

Dates of Tests : April 03 ~ April 16, 2017
Test Report S/N: LR500111704B
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID.

W6YHP500

APPLICANT

PASSTECH CO.,LTD

Equipment Class	:	Digital Transmission System (DTS)
Manufacturing Description	:	Hotel Door locks
Manufacturer	:	PASSTECH CO.,LTD
Model name	:	HP500
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	:	2405 MHz ~ 2475 MHz (Zigbee) 2402 MHz ~ 2480 MHz (Bluetooth BLE)
Max. Output Power	:	Max -2.76 dBm (Zigbee) – Conducted Max -7.02 dBm (Bluetooth BLE) – Conducted
Data of issue	:	April 18, 2017

This test report is issued under the authority of:



Yong-Cheol, Wang / Manager

The test was supervised by:



Jung-won, Seo / 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.
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 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	2017-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	2019-04-13	FCC CAB
VCCI	JAPAN	R2133(10 m), C2307	2017-06-21	VCCI registration
VCCI	JAPAN	T-2009	2017-12-23	VCCI registration
VCCI	JAPAN	G-563	2018-12-13	VCCI registration
IC	CANADA	5799A-1	2019-11-07	IC filing
KOLAS	KOREA	NO.551	UPDATING	KOLAS accredited Lab.

2-1 Client & Manufacturer

Company name : PASSTECH CO., LTD
Address : No. B-402, Geumgang Penterium IT Tower, 215, Galmachi-ro, Jungwon-
gu, Seongnam-si, Gyeonggi-do, 13217 Rep. of KOREA
Tel / Fax : TEL No : +82-31-743-7277 / FAX No : +82-31-743-7276

Trade name	: Hotel Door locks
Model name	: HP500
Serial number	: Identical prototype
Date of receipt	: April 01, 2017
EUT condition	: Pre-production, not damaged
Antenna type	: Chip antenna - Max Gain 3.5 dBi
Frequency Range	: 2405 MHz ~ 2475 MHz (Zigbee) 2402 MHz ~ 2480 MHz (Bluetooth BLE)
RF output power	: Max -2.76 dBm (Zigbee) – Conducted Max -7.02 dBm (Bluetooth BLE) – Conducted
Number of channels	: 16 (Zigbee) 40 (Bluetooth BLE)
Type of Modulation	: Direct Sequence Spread Spectrum(DSSS) Gaussian frequency-shift keying(GFSK)
Power Source	: 6 Vdc
Firmware Version	: V1.0.0

Zigbee	LOW	MID	HIGH
Frequency (MHz)	2405	2445	2475
Frequency (MHz)	2402	2438	2480

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-

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

The PASSTECH CO.,LTD FCC ID: W6YHP500 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 v03r05

*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

VBW = 100 kHz (VBW $\geq$ RBW)

Sweep = auto

Trace = max hold

Detector function = peak

Measurement Data : **Complies**

(Zigbee mode)

Frequency (MHz)	Test Results	
	Measured Bandwidth (MHz)	Result
2405	1.599	Complies
2445	1.599	Complies
2475	1.599	Complies

(Bluetooth BLE mode)

Frequency (MHz)	Test Results	
	Measured Bandwidth (MHz)	Result
2402	0.538	Complies
2438	0.538	Complies
2480	0.525	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

6 dB Bandwidth > 500 kHz

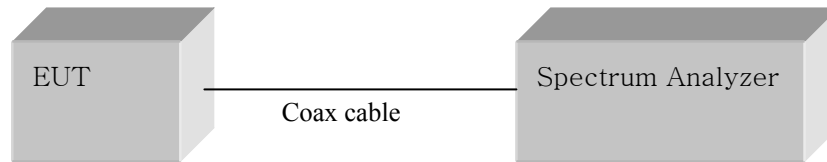
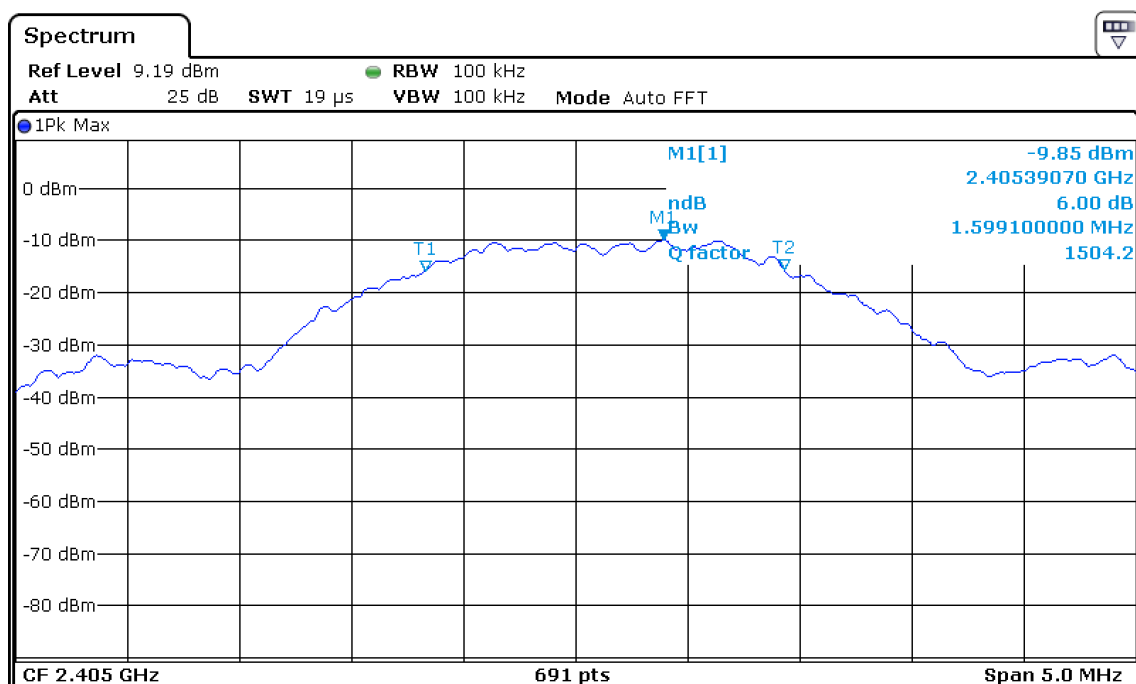
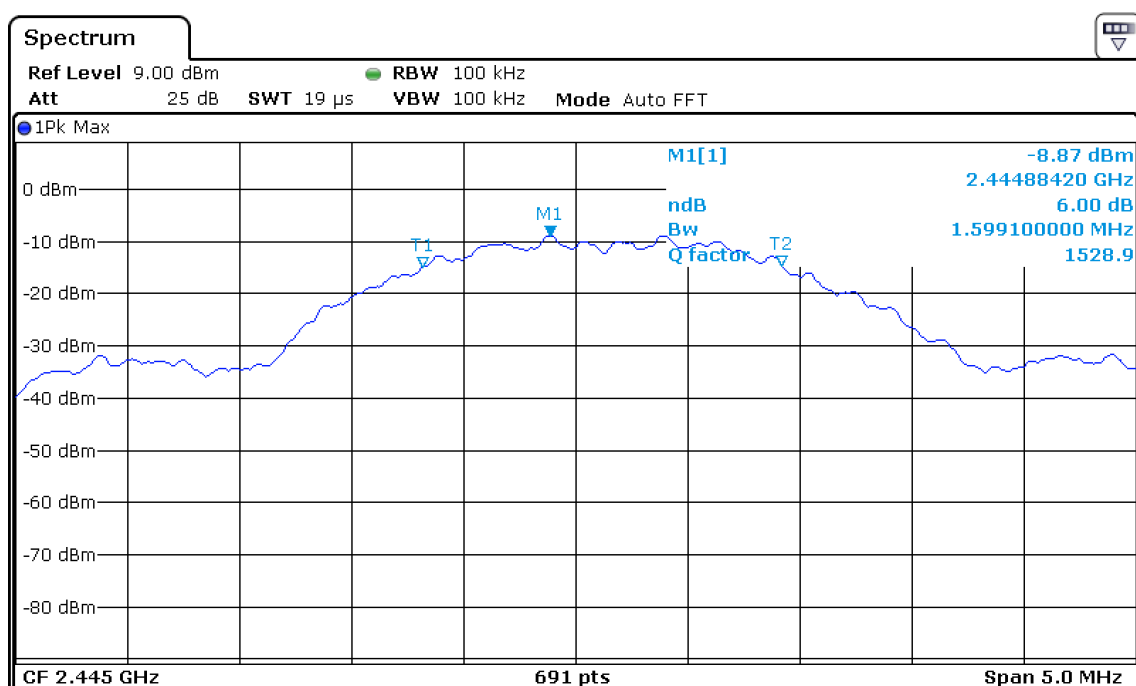
Measurement Setup

Figure 1: Measurement setup for the carrier frequency separation

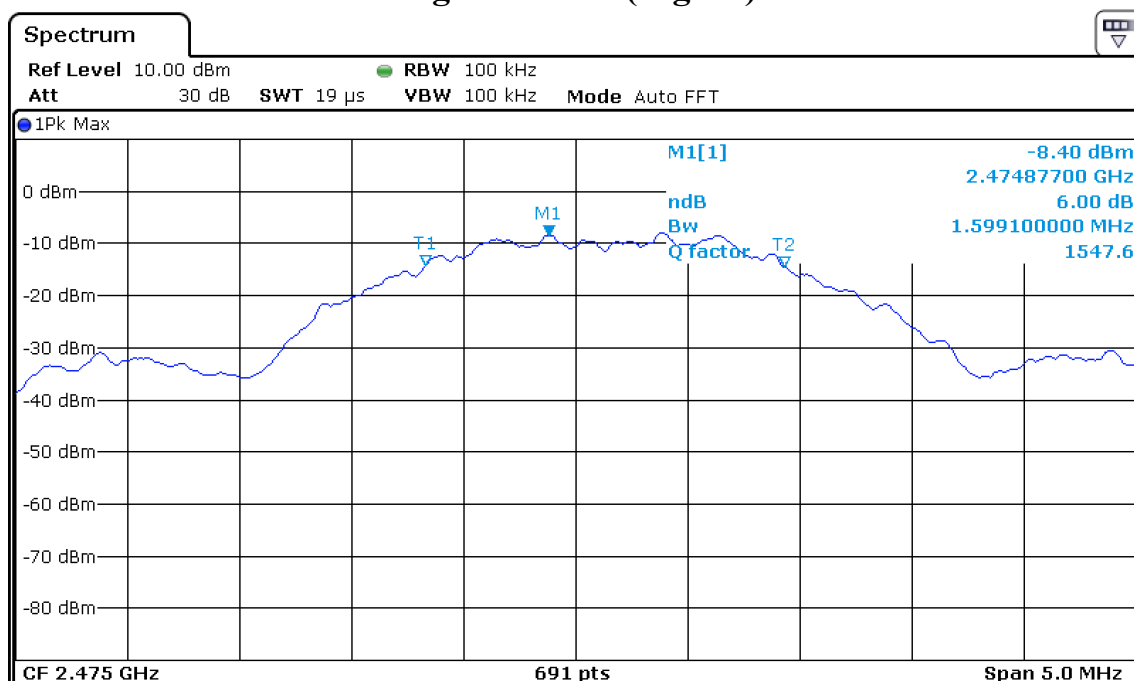
Low Channel (Zigbee)



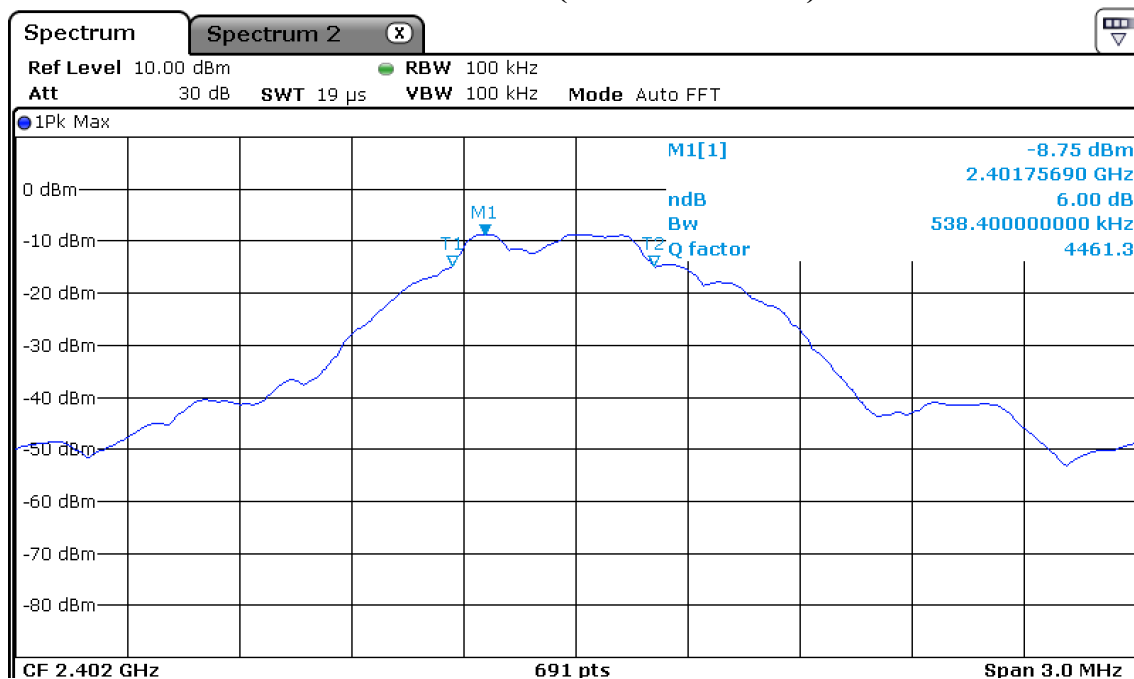
Middle Channel (Zigbee)



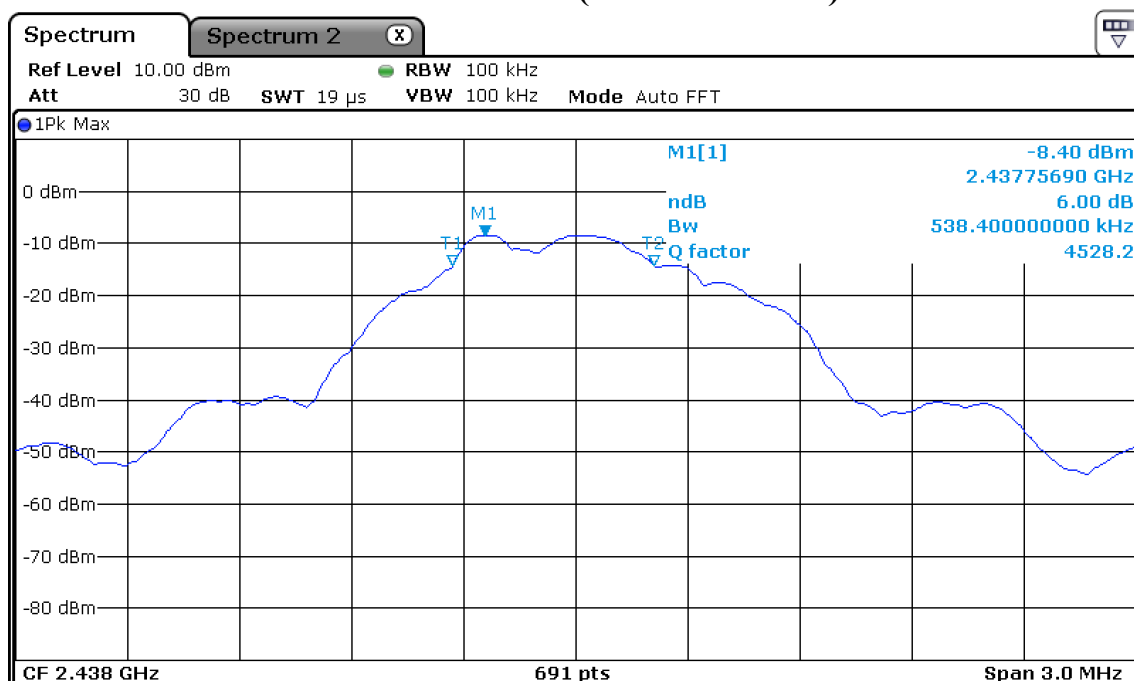
High Channel (Zigbee)



