RF TEST REPORT

Report No.: 18020638-FCC-R
Supersede Report No.: N/A

Applicant	Shanghai MXCHIP Information Technology Co., Ltd.
Product Name	BLE module
Main Model	EMB1061
Serial Model	EMB1061-P,EMB1061-E
Test Standard	FCC Part 15.247: 2017, ANSI C63.10: 2013
Test Date	June 22 to July 11, 2018
Issue Date	July 17, 2018
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

peter Wei	Amos. Xia	
Peter Wei **Test Engineer**	**Amos Xia** **Engineer Reviewer**	

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Test result presented in this test report is applicable to the tested sample only

Issued by:
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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
18020638-FCC-R	NONE	Original	July 17, 2018

2. Customer information

Applicant Name	Shanghai MXCHIP Information Technology Co., Ltd.
Applicant Add	9thFloor, No.5 Lane2145JinshaJiangRoad,Putuo District,ShangHai(200333)
Manufacturer	Shanghai MXCHIP Information Technology Co., Ltd.
Manufacturer Add	9thFloor, No.5 Lane2145JinshaJiangRoad,Putuo District,ShangHai(200333)

3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic andTechnology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMC

4. Equipment under Test (EUT) Information

Description of EUT:	BLE module
Main Model:	EMB1061
Serial Model:	EMB1061-P,EMB1061-E
Date EUT received:	June 20, 2018
Test Date(s):	June 22 to July 11, 2018
Output Max power	5.547 dBm
Antenna Gain:	2 dBi
Type of Modulation:	BLE: GFSK
RF Operating Frequency (ies):	BLE: 2402-2480 MHz
Number of Channels:	BLE: 40CH
Port:	N/A
Input Power:	3~3.6V
Trade Name :	MXCHIP
FCC ID:	P53-EMB1061

Operating channel list

Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

5. Test Summary

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	DTS (6 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Test Item	Description	Uncertainty
Radiated Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	3.952dB

6. Measurements, Examination And Derived Results

6.1 RF Exposure

The EUT is a mobile device, thus requires RF exposure evaluation;
Please refer to SIEMIC RF Exposure Report: 18020638-FCC-H.

6.2 Antenna Requirement

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

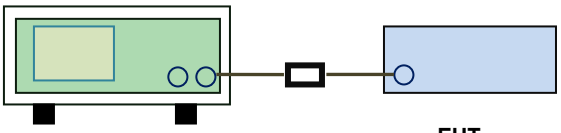
The EUT has 2 antennas:
A permanently attached PCB antenna/External antenna for BLE, the gain is 2 dBi for BLE.

PCB antenna will permanently attached to the unit.
External antenna use a unique type of connector to attach to the unit.
Please see internal photos for details.

Result: Compliant.

6.3 DTS (6 dB) Channel Bandwidth

Temperature	28°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	June 22, 2018
Tested By :	Peter Wei

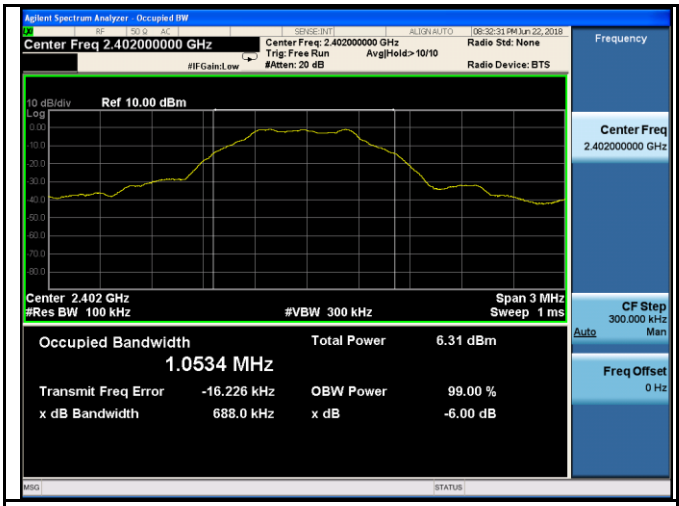
Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW≥500kHz;	☑
	b)	20dB BW: For FCC reference only; required by IC.	N/A
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance V04, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 x RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.		
Remark			
Result	☑ Pass	☐ Fail	
Test Data	☑ Yes	☐ N/A	
Test Plot	☑ Yes (See below)	☐ N/A	

6dB Bandwidth measurement result

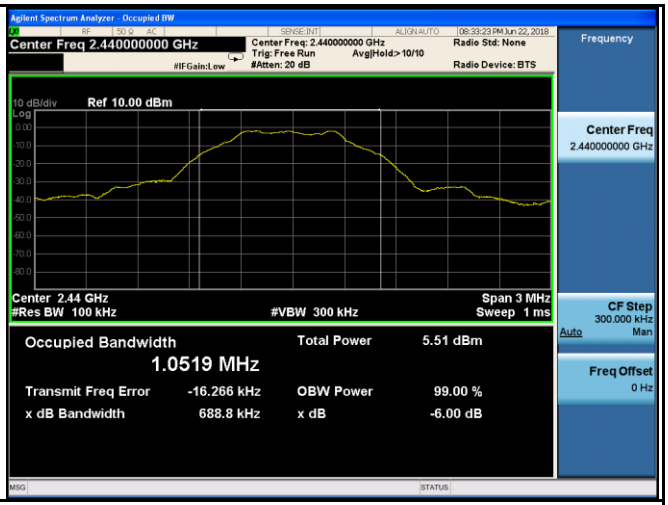
Type	Test mode	CH	Freq (MHz)	Result (MHz)	Limit (MHz)	Result
6dB BW	BLE	Low	2402	0.6880	≥0.5	Pass
		Mid	2440	0.6888	≥0.5	Pass
		High	2480	0.6966	≥0.5	Pass

Test Plots

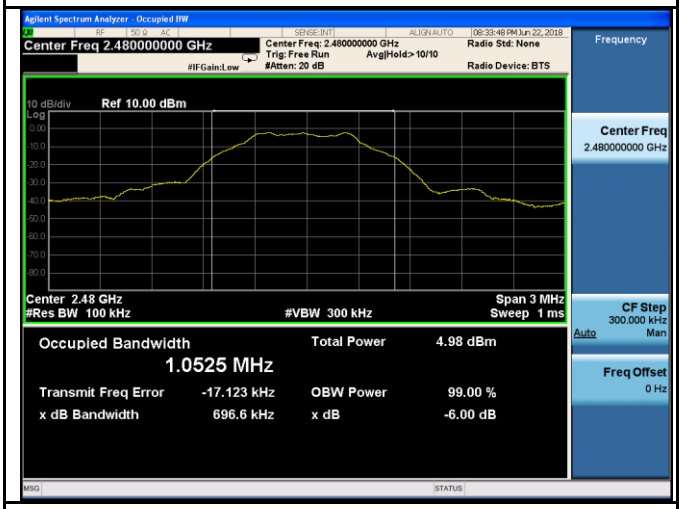
6dB Bandwidth measurement result



6dB Bandwidth - Low CH 2402



6dB Bandwidth - Mid CH 2440

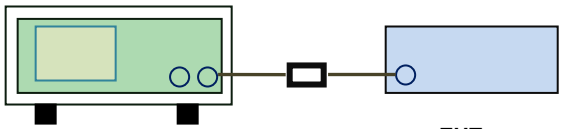


6dB Bandwidth - High CH 2480

6.4 Maximum Output Power

Temperature	28°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	June 22, 2018
Tested By :	Peter Wei

Requirement(s):

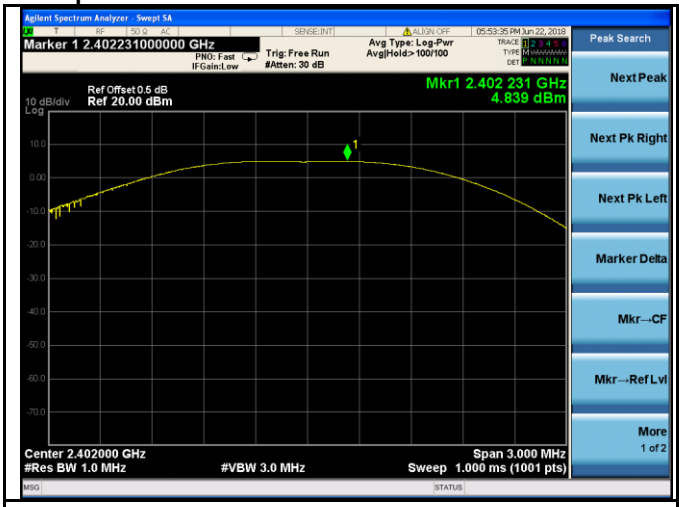
Spec	Item	Requirement	Applicable
§15.247(b) (2)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤1 Watt	☑
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance V04, 9.1.2 Integrated band power method Maximum output power measurement procedure a) Set the RBW ≥ DTS bandwidth. b) Set VBW ≥ 3 × RBW. c) Set span ≥ 3 x RBW d) Sweep time = auto couple. e) Detector = peak. f) Trace mode = max hold. g) Allow trace to fully stabilize. h) Use peak marker function to determine the peak amplitude level.		
Remark			
Result	☑ Pass	☐ Fail	
Test Data	☑ Yes	☐ N/A	
Test Plot	☑ Yes (See below)	☐ N/A	

Output Power measurement result

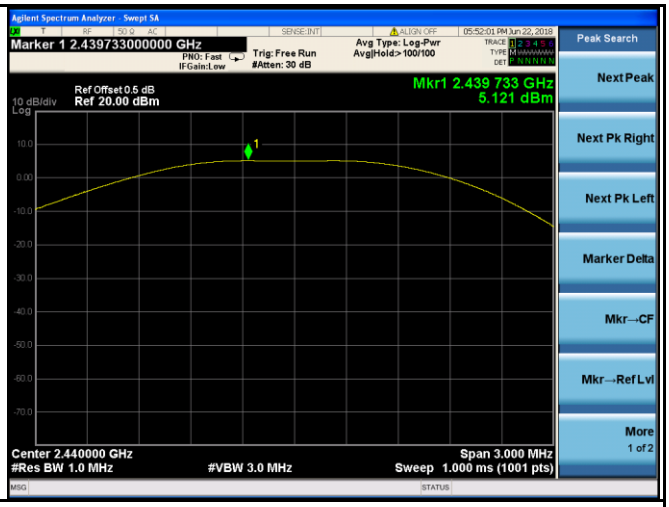
Type	Test mode	CH	Freq (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	BLE	Low	2402	4.839	30	Pass
		Mid	2440	5.121	30	Pass
		High	2480	5.547	30	Pass

