

TEST REPORT

Product : BLE MODULE
Trade mark : N/A
Model/Type reference : LH-8267M
Serial Number : N/A
Report Number : EED32K00091101
FCC ID : 2APP2-LH8267M
Date of Issue : May 24, 2018
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

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Longhorn Hi-Tech Estate, Gongyeyuan rd., Dalang Street, 518109
Longhua New District, Shenzhen, Guangdong, P.R. China

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May 24, 2018

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2 Version

Version No.	Date	Description
00	May 24, 2018	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

Remark:

Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

The tested sample(s) and the sample information are provided by the client.

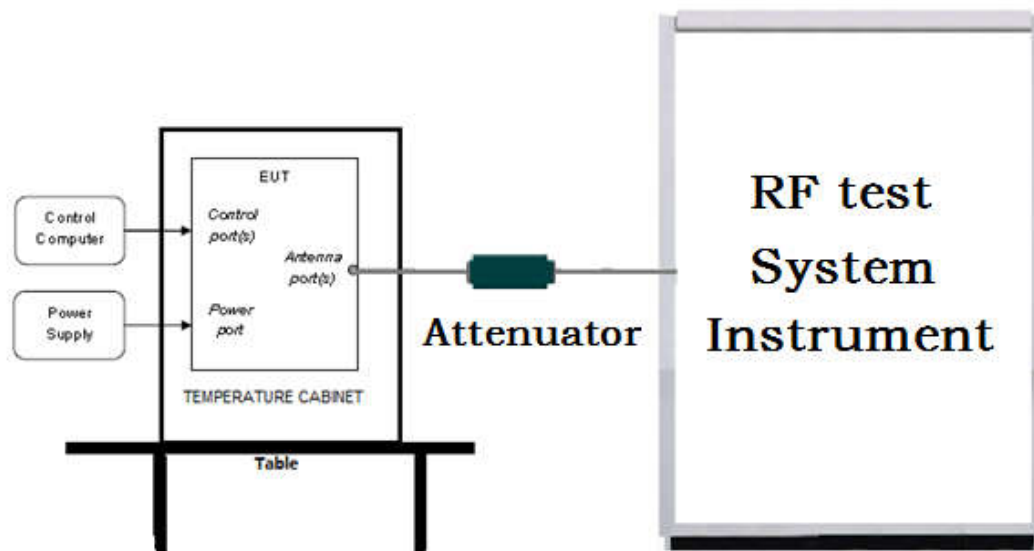
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

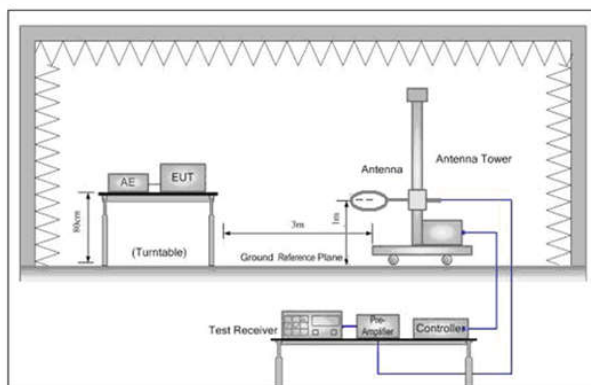


Figure 1. Below 30MHz

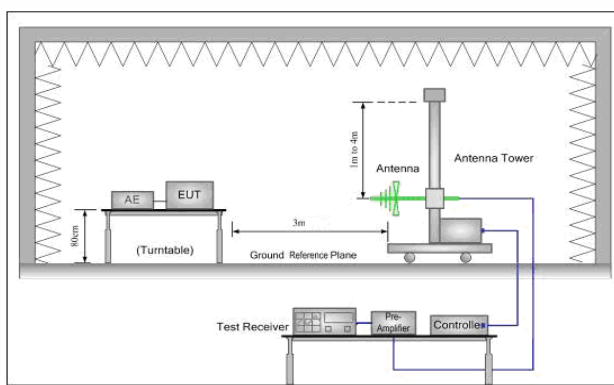


Figure 2. 30MHz to 1GHz

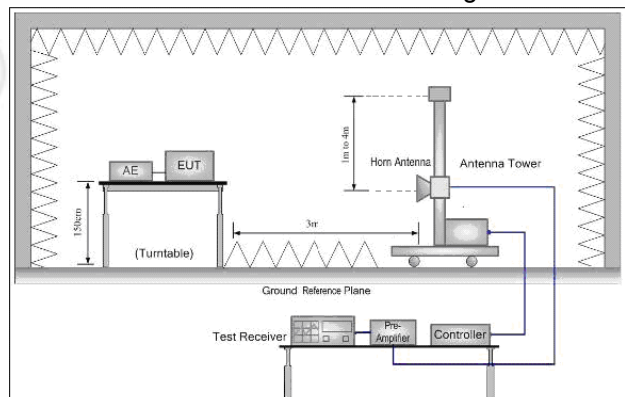
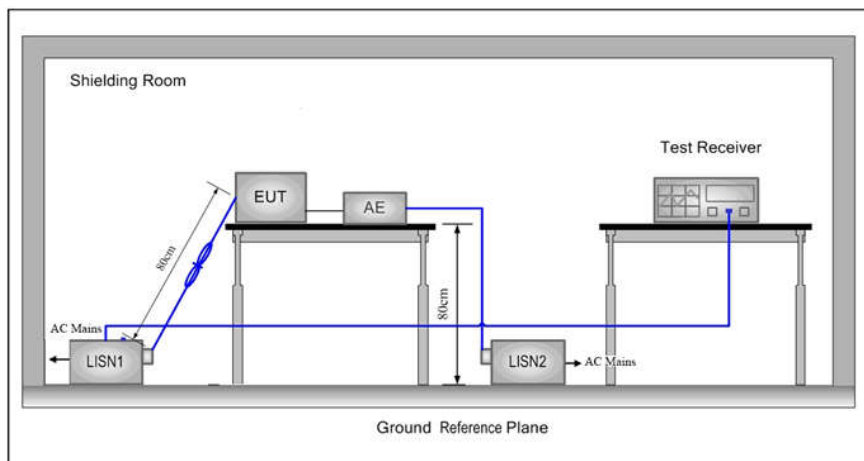


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	21.7 °C
Humidity:	52% RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel 40
		2402MHz	2440MHz	2480MHz
TX mode:	The EUT transmitted the continuous signal at the specific channel(s).			

6 General Information

6.1 Client Information

Applicant:	Longhorn Intelligent Tech Co., Ltd
Address of Applicant:	Longhorn Hi-Tech Estate, Gongyeyuan rd., Dalang Street, 518109 Longhua New District, Shenzhen, Guangdong, P.R. China
Manufacturer:	Longhorn Intelligent Tech Co., Ltd
Address of Manufacturer:	Longhorn Hi-Tech Estate, Gongyeyuan rd., Dalang Street, 518109 Longhua New District, Shenzhen, Guangdong, P.R. China
Factory:	Longhorn Intelligent Tech Co., Ltd
Address of Factory:	Longhorn Hi-Tech Estate, Gongyeyuan rd., Dalang Street, 518109 Longhua New District, Shenzhen, Guangdong, P.R. China

6.2 General Description of EUT

Product Name:	BLE MODULE
Model No.(EUT):	LH-8267M
Trade mark:	N/A
EUT Supports Radios application:	BT4.0 Signal mode, 2402-2480MHz
Power Supply:	DC 3.3 V
Sample Received Date:	Apr. 17, 2018
Sample tested Date:	Apr. 17, 2018 to May. 23, 2018

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz						
Bluetooth Version:	4.0						
Modulation Technique:	DSSS						
Modulation Type:	GFSK						
Number of Channel:	40						
Hardware Version:	REV.B(manufacturer declare)						
Firmware version:	V1.0(manufacturer declare)						
Sample Type:	Mobile production						
Test power grade:	N/A						
Test software of EUT:	(manufacturer declare)wtcdb.exe						
Antenna Type and Gain:	Type: PCB Antenna and Gain: 0dBi						
Test Voltage:	DC 3.3 V and AC 120V, 60Hz						
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
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

6.4 Description of Support Units

The EUT has been tested independently.

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164.

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

7 Equipment List

RF test system					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-13-2018	03-12-2019
Signal Generator	Keysight	N5182B	MY53051549	03-13-2018	03-12-2019
High-pass filter	Sinoscite	FL3CX03WG 18NM12- 0398-002	---	01-10-2018	01-09-2019
DC Power	Keysight	E3642A	MY54426035	03-13-2018	03-12-2019
power meter & power sensor	R&S	OSP120	101374	03-13-2018	03-12-2019
RF control unit	JS Tonscend	JS0806-2	158060006	03-13-2018	03-12-2019
Temperature / Humidity Indicator	Defu	TH128	---	07-08-2017	07-07-2018

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100009	06-14-2017	06-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-05-2017	05-04-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-02-2018	05-01-2019
LISN	schwarzbeck	NNLK8121	8121-529	06-13-2017	06-12-2018

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3MChamber&Accessory Equipment	TDK	SAC-3	---	06-04-2016	06-03-2019
Spectrum Analyzer	Agilent	E4443A	MY45300910	11-16-2017	11-15-2018
Receiver	R&S	ESCI	100435	06-14-2017	06-13-2018
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-618	08-15-2017	08-14-2018
Horn Antenna	ETS-LINGREN	3117	00057407	07-20-2015	07-18-2018
Spectrum Analyzer	R&S	FSP40	100416	06-13-2017	06-12-2018
Microwave Preamplifier	JS Tonscend	EMC051845 SE	980380	01-19-2018	01-18-2019
Loop Antenna	ETS-LINDGREN	6502	00071730	06-22-2017	06-21-2019
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	6042	06-30-2015	06-28-2018
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041	06-30-2015	06-28-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-05-2017	05-04-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-02-2018	05-01-2019
Cable line	Fulai(7M)	SF106	5219/6A	01-09-2018	01-08-2019
Cable line	Fulai(7M)	SF106	5219/6A	01-09-2018	01-08-2019
Cable line	Fulai(6M)	SF106	5220/6A	01-10-2018	01-10-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-09-2018	01-08-2019
Cable line	Fulai(3M)	SF106	5216/6A	01-10-2018	01-10-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-09-2018	01-08-2019
Cable line	Fulai(3M)	SF106	5217/6A	01-09-2018	01-08-2019
Cable line	Fulai(3M)	SF106	5217/6A	01-09-2018	01-08-2019
band rejection filter	Sinoscite	FL5CX01CA 09CL12-0395-001	---	11-06-2017	11-05-2018
band rejection filter	Sinoscite	FL5CX01CA 08CL12-0393-001	---	11-06-2017	11-05-2018
band rejection filter	Sinoscite	FL5CX02CA 04CL12-0396-002	---	11-06-2017	11-05-2018
band rejection filter	Sinoscite	FL5CX02CA 03CL12-0394-001	---	11-06-2017	11-05-2018

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Test Results List:

