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Dates of Tests: March 15 ~ April 23, 2019
 Test Report S/N: LR500111904L
 Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID.

2AMMIMIR-001

APPLICANT

MIRO Corporation

Equipment Class	:	Digital Transmission System (DTS)
Manufacturing Description	:	Humidifier WiFi Card
Manufacturer	:	MIRO Corporation
Model name	:	MIR-001
Test Device Serial No.:	:	Identical prototype
Rule Part(s)	:	FCC Part 15.247 Subpart C ; ANSI C-63.4-2014 ANSI C-63.10-2013
Frequency Range	:	2412 MHz ~ 2462 MHz(802.11 b/g/n)
Max. Output Power	:	Max 11.49 dBm – Conducted(802.11 b) Max 14.79 dBm – Conducted(802.11 g) Max 13.79 dBm – Conducted(802.11 n)
Data of issue	:	April 23, 2019

This test report is issued under the authority of:

JaBeom.Koo

Ja-Beom, Koo / Manager

The test was supervised by:

延

Jae-hum, Yeon / Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB Code.: 200723-0

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1. General information

1-1 Test Performed

Company name : LTA Co., Ltd.
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822
 Web site : <http://www.ltalab.com>
 E-mail : chahn@ltalab.com
 Telephone : +82-31-323-6008
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2019-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	Updating	FCC CAB
VCCI	JAPAN	C-4948	2020-09-10	VCCI registration
VCCI	JAPAN	T-2416	2020-09-10	VCCI registration
VCCI	JAPAN	R-4483(10m)	2020-10-15	VCCI registration
VCCI	JAPAN	G-847	2022-06-13	VCCI registration
IC	CANADA	5799A-1	2019-06-15	IC filing
KOLAS	KOREA	NO.551	2021-08-20	KOLAS accredited Lab.

2. Information about test item

2-1 Client & Manufacturer

Company name : MIRO Corporation
 Address : 26F, M, 32, Songdogwahak-ro, Yeonsu-gu, INCHEON, Korea
 Tel / Fax : TEL No : +82-10-4861-9286 / FAX No : 070-4032-5030
 :
 :

2-2 Equipment Under Test (EUT)

Model name : MIR-001
 Serial number : Identical prototype
 Date of receipt : March 15, 2019
 EUT condition : Pre-production, not damaged
 Antenna type : Chip Antenna - Max Gain 3.3 dBi
 Frequency Range : 2412 MHz ~ 2462 MHz (802.11 b/g/n)
 RF output power : Max 11.49 dBm – Conducted (802.11 b)
 Max 14.79 dBm – Conducted (802.11 g)
 Max 13.79 dBm – Conducted (802.11 n20)
 Number of channels : 11 (802.11 b/g/n)
 Type of Modulation : QPSK, Direct Sequence Spread Spectrum(DSSS)
 Power Source : DC 5 V
 Firmware Version : V1.0.0

2-3 Tested frequency

802.11 b/g/n	LOW	MID	HIGH
Frequency (MHz)	2412	2442	2462

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Notebook	CR720	MS-1736	MSI

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	6 dB Bandwidth	> 500 kHz	Conducted	C
15.247(b)	Transmitter Peak Output Power	< 1 Watt		C
15.247(d)	Transmitter Power Spectral Density	< 8 dBm @ 3 kHz		C
15.247(d)	Band Edge	> 20 dBc		C
15.209	Field Strength of Harmonics	Emission	Radiated	C
15.207	AC Conducted Emissions	Emissions	Conducted	NA
15.203	Antenna requirement	-	-	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

→ Antenna Requirement

MIRO Corporation. FCC ID: 2AMMIMIR-001 unit complies with the requirement of §15.203.

The antenna type is Chip Antenna

The sample was tested according to the following specification:

*FCC Parts 15.247; ANSI C-63.4-2014

*FCC KDB Publication No. 558074 D01 v05r02

*FCC TCB Workshop 2012, April

3.2 Technical Characteristics Test

3.2.1 6 dB Bandwidth

Procedure:

The bandwidth at 6 dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 5 MHz, 30 MHz

VBW = 100 kHz (VBW \geq RBW)

Sweep = auto

Trace = max hold

Detector function = peak

Measurement Data : **Complies**

(802.11 b)

Frequency (MHz)	Test Results	
	Measured Bandwidth (MHz)	Result
2412	10.724	Complies
2442	10.724	Complies
2462	10.724	Complies

(802.11 g)

Frequency (MHz)	Test Results	
	Measured Bandwidth (MHz)	Result
2412	16.570	Complies
2442	16.570	Complies
2462	16.643	Complies

(802.11 n)

Frequency (MHz)	Test Results	
	Measured Bandwidth (MHz)	Result
2412	17.873	Complies
2442	17.873	Complies
2462	17.873	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

6 dB Bandwidth > 500 kHz

Measurement Setup

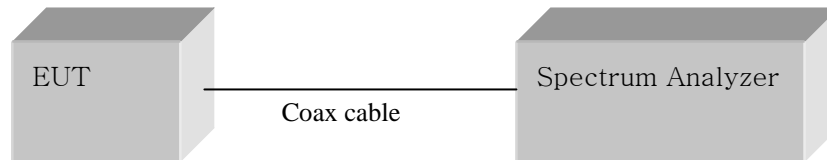
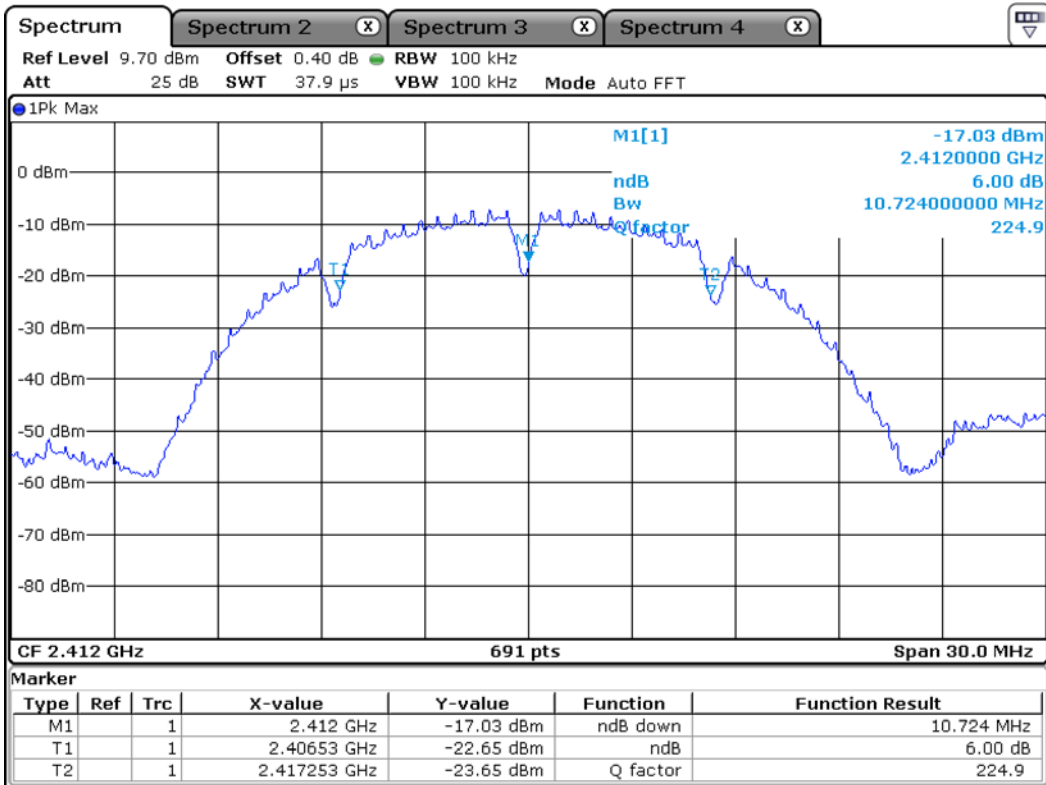


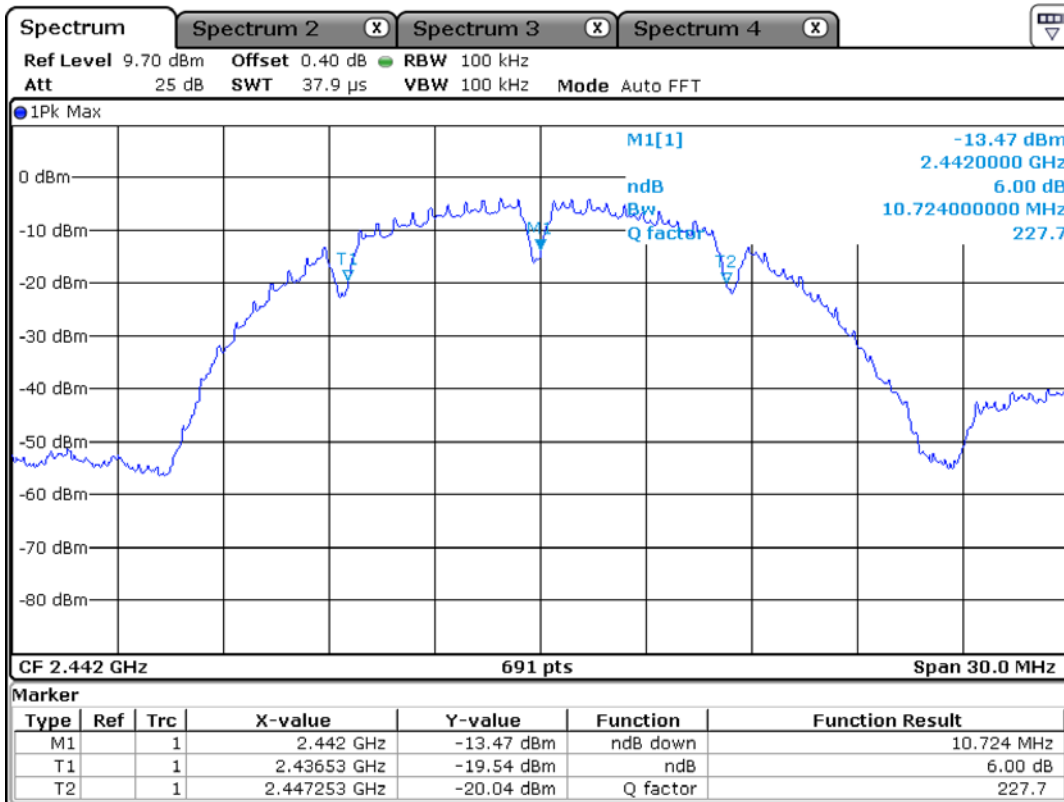
Figure 1: Measurement setup for the carrier frequency separation

