



Shenzhen GUOREN Certification Technology Service Co., Ltd.

101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community,
Fenghuang Street, Guangming District, Shenzhen, China

**TEST REPORT
FCC Part 95**

Report Reference No......: **GRCTR260102045-01**

FCC ID.....: **2AQQS-E02**

Compiled by

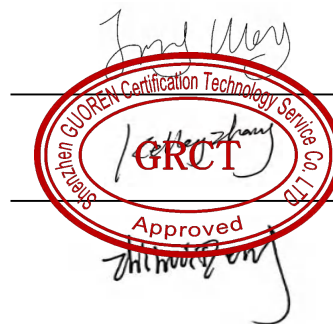
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Date of issue.....: May. 28, 2026

Testing Laboratory Name.....: **Shenzhen GUOREN Certification Technology Service Co., Ltd.**

Address.....: 101#, Building K & Building T, The Second Industrial Zone, Jiazitang
Community, Fenghuang Street, Guangming District, Shenzhen, China

Applicant's name.....: **Shenzhen Todakj Co. Ltd.**

Address.....: 2nd Floor, Xinshidai Stationery Factory Building, Tiegang
Community, Xixiang Subdistrict, Bao'an District, Shenzhen, Guangdong
Province, China

Test specification.....:

Standard.....: **FCC CFR Title 47 Part 95B**

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Test item description.....: **TOW WAY RADIO**

Trade Mark.....: /

Manufacturer.....: **Shenzhen Todakj Co. Ltd.**

Model/Type reference.....: E02

Listed Models: TD-E02

Modulation: FM

Hardware version.....: V 1.0

Software version: V 1.0

Frequency.....: FRS:462.5625MHz~462.7125MHz
FRS:462.5500MHz~462.5750MHz
FRS:467.5625MHz~467.7125MHz

Rating.....: DC 5V Powered by adapter
DC 3.7V By Li-ion rechargeable battery

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

TEST REPORT

Equipment under Test : TOW WAY RADIO

Model /Type : E02

Listed Models : TD-E02

Applicant : **Shenzhen Todakj Co. Ltd.**

Address : 2nd Floor, Xinshidai Stationery Factory Building,Tiegang
Community,XixiangSubdistrict,Bao'an District, Shenzhen,
Guangdong Province,China

Manufacturer : **Shenzhen Todakj Co. Ltd.**

Address : 2nd Floor, Xinshidai Stationery Factory Building,Tiegang
Community,XixiangSubdistrict,Bao'an District, Shenzhen,
Guangdong Province,China

Test result	Pass
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 95](#): PERSONAL RADIO SERVICES.

[ANSI C63.10-2020+COR. 1-2023+C63.10A-2024 + ERRATA TO C63.10A-2024](#): American National Standard for Testing Unlicensed Wireless Devices

[ANSI C63.26:2015](#): American National Standard of procedures for compliance testing of transmitters used in licensed radio services.

1.2 Test Description

Description of Test Item	Standard clause	Verdict
Maximum Transmitter Power	FCC Part 95.567	PASS
Modulation Characteristic	FCC Part 2.1047 FCC Part 95.575	PASS
Occupied Bandwidth and Emission Mask	FCC Part 2.1049 FCC Part 95.573 FCC Part 95.579	PASS
Radiated Spurious Emission	FCC Part 95.579	PASS
Frequency Stability	FCC Part 2.1055 FCC Part 95.565	PASS

Remark: The measurement uncertainty is not included in the test result.

2 GENERAL INFORMATION

2.1 General Remarks

Date of receipt of test sample	:	Jan. 27, 2026
Testing commenced on	:	Jan. 27, 2026
Testing concluded on	:	May. 28, 2026

2.2 Product Description

Product Name:	TOW WAY RADIO
Model/Type reference:	E02
Listed Models:	TD-E02(The products are identical in interior structure, electrical circuits and components, just model names and color are different.)
Power Supply	DC 5V Powered by adapter or DC 3.7V By Li-ion rechargeable battery
Adapter Information:	M/N:BS05A-050100US Input:100-240V~ 50/60Hz 0.25A Max Output:5V $\overline{\overline{=}}$ 1000mA
Testing sample ID:	GRCTR260102045-01-1#(Engineer sample) GRCTR260102045-01-2#(Normal sample)
Frequency Range	FRS:462.5625MHz~462.7125MHz FRS:462.5500MHz~462.5750MHz FRS:467.5625MHz~467.7125MHz
Modulation Type	FM
Channel Separation	12.5KHz
Antenna Type	Spring antenna
Antenna gain*(Supplied by the customer):	1.01dBi
Remark:*When the information provided by the customer was used to calculate test results, if the information provided by the customer is not accurate, shenzhen GUOREN Certification Technology Service Co., Ltd. does not assume any responsibility.	

2.3 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. As, test modes selected as below by the technical parameters of the EUT:

Operation Mode No.	Modulation	Channel Separation	Condition	
	FM	12.5KHz	TX	RX
1	☒	☒	☒	
2	☒	☒		☒

Frequency list

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	462.5625	12	467.6625
2	462.5875	13	467.6875
3	462.6125	14	467.7125
4	462.6375	15	462.5500
5	462.6625	16	462.5750
6	462.6875		
7	462.7125		
8	467.5625		
9	467.5875		
10	467.6125		
11	467.6375		

Note: Per C63.26 the above frequencies in bold were performed the test.

2.4 Equipment Under Test**Power supply system utilised**

Power supply voltage	:	☐ 230V / 50 Hz	☐ 120V / 60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

DC 3.7V by Li-ion rechargeable battery

2.5 Short description of the Equipment under Test (EUT)

This is a TOW WAY RADIO.

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

2.6 Block Diagram of Test Setup**2.7 Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended to comply with FCC Part 95 & RSS-210 Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen GUOREN Certification Technology Service Co., Ltd.

101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community, Fenghuang Street, Guangming District, Shenzhen, China

3.2 Test Facility

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

FCC-Registration No.: 920798 Designation Number: CN1304

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6202.01

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

ISED#: 27264 CAB identifier: CN0115

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

CNAS-Lab Code: L15631

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories for the Competence of Testing and Calibration Laboratories.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

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

Normal Temperature	15-35 °C
Relative Humidity	30-60 %
Air Pressure	950-1050mbar

3.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen GUOREN Certification Technology Service Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GUOREN Certification Technology Service Co., Ltd.:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)
Max output power	30MHz~18GHz	0.54 dB	(1)
Spectrum bandwidth	/	1.2%	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	GRCTEE009	2025/09/11	2026/09/10
LISN	R&S	ENV216	GRCTEE010	2025/09/11	2026/09/10
EMI Test Receiver	R&S	ESPI	GRCTEE017	2025/09/11	2026/09/10
EMI Test Receiver	R&S	ESCI	GRCTEE008	2025/09/11	2026/09/10
Spectrum Analyzer	Agilent	N9020A	GRCTEE002	2025/09/11	2026/09/10
Spectrum Analyzer	R&S	FSP	GRCTEE003	2025/09/12	2026/09/11
Vector Signal generator	Agilent	N5181A	GRCTEE007	2025/09/11	2026/09/10
Analog Signal Generator	R&S	SML03	GRCTEE006	2025/09/11	2026/09/10
Climate Chamber	QIYA	LCD-9530	GRCTES016	2025/09/11	2026/09/10
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	GRCTEE018	2023/09/28	2026/09/27
Horn Antenna	Schwarzbeck	BBHA 9120D	GRCTEE019	2023/09/28	2026/09/27
Loop Antenna	Zhinan	ZN30900C	GRCTEE020	2023/10/15	2026/10/14
Horn Antenna	Beijing Hangwei Dayang	OBH100400	GRCTEE049	2023/09/28	2026/09/27

Amplifier	Schwarzbeck	BBV 9745	GRCTEE021	2025/09/11	2026/09/10
Amplifier	Taiwan chengyi	EMC051845B	GRCTEE022	2025/09/11	2026/09/10
Temperature/Humidity Meter	Huaguan	HG-308	GRCTES037	2025/09/11	2026/09/10
Directional coupler	NARDA	4226-10	GRCTEE004	2025/09/11	2026/09/10
High-Pass Filter	XingBo	XBLBQ-GTA18	GRCTEE053	2025/09/11	2026/09/10
High-Pass Filter	XingBo	XBLBQ-GTA27	GRCTEE054	2025/09/11	2026/09/10
Automated filter bank	Tonscend	JS0806-F	GRCTEE055	2025/09/11	2026/09/10
Power Sensor	Agilent	U2021XA	GRCTEE070	2025/09/11	2026/09/10
Cable	Times	Cable-CE	GRCTEE086	2025/09/11	2026/09/10
Cable	Times	Cable-RE-1	GRCTEE087	2025/09/11	2026/09/10
Cable	Times	Cable-RE-2	GRCTEE088	2025/09/11	2026/09/10
EMI Test Software	ROHDE & SCHWARZ	ESK1-V1.71	GRCTEE060	N/A	N/A
EMI Test Software	Fera	EZ-EMC	GRCTEE061	N/A	N/A

