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FCC PART 15 SUBPART C TEST REPORT

Report Reference No. : **CTL1907031011-WF**

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Address : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,
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Applicant's name : **Shenzhen Powerqi Technology Co., Ltd.**

Address : 2nd Floor, A4 Building, Block A, Fangxing Science & Tech.
Park, Longgang District, Shenzhen, China

Test specification:

Standard : FCC Part 15C

Master TRF : Dated 2011-01

Test item description : Wireless Charging Pad

FCC ID : 2AFP2FC40

Trade Mark : N/A

Model/Type reference : FC40, FC45

Transmit Frequency : 115~205KHz

Antenna type : Loop antenna

Date of receipt of test item : Jul. 15, 2019

Date of sampling : Jul. 15, 2019

Date of Test Date : Jul. 15, 2019–Jul. 30, 2019

Data of Issue : Jul. 31, 2019

Result : **Pass**

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TEST REPORT

Test Report No. :	CTL1907031011-WF	Jul. 31, 2019
		Date of issue

Equipment under Test : Wireless Charging Pad

Type / Model(s) : FC40, FC45

Applicant : **Shenzhen Powerqi Technology Co., Ltd.**

Address : 2nd Floor, A4 Building, Block A, Fangxing Science & Tech. Park,
Longgang District, Shenzhen, China

Manufacturer : **Shenzhen Powerqi Technology Co., Ltd.**

Address : 2nd Floor, A4 Building, Block A, Fangxing Science & Tech. Park,
Longgang District, Shenzhen, China

Test result	Pass *
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The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.207,15.209, 15.215\(c\)](#)

[ANSI C63.10-2013](#)

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Jul. 15, 2019
Testing commenced on	:	Jul. 15, 2019
Testing concluded on	:	Jul. 30, 2019

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 9V from USB

2.3. Short description of the Equipment under Test (EUT)

A wireless charging pad work frequency range 115-205 KHz.

For more details, refer to the user's manual of the EUT.

Serial number: FC40, FC45

2.4. EUT operation mode

The charger support DC 5V/2A and DC 9V/1.67A input modes, this 2 modes all have been tested, only worse case DC 5V/2A input mode was reported.

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- ☐ - supplied by the manufacturer
- ☒ - supplied by the lab

<input checked="" type="radio"/> Mobile Phone	Manufacturer :	SAMSUNG
	Model No. :	S7 edge
<input checked="" type="radio"/> AC adapter	Manufacturer :	ASUSTEK COMPUTER INC
	Model No. :	QCNFA335

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

This submittal(s) (test report) is intended for **FCC ID:2AFP2FC40** filing to comply with FCC Part 15, Subpart C Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. Summary of Test Results

The EUT is wireless charging pad, The test summary of the EUT listed as below:

	Test Standards	Test Result
Electric Field Radiated Emissions	FCC Part 15 C (Section15.209)	PASS
20dB Bandwidth/99% Bandwidth	FCC Part 15 C (Section15.215(c))	PASS
Conducted Emissions	FCC Part 15 C (Section15.207)	PASS

Remark: The measurement uncertainty is not included in the test result.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shaheji Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

3.2. Test Facility

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9518B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9518B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology 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. Registration 399832, December 08, 2017.

3.3. Environmental conditions

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

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.1 2	2019/05/24	2020/05/23
LISN	R&S	ESH2-Z5	860014/010	2019/05/24	2020/05/23
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2019/05/24	2020/05/23
EMI Test Receiver	R&S	ESCI	1166.5950.0 3	2019/05/24	2020/05/23
Spectrum Analyzer	Agilent	E4407B	MY41440676	2019/05/24	2020/05/23
Spectrum Analyzer	Agilent	N9020	US46220290	2019/05/24	2020/05/23
Controller	EM Electronics	EM 1000	060859	2019/05/24	2020/05/23
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2019/05/24	2020/05/23
Active Loop Antenna	Da Ze	ZN30900A	/	2019/05/24	2020/05/23
Amplifier	Agilent	8449B	3008A02306	2019/05/24	2020/05/23
Amplifier	Agilent	8447D	2944A10176	2019/05/24	2020/05/23
Temperature/Humidity Meter	Gangxing	CTH-608	02	2019/05/24	2020/05/23
High-Pass Filter	micro-tranics	HPM50108	G174	2019/05/24	2020/05/23
High-Pass Filter	micro-tranics	HPM50111	G142	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHN ER	SUCOFLEX 104PEA-10M	10m	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHN	SUCOFLEX	3m	2019/05/24	2020/05/23

