

TEST REPORT

Product : WisePad 2
Trade mark : BBPOS
Model/Type reference : WPC23
Serial Number : N/A
Report Number : EED32J00095403
FCC ID : 2AB7X-WISEPAD2-3G
Date of Issue : Jun. 21, 2017
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

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Date:

Jun. 21, 2017

Check No.:2402681052



2 Version

Version No.	Date	Description
00	Jun. 21, 2017	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/ KDB 558074 D01v04	PASS
6dB Occupied Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
Power Spectral Density	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
RF Conducted Spurious Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013/ KDB 558074 D01v04	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 and the sample information are provided by the client.

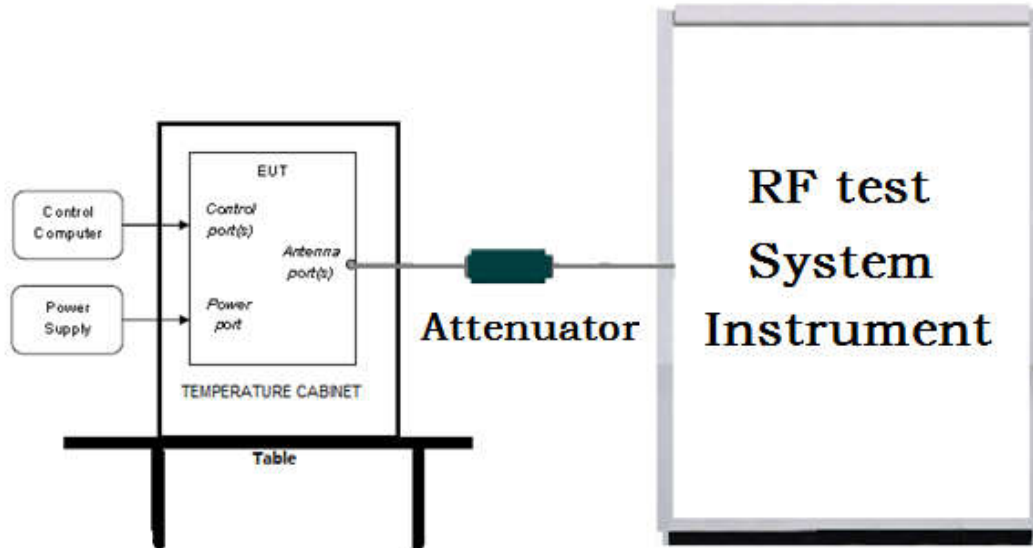
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

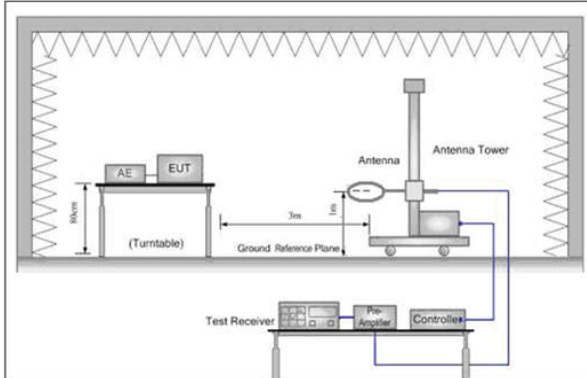


Figure 1. Below 30MHz

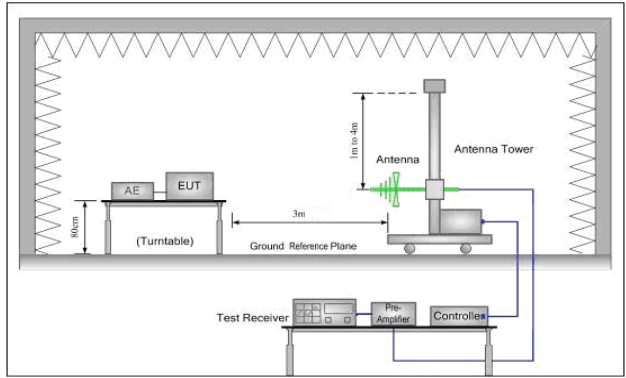


Figure 2. 30MHz to 1GHz

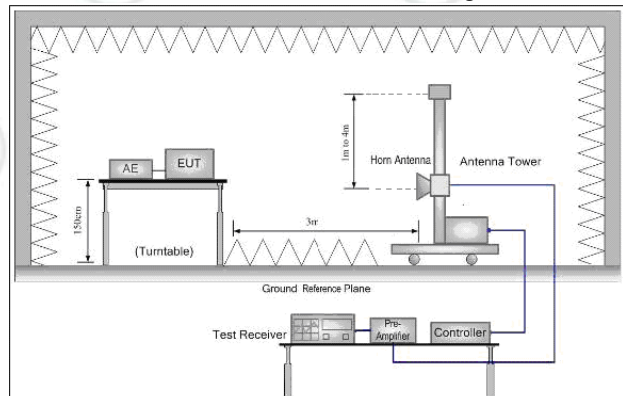
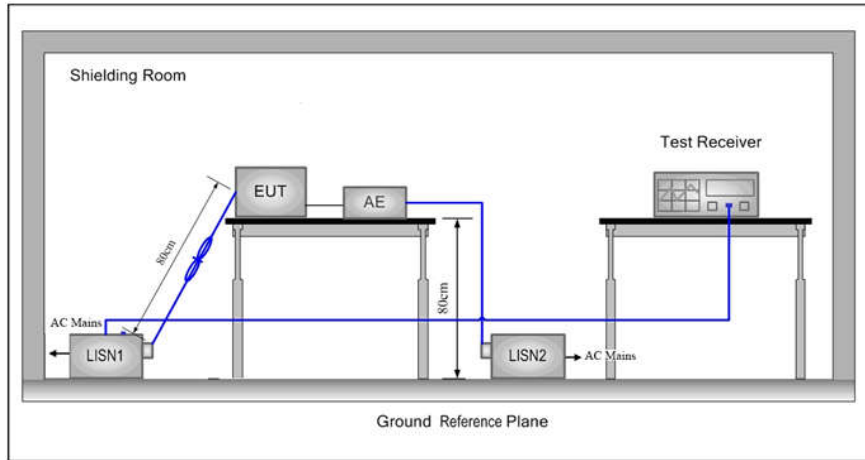


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup
Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	21°C
Humidity:	54% RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test channel:

Test Mode	Tx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel 40
		2402MHz	2440MHz	2480MHz
Transmitting mode:	Keep the EUT at Transmit mode.			

6 General Information

6.1 Client Information

Applicant:	BBPOS International Limited
Address of Applicant:	Suite 1602, 16/F, Tower 2, Nina Tower, No. 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong
Manufacturer:	BBPOS International Limited
Address of Manufacturer:	Suite 1602, 16/F, Tower 2, Nina Tower, No. 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong

6.2 General Description of EUT

Product Name:	WisePad 2
Mode No.(EUT):	WPC23
Trade Mark:	BBPOS
EUT Supports Radios application:	Bluetooth V4.0 BLE
Power Supply:	DC 3.7V by Battery DC 5V by USB port
Battery	Li-polymer 3.7V, 750mAh
Sample Received Date:	May 18, 2017
Sample tested Date:	May 18, 2017 to Jun. 21, 2017

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.0
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Portable
Test Power Grade:	N/A
Test Software of EUT:	BBBPOS_Transaction
Antenna Type:	Monopole
Antenna Gain:	1dBi
Test Voltage:	DC 3.7V by Battery DC 5V by USB port

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 with associated equipment below.

Description	Manufacturer	Model No.	Certification	Supplied by
laptop	LENOVO	E46L	FCC DOC	CTI
Keyboard	IBM	89P8300	FCC DOC	CTI
Mouse	L.Selectron	OP-200	FCC DOC	CTI

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China518101

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

No tests were sub-contracted.

6.6 Test Facility

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

CNAS-Lab Code: L1910

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

A2LA-Lab Cert. No. 3061.01

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

FCC-Registration No.: 886427

Centre Testing International Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 886427.

IC-Registration No.: 7408A-2

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A-2 .

IC-Registration No.: 7408B-1

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B-1.

NEMKO-Aut. No.: ELA503

Centre Testing International Group Co., Ltd. has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

VCCI

The Radiation 3 &10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.

Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563.

Telecommunication Ports Conducted Disturbance Measurement of

Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.

The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

6.7 Deviation from Standards

None.

6.8 Abnormalities from Standard Conditions

None.

6.9 Other Information Requested by the Customer

None.

