

FCC TEST REPORT
For
Eagle Vision Corporation Limited
Intelligent Driving Assist System
Test Model: YN-IDAS
List Model No.: /

Prepared for : Eagle Vision Corporation Limited
Address : 2 F,D Building,Dasheng Industry Park,Heguang 3 Road,Tianhe District, Guangzhou, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : May 15, 2017
Number of tested samples : 1
Serial number : Prototype
Date of Test : May 15, 2017~June 06, 2017
Date of Report : June 06, 2017

FCC TEST REPORT
FCC CFR 47 PART 15 C(15.247): 2016

Report Reference No. : LCS170515066AE

Date of Issue : June 06, 2017

Testing Laboratory Name : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure : Full application of Harmonised standards
Partial application of Harmonised standards
Other standard testing method

Applicant's Name : Eagle Vision Corporation Limited

Address : 2 F,D Building,Dasheng Industry Park,Heguang 3 Road,Tianhe District, Guangzhou, China

Test Specification

Standard : FCC CFR 47 PART 15 C(15.247): 2016

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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EUT Description : Intelligent Driving Assist System

Trade Mark : YINCAA

Model/ Type reference : YN-IDAS

Ratings : Input: 12-24V, 2A

Result : Positive

Compiled by:

Ada Liang

Ada Liang/ File administrators

Supervised by:

Glin Lu

Glin Lu/ Technique principal

Approved by:

Gavin Liang

Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS170515066AE	<u>June 06, 2017</u> Date of issue
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EUT..... : Intelligent Driving Assist System
 Type / Model..... : YN-IDAS

Applicant..... : Eagle Vision Corporation Limited
 Address..... : 2 F,D Building,Dasheng Industry Park,Heguang 3 Road,Tianhe District, Guangzhou, China
 Telephone..... : /
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Manufacturer..... : Eagle Vision Corporation Limited
 Address..... : 2 F,D Building,Dasheng Industry Park,Heguang 3 Road,Tianhe District, Guangzhou, China
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Factory..... : Eagle Vision Corporation Limited
 Address..... : 2 F,D Building,Dasheng Industry Park,Heguang 3 Road,Tianhe District, Guangzhou, China
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 Fax..... : /

Test Result	Positive
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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.

Revision History

Revision	Issue Date	Revisions	Revised By
00	June 06, 2017	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Intelligent Driving Assist System
Test Model	:	YN-IDAS
List Model No.	:	/
Model Declaration	:	/
Power Supply	:	Input: 12-24V ^{DC} , 2A
Hardware version	:	V1S
Software version	:	V1.0
Bluetooth Operation frequency	:	2402MHz-2480MHz
Bluetooth Version	:	V4.0
Bluetooth Channel Number	:	79 Channels for Bluetooth V3.0(DSS) 40 Channels for Bluetooth 4.0(DTS)
Bluetooth Modulation Type	:	GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V3.0(DSS) GFSK for Bluetooth V4.0(DSS)
WLAN	:	Supported 802.11b/802.11g/802.11n
WLAN FCC Operation	:	IEEE 802.11b:2412-2462MHz
Frequency	:	IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz
WLAN Channel Number	:	11 Channels for WIFI 20MHz Bandwidth(802.11b/g/n-HT20) 7 Channels for WIFI 40MHz Bandwidth(802.11n-HT40)
WLAN Modulation Technology	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM,QPSK,BPSK)
Antenna Description	:	Internal Antenna, 5dBi(Max.)

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
--	AC/DC ADAPTOR	MDL-1420	--	VOC

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
Micro USB PORT	2	5m
TF CARD PORT	1	N/A
USB PORT	1	5m

1.4. Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. 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 LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional

1.6. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	9KHz~30MHz	±3.10dB	(1)
	30MHz~200MHz	±2.96dB	(1)
	200MHz~1000MHz	±3.10dB	(1)
	1GHz~26.5GHz	±3.80dB	(1)
	26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	150kHz~30MHz	±1.63dB	(1)
Power disturbance	30MHz~300MHz	±1.60dB	(1)

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

1.7. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, that was determined to be 802.11b mode(High Channel).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be 802.11b mode(High Channel).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

BLE 4.0: 1Mbps, GFSK

802.11b Mode: 1 Mbps, DSSS.

802.11g Mode: 6 Mbps, OFDM.

802.11n Mode HT20: MCS0, OFDM.

802.11n Mode HT40: MCS8, OFDM.

Channel List & Frequency

BLE 4.0

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2402~2480MHz	1	2402	21	2442
	2	2404	--	--
	3	2406	--	--
	--	--	38	2476
	--	--	39	2478
	20	2440	40	2480

802.11b/g/n(HT20)

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2412~2462MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	--	--

IEEE 802.11n HT40

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2422~2452MHz	1	--	7	2442
	2	--	8	2447
	3	2422	9	2452
	4	2427	10	--
	5	2432	11	--
	6	2437	--	--

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure KDB558074 D01 DTS Meas. Guidance v03r05 are required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmit condition. The duty cycle is 100% and the average correction factor is 0.

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C		
FCC Rules	Description of Test	Result
§15.247(b)	Maximum Conducted Output Power	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(a)	Occupied Bandwidth	Compliant
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant
§15.205	Emissions at Restricted Band	Compliant
§15.207(a)	Conducted Emissions	Compliant
§15.203	Antenna Requirements	Compliant
§15.247(i)§2.1093	RF Exposure	Compliant

5. TEST RESULT

5.1. On Time and Duty Cycle

5.1.1. Standard Applicable

None; for reporting purpose only.

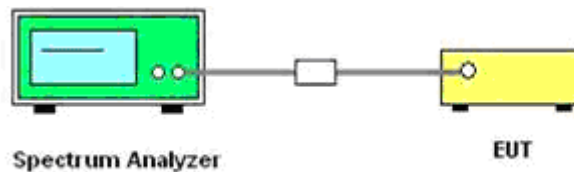
5.1.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyse.

5.1.3. Test Procedures

1. Set the centre frequency of the spectrum analyse to the transmitting frequency;
2. Set the span=0MHz, RBW=8MHz, VBW=50MHz, Sweep time=5ms;
3. Detector = peak;
4. Trace mode = Single hold.

5.1.4. Test Setup Layout



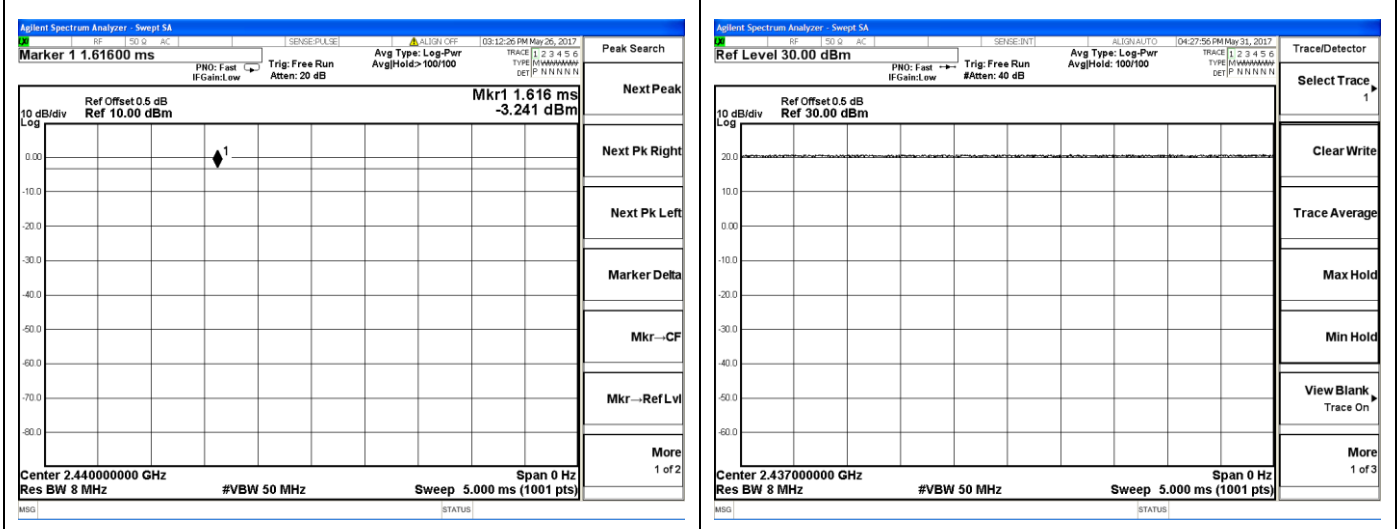
5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.1.6. Test result

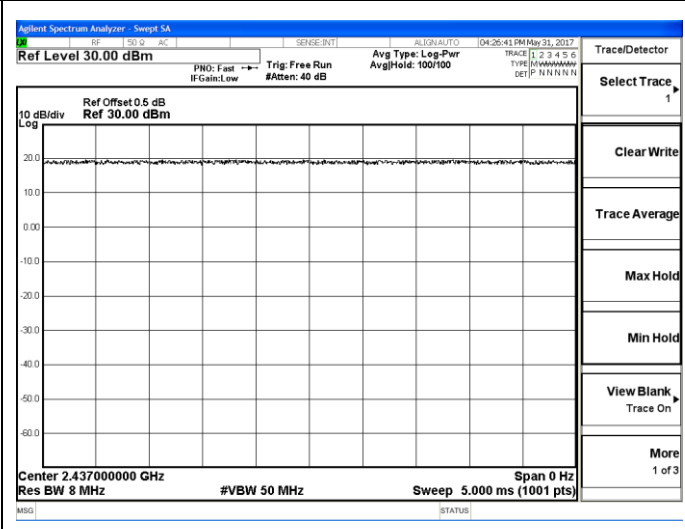
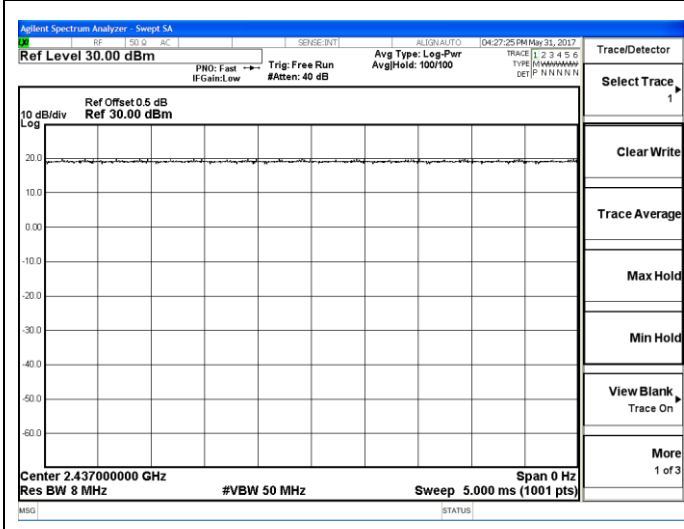
Mode	On Time B (ms)	Period (ms)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW(KHz)
BLE 4.0	5	5	1	100	0	0.010
802.11b	5	5	1	100	0	0.010
802.11g	5	5	1	100	0	0.010
802.11n -HT20	5	5	1	100	0	0.010
802.11n -HT40	5	5	1	100	0	0.010

Test plot of On Time and Duty Cycle



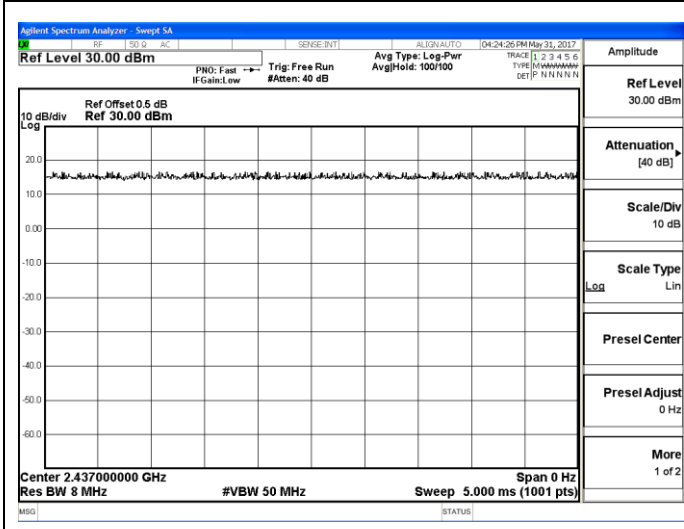
BLE 4.0

802.11b



802.11g

802.11n-HT20



802.11n-HT40

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

According to §15.247(b): For systems using digital modulation in the 2400-2483.5 MHz and 5725-5850 MHz band, the limit for maximum peak conducted output power is 30dBm. The limit has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter peak output power.

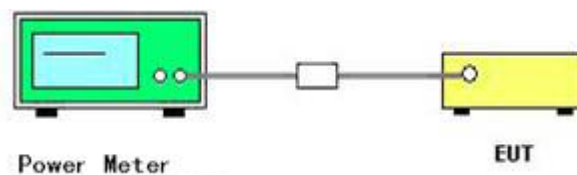
5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the power meter.

