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Dates of Tests: March 25 ~ April 18, 2019
 Test Report S/N: LR500111904I
 Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID.

2ASY3AK1G-BB

APPLICANT

I.M.LAB Inc.

| | | |
|---------------------------|---|---|
| Equipment Class | : | Digital Transmission System (DTS) |
| Manufacturing Description | : | CPR Add-on KIT |
| Manufacturer | : | I.M.LAB Inc. |
| Model name | : | AK1G BB |
| Variant Model name | : | AK1G PT |
| Test Device Serial No.: | : | Identical prototype |
| Rule Part(s) | : | FCC Part 15.247 Subpart C ; ANSI C-63.10-2013 |
| Frequency Range | : | 2402 ~ 2480 MHz |
| Max. Output Power | : | Max -0.43 dBm – Conducted |
| Date of issue | : | MAY 11, 2019 |

This test report is issued under the authority of:

Ja-Beom, Koo / Manager

The test was supervised by:

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.
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 Web site : <http://www.ltalab.com>
 E-mail : chahn@ltalab.com
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 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 | 2021-04-11 | FCC CAB |
| VCCI | JAPAN | C-4948, | 2020-09-10 | VCCI registration |
| VCCI | JAPAN | T-2416, | 2020-09-10 | VCCI registration |
| VCCI | JAPAN | R-4483(10 m), | 2020-10-15 | VCCI registration |
| VCCI | JAPAN | G-847 | 2021-12-13 | VCCI registration |
| IC | CANADA | 5799A-1 | 2019-11-07 | IC filing |
| KOLAS | KOREA | NO.551 | 2021-08-20 | KOLAS accredited Lab. |
| NVLAP | U.S.A | 200723-0 | 2021-08-20 | ECT accredited Lab. |

2. Information about test item

2-1 Client & Manufacturer

Company name : I.M.LAB Inc.
 Address : Haeseong BLDG 7F, 165, Yeoksam-ro, Gangnam-gu, Seoul, Republic of Korea (06247)
 Tel / Fax : TEL No : +82-10-6676-8403 / FAX No : -

2-2 Equipment Under Test (EUT)

Trade name : I.M.LAB Inc.
 Model name : AK1G BB
 Serial number : Identical prototype
 Date of receipt : April 18, 2019
 EUT condition : Pre-production, not damaged
 Antenna type : Patten Antenna (Max Gain : -7.6 dBi)
 Frequency Range : 2402 ~ 2480 MHz
 RF output power : Max -0.43 dBm – Conducted
 Number of channels : 40
 Type of Modulation : GFSK
 Power Source : 3.0 Vdc

2-3 Tested frequency

| | LOW | MID | HIGH |
|-----------------|------|------|------|
| Frequency (MHz) | 2402 | 2442 | 2480 |

2-4 Ancillary Equipment

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

2-5 Operating Mode

| Mode | Remakrs ¹⁾ |
|------------------------------|-------------------------------|
| Bluetooth(BT) Low Energy(LE) | Maximum Packet Size, VQFN 7x7 |

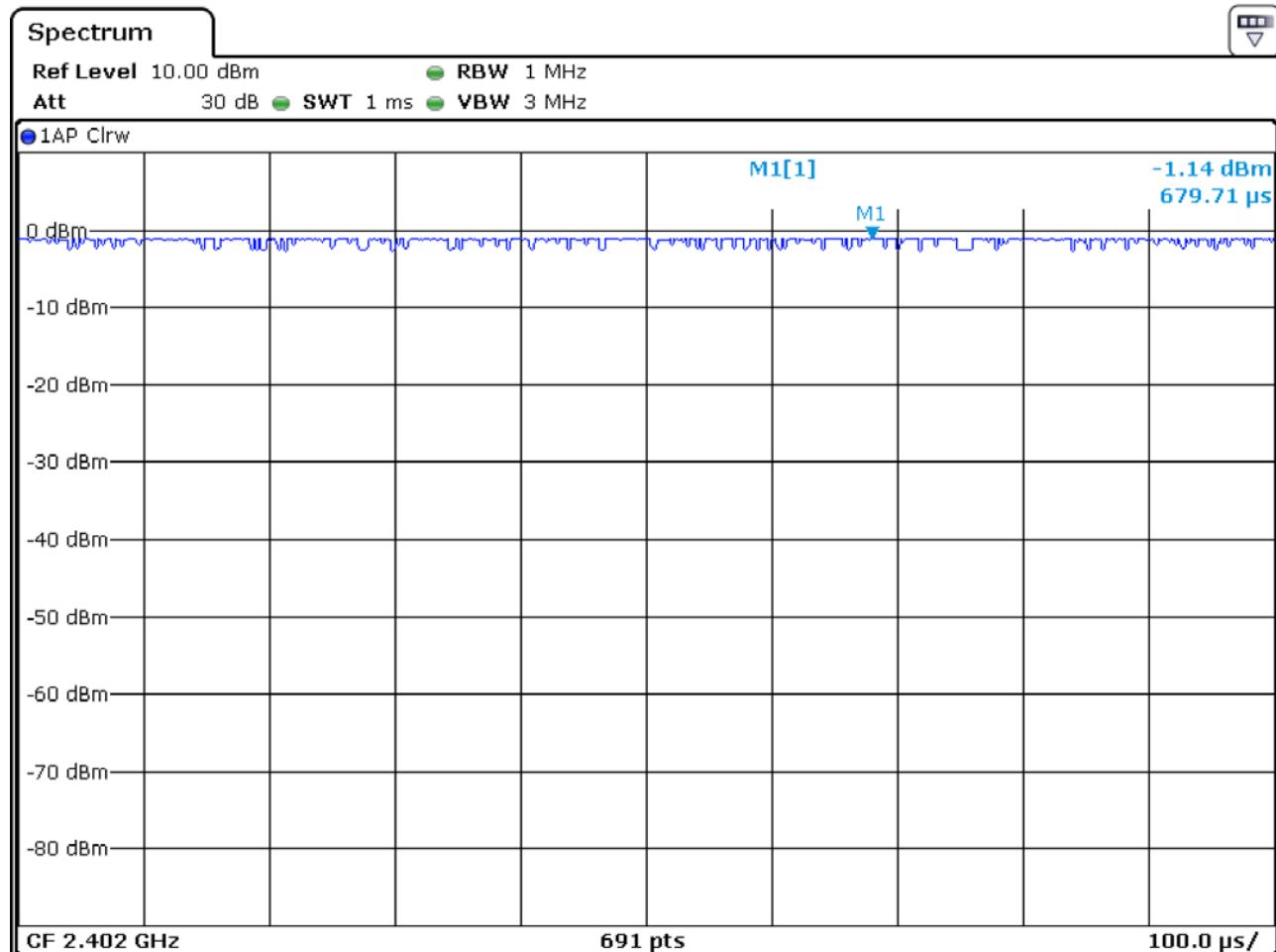
¹⁾ This setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting

In addition, end users cannot change the settings of the output power of the product.

2-5 Duty Cycle

| Test Mode | T _{on} (ms) | T _{on+off} (ms) | Duty Cycle (%) |
|-----------|-------------------------|-----------------------------|-------------------|
| BLE | 100 | 100 | 100 |



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(e) | Transmitter Power Spectral Density | < 8 dBm @ 3 kHz | | C |
| 15.247(d) | Band Edge | > 20 dBc | | C |
| | Conducted Spurious Emissions | > 20 dBc | | C |
| 15.209(a) | Radiated Spurious Emissions | 0n page 23 | 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: This product operates only with battery

The above equipment was tested by LTA Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247. The test results of this report relate only to the tested sample identified in this report.

Frequency range to be scanned:

0.15 MHz - 30 MHz as conducted measurement

30 MHz to 5th harmonic of the highest frequency or 40 GHz, whichever is lower as radiated measurement.

Bandwidth:

Measured by the CISPR quasi-peak function Bandwidth is 9 kHz in the frequency 0.15 MHz to 30 MHz and 120 kHz in the frequency 30 MHz to 1,000 MHz.

Measured by the Peak function Bandwidth is 1 MHz in the frequency 1 GHz to 40 GHz.

A sample calculation:

COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + COR.F

→ Antenna Requirement

The **I.M.LAB Inc** FCC ID: **2ASY3AK1G-BB** unit complies with the requirement of §15.203.

The antenna type is Patten Antenna.

3.2 MEASUREMENT METHODS

| Parameter | METHODS |
|------------------------------------|--|
| 6 dB Bandwidth | KDB 558074 D01 v05r02, Section 8.2 |
| Transmitter Peak Output Power | KDB 558074 D01 v05r02, Section 8.3.1.1 |
| Transmitter Power Spectral Density | KDB 558074 D01 v05r02, Section 8.4. |
| Band Edge | KDB 558074 D01 v05r02, Section 8.7 |
| Conducted Spurious Emissions | KDB 558074 D01 v05r02, Section 8.5 |
| Radiated Spurious Emissions | KDB 558074 D01 v05r02, Section 8.6 |
| AC Conducted Emissions | ANSI C63.10-2013, Section 6.2. |

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 = 300 kHz (VBW \geq 3*RBW)

Sweep = auto

Trace = max hold

Detector function = peak

Measurement Data : **Complies**

| Frequency (MHz) | Test Results | |
|--------------------|--------------------------|----------|
| | Measured Bandwidth (MHz) | Result |
| 2402 | 0.752 | Complies |
| 2442 | 0.745 | Complies |
| 2480 | 0.752 | Complies |

- See next pages for actual measured spectrum plots.

Minimum Standard:

6 dB Bandwidth $>$ 500 kHz

Measurement Setup

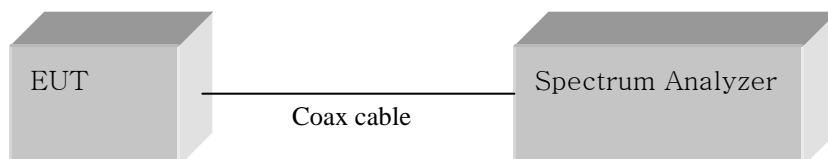
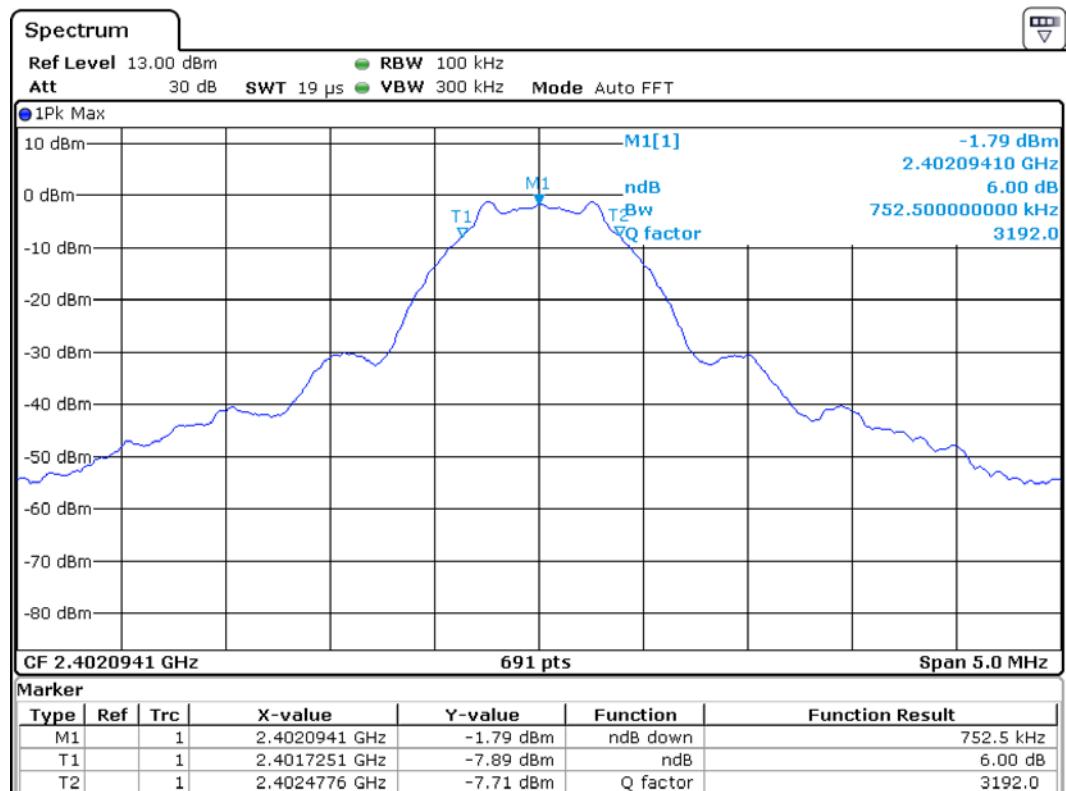
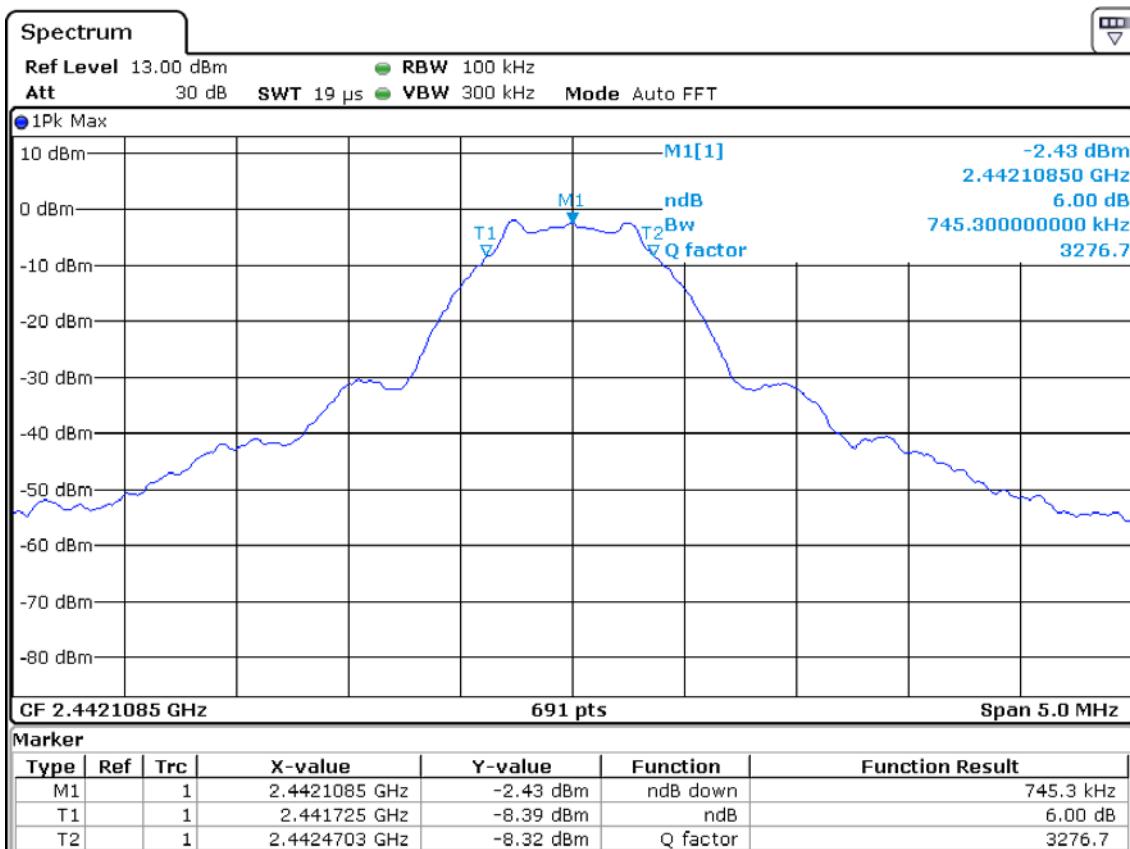


