

# 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-210021(1)                    |  <b>KOSTEC Co., Ltd.</b><br><a href="http://www.kostec.org">http://www.kostec.org</a> |
| <p>1. Applicant</p> <ul style="list-style-type: none"> <li>• Name : MANDO corp.</li> <li>• Address : 21, Pangyo-ro 255beon-gil, Bundang-gu, Gyeonggi-do, Seongnam-si 463-400 Korea (Republic Of)</li> </ul> <p>2. Test Item</p> <ul style="list-style-type: none"> <li>• Product Name: Automotive Radar</li> <li>• Model Name: LRR-20</li> <li>• Brand: -</li> <li>• FCC ID: 2ACDX-LRR-20      • IC: 11988A-LRR20</li> </ul> <p>3. Manufacturer</p> <ul style="list-style-type: none"> <li>• Name : MANDO corp.</li> <li>• Address : 21, Pangyo-ro 255beon-gil, Bundang-gu, Gyeonggi-do, Seongnam-si 463-400 Korea (Republic Of)</li> </ul> <p>4. Date of Test : 2021. 05. 24. ~ 2021. 05. 25., 2021. 07. 27.</p> <p style="text-align: center;">FCC CFR 47, Part 95. Subpart M</p> <p>5. Test Method Used : RSS-251 issue 2, RSS-GEN issue 5<br/>ANSI C 63.10-2013</p> <p>6. Test Result : Compliance</p> <p>7. Note: -</p> |                                                  |                                                                                                                                                                          |
| <p><b>Supplementary Information</b></p> <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 style="text-align: center;">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>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                  |                                                                                                                                                                          |
| Affirmation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Tested by<br>Name : Choo, Kwang-Yeol (Signature) | Technical Manager<br>Name : Park, Gyeong-Hyeon (Signature)                                                                                                               |
| 2021. 08. 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                  |                                                                                                                                                                          |
| <b>KOSTEC Co., Ltd.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                  |                                                                                                                                                                          |

## **Table of Contents**

|                                               |           |
|-----------------------------------------------|-----------|
| <b>1. GENERAL INFORMATION.....</b>            | <b>3</b>  |
| 1.1 Test Facility.....                        | 3         |
| 1.2 Location .....                            | 3         |
| 1.3 Revision History of test report .....     | 4         |
| <b>2. EQUIPMENT DESCRIPTION .....</b>         | <b>5</b>  |
| <b>3. SYSTEM CONFIGURATION FOR TEST .....</b> | <b>6</b>  |
| 3.1 Characteristics of equipment.....         | 6         |
| 3.2 Used peripherals list.....                | 6         |
| 3.3 Product Modification .....                | 6         |
| 3.4 Operating Mode .....                      | 6         |
| 3.5 Test Setup of EUT .....                   | 6         |
| 3.6 Used Test Equipment List.....             | 7         |
| 3.7 Measurement uncertainty .....             | 11        |
| <b>4. SUMMARY TEST RESULTS .....</b>          | <b>12</b> |
| <b>5. MEASUREMENT RESULTS.....</b>            | <b>13</b> |
| 5.1 Unwanted Emissions .....                  | 16        |
| 5.2 Frequency Stability .....                 | 25        |
| 5.3 Occupied Bandwidth.....                   | 27        |
| 5.4 Modulation characteristics .....          | 29        |
| 5.5 Antenna requirement .....                 | 30        |

