

# TEST REPORT

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                |                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KOSTEC Co., Ltd.</b><br>28(175-20, Annyeong-dong) 406-gil sejaro,<br>Hwaseong-si, Gyeonggi-do, Korea<br>Tel:031-222-4251, Fax:031-222-4252                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Report No.: KST-FCR-210023                                                                                                                     | <br><b>KOSTEC Co., Ltd.</b><br><a href="http://www.kostec.org">http://www.kostec.org</a> |
| <b>1. Applicant</b> <ul style="list-style-type: none"><li>• Name : Gen2wave</li><li>• Address : 7th fl., Point town B/D, Gumi-ro, Bundang-gu, Seongnam-si, South Korea</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                |                                                                                                                                                                             |
| <b>2. Test Item</b> <ul style="list-style-type: none"><li>• Product Name: BIO SLED</li><li>• Model Name: A10</li><li>• Brand: -</li><li>• FCC ID: 2AWCDA10</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                |                                                                                                                                                                             |
| <b>3. Manufacturer</b> <ul style="list-style-type: none"><li>• Name : Gen2wave</li><li>• Address : 7th fl., Point town B/D, Gumi-ro, Bundang-gu, Seongnam-si, South Korea</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                |                                                                                                                                                                             |
| <b>4. Date of Test :</b> 2021. 09. 01. ~ 2021. 09. 02.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                |                                                                                                                                                                             |
| <b>5. Test Method Used :</b> FCC CFR 47, Part 15.225                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                |                                                                                                                                                                             |
| <b>6. Test Result :</b> Compliance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                |                                                                                                                                                                             |
| <b>7. Note:</b> None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                |                                                                                                                                                                             |
| <b>Supplementary Information</b> <p>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 <u>ANSI C 63.10-2013</u>.</p> <p>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.</p> <p>The results shown in this test report refer only to the sample(s) tested unless otherwise stated.<br/>This test report is not related to KOLAS accreditation.</p> |                                                                                                                                                |                                                                                                                                                                             |
| <b>Affirmation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Tested by</b><br>Name : Lee, Mi-Young<br><br>(Signature) | <b>Technical Manager</b><br>Name : Park, Gyeong-Hyeon<br><br>(Signature)               |
| <b>2021. 09. 06.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                |                                                                                                                                                                             |
| <b>KOSTEC Co., Ltd.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                |                                                                                                                                                                             |

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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

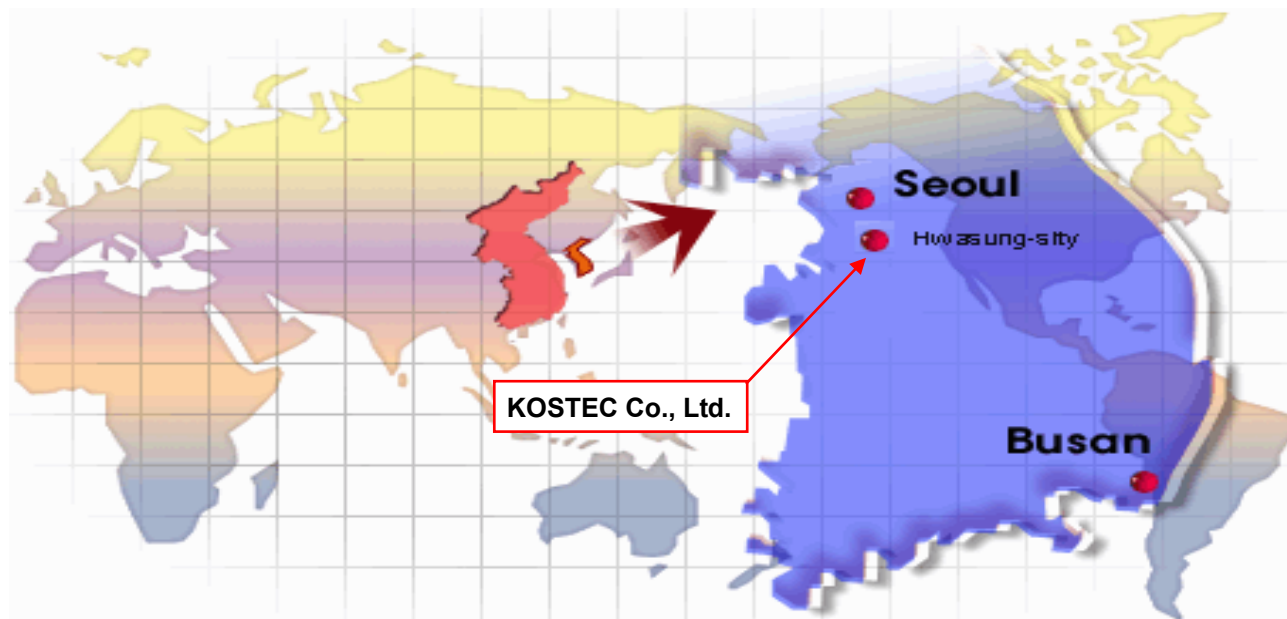
RRA (National Radio Research Agency): KR0041

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         | Park, Gyeong-Hyeon | 2021. 09. 06. |
|      |               |             |                    |               |

## 2. EQUIPMENT DESCRIPTION

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

|                       |                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment Name        | SLED                                                                                                                                                                                                                                                                                                                                                       |
| Model No              | A10                                                                                                                                                                                                                                                                                                                                                        |
| Usage                 | Biometric & biographic data capture                                                                                                                                                                                                                                                                                                                        |
| Serial Number         | Proto type                                                                                                                                                                                                                                                                                                                                                 |
| Modulation type       | ASK                                                                                                                                                                                                                                                                                                                                                        |
| Emission Type         | A1D                                                                                                                                                                                                                                                                                                                                                        |
| Maximum output power  | RFID 1(ACM1281U) : 27.87 dBμV/m @ 3 m<br>RFID 2(HID_13.56 MHz) : 19.65 dBμV/m @ 3 m<br>RFID 2(HID_125 kHz) : 75.95 dBμV/m @ 3 m                                                                                                                                                                                                                            |
| Operated Frequency    | 13.56 MHz, 125 kHz                                                                                                                                                                                                                                                                                                                                         |
| Channel Number        | 3 ea (1 for each operating RFID module)                                                                                                                                                                                                                                                                                                                    |
| Operation temperature | -10 °C ~ 55 °C                                                                                                                                                                                                                                                                                                                                             |
| Power Source          | Li-ion battery / DC 3.7 V / 6700 mA                                                                                                                                                                                                                                                                                                                        |
| Antenna Description   | Internal PCB antenna                                                                                                                                                                                                                                                                                                                                       |
| 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 (Y) 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                | 2AWCDA10                                                                                                                                                                                                                                                                                                                                                   |

### 3. SYSTEM CONFIGURATION FOR TEST

#### 3.1 Characteristics of equipment

Biometric & biographic data capture device.

#### 3.2 Used peripherals list

| Description | Model No. | Serial No. | Manufacture | Remark |
|-------------|-----------|------------|-------------|--------|
| Smartphone  | SM-G973N  | 0052257    | SAMSUNG     |        |
|             |           |            |             |        |

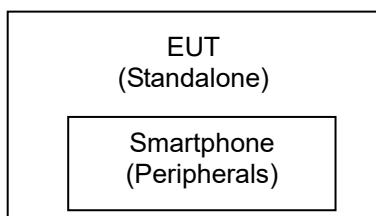
#### 3.3 Product Modification

N/A

#### 3.4 Operating Mode

Constantly transmitting with a modulated carrier at maximum power.