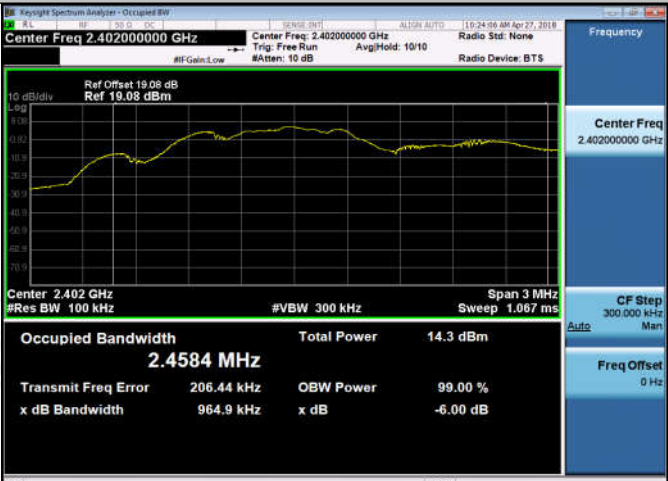
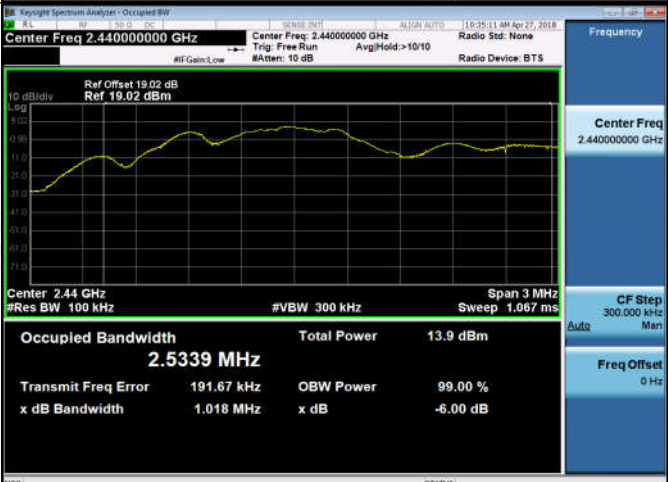
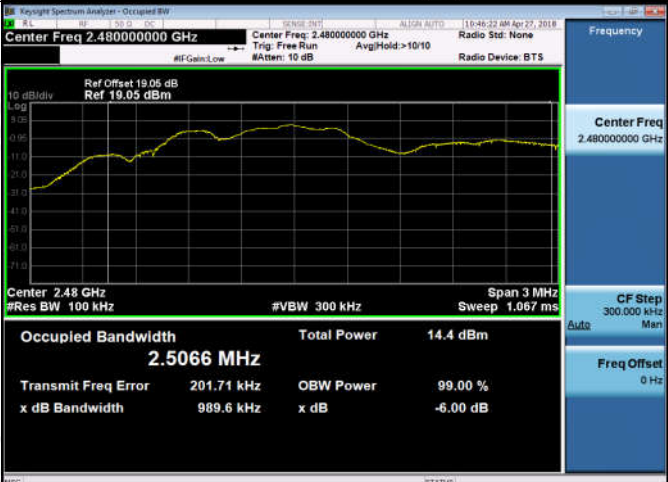
Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

Appendix A): 6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict	Remark
BLE	LCH	0.9649	2.4584	PASS	Peak detector
BLE	MCH	1.018	2.5339	PASS	
BLE	HCH	0.9896	2.5066	PASS	

Test Graphs

Graphs	
LCH	 <p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.402000000 GHz</p> <p>Ref Offset 19.08 dB Ref 19.08 dBm</p> <p>Center 2.402 GHz #Res BW 100 kHz</p> <p>Span 3 MHz #VBW 300 kHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 2.4584 MHz</p> <p>Total Power 14.3 dBm</p> <p>Transmit Freq Error 206.44 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 964.9 kHz</p> <p>x dB -6.00 dB</p>
MCH	 <p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.440000000 GHz</p> <p>Ref Offset 19.02 dB Ref 19.02 dBm</p> <p>Center 2.44 GHz #Res BW 100 kHz</p> <p>Span 3 MHz #VBW 300 kHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 2.5339 MHz</p> <p>Total Power 13.9 dBm</p> <p>Transmit Freq Error 191.67 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 1.018 MHz</p> <p>x dB -6.00 dB</p>
HCH	 <p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.480000000 GHz</p> <p>Ref Offset 19.05 dB Ref 19.05 dBm</p> <p>Center 2.48 GHz #Res BW 100 kHz</p> <p>Span 3 MHz #VBW 300 kHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 2.5066 MHz</p> <p>Total Power 14.4 dBm</p> <p>Transmit Freq Error 201.71 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 989.6 kHz</p> <p>x dB -6.00 dB</p>

Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	6.739	PASS
BLE	MCH	6.557	PASS
BLE	HCH	6.761	PASS

Test Graphs

Graphs	
LCH	<p>Keygraph Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.402000000 GHz</p> <p>Ref Offset 19.08 dB Ref 19.08 dBm</p> <p>Mkr1 2.403256 GHz 6.739 dBm</p> <p>Center 2.40200 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Sweep 1.067 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.402000000 GHz</p> <p>Start Freq 2.389500000 GHz</p> <p>Stop Freq 2.414500000 GHz</p> <p>CF Step 2.500000 MHz Man</p> <p>Freq Offset 0 Hz</p>
MCH	<p>Keygraph Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.440000000 GHz</p> <p>Ref Offset 19.02 dB Ref 19.02 dBm</p> <p>Mkr1 2.440319 GHz 6.557 dBm</p> <p>Center 2.44000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Sweep 1.067 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.440000000 GHz</p> <p>Start Freq 2.427500000 GHz</p> <p>Stop Freq 2.452500000 GHz</p> <p>CF Step 2.500000 MHz Man</p> <p>Freq Offset 0 Hz</p>
HCH	<p>Keygraph Spectrum Analyzer - Sweep SA</p> <p>Center Freq 2.480000000 GHz</p> <p>Ref Offset 19.05 dB Ref 19.05 dBm</p> <p>Mkr1 2.481500 GHz 6.761 dBm</p> <p>Center 2.48000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Sweep 1.067 ms (8001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.480000000 GHz</p> <p>Start Freq 2.467500000 GHz</p> <p>Stop Freq 2.492500000 GHz</p> <p>CF Step 2.500000 MHz Man</p> <p>Freq Offset 0 Hz</p>

Appendix C): Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	6.435	-52.549	-13.57	PASS
BLE	HCH	6.577	-42.096	-13.42	PASS