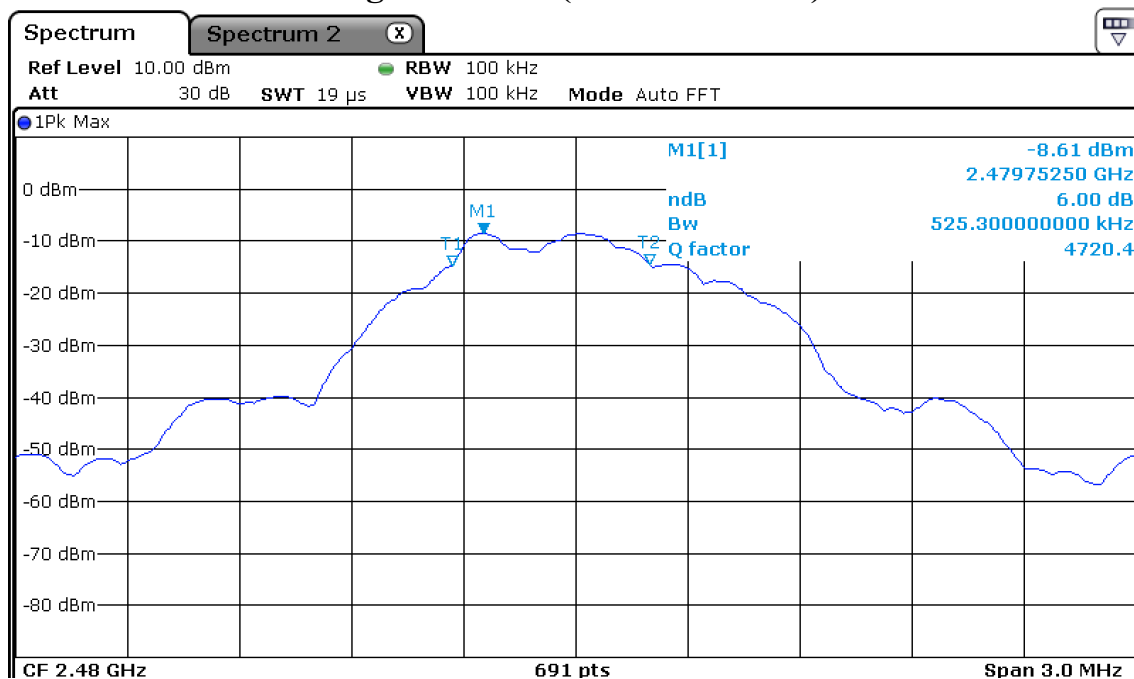
Low Channel (Bluetooth BLE)



Middle Channel (Bluetooth BLE)



High Channel (Bluetooth BLE)



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 = 1MHz (VBW $\geq$ RBW)

Sweep = auto

Detector function = peak

Measurement Data : **Complies**

(Zigbee mode)

Frequency (MHz)	Test Results		
	dBm	W	Result
2405	-4.02	0.0004	Complies
2445	-3.57	0.0004	Complies
2475	-2.76	0.0005	Complies

(Bluetooth BLE mode)

Frequency (MHz)	Test Results		
	dBm	W	Result
2402	-7.48	0.0002	Complies
2438	-7.02	0.0002	Complies
2480	-7.10	0.0002	Complies

- See next pages for actual measured spectrum plots.

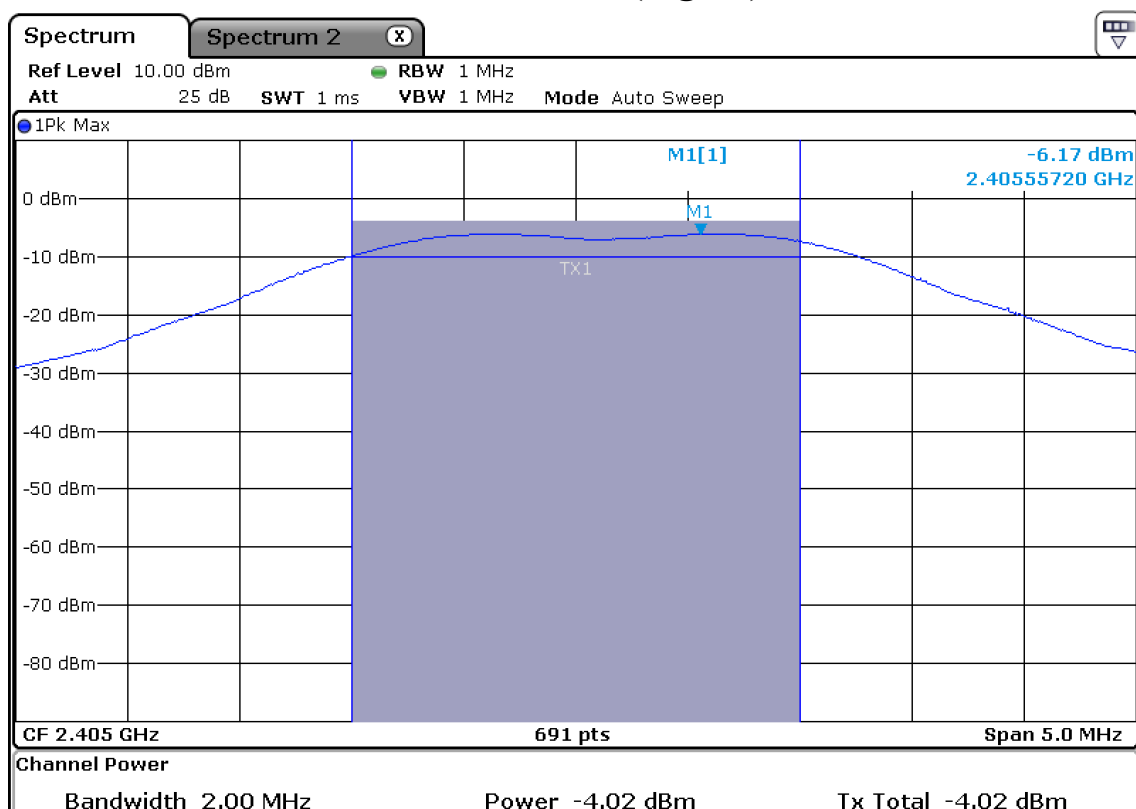
Minimum Standard:

Peak output power	< 1 W
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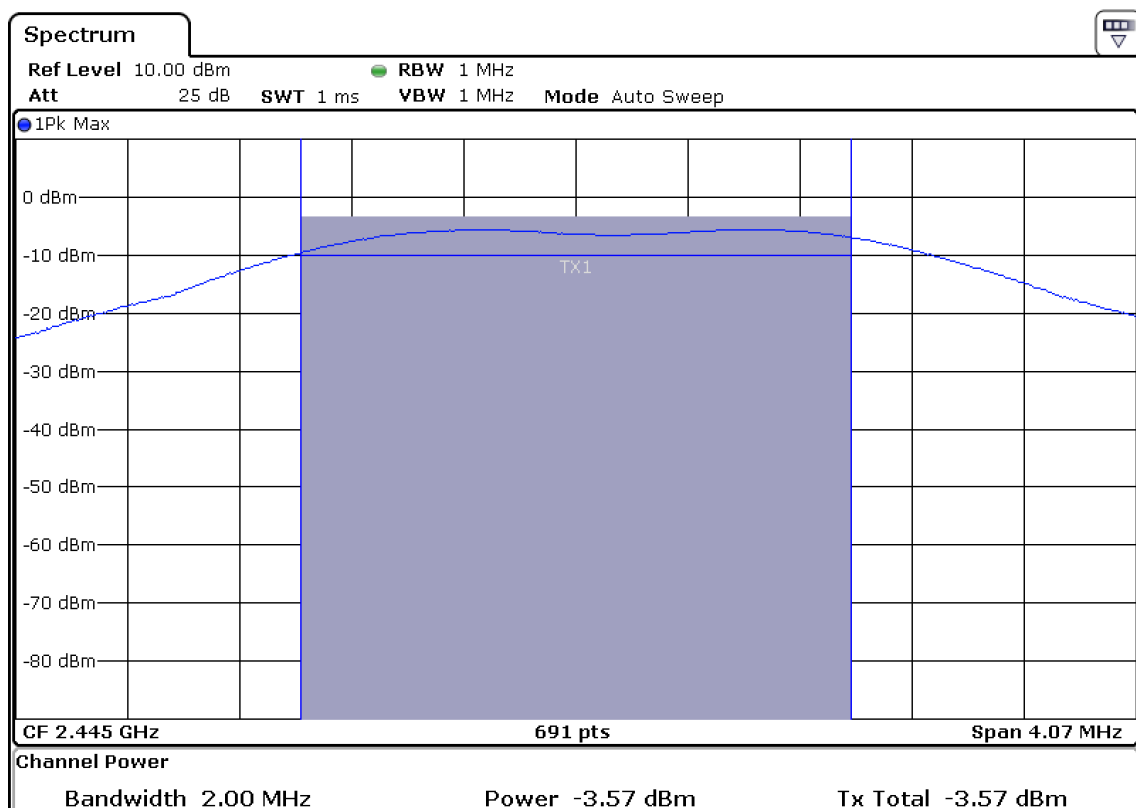
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

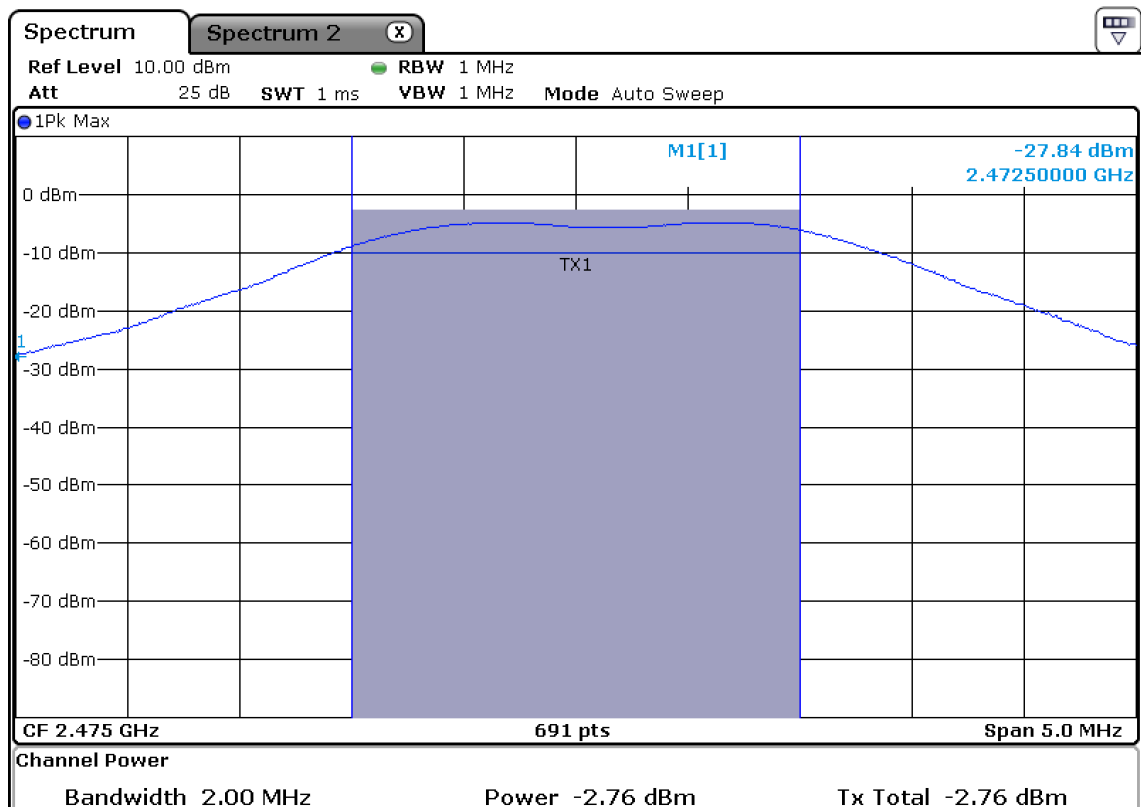
Low Channel (Zigbee)



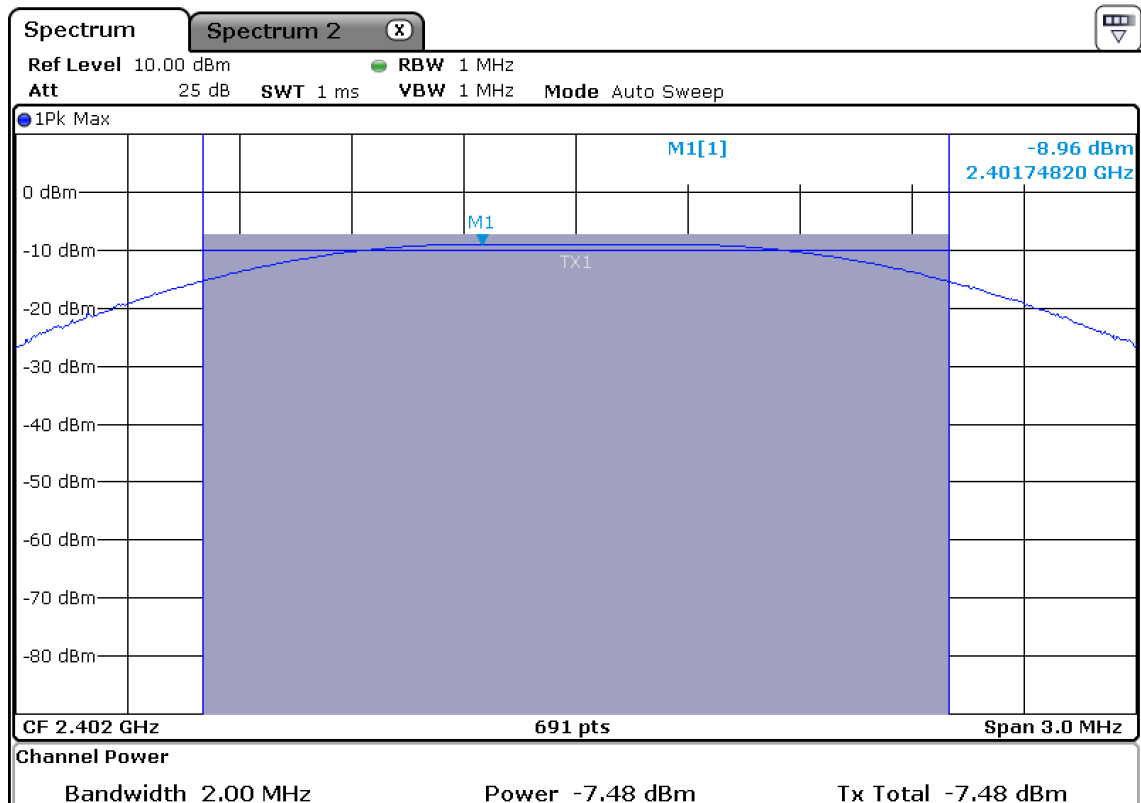
Middle Channel (Zigbee)



