



FCC PART 95  
MEASUREMENT AND TEST REPORT

For

**Shenzhen Hui Ke Electronics Co., LTD.**

Room A, 2 Floor, 5 Building, Hezhou Yuye Industrial park, Xixiang, Baoan District,  
Shenzhen, China

**FCC ID: 2ASRN-HK-588**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Walkie Talkie
<b>Report Number:</b> <u>RSZ190128810-00</u>	
<b>Report Date:</b> <u>2019-03-04</u>	
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The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity.

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## GENERAL INFORMATION

### Product Description for Equipment Under Test (EUT)

Product	Walkie Talkie
Tested Model	HK-588
Multiple Model <sup>#</sup>	HK-188, HK-288, HK-688, HK-888, HK-988, T-388, HK-002, HK-001
Frequency Range	462.5500-462.7250 MHz 467.5625-467.7125 MHz
Transmit Power	ERP: 23.70 dBm
Testing Bandwidth	12.5kHz
Modulation Technique	FM
Antenna Specification	Integral Antenna
Voltage Range	DC 1.5*4 V
Date of Test	2019/01/30~ 2019/03/01
Sample serial number	190128810
Received date	2019/01/28
Sample/EUT Status	Good condition

*Notes: This series products model: HK-188, HK-288, HK-688, HK-888, HK-988, T-388, HK-002, HK-001 and HK-588 are electrically identical, the differences among them is the model number. Model HK-588 was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.*

### Objective

This report is prepared on behalf of *Shenzhen Hui Ke Electronics Co., LTD.* in accordance with Part 2 and Part 95, Subpart A & Subpart B of the Federal Communication Commissions rules.

### Related Submittal(s)/Grant(s)

No related submittal(s).

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart A, Subpart B of the Federal Communication Commissions rules with TIA-603-D, Land Mobile FM or PM-Communications Equipment-Measurement and Performance Standards.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

Parameter		uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.5dB
RF conducted test with spectrum		±1.5dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±3°C
Humidity		±6%
Supply voltages		±0.4%

*Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 342867, the FCC Designation No. : CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

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### Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

### Description of Channel List

Channel No.	Channel Frequency (MHz)	Channel No.	Channel Frequency (MHz)
1	462.5500	12	462.6875
2	462.5625	13	462.7000
3	462.5750	14	462.7125
4	462.5875	15	462.7250
5	462.6000	16	467.5625
6	462.6125	17	467.5875
7	462.6250	18	467.6125
8	462.6375	19	467.6375
9	462.6500	20	467.6625
10	462.6625	21	467.6875
11	462.6750	22	467.7125

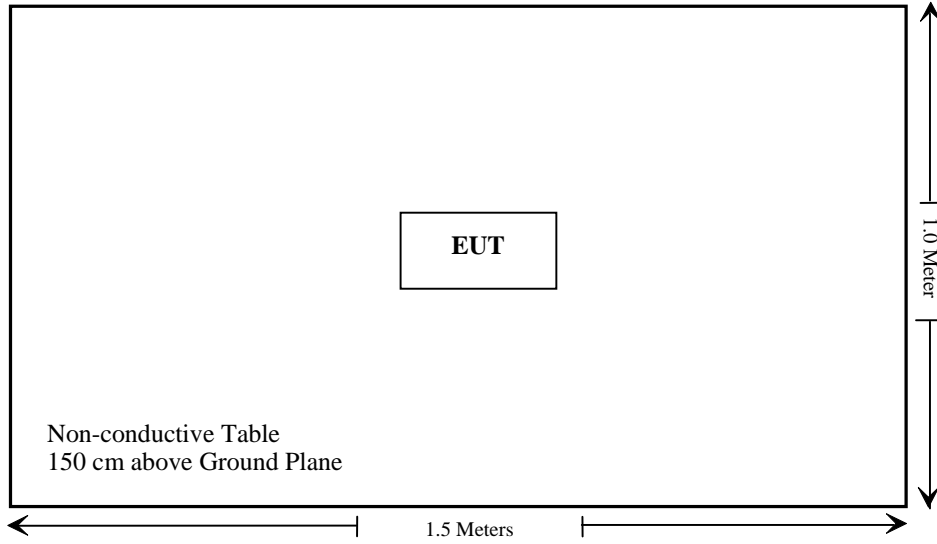
### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Results</b>
§2.1093	RF Exposure	Compliance
§95.587(b)(1)	Antenna Requirement	Compliance
§2.1046, §95.567	RF Output Power	Compliance
§2.1047, §95.575	Modulation Characteristic	Compliance
§2.1049, §95.573 & §95.579	Authorized Bandwidth & Emission Mask	Compliance
§2.1053, §95.579	Spurious Radiated Emissions	Compliance
§2.1055(d), §95.565	Frequency Stability	Compliance