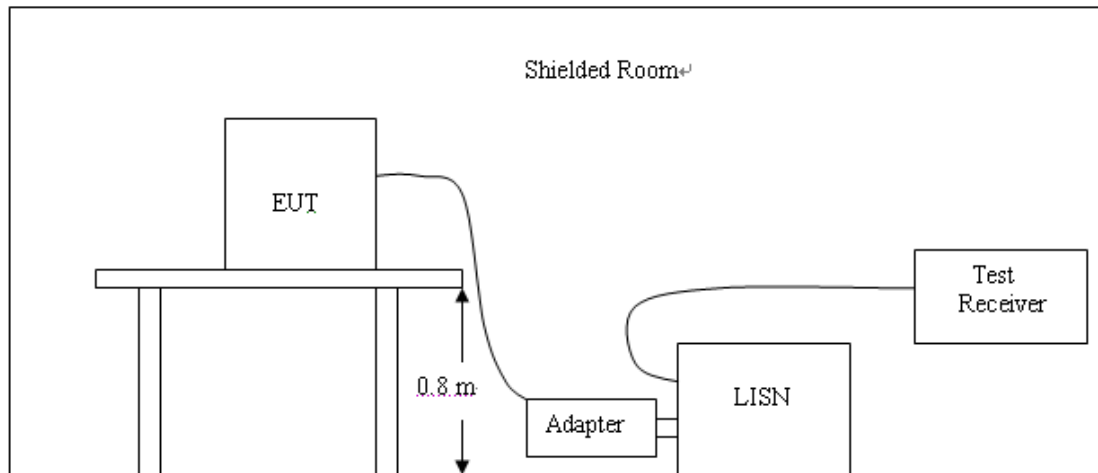
	ER	104PEA-3M			
Coaxial Cables	HUBER+SUHN ER	SUCOFLEX 104PEA-3M	3m	2019/05/24	2020/05/23
RF Cable	Megalon	RF-A303	N/A	2019/05/24	2020/05/23

The calibration interval was one year

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

AC Power Conducted Emission Limit

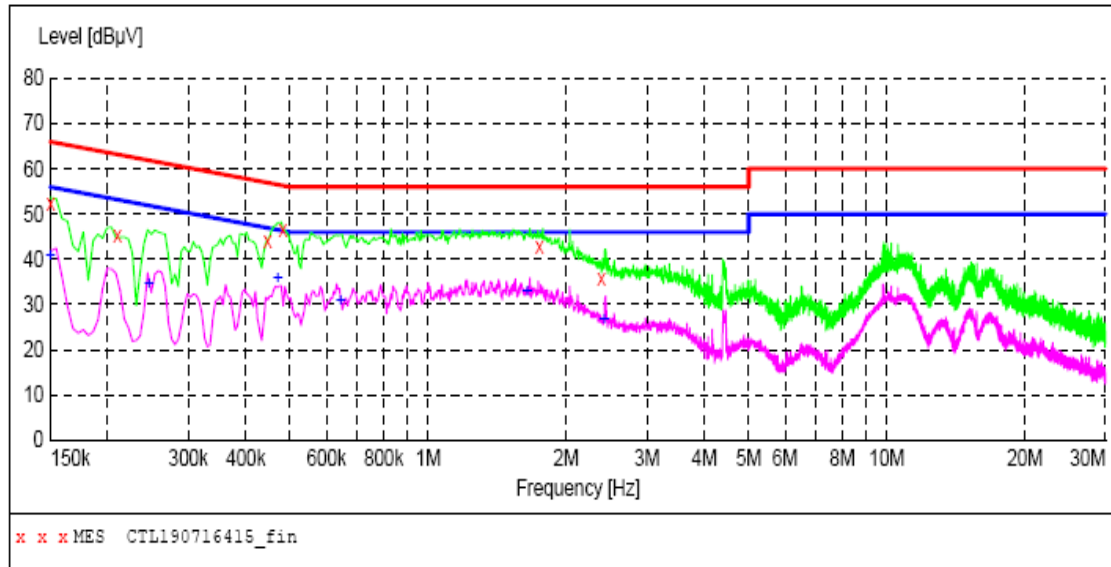
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS**SCAN TABLE: "Voltage (9K-30M) FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL190716415_fin"**