Test Graphs

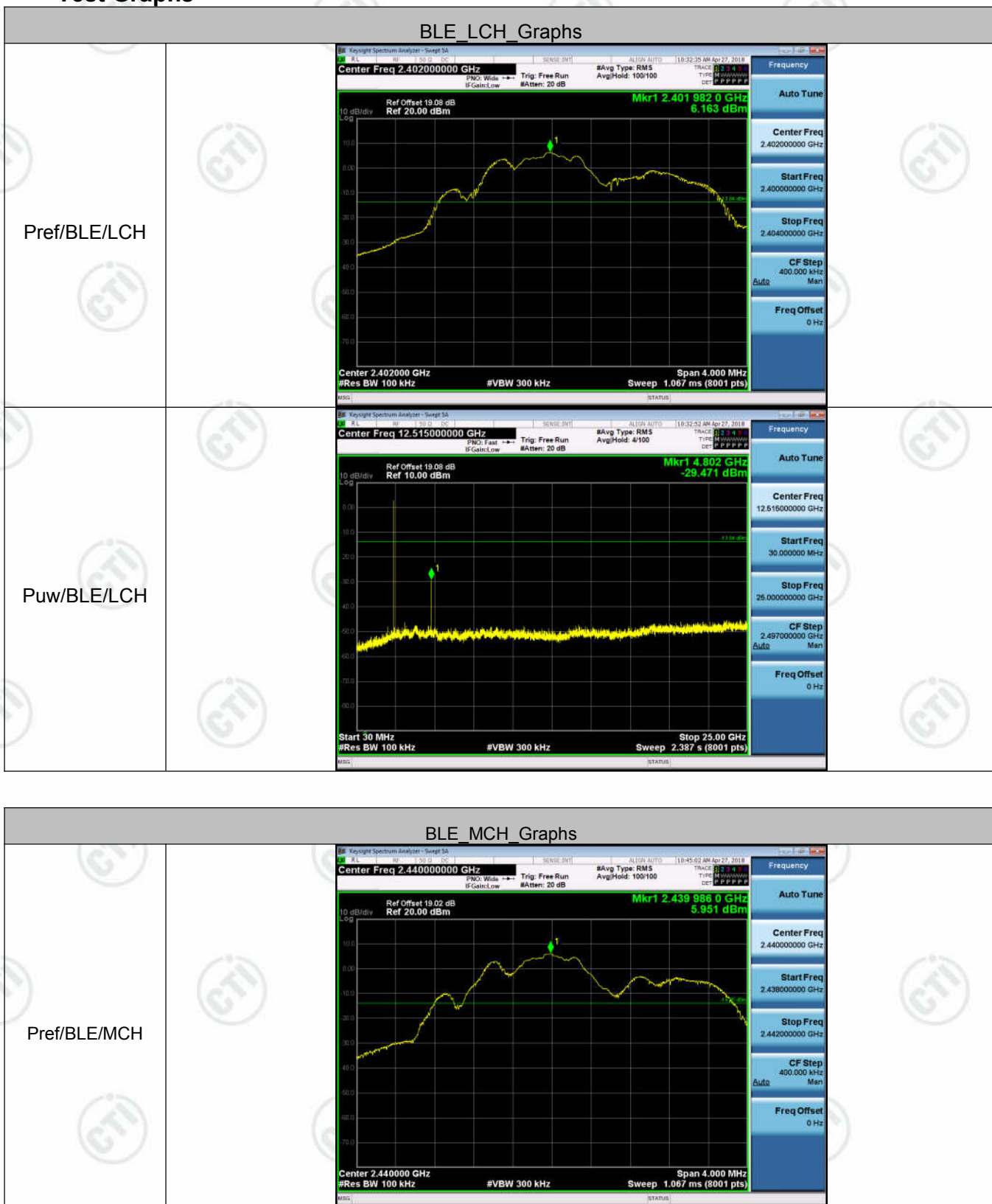


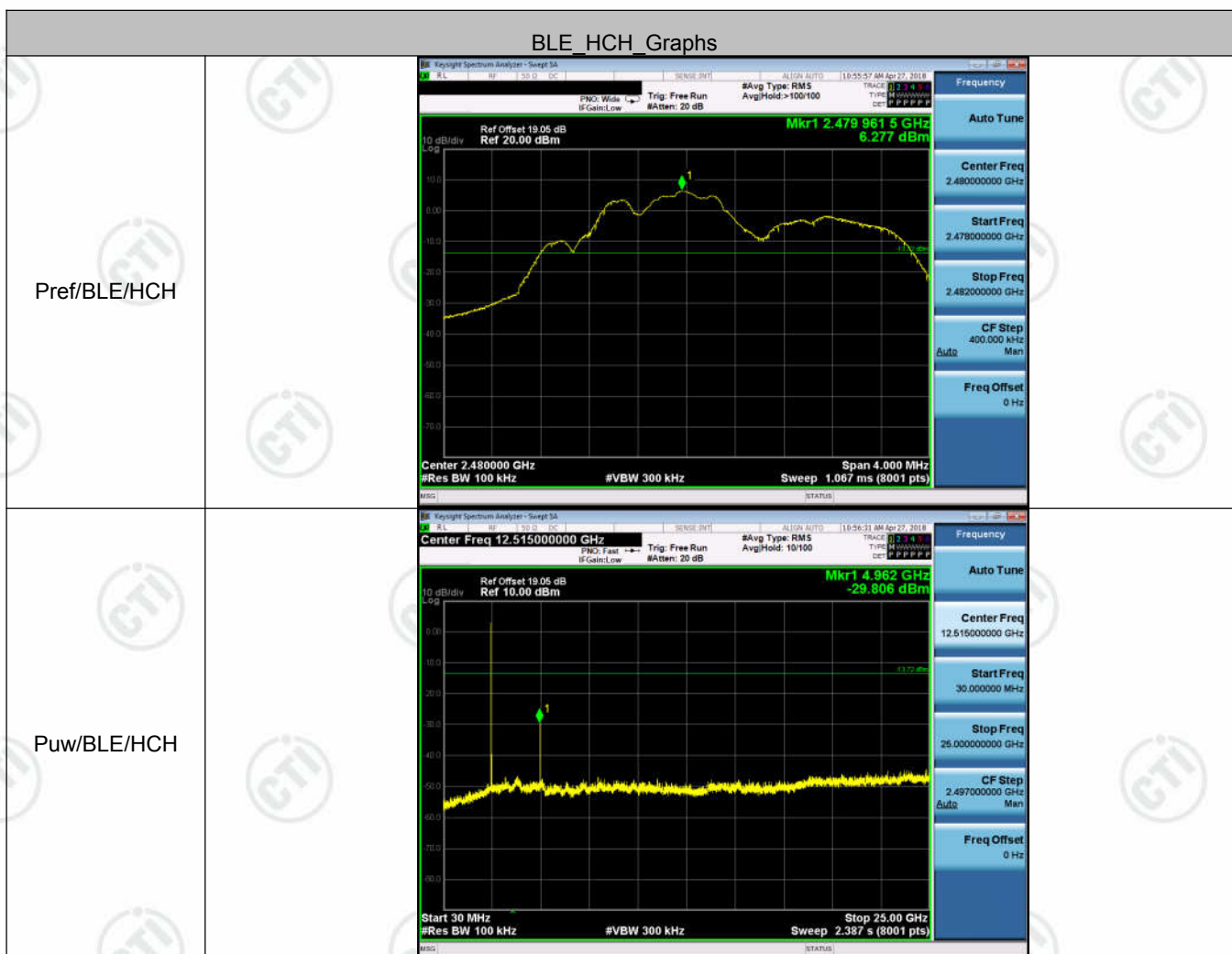
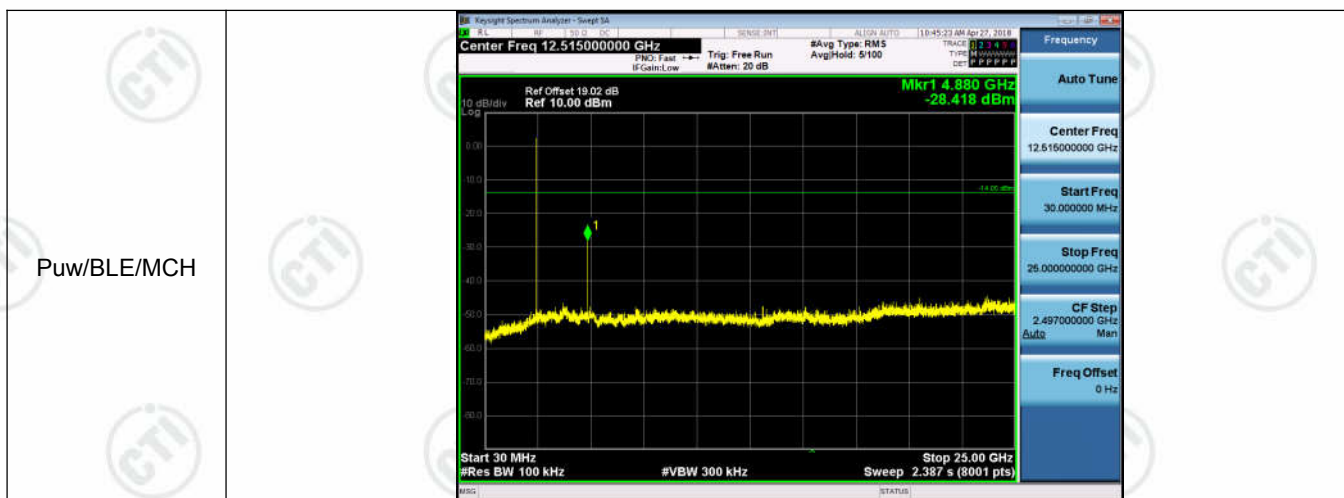
Appendix D): RF Conducted Spurious Emissions

Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	6.163	<Limit	PASS
BLE	MCH	5.951	<Limit	PASS
BLE	HCH	6.277	<Limit	PASS

Test Graphs



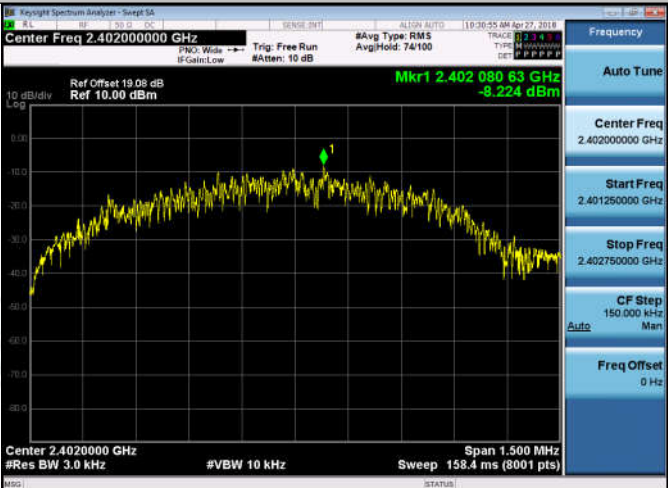

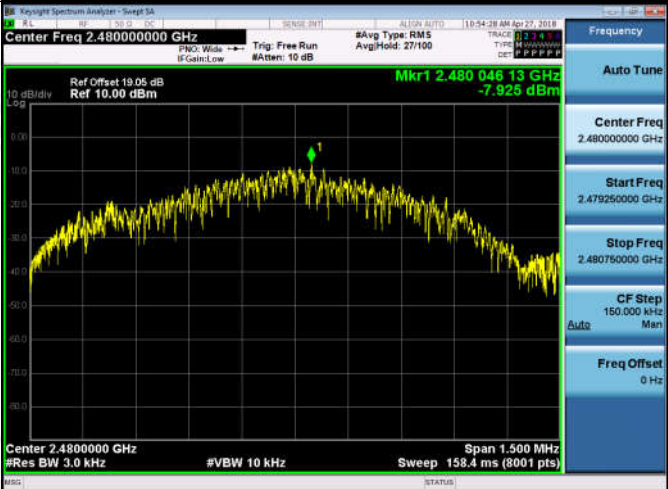


Appendix E): Power Spectral Density

Result Table

Mode	Channel	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE	LCH	-8.224	8	PASS
BLE	MCH	-8.754	8	PASS
BLE	HCH	-7.925	8	PASS

Test Graphs

Graphs	
LCH	
MCH	
HCH	

Appendix F): Antenna Requirement

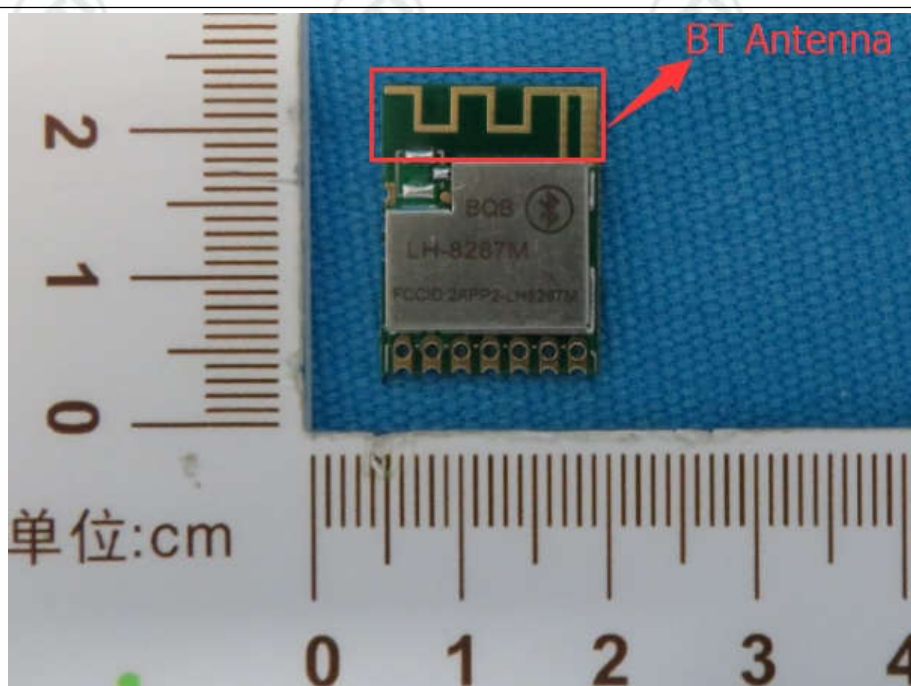
15.203 requirement:

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(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.

Appendix G): AC Power Line Conducted Emission

Test Procedure:	<p>Test frequency range :150KHz-30MHz</p> <p>1)The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</p> <p>3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</p> <p>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</p> <p>5) 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 on conducted measurement.</p>														
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></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> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.</p> <p>NOTE : The lower limit is applicable at the transition frequency</p>	Frequency range (MHz)	Limit (dB μ V)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dB μ V)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													

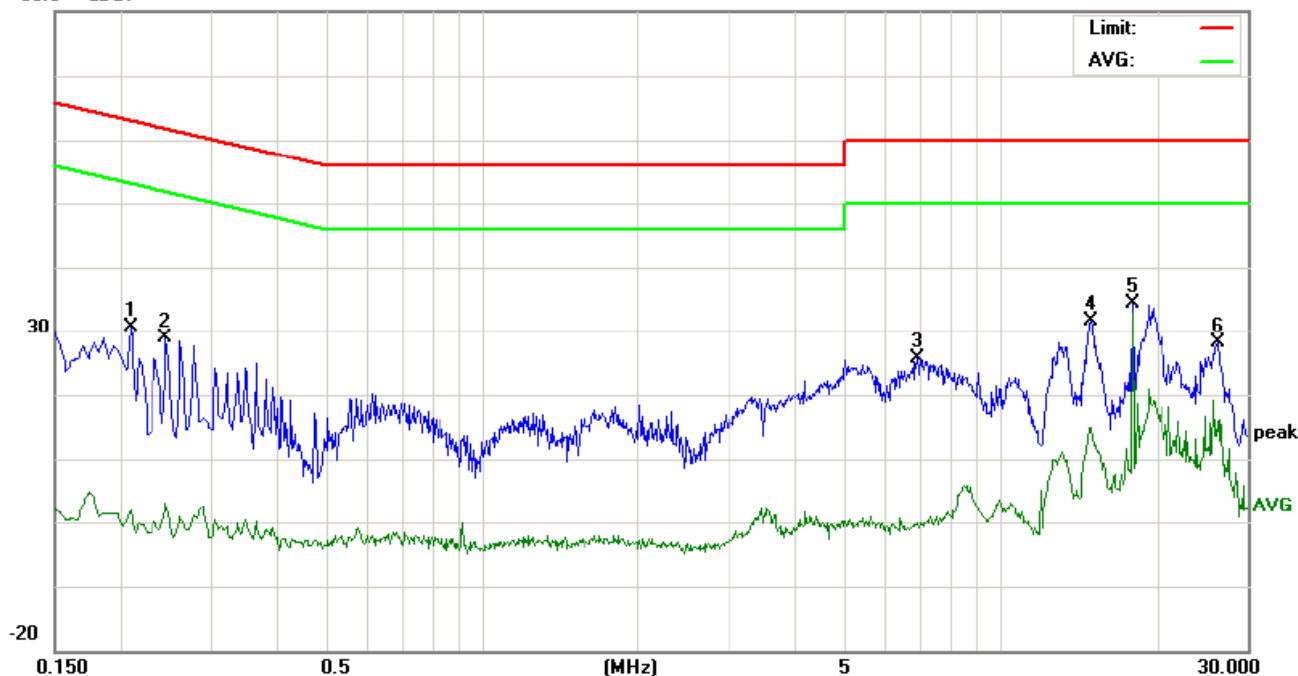
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:

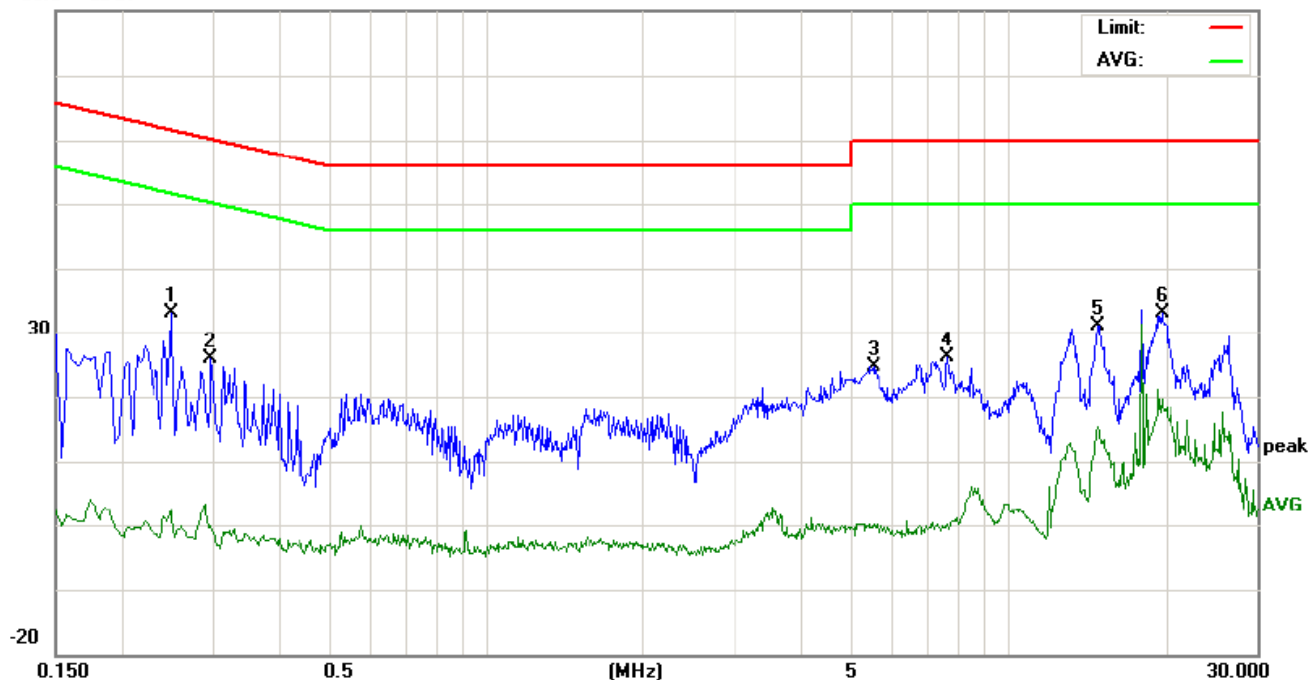
80.0 dBuV



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2100	20.83	18.56	-7.88	9.72	30.55	28.28	1.84	63.20	53.20	-34.92	-51.36	P	
2	0.2460	19.05	16.38	-6.64	9.74	28.79	26.12	3.10	61.89	51.89	-35.77	-48.79	P	
3	6.9340	16.06	13.45	-9.87	9.62	25.68	23.07	-0.25	60.00	50.00	-36.93	-50.25	P	
4	15.0220	21.69	19.41	4.81	10.01	31.70	29.42	14.82	60.00	50.00	-30.58	-35.18	P	
5	18.0020	24.41	22.13	22.82	10.04	34.45	32.17	32.86	60.00	50.00	-27.83	-17.14	P	
6	26.3060	17.97	15.24	5.55	10.21	28.18	25.45	15.76	60.00	50.00	-34.55	-34.24	P	

Neutral line:

80.0 dBuV



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG	P/F		
1	0.2500	23.34	20.52	-7.38	9.74	33.08	30.26	2.36	61.75	51.75	-31.49	-49.39	P		
2	0.2980	16.06	13.87	-9.97	9.78	25.84	23.65	-0.19	60.30	50.30	-36.65	-50.49	P		
3	5.5220	15.12	12.42	-9.43	9.62	24.74	22.04	0.19	60.00	50.00	-37.96	-49.81	P		
4	7.6580	16.44	14.10	-9.52	9.66	26.10	23.76	0.14	60.00	50.00	-36.24	-49.86	P		
5	14.8940	21.12	19.08	5.40	10.01	31.13	29.09	15.41	60.00	50.00	-30.91	-34.59	P		
6	19.6380	22.99	20.53	9.65	10.06	33.05	30.59	19.71	60.00	50.00	-29.41	-30.29	P		

Notes:

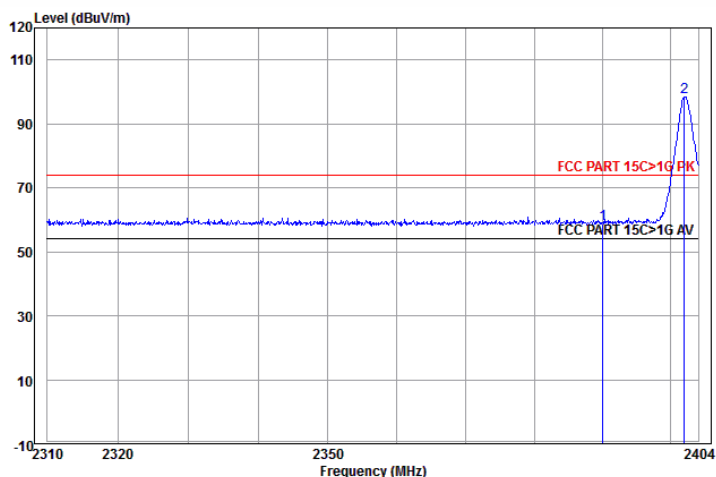
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

Appendix H): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:	<p>Below 1GHz test procedure as below:</p> <ol style="list-style-type: none"> The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel <p>Above 1GHz test procedure as below:</p> <ol style="list-style-type: none"> Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter). . Test the EUT in the lowest channel , the Highest channel The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete. 				
Limit:	Frequency	Limit (dBμV/m @3m)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
		74.0		Peak Value	

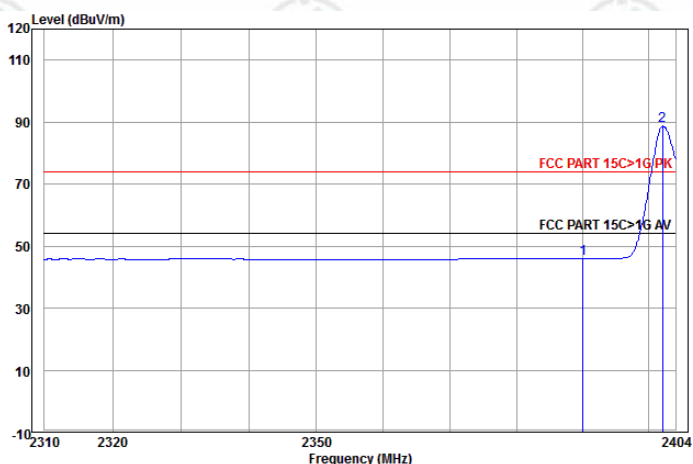
Test plot as follows:

Worse case mode:	GFSK		
Frequency: 2402MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



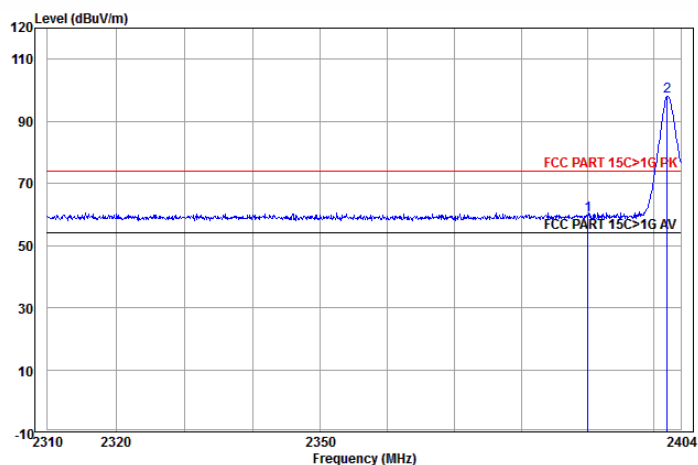
	Ant Freq	Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.10	58.70	74.00	-15.30	Horizontal	Peak
2 pp	2401.987	32.56	3.07	62.90	98.53	74.00	24.53	Horizontal	Peak

Worse case mode:	GFSK		
Frequency: 2402MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Average



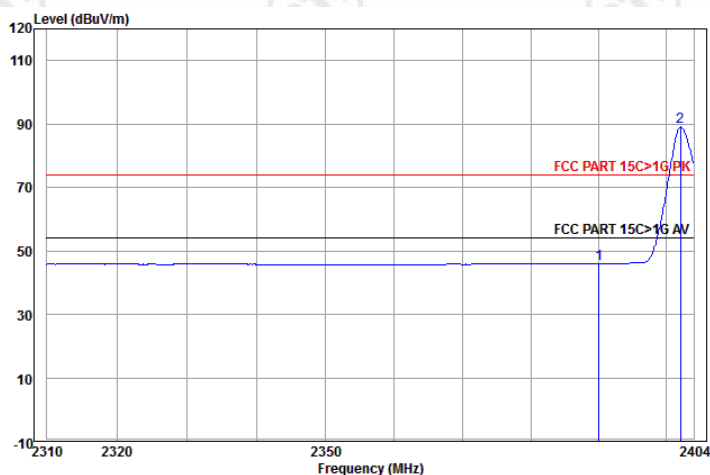
	Ant Freq	Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.45	46.05	54.00	-7.95	Horizontal	Average
2 pp	2402.083	32.56	3.07	53.08	88.71	54.00	34.71	Horizontal	Average

Worse case mode:	GFSK		
Frequency: 2402MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



