

FCC PART 15.247

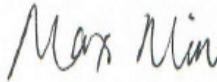
TEST REPORT

For

HiKaMi Digital SA

Av. Victor-Ruffly 5, Lausanne, Switzerland 1012

FCC ID: 2AOW5-SBO2

Report Type: Original Report	Product Type: HiKaMi Digital WECHEER.IO Smart Bottle Opener
Test Engineer: Max Min	
Report Number: RSHA180131001-00B	
Report Date: 2018-03-02	
Reviewed By: Oscar Ye RF Leader	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	6
SUPPORT EQUIPMENT LIST AND DETAILS	10
EXTERNAL I/O CABLE.....	10
BLOCK DIAGRAM OF TEST SETUP	11
SUMMARY OF TEST RESULTS	13
TEST EQUIPMENT LIST	14
FCC §15.247 (I) & §1.1310 & §2.1093 - RF EXPOSURE	15
MEASUREMENT RESULT	15
FCC §15.203 - ANTENNA REQUIREMENT.....	16
APPLICABLE STANDARD	16
ANTENNA CONNECTOR CONSTRUCTION	16
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	17
APPLICABLE STANDARD	17
EUT SETUP	17
EMI TEST RECEIVER SETUP.....	17
TEST PROCEDURE	17
CORRECTED FACTOR & MARGIN CALCULATION	18
TEST RESULTS SUMMARY	18
TEST DATA	18
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	23
APPLICABLE STANDARD	23
EUT SETUP	23
EMI TEST RECEIVER SETUP.....	24
TEST PROCEDURE	24
CORRECTED AMPLITUDE & MARGIN CALCULATION	24
TEST RESULTS SUMMARY	24
TEST DATA	25
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....	55
APPLICABLE STANDARD	55
TEST PROCEDURE	55
TEST DATA	55
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER.....	65
APPLICABLE STANDARD	65
TEST PROCEDURE	65
TEST DATA	65

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....	69
APPLICABLE STANDARD	69
TEST PROCEDURE	69
TEST DATA	69
FCC §15.247(e) - POWER SPECTRAL DENSITY	75
APPLICABLE STANDARD	75
TEST PROCEDURE	75
TEST DATA	75

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	HiKaMi Digital SA
Tested Model	HiKaMi SBO2
Product Type	HiKaMi Digital WECHEER.IO Smart Bottle Opener
Dimension	30 mm (L)* 30 mm (W)*120 mm(H)
Power Supply	DC 3.7V by battery and DC 5.0V charging by USB Port

**All measurement and test data in this report was gathered from production sample serial number: 20180131001.
(Assigned by the BACL. The EUT supplied by the applicant was received on 2018-01-31)*

Objective

This report is prepared on behalf of HiKaMi Digital SA in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS submission with FCC ID: 2AOW5-SBO2.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB558074 D01 DTS Meas Guidance v04.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Test channel list is as below:

For 802.11b, 802.11g and 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11;

For 802.11n-HT40 mode, EUT was tested with Channel 3, 6 and 9.

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

For BLE mode, EUT was tested with channel 0, 19 and 39.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	...	...
...	...	...	...
...	...	...	...
18	2438	38	2478
19	2440	39	2480

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

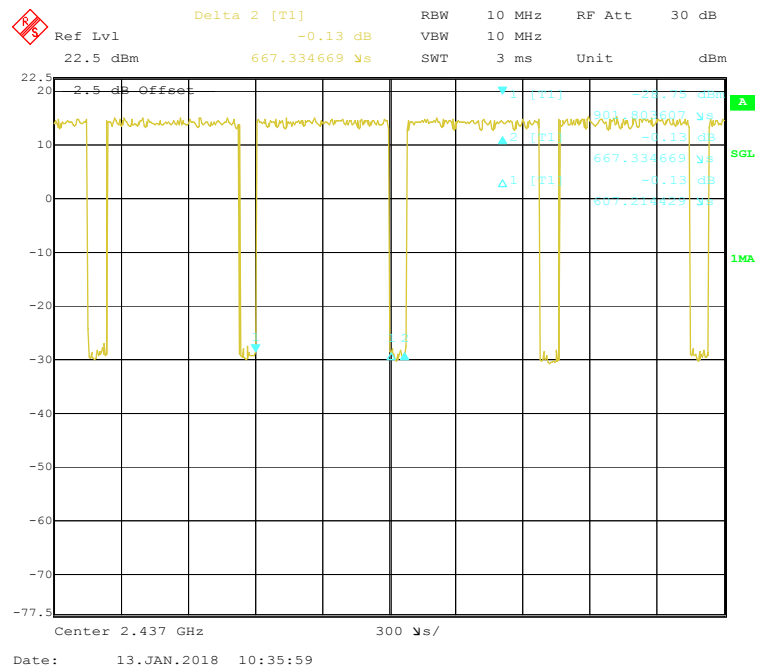
RF test tool: SecureCRT

Pre-scan with all the data rates, and the worst case was performed as below:

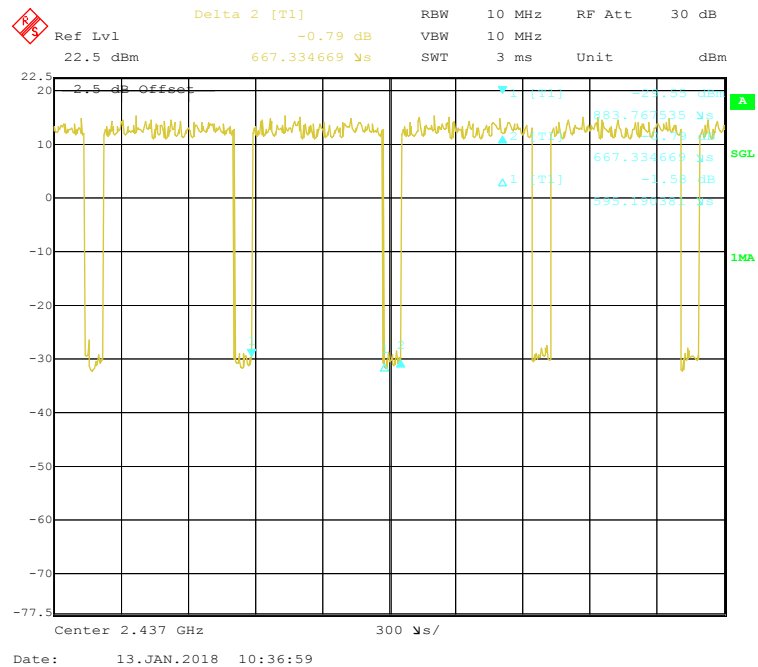
Mode	Data Rate	Power Level
802.11b	1 Mbps	25
802.11g	6 Mbps	25
802.11n-HT20	MCS0	25
802.11n-HT40	MCS0	28
BLE	1Mbps	5

Duty Cycle:

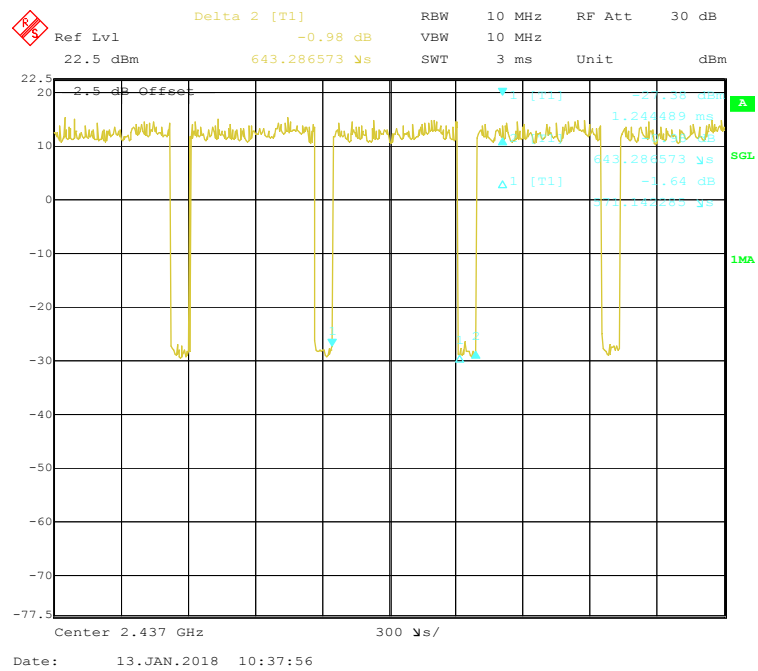
802.11b Mode Middle Channel



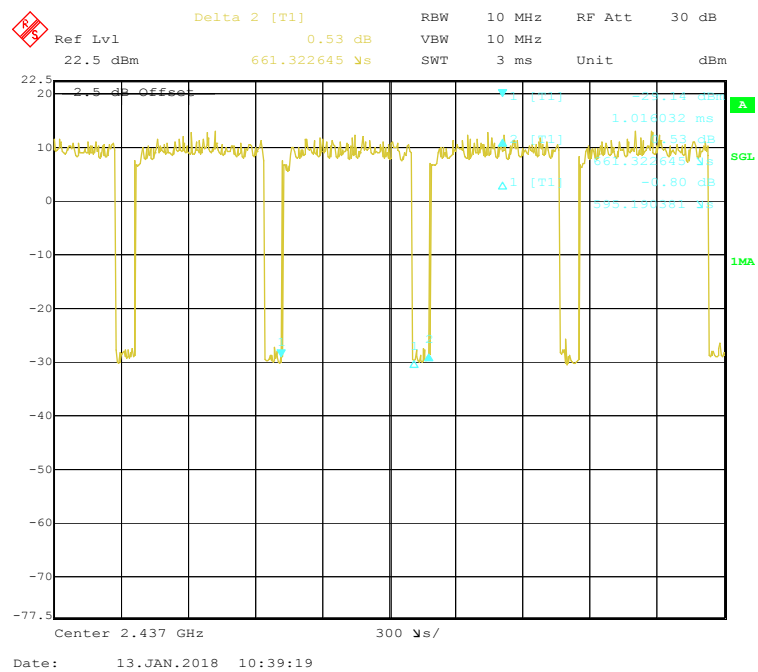
802.11g Mode Middle Channel



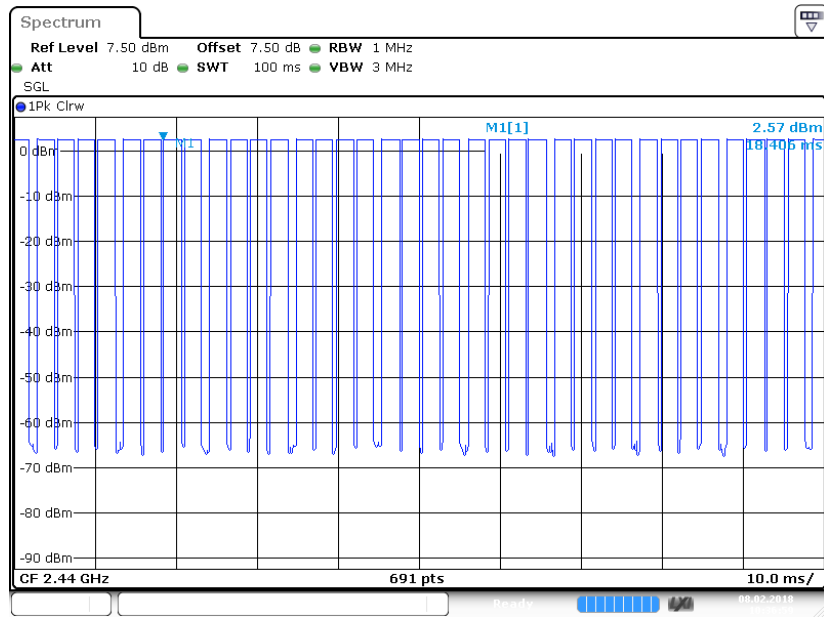
802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel

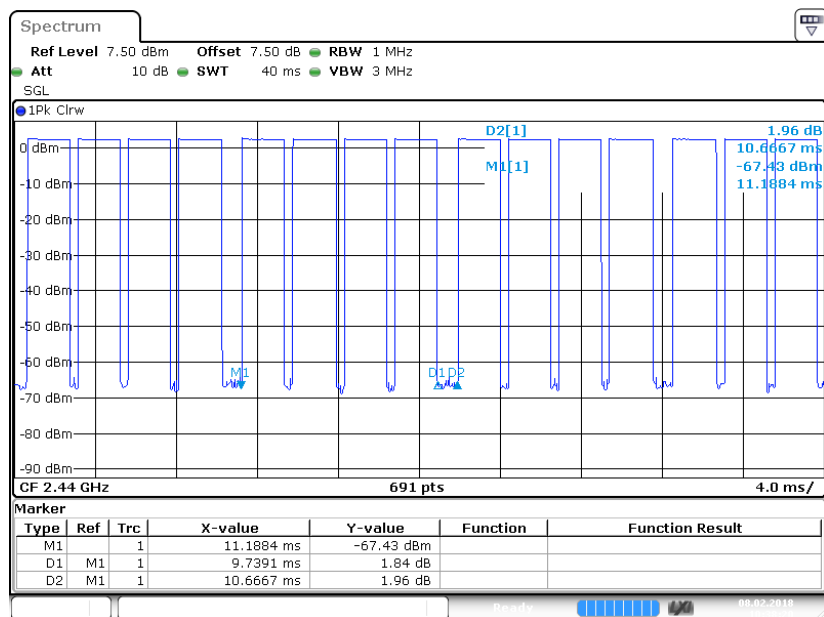


BLE Mode Middle Channel-1



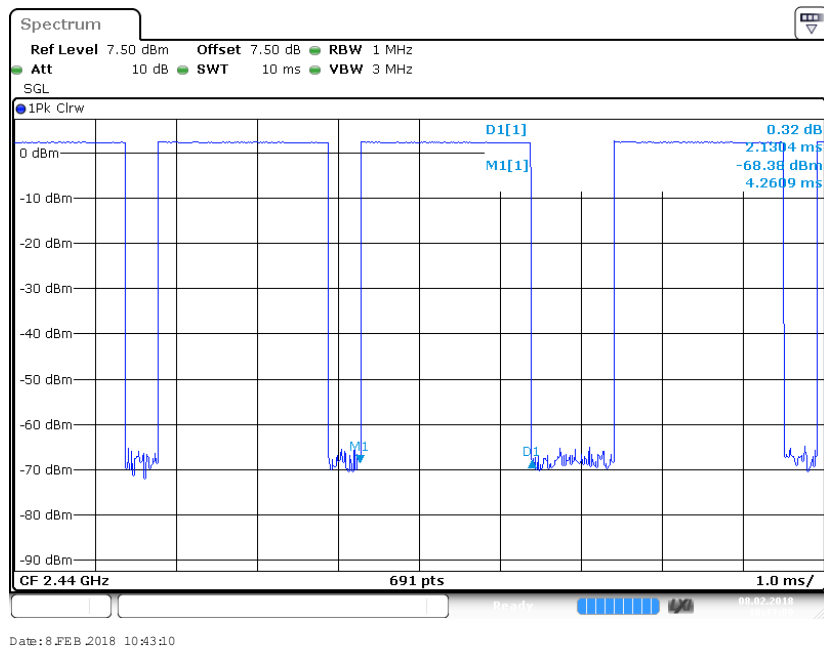
Date: 8.FEB.2018 10:37:00

BLE Mode Middle Channel-2



Date: 8.FEB.2018 10:38:20

BLE Mode Middle Channel-3



Mode	Duty Cycle(%)	T(us)	1/T(kHz)	10log(1/x)
802.11b	91.00	607	1.65	0.41
802.11g	89.21	595	1.68	0.50
802.11n-HT20	88.80	571	1.75	0.52
802.11n-HT40	90.02	595	1.68	0.46
BLE	79.87	2130	0.47	0.98

Note: “x” means the Duty Cycle.

Support Equipment List and Details

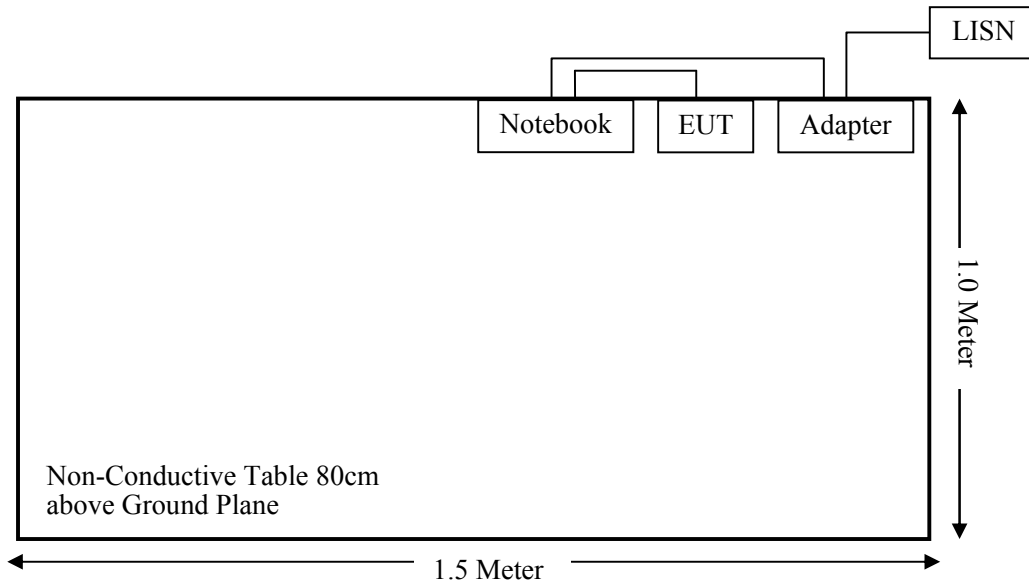
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152
DELL	Adapter	LA65NS0-00	DF263

External I/O Cable

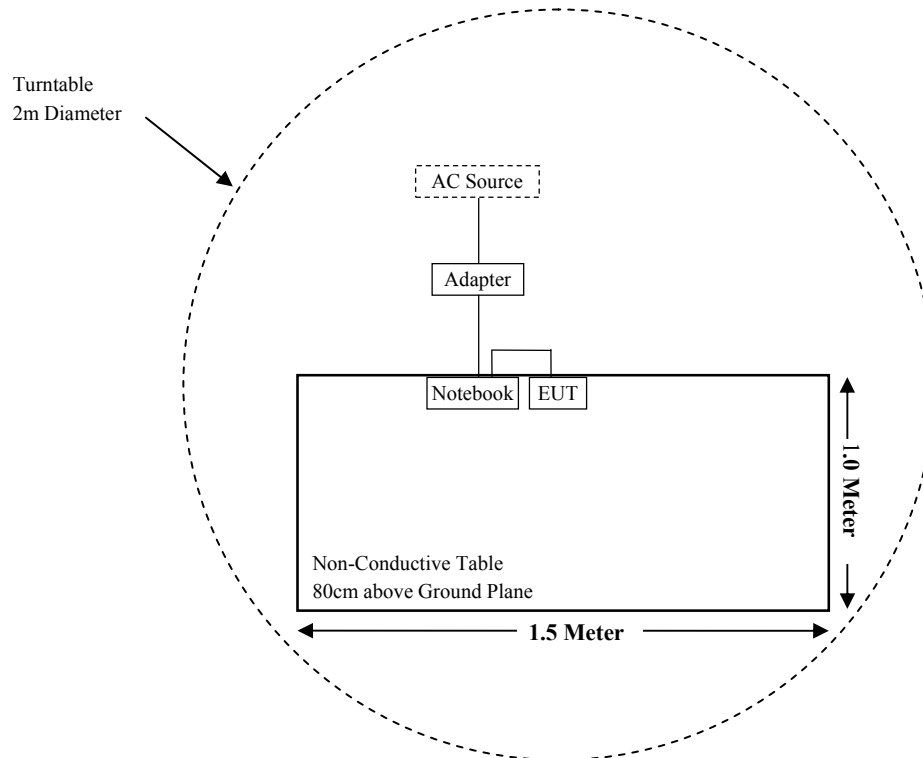
Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.8	Notebook	EUT

Block Diagram of Test Setup

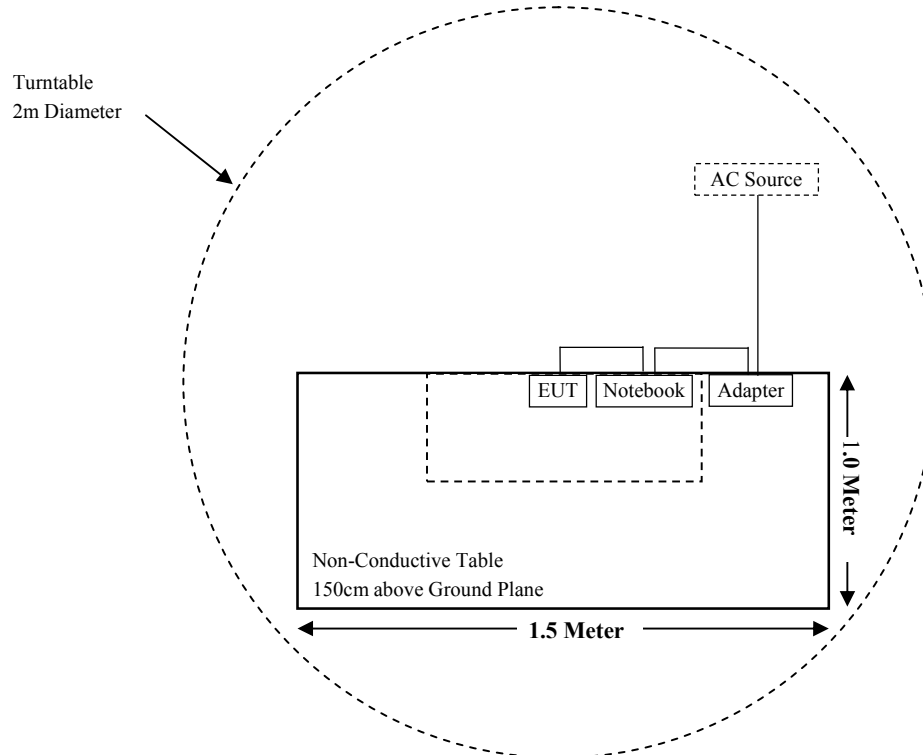
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (I), §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2017-11-12	2018-11-11
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Narda	Pre-amplifier	AFS42-00101800	2001270	2017-12-22	2018-12-21
QuinStar	Amplifier	QLW-18405536-J0	15964001009	2017-12-22	2018-12-21
SINOSCITE	Band Reject Filter	BSF2402-2480MN-0898	/	2017-08-05	2018-08-04
SINOSCITE	Band Reject Filter	BSF2400-2483MN-0995	/	2017-08-05	2018-08-04
Narda	Attenuator/10dB	10dB	/	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2017-07-22	2018-07-21
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Agilent	Power Meter	N1912A	MY5000492	2017-12-18	2018-12-17
Agilent	Power Sensor	N1921A	MY54210024	2017-12-18	2018-12-17
Narda	Attenuator/2dB	2dB	/	2017-08-15	2018-08-14
Narda	Attenuator/6dB	10690812-2	26850-6	2018-01-10	2019-01-09
HiKaMi	RF Cable	/	/	/	/
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2017-11-12	2018-11-11
Rohde & Schwarz	LISN	ENV216	3560655016	2017-11-25	2018-11-24
BACL	Auto test Software	BACL-EMC	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2018-01-10	2019-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2017-08-15	2018-08-14

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (I) & §1.1310 & §2.1093 - RF EXPOSURE

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

2.4G Wi-Fi Mode:

Result: Compliance. Please refer to the SAR report: RSH180131001-20 for details.

BLE Mode:

Frequency Range (MHz)	Target Output Power		Minimum test separation distance required for the exposure conditions (mm)
	(dBm)	(mW)	
2402-2480	3.50	2.24	5.00

Note: The target output power was declared by the manufacturer.

