

GWD Concept Sp. z o.o

TEST REPORT

SCOPE OF WORK

EMC TESTING-AL0001

REPORT NUMBER

230814057GZU-001

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TEST REPORT

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Intertek Report No: : 230814057GZU-001
FCC ID : 2BAGF-AL0001

Test standards

CFR 47, FCC Part 15, Subpart B:2021

Sample Description

Product : Ambient Light
Model No. : AL0001
Electrical Rating : Battery supply: 3,7 Vdc; 20000mAh.
Serial No. : Not Labeled
Date Received : 14 August 2023
Date Test Conducted : 12 October 2023 to 14 October 2023

Prepared and Checked By



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TEST REPORT**CONTENT**

TEST REPORT	1
CONTENT	3
1. TEST RESULTS SUMMARY	4
2. EMC RESULTS CONCLUSION.....	5
3. LABORATORY MEASUREMENTS.....	6
4. EQUIPMENT USED DURING TEST	8
5. EMI TEST.....	10
5.1 CONDUCTED DISTURBANCE VOLTAGE AT MAINS PORTS	10
5.1.1 <i>Block Diagram of Test Setup</i>	10
5.1.2 <i>Test Setup and Procedure</i>	10
5.1.3 <i>Limit</i>	11
5.1.4 <i>Test Data and curve</i>	12
5.2 RADIATED EMISSION 30 MHz -1000 MHz	14
5.2.1 <i>Block Diagram of Test Setup</i>	14
5.2.2 <i>Test Setup and Procedure</i>	14
5.2.3 <i>Limit</i>	15
5.2.4 <i>Test Data and Curve</i>	16
5.3 RADIATED EMISSION ABOVE 1 GHz	17
5.3.1 <i>Block Diagram of Test Setup</i>	18
5.3.2 <i>Test Setup and Procedure</i>	18
5.3.3 <i>Limit</i>	19
5.3.4 <i>Test Data and Curve</i>	20

TEST REPORT**1. TEST RESULTS SUMMARY**

Classification of EUT: Class B

Test Item	Standard	Result
Conducted disturbance voltage at mains ports	CFR 47, FCC Part 15, Subpart B	Pass
Radiated emission (30 MHz–1 GHz)	CFR 47, FCC Part 15, Subpart B	Pass
Radiated emission (Above 1 GHz)	CFR 47, FCC Part 15, Subpart B	Pass

Remark:

Reference publication is used for methods of measurement: ANSI C63.4:2014

Remark:

1. The symbol “N/A” in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

TEST REPORT**2. EMC RESULTS CONCLUSION**

RE: EMC Testing Pursuant to FCC part 15 performed on the Ambient Light, Model: AL0001.

We tested the Ambient Light, Model: AL0001, to determine if it was in compliance with the relevant standards as marked on the Test Results Summary. We found that the unit met the requirement of FCC part 15 standard when tested as received. The worst case's test data was presented in this test report.

The production units are required to conform to the initial sample as received when the units are placed on the market.

TEST REPORT

3. LABORATORY MEASUREMENTS

Configuration Information

Support Equipment:

Description	Manufacturer	Model No.	SN/Version	Supplied by
Adapter	Aohai	A18A-050100U-CN2	--	Intertek

Rated Voltage and frequency under test: 120 V~; 60 Hz

Condition of Environment:

Temperature: 22~28°C

Relative Humidity:35~60%

Atmosphere Pressure:86~106kPa

Notes:

1. The EMI measurements had been made in the operating mode produced the largest emission in the frequency band being investigated consistent with normal applications. An attempt had been made to maximize the emission by varying the configuration of the EUT.

2. Test Facility accreditation:

A2LA Certificate Number 0078.10

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

3. Test Location:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

All tests were performed at:

Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

Except Radiated Emissions was performed at:

Room 102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China

4. Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Emission (9 kHz-150 kHz)	2.54 dB
2	Conducted Emission (150 kHz-30 MHz)	2.56 dB
3	Disturbance Power (30 MHz-300 MHz)	3.13 dB
4	Radiated Emission (9 kHz-30 MHz)	4.15 dB
5	Radiated Emission (30 MHz-1 GHz)	4.62 dB
6	Radiated Emission (1 GHz-6 GHz)	4.67 dB
7	Radiated Emission (6 GHz-18 GHz)	4.76 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty is calculated in accordance with CISPR16-4-2:2011+A1:2014 +A2:2018.

