Test Report of FCC CFR 47 Part 15 Subpart C

On Behalf of

Betterspot technologies inc.
Vancouver Main, Vancouver BC, V6B 3Z7

Product Name:	**Betterspot Smart VPN Router**
Model/Type No.:	**Betterspot1**
FCC ID:	**2AL3L-BS76201**
Prepared By:	**Shenzhen Hongcai Testing Technology Co., Ltd.** 1st-3rd Floor, Building C, Shuanghuan Xin Yi Dai Hi-Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen, Guangdong, China Tel: +86-755-86337020 Fax:+86-755-86337028
Report Number:	HCT17HR-1202E-1
Tested Date:	June 2~July 8, 2017
Issued Date:	July 10, 2017
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EMC Technical Supervisor

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	**Betterspot technologies inc.**
Address of Applicant:	Vancouver Main, Vancouver BC, V6B 3Z7
Manufacturer:	**GL Technologies (Hong Kong) Limited**
Address of Manufacturer:	Unit 210D, 2/F, Enterprise Place Hong Kong Science Park, Shatin, N.T. Hong Kong, China

General Description of E.U.T

Items	Description
EUT Description:	**Betterspot Smart VPN Router**
Model No.:	Betterspot1
Trade Mark:	Betterspot
Frequency Band:	IEEE 802.11b : 2412MHz～2462MHz; IEEE 802.11g : 2412MHz～2462MHz; IEEE 802 11n HT20 : 2412MHz～2462MHz; IEEE 802 11n HT40 : 2422MHz～2452MHz;
Channel Spacing:	IEEE 802.11b : 5MHz IEEE 802.11g : 5MHz IEEE 802 11n HT20 : 5MHz IEEE 802 11n HT40 : 5MHz
Number of Channels:	IEEE 802.11b :11 Channels; IEEE 802.11g :11 Channels; IEEE 802 11n HT20 :11 Channels; IEEE 802 11n HT40 :7 Channels;
Transmit Data Rate:	maximum of 150Mbps
Type of Modulation:	IEEE 802.11b：CCK IEEE 802.11g：OFDM IEEE 802 11n HT20：OFDM IEEE 802 11n HT40：OFDM
Antenna Type:	Printed PCB Antenna
Antenna Gain:	Chain1:2dBi Chain2:2dBi

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Power Rating:	Input: DC 5V from adapter

Remark:* *The test data gathered are from the production sample provided by the manufacturer.*

1.2 Test 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 V04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247.

RSS-GEN Issue 4: General Requirements for Compliance of Radio Apparatus.

RSS 247 Issue 2: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices.

1.3 Test Facility

All measurement required was performed at laboratory of Shenzhen CTL Testing Technology Co., Ltd. Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen, China.
There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

FCC – Registration No.: 970318
Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December, 2013.

IC Registration No.: 9618B
The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

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2. SYSTEM TEST CONFIGURATION

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 calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions: The EUT is placed on the table, which is 0.8 m above ground plane According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is a placed on as turntable, 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 ANSI C63.10-2013.

2.4 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 CTL Testing Technology 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.

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Transmitter power conducted	+/- 0.57 dB
Transmitter power Radiated	+/- 2.20 dB
Conducted spurious emission 9KHz-40 GHz	+/- 2.20 dB
Occupied Bandwidth	+/- 0.01 dB
Power Line Conducted Emission	+/- 3.20 dB
Radiated Emission	+/- 4.32 dB

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

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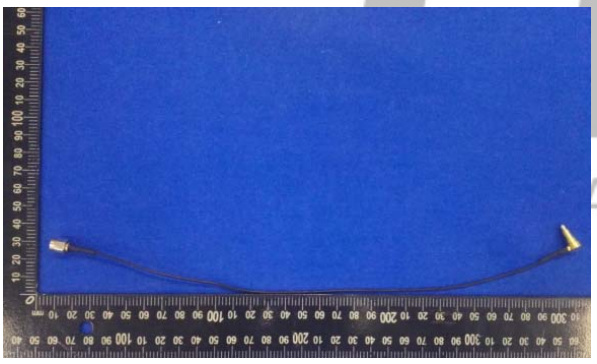
2.5 Measure Results Explanation Example

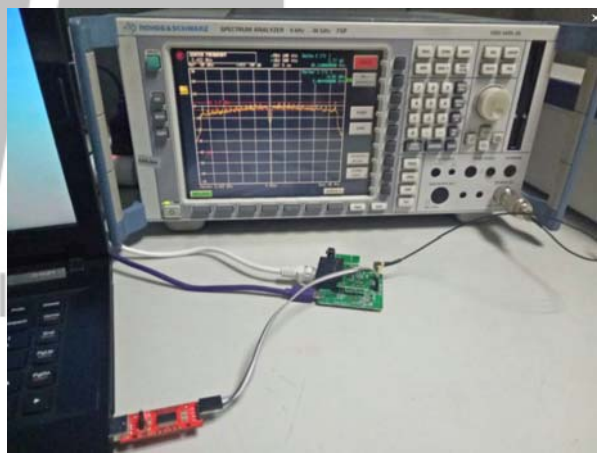
For all conducted test items:
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable less and attenuator factor.
Offset= RF cable less+ attenuator factor.

Note: Using a temporary antenna connector for the EUT when the conducted measurements are performed.

Equipment	Manufacturer	Model No.	Frequency range(GHz)	Attenuation values(dBm)
Line	Zhenjiang south electronic	RG317	1-12	0.09
			<1G	0.04
			>12G	1.01
Connector	Zhenjiang south electronic	SMA-K/N-J	1-12	0.01
			<1G	0.005
			>12G	0.03





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2.6. Information of EUT configuration for test

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

Mode	Data rate (Mpbs) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	CH1	2412
	1	CH6	2437
	1	CH11	2462
IEEE 802.11g	6	CH1	2412
	6	CH6	2437
	6	CH11	2462
IEEE 802.11N HT20	6.5	CH1	2412
	6.5	CH6	2442
	6.5	CH11	2462
IEEE 802.11N HT40	13.5	CH3	2422
	13.5	CH6	2437
	13.5	CH9	2452
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			

2.7 List of Measuring Equipments Used

Test equipments list of Shenzhen CTL Testing Technology Co., Ltd.

No.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	EMI Test Receiver	R&S	ESCI	100687	2016-7-25	2017-7-24
2	EMI Test Receiver	R&S	ESPI	100097	2016-10-1	2017-10-31
3	Amplifier	HP	8447D	1937A02492	2016-7-25	2017-7-24
4	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2016-7-25	2017-7-24
5	RF POWER AMPLIFIER	FRANKONIA	FLL-75	1020A1109	2016-7-25	2017-7-24
6	6DB Attenuator	FRANKONIA	N/A	1001698	2016-7-25	2017-7-24
7	10dB attenuator	ELECTRO-METRICS	EM-7600	836	2016-7-25	2017-7-24
8	Spectrum Analyzer	R&S	FSP	100397	2016-10-1	2017-10-31
9	Broadband preamplifier	SCH WARZBECK	BBV9718	9718-182	2016-7-25	2017-7-24
10	Power Sensor	Anritsu	ML2438A	1241002	2016-7-25	2017-7-24
11	Power Sensor	Anritsu	MA2411B	1207366	2016-7-25	2017-7-24
12	Horn Antenna	SCHWARZBECK	BBHA 9120D	0437	2016-7-25	2017-7-24
13	Horn Antenna	SCHWARZBECK	BBHA9170	0483	2016-7-25	2017-7-24

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3. SUMMARY OF Test RESULTS

FCC/IC Rules	Description of Test	Result
FCC §15.207 IC RSS-GEN Clause 8.8	AC Power Line Conducted Emission	Pass
FCC §15.247(b) IC RSS-247 Issue2 Clause 5.4 (4)	Output Power Measurement	Pass
FCC §15.247(e) IC RSS-247 Issue2 Clause 5.2 (2)	Power Spectral Density	Pass
FCC §15.247(a) IC RSS-247 Issue2 Clause 5.2 (1) IC RSS-GEN Clause 6.6	6dB Bandwidth 99%Occupied Bandwidth	Pass
FCC §15.247 (d) IC RSS-247 Issue2 Clause 5.5	Conducted Spurious Emission	Pass
FCC §15.205 and §15.209 IC RSS-247 Issue2 Clause 5.5	Radiated Spurious Emission	Pass
FCC§15.247 (d) and §15.205 and §15.209 IC RSS-247 Issue2 Clause 5.5	Unwanted Emissions	Pass
FCC §15.203/15.247(b)/(c) IC RSS-GEN Clause 8.3	Antenna Requirement	Pass

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4. Test OF AC POWER LINE CONDUCTED EMISSION

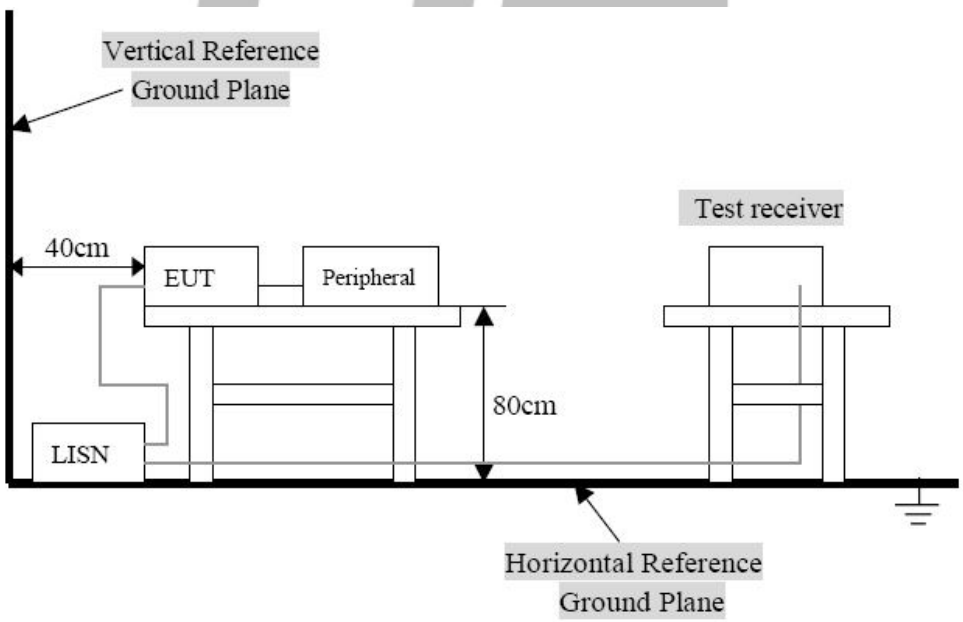
4.1 Applicable standard

Refer to FCC §15.207 and IC RSS-GEN Clause 8.8

For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

4.2 Test Setup Diagram



Remark: The EUT was connected to a 120 VAC/ 60Hz power source.

4.3 Test Result

Temperature (℃) : 23~25	EUT: Betterspot Smart VPN Router
Humidity (%RH): 45~58	M/N: Betterspot1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuously Tx Mode

Test result: PASS

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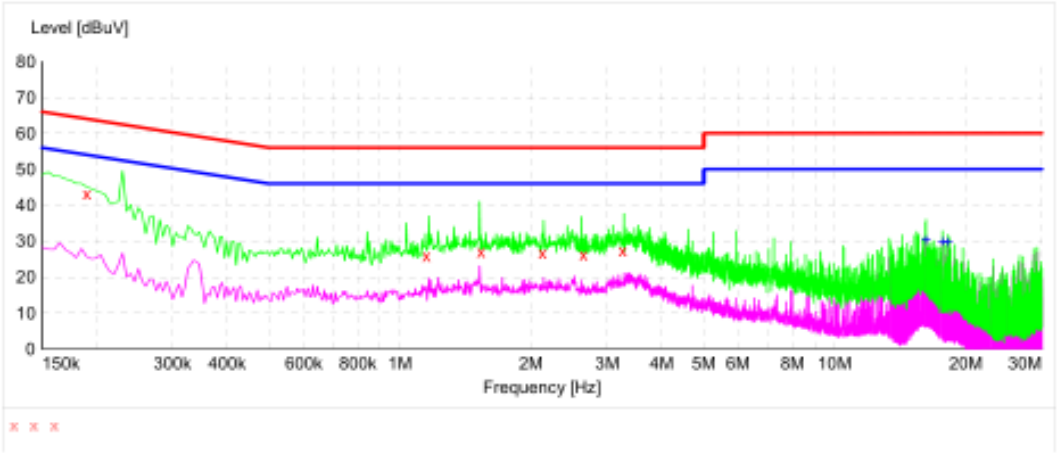
Conducted Emission Test Data

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	Shielded Room
Operator:	Li
Test Specification:	AC 120V/60Hz
Comment:	Live Line
Start of Test:	Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "YG081403_fin"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.190000	43.10	15.0	64	20.9	QP	L1	GND
1.150000	25.90	11.0	56	30.1	QP	L1	GND
1.535000	27.00	12.2	56	29.0	QP	L1	GND
2.125000	26.70	13.1	56	29.3	QP	L1	GND
2.640000	26.30	12.6	56	29.7	QP	L1	GND
3.245000	27.30	12.5	56	28.7	QP	L1	GND

MEASUREMENT RESULT: "YG081403_fin2"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
16.230000	30.40	13.4	50	19.6	AV	L1	GND
17.695000	29.90	13.1	50	20.1	AV	L1	GND
18.245000	29.70	13.1	50	20.3	AV	L1	GND

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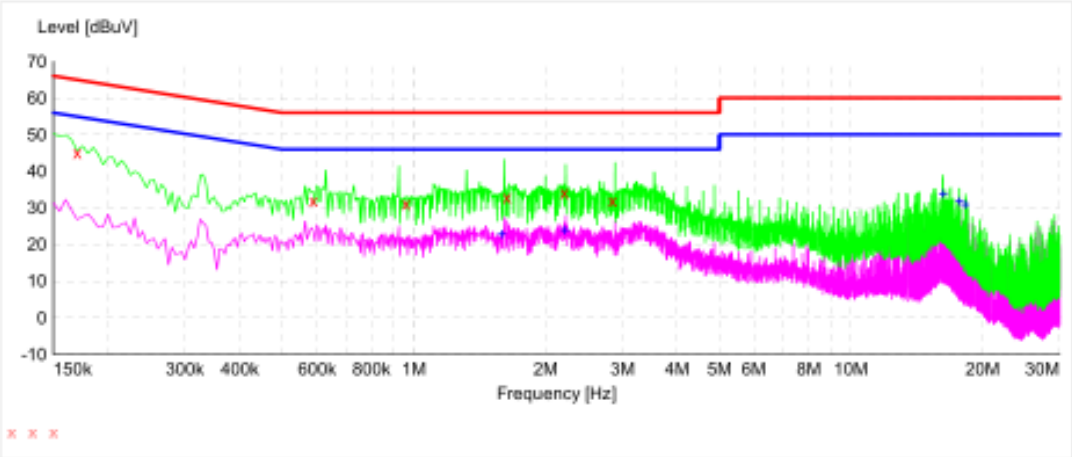
Conducted Emission Test Data

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	Shielded Room
Operator:	Li
Test Specification:	AC 120V/60Hz
Comment:	Neutral Line
Start of Test:	Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "YG081404_fin"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	45.10	15.2	65	19.9	QP	N	GND
0.590000	32.00	10.4	56	24.0	QP	N	GND
0.960000	31.10	10.4	56	24.9	QP	N	GND
1.635000	32.90	12.4	56	23.1	QP	N	GND
2.210000	34.10	13.0	56	21.9	QP	N	GND
2.845000	32.00	12.4	56	24.0	QP	N	GND

MEASUREMENT RESULT: "YG081404_fin2"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
1.590000	22.70	12.3	46	23.3	AV	N	GND
2.220000	23.90	13.0	46	22.1	AV	N	GND
16.230000	33.80	13.4	50	16.2	AV	N	GND
17.695000	31.80	13.1	50	18.2	AV	N	GND
18.245000	30.90	13.1	50	19.1	AV	N	GND

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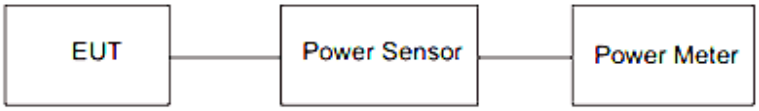
5. Output Power Measurement

5.1 Applicable standard

Refer to FCC §15.247 (b) and IC RSS-247 Issue2 Clause 5.4 (d).
KDB558074 D01 V04 Section 9.0

The maximum permissible conducted output power is 1Watt.

5.2 EUT Setup



5.3 Test Equipment List and Details

See section 2.7.

5.4 Test Procedure

☒ Maximum Peak Conducted Output Power

☐ Spectrum analyzer

1) Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
2) Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
3) Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

☒ Power meter

A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

☐ Maximum Conducted Average Output Power (For reference only)

☐ Power meter

A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

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5.5 Test Result

Temperature (℃) : 22~23	EUT: Betterspot Smart VPN Router
Humidity (%RH): 50~54	M/N: Betterspot1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuously Tx Mode

Mode	Test CH	Ant. Port	Peak power (dBm)	Total Peak power (dBm)	Limit (dBm)	Result
802.11b	Low	Chain 1	16.35	19.08	30.00	Pass
		Chain 2	15.77			
	Mid	Chain 1	17.96	19.68	30.00	Pass
		Chain 2	14.85			
	High	Chain 1	16.39	19.03	30.00	Pass
		Chain 2	15.55			
802.11g	Low	Chain 1	13.15	16.02	30.00	Pass
		Chain 2	13.26			
	Mid	Chain 1	14.05	16.63	30.00	Pass
		Chain 2	13.14			
	High	Chain 1	12.91	16.02	30.00	Pass
		Chain 2	12.91			
802.11n20	Low	Chain 1	13.63	16.02	30.00	Pass
		Chain 2	13.33			
	Mid	Chain 1	12.42	15.44	30.00	Pass
		Chain 2	12.44			
	High	Chain 1	12.73	14.14	30.00	Pass
		Chain 2	12.47			
802.11n40	Low	Chain 1	9.53	12.55	30.00	Pass
		Chain 2	9.53			
	Mid	Chain 1	8.93	11.76	30.00	Pass
		Chain 2	8.55			
	High	Chain 1	8.81	12.04	30.00	Pass
		Chain 2	9.52			

Remark: The Total Peak Power (dBm) = $10*\log\{10^{(\text{Chain1 Peak Power }/10)}+10^{(\text{Chain 2 Peak Power }/10)}\}$.

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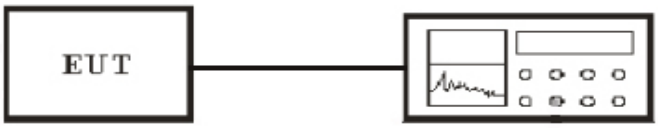
6. Test of Peak Power Spectral Density

6.1 Applicable standard

Refer to FCC §15.247 (e) and IC RSS-247 Issue2 Clause 5.2 (b).
KDB558074 D01 V04 Section 10.2 Method PKPSD

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.2 EUT Setup



Spectrum Analyzer

6.3 Test Equipment List and Details

See section 2.7.

6.4 Test Procedure

☒ Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.

1) Set the RBW = 3kHz, VBW = 10kHz.
2) Detector = Peak, Sweep time = auto couple.
3) Trace mode = max hold, allow trace to fully stabilize.
4) Use the peak marker function to determine the maximum amplitude level.

☐ Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.

1) Set the RBW = 100kHz, VBW = 300 kHz.
2) Detector = RMS, Sweep time = auto couple.
3) Perform the measurement over a single sweep.
4) Use the peak marker function to determine the maximum amplitude level.

6.5 Test Result

Temperature (℃) : 22~23	EUT: Betterspot Smart VPN Router
Humidity (%RH): 50~54	M/N: Betterspot1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuously Tx Mode

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IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Power Level in 3KHz RBW (dBm)			Maximum Limit (dBm)	Pass / Fail
		Chain 1	Chain2	Total		
Low	2412	-3.92	-4.77	-1.54	8	PASS
Middle	2437	-4.36	-5.52	-1.54	8	PASS
High	2462	-4.04	-4.52	-1.54	8	PASS

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Power Level in 3KHz RBW (dBm)			Maximum Limit (dBm)	Pass / Fail
		Chain 1	Chain2	Total		
Low	2412	-10.99	-12.27	-6.98	8	PASS
Middle	2437	-13.39	-12.56	-6.99	8	PASS
High	2462	-12.25	-11.94	-6.98	8	PASS

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Power Level in 3KHz RBW (dBm)			Maximum Limit (dBm)	Pass / Fail
		Chain 1	Chain2	Total		
Low	2412	-11.27	-11.13	-6.97	8	PASS
Middle	2437	-13.61	-13.54	-7.01	8	PASS
High	2462	-12.44	-13.74	-7.02	8	PASS

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Power Level in 3KHz RBW (dBm)			Maximum Limit (dBm)	Pass / Fail
		Chain 1	Chain2	Total		
Low	2422	-16.71	-16.10	-8.22	8	PASS
Middle	2437	-17.49	-16.55	-8.23	8	PASS
High	2452	-16.60	-15.51	-8.22	8	PASS

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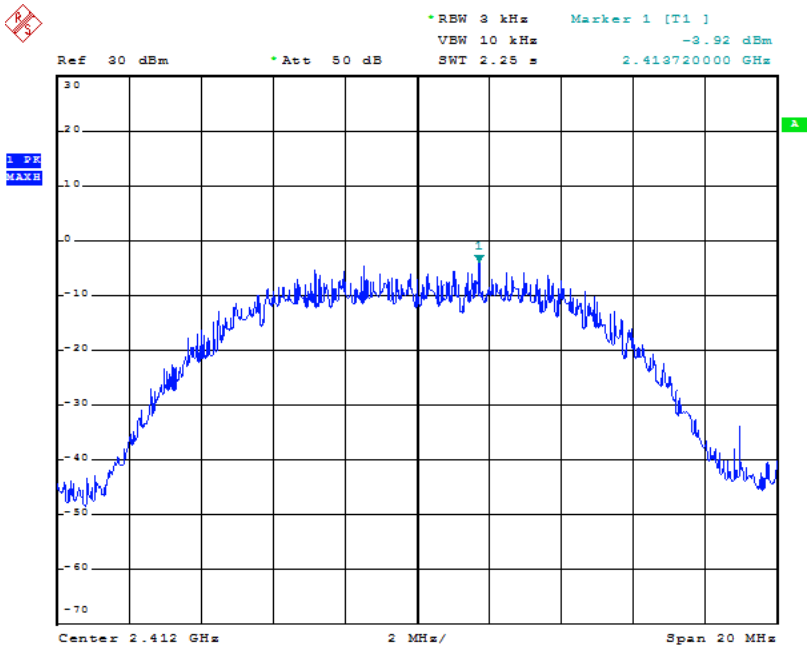
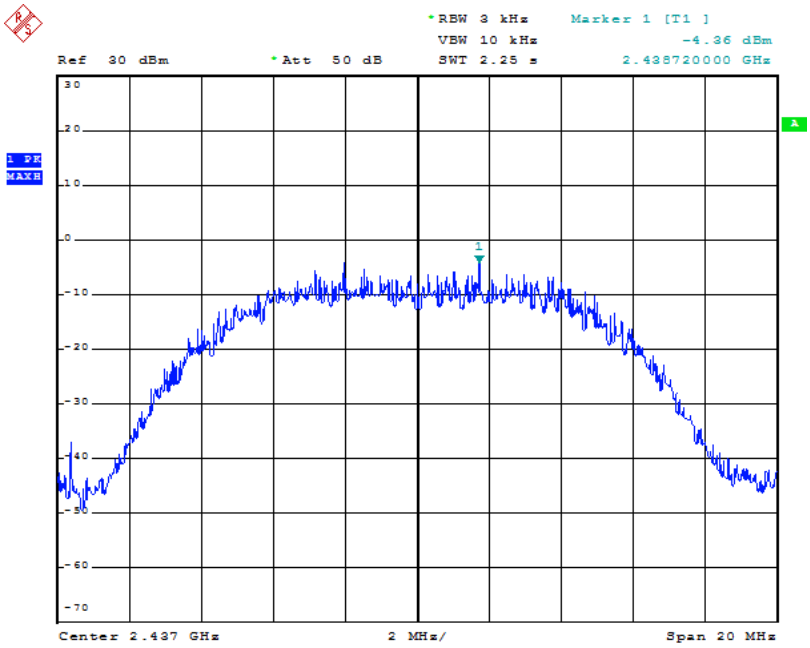
CH1

POWER SPECTRAL DENSITY (IEEE 802.11b MODE CH Low)



POWER SPECTRAL DENSITY (IEEE 802.11b MODE CH Mid)



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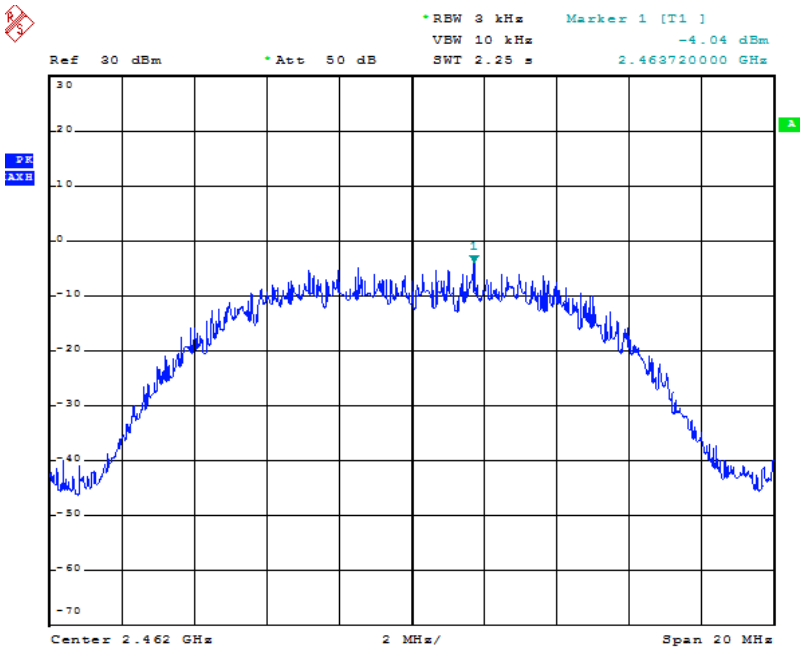
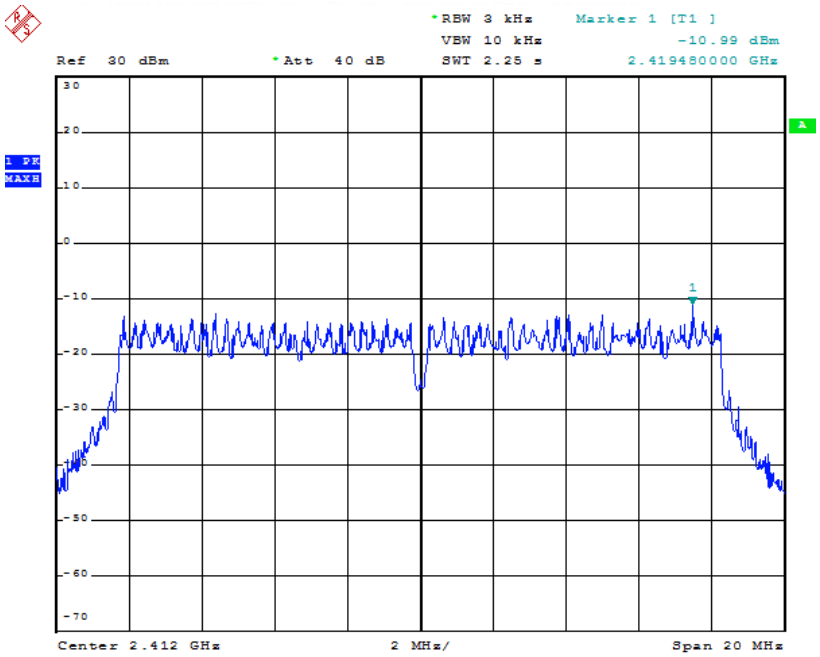
POWER SPECTRAL DENSITY (IEEE 802.11b MODE CH High)



POWER SPECTRAL DENSITY (IEEE 802.11g MODE CH Low)



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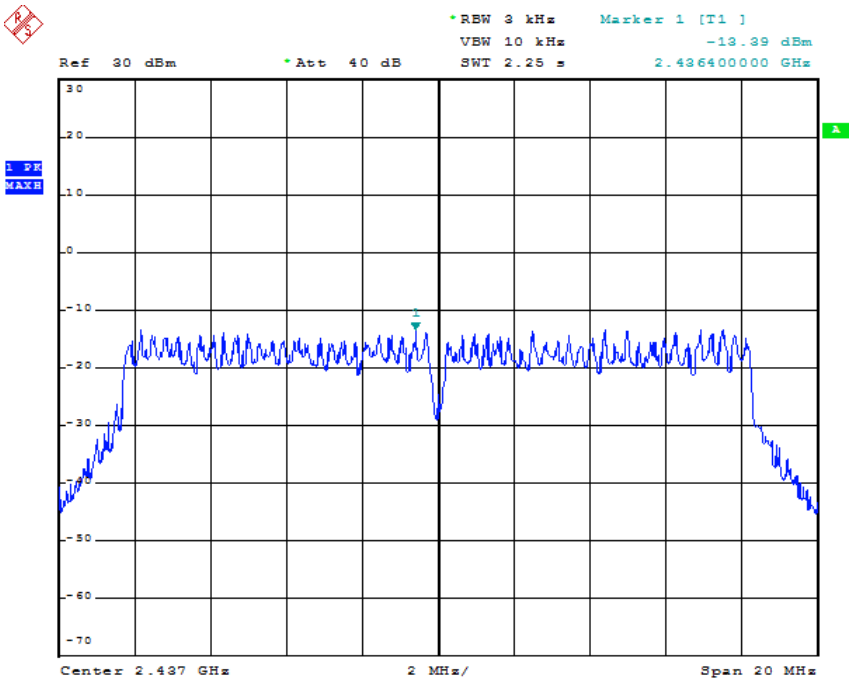
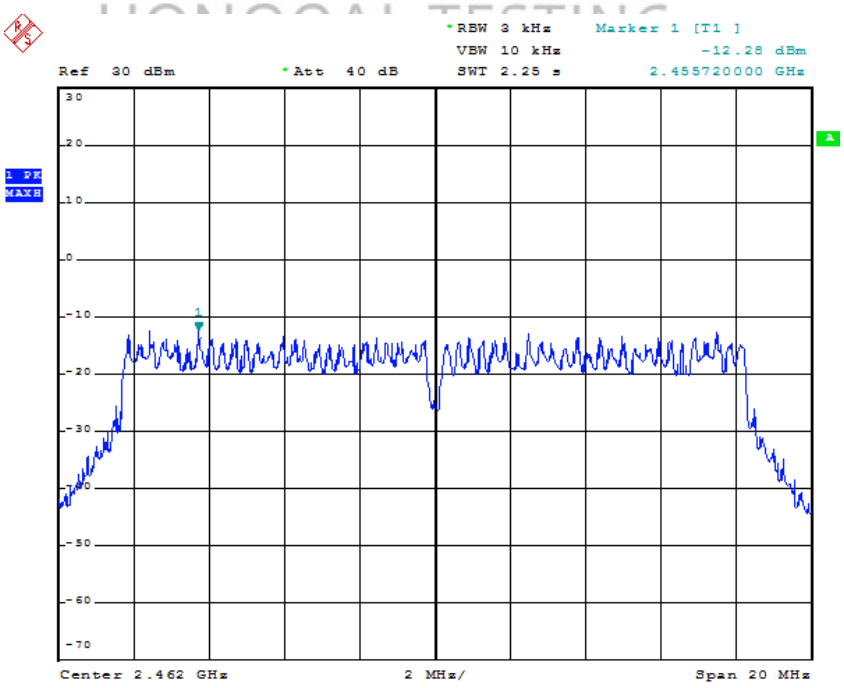
POWER SPECTRAL DENSITY (IEEE 802.11g MODE CH Mid)