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

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9 x 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	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	Keysight	E8257D	MY53401106	04-01-2016	03-13-2018
Communication test set test set	Agilent	N4010A	MY51400230	04-01-2016	03-13-2018
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2016	03-13-2018
Signal Generator	Keysight	N5182B	MY53051549	04-01-2016	03-13-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2016	01-11-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-12-2016	01-11-2018
DC Power	Keysight	E3642A	MY54436035	04-01-2016	03-31-2018
PC-1	Lenovo	R4960d	---	04-01-2016	03-31-2018
power meter & power sensor	R&S	OSP120	101374	04-01-2016	03-13-2018
RF control unit	JS Tonscend	JS0806-2	158060006	04-01-2016	03-13-2018
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	04-01-2016	03-31-2018

Conducted disturbance Test					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100009	06-16-2016	06-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2016	05-07-2018
Communication test set	Agilent	E5515C	GB47050534	04-01-2016	03-13-2018
Communication test set	R&S	CMW500	152394	04-01-2016	03-13-2018
LISN	R&S	ENV216	100098	06-16-2016	06-12-2018
LISN	schwarzbeck	NNLK8121	8121-529	06-16-2016	06-12-2018
Voltage Probe	R&S	ESH2-Z3	--	06-13-2017	06-12-2018
Current Probe	R&S	EZ17	100106	06-16-2016	06-12-2018
ISN	TESEQ GmbH	ISN T800	30297	01-29-2015	02-22-2018

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-05-2016	06-05-2019
TRILOG Broadband Antenna	SCHWARZBECK	VULB9163	9163-484	05-23-2016	05-22-2018
Microwave Preamplifier	Agilent	8449B	3008A02425	02-04-2016	02-15-2018
Horn Antenna	ETS-LINDGREN	3117	00057410	06-30-2015	06-28-2018
Horn Antenna	A.H.SYSTEMS	SAS-574	374	06-30-2015	06-28-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Spectrum Analyzer	R&S	FSP40	100416	06-16-2016	06-12-2018
Receiver	R&S	ESCI	100435	06-16-2016	06-13-2018
Multi device Controller	matur	NCD/070/10711 112	---	01-12-2016	01-11-2018
LISN	schwarzbeck	NNBM8125	81251547	06-16-2016	06-12-2018
LISN	schwarzbeck	NNBM8125	81251548	06-16-2016	06-12-2018
Signal Generator	Agilent	E4438C	MY45095744	04-01-2016	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	04-01-2016	03-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2016	05-07-2018
Communication test set	Agilent	E5515C	GB47050534	04-01-2016	03-13-2018
Cable line	Fulai(7M)	SF106	5219/6A	01-12-2016	01-11-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-12-2016	01-11-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-12-2016	01-11-2018
Cable line	Fulai(3M)	SF106	5217/6A	01-12-2016	01-11-2018
Communication test set	R&S	CMW500	152394	04-01-2016	03-13-2018
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2016	01-11-2018
High-pass filter(6-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-12-2016	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-12-2016	01-11-2018

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C (2015)	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Test Results List:

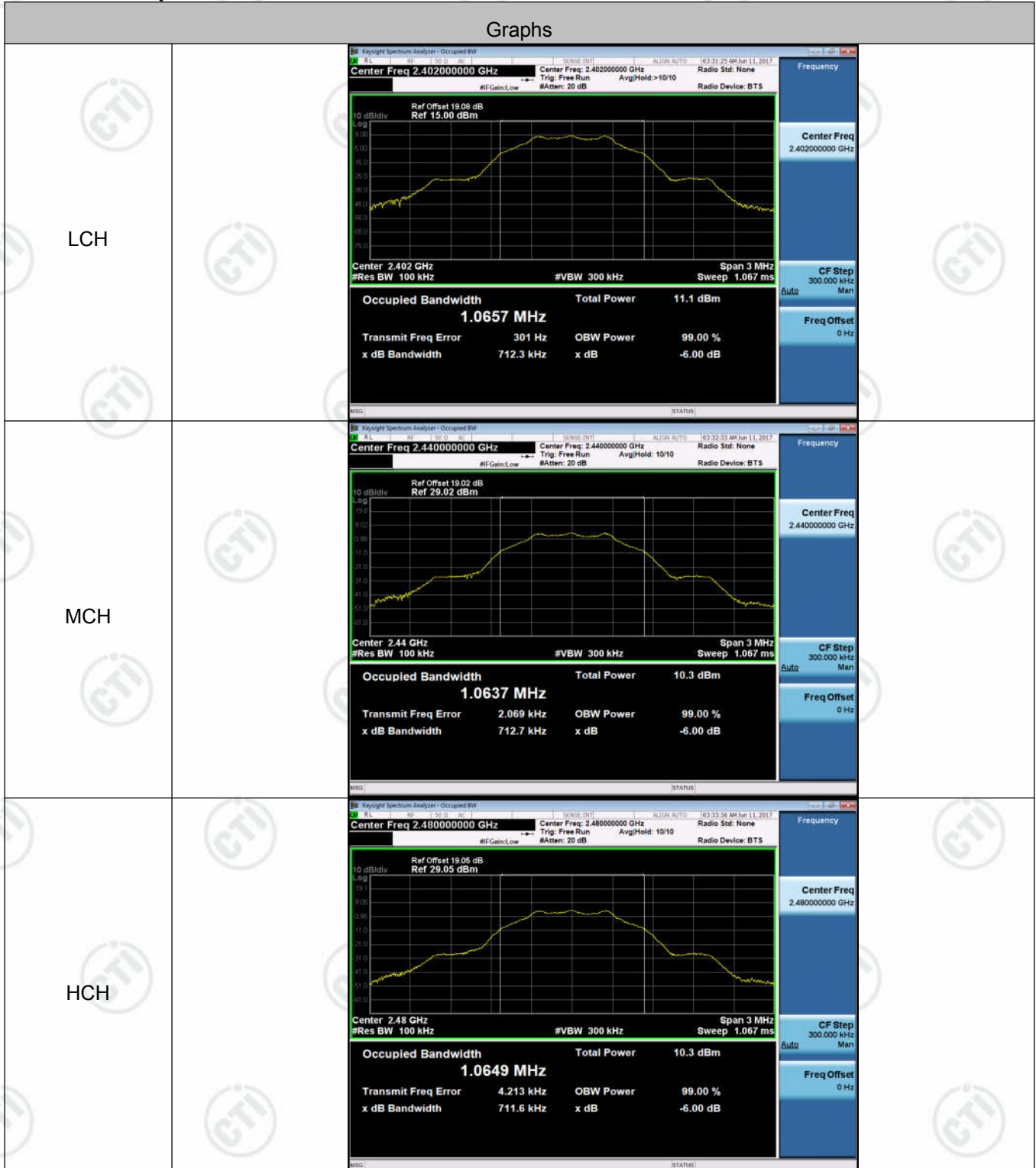
Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10/KDB 558074	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10/KDB 558074	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10/KDB 558074	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10/KDB 558074	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10/KDB 558074	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	K 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	0.7123	1.0657	PASS	Peak detector
BLE	MCH	0.7127	1.0637	PASS	
BLE	HCH	0.7116	1.0649	PASS	

Test Graphs



Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	4.785	PASS
BLE	MCH	4.091	PASS
BLE	HCH	4.133	PASS

