

FCC Test Report

Report No.: 2405V83955EB

Applicant: Kirisun Communication Co., Ltd.

Address: 3rd Floor, Building A, Tongfang Information Habour, No.11 Langshan

Road Nanshan District, Shenzhen 518057 China

Product Name: Two Way Radio

Product Model: PT370

Multiple Models: PT375, PT376

Trade Mark: VIIISUN

FCC ID: Q5EPT37002

Standards: FCC CFR Title 47 Part 90

Test Date: 2024-07-09 to 2024-07-11

Test Result: Complied

Issue Date: 2024-07-23

Reviewed by:

Approved by:

Frank Yin

Frank Tin

Project Engineer

Jacob Kong

Jacob Gong

Manager

Prepared by:

World Alliance Testing and Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China



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Revision History

Version No.	Issued Date	Description	
00	2024-07-23	Original	

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1 General Information

1.1 Client Information

Applicant:	Kirisun Communication Co., Ltd.	
Address:	3rd Floor, Building A, Tongfang Information Habour, No.11 Langshan Road	
	Nanshan District, Shenzhen 518057 China	
Manufacturer:	Kirisun Communication Co., Ltd.	
Address:	3rd Floor, Building A, Tongfang Information Habour, No.11 Langshan Road	
	Nanshan District, Shenzhen 518057 China	

1.2 Product Description of EUT

Sample Serial number	2NVL-2 (assigned by WATC)	
Sample Received Date	2024-07-02	
Sample Status	Good Condition	
Operating Frequency Range	400-470MHz	
Rated Output Power#	2 Watts	
Modulation Technology	FM	
Channel Spacing	12.5kHz/25kHz	
Antenna Type	External antenna	
Antenna Gain#	0dBi	
Power Supply	DC 3.7V from battery or DC 5.0V from adapter	
Adapter Information	Model: YC-R02051000UU	
	Input: AC 100-240V, 50/60Hz, 0.2A	
	Output: DC 5V/1.0A	
Modification	Sample No Modification by the test lab	

1.3 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
	Below 30MHz	±2.78dB
Emissions, Radiated	Below 1GHz	±4.84dB
	Above 1GHz	±5.44dB
Emissions, Conducted		1.75dB
Conducted Power		0.74dB
Frequency Error		150Hz
Bandwidth		0.34%
Modulation Limiting		1.32%

Note 1: 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.

Note 2: The Decision Rule is based on simple acceptance with ISO Guide 98-4:2012 Clause 8.2 (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

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1.4 Laboratory Location

World Alliance Testing and Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: ga@watc.com.cn

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

1.5 Test Methodology

FCC CFR Title 47 Part 2, 90 ANSI C63.26-2015 ANSI TIA-603-E-2016

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2 Description of Measurement

2.1 Test Configuration

Operating frequency range: 400-470MHz					
According to Per C63.26-2015, section 5.1, below frequencies was tested					
Modulation Channel spacing Lowest Channel Middle Channel High channel [MHz] [MHz] [MHz]				High channel [MHz]	
FM	12.5	400.0125	450.0125	469.9875	
FM	25	400.0125	450.0125	469.9875	

Test Mode:	
Transmitting mode:	Keep the EUT in continuous transmitting with modulation

Worst-Case Configuration:

For radiated emissions, EUT was investigated in three orthogonal orientation, the worst-case orientation was recorded in report.

For antenna-conducted emission and radiated emission was investigated from 30MHz to 10 times of fundamental with the EUT transmits at the highest output power as worst-case scenario.

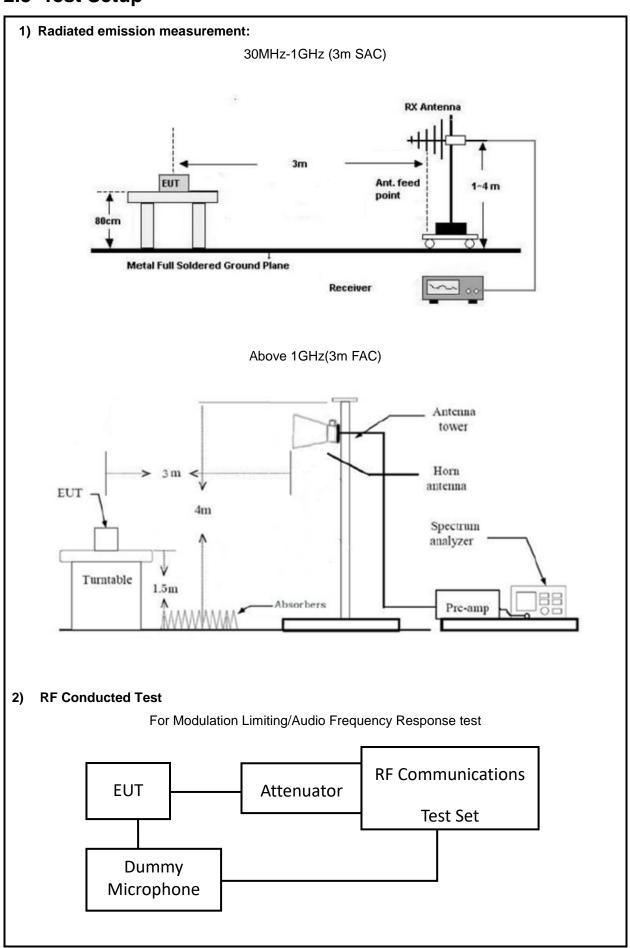
2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
N/A	50Ω Load	ADL 96	N/A

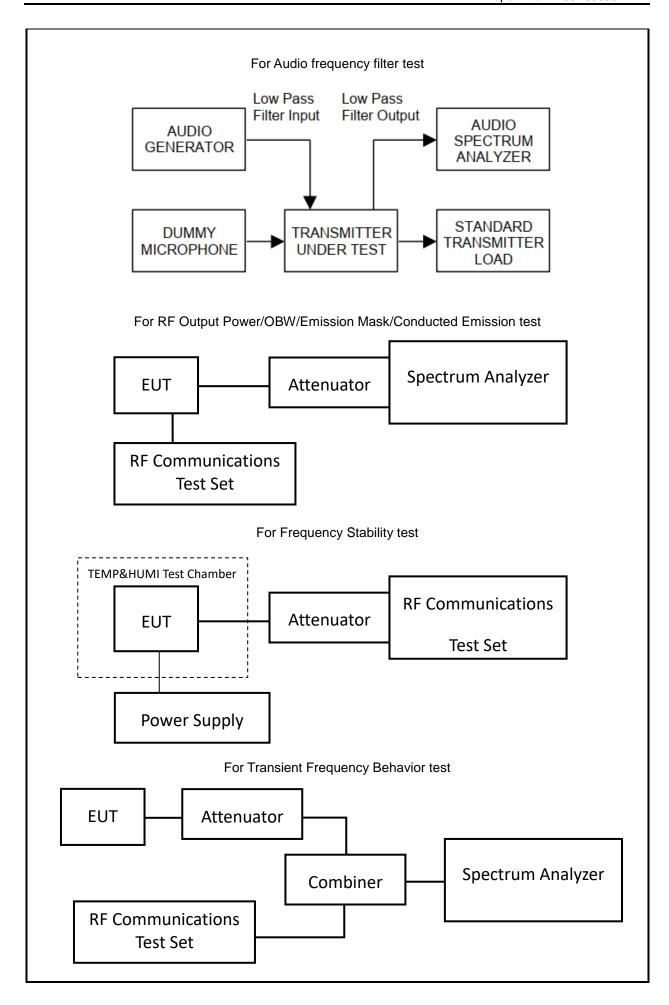
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2.3 Test Setup









2.4 Test Procedure

Radiated Emission Procedure:

a) For 30MHz-1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.

