1 COVER PAGE

TEST REPORT

Product	:	Zigbee Module
Trade mark	:	N/A
Model/Type reference	:	MZ100
Serial Number	:	N/A
Report Number	:	EED32H002581
FCC ID	:	2AG8T-MZ100
Date of Issue	:	Jan. 12, 2016
Test Standards	:	47 CFR Part 15 Subpart C (2015)
Test result	:	PASS

Prepared for:

A&R Technologies Ltd.
21/F, CATIC Plaza, 8 Causeway Road, Causeway Bay, Hong Kong

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Compiled by: Kevin Lan Reviewed by: Jason Zeng

Approved by: Sheek Luo Date: Jan. 12, 2016

Sheek Luo
Lab supervisor

Check No.: 1996299655

2 Version

Version No.	Date	Description
00	Jan. 12, 2016	Original

3 Test Summary

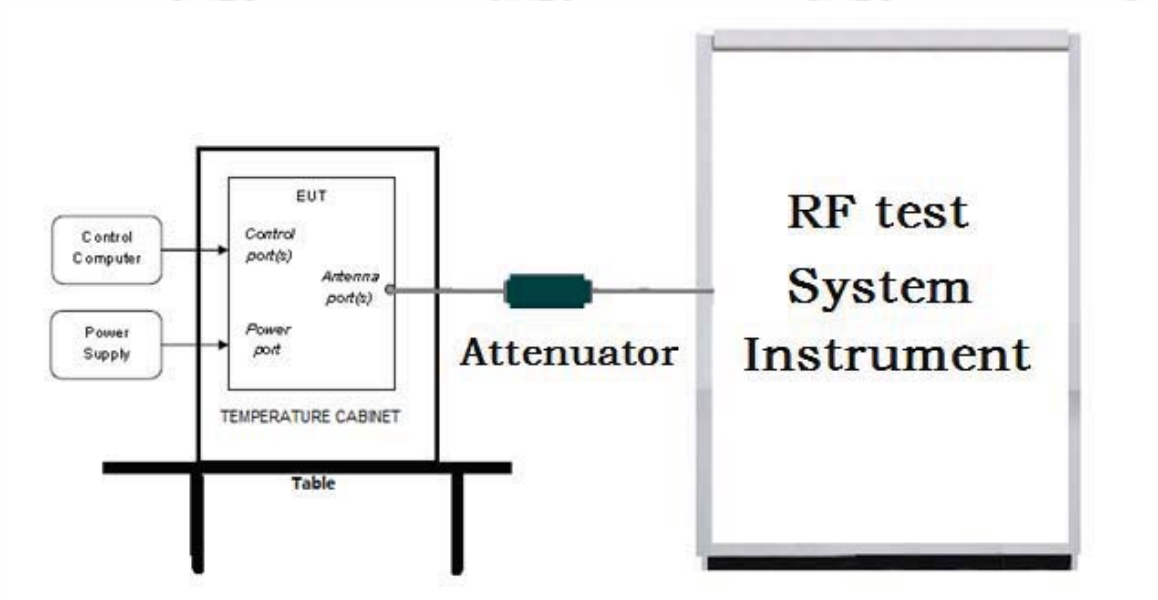
Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247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

4 Content

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:

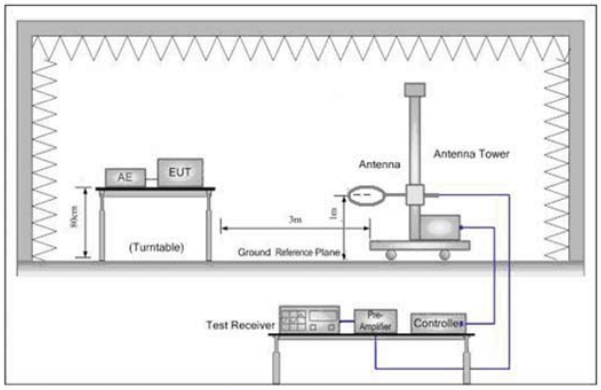


Figure 1. Below 30MHz

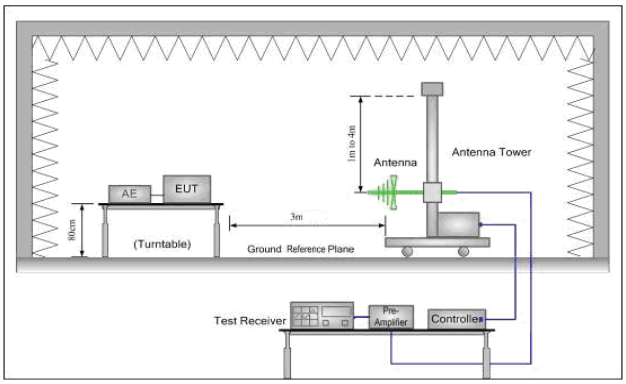


Figure 2. 30MHz to 1GHz

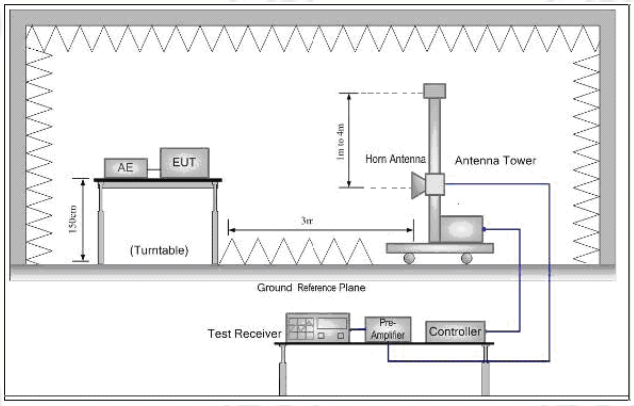
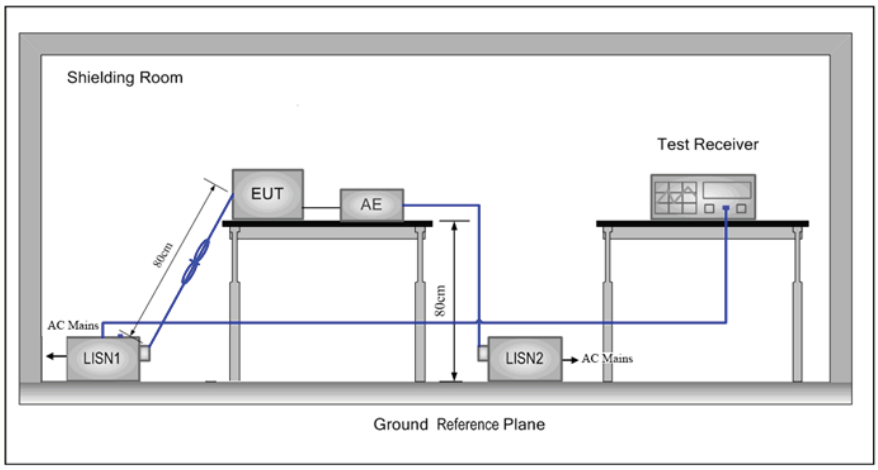


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	22°C
Humidity:	50% RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test channel:

Test Mode	Tx	RF Channel		
		Low(L)	Middle(M)	High(H)
OQPSK	2405MHz ~2480MHz	Channel 1	Channel 8	Channel16
		2405MHz	2440MHz	2480MHz
Transmitting mode:	The EUT transmitted the continuous modulation test signal at the specific channel(s).			

6 General Information

6.1 Client Information

Applicant:	A&R Technologies Ltd.
Address of Applicant:	21/F, CATIC Plaza, 8 Causeway Road, Causeway Bay, Hong Kong
Manufacturer:	A&R Technologies Ltd.
Address of Manufacturer:	Block 34B, phase 4, Huaide Cuigang Ind, Park, Fuyong, Baoan, Shenzhen, China
Factory:	A&R Technologies Ltd.
Address of Factory:	Block 34B, phase 4, Huaide Cuigang Ind, Park, Fuyong, Baoan, Shenzhen, China

6.2 General Description of EUT

Product Name:	Zigbee Module
Model No.(EUT):	MZ100
Trade Mark:	N/A
Power Supply:	DC 3.3V
Sample Received Date:	Dec. 17, 2015
Sample tested Date:	Dec. 17, 2015 to Jan. 11, 2016

6.3 Product Specification subjective to this standard

Operation Frequency:	2405MHz ~2480MHz
Carrier Frequency:	2405; 2410; 2415; 2420; 2425; 2430; 2435;2440; 2445; 2450; 2455; 2460; 2465; 2470; 2475; 2480
Modulation Type:	OQPSK
Number of Channel:	16
Hardware version:	A (manufacturer declare)
Software version:	OTA DUT_ 20140725 (manufacturer declare)
Test power grade:	NA (manufacturer declare)
Test software of EUT:	Putty_V0.63.0.0.43510830 (manufacturer declare)
Sample Type:	N/A
Antenna Type and Gain:	Type: PCB antenna Gain: 3dBi
Test Voltage:	AC 120V, 60Hz

6.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Serial number	Certification	Supplied by
Development Board	MARUELL	N/A	---	Client
DC Power supply	Qiekesi	10209898	FCC VOC	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.: 565659

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 565659.

IC-Registration No.: 7408A

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 .

IC-Registration No.: 7408B

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.