## 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

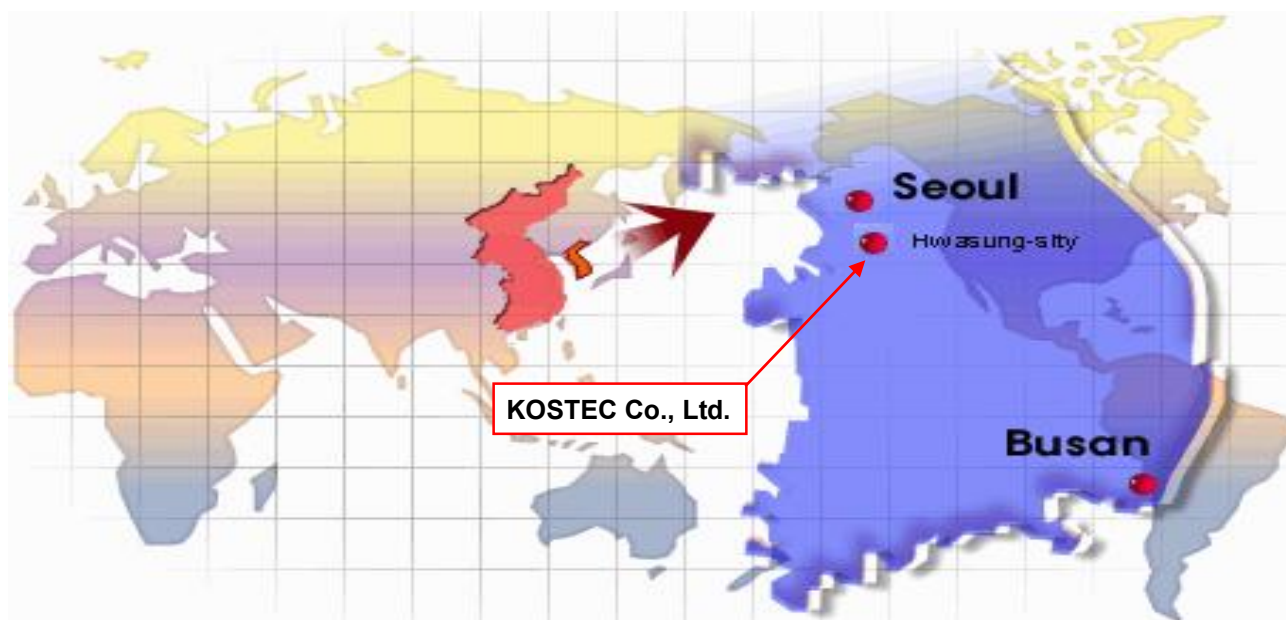
RRA (National Radio Research Agency): KR0041

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 | 2021. 07. 30. |
| 1    | Added FMCW desensitization factor and measurement plot | 14, 15      | Gyeong Hyeon, Park | 2021. 08. 11. |

## 2. EQUIPMENT DESCRIPTION

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

|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment Name                               | Automotive Radar                                                                                                                                                                                                                                                                                                                                                                                                         |
| Model No                                     | LRR-20                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Usage                                        | Automotive Radar                                                                                                                                                                                                                                                                                                                                                                                                         |
| Serial Number                                | Proto type                                                                                                                                                                                                                                                                                                                                                                                                               |
| Modulation type                              | FMCW                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Emission Type                                | 825MF0N                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Maximum output power(e.i.r.p)                | 33.303 dBm(PK), 31.95 dBm(AV)                                                                                                                                                                                                                                                                                                                                                                                            |
| Operated Frequency                           | 76 GHz ~ 77 GHz                                                                                                                                                                                                                                                                                                                                                                                                          |
| Channel Number                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Operation temperature                        | -40 °C ~ 85 °C                                                                                                                                                                                                                                                                                                                                                                                                           |
| Power Source                                 | DC 12 V                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Antenna Description                          | Patch Antenna(Fixed), gain : 21.8 dBi                                                                                                                                                                                                                                                                                                                                                                                    |
| Remark                                       | <ol style="list-style-type: none"> <li>1. The device was operating at its maximum output power for all measurements.</li> <li>2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case (Y) is shown in the report.</li> <li>3. The above DUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description.</li> </ol> |
| FCC ID                                       | 2ACDX-LRR-20                                                                                                                                                                                                                                                                                                                                                                                                             |
| IC                                           | 11988A-LRR20                                                                                                                                                                                                                                                                                                                                                                                                             |
| PMN(Product Marketing Number)                | LRR-20                                                                                                                                                                                                                                                                                                                                                                                                                   |
| HVIN(Hardware Version Identification Number) | LRR-20                                                                                                                                                                                                                                                                                                                                                                                                                   |
| FVIN(Firmware Version Identification Number) | A.01                                                                                                                                                                                                                                                                                                                                                                                                                     |
| HMN(Host Marketing Name)                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                      |

