TEST REPORT

For

Thermal Camera

Model Number: TIMNBLS207, TIMNBLS210

FCC ID: 2BGKL-TIMNBLS

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection
Site Location	:	No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China
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Revision History

No	Date	Remark
V1.0	2024-7-5	Initial issue

TEST REPORT DECLARATION

Applicant	:	Hangzhou Shunli Optotech Co., Ltd.
Address	:	3rd Floor, Building 2, No. 526 Binkang Road, Binjiang District, Hangzhou, Zhejiang, China
Manufacturer	:	Hangzhou Shunli Optotech Co., Ltd.
Address	:	3rd Floor, Building 2, No. 526 Binkang Road, Binjiang District, Hangzhou, Zhejiang, China
EUT Description	:	Thermal Camera
Model No.	:	TIMNBLS207, TIMNBLS210
Trade mark	:	EMDI
Serial Number	:	--------
Date of EUT Receive	:	2024-4-24
Test Standards:	:	FCC Part 15 Subpart C

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results, unless they depend on the manufacturer information.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	(陈司林 Chen SiLin)	Date:	2024-7-4
Checked by:	(万晓婧 Wan XiaoJing)	Date:	2024-7-5
Approved by:	(林斌 Lin Bin)	Date:	2024-7-5

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Average Power	PASS
6dB bandwidth	PASS
Maximum Peak Conducted Power	PASS
Power spectral density	PASS
Conducted Bandedge and Spurious	PASS
Radiated emission	PASS
Conducted Emission	PASS
Antenna Requirement	PASS

Remark: “N/A” means “Not applicable.”

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

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The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

The Laboratory is registered to perform emission tests with VCCI, and the

registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3. Measurement Uncertainty

Conducted Emission
9 kHz~150 kHz U=3.7 dB k=2
150 kHz~30 MHz U=3.3 dB k=2

Radiated Emission
30 MHz~1000 MHz U=4.3 dB k=2
1 GHz~6 GHz U=4.6 dB k=2
6 GHz~40 GHz U=5.1 dB k=2

3. PRODUCT DESCRIPTION

3.1. EUT Description

Operate Frequency	:	2.412 GHz~ 2.462 GHz
Antenna Designation	:	IFA -0.588 dBi
Modulation	:	Wi-Fi: DSSS (DBPSK, DQPSK, CCK) for 802.11b OFDM (BPSK, QPSK, 16QAM, 64QAM) for 802.11g/n
Operating Voltage	:	DC 3.8 V (Li-ion, battery) AC 120 V/60 Hz (Adapter)
Software Version	:	V2.630.0000000.0.R.240427
Hardware Version	:	26_1273

Remark: The product differences are as follows, and the others are the same.

Model	Focal Length
TIMNBLS207	7mm
TIMNBLS210	10mm

Unless otherwise specified, the model TIMNBLS210 was chosen as the representative model to perform all the tests.

WLAN:

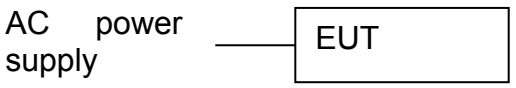
Table 2 Working Frequencies Lists (802.11b, 802.11g, 802.11n HT20)

Channel	Frequency	Channel	Frequency
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	---	---
6	2437MHz	---	---
7	2442MHz	---	---

3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2BGKL-TIMNBLT** filing to comply with Section 15.207,15.209，15.247 of the FCC Part 15, Subpart C Rules.

3.3. Block Diagram of EUT Configuration



Setup of test

3.4. Operating Condition of EUT

The Radiated spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).
Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power.
Worst-case data rates as provided by the client were:
802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0

3.5. Directional Antenna Gain

Not available for this EUT intended for grant.

3.6. Support Equipment List

Table 3 Support Equipment List

Name	Model No.	S/N	Manufacturer
Notebook	HSN-Q15C	5CD9361KR6	HP
Adapter	VCB3HDUH	---	Huizhou Golden Lake Industrial Co., Ltd.

3.7. Special Accessories

Not available for this EUT intended for grant.

3.8. Equipment Modifications

Not available for this EUT intended for grant.

4. AVERAGE POWER

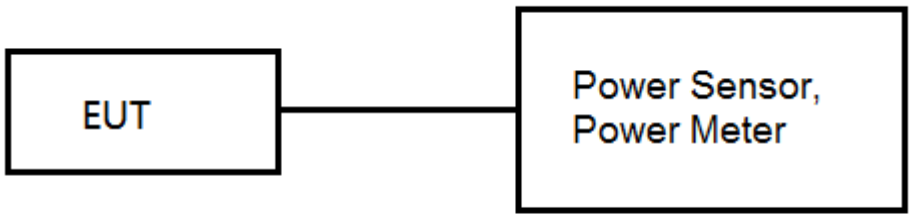
4.1. Test Limit

None; for report purposes only.

