

CFR 47 FCC PART 90

TEST REPORT

For

XAG APC 4 AutoPilot Console Mainframe

MODEL NUMBER: M9HCM2.5CH

REPORT NUMBER: 03684300-1-RF-2

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Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	August 7, 2026	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	RF Power Output	CFR 47 FCC Part 90.205	Pass
2	Emission Bandwidth & Occupied Bandwidth & Emission Mask	CFR 47 FCC Part 90.209	Pass
3	Transmitter Radiated Spurious Emission	CFR 47 FCC Part 90.210	Pass
4	Transmitter Conducted Spurious Emissions	CFR 47 FCC Part 90.210	Pass
5	Adjacent channel power	CFR 47 FCC Part 90.221	Pass
6	Transient Frequency Behavior	CFR 47 FCC Part 90.214	Pass
7	Frequency stability	CFR 47 FCC Part 90.213	Pass
8	Modulation Characteristics - Audio Frequency Response	CFR 47 FCC Part 2.1047(a) CFR 47 FCC Part 90.207	N/A
9	Modulation Characteristics - Modulation Limiting	CFR 47 FCC Part 2.1047(b) CFR 47 FCC Part 90.207	N/A
Note 1: This test report is only published to and used by the applicant, and it is not for evidence purpose in China. Note 2: The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 90 > when <Simple Acceptance> decision rule is applied. Decision rule for statement of conformity: The measurement uncertainty is not taken into account for statement of conformity. Note 3: N/A: In this whole report not applicable.			

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Guangzhou Xaircraft Technology CO.,LTD
Address: Building 1, No. 9 Xinrui Road, Huangpu District
Guangzhou,P.R. China

Manufacturer Information

Company Name: Guangzhou Xaircraft Technology CO.,LTD
Address: Building 1, No. 9 Xinrui Road, Huangpu District
Guangzhou,P.R. China

EUT Information

EUT Name: XAG APC 4 AutoPilot Console Mainframe
Model: M9HCM2.5CH
Brand: XAG
Sample Received Date: June 5, 2026
Sample Status: Normal
Sample ID: 9835980
Date of Tested: June 6, 2026 to August 7, 2026

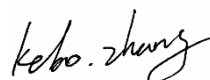
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 FCC PART 90 SUBPART I	PASS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26-2015, CFR 47 FCC Part 2, CFR 47 FCC Part 90.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules. ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. VCCI (Registration No.: C-20202, G-20240, R-20248 and T-20202) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber E, the VCCI registration No. is G-20240 and R-20248 Shielding Room F, the VCCI registration No. is C-20202 and T-20202
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Note 1: All tests measurement facilities use to collect the measurement data are located at Room 101, Building 2, No.4, Information Road, Songshan Lake, Dongguan, Guangdong, China.

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	4.36 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.47 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 40 GHz)	5.65 dB (1 GHz ~ 18 GHz)
	4.73 dB (18 GHz ~ 26 GHz)
	5.37 dB (26 GHz ~ 40 GHz)
Emission Bandwidth and 99% Occupied Bandwidth	±0.0196%
Maximum Conducted Output Power	±0.766 dB
Maximum Power Spectral Density Level	±1.22 dB
Frequency Stability	±2.76%
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

Remark: For Radiated Emission measurements (200 MHz - 18 GHz), the EUT support table is made of Expanded Polystyrene (EPS). This material is characterized by a low dielectric constant, as recognized in CISPR 16-1-4, to minimize its influence on field strength measurements. This influence has been considered in the uncertainty budget.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	XAG APC 4 AutoPilot Console Mainframe
Model	M9HCM2.5CH

Product Description	Operation Frequency	410.05 – 469.95 MHz
	Modulation Type	GMSK
	Channel Separation	25kHz
	Max Output Power	0.5 W
Normal Test Voltage:		DC 12-24V

5.2. CHANNEL LIST

Channel List For Bandwidth=25 kHz							
Channel	1	...	Channel	1199	...	Channel	2397
Frequency (MHz)	410.05	...	Frequency (MHz)	440	...	Frequency (MHz)	469.95
Note: The 2397 channels spread from 410.05MHz to 469.95MHz with 25kHz channel separation							

5.3. TEST CHANNEL CONFIGURATION

Test Channel	Frequency (MHz)	Channel Spacing (kHz)	Modulation Type
1	410.05	25	GMSK
1199	440	25	GMSK
2397	469.95	25	GMSK

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Gain(dBi)
1	410-470	PCB Antenna	1.01

Mode	Transmit and Receive Mode	Description
GMSK	☒ 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

5.5. SUPPORT UNITS FOR SYSTEM TEST

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remark
1	PC	Lenovo	E14	/

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	1.0	/

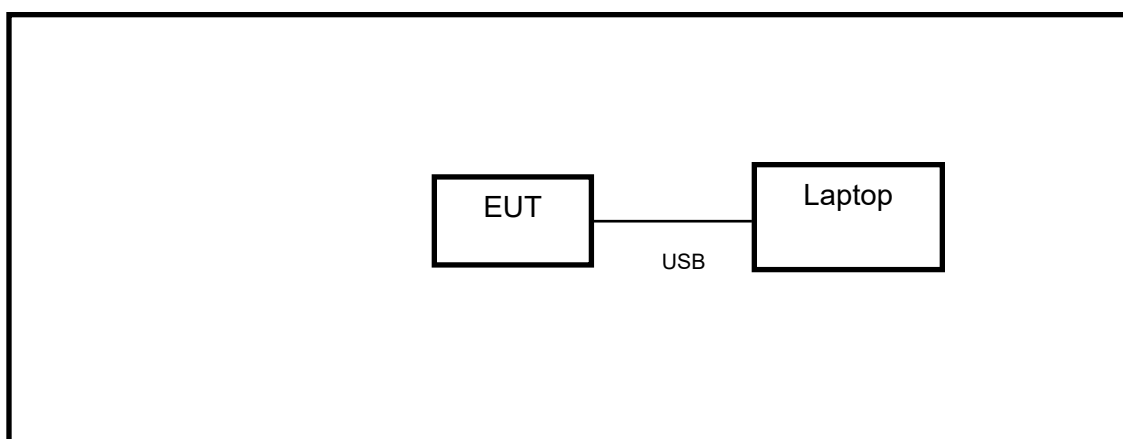
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
/	/	/	/	/

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



6. MEASURING INSTRUMENT AND SOFTWARE USED

R&S TS 8997 Test System						
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date	
Power sensor, Power Meter	R&S	OSP120	100921	Dec.26,2025	Dec.25,2026	
Vector Signal Generator	R&S	SMBV100A	261637	Sep.12, 2025	Sep.11, 2026	
Signal Generator	R&S	SMB100A	178553	Sep.12, 2025	Sep.11, 2026	
Signal Analyzer	R&S	FSV40	101118	Sep.12, 2025	Sep.11, 2026	
Software						
Description		Manufacturer		Name	Version	
For R&S TS 8997 Test System		Rohde & Schwarz		EMC 32	10.60.10	
Tonsend RF Test System						
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date	
Wireless Connectivity Tester	R&S	CMW270	1201.0002N75-102	Sep.12, 2025	Sep.11, 2026	
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Sep.12, 2025	Sep.11, 2026	
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Sep.12, 2025	Sep.11, 2026	
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Sep.12, 2025	Sep.11, 2026	
DC power supply	TSSTAKASAGO	ZX-400L	409150160137	Sep.12, 2025	Sep.11, 2026	
Temperature & Humidity Chamber	SANMOOD	SG-80-CC-2	2088	Sep.12, 2025	Sep.11, 2026	
Attenuator	Aglient	8495B	2814a12853	Sep.12, 2025	Sep.11, 2026	
RF Control Unit	Tonscend	JS0806-2	23B80620666	Dec.26,2025	Dec.25,2026	
Software						
Description		Manufacturer		Name		Version
Tonsend SRD Test System		Tonsend		JS1120-3 RF Test System		V3.2.22

Radiated Emissions(Below 1G)					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Sep.12, 2025	Sep.11, 2026
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	June 28, 2024	June.27 2027
Preamplifier	HP	8447D	2944A09099	Sep.12, 2025	Sep.11, 2026
Loop antenna	Schwarzbeck	1519B	00008	Dec.09, 2024	Dec.08, 2027
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1

Radiated Emissions(Above 1G)					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Signal Analyzer	R&S	FSV40	101117	Sep.12, 2025	Sep.11, 2026
Preamplifier	TDK	PA-02-001-3000	TRS-302-00051	Sep.12, 2025	Sep.11, 2026
Horn Antenna	ETS-Lindgren	3117	00213191	Jan.29,2026	Jan.28,2029
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Sep.12, 2025	Sep.11, 2026
Software					
Description		Manufacturer	Name		Version
Test Software for Radiated Emission		Tonscend	JS32-RE		5.0.0

Other Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
Temperature humidity probe	OMEGA	ITHX-SD-5	18470007	Sep.16, 2025	Sep.15, 2026
Barometer	Yiyi	Baro	N/A	Sep.19, 2025	Sep.18, 2026
Attenuator	Agilent	8495B	2814a12853	Sep.12, 2025	Sep.11, 2026

7. TRANSMITTER TEST PARAMETERS

7.1. RF OUTPUT POWER

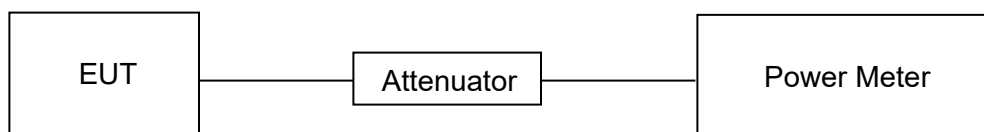
LIMITS

Per FCC §2.1046 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

TEST PROCEDURE

- (1) The DUT transmitter connected to Power Meter using the 30 dB attenuator and power sensor with above setup.
- (2) Path loss for the measurement included.
- (3) All the measurement was done at low, mid, high frequency for each band.
- (4) Record the power into the test report.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.8°C	Relative Humidity	59.3%
Atmosphere Pressure	101 kPa	Test Voltage	DC 24V

RESULT

Test Channel	Frequency (MHz)	Maximum Conducted Output Power(Peak)	Maximum ERP (dBm)	Stated ERP Power (dBm)	Conducted Output Power Limit (dBm)	Verdict
1	410.05	23.66	22.52	23	23.0±1	PASS
1199	440.00	24.23	23.09	23	23.0±1	PASS
2397	469.95	24.62	23.48	23	23.0±1	PASS

7.2. EMISSION BANDWIDTH & OCCUPIED BANDWIDTH & EMISSION MASK

LIMITS

CFR 47 FCC Part 90.209 (b)(5)

Standard Channel Spacing/Bandwidth

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
Below 25 ²		
25-50	20	20
72-76	20	20
150-174	¹ 7.5	^{1 3} 20/11.25/6
216-220 ⁵	6.25	20/11.25/6
220-222	5	4
406-512 ²	¹ 6.25	^{1 3 6} 20/11.25/6
806-809/851-854	12.5	20
809-817/854-862	12.5	⁶ 20/11.25
817-824/862-869	25	⁶ 20
896-901/935-940	12.5	13.6
902-928 ⁴		
929-930	25	20
1427-1432 ⁵	12.5	12.5
³ 2450-2483.5 ²		
Above 2500 ²		

Note3: 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.

Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25 ¹	A or B	A or C
25-50	B	C
72-76	B	C
150-174 ²	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512 ^{2,5}	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854 ⁶	B	H
809-824/854-869 ^{3,5}	B, D	D, G.
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925 ⁴		
All other bands	B	C

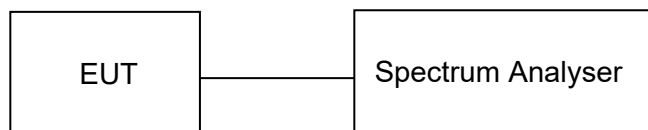
CFR 47 FCC Part 90.210 (c)

Emission Mask C: For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least $83 \log (f_d/5)$ dB;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least $29 \log (f_d^2/11)$ dB or 50 dB, whichever is the lesser attenuation;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.
- (4) In the 1427-1432 MHz band, licensees are encouraged to take all reasonable steps to ensure that unwanted emissions power does not exceed the following levels in the 1400-1427 MHz band:
 - (i) For stations of point-to-point systems in the fixed service: -45 dBW/27 MHz.
 - (ii) For stations in the mobile service: -60 dBW/27 MHz.