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	7.9×10^{-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	04-14-2015	04-13-2016
Communication test set test set	Agilent	N4010A	MY47230124	04-02-2015	04-01-2016
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2015	03-31-2016
Attenuator	HuaXiang	SHX370	15040701	04-01-2015	03-31-2016
Signal Generator	Keysight	N5182B	MY53051549	03-31-2015	03-30-2016
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-13-2015	01-12-2016
High-pass filter(5-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-13-2015	01-12-2016
band rejection filter (GSM900)	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-13-2015	01-12-2016
band rejection filter (GSM850)	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-13-2015	01-12-2016
band rejection filter (GSM1800)	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-13-2015	01-12-2016
band rejection filter (GSM1900)	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-13-2015	01-12-2016
DC Power	Keysight	E3642A	MY54436035	03-31-2015	03-30-2016
PC-1	Lenovo	R4960d	---	04-01-2015	03-31-2016
BT&WI-FI Automatic control	R&S	OSPB157	101374	04-01-2015	03-31-2016
RF control unit	JS Tonscend	JS0806-2	2015860006	04-01-2015	03-31-2016
BT&WI-FI Automatic test software	JS Tonscend	JSTS1120-2	---	04-01-2015	03-31-2016

Conducted disturbance Test					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100435	06-30-2015	06-28-2016
Receiver	R&S	ESCI	100009	06-30-2015	06-28-2016
Temperature/ Humidity Indicator	Belida	TT-512	101	07-09-2015	07-07-2016
Communication test set	Agilent	E5515C	GB47050533	04-27-2015	04-26-2016
Communication test set	R&S	CMW500	152394	04-19-2015	04-18-2016
LISN	R&S	ENV216	100098	06-30-2015	06-28-2016
LISN	schwarzbeck	NNLK8121	8121-529	06-30-2015	06-28-2016
Voltage Probe	R&S	ESH2-Z3	100042	07-09-2014	07-08-2017
Current Probe	R&S	EZ17	100106	07-09-2014	07-08-2017
ISN	TESEQ GmbH	ISN T800	30297	01-29-2015	01-27-2017

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber	TDK	SAC-3	---	06-02-2013	06-01-2016
TRILOG Broadband Antenna	schwarzbeck	VULB9163	9163-617	07-31-2015	07-29-2016
Microwave Preamplifier	Agilent	8449B	3008A02425	02-05-2015	02-04-2016
Horn Antenna	ETS-LINDGREN	3117	00057410	06-30-2015	06-28-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Spectrum Analyzer	R&S	FSP40	100416	06-30-2015	06-28-2016
Receiver	R&S	ESCI	100435	06-30-2015	06-28-2016
Multi device Controller	maturo	NCD/070/10711112	---	01-13-2015	01-12-2016
LISN	schwarzbeck	NNBM8125	81251547	06-30-2015	06-28-2016
LISN	schwarzbeck	NNBM8125	81251548	06-30-2015	06-28-2016
Signal Generator	Agilent	E4438C	MY45095744	04-19-2015	04-18-2016
Signal Generator	Keysight	E8257D	MY53401106	04-14-2015	04-13-2016
Temperature/ Humidity Indicator	TAYLOR	1451	1905	07- 08-2015	07-06-2016
Communication test set	Agilent	E5515C	GB47050533	04-27-2015	04-26-2016
Cable line	Fulai(7M)	SF106	5219/6A	01-13-2015	01-12-2016
Cable line	Fulai(6M)	SF106	5220/6A	01-13-2015	01-12-2016
Cable line	Fulai(3M)	SF106	5216/6A	01-13-2015	01-12-2016
Cable line	Fulai(3M)	SF106	5217/6A	01-13-2015	01-12-2016
Communication test set	R&S	CMW500	152394	04-19-2015	04-18-2016
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18NM 12-0398-002	---	01-13-2015	01-12-2016
High-pass filter(5-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX01CA09CL1 2-0395-001	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX01CA08CL1 2-0393-001	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX02CA04CL1 2-0396-002	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX02CA03CL1 2-0394-001	---	01-13-2015	01-12-2016

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 Unlicesed 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	K ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

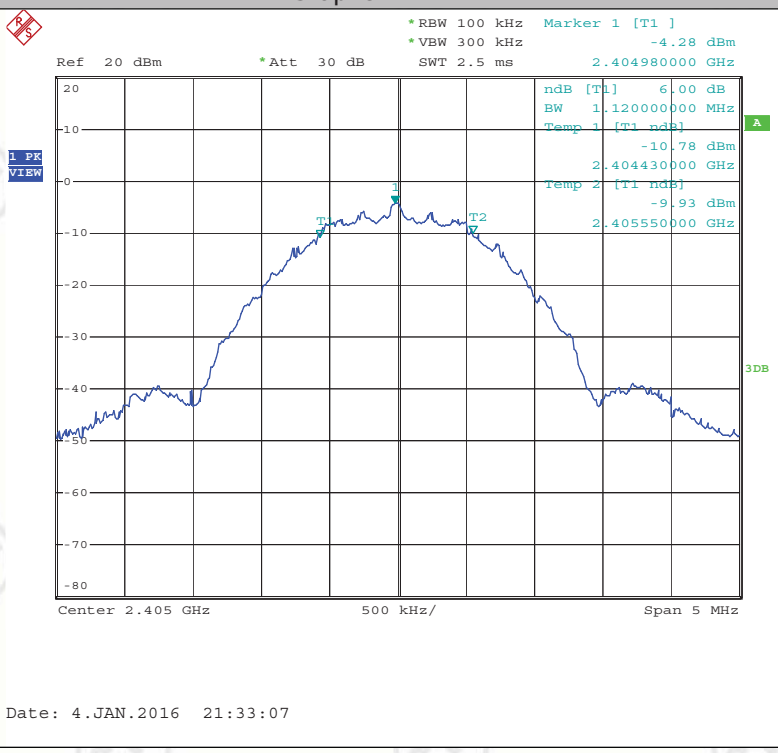
Appendix A) 6dB Occupied Bandwidth & 99% Occupied Bandwidth

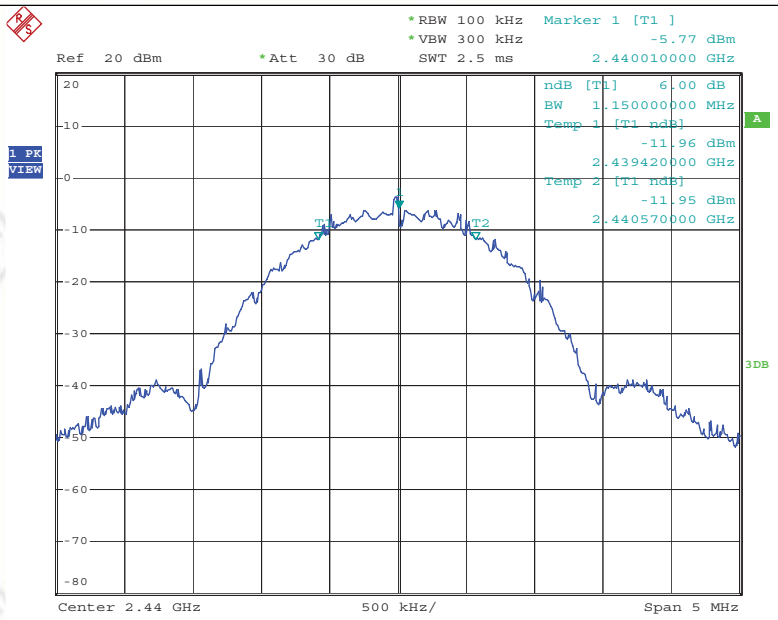
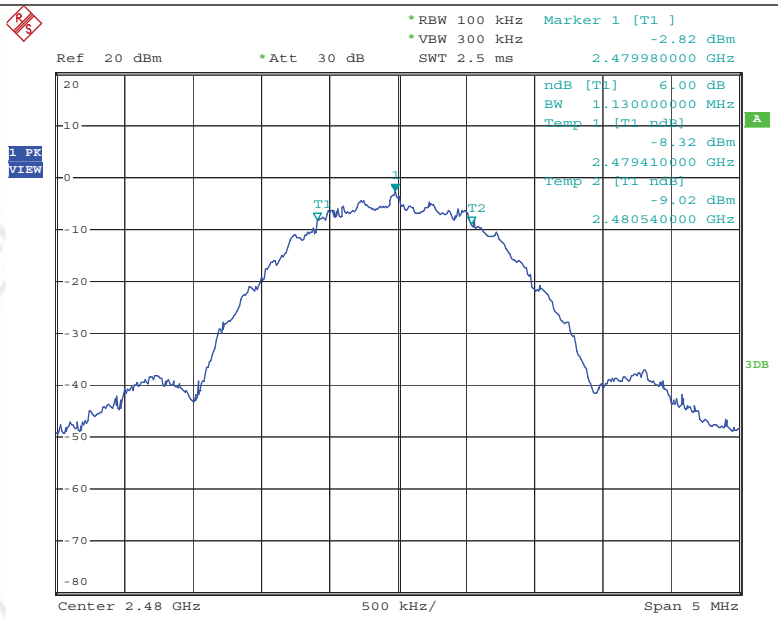
Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict
OQPSK	LCH	1.12	1.94	PASS
OQPSK	MCH	1.15	1.92	PASS
OQPSK	HCH	1.13	1.92	PASS

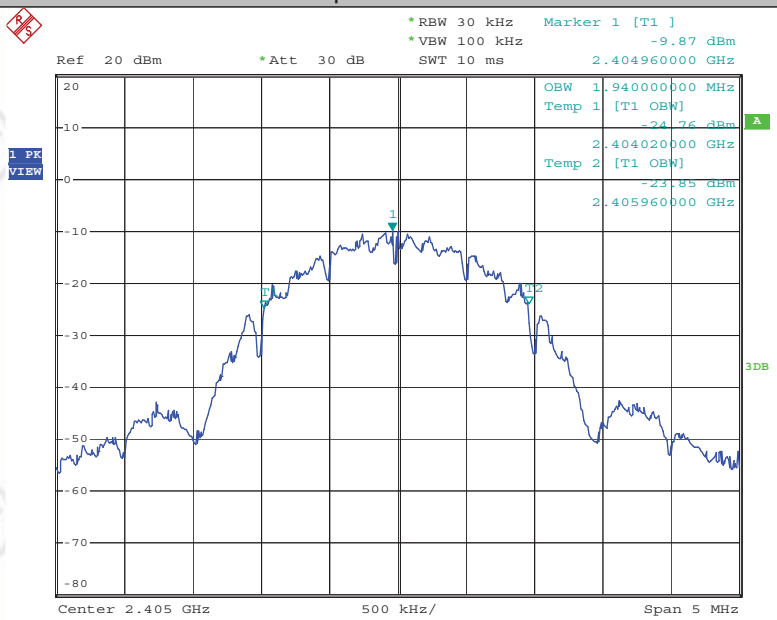
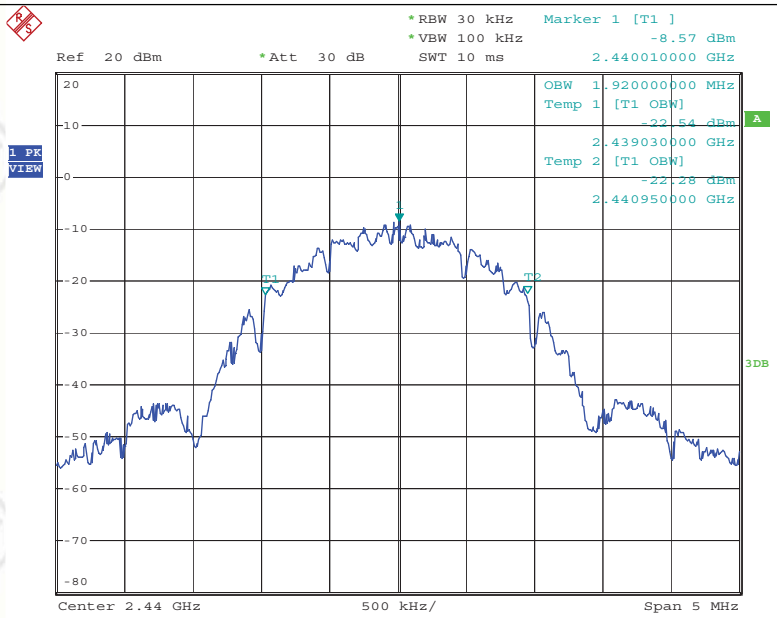
Test Graphs

