

FCC Test Report

Report No.: 2405S27918EA

Applicant: GUANGZHOU GEOSURV INFORMATION TECHNOLOGY Co., Ltd

Address: Room C401 TOPS Beidou Base No 83 Kaiyuan Avenue,
Guangzhou, China, 510700

Product Name: 5W Long-distance Wireless Data transreceiver Module

Product Model: T500L

Multiple Models: N/A

Trade Mark: N/A

FCC ID: 2BDE5-T500L

Standards: FCC CFR Title 47 Part 90

Test Date: 2024-05-10 to 2024-05-29

Test Result: Complied

Issue Date: 2024-06-04

Reviewed by:

Frank Yin

Approved by:

Jacob Kong

Frank Yin
Project Engineer

Jacob Kong
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Prepared by:

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Guangdong, People's Republic of China



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Revision History

Version No.	Issued Date	Description
00	2024-06-04	Original

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1 General Information

1.1 Client Information

Applicant:	GUANGZHOU GEOSURV INFORMATION TECHNOLOGY Co., Ltd
Address:	Room C401 TOPS Beidou Base No 83 Kaiyuan Avenue, Guangzhou, China, 510700
Manufacturer:	GUANGZHOU MERCURY NAVIGATION TECHNOLOGY CO., LTD
Address:	A403, TOPS Beidou Innovation Base, No.83, Kaiyuan Avenue, Huangpu, Guangzhou, Guangdong, China

1.2 Product Description of EUT

Sample Serial number	2KQ8-2 (assigned by WATC)
Sample Received Date	2024-04-30
Sample Status	Good Condition
Operating Frequency Range	410-470MHz
Rated Output Power [#]	5 Watts, 3 Watts
Modulation Technology	GMSK
Channel Spacing	12.5kHz
Antenna Type	External antenna
Antenna Gain [#]	4dBi
Power Supply	DC 7.5V
Adapter Information	N/A
Modification	Sample No Modification by the test lab

1.3 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Emissions, Radiated	Below 30MHz	±2.78dB
	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.)		

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

2 Description of Measurement

2.1 Test Configuration

Operating frequency range:		410-470 MHz		
According to Per C63.26-2015, section 5.1, below frequencies was tested				
Modulation	Channel spacing [kHz]	Lowest Channel [MHz]	Middle Channel [MHz]	High channel [MHz]
GMSK	12.5	410.0125	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.

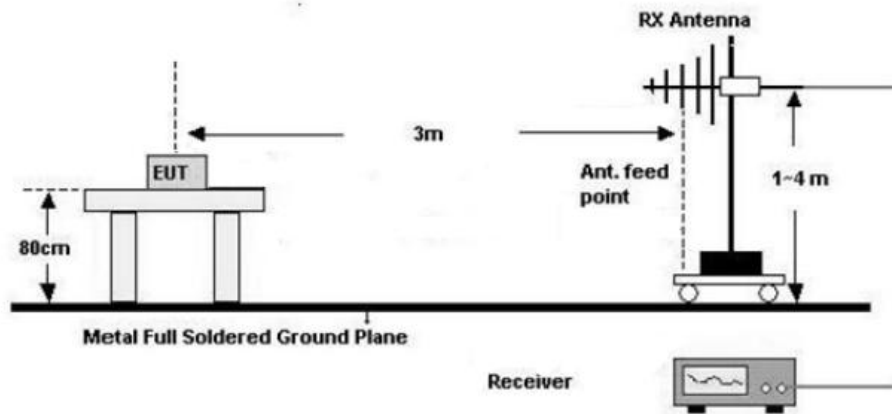
2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
unknown	Load	unknown	unknown
unknown	RF cable	unknown	unknown
unknown	USB to RS232 cable	unknown	unknown
DELL	laptop	unknown	unknown
UNI-TREND Technology (CHINA) Co., Ltd.	DC Power Supply	UTP1310S	C221286498

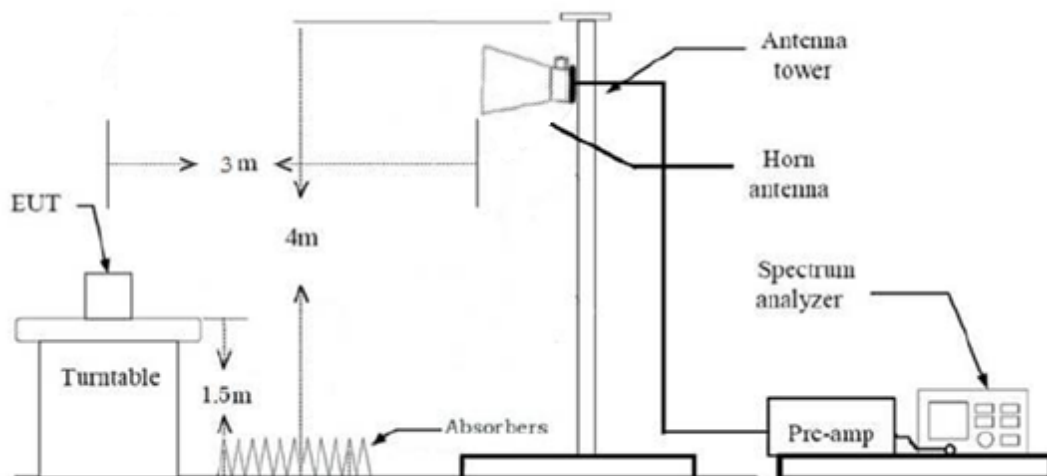
2.3 Test Setup

1) Radiated emission measurement:

30MHz-1GHz (3m SAC)

