

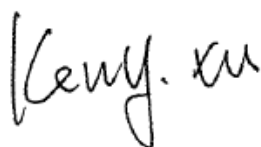
TEST REPORT

Application No.: SZEM2005004379BA
Applicant: Otter Products LLC.
Address of Applicant: 209 South Meldrum, Fort Collins, Colorado, 80521 United States
Manufacturer: Hamedata Technology Co., Limited
Address of Manufacturer: 3F, Building 1, Huahan Industrial Park, No.16, Jinniu West Rd., Pingshan New District., Shenzhen
Factory: Hamedata Technology Co., Limited
Address of Factory: 3F, Building 1, Huahan Industrial Park, No.16, Jinniu West Rd., Pingshan New District., Shenzhen

Equipment Under Test (EUT):
EUT Name: Power Bank
Model No.: OBFTC-0044-A
Trade Mark: OTTERBOX
FCC ID: 2AEEV-OBFTC0044A
Standard(s) : 47 CFR Part 15, Subpart C
Date of Receipt: 2020-06-01
Date of Test: 2020-06-03 to 2020-06-09
Date of Issue: 2020-06-11

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Keny Xu
EMC Laboratory Manager



Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-06-11		Original

Authorized for issue by:			
			
		<hr/> Peter Geng /Project Engineer	
			
		<hr/> Eric Fu /Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C	ANSI C63.10 (2013) Section 6.9.2	47 CFR Part 15, Subpart C 15.215	Pass
Restricted Bands	47 CFR Part 15, Subpart C	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C	ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass



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4 General Information

4.1 Details of E.U.T.

Power Supply:	Battery Capacity: 15000mAh/3.7V 55.5Wh Rated Capacity(min):9200mAh USB-C Input: DC 5V, 3A; DC 9V, 2A; DC 12V, 1.5A USB-A Output: DC 5V, 2.4A; DC 9V, 2A; DC 12V, 1.5A USB-C Output: DC 5V, 3A; DC 9V, 2A; DC 12V, 1.5A Qi Output: 5W; 7.5W; 10W Total Output: DC 5V, 3A
Operation frequency:	126.44-129.01kHz
Antenna Type:	Loop Antenna
Modulation Type:	Load Modulation

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
iPhone 8	Apple	A1863	F4GVQ656JC6D
SAMSUNG Galaxy S8	SAMSUNG	SM-G9500	R28J9140LPB

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Occupied Bandwidth	$\pm 3\%$
3	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
4	Temperature test	$\pm 1^\circ\text{C}$
5	Humidity test	$\pm 3\%$
6	Supply voltages	$\pm 1\%$
7	Time	$\pm 3\%$



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27

Restricted Bands					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27

Radiated Emissions (9kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019-07-11	2020-07-10
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2019-12-16	2020-12-15
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07



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Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2020-04-09	2021-04-08
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Radiated Emissions (30MHz-1GHz)

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019-07-11	2020-07-10
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2019-12-16	2020-12-15
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2020-04-09	2021-04-08
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

Limit:

Standard Requirement:

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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

6.1.2 Conclusion

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.



7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
 Test Method: ANSI C63.10 (2013) Section 6.9.2
 Limit:

For report reference only

7.1.1 E.U.T. Operation

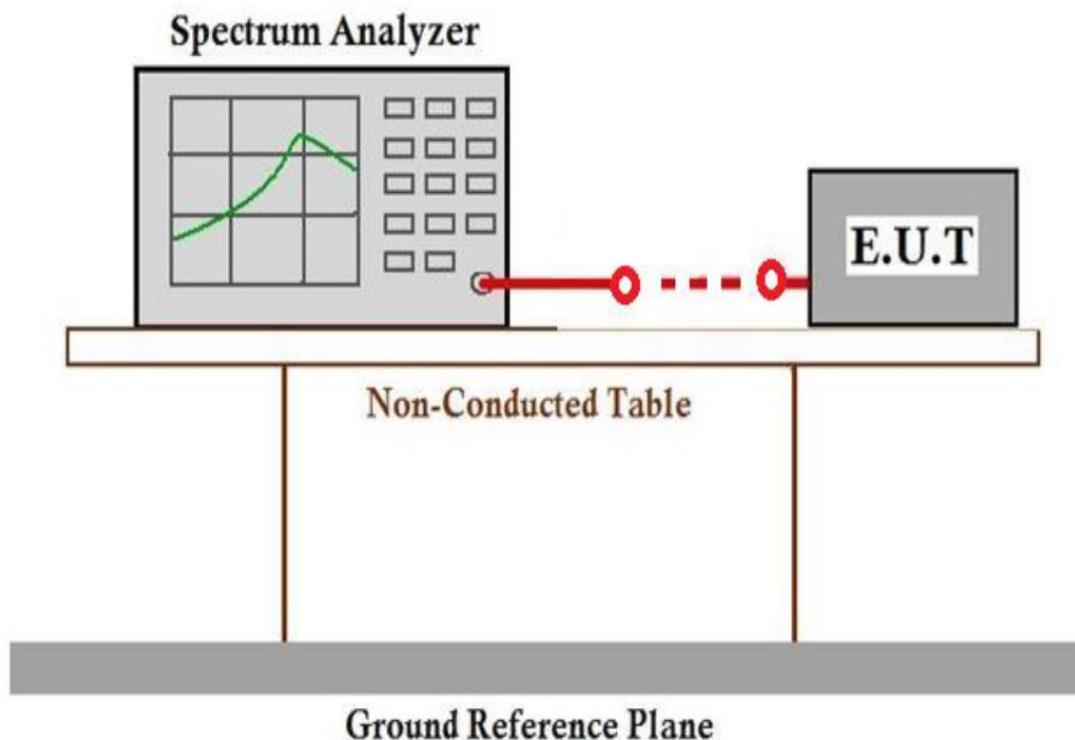
Operating Environment:

Temperature: 28.6 °C Humidity: 45.7 % RH Atmospheric Pressure: 1005 mbar

Pretest these modes to find the worst case:
 c: Charge mode_Keep the EUT charging(5W)
 d: Charge mode_Keep the EUT charging(7.5W)
 e: Charge mode_Keep the EUT charging(10W)

The worst case for final test:
 e: Charge mode_Keep the EUT charging(10W)

7.1.2 Test Setup Diagram

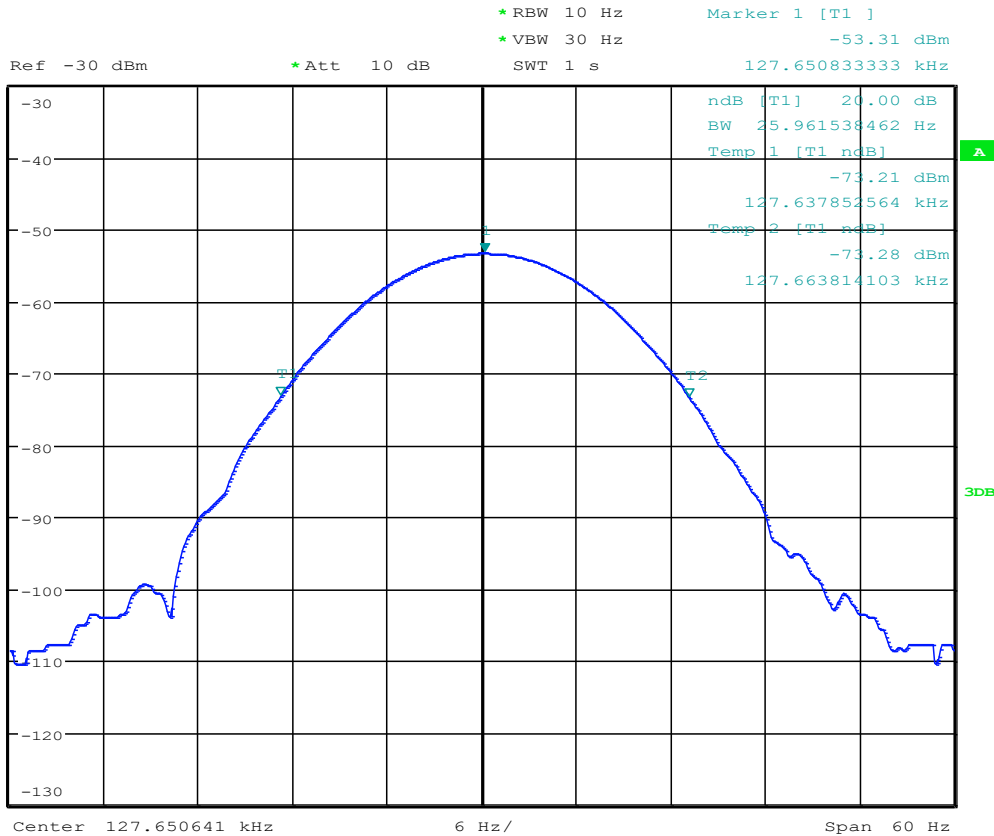


7.1.3 Measurement Procedure and Data





1 PK
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7.2 Restricted Bands

Test Requirement 47 CFR Part 15, Subpart C 15.205
 Test Method: ANSI C63.10 (2013) Section 6.10.5
 Limit:

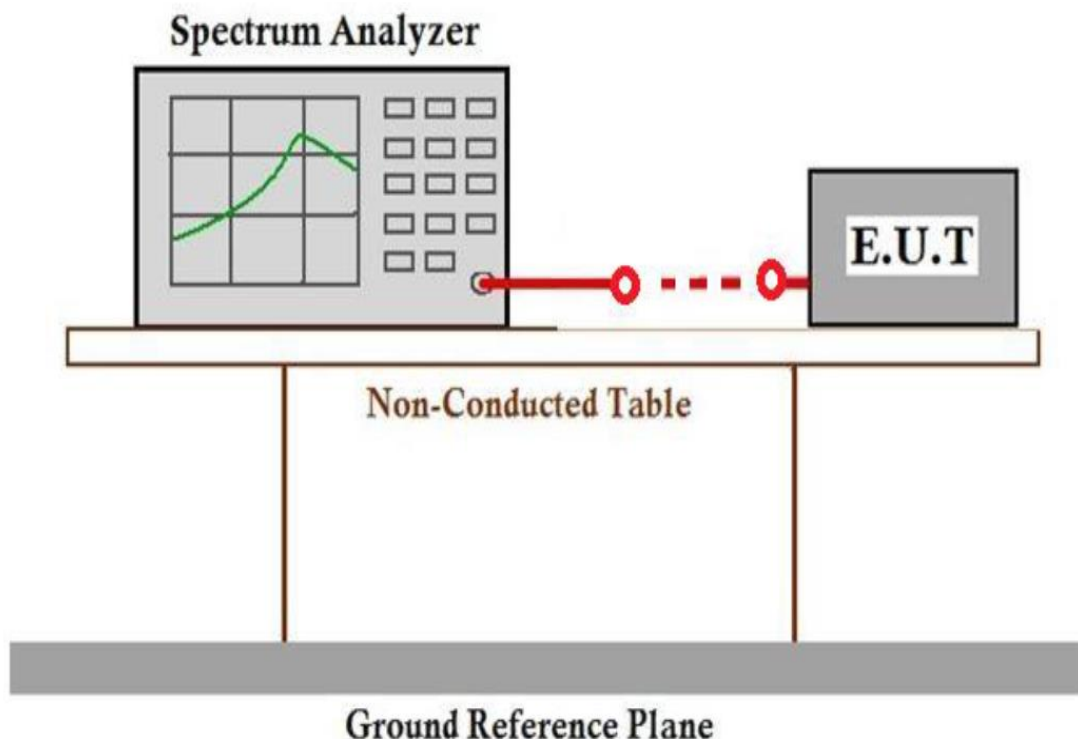
The fundamental wave can not fall in the restricted band 90KHz-110KHz

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 28.6 °C Humidity: 45.7 % RH Atmospheric Pressure: 1005 mbar
 Pretest these modes to find the worst case:
 c: Charge mode_Keep the EUT charging(5W)
 d: Charge mode_Keep the EUT charging(7.5W)
 e: Charge mode_Keep the EUT charging(10W)
 The worst case for final test: e: Charge mode_Keep the EUT charging(10W)