TEST PROCEDURE

- 1) The DUT transmitter connected to Spectrum Analyser with above setup.
- 2) Path loss for the measurement included.
- 3) Spectrum set as follow:
Emission bandwidth & Occupied bandwidth:
Centre frequency = fundamental frequency, span=50 kHz, RBW=510 Hz, VBW=2 kHz, Sweep = auto, Detector function = Peak, Trace = max hold
Emission Mask:
Centre frequency = fundamental frequency, span=200 kHz, RBW=100 Hz, VBW=1 kHz, Sweep = auto, Detector function = Peak, Trace = max hold
- 4) Key the transmitter and set the level of the unmodulated carrier to a full scale reference line.
- 7) Measure and record the results in the test report.
- 8) Use the 99 % occupied bandwidth and ndB bandwidth function to test the bandwidth.

TEST SETUP**TEST ENVIRONMENT**

Temperature	24.8°C	Relative Humidity	59.3%
Atmosphere Pressure	101 kPa	Test Voltage	DC 24V

RESULTS

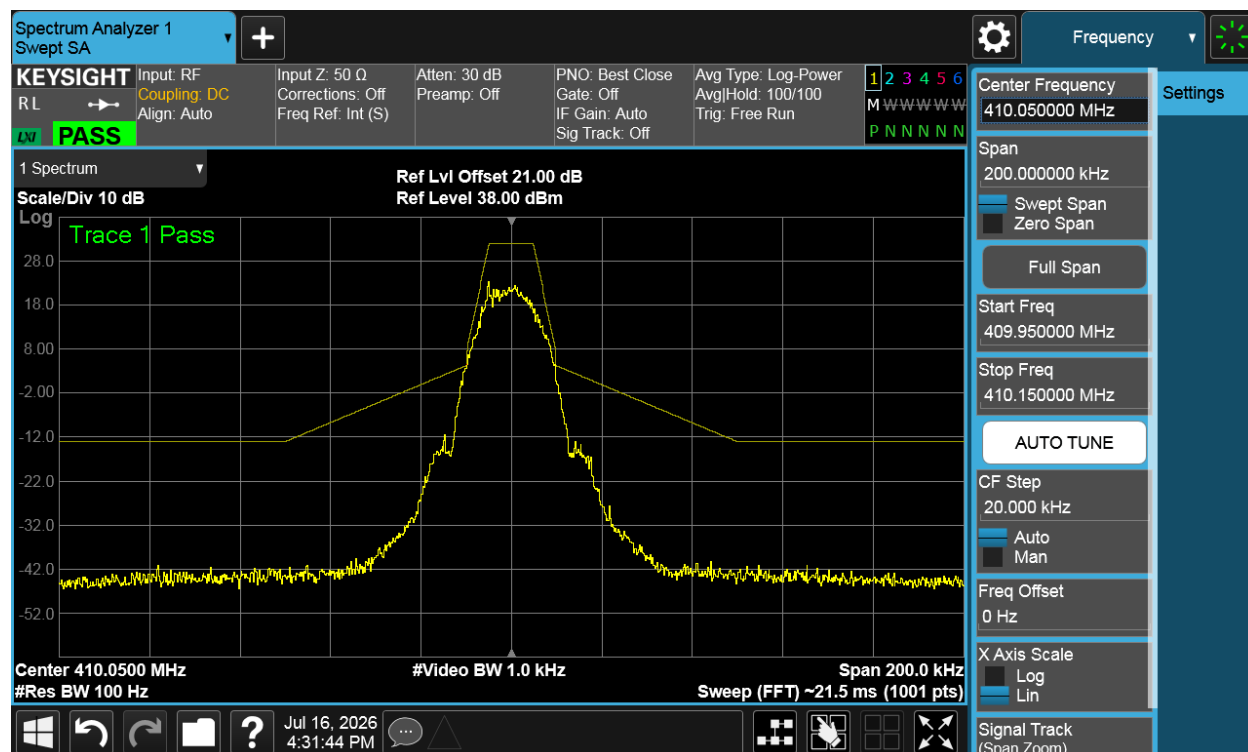
Emission Bandwidth & Occupied Bandwidth

Test Channel	Frequency (MHz)	26dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	99% Occupied Bandwidth Limit (kHz)	Verdict
1	410.05	21.67	17.820	20	PASS
1199	440.00	21.29	17.675	20	PASS
2397	469.95	21.38	17.2121	20	PASS

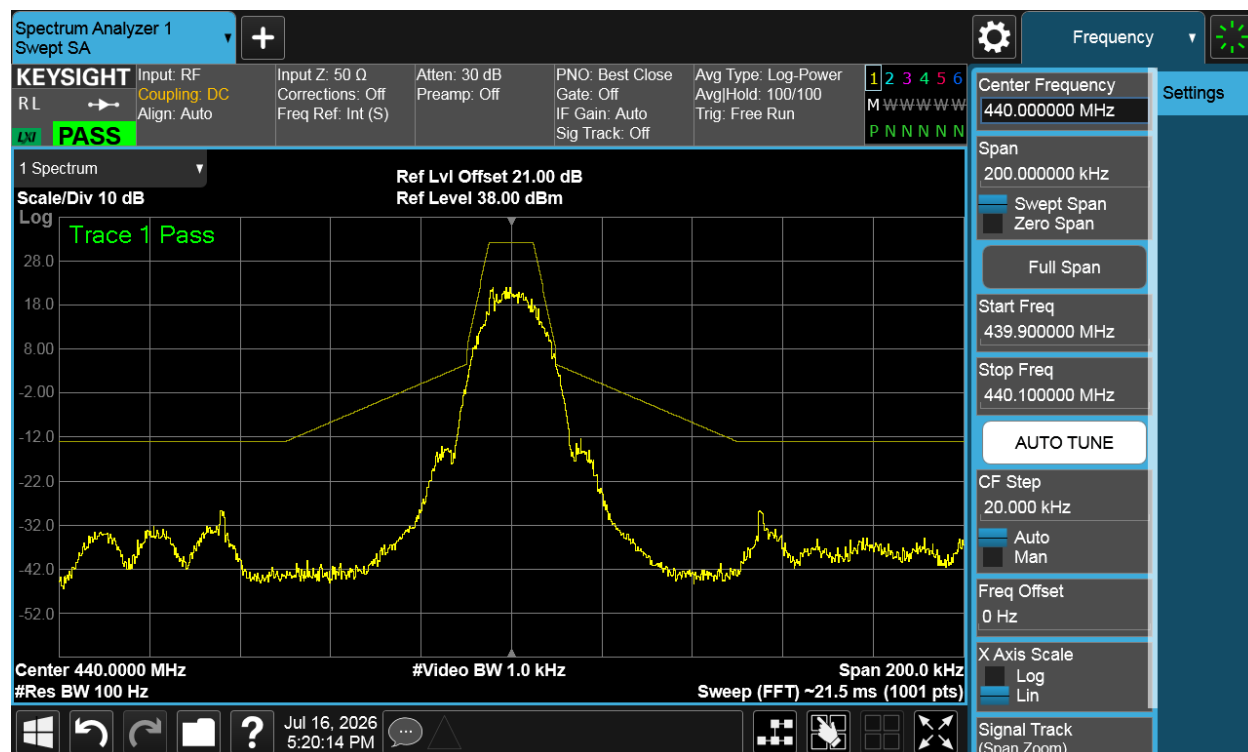
Emission Mask

Test Channel	Frequency (MHz)	Applicable Mask	RBW	Verdict
1	410.05	C	100Hz	PASS
1199	440.00	C	100Hz	PASS
2397	469.95	C	100Hz	PASS

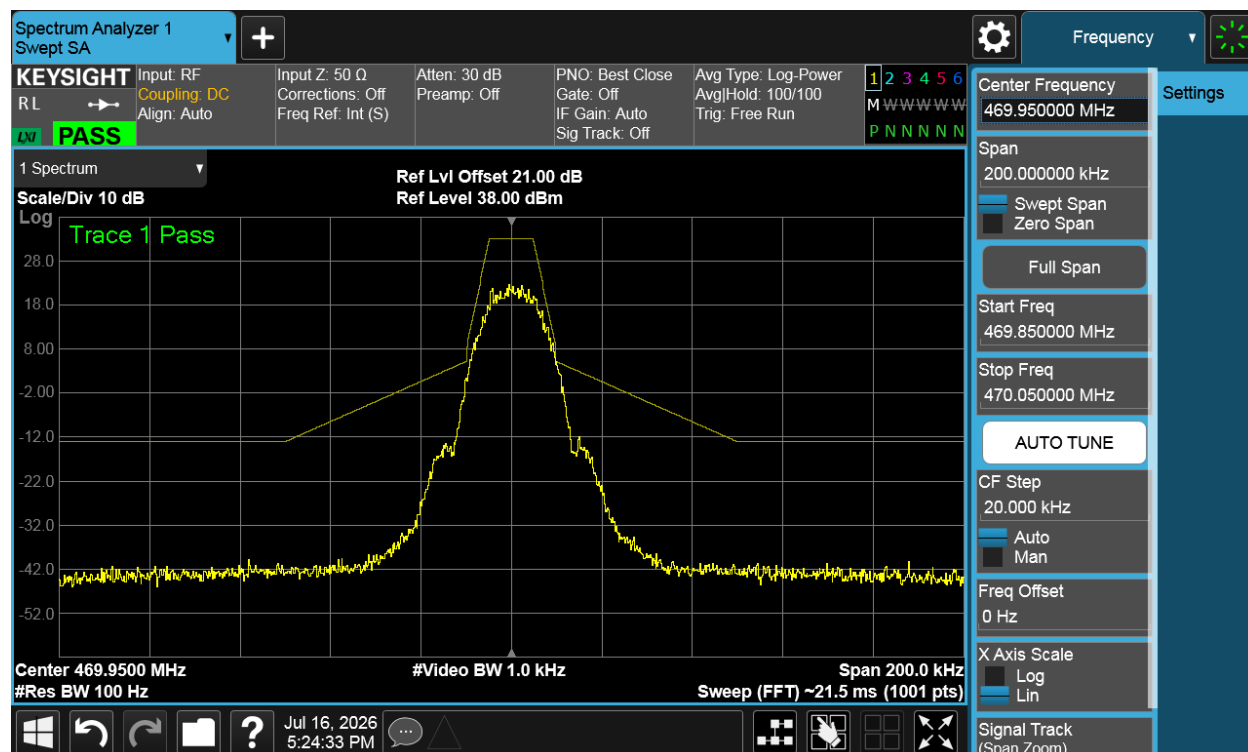
Measurement Method	Conducted	Test Channel	410.05 MHz
Channel Separation	25 kHz	Modulation	GMSK



Measurement Method	Conducted	Test Channel	440.00 MHz
Channel Separation	25 kHz	Modulation	GMSK



Measurement Method	Conducted	Test Channel	469.95 MHz
Channel Separation	25 kHz	Modulation	GMSK



7.3. TRANSMITTER RADIATED SPURIOUS EMISSION

LIMITS

$EIRP\ (dBm) = E\ (dB\mu V/m) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m. when $m = 3$, $EIRP\ (dBm) = E\ (dB\mu V/m) - 95.2$

For 25 kHz Channel Separation mode: $43 + 10\log(P_{watts})$

Calculation: Limit (dBm) = $EL - 43 - 10\log(10\ TP)$

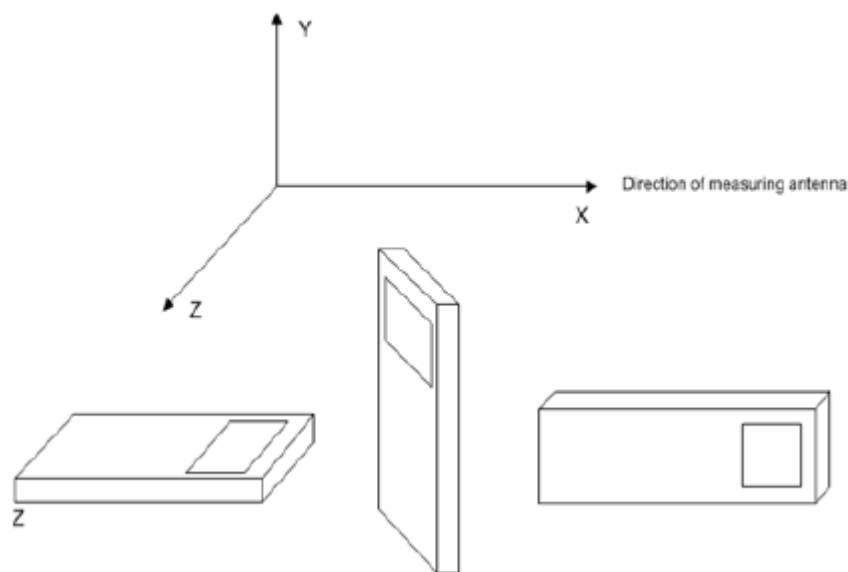
Notes: EL is the emission level of the Output Power expressed in dBm, In this application, the EL is P (dBm).