4 TEST CONDITIONS AND RESULTS

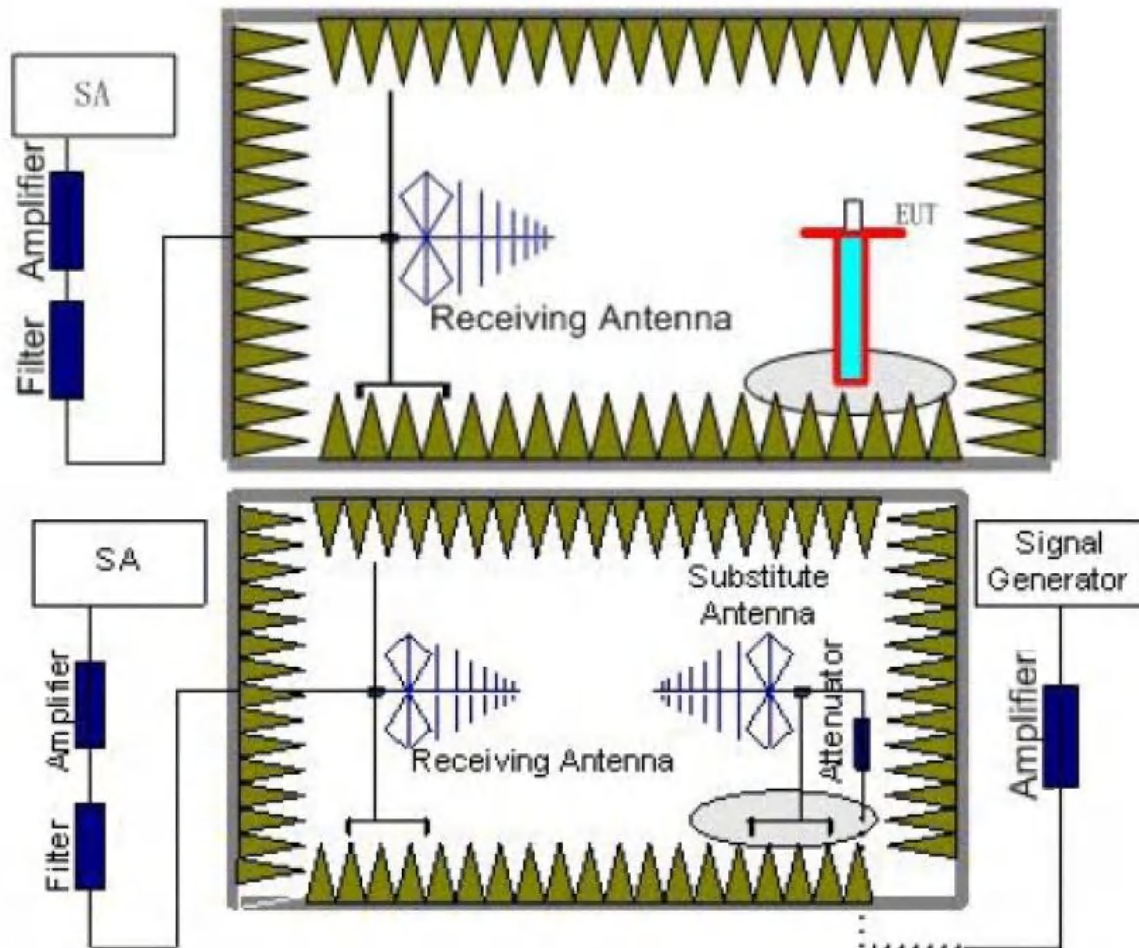
4.1 Maximum Transmitter Power

LIMITS

According to FCC Part 95.567:

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.

TEST CONFIGURATION



Measurement Procedure

1. EUT was placed on a 1.5 meter 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 height of receiving antenna is 1.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all test transmit frequencies 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, 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 (P_r). 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. An amplifier may 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 (P_{Ag}) should be recorded after test. The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

TEST RESULTS

Remark;

The field strength of radiation emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The data show in this report only with the worst case setup. After exploratory measurement the worst case of Z axis and receiver antenna at vertical polarization was reported.

Test Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dBi)	P_{Ag} (dB)	Correction (dB)	ERP (dBm)	ERP (W)	Limit (W)	Polarization
462.6375	-1.62	2.41	6.9	31.89	2.15	32.61	1.8239	2	V
462.5500	-1.57	2.41	6.9	31.89	2.15	32.66	1.8450	2	V
467.6375	-7.77	2.42	6.9	31.91	2.15	26.47	0.444	0.5	V

Remark:

1. $EIRP = P_{Mea}(\text{dBm}) + P_{Ag}(\text{dB}) - P_{cl}(\text{dB}) + G_a(\text{dBi})$
2. $ERP = EIRP - 2.15\text{dBi}$ as EIRP by subtracting the gain of the dipole.

4.2 Occupied Bandwidth and Emission Mask

LIMITS

According to FCC 95.573:

Each FRS transmitter type must be designed such that the occupied bandwidth does not exceed 12.5 kHz.

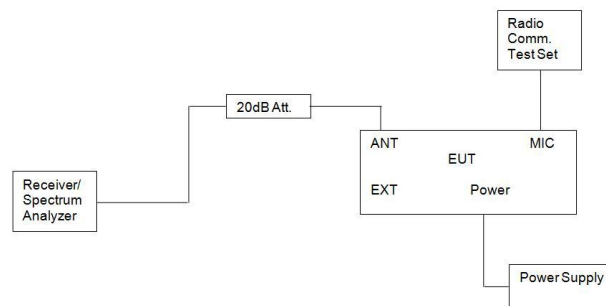
According to FCC 95.579:

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

At least 35 dB on any frequency removed from the centre of the authorized bandwidth by more than 100 % up to and including 250 % of the authorized bandwidth.

At least $43 + 10 \log_{10}(T)$ dB on any frequency removed from the centre of the authorized bandwidth by more than 250 %.

TEST CONFIGURATION

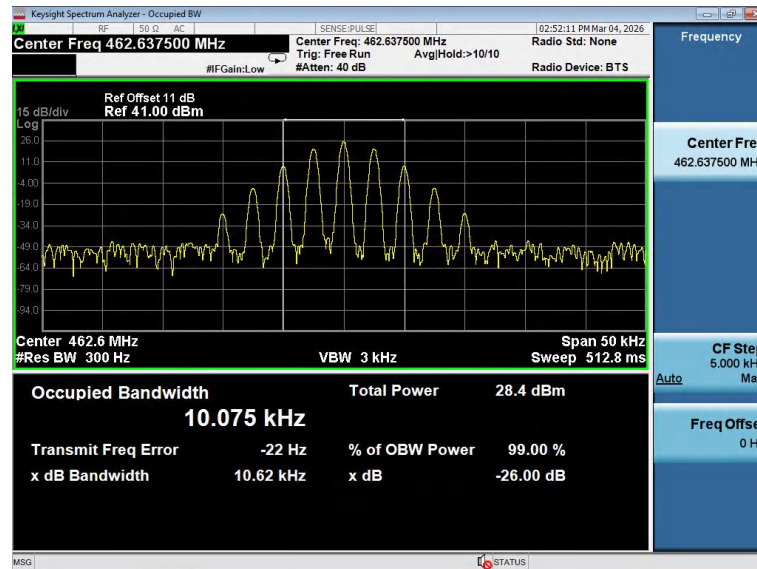


TEST PROCEDURE

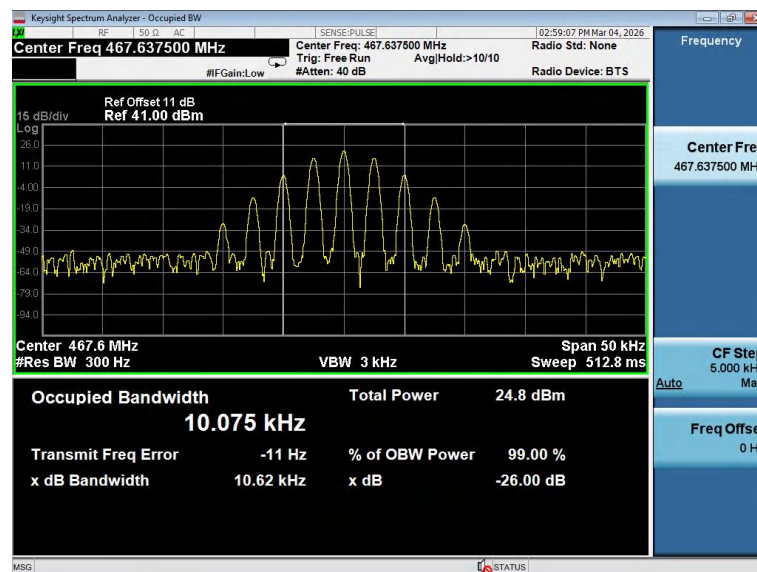
- 1 The EUT was modulated by 2.5 KHz Sine wave audio signal; the level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing).
- 2 Set SPA Center Frequency = fundamental frequency, RBW=300Hz, VBW= 3 KHz, span =50 KHz.
- 3 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

