FCC Part 15C
Measurement and Test Report

For

Dalian Cloud Force Technologies Co., Ltd.

FCC ID: 2AMFC-WS1-PRO

FCC Rule(s):	FCC Part 15C
Product Description:	UbiBot Wireless Smart Multi Sensor Device WS1 Pro
Tested Model:	WS1 Pro
Report No.:	BSL11012901RF
Tested Date:	October 23~24, 2018
Issued Date:	October 31,2018
Tested By:	Messi.Wang/ Engineer
Reviewed By:	Lisa. Ji / EMC Manager
Approved & Authorized By:	Mike mo / PSQ Manager
Prepared By:	

BSL Testing Co.,LTD.
NO. 24, ZH Park, Nantou, Shenzhen, 518000 China
Tel: 400-882-9628 Fax: 86- 755-26508703

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Dalian Cloud Force Technologies Co., Ltd.
Address of applicant:	Unit1,Block B,6th Floor, No.23 Honggang Rd. Ganjingzi Distr. Dalian, Liaoning Province
Manufacturer:	Dalian Cloud Force Technologies Co., Ltd.
Address of manufacturer:	Unit1,Block B,6th Floor, No.23 Honggang Rd. Ganjingzi Distr. Dalian, Liaoning Province

General Description of EUT	
Product Name:	UbiBot Wireless Smart Multi Sensor Device WS1 Pro
Trade Name:	轻松连/Ubibot
Model No.:	WS1 Pro,WS1-PRO,WS1P,WS1-P,WS1-PRO-A, WS1-PRO-B
Rated Voltage:	DC 5V from USB or battery AA 1.5X4
Adapter information:	N/A
Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model WS1 Pro, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
RF Output Power:	17.51dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels:	11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
Channel Separation:	5MHz
Type of Antenna:	PCB Antenna
Antenna Gain:	0dBi
Lowest Internal Frequency	32.768KHz

1.2 Test Standards

The following report is prepared on behalf of the MAD Gaze (Shen Zhen) Limited in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 558074 D01 v04 for digital transmission systems shall be performed also.

1.4 Test Facility

BSL Testing Co.,LTD.
NO. 24, ZH Park, Nantou, Shenzhen, 518000 China
Designation Number : CN1217
Test Firm Registration Number: 866035
Tel: 86- 755-26508703
Fax: 86- 755-26508703

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	2412MHz, 2437MHz, 2462MHz
TM2	802.11g	2412MHz, 2437MHz, 2462MHz
TM3	802.11n-HT20	2412MHz, 2437MHz, 2462MHz
TM4	802.11n-HT40	2422MHz, 2437MHz, 2452MHz
Note: All test modes (different data rate and different modulation) are performed, but only the worst case is recorded in this report.		

Accessories Equipment List and Details			
Description	**Manufacturer**	**Model No.**	**Serial Number**
Accessories Cable List and Details			
Cable Description	**Length (m)**	**Shielded/Unshielded**	**With Core/Without Core**
EUT Cable List and Details			
Cable Description	**Length (m)**	**Shielded/Unshielded**	**With Core/Without Core**

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E23	EB12648265
USB	ESR	Shielded	Without Core

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
Spectrum Analyzer	R&S	FSP40	100550	2018-10-08	2019-10-07
Test Receiver	R&S	ESCI7	US47140102	2018-10-08	2019-10-07
Signal Generator	HP	83630B	3844A01028	2018-10-08	2019-10-07
Test Receiver	R&S	ESPI-3	100180	2018-10-08	2019-10-07
Amplifier	Agilent	8449B	4035A00116	2018-10-08	2019-10-07
Amplifier	HP	8447E	2945A02770	2018-10-08	2019-10-07
Signal Generator	IFR	2023A	202307/242	2018-10-08	2019-10-07
Broadband Antenna	SCHAFFNER	2774	2774	2018-10-21	2019-10-20
Biconical and log periodic antennas	ELECTRO-METRICS	EM-6917B-1	171	2018-10-21	2019-10-20
Horn Antenna	R&S	HF906	100253	2018-10-21	2019-10-20
Horn Antenna	EM	EM-6961	6462	2018-10-21	2019-10-20
LISN	R&S	ESH3-Z5	100196	2018-10-08	2019-10-07
LISN	COM-POWER	LI-115	02027	2018-10-08	2019-10-07
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	2018-10-08	2019-10-07
Horn Antenna	Schwarzbeck	BBHA9170	00814	2018-10-21	2019-10-20

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	PASS
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	PASS
§15.205	Restricted Band of Operation	PASS
§ 15.207(a)	Conducted Emission	PASS
§ 15.247(e)	Power Spectral Density	PASS
§ 15.247(a)(2)	6 dB Bandwidth	PASS
§ 15.247(b)(3)	RF Output Power	PASS
§ 15.209(a)	Radiated Emission	PASS
§ 15.247(d)	Band Edge (Out of Band Emissions)	PASS

Note: PASS: applicable, N/A: not applicable.

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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.

4.2 Evaluation Information

This product has a PCB Antenna, fulfill the requirement of this section.

5. Power Spectral Density

5.1 Standard Applicable

According to 15.247(a)(1)(iii), 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.

5.2 Test Procedure

According to the KDB 558074 D01 v04, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Environmental Conditions

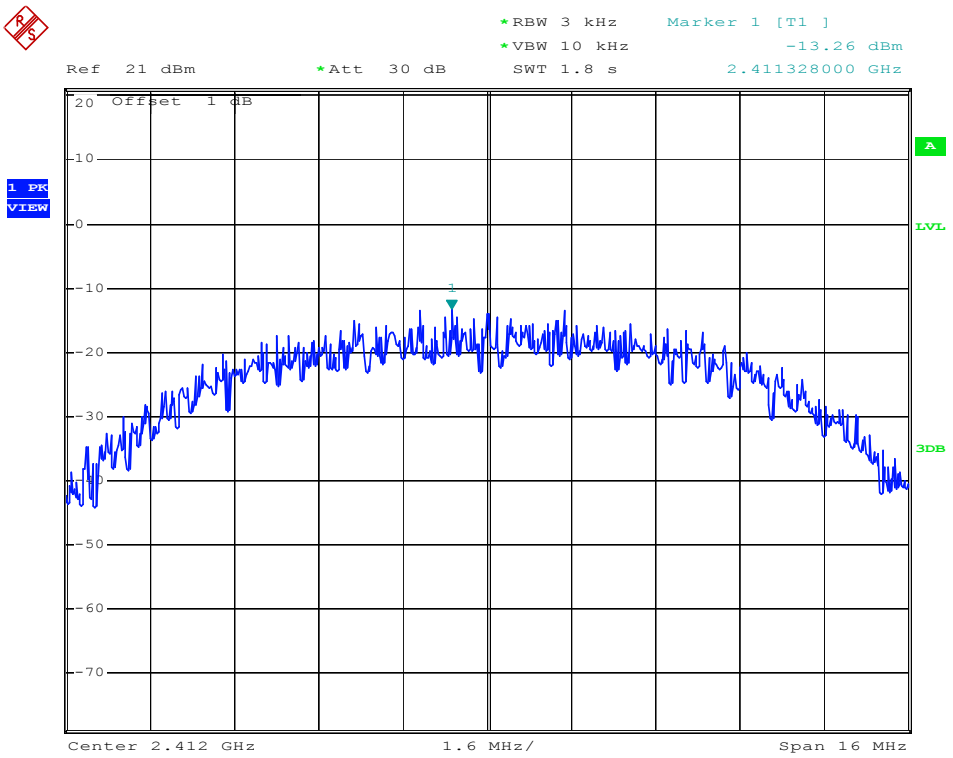
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results/Plots

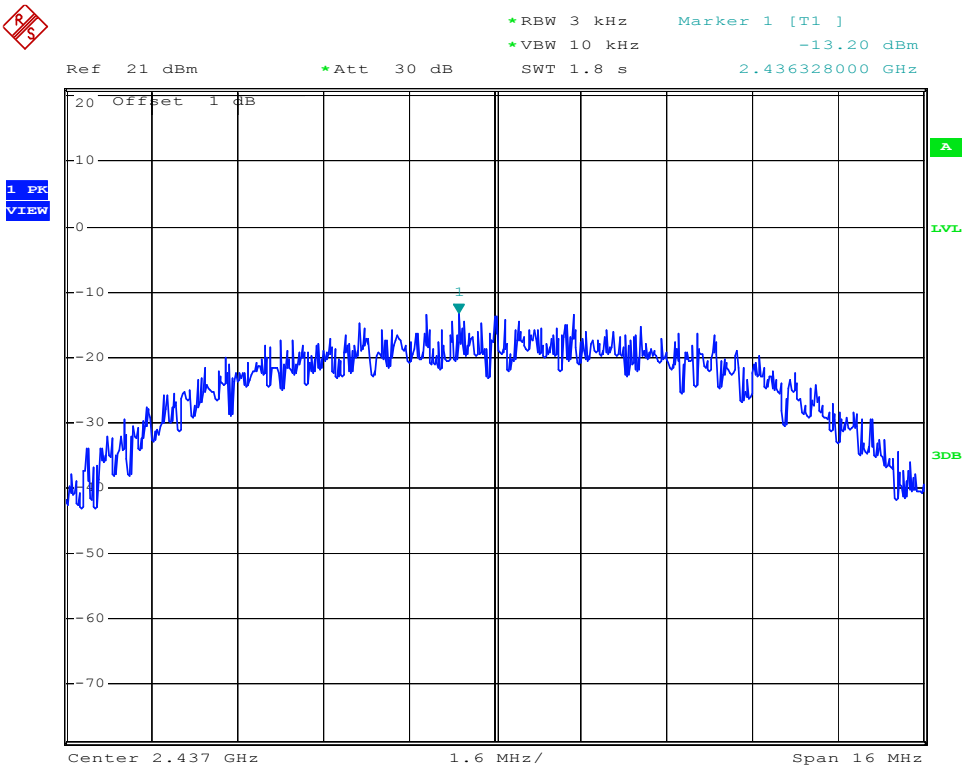
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
802.11b	2412	-13.26	8
	2437	-13.20	8
	2462	-13.60	8
802.11g	2412	-16.72	8
	2437	-16.87	8
	2462	-17.20	8
802.11n HT20	2412	-18.64	8
	2437	-18.26	8
	2462	-18.43	8
802.11n HT40	2422	-19.56	8
	2437	-20.16	8
	2452	-20.51	8

Please refer to the following test plots:

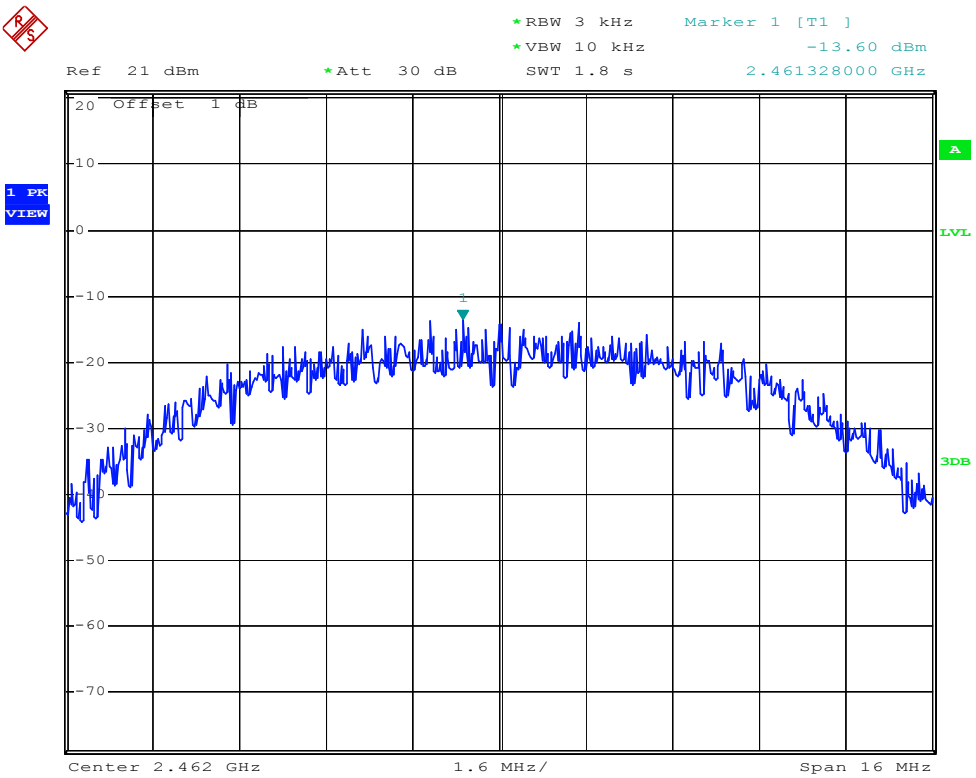
802.11b-Low Channel



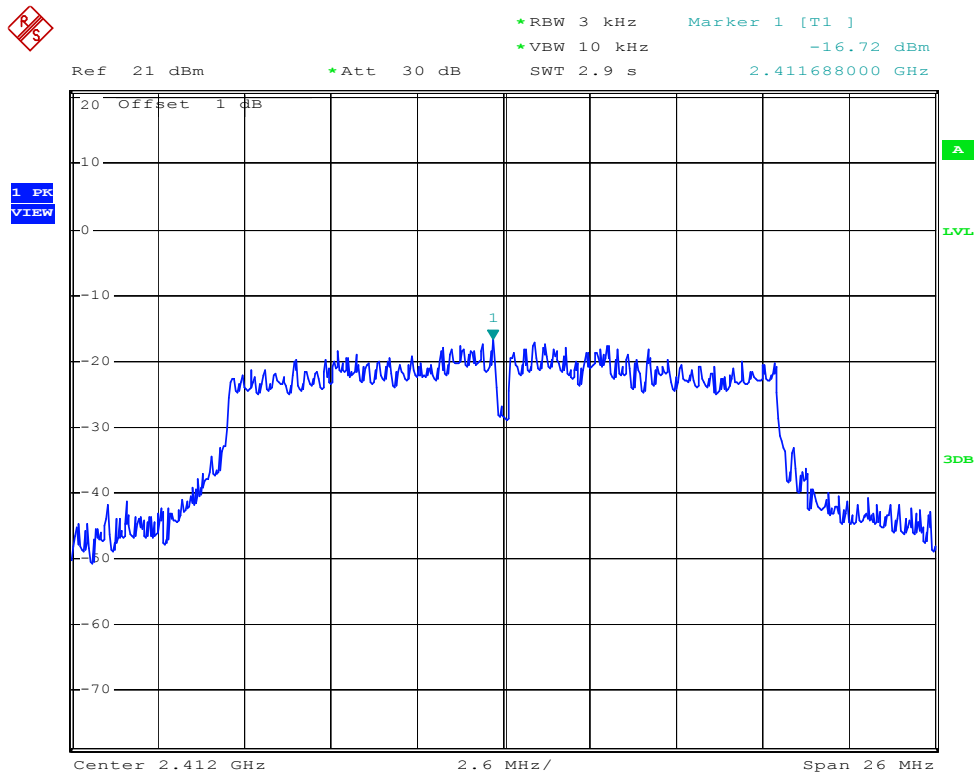
802.11b-Middle Channel



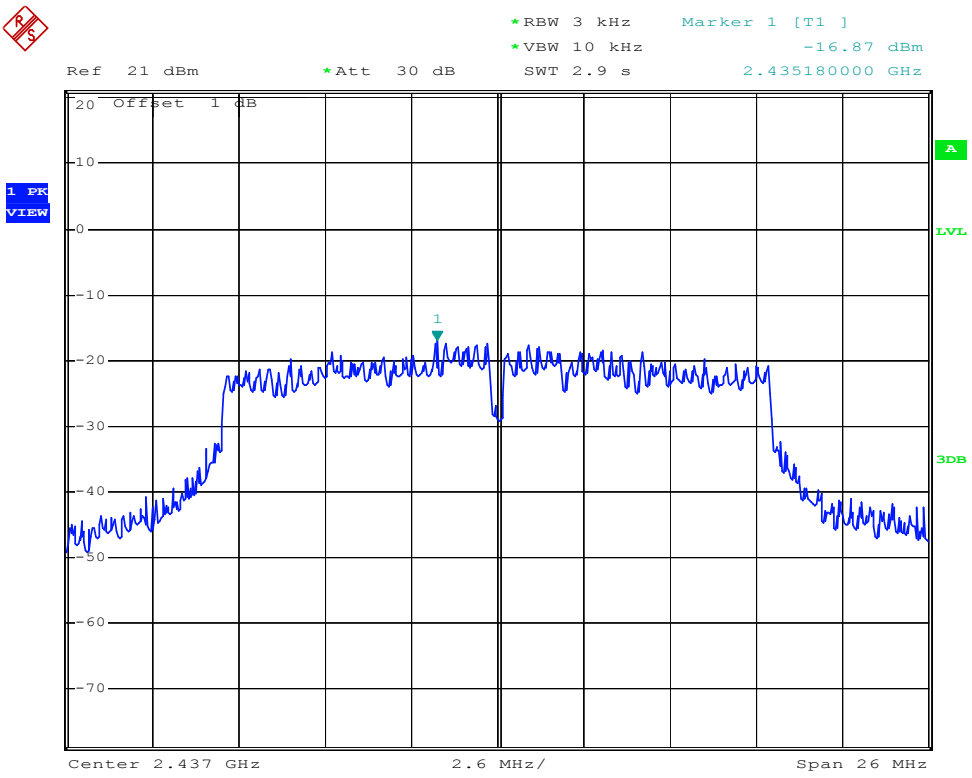
802.11b-High Channel



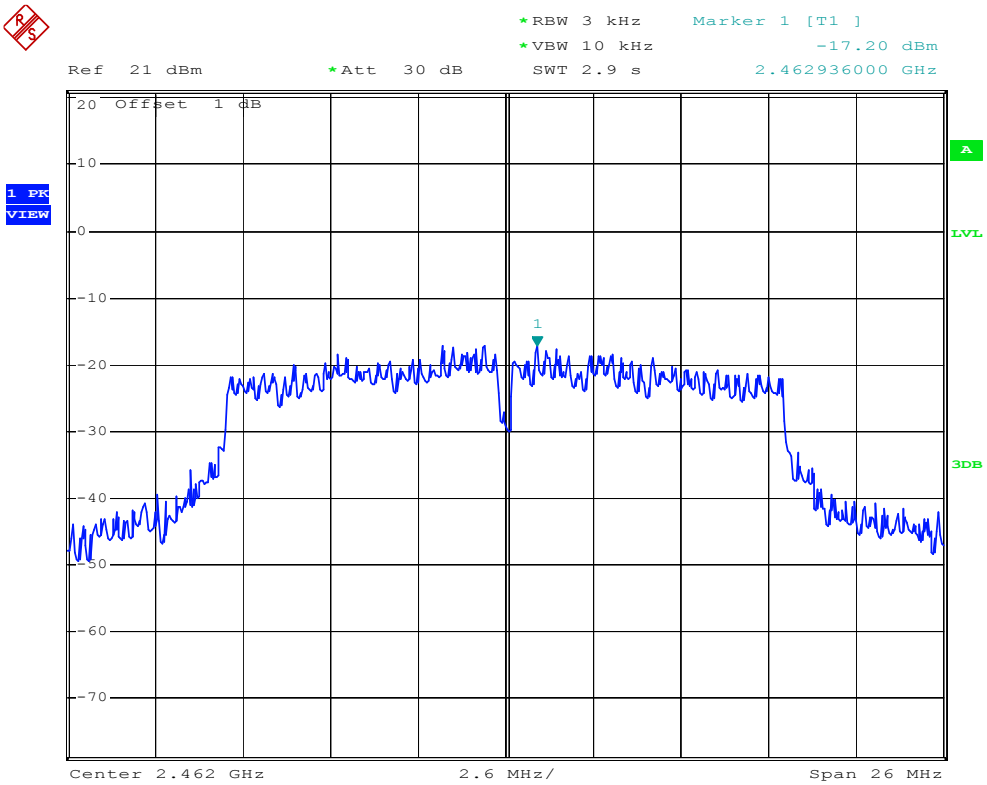
802.11g-Low Channel



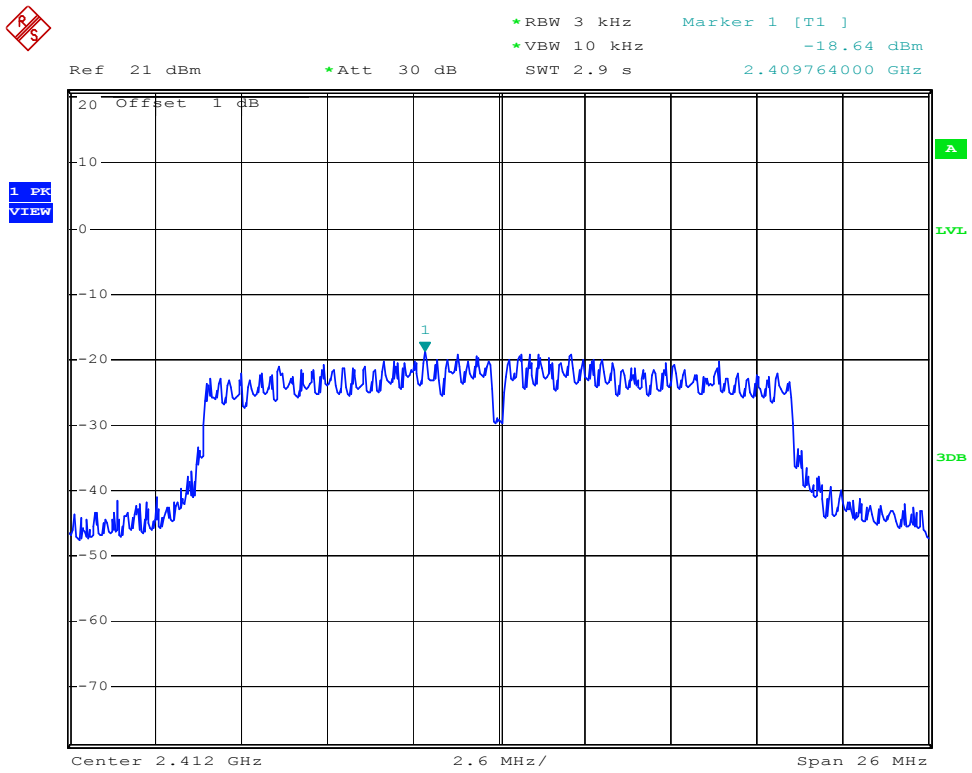
802.11g-Middle Channel



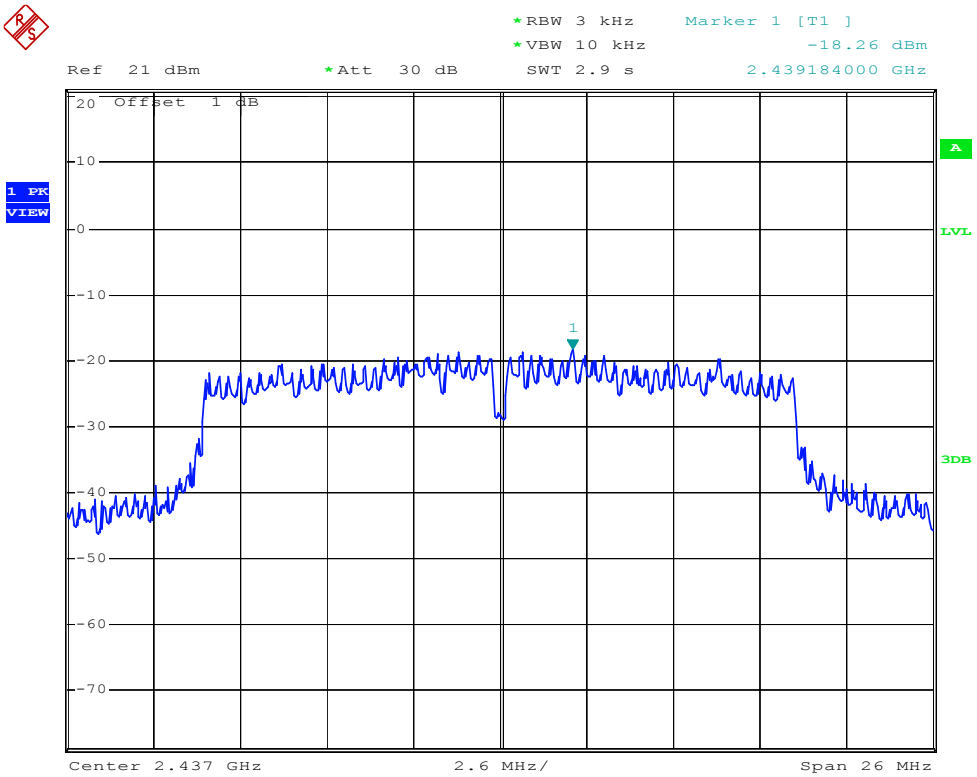
802.11g-High Channel



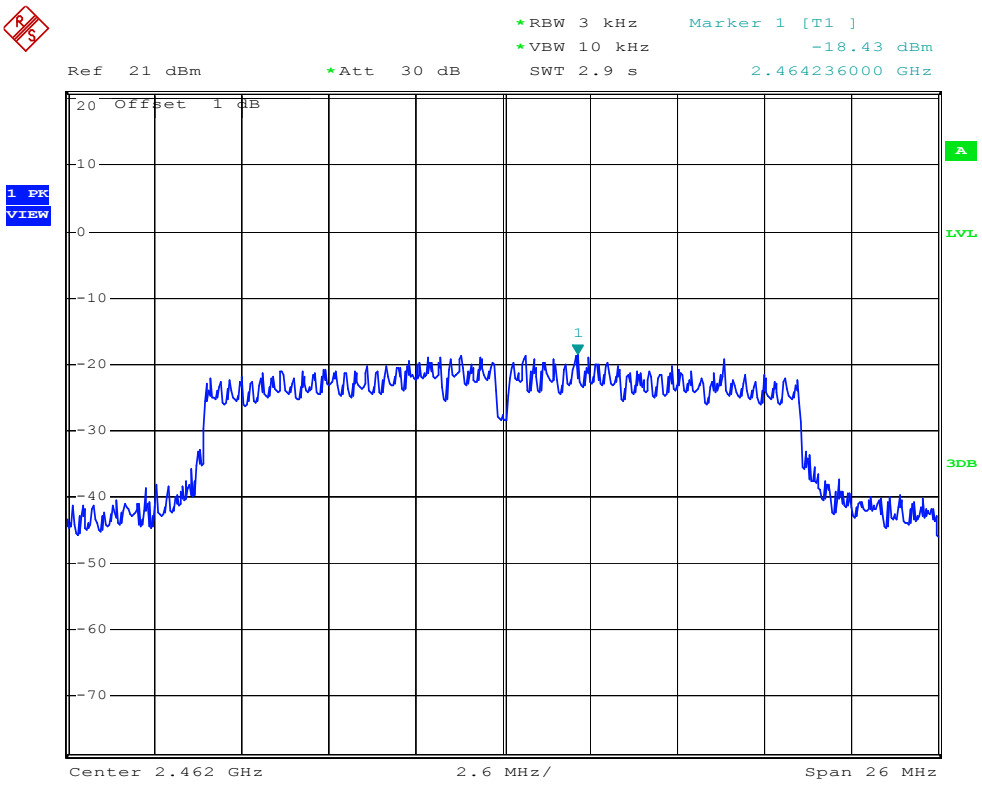
802.11n-HT20-Low Channel



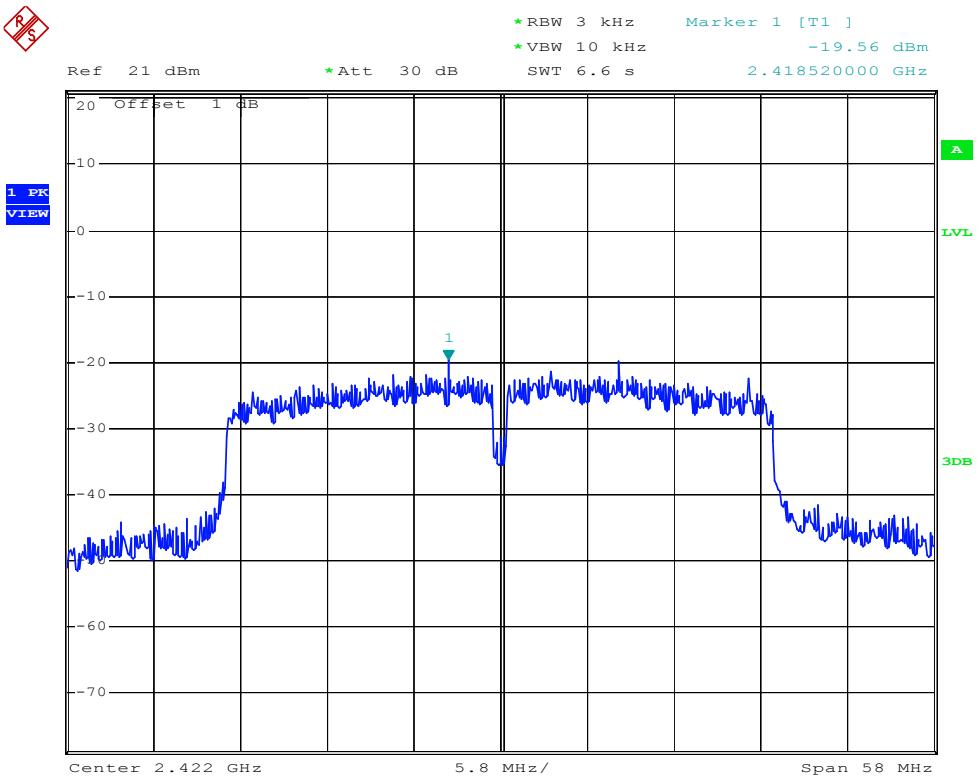
802.11n-HT20-Middle Channel



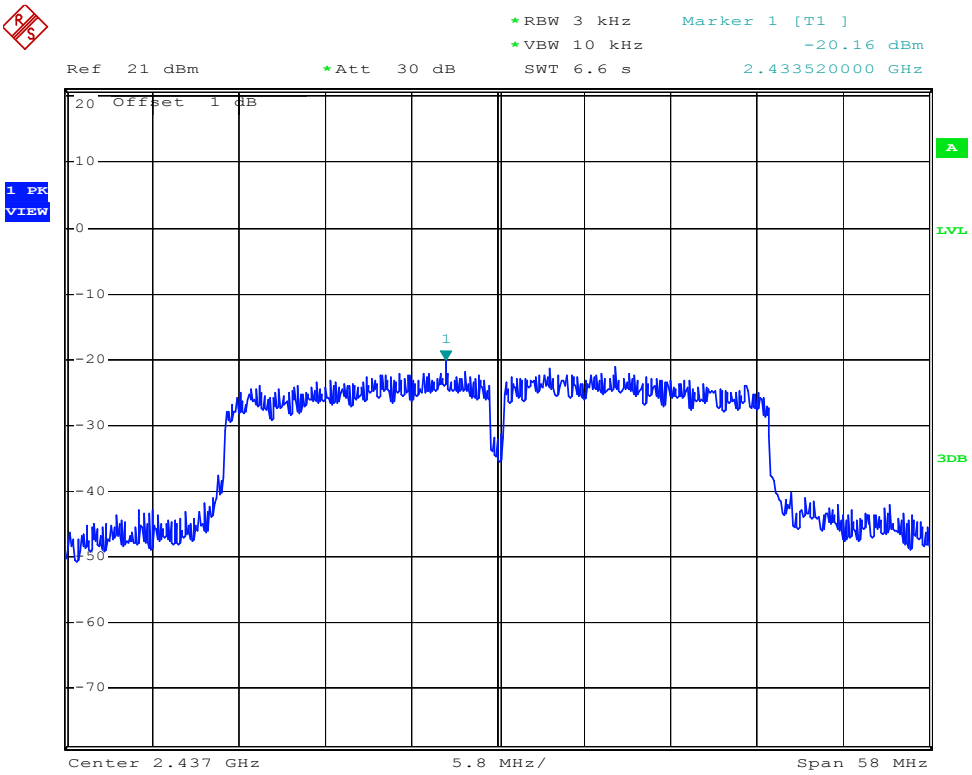
802.11n-HT20-High Channel



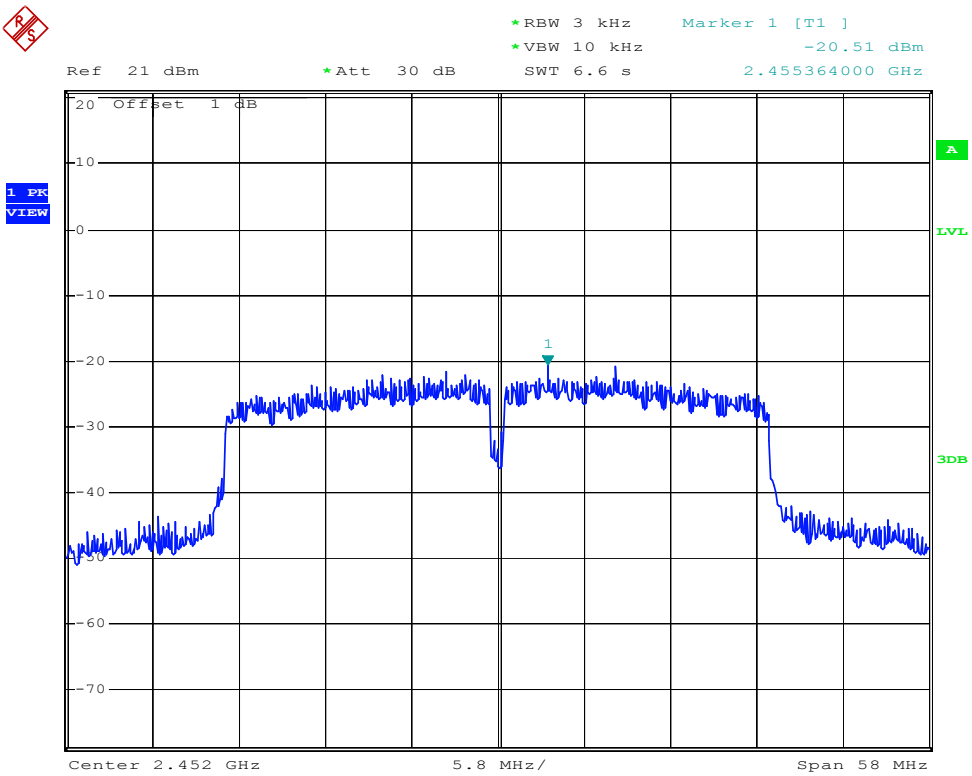
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



