EMC TEST REPORT

Report No.:	20230617G06091X-W1
Product Name:	RICO Thermal Imaging Sights
Model No. :	RL42 V2,RH50 V2
FCC ID:	2AYGT-RICO
Applicant:	IRay Technology Co., Ltd.
Address:	11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA.
Received Date:	2023.06.12
Dates of Testing:	2023.06.19—2023.06.25
Issued by:	CCIC Southern Testing Co., Ltd.
Lab Location:	Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China. **Tel:** 86 755 26627338 **Fax:** 86 755 26627238

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Test Report

Product Name.....	RICO Thermal Imaging Sights
Model No.	RL42 V2, RH50 V2
Trade name	InfiRay
Brand name	InfiRay
Applicant.....	IRay Technology Co., Ltd.
Applicant Address.....	11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA.
Manufacturer	IRay Technology Co., Ltd.
Manufacturer Address	11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA.
Test Standards.....	47 CFR Part 15 Subpart B
Test Result.....	PASS

Tested by ..... Ruihong Xie

Ruihong Xie Test Engineer 2023.07.05

Reviewed by ..... Chris You

Chris You Senior Engineer 2023.07.05

Approved by ..... Yang Fan

2023.07.05

Yang Fan, Manager

TABLE OF CONTENTS

Change History		
Issue	Date	Reason for change
1.0	2023.07.05	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Name ..... .:	RICO Thermal Imaging Sights
Trade Name……:	InfiRay
Brand Name……:	InfiRay
Model No. ……..……:	RL42 V2, RH50 V2
Power supply……..:	Battery Brand Name: Jinqu Battery Model No.: IBP-1 Capacitance: 4400mAh Rated Voltage: 3.6V Charge Limit: 4.2V Manufacturer : JinQu New Energy （Zhejiang）Co.，Ltd
Ancillary Equipment……..:	AC Adapter Model No.: LX10B-050200E I/p: 100-240V～50/60Hz ,350mA O/p: 5.0V⎓2000mA Manufacturer : Shenzhen LvXiangYuan Technology Co., Ltd

Note1:The EUT is a RICO Thermal Imaging Sights;

Note 2: Rico Thermal Imaging Sights main models are RH50 V2, series models is RL42 V2.The differences in models are only software functions and geographical differences, which do not affect EMC.

Note 3:For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 4: The EUE works in an industrial environment and applies to CLASS A limits.

1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS

NOTE:

(1) The EUT has been tested according to 47 CFR Part 15 Subpart B,Class B.The test procedure is according to ANSI C63.4:2014.

1.3 Facilities and Accreditations

1.3.1 Facilities

FCC-Registration No.: CN1283

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until Sep.30, 2023.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Sep.30, 2023

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (℃):	15℃ - 35℃
Relative Humidity (%):	25% -75%
Atmospheric Pressure (kPa):	86kPa-106kPa

1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	Uc = 2.6 dB (k=2)
Uncertainty of Radiated Emission: (30MHz~1GHz)	Uc = 3.91 dB (k=2)
Uncertainty of Radiated Emission: (1~18GHz)	Uc = 4.5 dB (k=2)

2. TEST CONDITIONS SETTING

2.1 Test Peripherals

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Support Equipment:

Description	Brand name	Model	Serial No.	FCCID
Notebook	ThinkPad	E430C	A131101550	N/A
Mouse	Logitech	M100r	25011051	DOC

Support Cable：

Description	Shield Type	Ferrite Core	Length
PC Power adapter Cable	Un- shielding	No	1.2m
Mouse Cable	Un- shielding	No	1m

Support Software：

Software	Version number	Manufacturer	Use the project
ES-K1	V1.73	ROHDE&SCHWARZ	Radiated Emissions below 1GHz
TS+	JS32-RE 2.5.2.0	Tonsceng	Radiated Emissions above 1GHz
EMC32	Version 10.35.10	ROHDE&SCHWARZ	Conducted Emission

