FCC TEST REPORT

For

Shenzhen Wisdom Science and Technology Co.,Ltd

POWER TALKIE

Test Model: PT01

List Model No.: Please refer to page 6

Prepared for	:	Shenzhen Wisdom Science and Technology Co.,Ltd
Address	:	Floor 3, Building 6, Jinhuafa Industrial Area, Northeast Side, 2St East Ring Road, Longhua New District, Shenzhen, China.
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	March 05, 2019
Number of tested samples	:	2
Serial number	:	Prototype
Date of Test	:	March 05, 2019~April 26, 2019
Date of Report	:	April 27, 2019

FCC TEST REPORT
FCC CFR 47 PART 95

Report Reference No. ..... :		**LCS190204009AEA**
Date of Issue ..... :		April 27, 2019
Testing Laboratory Name ..... :		**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address ..... :		1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure..... :		Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name ..... :		**Shenzhen Wisdom Science and Technology Co.,Ltd**
Address ..... :		Floor 3, Building 6, Jinhuafa Industrial Area, Northeast Side, 2St East Ring Road, Longhua New District, Shenzhen, China.
Test Specification		
Standard..... :		FCC CFR 47 PART 95
Test Report Form No..... :		LCSEMC-1.0
TRF Originator..... :		Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF ..... :		Dated 2011-03

EUT Description. ..... :		**POWER TALKIE**
Trade Mark..... :		POWER TALKIE, IWOXS
Test Model..... :		PT01
Ratings ..... :		DC 3.8V by Rechargeable Li-ion Polymer Battery (6000mAh) Recharge Voltage: DC 5V
Result ..... :		**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Aking Jin	Calvin Weng	Gavin Liang
Aking Jin/ File administrator	Calvin Weng/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS190204009AEA	April 27, 2019 Date of issue

Test Model.....	:	PT01
EUT.....	:	POWER TALKIE
Applicant.....	**:**	**Shenzhen Wisdom Science and Technology Co.,Ltd**
Address.....	:	Floor 3, Building 6, Jinhuafa Industrial Area, Northeast Side, 2St East Ring Road, Longhua New District, Shenzhen, China.
Telephone.....	:	
Fax.....	:	
Manufacturer.....	**:**	**Shenzhen Wisdom Science and Technology Co.,Ltd**
Address.....	:	Floor 3, Building 6, Jinhuafa Industrial Area, Northeast Side, 2St East Ring Road, Longhua New District, Shenzhen, China.
Telephone.....	:	
Fax.....	:	
Factory.....	**:**	**Shenzhen Wisdom Science and Technology Co.,Ltd**
Address.....	:	Floor 3, Building 6, Jinhuafa Industrial Area, Northeast Side, 2St East Ring Road, Longhua New District, Shenzhen, China.
Telephone.....	:	
Fax.....	:	

Test Result	**Positive**

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.

Revision History

Revision	Issue Date	Revisions	Revised By
000	April 27, 2019	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	POWER TALKIE
Model Number	:	PT01, PT01+, PT02, PT03, PT04, PT05, IW01, IW01+, IW02, IW03, IW04, IW05
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, so no additional models were tested.
Test Model	:	PT01
Power Supply	:	DC 3.8V by Rechargeable Li-ion Polymer Battery (6000mAh) Recharge Voltage: DC 5V
Hardware Version	:	PT0.1 v2,4 1824
Software Version	:	1855
Bluetooth		
Frequency Range	:	2402-2480MHz
Channel Number	:	40 channels
Channel Spacing	:	2MHz
Modulation Type	:	GFSK
Bluetooth Version	:	V4.2 (Support Only BTLE)
Antenna Description	:	Internal Antenna, -2dBi (Max.)
PMR		
Frequency Range	:	462.55MHz~462.725MHz
Channel Number	:	15 channels
Test Channel	:	Channel 5 and 12
Channel Spacing	:	12.5KHz
Modulation Type	:	4FSK
Emission Type	:	F1D
Rate Power	:	2W/1.8W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Antenna Description	:	External antenna, -2dBi (Max.)

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
Kalley	Adaptor (Supplied by Lab.)	ABA-050200U-US1	--	SDOC

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
Micro USB	1	N/A
USB Type-A	1	N/A
Antenna Port	1	N/A

1.4. Description of Test Facility

FCC Registration Number is 254912.
Industry Canada Registration Number is 9642A-1.
ESMD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001.
NVLAP Registration Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. 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 CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS 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.

