

FCC PART 15.247



TEST REPORT

For

MOBIWIRE MOBILES (NINGBO) CO., LTD

No.999, Dacheng East Road, Fenghua, Zhejiang, China

FCC ID: 2ADA4OWNF1313

Report Type: Original Report	Product Type: 3G Smart feature Phone
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Report Number: RSHA180111001-00B	
Report Date: 2018-01-22	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	MOBIWIRE MOBILES (NINGBO) CO., LTD
Tested Model	OWN F1313
Product Type	3G Smart feature Phone
Dimension	119.5 mm (L)* 48 mm (W)*11.5 mm(H)
Power Supply	DC 3.7V by battery

**All measurement and test data in this report was gathered from production sample serial number: 20180111001.
(Assigned by the BACL. The EUT supplied by the applicant was received on 2018-01-11)*

Objective

This report is prepared on behalf of MOBIWIRE MOBILES (NINGBO) CO., LTD 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 and Part 22H24E27 PCE submissions with FCC ID: 2ADA4OWNF1313.

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

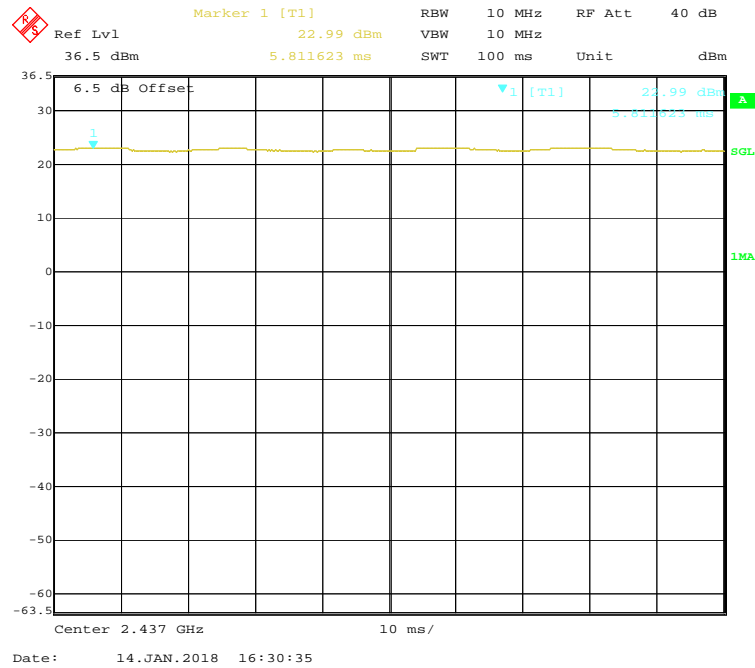
The EUT entered the engineering mode through engineering code.

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

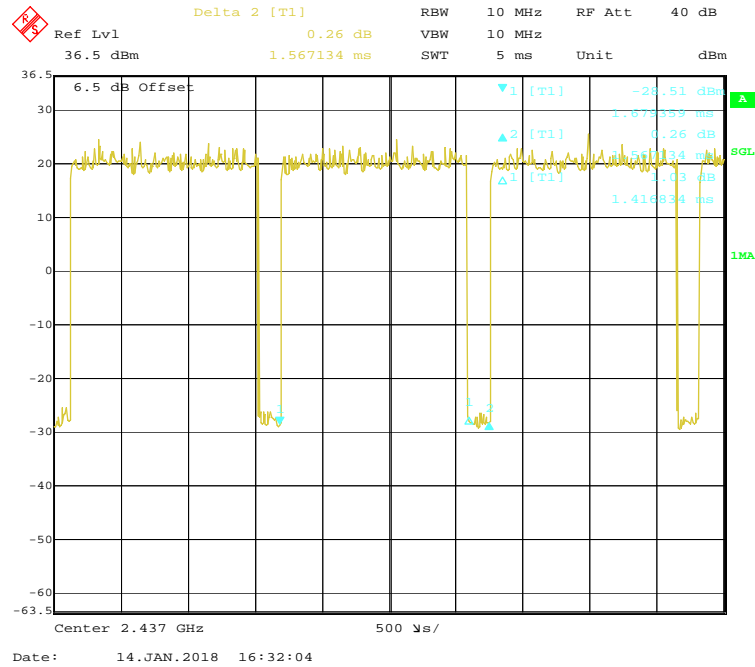
Mode	Data Rate	Power Level
802.11b	1 Mbps	19
802.11g	6 Mbps	15
802.11n-HT20	MCS0	15
802.11n-HT40	MCS0	14
BLE	1Mbps	0

Duty Cycle:

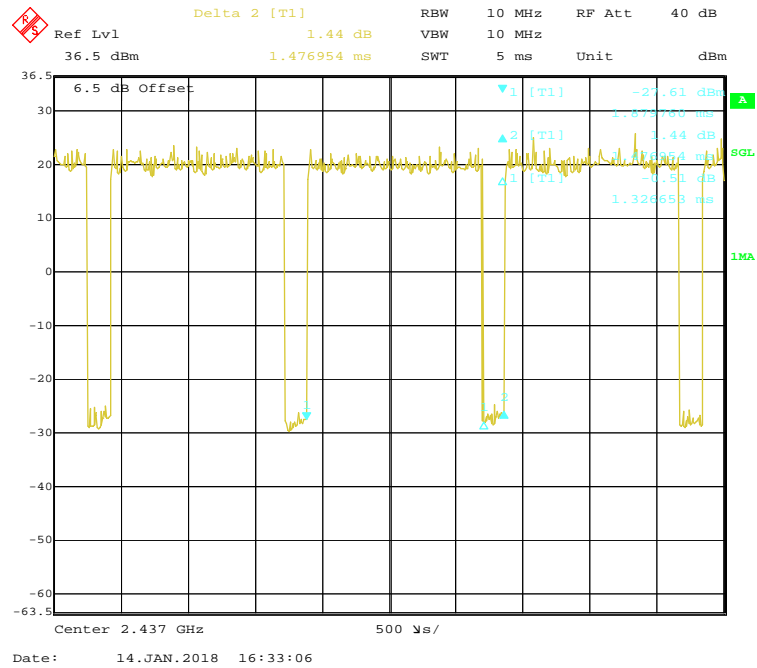
802.11b Mode Middle Channel



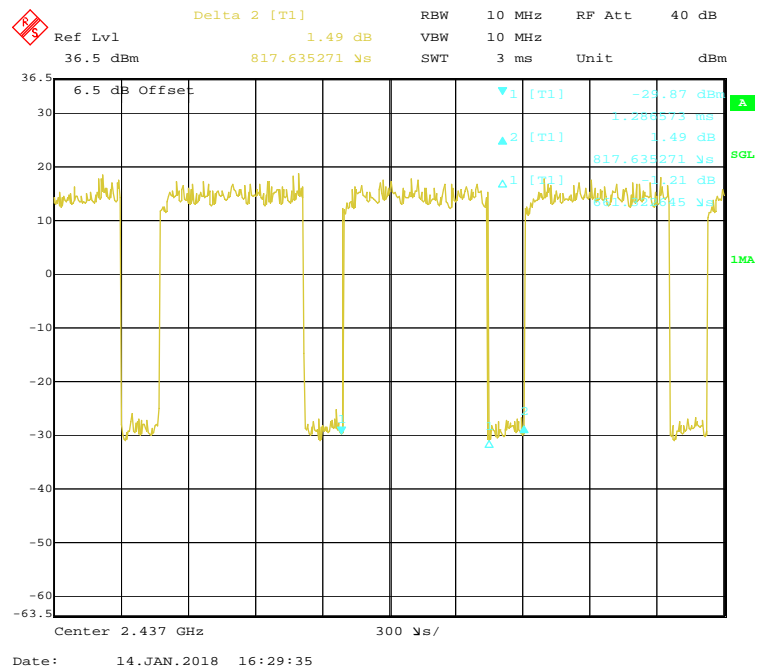
802.11g Mode Middle Channel



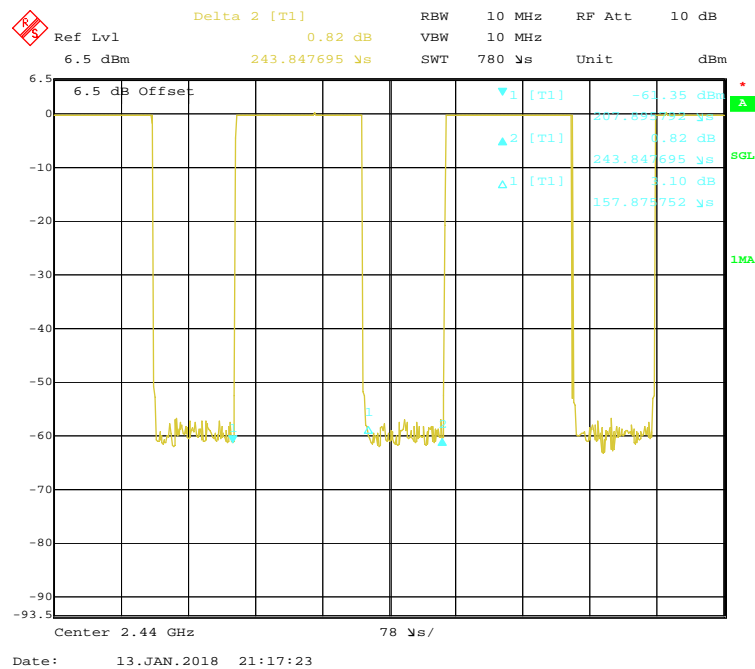
802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



BLE Mode Middle Channel



Mode	Duty Cycle(%)	T(us)	1/T(kHz)	10log(1/x)
802.11b	100	/	/	0
802.11g	90.43	1417	1	0.44
802.11n-HT20	89.84	1327	1	0.47
802.11n-HT40	80.81	661	3	0.93
BLE	64.75	158	10	1.89

Note: “x” means the Duty Cycle.

Support Equipment List and Details

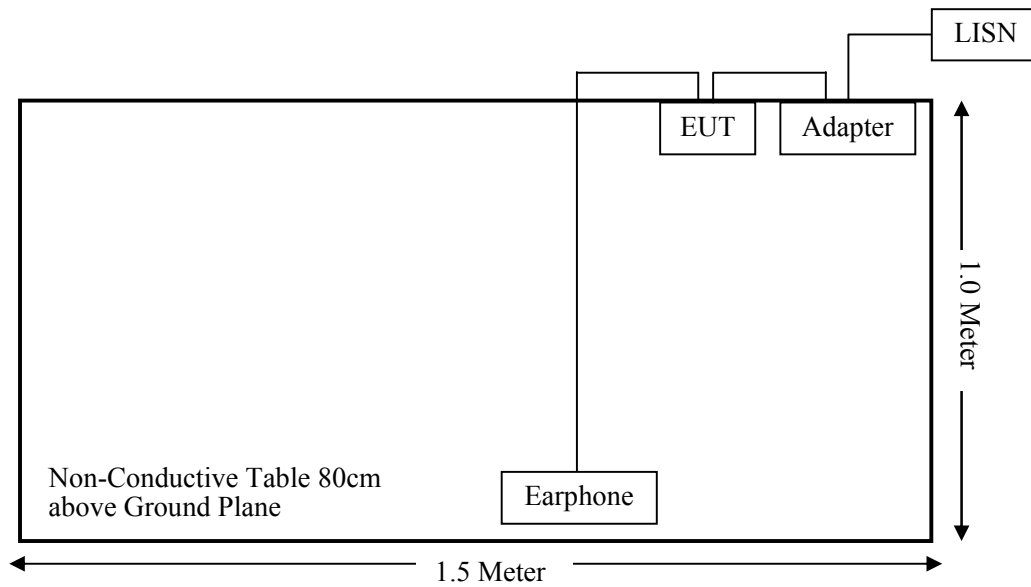
Manufacturer	Description	Model	Serial Number
MOBIWIRE	Earphone	/	/
TENPAO	Adapter Input: AC100-240V,50/60Hz,150mA Output: DC5V, 1000mA	S005UA0500100	178111868

External I/O Cable

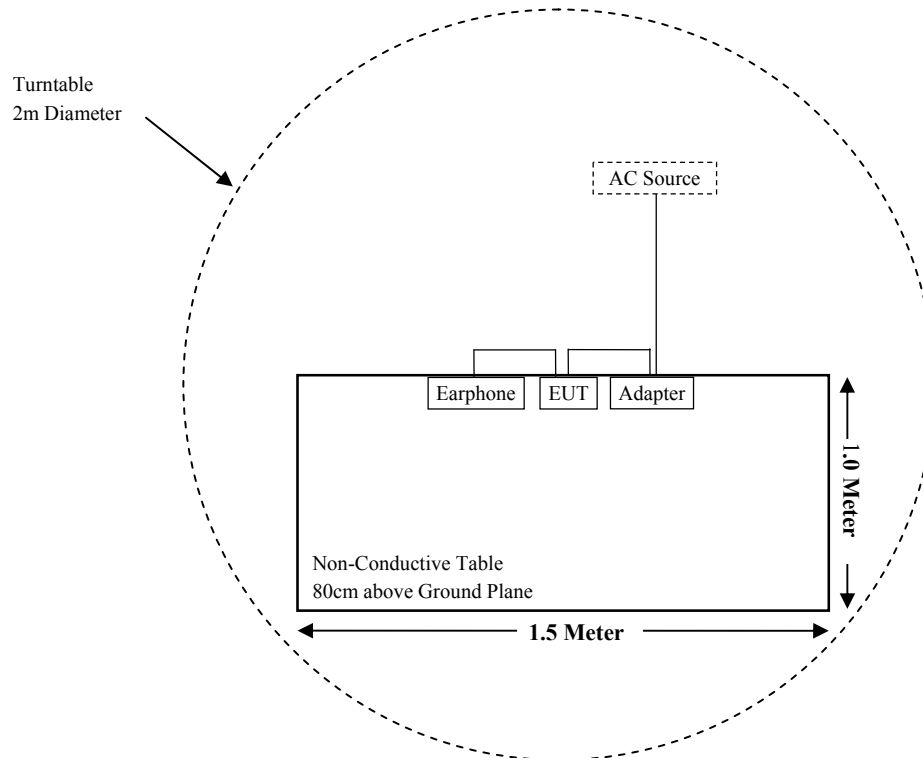
Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

Block Diagram of Test Setup

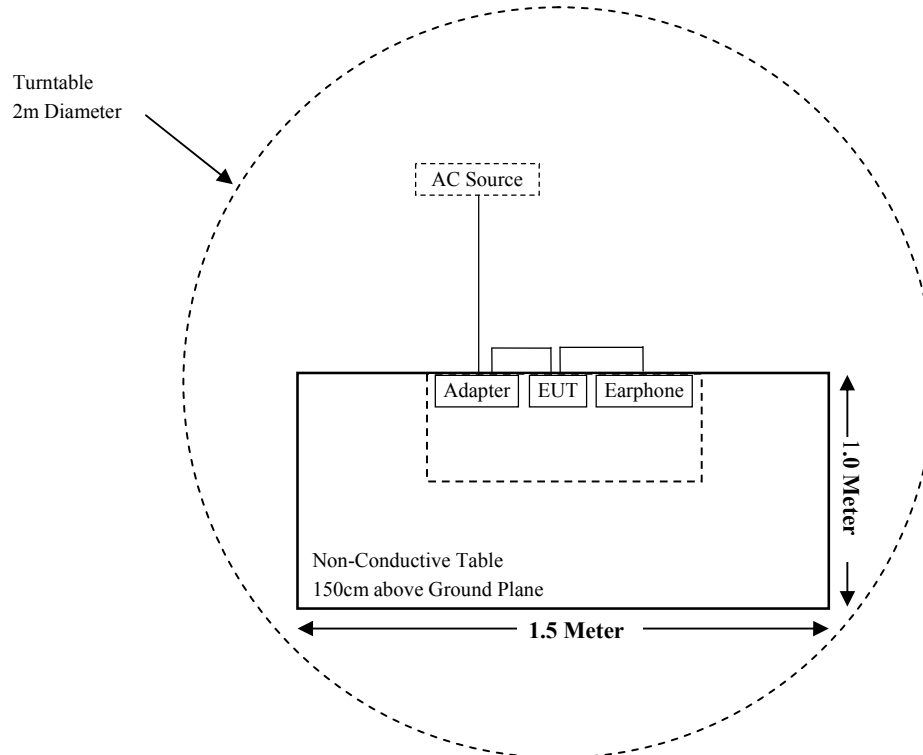
For Conducted Emissions:



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	FSIQ26	836131/009	2017-09-21	2018-09-20
Narda	Attenuator/6dB	10690812-2	26850-6	2018-01-10	2019-01-09
Agilent	Power Meter	N1912A	MY5000492	2017-11-18	2018-11-17
Agilent	Power Sensor	N1921A	MY54210024	2017-11-18	2018-11-17
MOBIWIRE	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: RSH180110050-20M1 for details.

BLE Mode:

Frequency Range (MHz)	Target Output Power		Minimum test separation distance required for the exposure conditions (mm)
	(dBm)	(mW)	
2402-2480	0	1.0	5.00

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

Result: $[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] = 1.0/5 \cdot \sqrt{2.48} = 0.3 < 3.0$.

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 PIFA antenna for Wi-Fi & BLE, which the antenna gain is 0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

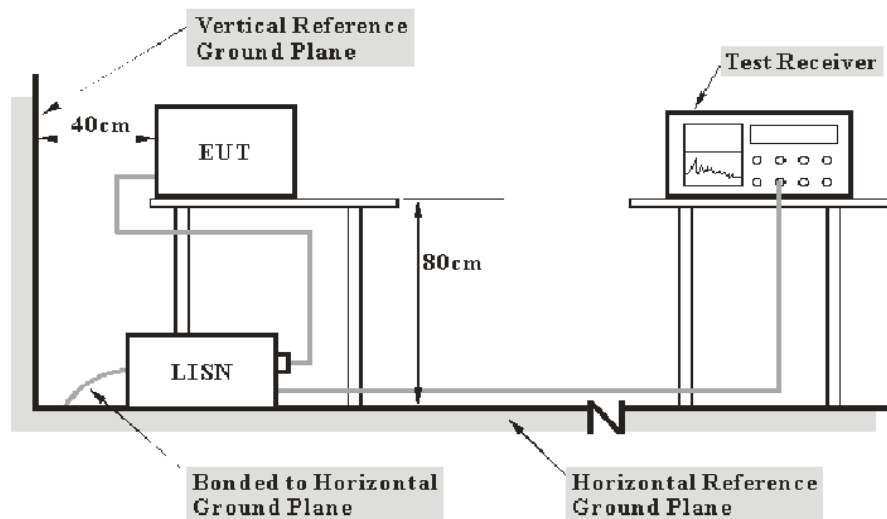
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

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

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

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

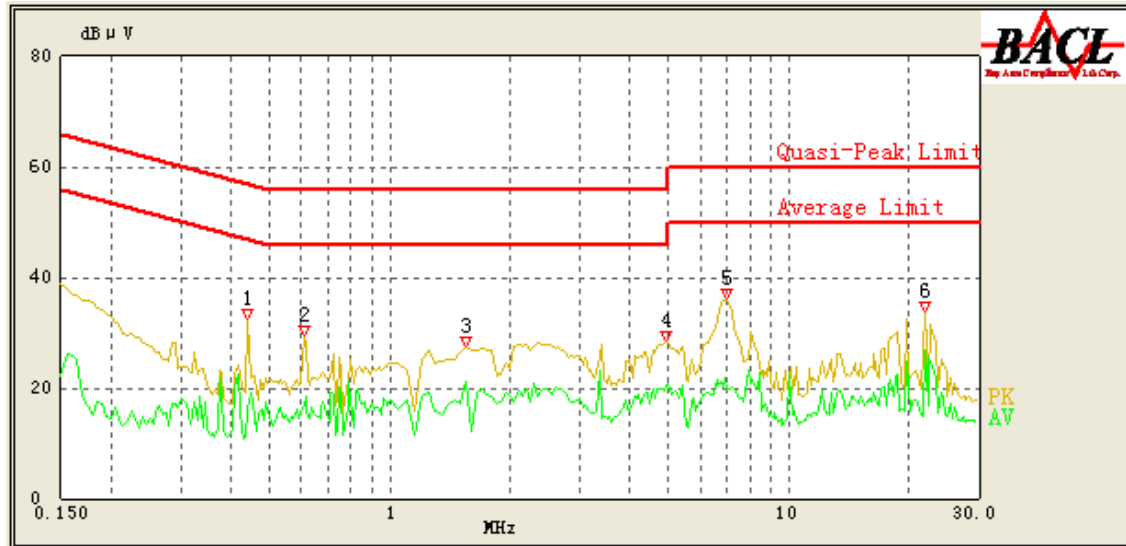
Environmental Conditions

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

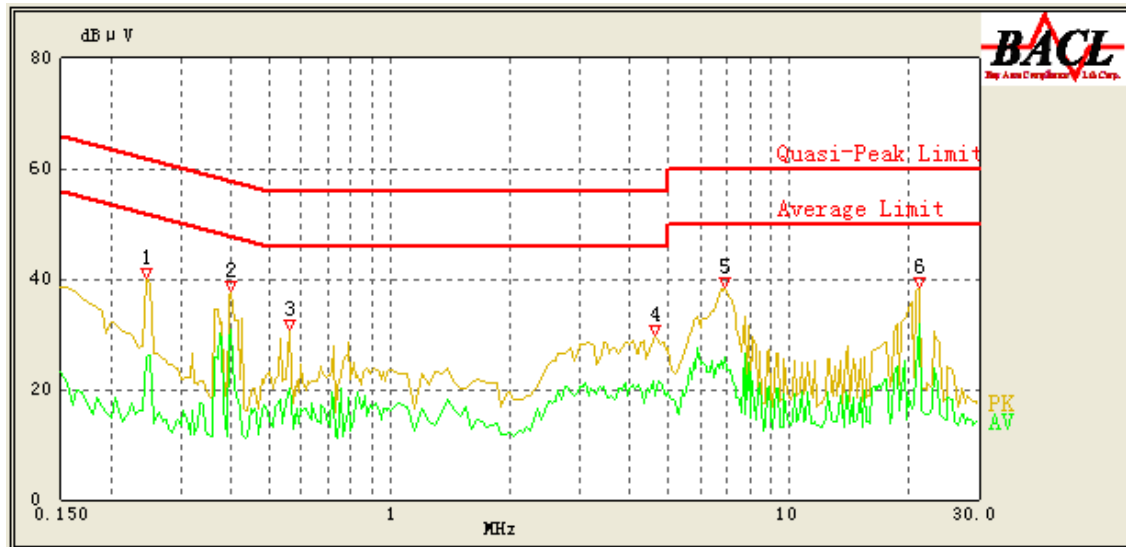
The testing was performed by Max Min on 2018-01-18.