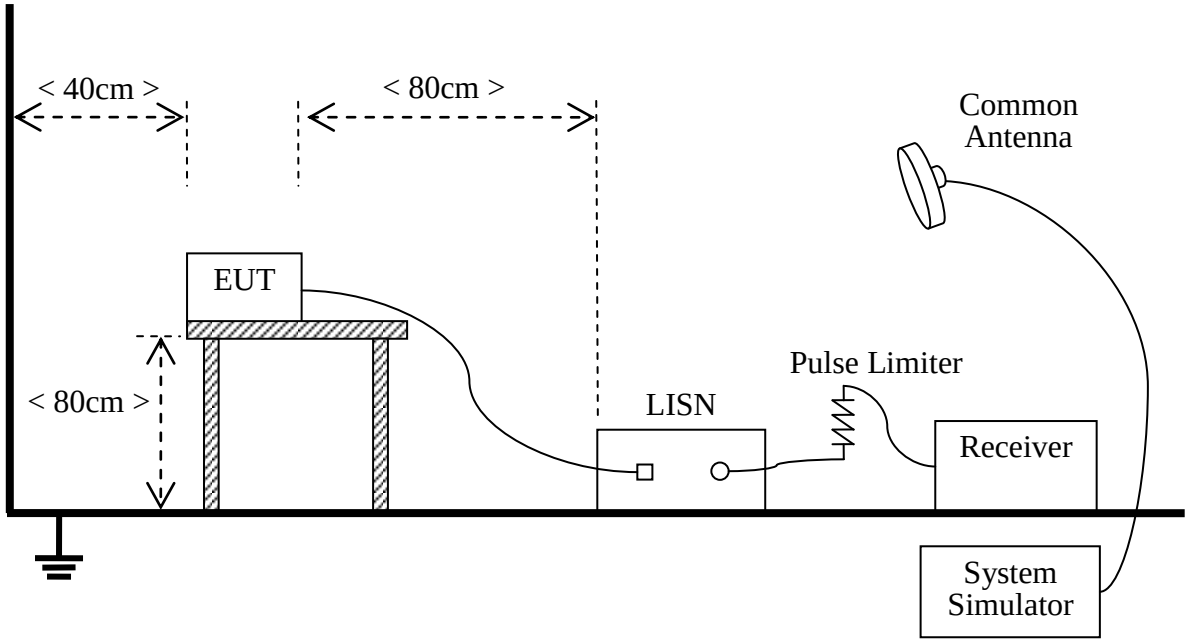
2.2 Test Mode

The EUT have the following typical setups during the test:
Setup1: image display+ charger
Setup2: EUT+ Computer data transmission
Setup3: Idle + charger
Note: Only worst-case mode setup 1 mode data provide at the report

2.3 Test Setup and Equipments List

2.3.1 Conducted Emission

A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides 50Ω/50μH of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

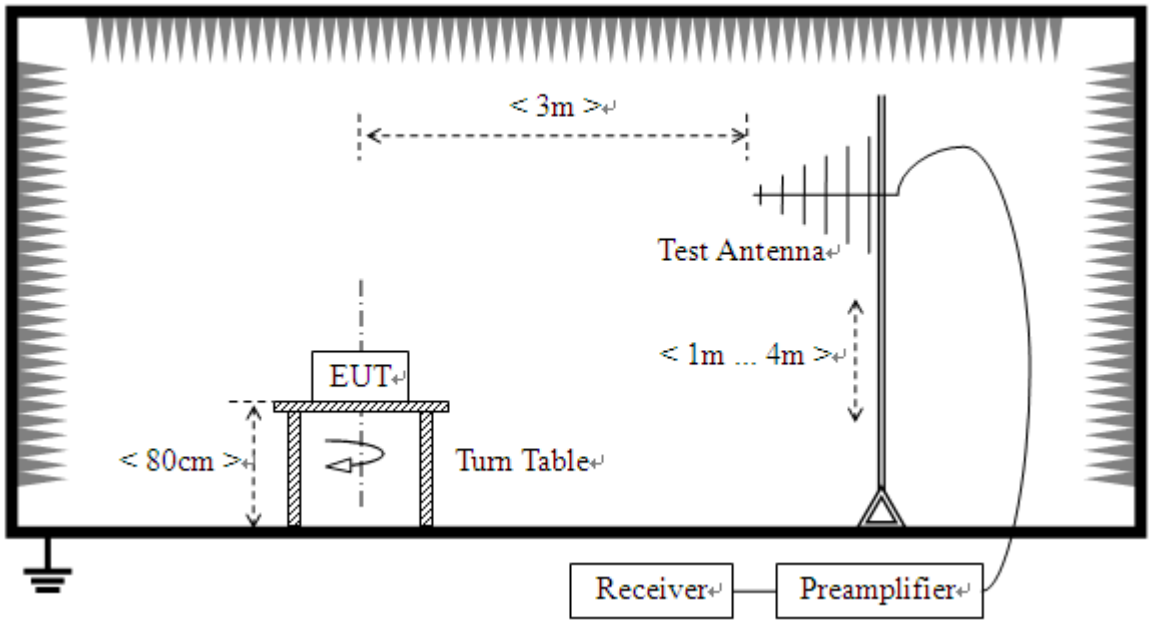
B. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2022.07.21	2023.07.20
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2022.07.21	2023.07.20
Cable	MATCHING PAD	W7	/	2022.08.02	2023.08.02

