

FCC PART 95

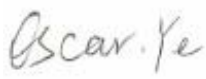
TEST REPORT

For

QUANZHOU KAILI ELECTRONICS CO., LTD.

Kaili Electronic Industrial Park(Photoelectric Information Base), Xiamei Town, Nanan, Quanzhou City,
Fujian Province, China

FCC ID: 2AQX5KD-C70

Report Type: Original Report	Product Type: two way radio
Test Engineer:	Stone Zhang 
Report Number:	RXM200420051-00A
Report Date:	2020-06-15
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	QUANZHOU KAILI ELECTRONICS CO., LTD.
Tested Model	KD-C70
Product Type	two way radio
Modulation Mode	FM
Channel Spacing	12.5 kHz
Channel Spacing	11K0F3E
Maximum Output Power (ERP)	462.5500-462.7250MHz: 30.16dBm 467.5625-467.7125MHz: 12.74dBm
Operation Frequency	462.5500-462.7250MHz; 467.5625-467.7125MHz
Power Supply	DC 3.7V from Battery and DC 5V
Antenna Gain	1.0 dBi

**All measurement and test data in this report was gathered from production sample serial number: 20200420051.
(Assigned by the BACL. The EUT supplied by the applicant was received on 2020-04-20)*

Objective

This test report is prepared on behalf of QUANZHOU KAILI ELECTRONICS CO., LTD. in accordance with Part 2 and Part 95, Subpart B of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart B and Subpart E 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. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item	Uncertainty
Occupied Channel Bandwidth	$\pm 5\%$
RF output power, conducted	$\pm 0.61\text{dB}$
Unwanted Emissions, radiated	30MHz~1GHz: 5.85dB 1G~26.5GHz: 5.23dB
Unwanted Emissions, conducted	$\pm 1.5\text{dB}$
Temperature	$\pm 1.0^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%

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. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

Test channel list as below, EUT was tested with channel 4 and 11.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	462.5625	16	462.5750
2	462.5875	17	462.6000
3	462.6125	18	462.6250
4	462.6375	19	462.6500
5	462.6625	20	462.6750
6	462.6875	21	462.7000
7	462.7125	22	462.7250
8	467.5625	/	/
9	467.5875	/	/
10	467.6125	/	/
11	467.6375	/	/
12	467.6625	/	/
13	467.6875	/	/
14	467.7125	/	/
15	462.5500	/	/

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

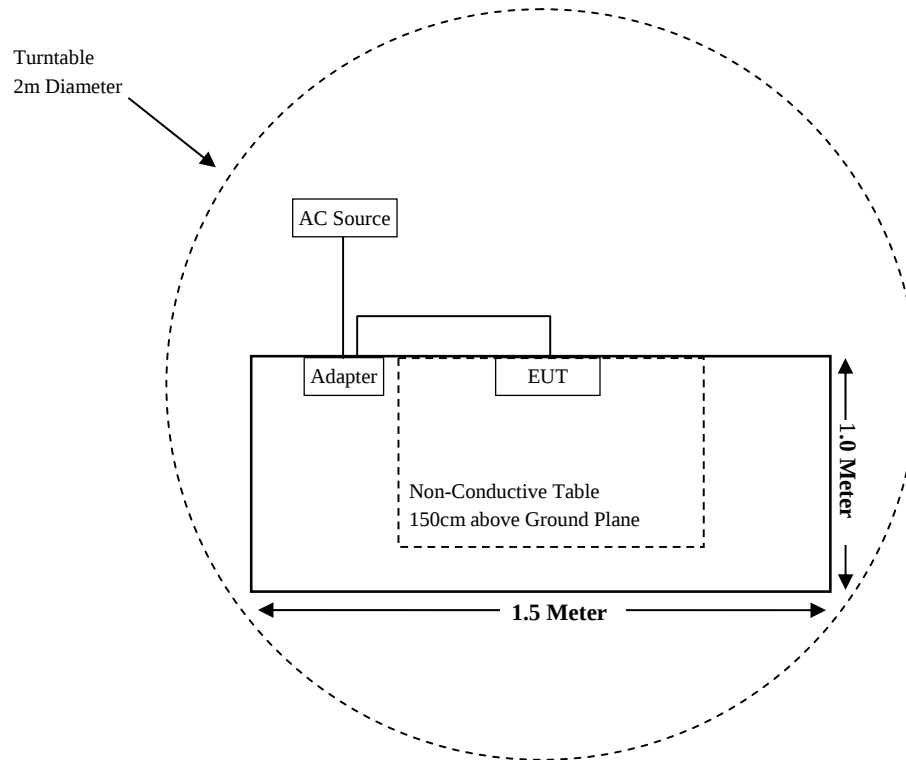
Manufacturer	Description	Model	Serial Number
MASON	Adapter	Input: AC 100-240V, 50-60Hz, 0.5A Output: DC 5V, 2A	/

