Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**GTSR19010009-01**
FCC ID..... :	**2ASJA-B8821CU1**
Compiled by (position+printed name+signature)..:	File administrators Jimmy Wang
Supervised by (position+printed name+signature)..:	Test Engineer Aaron Tan
Approved by (position+printed name+signature)..:	Manager Jason Hu
Date of issue.....:	Feb.25, 2019
Representative Laboratory Name .:	**Shenzhen Global Test Service Co.,Ltd.**
Address.....:	No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong
Applicant's name.....:	**REV Robotics LLC**
Address .....:	1621 W Crosby Road Suite 104 Carrollton TX,75006
Test specification .....:	
Standard .....:	**FCC Part 15.247**
TRF Originator.....:	Shenzhen Global Test Service Co.,Ltd.
Master TRF.....:	Dated 2014-12

Shenzhen Global Test Service Co.,Ltd. All rights reserved.
This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Global Test Service Co.,Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Global Test Service Co.,Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description .....:	**IEEE 802.11a/b/g/n/ac(1T1R) USB WLAN And BT Module**
Trade Mark .....:	/
Manufacturer .....:	Shenzhen Bilian Electronic Co.,Ltd
Model/Type reference.....:	BL-M8821CU1
Listed Models .....:	/
Modulation Type .....:	IEEE 802.11a /802.11ac /802.11b/802.11g/802.11n
Operation Frequency.....:	From 2412 - 2462MHz &5180 - 5240MHz
Hardware Version .....:	V1.1
Software Version .....:	V30_20121220
Rating .....:	DC 3.3V
Result.....:	**PASS**

TEST REPORT

Test Report No. :	GTSR19010009-01	Feb. 25, 2019 Date of issue

Equipment under Test	:	**IEEE 802.11a/b/g/n/ac(1T1R) USB WLAN And BT Module**
Model /Type	:	BL-M8821CU1
Listed Models	:	/
Applicant	:	REV Robotics LLC
Address	:	1621 W Crosby Road Suite 104 Carrollton TX, 75006
Manufacturer	:	Shenzhen Bilian Electronic Co.,Ltd
Address	:	No.3 Building 401, 107 FuQian Rd, JuTang Community Fucheng Street, Longhua District, shenzhen, P.R.China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS 4

2. SUMMARY 5

2.1. General Remarks 5
2.2. Product Description 5
2.3. Equipment Under Test 5
2.4. Short description of the Equipment under Test (EUT) 6
2.5. EUT operation mode 6
2.6. Block Diagram of Test Setup 6
2.7. Special Accessories 6
2.8. Related Submittal(s) / Grant (s) 6
2.9. Modifications 6

3. TEST ENVIRONMENT 7

3.1. Address of the test laboratory 7
3.2. Test Facility 7
3.3. Environmental conditions 7
3.4. Test Description 8
3.5. Statement of the measurement uncertainty 9
3.6. Equipments Used during the Test 10

4. TEST CONDITIONS AND RESULTS..... 11

4.1. AC Power Conducted Emission 11
4.2. Radiated Emission.....16
4.3. Maximum Peak Output Power.....22
4.4. Power Spectral Density 25
4.5. 6dB Bandwidth 28
4.6. Band Edge Compliance of RF Emission 31
4.7. Spurious RF Conducted Emission 36
4.8. Antenna Requirement.....49

5. TEST SETUP PHOTOS OF THE EUT 50

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT 52

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices
KDB558074 D01 v05r01: Guidance for Compliance Measurements on Digital Transmission Systems (DTS) ,Frequency Hopping Spread Spectrum System(HFSS), and Hybrid System Devices Operating Under §15.247 of The FCC rules.
KDB 662911 D01 Multiple Transmitter Output v02r01: Emissions Testing of Transmitters with Multiple Outputs in the Same Band

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Feb. 12, 2019
Testing commenced on	:	Feb. 12, 2019
Testing concluded on	:	Feb. 25, 2019

2.2. Product Description

Product Name:	**IEEE 802.11a/b/g/n/ac(1T1R) USB WLAN And BT Module**
Trade Mark:	/
Model/Type reference:	BL-M8821CU1
Antenna Type	Connect to external antenna
Power supply:	DC 3.3V
Notebook:	Manufacturer: TOSHIBA Model: Satellite S40Dt-A
WIFI	
WLAN	Supported 802.11 a/b/g/n/ac
Modulation Type	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Operation frequency	IEEE 802.11a:5180-5240MHz IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz, 5180-5240MHz IEEE 802.11ac VHT20: 5180-5240MHz IEEE 802.11n HT40:2422-2452MHz, 5190-5230MHz IEEE 802.11ac VHT40: 5190-5230MHz IEEE 802.11ac VHT80: 5210-5210MHz
Antenna gain	1.62 dBi Max for 2.4G band; 1.62 dBi Max for 5.2G band
BT	
Modulation Type	GFSK
Operation frequency	2402-2480MHz
Antenna gain	1.62 dBi Max

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 3.3V

2.4. Short description of the Equipment under Test (EUT)

This is a **Module**.

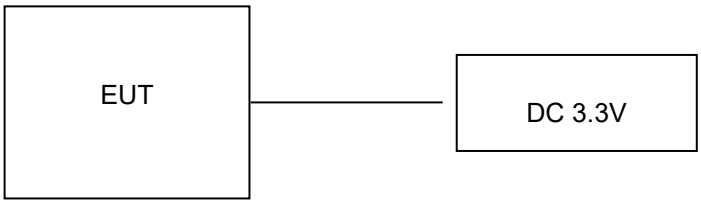
2.5. EUT operation mode

The application provider specific test software to control sample in continuous TX and RX (Duty Cycle >98%) for testing meet KDB558074 test requirement.

IEEE 802.11b/g/n: Thirteen channels are provided to the EUT.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

2.6. Block Diagram of Test Setup



2.7. Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
TOSHIBA	Tablet PC	Satellite S40Dt-A	D26T	DOC

2.8. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2ASJA-M8821CU1** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.9. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

3.2. Test Facility

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

FCC-Registration No.: 165725

Shenzhen Global Test Service 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.

A2LA-Lab Cert. No.: 4758.01

Shenzhen Global Test Service 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.

CNAS-Lab Code: L8169

Shenzhen Global Test Service 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.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	802.11b	☒ Lowest ☒ Middle ☒ Highest	802.11b	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	☐	☐	☒	☐	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	802.11b	-/-	802.11b	-/-	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	802.11b	-/-	802.11b	-/-	☒	☐	☐	☐	complies

Remark:
1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9KHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
	11n(40MHz)/OFDM	13.5Mbps	3/6/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11
	11n(40MHz)/OFDM	13.5Mbps	3/9

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

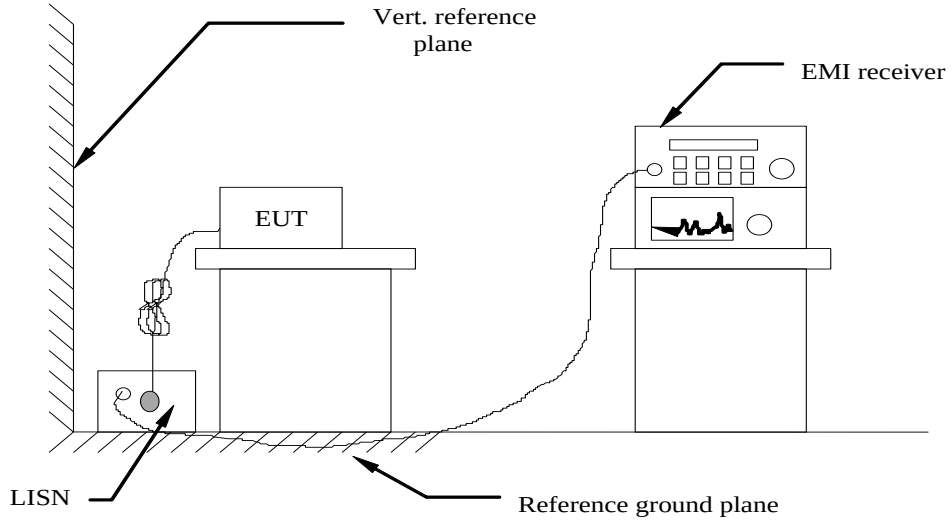
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2018/09/20	2019/09/19
LISN	R&S	ESH2-Z5	893606/008	2018/09/20	2019/09/19
Bilog Antenna	Schwarzbeck	VULB9163	976	2016/09/20	2019/09/19
EMI Test Receiver	R&S	ESCI7	101102	2018/09/20	2019/09/19
Spectrum Analyzer	Agilent	N9020A	MY48010425	2018/09/20	2019/09/19
Spectrum Analyzer	R&S	FSP40	100019	2018/06/05	2019/06/04
Controller	EM Electronics	Controller EM 1000	N/A	N/A	N/A
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2016/09/20	2019/09/19
Active Loop Antenna	SCHWARZBEC K	FMZB1519	1519-037	2016/09/20	2019/09/19
Broadband Horn Antenna	SCHWARZBEC K	BBHA 9170	971	2016/09/20	2019/09/19
Amplifier	Schwarzbeck	BBV 9743	#202	2018/09/20	2019/09/19
Amplifier	EMCI	EMC051845B	980355	2018/09/20	2019/09/19
Temperature/Humidi ty Meter	Gangxing	CTH-608	02	2018/09/20	2019/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	KL142031	2018/09/20	2019/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	KL142032	2018/09/20	2019/09/19
RF Cable(below 1GHz)	HUBER+SUHNE R	RG214	RE01	2018/09/20	2019/09/19
RF Cable(above 1GHz)	HUBER+SUHNE R	RG214	RE02	2018/09/20	2019/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2018/09/20	2019/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2018/09/20	2019/09/19
EMI Test Software	R&S	ES-K1	V1.7.1	2018/09/20	2019/09/19
EMI Test Software	JS Tonscend	JS32-RE	2.0.1.5	2018/09/20	2019/09/19
EMI Test Software	Audix	E3	2..1.1	2018/09/20	2019/09/19

Note: The Cal.Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received DC 5V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

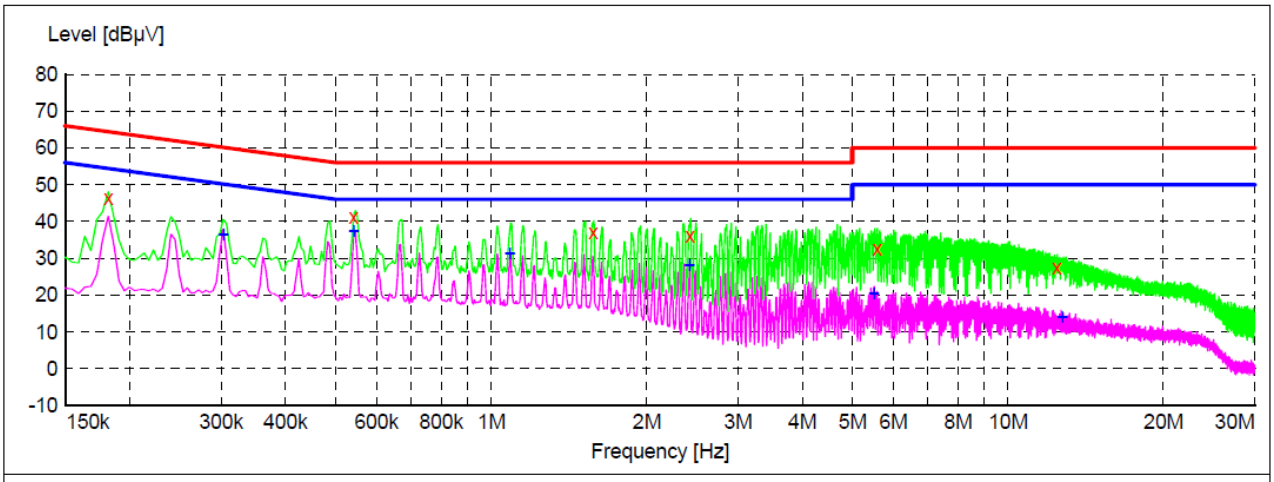
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

Remark: We measured Conducted Emission at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode in AC 120V/60Hz and AC 240V/50Hz, Pre-test AC conducted emission at power from AC mains mode and at charge from PC mode, recorded worst case..