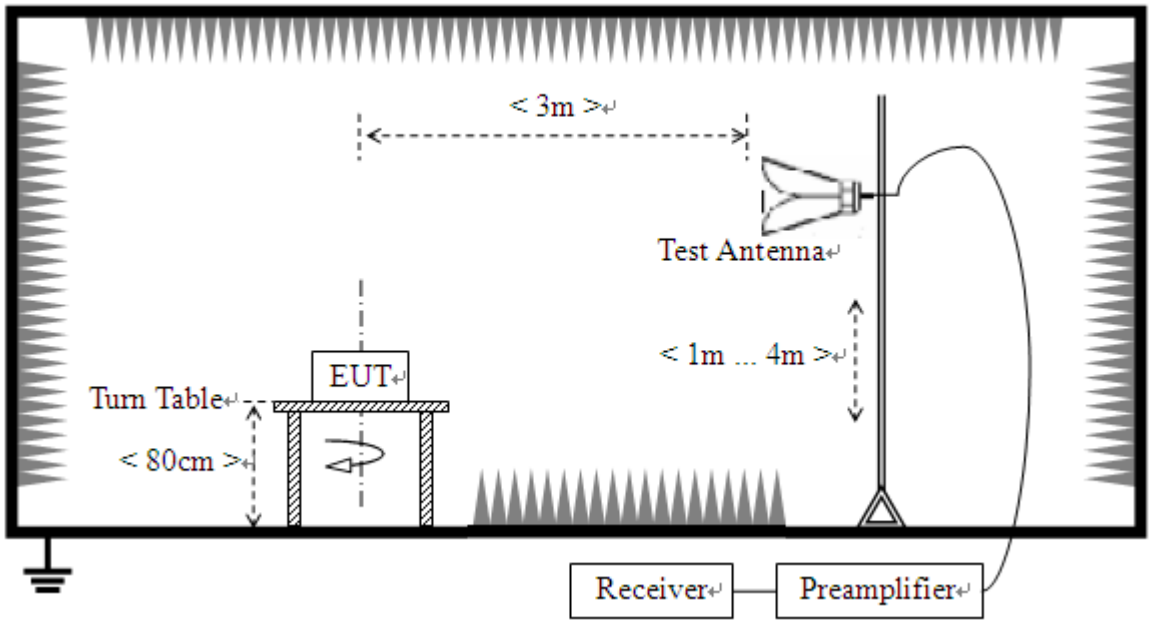
2.3.2 Radiated Emission

A. Test Setup:

1) For radiated emissions from 30MHz to1GHz



2) For radiated emissions above 1GHz



B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
EMI Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2023.03.16	2024.03.15
Broadband Ant.	2786	ETC	A150402239	2021.09.16	2024.03.03
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2021.03.26	2024.03.25
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2022.07.21	2023.07.20
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.03.25	2025.06.07
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2022.04.12	2025.04.11

3. 47 CFR PART 15B REQUIREMENTS

3.1 Conducted Emission

3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	79	66
0.50 - 30	73	60

Note:

a) The limit subjects to the Class A digital device.

b) The lower limit shall apply at the band edges.

c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2 Test Description

See section 2.3.1 of this report.