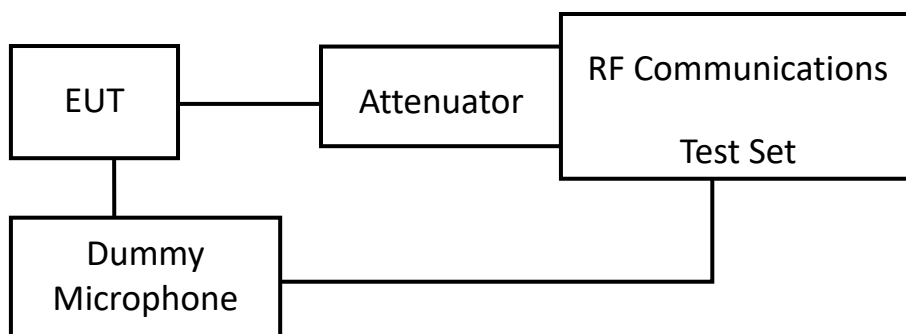


Above 1GHz(3m FAC)

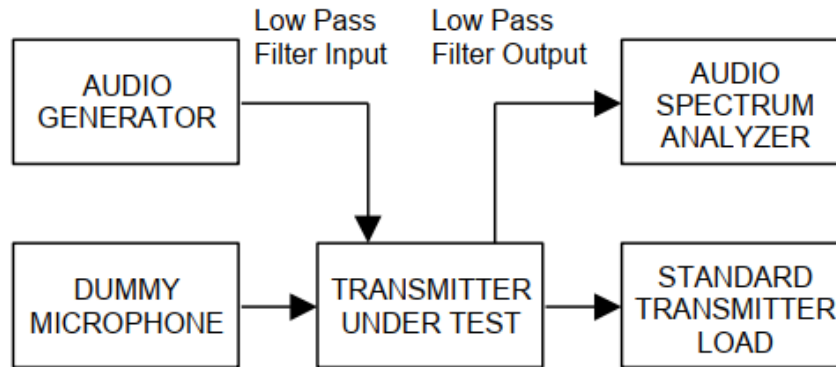


2) RF Conducted Test

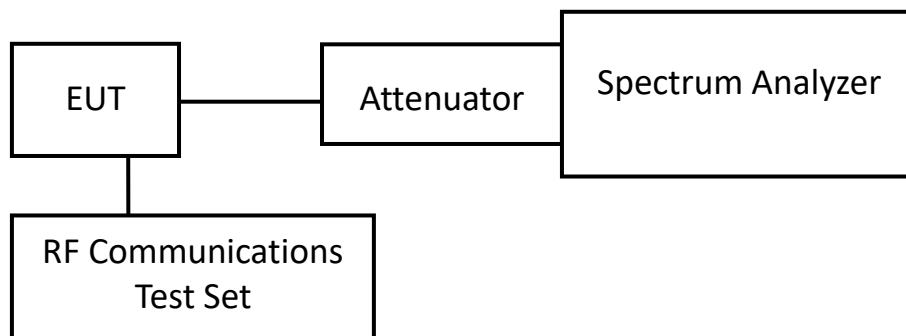
For Modulation Limiting/Audio Frequency Response test



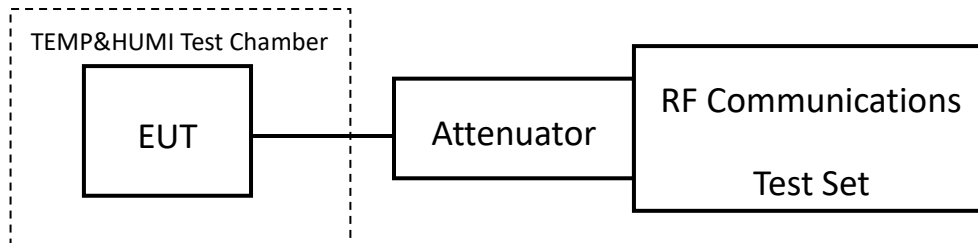
For Audio frequency filter test



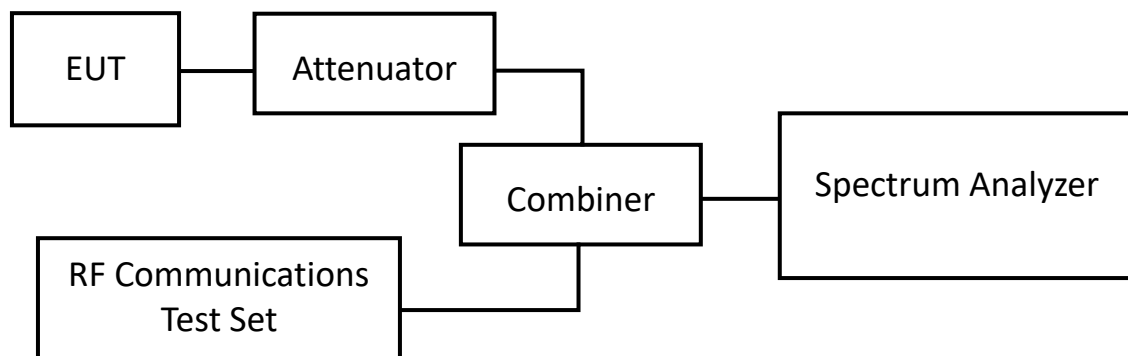
For RF Output Power/OBW/Emission Mask/Conducted Emission test



For Frequency Stability test



For Transient Frequency Behavior test



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 31.3dB (including 30dB Attenuator and 1.3dB 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 1.3dB 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.

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 No.	Calibration Date	Calibration Due Date
Radiated Emission Test					
R&S	EMI test receiver	ESR3	102758	2023/7/3	2024/7/2
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2023/7/3	2024/7/2
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2023/7/12	2024/7/11
COM-POWER	preamplifier	PAM-118A	18040152	2023/8/21	2024/8/20
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2024/7/6
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2024/7/5
N/A	Coaxial Cable	N/A	NO.9	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.10	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.11	2023/8/8	2024/8/7
Audix	Test Software	E3	191218 V9	/	/
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	FSU-26	200680/026	2023/7/12	2024/7/11
HP	RF communication 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

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	Modulation Characteristic	N/A

N/A: the device employ digital modulation.