External I/O Cable

Cable Description	Length (m)	From Port	To
Power Cable	1.2	EUT	Adapter

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz & Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1093	RF Exposure	Compliant
§2.1046, §95.567	RF Output Power	Compliant
§2.1047, §95.575	Modulation Characteristic	Compliant
§2.1049, §95.573, §95.579	Authorized Bandwidth & Emission Mask	Compliant
§2.1053, §95.579	Spurious Radiated Emissions	Compliant
§2.1055(d), §95.565	Frequency Stability	Compliant
§95.587	Digital data transmissions	Not Applicable (See Note 1)

Note 1: The EUT is analogue.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-12-14	2020-12-13
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2017-12-26	2020-12-25
Sunol Sciences	Bilog antenna	JB3	A060217	2017-08-04	2020-08-03
HP	Signal Generator	N5183A	MY51040755	2019-12-14	2020-12-13
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Radiated Emission Test (Chamber 2#)					
HP	Signal Generator	N5183A	MY51040755	2019-12-14	2020-12-13
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2020-04-01	2021-03-31
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2017-07-15	2020-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-10	2023-01-09
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-02-20	2021-02-19
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2019-08-05	2020-08-04
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
BACL	Temperature & Humidity Chamber	BTH-150	30023	2019-12-20	2020-12-19
HP	RF communication test SET.	8920B	079	2020-04-01	2021-03-31
WLN	RF Cable	WLN C01	C01	Each Time	/

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

FCC §2.1093 - RF EXPOSURE

Applicable Standard

According to §15.1093 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Measurement Result

Please refer to SAR Report: RXM200420051-20A

FCC §2.1046, §95.567 - RF OUTPUT POWER

Applicable Standard

According to FCC §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:	26.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Stone Zhang on 2020-05-27.

Test Result: Compliant.

Test Mode: Transmitting

ERP:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBuV)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)			
Frequency: 462.6375MHz								
462.6375	H	101.08	32.44	0.55	-1.73	30.16	33	2.84
462.6375	V	100.29	31.65	0.55	-1.73	29.37	33	3.63
Frequency: 467.6375MHz								
467.6375	H	84.15	15.05	0.55	-1.76	12.74	27	14.26
467.6375	V	83.87	14.77	0.55	-1.76	12.46	27	14.54

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level.

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**

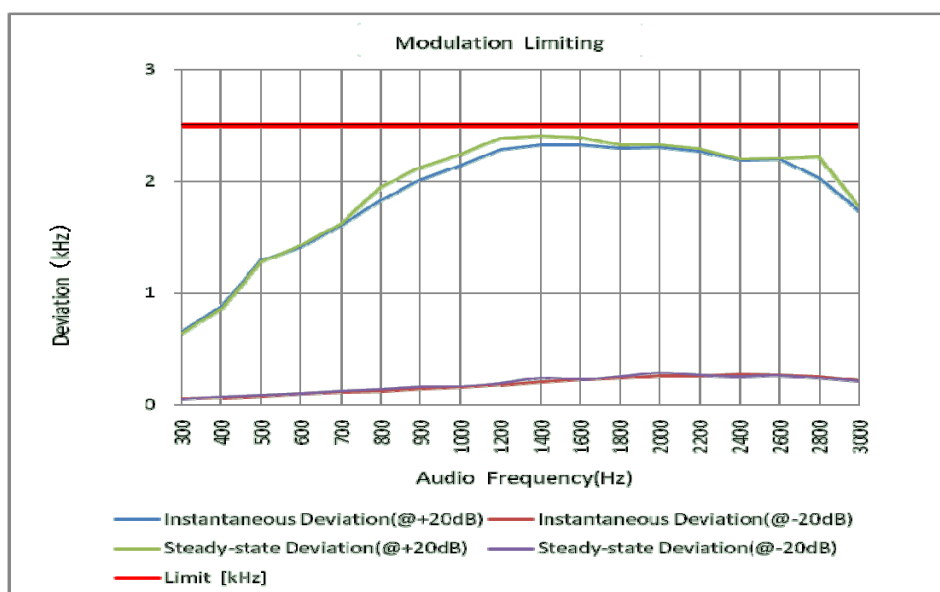
Temperature:	26.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Stone Zhang on 2020-06-04.