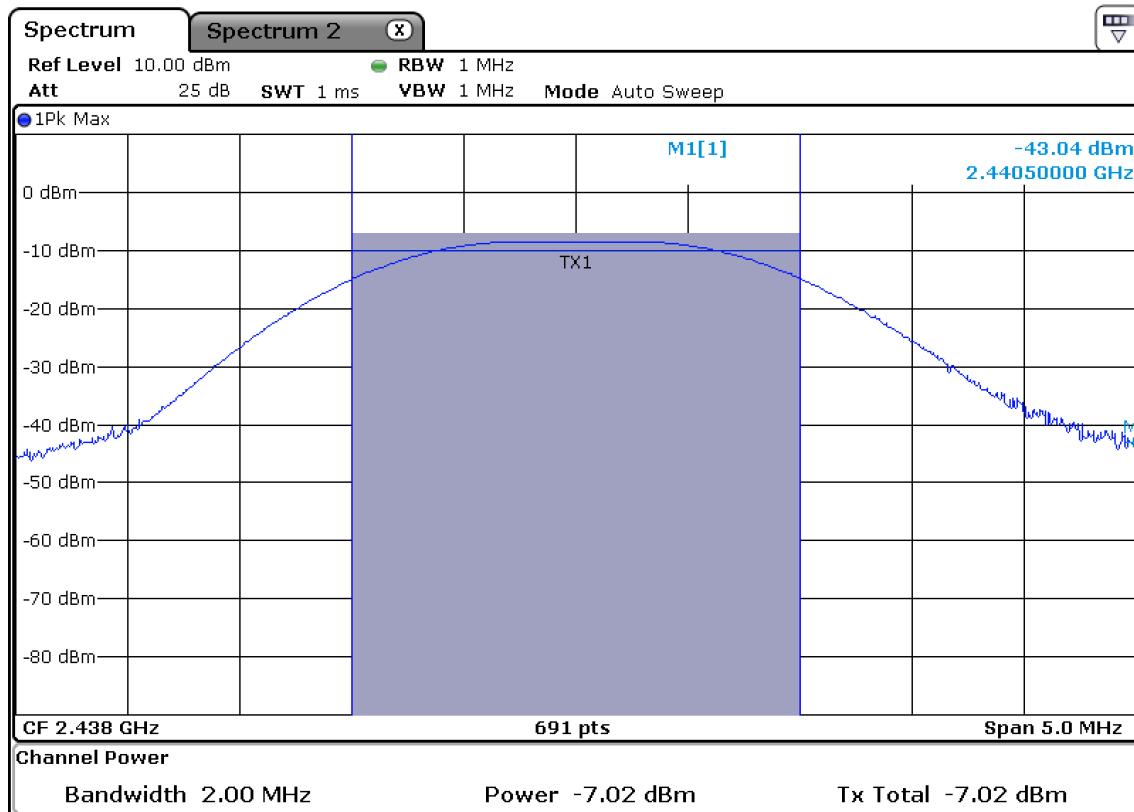
High Channel (Zigbee)



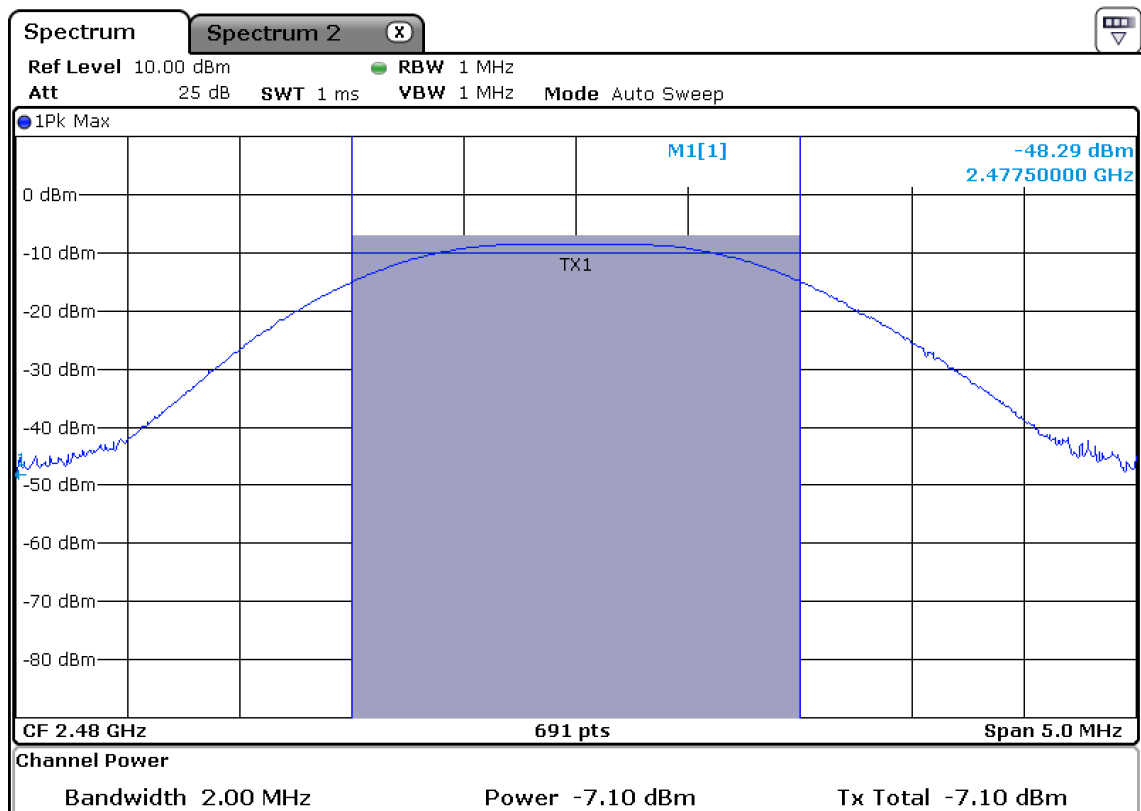
Low Channel (Bluetooth BLE)



Middle Channel (Bluetooth BLE)



High Channel (Bluetooth BLE)



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

Span = 300 kHz

VBW = 3 kHz

Sweep = auto

Detector function = peak

Trace = max hold

Measurement Data : **Complies**

(Zigbee mode)

Frequency (MHz)	Test Results	
	dBm @ 3 kHz	Result
2405	-20.90	Complies
2445	-21.33	Complies
2475	-20.39	Complies

(Bluetooth BLE mode)

Frequency (MHz)	Test Results	
	dBm @ 3 kHz	Result
2402	-22.26	Complies
2438	-21.17	Complies
2480	-21.43	Complies

- See next pages for actual measured spectrum plots.

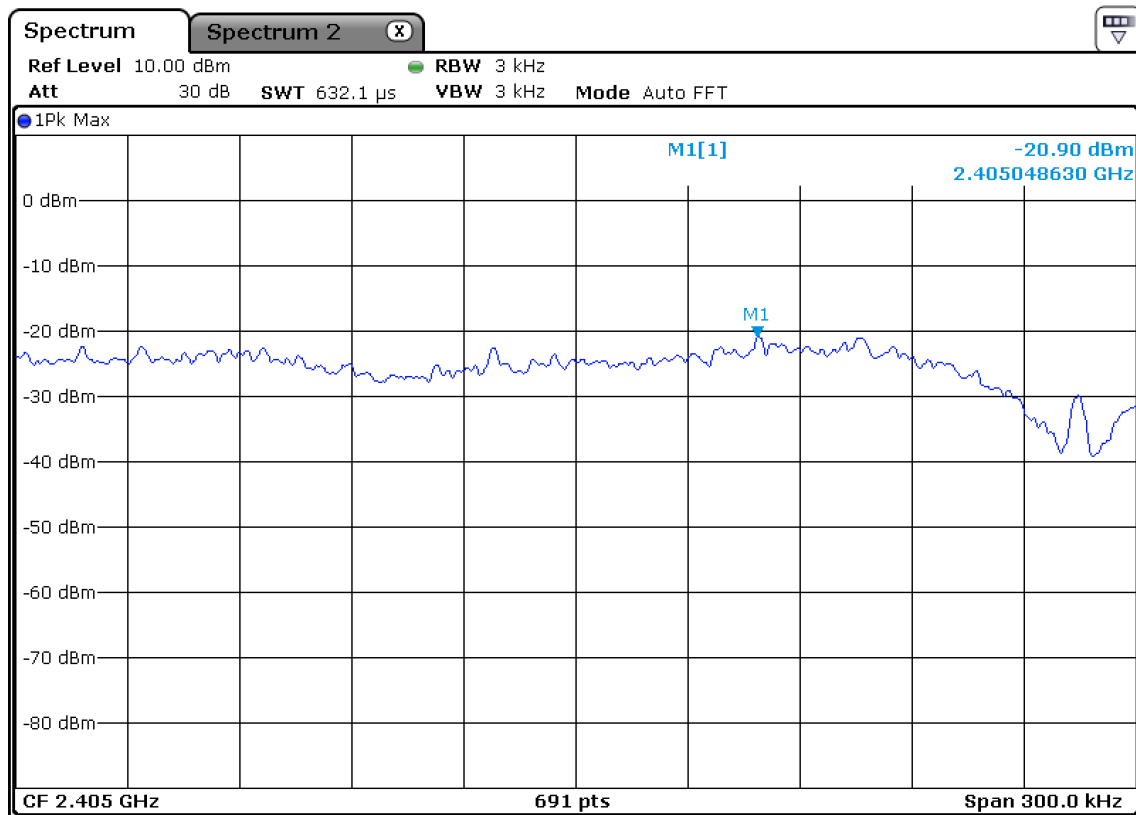
Minimum Standard:

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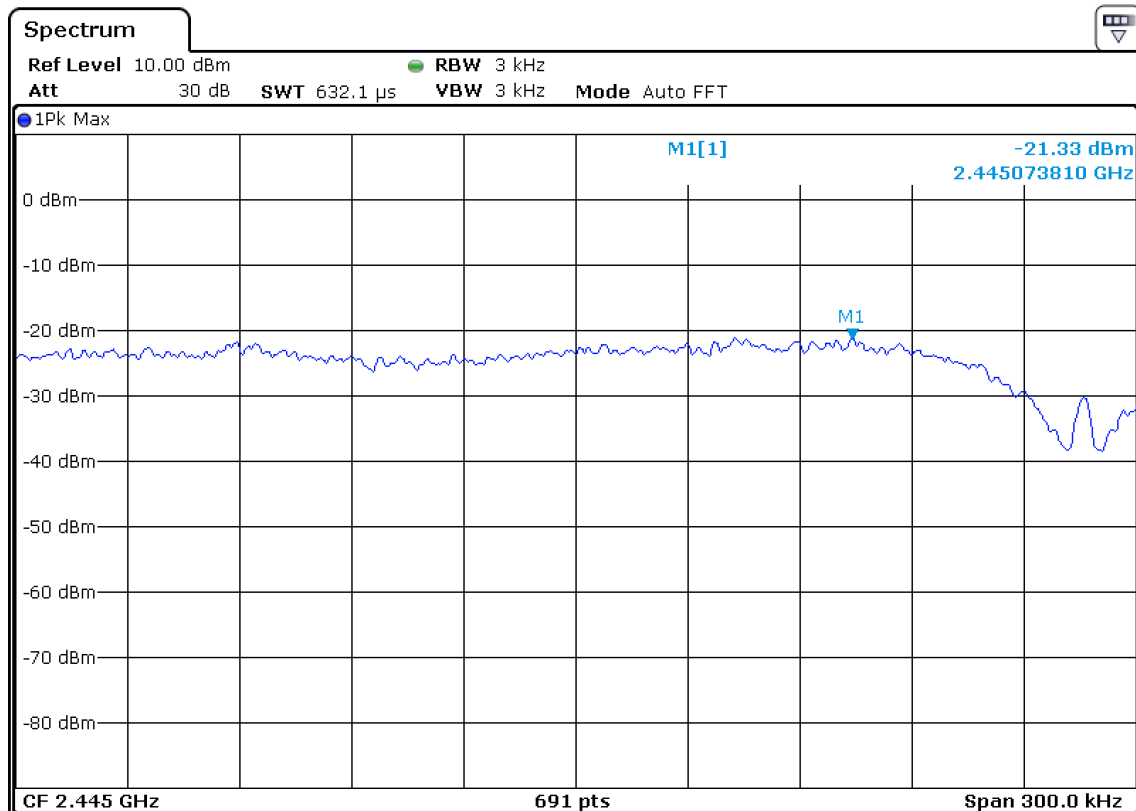
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

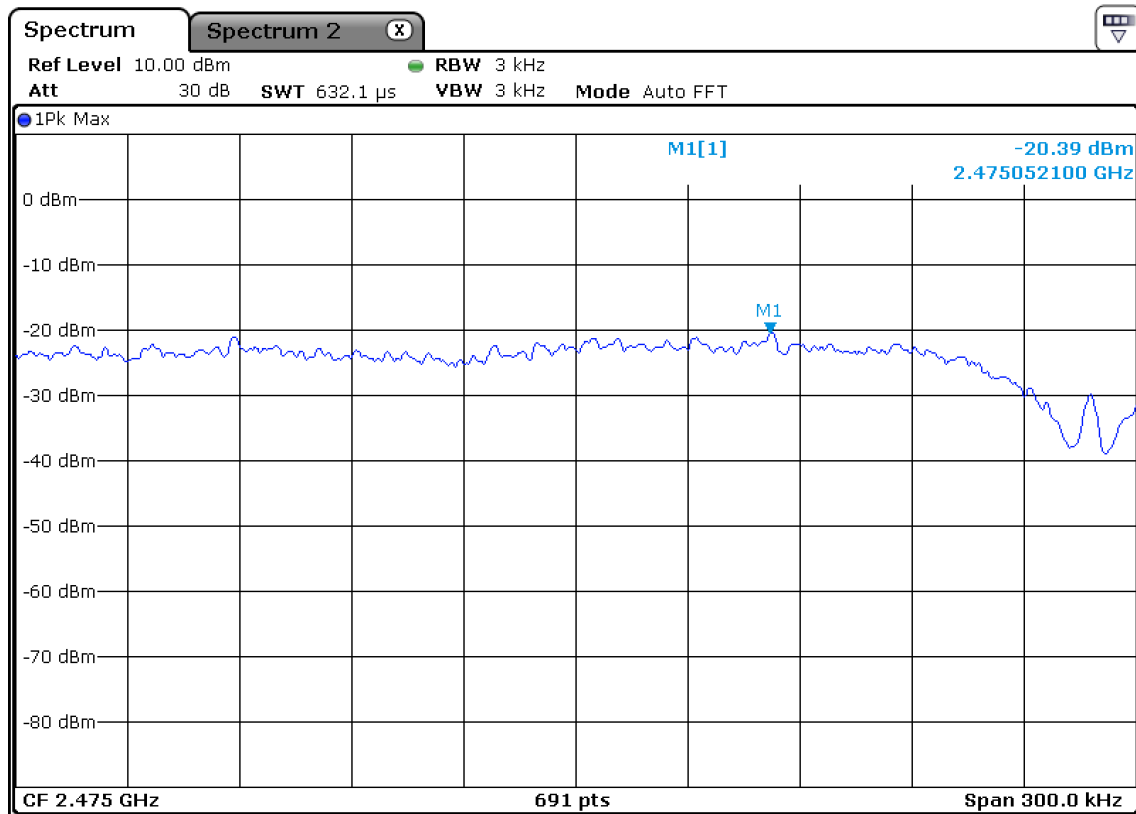
Power Density Measurement Low Channel (Zigbee)



