

FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Ridge X-ray Flat Panel Detector

**Model No.: Ridge F17C, Ridge V14C, Ridge V17C, Ridge F14C,
Ridge F14G, Ridge F17G**

Trade Name: INCX

Issued to

**InnoCare Optoelectronics Corp
Rm. B, No. 2, Sec. 2, Huanxi Rd., Southern Taiwan Science Park,
Xinshi Dist., Tainan, 741 Taiwan**

Issued by

**Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan.
Issued Date: November 30, 2022**

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 30, 2022	Initial Issue	ALL	Doris Chu

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Report No.: TMWK2209003824KR

1. TEST RESULT CERTIFICATION

Applicant: InnoCare Optoelectronics Corp
Rm. B, No. 2, Sec. 2, Huanxi Rd., Southern Taiwan Science
Park, Xinshi Dist., Tainan, 741 Taiwan

Manufacturer: InnoCare Optoelectronics Corp
Rm. B, No. 2, Sec. 2, Huanxi Rd., Southern Taiwan Science
Park, Xinshi Dist., Tainan City 741, Taiwan, R.O.C.

Equipment Under Test: Ridge X-ray Flat Panel Detector

Trade Name: INCX

Model No.: Ridge F17C, Ridge V14C, Ridge V17C, Ridge F14C,
Ridge F14G, Ridge F17G

Date of Test: October 7 ~ 17, 2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	Compliance
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.225.

The test results of this report relate only to the tested sample identified in this report.

Approved by:



Shawn Wu
Supervisor
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Ridge X-ray Flat Panel Detector					
Model No.	Ridge F17C, Ridge V14C, Ridge V17C, Ridge F14C, Ridge F14G, Ridge F17G					
Model Discrepancy	Model		PCBA X-Board	ROIC	Scintillator	Other
	Main	Ridge F17C	different size	17	CsI	Marketing Differences
	Series	Ridge V14C		14	CsI	
		Ridge V17C		17	CsI	
		Ridge F14C		14	CsI	
		Ridge F14G		14	GOS	
		Ridge F17G		17	GOS	
Trade	INCX					
Received Date	September 23, 2022					
Power Supply	1. Power from Power Adapter. Mean well / GSM60A24-P1L I/P: 100-240VAC, 1.4-0.7A, 50-60Hz O/P: 24VDC, 2.5A, 60W MAX. 2. Power from Battery. 11.4VDC, 4231mAh or 4129mAh/48Wh					
Frequency Range	13.56MHz					
Modulation Technique	ASK					
Number of Channels	1 Channel					
Antenna Requirement	PCB Antenna					
HW Version	V06					
SW Version	V81.36					

Remark:

- For more details, refer to the User's manual of the EUT.
- Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
- Disclaimer: The variant trademarks are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.225.

The tests documented in this report were performed in accordance with IC RSS-210, IC RSS-Gen, and ANSI C63.10: 2013

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.3 DESCRIPTION OF TEST MODES

The EUT had been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

All modes and data rates were investigated and it was determined that ISO 14443A/B and ISO 18092 Type y, 106/212/424/848 kbps.

All data rates were investigated and it was determined that 106 Kbps was considered worst-case. Therefore, all testing was performed in 106 Kbps mode.

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT power by Adapter (14 inch) Mode 2: EUT power by Adapter (17 inch)
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Adapter (14 inch) Mode 2: EUT power by Adapter (17 inch)
Worst Mode	<input type="checkbox"/> Mode 1 <input checked="" type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> 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(X-Plane) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

4. TEST SUMMARY

FCC Standard Sec.	Chapter	Test Item	Result
15.203	2	Antenna Requirement	Pass
15.215	8.1	Occupied Bandwidth (99%) and 20dB Bandwidth	Pass
15.209	8.2	Radiated Emissions	Pass
15.225	8.3	Frequency Stability	Pass
15.207	8.4	AC Power-line Conducted Emission	Pass

5. INSTRUMENT CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EXA Signal Analyzer	KEYSIGHT	N9010B	MY60242460	2022-01-30	2023-01-29
Thermostatic/Humidity Chamber	GWINSTEK	GTC-288MH-CC	TH160402	2022-05-20	2023-05-19
Loop Probe	LANGER EMV-TECHNIK	RF-R 50-1	02-2644	2022-01-24	2023-01-23
Software	N/A				

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2022-08-03	2023-08-02
Spectrum Analyzer	Agilent	E4446A	MY46180323	2021-12-06	2022-12-05
Thermo-Hygro Meter	WISEWIND	1206	D07	2021-12-28	2022-12-27
Loop Antenna	COM-POWER	AL-130	121051	2022-04-13	2023-04-12
Preamplifier	EMEC	EM330	060609	2022-02-23	2023-02-22
Cable	Huber+Suhner	104PEA	20995+11112+182330	2022-02-23	2023-02-22
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180419c				

AC Conducted Emissions Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
CABLE	EMCI	CFD300-NL	CERF	2022-06-27	2023-06-26
EMI Test Receiver	R&S	ESCI	100064	2022-06-17	2023-06-16
LISN	SCHAFFNER	NNB 41	03/10013	2022-02-15	2023-02-14
Software	EZ-EMC(CCS-3A1-CE-WUGU)				

Remark:

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

5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.1183
Channel Bandwidth	± 2.1863
Frequency Stability	± 2.0730
Radiated Emission_9kHz-30MHz	± 3.814
Radiated Emission_30MHz-200MHz	± 4.272
Radiated Emission_200MHz-1GHz	± 4.619

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5.4 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	Jack Chen	-
Radiation	Ray Li	-
RF Conducted	David Li	-

Remark: 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. :444940, the FCC Designation No.:TW1309

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix A for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

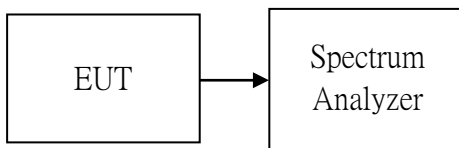
No.	Device Type	Brand	Model	Series No.	FCC ID
1	NB(C)	Lenovo	T470	N/A	N/A

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7. FCC PART 15.225 REQUIREMENTS

7.1 OCCUPIED BANDWIDTH(99%) AND 20 dB BANDWIDTH TEST CONFIGURATION



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW & VBW (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth (VBW) shall not be smaller than three times the RBW value.
4. Record the max. reading.