2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

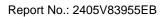
b) For above 1GHz:

- 1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m.
- 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
- 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

RF Conducted Test:

- 1. The antenna port of EUT was connected to the RF port of the test equipment (RF Communications Test Set or Spectrum analyzer) through Attenuator and RF cable.
- 2. The cable assembly insertion loss of 31.0dB (including 30dB Attenuator and 1.0 dB cable) was entered as an offset in the spectrum analyzer. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 1.0dB was assumed as worst case. This was later verified to be true by laboratory. (if the RF cable provided by client, the cable loss declared by client)
- 3. The EUT is keeping in continuous transmission mode with modulation signals required.

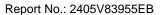
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2.5 Measurement Method

Description of Test	Measurement Method		
Modulation Limiting	ANSI C63.26-2015 section 5.3.2		
Audio Frequency Response	ANSI C63.26-2015 section 5.3.3.2		
Audio frequency filter	ANSI TIA-603-E-2016 section 2.2.15		
Occupied Bandwidth	ANSI C63.26-2015 section 5.4.4		
RF Output Power	ANSI C63.26-2015 section 5.2.3.3		
Emission Mask	ANSI C63.26-2015 section 5.7.3		
Spurious Emission at Antenna Terminal	ANSI C63.26-2015 section 5.7.4		
Frequency Stability	ANSI C63.26-2015 section 5.6		
Spurious Radiated Emissions	ANSI C63.26-2015 section 5.5.4		
Transient Frequency Behavior	ANSI C63.26-2015 section 6.5.2.2		

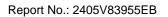




2.6 Measurement Equipment

Manufacturer Description Model Management Calibration Calibration					
Manufacturer	Description	Model	No.	Date	Due Date
		Radiated Emission	n Test		
R&S	EMI test receiver	ESR3	102758	2024/6/4	2025/6/3
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2024/6/4	2025/6/3
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2024/6/4	2025/6/3
COM-POWER	preamplifier	PAM-118A	18040152	2024/6/4	2025/6/3
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2026/7/6
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2026/7/5
N/A	Coaxial Cable	N/A	NO.9	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.14	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.15	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.16	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.17	N/A	2024/6/4	2025/6/3
Audix	Test Software	E3	191218 V9	1	/
		RF Conducted ⁻	Test		
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40	101419	2023/9/12	2024/9/11
BIRD	30dB attenuator	300-WA-FFN-30	1207	2023/7/26	2024/7/25
N/A	Coaxial Cable	NO.9	N/A	2023/8/8	2024/8/7
N/A	Coaxial Cable	NO.10	N/A	2023/8/8	2024/8/7
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSIQ26	837405	2024/01/08	2025/01/07
HP	RF comminication test set	HP8920A	T-01-EM046	2023/7/12	2024/7/11
HP	Power Splitter	11667A	1610A	2023/7/26	2024/7/25
BACL	TEMP&HUMI Test Chamber	BTH-150	30022	2023/7/12	2024/7/11
FLUKE	Digital Multimeter	15B+	N/A	2023/7/12	2024/7/11
UNI-T	DC Power Supply	UTP1310S	C221286498	NCR	NCR

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.



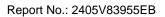


3 Test Results

3.1 Test Summary

FCC Rules	Description of Test	Result
§2.1055; §90.213	Frequency Stability	Compliance
§2.1046; §90.205	RF Output Power	Compliance
§2.1049; §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053; §90.210	Spurious Radiated Emissions	Compliance
§90.214	Transient Frequency Behavior	Compliance
§2.1047	§2.1047 Modulation Characteristic	

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3.2 Limit

Test items	Limit				
	Table 1 to § 90.213(a)—Minimum Frequency Stability [Parts per million (ppm)]				
	[i dite per immeri (ppin)	,	Makila	-4-4:	
	Frequency range (MHz)	Fixed and base	Mobile stations Over 2 watts output 2 watts or less output		
		stations	power	power	
	Below 25	^{1 2 3} 100	100	200	
	25-50	20	20	50	
	72-76	5		50	
	150-174	^{5 11} 5	⁶ 5	⁴⁶ 50	
	216-220	1.0		1.0	
	220-222 ¹²	0.1	1.5	1.5	
	421-512	^{7 11 14} 2.5	8 5	⁸ 5	
	designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.				
	operate with a 6.25 kHz channel bandwidth must have a frequency stability of				
	bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.				
	⁸ In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.				
Occupied Bandwidth	Operations using equipment designed to operate with a 25 kHz channel bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Operations using equipment designed to operate with a 6.25 kHz channel bandwidth will be authorized a 6 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2013, unless the operations meet the efficiency standard of § 90.203(j)(3).				

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§90.205(d): 150-174 MHz

The maximum allowable station ERP is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 1. Applicants requesting an ERP in excess of that listed in table 1 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

§90.205(h): 450-470 MHz

RF Output Power

The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 2. Applicants requesting an ERP in excess of that listed in table 2 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

§90.205(s):

The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with § 90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

Emission Mask D—12.5 kHz channel bandwidth equipment.

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd-2.88 kHz) dB.

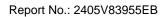
Emission Mask

Spurious Emission at Antenna Terminal

Spurious Radiated Emissions

- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

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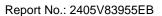




	Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:						
Emission Mask Spurious Emission at Antenna Terminal	(1) On any frequency percent, but not more dB.		- ·				
Spurious Radiated Emissions	(2) On any frequency percent, but not more dB.	than 250 perce	nt of the authorized b	pandwidth: At least 35			
	(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.						
	Transmitters designed frequency bands must frequency difference li	I to operate in the trans	he 150-174 MHz and ient frequencies with time intervals indicat	421-512 MHz in the maximum			
	Time intervals ¹²	frequency difference ³	421 to 512 MHz				
	Transient Frequenc	y Behavior for Equip	oment Designed to Operate	on 25 kHz Channels			
	t ₁ ⁴	±25.0 kHz	5.0 ms	10.0 ms			
	t ₂	±12.5 kHz	20.0 ms	25.0 ms			
	t_3^4	±25.0 kHz	5.0 ms	10.0 ms			
	Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels						
	t ₁ ⁴	±12.5 kHz	5.0 ms	10.0 ms			
	t ₂	±6.25 kHz	20.0 ms	25.0 ms			
	t ₃ ⁴	±12.5 kHz	5.0 ms	10.0 ms			
Transient Frequency Behavior			ment Designed to Operate o				
	t ₁ ⁴	±6.25 kHz	5.0 ms	10.0 ms			
	t ₂	±3.125 kHz	20.0 ms	25.0 ms			
	t ₃ ⁴	±6.25 kHz	5.0 ms	10.0 ms			
	$^{1}_{\text{on}}$ is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.						
	t ₁ is the time period immed	liately following t _{on} .					
	t ₂ is the time period immed	liately following t ₁ .					
	t_3 is the time period from the	he instant when the	transmitter is turned off unt	ill t _{off} .			
	$t_{\mbox{\scriptsize off}}$ is the instant when the	1 kHz test signal sta	arts to rise.				
	2 During the time from the end of $\rm t_2$ to the beginning of $\rm t_3$, the frequency difference must not exceed the limits specified in § 90.213.						
	³ Difference between the ac	ctual transmitter fre	quency and the assigned tra	ansmitter frequency.			
			s 6 watts or less, the freque cy difference for this time p				



Modulation Characteristic	(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
	(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
	(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
	(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.