1.6. Measurement Uncertainty

Test Item	Uncertainty	Note
Frequency error	30 Hz	(1)
Transmitter power conducted	0.62 dB	(1)
Transmitter power Radiated	2.67 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.88 dB	(1)
Conducted Emission 9KHz-30MHz	1.63 dB	(1)
Radiated spurious emission 30~1000MHz	4.65 dB	(1)
Radiated spurious emission 1~18GHz	3.89 dB	(1)
Radiated spurious emission 18-40GHz	3.90 dB	(1)
Occupied Bandwidth	N/A	N/A
Emission Mask	N/A	N/A
Modulation Characteristic	N/A	N/A
Transmitter Frequency Behavior	N/A	N/A

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

1.7. Description of Test Modes

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

Operation Mode	Modulation	Channel Separation	Additional Information
TM1	4FSK	12.5KHz	The EUT transmitting at maximum rate power.
TM2	4FSK	12.5KHz	The EUT transmitting at minimum rate power.

Frequency list:

462 main channels			
Channel	Frequency(MHz)	Type	Rate Power (High/Low)
1	462.5500	GMRS	2 W/1.8 W
2	462.5750	GMRS	
3	462.6000	GMRS	
4	462.6250	GMRS	
5	**462.6500**	**GMRS**	
6	462.6750	GMRS	
7	462.7000	GMRS	
8	462.7250	GMRS	
462 interstitial channels			
Channel	Frequency(MHz)	Type	Rate Power (High/Low)
9	462.5625	GMRS	2 W/1.8 W
10	462.5875	GMRS	
11	462.6125	GMRS	
12	**462.6375**	**GMRS**	
13	462.6625	GMRS	
14	462.6875	GMRS	
15	462.7125	GMRS	

Note1: In section 15.31(m), regards to the operating frequency range less than 1MHz, only one point centered in the frequency range of operation selected to measure.
Note2: The line display in grey was the channel selected for test.

2. TEST METHODOLOGY

2.1. TEST STANDARDS

The tests were performed according to following standards:
FCC Rules Part 95: PERSONAL RADIO SERVICES.
ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
ANSI C63.10: 2013: American National Standard for Testing Unlicensed Wireless Devices
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 40GHz

2.2. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.3. EUT Exercise

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.4. General Test Procedures

2.4.1 Conducted Emissions

N/A

2.4.2 Radiated Emissions

The EUT is placed on a turntable, which is directly placed on the ground. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

2.5. Test Sample

The application provides 1 samples to meet requirement;