5.2.3. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

5.2.4. Test Setup Layout



5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Test Result of Maximum Conducted Output Power

Temperature	24.6°C	Humidity	50.4%
Test Engineer	Jayden Zhuo	Configurations	BLE 4.0; 802.11b/g/n

BLE 4.0

Channel	Frequency (MHz)	Conducted Power (Peak, dBm)	Max. Limit (dBm)	Result
1	2402	-2.520	30	Complies
20	2440	-3.172	30	Complies
40	2480	-3.476	30	Complies

802.11b

Channel	Frequency (MHz)	Conducted Power (Peak, dBm)	Max. Limit (dBm)	Result
1	2412	15.20	30	Complies
6	2437	15.36	30	Complies
11	2462	15.37	30	Complies

802.11g

Channel	Frequency (MHz)	Conducted Power (Peak, dBm)	Max. Limit (dBm)	Result
1	2412	13.08	30	Complies
6	2437	13.18	30	Complies
11	2462	12.84	30	Complies

802.11n (HT20)

Channel	Frequency (MHz)	Conducted Power (Peak, dBm)	Max. Limit (dBm)	Result
1	2412	12.83	30	Complies
6	2437	13.38	30	Complies
11	2462	13.34	30	Complies

802.11n (HT40)

Channel	Frequency (MHz)	Conducted Power (Peak, dBm)	Max. Limit (dBm)	Result
3	2422	12.63	30	Complies
6	2437	12.95	30	Complies
9	2452	12.96	30	Complies

5.3. Power Spectral Density Measurement

5.3.1. Standard Applicable

According to §15.247(e): 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.

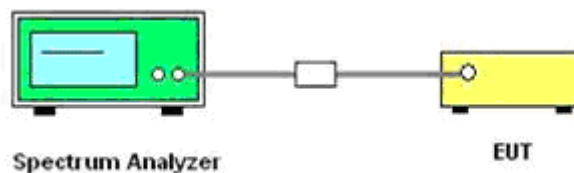
5.3.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

5.3.3. Test Procedures

1. The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
2. The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
3. Set the RBW = 3 kHz~100 kHz.
4. Set the VBW $\geq 3 \times$ RBW
5. Set the span to 1.5 times the DTS channel bandwidth.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

5.3.4. Test Setup Layout



5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.3.6. Test Result of Power Spectral Density

Temperature	24.6°C	Humidity	50.4%
Test Engineer	Jayden Zhuo	Configurations	BLE 4.0; 802.11b/g/n

BLE 4.0

Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
1	2402	-9.973	8	Complies
20	2440	-10.265	8	Complies
40	2480	-10.564	8	Complies

802.11b

Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
1	2412	2.292	8	Complies
6	2437	2.316	8	Complies
11	2462	2.382	8	Complies

802.11g

Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
1	2412	-5.509	8	Complies
6	2437	-4.857	8	Complies
11	2462	-5.168	8	Complies

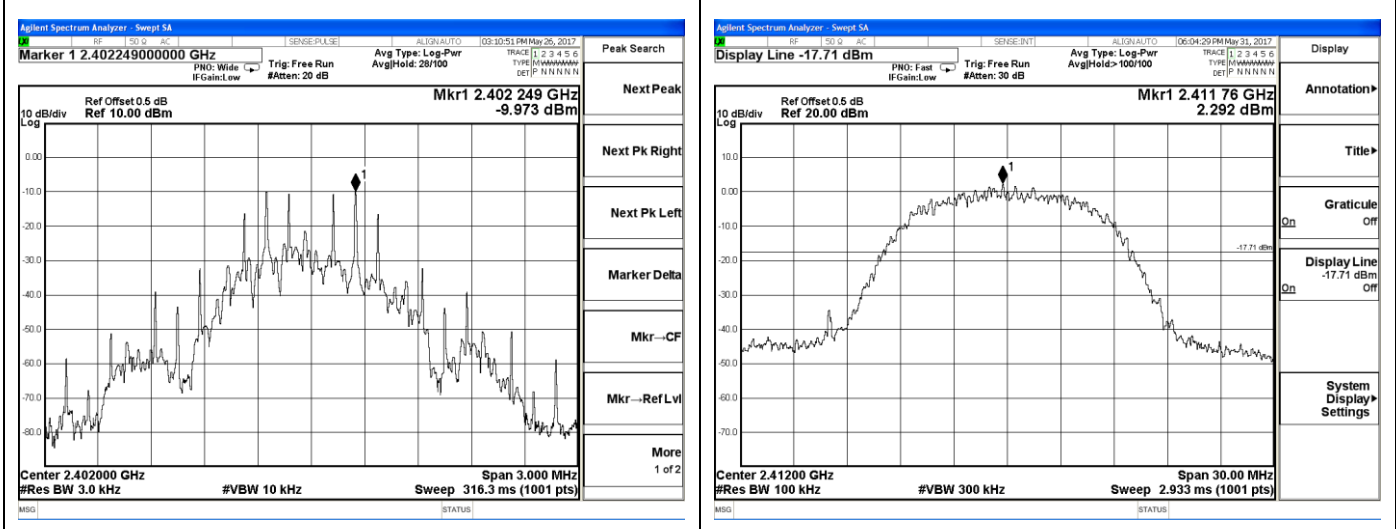
802.11n-HT20

Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
1	2412	-5.241	8	Complies
6	2437	-4.999	8	Complies
11	2462	-5.069	8	Complies

802.11n-HT40

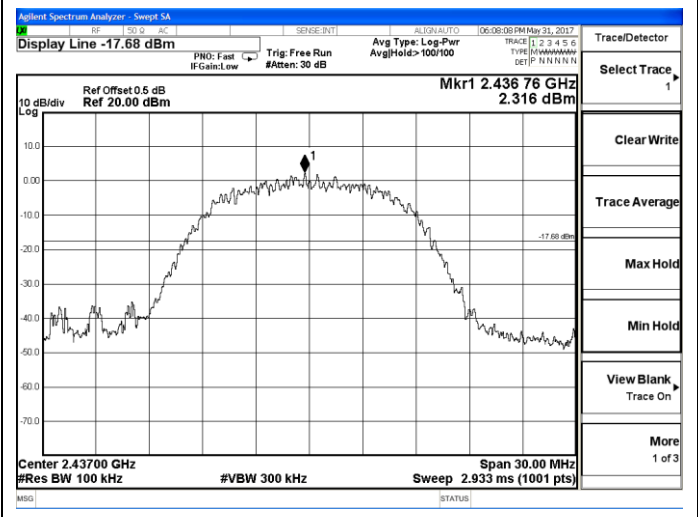
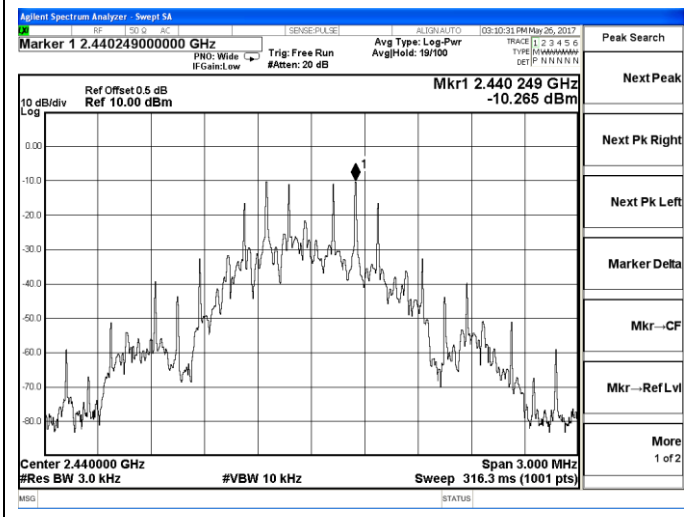
Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
3	2422	-8.992	8	Complies
6	2437	-8.585	8	Complies
9	2452	-8.378	8	Complies

Test plot of Power Spectral Density



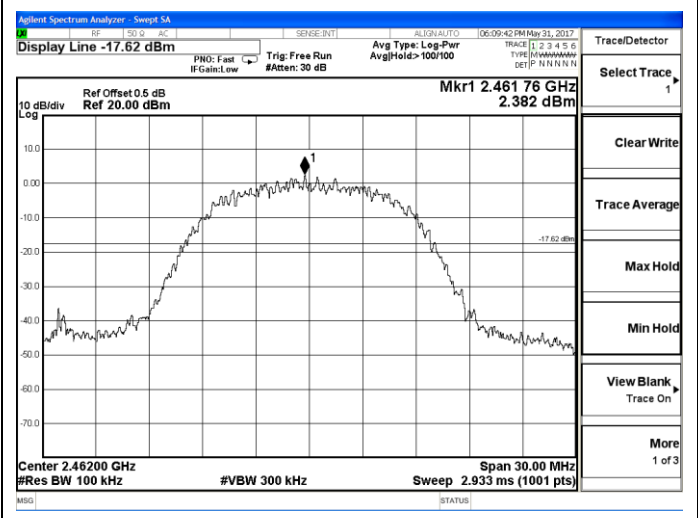
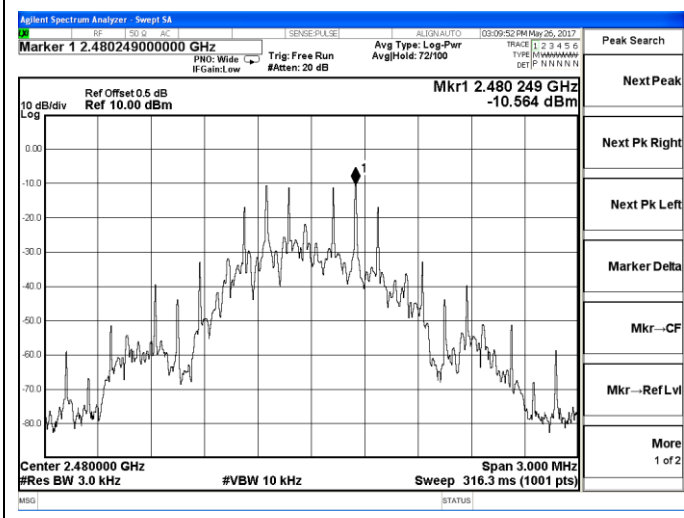
BLE 4.0_Low Channel

802.11b_Low Channel



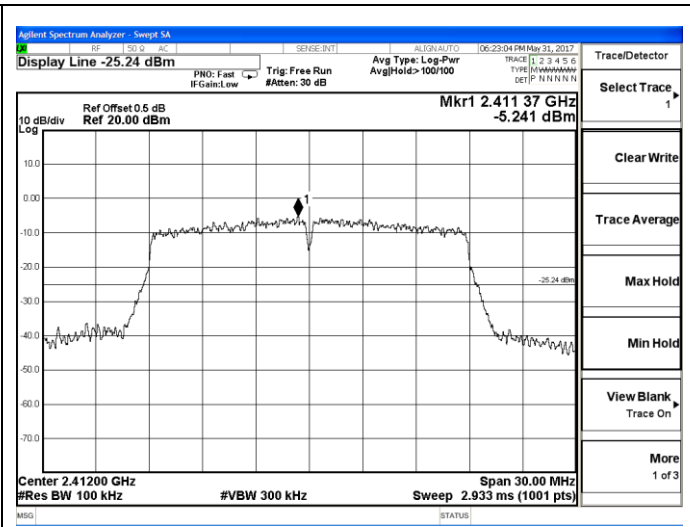
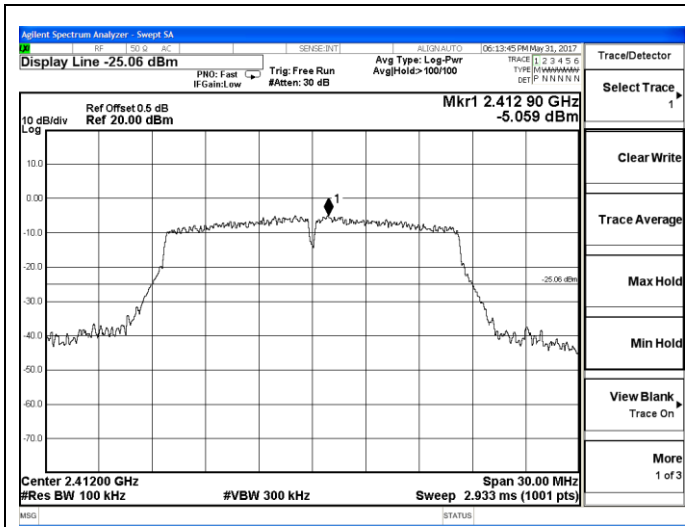
BLE 4.0_Middle Channel

