FCC Report (Bluetooth)

Applicant:	Maxwell Forest PTY LTD
Address of Applicant:	Level 1, 85 William Street, Sydney, 2010, Australia
Manufacturer:	Shenzhen Union Smart Card Co., Ltd
Address of Manufacturer:	Floor 2nd & 5th ,Building No.3, Jinli Science and Technology Industrial Park, Jinniu West Road, Pingshan District, Shenzhen, China
Equipment Under Test (EUT)	
Product Name:	Safedome Recharge Card
Model No.:	SDR001
FCC ID:	2AQQ5-SDR001
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	July 19, 2018
Date of Test:	July 19 – August 01, 2018
Date of report issued:	August 01, 2018
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*August 01, 2018*	*Original*

Prepared By: ***Date:*** *August 01, 2018*

Project Engineer

Check By: ***Date:*** *August 01, 2018*

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable.

Remark: Test according to ANSI C63.10:2013.

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Safedome Recharge Card
Model No.:	SDR001
Serial No.:	9369998119516
Test sample(s) ID:	GTS201807000148-1
Sample(s) Status	Engineer sample
Hardware:	revB
Software:	MVT_SAFE_C81_CARD_ISO_8.0.11.13
Operation Frequency:	2402MHz-2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	3.3dBi
Power Supply:	DC 3.7V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2442MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
Supplied by client	FAST CHARGE	N/A	N/A
TEKA	AC ADAPTER	TEKA006-0501500EUU	N/A

5.4 Test Facility

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

● **FCC □Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, January 08, 2018.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

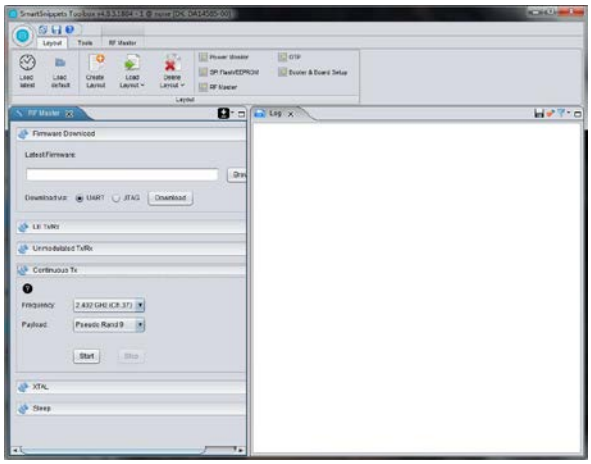
5.6 Additional Instructions

EUT Software Settings:

Mode	Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

Power level setup in software			
Test Software Name	SmartSnippets toolbox		
Mode	Channel	Frequency (MHz)	Soft Set
GFSK	CH01	2402	TX level : default
	CH21	2442	
	CH40	2480	

Run Software



6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 27 2018	June. 26 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 27 2018	June. 26 2019
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 27 2018	June. 26 2019
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 27 2018	June. 26 2019
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 27 2018	June. 26 2019
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 27 2018	June. 26 2019
8	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
9	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 27 2018	June. 26 2019

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 27 2018	June. 26 2019
2	Barometer	ChangChun	DYM3	GTS255	June. 27 2018	June. 26 2019

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 27 2018	June. 26 2019
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 27 2018	June. 26 2019
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 27 2018	June. 26 2019
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 27 2018	June. 26 2019

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

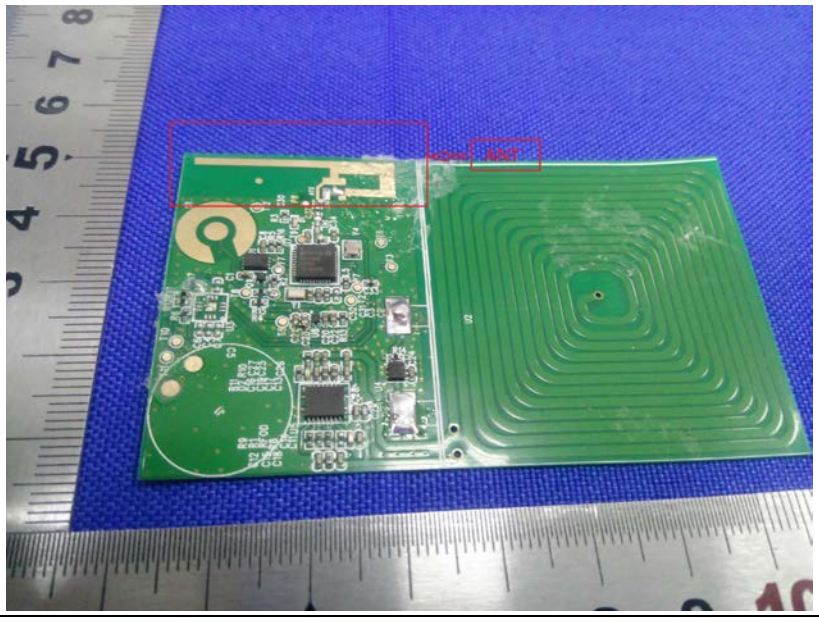
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit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

15.247(c) (1)(i) requirement:

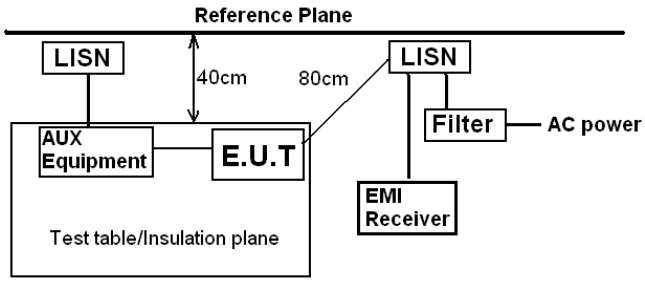
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The antenna is PCB antenna, the best case gain of the antenna is 3.3dBi