6. 6dB Bandwidth

6.1 Standard Applicable

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 Environmental Conditions

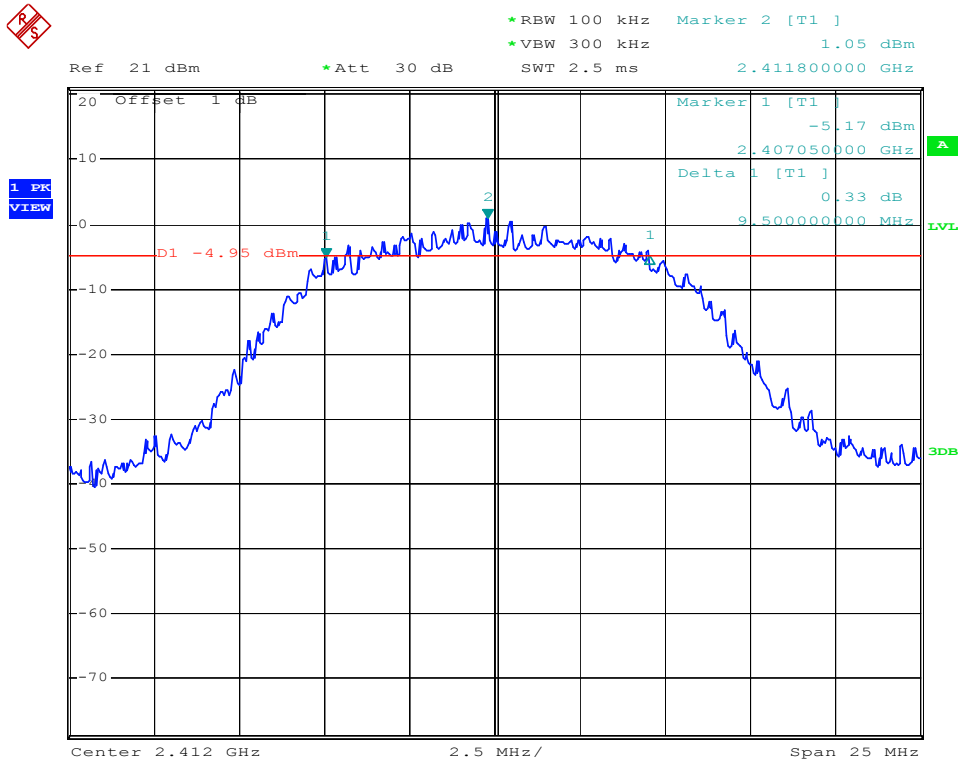
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

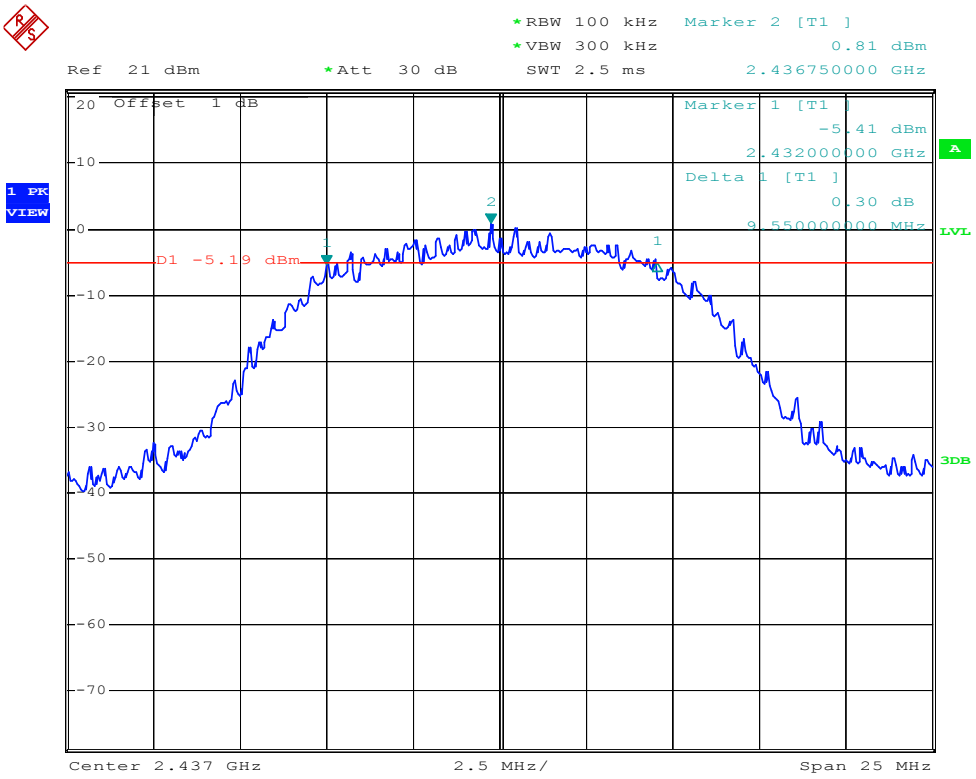
Test Mode	Test Channel MHz	6 dB Bandwidth MHz	Limit kHz
802.11b	2412	9.5000	≥500
	2437	9.5500	≥500
	2462	9.5500	≥500
802.11g	2412	16.5940	≥500
	2437	16.5760	≥500
	2462	16.5760	≥500
802.11n-HT20	2412	17.6960	≥500
	2437	17.6960	≥500
	2462	17.6960	≥500
802.11n-HT40	2422	36.4000	≥500
	2437	36.4380	≥500
	2452	36.4160	≥500

Please refer to the following test plots:

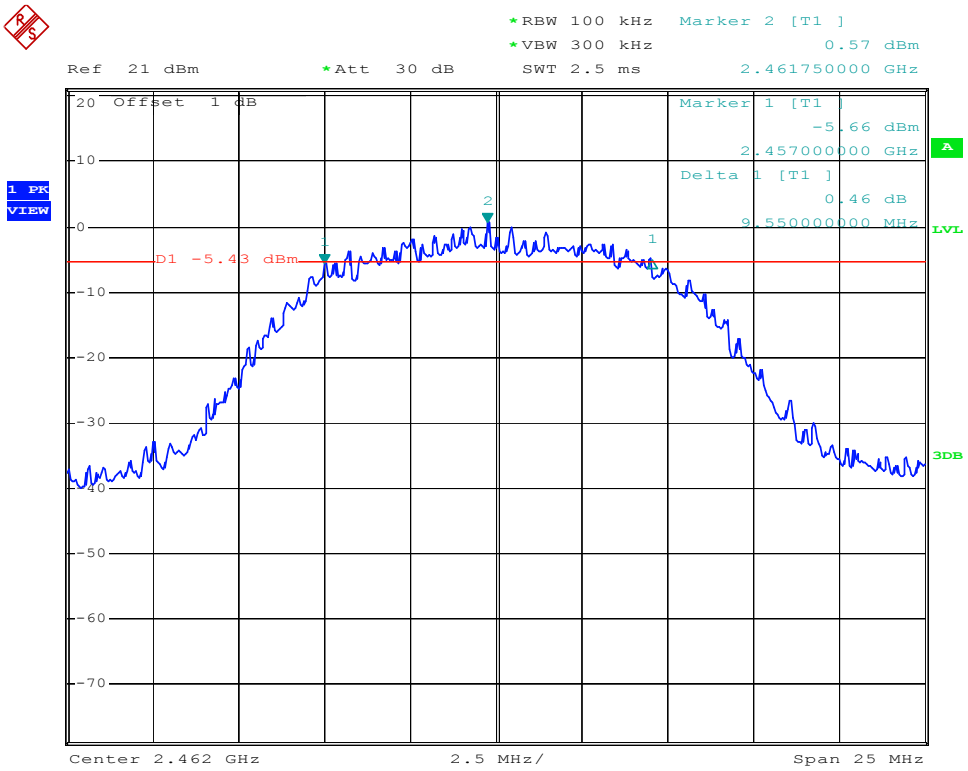
802.11b-Low Channel



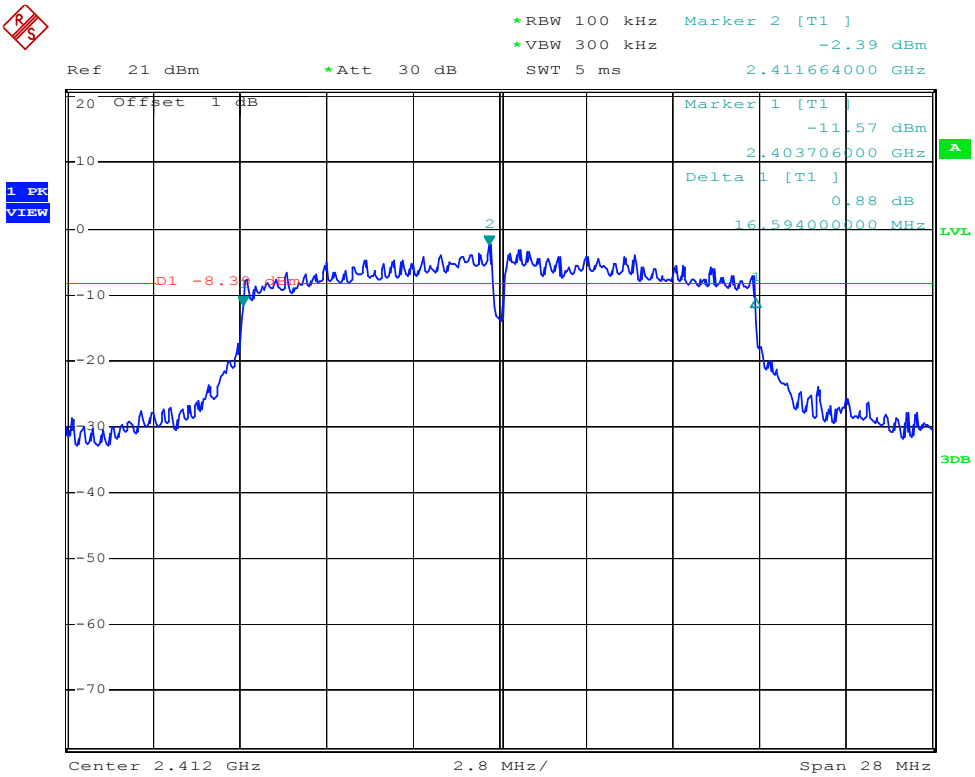
802.11b-Middle Channel



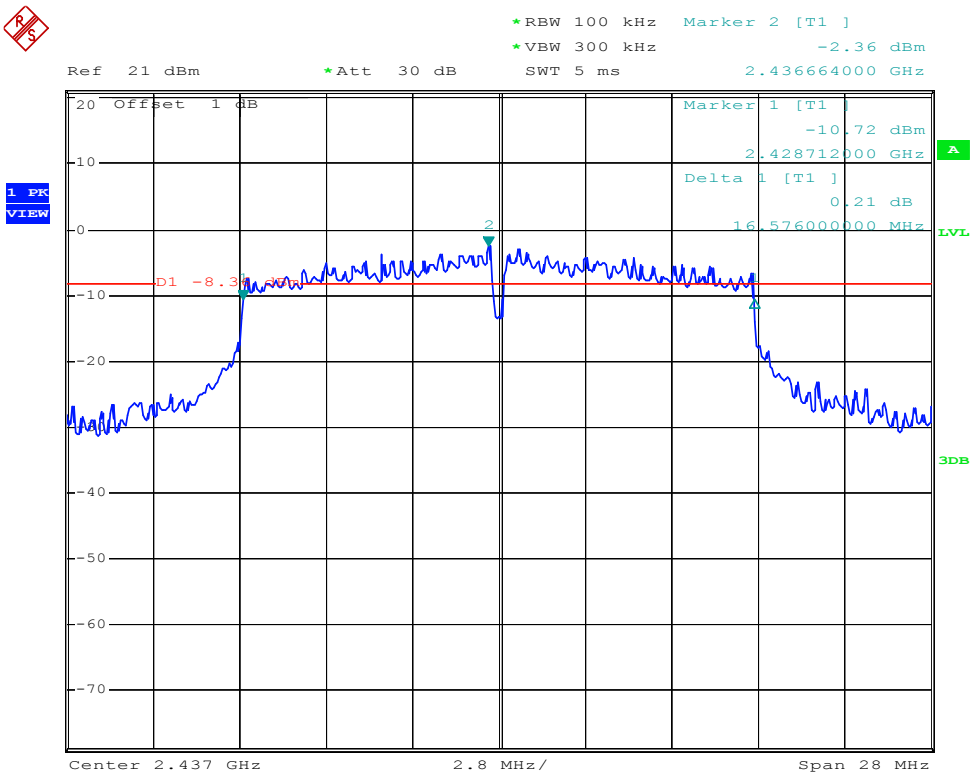
802.11b-High Channel



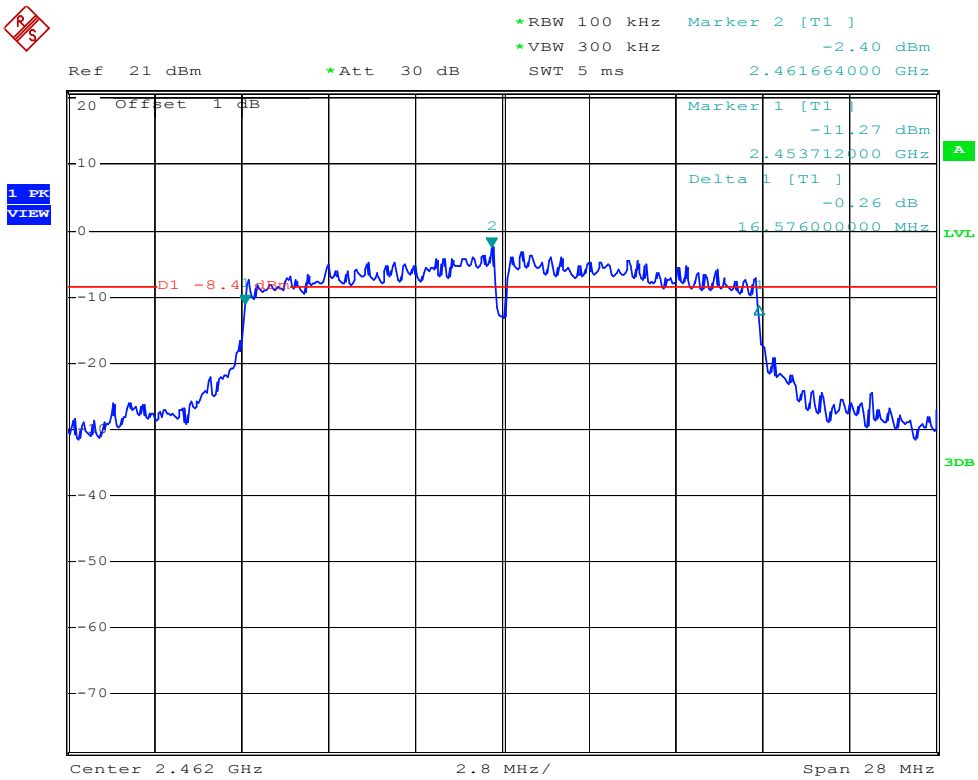
802.11g-Low Channel



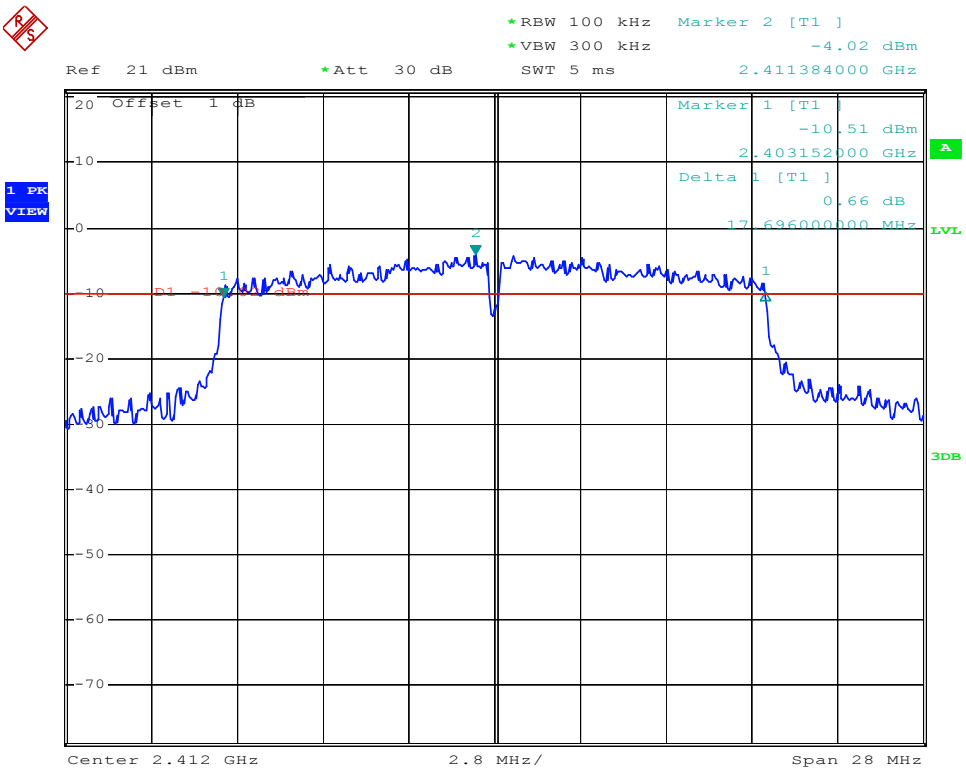
802.11g-Middle Channel



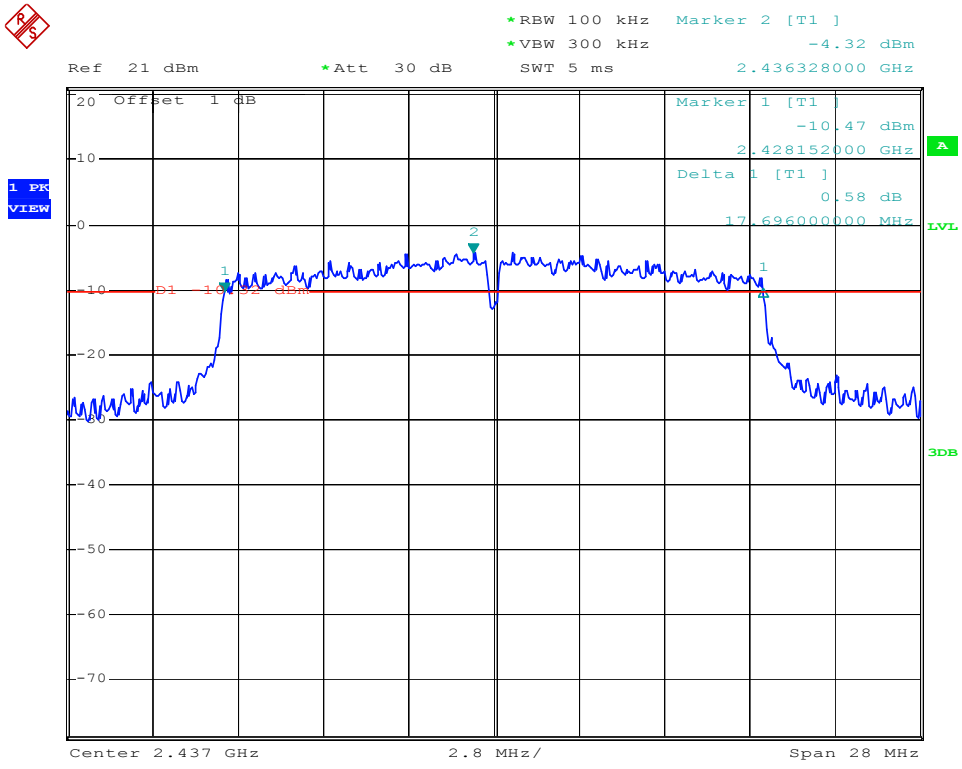
802.11g-High Channel



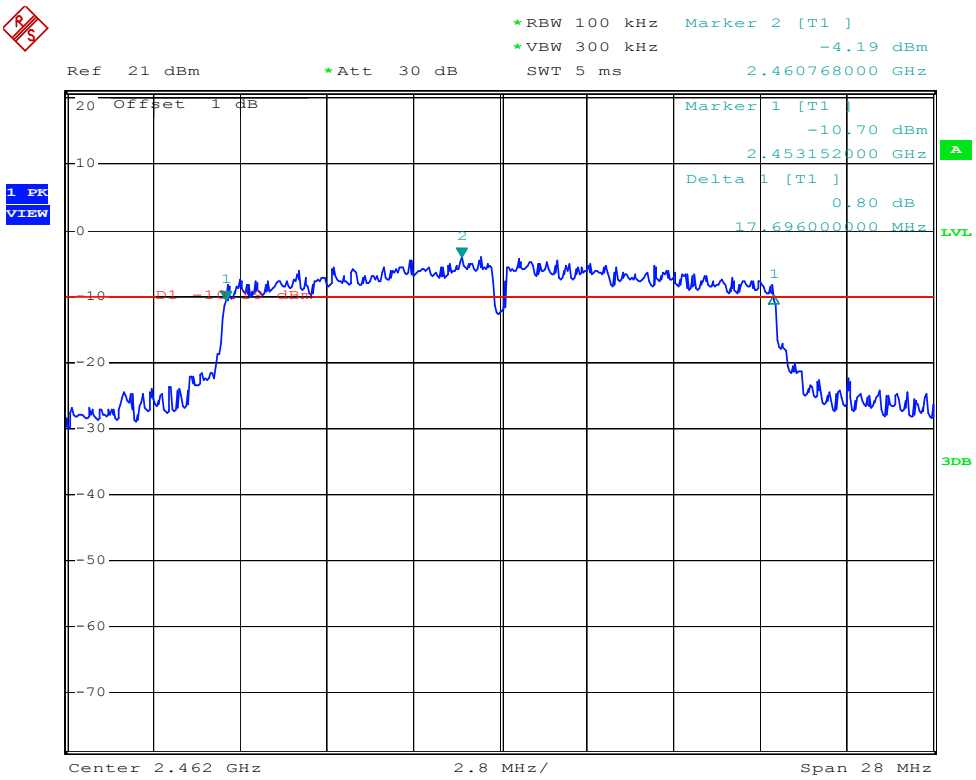
802.11n-HT20-Low Channel



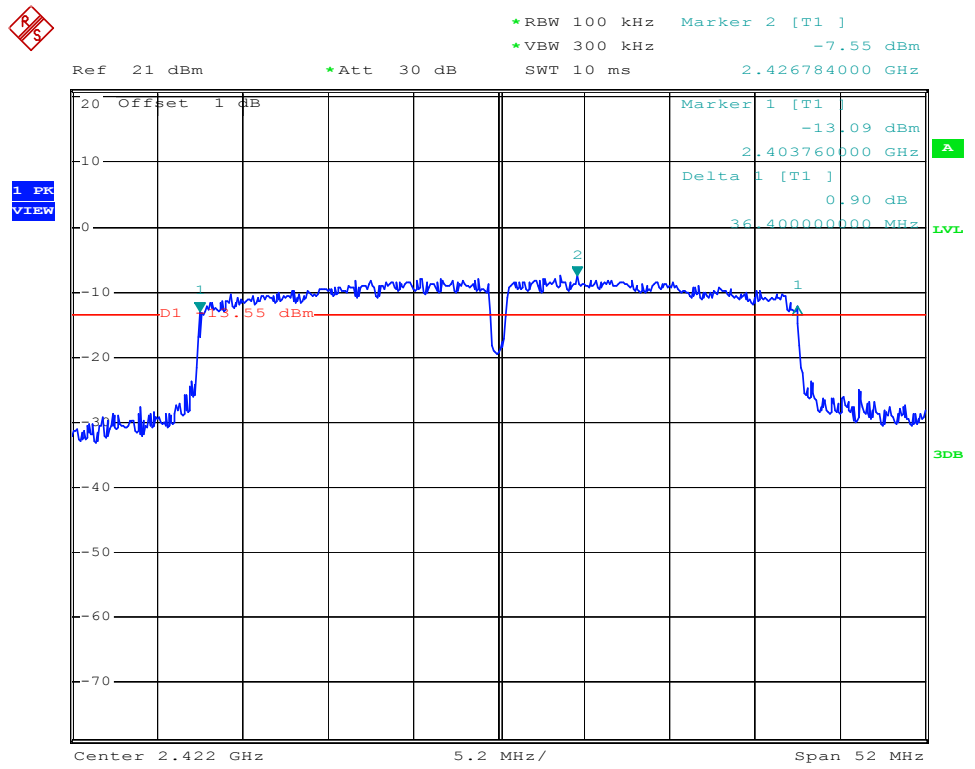
802.11n-HT20-Middle Channel



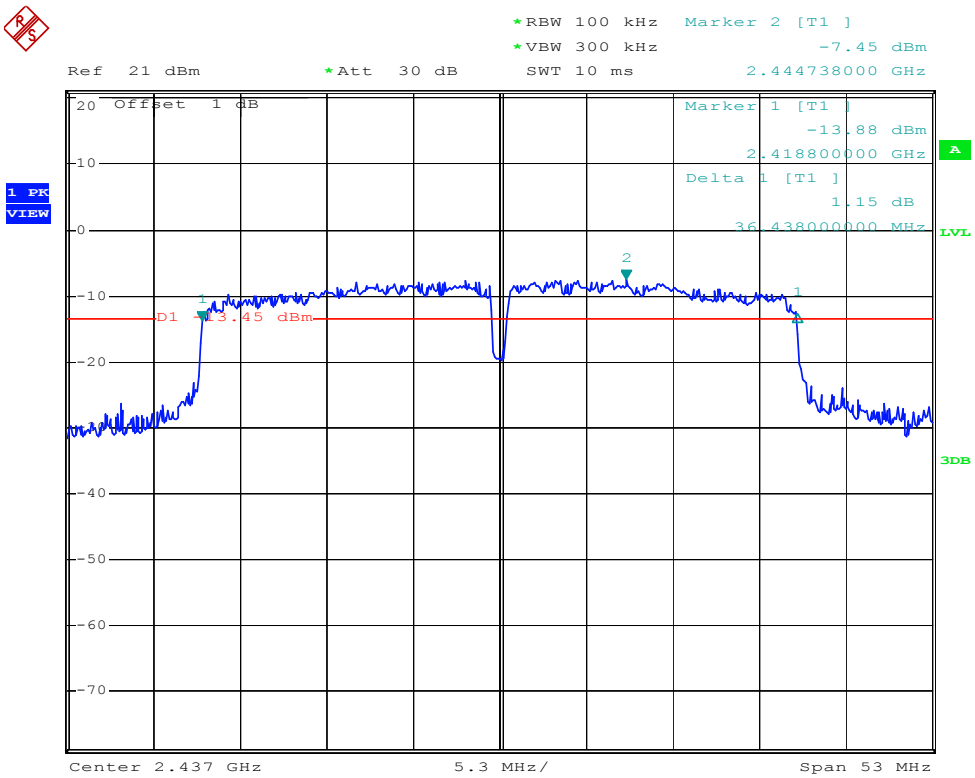
802.11n-HT20-High Channel



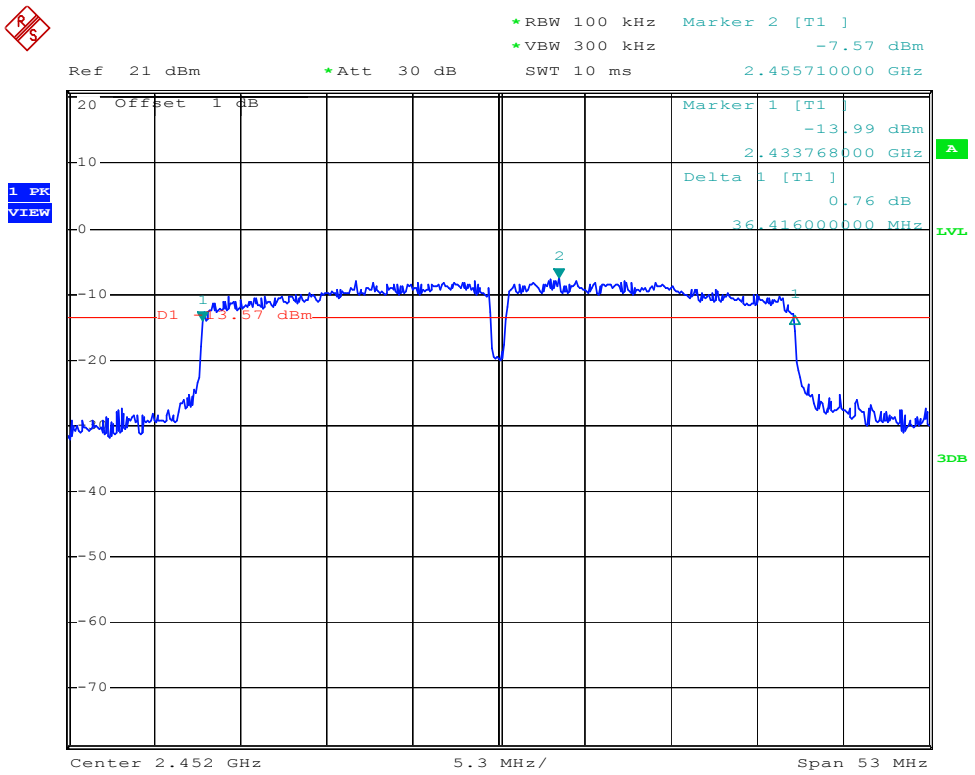
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



7. RF Output Power

7.1 Standard Applicable

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

7.2 Test Procedure

According to the KDB-558074 D01 v04, 9.2.2.2, when this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 x RBW.
d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
e) Sweep time = auto.
f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

7.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

7.4 Summary of Test Results/Plots

Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
802.11b _ 11Mbps	2412	16.36	43.25	1000
	2437	17.51	56.36	1000
	2462	16.24	42.07	1000
802.11g_54Mbps	2412	15.64	36.64	1000
	2437	15.62	36.48	1000
	2462	15.31	33.96	1000
802.11n HT20_MCS7	2412	13.24	21.09	1000
	2437	13.51	22.44	1000
	2462	13.91	24.60	1000
802.11n HT40_MCS7	2422	13.64	23.12	1000
	2437	13.57	22.75	1000
	2452	12.91	19.54	1000

Please refer to the following test plots:

8. Field Strength of Spurious Emissions

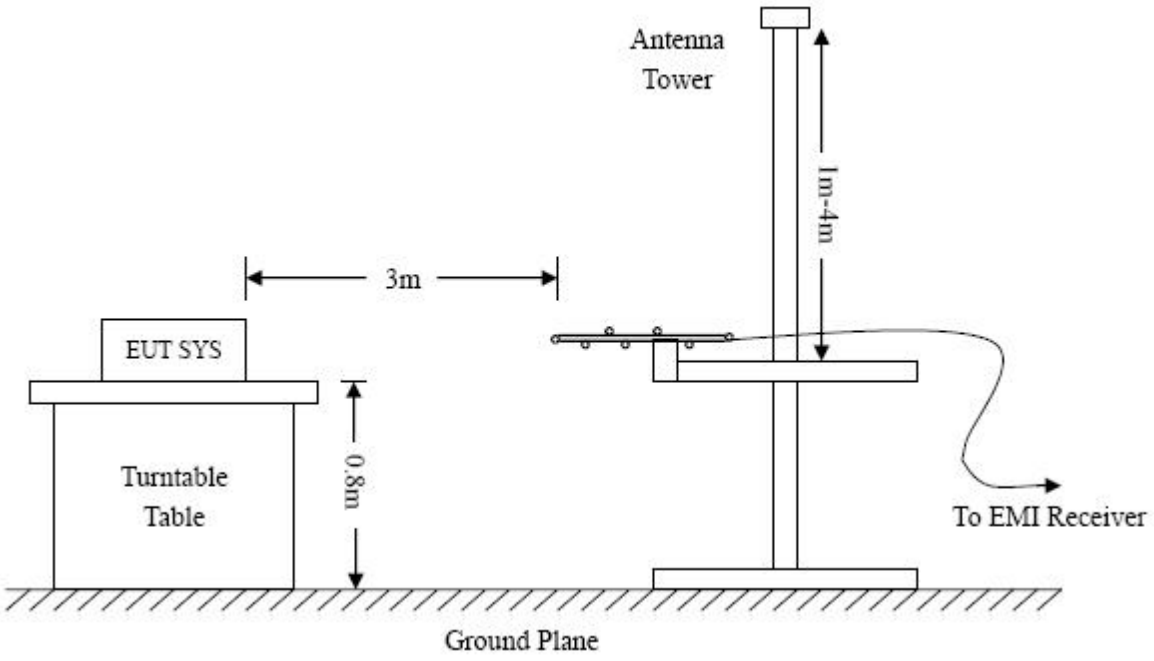
8.1 Standard Applicable

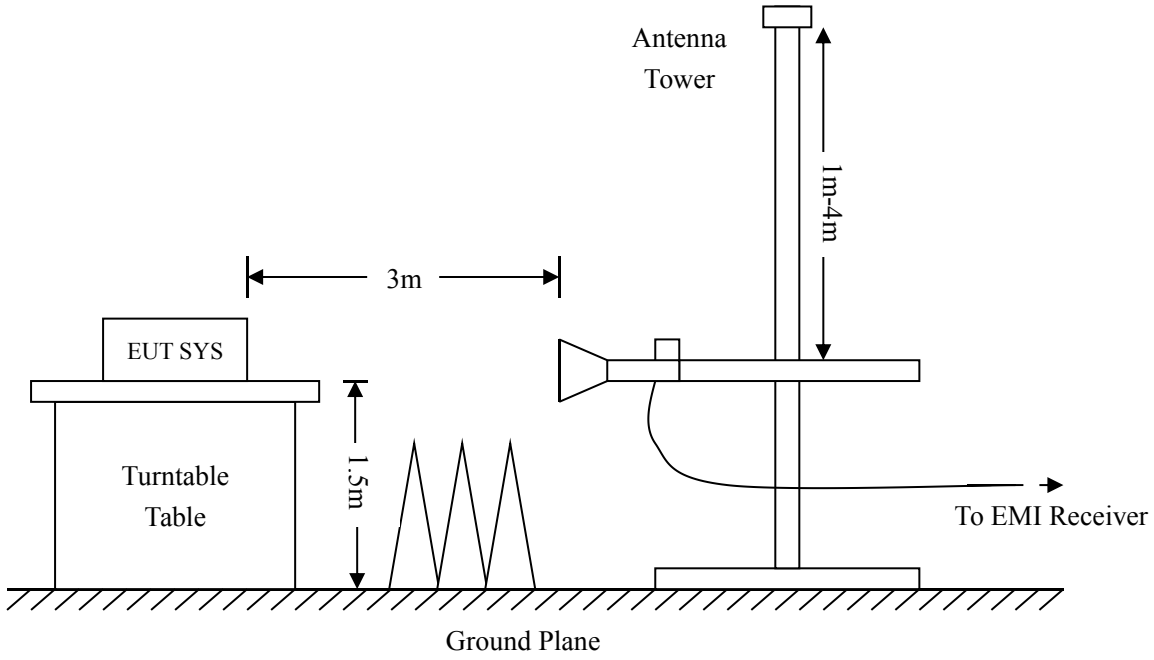
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, 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).