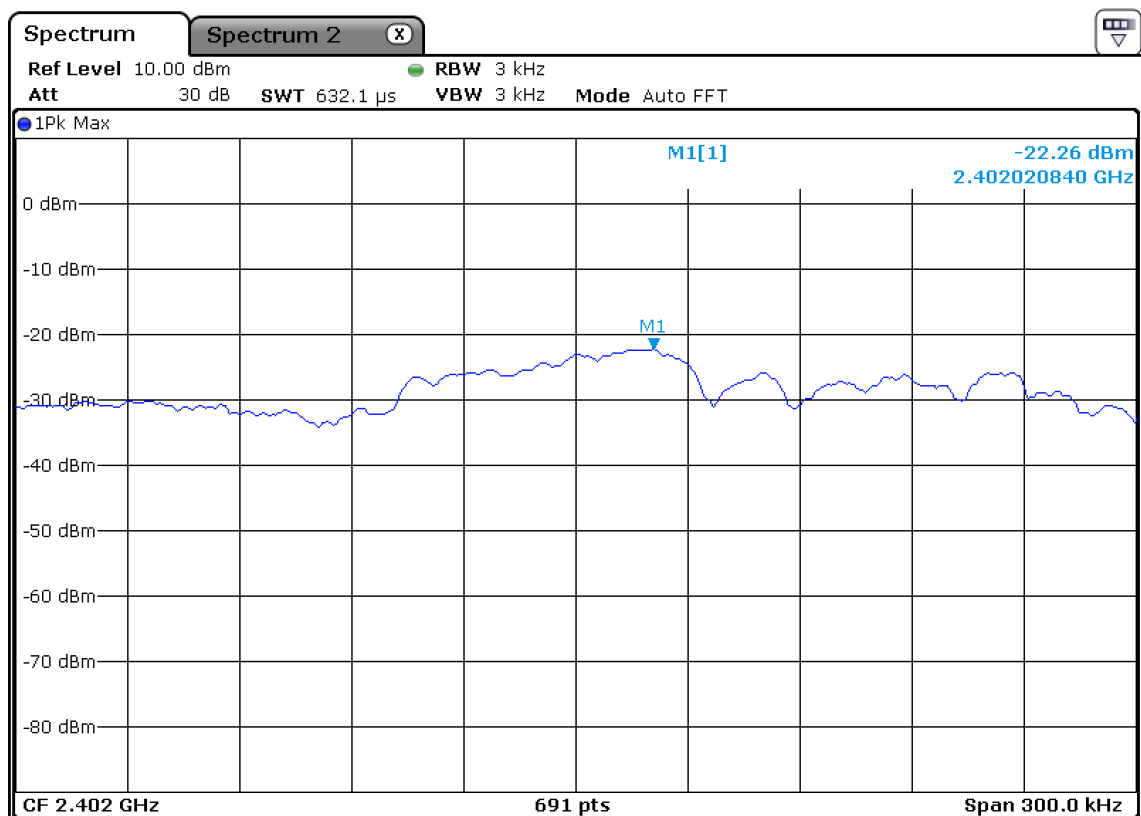
Middle Channel (Zigbee)



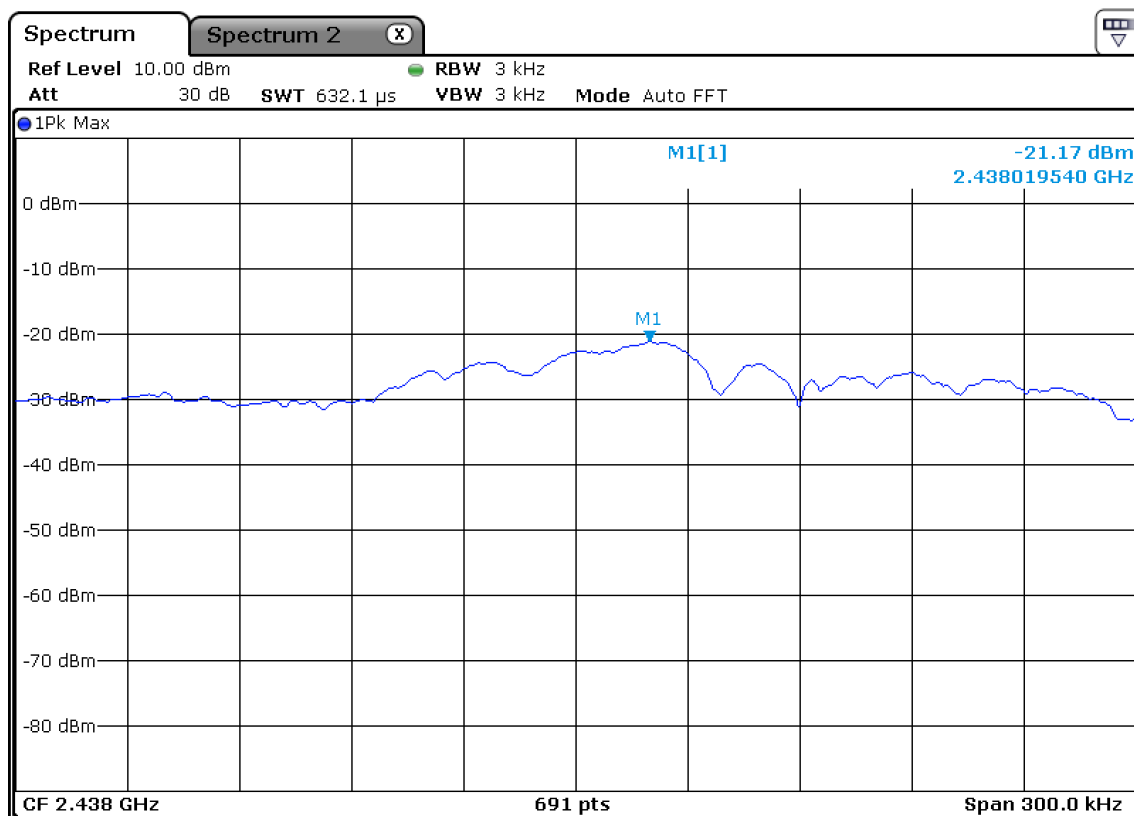
High Channel (Zigbee)



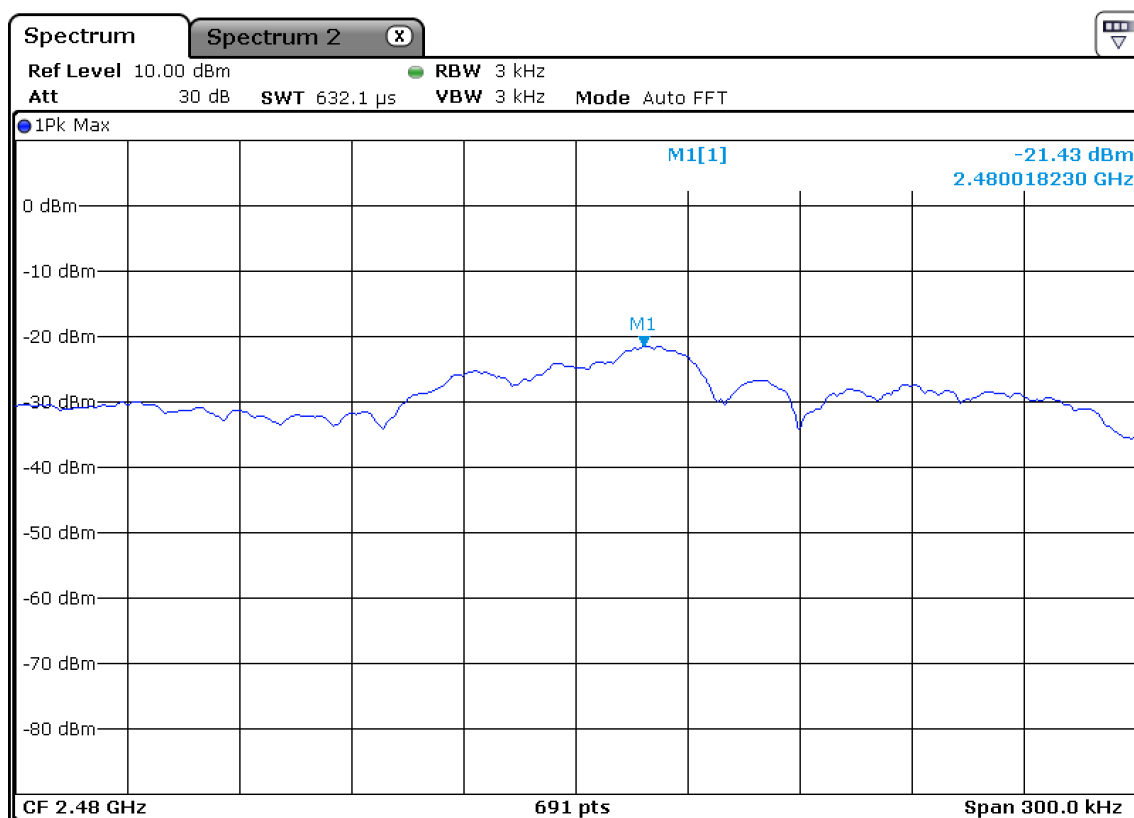
Low Channel (Bluetooth BLE)



Middle Channel (Bluetooth BLE)



High Channel (Bluetooth BLE)



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

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:

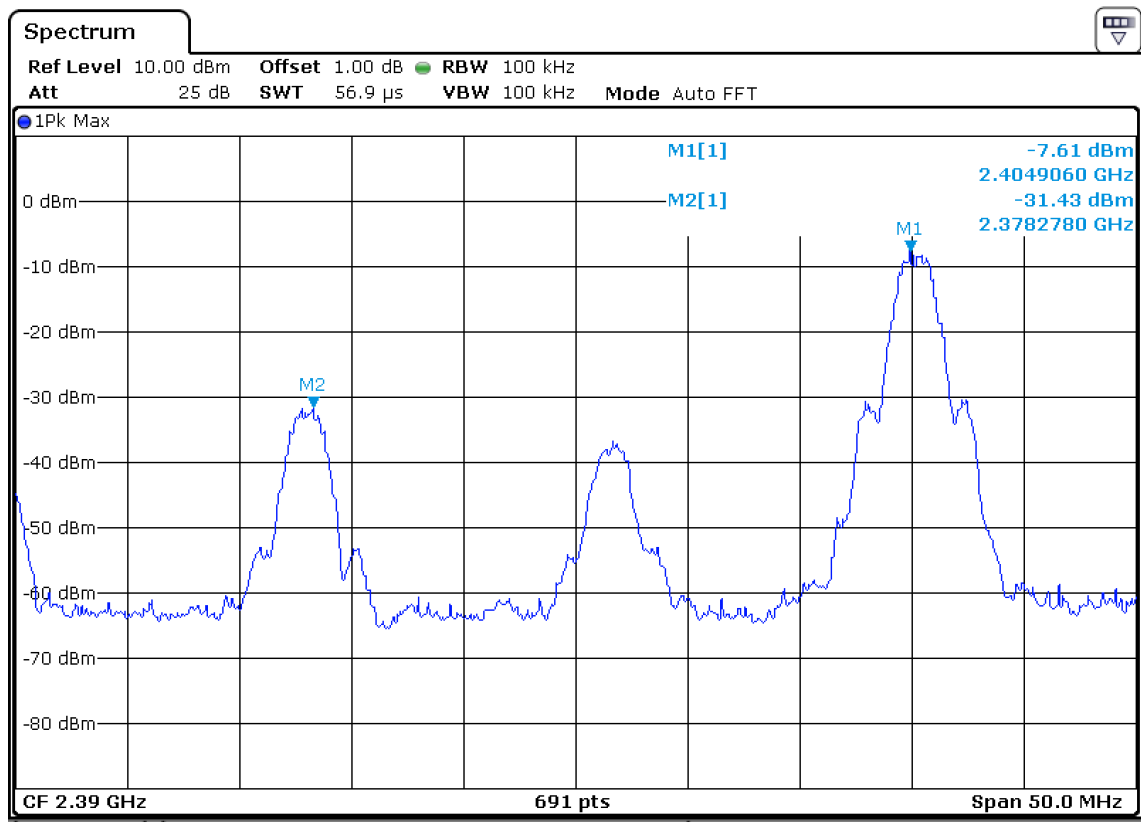
Horizontal / Vertical

Measurement Data: Complies

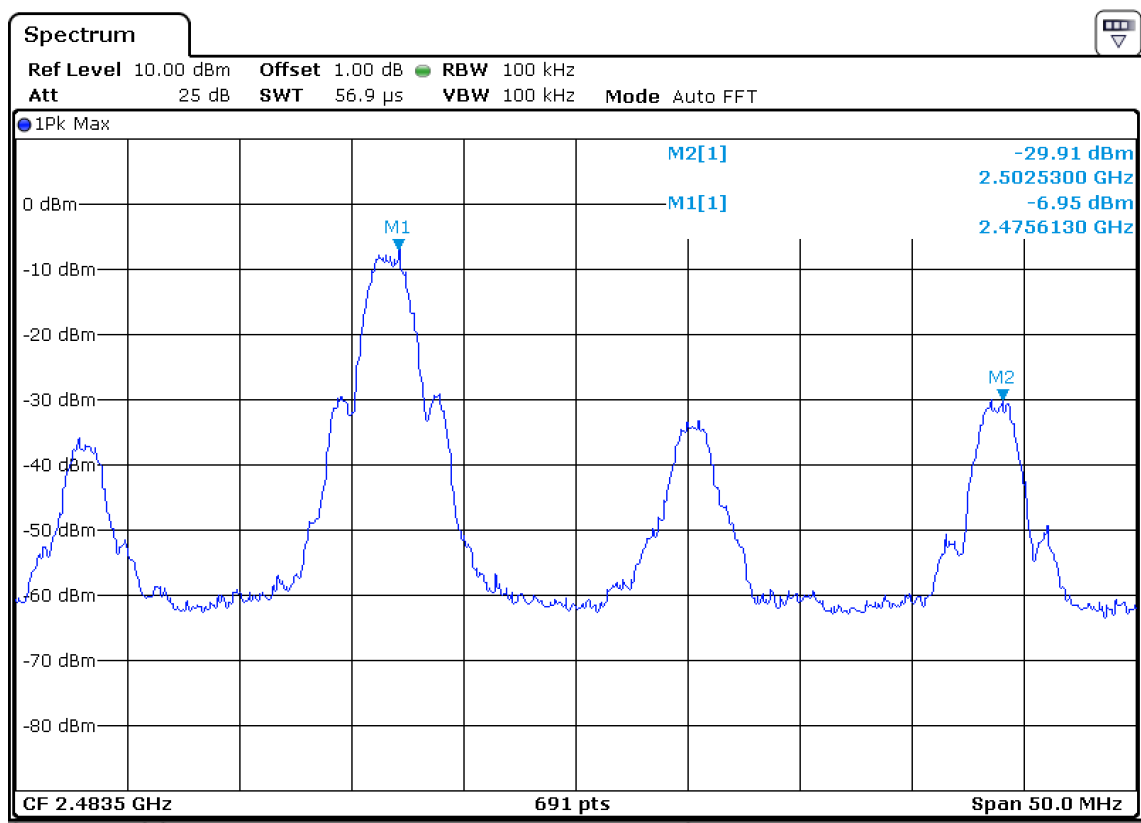
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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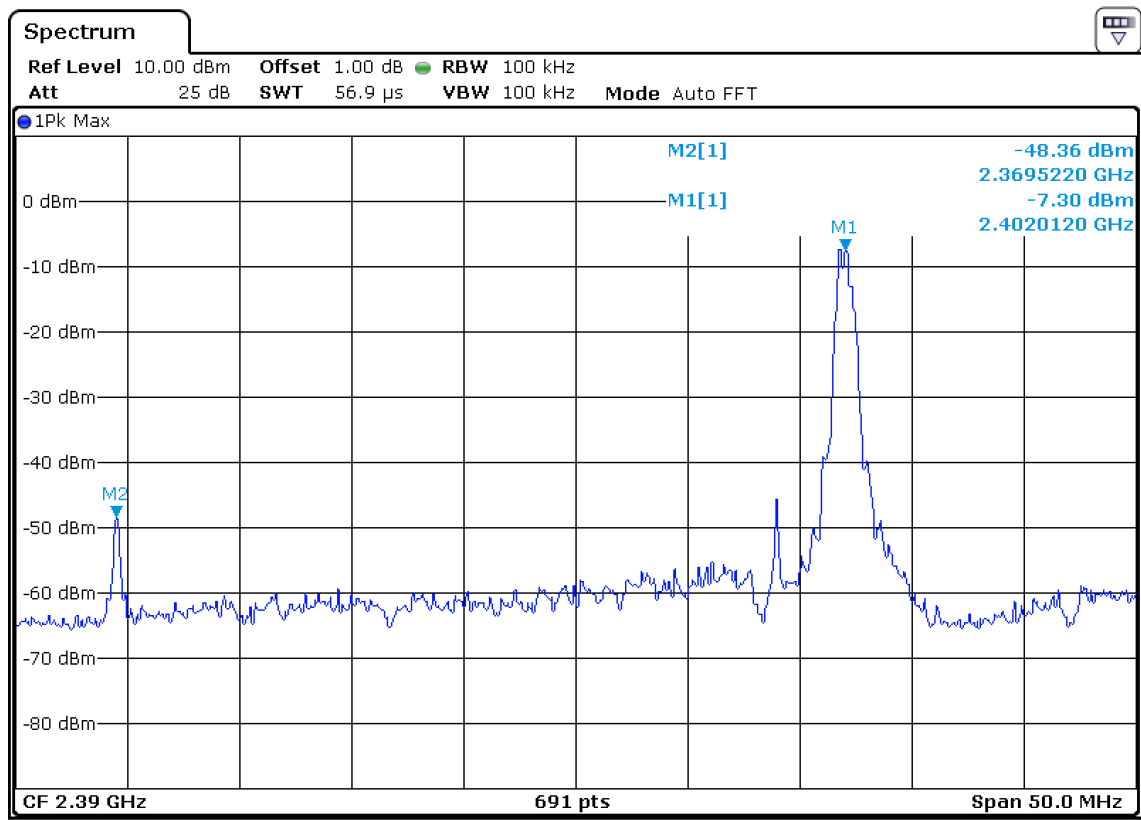
Band edge Lower edge (Zigbee)



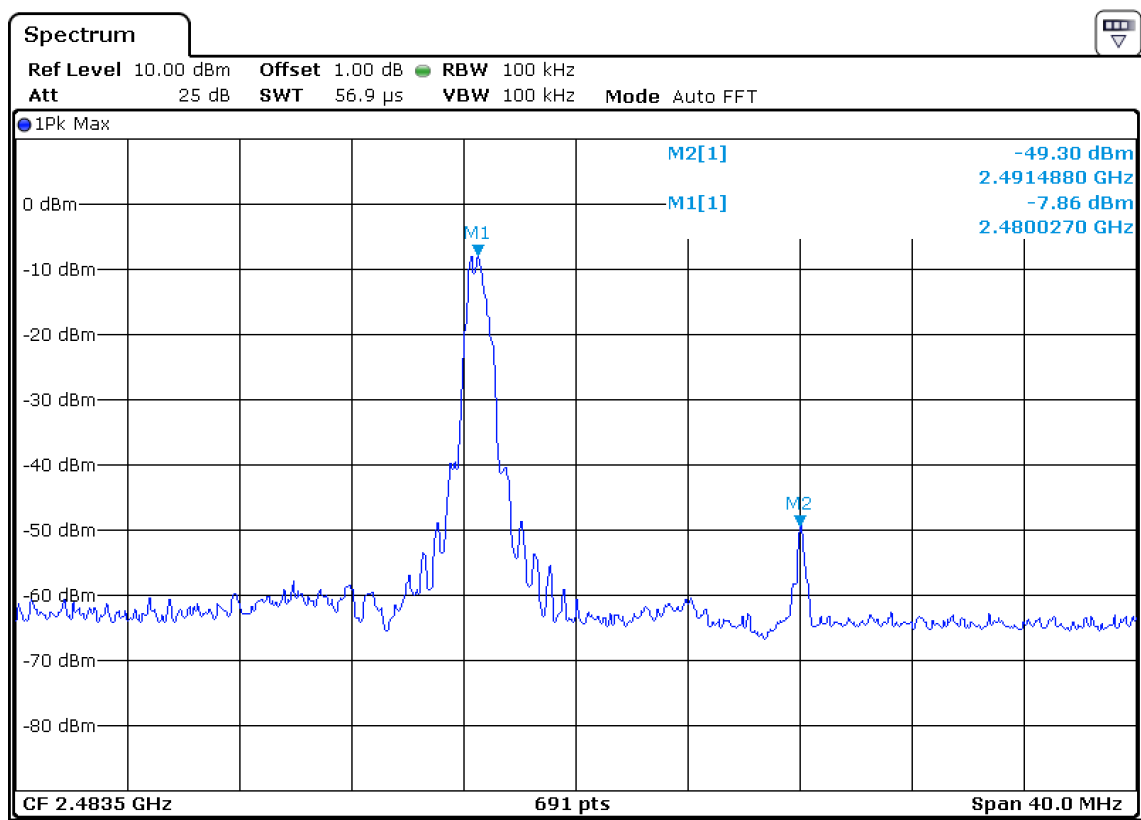
Upper edge (Zigbee)



Lower edge (Bluetooth BLE)



Upper edge (Bluetooth BLE)



Radiated Band-edges in the restricted band 2310-2390 MHz measurement (Zigbee mode)

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	
2378.3	39.8	51.7	H	28.08	22.9	54.0	74.0	45.0	56.9	9.0	17.1
2377.9	40.4	52.0	H	28.08	22.9	54.0	74.0	45.6	57.2	8.4	16.8
2380.5	39.5	52.1	H	28.08	22.9	54.0	74.0	44.7	57.3	9.3	16.7

Radiated Band-edges in the restricted band 2483.5-2500 MHz measurement (Zigbee mode)

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	
2502.5	37.25	38.29	H	28.08	22.9	54.0	74.0	42.4	43.5	11.6	30.5
2501.8	37.11	39.11	H	28.08	22.9	54.0	74.0	42.3	44.3	11.7	29.7
2503.2	36.84	38.34	H	28.08	22.9	54.0	74.0	42.0	43.5	12.0	30.5

Radiated Band-edges in the restricted band 2310-2390 MHz measurement (Bluetooth BLE mode)

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	
2369.4	20.11	34.15	H	28.08	22.9	54.0	74.0	25.3	39.3	28.7	34.7
2368.9	21.41	35.33	H	28.08	22.9	54.0	74.0	26.6	40.5	27.4	33.5
2368.8	20.80	34.62	H	28.08	22.9	54.0	74.0	26.0	39.8	28.0	34.2

Radiated Band-edges in the restricted band 2483.5-2500 MHz measurement (Bluetooth BLE mode)

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	
2491.5	25.40	39.80	H	28.08	22.9	54.0	74.0	30.6	45.0	23.4	29.0
2491.8	24.11	40.11	H	28.08	22.9	54.0	74.0	29.3	45.3	24.7	28.7
2492.0	25.34	39.87	H	28.08	22.9	54.0	74.0	30.5	45.1	23.5	29.0

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.

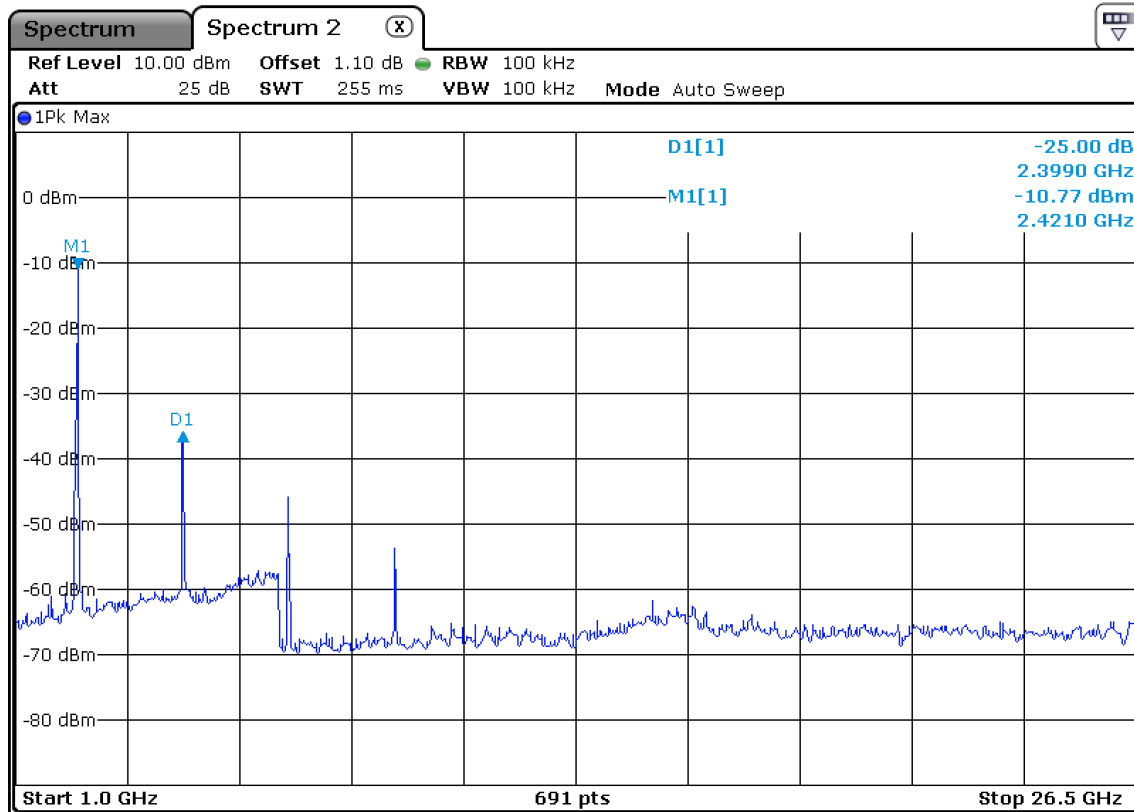
Minimum Standard:	> 20 dBc
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Measurement Setup

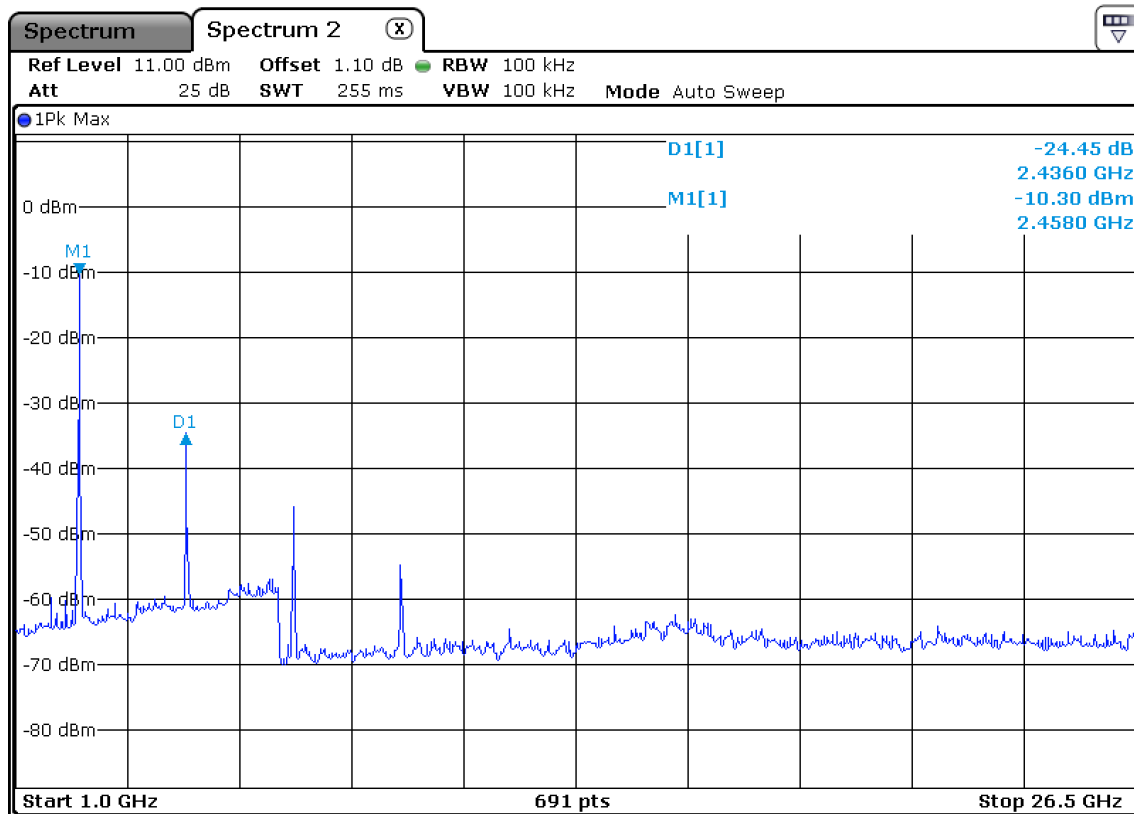
Same as the Chapter 3.2.1 (Figure 1)