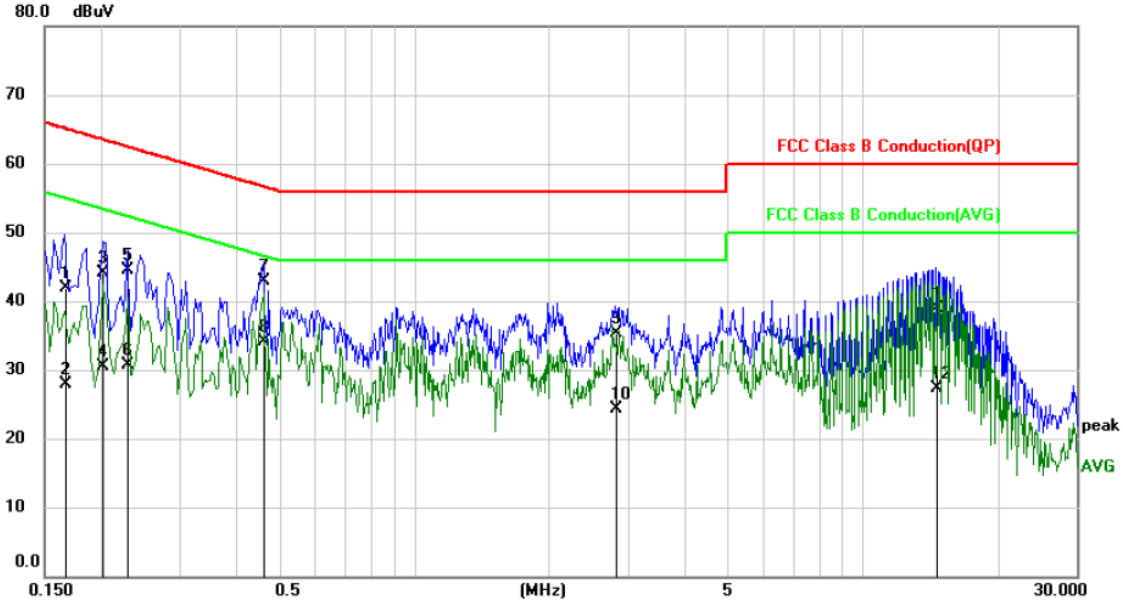


7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	<table><tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr><tr><td>Quasi-peak</td><td>Average</td></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data
Line:

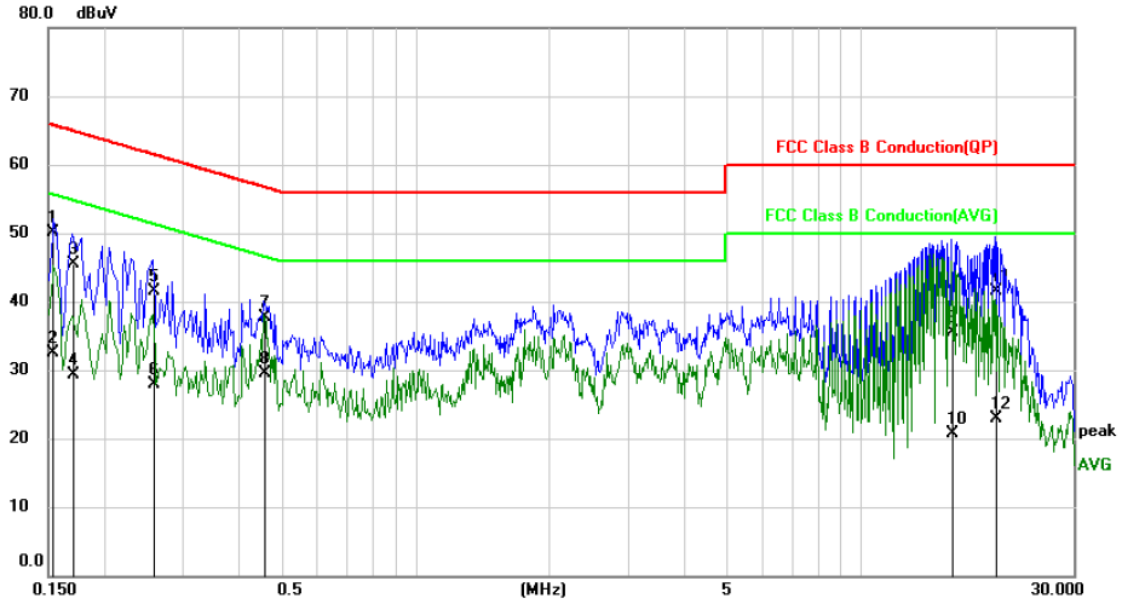
EUT:	**Safedome Recharge Card**	**Probe:**	**L1**
Model:	**SDR001**	**Power Source:**	**AC120V/60Hz**
Mode:	**BLE mode**	**Test by:**	**Bill**
Temp./Hum.(%H):	**26℃/60%RH**		
Note:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	31.72	10.09	41.81	65.16	-23.35	QP	
2		0.1660	17.91	10.09	28.00	55.16	-27.16	AVG	
3		0.2020	34.20	9.93	44.13	63.53	-19.40	QP	
4		0.2020	20.48	9.93	30.41	53.53	-23.12	AVG	
5		0.2300	34.50	9.93	44.43	62.45	-18.02	QP	
6		0.2300	20.71	9.93	30.64	52.45	-21.81	AVG	
7		0.4620	32.87	10.04	42.91	56.66	-13.75	QP	
8	*	0.4620	24.00	10.04	34.04	46.66	-12.62	AVG	
9		2.8220	25.53	9.79	35.32	56.00	-20.68	QP	
10		2.8220	14.42	9.79	24.21	46.00	-21.79	AVG	
11		14.5740	29.17	9.82	38.99	60.00	-21.01	QP	
12		14.5740	17.43	9.82	27.25	50.00	-22.75	AVG	

Neutral:

EUT:	**Safedome Recharge Card**	**Probe:**	**N**
Model:	**SDR001**	**Power Source:**	**AC120V/60Hz**
Mode:	**BLE mode**	**Test by:**	**Bill**
Temp./Hum.(%H) :	**26℃/60%RH**		
Note:			



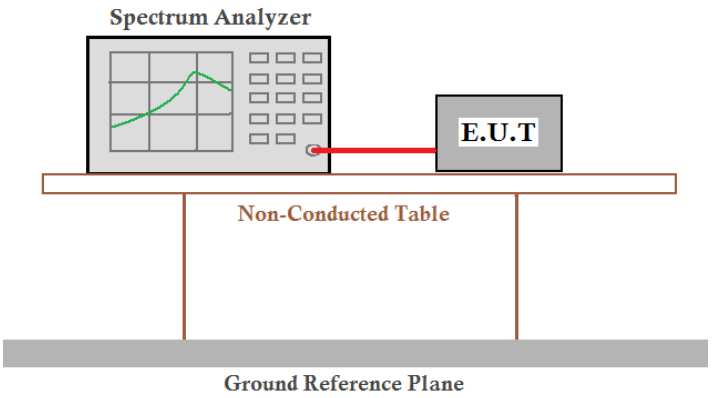
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1539	40.34	9.85	50.19	65.79	-15.60	QP	
2		0.1539	22.59	9.85	32.44	55.79	-23.35	AVG	
3		0.1700	35.34	10.11	45.45	64.96	-19.51	QP	
4		0.1700	19.14	10.11	29.25	54.96	-25.71	AVG	
5		0.2580	31.58	9.95	41.53	61.50	-19.97	QP	
6		0.2580	17.87	9.95	27.82	51.50	-23.68	AVG	
7		0.4580	27.64	10.04	37.68	56.73	-19.05	QP	
8		0.4580	19.50	10.04	29.54	46.73	-17.19	AVG	
9		16.0220	25.72	9.82	35.54	60.00	-24.46	QP	
10		16.0220	10.85	9.82	20.67	50.00	-29.33	AVG	
11		20.0100	31.78	9.80	41.58	60.00	-18.42	QP	
12		20.0100	13.12	9.80	22.92	50.00	-27.08	AVG	

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. *Final Level =Receiver Read level + Correct factor*
4. *Correct factor = LISN Factor + Cable Loss*

5. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

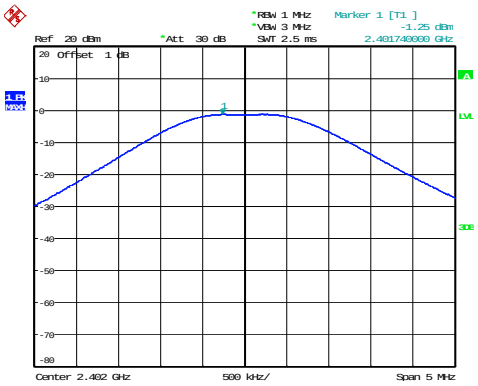
7.3 Conducted Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

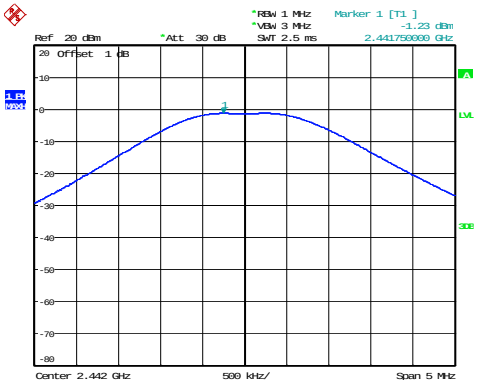
Test channel	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	-1.25	30.00	Pass
Middle	-1.23		
Highest	-1.91		

Test plot as follows:



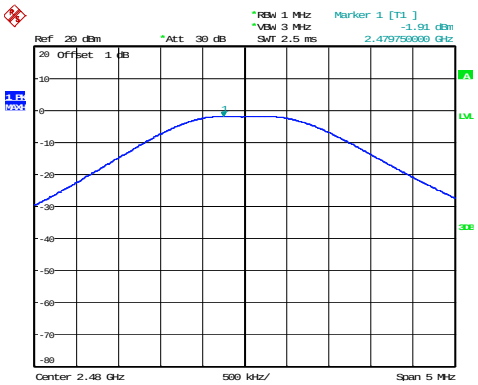
Date: 31.JUL.2018 11:19:35

Lowest channel



Date: 31.JUL.2018 11:21:41

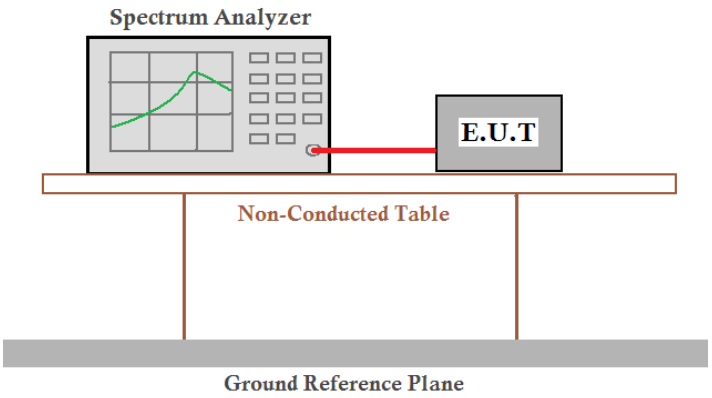
Middle channel



Date: 31.JUL.2018 11:23:49

Highest channel

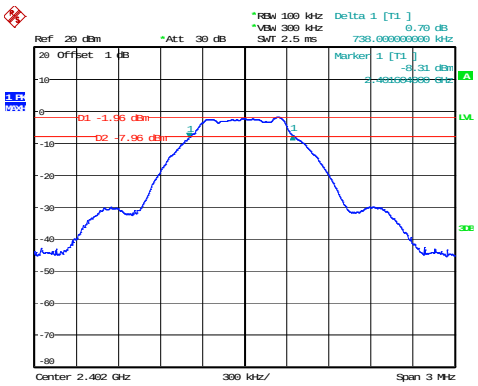
7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

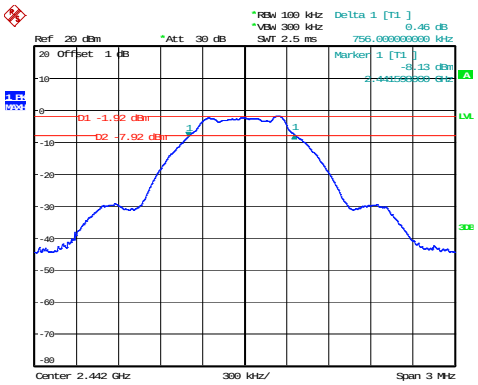
Test channel	Channel Bandwidth (MHz)	Limit(KHz)	Result
Lowest	0.738	>500	Pass
Middle	0.756		
Highest	0.762		

Test plot as follows:



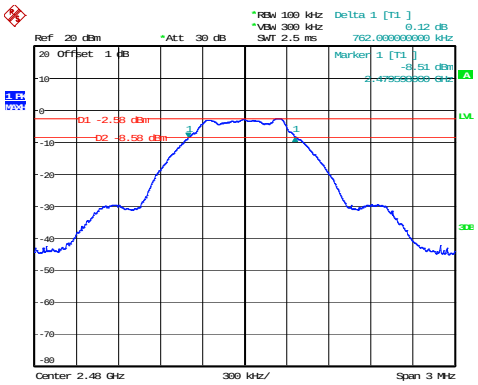
Date: 31.JUL.2018 10:56:06

Lowest channel



Date: 31.JUL.2018 10:59:37

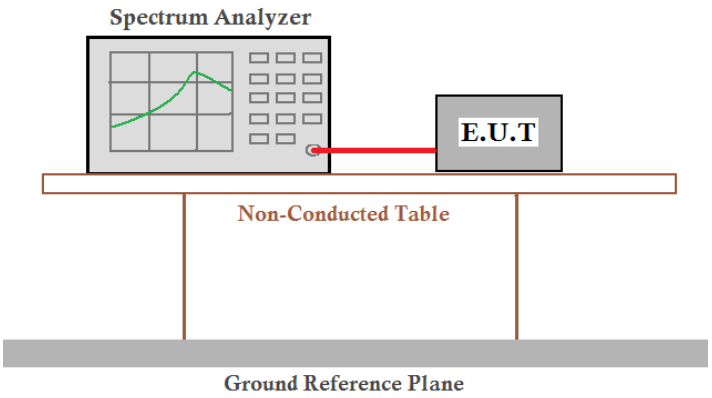
Middle channel



Date: 31.JUL.2018 11:01:40

Highest channel

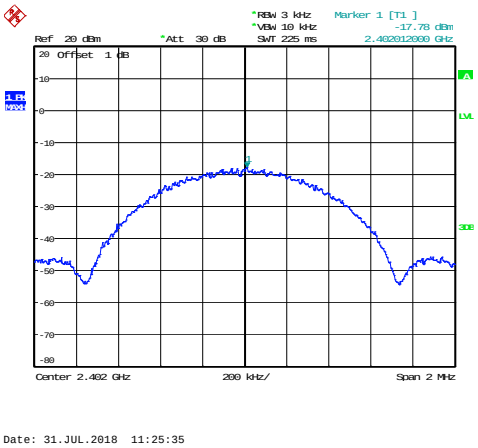
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