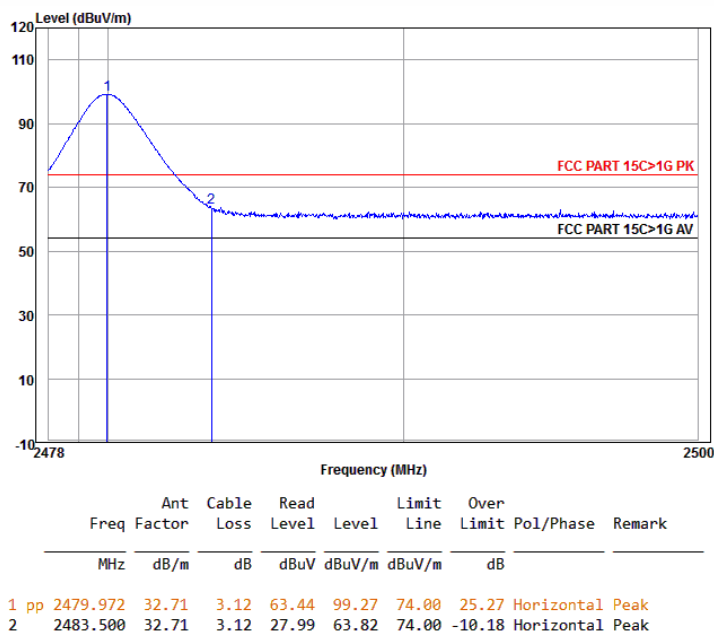
	Ant Freq	Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	24.13	59.73	74.00	-14.27	Vertical	Peak
2 pp	2401.987	32.56	3.07	62.31	97.94	74.00	23.94	Vertical	Peak

Worse case mode:	GFSK		
Frequency: 2402MHz	Test channel: Lowest	Polarization: Vertical	Remark: Average

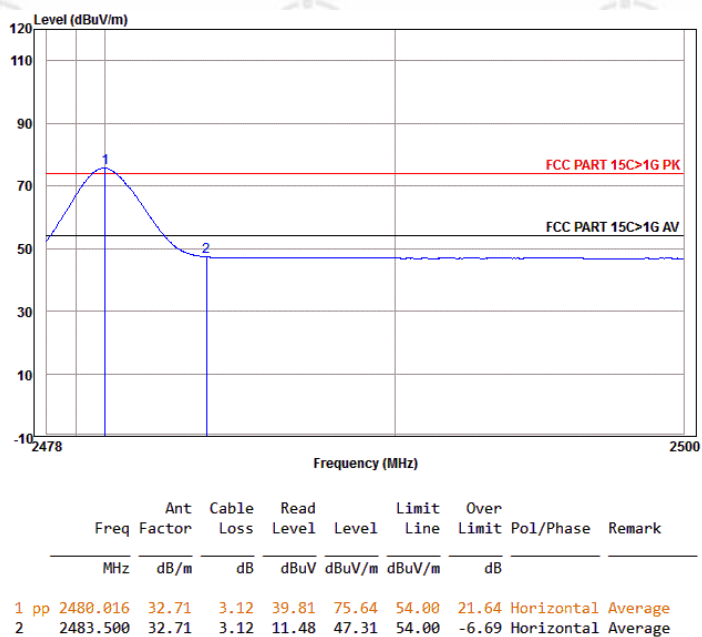


	Ant Freq	Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.50	46.10	54.00	-7.90	Vertical	Average
2 pp	2402.083	32.56	3.07	53.55	89.18	54.00	35.18	Vertical	Average

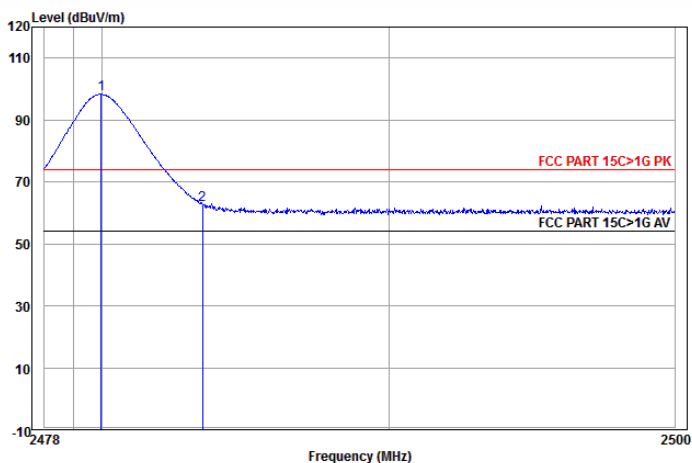
Worse case mode:	GFSK		
Frequency: 2480MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



Worse case mode:	GFSK		
Frequency: 2480MHz	Test channel: Highest	Polarization: Horizontal	Remark: Average

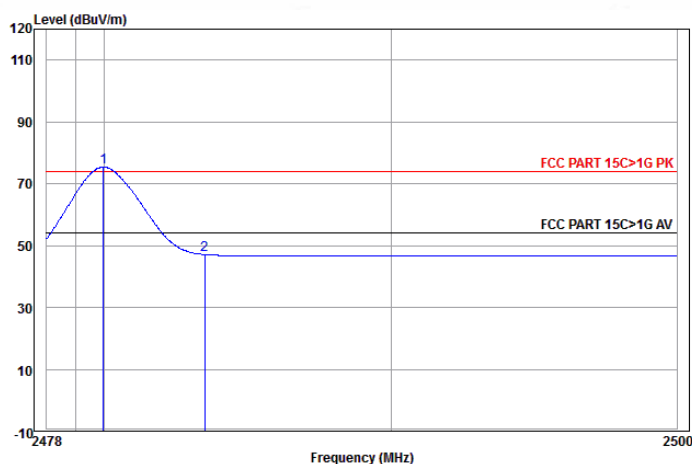


Worse case mode:	GFSK		
Frequency: 2480MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.972	32.71	3.12	62.44	98.27	74.00	24.27	Vertical	Peak
2	2483.500	32.71	3.12	26.91	62.74	74.00	-11.26	Vertical	Peak

Worse case mode:	GFSK		
Frequency: 2480MHz	Test channel: Highest	Polarization: Vertical	Remark: Average



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.972	32.71	3.12	39.55	75.38	54.00	21.38	Vertical	Average
2	2483.500	32.71	3.12	11.28	47.11	54.00	-6.89	Vertical	Average

Note: The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

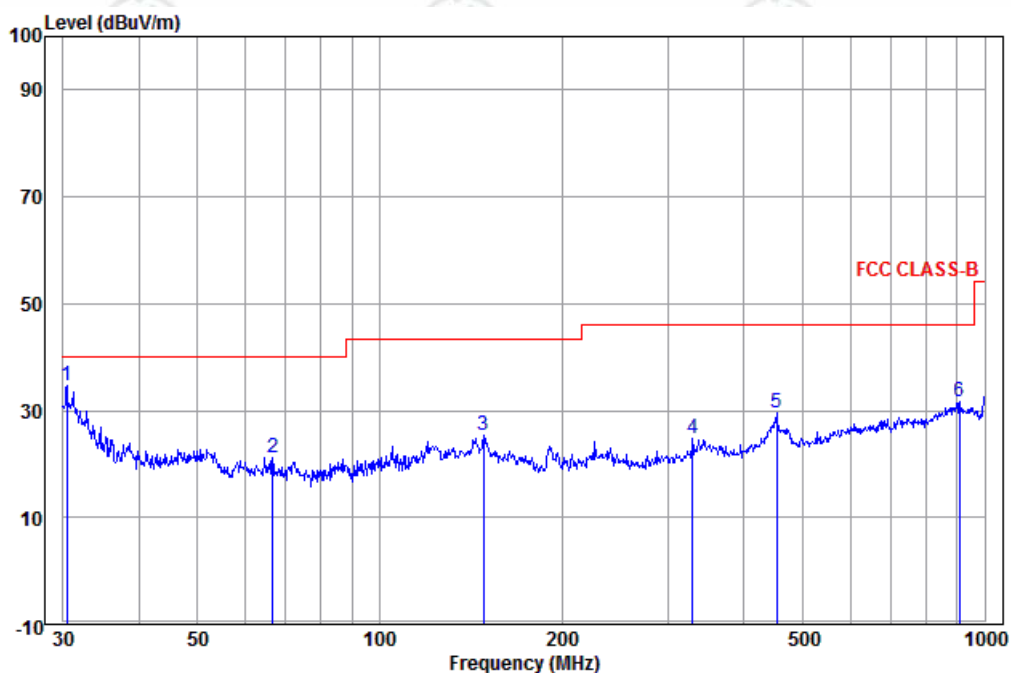
Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

Appendix I): Radiated Spurious Emissions

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
Test Procedure:					
Below 1GHz test procedure as below:					
<p>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. 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.</p> <p>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. 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.</p>					
Above 1GHz test procedure as below:					
<p>g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).</p> <p>h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>					
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

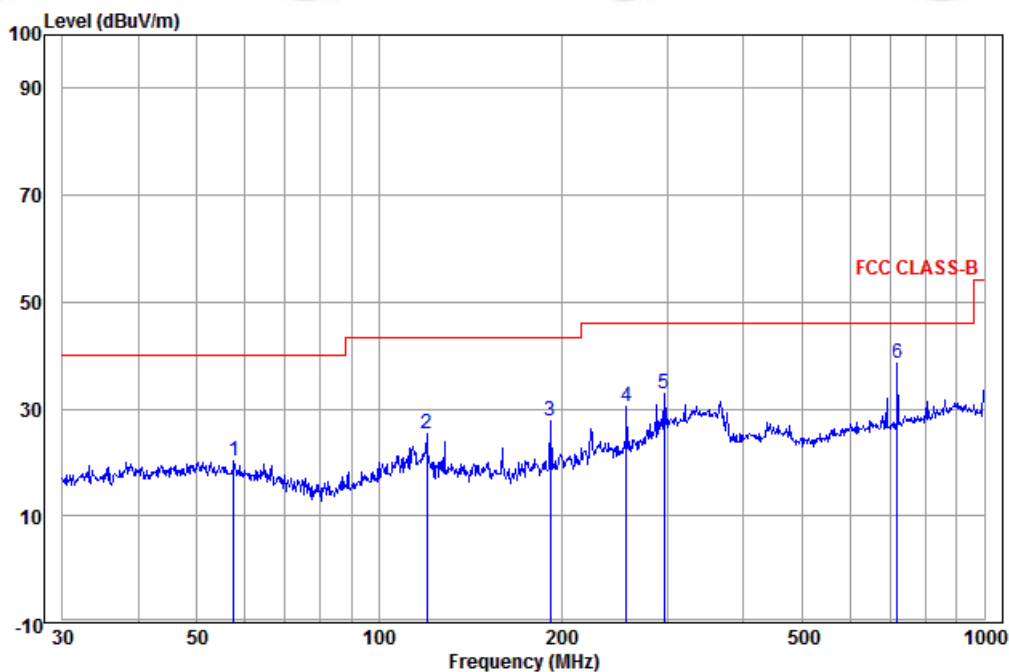
Radiated Spurious Emissions test Data: **Radiated Emission below 1GHz**