POWER SPECTRAL DENSITY (IEEE 802.11g MODE CH High)



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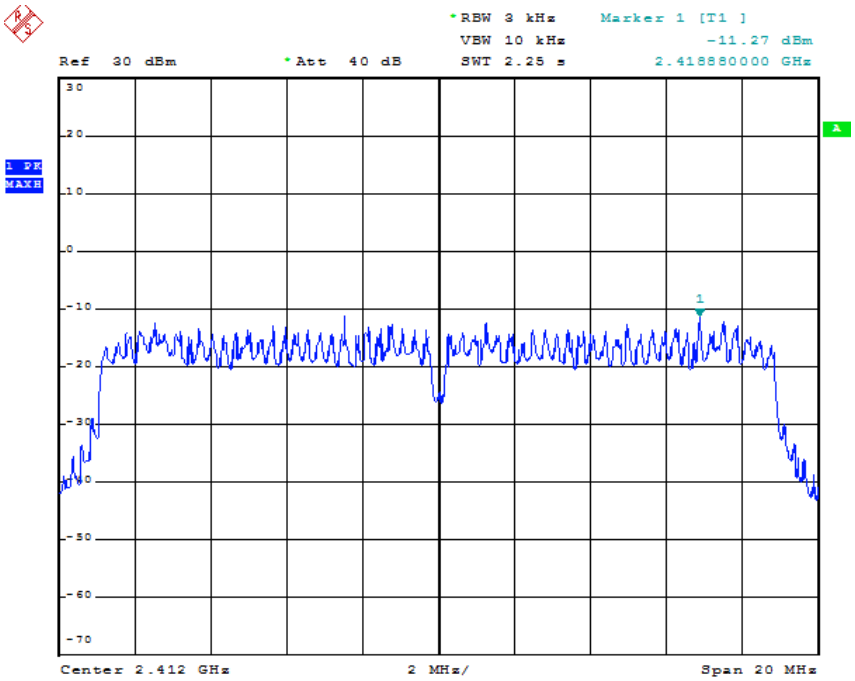
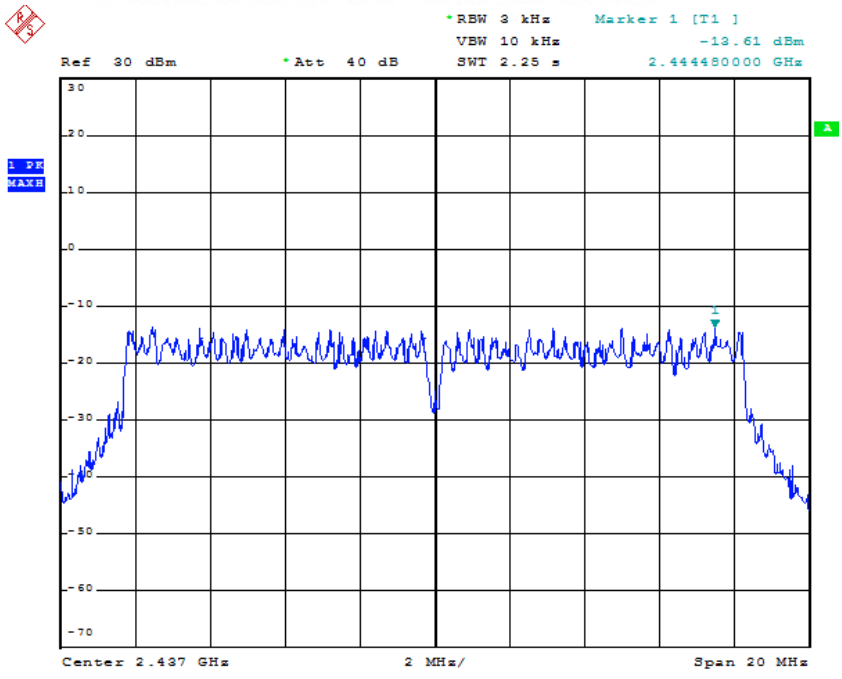
POWER SPECTRAL DENSITY (IEEE 802.11n HT20 MODE CH Low)



POWER SPECTRAL DENSITY (IEEE 802.11n HT20 MODE CH Mid)



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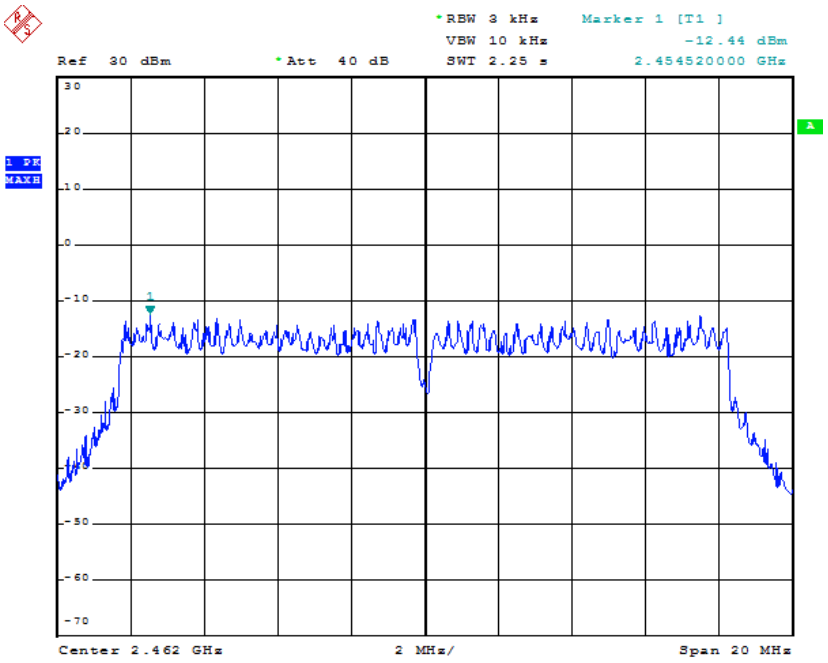
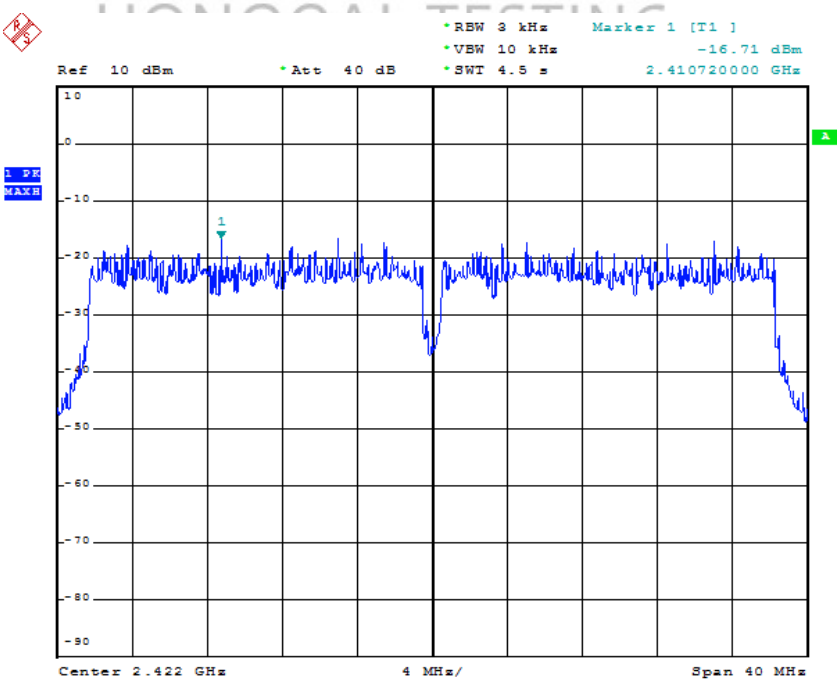
POWER SPECTRAL DENSITY (IEEE 802.11n HT20 MODE CH High)



POWER SPECTRAL DENSITY (IEEE 802.11n HT40 MODE CH Low)



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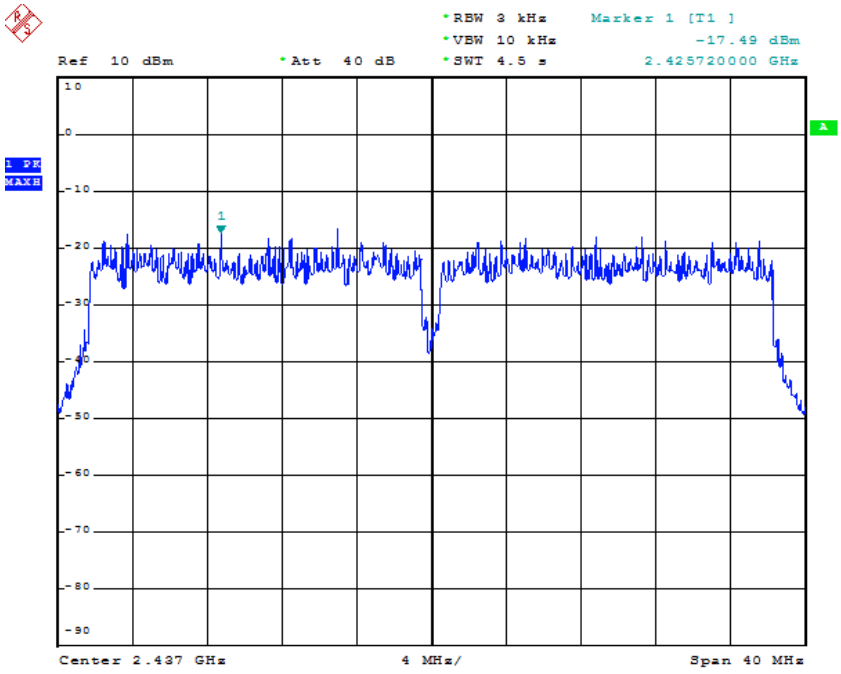
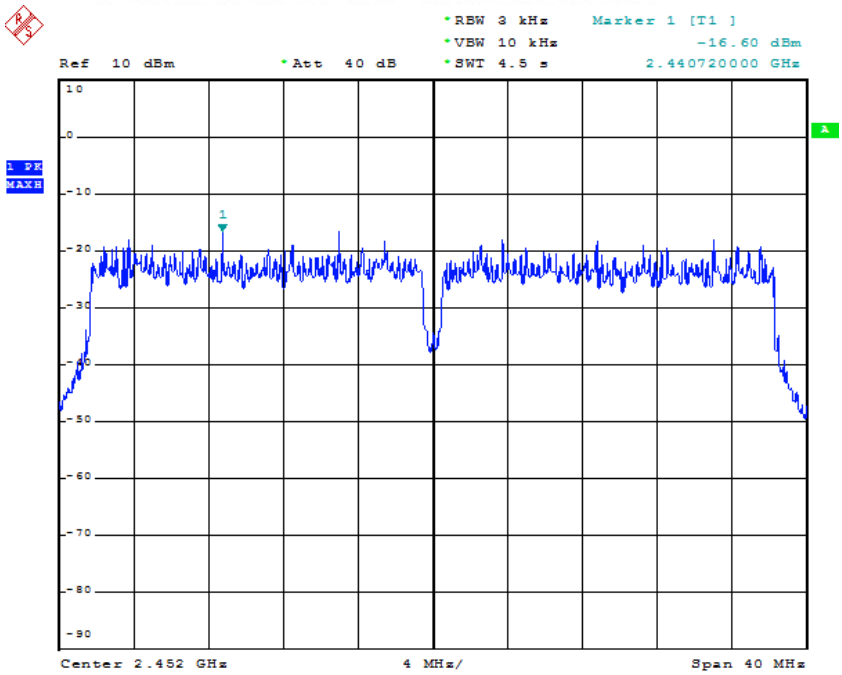
POWER SPECTRAL DENSITY (IEEE 802.11n HT40 MODE CH Mid)



POWER SPECTRAL DENSITY (IEEE 802.11n HT40 MODE CH High)



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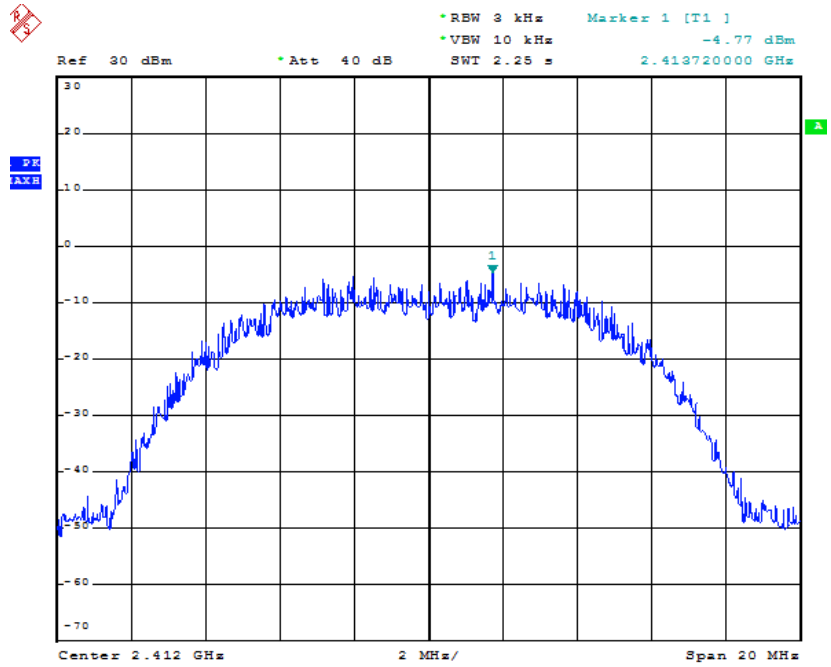
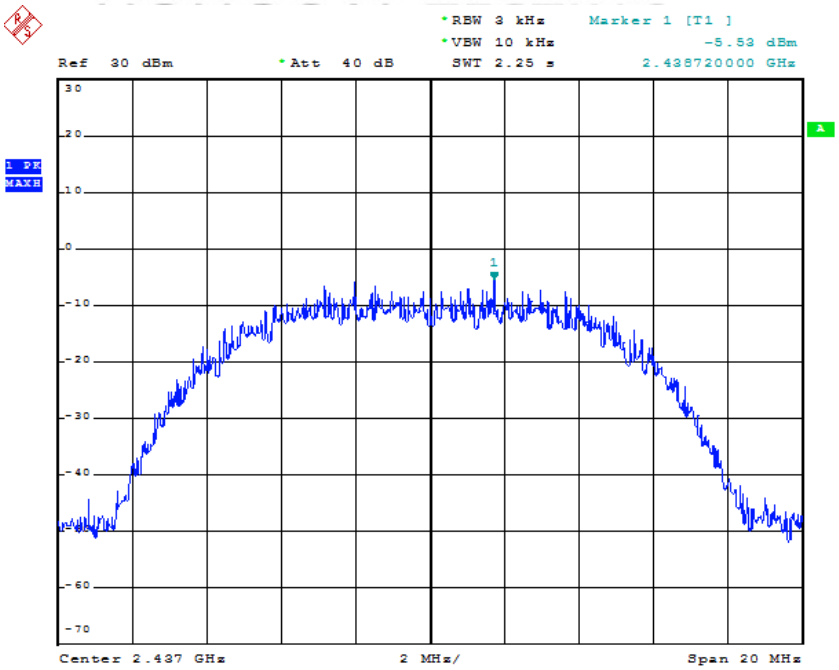
CH2

POWER SPECTRAL DENSITY (IEEE 802.11b MODE CH Low)



POWER SPECTRAL DENSITY (IEEE 802.11b MODE CH Mid)



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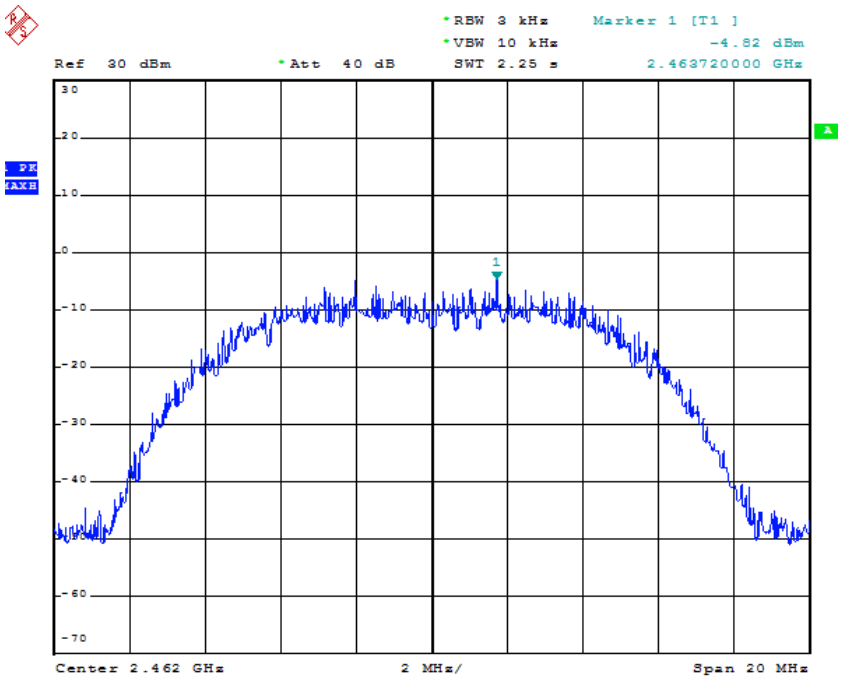
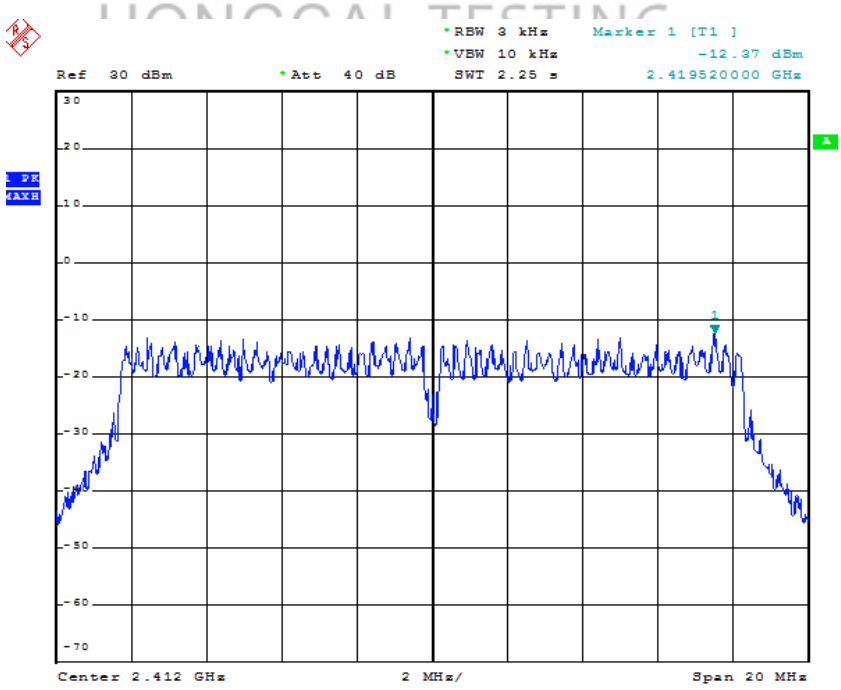
POWER SPECTRAL DENSITY (IEEE 802.11b MODE CH High)



POWER SPECTRAL DENSITY (IEEE 802.11g MODE CH Low)



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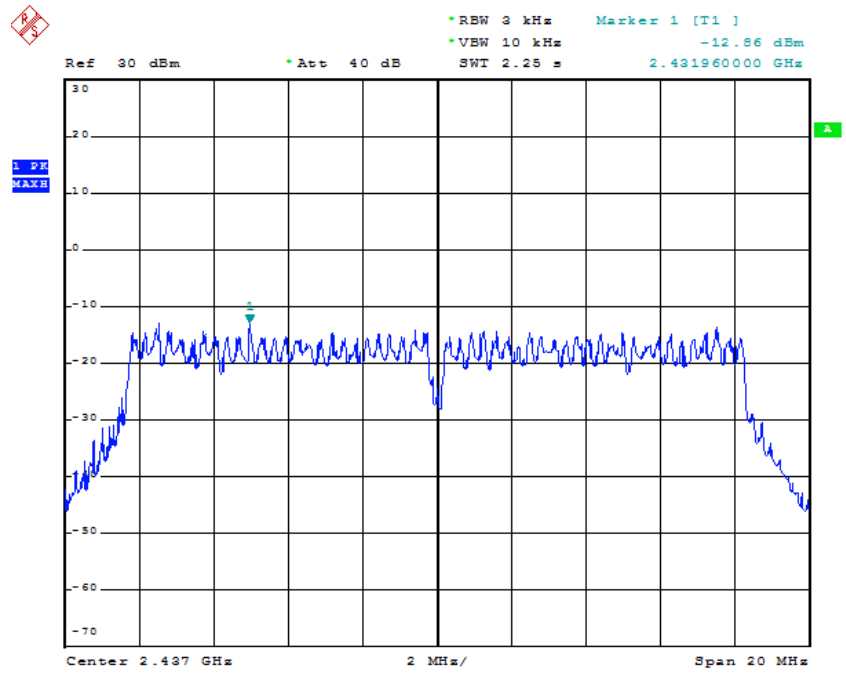
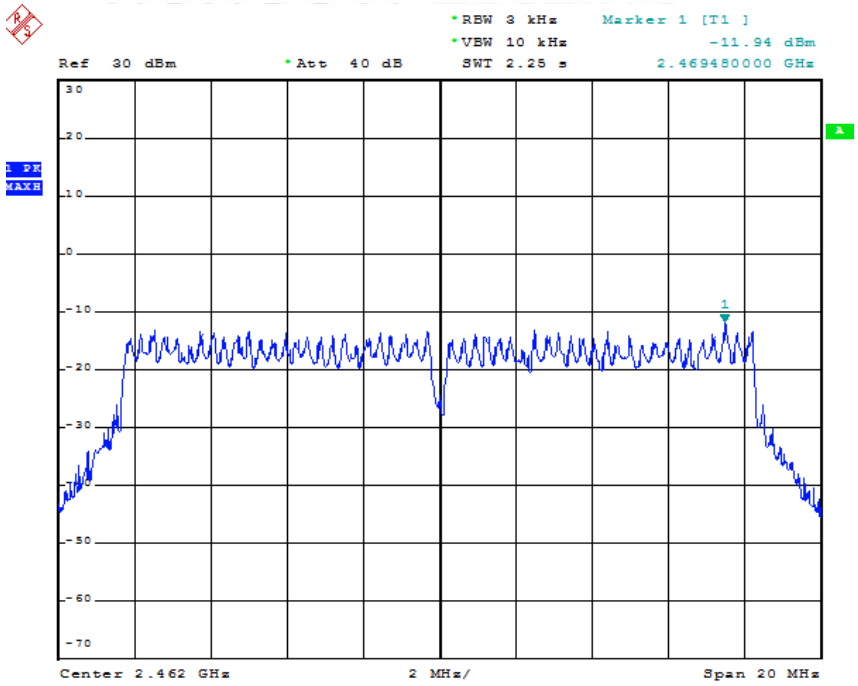
POWER SPECTRAL DENSITY (IEEE 802.11g MODE CH Mid)



POWER SPECTRAL DENSITY (IEEE 802.11g MODE CH High)



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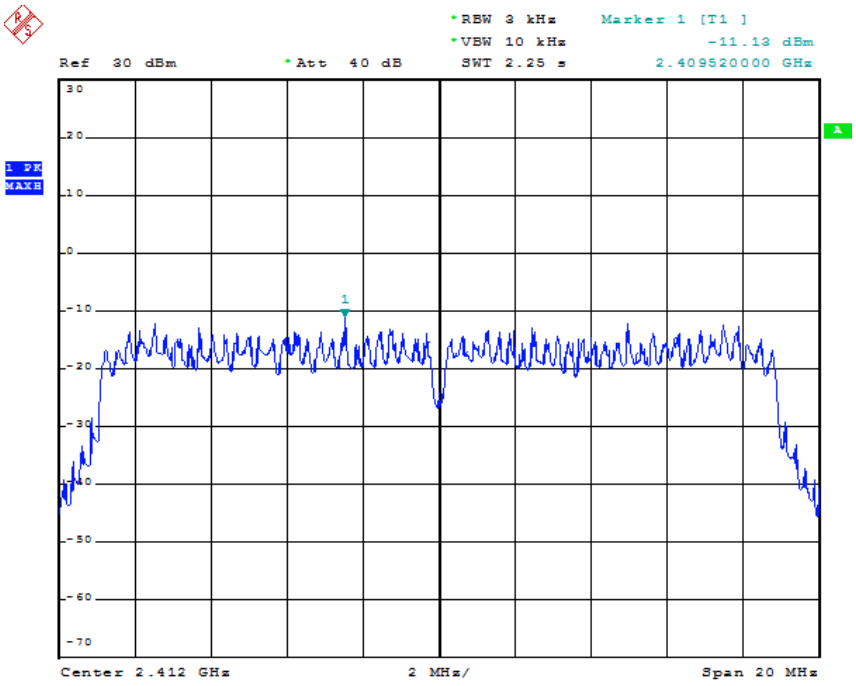
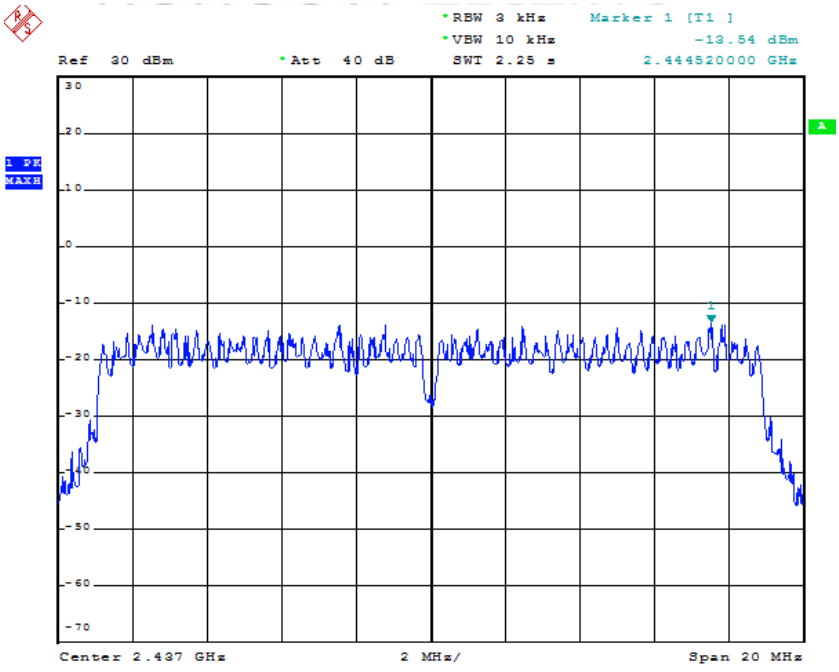
POWER SPECTRAL DENSITY (IEEE 802.11n HT20 MODE CH Low)



POWER SPECTRAL DENSITY (IEEE 802.11n HT20 MODE CH Mid)



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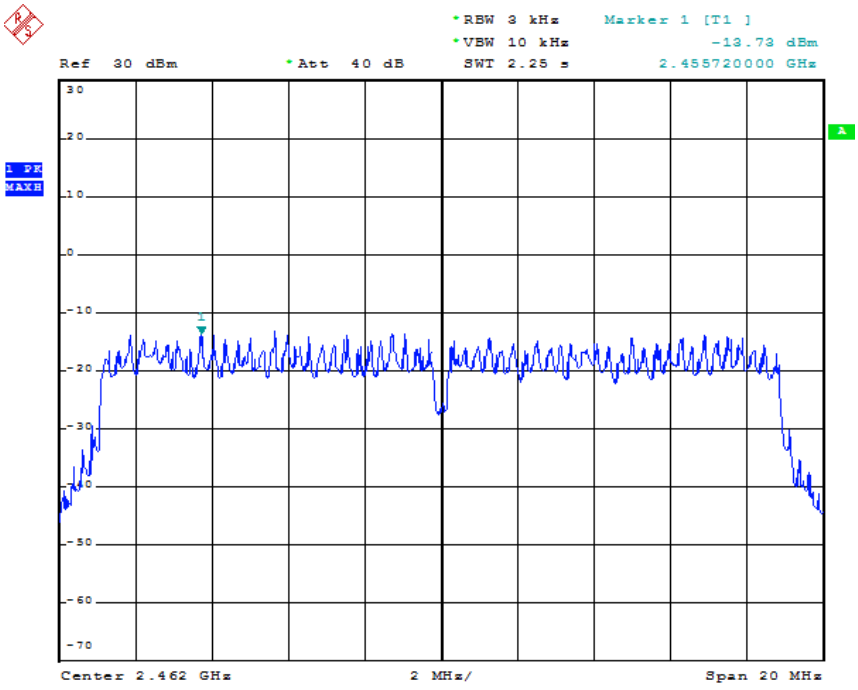
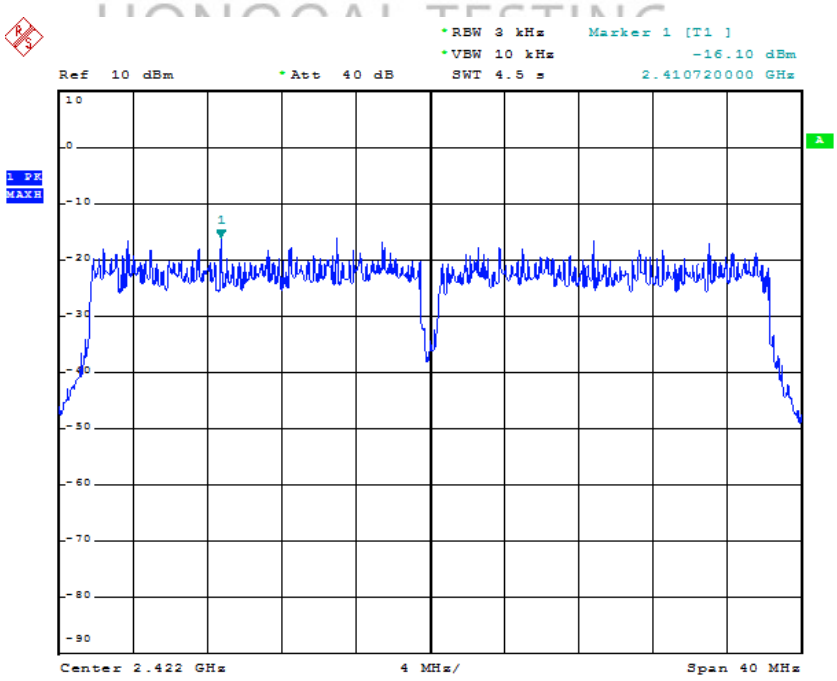
POWER SPECTRAL DENSITY (IEEE 802.11n HT20 MODE CH High)