Limit (dBm) = $P(dBm) - 43 - 10\log(P_{watts}) = -13\ dBm$

Limit (dBuV/m) = $-13 + 95.2 = 82.2\ dBuV/m$

TEST PROCEDURE

- The measuring distance of at 3m shall be used for measurements at frequency up to 1 GHz.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- $EIRP\ (dBm) = E\ (dB\mu V/m) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
So, $EIRP\ (dBm) = E\ (dB\mu V/m) - 95.2$
- EUT in each of three orthogonal axis emissions need to be tested.



EUT configuration positions

TEST ENVIRONMENT

For below 1GHz

Temperature	23.1	Relative Humidity	61%
Atmosphere Pressure	101kPa		

For above 1GHz

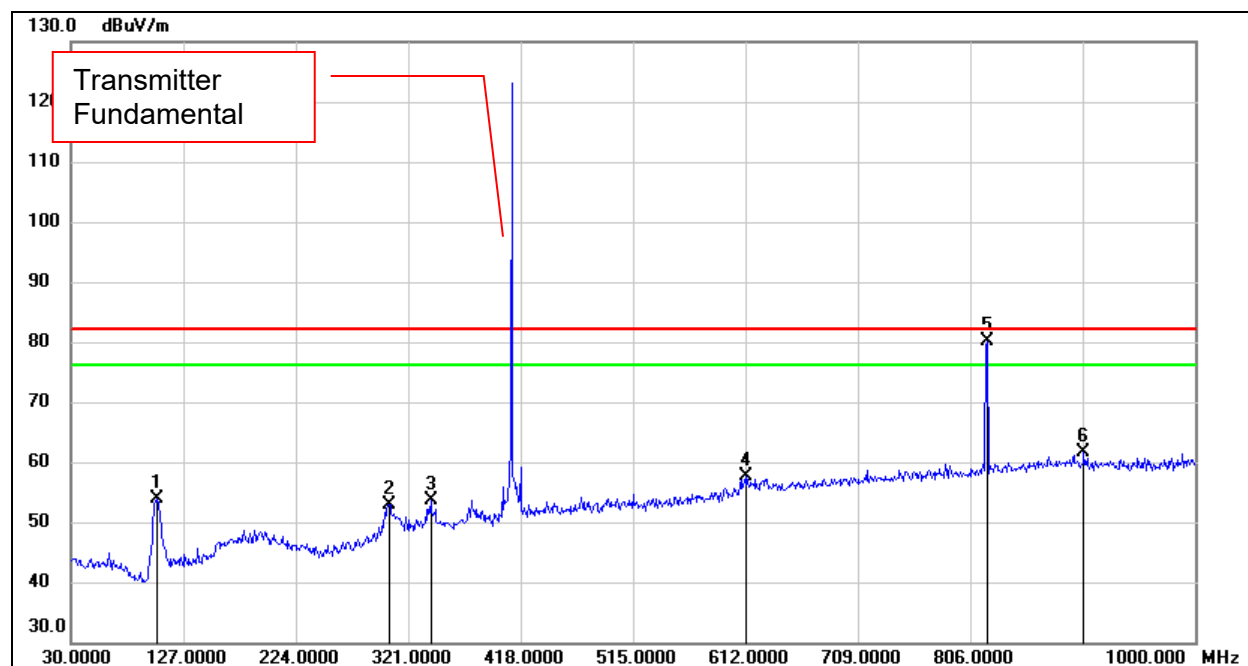
Temperature	21.9°C	Relative Humidity	61%
Atmosphere Pressure	101kPa		

RESULT – BELOW 1 GHz

For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (Y axis) data recorded in the report.

The frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line was not reported.

Measurement Method	Radiated	Test Channel	410.05 MHz
Channel Separation	25 kHz	Modulation	GMSK
Polar	Horizontal		

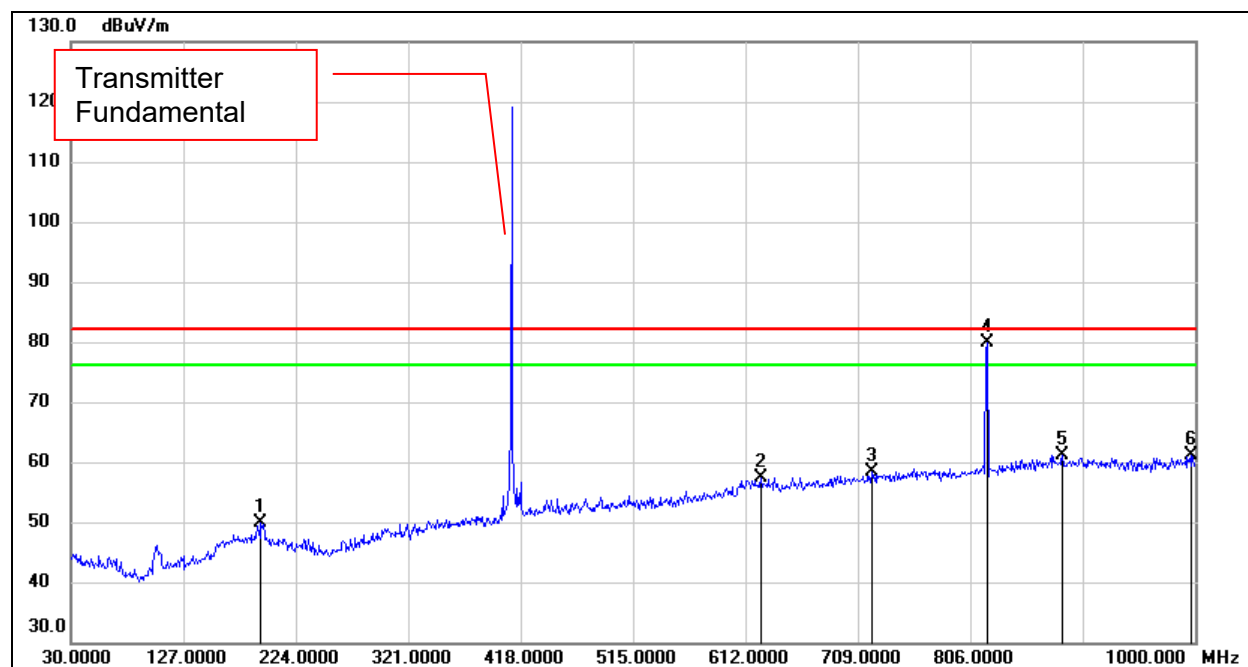


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	104.6900	44.02	9.74	53.76	82.20	-28.44	peak
2	304.5100	38.17	14.78	52.95	82.20	-29.25	peak
3	340.4000	37.04	16.49	53.53	82.20	-28.67	peak
4	612.9699	36.24	21.48	57.72	82.20	-24.48	peak
5	820.5500	56.02	24.16	80.18	82.20	-2.02	peak
6	903.9700	35.83	25.82	61.65	82.20	-20.55	peak

Note: 1. Limit (dBuV/m) = -13+95.2 = 82.2 dBuV/m

2. Margin = Limit – Result

Measurement Method	Radiated	Test Channel	410.05 MHz
Channel Separation	25 kHz	Modulation	GMSK
Polar	Vertical		

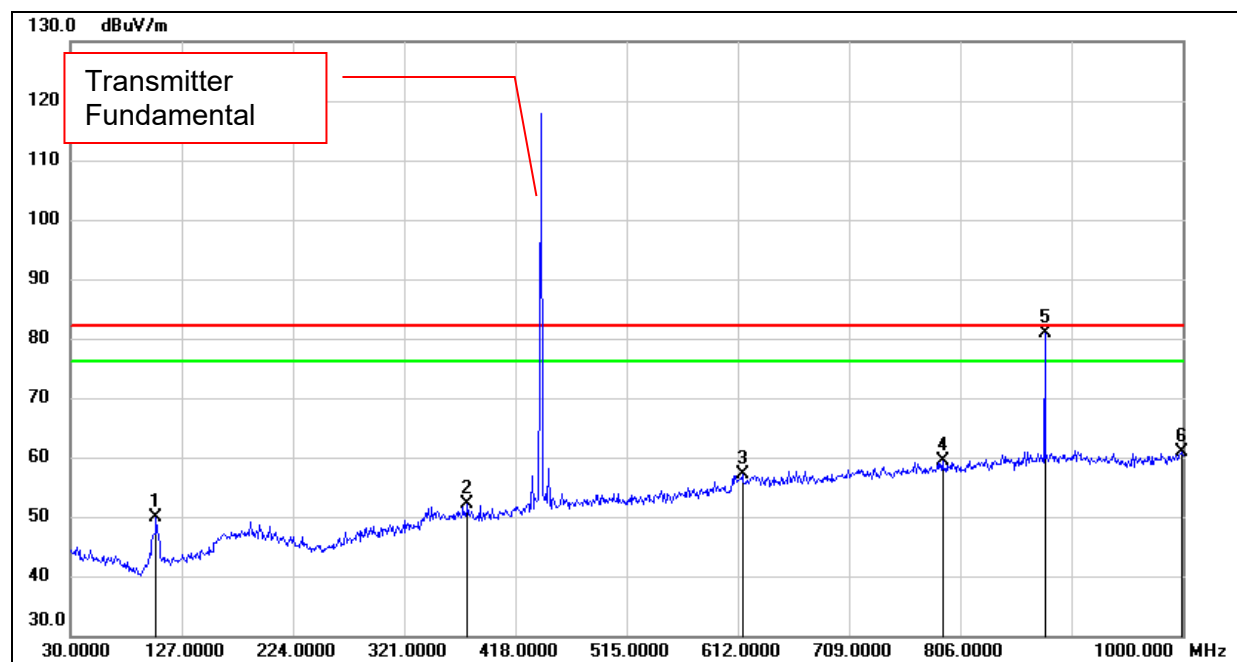


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	193.9299	36.20	13.71	49.91	82.20	-32.29	peak
2	625.5800	36.06	21.40	57.46	82.20	-24.74	peak
3	720.6400	35.99	22.51	58.50	82.20	-23.70	peak
4	820.5500	55.66	24.16	79.82	82.20	-2.38	peak
5	885.5400	35.47	25.62	61.09	82.20	-21.11	peak
6	996.1200	34.81	26.36	61.17	82.20	-21.03	peak

Note: 1. Limit (dBuV/m) = $-13 + 95.2 = 82.2$ dBuV/m

2. Margin = Limit – Result

Measurement Method	Radiated	Test Channel	440.00 MHz
Channel Separation	25 kHz	Modulation	GMSK
Polar	Horizontal		