For Wi-Fi Mode:

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

AC 120V/60 Hz, Line

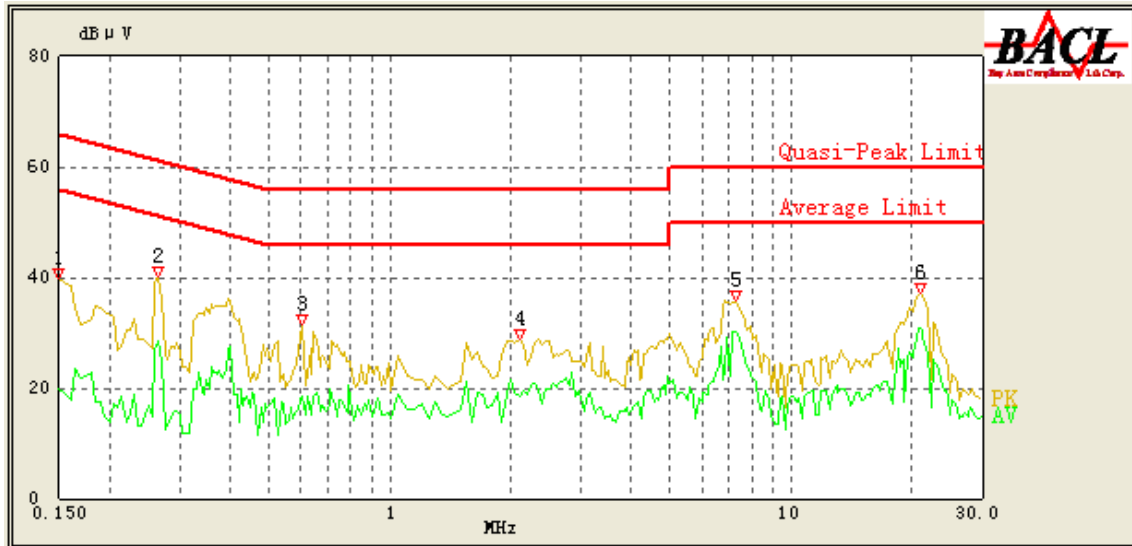
Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.440	32.57	QP	9.000	L1	16.10	57.71	25.14	Compliance
0.440	16.08	AV	9.000	L1	16.10	47.71	31.63	Compliance
0.610	29.42	QP	9.000	L1	16.04	56.00	26.58	Compliance
0.610	16.80	AV	9.000	L1	16.04	46.00	29.20	Compliance
1.550	27.48	QP	9.000	L1	15.92	56.00	28.52	Compliance
1.550	21.12	AV	9.000	L1	15.92	46.00	24.88	Compliance
4.900	28.54	QP	9.000	L1	15.87	56.00	27.46	Compliance
4.950	20.02	AV	9.000	L1	15.87	46.00	25.98	Compliance
7.000	36.03	QP	9.000	L1	15.92	60.00	23.97	Compliance
7.000	19.86	AV	9.000	L1	15.92	50.00	30.14	Compliance
21.900	33.92	QP	9.000	L1	16.19	60.00	26.08	Compliance
21.900	26.69	AV	9.000	L1	16.19	50.00	23.31	Compliance

AC 120V/60 Hz, Neutral

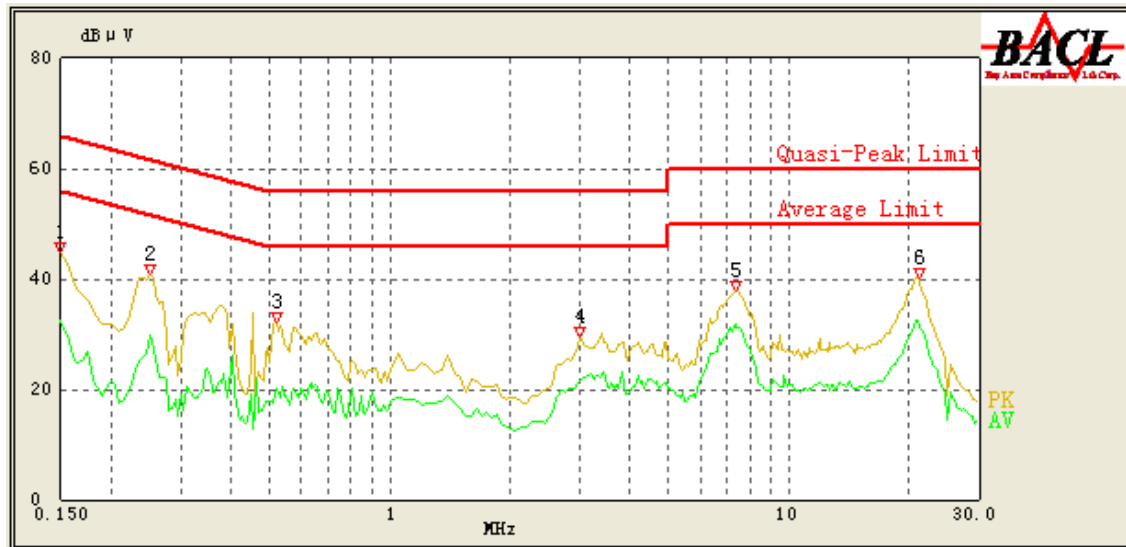
Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.245	40.10	QP	9.000	N	16.06	63.29	23.19	Compliance
0.245	26.00	AV	9.000	N	16.06	53.29	27.29	Compliance
0.400	37.69	QP	9.000	N	16.09	58.86	21.17	Compliance
0.400	30.97	AV	9.000	N	16.09	48.86	17.89	Compliance
0.560	30.79	QP	9.000	N	16.07	56.00	25.21	Compliance
0.560	20.23	AV	9.000	N	16.07	46.00	25.77	Compliance
4.600	29.67	QP	9.000	N	15.88	56.00	26.33	Compliance
4.600	18.72	AV	9.000	N	15.88	46.00	27.28	Compliance
6.900	38.41	QP	9.000	N	15.92	60.00	21.59	Compliance
6.900	25.80	AV	9.000	N	15.92	50.00	24.20	Compliance
21.150	38.40	QP	9.000	N	16.18	60.00	21.60	Compliance
21.150	31.83	AV	9.000	N	16.18	50.00	18.17	Compliance

Note:

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

For BLE Mode:*EUT operation mode: Transmitting in middle 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	39.72	QP	9.000	L1	16.06	66.00	26.28	Compliance
0.150	19.98	AV	9.000	L1	16.06	56.00	36.02	Compliance
0.265	40.17	QP	9.000	L1	16.03	62.71	22.54	Compliance
0.265	28.54	AV	9.000	L1	16.03	52.71	24.17	Compliance
0.605	31.61	QP	9.000	L1	16.01	56.00	24.39	Compliance
0.605	18.55	AV	9.000	L1	16.01	46.00	27.45	Compliance
2.100	28.83	QP	9.000	L1	15.85	56.00	27.17	Compliance
2.100	18.45	AV	9.000	L1	15.85	46.00	27.55	Compliance
7.300	35.70	QP	9.000	L1	15.99	60.00	24.30	Compliance
7.300	30.08	AV	9.000	L1	15.99	50.00	19.92	Compliance
20.950	37.26	QP	9.000	L1	16.44	60.00	22.74	Compliance
20.850	30.77	AV	9.000	L1	16.44	50.00	19.23	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	44.86	QP	9.000	N	16.06	66.00	21.14	Compliance
0.150	32.42	AV	9.000	N	16.06	56.00	23.58	Compliance
0.250	40.74	QP	9.000	N	16.06	63.14	22.40	Compliance
0.250	29.84	AV	9.000	N	16.06	53.14	23.30	Compliance
0.520	32.24	QP	9.000	N	16.10	56.00	23.76	Compliance
0.520	20.31	AV	9.000	N	16.10	46.00	25.69	Compliance
3.000	29.59	QP	9.000	N	15.90	56.00	26.41	Compliance
3.000	21.55	AV	9.000	N	15.90	46.00	24.45	Compliance
7.400	37.92	QP	9.000	N	15.93	60.00	22.08	Compliance
7.400	31.17	AV	9.000	N	15.93	50.00	18.83	Compliance
21.150	40.07	QP	9.000	N	16.18	60.00	19.93	Compliance
21.100	32.55	AV	9.000	N	16.18	50.00	17.45	Compliance

Note:

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

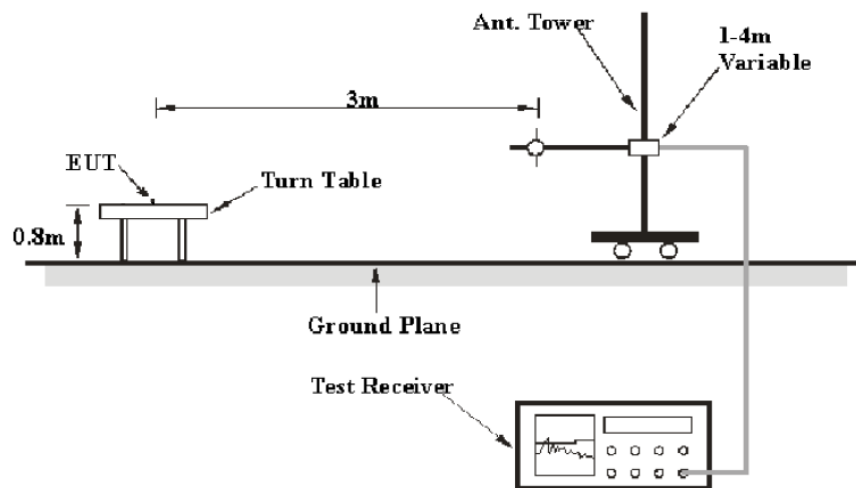
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

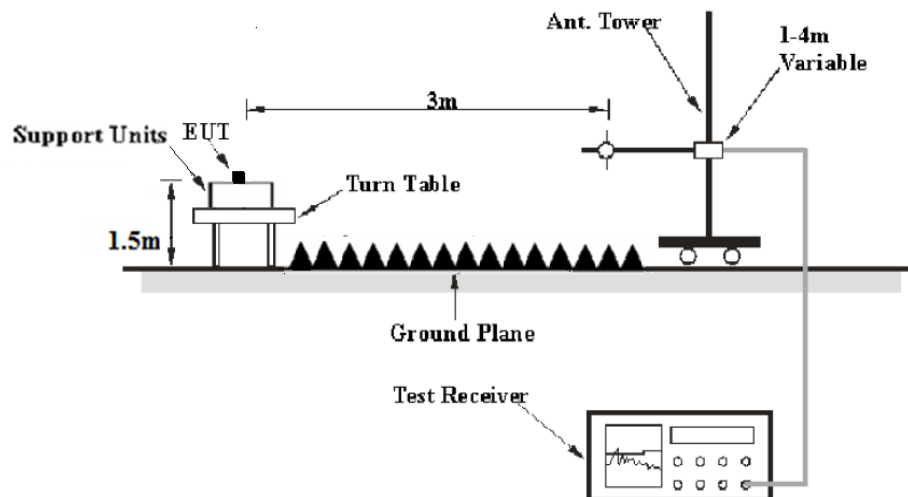
FCC §15.247 (d); §15.209; §15.205;

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

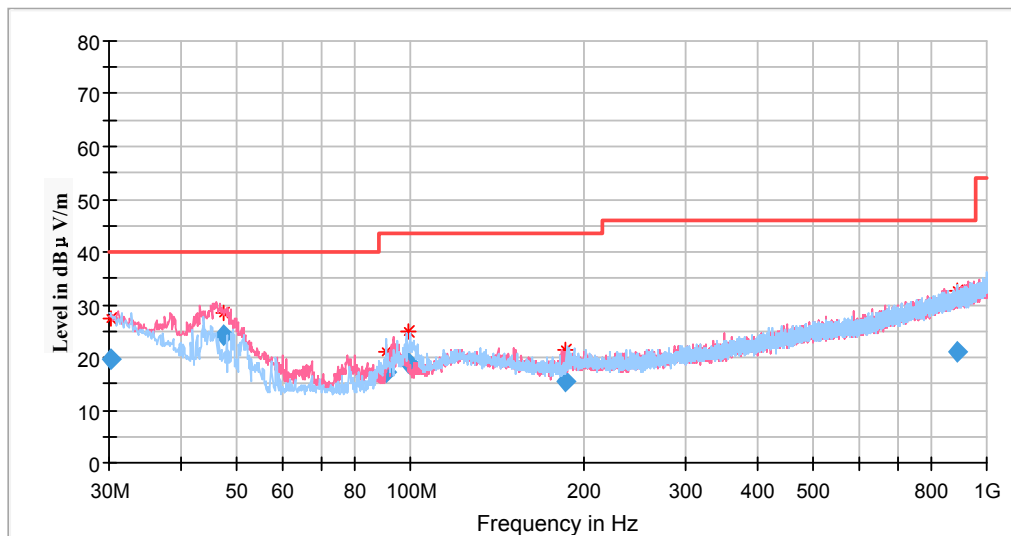
The testing was performed by Max Min from 2018-01-13 to 2018-01-20.

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)				
30.244742	19.49	101.0	V	35.0	-4.5	40.00	20.51
47.250890	24.15	101.0	V	172.0	-16.1	40.00	15.85
91.046220	17.05	199.0	H	0.0	-17.6	43.50	26.45
98.994210	18.98	199.0	H	0.0	-15.6	43.50	24.52
185.641430	15.38	199.0	H	133.0	-13.7	43.50	28.12
887.157770	21.12	199.0	H	16.0	0.0	46.00	24.88

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

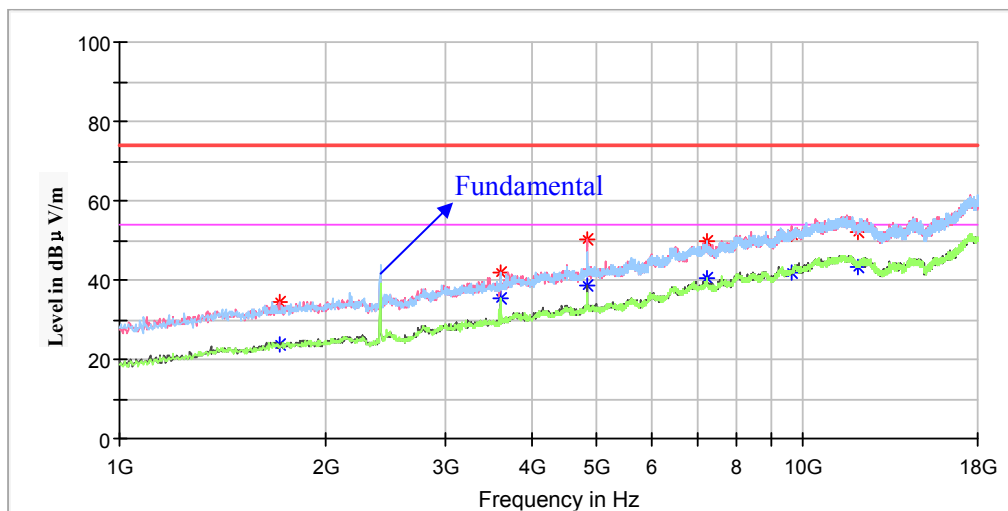
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

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

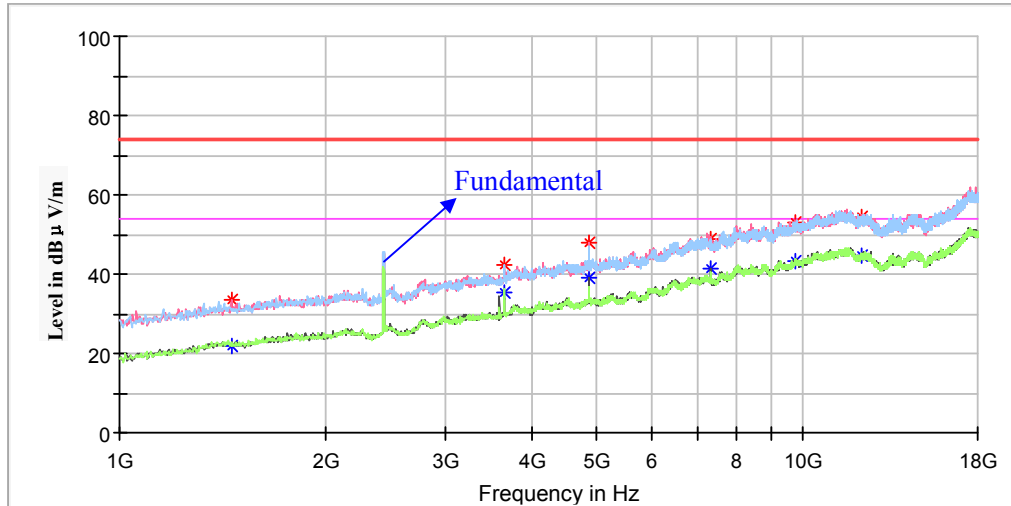
Full Spectrum



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)				
1710.600000	34.52	---	200.0	V	112.0	-7.1	74.00	39.48
1710.600000	---	23.90	200.0	V	112.0	-7.1	54.00	30.10
3614.600000	41.65	---	100.0	H	1.0	-0.5	74.00	32.35
3614.600000	---	35.15	100.0	H	1.0	-0.5	54.00	18.85
4824.000000	50.27	---	100.0	V	218.0	2.5	74.00	23.73
4824.000000	---	38.83	100.0	V	218.0	2.5	54.00	15.17
7236.000000	49.54	---	100.0	V	7.0	9.8	74.00	24.46
7236.000000	---	40.28	100.0	V	7.0	9.8	54.00	13.72
9649.600000	---	41.96	100.0	H	353.0	14.9	54.00	12.04
9649.600000	51.77	---	100.0	H	353.0	14.9	74.00	22.23
12005.800000	51.93	---	150.0	V	2.0	16.5	74.00	22.07
12005.800000	---	43.40	150.0	V	2.0	16.5	54.00	10.60

Middle Channel: 2437MHz

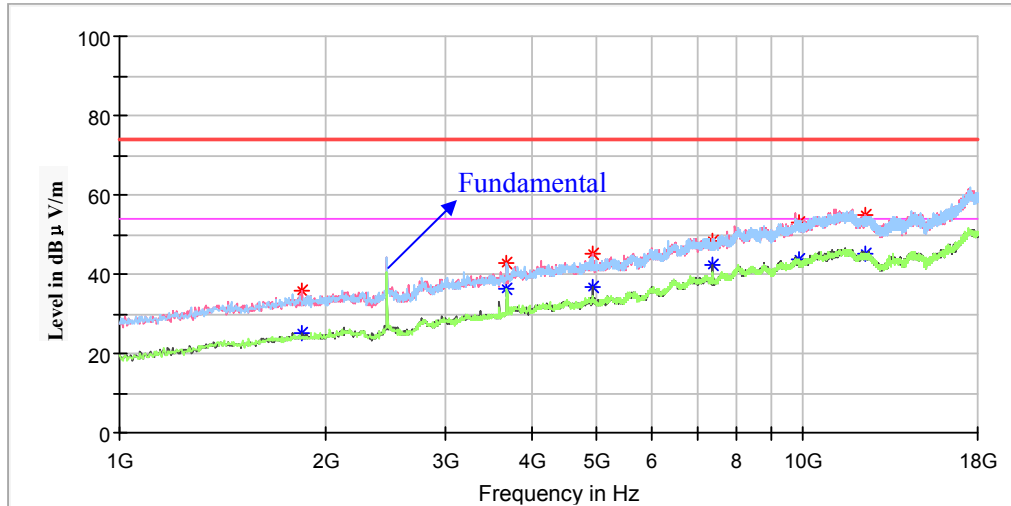
Full Spectrum



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)				
1455.600000	33.65	---	100.0	V	24.0	-8.4	74.00	40.35
1455.600000	---	21.97	100.0	V	24.0	-8.4	54.00	32.03
3652.000000	---	35.21	150.0	H	8.0	-0.4	54.00	18.79
3652.000000	42.53	---	150.0	H	8.0	-0.4	74.00	31.47
4874.000000	47.98	---	200.0	V	358.0	2.6	74.00	26.02
4874.000000	---	38.85	200.0	V	358.0	2.6	54.00	15.15
7311.000000	48.78	---	200.0	V	181.0	10.0	74.00	25.22
7311.000000	---	41.32	200.0	V	181.0	10.0	54.00	12.68
9748.200000	---	43.37	150.0	V	210.0	14.9	54.00	10.63
9748.200000	53.04	---	150.0	V	210.0	14.9	74.00	20.96
12186.000000	---	44.87	150.0	V	0.0	16.7	54.00	9.13
12186.000000	54.38	---	150.0	V	0.0	16.7	74.00	19.62