Result: $[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})]$
 • $[\sqrt{f(\text{GHz})}] = 2.24/5 \cdot \sqrt{2.48} = 0.7 < 7.5$

So the stand-alone SAR evaluation is not necessary for BLE.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
 - b. Antenna must use a unique type of connector to attach to the EUT.
- Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

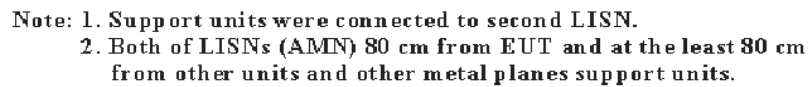
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has a PCB antenna for Bluetooth& Wi-Fi, which the antenna gain is 2dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

EUT Setup



Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Corrected Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Reading}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

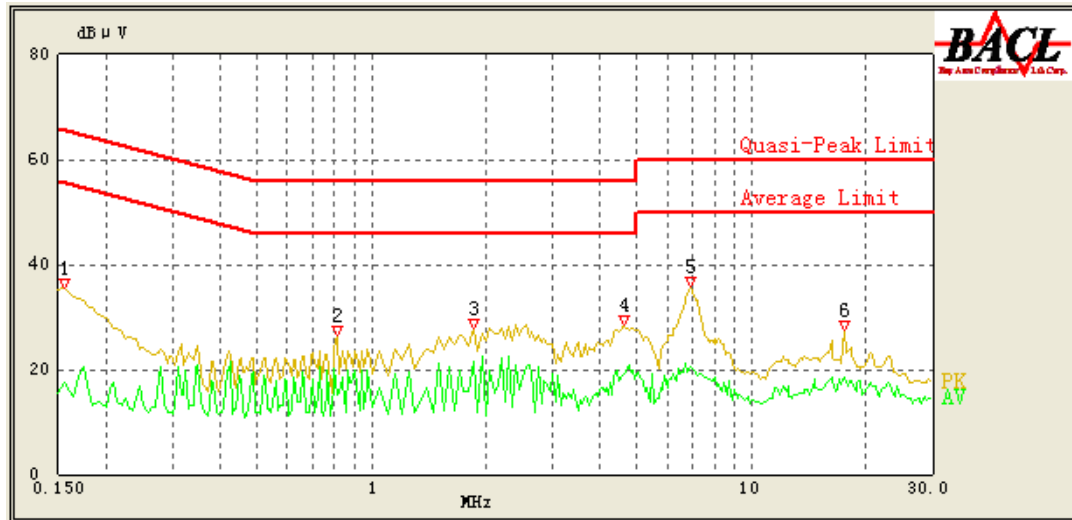
Temperature:	20.2 °C
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Max Min on 2018-02-11.

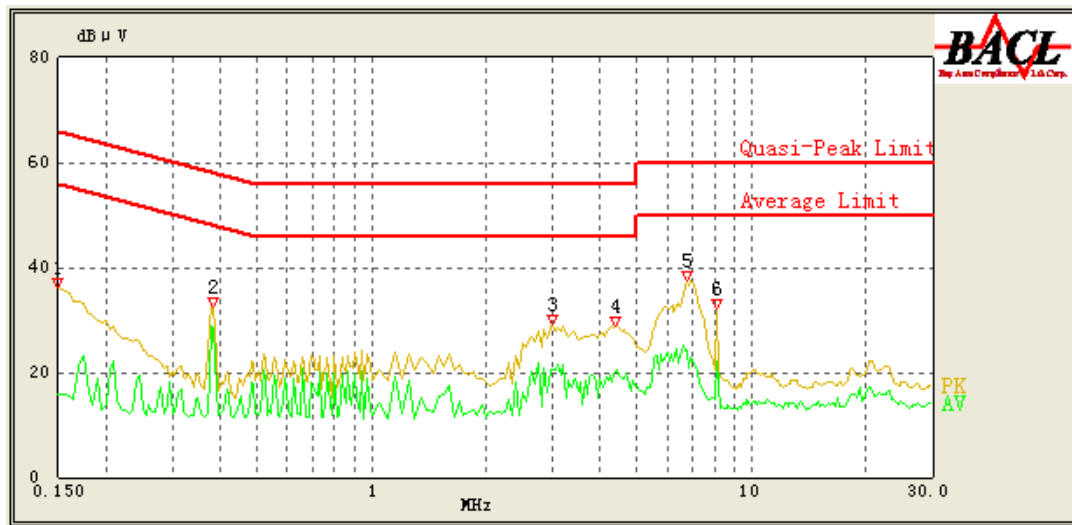
For Wi-Fi Mode:

EUT operation mode: Transmitting in 802.11g mode high channel(worst case)

AC 120V/60 Hz, Line



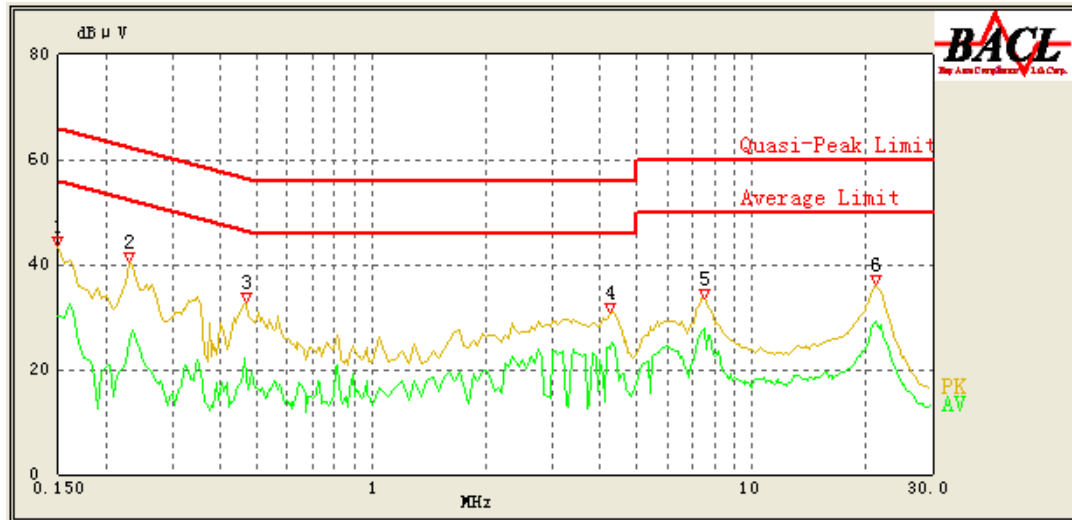
Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.155	35.47	QP	9.000	L1	16.06	65.86	30.39	Compliance
0.155	17.52	AV	9.000	L1	16.06	55.86	38.34	Compliance
0.815	26.39	QP	9.000	L1	15.92	56.00	29.61	Compliance
0.810	15.17	AV	9.000	L1	15.92	46.00	30.83	Compliance
1.850	27.86	QP	9.000	L1	15.85	56.00	28.14	Compliance
1.850	21.36	AV	9.000	L1	15.85	46.00	24.64	Compliance
4.600	28.44	QP	9.000	L1	15.85	56.00	27.56	Compliance
4.600	19.27	AV	9.000	L1	15.85	46.00	26.73	Compliance
6.950	35.71	QP	9.000	L1	15.98	60.00	24.29	Compliance
6.900	20.52	AV	9.000	L1	15.97	50.00	29.48	Compliance
17.600	27.41	QP	9.000	L1	16.33	60.00	32.59	Compliance
17.600	18.43	AV	9.000	L1	16.33	50.00	31.57	Compliance

AC 120V/60 Hz, Neutral

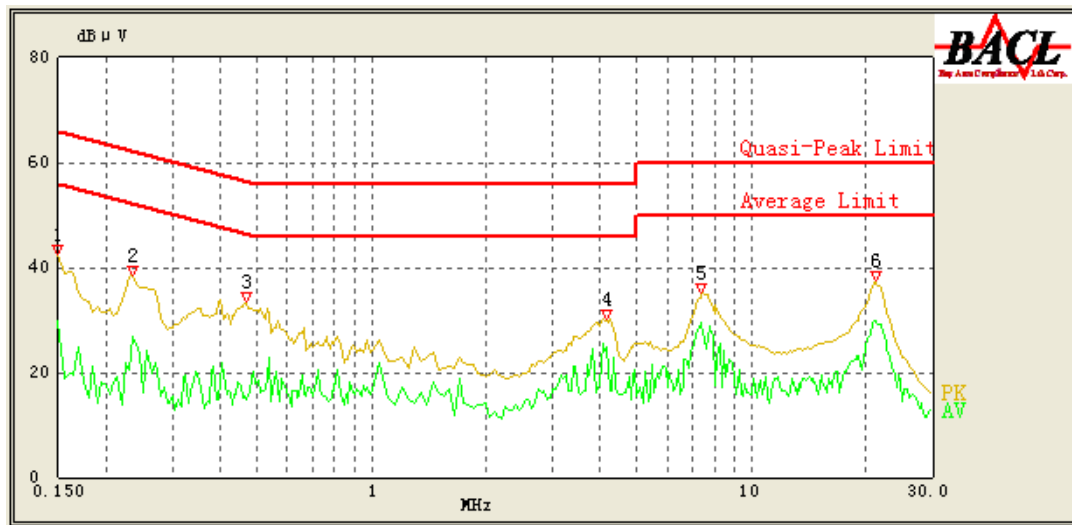
Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.150	36.06	QP	9.000	N	16.06	66.00	29.94	Compliance
0.150	15.89	AV	9.000	N	16.06	56.00	40.11	Compliance
0.385	32.63	QP	9.000	N	16.09	59.29	26.66	Compliance
0.385	28.39	AV	9.000	N	16.09	49.29	20.90	Compliance
3.000	29.25	QP	9.000	N	15.90	56.00	26.75	Compliance
3.000	20.53	AV	9.000	N	15.90	46.00	25.47	Compliance
4.400	28.72	QP	9.000	N	15.88	56.00	27.28	Compliance
4.450	20.58	AV	9.000	N	15.88	46.00	25.42	Compliance
6.800	37.63	QP	9.000	N	15.91	60.00	22.37	Compliance
6.800	24.08	AV	9.000	N	15.91	50.00	25.92	Compliance
8.100	32.28	QP	9.000	N	15.95	60.00	27.72	Compliance
8.100	22.08	AV	9.000	N	15.95	50.00	27.92	Compliance

Note:

- 1) Corrected Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation
- 2) Margin = Limit – Reading

For BLE Mode:*EUT operation mode: Transmitting in low channel(worst case)***AC 120V/60 Hz, Line**

Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.150	43.52	QP	9.000	L1	16.06	66.00	22.48	Compliance
0.150	30.32	AV	9.000	L1	16.06	56.00	25.68	Compliance
0.230	40.39	QP	9.000	L1	16.02	63.71	23.32	Compliance
0.230	25.38	AV	9.000	L1	16.02	53.71	28.33	Compliance
0.470	32.95	QP	9.000	L1	16.07	56.86	23.91	Compliance
0.470	18.41	AV	9.000	L1	16.07	46.86	28.45	Compliance
4.250	30.93	QP	9.000	L1	15.85	56.00	25.07	Compliance
4.250	23.92	AV	9.000	L1	15.85	46.00	22.08	Compliance
7.550	33.47	QP	9.000	L1	15.99	60.00	26.53	Compliance
7.550	27.79	AV	9.000	L1	15.99	50.00	22.21	Compliance
21.250	36.09	QP	9.000	L1	16.44	60.00	23.91	Compliance
21.200	29.11	AV	9.000	L1	16.44	50.00	20.89	Compliance

AC 120V/60 Hz, Neutral

Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.150	42.51	QP	9.000	N	16.06	66.00	23.49	Compliance
0.150	30.00	AV	9.000	N	16.06	56.00	26.00	Compliance
0.235	38.55	QP	9.000	N	16.06	63.57	25.02	Compliance
0.235	26.78	AV	9.000	N	16.06	53.57	26.79	Compliance
0.470	33.35	QP	9.000	N	16.10	56.86	23.51	Compliance
0.470	14.90	AV	9.000	N	16.10	46.86	31.96	Compliance
4.150	30.05	QP	9.000	N	15.88	56.00	25.95	Compliance
4.150	24.82	AV	9.000	N	15.88	46.00	21.18	Compliance
7.400	35.01	QP	9.000	N	15.93	60.00	24.99	Compliance
7.450	27.40	AV	9.000	N	15.93	50.00	22.60	Compliance

Note:

1) Corrected Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

2) Margin = Limit – Reading

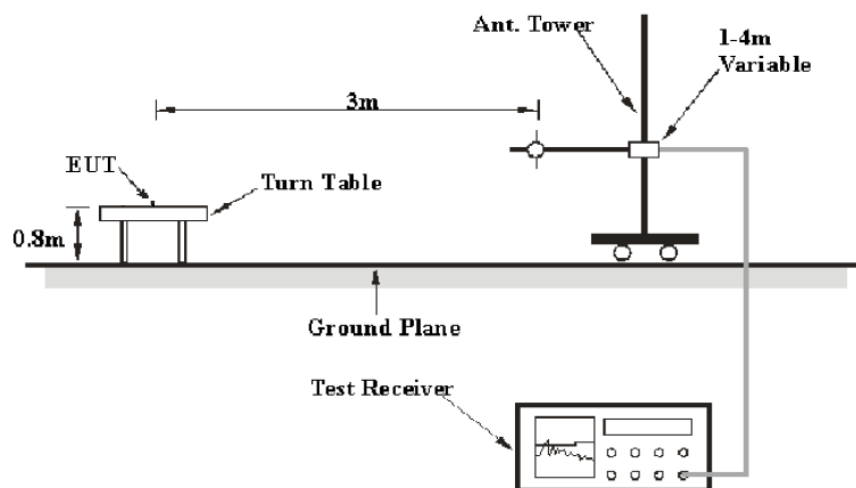
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

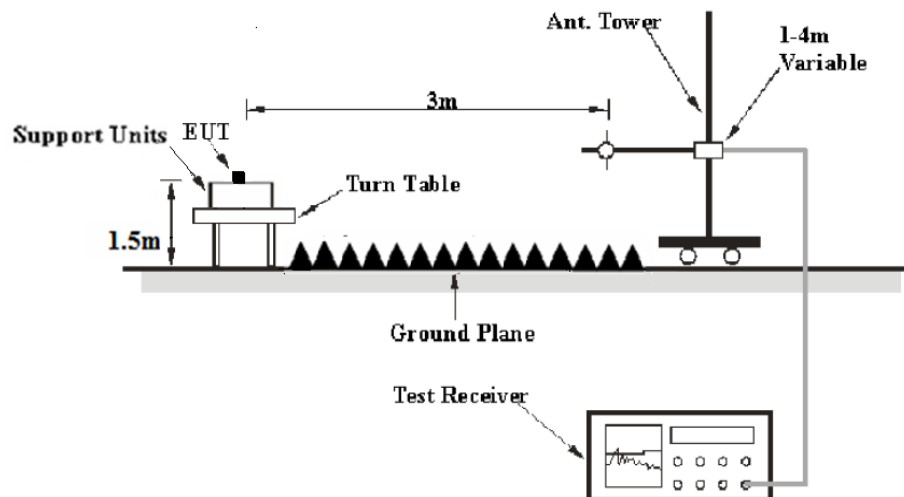
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	Ave.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 12.1 and 12.2. and ANSI C63.10-2013 clause 6.5, 6.6 and 6.7.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection mode for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data**Environmental Conditions**

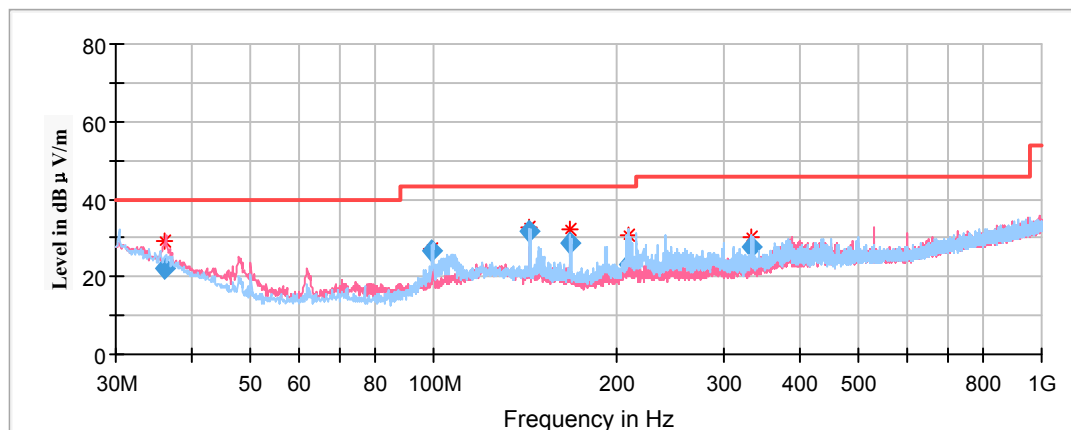
Temperature:	24.1 °C
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Max Min from 2018-02-06 to 2018-02-26.

EUT operation mode: Transmitting

For Wi-Fi Mode:**Spurious Emission Test:****30MHz-1GHz:**

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case **802.11g mode(high channel:2462MHz) in X-axis of orientation** was recorded



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	QuasiPeak (dBμV/m)	Height (cm)	Polar (H/V)				
36.032750	21.93	199.0	V	0.0	-8.5	40.00	18.07
99.554410	26.60	199.0	H	0.0	-15.5	43.50	16.90
144.014840	31.82	199.0	H	326.0	-12.6	43.50	11.68
167.604980	28.56	199.0	H	332.0	-13.5	43.50	14.94
209.210800	22.90	199.0	H	316.0	-12.7	43.50	20.60
331.847900	27.88	101.0	H	44.0	-10.3	46.00	18.12

1GHz-18GHz:**802.11b Mode:**

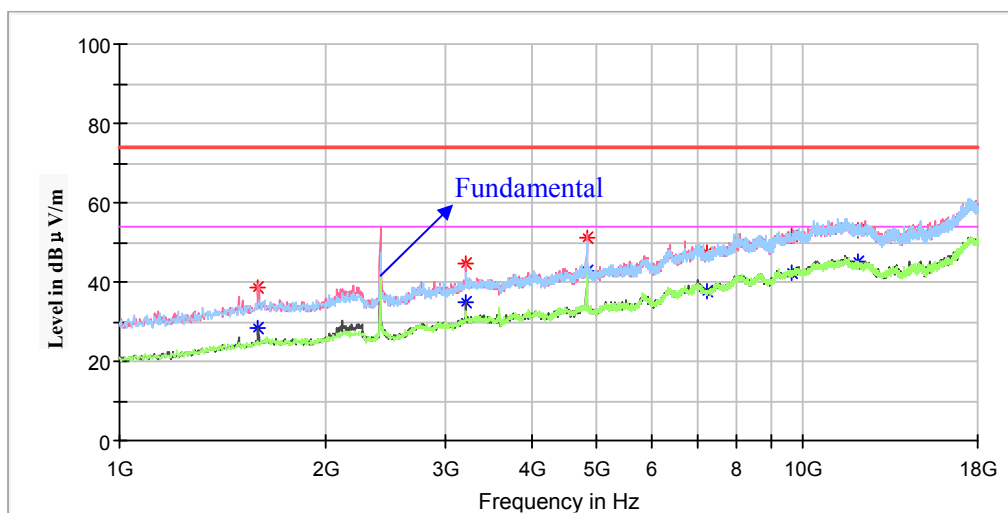
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.4835GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
3. Corrected Amplitude = Corrected Factor + Reading
4. Margin = Limit - Corrected. Amplitude

Low Channel: 2412MHz

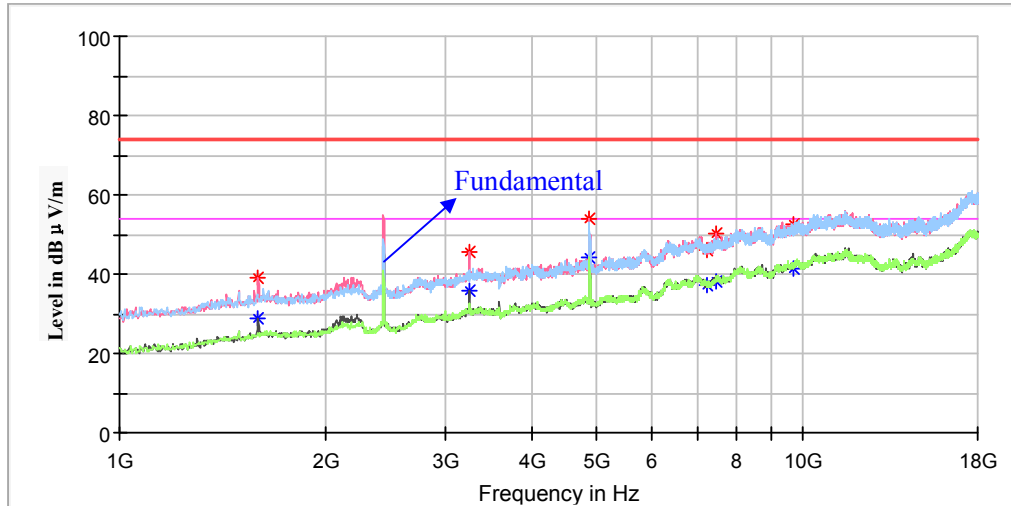
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1595.000000	38.78	---	200.0	V	175.0	-7.6	74.00	35.22
1595.000000	---	28.29	200.0	V	175.0	-7.6	54.00	25.71
3213.400000	---	34.78	150.0	V	332.0	-1.5	54.00	19.22
3213.400000	44.74	---	150.0	V	332.0	-1.5	74.00	29.26
4824.000000	51.17	---	150.0	V	185.0	2.5	74.00	22.83
4824.000000	---	42.92	150.0	V	185.0	2.5	54.00	11.08
7236.000000	---	37.55	200.0	V	21.0	9.8	54.00	16.45
7236.000000	47.54	---	200.0	V	21.0	9.8	74.00	26.46
9649.600000	---	42.18	200.0	V	81.0	14.9	54.00	11.82
9649.600000	51.52	---	200.0	V	81.0	14.9	74.00	22.48
12060.200000	---	45.19	150.0	V	292.0	16.5	54.00	8.81
12060.200000	52.88	---	150.0	V	292.0	16.5	74.00	21.12

Middle Channel: 2437MHz

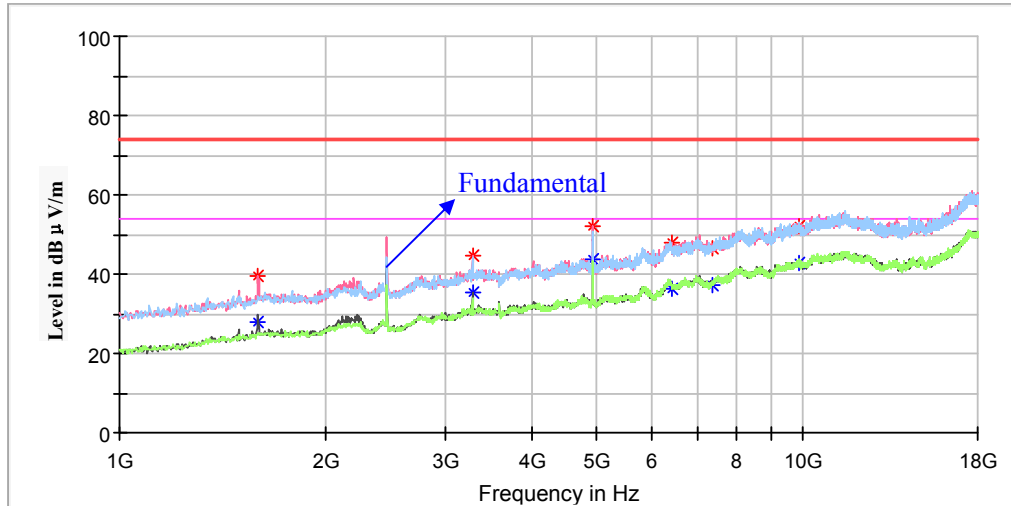
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1595.000000	39.11	---	150.0	V	178.0	-7.6	74.00	34.89
1595.000000	---	28.68	150.0	V	178.0	-7.6	54.00	25.32
3247.400000	45.48	---	150.0	V	350.0	-1.5	74.00	28.52
3247.400000	---	35.91	150.0	V	350.0	-1.5	54.00	18.09
4874.000000	53.95	---	150.0	V	178.0	2.6	74.00	20.05
4874.000000	---	44.27	150.0	V	178.0	2.6	54.00	9.73
7236.000000	46.16	---	200.0	V	48.0	9.8	74.00	27.84
7236.000000	---	37.11	200.0	V	48.0	9.8	54.00	16.89
7460.000000	---	38.29	150.0	V	191.0	10.2	54.00	15.71
7460.000000	50.45	---	150.0	V	191.0	10.2	74.00	23.55
9653.000000	---	41.52	150.0	V	19.0	14.9	54.00	12.48
9653.000000	52.43	---	150.0	V	19.0	14.9	74.00	21.57