Test Graphs

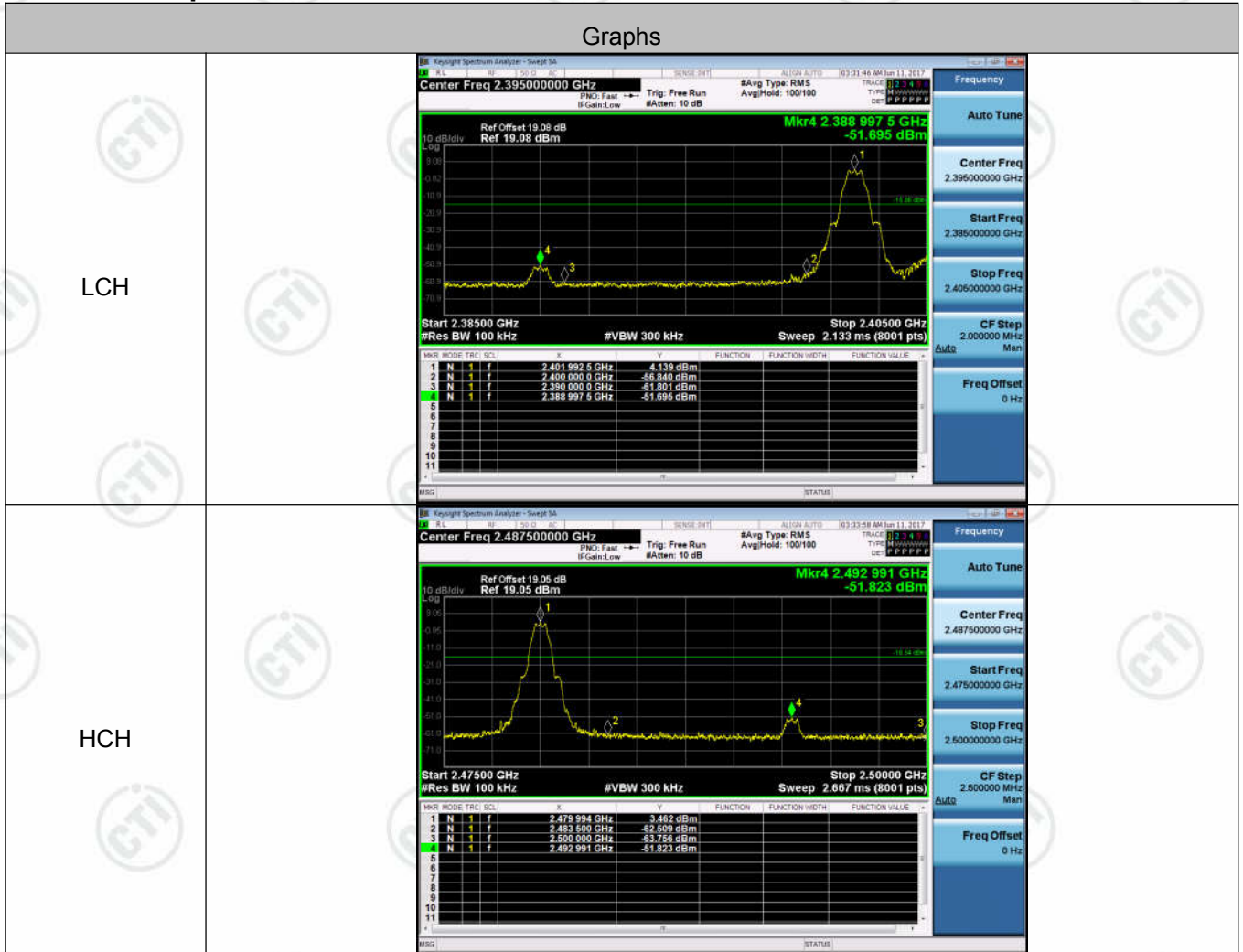


Appendix C): Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	4.139	-51.695	-15.86	PASS
BLE	HCH	3.462	-51.823	-16.54	PASS

Test Graphs

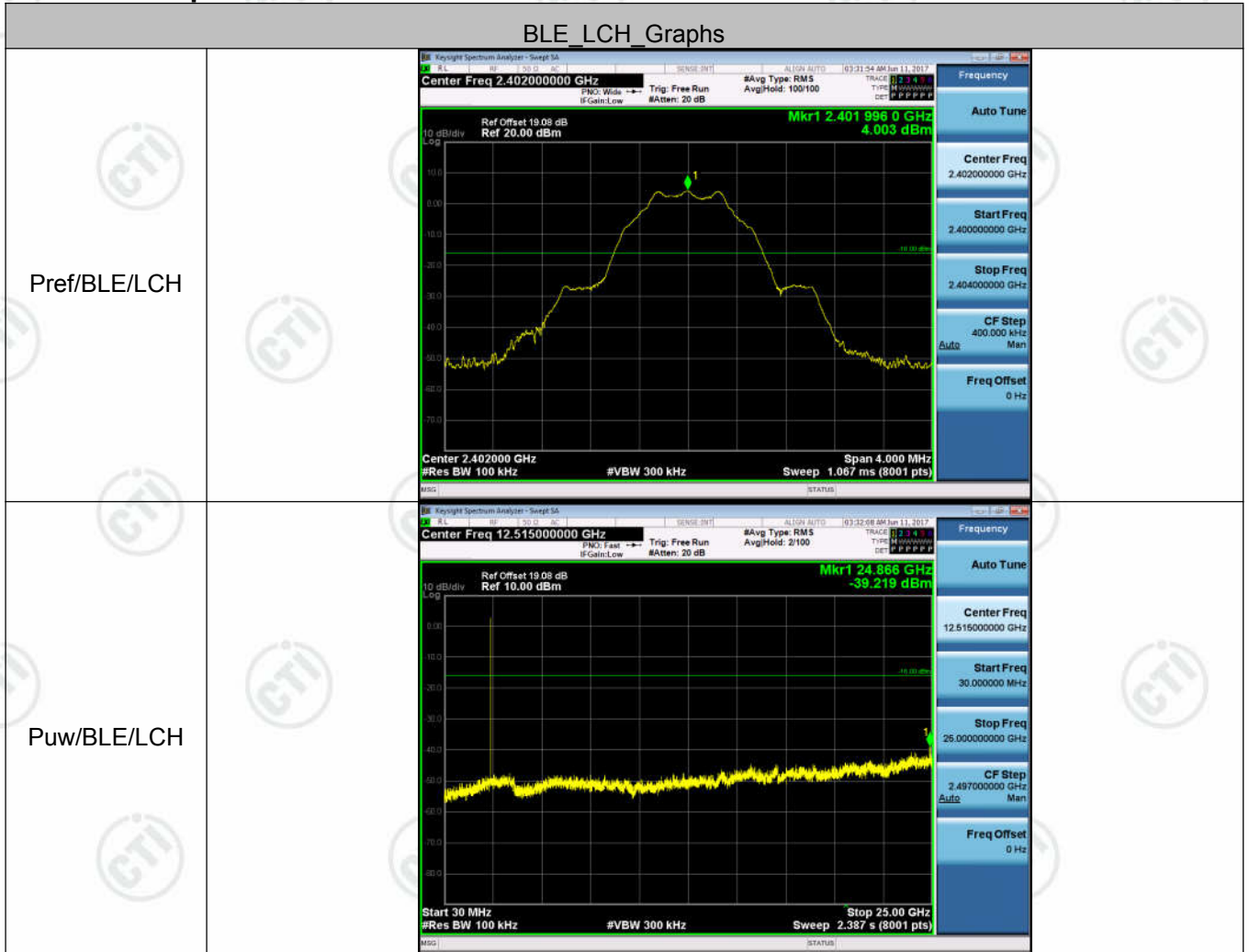


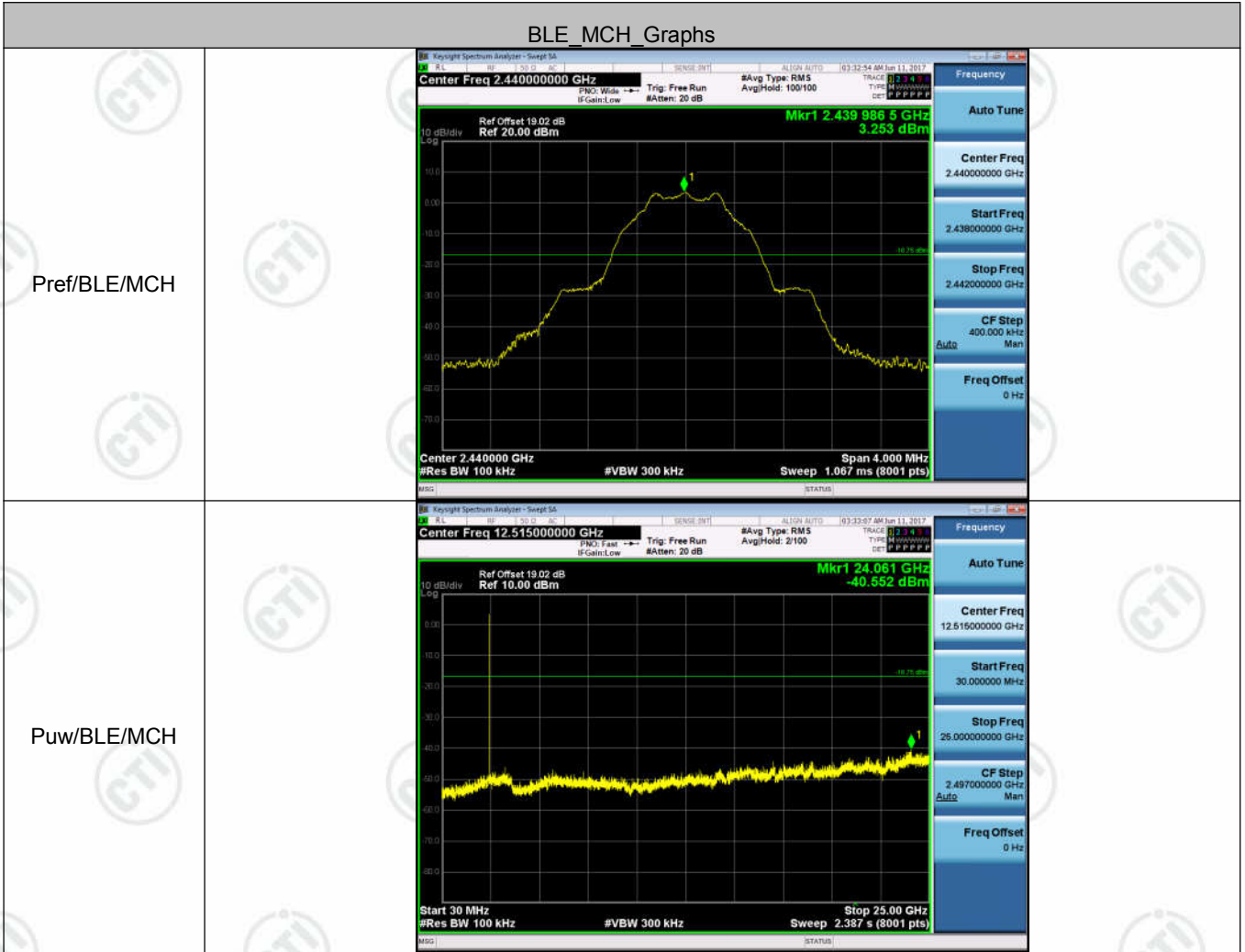
Appendix D): RF Conducted Spurious Emissions