POWER SPECTRAL DENSITY (IEEE 802.11n HT40 MODE CH Low)



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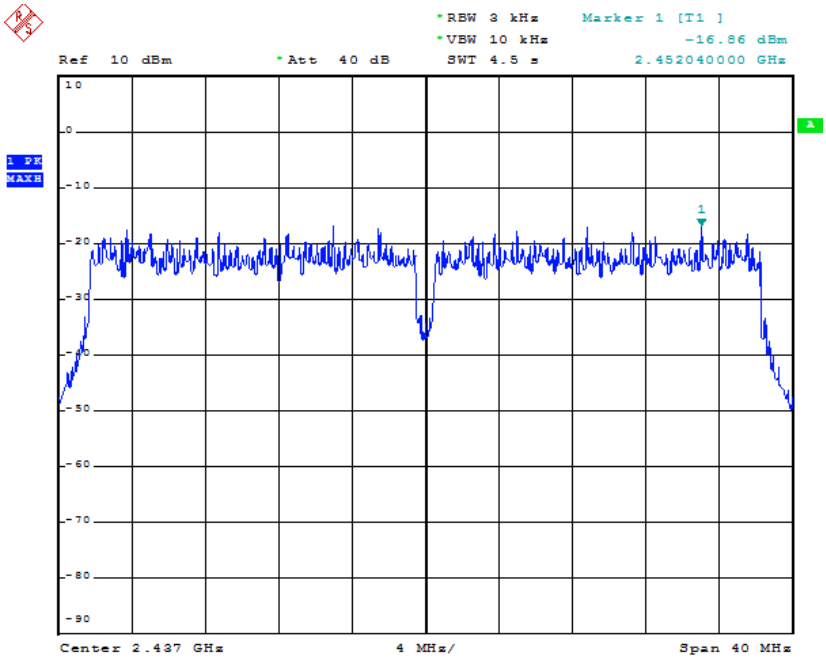
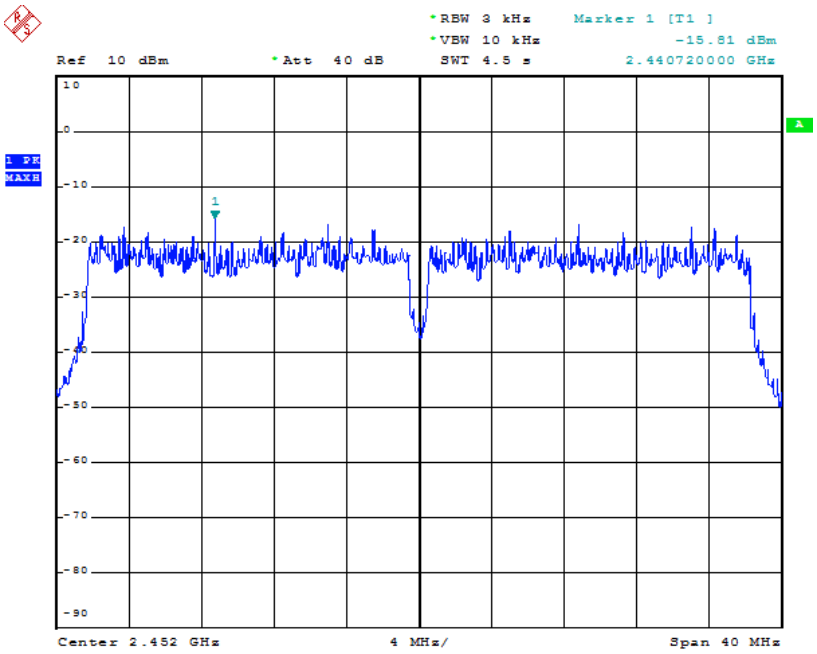
POWER SPECTRAL DENSITY (IEEE 802.11n HT40 MODE CH Mid)



POWER SPECTRAL DENSITY (IEEE 802.11n HT40 MODE CH High)



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7. Test of 6dB Bandwidth

7.1 Applicable standard

Refer to FCC §15.247 (a) (2) and IC RSS-247 Issue2 Clause 5.2 (1), IC RSS-GEN Clause 6.6
KDB558074 D01 V04 Section 8.2 Option 2

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

7.2 EUT Setup

Spectrum Analyzer

7.3 Test Equipment List and Details

See section 2.7.

7.4 Test Procedure

The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. The transmitter output was connected to a spectrum analyzer and the parameter was set as below:

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ⩾ 3 x 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) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.5 Test Result

Temperature (℃) : 22~23	EUT: Betterspot Smart VPN Router
Humidity (%RH): 50~54	M/N: Betterspot1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuously Tx Mode

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CH1

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	8.88	500	PASS
Middle	2437	8.84	500	PASS
High	2462	9.04	500	PASS

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.56	500	PASS
Middle	2437	16.56	500	PASS
High	2462	16.56	500	PASS

IEEE 802 11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17.64	500	PASS
Middle	2437	17.48	500	PASS
High	2462	17.68	500	PASS

IEEE 802 11n HT40 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2422	36.40	500	PASS
Middle	2437	36.44	500	PASS
High	2452	36.45	500	PASS

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CH2

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	9.04	500	PASS
Middle	2437	8.72	500	PASS
High	2462	8.96	500	PASS

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.56	500	PASS
Middle	2437	16.56	500	PASS
High	2462	16.56	500	PASS

IEEE 802 11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17.64	500	PASS
Middle	2437	17.60	500	PASS
High	2462	17.68	500	PASS

IEEE 802 11n HT40 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2422	36.40	500	PASS
Middle	2437	36.52	500	PASS
High	2452	36.40	500	PASS

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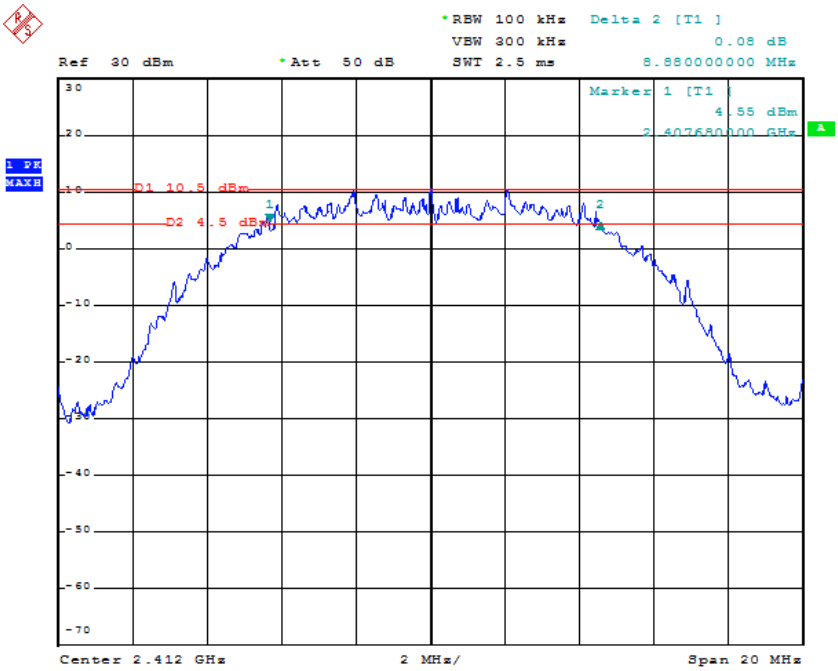
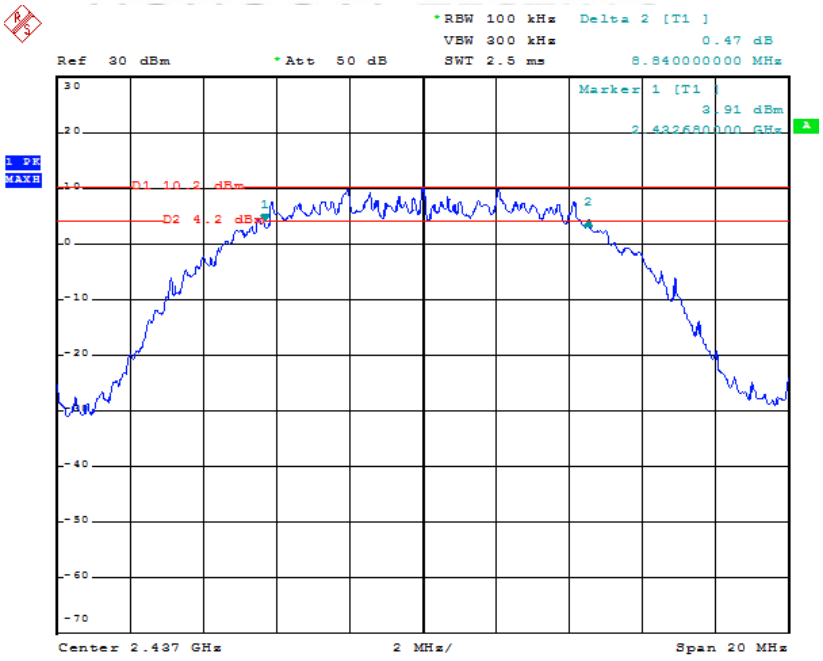
CH1

6dB BANDWIDTH (IEEE 802.11b MODE CH Low)



6dB BANDWIDTH (IEEE 802.11b MODE CH Mid)



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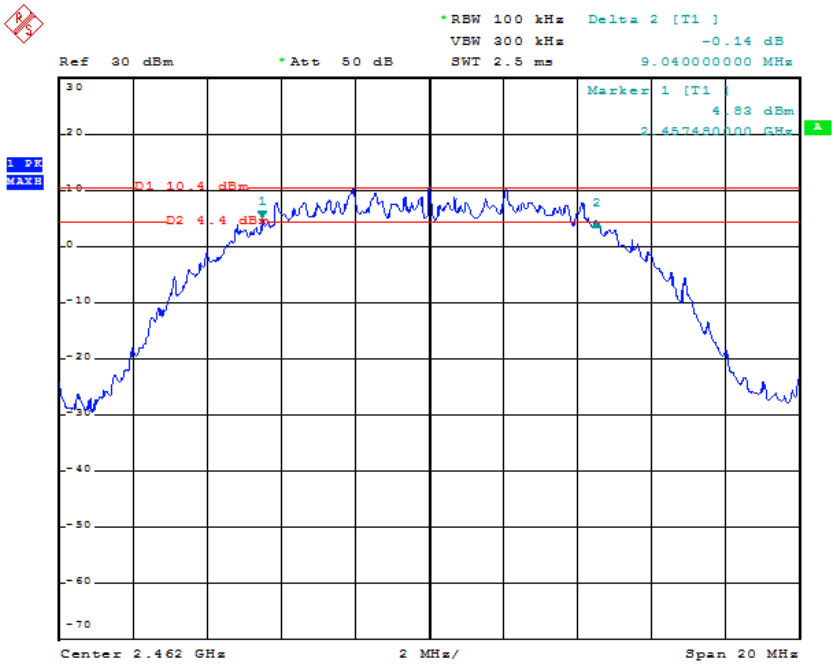
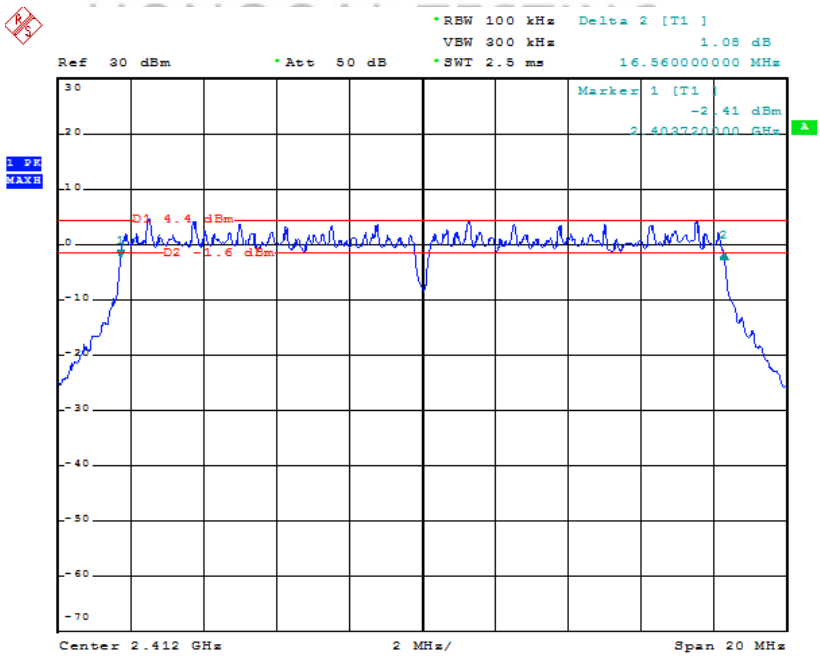
6dB BANDWIDTH (IEEE 802.11b MODE CH High)



6dB BANDWIDTH (IEEE 802.11g MODE CH Low)



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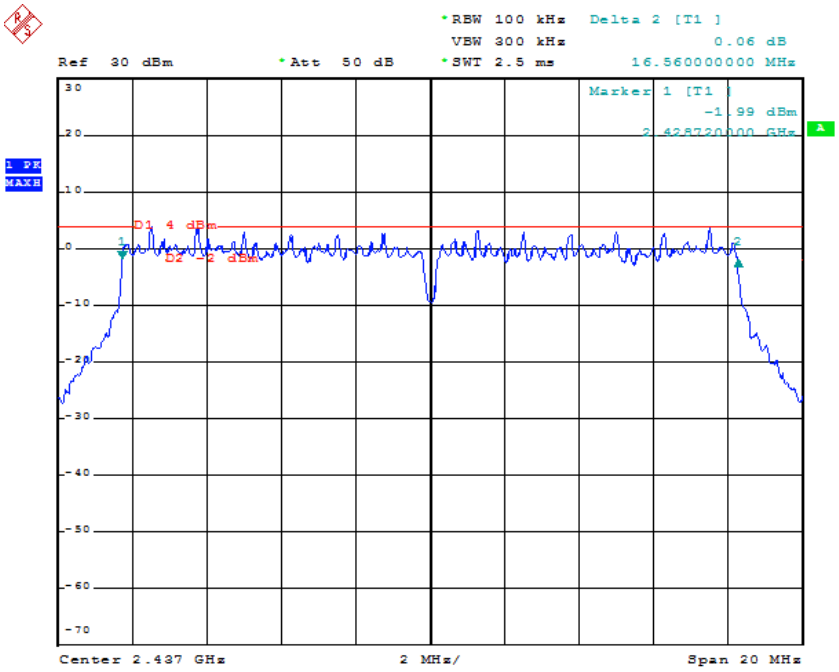
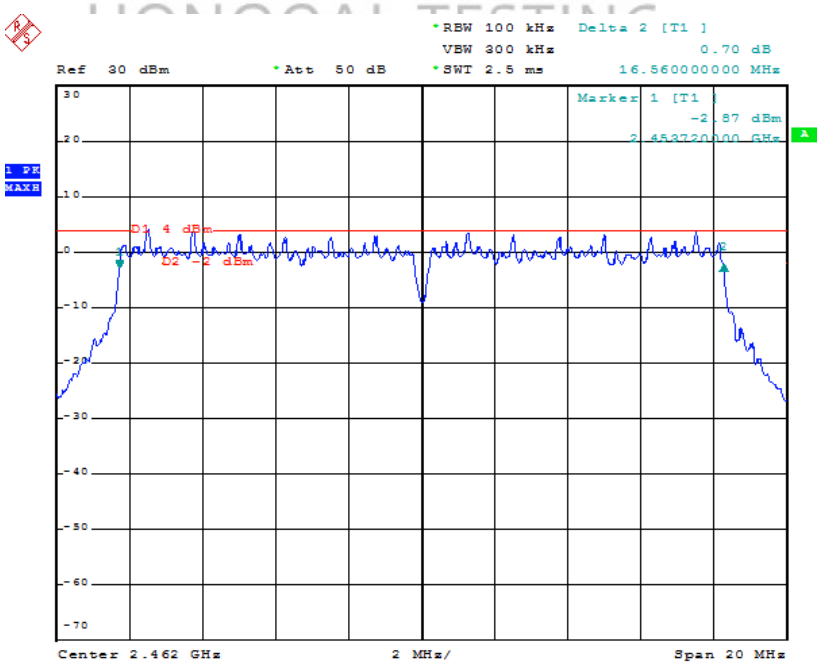
6dB BANDWIDTH (IEEE 802.11g MODE CH Mid)



6dB BANDWIDTH (IEEE 802.11g MODE CH High)



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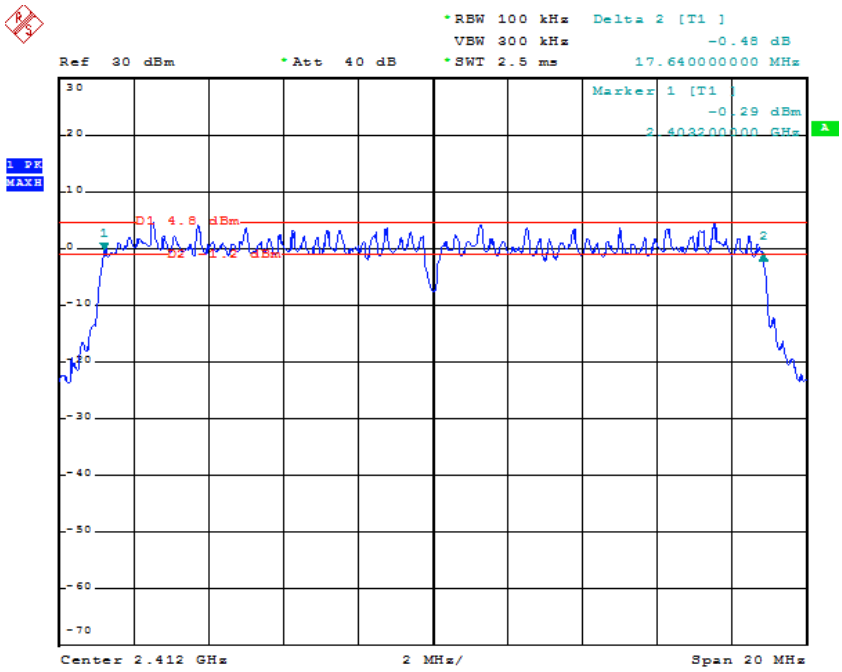
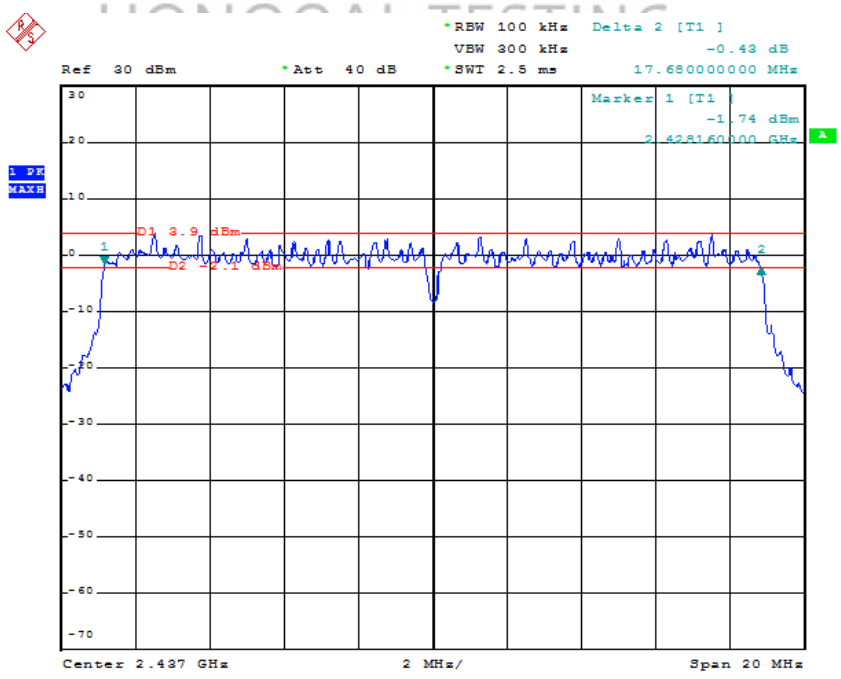
6dB BANDWIDTH (IEEE 802 11n HT20 MODE CH Low)



6dB BANDWIDTH (IEEE 802 11n HT20 MODE CH Mid)



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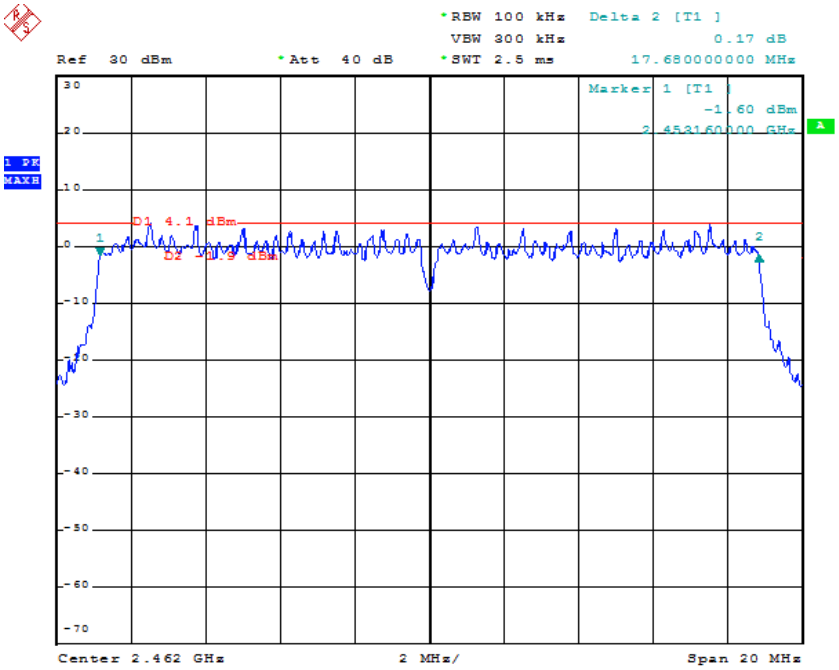
6dB BANDWIDTH (IEEE 802.11n HT20 MODE CH High)



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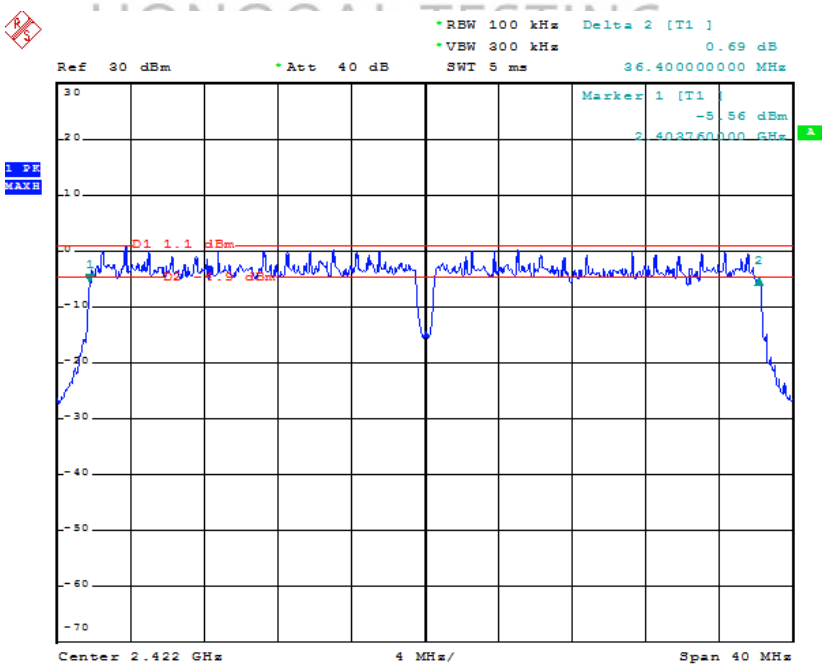

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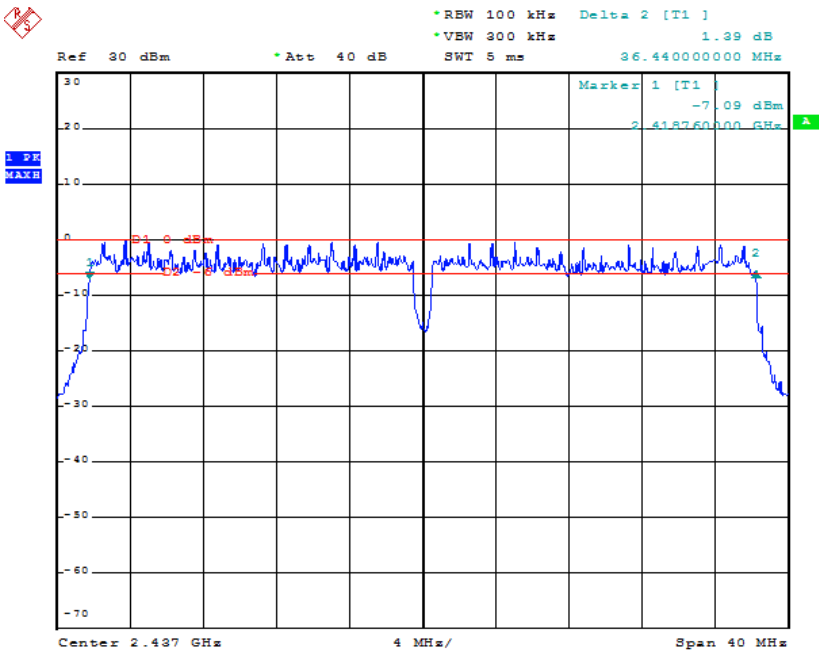
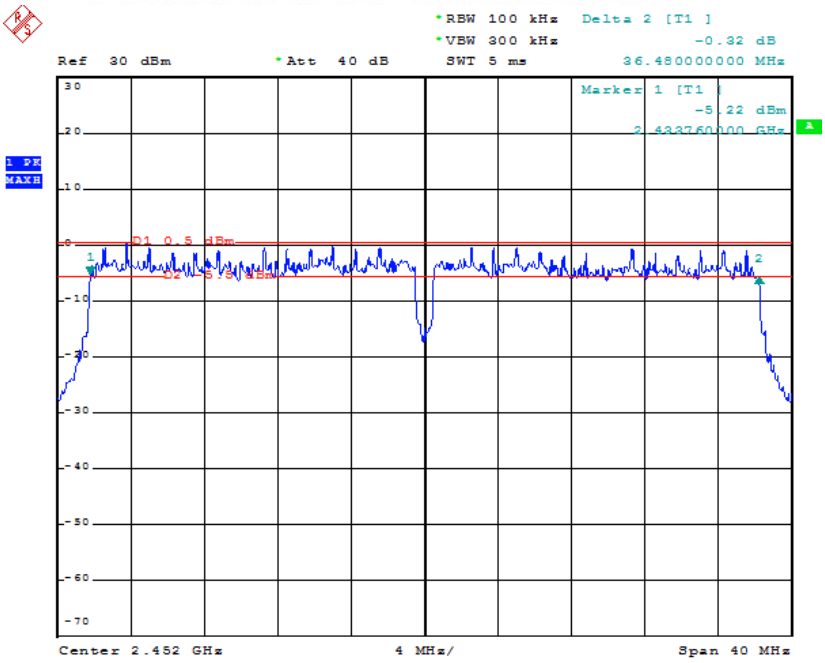
6dB BANDWIDTH (IEEE 802 11n HT40 MODE CH Mid)



6dB BANDWIDTH (IEEE 802.11 n HT40 MODE CH High)



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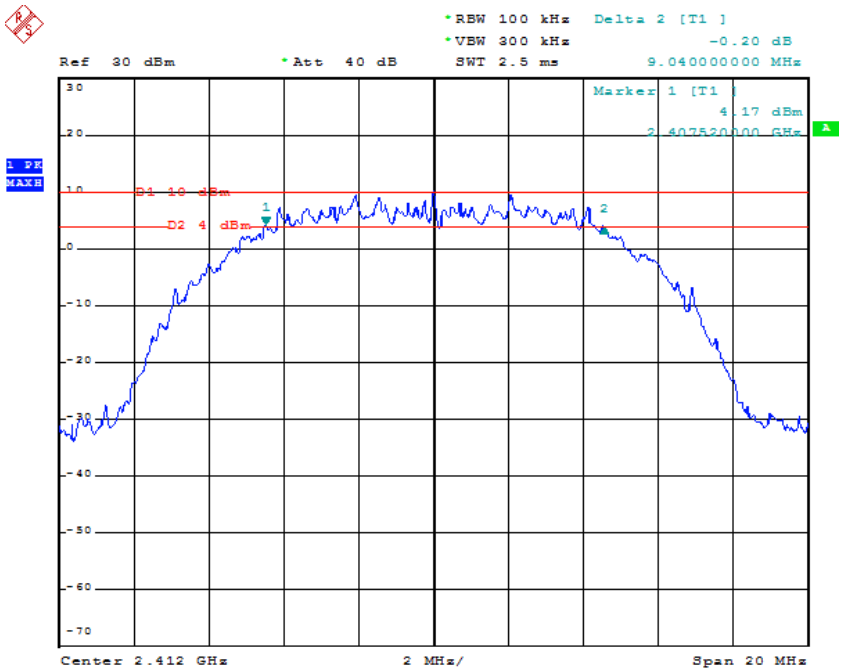
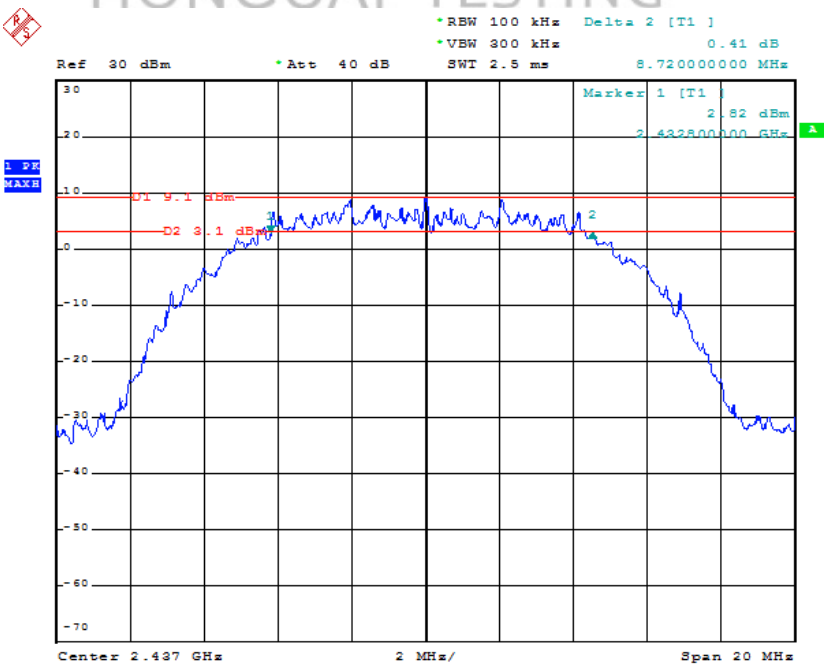
CH2