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1591.600000	39.64	---	200.0	V	175.0	-7.6	74.00	34.36
1591.600000	---	28.02	200.0	V	175.0	-7.6	54.00	25.98
3281.400000	---	35.18	150.0	V	333.0	-1.4	54.00	18.82
3281.400000	44.60	---	150.0	V	333.0	-1.4	74.00	29.40
4924.000000	52.18	---	200.0	V	215.0	2.7	74.00	21.82
4924.000000	---	43.73	200.0	V	215.0	2.7	54.00	10.27
6423.000000	---	36.44	150.0	V	279.0	7.9	54.00	17.56
6423.000000	48.06	---	150.0	V	279.0	7.9	74.00	25.94
7386.000000	46.58	---	200.0	V	188.0	10.1	74.00	27.42
7386.000000	---	37.19	200.0	V	188.0	10.1	54.00	16.81
9850.200000	52.18	---	150.0	V	279.0	14.9	74.00	21.82
9850.200000	---	42.72	150.0	V	279.0	14.9	54.00	11.28

802.11g Mode:

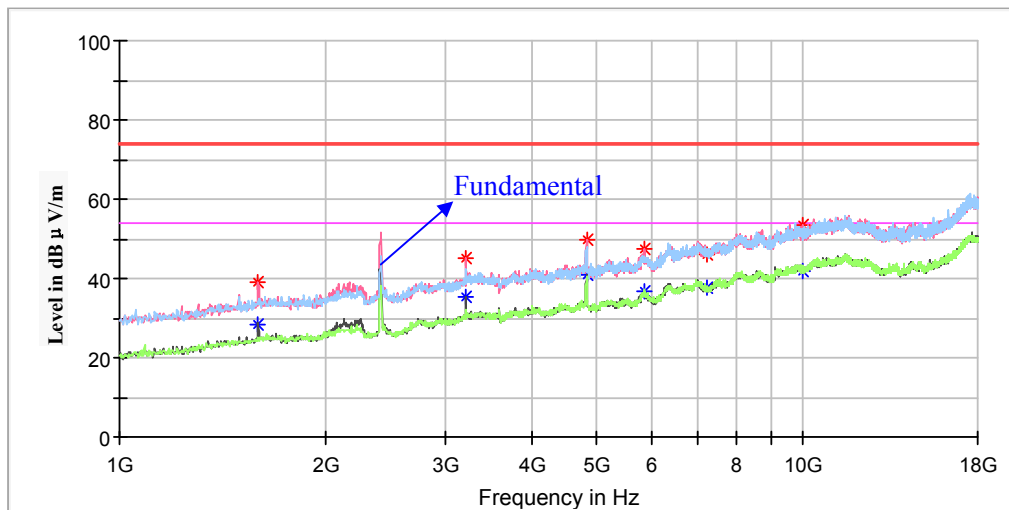
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.4835GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
3. Corrected Amplitude = Corrected Factor + Reading
4. Margin = Limit - Corrected. Amplitude

Low Channel: 2412MHz

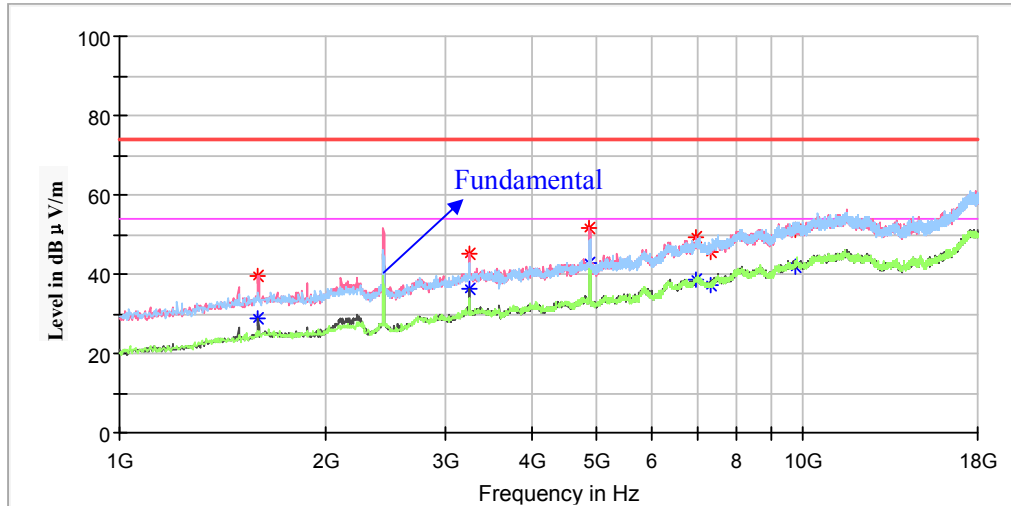
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1595.000000	39.11	---	200.0	V	183.0	-7.6	74.00	34.89
1595.000000	---	28.28	200.0	V	183.0	-7.6	54.00	25.72
3213.400000	45.10	---	150.0	V	338.0	-1.5	74.00	28.90
3213.400000	---	35.57	150.0	V	338.0	-1.5	54.00	18.43
4824.000000	49.64	---	150.0	V	196.0	2.5	74.00	24.36
4824.000000	---	40.74	150.0	V	196.0	2.5	54.00	13.26
5845.000000	---	36.59	200.0	V	75.0	5.2	54.00	17.41
5845.000000	47.21	---	200.0	V	75.0	5.2	74.00	26.79
7236.000000	46.17	---	150.0	V	285.0	9.8	74.00	27.83
7236.000000	---	37.51	150.0	V	285.0	9.8	54.00	16.49
9962.400000	---	41.84	200.0	V	89.0	14.9	54.00	12.16
9965.800000	53.31	---	200.0	V	89.0	14.9	74.00	20.69

Middle Channel: 2437MHz

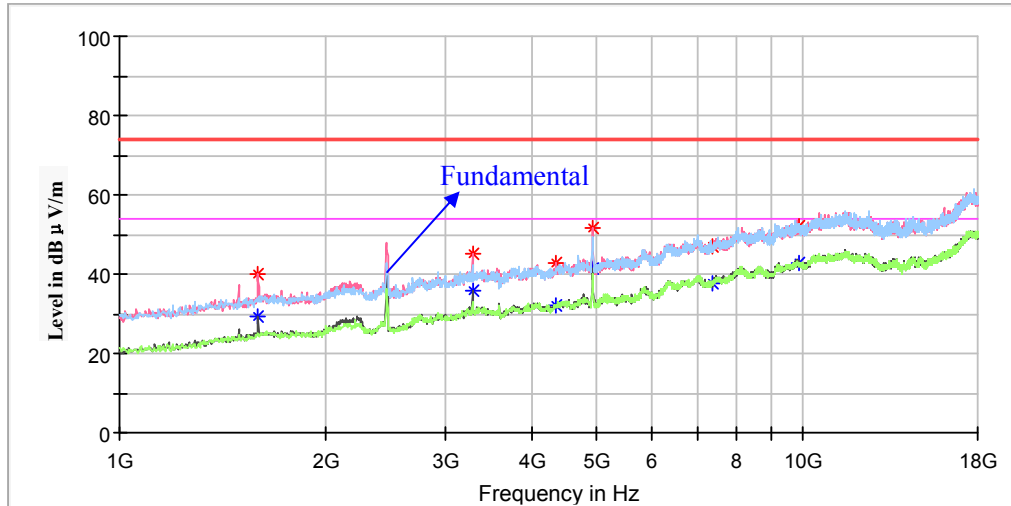
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1595.000000	39.51	---	150.0	V	159.0	-7.6	74.00	34.49
1595.000000	---	28.80	150.0	V	159.0	-7.6	54.00	25.20
3247.400000	45.08	---	150.0	V	334.0	-1.5	74.00	28.92
3247.400000	---	36.44	150.0	V	334.0	-1.5	54.00	17.56
4874.000000	51.72	---	150.0	V	186.0	2.6	74.00	22.28
4874.000000	---	42.72	150.0	V	186.0	2.6	54.00	11.28
6977.200000	---	38.47	200.0	V	253.0	9.4	54.00	15.53
6977.200000	49.21	---	200.0	V	253.0	9.4	74.00	24.79
7311.000000	---	37.35	150.0	V	34.0	10.0	54.00	16.65
7311.000000	45.79	---	150.0	V	34.0	10.0	74.00	28.21
9748.200000	---	41.78	200.0	V	94.0	14.9	54.00	12.22
9748.200000	51.25	---	200.0	V	94.0	14.9	74.00	22.75

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1591.600000	39.91	---	200.0	V	188.0	-7.6	74.00	34.09
1595.000000	---	29.27	200.0	V	188.0	-7.6	54.00	24.73
3281.400000	---	36.03	150.0	V	332.0	-1.4	54.00	17.97
3281.400000	45.10	---	150.0	V	332.0	-1.4	74.00	28.90
4349.000000	---	32.15	200.0	V	67.0	1.5	54.00	21.85
4349.000000	42.87	---	200.0	V	67.0	1.5	74.00	31.13
4924.000000	---	41.63	150.0	V	211.0	2.7	54.00	12.37
4924.000000	51.77	---	150.0	V	211.0	2.7	74.00	22.23
7386.000000	---	37.59	150.0	H	0.0	10.1	54.00	16.41
7386.000000	47.16	---	150.0	H	0.0	10.1	74.00	26.84
9846.800000	52.14	---	200.0	V	252.0	14.9	74.00	21.86
9850.200000	---	42.83	200.0	V	252.0	14.9	54.00	11.17

802.11n-HT20 Mode:

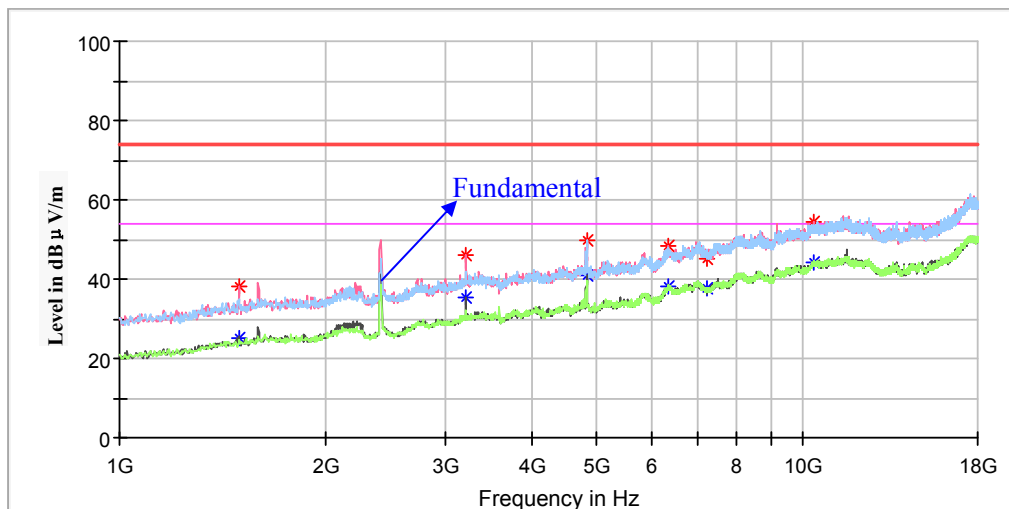
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.4835GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
3. Corrected Amplitude = Corrected Factor + Reading
4. Margin = Limit - Corrected. Amplitude

Low Channel: 2412MHz

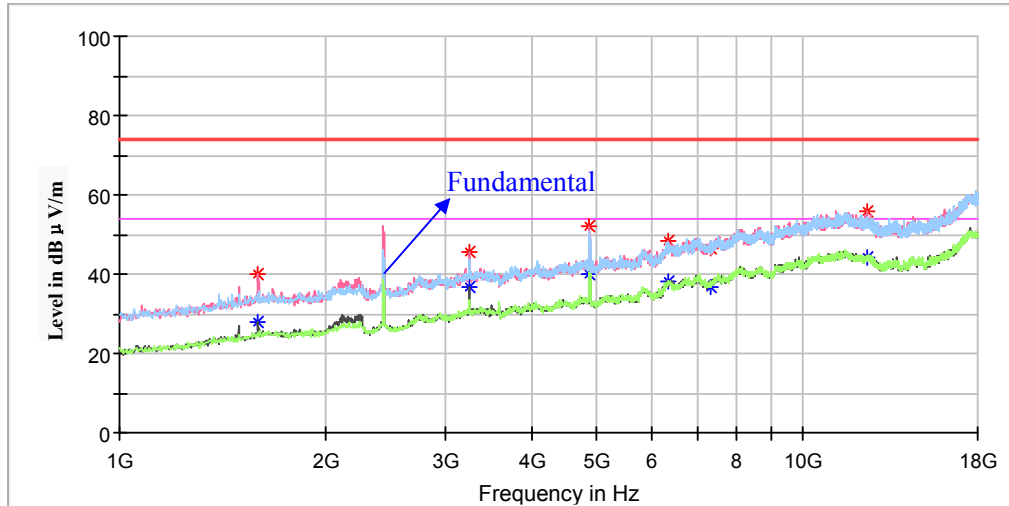
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1496.400000	---	25.25	200.0	V	172.0	-8.1	54.00	28.75
1496.400000	38.04	---	200.0	V	172.0	-8.1	74.00	35.96
3213.400000	---	35.44	150.0	V	334.0	-1.5	54.00	18.56
3213.400000	46.23	---	150.0	V	334.0	-1.5	74.00	27.77
4824.000000	---	40.85	150.0	V	199.0	2.5	54.00	13.15
4824.000000	49.57	---	150.0	V	199.0	2.5	74.00	24.43
6334.600000	---	37.99	200.0	V	19.0	7.4	54.00	16.01
6334.600000	48.16	---	200.0	V	19.0	7.4	74.00	25.84
7236.000000	---	37.53	150.0	H	88.0	9.8	54.00	16.47
7236.000000	45.06	---	150.0	H	88.0	9.8	74.00	28.94
10350.000000	54.26	---	200.0	V	147.0	16.4	74.00	19.74
10350.000000	---	44.32	200.0	V	147.0	16.4	54.00	9.68

Middle Channel: 2437MHz

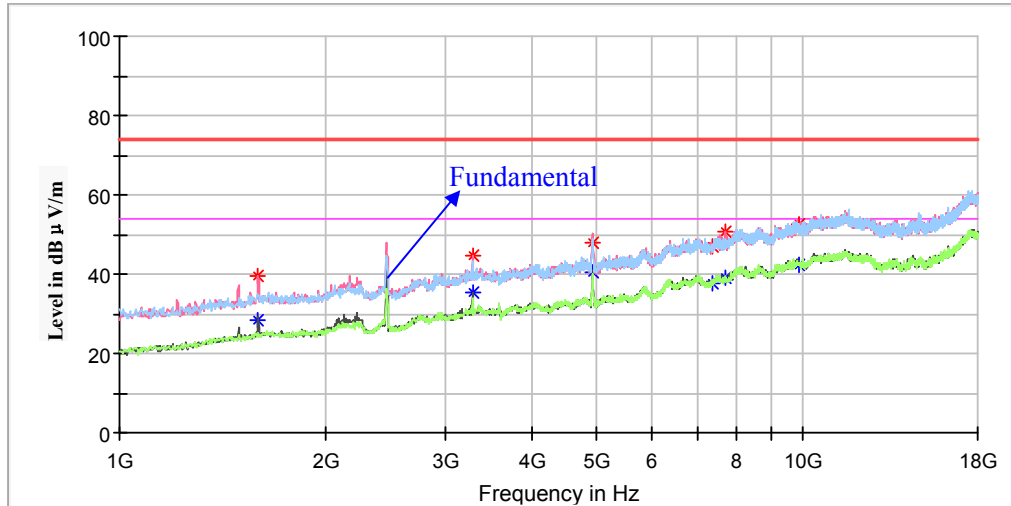
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1591.600000	---	28.09	200.0	V	182.0	-7.6	54.00	25.91
1591.600000	39.87	---	200.0	V	182.0	-7.6	74.00	34.13
3247.400000	---	36.52	150.0	V	338.0	-1.5	54.00	17.48
3247.400000	45.77	---	150.0	V	338.0	-1.5	74.00	28.23
4874.000000	---	40.08	150.0	V	208.0	2.6	54.00	13.92
4874.000000	52.13	---	150.0	V	208.0	2.6	74.00	21.87
6358.400000	---	38.20	200.0	V	244.0	7.6	54.00	15.80
6358.400000	48.26	---	200.0	V	244.0	7.6	74.00	25.74
7311.000000	---	36.85	150.0	V	217.0	10.0	54.00	17.15
7311.000000	46.71	---	150.0	V	217.0	10.0	74.00	27.29
12434.000000	---	44.21	200.0	V	312.0	17.1	54.00	9.79
12434.000000	55.74	---	200.0	V	312.0	17.1	74.00	18.26

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1591.600000	---	28.31	150.0	V	171.0	-7.6	54.00	25.69
1591.600000	39.73	---	150.0	V	171.0	-7.6	74.00	34.27
3281.400000	---	35.22	150.0	V	345.0	-1.4	54.00	18.78
3281.400000	44.54	---	150.0	V	345.0	-1.4	74.00	29.46
4924.000000	---	40.64	150.0	V	185.0	2.7	54.00	13.36
4924.000000	48.09	---	150.0	V	185.0	2.7	74.00	25.91
7386.000000	---	37.65	150.0	V	211.0	10.1	54.00	16.35
7386.000000	46.85	---	150.0	V	211.0	10.1	74.00	27.15
7677.600000	---	39.10	200.0	V	117.0	10.9	54.00	14.90
7677.600000	50.75	---	200.0	V	117.0	10.9	74.00	23.25
9857.000000	---	42.10	200.0	H	135.0	14.9	54.00	11.90
9857.000000	52.55	---	200.0	H	135.0	14.9	74.00	21.45

802.11n-HT40 Mode:

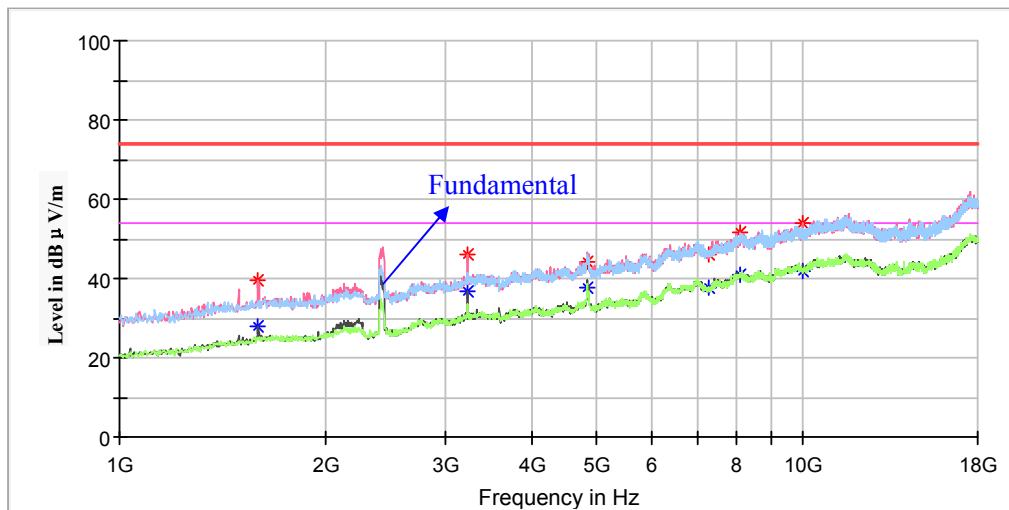
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.4835GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
3. Corrected Amplitude = Corrected Factor + Reading
4. Margin = Limit - Corrected. Amplitude

Low Channel: 2422MHz

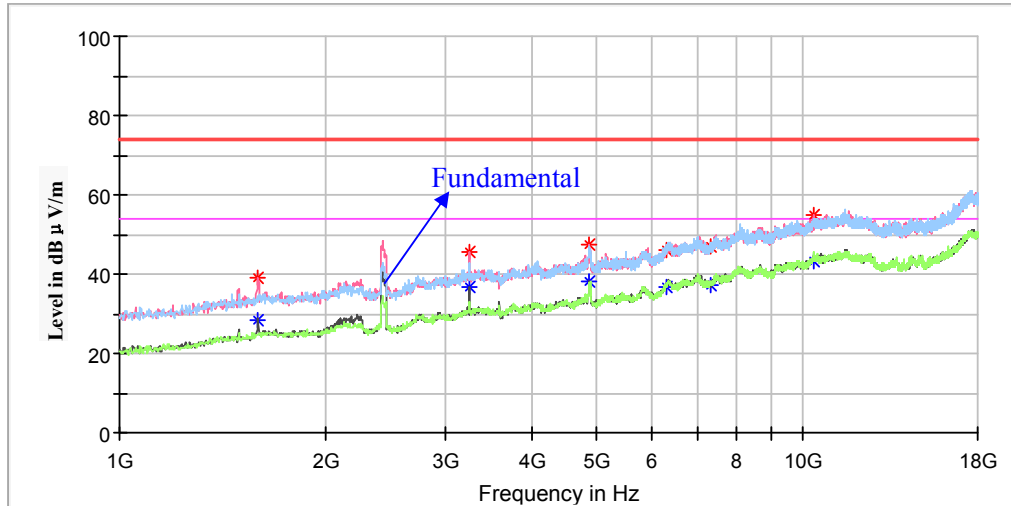
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1591.600000	---	27.90	150.0	H	172.0	-7.6	54.00	26.10
1591.600000	39.46	---	150.0	H	172.0	-7.6	74.00	34.54
3227.000000	---	36.68	150.0	V	333.0	-1.5	54.00	17.32
3227.000000	46.24	---	150.0	V	333.0	-1.5	74.00	27.76
4844.000000	---	37.70	150.0	V	199.0	2.6	54.00	16.30
4844.000000	44.18	---	150.0	V	199.0	2.6	74.00	29.82
7266.000000	---	37.55	200.0	V	27.0	9.9	54.00	16.45
7266.000000	45.86	---	200.0	V	27.0	9.9	74.00	28.14
8078.800000	---	40.73	150.0	V	145.0	12.1	54.00	13.27
8078.800000	51.78	---	150.0	V	145.0	12.1	74.00	22.22
9979.400000	54.17	---	200.0	V	81.0	14.9	74.00	19.83
9982.800000	---	42.01	200.0	V	81.0	14.9	54.00	11.99

Middle Channel: 2437MHz

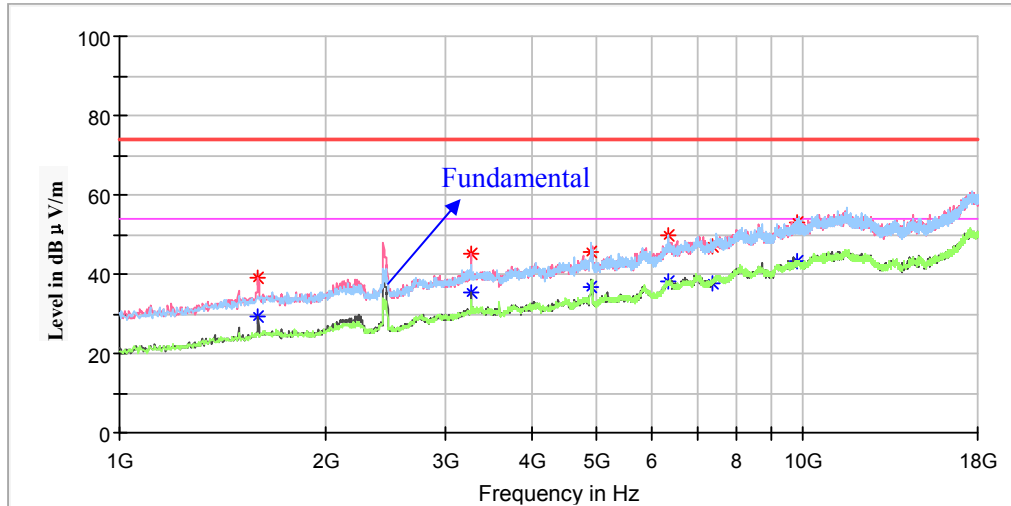
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1595.000000	---	28.32	200.0	V	175.0	-7.6	54.00	25.68
1595.000000	39.19	---	200.0	V	175.0	-7.6	74.00	34.81
3247.400000	---	36.69	150.0	V	333.0	-1.5	54.00	17.31
3247.400000	45.64	---	150.0	V	333.0	-1.5	74.00	28.36
4874.000000	---	37.97	200.0	V	189.0	2.6	54.00	16.03
4874.000000	47.40	---	200.0	V	189.0	2.6	74.00	26.60
6293.800000	45.85	---	200.0	V	6.0	7.2	74.00	28.15
6293.800000	---	36.82	200.0	V	6.0	7.2	54.00	17.18
7311.000000	---	37.35	200.0	H	305.0	10.0	54.00	16.65
7311.000000	46.92	---	200.0	H	305.0	10.0	74.00	27.08
10380.600000	---	43.21	200.0	V	189.0	16.5	54.00	10.79
10380.600000	55.07	---	150.0	V	189.0	16.5	74.00	18.93