3.2 Limit

Test items	Limit																																		
Frequency Stability	Table 1 to § 90.213(a)—Minimum Frequency Stability [Parts per million (ppm)] <table><tr><th rowspan="2">Frequency range (MHz)</th><th rowspan="2">Fixed and base stations</th><th colspan="2">Mobile stations</th></tr><tr><th>Over 2 watts output power</th><th>2 watts or less output power</th></tr><tr><td>Below 25</td><td>^{1 2 3} 100</td><td>100</td><td>200</td></tr><tr><td>25-50</td><td>20</td><td>20</td><td>50</td></tr><tr><td>72-76</td><td>5</td><td></td><td>50</td></tr><tr><td>150-174</td><td>^{5 11} 5</td><td>⁶ 5</td><td>^{4 6} 50</td></tr><tr><td>216-220</td><td>1.0</td><td></td><td>1.0</td></tr><tr><td>220-222¹²</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>421-512</td><td>^{7 11 14} 2.5</td><td>⁸ 5</td><td>⁸ 5</td></tr></table> ⁵In the 150-174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm. ⁶In the 150-174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically 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. ⁷In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel 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. ⁸In 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.	Frequency range (MHz)	Fixed and base stations	Mobile stations		Over 2 watts output power	2 watts or less output 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	^{4 6} 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
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421-512	^{7 11 14} 2.5	⁸ 5	⁸ 5																																
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(i)(3).																																		

RF Output Power	§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 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 Spurious Emission at Antenna Terminal Spurious Radiated Emissions	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 f_0 to 5.625 kHz removed from f_0: Zero dB. (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB. (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d 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.

Transient Frequency Behavior	Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:												
	<table><tr><th rowspan="2">Time intervals^{1 2}</th><th rowspan="2">Maximum frequency difference³</th><th colspan="2">All equipment</th></tr><tr><th>150 to 174 MHz</th><th>421 to 512 MHz</th></tr></table>	Time intervals ^{1 2}	Maximum frequency difference ³	All equipment		150 to 174 MHz	421 to 512 MHz						
	Time intervals ^{1 2}			Maximum frequency difference ³	All equipment								
		150 to 174 MHz	421 to 512 MHz										
	Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels												
	<table><tr><td>t₁⁴</td><td>±25.0 kHz</td><td>5.0 ms</td><td>10.0 ms</td></tr><tr><td>t₂</td><td>±12.5 kHz</td><td>20.0 ms</td><td>25.0 ms</td></tr><tr><td>t₃⁴</td><td>±25.0 kHz</td><td>5.0 ms</td><td>10.0 ms</td></tr></table>	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
	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												
	<table><tr><td>t₁⁴</td><td>±12.5 kHz</td><td>5.0 ms</td><td>10.0 ms</td></tr><tr><td>t₂</td><td>±6.25 kHz</td><td>20.0 ms</td><td>25.0 ms</td></tr><tr><td>t₃⁴</td><td>±12.5 kHz</td><td>5.0 ms</td><td>10.0 ms</td></tr></table>	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
	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 for Equipment Designed to Operate on 6.25 kHz Channels												
<table><tr><td>t₁⁴</td><td>±6.25 kHz</td><td>5.0 ms</td><td>10.0 ms</td></tr><tr><td>t₂</td><td>±3.125 kHz</td><td>20.0 ms</td><td>25.0 ms</td></tr><tr><td>t₃⁴</td><td>±6.25 kHz</td><td>5.0 ms</td><td>10.0 ms</td></tr></table>	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	
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 t _{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 immediately following t _{on} .													
t ₂ is the time period immediately following t ₁ .													
t ₃ is the time period from the instant when the transmitter is turned off until t _{off} .													
t _{off} is the instant when the 1 kHz test signal starts to rise.													
² During the time from the end of t ₂ to the beginning of t ₃ , the frequency difference must not exceed the limits specified in § 90.213.													
³ Difference between the actual transmitter frequency and the assigned transmitter frequency.													
⁴ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.													
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