Figure 1: Measurement setup for the carrier frequency separation

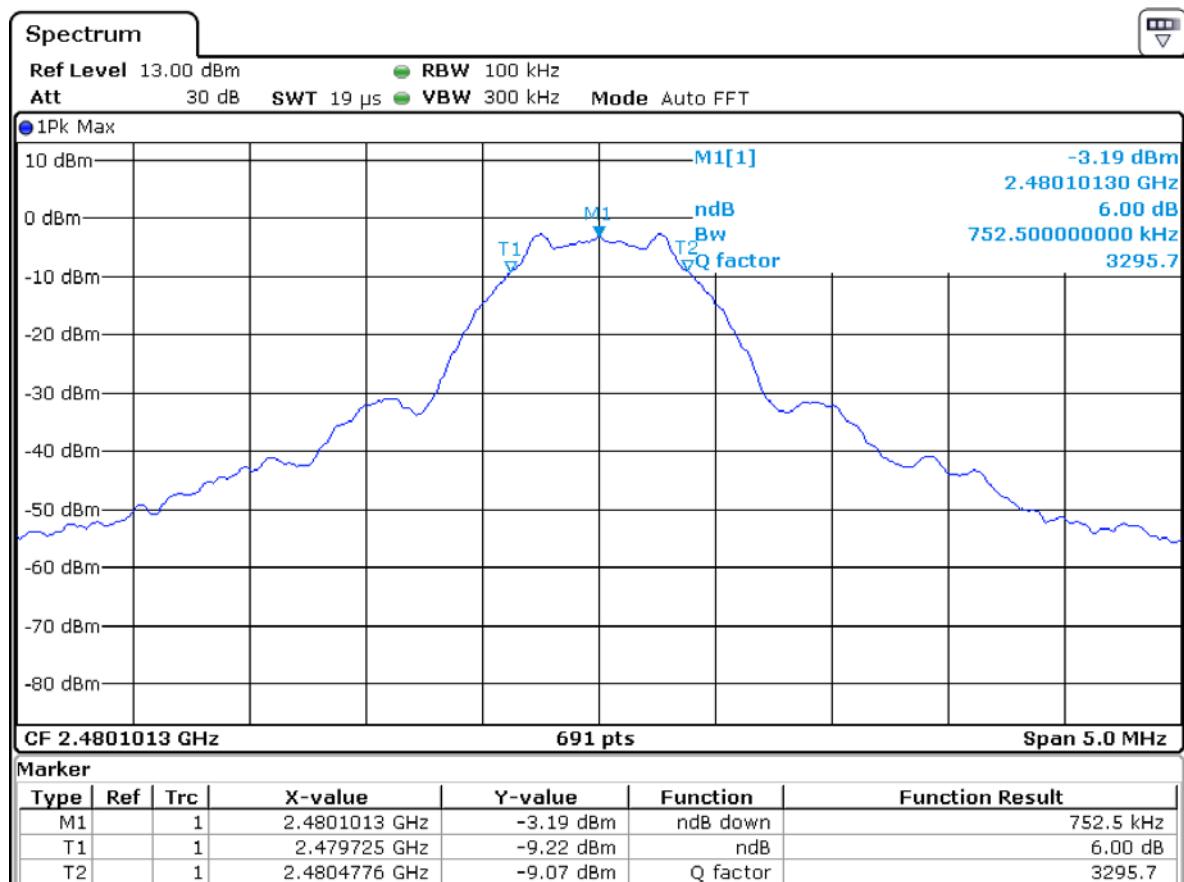
Low Channel



Middle Channel



High Channel



3.2.2 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(Peak):

Center frequency = the highest, middle and the lowest channels

RBW = 1 MHz Span = auto

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

Detector function = peak

The spectrum analyzer is set to(Average):

Center frequency = the highest, middle and the lowest channels

RBW = 1 MHz Span = auto

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

Detector function = RMS

Measurement Data : Complies

| Frequency (MHz) | Test Results | | | | |
|--------------------|----------------|----------------|--------|-------|----------|
| | dBm(AV / Peak) | mW (AV / Peak) | Result | | |
| 2402 | -1.09 | -0.43 | 0.778 | 0.905 | Complies |
| 2442 | -1.74 | -1.17 | 0.669 | 0.763 | Complies |
| 2480 | -2.44 | -1.84 | 0.570 | 0.654 | Complies |

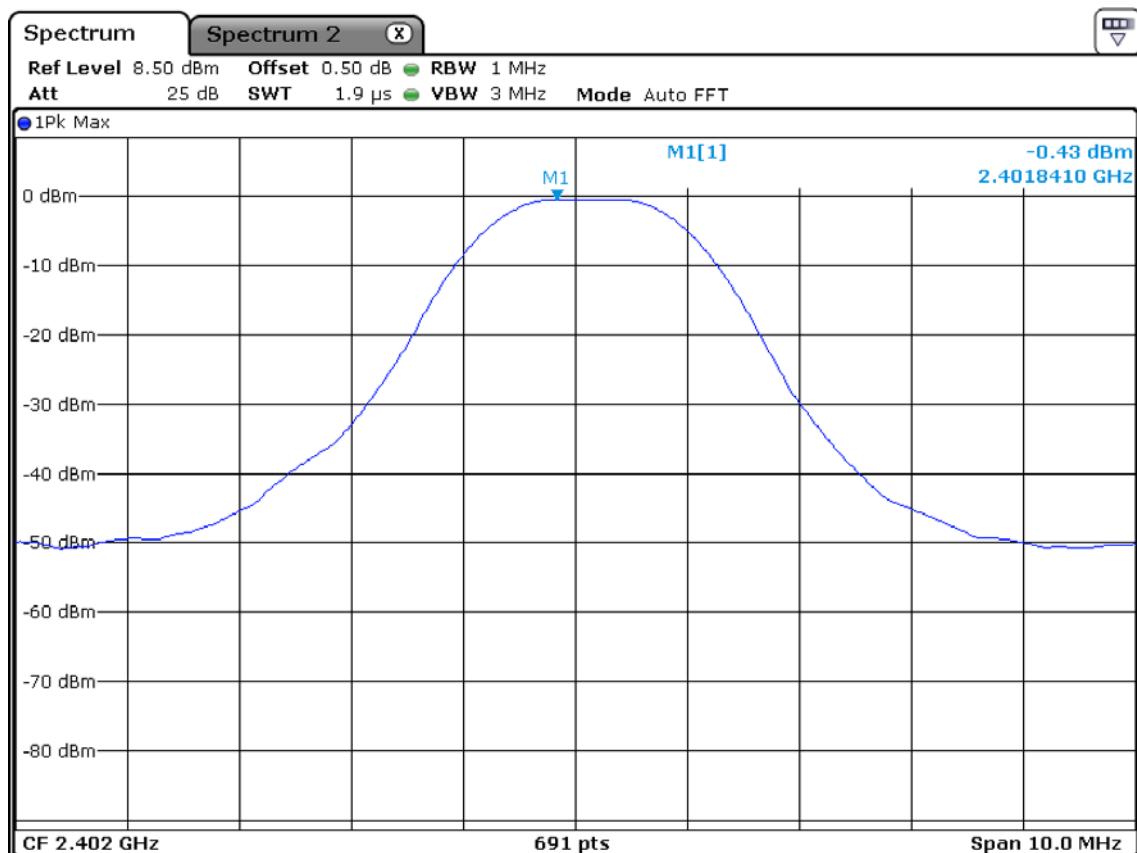
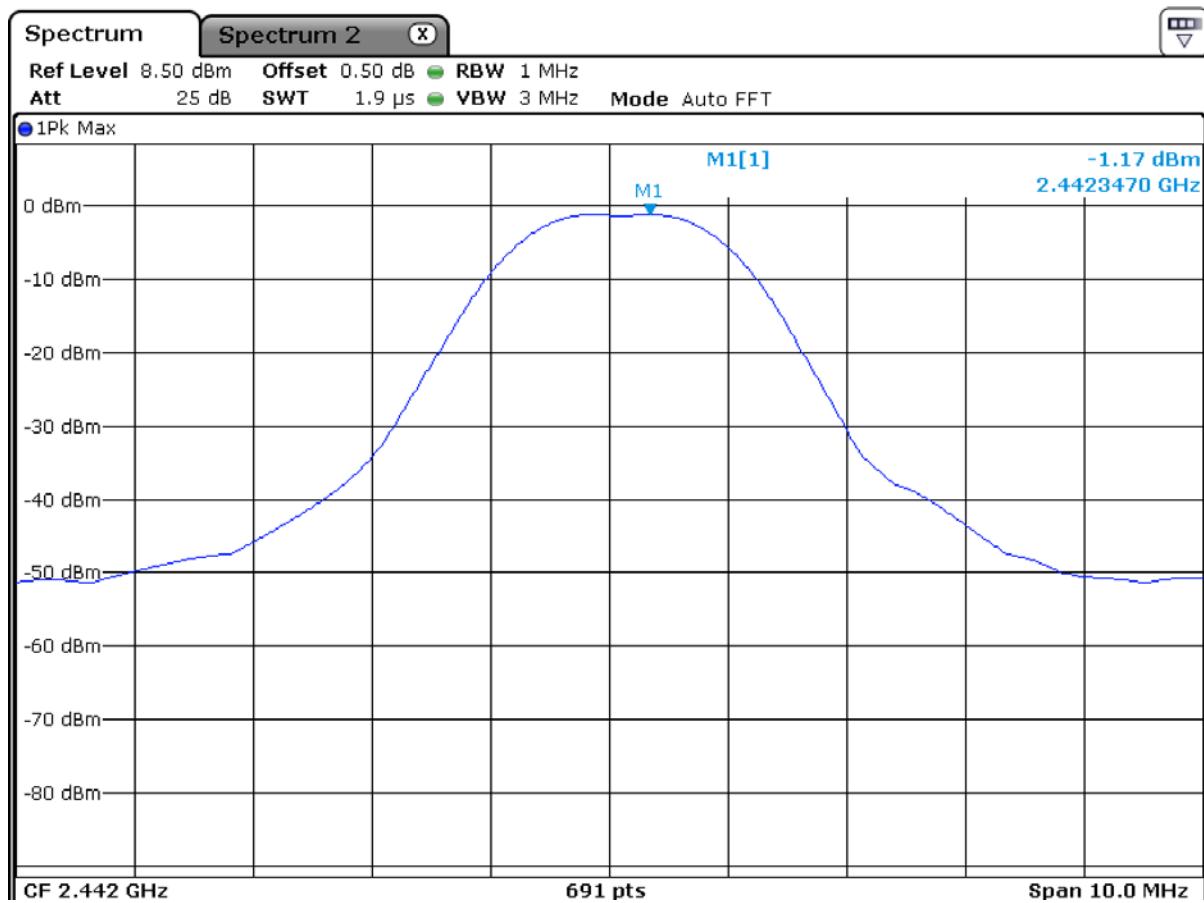
- See next pages for actual measured spectrum plots.