6dB BANDWIDTH (IEEE 802.11b MODE CH Low)



6dB BANDWIDTH (IEEE 802.11b MODE CH Mid)



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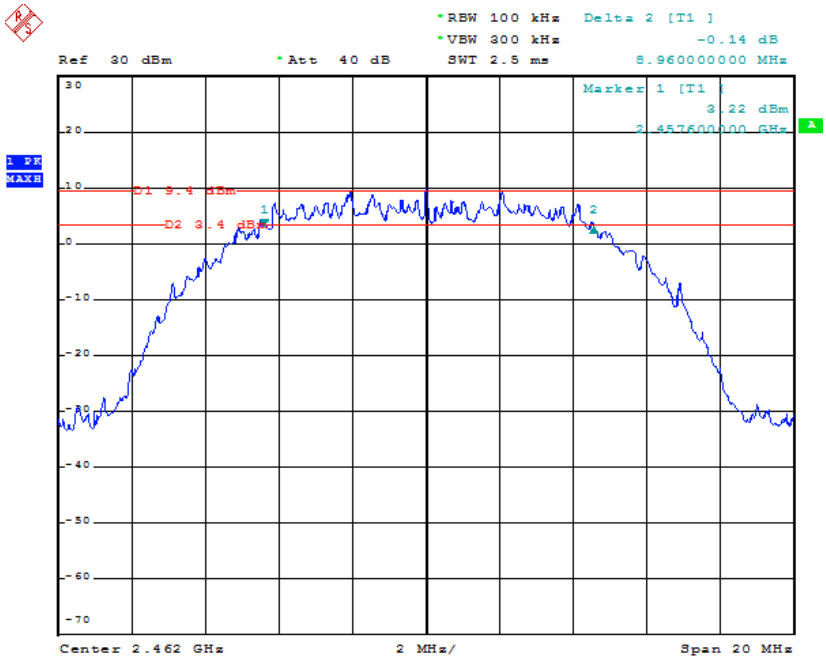
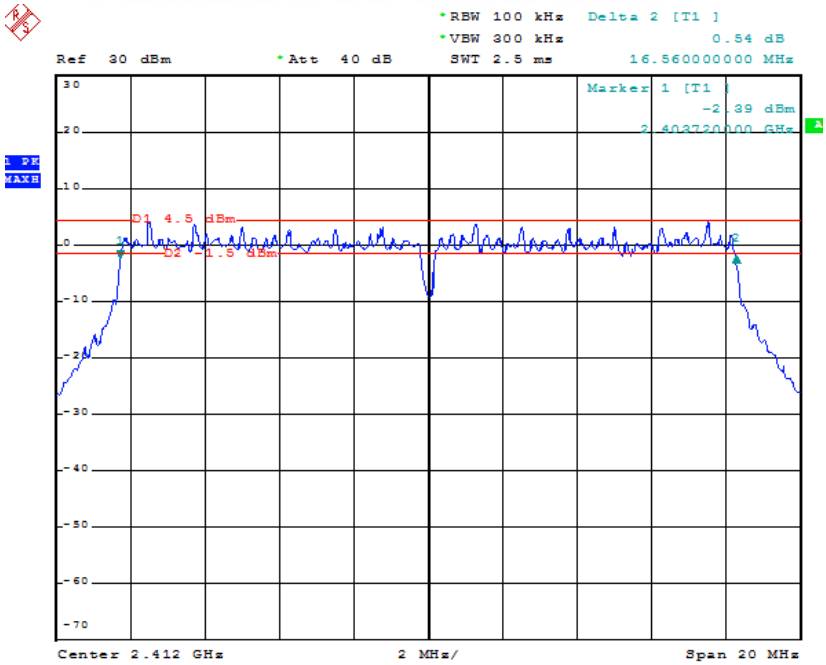
6dB BANDWIDTH (IEEE 802.11b MODE CH High)



6dB BANDWIDTH (IEEE 802.11g MODE CH Low)



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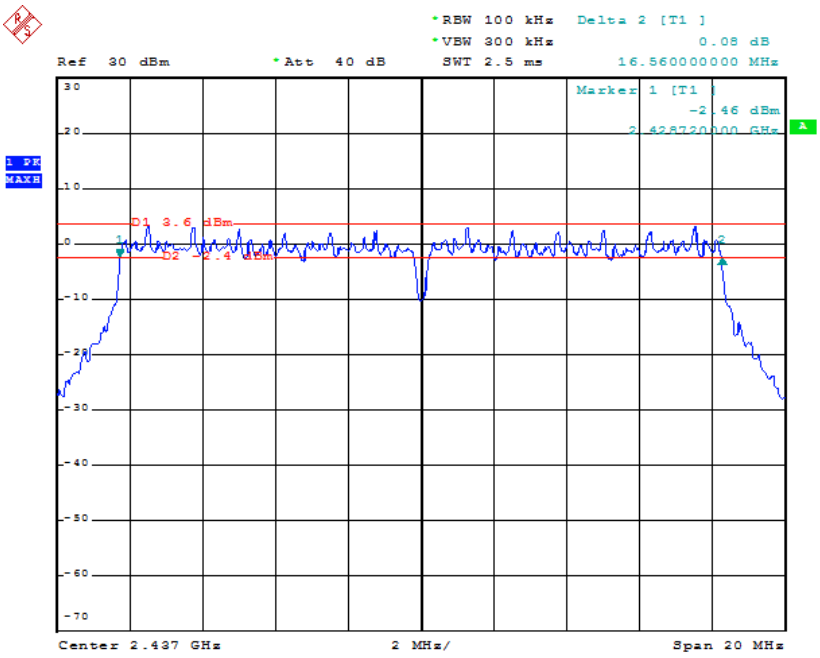
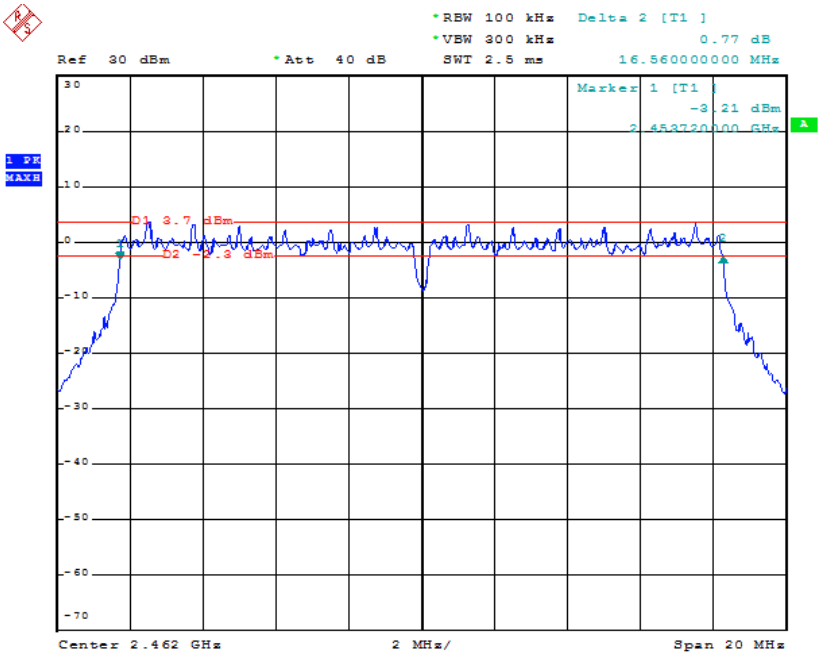
6dB BANDWIDTH (IEEE 802.11g MODE CH Mid)



6dB BANDWIDTH (IEEE 802.11g MODE CH High)



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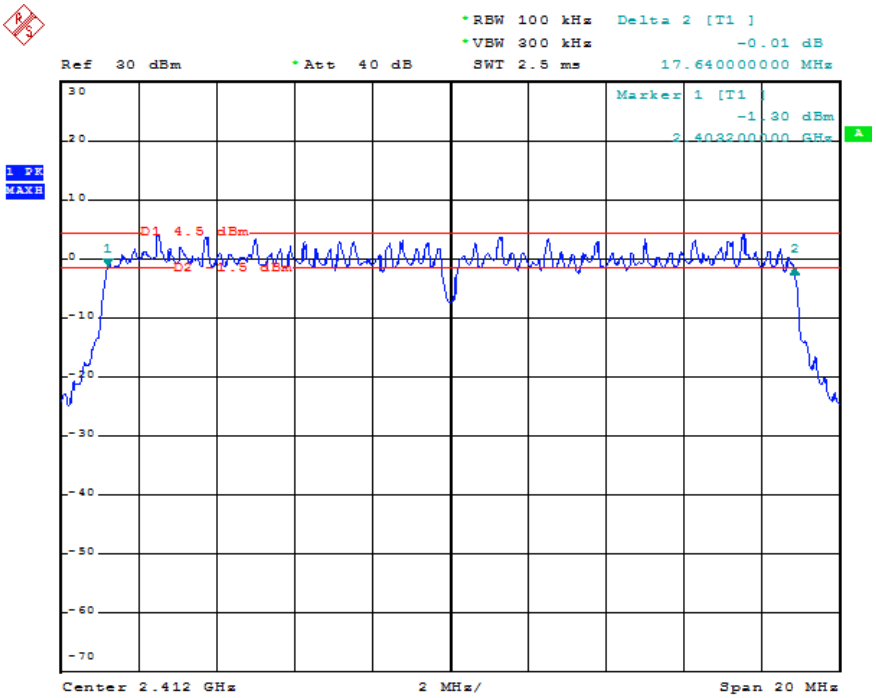
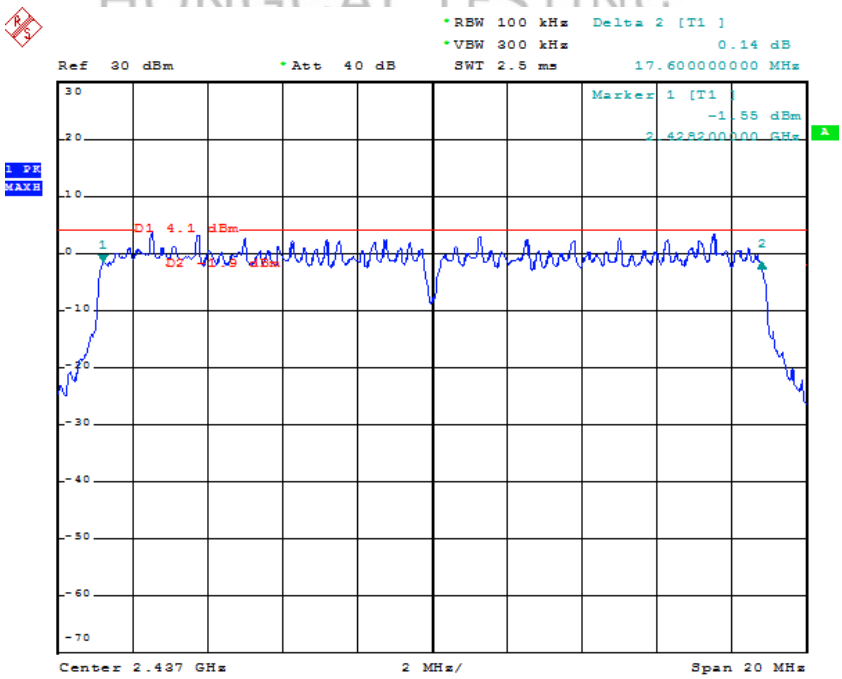
6dB BANDWIDTH (IEEE 802 11n HT20 MODE CH Low)



6dB BANDWIDTH (IEEE 802 11n HT20 MODE CH Mid)



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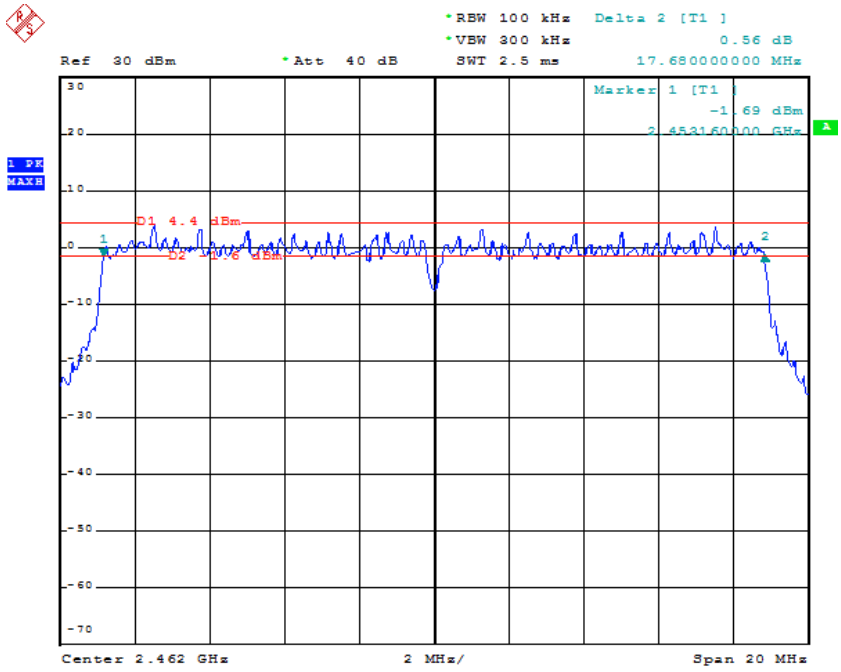
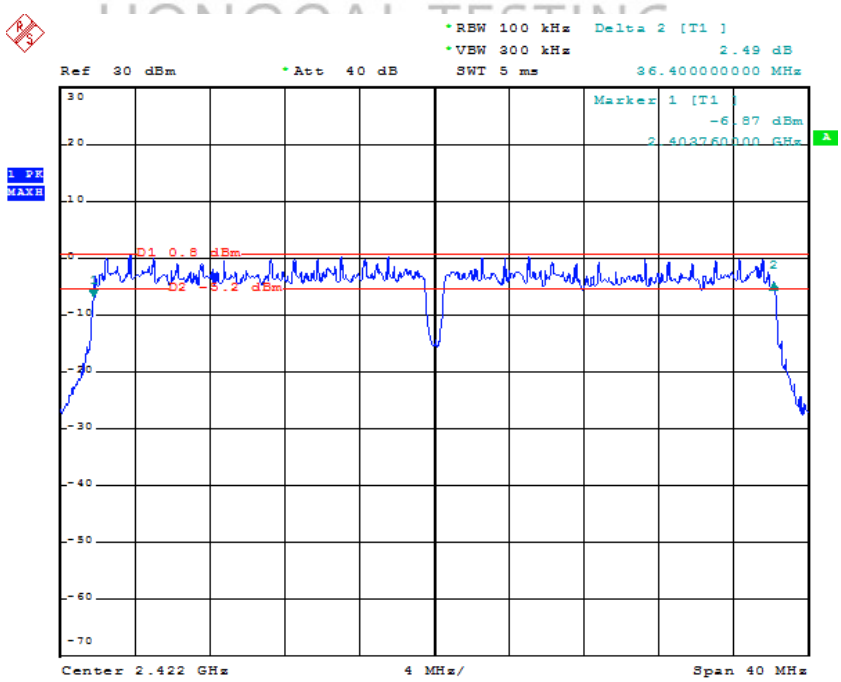
6dB BANDWIDTH (IEEE 802.11n HT20 MODE CH High)



6dB BANDWIDTH (IEEE 802 11n HT40 MODE CH Low)



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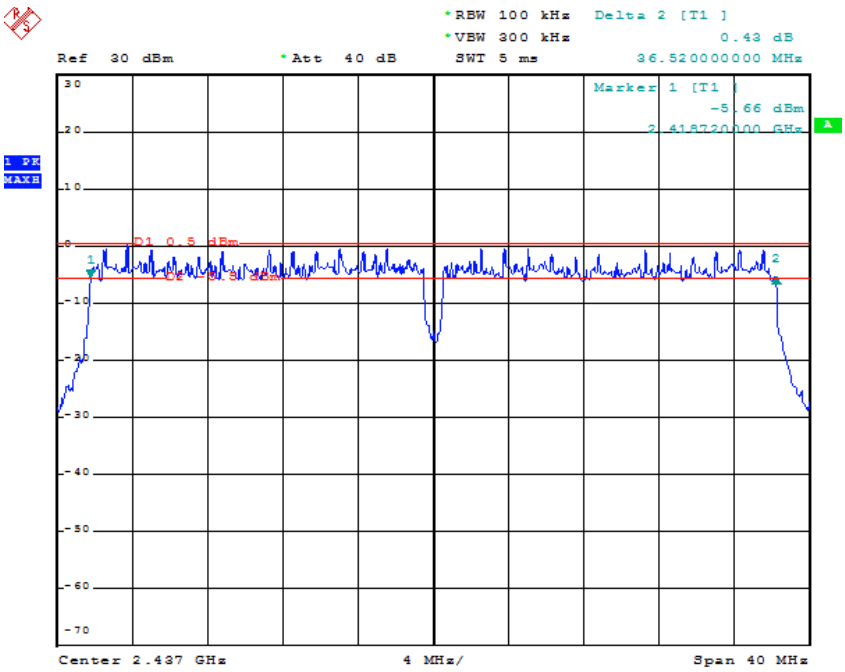
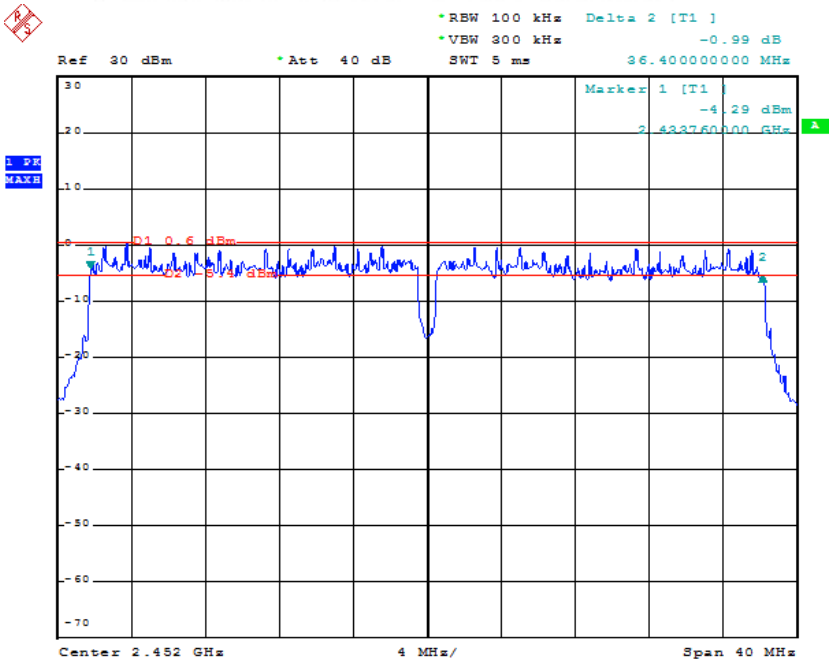
6dB BANDWIDTH (IEEE 802 11n HT40 MODE CH Mid)



6dB BANDWIDTH (IEEE 802.11 n HT40 MODE CH High)



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8. Test of Conducted Spurious Emission

8.1 Applicable standard

Refer to FCC §15.247 (d) and IC RSS-247 Issue2 Clause 5.5 and KDB558074 D01 V04 Section 11.3

Section 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. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

8.2 EUT Setup

Spectrum Analyzer

8.3 Test Equipment List and Details

See section 2.7.

8.4 Test Procedure

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW ≥ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

8.5 Test Result

Temperature (℃) : 22~23	EUT: Betterspot Smart VPN Router
Humidity (%RH): 50~54	M/N: Betterspot1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuously Tx Mode

Test Result: PASS

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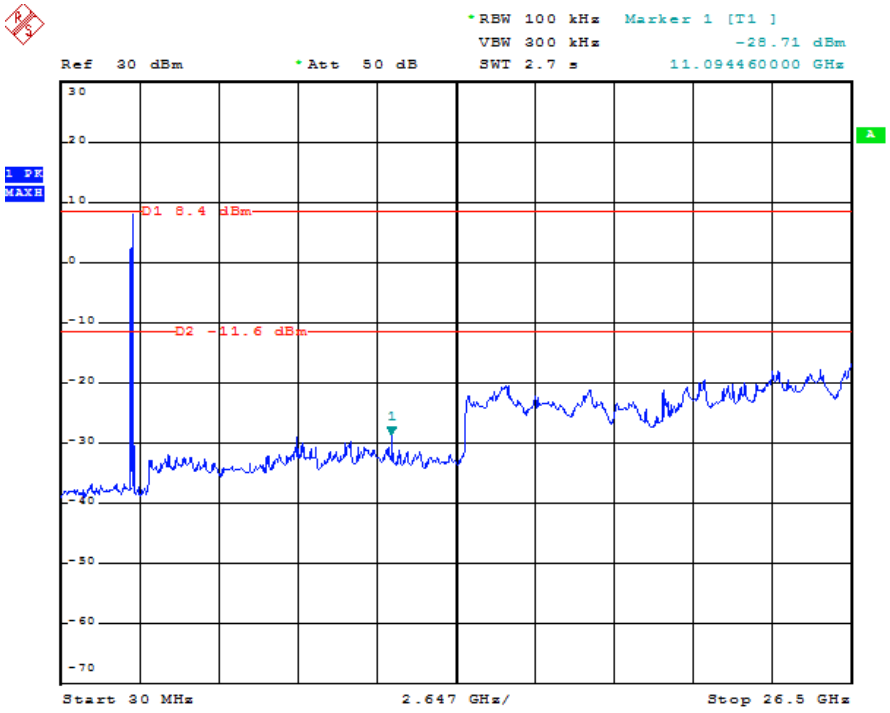
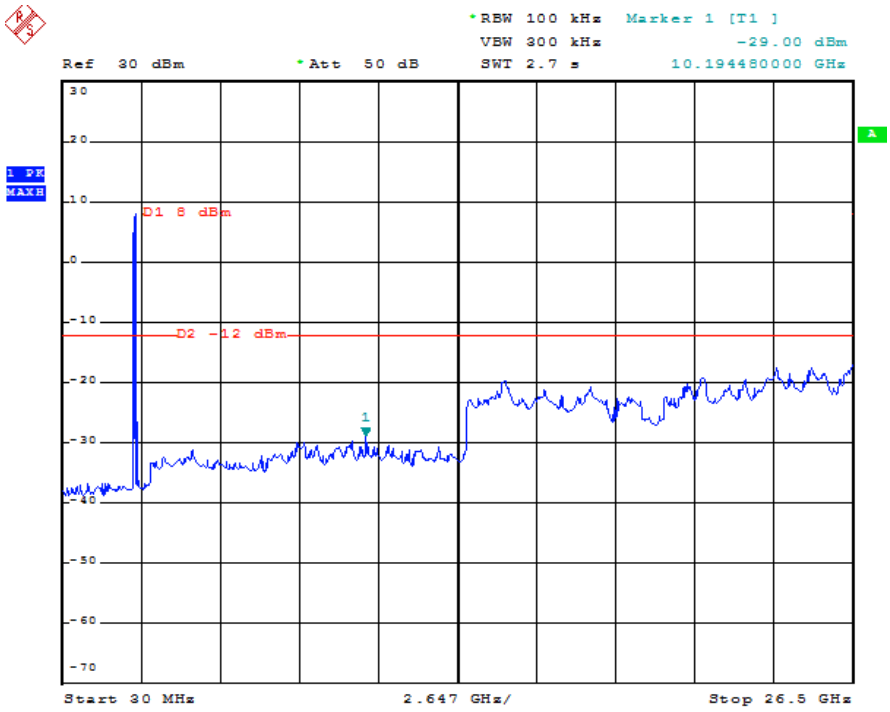
CH1
IEEE 802.11b mode
Channel Low



Channel High



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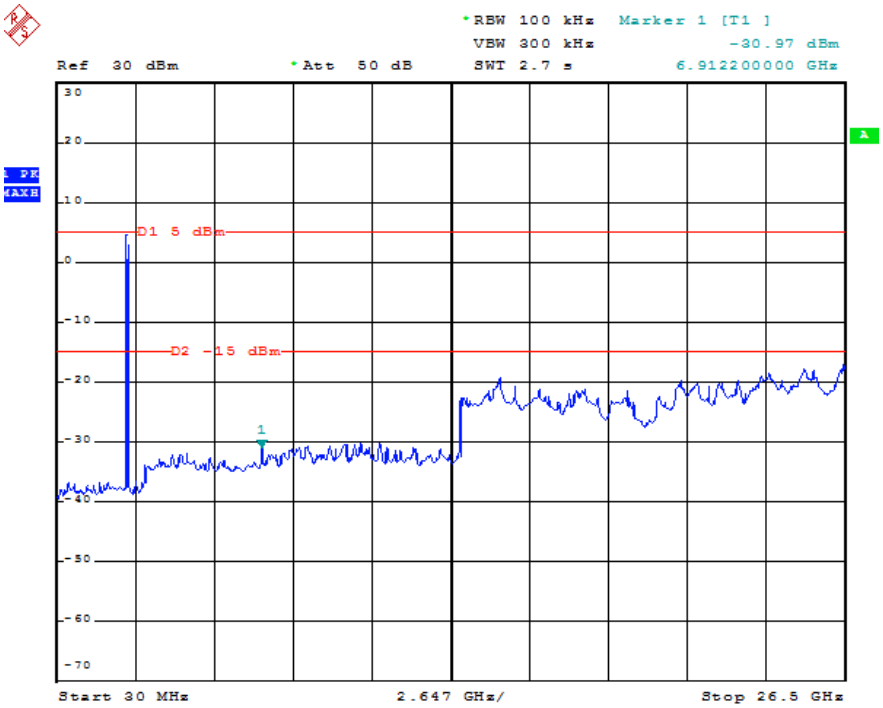
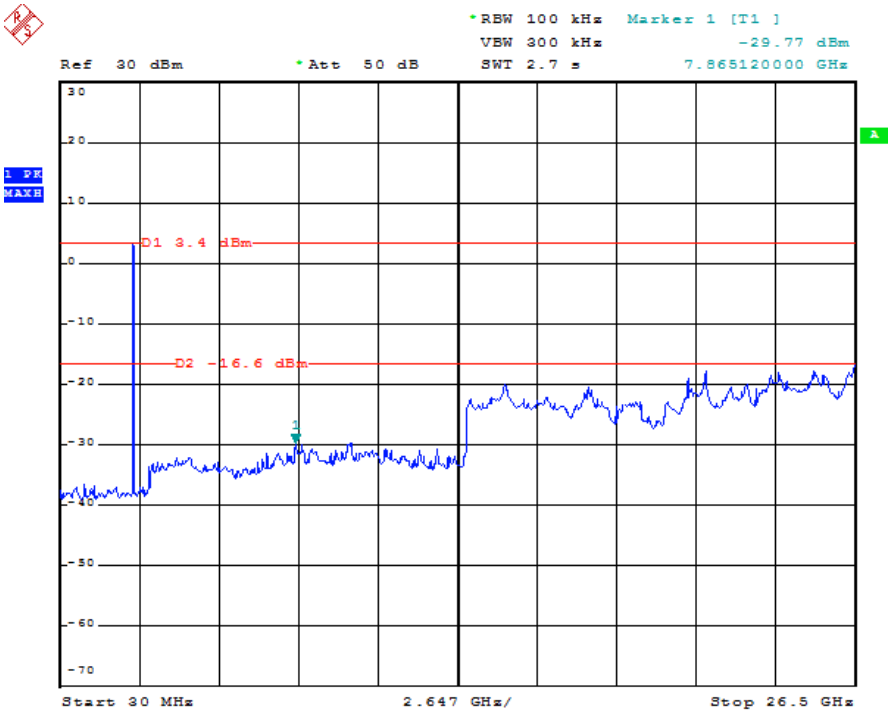
IEEE 802.11g mode
Channel Low



