



FCC PART 95 MEASUREMENT AND TEST REPORT

For

Shenzhen Sinuo Xinda Technology Co. LTD

Room 611, Building B, Bantian International Center No.5 Huancheng South Road,
Shenzhen, China

FCC ID: 2AXGQ-WTK100

Report Type: Original Report	Product Type: Walkie Talkies
Report Number: <u>RSZ200817007-00</u>	
Report Date: <u>2020-09-17</u>	
Reviewed By: <u>RF Engineer</u> Jimmy Xiao <i>Jimmy Xiao</i>	
Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn	

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Product	Walkie Talkies
Tested Model	WTK100
Frequency Range	462.5500~462.7250MHz 467.5625~467.7125MHz
Transmit Power (ERP)	462.5500~462.7250MHz: 29.18dBm 467.5625~467.7125MHz: 26.32dBm
Channel Spacing	12.5kHz
Modulation Technique	FM
Antenna Specification	-2.14dBi
Voltage Range	DC 4*1.5V from batteries
Date of Test	2020-08-24 to 2020-09-15
Sample serial number	RSZ200817007-RF-S1(Assigned by BACL, Shenzhen)
Received date	2020-08-17
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2 and Part 95, Subpart A & Subpart B of the Federal Communication Commissions rules.

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-E, 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		±0.73dB
RF conducted test with spectrum		±1.6dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1 °C
Humidity		±6%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. 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

Description of Test Configuration

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

FRS Channel List

Channel No.	Channel Frequency (MHz)	Channel No.	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	17	462.6000
7	462.7125	18	462.6250
8	467.5625	19	462.6500
9	467.5875	20	462.6750
10	467.6125	21	462.7000
11	467.6375	22	462.7250

Equipment Modifications

No modification was made to the EUT tested.

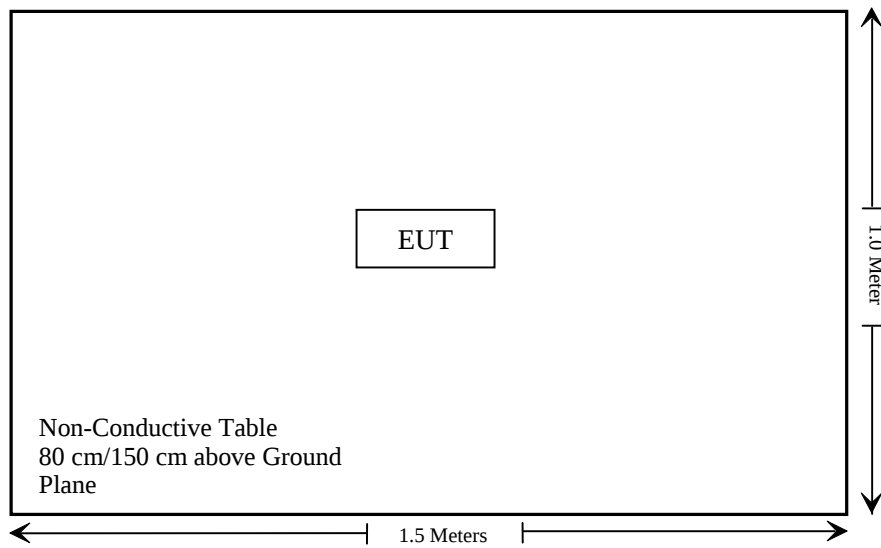
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Manufacturer	Description	Model	Serial Number
/	/	/	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1093	RF Exposure	Compliance
§95.587(b)(1)(2)(3)	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	Radiated Spurious Emission	Compliance
§2.1055(d), §95.565	Frequency Stability	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
COM-POWER	Dipole Antenna	AD-100	721027	NCR	NCR
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 4	EC-007	2019/11/29	2020/11/28
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2020/08/04	2021/08/03
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
A.H.System	Horn Antenna	SAS-200/571	135	2018/09/01	2021/08/31
Insulated Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
RF Conducted test					
WEINSCHL	10dB Attenuator	5324	AU 3842	2019/11/29	2020/11/28
HP Agilent	RF Communication test set	8920A	3325UC0859	2020/07/31	2021/07/30
Unknown	Notch Filter	SKU 5G3	ATR0205-04-13	2020/04/20	2021/04/20
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200982	2020/08/04	2021/08/03
Unknown	RF Cable	Unknown	DLO J5/W6102	2019/11/29	2020/11/28
Unknown	RF Cable	Unknown	8082176/W6111	2019/11/29	2020/11/28
Weinschel	Power divider	1515	MY628	2019/11/29	2020/11/28
Ducommun technologies	RF Cable	RG-214	3	2020/05/22	2021/05/22
Unknown	Signal Cable	RG-214	2	2019/11/29	2020/11/28
ESPEC	Temperature & Humidity Chamber	EL-10KA	9107726	2019/12/21	2020/12/21
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2020/07/23	2021/07/22