2019-7-16 02:25??

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	52.20	11.2	66	13.8	QP	L1	GND
0.210000	45.10	11.2	63	18.1	QP	L1	GND
0.446000	44.00	11.2	57	12.9	QP	L1	GND
0.482000	46.70	11.2	56	9.6	QP	L1	GND
1.748000	43.00	11.3	56	13.0	QP	L1	GND
2.384000	35.90	11.4	56	20.1	QP	L1	GND

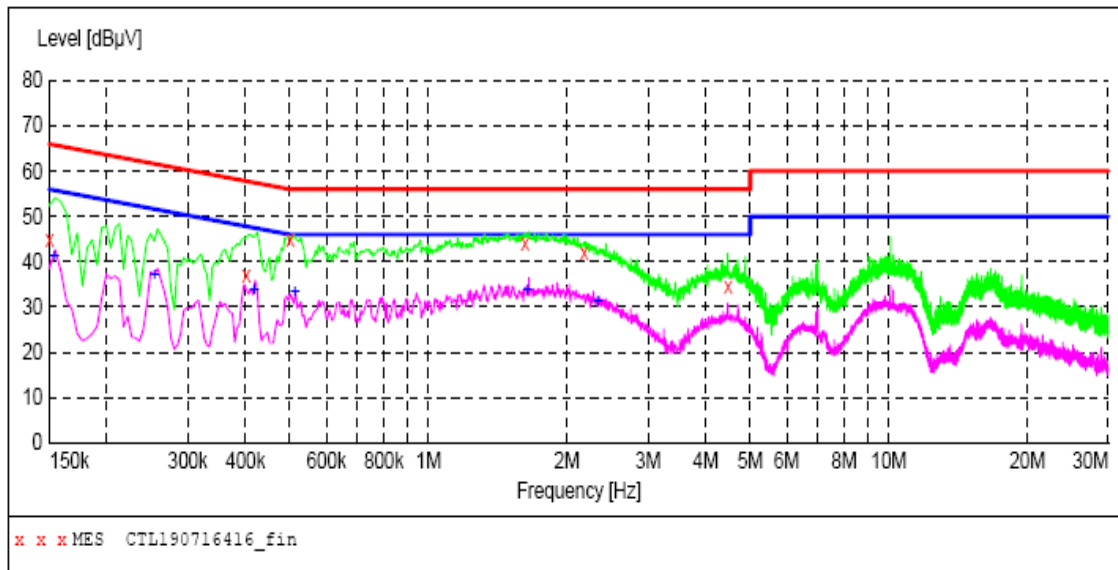
MEASUREMENT RESULT: "CTL190716415_fin2"

2019-7-16 02:25??

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	40.60	11.2	56	15.4	AV	L1	GND
0.246000	34.40	11.2	52	17.5	AV	L1	GND
0.470000	35.80	11.2	47	10.7	AV	L1	GND
0.644000	31.00	11.2	46	15.0	AV	L1	GND
1.646000	32.70	11.3	46	13.3	AV	L1	GND
2.420000	26.50	11.4	46	19.5	AV	L1	GND

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL190716416_fin"**

2019-7-16 02:29??