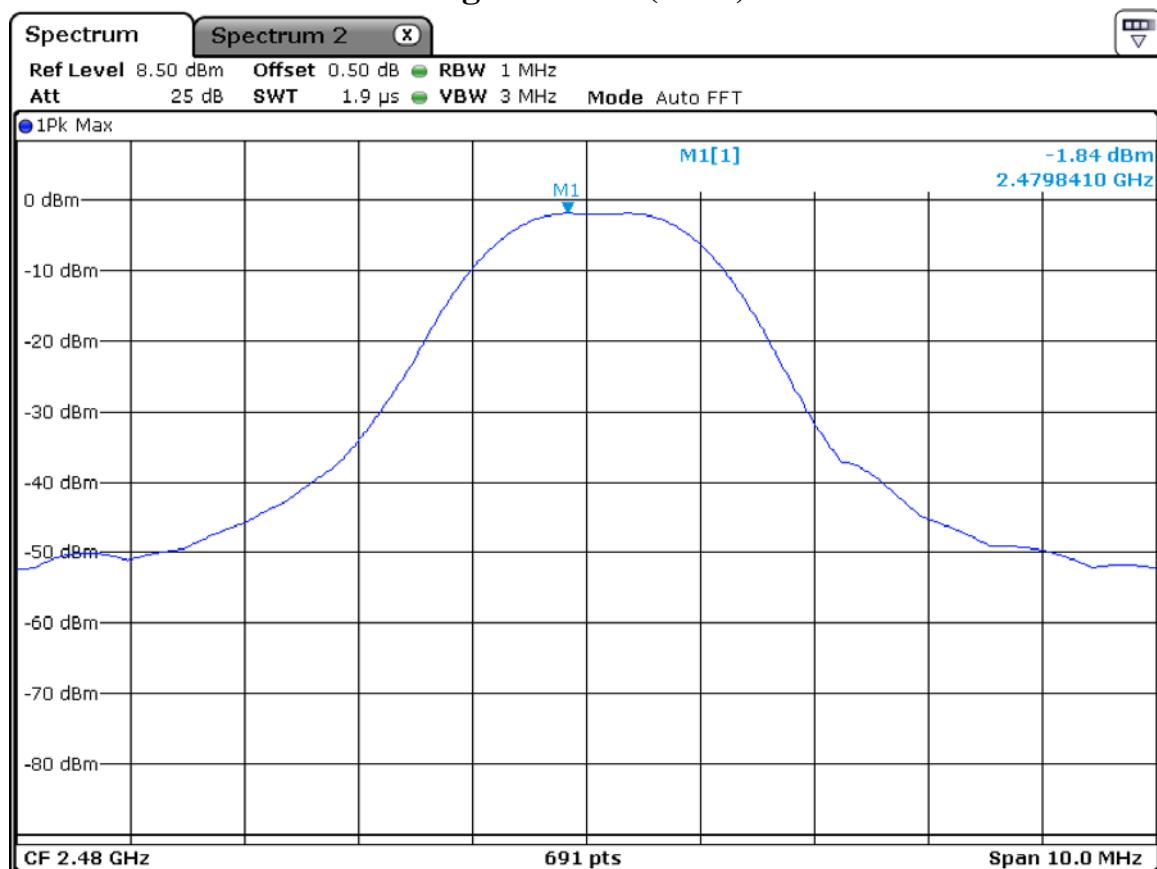
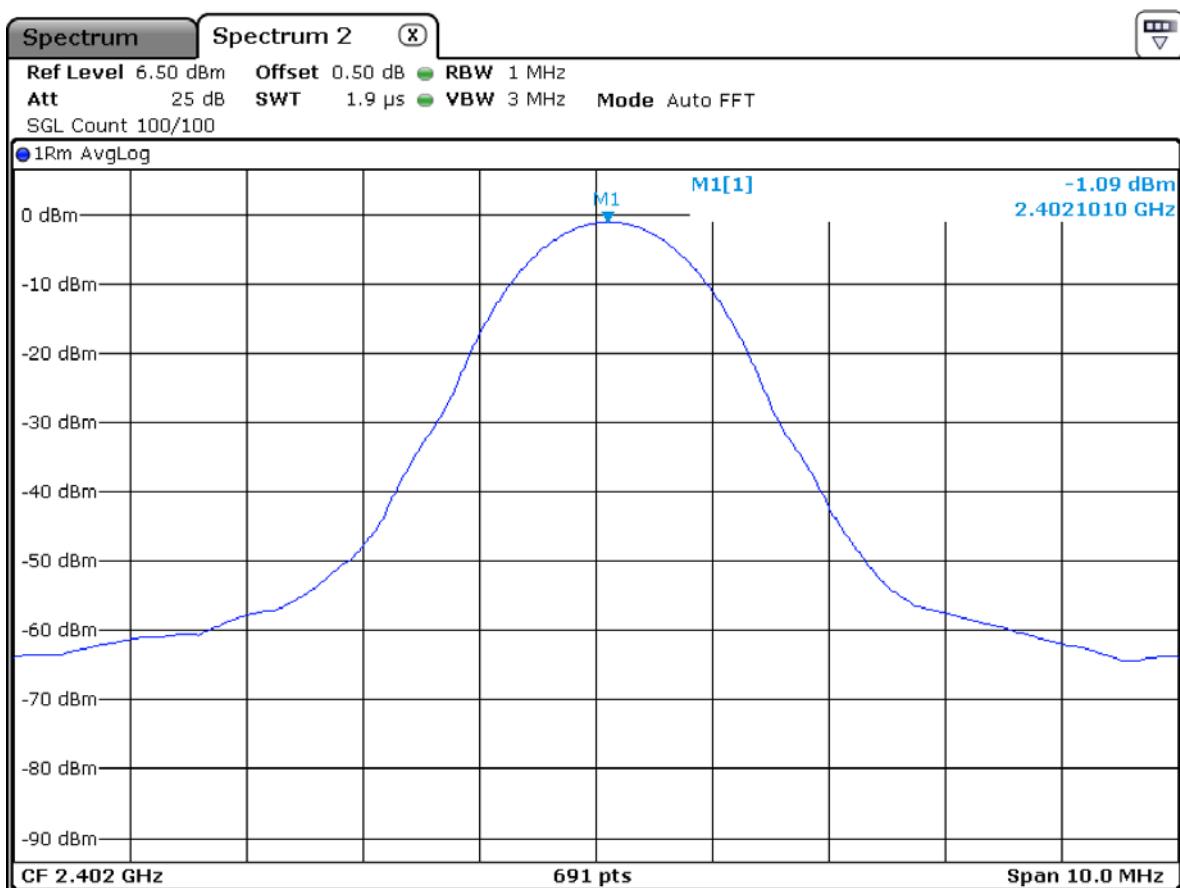
Minimum Standard:

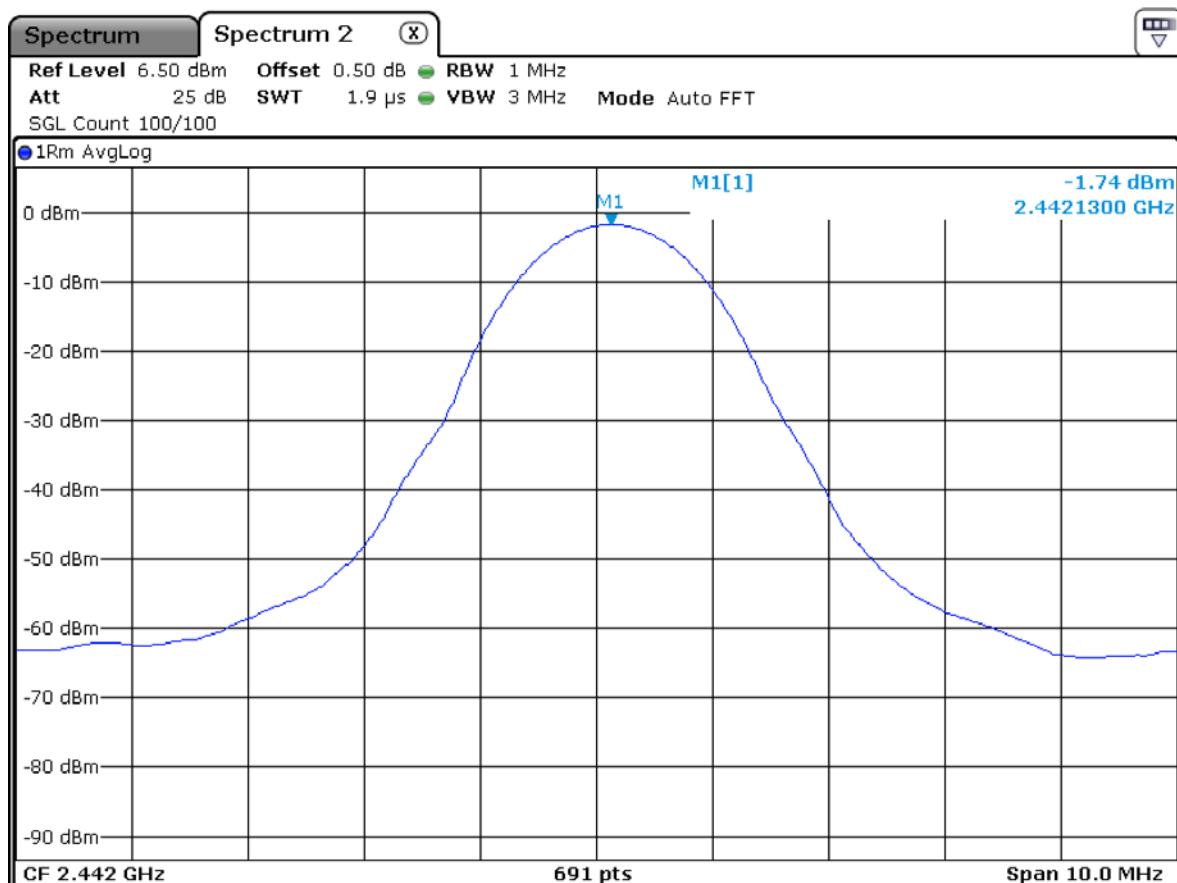
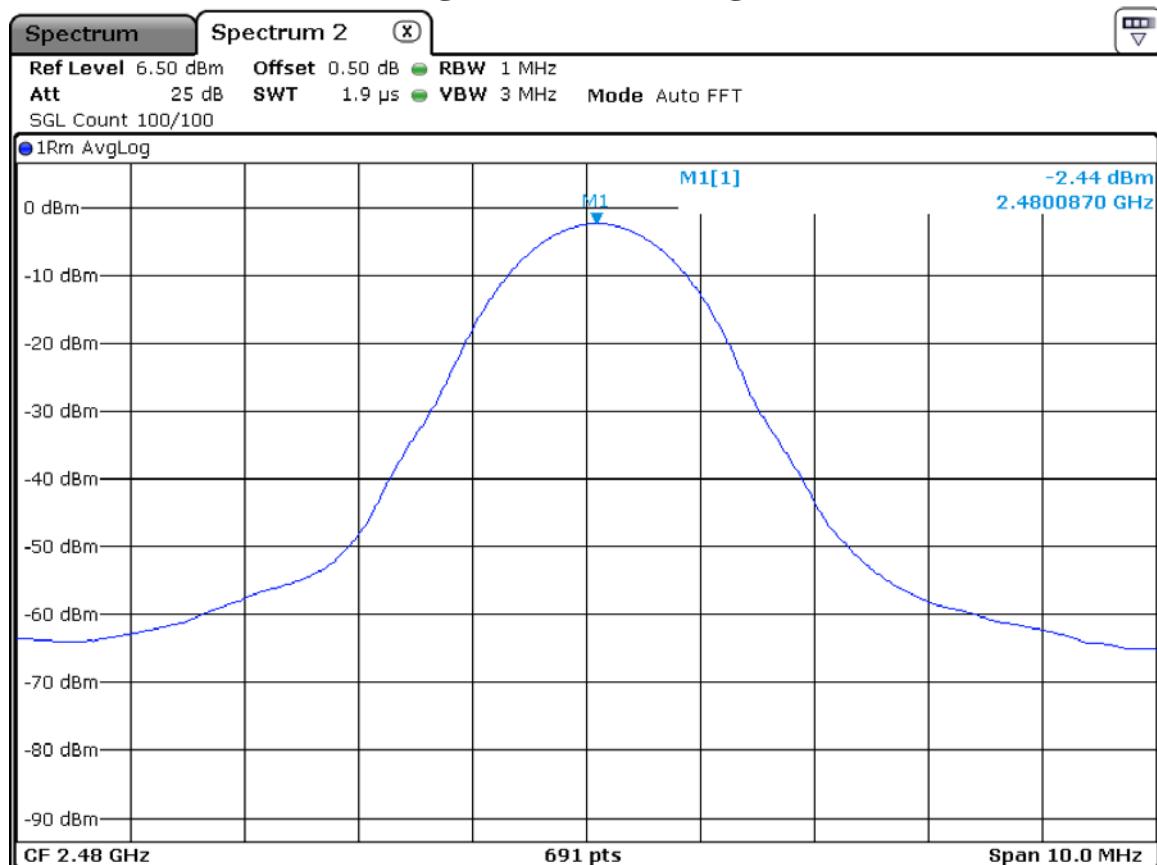
| | |
|-------------------|-------|
| Peak output power | < 1 W |
|-------------------|-------|

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Low Channel(Peak)**Middle Channel(Peak)**

High Channel(Peak)**Low Channel(Average)**

Middle Channel(Average)**High Channel(Average)**

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 (3kHz≤RBW≤100kHz) Span = 1.5 times the DTS bandwidth

VBW = 10 kHz (3 * RBW) Sweep = auto

Detector function = peak Trace = max hold

Measurement Data : Complies

| Frequency (MHz) | Test Results | |
|--------------------|--------------|----------|
| | dBm | Result |
| 2402 | -8.55 | Complies |
| 2442 | -10.20 | Complies |
| 2480 | -12.26 | Complies |

- See next pages for actual measured spectrum plots.