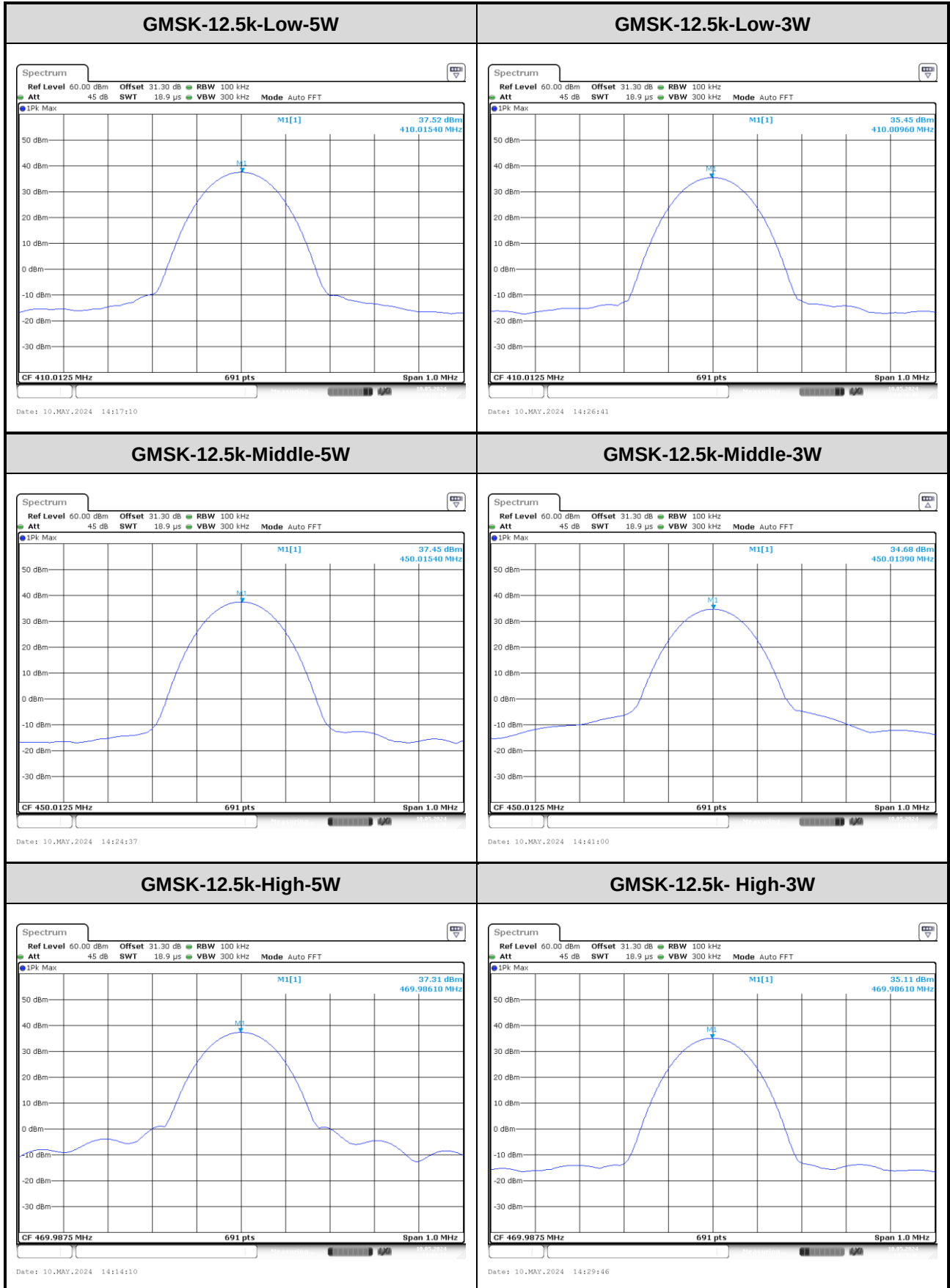
Test Date:	2024-05-10~2024-05-29	Test By:	Ryan Zhang
Environment condition:	Temperature: 21.8~25.9°C; Relative Humidity:50~74%; ATM Pressure: 100.7~101.0kPa		

3.3.1 RF Output Power

Modulat ion	Channel Spacing (kHz)	Rated Power (W)	Conducted Output power						Limit (W)	Verdict
			Low Channel		Middle Channel		High Channel			
			(dBm)	(W)	(dBm)	(W)	(dBm)	(W)		
GMSK	12.5	5	37.52	5.65	37.45	5.56	37.31	5.38	≤6.0	Pass
		3	35.45	3.51	34.68	2.94	35.11	3.24	≤3.6	Pass

Note: The output power shall not exceed by more than 20 percent the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

Test Plots:



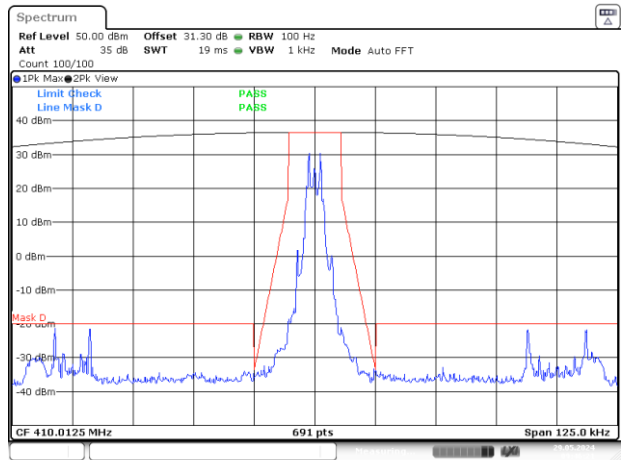
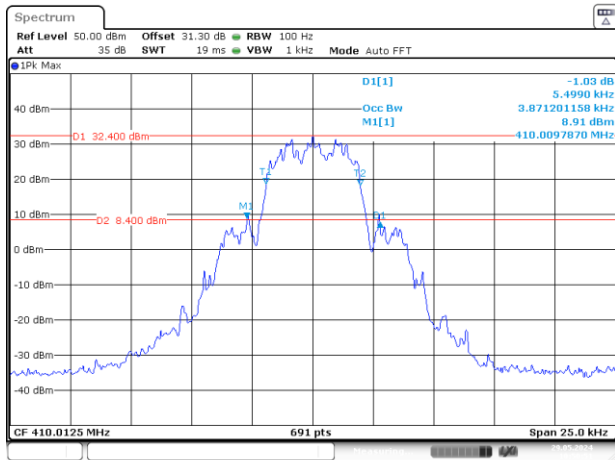
3.3.2 Occupied Bandwidth and Emission Mask

Modulation	Channel Spacing (kHz)	Rated Power (W)	Bandwidth(kHz)						Limit (kHz)	Verdict
			Low Channel		Middle Channel		High Channel			
			26dB	99%	26dB	99%	26dB	99%		
GMSK	12.5	5	5.499	3.871	5.572	3.871	5.572	3.907	≤11.25	Pass
		3	5.572	3.871	5.535	3.871	5.572	3.871	≤11.25	Pass

