RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.247**
Product name	**Image sensor with LoRa module**
Brand Name	**Sercomm**
Model No.	**SL-IMG01**
Test Result	**Pass**
Statements of Conformity	**Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:

Shawn Wu
Supervisor

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 8, 2023	Initial Issue	ALL	Doris Chu
01	June 16, 2023	See the following Note Rev. (01)	P.4, P.31-36, P.39-44	Doris Chu

Rev. (01)
1. Modify power supply in section 1.1.
2. Added remark in page 31-36.
3. Added Average and remark in page 39-44

Table of contents

1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Sercomm Corporation 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan
Manufacturer	Sercomm Corporation 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan
Equipment	Image sensor with LoRa module
Model No.	SL-IMG01
Model Discrepancy	N/A
Trade Name	Sercomm
Received Date	May 9, 2023
Date of Test	May 15 ~ June 2, 2023
Power Supply	Power from Battery. (DC 6V)

Remark:
1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.2 EUT CHANNEL INFORMATION

Frequency Range	903 MHz-914.2 MHz
Modulation Type	LoRa
Number of channels	8 Channels

Remark:
Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	**Number of frequencies**	**Location in frequency range of operation**
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☐ CHIP ☒ PIFA ☐ PCB ☐ Dipole ☐ Coils
Antenna Gain	Gain: -2.8 dBi
Antenna Connector	N/A

Remark:
1. The industrial epoxy adhesive is used making Antenna connection permanently prior to shipping. It complies with rule 15.203.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.1183
Channel Bandwidth	± 2.1863
Power Spectral density	± 2.1855
Conducted Bandedge	± 2.1866
Conducted Spurious Emission	± 2.1859
Radiated Emission_9kHz-30MHz	± 3.842
Radiated Emission_30MHz-200MHz	± 4.517
Radiated Emission_200MHz-1GHz	± 4.844
Radiated Emission_1GHz-6GHz	± 5.411
Radiated Emission_6GHz-18GHz	± 5.266

Remark:
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at
☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.
☒ No. 12, Ln. 116, Wugong 3rd Rd., Wugu Dist., New Taipei City, Taiwan 24803
CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	-	Not applicable, because EUT doesn't connect to AC Main Source direct.
Radiation	Czerny Lin	-
RF Conducted	Jack Chen	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC pubic Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Power Sensor	Anritsu	MA2411B	1911386	2022-08-08	2023-08-07
Power Sensor	Anritsu	MA2411B	1911387	2022-08-08	2023-08-07
EXA Signal Analyzer	Keysight	N9010B	MY55460167	2022-09-07	2023-09-06
EXA Signal Analyzer	Keysight	N9010A	MY54200716	2022-10-13	2023-10-12
Power Meter	Anritsu	ML2496A	2136002	2022-11-24	2023-11-23
Software	Radio Test Software Ver. 21				

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Antenna	SHWARZBECK	VULB 9168	1277	2023-01-13	2024-01-12
Pre-Amplifier	EMCI	EMC118A45SE	980820	2022-12-23	2023-12-22
Pre-Amplifier	EMCI	EMC330N	980853	2022-12-23	2023-12-22
Coaxial Cable	EMC	EMC101G-KM-KM-9000	220407+211228+230205	2023-03-21	2024-03-20
Signal Generator	Agilent	N9010A	MY52220817	2023-03-09	2024-03-08
Coaxial Cable	EMC	EMCCFD400	211212+211222+211020	2023-03-21	2024-03-20
Thermo-Hygro Meter	EDSDS	EDS-A49	966D1	2023-05-11	2024-05-10
Pre-Amplifier	EMCI	EMC184045SE	980872	2023-01-03	2024-01-02
Horn Antenna	RF SPIN	DRH18-E	210301A18ES	2023-02-03	2024-02-02
Horn Antenna	SHWARZBECK	BBHA 9170	1134	2022-12-30	2023-12-29
Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2022-12-27	2023-12-26
High Pass Filter	TITAN	T04H10001000060S01	211215-7-2	2023-02-02	2024-02-01
Software	e3 6.11-20180413				

AC Conducted Emissions Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
N/A					

Remark:
1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	NB(E)	Lenovo	T460	N/A	N/A

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247.

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2. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	4.1	AC Conducted Emission	N/A
15.247(a)(2)	4.2	6 dB Bandwidth	Pass
-	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)(3)	4.3	Output Power Measurement	Pass
15.247(e)	4.4	Power Spectral Density	Pass
15.247(d)	4.5	Conducted Spurious Emission	Pass
15.247(d)	4.5	Conducted Emission	Pass
15.247(d)	4.6	Radiation Band Edge	Pass
15.247(d)	4.6	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

<table>
<tr><td>Operation mode</td><td>LoRa with 500kHz Bandwidth.</td></tr>
<tr><td>Test Channel Frequencies</td><td>1.Lowest Channel: 903 MHz
2.Middle Channel: 907.8 MHz
3.Highest Channel: 914.2 MHz</td></tr>
<tr><td>Channel List</td><td><table><tr><th>Channel</th><th>Frequency (MHz)</th></tr><tr><td>CH64</td><td>903</td></tr><tr><td>CH65</td><td>904.6</td></tr><tr><td>CH66</td><td>906.2</td></tr><tr><td>CH67</td><td>907.8</td></tr><tr><td>CH68</td><td>909.4</td></tr><tr><td>CH69</td><td>911</td></tr><tr><td>CH70</td><td>912.6</td></tr><tr><td>CH71</td><td>914.2</td></tr></table></td></tr>
</table>

Remark:
1. The device supports hybrid mode.
2. RF output power was measured with Average detector

3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	**Radiated Emission Above 1G**
Power supply Mode	**Mode 1: EUT power by Battery**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Worst Position	☐ **Placed in fixed position.** ☐ **Placed in fixed position at X-Plane (E2-Plane)** ☒ **Placed in fixed position at Y-Plane (E1-Plane)** ☐ **Placed in fixed position at Z-Plane (H-Plane)**

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT power by Battery**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Y-Plane) were recorded in this report

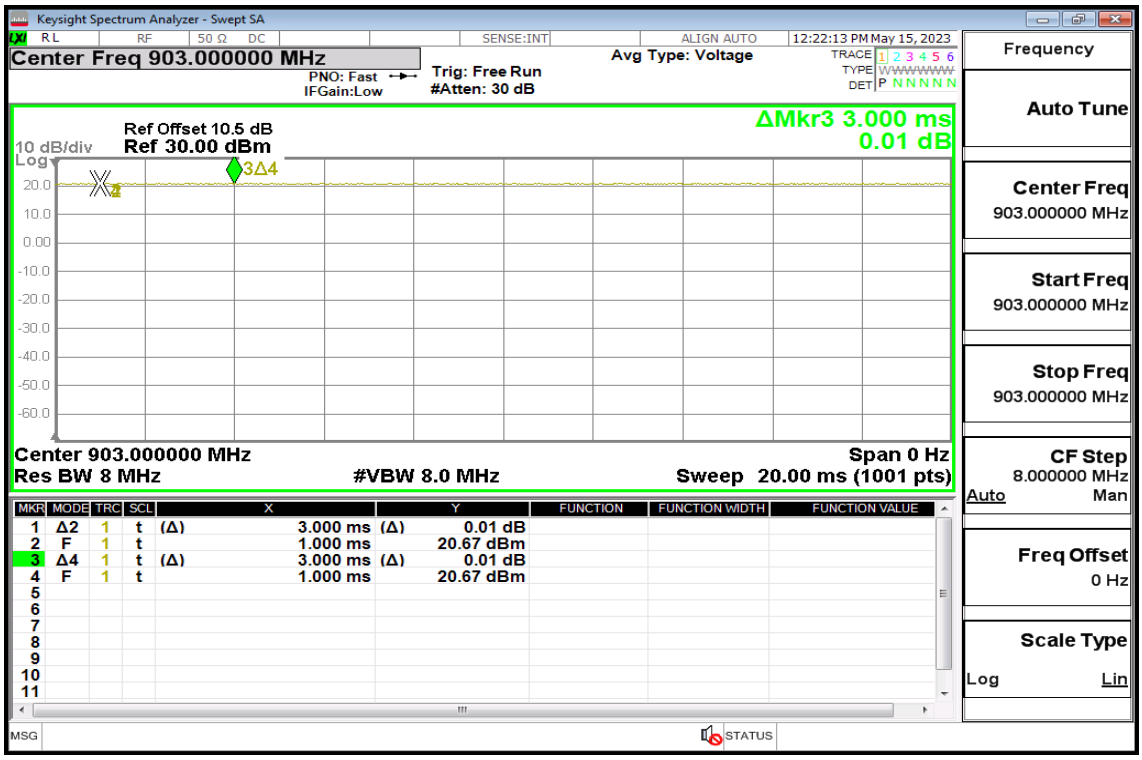
3.3 EUT DUTY CYCLE

Temperature: 22.8 ~ 26.8℃ **Test date:** May 15 ~ June 2, 2023

Humidity: 52 ~ 61% RH **Tested by:** Jack Chen

Duty Cycle				
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
LoRa-500kHz	100.00	0.00	0.33	0.01