#### 3.5 Test Setup of EUT



### 3.6 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                 | 2021.11.04    | 1 year       | <input type="checkbox"/>            |
| 2   | T & H Chamber                 | SH-662       | 93000067     | ESPEC CORP                 | 2022.08.27    | 1 year       | <input checked="" type="checkbox"/> |
| 3   | T & H Chamber                 | SH-641       | 92006831     | ESPEC CORP                 | 2022.03.29    | 1 year       | <input type="checkbox"/>            |
| 4   | Spectrum Analyzer             | 8563EC       | 3046A00527   | Agilent Technology         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 5   | Spectrum Analyzer             | FSV30        | 104029       | Rohde & Schwarz            | 2022.08.30    | 1 year       | <input type="checkbox"/>            |
| 6   | Spectrum Analyzer             | FSV30        | 20-353063    | Rohde & Schwarz            | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 7   | Spectrum Analyzer             | FSV40        | 101727       | Rohde & Schwarz            | 2022.07.19    | 1 year       | <input type="checkbox"/>            |
| 8   | Signal Analyzer               | FSW43        | 101294       | Rohde & Schwarz            | 2022.02.18    | 1 year       | <input checked="" type="checkbox"/> |
| 9   | Signal Analyzer               | FSW85        | 101602       | Rohde & Schwarz            | 2022.06.30    | 1 year       | <input type="checkbox"/>            |
| 10  | EMI Test Receiver             | ESCI7        | 100823       | Rohde & Schwarz            | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 11  | EMI Test Receiver             | ESI          | 837514/004   | Rohde & Schwarz            | 2022.08.30    | 1 year       | <input checked="" type="checkbox"/> |
| 12  | Vector Signal Analyzer        | 89441A       | 3416A02620   | Agilent Technology         | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 13  | Network Analyzer              | 8753ES       | US39172348   | AGILENT                    | 2022.08.31    | 1 year       | <input type="checkbox"/>            |
| 14  | EPM Series Power meter        | E4418B       | GB39512547   | Agilent Technology         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 15  | RF Power Sensor               | E9300A       | MY41496631   | Agilent Technology         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 16  | Microwave Frequency Counter   | 5352B        | 2908A00480   | Agilent Technology         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 17  | Audio Analyzer                | 8903B        | 3514A16919   | Agilent Technology         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 18  | Audio Telephone Analyzer      | DD-5601CID   | 520010281    | CREDIX                     | 2022.01.18    | 1 year       | <input type="checkbox"/>            |
| 19  | Modulation Analyzer           | 8901A        | 3041A05716   | H.P                        | 2022.01.18    | 1 year       | <input type="checkbox"/>            |
| 20  | Digital storage Oscilloscope  | TDS3052      | B015962      | Tektronix                  | 2022.08.30    | 1 year       | <input type="checkbox"/>            |
| 21  | ESG-D Series Signal Generator | E4436B       | US39260458   | Agilent Technology         | 2022.01.18    | 1 year       | <input type="checkbox"/>            |
| 22  | Vector Signal Generator       | SMBV100A     | 257557       | Rohde & Schwarz            | 2022.01.18    | 1 year       | <input type="checkbox"/>            |
| 23  | GNSS Signal Generator         | TC-2800A     | 2800A000494  | TESCOM CO., LTD.           | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 24  | Signal Generator              | SMB100A      | 179628       | Rohde & Schwarz            | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 25  | Signal Generator              | N5173B       | MY57280148   | KEYSIGHT                   | 2022.06.11    | 1 year       | <input type="checkbox"/>            |
| 26  | SLIDAC                        | None         | 0207-4       | Myoung sung Ele.           | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 27  | DC Power supply               | DRP-5030     | 9028029      | Digital Electronic Co.,Ltd | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 28  | DC Power supply               | E3610A       | KR24104505   | Agilent Technology         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 29  | DC Power supply               | UP-3005T     | 68           | Unicon Co.,Ltd             | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 30  | DC Power Supply               | SM 3004-D    | 114701000117 | DELTAELEKTRONIKA           | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 31  | DC Power supply               | 6632B        | MY43004005   | Agilent Technology         | 2022.01.20    | 1 year       | <input checked="" type="checkbox"/> |
| 32  | DC Power Supply               | 6632B        | MY43004137   | Agilent Technology         | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 33  | Termination                   | 1433-3       | LM718        | WEINSCHEL                  | 2022.07.16    | 1 year       | <input type="checkbox"/>            |
| 34  | Termination                   | 1432-3       | QR946        | AEROFLEX/WEINSCHEL         | 2022.07.16    | 1 year       | <input type="checkbox"/>            |
| 35  | Attenuator                    | 24-30-34     | BX5630       | Aeroflex / Weinschel       | 2021.12.04    | 1 year       | <input type="checkbox"/>            |
| 36  | Attenuator                    | 8498A        | 3318A09485   | HP                         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 37  | Step Attenuator               | 8494B        | 3308A32809   | HP                         | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 38  | RF Step Attenuator            | RSP          | 100091       | Rohde & Schwarz            | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 39  | Attenuator                    | 18B50W-20F   | 64671        | INMET                      | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 40  | Attenuator                    | 10 dB        | 1            | Rohde & Schwarz            | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 41  | Attenuator                    | 54A-10       | 74564        | WEINSCHEL                  | 2022.08.31    | 1 year       | <input type="checkbox"/>            |
| 42  | Attenuator                    | 56-10        | 66920        | WEINSCHEL                  | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 43  | Attenuator                    | 48-30-33-LIM | BL5350       | Weinschel Corp.            | 2022.07.16    | 1 year       | <input type="checkbox"/>            |
| 44  | Power divider                 | 11636B       | 51212        | HP                         | 2022.01.21    | 1 year       | <input type="checkbox"/>            |
| 45  | 3Way Power divider            | KPDSU3W      | 00070365     | KMW                        | 2022.08.30    | 1 year       | <input type="checkbox"/>            |
| 46  | 4Way Power divider            | 70052651     | 173834       | KRYTAR                     | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 47  | 3Way Power divider            | 1580         | SQ361        | WEINSCHEL                  | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 48  | OSP                           | OSP120       | 101577       | Rohde & Schwarz            | 2022.06.14    | 1 year       | <input type="checkbox"/>            |
| 49  | White noise audio filter      | ST31EQ       | 101902       | SoundTech                  | 2022.08.31    | 1 year       | <input type="checkbox"/>            |
| 50  | Dual directional coupler      | 778D         | 17693        | HEWLETT PACKARD            | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 51  | Dual directional coupler      | 772D         | 2839A00924   | HEWLETT PACKARD            | 2022.01.19    | 1 year       | <input type="checkbox"/>            |

