

# TEST REPORT

|                                                                                                                                              |                            |                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KOSTEC CO., Ltd.</b><br>28(175-20, Anyeong-dong) 406-gil sejaro,<br>Hwaseong-si, Gyeonggi-do, Korea<br>Tel:031-222-4251, Fax:031-222-4252 | Report No.: KST-FCR-200013 |  <b>KOSTEC Co., Ltd.</b><br><a href="http://www.kostec.org">http://www.kostec.org</a> |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 1. Applicant

- Name : IIRCADE, INC.
- Address : No.A-627, 338 GwanggyoJungang-Ro, Suji-Gu, Yongin-Si, Gyeonggi-Do, 16942, Republic of KOREA

## 2. Test Item

- Product Name: iiRcade Game Console Bartop
- Model Name: IRORO1-128C19OGA
- Brand: None
- FCC ID: 2AXRR- IRORO1

## 3. Manufacturer

- Name : IIRCADE, INC.
- Address : No.A-627, 338 GwanggyoJungang-Ro, Suji-Gu, Yongin-Si, Gyeonggi-Do, 16942, Republic of KOREA

4. Date of Test : 2020. 09. 14. ~ 2020. 09. 23.

FCC CFR 47, Part 15. Subpart C-15.247

5. Test Method Used : 558074 D01 15.247 Meas Guidance v05  
ANSI C 63.10-2013

6. Test Result : Compliance

7. Note: Request for family model name by appearance and flash memory capacity change. Family model names: IRORO1-64C19OGA, IRORO1-128S19BLK, IRORO1-128S19DLA

## Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI C 63.10-2013.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
This test report is not related to KOLAS accreditation.

|             |                                                |                                                            |
|-------------|------------------------------------------------|------------------------------------------------------------|
| Affirmation | Tested by<br>Name : Jung, Ho-Cheol (Signature) | Technical Manager<br>Name : Park, Gyeong-Hyeon (Signature) |
|-------------|------------------------------------------------|------------------------------------------------------------|

2020. 09. 25.

**KOSTEC Co., Ltd.**

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## 1. GENERAL INFORMATION

### 1.1 Test Facility

#### Test laboratory and address

KOSTEC Co., Ltd.

28(175-20,Annyeong-dong)406-gil sejaro, Hwaseong-si Gyeonggi-do, Korea

Telephone Number: 82-31-222-4251

Facsimile Number: 82-31-222-4252

#### Registration information

KOLAS No.: KT232

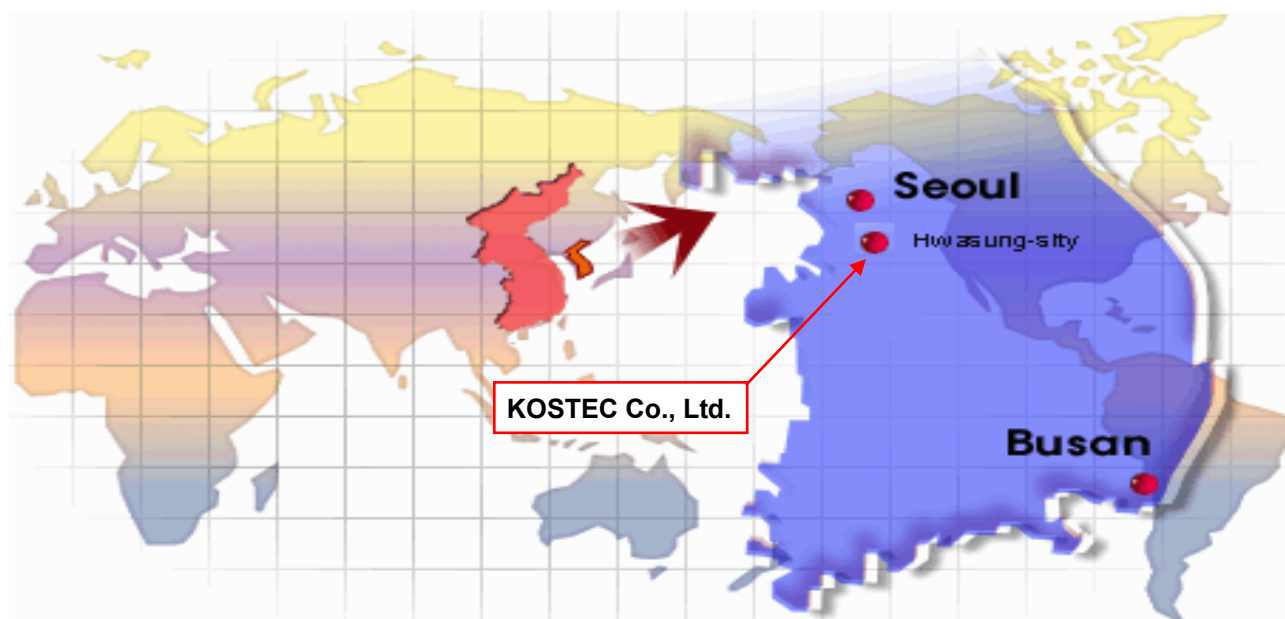
RRA (National Radio Research Agency): KR0041

FCC Designation No.: KR0041

IC Designation No.: KR0041

VCCI Membership No.: 2005

### 1.2 Location





### 1.3 Revision History of test report

| Rev. | Revisions     | Effect page | Reviewed           | Date          |
|------|---------------|-------------|--------------------|---------------|
| -    | Initial issue | All         | Gyeong Hyeon, Park | 2020. 09. 25. |
|      |               |             |                    |               |

## 2. EQUIPMENT DESCRIPTION

The product specification described herein was declared by manufacturer. And refer to user's manual for the details.

|                       |                                                                                                                                                                                                                                                                                                                                                            |                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Equipment Name        | iiRcade Game Console Bartop                                                                                                                                                                                                                                                                                                                                |                                                                                                      |
| Model No              | IRORO1-128C19OGA (Family model names: IRORO1-64C19OGA, IRORO1-128S19BLK, IRORO1-128S19DLA)                                                                                                                                                                                                                                                                 |                                                                                                      |
| Usage                 | iiRcade Game Console Bartop                                                                                                                                                                                                                                                                                                                                |                                                                                                      |
| Serial Number         | Proto type                                                                                                                                                                                                                                                                                                                                                 |                                                                                                      |
| Modulation type       | 802.11b: DSSS (DBPSK / DQPSK / CCK)<br>802.11g/n(HT20/HT40): OFDM (BPSK / QPSK / 16QAM / 64QAM)                                                                                                                                                                                                                                                            |                                                                                                      |
| Emission Type         | G1D, D1D                                                                                                                                                                                                                                                                                                                                                   |                                                                                                      |
| Maximum output power  | Peak Power                                                                                                                                                                                                                                                                                                                                                 | 802.11b : 17.61 dBm<br>802.11g : 18.82 dBm<br>802.11n(HT20) : 18.73 dBm<br>802.11n(HT40) : 18.78 dBm |
|                       | Average Power                                                                                                                                                                                                                                                                                                                                              | 802.11b : 15.82 dBm<br>802.11g : 17.13 dBm<br>802.11n(HT20) : 17.08 dBm<br>802.11n(HT40) : 17.03 dBm |
| Operated Frequency    | 802.11b/g/n(HT20): 2 412 MHz – 2 462 MHz<br>802.11n(HT40): 2 422 MHz – 2 452 MHz                                                                                                                                                                                                                                                                           |                                                                                                      |
| Channel Number        | 11 for 802.11b/g/n(HT20)<br>7 for 802.11n(HT40)                                                                                                                                                                                                                                                                                                            |                                                                                                      |
| Operation temperature | -10 °C ~ 55 °C                                                                                                                                                                                                                                                                                                                                             |                                                                                                      |
| Power Source          | AC/DC Adaptor, output: DC 24 V                                                                                                                                                                                                                                                                                                                             |                                                                                                      |
| Antenna Description   | Internal PCB pattern antenna, gain : 6 dBi                                                                                                                                                                                                                                                                                                                 |                                                                                                      |
| Remark                | 1. The device was operating at its maximum output power for all measurements.<br>2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case (X) is shown in the report.<br>3. The above DUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description. |                                                                                                      |
| FCC ID                | 2AXRR- IRORO1                                                                                                                                                                                                                                                                                                                                              |                                                                                                      |

### 3. SYSTEM CONFIGURATION FOR TEST

#### 3.1 Characteristics of equipment

The Equipment Under Test (EUT) contains the following capabilities: This equipment is GAME CONSOLE.  
The detailed explanation is refer as user manual.

#### 3.2 Used peripherals list

| Description | Model No.    | Serial No. | Manufacture | Remark       |
|-------------|--------------|------------|-------------|--------------|
| Notebook    | BCM-1063     | 2Z7S1Z1    | Dell Inc    | -            |
| Adapter     | DA65NM111-00 | None       | Dell Inc    | For notebook |

#### 3.3 Product Modification

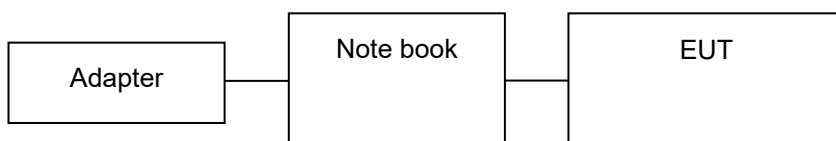
N/A

#### 3.4 Operating Mode

Constantly transmitting with a modulated carrier at maximum power on the low, middle and high channels.

#### 3.5 Test Setup of EUT

The measurements were taken in continuous transmit / receive mode using the TEST MODE.  
For controlling the EUT as TEST MODE, the test program and the test cables were provided by the applicant.



### 3.6 Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

■ TX Power setting value during test

| Band         | Mode          | TX Power setting value |           |         |
|--------------|---------------|------------------------|-----------|---------|
|              |               | Low CH                 | Middle CH | High CH |
| 2.4 GHz band | 802.11b       | Default                | Default   | Default |
|              | 802.11g       | Default                | Default   | Default |
|              | 802.11n(HT20) | Default                | Default   | Default |
|              | 802.11n(HT40) | Default                | Default   | Default |

### 3.7 Table for Carrier Frequencies

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1       | 2 412           | 7       | 2 442           |
| 2       | 2 417           | 8       | 2 447           |
| 3       | 2 422           | 9       | 2 452           |
| 4       | 2 427           | 10      | 2 457           |
| 5       | 2 432           | 11      | 2 462           |
| 6       | 2 437           | -       | -               |

\* For 20 MHz bandwidth, use ch 1 - 11, for 40 MHz bandwidth use ch 3 - 9

### 3.8 Duty Cycle Of Test signal

Duty cycle is 100 %

### 3.9 Used Test Equipment List

| No. | Instrument                    | Model        | S/N          | Manufacturer               | Next Cal Date | Cal interval | used                                |
|-----|-------------------------------|--------------|--------------|----------------------------|---------------|--------------|-------------------------------------|
| 1   | T & H Chamber                 | PL-3J        | 15003623     | ESPEC CORP                 | 2020.11.07    | 1 year       | <input type="checkbox"/>            |
| 2   | T & H Chamber                 | SH-662       | 93000067     | ESPEC CORP                 | 2021.09.02    | 1 year       | <input type="checkbox"/>            |
| 3   | T & H Chamber                 | SH-641       | 92006831     | ESPEC CORP                 | 2021.03.31    | 1 year       | <input type="checkbox"/>            |
| 4   | Spectrum Analyzer             | 8563EC       | 3046A00527   | Agilent Technology         | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 5   | Spectrum Analyzer             | FSV30        | 104029       | Rohde & Schwarz            | 2021.09.01    | 1 year       | <input type="checkbox"/>            |
| 6   | Spectrum Analyzer             | FSV30        | 20-353063    | Rohde & Schwarz            | 2021.01.21    | 1 year       | <input checked="" type="checkbox"/> |
| 7   | Signal Analyzer               | FSW43        | 101294       | Rohde & Schwarz            | 2021.02.26    | 1 year       | <input type="checkbox"/>            |
| 8   | Signal Analyzer               | FSW85        | 101602       | Rohde & Schwarz            | 2021.06.21    | 1 year       | <input type="checkbox"/>            |
| 9   | EMI Test Receiver             | ESCI7        | 100823       | Rohde & Schwarz            | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 10  | EMI Test Receiver             | ESI          | 837514/004   | Rohde & Schwarz            | 2021.08.31    | 1 year       | <input checked="" type="checkbox"/> |
| 11  | Vector Signal Analyzer        | 89441A       | 3416A02620   | Agilent Technology         | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 12  | Network Analyzer              | 8753ES       | US39172348   | AGILENT                    | 2021.09.01    | 1 year       | <input type="checkbox"/>            |
| 13  | EPM Series Power meter        | E4418B       | GB39512547   | Agilent Technology         | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 14  | RF Power Sensor               | E9300A       | MY41496631   | Agilent Technology         | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 15  | Microwave Frequency Counter   | 5352B        | 2908A00480   | Agilent Technology         | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 16  | Audio Analyzer                | 8903B        | 3514A16919   | Agilent Technology         | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 17  | Audio Telephone Analyzer      | DD-5601CID   | 520010281    | CREDIX                     | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 18  | Modulation Analyzer           | 8901A        | 3041A05716   | H.P                        | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 19  | Digital storage Oscilloscope  | TDS3052      | B015962      | Tektronix                  | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 20  | ESG-D Series Signal Generator | E4436B       | US39260458   | Agilent Technology         | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 21  | Vector Signal Generator       | SMBV100A     | 257557       | Rohde & Schwarz            | 2021.01.20    | 1 year       | <input checked="" type="checkbox"/> |
| 22  | GNSS Signal Generator         | TC-2800A     | 2800A000494  | TESCOM CO., LTD.           | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 23  | Signal Generator              | SMB100A      | 179628       | Rohde & Schwarz            | 2021.05.13    | 1 year       | <input checked="" type="checkbox"/> |
| 24  | Signal Generator              | N5173B       | MY57280148   | KEYSIGHT                   | 2021.06.11    | 1 year       | <input type="checkbox"/>            |
| 25  | SLIDAC                        | None         | 0207-4       | Myoung sung Ele.           | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 26  | DC Power supply               | DRP-5030     | 9028029      | Digital Electronic Co.,Ltd | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 27  | DC Power supply               | E3610A       | KR24104505   | Agilent Technology         | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 28  | DC Power supply               | UP-3005T     | 68           | Unicon Co.,Ltd             | 2021.01.20    | 1 year       | <input checked="" type="checkbox"/> |
| 29  | DC Power Supply               | SM 3004-D    | 114701000117 | DELTAELEKTRONIKA           | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 30  | DC Power supply               | 6632B        | MY43004005   | Agilent Technology         | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 31  | DC Power Supply               | 6632B        | MY43004137   | Agilent Technology         | 2021.01.20    | 1 year       | <input type="checkbox"/>            |
| 32  | Termination                   | 1433-3       | LM718        | WEINSCHEL                  | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 33  | Termination                   | 1432-3       | QR946        | AEROFLEX/WEINSCHEL         | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 34  | Attenuator                    | 24-30-34     | BX5630       | Aeroflex / Weinschel       | 2020.12.17    | 1 year       | <input type="checkbox"/>            |
| 35  | Attenuator                    | 8498A        | 3318A09485   | HP                         | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 36  | Step Attenuator               | 8494B        | 3308A32809   | HP                         | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 37  | RF Step Attenuator            | RSP          | 100091       | Rohde & Schwarz            | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 38  | Attenuator                    | 18B50W-20F   | 64671        | INMET                      | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 39  | Attenuator                    | 10 dB        | 1            | Rohde & Schwarz            | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 40  | Attenuator                    | 54A-10       | 74564        | WEINSCHEL                  | 2021.09.02    | 1 year       | <input checked="" type="checkbox"/> |
| 41  | Attenuator                    | 56-10        | 66920        | WEINSCHEL                  | 2021.05.13    | 1 year       | <input checked="" type="checkbox"/> |
| 42  | Attenuator                    | 48-20-11     | BV2658       | Aeroflex/Weinschel         | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 43  | Attenuator                    | 48-30-33-LIM | BL5350       | Weinschel Corp.            | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 44  | Power divider                 | 11636B       | 51212        | HP                         | 2021.01.23    | 1 year       | <input type="checkbox"/>            |
| 45  | 3Way Power divider            | KPDSU3W      | 00070365     | KMW                        | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 46  | 4Way Power divider            | 70052651     | 173834       | KRYTAR                     | 2021.01.23    | 1 year       | <input type="checkbox"/>            |
| 47  | 3Way Power divider            | 1580         | SQ361        | WEINSCHEL                  | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 48  | OSP                           | OSP120       | 101577       | Rohde & Schwarz            | 2021.05.14    | 1 year       | <input type="checkbox"/>            |
| 49  | White noise audio filter      | ST31EQ       | 101902       | SoundTech                  | 2021.08.31    | 1 year       | <input type="checkbox"/>            |