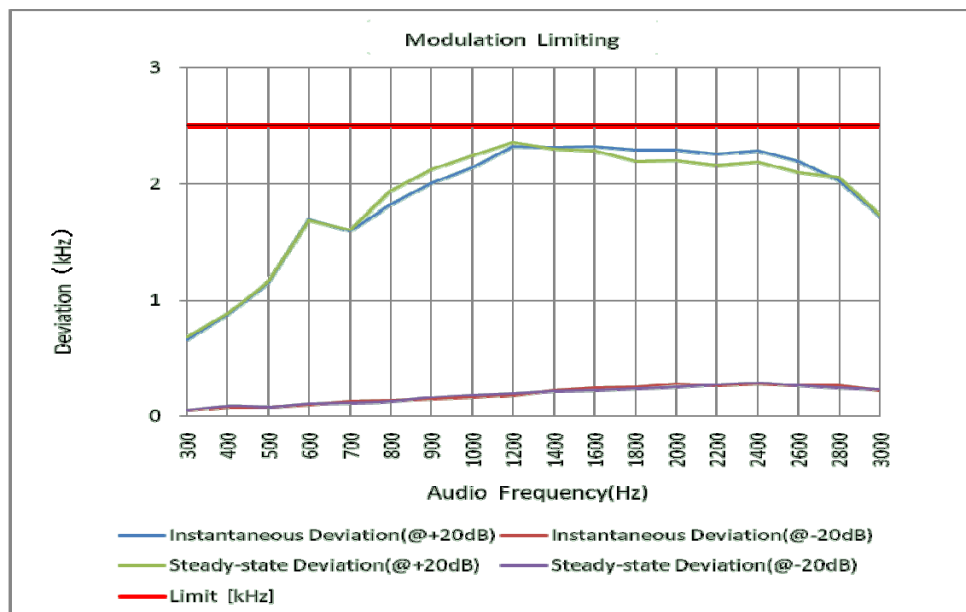
Test Mode: Transmitting

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	0.652	0.058	0.639	0.051	2.5
400	0.882	0.067	0.862	0.072	2.5
500	1.292	0.081	1.276	0.085	2.5
600	1.408	0.099	1.423	0.101	2.5
700	1.603	0.111	1.618	0.123	2.5
800	1.827	0.124	1.946	0.136	2.5
900	2.018	0.143	2.124	0.156	2.5
1000	2.143	0.158	2.237	0.163	2.5
1200	2.278	0.179	2.384	0.189	2.5
1400	2.321	0.205	2.406	0.237	2.5
1600	2.324	0.228	2.389	0.229	2.5
1800	2.295	0.239	2.318	0.253	2.5
2000	2.298	0.264	2.321	0.286	2.5
2200	2.265	0.263	2.286	0.268	2.5
2400	2.186	0.273	2.198	0.254	2.5
2600	2.196	0.270	2.206	0.263	2.5
2800	2.032	0.251	2.214	0.237	2.5
3000	1.728	0.221	1.765	0.213	2.5

