




TEST REPORT

Report No. : **CHTEW20040243** Report Verification: 

Project No..... : **SHT1909028401EW**

FCC ID..... : **2ASNSRT97**

Applicant's name..... : **Shenzhen Retevis Technology Co., Ltd.**

Address..... : Room 700, 7/F, 13-C, Zhonghaixin Science &Technology Park,
No.12 Ganli 6th Road,Jihua Street, Longgang District,
Shenzhen,China

Manufacturer..... : Shenzhen Retevis Technology Co., Ltd.

Address..... : Room 700, 7/F, 13-C, Zhonghaixin Science &Technology Park,
No.12 Ganli 6th Road,Jihua Street, Longgang District,
Shenzhen,China

Test item description : **GMRS Repeater**

Trade Mark : RETEVIS

Model/Type reference..... : RT97

Listed Model(s) : RT90, RT92, RT93, RT94, RT95, RT98, RT99, RT9000D,
RT9550

Standard : **FCC CFR Title 47 Part 95 Subpart E**

Date of receipt of test sample..... : Oct.08, 2019

Date of testing..... : Oct.08, 2019- Apr.27, 2020

Date of issue..... : Apr.28, 2020

Result..... : **PASS**

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Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,
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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

- [FCC Rules Part 95](#): PERSONAL RADIO SERVICES
- [FCC Rules Part 2](#): Frequency allocations and radio treaty matters; General rules and regulations
- [ANSI C63.26-2013](#): American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
- [ANSI C63.4-2014](#): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.2. Report version

Revision No.	Date of issue	Description
N/A	2020-04-28	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result
5.1	Carrier Output Power(ERP)	Part 95.1767 Part 2.1046(a)	PASS
5.2	99% Occupied Bandwidth & 26dB bandwidth	Part 95.1773 Part 2.1049	PASS
5.3	Emission Mask	Part 95.1779(a)(1)(2)(7) Part 2.1049	PASS
5.4	Modulation Limit	Part 95.1775 Part 2.1047(b)	PASS
5.5	Audio Frequency Response	Part 95.1775 Part 2.1047(a)	PASS
5.6	Audio Low Pass Filter Response	Part 95.1775 Part 2.1047(a)	PASS
5.7	Frequency Stability V.S. Temperature	Part 95.1765 Part 2.1055	PASS
5.8	Frequency Stability V.S. Voltage	Part 95.1765 Part 2.1055	PASS
5.9	Transmit Radiated Spurious Emission	Part 95.1779(a)(7) Part 2.1053	PASS
5.10	AC Power Line Conducted Emission	Part 15.107	PASS
5.11	Radiated Emission	Part 15.109	PASS

Note:

- The measurement uncertainty is not included in the test result.

Audio Low Pass Filter Response

3. SUMMARY

3.1. Client Information

Applicant:	Shenzhen Retevis Technology Co., Ltd.
Address:	Room 700, 7/F, 13-C, Zhonghaixin Science & Technology Park, No.12 Ganli 6th Road, Jihua Street, Longgang District, Shenzhen, China
Manufacturer:	Shenzhen Retevis Technology Co., Ltd.
Address:	Room 700, 7/F, 13-C, Zhonghaixin Science & Technology Park, No.12 Ganli 6th Road, Jihua Street, Longgang District, Shenzhen, China

3.2. Product Description

Main unit	
Name of EUT:	GMRS Repeater
Trade Mark:	RETEVIS
Model No.:	RT97
Listed Model(s):	RT90, RT92, RT93, RT94, RT95, RT98, RT99, RT9000D, RT9550
Power supply:	AC 120V
Hardware version:	V1.01
Software version:	V1.01
Ancillary unit	
Adapter information:	Model: B06120050 Input: 100-240V a.c., 50/60Hz 1.6A Output: 12V d.c., 5A

3.3. Radio Specification Description

Support Frequency Range:	462MHz Main channel: 462.5500, 462.5750, 462.6000, 462.6250, 462.6500, 462.6750, 462.7000, 462.7250MHz
Modulation Type:	FM
Emission Designator: * ¹	11K0F3E
Antenna Type:	Detachable
Antenna Gain:	7.2dBi

Note:

(1) *¹ According to FCC Part 2.202 requirements, the Necessary Bandwidth is calculated as follows:

- For FM Voice Modulation

Channel Spacing = 12.5 KHz, D = 2.5 KHz max, K = 1, M = 3 KHz

$B_n = 2M + 2DK = 2 \times 3 + 2 \times 2.5 \times 1 = 11 \text{ KHz}$

Emission designation: 11K0F3E

(2) The device only supports voice communication.

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Qualifications	Type	Accreditation Number
	CNAS	L1225
	A2LA	3902.01
	FCC	762235
	Canada	5377A

4. TEST CONFIGURATION

4.1. 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

Test Channel	Frequency range	Type	Frequency (MHz)
CH _{M1}	462MHz	Main	462.6500

The Product channel frequency table:

Frequency Band	Type	Frequency (MHz)
462MHz	Main	462.5500
		462.5750
		462.6000
		462.6250
		462.6500
		462.6750
		462.7000
		462.7250

4.2. Test mode

Test mode	Transmitting	Receiving
TX-GMRS	√	
RX-GMRS		√

Note:

√: is operation mode.

Charging mode: Keep the EUT works at charging and off status.

Modulation Type	Description
UM	Un-modulation
AM2	Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
AM6	Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation, then increase the level from the audio generator by 20 dB
AM5	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.

Test item	Modulation Type	Test mode
Output Power(ERP)	UM	TX-GMRS
99% Occupied Bandwidth & 26dB bandwidth	AM6	TX-GMRS
Emission Mask	AM5	TX-GMRS
Modulation Limit	AM6	TX-GMRS
Audio Frequency Response	AM2	TX-GMRS
Audio Low Pass Filter Response	AM2	TX-GMRS
Frequency Stability VS Temperature	UM	TX-GMRS
Frequency Stability VS Voltage	UM	TX-GMRS
Transmit Radiated Spurious Emission	AM5	TX-GMRS
AC Power Line Conducted Emission	-	RX-GMRS
Radiated Emission	-	RX-GMRS

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

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

Whether support unit is used?					
√ No					
Item	Equipment	Trade Name	Model No.	FCC ID	Power cord
1					
2					

4.4. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar
Test voltage:	Normal voltage:	AC 120V
	Extreme lower voltage:	AC 102V
	Extreme upper voltage:	AC 138V

4.5. Measurement uncertainty

Test Item	Measurement Uncertainty
Frequency stability	25 Hz
Carrier output power (ERP)	2.20 dB
Occupied Bandwidth	35 Hz
Modulation Limiting	0.42 %
FM deviation	25 Hz
Audio level	0.62 dB
Radiated Spurious Emission 30~1000MHz	4.65 dB
Radiated Spurious Emission 1~18GHz	5.16 dB
AC power line Conducted Emission 9KHz-30MHz	3.39 dB

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

4.6. Equipment Used during the Test

● TS8613 Test system							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Spectrum Analyzer	Agilent	HTWE0286	N9020A	MY50510187	2019/10/26	2020/10/25
●	Signal & Spectrum Analyzer	R&S	HTWE0262	FSW26	103440	2019/10/26	2020/10/25
●	RF Communication Test Set	HP	HTWE0038	8920A	3813A10206	2018/10/28	2019/10/27
●	RF Communication Test Set	HP	HTWE0038	8920A	3813A10206	2019/10/26	2020/10/25
●	Digital intercom communication tester	Aeroflex	HTWE0255	3920B	1001682041	2019/10/26	2020/10/25
●	Signal Generator	R&S	HTWE0191	SML02	100507	2019/10/26	2020/10/25
●	RF Control Unit	Tonscend	HTWE0294	JS0806-2	N/A	N/A	N/A
○	Filter-VHF	Microwave	HTWE0309	N26460M1	498702	N/A	N/A
●	Filter-UHF	Microwave	HTWE0311	N25155M2	498704	N/A	N/A
○	Power Divider	Microwave	HTWE0043	OPD1040-N-4	N/A	2019/05/24	2020/05/23
○	Attenuator	JFW	HTWE0292	50FH-030-100	N/A	2019/05/18	2020/05/17
○	Attenuator	JFW	HTWE0293	50-A-MFN-20	0322	2019/05/18	2020/05/17
●	Test software	HTW	N/A	Radio ATE	N/A	N/A	N/A

● Auxiliary Equipment							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Climate chamber	ESPEC	HTWE0254	GPL-2	N/A	2019/10/23	2020/10/22
●	DC Power Supply	Gwinstek	HTWE0274	SPS-2415	GER835793	N/A	N/A

● Radiated Spurious Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2021/09/26
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2018/10/11	2021/10/10
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0123	VULB9163	538	2018/04/04	2021/04/03
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31

●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
●	Broadband Preamplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	EMI Test Software	Audix	N/A	E3	N/A	N/A	N/A

● Conducted Emission

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/28	2020/10/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2018/10/25	2019/10/24
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2018/10/25	2019/10/24
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE X_142	EF-NM-BNCM-2M	2018/10/25	2019/10/24
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE X_142	EF-NM-BNCM-2M	2019/10/23	2020/10/22
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated Emission-6th test site

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2018/10/28	2019/10/27
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
●	Ultra-Broadband Antenna	SCHWARZBEC K	HTWE0123	VULB9163	538	2018/04/04	2021/04/03
●	Pre-Amplifier	SCHWARZBEC K	HTWE0295	BBV 9742	N/A	2018/11/16	2019/11/15
●	Pre-Amplifier	SCHWARZBEC K	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2019/08/21	2020/08/20
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX104	501184/4	2019/05/27	2020/05/26
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-7th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2018/10/28	2019/10/27
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2017/04/03	2020/04/02
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	RE-7-FH	N/A	2019/05/10	2020/05/09
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Carrier Output Power

LIMIT

FCC Part FCC Part 95.1767, FCC Part 2.1046

(a) 462/467 MHz main channels.

The limits in this paragraph apply to stations transmitting on any of the 462 MHz main channels or any of the 467 MHz main channels. Each GMRS transmitter type must be capable of operating within the allowable power range. GMRS licensees are responsible for ensuring that their GMRS stations operate in compliance with these limits.

(1) The transmitter output power of mobile, repeater and base stations must **not exceed 50 Watts**.

(2) The transmitter output power of fixed stations must **not exceed 15 Watts**.

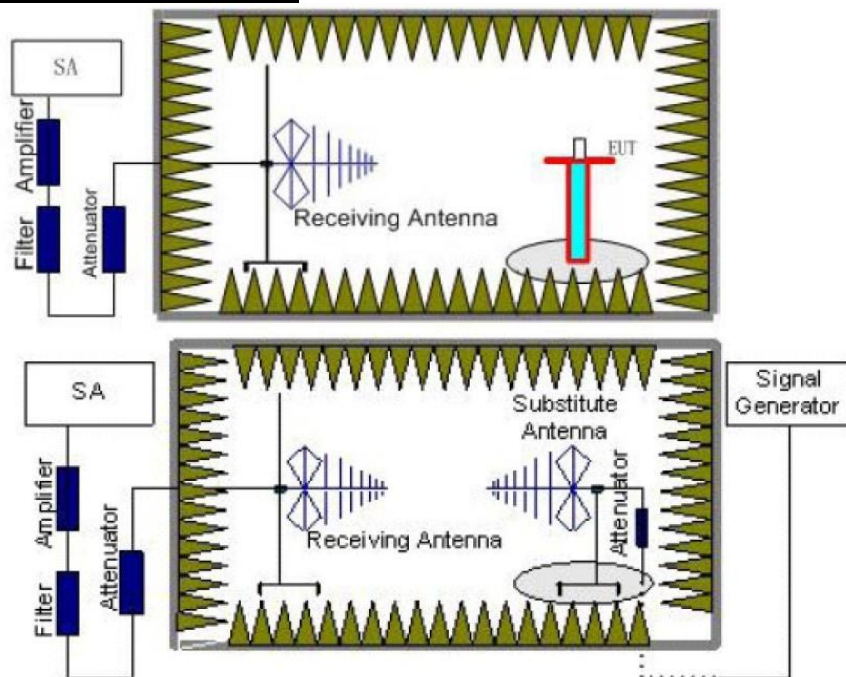
(b) 462 MHz interstitial channels.