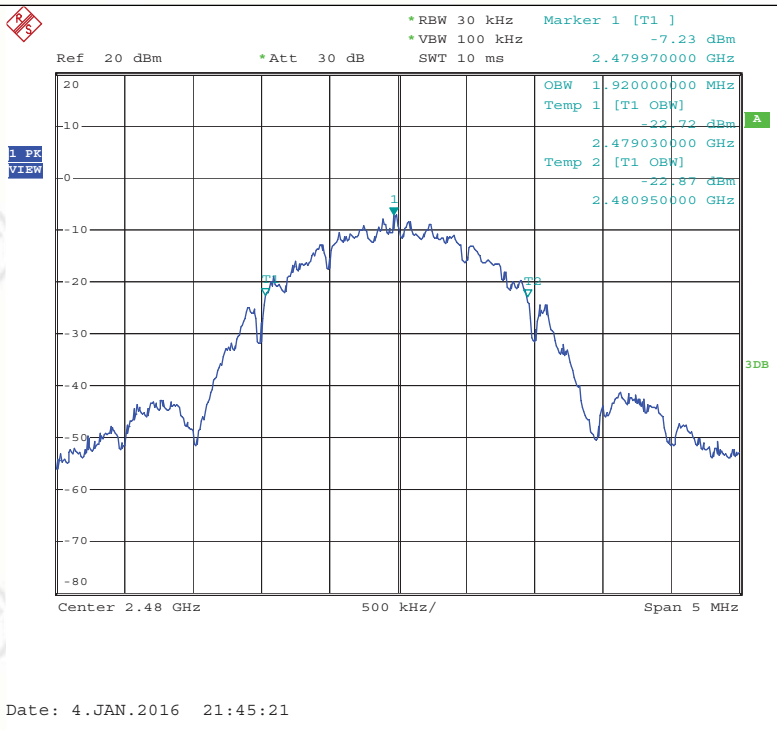
6dB Bandwidth

Graphs	
LCH	

MCH	 Date: 4.JAN.2016 21:38:04
HCH	 Date: 4.JAN.2016 21:40:51

99% Bandwidth

Graphs	
LCH	
MCH	

HCH	

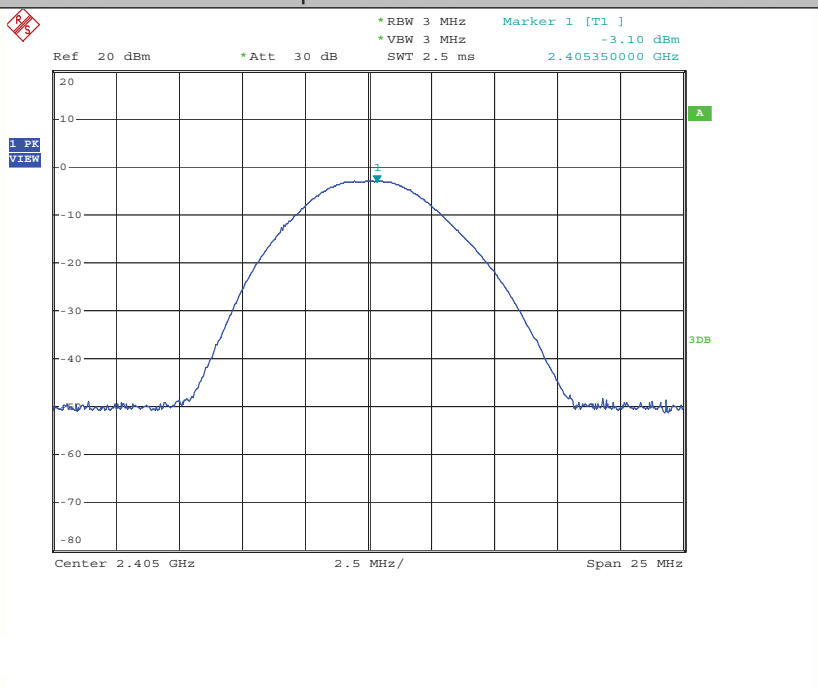
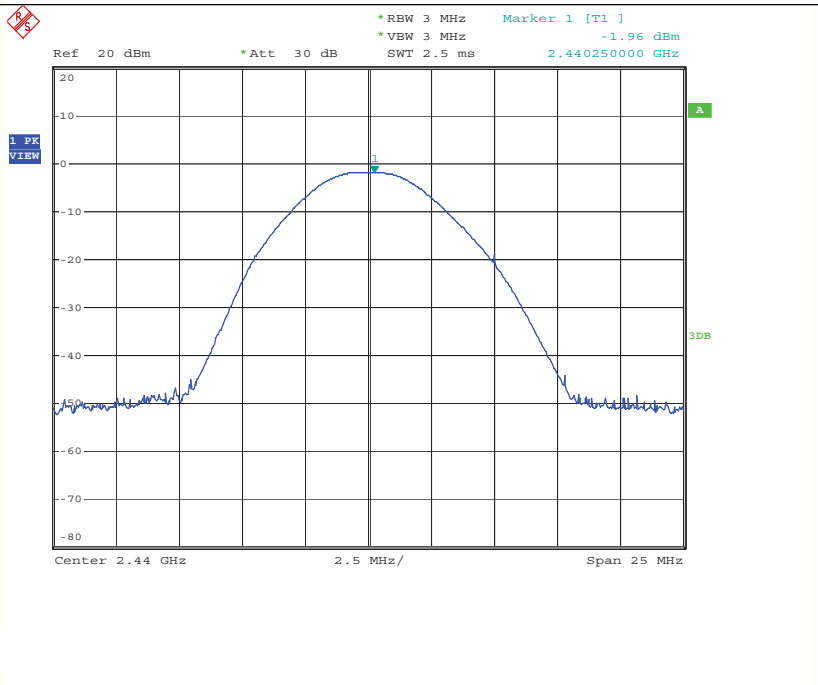
*RBW 30 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 10 ms
Marker 1 [T1]
-7.23 dBm
2.479970000 GHz
OBW 1.920000000 MHz
Temp 1 [T1 OBW]
-22.72 dBm
2.479030000 GHz
Temp 2 [T1 OBW]
-22.87 dBm
2.480950000 GHz
1 PK VIEW
A
3DB
Center 2.48 GHz
500 kHz/
Span 5 MHz
Date: 4.JAN.2016 21:45:21

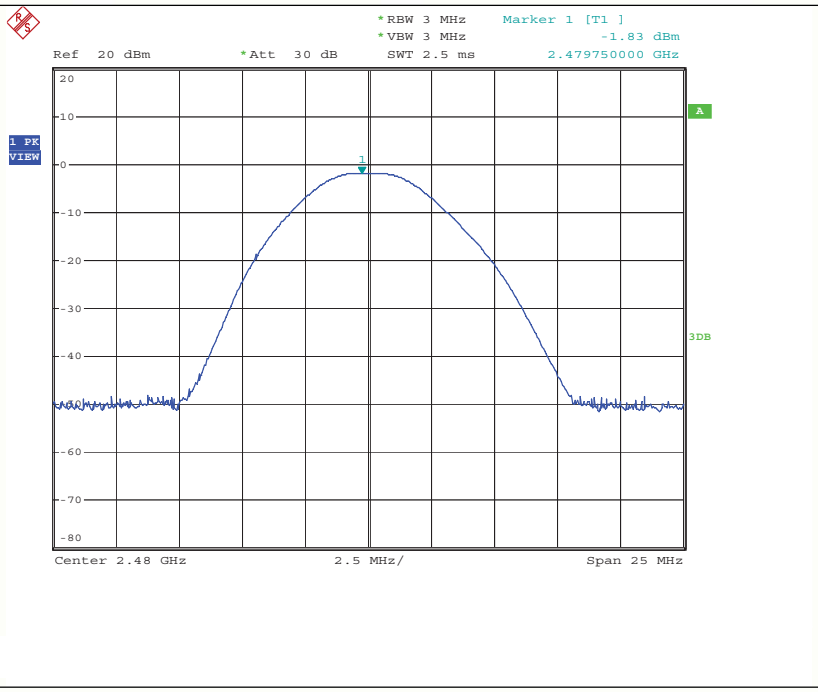
Appendix B) Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
OQPSK	LCH	-3.10	PASS
OQPSK	MCH	-1.96	PASS
OQPSK	HCH	-1.83	PASS