Sample Number	Description
Sample 1	continuous transmit

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

N/ A

3.3. Special Accessories

N/ A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

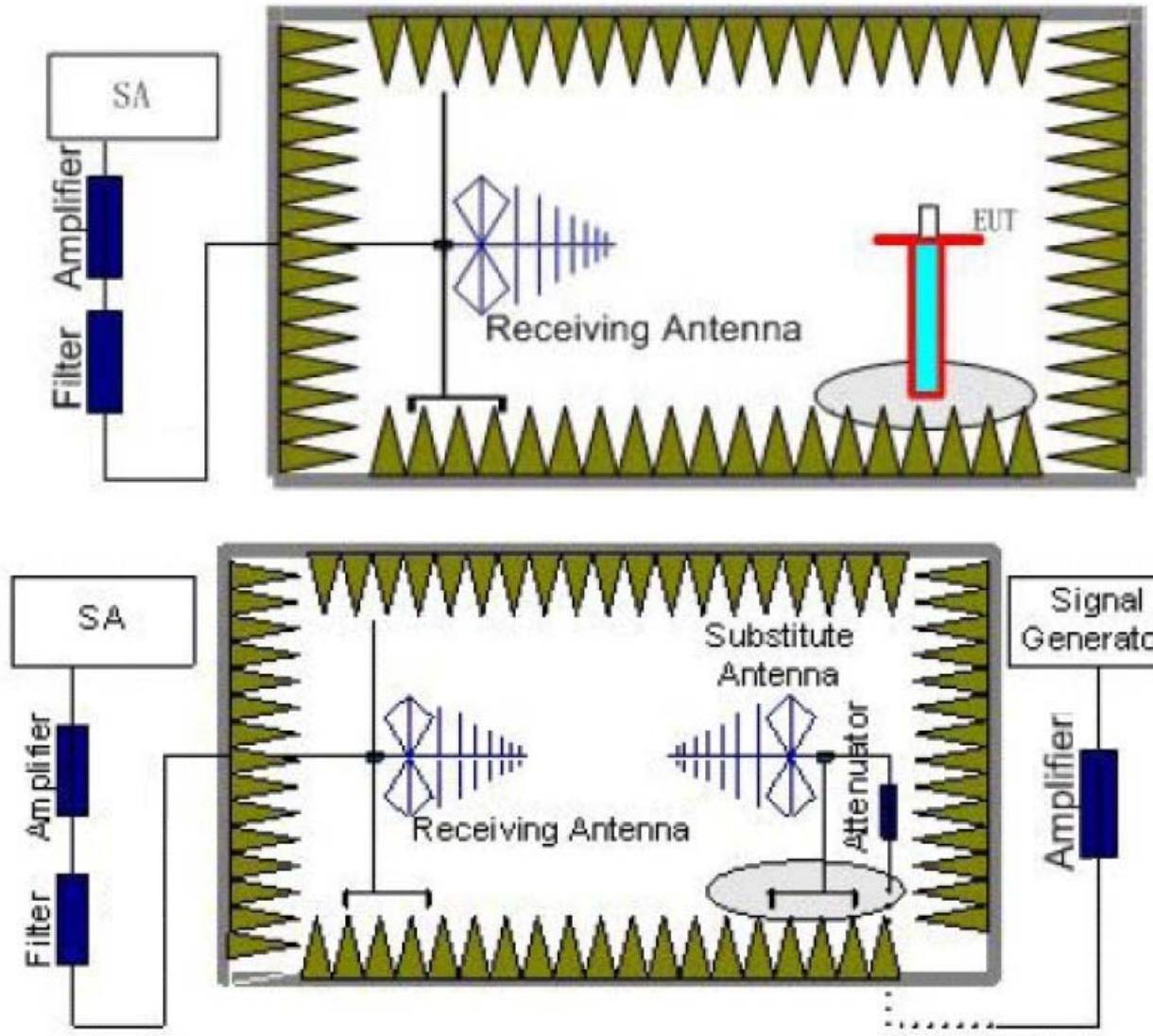
Applied Standard: FCC Part 95				
FCC Rules	Description of Test	Test Sample	Result	Remark
FCC Part 95.1767	Maximum Transmitter Power	Sample 1	Compliant	Note 1
FCC Part 2.1047 FCC Part 95.1775	Modulation Characteristic	Sample 1	Compliant	Note 1
FCC Part 95.1775	Audio Frequency Filter Attenuation	Sample 1	Compliant	Note 1
FCC Part 2.1049 FCC Part 95.1773 FCC Part 95.1779	Occupied Bandwidth and Emission Mask	Sample 1	Compliant	Note 1
FCC Part 95.1779	Radiated Spurious Emission	Sample 1	Compliant	Note 1
FCC Part 2.1055 FCC Part 95.1765	Frequency Stability	Sample 1	Compliant	Note 1

Remark:
1. Note 1 – Test results inside test report;

5. MEASUREMENT RESULTS

5.1. Maximum Transmitter Power

5.1.1 Block Diagram of Test Setup



5.1.2 Limit

According to FCC Part 95.1767:

This section contains transmitting power limits for GMRS stations. The maximum transmitting power depends on which channels are being used and the type of station.

(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 462 MHz 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.

5.1.3 Test Procedure

1. EUT was placed on a 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 height of receiving antenna is 1.5m. 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, a 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:
   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 (2.15dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

5.1.4 Test Results

Temperature	23.8℃	Humidity	54.2%
Test Engineer	David Luo	Test Voltage	Normal Voltage
Test Mode	TM1	Test Date	April 26, 2019

Test Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain (dBi)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	ERP (W)	Polarization	Limit (W)
462.6500	-5.15	2.08	7.69	2.15	34.59	32.90	1.9498	V	50.0
462.6500	-5.21	2.08	7.69	2.15	34.59	32.84	1.9231	H	50.0
462.6375	-5.28	2.08	7.69	2.15	34.59	32.77	1.8923	V	5.0
462.6375	-5.17	2.08	7.69	2.15	34.59	32.88	1.9409	H	5.0