Power supply:	AC 120V/60Hz	Polarization	L



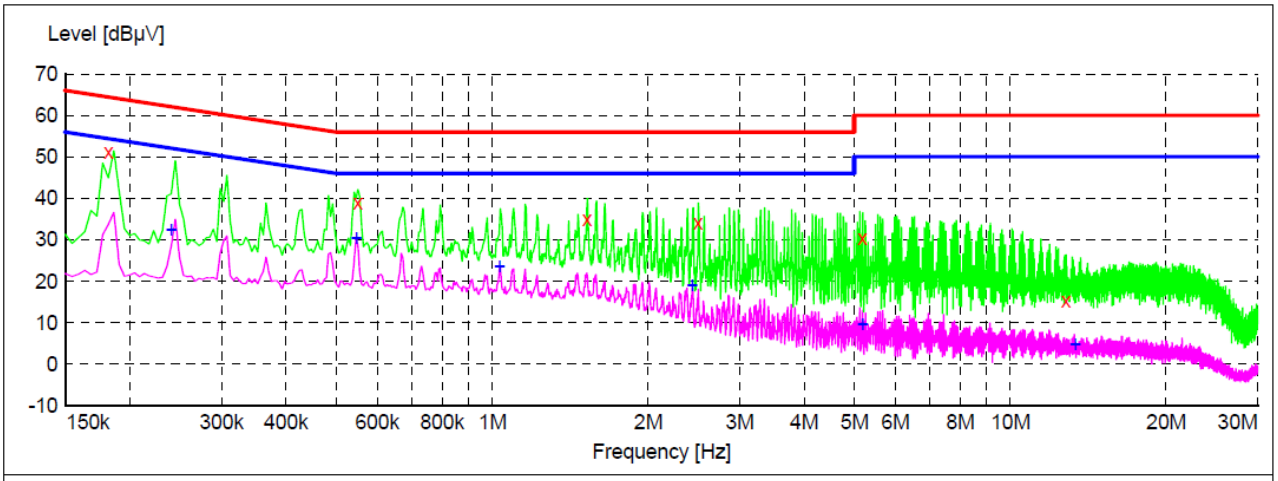
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.181500	46.50	10.0	64	17.9	QP	L1	GND
0.541500	41.10	9.8	56	14.9	QP	L1	GND
1.576500	37.10	9.5	56	18.9	QP	L1	GND
2.427000	36.20	9.5	56	19.8	QP	L1	GND
5.581500	32.60	9.2	60	27.4	QP	L1	GND
12.435000	27.40	8.5	60	32.6	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.303000	36.30	9.9	50	13.9	AV	L1	GND
0.541500	37.40	9.8	46	8.6	AV	L1	GND
1.086000	31.20	9.6	46	14.8	AV	L1	GND
2.418000	28.20	9.5	46	17.8	AV	L1	GND
5.500500	20.50	9.3	50	29.5	AV	L1	GND
12.714000	14.10	8.5	50	35.9	AV	L1	GND

Power supply:	AC 120V/60Hz	Polarization	N



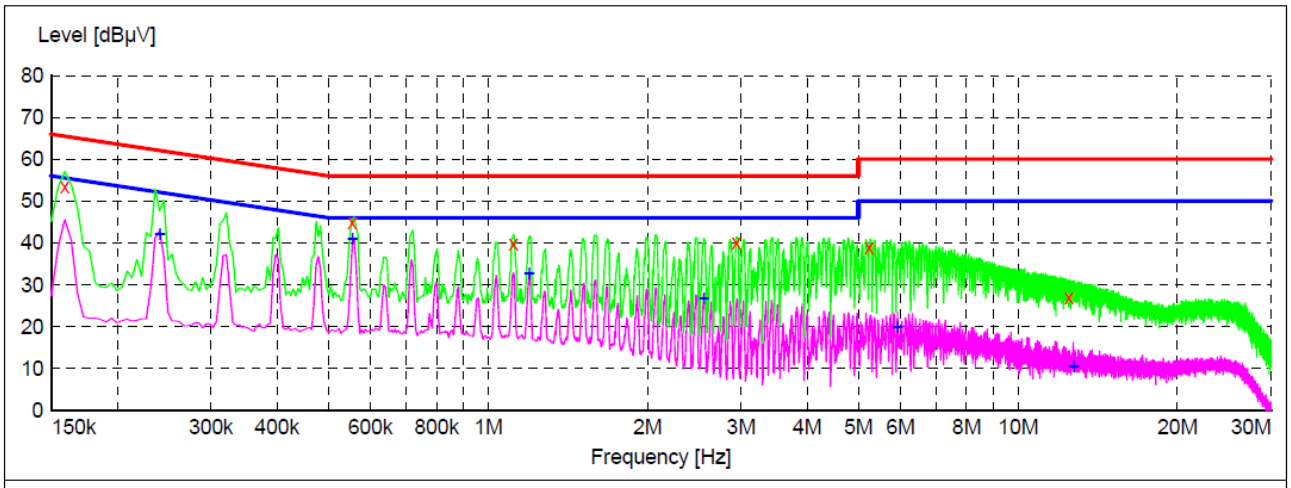
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.181500	51.30	10.0	64	13.1	QP	N	GND
0.550500	38.90	9.8	56	17.1	QP	N	GND
1.522500	35.00	9.6	56	21.0	QP	N	GND
2.494500	34.00	9.5	56	22.0	QP	N	GND
5.176500	30.30	9.3	60	29.7	QP	N	GND
12.799500	15.30	8.5	60	44.7	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.240000	32.50	10.0	52	19.6	AV	N	GND
0.546000	30.50	9.8	46	15.5	AV	N	GND
1.032000	23.60	9.6	46	22.4	AV	N	GND
2.431500	19.00	9.5	46	27.0	AV	N	GND
5.176500	9.50	9.3	50	40.5	AV	N	GND
13.335000	4.70	8.4	50	45.3	AV	N	GND

Power supply:	AC 240V/50Hz	Polarization	L



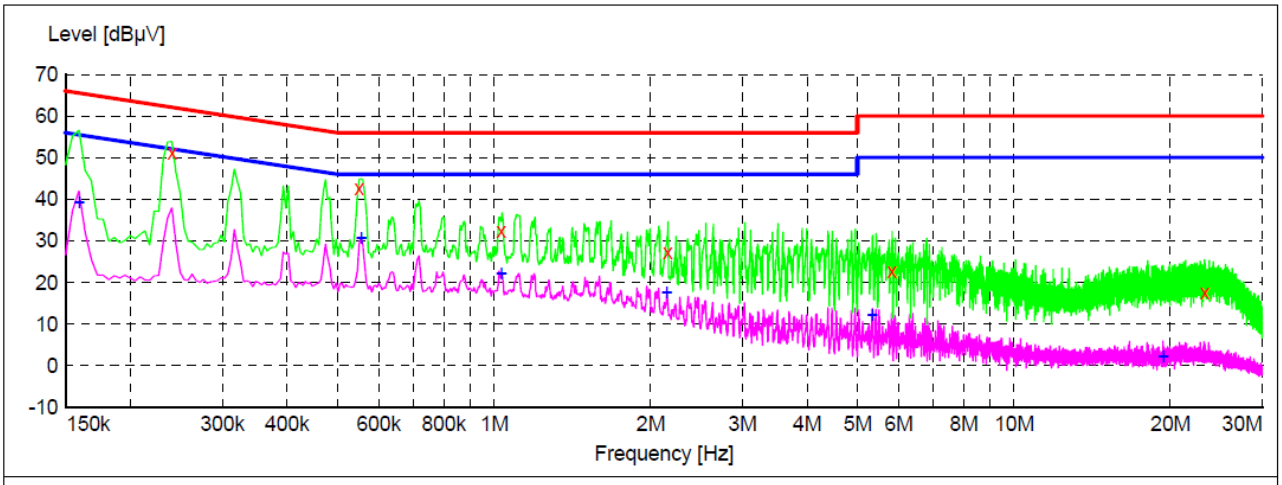
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	53.40	10.0	66	12.1	QP	L1	GND
0.555000	45.00	9.8	56	11.0	QP	L1	GND
1.117500	39.70	9.6	56	16.3	QP	L1	GND
2.940000	40.10	9.5	56	15.9	QP	L1	GND
5.248500	39.00	9.3	60	21.0	QP	L1	GND
12.480000	27.10	8.5	60	32.9	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.240000	42.00	10.0	52	10.1	AV	L1	GND
0.555000	41.00	9.8	46	5.0	AV	L1	GND
1.194000	32.60	9.6	46	13.4	AV	L1	GND
2.553000	26.60	9.5	46	19.4	AV	L1	GND
5.914500	20.00	9.2	50	30.0	AV	L1	GND
12.709500	10.50	8.5	50	39.5	AV	L1	GND

Power supply:	AC 240V/50Hz	Polarization	N



MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.240000	51.30	10.0	62	10.8	QP	N	GND
0.550500	42.60	9.8	56	13.4	QP	N	GND
1.032000	32.40	9.6	56	23.6	QP	N	GND
2.157000	27.30	9.5	56	28.7	QP	N	GND
5.824500	22.70	9.2	60	37.3	QP	N	GND
23.266500	17.70	7.0	60	42.3	QP	N	GND

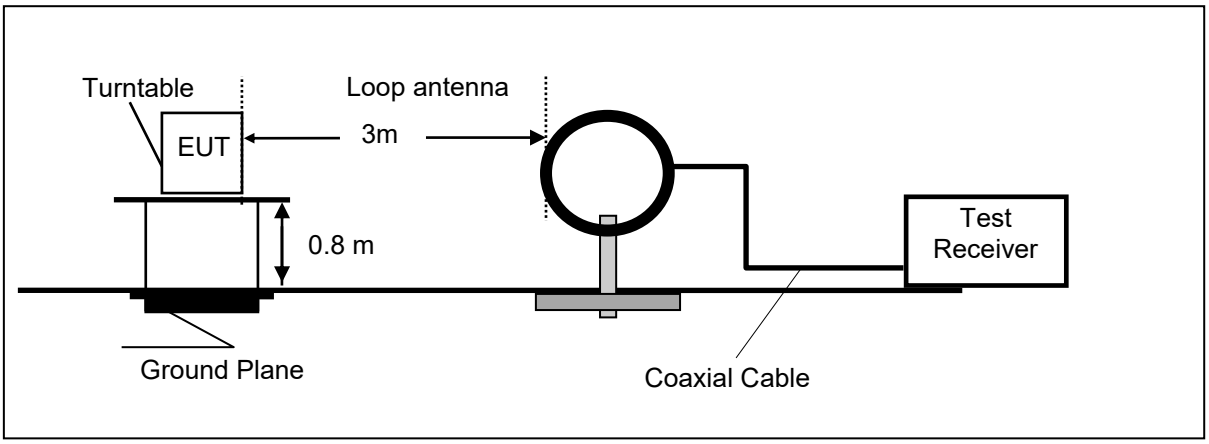
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	39.20	10.0	56	16.3	AV	N	GND
0.555000	30.60	9.8	46	15.4	AV	N	GND
1.032000	22.20	9.6	46	23.8	AV	N	GND
2.148000	17.60	9.5	46	28.4	AV	N	GND
5.334000	12.30	9.3	50	37.7	AV	N	GND
19.356000	2.30	7.1	50	47.7	AV	N	GND

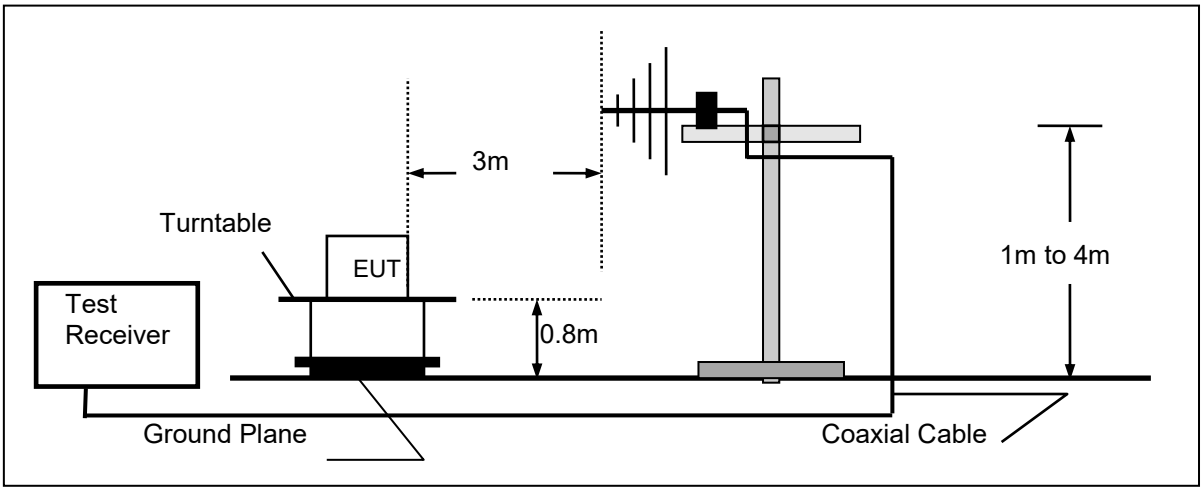
4.2. Radiated Emission

TEST CONFIGURATION

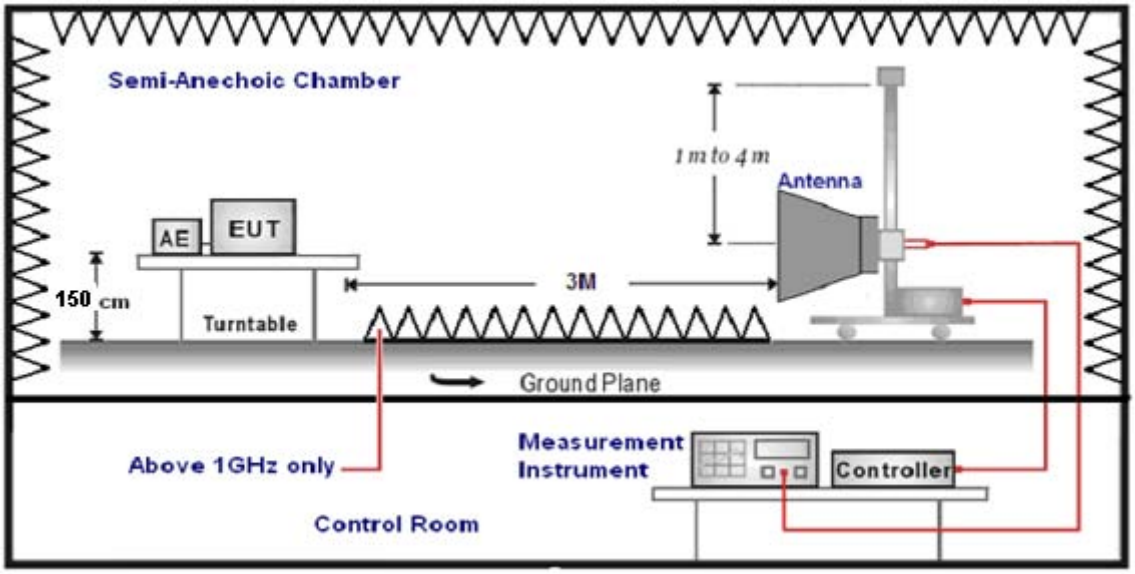
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

Remark: We tested at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode at the antenna single transmitting mode and 802.11n HT20/802.11n HT40 at the Mimo mode in AC 120V/60Hz, and recored the worst data at the antenna single transmitting mode.