3.1.3 Test Result

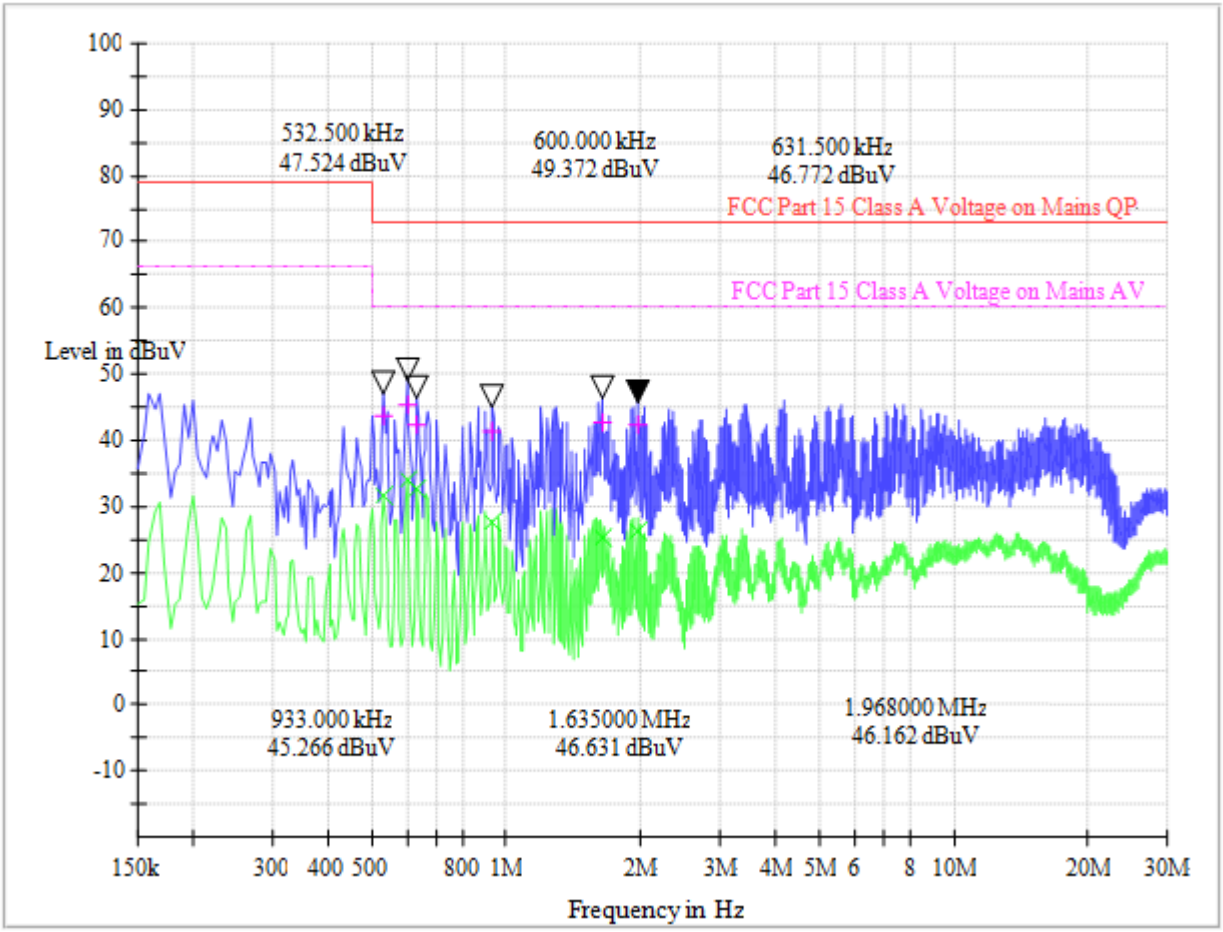
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

Note:

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a Nominal 120V AC,50/60Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

Test voltage and frequency (120V AC,60Hz)