*** 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).

§2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

§2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ200817007-20A.

FCC §95.587(b)(1)(2)(3) – ANTENNA REQUIREMENT

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.
- (2) The gain of the antenna must not exceed that of a half-wave dipole antenna.
- (3) The antenna must be designed such that the electric field of the emitted waves is vertically polarized when the unit is operated in the normal orientation.

Antenna Description

The EUT has an integral vertically polarized antenna arrangement and the antenna gain is -2.14dBi, 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

Temperature:	28 °C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang on 2020-09-15.

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 (dBd)			
462.6375MHz										
462.6375	82.01	99	1.5	H	7.2	1.32	0.0	5.88	33	27.12
462.6375	101.04	215	2.0	V	30.5	1.32	0.0	29.18	33	3.82
467.6375MHz										
467.6375	85.21	90	1.7	H	9.7	1.28	0.0	8.42	27	18.58
467.6375	99.29	123	2.0	V	27.6	1.28	0.0	26.32	27	0.68

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-E

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-08-24.

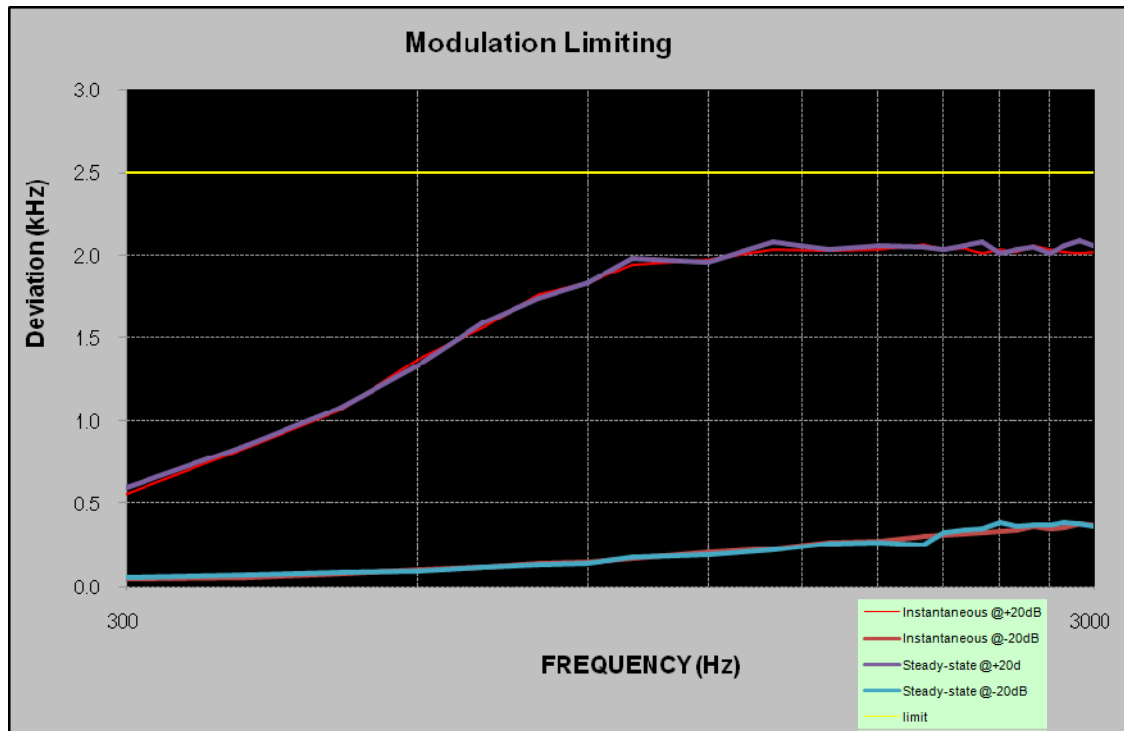
Please refer to the following tables and plots.