Minimum Standard:

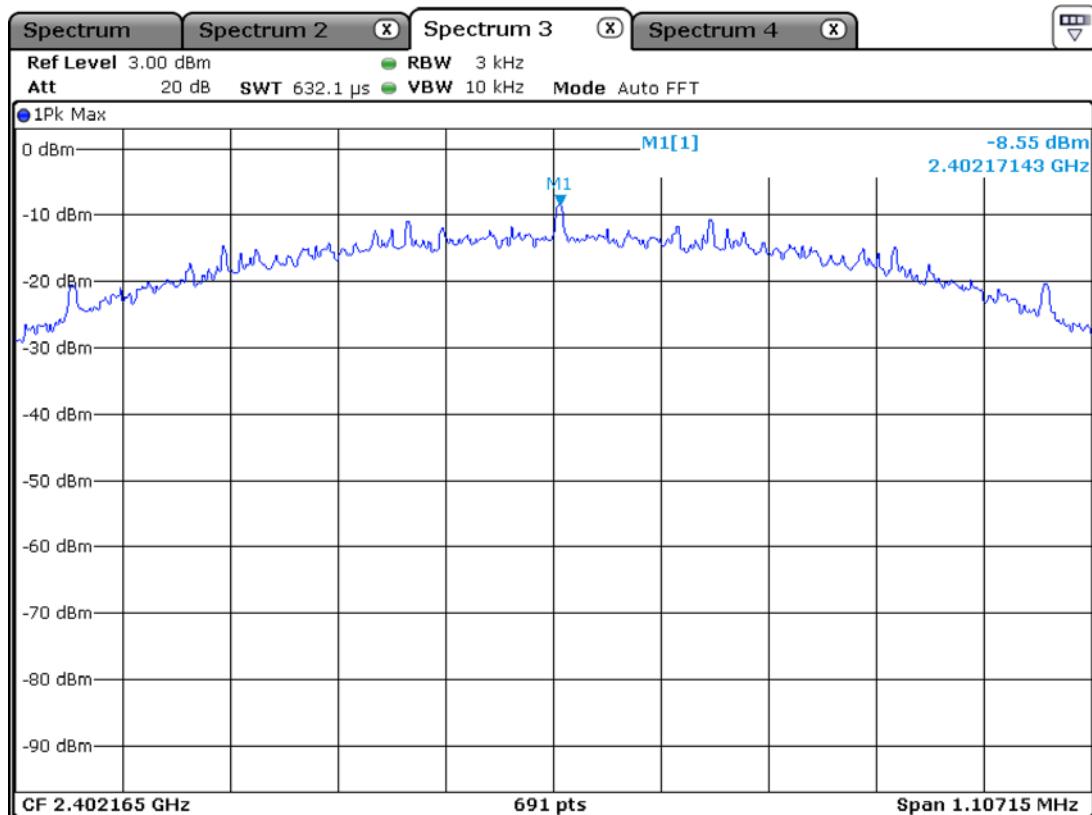
| | |
|------------------------|--------------------|
| Power Spectral Density | < 8 dBm @ 3 kHz BW |
|------------------------|--------------------|

Measurement Setup

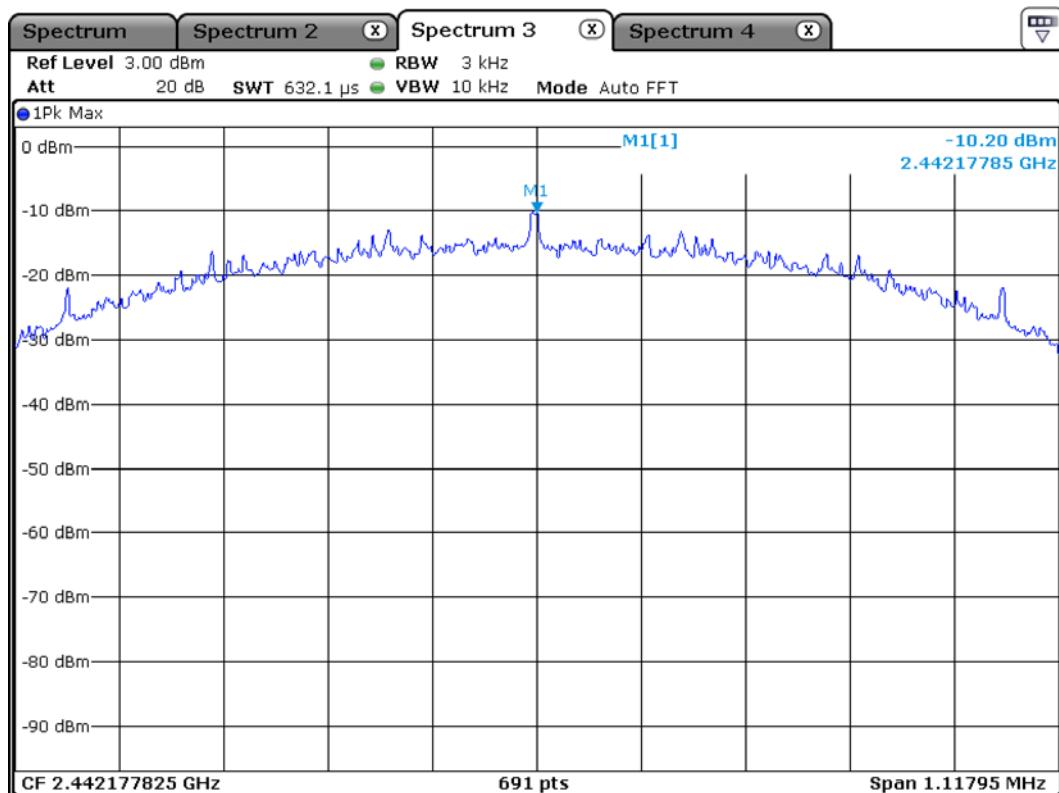
Same as the Chapter 3.2.1 (Figure 1)

Power Density Measurement

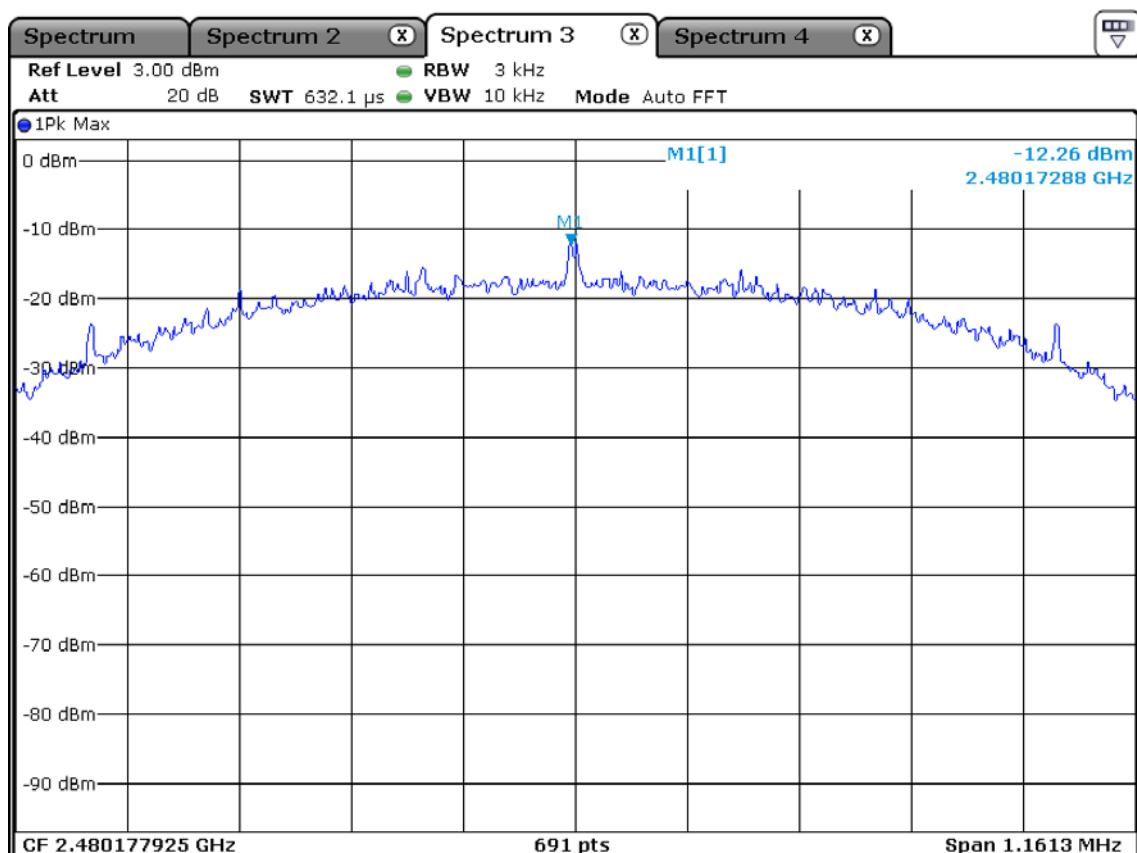
Low Channel



Middle Channel



High Channel



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

Span = 40 MHz, 100 MHz Detector function = peak

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 = 1 MHz, VBW \geq 3 MHz, Sweep=Auto

Average: RBW = 1 MHz, VBW = 3 MHz, Sweep=Auto

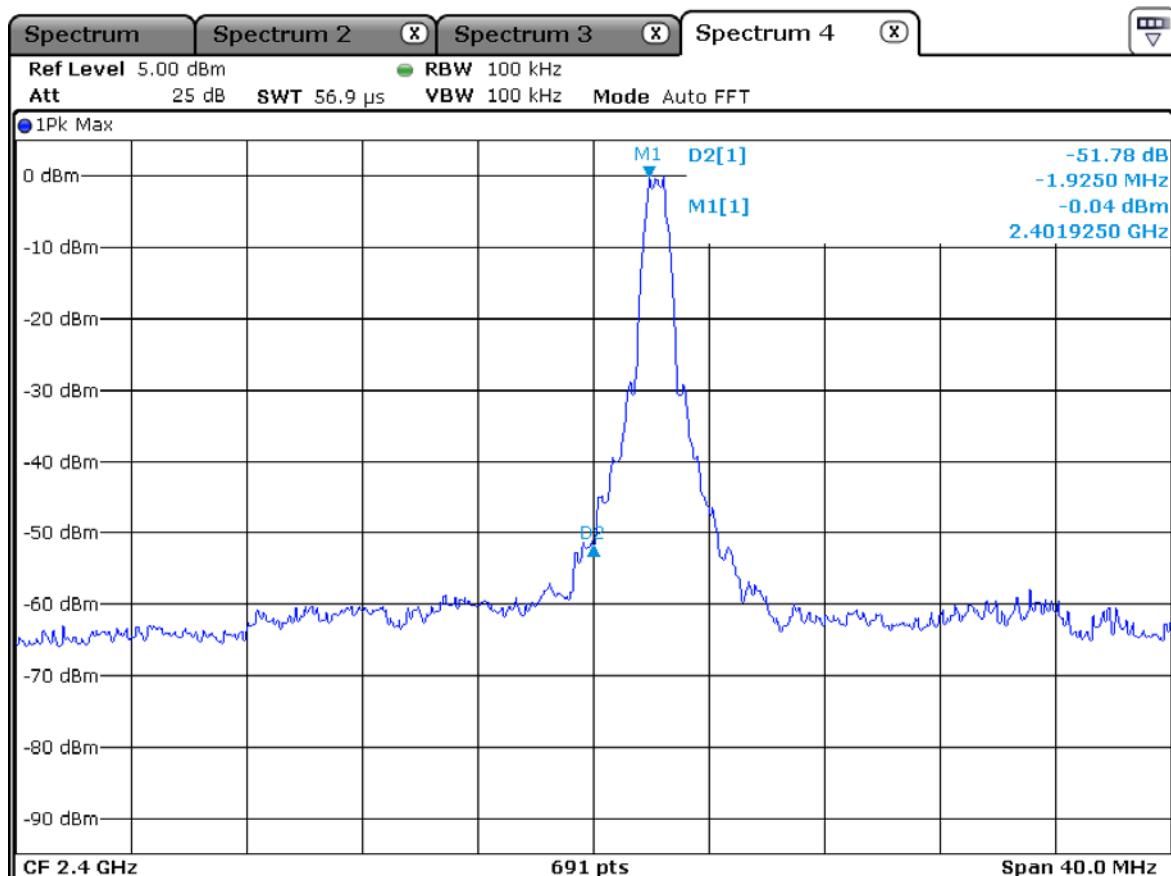
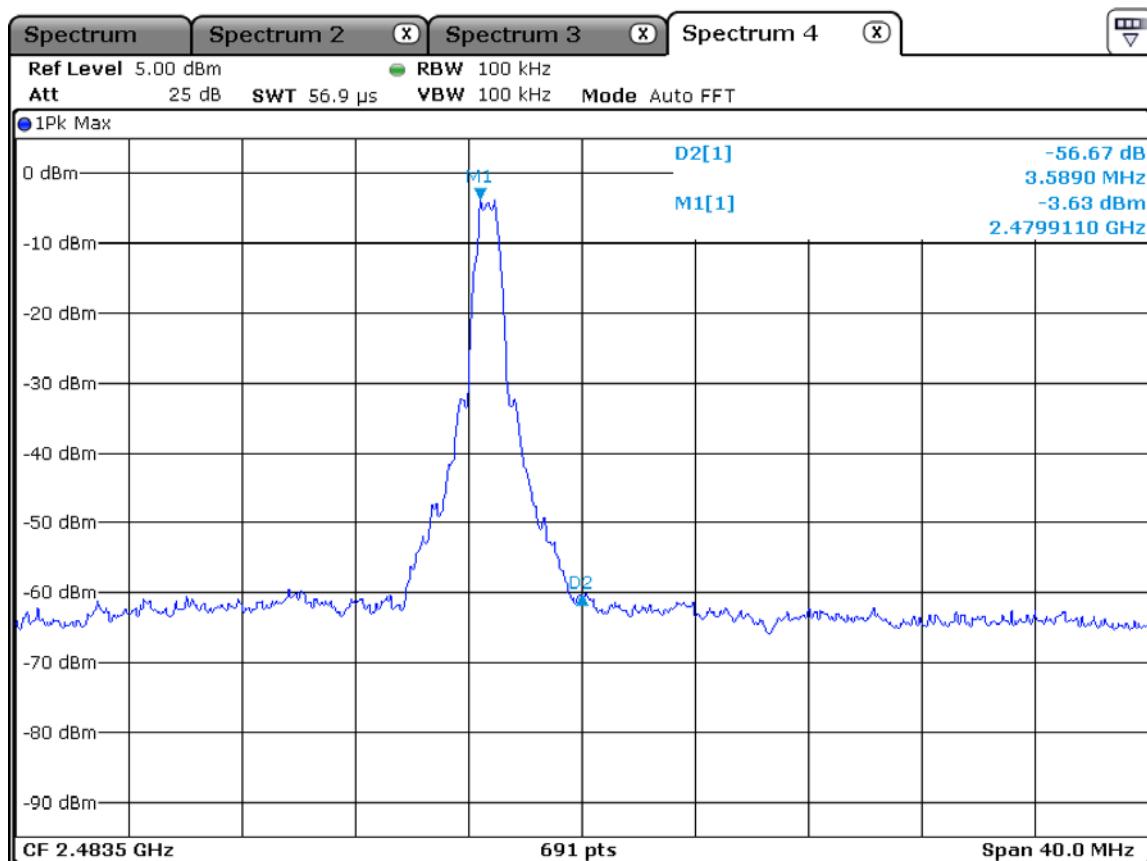
Measurement Distance: 3 m