7.2.2 Test Setup Diagram



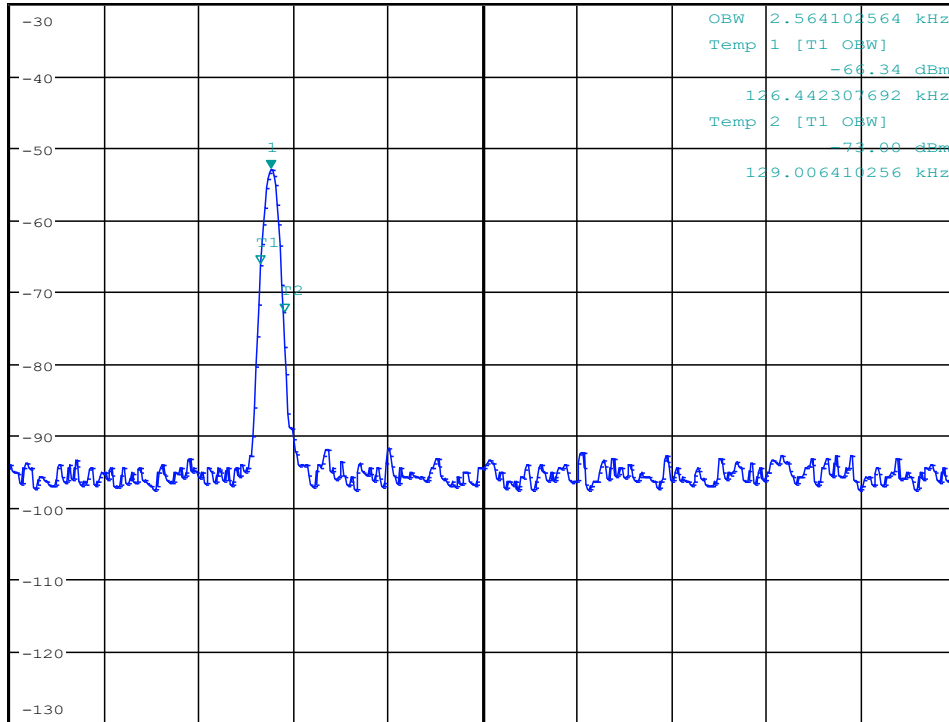
7.2.3 Measurement Procedure and Data





Ref -30 dBm * Att 10 dB * RBW 1 kHz * VBW 3 kHz Marker 1 [T1]
SWT 100 ms 127.564102564 kHz -52.99 dBm

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Start 100 kHz 10 kHz/ Stop 200 kHz



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7.3 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4
Measurement Distance: 3m
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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

If field strength is measured at only a single point, then that point shall be at the radial from the EUT that produces the maximum emission at the frequency being measured, as described in 5.4. If that point is closer to the EUT than $\lambda/2\pi$ and the limit distance is greater than $\lambda/2\pi$, the measurement shall be extrapolated to the limit distance by conservatively presuming that the field strength decreases at a 40 dB/decade of distance rate to the $\lambda/2\pi$ distance, and at a 20 dB/decade of distance rate beyond $\lambda/2\pi$. This shall be accomplished using Equation (2):

$$FS_{(10m)} = FS_{(30/300m)} + 40\log\{d_{(near\ field)}/d_{(10m)}\} + 20\log\{d_{(30/300m)}/d_{(near\ field)}\} \quad (2)$$

If the single point measured is at a distance greater than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (3):

$$FS_{(10m)} = FS_{(30/300m)} + 20\log\{d_{(30/300m)}/d_{(10m)}\} \quad (3)$$

If both the single point and the limit distance are equal to or closer to the EUT than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{(10m)} = FS_{(30/300m)} + 40\log\{d_{(30/300m)}/d_{(10m)}\} \quad (4)$$

Remark:

$$d_{near\ field} = 47.77 / f_{MHz}$$

where f_{MHz} is the frequency of the emission being measured in MHz.



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7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