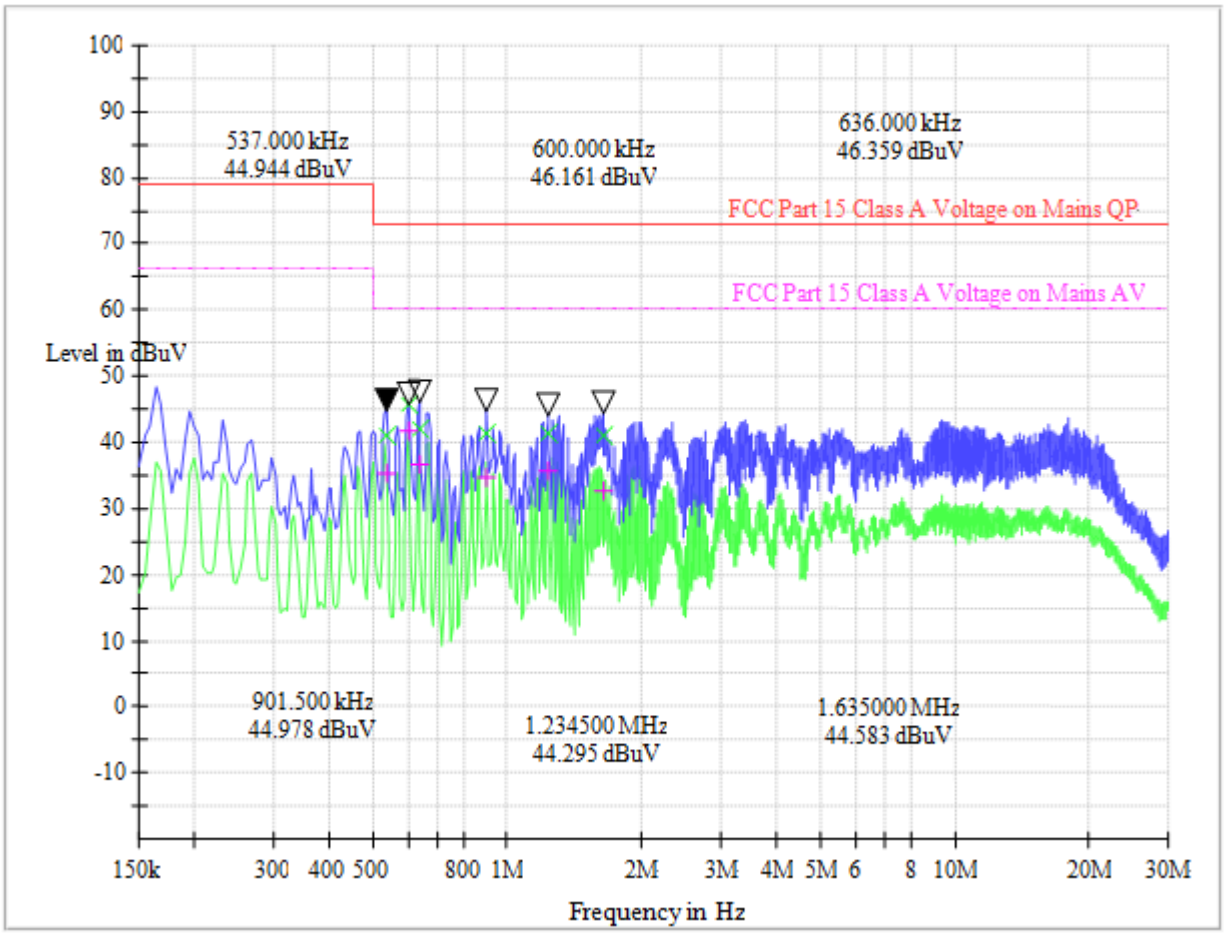
A. Mains terminal disturbance voltage, L phase



(Plot A: L Phase)

Frequency (MHz)	QuasiPeak	CAverage (dB µ V)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dB µ V)
0.532500	43.58	31.61	0.1	10.2	29.42	73.0	28.39	60.0
0.600000	45.29	34.11	0.1	10.2	27.71	73.0	25.89	60.0
0.631500	42.37	32.71	0.1	10.2	30.63	73.0	27.29	60.0
0.933000	41.50	27.46	0.2	10.3	31.50	73.0	32.54	60.0
1.635000	42.52	25.31	0.2	10.2	30.48	73.0	34.69	60.0
1.968000	42.27	26.14	0.2	10.2	30.73	73.0	33.86	60.0

B. Mains terminal disturbance voltage, N phase



(Plot B: N Phase)

Frequency (MHz)	QuasiPeak	CAverage (dBµV)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.537000	41.16	35.34	0.1	10.2	31.84	73.0	24.66	60.0
0.600000	45.60	41.70	0.1	10.2	27.40	73.0	18.30	60.0
0.636000	41.89	36.58	0.1	10.2	31.11	73.0	23.42	60.0
0.901500	41.20	34.71	0.2	10.2	31.80	73.0	25.29	60.0
1.234500	41.35	35.56	0.2	10.2	31.65	73.0	24.44	60.0
1.635000	40.85	32.71	0.2	10.2	32.15	73.0	27.29	60.0

3.2 Radiated Emission

3.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength	
	dBuV/m	Dist
30.0 - 88.0	50.0	3m
88.0 - 216.0	53.5	3m
216.0 - 960.0	56.0	3m
Above 960.0	64.0	3m

a) As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

b) Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

c) For below 1G :QP detector RBW 120kHz ,VBW 300kHz.

d) For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;AV detector RBW 1MHz, VBW 10Hz for AV value.

Note:

1) The tighter limit shall apply at the boundary between two frequency range.
2) Limitation expressed in dBuV/m is calculated by 20log Emission Level(uV/m).
3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^{2.}$
   Example:
   F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as
   $Ld1 = L1 = 30uV/m * (10)^2 = 100 * 30uV/m$.

3.2.2 Test Description

See section 2.3.2 of this report.