TEST RESULTS

No non-compliance noted.

Temperature: 25.5°C

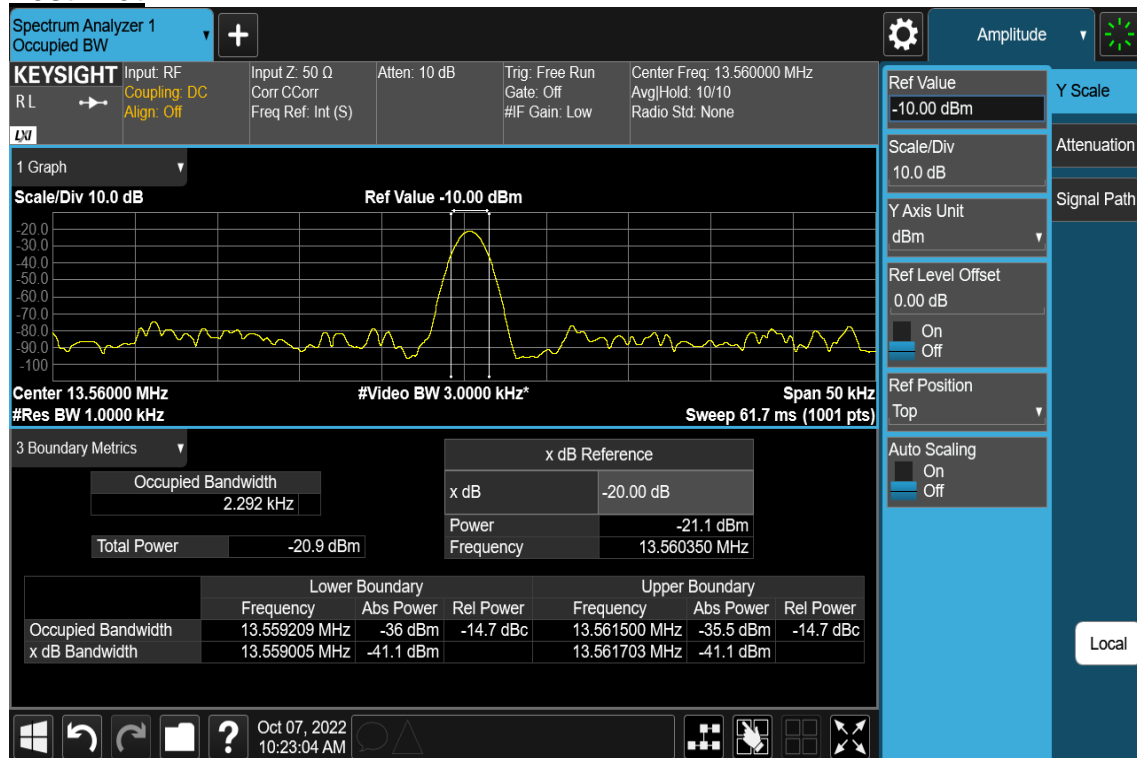
Humidity: 53% RH

Tested by: David Li

Test Date: October 7, 2022

Test Condition	Frequency(MHz)	Occupied Bandwidth 99% (kHz)	20 dB Bandwidth (kHz)
NFC	13.56	2.292	2.698

Test Plot



7.2 FUNDAMENTAL AND RADIATED EMISSIONS

LIMIT

According to §15.225

- (a) The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts / meter at 30 meters.
- (b) Within the bands 13.410 – 13.553 MHz and 13.567 -13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts / meter at 30 meters.
- (c) Within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz the field strength of any emissions shall not exceed 106 microvolts / meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110 – 14.010 MHz and shall not exceed the general radiated emission limits in §15.209.

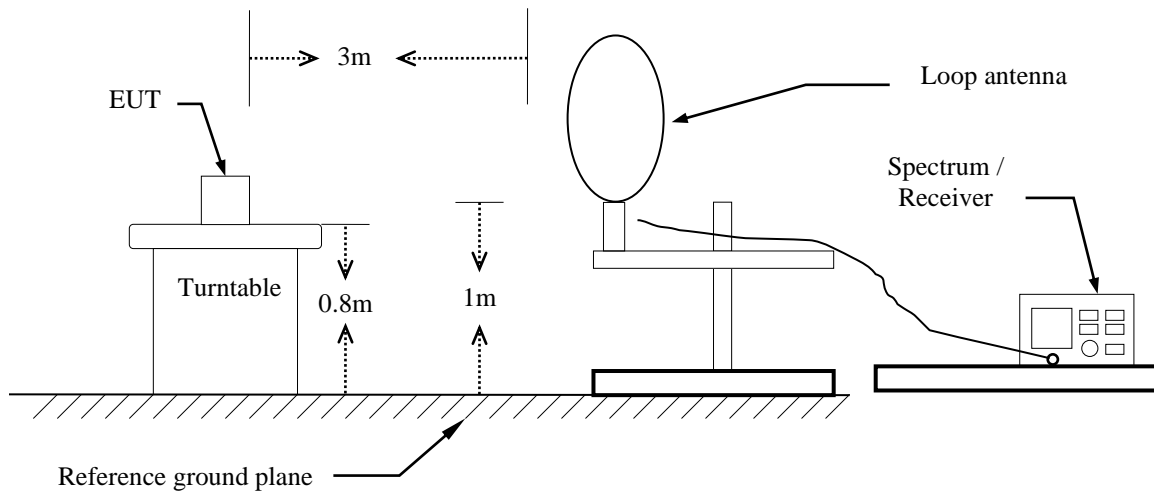
According to §15.225, except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m at meter)	Measurement Distance (meter)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