TEST RESULTS**Emission Bandwidth:**

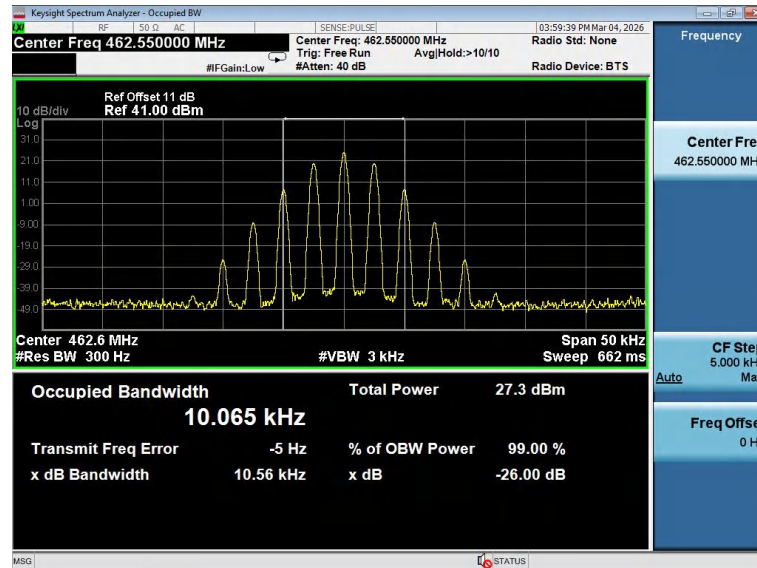
Modulation	Frequency (MHz)	Occupied Bandwidth (kHz)	26dB bandwidth (kHz)	Occupied Bandwidth Limit (KHz)	Result
FM	462.6375	10.075	10.62	20	Pass



Modulation	Frequency (MHz)	Occupied Bandwidth (kHz)	26dB bandwidth (kHz)	Occupied Bandwidth Limit (KHz)	Result
FM	467.6375	10.075	10.62	12.5	Pass

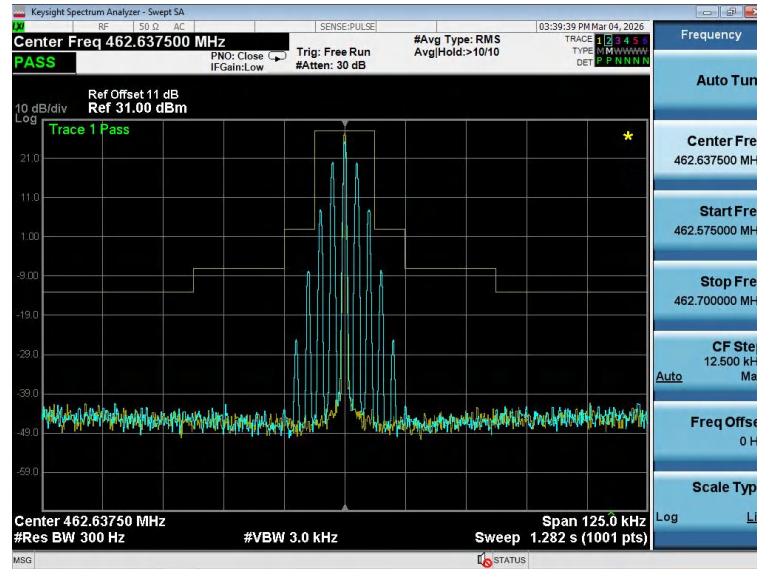


Modulation	Channel	Occupied Bandwidth (kHz)	26dB bandwidth (kHz)	Occupied Bandwidth Limit (KHz)	Result
FM	462.5500	10.065	10.56	20	Pass

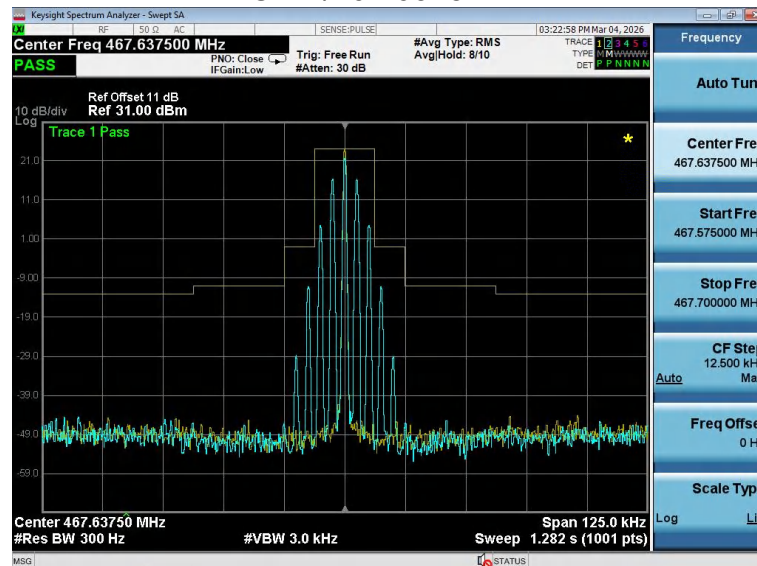


Emission Mask:

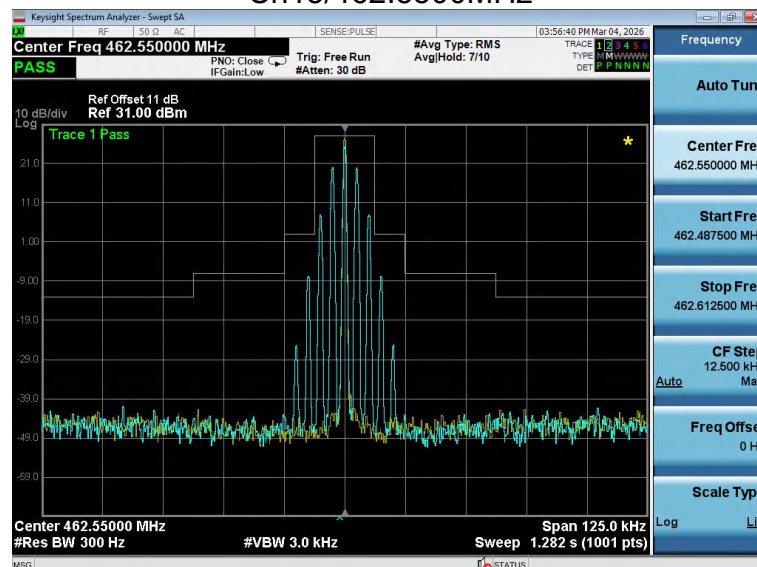
Ch4/462.6375MHz



Ch11/467.6375MHz



Ch15/462.5500MHz



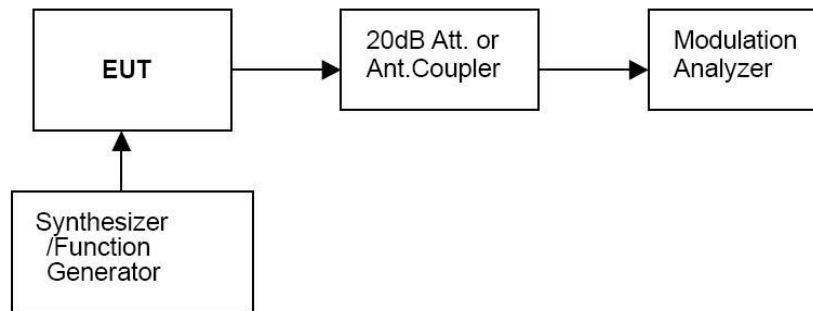
4.3 Modulation Characteristic

LIMITS

According to FCC 95.575:

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.

TEST CONFIGURATION



TEST PROCEDURE

Modulation Limit

- 1 Configure the EUT as shown in test configuration, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.
- 2 Repeat step 1 with input frequency changing to 300, 1004, 1500 and 2500Hz in sequence.