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

8.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

8.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.5 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

Note:

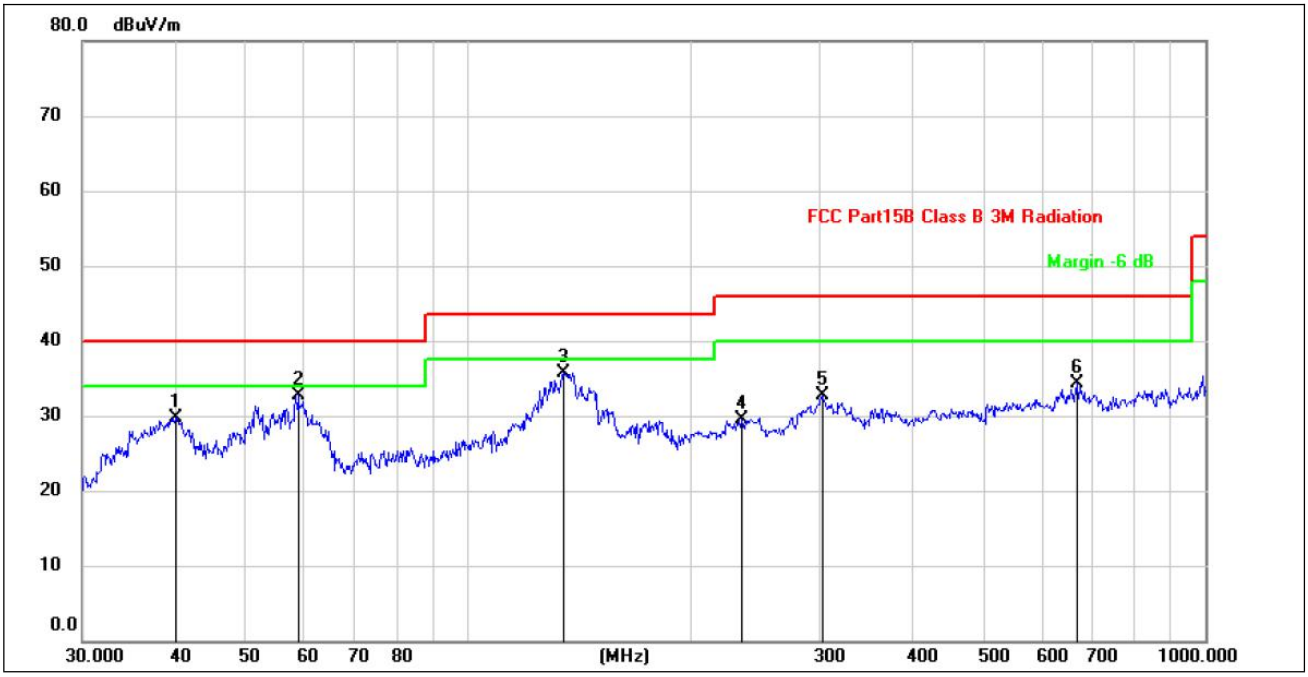
1. Worst-case radiated emission below 1GHz is 802.11b (CH Low) mode.

2. Worst-case radiated emission above 1GHz is 802.11g (CH Low, Middle, High) mode.

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

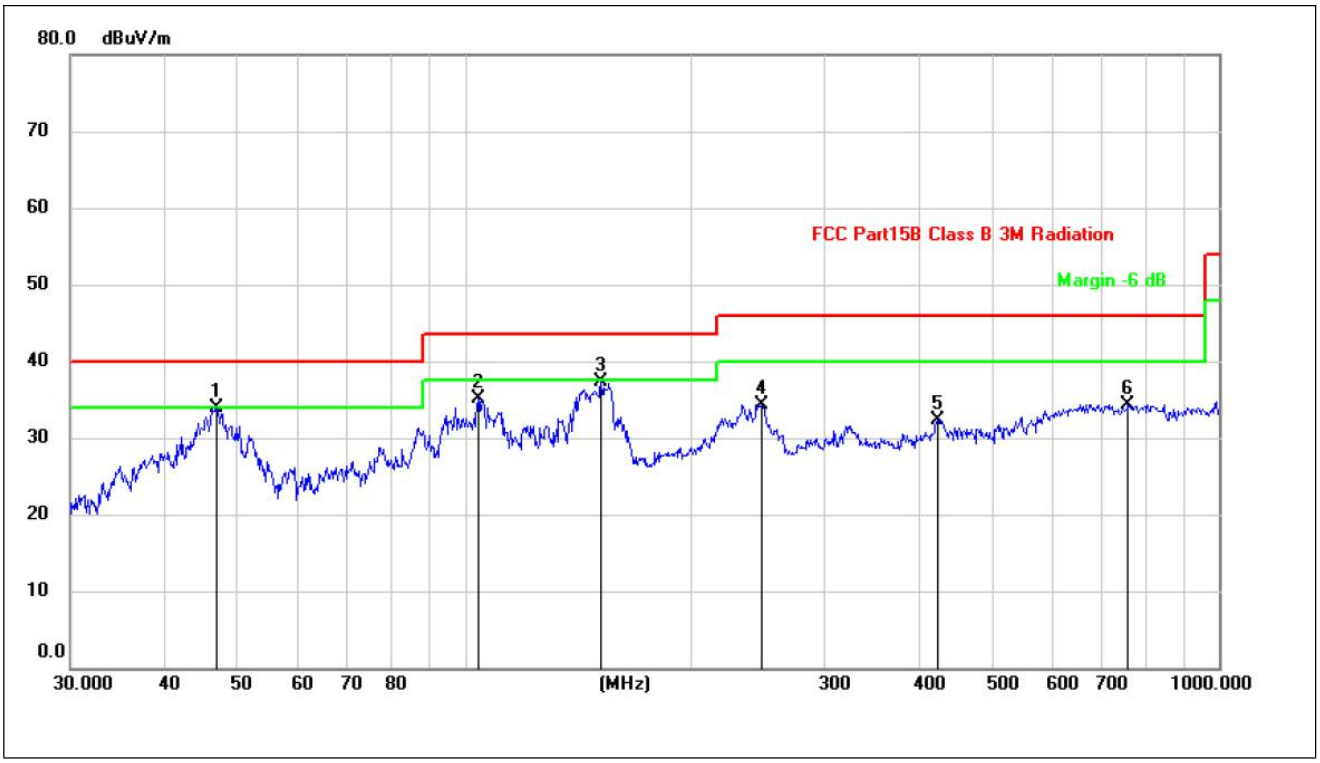
Operating Condition: *802.11b Transmitting Low Channel-2412MHz*

Test Specification: *Horizontal*



No.	Mk.	Freq.	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		40.1347	29.75	40.00	-10.25	QP			
2	*	58.8185	32.69	40.00	-7.31	QP			
3		135.0319	35.74	43.50	-7.76	QP			
4		234.9909	29.44	46.00	-16.56	QP			
5		302.4812	32.72	46.00	-13.28	QP			
6		670.4891	34.39	46.00	-11.61	QP			

Test Specification: *Vertical*



No.	Mk.	Freq.	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	46.8303	33.88	40.00	-6.12	QP			
2		104.1701	35.13	43.50	-8.37	QP			
3		151.5971	37.22	43.50	-6.28	QP			
4		247.6819	34.31	46.00	-11.69	QP			
5		423.5403	32.25	46.00	-13.75	QP			
6		758.0407	34.28	46.00	-11.72	QP			

Spurious Emissions Above 1GHz

Test Mode: 802.11g

Frequency	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low channel-2412MHz					
4824.000	51.35	74	-22.65	H	PK
4824.000	43.62	54	-10.38	H	AV
7236.000	51.21	74	-22.79	H	PK
7236.000	36.51	54	-17.49	H	AV
4824.000	54.35	74	-19.65	V	PK
4824.000	46.94	54	-7.06	V	AV
7236.000	51.37	74	-22.63	V	PK
7236.000	38.84	54	-15.16	V	AV
Middle channel-2437MHz					
4874.000	52.62	74	-21.38	H	PK
4874.000	43.34	54	-10.66	H	AV
7311.000	52.85	74	-21.15	H	PK
7311.000	36.91	54	-17.09	H	AV
4874.000	51.57	74	-22.43	V	PK
4874.000	42.64	54	-11.36	V	AV
7311.000	52.37	74	-21.63	V	PK
7311.000	39.85	54	-14.15	V	AV
High channel-2462MHz					
4924.000	53.62	74	-20.38	H	PK
4924.000	39.35	54	-14.65	H	AV
7386.000	53.91	74	-20.09	H	PK
7386.000	36.48	54	-17.52	H	AV
4924.000	51.95	74	-22.05	V	PK
4924.000	41.65	54	-12.35	V	AV
7386.000	55.84	74	-18.16	V	PK
7386.000	38.77	54	-15.23	V	AV

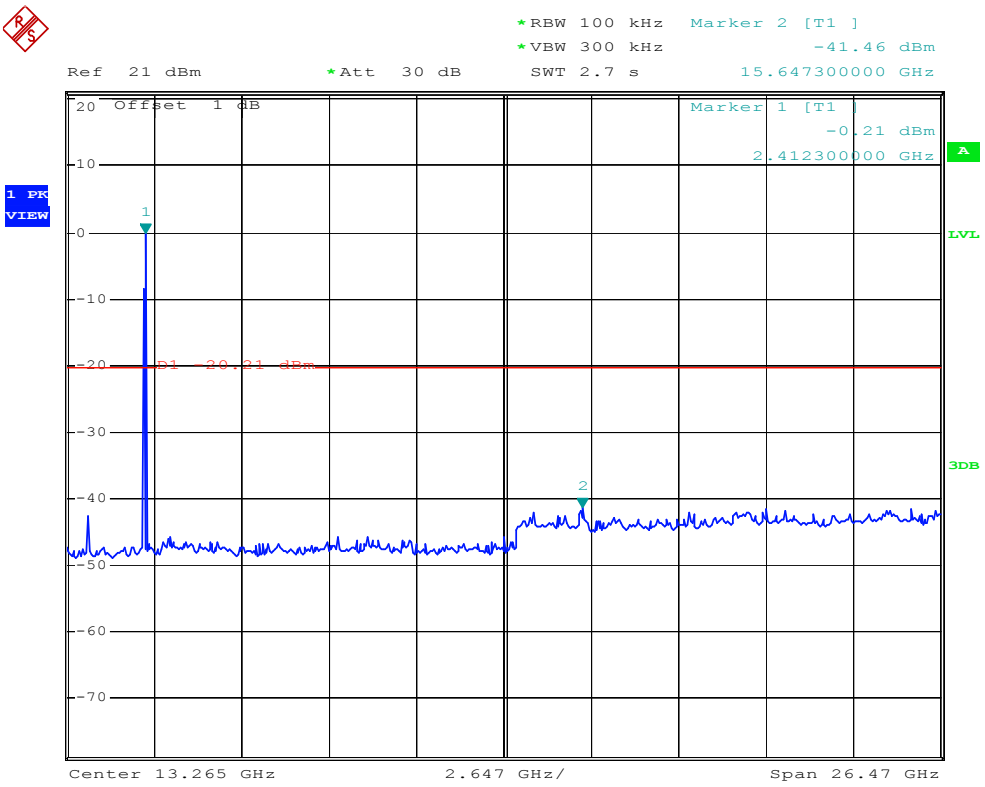
Note:

1. Calculation of result is: Result (dBm) = Reading (dBm) + Correction Factor (dB).
2. Correction Factor (dB)=Ant. Factor + Cable Loss – Ampl. Gain.
3. Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

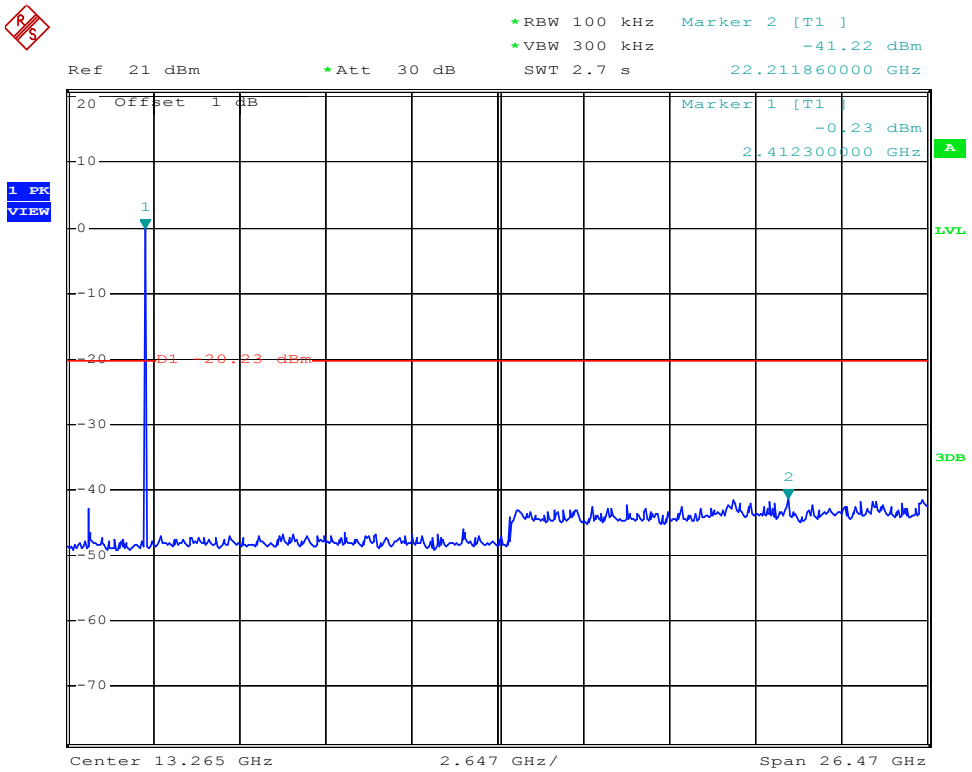
Spurious (Conducted)