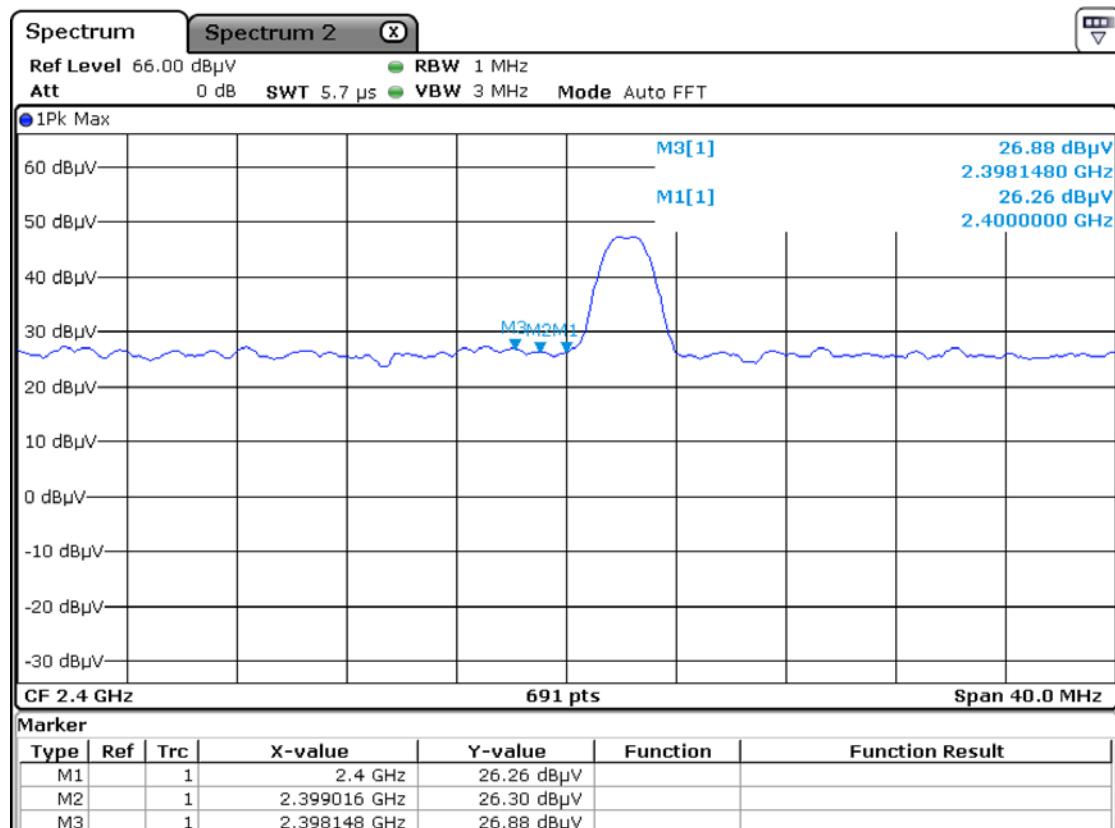
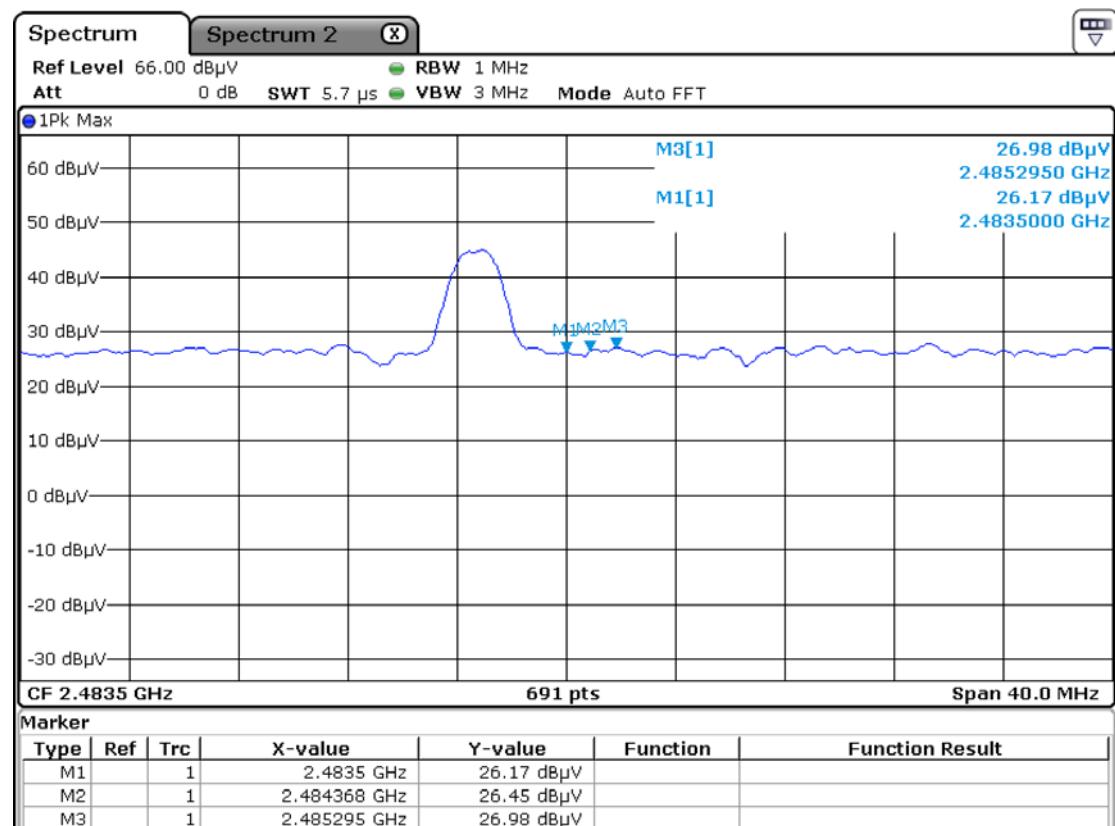
Polarization: Horizontal / Vertical

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 |
|--------------------------|----------|

Lower edgeUpper edge

Radiated emissions Lower edgeRadiated emissions Upper edge

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

| Frequency [MHz] | Reading [dBuV/m] | | Pol. | Correction Factor | | Limits [dBuV/m] | | Result | | Margin | |
|--------------------|---------------------|-------|------|----------------------|---------------------------|--------------------|----|-----------|-----------|--------|-----------|
| | | | | Antenna | Amp. Gain + Cable Loss | | | AV / Peak | AV / Peak | [dB] | AV / Peak |
| 2400 | 16.96 | 26.26 | H | 28.08 | 8.77 | 54 | 74 | 36.27 | 45.57 | 17.73 | 28.43 |
| 2399 | 16.47 | 26.30 | H | 28.09 | 8.78 | 54 | 74 | 35.78 | 45.61 | 18.22 | 28.39 |
| 2398 | 16.94 | 26.8 | H | 28.08 | 8.77 | 54 | 74 | 36.25 | 46.11 | 17.75 | 27.89 |

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

| Frequency [MHz] | Reading [dBuV/m] | | Pol. | Correction Factor | | Limits [dBuV/m] | | Result | | Margin | |
|--------------------|---------------------|-------|------|----------------------|---------------------------|--------------------|----|-----------|-----------|--------|-----------|
| | | | | Antenna | Amp. Gain + Cable Loss | | | AV / Peak | AV / Peak | [dB] | AV / Peak |
| 2493.1 | 16.25 | 26.17 | H | 27.88 | 8.57 | 54 | 74 | 35.56 | 45.48 | 18.44 | 28.52 |
| 2492.2 | 16.07 | 26.45 | H | 27.88 | 8.57 | 54 | 74 | 35.38 | 45.76 | 18.62 | 28.24 |
| 2491.4 | 16.65 | 26.98 | H | 27.88 | 8.57 | 54 | 74 | 35.96 | 46.29 | 18.04 | 24.03 |

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

7 Trace = max hold

Measurement Data: Complies

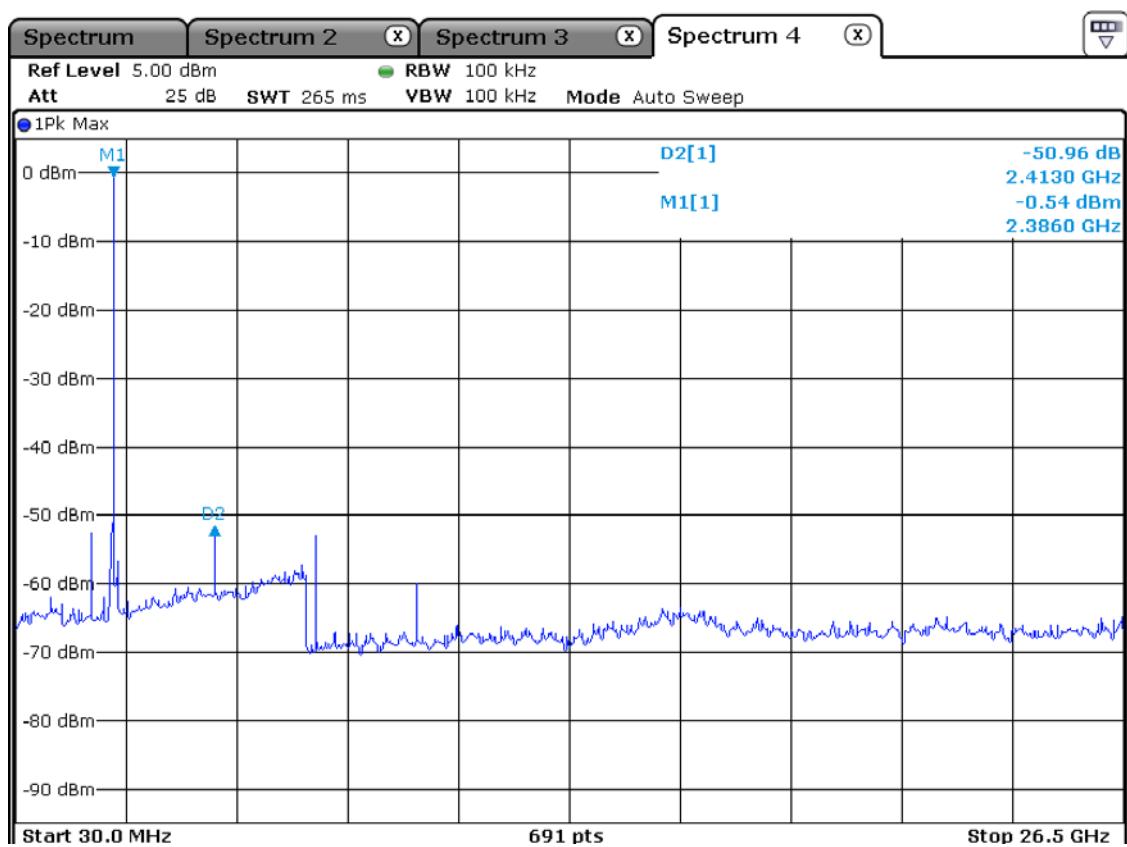
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