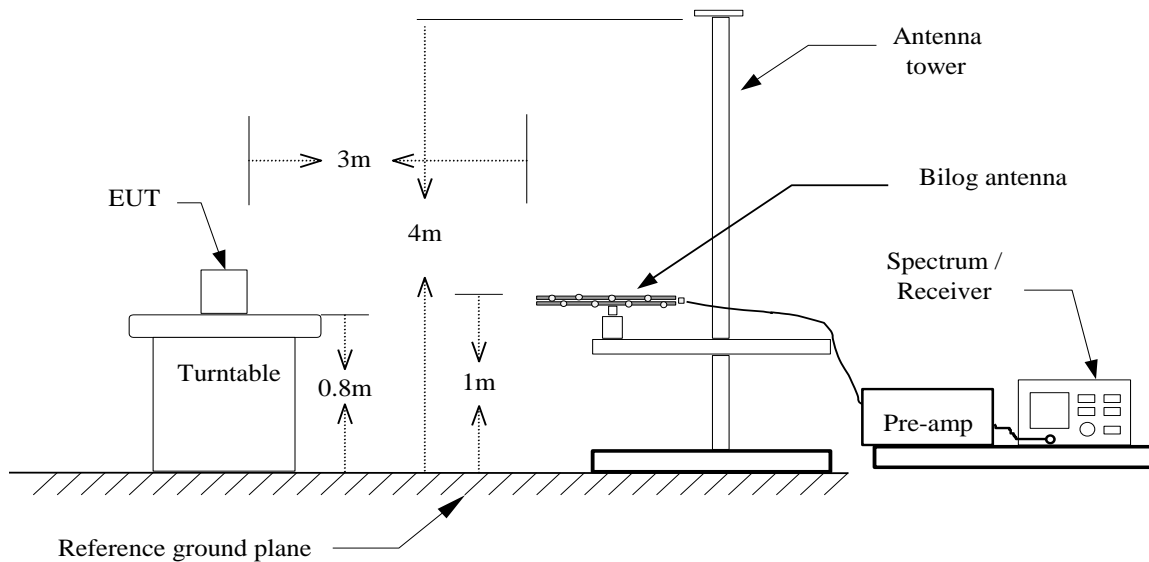
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Test Configuration

9kHz ~ 30MHz



30MHz ~ 1GHz



TEST PROCEDURE

For 9kHz ~ 30MHz

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, The center of the loop shall be 1 m above the ground then to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Set the spectrum analyzer in the following setting as:
9KHz-490KHz : RBW=200Hz / VBW=1kHz / Sweep=AUTO
490KHz-30MHz : RBW=10kHz / VBW=30kHz / Sweep=AUTO
6. Repeat above procedures until the measurements for all frequencies are complete.

For 30MHz ~ 1GHz

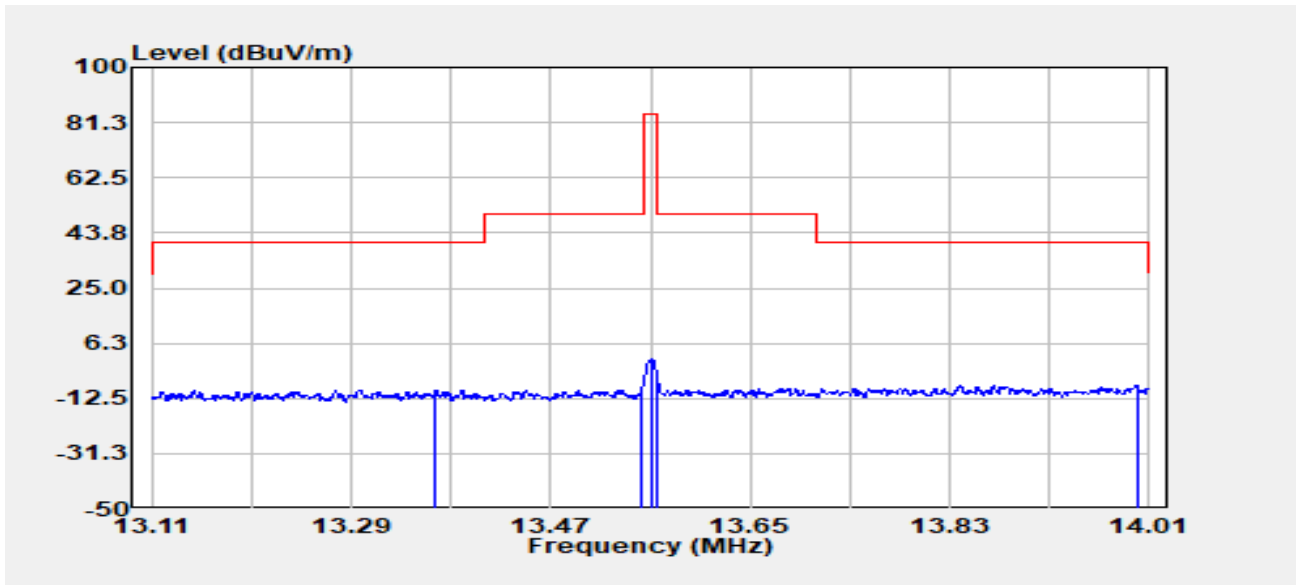
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

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.

Mode 2

Operation Mode: TX mode **Test Date:** October 11, 2022
Temperature: 23.4°C **Tested by:** Ray Li
Humidity: 63 % RH **Polarity:** Hor.