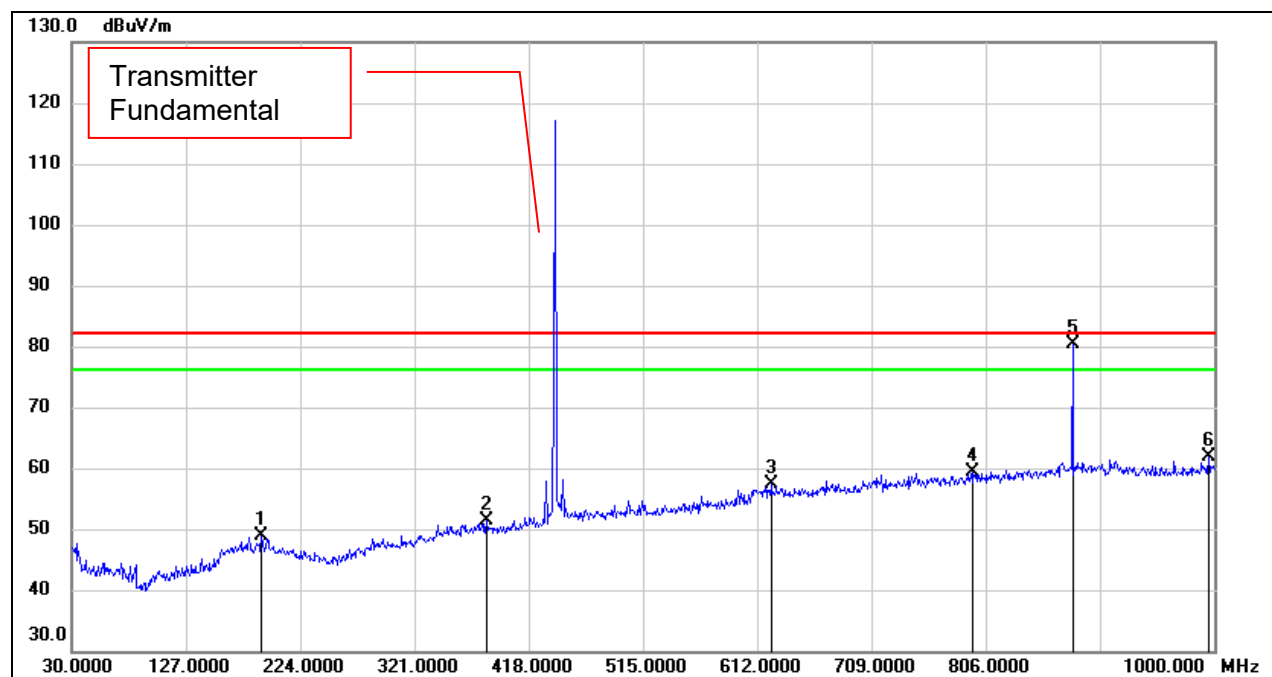


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	104.6900	40.19	9.74	49.93	82.20	-32.27	peak
2	376.2900	35.12	17.10	52.22	82.20	-29.98	peak
3	615.8800	35.63	21.46	57.09	82.20	-25.11	peak
4	790.4800	35.69	23.57	59.26	82.20	-22.94	peak
5	879.7200	55.29	25.54	80.83	82.20	-1.37	peak
6	999.0300	34.53	26.40	60.93	82.20	-21.27	peak

Note: 1. Limit (dBuV/m) = -13+95.2 = 82.2 dBuV/m

2. Margin = Limit – Result

Measurement Method	Radiated	Test Channel	440.00 MHz
Channel Separation	25 kHz	Modulation	GMSK
Polar	Vertical		

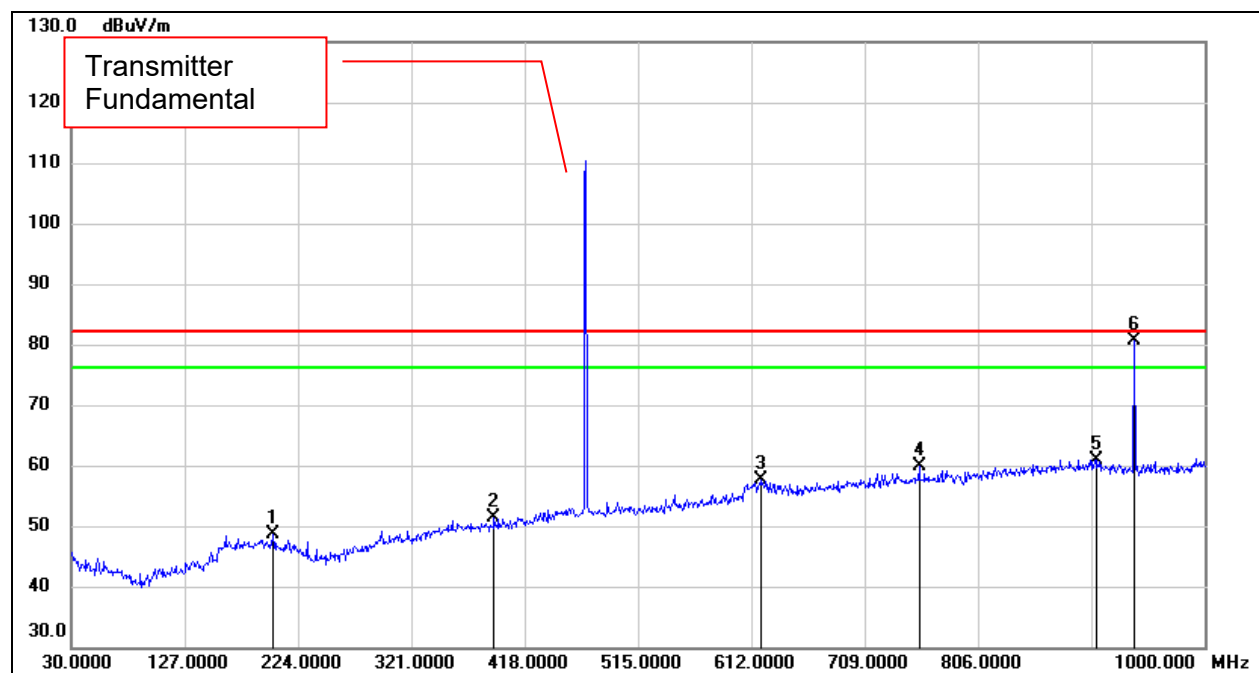


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	191.0200	35.01	13.83	48.84	82.20	-33.36	peak
2	382.1099	34.24	17.12	51.36	82.20	-30.84	peak
3	623.6400	35.84	21.42	57.26	82.20	-24.94	peak
4	795.3300	35.69	23.64	59.33	82.20	-22.87	peak
5	879.7200	54.92	25.54	80.46	82.20	-1.74	peak
6	995.1500	35.62	26.34	61.96	82.20	-20.24	peak

Note: 1. Limit (dBuV/m) = -13+95.2 = 82.2 dBuV/m

2. Margin = Limit – Result

Measurement Method	Radiated	Test Channel	469.95 MHz
Channel Separation	25 kHz	Modulation	GMSK
Polar	Horizontal		

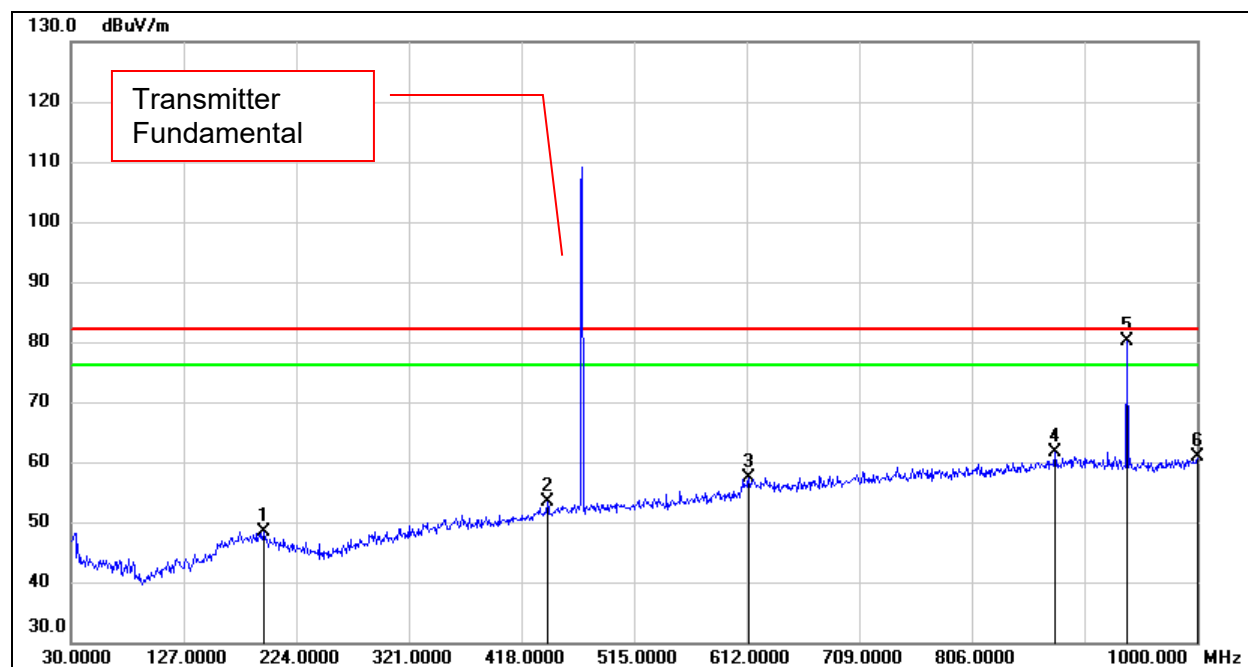


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	202.6600	35.21	13.35	48.56	82.20	-33.64	peak
2	391.8100	34.33	17.14	51.47	82.20	-30.73	peak
3	620.7300	36.17	21.44	57.61	82.20	-24.59	peak
4	755.5600	36.72	23.10	59.82	82.20	-22.38	peak
5	906.8800	35.09	25.80	60.89	82.20	-21.31	peak
6	939.8600	54.99	25.60	80.59	82.20	-1.61	peak

Note: 1. Limit (dBuV/m) = $-13 + 95.2 = 82.2$ dBuV/m

2. Margin = Limit – Result

Measurement Method	Radiated	Test Channel	469.95 MHz
Channel Separation	25 kHz	Modulation	GMSK
Polar	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	195.8700	34.78	13.63	48.41	82.20	-33.79	peak
2	440.3100	34.70	18.57	53.27	82.20	-28.93	peak
3	613.9400	35.94	21.48	57.42	82.20	-24.78	peak
4	877.7800	36.11	25.48	61.59	82.20	-20.61	peak
5	939.8600	54.62	25.60	80.22	82.20	-1.98	peak
6	1000.0000	34.38	26.42	60.80	82.20	-21.40	peak

Note: 1. Limit (dBuV/m) = -13+95.2 = 82.2 dBuV/m

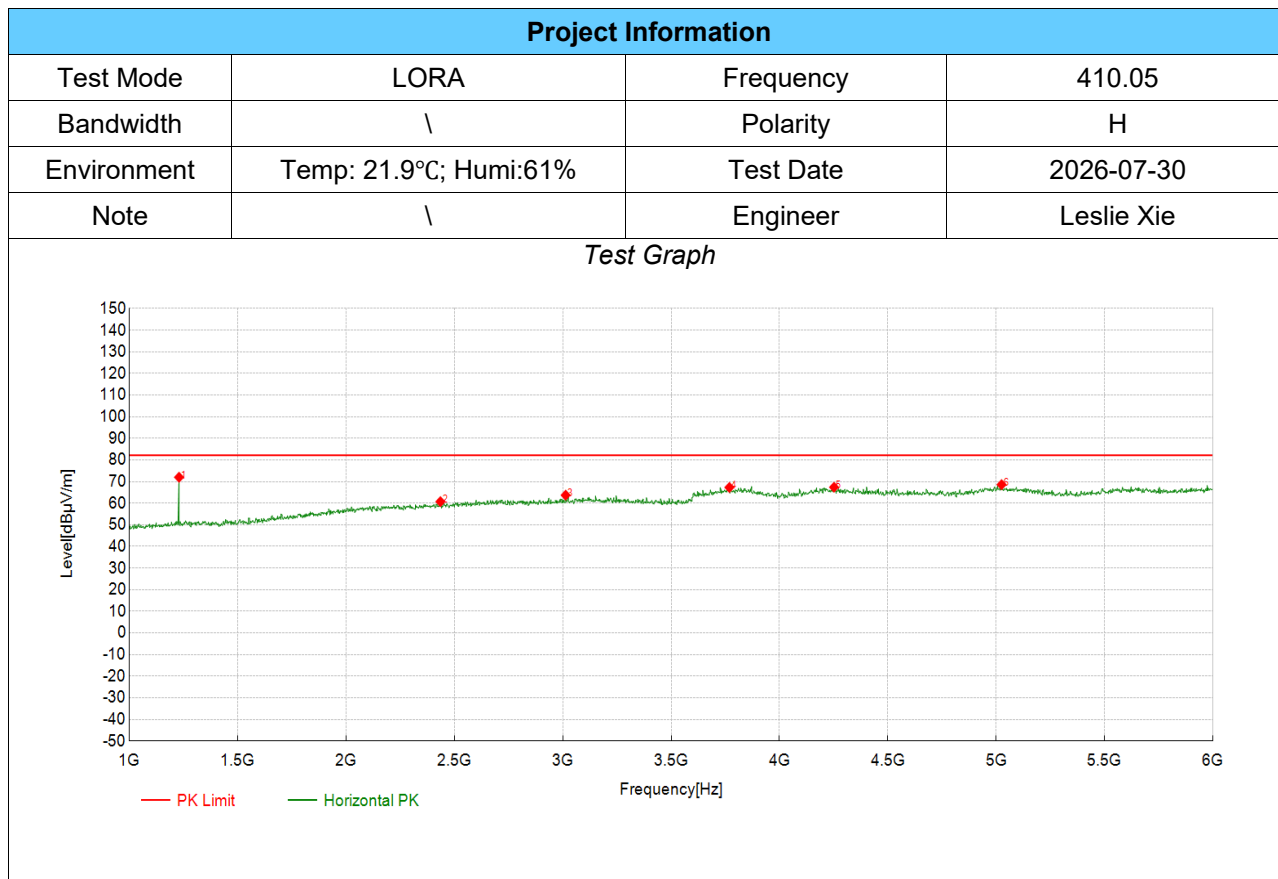
2. Margin = Limit – Result

Note: All the modes had been tested, but only the worst data recorded in the report.