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)				
1853.400000	35.64	---	200.0	V	197.0	-6.6	74.00	38.36
1853.400000	---	24.92	200.0	V	197.0	-6.6	54.00	29.08
3689.400000	43.00	---	200.0	H	19.0	-0.2	74.00	31.00
3689.400000	---	36.13	200.0	H	19.0	-0.2	54.00	17.87
4924.000000	45.03	---	100.0	V	142.0	2.7	74.00	28.97
4924.000000	---	36.54	100.0	V	142.0	2.7	54.00	17.46
7386.000000	48.44	---	200.0	V	233.0	10.1	74.00	25.56
7386.000000	---	42.55	200.0	V	233.0	10.1	54.00	11.45
9846.800000	52.98	---	150.0	H	20.0	14.9	74.00	21.02
9846.800000	---	43.85	150.0	H	20.0	14.9	54.00	10.15
12308.400000	---	44.99	100.0	V	33.0	16.9	54.00	9.01
12308.400000	54.91	---	100.0	V	33.0	16.9	74.00	19.09

802.11g Mode:

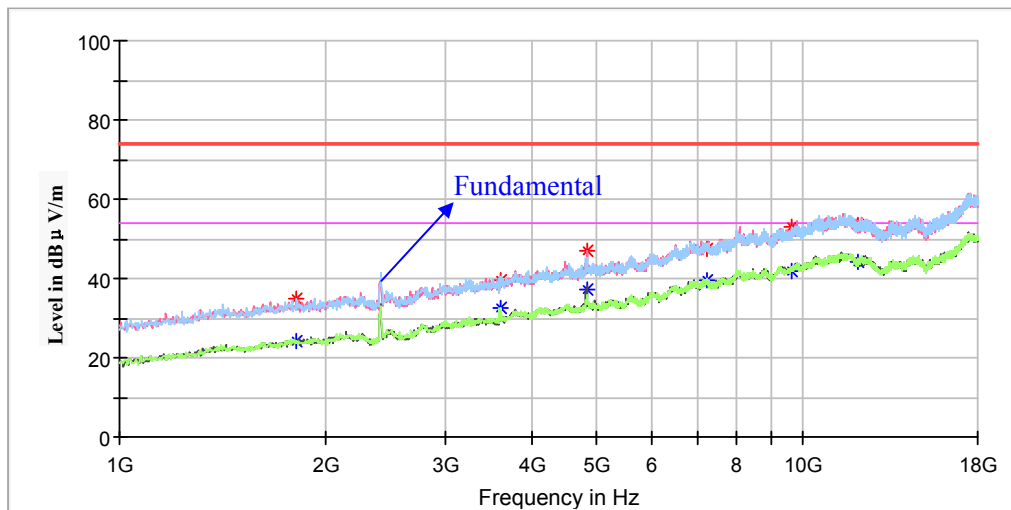
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

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

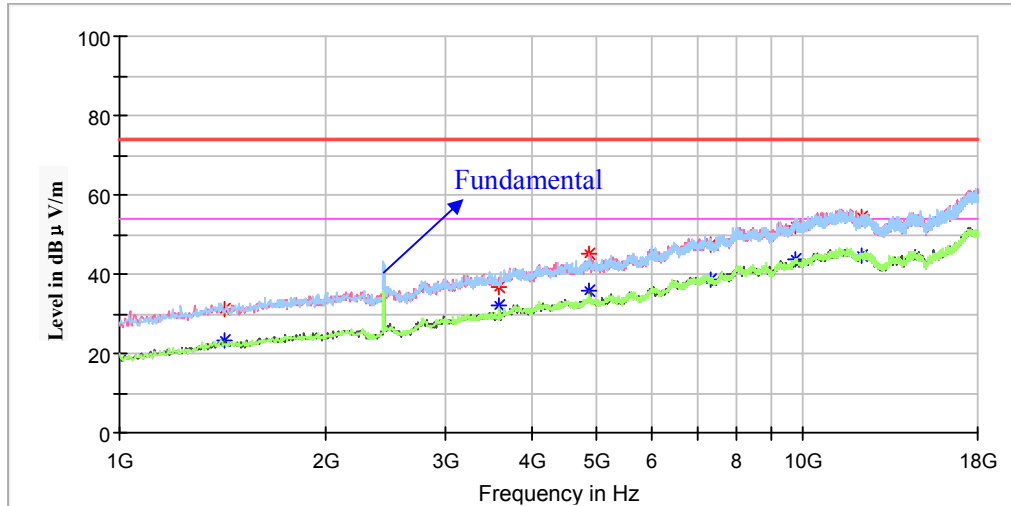
Full Spectrum



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)				
1819.400000	35.07	---	100.0	H	189.0	-6.7	74.00	38.93
1819.400000	---	24.38	100.0	H	189.0	-6.7	54.00	29.62
3618.000000	39.72	---	150.0	H	30.0	-0.5	74.00	34.28
3618.000000	---	32.48	150.0	H	30.0	-0.5	54.00	21.52
4824.000000	---	37.06	100.0	V	119.0	2.5	54.00	16.94
4824.000000	46.88	---	100.0	V	119.0	2.5	74.00	27.12
7236.000000	---	39.39	200.0	V	244.0	9.8	54.00	14.61
7236.000000	47.56	---	200.0	V	244.0	9.8	74.00	26.44
9649.600000	---	41.92	150.0	H	15.0	14.9	54.00	12.08
9649.600000	52.85	---	150.0	H	15.0	14.9	74.00	21.15
12060.200000	53.41	---	100.0	V	103.0	16.5	74.00	20.59
12060.200000	---	43.98	100.0	V	103.0	16.5	54.00	10.02

Middle Channel: 2437MHz

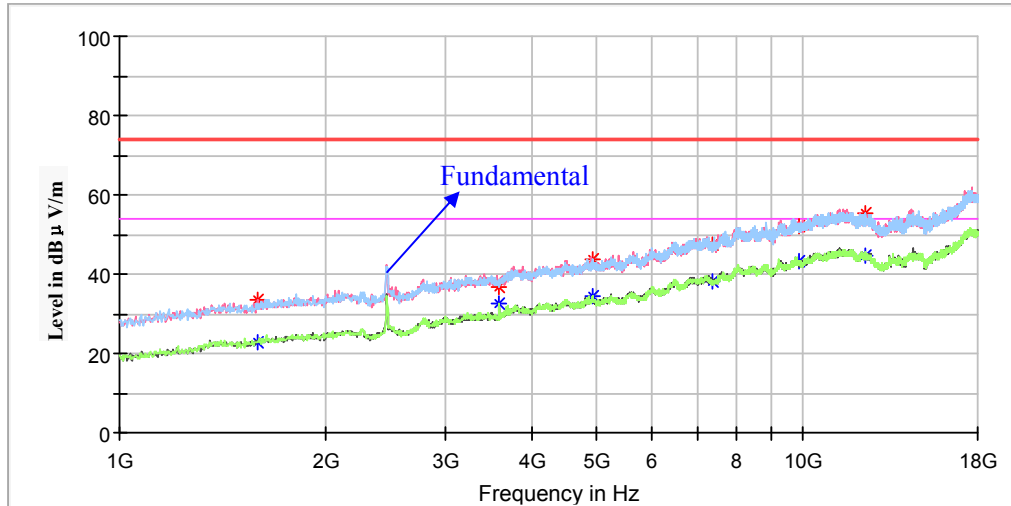
Full Spectrum



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)				
1421.600000	31.18	---	200.0	V	228.0	-8.6	74.00	42.82
1421.600000	---	23.34	200.0	V	228.0	-8.6	54.00	30.66
3597.600000	36.75	---	100.0	V	33.0	-0.6	74.00	37.25
3597.600000	---	32.21	100.0	V	33.0	-0.6	54.00	21.79
4874.000000	---	35.80	100.0	V	158.0	2.6	54.00	18.20
4874.000000	45.04	---	100.0	V	158.0	2.6	74.00	28.96
7311.000000	---	38.39	150.0	V	327.0	10.0	54.00	15.61
7311.000000	47.42	---	150.0	V	327.0	10.0	74.00	26.58
9748.200000	51.89	---	150.0	H	12.0	14.9	74.00	22.11
9748.200000	---	43.67	150.0	H	12.0	14.9	54.00	10.33
12186.000000	---	44.47	200.0	V	120.0	16.7	54.00	9.53
12186.000000	54.19	---	200.0	V	120.0	16.7	74.00	19.81

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	---	22.98	100.0	V	80.0	-7.6	54.00	31.02
1591.600000	33.38	---	100.0	V	80.0	-7.6	74.00	40.62
3597.600000	---	32.41	200.0	V	312.0	-0.6	54.00	21.59
3597.600000	36.85	---	200.0	V	312.0	-0.6	74.00	37.15
4924.000000	43.82	---	150.0	V	216.0	2.8	74.00	30.18
4924.000000	---	34.31	150.0	V	216.0	2.8	54.00	19.69
7386.000000	47.50	---	150.0	V	110.0	10.1	74.00	26.50
7386.000000	---	38.18	150.0	V	110.0	10.1	54.00	15.82
9846.800000	---	43.06	200.0	H	194.0	14.9	54.00	10.94
9846.800000	51.98	---	200.0	H	194.0	14.9	74.00	22.02
12308.400000	55.41	---	150.0	H	141.0	16.9	74.00	18.59
12308.400000	---	44.76	150.0	H	141.0	16.9	54.00	9.24

802.11n-HT20 Mode:

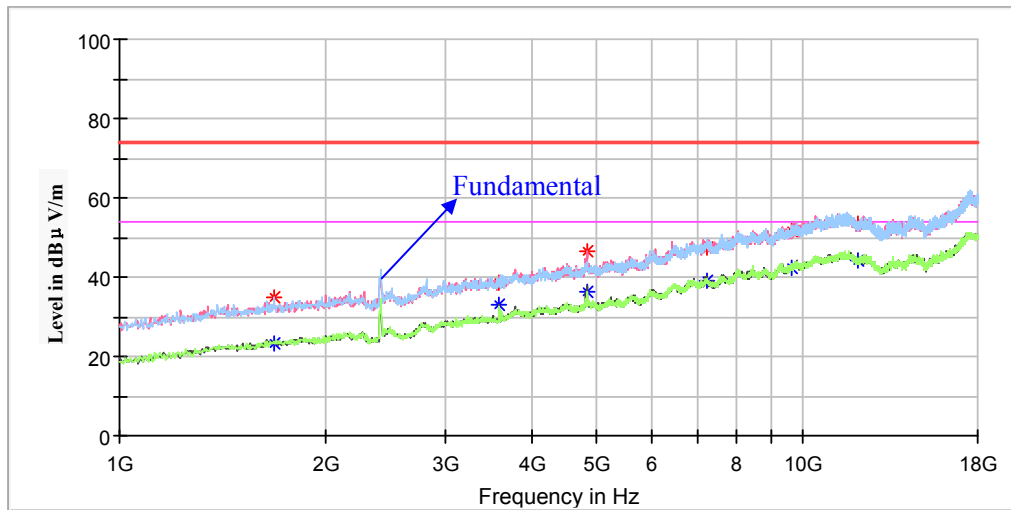
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

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

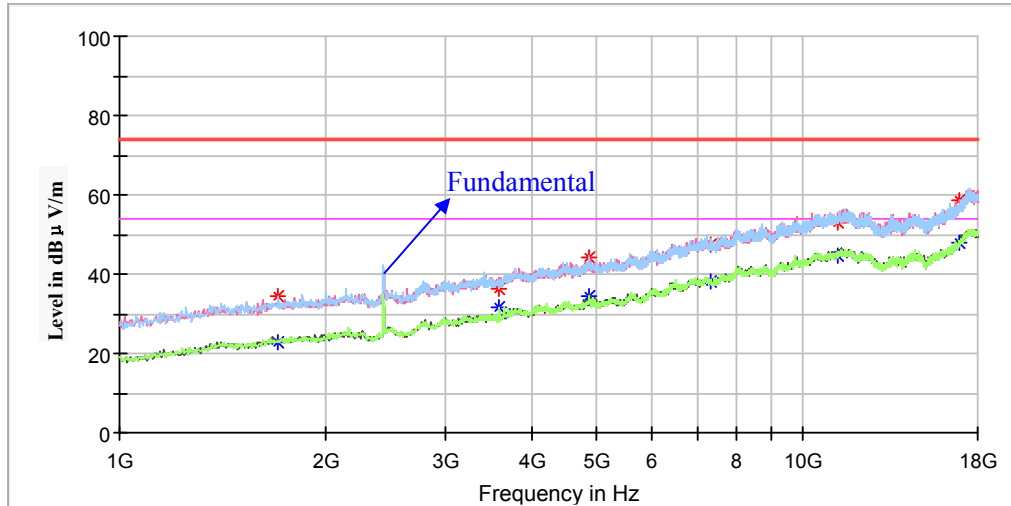
Full Spectrum



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)				
1683.400000	35.09	---	200.0	H	165.0	-7.2	74.00	38.91
1683.400000	---	23.21	200.0	H	165.0	-7.2	54.00	30.79
3597.600000	38.68	---	150.0	V	277.0	-0.6	74.00	35.32
3597.600000	---	33.16	150.0	V	277.0	-0.6	54.00	20.84
4824.000000	---	36.31	150.0	V	222.0	2.5	54.00	17.69
4824.000000	46.51	---	150.0	V	222.0	2.5	74.00	27.49
7236.000000	47.64	---	200.0	V	281.0	9.8	74.00	26.36
7236.000000	---	39.06	200.0	V	281.0	9.8	54.00	14.94
9649.600000	51.60	---	100.0	H	213.0	14.9	74.00	22.40
9649.600000	---	42.31	100.0	H	213.0	14.9	54.00	11.69
12060.200000	53.47	---	150.0	V	2.0	16.5	74.00	20.53
12060.200000	---	44.01	150.0	V	2.0	16.5	54.00	9.99

Middle Channel: 2437MHz

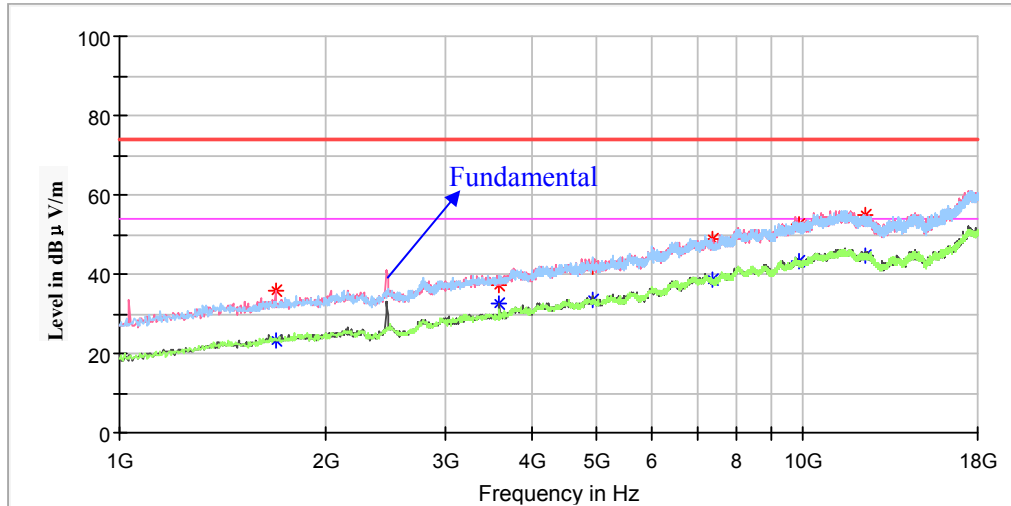
Full Spectrum



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)				
1707.200000	---	23.01	200.0	H	276.0	-7.1	54.00	30.99
1707.200000	34.52	---	200.0	H	276.0	-7.1	74.00	39.48
3597.600000	36.19	---	100.0	V	295.0	-0.6	74.00	37.81
3597.600000	---	31.78	100.0	V	295.0	-0.6	54.00	22.22
4874.000000	---	34.40	150.0	V	274.0	2.6	54.00	19.60
4874.000000	44.24	---	150.0	V	274.0	2.6	74.00	29.76
7311.000000	---	37.92	150.0	V	351.0	10.0	54.00	16.08
7311.000000	47.50	---	150.0	V	351.0	10.0	74.00	26.50
11230.600000	53.25	---	200.0	V	277.0	17.7	74.00	20.75
11230.600000	---	44.87	200.0	V	277.0	17.7	54.00	9.13
16932.400000	---	47.89	150.0	V	63.0	20.7	54.00	6.11
16932.400000	58.51	---	150.0	V	63.0	20.7	74.00	15.49

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)				
1690.200000	---	23.32	100.0	V	225.0	-7.2	54.00	30.68
1690.200000	35.96	---	100.0	V	225.0	-7.2	74.00	38.04
3597.600000	37.41	---	200.0	V	133.0	-0.6	74.00	36.59
3597.600000	---	32.63	200.0	V	133.0	-0.6	54.00	21.37
4924.000000	41.76	---	100.0	V	257.0	2.7	74.00	32.24
4924.000000	---	33.54	100.0	V	257.0	2.7	54.00	20.46
7386.000000	---	38.41	100.0	V	147.0	10.1	54.00	15.59
7386.000000	48.84	---	100.0	V	147.0	10.1	74.00	25.16
9850.200000	52.42	---	150.0	H	186.0	14.9	74.00	21.58
9850.200000	---	43.06	150.0	H	186.0	14.9	54.00	10.94
12315.200000	---	44.51	150.0	V	335.0	16.9	54.00	9.49
12315.200000	54.71	---	150.0	V	335.0	16.9	74.00	19.29

802.11n-HT40 Mode:

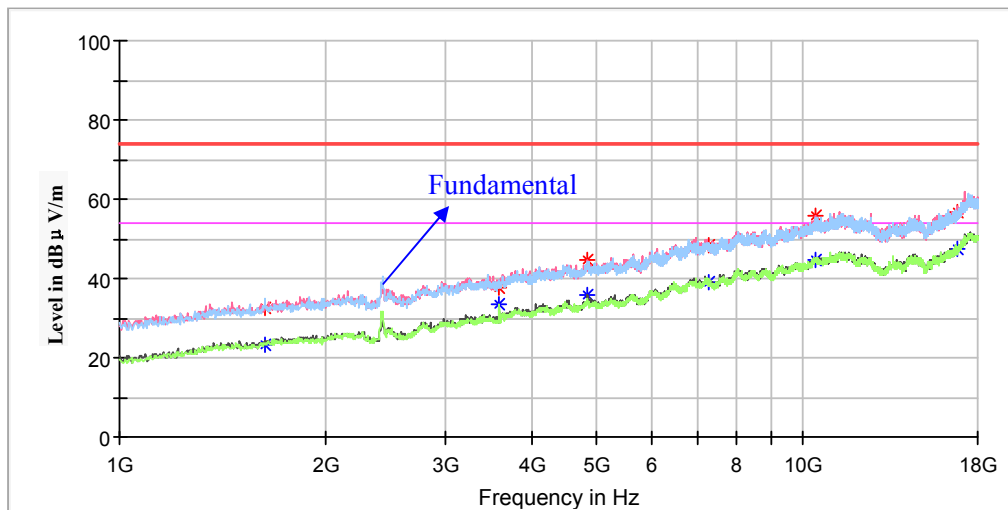
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

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

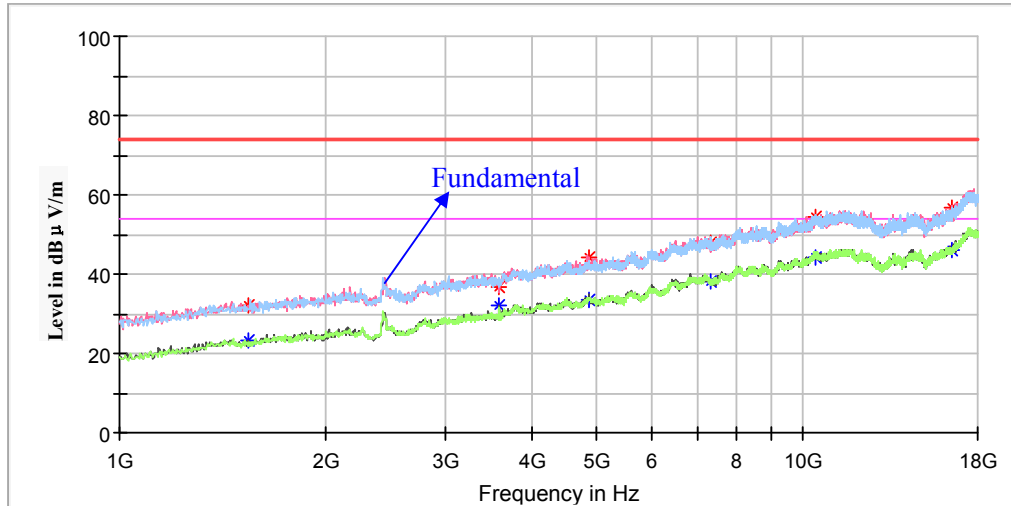
Full Spectrum



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)				
1632.400000	32.62	---	200.0	V	190.0	-7.5	74.00	41.38
1632.400000	---	23.46	200.0	V	190.0	-7.5	54.00	30.54
3597.600000	37.55	---	150.0	H	1.0	-0.6	74.00	36.45
3597.600000	---	33.36	150.0	H	1.0	-0.6	54.00	20.64
4844.000000	44.73	---	200.0	V	280.0	2.6	74.00	29.27
4844.000000	---	35.72	200.0	V	280.0	2.6	54.00	18.28
7266.000000	---	39.15	150.0	V	65.0	9.9	54.00	14.85
7266.000000	48.35	---	150.0	V	65.0	9.9	74.00	25.65
10424.800000	---	44.80	150.0	V	229.0	16.7	54.00	9.20
10424.800000	55.75	---	150.0	V	229.0	16.7	74.00	18.25
16772.600000	56.56	---	150.0	H	0.0	19.9	74.00	17.44
16772.600000	---	47.61	150.0	H	0.0	19.9	54.00	6.39