LoRa-500kHz



4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

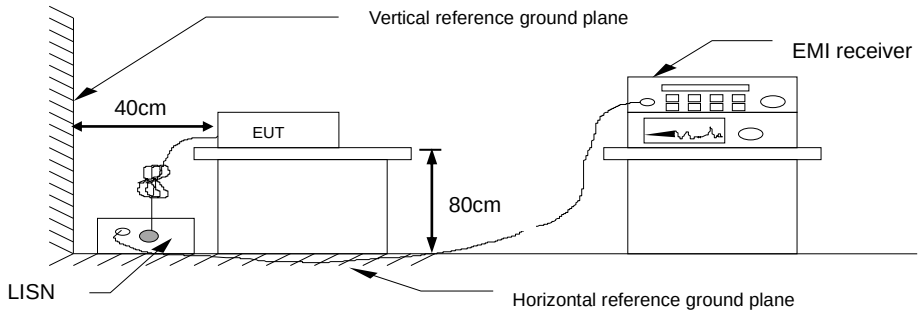
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed above horizontal ground plane and 0.4m above vertical ground plane
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

4.1.3 Test Setup



4.1.4 Test Result

Not applicable, because EUT not connect to AC Main Source direct.

4.2 6dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

4.2.1 Test Limit

According to §15.247(a)(2),

6 dB Bandwidth ：

Limit	Shall be at least 500kHz

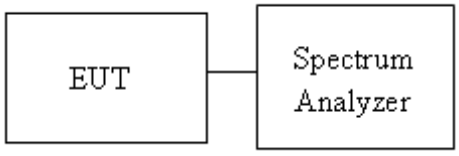
Occupied Bandwidth(99%) ： For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.9.2,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT.
3. SA set RBW = 100kHz, VBW = 300 kHz and Detector = Peak, to measurement 6 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth.
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup



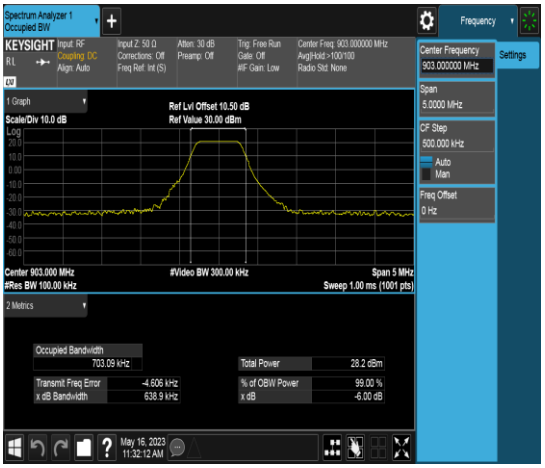
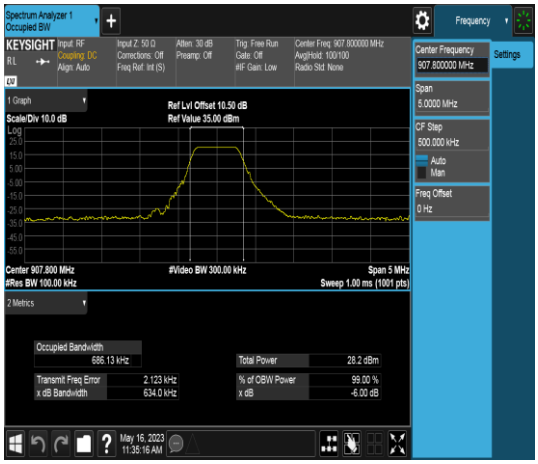
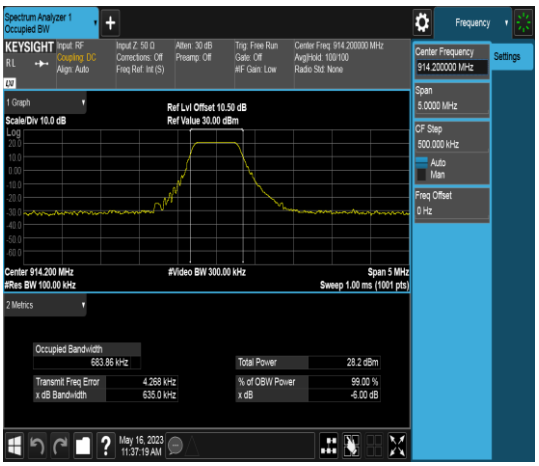
4.2.4 Test Result

Temperature: 22.8 ~ 26.8℃ **Test date:** May 15 ~ June 2, 2023

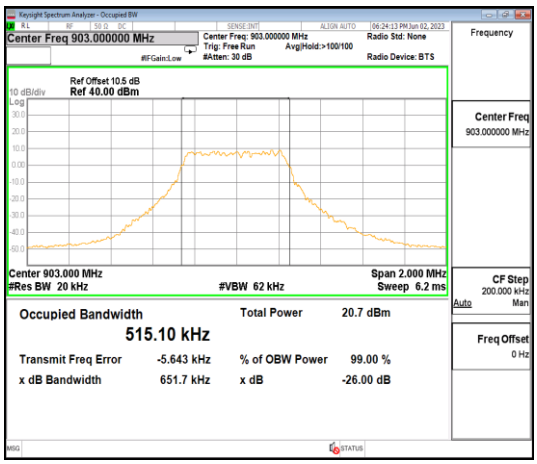
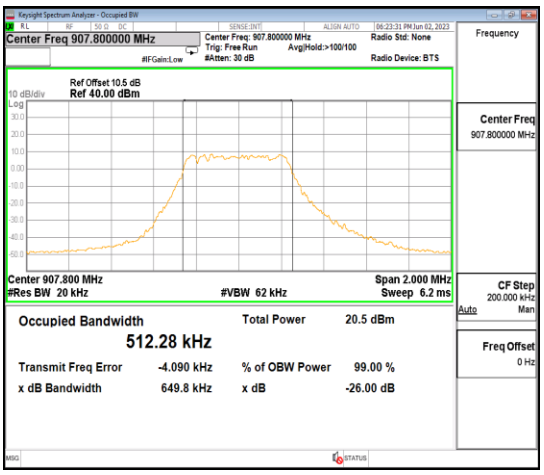
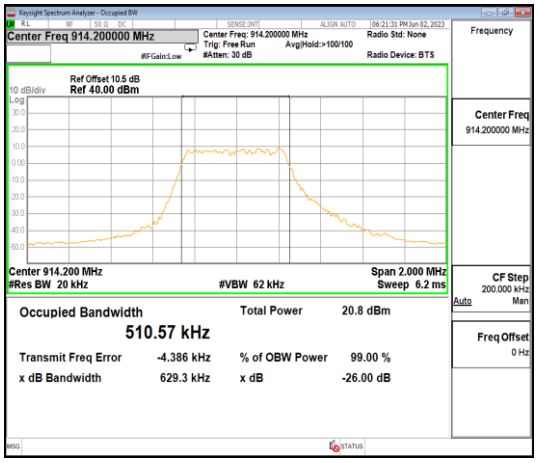
Humidity: 52 ~ 61% RH **Tested by:** Jack Chen

Test mode: LoRa-500kHz / 903-914.2 MHz				
Channel	**Frequency (MHz)**	**OBW (99%) (MHz)**	**6dB BW (MHz)**	**6dB limit (kHz)**
Low	903	0.51510	0.6389	>500
Mid	907.8	0.51228	0.6340	
High	914.2	0.51057	0.6350	

6dB BANDWIDTH Test Data

LoRa-500kHz	
Low CH	**Mid CH**
	
High CH	
	

BANDWIDTH (99%) Test Data

LoRa-500kHz	
Low CH	**Mid CH**
	
High CH	
	

4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(b)(3).

For systems using digital modulation in the 902-928 MHz: 1 Watt(30 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

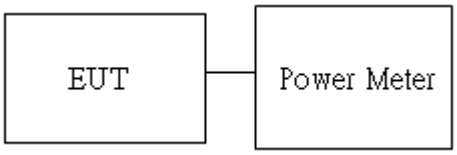
Limit	☒ Antenna not exceed 6 dBi：30dBm ☐ Antenna with DG greater than 6 dBi [Limit = 30 – (DG – 6)] ☐ Point-to-point operation

4.3.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Average output power. in the test report.