Test Graphs

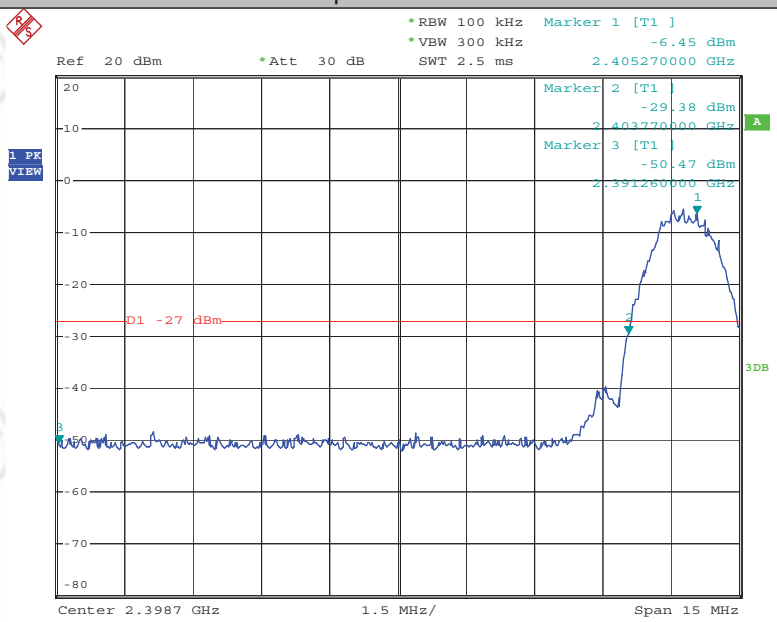
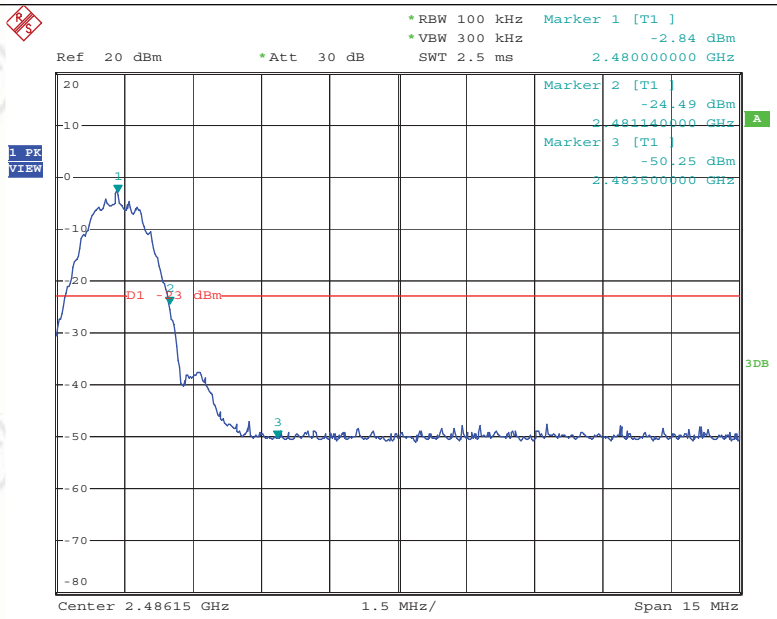
Graphs	
LCH	
MCH	

HCH	

*RBW 3 MHz
*VBW 3 MHz
Marker 1 [T1]
-1.83 dBm
2.479750000 GHz
Ref 20 dBm
*Att 30 dB
SWT 2.5 ms
1 PK VIEW
A
3DB
20
10
0
-10
-20
-30
-40
-60
-70
-80
Center 2.48 GHz
2.5 MHz/
Span 25 MHz

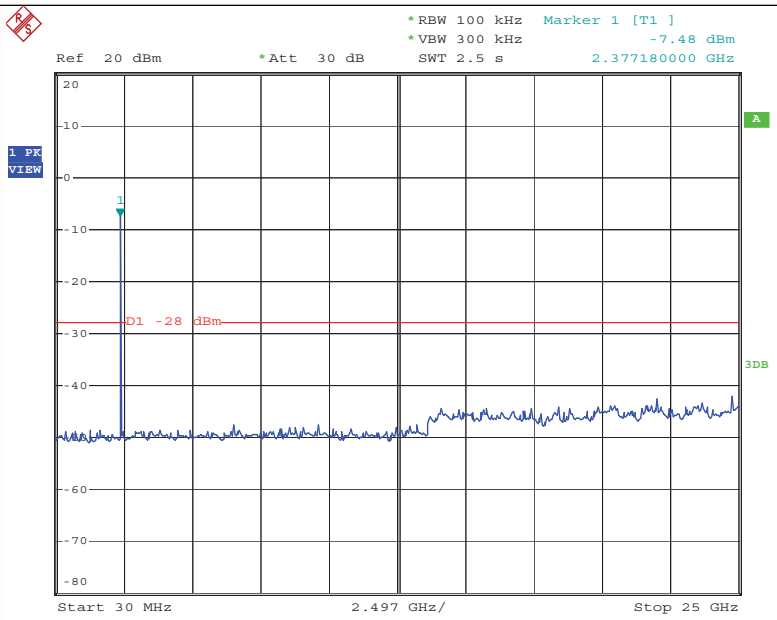
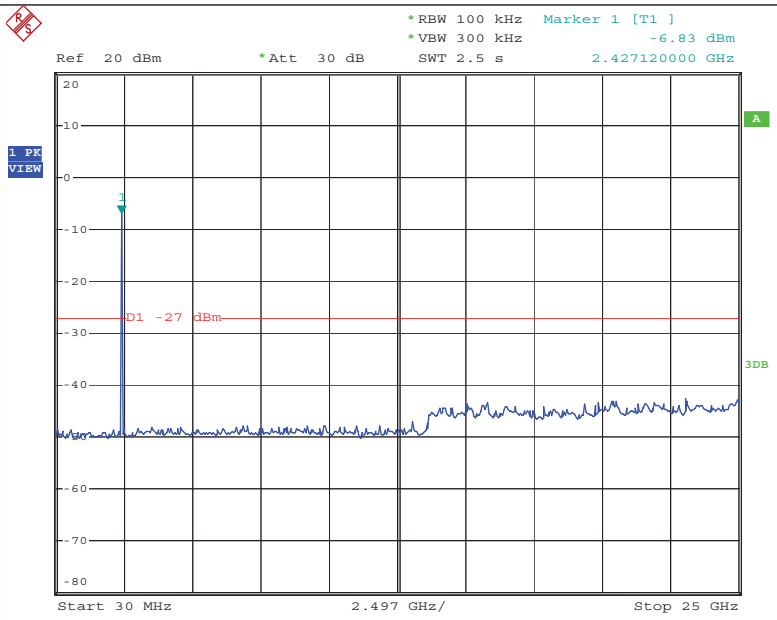
Appendix C) Band-edge for RF Conducted Emissions

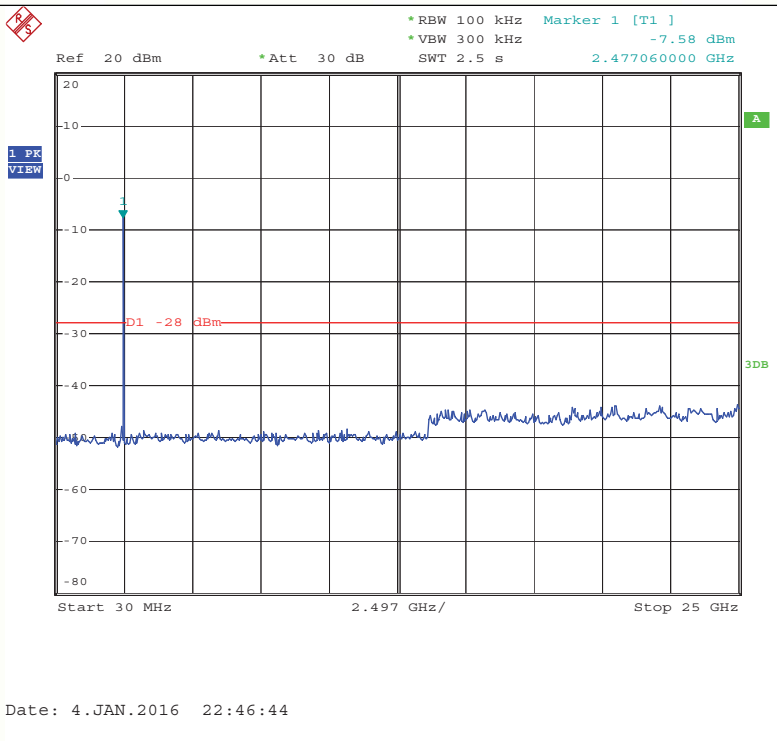
Test Graphs

Graphs	
LCH	
HCH	

Appendix D) RF Conducted Spurious Emissions

Test Graphs

Puw/OQPSK/LCH	 Date: 4.JAN.2016 22:29:46
Puw/OQPSK/MCH	 Date: 4.JAN.2016 22:41:09