| No. | Instrument                                       | Model                            | S/N         | Manufacturer                | Next Cal Date | Cal interval | used                                |
|-----|--------------------------------------------------|----------------------------------|-------------|-----------------------------|---------------|--------------|-------------------------------------|
| 52  | Band rejection filter                            | 3TNF-0006                        | 26          | DOVER Tech                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 53  | Band rejection filter                            | 3TNF-0007                        | 311         | DOVER Tech                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 54  | Band rejection filter                            | WTR-BRF2442-84NN                 | 09020001    | WAVE TECH Co.,LTD           | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 55  | Band rejection filter                            | WRCJV12-5695-5725-5825-5855-50SS | 1           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 56  | Band rejection filter                            | WRCJV12-5120-5150-5350-5380-40SS | 4           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 57  | Band rejection filter                            | WRCGV10-2360-2400-2500-2540-50SS | 2           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 58  | Band rejection filter                            | CTF-155M-S1                      | 001         | RF One Electronics          | 2022.08.30    | 1 year       | <input type="checkbox"/>            |
| 59  | Band rejection filter                            | CTF-435M-S1                      | 001         | RF One Electronics          | 2022.08.30    | 1 year       | <input type="checkbox"/>            |
| 60  | Band rejection filter                            | CTF-5890M-70MS1                  | 1           | RF One Electronics          | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 61  | Highpass Filter                                  | WHJS1100-10EF                    | 1           | WAINWRIGHT                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 62  | Highpass Filter                                  | WHJS3000-10EF                    | 1           | WAINWRIGHT                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 63  | Highpass Filter                                  | WHNX6-5530-7000-26500-40CC       | 2           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 64  | Highpass Filter                                  | WHNX6-2370-3000-26500-40CC       | 4           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 65  | WideBand Radio Communication Tester              | CMW500                           | 102276      | Rohde & Schwarz             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 66  | WideBand Radio Communication Tester              | CMW500                           | 117235      | Rohde & Schwarz             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 67  | WideBand Radio Communication Tester(with CMX500) | CMW500                           | 167157      | Rohde & Schwarz             | 2022.04.09    | 1 year       | <input type="checkbox"/>            |
| 68  | Bluetooth Tester                                 | TC-3000B                         | 3000B6A0166 | TESCOM CO., LTD.            | 2022.01.18    | 1 year       | <input type="checkbox"/>            |
| 69  | Loop Antenna                                     | 6502                             | 9203-0493   | EMCO                        | 2023.05.31    | 2 year       | <input type="checkbox"/>            |
| 70  | Loop Antenna                                     | FMZB1513                         | #374        | Schwarzbeck                 | 2023.02.26    | 2 year       | <input checked="" type="checkbox"/> |
| 71  | BiconiLog Antenna                                | 3142B                            | 1745        | EMCO                        | 2022.04.24    | 2 year       | <input type="checkbox"/>            |
| 72  | Trilog-Broadband Antenna <sub>(R)</sub>          | VULB 9168                        | 9168-606    | SCHWARZBECK                 | 2022.09.21    | 2 year       | <input checked="" type="checkbox"/> |
| 73  | Biconical Antenna <sub>(T)</sub>                 | VUBA9117                         | 9117-342    | Schwarz beck                | 2022.03.24    | 2 year       | <input type="checkbox"/>            |
| 74  | Horn Antenna                                     | 3115                             | 9605-4834   | EMCO                        | 2022.03.06    | 2 year       | <input type="checkbox"/>            |
| 75  | Horn Antenna                                     | QMS-00208                        | 21909       | STEATITE ANTENNA            | 2022.12.04    | 2 year       | <input type="checkbox"/>            |
| 76  | Horn Antenna <sub>(R)</sub>                      | 3117                             | 00135191    | ETS-LINDGREN                | 2022.04.29    | 2 year       | <input type="checkbox"/>            |
| 77  | Horn Antenna <sub>(T)</sub>                      | 3115                             | 2996        | EMCO                        | 2022.02.14    | 2 year       | <input type="checkbox"/>            |
| 78  | Horn Antenna <sub>(R)</sub>                      | BBHA 9170                        | 9170-722    | SCHWARZBECK                 | 2022.05.12    | 2 year       | <input type="checkbox"/>            |
| 79  | Horn Antenna <sub>(T)</sub>                      | BBHA 9170                        | 743         | SCHWARZBECK                 | 2023.01.21    | 2 year       | <input type="checkbox"/>            |
| 80  | AMPLIFIER(A_10)                                  | TK-PA6S                          | 120009      | TESTEK                      | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 81  | AMPLIFIER(C_3)                                   | TK-PA01S                         | 200141-L    | TESTEK                      | 2022.08.31    | 1 year       | <input checked="" type="checkbox"/> |
| 82  | PREAMPLIFIER(C_3)                                | 8449B                            | 3008A02577  | Agilent                     | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 83  | RF PRE AMPLIFIER                                 | SCU08F2                          | 100762      | Rohde & Schwarz             | 2021.12.04    | 1 year       | <input type="checkbox"/>            |
| 84  | AMPLIFIER                                        | TK-PA18                          | 150003      | TESTEK                      | 2022.01.21    | 1 year       | <input type="checkbox"/>            |
| 85  | AMPLIFIER                                        | TK-PA1840H                       | 160010-L    | TESTEK                      | 2022.01.21    | 1 year       | <input type="checkbox"/>            |
| 86  | Horn Antenna                                     | M19RH                            | T01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 87  | Horn Antenna                                     | M19RH                            | R01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 88  | Horn Antenna                                     | M12RH                            | T02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 89  | Horn Antenna                                     | M12RH                            | R02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 90  | Horn Antenna                                     | M08RH                            | T03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 91  | Horn Antenna                                     | M08RH                            | R03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 92  | Horn Antenna                                     | M05RH                            | T04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 93  | Horn Antenna                                     | M05RH                            | R04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 94  | Horn Antenna                                     | M03RH                            | T05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 95  | Horn Antenna                                     | M03RH                            | R05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input type="checkbox"/>            |
| 96  | Harmonic Mixer                                   | M12HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input type="checkbox"/>            |
| 97  | Harmonic Mixer                                   | M08HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input type="checkbox"/>            |
| 98  | Harmonic Mixer                                   | M05HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input type="checkbox"/>            |
| 99  | Harmonic Mixer                                   | M03HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input type="checkbox"/>            |
| 100 | Source Module                                    | S19MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input type="checkbox"/>            |
| 101 | Source Module                                    | S12MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input type="checkbox"/>            |
| 102 | Source Module                                    | S08MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input type="checkbox"/>            |
| 103 | Source Module                                    | S05MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input type="checkbox"/>            |
| 104 | Source Module                                    | S03MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input type="checkbox"/>            |

## 4. SUMMARY TEST RESULTS

| Description of Test                                                                                                                                                                                                                                   | FCC Rule          | Reference Clause | Used                                | Test Result |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-------------------------------------|-------------|
| Carrier frequency tolerance                                                                                                                                                                                                                           | 15.225(e)         | Clause 5.1       | <input checked="" type="checkbox"/> | Compliance  |
| Field strength of radiated emission                                                                                                                                                                                                                   | 15.225(a) ~ (d)   | Clause 5.2       | <input checked="" type="checkbox"/> | Compliance  |
| 20 dB Bandwidth (Occupied bandwidth)                                                                                                                                                                                                                  | 15.215(c), 2.1049 | Clause 5.3       | <input checked="" type="checkbox"/> | Compliance  |
| Antenna requirement                                                                                                                                                                                                                                   | 15.203            | Clause 5.4       | <input checked="" type="checkbox"/> | Compliance  |
| AC Conducted emission                                                                                                                                                                                                                                 | 15.207            | Clause 5.5       | <input checked="" type="checkbox"/> | Compliance  |
| <p>Compliance/pass : The EUT complies with the essential requirements in the standard.</p> <p>Not Compliance : The EUT does not comply with the essential requirements in the standard.</p> <p>N/A : The test was not applicable in the standard.</p> |                   |                  |                                     |             |

### Procedure Reference

FCC CFR 47, Part 15. Subpart C-15.225 & 15.207 & 15.209

ANSI C63.10-2013

ANSI C63.4-2014

## 5. MEASUREMENT RESULTS

### 5.1 Carrier Frequency tolerance

#### 5.1.1 Standard Applicable [FCC Part 15.225(e)]

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency Over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

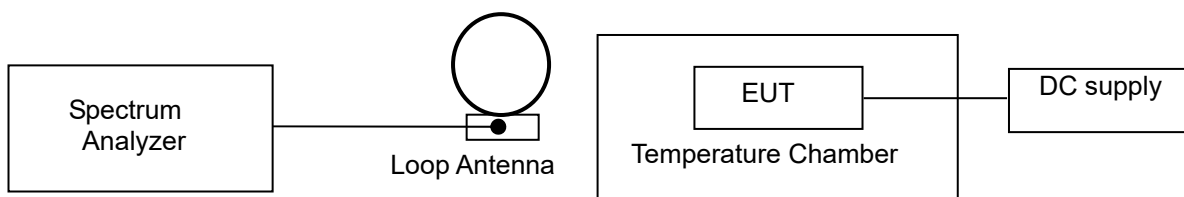
#### 5.1.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) °C • Relative Humidity : (49 ~ 51) % R.H.

#### 5.1.3 Measurement Procedure

Before measurements are made the equipment shall have reached thermal balance in the Test chamber period. and then it is normal operating for about 15 minutes after thermal balance has been reached. For tests at the extreme temperature, the equipment shall be left in the test chamber until thermal balance is attained, then the standby or receive condition for a period of a few minute after which the equipment shall meet the specified requirements. The test data sheet recorded measured value by frequency counter.

#### 5.1.4 Test setup



#### 5.1.5 Measurement Result

##### ▪ RFID1 (ACM1281U)

| Temp(°C)        | Power Supply   | Measured Freq(Hz)                        | Freq Drift |          |
|-----------------|----------------|------------------------------------------|------------|----------|
|                 |                |                                          | Hz         | %        |
| 50              | DC 5.0 (Vnom)* | 13,560,337                               | 337        | 0.002 5  |
| 40              | DC 5.0 (Vnom)  | 13,560,333                               | 333        | 0.002 5  |
| 30              | DC 5.0 (Vnom)  | 13,560,297                               | 297        | 0.002 2  |
| 20              | DC 5.0 (Vnom)  | 13,560,263                               | 263        | 0.001 9  |
| 10              | DC 5.0 (Vnom)  | 13,560,255                               | 255        | 0.001 9  |
| 0               | DC 5.0 (Vnom)  | 13,560,174                               | 174        | 0.001 3  |
| -10             | DC 5.0 (Vnom)  | 13,559,833                               | -167       | -0.001 2 |
| -20             | DC 5.0 (Vnom)  | 13,559,641                               | -359       | -0.002 6 |
| Nom Temperature | DC 4.25 (Vmin) | 13,560,267                               | 267        | 0.002 0  |
| Nom Temperature | DC 5.75 (Vmax) | 13,560,262                               | 262        | 0.001 9  |
| Limit           |                | Within in $\pm 0.01$ % or $\pm 1$ 356 Hz |            |          |
| Test Results    |                | Compliance                               |            |          |

\*based on the adapter power input.