Test Plots

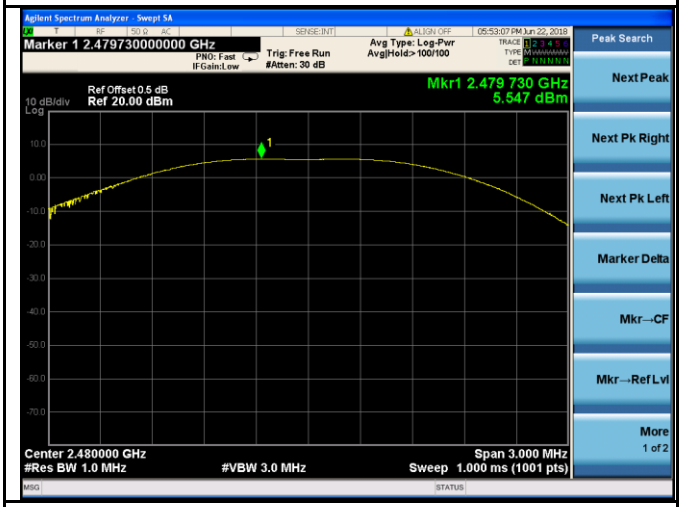
Output Power measurement result



Output power - Low CH 2402



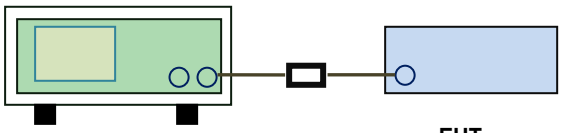
Output power - Mid CH 2440



Output power - High CH 2480

6.5 Power Spectral Density

Temperature	28°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	June 22, 2018
Tested By :	Peter Wei

Spec	Item	Requirement	Applicable
§15.247(e)	a)	The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance V04, 10.2 power spectral density method power spectral density measurement procedure a) Set analyzer center frequency to DTS channel center frequency. b) Set the span to 1.5 times the DTS bandwidth. c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. d) Set the VBW ≥ 3 × RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum amplitude level within the RBW. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Remark			
Result	☑ Pass ☐ Fail		
Result	☑ Pass ☐ Fail		
Test Data	☑ Yes ☐ N/A		

Power Spectral Density measurement result

Type	Test mode	CH	Freq (MHz)	PSD (dBm)	Limit (dBm)	Result
PSD	BLE	Low	2402	-4.556	8	Pass
		Mid	2440	-5.388	8	Pass
		High	2480	-5.830	8	Pass

Test Plots

Power Spectral Density measurement result

PSD - Low CH 2402

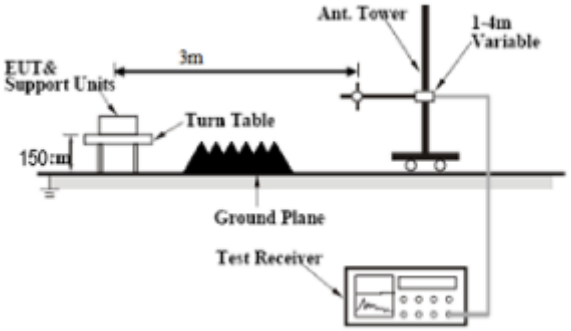
PSD - Mid CH 2440

PSD - High CH 2480

6.6 Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands

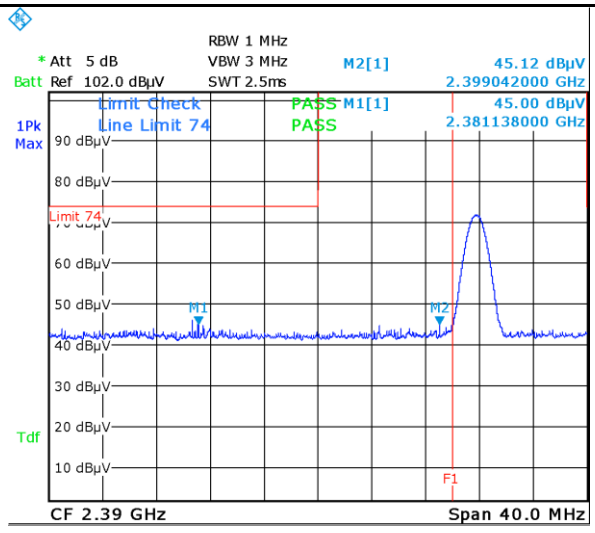
Temperature	28°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	July 11, 2018
Tested By :	Peter Wei

Requirement(s):

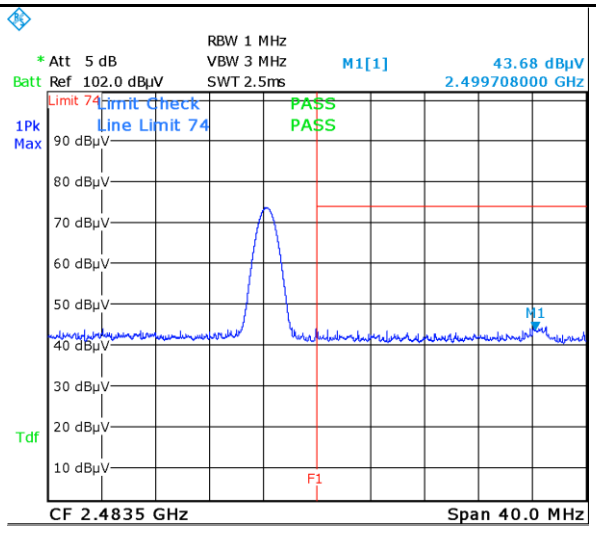
Spec	Item	Requirement	Applicable
§15.247(d)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	☑
Test Setup			
Test Procedure	Radiated Method Only - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth for Average detection (AV) as below at frequency above 1GHz. ■ 1/T kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.		
Remark			
Result	☑ Pass	☐ Fail	
Test Data	☐ Yes	☑ N/A	
Test Plot	☑ Yes (See below)	☐ N/A	

Test Plots

Band Edge measurement result



GFSK-Left Side



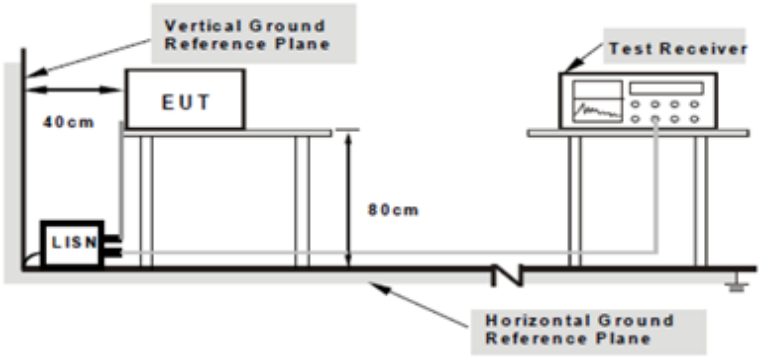
GFSK-Right Side

6.7 AC Power Line Conducted Emissions

Temperature	28°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	July 03, 2018
Tested By :	Peter Wei

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.207</td><td>a)</td><td>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.

Class A Limit
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>79</td><td>66</td></tr>
<tr><td>0.5 ~ 30</td><td>73</td><td>60</td></tr>
</table>
Class B Limit
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 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></td><td>☑</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 

Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.
8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</td></tr>
<tr><td>Remark</td><td colspan="3"></td></tr>
<tr><td>Result</td><td colspan="3">☑ Pass ☐ Fail</td></tr>
</table>

Test Data	☑ Yes ☐ N/A
Test Plot	☑ Yes (See below) ☐ N/A

Data sample

No.	Frequency	Reading	Detector	Lisn/Isn	Ps_Lmt	Cab_L	Result	Limit	Margin
	(MHz)	(dBμV)		(dB)	(dB)	(dB)	(dBμV)	(dBμV)	(dB)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV) = Receiver Reading Value

Detector=Quasi Peak Detector or Average Detector

Lisn/ISN= Insertion loss of LISN

Ps_Lmt= Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

Cab_L= cable loss

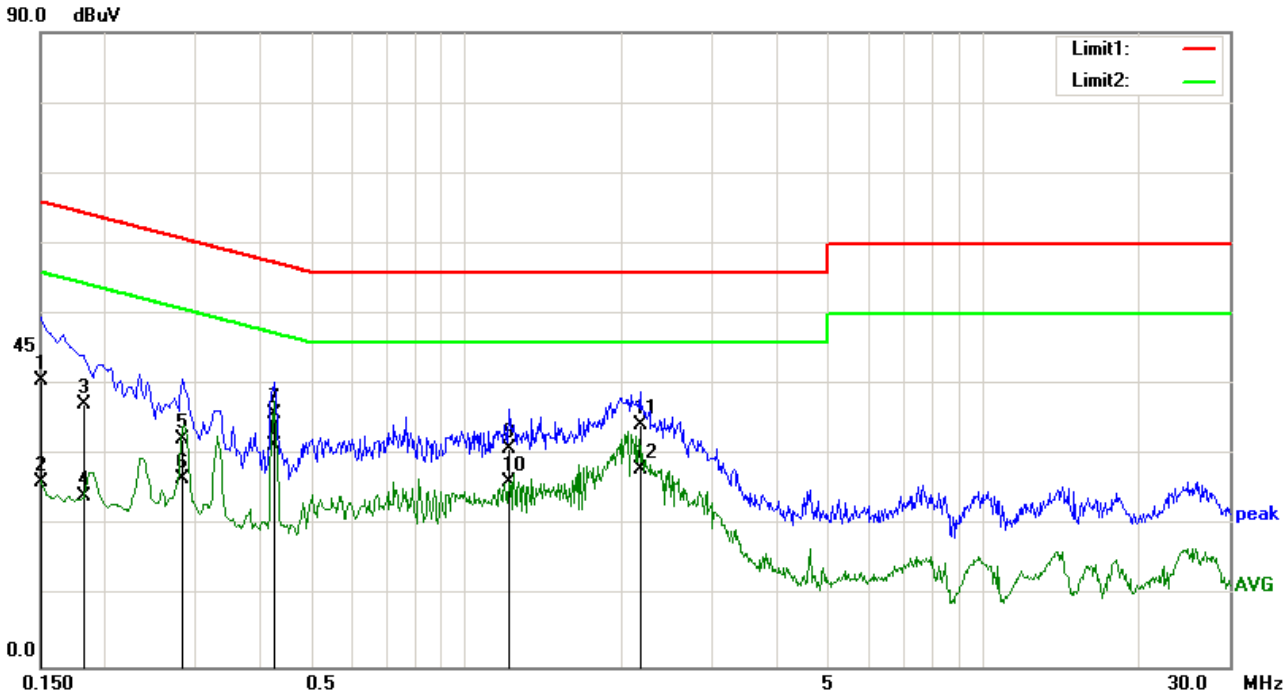
Result (dBμV) = Reading Value + Corrected Value