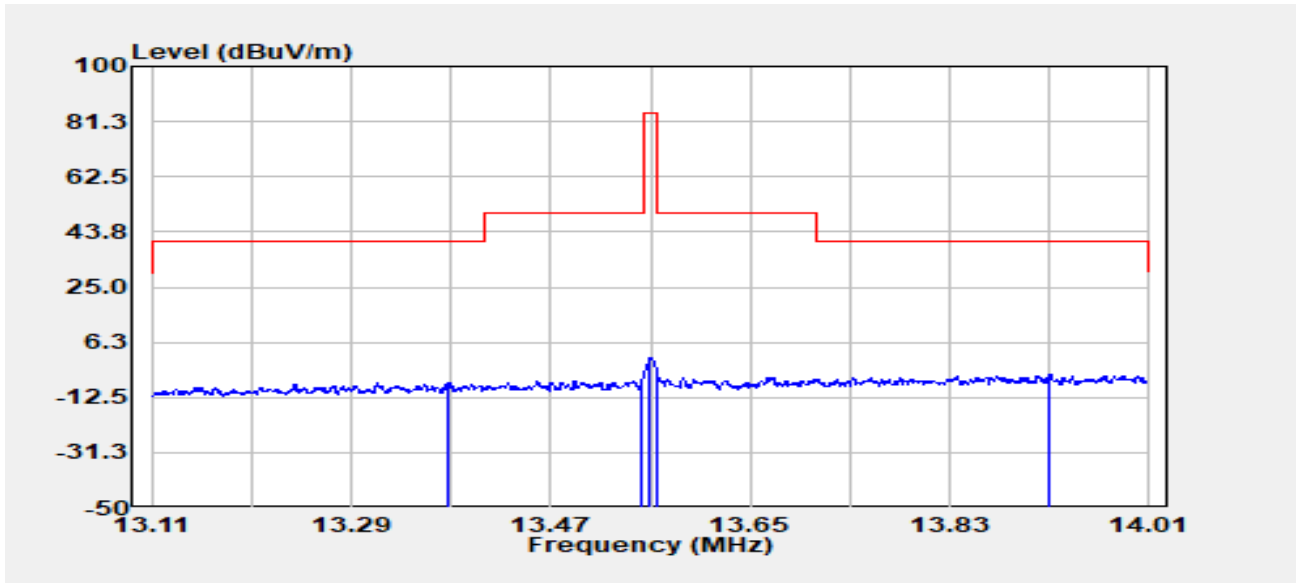


No.	Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
1	13.37	Peak	15.27	-24.85	-9.58	40.51	-50.09
2	13.55	Peak	16.01	-24.85	-8.84	50.47	-59.31
3	13.56	Peak	25.64	-24.85	0.79	84.00	-83.21
4	13.57	Peak	18.34	-24.85	-6.51	50.47	-56.98
5	14.00	Peak	16.99	-24.84	-7.85	40.51	-48.36

Remark:

1. Radiated emissions measured were made with an instrument using peak/quasi-peak/average detector mode.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).
4. 9kHz to 490kHz Limit(@3m) = 2400(F/kHz)+ 40*Log (300 meters/3 meters)
 490kHz to 1.705MHz Limit (@3m) = 2400(F/kHz)+ 40*Log (30 meters/3 meters)
 1.705MHz to 30MHz Limit (@3m) = 30 + 40*Log (30 meters/3 meters)

Operation Mode:	TX mode	Test Date:	October 11, 2022
Temperature:	23.4°C	Tested by:	Ray Li
Humidity:	63 % RH	Polarity:	Ver.

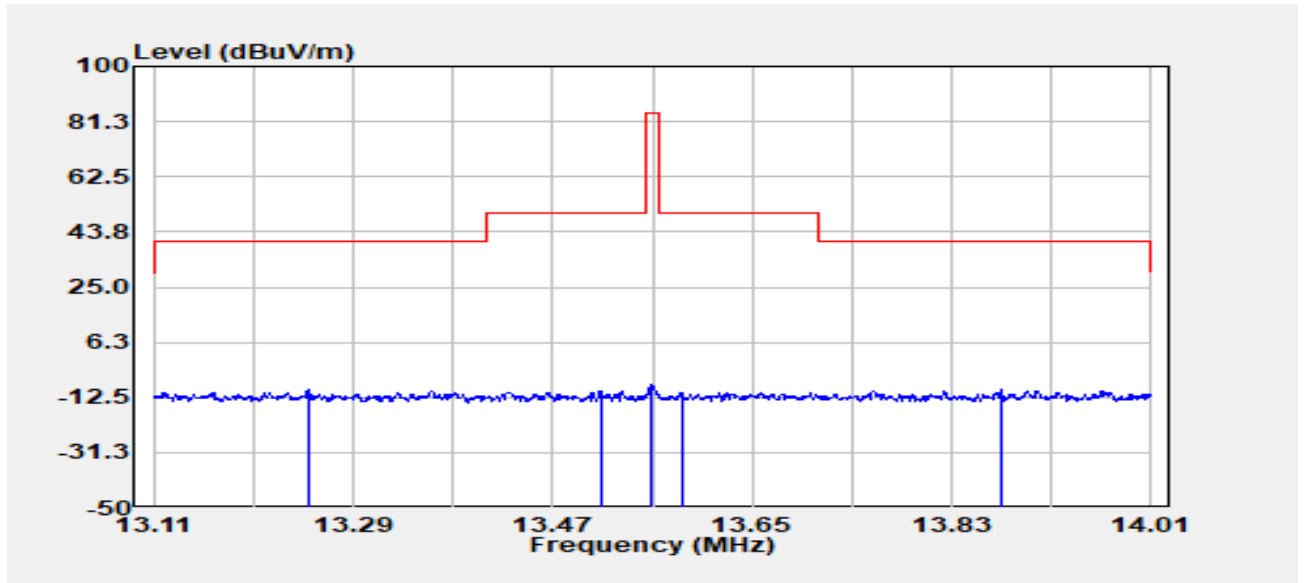


No.	Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
1	13.38	Peak	17.53	-24.85	-7.33	40.51	-47.83
2	13.55	Peak	18.41	-24.85	-6.44	50.47	-56.91
3	13.56	Peak	25.98	-24.85	1.13	84.00	-82.87
4	13.57	Peak	19.48	-24.85	-5.37	50.47	-55.84
5	13.92	Peak	20.18	-24.84	-4.66	40.51	-45.16