The effective radiated power (ERP) of mobile, hand-held portable and base stations transmitting on the 462MHz interstitial channels must **not exceed 5 Watts**.

(c) 467 MHz interstitial channels.

The effective radiated power (ERP) of hand-held portable units transmitting on the 467 MHz interstitial channels must **not exceed 0.5 Watt**. Each GMRS transmitter type capable of transmitting on these channels must be designed such that the ERP does not exceed 0.5 Watt.

TEST CONFIGURATION



TEST PROCEDURE

- 1) The measuring distance of at 3m shall be used for measurements
- 2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation
- 3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) The spectrum setting for Equivalent Isotropically Radiated Power (EIRP) is RBW = 100kHz, VBW = 300kHz. Detector Mode is Positive Peak
- 5) Record the field strength level of the EUT from the spectrum
- 6) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be moved height from 1m to 4m to find the highest radiation. Adjust the S.G. output level and repeat this step to get the same field strength level as the EUT
- 7) The EIRP level = S.G. output level(dBm)- TX cable(dB) + Substituted Antenna Gain(dBi)
- 8) The ERP level = EIRP-2.15

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed **Not Applicable**

TEST Data

Please refer to appendix A on the appendix report

5.2. 99% Occupied Bandwidth & 26dB Bandwidth

LIMIT

FCC Part 95.1773, FCC Part 2.1049

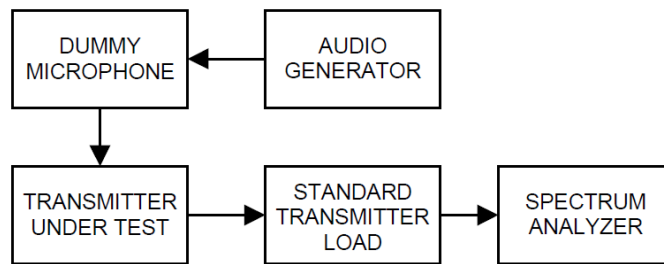
(a) Main channels.

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.

(b) 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

TEST CONFIGURATION



TEST PROCEDURE

1) Connect the equipment as illustrated

2) Spectrum set as follow:

Centre frequency = the nominal EUT channel center frequency,

The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient)

RBW = 1% to 5% of the anticipated OBW, VBW $\geq 3 \times \text{RBW}$, Sweep = auto,

Detector function = peak, Trace = max hold

3) Set 99% Occupied Bandwidth and 26dB Bandwidth

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

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

TEST Data

Please refer to appendix B on the appendix report

5.3. Emission Mask

LIMIT

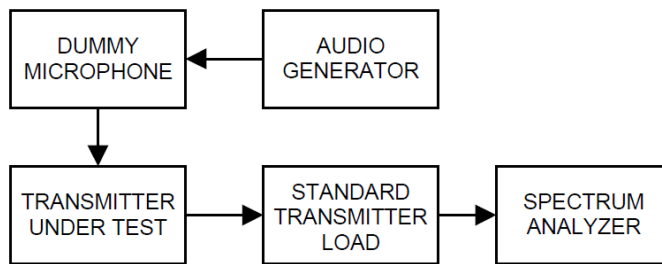
FCC Part 95.1779(b)(1)(2)(7), FCC Part 2.1049

(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 than 100% 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%.

TEST CONFIGURATION



TEST PROCEDURE

- 1) Connect the equipment as illustrated.
- 2) Spectrum set as follow:
Centre frequency = fundamental frequency, RBW=300Hz, VBW=1000Hz, 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) Apply Input Modulation Signal to EUT according to Section 4.2
- 5) Measure and record the results in the test report.

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

TEST Data

Please refer to appendix C on the appendix report

5.4. Modulation Limit

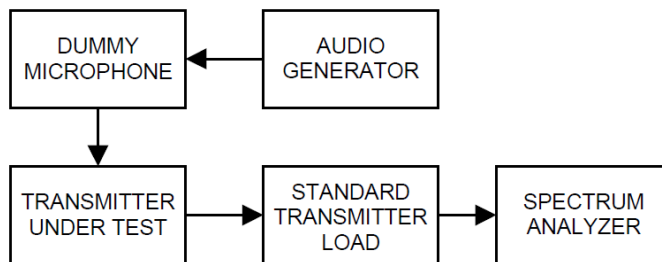
LIMIT

FCC Part 95.1775, FCC Part 2.1047(b)

Each GMRS transmitter type must be designed to satisfy the modulation requirements in this section. Operation of GMRS stations must also be in compliance with these requirements.

- (a) **Main channels** The peak frequency deviation for emissions to be transmitted on the main channels must **not exceed ± 5 kHz**.
- (b) **462 MHz interstitial channels**. The peak frequency deviation for emissions to be transmitted on the 462 MHz interstitial channels must **not exceed ± 5 kHz**.
- (c) **467 MHz interstitial channels**. The peak frequency deviation for emissions to be transmitted on the 467 MHz interstitial channels must **not exceed ± 2.5 kHz**, and the highest audio frequency contributing substantially to modulation must **not exceed 3.125 kHz**.

TEST CONFIGURATION



TEST PROCEDURE

- 1) Connect the equipment as illustrated.
- 2) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- 3) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤ 0.25 Hz to $\geq 15,000$ Hz. Turn the de-emphasis function off.
- 4) Apply Input Modulation Signal to EUT according to Section 4.2 and vary the input level from -20 to $+20$ dB.
- 5) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level
- 6) Repeat step 4-5 with input frequency changing to 300Hz, 1004Hz, 1500Hz and 2500Hz in sequence.

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

TEST Data

Please refer to appendix D on the appendix report

5.5. Audio Frequency Response

LIMIT

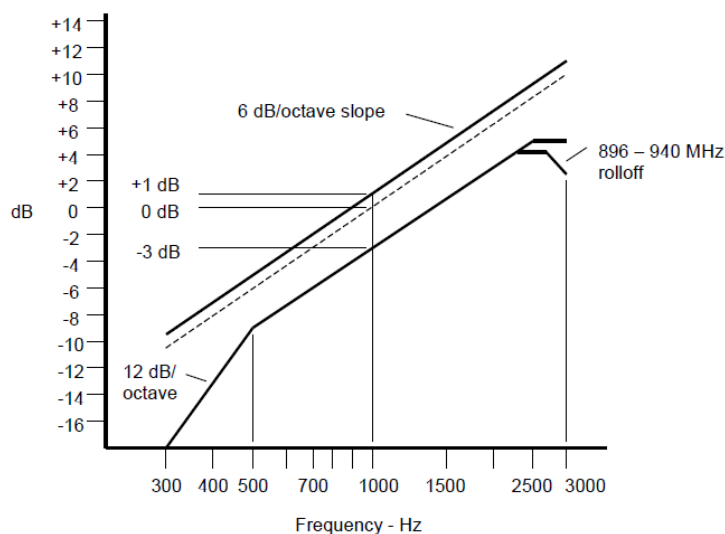
FCC Part 95.1775, FCC Part 2.1047(a)

Each GMRS transmitter type must be designed to satisfy the modulation requirements in this section.

Operation of GMRS stations must also be in compliance with these requirements.

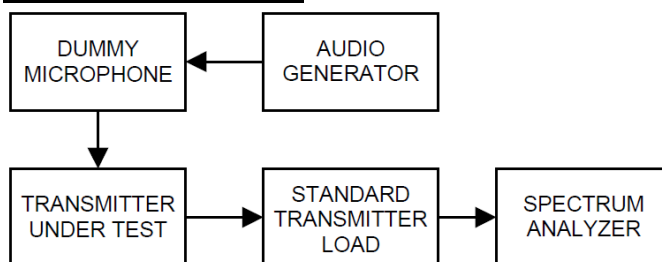
- (d) **Main channels** The peak frequency deviation for emissions to be transmitted on the main channels must **not exceed ± 5 kHz**.
- (e) **462 MHz interstitial channels.** The peak frequency deviation for emissions to be transmitted on the 462 MHz interstitial channels must **not exceed ± 5 kHz**.
- (f) **467 MHz interstitial channels.** The peak frequency deviation for emissions to be transmitted on the 467 MHz interstitial channels must **not exceed ± 2.5 kHz**, and the highest audio frequency contributing substantially to modulation must **not exceed 3.125 kHz**.

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.



An additional 6 dB per octave attenuation is allowed from 2500 Hz to 3000 Hz in equipment operating in the 25 MHz to 869 MHz range.

TEST CONFIGURATION



TEST PROCEDURE

- 1) Connect the equipment as illustrated.
- 2) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for 50 Hz to 15,000 Hz. Turn the de-emphasis function off.
- 3) Set the DMM to measure rms voltage.
- 4) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- 5) Apply Input Modulation Signal to EUT according to Section 4.2
- 6) Set the test receiver to measure rms deviation and record the deviation reading.
- 7) Record the DMM reading as V_{REF} .
- 8) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz.
- 9) Vary the audio frequency generator output level until the deviation reading that was recorded in step 6) is obtained.
- 10) Record the DMM reading as V_{FREQ}

- 11) Calculate the audio frequency response at the present frequency as:
audio frequency response= $20\log_{10}(V_{\text{FREQ}}/V_{\text{REF}})$.
- 12) Repeat steps 8) through 11) for all the desired test frequencies

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed **Not Applicable**

TEST Data

Please refer to appendix E on the appendix report

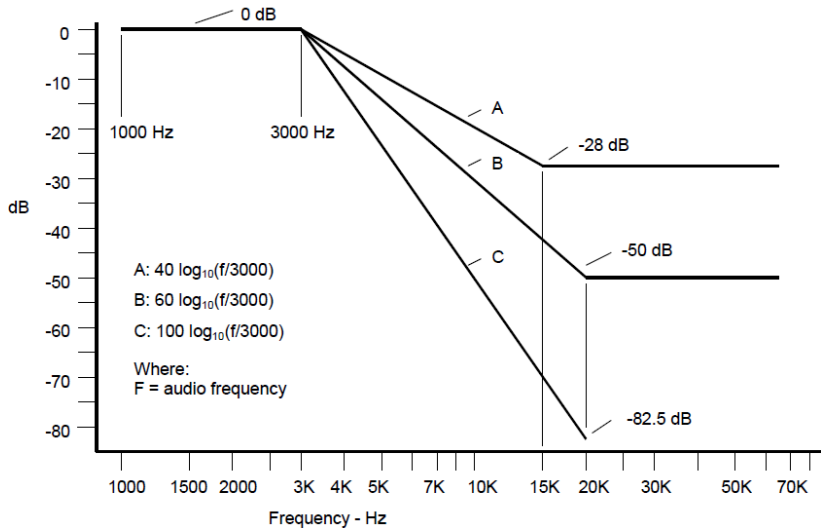
5.6. Audio Low Pass Filter Response

LIMIT

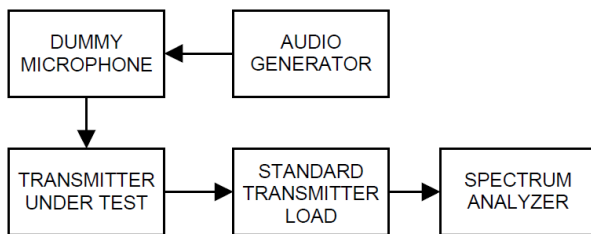
FCC Part 95.1775(e)(1)(2):

(e) Audio filter. Each GMRS transmitter type must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of §95.1779 (without filtering).

- (1) The filter must be between the modulation limiter and the modulated stage of the transmitter.
- (2) At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least 60 log (f/3) dB more than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB more than the attenuation at 1 kHz.