High Channel: 2452MHz

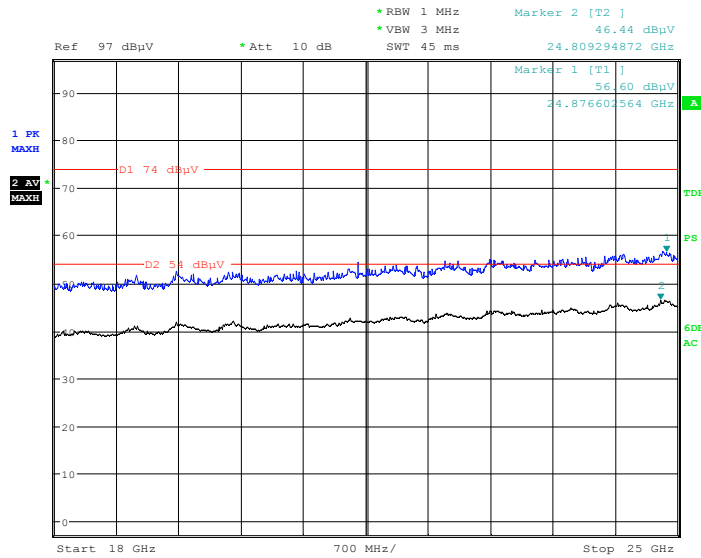
Full Spectrum



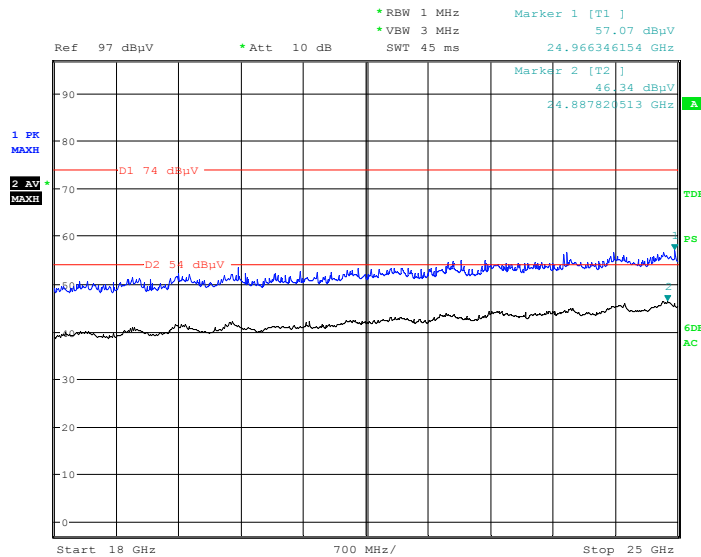
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1595.000000	---	29.38	150.0	V	172.0	-7.6	54.00	24.62
1595.000000	39.24	---	150.0	V	172.0	-7.6	74.00	34.76
3267.800000	---	35.52	150.0	V	333.0	-1.4	54.00	18.48
3267.800000	45.19	---	150.0	V	333.0	-1.4	74.00	28.81
4904.000000	---	36.93	200.0	V	188.0	2.7	54.00	17.07
4904.000000	45.44	---	200.0	V	188.0	2.7	74.00	28.56
6351.600000	49.95	---	200.0	H	258.0	7.5	74.00	24.05
6355.000000	---	38.23	200.0	H	258.0	7.5	54.00	15.77
7356.000000	---	37.87	200.0	V	148.0	10.0	54.00	16.13
7356.000000	47.16	---	200.0	V	148.0	10.0	74.00	26.84
9806.000000	---	43.43	150.0	H	75.0	14.9	54.00	10.57
9806.000000	52.98	---	150.0	H	75.0	14.9	74.00	21.02

18GHz-25GHz:

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case **802.11g mode(high channel:2462MHz) in X-axis of orientation** was recorded

Horizontal

Date: 26.FEB.2018 14:32:21

Vertical

Date: 26.FEB.2018 14:45:50

Fundamental Test & Restricted Bands Emissions Test:

Note:

1. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
2. Corrected Amplitude = Corrected Factor + Reading
3. Margin = Limit - Corrected. Amplitude

802.11b Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.000000	105.62	---	192.0	V	143.0	5.1	/	/
2412.000000	---	101.64	192.0	V	143.0	5.1	/	/
2390.000000	50.43	---	221.0	V	13.0	5.1	74.00	23.57
2390.000000	---	40.35	221.0	V	13.0	5.1	54.00	13.65
Middle Channel: 2437MHz								
2437.000000	105.71	---	114.0	V	26.0	5.2	/	/
2437.000000	---	101.55	114.0	V	26.0	5.2	/	/
High Channel: 2462MHz								
2462.000000	---	100.87	151.0	V	159.0	5.2	/	/
2462.000000	104.13	---	151.0	V	159.0	5.2	/	/
2483.500000	---	41.18	165.0	V	136.0	5.3	54.00	12.82
2483.500000	50.49	---	165.0	V	136.0	5.3	74.00	23.51

802.11g Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.000000	---	98.02	101.0	V	208.0	5.1	/	/
2412.000000	102.18	---	101.0	V	208.0	5.1	/	/
2390.000000	---	46.55	111.0	V	339.0	5.1	54.00	7.45
2390.000000	58.72	---	111.0	V	339.0	5.1	74.00	15.28
Middle Channel: 2437MHz								
2437.000000	102.21	---	218.0	V	63.0	5.2	/	/
2437.000000	---	98.00	218.0	V	63.0	5.2	/	/
High Channel: 2462MHz								
2462.000000	---	97.54	191.0	V	130.0	5.2	/	/
2462.000000	101.77	---	191.0	V	130.0	5.2	/	/
2483.500000	64.30	---	103.0	V	338.0	5.3	74.00	9.70
2483.500000	---	49.89	103.0	V	338.0	5.3	54.00	4.11

802.11n-HT20 Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

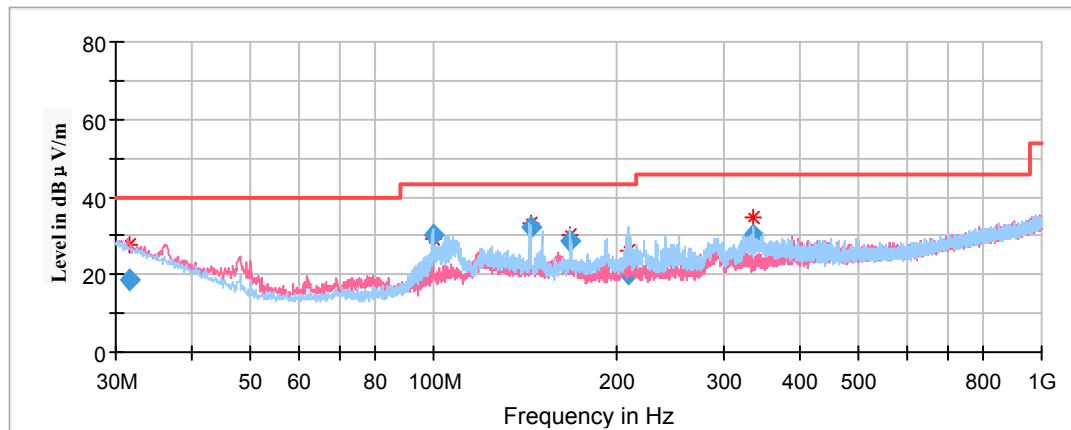
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.000000	101.81	---	135.0	V	223.0	5.1	/	/
2412.000000	---	97.60	135.0	V	223.0	5.1	/	/
2390.000000	---	46.45	210.0	V	200.0	5.1	54.00	7.55
2390.000000	58.35	---	210.0	V	200.0	5.1	74.00	15.65
Middle Channel: 2437MHz								
2437.000000	102.63	---	165.0	V	64.0	5.2	/	/
2437.000000	---	97.97	165.0	V	64.0	5.2	/	/
High Channel: 2462MHz								
2462.000000	---	97.82	190.0	V	318.0	5.2	/	/
2462.000000	102.51	---	190.0	V	318.0	5.2	/	/
2483.500000	---	49.48	106.0	V	285.0	5.3	54.00	4.52
2483.500000	64.62	---	106.0	V	285.0	5.3	74.00	9.38

802.11n-HT40 Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2422MHz								
2422.000000	---	93.01	134.0	V	93.0	5.1	/	/
2422.000000	97.76	---	134.0	V	93.0	5.1	/	/
2390.000000	60.39	---	173.0	V	273.0	5.1	74.00	13.61
2390.000000	---	48.12	173.0	V	273.0	5.1	54.00	5.88
Middle Channel: 2437MHz								
2437.000000	98.00	---	196.0	V	195.0	5.2	/	/
2437.000000	---	93.15	196.0	V	195.0	5.2	/	/
High Channel: 2452MHz								
2452.000000	---	93.06	140.0	V	293.0	5.2	/	/
2452.000000	97.81	---	140.0	V	293.0	5.2	/	/
2483.500000	---	50.53	136.0	V	323.0	5.3	54.00	3.47
2483.500000	64.39	---	136.0	V	323.0	5.3	74.00	9.61

For BLE Mode:**Spurious Emission Test:****30MHz-1GHz**

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low** channel of operation in the X axis of orientation was recorded)



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	QuasiPeak (dB μ V/m)	Height (cm)	Polar (H/V)				
31.565880	18.44	101.0	V	1.0	-5.4	40.00	21.56
99.943010	30.14	199.0	H	346.0	-15.4	43.50	13.36
144.042700	32.09	199.0	H	330.0	-12.6	43.50	11.41
167.624780	28.78	199.0	H	155.0	-13.5	43.50	14.72
209.619340	20.31	199.0	H	316.0	-12.7	43.50	23.19
335.206840	30.27	101.0	H	1.0	-10.2	46.00	15.73

1GHz-18GHz

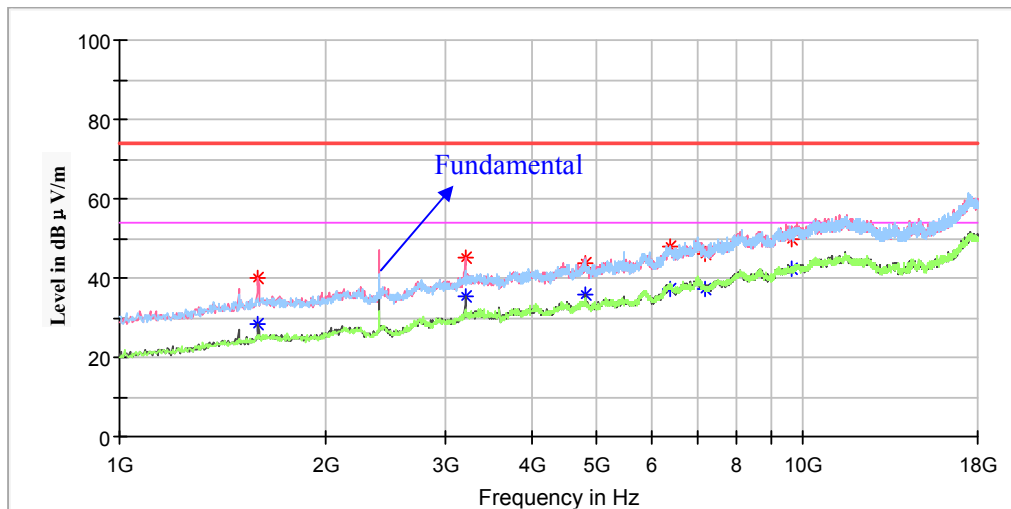
(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

Note:

1. This test was performed with the 2.402-2.48GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude

Low Channel: 2402MHz

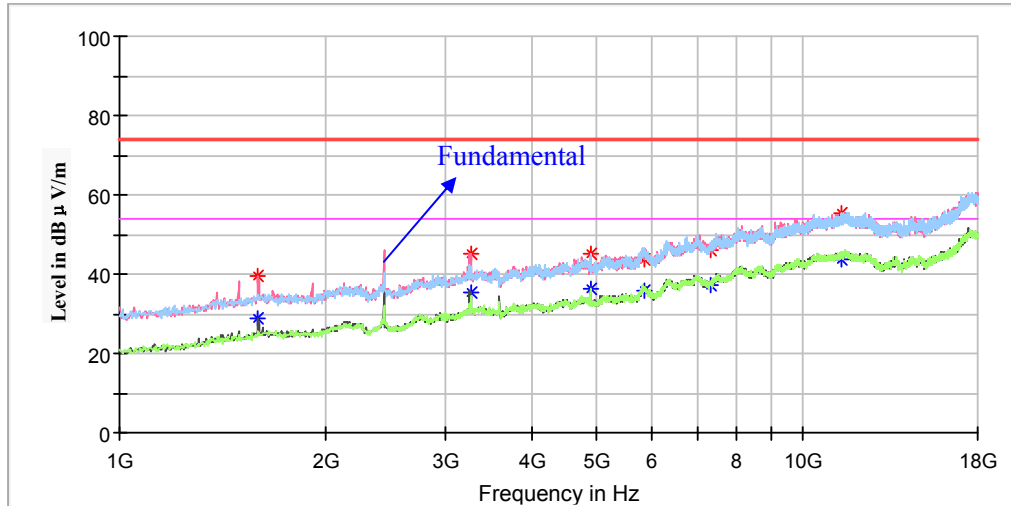
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1595.000000	39.94	---	200.0	V	175.0	-7.6	74.00	34.06
1595.000000	---	28.22	200.0	V	175.0	-7.6	54.00	25.78
3199.800000	44.95	---	150.0	V	0.0	-1.6	74.00	29.05
3203.200000	---	35.56	150.0	V	0.0	-1.6	54.00	18.44
4804.000000	43.81	---	200.0	V	216.0	2.5	74.00	30.19
4804.000000	---	35.69	200.0	V	216.0	2.5	54.00	18.31
6389.000000	---	37.31	150.0	V	345.0	7.7	54.00	16.69
6389.000000	48.08	---	150.0	V	345.0	7.7	74.00	25.92
7206.000000	46.03	---	200.0	V	62.0	9.8	74.00	27.97
7206.000000	---	37.20	200.0	V	62.0	9.8	54.00	16.80
9608.800000	---	42.20	200.0	V	55.0	14.9	54.00	11.80
9608.800000	49.92	---	200.0	V	55.0	14.9	74.00	24.08

Middle Channel: 2440MHz

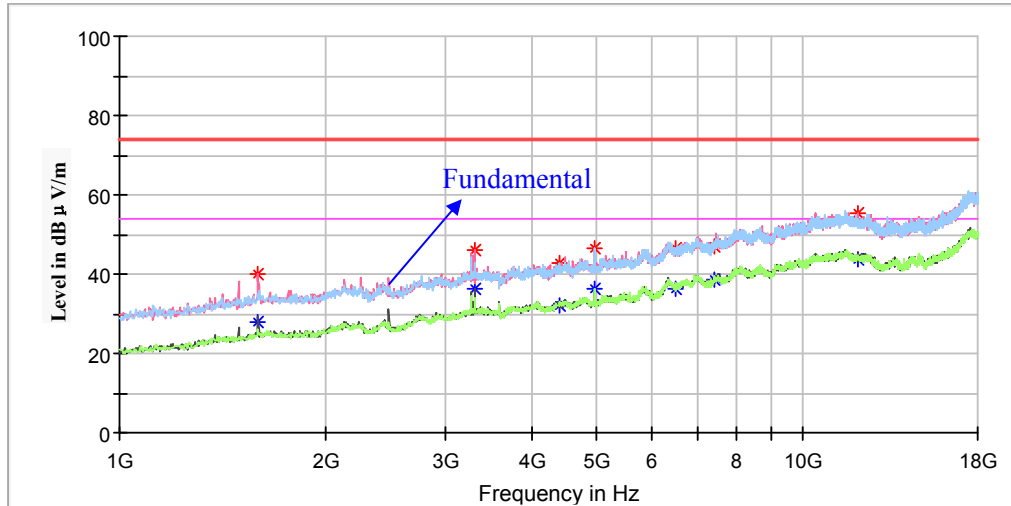
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1595.000000	---	28.94	200.0	V	174.0	-7.6	54.00	25.06
1595.000000	39.60	---	200.0	V	174.0	-7.6	74.00	34.40
3267.800000	---	35.12	150.0	V	347.0	-1.4	54.00	18.88
3267.800000	45.20	---	150.0	V	347.0	-1.4	74.00	28.80
4880.000000	---	36.19	200.0	V	338.0	2.6	54.00	17.81
4880.000000	45.34	---	200.0	V	338.0	2.6	74.00	28.66
5865.400000	43.69	---	200.0	V	121.0	5.3	74.00	30.31
5865.400000	---	35.65	200.0	V	121.0	5.3	54.00	18.35
7320.000000	45.91	---	150.0	V	147.0	10.0	74.00	28.09
7320.000000	---	37.35	150.0	V	147.0	10.0	54.00	16.65
11342.800000	55.40	---	200.0	V	6.0	17.9	74.00	18.60
11346.200000	---	43.84	200.0	V	6.0	17.9	54.00	10.16

High Channel: 2480MHz

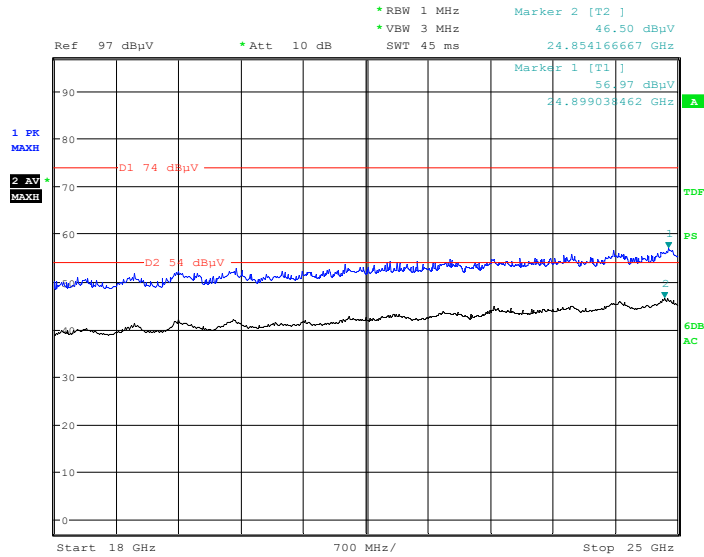
Full Spectrum



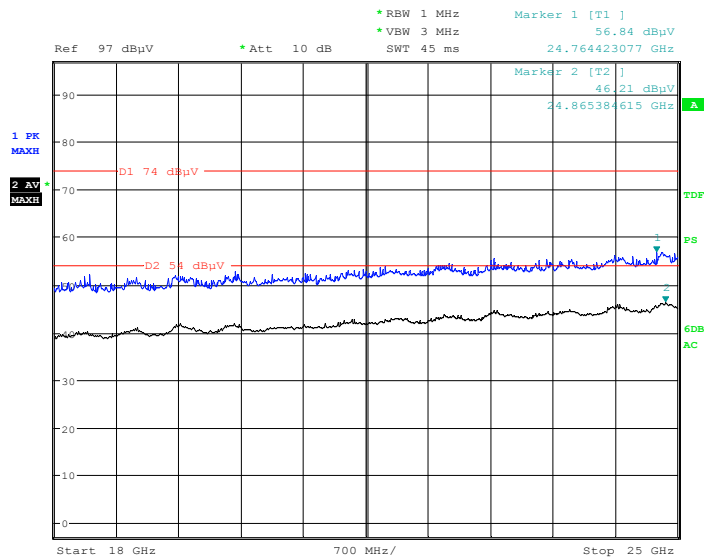
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1591.600000	39.90	---	200.0	V	174.0	-7.6	74.00	34.10
1591.600000	---	27.76	200.0	V	174.0	-7.6	54.00	26.24
3305.200000	46.03	---	150.0	V	338.0	-1.3	74.00	27.97
3305.200000	---	36.32	150.0	V	338.0	-1.3	54.00	17.68
4393.200000	---	32.20	150.0	H	80.0	1.6	54.00	21.80
4393.200000	42.62	---	150.0	H	80.0	1.6	74.00	31.38
4960.000000	46.70	---	200.0	V	346.0	2.8	74.00	27.30
4960.000000	---	36.05	200.0	V	346.0	2.8	54.00	17.95
6511.400000	---	36.50	150.0	V	338.0	8.3	54.00	17.50
6514.800000	46.56	---	150.0	V	338.0	8.3	74.00	27.44
7440.000000	47.05	---	200.0	V	191.0	10.1	74.00	26.95
7440.000000	---	38.51	200.0	V	191.0	10.1	54.00	15.49

18GHz-25GHz

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low** channel of operation in the X axis of orientation was recorded)

Horizontal Plot

Date: 26.FEB.2018 13:39:43

Vertical Plot

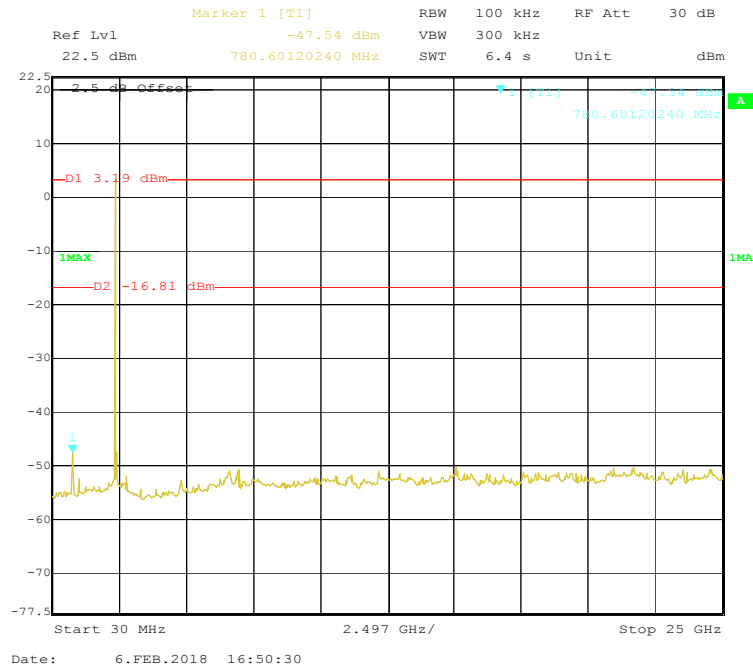
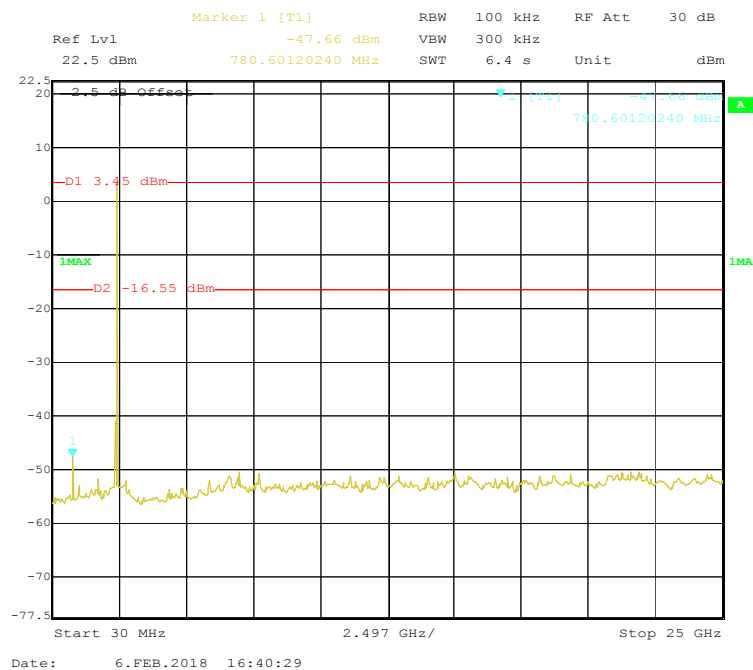
Date: 26.FEB.2018 14:21:16