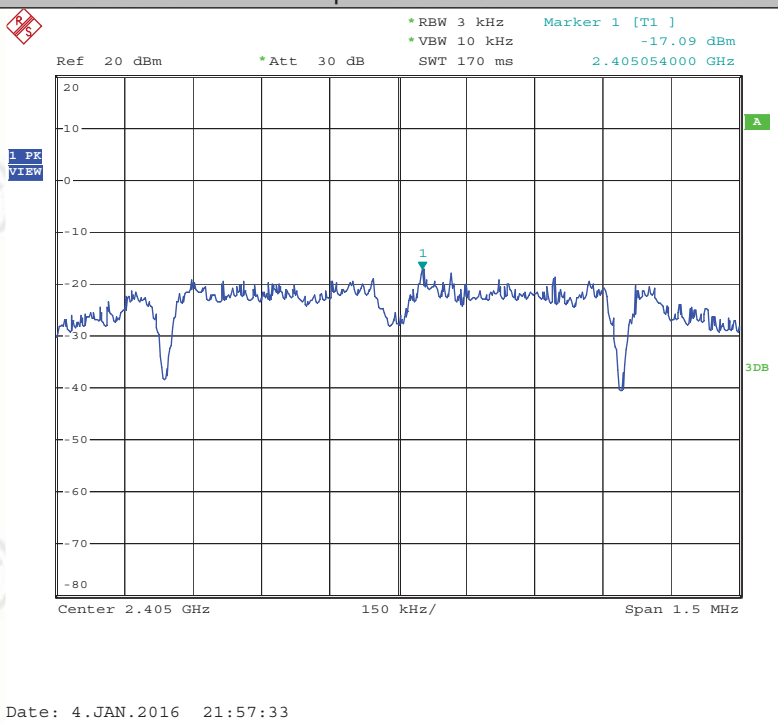
Puw/OQPSK/HCH	

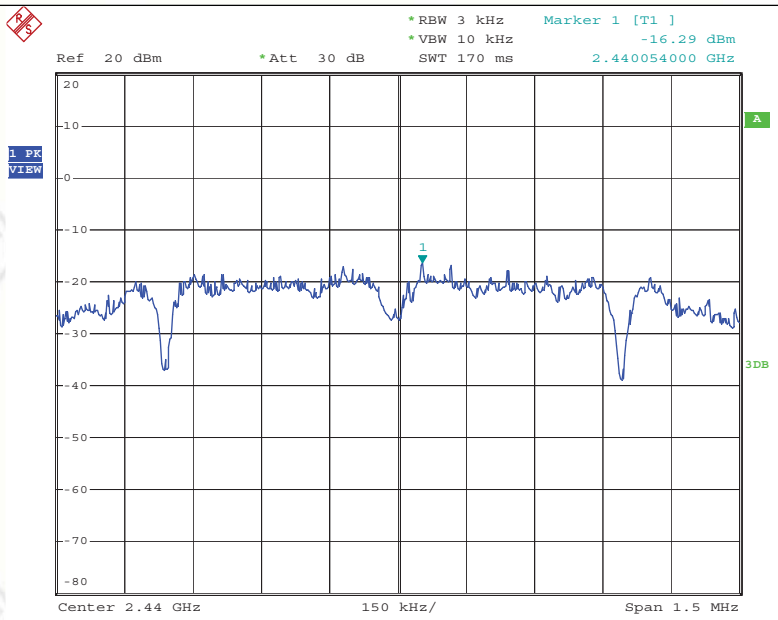
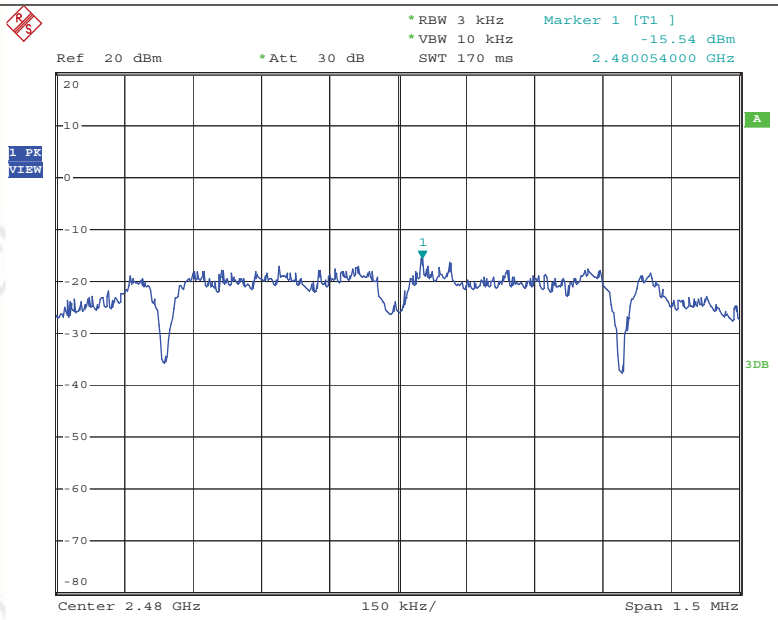
Appendix E) Power Spectral Density

Result Table

Mode	Channel	PSD [dBm]	Verdict
OQPSK	LCH	-17.09	PASS
OQPSK	MCH	-16.29	PASS
OQPSK	HCH	-15.54	PASS

Test Graphs

Graphs	
LCH	

MCH	 Date: 4.JAN.2016 22:03:15
HCH	 Date: 4.JAN.2016 22:11:34

Appendix F) Antenna Requirement

15.203 requirement:

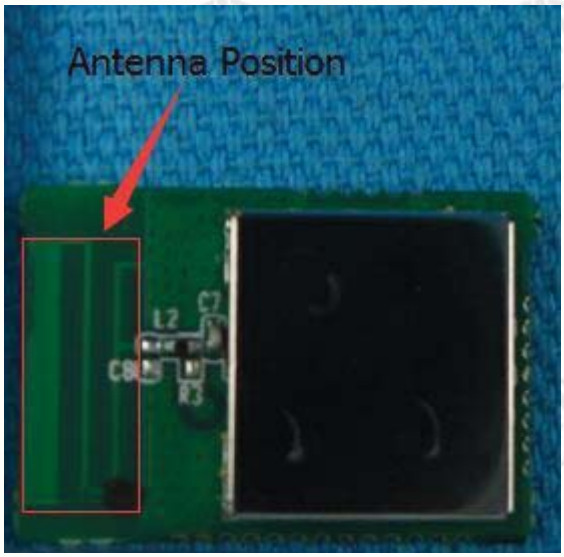
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 3dBi.



Appendix G) AC Power Line Conducted Emission

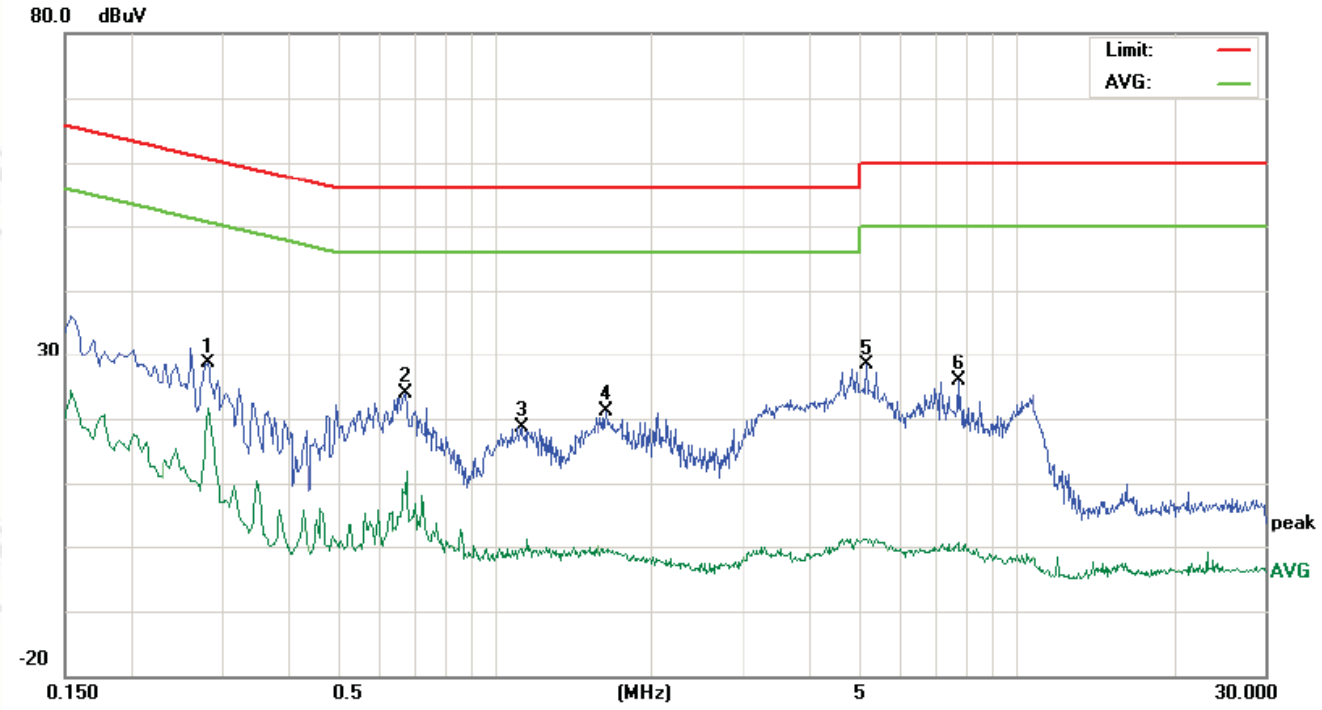
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. 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.</td></tr>
<tr><td>Limit:</td><td>
<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>
* 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</td></tr>
</table>

Measurement Data

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

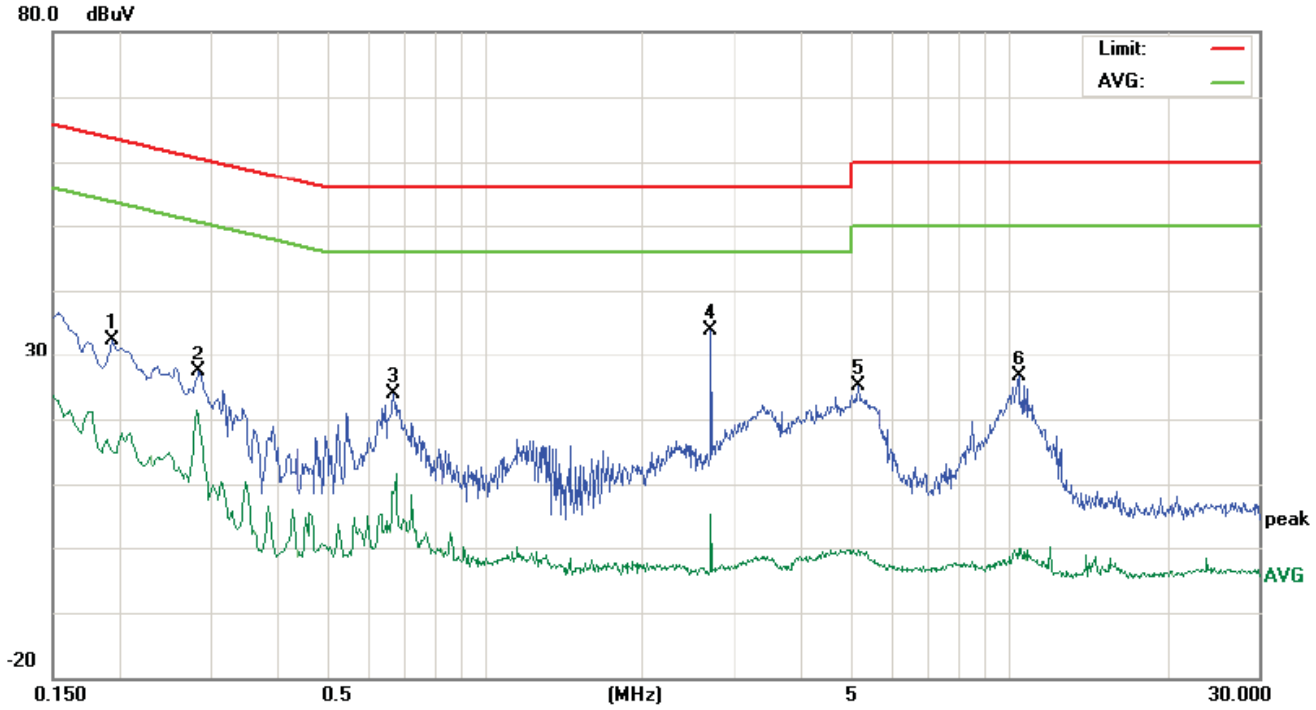
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.2819	18.72		11.77	9.80	28.52		21.57	60.76	50.76	-32.24	-29.19	P	
2	0.6780	12.01		2.01	9.90	21.91		11.91	56.00	46.00	-34.09	-34.09	P	
3	1.1260	8.62		-10.7	10.00	18.62		-0.72	56.00	46.00	-37.38	-46.72	P	
4	1.6380	11.07		-10.5	10.00	21.07		-0.56	56.00	46.00	-34.93	-46.56	P	
5	5.1579	18.44		-8.83	10.00	28.44		1.17	60.00	50.00	-31.56	-48.83	P	
6	7.7620	15.88		-9.46	10.00	25.88		0.54	60.00	50.00	-34.12	-49.46	P	