TEST CONFIGURATION



TEST PROCEDURE

- 1) Configure the EUT as shown in figure .
- 2) Apply a 1000 Hz tone from the audio signal generator and adjust the level per manufacturer's specifications. Record the dB level of the 1000 Hz tone as LEV_{REF} .
- 3) Set the audio signal generator to the desired test frequency between 3000 Hz and the upper low pass filter limit. Record the dB level at the test frequency as LEV_{FREQ} .
- 4) Calculate the audio frequency response at the test frequency as:
 low pass filter response = $LEV_{FREQ} - LEV_{REF}$

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

TEST Data

Please refer to appendix F on the appendix report

5.7. Frequency stability VS Temperature

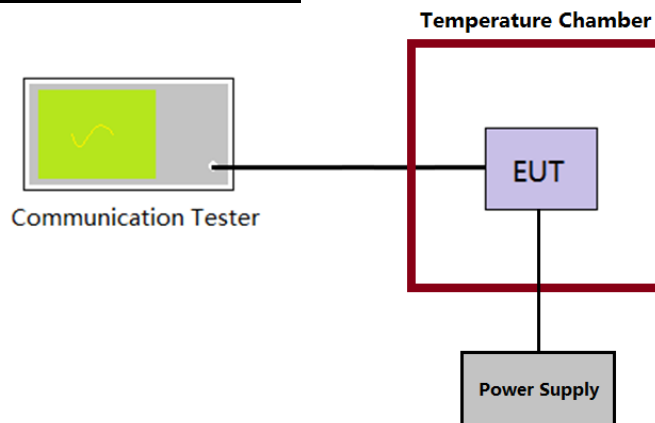
LIMIT

FCC Part 95.1765:

Each GMRS transmitter type must be designed to comply with the frequency accuracy requirements in this section under normal operating conditions. Operators of GMRS stations must also ensure compliance with these requirements.

- (a) The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth greater than 12.5 kHz must remain **within 5 ppm** of the channel center frequencies listed in §95.1763 under normal operating conditions.
- (b) 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** of the channel center frequencies listed in §95.1763 under normal operating conditions.

TEST CONFIGURATION



TEST PROCEDURE

- 1) The EUT output port was connected to communication tester.
- 2) The EUT was placed inside the temperature chamber.
- 3) Turn EUT off and set the chamber temperature to -30°C . After the temperature stabilized for approximately 30 minutes recorded the frequency as MCF_{MHz} .
- 4) Calculate the ppm frequency error by the following:

$$\text{ppm error} = (MCF_{\text{MHz}} / ACF_{\text{MHz}} - 1) * 10^6$$
 where
 MCF_{MHz} is the Measured Carrier Frequency in MHz
 ACF_{MHz} is the Assigned Carrier Frequency in MHz
- 5) Repeat step 3 measure with 10°C increased per stage until the highest temperature of $+50^{\circ}\text{C}$ reached.

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

TEST Data

Please refer to appendix G on the appendix report

5.8. Frequency stability VS Voltage

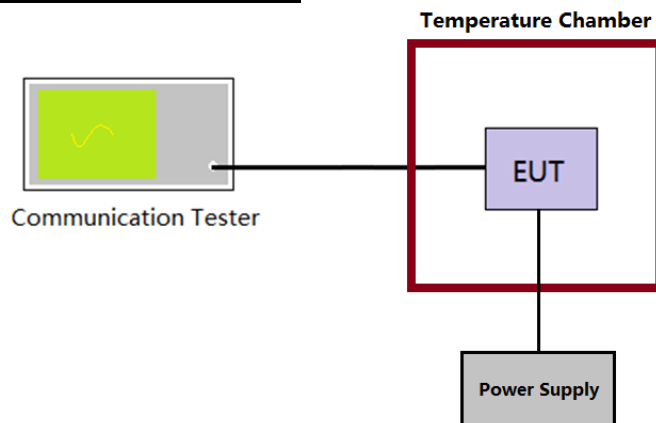
LIMIT

FCC Part 95.1765:

Each GMRS transmitter type must be designed to comply with the frequency accuracy requirements in this section under normal operating conditions. Operators of GMRS stations must also ensure compliance with these requirements.

- (a) The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth greater than 12.5 kHz must remain **within 5 ppm** of the channel center frequencies listed in §95.1763 under normal operating conditions.
- (b) 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** of the channel center frequencies listed in §95.1763 under normal operating conditions.

TEST CONFIGURATION



TEST PROCEDURE

- 1) The EUT output port was connected to communication tester.
- 2) The EUT was placed inside the temperature chamber at 25°C
- 3) Record the carrier frequency of the transmitter as MCF_{MHz}
- 4) Calculate the ppm frequency error by the following:

$$ppm\ error = (MCF_{MHz} / ACF_{MHz} - 1) * 10^6$$

where
 MCF_{MHz} is the Measured Carrier Frequency in MHz
 ACF_{MHz} is the Assigned Carrier Frequency in MHz
- 5) Repeat step 3 measure with varied $\pm 15\%$ of the nominal value measured at the input to the EUT

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

TEST Data

Please refer to appendix H on the appendix report

5.9. Transmit Radiated Spurious Emission

LIMIT

FCC Part 95.1779(b)(1)(2)(7), FCC Part 2.1049

(c) 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 than 100% 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%.

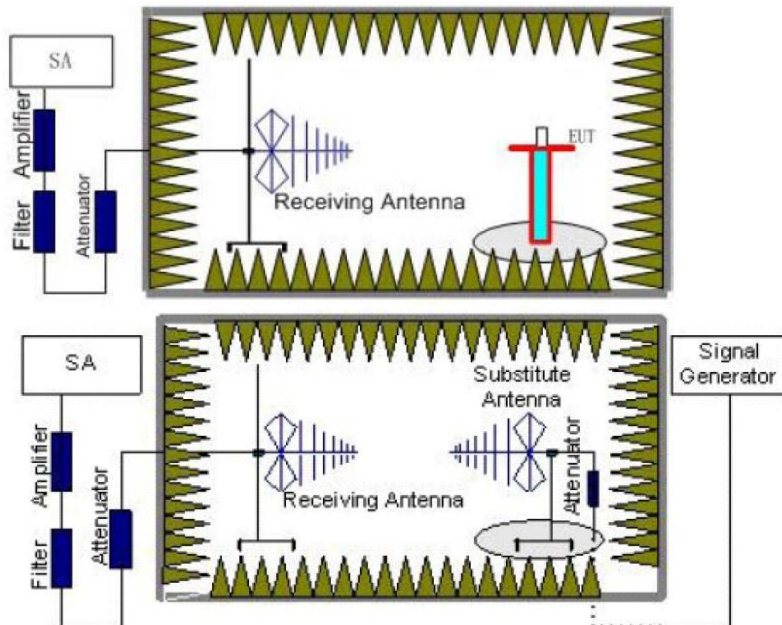
Note:

Limit (dBm) = EL - [43 + 10 log(P)] = 10 log(P * 1000) - [43 + 10 log(P)] = 10 log(P) + 30 - 43 - 10 log(P) = -13 dBm

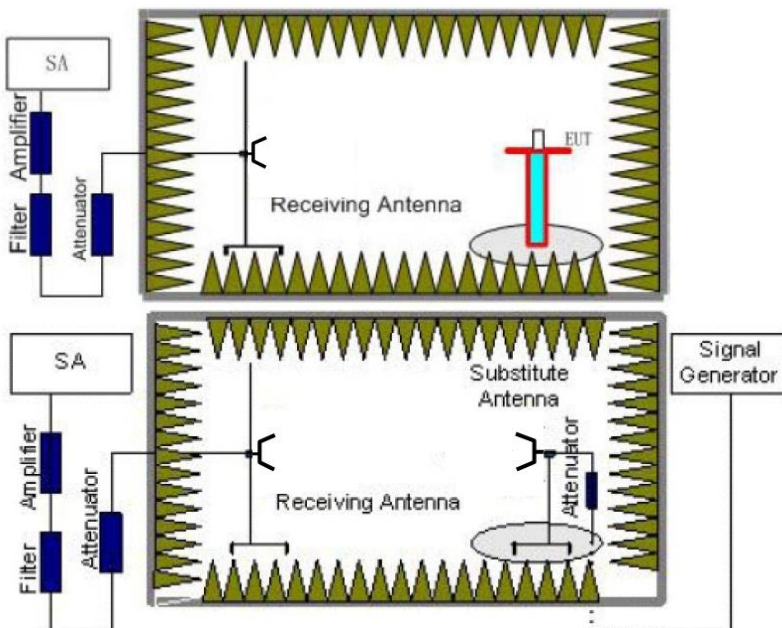
EL is the emission level of the Output Power expressed in dBm,

TEST CONFIGURATION

Below 1GHz:



Above 1GHz:



TEST PROCEDURE

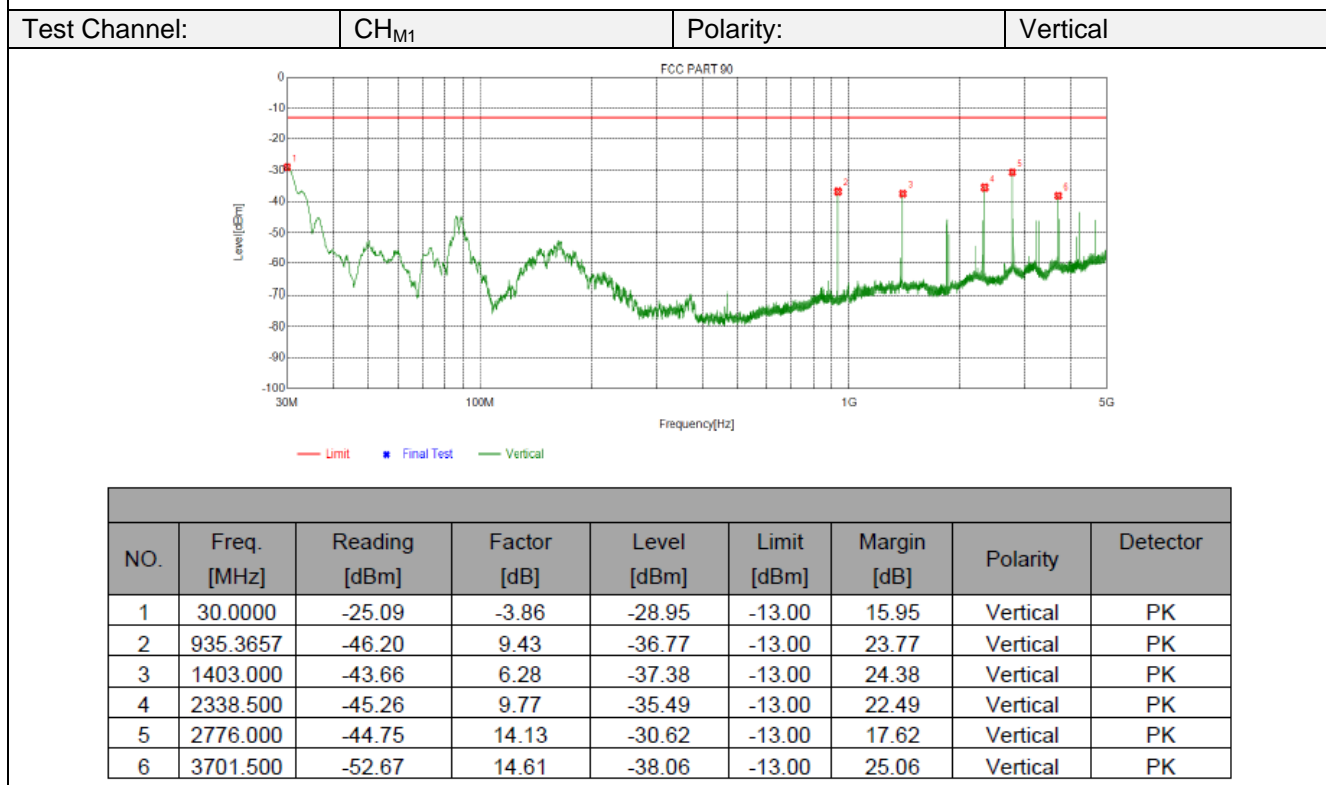
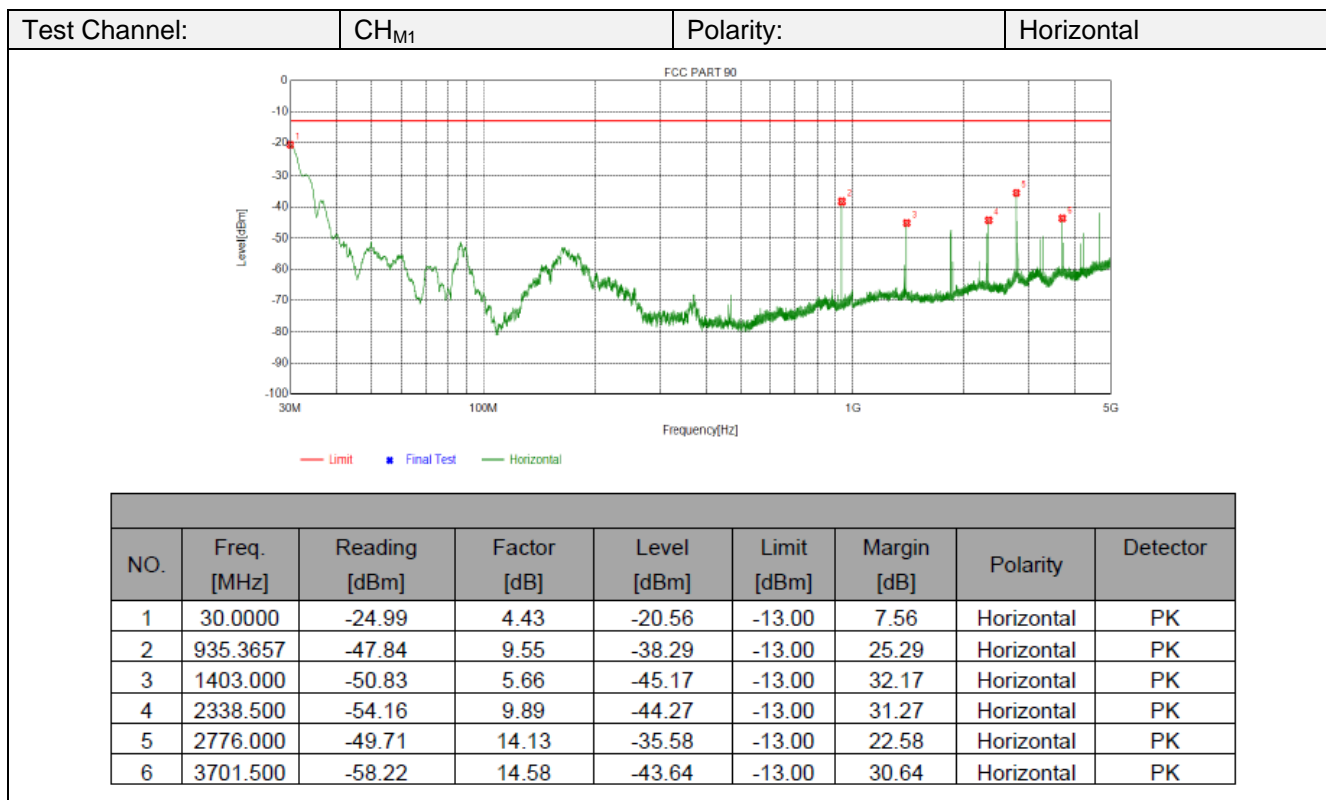
- 1) The measuring distance of at 3m shall be used for measurements
- 2) The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The table was rotated 360 degrees to determine the position of the highest radiation
- 3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) The spectrum setting as follow
Below 1 GHz: RBW=120kHz, VBW=300kHz, Sweep time=auto, Detector =peak, Trace=max hold;
Above 1GHz: RBW=1MHz, VBW=3MHz Sweep time=auto, Detector=peak, Trace=max hold
- 5) Record the field strength level of the EUT from the spectrum
- 6) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be moved height from 1m to 4m to find the highest radiation. Adjust the S.G. output level and repeat this step to get the same field strength level as the EUT
- 7) The EIRP level = S.G. output level(dBm)- TX cable(dB) + Substituted Antenna Gain(dBi)
- 8) Record the ERP value for below 1GHz, ERP value = EIRP-2.15; Record the EIRP for above 1GHz.