Limit (dBμV) = Limit stated in standard

Calculation Formula:

Margin (dB) = Result (dBμV) – limit (dBμV)

Test Mode :	Low Channel

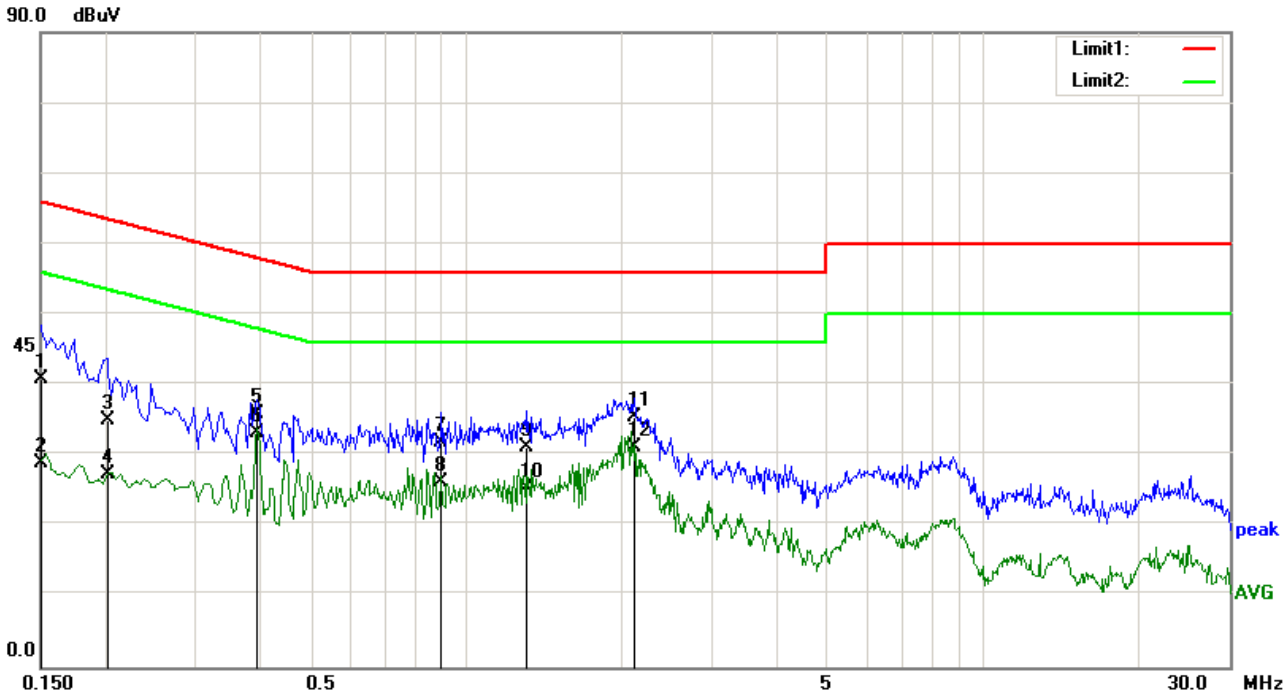


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1500	30.13	QP	0.10	-10.00	0.36	40.59	66.00	-25.41
2	0.1500	15.85	AVG	0.10	-10.00	0.36	26.31	56.00	-29.69
3	0.1820	26.77	QP	0.10	-10.00	0.31	37.18	64.39	-27.21
4	0.1820	13.81	AVG	0.10	-10.00	0.31	24.22	54.39	-30.17
5	0.2820	21.90	QP	0.11	-10.00	0.20	32.21	60.76	-28.55
6	0.2820	16.42	AVG	0.11	-10.00	0.20	26.73	50.76	-24.03
7	0.4260	25.62	QP	0.12	-10.00	0.21	35.95	57.33	-21.38
8	0.4260	21.10	AVG	0.12	-10.00	0.21	31.43	47.33	-15.90
9	1.2100	20.67	QP	0.14	-10.00	0.21	31.02	56.00	-24.98
10	1.2100	15.85	AVG	0.14	-10.00	0.21	26.20	46.00	-19.80
11	2.1740	24.00	QP	0.17	-10.00	0.21	34.38	56.00	-21.62
12	2.1740	17.62	AVG	0.17	-10.00	0.21	28.00	46.00	-18.00

Test Mode :	Low Channel

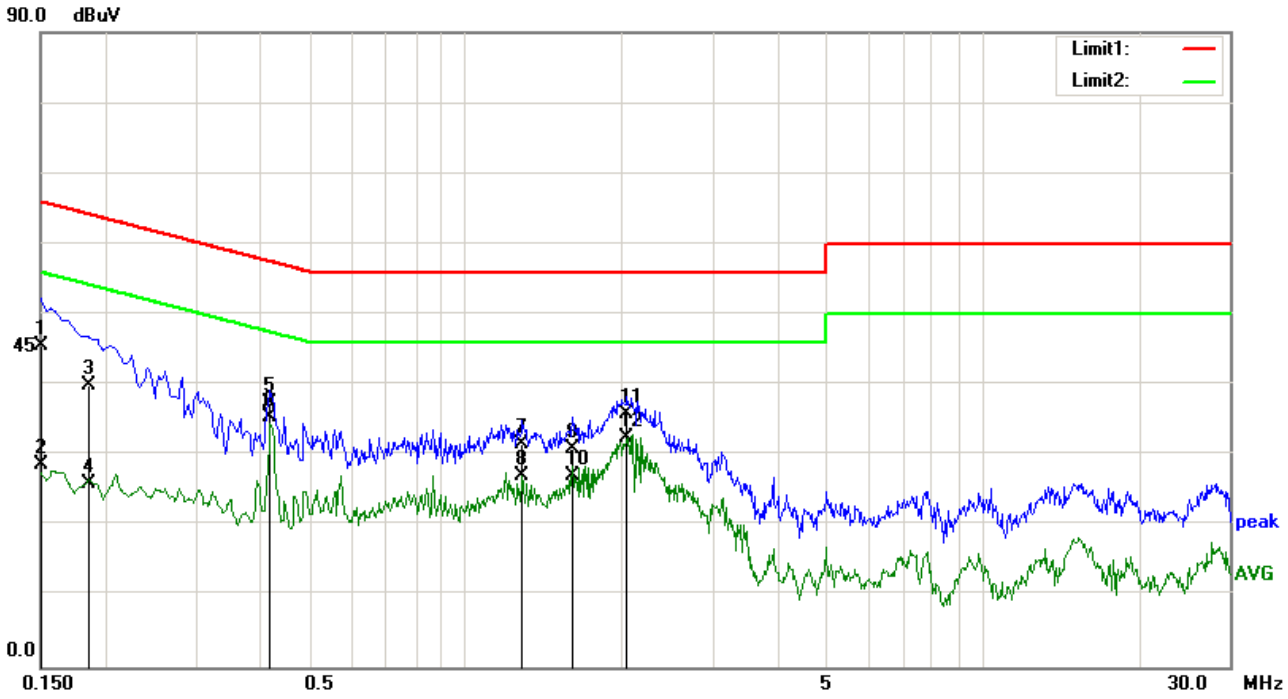


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1500	30.44	QP	0.11	-10.00	0.36	40.91	66.00	-25.09
2	0.1500	18.40	AVG	0.11	-10.00	0.36	28.87	56.00	-27.13
3	0.2020	24.56	QP	0.10	-10.00	0.28	34.94	63.53	-28.59
4	0.2020	16.85	AVG	0.10	-10.00	0.28	27.23	53.53	-26.30
5	0.3940	25.46	QP	0.11	-10.00	0.21	35.78	57.98	-22.20
6	0.3940	22.95	AVG	0.11	-10.00	0.21	33.27	47.98	-14.71
7	0.8980	21.41	QP	0.13	-10.00	0.19	31.73	56.00	-24.27
8	0.8980	15.86	AVG	0.13	-10.00	0.19	26.18	46.00	-19.82
9	1.3100	20.73	QP	0.14	-10.00	0.21	31.08	56.00	-24.92
10	1.3100	14.87	AVG	0.14	-10.00	0.21	25.22	46.00	-20.78
11	2.1140	25.17	QP	0.17	-10.00	0.20	35.54	56.00	-20.46
12	2.1140	20.72	AVG	0.17	-10.00	0.20	31.09	46.00	-14.91