802.11b_Middle Channel



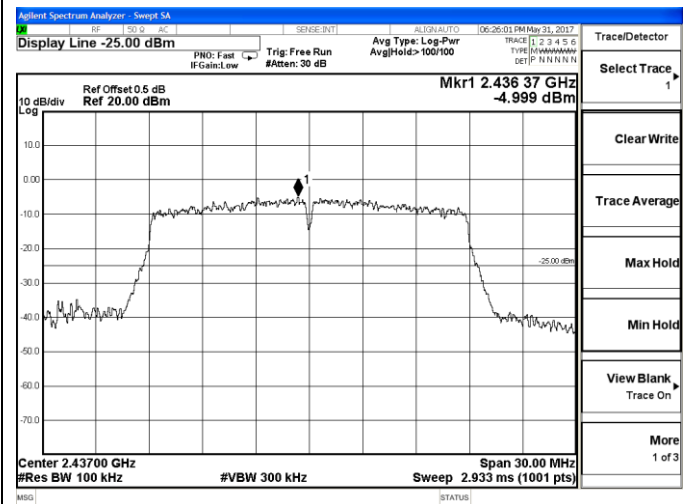
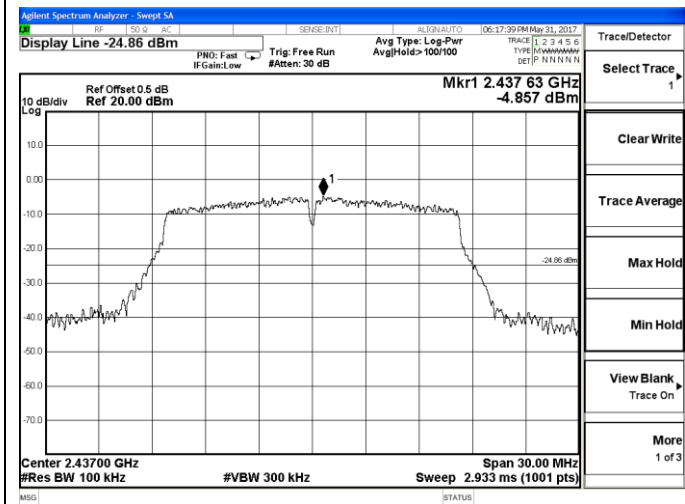
BLE 4.0_High Channel

802.11b_High Channel



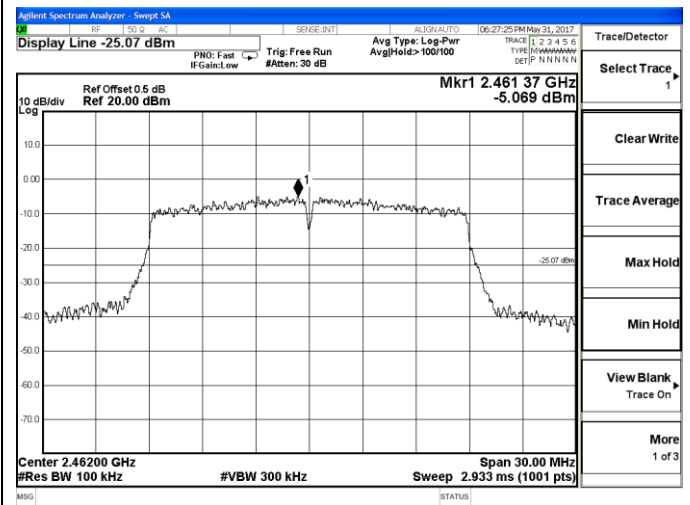
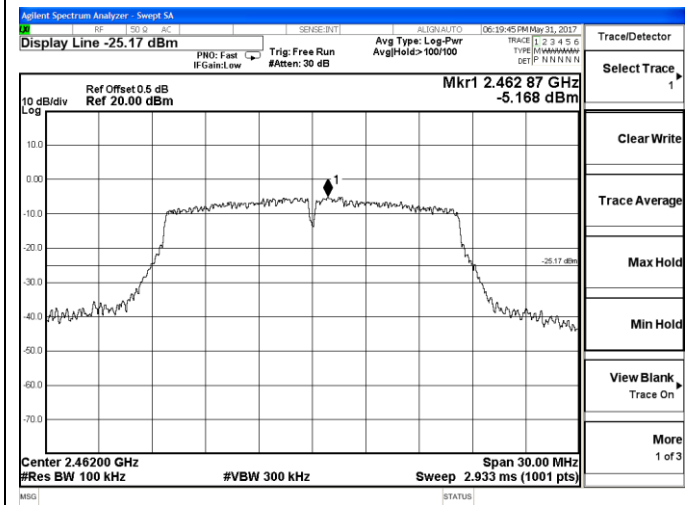
802.11g Low channel

802.11n-HT20 Low channel



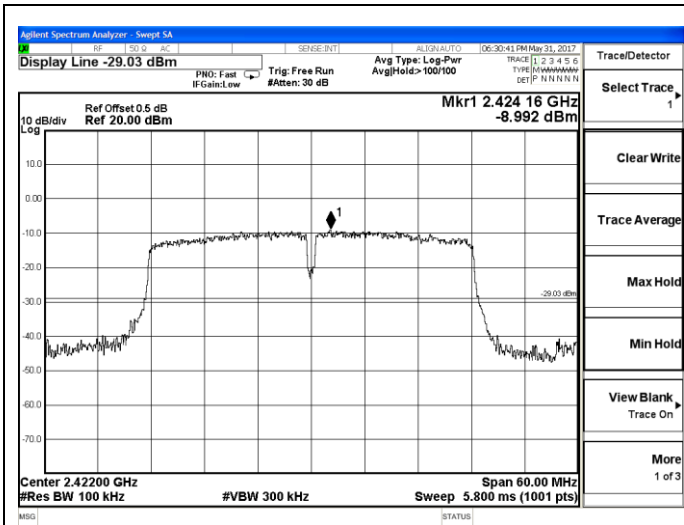
802.11g Middle channel

802.11n-HT20 Middle channel

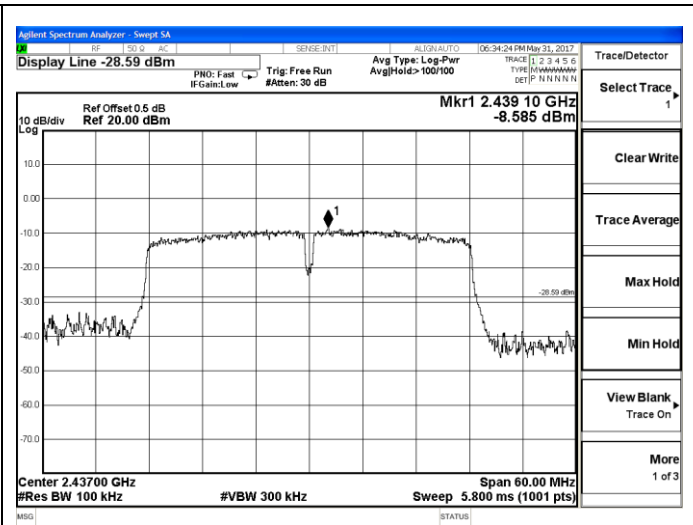


802.11g High channel

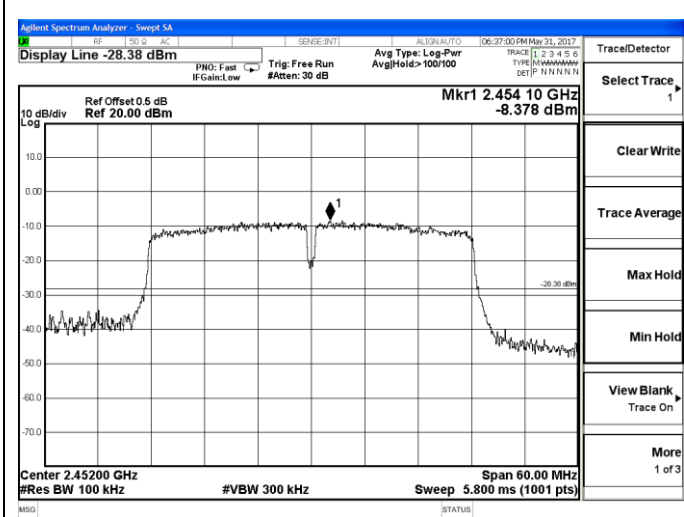
802.11n-HT20 High channel



802.11n-HT40 Low channel



802.11n-HT40 Middle channel



802.11n-HT40 High channel

5.4. 6 dB Spectrum Bandwidth Measurement

5.4.1. Standard Applicable

According to §15.247(a)(2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

5.4.2. Measuring Instruments and Setting

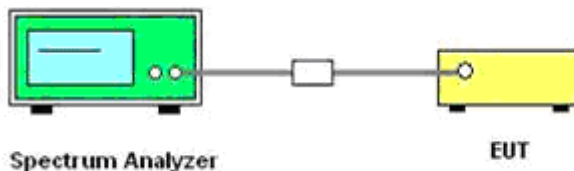
Please refer to section 6 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> RBW
Detector	Peak
Trace	Max Hold
Sweep Time	100ms

5.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth and the video bandwidth were set according to KDB558074.
3. Measured the spectrum width with power higher than 6dB below carrier.

5.4.4. Test Setup Layout



5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6. Test Result of 6dB Spectrum Bandwidth

Temperature	24.6°C	Humidity	50.4%
Test Engineer	Jayden Zhuo	Configurations	BLE 4.0; 802.11b/g/n

BLE 4.0

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2402	0.650	500	Complies
20	2440	0.650	500	Complies
40	2480	0.651	500	Complies

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	8.909	500	Complies
6	2437	8.912	500	Complies
11	2462	8.904	500	Complies

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	16.430	500	Complies
6	2437	16.420	500	Complies
11	2462	16.400	500	Complies

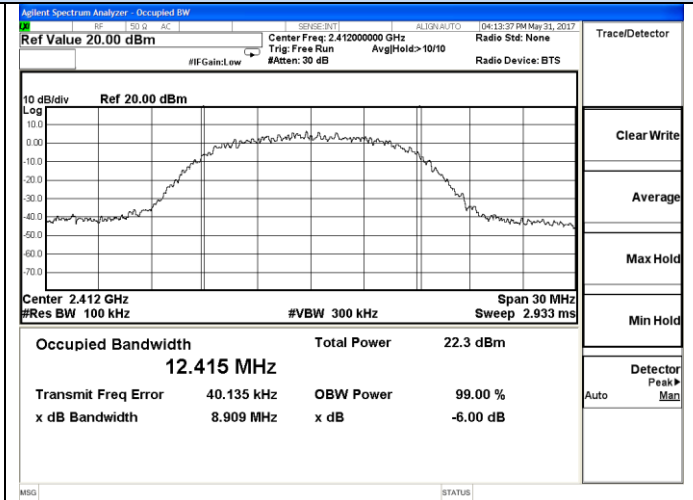
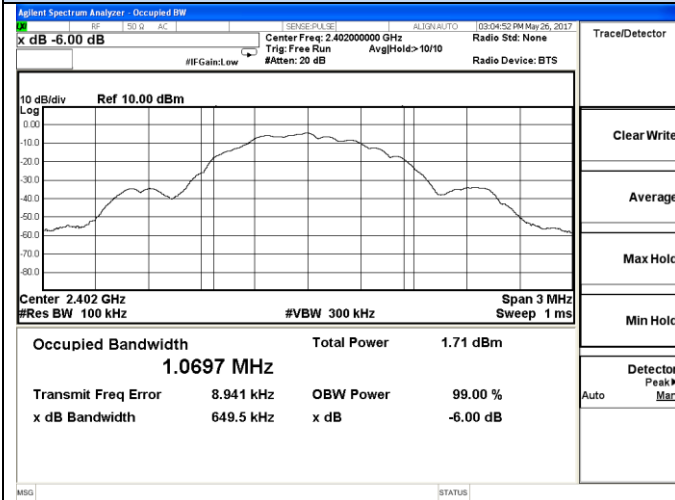
802.11n HT20

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	17.620	500	Complies
6	2437	17.640	500	Complies
11	2462	17.620	500	Complies

802.11n HT40

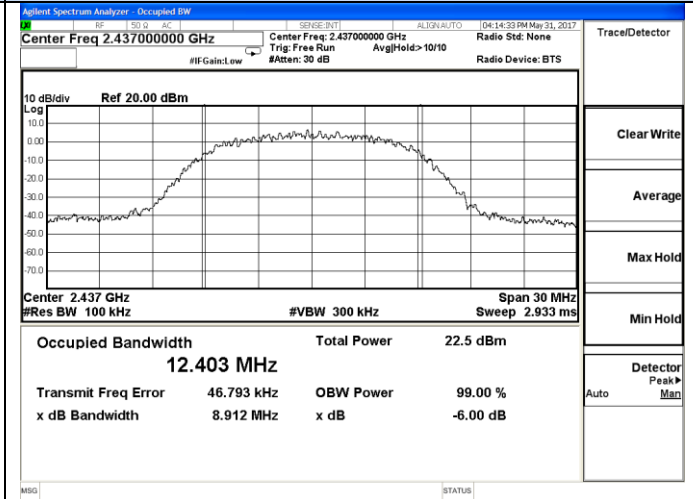
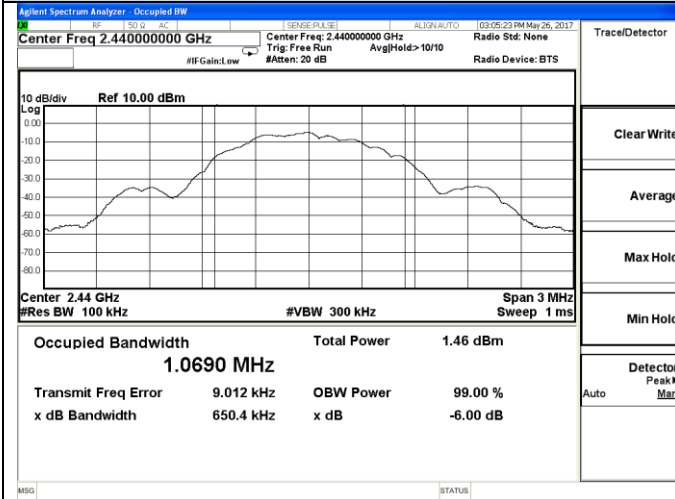
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
3	2422	36.380	500	Complies
6	2437	36.160	500	Complies
9	2452	36.130	500	Complies