TEST REPORT

The measurement uncertainty is given with a confidence of 95%, k=2.
Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

TEST REPORT
4. EQUIPMENT USED DURING TEST
Conducted Disturbance-Mains Terminal (2)

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM031-04	EMI receiver	ESR3	R&S	1Y
EM006-06	LISN	ENV216	R&S	1Y
SA047-111	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM004-03	EMC shield Room	8m×4m×3m	Zhongyu	1Y
EM031-04-01	EMC32 software (CE)	V10.01.00	R&S	N/A

Radiated Disturbance (30 MHz-1 GHz)

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m3	ETS-LINDGREN	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	1Y
EM033-01	TRILOG Super Broadband test Antenna (30 MHz-3 GHz)	VULB 9163	SCHWARZBECK	1Y
EM031-02-01	Coaxial cable	/	R&S	1Y
EM036-01	Common-mode absorbing clamp	CMAD 20B	TESEQ	1Y
SA047-118	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A

Radiated Disturbance (1-18 GHz)

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m3	ETS—LINDGREN	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	1Y
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	1Y
EM033-02	Double-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)	R&S HF907	R&S	1Y
EM033-02-02	Coaxial cable(1 GHz-18 GHz)	N/A	R&S	1Y
EM022-03	2.45 GHz Filter	BRM 50702	Micro-Tronics	1Y
SA047-118	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A

TEST REPORT

Detail of the equipment calibration due date:

Equipment No.	Cal. Due date (DD-MM-YYYY)
Conducted Disturbance-Mains Terminal (1)	
EM080-05	06/06/2024
EM006-05	06/06/2024
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Mains Terminal (2)	
EM031-04	06/01/2024
EM006-06	04/09/2024
SA047-111	23/10/2023
EM004-03	03/01/2024
EM031-04-01	N/A
Conducted Disturbance-Load and Control Terminal (1)	
EM080-05	06/06/2024
EM080-05-01	04/09/2024
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Load and Control Terminal (2)	
EM080-05	06/06/2024
EM005-06-01	04/09/2024
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Telecom Terminal	
EM080-05	06/06/2024
EM011-05	10/04/2024
EM011-06	10/04/2024
EM006-06	04/09/2024
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Antenna Terminal	
EM031-04	06/01/2024
EM084-02	19/07/2024
EM041-01	05/01/2024
EM041-02	05/01/2024
SA047-111	23/10/2023
EM004-03	03/01/2024

Equipment No.	Cal. Due date (DD-MM-YYYY)
Radiated Disturbance (CDN Method)	
EM080-05	06/06/2024
EM003-02	15/11/2023
EM003-03	15/11/2023
EM046-04-03	05/03/2024
EM032-02-01	13/07/2024
EM032-02-02	13/07/2024
SA047-112	23/10/2023
EM004-04	03/01/2024
Radiated electromagnetic disturbances (9 kHz-30 MHz)	
EM031-04	06/01/2024
EM061-04	05/03/2024
SA047-111	23/10/2023
EM004-03	03/01/2024
Radiated Disturbance (9 kHz-30 MHz)	
EM030-04	10/04/2024
EM031-02	15/11/2023
EM011-04	02/07/2024
EM031-02-01	10/04/2024
SA047-118	16/07/2024
EM045-01-01	N/A
Radiated Disturbance (30 MHz-1 GHz)	
EM030-04	10/04/2024
EM031-02	15/11/2023
EM033-01	04/12/2023
EM031-02-01	10/04/2024
EM036-01	17/07/2024
SA047-118	16/07/2024
EM045-01-01	N/A
Radiated Disturbance (1-18 GHz)	
EM030-04	10/04/2024
EM031-02	15/11/2023
EM031-03	15/11/2023
EM033-02	02/07/2024
EM033-02-02	10/04/2024
EM022-03	09/05/2024
SA047-118	16/07/2024
EM045-01-01	N/A