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

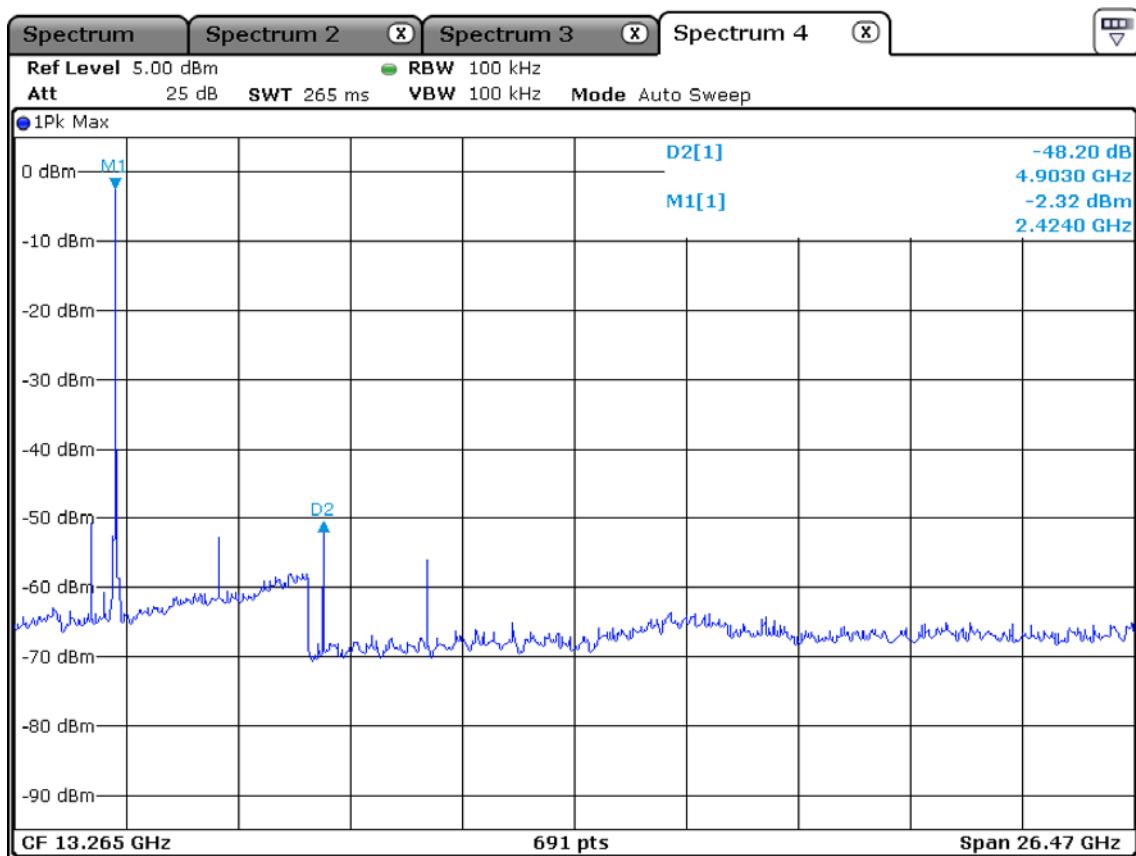
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

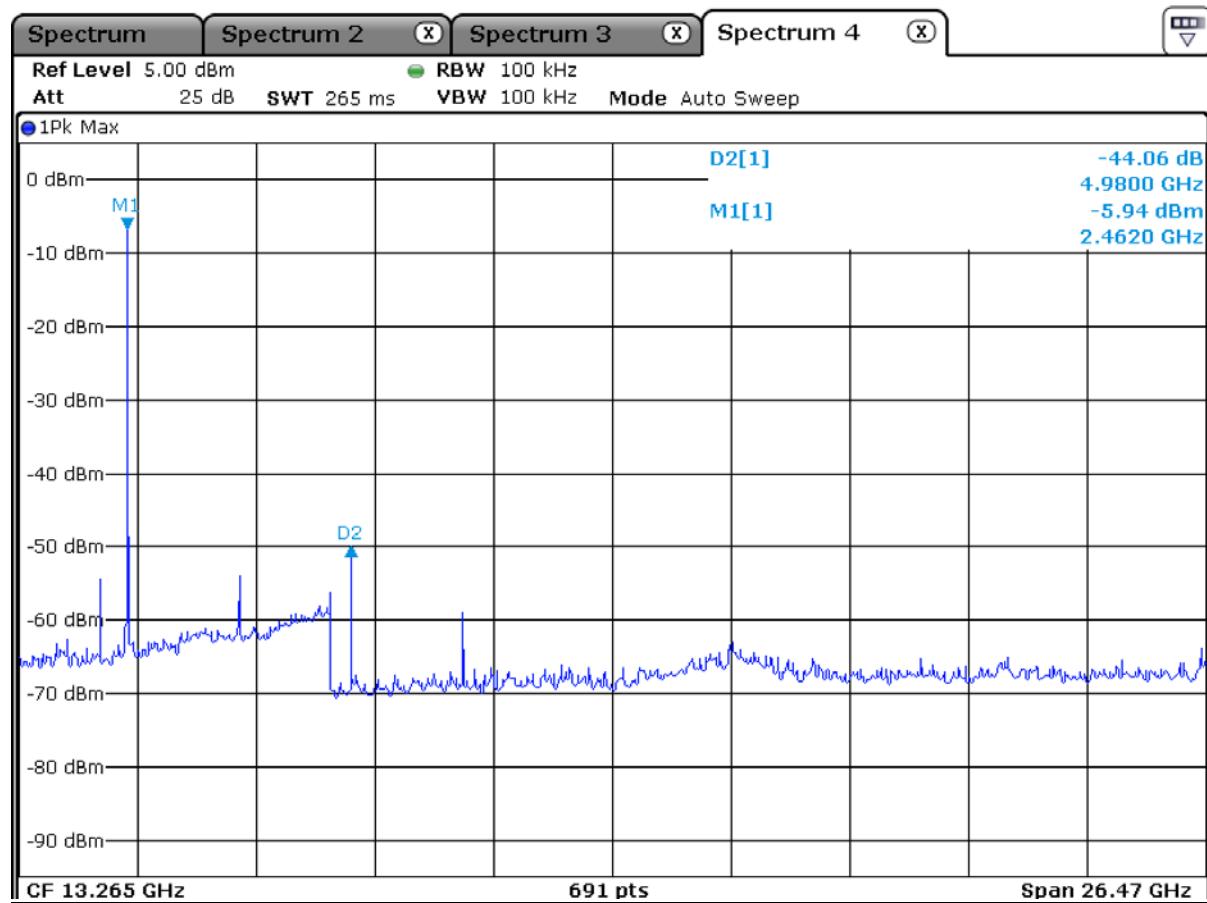
Unwanted Emission – Low Channel
Frequency Range = 30 MHz ~ 26.5 GHz



Unwanted Emission – Middle Channel
Frequency Range = 30 MHz ~ 26.5 GHz



Unwanted Emission – High Channel
Frequency Range = 30 MHz ~ 26.5 GHz



3.2.6 Radiated Spurious Emissions

Procedure:

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defined in ANSI C63.10-2013.

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 9 kHz ~ 10th harmonic.

PK

RBW = 100 kHz (30 MHz ~ 1 GHz)

VBW \geq RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

AV

RBW = 1 MHz

VBW = 3MHz

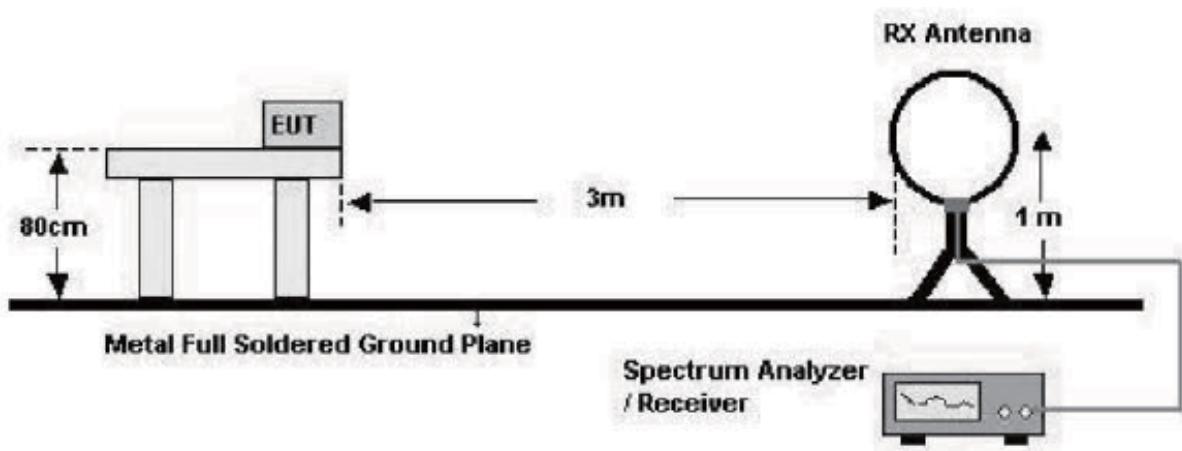
Trace = 100

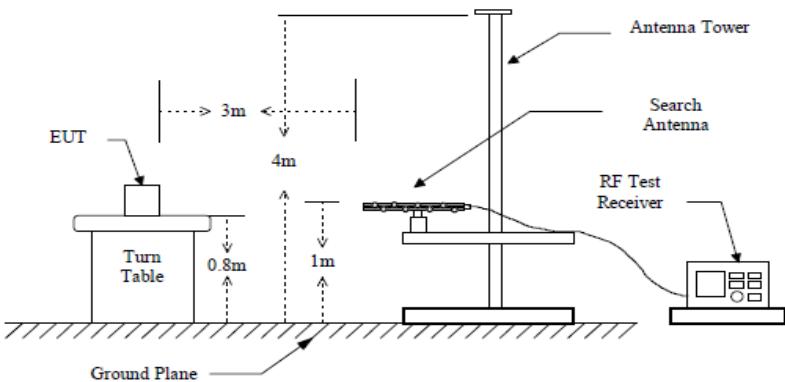
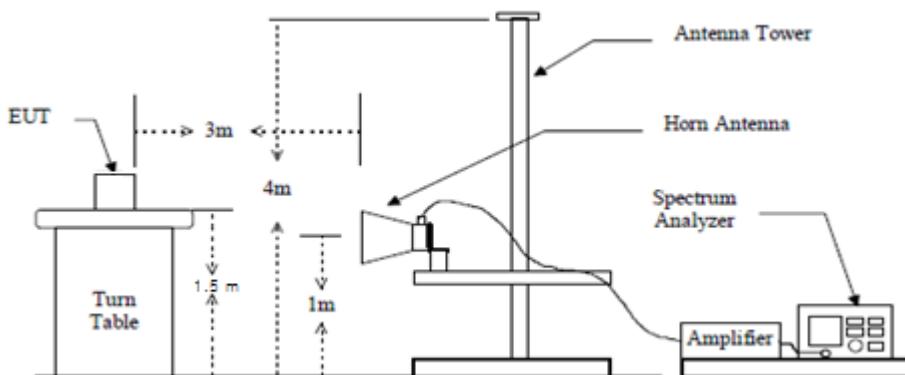
Detector function = RMS

Duty cycle

The EUT is configured to transmit continuously (D \geq 98%)/ Duty Factor = 0

below 30 MHz



below 1 GHz (30 MHz to 1 GHz)**above 1 GHz****Measurement Data: Complies**

- See next pages for actual measured data.
- 30 MHz or less Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 10m open field test site. Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlated with the one of tests made in an open field site based on KDB 414788.
- No other emissions were detected at a level greater than 20 dB below limit include from 9 kHz to 30MHz.

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] | |
|---|---------------------|------|----------------------|----------------|--------------------|-----------|--------------------|-----------|----------------|-----------|
| | | | Antenna | Amp.Gain+Cable | AV / Peak | AV / Peak | AV / Peak | AV / Peak | AV / Peak | AV / Peak |
| - | - | - | - | - | - | - | - | - | - | - |
| No emissions were detected at a level greater than 20 dB below limit. | | | | | | | | | | |
| - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - |

Measurement Data : (Below 1 GHz)

| Frequency [MHz] | Reading [dBuV/m] | Pol. | Correction Factor | | Limits [dBuV/m] | | Result [dBuV/m] | | Margin [dB] | |
|--------------------|---------------------|------|------------------------|------------------------|--------------------|-----------|--------------------|-----------|----------------|-----------|
| | | | Antenna-Amp.Gain+Cable | Antenna-Amp.Gain+Cable | AV / Peak | AV / Peak | AV / Peak | AV / Peak | AV / Peak | AV / Peak |
| 141.35 | 53.10 | V | -12.89 | | 43.50 | | 40.11 | | 3.39 | |
| 143.77 | 52.59 | V | -12.85 | | 43.50 | | 39.74 | | 3.76 | |
| 142.95 | 51.73 | V | -12.88 | | 43.50 | | 38.85 | | 4.65 | |
| 144.46 | 51.61 | V | -12.80 | | 43.50 | | 38.81 | | 4.69 | |
| 130.84 | 52.73 | V | -13.93 | | 43.50 | | 38.80 | | 4.70 | |
| 144.46 | 51.60 | V | -12.80 | | 43.50 | | 38.80 | | 4.70 | |

Measurement Data : (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 | AV / Peak | AV / Peak |
| 7334 | 36.70 | V | 46.70 | -6.27 | 54 | 74 | 30.43 | 40.43 | 23.57 | 33.57 |
| 7195 | 39.63 | V | 49.63 | -7.98 | 54 | 74 | 31.65 | 41.65 | 22.35 | 32.35 |
| 7439 | 35.40 | V | 43.00 | -4.97 | 54 | 74 | 30.43 | 38.03 | 23.57 | 35.97 |
| 11017 | 33.43 | V | 43.73 | -5.53 | 54 | 74 | 27.90 | 38.20 | 26.10 | 35.80 |
| 13012 | 11.33 | V | 24.77 | 14.84 | 54 | 74 | 26.17 | 39.61 | 27.83 | 34.39 |
| 12850 | 17.89 | V | 27.68 | 11.32 | 54 | 74 | 29.21 | 39.00 | 24.79 | 35.00 |