Low Channel – 802.11 b



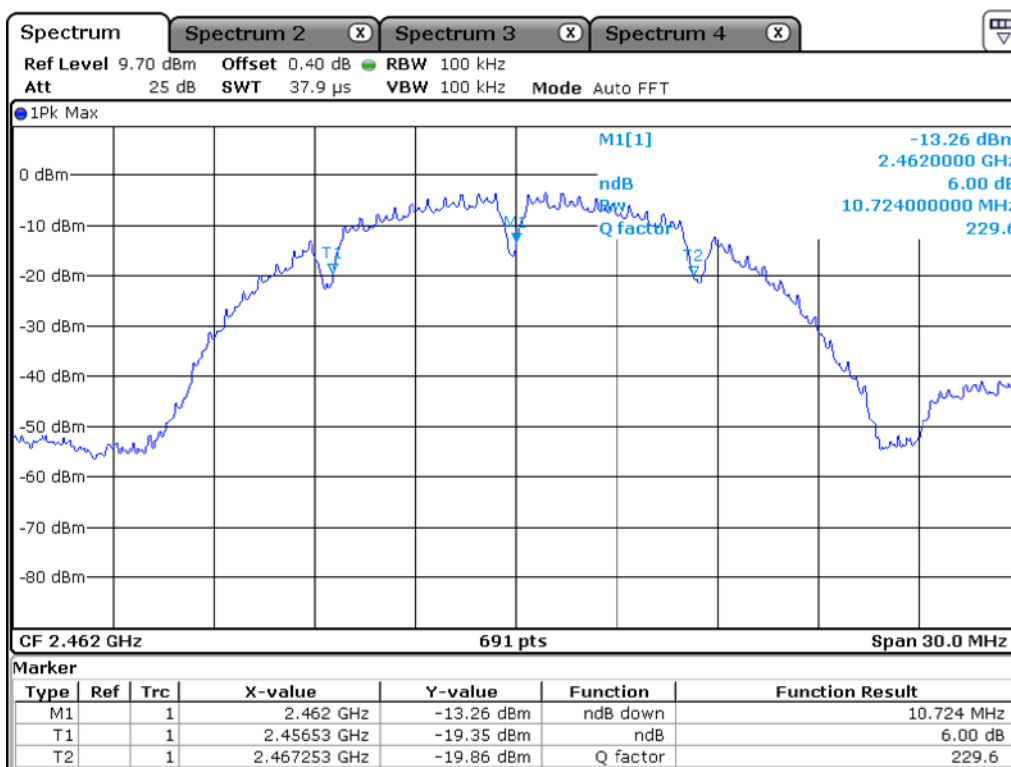
Date: 23.APR.2019 11:06:36

Middle Channel – 802.11 b



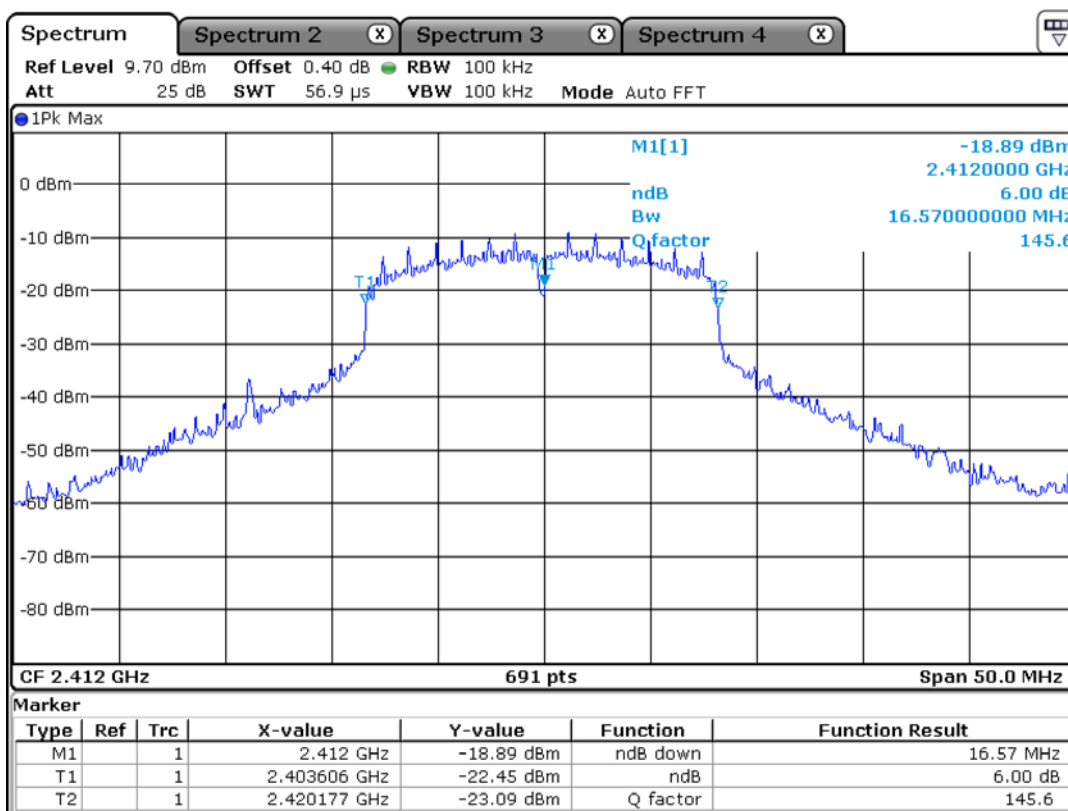
Date: 23.APR.2019 11:07:24

High Channel – 802.11 b



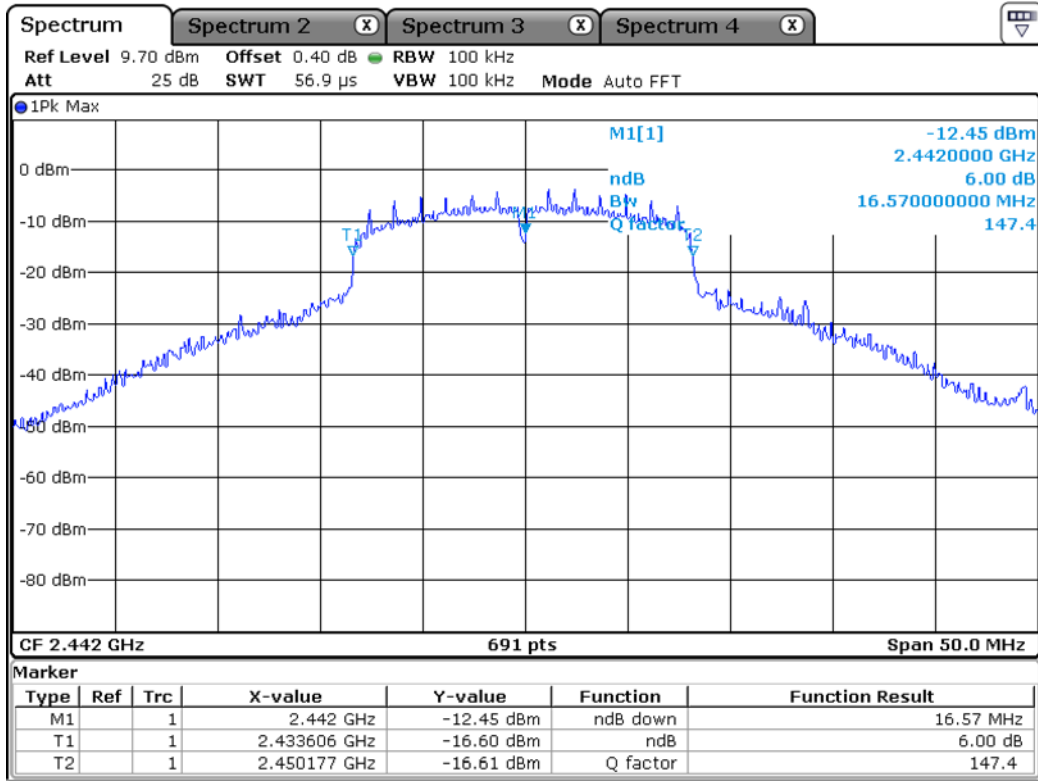
Date: 23.APR.2019 11:07:44

Low Channel – 802.11 g



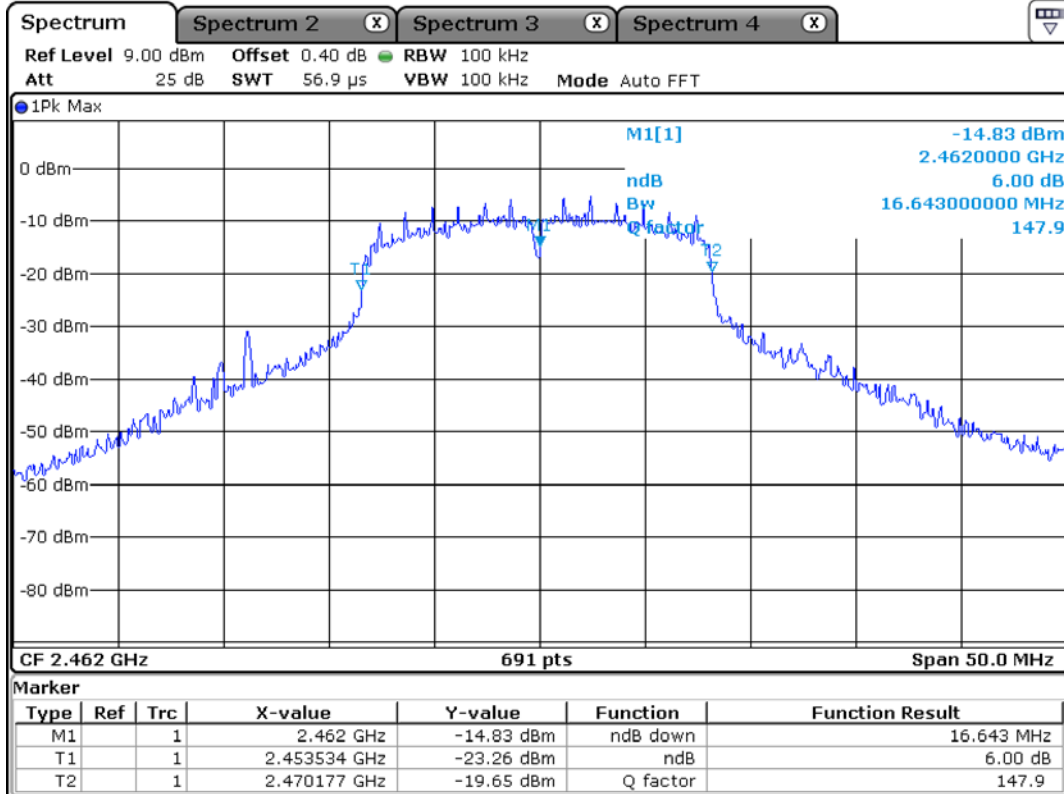
Date: 23.APR.2019 11:08:20

Middle Channel – 802.11 g



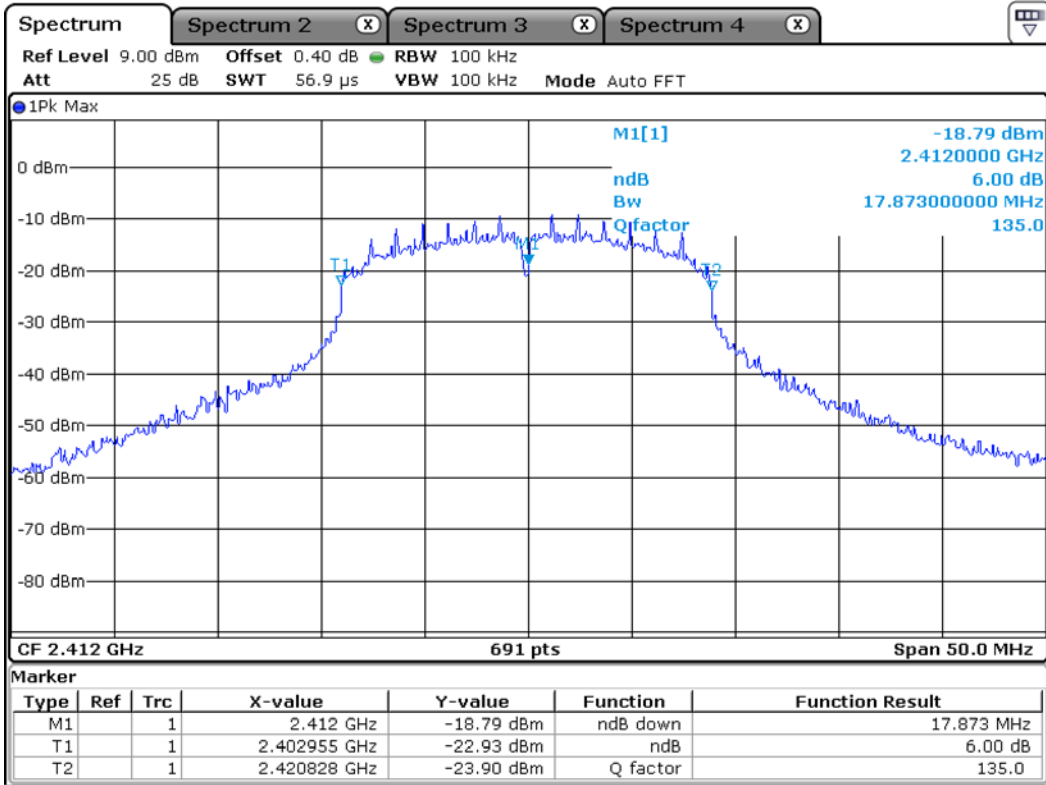
Date: 23.APR.2019 11:18:14

High Channel – 802.11 g



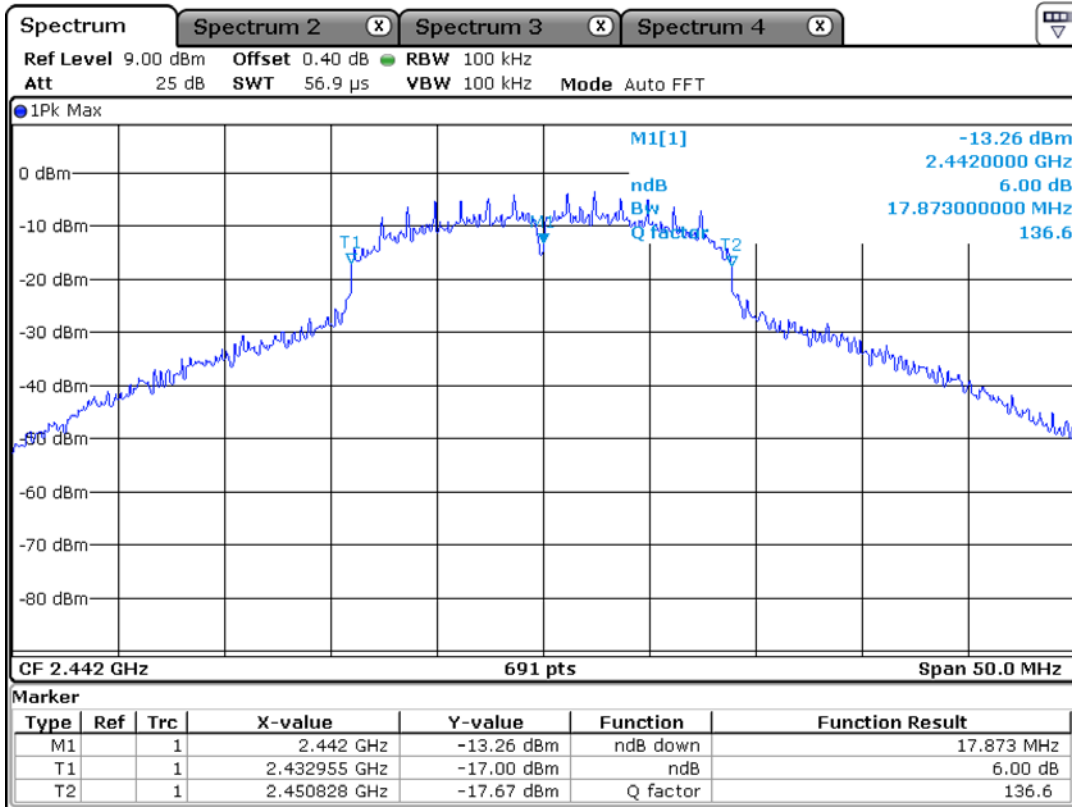
Date: 23.APR.2019 11:18:46

Low Channel – 802.11 n



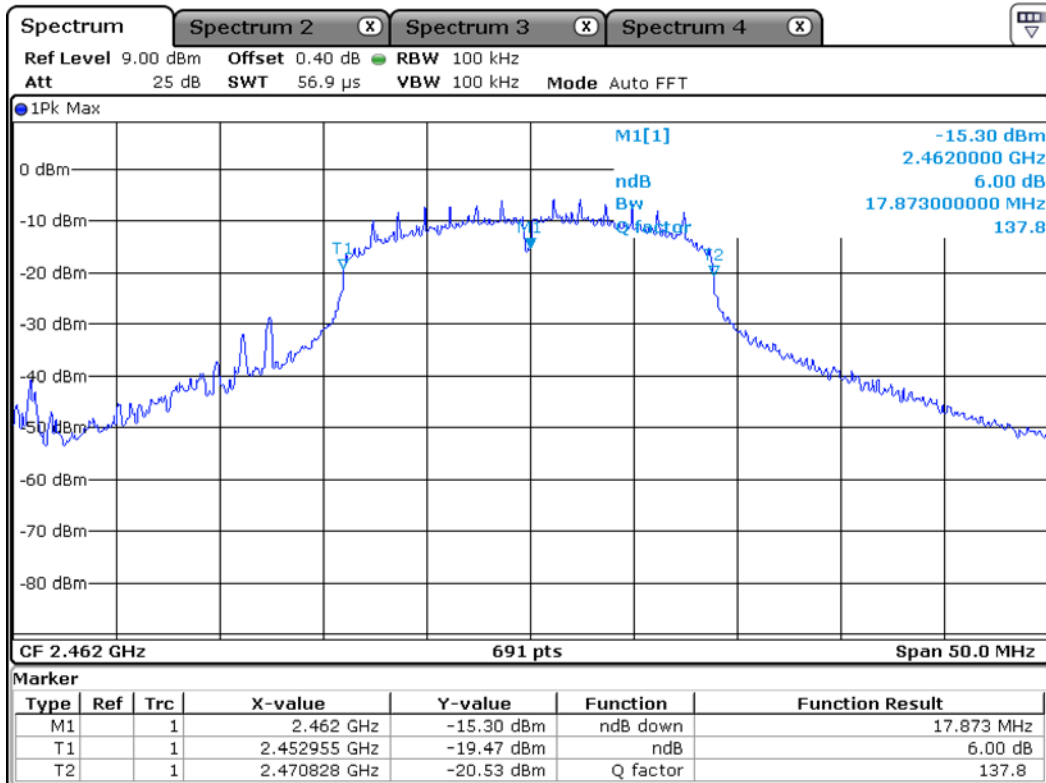
Date: 23.APR.2019 11:19:23

Middle Channel – 802.11 n



Date: 23.APR.2019 11:19:46

High Channel – 802.11 n



Date: 23.APR.2019 11:30:10

3.2.2 Peak Output Power Measurement

Procedure:

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1MHz

Span = auto

VBW = 3MHz (VBW \geq 3 * RBW)

Sweep = auto

Detector function = peak

Measurement Data : **Complies**

(802.11 b)

Frequency (MHz)	Test Results		
	dBm	W	Result
2412	8.09	0.006	Complies
2442	11.49	0.014	Complies
2462	11.03	0.013	Complies

(802.11 g)

Frequency (MHz)	Test Results		
	dBm	W	Result
2412	10.12	0.010	Complies
2442	14.79	0.030	Complies
2462	13.22	0.021	Complies

(802.11 n)

Frequency (MHz)	Test Results		
	dBm	W	Result
2412	9.53	0.009	Complies
2442	13.79	0.024	Complies
2462	12.42	0.017	Complies

- See next pages for actual measured spectrum plots.

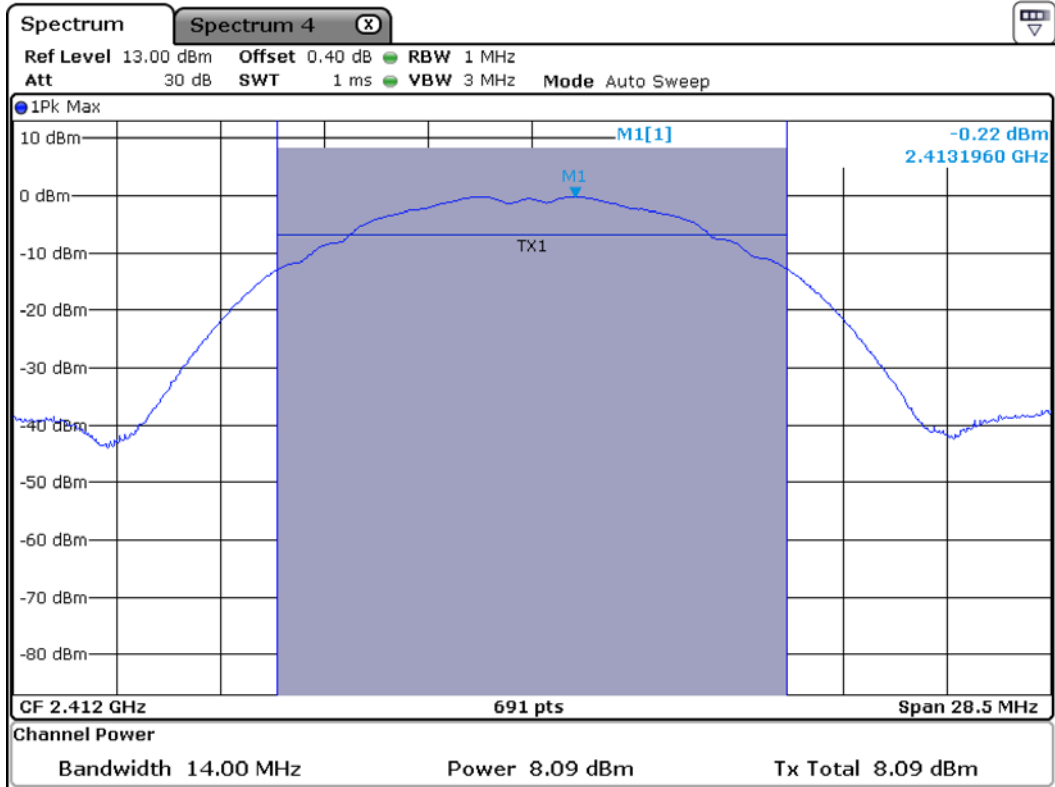
Minimum Standard:

Peak output power	< 1 W
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Measurement Setup

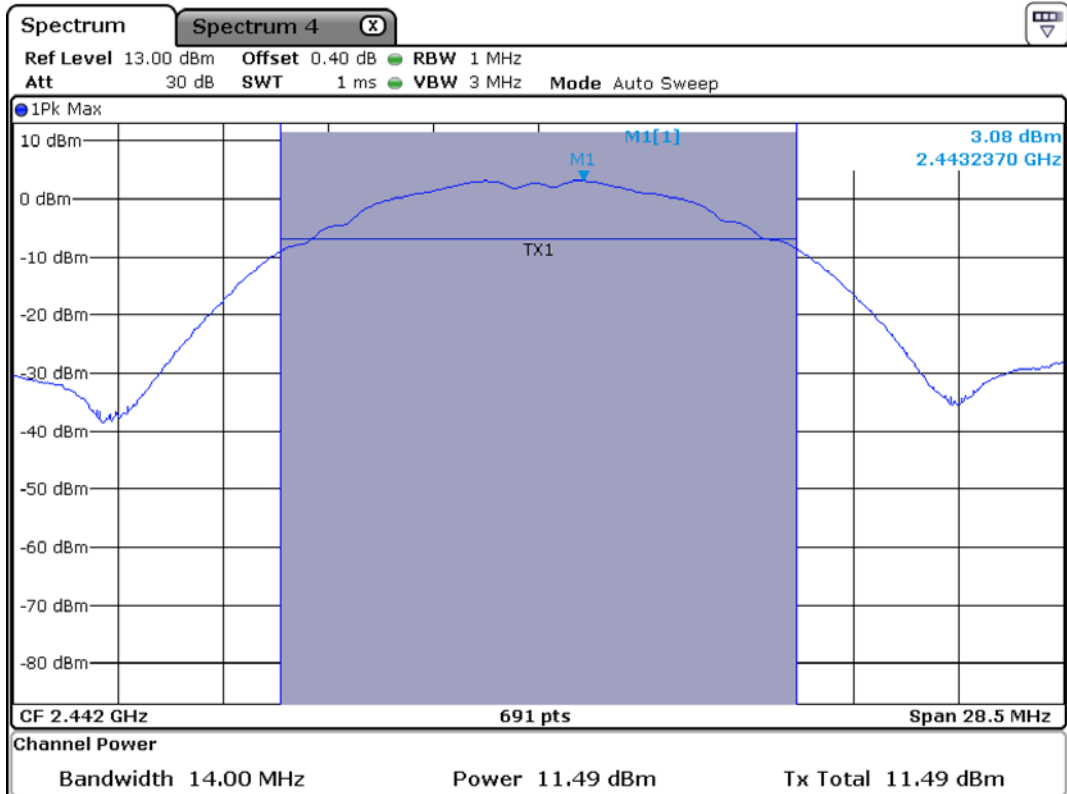
Same as the Chapter 3.2.1 (Figure 1)

