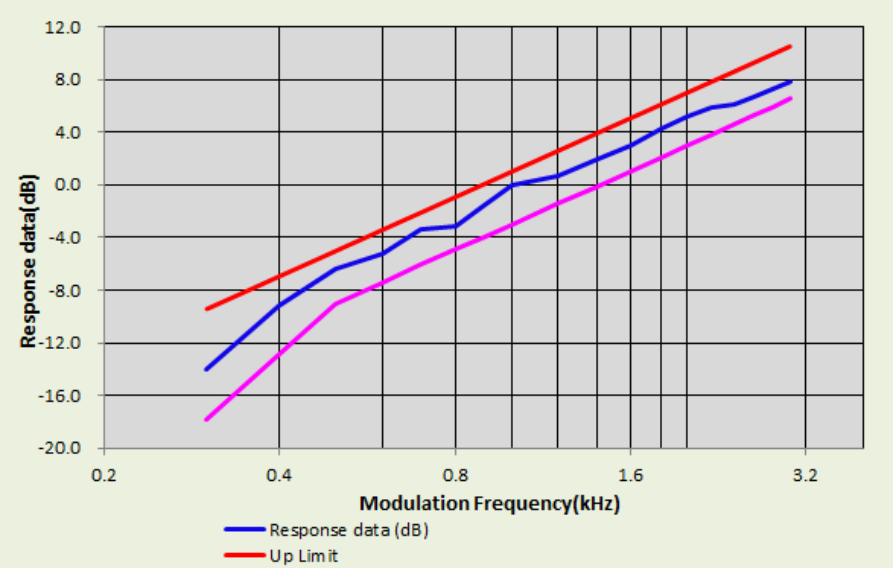
B. Audio Frequency Response:

12.5kHz, Analog modulation, Assigned Frequency:462.5875MHz		
Frequency (Hz)	Deviation (kHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.15	-13.98
400	0.26	-9.20
500	0.36	-6.38
600	0.41	-5.25
700	0.51	-3.35
800	0.52	-3.18
900	0.63	-1.51
1000	**0.75**	0.00
1200	0.81	0.67
1400	0.94	1.96
1600	1.05	2.92
1800	1.22	4.23
2000	1.36	5.17
2400	1.48	5.90
2500	1.51	6.08
2800	1.62	6.69
3000	1.74	7.31



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Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC15705230888AP01

Appendix Ii: Photographs of Test EUT

Refer to the Report No.: AGC15705230888AP02

-----End of Report-----

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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. 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.

5. 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.

6. 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.

7.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.

8. 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.

9. 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.

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