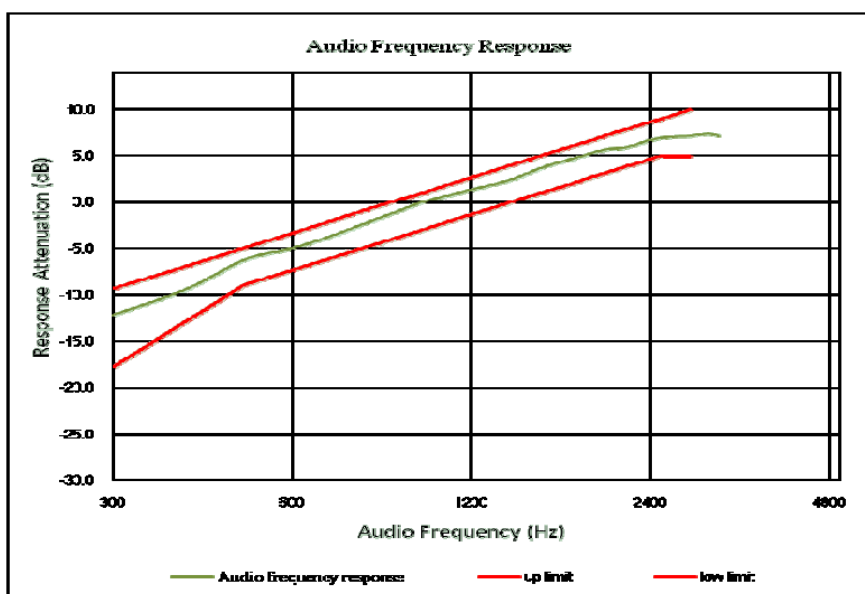


Carrier Frequency: 467.6375MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.657	0.054	0.677	0.053	2.5
400	0.879	0.083	0.885	0.087	2.5
500	1.151	0.081	1.157	0.081	2.5
600	1.698	0.103	1.687	0.105	2.5
700	1.597	0.130	1.603	0.116	2.5
800	1.823	0.138	1.937	0.125	2.5
900	2.009	0.150	2.125	0.163	2.5
1000	2.137	0.163	2.243	0.186	2.5
1200	2.322	0.183	2.358	0.199	2.5
1400	2.317	0.228	2.302	0.218	2.5
1600	2.322	0.250	2.286	0.228	2.5
1800	2.291	0.255	2.197	0.238	2.5
2000	2.296	0.282	2.204	0.251	2.5
2200	2.261	0.266	2.163	0.275	2.5
2400	2.283	0.278	2.192	0.288	2.5
2600	2.193	0.270	2.099	0.265	2.5
2800	2.026	0.267	2.054	0.249	2.5
3000	1.724	0.226	1.733	0.235	2.5

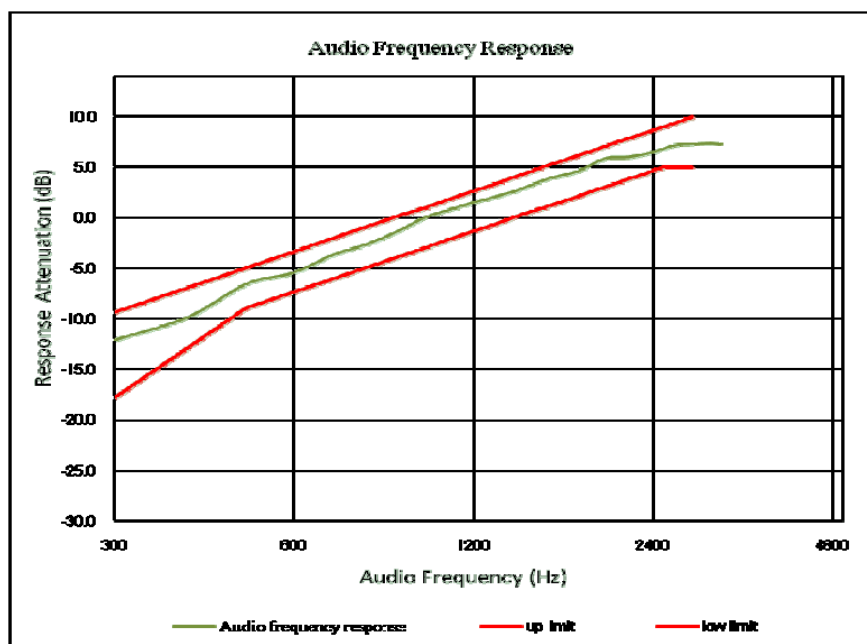


Audio Frequency Response

Carrier Frequency: 462.6375MHz	
Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.26
400	-9.43
500	-6.24
600	-5.06
700	-3.68
800	-2.27
900	-1.14
1000	0.00
1200	1.26
1400	2.38
1600	3.78
1800	4.68
2000	5.57
2200	5.87
2400	6.67
2600	7.03
2800	7.11
3000	7.36
3125	7.09