Temperature	23.8℃	Humidity	54.2%
Test Engineer	David Luo	Test Voltage	Normal Voltage
Test Mode	TM2	Test Date	April 26, 2019

Test Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain (dBi)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	ERP (W)	Polarization	Limit (W)
462.6500	-5.54	2.08	7.69	2.15	34.59	32.51	1.7824	V	50.0
462.6500	-5.67	2.08	7.69	2.15	34.59	32.38	1.7298	H	50.0
462.6375	-5.59	2.08	7.69	2.15	34.59	32.46	1.7620	V	5.0
462.6375	-5.53	2.08	7.69	2.15	34.59	32.52	1.7865	H	5.0

Remark:

1. *EIRP=P_{Mea}(dBm) +P_{Ag}(dB) -P_{cl}(dB) +G_a(dBi)*
2. *ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.*
3. *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.*

5.2. Occupied Bandwidth and Emission Mask

5.2.1 Limit

According to FCC 95.573:
Each GMRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the channels used. Operation of GMRS stations must also be in compliance with these requirements.

(a) Main channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz main channels (see §95.1763(a)) or any of the 467 MHz main channels (see §95.1763(c)).
(b) Interstitial channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz interstitial channels (see §95.1763(b)) and is 12.5 kHz for GMRS transmitters operating on any of the 467 MHz interstitial channels (see §95.1763(d)).
(c) Digital data transmissions. Digital data transmissions are limited to the 462 MHz main channels and interstitial channels in the 462 MHz and 467 MHz bands.

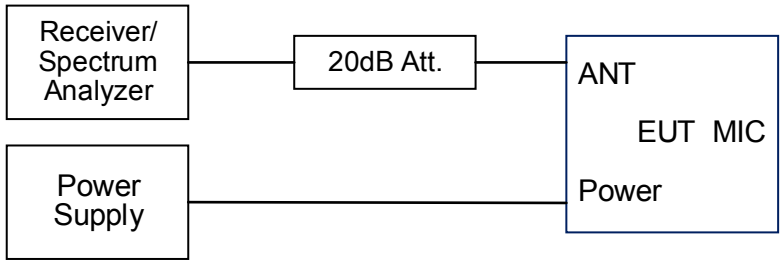
According to FCC 95.1779:
Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

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

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

(1) Filtering noted for GMRS transmitters refers to the requirement in §95.1775(e).
(2) Unwanted emission power may be measured as either mean power or peak envelope power, provided that the transmitter output power is measured the same way.
(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:
(1) 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.
(2) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.
(3) 83 log ($f_d \div 5$) dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz up to and including 10 kHz.
(4) 116 log ($f_d \div 6.1$) dB or 50 + 10 log (P) dB, whichever is the lesser attenuation, on any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz), of more than 10 kHz up to and including 250% of the authorized bandwidth.
(5) 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 150% of the authorized bandwidth.
(6) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 150% up to and including 250% of the authorized bandwidth.
(7) 43 + 10 log (P) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.
(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b) (1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b) (5) of this section is measured with a reference bandwidth of at least 30 kHz.
(d) Measurement conditions. The requirements in this section apply to each GMRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone, power cord and/or antenna.