Test Mode :	Low Channel

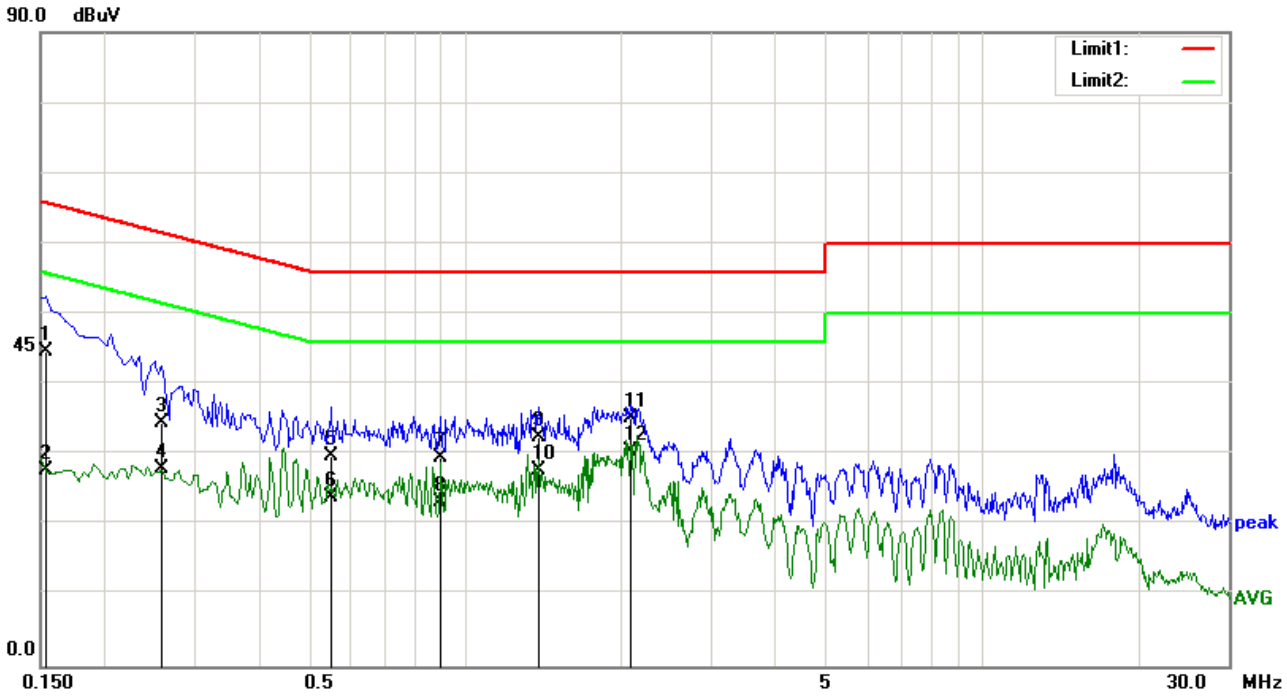


Test Data

Phase Line Plot at 230Vac, 50Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1500	35.16	QP	0.10	-10.00	0.36	45.62	66.00	-20.38
2	0.1500	18.23	AVG	0.10	-10.00	0.36	28.69	56.00	-27.31
3	0.1860	29.62	QP	0.10	-10.00	0.30	40.02	64.21	-24.19
4	0.1860	15.48	AVG	0.10	-10.00	0.30	25.88	54.21	-28.33
5	0.4180	27.10	QP	0.11	-10.00	0.21	37.42	57.49	-20.07
6	0.4180	25.09	AVG	0.11	-10.00	0.21	35.41	47.49	-12.08
7	1.2860	21.17	QP	0.15	-10.00	0.21	31.53	56.00	-24.47
8	1.2860	16.81	AVG	0.15	-10.00	0.21	27.17	46.00	-18.83
9	1.6100	20.62	QP	0.15	-10.00	0.20	30.97	56.00	-25.03
10	1.6100	16.73	AVG	0.15	-10.00	0.20	27.08	46.00	-18.92
11	2.0540	25.58	QP	0.16	-10.00	0.19	35.93	56.00	-20.07
12	2.0540	22.07	AVG	0.16	-10.00	0.19	32.42	46.00	-13.58

Test Mode :	Low Channel



Test Data

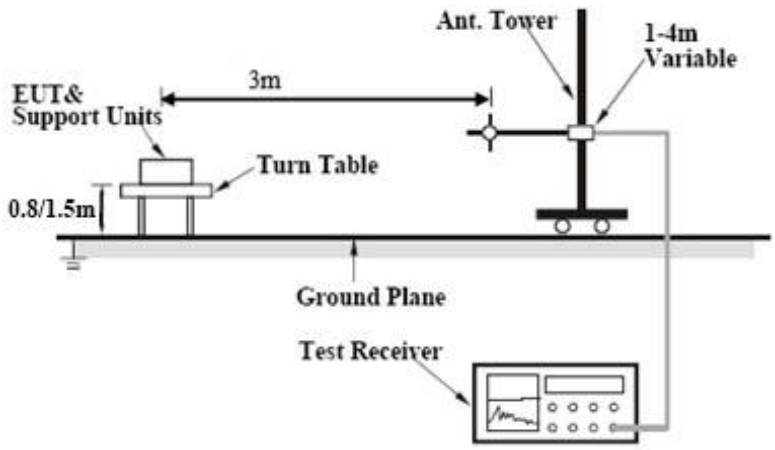
Phase Neutral Plot at 230Vac, 50Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1540	34.24	QP	0.11	-10.00	0.35	44.70	65.78	-21.08
2	0.1540	17.27	AVG	0.11	-10.00	0.35	27.73	55.78	-28.05
3	0.2580	24.32	QP	0.10	-10.00	0.20	34.62	61.50	-26.88
4	0.2580	17.64	AVG	0.10	-10.00	0.20	27.94	51.50	-23.56
5	0.5500	19.54	QP	0.11	-10.00	0.21	29.86	56.00	-26.14
6	0.5500	13.61	AVG	0.11	-10.00	0.21	23.93	46.00	-22.07
7	0.8980	19.38	QP	0.13	-10.00	0.19	29.70	56.00	-26.30
8	0.8980	13.03	AVG	0.13	-10.00	0.19	23.35	46.00	-22.65
9	1.3820	22.24	QP	0.15	-10.00	0.20	32.59	56.00	-23.41
10	1.3820	17.50	AVG	0.15	-10.00	0.20	27.85	46.00	-18.15
11	2.0980	24.74	QP	0.17	-10.00	0.20	35.11	56.00	-20.89
12	2.0980	20.22	AVG	0.17	-10.00	0.20	30.59	46.00	-15.41

6.8 Radiated Emissions

Temperature	28°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	July 11, 2018
Tested By :	Peter Wei

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.209(d)</td><td>a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges
Class A Limit
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (μV/m)</th></tr>
<tr><td>30 – 88</td><td>90</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 – 960</td><td>210</td></tr>
<tr><td>Above 960</td><td>300</td></tr>
</table>
Class B Limit
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (μV/m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 – 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table></td><td>☑</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
b. The EUT was then rotated to the direction that gave the maximum emission.
c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.
The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth with Peak</td></tr>
</table>

	detection for Average Measurement as below at frequency above 1GHz. ■1/T kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) 5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	
Result	☑ Pass ☐ Fail
Test Data	☑ Yes ☐ N/A
Test Plot	☑ Yes (See below) ☐ N/A

Data sample

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBμV/m)		(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV/m) = Receiver Reading Value

Detector= Peak Detector or Quasi Peak Detector

Ant_F=Antenna Factor

PA_G=Pre-Amplifier Gain

Cab_L=Cable Loss

Result (dBμV/m) = Read ing Value + Corrected Value

Limit (dBμV/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

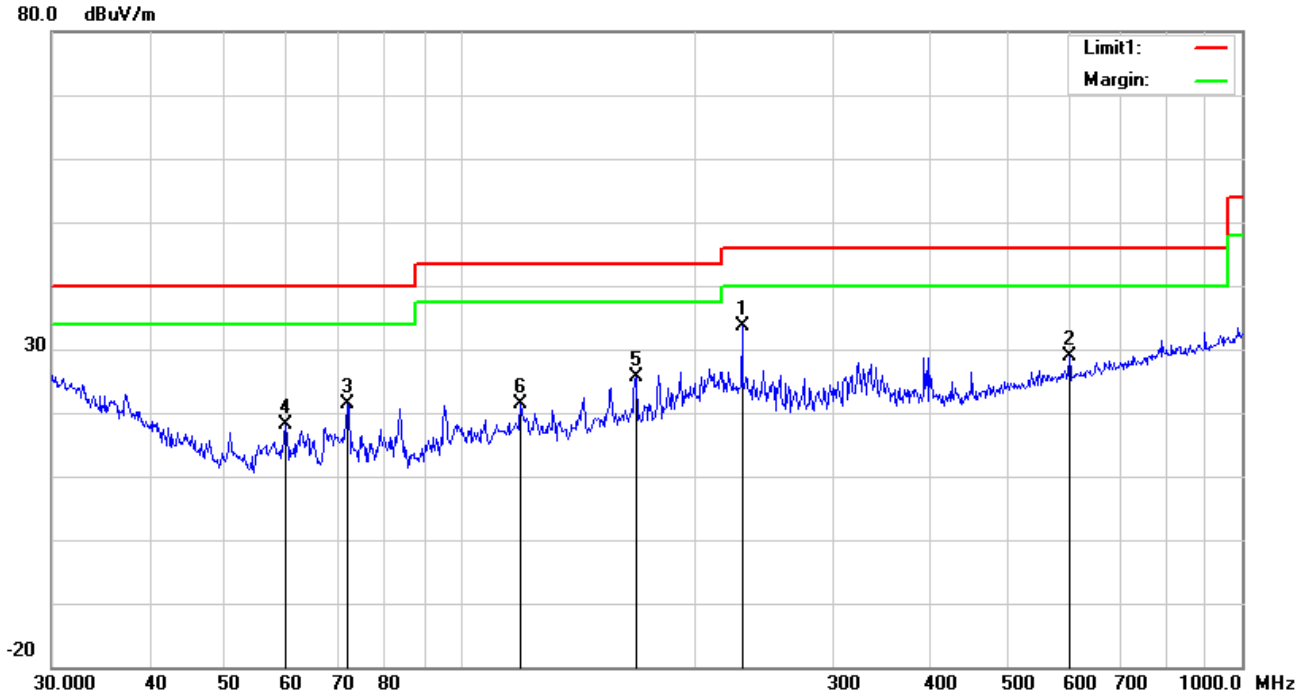
Degree = Turn table degree

Calculation Formula:

Margin (dB) = Result (dBμV/m) – limit (dBμV/m)