Fundamental Test & Restricted Bands Emissions Test:*(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)*

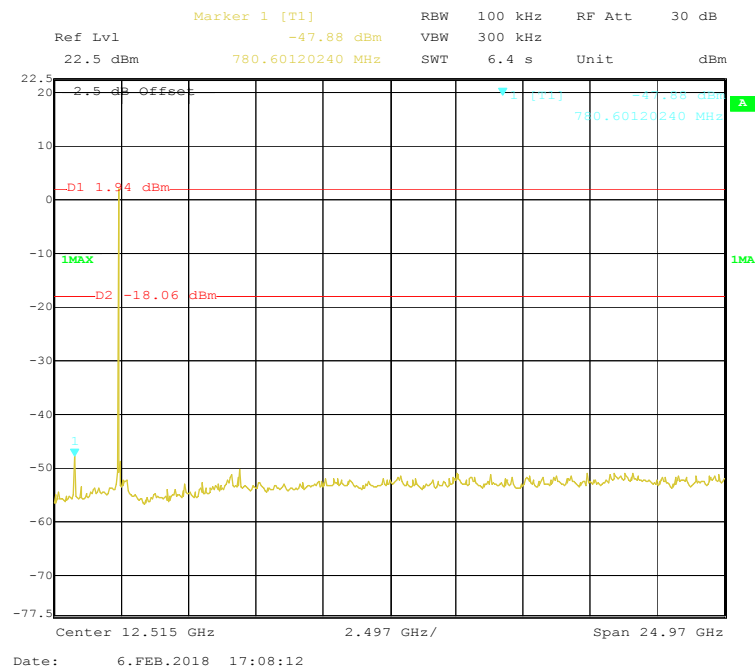
Note:

1. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
2. Corrected Amplitude = Corrected Factor + Reading
3. Margin = Limit - Corrected. Amplitude

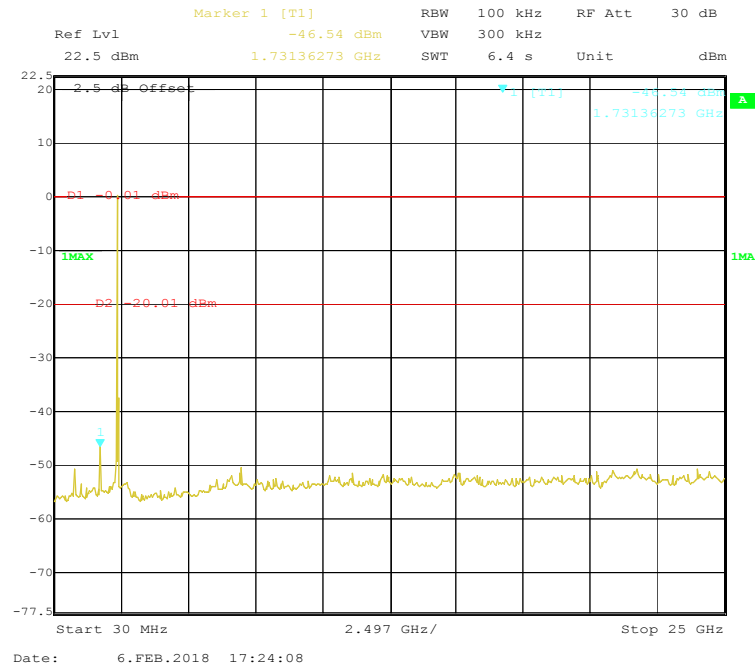
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2402.000000	98.23	---	126.0	V	174.0	5.1	/	/
2402.000000	---	91.36	126.0	V	174.0	5.1	/	/
2390.000000	---	39.70	185.0	V	10.0	5.1	54.00	14.30
2390.000000	48.97	---	185.0	V	10.0	5.1	74.00	25.03
Middle Channel: 2440MHz								
2440.000000	98.04	---	127.0	V	215.0	5.2	/	/
2440.000000	---	91.21	127.0	V	215.0	5.2	/	/
High Channel: 2480MHz								
2480.000000	---	90.26	205.0	V	330.0	5.3	/	/
2480.000000	97.13	---	205.0	V	330.0	5.3	/	/
2483.500000	---	40.71	187.0	V	165.0	5.3	54.00	13.29
2483.500000	51.93	---	187.0	V	165.0	5.3	74.00	22.07

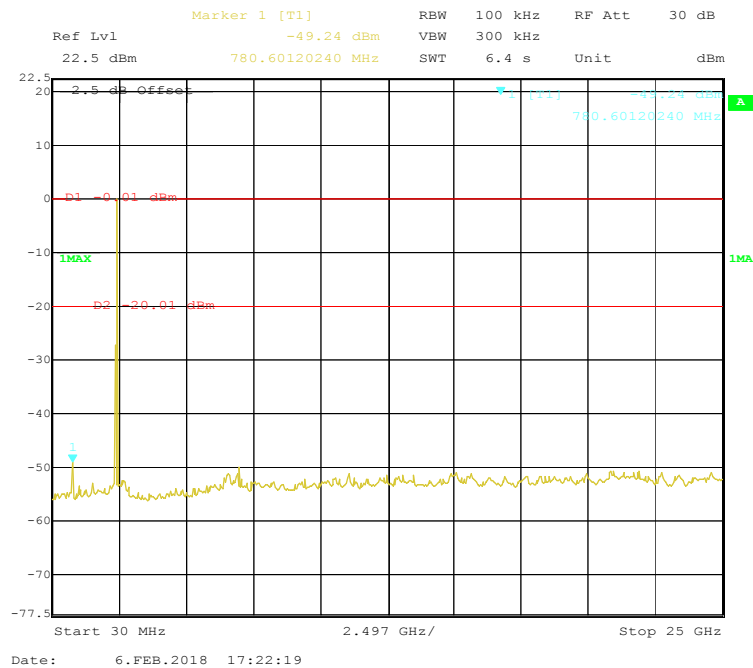
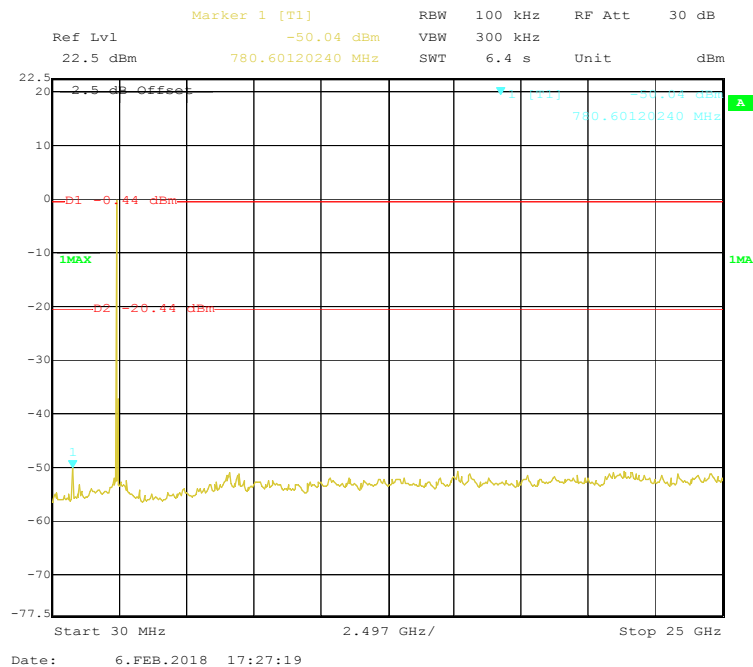
Conducted Spurious Emissions at Antenna Port**802.11b Mode Low Channel****802.11b Mode Middle Channel**

802.11b Mode High Channel

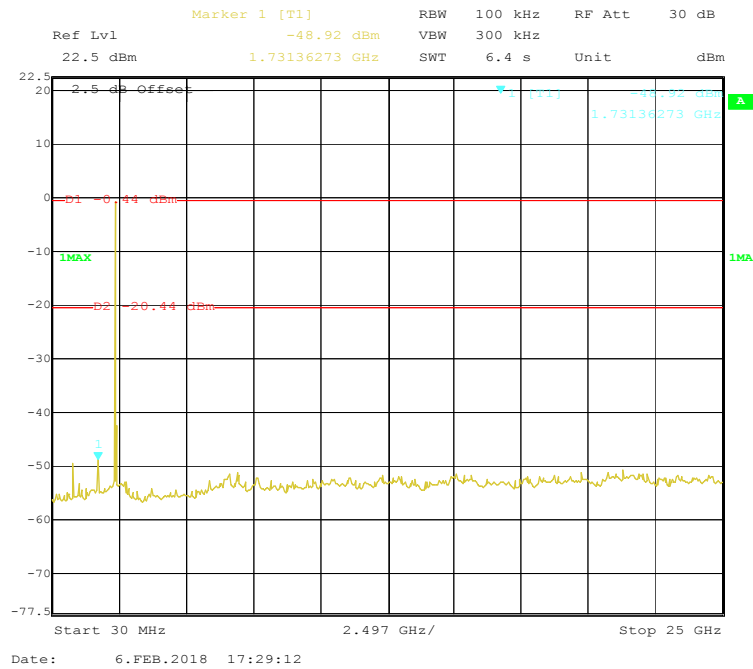


802.11g Mode Low Channel

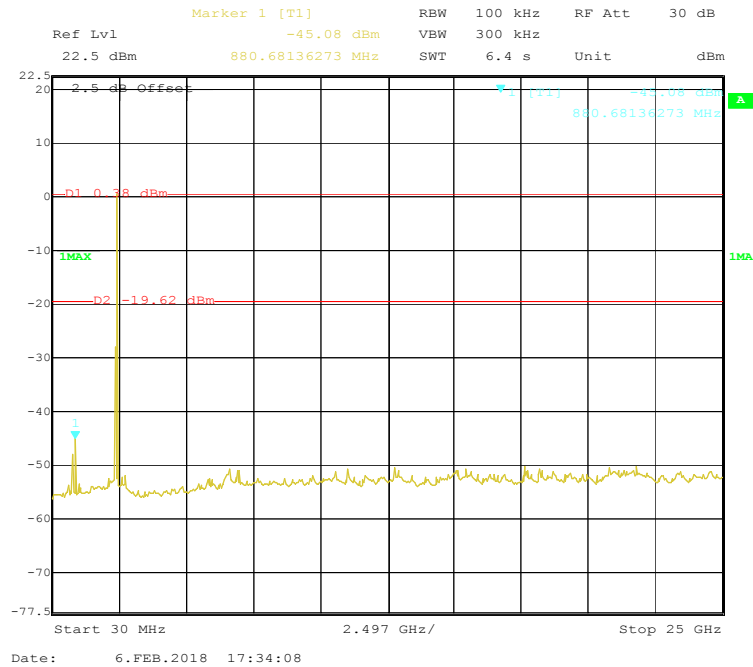


802.11g Mode Middle Channel**802.11g Mode High Channel**

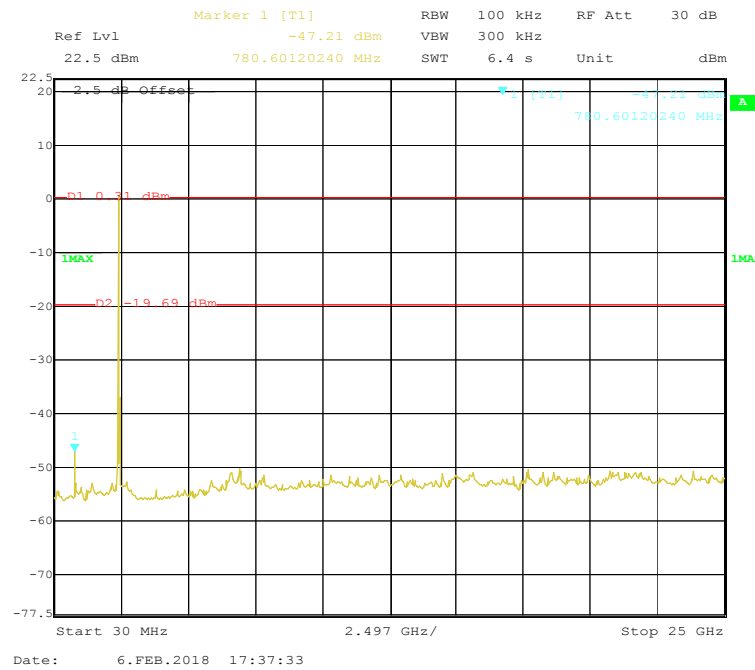
802.11n-HT20 Mode Low Channel



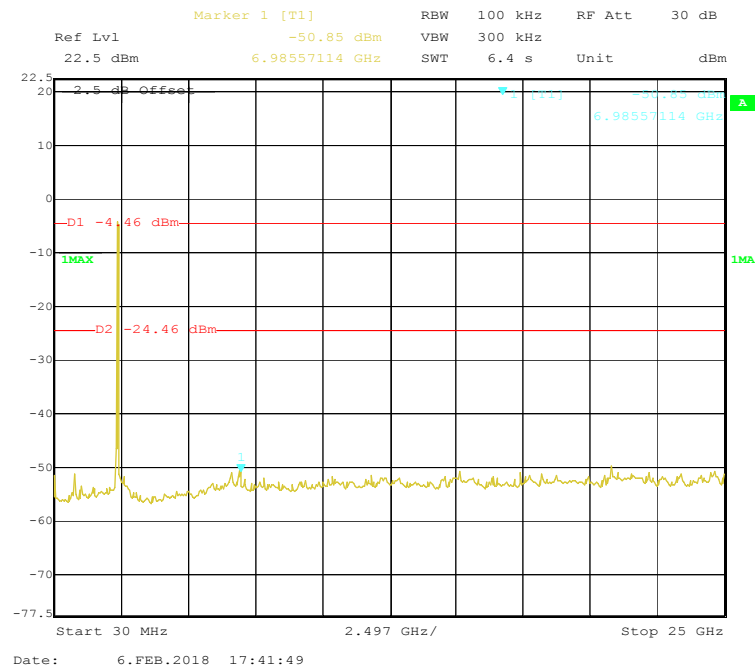
802.11n-HT20 Mode Middle Channel



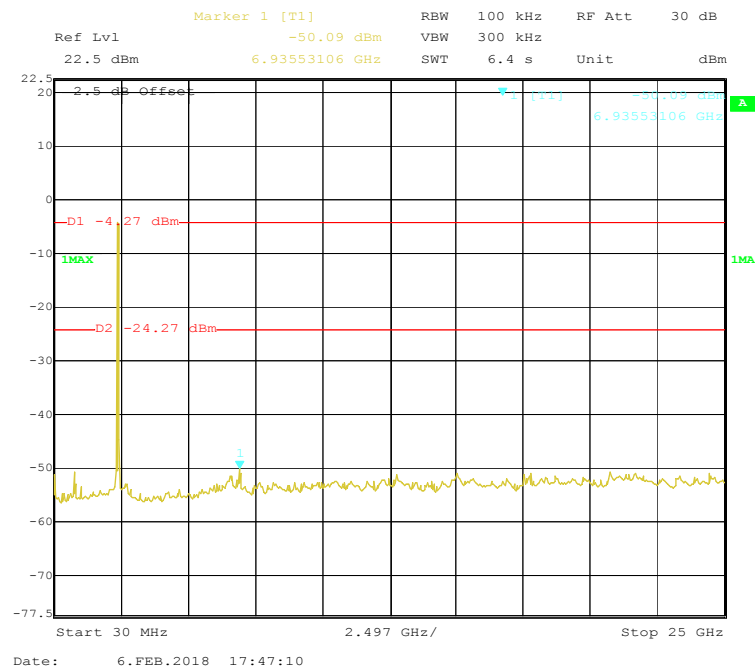
802.11n-HT20 Mode High Channel



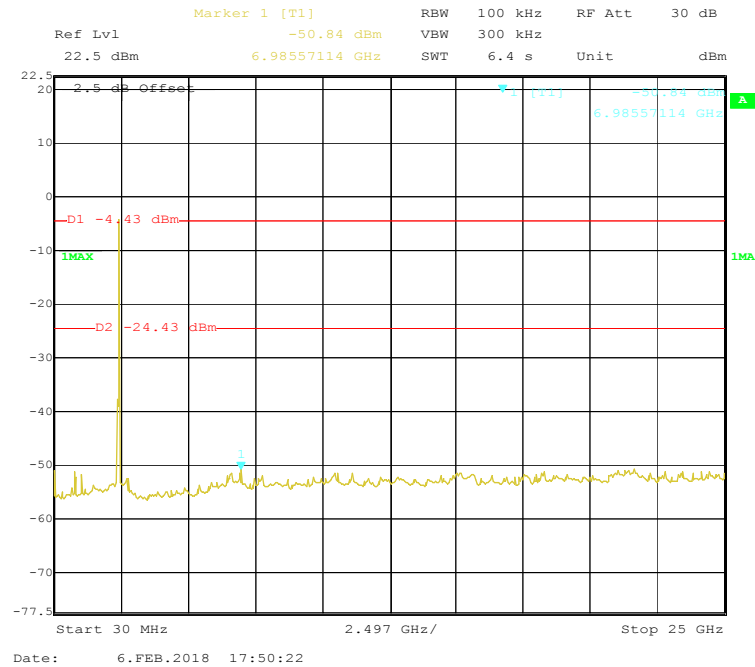
802.11n-HT40 Mode Low Channel



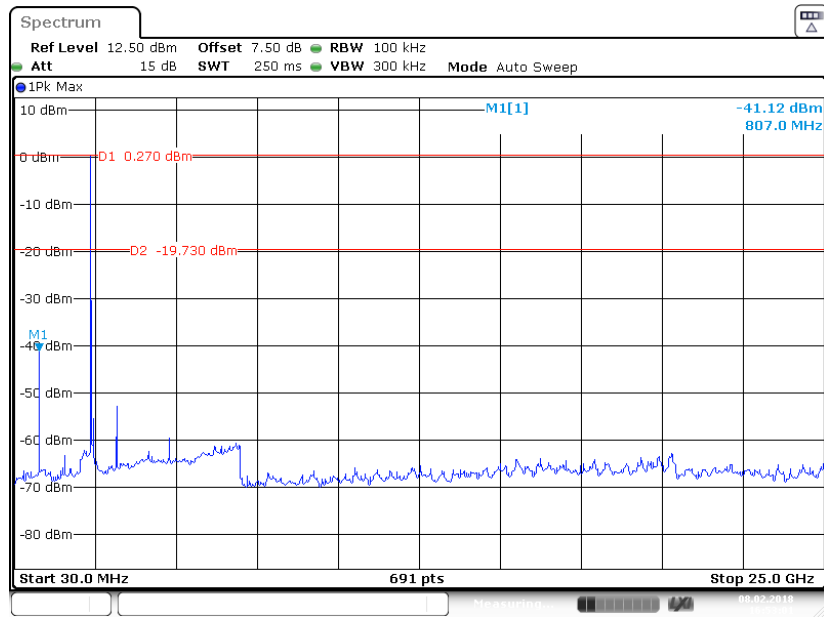
802.11n-HT40 Mode Middle Channel



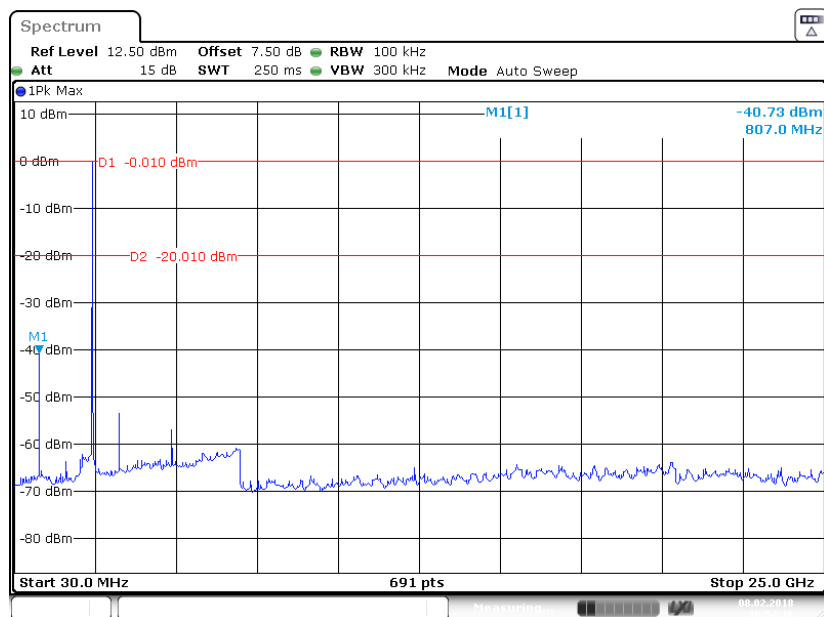
802.11n-HT40 Mode High Channel



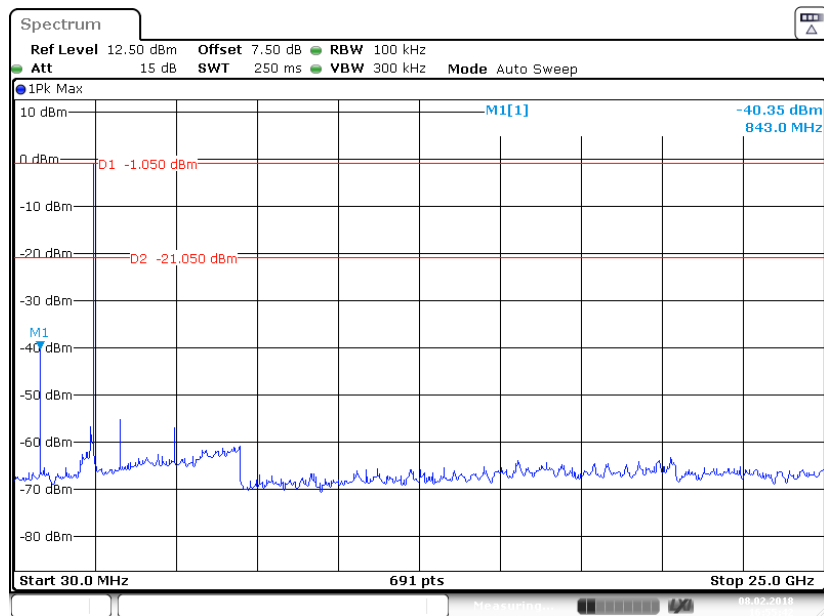
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



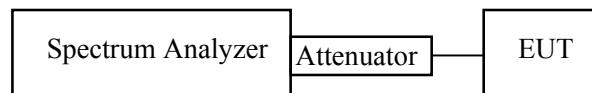
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH**Applicable Standard**

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.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Test Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

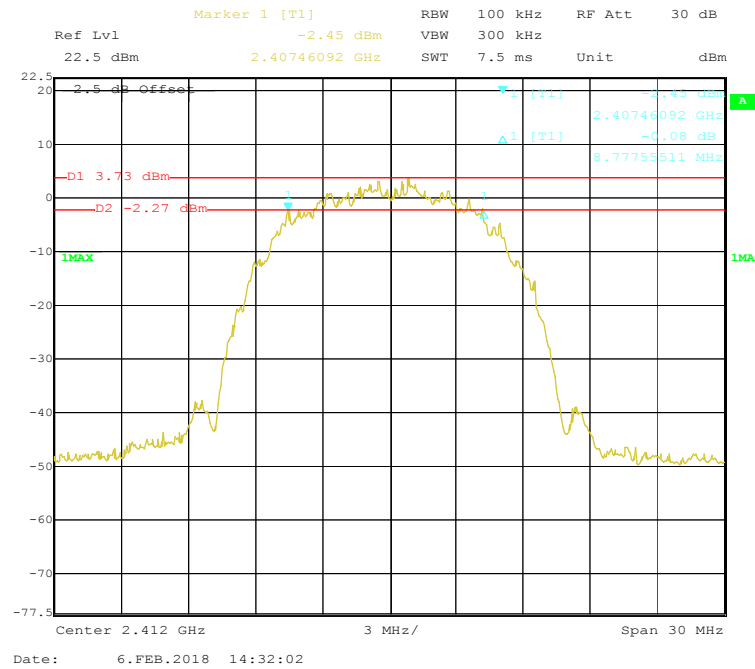
The testing was performed by Max Min on 2018-02-06 & 2018-02-08.