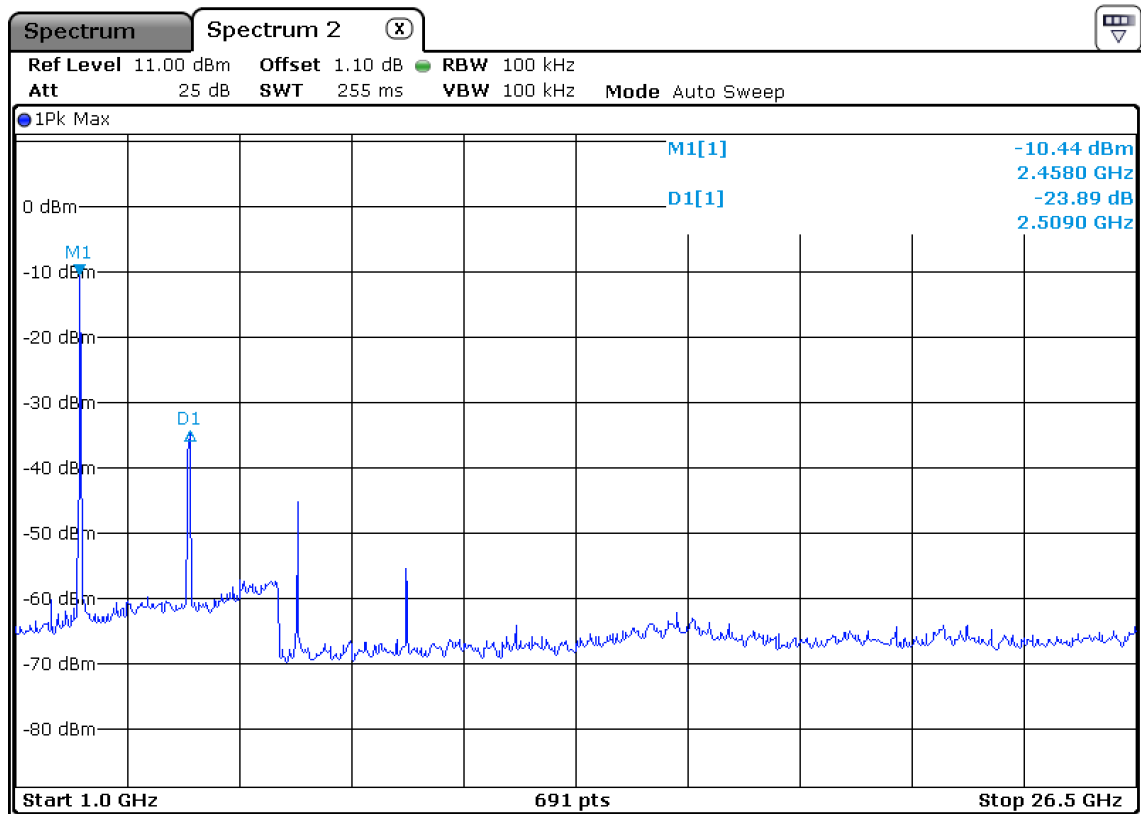
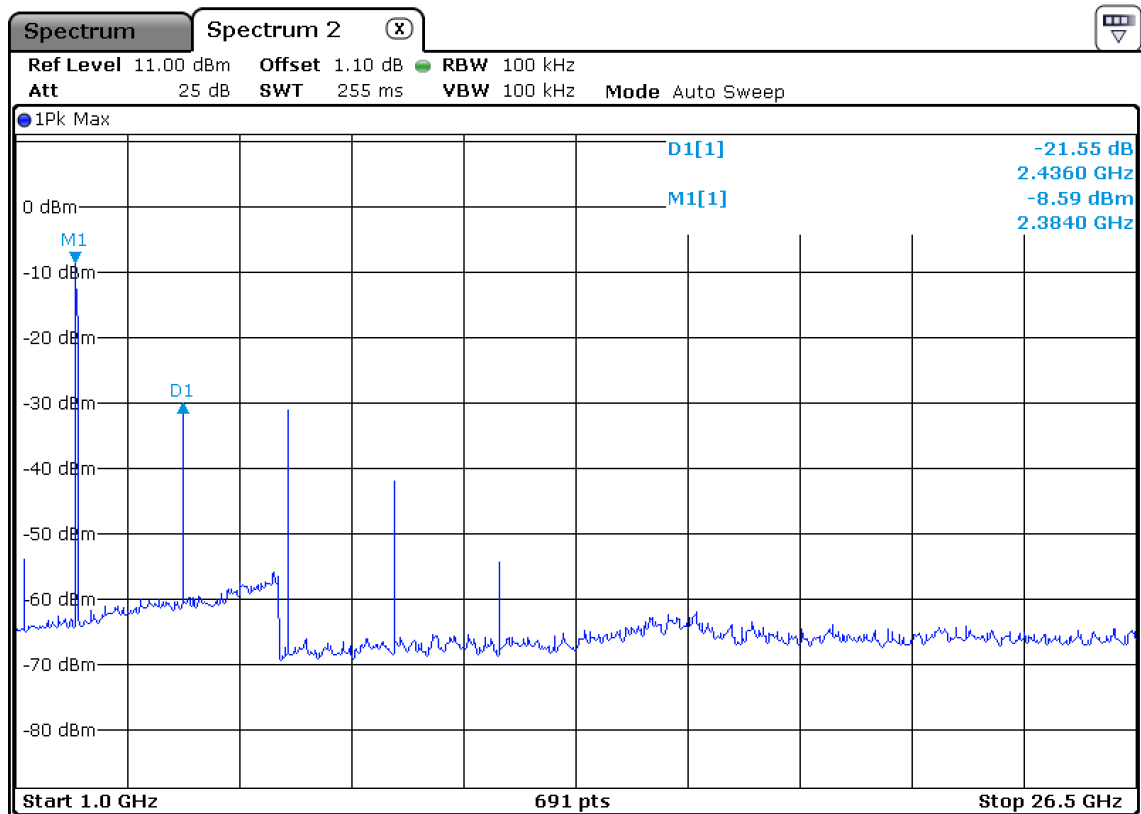
Unwanted Emission – Low Channel (Zigbee)

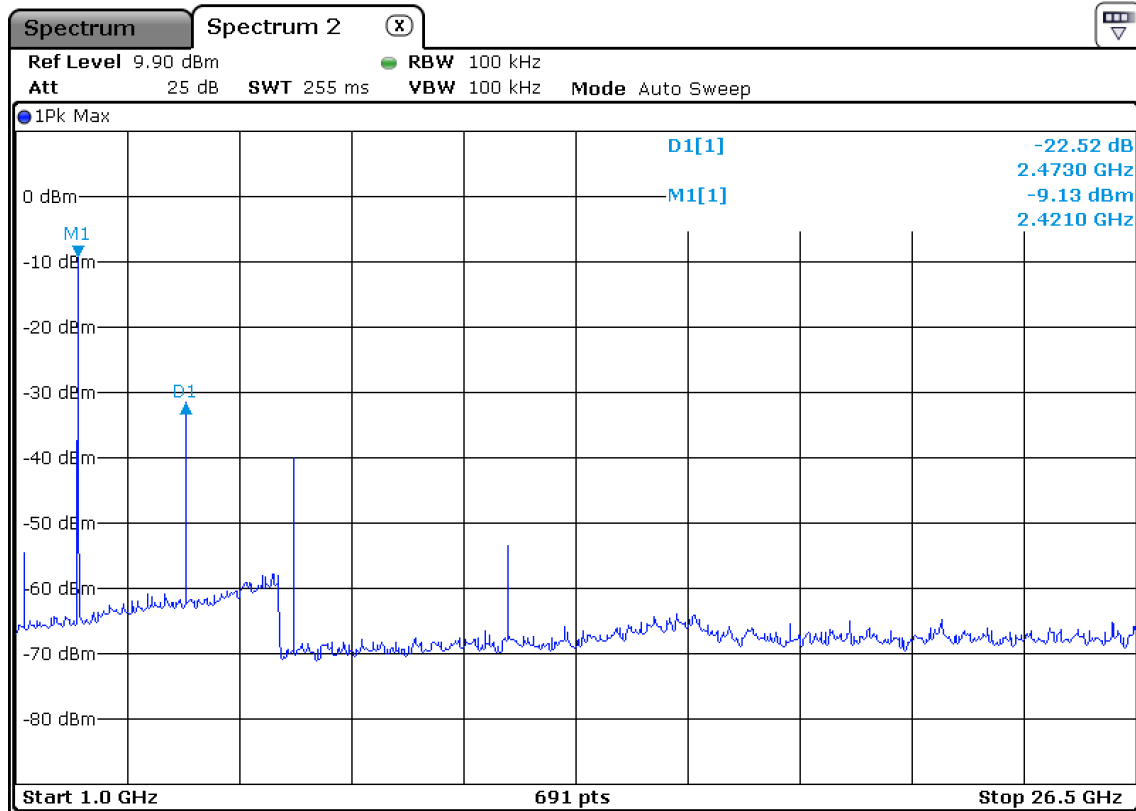
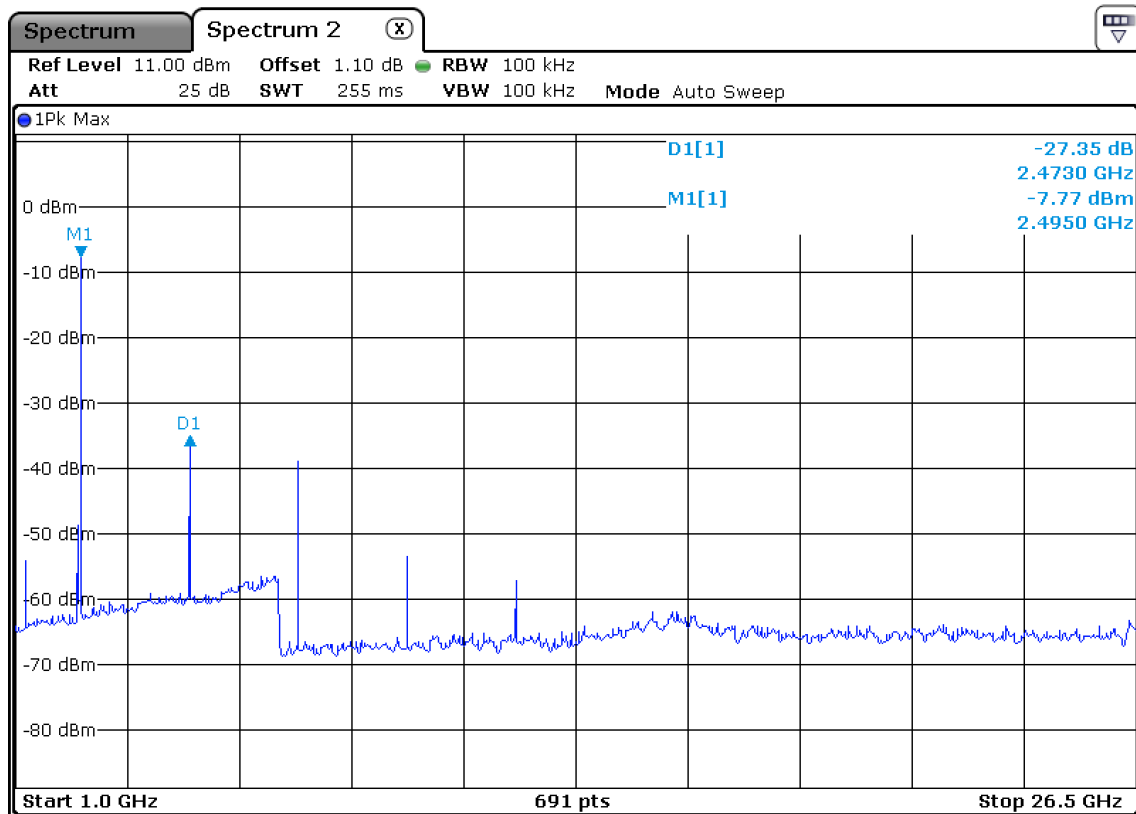
Frequency Range = 30 MHz ~ 26.5 GHz



Middle Channel (Zigbee)



High Channel (Zigbee)**Unwanted Emission – Low Channel (Bluetooth BLE)****Frequency Range = 30 MHz ~ 26.5 GHz**

Middle Channel (Bluetooth BLE)**High Channel (Bluetooth BLE)**

3.2.6 Radiated Spurious Emissions

Procedure:

The EUT was placed on a 0.8m 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

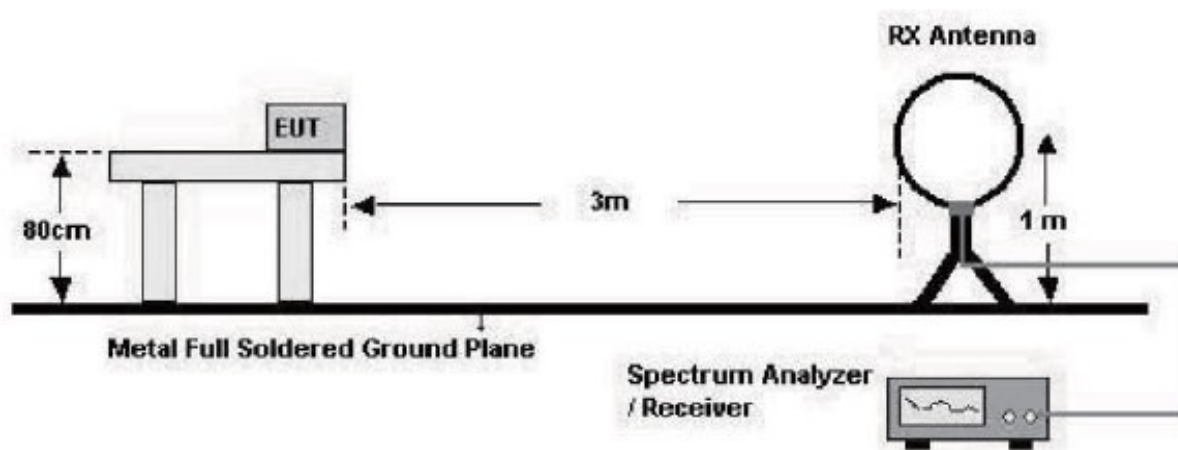
Trace = max hold

VBW $\geq$ RBW

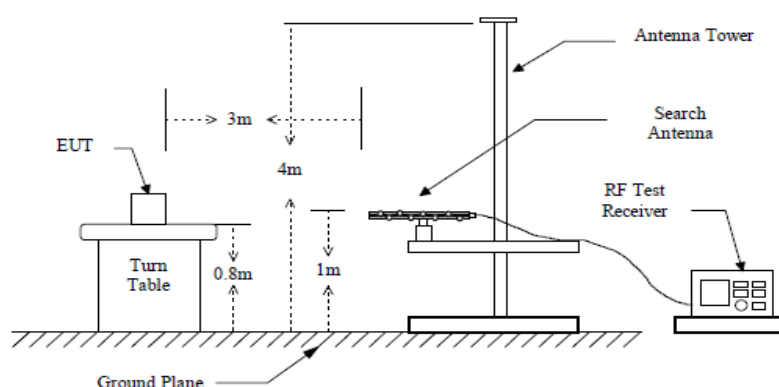
Detector function = peak

Sweep = auto

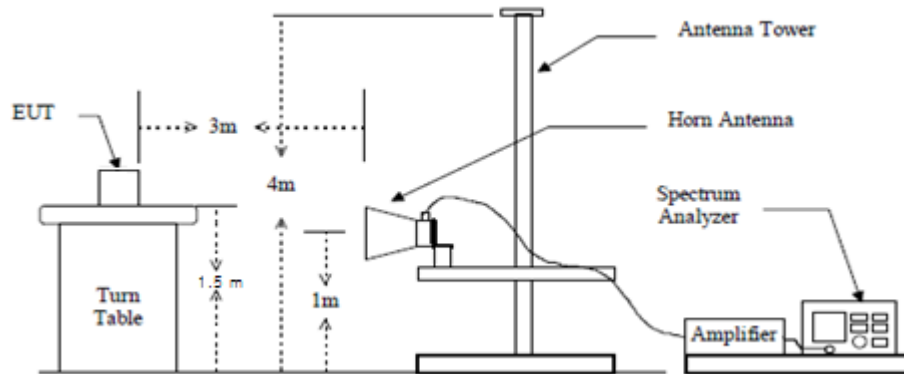
below 30 MHz



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 : (Above 1 GHz)**(Zigbee mode)**

Frequency	Reading		Pol.	Correction		Limits		Result		Margin	
	[dBuV/m]			Factor		[dBuV/m]		[dBuV/m]		[dB]	
	AV / Peak			Antenna	Amp.Gain+Cable	AV/Peak		AV/Peak		AV / Peak	
5736.2	26.2	37.8	V	33.61	14.01	54.0	74.0	45.8	57.4	8.2	16.6
5132.5	20.7	42.4	V	34.04	17.29	54.0	74.0	37.5	59.2	16.6	14.9
4296.3	26.4	42.3	V	34.47	20.03	54.0	74.0	40.8	56.7	13.2	17.3

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

(Bluetooth BLE mode)

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	
5965.9	20.7	38.1	V	34.16	13.12	54.0	74.0	41.7	59.1	12.3	14.9
5910.8	20.3	40.1	V	34.16	13.47	54.0	74.0	41.0	60.8	13.0	13.2
5018.6	25.1	40.4	V	34.04	16.02	54.0	74.0	43.1	58.4	10.9	15.6

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

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.