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-22	2020-12-21
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-11-12
Sonoma instrument	Amplifier	310N	186238	2018-11-12	2019-11-12
Anritsu	Signal Generator	68369B	004114	2018-12-24	2019-12-24
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM POWER	Dipole Antenna	AD-100	41000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2018-07-11	2019-07-11
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639231029-003	2018-07-11	2019-07-10
Ducommun technologies	RF Cable	104PEA	218124002	2018-11-21	2019-05-21
Ducommun technologies	RF Cable	RG-214	1	2018-11-21	2019-05-21
Ducommun technologies	RF Cable	RG-214	2	2018-11-21	2019-05-21
Ducommun technologies	Pre-amplifier	ALN-22093530-01	991373-01	2018-08-03	2019-08-03
<b>RF Conducted test</b>					
WEINSCHEL	30dB Attenuator	53-30-43	PG633	Each Time	
HP Agilent	RF Communication test set	8920B	3325U00859	2018-06-23	2019-06-23
HP	Microwave Frequency Counter	5343A	2232A00827	2016-08-29	2019-08-29
Fluke	Digital Multimeter	287	19000011	2018-04-12	2019-04-12
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2018-12-21	2019-12-21
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Un-known	Notch Filter	SKU 5G3	ATR0205-04-13	2019/01/02	2020/01/01
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2018-12-24	2019-12-24
Ducommun Technologies	RF Cable	RG-214	3	Each Time	

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).



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## **FCC §1.1307(b) & §2.1093 - RF EXPOSURE**

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### **Applicable Standard**

According to FCC §1.1307(b) and §2.1093, portable device operates Part 95 should be subjected to routine environmental evaluation for RF exposure prior or equipment authorization or use.

**Result:** Compliance.

Please refer to SAR Report Number: RSZ190128810-20.

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## **FCC §95.587(b)(1) – ANTENNA REQUIREMENT**

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### **Applicable Standard**

According to FCC § 95.587, (b) Antenna. The antenna of each FRS transmitter type must meet the following requirements.

(1) The antenna must be a non-removable integral part of the FRS transmitter type.

### **Antenna Connector Construction**

The EUT has an integral antenna arrangement, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

## FCC §2.1046 & §95.567 - RF OUTPUT POWER

### Applicable Standard

Per FCC §2.1046, and §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 Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the emissions were measured by the substitution.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Andy Yu on 2019-03-01.

Test Mode: Transmitting

Indicated		Table Angle Degree	Test Ant.		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Reading (dBμV)		Height (m)	Polar (H/V)	Substituted level (dBm)	Cable Loss (dB)	Ant. Gain (dBi)			
462.6375MHz FRS										
462.6375	85.73	189	1.8	H	10.1	0.66	0.0	9.44	33	23.56
462.6375	93.82	186	2.4	V	21.7	0.66	0.0	21.04	33	11.96
467.6375 MHz FRS										
467.6375	88.24	279	1.2	H	12.1	0.3	0.0	11.80	27	15.20
467.6375	96.9	136	1.1	V	24.0	0.3	0.0	23.70	27	3.30

**Test Result:** Compliance.

**FCC §2.1047 & §95.575 - MODULATION CHARACTERISTIC****Applicable Standard**

Per FCC §2.1047 and §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 Procedure**