Channel High



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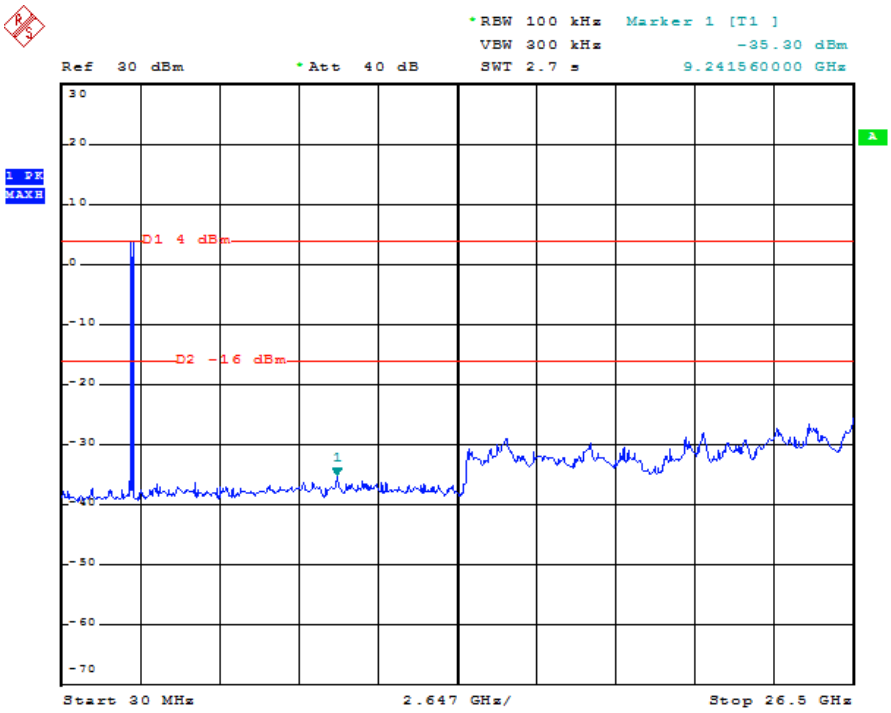
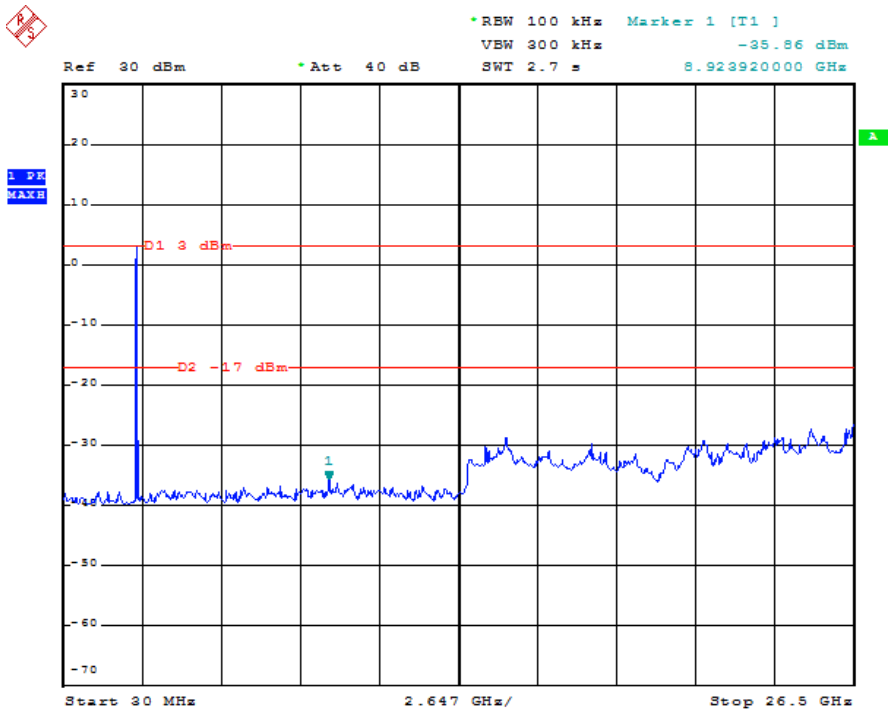
IEEE 802 11n HT20 mode
Channel Low



Channel High



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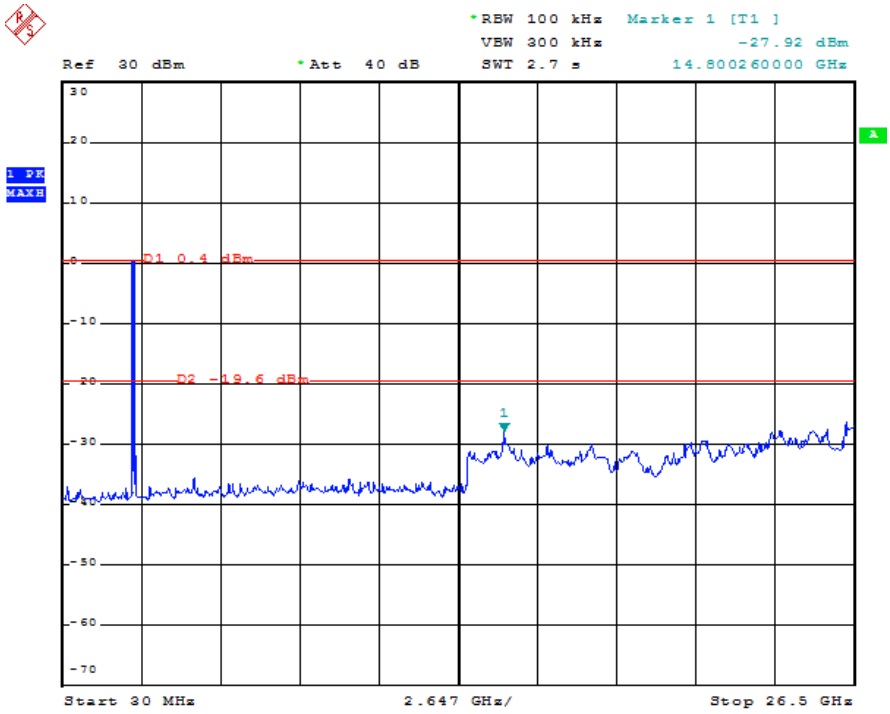
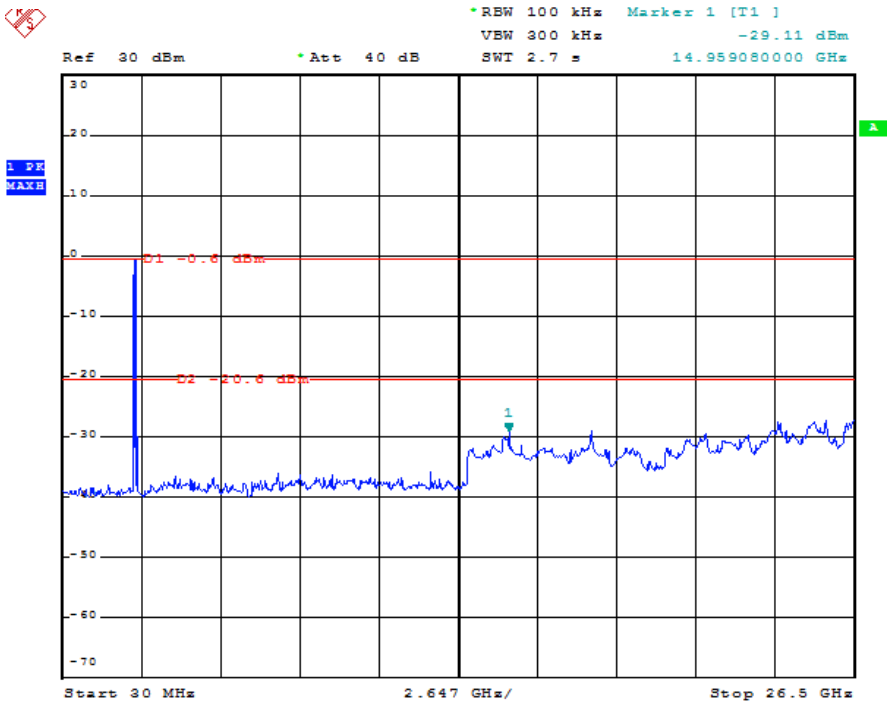
IEEE 802 11n HT40 mode
Channel Low



Channel High



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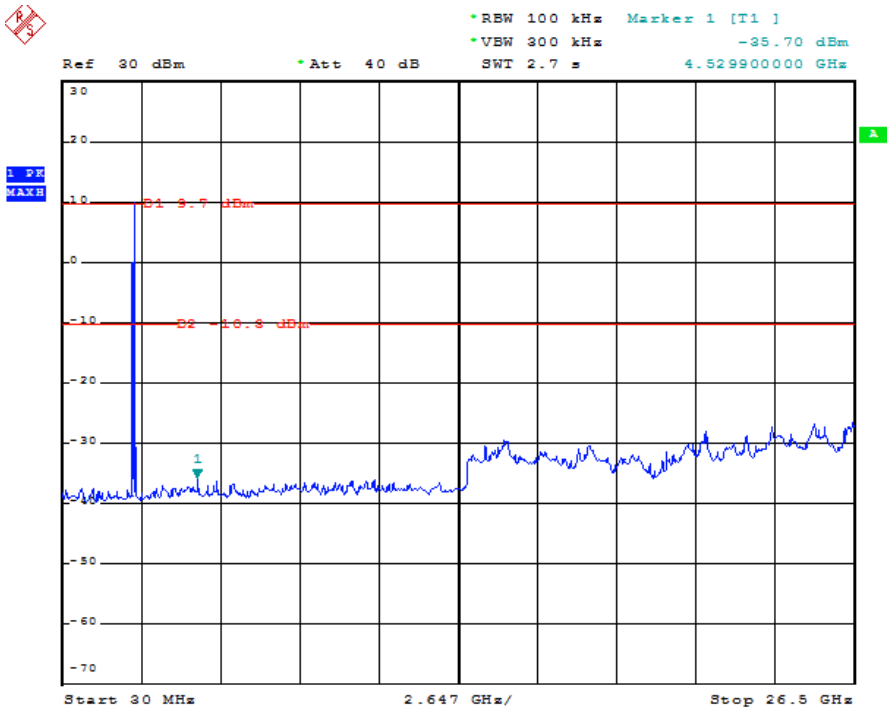
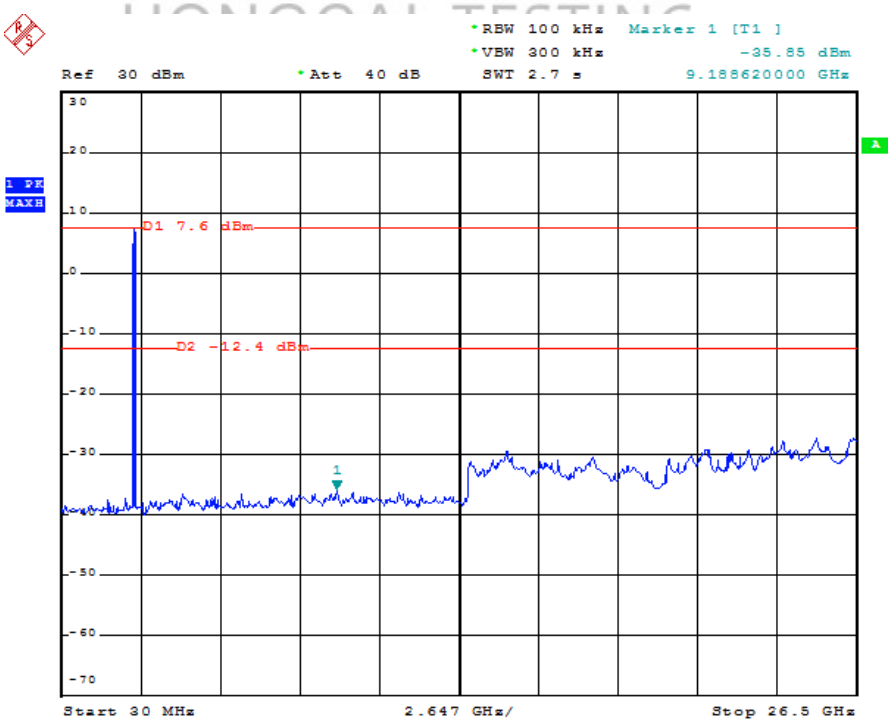
CH2

IEEE 802.11b mode
Channel Low



Channel High



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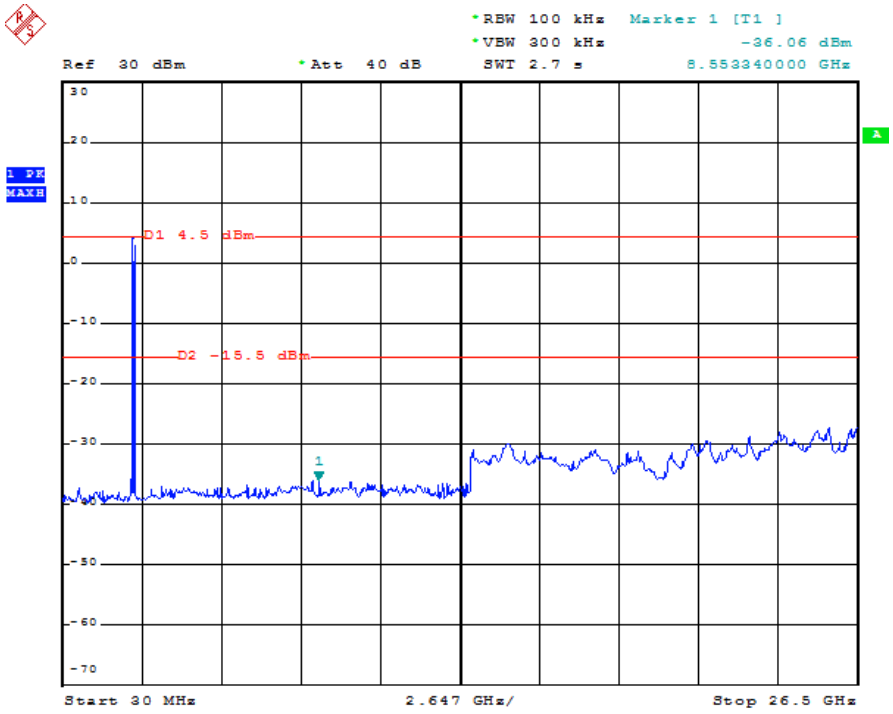
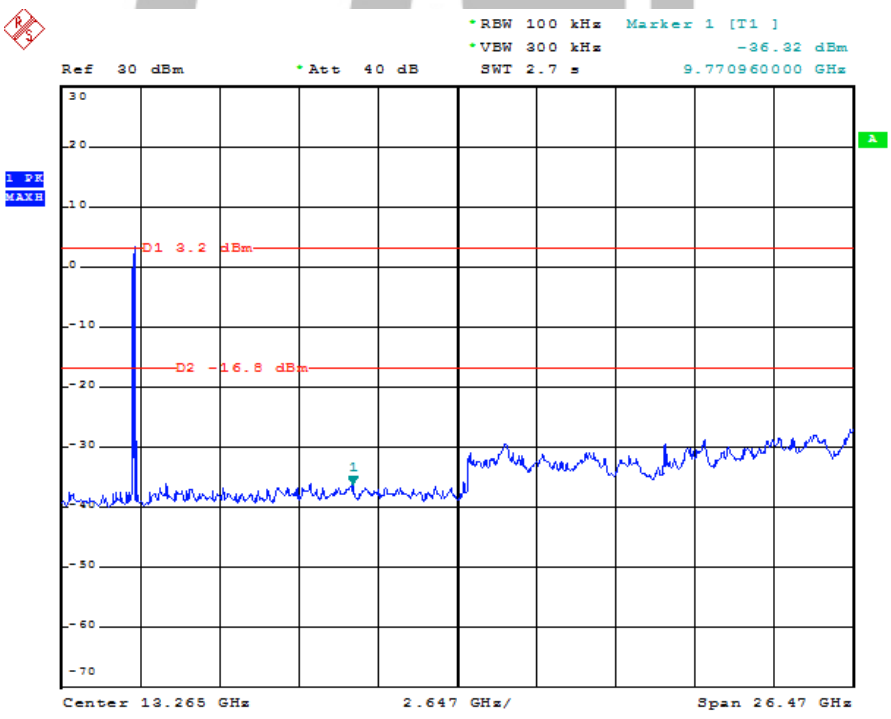
IEEE 802.11g mode
Channel Low



Channel High



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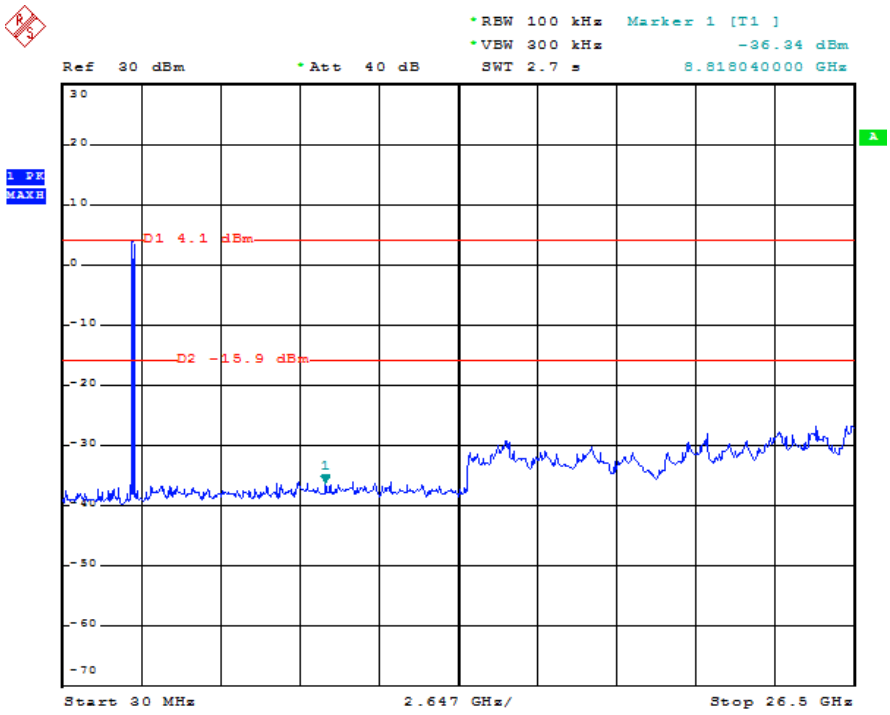
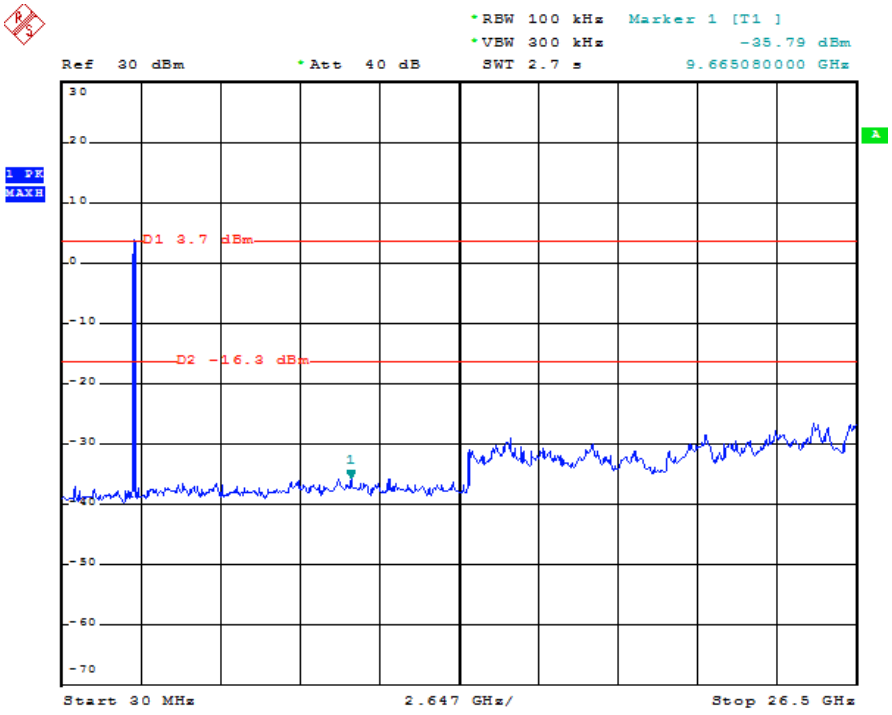
IEEE 802 11n HT20 mode
Channel Low



Channel High



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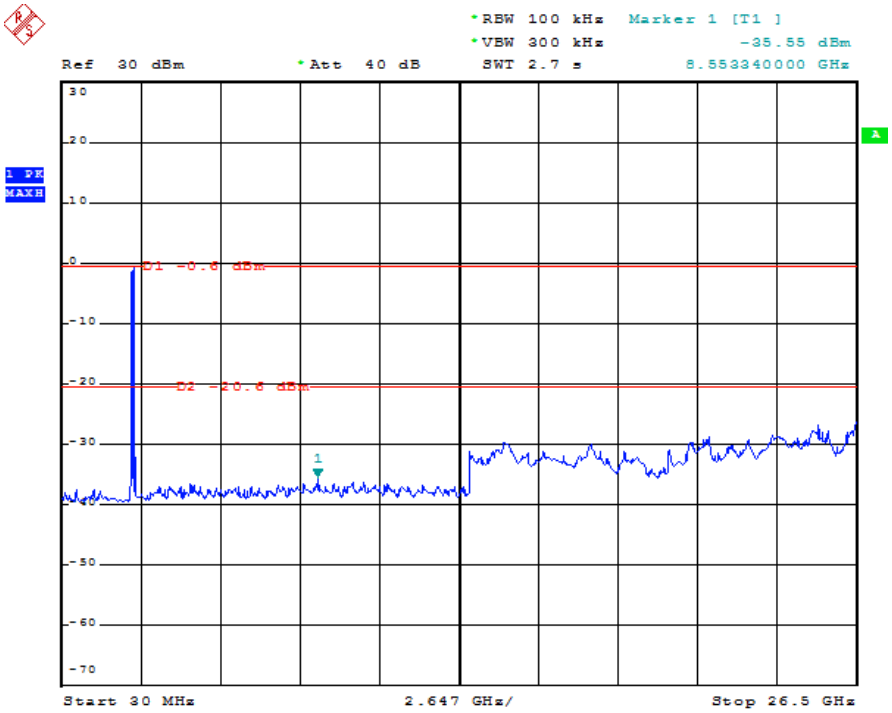
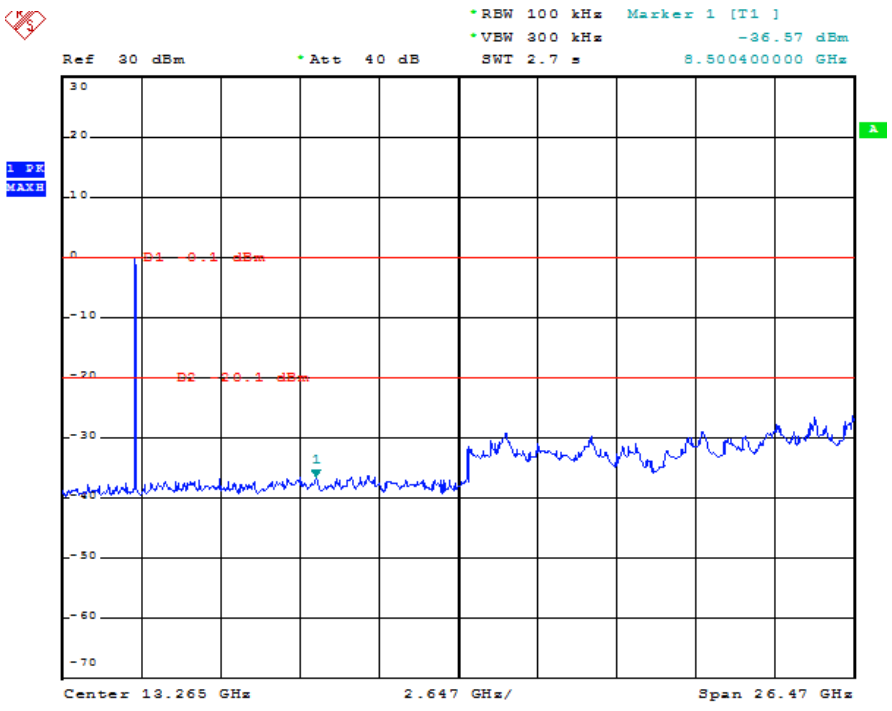
IEEE 802 11n HT40 mode
Channel Low



Channel High



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9. Test of Radiated Spurious Emission

9.1 Radiated Spurious Emission

Refer to FCC §15.205 and §15.209, IC RSS-247 Clause 5.5
KDB558074 D01 V04 Section 12.1, 12.2.7

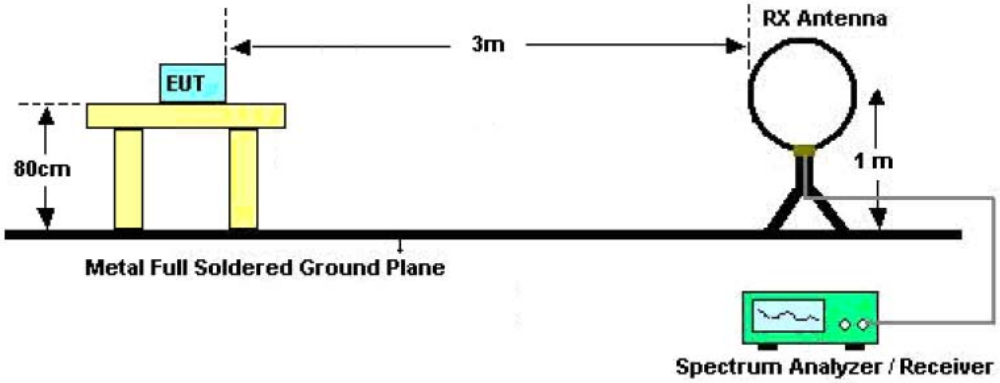
9.1.1 Limits

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

Frequency (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

9.1.2 EUT Setup

For radiated emission below 30MHz



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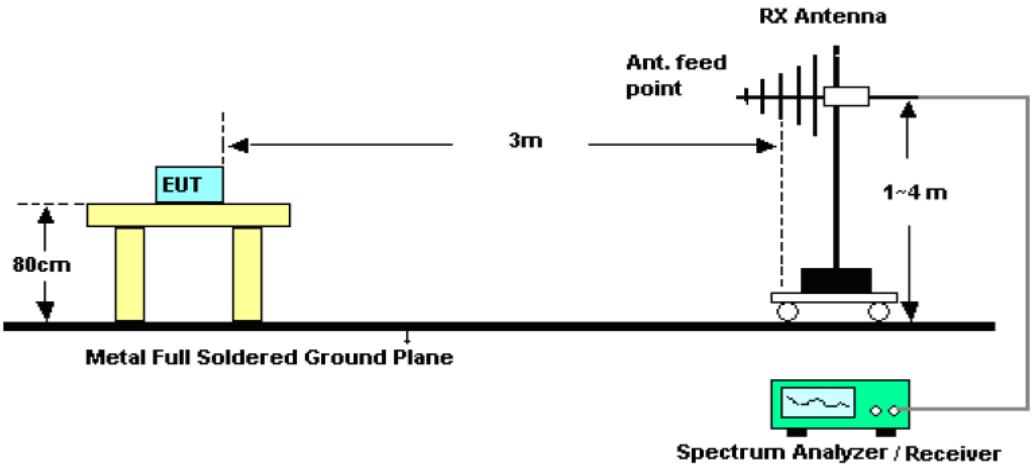
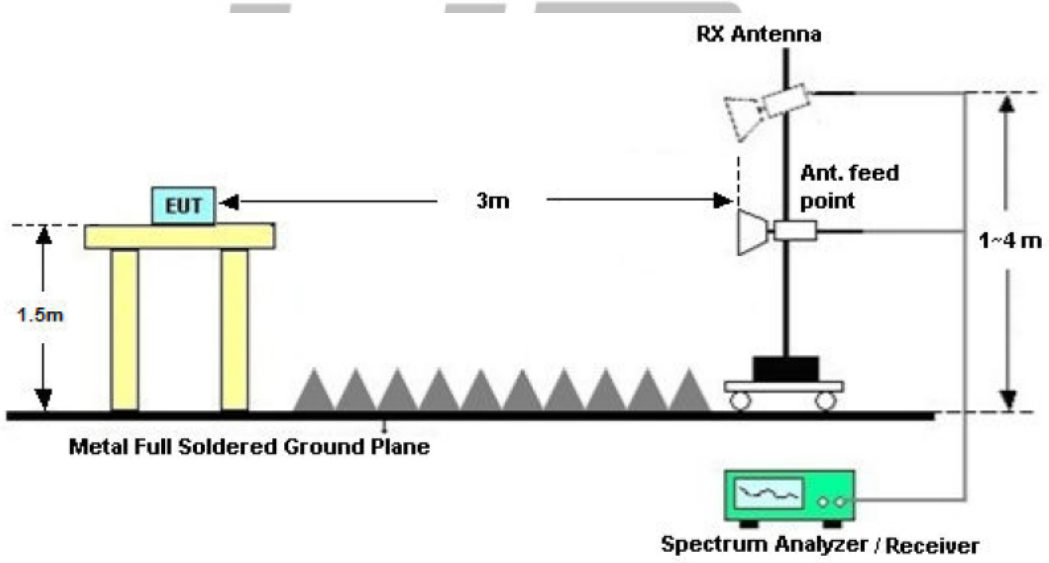
For radiated emission from 30MHz to1GHz



For radiated emission from above1GHz



9.1.3 Test Procedure

KDB558074 D01 V04 Section 12.1, 12.2.7

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Set RBW = 120kHz(for emissions from 30MHz-1GHz)
3. Detector = Quasi-Peak
4. Trace Mode = max hold.
5. Sweep = auto couple.
6. Trace was allowed to stabilize

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Set RBW = 1MHz
3. Set VBW = 3MHz

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4. Detector = Peak
5. Trace Mode = max hold.
6. Sweep = auto couple.
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Set RBW = 1MHz
3. Set VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points=1001 (>= 2 x span/RBW)
6. Sweep = auto couple.
7. Trace (RMS) averaging was performed over at least 100 traces

Note:

1. Configure the EUT according to ANSI C63.10-2013
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.

9.1.4 Test Result

Temperature (℃) : 22~23	EUT: Betterspot Smart VPN Router
Humidity (%RH): 50~54	M/N: Betterspot1
Barometric Pressure (mbar): 950~1000	Operation Condition: Charging, Normal operation ,Continuously Tx Mode

Note:
1. Worst-case radiated emission below 30MHz is IEEE 802 11g Tx (CH Low) mode;
2. Worst-case radiated emission below 1GHz is IEEE 802.11g Tx (CH Low, Middle, High) mode.
3. Worst-case radiated emission above 1GHz is IEEE 802.11b/g/n (CH Low, CH High)
4. Worst-case radiated emission is Antenna 1,so we chose it for the data as follow:

RADIATED EMISSION BELOW 30 MHz

IEEE 802.11 g Tx (CH Low) operating Mode:

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dBμV/M)	(dB)	PK/QP
0.58	32.59	7.88	1.1	41.57	72.3	-30.73	QP
23.43	32.04	8.64	1.24	41.92	69.5	-27.58	QP
27.97	33.36	8.82	1.13	43.31	69.5	-26.19	QP
32.92	33.46	8	1.71	43.17	69.5	-26.33	QP