5.2.2 Block Diagram of Test Setup



5.2.3 Test Procedure

1. Set EUT as normal operation.
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.

5.2.4 Test Results

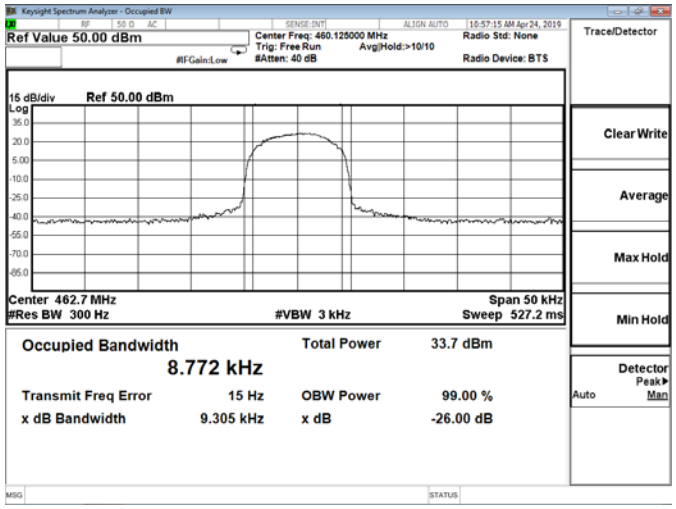
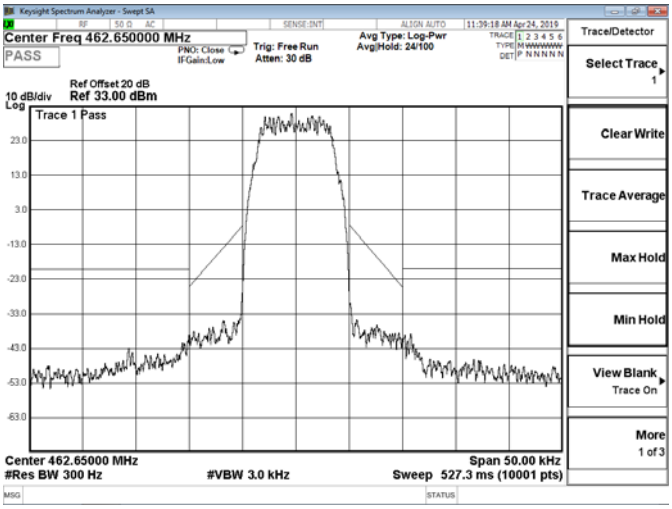
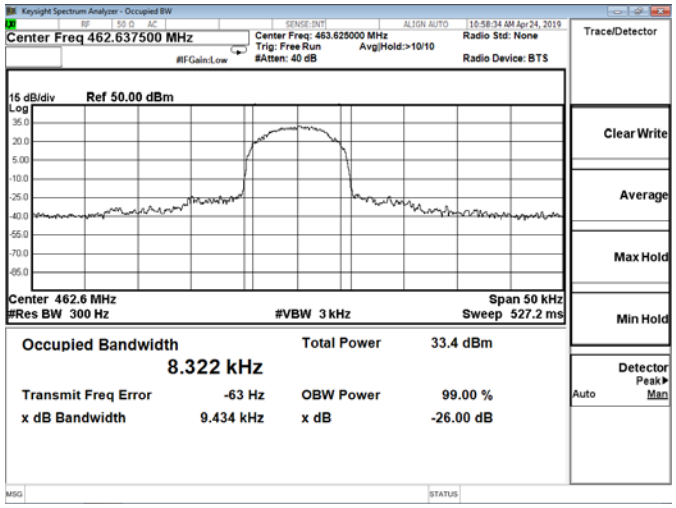
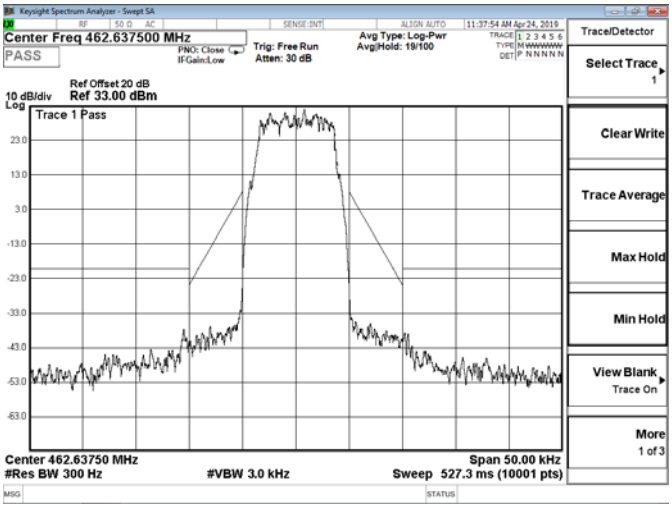
Temperature	23.8℃	Humidity	54.2%
Test Engineer	David Luo	Test Voltage	Normal Voltage
Test Mode	TM1	Test Date	April 26, 2019

Occupied Bandwidth:

Modulation Type	Frequency (MHz)	99% OBW (kHz)	26dB bandwidth (kHz)	Limit (KHz)	Result
Digital/4FSE	462.6500	8.772	9.305	12.5	Pass
Digital/4FSE	462.6375	8.322	9.434	12.5	Pass

Remark:
1. Measured at TM1 to TM2, recorded worst case at TM1.

Please refer to following page.