For 9 KHz-30MHz

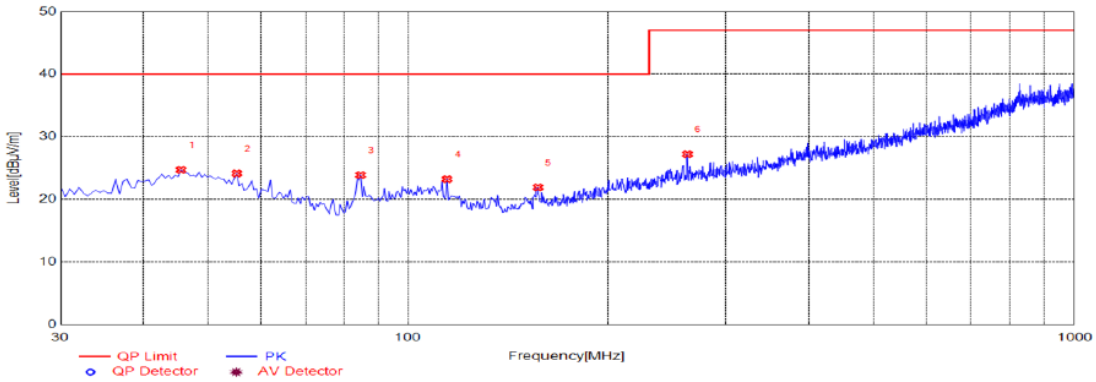
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

For 30MHz-1GHz

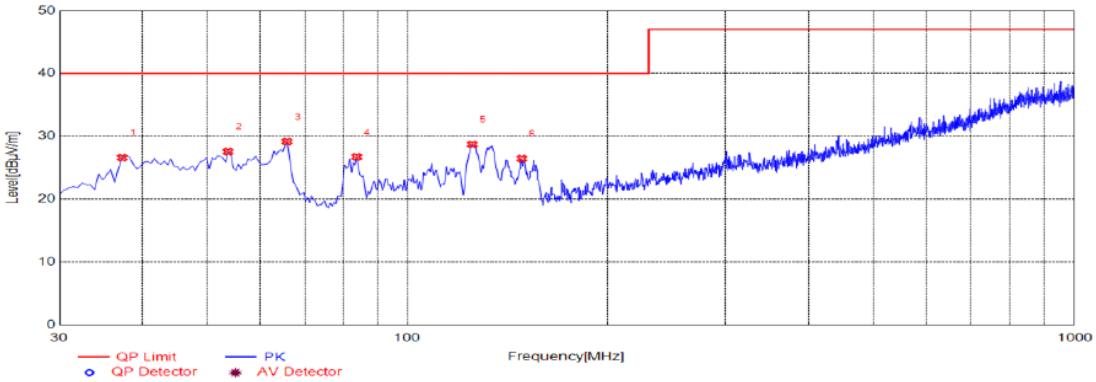
Horizontal



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Readind[dB μV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	45.5200	24.73	-14.77	39.50	40.00	15.27	100	118	Horizontal
2	55.2200	24.17	-15.87	40.04	40.00	15.83	100	297	Horizontal
3	84.8050	23.91	-19.72	43.63	40.00	16.09	100	184	Horizontal
4	114.390	23.25	-17.69	40.94	40.00	16.75	100	208	Horizontal
5	156.585	21.94	-19.41	41.35	40.00	18.06	100	279	Horizontal
6	262.800	27.24	-14.82	42.06	47.00	19.76	100	302	Horizontal

Vertical



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Readind[dB μV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.2750	26.62	-16.57	43.19	40.00	13.38	100	197	Vertical
2	53.7650	27.58	-15.57	43.15	40.00	12.42	100	169	Vertical
3	65.8900	29.21	-18.37	47.58	40.00	10.79	100	145	Vertical
4	83.8350	26.76	-19.96	46.72	40.00	13.24	100	137	Vertical
5	125.060	28.75	-19.57	48.32	40.00	11.25	100	213	Vertical
6	148.340	26.49	-19.78	46.27	40.00	13.51	100	55	Vertical

For 1GHz to 25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11b-2412MHz									
V	4824	35.56	30.28	7.01	26.63	46.22	74	-27.78	Pk
H	4824	34.36	30.28	7.01	26.63	45.02	74	-28.98	PK
V	7236	27.13	36.59	8.91	24.98	47.65	74	-26.35	Pk
H	7236	26.45	36.59	8.91	24.98	46.97	74	-27.03	PK
802.11b-2437MHz									
V	4874	35.12	30.36	7.62	26.63	46.47	74	-27.53	Pk
H	4874	34.28	30.36	7.62	26.63	45.63	74	-28.37	PK
V	7311	27.38	36.61	8.84	24.98	47.85	74	-26.15	Pk
H	7311	27.86	36.61	8.84	24.98	48.33	74	-25.67	PK
802.11b-2462MHz									
V	4924	36.24	30.43	7.94	26.63	47.98	74	-26.02	Pk
H	4924	35.26	30.43	7.94	26.63	47.00	74	-27.00	PK
V	7386	27.96	36.78	8.45	24.98	48.21	74	-25.79	Pk
H	7386	26.58	36.78	8.45	24.98	46.83	74	-27.17	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11g-2412MHz									
V	4824	33.54	30.28	7.01	26.63	44.20	74	-29.80	PK
H	4824	32.69	30.28	7.01	26.63	43.35	74	-30.65	PK
V	7236	28.04	36.59	8.91	24.98	48.56	74	-25.44	PK
H	7236	25.48	36.59	8.91	24.98	46.00	74	-28.00	PK
802.11g-2437MHz									
V	4874	34.12	30.36	7.62	26.63	45.47	74	-28.53	PK
H	4874	33.21	30.36	7.62	26.63	44.56	74	-29.44	PK
V	7311	26.59	36.61	8.84	24.98	47.06	74	-26.94	PK
H	7311	26.41	36.61	8.84	24.98	46.88	74	-27.12	PK
802.11g-2462MHz									
V	4924	35.47	30.43	7.94	26.63	47.21	74	-26.79	PK
H	4924	33.18	30.43	7.94	26.63	44.92	74	-29.08	PK
V	7386	25.42	36.78	8.45	24.98	45.67	74	-28.33	PK
H	7386	25.18	36.78	8.45	24.98	45.43	74	-28.57	PK

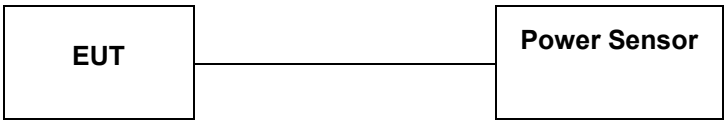
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11n20-2412MHz									
V	4824	31.96	30.28	7.01	26.63	42.62	74	-31.38	PK
H	4824	32.48	30.28	7.01	26.63	43.14	74	-30.86	PK
V	7236	27.59	36.59	8.91	24.98	48.11	74	-25.89	PK
H	7236	26.32	36.59	8.91	24.98	46.84	74	-27.16	PK
802.11n20-2437MHz									
V	4874	35.48	30.36	7.62	26.63	46.83	74	-27.17	PK
H	4874	33.32	30.36	7.62	26.63	44.67	74	-29.33	PK
V	7311	26.94	36.61	8.84	24.98	47.41	74	-26.59	PK
H	7311	25.86	36.61	8.84	24.98	46.33	74	-27.67	PK
802.11n20-2462MHz									
V	4924	34.18	30.43	7.94	26.63	45.92	74	-28.08	PK
H	4924	33.27	30.43	7.94	26.63	45.01	74	-28.99	PK
V	7386	25.85	36.78	8.45	24.98	46.10	74	-27.90	PK
H	7386	26.18	36.78	8.45	24.98	46.43	74	-27.57	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11n40-2422MHz									
V	4844	29.62	30.18	7.06	26.63	40.23	74	-33.77	PK
H	4844	30.01	30.18	7.06	26.63	40.62	74	-33.38	PK
V	7266	24.18	36.61	9.02	24.98	44.83	74	-29.17	PK
H	7266	25.24	36.61	9.02	24.98	45.89	74	-28.11	PK
802.11n40-2437MHz									
V	4874	30.15	30.36	7.62	26.63	41.50	74	-32.50	PK
H	4874	29.68	30.36	7.62	26.63	41.03	74	-32.97	PK
V	7311	22.58	36.61	8.84	24.98	43.05	74	-30.95	PK
H	7311	23.35	36.61	8.84	24.98	43.82	74	-30.18	PK
802.11n40-2452MHz									
V	4904	31.26	30.31	8.06	26.63	43.00	74	-31.00	PK
H	4904	29.29	30.31	8.06	26.63	41.03	74	-32.97	PK
V	7356	21.86	36.56	8.45	24.98	41.89	74	-32.11	PK
H	7356	23.28	36.56	8.45	24.98	43.31	74	-30.69	PK

Note:
1). Measuring frequencies from 9 KHz - 10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9k~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.
3). Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4). Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power,9.1.2. and Average conducted output power, 9.2.3.1.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple derector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

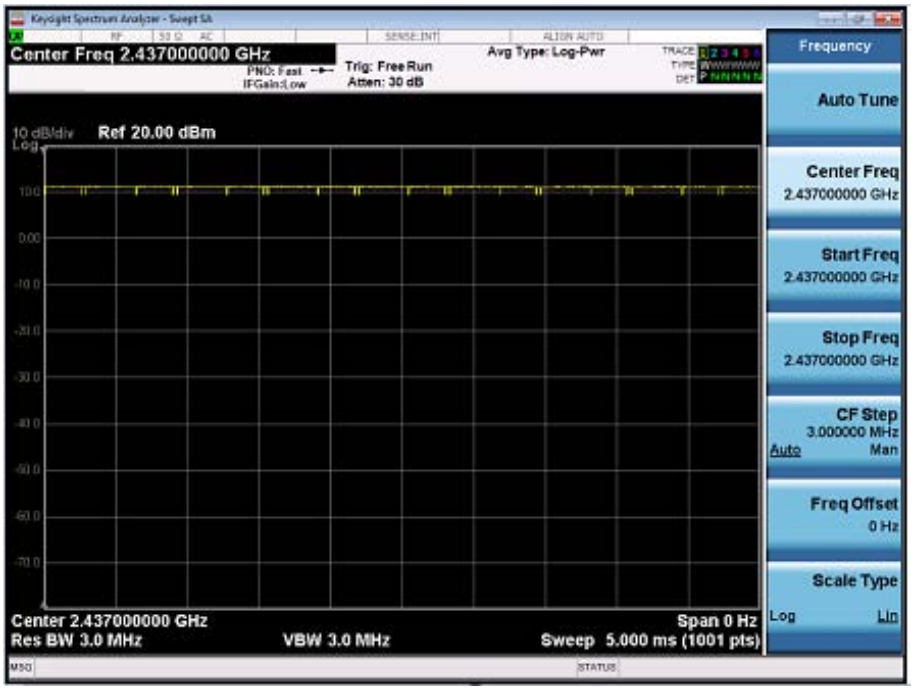
TEST RESULTS

Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
802.11b	01	13.98	30.00	Pass
	06	13.89		
	11	13.84		
802.11g	01	11.41	30.00	Pass
	06	11.54		
	11	11.78		
802.11n(HT20)	01	11.75	30.00	Pass
	06	11.89		
	11	11.62		
802.11n(HT40)	03	10.68	30.00	Pass
	06	10.34		
	09	10.57		