Low Channel – 802.11 b



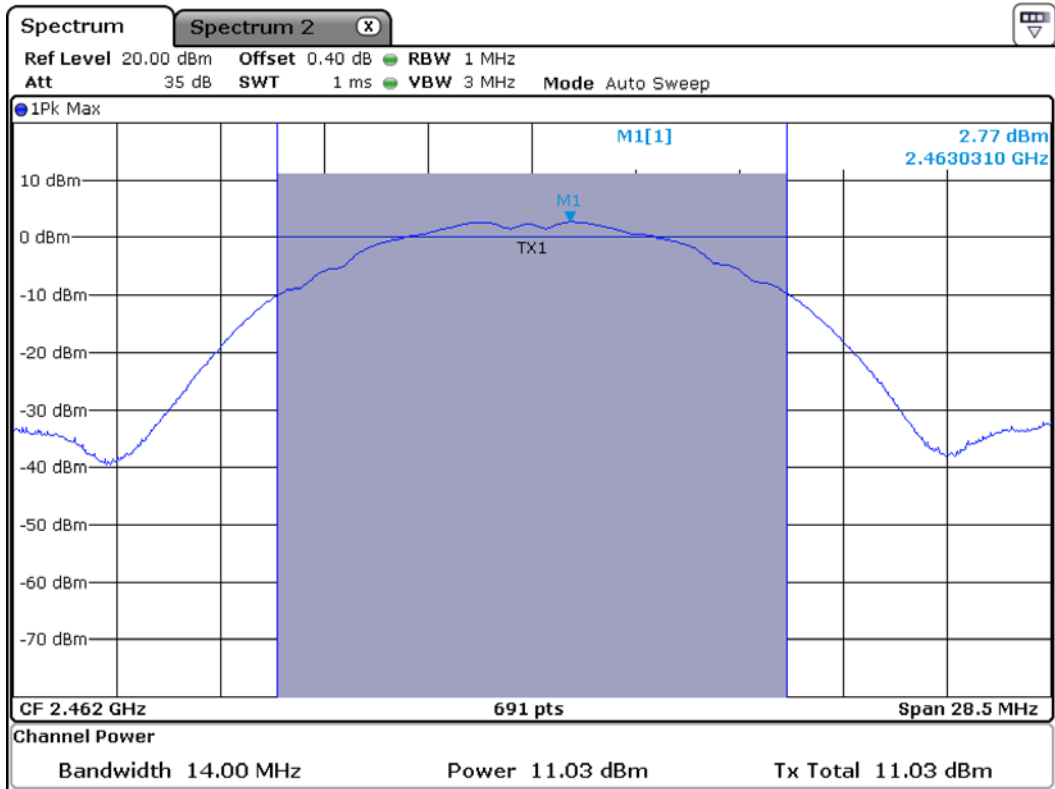
Date: 16.APR.2019 11:45:07

Middle Channel – 802.11 b



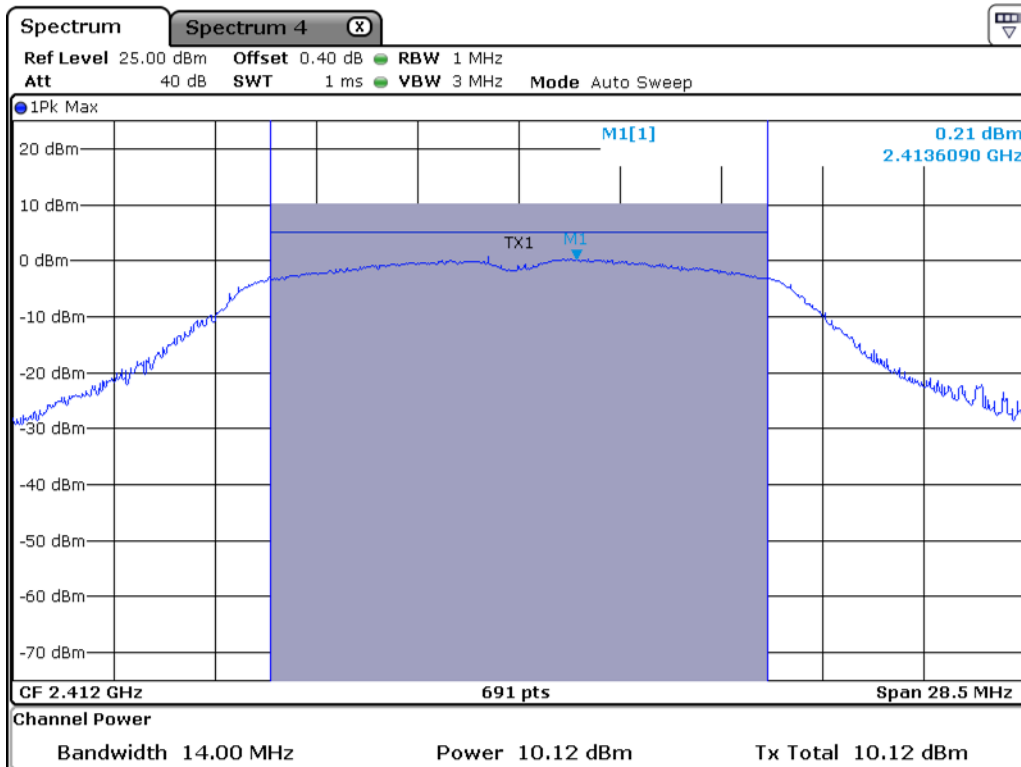
Date: 16.APR.2019 11:45:24

High Channel – 802.11 b



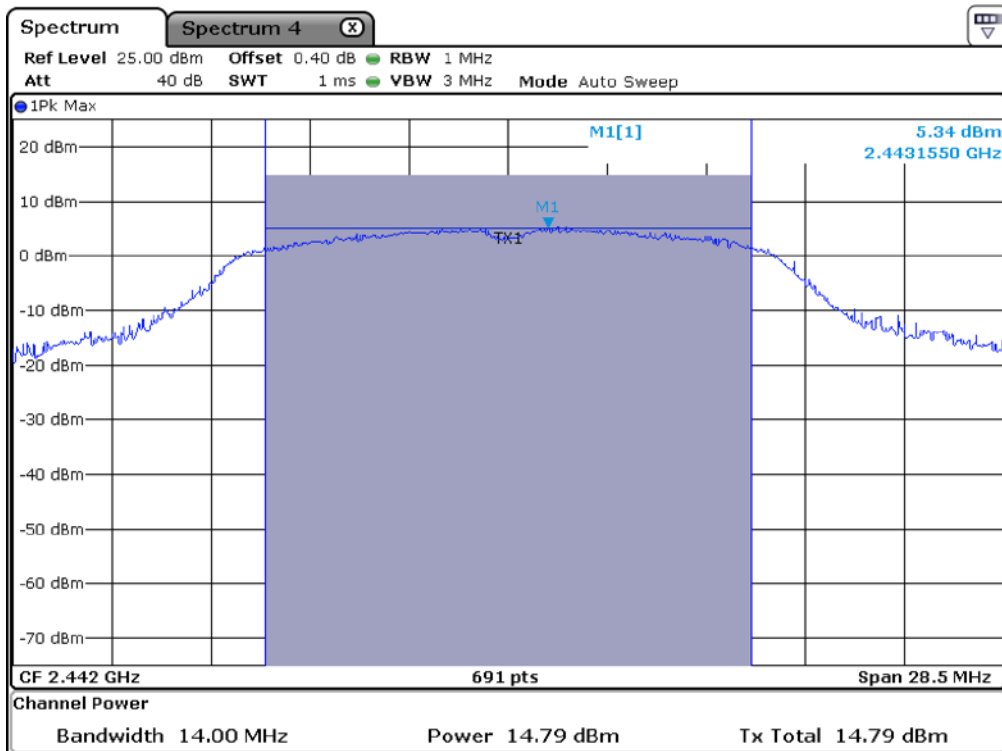
Date: 18.APR.2019 03:24:00

Low Channel – 802.11 g



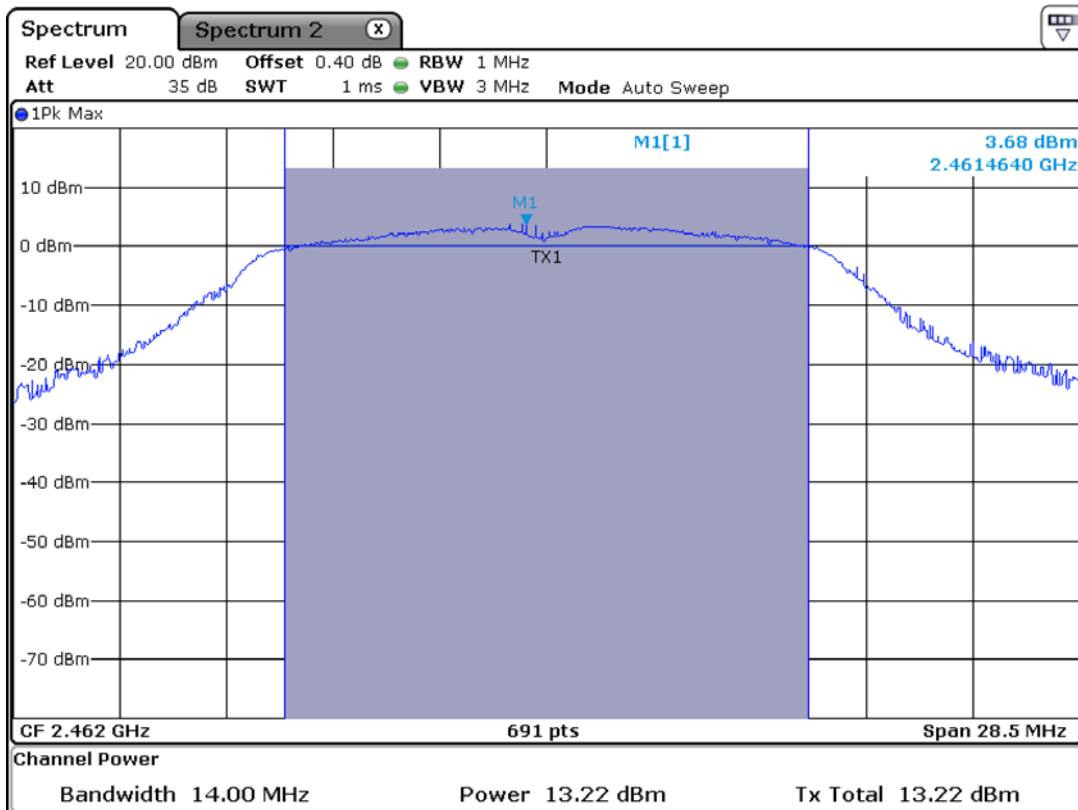
Date: 16.APR.2019 12:15:45

Middle Channel – 802.11 g



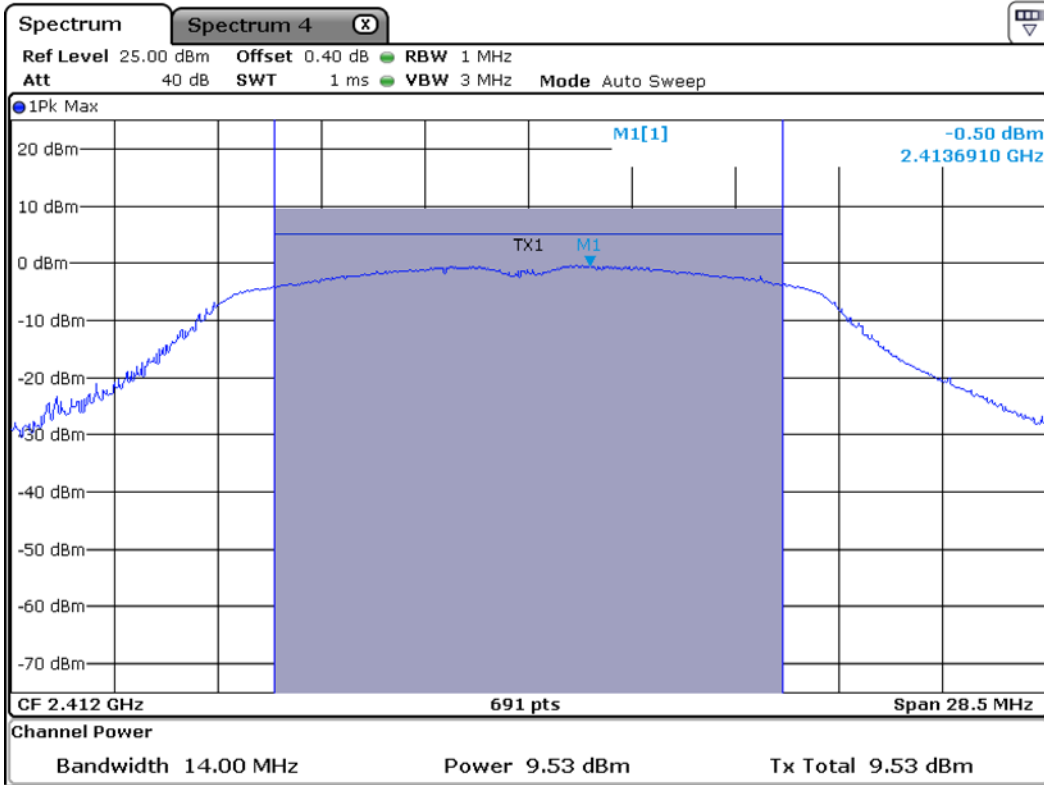
Date: 16.APR.2019 12:15:30

High Channel – 802.11 g



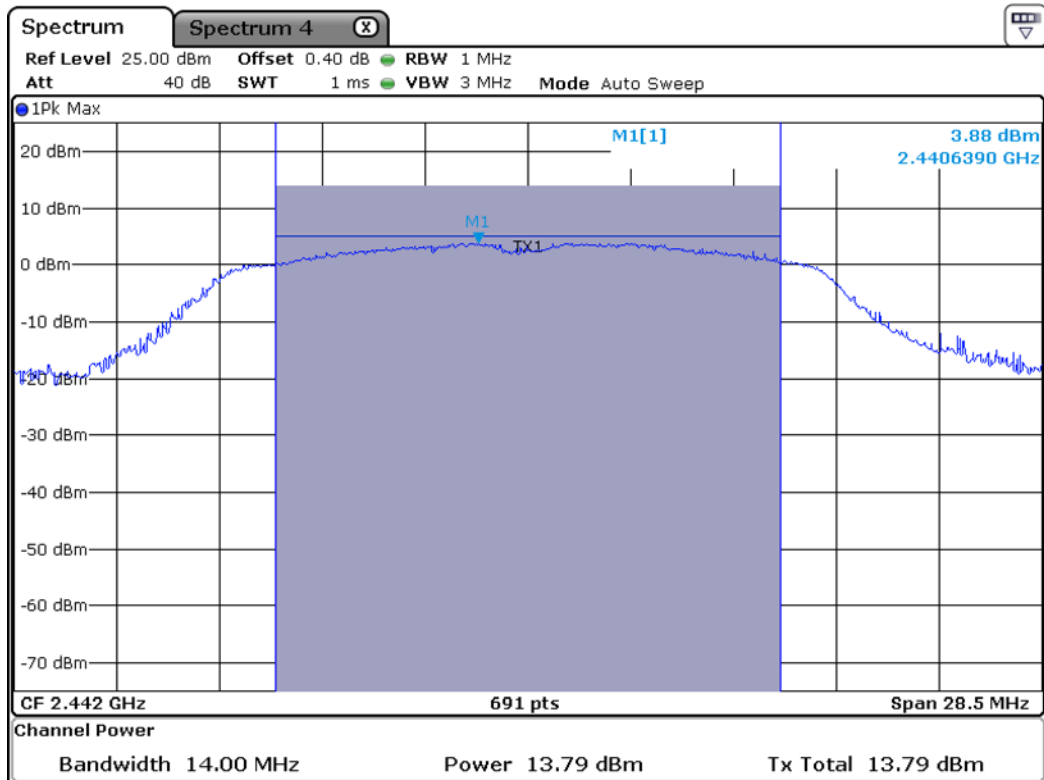
Date: 18.APR.2019 03:25:00

Low Channel – 802.11 n



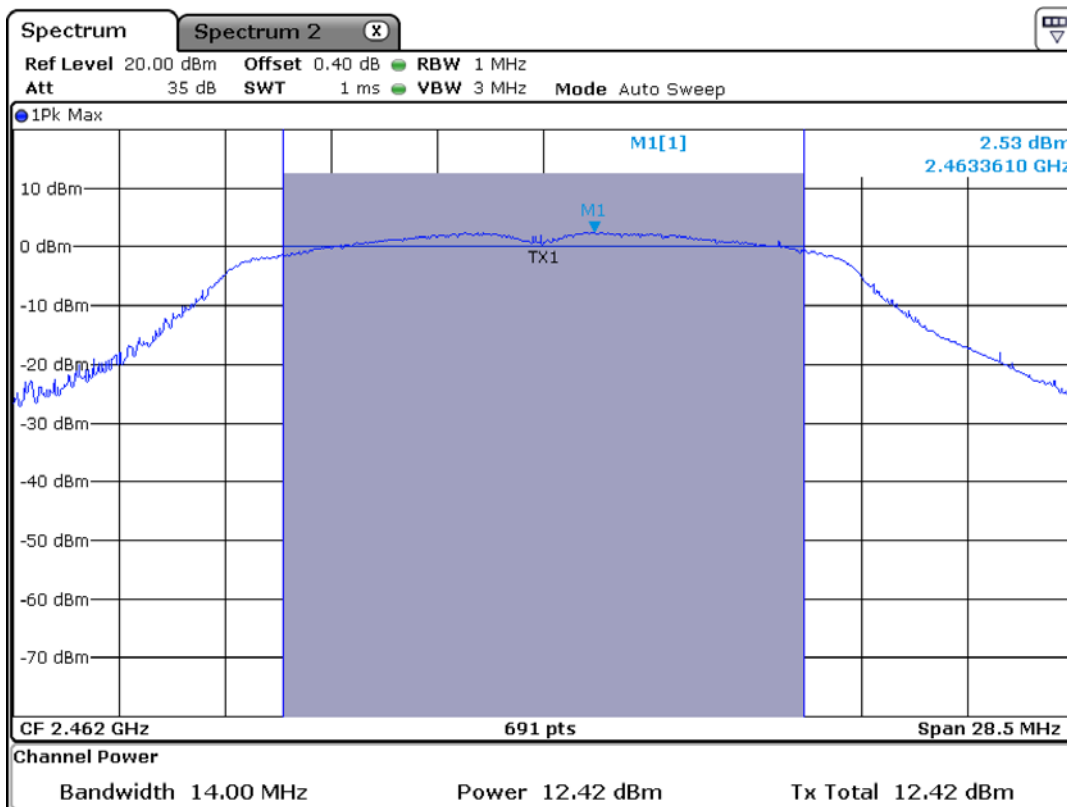
Date: 16.APR.2019 12:16:28

Middle Channel – 802.11 n



Date: 16.APR.2019 12:16:44

High Channel – 802.11 n



Date: 18.APR.2019 03:24:36

3.2.3 Power Spectral Density

Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 3 kHz ($3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$)

Span = 1.5 times the DTS bandwidth

VBW = 10 kHz ($3 * \text{RBW}$)

Sweep = auto

Detector function = peak

Trace = max hold

Measurement Data : **Complies**

(802.11 b)

Frequency (MHz)	Test Results	
	dBm	Result
2412	-20.02	Complies
2442	-16.89	Complies
2462	-16.61	Complies

(802.11 g)

Frequency (MHz)	Test Results	
	dBm	Result
2412	-23.93	Complies
2442	-19.12	Complies
2462	-20.04	Complies

(802.11 n)

Frequency (MHz)	Test Results	
	dBm	Result
2412	-23.34	Complies
2442	-19.09	Complies
2462	-20.04	Complies

- See next pages for actual measured spectrum plots.

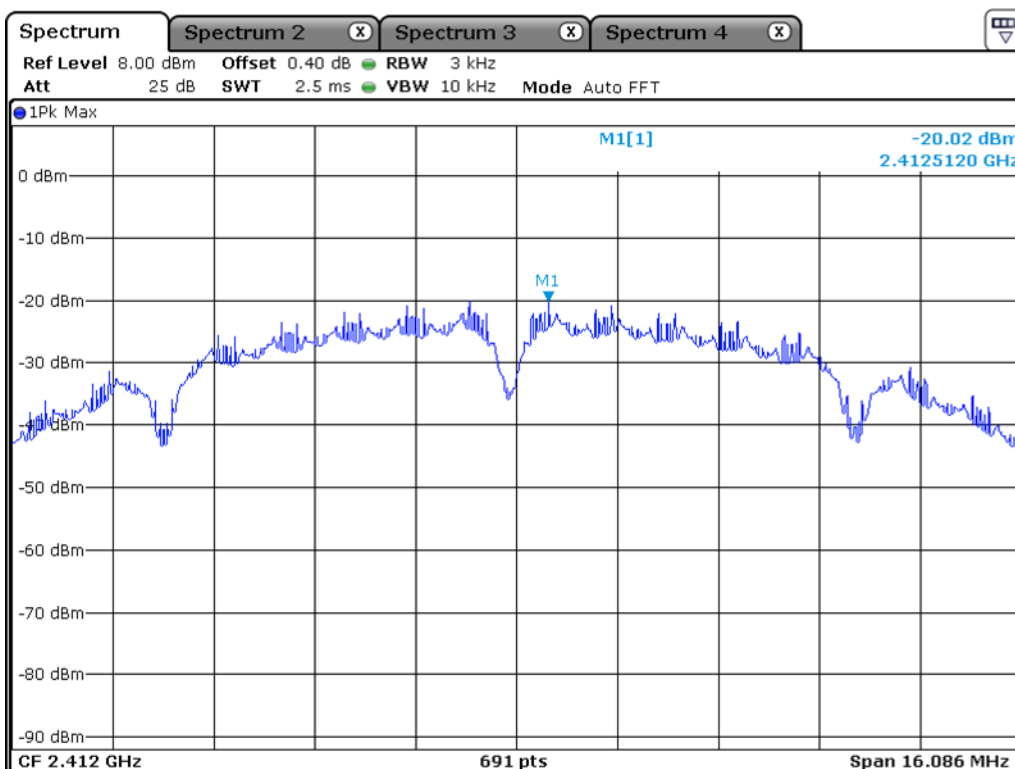
Minimum Standard:

Power Spectral Density	< 8 dBm @ 3 kHz BW
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Measurement Setup

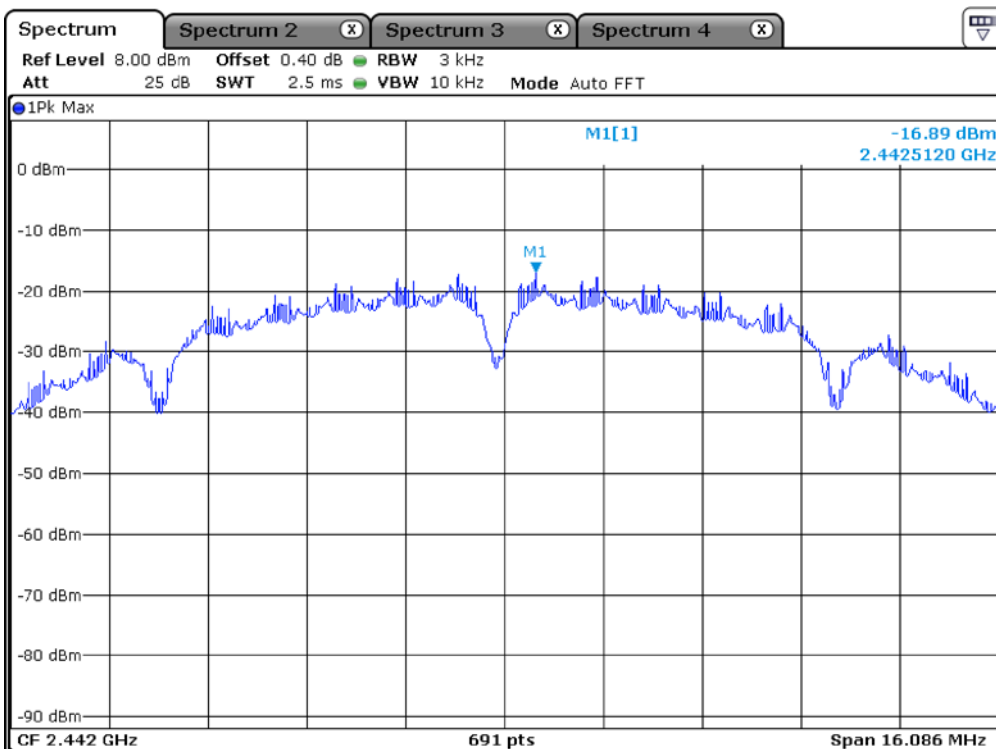
Same as the Chapter 3.2.1 (Figure 1)