Audio Frequency Response

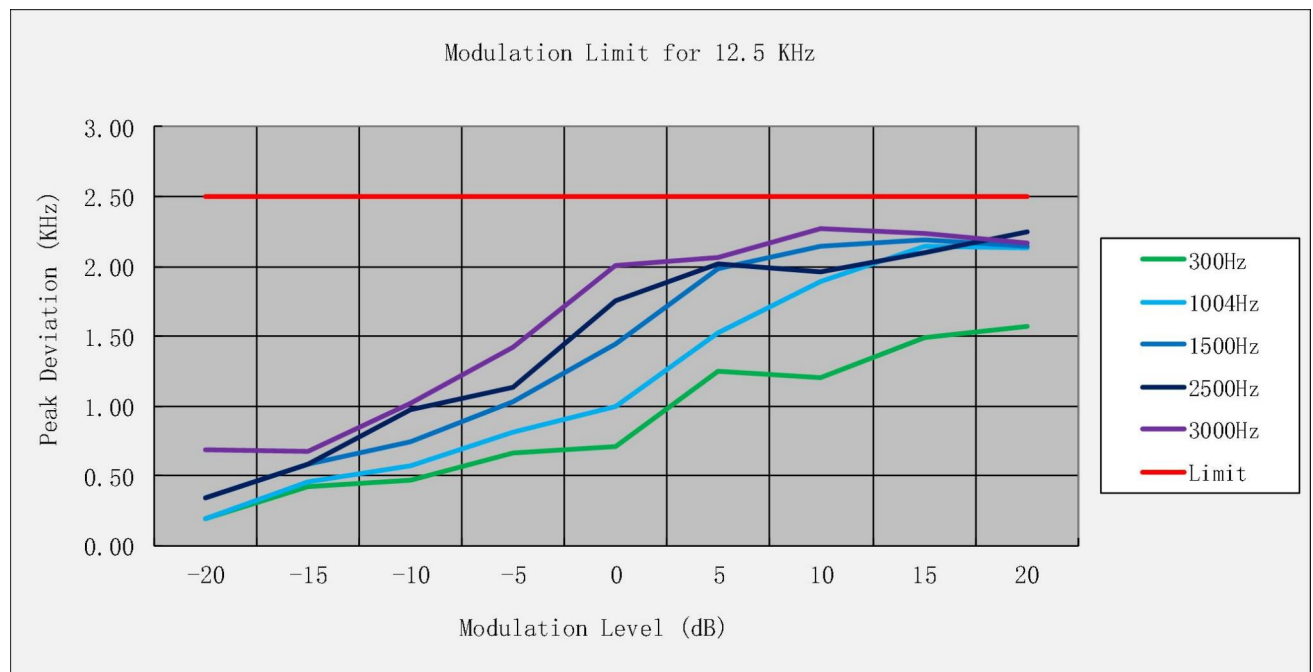
- 1 Configure the EUT as shown in test configuration.
- 2 Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0dB).
- 3 Vary the Audio frequency from 100 Hz to 3125KHz and record the frequency deviation.
- 4 Audio Frequency Response = $20\log_{10} (\text{Deviation of test frequency} / \text{Deviation of 1 KHz reference})$.

Audio Low Pass Filter Response

- 1 Connect the equipment as illustrated.
- 2 Connect the Audio Generator as close as possible the input of the post limiter low pass filter within the transmitter under test.
- 3 Connect the RF Communications Test Set to the output of the post limiter low pass filter within the transmitter under test.
- 4 Apply a 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.
- 5 Record the dB level of the 1000 Hz spectral line on the RF Communications Test Set as LEV_{REF} .
- 6 Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.
- 7 Record RF Communications Test Set levels, at the test frequency in step 8)
- 8 Record the dB level on the RF Communications Test Set as LEV_{FREQ} .

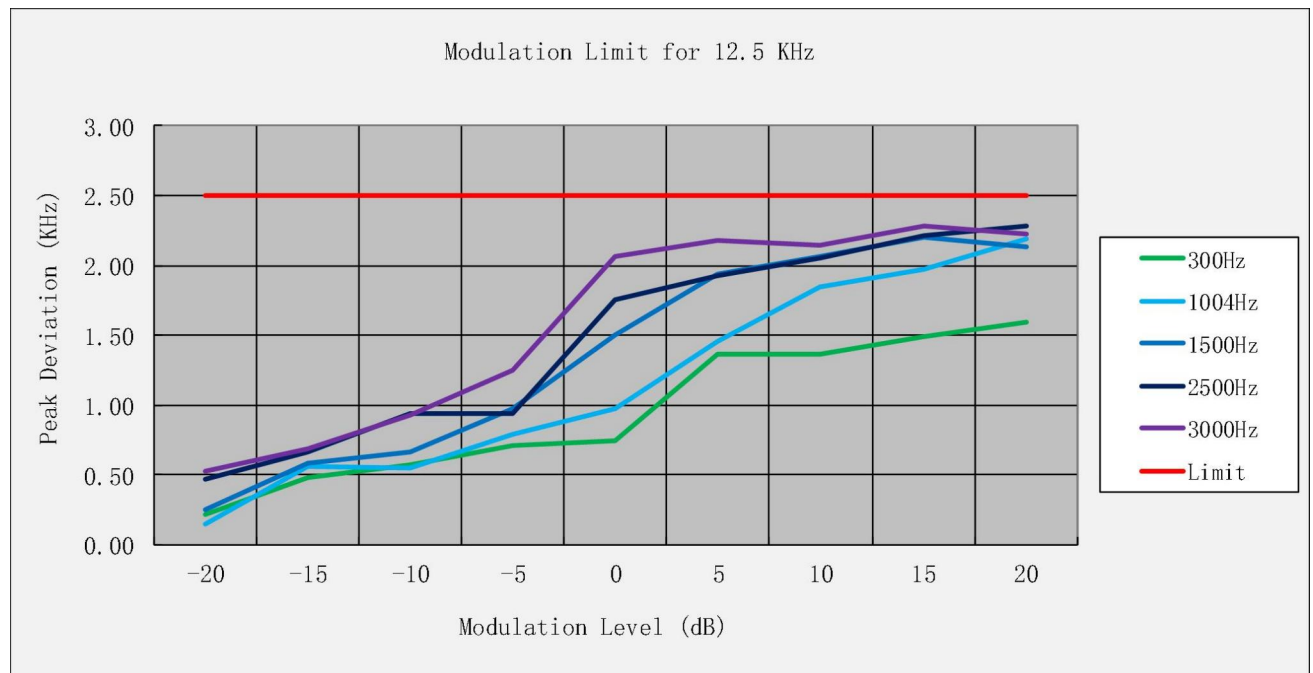
TEST RESULTS**a) Modulation Limit:****Ch4/462.6375MHz**

Modulation Level(dB)	Peak Freq. Deviation At 300 Hz(KHz)	Peak Freq. Deviation At 1004 Hz(KHz)	Peak Freq. Deviation At 1500 Hz(KHz)	Peak Freq. Deviation At 2500 Hz(KHz)	Peak Freq. Deviation At 3000 Hz(KHz)
-20	0.20	0.20	0.34	0.34	0.69
-15	0.42	0.46	0.58	0.58	0.68
-10	0.47	0.57	0.75	0.98	1.02
-5	0.66	0.82	1.03	1.14	1.42
0	0.71	1.00	1.45	1.76	2.01
+5	1.25	1.53	1.98	2.02	2.07
+10	1.21	1.89	2.14	1.96	2.27
+15	1.49	2.14	2.19	2.10	2.24
+20	1.57	2.13	2.14	2.25	2.17



Ch11/467.6375MHz

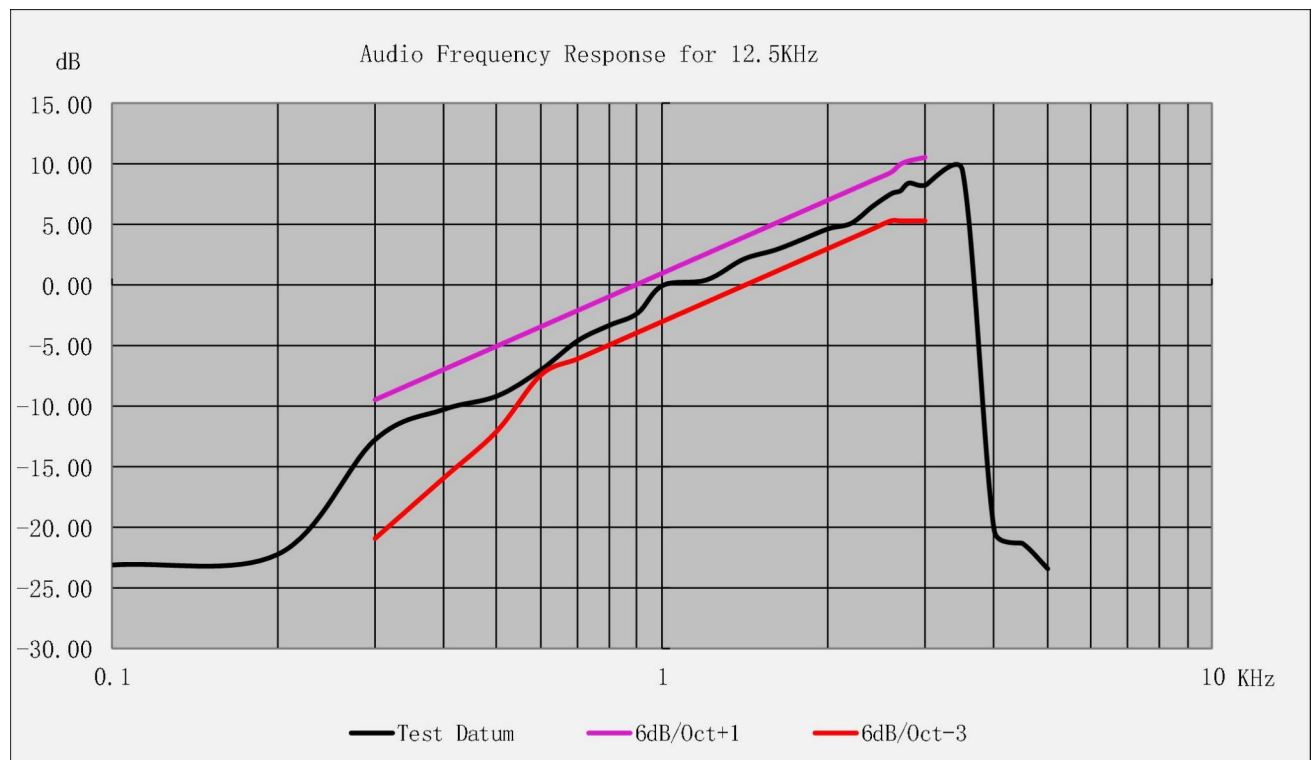
Modulation Level(dB)	Peak Freq. Deviation At 300 Hz(KHz)	Peak Freq. Deviation At 1004 Hz(KHz)	Peak Freq. Deviation At 1500 Hz(KHz)	Peak Freq. Deviation At 2500 Hz(KHz)	Peak Freq. Deviation At 3000 Hz(KHz)
-20	0.22	0.15	0.25	0.47	0.53
-15	0.48	0.56	0.59	0.66	0.69
-10	0.57	0.55	0.67	0.94	0.93
-5	0.71	0.79	0.97	0.94	1.25
0	0.75	0.98	1.50	1.75	2.07
+5	1.36	1.46	1.94	1.93	2.18
+10	1.36	1.85	2.06	2.05	2.15
+15	1.49	1.97	2.20	2.21	2.28
+20	1.59	2.19	2.13	2.28	2.23