EUT operation mode: Transmitting

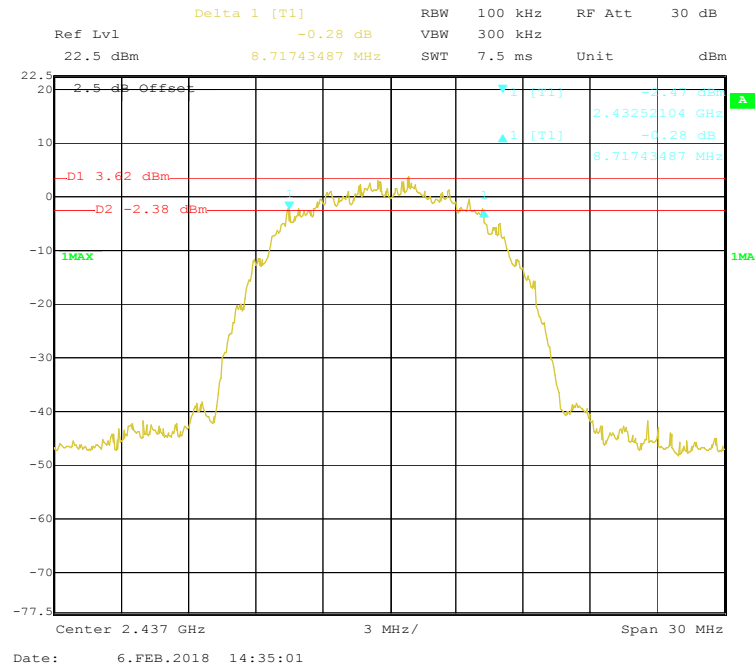
Test Result: Pass

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	8.778	≥ 0.5
Middle	2437	8.717	≥ 0.5
High	2462	8.838	≥ 0.5
802.11g Mode			
Low	2412	16.293	≥ 0.5
Middle	2437	16.353	≥ 0.5
High	2462	16.293	≥ 0.5
802.11n-HT20 Mode			
Low	2412	16.232	≥ 0.5
Middle	2437	16.172	≥ 0.5
High	2462	16.232	≥ 0.5
802.11n-HT40 Mode			
Low	2422	35.591	≥ 0.5
Middle	2437	35.832	≥ 0.5
High	2452	35.711	≥ 0.5
BLE Mode			
Low	2402	0.647	≥ 0.5
Middle	2440	0.647	≥ 0.5
High	2480	0.647	≥ 0.5

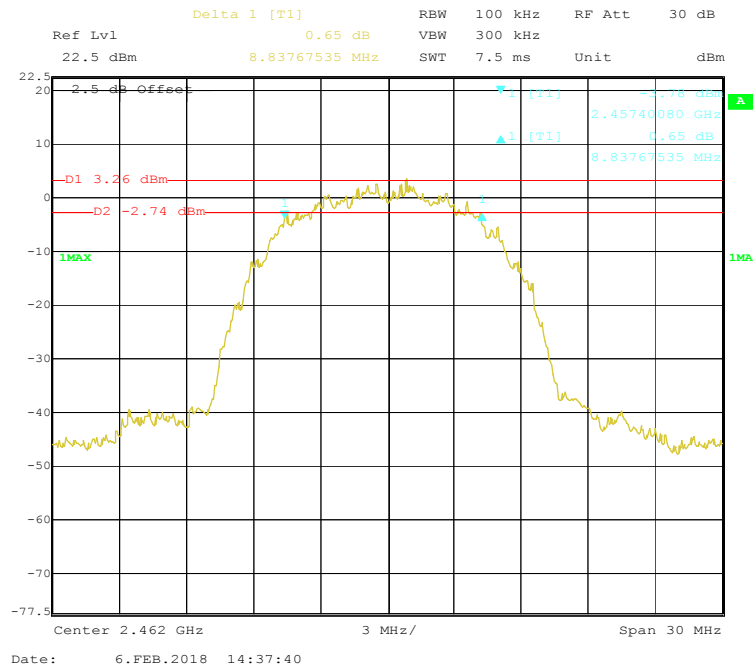
802.11b Mode Low Channel



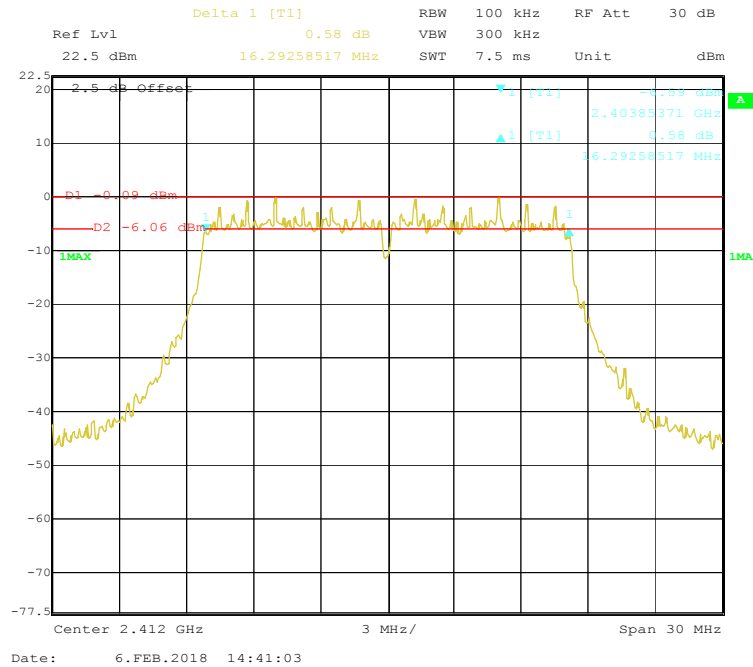
802.11b Mode Middle Channel



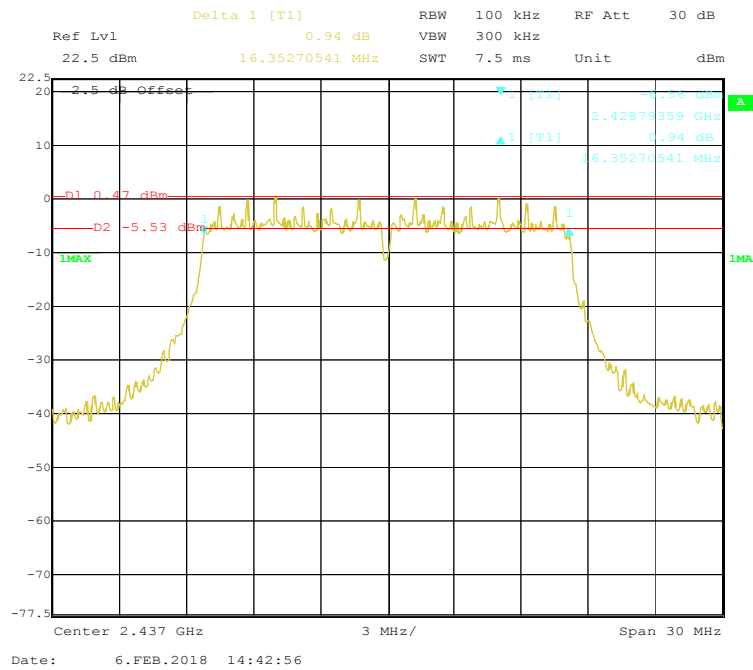
802.11b Mode High Channel



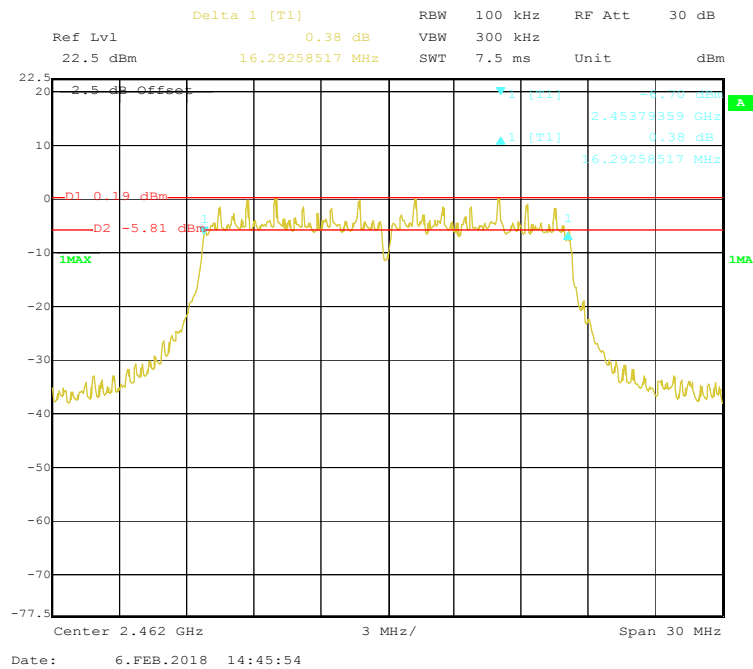
802.11g Mode Low Channel



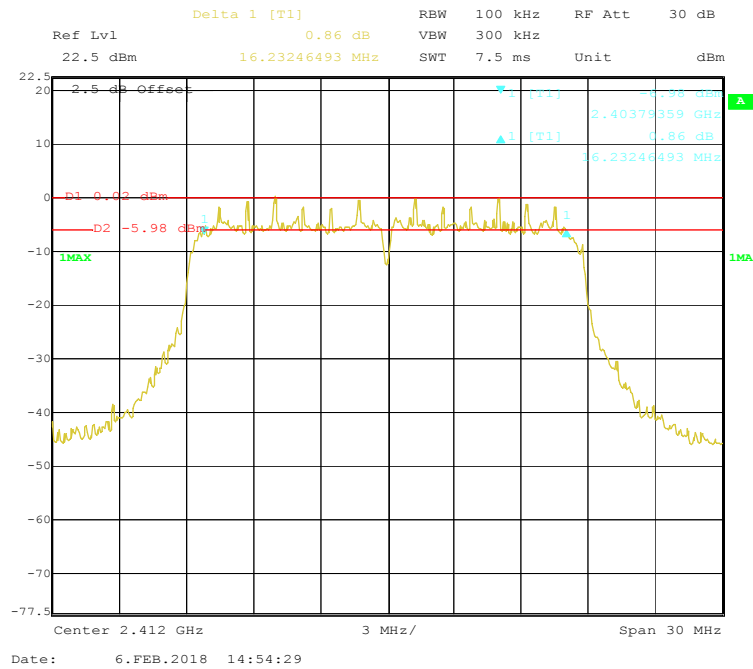
802.11g Mode Middle Channel



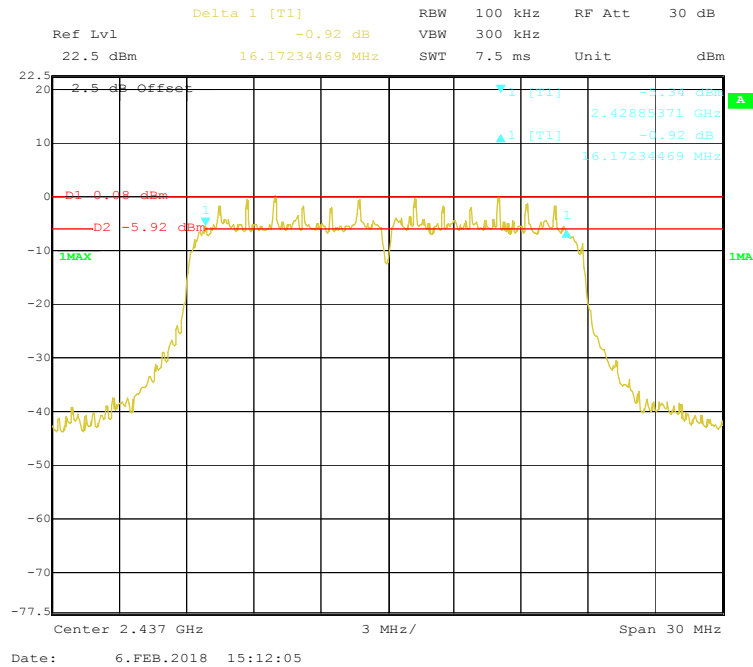
802.11g Mode High Channel



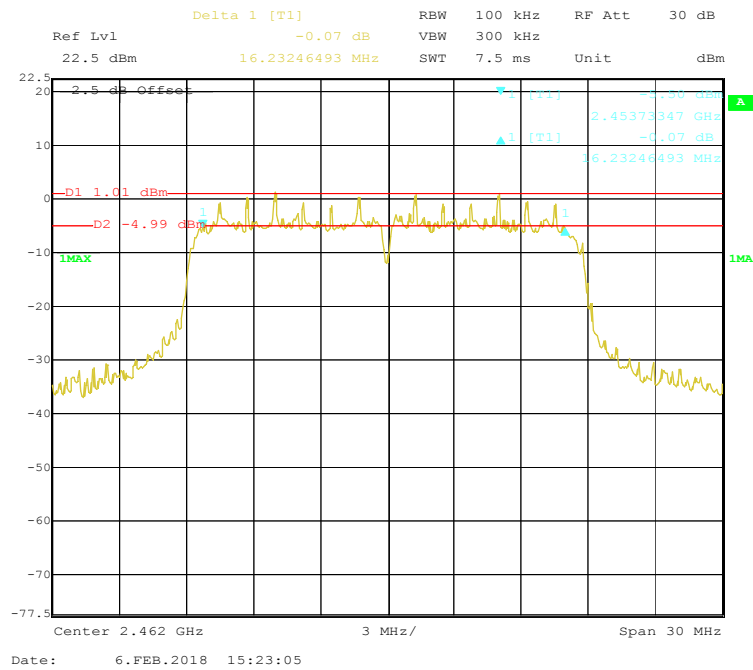
802.11n-HT20 Mode Low Channel



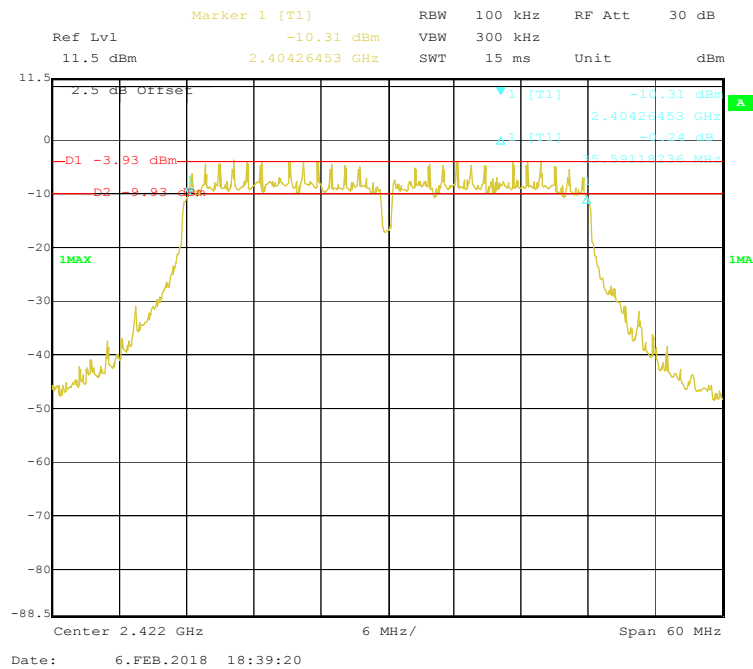
802.11n-HT20 Mode Middle Channel



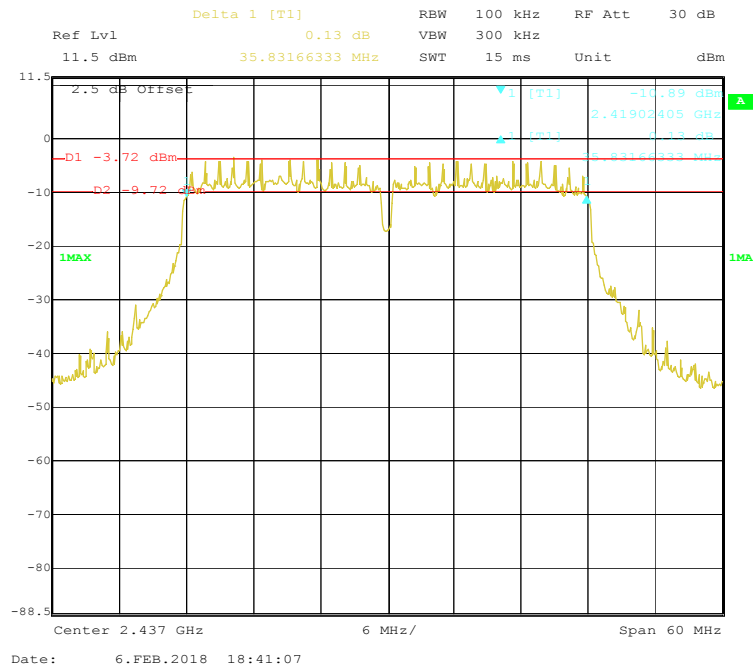
802.11n-HT20 Mode High Channel



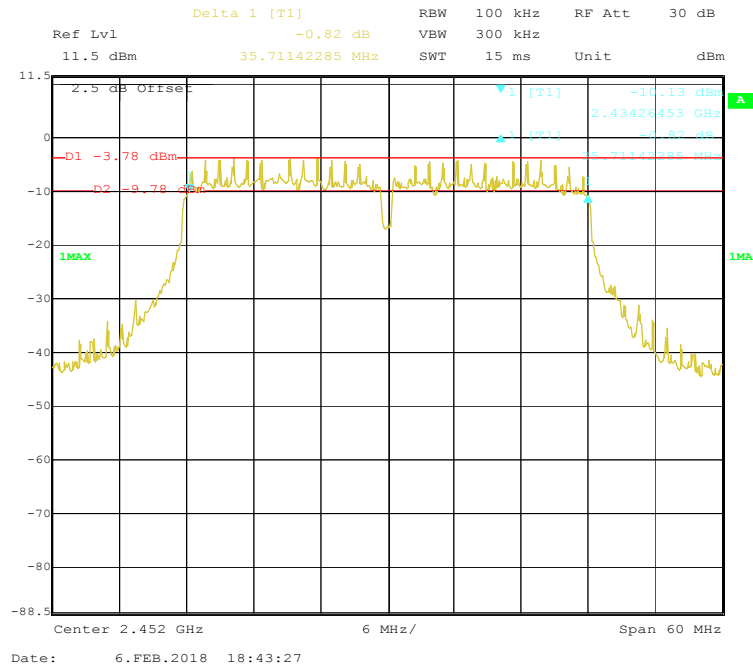
802.11n-HT40 Mode Low Channel



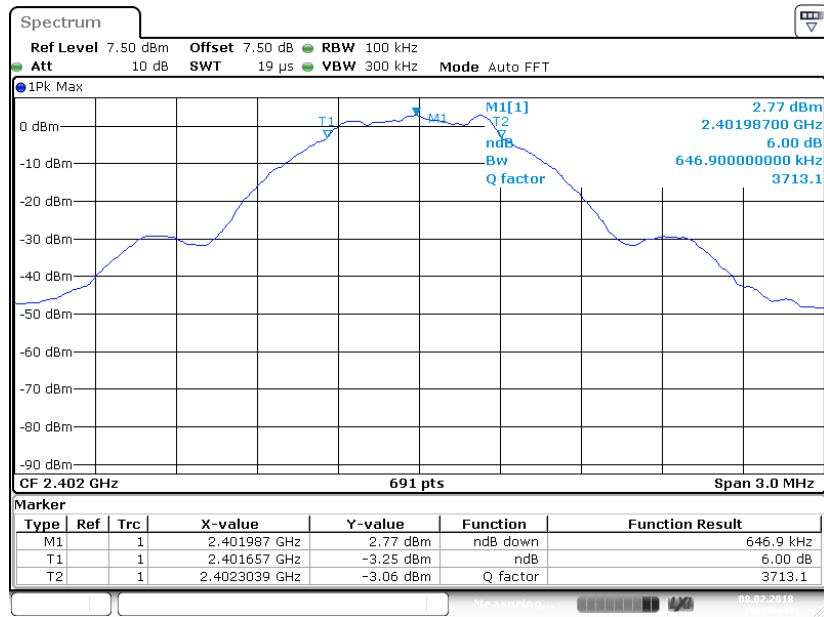
802.11n-HT40 Mode Middle Channel



802.11n-HT40 Mode High Channel

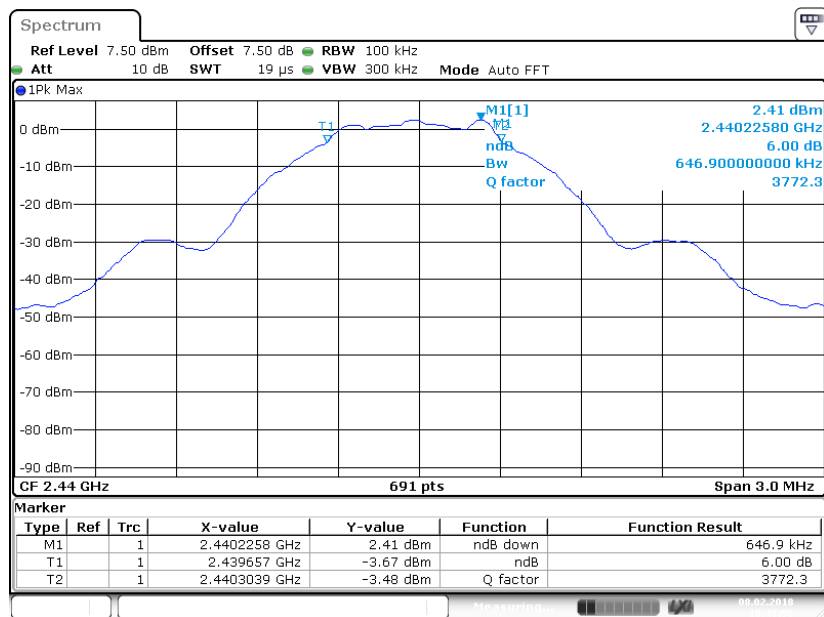


BLE Mode Low Channel



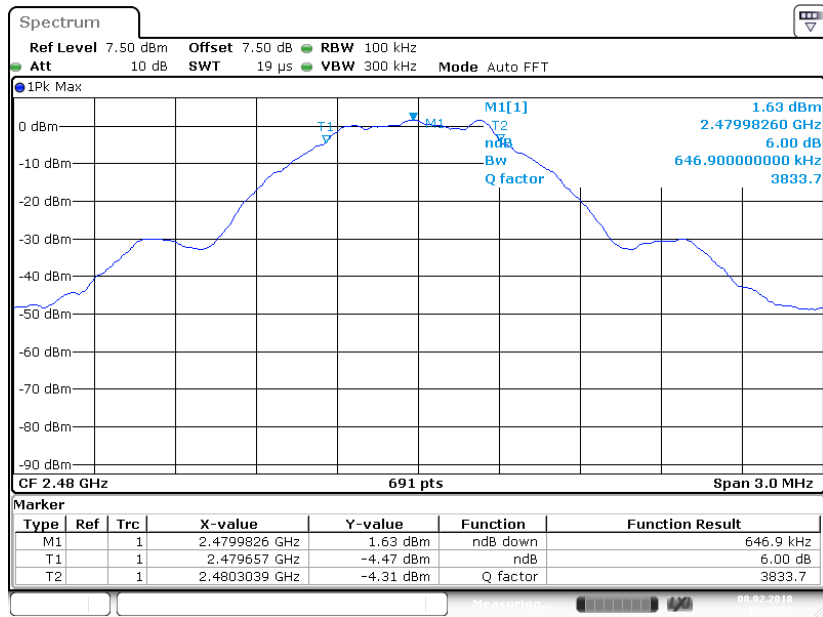
Date: 8.FEB.2018 10:46:45

BLE Mode Middle Channel



Date: 8.FEB.2018 10:45:56

BLE Mode High Channel



Date: 8.FEB.2018 10:47:29

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §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. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

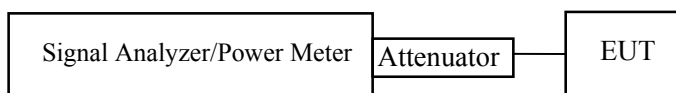
Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 9.1.1

1. Set the RBW $\geq$ DTS bandwidth.
2. Set VBW $\geq 3 \times$ RBW.
3. Set span $\geq 3 \times$ RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 9.1.3

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



Test Data

Environmental Conditions

Temperature:	23.8°C
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by Max Min on 2018-02-08.