4.3.3 Test Setup



4.3.4 Test Result

Temperature:	22.8 ~ 26.8℃	**Test date:**	May 15 ~ June 2, 2023
Humidity:	52 ~ 61% RH	**Tested by:**	Jack Chen

LoRa-500kHz:

CH	Frequency (MHz)	Power set	Maximum Output power (dBm)	Required Limit (dBm)
Low	903	22	20.33	30
Mid	907.8	22	20.36	30
High	914.2	22	**20.38**	30

4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

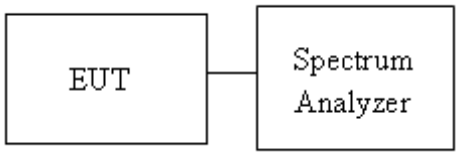
Limit	☒ Antenna not exceed 6 dBi：8dBm ☐ Antenna with DG greater than 6 dBi [Limit = 8 – (DG – 6)] ☐ Point-to-point operation：

4.4.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 10kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = RMS, Sweep Time = Auto and Trace = Max hold.
4. The path loss and Duty Factor were compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup



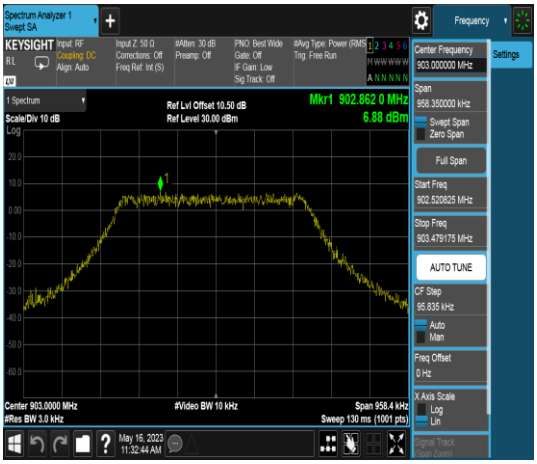
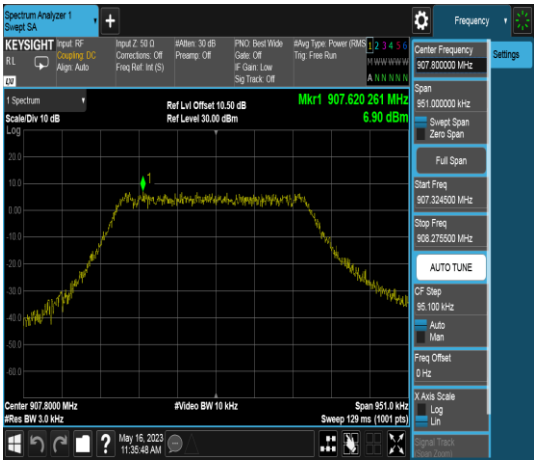
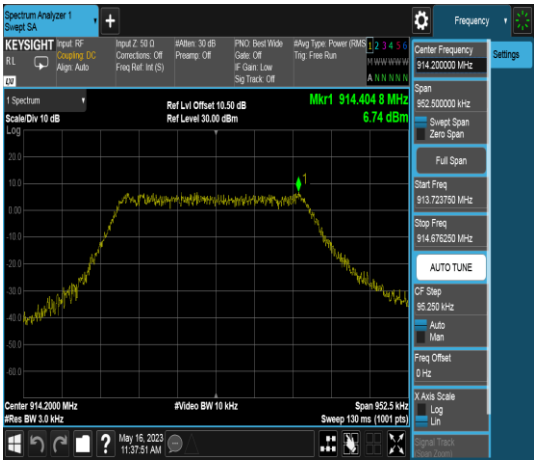
4.4.4 Test Result

Temperature:	22.8 ~ 26.8℃	**Test date:**	May 15 ~ June 2, 2023
Humidity:	52 ~ 61% RH	**Tested by:**	Jack Chen

LoRa-500kHz

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
903	6.880	8	PASS
907.8	6.900	8	PASS
914.2	6.740	8	PASS

Test Data

LoRa-500kHz	
Low CH	**Mid CH**
	
High CH	
	

4.5 CONDUCTED BAND EDGE AND SPURIOUS EMISSION

4.5.1 Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

4.5.2 Test Procedure

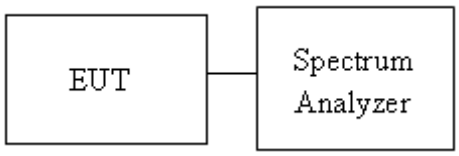
Test method Refer as ANSI C63.10:2013.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.

2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.

3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

4.5.3 Test Setup



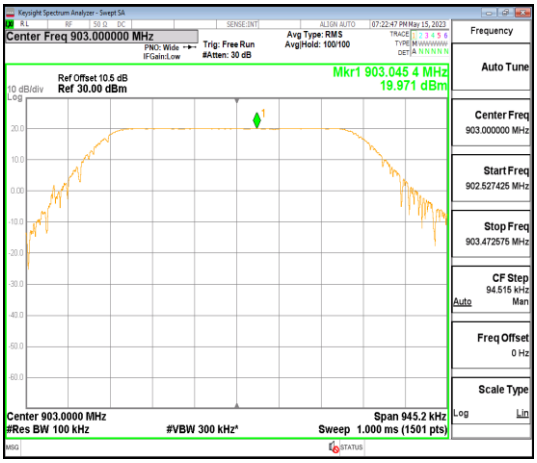
4.5.4 Test Result

Temperature:	22.8 ~ 26.8℃	**Test date:**	May 15 ~ June 2, 2023
Humidity:	52 ~ 61% RH	**Tested by:**	Jack Chen

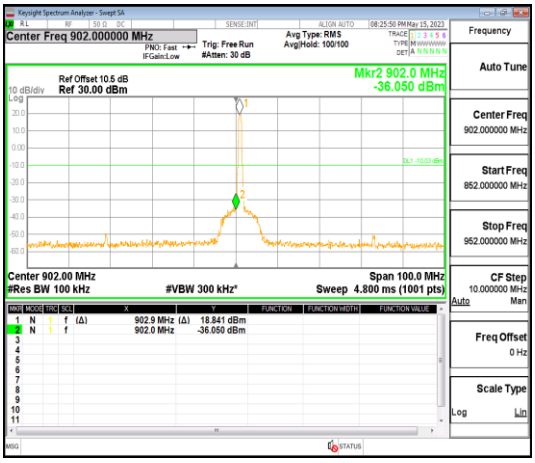
Test Data

LoRa-500kHz Low CH

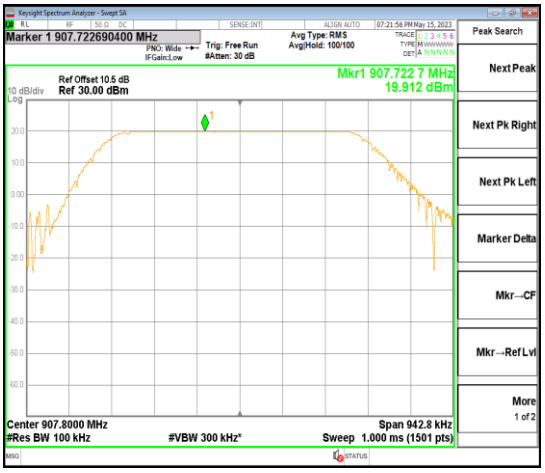
Reference Level of PSD in 100kHz



Band Edge

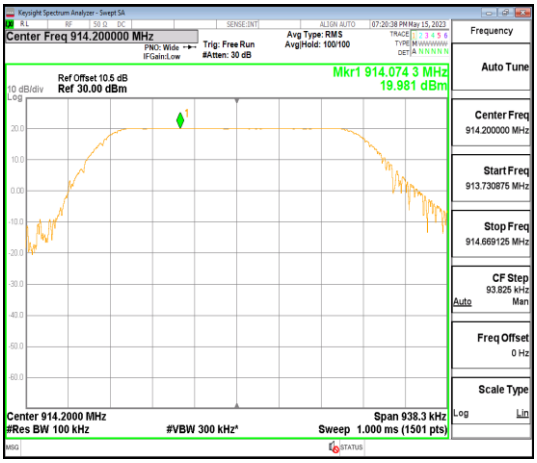


Spurious Emission 30MHz-25GHz

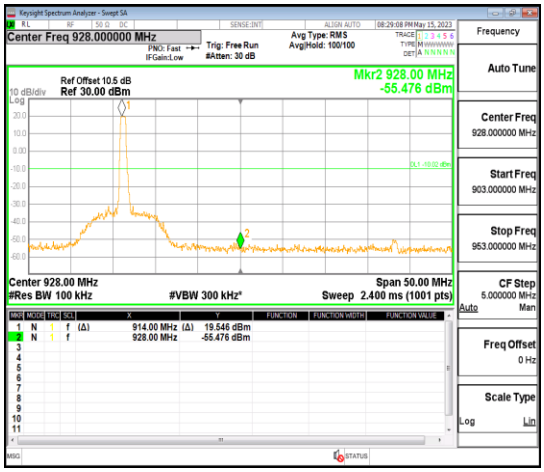
LoRa-500kHz Mid CH	
Reference Level of PSD in 100kHz	**Spurious Emission 30MHz-25GHz**
	

LoRa-500kHz High CH

Reference Level of PSD in 100kHz



Band Edge



Spurious Emission 30MHz-25GHz

4.6 RADIATION BANDEDGE AND SPURIOUS EMISSION

4.6.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Remark:
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

4.6.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.