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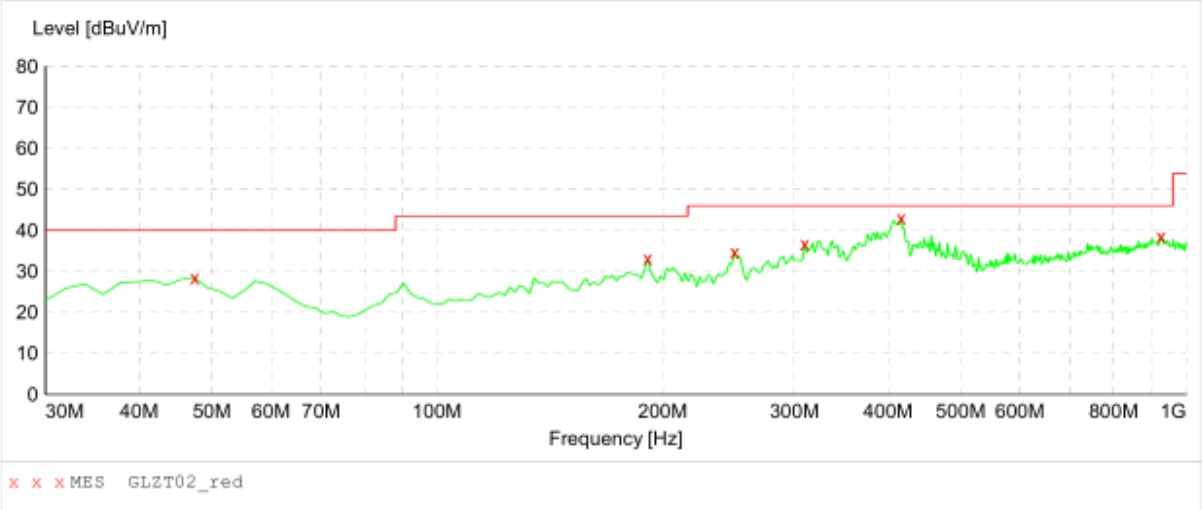
Spurious Emission Below 1GHz: IEEE 802.11g Tx (CH Low)

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	3m CHAMBER
Operator:	Chen
Test Specification:	AC 120V/60Hz
Comment:	Polarization: Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "GLZT02_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	28.50	16.7	40.0	11.5	---	100.0	0.00	HORIZONTAL
191.020000	33.20	13.6	43.5	10.3	---	100.0	0.00	HORIZONTAL
249.220000	34.70	13.7	46.0	11.3	---	100.0	0.00	HORIZONTAL
309.360000	36.70	15.6	46.0	9.3	---	100.0	0.00	HORIZONTAL
416.060000	43.10	18.2	46.0	2.9	---	100.0	0.00	HORIZONTAL
924.340000	38.50	25.8	46.0	7.5	---	100.0	0.00	HORIZONTAL

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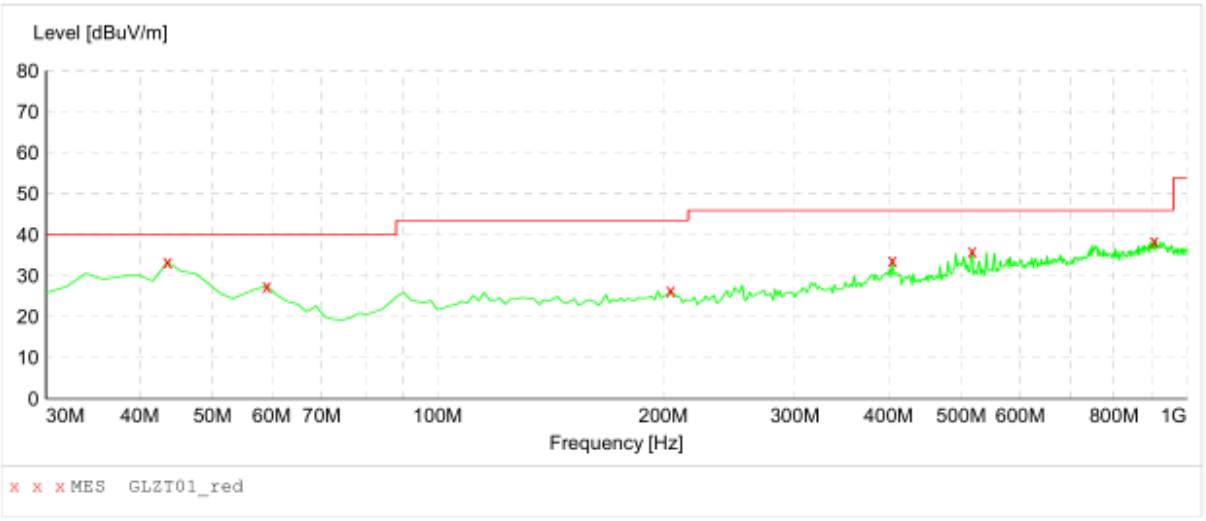
Spurious Emission Below 1GHz : IEEE 802.11g Tx (CH Low)

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	3m CHAMBER
Operator:	Chen
Test Specification:	AC 120V/60Hz
Comment:	Polarization: Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "MES GLZT01_red "

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	33.40	15.8	40.0	6.6	---	100.0	0.00	VERTICAL
59.100000	27.50	15.7	40.0	12.5	---	100.0	0.00	VERTICAL
204.600000	26.40	14.1	43.5	17.1	---	100.0	0.00	VERTICAL
404.420000	33.80	17.9	46.0	12.2	---	100.0	0.00	VERTICAL
516.940000	36.00	19.6	46.0	10.0	---	100.0	0.00	VERTICAL
904.940000	38.50	25.8	46.0	7.5	---	100.0	0.00	VERTICAL

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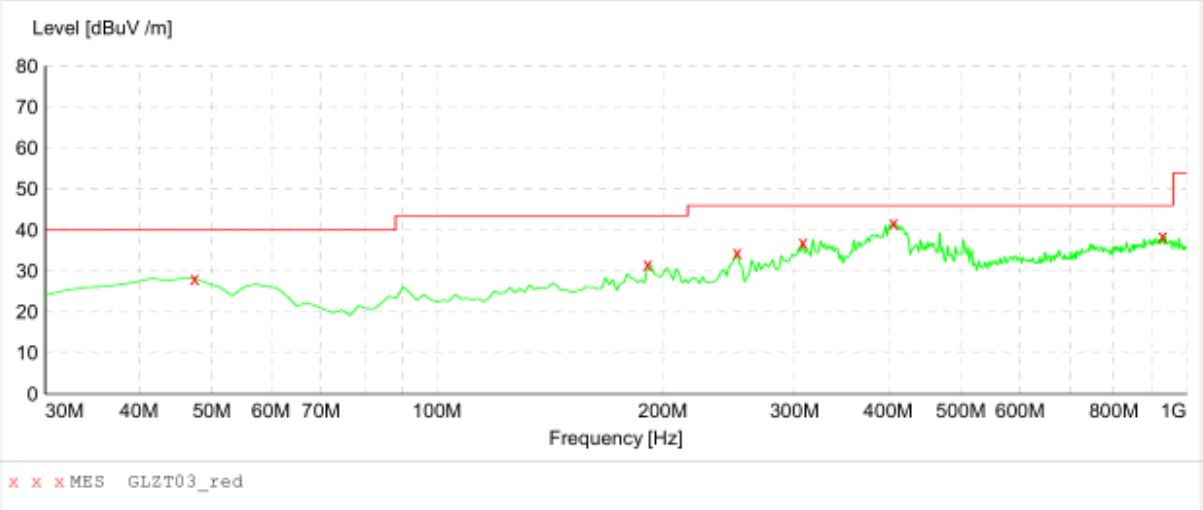
Spurious Emission Below 1GHz: IEEE 802.11g Tx (CH Mid)

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	3m CHAMBER
Operator:	Chen
Test Specification:	AC 120V/60Hz
Comment:	Polarization: Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "GLZT03_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	28.20	16.7	40.0	11.8	---	100.0	0.00	HORIZONTAL
191.020000	31.70	13.6	43.5	11.8	---	100.0	0.00	HORIZONTAL
251.160000	34.50	13.8	46.0	11.5	---	100.0	0.00	HORIZONTAL
307.420000	37.00	15.4	46.0	9.0	---	100.0	0.00	HORIZONTAL
406.360000	41.70	17.9	46.0	4.3	---	100.0	0.00	HORIZONTAL
928.220000	38.60	25.9	46.0	7.4	---	100.0	0.00	HORIZONTAL

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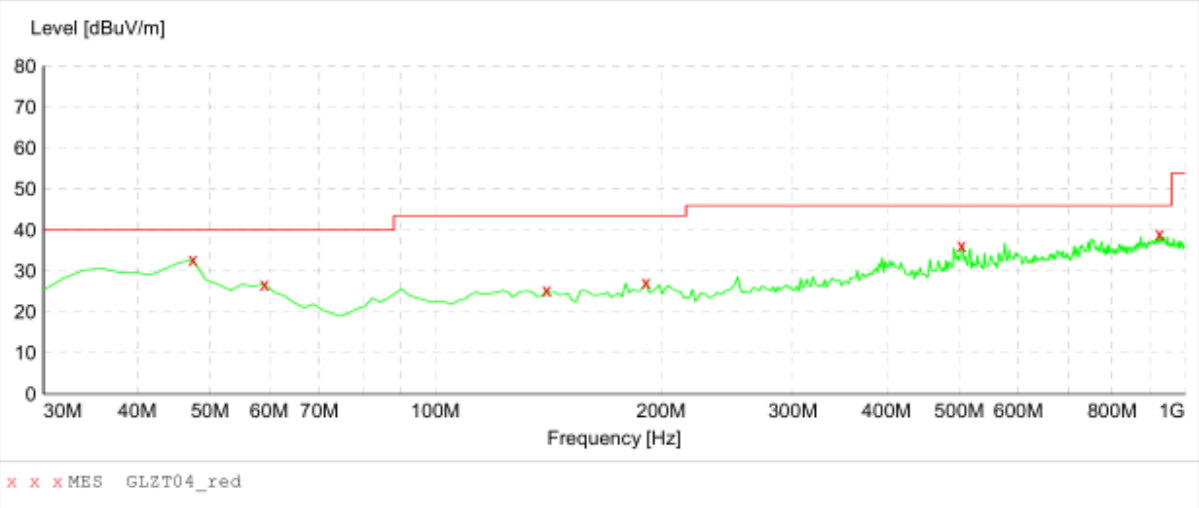
Spurious Emission Below 1GHz: IEEE 802.11g Tx (CH Mid)

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	3m CHAMBER
Operator:	Chen
Test Specification:	AC 120V/60Hz
Comment:	Polarization: Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "GLZT04_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	32.80	16.7	40.0	7.2	---	100.0	0.00	VERTICAL
59.100000	26.80	15.7	40.0	13.2	---	100.0	0.00	VERTICAL
140.580000	25.40	12.5	43.5	18.1	---	100.0	0.00	VERTICAL
191.020000	27.20	13.6	43.5	16.3	---	100.0	0.00	VERTICAL
503.360000	36.30	19.6	46.0	9.7	---	100.0	0.00	VERTICAL
924.340000	39.10	25.8	46.0	6.9	---	100.0	0.00	VERTICAL

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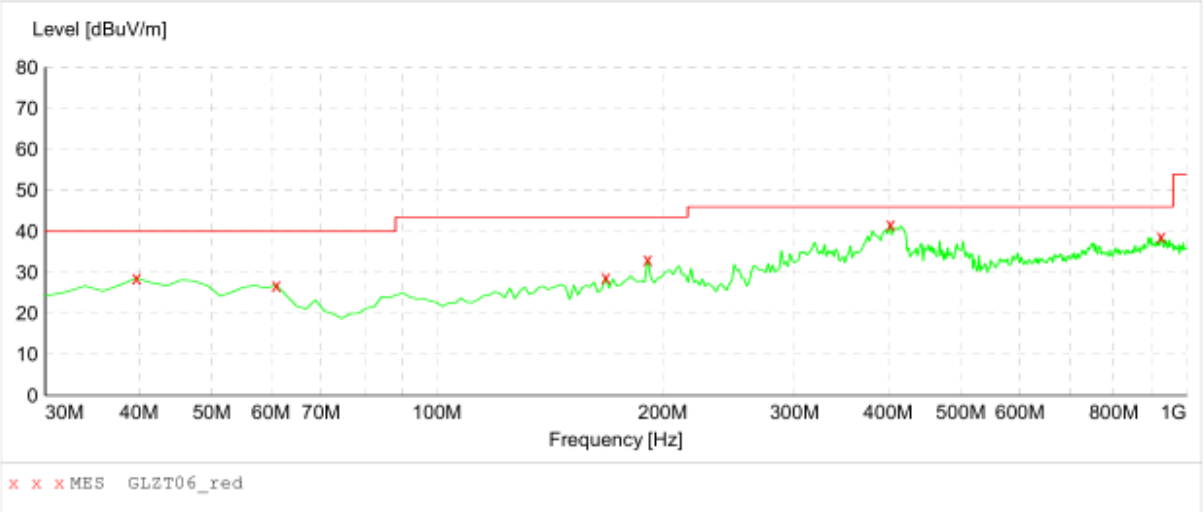
Spurious Emission Below 1GHz: IEEE 802.11g Tx (CH High)

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	3m CHAMBER
Operator:	Chen
Test Specification:	AC 120V/60Hz
Comment:	Polarization: Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "GLZT06_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
39.700000	28.70	15.7	40.0	11.3	---	100.0	0.00	HORIZONTAL
61.040000	26.90	14.9	40.0	13.1	---	100.0	0.00	HORIZONTAL
167.740000	28.80	12.7	43.5	14.7	---	100.0	0.00	HORIZONTAL
191.020000	33.20	13.6	43.5	10.3	---	100.0	0.00	HORIZONTAL
402.480000	41.70	17.8	46.0	4.3	---	100.0	0.00	HORIZONTAL
924.340000	38.80	25.8	46.0	7.2	---	100.0	0.00	HORIZONTAL

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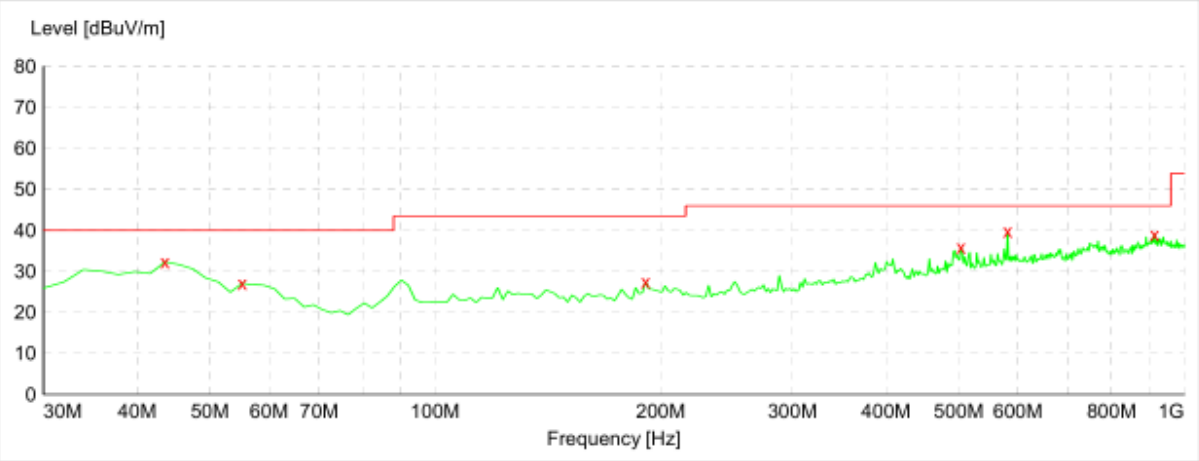
Spurious Emission Below 1GHz: IEEE 802.11g Tx (CH High)

EUT:	Betterspot Smart VPN Router
M/N:	Betterspot1
Operating Condition:	Tx Mode
Test Site:	3m CHAMBER
Operator:	Chen
Test Specification:	AC 120V/60Hz
Comment:	Polarization: Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "GLZT05_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	32.40	15.8	40.0	7.6	---	100.0	0.00	VERTICAL
55.220000	27.10	15.1	40.0	12.9	---	100.0	0.00	VERTICAL
191.020000	27.50	13.6	43.5	16.0	---	100.0	0.00	VERTICAL
503.360000	35.90	19.6	46.0	10.1	---	100.0	0.00	VERTICAL
580.960000	39.80	21.2	46.0	6.2	---	100.0	0.00	VERTICAL
912.700000	39.00	25.8	46.0	7.0	---	100.0	0.00	VERTICAL

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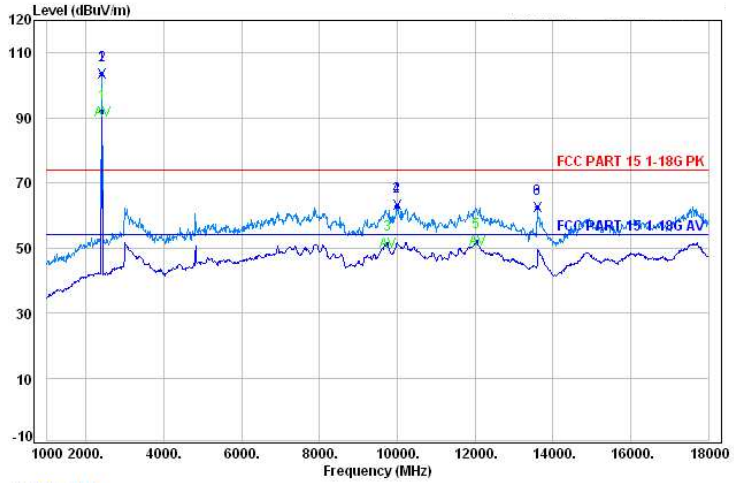
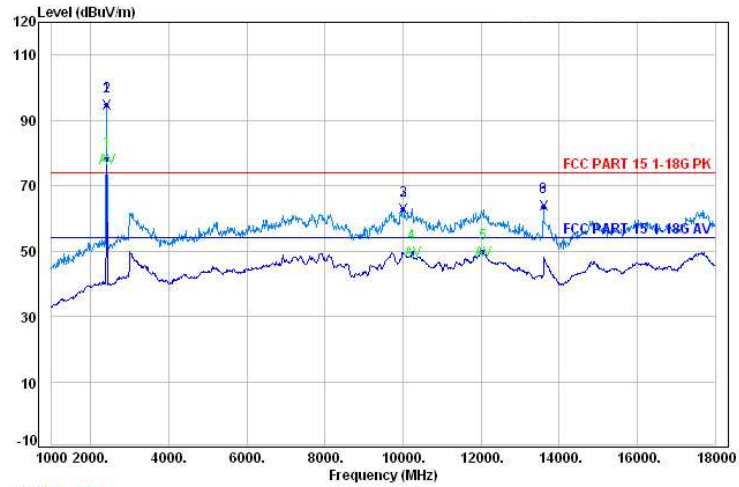
RADIATED EMISSION ABOVE 1 GHz

IEEE 802.11b Tx (CH Low)



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2411.00	30.74	92.86	92.00	74.00	18.00	Average
2	2411.00	30.74	104.45	103.59	74.00	29.59	Peak
3	9738.00	39.19	55.20	51.33	74.00	-22.67	Average
4	9993.00	39.39	65.62	63.00	74.00	-11.00	Peak
5	12033.00	41.43	53.97	52.03	74.00	-21.97	Average
6	13597.00	42.38	71.08	62.50	74.00	-11.50	Peak



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2411.00	30.74	79.00	78.14	74.00	4.14	Average
2	2411.00	30.74	95.64	94.78	74.00	20.78	Peak
3	10010.00	39.40	65.57	62.96	74.00	-11.04	Peak
4	10231.00	39.49	52.86	49.57	74.00	-24.43	Average
5	12050.00	41.45	51.80	49.80	74.00	-24.20	Average
6	13597.00	42.38	72.28	63.70	74.00	-10.30	Peak

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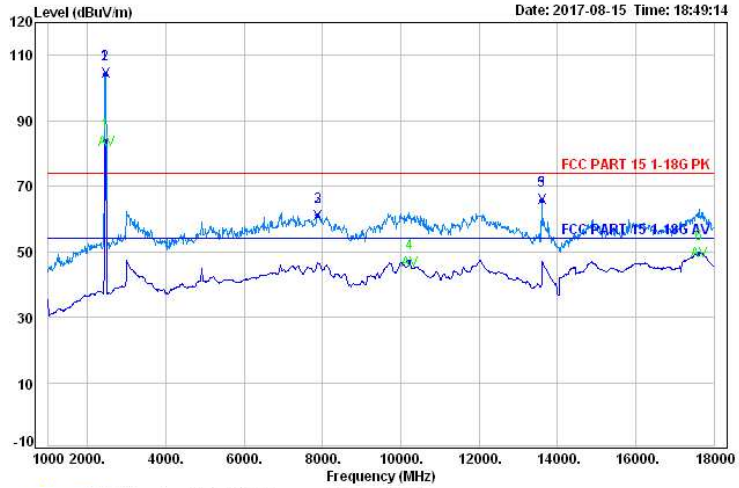
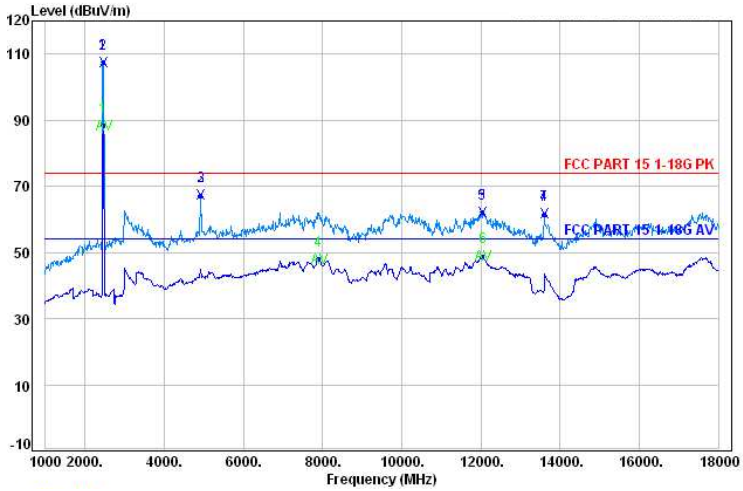
IEEE 802.11b Tx (CH High)



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	84.58	83.75	74.00	9.75	Average
2	2462.00	30.72	105.25	104.42	74.00	30.42	Peak
3	7885.00	39.48	64.53	61.08	74.00	-12.92	Peak
4	10214.00	39.49	50.24	47.01	74.00	-26.99	Average
5	13597.00	42.38	74.42	65.84	74.00	-8.16	Peak
6	17609.00	43.88	62.50	49.67	74.00	-24.33	Average



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	89.21	88.38	74.00	14.38	Average
2	2462.00	30.72	108.31	107.48	74.00	33.48	Peak
3	4927.00	35.50	71.92	67.38	74.00	-6.62	Peak
4	7902.00	39.48	51.40	47.92	74.00	-26.08	Average
5	12033.00	41.43	64.04	62.10	74.00	-11.90	Peak
6	12050.00	41.45	50.85	48.85	74.00	-25.15	Average
7	13597.00	42.38	70.19	61.61	74.00	-12.39	Peak

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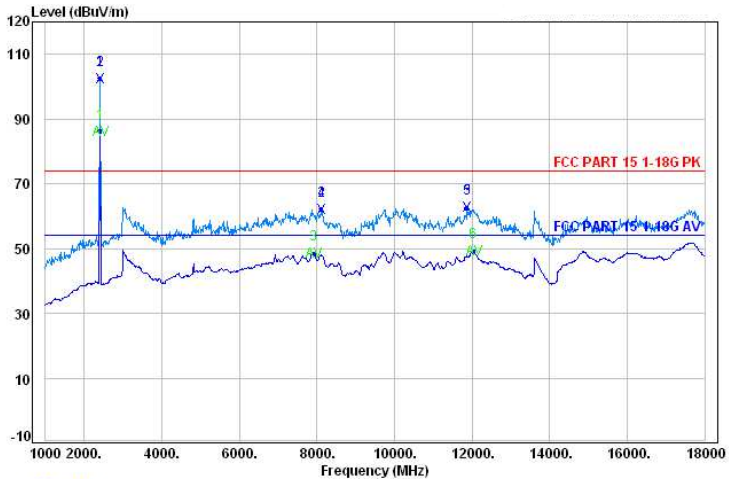
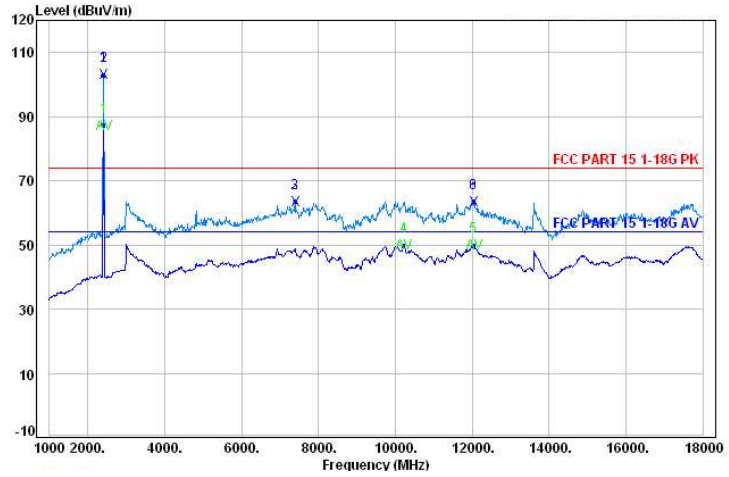
IEEE 802.11g Tx (CH Low)



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2411.00	30.74	87.20	86.34	74.00	12.34	Average
2	2411.00	30.74	103.42	102.56	74.00	28.56	Peak
3	7919.00	39.48	51.98	48.47	74.00	-25.53	Average
4	8123.00	39.25	66.39	62.15	74.00	-11.85	Peak
5	11880.00	41.18	64.95	62.65	74.00	-11.35	Peak
6	12033.00	41.43	51.20	49.26	74.00	-24.74	Average



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2411.00	30.74	88.17	87.31	74.00	13.31	Average
2	2411.00	30.74	103.86	103.00	74.00	29.00	Peak
3	7392.00	39.42	66.21	63.51	74.00	-10.49	Peak
4	10214.00	39.49	53.17	49.94	74.00	-24.06	Average
5	12033.00	41.43	51.98	50.04	74.00	-23.96	Average
6	12033.00	41.43	65.46	63.52	74.00	-10.48	Peak

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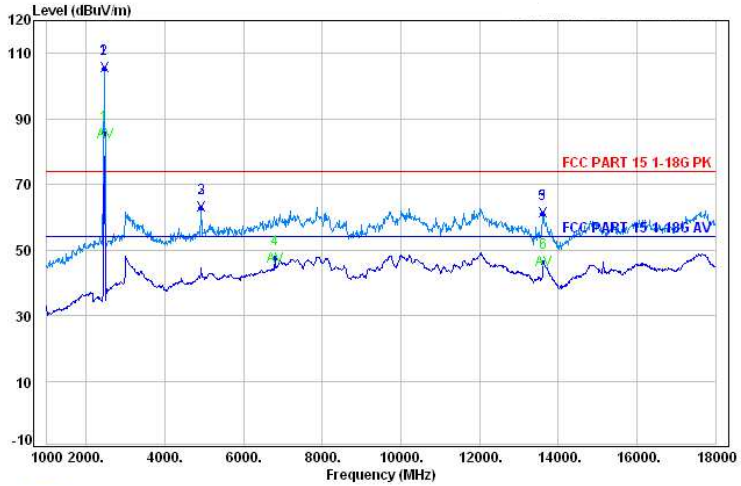
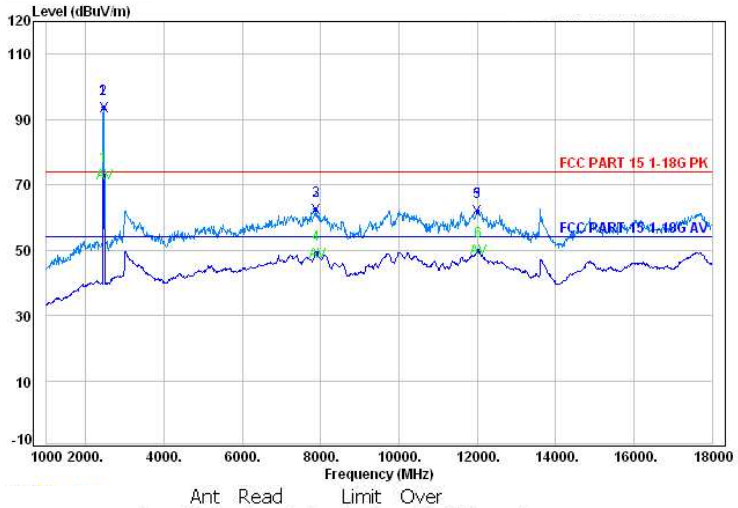
IEEE 802.11g Tx (CH High)



	Freq	Ant Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	86.33	85.50	74.00	11.50	Average
2	2462.00	30.72	106.47	105.64	74.00	31.64	Peak
3	4927.00	35.50	67.61	63.07	74.00	-10.93	Peak
4	6797.00	39.01	49.81	47.71	74.00	-26.29	Average
5	13597.00	42.38	69.88	61.30	74.00	-12.70	Peak
6	13614.00	42.39	60.13	46.48	74.00	-27.52	Average



	Freq	Ant Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	73.86	73.03	74.00	-0.97	Average
2	2462.00	30.72	94.50	93.67	74.00	19.67	Peak
3	7885.00	39.48	65.92	62.47	74.00	-11.53	Peak
4	7902.00	39.48	52.63	49.15	74.00	-24.85	Average
5	11999.00	41.40	63.89	62.08	74.00	-11.92	Peak
6	12016.00	41.42	51.77	49.90	74.00	-24.10	Average

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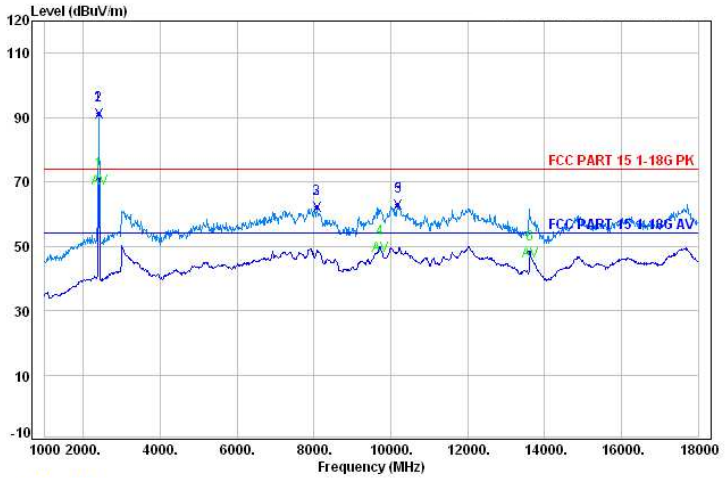
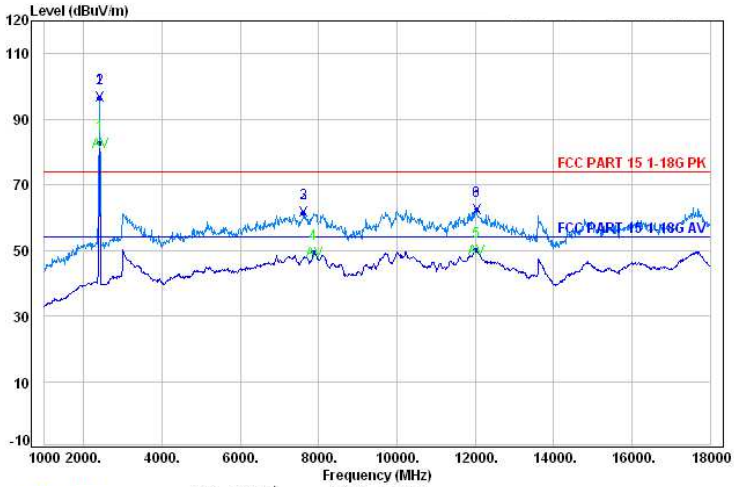
IEEE 802.11 n HT20 Tx (CH LOW)