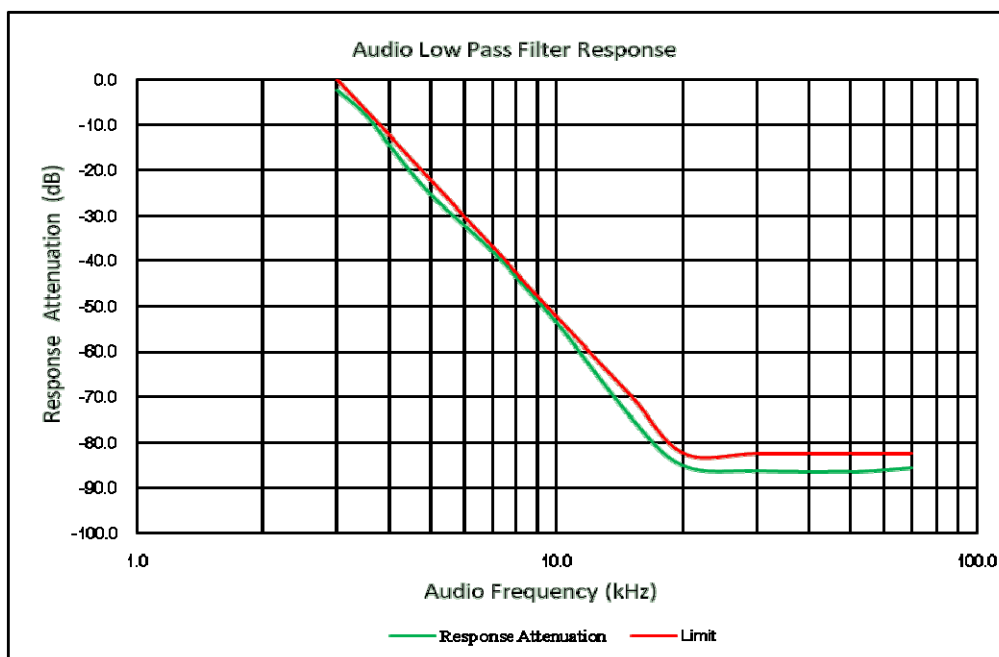


Carrier Frequency: 467.6375MHz	
Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.16
400	-9.89
500	-6.56
600	-5.46
700	-3.72
800	-2.58
900	-1.36
1000	0.00
1200	1.42
1400	2.56
1600	3.82
1800	4.59
2000	5.84
2200	5.98
2400	6.45
2600	7.11
2800	7.24
3000	7.36
3125	7.22