Low Channel – 802.11 b



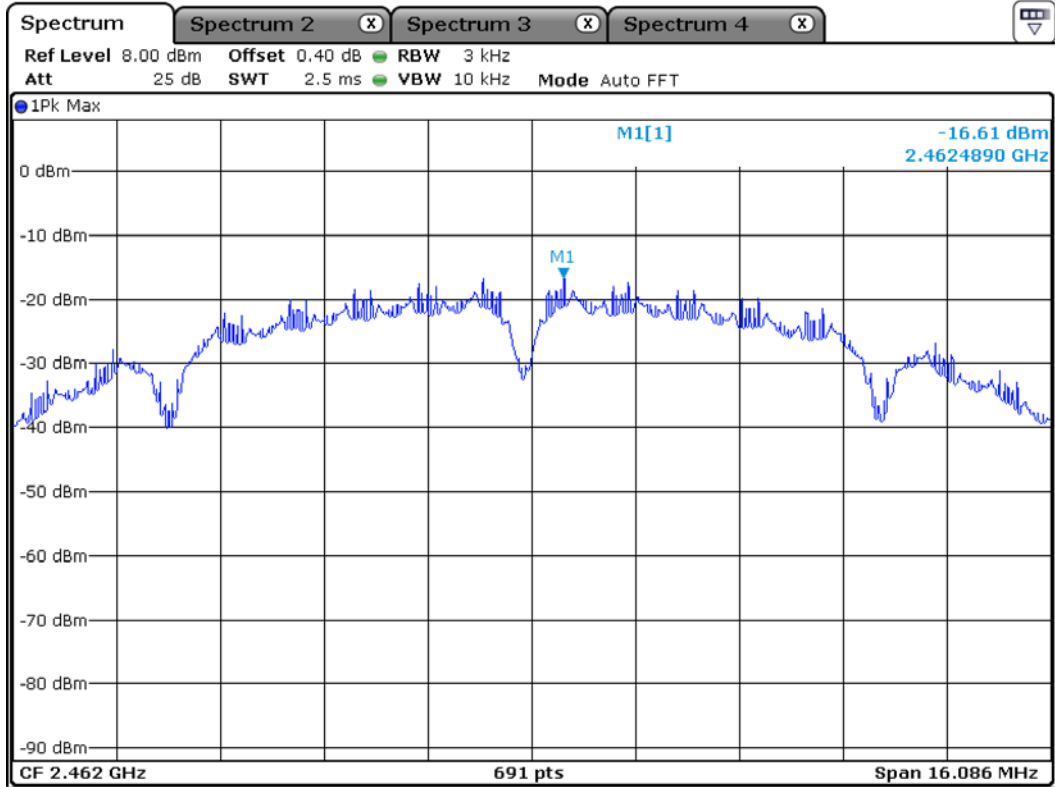
Date: 23.APR.2019 11:38:42

Middle Channel – 802.11 b



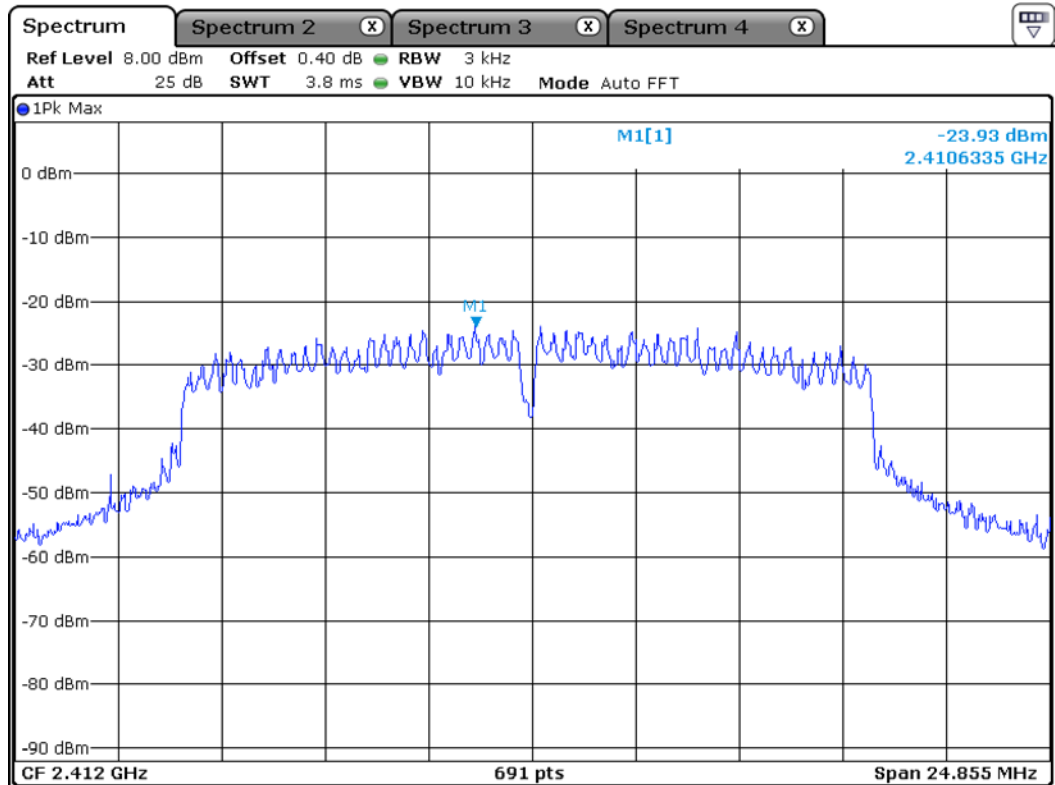
Date: 23.APR.2019 11:39:05

High Channel – 802.11 b



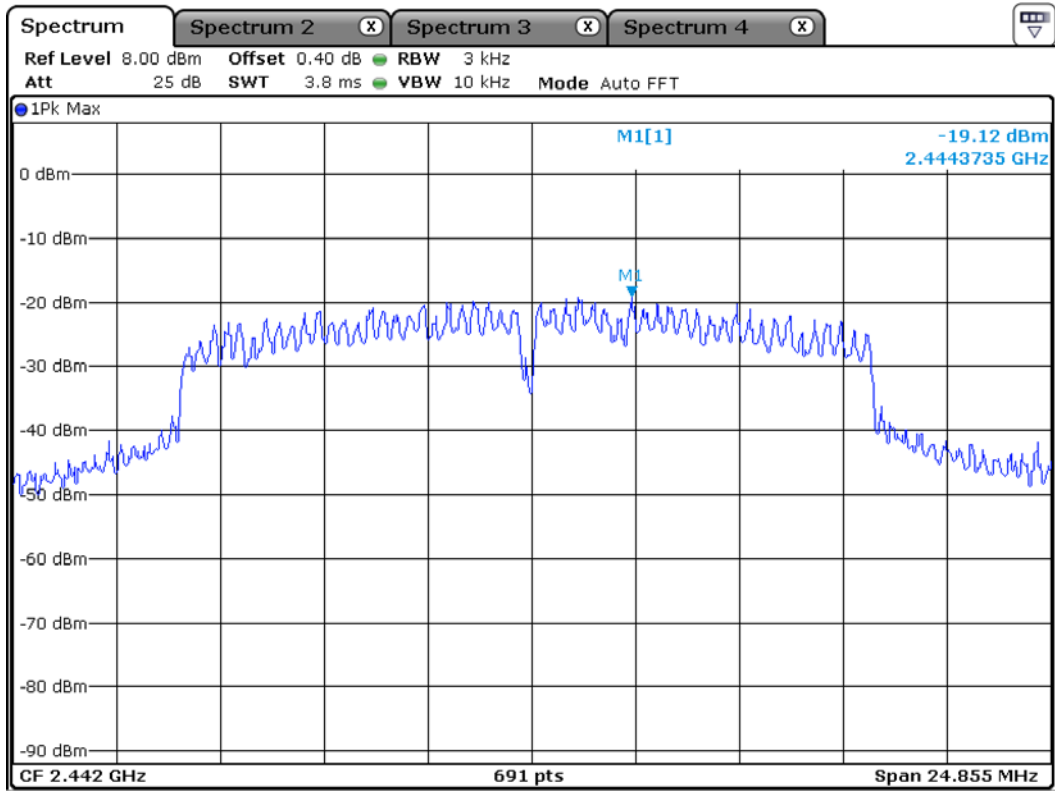
Date: 23.APR.2019 11:39:27

Low Channel – 802.11 g



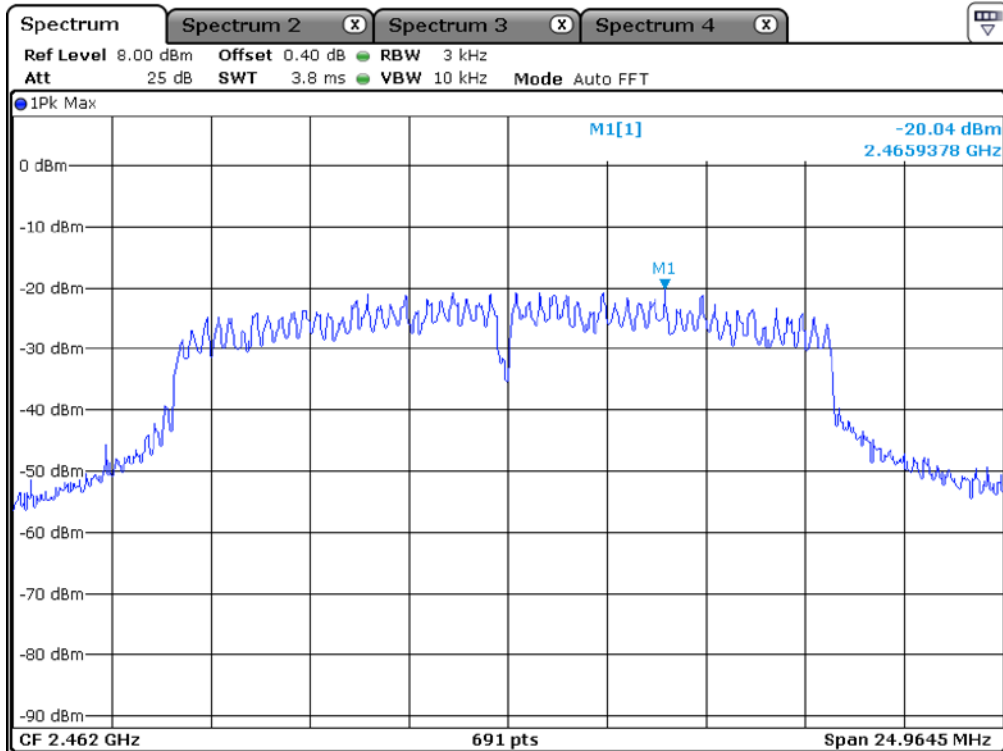
Date: 23.APR.2019 11:40:17

Middle Channel – 802.11 g



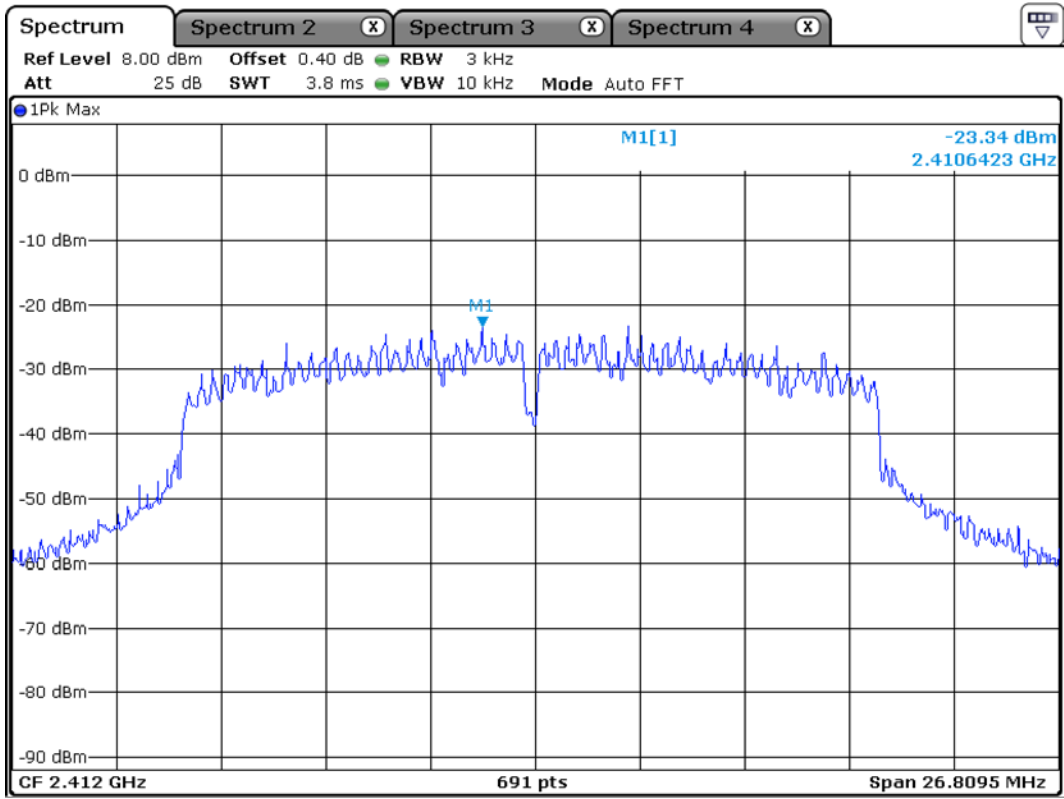
Date: 23.APR.2019 11:40:39

High Channel – 802.11 g



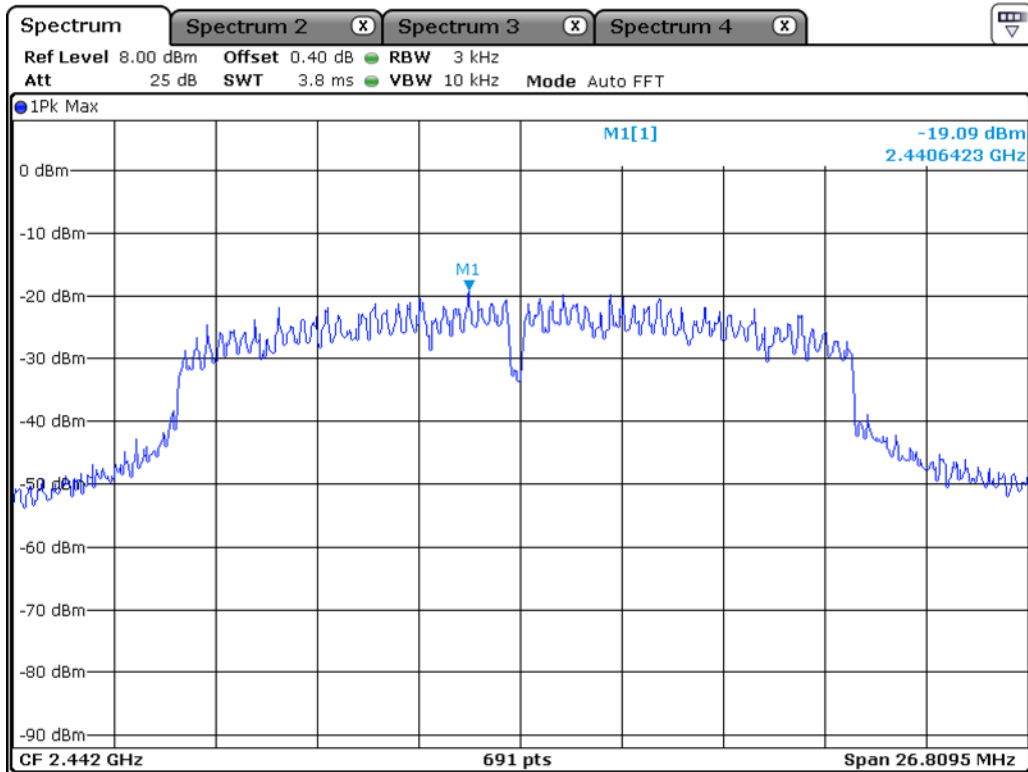
Date: 23.APR.2019 11:41:33

Low Channel – 802.11 n



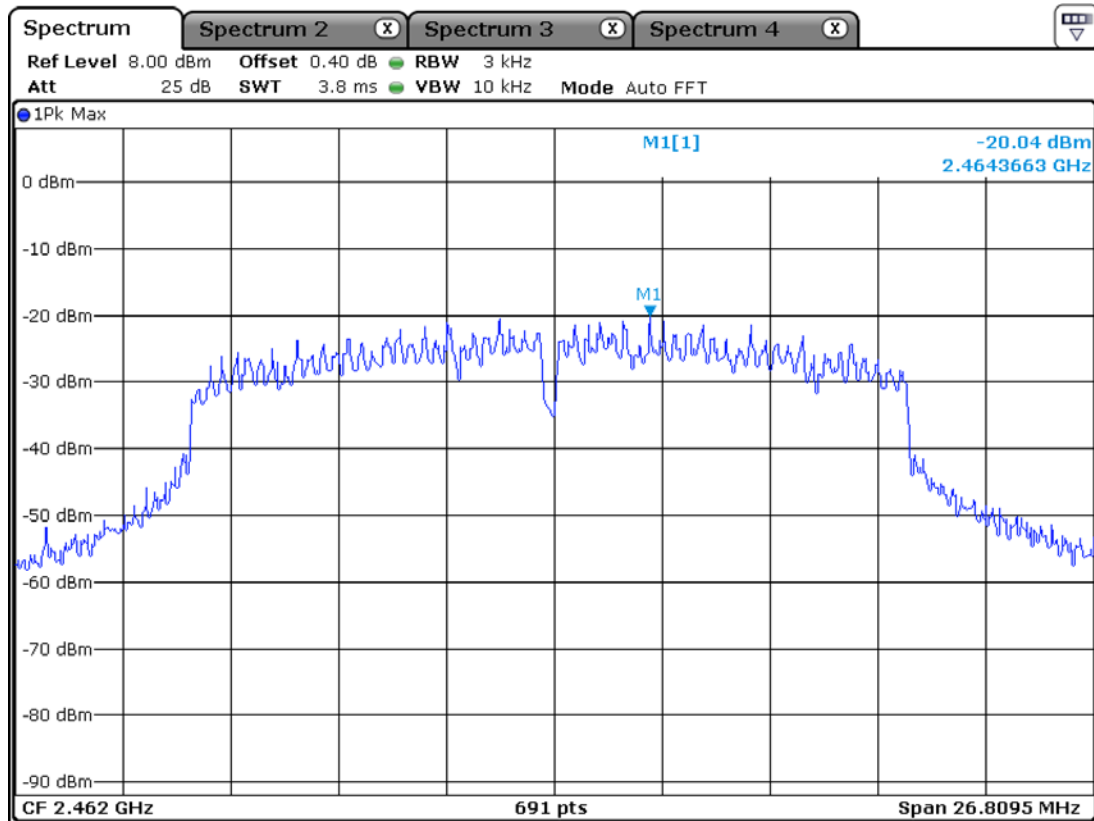
Date: 23.APR.2019 11:42:17

Middle Channel – 802.11 n



Date: 23.APR.2019 11:42:49

High Channel – 802.11 n



Date: 23.APR.2019 11:43:16

3.2.4 Band - edge

Procedure:

The bandwidth at 20 dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 100 kHz

Span = 40 MHz, 80 MHz

Detector function = peak

Trace = max hold

Sweep = auto

Radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a)

The spectrum analyzer is set to:

Center frequency = the highest, the lowest channels

PEAK:

RBW = VBW = 1 MHz, Sweep=Auto

Average:

RBW = 1 MHz, VBW=10 Hz, Sweep=Auto

Measurement Distance:

3 m

Polarization:

Horizontal / Vertical

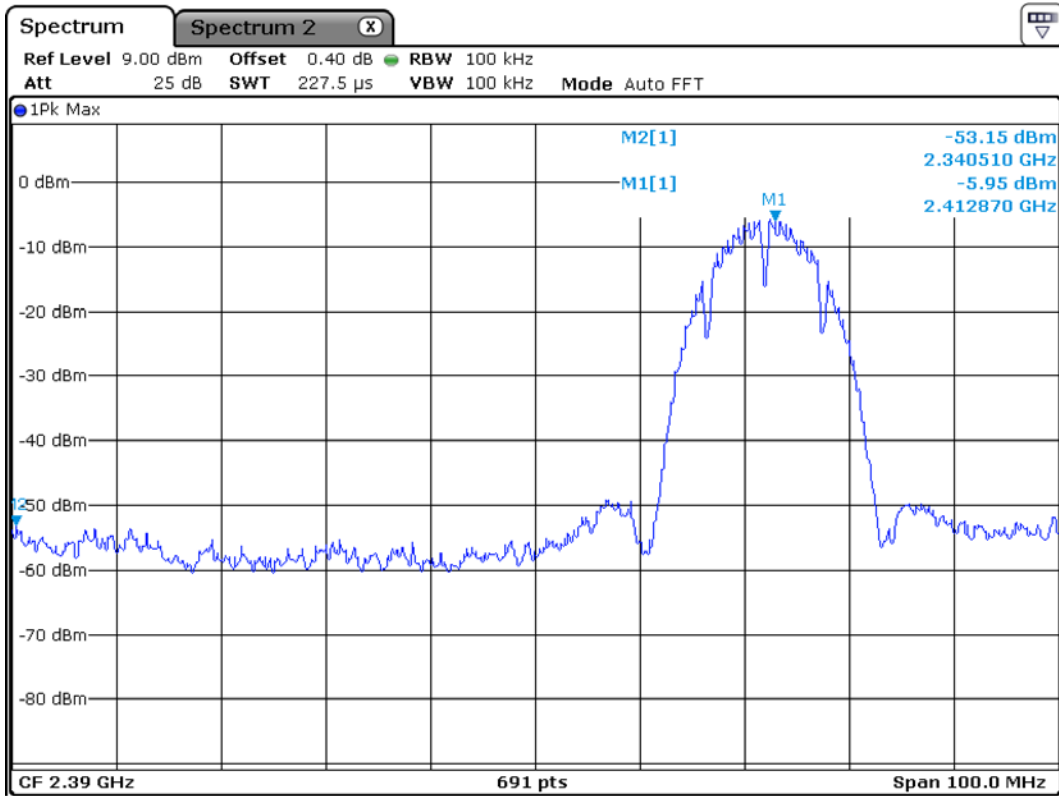
Measurement Data: Complies

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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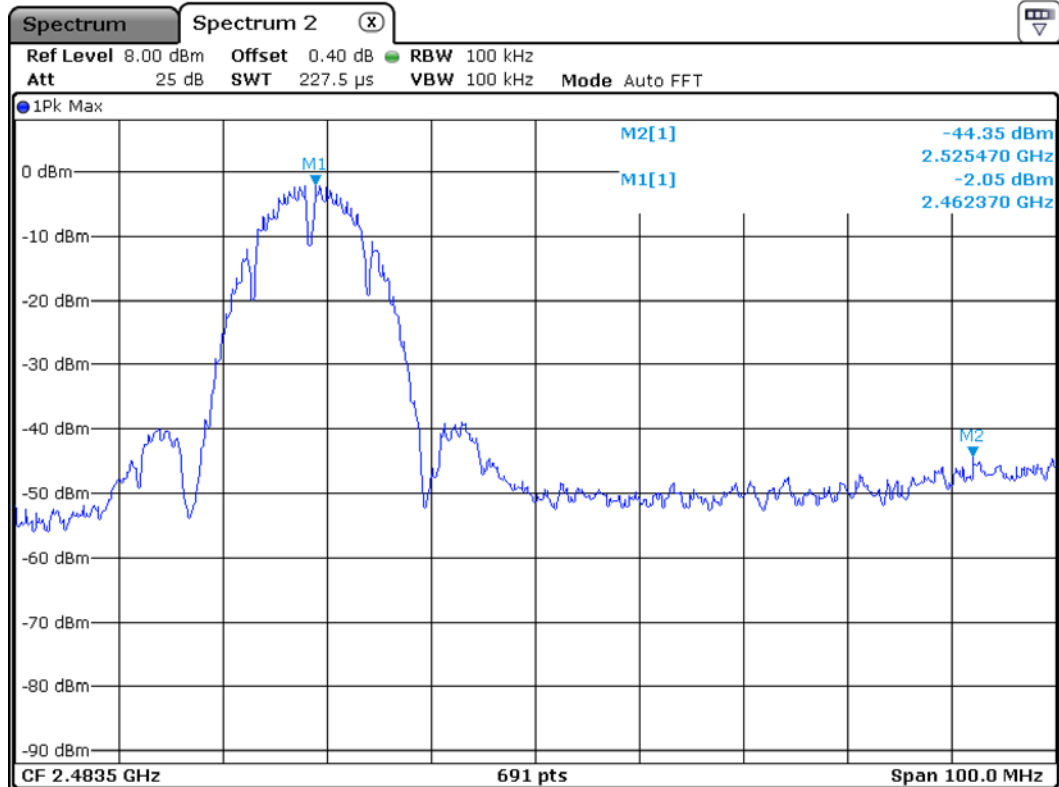
Band edge – 802.11b

Lower edge



Date: 17.APR.2019 06:59:46

Upper edge



Date: 18.APR.2019 03:52:35

Radiated Band-edges in the restricted band 2310-2390 MHz measurement

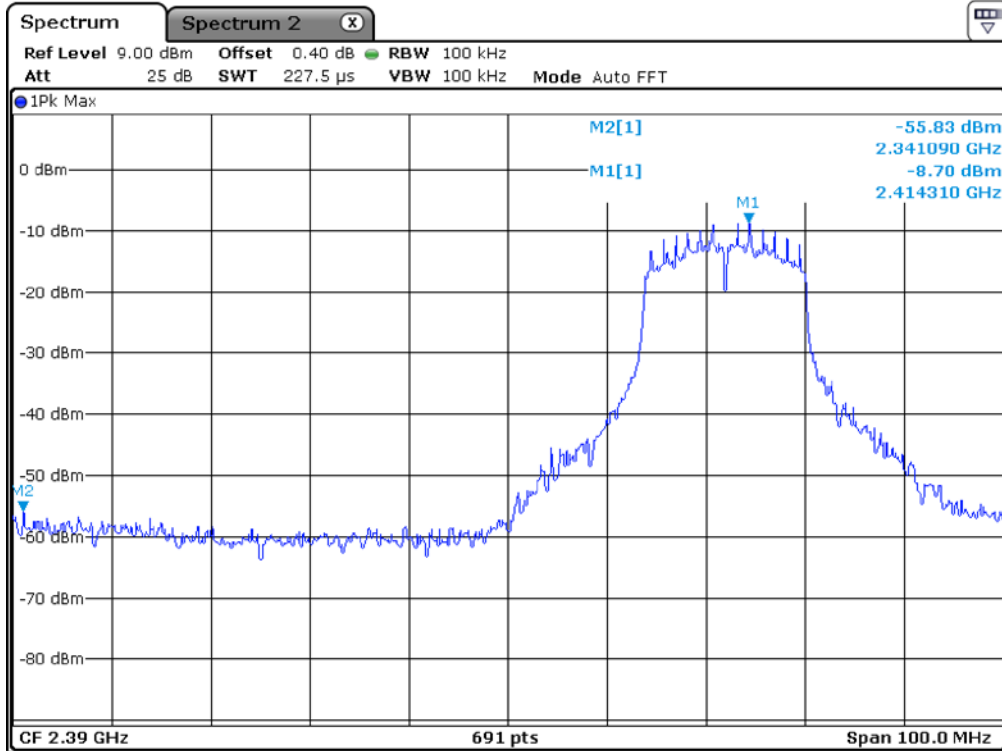
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain + Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2340.5	22.71	27.55	H	27.9	8.75	54	74	41.86	46.7	12.14	27.3