Test Mode: Transmitting

MODULATION LIMITING

Carrier Frequency: 462.6375MHz

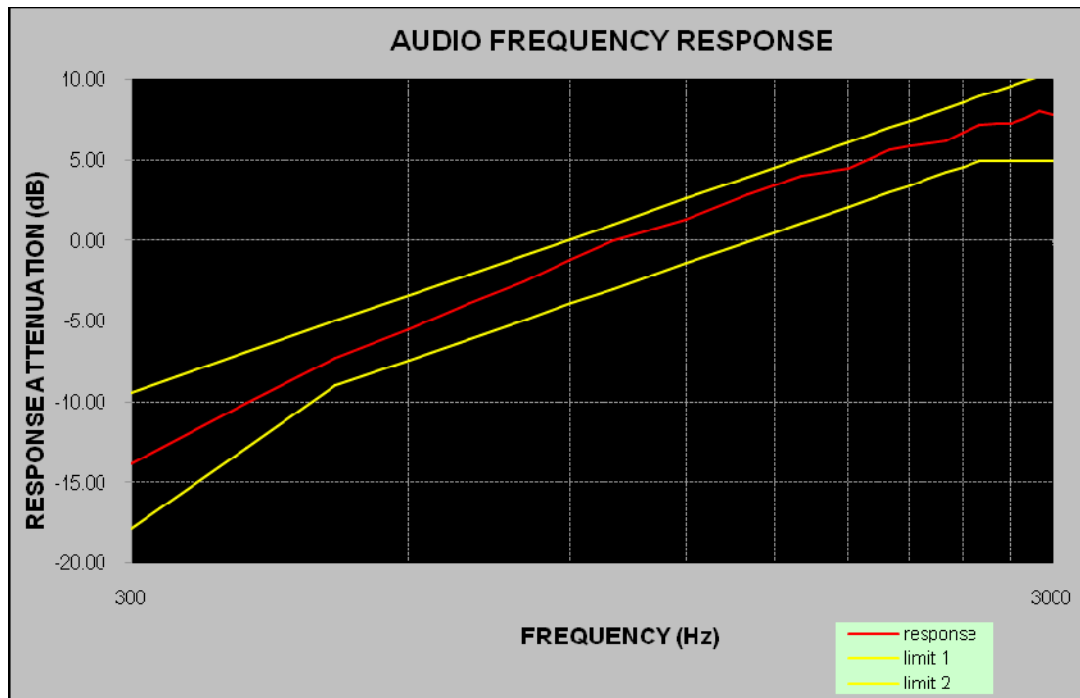
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	0.559	0.054	0.598	0.061	2.500
400	0.842	0.061	0.853	0.075	2.500
500	1.065	0.077	1.081	0.091	2.500
600	1.375	0.105	1.339	0.095	2.500
700	1.564	0.116	1.594	0.115	2.500
800	1.768	0.138	1.739	0.135	2.500
900	1.835	0.149	1.829	0.141	2.500
1000	1.946	0.169	1.983	0.175	2.500
1200	1.975	0.211	1.961	0.191	2.500
1400	2.033	0.229	2.078	0.223	2.500
1600	2.026	0.267	2.036	0.261	2.500
1800	2.038	0.273	2.061	0.271	2.500
2000	2.064	0.309	2.049	0.256	2.500
2100	2.036	0.316	2.035	0.326	2.500
2200	2.046	0.323	2.059	0.346	2.500
2300	2.016	0.329	2.081	0.351	2.500
2400	2.036	0.333	2.016	0.387	2.500
2500	2.019	0.347	2.039	0.364	2.500
2600	2.061	0.365	2.054	0.373	2.500
2700	2.036	0.350	2.016	0.375	2.500
2800	2.018	0.359	2.061	0.389	2.500
2900	2.016	0.382	2.091	0.378	2.500
3000	2.019	0.371	2.055	0.365	2.500