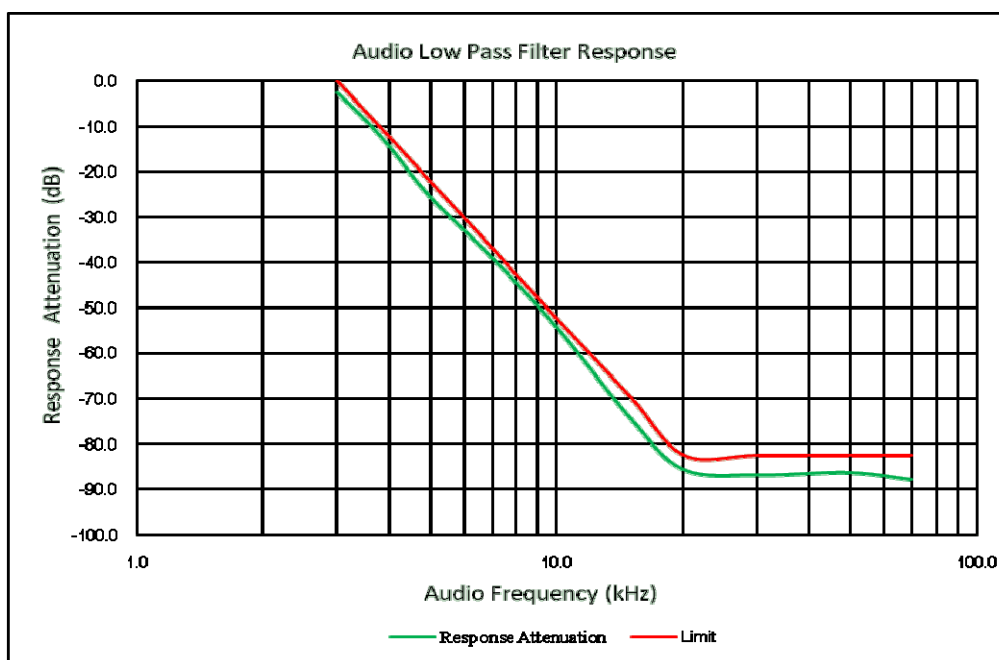


Audio Low Pass Filter Response

Carrier Frequency: 462.6375MHz		
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
3.0	-2.5	0
3.5	-7.8	-6.7
4.0	-14.8	-12.5
5.0	-25.4	-22.2
7.0	-37.8	-36.8
10.0	-53.6	-52.3
15.0	-74.6	-69.9
20.0	-85.3	-82.5
30.0	-86.4	-82.5
50.0	-86.5	-82.5
70.0	-85.7	-82.5



Carrier Frequency: 467.6375MHz		
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
3.0	-2.6	0
3.5	-8.6	-6.7
4.0	-14.6	-12.5
5.0	-25.7	-22.2
7.0	-38.9	-36.8
10.0	-54.2	-52.3
15.0	-74.6	-69.9
20.0	-85.7	-82.5
30.0	-86.9	-82.5
50.0	-86.4	-82.5
70.0	-87.8	-82.5



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.
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.

Test Procedure

TIA-603-E, section 2.2.11

Test Data

Environmental Conditions

Temperature:	26.5 °C
Relative Humidity:	51 %
ATM Pressure:	101.6 kPa

The testing was performed by Stone Zhang on 2020-06-14.

Test Mode: Transmitting

Modulation	fc (MHz)	99% Occupied Bandwidth (kHz)	20dB Bandwidth (kHz)	Limit (kHz)
FM	462.6375	9.986	10.333	12.5
	467.6375	9.986	10.333	12.5

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator

Per CFR 47 §2.201& §2.202, $BW = 2M + 2D$

For FM Mode (Channel Spacing: 12.5 kHz)