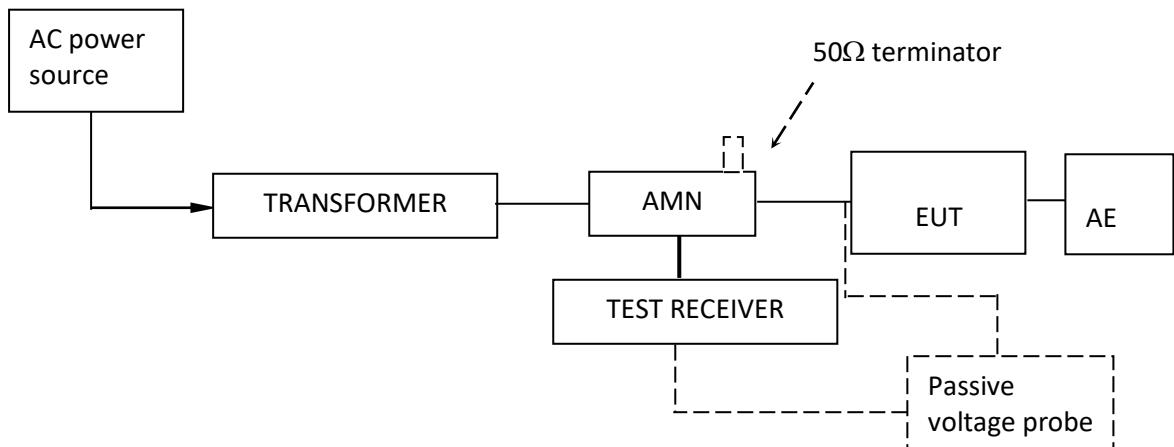
TEST REPORT

5. EMI TEST

5.1 Conducted Disturbance Voltage at mains ports

Test Result: Pass

5.1.1 Block Diagram of Test Setup



5.1.2 Test Setup and Procedure

The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane(Ground Reference Plane).And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT. During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

TEST REPORT**5.1.3 Limit**

Frequency range MHz	AC mains terminals dB (uV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note 2: The lower limit is applicable at the transition frequency.

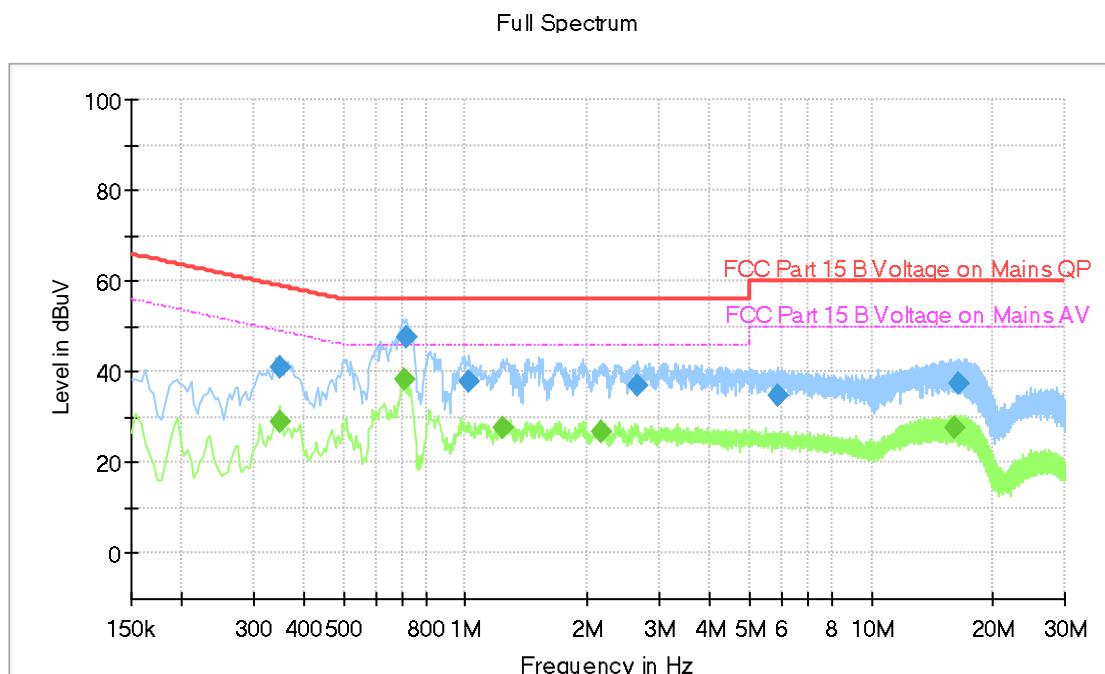
TEST REPORT

5.1.4 Test Data and curve

At mains terminal:

Tested Wire: Live

Operation Mode: lighting & charging(worst case)

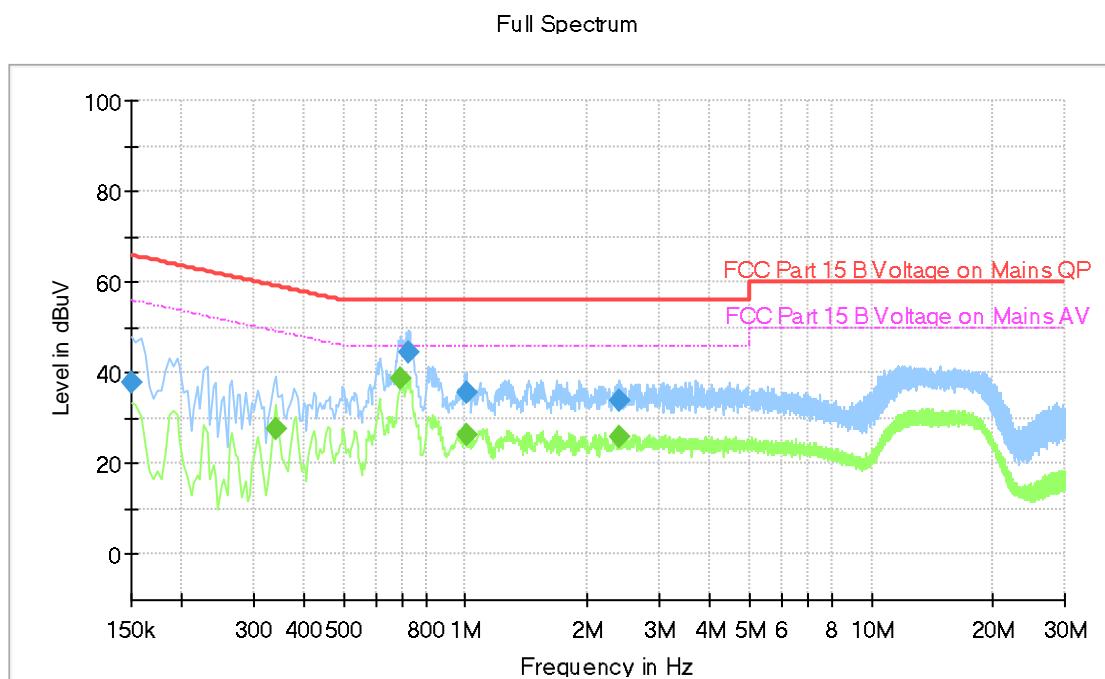


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.350000	---	29.08	48.96	19.89	1000.0	9.000	L1	ON	9.6
0.350000	41.16	---	58.96	17.80	1000.0	9.000	L1	ON	9.6
0.710000	---	38.25	46.00	7.75	1000.0	9.000	L1	ON	9.6
0.714000	47.82	---	56.00	8.18	1000.0	9.000	L1	ON	9.6
1.022000	38.09	---	56.00	17.91	1000.0	9.000	L1	ON	9.6
1.238000	---	27.91	46.00	18.09	1000.0	9.000	L1	ON	9.6
2.166000	---	26.93	46.00	19.07	1000.0	9.000	L1	ON	9.7
2.658000	37.09	---	56.00	18.91	1000.0	9.000	L1	ON	9.7
5.890000	34.71	---	60.00	25.29	1000.0	9.000	L1	ON	9.8
16.062000	---	27.55	50.00	22.45	1000.0	9.000	L1	ON	9.9
16.402000	37.43	---	60.00	22.57	1000.0	9.000	L1	ON	9.9

Remark:

1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dB μ V) = Corr. (dB) + Read Level (dB μ V)
3. Delta Limit (dB) = Level (dB μ V)-Limit (dB μ V)

TEST REPORT
Tested Wire: Neutral
Operation Mode: lighting & charging(worst case)

Final Result

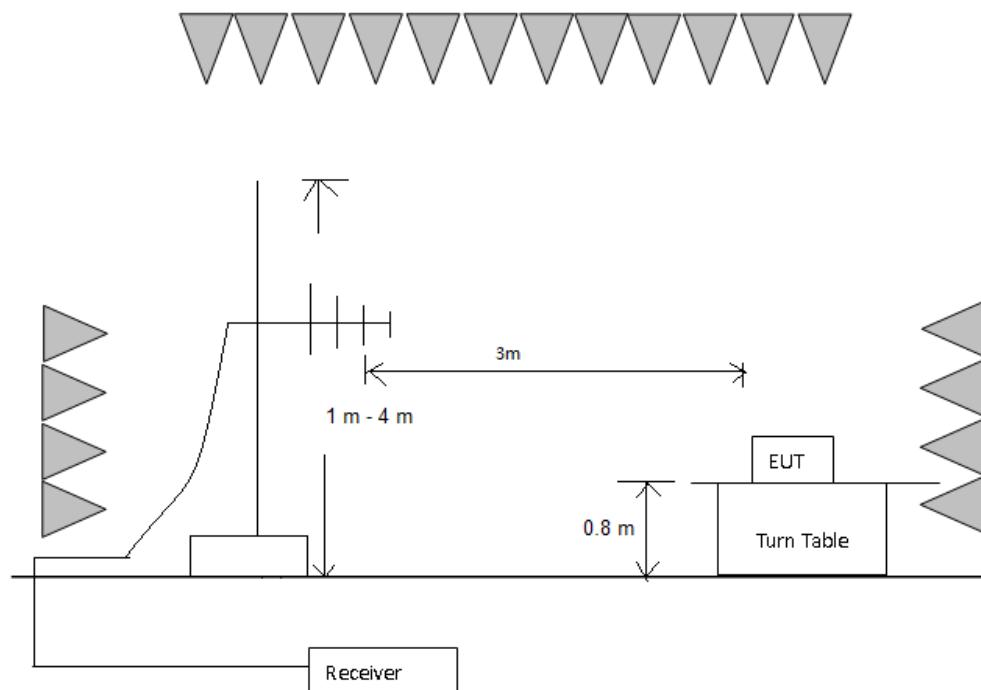
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	37.90	---	66.00	28.10	1000.0	9.000	N	ON	9.5
0.342000	---	27.53	49.16	21.63	1000.0	9.000	N	ON	9.5
0.694000	---	38.60	46.00	7.40	1000.0	9.000	N	ON	9.5
0.726000	44.48	---	56.00	11.52	1000.0	9.000	N	ON	9.5
1.002000	35.68	---	56.00	20.32	1000.0	9.000	N	ON	9.5
1.002000	---	26.50	46.00	19.50	1000.0	9.000	N	ON	9.5
2.382000	34.06	---	56.00	21.94	1000.0	9.000	N	ON	9.5
2.390000	---	26.08	46.00	19.92	1000.0	9.000	N	ON	9.5

Remark:

1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dB μ V) = Corr. (dB) + Read Level (dB μ V)
3. Delta Limit (dB) = Level (dB μ V)-Limit (dB μ V)

TEST REPORT**5.2 Radiated Emission 30 MHz -1000 MHz**

Test Result: Pass

5.2.1 Block Diagram of Test Setup**5.2.2 Test Setup and Procedure**

The measurement was applied in a semi-anechoic chamber. The EUT and simulators were placed on a 0.8 m high foamed table above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1 meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4 requirement during radiated test. The bandwidth setting on R&S Test Receiver was 120 kHz.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

TEST REPORT

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper Frequency of Radiated Measurement
Below 1.705 MHz	30MHz
1.705 MHz – 108 MHz	1 GHz
108 MHz – 500 MHz	2 GHz
500 MHz – 1 GHz	5 GHz
Above 1 GHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

At transitional frequencies the lower limit applies.

Remark: Radiated Emission was performed from 30 MHz to 1 GHz.