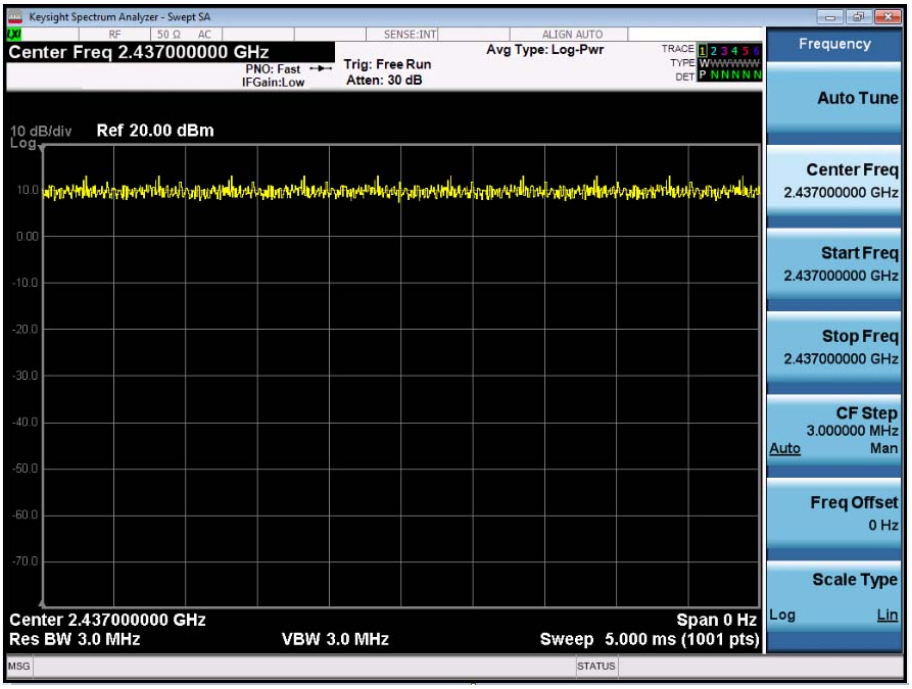
Note:
1) Measured output power at difference data rate for each mode and recorded worst case for each mode.
2). Test results including cable loss;
3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;

Test for Duty Cycle

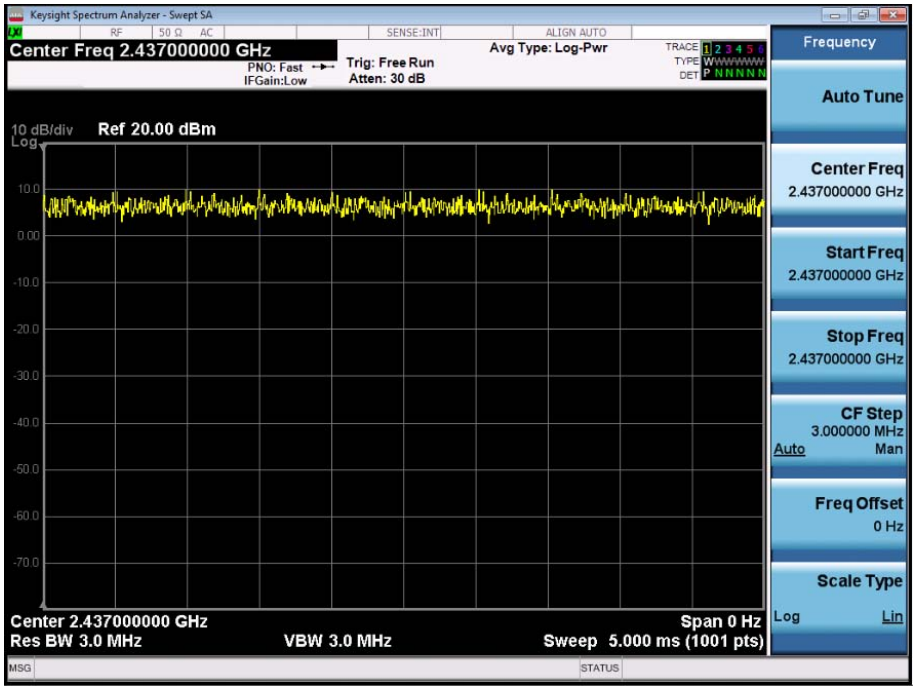
802.11b



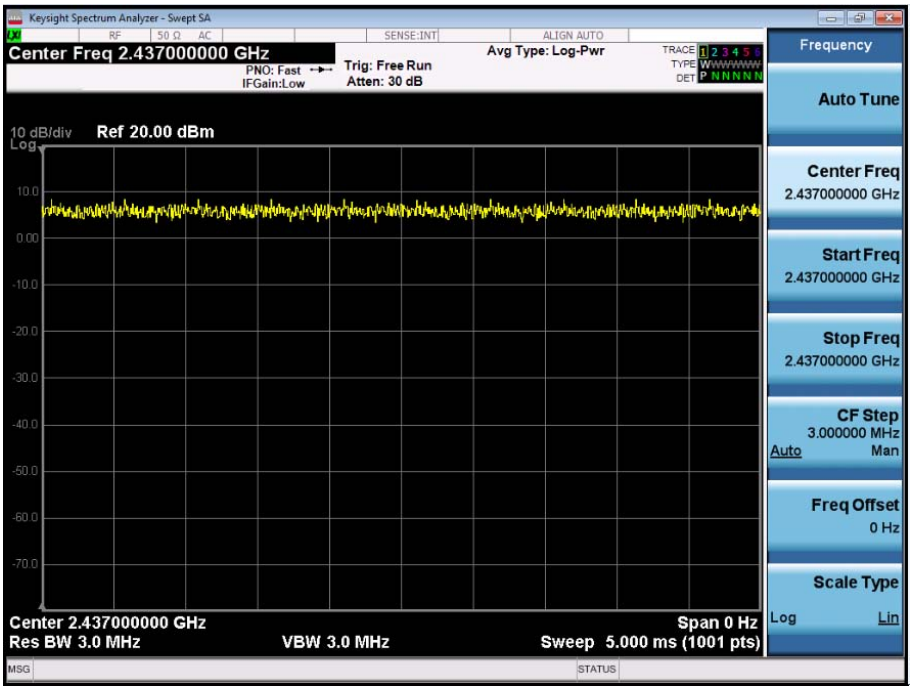
802.11g



802.11n20

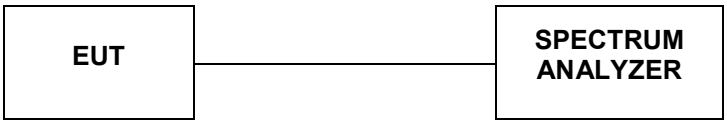


802.11n40



4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

According to KDB 558074 D01 Method PKPSD (peak PSD) This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

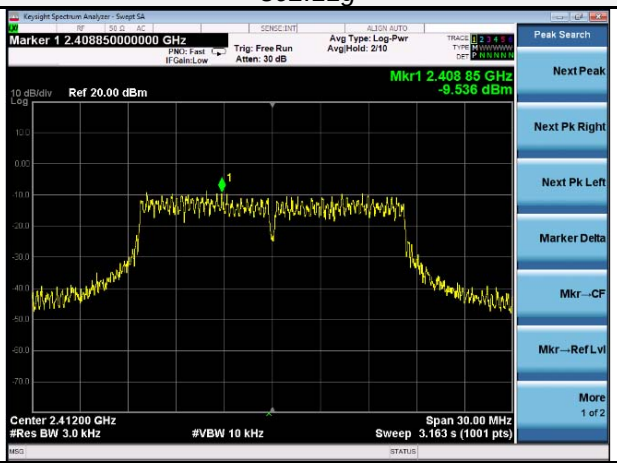
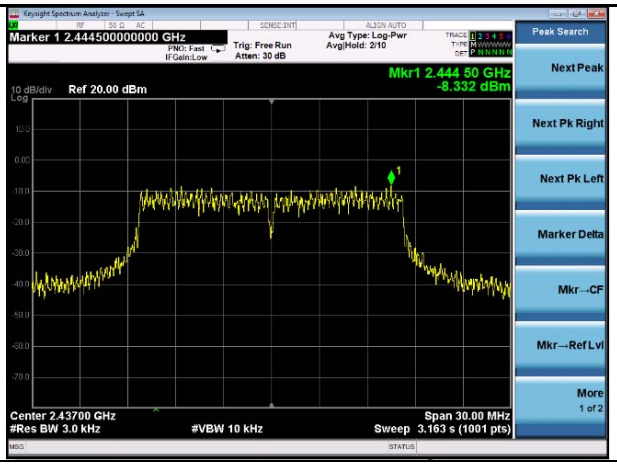
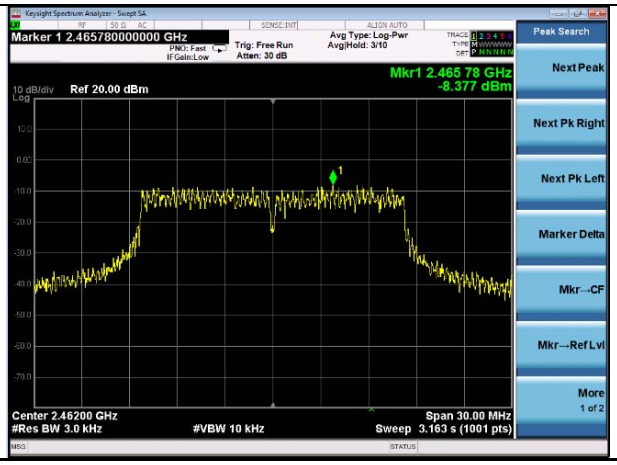
LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

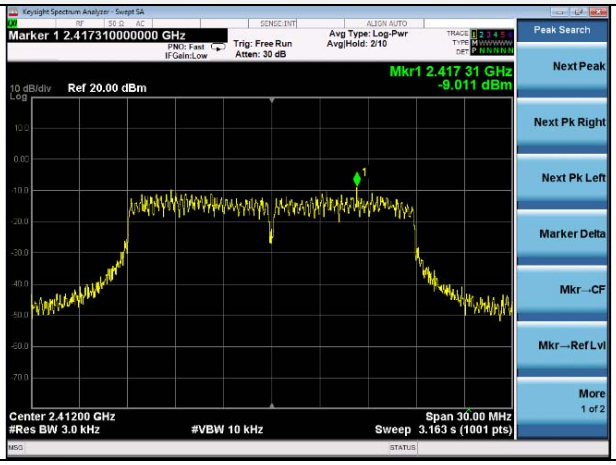
TEST RESULTS

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-6.614	8.00	Pass
	06	-7.295		
	11	-6.503		
802.11g	01	-9.536	8.00	Pass
	06	-8.332		
	11	-8.377		
802.11n(HT20)	01	-9.011	8.00	Pass
	06	-7.364		
	11	-8.834		
802.11n(HT40)	03	-11.591	8.00	Pass
	06	-10.15		
	09	-11.325		

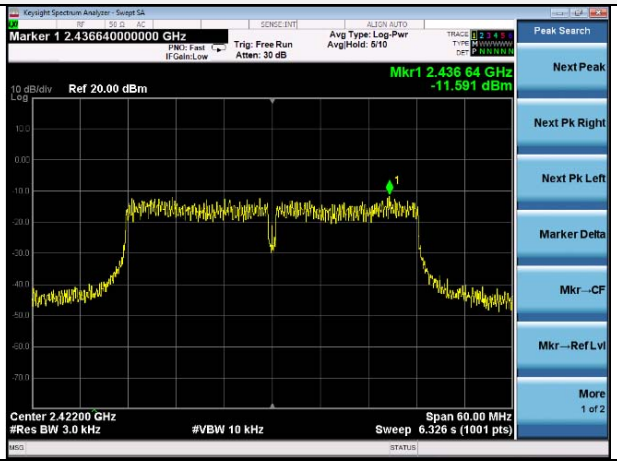
Note:
1). Measured peak power spectrum density at difference data rate for each mode and recorded worst case for each mode.
2). Test results including cable loss;
3). Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;
4.) Please refer to following plots;