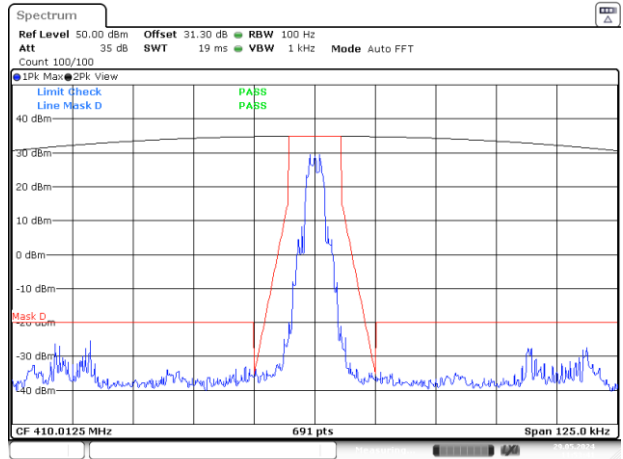
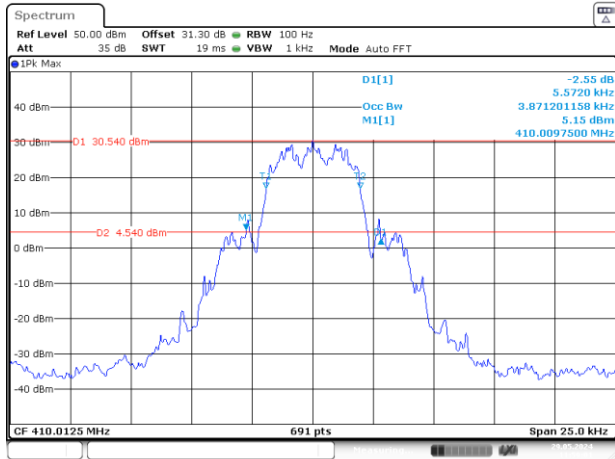
Modulation	Channel Spacing (kHz)	Rated Power (W)	Emission Mask Result			Limit	Verdict
			Low Channel	Middle Channel	High Channel		
GMSK	12.5	5	Refer test plot	Refer test plot	Refer test plot	Refer test plot	Pass
		3	Refer test plot	Refer test plot	Refer test plot	Refer test plot	Pass

Test Plots:

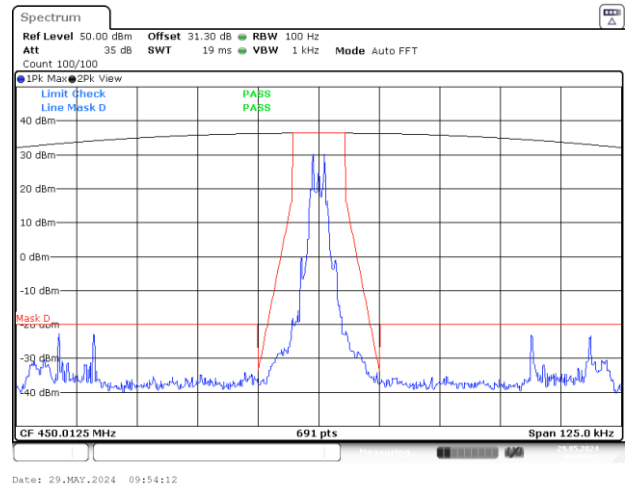
GMSK-12.5k-Low-5W



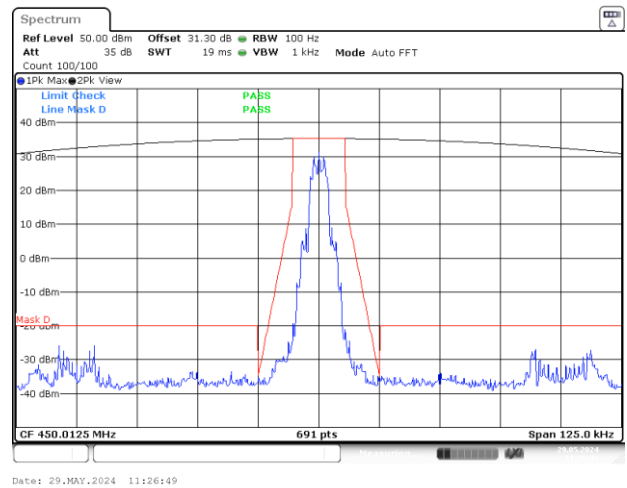
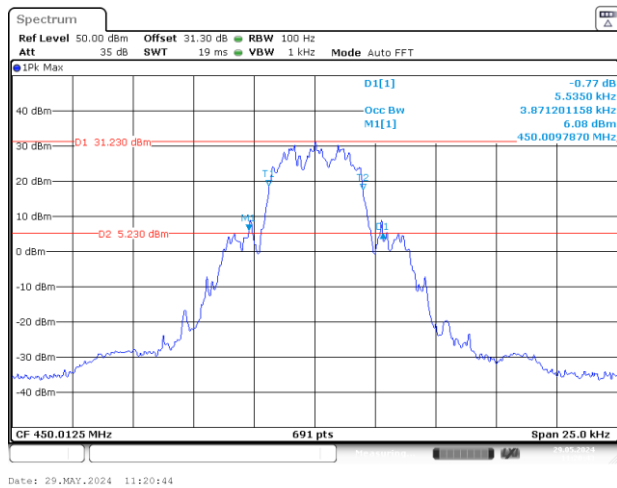
GMSK-12.5k-Low-3W



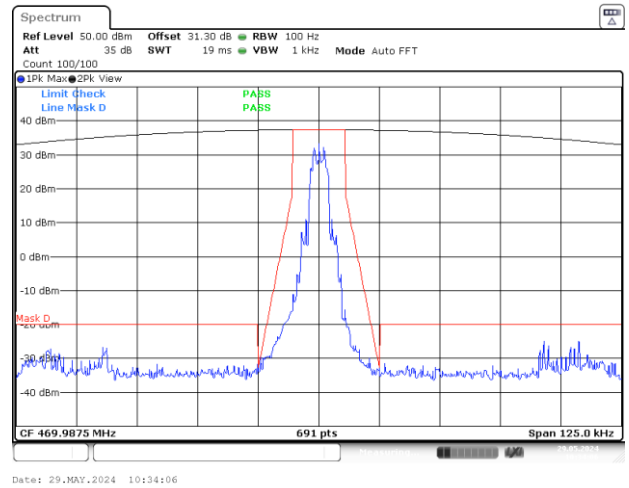
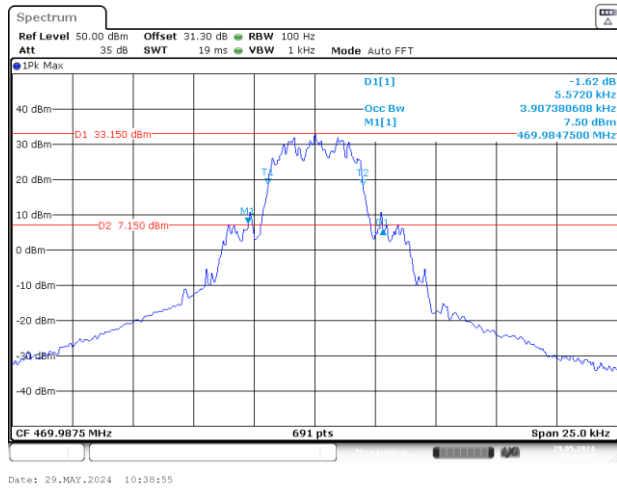
GMSK-12.5k-Middle-5W