▪ RFID 2 (HID)

| Temp(℃)         | Power Supply   | Measured Freq(Hz)                        | Freq Drift |          |
|-----------------|----------------|------------------------------------------|------------|----------|
|                 |                |                                          | Hz         | %        |
| 50              | DC 5.0 (Vnom)* | 13,560,141                               | 141        | 0.001 0  |
| 40              | DC 5.0 (Vnom)  | 13,560,133                               | 133        | 0.001 0  |
| 30              | DC 5.0 (Vnom)  | 13,559,987                               | -13        | -0.000 1 |
| 20              | DC 5.0 (Vnom)  | 13,559,846                               | -154       | -0.001 1 |
| 10              | DC 5.0 (Vnom)  | 13,559,811                               | -189       | -0.001 4 |
| 0               | DC 5.0 (Vnom)  | 13,559,712                               | -288       | -0.002 1 |
| -10             | DC 5.0 (Vnom)  | 13,559,611                               | -389       | -0.002 9 |
| -20             | DC 5.0 (Vnom)  | 13,559,583                               | -417       | -0.003 1 |
| Nom Temperature | DC 4.25 (Vmin) | 13,559,833                               | -167       | -0.001 2 |
| Nom Temperature | DC 5.75 (Vmax) | 13,559,846                               | -154       | -0.001 1 |
| Limit           |                | Within in $\pm 0.01$ % or $\pm 1$ 356 Hz |            |          |
| Test Results    |                | Compliance                               |            |          |

\*based on the adapter power input.

## 5.2 Field strength of radiated emissions

### 5.2.1 Standard Applicable [FCC Part 15.225(a) ~ (d)]

(a) The Field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15,848  $\mu\text{V/m}$  at 30 meter  
(b) Within the bands 13.410 - 13.553 MHz and 13.567 - 13.710 MHz, the field strength of any emissions shall not exceed 334 micro volts/meter at 30 meter

(c) Within the bands 13.110 - 13.410 MHz and 13.710 - 14.010 MHz, the field strength of any emissions shall not exceed 106 micro volts/meter at 30 meter

(d) The Field strength of any emissions appearing outside of the 13.110 - 14.010 MHz band shall not exceed The general radiated emission limits in §15.209

Above required standard (a ~ c) and (d) is brief describe table as follows

#### § 15.225 [(a) ~ (c)] : Limit for in-band field strength

| Frequency Band (MHz)               | Limit               |                       | Measurement distance (meter) |
|------------------------------------|---------------------|-----------------------|------------------------------|
|                                    | ( $\mu\text{V/m}$ ) | (dB $\mu\text{V/m}$ ) |                              |
| 13.553 - 13.567                    | 15,848              | 84.00 (124.0 @ 3 m)   | 30                           |
| 13.410 - 13.553<br>13.567 - 13.710 | 334                 | 50.47 (90.5 @ 3 m)    | 30                           |
| 13.110 - 13.410<br>13.710 - 14.010 | 106                 | 40.50 (80.5 @ 3 m)    | 30                           |

#### §15.209. limits for radiated emissions measurements

| Frequency Band | Limit [ $\mu\text{V/m}$ ] | Limit [dB $\mu\text{V/m}$ ] | Measurement distance (meter) | Detector       |
|----------------|---------------------------|-----------------------------|------------------------------|----------------|
| 0.009 - 0.490  | 2 400/F (kHz)             | -                           | 300                          |                |
| 0.490 - 1.705  | 2 4000/F(kHz)             | -                           | 30                           |                |
| 1.705 - 30.0   | 30                        | 29.54                       | 30                           | Quasi peak     |
| 30 - 88        | 100 **                    | 40.0                        | 3                            | Quasi peak     |
| 88 - 216       | 150 **                    | 43.5                        | 3                            | Quasi peak     |
| 216 - 960      | 200 **                    | 46.0                        | 3                            | Quasi peak     |
| Above 960      | 500                       | 54.0                        | 3                            | Peak & 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

Only spurious emissions are permitted in any of the frequency bands listed below ;

| [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

#### 5.2.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) °C • Relative Humidity : (49 ~ 51) % R.H.

#### 5.2.3 Measurement Procedure

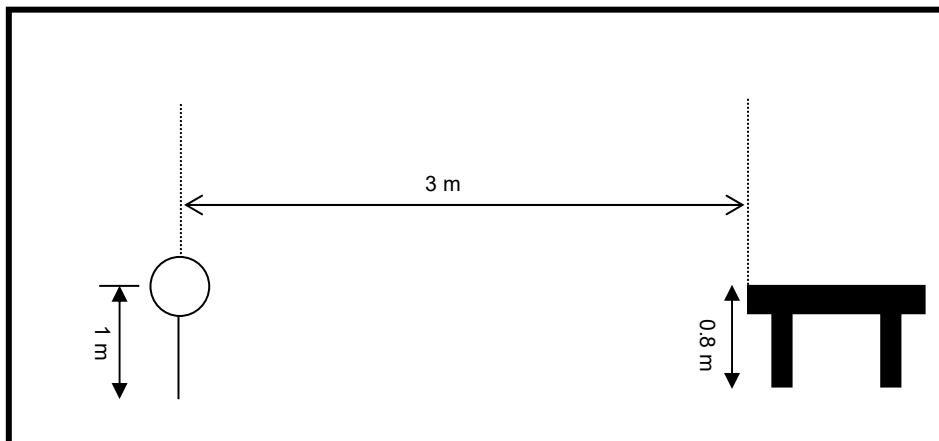
The measurements procedure of the Spurious RF Radiated emissions is as following describe method.

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.

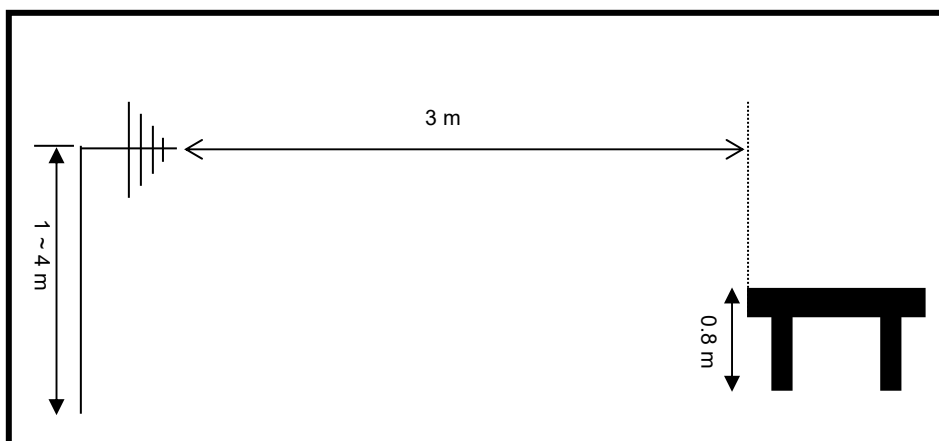
Above test was performed in accordance with ANSI C63.10-2013 Section 6.10.5 & 6.4, 6.5, 6.6

## 5.2.4 Test setup

Radiated emission setup, below 30 MHz



Radiated emission setup, below 1 000 MHz



## 5.2.5 Measurement Result

### ▣ IN-BAND

#### ▪ RFID 1(ACM1281U)

| Freq.<br>(MHz) | Reading<br>(dBμV/m) | Table<br>(Deg) | Pstn<br>(axis) | Antenna       |               |                 | CL<br>(dB) | Distn<br>factor<br>(dB) | Meas Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Mgn<br>(dB) | Result     |
|----------------|---------------------|----------------|----------------|---------------|---------------|-----------------|------------|-------------------------|-------------------------|-------------------|-------------|------------|
|                |                     |                |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                         |                         |                   |             |            |
| 13.560*        | 47.15               | 180            | Y              | 1             | -             | 20.11           | 0.61       | -40                     | 27.87                   | 84.0              | 56.13       | Compliance |
| 13.384         | 28.12               | 180            | Y              | 1             | -             | 20.10           | 0.61       | -40                     | 12.97                   | 40.5              | 27.53       | Compliance |
| 13.472         | 32.25               | 170            | Y              | 1             | -             | 20.11           | 0.61       | -40                     | 8.83                    | 50.5              | 41.67       | Compliance |
| 13.650         | 32.32               | 170            | Y              | 1             | -             | 20.12           | 0.61       | -40                     | 13.05                   | 50.5              | 37.45       | Compliance |
| 13.738         | 28.40               | 180            | Y              | 1             | -             | 20.12           | 0.61       | -40                     | 9.13                    | 40.5              | 31.37       | Compliance |