802.11b	802.11g
	
CH01	CH01
	
CH06	CH06
	
CH11	CH11

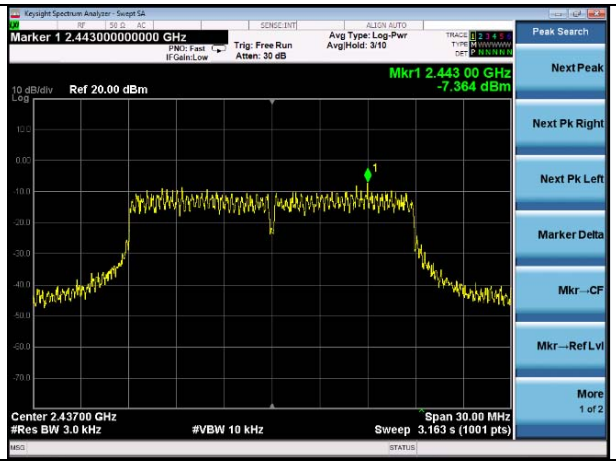
802.11 nHT20



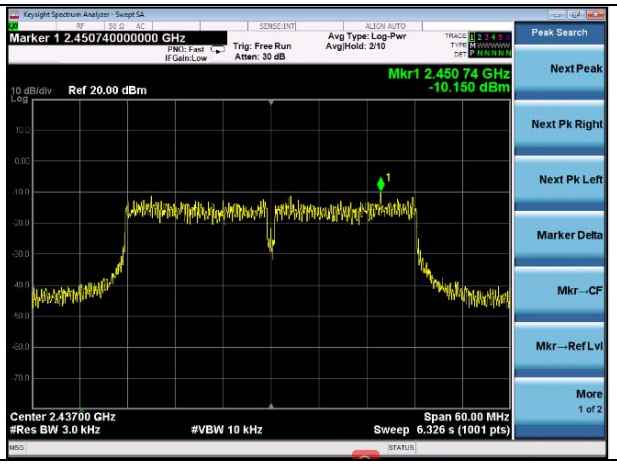
802.11nHT40



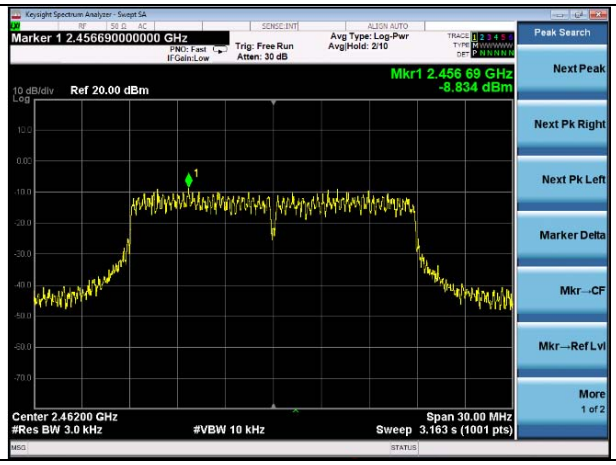
CH01



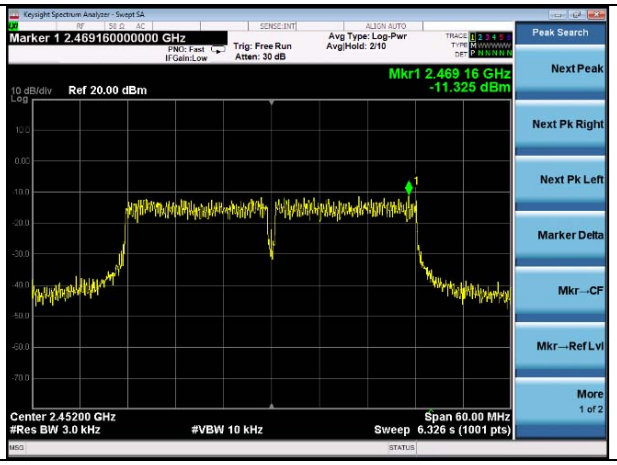
CH03



CH06



CH06

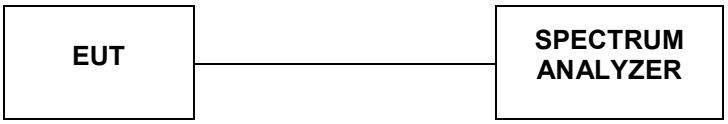


CH11

CH09

4.5. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
According to KDB558074 D01 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

LIMIT

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

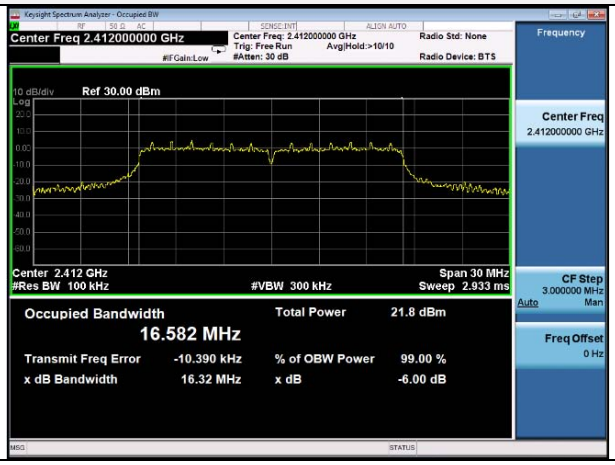
Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	01	9.565	≥500	Pass
	06	9.119		
	11	9.564		
802.11g	01	16.32	≥500	Pass
	06	16.36		
	11	16.30		
802.11nHT20	01	17.32	≥500	Pass
	06	17.32		
	11	17.08		
802.11nHT40	03	36.08	≥500	Pass
	06	36.33		
	09	36.08		

Note:
1). Measured 6dB Bandwidth at difference data rate for each mode and recorded worst case for each mode.
2). Test results including cable loss;
3). Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;

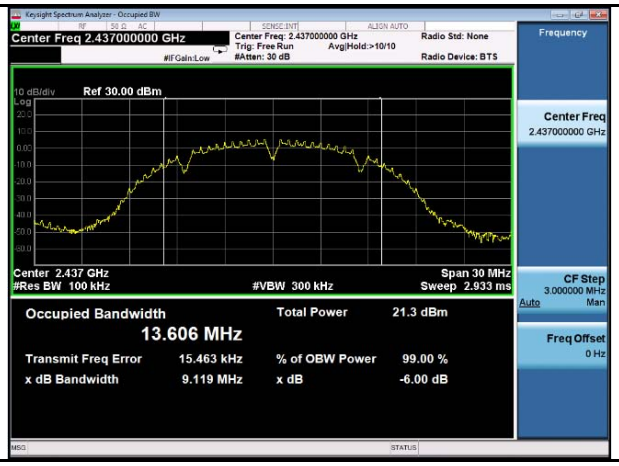
802.11b

CH01

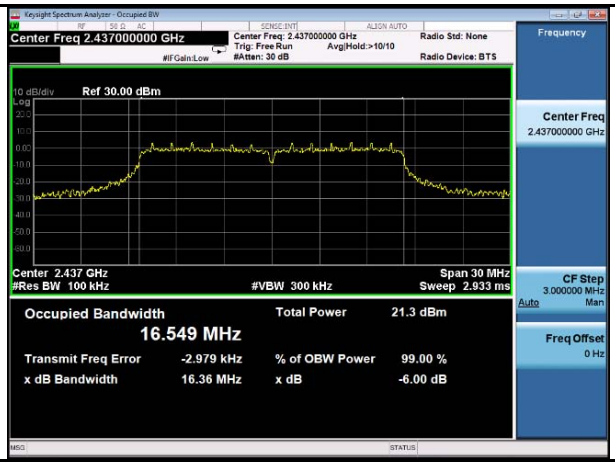
802.11g



CH01

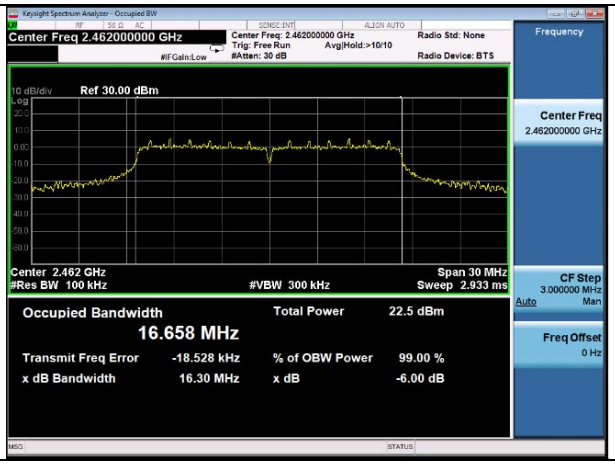


CH06



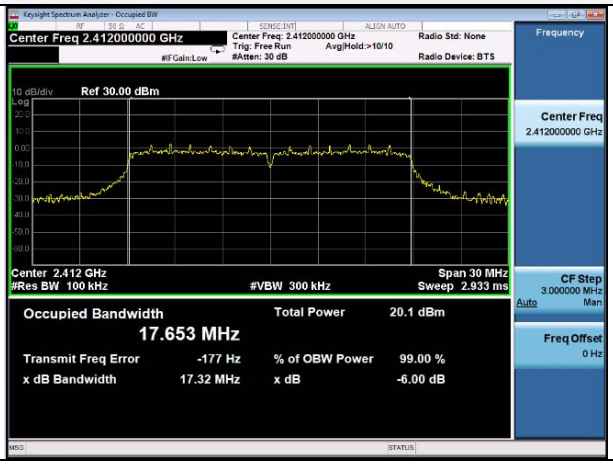
CH06

CH11



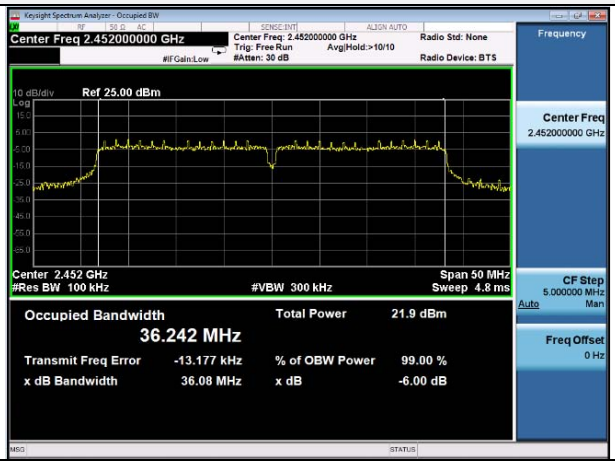
CH11

802.11n HT20

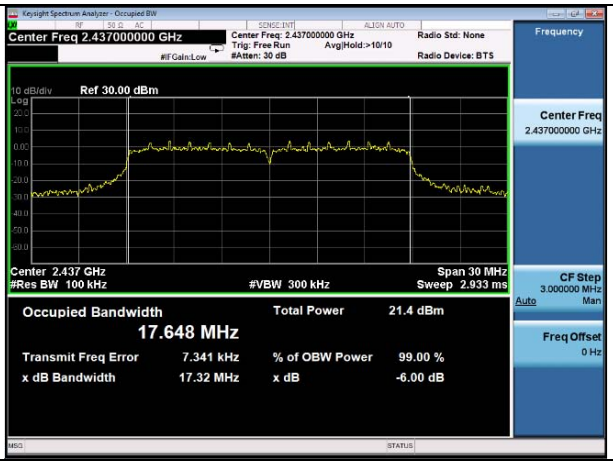


CH01

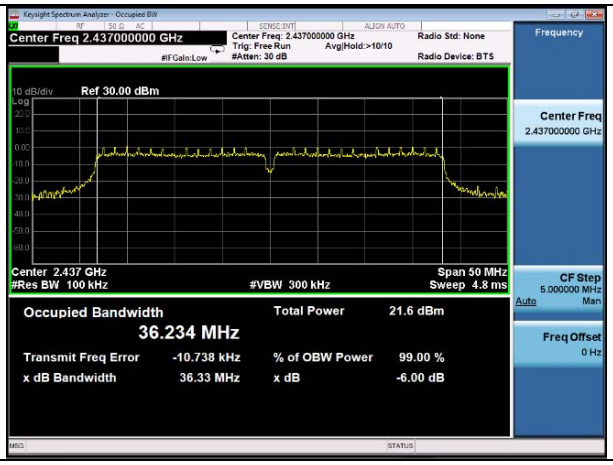
802.11n HT40



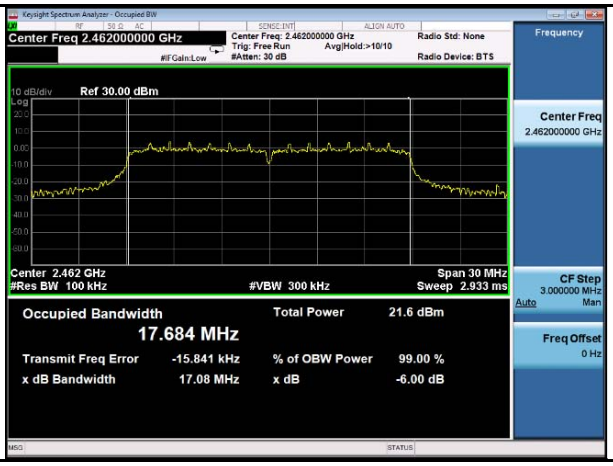
CH03



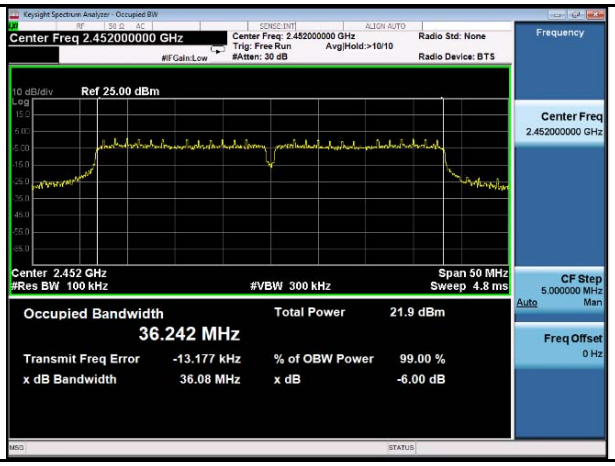
CH06



CH06



CH11



CH09

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

According to KDB 558074 D01 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
10. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:
    $E = EIRP – 20\log D + 104.8$

where:
E = electric field strength in dBμV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
12. Compare the resultant electric field strength level to the applicable regulatory limit.
13. Perform radiated spurious emission test dures until all measured frequencies were complete.