5.2.3 Limit

Class B limit at 3m test distance:

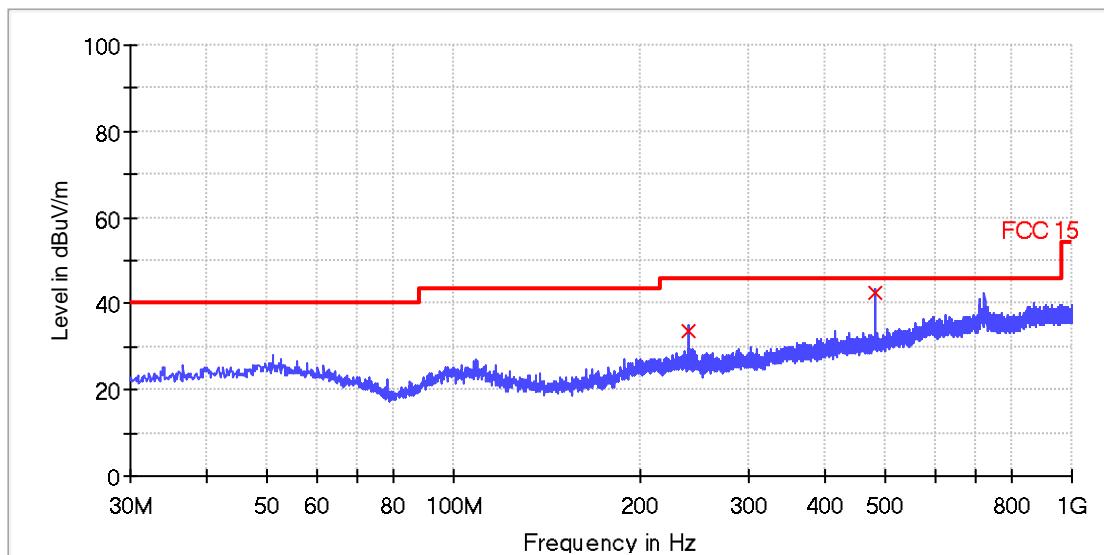
Frequency range MHz	Quasi-peak limits dB (μV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
960 to 1000	54

At transitional frequencies the lower limit applies.

TEST REPORT

5.2.4 Test Data and Curve

Operation Mode: lighting & charging(worst case)
 Horizontal



QP

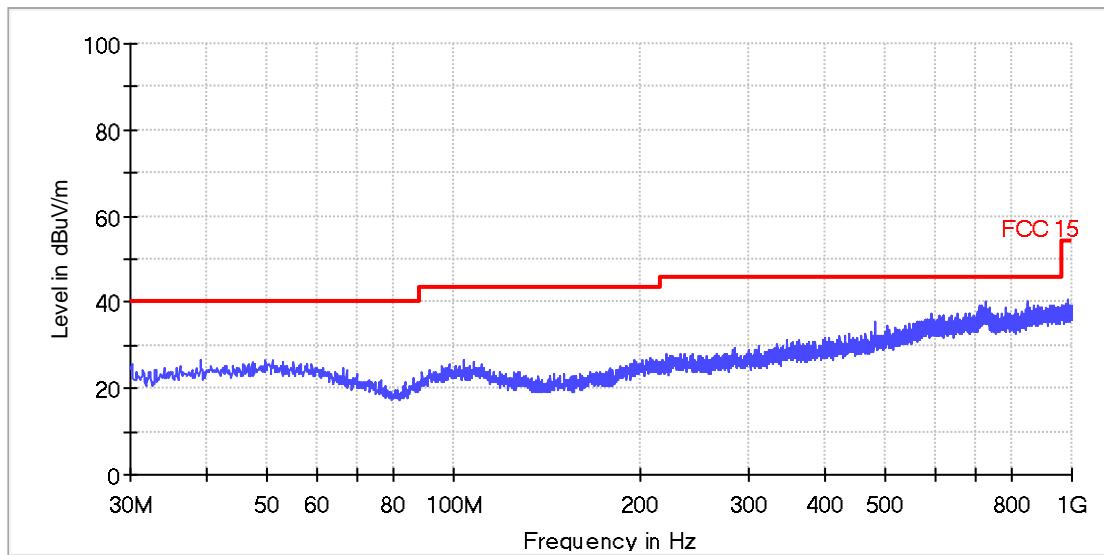
Frequency (MHz)	Quasi Peak (dB μ V/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dB μ V/m)
240.000000	33.6	120.000	H	19.9	12.4	46.0
480.000000	42.4	120.000	H	25.0	3.6	46.0