Radiated Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain + Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2525.5	22.96	27.88	H	27.95	8.59	54	74	42.32	47.24	11.68	26.76

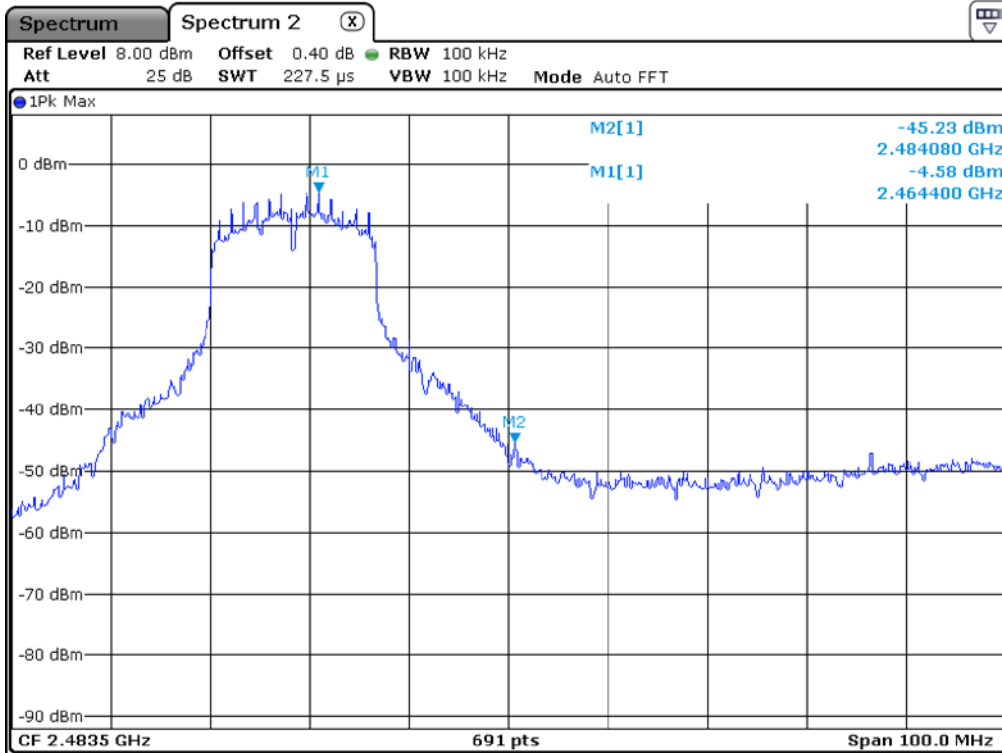
Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented

Band edge – 802.11g Lower edge



Date: 17.APR.2019 07:01:02

Upper edge



Date: 18.APR.2019 03:53:24

Radiated Band-edges in the restricted band 2310-2390 MHz measurement

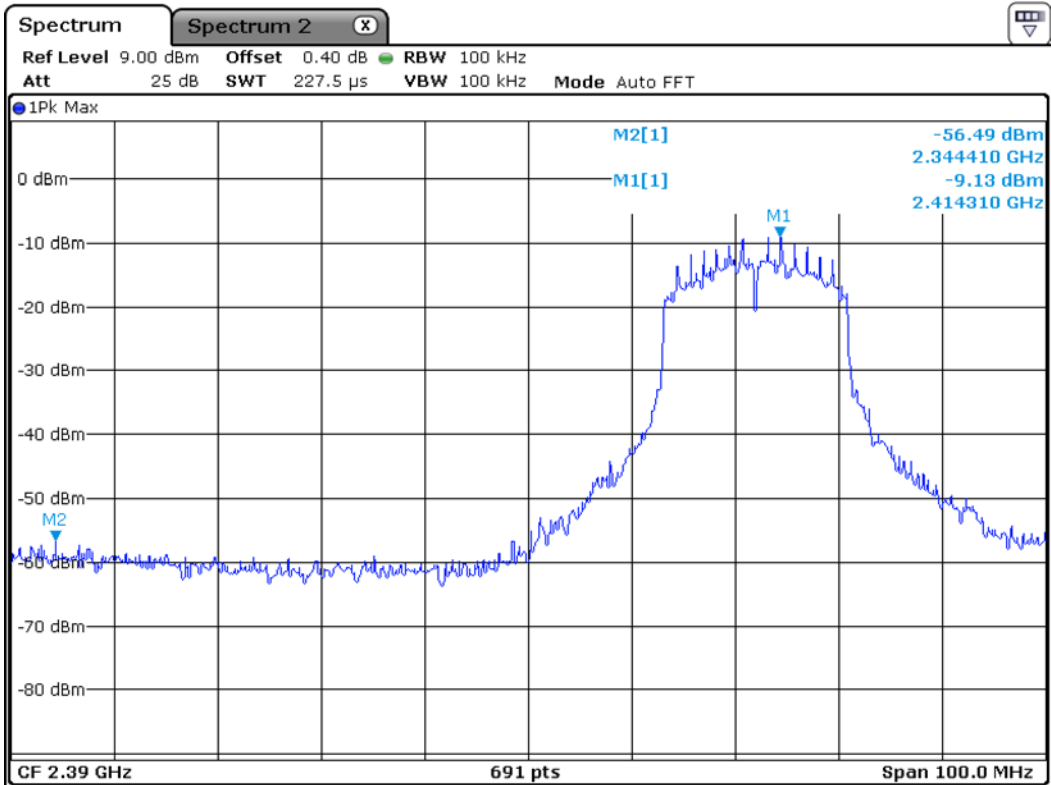
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain + Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2341.1	22.76	27.27	H	27.9	8.75	54	74	41.91	46.42	12.09	27.58

Radiated Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain + Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2484.1	23.12	28.03	H	28.08	8.77	54	74	42.43	47.34	11.57	26.66

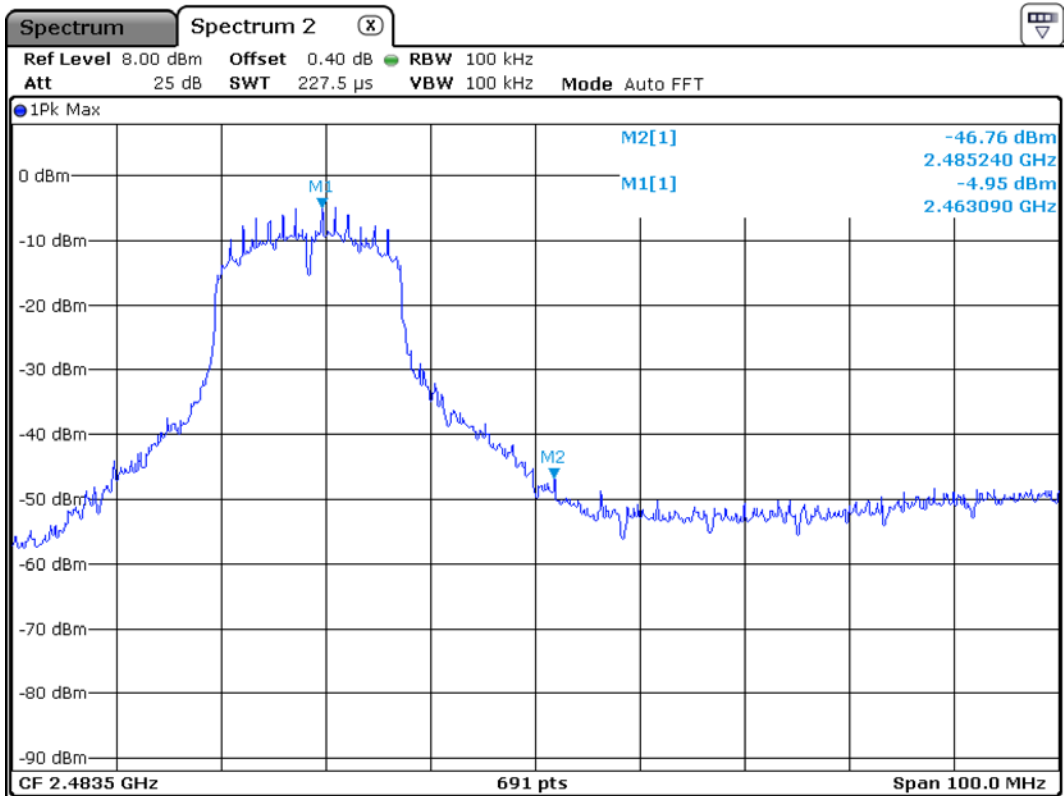
Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented

Band edge – 802.11n Lower edge



Date: 17.APR.2019 07:02:13

Upper edge



Date: 18.APR.2019 03:53:59

Radiated Band-edges in the restricted band 2310-2390 MHz measurement

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain + Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2344.4	20.37	25.42	H	27.9	8.75	54	74	39.52	44.57	14.48	29.43

Radiated Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain + Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2485.5	22.96	27.88	H	28.08	8.77	54	74	42.27	47.19	11.73	26.81

Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented

3.2.5 Conducted Spurious Emissions

Procedure:

The test follows KDB558074. The conducted spurious emissions were measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, set the marker on the peak of any spurious emission recorded.

The spectrum analyzer is set to:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions

RBW = 100 kHz

Sweep = auto

VBW = 100 kHz

Detector function = peak

Trace = max hold

Measurement Data: **Complies**

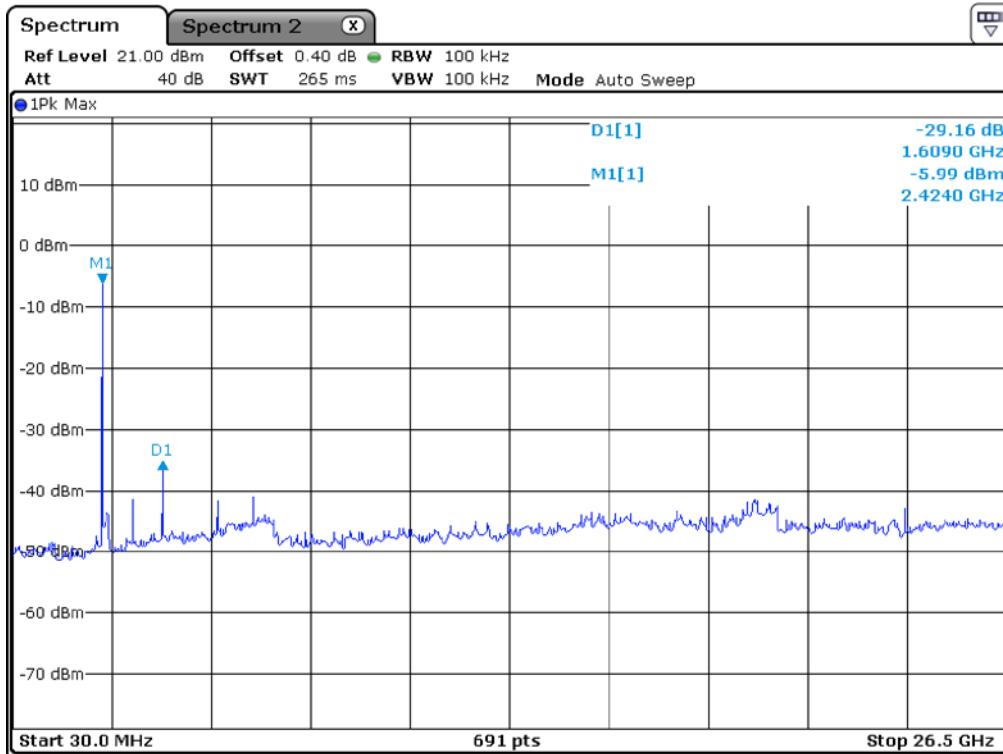
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
--------------------------	----------

Measurement Setup

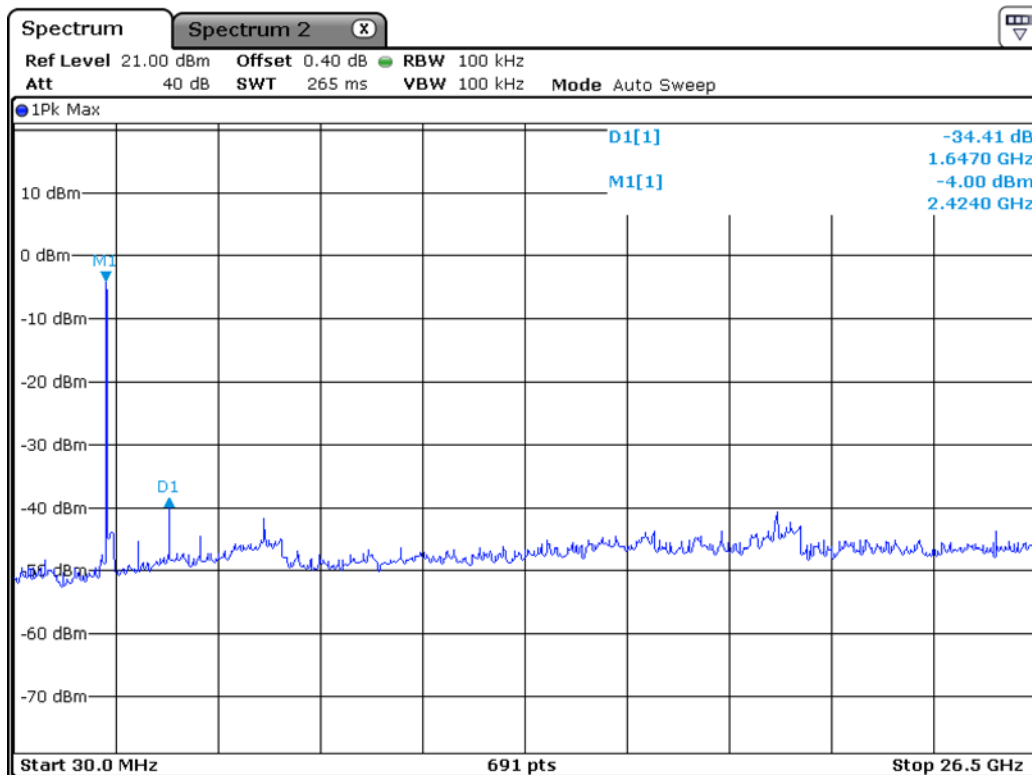
Same as the Chapter 3.2.1 (Figure 1)