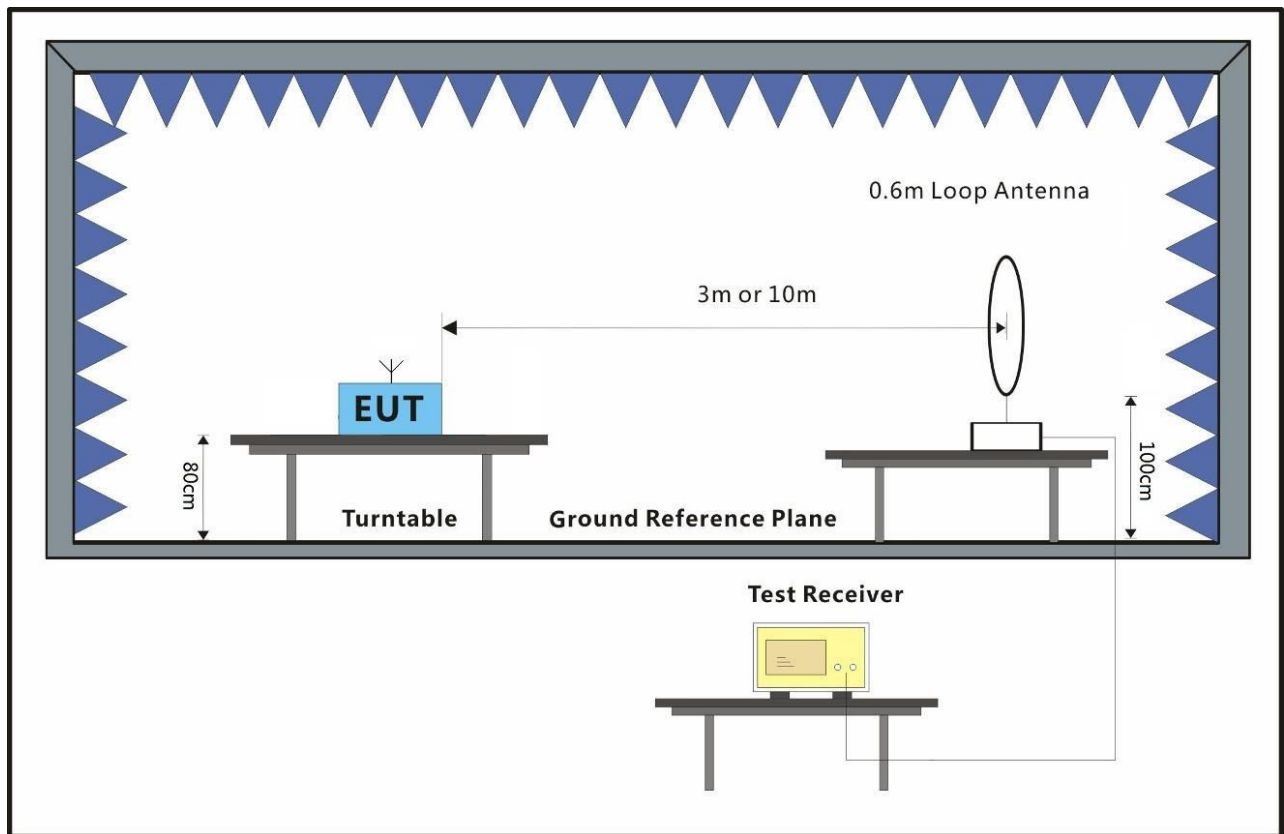
Pretest these modes to find the worst case:

- c: Charge mode_Keep the EUT charging(5W)
- d: Charge mode_Keep the EUT charging(7.5W)
- e: Charge mode_Keep the EUT charging(10W)

The worst case for final test:

- e: Charge mode_Keep the EUT charging(10W)

7.3.2 Test Setup Diagram

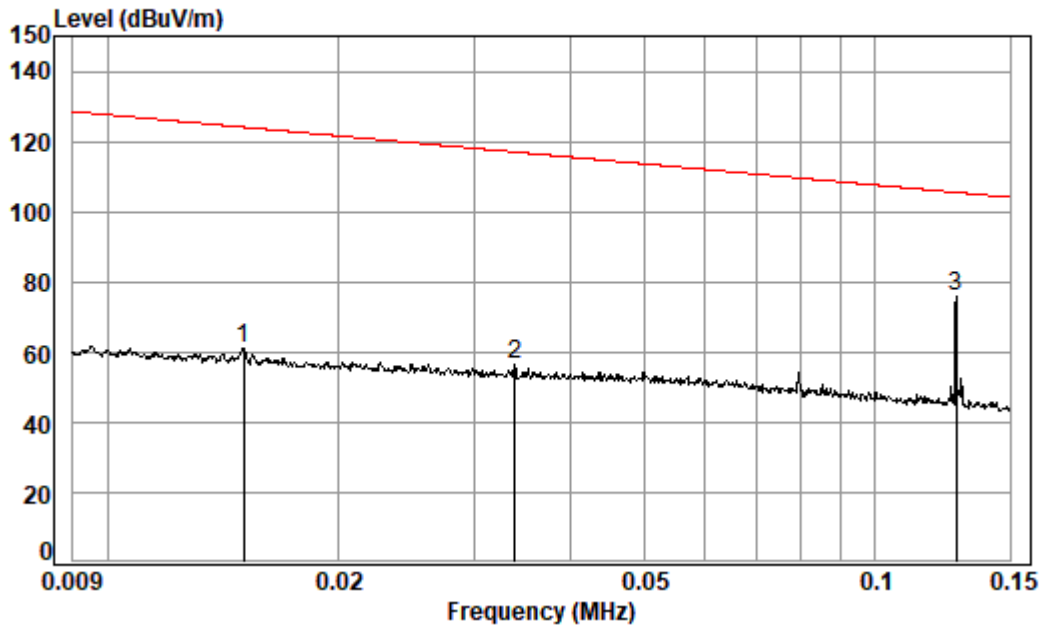


7.3.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.