Remark:

1. Radiated emissions measured were made with an instrument using peak/quasi-peak/average detector mode.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).
4. 9kHz to 490kHz Limit(@3m) = 2400(F/kHz)+ 40*Log (300 meters/3 meters)
 490kHz to 1.705MHz Limit (@3m) = 2400(F/kHz)+ 40*Log (30 meters/3 meters)
 1.705MHz to 30MHz Limit (@3m) = 30 + 40*Log (30 meters/3 meters)

Operation Mode:	TX mode	Test Date:	October 11, 2022
Temperature:	23.4°C	Tested by:	Ray Li
Humidity:	63 % RH	Polarity:	Ground



No.	Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
1	13.25	Peak	14.86	-24.86	-9.99	40.51	-50.50
2	13.51	Peak	14.49	-24.85	-10.36	50.47	-60.83
3	13.56	Peak	16.73	-24.85	-8.12	84.00	-92.12
4	13.59	Peak	14.04	-24.85	-10.81	50.47	-61.28
5	13.87	Peak	14.76	-24.84	-10.09	40.51	-50.59

Remark:

5. Radiated emissions measured were made with an instrument using peak/quasi-peak/average detector mode.
6. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
7. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).
8. 9kHz to 490kHz Limit (@3m) = 2400(F/kHz)+ 40*Log (300 meters/3 meters)
 490kHz to 1.705MHz Limit (@3m) = 2400(F/kHz)+ 40*Log (30 meters/3 meters)
 1.705MHz to 30MHz Limit (@3m) = 30 + 40*Log (30 meters/3 meters)

Mode 2

9kHz ~ 30MHz

Operation Mode: TX mode

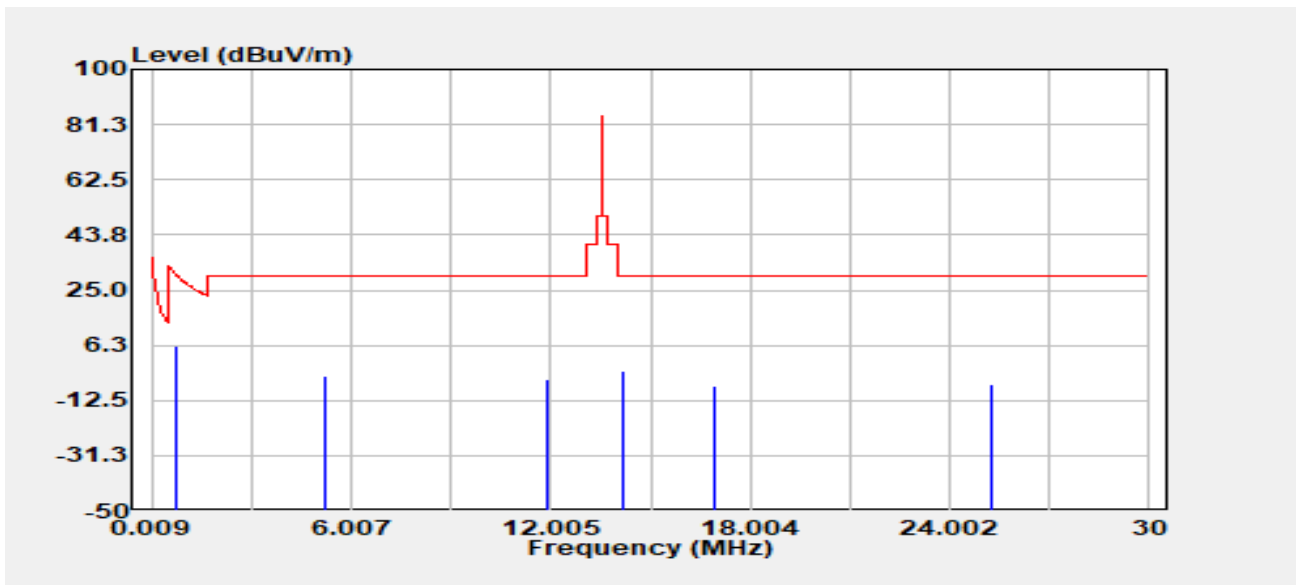
Test Date: October 11, 2022

Temperature: 23.4°C

Tested by: Ray Li

Humidity: 63 % RH

Polarity: Ver.



No.	Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
1	0.73	Peak	32.34	-26.46	5.88	30.35	-24.47
2	5.20	Peak	21.83	-25.80	-3.97	29.54	-33.51
3	11.90	Peak	19.83	-24.89	-5.06	29.54	-34.60
4	14.18	Peak	22.36	-24.84	-2.48	29.54	-32.02
5	16.97	Peak	17.29	-24.77	-7.48	29.54	-37.02
6	25.30	Peak	18.83	-25.63	-6.80	29.54	-36.34

Remark:

- 9kHz to 490kHz Limit(@3m) = 2400(F/kHz)+ 40*Log (300 meters/3 meters)
 490kHz to 1.705MHz Limit (@3m) = 2400(F/kHz)+ 40*Log (30 meters/3 meters)
 1.705MHz to 30MHz Limit (@3m) = 30 + 40*Log (30 meters/3 meters)