Frequency Range = 30 MHz ~ 26.5 GHz
Unwanted Emission – Low Channel – 802.11 b



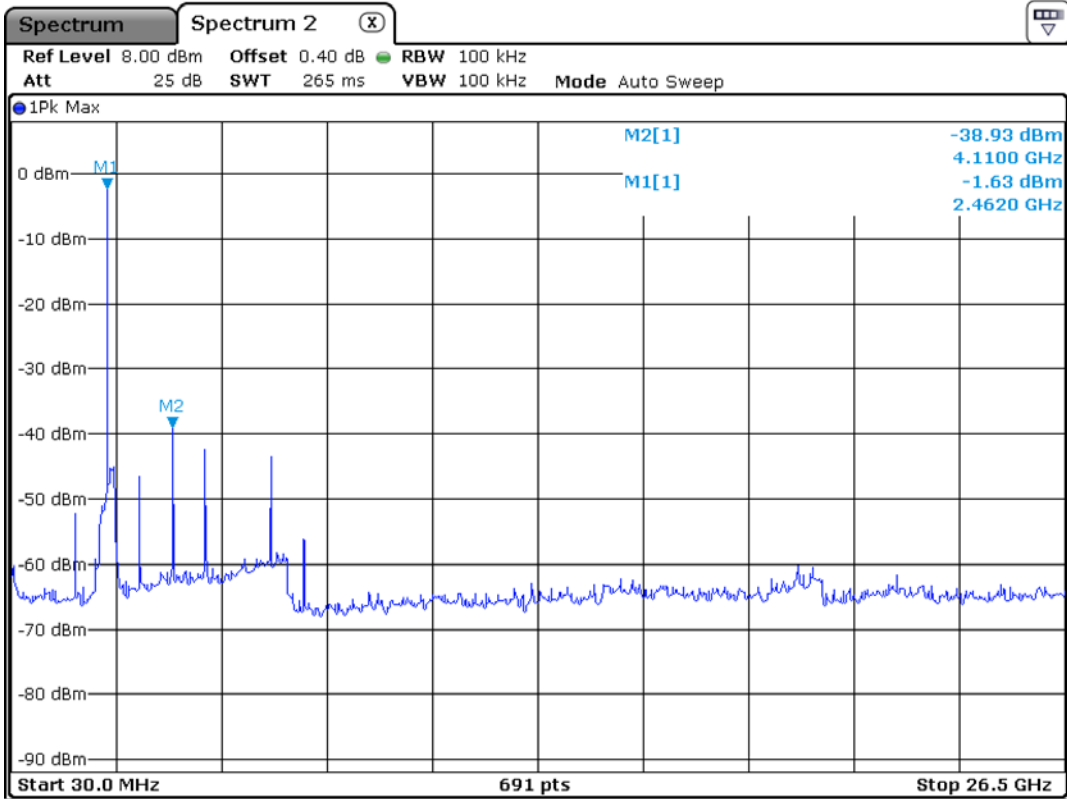
Date: 17.APR.2019 07:06:33

Middle Channel – 802.11 b



Date: 17.APR.2019 07:06:55

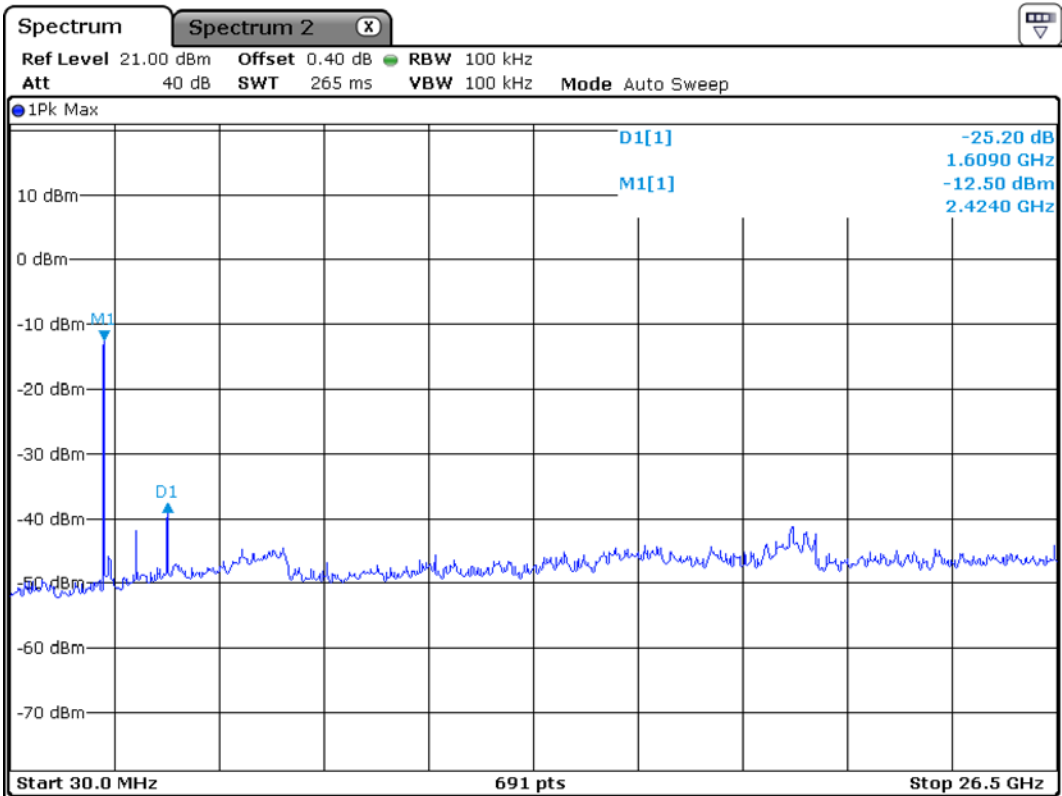
High Channel – 802.11 b



Date: 18.APR.2019 04:00:02

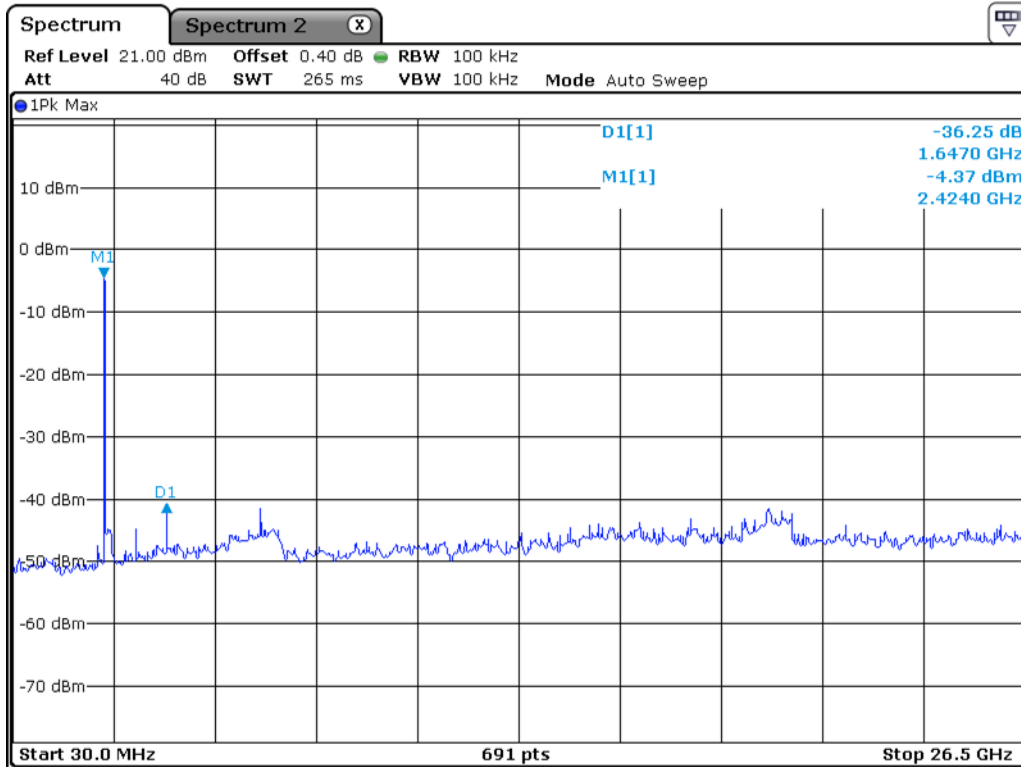
Frequency Range = 30 MHz ~ 26.5 GHz

Unwanted Emission – Low Channel – 802.11 g



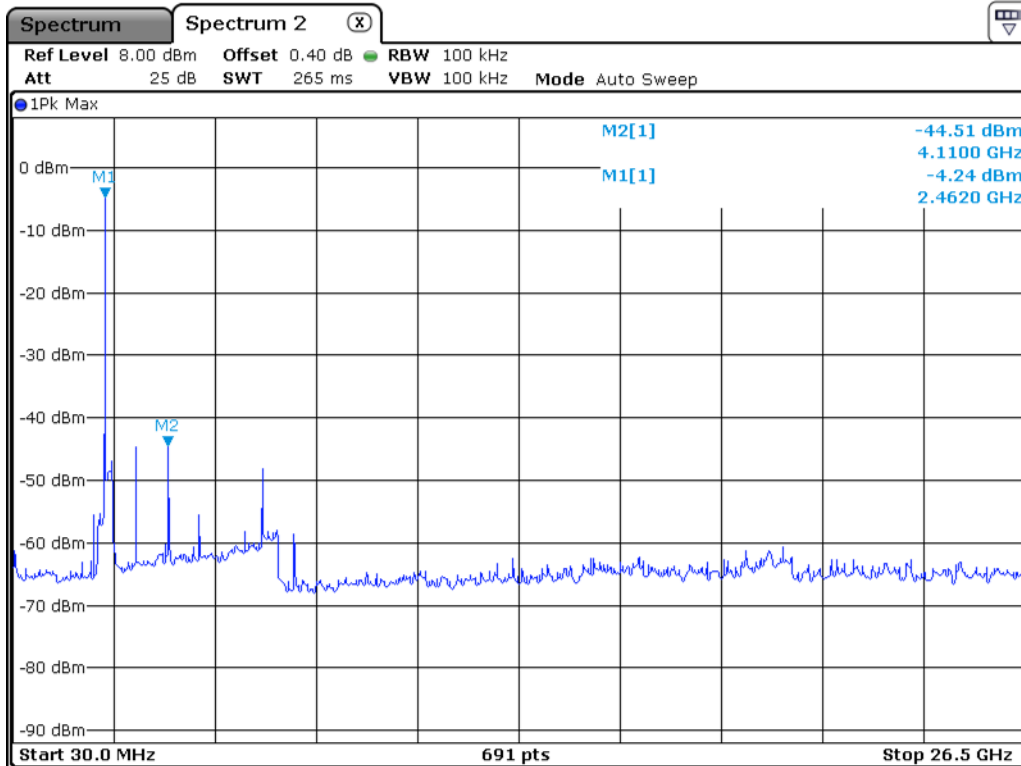
Date: 17.APR.2019 07:07:38

Middle Channel – 802.11 g



Date: 17.APR.2019 07:08:00

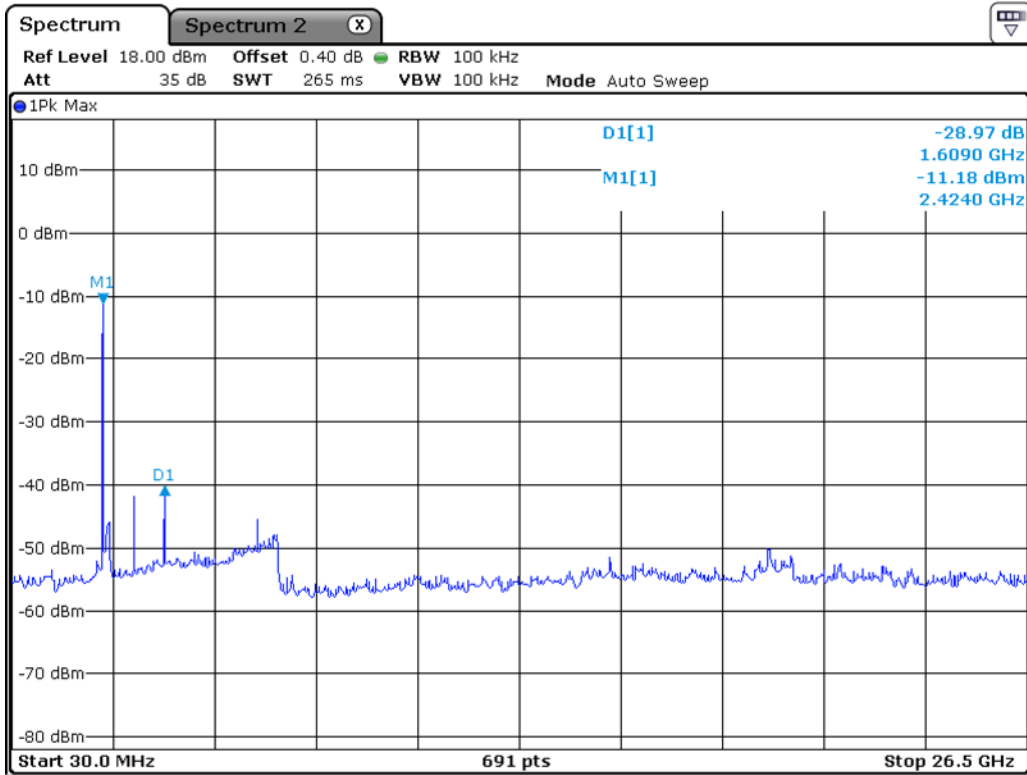
High Channel – 802.11 g



Date: 18.APR.2019 04:00:21

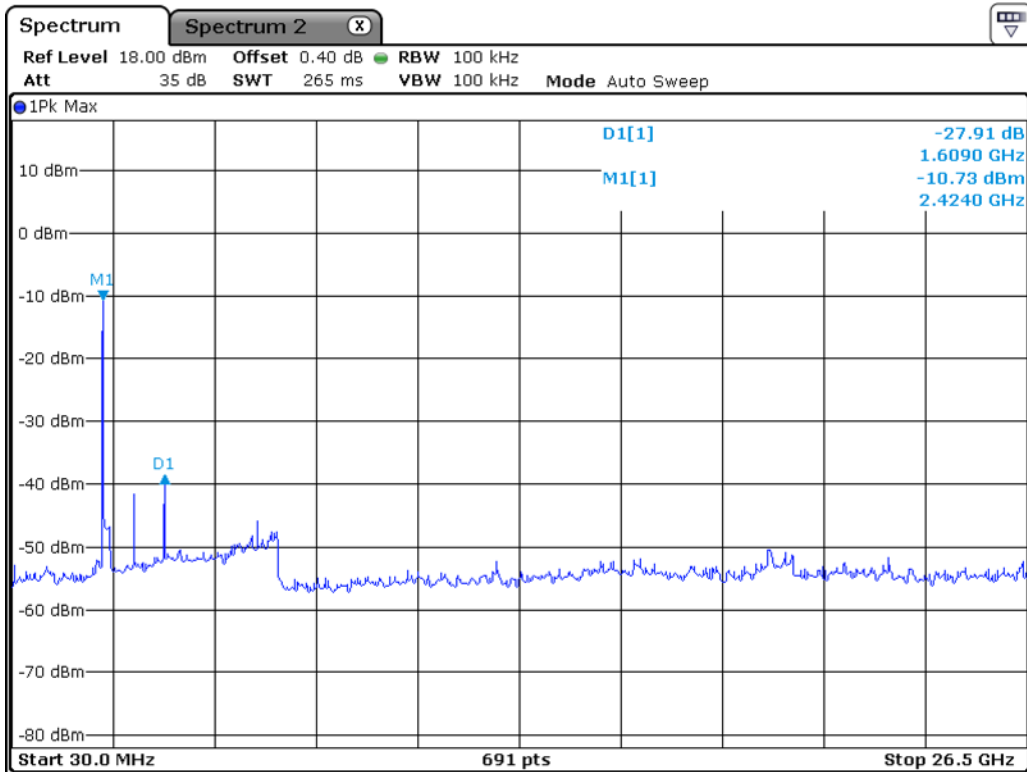
Frequency Range = 30 MHz ~ 26.5 GHz

Unwanted Emission – Low Channel – 802.11 n



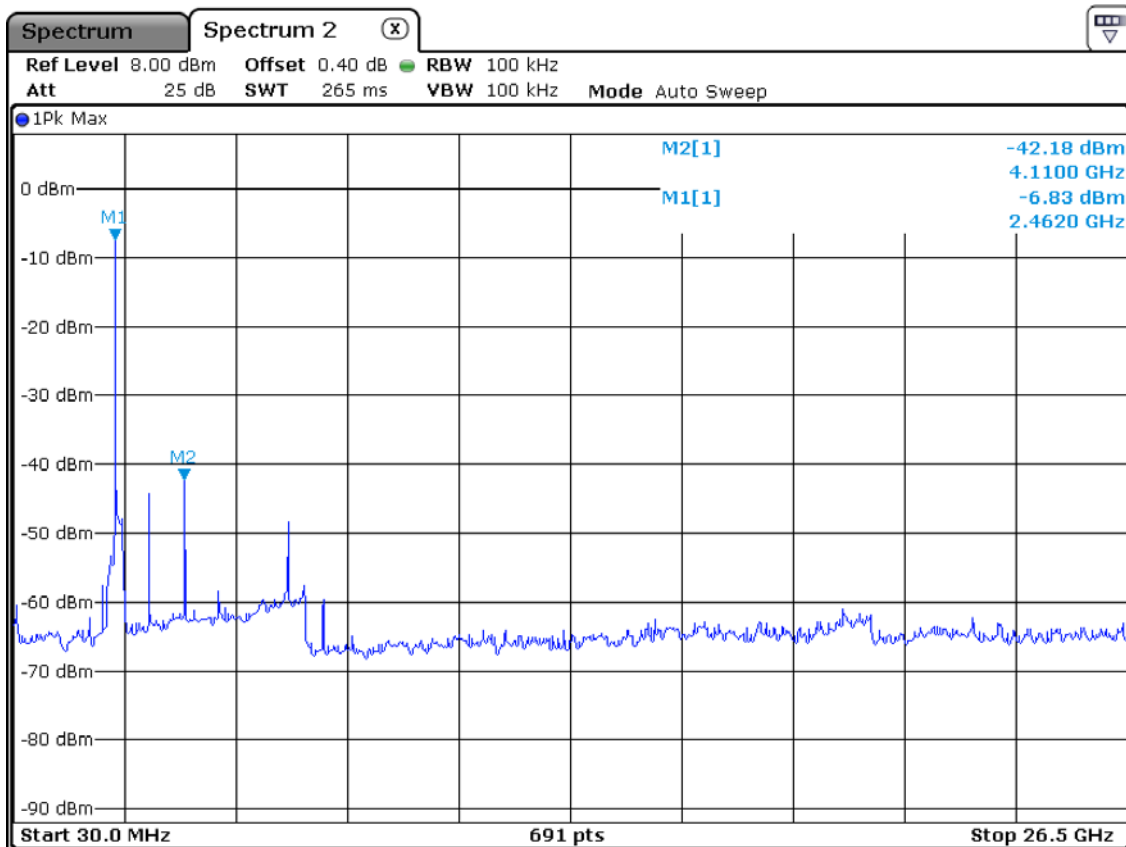
Date: 17.APR.2019 07:09:05

Middle Channel – 802.11 n



Date: 17.APR.2019 07:11:45

High Channel – 802.11 n



Date: 18.APR.2019 04:00:36

3.2.6 Radiated Spurious Emissions

Procedure:

The EUT was placed on a 0.8 m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 9 kHz ~ 10th harmonic.

RBW = 100 kHz (30 MHz ~ 1 GHz)

= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

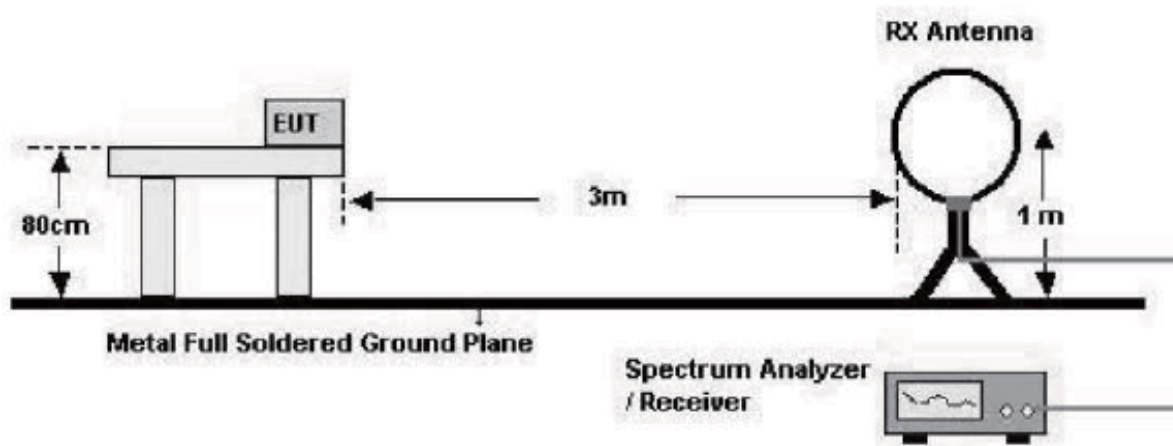
Trace = max hold

VBW \geq RBW

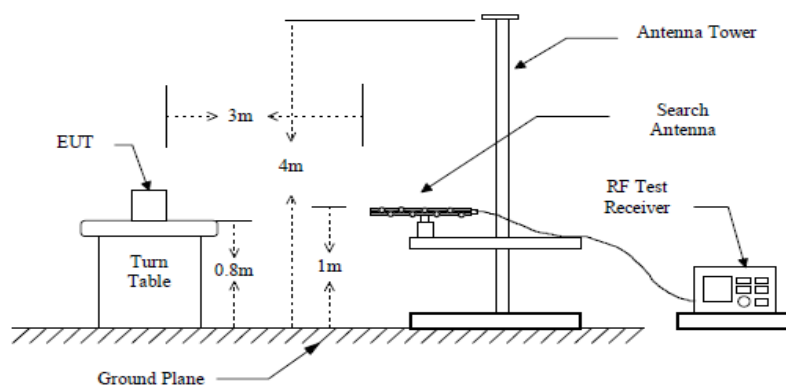
Detector function = peak

Sweep = auto

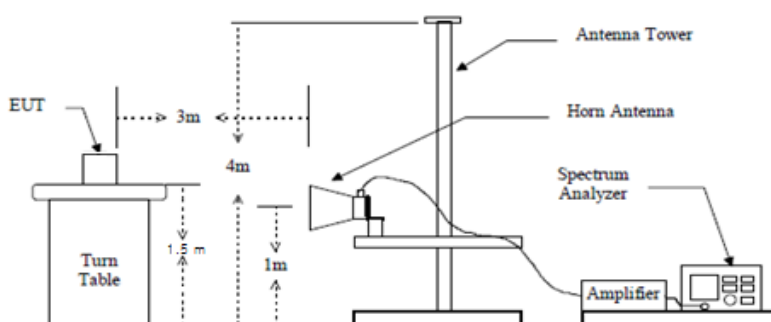
below 30 MHz



below 1 GHz (30 MHz to 1 GHz)



above 1 GHz



Measurement Data: **Complies**

- See next pages for actual measured data.
- No other emissions were detected at a level greater than 20 dB below limit include from 9 kHz to 30 MHz.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3 m
0.009 ~ 0.490	2400/F(kHz) (@ 300 m)
0.490 ~ 1.705	24000/F(kHz) (@ 30 m)
1.705 ~ 30	30(@ 30 m)
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Measurement Data: (9 kHz – 30 MHz)

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp.Gain+Cable	AV / Peak		AV / Peak		AV / Peak	
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
*No emissions were detected at a level greater than 20 dB below limit.											
-	-	-	-	-	-	-	-	-	-	-	-

*No emissions were detected at a level greater than 20 dB below limit.

Measurement Data : 802.11 b (Above 1 GHz)

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna-Amp.Gain+Cable	AV/Peak	AV/Peak		AV / Peak		AV / Peak	
4825.51	46.72	51.68	H	-15.05	54	74	31.67	36.63	22.33	37.37	
-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	

- No other emissions were detected at a level greater than 20 dB below limit.

Measurement Data : 802.11 g (Above 1 GHz)

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna-Amp.Gain+Cable	AV/Peak	AV/Peak		AV / Peak		AV / Peak	
7486.61	33.76	38.94	H	-4.39	54	74	29.37	34.55	24.63	39.45	
-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	

- No other emissions were detected at a level greater than 20 dB below limit.

Measurement Data : 802.11 n (Above 1 GHz)

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna-Amp.Gain+Cable	AV/Peak	AV/Peak		AV / Peak		AV / Peak	
7331.15	38.06	42.74	H	-6.30	54	74	31.76	36.44	22.24	37.56	
-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	

- No other emissions were detected at a level greater than 20 dB below limit.

Measurement Data : 802.11 b (Below 1 GHz)

Frequency [MHz]	Reading [dBuV/m]	Pol.	Correction		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
			Factor				
			Antenna-Amp.Gain+Cable				
288.38	50.96	H	-11.31		46	39.65	6.35
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

- No other emissions were detected at a level greater than 20 dB below limit.

Measurement Data : 802.11 g (Below 1 GHz)

Frequency [MHz]	Reading [dBuV/m]	Pol.	Correction		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
			Factor				
			Antenna-Amp.Gain+Cable				
288.38	49.65	H	-11.31		46	38.34	7.66
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

- No other emissions were detected at a level greater than 20 dB below limit.

Measurement Data : 802.11 n (Below 1 GHz)

Frequency [MHz]	Reading [dBuV/m]	Pol.	Correction		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
			Factor				
			Antenna-Amp.Gain+Cable				
288.14	50.74	H	-11.32		46	39.42	6.58
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

- No other emissions were detected at a level greater than 20 dB below limit.

Radiated Emissions (Below 1 GHz) – 802.11 b mode, Vertical



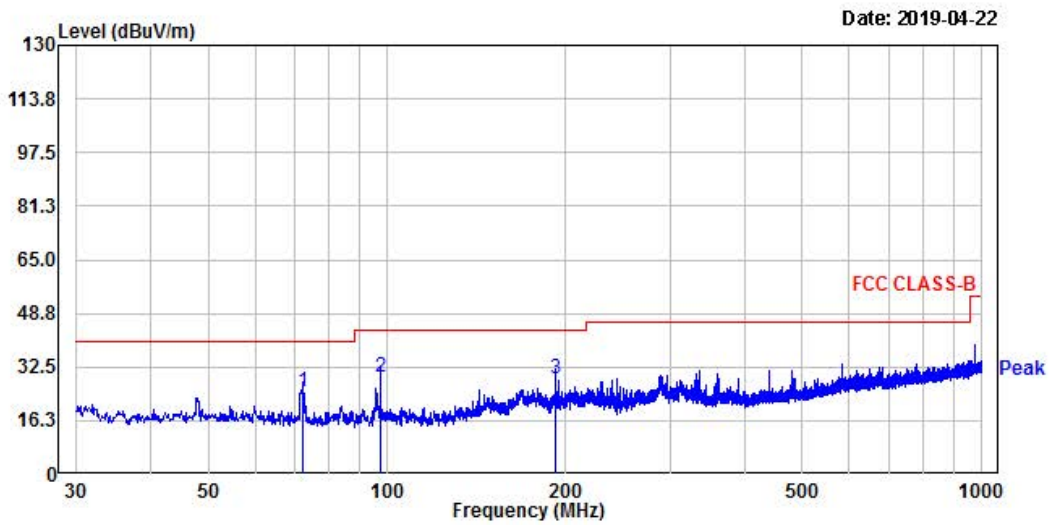
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Yongin-si, Gyeonggi-do, Korea
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Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: MTR-001

Temp/Humi: 23 / 36

Test Mode : Wireless a mode

Tested by: YEON J H



Freq MHz	Reading dBuV	C.F dB	Result QP dBuV/m	Limit dBuV/m	Margin dB	Height cm	Angle deg	Polarity
72.07	40.62	-15.65	24.97	40.00	15.03	400	290	vertical
97.42	47.44	-17.97	29.47	43.50	14.03	100	93	vertical
191.99	43.94	-15.05	28.89	43.50	14.61	183	0	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Below 1 GHz) – 802.11 b mode, Horizontal



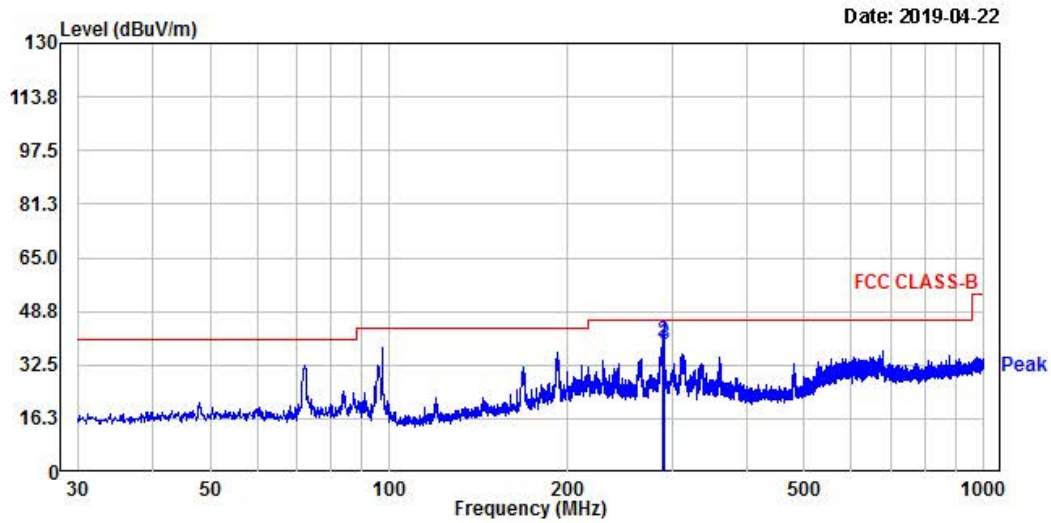
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EUT/Model No.: MTR-001