Test plot of 6 dB Bandwidth



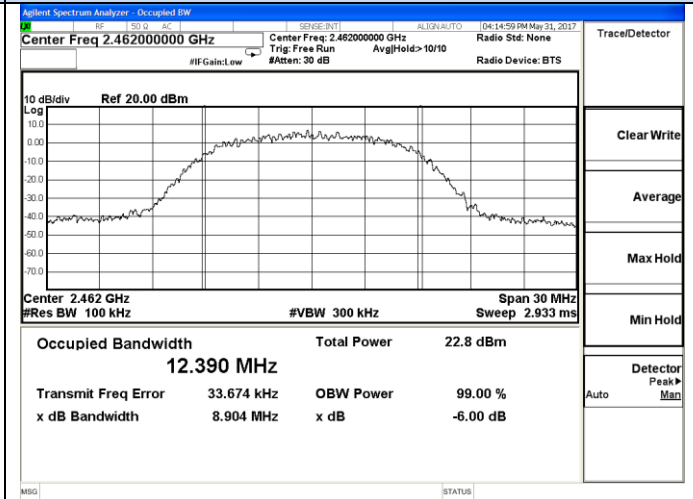
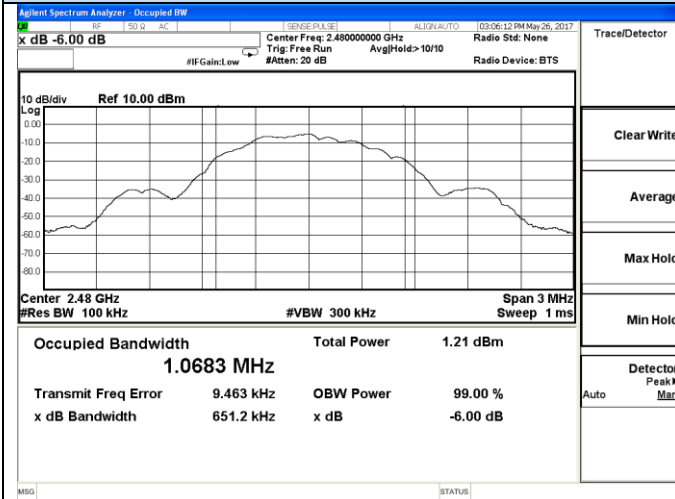
BLE 4.0_Low Channel / 2402MHz

802.11b Low channel



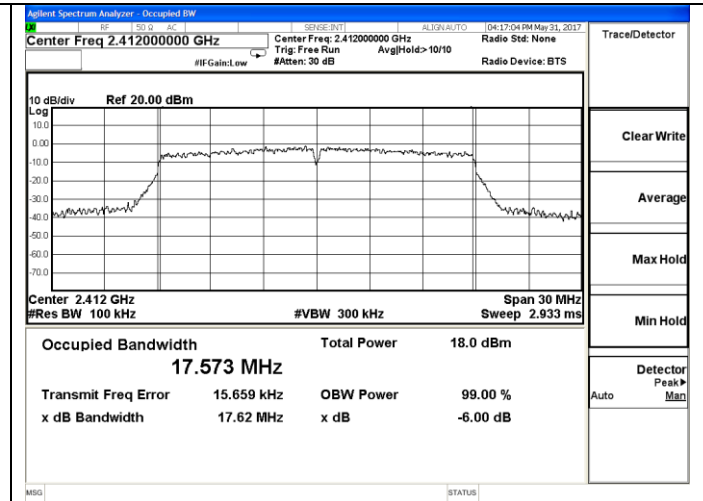
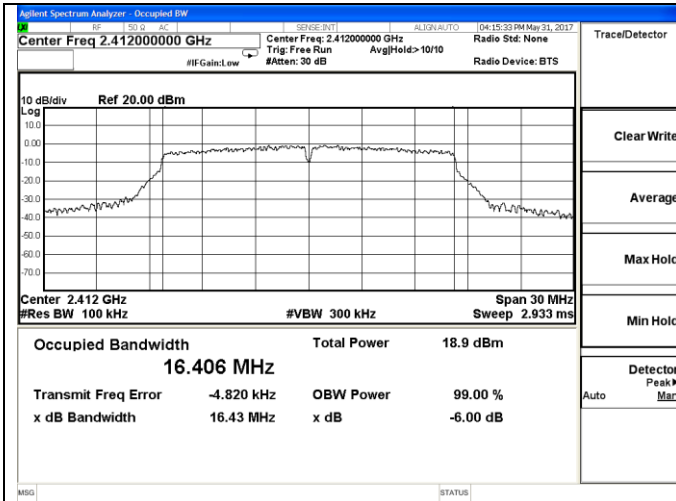
BLE 4.0_Middle Channel / 2440MHz

802.11b Middle channel



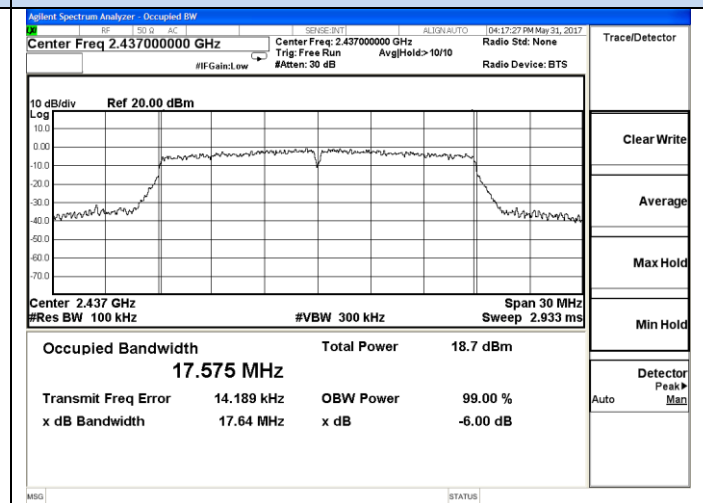
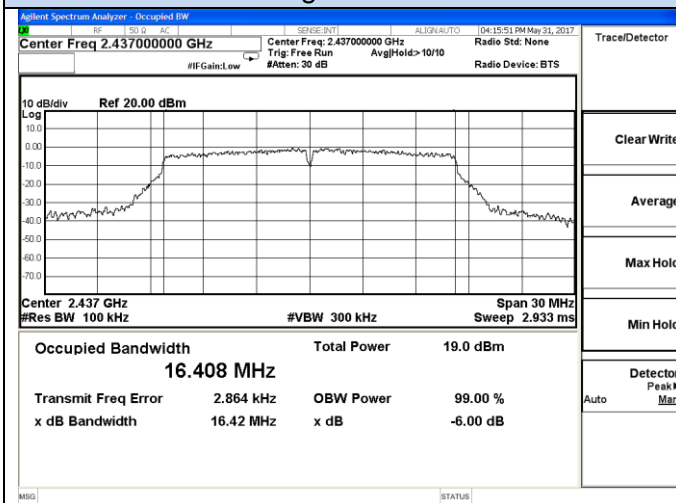
BLE 4.0_High Channel / 2480MHz

802.11b High channel



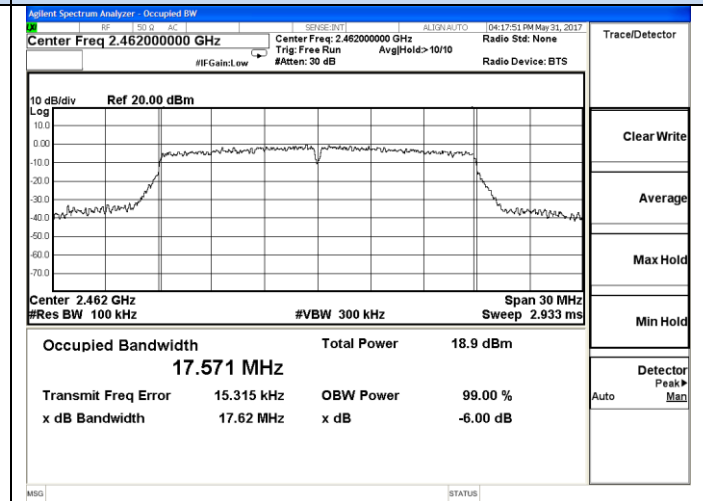
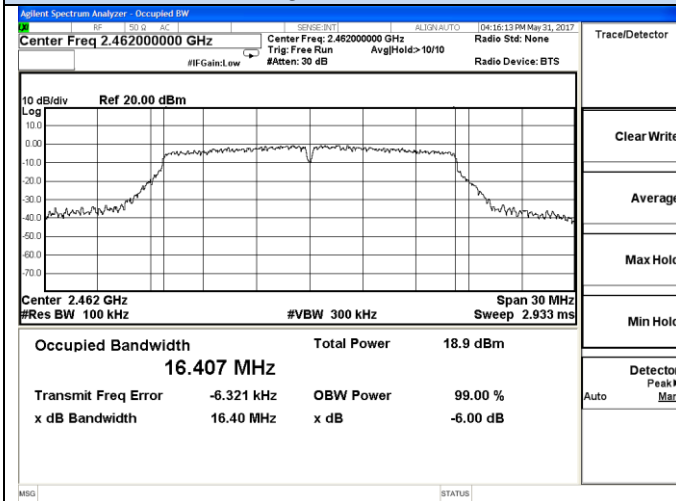
802.11g Low channel

802.11n-HT20 Low channel



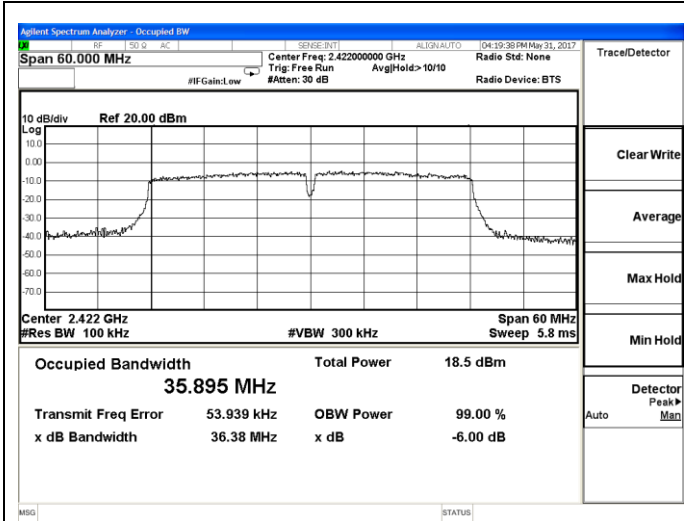
802.11g Middle channel

802.11n-HT20 Middle channel

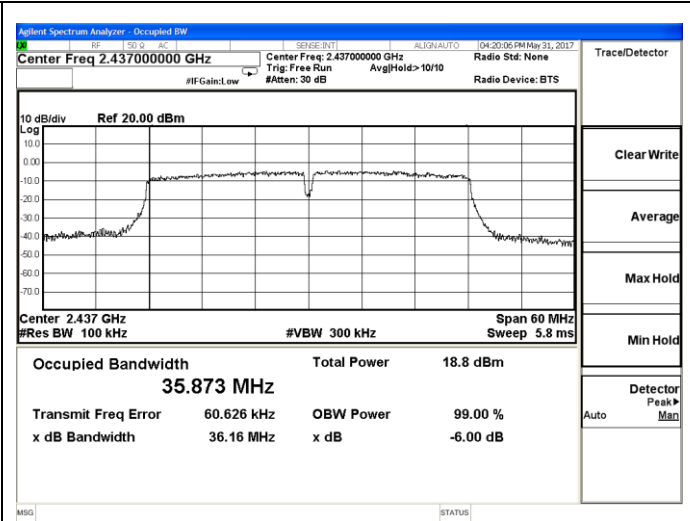


802.11g High channel

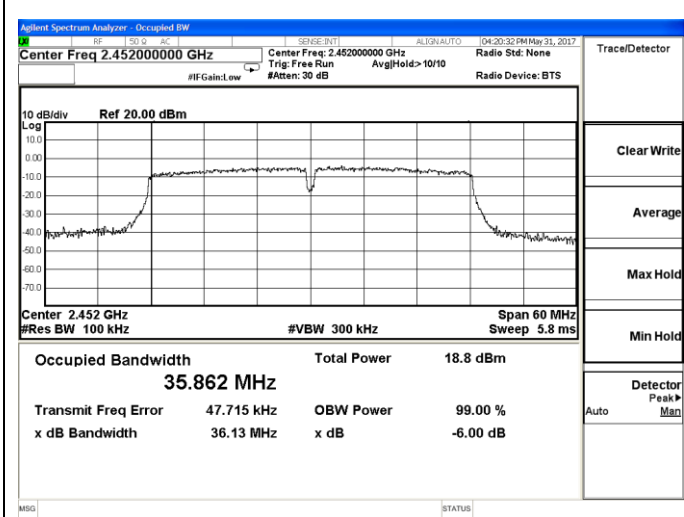
802.11n-HT20 High channel



802.11n-HT40 Low channel



802.11n-HT40 Middle channel



802.11n-HT40 High channel

5.5. Radiated Emissions Measurement

5.5.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.5.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP/AVG