Test Method: TIA/EIA-603-D

**Test Data****Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong on 2019-02-22.*

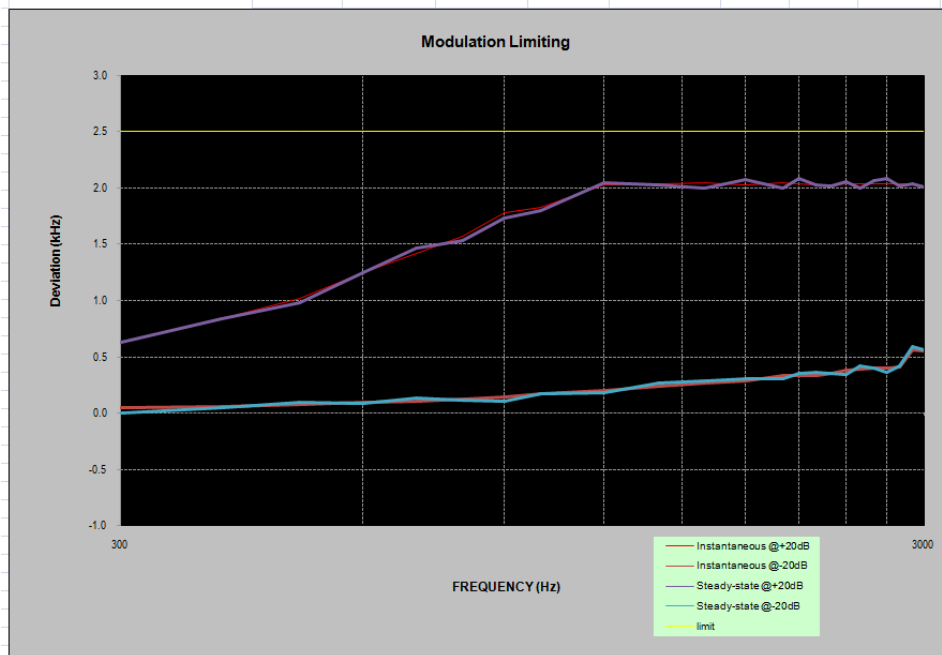
Please refer to the following tables and plots.

*Test Mode: Transmitting*

**MODULATION LIMITING**

Carrier Frequency: 462.6375MHz

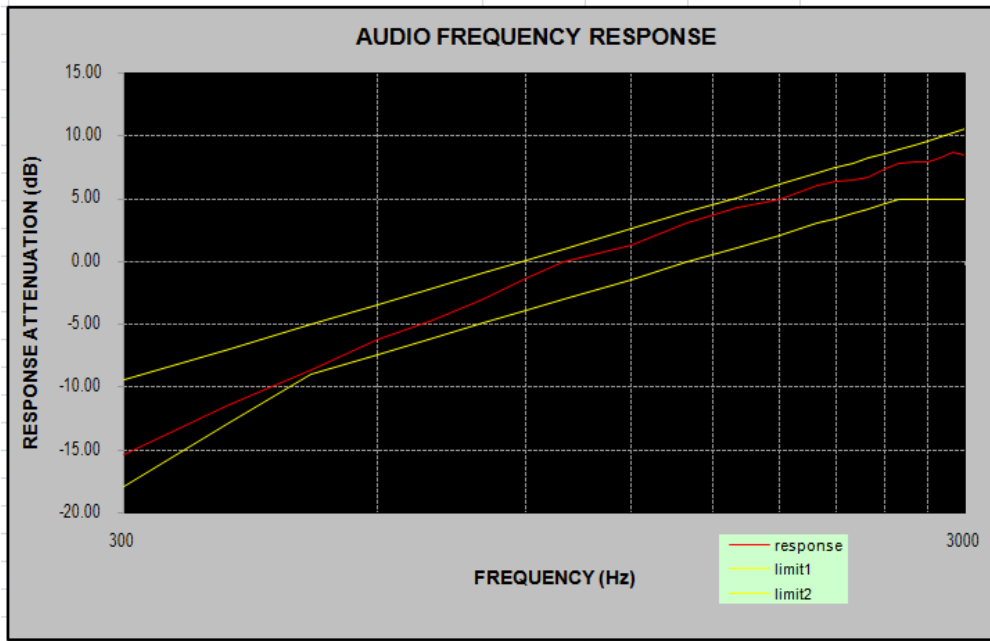
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	0.630	0.043	0.625	0.000	2.5
400	0.834	0.055	0.842	0.052	2.5
500	1.020	0.073	0.978	0.099	2.5
600	1.246	0.097	1.244	0.088	2.5
700	1.419	0.108	1.463	0.134	2.5
800	1.574	0.123	1.533	0.110	2.5
900	1.778	0.145	1.730	0.102	2.5
1000	1.831	0.170	1.797	0.171	2.5
1200	2.023	0.197	2.044	0.185	2.5
1400	2.032	0.235	2.030	0.265	2.5
1600	2.043	0.265	1.996	0.281	2.5
1800	2.024	0.287	2.073	0.303	2.5
2000	2.044	0.329	1.994	0.304	2.5
2100	2.040	0.335	2.082	0.352	2.5
2200	2.027	0.336	2.024	0.364	2.5
2300	2.026	0.353	2.022	0.355	2.5
2400	2.040	0.376	2.052	0.342	2.5
2500	2.040	0.391	1.998	0.420	2.5
2600	2.041	0.398	2.069	0.402	2.5
2700	2.035	0.400	2.080	0.364	2.5
2800	2.037	0.413	2.020	0.419	2.5
2900	2.040	0.557	2.040	0.593	2.5
3000	2.016	0.554	2.012	0.564	2.5