Test Plot of Occupied Bandwidth and Emission Mask	
Occupied Bandwidth	Emission Mask
	
Channel 5: 462.6500MHz	
	
Channel 12: 462.6375MHz	

5.3. Modulation Characteristic

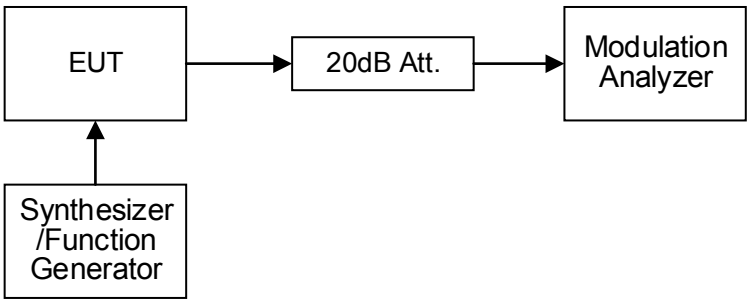
5.3.1 Limit

According to CFR47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

According to FCC 95.1775:
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.
(d) Overmodulation. Each GMRS transmitter type, except for a mobile station transmitter type with a transmitter power output of 2.5 W or less, must automatically prevent a higher than normal audio level from causing overmodulation.
(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 60log(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.

5.3.2 Block Diagram of Test Setup



5.3.3 Test Procedure

Modulation Limit

1. Configure the EUT as shown in clause 5.3.2, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.
2. Repeat step 1 with input frequency changing to 300, 1004, 1500 and 2500Hz in sequence.

Audio Frequency Response

1. Configure the EUT as shown in clause 5.3.2.
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 3 KHz and record the frequency deviation.
4. Audio Frequency Response $=20\log_{10}$ (Deviation of test frequency/Deviation of 1 KHz reference).

5.3.4 Test Results

It is not applicable for device which operate with the digitized voice/data modulation type.

5.4. Audio Frequency Filter

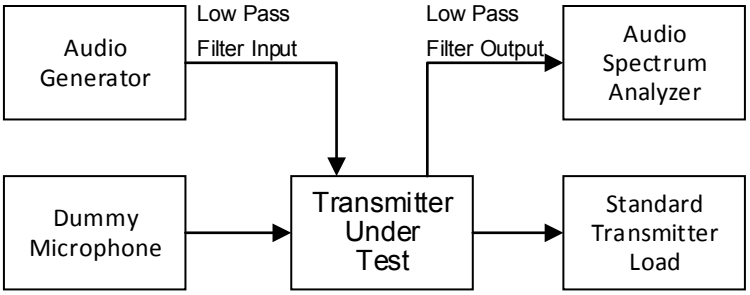
5.4.1 Limit

The audio low pass filter response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

According to FCC 95.1775:
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.

(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 60log(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.

5.4.2 Block Diagram of Test Setup



5.4.3 Test Procedure

1. Connect the equipment as illustrated.
2. Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.
3. Connect the audio spectrum analyzer 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 audio spectrum analyzer 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 audio spectrum analyzer levels, at the test frequency in step 6.
8. Record the dB level on the audio spectrum analyzer as LEV_{FREQ}.
9. Calculate the audio frequency response at the test frequency as:
   low pass frequency response = LEV_{FREQ} - LEV_{REF}
10. Repeat steps 6 through 8 for all the desired test frequencies.

5.4.4 Test Results

It is not applicable for device which operate with the digitized voice/data modulation type.

5.5. Frequency Stability

5.5.1 Limit

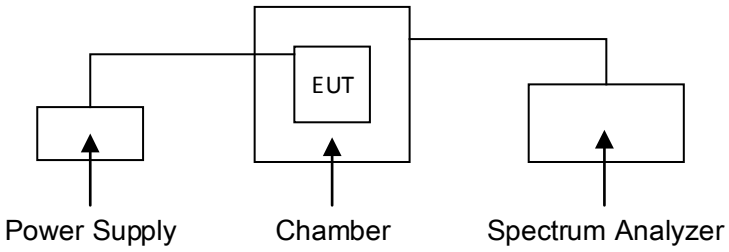
According to FCC 95.1765

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 parts-per-million (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.

5.5.2 Block Diagram of Test Setup



5.5.3 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.