Temp/Humi: 23 / 36

Test Mode : Wireless b mode

Tested by: YEON J H



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
288.14	50.71	-11.32	39.39	46.00	6.61	100	154	horizontal
288.38	50.96	-11.31	39.65	46.00	6.35	100	154	horizontal
290.08	49.97	-11.27	38.70	46.00	7.30	100	23	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Below 1 GHz) – 802.11 g mode, Vertical



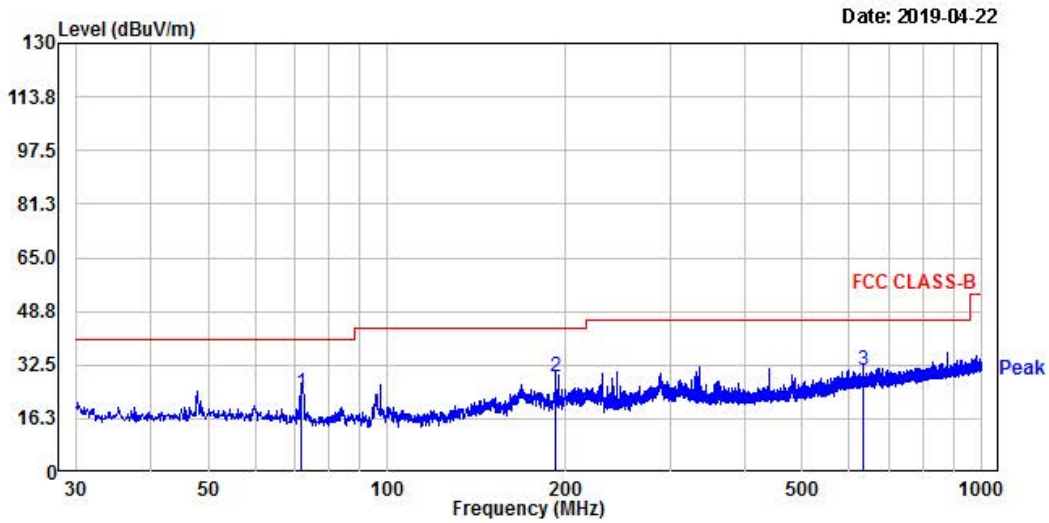
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EUT/Model No.: MTR-001

Temp/Humi: 23 / 36

Test Mode : Wireless g mode

Tested by: YEON J H



Freq MHz	Reading dBuV	C.F dB	Result QP dBuV/m	Limit dBuV/m	Margin dB	Height cm	Angle deg	Polarity
71.71	39.70	-15.59	24.11	40.00	15.89	400	265	vertical
191.99	43.83	-15.05	28.78	43.50	14.72	100	1	vertical
633.83	35.01	-4.28	30.73	46.00	15.27	100	53	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Below 1 GHz) – 802.11 g mode, Horizontal



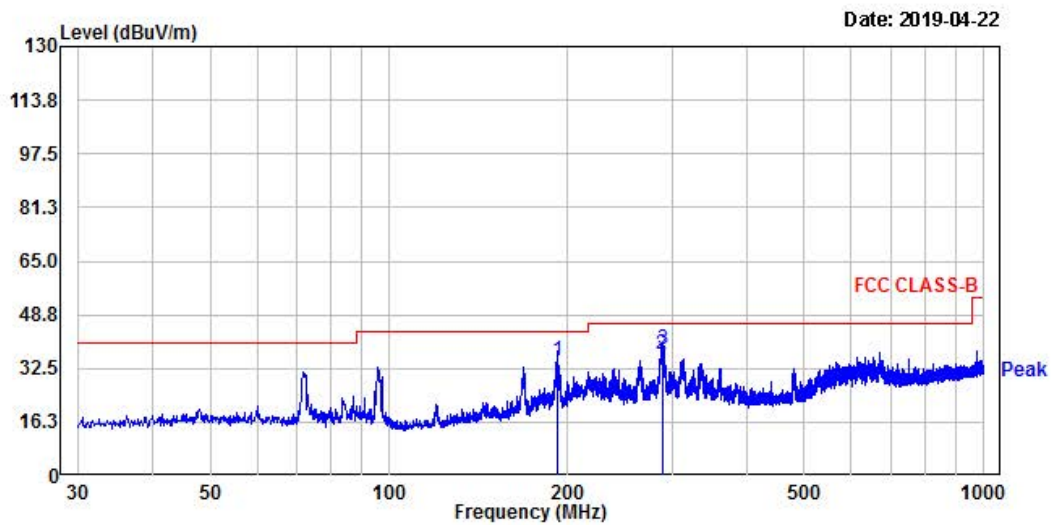
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EUT/Model No.: MIR-001

Temp/Humi: 23 / 36

Test Mode : Wireless g mode

Tested by: YEON J H



Freq MHz	Reading dBuV	C.F dB	Result QP dBuV/m	Limit dBuV/m	Margin dB	Height cm	Angle deg	Polarity
192.23	49.74	-15.05	34.69	43.50	8.81	100	35	horizontal
288.02	48.10	-11.32	36.78	46.00	9.22	100	151	horizontal
288.38	49.65	-11.31	38.34	46.00	7.66	100	24	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Below 1 GHz) – 802.11 n20 mode, Vertical



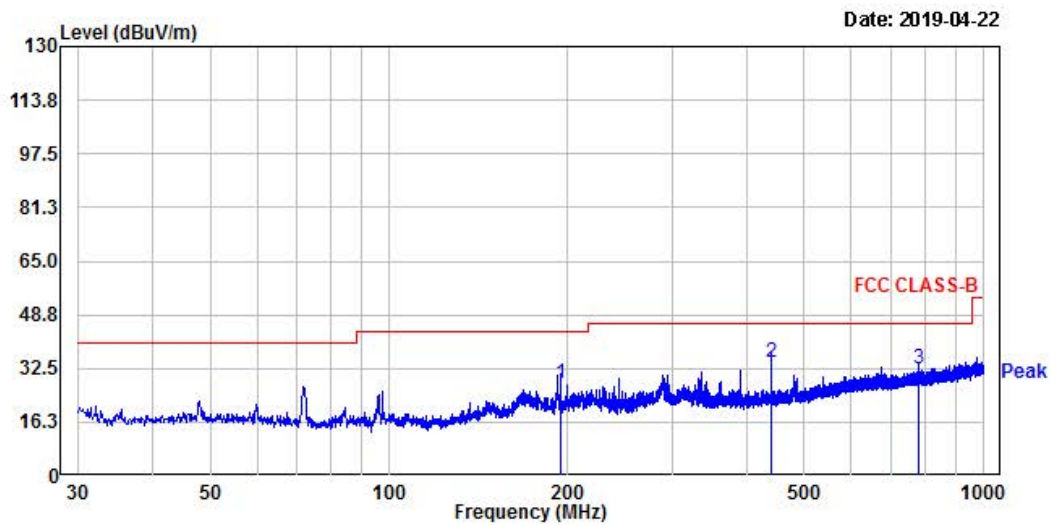
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EUT/Model No.: MIR-001

Temp/Humi: 23 / 36

Test Mode : Wireless n mode

Tested by: YEON J H



Freq MHz	Reading dBuV	C.F dB	Result QP dBuV/m	Limit dBuV/m	Margin dB	Height cm	Angle deg	Polarity
195.02	43.12	-15.22	27.90	43.50	15.60	100	360	vertical
438.73	42.42	-7.98	34.44	46.00	11.56	100	92	vertical
780.05	33.88	-1.56	32.32	46.00	13.68	206	360	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Below 1 GHz) – 802.11 n20 mode, Horizontal



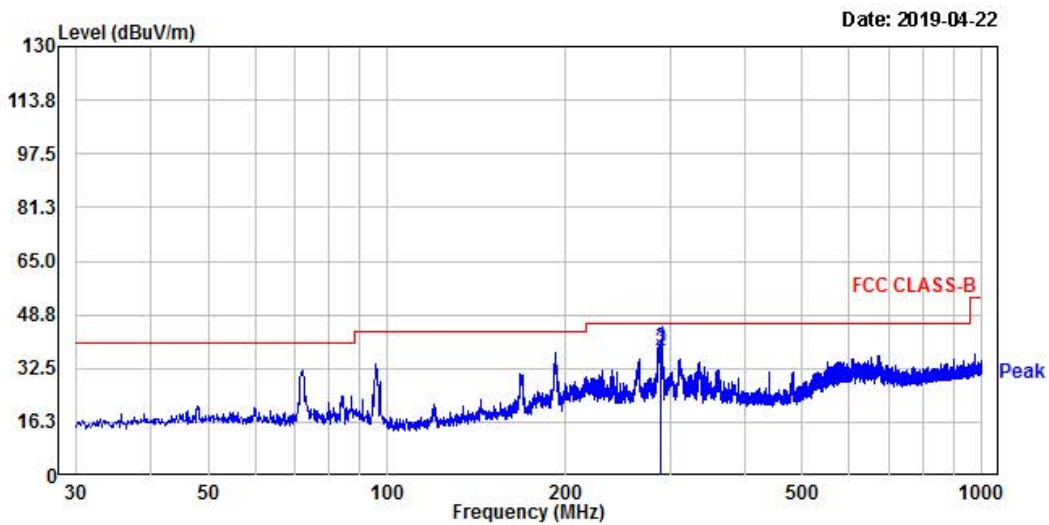
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EUT/Model No.: MIR-001

Temp/Humi: 23 / 36

Test Mode : Wireless n mode

Tested by: YEON J H



Freq MHz	Reading dBUV	C.F dB	Result QP dBUV/m	Limit dBUV/m	Margin dB	Height cm	Angle deg	Polarity
288.14	50.74	-11.32	39.42	46.00	6.58	100	166	horizontal
288.87	49.09	-11.30	37.79	46.00	8.21	100	150	horizontal
289.11	50.02	-11.30	38.72	46.00	7.28	100	150	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

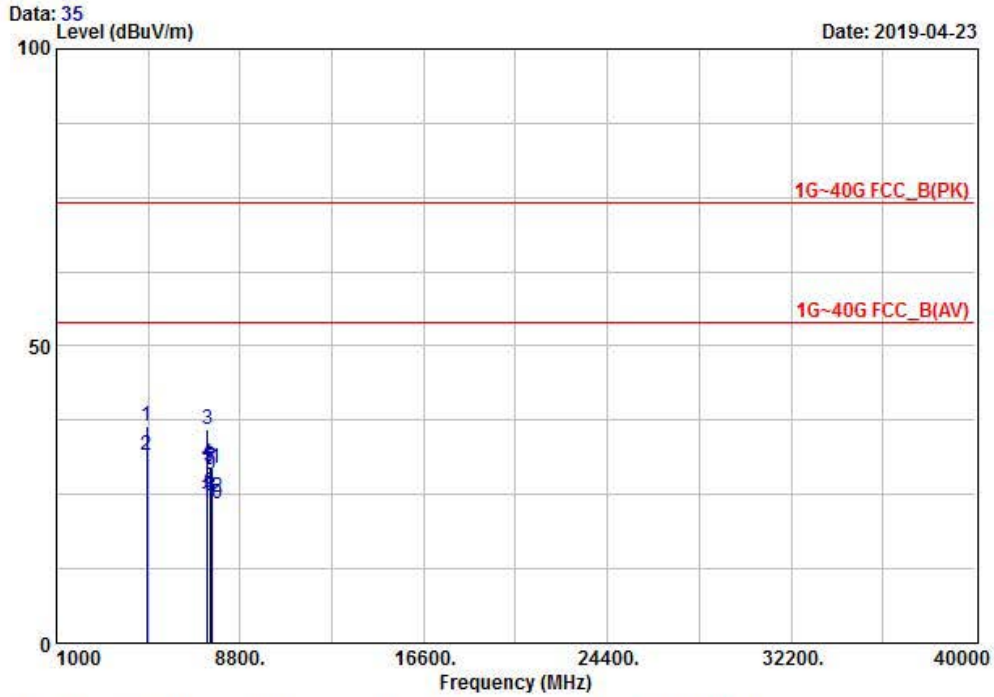
Radiated Emissions (Above 1 GHz) – 802.11 b(Low) mode



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EUT/Model No. : MIR-001 Test Mode: wireless b(low)

 Tested by : YEON J H Temp/Humi: 22 / 62



No.	Freq. (MHz)	Level (dBuV/m)	Correction (dB)	Antenna Gain (dB)	Cable Loss (dB)	Preamp Gain (dB)	Orientation
1	4825.51	51.68	-15.05	36.63	74.00	37.37	HORIZONTAL
2	4825.51	46.72	-15.05	31.67	54.00	22.33	HORIZONTAL
3	7430.16	40.96	-5.08	35.88	74.00	38.12	VERTICAL
4	7430.16	35.41	-5.08	30.33	54.00	23.67	VERTICAL
5	7533.64	34.16	-4.53	29.63	74.00	44.37	VERTICAL
6	7533.64	29.86	-4.53	25.33	54.00	28.67	VERTICAL
7	7578.41	34.31	-4.95	29.36	74.00	44.64	VERTICAL
8	7578.41	29.72	-4.95	24.77	54.00	29.23	VERTICAL
9	7587.25	33.24	-5.03	28.21	74.00	45.79	HORIZONTAL
10	7587.25	28.50	-5.03	23.47	54.00	30.53	HORIZONTAL
11	7595.49	34.61	-5.11	29.50	74.00	44.50	HORIZONTAL
12	7595.49	29.63	-5.11	24.52	54.00	29.48	HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

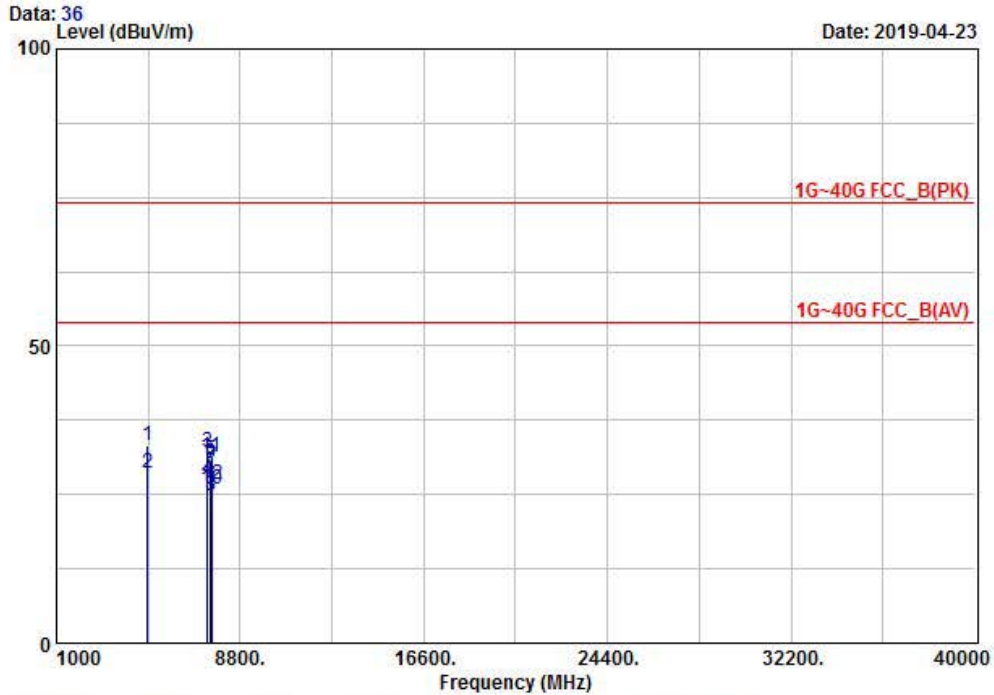
Radiated Emissions (Above 1 GHz) – 802.11 b(MID) mode



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EUT/Model No. : MIR-001 Test Mode: wireless b(mid)

 Tested by : YEON J H Temp/Humi: 22 / 62



No.	Freq (MHz)	Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Gain (dB)	Correction Factor (dB)	Polarization
1	4884.81	48.21	-15.03	33.18	74.00	40.82	HORIZONTAL
2	4884.81	43.76	-15.03	28.73	54.00	25.27	HORIZONTAL
3	7427.45	37.15	-5.12	32.03	74.00	41.97	HORIZONTAL
4	7427.45	32.68	-5.12	27.56	54.00	26.44	HORIZONTAL
5	7535.71	35.28	-4.55	30.73	74.00	43.27	VERTICAL
6	7535.71	30.52	-4.55	25.97	54.00	28.03	VERTICAL
7	7580.60	34.57	-4.97	29.60	74.00	44.40	VERTICAL
8	7580.60	29.83	-4.97	24.86	54.00	29.14	VERTICAL
9	7588.41	35.37	-5.05	30.32	74.00	43.68	HORIZONTAL
10	7588.41	30.96	-5.05	25.91	54.00	28.09	HORIZONTAL
11	7594.68	36.45	-5.10	31.35	74.00	42.65	HORIZONTAL
12	7594.68	31.94	-5.10	26.84	54.00	27.16	HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

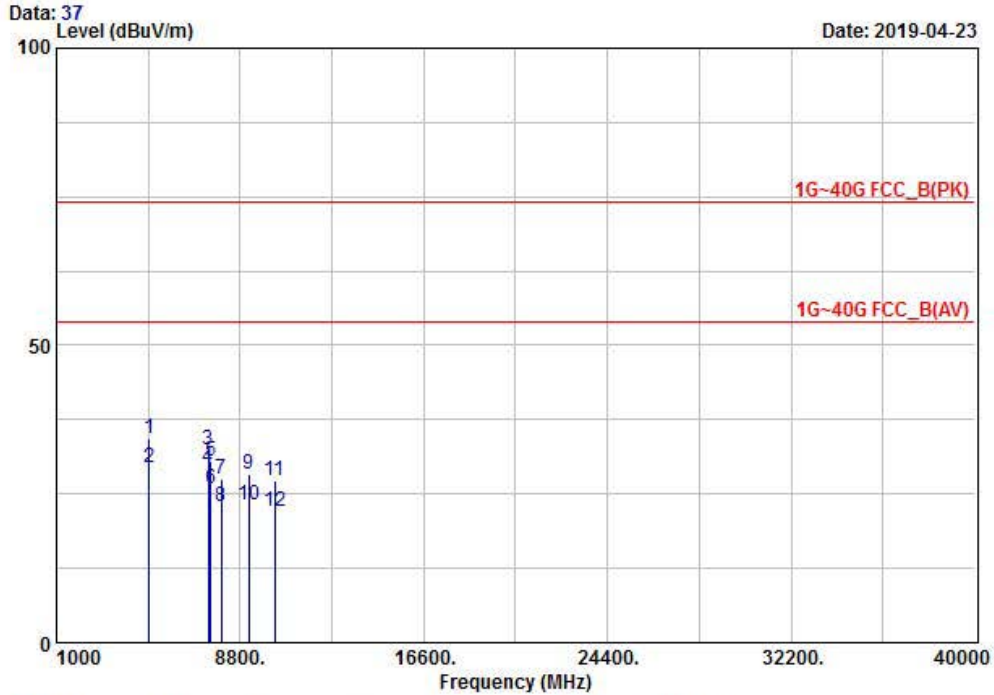
Radiated Emissions (Above 1 GHz) – 802.11 b(HIGH) mode



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EUT/Model No. : MIR-001 Test Mode: wireless b(high)

 Tested by : YEON J H Temp/Humi: 22 / 62



Line No	Freq (MHz)	Level (dBuV/m)	C.F.	Ant. Fact.	Cable Loss	Preamp Gain	Orientation
1	4943.88	49.23	-15.01	34.22	74.00	39.78	VERTICAL
2	4943.88	44.49	-15.01	29.48	54.00	24.52	VERTICAL
3	7463.33	37.16	-4.67	32.49	74.00	41.51	VERTICAL
4	7463.33	34.05	-4.67	29.38	54.00	24.62	VERTICAL
5	7548.51	35.11	-4.67	30.44	74.00	43.56	HORIZONTAL
6	7548.51	30.46	-4.67	25.79	54.00	28.21	HORIZONTAL
7	8003.04	36.34	-8.89	27.45	74.00	46.55	HORIZONTAL
8	8003.04	31.68	-8.89	22.79	54.00	31.21	HORIZONTAL
9	9152.47	37.50	-9.27	28.23	74.00	45.77	HORIZONTAL
10	9152.47	32.55	-9.27	23.28	54.00	30.72	HORIZONTAL
11	1110257.42	34.81	-7.56	27.25	74.00	46.75	VERTICAL
12	1210257.42	29.65	-7.56	22.09	54.00	31.91	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

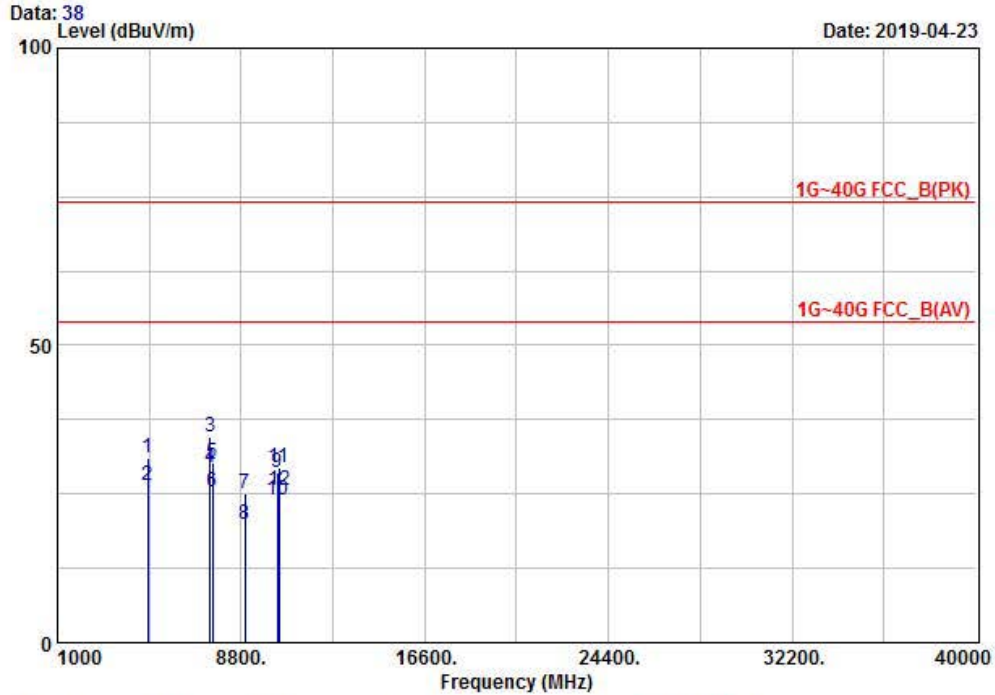
Radiated Emissions (Above 1 GHz) – 802.11 g(LOW) mode