RESULT – ABOVE 1 GHz

For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (Y axis) data recorded in the report.

TX Radiated Test Result

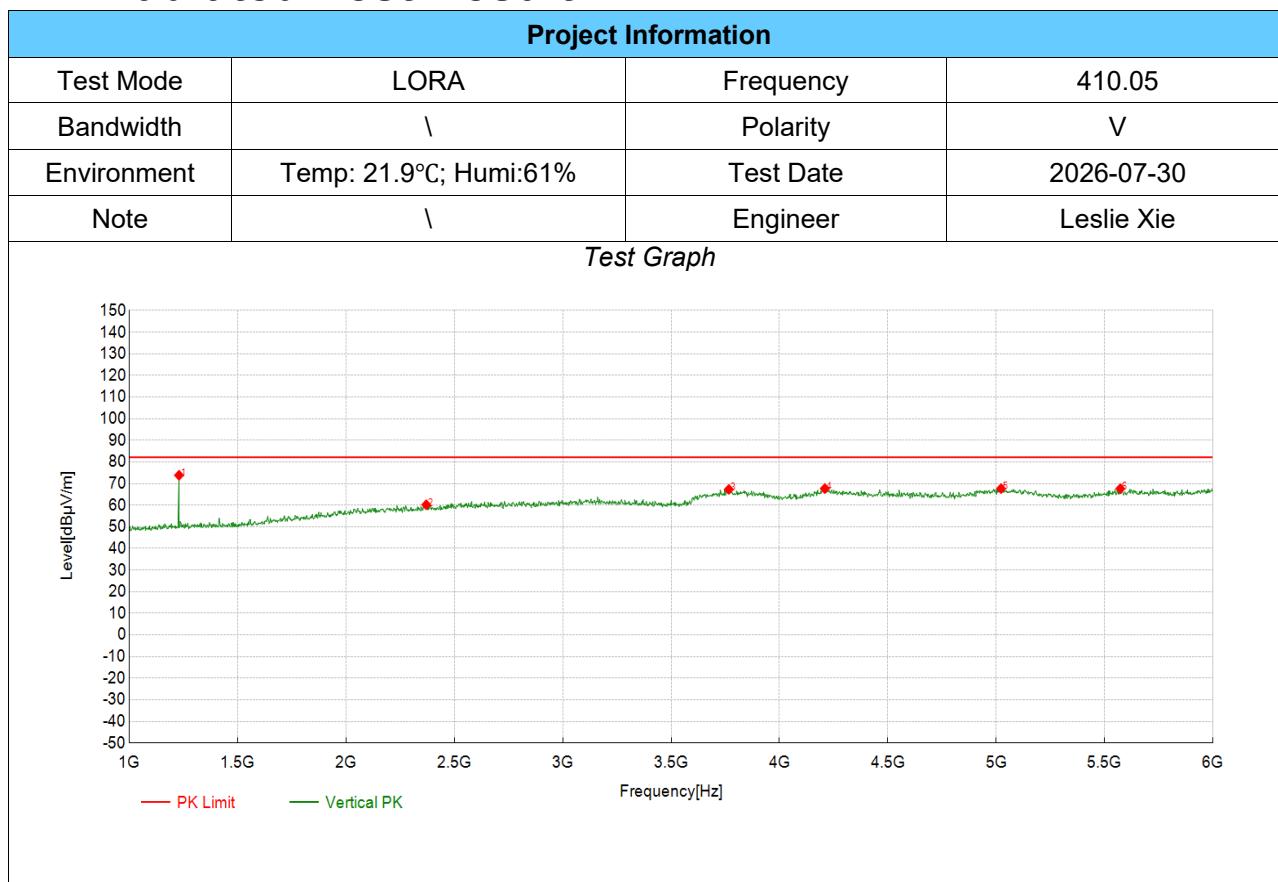


PEAK Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Verdict
1	1230.12	41.81	72.00	30.19	82.20	10.20	PK	Horizontal	PASS
2	2435.72	25.12	60.71	35.59	82.20	21.49	PK	Horizontal	PASS
3	3013.51	26.68	63.71	37.03	82.20	18.49	PK	Horizontal	PASS
4	3768.88	29.97	67.28	37.31	82.20	14.92	PK	Horizontal	PASS
5	4251.63	27.66	67.38	39.72	82.20	14.82	PK	Horizontal	PASS
6	5024.51	28.99	68.57	39.58	82.20	13.63	PK	Horizontal	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

TX Radiated Test Result

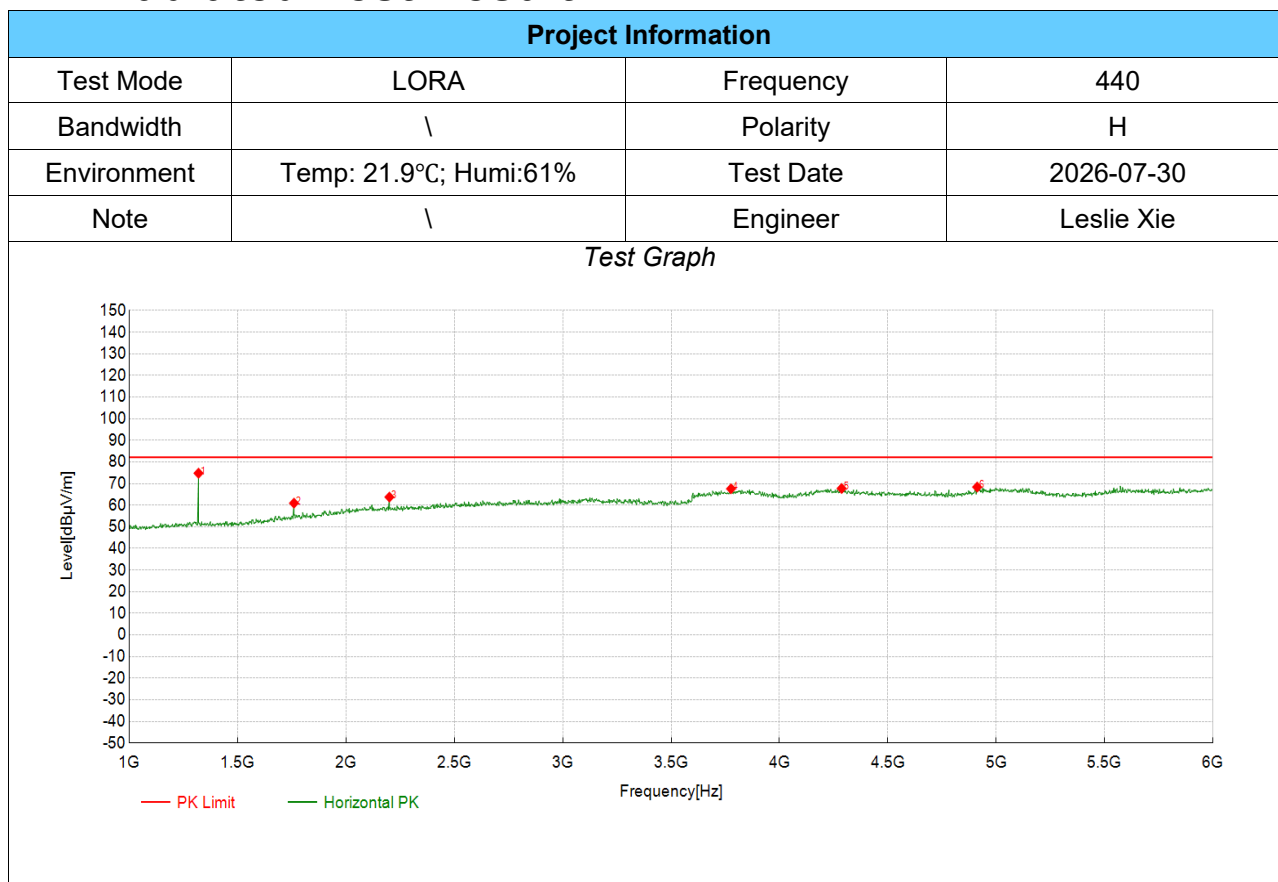


PEAK Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Verdict
1	1230.12	43.65	73.84	30.19	82.20	8.36	PK	Vertical	PASS
2	2370.69	24.68	60.21	35.53	82.20	21.99	PK	Vertical	PASS
3	3766.38	30.03	67.34	37.31	82.20	14.86	PK	Vertical	PASS
4	4209.10	27.78	67.69	39.91	82.20	14.51	PK	Vertical	PASS
5	5022.01	28.09	67.68	39.59	82.20	14.52	PK	Vertical	PASS
6	5572.29	27.27	67.60	40.33	82.20	14.60	PK	Vertical	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

TX Radiated Test Result

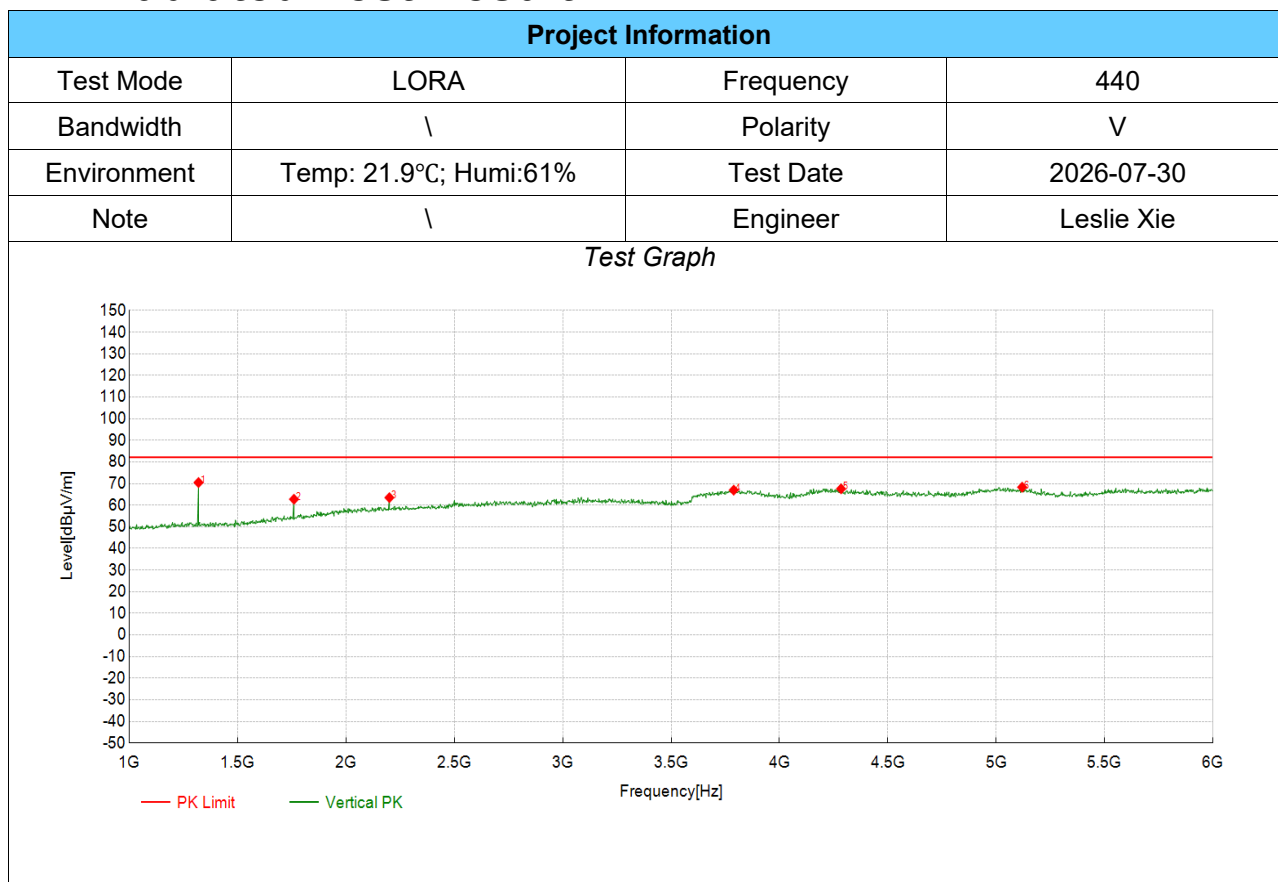


PEAK Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Verdict
1	1320.16	44.60	74.79	30.19	82.20	7.41	PK	Horizontal	PASS
2	1760.38	28.19	60.95	32.76	82.20	21.25	PK	Horizontal	PASS
3	2200.60	28.17	63.76	35.59	82.20	18.44	PK	Horizontal	PASS
4	3776.39	30.28	67.60	37.32	82.20	14.60	PK	Horizontal	PASS
5	4286.64	28.18	67.74	39.56	82.20	14.46	PK	Horizontal	PASS
6	4911.96	29.12	68.39	39.27	82.20	13.81	PK	Horizontal	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