4.2. Test Procedure

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor.

4.3. Test Setup



4.4. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months

4.5. Test Condition

Date of test: Apr.28,2024
Temperature: 27℃
Relative Humidity: 48%RH
Atmospheric Pressure: 100kPa

4.6. Test Data

Please refer to the Annex A

5. 6DB BANDWIDTH

5.1. Test Limit

The minimum 6 dB bandwidth shall be 500 kHz.

5.2. Test Procedure

ANSI C63.10-2013 Clause 11.8
The transmitter output was connected to the spectrum analyzer.
a) Set RBW = 100 kHz.
b) Set the VBW ≥ [3 × RBW].
c)Detector = Peak.
d)Trace mode = max hold.
e)Sweep = auto couple.
f)Allow the trace to stabilize.
g)Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

5.3. Test Setup

5.4. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB9060	Signal Analyzer	Rohde & Schwarz	SB9060	2024-04-22	12Months

5.5. Test Condition

Date of test: Apr.28,2024

Temperature: 27℃
Relative Humidity: 48%RH
Atmospheric Pressure: 100kPa

5.6. Test Data

Please refer to the Annex A

6. MAXIMUM PEAK CONDUCTED OUTPUT POWER

6.1. Test Limit

Compliance with part CFR 47 (FCC) part 15.247 (b)

(1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

(2) For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2. Test Procedure

For FHSs

ANSI C63.10-2013 Clause 7.8.5

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.

2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.
d) The indicated level is the peak output power, after any corrections for external attenuators and
cables.
e) A plot of the test results and setup description shall be included in the test report.

For DTSs
ANSI C63.10-2013 Clause 11.9
The following procedure can be used when the maximum available RBW of the instrument is less than the
DTS bandwidth:
a) Set the RBW = 1 MHz.
b) Set the VBW ≥ [3 × RBW].
c) Set the span ≥ [1.5 × DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel

6.3. Test Setup

6.4. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB9060	Signal Analyzer	Rohde & Schwarz	FSQ40	2024-04-22	12Months

6.5. Test Condition

Date of test: Apr.28,2024
Temperature: 27℃
Relative Humidity: 48%RH
Atmospheric Pressure: 100kPa

6.6. Test Data

Please refer to the Annex A

7. POWER SPECTRAL DENSITY

7.1. Test Limit

CFR 47 (FCC) part 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

7.2. Test Procedure

ANSI C63.10-2013 Clause 11.10
The transmitter output was connected to the spectrum analyzer.
a)Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set RBW to：3kHz≤RBW≤100 kHz.
d) Set VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h)Allow trace to fully stabilize.
i)Use the peak marker function to determine the maximum amplitude level within the RBW.
j)If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.3. Test Setup

7.4. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB9060	Signal Analyzer	Rohde & Schwarz	FSQ40	2024-04-22	12Months

7.5.Test Condition

Date of test: Apr.28,2024
Temperature: 27℃
Relative Humidity: 48%RH
Atmospheric Pressure: 100kPa

7.6.Test Data

Please refer to the Annex A

8. CONDUCTED BANDEDGE AND SPURIOUS

8.1. Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz
bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

8.2. Test Procedure

ANSI C63.10-2013
The transmitter output was connected to the spectrum analyzer.
Establish a reference level by using the following procedure:
a)Set instrument center frequency to DTS channel center frequency.
b)Set the span to ≥ 1.5 times the DTS bandwidth.
c)Set the RBW = 100 kHz.
d)Set the VBW ≥ 3 x RBW.
e)Detector = peak.
f)Sweep time = auto couple.
g)Trace mode = max hold.
h)Allow trace to fully stabilize.
i)Use the peak marker function to determine the maximum PSD level.
Emission level measurement
a)Set the center frequency and span to encompass frequency range to be measured.
b)Set the RBW = 100 kHz.
c)Set the VBW ≥ 3 x RBW.
d)Detector = peak.
e)Sweep time = auto couple.
f)Trace mode = max hold.
g)Allow trace to fully stabilize.
h)Use the peak marker function to determine the maximum amplitude level.
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal

Test Result ： All emission outside of 2400-2483.5 are lower at least

20dB than fundamental frequency.