5.5.4 Test Results

Temperature	23.8℃	Humidity	54.2%
Test Engineer	David Luo	Test Voltage	Normal Voltage
Test Mode	TM1	Test Date	April 26, 2019

Reference Frequency: 462.65MHz					
Voltage (V)	Temperature (℃)	Frequency error (Hz)	Frequency Tolerance (%)	Limit (%)	Result
3.70	-30	534	0.000115	0.00025%	Pass
	-20	246	0.000053		
	-10	306	0.000066		
	0	481	0.000104		
	10	490	0.000106		
	20	552	0.000119		
	30	377	0.000081		
	40	495	0.000107		
	50	411	0.000089		
4.26	25	342	0.000074		
3.15	25	395	0.000085		

Reference Frequency: 462.6375MHz					
Voltage (V)	Temperature (℃)	Frequency error (Hz)	Frequency Tolerance (%)	Limit (%)	Result
3.70	-30	481	0.000104	0.00025%	Pass
	-20	453	0.000098		
	-10	561	0.000121		
	0	469	0.000101		
	10	585	0.000126		
	20	227	0.000049		
	30	589	0.000127		
	40	554	0.000120		
	50	376	0.000081		
4.26	25	582	0.000126		
3.15	25	304	0.000066		

Remark:

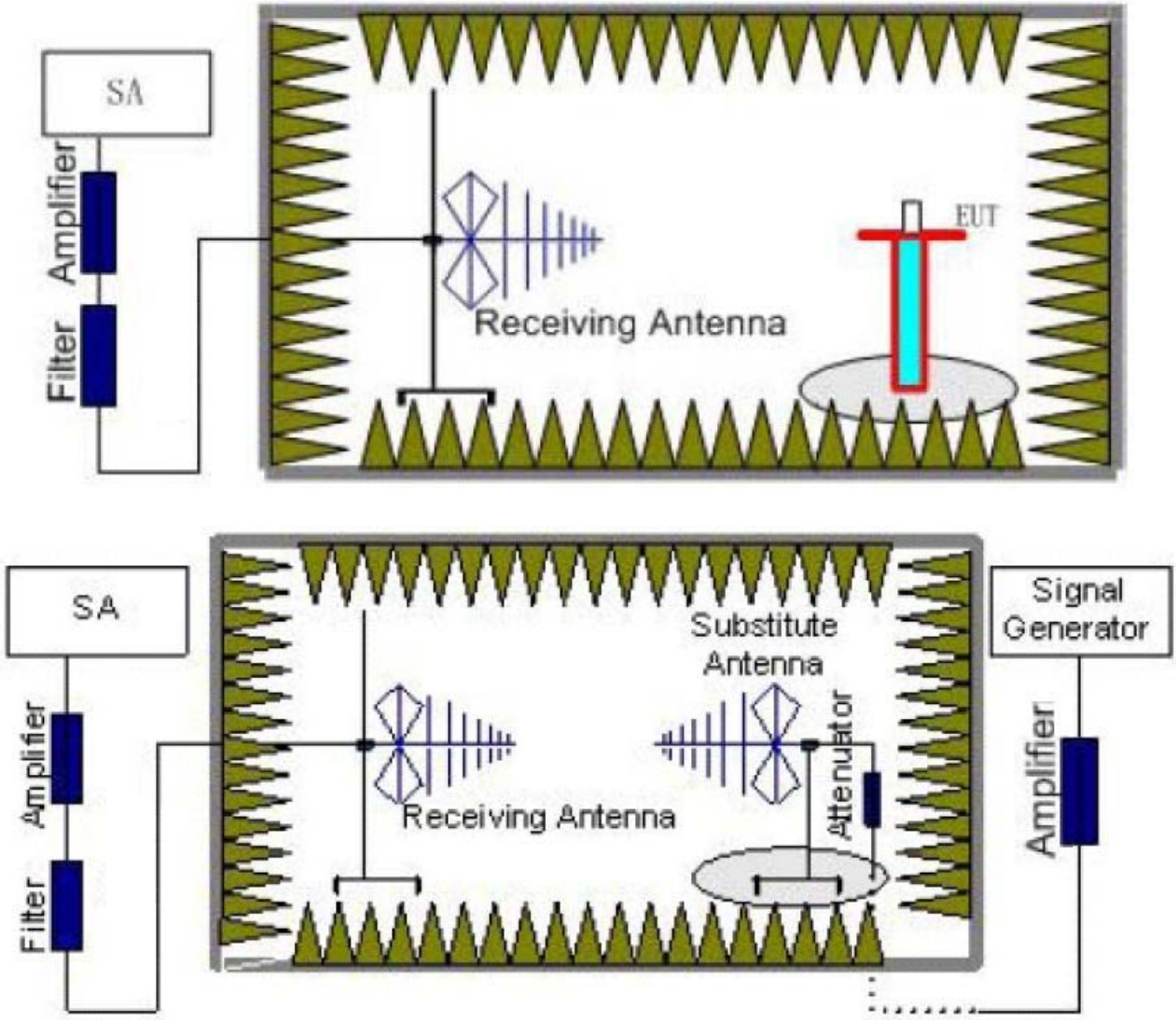
1. Measured at TM1 to TM2, recorded worst case at TM1.