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	44.90	11.2	66	21.1	QP	N	GND
0.402000	36.90	11.2	58	20.9	QP	N	GND
0.500000	44.80	11.2	56	11.2	QP	N	GND
1.622000	44.00	11.3	56	12.0	QP	N	GND
2.180000	41.80	11.4	56	14.2	QP	N	GND
4.478000	34.60	11.4	56	21.4	QP	N	GND

MEASUREMENT RESULT: "CTL190716416_fin2"

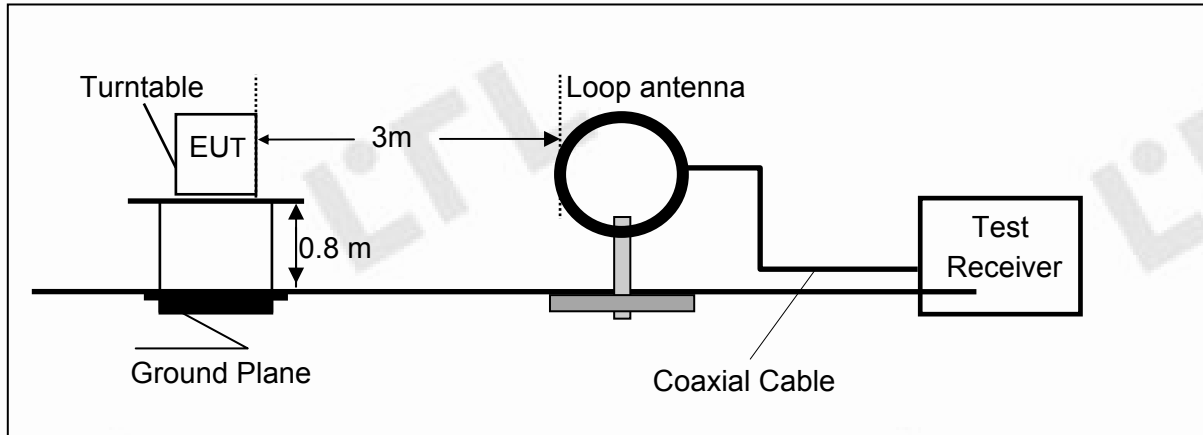
2019-7-16 02:29??

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.154000	41.20	11.2	56	14.6	AV	N	GND
0.254000	36.90	11.2	52	14.7	AV	N	GND
0.418000	33.80	11.2	48	13.7	AV	N	GND
0.512000	33.30	11.2	46	12.7	AV	N	GND
1.640000	33.80	11.3	46	12.2	AV	N	GND
2.330000	31.20	11.4	46	14.8	AV	N	GND