#### ▪ RFID 2(HID)

| Freq.<br>(MHz) | Reading<br>(dBμV/m) | Table<br>(Deg) | Pstn<br>(axis) | Antenna       |               |                 | CL<br>(dB) | Distn<br>factor<br>(dB) | Meas Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Mgn<br>(dB) | Result     |
|----------------|---------------------|----------------|----------------|---------------|---------------|-----------------|------------|-------------------------|-------------------------|-------------------|-------------|------------|
|                |                     |                |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                         |                         |                   |             |            |
| 0.125*         | 55.49               | 170            | Y              | 1             | -             | 19.99           | 0.17       | -                       | 75.95                   | 105.62            | 29.67       | Compliance |
| 13.560*        | 38.93               | 160            | Y              | 1             | -             | 20.11           | 0.61       | -40                     | 19.65                   | 84.0              | 64.35       | Compliance |
| 13.422         | 19.31               | 170            | Y              | 1             | -             | 20.11           | 0.61       | -40                     | 0.03                    | 50.5              | 50.47       | Compliance |
| 13.472         | 22.60               | 170            | Y              | 1             | -             | 20.11           | 0.61       | -40                     | 3.32                    | 50.5              | 47.18       | Compliance |
| 13.569         | 23.99               | 180            | Y              | 1             | -             | 20.11           | 0.61       | -40                     | 4.71                    | 50.5              | 45.79       | Compliance |
| 13.619         | 23.10               | 180            | Y              | 1             | -             | 20.12           | 0.61       | -40                     | 3.83                    | 50.5              | 46.67       | Compliance |

\*It is fundamental frequency

Note1. above measured frequency have been done at 3 m distance and corrected according to required FCC 15.209. e)

∴ Extrapolation distance factor :  $40\log(3/30) = -40$  dB

If Measurement distance is 3 m and Mandatory requirement distance is 30 m at 30 MHz or less, extrapolation distance factor(dB) is  $40 / \text{decade} = 40 \log_{10}^{(MRD/MD)}$

MRD is Mandatory requirement distance and MD is Measured distance

Note2. above measured frequencies is apply required standard FCC Part 15.225

Note3. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.

Note4. All measurements were recorded using a quasi-peak detector.

Freq.(MHz) : Measurement frequency

Reading(dBμV/m) : Indicated value for test receiver

Table (Deg) : Directional degree of Turn table

Pstn(axis) : Location axis of EUT

Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor

Cbl(dB) : Cable loss,

Distn factor(dB) : distance correction factor [40 dB /decade as per § 15.31f(2)]

Meas Result (dBμV/m) : Reading(dBμV/m)+ Antenna factor.( dB/m )+ CL(dB) + Distn factor(dB)

Limit(dBμV/m): Limit value specified with FCC Rule

Mgn(dB) : FCC Limit (dBμV/m) – Meas Result(dBμV/m)

▣ OUT-BAND

▪ RFID 1(ACM1281U)

| Freq.<br>(MHz) | Reading<br>(dBμV/m) | Table<br>(Deg) | Pstn<br>(axis) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Mgn<br>(dB) | Result     |
|----------------|---------------------|----------------|----------------|---------------|---------------|-----------------|------------|--------------------|-------------------------|-------------------|-------------|------------|
|                |                     |                |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                         |                   |             |            |
| 122.32         | 55.83               | 180            | Y              | 1.5           | V             | 17.34           | 1.41       | 46.45              | 28.13                   | 43.5              | 15.37       | Compliance |
| 190.44         | 52.76               | 180            | Y              | 1.5           | V             | 16.65           | 1.74       | 46.41              | 24.74                   | 43.5              | 18.76       | Compliance |
| 217.64         | 48.20               | 170            | Y              | 1.5           | H             | 16.46           | 1.88       | 46.37              | 20.17                   | 46.0              | 25.83       | Compliance |
| 272.52         | 44.56               | 170            | Y              | 1.5           | H             | 18.50           | 2.15       | 46.32              | 18.89                   | 46.0              | 27.11       | Compliance |
| 458.40         | 51.55               | 180            | Y              | 1.5           | V             | 23.22           | 2.81       | 46.12              | 31.47                   | 46.0              | 14.53       | Compliance |
| 505.79         | 51.77               | 190            | Y              | 1.5           | V             | 23.88           | 2.99       | 45.99              | 32.65                   | 46.0              | 13.35       | Compliance |

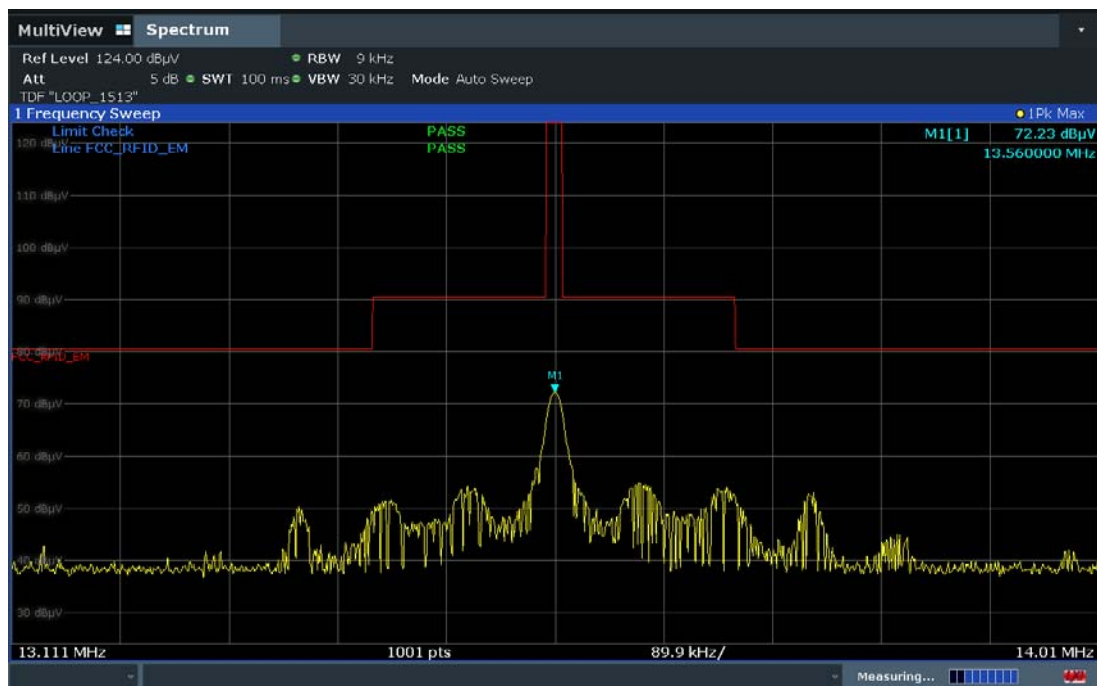
▪ RFID 2(HID)

| Freq.<br>(MHz) | Reading<br>(dBμV/m) | Table<br>(Deg) | Pstn<br>(axis) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Mgn<br>(dB) | Result     |
|----------------|---------------------|----------------|----------------|---------------|---------------|-----------------|------------|--------------------|-------------------------|-------------------|-------------|------------|
|                |                     |                |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                         |                   |             |            |
| 92.99          | 45.68               | 180            | Y              | 1.5           | H             | 14.07           | 1.18       | 46.46              | 14.47                   | 43.5              | 29.03       | Compliance |
| 245.26         | 43.44               | 180            | Y              | 1.5           | H             | 17.53           | 2.04       | 46.33              | 16.68                   | 46.0              | 29.32       | Compliance |
| 311.45         | 45.12               | 170            | Y              | 1.5           | H             | 19.64           | 2.28       | 46.30              | 20.74                   | 46.0              | 25.26       | Compliance |
| 448.84         | 52.17               | 170            | Y              | 1.5           | V             | 23.07           | 2.78       | 46.14              | 31.87                   | 46.0              | 14.13       | Compliance |
| 474.79         | 54.45               | 180            | Y              | 1.5           | V             | 23.46           | 2.87       | 46.07              | 34.71                   | 46.0              | 11.29       | Compliance |
| 502.25         | 52.76               | 180            | Y              | 1.5           | V             | 23.83           | 2.97       | 46.00              | 33.57                   | 46.0              | 12.43       | Compliance |
| 558.08         | 47.39               | 180            | Y              | 1.5           | V             | 24.73           | 3.17       | 45.93              | 29.37                   | 46.0              | 16.63       | Compliance |