5.6. Transmitter Radiated Spurious Emission

5.6.1 Limit

According to FCC section 95.1779, At least 43 + 10 log (P) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

5.6.2 Block Diagram of Test Setup



5.6.3 Test Procedure

a. 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 1.5m. 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, a 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:
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 (2.15dBi) and known input power.

f. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

g. Test site anechoic chamber refer to ANSI C63.10.

5.6.4 Test Results

Temperature	23.8℃	Humidity	54.2%
Test Engineer	David Luo	Test Voltage	Normal Voltage
Test Mode	TM1	Test Date	April 26, 2019

Test Frequency (MHz)	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Pol.
462.65	925.33	-27.77	3.54	3.00	12.87	-18.44	-13.00	5.44	V
	1387.45	-29.58	4.21	3.00	15.48	-18.31	-13.00	5.31	V
	1862.66	-35.94	4.52	3.00	17.32	-23.14	-13.00	10.14	V
	2775.59	-39.92	5.24	3.00	18.76	-26.40	-13.00	13.40	V
	925.33	-28.90	3.54	3.00	12.87	-19.57	-13.00	6.57	H
	1387.45	-29.84	4.21	3.00	15.48	-18.57	-13.00	5.57	H
	1862.66	-35.24	4.52	3.00	17.32	-22.44	-13.00	9.44	H
	2775.59	-42.09	5.24	3.00	18.76	-28.57	-13.00	15.57	H
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Test Frequency (MHz)	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Pol.
462.6375	925.26	-25.32	3.54	3.00	12.87	-15.99	-13.00	2.99	V
	1387.32	-32.45	4.21	3.00	15.48	-21.18	-13.00	8.18	V
	1862.54	-35.81	4.52	3.00	17.32	-23.01	-13.00	10.01	V
	2775.83	-42.20	5.24	3.00	18.76	-28.68	-13.00	15.68	V
	925.26	-24.40	3.54	3.00	12.87	-15.07	-13.00	2.07	H
	1387.32	-31.08	4.21	3.00	15.48	-19.81	-13.00	6.81	H
	1862.54	-36.53	4.52	3.00	17.32	-23.73	-13.00	10.73	H
	2775.83	-43.13	5.24	3.00	18.76	-29.61	-13.00	16.61	H
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Remark:

1. *EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)*
2. *Margin = Limit - EIRP*
3. *-- Means other points for values lower than limits and not recorded.*
4. *The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency，and only recorded worst spurious emissions.*
5. *Measured at TM1 to TM2, recorded worst case at TM1.*

6. SUMMARY OF TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2018-06-16	2019-06-15
2	Power Sensor	R&S	NRV-Z81	100458	2018-06-16	2019-06-15
3	Power Sensor	R&S	NRV-Z32	10057	2018-06-16	2019-06-15
4	ESG Vector Signal Generator	Agilent	E4438C	MY49072627	2018-06-16	2019-06-15
5	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2018-06-16	2019-06-15
6	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
9	Positioning Controller	MF	MF-7082	N/A	2018-06-16	2019-06-15
10	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2019-07-25
11	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2019-07-25
12	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2019-07-01
13	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
14	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
15	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
16	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
17	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
18	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
19	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
20	6dB Attenuator	/	100W/6dB	1172040	2018-06-16	2019-06-15
21	3dB Attenuator	/	2N-3dB	/	2018-06-16	2019-06-15
22	EMI Test Receiver	R&S	ESPI	101840	2018-06-16	2019-06-15
23	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15
24	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2018-06-16	2019-06-15
25	Combiner	eastsheep	SHWLPD2-52 500S	/	2018-11-15	2019-11-14
26	Audio Analyzer	R&S	UPV	1146.2003K02-10 1721-UW	2018-11-15	2019-11-14
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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