Radiated Emissions (Below 1 GHz) – 2.4 GHz Zigbee(Low) mode - Vertical

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
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Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

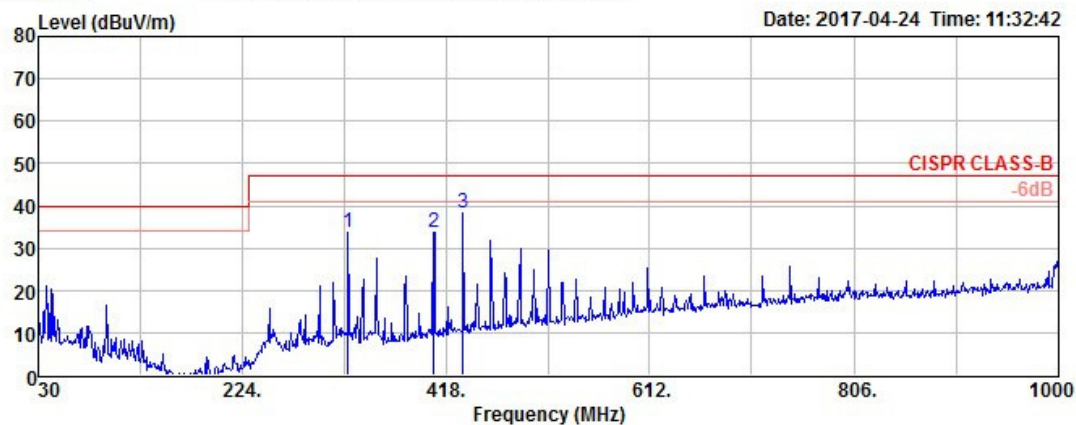
Test Mode : Zigbee(Low) mode

Tested by: BANG Y H

Data: 1274

File: C:\Program Files (x86)\e3\3.EM6 (1274)

Date: 2017-04-24 Time: 11:32:42



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.84	48.51	-14.80	33.71	47.00	13.29	105	94	VERTICAL
406.33	47.17	-13.41	33.76	47.00	13.24	100	314	VERTICAL
434.43	50.96	-12.59	38.37	47.00	8.63	126	95	VERTICAL

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

Radiated Emissions (Below 1 GHz) – 2.4 GHz Zigbee(Low) mode - Horizontal

4, Songjuro 236Beon-gil, yanggi-myeon,
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Tel : +82-31-3236008,9
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www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

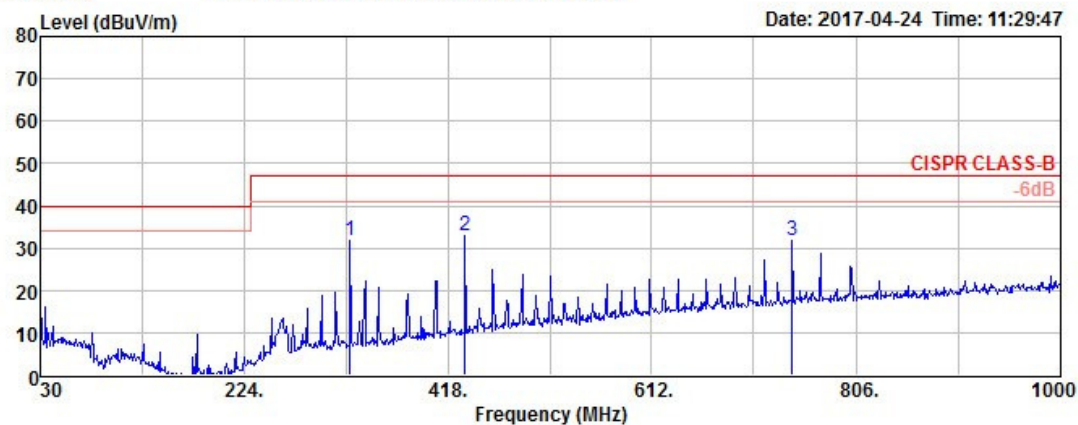
Test Mode : Zigbee(Low) mode

Tested by: BANG Y H

Data: 1273

File: C:\Program Files (x86)\e3\3.EM6 (1273)

Date: 2017-04-24 Time: 11:29:47



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	46.41	-14.80	31.61	47.00	15.39	354	182	HORIZONTAL
434.43	45.58	-12.59	32.99	47.00	14.01	395	153	HORIZONTAL
745.87	37.85	-6.04	31.81	47.00	15.19	400	174	HORIZONTAL

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

Radiated Emissions (Below 1 GHz) – 2.4GHz Zigbee(Middle) mode - Vertical

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Yongin-si, Gyeonggi-do, Korea
Tel : +82-31-3236008,9
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www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

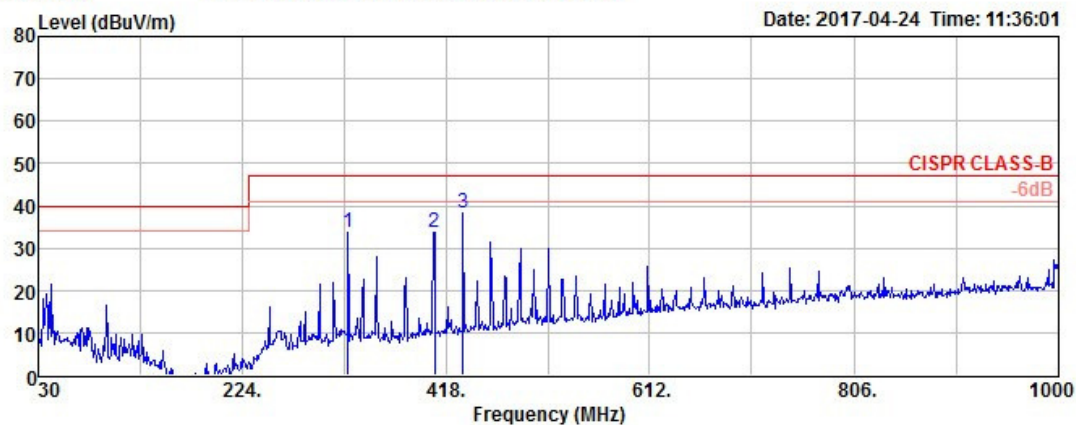
Test Mode : Zigbee(MID) mode

Tested by: BANG Y H

Data: 1276

File: C:\Program Files (x86)\e3\3.EM6 (1276)

Date: 2017-04-24 Time: 11:36:01



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	48.64	-14.80	33.84	47.00	13.16	184	89	VERTICAL
407.31	47.20	-13.40	33.80	47.00	13.20	100	212	VERTICAL
434.46	51.01	-12.59	38.42	47.00	8.58	174	162	VERTICAL

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

Radiated Emissions (Below 1 GHz) – 2.4GHz Zigbee(Middle) mode - Horizontal

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Tel : +82-31-3236008,9
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www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

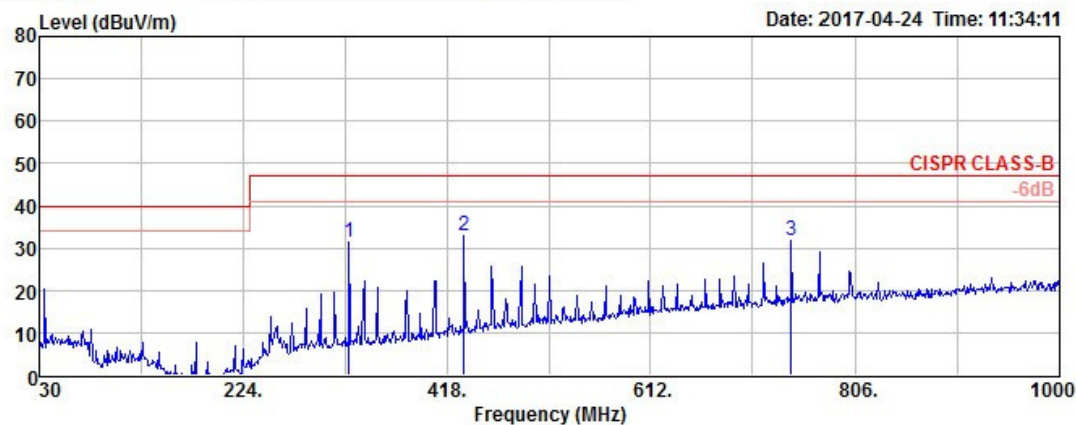
Test Mode : Zigbee(MID) mode

Tested by: BANG Y H

Data: 1275

File: C:\Program Files (x86)\e3\3.EM6 (1275)

Date: 2017-04-24 Time: 11:34:11



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.87	46.16	-14.80	31.36	47.00	15.64	350	132	HORIZONTAL
434.44	45.57	-12.59	32.98	47.00	14.02	322	169	HORIZONTAL
745.80	37.88	-6.05	31.83	47.00	15.17	377	186	HORIZONTAL

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

Radiated Emissions (Below 1 GHz) – 2.4GHz Zigbee(High) mode - Vertical

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
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www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

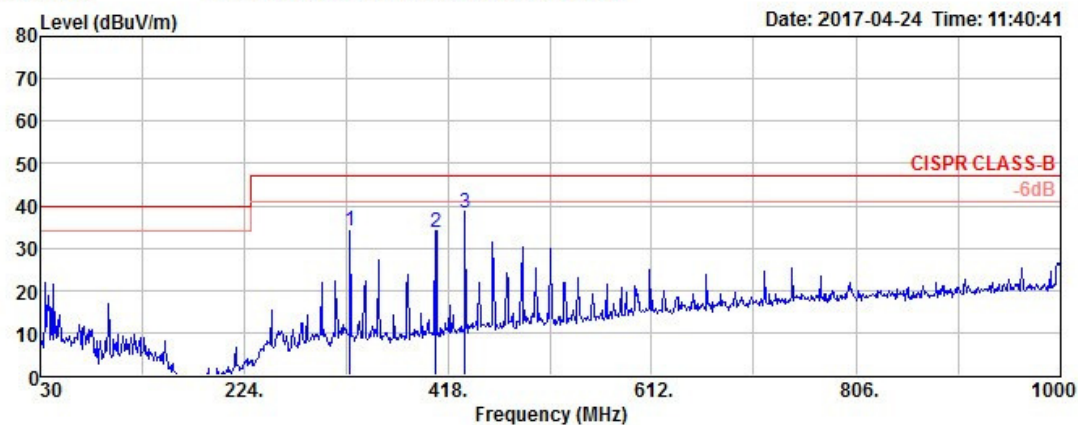
Test Mode : Zigbee(High) mode

Tested by: BANG Y H

Data: 1278

File: C:\Program Files (x86)\e3\3.EM6 (1278)

Date: 2017-04-24 Time: 11:40:41



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.90	48.69	-14.80	33.89	47.00	13.11	137	220	VERTICAL
406.29	47.20	-13.41	33.79	47.00	13.21	193	101	VERTICAL
434.42	50.94	-12.59	38.35	47.00	8.65	142	28	VERTICAL

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

Radiated Emissions (Below 1 GHz) – 2.4GHz Zigbee(High) mode - Horizontal

4, Songjuro 236Beon-gil, yanggi-myeon,
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Tel : +82-31-3236008,9
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www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

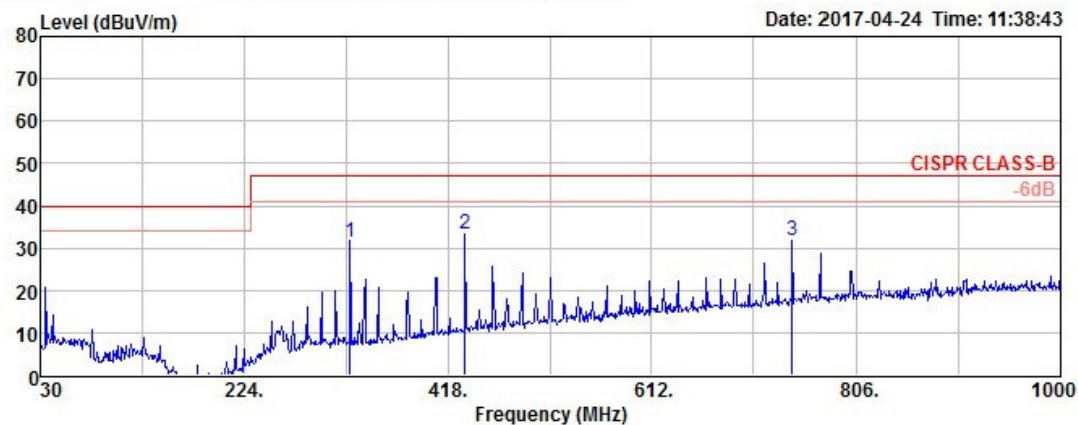
Test Mode : Zigbee(High) mode

Tested by: BANG Y H

Data: 1277

File: C:\Program Files (x86)\e3\3.EM6 (1277)

Date: 2017-04-24 Time: 11:38:43



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.78	46.36	-14.81	31.55	47.00	15.45	388	121	HORIZONTAL
434.47	45.78	-12.59	33.19	47.00	13.81	318	122	HORIZONTAL
745.87	37.69	-6.04	31.65	47.00	15.35	306	311	HORIZONTAL

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

Radiated Emissions (Above 1 GHz) – 2.4 GHz Bluetooth BLE(Low) mode - Vertical

4, Songjiuro 236Beon-gil, yanggi-myeon,
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EUT/Model No.: HP500