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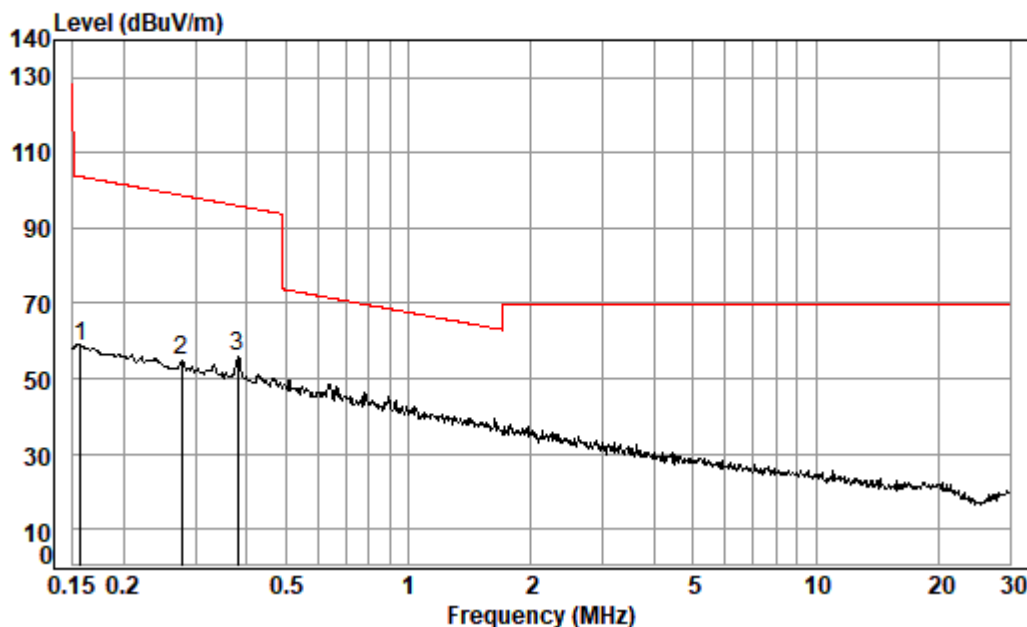


Condition: 3m
Job No. : 04379BA
Test Mode: e

	Ant Freq	Preamp Factor	Cable Loss	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	0.015	18.61	30.91	0.32	73.08	61.10	124.07	-62.97 Average
2	0.034	15.28	31.46	0.01	72.83	56.66	116.99	-60.33 Average
3 pp	0.128	13.96	32.20	0.02	94.01	75.79	105.48	-29.69 Average



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Condition: 3m
Job No. : 04379BA
Test Mode: e

	Ant Freq	Preamp Factor	Cable Loss	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	0.156	13.94	32.21	0.02	77.00	58.75	103.71	-44.96 Average
2	0.277	13.82	32.23	0.04	73.40	55.03	98.74	-43.71 Average
3 pp	0.381	13.80	32.24	0.04	74.14	55.74	95.98	-40.24 Average



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7.4 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.5
Measurement Distance: 10m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.4.1 E.U.T. Operation

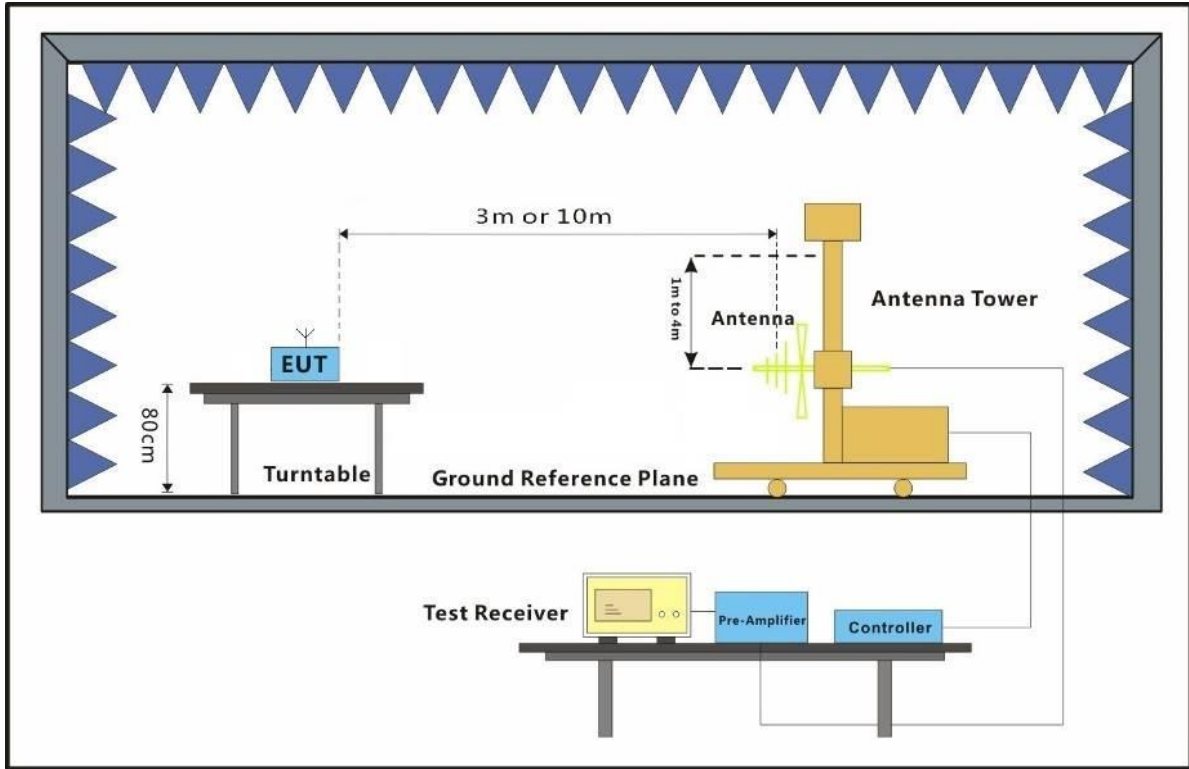
Operating Environment:

Temperature: 25 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar
Pretest these modes to find the worst case:
c: Charge mode_Keep the EUT charging(5W)
d: Charge mode_Keep the EUT charging(7.5W)
e: Charge mode_Keep the EUT charging(10W)
The worst case for final test:
e: Charge mode_Keep the EUT charging(10W)



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7.4.2 Test Setup Diagram



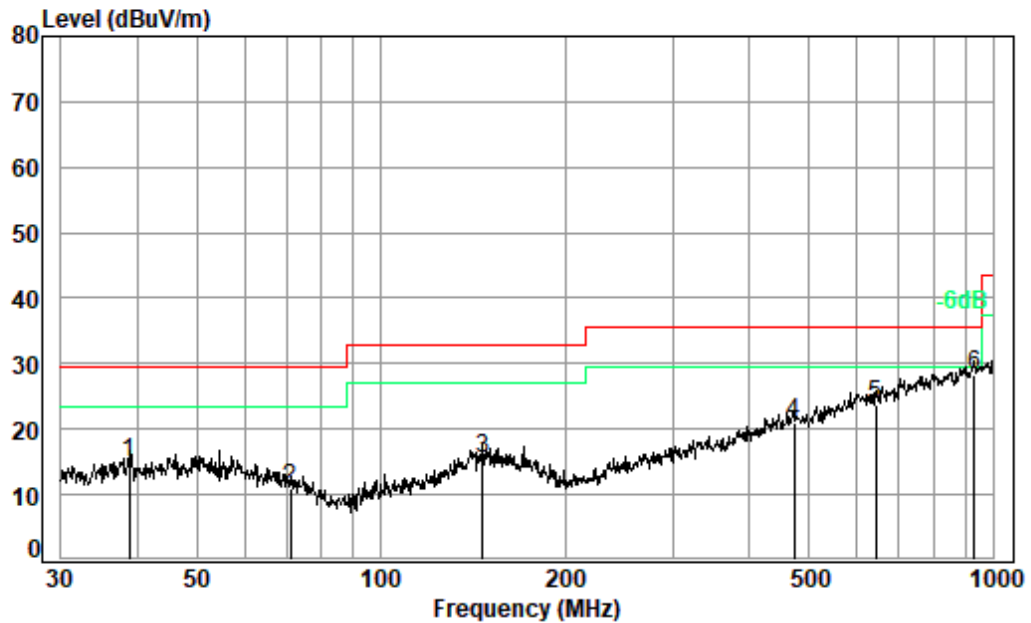
7.4.3 Measurement Procedure and Data

- The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



Mode:e; Polarization:Horizontal

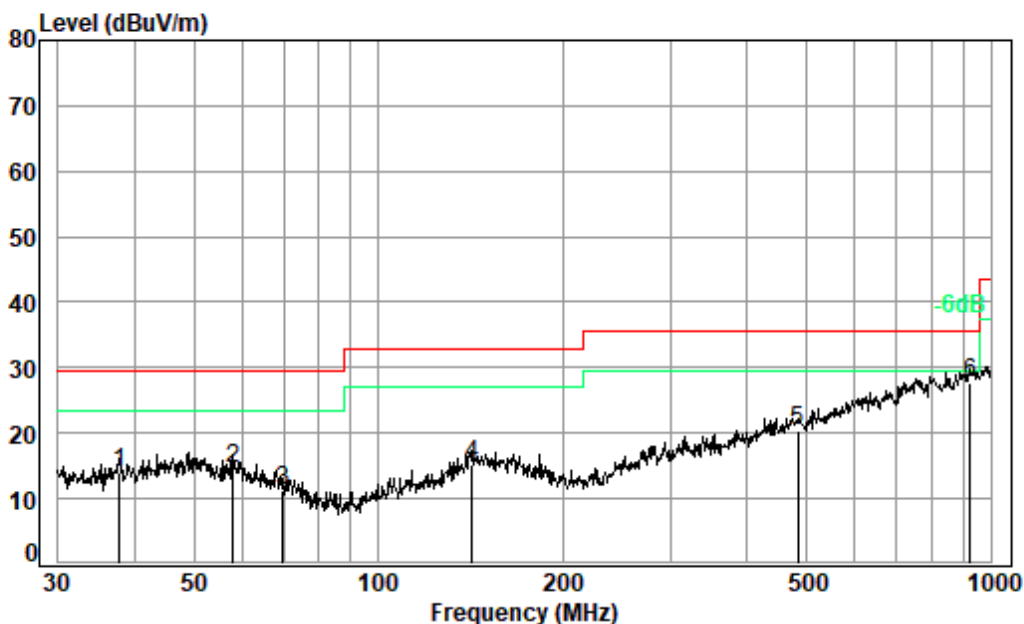


Condition: 10m HORIZONTAL
Job No. : 04379BA
Test Mode: e

	Ant Freq	Preamp Factor	Preamp Factor	Cable Loss	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	38.752	20.00	32.42	0.91	26.34	14.83	29.50	-14.67	QP
2	71.080	17.22	32.38	1.09	24.90	10.83	29.50	-18.67	QP
3	146.888	20.05	32.30	1.46	26.43	15.64	33.00	-17.36	QP
4	473.835	23.70	32.38	2.81	26.81	20.94	35.60	-14.66	QP
5	642.861	26.36	32.13	3.19	26.37	23.79	35.60	-11.81	QP
6 pp	932.272	29.80	31.35	3.46	26.47	28.38	35.60	-7.22	QP



Mode:e; Polarization:Vertical



Condition: 10m VERTICAL

Job No. : 04379BA

Test Mode: e

	Ant Freq	Preamp Factor	Cable Factor	Cable Loss	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.812	19.95	32.42	0.91	25.67	14.11	29.50	-15.39	QP