5.5.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be

stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

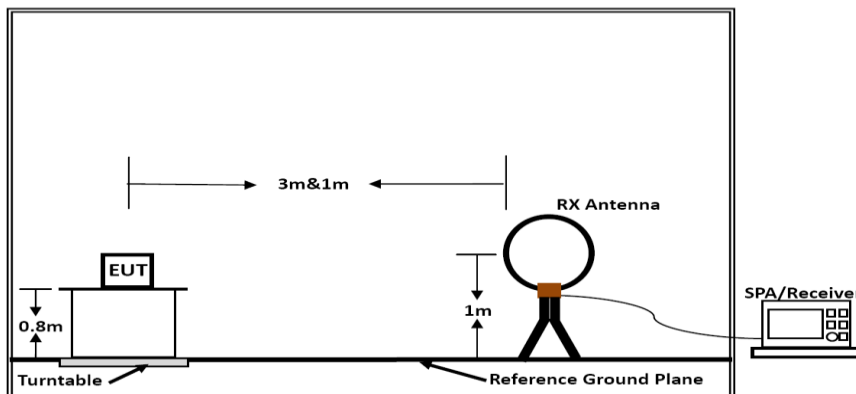
Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

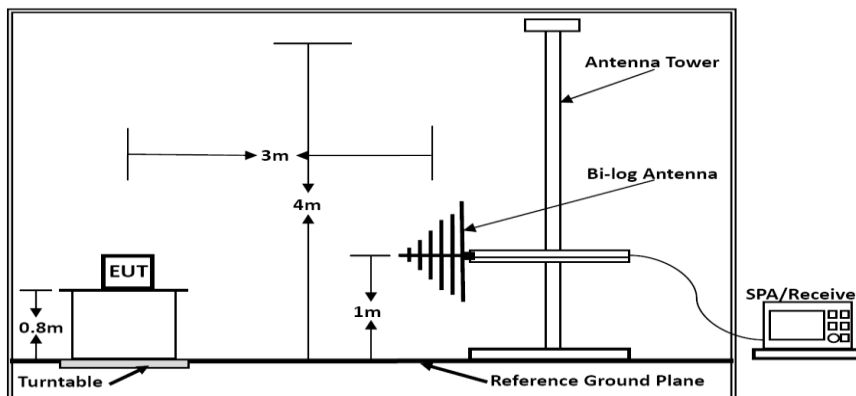
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.5.4. Test Setup Layout

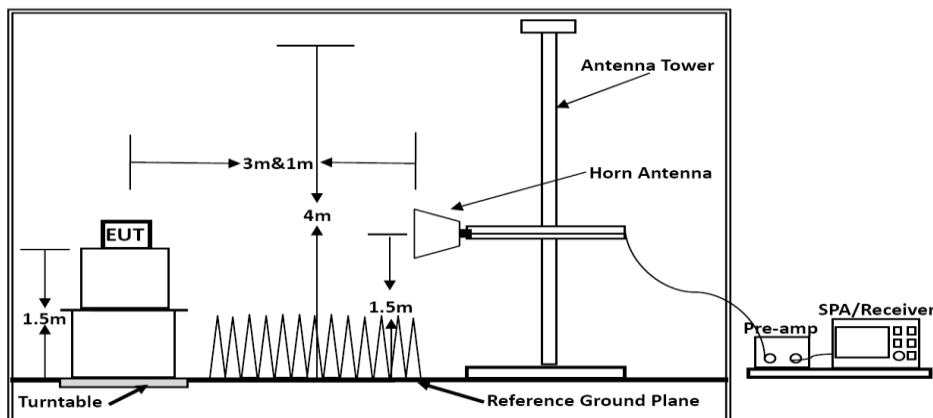
For radiated emissions below 30MHz



Below 30MHz



Below 1GHz



Above 1GHz

Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6. Results of Radiated Emissions (9kHz~30MHz)

Temperature	24.2°C	Humidity	52%
Test Engineer	Jayden Zhuo	Configurations	BLE 4.0; 802.11b/g/n
Test Date	June 05, 2017		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

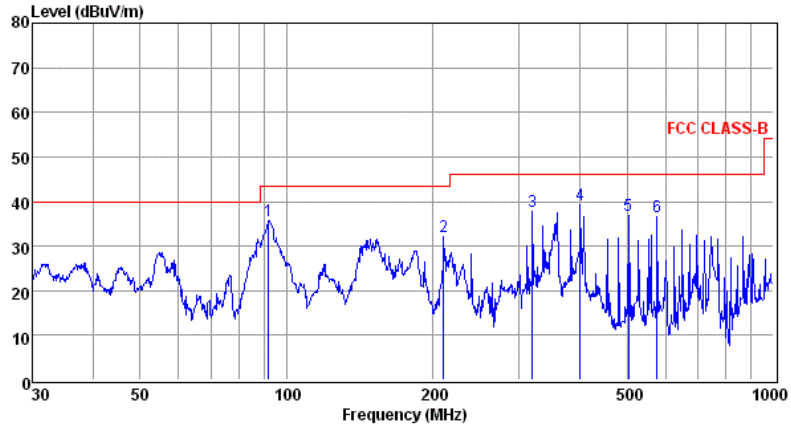
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.5.7. Results of Radiated Emissions (30MHz~1GHz)

Temperature	25°C	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	BLE 4.0 (Low CH)
Test Date	June 05, 2017		

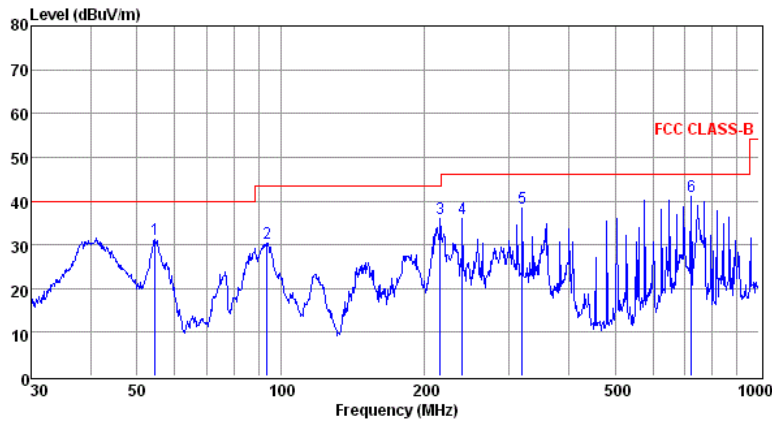
Test result for BLE 4.0 (Low Channel)



pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	91.82	23.02	0.56	12.24	35.82	43.50	-7.68	QP
2	210.05	20.34	0.93	10.89	32.16	43.50	-11.34	QP
3	319.94	23.37	1.16	13.33	37.86	46.00	-8.14	QP
4	400.43	22.87	1.20	15.07	39.14	46.00	-6.86	QP
5	504.71	19.01	1.29	16.67	36.97	46.00	-9.03	QP
6	576.64	17.13	1.49	18.01	36.63	46.00	-9.37	QP

- Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db blow the official limit are not reported



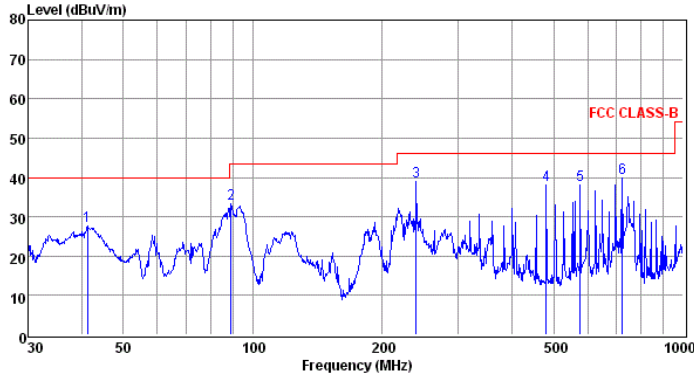
pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	54.45	17.67	0.46	13.05	31.18	40.00	-8.82	QP
2	93.44	17.31	0.56	12.55	30.42	43.50	-13.08	QP
3	215.27	23.89	0.95	11.05	35.89	43.50	-7.61	QP
4	239.99	23.03	1.01	12.09	36.13	46.00	-9.87	QP
5	319.94	24.00	1.16	13.33	38.49	46.00	-7.51	QP
6	721.73	20.31	1.63	19.08	41.02	46.00	-4.98	QP

- Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db blow the official limit are not reported

Temperature	25°C	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	802.11b (High CH)
Test Date	June 05, 2017		

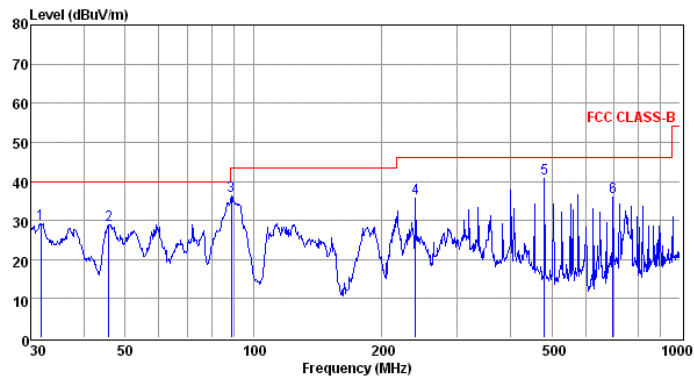
Test result for 802.11b (High Channel)



pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	41.28	13.62	0.50	13.57	27.69	40.00	-12.31	QP
2	88.96	21.12	0.68	11.57	33.37	43.50	-10.13	QP
3	239.99	25.95	1.01	12.09	39.05	46.00	-6.95	QP
4	480.53	20.56	1.31	16.08	37.95	46.00	-8.05	QP
5	576.64	18.71	1.49	18.01	38.21	46.00	-7.79	QP
6	721.73	19.09	1.63	19.08	39.80	46.00	-6.20	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db below the official limit are not reported



pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	31.73	16.52	0.37	12.32	29.21	40.00	-10.79	QP
2	45.69	15.03	0.41	13.51	28.95	40.00	-11.05	QP
3	88.65	24.19	0.68	11.47	36.34	43.50	-7.16	QP
4	239.99	22.69	1.01	12.09	35.79	46.00	-10.21	QP
5	480.53	23.24	1.31	16.08	40.63	46.00	-5.37	QP
6	696.86	15.72	1.59	18.80	36.11	46.00	-9.89	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db below the official limit are not reported

Note:

Pre-scan all mode and recorded the worst case results in this report (802.11b (High Channel)).

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

BLE 4.0

Channel 1

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4804.00	55.45	33.06	35.04	3.94	57.41	74	-16.59	Peak	Horizontal
4804.00	42.16	33.06	35.04	3.94	44.12	54	-9.88	Average	Horizontal
4804.00	54.09	33.06	35.04	3.94	56.05	74	-17.95	Peak	Vertical
4804.00	40.69	33.06	35.04	3.94	42.65	54	-11.35	Average	Vertical

Channel 19

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4880.00	56.84	33.16	35.15	3.96	58.81	74	-15.19	Peak	Horizontal
4880.00	41.24	33.16	35.15	3.96	43.21	54	-10.79	Average	Horizontal
4880.00	54.82	33.16	35.15	3.96	56.79	74	-17.21	Peak	Vertical
4880.00	38.96	33.16	35.15	3.96	40.93	54	-13.07	Average	Vertical

Channel 40

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4960.00	56.41	33.26	35.14	3.98	58.51	74	-15.49	Peak	Horizontal
4960.00	42.68	33.26	35.14	3.98	44.78	54	-9.22	Average	Horizontal
4960.00	54.02	33.26	35.14	3.98	56.12	74	-17.88	Peak	Vertical
4960.00	38.18	33.26	35.14	3.98	40.28	54	-13.72	Average	Vertical

802.11b

Channel 1

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4824.00	55.77	33.06	35.04	3.94	57.73	74	-16.27	Peak	Horizontal
4824.00	41.56	33.06	35.04	3.94	43.52	54	-10.48	Average	Horizontal
4824.00	54.95	33.06	35.04	3.94	56.91	74	-17.09	Peak	Vertical
4824.00	41.89	33.06	35.04	3.94	43.85	54	-10.15	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	57.76	33.16	35.15	3.96	59.73	74	-14.27	Peak	Horizontal
4874.00	42.18	33.16	35.15	3.96	44.15	54	-9.85	Average	Horizontal
4874.00	55.62	33.16	35.15	3.96	57.59	74	-16.41	Peak	Vertical
4874.00	39.22	33.16	35.15	3.96	41.19	54	-12.81	Average	Vertical

Channel 11

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4924.00	57.11	33.26	35.14	3.98	59.21	74	-14.79	Peak	Horizontal
4924.00	43.16	33.26	35.14	3.98	45.26	54	-8.74	Average	Horizontal
4924.00	55.32	33.26	35.14	3.98	57.42	74	-16.58	Peak	Vertical
4924.00	39.10	33.26	35.14	3.98	41.20	54	-12.80	Average	Vertical