Emission Designator 11K0F3E

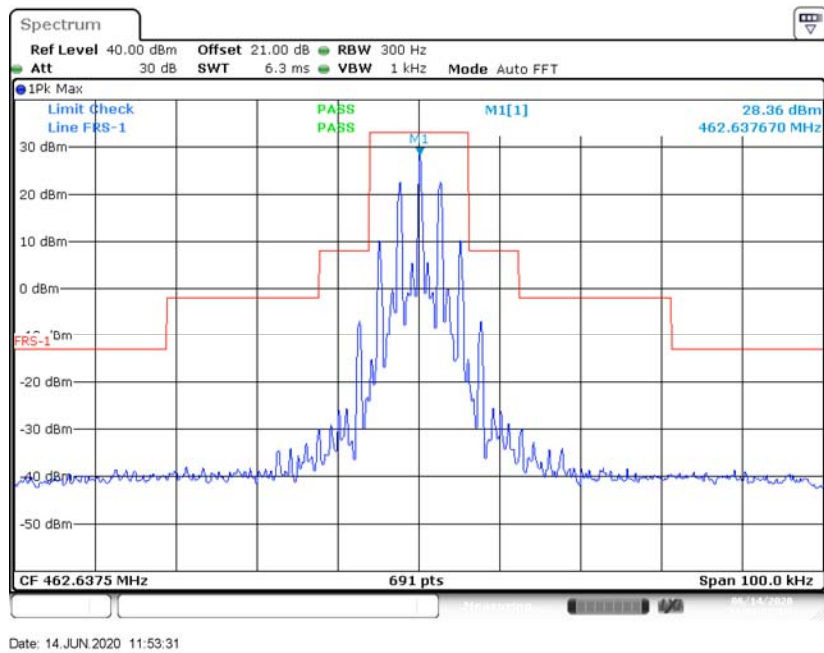
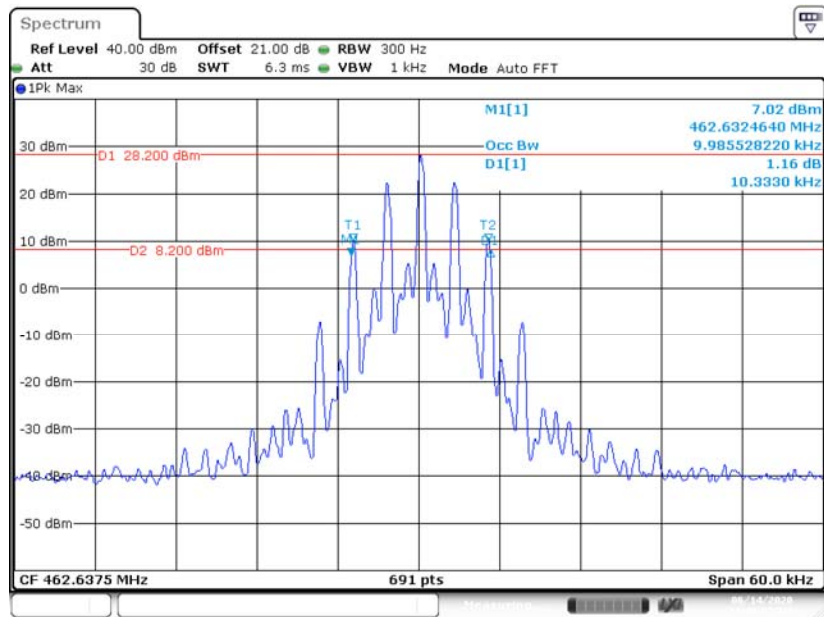
In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} = 11K0$

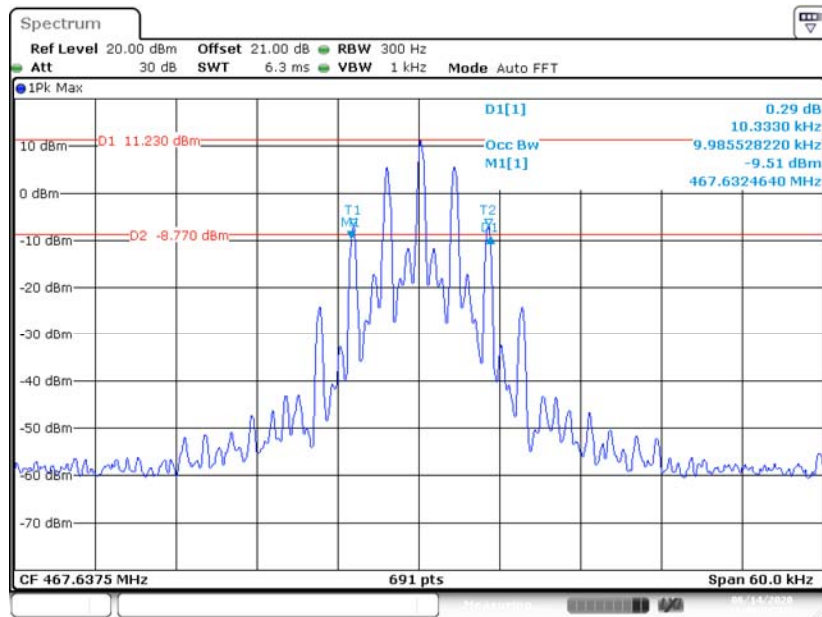
F3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