Audio Frequency Response

Carrier Frequency: 462.6375 MHz

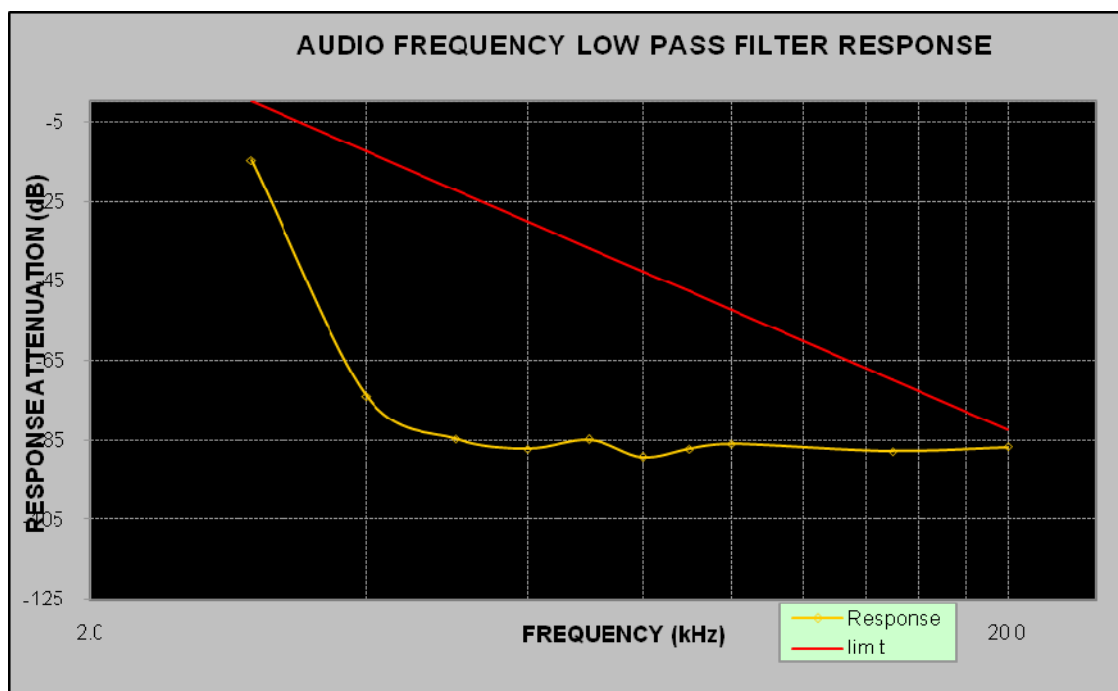
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.89
400	-10.06
500	-7.25
600	-5.48
700	-3.85
800	-2.59
900	-1.15
1000	0.00
1200	1.33
1400	2.85
1600	3.98
1800	4.51
2000	5.61
2100	5.87
2200	5.99
2300	6.20
2400	6.75
2500	7.18
2600	7.27
2700	7.26
2800	7.55
2900	8.06
3000	7.77



Audio frequency lows pass filter response

Carrier Frequency: 462.6375 MHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-14.7	0.0
4.0	-74.0	-12.5
5.0	-84.7	-22.2
6.0	-87.2	-30.1
7.0	-84.9	-36.8
8.0	-89.2	-42.6
9.0	-87.1	-47.7
10.0	-85.9	-52.3
15.0	-87.8	-69.9
20.0	-86.6	-82.4



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

Applicable Standard

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

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.