TEST MODE

Please reference to the section 4.2

TEST RESULTS

Passed **Not Applicable**



5.10. AC Power Line Conducted Emission

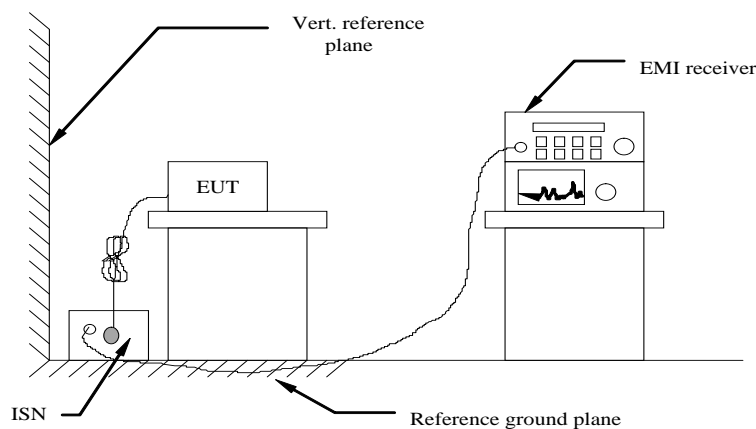
The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u Henry as specified by section 5.1 of ANSI C63.4. Cables and peripherals were moved to find the maximum emission levels for each frequency.

Limit

FCC part 15.107(a)

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

TEST CONFIGURATION



TEST PROCEDURE

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4
- 2) Support equipment, if needed, was placed as per ANSI C63.4
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4) If a EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipments received AC power from a second LISN, if any
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.

TEST MODE

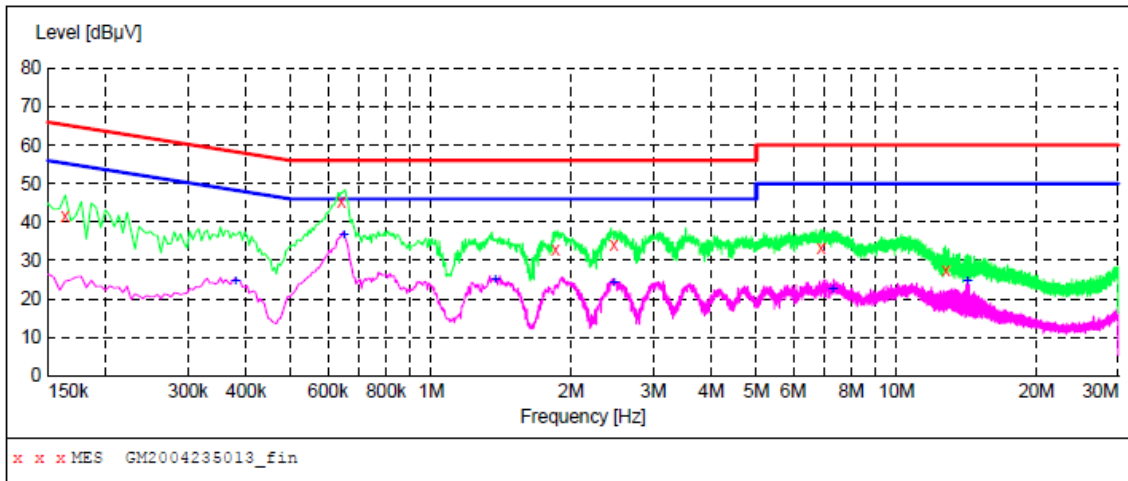
Please reference to the section 4.2

TEST RESULTS

Passed Not Applicable

Polarity:

L



MEASUREMENT RESULT: "GM2004235013_fin"

4/23/2020 1:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	41.50	10.0	65	23.8	QP	L1	GND
0.640500	45.20	10.1	56	10.8	QP	L1	GND
1.846500	33.00	10.1	56	23.0	QP	L1	GND
2.472000	34.20	10.2	56	21.8	QP	L1	GND
6.882000	33.40	10.2	60	26.6	QP	L1	GND
12.772500	27.30	10.4	60	32.7	QP	L1	GND

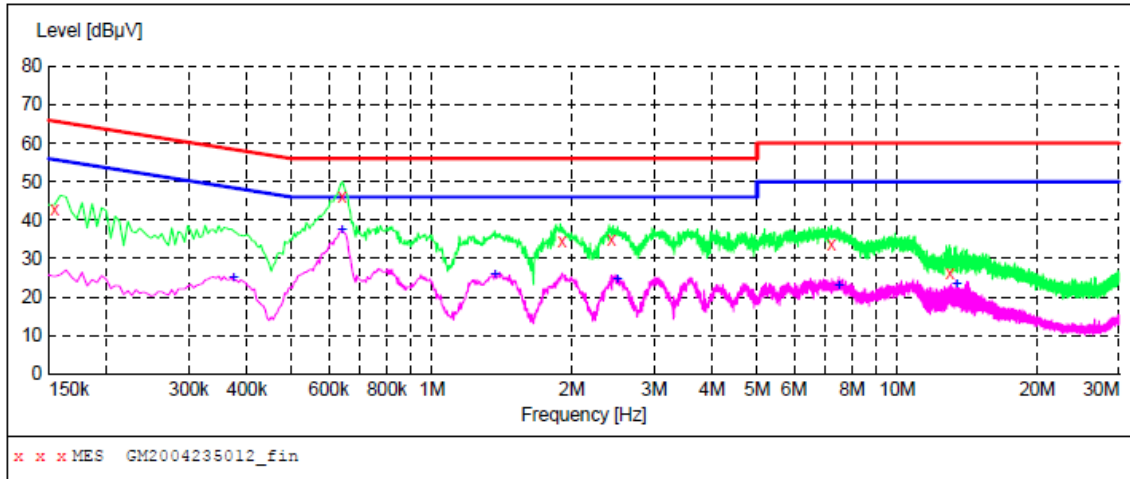
MEASUREMENT RESULT: "GM2004235013_fin2"

4/23/2020 1:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.379500	24.60	10.1	48	23.7	AV	L1	GND
0.649500	36.80	10.1	46	9.2	AV	L1	GND
1.374000	25.10	10.1	46	20.9	AV	L1	GND
2.467500	24.00	10.2	46	22.0	AV	L1	GND
7.300500	22.60	10.3	50	27.4	AV	L1	GND
14.212500	24.60	10.4	50	25.4	AV	L1	GND

Polarity:

N



MEASUREMENT RESULT: "GM2004235012_fin"

4/23/2020 1:16PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	43.00	10.0	66	22.8	QP	N	GND
0.640500	46.00	10.1	56	10.0	QP	N	GND
1.905000	34.40	10.1	56	21.6	QP	N	GND
2.431500	34.90	10.2	56	21.1	QP	N	GND
7.219500	33.80	10.3	60	26.2	QP	N	GND
12.988500	26.10	10.4	60	33.9	QP	N	GND

MEASUREMENT RESULT: "GM2004235012_fin2"

4/23/2020 1:16PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.375000	25.10	10.1	48	23.3	AV	N	GND
0.640500	37.40	10.1	46	8.6	AV	N	GND
1.365000	25.60	10.1	46	20.4	AV	N	GND
2.503500	24.70	10.2	46	21.3	AV	N	GND
7.485000	23.10	10.3	50	26.9	AV	N	GND
13.420500	23.40	10.4	50	26.6	AV	N	GND

5.11. Radiated Emission

LIMIT

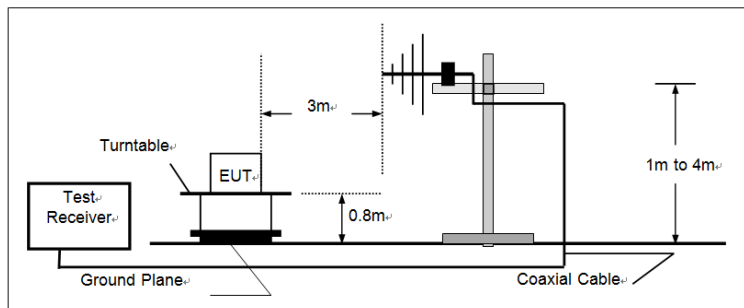
For unintentional device, according to § 15.109(a) except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

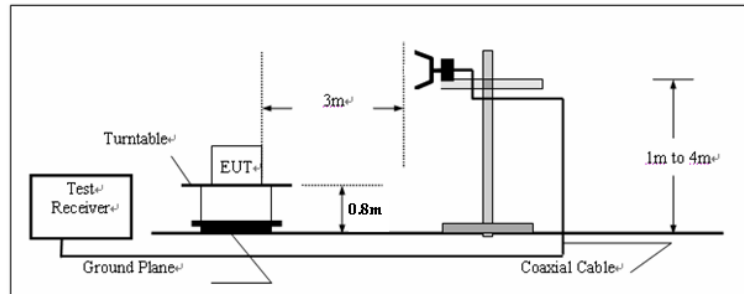
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

TEST CONFIGURATION

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



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



TEST PROCEDURE

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

TEST MODE

Please reference to the section 4.2

TEST RESULTS

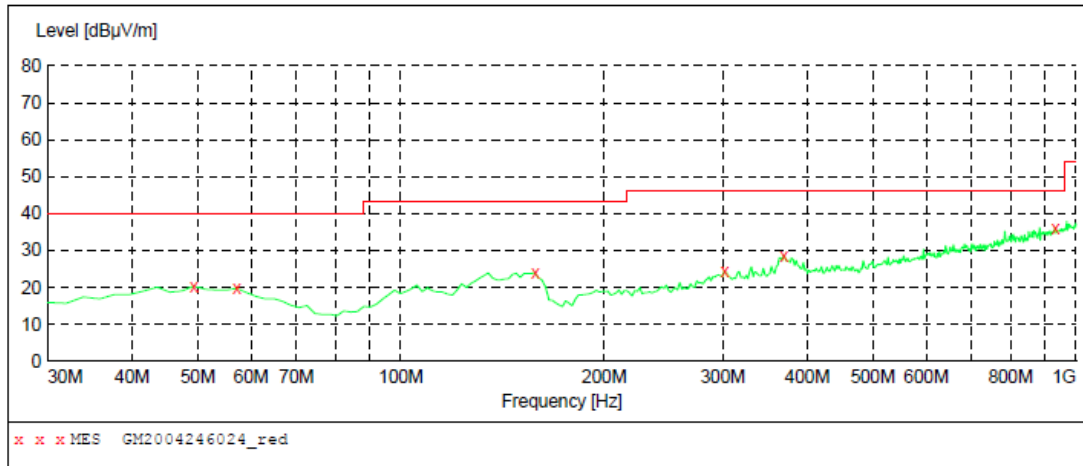
Passed Not Applicable

Note:

The EUT shall be scanned from 30 MHz to the 5th harmonic of the highest oscillator frequency in the digital devices or 1 GHz whichever is higher.