Mode 2

30MHz ~ 1GHz

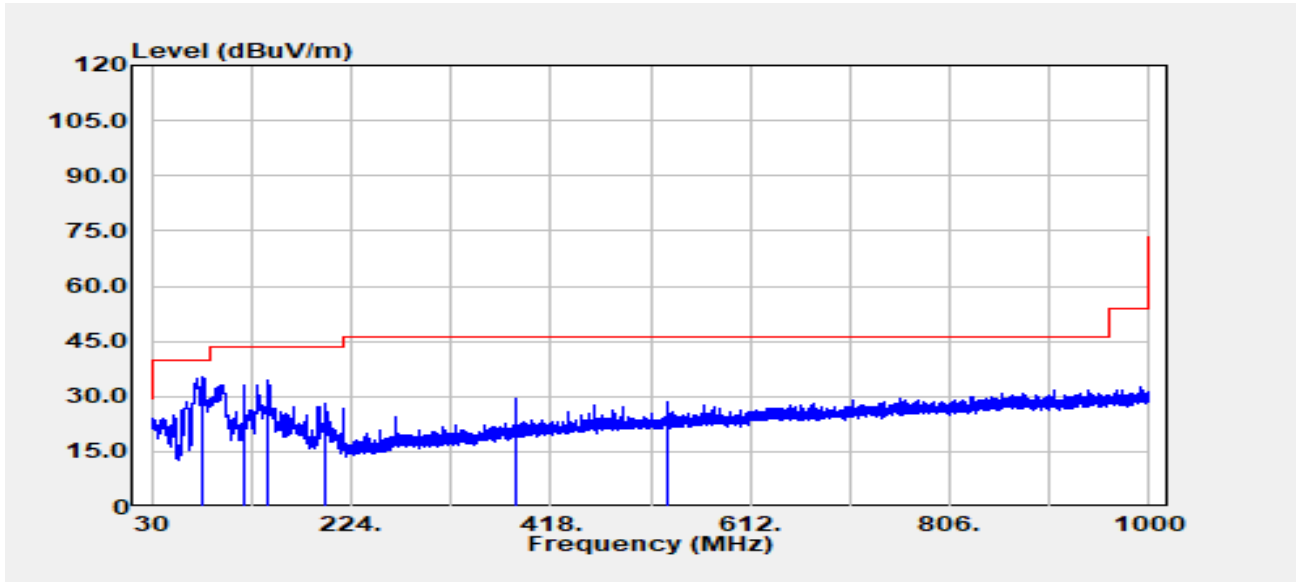
Operation Mode: TX mode **Test Date:** October 11, 2022

Temperature: 23.4°C **Tested by:** Ray Li

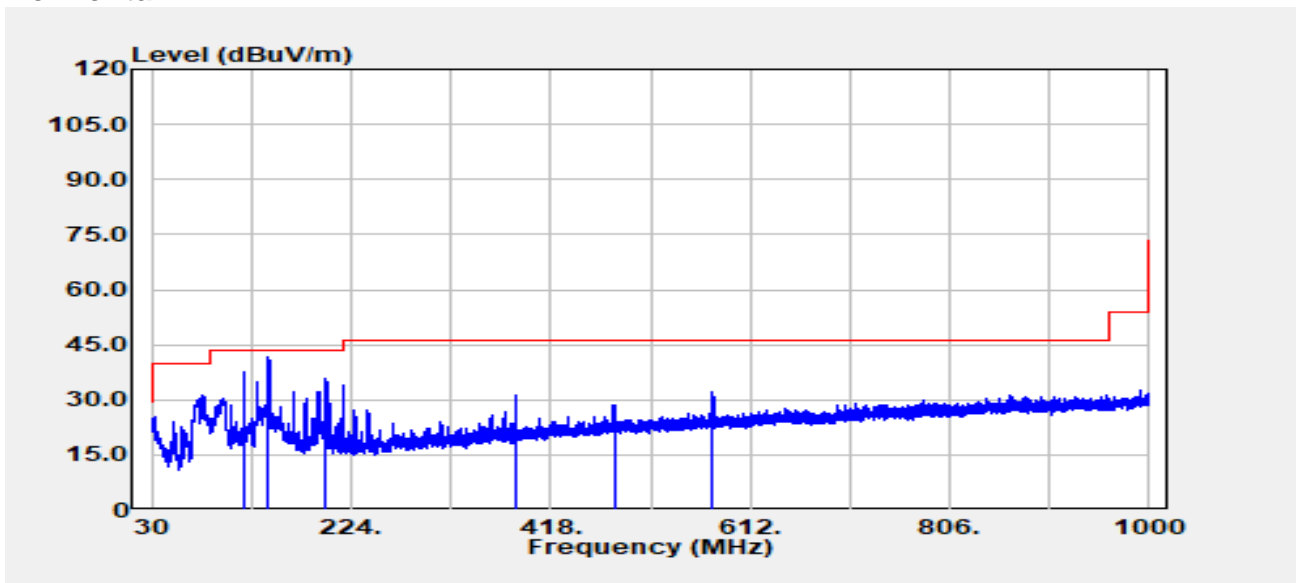
Humidity: 63 % RH **Polarity:** Ver. / Hor.

Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB	Polarity
80.20	Peak	51.37	-15.97	35.40	40.00	-4.60	V
119.73	Peak	42.52	-9.40	33.12	43.50	-10.38	V
143.61	Peak	44.94	-10.38	34.56	43.50	-8.94	V
199.27	Peak	38.13	-9.91	28.22	43.50	-15.28	V
384.90	Peak	36.04	-6.63	29.40	46.00	-16.60	V
532.22	Peak	31.75	-3.33	28.42	46.00	-17.58	V
120.33	Peak	46.77	-9.38	37.39	43.50	-6.11	H
143.73	Peak	52.04	-10.38	41.67	43.50	-1.83	H
199.87	Peak	45.53	-9.90	35.62	43.50	-7.88	H
384.90	Peak	38.00	-6.63	31.36	46.00	-14.64	H
481.05	Peak	32.57	-3.82	28.75	46.00	-17.25	H
574.90	Peak	34.74	-2.43	32.31	46.00	-13.69	H