Test Mode :	Low Channel

Below 1GHz



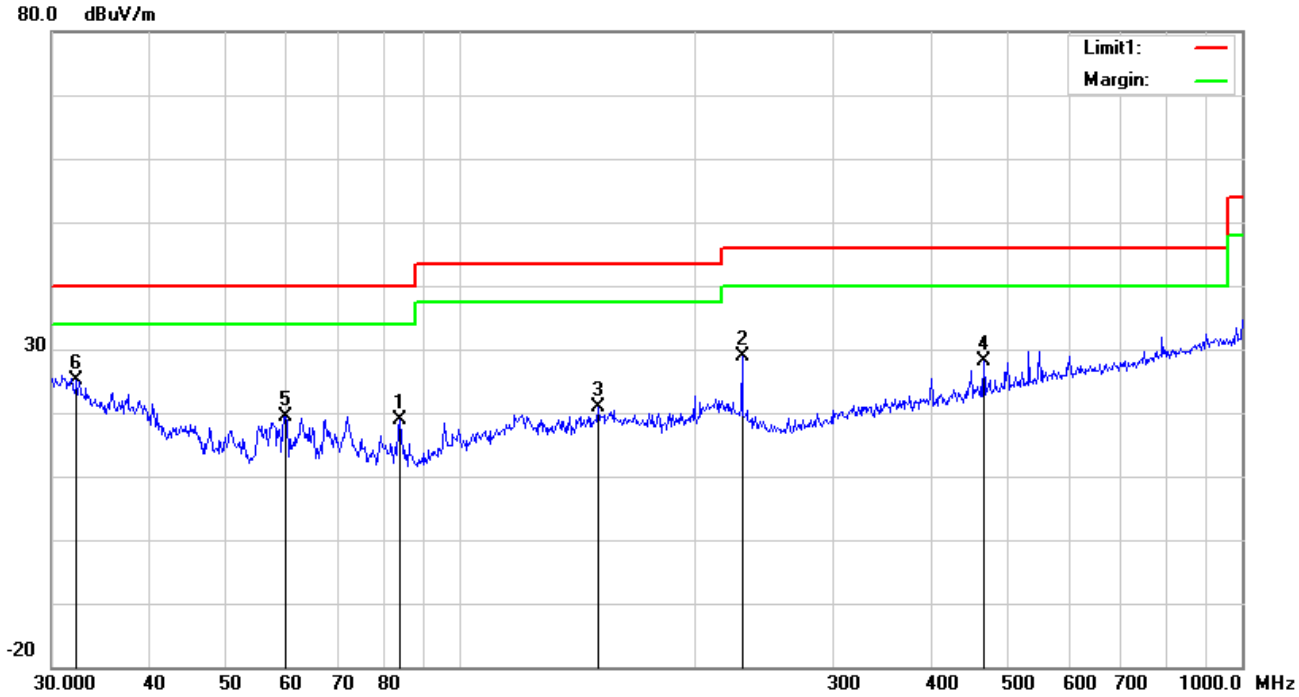
Test Data

Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	229.2931	42.52	peak	11.69	22.33	1.63	33.51	46.00	-12.49	100	199
2	601.4265	28.76	peak	19.12	21.58	2.49	28.79	46.00	-17.21	100	355
3	71.8320	35.06	peak	7.76	22.39	0.97	21.40	40.00	-18.60	100	150
4	59.6493	32.43	peak	7.34	22.41	0.75	18.11	40.00	-21.89	100	325
5	167.8243	34.63	peak	11.97	22.26	1.37	25.71	43.50	-17.79	100	21
6	119.4361	28.78	peak	13.80	22.36	1.16	21.38	43.50	-22.12	100	248

Test Mode :	Low Channel

Below 1GHz



Test Data

Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	83.5222	32.48	peak	7.74	22.38	1.06	18.90	40.00	-21.10	100	68
2	229.2931	37.88	peak	11.69	22.33	1.63	28.87	46.00	-17.13	200	139
3	150.0108	29.31	peak	12.60	22.34	1.34	20.91	43.50	-22.59	100	130
4	467.2349	30.75	peak	17.04	21.88	2.23	28.14	46.00	-17.86	100	127
5	59.6493	33.71	peak	7.34	22.41	0.75	19.39	40.00	-20.61	100	326
6	32.2925	27.21	peak	19.63	22.27	0.68	25.25	40.00	-14.75	100	97

Test Mode :	Low Channel

Above 1GHz

Low Channel

Frequency	S.A.	Detector	Polarity	Ant.	Cable	Pre-Amp.	Cord.	Limit	Margin
(MHz)	Reading	(PK/AV)	(H/V)	Factor	Loss	Gain	Amp.	(dBµV/m)	(dB)
	(dBµV)			(dB/m)	(dB)	(dB)	(dBµV/m)		
4804	42.45	AV	V	33.39	7.22	48.46	34.6	54	-19.4
4804	41.81	AV	H	33.39	7.22	48.46	33.96	54	-20.04
4804	58.73	PK	V	33.39	7.22	48.46	50.88	74	-23.12
4804	59.26	PK	H	33.39	7.22	48.46	51.41	74	-22.59
10313	29.87	AV	V	39.23	10.54	46.51	33.13	54	-20.87
10313	24.27	AV	H	39.23	10.54	46.51	27.53	54	-26.47
10313	44.62	PK	V	39.23	10.54	46.51	47.88	74	-26.12
10313	48.52	PK	H	39.23	10.54	46.51	51.78	74	-22.22

Middle Channel

Frequency	S.A.	Detector	Polarity	Ant.	Cable	Pre-Amp.	Cord.	Limit	Margin
(MHz)	Reading	(PK/AV)	(H/V)	Factor	Loss	Gain	Amp.	(dBµV/m)	(dB)
	(dBµV)			(dB/m)	(dB)	(dB)	(dBµV/m)		
4880	43.43	AV	V	33.62	7.53	48.36	36.22	54	-17.78
4880	47.43	AV	H	33.62	7.53	48.36	40.22	54	-13.78
4880	63.67	PK	V	33.62	7.53	48.36	56.46	74	-17.54
4880	61.64	PK	H	33.62	7.53	48.36	54.43	74	-19.57
9183	27.32	AV	V	38.14	8.94	47.72	26.68	54	-27.32
9183	28.76	AV	H	38.14	8.94	47.72	28.12	54	-25.88
9183	45.9	PK	V	38.14	8.94	47.72	45.26	74	-28.74
9183	49.56	PK	H	38.14	8.94	47.72	48.92	74	-25.08

High Channel

Frequency	S.A.	Detector	Polarity	Ant.	Cable	Pre-Amp.	Cord.	Limit	Margin
(MHz)	Reading	(PK/AV)	(H/V)	Factor	Loss	Gain	Amp.	(dBµV/m)	(dB)
	(dBµV)			(dB/m)	(dB)	(dB)	(dBµV/m)		
4880	43.43	AV	V	33.62	7.53	48.36	36.22	54	-17.78
4880	47.43	AV	H	33.62	7.53	48.36	40.22	54	-13.78
4880	63.67	PK	V	33.62	7.53	48.36	56.46	74	-17.54
4880	61.64	PK	H	33.62	7.53	48.36	54.43	74	-19.57
9183	27.32	AV	V	38.14	8.94	47.72	26.68	54	-27.32
9183	28.76	AV	H	38.14	8.94	47.72	28.12	54	-25.88
9183	45.9	PK	V	38.14	8.94	47.72	45.26	74	-28.74
9183	49.56	PK	H	38.14	8.94	47.72	48.92	74	-25.08

Note1: The frequency that above 3GHz is mainly from the environment noise.

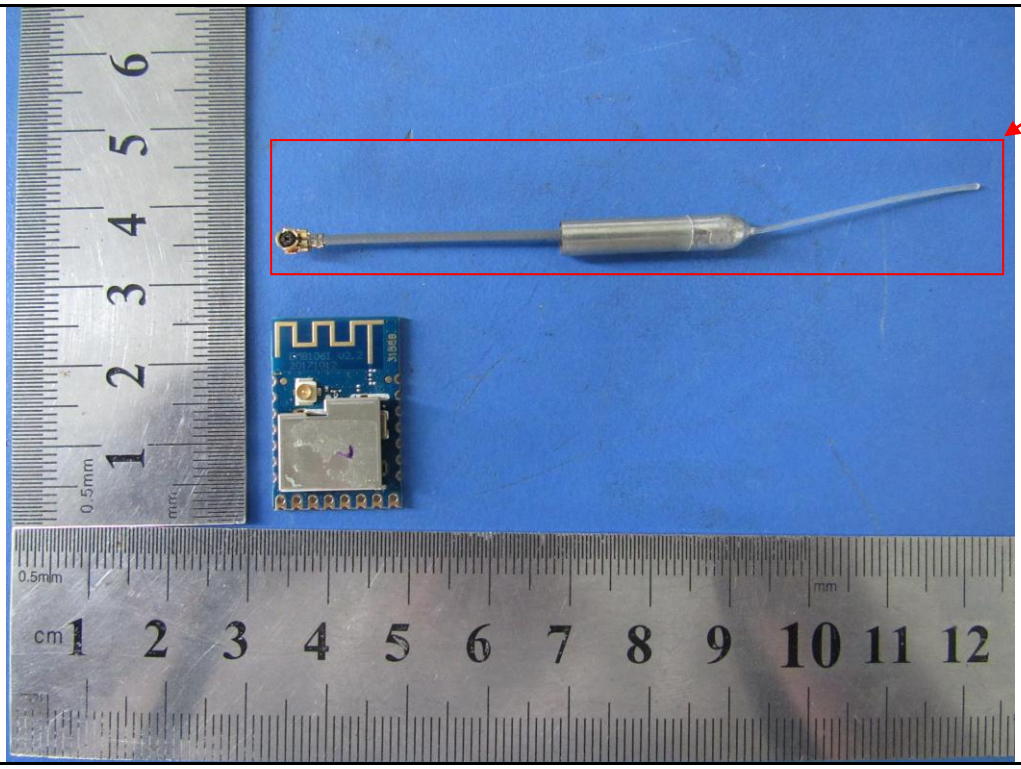
Note2: The AV measurement performed, more than 20dB below limit so AV test data was not presented.