Polarity:

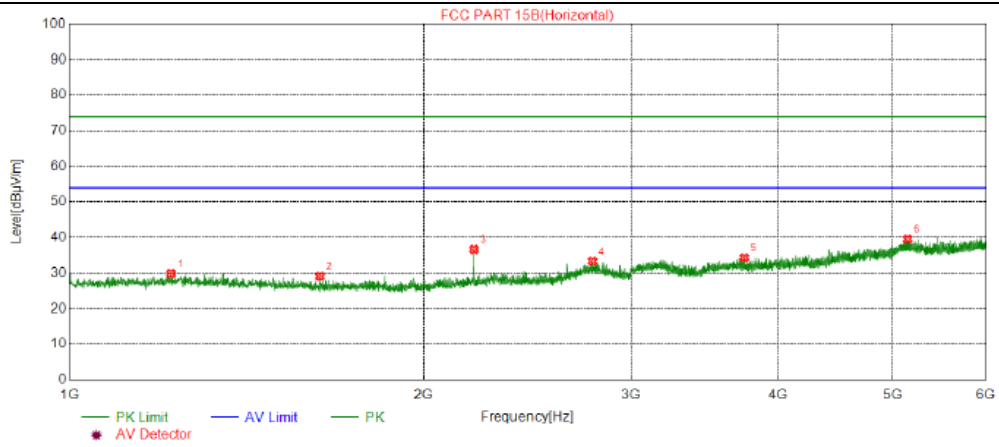
Horizontal



MEASUREMENT RESULT: "GM2004246024_red"

4/24/2020 12:22PM

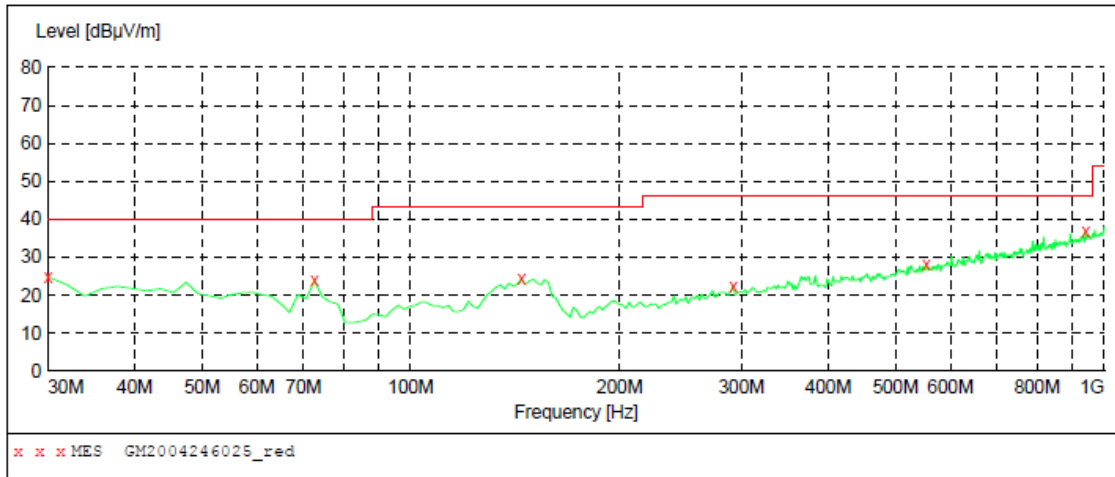
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
49.400000	20.40	-7.7	40.0	19.6	QP	300.0	282.00	HORIZONTAL
57.160000	19.80	-7.4	40.0	20.2	QP	300.0	14.00	HORIZONTAL
158.040000	24.00	-12.3	43.5	19.5	QP	100.0	167.00	HORIZONTAL
301.600000	24.40	-5.6	46.0	21.6	QP	100.0	0.00	HORIZONTAL
369.500000	28.70	-4.2	46.0	17.3	QP	100.0	167.00	HORIZONTAL
932.100000	36.20	8.7	46.0	9.8	QP	300.0	360.00	HORIZONTAL



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity	Detector
1	1219.375	35.69	-5.78	29.91	74.00	44.09	Horizontal	PK
2	1632.500	35.32	-6.22	29.10	74.00	44.90	Horizontal	PK
3	2205.625	39.61	-2.93	36.68	74.00	37.32	Horizontal	PK
4	2780.625	31.56	1.80	33.36	74.00	40.64	Horizontal	PK
5	3743.125	32.60	1.76	34.36	74.00	39.64	Horizontal	PK
6	5151.250	30.69	8.89	39.58	74.00	34.42	Horizontal	PK

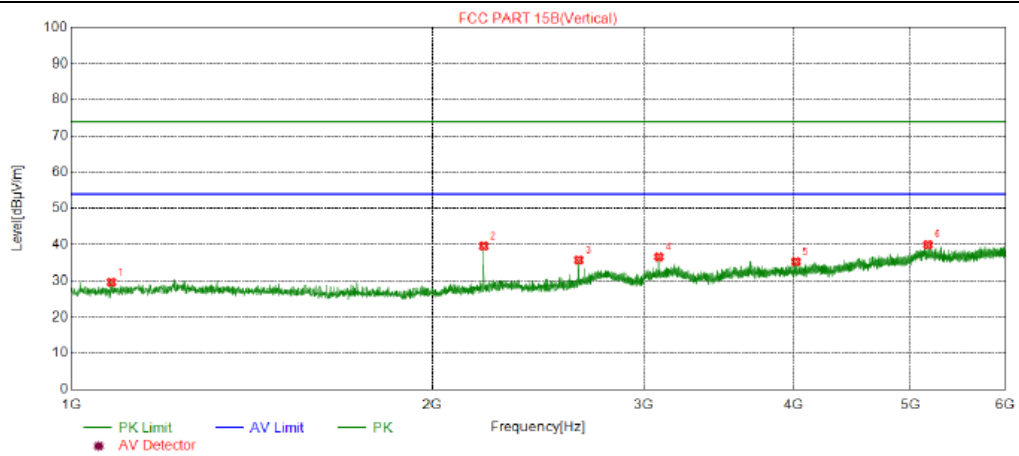
Polarity: Vertical



MEASUREMENT RESULT: "GM2004246025_red"

4/24/2020 12:24PM

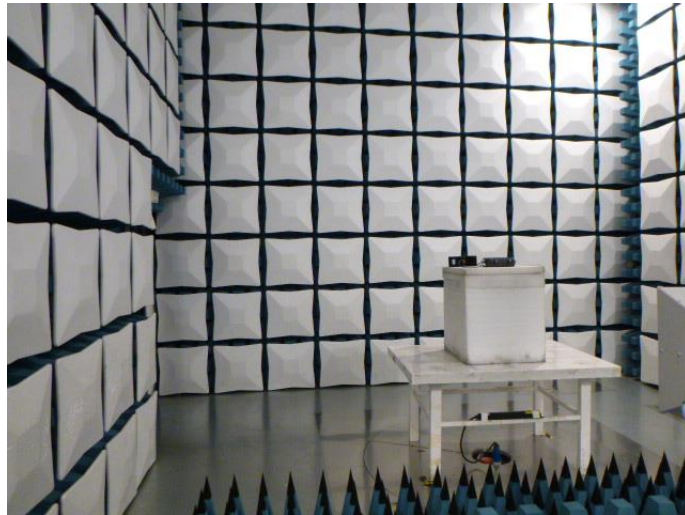
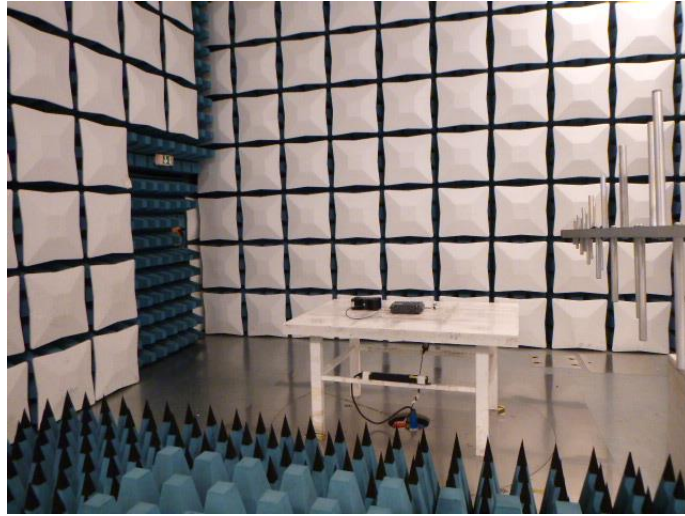
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.90	-10.7	40.0	15.1	QP	100.0	359.00	VERTICAL
72.680000	23.80	-13.5	40.0	16.2	QP	100.0	236.00	VERTICAL
144.460000	24.30	-13.1	43.5	19.2	QP	100.0	99.00	VERTICAL
291.900000	22.50	-5.8	46.0	23.5	QP	100.0	65.00	VERTICAL
553.800000	28.00	1.1	46.0	18.0	QP	100.0	353.00	VERTICAL
939.860000	36.70	8.9	46.0	9.3	QP	100.0	258.00	VERTICAL



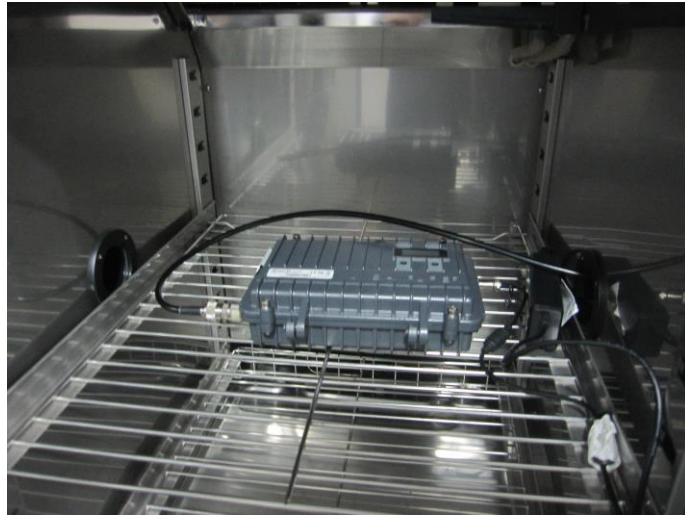
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity	Detector
1	1080.000	36.69	-7.03	29.66	74.00	44.34	Vertical	PK
2	2206.250	42.56	-2.93	39.63	74.00	34.37	Vertical	PK
3	2647.500	36.20	-0.42	35.78	74.00	38.22	Vertical	PK
4	3088.125	36.39	0.27	36.66	74.00	37.34	Vertical	PK
5	4015.625	32.25	3.06	35.31	74.00	38.69	Vertical	PK
6	5171.875	31.12	8.93	40.05	74.00	33.95	Vertical	PK