30MHz~1GHz (QP)		
Test mode:	Transmitting	Vertical



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	30.424	11.99	0.09	22.56	34.64	40.00	-5.36	Vertical	QP
2	66.499	11.30	0.24	9.78	21.32	40.00	-18.68	Vertical	QP
3	148.441	8.90	0.61	15.82	25.33	43.50	-18.17	Vertical	QP
4	329.039	14.00	1.22	9.43	24.65	46.00	-21.35	Vertical	QP
5	452.720	16.24	1.47	11.76	29.47	46.00	-16.53	Vertical	QP
6	909.667	22.08	2.46	7.22	31.76	46.00	-14.24	Vertical	QP

Test mode:	Transmitting	Horizontal
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	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	57.594	13.44	0.19	6.51	20.14	40.00	-19.86	Horizontal	QP
2	119.856	10.85	0.60	13.97	25.42	43.50	-18.08	Horizontal	QP
3	191.745	11.10	1.03	15.64	27.77	43.50	-15.73	Horizontal	QP
4	256.521	12.71	1.30	16.38	30.39	46.00	-15.61	Horizontal	QP
5	296.184	13.34	1.09	18.28	32.71	46.00	-13.29	Horizontal	QP
6 pp	719.200	19.26	2.21	17.08	38.55	46.00	-7.45	Horizontal	QP

Transmitter Emission above 1GHz

Worse case mode:		GFSK		Test channel:		Lowest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1038.921	29.81	1.58	44.63	49.22	35.98	74.00	-38.02	Pass	H
1565.200	30.99	2.37	43.92	47.76	37.20	74.00	-36.80	Pass	H
4804.000	34.69	5.98	44.60	48.54	44.61	74.00	-29.39	Pass	H
5821.207	35.77	7.26	44.52	49.05	47.56	74.00	-26.44	Pass	H
7206.000	36.42	6.97	44.77	49.78	48.40	74.00	-25.60	Pass	H
9608.000	37.88	6.98	45.58	46.06	45.34	74.00	-28.66	Pass	H
1309.737	30.48	2.03	44.23	48.41	36.69	74.00	-37.31	Pass	V
1630.264	31.11	2.45	43.85	47.79	37.50	74.00	-36.50	Pass	V
4804.000	34.69	5.98	44.60	54.86	50.93	74.00	-23.07	Pass	V
5986.509	35.89	7.43	44.50	48.89	47.71	74.00	-26.29	Pass	V
7206.000	36.42	6.97	44.77	47.58	46.20	74.00	-27.80	Pass	V
9608.000	37.88	6.98	45.58	46.71	45.99	74.00	-28.01	Pass	V

Worse case mode:		GFSK		Test channel:		Middle	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1138.626	30.07	1.76	44.48	48.47	35.82	74.00	-38.18	Pass	H
1514.252	30.90	2.31	43.98	48.19	37.42	74.00	-36.58	Pass	H
4880.000	34.85	6.13	44.60	46.98	43.36	74.00	-30.64	Pass	H
6577.752	36.20	7.29	44.56	49.32	48.25	74.00	-25.75	Pass	H
7320.000	36.43	6.85	44.87	46.78	45.19	74.00	-28.81	Pass	H
9760.000	38.05	7.12	45.55	47.68	47.30	74.00	-26.70	Pass	H
1273.572	30.40	1.97	44.28	48.05	36.14	74.00	-37.86	Pass	V
1529.749	30.93	2.33	43.96	48.41	37.71	74.00	-36.29	Pass	V
4880.000	34.85	6.13	44.60	54.33	50.71	74.00	-23.29	Pass	V
5986.509	35.89	7.43	44.50	48.70	47.52	74.00	-26.48	Pass	V
7320.000	36.43	6.85	44.87	49.56	47.97	74.00	-26.03	Pass	V
9760.000	38.05	7.12	45.55	45.86	45.48	74.00	-28.52	Pass	V

Worse case mode:		GFSK		Test channel:		Highest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1185.958	30.19	1.84	44.40	47.82	35.45	74.00	-38.55	Pass	H
1565.200	30.99	2.37	43.92	47.77	37.21	74.00	-36.79	Pass	H
4960.000	35.02	6.29	44.60	46.39	43.10	74.00	-30.90	Pass	H
6561.030	36.19	7.30	44.56	48.63	47.56	74.00	-26.44	Pass	H
7440.000	36.45	6.73	44.97	48.59	46.80	74.00	-27.20	Pass	H
9920.000	38.22	7.26	45.52	45.66	45.62	74.00	-28.38	Pass	H
1182.943	30.18	1.83	44.41	47.78	35.38	74.00	-38.62	Pass	V
1388.708	30.65	2.14	44.13	48.25	36.91	74.00	-37.09	Pass	V
4960.000	35.02	6.29	44.60	54.18	50.89	74.00	-23.11	Pass	V
5806.408	35.76	7.25	44.52	49.83	48.32	74.00	-25.68	Pass	V
7440.000	36.45	6.73	44.97	46.38	44.59	74.00	-29.41	Pass	V
9920.000	38.22	7.26	45.52	47.11	47.07	74.00	-26.93	Pass	V

Note:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

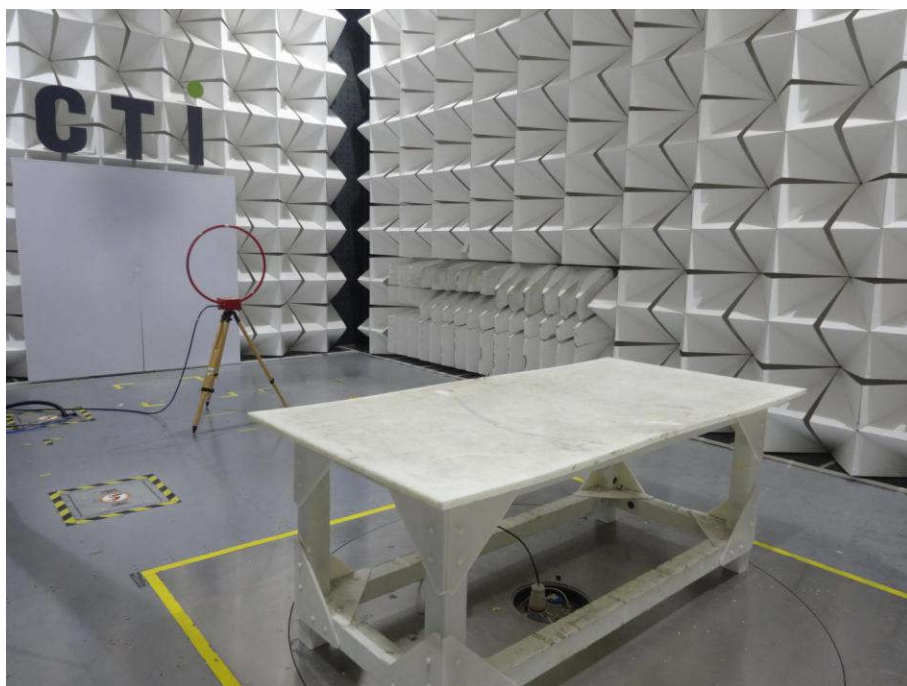
Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

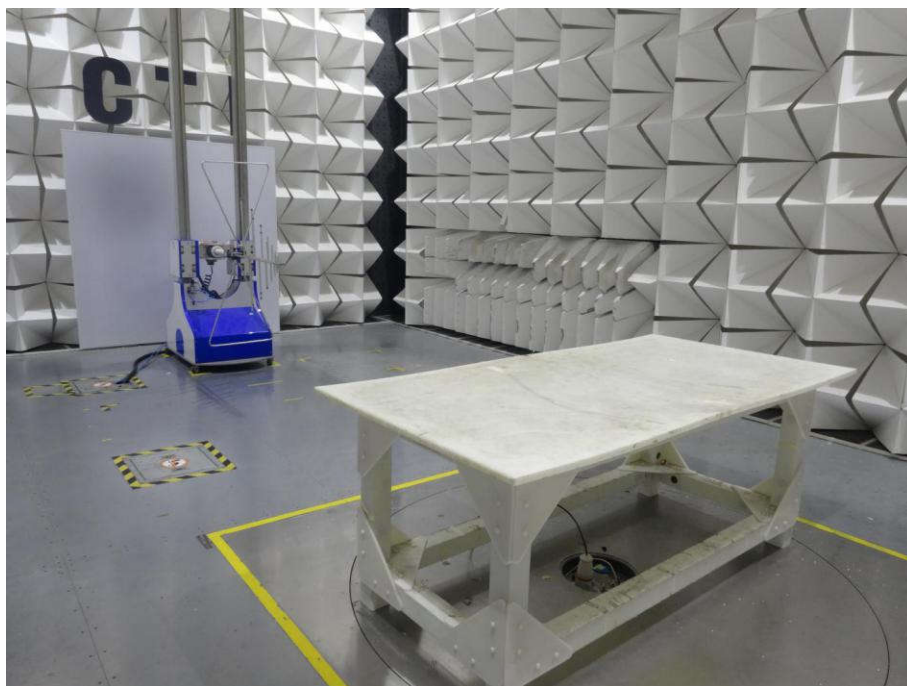
2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

PHOTOGRAPHS OF TEST SETUP

Test model No.: LH-8267M



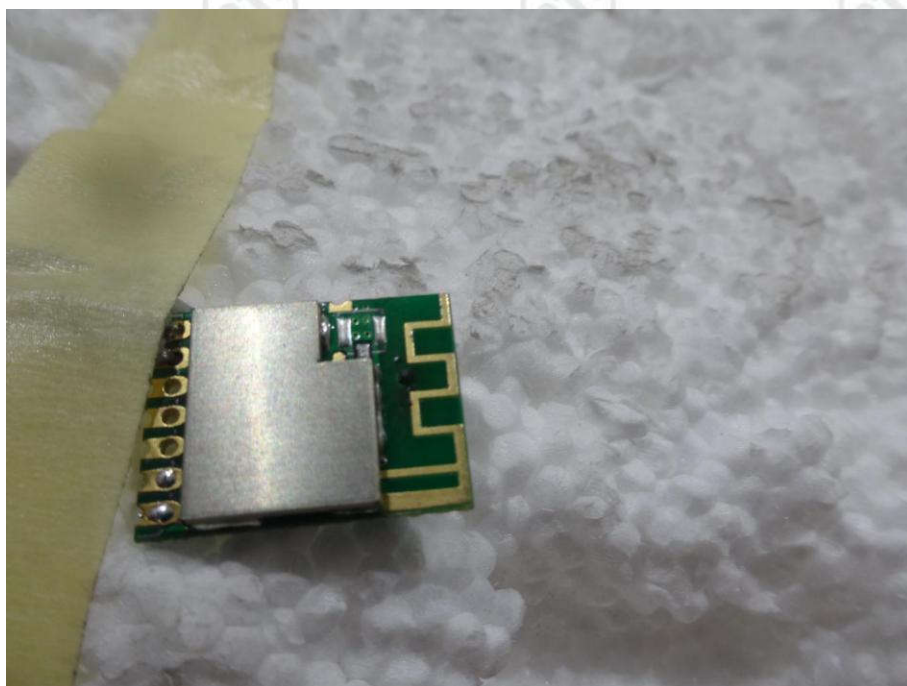
Radiated spurious emission Test Setup-1(Below 30MHz)



Radiated spurious emission Test Setup-2(30MHz-1GHz)



Radiated spurious emission Test Setup-3(Above 1GHz)