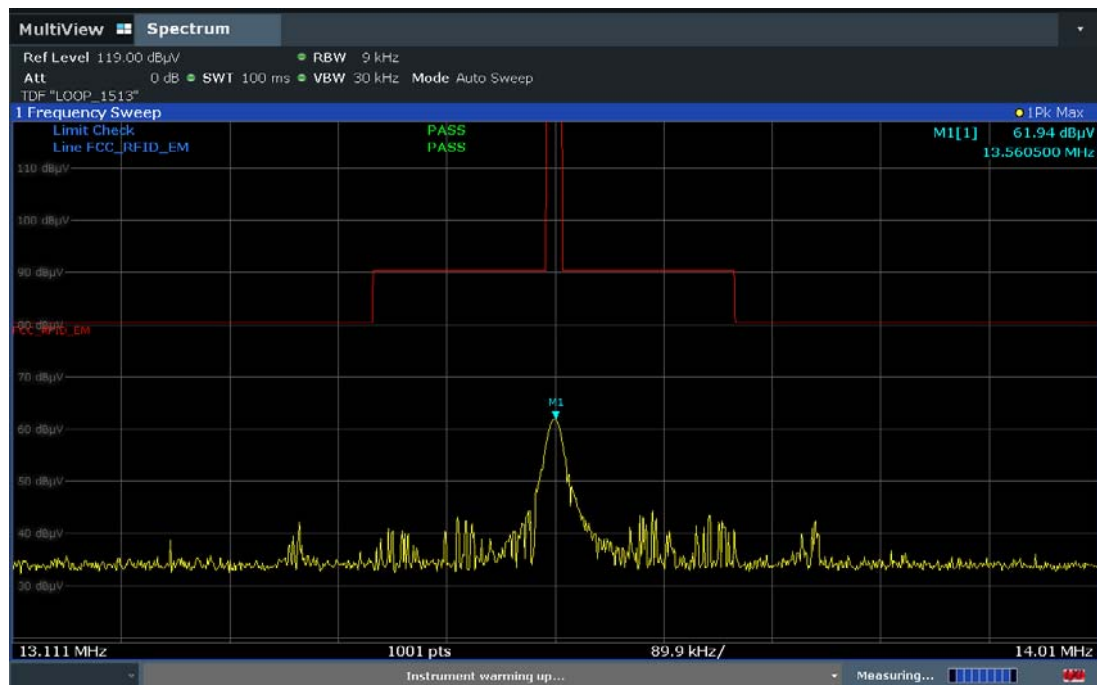
- It is not recorded on the report that the reading of emissions are attenuated more than 30 dB below the permissible limits or the field strength is too small to measured.
- The transmitter radiated spectrum was investigated from 9 kHz to 1 GHz.

## 5.2.6 Plots

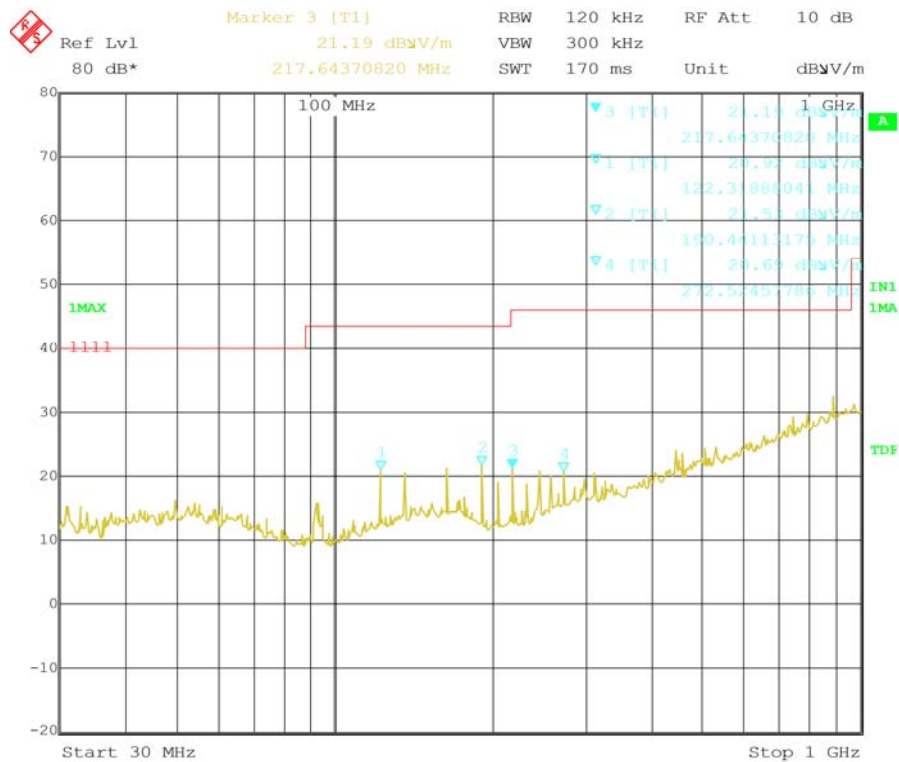
### RFID 1(ACM1281U) – In band



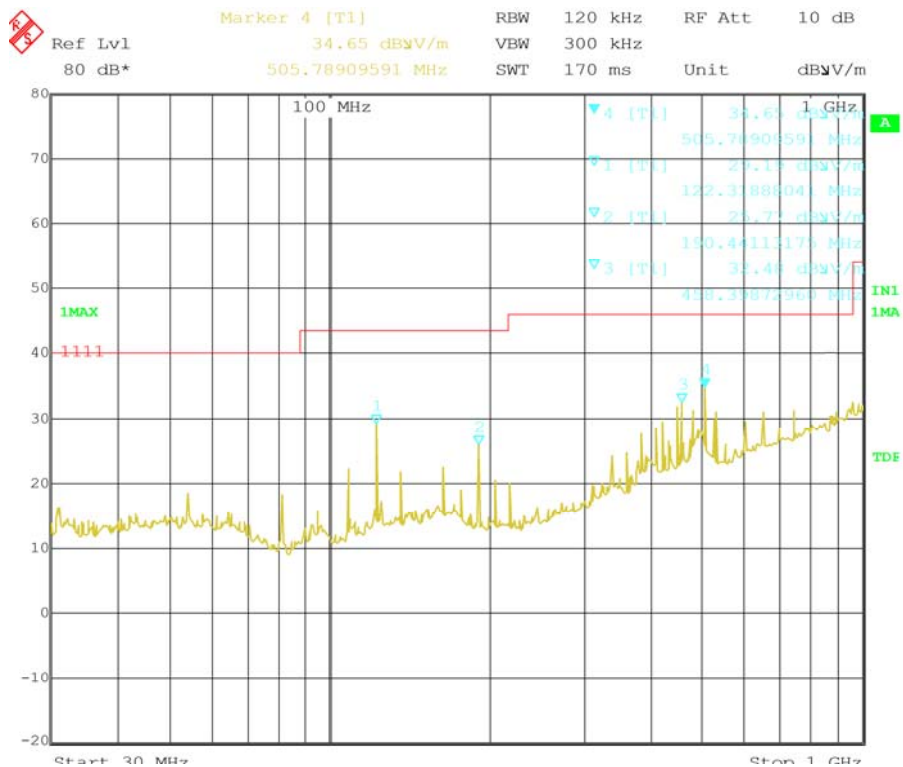
### RFID 2(HID) – In band



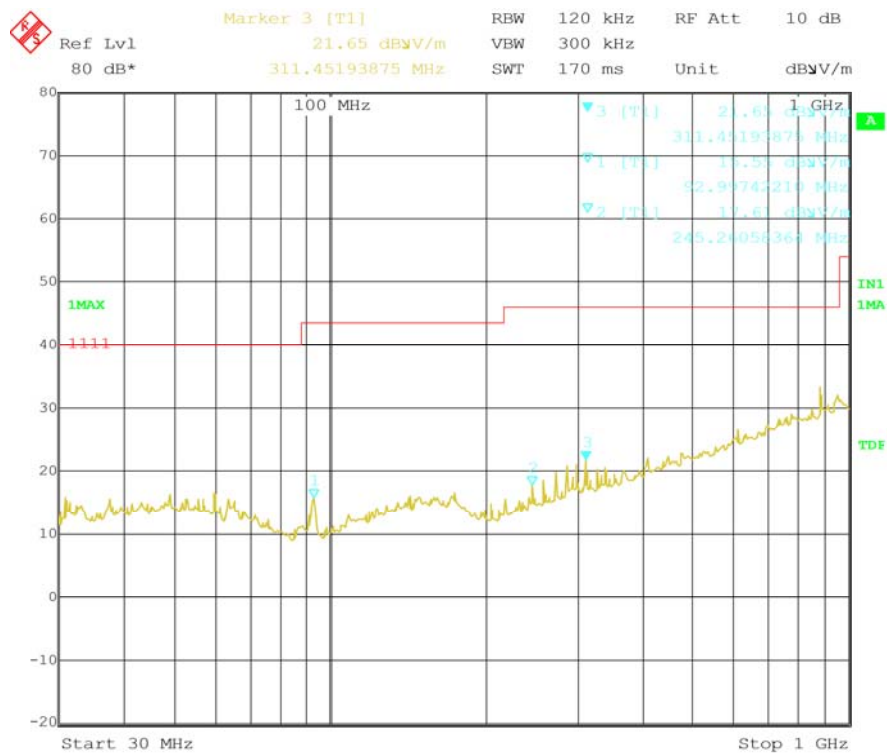
### RFID 1(ACM1281U) – Out band (H)