**Audio Frequency Response**

Carrier Frequency: 462.6375 MHz

<b>Audio Frequency (Hz)</b>	<b>Response Attenuation (dB)</b>
300	-15.39
400	-11.44
500	-8.64
600	-6.20
700	-4.64
800	-2.97
900	-1.39
1000	0.00
1200	1.33
1400	3.01
1600	4.27
1800	4.88
2000	6.06
2100	6.36
2200	6.44
2300	6.74
2400	7.41
2500	7.78
2600	7.93
2700	7.94
2800	8.22
2900	8.72
3000	8.44

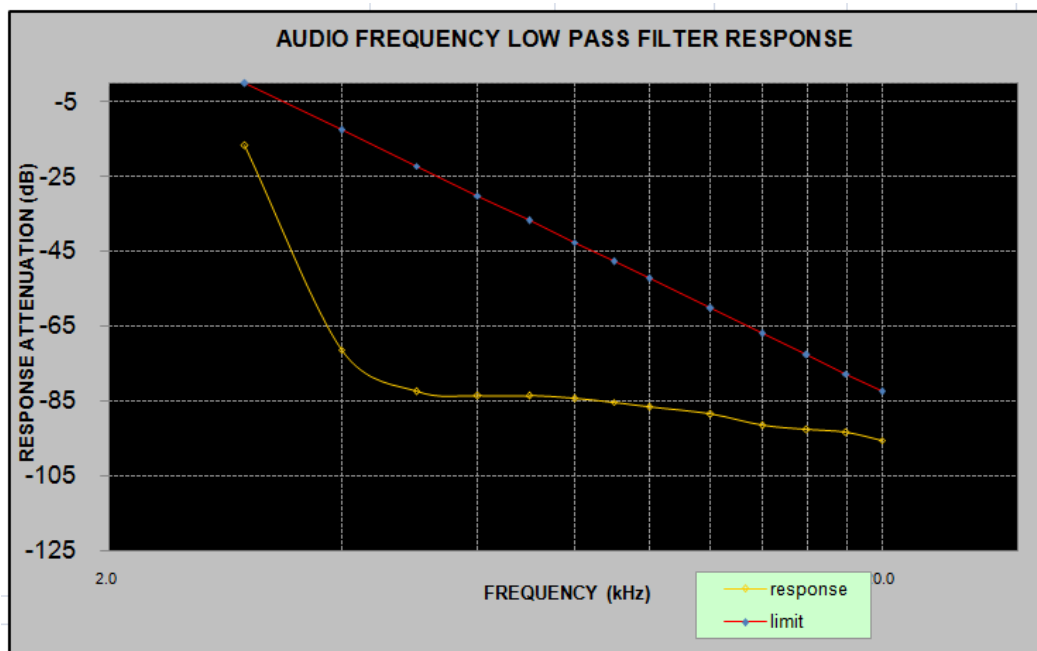




**Audio frequency lows pass filter response**

Carrier Frequency: 462.6375 MHz, Channel Separation=12.5 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-16.8	0.0
4.0	-71.4	-12.5
5.0	-82.5	-22.2
6.0	-83.6	-30.1
7.0	-83.7	-36.8
8.0	-84.3	-42.6
9.0	-85.4	-47.7
10.0	-86.7	-52.3
12.0	-88.6	-60.2
14.0	-91.5	-66.9
16.0	-92.6	-72.7
18.0	-93.4	-77.8
20.0	-95.6	-82.5



## **FCC §2.1049 & §95.573 & §95.579 - AUTHORIZED BANDWIDTH AND EMISSION MASK**

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### **Applicable Standard**

According to §95.573. Each FRS transmitter type must be designed such that the occupied bandwidth does not exceed 12.5 kHz.