### 3. SYSTEM CONFIGURATION FOR TEST

#### 3.1 Characteristics of equipment

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

#### 3.2 Used peripherals list

| Description | Model No. | Serial No. | Manufacture | Remark |
|-------------|-----------|------------|-------------|--------|
| -           | -         | -          | -           | -      |

#### 3.3 Product Modification

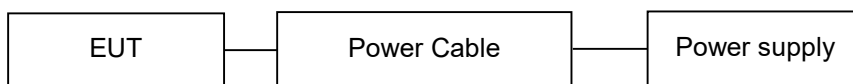
N/A

#### 3.4 Operating Mode

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. Software used to control the EUT for staying in continuous transmitting mode was programmed. The worst case data rate is determined as the data rate with highest output power.

#### 3.5 Test Setup of EUT

The measurements were taken in continuous transmit mode using the test mode. The cables were provided by the applicant.



### 3.6 Used Test Equipment List

Used Test Equipment List for Test Date (21.05.24~21.05.25)

| 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                 | 2021.09.02    | 1 year       | <input type="checkbox"/>            |
| 3   | T & H Chamber                 | SH-641       | 92006831     | ESPEC CORP                 | 2022.03.29    | 1 year       | <input checked="" type="checkbox"/> |
| 4   | Spectrum Analyzer             | 8563EC       | 3046A00527   | Agilent Technology         | 2022.01.19    | 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            | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 7   | Spectrum Analyzer             | FSV40        | 101727       | Rohde & Schwarz            | 2021.07.22    | 1 year       | <input type="checkbox"/>            |
| 8   | Signal Analyzer               | FSW43        | 101294       | Rohde & Schwarz            | 2022.02.18    | 1 year       | <input type="checkbox"/>            |
| 9   | Signal Analyzer               | FSW85        | 101602       | Rohde & Schwarz            | 2021.06.21    | 1 year       | <input checked="" 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            | 2021.08.31    | 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                    | 2021.09.01    | 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                  | 2021.08.31    | 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 checked="" type="checkbox"/> |
| 25  | Signal Generator              | N5173B       | MY57280148   | KEYSIGHT                   | 2021.06.11    | 1 year       | <input checked="" 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 checked="" 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 type="checkbox"/>            |
| 32  | DC Power Supply               | 6632B        | MY43004137   | Agilent Technology         | 2022.01.20    | 1 year       | <input type="checkbox"/>            |
| 33  | Termination                   | 1433-3       | LM718        | WEINSCHEL                  | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 34  | Termination                   | 1432-3       | QR946        | AEROFLEX/WEINSCHEL         | 2021.07.17    | 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                  | 2021.09.02    | 1 year       | <input type="checkbox"/>            |
| 42  | Attenuator                    | 56-10        | 66920        | WEINSCHEL                  | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 43  | Attenuator                    | 48-20-11     | BV2658       | Aeroflex/Weinschel         | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 44  | Attenuator                    | 48-30-33-LIM | BL5350       | Weinschel Corp.            | 2021.07.17    | 1 year       | <input type="checkbox"/>            |
| 45  | Power divider                 | 11636B       | 51212        | HP                         | 2022.01.21    | 1 year       | <input type="checkbox"/>            |
| 46  | 3Way Power divider            | KPDSU3W      | 00070365     | KMW                        | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 47  | 4Way Power divider            | 70052651     | 173834       | KRYTAR                     | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 48  | 3Way Power divider            | 1580         | SQ361        | WEINSCHEL                  | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 49  | OSP                           | OSP120       | 101577       | Rohde & Schwarz            | 2021.06.02    | 1 year       | <input type="checkbox"/>            |
| 50  | 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                                |
|-----|--------------------------------------------------|----------------------------------|-------------|-----------------------------|---------------|--------------|-------------------------------------|
| 51  | Dual directional coupler                         | 778D                             | 17693       | HEWLETT PACKARD             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 52  | Dual directional coupler                         | 772D                             | 2839A00924  | HEWLETT PACKARD             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 53  | Band rejection filter                            | 3TNF-0006                        | 26          | DOVER Tech                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 54  | Band rejection filter                            | 3TNF-0007                        | 311         | DOVER Tech                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 55  | Band rejection filter                            | WTR-BRF2442-84NN                 | 09020001    | WAVE TECH Co.,LTD           | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 56  | Band rejection filter                            | WRCJV12-5695-5725-5825-5855-50SS | 1           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 57  | Band rejection