Test Procedure

TIA-603-E, section 2.2.11

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-08-24.

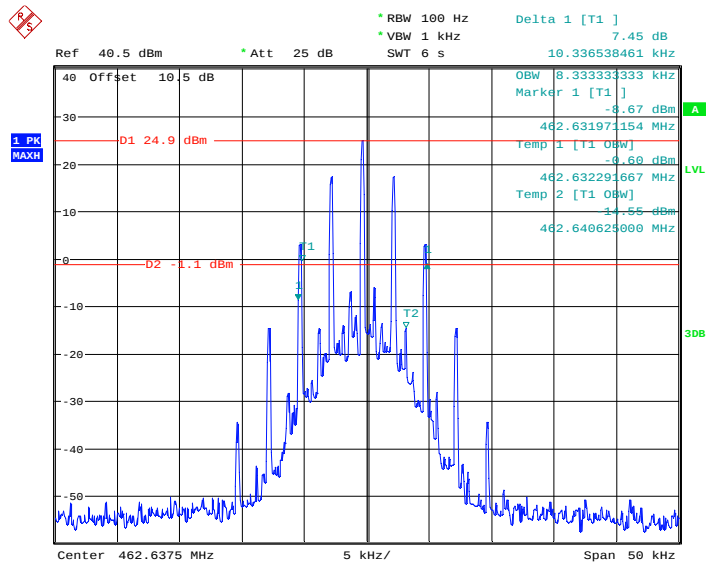
Test Mode: Transmitting

Modulation	Channel Separation (kHz)	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26dB Emissions Bandwidth (kHz)
Analog	12.5	462.6375	8.333	10.337
Analog	12.5	467.6375	8.894	10.304

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

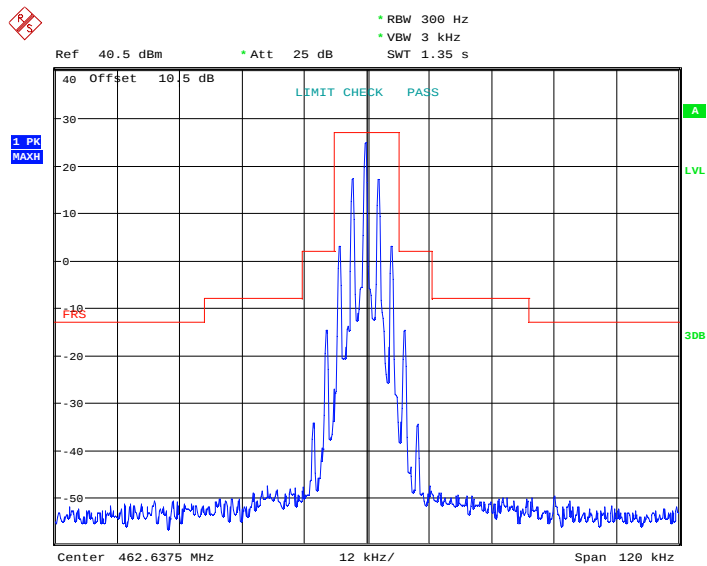
Emission Designator 11K0F3E In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation. $BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} \rightarrow 11K0$
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