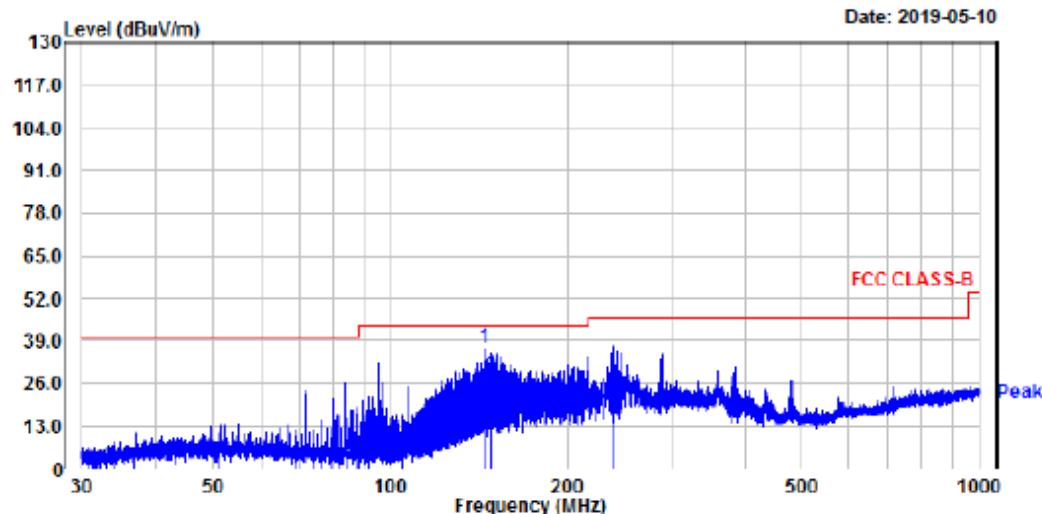
The eut configures to transmit continuously(D ≥ 98%)

Radiated Emissions - (Below 1 GHz)

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EUT/Model No.: I.M.LAB INC AK1G-BB(LOW) Temp/Humi: 23 / 36

Test Mode : BLE Tested by: KKH



| Freq | Reading | C.F | Result | Limit | Margin | Height | Angle | Polarity |
|--------|---------|--------|--------|--------|--------|--------|-------|------------|
| MHz | dBuV | dB | dBuV/m | dBuV/m | dB | cm | deg | |
| 143.70 | 49.69 | -12.85 | 36.84 | 43.50 | 6.66 | 0 | 94 | horizontal |
| 147.53 | 40.70 | -12.56 | 28.14 | 43.50 | 15.36 | 0 | 148 | horizontal |
| 238.52 | 37.01 | -13.61 | 23.40 | 46.00 | 22.60 | 0 | 175 | horizontal |

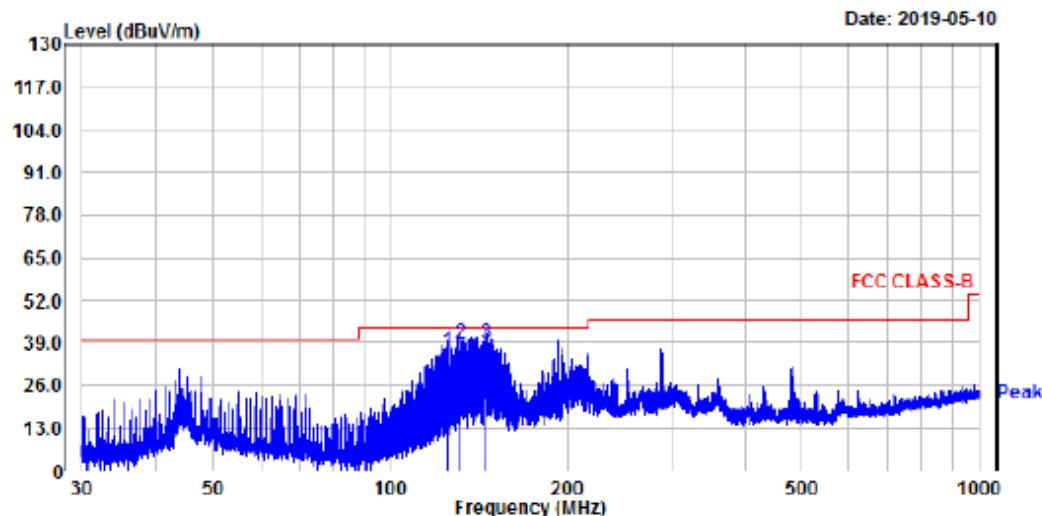
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



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EUT/Model No.: I.M.LAB INC AK1G-BB(LOW) Temp/Humi: 23 / 36

Test Mode : BLE Tested by: KKH



| Freq MHz | Reading dBuV | C.F dB | Result PK dBuV/m | Limit dBuV/m | Margin dB | Height cm | Angle deg | Polarity |
|-------------|-----------------|-----------|------------------------|-----------------|--------------|--------------|--------------|----------|
| 124.84 | 51.10 | -14.60 | 36.50 | 43.50 | 7.00 | 0 | 198 | vertical |
| 130.84 | 52.73 | -13.93 | 38.80 | 43.50 | 4.70 | 0 | 134 | vertical |
| 144.46 | 51.60 | -12.80 | 38.80 | 43.50 | 4.70 | 0 | 102 | vertical |

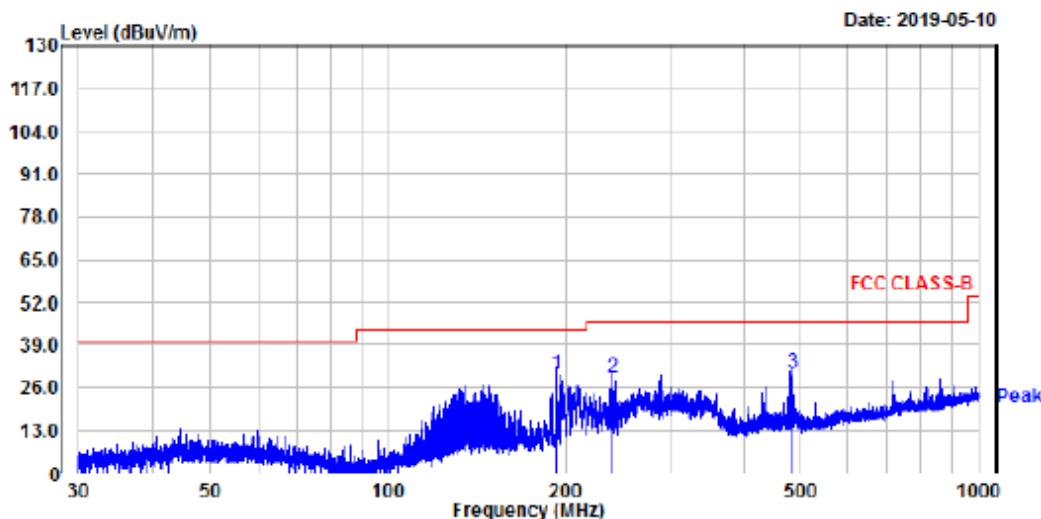
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



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EUT/Model No.: I.M.LAB INC AK1G-BB(MID) Temp/Humi: 23 / 36

Test Mode : BLE Tested by: KKH



| Freq MHz | Reading dBuV | C.F dB | Result PK dBuV/m | Limit dBuV/m | Margin dB | Height cm | Angle deg | Polarity |
|-------------|-----------------|-----------|------------------------|-----------------|--------------|--------------|--------------|------------|
| 192.00 | 45.19 | -15.05 | 30.14 | 43.50 | 13.36 | 0 | 226 | horizontal |
| 239.99 | 42.28 | -13.50 | 28.78 | 46.00 | 17.22 | 0 | 262 | horizontal |
| 482.00 | 37.74 | -7.53 | 30.21 | 46.00 | 15.79 | 0 | 197 | horizontal |

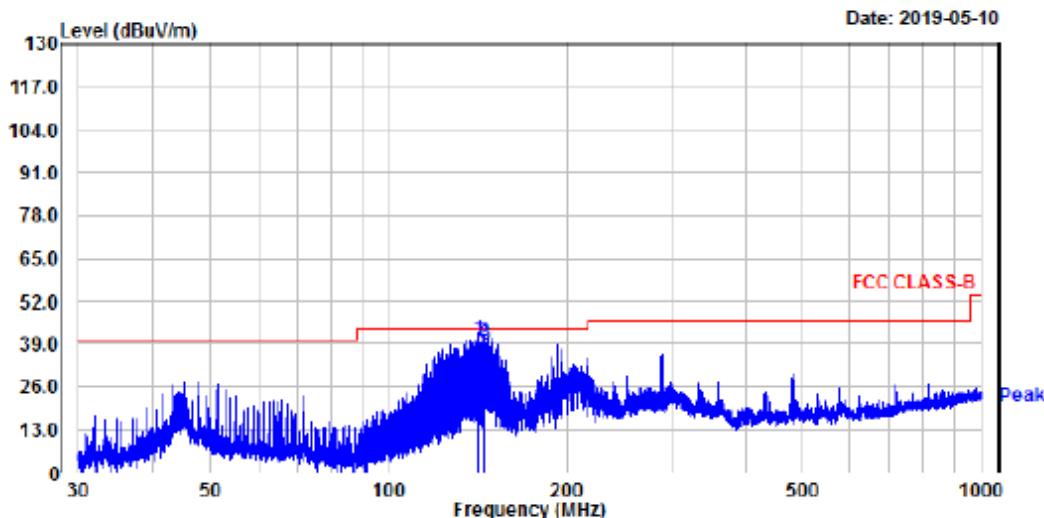
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



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EUT/Model No.: I.M.LAB INC AK1G-BB(MID) Temp/Humi: 23 / 36

Test Mode : BLE Tested by: KKH



| Freq MHz | Reading dBuV | C.F dB | Result PK dBuV/m | Limit dBuV/m | Margin dB | Height cm | Angle deg | Polarity |
|-------------|-----------------|-----------|------------------------|-----------------|--------------|--------------|--------------|----------|
| 141.45 | 53.10 | -12.99 | 40.11 | 43.50 | 3.39 | 0 | 109 | vertical |
| 143.77 | 52.59 | -12.85 | 39.74 | 43.50 | 3.76 | 0 | 109 | vertical |
| 145.29 | 51.47 | -12.71 | 38.76 | 43.50 | 4.74 | 0 | 239 | vertical |

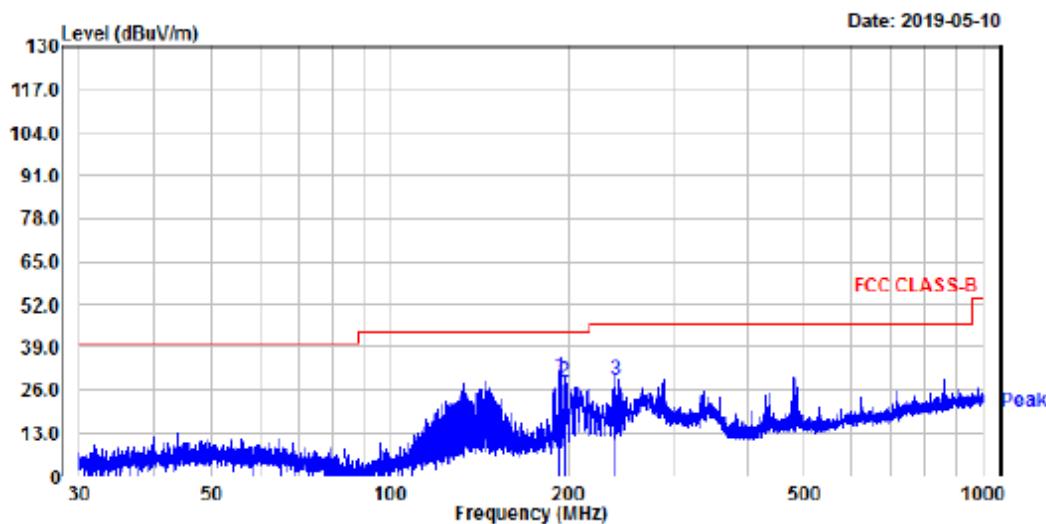
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



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EUT/Model No.: I.M.LAB INC AK1G-BB(HIGH) Temp/Humi: 23 / 36

Test Mode : BLE Tested by: KKH



| Freq MHz | Reading dBuV | C.F dB | Result PK dBuV/m | Limit PK dBuV/m | Margin dB | Height cm | Angle deg | Polarity |
|-------------|-----------------|-----------|------------------------|-----------------------|--------------|--------------|--------------|------------|
| 192.00 | 45.06 | -15.05 | 30.01 | 43.50 | 13.49 | 0 | 120 | horizontal |
| 196.42 | 43.80 | -15.20 | 28.60 | 43.50 | 14.90 | 0 | 158 | horizontal |
| 239.99 | 42.59 | -13.50 | 29.09 | 46.00 | 16.91 | 0 | 341 | horizontal |

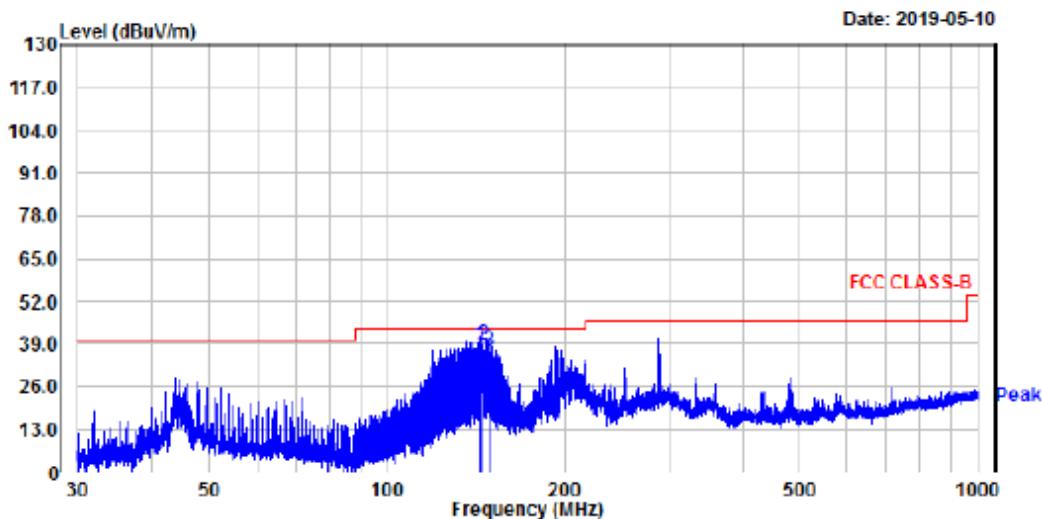
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