filter                            | WRCJV12-5120-5150-5350-5380-40SS | 4           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 58  | Band rejection filter                            | WRCGV10-2360-2400-2500-2540-50SS | 2           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 59  | Band rejection filter                            | CTF-155M-S1                      | 001         | RF One Electronics          | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 60  | Band rejection filter                            | CTF-435M-S1                      | 001         | RF One Electronics          | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 61  | Band rejection filter                            | CTF-5890M-70MS1                  | 1           | RF One Electronics          | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 62  | Highpass Filter                                  | WHJS1100-10EF                    | 1           | WAINWRIGHT                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 63  | Highpass Filter                                  | WHJS3000-10EF                    | 1           | WAINWRIGHT                  | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 64  | Highpass Filter                                  | WHNX6-5530-7000-26500-40CC       | 2           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 65  | Highpass Filter                                  | WHNX6-2370-3000-26500-40CC       | 4           | Wainwright Instruments GmbH | 2022.05.04    | 1 year       | <input type="checkbox"/>            |
| 66  | WideBand Radio Communication Tester              | CMW500                           | 102276      | Rohde & Schwarz             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 67  | WideBand Radio Communication Tester              | CMW500                           | 117235      | Rohde & Schwarz             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 68  | WideBand Radio Communication Tester(with CMX500) | CMW500                           | 167157      | Rohde & Schwarz             | 2022.04.09    | 1 year       | <input type="checkbox"/>            |
| 69  | Bluetooth Tester                                 | TC-3000B                         | 3000B6A0166 | TESCOM CO., LTD.            | 2022.01.18    | 1 year       | <input type="checkbox"/>            |
| 70  | Loop Antenna                                     | 6502                             | 9203-0493   | EMCO                        | 2021.05.27    | 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 checked="" type="checkbox"/> |
| 78  | Horn Antenna <sub>(R)</sub>                      | BBHA 9170                        | 9170-722    | SCHWARZBECK                 | 2022.05.12    | 2 year       | <input checked="" 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                      | 2021.09.23    | 1 year       | <input checked="" type="checkbox"/> |
| 82  | PREAMPLIFIER(C_3)                                | 8449B                            | 3008A02577  | Agilent                     | 2022.01.19    | 1 year       | <input checked="" 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 checked="" type="checkbox"/> |
| 86  | Horn Antenna                                     | M19RH                            | T01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 87  | Horn Antenna                                     | M19RH                            | R01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 88  | Horn Antenna                                     | M12RH                            | T02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 89  | Horn Antenna                                     | M12RH                            | R02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 90  | Horn Antenna                                     | M08RH                            | T03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 91  | Horn Antenna                                     | M08RH                            | R03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 92  | Horn Antenna                                     | M05RH                            | T04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 93  | Horn Antenna                                     | M05RH                            | R04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 94  | Horn Antenna                                     | M03RH                            | T05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 95  | Horn Antenna                                     | M03RH                            | R05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 96  | Harmonic Mixer                                   | M12HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 97  | Harmonic Mixer                                   | M08HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 98  | Harmonic Mixer                                   | M05HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 99  | Harmonic Mixer                                   | M03HWD                           | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 100 | Source Module                                    | S19MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 101 | Source Module                                    | S12MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 102 | Source Module                                    | S08MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 103 | Source Module                                    | S05MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |
| 104 | Source Module                                    | S03MS-A                          | 200529-1    | OML, Inc.                   | 2021.07.03    | 1 year       | <input checked="" type="checkbox"/> |