802.11g

Channel 1

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4824.00	55.84	33.06	35.04	3.94	57.80	74	-16.20	Peak	Horizontal
4824.00	43.19	33.06	35.04	3.94	45.15	54	-8.85	Average	Horizontal
4824.00	54.86	33.06	35.04	3.94	56.82	74	-17.18	Peak	Vertical
4824.00	40.56	33.06	35.04	3.94	42.52	54	-11.48	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	57.86	33.16	35.15	3.96	59.83	74	-14.17	Peak	Horizontal
4874.00	42.27	33.16	35.15	3.96	44.24	54	-9.76	Average	Horizontal
4874.00	55.13	33.16	35.15	3.96	57.10	74	-16.90	Peak	Vertical
4874.00	40.36	33.16	35.15	3.96	42.33	54	-11.67	Average	Vertical

Channel 11

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4924.00	56.42	33.26	35.14	3.98	58.52	74	-15.48	Peak	Horizontal
4924.00	42.19	33.26	35.14	3.98	44.29	54	-9.71	Average	Horizontal
4924.00	54.24	33.26	35.14	3.98	56.34	74	-17.66	Peak	Vertical
4924.00	37.87	33.26	35.14	3.98	39.97	54	-14.03	Average	Vertical

802.11n HT20

Channel 1

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4824.00	56.56	33.06	35.04	3.94	58.52	74	-15.48	Peak	Horizontal
4824.00	43.28	33.06	35.04	3.94	45.24	54	-8.76	Average	Horizontal
4824.00	54.87	33.06	35.04	3.94	56.83	74	-17.17	Peak	Vertical
4824.00	40.56	33.06	35.04	3.94	42.52	54	-11.48	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	57.62	33.16	35.15	3.96	59.59	74	-14.41	Peak	Horizontal
4874.00	42.27	33.16	35.15	3.96	44.24	54	-9.76	Average	Horizontal
4874.00	53.93	33.16	35.15	3.96	55.90	74	-18.10	Peak	Vertical
4874.00	39.84	33.16	35.15	3.96	41.81	54	-12.19	Average	Vertical

Channel 11

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4924.00	56.61	33.26	35.14	3.98	58.71	74	-15.29	Peak	Horizontal
4924.00	41.58	33.26	35.14	3.98	43.68	54	-10.32	Average	Horizontal
4924.00	53.94	33.26	35.14	3.98	56.04	74	-17.96	Peak	Vertical
4924.00	39.29	33.26	35.14	3.98	41.39	54	-12.61	Average	Vertical

802.11n HT40

Channel 3

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4844.00	56.48	33.06	35.04	3.94	58.44	74	-15.56	Peak	Horizontal
4844.00	43.13	33.06	35.04	3.94	45.09	54	-8.91	Average	Horizontal
4844.00	55.44	33.06	35.04	3.94	57.40	74	-16.60	Peak	Vertical
4844.00	41.90	33.06	35.04	3.94	43.86	54	-10.14	Average	Vertical

Channel 6

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	56.83	33.16	35.15	3.96	58.80	74	-15.20	Peak	Horizontal
4874.00	40.85	33.16	35.15	3.96	42.82	54	-11.18	Average	Horizontal
4874.00	55.37	33.16	35.15	3.96	57.34	74	-16.66	Peak	Vertical
4874.00	38.65	33.16	35.15	3.96	40.62	54	-13.38	Average	Vertical

Channel 9

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4904.00	56.32	33.26	35.14	3.98	58.42	74	-15.58	Peak	Horizontal
4904.00	43.15	33.26	35.14	3.98	45.25	54	-8.75	Average	Horizontal
4904.00	55.10	33.26	35.14	3.98	57.20	74	-16.80	Peak	Vertical
4904.00	37.73	33.26	35.14	3.98	39.83	54	-14.17	Average	Vertical

Notes:

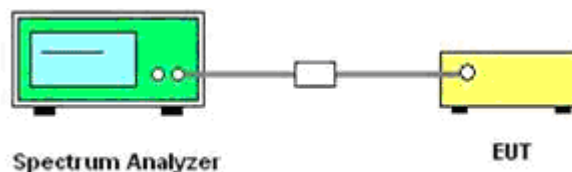
1. Measuring frequencies from 9k~10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2. Radiated emissions measured in frequency range from 9k~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.
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.

5.5.8 Band-edge measurements for radiated emissions

5.5.8.1 Standard Applicable

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)).

5.5.8.2 Test Setup Layout



5.5.8.3. Measuring Instruments and Setting

Please refer to section 6 of equipment list in this report. The following table is the setting of Spectrum Analyzer.

5.5.8.4. Test Procedures

According to KDB 558074 D01 V03 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=1/B for Peak 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:
 $E = \text{EIRP} - 20\log D + 104.8$

Where:

E = electric field strength in dB μ V/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 duress until all measured frequencies were complete.

5.5.8.5 Test Results

BLE 4.0							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-59.314	5.0	0.00	40.946	Peak	74.00	PASS
2310.000	-71.503	5.0	0.00	28.757	AV	54.00	PASS
2390.000	-58.369	5.0	0.00	41.891	Peak	74.00	PASS
2390.000	-70.844	5.0	0.00	29.416	AV	54.00	PASS
2483.500	-57.981	5.0	0.00	42.279	Peak	74.00	PASS
2483.500	-69.630	5.0	0.00	30.630	AV	54.00	PASS
2500.000	-58.645	5.0	0.00	41.615	Peak	74.00	PASS
2500.000	-70.672	5.0	0.00	29.588	AV	54.00	PASS

IEEE 802.11b							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-51.150	5.0	0.00	49.110	Peak	74.00	PASS
2310.000	-62.395	5.0	0.00	37.865	AV	54.00	PASS
2390.000	-48.063	5.0	0.00	52.197	Peak	74.00	PASS
2390.000	-59.679	5.0	0.00	40.581	AV	54.00	PASS
2483.500	-48.064	5.0	0.00	52.196	Peak	74.00	PASS
2483.500	-59.063	5.0	0.00	41.197	AV	54.00	PASS
2500.000	-48.673	5.0	0.00	51.587	Peak	74.00	PASS
2500.000	-60.334	5.0	0.00	39.926	AV	54.00	PASS

IEEE 802.11g							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-50.915	5.0	0.00	49.345	Peak	74.00	PASS
2310.000	-62.114	5.0	0.00	38.146	AV	54.00	PASS
2390.000	-36.391	5.0	0.00	63.869	Peak	74.00	PASS
2390.000	-53.931	5.0	0.00	46.329	AV	54.00	PASS
2483.500	-40.895	5.0	0.00	59.365	Peak	74.00	PASS
2483.500	-54.914	5.0	0.00	45.346	AV	54.00	PASS
2500.000	-48.361	5.0	0.00	51.899	Peak	74.00	PASS
2500.000	-58.854	5.0	0.00	41.406	AV	54.00	PASS

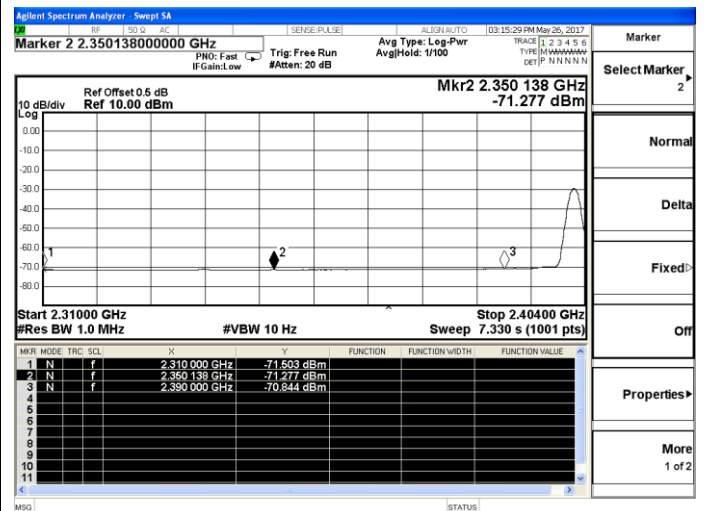
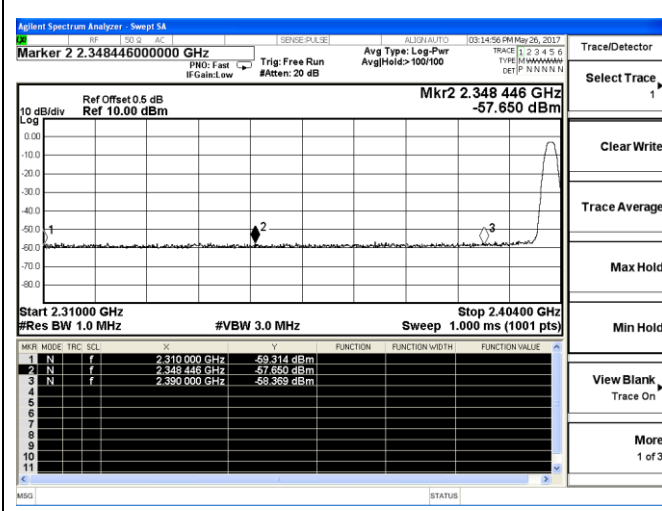
IEEE 802.11n HT20							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-51.806	5.0	0.00	48.454	Peak	74.00	PASS
2310.000	-61.981	5.0	0.00	38.279	AV	54.00	PASS
2390.000	-31.547	5.0	0.00	68.713	Peak	74.00	PASS
2390.000	-52.489	5.0	0.00	47.771	AV	54.00	PASS
2483.500	-37.907	5.0	0.00	62.353	Peak	74.00	PASS
2483.500	-53.942	5.0	0.00	46.318	AV	54.00	PASS
2500.000	-46.707	5.0	0.00	53.553	Peak	74.00	PASS
2500.000	-58.921	5.0	0.00	41.339	AV	54.00	PASS

IEEE 802.11n HT40							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-51.010	5.0	0.00	49.250	Peak	74.00	PASS
2310.000	-62.156	5.0	0.00	38.104	AV	54.00	PASS
2390.000	-35.990	5.0	0.00	64.270	Peak	74.00	PASS
2390.000	-47.437	5.0	0.00	52.823	AV	54.00	PASS
2483.500	-36.542	5.0	0.00	63.718	Peak	74.00	PASS
2483.500	-50.441	5.0	0.00	49.819	AV	54.00	PASS
2500.000	-44.982	5.0	0.00	55.278	Peak	74.00	PASS
2500.000	-57.644	5.0	0.00	42.616	AV	54.00	PASS

Remark:

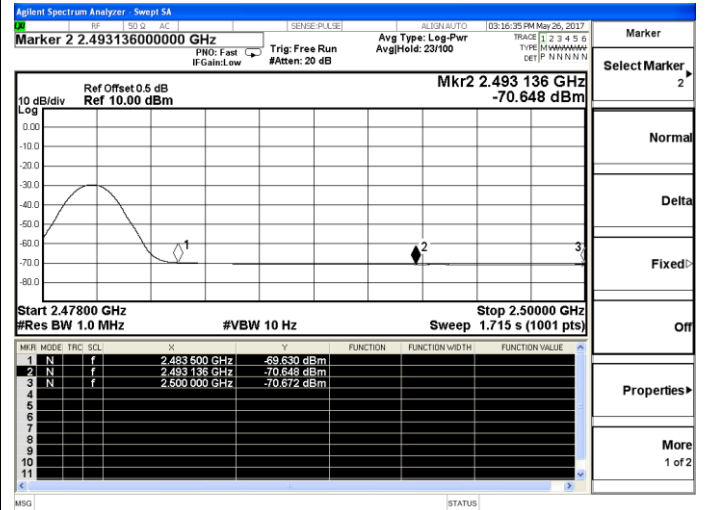
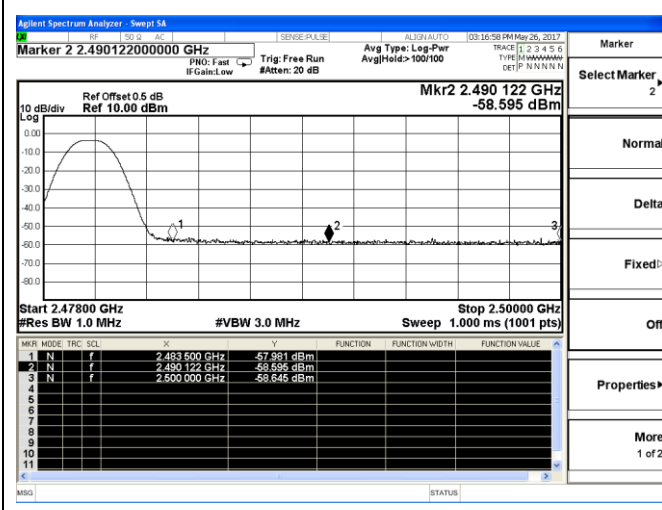
1. Measured output power at difference data rate for each mode and recorded worst case for each mode.
2. Test results including cable loss;
3. “---“means that the fundamental frequency not for 15.209 limits requirement.
4. please refer to following plots;