Middle Channel: 2437MHz

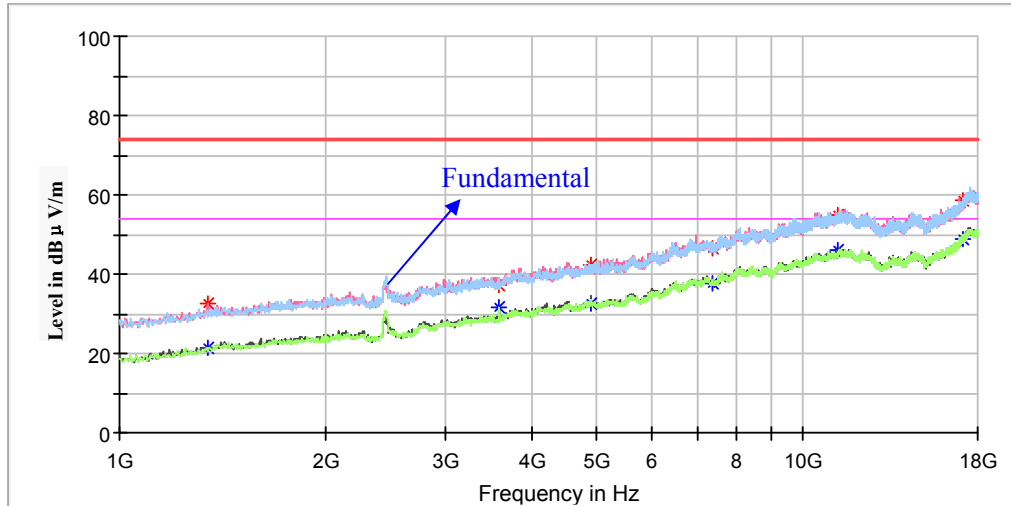
Full Spectrum



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)				
1540.600000	31.94	---	150.0	V	180.0	-7.9	74.00	42.06
1540.600000	---	23.22	150.0	V	180.0	-7.9	54.00	30.78
3597.600000	36.78	---	200.0	V	296.0	-0.6	74.00	37.22
3597.600000	---	32.24	200.0	V	296.0	-0.6	54.00	21.76
4874.000000	---	33.45	100.0	V	133.0	2.6	54.00	20.55
4874.000000	44.33	---	100.0	V	133.0	2.6	74.00	29.67
7311.000000	---	38.23	150.0	H	33.0	10.0	54.00	15.77
7311.000000	47.96	---	150.0	H	33.0	10.0	74.00	26.04
10407.800000	---	44.30	150.0	V	19.0	16.6	54.00	9.70
10407.800000	54.59	---	150.0	V	19.0	16.6	74.00	19.41
16473.400000	---	46.06	200.0	H	352.0	18.6	54.00	7.94
16473.400000	56.97	---	200.0	H	352.0	18.6	74.00	17.03

High Channel: 2452MHz

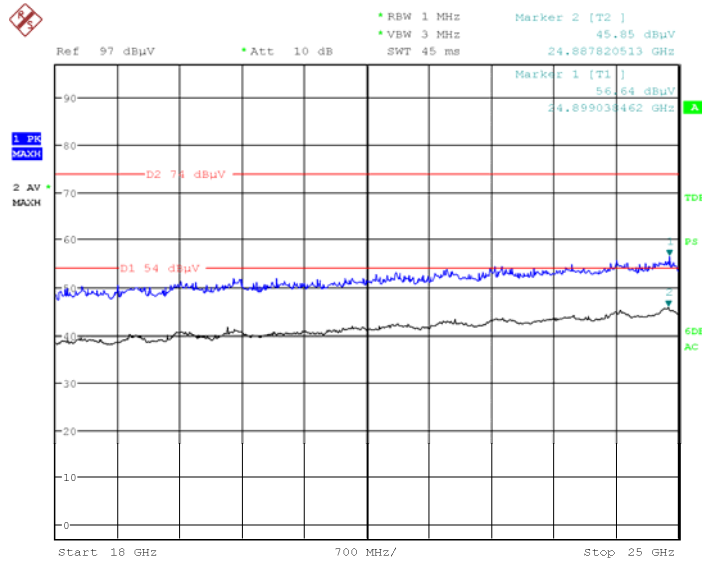
Full Spectrum



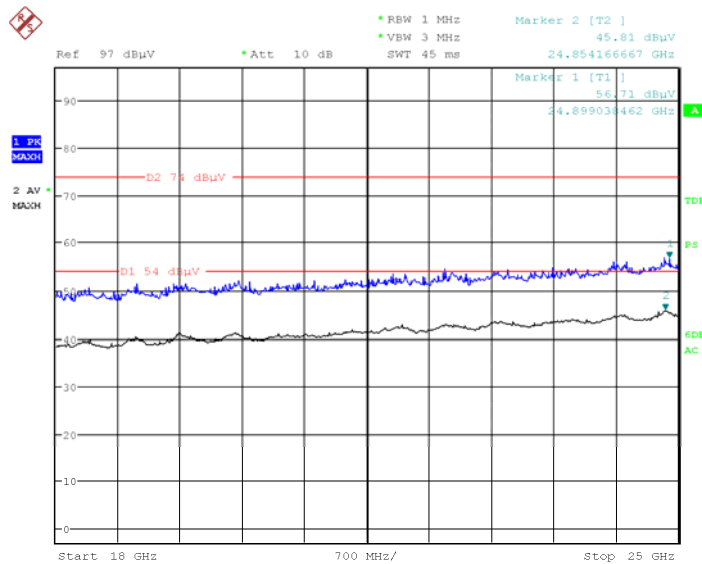
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1343.400000	---	21.28	150.0	V	349.0	-9.2	54.00	32.72
1343.400000	32.41	---	150.0	V	349.0	-9.2	74.00	41.59
3597.600000	37.34	---	200.0	V	148.0	-0.6	74.00	36.66
3597.600000	---	31.63	200.0	V	148.0	-0.6	54.00	22.37
4904.000000	42.18	---	150.0	V	72.0	2.7	74.00	31.82
4904.000000	---	32.79	150.0	V	72.0	2.7	54.00	21.21
7356.000000	46.70	---	150.0	V	150.0	10.0	74.00	27.30
7356.000000	---	37.52	150.0	V	150.0	10.0	54.00	16.48
11200.000000	---	45.91	100.0	V	162.0	17.6	54.00	8.09
11200.000000	54.86	---	100.0	V	162.0	17.6	74.00	19.14
17085.400000	58.78	---	100.0	V	178.0	21.5	74.00	15.22
17085.400000	---	48.68	100.0	V	178.0	21.5	54.00	5.32

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: 18.JAN.2018 15:45:52

Vertical

Date: 18.JAN.2018 15:59:34

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	---	104.19	100.0	V	7.0	5.1	/	/
2412.000000	106.61	---	100.0	V	7.0	5.1	/	/
2390.000000	48.80	---	150.0	V	28.0	5.1	74.00	25.20
2390.000000	---	38.60	150.0	V	28.0	5.1	54.00	15.40
Middle Channel: 2437MHz								
2437.000000	107.43	---	200.0	V	165.0	5.2	/	/
2437.000000	---	105.16	200.0	V	165.0	5.2	/	/
High Channel: 2462MHz								
2462.000000	---	105.56	100.0	V	17.0	5.2	/	/
2462.000000	107.83	---	100.0	V	17.0	5.2	/	/
2483.500000	51.02	---	150.0	V	28.0	5.3	74.00	22.98
2483.500000	---	42.52	150.0	V	28.0	5.3	54.00	11.48

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	103.86	---	200.0	V	14.0	5.1	/	/
2412.000000	---	96.73	200.0	V	14.0	5.1	/	/
2390.000000	56.34	---	200.0	V	214.0	5.1	74.00	17.66
2390.000000	---	44.52	200.0	V	214.0	5.1	54.00	9.48
Middle Channel: 2437MHz								
2437.000000	104.44	---	250.0	V	175.0	5.2	/	/
2437.000000	---	97.07	250.0	V	175.0	5.2	/	/
High Channel: 2462MHz								
2462.000000	---	97.13	150.0	V	127.0	5.2	/	/
2462.000000	104.62	---	150.0	V	127.0	5.2	/	/
2483.500000	62.38	---	100.0	V	174.0	5.3	74.00	11.62
2483.500000	---	47.73	100.0	V	174.0	5.3	54.00	6.27

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

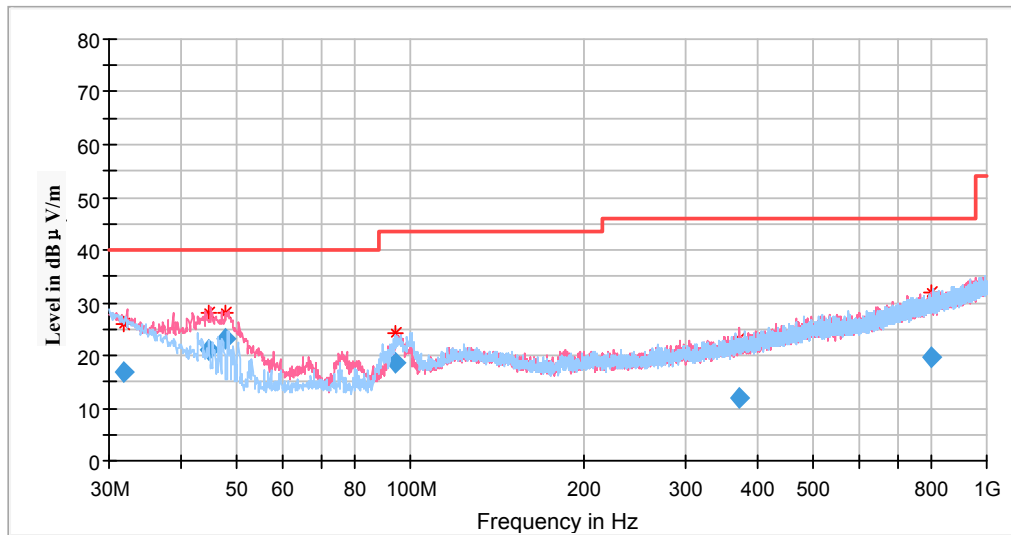
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.000000	103.12	---	100.0	V	169.0	5.1	/	/
2412.000000	---	96.44	100.0	V	169.0	5.1	/	/
2390.000000	55.28	---	200.0	V	196.0	5.1	74.00	18.72
2390.000000	---	41.78	200.0	V	196.0	5.1	54.00	12.22
Middle Channel: 2437MHz								
2437.000000	103.89	---	200.0	V	185.0	5.2	/	/
2437.000000	---	97.01	200.0	V	185.0	5.2	/	/
High Channel: 2462MHz								
2462.000000	104.13	---	100.0	H	19.0	5.2	/	/
2462.000000	---	97.09	100.0	H	19.0	5.2	/	/
2483.500000	59.45	---	200.0	V	125.0	5.3	74.00	14.55
2483.500000	---	46.56	200.0	V	125.0	5.3	54.00	7.44

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	---	93.60	200.0	V	18.0	5.1	/	/
2422.000000	102.09	---	200.0	V	18.0	5.1	/	/
2390.000000	55.12	---	200.0	V	1.0	5.1	74.00	18.88
2390.000000	---	42.64	200.0	V	1.0	5.1	54.00	11.36
Middle Channel: 2437MHz								
2437.000000	102.26	---	200.0	V	157.0	5.2	/	/
2437.000000	---	94.03	200.0	V	157.0	5.2	/	/
High Channel: 2452MHz								
2452.000000	---	95.16	100.0	V	21.0	5.2	/	/
2452.000000	102.95	---	100.0	V	21.0	5.2	/	/
2483.500000	63.69	---	150.0	V	157.0	5.3	74.00	10.31
2483.500000	---	50.98	150.0	V	157.0	5.3	54.00	3.02

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 middle 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)				
31.843590	16.77	199.0	V	266.0	-5.6	40.00	23.23
44.781890	21.10	101.0	V	1.0	-14.4	40.00	18.90
47.914070	23.19	101.0	V	143.0	-16.6	40.00	16.81
94.396330	18.62	101.0	V	102.0	-16.8	43.50	24.88
372.409730	11.96	199.0	V	113.0	-9.3	46.00	34.04
800.041670	19.56	199.0	V	284.0	-1.4	46.00	26.44

1GHz-18GHz

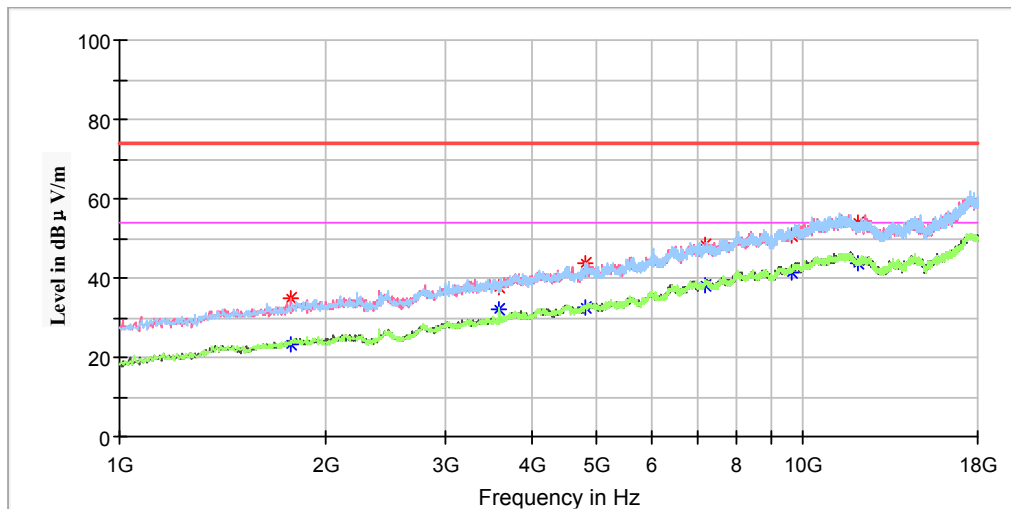
(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

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

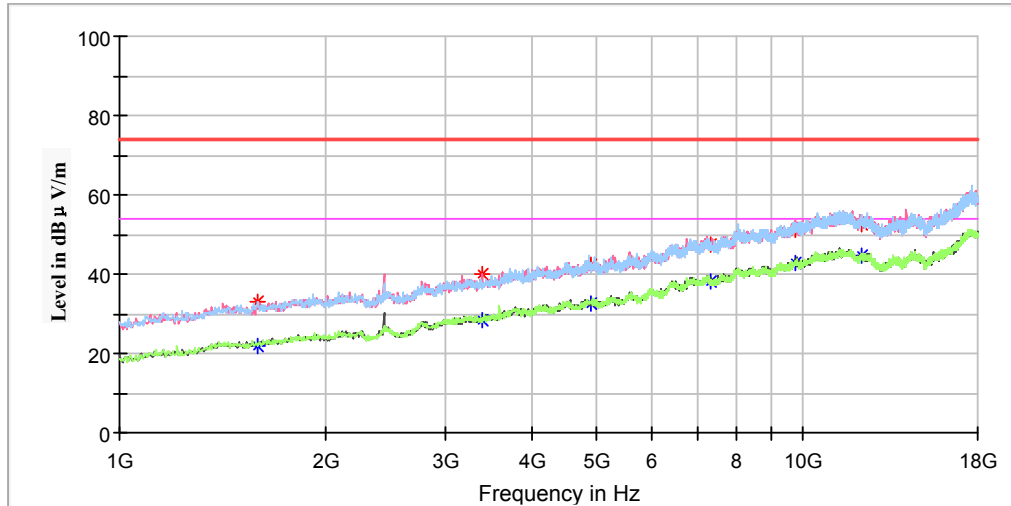
Full Spectrum



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)				
1778.600000	---	23.32	200.0	V	110.0	-6.9	54.00	30.68
1778.600000	34.76	---	200.0	V	110.0	-6.9	74.00	39.24
3597.600000	37.63	---	150.0	V	79.0	-0.6	74.00	36.37
3597.600000	---	32.31	150.0	V	79.0	-0.6	54.00	21.69
4804.000000	43.56	---	150.0	V	118.0	2.5	74.00	30.44
4804.000000	---	32.44	150.0	V	118.0	2.5	54.00	21.56
7206.000000	---	38.35	150.0	V	282.0	9.8	54.00	15.65
7206.000000	48.34	---	150.0	V	282.0	9.8	74.00	25.66
9608.800000	---	41.61	200.0	H	313.0	14.9	54.00	12.39
9608.800000	50.74	---	200.0	H	313.0	14.9	74.00	23.26
12016.000000	54.02	---	150.0	H	0.0	16.5	74.00	19.98
12016.000000	---	43.95	150.0	H	0.0	16.5	54.00	10.05

Middle Channel: 2440MHz

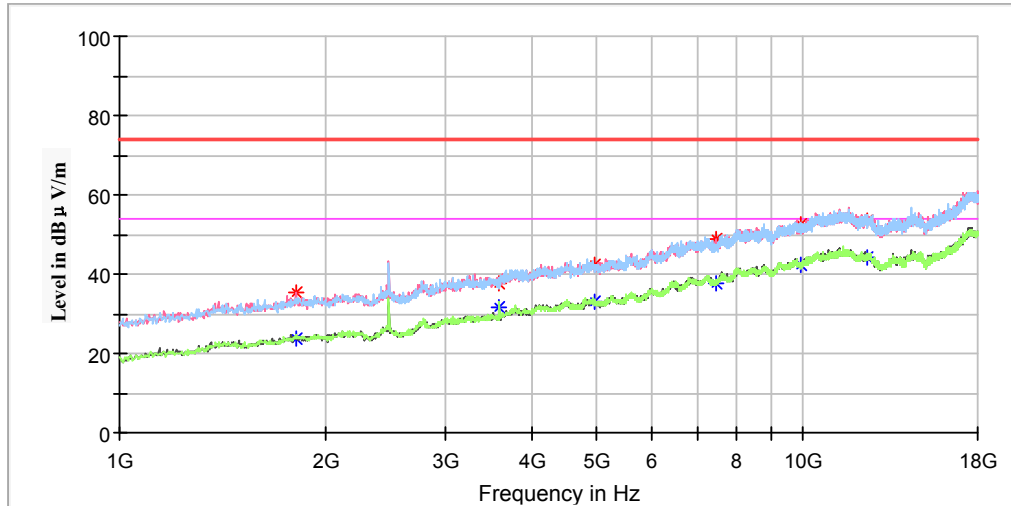
Full Spectrum



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)				
1591.600000	---	22.00	150.0	H	281.0	-7.6	54.00	32.00
1591.600000	33.24	---	150.0	H	281.0	-7.6	74.00	40.76
3397.000000	---	28.32	200.0	V	291.0	-1.1	54.00	25.68
3397.000000	40.01	---	200.0	V	291.0	-1.1	74.00	33.99
4880.000000	42.35	---	150.0	V	84.0	2.6	74.00	31.65
4880.000000	---	32.72	150.0	V	84.0	2.6	54.00	21.28
7320.000000	---	37.96	200.0	V	31.0	10.0	54.00	16.04
7320.000000	47.28	---	200.0	V	31.0	10.0	74.00	26.72
9761.800000	51.36	---	150.0	V	342.0	14.9	74.00	22.64
9761.800000	---	42.64	150.0	V	342.0	14.9	54.00	11.36
12199.600000	---	44.51	200.0	H	328.0	16.8	54.00	9.49
12199.600000	52.38	---	200.0	H	328.0	16.8	74.00	21.62

High Channel: 2480MHz

Full Spectrum

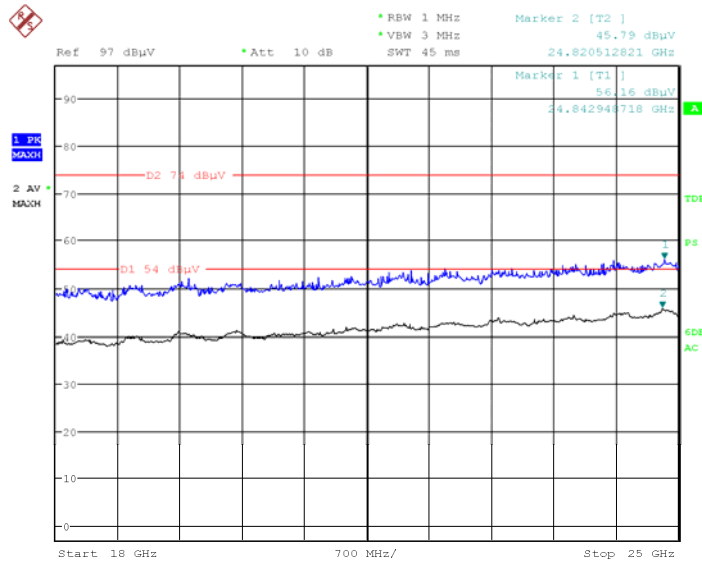


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1809.200000	35.47	---	200.0	V	0.0	-6.7	74.00	38.53
1809.200000	---	23.60	200.0	V	0.0	-6.7	54.00	30.40
3597.600000	37.48	---	150.0	V	78.0	-0.6	74.00	36.52
3597.600000	---	31.47	150.0	V	78.0	-0.6	54.00	22.53
4960.000000	---	32.88	100.0	V	265.0	2.8	54.00	21.12
4960.000000	42.23	---	100.0	V	265.0	2.8	74.00	31.77
7440.000000	---	37.89	200.0	V	75.0	10.1	54.00	16.11
7440.000000	48.91	---	200.0	V	75.0	10.1	74.00	25.09
9921.600000	---	42.24	100.0	H	132.0	14.9	54.00	11.76
9921.600000	52.35	---	100.0	H	132.0	14.9	74.00	21.65
12403.600000	53.26	---	100.0	V	234.0	17.1	74.00	20.74
12403.600000	---	44.02	100.0	V	234.0	17.1	54.00	9.98