3. Span shall wide enough to full capture the emission measured. The SA from 9KHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

Remark:
1. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

4. The SA setting following：

(1) Below 1G：RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2) Above 1G：

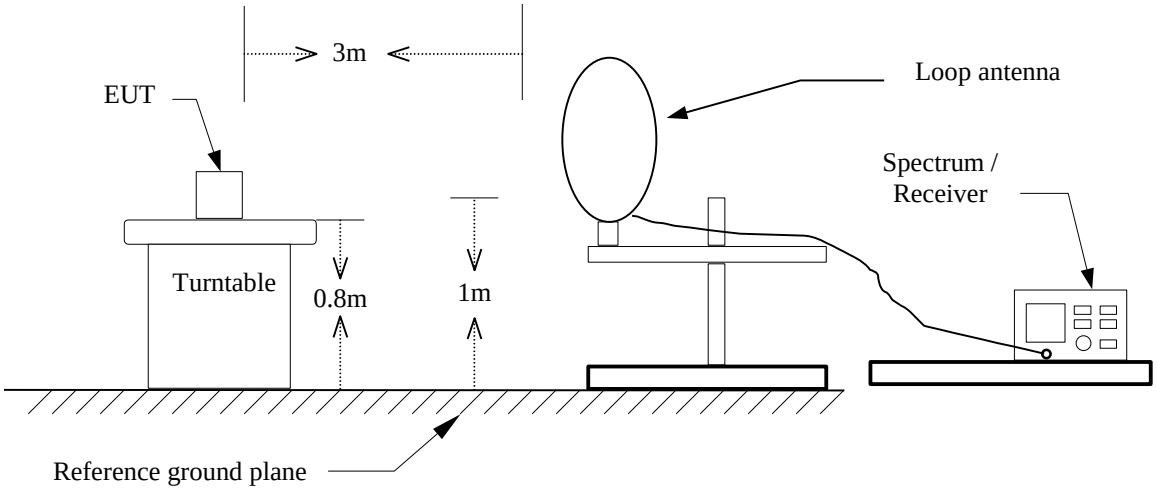
(2.1) For Peak measurement：RBW = 1MHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2.2) For Average measurement：RBW = 1MHz, VBW

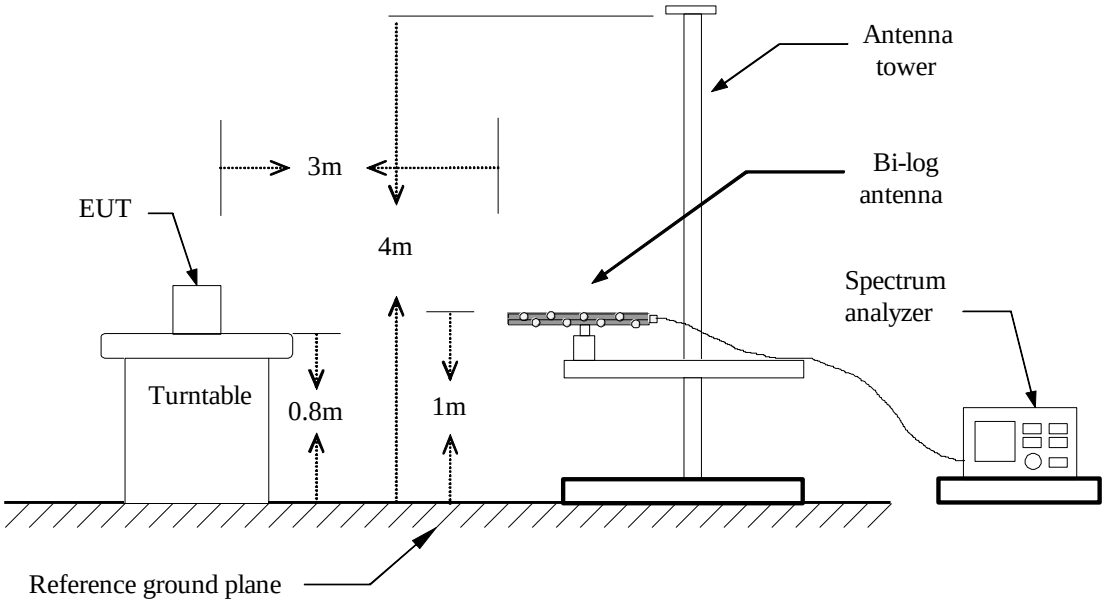
- If Duty Cycle ≥ 98%, VBW=10Hz.
- If Duty Cycle < 98%, VBW=1/T.