802.11b-Lowest

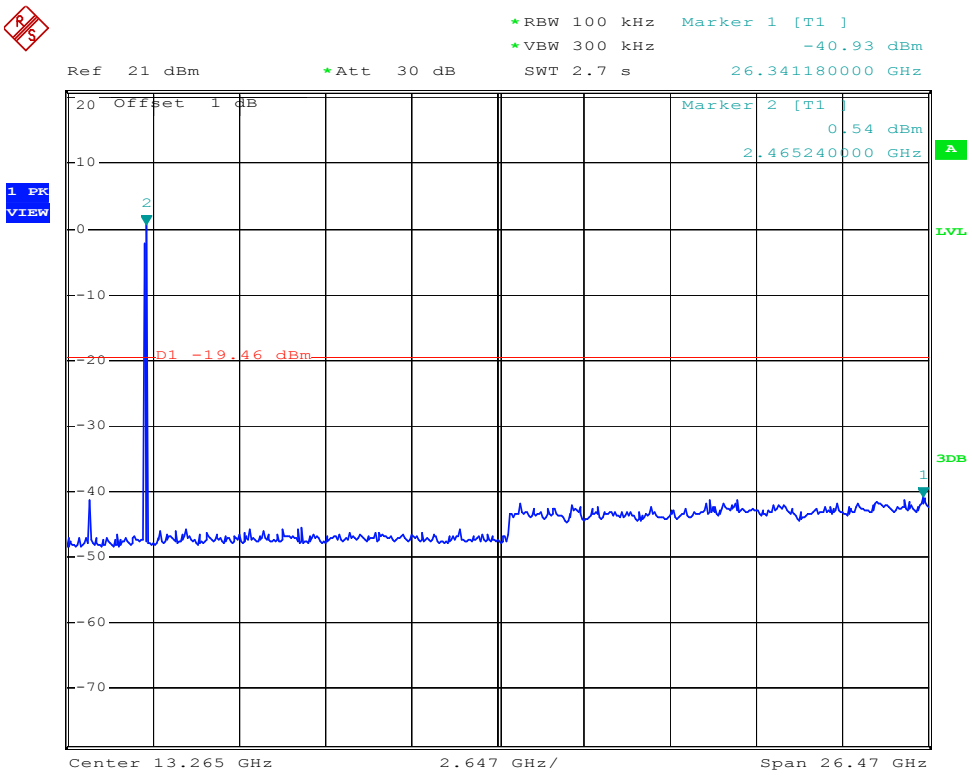
Lowest



Middle



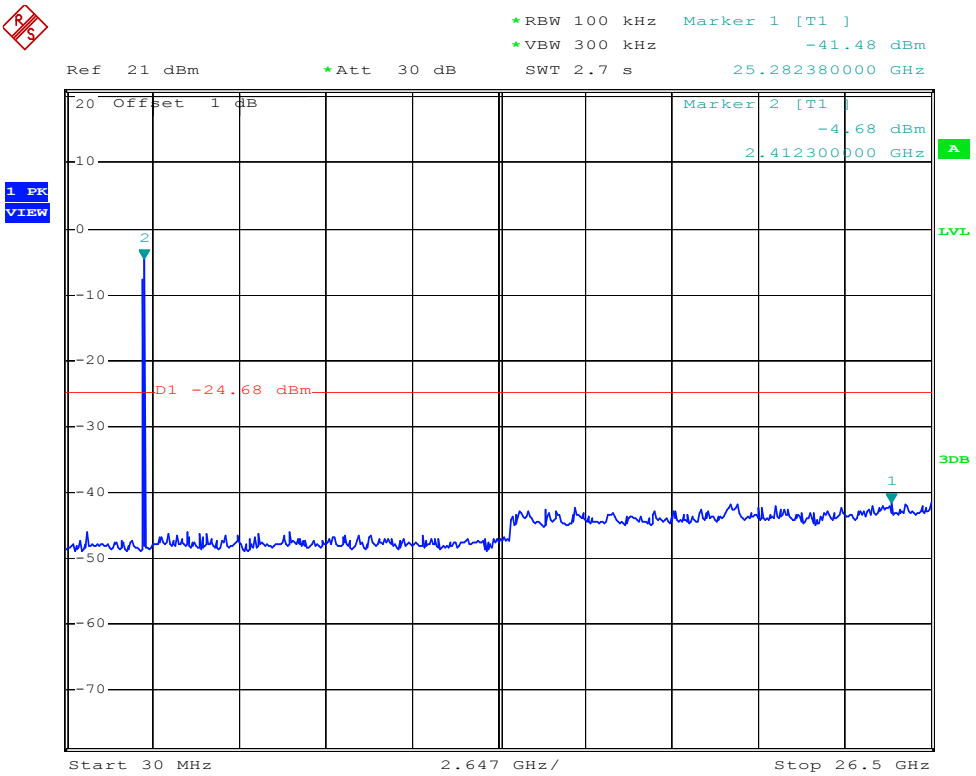
Highest



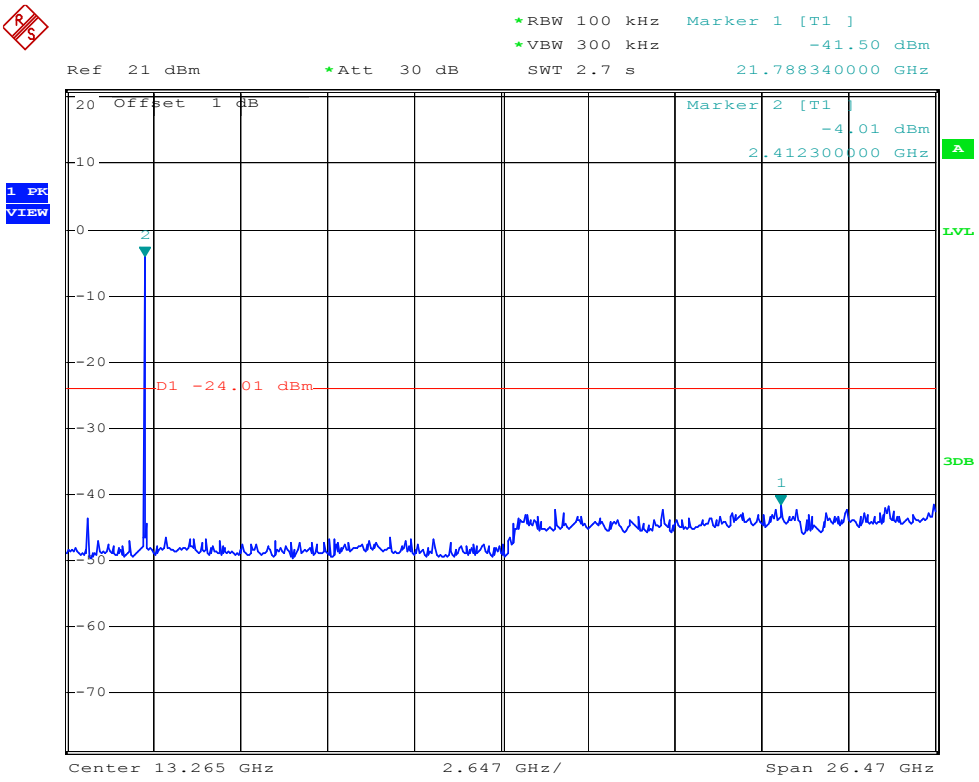
Spurious (Conducted)

802.11g-Lowest

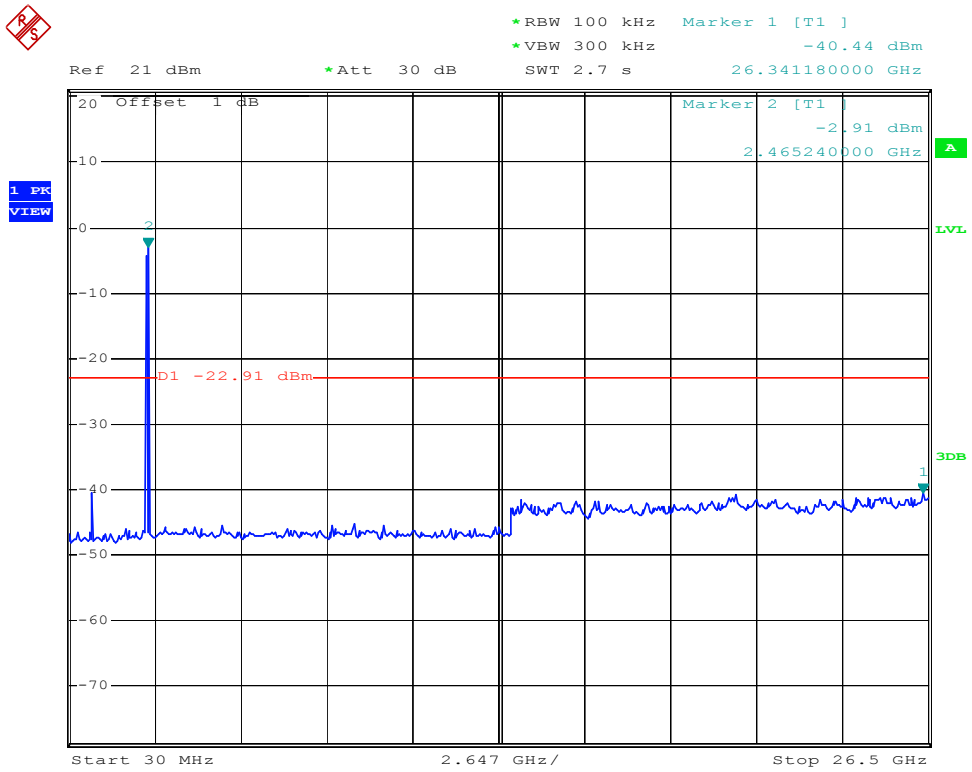
Lowest



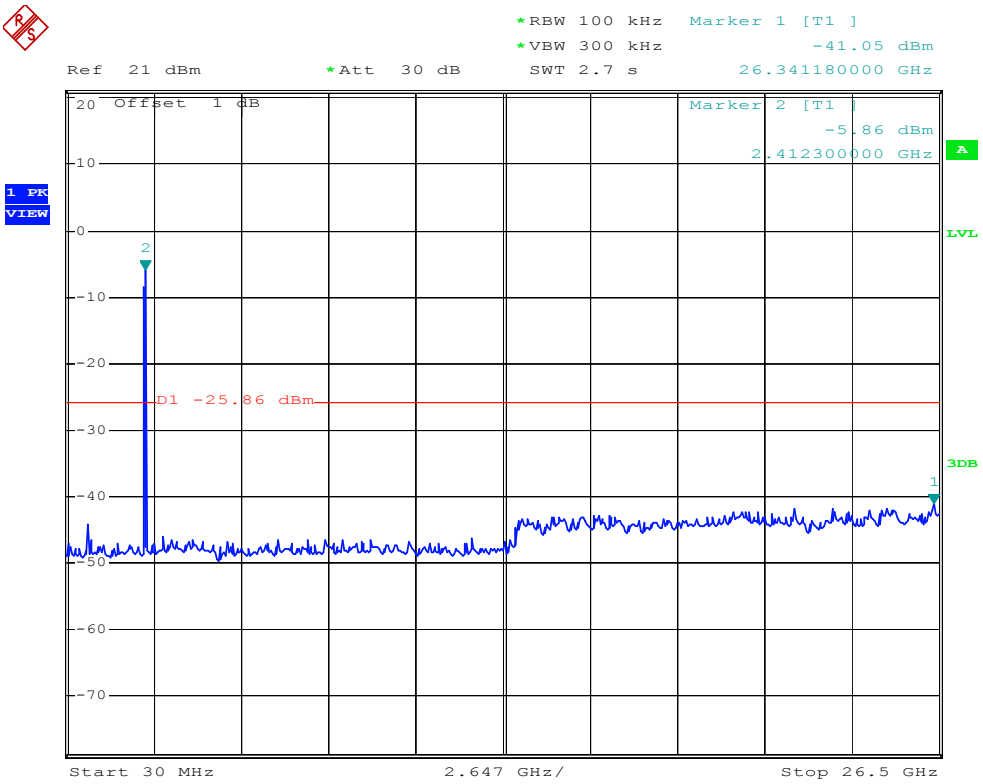
Middle



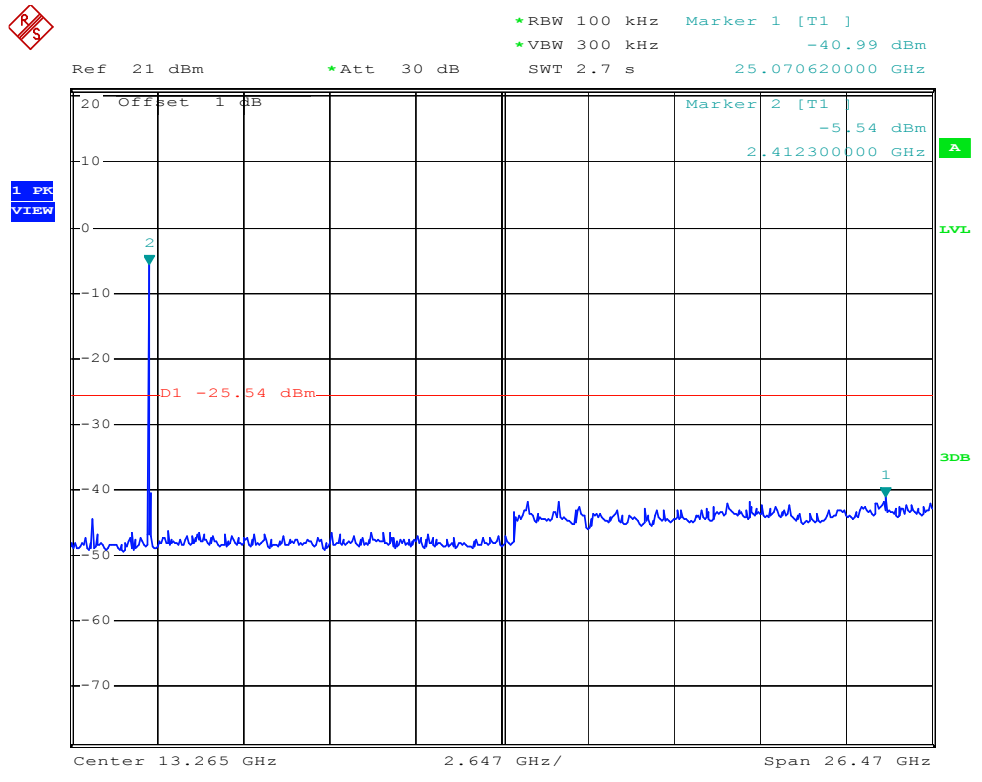
Highest



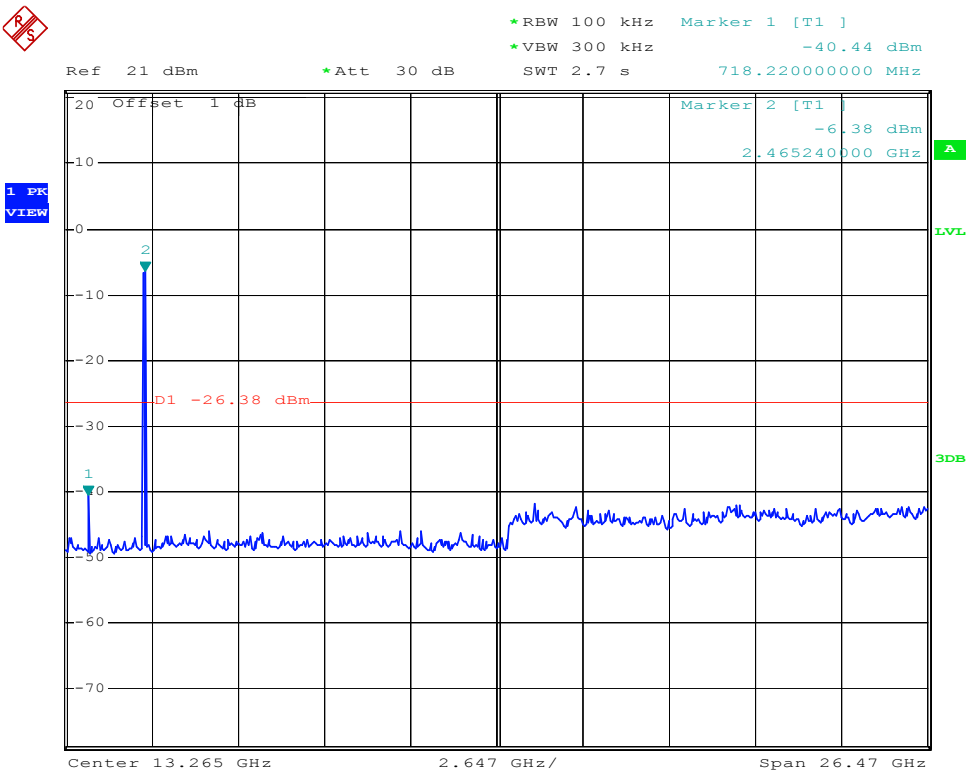
Spurious (Conducted)
802.11n-HT20-Lowest
Lowest



Middle



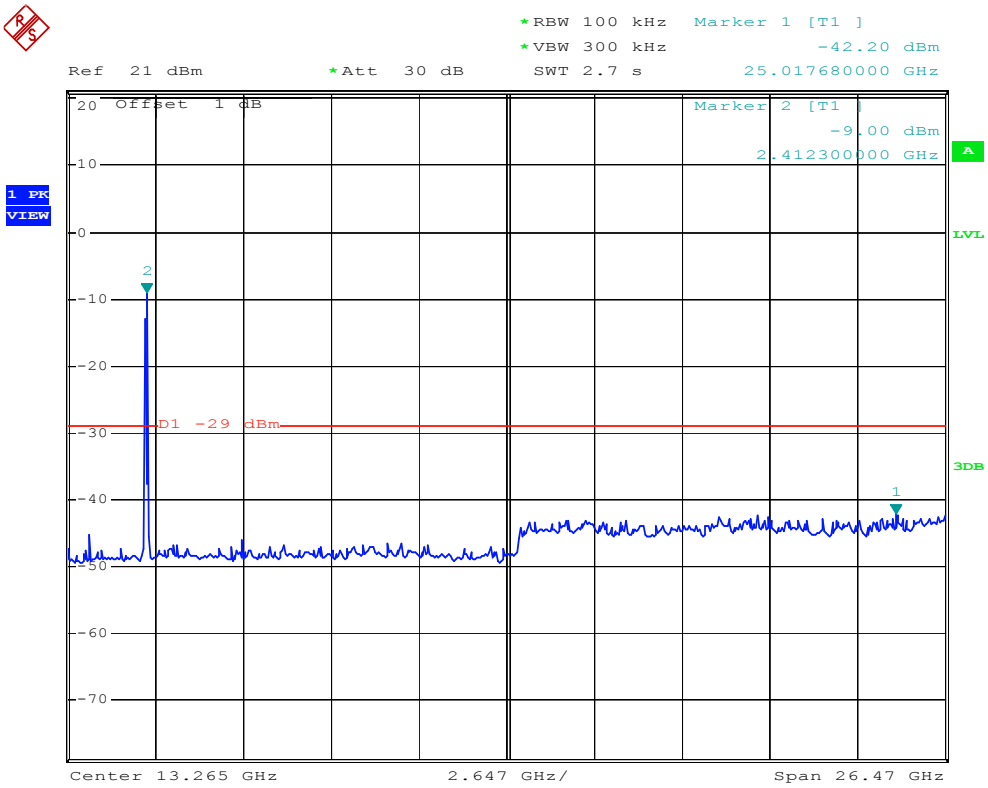
Highest



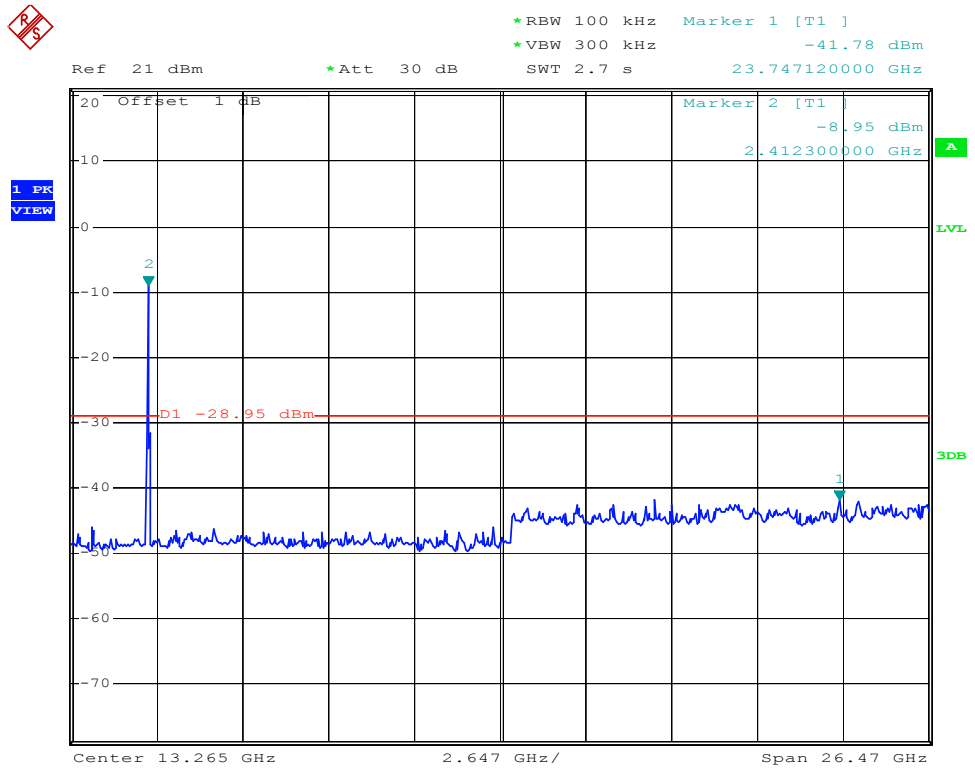
Spurious (Conducted)