6. TEST SETUP PHOTOS

Transmitter Radiated Spurious Emission



Frequency stability



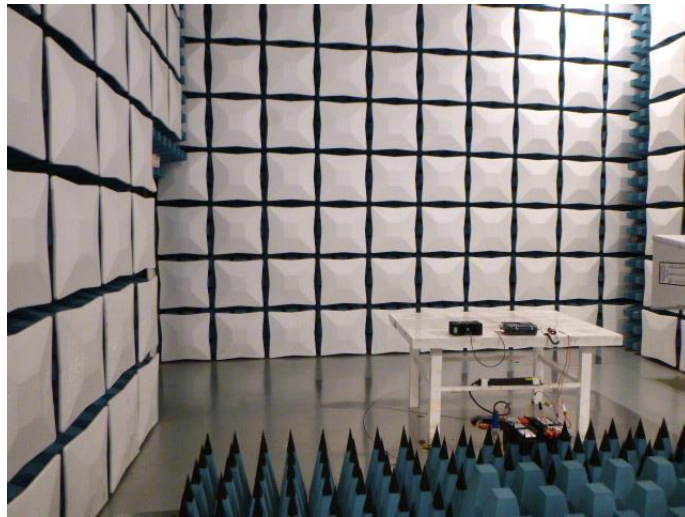
Other RF test item



AC power line conducted emission

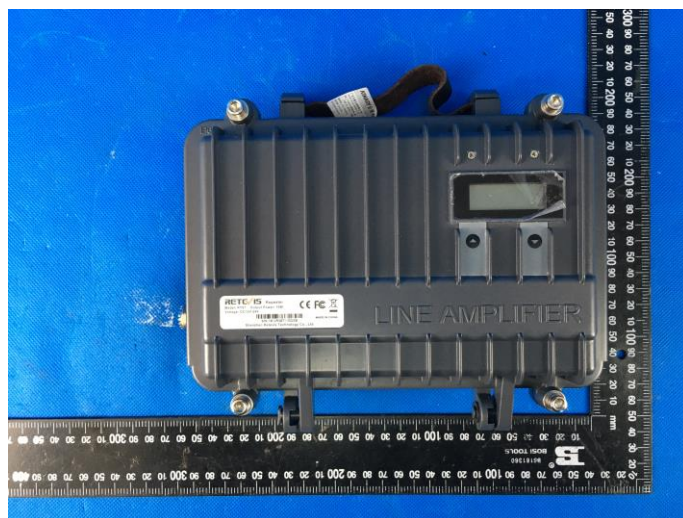
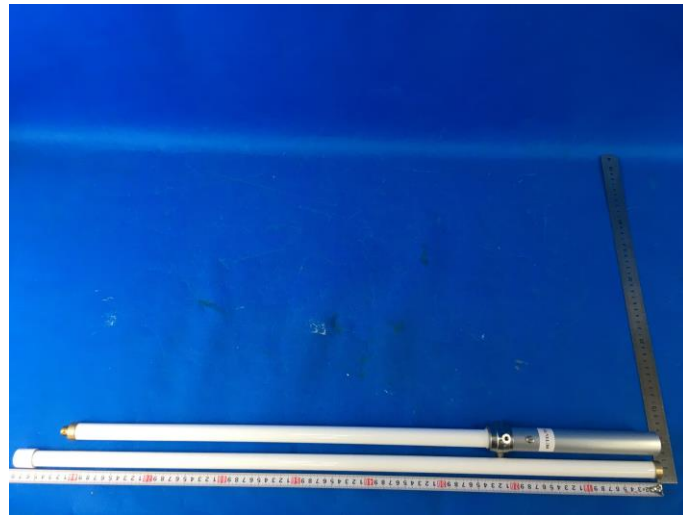


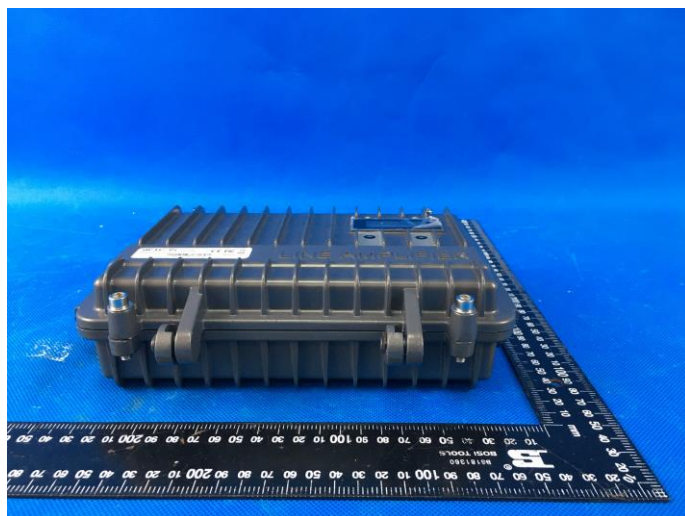
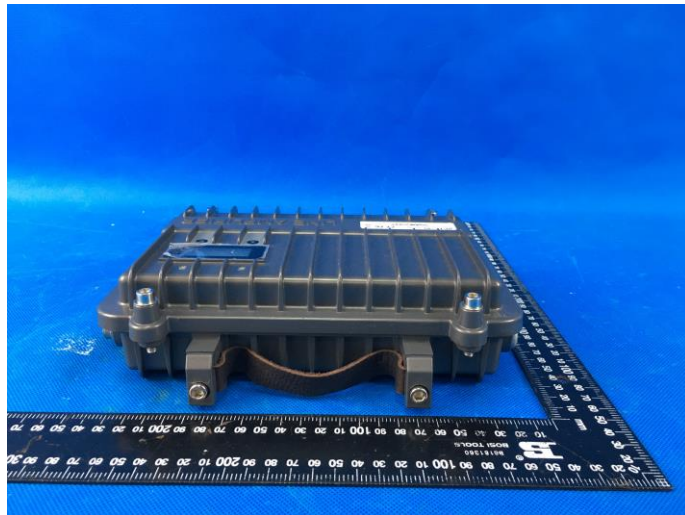
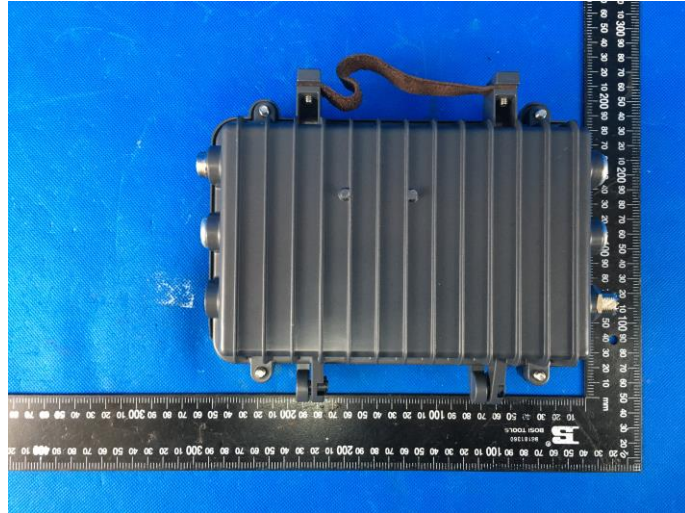
Radiated emission



7. EXTERANAL AND INTERNAL PHOTOS

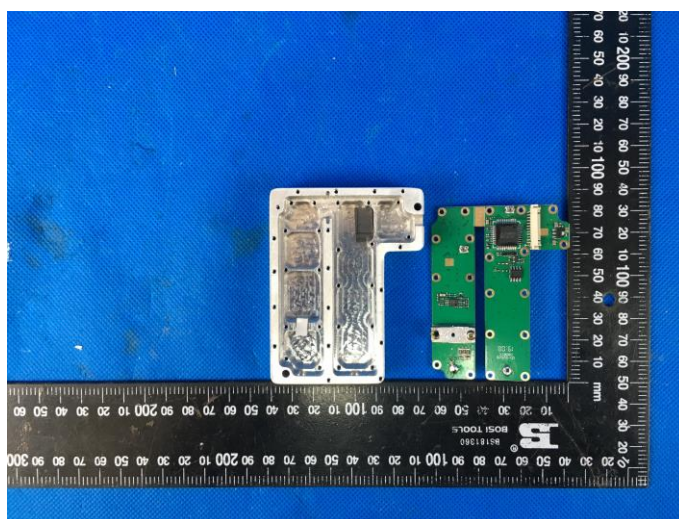
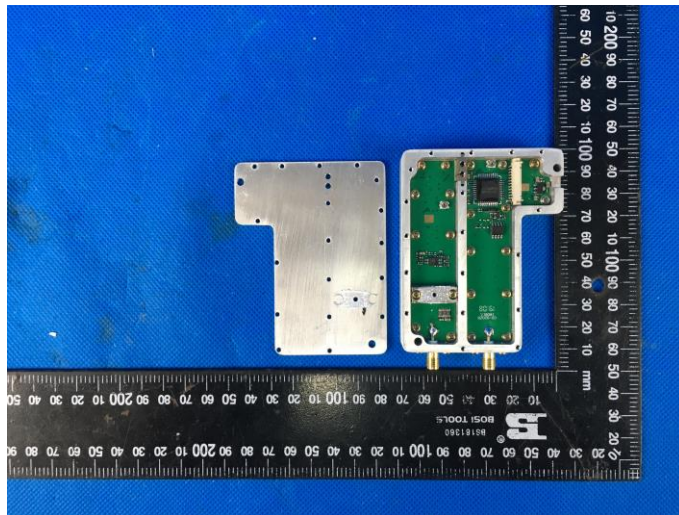
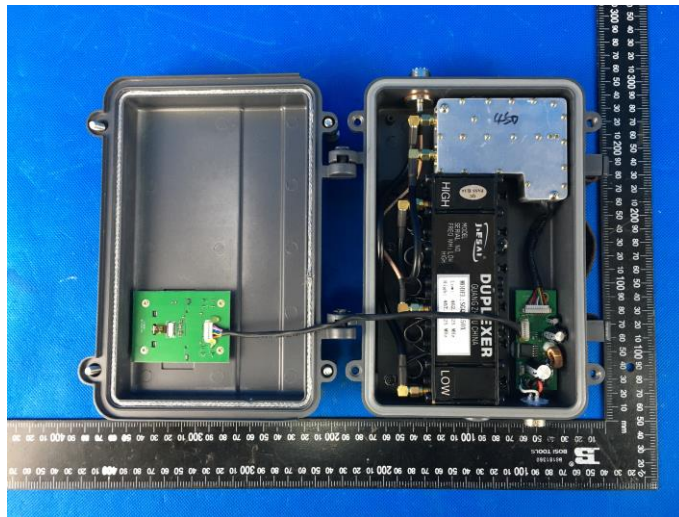
External Photos

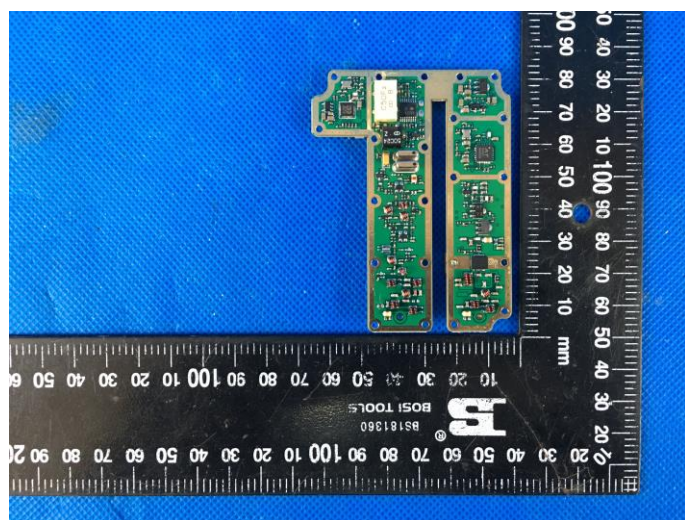
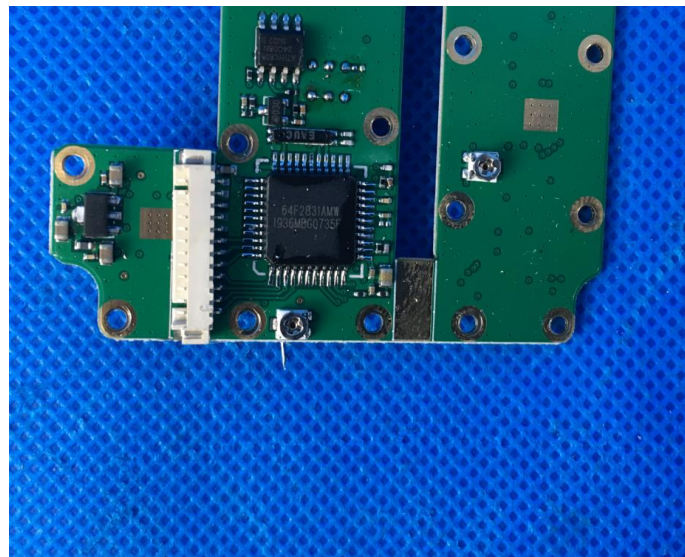