4.6.3 Test Setup

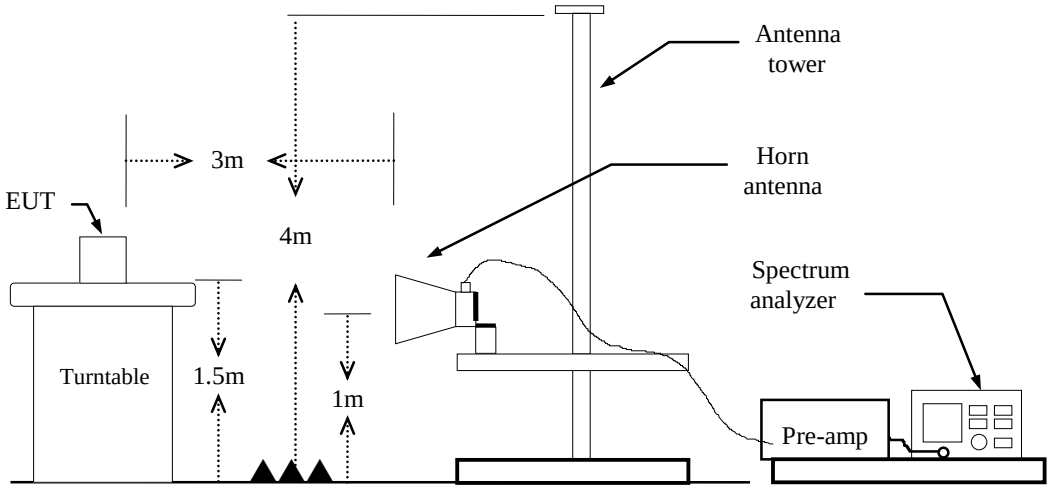
9kHz ~ 30MHz



30MHz ~ 1GHz



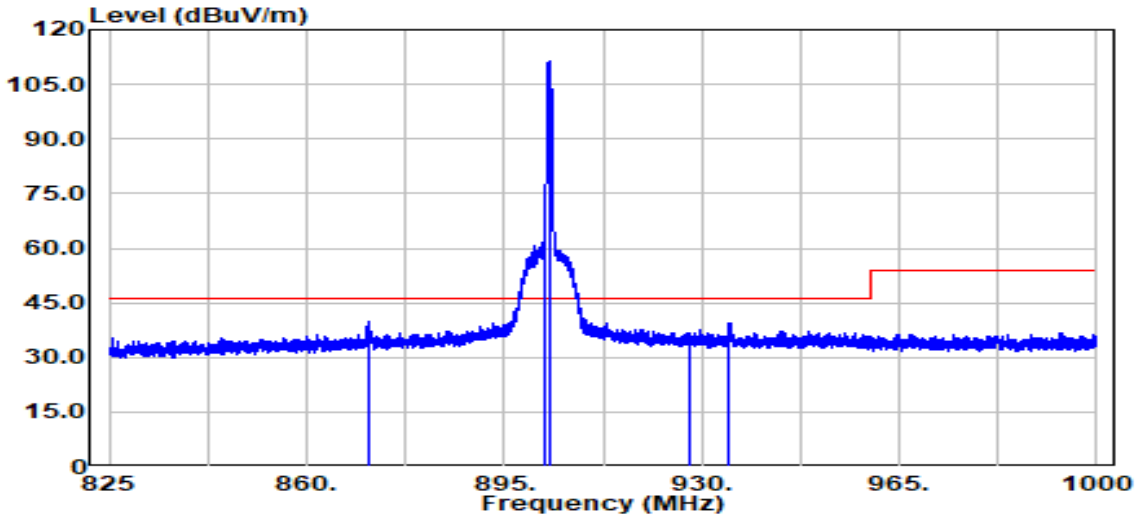
Above 1 GHz



4.6.4 Test Result

Band Edge Test Data

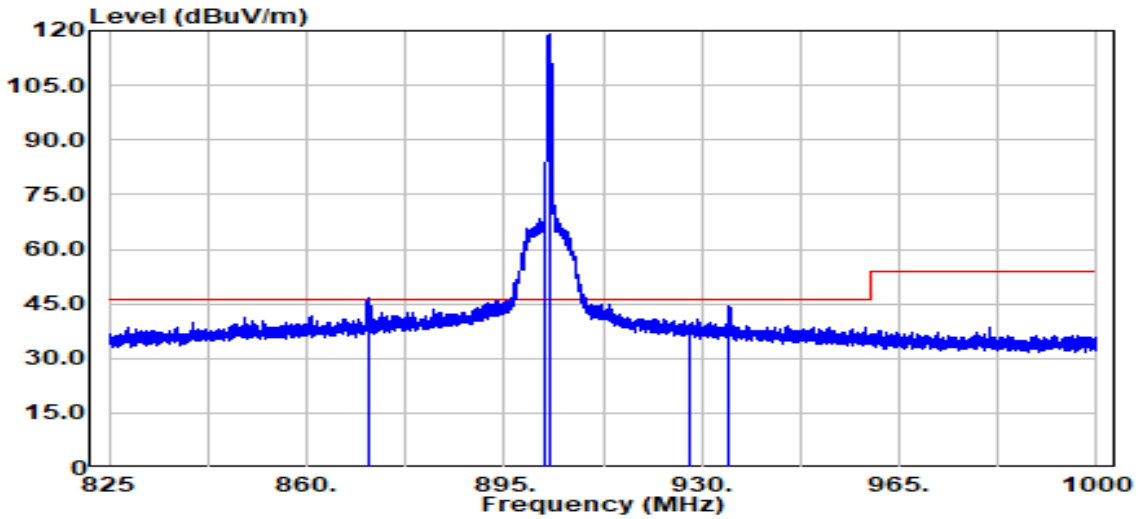
Test Mode	Low CH 903 MHz	Temp/Hum	25.5(℃) / 54%RH
Test Item	Band Edge	Test Date	May 22, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak / Average		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
871.11	Peak	40.88	-1.24	39.64	81.77[1]	-42.13
902.00	QP	57.73	-0.84	56.89	80.47[1]	-23.58
902.00	Peak	60.33	-0.84	59.50	81.77[1]	-22.27
903.00	QP	111.30	-0.83	110.47	--	--
903.00	Peak	112.60	-0.83	111.77	--	--
903.00	Average	103.90	-0.83	103.07	--	--
928.01	Peak	34.13	-0.19	33.94	81.77[1]	-47.83
934.83	Peak	39.58	-0.01	39.57	81.77[1]	-42.20

Remark:
1. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

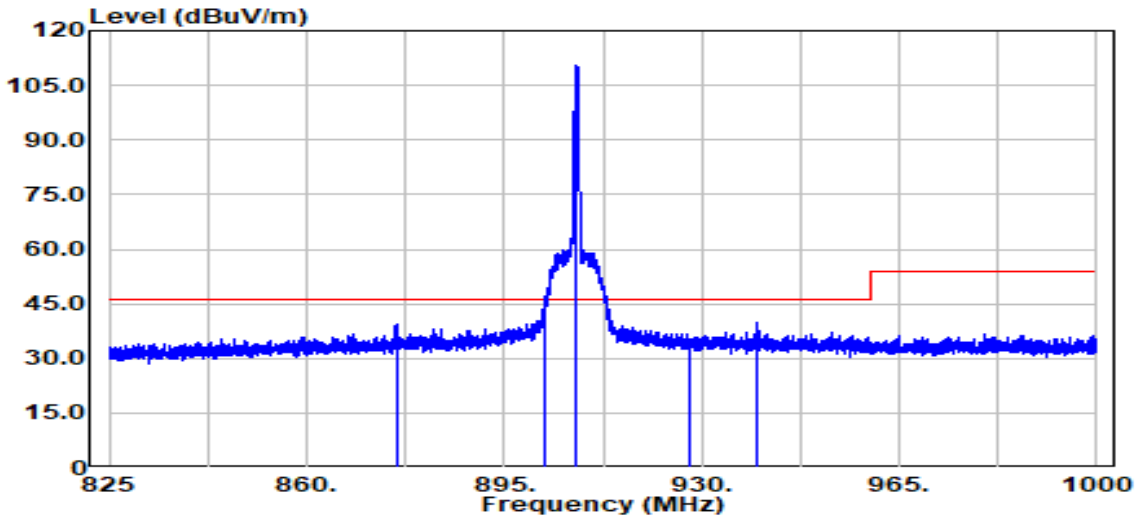
Test Mode	Low CH 904 MHz	Temp/Hum	25.5(℃) / 54%RH
Test Item	Band Edge	Test Date	May 22, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak / Average		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
870.82	QP	42.60	-1.24	41.36	87.97[1]	-46.61
870.82	Peak	47.98	-1.24	46.74	89.37[1]	-42.63
902.00	QP	62.80	-0.84	61.96	87.97[1]	-26.01
902.00	Peak	68.22	-0.84	67.38	89.37[1]	-21.99
903.00	QP	118.80	-0.83	117.97	--	--
903.00	Peak	120.20	-0.83	119.37	--	--
903.00	Average	111.40	-0.83	110.57	--	--
928.00	Peak	38.28	-0.19	38.09	89.37[1]	-51.28
934.88	Peak	44.49	-0.01	44.48	89.37[1]	-44.89

Remark:
1. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

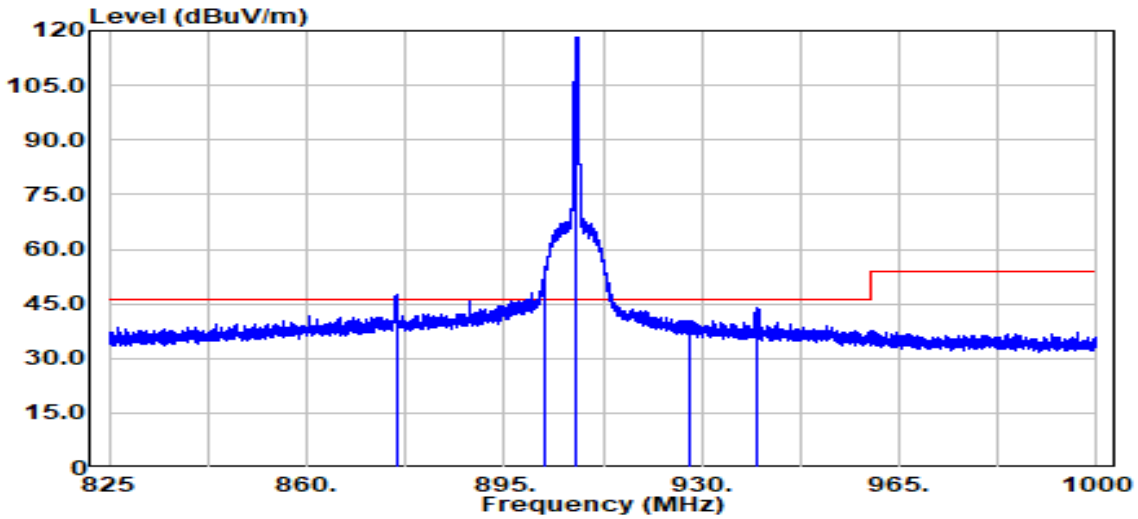
Test Mode	Mid CH 907.8 MHz	Temp/Hum	25.5(℃) / 54%RH
Test Item	Band Edge	Test Date	May 22, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak / Average		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
875.96	Peak	40.55	-1.20	39.35	81.06[1]	-41.71
902.00	Peak	43.88	-0.84	43.04	81.06[1]	-38.02
907.80	QP	110.40	-0.74	109.66	--	--
907.80	Peak	111.80	-0.74	111.06	--	--
907.80	Average	103.00	-0.74	102.26	--	--
928.00	Peak	33.13	-0.19	32.94	81.06[1]	-48.12
939.89	Peak	39.64	0.15	39.79	81.06[1]	-41.27