Temp/Humi: 21 / 41

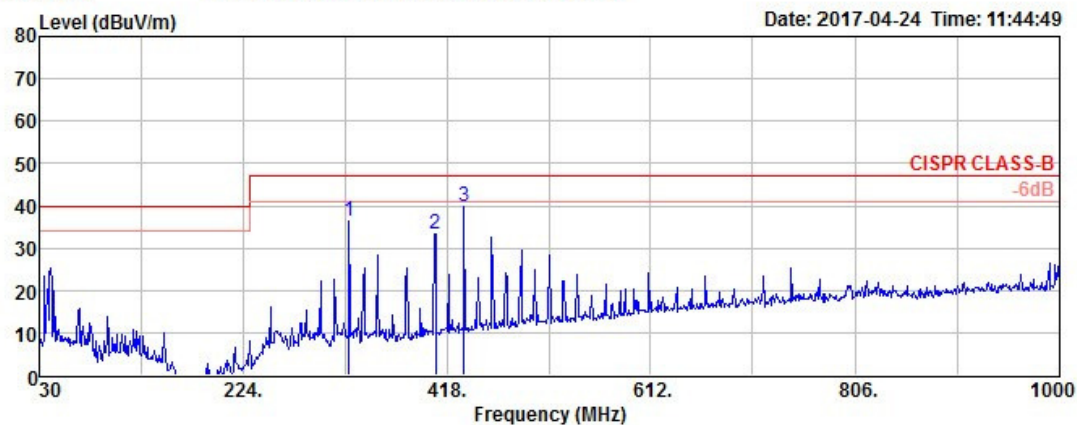
Test Mode : Bluetooth(Low) mode

Tested by: BANG Y H

Data: 1280

File: C:\Program Files (x86)\e3\EM6 (1280)

Date: 2017-04-24 Time: 11:44:49



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	51.00	-14.80	36.20	47.00	10.80	108	106	VERTICAL
407.34	46.64	-13.40	33.24	47.00	13.76	181	51	VERTICAL
434.48	52.29	-12.59	39.70	47.00	7.30	117	204	VERTICAL

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

Radiated Emissions (Above 1 GHz) – 2.4 GHz Bluetooth BLE (Low) mode - Horizontal

4, Songjuro 236Beon-gil, yanggi-myeon,
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Tel : +82-31-3236008,9
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www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

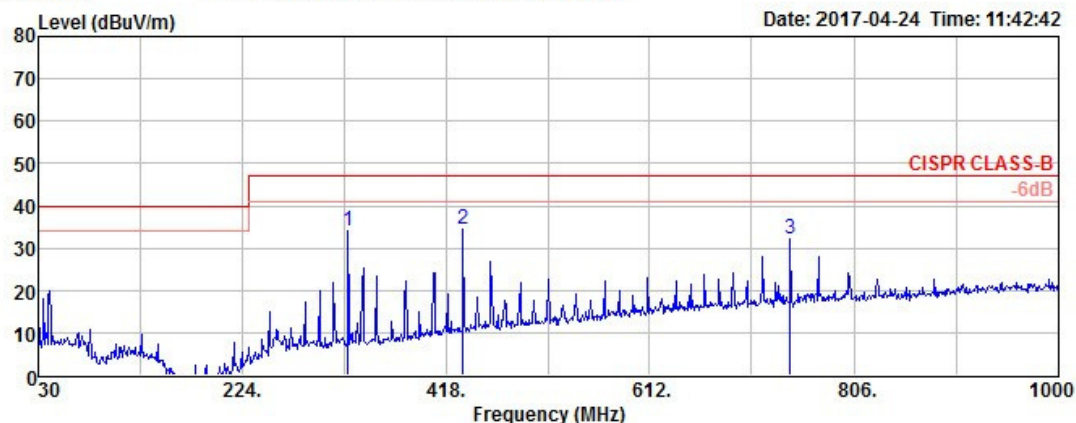
Test Mode : Bluetooth(Low) mode

Tested by: BANG Y H

Data: 1279

File: C:\Program Files (x86)\e3\3.EM6 (1279)

Date: 2017-04-24 Time: 11:42:42



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	48.83	-14.80	34.03	47.00	12.97	348	166	HORIZONTAL
434.48	47.06	-12.59	34.47	47.00	12.53	344	65	HORIZONTAL
745.85	38.01	-6.04	31.97	47.00	15.03	400	120	HORIZONTAL

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

Radiated Emissions (Above 1 GHz) – 2.4 GHz Bluetooth BLE (Middle) mode - Vertical

4, Songjuro 236Beon-gil, yanggi-myeon,
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EUT/Model No.: HP500

Temp/Humi: 21 / 41

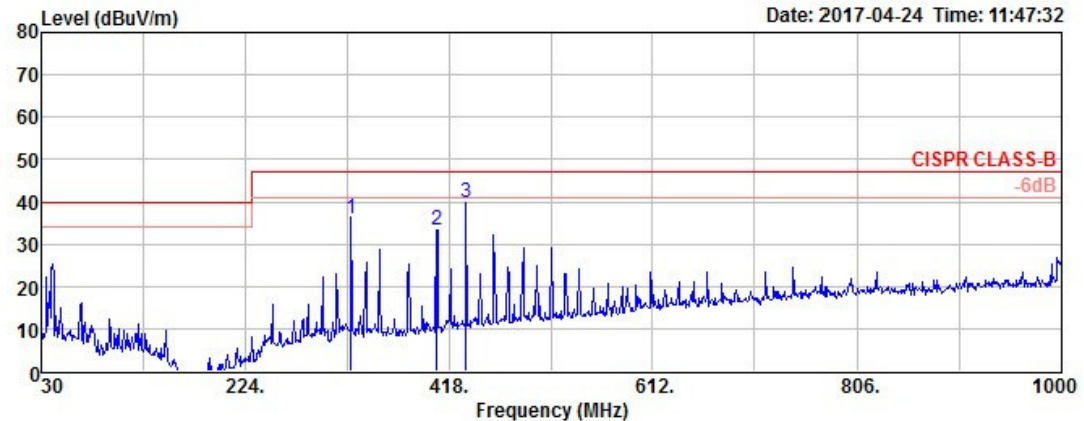
Test Mode : Bluetooth(Mid) mode

Tested by: BANG Y H

Data: 1281

File: C:\Program Files (x86)\e3\3.EM6 (1286)

Date: 2017-04-24 Time: 11:47:32



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	50.89	-14.80	36.09	47.00	10.91	103	128	VERTICAL
406.36	46.82	-13.41	33.41	47.00	13.59	115	133	VERTICAL
434.47	52.24	-12.59	39.65	47.00	7.35	102	344	VERTICAL

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

Radiated Emissions (Above 1 GHz) – 2.4 GHz Bluetooth BLE (Middle) mode - Horizontal

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EUT/Model No.: HP500

Temp/Humi: 21 / 41

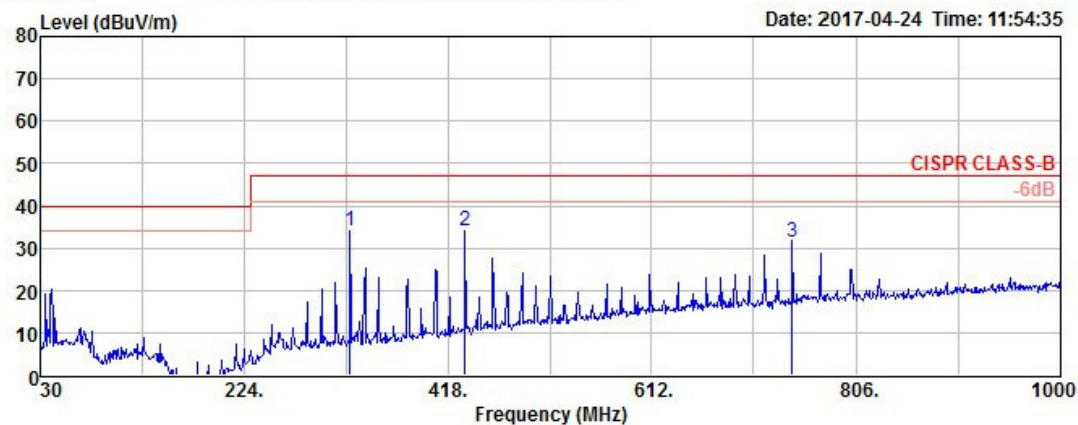
Test Mode : Bluetooth(Mid) mode

Tested by: BANG Y H

Data: 1284

File: C:\Program Files (x86)\e3\3.EM6 (1284)

Date: 2017-04-24 Time: 11:54:35



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.87	48.91	-14.80	34.11	47.00	12.89	342	184	HORIZONTAL
434.50	46.70	-12.58	34.12	47.00	12.88	389	128	HORIZONTAL
745.87	37.35	-6.04	31.31	47.00	15.69	362	207	HORIZONTAL

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

Radiated Emissions (Above 1 GHz) – 2.4 GHz Bluetooth BLE (High) mode - Vertical

4, Songjuro 236Beon-gil, yanggi-myeon,
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Tel : +82-31-3236008,9
Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

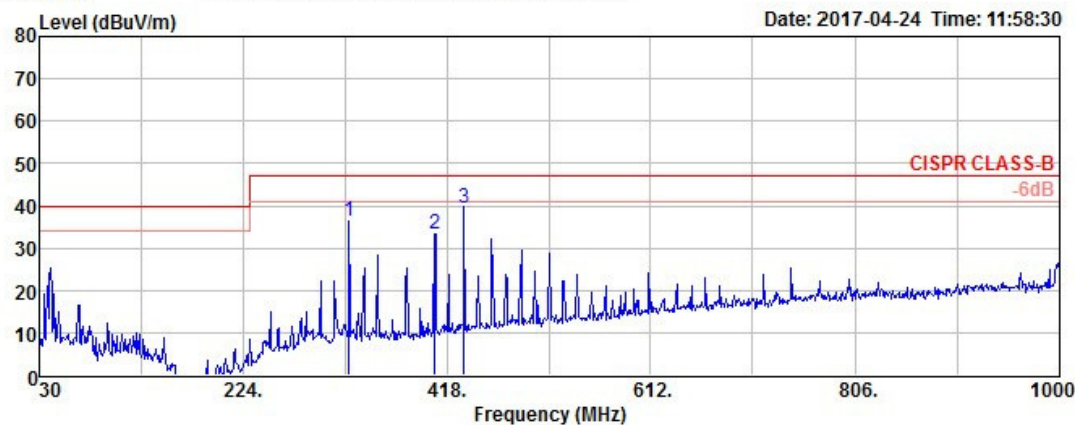
Test Mode : Bluetooth(High) mode

Tested by: BANG Y H

Data: 1286

File: C:\Program Files (x86)\e3\3.EM6 (1286)

Date: 2017-04-24 Time: 11:58:30



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	51.01	-14.80	36.21	47.00	10.79	167	205	VERTICAL
406.36	46.80	-13.41	33.39	47.00	13.61	129	87	VERTICAL
434.48	52.19	-12.59	39.60	47.00	7.40	100	145	VERTICAL

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

Radiated Emissions (Above 1 GHz) – 2.4 GHz Bluetooth BLE (High) mode - Horizontal

4, Songjuro 236Beon-gil, yanggi-myeon,
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Tel : +82-31-3236008,9
Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: HP500

Temp/Humi: 21 / 41

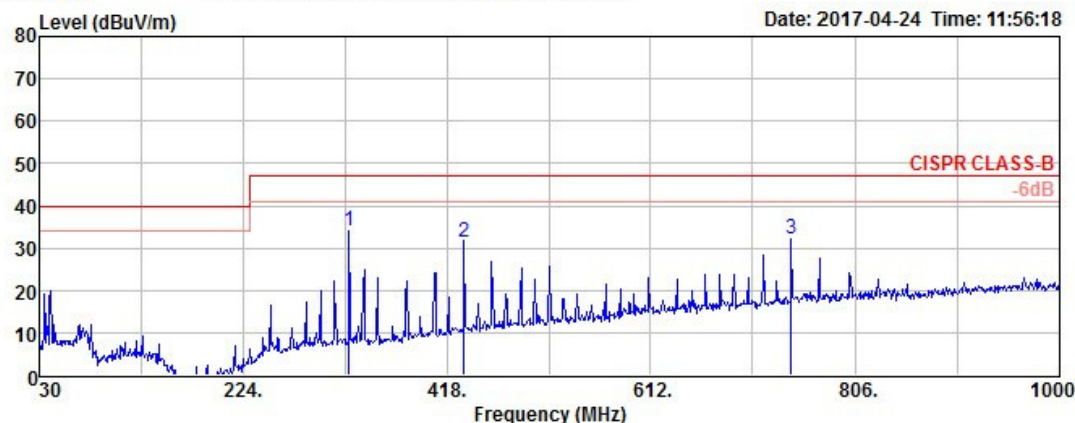
Test Mode : Bluetooth(High) mode

Tested by: BANG Y H

Data: 1285

File: C:\Program Files (x86)\e3\3.EM6 (1285)

Date: 2017-04-24 Time: 11:56:18



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
324.88	48.87	-14.80	34.07	47.00	12.93	397	108	HORIZONTAL
434.49	43.93	-12.59	31.34	47.00	15.66	295	132	HORIZONTAL
745.86	38.28	-6.04	32.24	47.00	14.76	361	210	HORIZONTAL

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

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	2016-10-11
2	■	Signal Generator (~3.2 GHz)	8648C	3623A02597	HP	1 year	2017-03-20
3		SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2017-03-20
4		Attenuator (3 dB)	8491A	37822	HP	1 year	2016-09-12
5		Attenuator (10 dB)	8491A	63196	HP	1 year	2016-09-12
6	■	EMI Test Receiver (~7 GHz)	ESC17	100722	R&S	1 year	2016-09-12
7	■	RF Amplifier (~1.3 GHz)	8447D OPT 010	2944A07684	HP	1 year	2016-09-12
8	■	RF Amplifier (1~26.5 GHz)	8449B	3008A02126	HP	1 year	2017-03-21
9	■	Horn Antenna (1~18 GHz)	3115	00114105	ETS	2 year	2016-08-04
10		DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2016-05-03
11	■	DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2016-05-03
12	■	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2015-07-13
13		Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2017-03-21
14		Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
15		Power Divider	11636A	06243	HP	1 year	2016-09-12
16	■	DC Power Supply	6674A	3637A01657	Agilent	-	-
17		Frequency Counter	5342A	2826A12411	HP	1 year	2017-03-21
18	■	Power Meter	EPM-441A	GB32481702	HP	1 year	2017-03-20
19	■	Power Sensor	8481A	3318A94972	HP	1 year	2016-12-30
20		Audio Analyzer	8903B	3729A18901	HP	1 year	2016-09-12
21		Modulation Analyzer	8901B	3749A05878	HP	1 year	2016-09-12
22		TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2016-09-12
23		Stop Watch	HS-3	812Q08R	CASIO	2 year	2017-03-21
24		LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2016-09-12
25		Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2017-03-20
26		UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2017-03-20
27		Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2017-03-20
28		Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2017-03-20
29	■	Active Loop Antenna	FMZB1519	1519-031	SCHWARZBECK	2 year	2016-01-12
30		OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2017-03-21
31		Signal Generator(100 kHz ~ 40 GHz)	SMB100A03	177621	R&S	1 year	2017-03-23
32		Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2017-03-21