| No. | Instrument                                       | Model                            | S/N         | Manufacturer                | Next Cal Date | Cal interval | used                                |
|-----|--------------------------------------------------|----------------------------------|-------------|-----------------------------|---------------|--------------|-------------------------------------|
| 50  | Dual directional coupler                         | 778D                             | 17693       | HEWLETT PACKARD             | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 51  | Dual directional coupler                         | 772D                             | 2839A00924  | HEWLETT PACKARD             | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 52  | Band rejection filter                            | 3TNF-0006                        | 26          | DOVER Tech                  | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 53  | Band rejection filter                            | 3TNF-0007                        | 311         | DOVER Tech                  | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 54  | Band rejection filter                            | WTR-BRF2442-84NN                 | 09020001    | WAVE TECH Co.,LTD           | 2021.01.22    | 1 year       | <input checked="" type="checkbox"/> |
| 55  | Band rejection filter                            | WRCJV12-5695-5725-5825-5855-50SS | 1           | Wainwright Instruments GmbH | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 56  | Band rejection filter                            | WRCJV12-5120-5150-5350-5380-40SS | 4           | Wainwright Instruments GmbH | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 57  | Band rejection filter                            | WRCGV10-2360-2400-2500-2540-50SS | 2           | Wainwright Instruments GmbH | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 58  | Band rejection filter                            | CTF-155M-S1                      | 001         | RF One Electronics          | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 59  | Band rejection filter                            | CTF-435M-S1                      | 001         | RF One Electronics          | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 60  | Highpass Filter                                  | WHJS1100-10EF                    | 1           | WAINWRIGHT                  | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 61  | Highpass Filter                                  | WHJS3000-10EF                    | 1           | WAINWRIGHT                  | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 62  | Highpass Filter                                  | WHNX6-5530-7000-26500-40CC       | 2           | Wainwright Instruments GmbH | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 63  | Highpass Filter                                  | WHNX6-2370-3000-26500-40CC       | 4           | Wainwright Instruments GmbH | 2021.05.13    | 1 year       | <input type="checkbox"/>            |
| 64  | WideBand Radio Communication Tester              | CMW500                           | 102276      | Rohde & Schwarz             | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 65  | WideBand Radio Communication Tester              | CMW500                           | 117235      | Rohde & Schwarz             | 2021.02.03    | 1 year       | <input type="checkbox"/>            |
| 66  | WideBand Radio Communication Tester(with CMX500) | CMW500                           | 167157      | Rohde & Schwarz             | 2021.04.03    | 1 year       | <input type="checkbox"/>            |
| 67  | Bluetooth Tester                                 | TC-3000B                         | 3000B6A0166 | TESCOM CO., LTD.            | 2021.01.22    | 1 year       | <input type="checkbox"/>            |
| 68  | Loop Antenna                                     | 6502                             | 9203-0493   | EMCO                        | 2021.05.27    | 2 year       | <input checked="" type="checkbox"/> |
| 69  | BiconiLog Antenna                                | 3142B                            | 1745        | EMCO                        | 2022.04.24    | 2 year       | <input type="checkbox"/>            |
| 70  | Trilog-Broadband Antenna <sub>(R)</sub>          | VULB 9168                        | 9168-606    | SCHWARZBECK                 | 2022.09.21    | 2 year       | <input checked="" type="checkbox"/> |
| 71  | Biconical Antenna <sub>(T)</sub>                 | VUBA9117                         | 9117-342    | Schwarz beck                | 2022.03.24    | 2 year       | <input type="checkbox"/>            |
| 72  | Horn Antenna                                     | 3115                             | 9605-4834   | EMCO                        | 2022.03.06    | 2 year       | <input type="checkbox"/>            |
| 73  | Horn Antenna <sub>(R)</sub>                      | 3117                             | 00135191    | ETS-LINDGREN                | 2022.04.29    | 2 year       | <input type="checkbox"/>            |
| 74  | Horn Antenna <sub>(T)</sub>                      | 3115                             | 2996        | EMCO                        | 2022.02.14    | 2 year       | <input checked="" type="checkbox"/> |
| 75  | Horn Antenna <sub>(R)</sub>                      | BBHA 9170                        | 9170-722    | SCHWARZBECK                 | 2022.05.12    | 2 year       | <input type="checkbox"/>            |
| 76  | Horn Antenna <sub>(T)</sub>                      | BBHA 9170                        | 743         | SCHWARZBECK                 | 2021.01.22    | 2 year       | <input checked="" type="checkbox"/> |
| 77  | AMPLIFIER(A_10)                                  | TK-PA6S                          | 120009      | TESTEK                      | 2021.01.21    | 1 year       | <input checked="" type="checkbox"/> |
| 78  | AMPLIFIER(C_3)                                   | 8447D                            | 2944A07881  | H.P                         | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 79  | PREAMPLIFIER(C_3)                                | 8449B                            | 3008A02577  | Agilent                     | 2021.01.20    | 1 year       | <input checked="" type="checkbox"/> |
| 80  | AMPLIFIER                                        | TK-PA18                          | 150003      | TESTEK                      | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 81  | AMPLIFIER                                        | TK-PA1840H                       | 160010-L    | TESTEK                      | 2021.01.28    | 1 year       | <input type="checkbox"/>            |
| 82  | Horn Antenna                                     | M19RH                            | T01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 83  | Horn Antenna                                     | M19RH                            | R01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 84  | Horn Antenna                                     | M12RH                            | T02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 85  | Horn Antenna                                     | M12RH                            | R02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 86  | Horn Antenna                                     | M08RH                            | T03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 87  | Horn Antenna                                     | M08RH                            | R03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 88  | Horn Antenna                                     | M05RH                            | T04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 89  | Horn Antenna                                     | M05RH                            | R04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 90  | Horn Antenna                                     | M03RH                            | T05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 91  | Horn Antenna                                     | M03RH                            | R05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 92  | Harmonic Mixer                                   | M12HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 93  | Harmonic Mixer                                   | M08HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 94  | Harmonic Mixer                                   | M05HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 95  | Harmonic Mixer                                   | M03HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 96  | Source Module                                    | S19MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 97  | Source Module                                    | S12MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 98  | Source Module                                    | S08MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 99  | Source Module                                    | S05MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |
| 100 | Source Module                                    | S03MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input type="checkbox"/>            |

\*

### 3.10 Used Test Cable List

| No. | Model                    | S/N        | Manufacturer | Specifications        | Next Cal Date | Cal interval | used                                |
|-----|--------------------------|------------|--------------|-----------------------|---------------|--------------|-------------------------------------|
| 1   | SMS112-GL200sD-SMS112-1M | None       | GigaLane     | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 2   | SMS112-GL200sD-SMS112-1M | None       | GigaLane     | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 3   | SMS112-GL200sD-SMS112-1M | None       | GigaLane     | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 4   | L-502W                   | None       | CANARE       | 9 kHz ~ 3 GHz(1 M)    | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 5   | L-502W                   | None       | CANARE       | 9 kHz ~ 3 GHz(1 M)    | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 6   | L-502W                   | None       | CANARE       | 9 kHz ~ 3 GHz(1 M)    | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 7   | SUCOFLEX 126E            | MY2202/26E | SUHNER       | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 8   | SUCOFLEX 126E            | MY2203/26E | SUHNER       | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 9   | SUCOFLEX 126E            | MY2204/26E | SUHNER       | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 10  | SUCOFLEX 126E            | MY2205/26E | SUHNER       | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input checked="" type="checkbox"/> |
| 11  | SUCOFLEX 126E            | MY2206/26E | SUHNER       | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input checked="" type="checkbox"/> |
| 12  | SUCOFLEX 126E            | MY2207/26E | SUHNER       | 9 kHz ~ 26.5 GHz(1 M) | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 13  | SUCOFLEX 102             | MY5433/2   | SUHNER       | 9 kHz ~ 40 GHz(1 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 14  | SUCOFLEX 102             | MY5434/2   | SUHNER       | 9 kHz ~ 40 GHz(1 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 15  | SUCOFLEX 102             | MY5435/2   | SUHNER       | 9 kHz ~ 40 GHz(1 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 16  | SUCOFLEX 102             | MY5436/2   | SUHNER       | 9 kHz ~ 40 GHz(1 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 17  | SUCOFLEX100              | None       | SUHNER       | 9 kHz ~ 26.5 GHz(8 M) | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 18  | SUCOFLEX102              | MY2709/2   | SUHNER       | 9 kHz ~ 40 GHz(5 M)   | 2021.01.21    | 1 year       | <input type="checkbox"/>            |
| 19  | SUCOFLEX 102             | 801434/2   | SUHNER       | 9 kHz ~ 40 GHz(2 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 20  | SUCOFLEX 102             | 801435/2   | SUHNER       | 9 kHz ~ 40 GHz(2 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 21  | SUCOFLEX 102             | 801436/2   | SUHNER       | 9 kHz ~ 40 GHz(2 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 22  | SUCOFLEX 102             | 801437/2   | SUHNER       | 9 kHz ~ 40 GHz(2 M)   | 2020.12.01    | 1 year       | <input type="checkbox"/>            |
| 23  | SF104/2*11N451/8000mm    | None       | None         | 9 kHz ~ 18 GHz        | 2021.02.08    | 1 year       | <input checked="" type="checkbox"/> |
| 24  | SF104/2*11N451/8000mm    | None       | None         | 9 kHz ~ 18 GHz        | 2021.02.08    | 1 year       | <input checked="" type="checkbox"/> |
| 25  | SF104/2*11N451/2500mm    | None       | None         | 9 kHz ~ 18 GHz        | 2021.02.08    | 1 year       | <input checked="" type="checkbox"/> |
| 26  | SF104/2*11N451/500mm     | None       | None         | 30 MHz ~ 18 GHz       | 2021.02.08    | 1 year       | <input checked="" type="checkbox"/> |
| 27  | SNMY2709/2               | None       | None         | 1 GHz ~ 40 GHz        | 2021.06.28    | 1 year       | <input checked="" type="checkbox"/> |

## 4. SUMMARY TEST RESULTS

| Description of Test                                                                                                                                                                                                                    | FCC Rule             | Reference Clause | Used                                | Test Result |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------|-------------------------------------|-------------|
| Max. Conducted output power                                                                                                                                                                                                            | 15.247(b)(3)         | Clause 5.1       | <input checked="" type="checkbox"/> | Compliance  |
| Power spectral density                                                                                                                                                                                                                 | 15.247(e)            | Clause 5.2       | <input checked="" type="checkbox"/> | Compliance  |
| 6 dB spectrum Bandwidth                                                                                                                                                                                                                | 15.247(a)(2)         | Clause 5.3       | <input checked="" type="checkbox"/> | Compliance  |
| Band edge of RF conducted emissions                                                                                                                                                                                                    | 15.247(d)            | Clause 5.4       | <input checked="" type="checkbox"/> | Compliance  |
| Spurious RF radiated emissions                                                                                                                                                                                                         | 15.247(d), 15.209(a) | Clause 5.5       | <input checked="" type="checkbox"/> | Compliance  |
| Antenna requirement                                                                                                                                                                                                                    | 15.203, 15.247(b)    | Clause 5.6       | <input checked="" type="checkbox"/> | Compliance  |
| AC Power Conducted emissions                                                                                                                                                                                                           | 15.207               | Clause 5.7       | <input checked="" type="checkbox"/> | Compliance  |
| Compliance/pass : The EUT complies with the essential requirements in the standard.<br>Not Compliance : The EUT does not comply with the essential requirements in the standard.<br>N/A : The test was not applicable in the standard. |                      |                  |                                     |             |

### Procedure Reference

FCC CFR 47, Part 15. Subpart C-15.247  
 558074 D01 15.247 Meas Guidance v05  
 ANSI C 63.10-2013

## 5. MEASUREMENT RESULTS

### 5.1 Max. Conducted output power

#### 5.1.1 Standard Applicable [FCC §15.247(b)(3)]

##### FCC

For systems using digital modulation in the 902 ~ 928 MHz, 2 400 ~ 2 483.5 MHz, and 5 725 ~ 5 850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

#### 5.1.2 Test Environment conditions

- Ambient temperature : (23 ~ 25) °C • Relative Humidity : (51 ~ 54) % R.H.

#### 5.1.3 Measurement Procedure

The transmitter output is connected to the Power Sensor

Peak Power (Procedure 8.3.1.3 in KDB 558074 v05, Procedure 11.9.1.3 in ANSI 63.10-2013)

: Measure the peak power of the transmitter

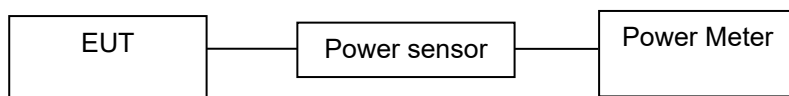
Average Power (Procedure 8.3.2.3 in KDB 558074 v05, Procedure 11.9.2.3 in ANSI 63.10-2013)

- Measure the duty cycle.
- Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- Add  $10 \log (1/x)$ , where x is duty cycle, to the measured power in order to compute the average power during the actual transmission times.

##### Calculation

- Conducted Output Power (Peak) = Reading + ATT loss + Cable loss
- Conducted Output Power (Average) = Reading + ATT loss + Cable loss + Duty Cycle Factor

#### 5.1.4 Test setup



## 5.1.5 Measurement Result

### 802.11b

| Channel | Frequency [MHz] | Conducted Power[dBm] |       | Limit [dBm] | Test Results |
|---------|-----------------|----------------------|-------|-------------|--------------|
|         |                 | Average              | Peak  |             |              |
| 1       | 2 412           | 15.82                | 17.61 | 30          | Compliance   |
| 6       | 2 437           | 15.46                | 17.37 | 30          | Compliance   |
| 11      | 2 462           | 15.22                | 17.18 | 30          | Compliance   |

### 802.11g

| Channel | Frequency [MHz] | Conducted Power[dBm] |       | Limit [dBm] | Test Results |
|---------|-----------------|----------------------|-------|-------------|--------------|
|         |                 | Average              | Peak  |             |              |
| 1       | 2 412           | 17.13                | 18.82 | 30          | Compliance   |
| 6       | 2 437           | 16.93                | 18.54 | 30          | Compliance   |
| 11      | 2 462           | 16.91                | 18.56 | 30          | Compliance   |

### 802.11nj(HT20)

| Channel | Frequency [MHz] | Conducted Power[dBm] |       | Limit [dBm] | Test Results |
|---------|-----------------|----------------------|-------|-------------|--------------|
|         |                 | Average              | Peak  |             |              |
| 1       | 2 412           | 17.08                | 18.73 | 30          | Compliance   |
| 6       | 2 437           | 16.95                | 18.38 | 30          | Compliance   |
| 11      | 2 462           | 16.89                | 18.19 | 30          | Compliance   |

### 802.11nj(HT40)

| Channel | Frequency [MHz] | Conducted Power[dBm] |       | Limit [dBm] | Test Results |
|---------|-----------------|----------------------|-------|-------------|--------------|
|         |                 | Average              | Peak  |             |              |
| 3       | 2 422           | 17.03                | 18.78 | 30          | Compliance   |
| 6       | 2 437           | 16.93                | 18.60 | 30          | Compliance   |
| 9       | 2 452           | 16.95                | 18.64 | 30          | Compliance   |

## 5.2 Power spectral density

### 5.2.1 Standard Applicable [FCC §15.247(e)]

#### **FCC**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmit

### 5.2.2 Test Environment conditions

- Ambient temperature : (23 ~ 25) °C • Relative Humidity : (51 ~ 54) % R.H.

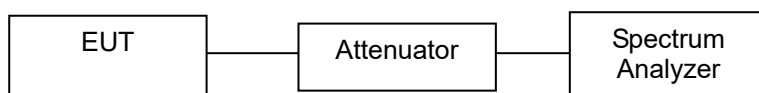
### 5.2.3 Measurement Procedure

The power spectral density conducted from the intentional radiator was measured with a spectrum analyzer connected to the antenna terminal, while EUT had the highest, middle and the lowest available channels. After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak power spectral density. Power spectral density test was performed using a test receiver in accordance with ANSI C63.10-2013 Section 11.10.2

The spectrum analyzer is set to the as follows :

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set the VBW  $\geq 3 \times \text{RBW}$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 5.2.4 Test setup



## 5.2.5 Measurement Result

### 802.11b

| Channel | Frequency [MHz] | Result Value [dBm/3 kHz] | Limit [dBm/3 kHz] | Test Results |
|---------|-----------------|--------------------------|-------------------|--------------|
| 1       | 2 412           | -11.32                   | 8                 | Compliance   |
| 6       | 2 437           | -11.47                   | 8                 | Compliance   |
| 11      | 2 462           | -11.80                   | 8                 | Compliance   |

### 802.11g

| Channel | Frequency [MHz] | Result Value [dBm/3 kHz] | Limit [dBm/3 kHz] | Test Results |
|---------|-----------------|--------------------------|-------------------|--------------|
| 1       | 2 412           | -14.56                   | 8                 | Compliance   |
| 6       | 2 437           | -14.63                   | 8                 | Compliance   |
| 11      | 2 462           | -14.80                   | 8                 | Compliance   |

### 802.11n(HT20)

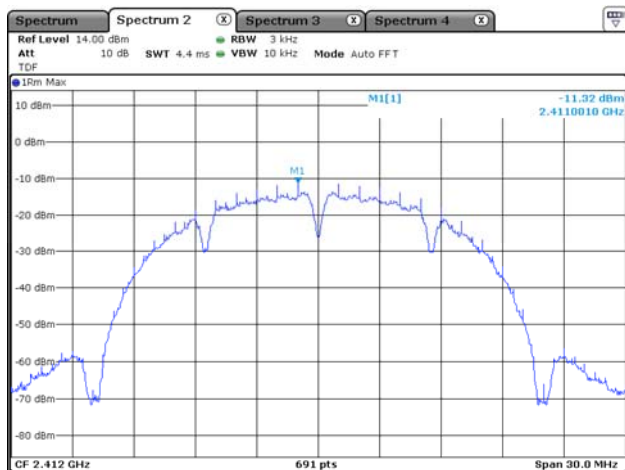
| Channel | Frequency [MHz] | Result Value [dBm/3 kHz] | Limit [dBm/3 kHz] | Test Results |
|---------|-----------------|--------------------------|-------------------|--------------|
| 1       | 2 412           | -16.07                   | 8                 | Compliance   |
| 6       | 2 437           | -16.12                   | 8                 | Compliance   |
| 11      | 2 462           | -16.52                   | 8                 | Compliance   |