Band-edge measurements for radiated emissions



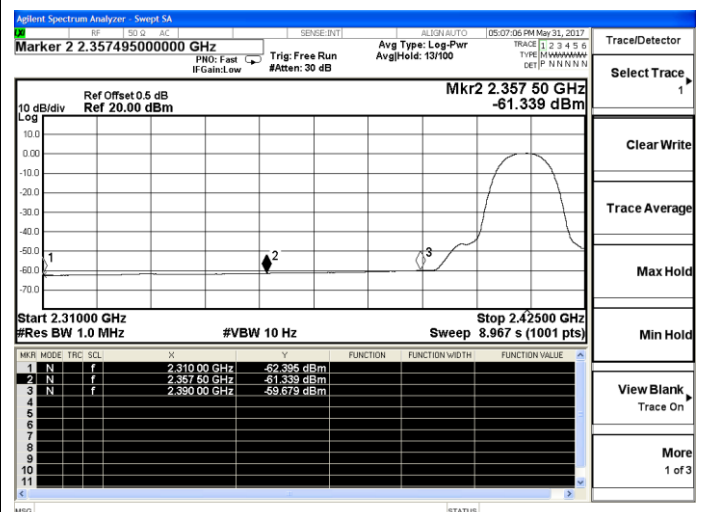
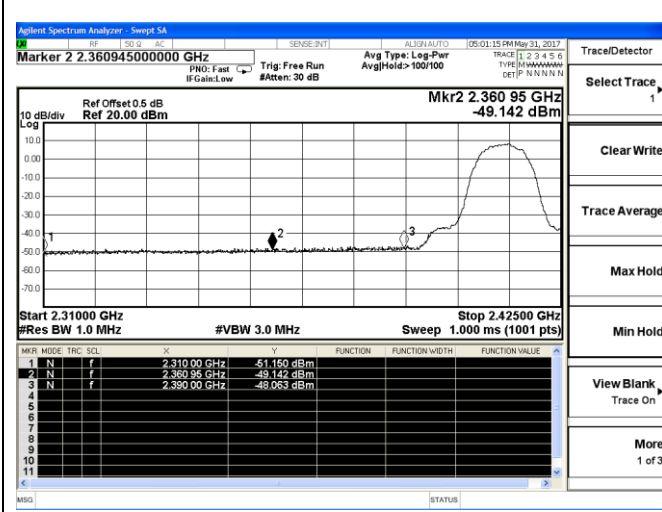
BLE 4.0-Low channel(Peak)

BLE 4.0-Low channel(Average)



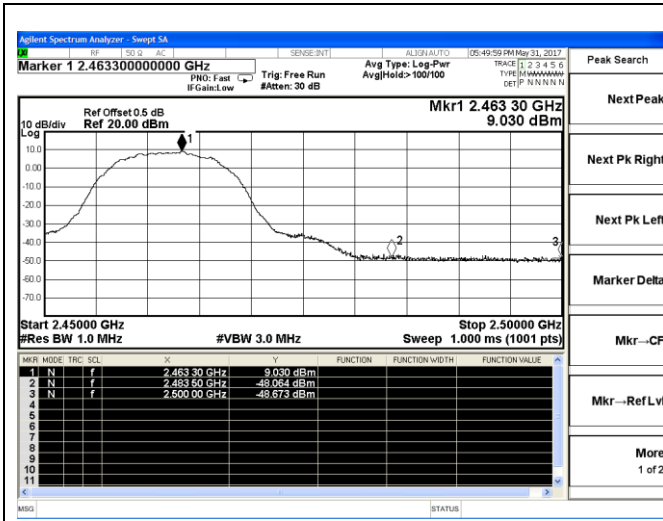
BLE 4.0-High channel(Peak)

BLE 4.0-High channel(Average)

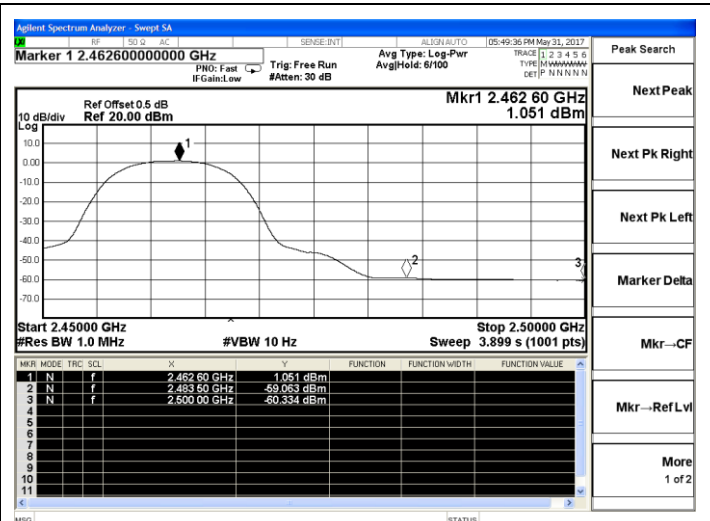


802.11b Low channel(Peak)

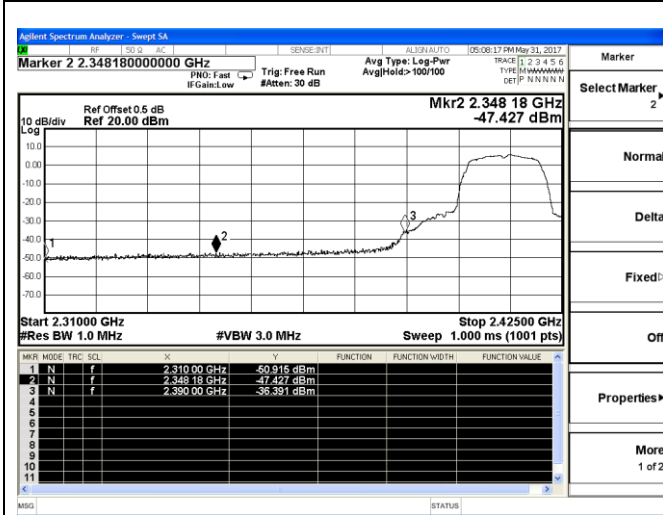
802.11b Low channel(Average)



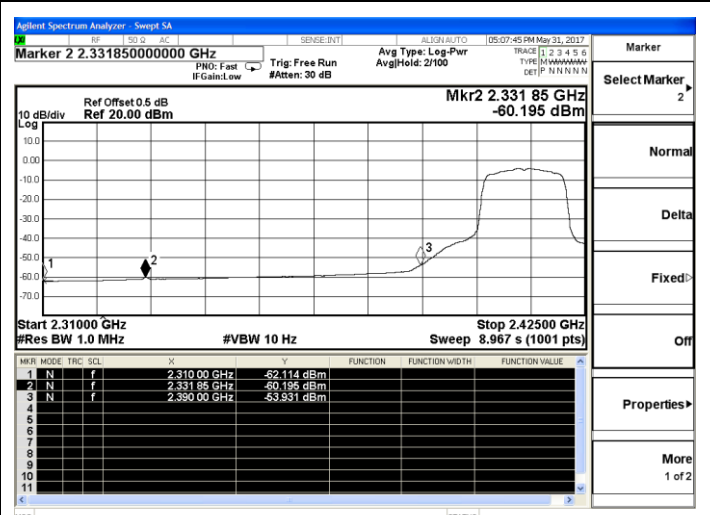
802.11b High channel(Peak)



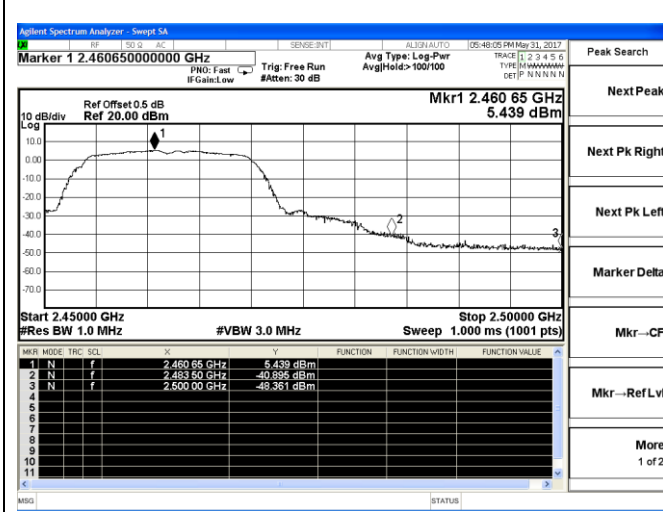
802.11b High channel(Average)



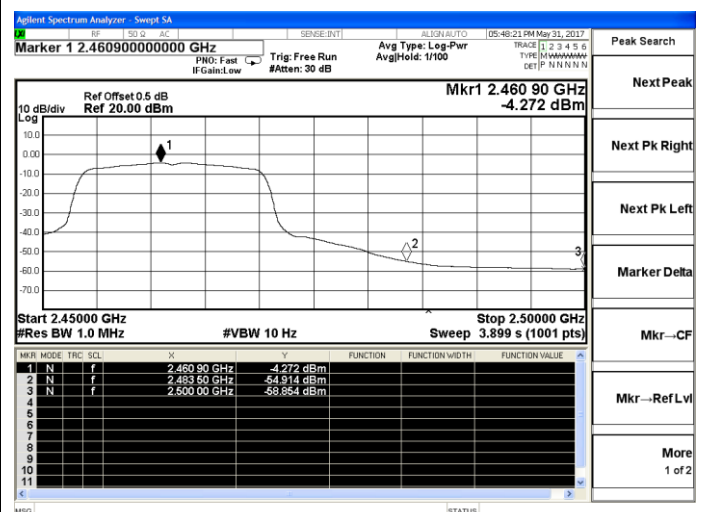
802.11g Low channel(Peak)



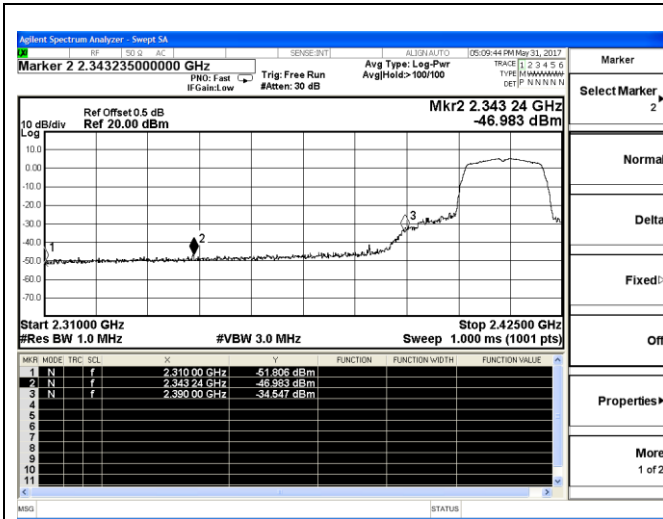
802.11g Low channel(Average)



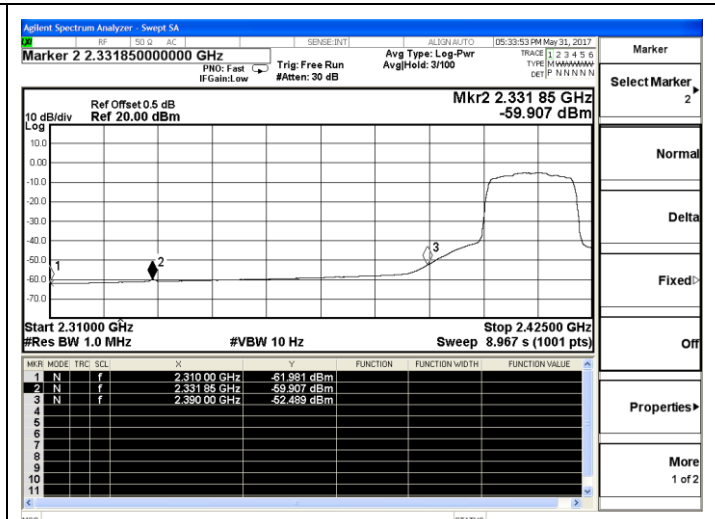
802.11g High channel(Peak)



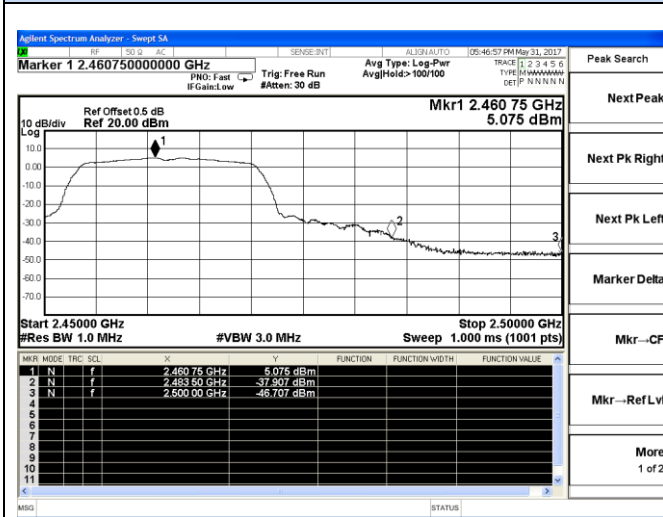
802.11g High channel(Average)