According to §95.579. Each FRS transmitter type must be designed to satisfy the applicable unwanted emissions limits in this paragraph.

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

- (1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.
- (2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.
- (3)  $43 + 10 \log (P)$  dB in any frequency band removed from the channel center frequency by more than 31.25 kHz.

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

(c) *Measurement conditions.* The requirements in this section apply to each FRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone and/or power cord.

### **Test Procedure**

TIA-603-D, section 2.2.11

**Test Data****Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong on 2019-02-22.*

*Test Mode: Transmitting*

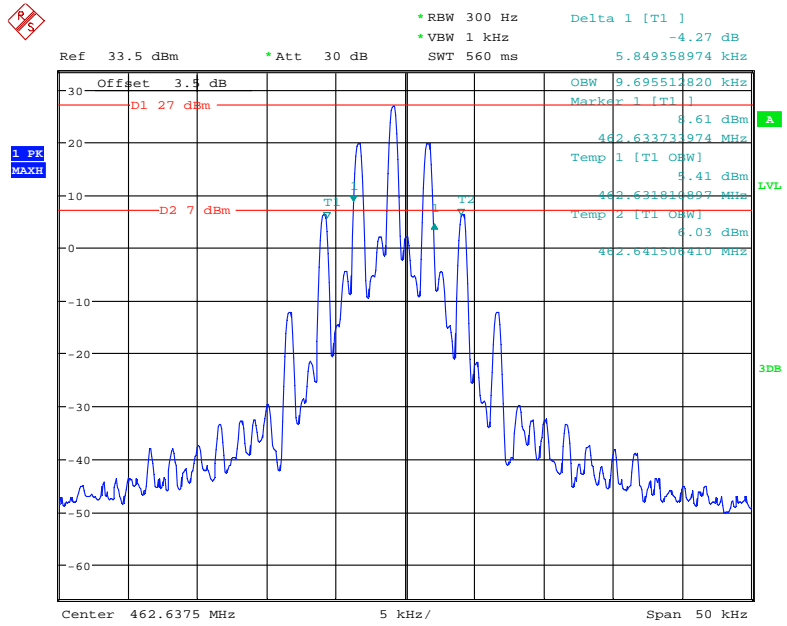
<b>Item</b>	<b>Frequency (MHz)</b>	<b>OBW (kHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
FRS	462.6375	9.696	12.5	Pass
FRS	467.6375	9.776	12.5	Pass

Emission Designator Per CFR 47 §2.201& §2.202&,  $B_n = 2M + 2D$  :

Emission Designator 11K0F3E In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.  $BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} \rightarrow 11K0$

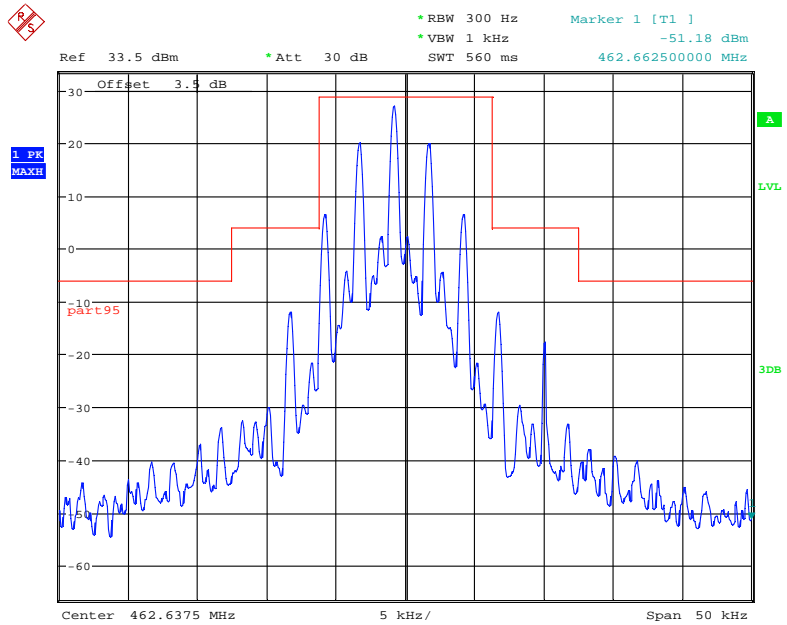
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