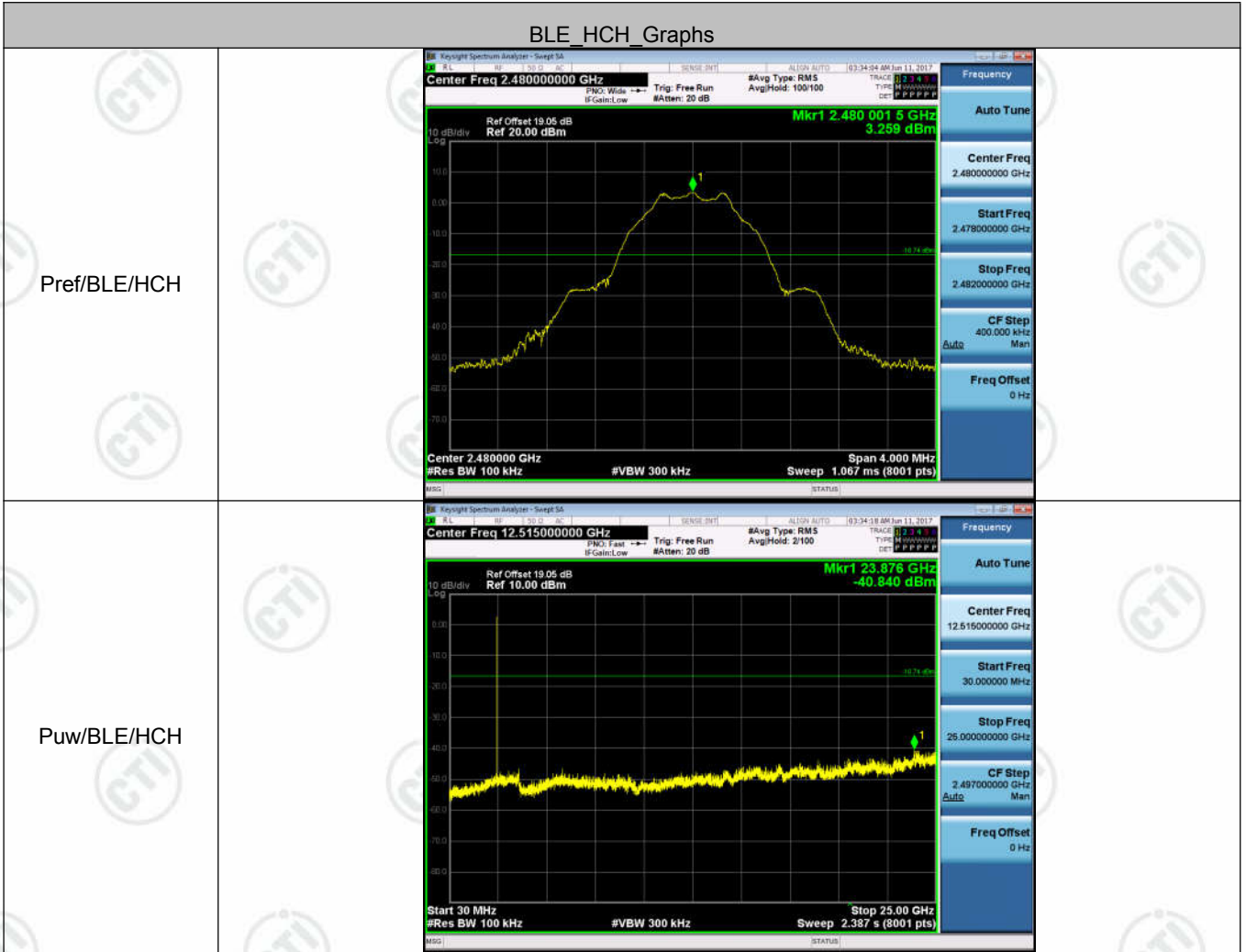
Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	4.003	<Limit	PASS
BLE	MCH	3.253	<Limit	PASS
BLE	HCH	3.259	<Limit	PASS

Test Graphs





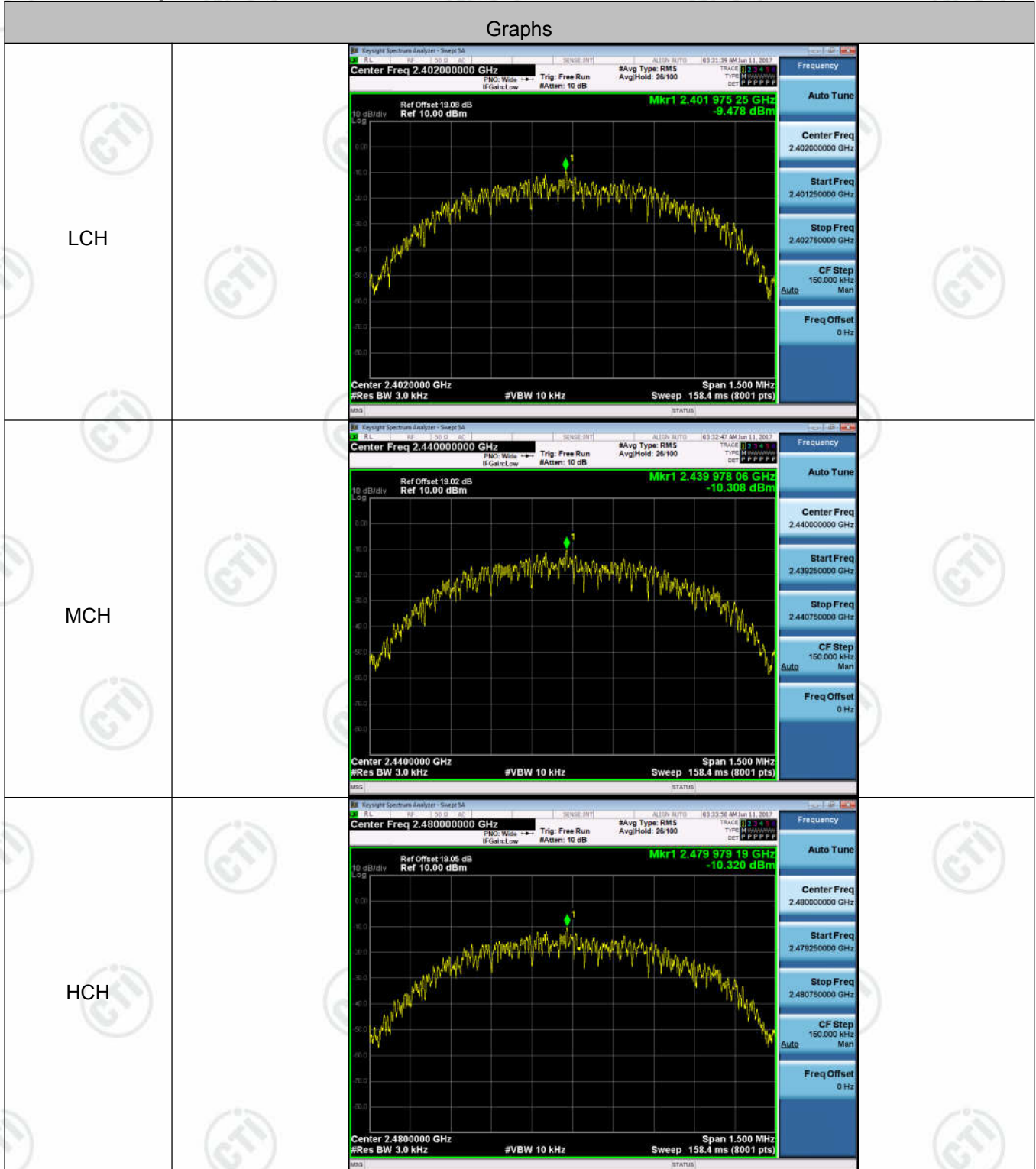


Appendix E): Power Spectral Density

Result Table

Mode	Channel	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE	LCH	-9.478	8	PASS
BLE	MCH	-10.308	8	PASS
BLE	HCH	-10.320	8	PASS