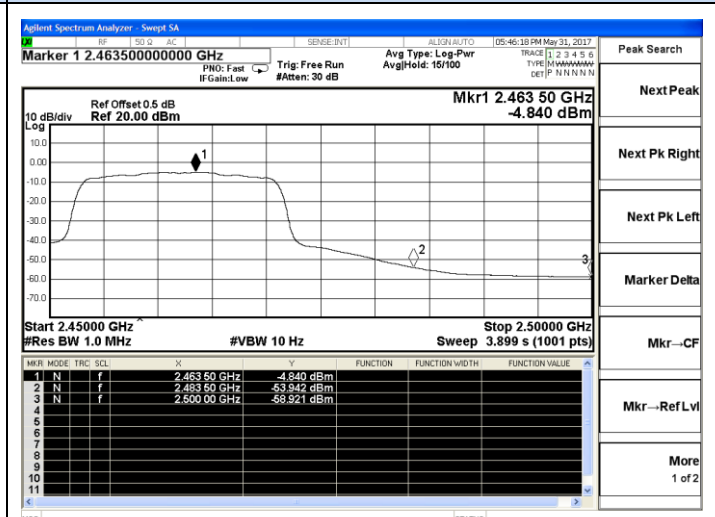
802.11n-HT20 Low channel(Peak)



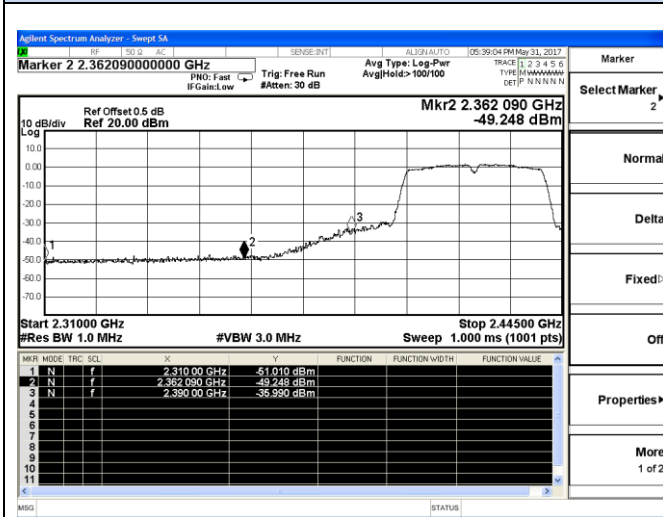
802.11n-HT20 Low channel(Average)



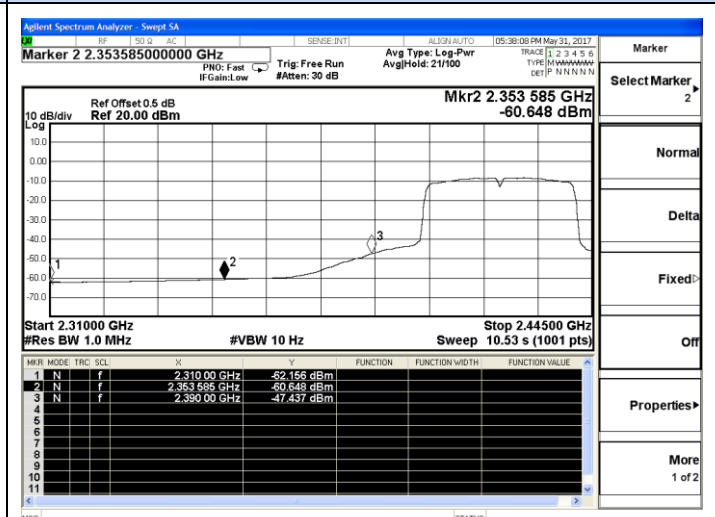
802.11n-HT20 High channel(Peak)



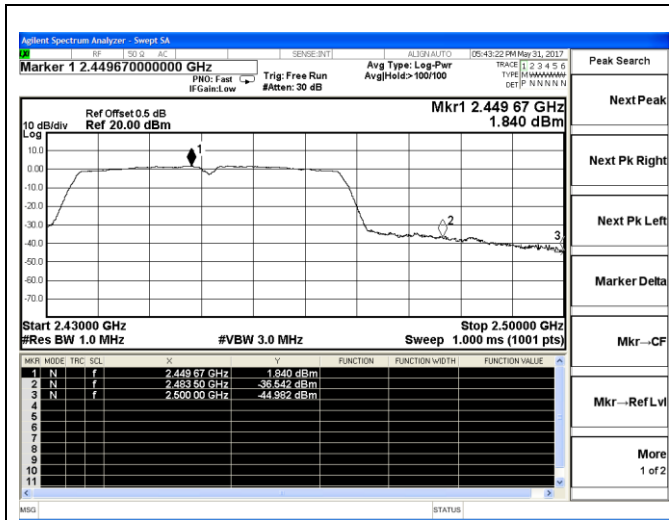
802.11n-HT20 High channel(Average)



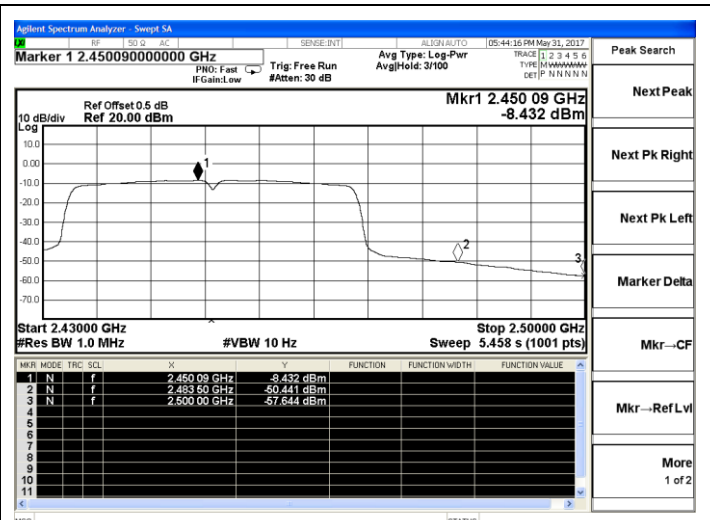
802.11n-HT40 Low channel(Peak)



802.11n-HT40 Low channel(Average)



802.11n-HT40 High channel(Peak)



802.11n-HT40 High channel(Average)

5.6. Conducted Spurious Emissions and Band Edges Test

5.6.1. Standard Applicable

According to §15.247 (d): 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.6.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
RB / VB (Emission in restricted band)	100KHz/300KHz
RB / VB (Emission in non-restricted band)	100KHz/300KHz

5.6.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9 kHz to 26.5GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

5.6.4. Test Setup Layout

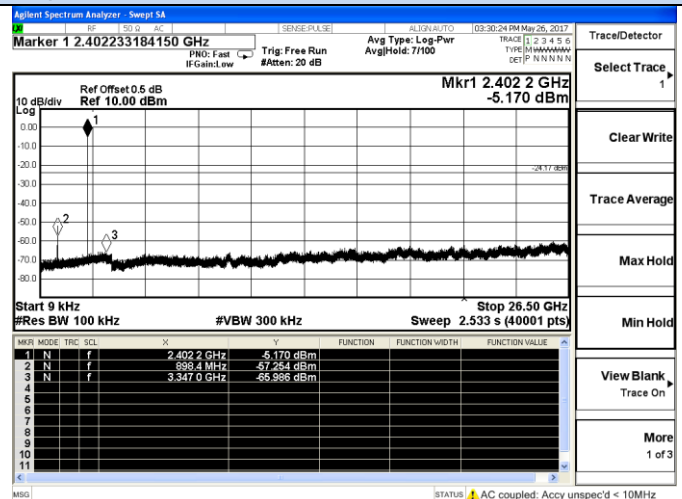
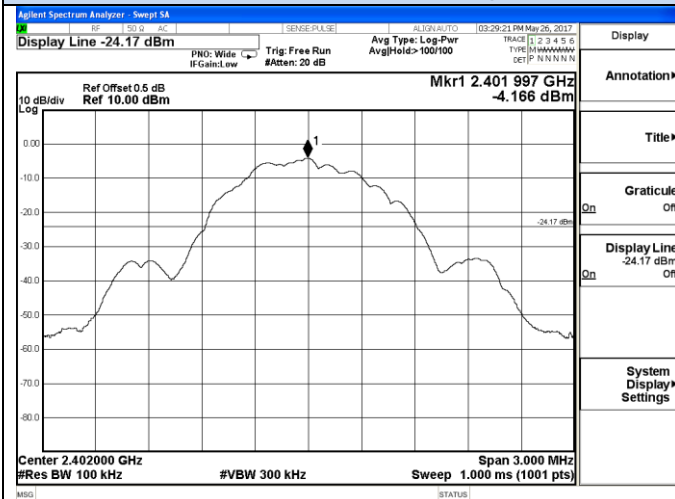
This test setup layout is the same as that shown in section 5.4.4.

5.6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

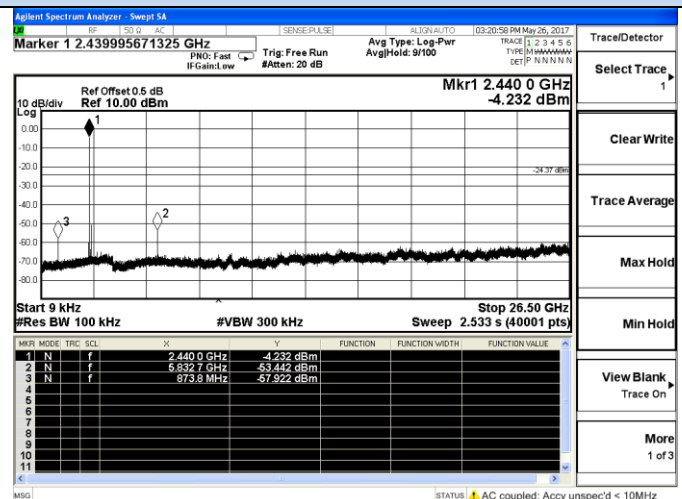
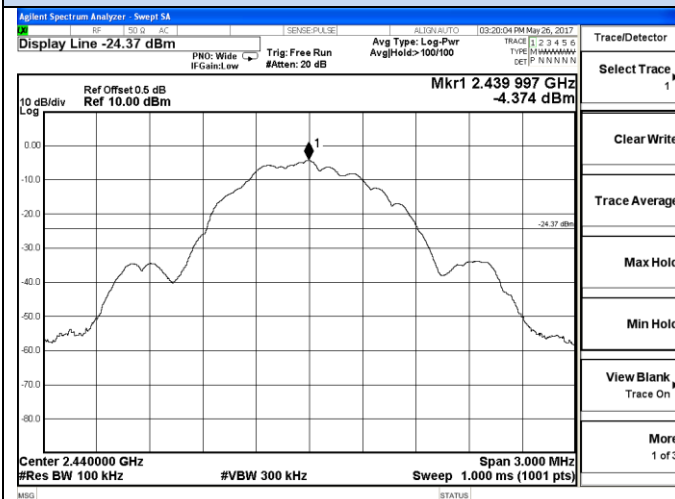
5.6.6. Test Results of Conducted Spurious Emissions

Test plot of Conducted Spurious Emission



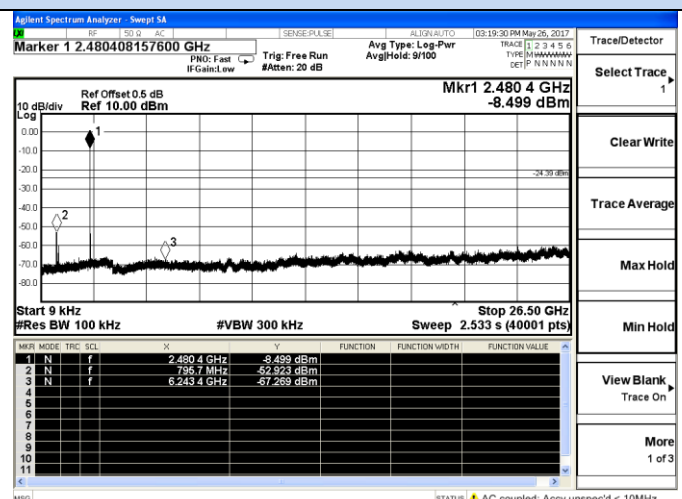
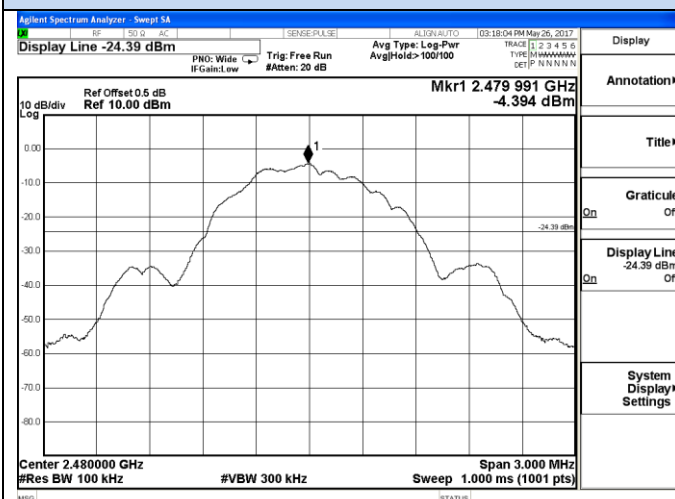
BLE 4.0-Low channel Reference

BLE 4.0-Low channel



BLE 4.0-Middle channel Reference

BLE 4.0-Middle channel



BLE 4.0-High channel Reference

BLE 4.0-High channel