Annex A. TEST INSTRUMENT

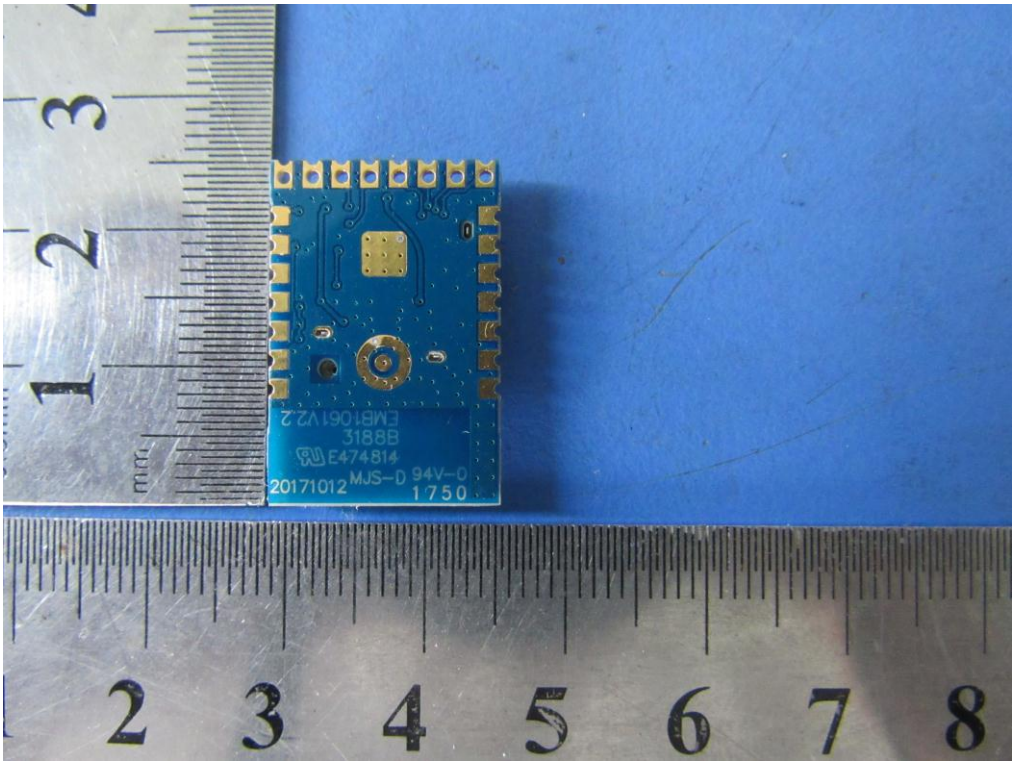
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	04/26/2018	04/25/2019	☒
V-LISN	ESH3-Z5	838979/005	04/26/2018	04/25/2019	☒
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	05/19/2018	05/18/2019	☒
SIEMIC Labview Conducted Emissions software	V1.0	N/A	N/A	N/A	☒
RF Conducted Test					
R&S EMI Receiver	ESPI3	101216	04/26/2018	04/25/2019	☒
Spectrum Analyzer	N9010A	MY47191130	04/26/2018	04/25/2019	☒
Radiated Emissions					
Spectrum Analyzer	N9010A	MY47191130	04/26/2018	04/25/2019	☒
R&S EMI Receiver	ESPI3	101216	04/26/2018	04/25/2019	☒
Antenna (30MHz~6GHz)	JB6	A121411	05/19/2018	05/18/2019	☒
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	04/26/2018	04/25/2019	☒
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	04/26/2018	04/25/2019	☒
Hp Pre-Amplifier	8447F	1937A01160	04/26/2018	04/25/2019	☒
SIEMIC Labview Radiated Emissions software	V1.0	N/A	N/A	N/A	☒

Annex B. EUT And Test Setup Photographs

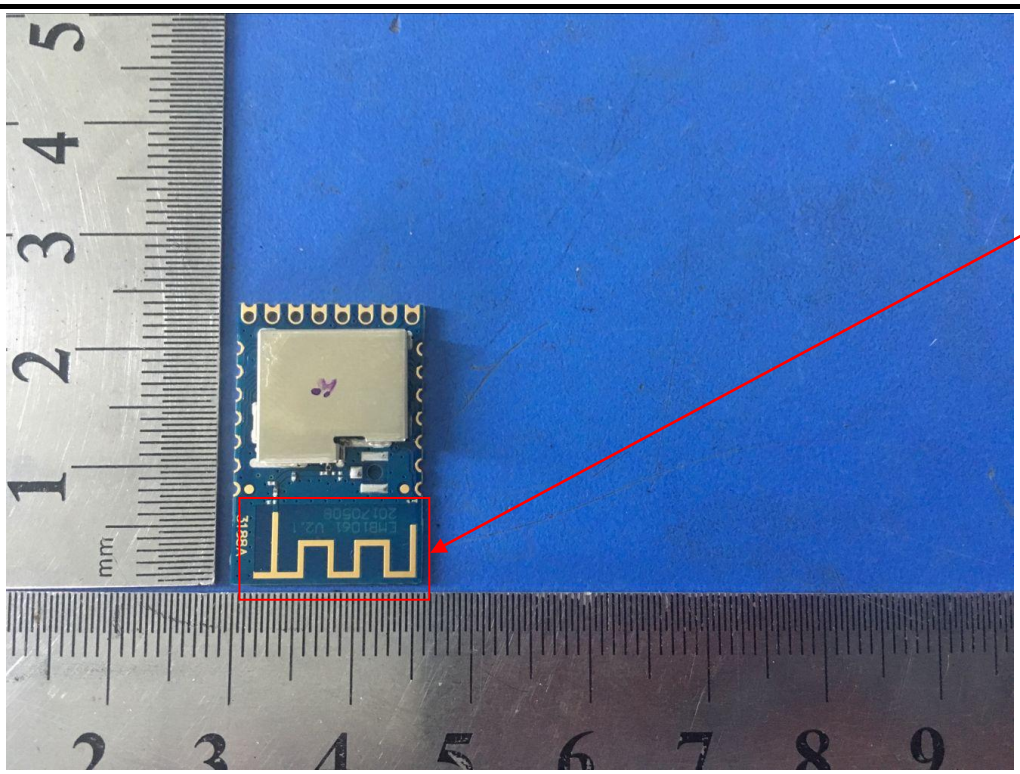
Annex B.i. Photograph: EUT External Photo