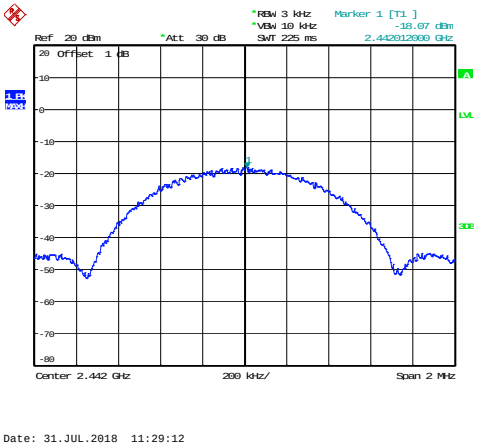
Measurement Data

Test channel	Power Spectral Density (dBm/3KHz)	Limit(dBm/3kHz)	Result
Lowest	-17.78	8.00	Pass
Middle	-18.07		
Highest	-18.72		

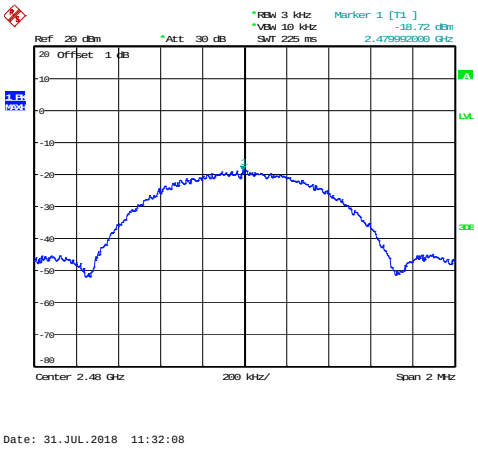
Test plot as follows:



Lowest channel



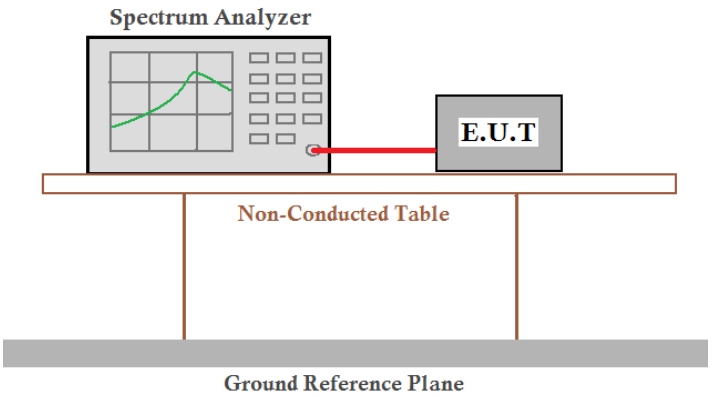
Middle channel



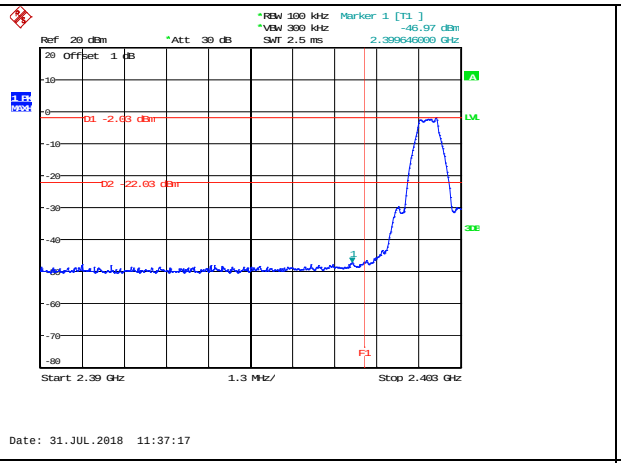
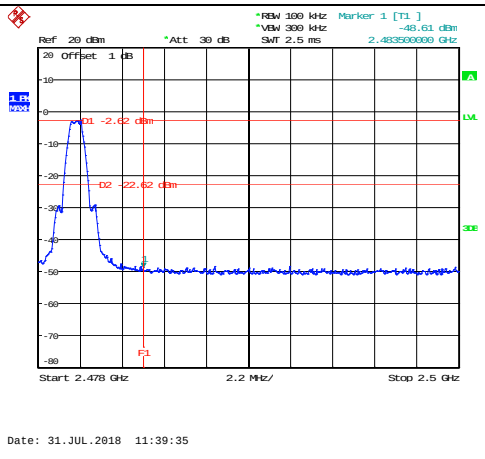
Highest channel

7.6 Band edges

7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:

	
Lowest channel	Highest channel

7.6.2 Radiated Emission Method

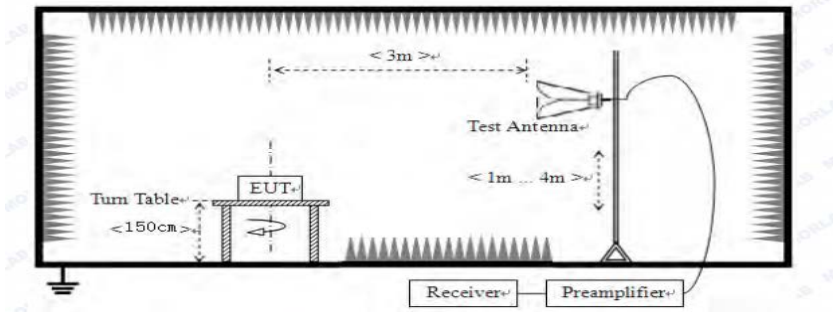
Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2390MHz, 2483.5MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	RMS	1MHz	3MHz	Average

Limit:

Frequency	Limit (dBuV/m @3m)	Value
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:



Test Procedure:

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	53.69	-15.12	38.57	74.00	-35.43	Horizontal
2390.00	53.13	-15.05	38.08	74.00	-35.92	Horizontal
2310.00	53.26	-15.12	38.14	74.00	-35.86	Vertical
2390.00	52.74	-15.05	37.69	74.00	-36.31	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	44.03	-15.12	28.91	54.00	-25.09	Horizontal
2390.00	43.81	-15.05	28.76	54.00	-25.24	Horizontal
2310.00	42.52	-15.12	27.40	54.00	-26.60	Vertical
2390.00	41.26	-15.05	26.21	54.00	-27.79	Vertical

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	72.01	-14.68	57.33	74.00	-16.67	Horizontal
2500.00	53.18	-14.60	38.58	74.00	-35.42	Horizontal
2483.50	71.25	-14.68	56.57	74.00	-17.43	Vertical
2500.00	54.08	-14.60	39.48	74.00	-34.52	Vertical

Average value:

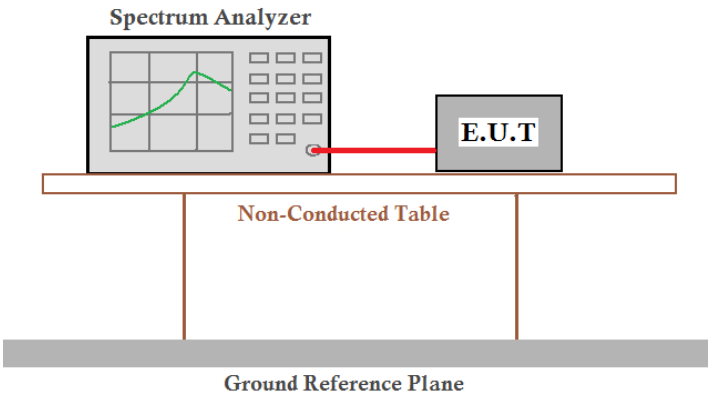
Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	53.71	-14.68	39.03	54.00	-14.97	Horizontal
2500.00	47.06	-14.60	32.46	54.00	-21.54	Horizontal
2483.50	51.33	-14.68	36.65	54.00	-17.35	Vertical
2500.00	44.29	-14.60	29.69	54.00	-24.31	Vertical

Remark:

1. *Final Level =Receiver Read level + Correct factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Correct factor= Antenna Factor + Cable Loss – Preamplifier Factor*

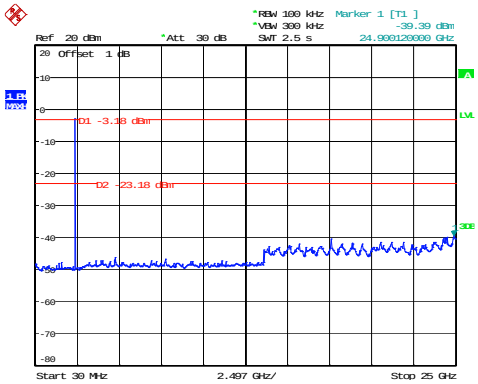
7.7 Spurious Emission

7.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:

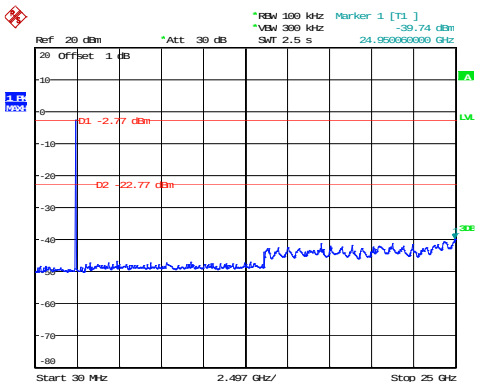
Lowest channel



Date: 31.JUL.2018 11:04:10

30MHz~25GHz

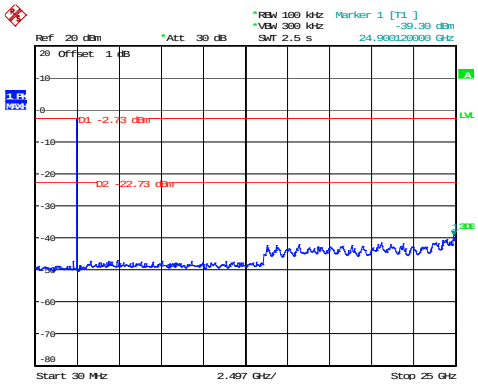
Middle channel



Date: 31.JUL.2018 11:10:53

30MHz~25GHz

Highest channel



Date: 31.JUL.2018 11:12:57

30MHz~25GHz

7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Field strength of the fundamental signal)

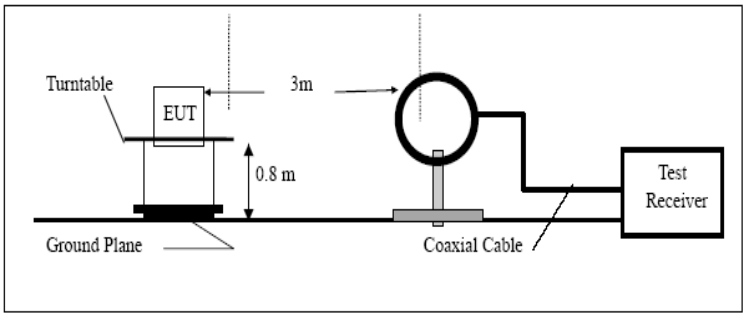
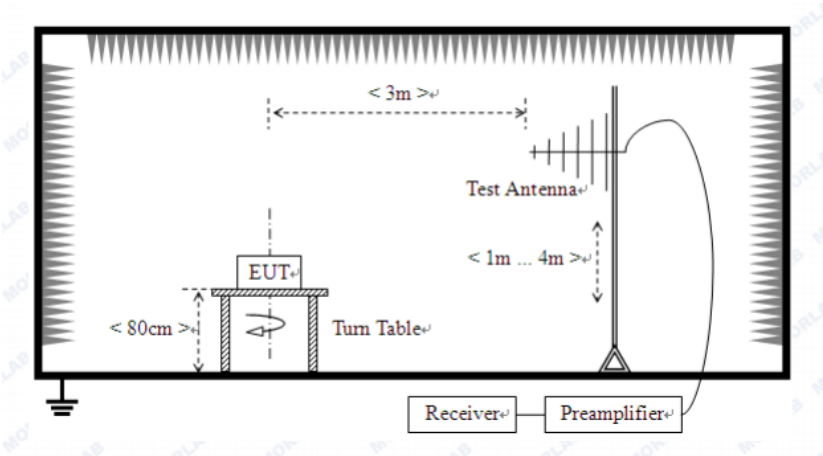
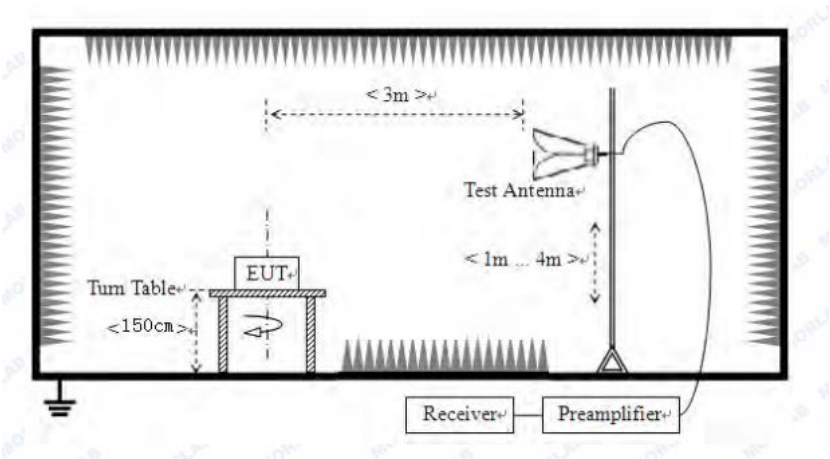
Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.00	Average Value
	114.00	Peak Value

Limit:
(Spurious Emissions)

Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	300m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Limit:
(band edge)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test setup:	Below 30MHz  Below 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. 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. 4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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 Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark:
Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