OBW, 462.6375 MHz



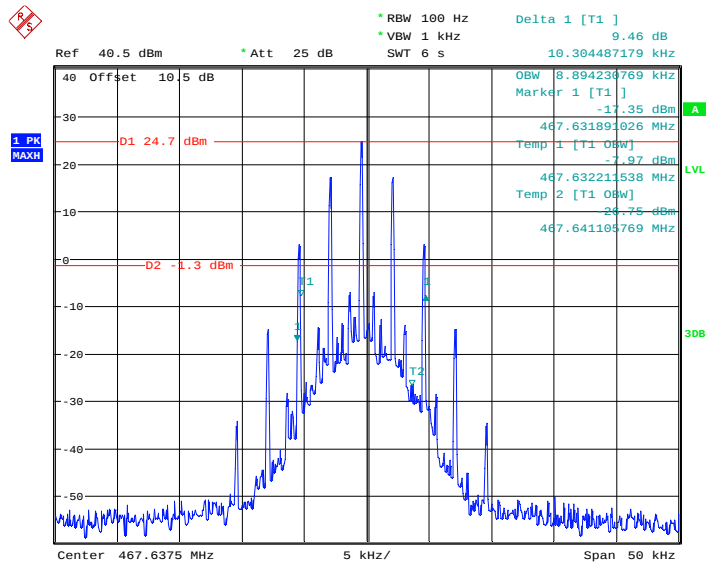
Date: 24.AUG.2020 21:30:47

Emission Mask, 462.6375 MHz



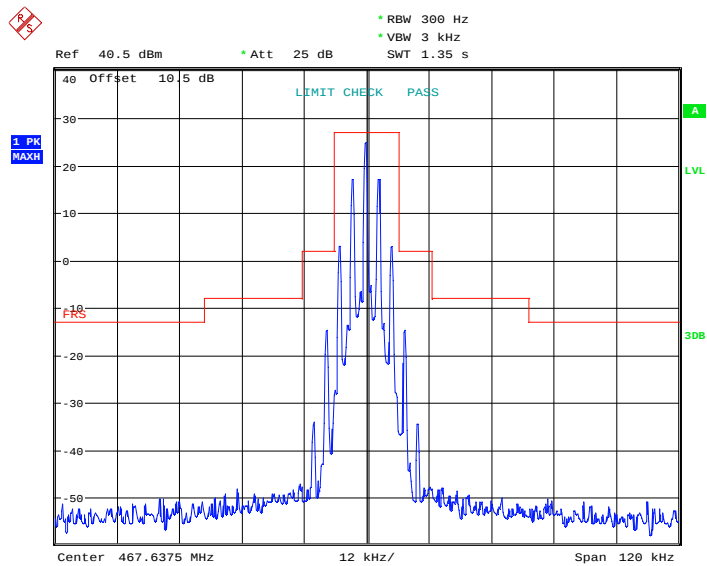
Date: 24.AUG.2020 21:42:31

OBW, 467.6375 MHz



Date: 24.AUG.2020 21:32:47

Emission Mask, 467.6375 MHz



Date: 24.AUG.2020 21:40:27

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 = $43 + 10 \lg_{10} (\text{power out in Watts})$

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang and Leven Gan on 2020-08-24.