Test Graphs



Appendix F): Antenna Requirement

15.203 requirement:

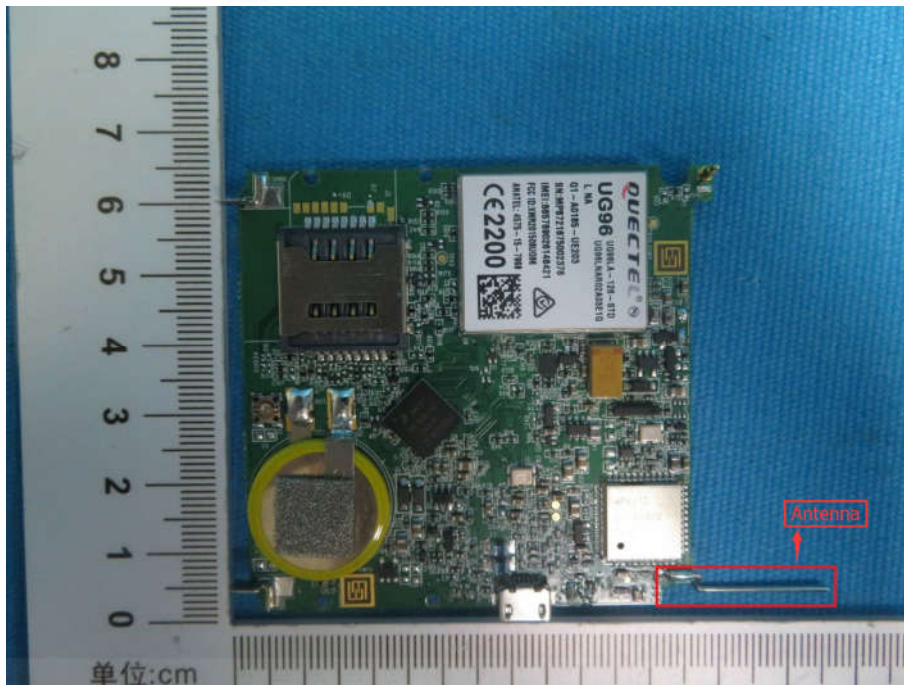
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 1dBi.



Appendix G): AC Power Line Conducted Emission

<p>Test Procedure:</p>	<p>Test frequency range :150KHz-30MHz</p> <ol style="list-style-type: none"> 1)The mains terminal disturbance voltage test was conducted in a shielded room. 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. 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, 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. 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:</p>	<table border="1" data-bbox="496 1106 1366 1326"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. 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													

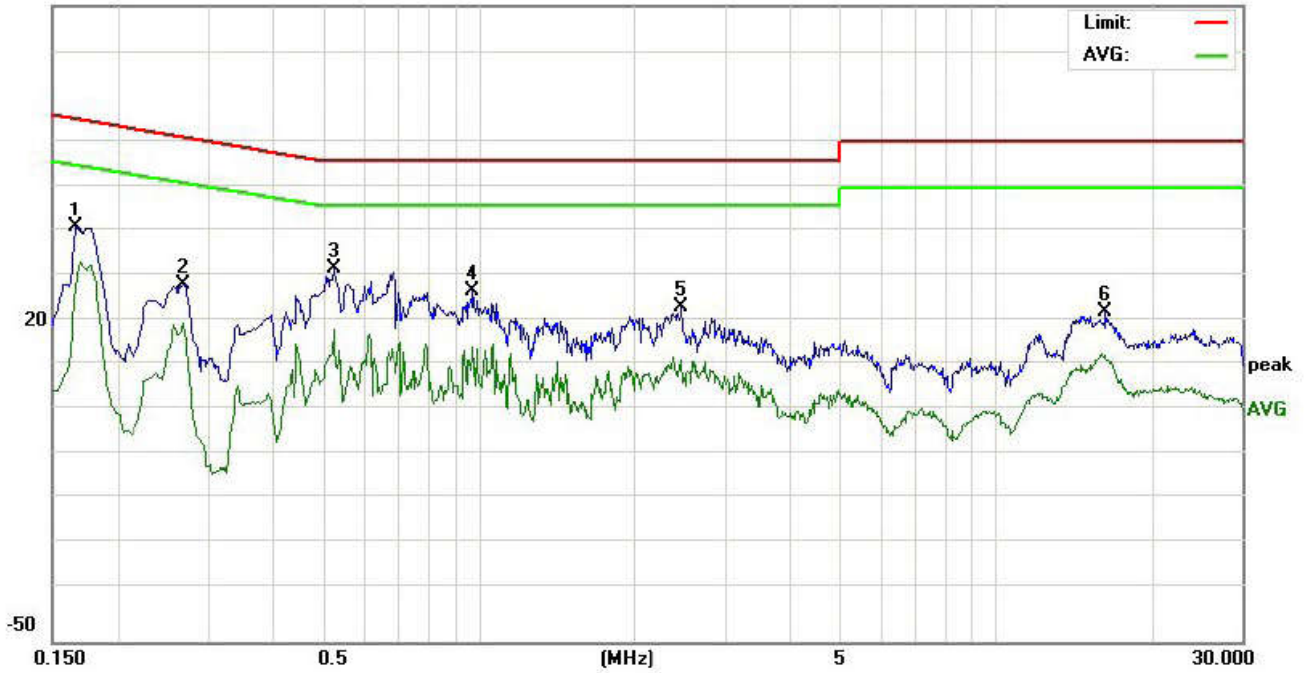
Measurement Data

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:

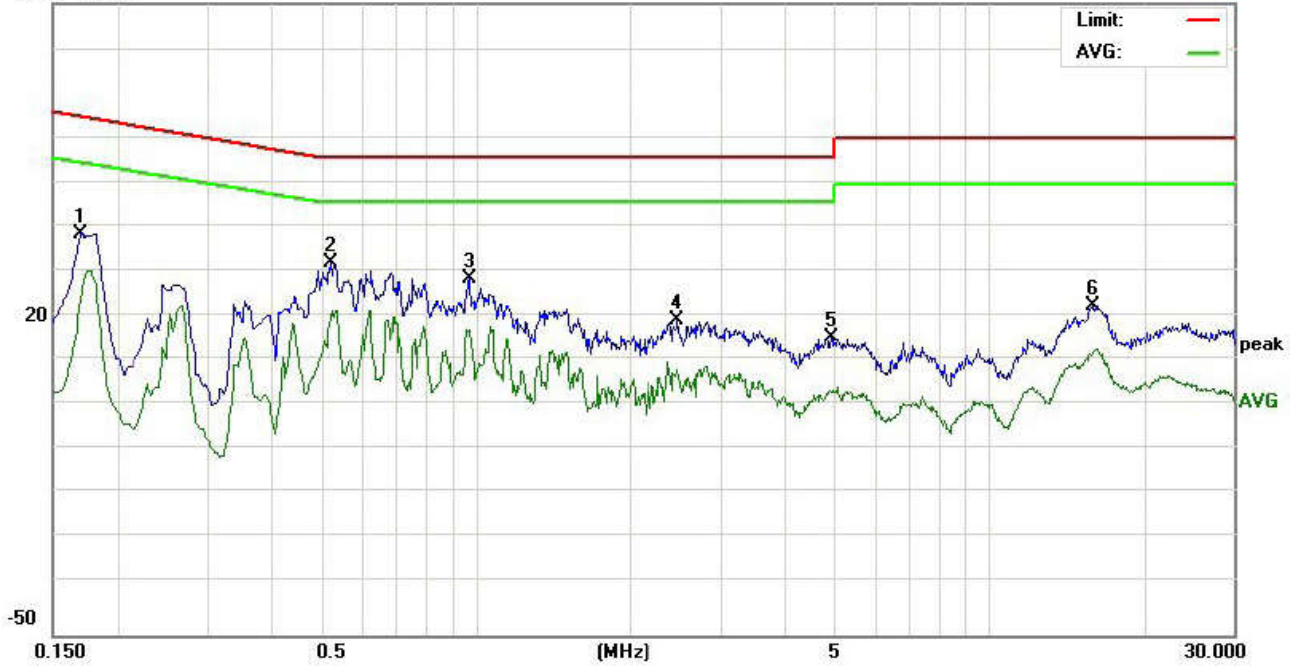
90.0 dBpW



No.	Freq. MHz	Reading_Level (dBpW)			Correct Factor dB	Measurement (dBpW)			Limit (dBpW)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1660	10.21	8.05	-4.66	9.78	19.99	17.83	5.12	65.15	55.15	-47.32	-50.03	P	
2	0.2700	19.04	15.36	10.55	9.64	28.68	25.00	20.19	61.12	51.12	-36.12	-30.93	P	
3	0.5260	22.41	18.41	9.19	9.57	31.98	27.98	18.76	56.00	46.00	-28.02	-27.24	P	
4	0.9778	17.68	13.67	5.13	9.50	27.18	23.17	14.63	56.00	46.00	-32.83	-31.37	P	
5	2.4739	13.84	10.77	2.10	9.72	23.56	20.49	11.82	56.00	46.00	-35.51	-34.18	P	
6	16.3616	13.29	9.38	3.07	9.35	22.64	18.73	12.42	60.00	50.00	-41.27	-37.58	P	

Neutral line:

90.0 dBpW



No.	Freq. MHz	Reading_Level (dBpW)			Correct Factor dB	Measurement (dBpW)			Limit (dBpW)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1700	29.06	24.51	14.97	9.77	38.83	34.28	24.74	64.96	54.96	-30.68	-30.22	P	
2	0.5220	22.75	19.14	10.82	9.57	32.32	28.71	20.39	56.00	46.00	-27.29	-25.61	P	
3	0.9700	19.39	15.32	8.22	9.50	28.89	24.82	17.72	56.00	46.00	-31.18	-28.28	P	
4	2.4820	10.02	8.51	-0.98	9.72	19.74	18.23	8.74	56.00	46.00	-37.77	-37.26	P	
5	4.9499	6.23	4.75	-5.96	9.60	15.83	14.35	3.64	56.00	46.00	-41.65	-42.36	P	
6	15.9859	13.69	10.36	2.83	9.34	23.03	19.70	12.17	60.00	50.00	-40.30	-37.83	P	

Notes:

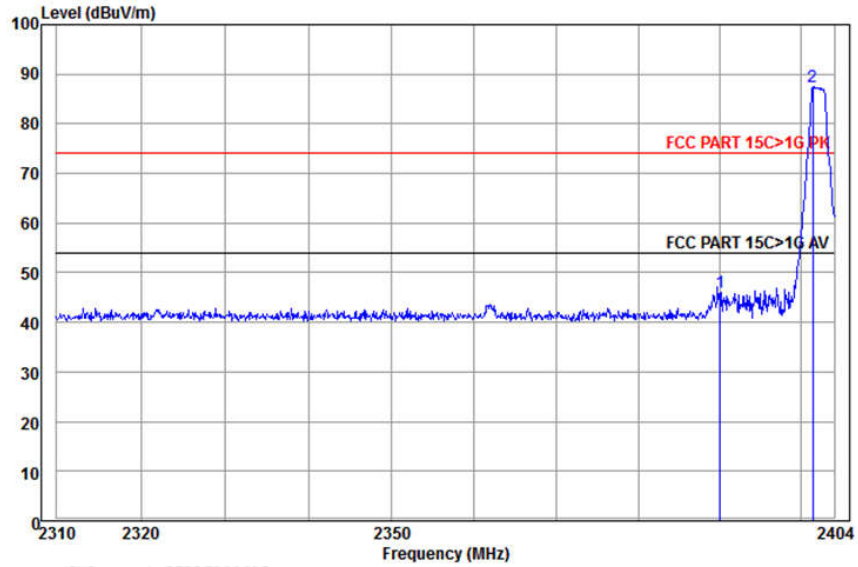
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. AC120V and 240V are tested and found the worst case is 120V, So only the 120V data were shown in the above.

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

Receiver Setup:	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Detector</th> <th>RBW</th> <th>VBW</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>30MHz-1GHz</td> <td>Quasi-peak</td> <td>120kHz</td> <td>300kHz</td> <td>Quasi-peak</td> </tr> <tr> <td rowspan="2">Above 1GHz</td> <td>Peak</td> <td>1MHz</td> <td>3MHz</td> <td>Peak</td> </tr> <tr> <td>Peak</td> <td>1MHz</td> <td>10Hz</td> <td>Average</td> </tr> </tbody> </table>	Frequency	Detector	RBW	VBW	Remark	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak	Above 1GHz	Peak	1MHz	3MHz	Peak	Peak	1MHz	10Hz	Average	
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:	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Limit (dBµV/m @3m)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>30MHz-88MHz</td> <td>40.0</td> <td>Quasi-peak Value</td> </tr> <tr> <td>88MHz-216MHz</td> <td>43.5</td> <td>Quasi-peak Value</td> </tr> <tr> <td>216MHz-960MHz</td> <td>46.0</td> <td>Quasi-peak Value</td> </tr> <tr> <td>960MHz-1GHz</td> <td>54.0</td> <td>Quasi-peak Value</td> </tr> <tr> <td rowspan="2">Above 1GHz</td> <td>54.0</td> <td>Average Value</td> </tr> <tr> <td>74.0</td> <td>Peak Value</td> </tr> </tbody> </table>	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
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																			

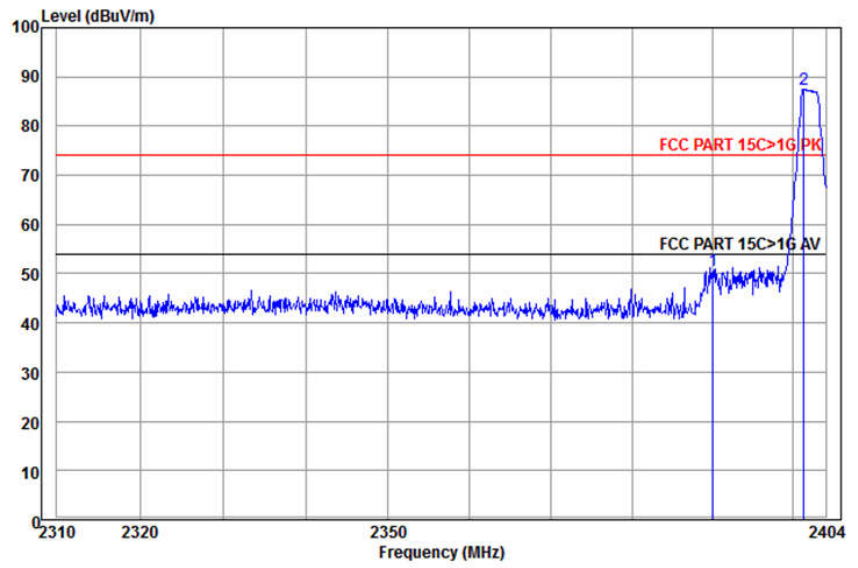
Test plot as follows:

Worse case mode:	GFSK		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Horizontal	Remark: PK



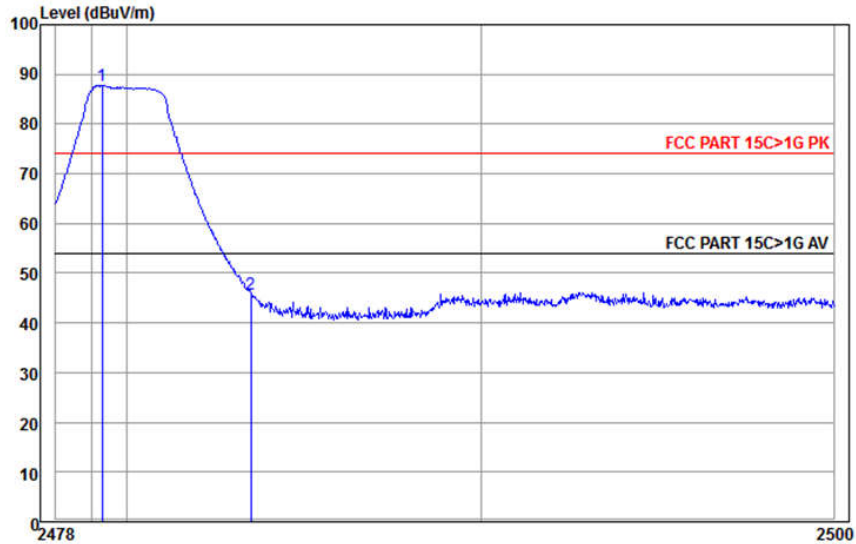
	Ant Freq	Cable Factor	Preamp Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	32.53	3.15	44.03	54.31	45.96	74.00	-28.04	Horizontal
2	2401.412	32.56	3.16	44.04	95.69	87.37	74.00	13.37	Horizontal