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2411.00	30.74	71.54	70.67	74.00	-3.33	Average
2	2411.00	30.74	92.08	91.21	74.00	17.21	Peak
3	8072.00	39.36	66.07	62.10	74.00	-11.90	Peak
4	9721.00	39.18	53.53	49.58	74.00	-24.42	Average
5	10180.00	39.47	65.98	62.84	74.00	-11.16	Peak
6	13614.00	42.39	61.69	48.04	74.00	-25.96	Average



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2411.00	30.74	83.58	82.72	74.00	8.72	Average
2	2411.00	30.74	97.61	96.75	74.00	22.75	Peak
3	7613.00	39.42	64.63	61.57	74.00	-12.43	Peak
4	7868.00	39.47	52.83	49.40	74.00	-24.60	Average
5	12016.00	41.42	52.01	50.14	74.00	-23.86	Average
6	12033.00	41.43	64.52	62.58	74.00	-11.42	Peak

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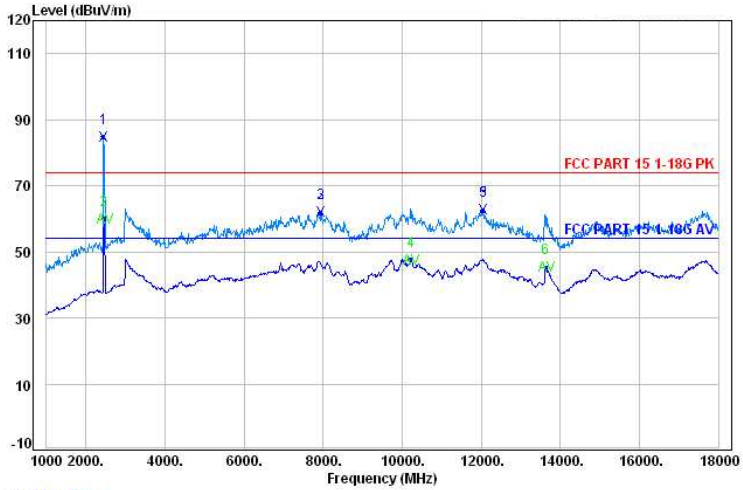
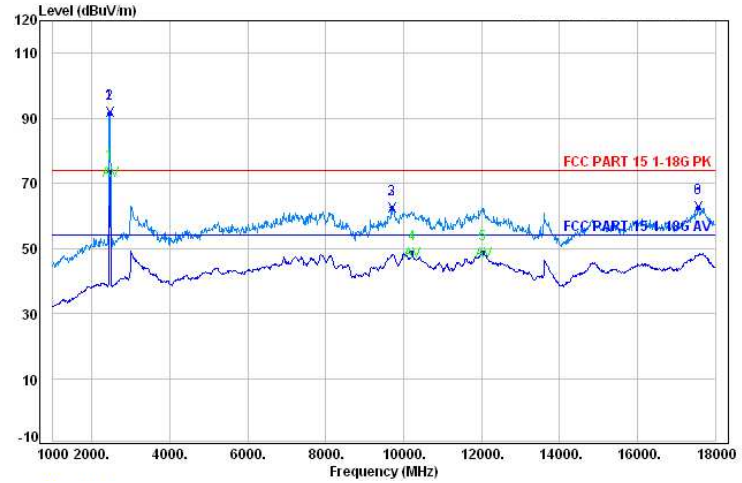
IEEE 802.11 n HT20 Tx (CH High)



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	85.73	84.88	74.00	10.88	Peak
2	2462.00	30.72	60.88	60.05	74.00	-13.95	Average
3	7936.00	39.49	65.45	61.93	74.00	-12.07	Peak
4	10214.00	39.49	50.86	47.63	74.00	-26.37	Average
5	12050.00	41.45	64.73	62.73	74.00	-11.27	Peak
6	13631.00	42.40	59.36	45.42	74.00	-28.58	Average



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	74.38	73.55	74.00	-0.45	Average
2	2462.00	30.72	92.63	91.80	74.00	17.80	Peak
3	9704.00	39.16	66.50	62.46	74.00	-11.54	Peak
4	10214.00	39.49	52.01	48.78	74.00	-25.22	Average
5	12033.00	41.43	50.64	48.70	74.00	-25.30	Average
6	17558.00	44.31	75.23	62.65	74.00	-11.35	Peak

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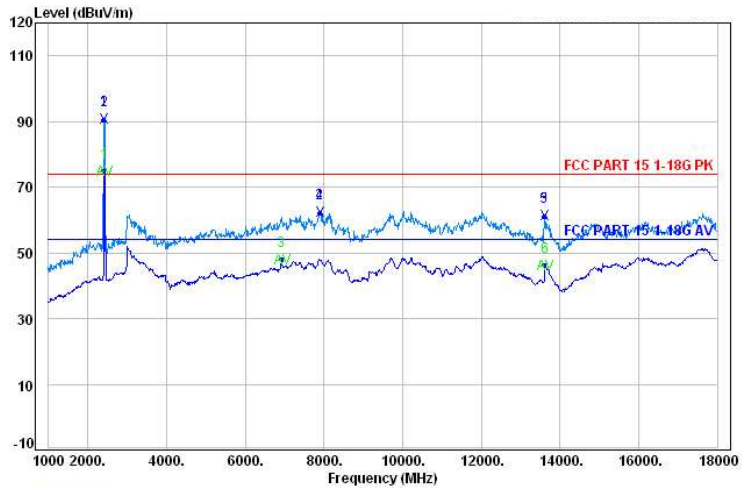
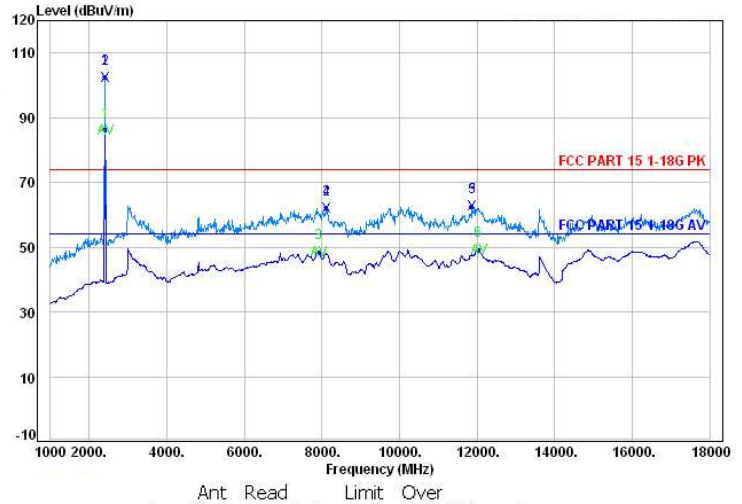
IEEE 802.11 n HT40 Tx (CH LOW)



Freq	Ant Factor	Read Level	Limit Level	Over Line Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2422.00	30.74	75.82	74.96	74.00	0.96	Average
2	2422.00	30.74	91.49	90.63	74.00	16.63	Peak
3	6916.00	39.30	50.11	48.09	74.00	-25.91	Average
4	7902.00	39.48	65.83	62.35	74.00	-11.65	Peak
5	13597.00	42.38	69.93	61.35	74.00	-12.65	Peak
6	13614.00	42.39	59.85	46.20	74.00	-27.80	Average



Freq	Ant Factor	Read Level	Limit Level	Over Line Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2422.00	30.74	78.14	77.28	74.00	3.28	Average
2	2422.00	30.74	95.57	94.71	74.00	20.71	Peak
3	7885.00	39.48	52.44	48.99	74.00	-25.01	Average
4	7902.00	39.48	66.40	62.92	74.00	-11.08	Peak
5	12016.00	41.42	64.34	62.47	74.00	-11.53	Peak
6	12033.00	41.43	52.11	50.17	74.00	-23.83	Average

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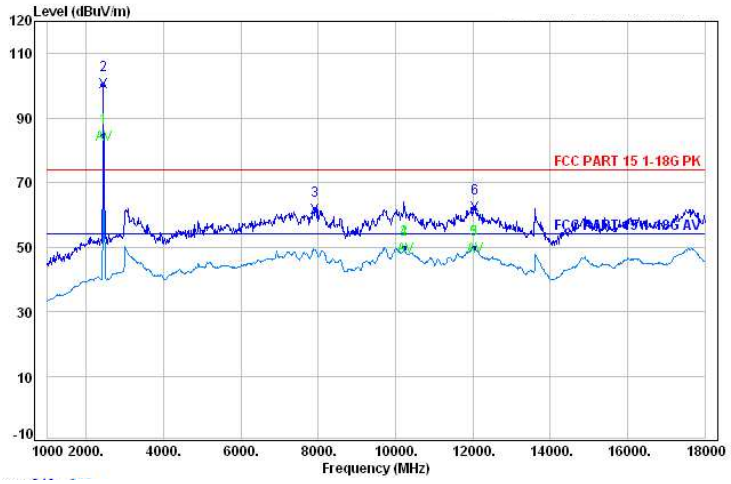
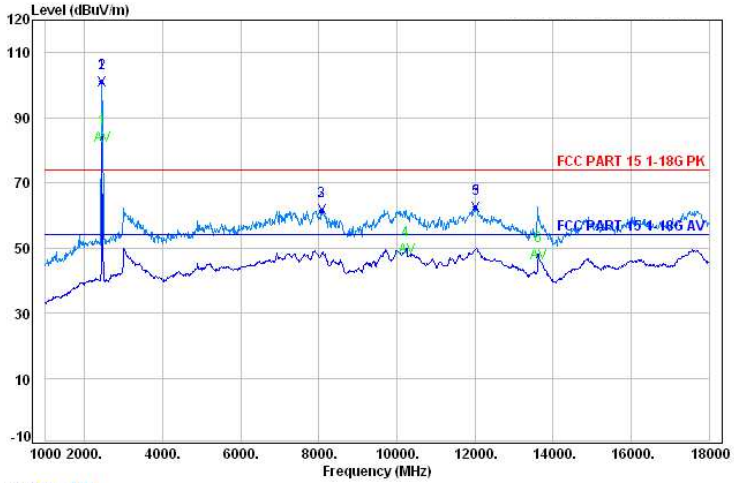
IEEE 802.11 n HT40 Tx (CH High)



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2452.00	30.72	85.31	84.46	74.00	10.46	Average
2	2452.00	30.72	101.42	100.57	74.00	26.57	Peak
3	7919.00	39.48	65.24	61.73	74.00	-12.27	Peak
4	10231.00	39.49	53.03	49.74	74.00	-24.26	Average
5	12033.00	41.43	51.77	49.83	74.00	-24.17	Average
6	12050.00	41.45	64.42	62.42	74.00	-11.58	Peak



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2452.00	30.72	84.87	84.02	74.00	10.02	Average
2	2452.00	30.72	102.01	101.16	74.00	27.16	Peak
3	8072.00	39.36	65.60	61.63	74.00	-12.37	Peak
4	10231.00	39.49	52.81	49.52	74.00	-24.48	Average
5	12016.00	41.42	64.41	62.54	74.00	-11.46	Peak
6	13614.00	42.39	61.42	47.77	74.00	-26.23	Average

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10. Test of Band Edges Emission

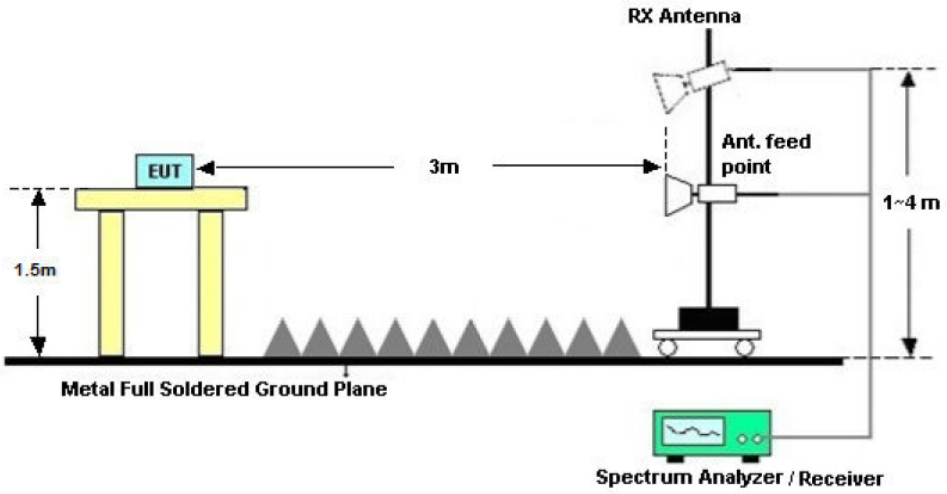
10.1 Applicable standard

Refer to FCC §15.247 (d), IC RSS-247 Issue2 Clause 5.5
KDB558074 D01 V04 Section 13.0

Section 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. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

10.2 EUT Setup

Radiated Measurement Setup



Conducted Measurement Setup

Spectrum Analyzer

10.3 Test Equipment List and Details

See section 2.7.

10.4 Test Procedure

Conducted Measurement

KDB558074 D01 V04 Section 11.3

1.Set the center frequency and span to encompass frequency range to be measured.

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2.Set the RBW = 100 kHz.
3.Set the VBW ≥ 3 x RBW.
4.Detector = peak.
5.Sweep time = auto couple.
6.Trace mode = max hold.
7.Allow trace to fully stabilize.
8.Use the peak marker function to determine the maximum amplitude level.

Radiated Measurement

KDB558074 D01 V04 Section 12.1, 12.2.7

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Set RBW = 1MHz
3. Set VBW = 3MHz
4. Detector = Peak
5. Trace Mode = max hold.
6. Sweep = auto couple.
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Set RBW = 1MHz
3. Set VBW = 3MHz
4. Detector = power average (RMS)
5. Sweep = auto couple.
6. Trace (RMS) averaging was performed over at least 100 traces

Note :

1. Configure the EUT according to ANSI C63.10-2013
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.

10.5 Test Result

Temperature (℃) : 22~23	EUT: GL-MIFI
Humidity (%RH): 50~54	M/N: GL-MIFI
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuously Tx Mode

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CH1

IEEE 802.11b mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	50.62	74	-23.38	Peak
LOW	2400	38.43	54	-15.57	Average
	2483.5	49.66	74	-24.34	Peak
HIGH	2483.5	38.23	54	-15.77	Average

IEEE 802.11g mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	49.6	74	-24.4	Peak
LOW	2400	37.45	54	-16.55	Average
	2483.5	50.46	74	-23.54	Peak
HIGH	2483.5	38.24	54	-15.76	Average

IEEE 802 11n HT20 mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	46.19	74	-27.81	Peak
LOW	2400	35.22	54	-18.78	Average
	2483.5	48.23	74	-25.77	Peak
HIGH	2483.5	36.01	54	-17.99	Average

IEEE 802 11n HT40 mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	46.19	74	-27.81	Peak
LOW	2400	35.22	54	-18.78	Average
	2483.5	48.23	74	-25.77	Peak
HIGH	2483.5	36.01	54	-17.99	Average

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CH2

IEEE 802.11b mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	50.62	74	-23.38	Peak
LOW	2400	38.43	54	-15.57	Average
	2483.5	49.66	74	-24.34	Peak
HIGH	2483.5	38.23	54	-15.77	Average

IEEE 802.11g mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	49.6	74	-24.4	Peak
LOW	2400	37.45	54	-16.55	Average
	2483.5	50.46	74	-23.54	Peak
HIGH	2483.5	38.24	54	-15.76	Average

IEEE 802 11n HT20 mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	46.19	74	-27.81	Peak
LOW	2400	35.22	54	-18.78	Average
	2483.5	48.23	74	-25.77	Peak
HIGH	2483.5	36.01	54	-17.99	Average

IEEE 802 11n HT40 mode

Channel	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dBuV/m)	Detector
	2400	46.19	74	-27.81	Peak
LOW	2400	35.22	54	-18.78	Average
	2483.5	48.23	74	-25.77	Peak
HIGH	2483.5	36.01	54	-17.99	Average

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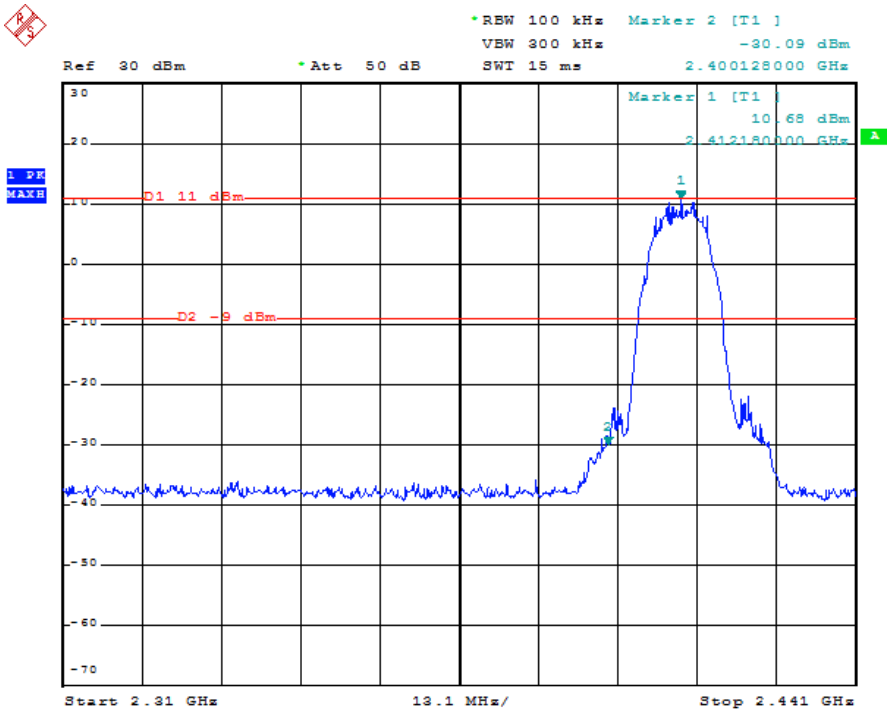
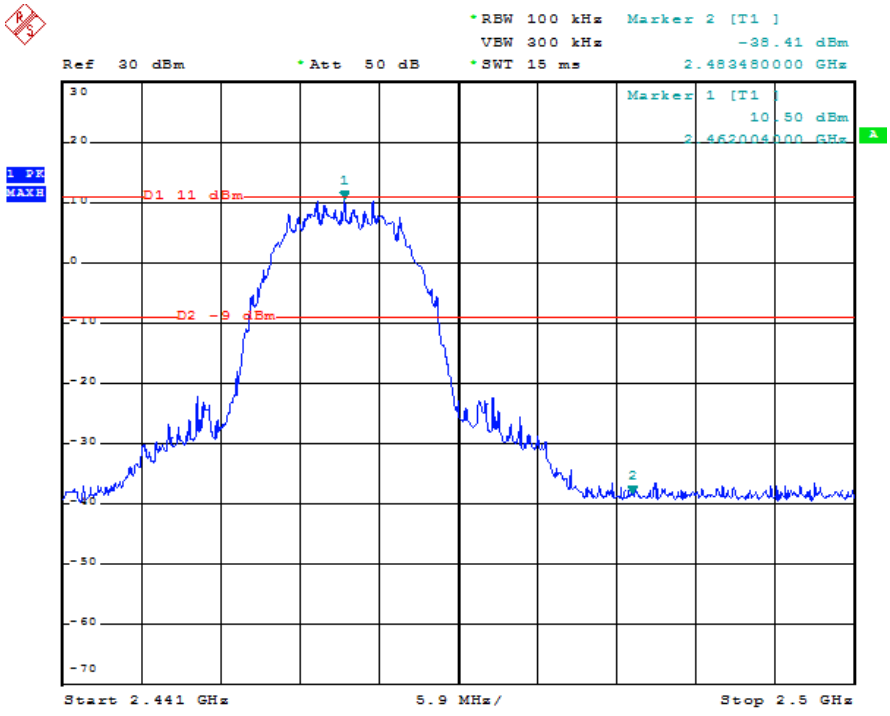
Test of Conducted band edges

CH1

CH Low (802.11b MODE)



CH High (802.11b MODE)



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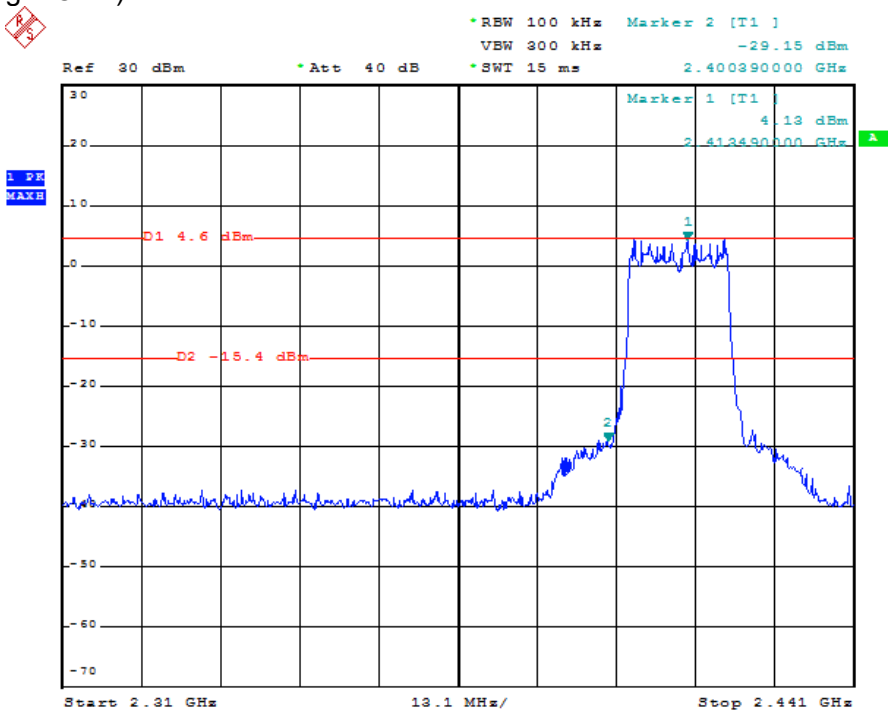
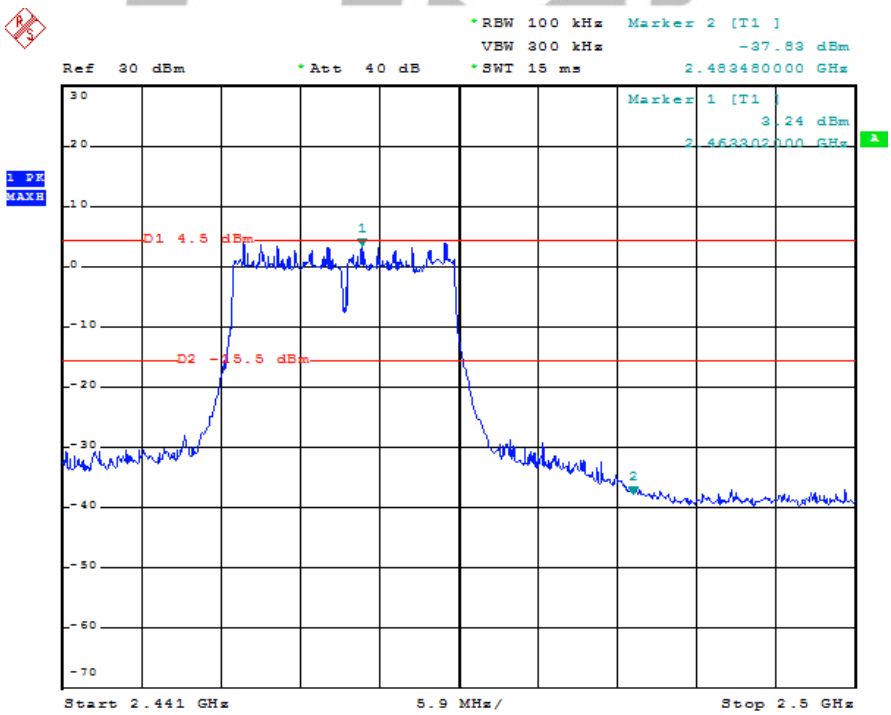
CH Low (802.11g MODE)



CH High (802.11g MODE)



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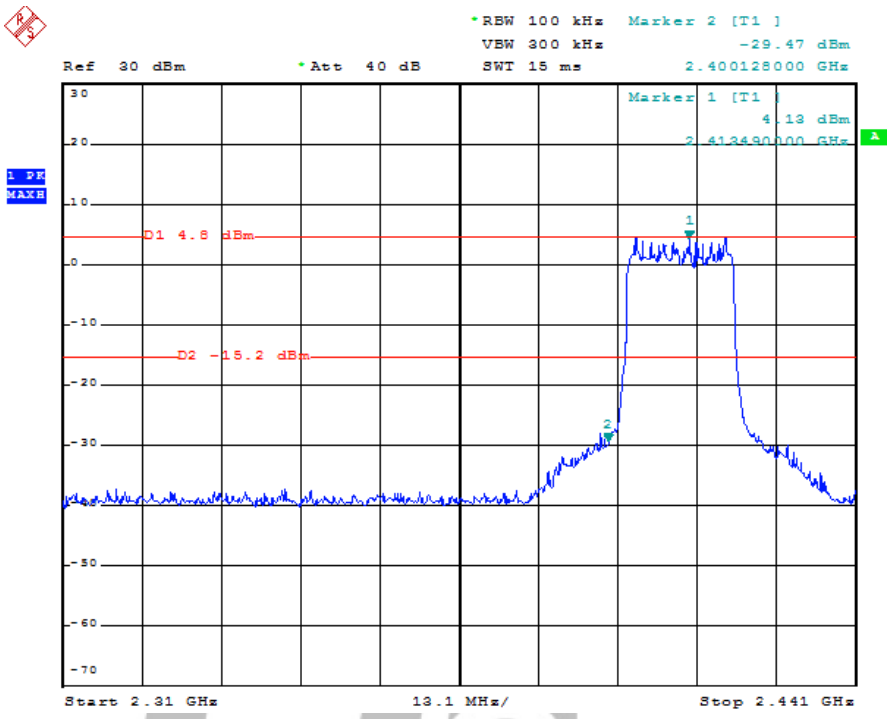
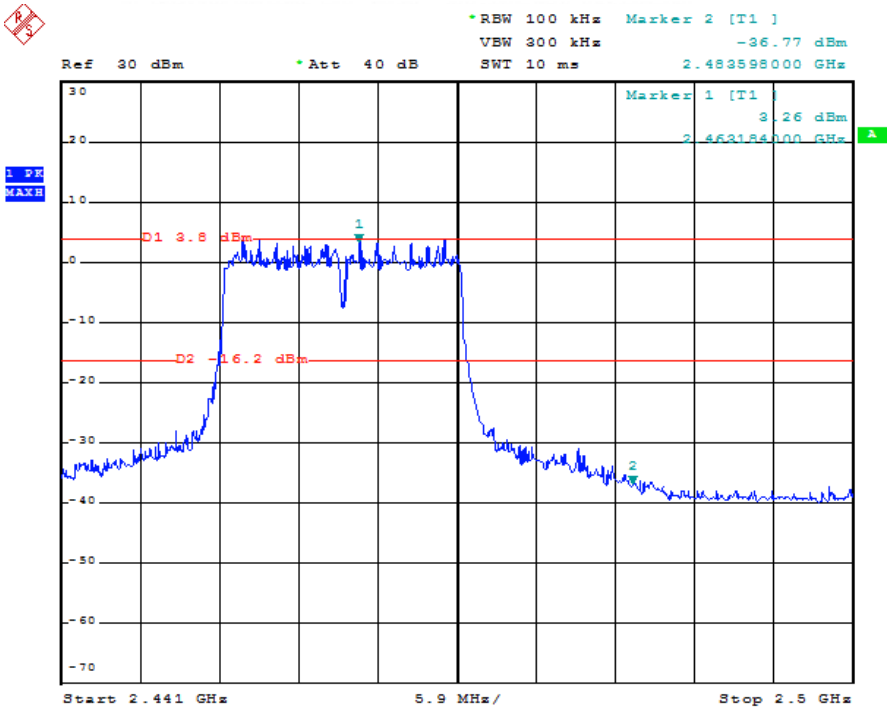
CH Low (802.11n(HT20) MODE)



CH High (802.11n(HT20) MODE)