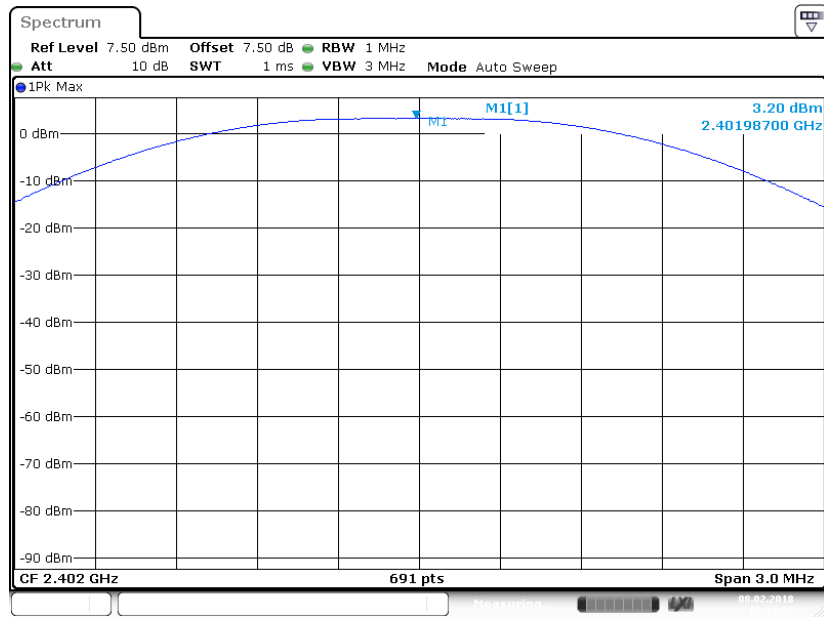
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power	Limit (dBm)	Result
802.11b Mode					
Low	2412	17.35	14.06	30	Pass
Middle	2437	17.78	14.45	30	Pass
High	2462	17.88	14.86	30	Pass
802.11g Mode					
Low	2412	17.71	11.71	30	Pass
Middle	2437	17.77	11.62	30	Pass
High	2462	17.88	11.30	30	Pass
802.11n-HT20 Mode					
Low	2412	17.71	10.70	30	Pass
Middle	2437	17.66	10.21	30	Pass
High	2462	17.82	9.90	30	Pass
802.11n-HT40 Mode					
Low	2422	17.50	10.55	30	Pass
Middle	2437	17.41	9.87	30	Pass
High	2452	17.48	10.43	30	Pass

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Result
BLE Mode				
Low	2402	3.20	30	Pass
Middle	2440	2.88	30	Pass
High	2480	1.95	30	Pass

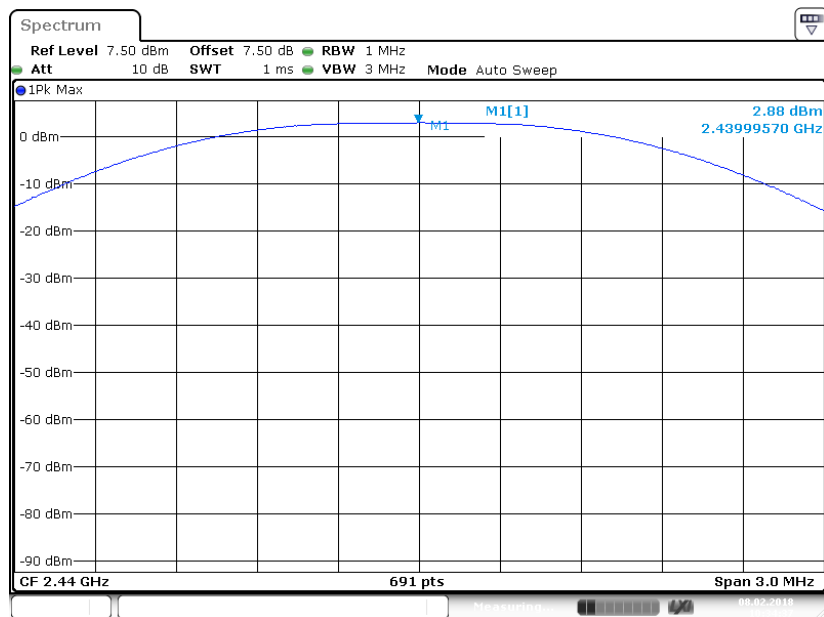
Note: *Signal Analyzer* was used for BLE test; *Power Meter* was used for Wi-Fi test.

BLE Mode Low Channel



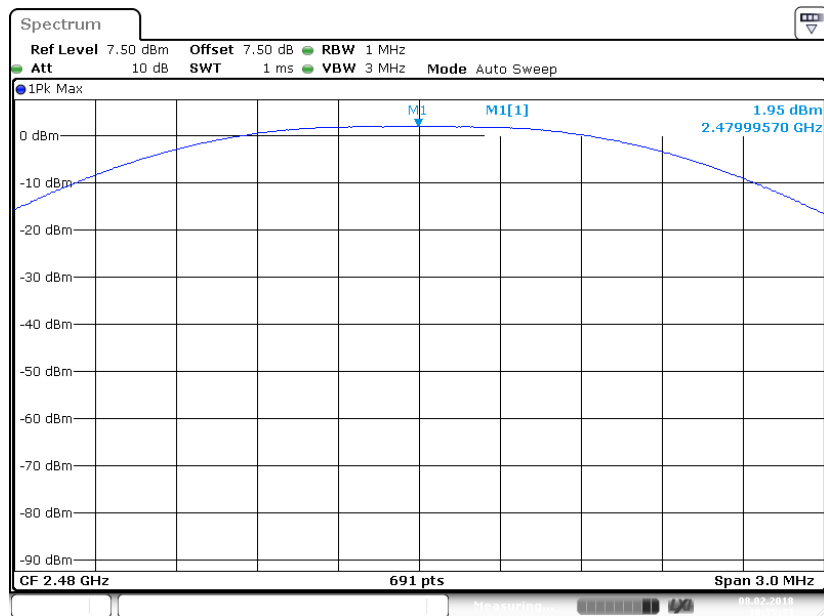
Date: 8.FEB.2018 10:34:00

BLE Mode Middle Channel



Date: 8.FEB.2018 10:34:38

BLE Mode High Channel



Date: 8.FEB.2018 10:35:33

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**Applicable Standard**

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

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 13.2 and ANSI C63.10-2013 clause 6.10.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data**Environmental Conditions**

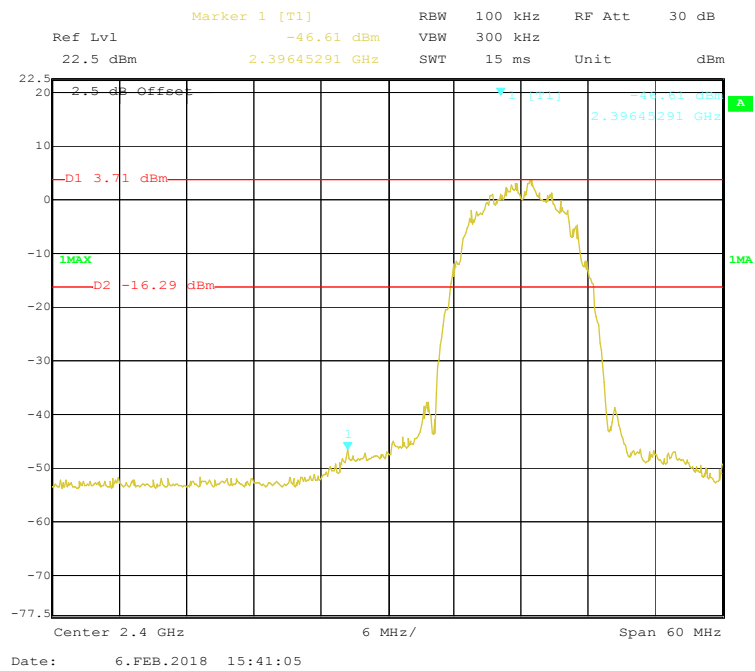
Temperature:	24.3 °C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Max Min on 2018-02-06 & 2018-02-08.

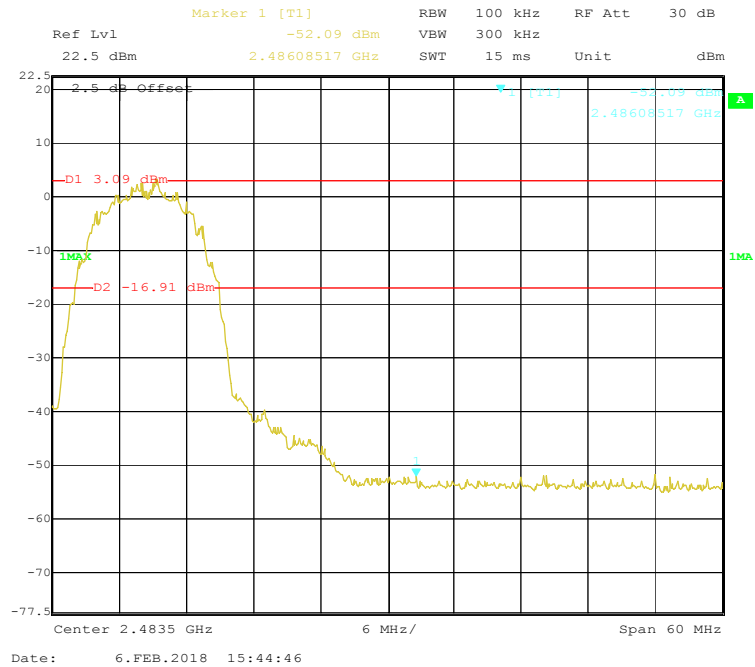
EUT operation mode: Transmitting

Test Result: Compliance

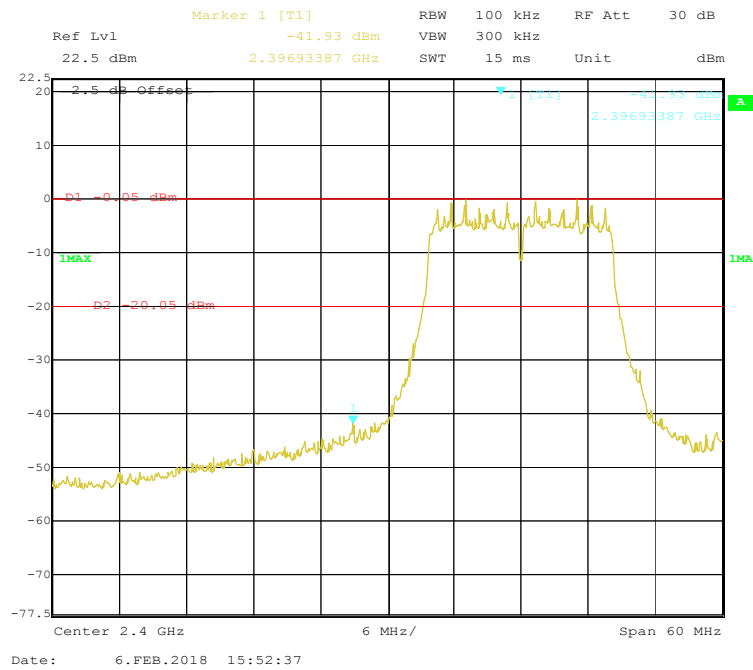
802.11b Mode Left Side



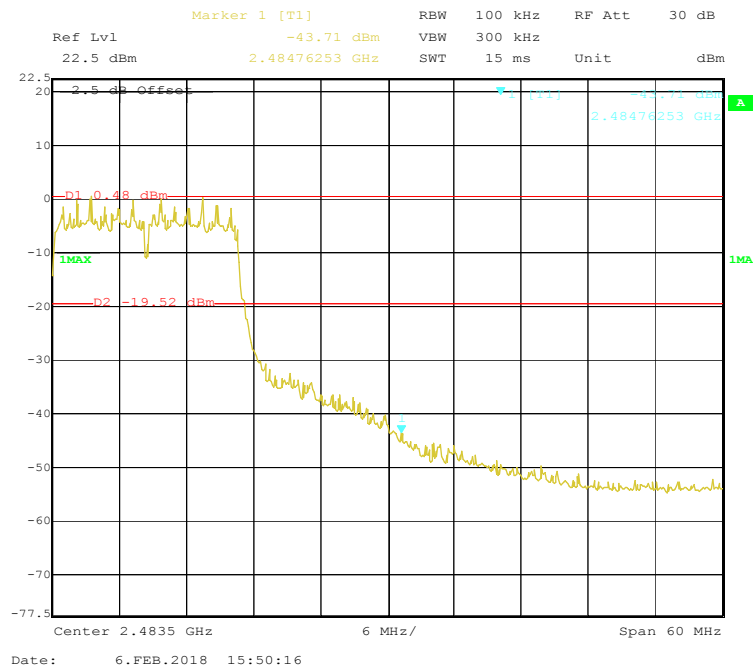
802.11b Mode Right Side



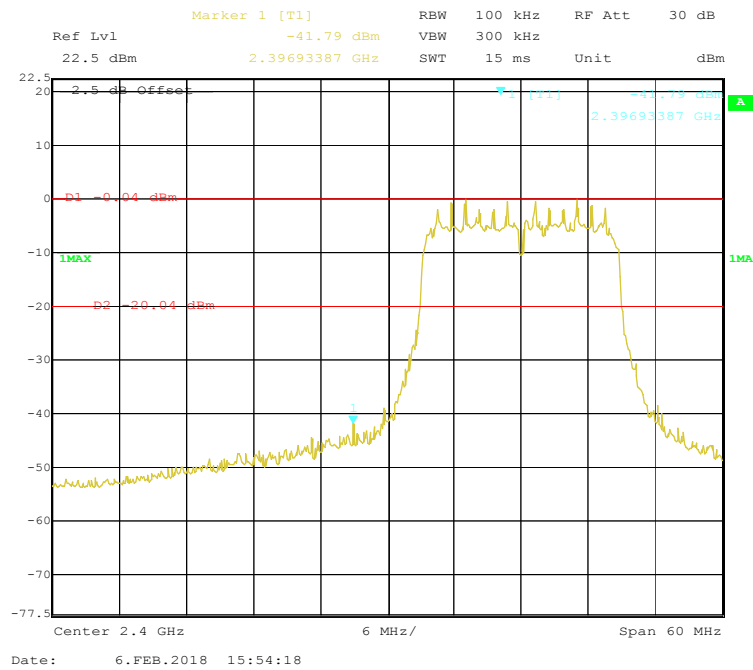
802.11g Mode Left Side



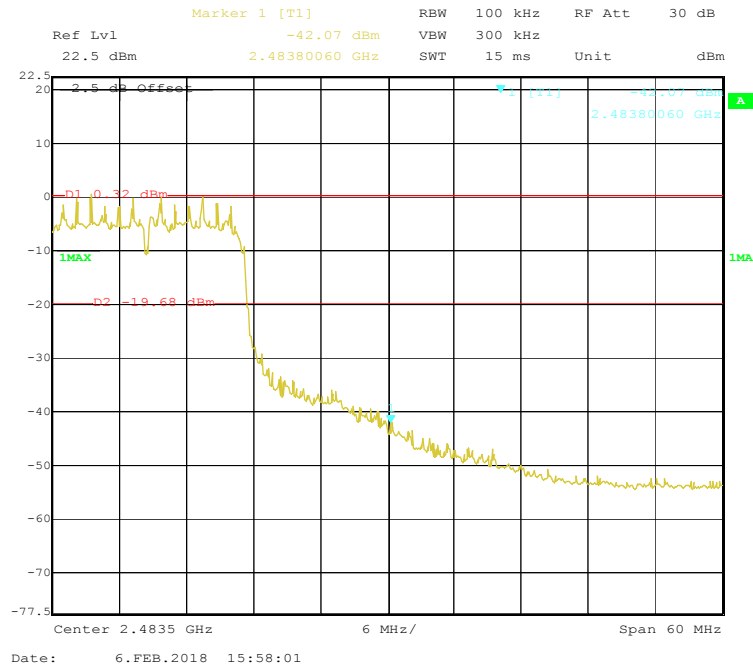
802.11g Mode Right Side



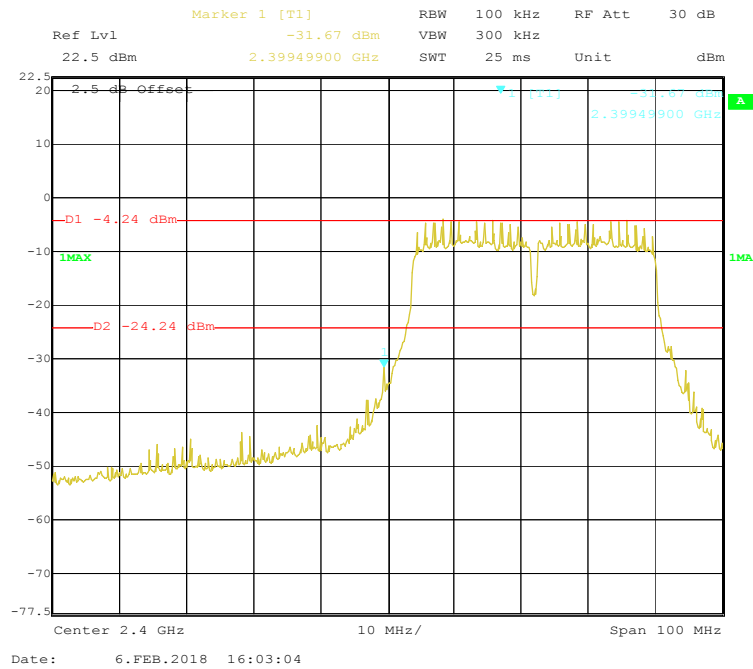
802.11n-HT20 Mode Left Side



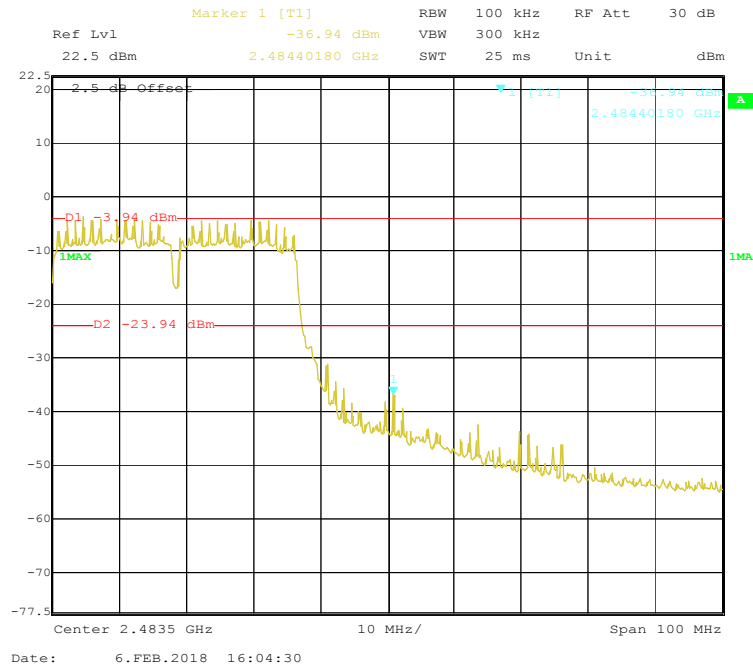
802.11n-HT20 Mode Right Side



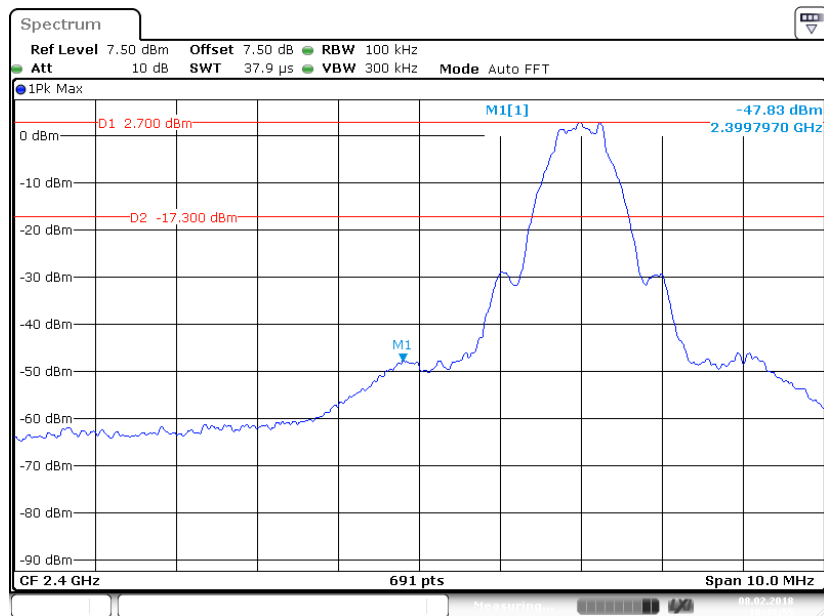
802.11n-HT40 Mode Left Side



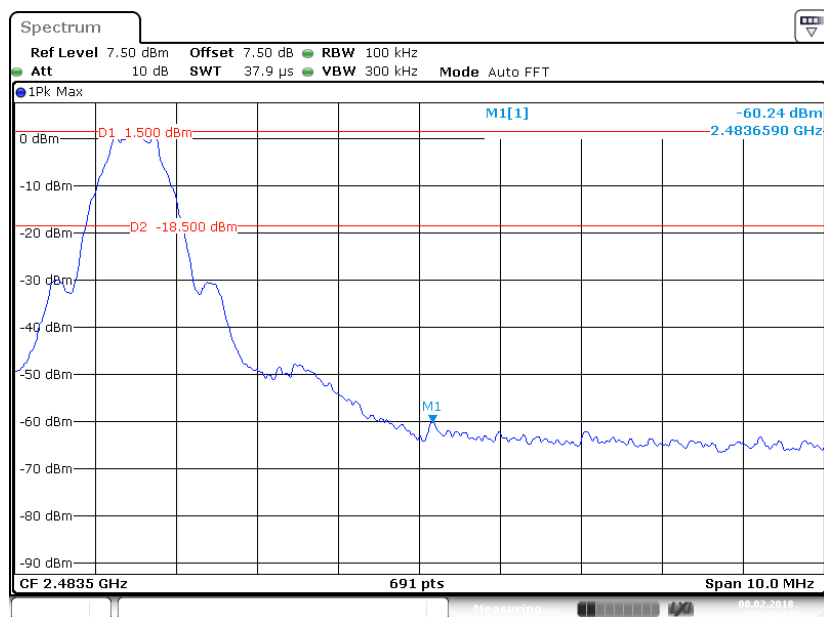
802.11n-HT40 Mode Right Side



BLE Mode Left Side



BLE Mode Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
3. Set the VBW $\geq 3 \times \text{RBW}$.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	24.1 °C
Relative Humidity:	50%
ATM Pressure:	101.3 kPa

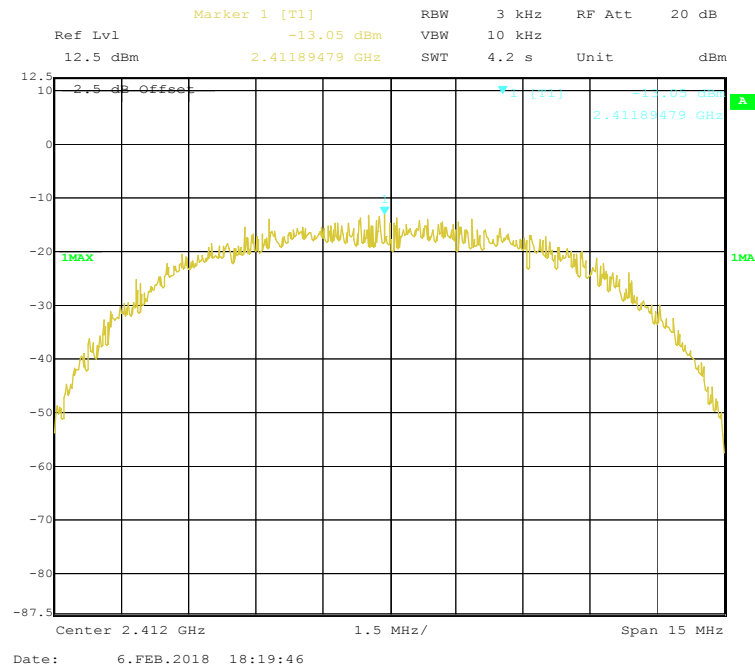
The testing was performed by Max Min on 2018-02-26 & 2018-02-28.