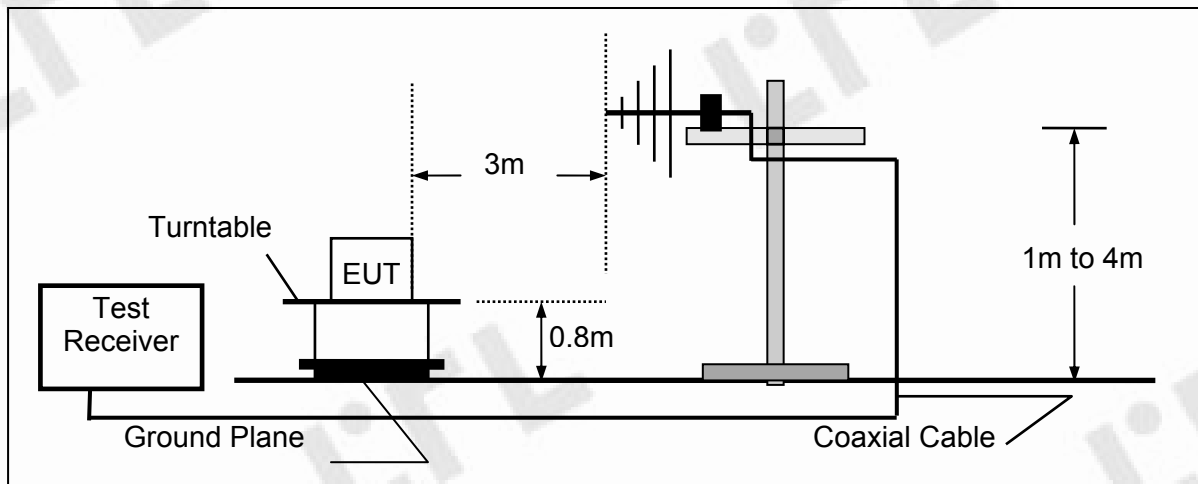
4.2. Radiated Emission

TEST CONFIGURATION

Radiated Emission Test Set-Up
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
- 3 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4 Repeat above procedures until all frequency measurements have been completed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dB μ V/m)	RA (dB μ V/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

RADIATION LIMIT

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:

9k~30MHz:

Frequency Range (MHz)	E-field Strength Limit @ 30m (mV/m)	E-field Strength Limit @ 3m (dB μ V/m)
0.009-0.490	2400/F(kHz)	129-94
0.490-1.705	24000/F(kHz)	74-63
1.705-30	30	70
Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: Extrapolation(dB) = $40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$		

Note:

- (1) The tighter limit shall apply at the edge between two frequency bands.
- (2) dB μ V/m = $20\log(\mu\text{V/m})$

30M~1GHz:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

Note:

- (1) The tighter limit shall apply at the edge between two frequency bands.
- (2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

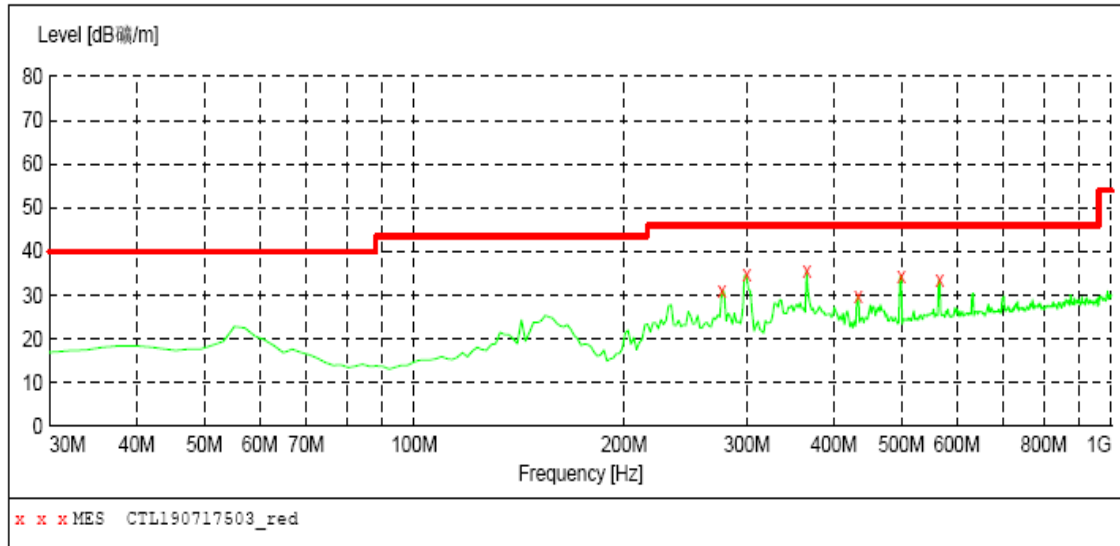
TEST RESULTS**WORST-CASE RADIATED EMISSION BELOW 30 MHz**

Frequency (MHz)	Reading (dBμV/m)	Polar Loop	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Levels (dBμV/m)	Limits at 3m (dBμV/m)	Detector Mode
0.123(F)	58.61	Loop	23.64	0.01	82.26	105.67	PK
0.123(F)	56.39	Loop	23.64	0.01	80.04	85.67	AV
0.110	36.30	Loop	23.55	0.01	59.86	106.78	PK
0.110	30.51	Loop	23.55	0.01	54.07	86.78	AV
0.646	38.80	Loop	25.07	-0.17	63.7	71.40	QP
0.978	35.72	Loop	27.12	-0.25	62.59	67.80	QP
2.805	33.35	Loop	23.91	-0.24	57.02	69.54	QP

- Remark:
1. Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
 2. The test limit distance is 3m limit.
 3. PK means Peak Value, QP means Quasi Peak Value, AV means Average Value.
 4. F means Fundamental Frequency.