Worse case mode:	GFSK		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Vertical	Remark: PK



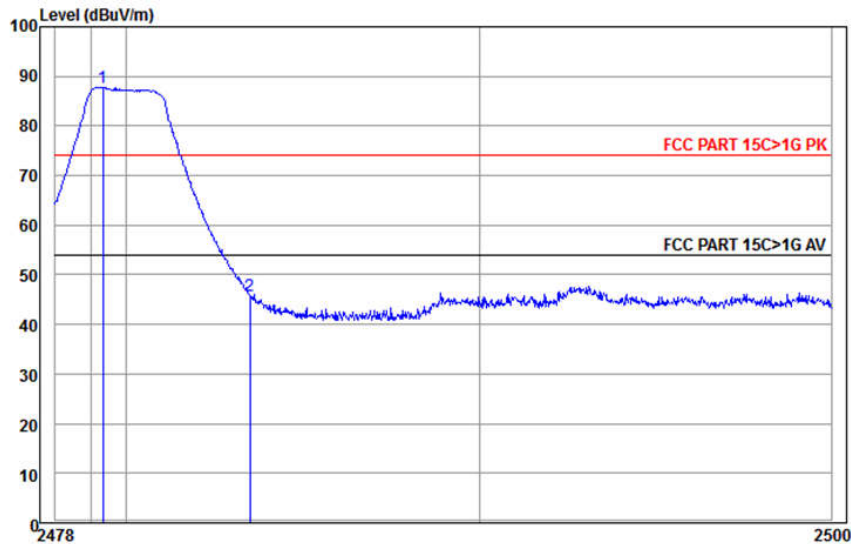
	Ant Freq	Cable Factor	Preamp Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	32.53	3.15	44.03	58.92	50.57	74.00	-23.43	Vertical
2	2401.317	32.56	3.16	44.04	95.92	87.60	74.00	13.60	Vertical

Worse case mode:	GFSK		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Horizontal	Remark: PK



		Frequency (MHz)							
	Ant Freq	Cable Factor	Preamp Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	pp 2479.314	32.71	3.21	44.14	95.90	87.68	74.00	13.68	Horizontal
2	2483.500	32.71	3.22	44.14	53.94	45.73	74.00	-28.27	Horizontal

Worse case mode:	GFSK		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Vertical	Remark: PK



		Frequency (MHz)							
	Ant Freq	Cable Factor	Preamp Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	pp 2479.336	32.71	3.22	44.14	96.03	87.82	74.00	13.82	Vertical
2	2483.500	32.71	3.22	44.14	54.07	45.86	74.00	-28.14	Vertical

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

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:

- 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 (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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

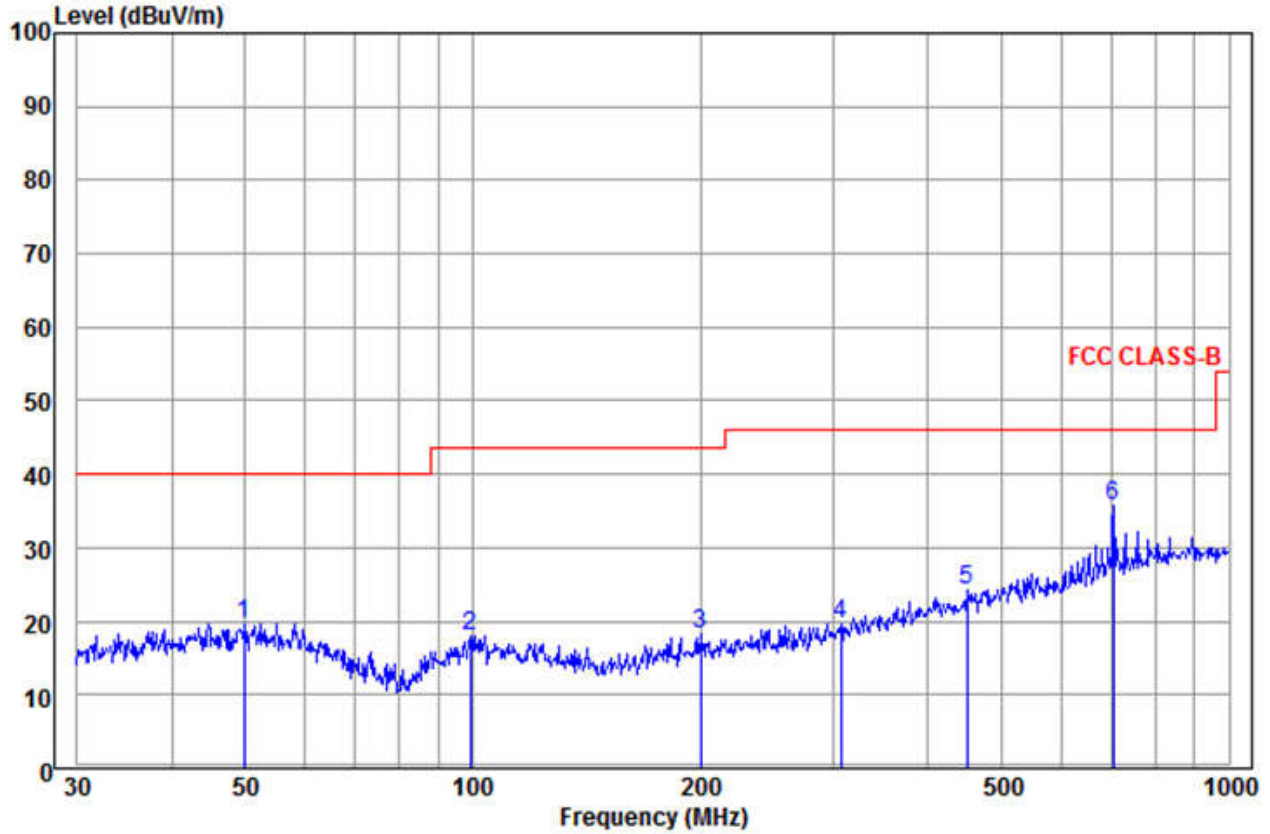
- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

Limit:	Frequency	Field strength (microvolt/meter)	Limit (dB μ V/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

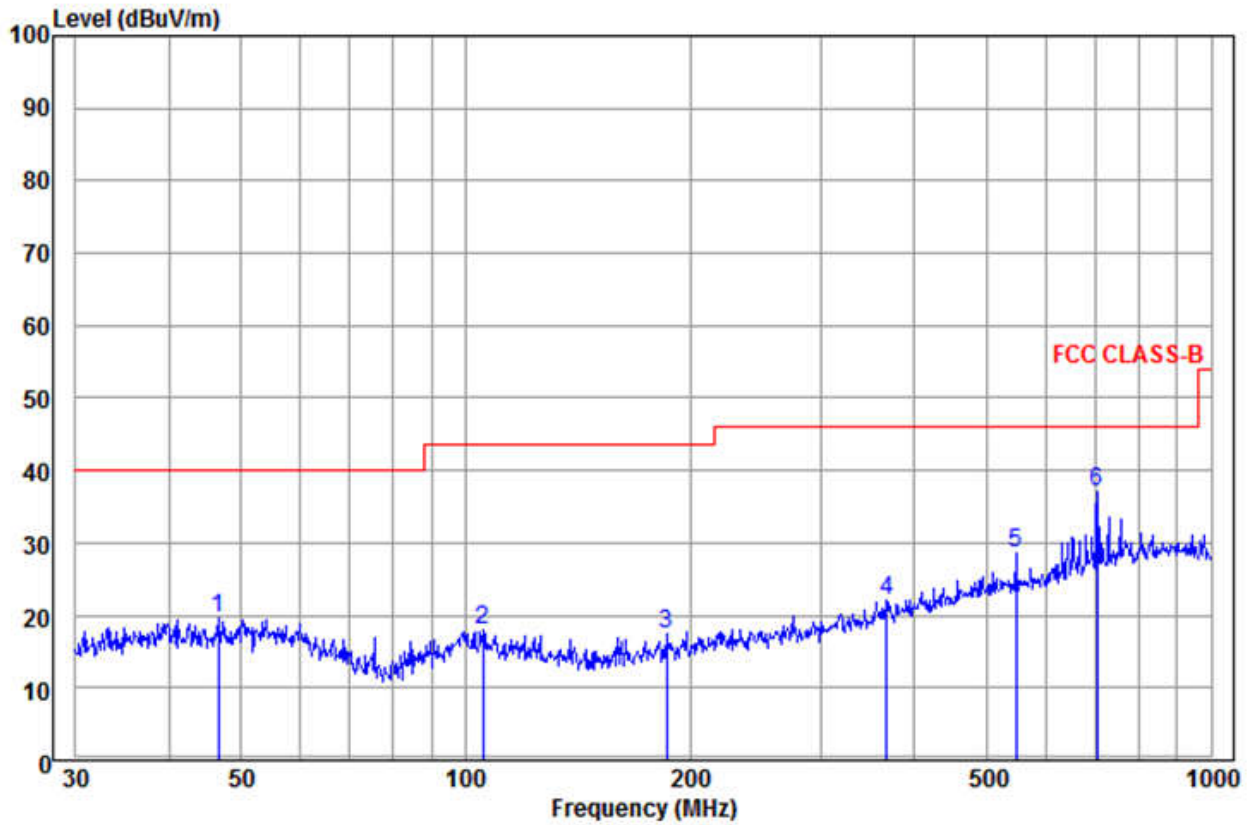
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