2	57.999	19.70	32.43	1.03	26.37	14.67	29.50	-14.83	QP
3	69.845	17.62	32.39	1.08	24.87	11.18	29.50	-18.32	QP
4	142.324	19.82	32.30	1.45	26.24	15.21	33.00	-17.79	QP
5	483.910	23.78	32.41	2.86	26.08	20.31	35.60	-15.29	QP
6 pp	925.756	29.80	31.38	3.45	25.90	27.77	35.60	-7.83	QP



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Radiated Emission below 1GHz

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$$L_3 / L_{10} = D_{10} / D_3$$

Note:

L₃: Level @ 3m distance. Unit: uV/m;

L₁₀: Level @ 10m distance. Unit: uV/m;

D₃: 3m distance. Unit: m

D₁₀: 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
38.75	14.83	5.51	18.38	25.29	40.00	-14.71	H
71.08	10.83	3.48	11.60	21.29	40.00	-18.71	H
146.89	15.64	6.05	20.18	26.10	43.50	-17.40	H
473.84	20.94	11.14	37.14	31.40	46.00	-14.60	H
642.86	23.79	15.47	51.57	34.25	46.00	-11.75	H
932.27	28.38	26.24	87.47	38.84	46.00	-7.16	H
37.81	14.11	5.08	16.92	24.57	40.00	-15.43	V
58.00	14.67	5.41	18.05	25.13	40.00	-14.87	V
69.85	11.18	3.62	12.07	21.64	40.00	-18.36	V
142.32	15.21	5.76	19.20	25.67	43.50	-17.83	V
483.91	20.31	10.36	34.54	30.77	46.00	-15.23	V
925.76	27.77	24.46	81.54	38.23	46.00	-7.77	V



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8 Photographs

8.1 Test Setup

Please refer to setup photos.

8.2 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

- End of the Report -