### 802.11n(HT40)

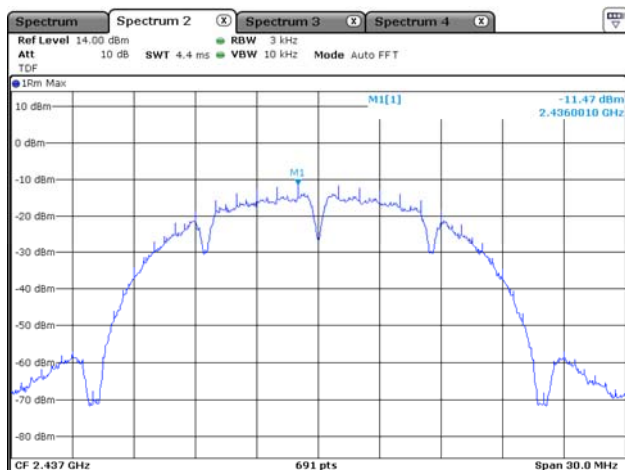
| Channel | Frequency [MHz] | Result Value [dBm/3 kHz] | Limit [dBm/3 kHz] | Test Results |
|---------|-----------------|--------------------------|-------------------|--------------|
| 3       | 2 422           | -20.04                   | 8                 | Compliance   |
| 6       | 2 437           | -20.03                   | 8                 | Compliance   |
| 9       | 2 452           | -20.03                   | 8                 | Compliance   |

## 5.2.6 Test Plot

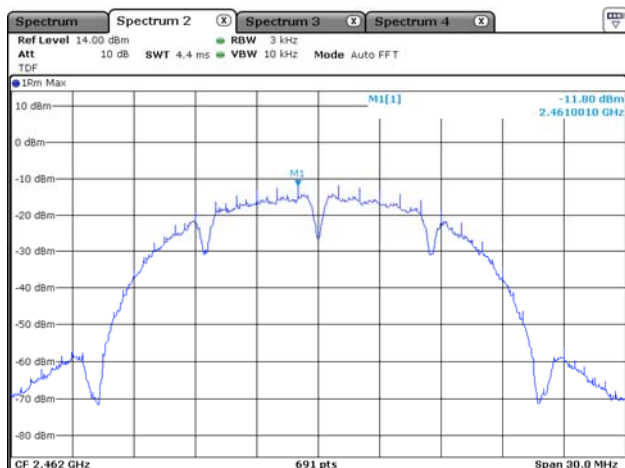
### 802.11b / CH Low



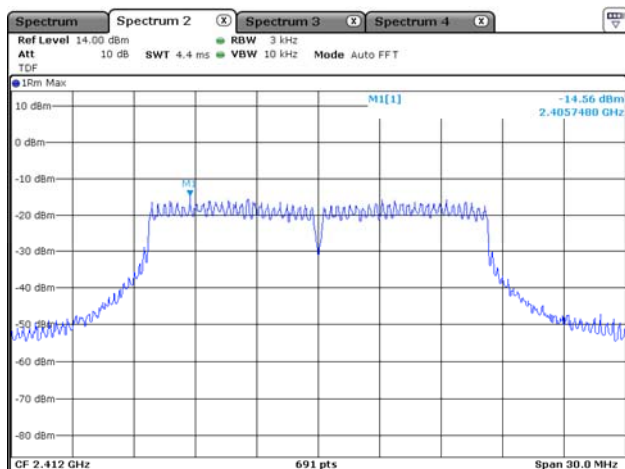
### 802.11b / CH Middle



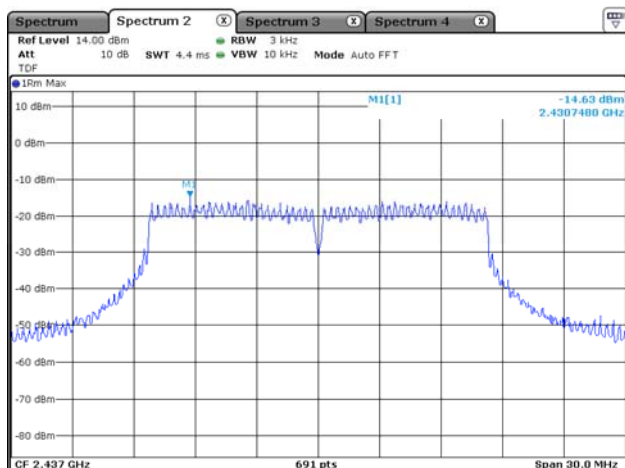
### 802.11b / CH High



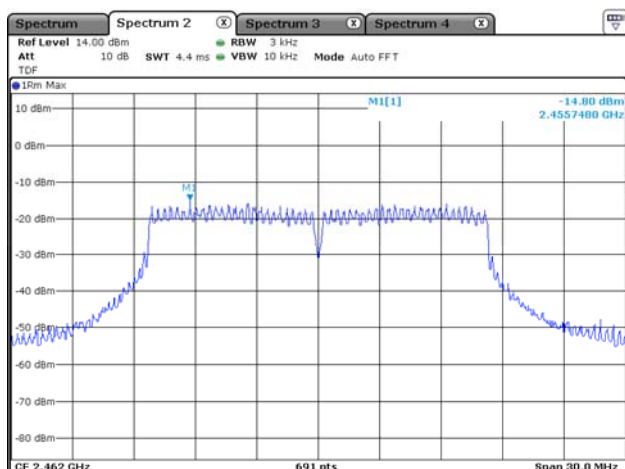
### 802.11g / CH Low



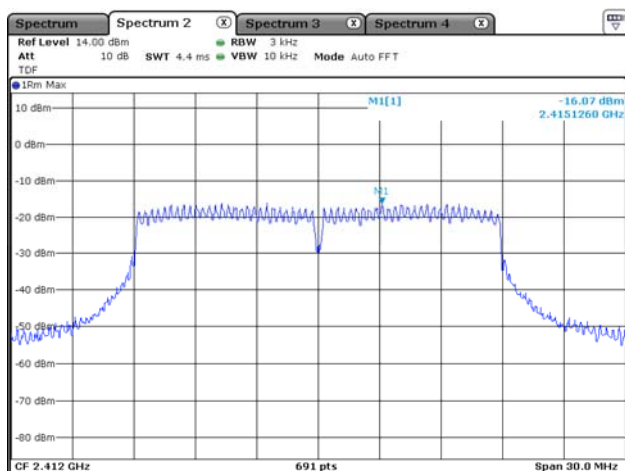
### 802.11g / CH Middle



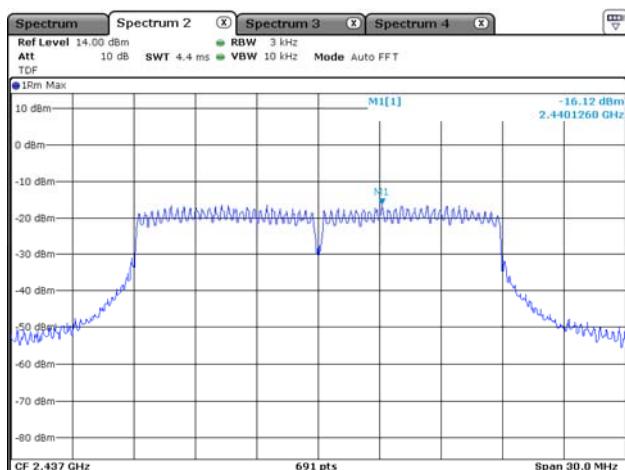
### 802.11g / CH High



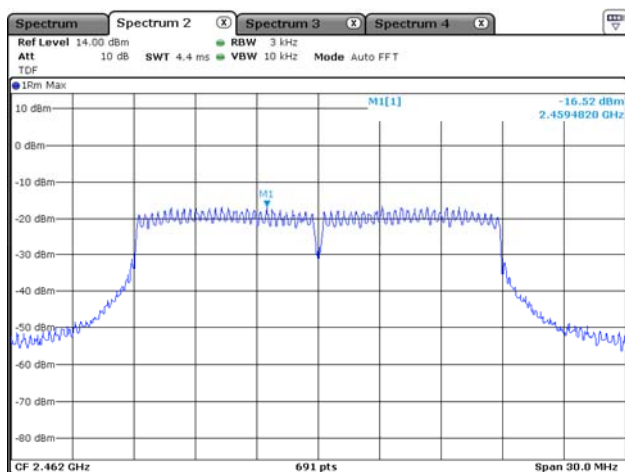
### 802.11n(HT20) / CH Low



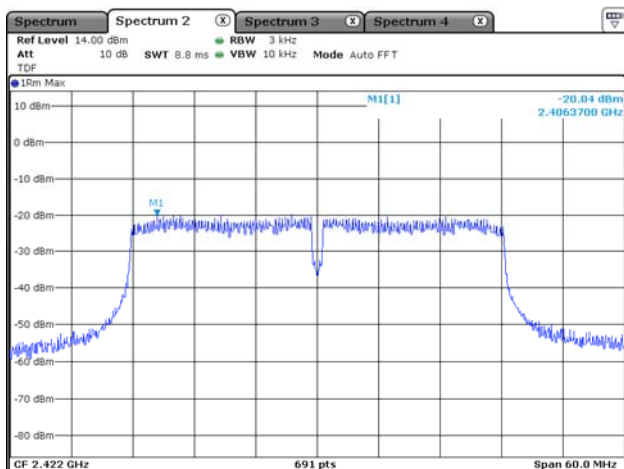
### 802.11n(HT20) / CH Middle



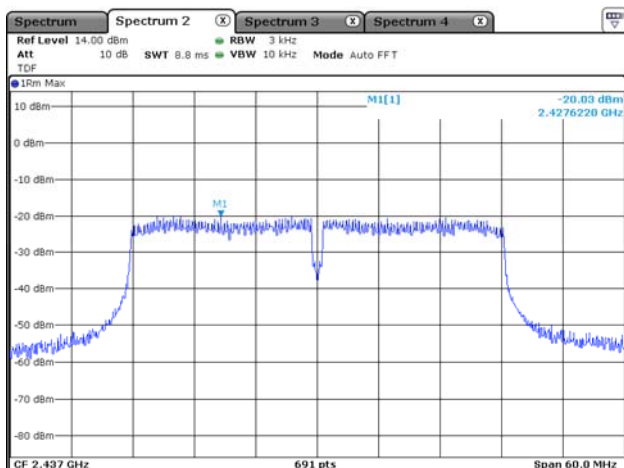
### 802.11n(HT20) / CH High



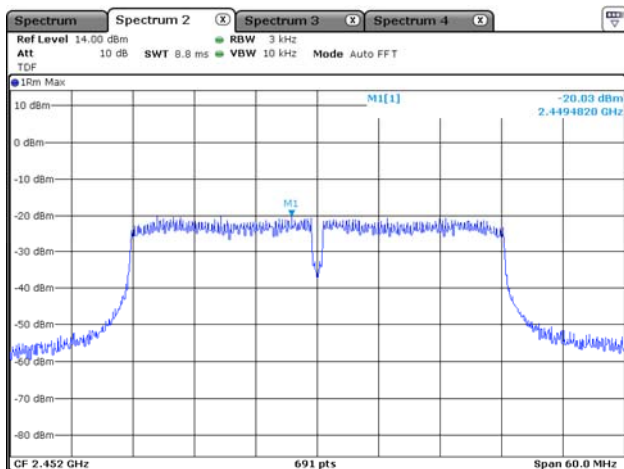
### 802.11n(HT40) / CH Low



### 802.11n(HT40) / CH Middle



### 802.11n(HT40) / CH High



## 5.3 6 dB spectrum Bandwidth

### 5.3.1 Standard Applicable [FCC §15.247(a)(2)]

#### FCC and IC

Systems using digital modulation techniques may operate in the 902 ~ 928 MHz, 2400 ~ 2483.5 MHz, and 5725 ~ 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.3.2 Test Environment conditions

- Ambient temperature : (23 ~ 25) °C
- Relative Humidity : (51 ~ 54) % R.H.

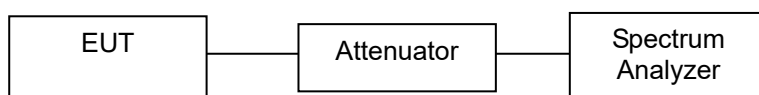
### 5.3.3 Measurement Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6 dB below carrier. 6 dB spectrum Bandwidth test was performed using a test receiver in accordance with ANSI C63.10-2013 Section 11.8.1

The spectrum analyzer is set to the as follows :

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

### 5.3.4 Test setup



### 5.3.5 Measurement Result

#### 802.11b

| Channel | Frequency [MHz] | 6 dB Bandwidth [MHz] | 99% Bandwidth [MHz] | Limit [MHz] | Test Results |
|---------|-----------------|----------------------|---------------------|-------------|--------------|
| 1       | 2 412           | 10.12                | 14.98               | >0.5        | Compliance   |
| 6       | 2 437           | 10.16                | 14.98               | >0.5        | Compliance   |
| 11      | 2 462           | 10.12                | 14.98               | >0.5        | Compliance   |

#### 802.11g

| Channel | Frequency [MHz] | 6 dB Bandwidth [MHz] | 99% Bandwidth [MHz] | Limit [MHz] | Test Results |
|---------|-----------------|----------------------|---------------------|-------------|--------------|
| 1       | 2 412           | 15.89                | 16.45               | >0.5        | Compliance   |
| 6       | 2 437           | 15.93                | 16.45               | >0.5        | Compliance   |
| 11      | 2 462           | 16.19                | 16.50               | >0.5        | Compliance   |

#### 802.11n(HT20)

| Channel | Frequency [MHz] | 6 dB Bandwidth [MHz] | 99% Bandwidth [MHz] | Limit [MHz] | Test Results |
|---------|-----------------|----------------------|---------------------|-------------|--------------|
| 1       | 2 412           | 17.02                | 17.58               | >0.5        | Compliance   |
| 6       | 2 437           | 16.98                | 17.54               | >0.5        | Compliance   |
| 11      | 2 462           | 16.98                | 17.63               | >0.5        | Compliance   |

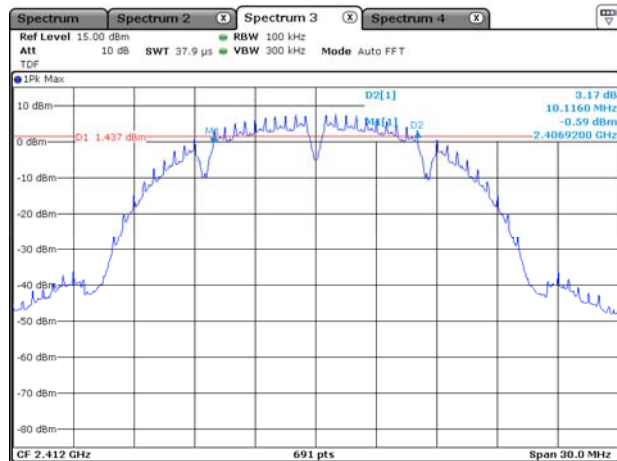
#### 802.11n(HT40)

| Channel | Frequency [MHz] | 6 dB Bandwidth [MHz] | 99% Bandwidth [MHz] | Limit [MHz] | Test Results |
|---------|-----------------|----------------------|---------------------|-------------|--------------|
| 3       | 2 422           | 36.01                | 35.95               | >0.5        | Compliance   |
| 6       | 2 437           | 36.12                | 35.95               | >0.5        | Compliance   |
| 9       | 2 452           | 36.06                | 35.95               | >0.5        | Compliance   |

### 5.3.6 Test Plot

6 dB Bandwidth

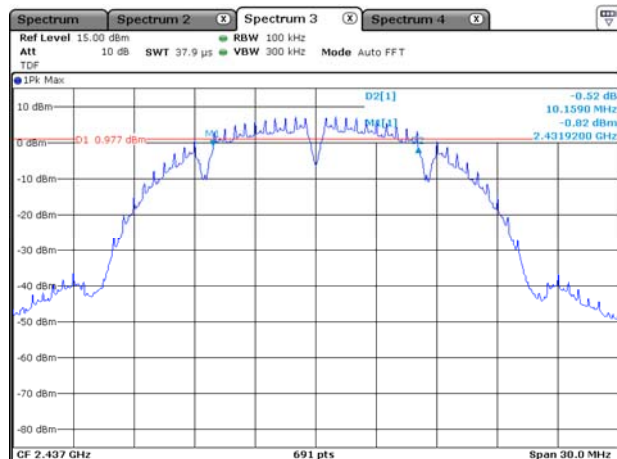
802.11b / 2 412 MHz



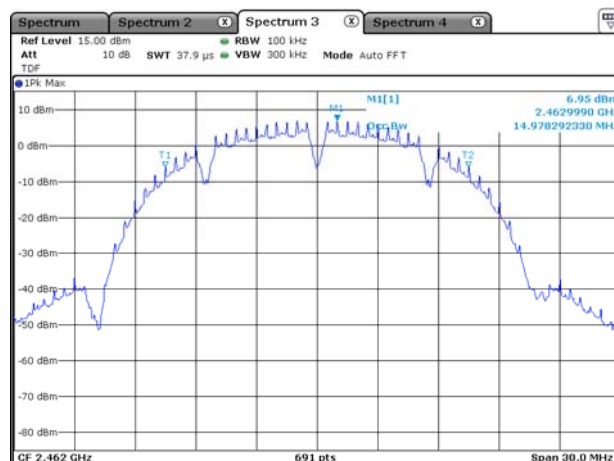
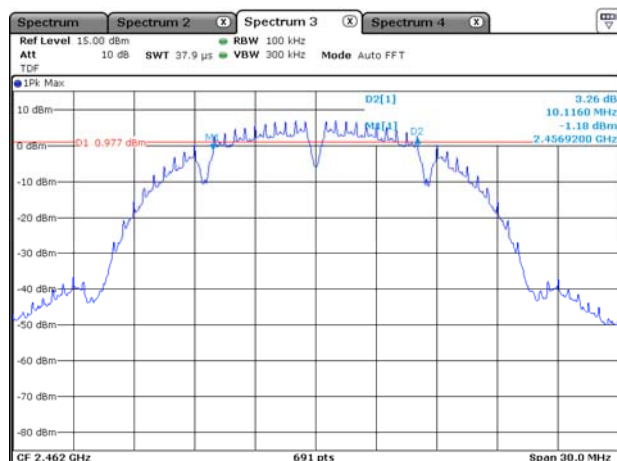
99 % Bandwidth