Remark:

1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB)
2. Quasi Peak (dB μ V/m) = Corr. (dB) + Read Level (dB μ V)
3. Margin (dB) = Limit QPK (dB μ V/m) – Quasi Peak (dB μ V/m)

TEST REPORT

Vertical



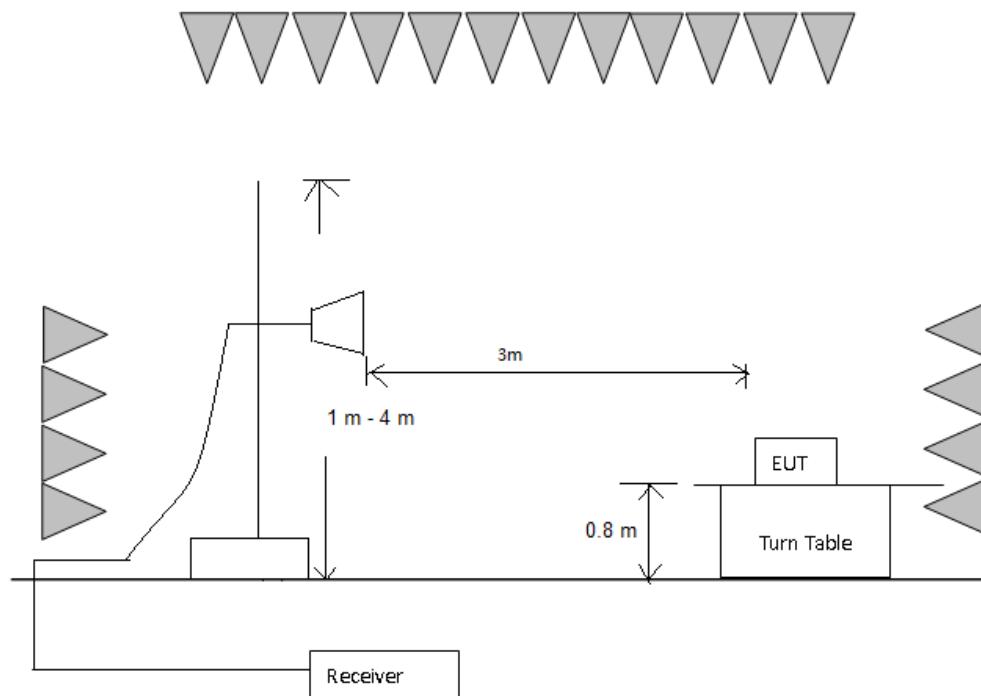
All emission levels are more than 6 dB below the limit.

5.3 Radiated Emission above 1 GHz

Test Result: Pass

TEST REPORT

5.3.1 Block Diagram of Test Setup



5.3.2 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber with absorbing material placed on the ground. The EUT were placed on a 0.8m high foamed table above the horizontal metal ground plane. The turntable varied every 30 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna pole. The antenna moved up and down from 1 meter to 4 meters to find out the maximum emission level.

Horn antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated during radiated test.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest Frequency Generated or Used in Device	Upper Frequency of Radiated Measurement
Below 1.705 MHz	30MHz
1.705 MHz – 108 MHz	1 GHz
108 MHz – 500 MHz	2 GHz
500 MHz – 1 GHz	5 GHz

TEST REPORT

Above 1 GHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower.
At transitional frequencies the lower limit applies.	

Remark: Radiated Emission was performed from 1 GHz to 13 GHz since the highest frequency generated from the EUT was 2480 MHz.