3.2.3 Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

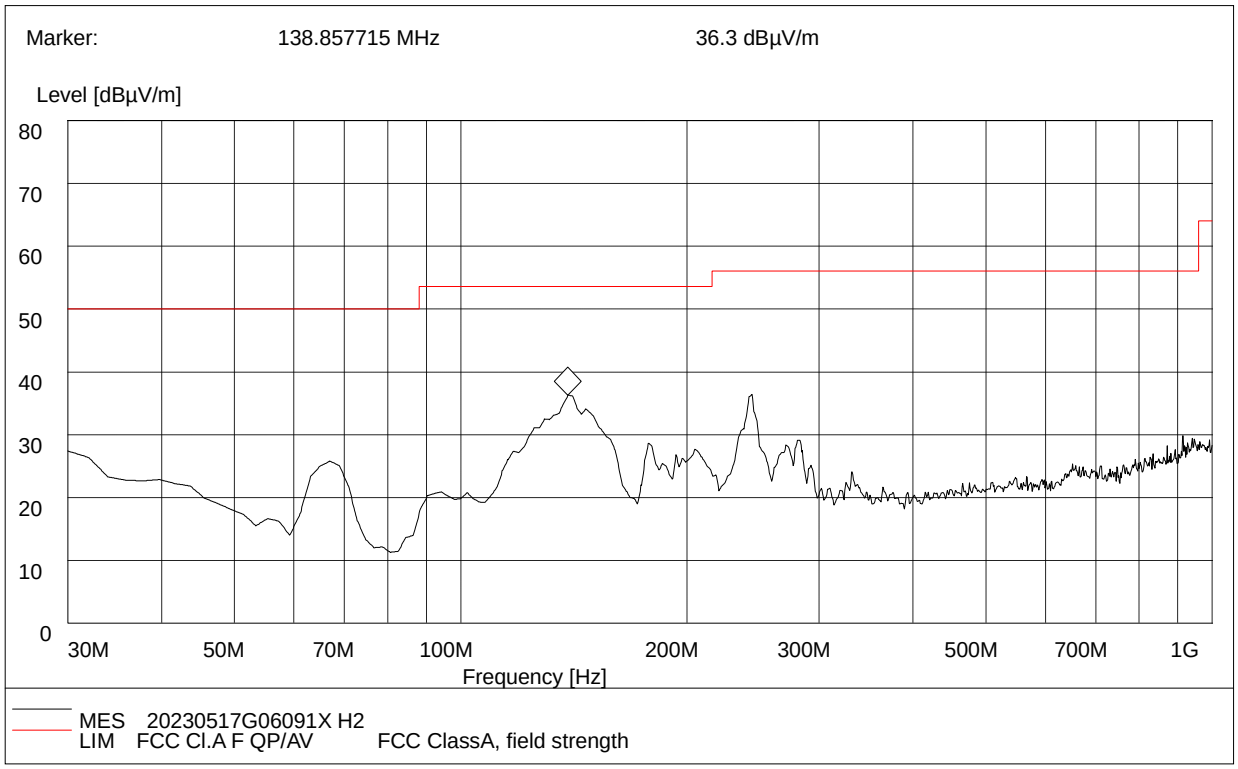
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

Note:

Emission Level(dBuV/m)= 20log Emission Level(uV/m)