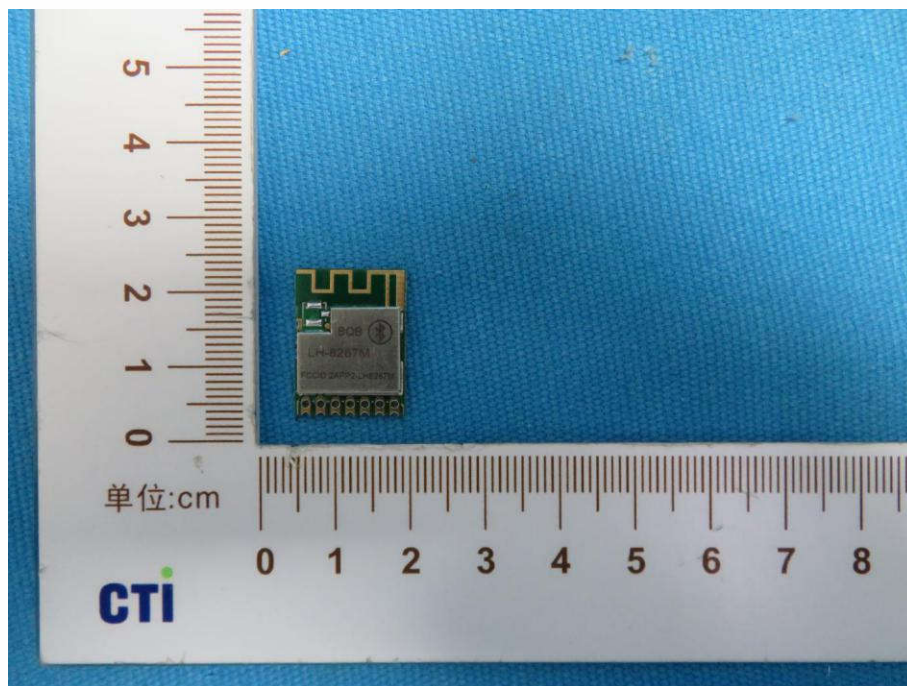
Close-up Test Setup



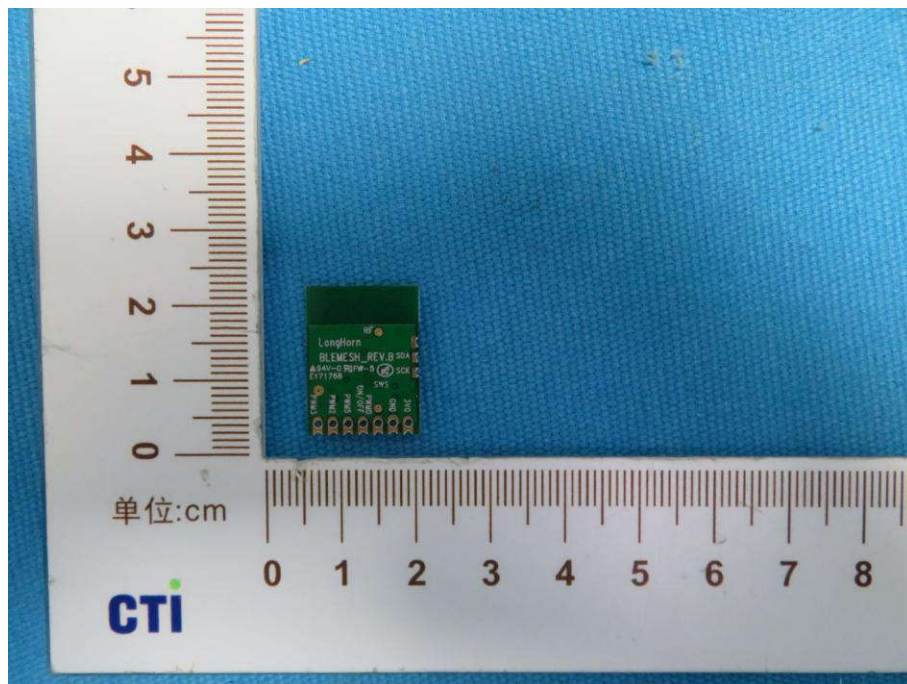
Conducted emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