802.11b / 2 432 MHz

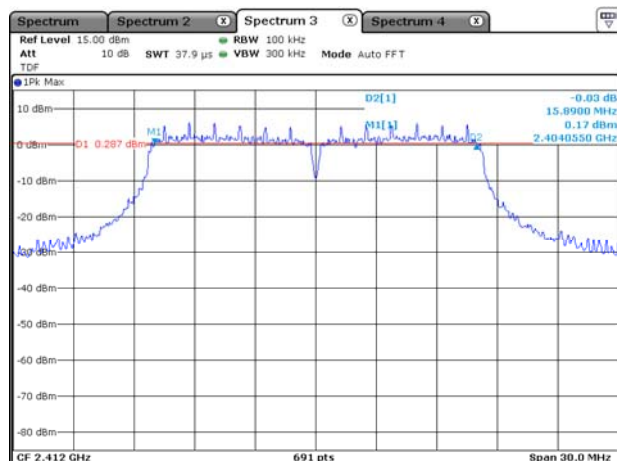


802.11b / 2 462 MHz

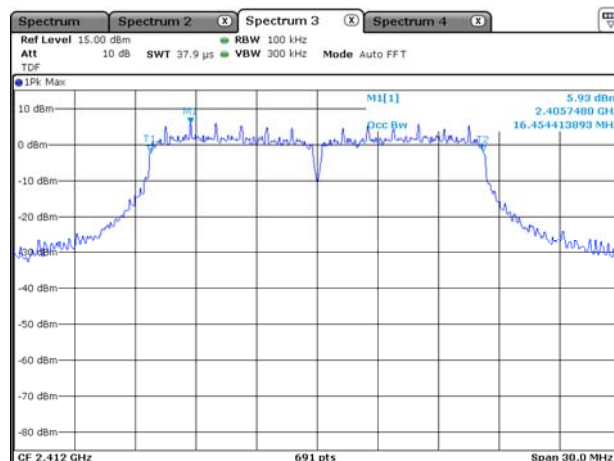


6 dB Bandwidth

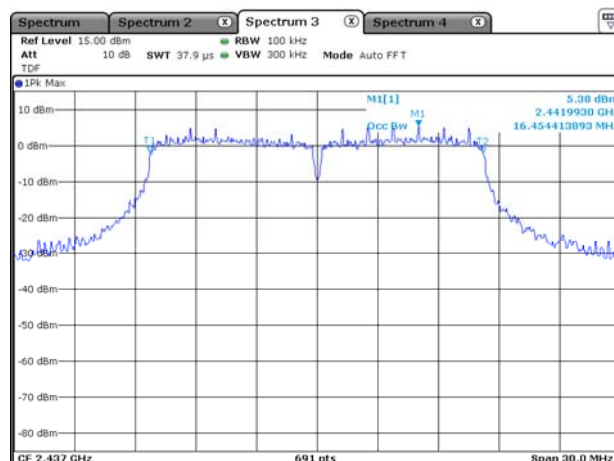
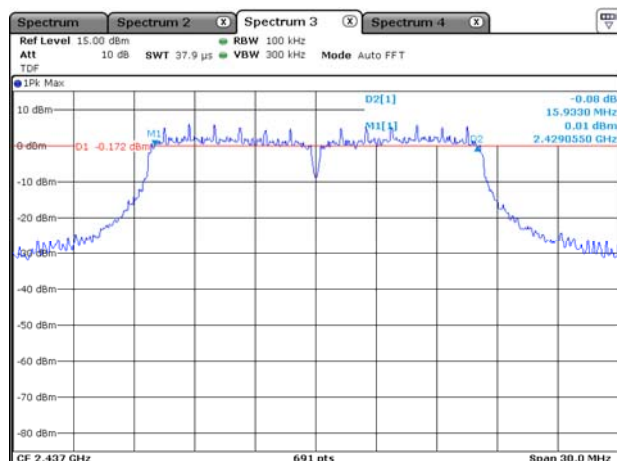
802.11g / 2 412 MHz



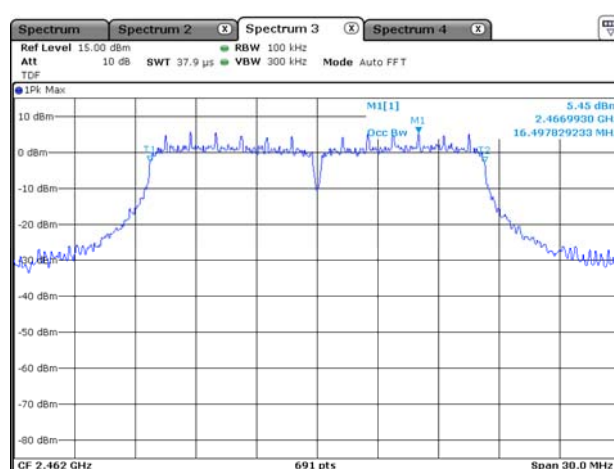
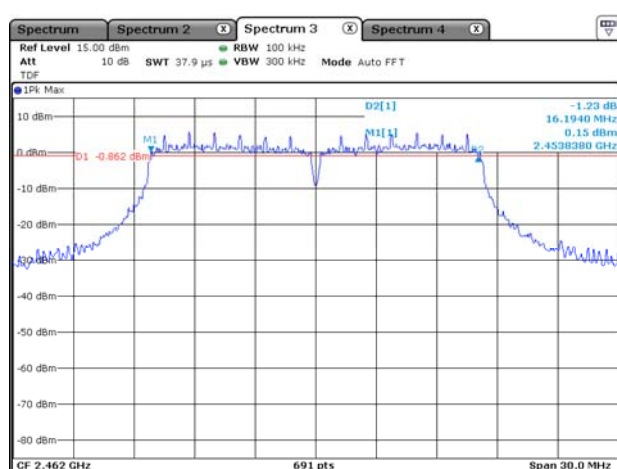
99 % Bandwidth



802.11g / 2 432 MHz

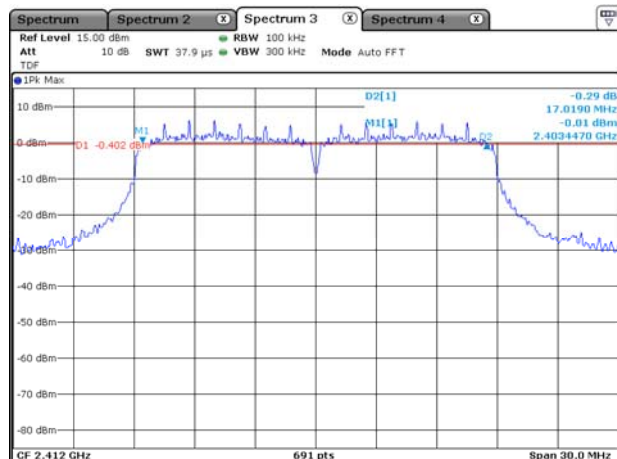


802.11g / 2 462 MHz

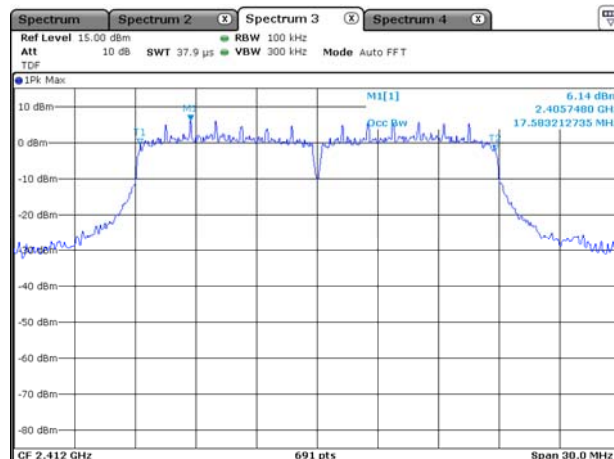


6 dB Bandwidth

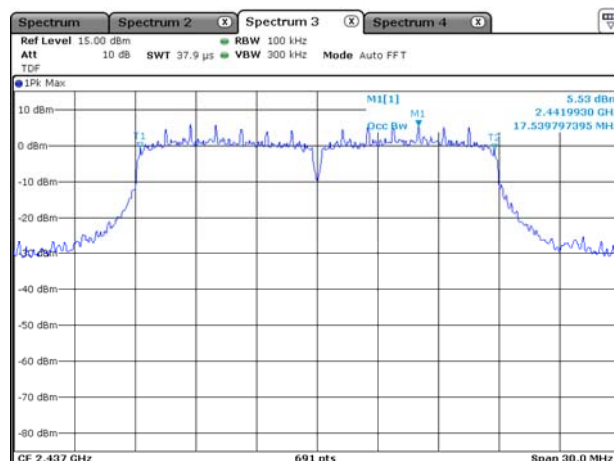
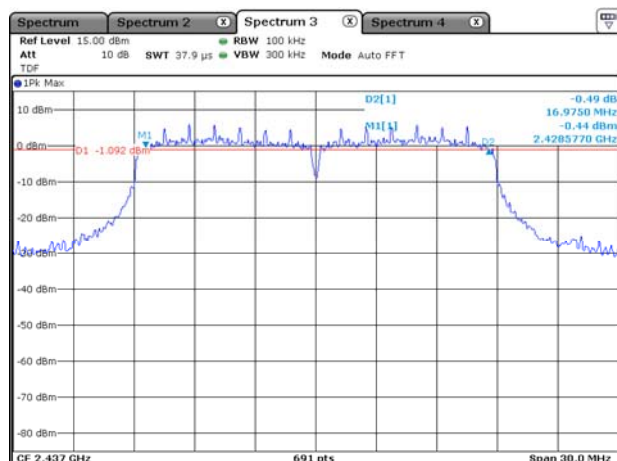
802.11n(HT20) / 2 412 MHz



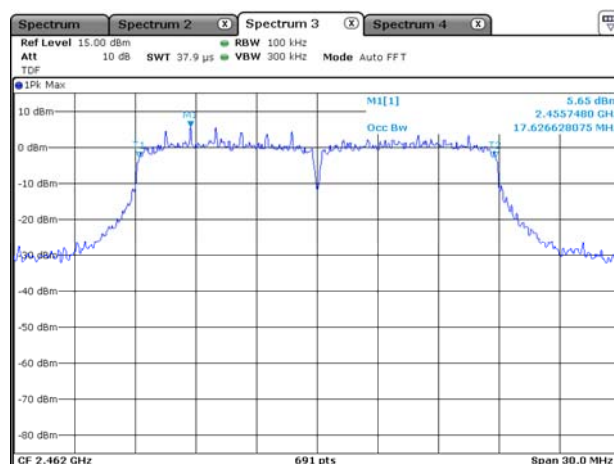
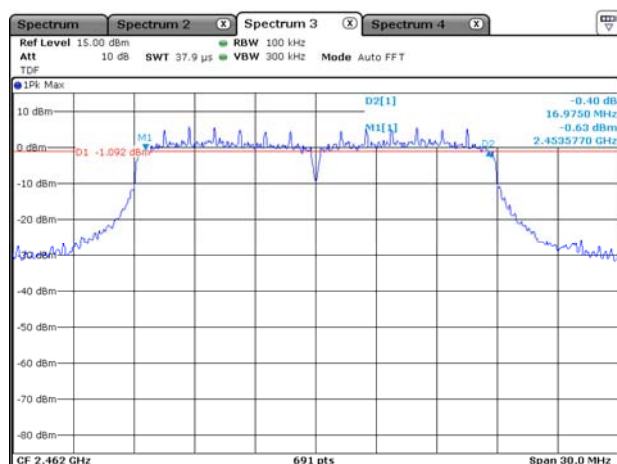
99 % Bandwidth



802.11n(HT20) / 2 432 MHz

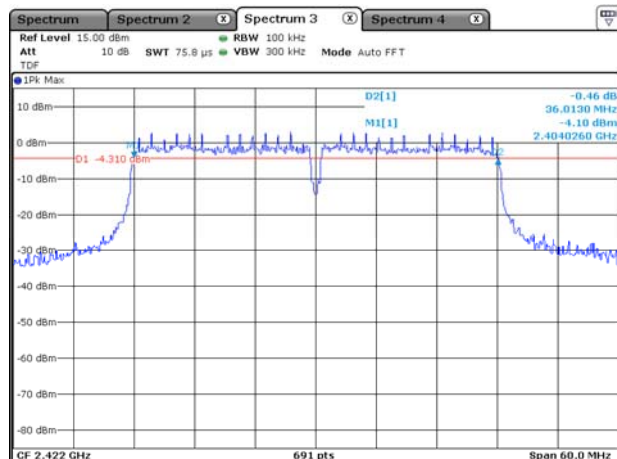


802.11n(HT20) / 2 462 MHz

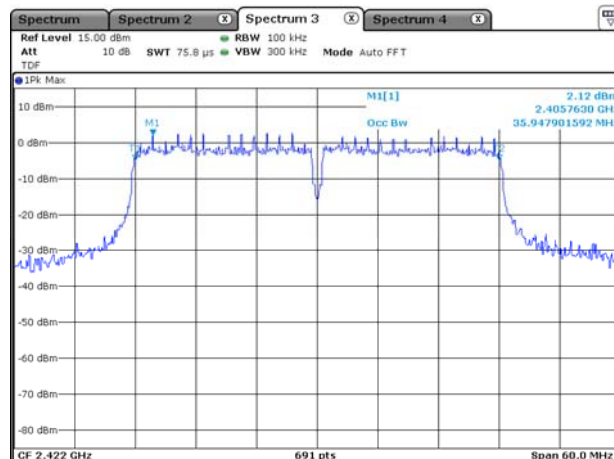


6 dB Bandwidth

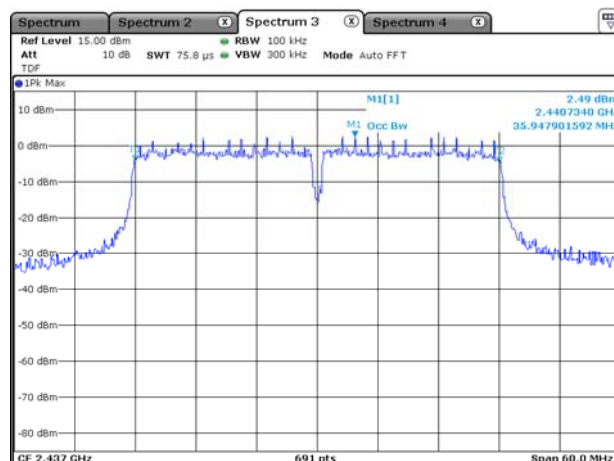
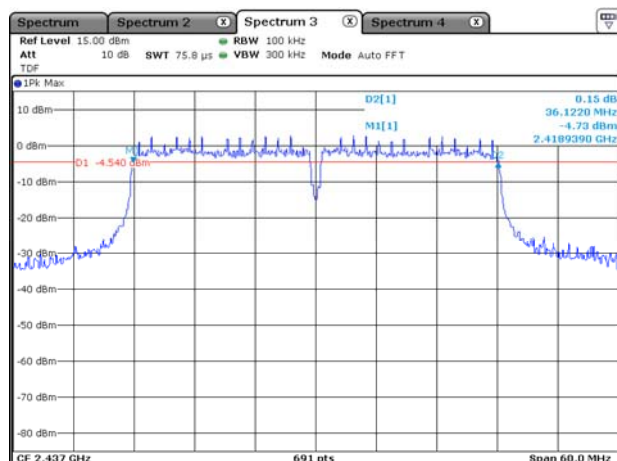
802.11n(HT40) / 2 422 MHz



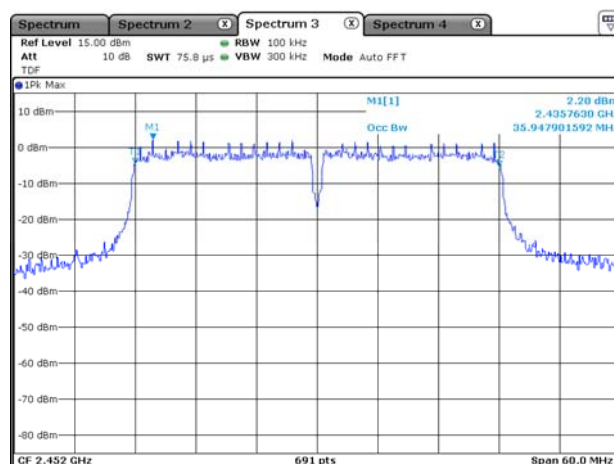
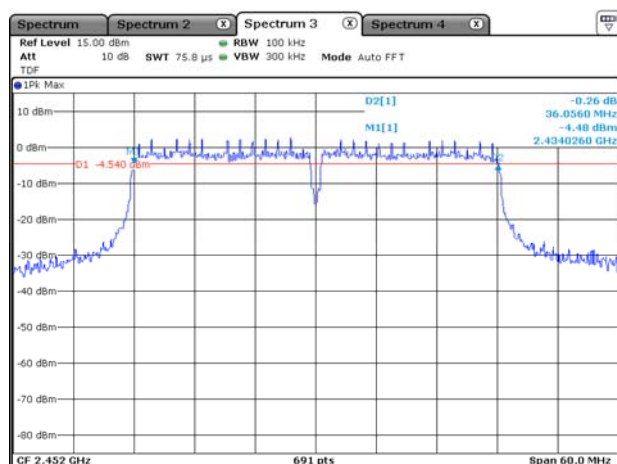
99 % Bandwidth



802.11n(HT40) / 2 432 MHz



802.11n(HT40) / 2 452 MHz



## **5.4 Band-edge Compliance of RF Conducted emissions**

### **5.4.1 Standard Applicable [FCC §15.247(d)]**

#### **FCC and IC**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on RF conducted.

### **5.4.2 Test Environment conditions**

- Ambient temperature : (23 ~ 25) °C
- Relative Humidity : (51 ~ 54) % R.H.