18GHz-25GHz

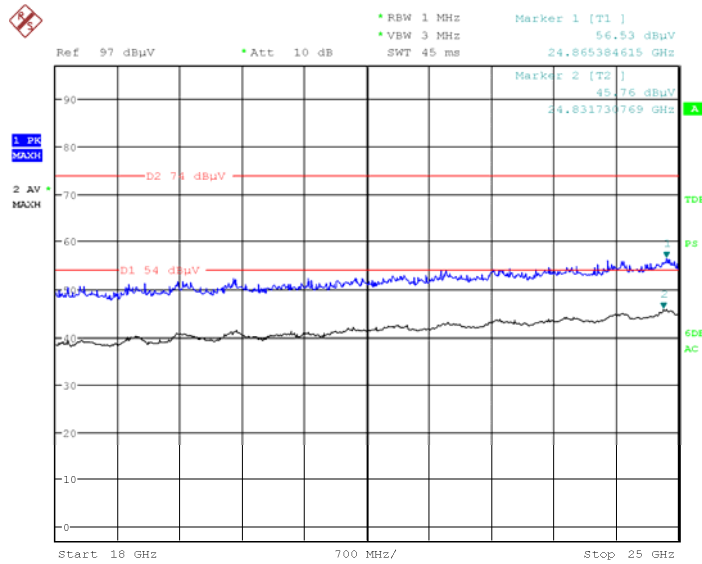
(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case middle channel of operation in the X axis of orientation was recorded)

Horizontal Plot



Date: 18.JAN.2018 15:16:13

Vertical Plot



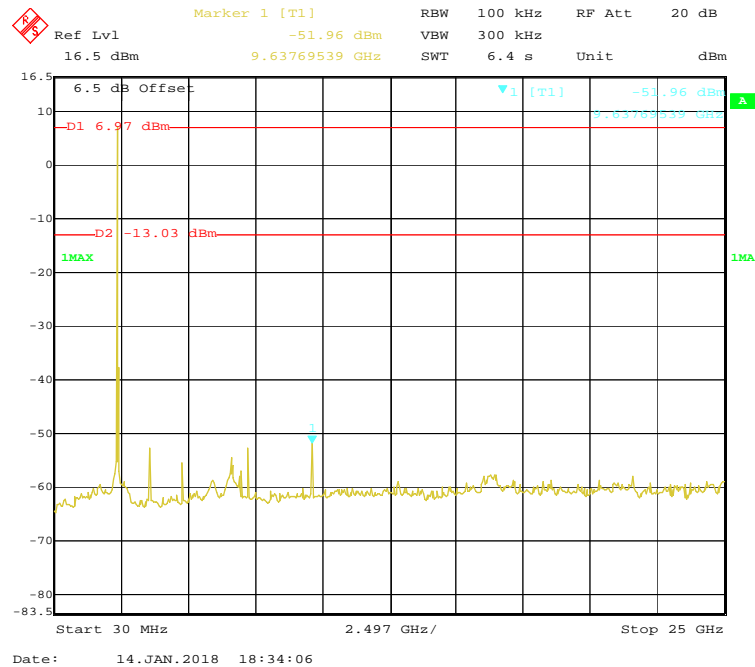
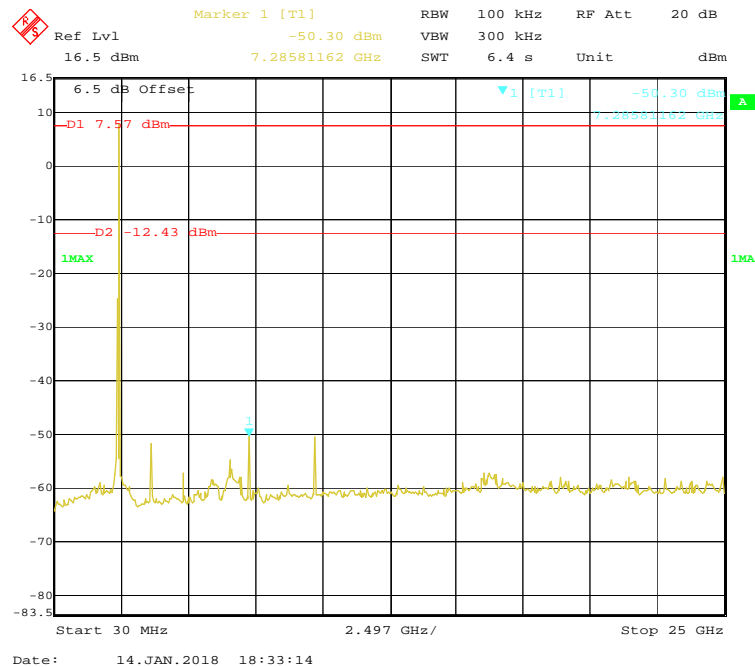
Date: 18.JAN.2018 15:00:22

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)*

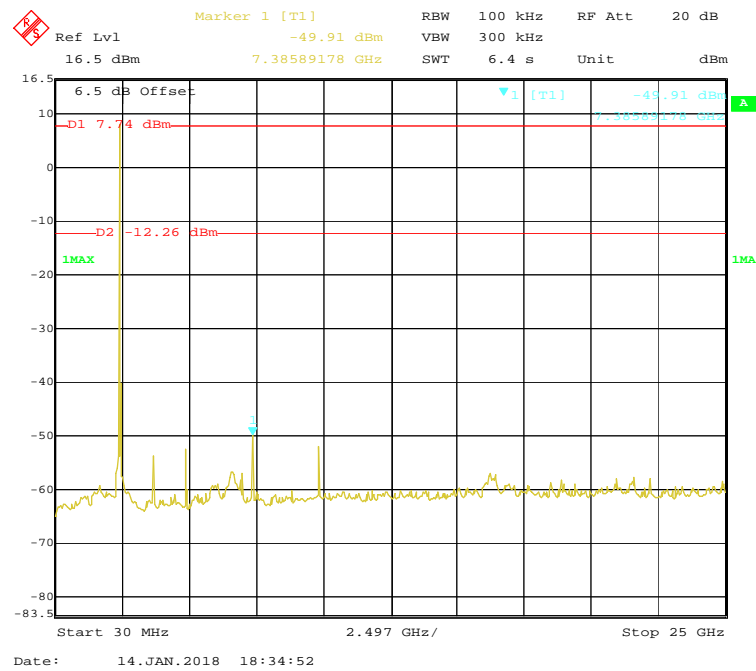
Note:

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

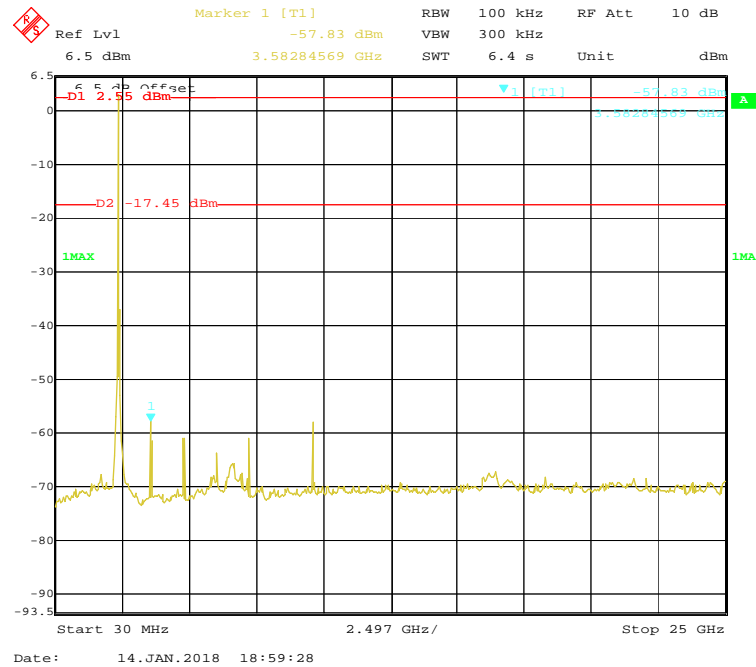
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2402.000000	---	93.97	100.0	V	164.0	5.1	/	/
2402.000000	94.58	---	100.0	V	164.0	5.1	/	/
2390.000000	---	38.41	200.0	V	215.0	5.1	54.00	15.59
2390.000000	47.86	---	200.0	V	215.0	5.1	74.00	26.14
Middle Channel: 2440MHz								
2440.000000	94.75	---	250.0	V	162.0	5.2	/	/
2440.000000	---	94.03	250.0	V	162.0	5.2	/	/
High Channel: 2480MHz								
2480.000000	94.88	---	150.0	V	153.0	5.3	/	/
2480.000000	---	94.09	150.0	V	153.0	5.3	/	/
2483.500000	48.07	---	250.0	V	114.0	5.3	74.00	25.93
2483.500000	---	38.25	250.0	V	114.0	5.3	54.00	15.75