8.3. Test Setup

8.4. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB9060	Signal Analyzer	Rohde & Schwarz	FSQ40	2024-04-22	12Months

8.5. Test Condition

Date of test: Apr.28,2024
Temperature: 27℃
Relative Humidity: 48%RH
Atmospheric Pressure: 100kPa

8.6. Test Data

Please refer to the Annex A

9. RADIATED EMISSION

9.1. Test Limit

CFR 47 (FCC) part 15.205, 15.209

Table 4 Radiation Emission Test Limit

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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., §§ 15.231 and 15.241.

Table 5 Restricted frequency bands

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
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	
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	
6.31175 - 6.31225	123 - 138	2200 - 2300	
8.291 - 8.294	149.9 - 150.05	2310 - 2390	
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	
12.29 - 12.293	167.72 - 173.2	3332 - 3339	
	240 - 285	3345.8 - 3358	
	322 - 335.4	3600 - 4400	

12.51975 - 12.52025 12.57675 - 12.57725 13.36 - 13.41			

9.2. Test Procedure

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. For measurement below 1GHz, the EUT was placed on a turntable with 0.8meter, above ground. For measurement above 1 GHz, test at FAR, the EUT is placed on a non-conductive table, which is 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
(1) Span shall wide enough to fully capture the emission being measured;
(2) Set RBW=100 kHz for f < 1 GHz; VBW >= RBW; Sweep = auto; Detector function = peak; Trace = max hold;
(3) Set RBW = 1 MHz, VBW= 3MHz for f > 1 GHz for peak measurement.
Set RBW = 1 MHz, and 1/T (on time) for average measurement.

9.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB15044/01	Test Receiver	ROHDE&SCHWARZ	ESW8	2024-03-15	12Months
SB18844	Anechoic chamber	Albatross	3mSAC	2024-03-19	12Months
SB18856	Broadband Antenna	SCHWARZBECK	VULB9163	2023-09-06	12Months
SB3345	Loop antenna	SCHWARZBECK	FMZB1516	2024-01-12	12Months
SB3435	Horn Antenna	ROHDE&SCHWARZ	HF906	2023-11-21	12Months
SB8501/09	Test Receiver	ROHDE&SCHWARZ	ESU40	2024-01-17	12Months
SB8501/11	Horn Antenna	ETS-Lindgren	3160-09	2023-02-22	36Months

SB8501/16	Low Noise Amplifier	ROHDE&SCHWARZ	SCU-26	2024-01-16	12Months
SB9058/03	Low Noise Amplifier	ROHDE&SCHWARZ	SCU18	2024-01-16	12Months
SB9555/02	Anechoic chamber	Albatross	/	2023-08-15	12Months

9.4. Test Condition

Date of test: May.7,2024-May.8,2024
Temperature: (21 ~ 23)℃
Relative Humidity: (45 ~ 52)%RH
Atmospheric Pressure: (100.8 ~ 101)kPa

9.5. Test Data

Please refer to the Annex A

10. AC POWER-LINE CONDUCTION EMISSIONS

10.1. Test Standard and Limit

10.1.1. Test Standard

CFR 47 (FCC) part 15.207

10.1.2. Test Limit

Table 6 AC Power-line Conduction Emissions Test Limit

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[1]	56 to 46[1]
0.5 - 5	56	46
5 - 30	60	50
Note[1]: The level decreases linearly with the logarithm of the frequency.		

10.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4a-2017. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.
The bandwidth of EMI test receiver is set at 9 kHz.

10.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

10.4. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB2604	AMN	ROHDE&SCHWARZ	ESH3-Z5	2024-01-13	12Months

SB3319	Test Receiver	ROHDE&SCHWARZ	ESCS30	2023-10-26	12Months
SB9548	Shielded Room	Albatross	SR	2023-08-30	12Months

10.5. Test Condition

Date of test: May.10,2024
Temperature: 22℃
Relative Humidity: 55%RH
Atmospheric Pressure: 101.2kPa

10.6. Test Data

Note: Emissions not reported below are too low against the prescribed limits. "/" means the test data is too low against the limit.