### **5.4.3 Measurement Procedure**

- (1) Pre-calibration for the spectrum analyzer has to be done first through a reference CW signal from signal generator.
- (2) Reference frequency generated from the signal generator is supply to spectrum analyzer input port via RF cable and attenuator, and then, it's applied to offset value on spectrum analyzer.
- (3) Remove the antenna from the EUT and then, connected to spectrum analyzer via a dc Block, suitable low loss RF cable and attenuator.
- (4) Place the EUT on the table and set on the emission at the band-edge,
- (5) After the trace being stable, Use the marker-to-peak function to move the marker to the peak of the in-band emission.
- (6) The marker-delta value now displayed must comply with the limit specified in above standard.

Band-edge test was performed using a test receiver in accordance with ANSI C63.10-2013 Section 11.13.2

The spectrum analyzer is set to the as follows :

- Span : Wide enough to capture the peak level of the emission operating on the channel closet to the Band-edge, as well as any modulation products which fall outside of the authorized band of operation
- RBW : 100 kHz ( $\geq 1\%$  of the span)
- VBW :  $\geq$  RBW
- Sweep : auto
- Detector function : peak
- Trace : Max hold

### **5.4.4 Test setup**

Please refer 5.3.4

## 5.4.5 Measurement Result

### 802.11b

| Setting Channel |               | Test Results         |                     |            |
|-----------------|---------------|----------------------|---------------------|------------|
|                 |               | Measured value [dBc] | Limit [dBc]         | Result     |
| 1               | ~ 2 400 MHz   | -45.18               | ≤ 20 than PSD level | Compliance |
| 11              | 2 483.5 MHz ~ | -57.37               |                     | Compliance |

### 802.11g

| Setting Channel |               | Test Results         |                     |            |
|-----------------|---------------|----------------------|---------------------|------------|
|                 |               | Measured value [dBc] | Limit [dBc]         | Result     |
| 1               | ~ 2 400 MHz   | -31.56               | ≤ 20 than PSD level | Compliance |
| 11              | 2 483.5 MHz ~ | -44.12               |                     | Compliance |

### 802.11n(HT20)

| Setting Channel |               | Test Results         |                     |            |
|-----------------|---------------|----------------------|---------------------|------------|
|                 |               | Measured value [dBc] | Limit [dBc]         | Result     |
| 1               | ~ 2 400 MHz   | -33.34               | ≤ 20 than PSD level | Compliance |
| 11              | 2 483.5 MHz ~ | -40.55               |                     | Compliance |

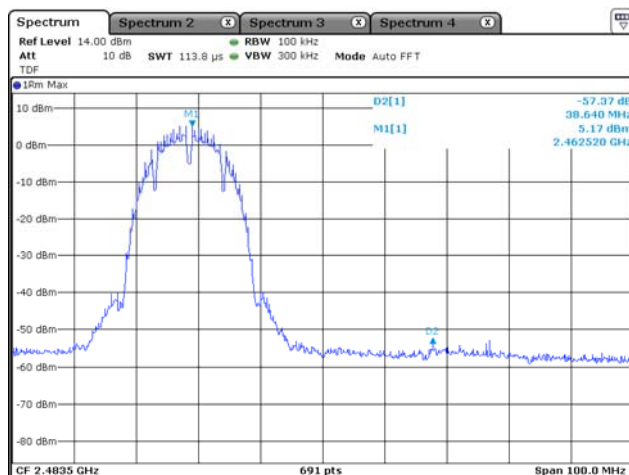
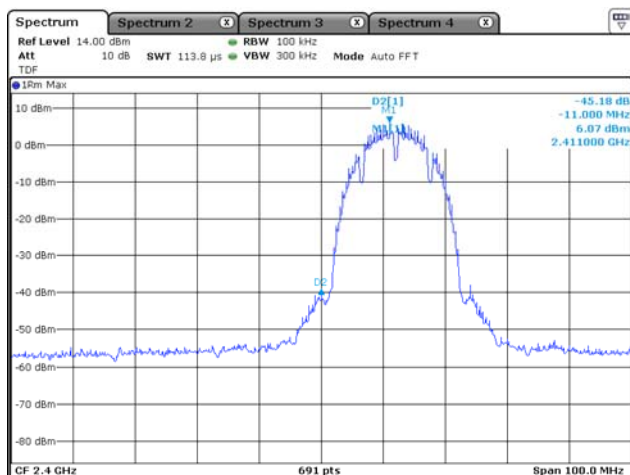
### 802.11n(HT40)

| Setting Channel |               | Test Results         |                     |            |
|-----------------|---------------|----------------------|---------------------|------------|
|                 |               | Measured value [dBc] | Limit [dBc]         | Result     |
| 3               | ~ 2 400 MHz   | -32.51               | ≤ 20 than PSD level | Compliance |
| 9               | 2 483.5 MHz ~ | -32.27               |                     | Compliance |

## 5.4.6 Test Plot (Band-edge)

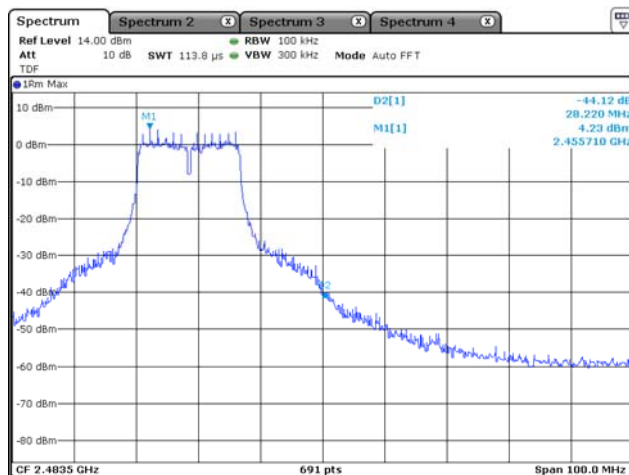
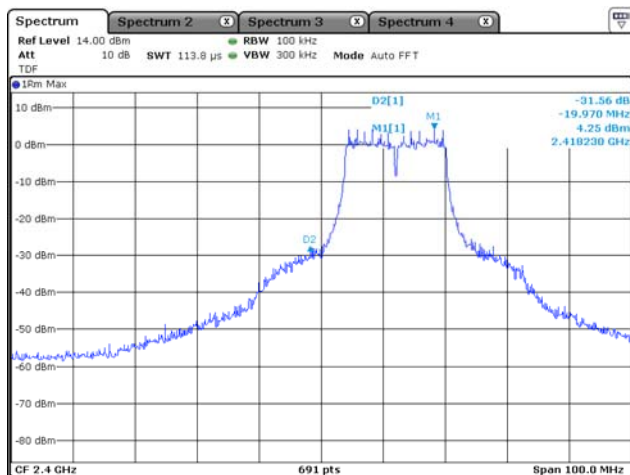
802.11b\_CH Low

802.11b\_CH High

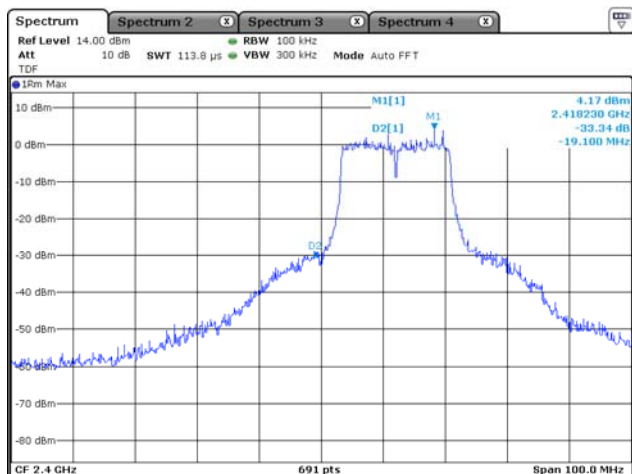


802.11g\_CH Low

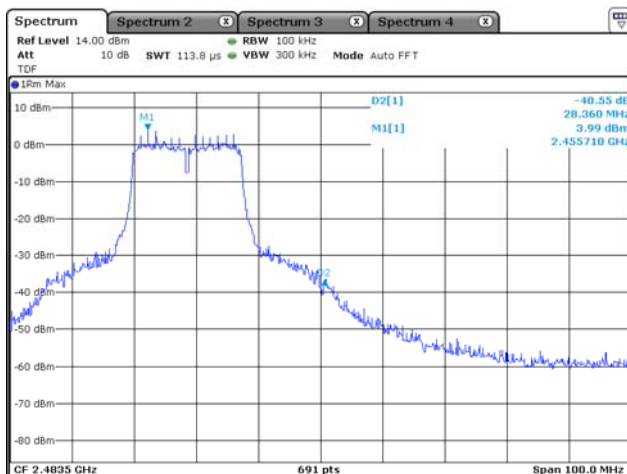
802.11g\_CH High



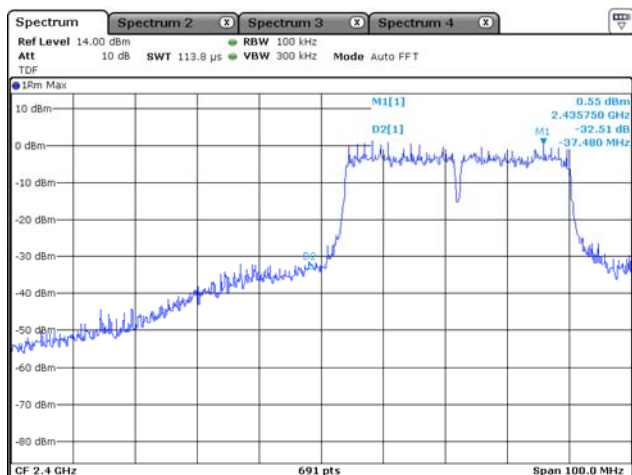
802.11n(HT20)\_CH Low



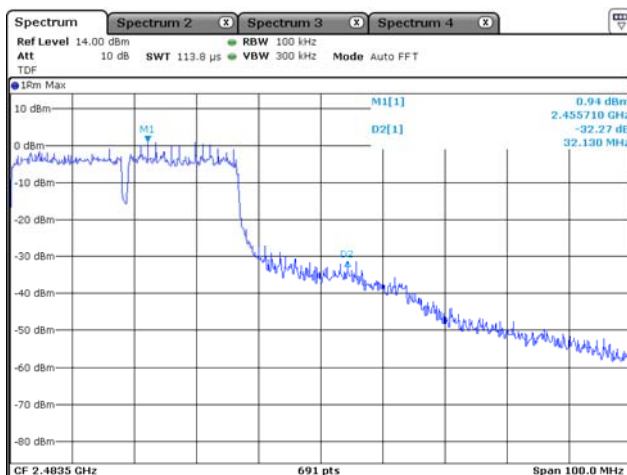
802.11n(HT20)\_CH High



802.11n(HT40)\_CH Low

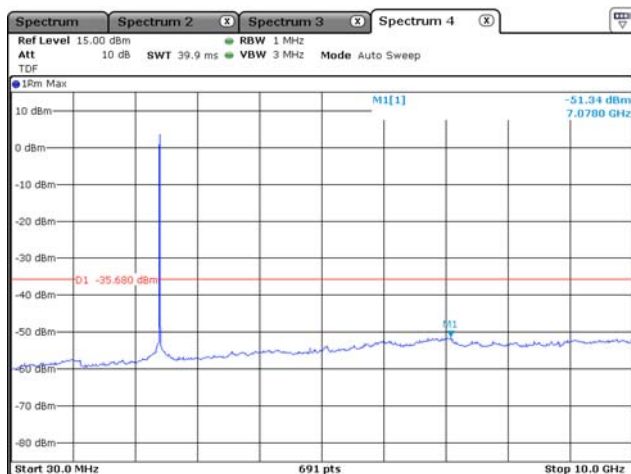


802.11n(HT40)\_CH High

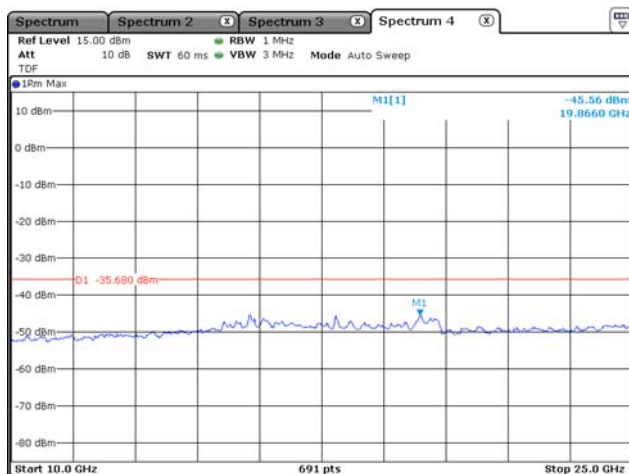


## 5.4.7 Test Plot (Conducted Spurious Emissions)

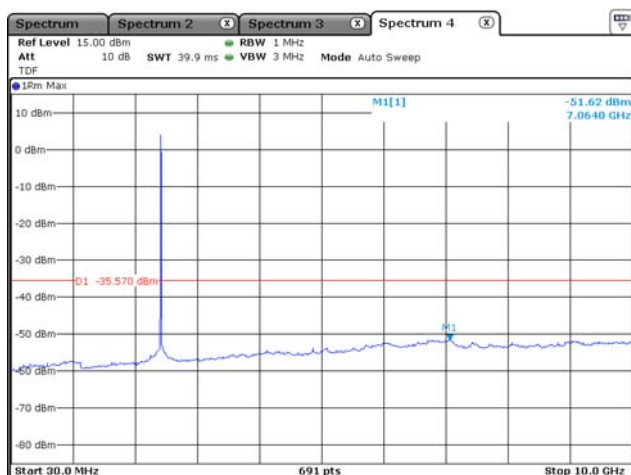
802.11b\_CH Low(Below 1 GHz)



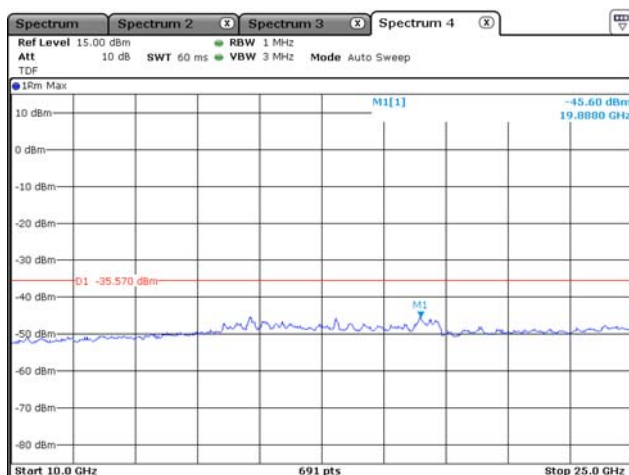
802.11b\_CH Low(Above 1 GHz)



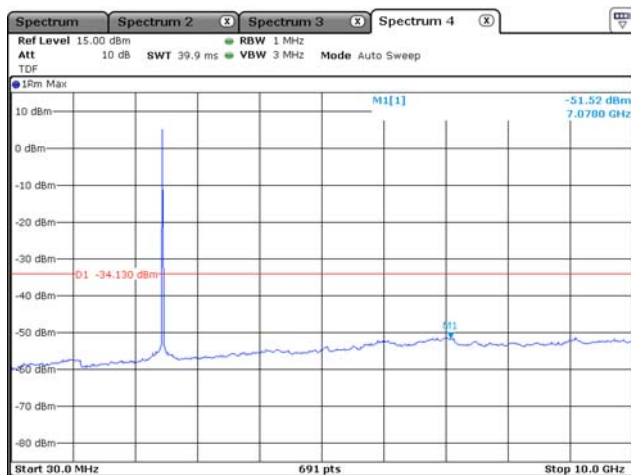
802.11b\_CH Middle(Below 1 GHz)



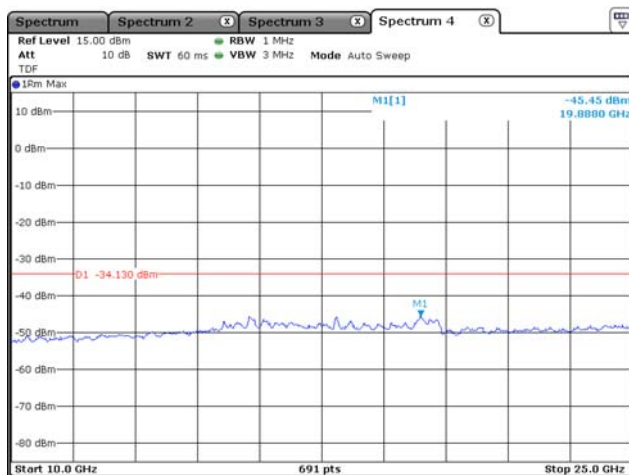
802.11b\_CH Middle(Above 1 GHz)