b) Audio Frequency Response:

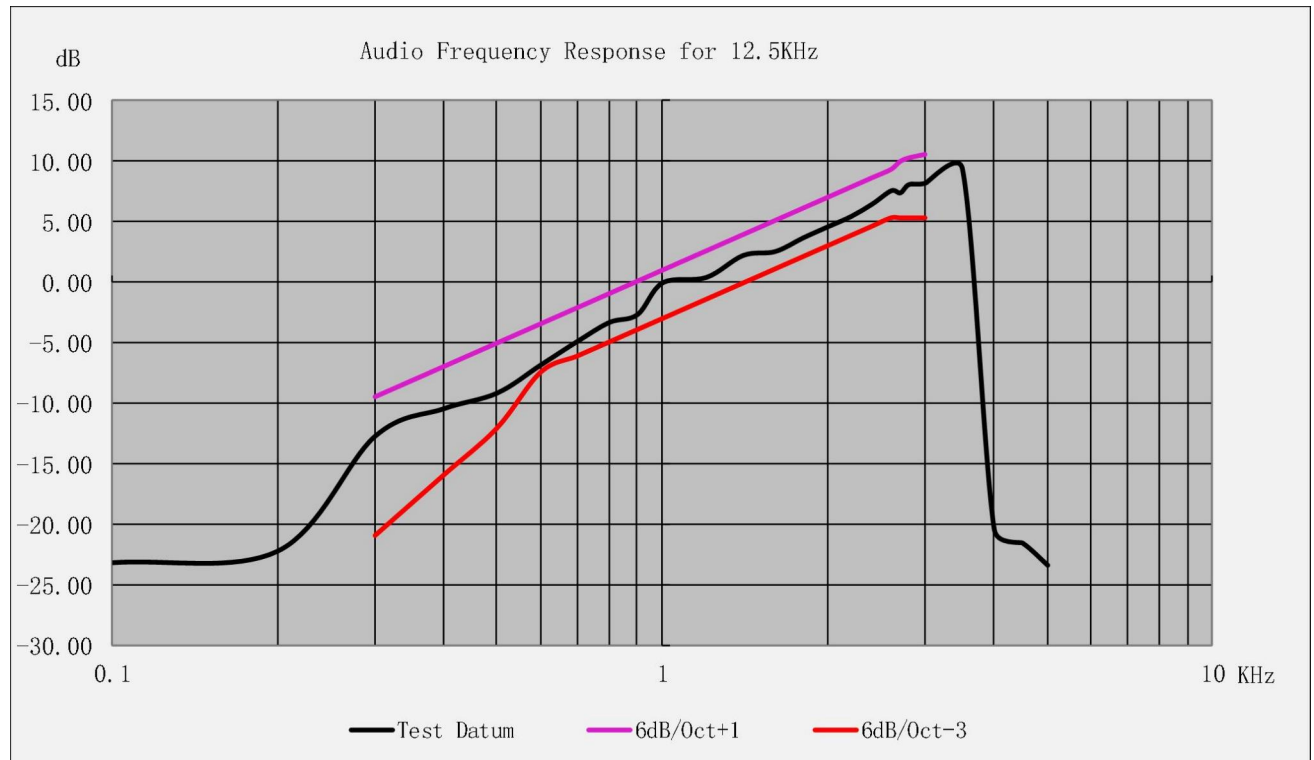
Ch4/462.6375MHz

Frequency (KHz)	Frequency Deviation (KHz)	1KHz Reference Deviation (KHz)	Audio Frequency Response (dB)
0.1	0.05	0.76	-23.10
0.2	0.06	0.76	-22.22
0.3	0.17	0.76	-12.77
0.4	0.23	0.76	-10.26
0.5	0.27	0.76	-9.15
0.6	0.34	0.76	-7.00
0.7	0.45	0.76	-4.59
0.8	0.52	0.76	-3.30
0.9	0.58	0.76	-2.30
1.0	0.76	0.76	0.00
1.2	0.80	0.76	0.44
1.4	0.97	0.76	2.15
1.6	1.06	0.76	2.92
1.8	1.18	0.76	3.83
2.0	1.30	0.76	4.68
2.2	1.37	0.76	5.13
2.4	1.61	0.76	6.50
2.6	1.82	0.76	7.57
2.7	1.87	0.76	7.80
2.8	2.01	0.76	8.45
3.0	1.97	0.76	8.28
3.5	2.27	0.76	9.49
4.0	0.07	0.76	-20.30
4.5	0.07	0.76	-21.32
5.0	0.05	0.76	-23.41