Remark:
1. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

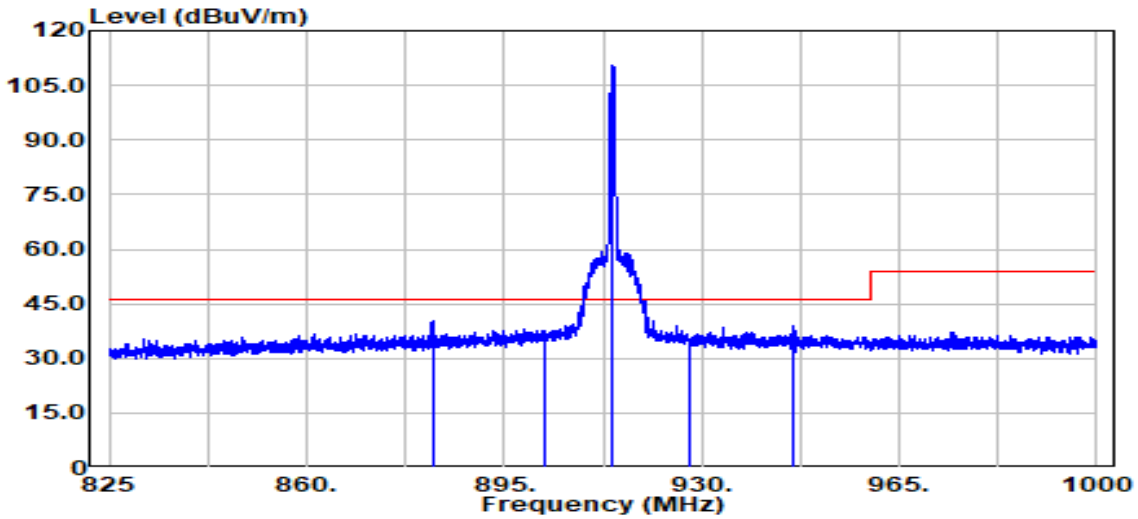
Test Mode	Mid CH 907.8 MHz	Temp/Hum	25.5(℃) / 54%RH
Test Item	Band Edge	Test Date	May 22, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak / Average		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
876.01	QP	44.87	-1.20	43.67	87.46[1]	-43.79
876.01	Peak	48.74	-1.20	47.55	88.86[1]	-41.31
902.00	QP	48.90	-0.84	48.06	87.46[1]	-39.40
902.00	Peak	52.64	-0.84	51.80	88.86[1]	-37.06
907.80	QP	118.20	-0.74	117.46	--	--
907.80	Peak	119.60	-0.74	118.86	--	--
907.80	Average	110.90	-0.74	110.16	--	--
928.01	Peak	39.02	-0.19	38.83	88.86[1]	-50.03
939.78	Peak	43.91	0.14	44.05	88.86[1]	-44.81

Remark:
1. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

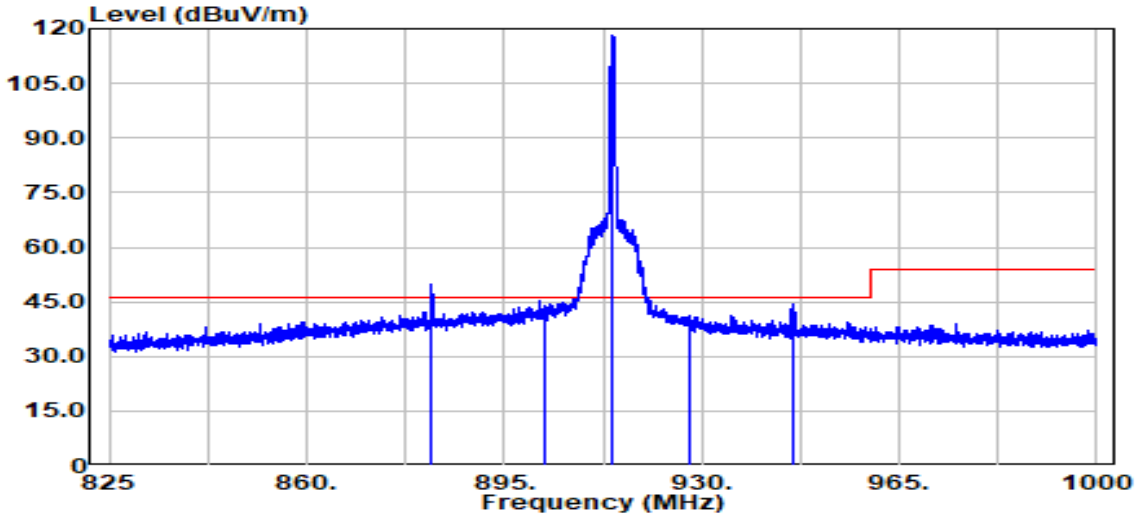
Test Mode	High CH 914.2 MHz	Temp/Hum	25.5(℃) / 54%RH
Test Item	Band Edge	Test Date	May 22, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak / Average		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
882.44	Peak	41.37	-1.16	40.21	81.06[1]	-40.85
902.00	Peak	38.30	-0.84	37.46	81.06[1]	-43.60
914.20	QP	110.30	-0.64	109.66	--	--
914.20	Peak	111.70	-0.64	111.06	--	--
914.20	Average	102.90	-0.64	102.26	--	--
927.99	Peak	34.94	-0.19	34.75	81.06[1]	-46.31
946.18	Peak	38.65	0.23	38.88	81.06[1]	-42.18

Remark:
1. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Test Mode	High CH 914.2 MHz	Temp/Hum	25.5(℃) / 54%RH
Test Item	Band Edge	Test Date	May 22, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak / Average		

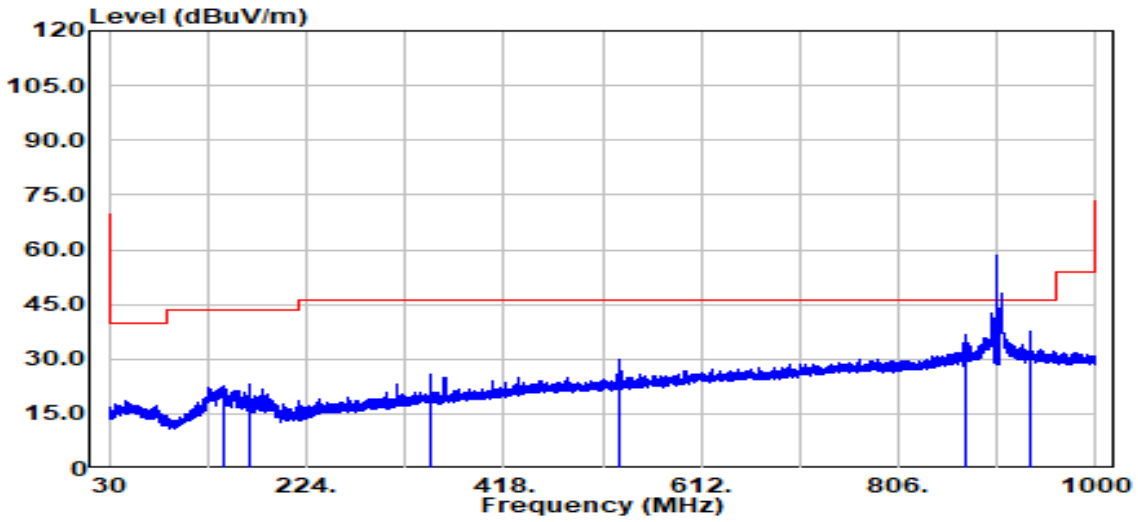


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
882.20	QP	47.44	-1.16	46.28	87.36[1]	-41.08
882.20	Peak	51.28	-1.16	50.12	88.76[1]	-38.64
902.00	Peak	41.62	-0.84	40.78	88.76[1]	-47.98
914.20	QP	118.00	-0.64	117.36	--	--
914.20	Peak	119.40	-0.64	118.76	--	--
914.20	Average	112.24	-0.64	111.61	--	--
927.99	Peak	38.75	-0.19	38.55	88.76[1]	-50.21
946.02	Peak	44.02	0.23	44.24	88.76[1]	-44.52

Remark:
1. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Below 1G Test Data