Radiated Emission Test Data 30-1000MHz:***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency				
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	VULB9168

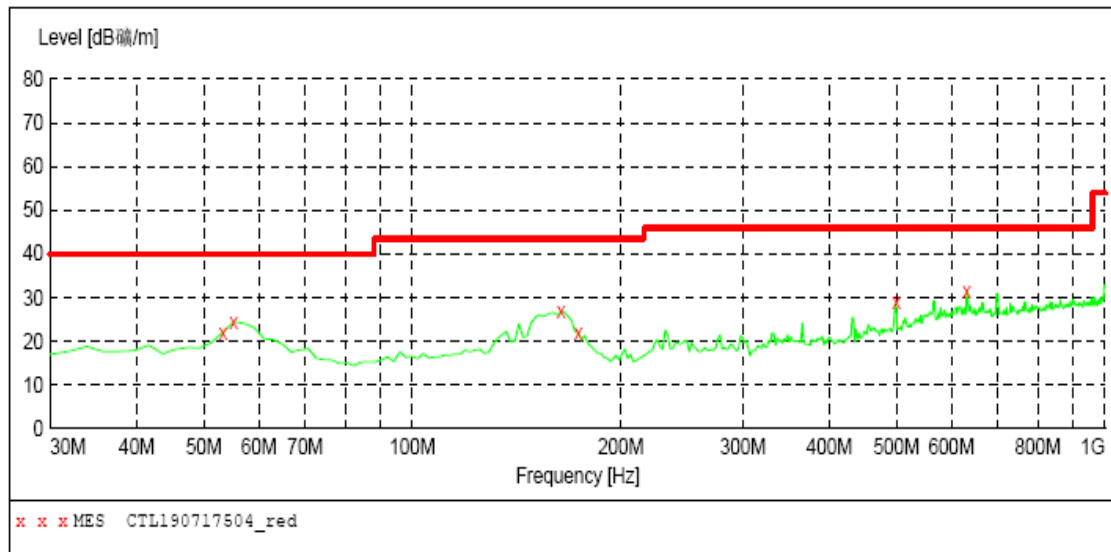
***MEASUREMENT RESULT: "CTL190717503_red"***

2019-7-17 9:25

Frequency MHz	Level dB/m	Transd dB	Limit dB/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
276.380000	31.20	13.6	46.0	14.8	---	0.0	0.00	HORIZONTAL
299.660000	34.60	14.1	46.0	11.4	---	0.0	0.00	HORIZONTAL
365.620000	35.60	15.6	46.0	10.4	---	0.0	0.00	HORIZONTAL
433.520000	29.80	17.1	46.0	16.2	---	0.0	0.00	HORIZONTAL
499.480000	34.40	18.2	46.0	11.6	---	0.0	0.00	HORIZONTAL
567.380000	33.60	19.4	46.0	12.4	---	0.0	0.00	HORIZONTAL

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency				
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	VULB9168

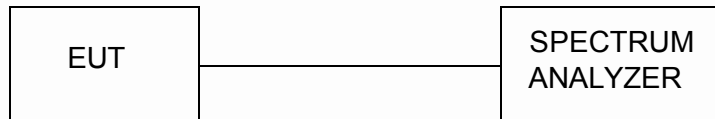
***MEASUREMENT RESULT: "CTL190717504_red"***

2019-7-17 9:27

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	22.10	13.9	40.0	17.9	---	0.0	0.00	VERTICAL
55.220000	24.50	13.8	40.0	15.5	---	0.0	0.00	VERTICAL
163.860000	26.80	14.8	43.5	16.7	---	0.0	0.00	VERTICAL
173.560000	21.80	13.7	43.5	21.7	---	0.0	0.00	VERTICAL
499.480000	28.80	18.2	46.0	17.2	---	0.0	0.00	VERTICAL
631.400000	31.50	20.7	46.0	14.5	---	0.0	0.00	VERTICAL