TX Radiated Test Result

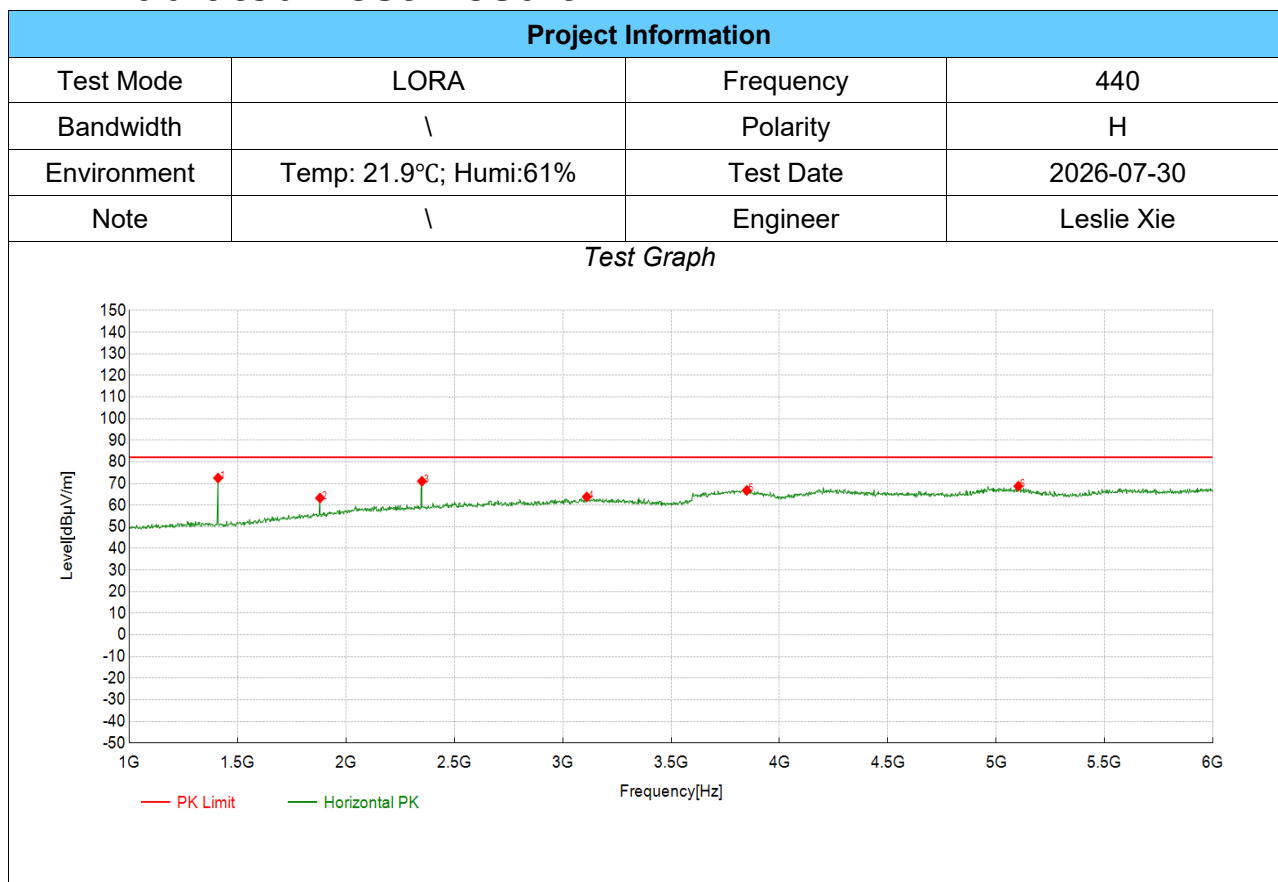


PEAK Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Verdict
1	1320.16	40.29	70.48	30.19	82.20	11.72	PK	Vertical	PASS
2	1760.38	30.00	62.76	32.76	82.20	19.44	PK	Vertical	PASS
3	2200.60	27.92	63.51	35.59	82.20	18.69	PK	Vertical	PASS
4	3788.89	29.64	66.97	37.33	82.20	15.23	PK	Vertical	PASS
5	4284.14	28.01	67.58	39.57	82.20	14.62	PK	Vertical	PASS
6	5119.56	28.87	68.32	39.45	82.20	13.88	PK	Vertical	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

TX Radiated Test Result

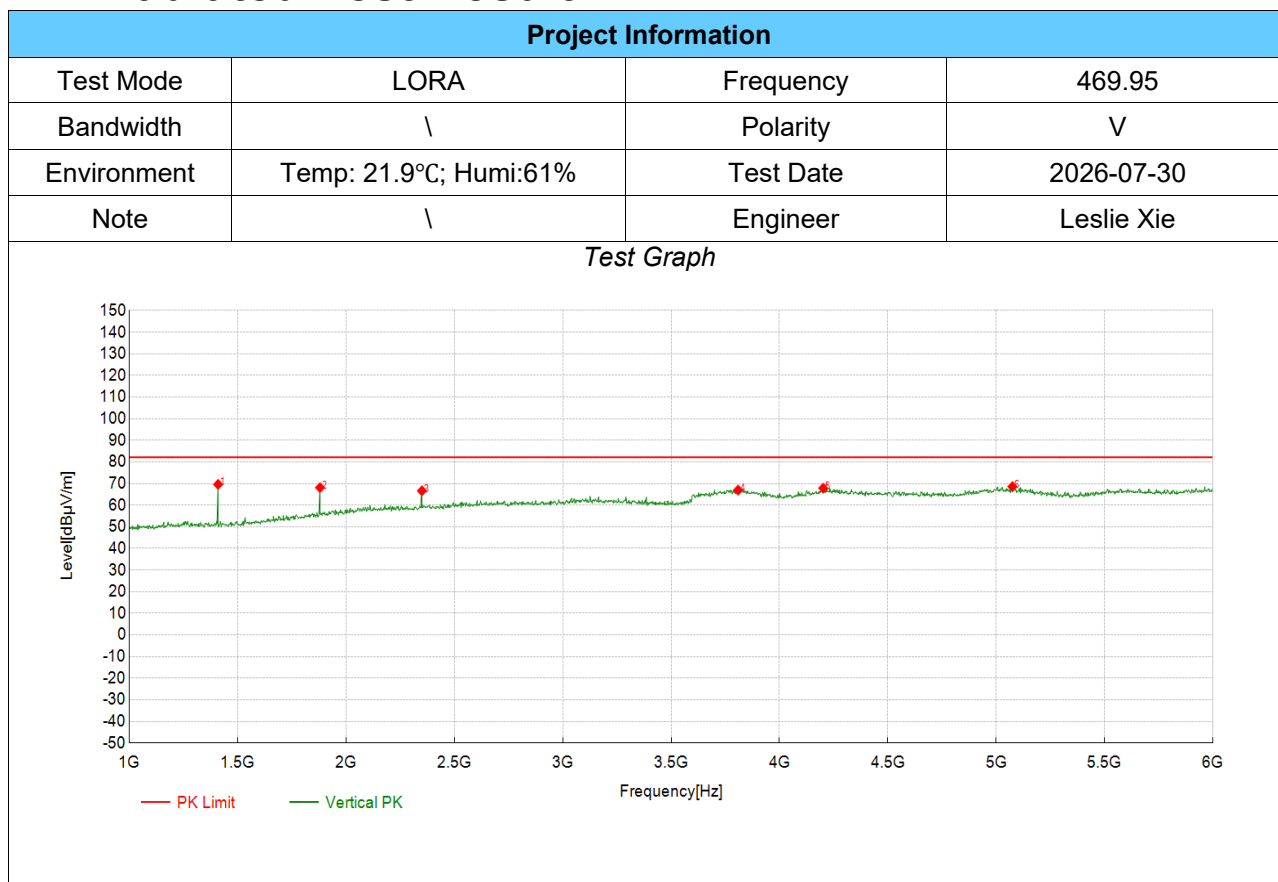


PEAK Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Verdict
1	1410.21	42.37	72.57	30.20	82.20	9.63	PK	Horizontal	PASS
2	1880.44	29.42	63.29	33.87	82.20	18.91	PK	Horizontal	PASS
3	2350.68	35.53	71.07	35.54	82.20	11.13	PK	Horizontal	PASS
4	3111.06	26.77	63.84	37.07	82.20	18.36	PK	Horizontal	PASS
5	3848.92	29.47	66.80	37.33	82.20	15.40	PK	Horizontal	PASS
6	5102.05	29.33	68.80	39.47	82.20	13.40	PK	Horizontal	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

TX Radiated Test Result



PEAK Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Verdict
1	1410.21	39.42	69.62	30.20	82.20	12.58	PK	Vertical	PASS
2	1880.44	34.25	68.12	33.87	82.20	14.08	PK	Vertical	PASS
3	2350.68	31.12	66.66	35.54	82.20	15.54	PK	Vertical	PASS
4	3808.90	29.64	66.98	37.34	82.20	15.22	PK	Vertical	PASS
5	4201.60	27.91	67.85	39.94	82.20	14.35	PK	Vertical	PASS
6	5074.54	29.10	68.61	39.51	82.20	13.59	PK	Vertical	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

7.4. TRANSMITTER CONDUCTED SPURIOUS EMISSION

LIMITS

EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m. when m = 3, EIRP (dBm) = E (dBμV/m) – 95.2

For 25 kHz Channel Separation mode: 43 + 10 log (Pwatts)

Calculation: Limit (dBm) = EL-43-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm, In this application, the EL is P (dBm).

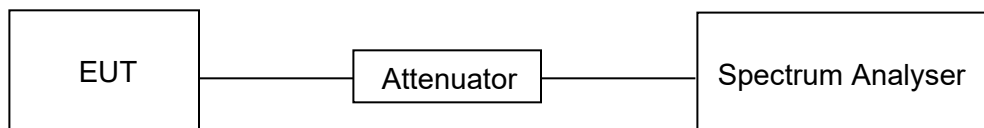
Limit (dBm) = P(dBm)-43-10 log (Pwatts) = -13 dBm

Limit (dBuV/m) = -13+95.2 = 82.2 dBuV/m

TEST PROCEDURE

- (1) The DUT transmitter connected to Power Meter using the 30 dB attenuator and power sensor with above setup.
- (2) Path loss for the measurement included.
- (3) All the measurement was done at low, mid, high frequency for each band.
- (4) Record the test result into the test report.