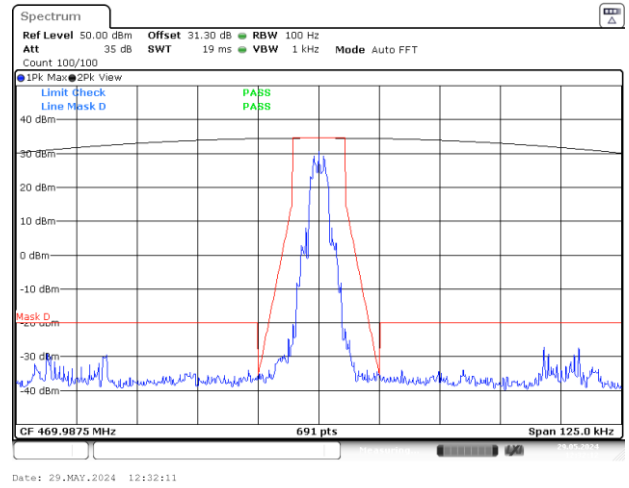
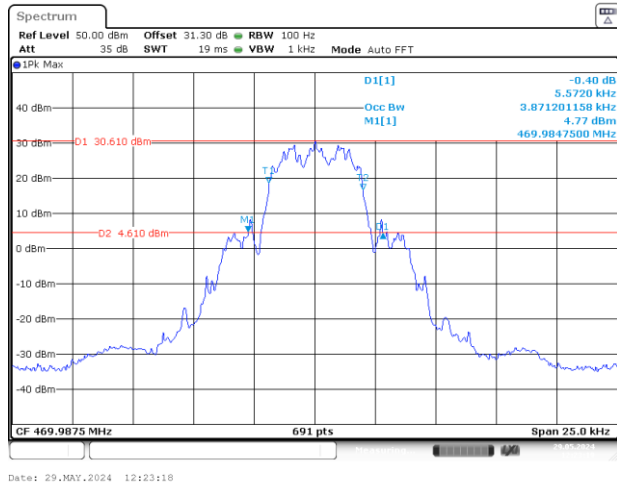
GMSK-12.5k-Middle-3W



GMSK-12.5k-High-5W



GMSK-12.5k-High-3W



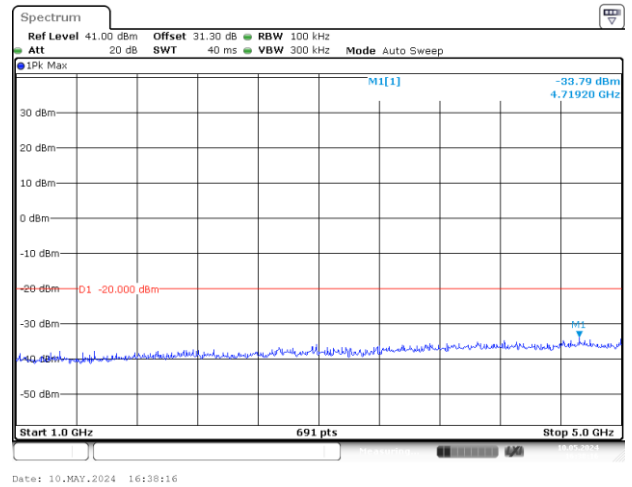
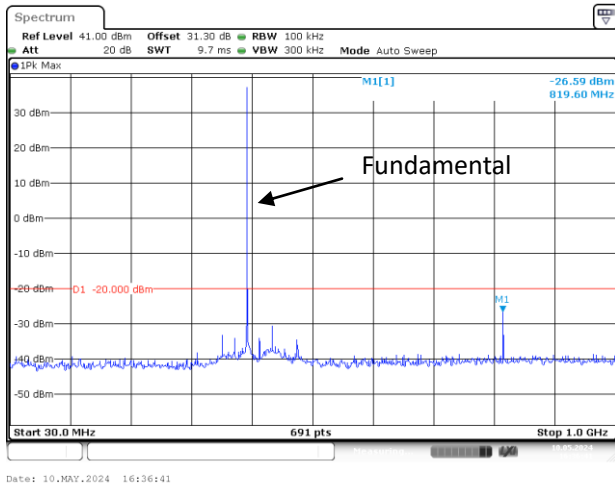
3.3.3 Spurious Emission at Antenna Terminal