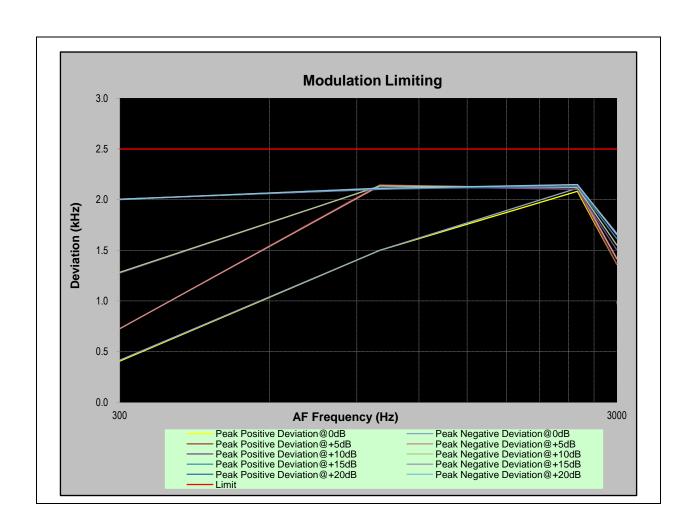
3.3 RF Conducted Test Data

Test Date:	2024-07-09	Test By:	Ryan Zhang
Environment condition:	Temperature: 24.9~25.3°C; Re	lative Humidity:49~51%;	ATM Pressure: 100.2kPa

3.3.1 Modulation Characteristic

Modulation Limiting

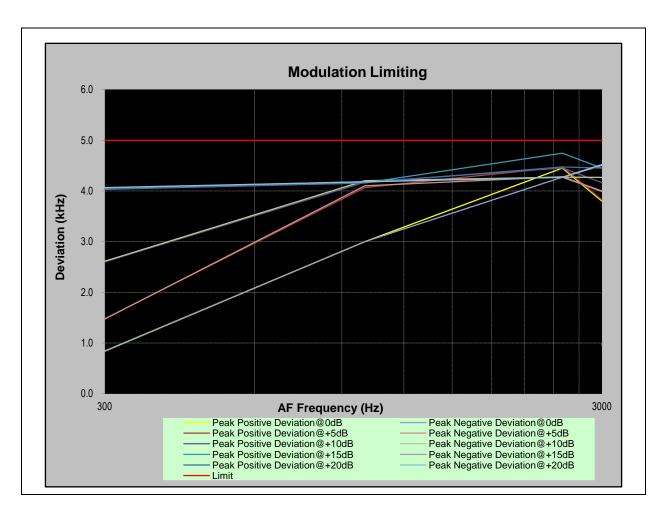
Carrier Frequency: 450.0125MHz, Channel Spacing: 12.5kHz												
	DEVIATION		DEVI	ATION	DEVI	ATION	DEVI	ATION	DEVI	ATION		
Audio	(@+	·0dB)	(@+	·5dB)	(@+10dB)		(@+15dB)		(@+20dB)		Limit	
Frequency	[k	Hz]	[k	Hz]	[k	Hz]	[k	Hz]	[k	Hz]	Limit	
(Hz)	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	[kHz]	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative		
300	0.406	0.416	0.726	0.727	1.276	1.283	2.001	2.005	2.004	2.003	2.500	
1000	1.500	1.500	2.145	2.136	2.134	2.135	2.114	2.101	2.105	2.111	2.500	
2500	2.083	2.113	2.103	2.121	2.101	2.120	2.130	2.147	2.132	2.148	2.500	
3000	1.364	1.415	1.367	1.420	1.504	1.551	1.616	1.667	1.613	1.654	2.500	



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Carrier Frequency: 450.0125MHz, Channel Spacing: 25kHz											
	DEVI	ATION	I DEVIATION		DEVI	ATION	DEVI	ATION	DEVIATION		
Audio	(@+	0dB)	(@+	(@+5dB)		10dB)	(@+	(@+15dB) (@		20dB)	Limit
Frequency	[k	Hz]	[k	Hz]	[k	Hz]	[k	Hz]	[k	Hz]	
(Hz)	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	[kHz]
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	
300	0.837	0.846	1.478	1.474	2.601	2.615	4.031	4.052	4.040	4.067	5.000
1000	3.000	3.000	4.067	4.103	4.175	4.203	4.159	4.184	4.162	4.182	5.000
2500	4.453	4.271	4.474	4.281	4.456	4.271	4.747	4.269	4.476	4.272	5.000
3000	3.803	3.990	3.827	4.001	4.164	4.270	4.452	4.504	4.452	4.521	5.000

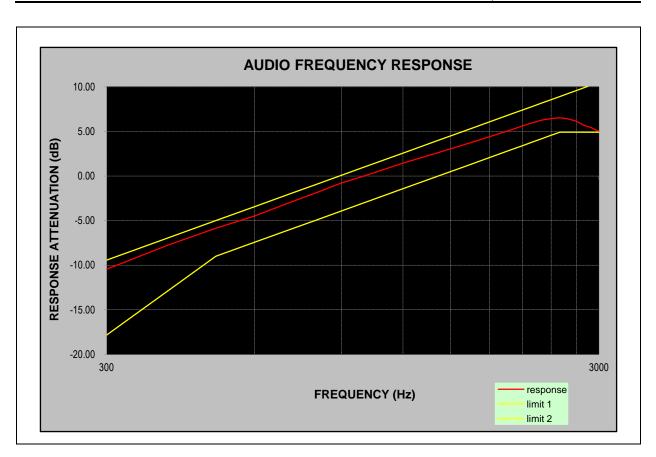




Audio Frequency Response

Test	Frequency: 450.0125MHz, C	Channel Spacing: 12.5k	Hz
Audio Frequency	Response Attenuation	High Limit	Low Limit
(Hz)	(dB)	(dB)	(dB)
300	-10.46	-9.4	-17.8
400	-7.74	-6.9	-12.9
500	-5.85	-5.0	-9.0
600	-4.47	-3.4	-7.4
700	-3.05	-2.1	-6.1
800	-1.87	-0.9	-4.9
900	-0.76	0.1	-3.9
1000	0.00	1.0	-3.0
1200	1.45	2.6	-1.4
1400	2.56	3.9	-0.1
1600	3.53	5.1	1.1
1800	4.41	6.1	2.1
2000	5.23	7.0	3.0
2100	5.65	7.4	3.4
2200	5.98	7.8	3.8
2300	6.29	8.2	4.2
2400	6.45	8.6	4.6
2500	6.54	8.9	4.9
2600	6.42	9.3	4.9
2700	6.17	9.6	4.9
2800	5.69	9.9	4.9
2900	5.41	10.2	4.9
3000	5.02	10.5	4.9