TEST SETUP

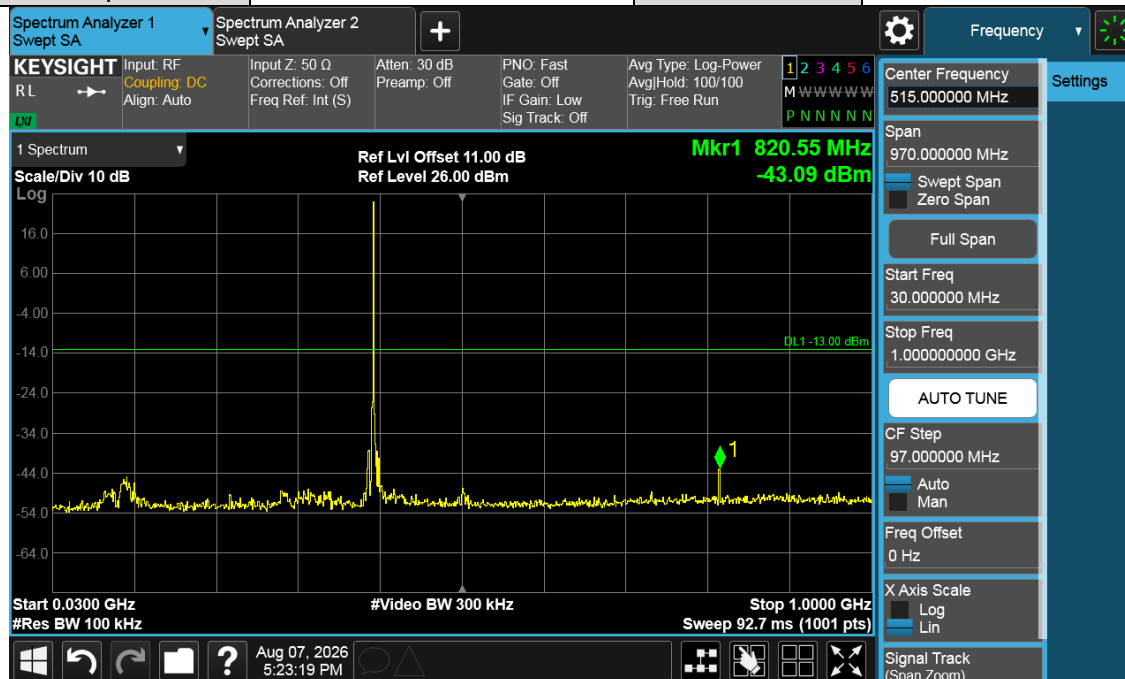


TEST ENVIRONMENT

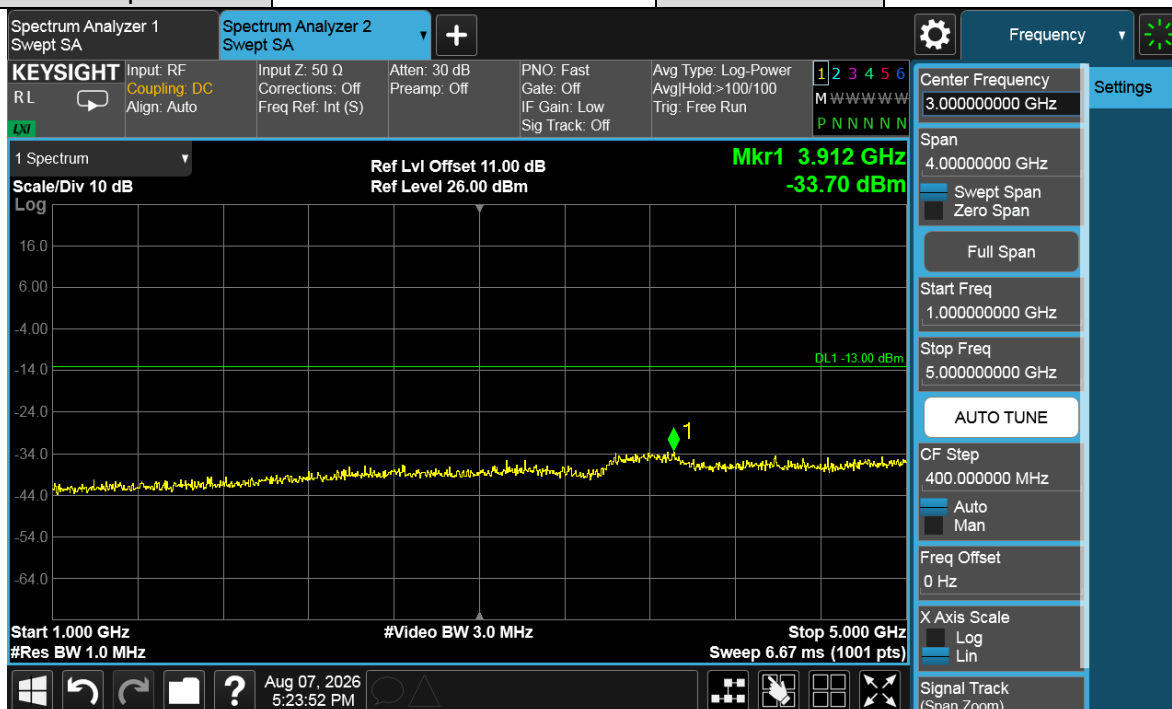
Temperature	24.8°C	Relative Humidity	59.3%
Atmosphere Pressure	101 kPa	Test Voltage	DC 24V

RESULT

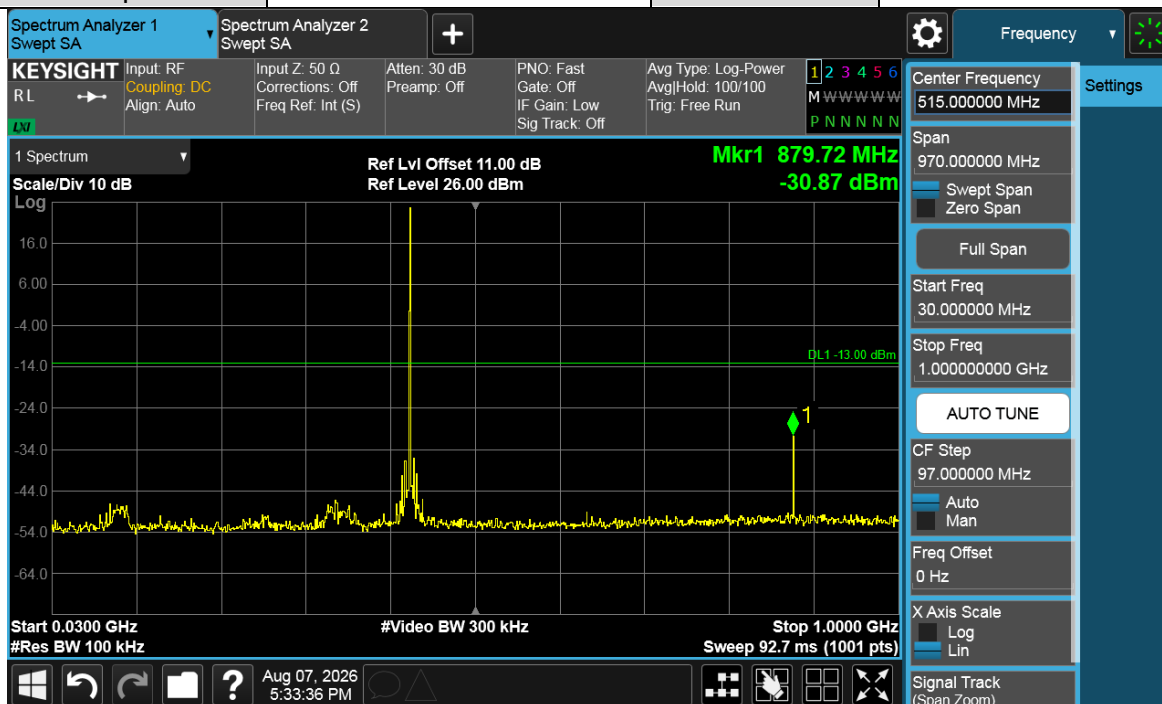
Measurement Method	Conducted	Test Channel	410.05 MHz
Channel Separation	25 kHz	Modulation	GMSK



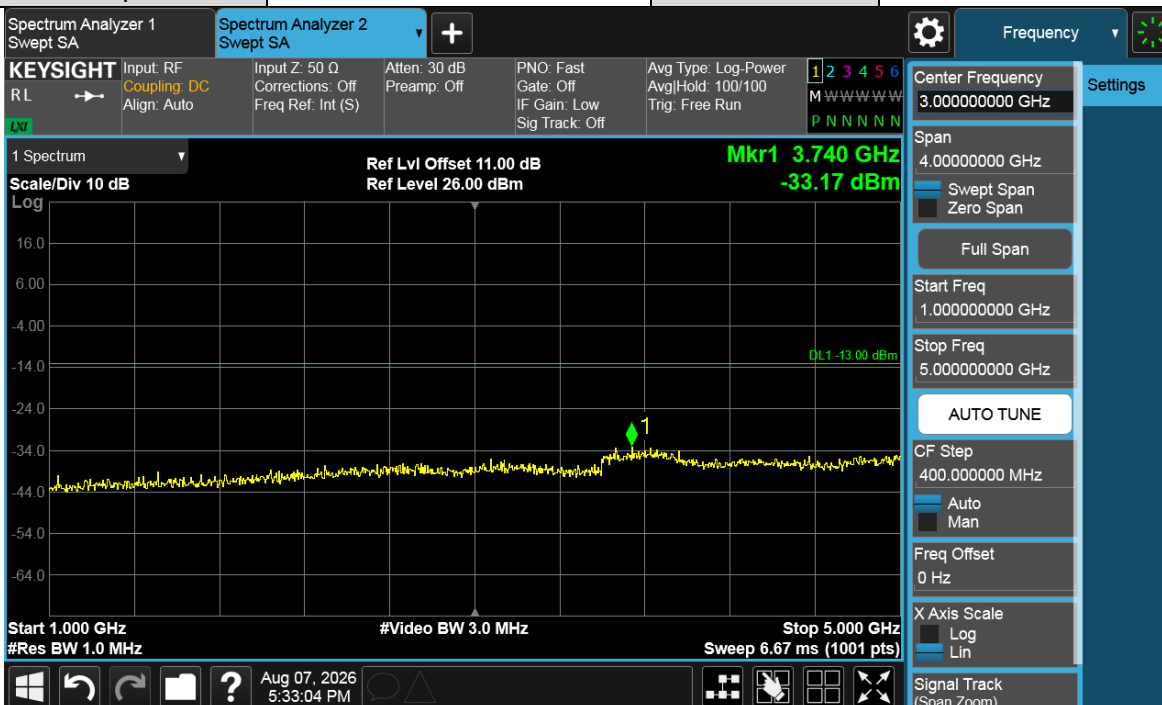
Measurement Method	Conducted	Test Channel	410.05 MHz
Channel Separation	25 kHz	Modulation	GMSK



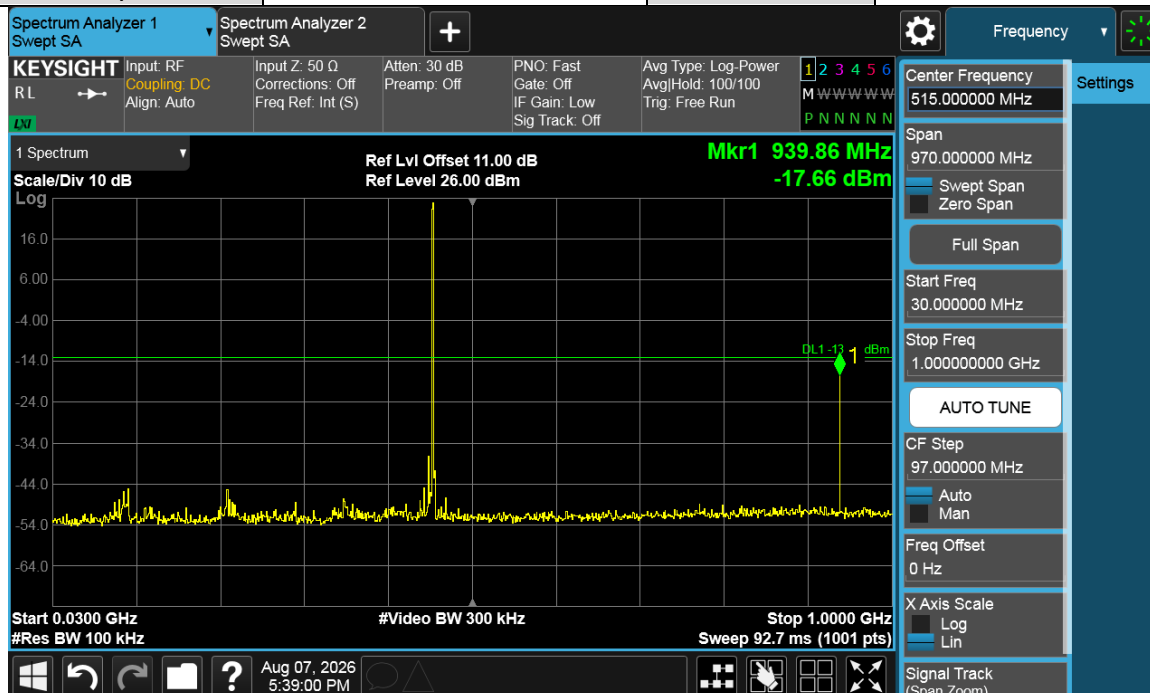
Measurement Method	Conducted	Test Channel	440.00 MHz
Channel Separation	25 kHz	Modulation	GMSK