### OBW, 462.6375 MHz



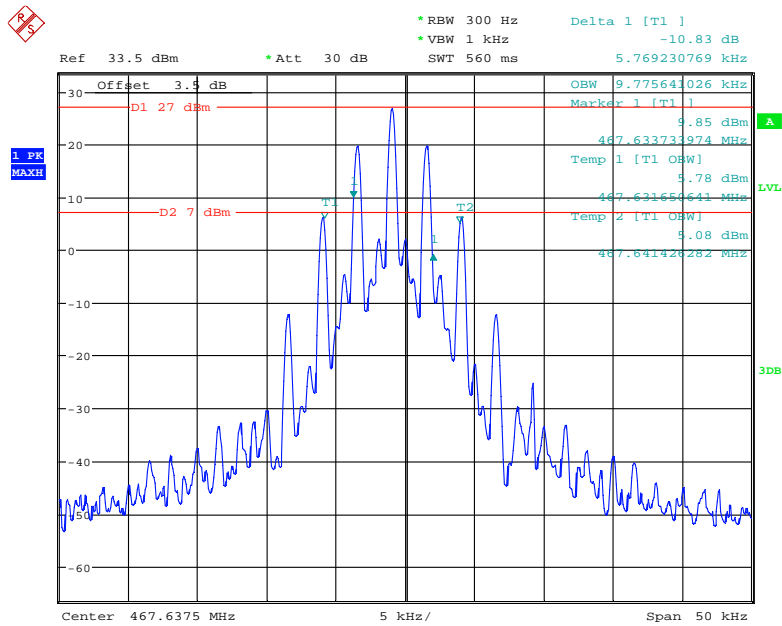
Date: 22.FEB.2019 10:55:19

### Emission Mask, 462.6375 MHz



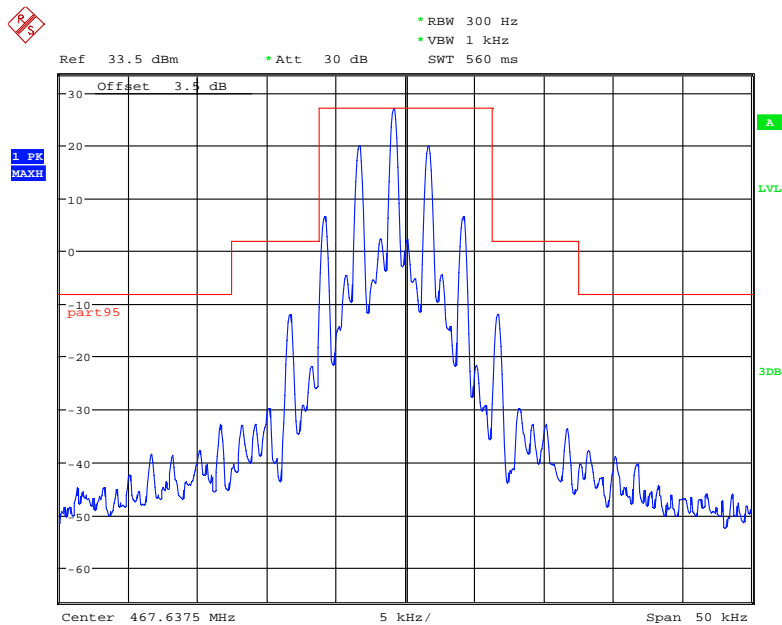
Date: 22.FEB.2019 11:24:06

### OBW, 467.6375 MHz



Date: 22.FEB.2019 10:59:40

### Emission Mask, 467.6375 MHz



Date: 22.FEB.2019 11:33:29

## FCC §2.1053 & §95.579- RADIATED SPURIOUS EMISSION

### Applicable Standard

FCC §2.1053 and §95.579. Each FRS transmitter type must be designed to satisfy the applicable unwanted emissions limits in this paragraph.

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

- (1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.
- (2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.
- (3)  $43 + 10 \log (P)$  dB in any frequency band removed from the channel center frequency by more than 31.25 kHz.

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

(c) *Measurement conditions.* The requirements in this section apply to each FRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone and/or power cord.