Corrected Reading=Antenna factor+Cable Loss+Read Level-Preamp Factor= Level

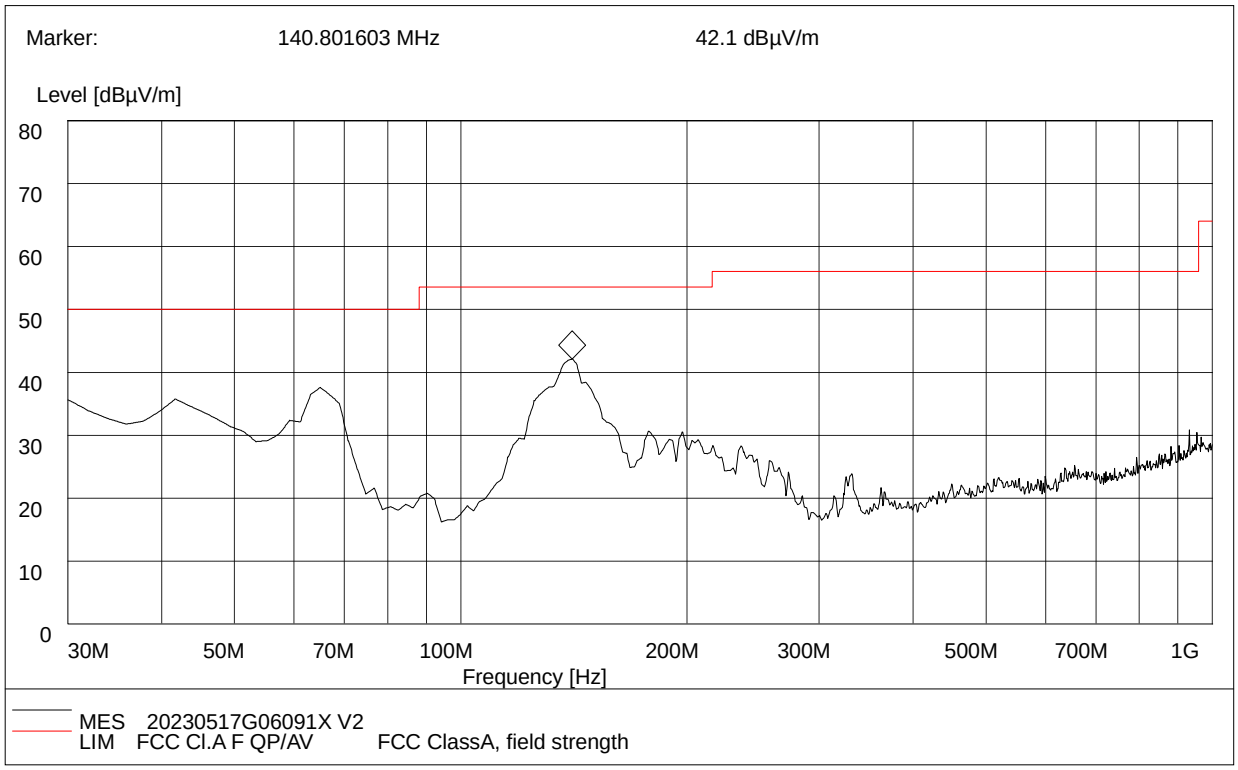
A.Radiation disturbances, antenna polarization: Horizontal



(Plot C: Test Antenna Vertical 30M - 1G)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.12	26.39	120.000	101	50.0	23.61	Horizontal	0.5	18.8	Pass
66.93	25.79	120.000	109	50.0	24.21	Horizontal	0.8	5.7	Pass
138.85	35.30	120.000	104	53.5	18.20	Horizontal	1.0	11.6	Pass
177.73	28.63	120.000	105	53.5	24.87	Horizontal	1.2	10.0	Pass
243.82	35.35	120.000	105	56.0	20.65	Horizontal	1.2	10.8	Pass
280.76	28.11	120.000	100	56.0	27.89	Horizontal	1.2	13.8	Pass

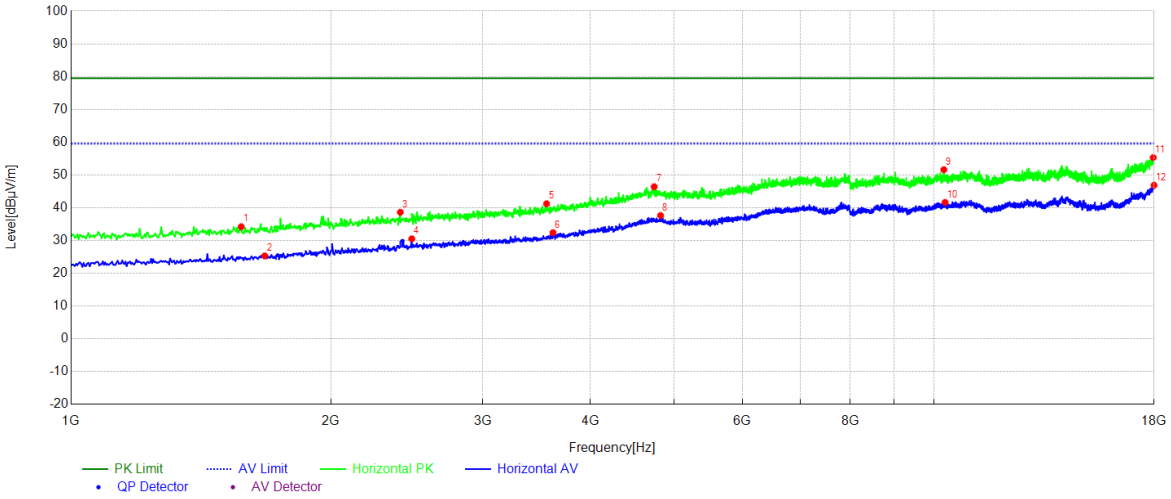
B.Radiation disturbances, antenna polarization: Vertical



(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	34.64	120.000	104	50	15.36	Vertical	0.5	18.8	Pass
64.98	36.59	120.000	104	50	13.41	Vertical	0.8	5.6	Pass
119.41	28.52	120.000	100	53.5	24.98	Vertical	1.0	11.3	Pass
140.80	41.12	120.000	102	53.5	12.38	Vertical	1.0	11.6	Pass
216.61	28.34	120.000	105	56	27.66	Vertical	1.2	11.4	Pass
236.05	28.32	120.000	106	56	27.68	Vertical	1.2	10.3	Pass