5.3.3 Limit

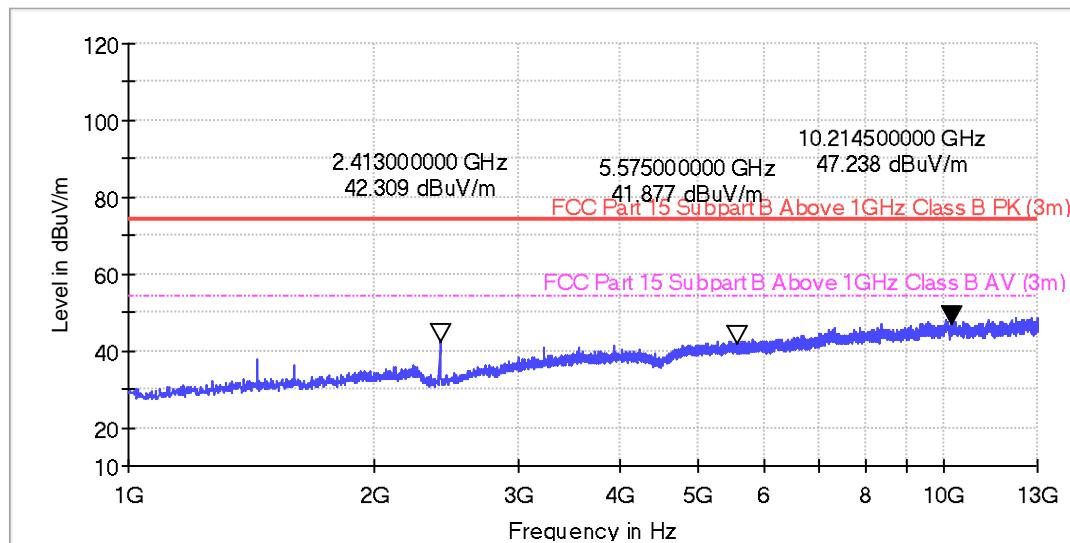
Class B limit at 3m test distance:

Frequency range MHz	Linear Average Detector dB (μ V/m)	Peak Detector dB (μ V/m)
> 1000	54	74
At transitional frequencies the lower limit applies.		

TEST REPORT

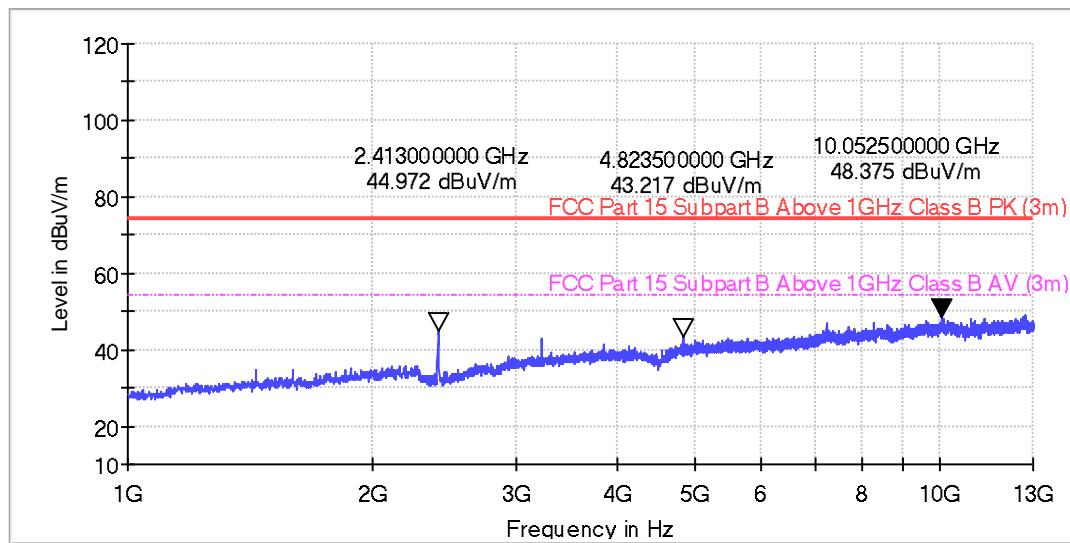
5.3.4 Test Data and Curve

Operation Mode: lighting & charging(worst case)
 Horizontal



All emission levels are more than 6 dB below the limit.

Vertical



All emission levels are more than 6 dB below the limit

*****End of Report*****