4.3. 20dB Bandwidth/99% Bandwidth

TEST CONFIGURATION



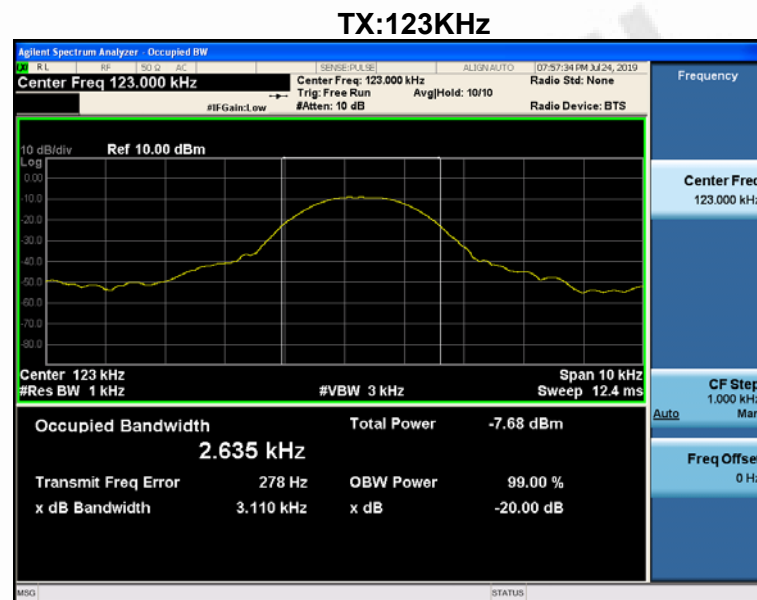
TEST PROCEDURE

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 10Hz RBW and 30Hz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

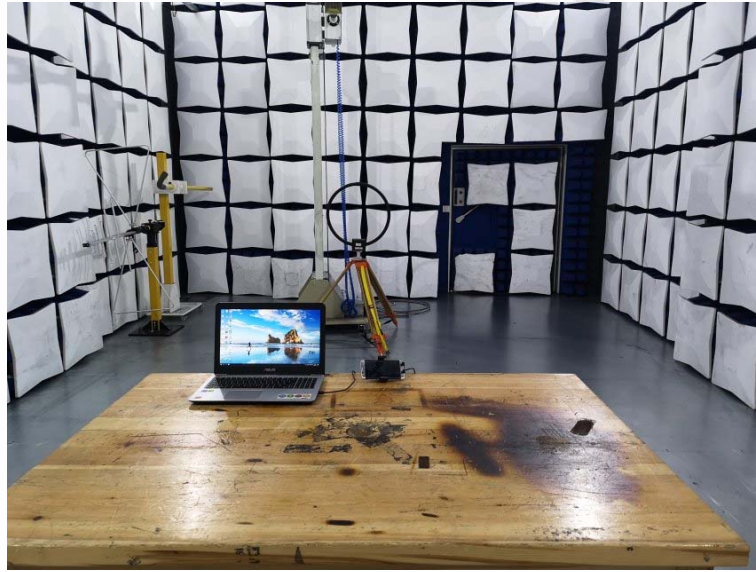
The 20dB bandwidth shall be less than 80% of the permitted frequency band.