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

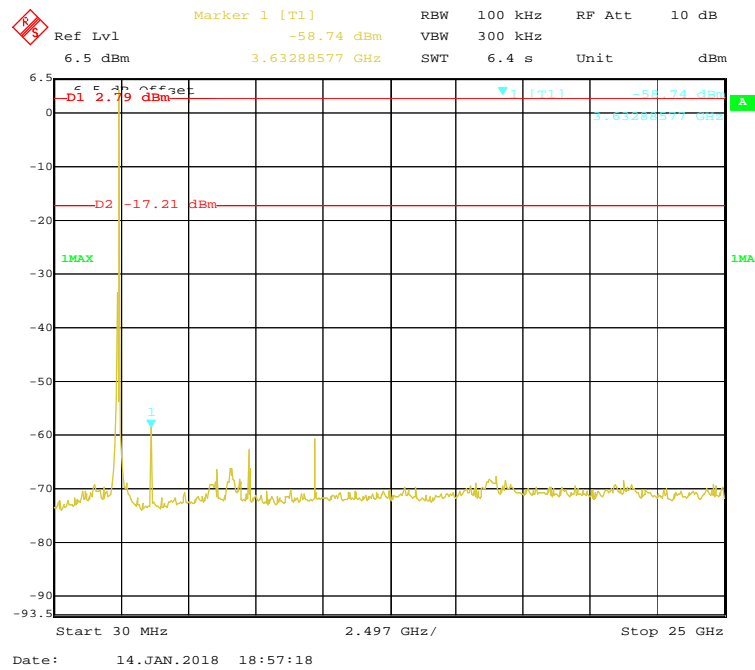
802.11b Mode High Channel



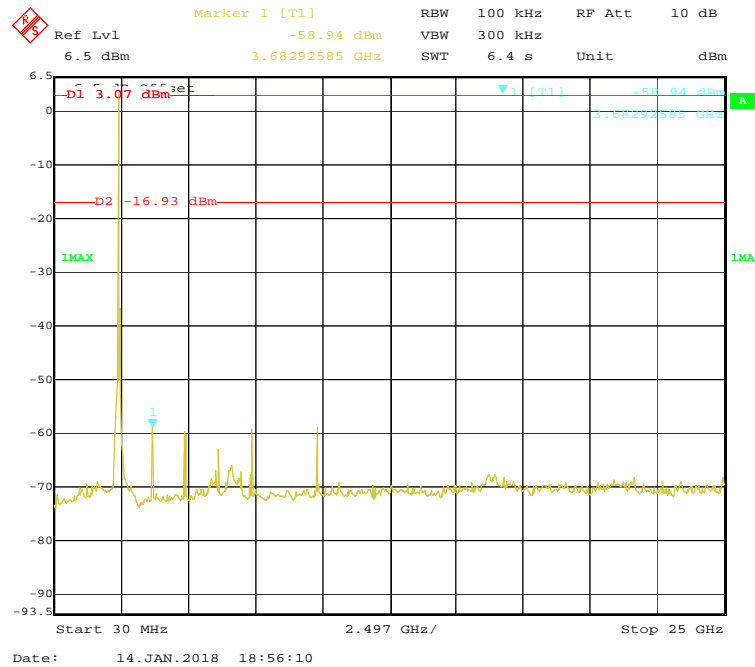
802.11g Mode Low Channel



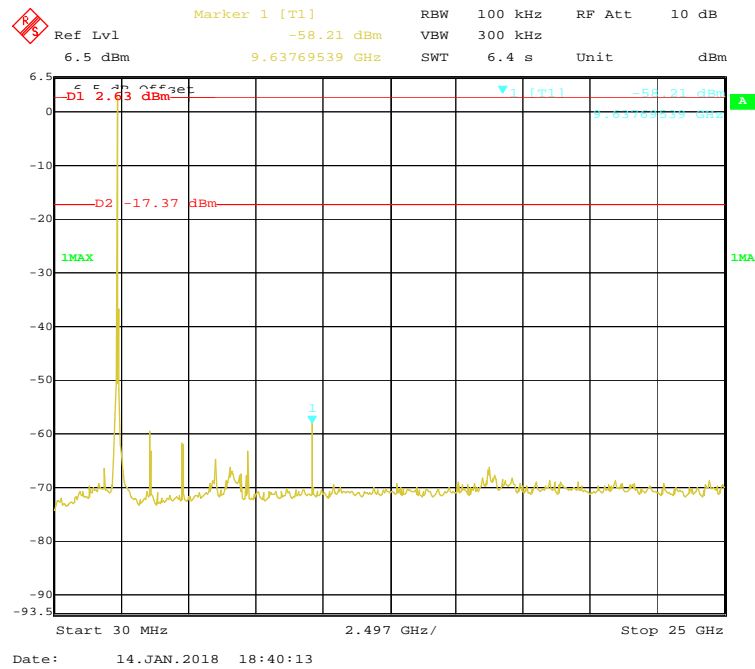
802.11g Mode Middle Channel



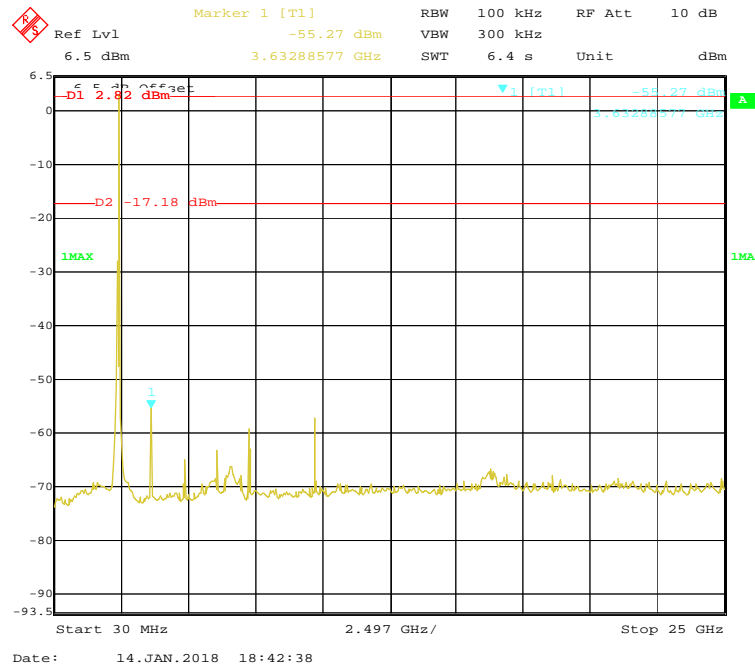
802.11g Mode High Channel



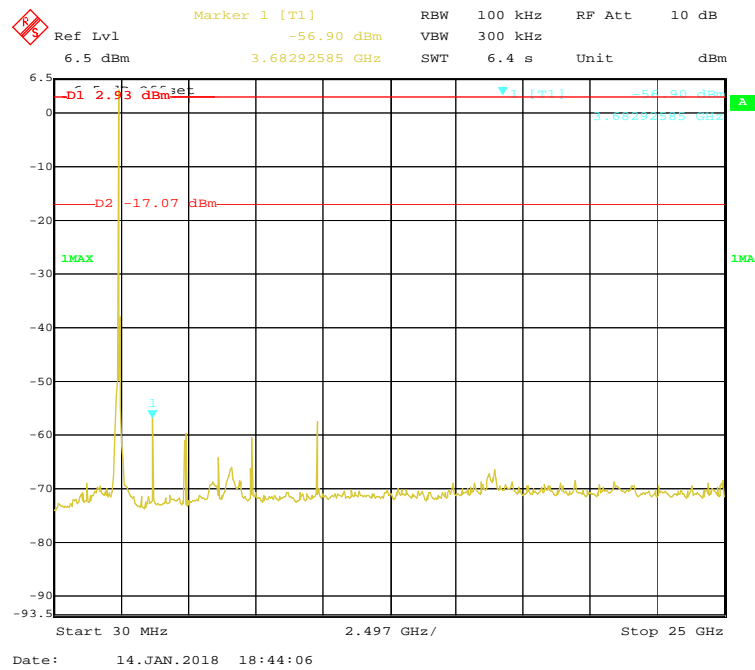
802.11n-HT20 Mode Low Channel



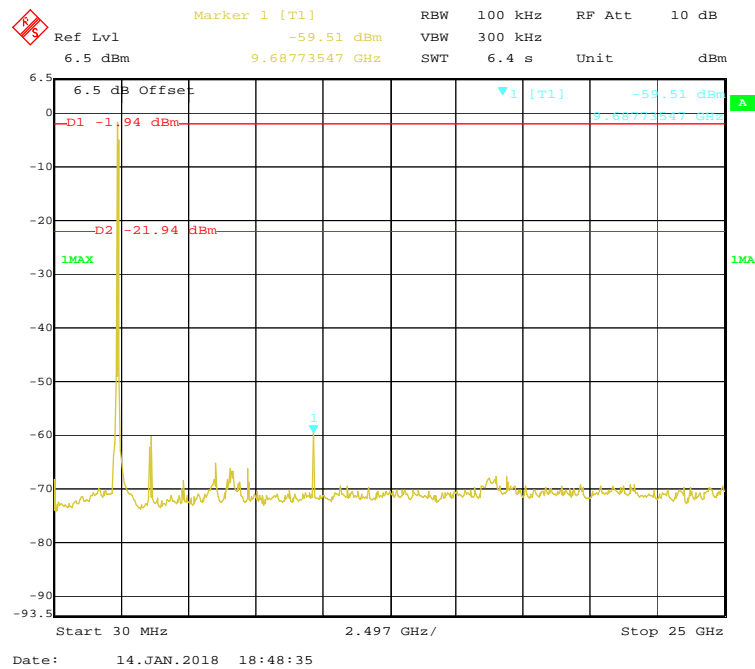
802.11n-HT20 Mode Middle Channel



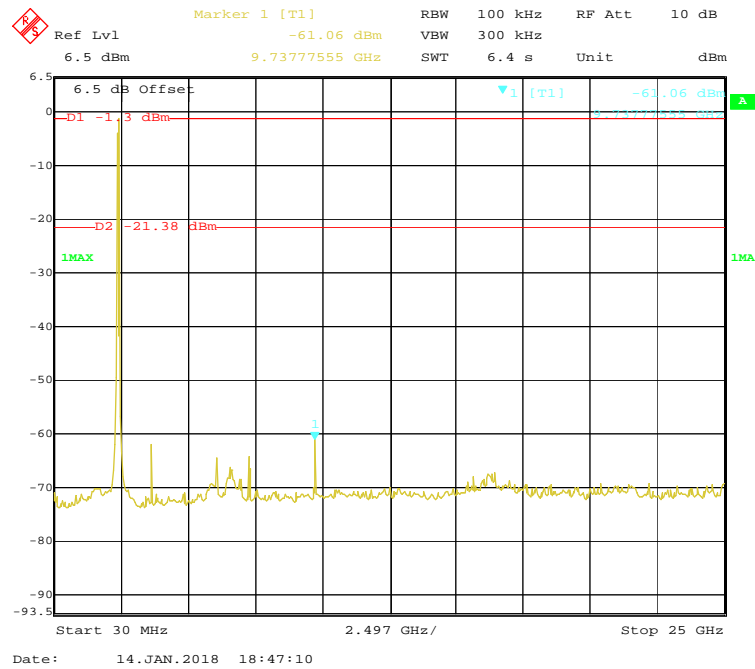
802.11n-HT20 Mode High Channel



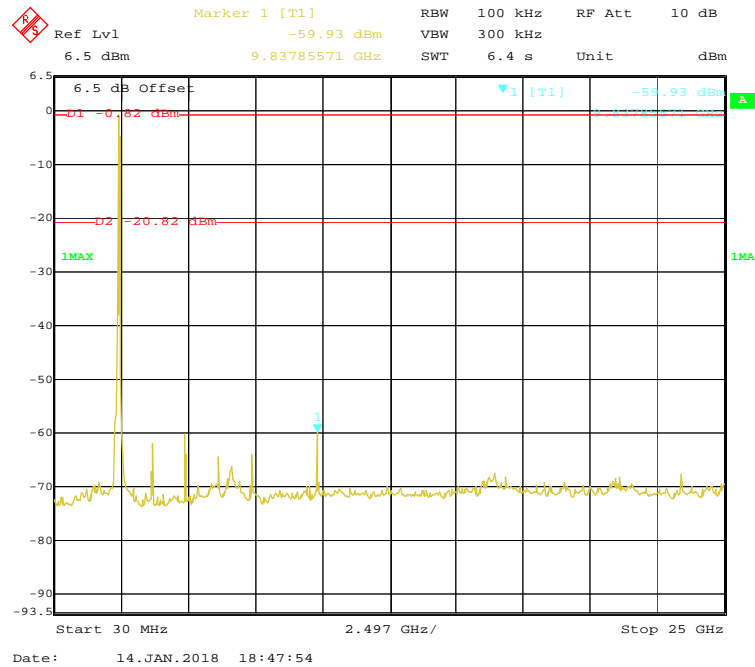
802.11n-HT40 Mode Low Channel



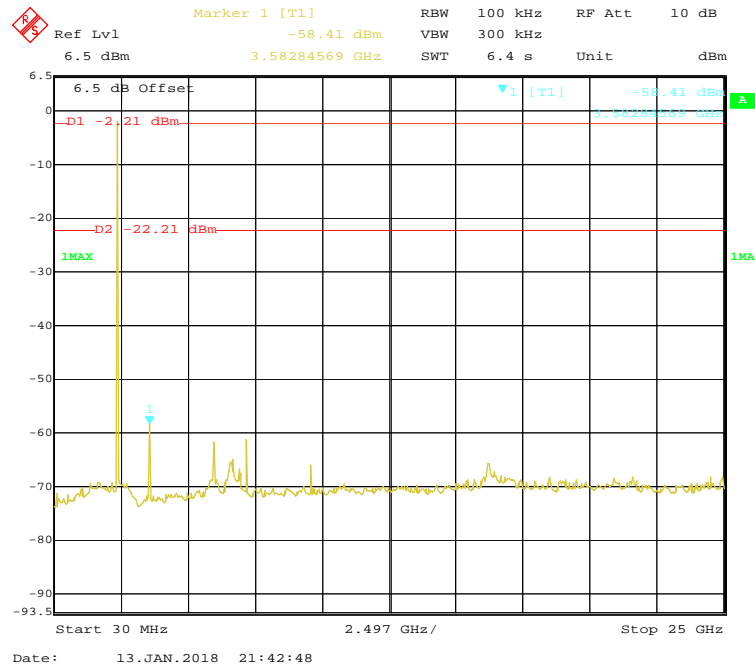
802.11n-HT40 Mode Middle Channel



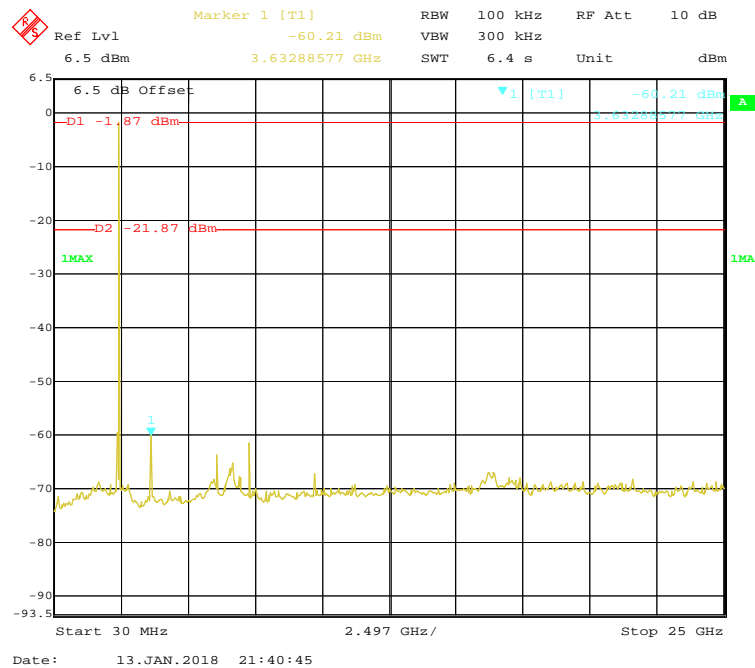
802.11n-HT40 Mode High Channel



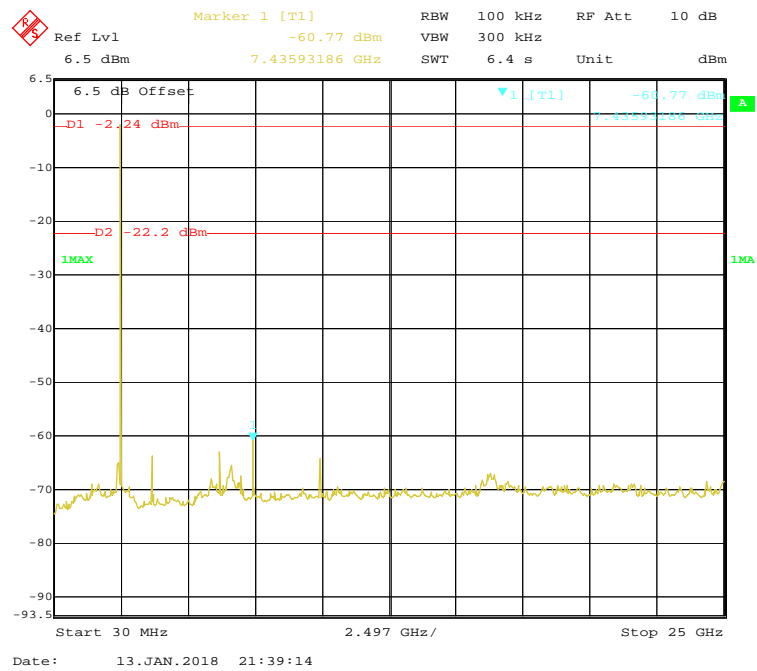
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



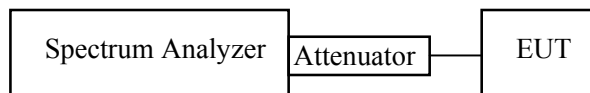
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH**Applicable Standard**

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

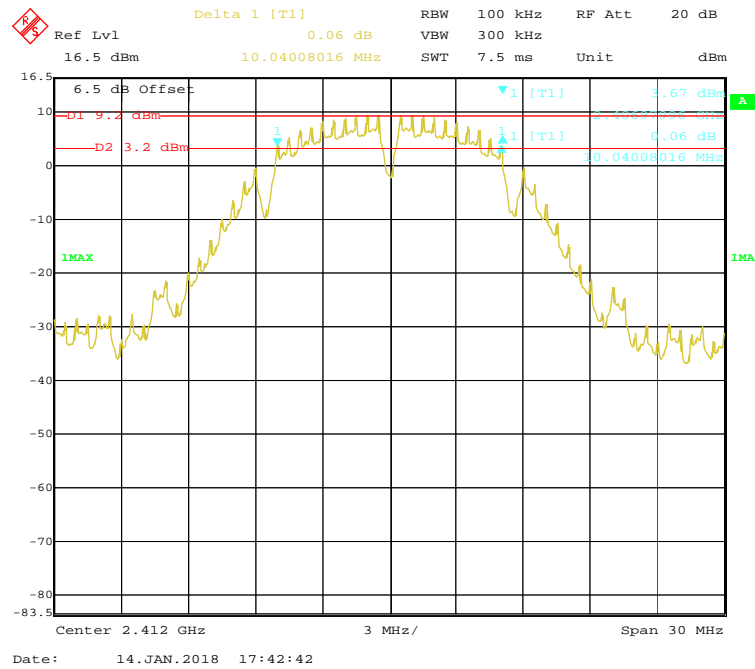
The testing was performed by Max Min on 2018-01-13 & 2018-01-14.

EUT operation mode: Transmitting

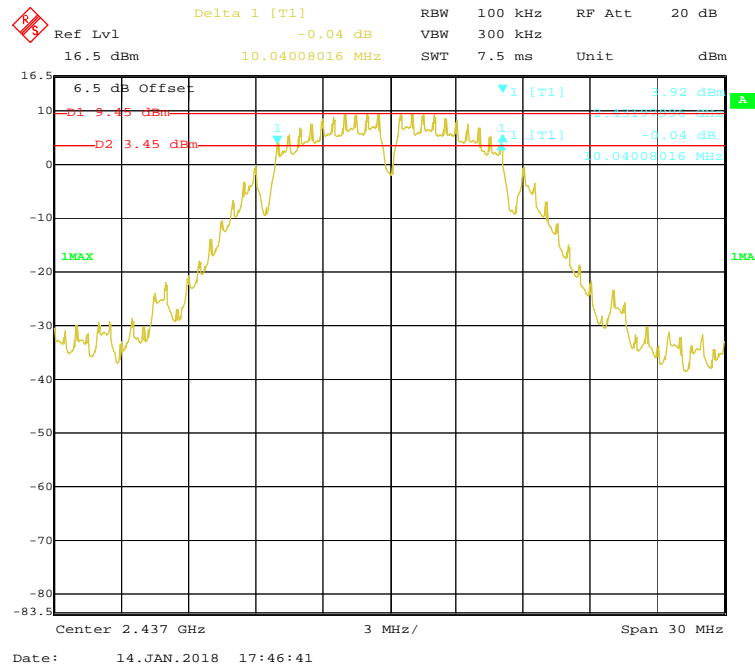
Test Result: Pass

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	10.04	≥ 0.5
Middle	2437	10.04	≥ 0.5
High	2462	10.04	≥ 0.5
802.11g Mode			
Low	2412	15.81	≥ 0.5
Middle	2437	15.81	≥ 0.5
High	2462	15.81	≥ 0.5
802.11n-HT20 Mode			
Low	2412	17.07	≥ 0.5
Middle	2437	17.07	≥ 0.5
High	2462	17.07	≥ 0.5
802.11n-HT40 Mode			
Low	2422	35.47	≥ 0.5
Middle	2437	35.47	≥ 0.5
High	2452	35.47	≥ 0.5
BLE Mode			
Low	2402	0.73	≥ 0.5
Middle	2440	0.73	≥ 0.5
High	2480	0.73	≥ 0.5

802.11b Mode Low Channel



802.11b Mode Middle Channel



Delta 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -0.35 dB VBW 300 kHz
 16.5 dBm 10.04008016 MHz SWT 7.5 ms Unit dBm

6.5 dB Offset
 D1 9.31 dBm
 D2 3.51 dBm
 10.04008016 MHz
 10.12 dBm
 -0.35 dB
 10.04008016 MHz
 1MAX
 1MA

Center 2.462 GHz 3 MHz/
 Span 30 MHz

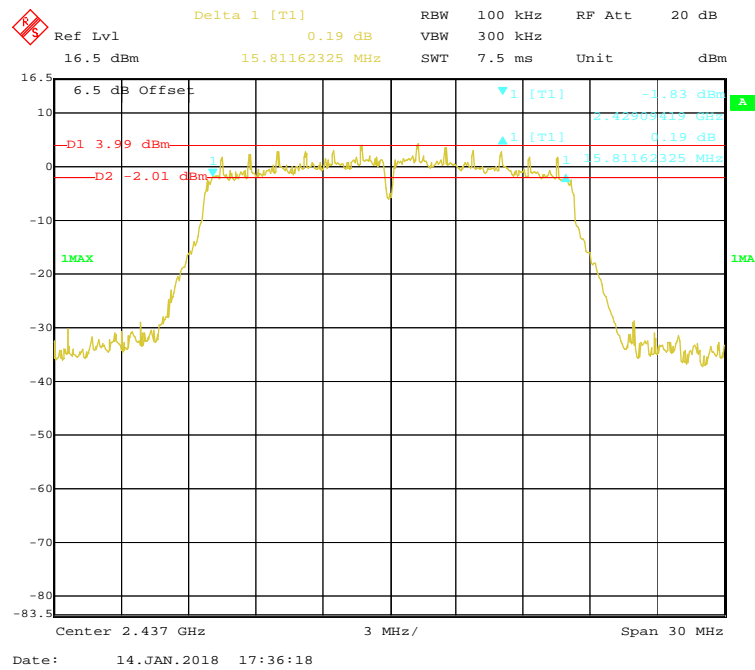
Date: 14.JAN.2018 17:48:15

Delta 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -0.19 dB VBW 300 kHz
 16.5 dBm 15.81162325 MHz SWT 7.5 ms Unit dBm

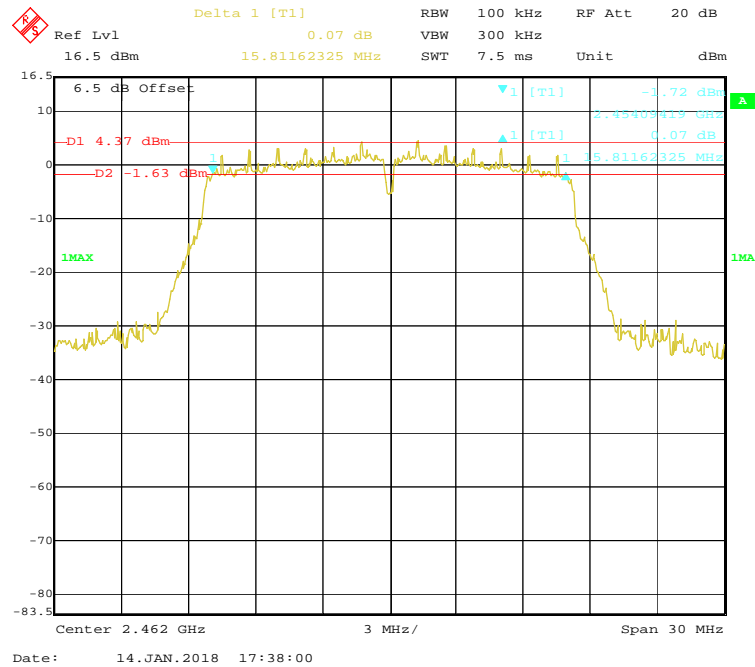
6.5 dB Offset
 -D1 4.04 dBm
 -D2 -1.96 dBm
 1MAX
 1MAX
 -1.49 dBm
 2.407023319 GHz
 -0.19 dB
 2.411623325 MHz
 Center 2.412 GHz 3 MHz/ Span 30 MHz

Date: 14.JAN.2018 17:40:13

802.11g Mode Middle Channel



802.11g Mode High Channel



Delta 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -0.47 dB VBW 300 kHz
 16.5 dBm 17.07414830 MHz SWT 7.5 ms Unit dBm

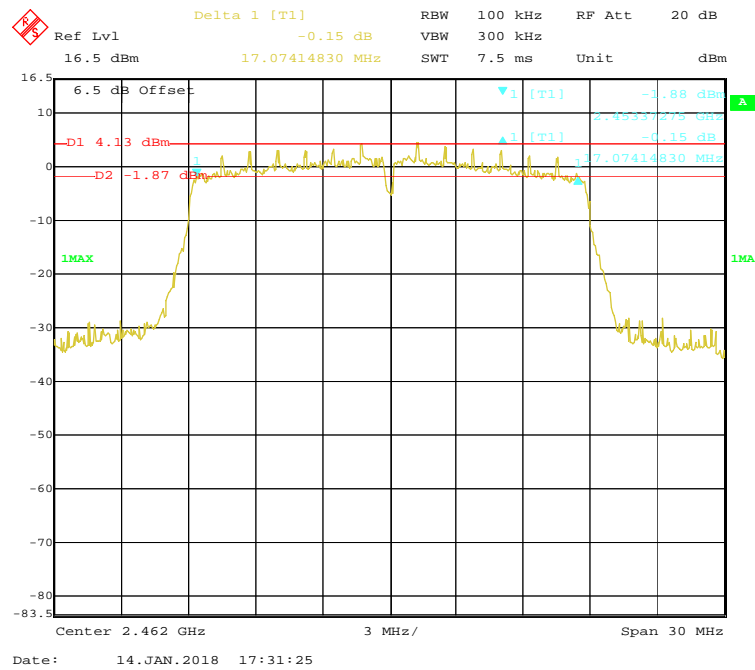
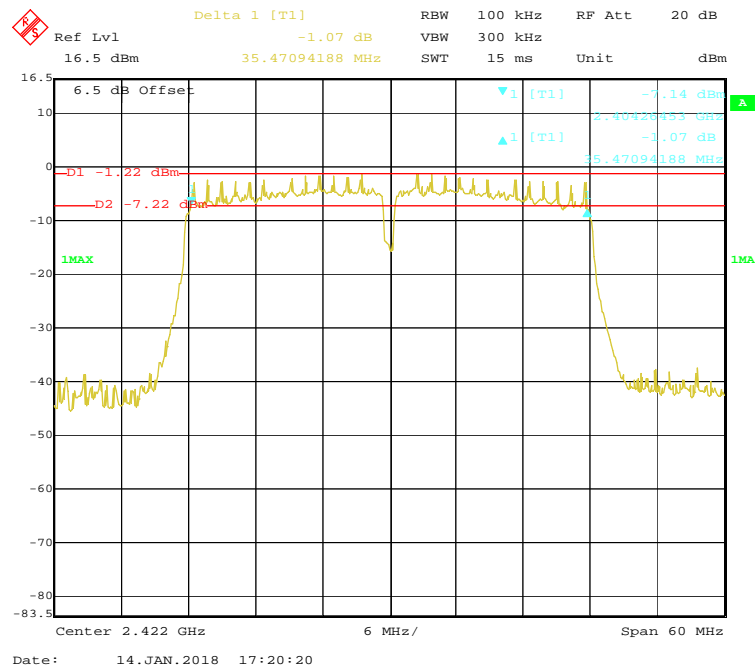
6.5 dB Offset 17.07414830 MHz
 -D1 4.04 dBm -1.90 dBm
 -D2 -1.96 dBm -0.47 dB
 1MAX 1MAX

Center 2.412 GHz 3 MHz/ Span 30 MHz

Date: 14.JAN.2018 17:27:07

Delta 1 [T1] 0.35 dB RBW 100 kHz RF Att 20 dB
 Ref Lvl 16.5 dBm VBW 300 kHz
 16.5 dBm 17.07414830 MHz SWT 7.5 ms Unit dBm

6.5 dB Offset
 D1 4.07 dBm
 D2 -1.93 dBm
 1MAX
 Center 2.437 GHz 3 MHz/ Span 30 MHz

802.11n-HT20 Mode High Channel**802.11n-HT40 Mode Low Channel**

Delta 1 [T1] -0.50 dB
 RBW 100 kHz RF Att 20 dB
 Ref Lvl 16.5 dBm VBW 300 kHz Unit dBm
 SWT 15 ms

6.5 dB Offset
 -1.07 dBm
 -7.07 dBm
 1MAX
 1MAX
 35.47094188 MHz
 -1.66 dBm
 -0.50 dB
 35.47094188 MHz

Center 2.437 GHz 6 MHz/ Span 60 MHz

Date: 14.JAN.2018 17:22:43

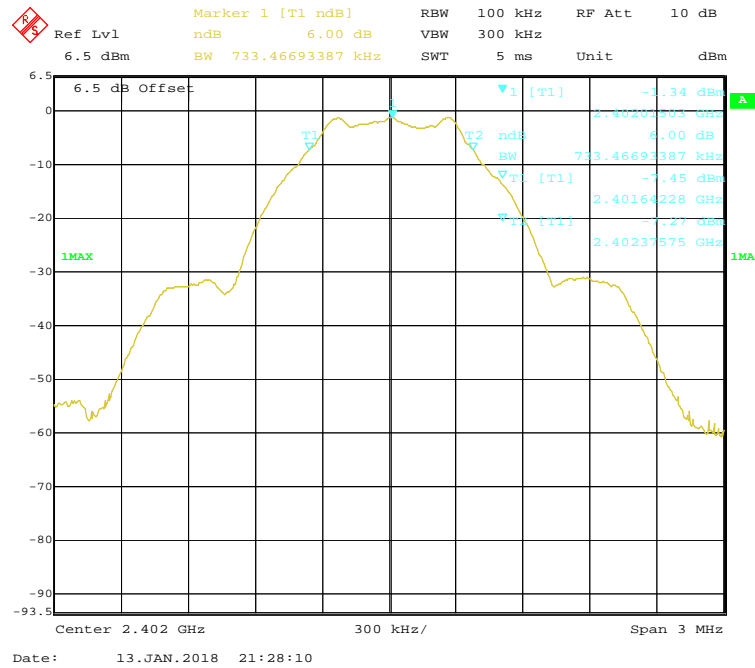
Delta 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -0.60 dB VBW 300 kHz
 16.5 dBm 35.47094188 MHz SWT 15 ms Unit dBm

6.5 dB Offset
 -D1 -1.22 dBm
 -D2 -7.22 dBm
 1MAX
 16.5
 10
 0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -83.5

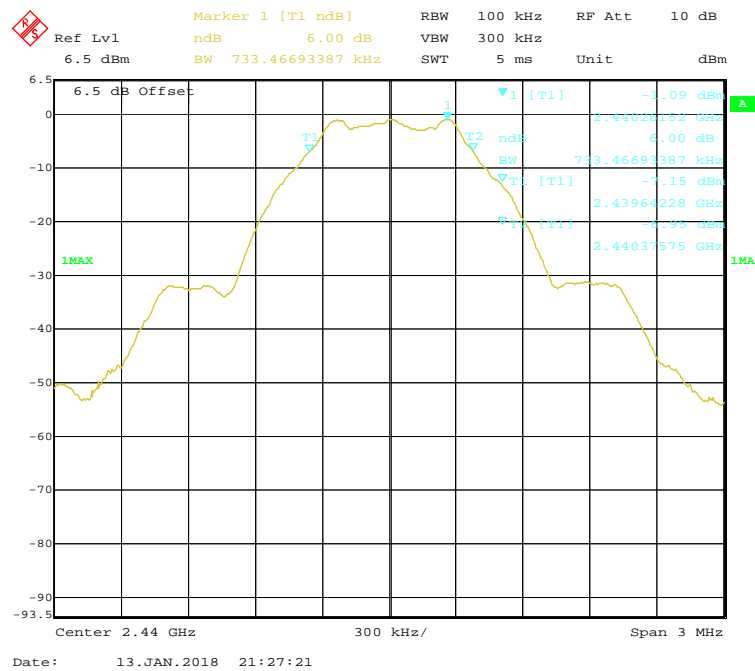
Center 2.452 GHz
 6 MHz/
 Span 60 MHz

Date: 14. JAN. 2018 17:24:28

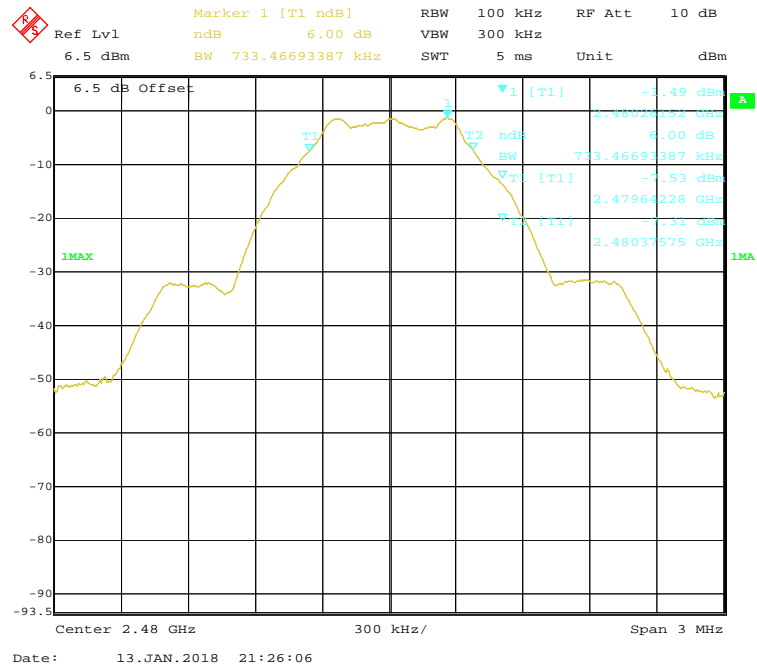
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



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.