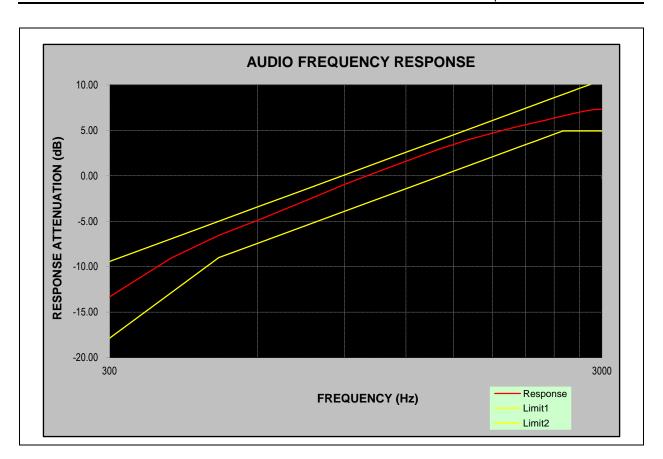


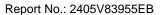




Test Frequency: 450.0125MHz, Channel Spacing: 25kHz								
Audio Frequency	Response Attenuation	High Limit	Low Limit					
(Hz)	(dB)	(dB)	(dB)					
300	-13.31	-9.4	-17.8					
400	-9.04	-6.9	-12.9					
500	-6.54	-5.0	-9.0					
600	-4.90	-3.4	-7.4					
700	-3.41	-2.1	-6.1					
800	-2.11	-0.9	-4.9					
900	-0.94	0.1	-3.9					
1000	0.00	1.0	-3.0					
1200	1.59	2.6	-1.4					
1400	2.91	3.9	-0.1					
1600	3.93	5.1	1.1					
1800	4.70	6.1	2.1					
2000	5.34	7.0	3.0					
2100	5.62	7.4	3.4					
2200	5.87	7.8	3.8					
2300	6.09	8.2	4.2					
2400	6.35	8.6	4.6					
2500	6.58	8.9	4.9					
2600	6.79	9.3	4.9					
2700	6.98	9.6	4.9					
2800	7.15	9.9	4.9					
2900	7.28	10.2	4.9					
3000	7.32	10.5	4.9					



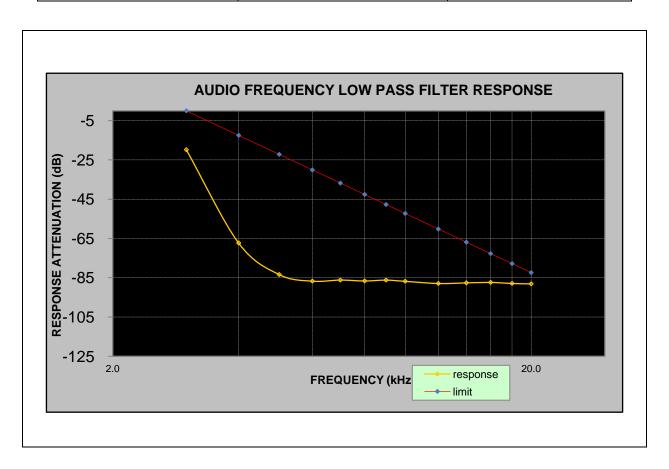






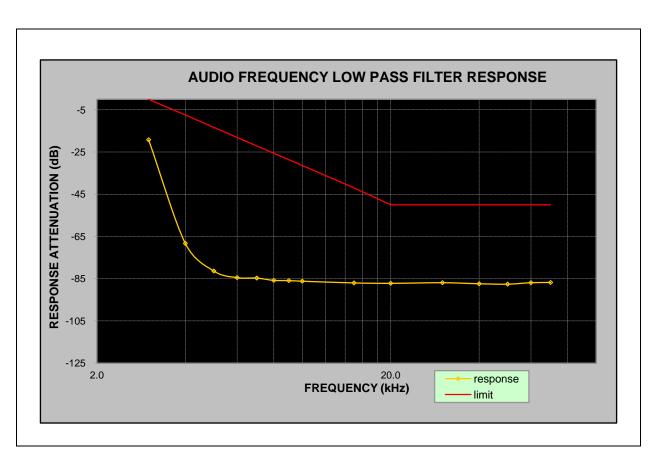
Audio Low Pass Filter Response

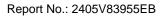
Carrie Freque	ncy: 450.0125MHz, Channel Spac	ing: 12.5kHz
Audio Frequency	Response Attenuation	Limit
(kHz)	(dB)	(dB)
1.0	0.0	/
3.0	-19.8	0.0
4.0	-67.3	-12.5
5.0	-83.4	-22.2
6.0	-86.7	-30.1
7.0	-86.2	-36.8
8.0	-86.6	-42.6
9.0	-86.2	-47.7
10.0	-86.8	-52.3
12.0	-87.9	-60.2
14.0	-87.6	-66.9
16.0	-87.4	-72.7
18.0	-87.9	-77.8
20.0	-88.1	-82.4





Carrie Frequ	ency: 450.0125MHz, Channel Spacii	ng: 25kHz
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-19.2	0.0
4.0	-68.3	-7.5
5.0	-81.4	-13.3
6.0	-84.5	-18.1
7.0	-84.7	-22.1
8.0	-85.8	-25.6
9.0	-85.9	-28.6
10.0	-86.2	-31.4
15.0	-87.0	-41.9
20.0	-87.2	-50.0
30.0	-86.9	-50.0
40.0	-87.4	-50.0
50.0	-87.6	-50.0
60.0	-86.9	-50.0
70.0	-86.8	-50.0



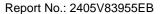




3.3.2 RF Output Power

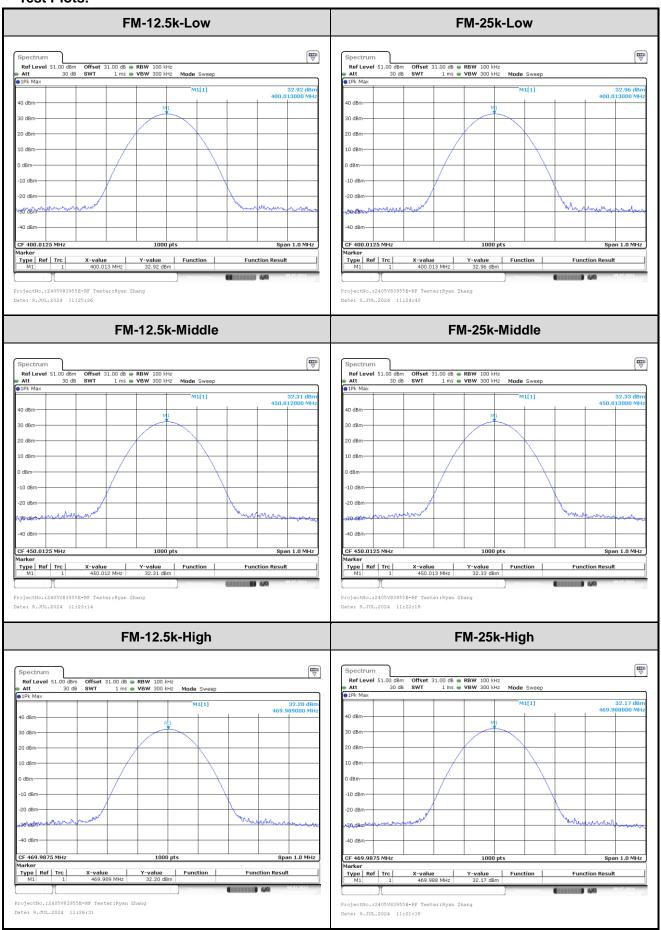
Channel Modulation Spacing	Channel	Rated		Coi	nducted C	Output po	wer		Limit	
	Power	Low C	hannel	Middle (Channel	High Channel		(W)	Verdict	
	(kHz)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)		
Analog	12.5	2	32.92	1.96	32.31	1.70	32.20	1.66	≤33	Pass
Allalog	25	2	32.96	1.98	32.33	1.71	32.17	1.65	≤33	Pass