LIMIT

Below -20dB of the highest emission level in operating band.
Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

TEST RESULTS

Remark: We tested at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode at the antenna single transmitting mode and 802.11n HT20/802.11n HT40 at the Mimo mode, and recored the worst data at the antenna single transmitting mode.

4.6.1 For Radiated Bandedge Measurement

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11b-2412MHz									
V	2310	33.85	30.28	7.01	26.63	44.51	74	-27.78	Pk
H	2310	35.84	30.28	7.01	26.63	46.5	74	-28.98	PK
V	2390	28.41	36.59	8.91	24.98	48.93	74	-26.35	Pk
H	2390	29.68	36.59	8.91	24.98	50.2	74	-27.03	PK
802.11b-2462MHz									
V	2483.5	37.45	30.43	7.94	26.63	49.19	74	-26.02	Pk
H	2483.5	39.68	30.43	7.94	26.63	51.42	74	-27	PK
V	2500	27.55	36.78	8.45	24.98	47.8	74	-25.79	Pk
H	2500	29.81	36.78	8.45	24.98	50.06	74	-27.17	PK

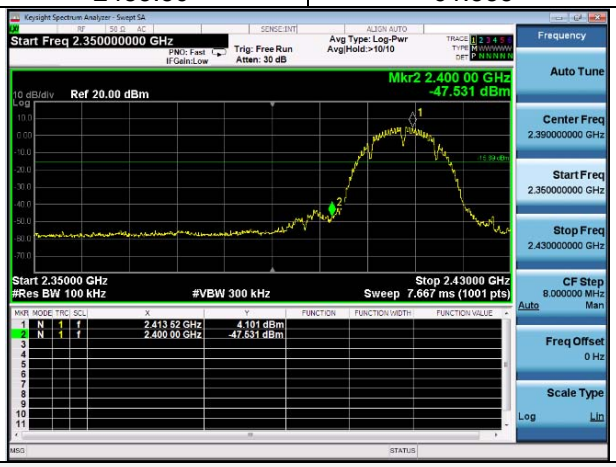
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11g-2412MHz									
V	2310	33.96	30.28	7.01	26.63	44.62	74	-29.8	Pk
H	2310	34.29	30.28	7.01	26.63	44.95	74	-30.65	PK
V	2390	30.14	36.59	8.91	24.98	50.66	74	-25.44	Pk
H	2390	31.08	36.59	8.91	24.98	51.6	74	-28	PK
802.11g-2462MHz									
V	2483.5	36.85	30.43	7.94	26.63	48.59	74	-26.79	Pk
H	2483.5	34.29	30.43	7.94	26.63	46.03	74	-29.08	PK
V	2500	25.52	36.78	8.45	24.98	45.77	74	-28.33	Pk
H	2500	26.19	36.78	8.45	24.98	46.44	74	-28.57	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
802.11n20-2412MHz									
V	2310	32.85	30.28	7.01	26.63	43.51	74	-31.38	Pk
H	2310	34.33	30.28	7.01	26.63	44.99	74	-30.86	PK
V	2390	28.15	36.59	8.91	24.98	48.67	74	-25.89	Pk
H	2390	29.68	36.59	8.91	24.98	50.2	74	-27.16	PK
802.11n20-2462MHz									
V	2483.5	34.15	30.43	7.94	26.63	45.89	74	-28.08	Pk
H	2483.5	36.28	30.43	7.94	26.63	48.02	74	-28.99	PK
V	2500	27.16	36.78	8.45	24.98	47.41	74	-27.9	Pk
H	2500	28.34	36.78	8.45	24.98	48.59	74	-25.41	PK

Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
802.11n40-2422MHz									
V	2310	30.12	30.18	7.06	26.63	40.73	74	-33.77	Pk
H	2310	32.22	30.18	7.06	26.63	42.83	74	-33.38	PK
V	2390	25.34	36.61	9.02	24.98	45.99	74	-29.17	Pk
H	2390	27.63	36.61	9.02	24.98	48.28	74	-28.11	PK
802.11n40-2452MHz									
V	2483.5	31.22	30.31	8.06	26.63	42.96	74	-31	Pk
H	2483.5	33.45	30.31	8.06	26.63	45.19	74	-32.97	PK
V	2500	20.76	36.56	8.45	24.98	40.79	74	-32.11	Pk
H	2500	21.12	36.56	8.45	24.98	41.15	74	-30.69	PK

4.6.2 For Conducted Bandedge Measurement

802.11b			
Frequency (MHz)	**Delta Peak to Band emission (dBc)**	**Limit (dBc)**	**Verdict**
2400.00	51.632	-20	PASS
2483.50	61.555	-20	PASS



2412	2462

802.11g			
Frequency (MHz)	**Delta Peak to Band emission (dBc)**	**Limit (dBc)**	**Verdict**
2400.00	28.655	-20	PASS
2483.05	38.141	-20	PASS

2412	2462

802.11n HT20			
Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
2400.00	27.133	-20	PASS
2483.50	33.245	-20	PASS

2412

2462

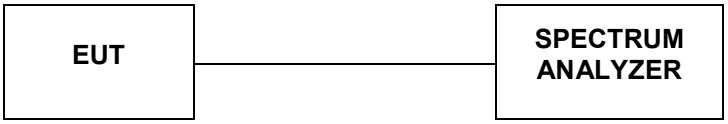
802.11n HT40			
Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
2400.00	27.647	-20	PASS
2483.50	28.747	-20	PASS

2422

2452

4.7. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013, For 9KHz-150kHz, Set RBW=1kHz and VBW= 3KHz;For 150KHz-10MHz, Set RBW=10kHz and VBW= 30KHz:For 10MHz-25GHz ,Set RBW=100kHz and VBW= 300KHz in order to measure the peak field strength, and mwasure frequeny range from 9KHz to 25GHz.

LIMIT

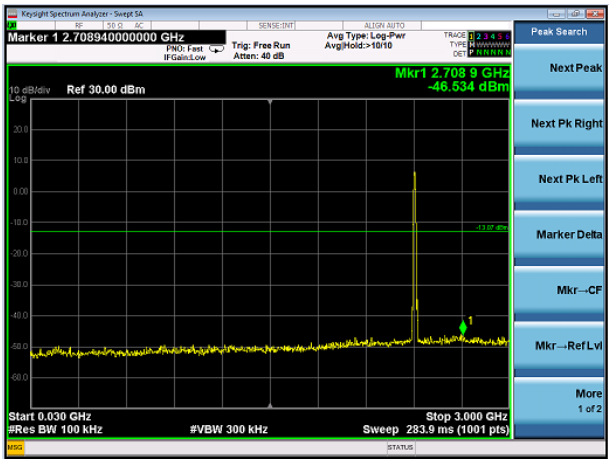
1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.
3.For below 30MHz,For 9KHz-150kHz,150K-10MHz,We use the RBW 1KHz,10KHz, So the limit need to calculated by “10lg(BW1/BW2)“. for example For9KHz-150kHz,RBW 1KHz, The Limit= the highest emission level-20-10log(100/1)= the highest emission level-40.

TEST RESULTS

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

Test Mode:	802.11b	Test channel :	01

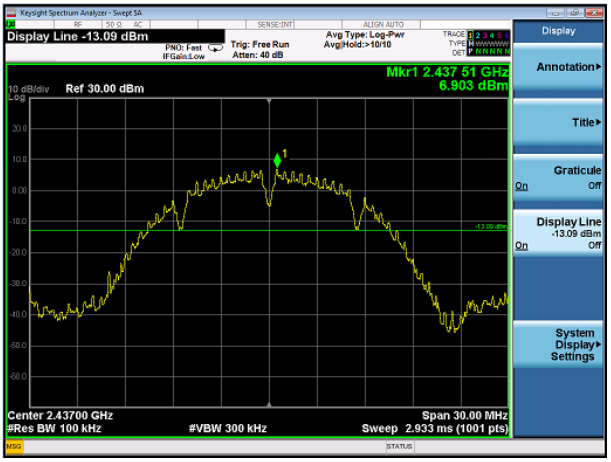
Channel 01



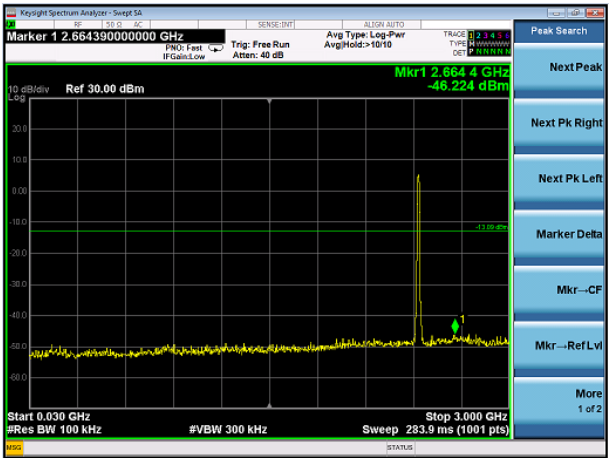
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11b	Test channel :	06



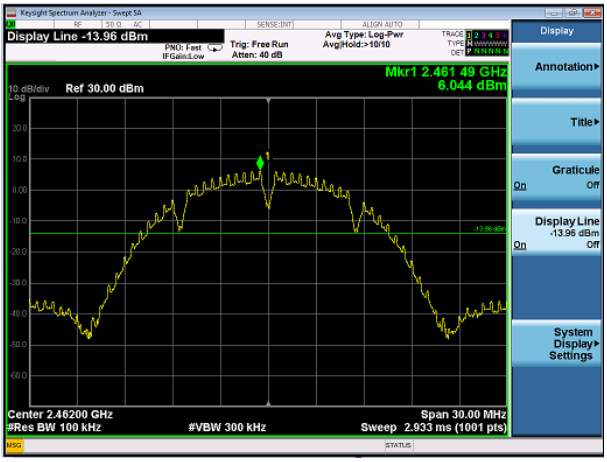
Channel 06



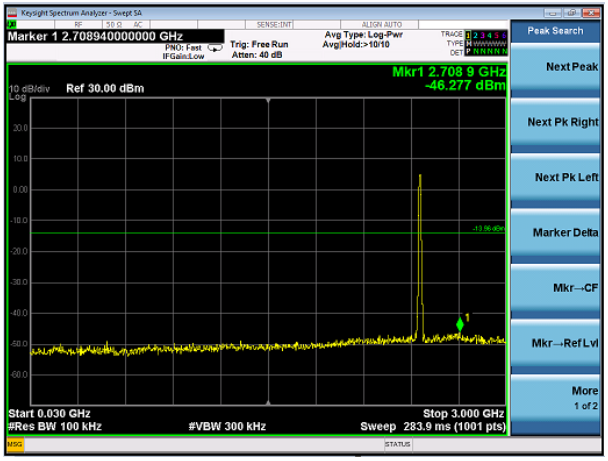
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11b	Test channel :	11



Channel 11

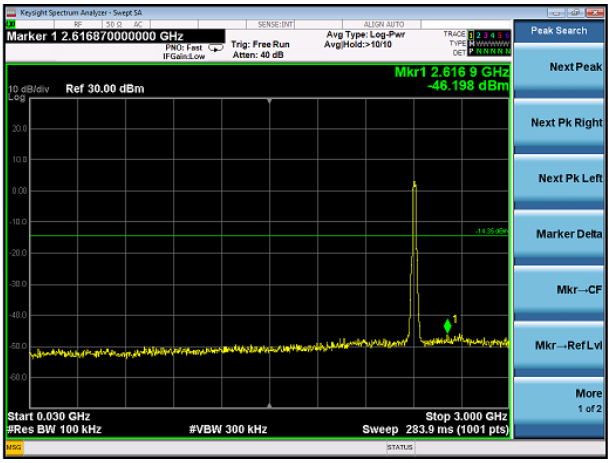


30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11g	Test channel :	01

Channel 01

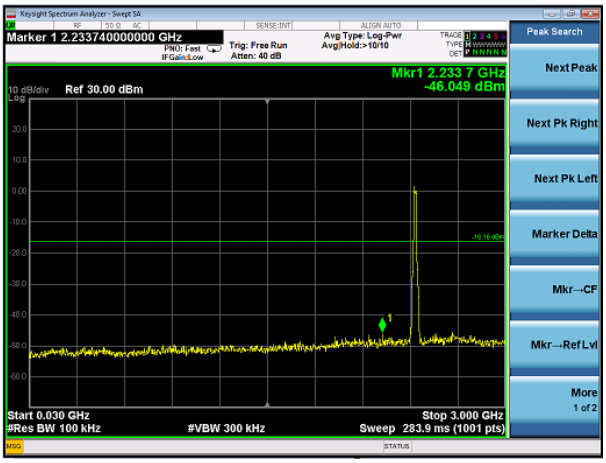


30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11g	Test channel :	06

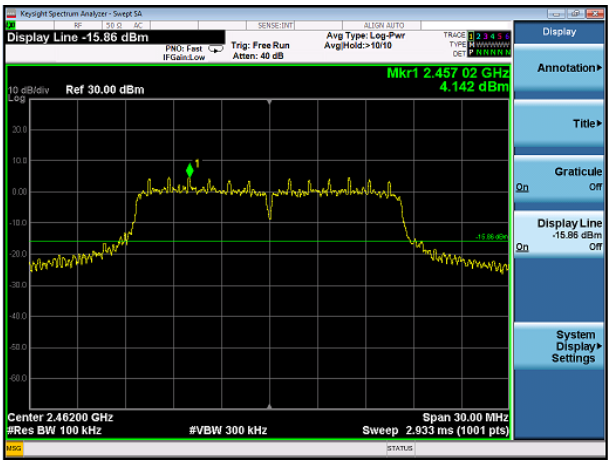
Channel 06



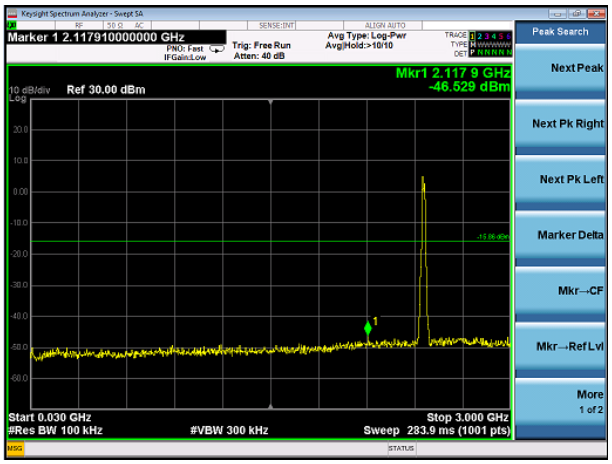
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11g	Test channel :	11