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

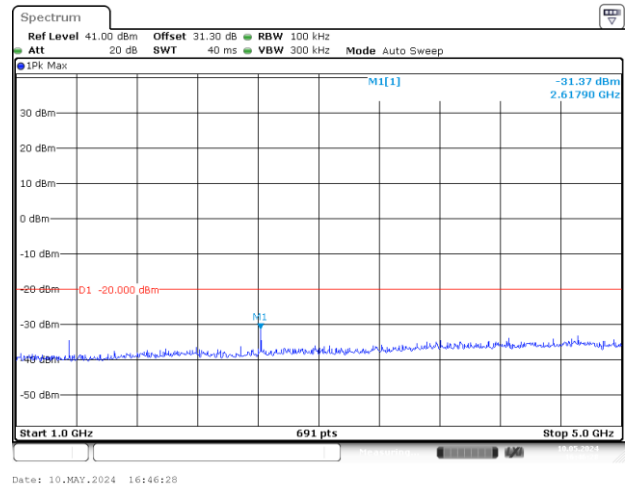
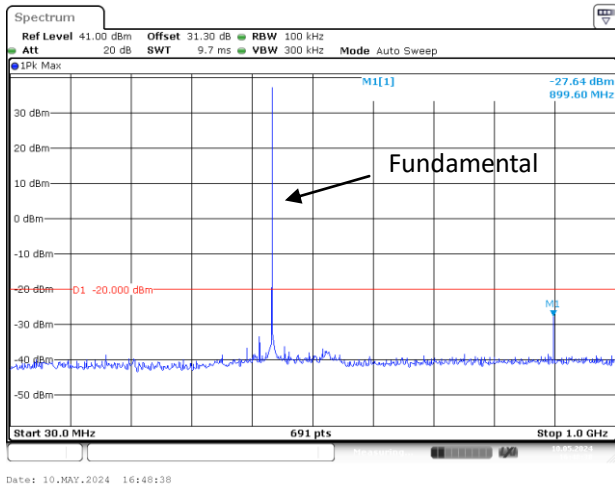
Note: the highest power level was tested.

Test Plots:

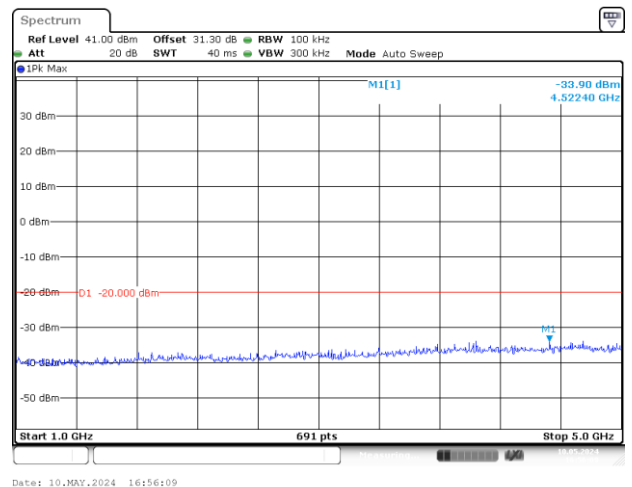
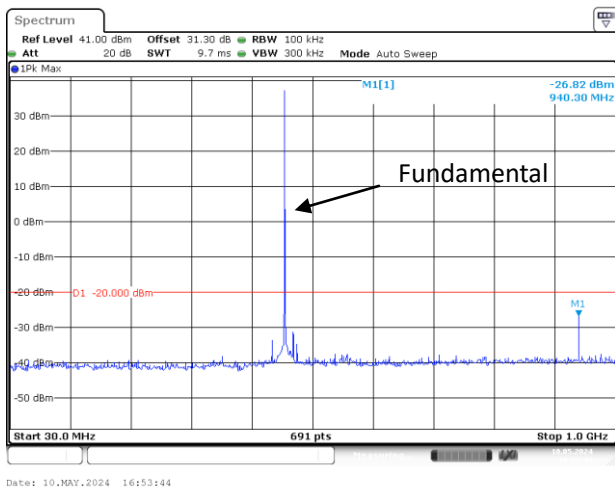
GMSK-12.5k-Low Channel



GMSK-12.5k-Middle Channel



GMSK-12.5k-High Channel



3.3.4 Frequency stability

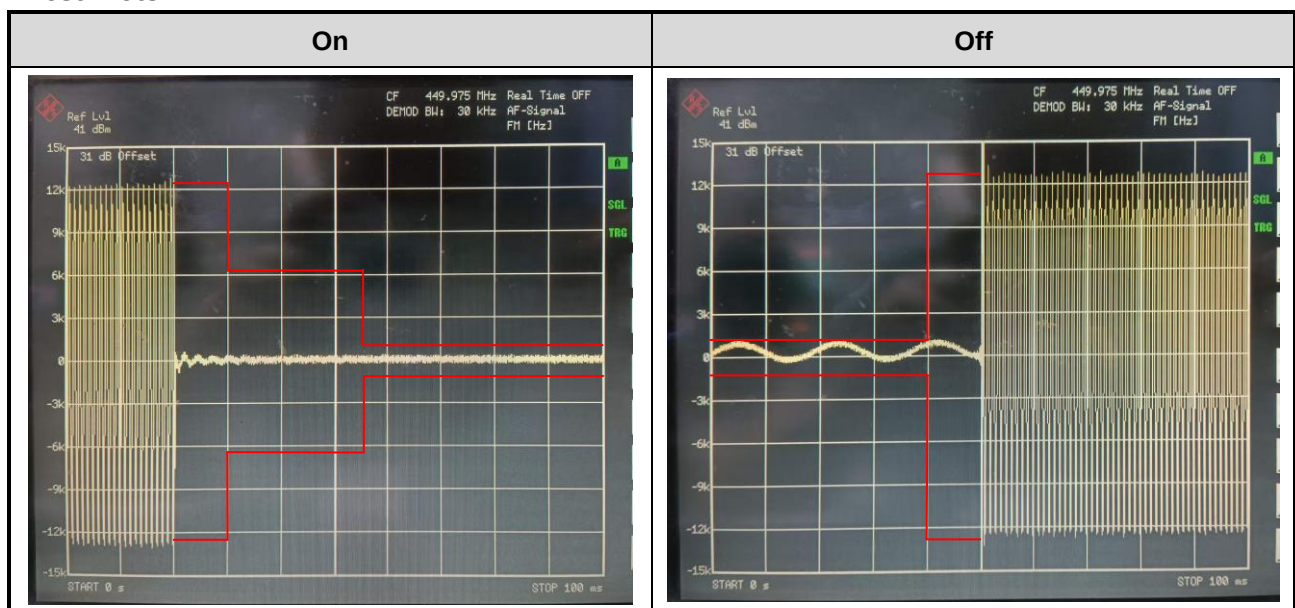
Test Item	Temperature (°C)	Voltage (Vdc)	Measured Frequency (MHz)	Frequency Error (ppm)	limit (ppm)	Verdict
Frequency Stability vs. Temperature & Voltage	-30	7.5	450.012785	0.63	≤2.5	Pass
	-20	7.5	450.012834	0.74	≤2.5	Pass
	-10	7.5	450.012604	0.23	≤2.5	Pass
	0	7.5	450.012598	0.22	≤2.5	Pass
	10	7.5	450.012738	0.53	≤2.5	Pass
	20	7.5	450.012612	0.25	≤2.5	Pass
	30	7.5	450.012596	0.21	≤2.5	Pass
	40	7.5	450.012632	0.29	≤2.5	Pass
	50	7.5	450.012787	0.64	≤2.5	Pass
	20	6.38	450.012809	0.69	≤2.5	Pass
	20	8.63	450.012757	0.57	≤2.5	Pass