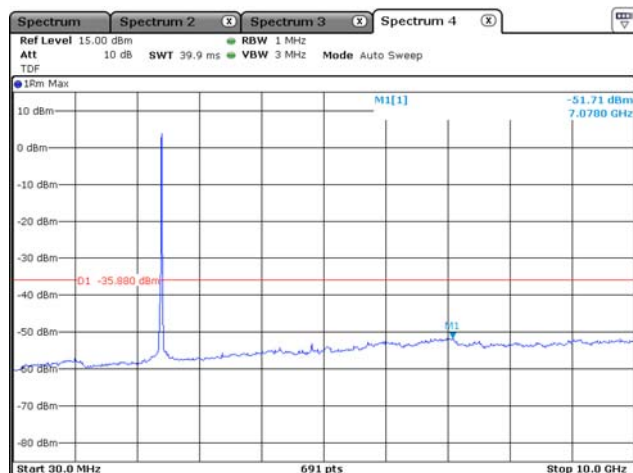
802.11b\_CH High(Below 1 GHz)



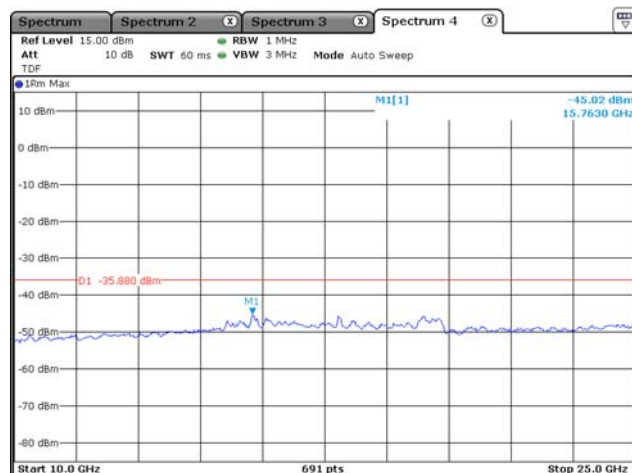
802.11b\_CH High(Above 1 GHz)



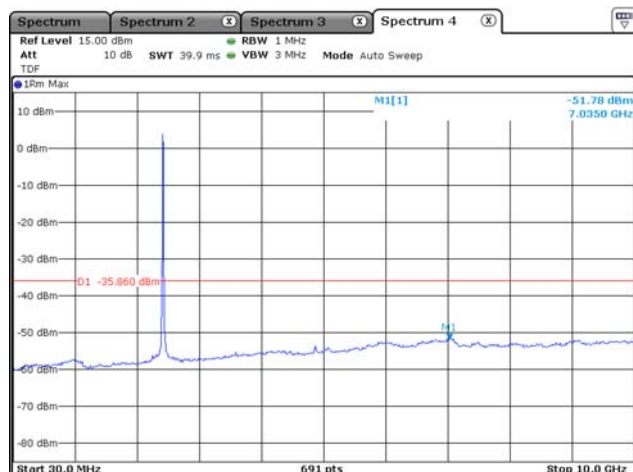
802.11g\_CH Low(Below 1 GHz)



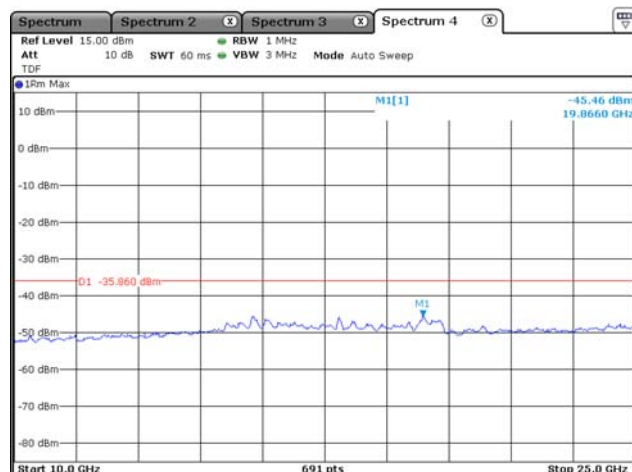
802.11g\_CH Low(Above 1 GHz)



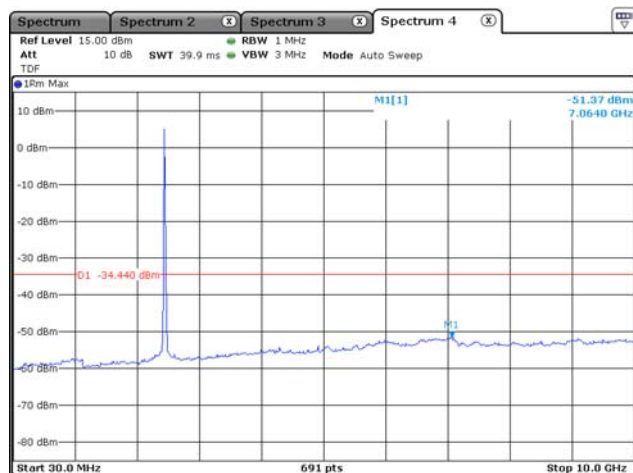
802.11g\_CH Middle(Below 1 GHz)



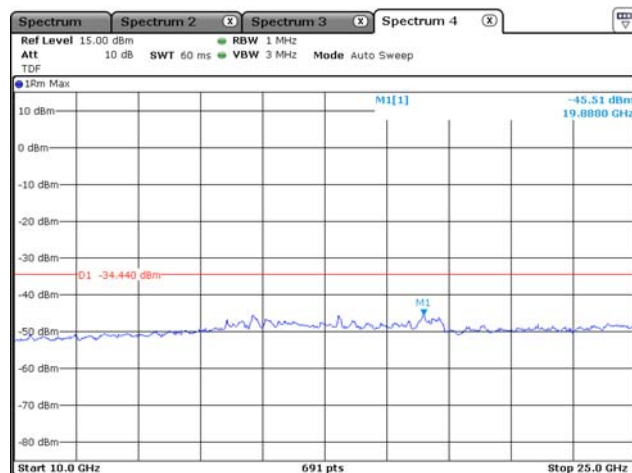
802.11g\_CH Middle(Above 1 GHz)



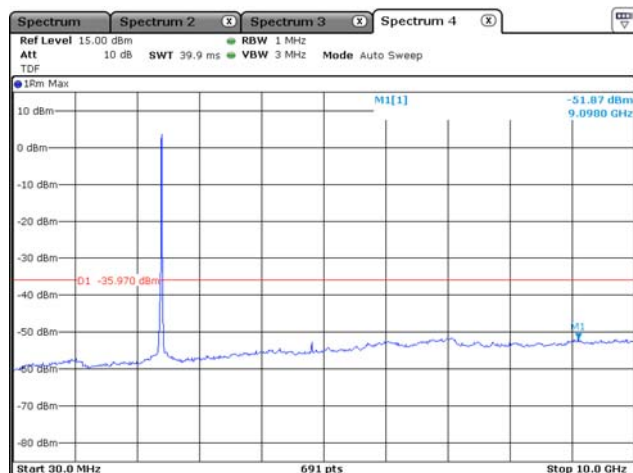
802.11g\_CH High(Below 1 GHz)



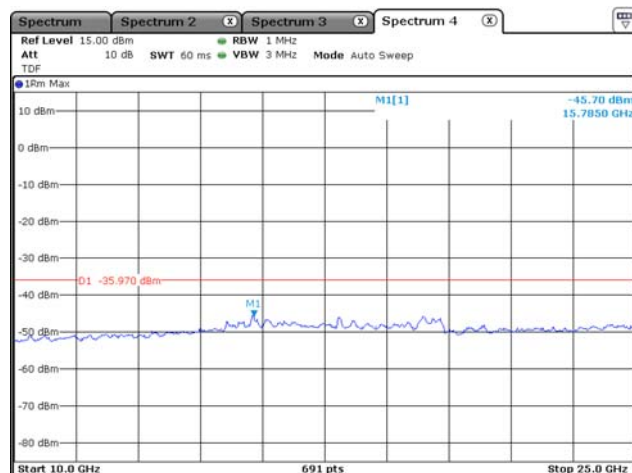
802.11g\_CH High(Above 1 GHz)



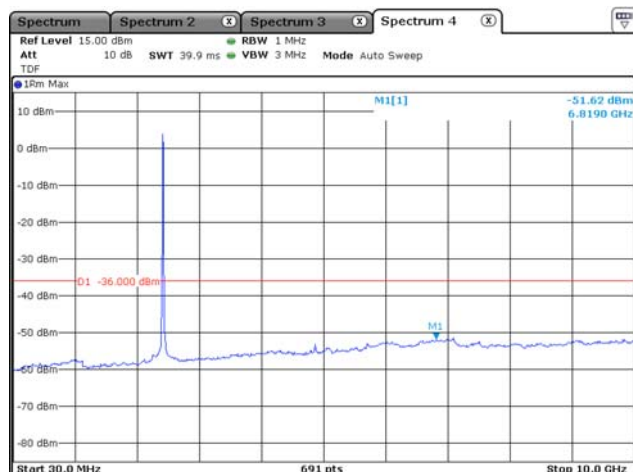
802.11n(HT20)\_CH Low(Below 1 GHz)



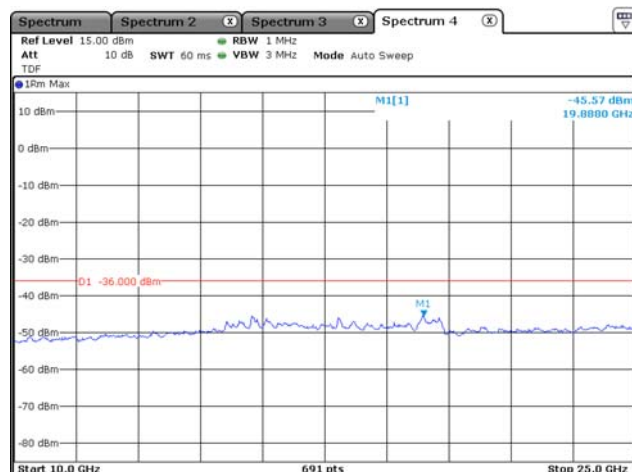
802.11 n(HT20)\_CH Low(Above 1 GHz)



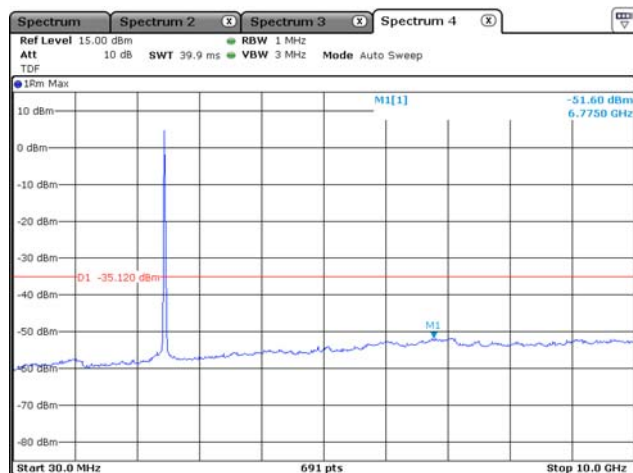
802.11 n(HT20)\_CH Middle(Below 1 GHz)



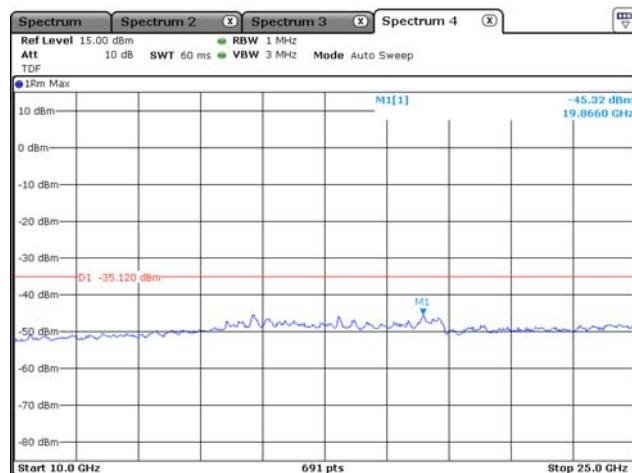
802.11 n(HT20)\_CH Middle(Above 1 GHz)



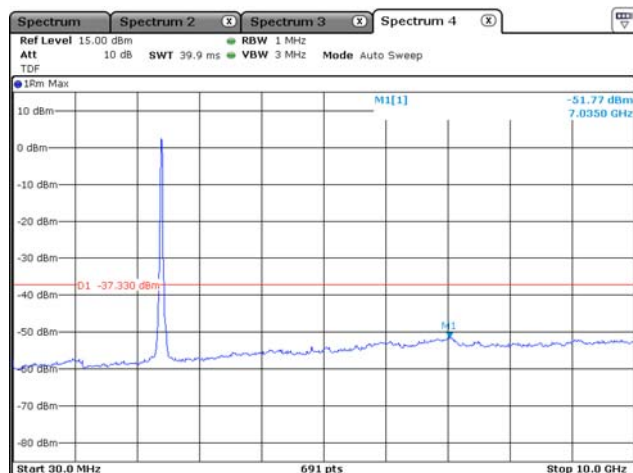
802.11 n(HT20)\_CH High(Below 1 GHz)



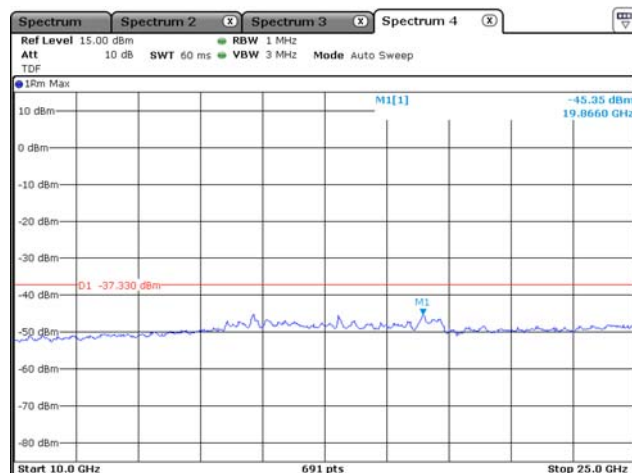
802.11 n(HT20)\_CH High(Above 1 GHz)



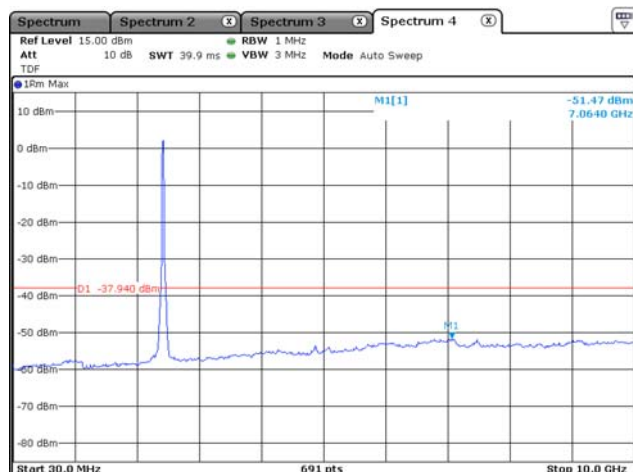
802.11n(HT40)\_CH Low(Below 1 GHz)



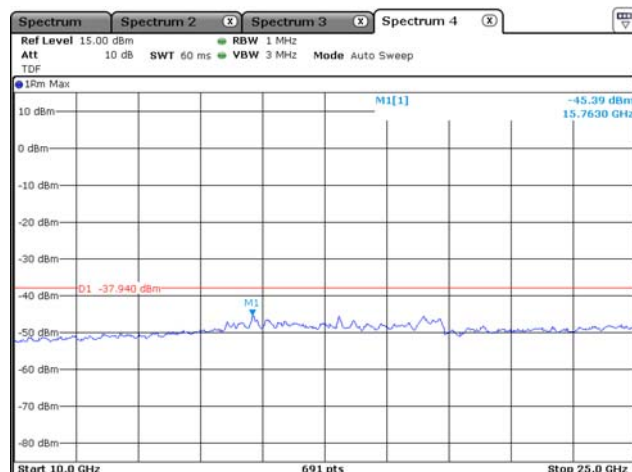
802.11 n(HT40)\_CH Low(Above 1 GHz)



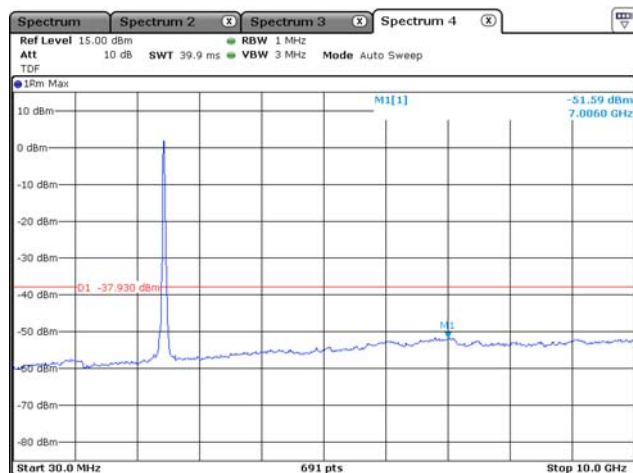
802.11 n(HT40)\_CH Middle(Below 1 GHz)



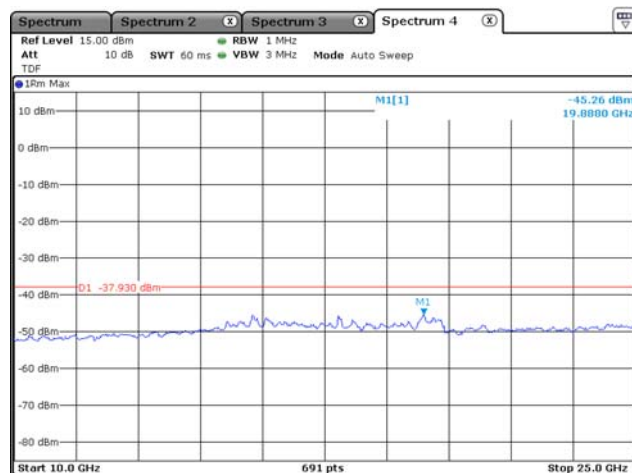
802.11 n(HT40)\_CH Middle(Above 1 GHz)



802.11 n(HT40)\_CH High(Below 1 GHz)



802.11 n(HT40)\_CH High(Above 1 GHz)



Note: RBW was set to 1 MHz rather than 100 kHz in order to increase the measurement speed. The display line shown in the following plots denotes the limit at 30 dB below the fundamental emission level measured in a 100 kHz bandwidth. However, since the trace in the following plots are measured with a 1 MHz RBW, the display line may not necessarily appear to be 30 dB below the level of the fundamental in a 1 MHz bandwidth.