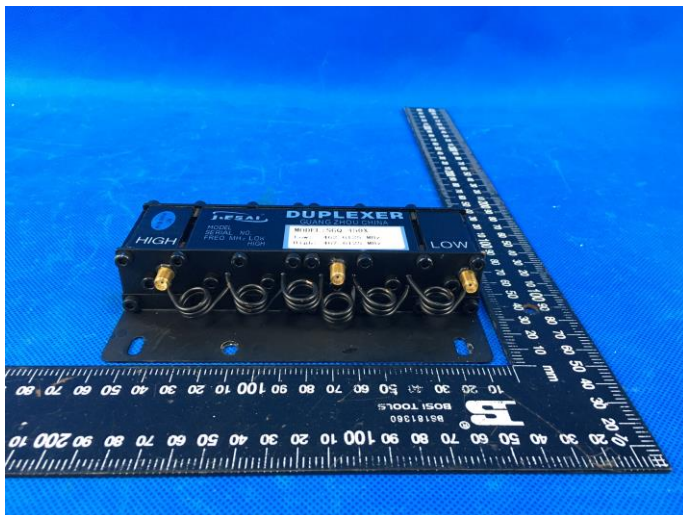
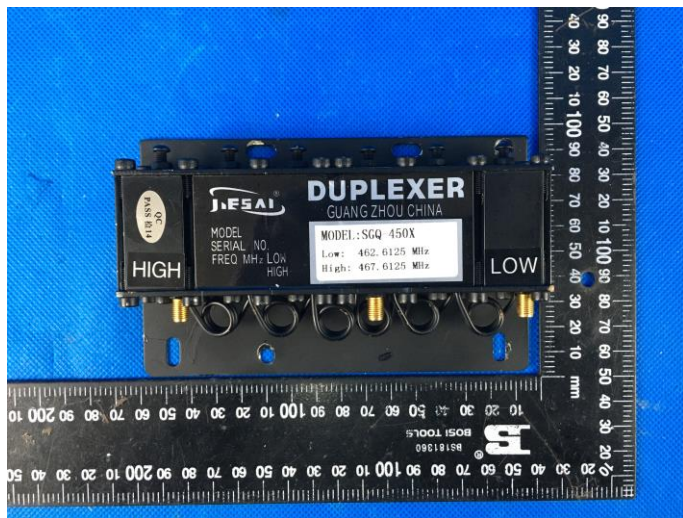
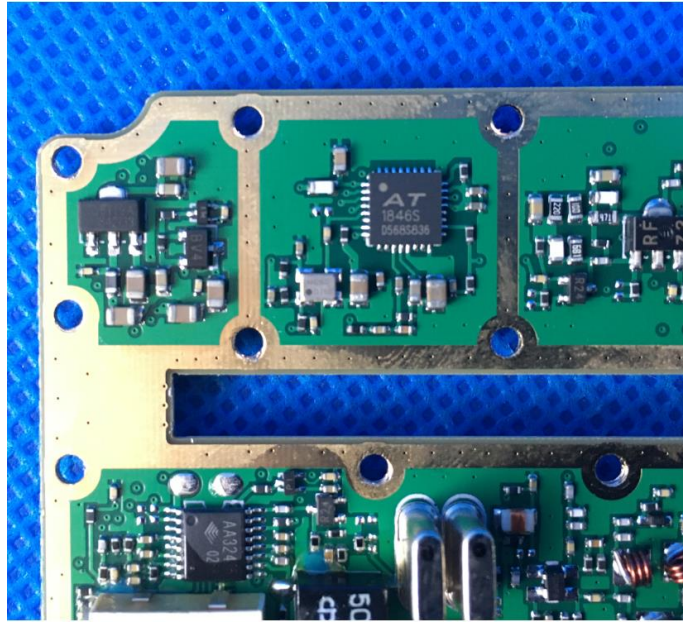


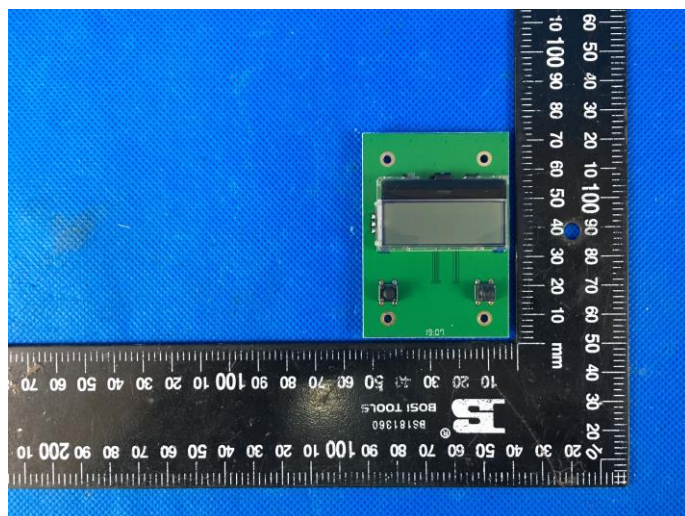
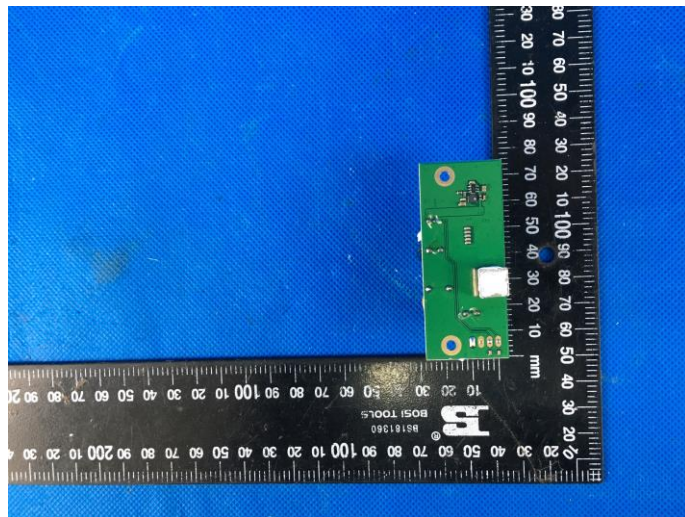


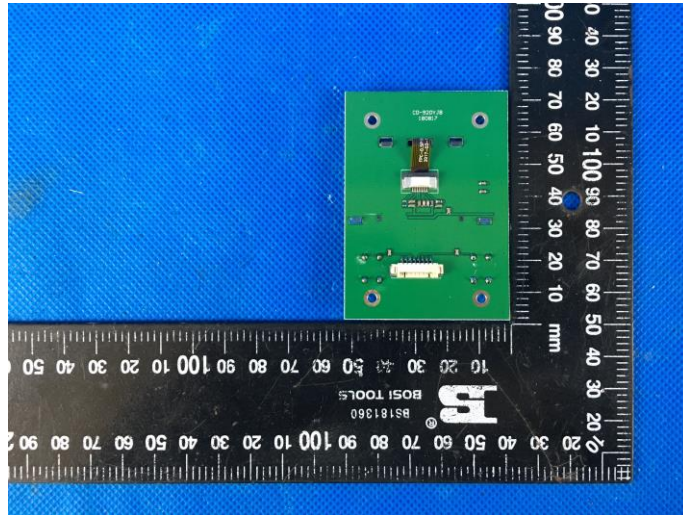
Internal Photos











8. APPENDIX

Project No.	SHT1909028401EW		
Test sample No.	YPHT19090284001	Model No.	RT97
Start test date	2019/12/5	Finish date	2020/4/26
Temperature	22.7	Humidity	26
Test Engineer	Linshuang.Chen	Auditor	<i>William.wang</i>
Appendix clause	Test Item	Test date (M/D)	Test Result (PASS/FAIL)
A	Carrier Output Power	2019/12/6	PASS
B	Occupied Bandwidth	2019/12/6	PASS
C	Emission Mask	2019/12/6	PASS
D	Modulation Limit	2019/12/5	PASS
E	Audio Frequency Response	2020/4/26	PASS
F	Audio Low Pass Filter Response	2019/12/5	PASS
G	Frequency Stability Test & Temperature	2019/12/5	PASS
H	Frequency Stability Test & Voltage	2019/12/5	PASS
Note			



Appendix A: Carrier Output Power

Test Mode	Modulation Type	Test Channel	Measured power (dBm)	Measured power (W)	Limit(W)	Result
TX-GMRS	FM	CH _{M1}	36.88	4.88	≤15	PASS



Appendix B:Occupied Bandwidth

Test Mode	Modulation Type	Test Channel	Occupied Bandwidth		99% Limit(kHz)	Result
			99%(kHz)	26dB(kHz)		
TX-GMRS	FM	CH _{M1}	11.888	14.491	≤20	PASS



Appendix B:Occupied Bandwidth

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT																																										
TX-GMRS	FM	CH _{M1}	<p>1 Occupied Bandwidth</p> <p>Ref Level 38.00 dBm Offset 30.40 dB RBW 300 Hz Att 17 dB SWI 14 ms (±23 ms) VBW 1 kHz Mode Auto FFT</p> <p>M2[1] 30.04 dBm 462.6472030 MHz M1[1] 1.98 dBm 462.6429340 MHz</p> <p>H1 30.040 dBm H2 4.040 dBm</p> <p>CF 462.65 MHz 1001 pts 5.0 kHz/ Span 50.0 kHz</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td></td> <td>1</td> <td>462.642934 MHz</td> <td>1.98 dBm</td> <td></td> <td></td> </tr> <tr> <td>T1</td> <td></td> <td>1</td> <td>462.6443057 MHz</td> <td>12.59 dBm</td> <td>Occ Bw</td> <td>11.88811888 kHz</td> </tr> <tr> <td>T2</td> <td></td> <td>1</td> <td>462.6561938 MHz</td> <td>13.50 dBm</td> <td></td> <td></td> </tr> <tr> <td>D1</td> <td>M1</td> <td>1</td> <td>14.491 kHz</td> <td>2.76 dB</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td></td> <td>1</td> <td>462.647203 MHz</td> <td>30.04 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 6.DEC.2019 11:46:25</p>	Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1		1	462.642934 MHz	1.98 dBm			T1		1	462.6443057 MHz	12.59 dBm	Occ Bw	11.88811888 kHz	T2		1	462.6561938 MHz	13.50 dBm			D1	M1	1	14.491 kHz	2.76 dB			M2		1	462.647203 MHz	30.04 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
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T2		1	462.6561938 MHz	13.50 dBm																																									
D1	M1	1	14.491 kHz	2.76 dB																																									
M2		1	462.647203 MHz	30.04 dBm																																									



Appendix C:Emission Mask

Test Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-GMRS	FM	CH _{M1}	<p>The figure is a spectrum plot titled 'Spectrum' showing the emission mask and signal for a TX-GMRS FM test. The y-axis represents power in dBm, ranging from -60 to 30. The x-axis represents frequency in kHz, with a span of 140.0 kHz centered at 462.65 MHz. A red stepped line represents the emission mask, and a blue line represents the measured signal. The signal is centered around 462.650280 MHz with a peak level of 36.94 dBm. The plot also shows a noise floor around -40 dBm. Technical parameters at the top include: Ref Level 39.00 dBm, Att 17 dB, SWI 14 ms (~23 ms), RBW 300 Hz, VBW 1 kHz, and Mode Auto FFT. The date and time are 6 DEC 2019 11:40:32.</p>