Neutral line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1940	22.61		5.32	9.80	32.41		15.12	63.86	53.86	-31.45	-38.74	P	
2	0.2860	17.49		10.26	9.80	27.29		20.06	60.64	50.64	-33.35	-30.58	P	
3	0.6700	14.05		-1.24	9.90	23.95		8.66	56.00	46.00	-32.05	-37.34	P	
4	2.6980	23.91		-4.64	10.00	33.91		5.36	56.00	46.00	-22.09	-40.64	P	
5	5.1460	15.18		-10.3	10.00	25.18		-0.37	60.00	50.00	-34.82	-50.37	P	
6	10.4100	16.49		-10.0	10.01	26.50		-0.06	60.00	50.00	-33.50	-50.06	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	120 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
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.
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.
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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel , the Highest channel
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.
j. 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:

Frequency (MHz)	Read Level (dBμV)	Level (dBμV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Premap Factor (dB)	Limit (dBμV/m)	Over Limit (dB)	Antenna Polaxis	Remark	Test Frequency (MHz)
2390.00	43.52	43.12	32.53	4.28	37.21	74	-30.88	H	PK	2405
2390.00	44.40	44.00	32.53	4.28	37.21	74	-30.00	V	PK	2405
2483.50	48.38	48.41	32.71	4.51	37.19	74	-25.59	H	PK	2480
2483.50	47.04	47.07	32.71	4.51	37.19	74	-26.93	V	PK	2480

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:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
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.
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.
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 table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
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.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
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.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

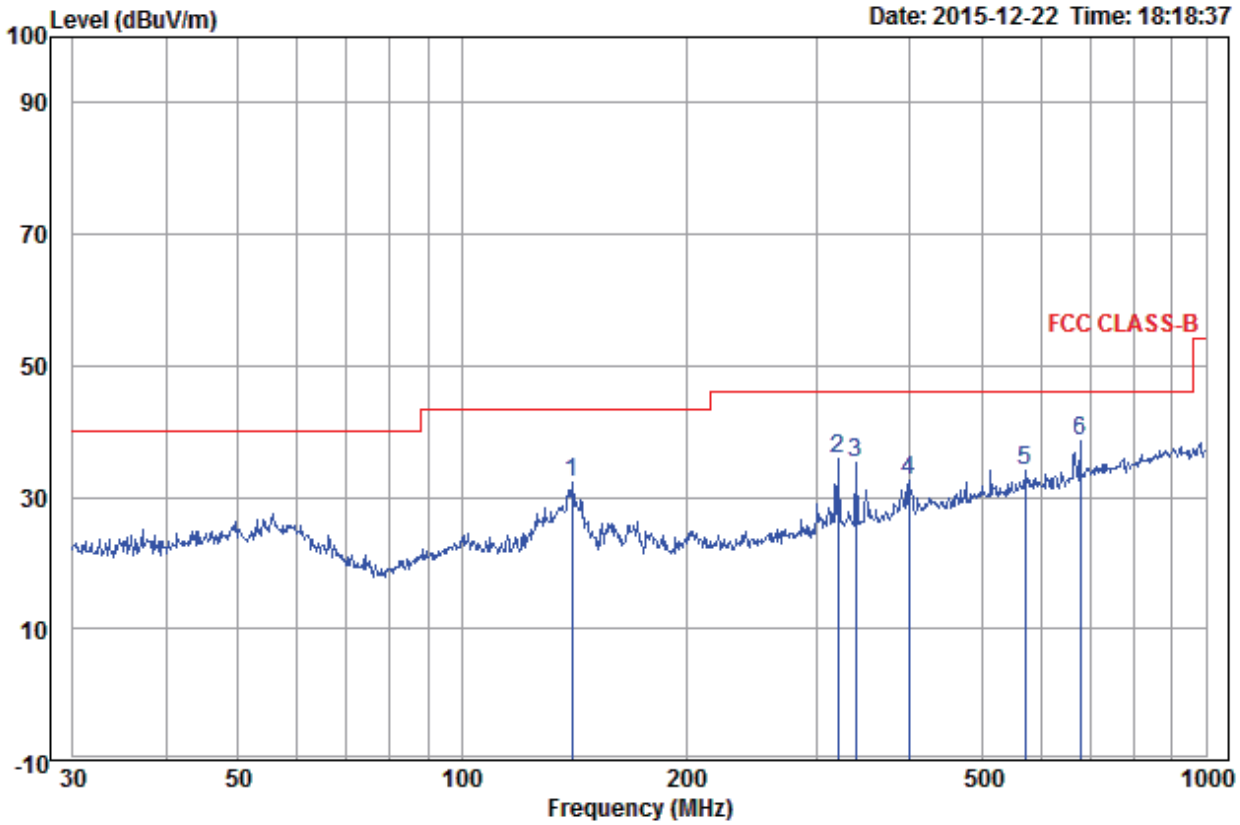
Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	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.

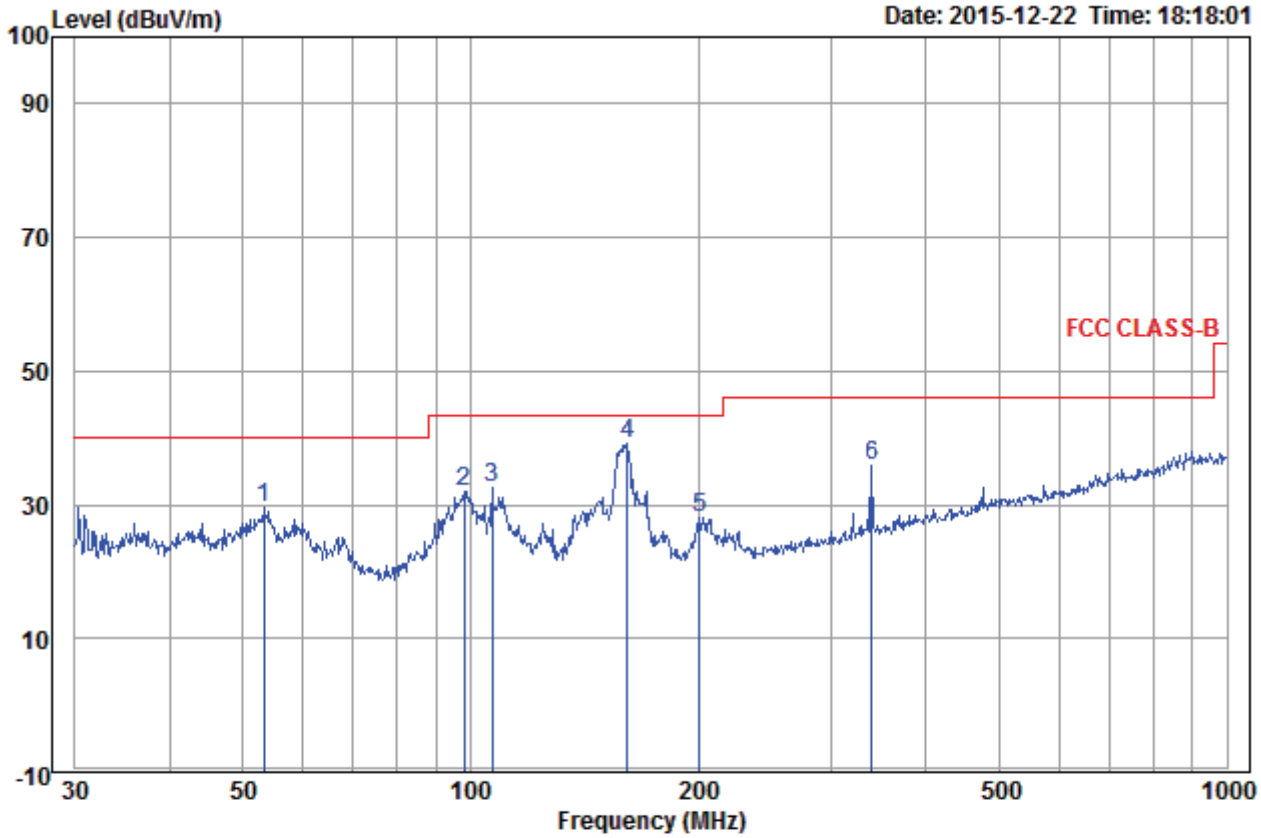
Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

30MHz~1GHz (QP)



	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	140.34	10.27	1.58	20.50	32.35	43.50	-11.15	Horizontal	
2	319.94	14.04	2.52	19.40	35.96	46.00	-10.04	Horizontal	
3	338.40	14.52	2.64	18.24	35.40	46.00	-10.60	Horizontal	
4	399.03	16.27	2.80	13.49	32.56	46.00	-13.44	Horizontal	
5	570.61	18.68	3.34	12.18	34.20	46.00	-11.80	Horizontal	
6 pp	677.58	20.22	3.75	14.70	38.67	46.00	-7.33	Horizontal	