3.3.5 Transient Frequency Behavior

Channel Spacing (kHz)	Time intervals (ms)	Maximum frequency difference (kHz)	Verdict
12.5	10.0 (t1)	12.5	Pass
	25.0 (t2)	6.25	Pass
	10.0 (t3)	12.5	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: $410\text{MHz} \times 2.5\text{ppm} = 1.025\text{kHz}$

Test Plots:



3.4 Radiated emission Test Data

Test Date:	2024-05-10	Test By:	Bard Huang
Environment condition:	Temperature: 24.2°C; Relative Humidity:61%; ATM Pressure: 100.7kPa		

Frequency (MHz)	Reading level (dBμV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Remark
GMSK 5W-12.5k-Low Channel								
820.025	45.67	horizontal	29.27	74.94	95.2	-20	-0.26	Peak
1230.038	68.55	horizontal	-5.22	63.33	95.2	-20	-11.87	Peak
1640.05	61.09	horizontal	-2.60	58.49	95.2	-20	-16.71	Peak
2050.063	57.12	horizontal	-2.97	54.15	95.2	-20	-21.05	Peak
2460.075	59.01	horizontal	-1.78	57.23	95.2	-20	-17.97	Peak
3280.1	52.99	horizontal	-1.84	51.15	95.2	-20	-24.05	Peak
820.25	44.28	vertical	29.27	73.55	95.2	-20	-1.65	Peak
1230.038	72.22	vertical	-5.22	67.00	95.2	-20	-8.20	Peak
1640.05	64.22	vertical	-2.60	61.62	95.2	-20	-13.58	Peak
2050.063	58.46	vertical	-2.97	55.49	95.2	-20	-19.71	Peak
2460.075	59.15	vertical	-1.78	57.37	95.2	-20	-17.83	Peak
3280.1	52.70	vertical	-1.84	50.86	95.2	-20	-24.34	Peak
GMSK 5W -12.5k-Middle Channel								
900.025	39.48	horizontal	30.34	69.82	95.2	-20	-5.38	Peak
1350.038	75.75	horizontal	-4.33	71.42	95.2	-20	-3.78	Peak
1800.05	63.00	horizontal	-2.26	60.74	95.2	-20	-14.46	Peak
2250.063	63.92	horizontal	-1.85	62.07	95.2	-20	-13.13	Peak
2700.075	55.01	horizontal	-1.45	53.56	95.2	-20	-21.64	Peak
3150.088	59.38	horizontal	-1.87	57.51	95.2	-20	-17.69	Peak
4050.113	52.69	horizontal	-2.04	50.65	95.2	-20	-24.55	Peak
900.025	41.61	vertical	30.34	71.95	95.2	-20	-3.25	Peak
1350.038	79.31	vertical	-4.33	74.98	95.2	-20	-0.22	Peak
1800.05	63.94	vertical	-2.26	61.68	95.2	-20	-13.52	Peak
2250.063	64.83	vertical	-1.85	62.98	95.2	-20	-12.22	Peak

2700.075	57.36	vertical	-1.45	55.91	95.2	-20	-19.29	Peak
3150.088	59.14	vertical	-1.87	57.27	95.2	-20	-17.93	Peak
3600.1	52.69	vertical	-1.48	51.21	95.2	-20	-23.99	Peak
4050.113	54.02	vertical	-2.04	51.98	95.2	-20	-23.22	Peak
GMSK 5W-12.5k-High Channel								
939.975	43.41	horizontal	30.5	73.91	95.2	-20	-1.29	Peak
1409.963	71.25	horizontal	-3.9	67.35	95.2	-20	-7.85	Peak
1879.95	61.50	horizontal	-2.33	59.17	95.2	-20	-16.03	Peak
2349.938	66.81	horizontal	-1.75	65.06	95.2	-20	-10.14	Peak
3289.913	58.90	horizontal	-1.84	57.06	95.2	-20	-18.14	Peak
939.975	44.57	vertical	30.5	75.07	95.2	-20	-0.13	Peak
1409.963	74.00	vertical	-3.9	70.10	95.2	-20	-5.10	Peak
1879.95	63.60	vertical	-2.33	61.27	95.2	-20	-13.93	Peak
2349.938	67.59	vertical	-1.75	65.84	95.2	-20	-9.36	Peak
2818.909	53.17	vertical	-1.41	51.76	95.2	-20	-23.44	Peak
3289.913	59.08	vertical	-1.84	57.24	95.2	-20	-17.96	Peak
3759.9	53.35	vertical	-1.75	51.60	95.2	-20	-23.60	Peak
4229.888	53.81	vertical	-2.21	51.60	95.2	-20	-23.60	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:

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

Test was performed on 3meters distance, so

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

= Corrected Amplitude - 95.2

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

4 Test Setup Photo

Please refer to the attachment 2405S27918E Test Setup photo.

5 E.U.T Photo

Please refer to the attachment 2405S27918E External photo and 2405S27918E Internal photo.

---End of Report---