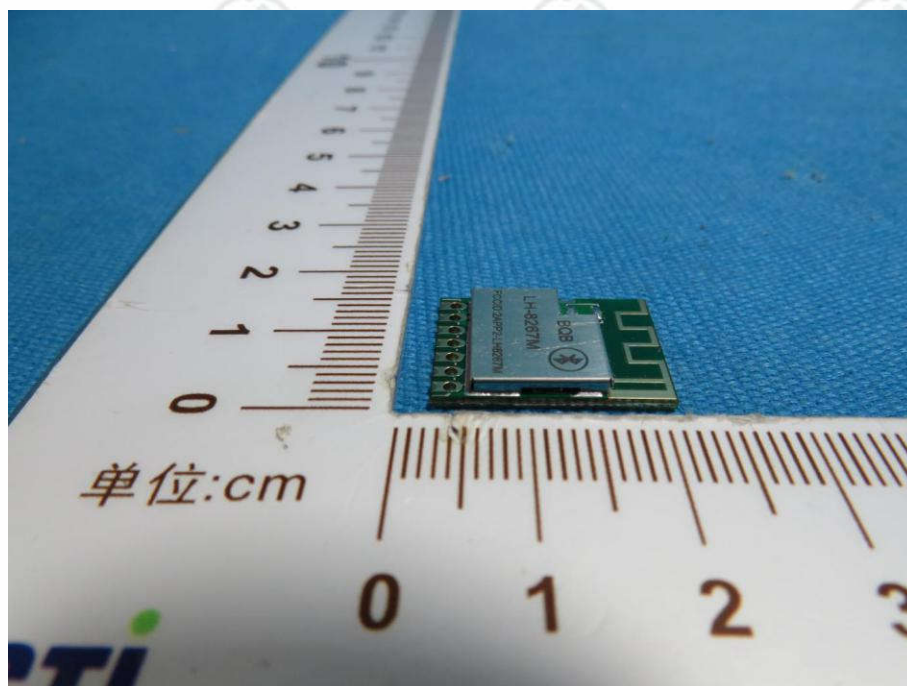
Test model No.: LH-8267M



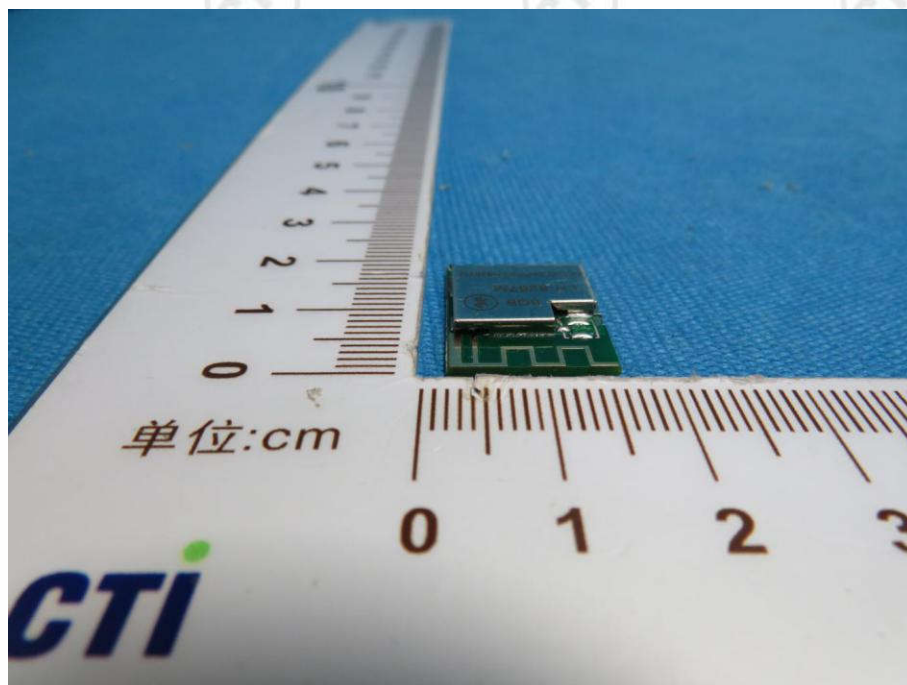
View of Product-1



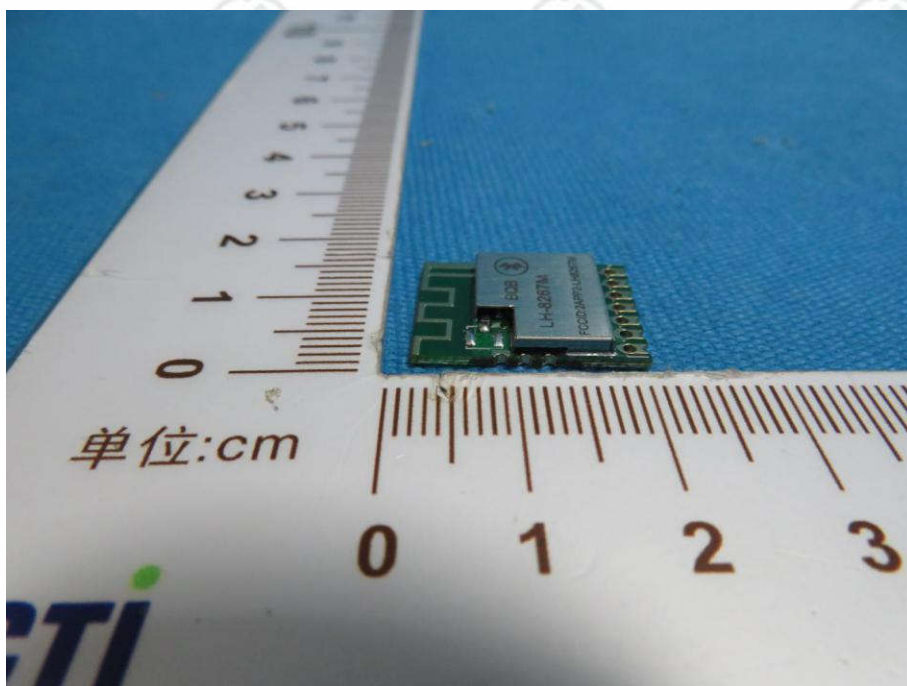
View of Product-2



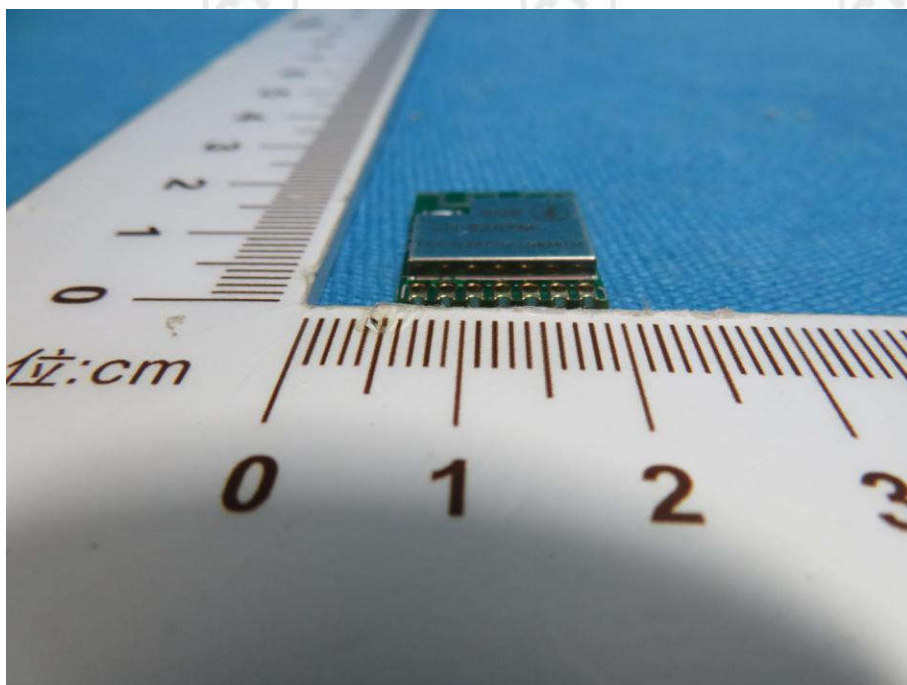
View of Product-3



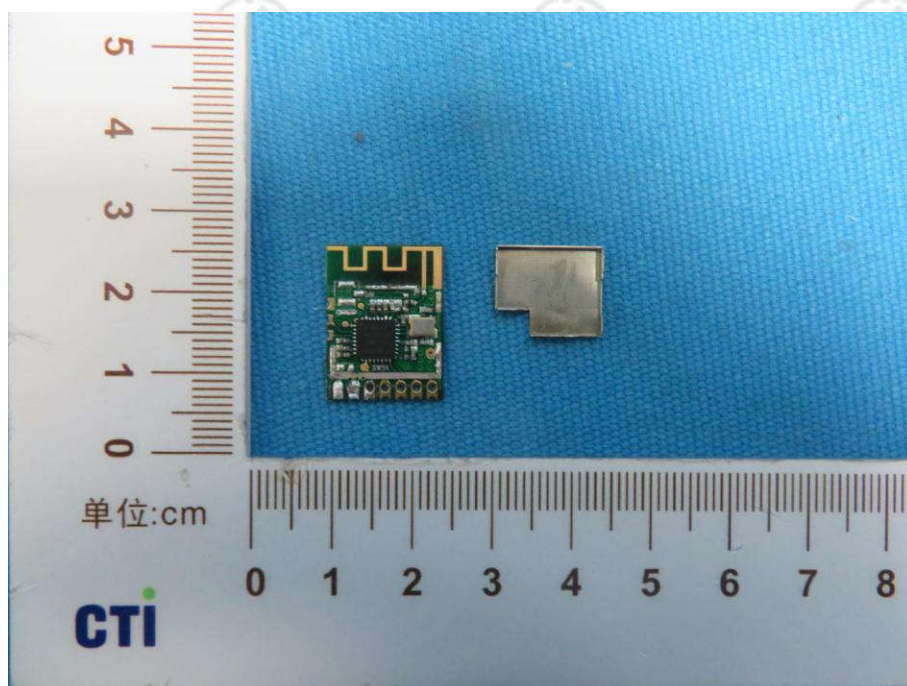
View of Product-4



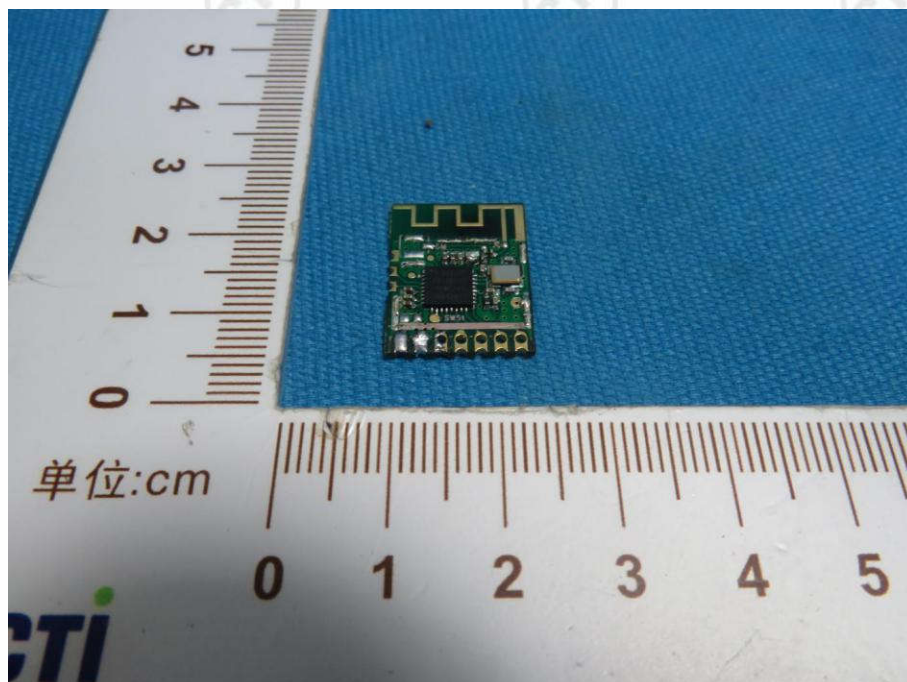
View of Product-5



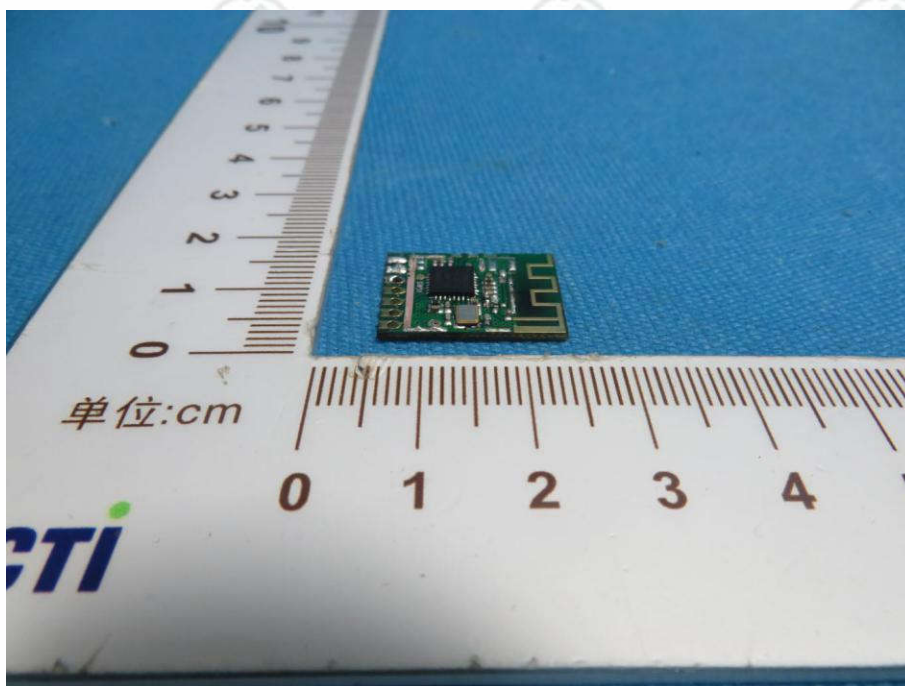
View of Product-6



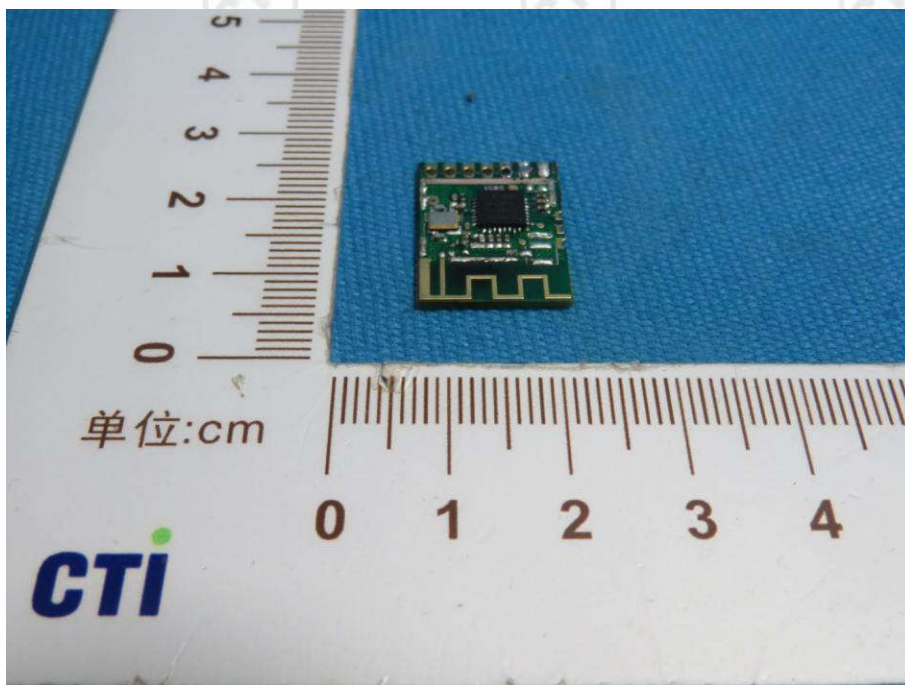
View of Product-7



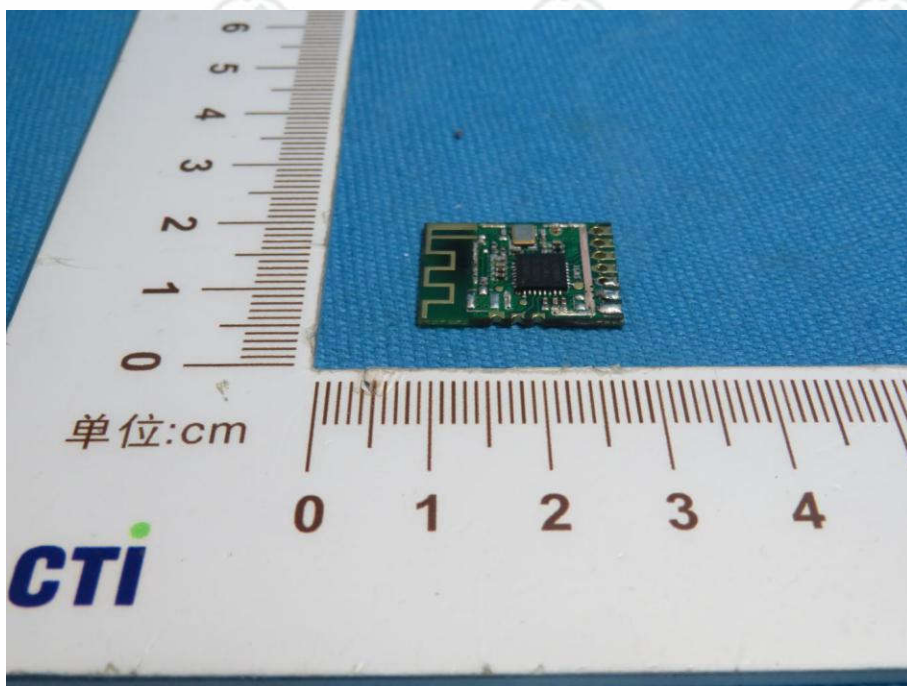
View of Product-8



View of Product-9



View of Product-10



View of Product-11



View of Product-12

*** End of Report ***

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