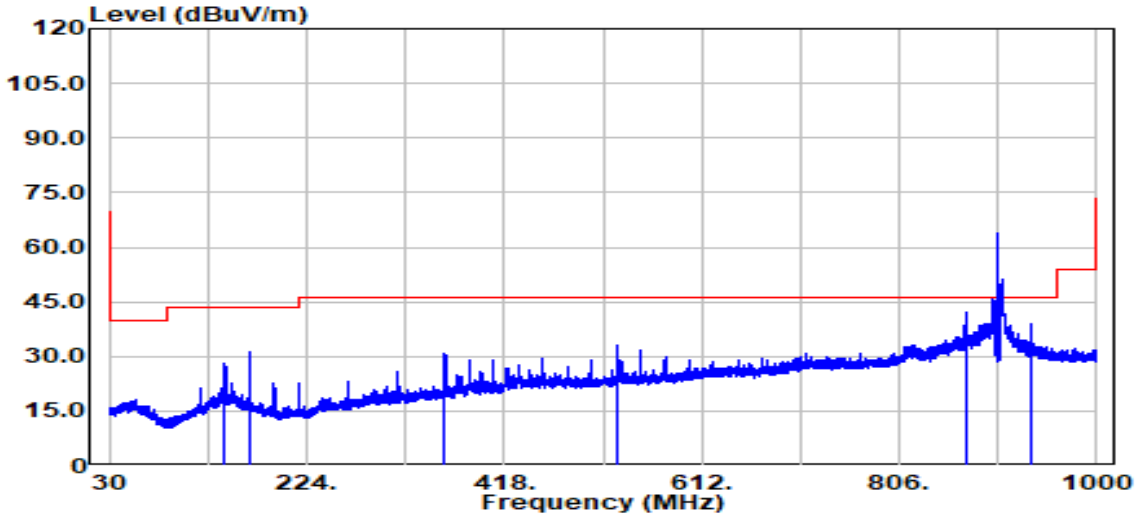
Test Mode:	LoRa-500kHz	Temp/Hum	23.2(℃) / 63%RH
Test Item	30MHz-1GHz	Test Date	May 24, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
142.52	Peak	36.03	-13.35	22.68	43.50	-20.82
168.03	Peak	36.53	-13.33	23.20	43.50	-20.30
345.64	Peak	36.79	-11.18	25.61	46.00	-20.39
532.75	Peak	36.52	-6.85	29.67	46.00	-16.33
870.89	Peak	38.10	-1.24	36.85	46.00	-9.15
934.91	Peak	37.48	-0.01	37.47	46.00	-8.53

Note: No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

Test Mode:	LoRa-500kHz	Temp/Hum	23.2(℃) / 63%RH
Test Item	30MHz-1GHz	Test Date	May 24, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak		

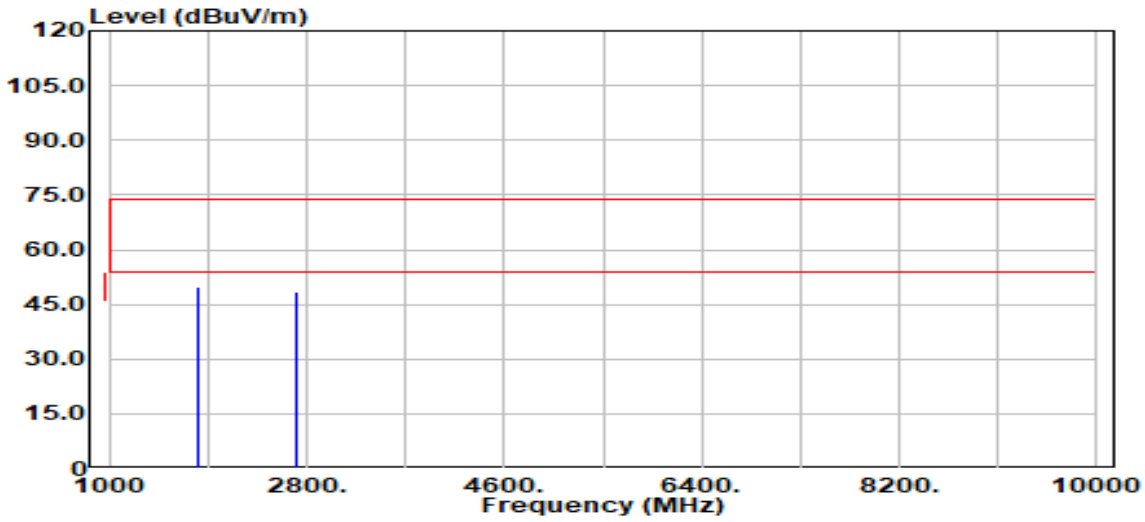


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
143.98	Peak	41.12	-13.18	27.93	43.50	-15.57
167.93	Peak	44.40	-13.32	31.08	43.50	-12.42
359.99	Peak	42.04	-11.10	30.94	46.00	-15.06
528.00	Peak	40.10	-7.01	33.09	46.00	-12.91
871.09	Peak	43.49	-1.24	42.25	46.00	-3.75
935.20	Peak	38.99	0.00	38.99	46.00	-7.01

Note: No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

Above 1G Test Data

Test Mode:	Low CH	Temp/Hum	25.5(℃) / 54%RH
Test Item	Harmonic	Test Date	May 22, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak / Average		

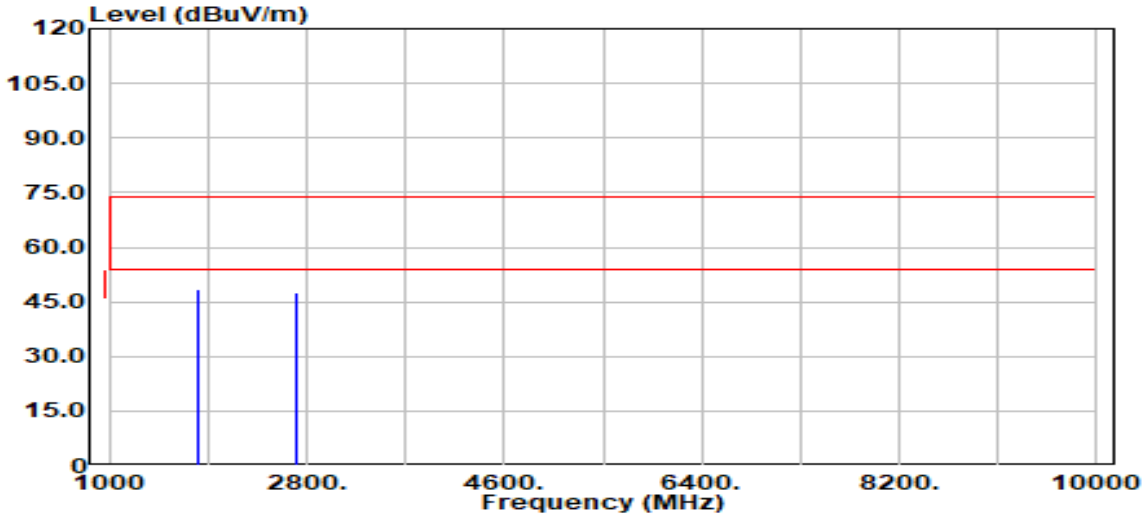


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
1806.00	Peak	56.98	-7.34	49.65	81.77[2]	-32.13
1806.00	Average	53.61	-7.34	46.27	73.07[2]	-26.80
2709.00	Peak	52.89	-4.41	48.48	74.00	-25.52
2709.00	Average	47.29	-4.41	42.88	54.00	-11.12

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Test Mode:	Low CH	Temp/Hum	25.5(℃) / 54%RH
Test Item	Harmonic	Test Date	May 22, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak / Average		

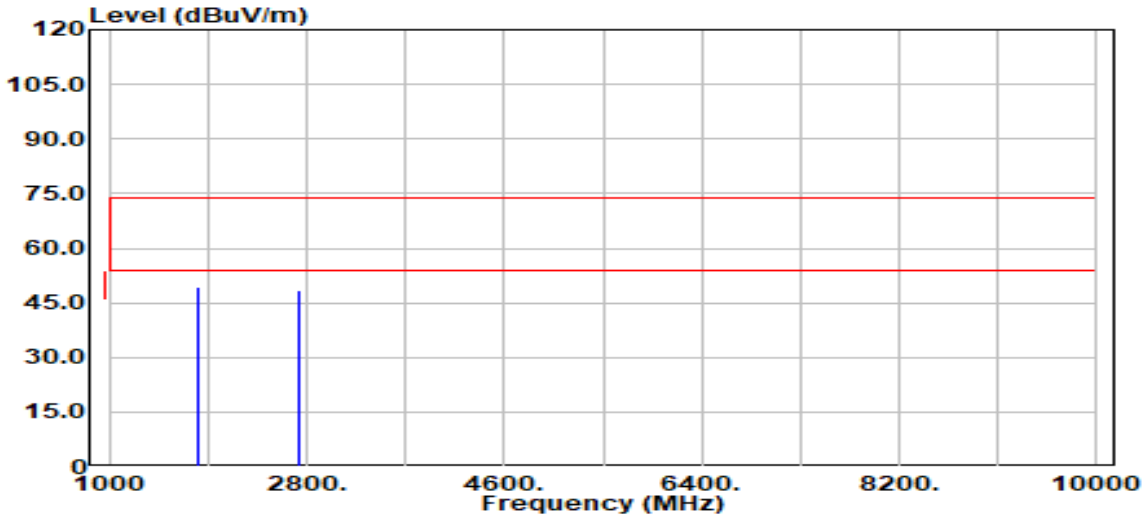


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
1806.00	Peak	55.68	-7.34	48.35	89.37[2]	-41.02
1806.00	Average	52.16	-7.34	44.83	80.57[2]	-35.74
2709.00	Peak	51.95	-4.41	47.54	74.00	-26.46
2709.00	Average	45.45	-4.41	41.04	54.00	-12.96