Vertical



Horizontal



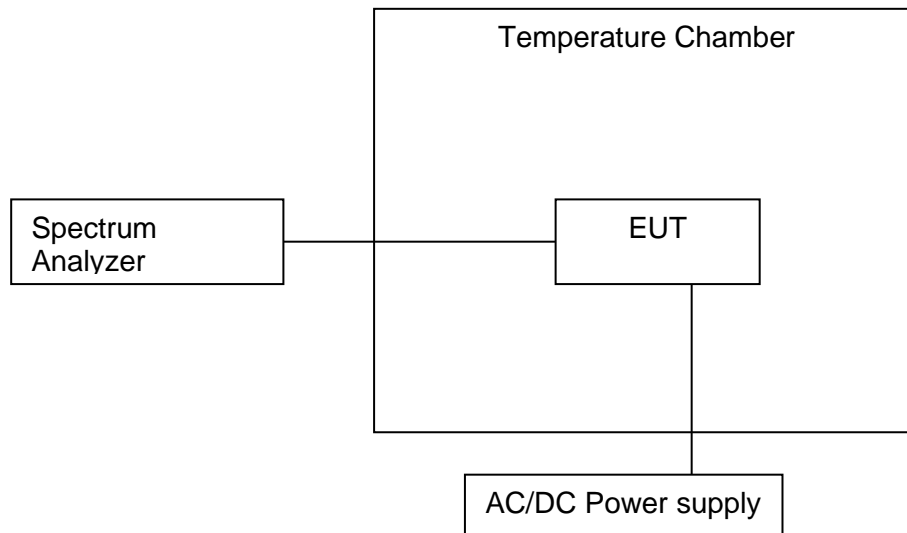
7.3 FREQUENCY STABILITY

LIMIT

According to §15.225(e) and RSS-210, B.6, The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Configuration

Temperature and Voltage Measurement (under normal and extreme test conditions)



TEST PROCEDURE

1. Turn the EUT off, and place it inside the environmental temperature chamber.
2. Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
3. Set the spectrum analyzer as RBW=1kHz, VBW = RBW, Span = 200kHz, Sweep = auto.
4. Turn the EUT on and record the operating frequency at startup and two, five, and ten minutes after the EUT is energized.
5. Switch off the EUT and Lower the chamber temperature by not more than 10 °C and allow the temperature inside the chamber to stabilize.
6. Mark the peak frequency and measure the frequency tolerance using frequency counter function.
7. Repeat step 4 through step 6 down to the lowest specified temperature.

TEST RESULTS

No non-compliance noted.

Temperature: 25.5°C

Humidity: 53% RH

Tested by: David Li

Test Date: October 7, 2022

TEST DATA

Startup				
A. Temperature Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
24	-20	13.560338	338.00	+/- 1356
24	-10	13.5603405	340.50	+/- 1356
24	0	13.560339	339.00	+/- 1356
24	10	13.5603375	337.50	+/- 1356
24	20	13.5603605	360.50	+/- 1356
24	30	13.5603361	336.10	+/- 1356
24	40	13.5603325	332.50	+/- 1356
24	50	13.560335	335.00	+/- 1356
B. Supply Voltage Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
26.4	20	13.560334	334.00	+/- 1356
24	20	13.5603605	360.50	+/- 1356
21.6	20	13.560333	333.00	+/- 1356

2 minutes				
A. Temperature Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
24	-20	13.560332	332.00	+/- 1356
24	-10	13.560334	334.00	+/- 1356
24	0	13.560331	331.00	+/- 1356
24	10	13.560333	330.00	+/- 1356
24	20	13.5603295	329.50	+/- 1356
24	30	13.560328	328.00	+/- 1356
24	40	13.5603295	329.50	+/- 1356
24	50	13.560331	331.00	+/- 1356
B. Supply Voltage Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
26.4	20	13.560362	362.00	+/- 1356
24	20	13.5603295	329.50	+/- 1356
21.6	20	13.5603305	330.50	+/- 1356

5 minutes				
A. Temperature Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
24	-20	13.5603291	329.10	+/- 1356
24	-10	13.5603275	327.50	+/- 1356
24	0	13.560331	331.00	+/- 1356
24	10	13.5603273	327.30	+/- 1356
24	20	13.5603282	328.20	+/- 1356
24	30	13.5603302	330.20	+/- 1356
24	40	13.5603278	327.80	+/- 1356
24	50	13.560329	329.00	+/- 1356
B. Supply Voltage Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
26.4	20	13.5603415	341.50	+/- 1356
24	20	13.5603282	328.20	+/- 1356
21.6	20	13.5603285	328.50	+/- 1356

10 minutes				
A. Temperature Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
24	-20	13.5603255	325.50	+/- 1356
24	-10	13.5603512	351.20	+/- 1356
24	0	13.5603256	325.60	+/- 1356
24	10	13.5603276	327.60	+/- 1356
24	20	13.5603252	325.20	+/- 1356
24	30	13.5603264	326.40	+/- 1356
24	40	13.5603253	325.30	+/- 1356
24	50	13.5603248	324.80	+/- 1356
B. Supply Voltage Variation				
Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
26.4	20	13.560324	324.00	+/- 1356
24	20	13.5603252	325.20	+/- 1356
21.6	20	13.560302	302.00	+/- 1356

7.4 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	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.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