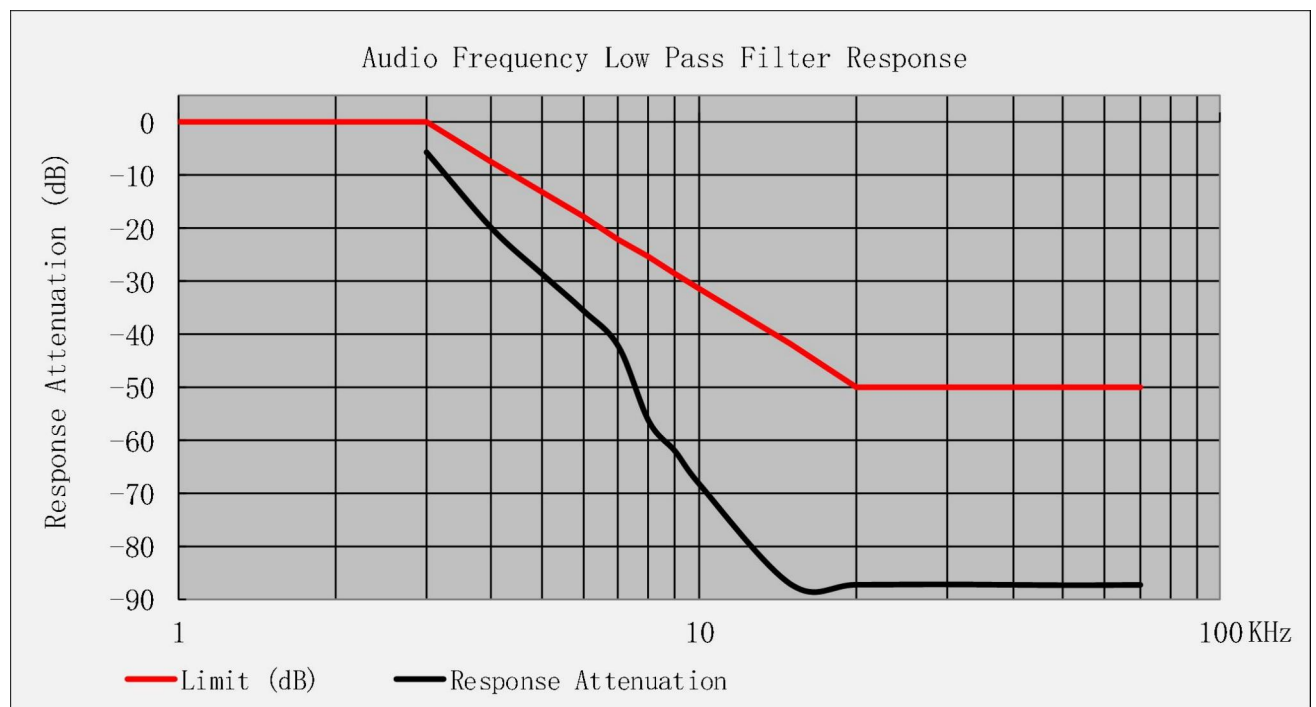
Ch11/467.6375MHz

Frequency (KHz)	Frequency Deviation (KHz)	1KHz Reference Deviation (KHz)	Audio Frequency Response (dB)
0.1	0.06	0.85	-23.15
0.2	0.07	0.85	-22.19
0.3	0.20	0.85	-12.71
0.4	0.26	0.85	-10.42
0.5	0.30	0.85	-9.13
0.6	0.39	0.85	-6.81
0.7	0.49	0.85	-4.85
0.8	0.58	0.85	-3.28
0.9	0.63	0.85	-2.63
1.0	0.85	0.85	0.00
1.2	0.89	0.85	0.44
1.4	1.10	0.85	2.26
1.6	1.14	0.85	2.58
1.8	1.30	0.85	3.72
2.0	1.45	0.85	4.65
2.2	1.60	0.85	5.49
2.4	1.80	0.85	6.50
2.6	2.04	0.85	7.61
2.7	2.00	0.85	7.43
2.8	2.16	0.85	8.12
3.0	2.19	0.85	8.24
3.5	2.51	0.85	9.41
4.0	0.08	0.85	-20.43
4.5	0.07	0.85	-21.52
5.0	0.06	0.85	-23.36



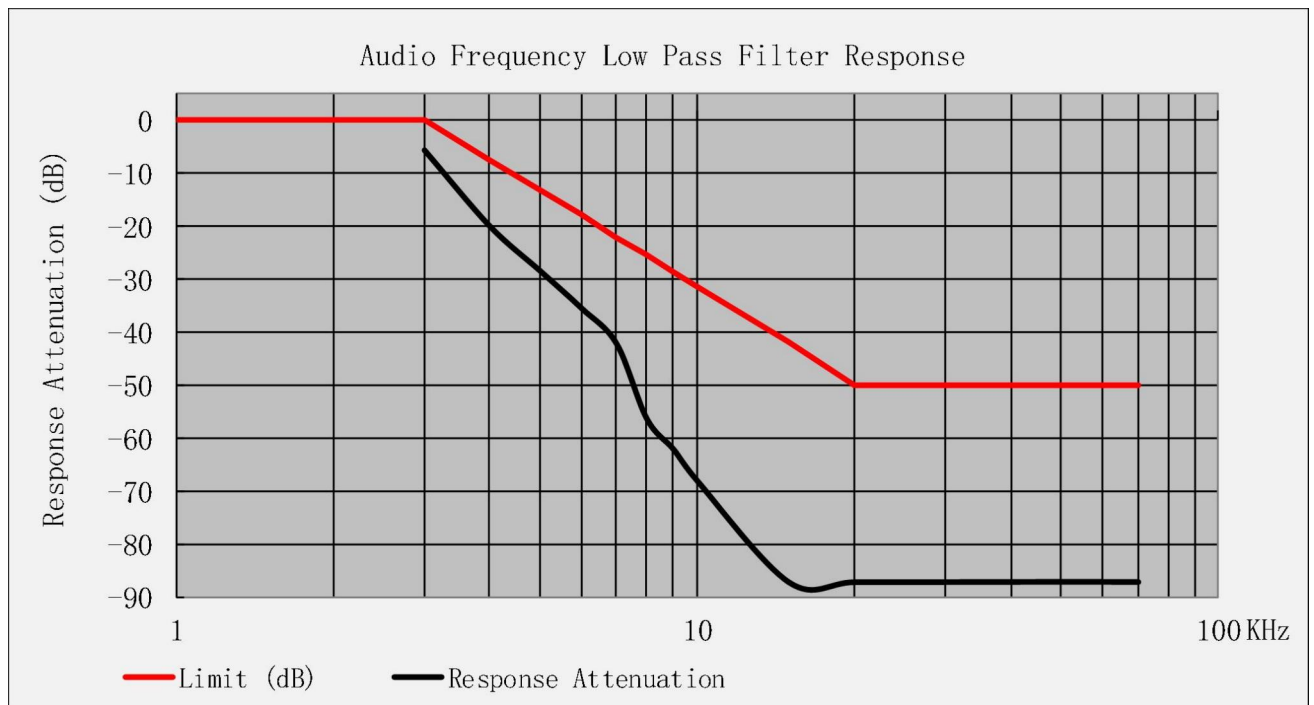
Audio Low Pass Filter Response**Ch4/462.6375MHz**

Audio Frequency (KHz)	Response Attenuation (dB)	Limit (dB)
3	-5.66	0
4	-20.04	-7.5
5	-28.7	-13.31
6	-35.61	-18.06
7	-42.38	-22.08
8	-56.46	-25.56
9	-62.22	-28.63
10	-68.36	-31.37
15	-87.33	-41.94
20	-87.35	-50
30	-87.29	-50
50	-87.44	-50
70	-87.38	-50



Ch11/467.6375MHz

Audio Frequency (KHz)	Response Attenuation (dB)	Limit (dB)
3	-5.66	0
4	-20.01	-7.5
5	-28.52	-13.31
6	-35.57	-18.06
7	-42.27	-22.08
8	-56.46	-25.56
9	-62.25	-28.63
10	-68.24	-31.37
15	-87.45	-41.94
20	-87.39	-50
30	-87.37	-50
50	-87.32	-50
70	-87.36	-50



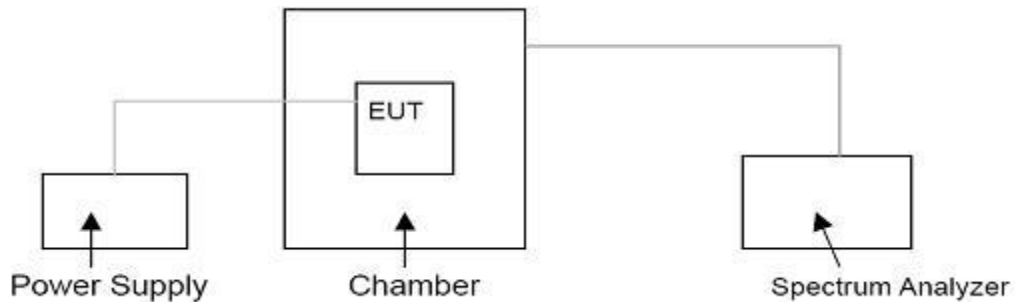
4.4 Frequency Stability

LIMITS

According to FCC 95.565

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

TEST CONFIGURATION



TEST PROCEDURE

The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Spectrum Analyzer. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST RESULTS

Reference Frequency: 462.6375MHz					
Voltage (V)	Temperature (°C)	Frequency error (Hz)	Frequency Tolerance (ppm)	Limit (ppm)	Result
3.70	-30	697	1.51	±2.5	Pass
	-20	696	1.50		
	-10	310	0.67		
	0	289	0.62		
	10	299	0.65		
	20	555	1.20		
	30	-608	-1.31		
	40	-365	-0.79		
	50	211	0.46		
4.26	25	-552	-1.19	±2.5	Pass
3.15	25	697	1.51		

Reference Frequency: 462.5500MHz					
Voltage (V)	Temperature (°C)	Frequency error (Hz)	Frequency Tolerance (ppm)	Limit (ppm)	Result
3.70	-30	210	0.45	±2.5	Pass
	-20	684	1.48		
	-10	-187	-0.40		
	0	-509	-1.10		
	10	775	1.68		
	20	39	0.08		
	30	553	1.20		
	40	-294	-0.64		
	50	-332	-0.72		
4.26	25	192	0.42	±2.5	Pass
3.15	25	210	0.45		