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

30MHz~1GHz (QP)



	Ant Freq	Cable Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	49.881	15.09	0.11	4.32	19.52	40.00	-20.48	Horizontal
2	99.180	13.04	0.58	4.45	18.07	43.50	-25.43	Horizontal
3	199.986	11.60	1.10	5.44	18.14	43.50	-25.36	Horizontal
4	306.754	13.69	1.11	4.87	19.67	46.00	-26.33	Horizontal
5	451.135	17.13	1.47	5.70	24.30	46.00	-21.70	Horizontal
6 pp	704.226	20.73	2.06	12.97	35.76	46.00	-10.24	Horizontal



	Ant Freq	Cable Factor	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dB	
1	46.666	14.82	0.09	4.83	19.74	40.00	-20.26 Vertical
2	105.642	12.73	0.59	4.79	18.11	43.50	-25.39 Vertical
3	185.788	11.11	0.97	5.49	17.57	43.50	-25.93 Vertical
4	366.823	15.33	1.32	5.49	22.14	46.00	-23.86 Vertical
5	547.098	18.59	1.54	8.48	28.61	46.00	-17.39 Vertical
6 pp	704.226	20.73	2.06	14.37	37.16	46.00	-8.84 Vertical

Transmitter Emission above 1GHz

Worse case mode:		GFSK		Test channel:		Lowest			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
2086.856	31.90	2.93	43.63	48.50	39.70	74.00	-34.30	Pass	Horizontal
3200.502	33.42	4.21	44.68	55.29	48.24	74.00	-25.76	Pass	Horizontal
3766.785	32.97	5.91	44.62	51.34	45.60	74.00	-28.40	Pass	Horizontal
4804.000	34.69	6.72	44.60	48.35	45.16	74.00	-28.84	Pass	Horizontal
7206.000	36.42	8.35	44.77	46.81	46.81	74.00	-27.19	Pass	Horizontal
9608.000	37.88	7.67	45.58	46.55	46.52	74.00	-27.48	Pass	Horizontal
1581.218	31.02	2.65	43.91	49.30	39.06	74.00	-34.94	Pass	Vertical
2013.795	31.73	2.87	43.52	49.73	40.81	74.00	-33.19	Pass	Vertical
2854.107	33.37	3.45	44.55	48.78	41.05	74.00	-32.95	Pass	Vertical
4804.000	34.69	6.72	44.60	47.66	44.47	74.00	-29.53	Pass	Vertical
7206.000	36.42	8.35	44.77	47.15	47.15	74.00	-26.85	Pass	Vertical
9608.000	37.88	7.67	45.58	44.62	44.59	74.00	-29.41	Pass	Vertical

Worse case mode:		GFSK		Test channel:		Middle			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
2118.973	31.97	2.96	43.67	49.07	40.33	74.00	-33.67	Pass	Horizontal
3249.760	33.38	4.37	44.67	54.78	47.86	74.00	-26.14	Pass	Horizontal
3873.749	32.89	6.20	44.61	49.91	44.39	74.00	-29.61	Pass	Horizontal
4880.000	34.85	6.74	44.60	47.60	44.59	74.00	-29.41	Pass	Horizontal
7320.000	36.43	8.45	44.87	48.51	48.52	74.00	-25.48	Pass	Horizontal
9760.000	38.05	7.54	45.55	47.17	47.21	74.00	-26.79	Pass	Horizontal
1529.749	30.93	2.62	43.96	49.04	38.63	74.00	-35.37	Pass	Vertical
2060.463	31.84	2.91	43.59	49.07	40.23	74.00	-33.77	Pass	Vertical
3249.760	33.38	4.37	44.67	53.92	47.00	74.00	-27.00	Pass	Vertical
4880.000	34.85	6.74	44.60	53.65	50.64	74.00	-23.36	Pass	Vertical
7320.000	36.43	8.45	44.87	48.90	48.91	74.00	-25.09	Pass	Vertical
9760.000	38.05	7.54	45.55	46.85	46.89	74.00	-27.11	Pass	Vertical

Worse case mode:		GFSK		Test channel:		Highest			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
2113.586	31.96	2.95	43.66	49.68	40.93	74.00	-33.07	Pass	Horizontal
3308.185	33.33	4.55	44.67	52.68	45.89	74.00	-28.11	Pass	Horizontal
4055.371	32.94	6.55	44.60	49.90	44.79	74.00	-29.21	Pass	Horizontal
4960.000	35.02	6.75	44.60	47.73	44.90	74.00	-29.10	Pass	Horizontal
7440.000	36.45	8.55	44.97	46.15	46.18	74.00	-27.82	Pass	Horizontal
9920.000	38.22	7.41	45.52	44.60	44.71	74.00	-29.29	Pass	Horizontal
1617.862	31.09	2.67	43.87	48.97	38.86	74.00	-35.14	Pass	Vertical
2097.507	31.92	2.94	43.64	49.32	40.54	74.00	-33.46	Pass	Vertical
3308.185	33.33	4.55	44.67	53.00	46.21	74.00	-27.79	Pass	Vertical
4960.000	35.02	6.75	44.60	53.79	50.96	74.00	-23.04	Pass	Vertical
7440.000	36.45	8.55	44.97	48.45	48.48	74.00	-25.52	Pass	Vertical
9920.000	38.22	7.41	45.52	46.61	46.72	74.00	-27.28	Pass	Vertical

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

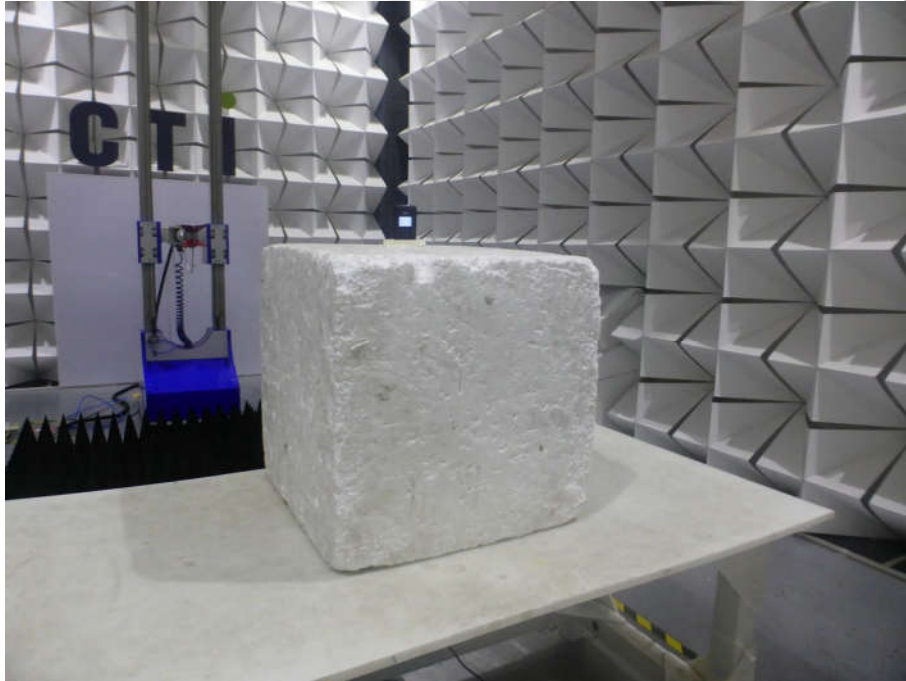
Test mode No.: WPC23



Radiated emission Test Setup-1 (9kHz~30MHz)



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



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



Conducted Emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No. EED32J00095402 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.