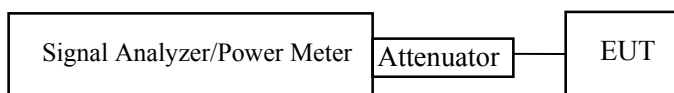
Test Procedure

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 2018-01-13.

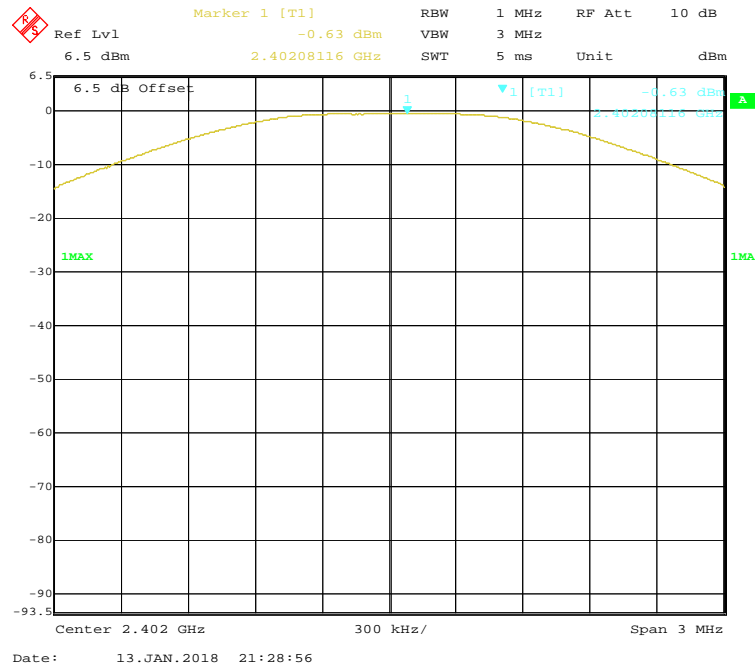
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)	Result
802.11b Mode					
Low	2412	21.64	18.62	30	Pass
Middle	2437	21.72	18.87	30	Pass
High	2462	21.90	18.87	30	Pass
802.11g Mode					
Low	2412	22.84	14.11	30	Pass
Middle	2437	22.88	14.37	30	Pass
High	2462	23.16	14.57	30	Pass
802.11n-HT20 Mode					
Low	2412	22.69	14.17	30	Pass
Middle	2437	22.87	14.12	30	Pass
High	2462	23.13	14.35	30	Pass
802.11n-HT40 Mode					
Low	2422	20.63	13.60	30	Pass
Middle	2437	20.97	13.84	30	Pass
High	2452	21.02	13.85	30	Pass

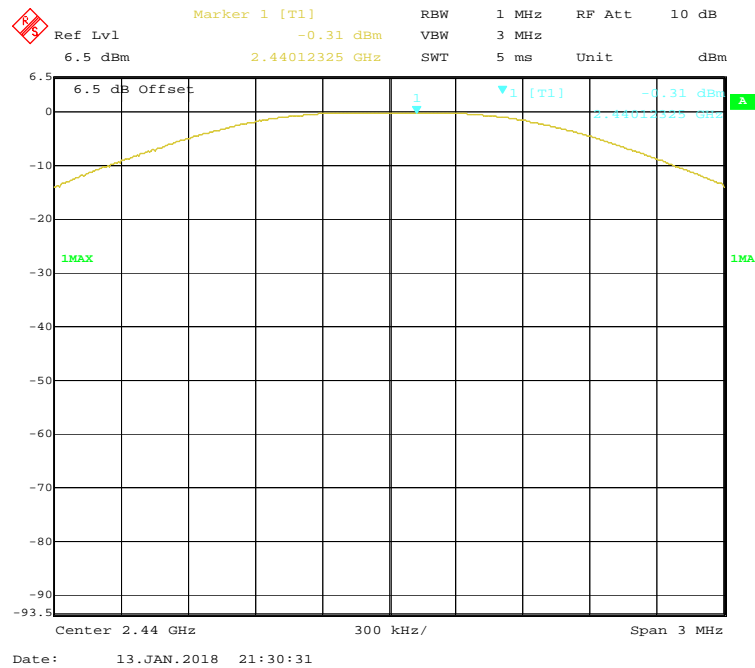
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Result
BLE Mode				
Low	2402	-0.63	30	Pass
Middle	2440	-0.31	30	Pass
High	2480	-0.77	30	Pass

Note: 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes were tested with power meter; BLE mode was tested with signal analyzer.

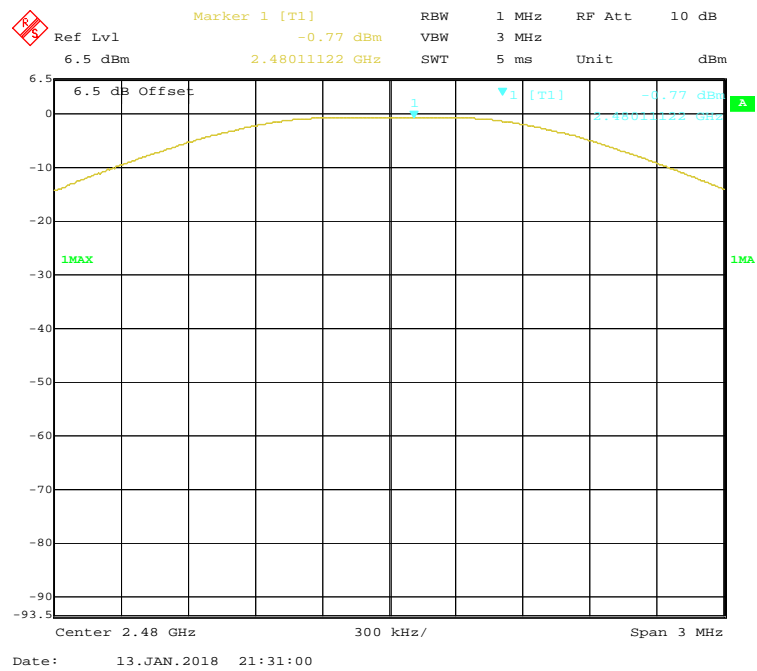
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



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 2018-01-13 & 2018-01-14.

EUT operation mode: Transmitting

Test Result: Compliance

REF Lvl 26.5 dBm
 Marker 1 [T1] 2.39945892 GHz
 RBW 100 kHz
 RF Att 30 dB
 VBW 300 kHz
 Unit dBm
 SWT 15 ms
 6.5 dB Offset
 1MAX
 D1 9.24 dBm
 D2 -10.76 dBm
 1 [T1] -28.49 dBm
 2.39945892 GHz
 Center 2.4 GHz
 6 MHz/
 Span 60 MHz
 Date: 14.JAN.2018 17:02:05

Ref Lvl 26.5 dBm
 RBW 100 kHz
 RF Att 30 dB
 VBW 300 kHz
 SWT 15 ms
 Unit dBm

Marker 1 [T1]
 -46.76 dBm
 2.48452204 GHz

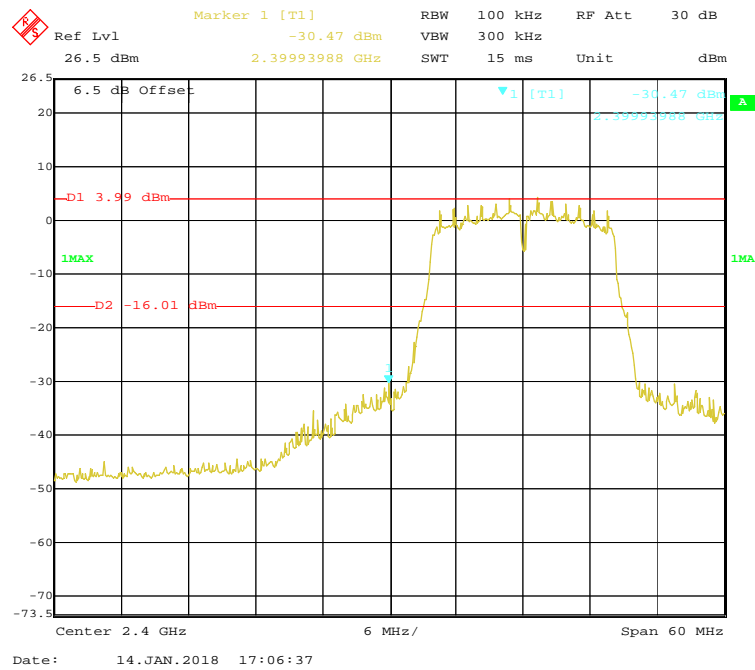
6.5 dB Offset
 1 [T1]
 -46.76 dBm
 2.48452204 GHz

D1 9.8 dBm
 D2 -10.4 dBm

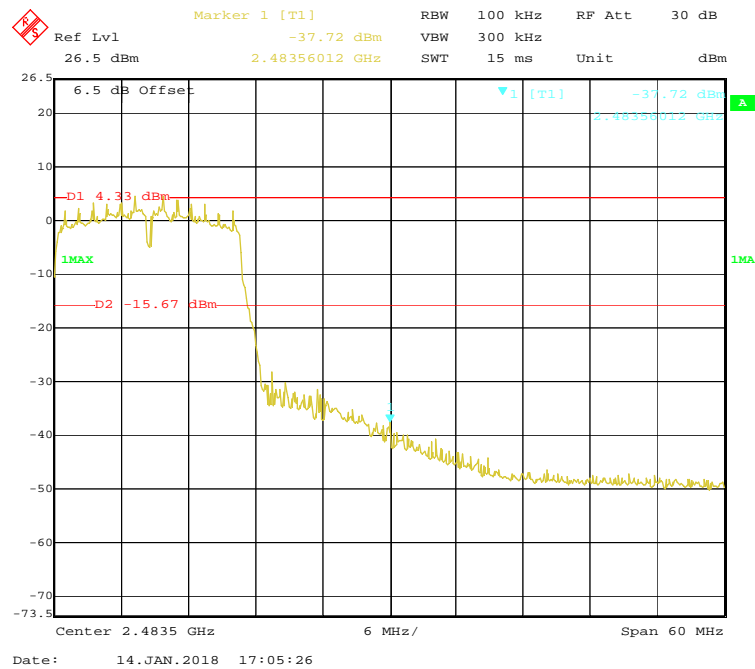
Center 2.4835 GHz
 6 MHz/
 Span 60 MHz

Date: 14.JAN.2018 17:03:19

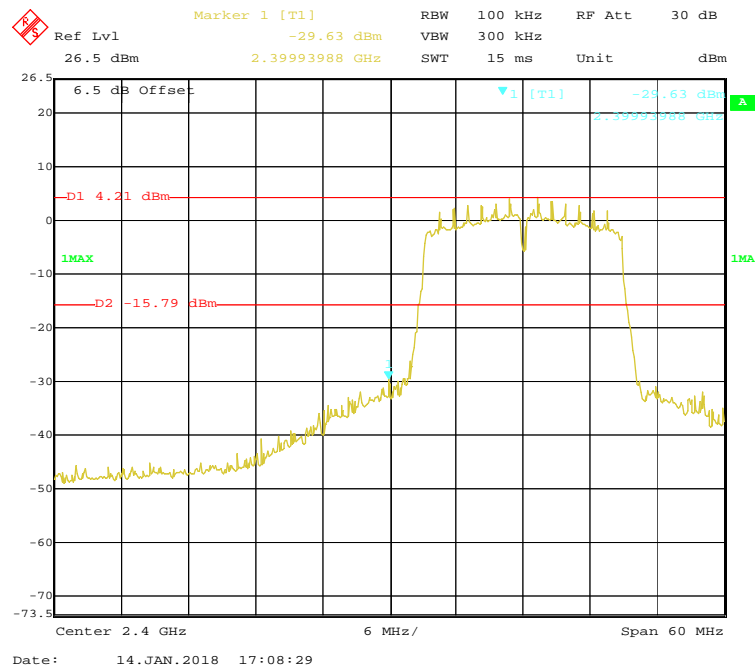
802.11g Mode Left Side



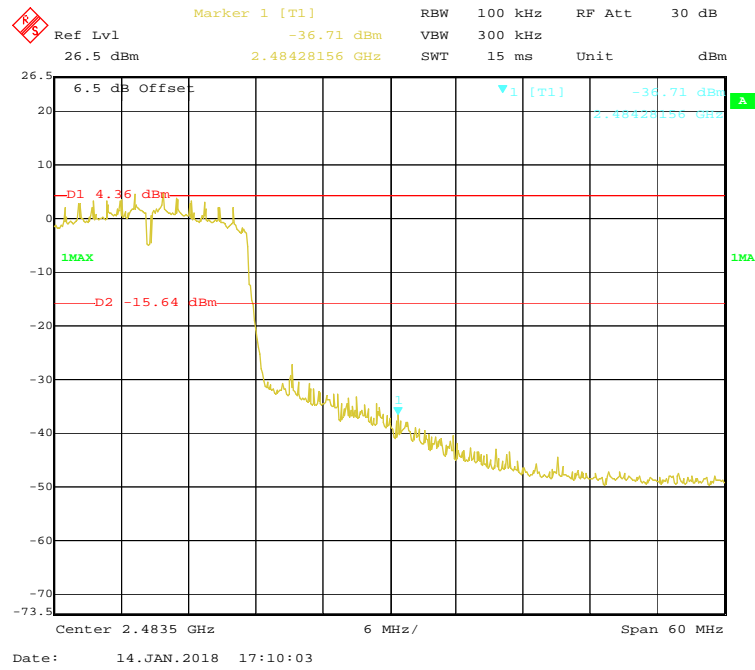
802.11g Mode Right Side



802.11n-HT20 Mode Left Side



802.11n-HT20 Mode Right Side



Marker 1 [T1]
 -39.42 dBm
 RBW 100 kHz RF Att 20 dB
 Ref Lvl 16.5 dBm
 2.39488978 GHz
 Unit dBm
 6.5 dB Offset
 -39.42 dBm
 2.39488978 GHz
 -1.42 dBm
 1MAX
 -21.42 dBm
 1MAX
 1 [T1]
 Center 2.4 GHz
 10 MHz/
 Span 100 MHz
 Date: 14.JAN.2018 17:11:39

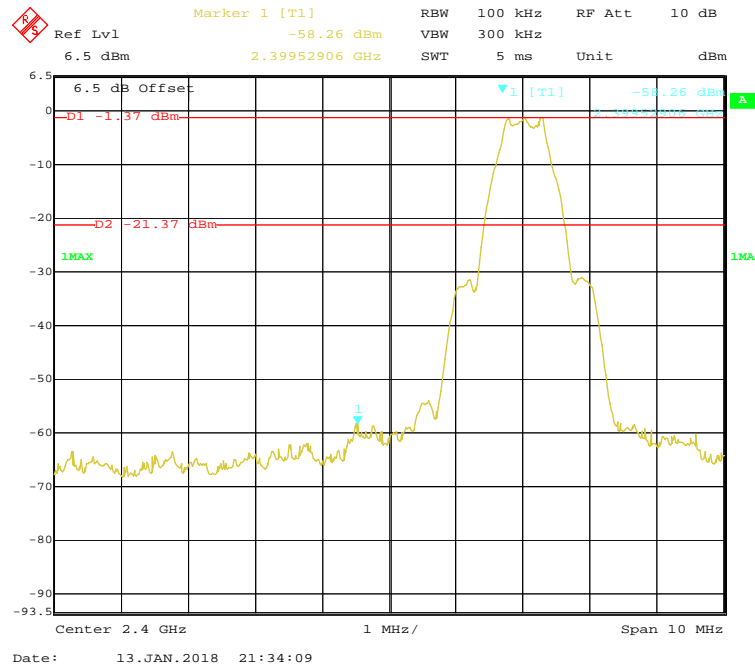
REF Lvl 16.5 dBm
 Marker 1 [T1] 2.48680661 GHz
 RBW 100 kHz
 VBW 300 kHz
 SWT 25 ms
 RF Att 20 dB
 Unit dBm

6.5 dB Offset
 -39.04 dBm
 -21.19 dBm
 1MAX
 1

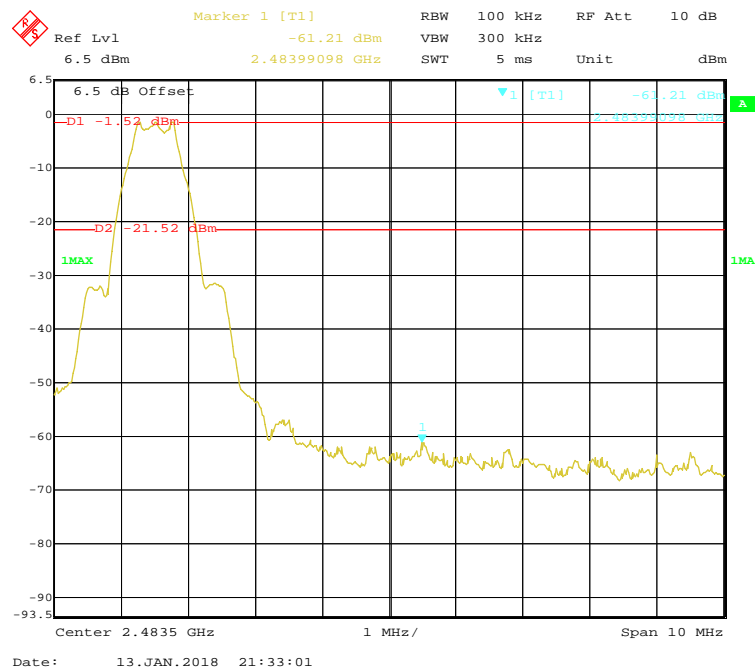
Center 2.4835 GHz
 10 MHz/
 Span 100 MHz

Date: 14.JAN.2018 17:13:23

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

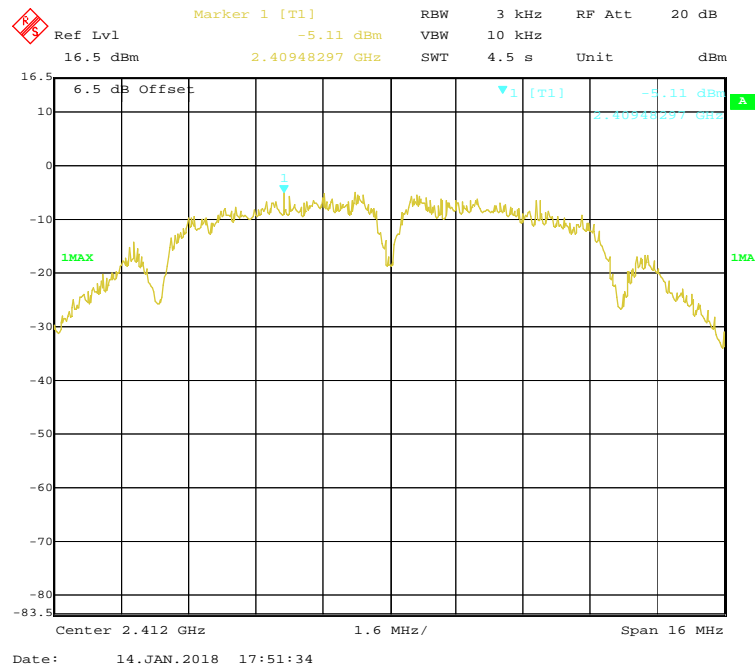
The testing was performed by Max Min on 2018-01-13 & 2018-01-14.