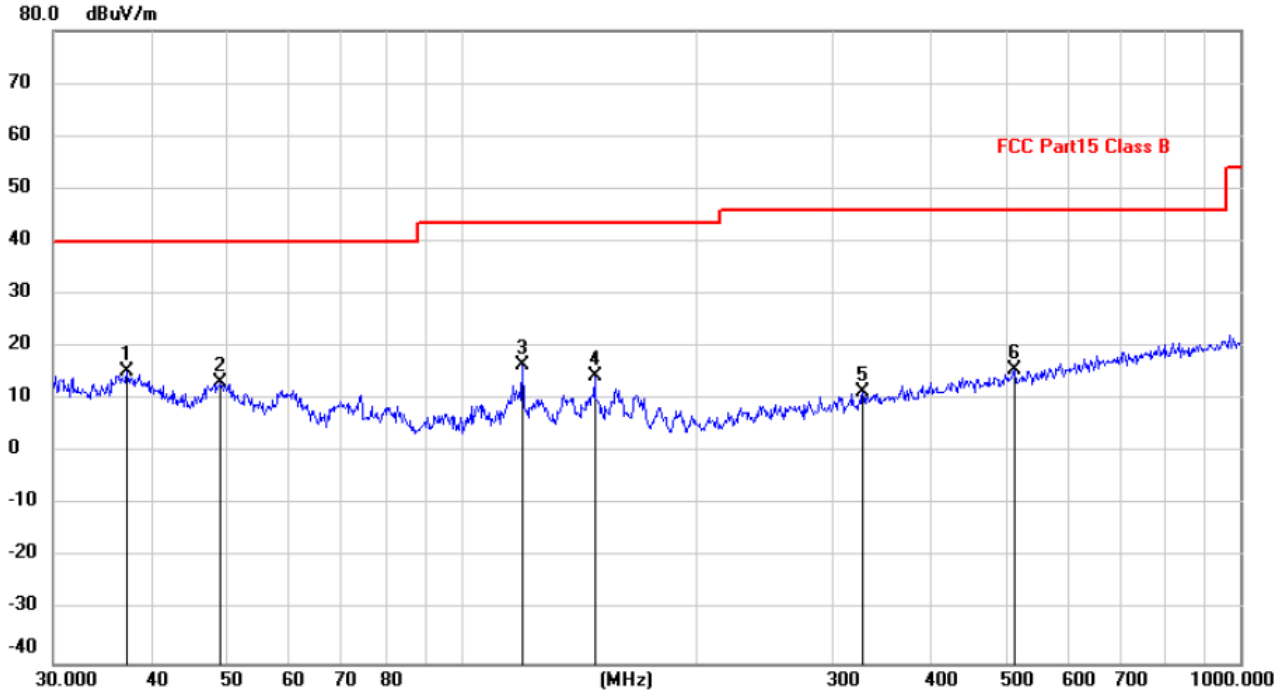
Measurement Data

- **9 kHz ~ 30 MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

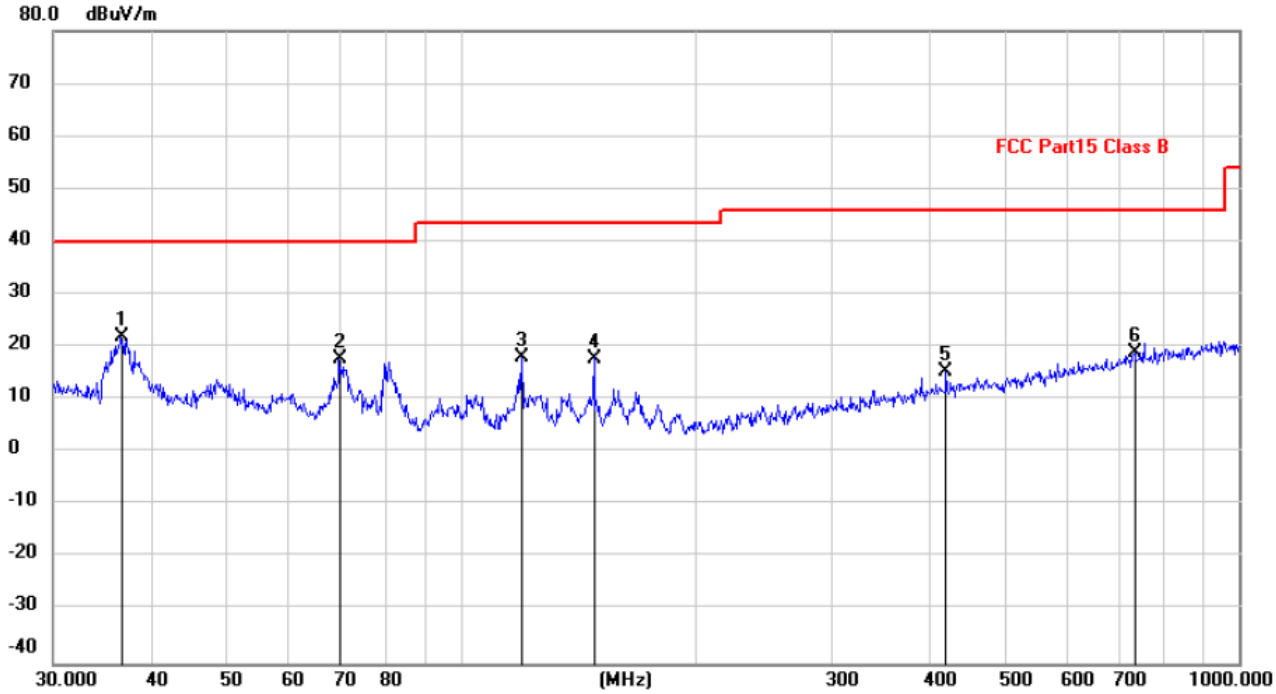
■ **Below 1GHz**

EUT:	**Safedome Recharge Card**	**Polarziation:**	**Horizontal**
Model:	**Safedome-recharge**	**Power Source:**	**AC120V/60Hz**
Mode:	**BLE mode**	**Temp./Hum.(%H):**	**26℃/60%RH**
Note:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	37.2854	48.64	-33.19	15.45	40.00	-24.55	QP
2		49.1865	47.47	-34.12	13.35	40.00	-26.65	QP
3		119.8555	53.04	-36.51	16.53	43.50	-26.97	QP
4		148.4410	49.07	-34.72	14.35	43.50	-29.15	QP
5		327.8872	45.73	-34.16	11.57	46.00	-34.43	QP
6		513.6331	45.62	-30.06	15.56	46.00	-30.44	QP

EUT:	**Safedome Recharge Card**	**Polarziation:**	**Vertical**
Model:	**Safedome-recharge**	**Power Source:**	**AC120V/60Hz**
Mode:	**BLE mode**	**Temp./Hum.(%H):**	**26℃/60%RH**
Note:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	36.6375	55.05	-33.20	21.85	40.00	-18.15	QP
2		69.8450	55.05	-37.42	17.63	40.00	-22.37	QP
3		119.8556	54.58	-36.51	18.07	43.50	-25.43	QP
4		148.4410	52.62	-34.72	17.90	43.50	-25.60	QP
5		420.5803	47.16	-31.87	15.29	46.00	-30.71	QP
6		734.4913	44.91	-25.85	19.06	46.00	-26.94	QP