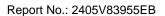
Note: according to FCC §90.203(j)(4), applications for part 90 certification of transmitters designed to operate on frequencies in the 421-512 MHz band should be capable of operating on channels of 6.25 kHz or less, except for hand-held transmitters with an output power of two watts or less.





Test Plots:







3.3.3 Occupied Bandwidth and Emission Mask

Modulation Sp	Channel	Rated			Bandwid	dth(kHz)			Limit	
	Spacing	Power	Low Ch	nannel	Middle (Channel	High C	hannel	(kHz)	Verdict
	(kHz)	(W)	26dB	99%	26dB	99%	26dB	99%		
Analog	12.5	2	9.95	10.20	9.95	10.20	9.95	10.20	≤11.25	Pass
Analog	25	2	15.00	15.60	15.00	15.65	14.95	15.65	≤20	Pass

	Channel	Rated	Er	nission Mask Res	ult		
	3	Power (W)	Low Channel	Middle Channel	High Channel	Limit	Verdict
Analog	12.5	2	Refer test plot	Refer test plot	Refer test plot	Refer test plot	Pass
Alialog	25	2	Refer test plot	Refer test plot	Refer test plot	Refer test plot	Pass

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 kHz + 2.5 kHz) = 11 kHz = 11KO

F3E portion of the designator represents an FM voice transmission

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

For FM Mode (Channel Spacing: 25kHz)

Emission Designator: 16K0F3E

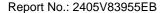
In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

BW = 2(M+D) = 2*(3.0 kHz + 5.0 kHz) = 16 kHz = 16 KO

F3E portion of the designator represents an FM voice transmission

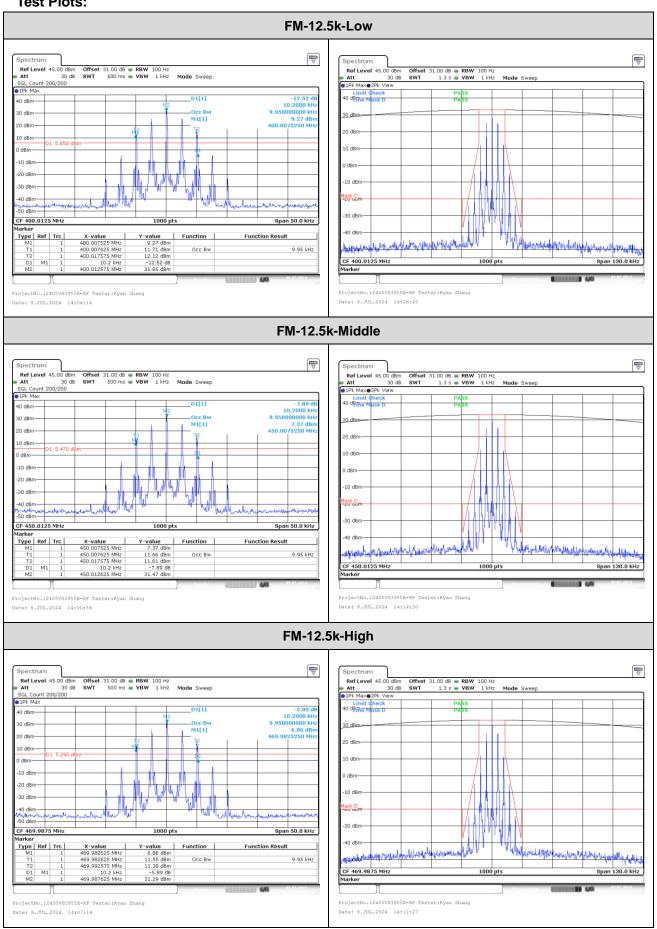
Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

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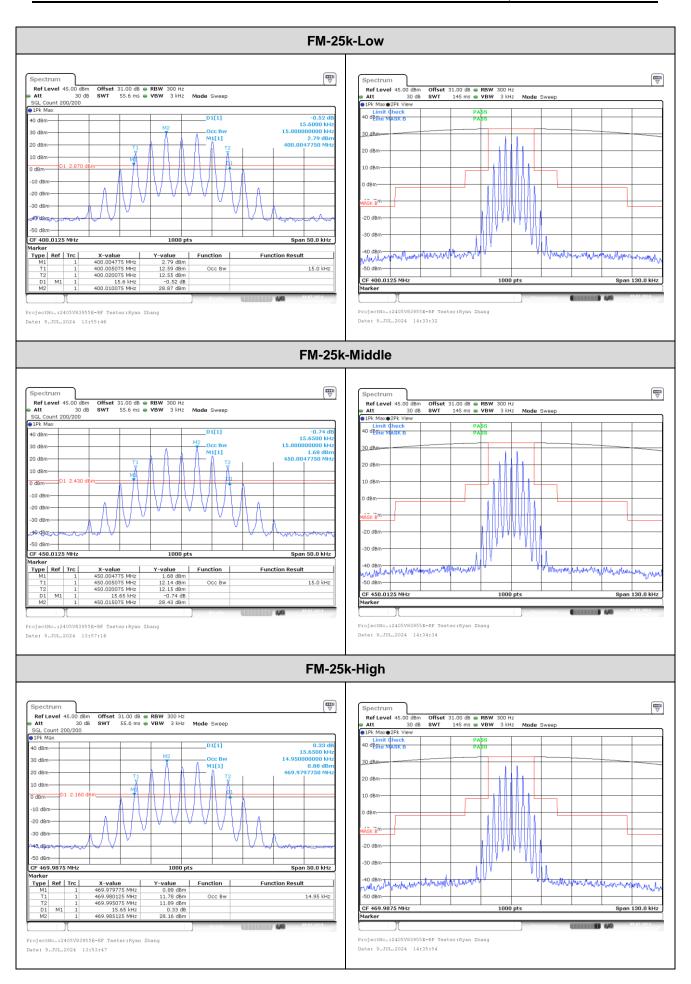


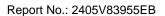


Test Plots:





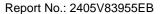






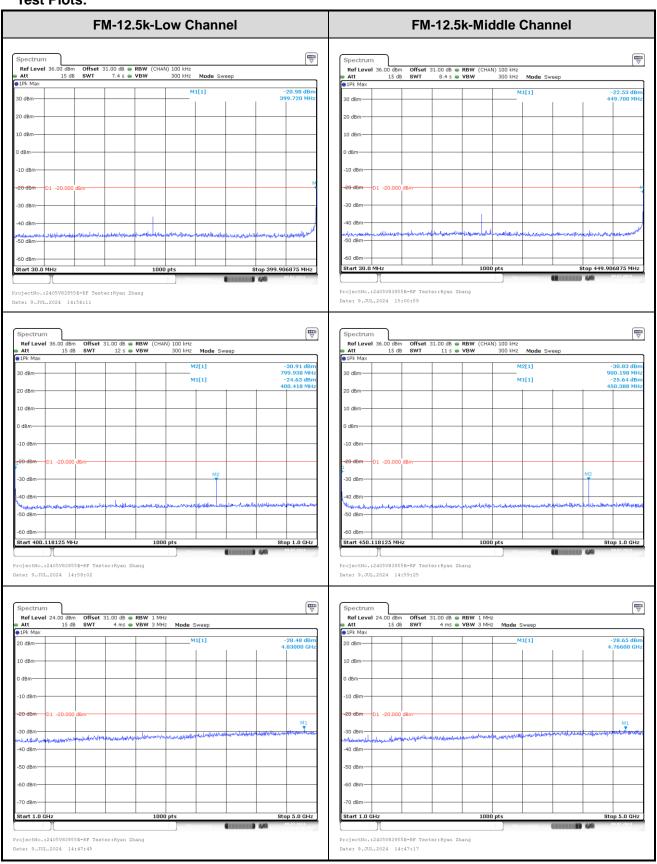
3.3.4 Spurious Emission at Antenna Terminal

Modulation	Channel Spacing (kHz)	Test Channel	Spurious Emission at Antenna Terminal Result	Limit	Verdict
		Low	Refer test plot	Refer test plot	Pass
FM	12.5	Middle	Refer test plot	Refer test plot	Pass
		High	Refer test plot	Refer test plot	Pass
		Low	Refer test plot	Refer test plot	Pass
4FSK	12.5	Middle	Refer test plot	Refer test plot	Pass
		High	Refer test plot	Refer test plot	Pass





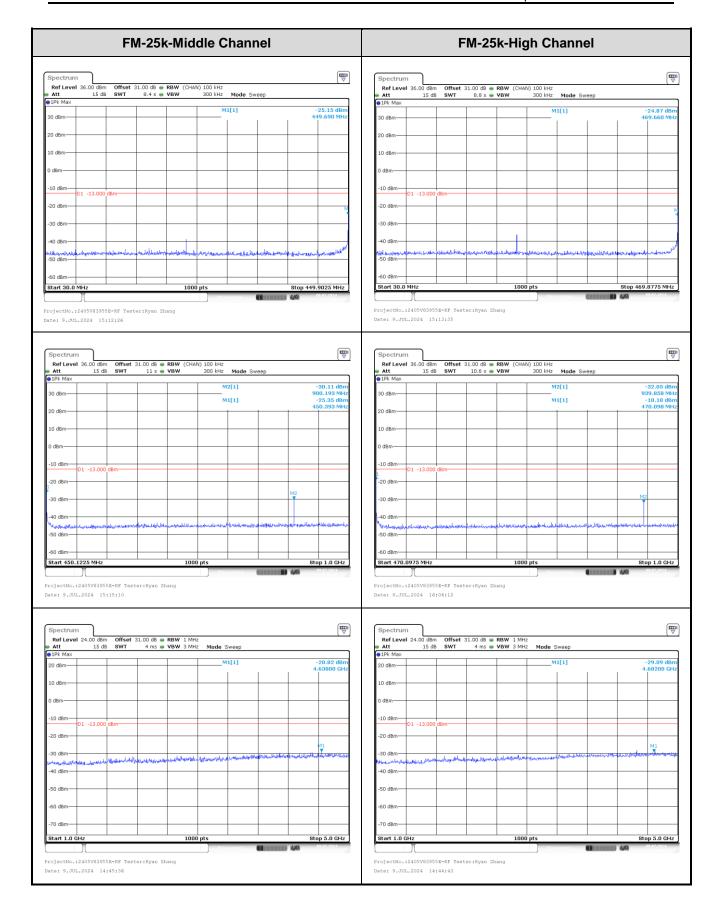
Test Plots:









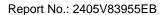




3.3.5 Frequency stability

	Un-modulation, Reference Frequency: 450.0125MHz											
Test Item	Temperature (°C)	Voltage (Vdc)	Center Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (ppm)	limit (ppm)	Verdict					
	50	3.7	450.0125	450.012546	0.10	≤2.5	Pass					
	40	3.7	450.0125	450.012583	0.18	≤2.5	Pass					
	30	3.7	450.0125	450.012604	0.23	≤2.5	Pass					
F	20	3.7	450.0125	450.012612	0.25	≤2.5	Pass					
Frequency	10	3.7	450.0125	450.012608	0.24	≤2.5	Pass					
Stability vs.	0	3.7	450.0125	450.012536	0.08	≤2.5	Pass					
Temperature& Voltage	-10	3.7	450.0125	450.012594	0.21	≤2.5	Pass					
voltage	-20	3.7	450.0125	450.012600	0.22	≤2.5	Pass					
	-30	3.7	450.0125	450.012601	0.22	≤2.5	Pass					
	20	4.26	450.0125	450.012524	0.05	≤2.5	Pass					
	20	3.15	450.0125	450.012536	0.08	≤2.5	Pass					

Note: the device support 12.5kHz and 25kHz mode, the stricter limit was used.





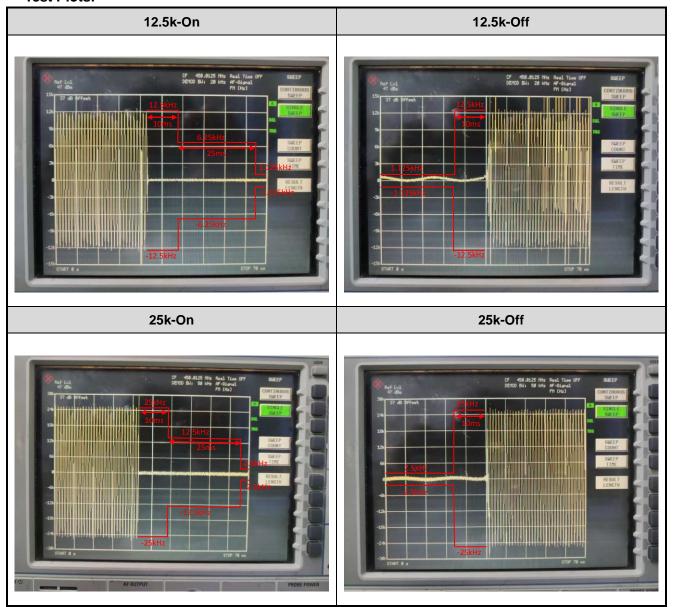
3.3.6 Transient Frequency Behavior

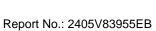
Channel Spacing (kHz)	Time intervals (ms)	Maximum frequency difference (kHz)	Verdict
	10.0(t1)	12.5	Pass
12.5	25.0 (t2)	6.25	Pass
	10.0 (t3)	12.5	Pass
	10.0(t1)	25	Pass
25	25.0 (t2)	12.5	Pass
	10.0 (t3)	25	Pass