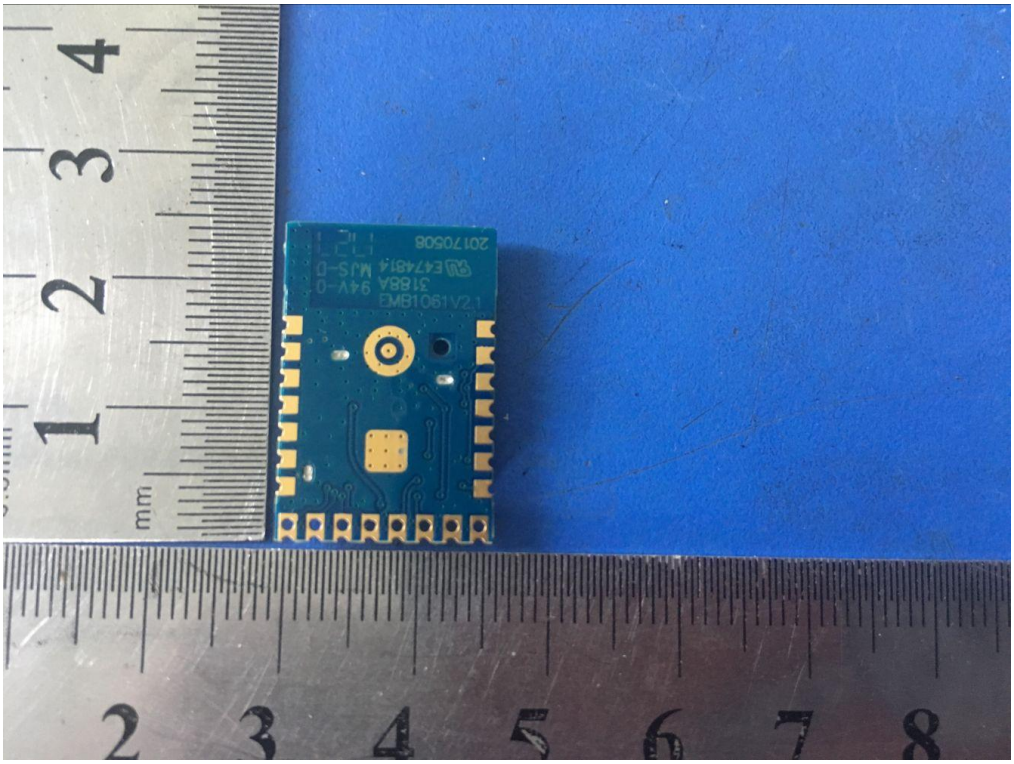
EUT(External Antenna) - Front View



EUT(External Antenna) - Bottom View

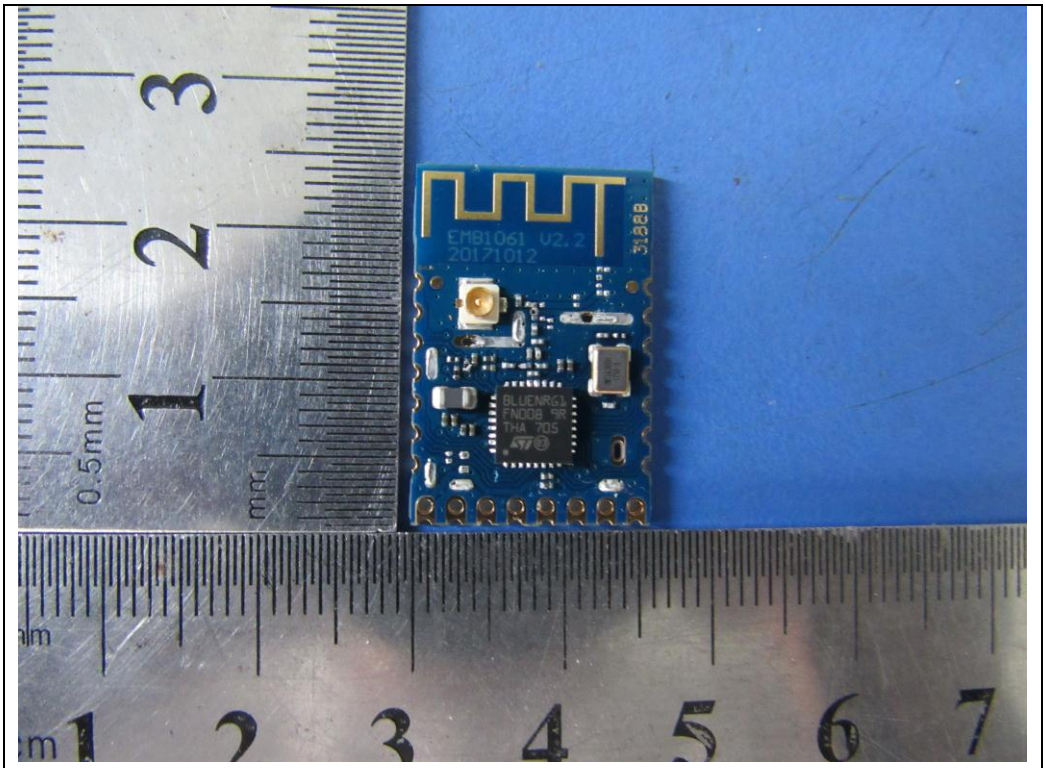


EUT(Internal Antenna) - Front View

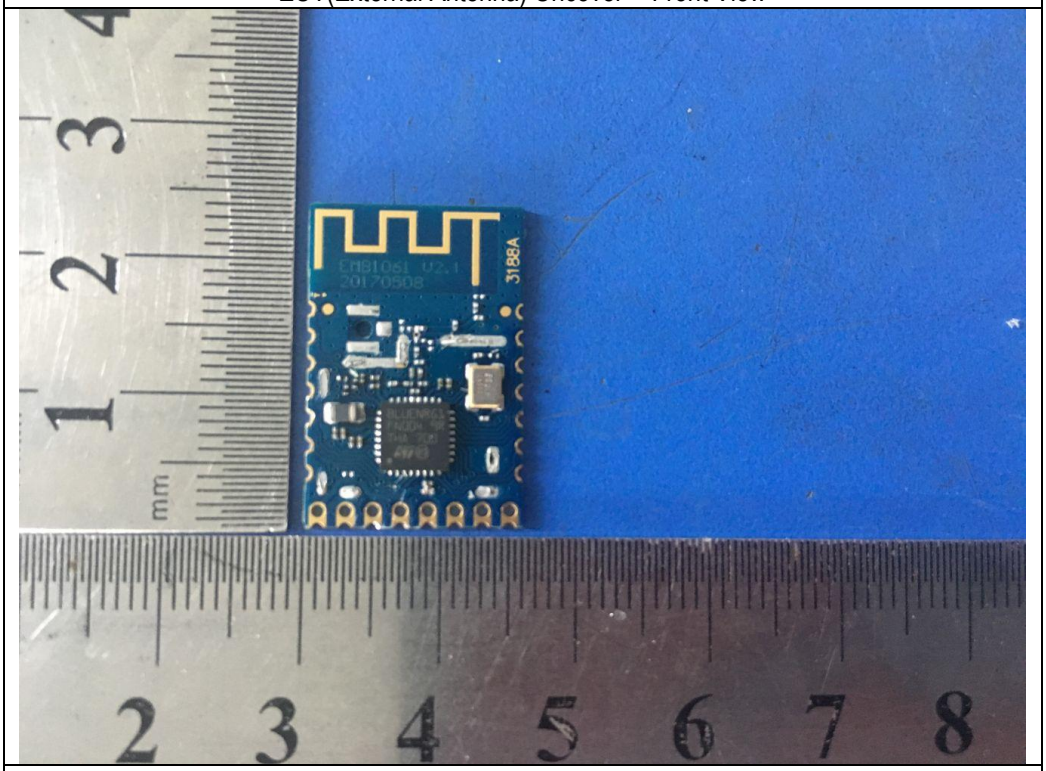


EUT(Internal Antenna) - Bottom View

Annex B.ii. Photograph: EUT Internal Photo



EUT(External Antenna) Uncover - Front View

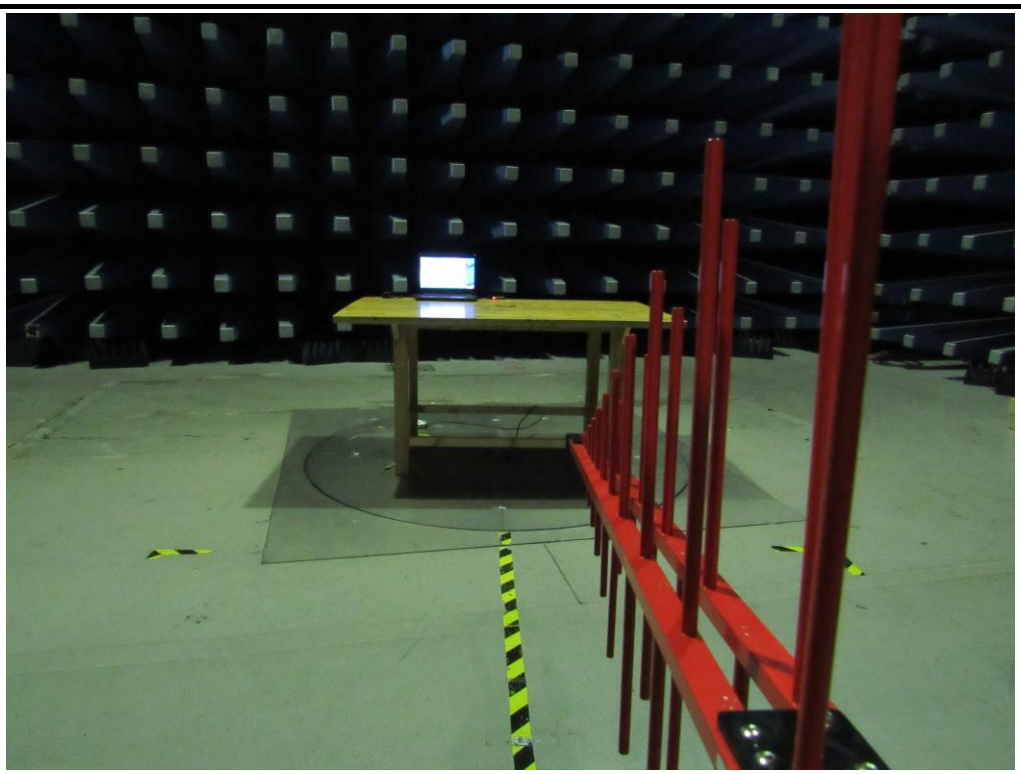


EUT(Internal Antenna) Uncover - Front View

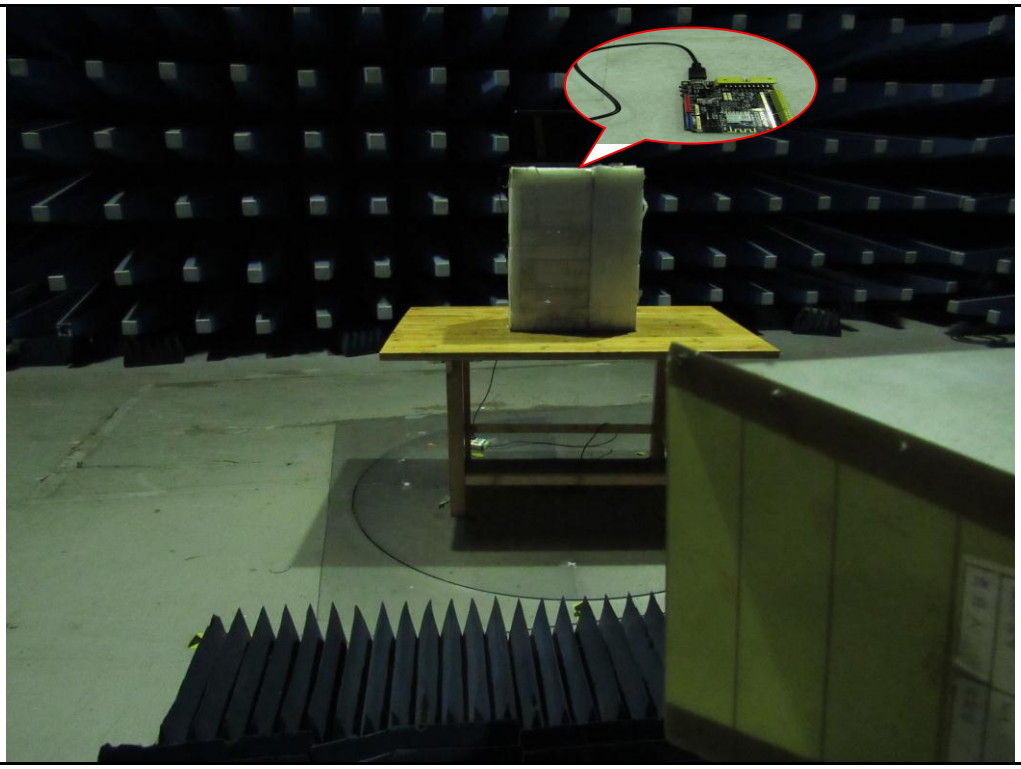
Annex B.iii. Photograph: Test Setup Photo