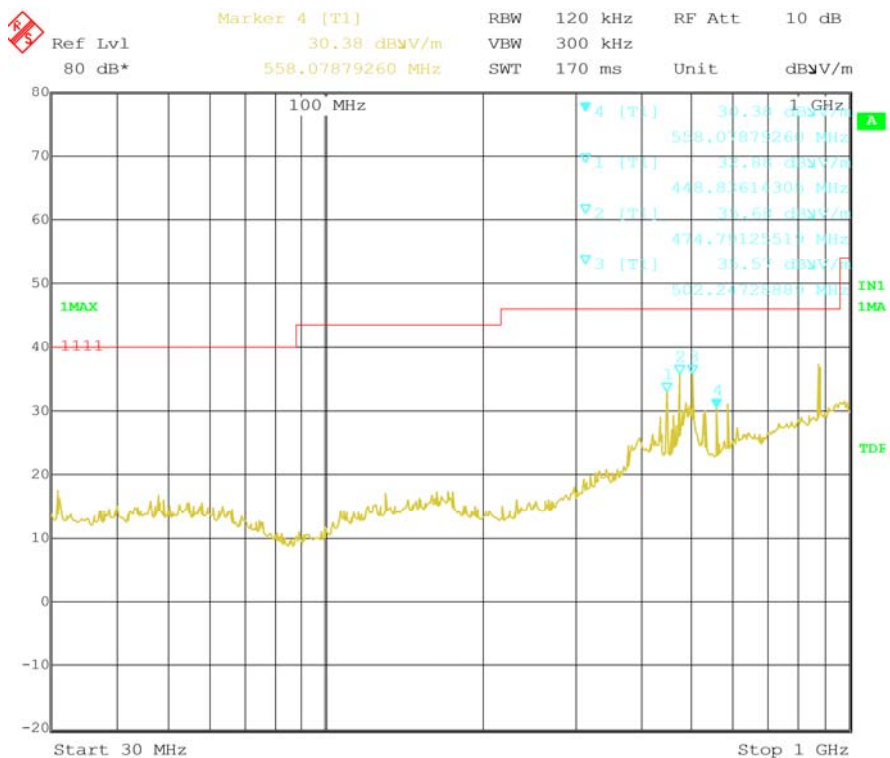
### RFID 1(ACM1281U) – Out band (V)



### RFID 2(HID) – Out band (H)



### RFID 2(HID) – Out band (V)



### 5.3 20 dB Bandwidth (Occupied bandwidth)

#### 5.3.1 Standard Applicable [FCC Part 15.215(c) & 2.1049]

The 20 dB & 99 % bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

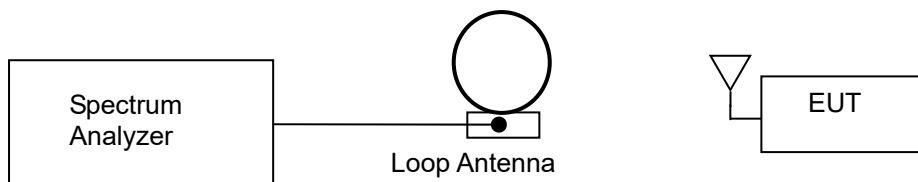
#### 5.3.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) °C • Relative Humidity : (49 ~ 51) % R.H.

#### 5.3.3 Measurement Procedure

Refer 5.3.1

#### 5.3.4 Test setup



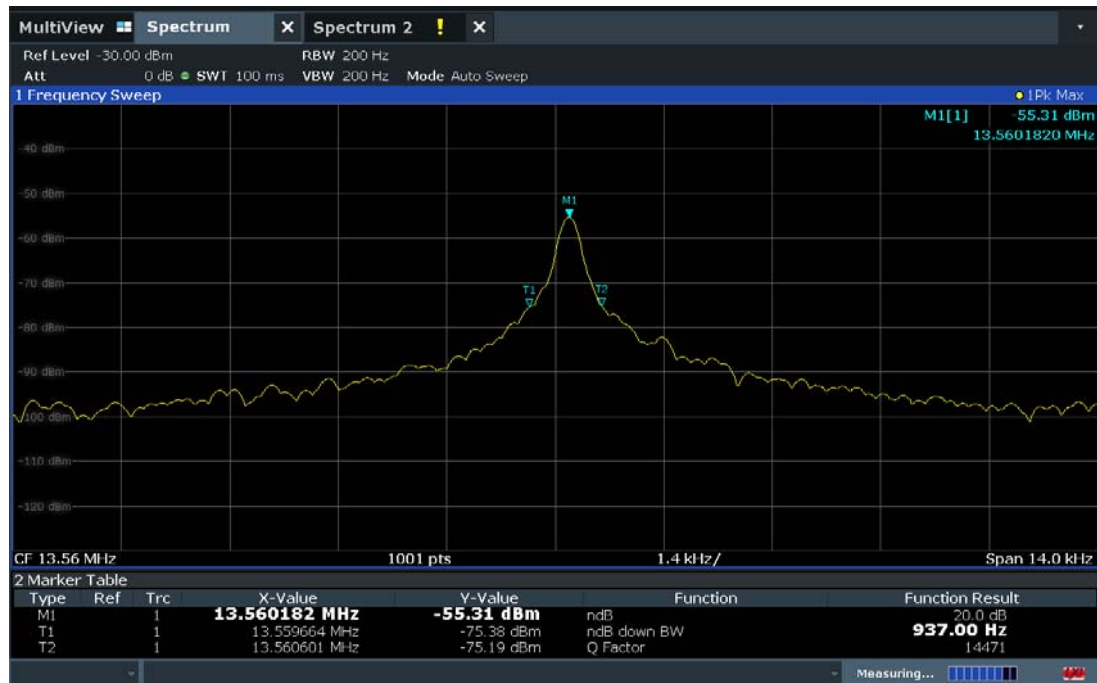
#### 5.3.5 Measurement Result

| Frequency [MHz] | 20 dB Bandwidth [kHz] |             | Limit                  | Test Results |
|-----------------|-----------------------|-------------|------------------------|--------------|
|                 | RFID 1(ACM1281U)      | RFID 2(HID) |                        |              |
| 13.56           | 0.94                  | 1.03        | N/A – Information only | Compliance   |

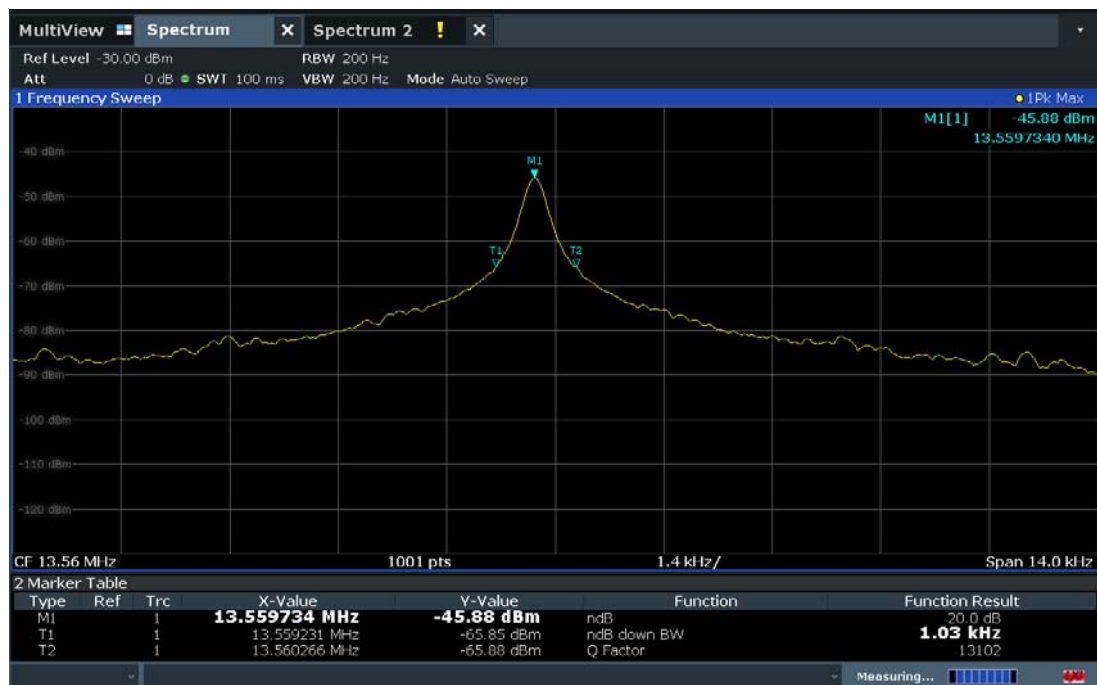
| Frequency<br>[MHz] | 99% Bandwidth<br>[kHz] | Limit                  | Test Results |
|--------------------|------------------------|------------------------|--------------|
|                    | RFID 2(HID)            |                        |              |
| 0.125              | 1.67                   | N/A – Information only | Compliance   |