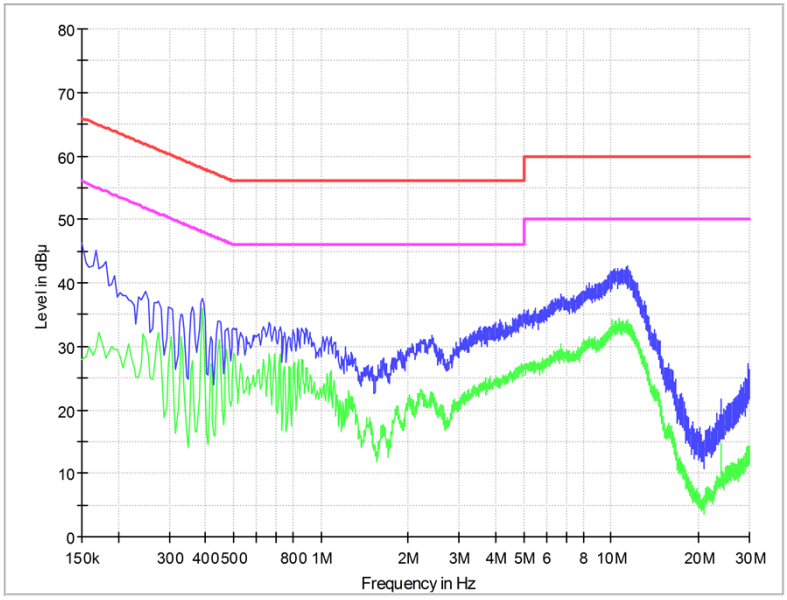
Table 7 AC Power-line Conduction Emissions Test Data

Test mode: Charging and Transmitting

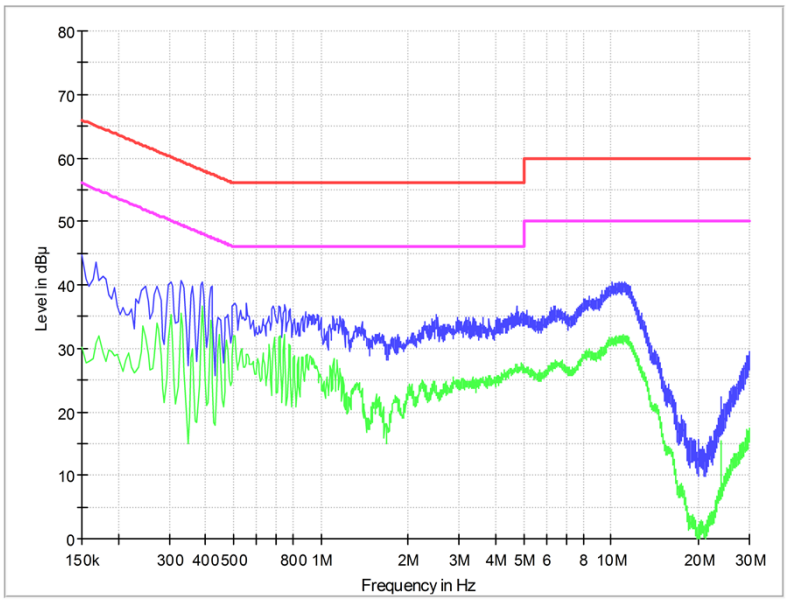
Port	Frequency (MHz)	Emission Level QP (dBuV/m)	Limit QP (dBuV/m)	Margin QP (dB)	Emission Level AV (dBuV/m)	Limit AV (dBuV/m)	Margin AV (dB)	Reading QP (dBuV/m)	Reading AV (dBuV/m)	Correction Factor (dB)
L	0.150	40.3	66.0	25.7	30.1	56.0	25.9	30.2	20.0	10.1
L	0.168	40.5	65.1	24.6	31.6	55.1	23.5	30.4	21.5	10.1
L	0.182	35.8	64.4	28.6	28.4	54.4	26.0	25.7	18.3	10.1
L	0.388	36.3	58.1	21.8	36.0	48.1	12.1	26.2	25.9	10.1
L	10.567	38.3	60.0	21.7	33.8	50.0	16.2	28.3	23.8	10.0
L	11.341	38.0	60.0	22.0	33.4	50.0	16.6	28.0	23.4	10.0
N	0.150	38.6	66.0	27.4	28.4	56.0	27.6	28.5	18.3	10.1
N	0.168	38.3	65.1	26.8	29.7	55.1	25.4	28.2	19.6	10.1
N	0.330	38.4	59.5	21.1	35.7	49.5	13.8	28.3	25.6	10.1
N	0.388	37.8	58.1	20.3	36.3	48.1	11.8	27.7	26.2	10.1
N	10.131	36.5	60.0	23.5	31.1	50.0	18.9	26.5	21.1	10.0
N	10.950	36.5	60.0	23.5	31.2	50.0	18.8	26.5	21.2	10.0

Test Mode: Charging and Transmitting

L:



N:



11. ANTENNA REQUIREMENTS

11.1. Test Limit

15.203 requirements:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

11.2. Antenna Connector

Antenna Connector is on the PCB within enclosure and not accessible to user.
----------End of Report----------