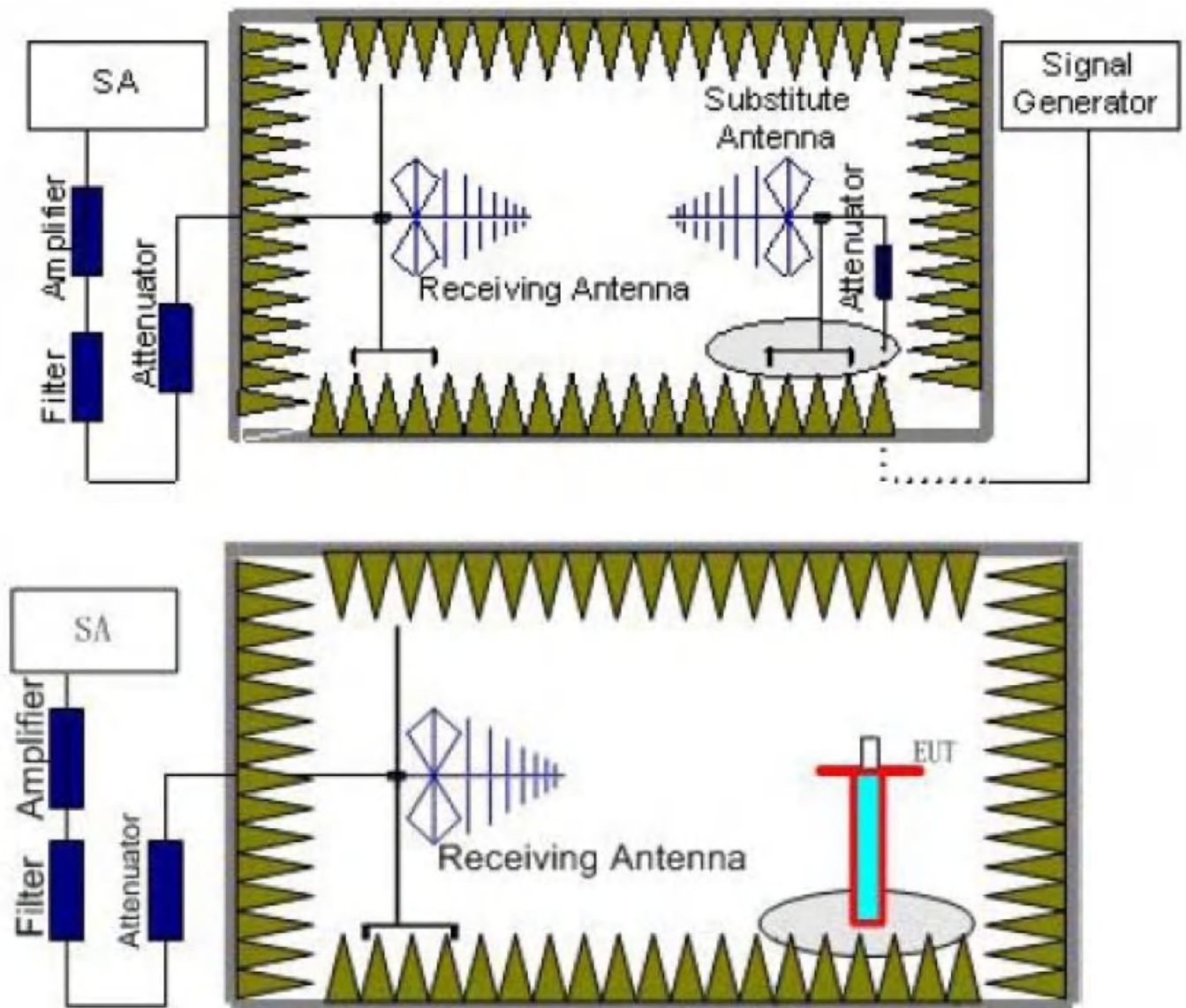
Reference Frequency: 467.6375MHz					
Voltage (V)	Temperature (°C)	Frequency error (Hz)	Frequency Tolerance (ppm)	Limit (ppm)	Result
3.70	-30	-52	-0.11	±2.5	Pass
	-20	-580	-1.25		
	-10	-357	-0.77		
	0	272	0.59		
	10	295	0.64		
	20	174	0.38		
	30	683	1.48		
	40	675	1.46		
	50	-663	-1.43		
4.26	25	221	0.48	±2.5	Pass
3.15	25	-52	-0.11		

4.5 Transmitter Radiated Spurious Emission

Limit

The unwanted emission should be attenuated below TP by at least $43 + 10 \log(\text{Transmit Power})$ dB A on any frequency removed from the centre of the authorized bandwidth by more than 250 %.

TEST CONFIGURATION



TEST PROCEDURE

- a. EUT was placed on a 0.8 meter 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 height of receiving antenna is 1.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all test transmit frequencies were measured with peak detector.
- b. 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.
- c. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum 100 kHz below 1GHz and 1MHz above 1GHz, Sweep from 30MHz to the 10th harmonic of the fundamental frequency; and recorded the level of the concerned spurious emission point as (P_r).
- d. The EUT then 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 (P_r). 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.

The measurement results are obtained as described below:

$$\text{Power}_{(EIRP)} = P_{Mea} - P_{cl} + G_a$$

Where;

P_{Mea} is the recorded signal generator level

P_{cl} is the cable loss connect between instruments

G_a Substitution Antenna Gain

- e. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- f. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

TEST RESULTS

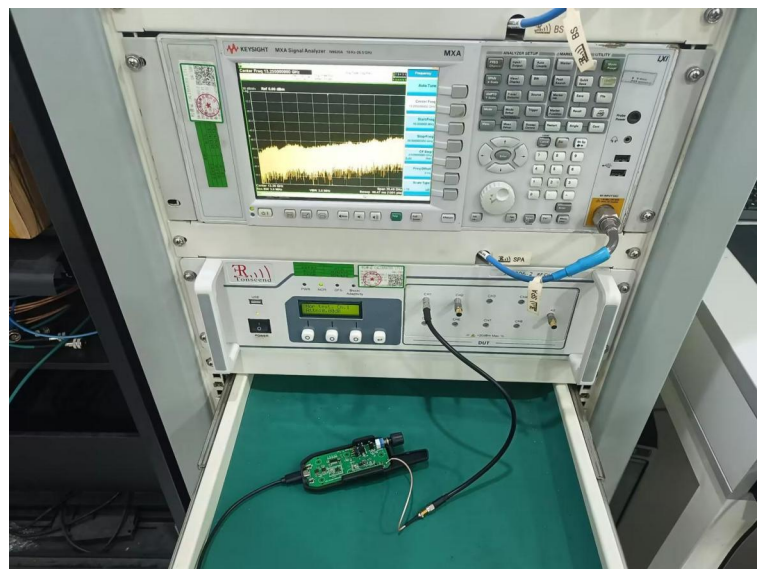
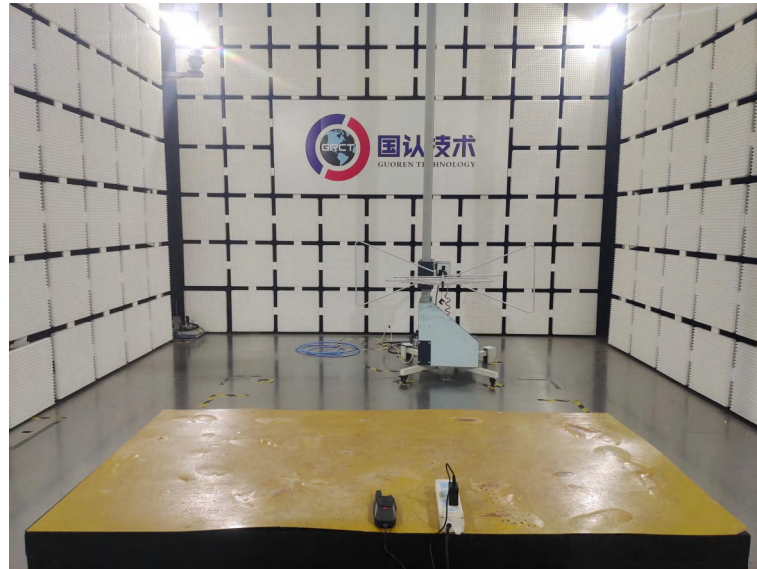
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency; and worst spurious emissions recorded as below:

Test Channel 4/462.6375 MHz							
Frequency(MHz)	P _{Mea} (dBm)	G _a Antenna Gain(dBi)	P _{cl} (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dBm)	Polarity
926.15	-29.95	5.91	2.82	-26.86	-13.00	-13.86	H
1388.20	-33.74	7.45	2.69	-28.98	-13.00	-15.98	H
1852.00	-39.71	9.94	3.21	-32.98	-13.00	-19.98	H
2314.15	-41.50	10.19	3.81	-35.12	-13.00	-22.12	H
--	--	--	--	--	--	--	H
926.15	-28.84	5.91	2.82	-25.75	-13.00	-12.75	V
1388.20	-33.54	7.45	2.69	-28.78	-13.00	-15.78	V
1852.00	-38.89	9.94	3.21	-32.16	-13.00	-19.16	V
2314.15	-40.78	10.19	3.81	-34.40	-13.00	-21.40	V
--	--	--	--	--	--	--	V
Test Channel 11/467.6375 MHz							
Frequency(MHz)	P _{Mea} (dBm)	G _a Antenna Gain(dBi)	P _{cl} (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dBm)	Polarity
936.40	-34.91	5.95	2.85	-31.81	-13.00	-18.81	H
1403.10	-30.83	7.55	2.69	-25.97	-13.00	-12.97	H
1871.75	-39.27	9.95	3.17	-32.49	-13.00	-19.49	H
2339.00	-41.73	10.24	3.83	-35.32	-13.00	-22.32	H
--	--	--	--	--	--	--	H
936.40	-34.60	5.95	2.85	-31.50	-13.00	-18.50	V
1403.10	-30.47	7.55	2.69	-25.61	-13.00	-12.61	V
1871.75	-38.91	9.95	3.17	-32.13	-13.00	-19.13	V
2339.00	-41.07	10.24	3.83	-34.66	-13.00	-21.66	V