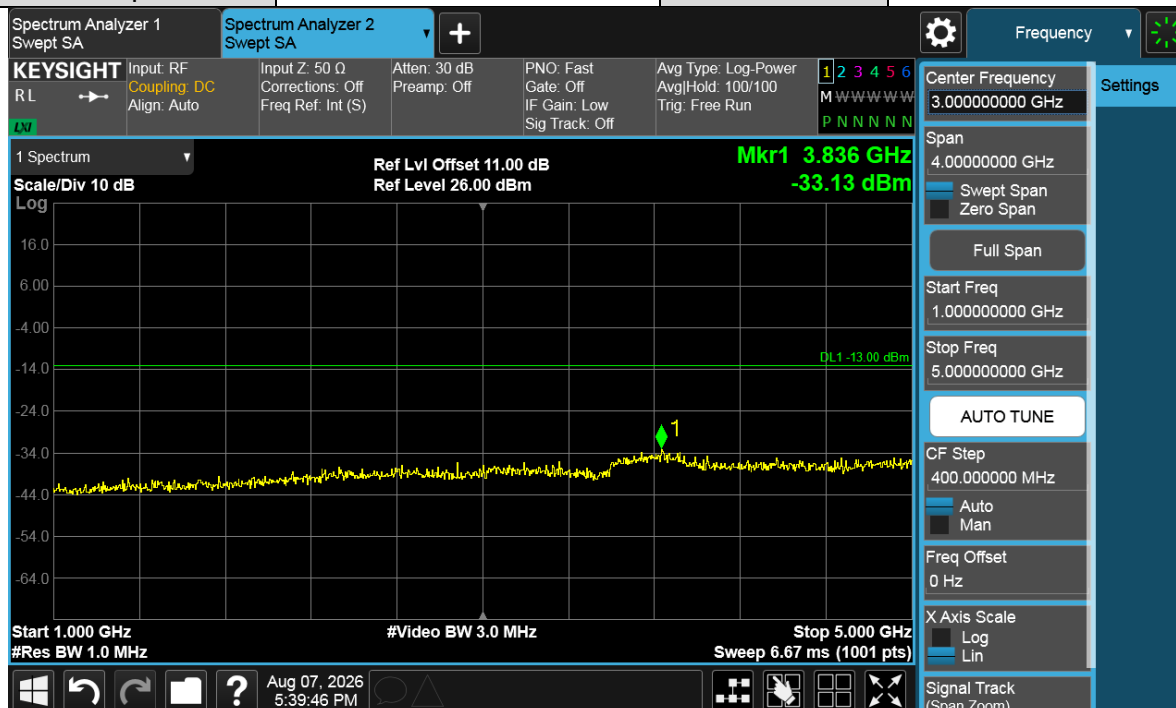
Measurement Method	Conducted	Test Channel	440.00 MHz
Channel Separation	25 kHz	Modulation	GMSK



Measurement Method	Conducted	Test Channel	469.95 MHz
Channel Separation	25 kHz	Modulation	GMSK



Measurement Method	Conducted	Test Channel	469.95 MHz
Channel Separation	25 kHz	Modulation	GMSK



7.5. ADJACENT CHANNEL POWER

LIMITS

(1) Maximum adjacent power levels for frequencies in the 450-470 MHz band:

Frequency offset	Maximum ACP (dBc) for devices 1 watt and less	Maximum ACP (dBc) for devices above 1 watt
25 kHz	-55 dBc	-60 dBc
50 kHz	-70 dBc	-70 dBc
75 kHz	-70 dBc	-70 dBc

(2) In any case, no requirement in excess of -36 dBm shall apply.

TEST PROCEDURE

- 1) The DUT transmitter output port was connected to RF Communications Test Set.
- 2) Path loss for the measurement included.
- 3) Use a nominal resolution bandwidth of 300 Hz and a measurement bandwidth of 18 kHz for offsets of 25 kHz, 50 kHz, and 75 kHz.
- 4) Measure ACP at the upper and lower sides of the transmitter frequency specified by the offset frequency in step 3).
- 5) Measure and record the results in the test report.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.8°C	Relative Humidity	59.3%
Atmosphere Pressure	101 kPa	Test Voltage	DC 24V

RESULTS

Test Channel	Frequency (MHz)	Channel Spacing (kHz)	Adjacent channel power (dBc)		Limit (dBc)	Verdict
			Lower	Upper		
1	410.05	25	-63.21	-63.72	-55	PASS
		50	-73.45	-73.72	-70	PASS
		75	-73.92	-74.13	-70	PASS
1199	440.00	25	-63.02	-63.16	-55	PASS
		50	-73.97	-74.04	-70	PASS
		75	-73.79	-73.99	-70	PASS
2397	469.95	25	-63.34	-63.55	-55	PASS
		50	-73.86	-73.61	-70	PASS
		75	-74.25	-73.82	-70	PASS

7.6. TRANSIENT FREQUENCY BEHAVIOR

LIMITS

Transmitters designed to operate in the 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

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			
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

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.

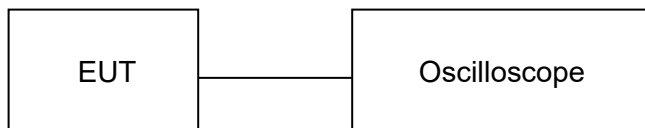
⁴ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

Note: Frequency limits specified in § 90.213 is 421 to 512 MHz.

PROCEDURE

- 1) The EUT was set in the climate chamber and connected to an external DC power supply and AC power supply.
- 2) The RF output was directly connected to Oscilloscope.
- 3) The coupling loss of the additional cables was recorded and taken in account for all the measurements.
- 4) Measure and record the results in the test report. t_3

TEST SETUP



RESULTS

Test Channel (MHz)	Channel Bandwidth (kHz)	Time Intervals	Maximum Frequency Difference (kHz)	Limit (kHz)	Transient Duration Limit(ms)
410.05	25	t ₁	+5.4/-5.3	±25	10
		t ₂	+0.9/-0.8	±12.5	25
		t ₃	+2.2/-2.2	±25	10
469.95	25	t ₁	+5.9/-5.7	±25	10
		t ₂	+1.5/-1.7	±12.5	25
		t ₃	+2.3/-2.2	±25	10

7.7. FREQUENCY STABILITY

LIMITS

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

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
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928 ¹³	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁹ 300	300	300
Above 2450 ¹⁰			

¹Fixed and base stations with over 200 watts transmitter power must have a frequency stability of 50 ppm except for equipment used in the Public Safety Pool where the frequency stability is 100 ppm.

²For single sideband operations below 25 MHz, the carrier frequency must be maintained within 50 Hz of the authorized carrier frequency.

³Travelers information station transmitters operating from 530-1700 kHz and transmitters exceeding 200 watts peak envelope power used for disaster communications and long distance circuit operations pursuant to §§90.242 and 90.264 must maintain the carrier frequency to within 20 Hz of the authorized frequency.

⁴Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.

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.

⁹Fixed stations with output powers above 120 watts and necessary bandwidth less than 3 kHz must operate with a frequency stability of 100 ppm. Fixed stations with output powers less than 120 watts and using time-division multiplex, must operate with a frequency stability of 500 ppm.

¹⁰Except for DSRCS equipment in the 5850-5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850-5925 MHz band is specified in subpart M of this part.

¹¹Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

¹²Mobile units may utilize synchronizing signals from associated base stations to achieve the specified carrier stability.

¹³Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency tolerance restrictions.

¹⁴Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

(b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

PROCEDURE

Frequency stability over variations in temperature:

- 1) The EUT transmitter output port was connected to communication tester.
- 2) The EUT was placed inside the temperature chamber.
- 3) Supply the EUT with a DC 24 V voltage by DC power supply.
- 4) Turn EUT off and set the chamber temperature to -20 °C. After the temperature stabilized for approximately 30 minutes recorded the frequency as MCF_{MHz} .
- 5) Calculate the ppm frequency error by the following:

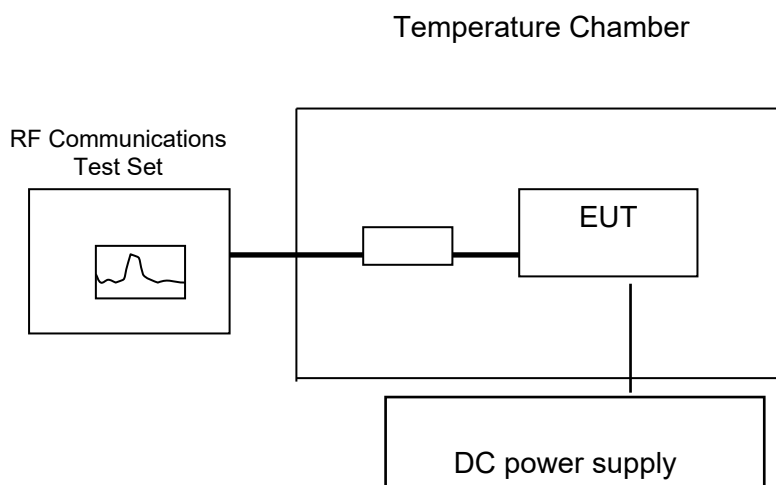
$$\text{ppm error} = (MCF_{MHz}/ACF_{MHz} - 1) * 10^6$$
 where
 MCF_{MHz} is the Measured Carrier Frequency in MHz ACF_{MHz} is the Assigned Carrier Frequency in MHz
- 6) Repeat step 4 measure with 10 °C increased per stage until the highest temperature of +70 °C reached.

Frequency stability when varying supply voltage:

- 7) The EUT transmitter output port was connected to communication tester.
- 8) The EUT was placed inside the temperature chamber at +15 °C to +25 °C.
- 9) Supply the EUT with a DC 24 V voltage by power supply.
- 10) Recorded the frequency as MCF_{MHz} .
- 11) Calculate the ppm frequency error by the following:

$$\text{ppm error} = (MCF_{MHz}/ACF_{MHz} - 1) * 10^6$$
 where
 MCF_{MHz} is the Measured Carrier Frequency in MHz ACF_{MHz} is the Assigned Carrier Frequency in MHz
- 12) Repeat step 4 measure with vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.

TEST SETUP



RESULTS

Compare to the limit of the standard:

Frequency / Channel Spacing	440.00 MHz / 25 kHz				
Temperature, °C	25				
Voltage	Voltage	Frequency	Frequency Stability	Low Limit	High Limit
%	V	MHz	PPM	PPM	PPM
85	20.4	439.999888	-0.25	-1.5	1.5
90	21.6	440.000170	0.39	-1.5	1.5
95	22.8	439.999783	-0.49	-1.5	1.5
100	24	439.999970	-0.07	-1.5	1.5
105	25.2	439.999987	-0.03	-1.5	1.5
110	26.4	440.000095	0.22	-1.5	1.5
115	27.6	439.999832	-0.38	-1.5	1.5

Frequency / Channel Spacing	440.00 MHz / 25 kHz			
Temperature	Frequency	Frequency Stability	Low Limit	High Limit
°C	MHz	PPM	PPM	PPM
-20	439.999924	-0.17	-1.5	1.5
-10	439.999945	-0.12	-1.5	1.5
0	439.999852	-0.34	-1.5	1.5
10	439.999865	-0.31	-1.5	1.5
20	440.000158	0.36	-1.5	1.5
30	440.000050	0.11	-1.5	1.5
40	439.999871	-0.29	-1.5	1.5
50	440.000091	0.21	-1.5	1.5
60	439.999793	-0.47	-1.5	1.5
70	440.000077	0.18	-1.5	1.5

END OF REPORT