### Test Procedure

The transmitter was placed on a wooden turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg (\text{TXpwr in Watts}/0.001)$ -the absolute level  
Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Leo Huang on 2019-01-30.*

*Test Mode: Transmitting*

Indicated		Table Angle Degree	Test Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Receiver Reading (dBuV)		Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
FRS 462.6375MHz										
925.275	61.46	89	1.7	H	-36.8	1.09	0.0	-37.89	-13	24.89
925.275	77.68	133	1.4	V	-18.3	1.09	0.0	-19.39	-13	6.39
1387.91	63.84	7	2.1	H	-44.0	1.60	7.90	-37.70	-13	24.70
1387.91	63.47	157	2.1	V	-44.6	1.60	7.90	-38.30	-13	25.30
1850.55	62.87	30	1.4	H	-41.4	1.30	9.40	-33.30	-13	20.30
1850.55	60.51	200	1.2	V	-44.0	1.30	9.40	-35.90	-13	22.90
FRS 467.6375MHz										
935.275	65.97	282	2.3	H	-34.1	1.08	0.0	-35.18	-13	22.18
935.275	78.17	308	1.7	V	-19.7	1.08	0.0	-20.78	-13	7.78
1402.91	64.19	170	2.3	H	-43.6	1.60	7.90	-37.30	-13	24.30
1402.91	61.71	326	2.5	V	-46.4	1.60	7.90	-40.10	-13	27.10
1870.55	60.02	261	1.4	H	-44.3	1.30	9.40	-36.20	-13	23.20
1870.55	58.43	167	1.5	V	-46.1	1.30	9.40	-38.00	-13	25.00

**Note:**

- 1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level

## **FCC§2.1055 (d) & §95.565 - FREQUENCY STABILITY**

### **Applicable Standard**

According to FCC §2.1055(a) (1), the frequency stability shall be measured with variation of ambient temperature from  $-30\text{ }^{\circ}\text{C}$  to  $+50\text{ }^{\circ}\text{C}$ , and according to FCC 2.1055(d) (2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.565, Each FRS transmitter type must be designed such that the carrier frequencies remain within  $\pm 2.5$  parts-per-million of the channel center frequencies specified in §95.563 during normal operating conditions.

### **Test Procedure**

**Frequency Stability vs. Temperature:** The equipment under test was connected to an external DC power supply and the RF output was connected to a Frequency Counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Frequency Counter.

Frequency Stability vs. Voltage (item 1 or item 2 will be chosen according to different condition) :

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

The output frequency was recorded for each voltage.

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong on 2019-02-22.*

*Test Mode: Transmitting*

*Note: The battery operating end point voltage is  $5.0V_{DC}$  which specified by the manufacturer.*



**FRS**

<b>Reference Frequency: 462.6375 MHz, Limit: ±2.5 ppm</b>			
<b>Environment Temperature (°C)</b>	<b>Power Supplied (V<sub>DC</sub>)</b>	<b>Measurement Frequency (MHz)</b>	<b>Frequency Error (ppm)</b>
Frequency Stability Ver. Temperature			
50	6	462.636707	-1.71
40	6	462.636788	-1.54
30	6	462.636745	-1.63
20	6	462.636739	-1.64
10	6	462.636720	-1.69
0	6	462.636614	-1.92
-10	6	462.636656	-1.82
-20	6	462.636704	-1.72
-30	6	462.636591	-1.96
Frequency Stability Ver. Input Voltage			
20	5.0	462.636645	-1.85

<b>Reference Frequency: 467.6375 MHz, Limit: ±2.5 ppm</b>			
<b>Environment Temperature (°C)</b>	<b>Power Supplied (V<sub>DC</sub>)</b>	<b>Measurement Frequency (MHz)</b>	<b>Frequency Error (ppm)</b>
Frequency Stability Ver. Temperature			
50	6	467.637039	-0.99
40	6	467.636858	-1.37
30	6	467.637011	-1.05
20	6	467.636986	-1.10
10	6	467.636864	-1.36
0	6	467.636871	-1.35
-10	6	467.636785	-1.53
-20	6	467.636778	-1.54
-30	6	467.636775	-1.55
Frequency Stability Ver. Input Voltage			
20	5.0	467.636797	-1.50

**\*\*\*\*\* END OF REPORT \*\*\*\*\***