Note: During the time from the end of t2 to the beginning of t3, the frequency difference must not exceed the limits of Frequency stability: $450.0125MHz^* + -2.5ppm = +-1.125kHz$ for 12.5kHz,

 $450.0125MHz^* + -5ppm = + -2.25kHz$ for 12.5kHz

Test Plots:







3.4 Radiated emission Test Data

Below 1GHz

Test Date:	2024-07-11	Test By:	Bard Huang
Environment condition:	Temperature: 23.5°C; Relative	Humidity: 61%; ATM F	Pressure: 100.2kPa

Frequency (MHz)	Reading level (dBµV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	EIRP CF	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Remark		
	FM-12.5k-Low Channel										
800.025	57.77	horizontal	-0.06	57.71	95.2	-37.49	-20	-17.49	Peak		
800.025	52.76	vertical	-0.06	52.70	95.2	-42.5	-20	-22.5	Peak		
			FN	Л-12.5k-Middle	Channel						
900.025	51.21	horizontal	1.42	52.63	95.2	-42.57	-20	-22.57	Peak		
900.025	47.88	vertical	1.42	49.30	95.2	-45.9	-20	-25.9	Peak		
			F	M-12.5k-High	Channel						
939.975	48.53	horizontal	2.28	50.81	95.2	-44.39	-20	-24.39	Peak		
939.975	44.69	vertical	2.28	46.97	95.2	-48.23	-20	-28.23	Peak		
				FM-25k-Low C	hannel						
800.025	55.32	horizontal	-0.06	55.26	95.2	-39.94	-13	-26.94	Peak		
800.025	45.75	vertical	-0.06	45.69	95.2	-49.51	-13	-36.51	Peak		
			F	M-25k -Middle	Channel						
900.025	43.56	horizontal	1.42	44.98	95.2	-50.22	-13	-37.22	Peak		
900.025	38.93	vertical	1.42	40.35	95.2	-54.85	-13	-41.85	Peak		
				FM-25k-High C	hannel						
939.975	44.72	horizontal	2.28	47.00	95.2	-48.2	-13	-35.2	Peak		
939.975	43.85	vertical	2.28	46.13	95.2	-49.07	-13	-36.07	Peak		

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Above 1GHz

Test Date:	2024-07-10	Test By:	Bard Huang
Environment condition:	Temperature: 22.6°C; Relative	Humidity: 57%; ATM F	ressure: 100.2kPa

Frequency (MHz)	Reading level (dBµV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	EIRP CF	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Remark	
FM-12.5k-Low Channel										
1200.038	60.36	horizontal	-5.80	54.56	95.2	-40.64	-20	-20.64	Peak	
1600.050	64.74	horizontal	-3.69	61.05	95.2	-34.15	-20	-14.15	Peak	
2000.063	59.98	horizontal	-4.21	55.77	95.2	-39.43	-20	-19.43	Peak	
2400.075	60.01	horizontal	-2.83	57.18	95.2	-38.02	-20	-18.02	Peak	
2800.088	64.59	horizontal	-2.51	62.08	95.2	-33.12	-20	-13.12	Peak	
3200.100	58.89	horizontal	-2.98	55.91	95.2	-39.29	-20	-19.29	Peak	
3600.113	65.00	horizontal	-2.61	62.39	95.2	-32.81	-20	-12.81	Peak	
4000.125	61.47	horizontal	-3.34	58.13	95.2	-37.07	-20	-17.07	Peak	
1200.038	60.88	vertical	-5.80	55.08	95.2	-40.12	-20	-20.12	Peak	
1600.050	71.94	vertical	-3.69	68.25	95.2	-26.95	-20	-6.95	Peak	
2000.063	59.83	vertical	-4.21	55.62	95.2	-39.58	-20	-19.58	Peak	
2400.075	58.98	vertical	-2.83	56.15	95.2	-39.05	-20	-19.05	Peak	
2800.088	65.47	vertical	-2.51	62.96	95.2	-32.24	-20	-12.24	Peak	
3200.100	58.20	vertical	-2.98	55.22	95.2	-39.98	-20	-19.98	Peak	
3600.113	65.67	vertical	-2.61	63.06	95.2	-32.14	-20	-12.14	Peak	
4000.125	64.11	vertical	-3.34	60.77	95.2	-34.43	-20	-14.43	Peak	
		T	FN	Л-12.5k-Middle	Channel	Т		1		
1350.038	66.65	horizontal	-5.05	61.60	95.2	-33.60	-20	-13.60	Peak	
1800.050	65.26	horizontal	-3.25	62.01	95.2	-33.19	-20	-13.19	Peak	
2250.063	71.80	horizontal	-2.81	68.99	95.2	-26.21	-20	-6.21	Peak	
2700.075	70.08	horizontal	-2.48	67.60	95.2	-27.60	-20	-7.60	Peak	
3150.088	68.75	horizontal	-2.98	65.77	95.2	-29.43	-20	-9.43	Peak	
3600.100	71.28	horizontal	-2.61	68.67	95.2	-26.53	-20	-6.53	Peak	
4050.113	67.41	horizontal	-3.31	64.10	95.2	-31.10	-20	-11.10	Peak	
4500.125	59.20	horizontal	-3.09	56.11	95.2	-39.09	-20	-19.09	Peak	
1350.038	62.02	vertical	-5.05	56.97	95.2	-38.23	-20	-18.23	Peak	
1800.050	65.98	vertical	-3.25	62.73	95.2	-32.47	-20	-12.47	Peak	
2250.063	68.35	vertical	-2.81	65.54	95.2	-29.66	-20	-9.66	Peak	