TEST RESULTS



Result: 3.110 kHz

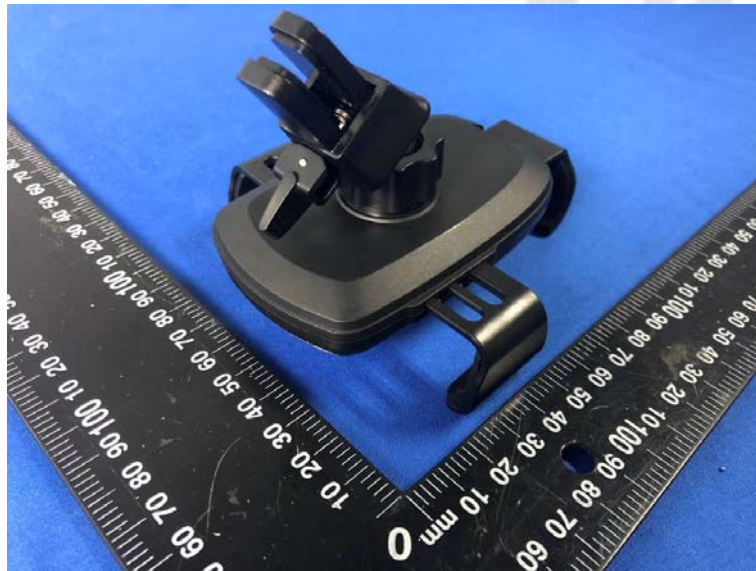
5. Test Setup Photos of the EUT



6. External and Internal Photos of the EUT

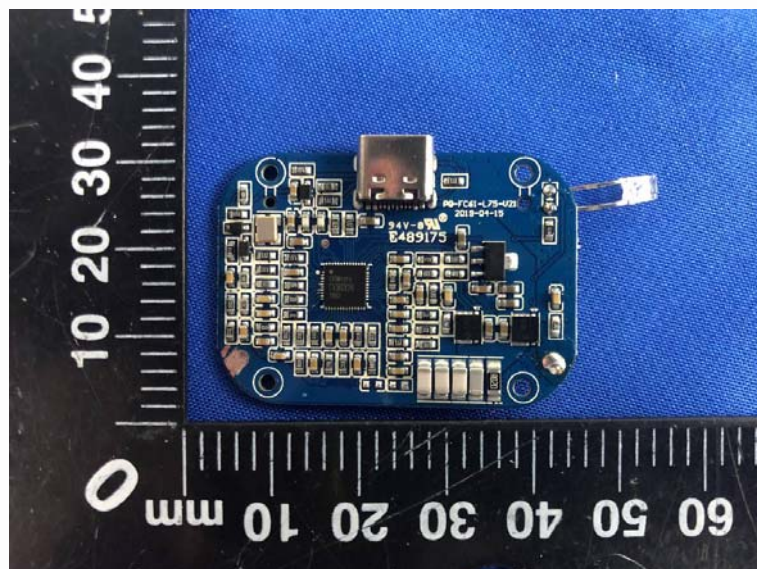
External Photos of EUT

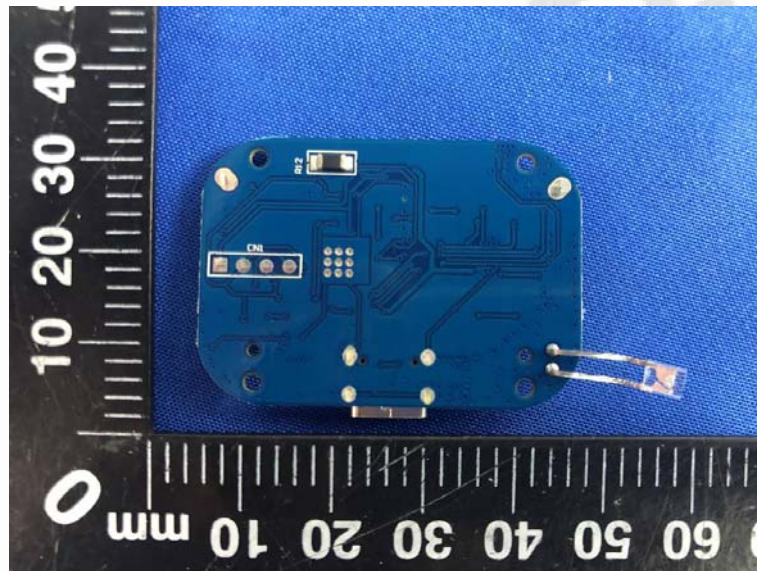




Internal Photos of EUT

Antenna





.....End of Report.....