■ **Above 1GHz**

Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	56.32	-7.43	48.89	74.00	-25.11	Vertical
7206.00	55.14	-2.42	52.72	74.00	-21.28	Vertical
9608.00	56.49	-2.38	54.11	74.00	-19.89	Vertical
12010.00	*			74.00		Vertical
14412.00	*			74.00		Vertical
4804.00	57.13	-7.43	49.70	74.00	-24.30	Horizontal
7206.00	56.26	-2.42	53.84	74.00	-20.16	Horizontal
9608.00	56.07	-2.38	53.69	74.00	-20.31	Horizontal
12010.00	*			74.00		Horizontal
14412.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	47.03	-7.43	39.60	54.00	-14.40	Vertical
7206.00	46.26	-2.42	43.84	54.00	-10.16	Vertical
9608.00	45.51	-2.38	43.13	54.00	-10.87	Vertical
12010.00	*			54.00		Vertical
14412.00	*			54.00		Vertical
4804.00	49.56	-7.43	42.13	54.00	-11.87	Horizontal
7206.00	48.78	-2.42	46.36	54.00	-7.64	Horizontal
9608.00	46.34	-2.38	43.96	54.00	-10.04	Horizontal
12010.00	*			54.00		Horizontal
14412.00	*			54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level +Correct factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor*

Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	57.36	-7.49	49.87	74.00	-24.13	Vertical
7326.00	56.45	-2.40	54.05	74.00	-19.95	Vertical
9768.00	57.52	-2.38	55.14	74.00	-18.86	Vertical
12210.00	*			74.00		Vertical
14652.00	*			74.00		Vertical
4884.00	56.61	-7.49	49.12	74.00	-24.88	Horizontal
7326.00	55.52	-2.40	53.12	74.00	-20.88	Horizontal
9768.00	57.28	-2.38	54.90	74.00	-19.10	Horizontal
12210.00	*			74.00		Horizontal
14652.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	49.23	-7.49	41.74	54.00	-12.26	Vertical
7326.00	47.45	-2.40	45.05	54.00	-8.95	Vertical
9768.00	48.09	-2.38	45.71	54.00	-8.29	Vertical
12210.00	*			54.00		Vertical
14652.00	*			54.00		Vertical
4884.00	47.11	-7.49	39.62	54.00	-14.38	Horizontal
7326.00	46.65	-2.40	44.25	54.00	-9.75	Horizontal
9768.00	45.27	-2.38	42.89	54.00	-11.11	Horizontal
12210.00	*			54.00		Horizontal
14652.00	*			54.00		Horizontal

Remark:
1. Final Level =Receiver Read level +Correct factor
2. "", means this data is the too weak instrument of signal is unable to test.*
3 . Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	57.34	-7.47	49.87	74.00	-24.13	Vertical
7440.00	56.62	-2.45	54.17	74.00	-19.83	Vertical
9920.00	57.09	-2.37	54.72	74.00	-19.28	Vertical
12400.00	*			74.00		Vertical
14880.00	*			74.00		Vertical
4960.00	56.65	-7.47	49.18	74.00	-24.32	Horizontal
7440.00	56.48	-2.45	54.03	74.00	-19.97	Horizontal
9920.00	57.15	-2.37	54.78	74.00	-19.22	Horizontal
12400.00	*			74.00		Horizontal
14880.00	*			74.00		Horizontal

Average value:

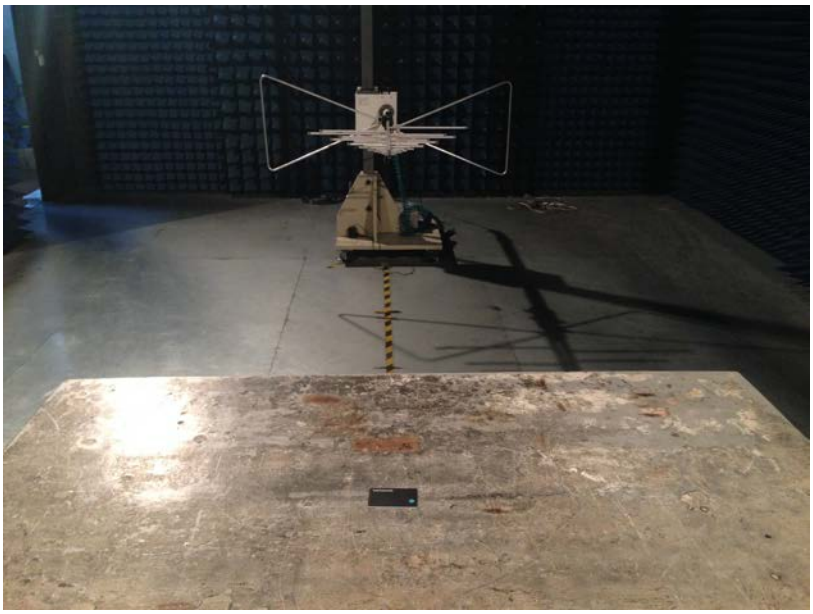
Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	48.24	-7.47	40.77	54.00	-13.23	Vertical
7440.00	47.49	-2.45	45.04	54.00	-8.96	Vertical
9920.00	46.63	-2.37	44.26	54.00	-9.74	Vertical
12400.00	*			54.00		Vertical
14880.00	*			54.00		Vertical
4960.00	47.75	-7.47	40.28	54.00	-13.72	Horizontal
7440.00	48.03	-2.45	45.58	54.00	-8.42	Horizontal
9920.00	47.12	-2.37	44.75	54.00	-9.25	Horizontal
12400.00	*			54.00		Horizontal
14880.00	*			54.00		Horizontal

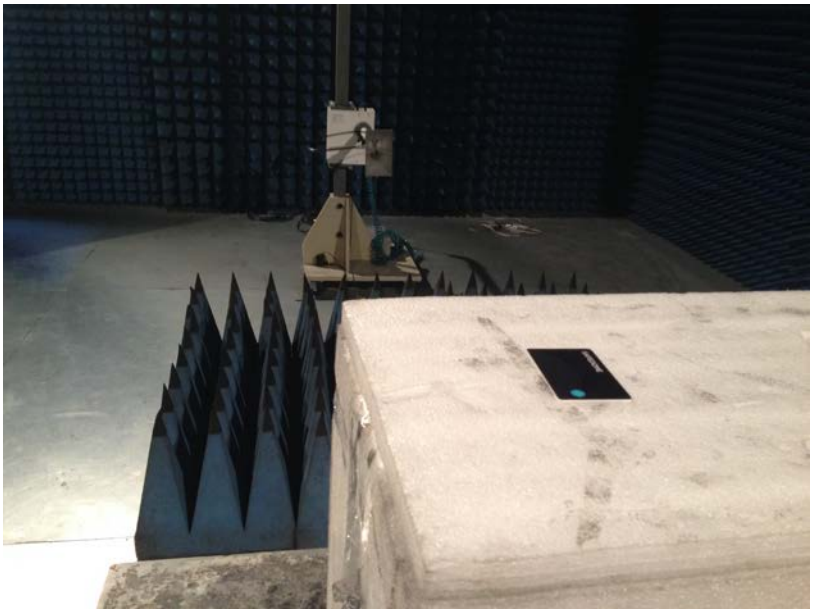
Remark:

1. *Final Level =Receiver Read level + Correct factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor*

8 Test Setup Photo

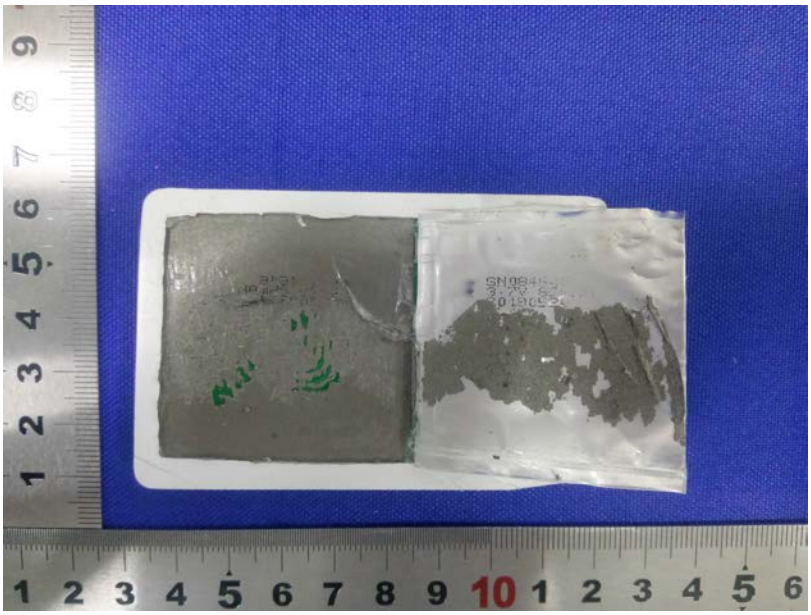
Radiated Emission

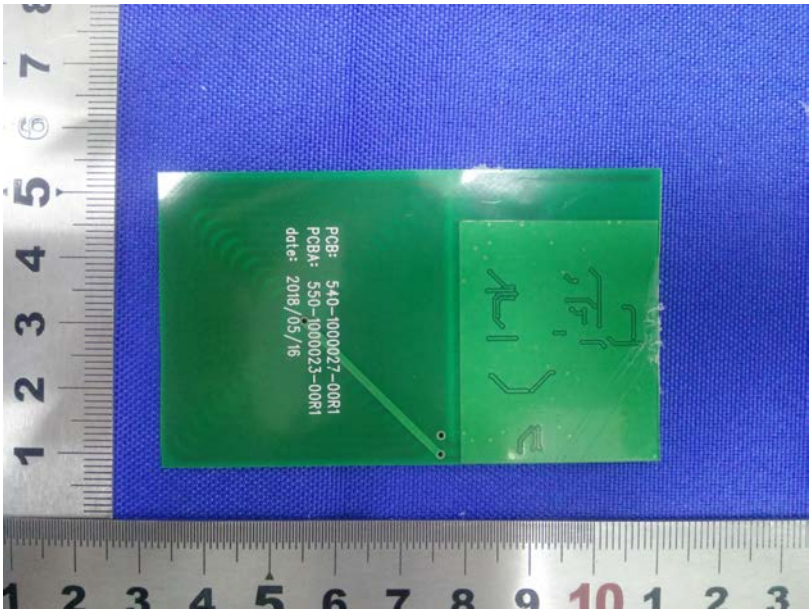




Conducted Emission

9 EUT Constructional Details

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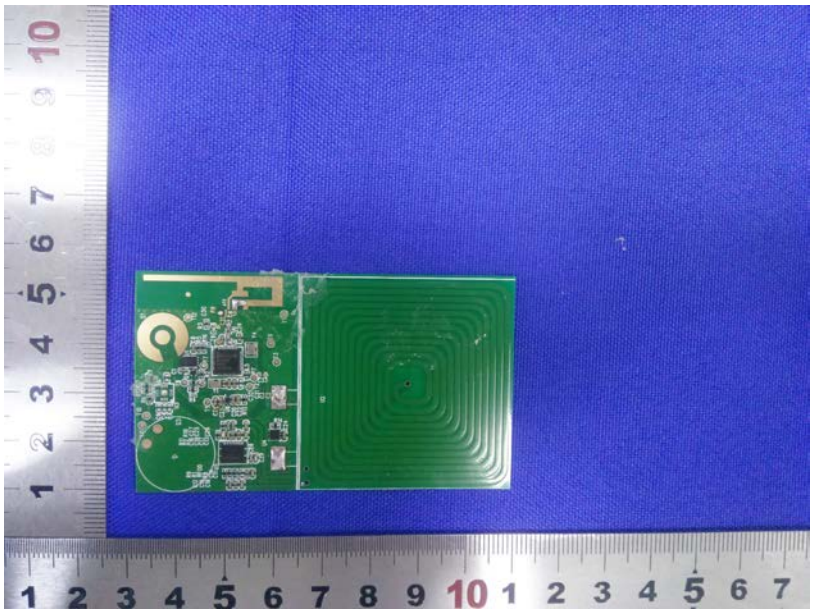

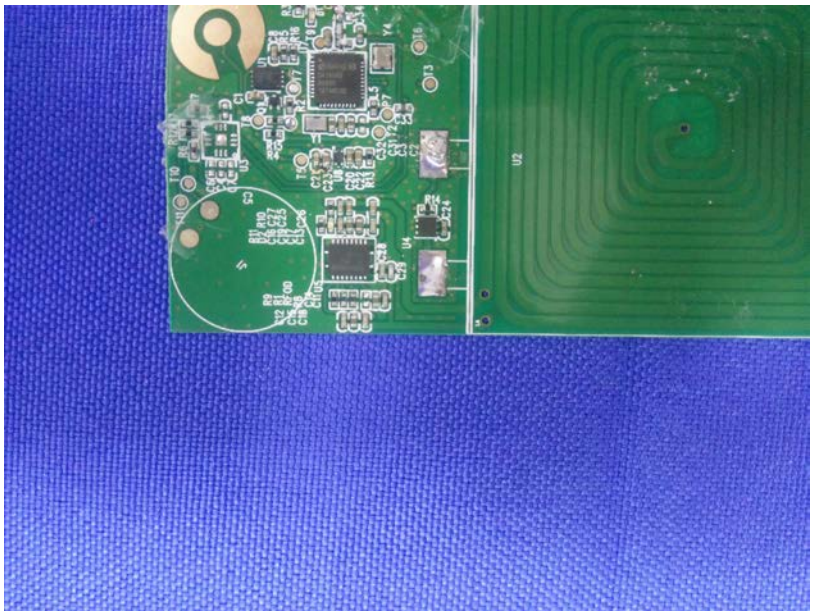

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