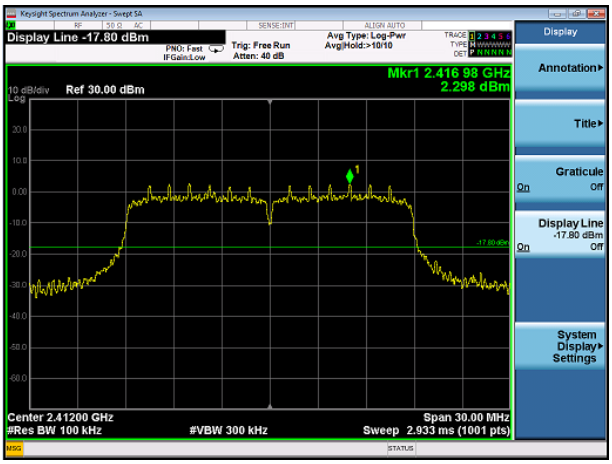
Channel 11



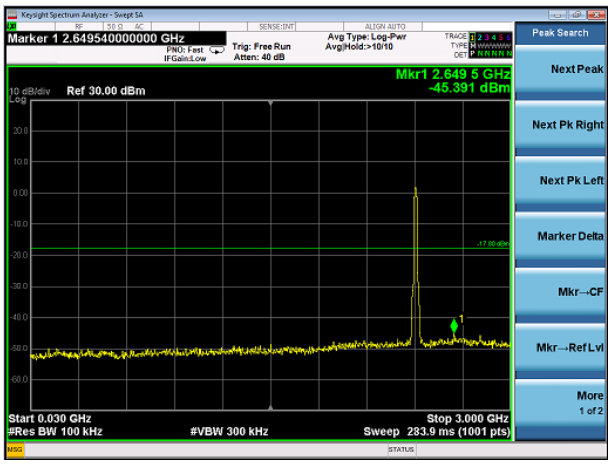
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11n HT20	Test channel :	01



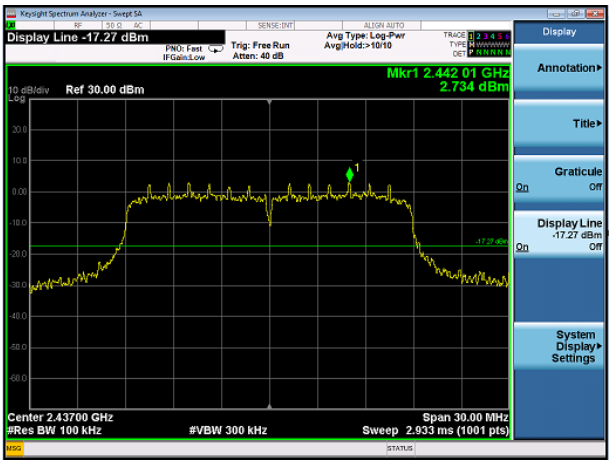
Channel 01



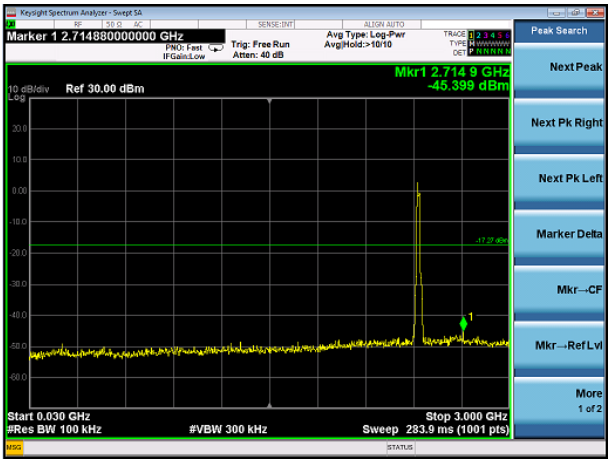
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11n HT20	Test channel :	06



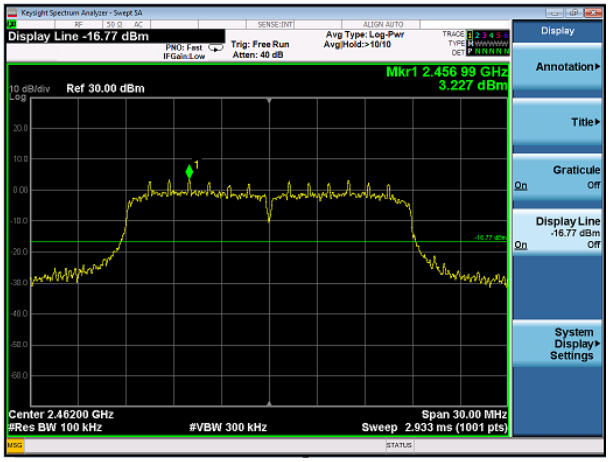
Channel 06



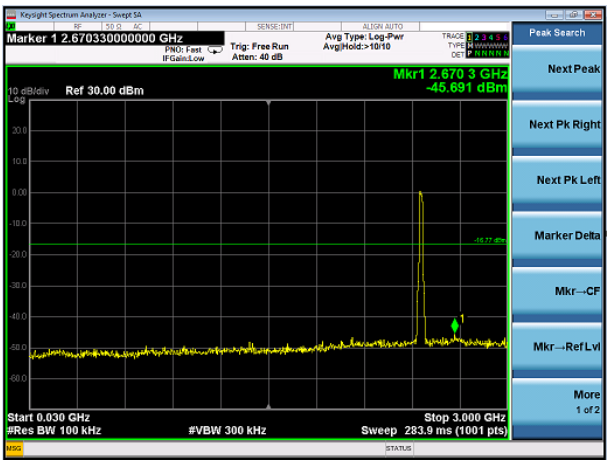
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11n HT20	Test channel :	11



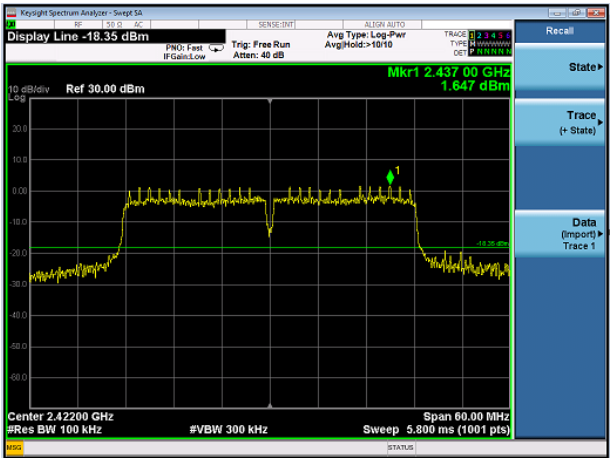
Channel 11



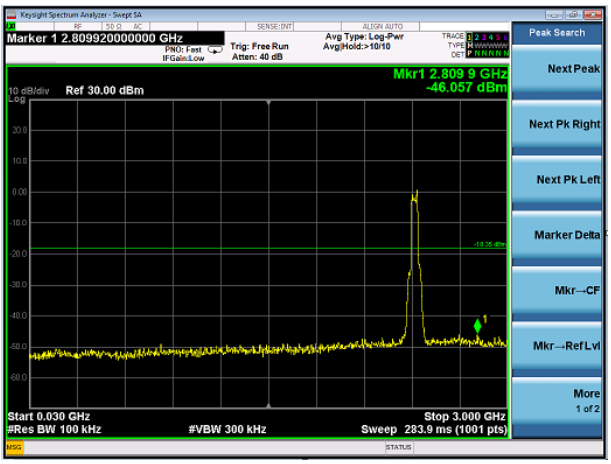
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11n HT40	Test channel :	03



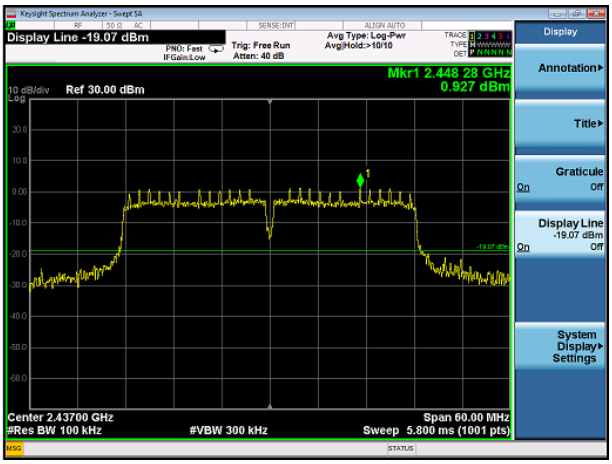
Channel 03



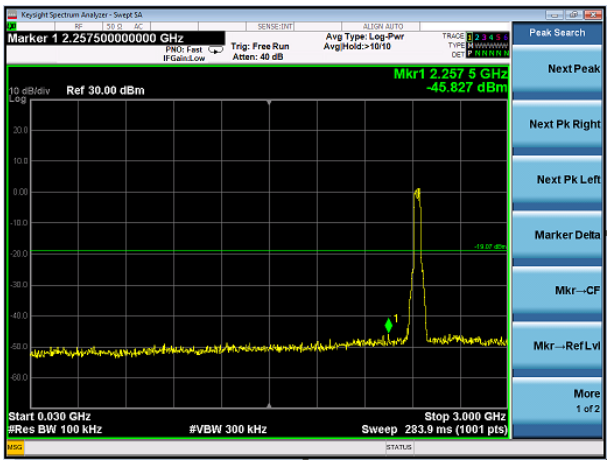
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11n HT40	Test channel :	06