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)			
462.6375MHz										
925.275	81.87	223	1.7	H	-16.3	1.09	0.0	-17.39	-13	4.39
925.275	82.30	312	2.5	V	-13.7	1.09	0.0	-14.79	-13	1.79
1387.91	63.05	164	1.7	H	-45.1	1.60	7.90	-38.80	-13	25.80
1387.91	67.98	232	1.4	V	-40.5	1.60	7.90	-34.20	-13	21.20
1850.55	72.57	207	1.6	H	-30.5	1.30	9.40	-22.40	-13	9.40
1850.55	63.25	48	2.1	V	-40.1	1.30	9.40	-32.00	-13	19.00
2313.19	57.30	3	2.1	H	-48.0	1.30	10.00	-39.30	-13	26.30
2313.19	59.06	359	1.5	V	-46.1	1.30	10.00	-37.40	-13	24.40
2775.83	52.27	328	1.7	H	-51.7	1.80	10.50	-43.00	-13	30.00
2775.83	53.11	0	1.5	V	-50.5	1.80	10.50	-41.80	-13	28.80
3238.46	49.96	261	1.5	H	-50.7	1.60	11.50	-40.80	-13	27.80
3238.46	49.54	323	2.0	V	-51.3	1.60	11.50	-41.40	-13	28.40
3701.10	47.64	228	1.4	H	-54.4	1.60	11.90	-44.10	-13	31.10
3701.10	46.49	267	1.7	V	-55.0	1.60	11.90	-44.70	-13	31.70
4163.74	46.45	80	1.1	H	-55.5	1.50	11.80	-45.20	-13	32.20
4163.74	49.10	85	2.2	V	-52.1	1.50	11.80	-41.80	-13	28.80
4626.38	47.07	142	2.0	H	-53.9	1.60	12.00	-43.50	-13	30.50
4626.38	45.45	130	1.8	V	-54.3	1.60	12.00	-43.90	-13	30.90
467.6375 MHz										
935.275	83.25	105	1.8	H	-16.8	1.08	0.0	-17.88	-13	4.88
935.275	85.01	47	1.7	V	-12.8	1.08	0.0	-13.88	-13	0.88
1402.91	59.62	174	1.5	H	-48.6	1.60	7.90	-42.30	-13	29.30
1402.91	66.70	312	2.0	V	-41.7	1.60	7.90	-35.40	-13	22.40
1870.55	70.00	305	1.6	H	-33.1	1.30	9.40	-25.00	-13	12.00
1870.55	66.97	102	1.4	V	-36.3	1.30	9.40	-28.20	-13	15.20
2338.19	60.40	322	2.5	H	-44.9	1.30	10.00	-36.20	-13	23.20
2338.19	55.69	113	1.2	V	-49.5	1.30	10.00	-40.80	-13	27.80
2805.83	50.56	115	1.5	H	-53.4	1.80	10.50	-44.70	-13	31.70
2805.83	54.18	192	1.9	V	-49.4	1.80	10.50	-40.70	-13	27.70
3273.46	50.69	155	2.2	H	-50.2	1.50	11.70	-40.00	-13	27.00
3273.46	49.54	283	1.8	V	-51.4	1.50	11.70	-41.20	-13	28.20
3741.10	47.18	191	1.1	H	-54.9	1.60	11.90	-44.60	-13	31.60
3741.10	47.55	291	1.1	V	-54.0	1.60	11.90	-43.70	-13	30.70
4208.74	47.77	34	1.6	H	-54.2	1.50	11.80	-43.90	-13	30.90
4208.74	47.01	323	2.3	V	-54.1	1.50	11.80	-43.80	-13	30.80
4676.38	44.29	97	2.5	H	-56.5	1.70	12.00	-46.20	-13	33.20
4676.38	44.50	353	2.5	V	-54.7	1.70	12.00	-44.40	-13	31.40

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

Note 2: Absolute Level = SG Level - Cable loss + Antenna Gain
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 °C to +50 °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 ± 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**

Temperature:	20 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-08-24.

Test Mode: Transmitting

Reference Frequency: 462.6375 MHz, Limit: ± 2.5 ppm			
Environment Temperature (°C)	Power Supplied (V _{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	6.0	462.637256	-0.53
40	6.0	462.637261	-0.52
30	6.0	462.637263	-0.51
20	6.0	462.637211	-0.62
10	6.0	462.637269	-0.50
0	6.0	462.637276	-0.48
-10	6.0	462.637259	-0.52
-20	6.0	462.637271	-0.49
-30	6.0	462.637258	-0.52
Frequency Stability Ver. Input Voltage			
20	4.2	462.637261	-0.52

Reference Frequency: 467.6375 MHz, Limit: ± 2.5 ppm			
Environment Temperature (°C)	Power Supplied (V _{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	6.0	467.637362	-0.30
40	6.0	467.637353	-0.31
30	6.0	467.637366	-0.29
20	6.0	467.637351	-0.32
10	6.0	467.637369	-0.28
0	6.0	467.637374	-0.27
-10	6.0	467.637371	-0.28
-20	6.0	467.637358	-0.30
-30	6.0	467.637360	-0.30
Frequency Stability Ver. Input Voltage			
20	4.2	467.637377	-0.26

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