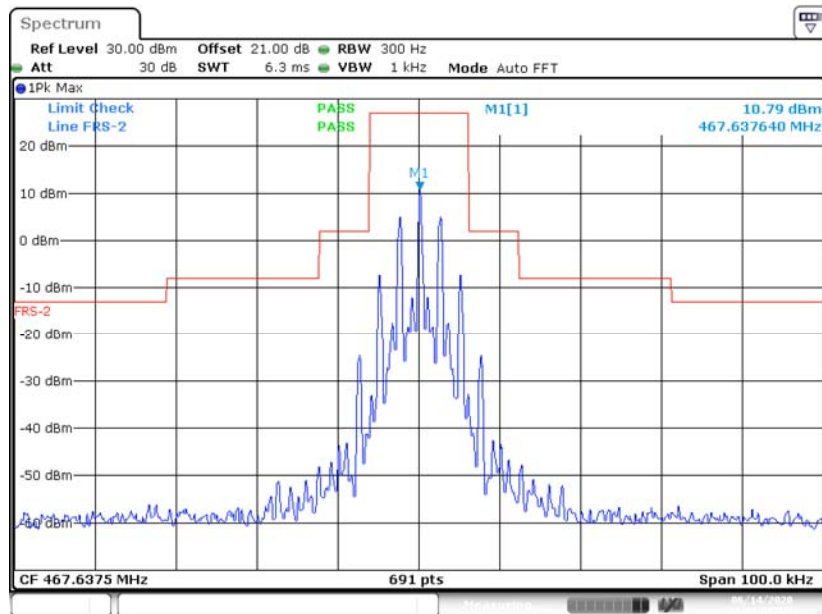
462.6375 MHz



467.6375 MHz



Date: 14 JUN 2020 11:39:53



Date: 14 JUN 2020 11:58:30

FCC §2.1053 & §95.579 - RADIATED SPURIOUS EMISSION

Applicable Standard

FCC §2.1053 and §95.579

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.

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 (TXpwr in Watts/0.001)-the absolute level
Spurious attenuation limit in dB = 43+10 Log10 (power out in Watts)

Test Data

Environmental Conditions

Temperature:	26.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Stone Zhang on 2020-06-04.

Test Mode: Transmitting

30MHz-5GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBuV)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
FM, Frequency: 462.6375MHz								
925.28	H	61.89	-35.77	0.64	-1.05	-37.46	-13	24.46
925.28	V	62.76	-34.9	0.64	-1.05	-36.59	-13	23.59
1387.91	H	66.13	-38.72	0.82	7.88	-31.66	-13	18.66
1387.91	V	64.31	-40.54	0.82	7.88	-33.48	-13	20.48
FM, Frequency: 467.6375MHz								
935.28	H	61.64	-36.12	0.64	-1.09	-37.85	-13	24.85
935.28	V	62.52	-35.24	0.64	-1.09	-36.97	-13	23.97
1402.91	H	65.71	-39.09	0.82	7.93	-31.98	-13	18.98
1402.91	V	63.62	-41.18	0.82	7.93	-34.07	-13	21.07

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

Note 2:

Absolute Level = Substituted 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 partsper-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:

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:	26.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Stone Zhang on 2020-06-04.

Test Mode: Transmitting

FM,Reference Frequency: 462.6375MHz				
Temperature (°C)	Voltage (V _{DC})	Reading (MHz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	462.63742	-0.17	2.5
-20		462.6379	0.86	
-10		462.63718	-0.69	
0		462.63762	0.26	
10		462.63798	1.04	
20		462.63794	0.95	
30		462.63770	0.43	
40		462.63721	-0.63	
50		462.63787	0.80	
25	4.2	462.63776	0.56	
25	3.5	462.63742	-0.17	

FM,Reference Frequency: 467.6375MHz				
Temperature (°C)	Voltage (V _{DC})	Reading (MHz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	467.63761	0.24	2.5
-20		467.63777	0.58	
-10		467.63780	0.64	
0		467.63747	-0.06	
10		467.63793	0.92	
20		467.63759	0.19	
30		467.63731	-0.41	
40		467.63701	-1.05	
50		467.63788	0.81	
25	4.2	467.63700	-1.07	
25	3.5	467.63731	-0.41	

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