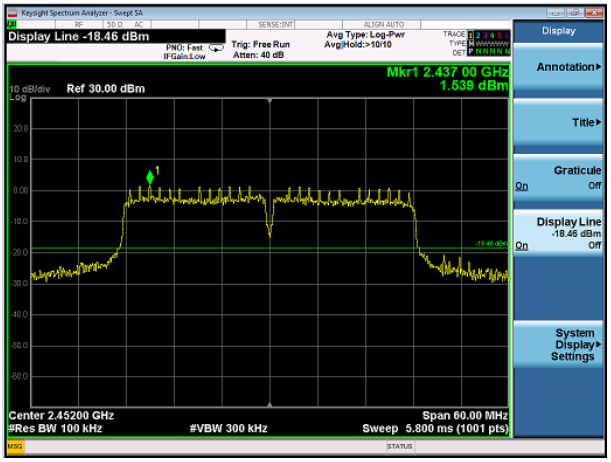
Channel 06



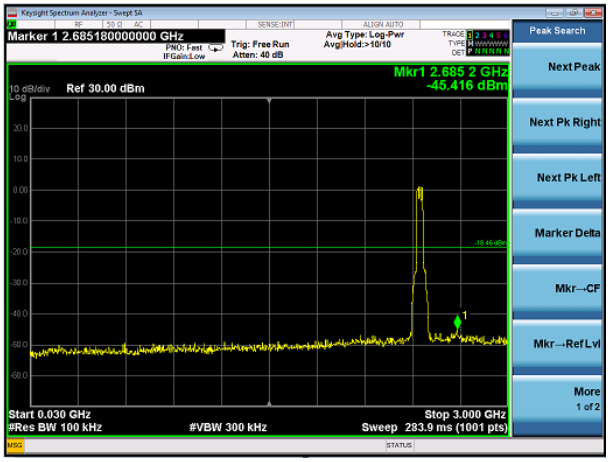
30MHz ~3GHz

3GHz~25GHz

Test Mode:	802.11n HT40	Test channel :	09



Channel 09



30MHz ~3GHz

3GHz~25GHz

4.8. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

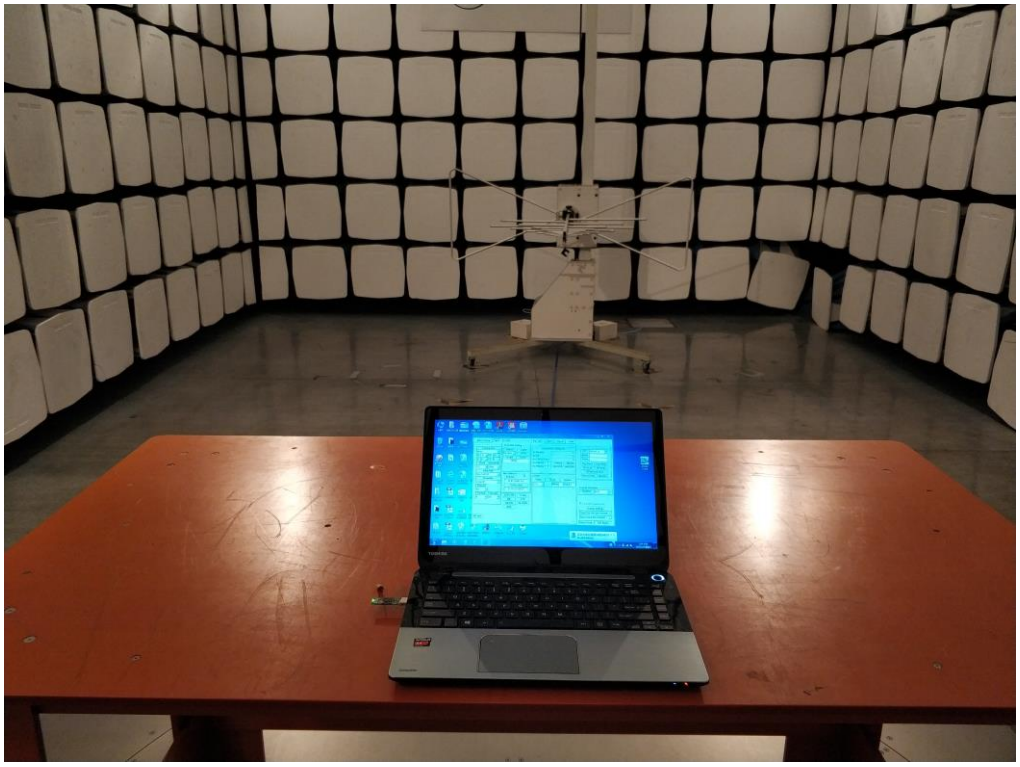
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

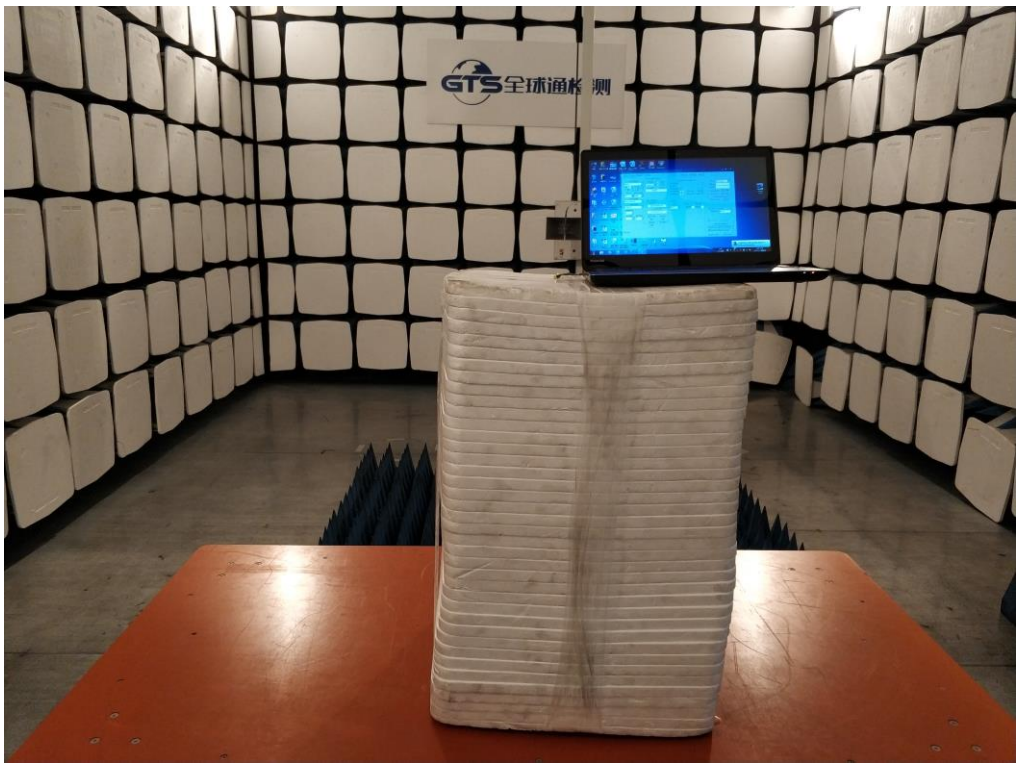
Test Result

The antenna used for this product is external Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.62dBi.

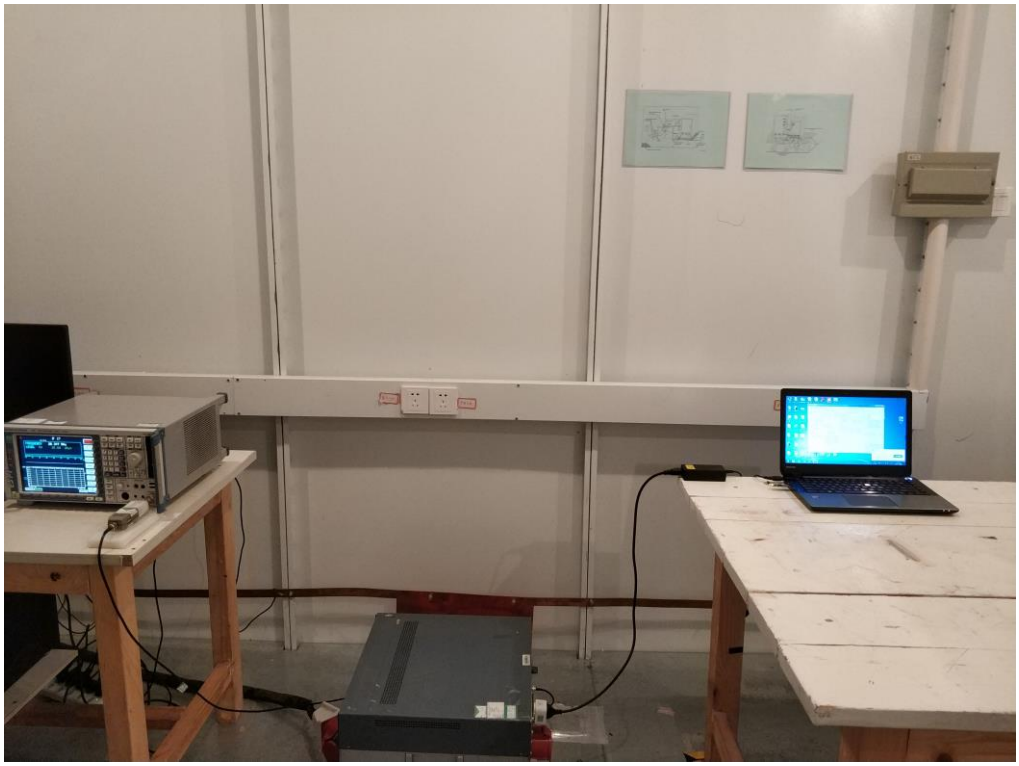
5. Test Setup Photos of the EUT

Radiated Emission Test

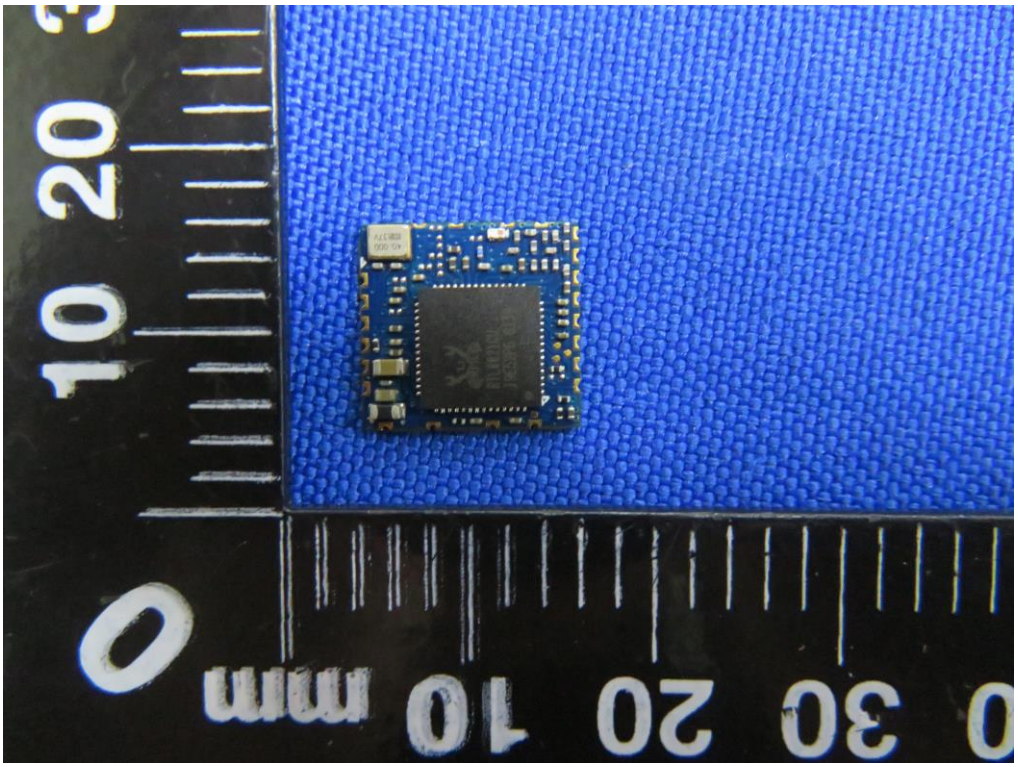


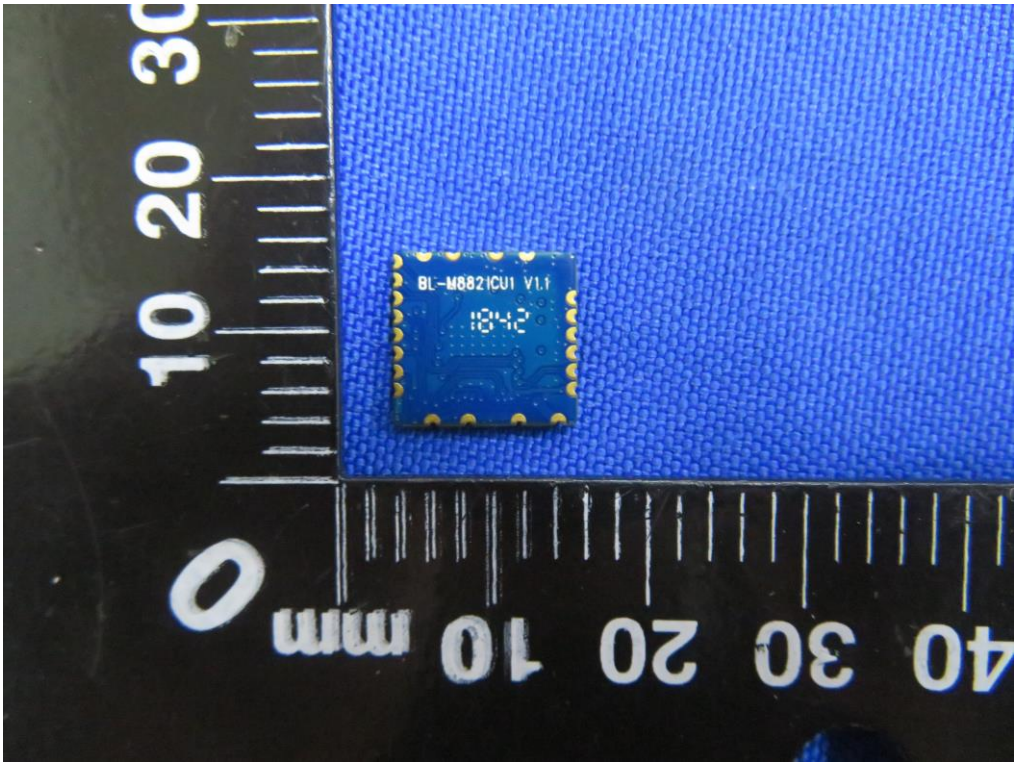


Conducted Emission



6. External and Internal Photos of the EUT





.....End of Report.....