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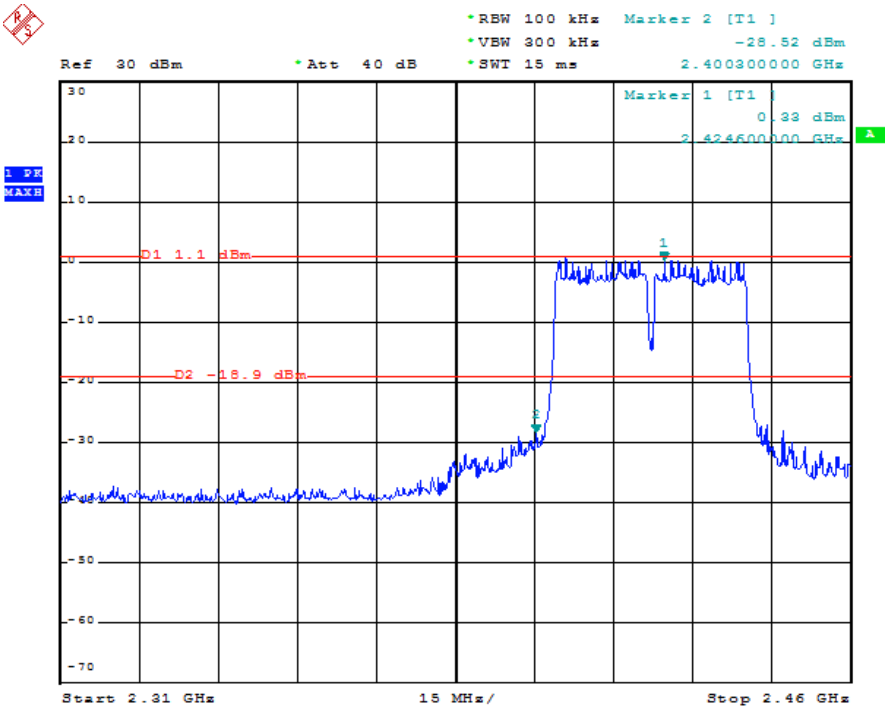
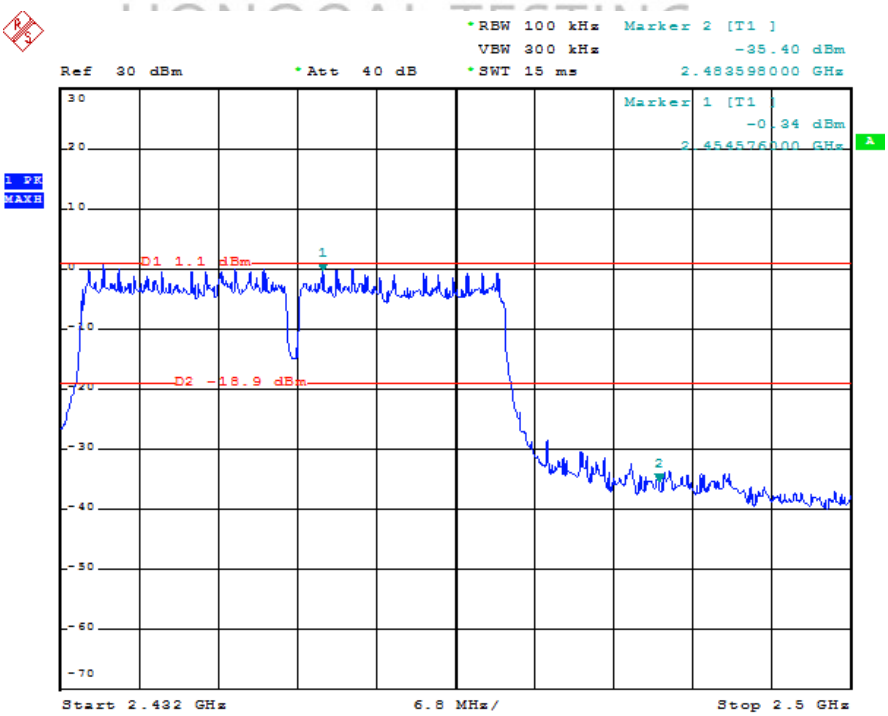
CH Low (802.11n(HT40) MODE)



CH High (802.11n(HT40) MODE)



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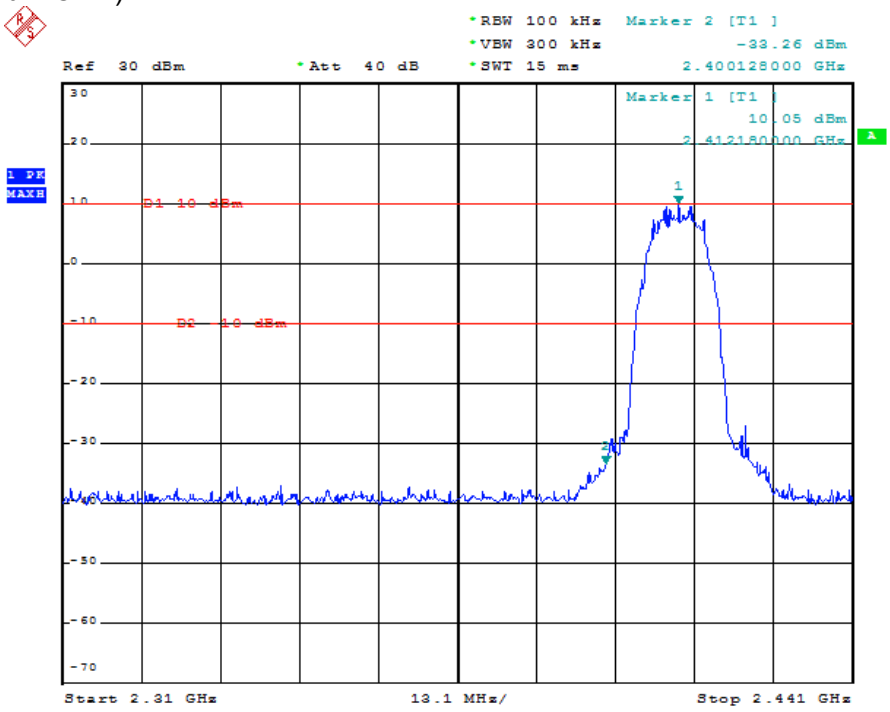
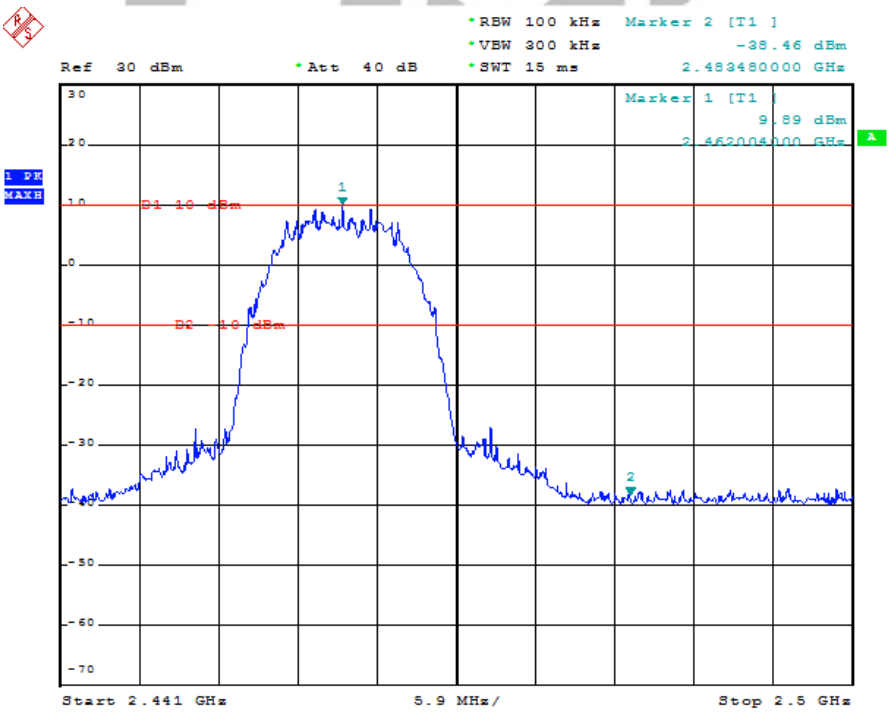
CH2

CH Low (802.11b MODE)



CH High (802.11b MODE)



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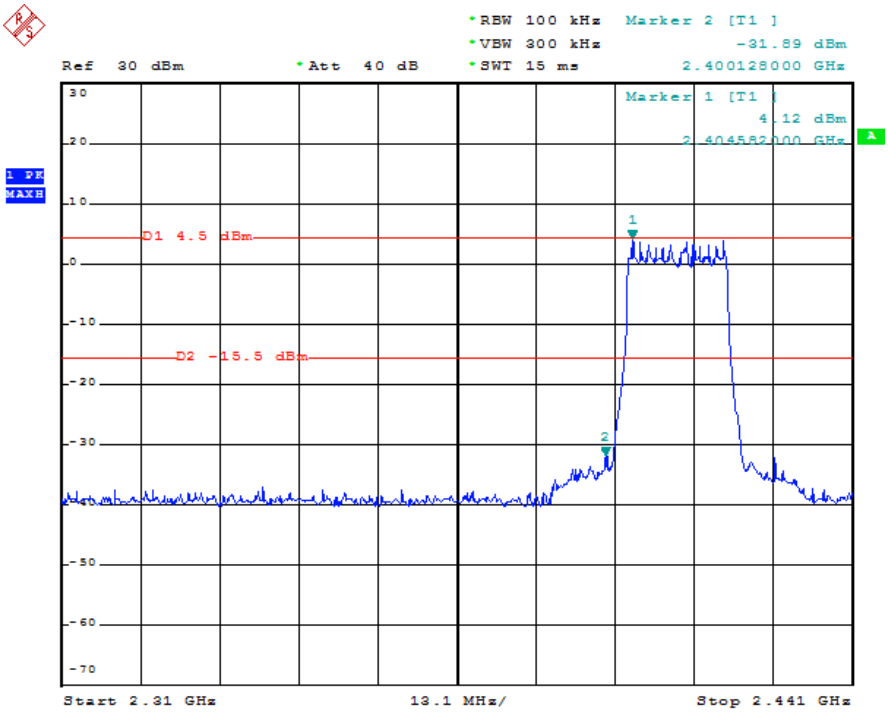
CH Low (802.11g MODE)



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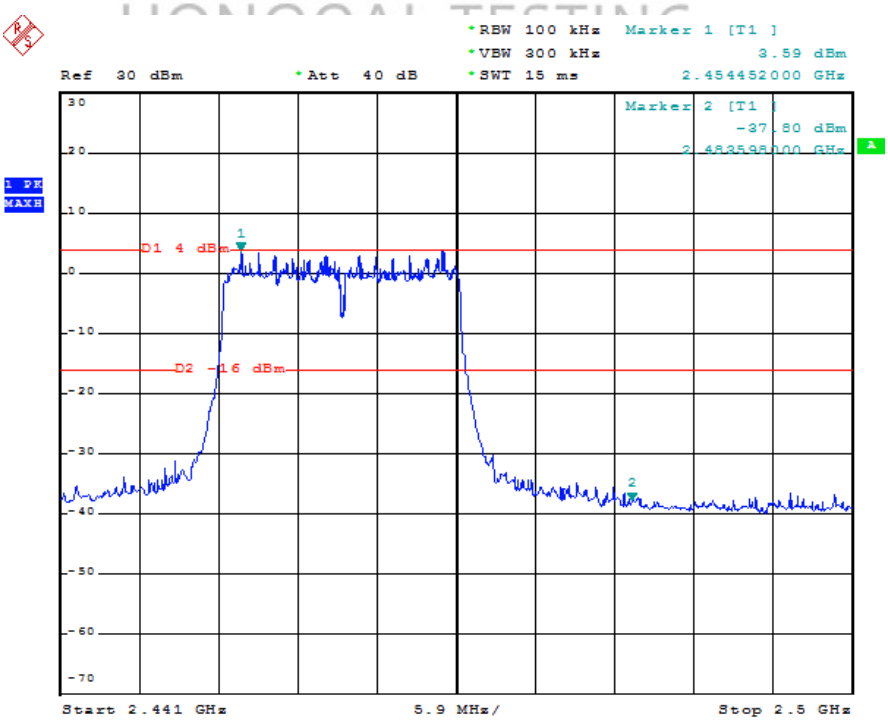

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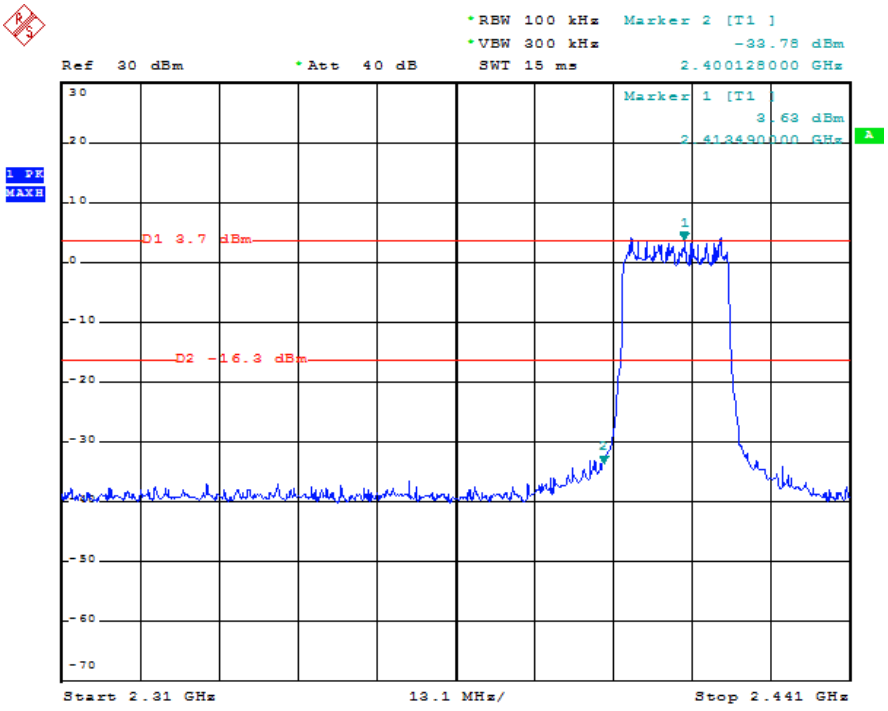
CH Low (802.11n(HT20) MODE)



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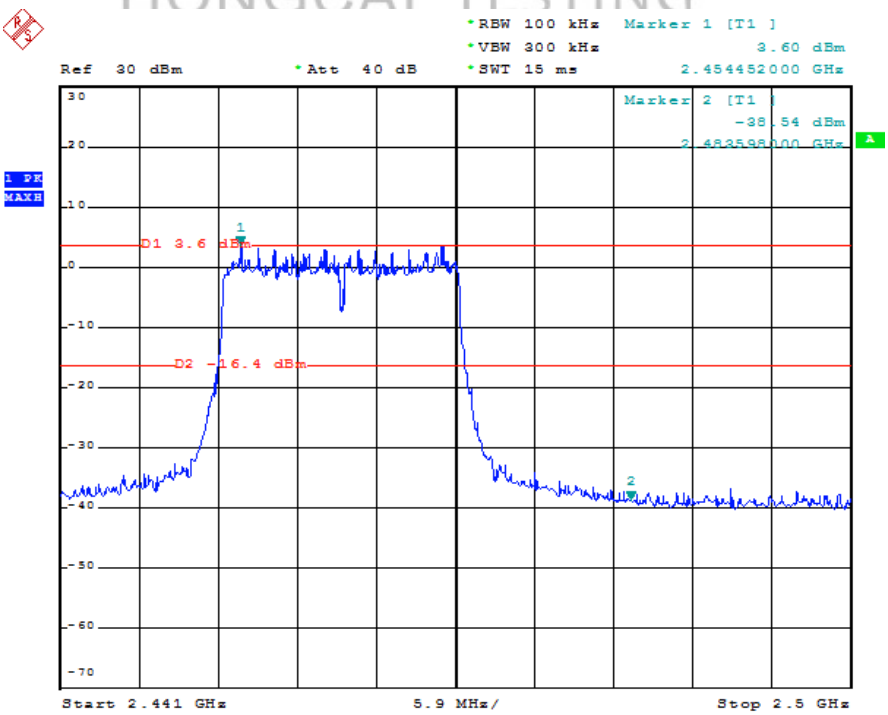

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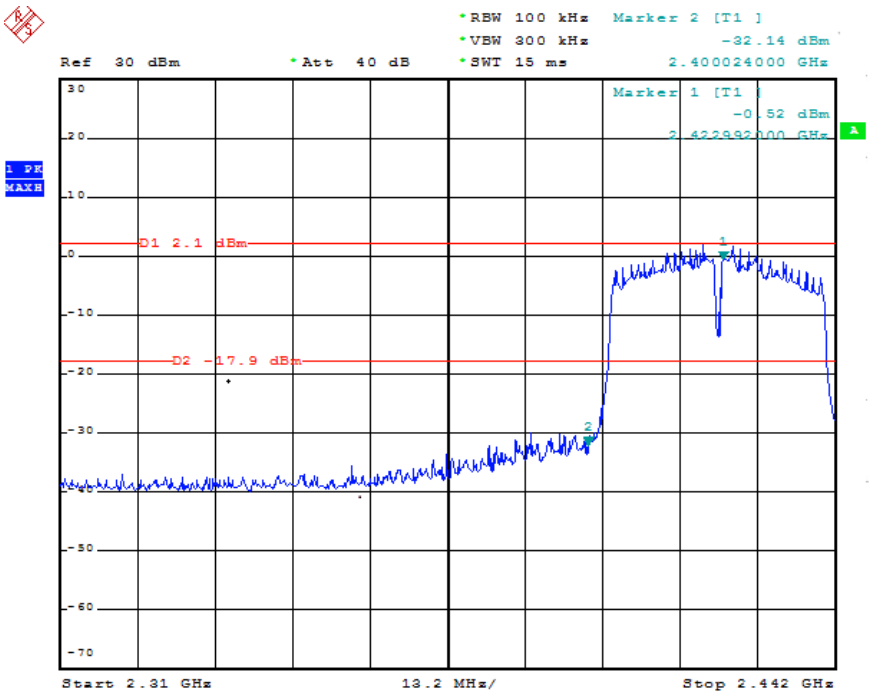
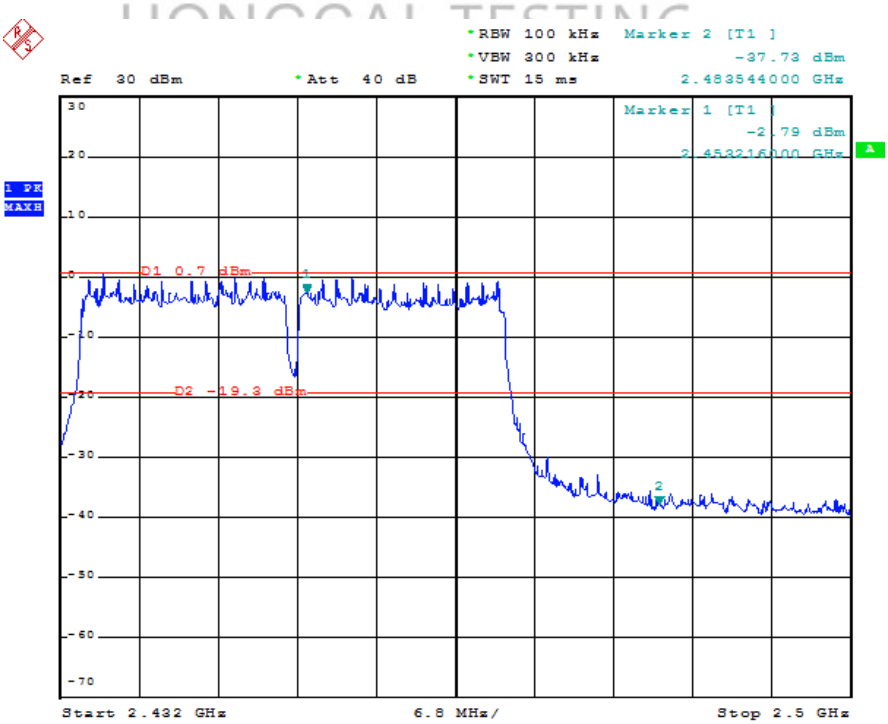
CH Low (802.11n(HT40) MODE)



CH High (802.11n(HT40) MODE)



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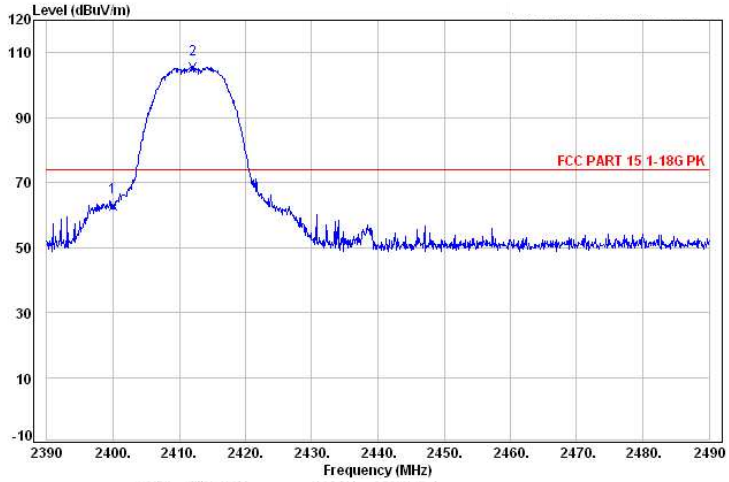
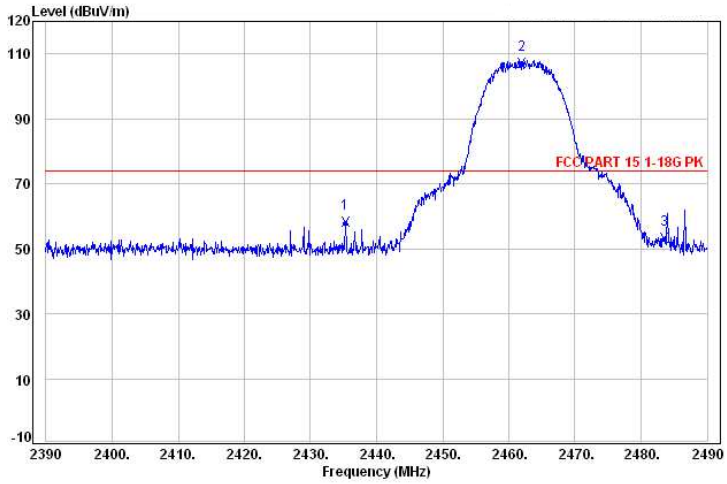
Radiated Test Result



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2400.00	30.74	63.54	62.67	74.00	-11.33	Peak
2	2412.00	30.74	106.30	105.44	74.00	31.44	Peak



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2435.30	30.73	58.98	58.13	74.00	-15.87	Peak
2	2462.00	30.72	108.05	107.22	74.00	33.22	Peak
3	2483.50	30.71	54.01	53.19	74.00	-20.81	Peak

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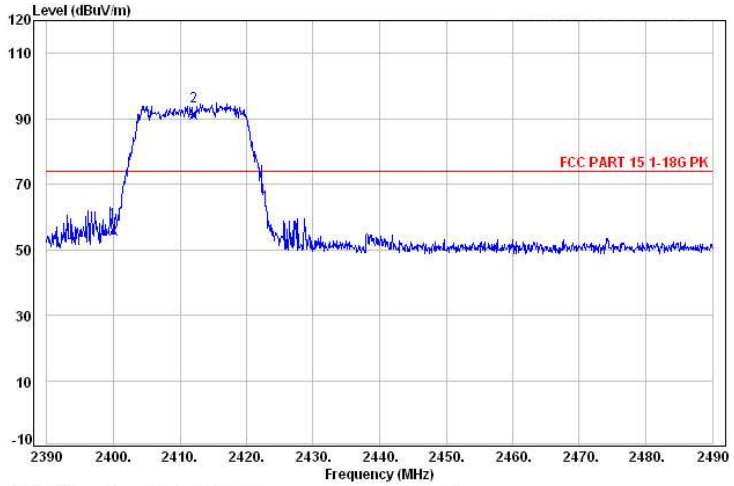
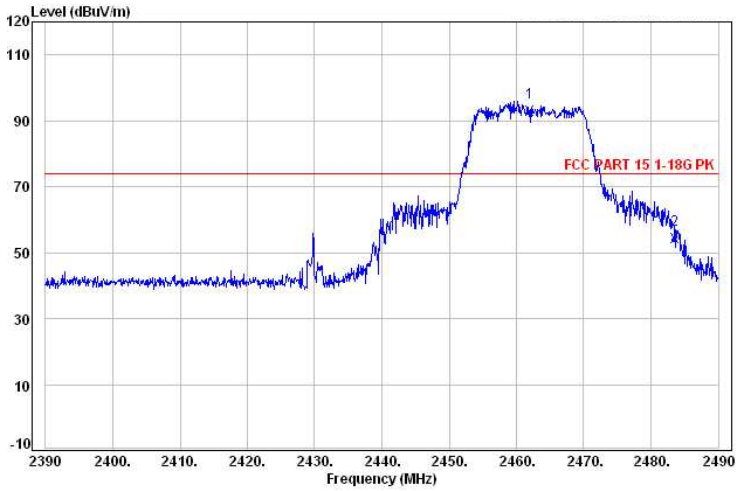


	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2400.00	30.74	56.48	55.61	74.00	-18.39	Peak
2	2412.00	30.74	92.03	91.17	74.00	17.17	Peak



	Freq	Ant Factor	Read Level	Limit Level	Over Line	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2462.00	30.72	93.60	92.77	74.00	18.77	Peak
2	2483.50	30.71	55.10	54.28	74.00	-19.72	Peak

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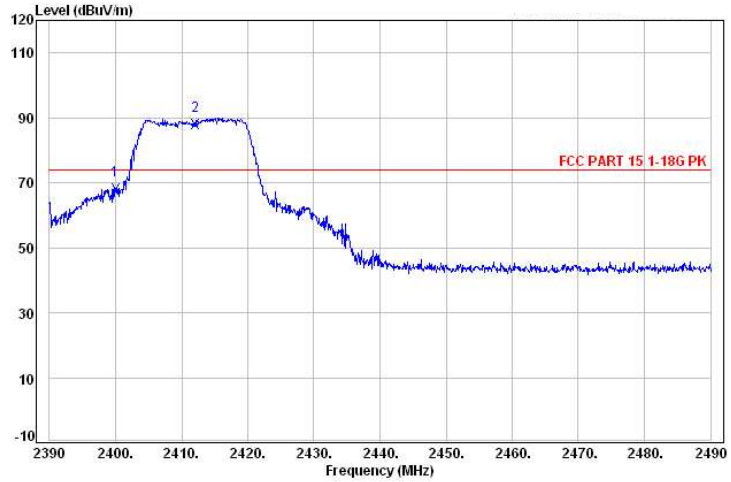
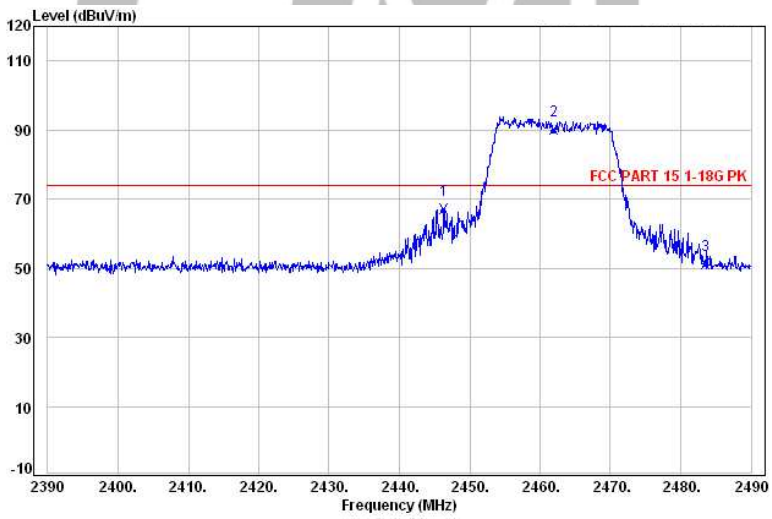


	Freq	Ant Factor	Read Level	Limit Level	Over Line Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	2400.00	30.74	68.84	67.97	74.00	-6.03 Peak
2	2412.00	30.74	88.91	88.05	74.00	14.05 Peak



	Freq	Ant Factor	Read Level	Limit Level	Over Line Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	2446.30	30.72	67.72	66.87	74.00	-7.13 Peak
2	2462.00	30.72	90.78	89.95	74.00	15.95 Peak
3	2483.50	30.71	51.99	51.17	74.00	-22.83 Peak

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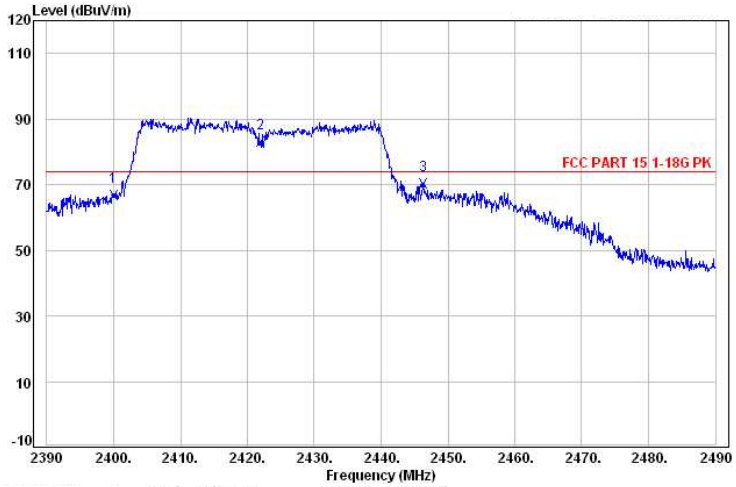
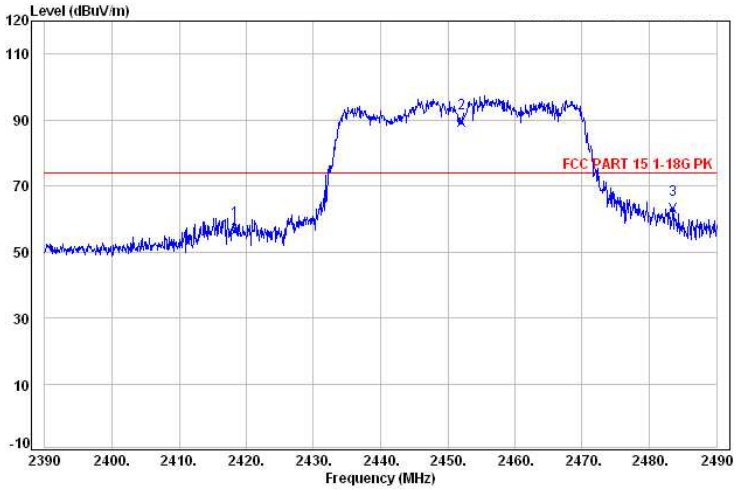


	Freq	Ant Factor	Read Level	Limit Level	Over Line Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	2400.00	30.74	67.66	66.79	74.00	-7.21 Peak
2	2422.00	30.73	83.77	82.91	74.00	8.91 Peak
3	2446.30	30.72	71.04	70.19	74.00	-3.81 Peak



	Freq	Ant Factor	Read Level	Limit Level	Over Line Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	2418.40	30.73	57.60	56.74	74.00	-17.26 Peak
2	2452.00	30.72	90.36	89.52	74.00	15.52 Peak
3	2483.50	30.71	63.95	63.13	74.00	-10.87 Peak

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11. ANTENNA REQUIREMENT

11.1 standard Applicable

Section 15.203 & IC RSS-GEN Clause 8.3

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Section 15.247(b)/(c)

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

11.2 Antenna Connected Construction

There are no provisions for connections to an external antenna.
The antenna is designed with PCB antenna and no consideration of replacement.
The antenna used in this product is complied with standard. The maximum Gain of the antenna lower than 6.0dBi and have the definite antenna Specification.

…End of Report…

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