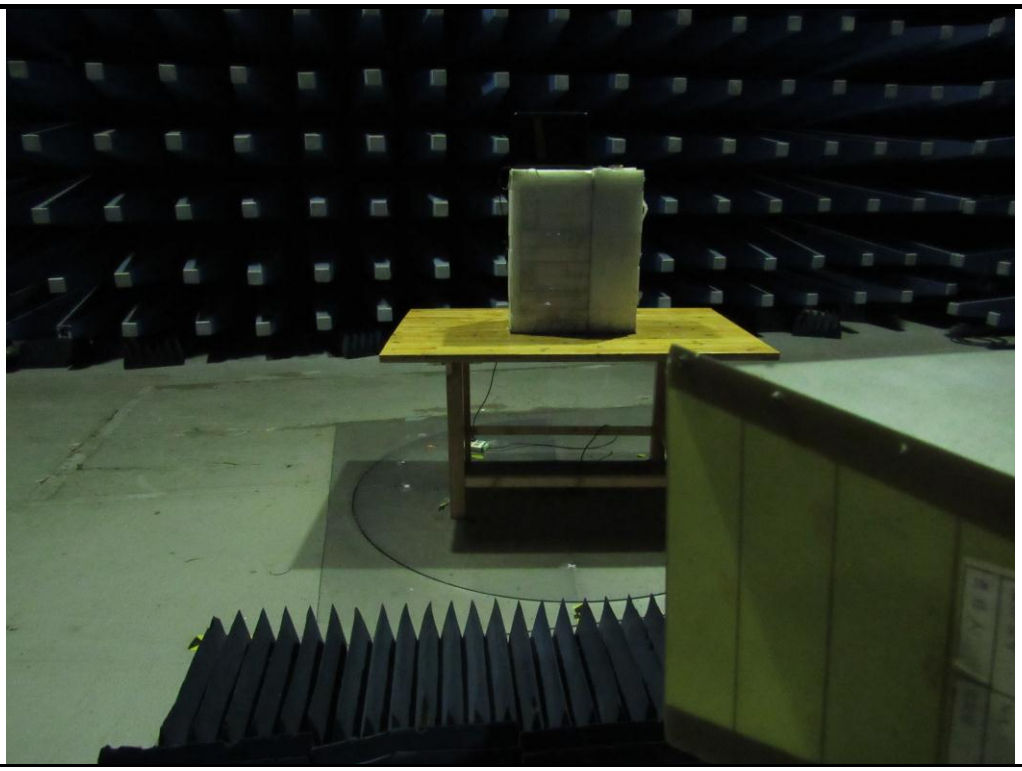
Conducted Emissions Test Setup Front View

Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz



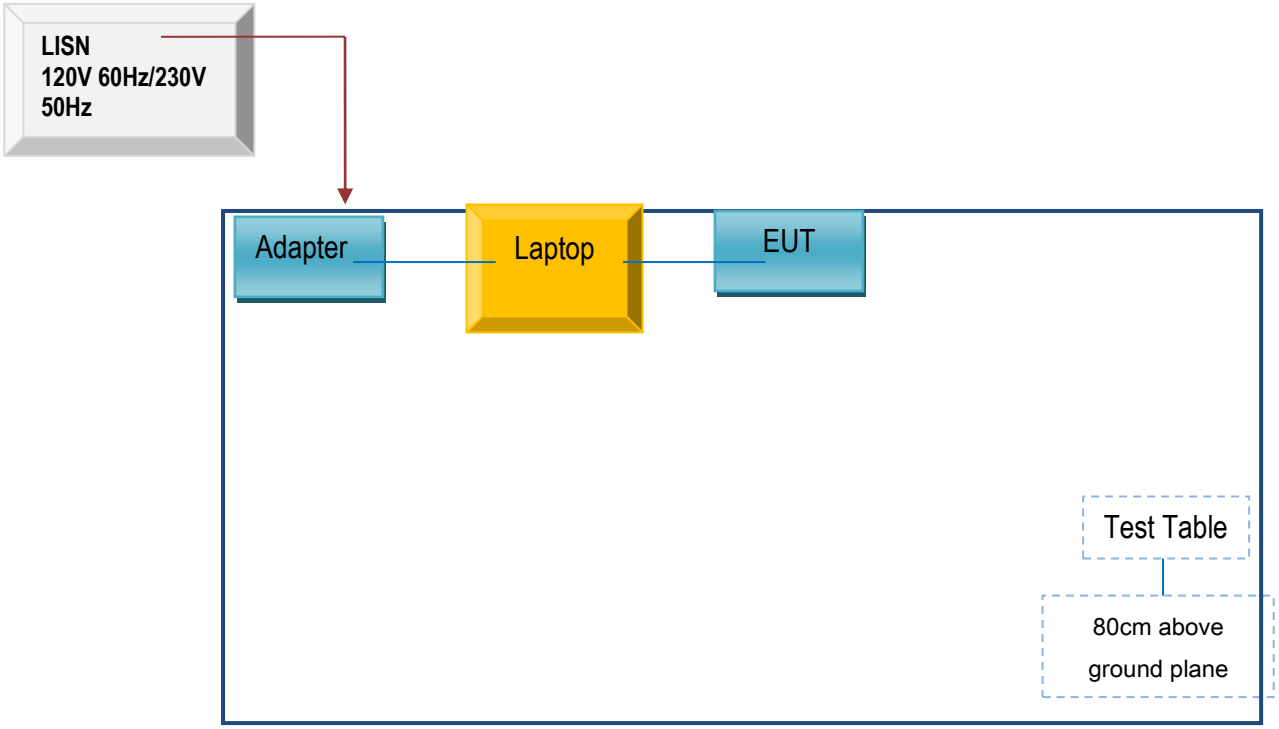


Radiated Spurious Emissions Test Setup Above 1GHz

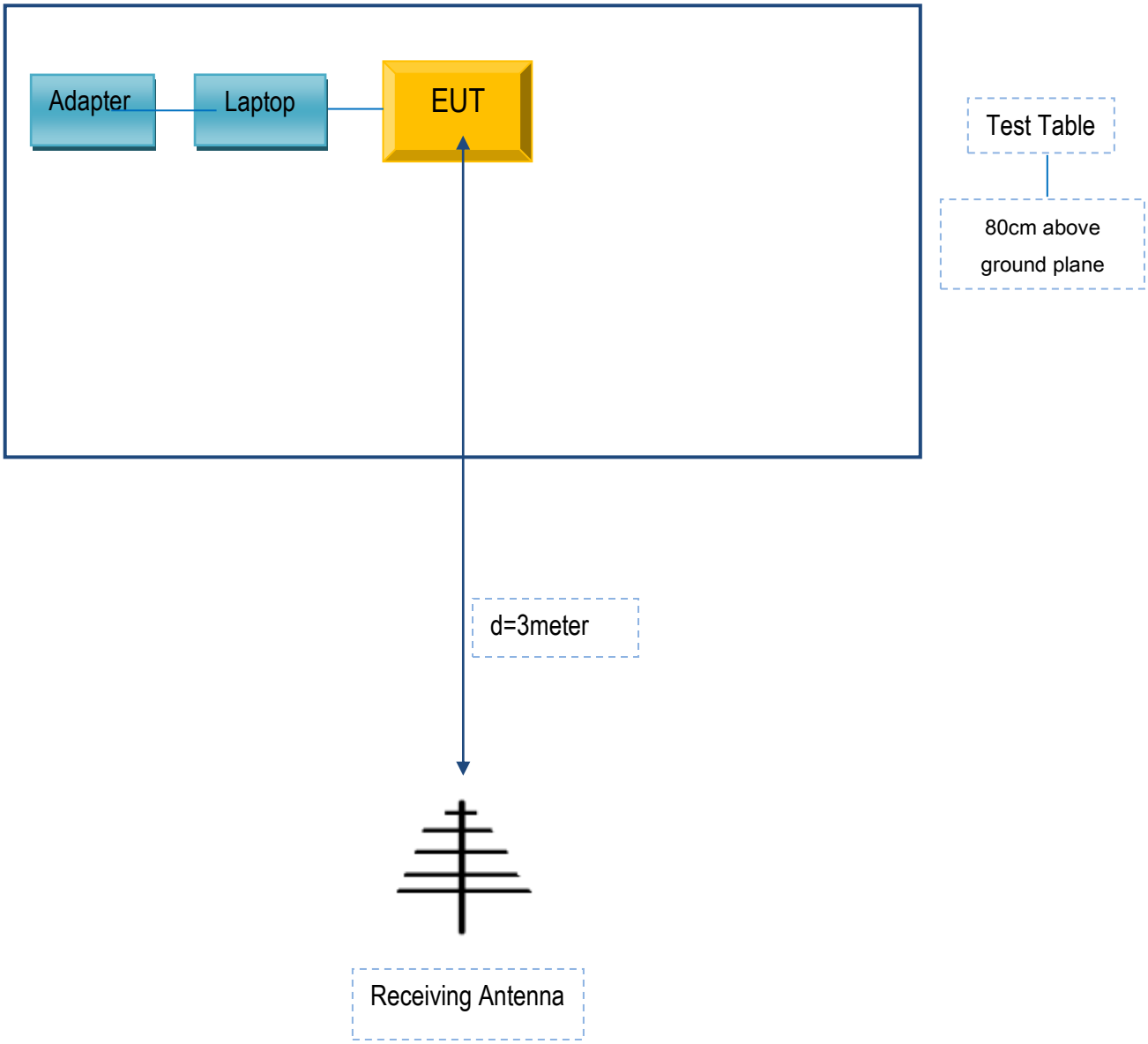
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

Block Configuration Diagram for Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description	Model	Serial No
DELL	Laptop	DSCM	N/A

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

Annex E. DECLARATION OF SIMILARITY

MXCHIP

Statement

We

Shanghai MXCHIP Information Technology Co.,Ltd.

Of

9thFloor,No.5,Lane2145JinshaJiangRoad,Putuo District,ShangHai (200333)

hereby state that

Product : BLE module

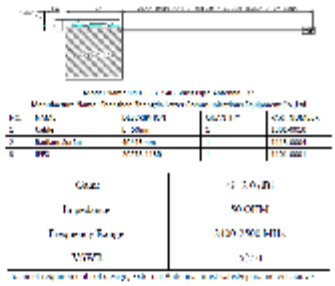
odel Number : EMB1061

The EMB1061 Serial included two Models（EMB1061-E and EMB1061-P）.

All models have the same constructions, circuit diagram and PCB layout.

EMB1061-E used external antenna, EMB1061-P used PCB antenna.

external antenna:



PCB antenna

Sincerely,

Signature:

chenjiang

E-mail: jiangchen@mxchip.com

Phone: +86 18621510666

Fax: +86 21 52655026-193

Address: 9thFloor,No.5,Lane2145JinshaJiangRoad,Putuo District,ShangHai (200333)