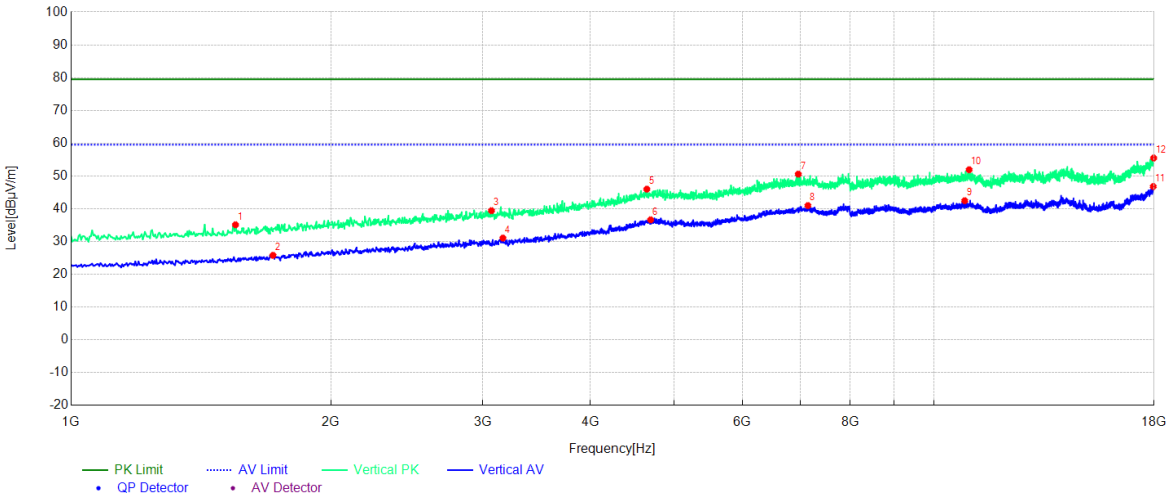
A.Radiation disturbances, antenna polarization: Horizontal



(Plot E: Test Antenna Horizontal 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dBµV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1574.71	34.22	-13.72	79.50	45.28	PK	105	114	Horizont
2	1676.74	25.31	-13.34	59.50	34.19	AV	105	109	Horizont
3	2407.88	38.64	-10.62	79.50	40.86	PK	100	120	Horizont
4	2482.70	30.52	-10.30	59.50	28.98	AV	103	243	Horizont
5	3557.31	41.23	-6.98	79.50	38.27	PK	104	230	Horizont
6	3618.52	32.41	-6.64	59.50	27.09	AV	106	46	Horizont
7	4740.75	46.41	-0.98	79.50	33.09	PK	109	295	Horizont
8	4822.36	37.63	-0.97	59.50	21.87	AV	101	80	Horizont
9	10270.2	51.61	5.65	79.50	27.89	PK	104	132	Horizont
10	10304.2	41.62	5.70	59.50	17.88	AV	107	153	Horizont
11	17959.1	55.31	14.78	79.50	24.19	PK	100	207	Horizont
12	18000.0	46.86	14.86	59.50	12.64	AV	103	19	Horizont

B.Radiation disturbances, antenna polarization: Vertical



(Plot F: Test Antenna Vertical 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dBµV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1550.91	35.11	-13.83	79.50	44.39	PK	107	213	Vertical
2	1714.14	25.80	-13.18	59.50	33.70	AV	106	112	Vertical
3	3071.01	39.42	-8.38	79.50	40.08	PK	100	200	Vertical
4	3166.23	31.06	-8.07	59.50	28.44	AV	103	46	Vertical
5	4648.93	45.98	-1.30	79.50	33.52	PK	100	137	Vertical
6	4696.54	36.62	-1.10	59.50	22.88	AV	102	250	Vertical
7	6964.79	50.56	3.28	79.50	28.94	PK	101	350	Vertical
8	7145.03	40.97	3.45	59.50	18.53	AV	101	294	Vertical
9	10858.5	42.46	6.54	59.50	17.04	AV	100	217	Vertical
10	10987.8	51.90	6.65	79.50	27.60	PK	104	90	Vertical
11	17959.1	46.78	14.78	59.50	12.72	AV	107	215	Vertical
12	17979.6	55.47	14.82	79.50	24.03	PK	107	50	Vertical

-----End of Report-----