Operation Mode: Mode 1

Test Date: October 17, 2022

Temperature: 24.3°C

Tested by: Jack Chen

Humidity: 52% RH

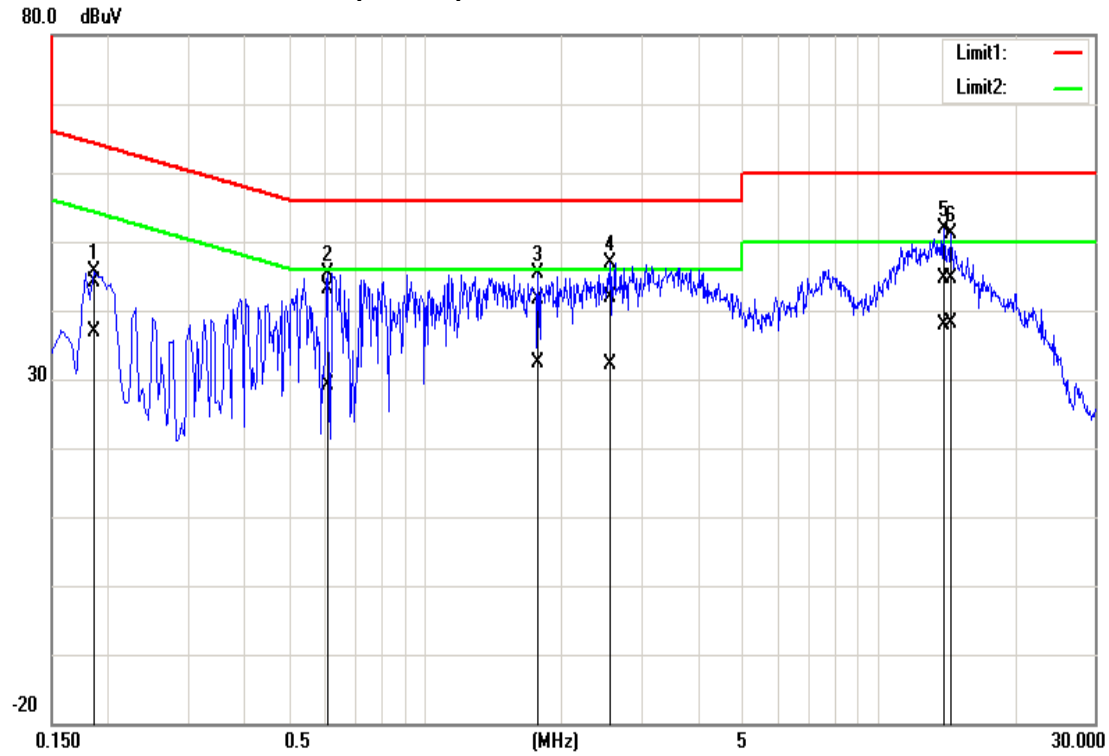
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1860	33.96	26.60	10.18	44.14	36.78	64.21	54.21	-20.07	-17.43	L1
0.6100	33.05	18.89	10.19	43.24	29.08	56.00	46.00	-12.76	-16.92	L1
1.7780	31.41	22.13	10.25	41.66	32.38	56.00	46.00	-14.34	-13.62	L1
2.5580	31.66	21.89	10.28	41.94	32.17	56.00	46.00	-14.06	-13.83	L1
13.9620	34.22	27.45	10.37	44.59	37.82	60.00	50.00	-15.41	-12.18	L1
14.4660	34.30	27.82	10.36	44.66	38.18	60.00	50.00	-15.34	-11.82	L1
0.3940	36.77	26.30	10.18	46.95	36.48	57.98	47.98	-11.03	-11.50	N
0.4940	34.99	22.92	10.18	45.17	33.10	56.10	46.10	-10.93	-13.00	N
1.0340	33.32	20.97	10.20	43.52	31.17	56.00	46.00	-12.48	-14.83	N
1.5420	31.83	21.38	10.23	42.06	31.61	56.00	46.00	-13.94	-14.39	N
2.9180	30.08	23.09	10.26	40.34	33.35	56.00	46.00	-15.66	-12.65	N
13.3340	35.73	30.04	10.37	46.10	40.41	60.00	50.00	-13.90	-9.59	N

Remark:

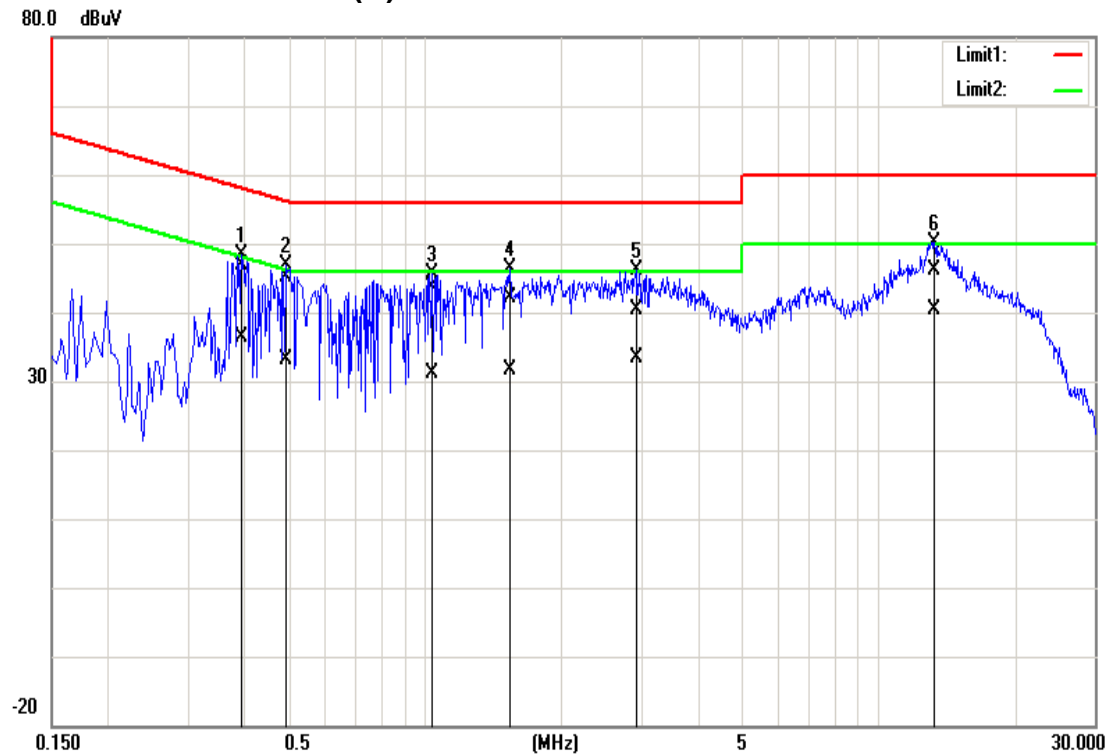
1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10kHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)
5. "-" means Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

Test Plots

Conducted emissions (Line 1)



Conducted emissions (N)



- End of Test Report -