EUT operation mode: Transmitting

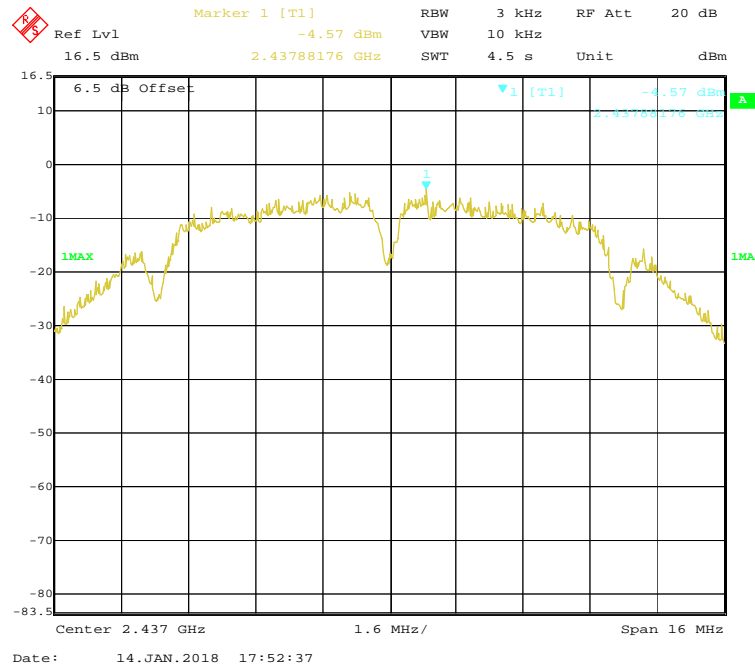
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-5.11	≤ 8
Middle	2437	-4.57	≤ 8
High	2462	-5.22	≤ 8
802.11g Mode			
Low	2412	-11.33	≤ 8
Middle	2437	-10.19	≤ 8
High	2462	-9.47	≤ 8
802.11n-HT20 mode			
Low	2412	-10.73	≤ 8
Middle	2437	-10.22	≤ 8
High	2462	-10.27	≤ 8
802.11n-HT40 Mode			
Low	2422	-15.52	≤ 8
Middle	2437	-15.37	≤ 8
High	2452	-15.08	≤ 8
BLE Mode			
Low	2402	-15.88	≤ 8
Middle	2440	-15.63	≤ 8
High	2480	-16.10	≤ 8

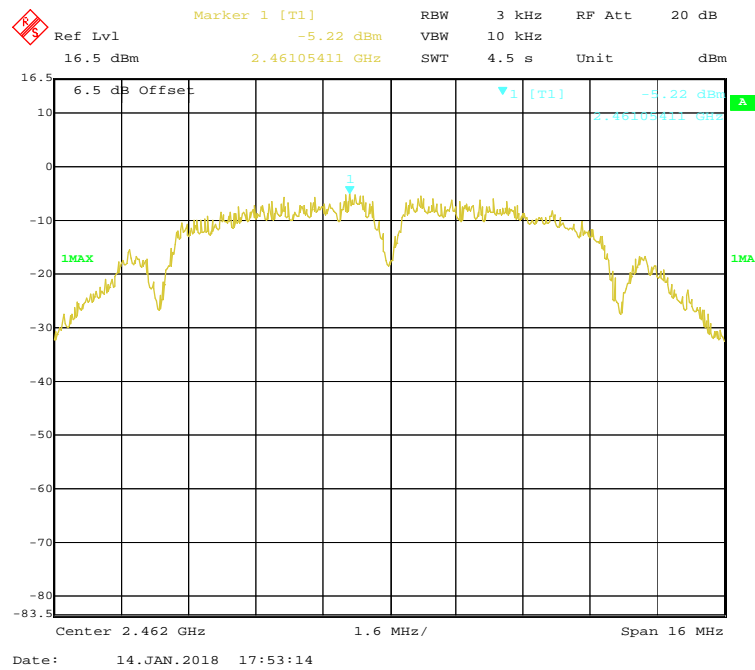
802.11b Mode Low Channel



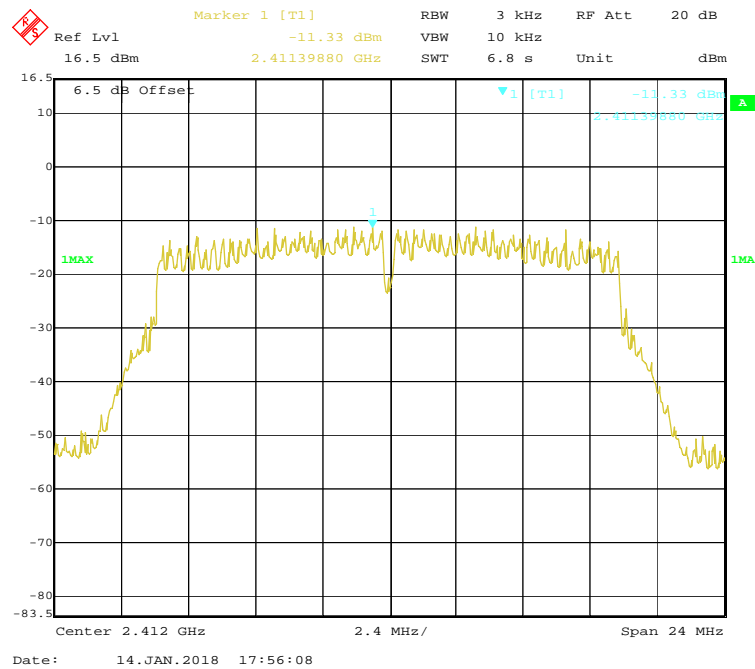
802.11b Mode Middle Channel



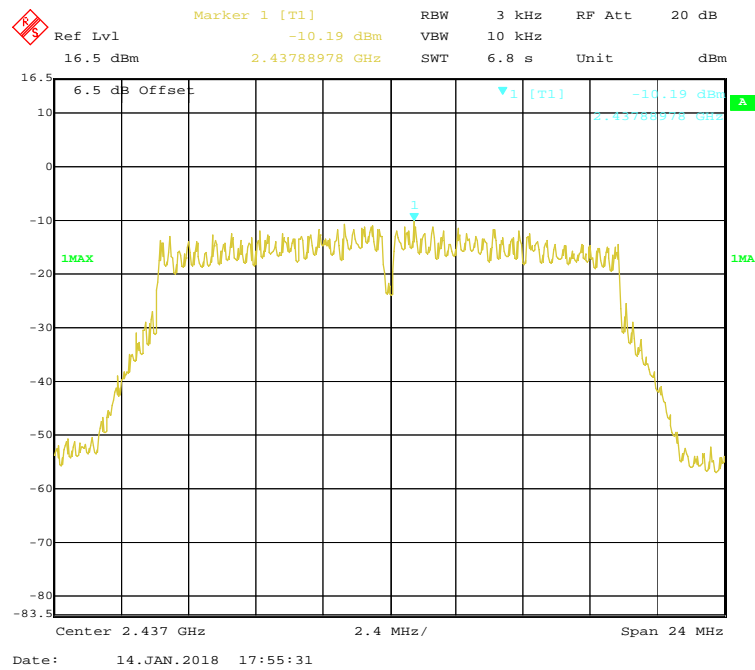
802.11b Mode High Channel



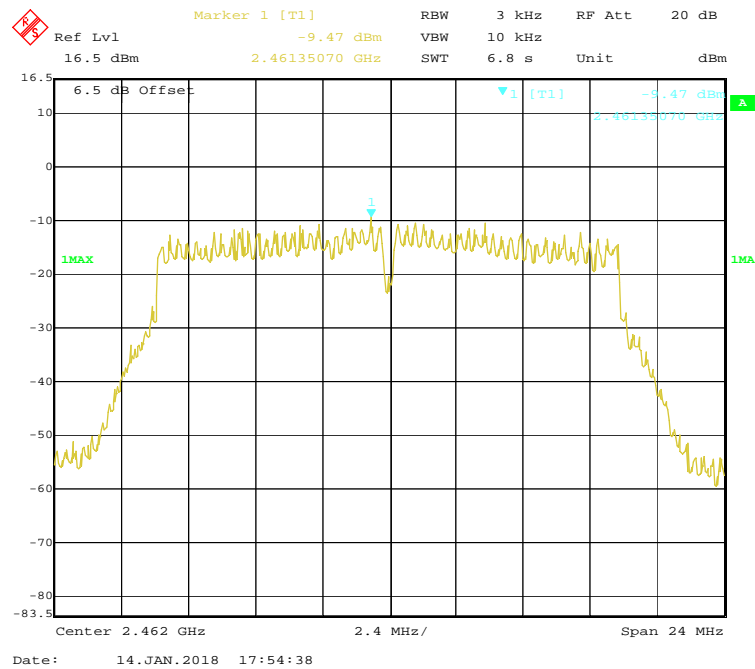
802.11g Mode Low Channel



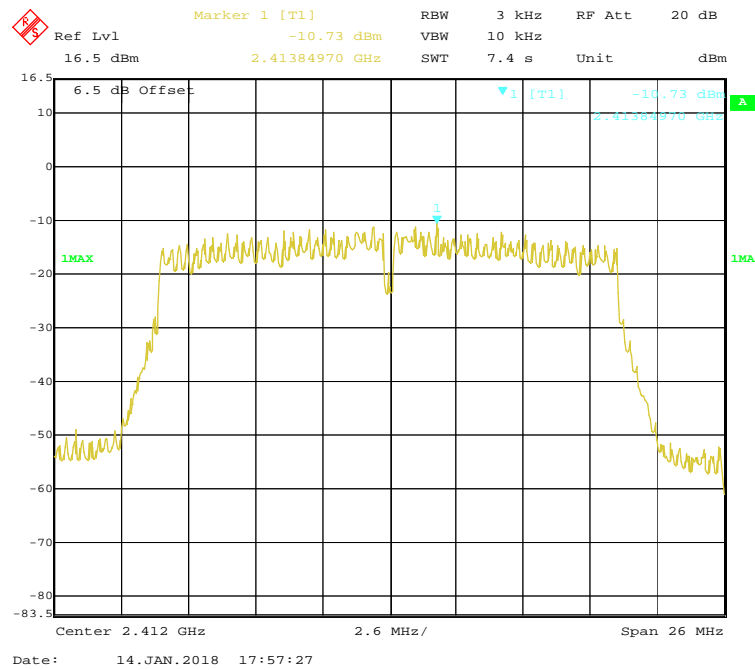
802.11g Mode Middle Channel



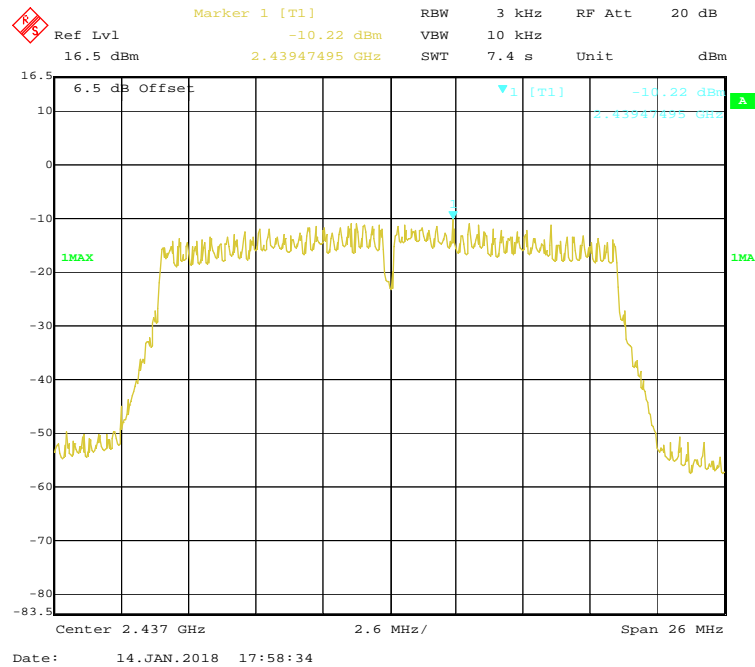
802.11g Mode High Channel



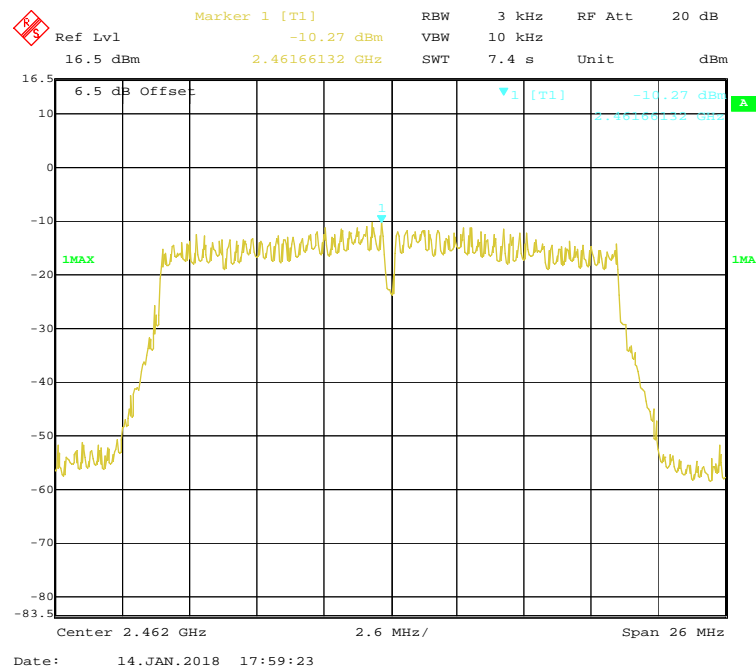
802.11n-HT20 Mode Low Channel



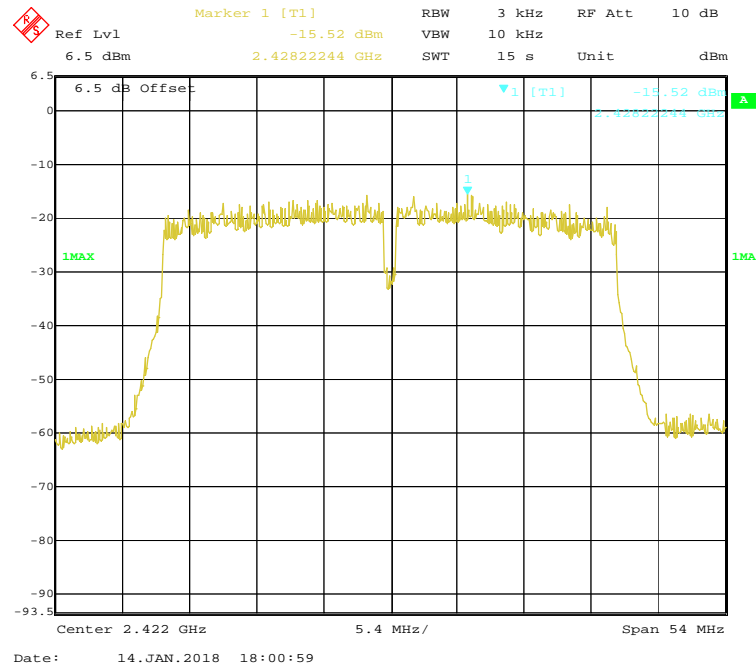
802.11n-HT20 Mode Middle Channel



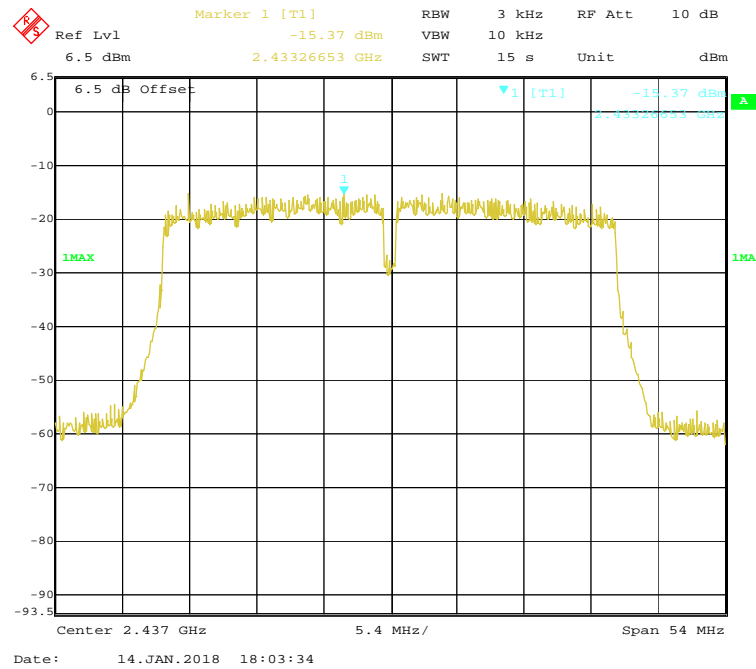
802.11n-HT20 Mode High Channel



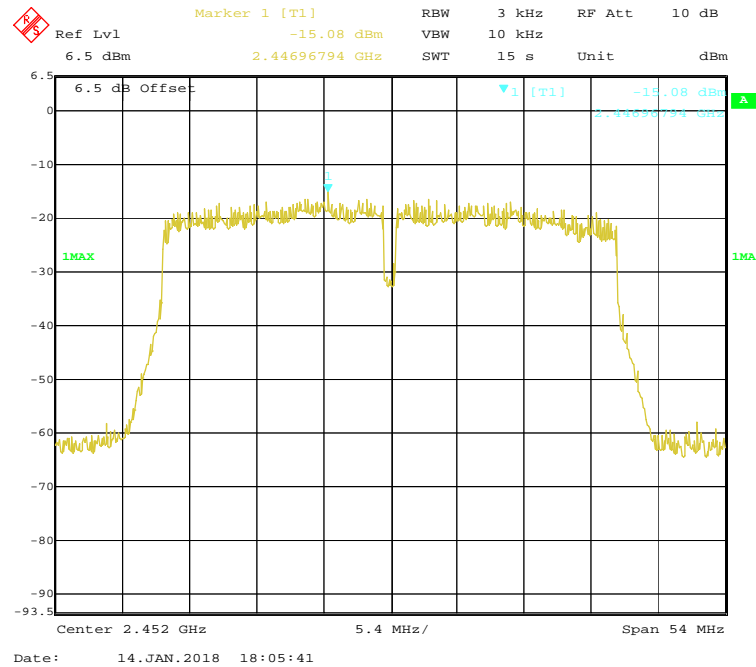
802.11n-HT40 Mode Low Channel



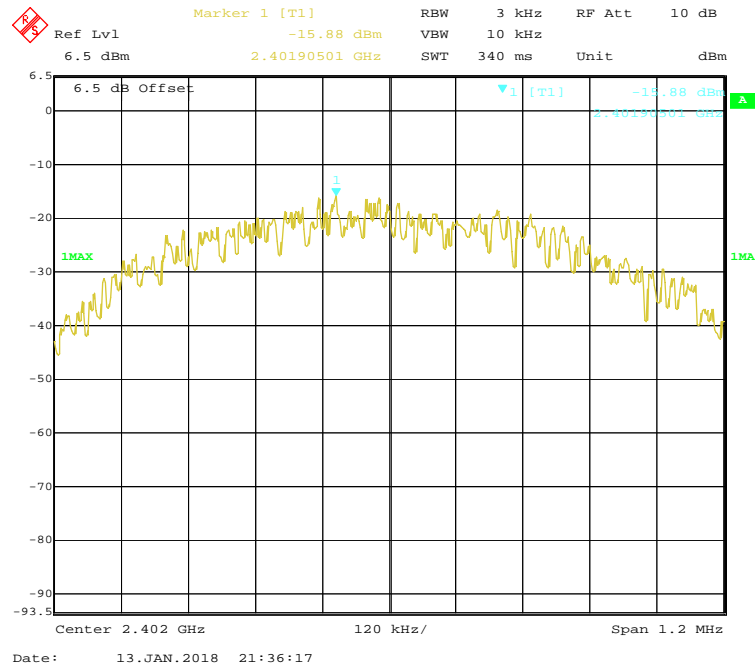
802.11n-HT40 Mode Middle Channel



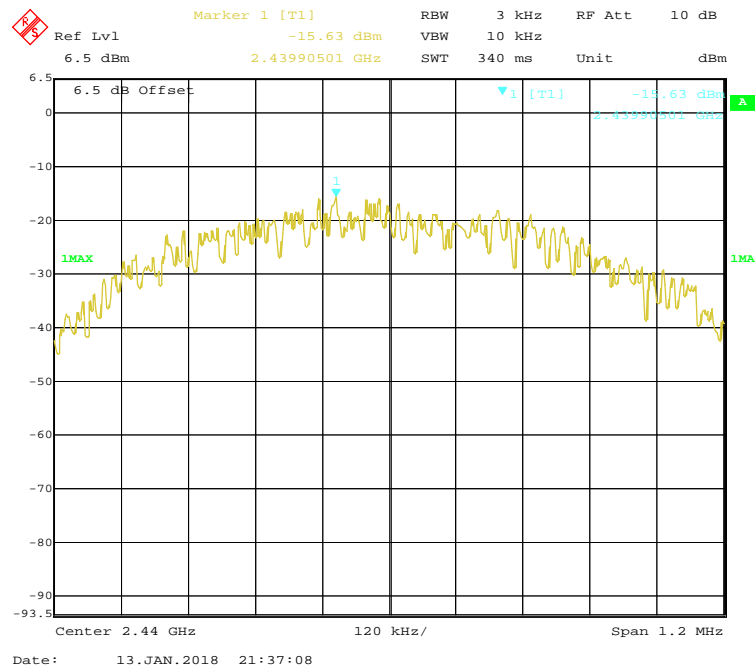
802.11n-HT40 Mode High Channel



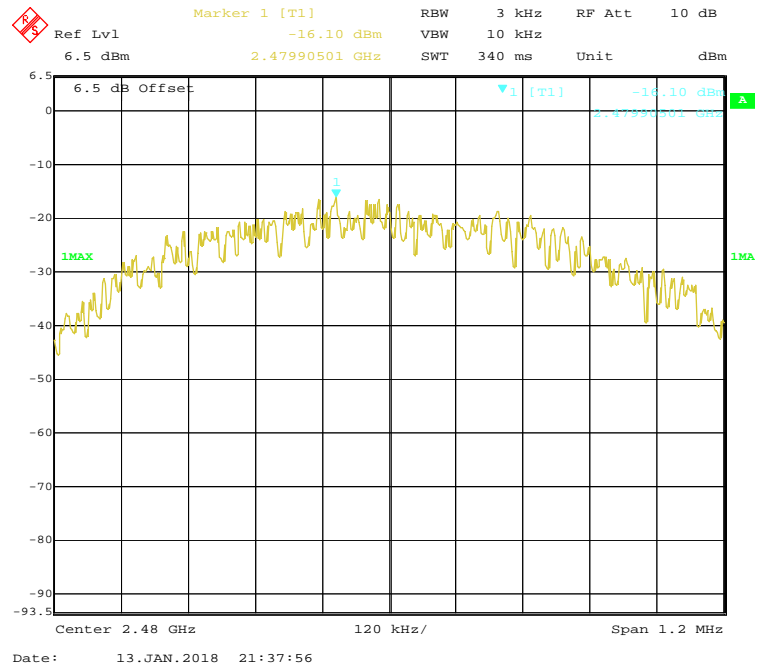
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



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