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		1		T		1	T	,				
2700.075	64.54	vertical	-2.48	62.06	95.2	-33.14	-20	-13.14	Peak			
3150.088	67.64	vertical	-2.98	64.66	95.2	-30.54	-20	-10.54	Peak			
3600.100	70.47	vertical	-2.61	67.86	95.2	-27.34	-20	-7.34	Peak			
4050.113	68.02	vertical	-3.31	64.71	95.2	-30.49	-20	-10.49	Peak			
4500.125	58.75	vertical	-3.09	55.66	95.2	-39.54	-20	-19.54	Peak			
	FM-12.5k-High Channel											
1409.963	68.52	horizontal	-4.61	63.91	95.2	-31.29	-20	-11.29	Peak			
1879.950	70.28	horizontal	-3.38	66.90	95.2	-28.30	-20	-8.30	Peak			
2349.938	68.37	horizontal	-2.79	65.58	95.2	-29.62	-20	-9.62	Peak			
2819.925	66.83	horizontal	-2.52	64.31	95.2	-30.89	-20	-10.89	Peak			
3289.913	67.95	horizontal	-2.71	65.24	95.2	-29.96	-20	-9.96	Peak			
3759.900	69.34	horizontal	-2.69	66.65	95.2	-28.55	-20	-8.55	Peak			
4229.888	62.15	horizontal	-3.42	58.73	95.2	-36.47	-20	-16.47	Peak			
4699.875	59.84	horizontal	-0.44	59.40	95.2	-35.80	-20	-15.80	Peak			
1409.963	66.97	vertical	-4.61	62.36	95.2	-32.84	-20	-12.84	Peak			
1879.950	70.36	vertical	-3.38	66.98	95.2	-28.22	-20	-8.22	Peak			
2349.938	70.58	vertical	-2.79	67.79	95.2	-27.41	-20	-7.41	Peak			
2819.925	66.18	vertical	-2.52	63.66	95.2	-31.54	-20	-11.54	Peak			
3289.913	67.05	vertical	-2.71	64.34	95.2	-30.86	-20	-10.86	Peak			
3759.900	69.56	vertical	-2.69	66.87	95.2	-28.33	-20	-8.33	Peak			
4229.888	62.06	vertical	-3.42	58.64	95.2	-36.56	-20	-16.56	Peak			
4699.875	60.92	vertical	-0.44	60.48	95.2	-34.72	-20	-14.72	Peak			
				FM-25k-Low C	hannel							
1200.038	62.04	horizontal	-5.8	56.24	95.2	-38.96	-13	-25.96	Peak			
1600.050	65.40	horizontal	-3.69	61.71	95.2	-33.49	-13	-20.49	Peak			
2000.063	66.71	horizontal	-4.21	62.5	95.2	-32.70	-13	-19.70	Peak			
2400.075	58.86	horizontal	-2.83	56.03	95.2	-39.17	-13	-26.17	Peak			
2800.088	70.26	horizontal	-2.51	67.75	95.2	-27.45	-13	-14.45	Peak			
3200.100	64.45	horizontal	-2.98	61.47	95.2	-33.73	-13	-20.73	Peak			
3600.113	68.07	horizontal	-2.61	65.46	95.2	-29.74	-13	-16.74	Peak			
4000.125	62.74	horizontal	-3.34	59.4	95.2	-35.80	-13	-22.80	Peak			
1200.038	60.05	vertical	-5.8	54.25	95.2	-40.95	-13	-27.95	Peak			
1600.050	71.79	vertical	-3.69	68.1	95.2	-27.10	-13	-14.10	Peak			
2000.063	61.17	vertical	-4.21	56.96	95.2	-38.24	-13	-25.24	Peak			
2400.075	59.84	vertical	-2.83	57.01	95.2	-38.19	-13	-25.19	Peak			



-		1		T	ı	ı	ı					
2800.088	66.27	vertical	-2.51	63.76	95.2	-31.44	-13	-18.44	Peak			
3200.100	59.77	vertical	-2.98	56.79	95.2	-38.41	-13	-25.41	Peak			
3600.113	68.23	vertical	-2.61	65.62	95.2	-29.58	-13	-16.58	Peak			
4000.125	62.59	vertical	-3.34	59.25	95.2	-35.95	-13	-22.95	Peak			
FM-25k-Middle Channel												
1350.038	67.85	horizontal	-5.05	62.8	95.2	-32.40	-13	-19.40	Peak			
1800.050	64.95	horizontal	-3.25	61.7	95.2	-33.50	-13	-20.50	Peak			
2250.063	71.71	horizontal	-2.81	68.9	95.2	-26.30	-13	-13.30	Peak			
2700.075	69.78	horizontal	-2.48	67.3	95.2	-27.90	-13	-14.90	Peak			
3150.088	67.73	horizontal	-2.98	64.75	95.2	-30.45	-13	-17.45	Peak			
3600.100	72.37	horizontal	-2.61	69.76	95.2	-25.44	-13	-12.44	Peak			
4050.113	68.03	horizontal	-3.31	64.72	95.2	-30.48	-13	-17.48	Peak			
4500.125	59.17	horizontal	-3.09	56.08	95.2	-39.12	-13	-26.12	Peak			
1350.038	62.71	vertical	-5.05	57.66	95.2	-37.54	-13	-24.54	Peak			
1800.050	65.32	vertical	-3.25	62.07	95.2	-33.13	-13	-20.13	Peak			
2250.063	66.83	vertical	-2.81	64.02	95.2	-31.18	-13	-18.18	Peak			
2700.075	64.50	vertical	-2.48	62.02	95.2	-33.18	-13	-20.18	Peak			
3150.088	65.95	vertical	-2.98	62.97	95.2	-32.23	-13	-19.23	Peak			
3600.100	71.68	vertical	-2.61	69.07	95.2	-26.13	-13	-13.13	Peak			
4050.113	68.37	vertical	-3.31	65.06	95.2	-30.14	-13	-17.14	Peak			
4500.125	60.35	vertical	-3.09	57.26	95.2	-37.94	-13	-24.94	Peak			
				FM-25k-High C	Channel		1	1				
1409.963	68.56	horizontal	-4.61	63.95	95.2	-31.25	-13	-18.25	Peak			
1879.950	70.52	horizontal	-3.38	67.14	95.2	-28.06	-13	-15.06	Peak			
2349.938	68.82	horizontal	-2.79	66.03	95.2	-29.17	-13	-16.17	Peak			
2819.925	67.55	horizontal	-2.52	65.03	95.2	-30.17	-13	-17.17	Peak			
3289.913	68.55	horizontal	-2.71	65.84	95.2	-29.36	-13	-16.36	Peak			
3759.900	69.46	horizontal	-2.69	66.77	95.2	-28.43	-13	-15.43	Peak			
4229.888	63.14	horizontal	-3.42	59.72	95.2	-35.48	-13	-22.48	Peak			
4699.875	60.04	horizontal	-0.44	59.6	95.2	-35.60	-13	-22.60	Peak			
1409.963	66.80	vertical	-4.61	62.19	95.2	-33.01	-13	-20.01	Peak			
1879.950	70.59	vertical	-3.38	67.21	95.2	-27.99	-13	-14.99	Peak			
2349.938	70.23	vertical	-2.79	67.44	95.2	-27.76	-13	-14.76	Peak			
2819.925	65.80	vertical	-2.52	63.28	95.2	-31.92	-13	-18.92	Peak			
3289.913	66.80	vertical	-2.71	64.09	95.2	-31.11	-13	-18.11	Peak			



3759.900	70.11	vertical	-2.69	67.42	95.2	-27.78	-13	-14.78	Peak
4229.888	62.94	vertical	-3.42	59.52	95.2	-35.68	-13	-22.68	Peak
4699.875	60.26	vertical	-0.44	59.82	95.2	-35.38	-13	-22.38	Peak

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss - Amplifier gain

Margin = Result - Limit

According to ANSI C63.26-2.15 section 5.2.7:

EIRP (dBm) = E (dB μ V/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

Test was performed on 3meters distance, so

Result = Corrected Amplitude + 20log(3) - 104.8

= Corrected Amplitude - 95.2

The emission levels of other frequencies that were lower than the limit 20dB, not show in test report.

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4 Test Setup Photo

Please refer to the attachment 2405V83955E Test Setup photo.



5 E.U.T Photo

Please refer to the attachment 2405V83955E External photo and 2405V83955E Internal photo.

---End of Report---