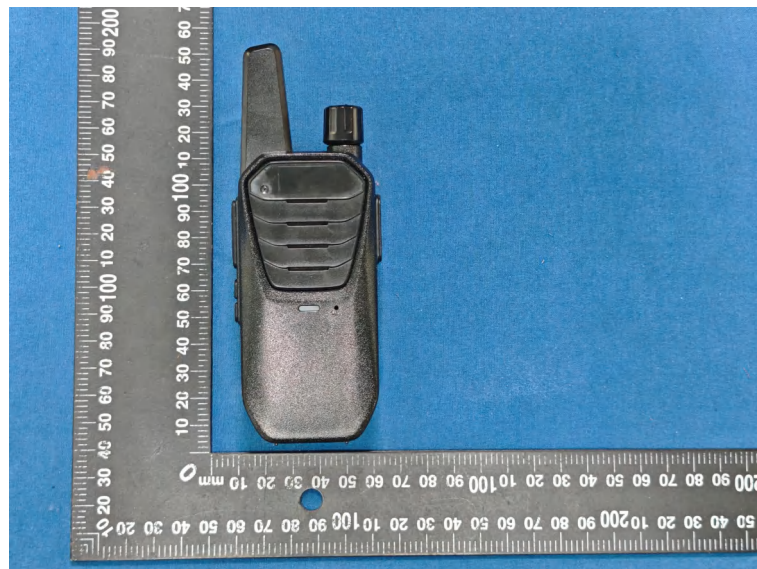
Remark:

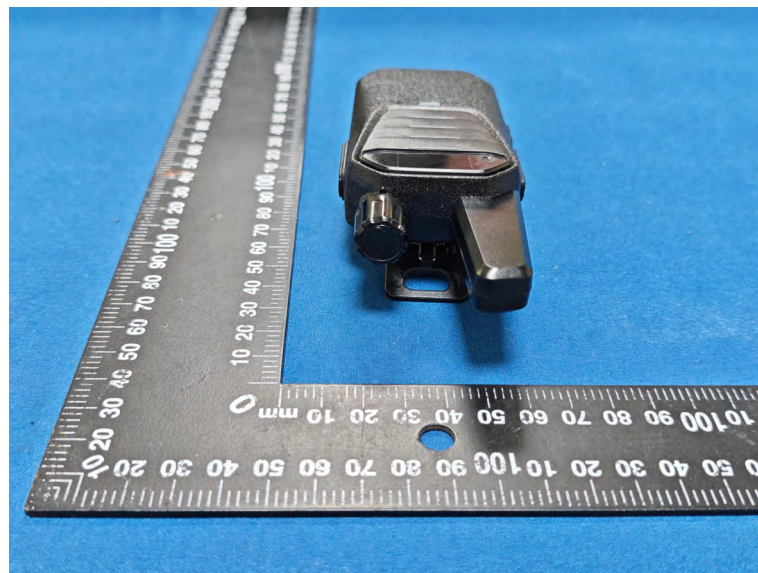
1. $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)$
2. -- Means other points for values lower than limits and not recorded.
3. $Margin = Limit - EIRP$

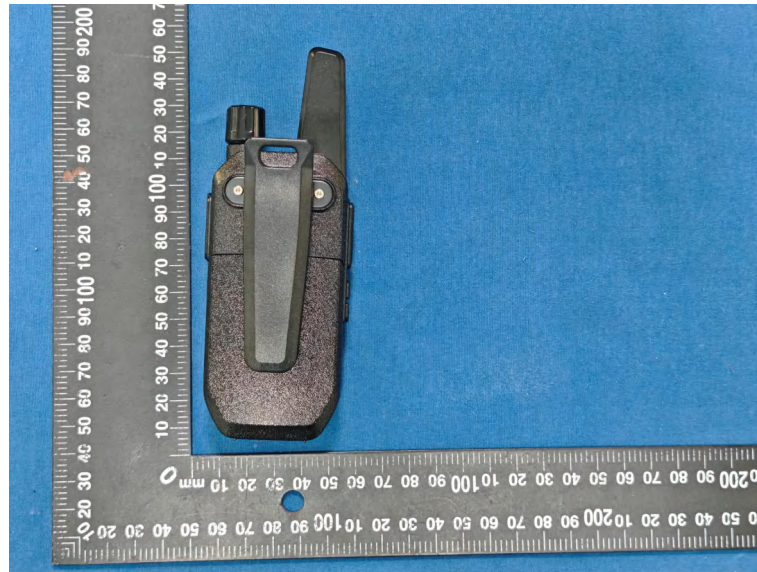
5 Test Setup Photos of the EUT

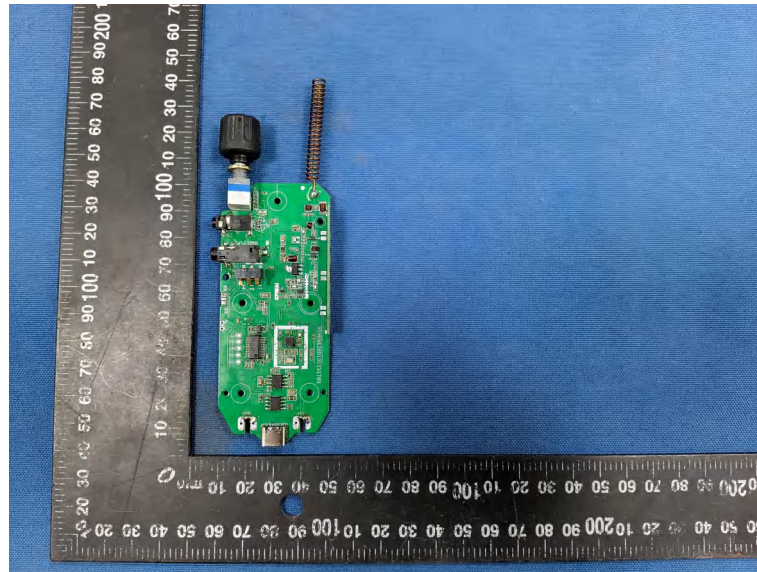


6 External and Internal Photos of the EUT

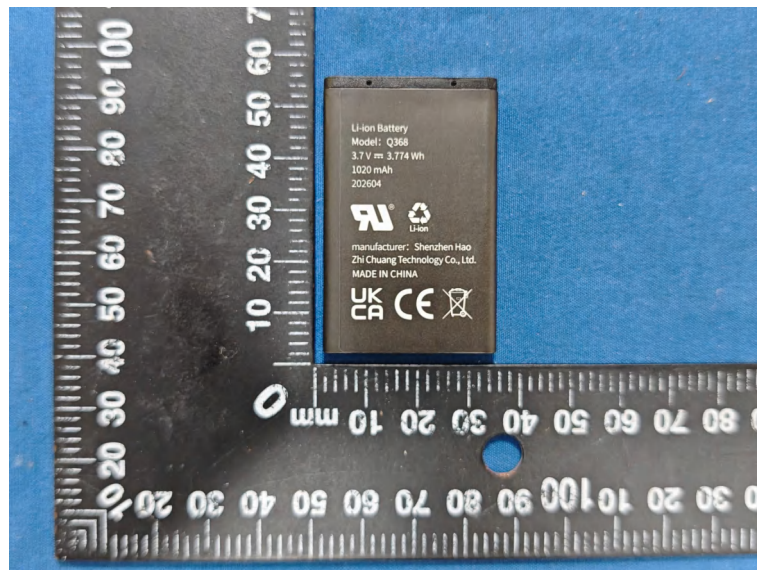
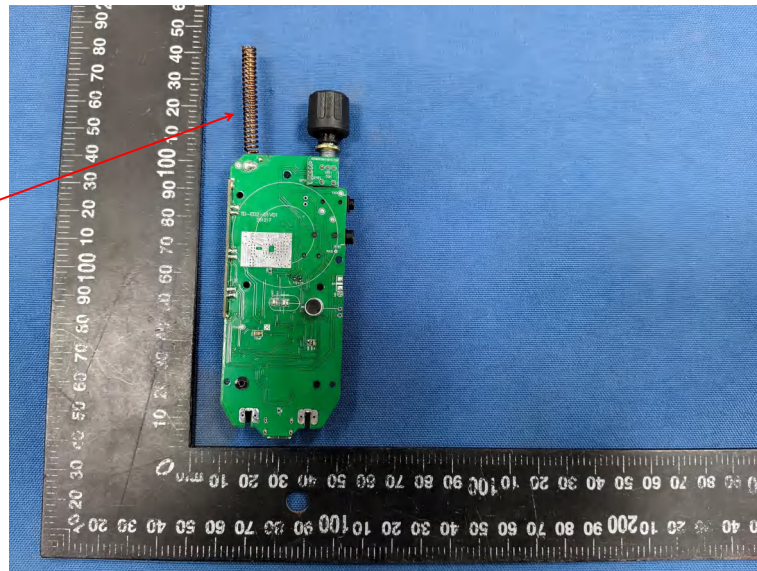








Antenna



***** End of Report *****