	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	53.32	14.64	1.41	13.50	29.55	40.00	-10.45	Vertical	
2	98.14	12.84	1.57	17.52	31.93	43.50	-11.57	Vertical	
3	106.76	12.64	1.57	18.41	32.62	43.50	-10.88	Vertical	
4 pp	161.47	10.19	1.74	27.21	39.14	43.50	-4.36	Vertical	
5	200.69	11.61	2.21	14.39	28.21	43.50	-15.29	Vertical	
6	339.59	14.55	2.65	18.65	35.85	46.00	-10.15	Vertical	

Transmitter Emission above 1GHz

Test mode:		OQPSK		Test Frequency:		2405MHz		
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Cable Loss (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1326.513	30.52	38.25	2.66	49.15	44.08	74	-29.92	H
1663.803	31.17	37.72	2.97	47.11	43.53	74	-30.47	H
4810.000	34.70	36.82	5.11	45.78	48.77	74	-25.23	H
5762.235	35.72	36.72	6.90	43.65	49.55	74	-24.45	H
7215.000	36.42	37.45	6.67	42.18	47.82	74	-26.18	H
9620.000	37.90	37.83	7.72	42.78	50.57	74	-23.43	H
1668.044	31.18	37.72	2.98	46.58	43.02	74	-30.98	V
3393.477	33.26	37.01	5.54	45.04	46.83	74	-27.17	V
4810.000	34.70	36.82	5.11	44.01	47.00	74	-27.00	V
5747.586	35.71	36.72	6.87	43.79	49.65	74	-24.35	V
7215.000	36.42	37.45	6.67	42.03	47.67	74	-26.33	V
9620.000	37.90	37.83	7.72	42.78	50.57	74	-23.43	V

Test mode:		OQPSK		Test Frequency:		2440MHz		
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Cable Loss (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1668.044	31.18	37.72	2.98	48.93	45.37	74	-28.63	H
3709.691	33.01	36.95	5.49	44.95	46.50	74	-27.50	H
4880.000	34.85	36.81	5.08	42.52	45.64	74	-28.36	H
6078.644	35.94	36.77	7.35	43.13	49.65	74	-24.35	H
7320.000	36.43	37.43	6.77	43.20	48.97	74	-25.03	H
9760.000	38.05	37.85	7.60	42.41	50.21	74	-23.79	H
1668.044	31.18	37.72	2.98	46.67	43.11	74	-30.89	V
3690.853	33.02	36.96	5.49	45.13	46.68	74	-27.32	V
4880.000	34.85	36.81	5.08	41.37	44.49	74	-29.51	V
6032.401	35.92	36.73	7.40	44.03	50.62	74	-23.38	V
7320.000	36.43	37.43	6.77	42.89	48.66	74	-25.34	V
9760.000	38.05	37.85	7.60	43.01	50.81	74	-23.19	V

Test mode:		OQPSK		Test Frequency:		2480MHz		
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Cable Loss (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1329.894	30.52	38.24	2.66	46.85	41.79	74	-32.21	H
1597.401	31.05	37.82	2.92	47.10	43.25	74	-30.75	H
4960.000	35.02	36.80	5.05	42.58	45.85	74	-28.15	H
5895.771	35.82	36.71	7.20	44.3	50.61	74	-23.39	H
7440.000	36.45	37.41	6.88	42.29	48.21	74	-25.79	H
9920.000	38.22	37.88	7.47	43.61	51.42	74	-22.58	H
1364.182	30.6	38.18	2.69	46.32	41.43	74	-32.57	V
1663.803	31.17	37.72	2.97	53.09	49.51	74	-24.49	V
3757.208	32.97	36.94	5.48	44.83	46.34	74	-27.66	V
4960.000	35.02	36.80	5.05	41.84	45.11	74	-28.89	V
7440.000	36.45	37.41	6.88	41.98	47.90	74	-26.10	V
9920.000	38.22	37.88	7.47	43.12	50.93	74	-23.07	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

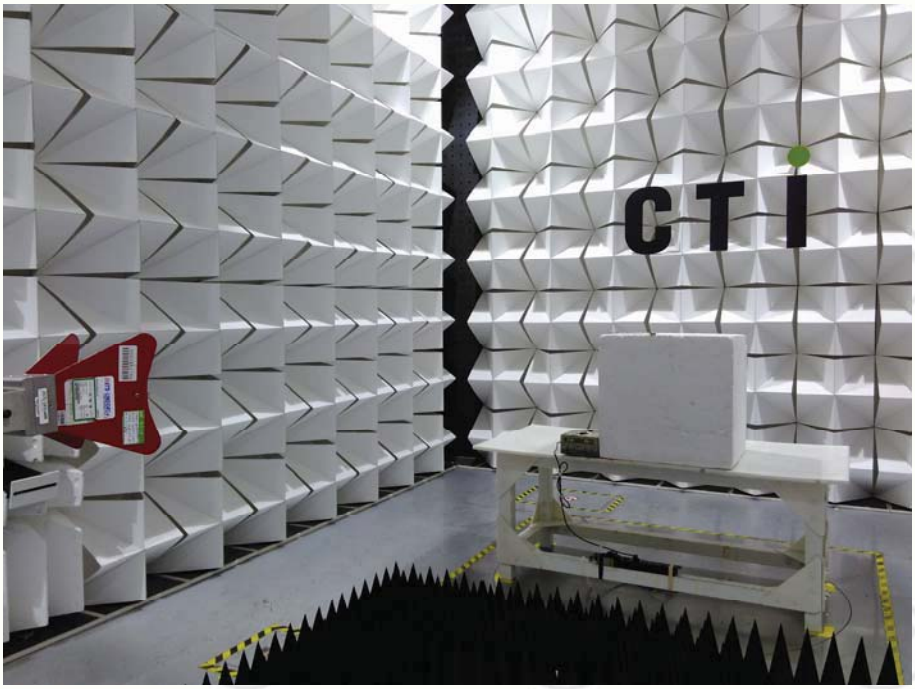
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

3) 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.

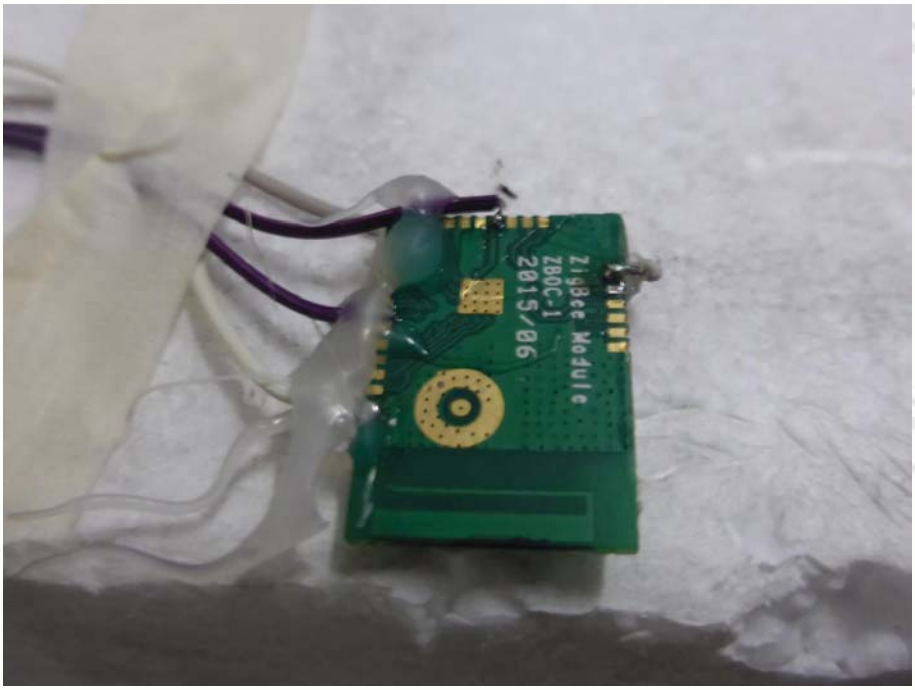
PHOTOGRAPHS OF TEST SETUP

Test mode No.: MZ100

Radiated spurious emission Test Setup-1(Below 1GHz)



Radiated spurious emission Test Setup-2(Above 1GHz)

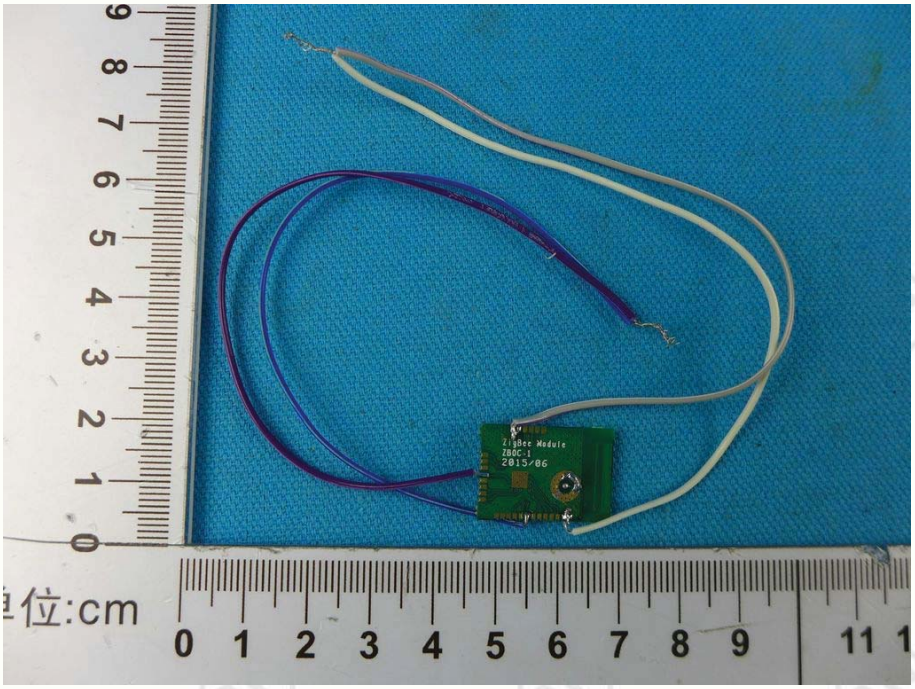


Radiated spurious emission Test Setup-3(Above 1GHz)