## 5.5 Spurious RF Radiated emissions

### 5.5.1 Standard Applicable [ FCC §15.247(d)]

#### FCC

All other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10 GHz, the frequency Range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, Whichever is lower. In addition, radiated emissions which fall in the restricted bands, as defined in Sec.15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a)

§15.209 and RSS-Gen limits for radiated emissions measurements (distance at 3 m)

| Frequency Band [MHz]                                                                                                                                                                                                                                                                                     | DISTANCE [Meters] | Limit [ $\mu\text{V}/\text{m}$ ]                                                | Limit [dB $\mu\text{V}/\text{m}$ ] | Detector   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------|------------------------------------|------------|
| 0.009 ~ 0.490                                                                                                                                                                                                                                                                                            | 300               | 2400/F(kHz)                                                                     | 67.6-20log(F)                      | Peak       |
| 0.490 ~ 1.705                                                                                                                                                                                                                                                                                            | 30                | 24000/F(kHz)                                                                    | 87.6-20log(F)                      | Peak       |
| 1.705 ~ 30.0                                                                                                                                                                                                                                                                                             | 30                | 30                                                                              | 29.54                              | Peak       |
| 30 - 88                                                                                                                                                                                                                                                                                                  | 3                 | 100 **                                                                          | 40.00                              | Quasi peak |
| 88 - 216                                                                                                                                                                                                                                                                                                 | 3                 | 150 **                                                                          | 43.52                              | Quasi peak |
| 216 - 960                                                                                                                                                                                                                                                                                                | 3                 | 200 **                                                                          | 46.02                              | Quasi peak |
| Above 960                                                                                                                                                                                                                                                                                                | 3                 | 500                                                                             | 54.00                              | Average    |
| Above 1000                                                                                                                                                                                                                                                                                               | 3                 | 74.0 dB $\mu\text{V}/\text{m}$ (Peak), 54.0 dB $\mu\text{V}/\text{m}$ (Average) |                                    |            |
| ** fundamental emissions from intentional radiators operation 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 Section 15.231 and 15.241 |                   |                                                                                 |                                    |            |

§15.205. Restrict Band of Operation for FCC

| [MHz]                 | [MHz]                   | [MHz]             | [GHz]         |
|-----------------------|-------------------------|-------------------|---------------|
| 0.090 - 0.110         | 16.42 - 16.423          | 399.9 - 410       | 4.5 - 5.15    |
| 0.495 - 0.505**       | 16.694 75 - 16.695 25   | 608 - 614         | 5.35 - 5.46   |
| 2.173 5 - 2.190 5     | 16.804 25 - 16.804 75   | 960 - 1 240       | 7.25 - 7.75   |
| 4.125 - 4.128         | 25.5 - 25.67            | 1 300 - 1 427     | 8.025 - 8.    |
| 4.177 25 - 4.177 75   | 37.5 -38.25             | 1 435 - 1 626.5   | 9.0 - 9.2     |
| 4.207 25 - 4.207 75   | 73 - 74.6               | 1 645.5 - 1 646.5 | 9.3 - 9.5     |
| 6.215 - 6.218         | 74.8 - 75.2             | 1 660 - 1 710     | 10.6 - 12.7   |
| 6.267 75 - 6.268 25   | 108 - 121.94            | 1 718.8 - 1 722.2 | 13.25 - 13.4  |
| 6.311 75 - 6.312 25   | 123 - 138               | 2 200 - 2 300     | 14.47 - 14.5  |
| 8.291 - 8.294         | 149.9 - 150.05          | 2 310 - 2 390     | 15.35 - 16.2  |
| 8.362 - 8.366         | 156.524 75 - 156.525 25 | 2 483.5 - 2 500   | 17.7 - 21.4   |
| 8.376 25 - 8.38 6 75  | 156.7 - 156.9           | 2 690 - 2 900     | 22.01 - 23.12 |
| 8.414 25 - 8.414 75   | 162.012 5 - 167.17      | 3 260 - 3 267     | 23.6 - 24.0   |
| 12.29 - 12.293        | 167.72 - 173.2          | 3 332 - 3 339     | 31.2 - 31.8   |
| 12.519 75 - 12.520 25 | 240 - 285               | 3 345.8 - 3 358   | 36.43 - 36.5  |
| 12.576 75 - 12.577 25 | 322 - 335.4             | 3 600 - 4 400     | Above 38.6    |
| 13.36 - 13.41         |                         |                   |               |

\*\* Until February 1, 1999, this restricted band shall be 0.490-0.510

## §15.205. Restrict Band of Operation for IC

| [MHz]                | [MHz]                   | [MHz]             | [GHz]         |
|----------------------|-------------------------|-------------------|---------------|
| 0.090 - 0.110        | 12.519 75 - 12.520 25   | 399.9 - 410       | 5.35 - 5.46   |
| 2.173 5 - 2.190 5    | 12.576 75 - 12.577 25   | 608 - 614         | 7.25 - 7.75   |
| 3.020 - 3.026        | 13.36 - 13.41           | 960 - 1 427       | 8.025 - 8.    |
| 4.125 - 4.128        | 16.42 - 16.423          | 1 435 - 1 626.5   | 9.0 - 9.2     |
| 4.177 25 - 4.177 75  | 16.694 75 - 16.695 25   | 1 645.5 - 1 646.5 | 9.3 - 9.5     |
| 4.207 25 - 4.207 75  | 16.804 25 - 16.804 75   | 1 660 - 1 710     | 10.6 - 12.7   |
| 5.677 - 5.683        | 25.5 - 25.67            | 1 718.8 - 1 722.2 | 13.25 - 13.4  |
| 6.215 - 6.218        | 37.5 - 38.25            | 2 200 - 2 300     | 14.47 - 14.5  |
| 6.26775-6.26825      | 73 - 74.6               | 2 310 - 2 390     | 15.35 - 16.2  |
| 6.31175-6.31225      | 74.8 - 75.2             | 2 655 - 2 900     | 17.7 - 21.4   |
| 8.291 - 8.294        | 108 - 138               | 3 260 - 3 267     | 22.01 - 23.12 |
| 8.362 - 8.366        | 156.524 75 - 156.525 25 | 3 332 - 3 339     | 23.6 - 24.0   |
| 8.376 25 - 8.38 6 75 | 156.7 - 156.9           | 3 345.8 - 3 358   | 31.2 - 31.8   |
| 8.414 25 - 8.414 75  | 240 - 285               | 3 500 - 4 400     | 36.43 - 36.5  |
| 12.29 - 12.293       | 322 - 335.4             | 4 500 - 5 150     | Above 38.6    |

## 5.5.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) °C • Relative Humidity : (54 ~ 55) % R.H.

## 5.5.3 Measurement Procedure

The measurements procedure of the Spurious RF Radiated emissions is as following describe method.

1. The EUT was placed on the top of a rotating table (0.8 meters for below 1 GHz and 1.5 meters for above 1 GHz) above the ground at a 3 meter camber. The table was rotated 360 degree to determine the position of the highest radiation.
  2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna master.
  3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both Horizontal and vertical polarizations of the antenna are set to make the measurement.
  4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 - 360 degrees to find the maximum reading.
  5. The measuring receiver was set to peak detector and specified bandwidth with max hold function.
  6. Low, Middle and high channels were measured, and radiation measurements are performed in X, Y, Z axis positioning. And found the worst axis position and only the test worst case mode is recorded in the report.
- The measurement results are obtained as described below:  
Result(dBμV/m) = Reading(dBμV) + Antenna factor(dB/m)+ CL(dB) + other applicable factor (dB)
  - The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
  - The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
  - According to §15.33 (a)(1), Frequency range of radiated measurement is performed the tenth harmonic.

Above test was performed in accordance with ANSI C63.10-2013 Section 6.10.5 & 6.4, 6.5, 6.6

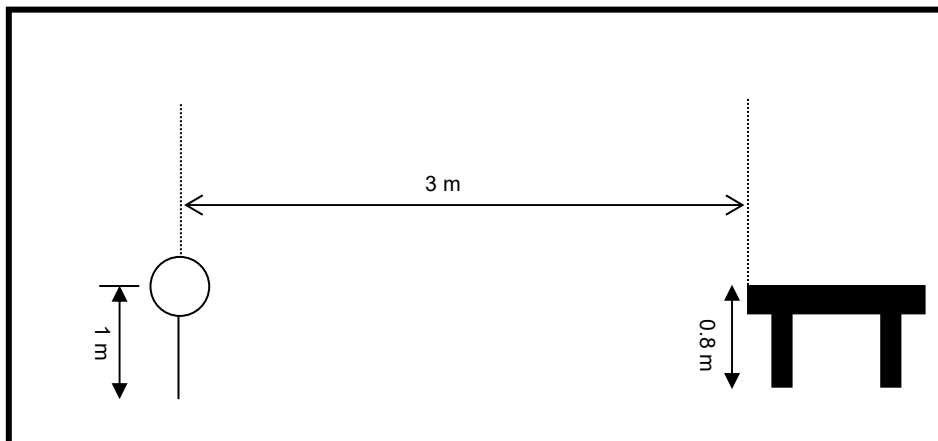
## 5.5.4 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

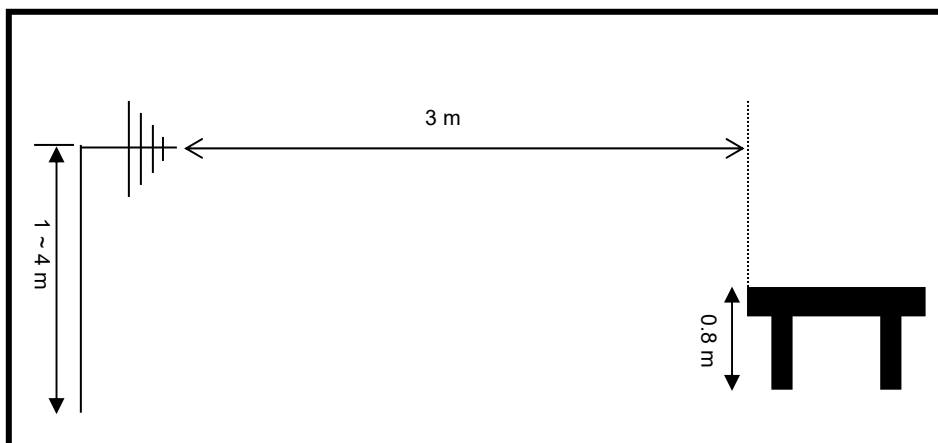
Radiated Emission measurement: Below 1 GHz: 3.62 dB (CL: Approx 95 %, k=2)  
Above 1 GHz: 4.06 dB (CL: Approx 95 %, k=2)

### 5.5.5 Test Configuration

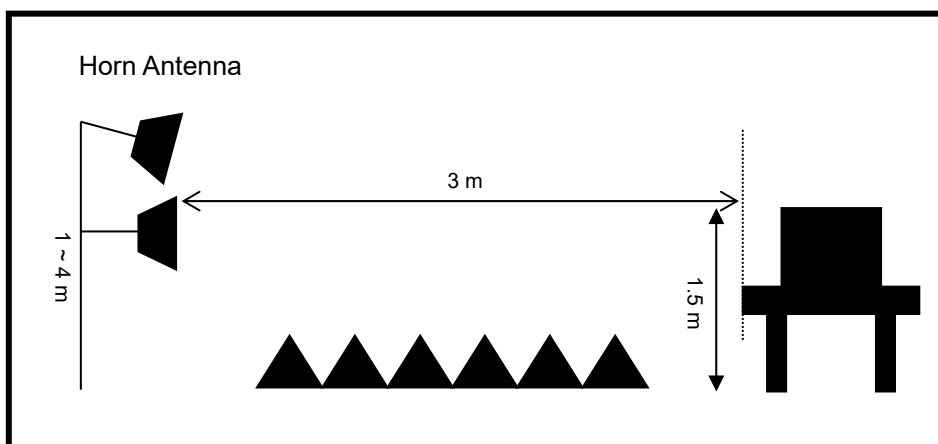
Radiated emission setup, below 30 MHz



Radiated emission setup, below 1 000 MHz



Radiated emission setup, above 1 GHz



## 5.5.6 Measurement Result

■ Above 1 GHz

802.11b (2 412 MHz)

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.387*         | 36.36                     | 27.34 | 0              | 1.5           | H             | 28.32           | 9.16       | -31.00      | 42.84                         | 33.82 | 74                      | 54 | 33.16        | 22.18 | Compliance |
| 2.385*         | 36.43                     | 26.38 | 0              | 1.5           | V             | 28.31           | 9.21       | -31.00      | 42.94                         | 32.89 | 74                      | 54 | 33.06        | 23.11 | Compliance |
| 2.092          | 36.65                     | 26.02 | 50             | 1.5           | H             | 27.58           | 9.22       | -31.41      | 42.03                         | 31.40 | 74                      | 54 | 33.97        | 24.60 | Compliance |

\* Restrict band & Band-edge emissions.

802.11b (2 437 MHz)

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.262          | 32.92                     | 23.10 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 41.46                         | 31.64 | 74                      | 54 | 34.54        | 24.36 | Compliance |

802.11b (2 462 MHz)

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.486*         | 37.27                     | 26.97 | 0              | 1.5           | H             | 28.66           | 9.15       | -30.87      | 44.20                         | 33.90 | 74                      | 54 | 31.80        | 22.10 | Compliance |
| 2.485*         | 37.13                     | 28.23 | 0              | 1.5           | V             | 28.66           | 9.15       | -30.87      | 44.06                         | 35.16 | 74                      | 54 | 31.94        | 20.84 | Compliance |
| 2.262          | 33.68                     | 22.77 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 42.22                         | 31.31 | 74                      | 54 | 33.78        | 24.69 | Compliance |

\* Restrict band & Band-edge emissions.

### ※Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB $\mu$ V/m(Average), 74 dB $\mu$ V /m(Peak), Attenuated more than 20 dB below the permissible value.
- It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to measured.
- For the below 30 MHz and above 2 486 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26.5 GHz.

**802.11g (2 412 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.387*         | 37.52                     | 27.87 | 0              | 1.5           | H             | 28.32           | 9.15       | -31.00      | 43.99                         | 34.34 | 74                      | 54 | 32.01        | 21.66 | Compliance |
| 2.385*         | 37.94                     | 26.39 | 0              | 1.5           | V             | 28.31           | 9.19       | -31.00      | 44.44                         | 32.89 | 74                      | 54 | 31.56        | 23.11 | Compliance |
| 2.092          | 36.23                     | 26.23 | 50             | 1.5           | H             | 27.58           | 9.22       | -31.41      | 41.61                         | 31.61 | 74                      | 54 | 34.39        | 24.39 | Compliance |

\* Restrict band & Band-edge emissions.

**802.11g (2 437 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.262          | 32.82                     | 23.26 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 41.36                         | 31.80 | 74                      | 54 | 34.64        | 24.20 | Compliance |

**802.11g (2 462 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.485*         | 40.53                     | 29.49 | 0              | 1.5           | H             | 28.65           | 9.15       | -30.87      | 47.46                         | 36.42 | 74                      | 54 | 28.54        | 19.58 | Compliance |
| 2.486*         | 36.13                     | 26.74 | 0              | 1.5           | V             | 28.66           | 9.15       | -30.87      | 43.06                         | 33.67 | 74                      | 54 | 32.94        | 22.33 | Compliance |
| 2.262          | 33.87                     | 23.01 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 42.41                         | 31.55 | 74                      | 54 | 33.59        | 24.45 | Compliance |

\* Restrict band & Band-edge emissions.

**※Note**

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB $\mu$ V/m(Average), 74 dB $\mu$ V /m(Peak), Attenuated more than 20 dB below the permissible value.
- It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to measured.
- For the below 30 MHz and above 2 485 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26.5 GHz.

**802.11n(HT20) (2 412 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.389*         | 36.99                     | 28.49 | 0              | 1.5           | H             | 28.33           | 9.12       | -30.99      | 43.44                         | 34.94 | 74                      | 54 | 32.56        | 21.06 | Compliance |
| 2.389*         | 37.06                     | 26.93 | 0              | 1.5           | V             | 28.33           | 9.12       | -30.99      | 43.51                         | 33.38 | 74                      | 54 | 32.49        | 22.62 | Compliance |
| 2.092          | 36.78                     | 26.46 | 50             | 1.5           | H             | 27.58           | 9.22       | -31.41      | 42.16                         | 31.84 | 74                      | 54 | 33.84        | 24.16 | Compliance |

\* Restrict band & Band-edge emissions.