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EUT/Model No.: I.M.LAB INC AK1G-BB(HIGH) Temp/Humi: 23 / 36

Test Mode : BLE Tested by: KKH



| Freq | Reading | C.F | Result | Limit | Margin | Height | Angle | Polarity |
|--------|---------|--------|--------|--------|--------|--------|-------|----------|
| MHz | dBuV | dB | dBuV/m | dBuV/m | dB | cm | deg | |
| 142.95 | 51.73 | -12.88 | 38.85 | 43.50 | 4.65 | 0 | 259 | vertical |
| 144.46 | 51.61 | -12.80 | 38.81 | 43.50 | 4.69 | 0 | 319 | vertical |
| 148.25 | 49.40 | -12.50 | 36.90 | 43.50 | 6.60 | 0 | 98 | vertical |

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

Radiated Emissions - (Above 1 GHz)

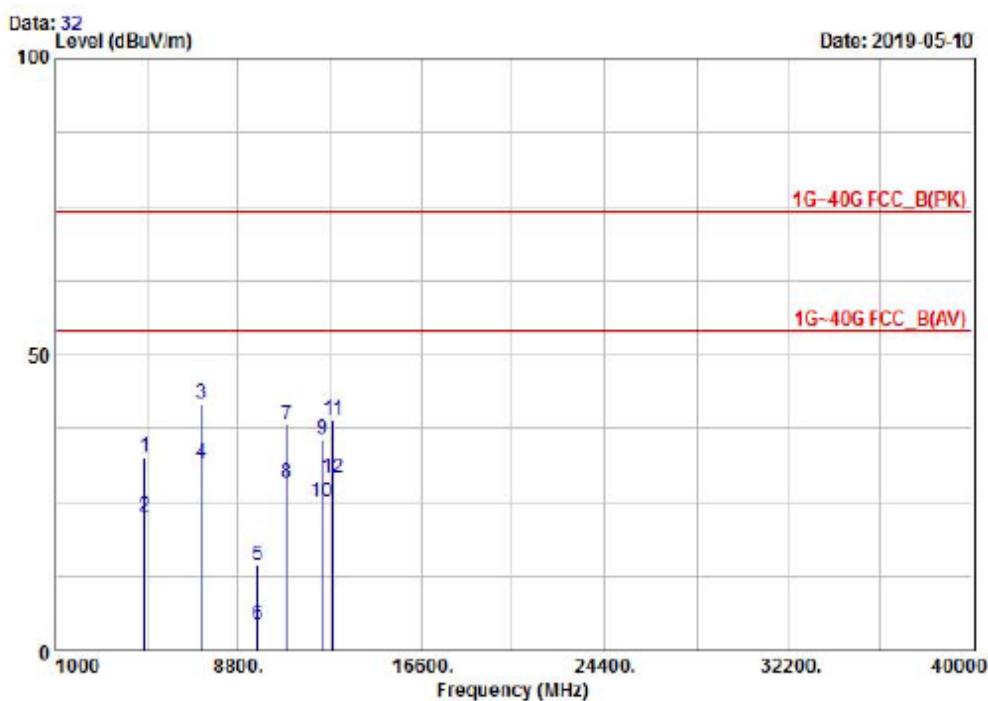
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EUT/Model No.: AKIC-BB

Test Mode: BLE (LOW)

Tested by : KO K H

Temp/Humi: 22 / 62



| | | | | | | | |
|----|------------|-------|--------|-------|-------|-------|------------|
| 1 | 4788.00 | 47.64 | -16.06 | 32.68 | 74.00 | 41.42 | HORIZONTAL |
| 2 | 4788.00 | 37.64 | -15.06 | 22.58 | 54.00 | 31.42 | HORIZONTAL |
| 3 | 7195.00 | 49.63 | -7.98 | 41.65 | 74.00 | 32.35 | VERTICAL |
| 4 | 7195.00 | 39.63 | -7.98 | 31.65 | 54.00 | 22.35 | VERTICAL |
| 5 | 9601.00 | 22.71 | -8.35 | 14.36 | 74.00 | 59.64 | VERTICAL |
| 6 | 9601.00 | 12.71 | -8.35 | 4.36 | 54.00 | 49.64 | VERTICAL |
| 7 | 710850.00 | 43.93 | -5.83 | 38.10 | 74.00 | 35.90 | HORIZONTAL |
| 8 | 910950.00 | 34.04 | -5.83 | 28.21 | 54.00 | 26.79 | HORIZONTAL |
| 9 | 912350.00 | 33.96 | 1.64 | 35.60 | 74.00 | 38.40 | HORIZONTAL |
| 10 | 1012350.00 | 23.48 | 1.64 | 25.12 | 54.00 | 28.88 | HORIZONTAL |
| 11 | 1112850.00 | 27.68 | 11.32 | 39.00 | 74.00 | 36.00 | HORIZONTAL |
| 12 | 1212850.00 | 17.89 | 11.32 | 29.21 | 54.00 | 24.79 | HORIZONTAL |

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



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EUT/Model No.: AK1C-BB

Test Model: BLE (MID)

Tested by : KO K H

Temp/Humi: 22 / 62

Data: 33

Level (dBuV/m)

100

Date: 2019-05-10

50

0

1000

8800.

16600.

24400.

32200.

40000

Frequency (MHz)

| | | | | | | | |
|----|----------|-------|--------|-------|-------|-------|------------|
| 1 | 4893.00 | 47.34 | -16.02 | 32.32 | 74.00 | 41.68 | HORIZONTAL |
| 2 | 4893.00 | 37.34 | -15.02 | 22.32 | 54.00 | 31.68 | HORIZONTAL |
| 3 | 7334.00 | 46.70 | -6.27 | 40.43 | 74.00 | 33.57 | VERTICAL |
| 4 | 7334.00 | 36.70 | -6.27 | 30.43 | 54.00 | 23.57 | VERTICAL |
| 5 | 9776.00 | 31.03 | -8.51 | 22.52 | 74.00 | 51.48 | VERTICAL |
| 6 | 9776.00 | 21.03 | -8.51 | 12.52 | 54.00 | 41.48 | VERTICAL |
| 7 | 10971.00 | 44.10 | -5.60 | 38.50 | 74.00 | 35.50 | HORIZONTAL |
| 8 | 10971.00 | 33.04 | -5.60 | 20.24 | 54.00 | 25.76 | HORIZONTAL |
| 9 | 12567.00 | 34.29 | 4.52 | 38.81 | 74.00 | 35.19 | HORIZONTAL |
| 10 | 12567.00 | 24.08 | 4.52 | 28.60 | 54.00 | 25.40 | HORIZONTAL |
| 11 | 13012.00 | 24.77 | 14.94 | 39.61 | 74.00 | 34.39 | HORIZONTAL |
| 12 | 13012.00 | 11.33 | 14.84 | 26.17 | 54.00 | 27.83 | HORIZONTAL |

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



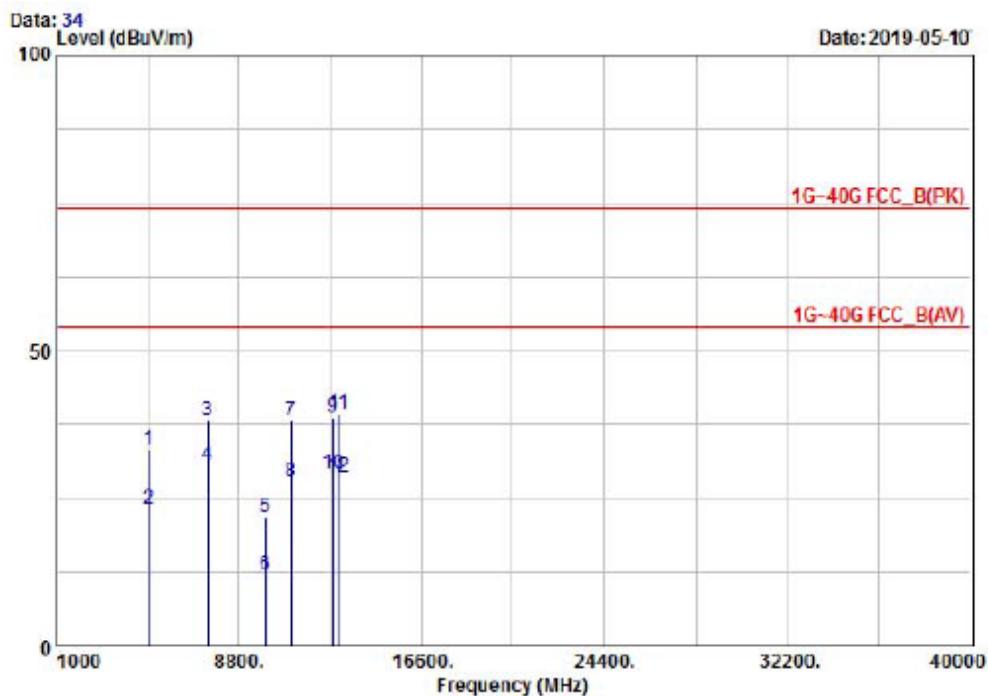
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EUT/Model No.: AK1C-BB

Test Mode: BLE (HIGH)

Tested by : KO K H

Temp/Humi: 22 / 62



| | | | | | | | |
|----|----------|-------|--------|-------|-------|-------|------------|
| 1 | 4963.00 | 48.11 | -16.00 | 29.11 | 74.00 | 40.89 | HORIZONTAL |
| 2 | 4963.00 | 38.11 | -18.00 | 23.11 | 54.00 | 30.89 | HORIZONTAL |
| 3 | 7439.00 | 43.00 | -4.97 | 28.03 | 74.00 | 36.97 | VERTICAL |
| 4 | 7439.00 | 35.40 | -4.97 | 30.43 | 54.00 | 23.57 | VERTICAL |
| 5 | 9915.00 | 30.53 | -8.64 | 21.89 | 74.00 | 52.11 | VERTICAL |
| 6 | 9915.00 | 20.59 | -8.64 | 11.95 | 54.00 | 42.06 | VERTICAL |
| 7 | 11017.00 | 43.73 | -5.53 | 38.20 | 74.00 | 35.80 | HORIZONTAL |
| 8 | 11017.00 | 33.43 | -5.53 | 27.90 | 54.00 | 26.10 | HORIZONTAL |
| 9 | 12813.00 | 28.27 | 10.43 | 38.70 | 74.00 | 35.30 | HORIZONTAL |
| 10 | 12813.00 | 18.77 | 10.43 | 25.20 | 54.00 | 24.80 | HORIZONTAL |
| 11 | 13071.00 | 24.76 | 14.44 | 29.20 | 74.00 | 34.80 | HORIZONTAL |
| 12 | 13071.00 | 14.16 | 14.44 | 28.60 | 54.00 | 25.40 | HORIZONTAL |

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

3.2.7 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: **NT**

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

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

* Note: This product operates only with battery

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 | 2018-09-07 |
| 4 | | Attenuator (10 dB) | 8491A | 63196 | HP | 1 year | 2018-09-07 |
| 5 | ■ | EMI Test Receiver (~7 GHz) | ESCI7 | 100722 | R&S | 1 year | 2018-09-07 |
| 6 | | RF Amplifier (~1.3 GHz) | 8447D OPT 010 | 2944A07684 | HP | 1 year | 2018-09-07 |
| 7 | ■ | RF Amplifier (1~26.5 GHz) | 8449B | 3008A02126 | HP | 1 year | 2019-03-21 |
| 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 | 2019-04-17 |
| 12 | | Temp.Humidity Data Logger | SK-L200TH II A | 00801 | SATO | 1 year | 2018-11-23 |
| 13 | ■ | DC Power Supply | 6674A | 3637A01657 | Agilent | - | - |
| 14 | | AC Power Supply | HK-80 | LR001 | DAERIMTECH | - | - |
| 15 | ■ | Power Meter | EPM-441A | GB32481702 | HP | 1 year | 2019-03-20 |
| 16 | ■ | Power Sensor | 8481A | 3318A94972 | HP | 1 year | 2018-12-26 |
| 17 | | Audio Analyzer | 8903B | 3729A18901 | HP | 1 year | 2018-09-07 |
| 18 | | Modulation Analyzer | 8901B | 3749A05878 | HP | 1 year | 2018-09-07 |
| 19 | ■ | TEMP & HUMIDITY Chamber | YJ-500 | LTAS06041 | JinYoung Tech | 1 year | 2018-09-07 |
| 20 | | Stop Watch | HS-3 | 812Q08R | CASIO | 2 year | 2019-03-21 |
| 21 | | LISN | KNW-407 | 8-1430-1 | Kyoritsu | 1 year | 2018-09-07 |
| 22 | | Two-Lime V-Network | ESH3-Z5 | 893045/017 | R&S | 1 year | 2019-03-20 |
| 23 | | Highpass Filter | WHKX1.5/15G-10SS | 74 | Wainwright Instruments | 1 year | 2019-03-19 |
| 24 | | Highpass Filter | WHKX3.0/18G-10SS | 118 | Wainwright Instruments | 1 year | 2019-03-19 |
| 25 | | OSP120 BASE UNIT | OSP120 | 101230 | R&S | 1 year | 2019-03-21 |
| 26 | ■ | Signal Generator(100 kHz ~ 40 GHz) | SMB100A | 177621 | R&S | 1 year | 2019-03-20 |
| 27 | | Vector Signal Generator(9kHz ~ 6 GHz) | SMBV100A | 255081 | R&S | 1 year | 2019-03-20 |
| 28 | ■ | Signal Analyzer (10 Hz ~ 40 GHz) | FSV40 | 101367 | R&S | 1 year | 2019-03-20 |