Appendix D:Modulation Limit

Test Mode	Modulation Type	Test Channel	Modulation Level (dB)	Peak Frequency Deviation (Hz)				Limit (kHz)	Result
				300	1004	1500	2500		
TX-GMRS	FM	CH _{M1}	-20	0.108	0.358	0.411	0.351	5	PASS
TX-GMRS	FM	CH _{M1}	-15	0.137	0.593	0.675	0.577	5	PASS
TX-GMRS	FM	CH _{M1}	-10	0.166	0.999	1.171	0.978	5	PASS
TX-GMRS	FM	CH _{M1}	-5	0.25	1.746	2.039	1.722	5	PASS
TX-GMRS	FM	CH _{M1}	0	0.385	3.065	3.516	3.066	5	PASS
TX-GMRS	FM	CH _{M1}	5	0.647	4.08	4.081	3.996	5	PASS
TX-GMRS	FM	CH _{M1}	10	1.104	4.544	4.244	4.066	5	PASS
TX-GMRS	FM	CH _{M1}	15	1.92	4.461	4.267	4.25	5	PASS
TX-GMRS	FM	CH _{M1}	20	2.585	4.497	4.281	4.28	5	PASS



Appendix D:Modulation Limit

Test Mode	Modulation Type	Test Channel	TEST PLOT RESULT																																																												
TX-GMRS	FM	CH _{M1}	<table border="1"><caption>Approximate Peak Deviation (kHz) vs Modulation Level (dB)</caption><thead><tr><th>Modulation Level (dB)</th><th>Limit (kHz)</th><th>300 (kHz)</th><th>1004 (kHz)</th><th>1500 (kHz)</th><th>2500 (kHz)</th></tr></thead><tbody><tr><td>-20</td><td>5.0</td><td>0.0</td><td>0.4</td><td>0.4</td><td>0.4</td></tr><tr><td>-15</td><td>5.0</td><td>0.1</td><td>0.6</td><td>0.6</td><td>0.6</td></tr><tr><td>-10</td><td>5.0</td><td>0.2</td><td>1.0</td><td>1.0</td><td>1.0</td></tr><tr><td>-5</td><td>5.0</td><td>0.3</td><td>1.8</td><td>1.8</td><td>1.8</td></tr><tr><td>0</td><td>5.0</td><td>0.4</td><td>3.0</td><td>3.0</td><td>3.0</td></tr><tr><td>5</td><td>5.0</td><td>0.6</td><td>4.0</td><td>4.0</td><td>4.0</td></tr><tr><td>10</td><td>5.0</td><td>1.0</td><td>4.5</td><td>4.5</td><td>4.5</td></tr><tr><td>15</td><td>5.0</td><td>1.8</td><td>4.5</td><td>4.5</td><td>4.5</td></tr><tr><td>20</td><td>5.0</td><td>2.6</td><td>4.5</td><td>4.5</td><td>4.5</td></tr></tbody></table>	Modulation Level (dB)	Limit (kHz)	300 (kHz)	1004 (kHz)	1500 (kHz)	2500 (kHz)	-20	5.0	0.0	0.4	0.4	0.4	-15	5.0	0.1	0.6	0.6	0.6	-10	5.0	0.2	1.0	1.0	1.0	-5	5.0	0.3	1.8	1.8	1.8	0	5.0	0.4	3.0	3.0	3.0	5	5.0	0.6	4.0	4.0	4.0	10	5.0	1.0	4.5	4.5	4.5	15	5.0	1.8	4.5	4.5	4.5	20	5.0	2.6	4.5	4.5	4.5
Modulation Level (dB)	Limit (kHz)	300 (kHz)	1004 (kHz)	1500 (kHz)	2500 (kHz)																																																										
-20	5.0	0.0	0.4	0.4	0.4																																																										
-15	5.0	0.1	0.6	0.6	0.6																																																										
-10	5.0	0.2	1.0	1.0	1.0																																																										
-5	5.0	0.3	1.8	1.8	1.8																																																										
0	5.0	0.4	3.0	3.0	3.0																																																										
5	5.0	0.6	4.0	4.0	4.0																																																										
10	5.0	1.0	4.5	4.5	4.5																																																										
15	5.0	1.8	4.5	4.5	4.5																																																										
20	5.0	2.6	4.5	4.5	4.5																																																										

**Appendix E:Aduio Frequency Response**

Test Mode	Modulation Type	Test Channel	Frequency (Hz)	Audio Frequency Response (dB)	Lower Limit	Upper Limit	Result
TX-GMRS	FM	CH _{M1}	100	-31.38			PASS
TX-GMRS	FM	CH _{M1}	200	-31.42			PASS
TX-GMRS	FM	CH _{M1}	300	-16.54	-17.84	-9.42	PASS
TX-GMRS	FM	CH _{M1}	400	-11.03	-12.86	-6.93	PASS
TX-GMRS	FM	CH _{M1}	500	-8.10	-9.00	-5.00	PASS
TX-GMRS	FM	CH _{M1}	600	-5.01	-7.42	-3.42	PASS
TX-GMRS	FM	CH _{M1}	700	-3.40	-6.09	-2.09	PASS
TX-GMRS	FM	CH _{M1}	800	-2.03	-4.93	-0.93	PASS
TX-GMRS	FM	CH _{M1}	900	-0.81	-3.91	0.09	PASS
TX-GMRS	FM	CH _{M1}	1000	0.06	-3.00	1.00	PASS
TX-GMRS	FM	CH _{M1}	1200	0.56	-1.42	2.58	PASS
TX-GMRS	FM	CH _{M1}	1400	1.89	-0.09	3.91	PASS
TX-GMRS	FM	CH _{M1}	1600	3.24	1.07	5.07	PASS
TX-GMRS	FM	CH _{M1}	1800	3.49	2.09	6.09	PASS
TX-GMRS	FM	CH _{M1}	2000	4.99	3.00	7.00	PASS
TX-GMRS	FM	CH _{M1}	2100	5.13	3.42	7.42	PASS
TX-GMRS	FM	CH _{M1}	2200	5.44	3.83	7.83	PASS
TX-GMRS	FM	CH _{M1}	2300	5.63	4.21	8.21	PASS
TX-GMRS	FM	CH _{M1}	2400	6.34	4.58	8.58	PASS
TX-GMRS	FM	CH _{M1}	2500	6.91	4.93	8.93	PASS
TX-GMRS	FM	CH _{M1}	2600	7.15	4.59	9.27	PASS
TX-GMRS	FM	CH _{M1}	2700	7.66	4.27	9.60	PASS
TX-GMRS	FM	CH _{M1}	2800	8.01	3.95	9.91	PASS
TX-GMRS	FM	CH _{M1}	2900	8.32	3.65	10.22	PASS
TX-GMRS	FM	CH _{M1}	3000	8.16	3.35	10.51	PASS
TX-GMRS	FM	CH _{M1}	3500	-30.73			PASS
TX-GMRS	FM	CH _{M1}	4000	-30.95			PASS
TX-GMRS	FM	CH _{M1}	4500	-30.42			PASS
TX-GMRS	FM	CH _{M1}	5000	-30.55			PASS



Appendix E:Aduio Frequency Response

Test Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-GMRS	FM	CH _{M1}	<p>RESPONSE ATTENUATION (dB)</p> <p>FREQUENCY (Hz)</p> <p>Legend: — Audio Frequency Response (dB) — Upper Limit</p>

**Appendix F:Audio Low Pass Filter Response**

Test Mode	Modulation Type	Test Channel	Audio Frequency(Hz)	Audio Frequency Response(dB)	Limit	Result
TX-GMRS	FM	CH _{M1}	1000	-15.32	0	PASS
TX-GMRS	FM	CH _{M1}	3000	-20.62	0	PASS
TX-GMRS	FM	CH _{M1}	4000	-29.63	-7.5	PASS
TX-GMRS	FM	CH _{M1}	5000	-50.23	-13.3	PASS
TX-GMRS	FM	CH _{M1}	6000	-55.32	-18.1	PASS
TX-GMRS	FM	CH _{M1}	8000	-55.48	-25.6	PASS
TX-GMRS	FM	CH _{M1}	10000	-55.35	-31.4	PASS
TX-GMRS	FM	CH _{M1}	15000	-55.87	-41.9	PASS
TX-GMRS	FM	CH _{M1}	20000	-55.74	-50	PASS
TX-GMRS	FM	CH _{M1}	30000	-55.31	-50	PASS
TX-GMRS	FM	CH _{M1}	40000	-55.77	-50	PASS
TX-GMRS	FM	CH _{M1}	50000	-55.61	-50	PASS
TX-GMRS	FM	CH _{M1}	60000	-56.22	-50	PASS
TX-GMRS	FM	CH _{M1}	70000	-55.42	-50	PASS
TX-GMRS	FM	CH _{M1}	80000	-55.74	-50	PASS
TX-GMRS	FM	CH _{M1}	90000	-56.38	-50	PASS
TX-GMRS	FM	CH _{M1}	100000	-55.79	-50	PASS



Appendix F:Audio Low Pass Filter Response

Test Mode	Modulation Type	Test Channel	TEST PLOT RESULT																					
TX-GMRS	FM	CH _{M1}	<p>The graph displays the audio low pass filter response for TX-GMRS FM. The y-axis represents the response in dB, ranging from 0 to -70. The x-axis represents the audio frequency in Hz, ranging from 1000 to 100,000. A red line indicates the limit, and a blue line indicates the actual audio frequency response. The response starts at approximately -15 dB at 1000 Hz, drops to -20 dB at 3000 Hz, then to -50 dB at 5000 Hz, and finally to -55 dB at 100,000 Hz. The limit starts at 0 dB, drops to -10 dB at 3000 Hz, and then to -50 dB at 20,000 Hz.</p> <table border="1"><caption>Approximate data points from the graph</caption><thead><tr><th>Audio Frequency (Hz)</th><th>Limit (dB)</th><th>Audio Frequency Response (dB)</th></tr></thead><tbody><tr><td>1000</td><td>0</td><td>-15</td></tr><tr><td>3000</td><td>-10</td><td>-20</td></tr><tr><td>5000</td><td>-20</td><td>-50</td></tr><tr><td>10000</td><td>-30</td><td>-55</td></tr><tr><td>20000</td><td>-50</td><td>-55</td></tr><tr><td>100000</td><td>-50</td><td>-55</td></tr></tbody></table>	Audio Frequency (Hz)	Limit (dB)	Audio Frequency Response (dB)	1000	0	-15	3000	-10	-20	5000	-20	-50	10000	-30	-55	20000	-50	-55	100000	-50	-55
Audio Frequency (Hz)	Limit (dB)	Audio Frequency Response (dB)																						
1000	0	-15																						
3000	-10	-20																						
5000	-20	-50																						
10000	-30	-55																						
20000	-50	-55																						
100000	-50	-55																						



Appendix G:Frequency Stability Test & Temperature

Test Mode	Modulation Type	Test Conditions		Frequency error (ppm)	Limit (ppm)	Result
		Voltage	Temperature	CH _{M1}		
TX-GMRS	FM	V _N	-30	-0.523	±5	PASS
TX-GMRS	FM	V _N	-20	-0.517	±5	PASS
TX-GMRS	FM	V _N	-10	-0.508	±5	PASS
TX-GMRS	FM	V _N	0	-0.495	±5	PASS
TX-GMRS	FM	V _N	10	-0.487	±5	PASS
TX-GMRS	FM	V _N	20	-0.464	±5	PASS
TX-GMRS	FM	V _N	30	-0.479	±5	PASS
TX-GMRS	FM	V _N	40	-0.486	±5	PASS
TX-GMRS	FM	V _N	55	-0.497	±5	PASS



Appendix H:Frequency Stability Test & Voltage

Test Mode	Modulation Type	Test Conditions		Frequency error (ppm)	Limit (ppm)	Result
		Voltage	Temperature	CH _{M1}		
TX-GMRS	FM	V _N	T _N	-0.464	±5	PASS
TX-GMRS	FM	V _L	T _N	-0.514	±5	PASS
TX-GMRS	FM	V _H	T _N	-0.487	±5	PASS

----End of Report----