**802.11n(HT20) (2 437 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.262          | 33.28                     | 23.18 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 41.82                         | 31.72 | 74                      | 54 | 34.18        | 24.28 | Compliance |

**802.11n(HT20) (2 462 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.484*         | 39.16                     | 28.89 | 0              | 1.5           | H             | 28.65           | 9.14       | -30.87      | 46.08                         | 35.81 | 74                      | 54 | 29.92        | 20.19 | Compliance |
| 2.487*         | 37.53                     | 26.96 | 0              | 1.5           | V             | 28.66           | 9.15       | -30.87      | 44.47                         | 33.90 | 74                      | 54 | 31.53        | 22.10 | Compliance |
| 2.262          | 33.75                     | 23.13 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 42.29                         | 31.67 | 74                      | 54 | 33.71        | 24.33 | Compliance |

\* Restrict band & Band-edge emissions.

**※Note**

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB $\mu$ V/m(Average), 74 dB $\mu$ V /m(Peak), Attenuated more than 20 dB below the permissible value.
- It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to measured.
- For the below 30 MHz and above 2 484 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26.5 GHz.

**802.11n(HT40) (2 422 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.389*         | 37.56                     | 30.07 | 0              | 1.5           | H             | 28.34           | 9.10       | -30.99      | 44.00                         | 36.51 | 74                      | 54 | 32.00        | 19.49 | Compliance |
| 2.389*         | 35.52                     | 27.05 | 0              | 1.5           | V             | 28.34           | 9.10       | -30.99      | 41.96                         | 33.49 | 74                      | 54 | 34.04        | 22.51 | Compliance |
| 2.092          | 36.53                     | 26.39 | 50             | 1.5           | H             | 27.58           | 9.22       | -31.41      | 41.91                         | 31.77 | 74                      | 54 | 34.09        | 24.23 | Compliance |

\* Restrict band & Band-edge emissions.

**802.11n(HT40) (2 437 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.262          | 33.45                     | 23.25 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 41.99                         | 31.79 | 74                      | 54 | 34.01        | 24.21 | Compliance |

**802.11n(HT40) (2 452 MHz)**

| Freq.<br>(GHz) | Reading<br>(dB $\mu$ V/m) |       | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas Result<br>(dB $\mu$ V/m) |       | Limit<br>(dB $\mu$ V/m) |    | Mgn.<br>(dB) |       | Result     |
|----------------|---------------------------|-------|----------------|---------------|---------------|-----------------|------------|-------------|-------------------------------|-------|-------------------------|----|--------------|-------|------------|
|                | PK                        | AV    |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             | PK                            | AV    | PK                      | AV | PK           | AV    |            |
| 2.487*         | 42.30                     | 31.51 | 0              | 1.5           | H             | 28.66           | 9.15       | -30.87      | 49.24                         | 38.45 | 74                      | 54 | 26.76        | 17.55 | Compliance |
| 2.485*         | 36.40                     | 26.86 | 0              | 1.5           | V             | 28.66           | 9.15       | -30.87      | 43.33                         | 33.79 | 74                      | 54 | 32.67        | 22.21 | Compliance |
| 2.262          | 33.62                     | 23.20 | 50             | 1.5           | H             | 27.69           | 12.02      | -31.16      | 42.16                         | 31.74 | 74                      | 54 | 33.84        | 24.26 | Compliance |

\* Restrict band & Band-edge emissions.

**※Note**

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB $\mu$ V/m(Average), 74 dB $\mu$ V /m(Peak), Attenuated more than 20 dB below the permissible value.
- It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to measured.
- For the below 30 MHz and above 2 487 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26.5 GHz.

■ Below 1 GHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m ) | Mgn<br>(dB) | Result     |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|-------------|----------------------------------|--------------------------|-------------|------------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             |                                  |                          |             |            |
| 33.89          | 50.79                     | 15             | 1.0           | V             | 14.15           | 1.38       | -31.01      | 35.31                            | 40.0                     | 4.69        | Compliance |
| 94.15          | 54.79                     | 0              | 1.0           | V             | 11.78           | 1.62       | -36.24      | 31.95                            | 43.5                     | 11.55       | Compliance |
| 179.68         | 56.95                     | 180            | 3.3           | H             | 16.66           | 2.12       | -39.25      | 36.47                            | 43.5                     | 7.03        | Compliance |
| 286.59         | 41.82                     | 170            | 2.1           | V             | 14.70           | 2.98       | -30.97      | 28.53                            | 46.0                     | 17.47       | Compliance |
| 811.44         | 44.97                     | 30             | 1.7           | H             | 27.44           | 4.28       | -36.08      | 40.61                            | 46.0                     | 5.39        | Compliance |

Freq.(MHz) : Measurement frequency, Reading(dB  $\mu$ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table  
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)  
 Meas Result (dB  $\mu$ V/m) : Reading(dB  $\mu$ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)  
 Limit(dB  $\mu$ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB  $\mu$ V/m) – Meas Result(dB  $\mu$ V/m)

Simultaneous TX Radiated Spurious Emissions Measurements (Worst case)

Measurement distance: 3m

WLAN: 5 220 MHz

BT: 2 440 MHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m ) | Mgn<br>(dB) | Result     |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|-------------|----------------------------------|--------------------------|-------------|------------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |             |                                  |                          |             |            |
| 33.89          | 49.44                     | 15             | 1.0           | V             | 14.15           | 1.38       | -31.01      | 33.96                            | 40.0                     | 6.04        | Compliance |
| 64.96          | 50.69                     | 50             | 3.3           | H             | 15.34           | 1.37       | -35.23      | 32.17                            | 40.0                     | 7.83        | Compliance |
| 92.24          | 54.96                     | 180            | 1.8           | V             | 12.65           | 1.56       | -38.91      | 30.26                            | 43.5                     | 13.24       | Compliance |
| 269.13         | 47.79                     | 180            | 2.0           | V             | 16.08           | 2.82       | -35.88      | 30.81                            | 46.0                     | 15.19       | Compliance |
| 599.55         | 41.83                     | 60             | 1.7           | H             | 20.14           | 3.72       | -28.36      | 37.33                            | 46.0                     | 8.67        | Compliance |

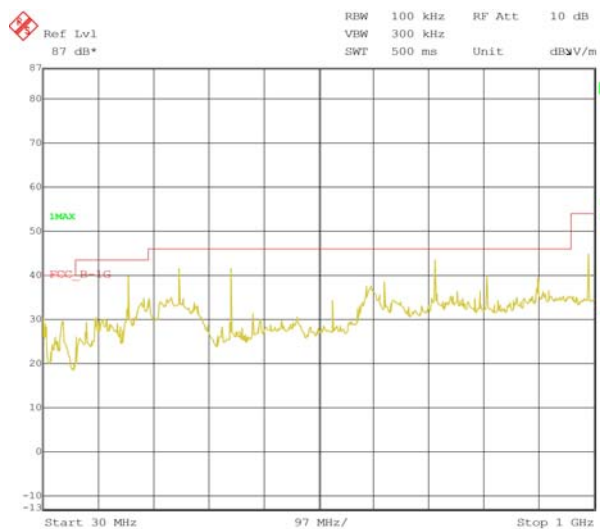
Freq.(MHz) : Measurement frequency, Reading(dB  $\mu$ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table  
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)  
 Meas Result (dB  $\mu$ V/m) : Reading(dB  $\mu$ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)  
 Limit(dB  $\mu$ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB  $\mu$ V/m) – Meas Result(dB  $\mu$ V/m)

## 5.5.7 Plots

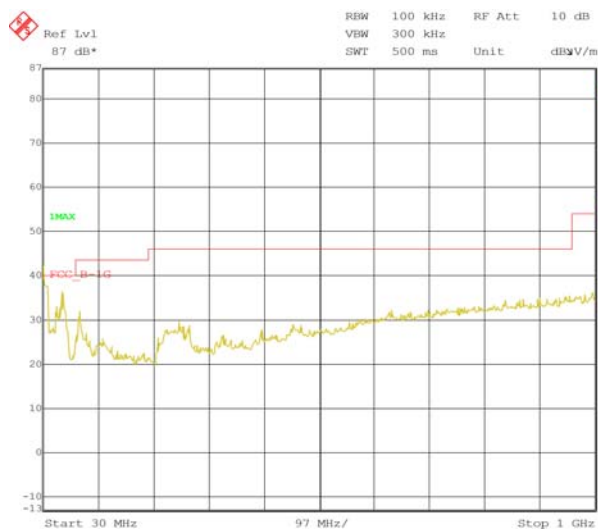
\*The worst case only.

- Below 1 GHz

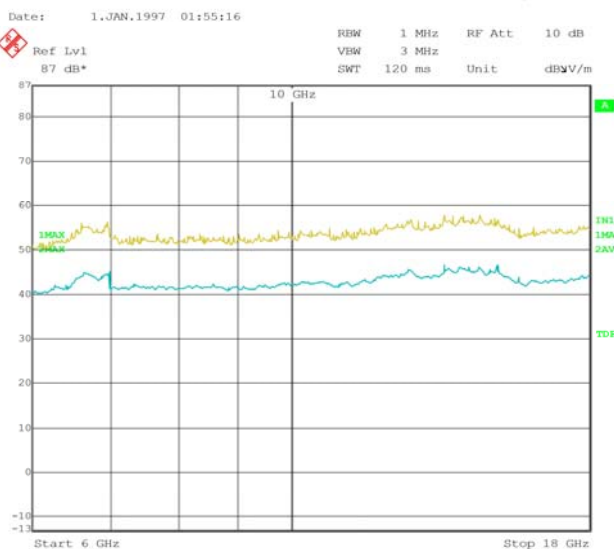
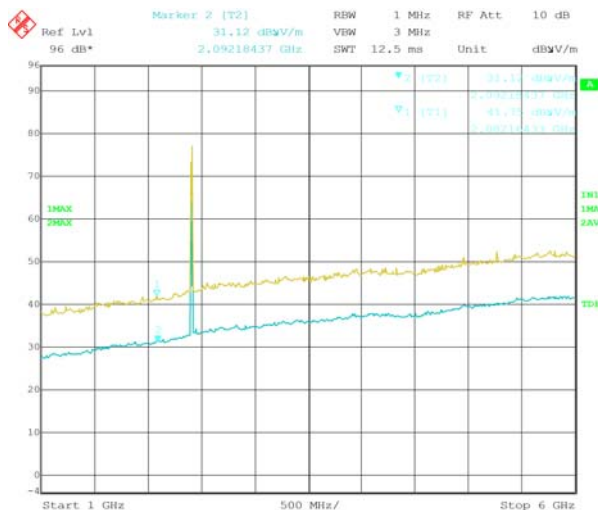
Horizontal



Vertical



- Above 1 GHz





## 5.6 Antenna requirement

### 5.6.1 Standard applicable [FCC §15.203]

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit so that broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 5.6.2 Antenna details

| Frequency Band | Antenna Type                 | Gain [dBi] | Results    |
|----------------|------------------------------|------------|------------|
| 2.4 GHz        | Internal PCB pattern antenna | 6 dBi      | Compliance |

The device complies with paragraph 15.203 of FCC rules because the antenna is a permanently fixed to enclosure and is unable to be removed or adjusted by the consumer.

## 5.7 AC Power Conducted emissions

### 5.7.1 Standard Applicable [FCC §15.207(a)]

For intentional radiator that is designed to be connected to the public utility(AC)power line, the radio frequency. Voltage that is conducted back onto the AC power line on any frequencies hopping mode within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line Impedance stabilization network(LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

§15.207 limits for AC line conducted emissions;

| Frequency of Emission(MHz) | Conducted Limit (dB $\mu$ V) |            |
|----------------------------|------------------------------|------------|
|                            | 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

### 5.7.2 Test Environment conditions

• Ambient temperature : (23 ~ 25) °C • Relative Humidity : (52 ~ 56) % R.H.

### 5.7.3 Measurement Procedure

EUT was placed on a non- metallic table height of 0.8 m above the reference ground plane. Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the Maximum signal strength.

### 5.7.4 Used equipment

| Equipment     | Model No. | Serial No. | Manufacturer    | Next cal date | Cal interval | Used                                |
|---------------|-----------|------------|-----------------|---------------|--------------|-------------------------------------|
| Test receiver | ESCS30    | 100111     | Rohde & Schwarz | 2021. 01. 21  | 1 year       | <input checked="" type="checkbox"/> |
| Pulse Limiter | ESH3-Z2   | 100097     | Rohde & Schwarz | 2021. 01. 21  | 1 year       | <input checked="" type="checkbox"/> |
| LISN          | ESH2-Z5   | 100044     | R&S             | 2021. 01. 21  | 1 year       | <input checked="" type="checkbox"/> |
|               | ESH3-Z5   | 100147     | R&S             | 2021. 01. 22  | 1 year       | <input checked="" type="checkbox"/> |

\*Test Program: " ESXS-K1 V2.2"

#### Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

0.009 ~ 0.15 MHz : 3.94 dB(CL: Approx 95 %,  $k=2$ )

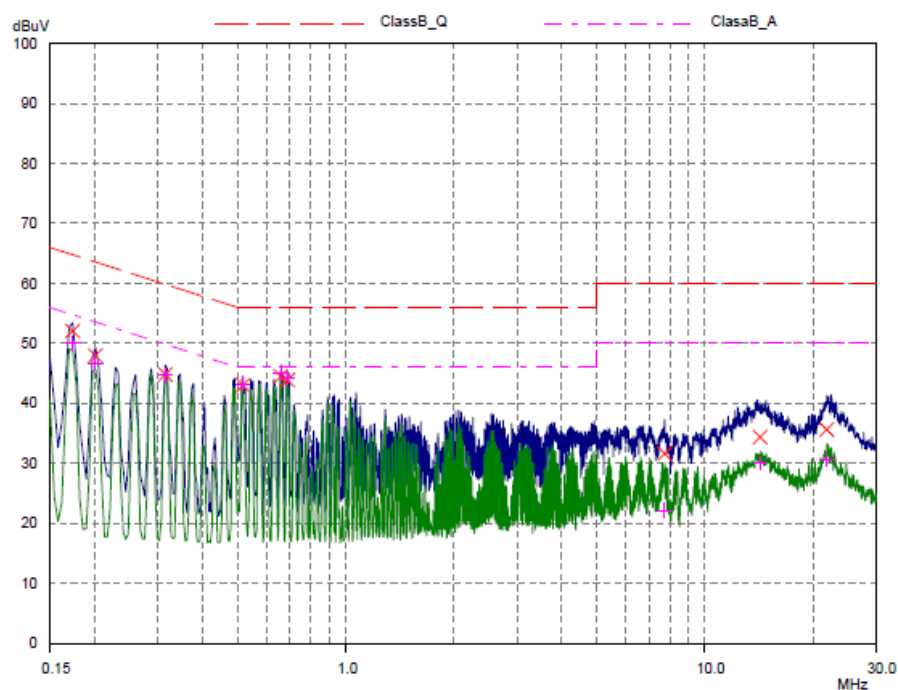
0.15 ~ 30 MHz : 3.32 dB(CL: Approx 95 %,  $k=2$ )

## 5.7.5 Measurement Result

| Freq.  | Factor<br>[dB] |               | POL | QP      |         |         | CISPR AV |         |         |
|--------|----------------|---------------|-----|---------|---------|---------|----------|---------|---------|
|        |                |               |     | Limit   | Reading | Result  | Limit    | Reading | Result  |
| [MHz]  | LISN           | CABLE<br>+P/L |     | [dB/μV] | [dB/μV] | [dB/μV] | [dB/μV]  | [dB/μV] | [dB/μV] |
| 0.173  | 0.12           | 10.01         | L   | 64.79   | 52.09   | 52.21   | 54.79    | 49.98   | 50.10   |
| 0.310  | 0.12           | 10.06         | L   | 59.97   | 44.84   | 44.96   | 49.97    | 44.68   | 44.80   |
| 0.517  | 0.12           | 10.06         | L   | 56.00   | 43.03   | 43.15   | 46.00    | 41.21   | 41.33   |
| 0.657  | 0.12           | 10.06         | L   | 56.00   | 44.50   | 44.62   | 46.00    | 42.10   | 42.22   |
| 0.689  | 0.12           | 10.06         | L   | 56.00   | 43.89   | 44.01   | 46.00    | 42.22   | 42.34   |
| 21.880 | 0.73           | 10.59         | L   | 60.00   | 35.63   | 36.36   | 50.00    | 30.62   | 31.35   |
| 0.173  | 0.12           | 10.01         | N   | 64.82   | 51.77   | 51.89   | 54.82    | 49.85   | 49.97   |
| 0.314  | 0.12           | 10.06         | N   | 59.86   | 44.71   | 44.83   | 49.86    | 44.84   | 44.96   |
| 0.517  | 0.12           | 10.06         | N   | 56.00   | 43.13   | 43.25   | 46.00    | 42.06   | 42.18   |
| 0.657  | 0.13           | 10.06         | N   | 56.00   | 44.75   | 44.88   | 46.00    | 42.02   | 42.15   |
| 0.685  | 0.13           | 10.06         | N   | 56.00   | 44.73   | 44.86   | 46.00    | 42.40   | 42.53   |
| 22.114 | 0.66           | 10.59         | N   | 60.00   | 35.17   | 35.83   | 50.00    | 29.83   | 30.49   |

- \* LISN: LISN insertion Loss, Cable: Cable Loss, P/L: pulse limiter factor
- \* L: Line. Live, N: Line. Neutral
- \* Reading: test receiver reading value (with cable loss & pulse limiter factor)
- \* Result = LISN + Reading

### Line. Live



### Line. Neutral