### 5.3.6 Test Plot

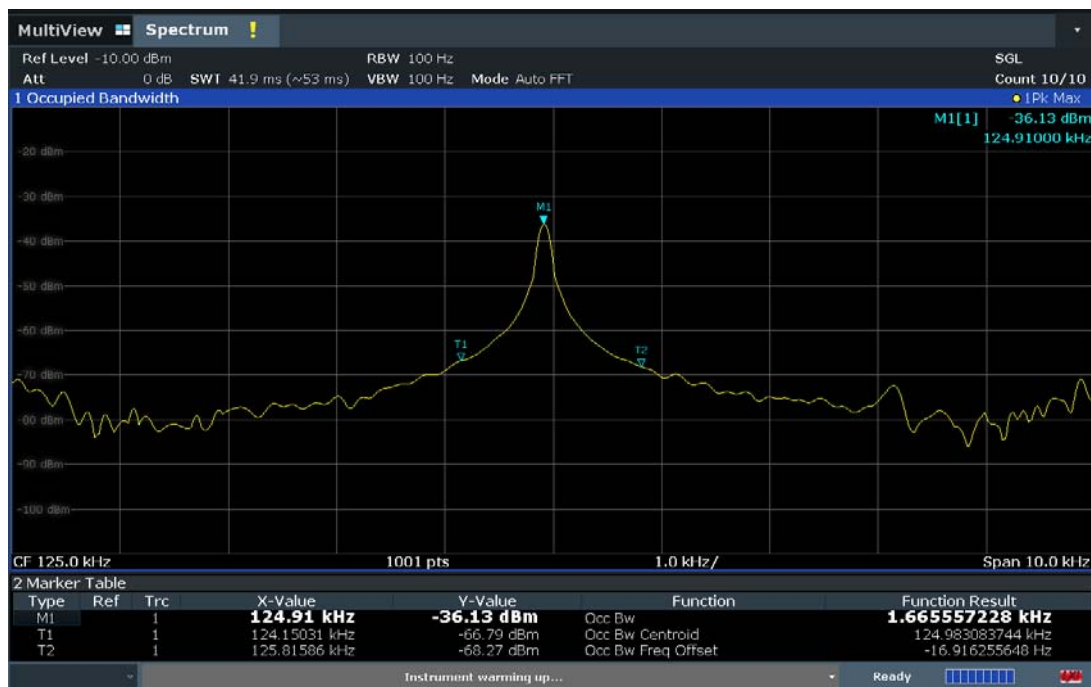
RFID 1(ACM1281U)



RFID 2(HID-13.56 MHz)



RFID 2(HID-125 kHz)



## 5.4 Antenna requirement

### 5.4.1 Standard applicable [FCC Part 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.

### 5.4.2 Antenna details

| Frequency Band | Antenna Type          | Gain [dBi] | Results    |
|----------------|-----------------------|------------|------------|
| 13.56 MHz      | Internal PCB antenna  | N/A        | Compliance |
| 125 kHz        | Internal coil antenna | N/A        | Compliance |

## 5.5 AC Power Conducted emissions

### 5.5.1 Standard Applicable [FCC Part15.207(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

### 5.5.2 Test Environment conditions

• Ambient temperature : (21 ~ 22) °C • Relative Humidity : (49 ~ 51) % R.H.

### 5.5.3 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.

### 5.5.4 Used equipment

| Equipment     | Model No. | Serial No. | Manufacturer    | Next cal date | Cal interval | Used                                |
|---------------|-----------|------------|-----------------|---------------|--------------|-------------------------------------|
| Test receiver | ESCS30    | 100111     | Rohde & Schwarz | 2022. 01. 20  | 1 year       | <input checked="" type="checkbox"/> |
| Pulse Limiter | ESH3-Z2   | 100097     | Rohde & Schwarz | 2022. 01. 20  | 1 year       | <input checked="" type="checkbox"/> |
| LISN          | ESH2-Z5   | 100044     | R&S             | 2022. 01. 20  | 1 year       | <input type="checkbox"/>            |
|               | ESH3-Z5   | 100147     | R&S             | 2022. 01. 20  | 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 UCISPR 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 : 3.98 dB(CL: Approx 95 %,  $k=2$ )

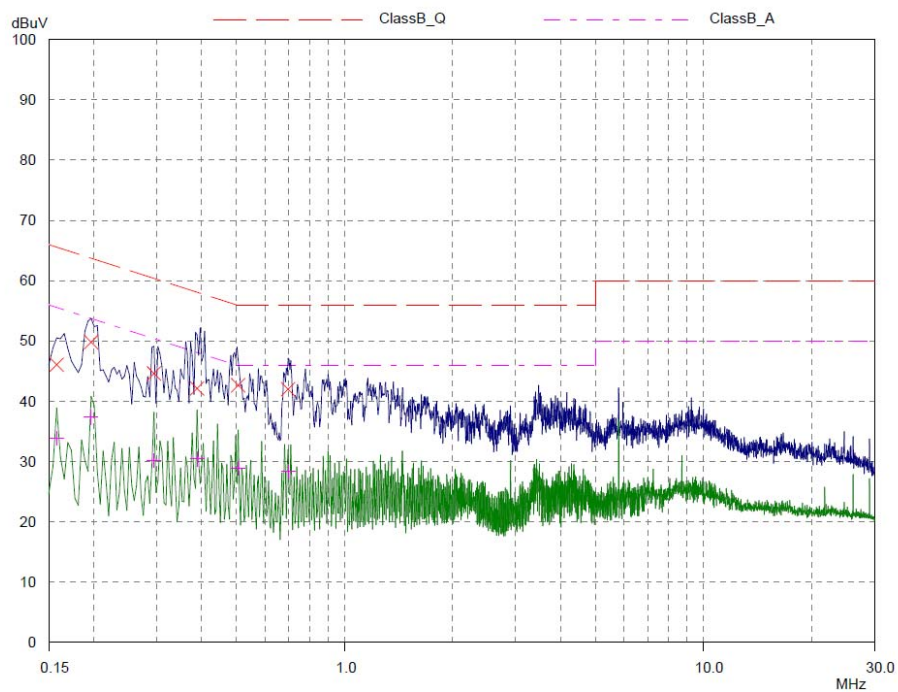
0.15 ~ 30 MHz : 3.48 dB(CL: Approx 95 %,  $k=2$ )

### 5.5.5 Measurement Result

| Freq.<br>[MHz] | Factor<br>[dB] |               | POL | QP     |         |        | CISPR AV |         |        |
|----------------|----------------|---------------|-----|--------|---------|--------|----------|---------|--------|
|                |                |               |     | Limit  | Reading | Result | Limit    | Reading | Result |
|                | LISN           | CABLE<br>+P/L |     | [dBμV] | [dBμV]  | [dBμV] | [dBμV]   | [dBμV]  | [dBμV] |
| 0.158          | 0.13           | 10.02         | L   | 65.58  | 46.07   | 46.20  | 55.58    | 32.92   | 33.05  |
| 0.197          | 0.12           | 9.87          | L   | 63.74  | 49.82   | 49.94  | 53.74    | 36.39   | 36.51  |
| 0.295          | 0.12           | 9.86          | L   | 60.40  | 44.62   | 44.74  | 50.40    | 29.83   | 29.95  |
| 0.388          | 0.12           | 9.86          | L   | 58.10  | 42.12   | 42.24  | 48.10    | 29.22   | 29.34  |
| 0.505          | 0.12           | 9.86          | L   | 56.00  | 42.65   | 42.77  | 46.00    | 28.60   | 28.72  |
| 0.697          | 0.13           | 10.00         | L   | 56.00  | 42.01   | 42.14  | 46.00    | 28.13   | 28.26  |
| 0.162          | 0.11           | 10.01         | N   | 65.38  | 47.79   | 47.90  | 55.38    | 35.86   | 35.97  |
| 0.201          | 0.11           | 9.86          | N   | 63.58  | 50.43   | 50.54  | 53.58    | 37.95   | 38.06  |
| 0.298          | 0.11           | 9.86          | N   | 60.29  | 46.30   | 46.41  | 50.29    | 38.00   | 38.11  |
| 0.357          | 0.11           | 9.86          | N   | 58.80  | 52.55   | 52.66  | 48.80    | 41.74   | 41.85  |
| 0.396          | 0.11           | 9.86          | N   | 57.93  | 54.75   | 54.86  | 47.93    | 44.52   | 44.63  |
| 0.470          | 0.11           | 9.86          | N   | 56.51  | 48.11   | 48.22  | 46.51    | 39.00   | 39.11  |

- \* 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