802.11n-HT40-Lowest

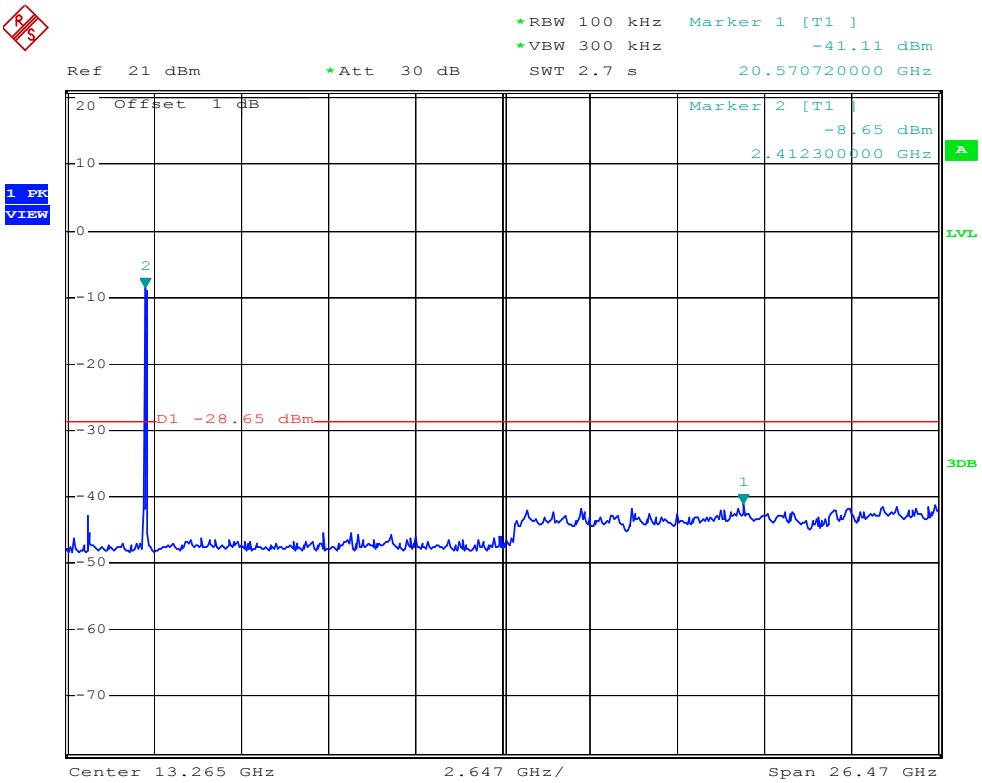
Lowest



Middle



Highest



9. Out of Band Emissions

9.1 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, 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).

9.2 Test Procedure

According to the KDB 558074D01 v04, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured
RBW = 1MHz, VBW = 10Hz for average value measured
Sweep = auto; Detector function = peak/average; Trace = max hold
All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 v04, the conducted spurious emissions test method as follows:
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.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

9.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

802.11b- Bandedge (Radiated)

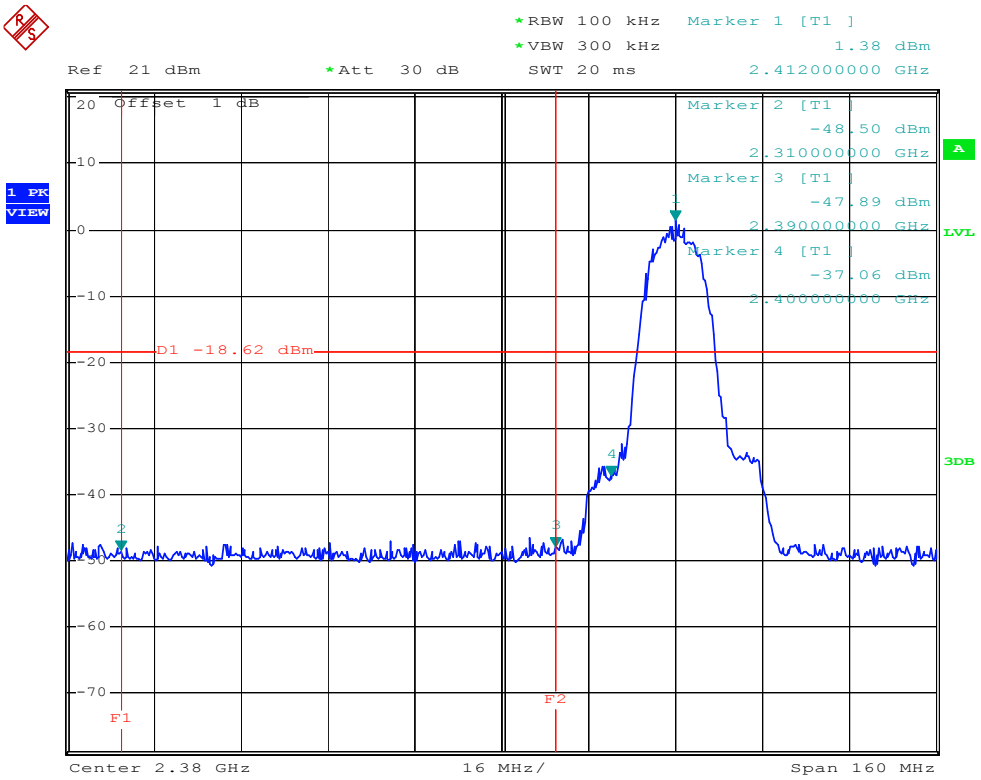
Note: we are pre-scan all modes, the worst data is 802.11b mode.

Channel	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	2400	55.32	74	-18.68	Peak
LOW	2400	48.51	54	-5.49	Average
	2483.5	46.56	74	-27.44	Peak
HIGH	2483.5	42.58	54	-11.42	Average

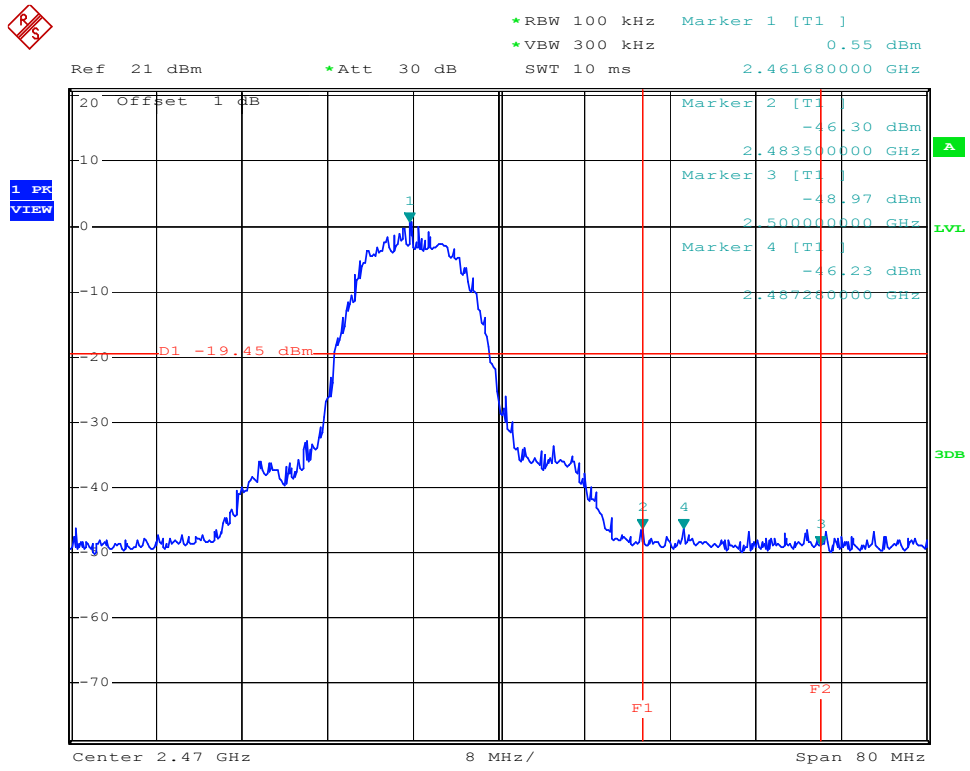
Bandedge (Conducted)