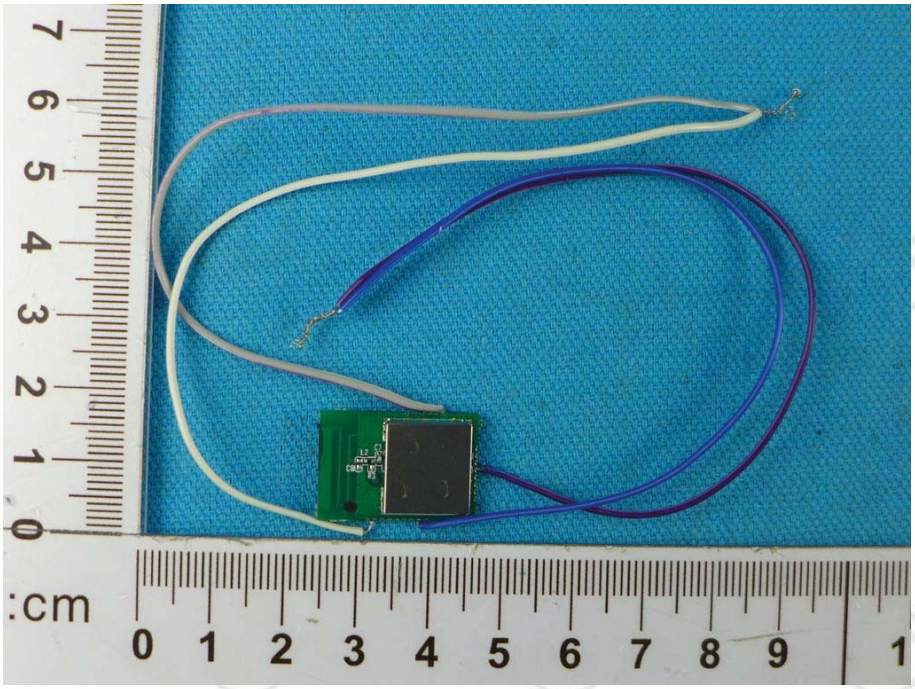
Conducted emission Test Setup

PHOTOGRAPHS OF EUT Constructional Details

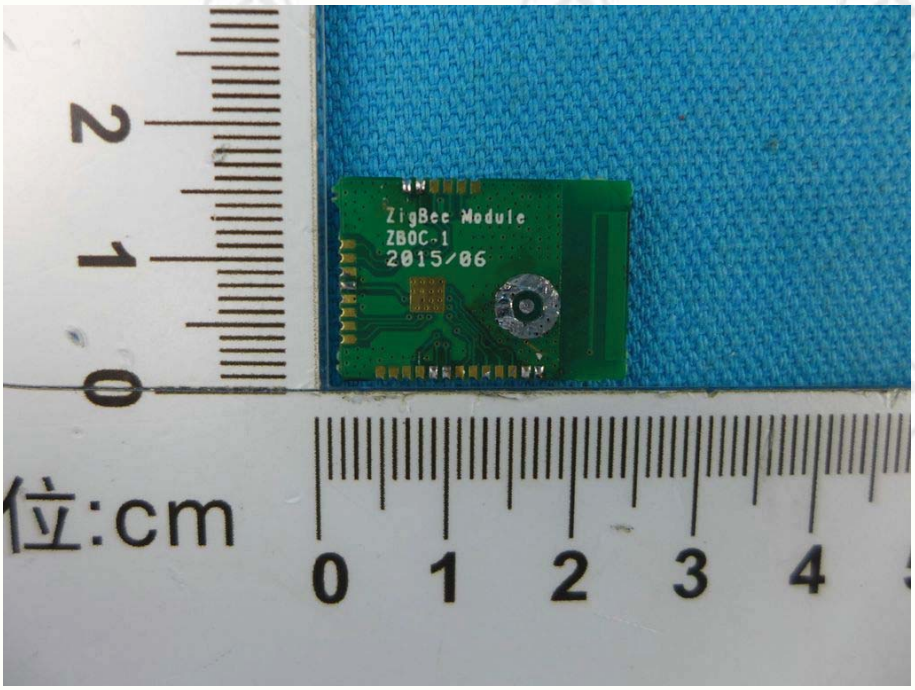
Test mode No.: MZ100



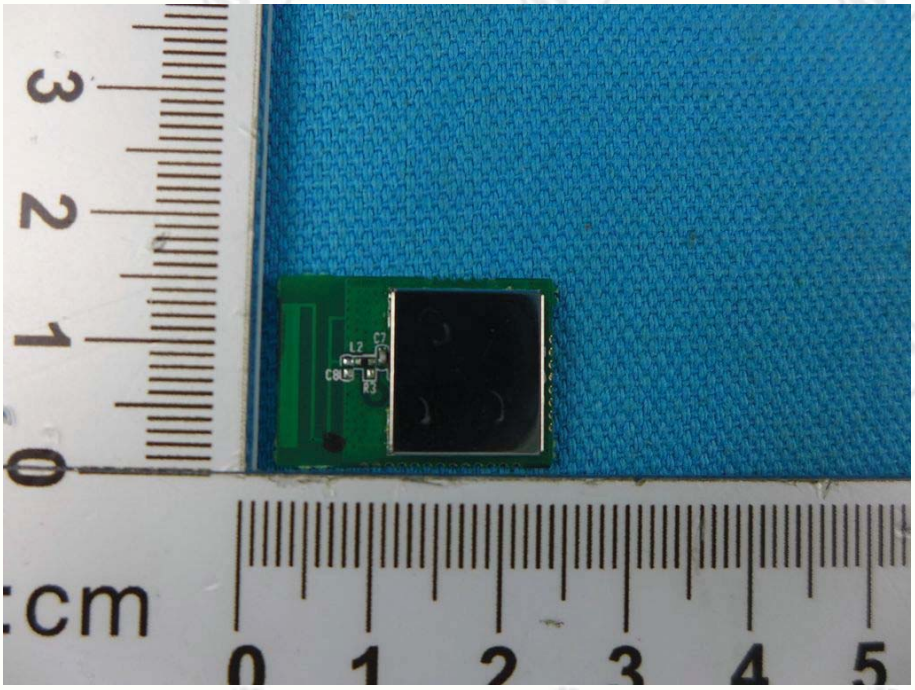
View of product-1



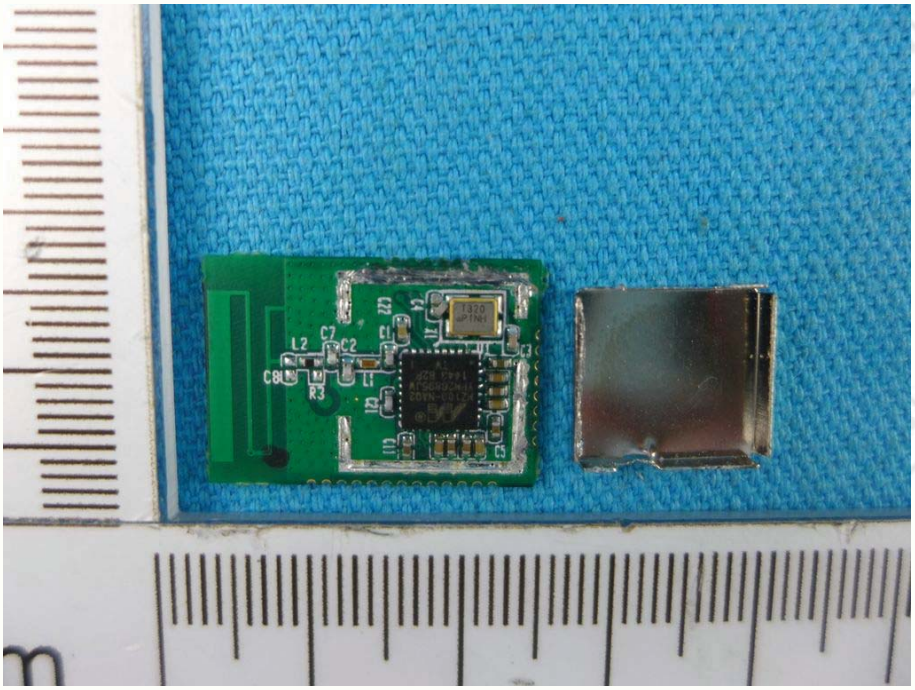
View of product-2



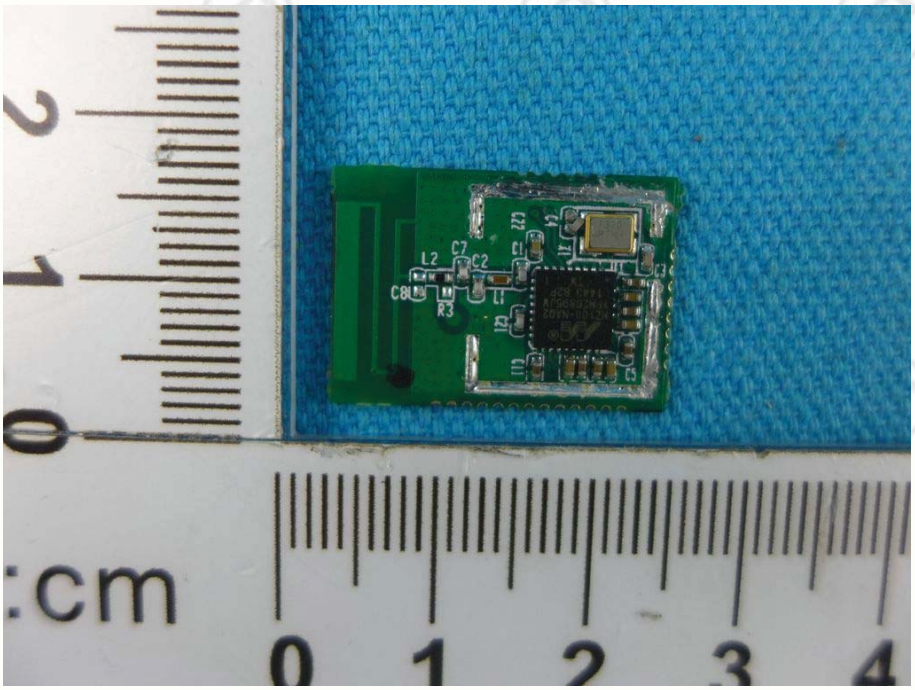
View of product-3



View of product-4



View of product-5



View of product-6

*** End of Report ***

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