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EUT/Model No. : MIR-001 Test Mode: wireless g(low)

 Tested by : YEON J H Temp/Humi: 22 / 62



Line No.	Frequency (MHz)	Level (dBuV/m)	C.F.	Antenna Factor (dB)	Cable Loss (dB)	Preamp Gain (dB)	Orientation
1	4826.03	46.22	-15.05	31.17	74.00	42.83	HORIZONTAL
2	4826.03	41.59	-15.05	26.54	54.00	27.46	HORIZONTAL
3	7486.61	38.94	-4.39	34.55	74.00	39.45	HORIZONTAL
4	7486.61	33.76	-4.39	29.37	54.00	24.63	HORIZONTAL
5	7585.46	35.19	-5.02	30.17	74.00	43.83	VERTICAL
6	7585.46	30.42	-5.02	25.40	54.00	28.60	VERTICAL
7	8965.52	34.73	-9.64	25.09	74.00	48.91	HORIZONTAL
8	8965.52	29.40	-9.64	19.76	54.00	34.24	HORIZONTAL
9	910332.66	35.73	-7.22	28.51	74.00	45.49	VERTICAL
10	1010332.66	31.29	-7.22	24.07	54.00	29.93	VERTICAL
11	1110415.68	36.21	-6.85	29.36	74.00	44.64	HORIZONTAL
12	1210415.68	32.56	-6.85	25.71	54.00	28.29	HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

Radiated Emissions (Above 1 GHz) – 802.11 g(MID) mode

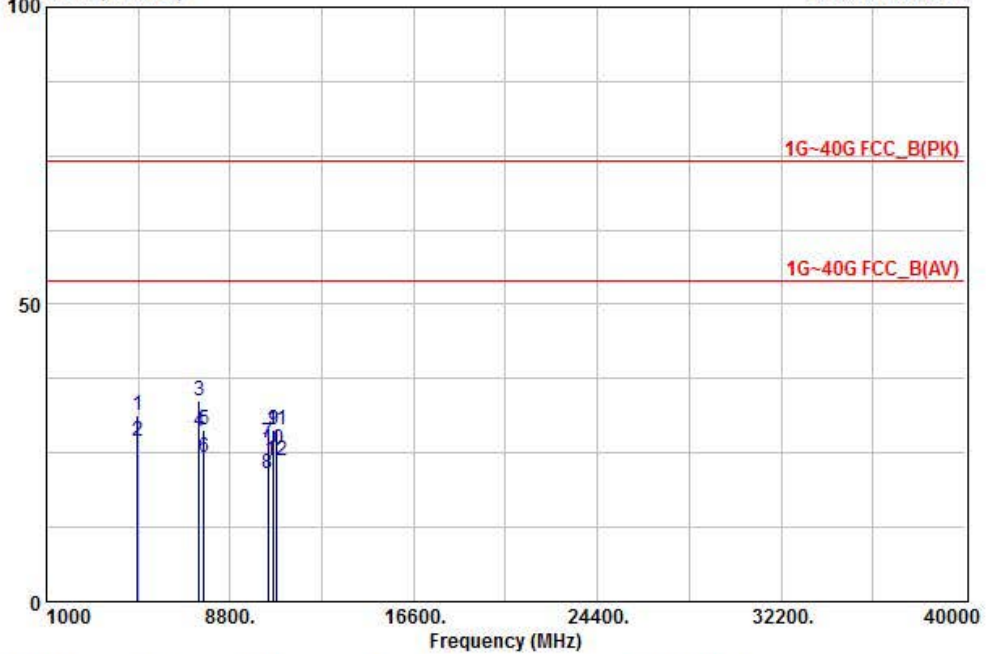


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EUT/Model No. : MIR-001 Test Mode: wireless g(mid)

 Tested by : YEON J H Temp/Humi: 22 / 62

Data: 39 Level (dBuV/m) Date: 2019-04-23



Line No.	Frequency (MHz)	Level (dBuV/m)	Correction Factor (dB)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Gain (dB)	Polarization
1	4884.93	46.37	-15.03	31.34	74.00	42.66	HORIZONTAL
2	4884.93	42.10	-15.03	27.07	54.00	26.93	HORIZONTAL
3	7499.32	37.98	-4.23	33.75	74.00	40.25	VERTICAL
4	7499.32	32.75	-4.23	28.52	54.00	25.48	VERTICAL
5	7680.14	34.66	-5.90	28.76	74.00	45.24	HORIZONTAL
6	7680.14	30.14	-5.90	24.24	54.00	29.76	HORIZONTAL
7	10394.50	33.71	-6.94	26.77	74.00	47.23	VERTICAL
8	10394.50	28.46	-6.94	21.52	54.00	32.48	VERTICAL
9	10641.37	35.17	-6.21	28.96	74.00	45.04	HORIZONTAL
10	10641.37	31.88	-6.21	25.67	54.00	28.33	HORIZONTAL
11	110775.21	34.81	-5.96	28.85	74.00	45.15	HORIZONTAL
12	110775.21	29.75	-5.96	23.79	54.00	30.21	HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

Radiated Emissions (Above 1 GHz) – 802.11 g(HIGH) mode

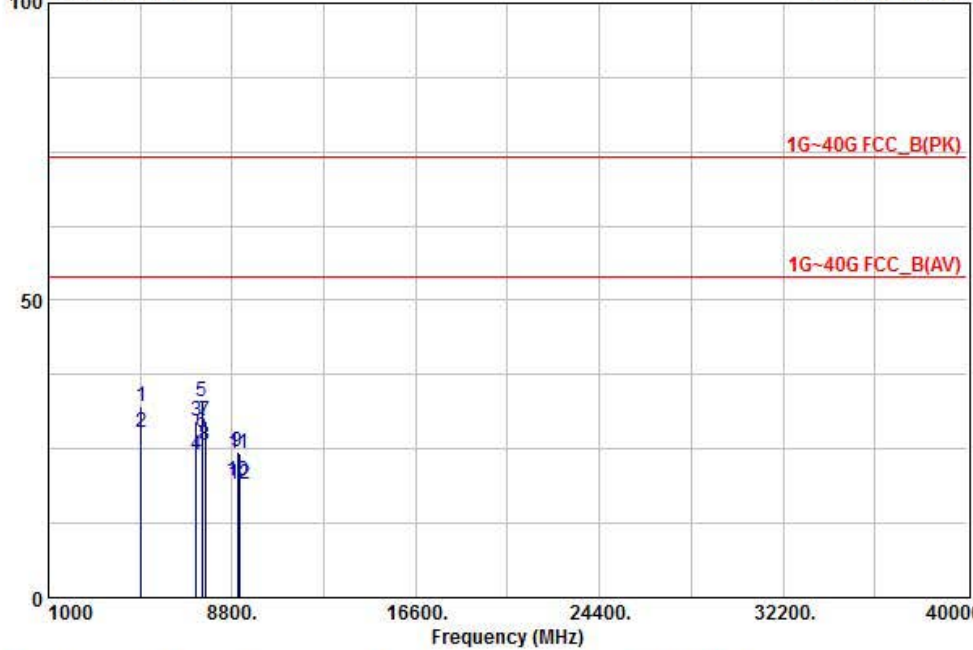


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EUT/Model No. : MIR-001 Test Mode: wireless g(high)

 Tested by : YEON J H Temp/Humi: 22 / 62

Data: 40 Level (dBuV/m) Date: 2019-04-23



No.	Freq (MHz)	Level (dBuV/m)	C.F.	Ant. Fact.	Cable Loss	Preamp Gain	Orientation
1	4945.02	47.19	-15.01	32.18	74.00	41.82	HORIZONTAL
2	4945.02	42.67	-15.01	27.66	54.00	26.34	HORIZONTAL
3	7270.88	36.72	-7.05	29.67	74.00	44.33	VERTICAL
4	7270.88	31.08	-7.05	24.03	54.00	29.97	VERTICAL
5	7531.64	37.61	-4.52	33.09	74.00	40.91	VERTICAL
6	7531.64	32.44	-4.52	27.92	54.00	26.08	VERTICAL
7	7660.42	35.37	-5.72	29.65	74.00	44.35	HORIZONTAL
8	7660.42	31.29	-5.72	25.57	54.00	28.43	HORIZONTAL
9	9043.50	34.16	-9.59	24.57	74.00	49.43	VERTICAL
10	9043.50	29.12	-9.59	19.53	54.00	34.47	VERTICAL
11	9115.37	33.52	-9.38	24.14	74.00	49.86	HORIZONTAL
12	9115.37	28.43	-9.38	19.05	54.00	34.95	HORIZONTAL

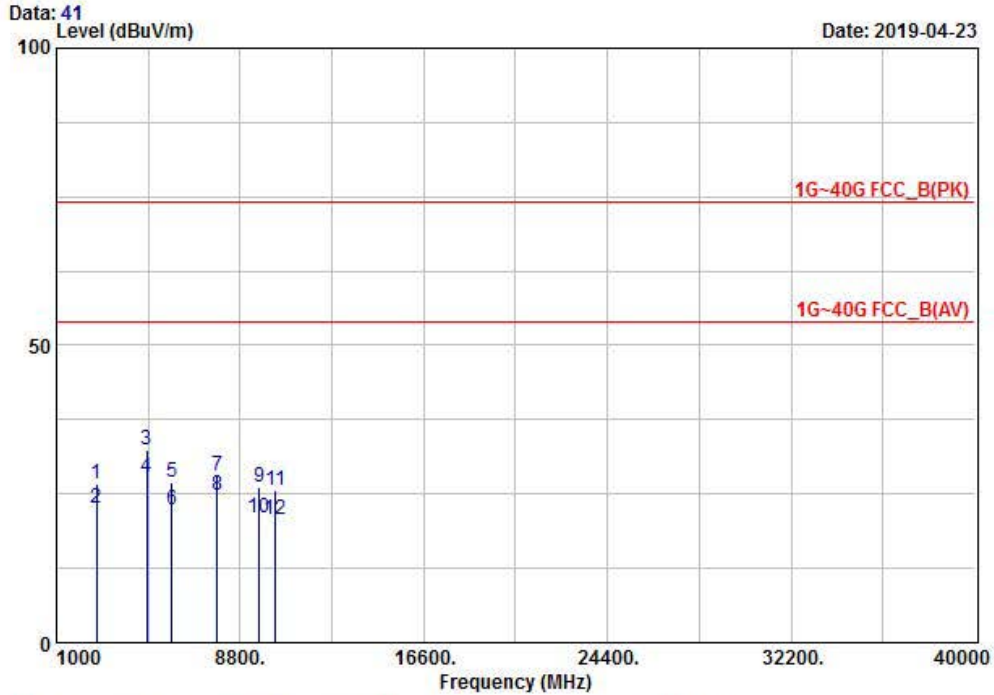
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

Radiated Emissions (Above 1 GHz) – 802.11 n20(LOW) mode



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EUT/Model No. : MIR-001 Test Mode: wireless n20(low)
 Tested by : YEON J H Temp/Humi: 22 / 62



Line No.	Frequency (MHz)	Level (dBuV/m)	C.F.	Antenna Factor	Cable Loss	Preamp Gain	Polarization
1	2715.16	50.16	-23.46	26.70	74.00	47.30	VERTICAL
2	2715.16	46.19	-23.46	22.73	54.00	31.27	VERTICAL
3	4824.59	47.39	-15.05	32.34	74.00	41.66	HORIZONTAL
4	4824.59	42.96	-15.05	27.91	54.00	26.09	HORIZONTAL
5	5906.41	39.50	-12.49	27.01	74.00	46.99	HORIZONTAL
6	5906.41	34.79	-12.49	22.30	54.00	31.70	HORIZONTAL
7	7825.69	35.41	-7.26	28.15	74.00	45.85	VERTICAL
8	7825.69	31.97	-7.26	24.71	54.00	29.29	VERTICAL
9	9615.51	34.47	-8.37	26.10	74.00	47.90	HORIZONTAL
10	9615.51	29.35	-8.37	20.98	54.00	33.02	HORIZONTAL
11	110292.90	33.14	-7.40	25.74	74.00	48.26	VERTICAL
12	110292.90	28.05	-7.40	20.65	54.00	33.35	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

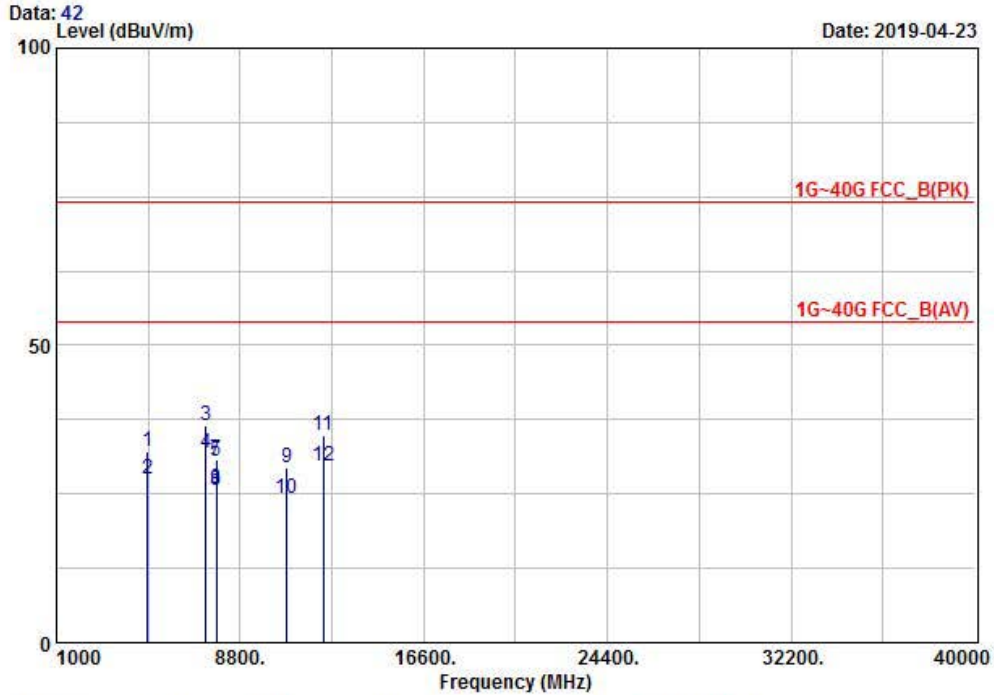
Radiated Emissions (Above 1 GHz) – 802.11 n20(MID) mode



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EUT/Model No. : MIR-001 Test Mode: wireless n20 (mid)

 Tested by : YEON J H Temp/Humi: 22 / 62



No.	Freq (MHz)	Level (dBuV/m)	CF (dB)	Ant. Gain (dB)	Cable Loss (dB)	Preamp Gain (dB)	Pol.
1	4884.26	47.06	-15.03	32.03	74.00	41.97	HORIZONTAL
2	4884.26	42.56	-15.03	27.53	54.00	26.47	HORIZONTAL
3	7331.15	42.74	-6.30	36.44	74.00	37.56	HORIZONTAL
4	7331.15	38.06	-6.30	31.76	54.00	22.24	HORIZONTAL
5	7779.75	37.42	-6.83	30.59	74.00	43.41	VERTICAL
6	7779.75	32.69	-6.83	25.86	54.00	28.14	VERTICAL
7	7783.76	37.58	-6.87	30.71	74.00	43.29	HORIZONTAL
8	7783.76	32.47	-6.87	25.60	54.00	28.40	HORIZONTAL
9	910793.46	35.39	-5.93	29.46	74.00	44.54	VERTICAL
10	1010793.46	30.14	-5.93	24.21	54.00	29.79	VERTICAL
11	1112330.67	33.48	1.48	34.96	74.00	39.04	VERTICAL
12	1212330.67	28.14	1.48	29.62	54.00	24.38	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

Radiated Emissions (Above 1 GHz) – 802.11 n20(HIGH) mode

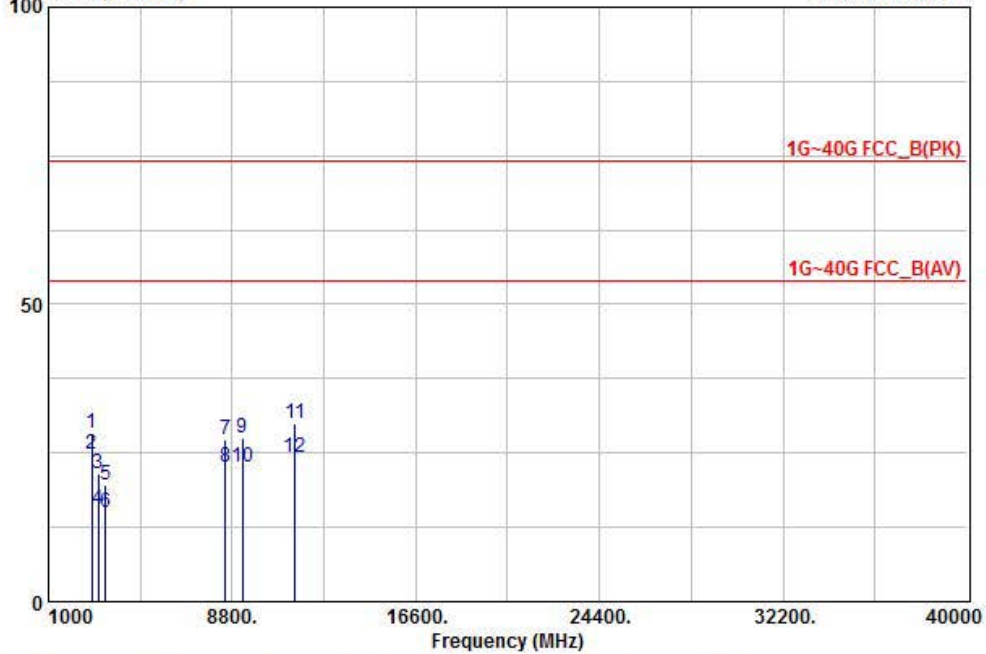


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EUT/Model No. : MIR-001 Test Mode: wireless n20 (high)

 Tested by : YEON J H Temp/Humi: 22 / 62

Data: 43 Level (dBuV/m) Date: 2019-04-23



Line No	Freq (MHz)	Level (dBuV/m)	C.F.	Ant. Fact.	Cable Loss	Preamp Gain	Orientation
1	2848.11	51.02	-22.81	28.21	74.00	45.79	HORIZONTAL
2	2848.11	47.51	-22.81	24.70	54.00	29.30	HORIZONTAL
3	3122.76	42.92	-21.48	21.44	74.00	52.56	HORIZONTAL
4	3122.76	37.10	-21.48	15.62	54.00	38.38	HORIZONTAL
5	3440.98	39.63	-19.97	19.66	74.00	54.34	VERTICAL
6	3440.98	34.85	-19.97	14.88	54.00	39.12	VERTICAL
7	8522.29	35.74	-8.60	27.14	74.00	46.86	HORIZONTAL
8	8522.29	31.20	-8.60	22.60	54.00	31.40	HORIZONTAL
9	9234.26	36.49	-9.04	27.45	74.00	46.55	VERTICAL
10	9234.26	31.75	-9.04	22.71	54.00	31.29	VERTICAL
11	111481.53	34.97	-4.95	30.02	74.00	43.98	HORIZONTAL
12	1211481.53	29.16	-4.95	24.21	54.00	29.79	HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
 Blue : Vertical Black : Horizontal

3.2.6 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: NA

Minimum Standard: FCC Part 15.207(a) / EN 55022

Class B

Frequency Range	quasi-peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

APPENDIX
TEST EQUIPMENT USED FOR TESTS

	Use	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	■	Signal Analyzer (9 kHz ~ 30 GHz)	FSV30	100757	R&S	1 year	2018-09-06
2		SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2019-03-16
3		Attenuator (3 dB)	8491A	37822	HP	1 year	2018-09-06
4		Attenuator (10 dB)	8491A	63196	HP	1 year	2018-09-06
5	■	EMI Test Receiver (~7 GHz)	ESCI7	100722	R&S	1 year	2018-09-06
6	■	RF Amplifier (~1.3 GHz)	8447D OPT 010	2944A07684	HP	1 year	2018-09-06
7	■	RF Amplifier (1~26.5 GHz)	8449B	3008A02126	HP	1 year	2019-03-16
8	■	Horn Antenna (1~18 GHz)	3115	00114105	ETS	2 year	2018-09-26
9		DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2018-05-03
10	■	DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2018-05-03
11	■	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2019-03-23
12		Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2018-09-06
13		DC Power Supply	6674A	3637A01657	Agilent	-	-
14	■	Power Meter	EPM-441A	GB32481702	HP	1 year	2019-03-16
15	■	Power Sensor	8481A	3318A94972	HP	1 year	2018-09-06
16		Audio Analyzer	8903B	3729A18901	HP	1 year	2018-09-06
17		Modulation Analyzer	8901B	3749A05878	HP	1 year	2018-09-06
18		TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2018-09-06
19		Stop Watch	HS-3	812Q08R	CASIO	2 year	2019-03-16
20		LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2018-09-06
21		Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2019-03-16
22		Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2019-03-16
23		Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2019-03-16
24		OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2019-03-16
25	■	Signal Generator(100 kHz ~ 40 GHz)	SMB100A	177621	R&S	1 year	2019-03-16
26		Vector Signal Generator(9kHz ~ 6 GHz)	SMBV100A	255081	R&S	1 year	2019-03-16
27		Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2019-03-16