802.11b-Lowest

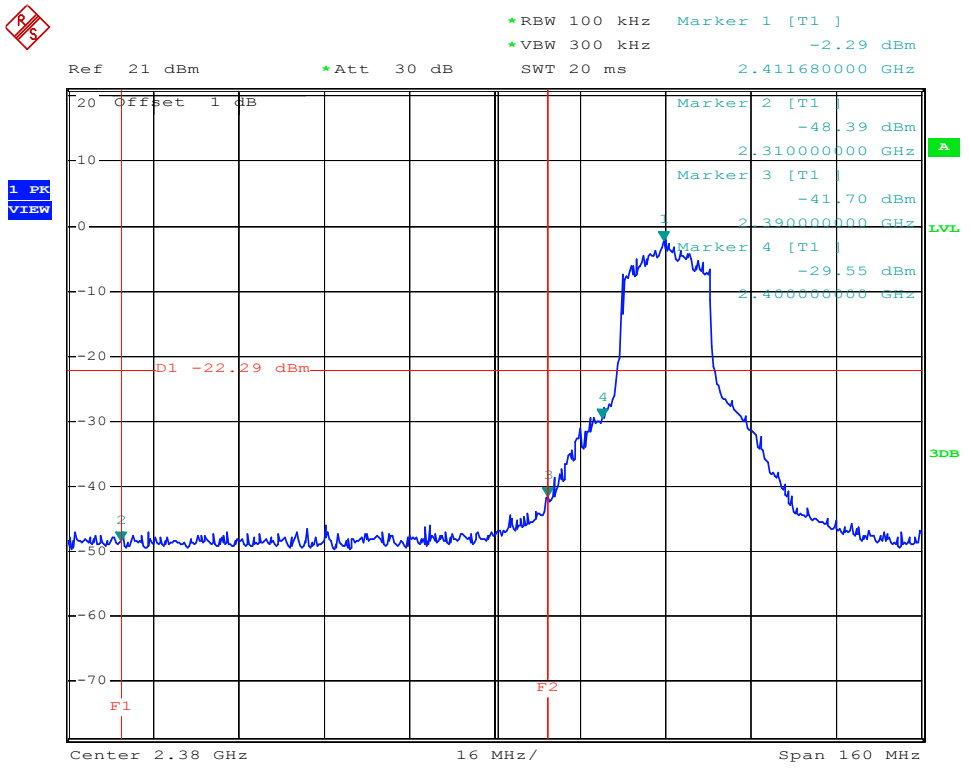
Lowest



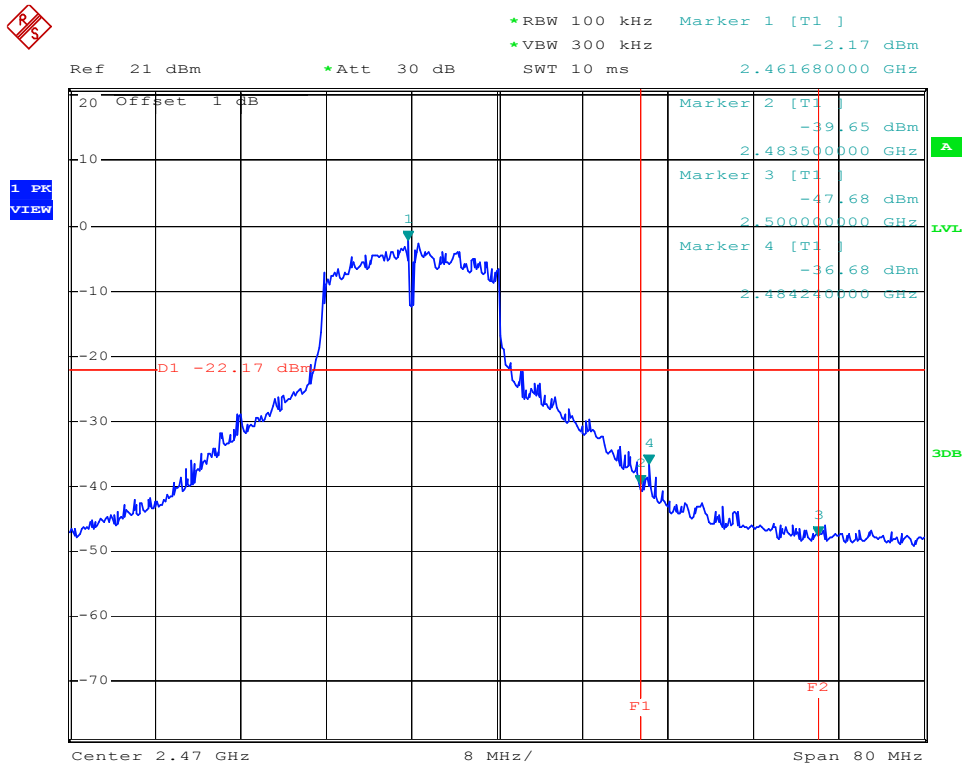
Highest



802.11g-Lowest

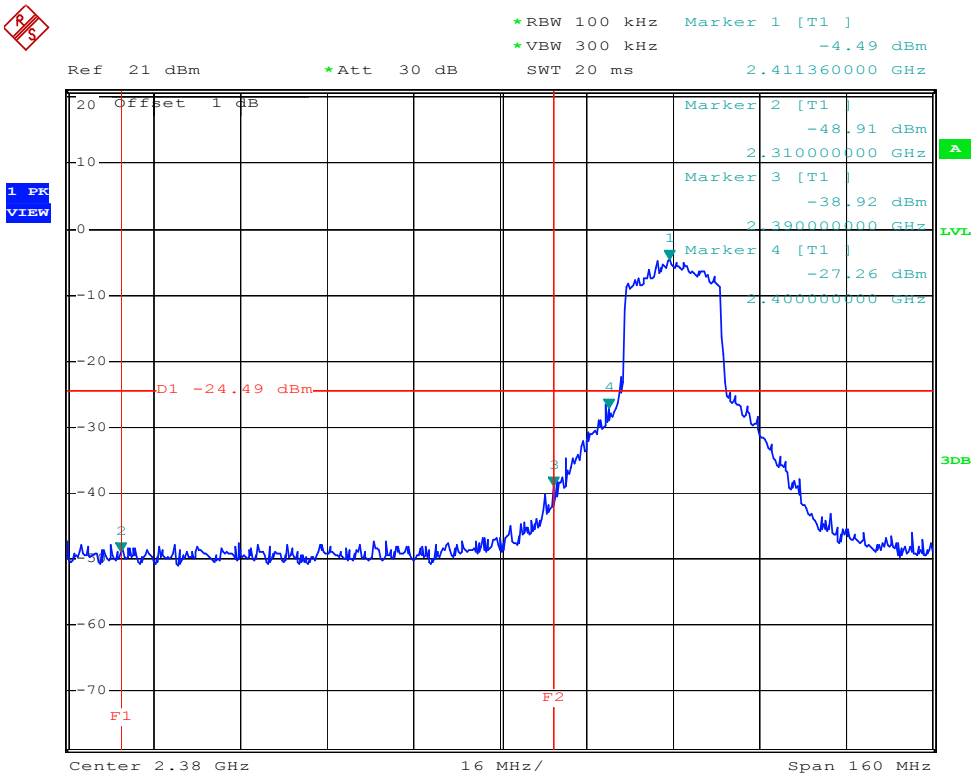


Highest

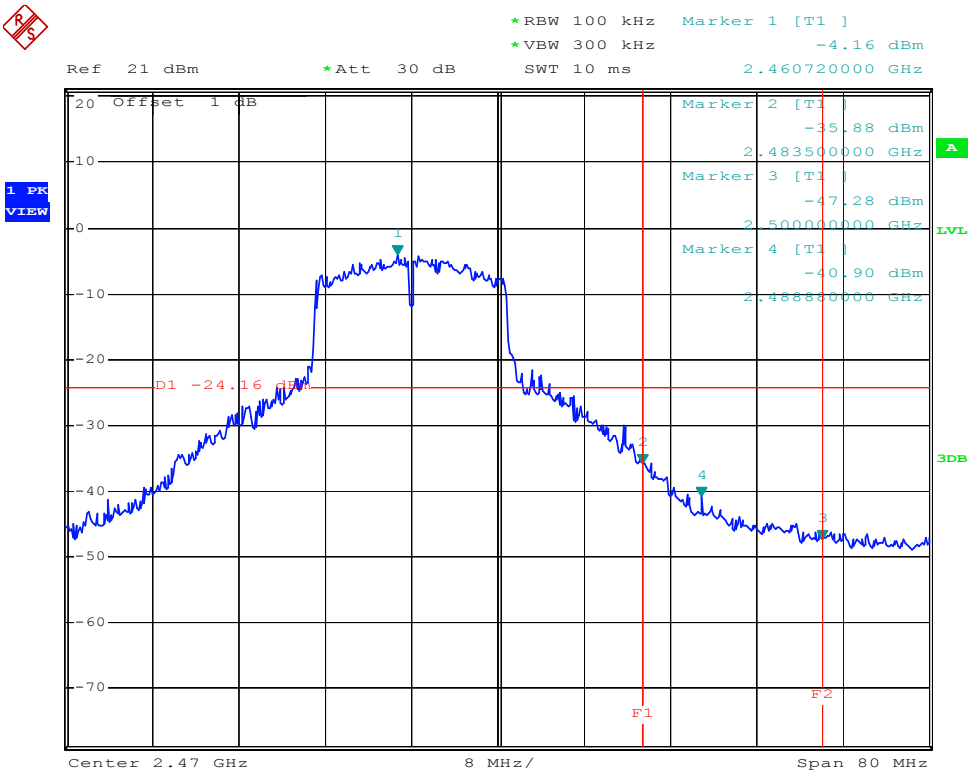


802.11n-HT20-Lowest

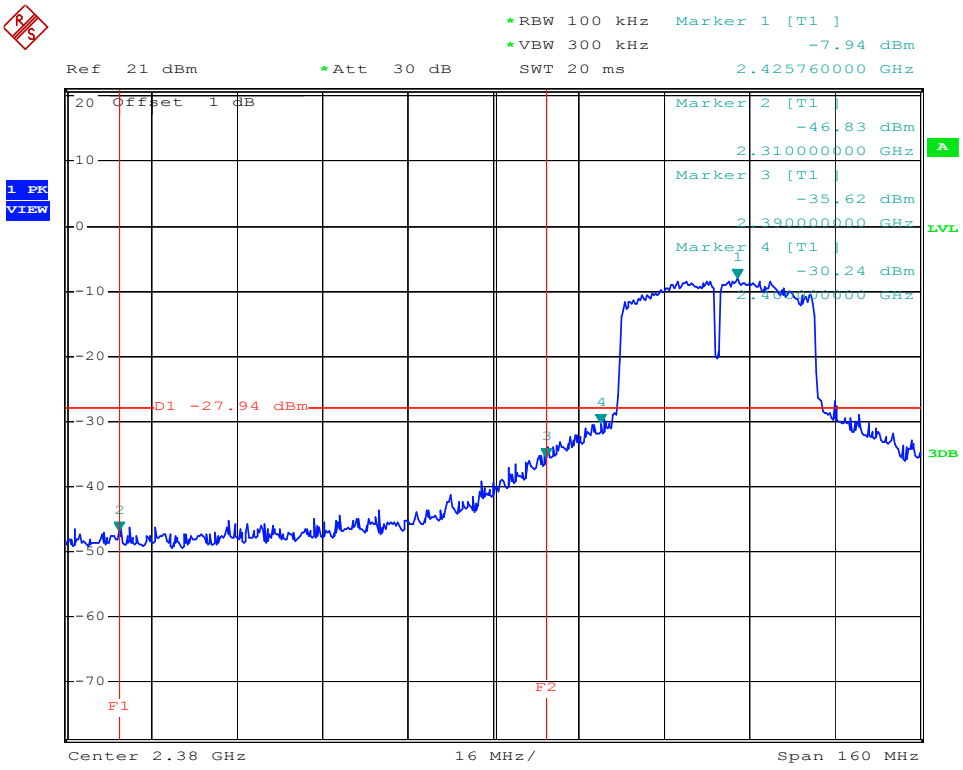
Lowest



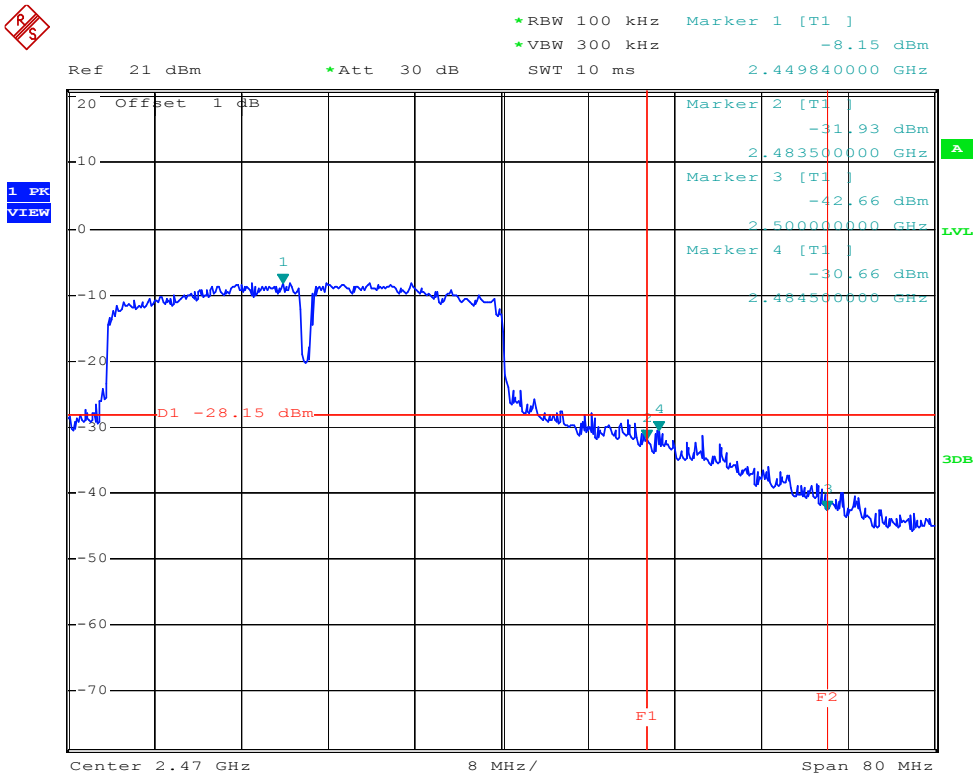
Highest



802.11n-HT40-Lowest



Highest

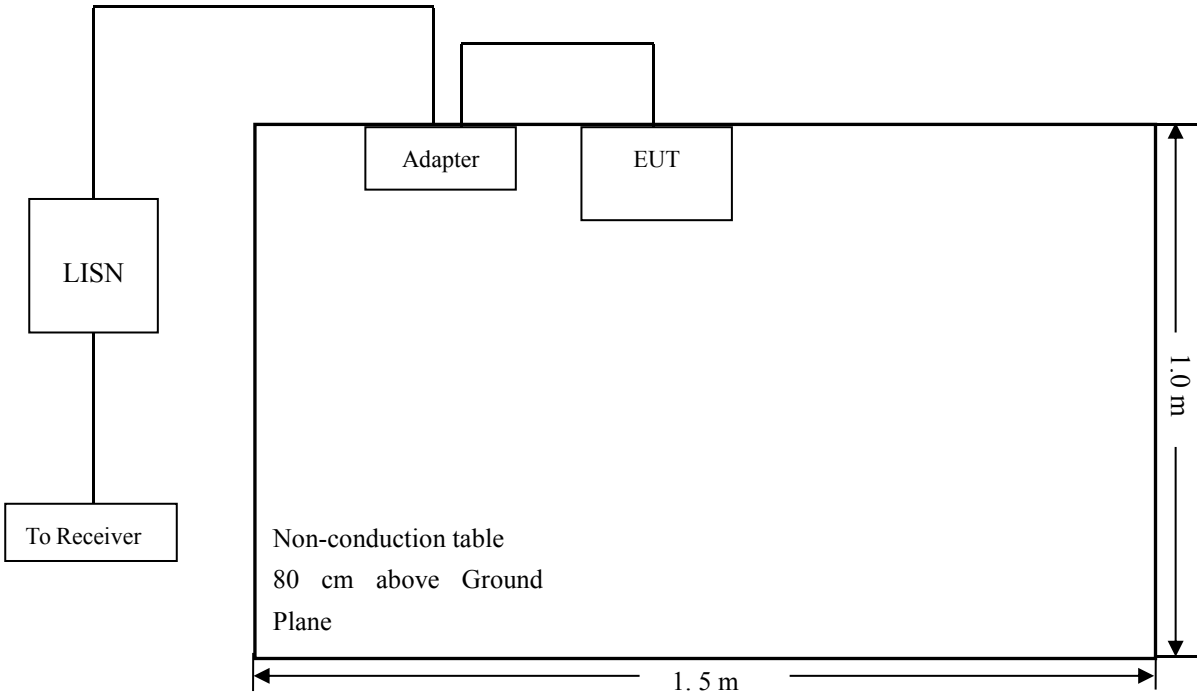

RBW 100 kHz
VBW 300 kHz
SWT 10 ms
Marker 1 [T1]
-8.15 dBm
2.449840000 GHz
Ref 21 dBm
Att 30 dB
Offset 1 dB
Marker 2 [T1]
-31.93 dBm
2.483500000 GHz
Marker 3 [T1]
-42.66 dBm
2.500000000 GHz
Marker 4 [T1]
-30.66 dBm
2.484500000 GHz
1 PK
VIEW
A
LVL
3DB
D1 -28.15 dBm
F1
F2
Center 2.47 GHz
8 MHz/
Span 80 MHz

10. Conducted Emissions

10.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

10.2 Basic Test Setup Block Diagram



10.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.4 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency..... 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed..... Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth..... 9 kHz
Quasi-Peak Adapter Mode.....Normal

10.5 Summary of Test Results/Plots

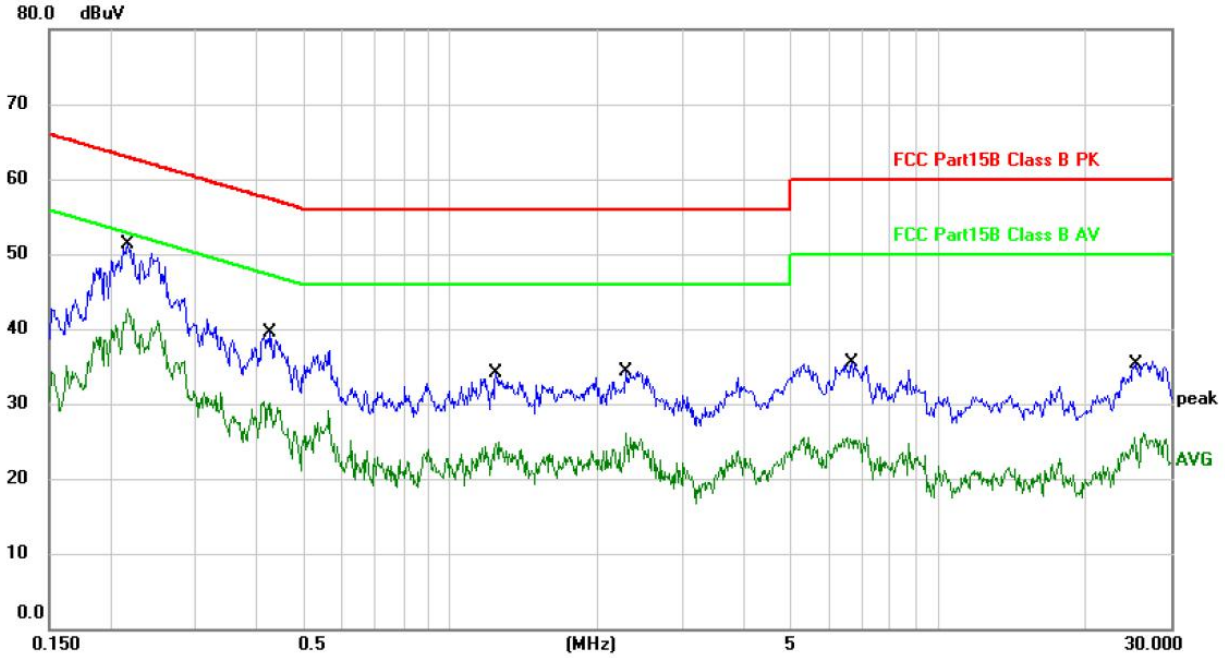
According to the data in section 10.6, the EUT complied with the FCC Part 15.207 Conducted margin for this device.

10.6 Conducted Emissions Test Data

Note: we are pre-scan all modes, the worst data is 802.11n HT20(Low) mode.

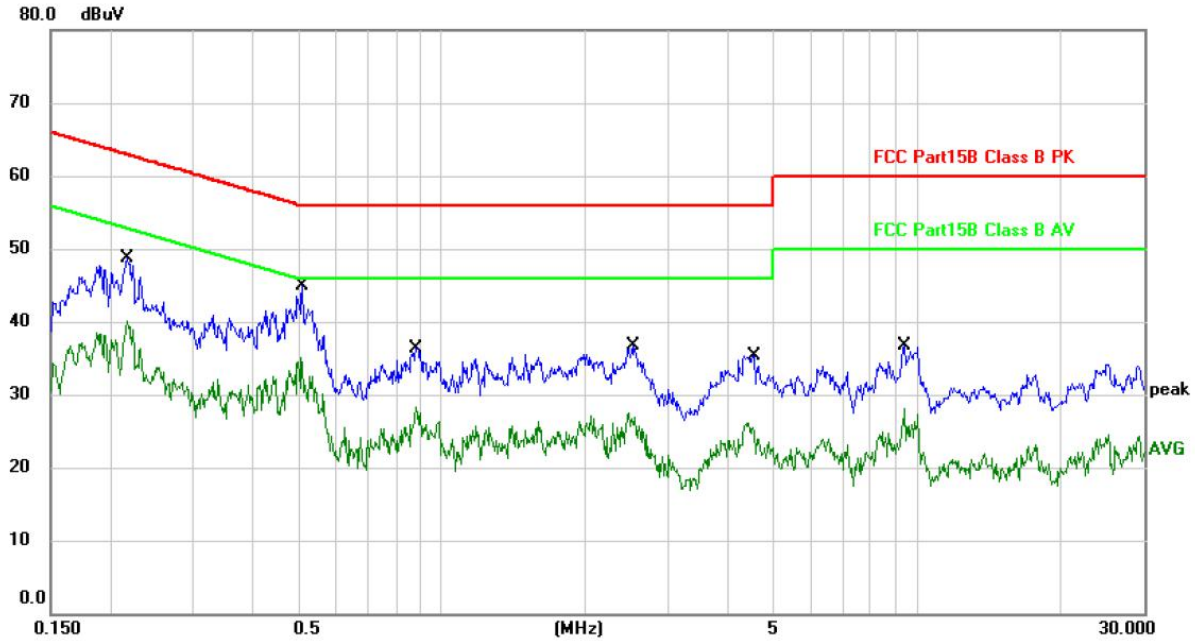
Plot of Conducted Emissions Test Data: 802.11n HT20(Low)

Test Specification: *Neutral*



No.	Mk.	Freq.	Measure-ment	Limit	Over		
		MHz	dBuV	dBuV	dB	Detector	Comment
1	*	0.2179	51.28	62.89	-11.61	QP	
2		0.2179	36.94	52.89	-15.95	AVG	
3		0.4259	39.55	57.33	-17.78	QP	
4		0.4259	28.93	47.33	-18.40	AVG	
5		1.2379	34.02	56.00	-21.98	QP	
6		1.2379	23.24	46.00	-22.76	AVG	
7		2.2900	34.39	56.00	-21.61	QP	
8		2.2900	21.10	46.00	-24.90	AVG	
9		6.6619	35.50	60.00	-24.50	QP	
10		6.6619	22.78	50.00	-27.22	AVG	
11		25.4893	35.20	60.00	-24.80	QP	
12		25.4893	26.12	50.00	-23.88	AVG	

Test Specification: *Live*



No.	Mk.	Freq.	Measure-ment	Limit	Over		
		MHz	dBuV	dBuV	dB	Detector	Comment
1		0.2179	48.78	62.89	-14.11	QP	
2		0.2179	33.68	52.89	-19.21	AVG	
3	*	0.5100	44.81	56.00	-11.19	QP	
4		0.5100	30.90	46.00	-15.10	AVG	
5		0.8820	36.34	56.00	-19.66	QP	
6		0.8820	25.90	46.00	-20.10	AVG	
7		2.5219	36.76	56.00	-19.24	QP	
8		2.5219	25.69	46.00	-20.31	AVG	
9		4.5259	35.40	56.00	-20.60	QP	
10		4.5259	23.85	46.00	-22.15	AVG	
11		9.4059	36.78	60.00	-23.22	QP	
12		9.4059	21.43	50.00	-28.57	AVG	

******* END OF REPORT *******