EUT operation mode: Transmitting

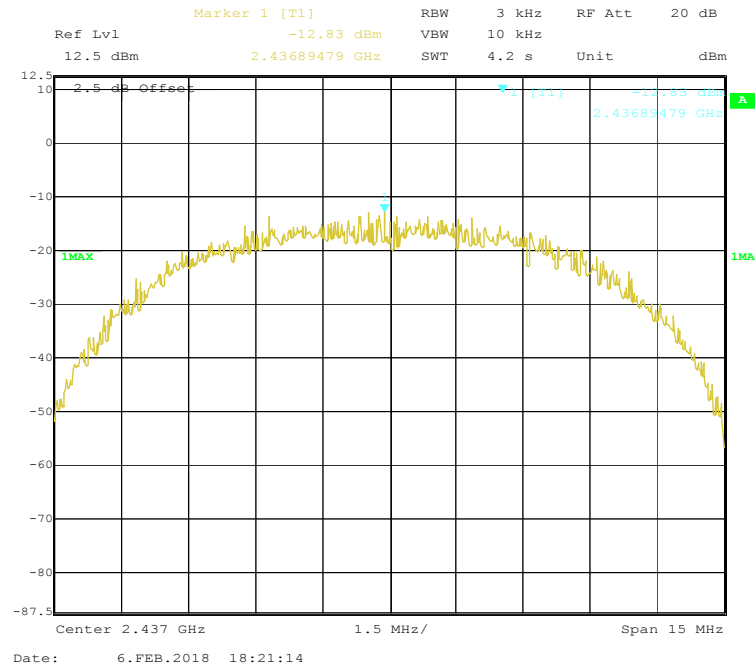
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-13.05	≤ 8
Middle	2437	-12.83	≤ 8
High	2462	-12.81	≤ 8
802.11g Mode			
Low	2412	-16.51	≤ 8
Middle	2437	-16.31	≤ 8
High	2462	-15.64	≤ 8
802.11n-HT20 mode			
Low	2412	-16.50	≤ 8
Middle	2437	-16.45	≤ 8
High	2462	-16.18	≤ 8
802.11n-HT40 Mode			
Low	2422	-19.00	≤ 8
Middle	2437	-19.52	≤ 8
High	2452	-18.85	≤ 8
BLE Mode			
Low	2402	-13.11	≤ 8
Middle	2440	-13.46	≤ 8
High	2480	-14.39	≤ 8

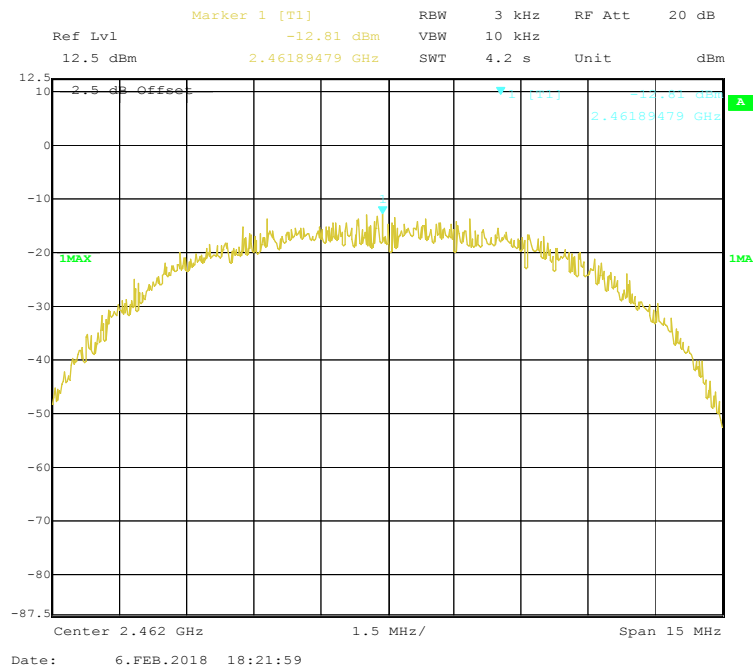
802.11b Mode Low Channel



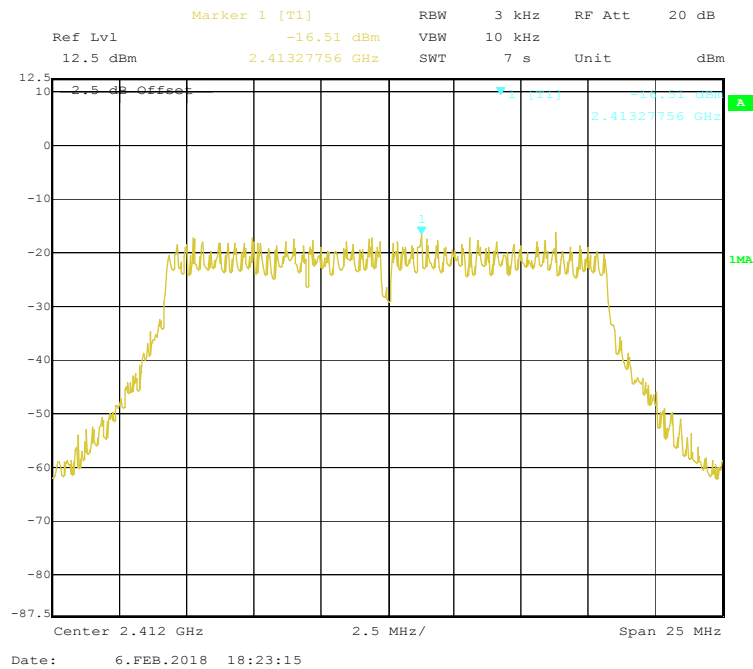
802.11b Mode Middle Channel



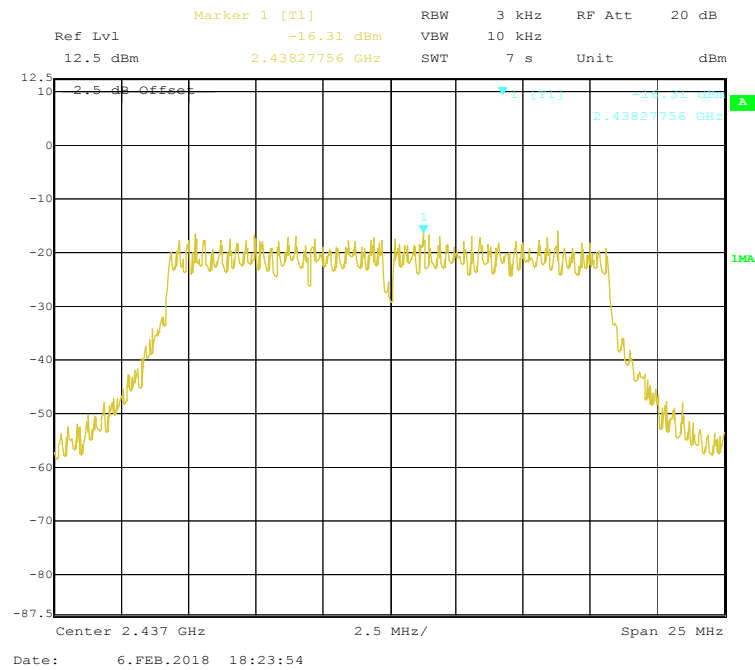
802.11b Mode High Channel



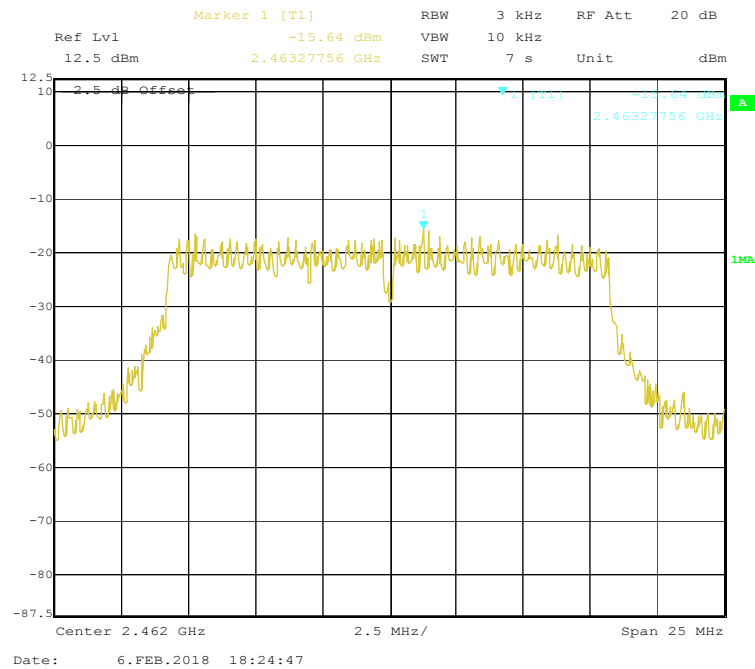
802.11g Mode Low Channel



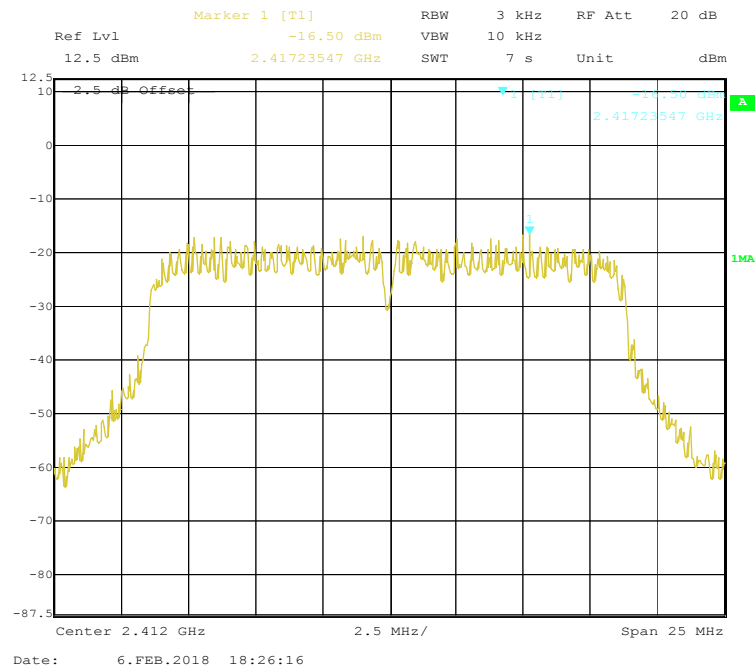
802.11g Mode Middle Channel



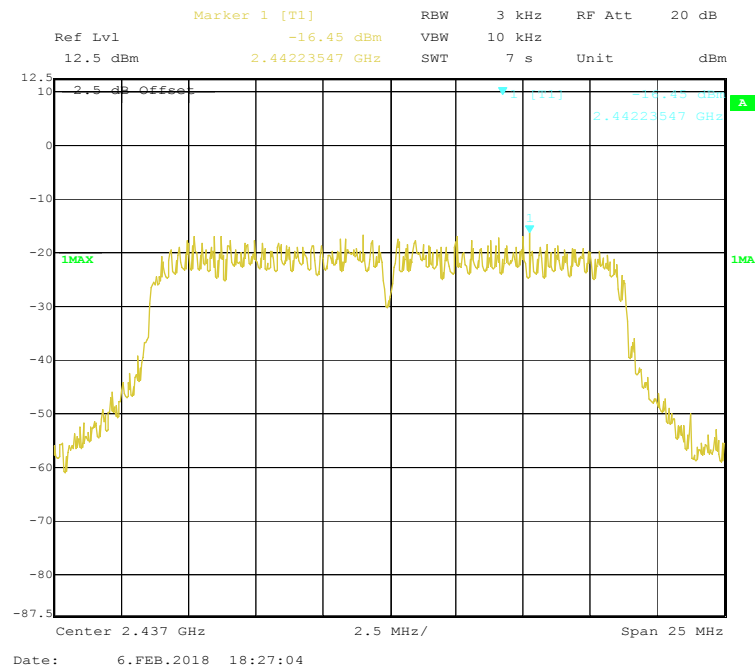
802.11g Mode High Channel



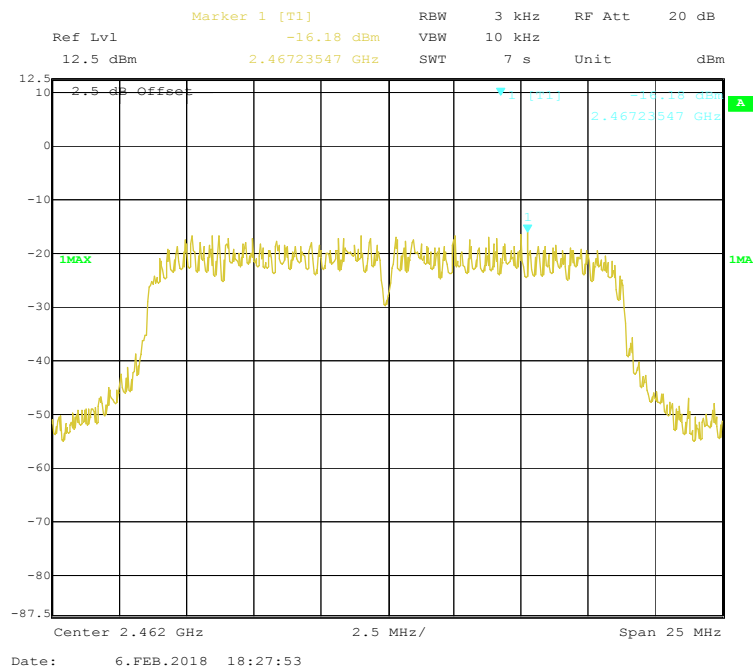
802.11n-HT20 Mode Low Channel



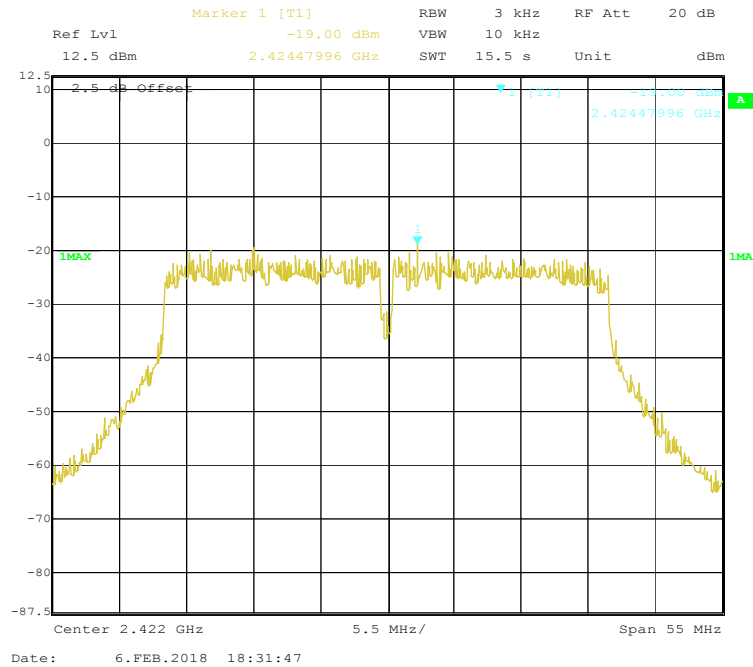
802.11n-HT20 Mode Middle Channel



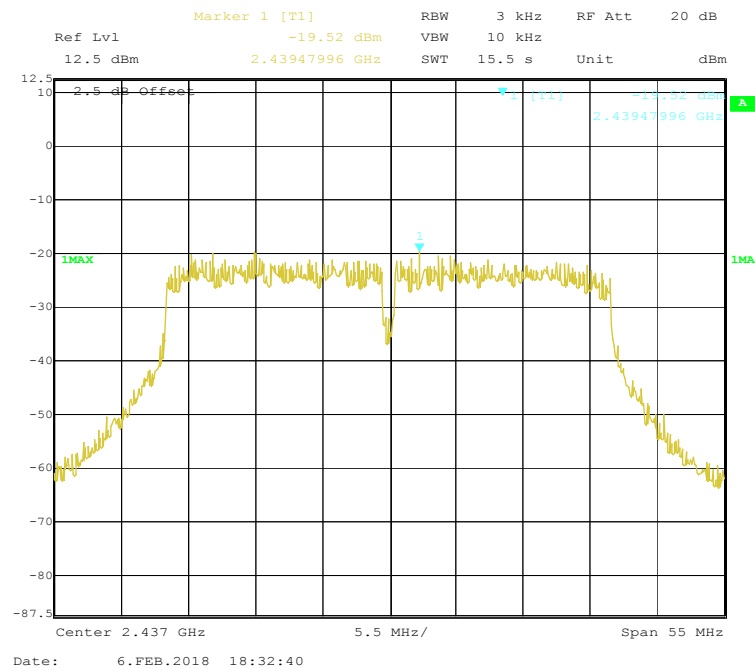
802.11n-HT20 Mode High Channel



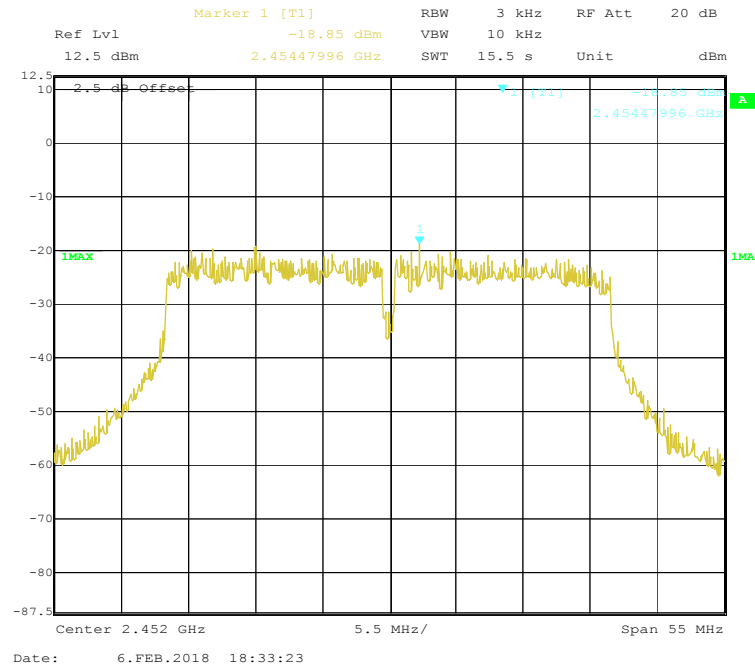
802.11n-HT40 Mode Low Channel



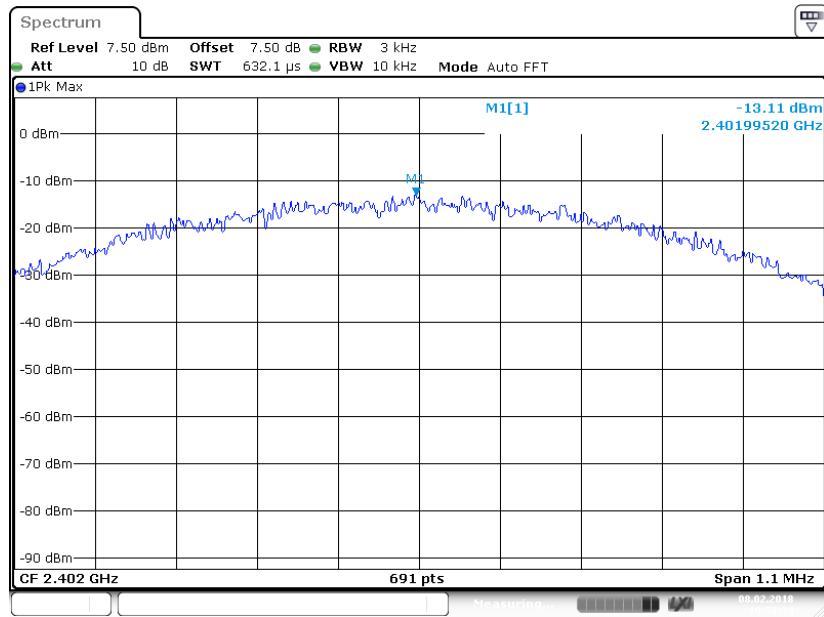
802.11n-HT40 Mode Middle Channel



802.11n-HT40 Mode High Channel

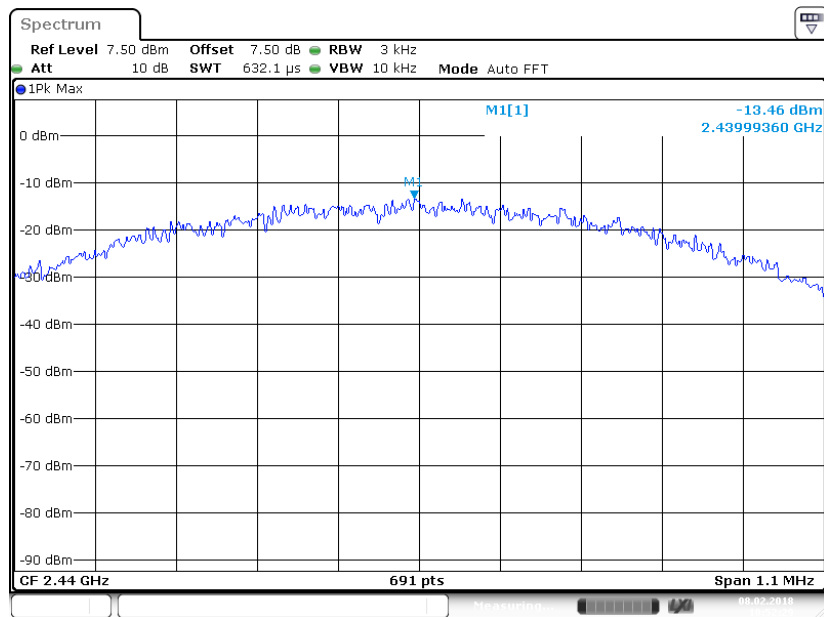


BLE Mode Low Channel



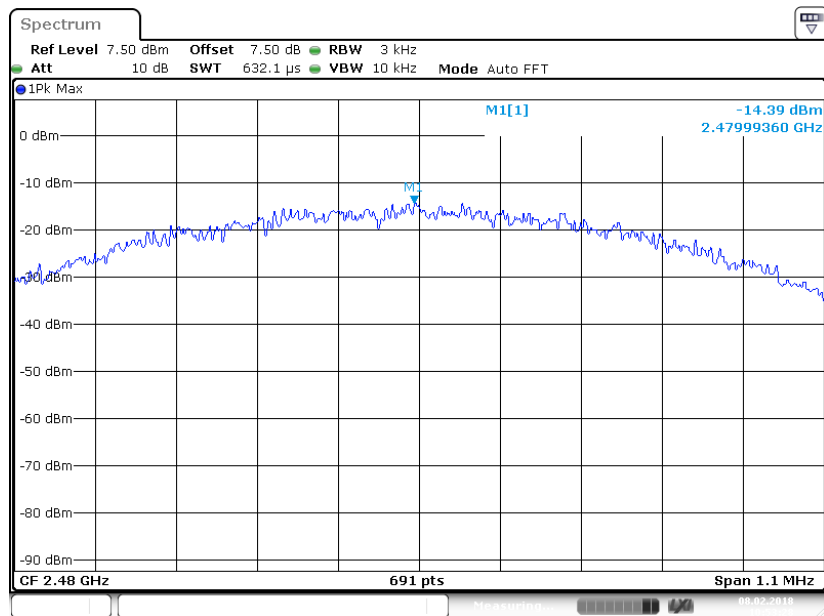
Date: 8.FEB.2018 10:51:35

BLE Mode Middle Channel



Date: 8.FEB.2018 10:52:29

BLE Mode High Channel



Date: 8.FEB.2018 10:53:29

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