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Test Mode:	Mid CH	Temp/Hum	25.5(℃) / 54%RH
Test Item	Harmonic	Test Date	May 22, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak / Average		

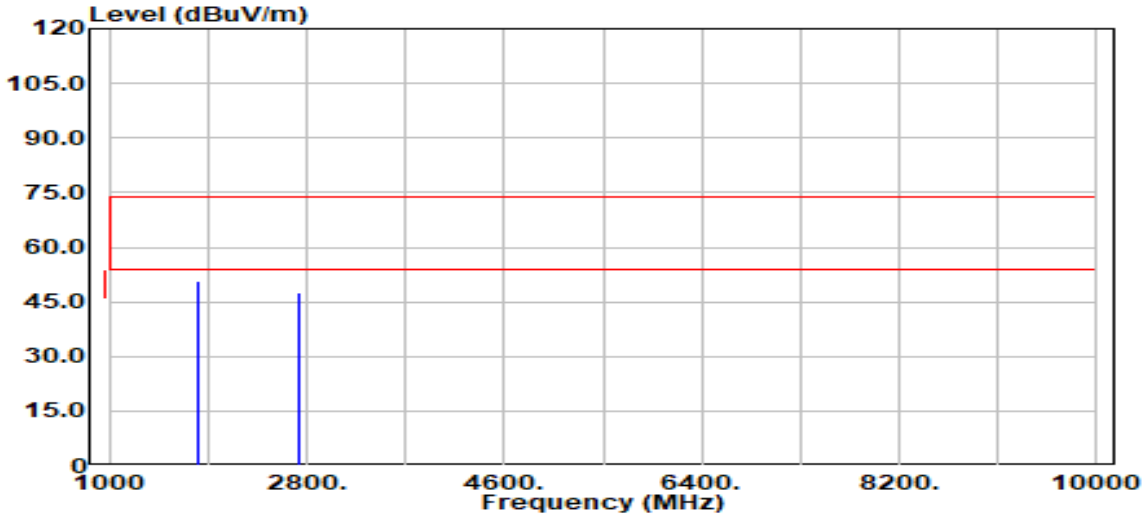


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
1815.60	Peak	56.87	-7.31	49.56	81.06[2]	-31.50
1815.60	Average	53.63	-7.31	46.33	72.26[2]	-25.93
2723.40	Peak	52.68	-4.36	48.32	74.00	-25.68
2723.40	Average	47.09	-4.36	42.73	54.00	-11.27

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Test Mode:	Mid CH	Temp/Hum	25.5(℃) / 54%RH
Test Item	Harmonic	Test Date	May 22, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak / Average		

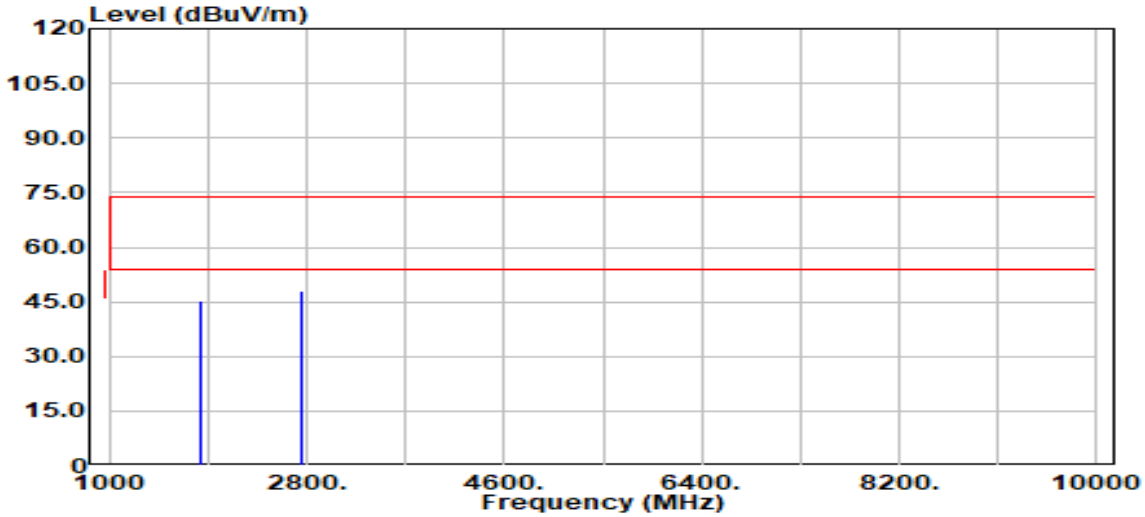


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
1815.60	Peak	58.13	-7.31	50.83	88.86[2]	-38.03
1815.60	Average	55.12	-7.31	47.82	80.16[2]	-32.34
2723.40	Peak	51.72	-4.36	47.37	74.00	-26.63
2723.40	Average	45.56	-4.36	41.21	54.00	-12.79

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Test Mode:	High CH	Temp/Hum	25.5(℃) / 54%RH
Test Item	Harmonic	Test Date	May 22, 2023
Polarize	Vertical	Test Engineer	Czerny Lin
Detector	Peak / Average		

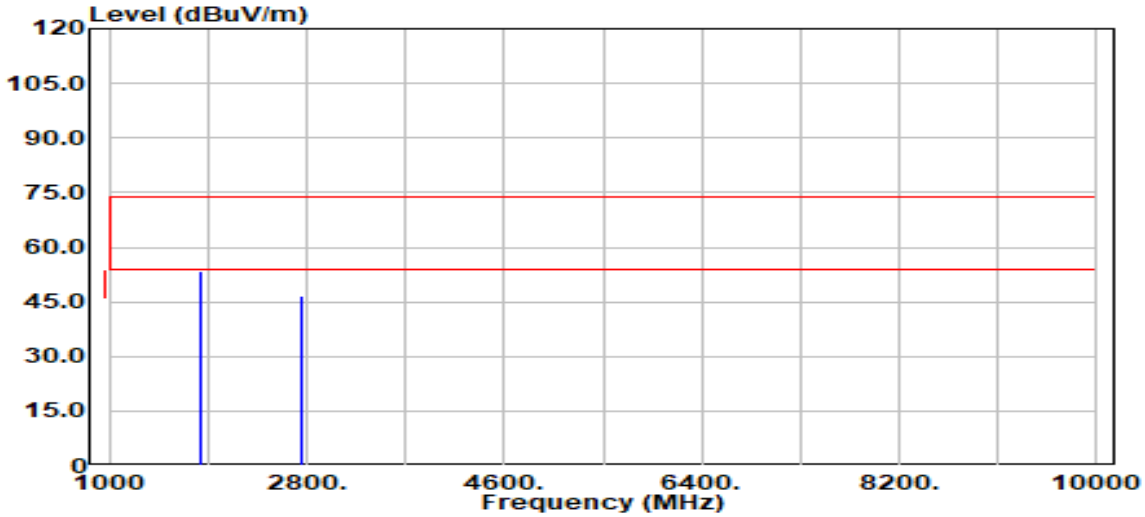


Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
1828.40	Peak	52.68	-7.32	45.36	81.06[2]	-35.70
1828.40	Average	48.41	-7.32	41.10	72.26[2]	-31.16
2742.60	Peak	52.23	-4.17	48.06	74.00	-25.94
2742.60	Average	45.92	-4.17	41.75	54.00	-12.25

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

Test Mode:	High CH	Temp/Hum	25.5(℃) / 54%RH
Test Item	Harmonic	Test Date	May 22, 2023
Polarize	Horizontal	Test Engineer	Czerny Lin
Detector	Peak / Average		



Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
1828.40	Peak	60.88	-7.32	53.56	88.76[2]	-35.20
1828.40	Average	58.12	-7.32	50.80	81.61[2]	-30.81
2742.60	Peak	50.91	-4.17	46.74	74.00	-27.26
2742.60	Average	44.35	-4.17	40.18	54.00	-13.82

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. The limit is fundamental signal – 30 dB since the frequency of the unwanted emission was not in restricted band.

--End of Test Report--