Used Test Equipment List for Test Date (21.07.27)

| 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                 | 2021.09.02    | 1 year       | <input type="checkbox"/>            |
| 3   | T & H Chamber                 | SH-641       | 92006831     | ESPEC CORP                 | 2022.03.29    | 1 year       | <input checked="" type="checkbox"/> |
| 4   | Spectrum Analyzer             | 8563EC       | 3046A00527   | Agilent Technology         | 2022.01.19    | 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            | 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 type="checkbox"/>            |
| 9   | Signal Analyzer               | FSW85        | 101602       | Rohde & Schwarz            | 2022.06.30    | 1 year       | <input checked="" 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            | 2021.08.31    | 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                    | 2021.09.01    | 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                  | 2021.08.31    | 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 checked="" type="checkbox"/> |
| 25  | Signal Generator              | N5173B       | MY57280148   | KEYSIGHT                   | 2022.06.11    | 1 year       | <input checked="" 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 checked="" 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 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                  | 2021.09.02    | 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                        | 2021.08.31    | 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                  | 2021.08.31    | 1 year       | <input type="checkbox"/>            |
| 50  | Dual directional coupler      | 778D         | 17693        | HEWLETT PACKARD            | 2022.01.19    | 1 year       | <input type="checkbox"/>            |

| No. | Instrument                                       | Model                            | S/N         | Manufacturer                | Next Cal Date | Cal interval | used                                |
|-----|--------------------------------------------------|----------------------------------|-------------|-----------------------------|---------------|--------------|-------------------------------------|
| 51  | Dual directional coupler                         | 772D                             | 2839A00924  | HEWLETT PACKARD             | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 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          | 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  | 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 checked="" type="checkbox"/> |
| 70  | BiconiLog Antenna                                | 3142B                            | 1745        | EMCO                        | 2022.04.24    | 2 year       | <input type="checkbox"/>            |
| 71  | Trilog-Broadband Antenna <sub>(R)</sub>          | VULB 9168                        | 9168-606    | SCHWARZBECK                 | 2022.09.21    | 2 year       | <input checked="" type="checkbox"/> |
| 72  | Biconical Antenna <sub>(T)</sub>                 | VUBA9117                         | 9117-342    | Schwarz beck                | 2022.03.24    | 2 year       | <input type="checkbox"/>            |
| 73  | Horn Antenna                                     | 3115                             | 9605-4834   | EMCO                        | 2022.03.06    | 2 year       | <input type="checkbox"/>            |
| 74  | Horn Antenna                                     | QMS-00208                        | 21909       | STEATITE ANTENNA            | 2022.12.04    | 2 year       | <input type="checkbox"/>            |
| 75  | Horn Antenna <sub>(R)</sub>                      | 3117                             | 00135191    | ETS-LINDGREN                | 2022.04.29    | 2 year       | <input type="checkbox"/>            |
| 76  | Horn Antenna <sub>(T)</sub>                      | 3115                             | 2996        | EMCO                        | 2022.02.14    | 2 year       | <input checked="" type="checkbox"/> |
| 77  | Horn Antenna <sub>(R)</sub>                      | BBHA 9170                        | 9170-722    | SCHWARZBECK                 | 2022.05.12    | 2 year       | <input checked="" type="checkbox"/> |
| 78  | Horn Antenna <sub>(T)</sub>                      | BBHA 9170                        | 743         | SCHWARZBECK                 | 2023.01.21    | 2 year       | <input type="checkbox"/>            |
| 79  | AMPLIFIER(A_10)                                  | TK-PA6S                          | 120009      | TESTEK                      | 2022.01.19    | 1 year       | <input type="checkbox"/>            |
| 80  | AMPLIFIER(C_3)                                   | TK-PA01S                         | 200141-L    | TESTEK                      | 2021.09.23    | 1 year       | <input checked="" type="checkbox"/> |
| 81  | PREAMPLIFIER(C_3)                                | 8449B                            | 3008A02577  | Agilent                     | 2022.01.19    | 1 year       | <input checked="" type="checkbox"/> |
| 82  | RF PRE AMPLIFIER                                 | SCU08F2                          | 100762      | Rohde & Schwarz             | 2021.12.04    | 1 year       | <input type="checkbox"/>            |
| 83  | AMPLIFIER                                        | TK-PA18                          | 150003      | TESTEK                      | 2022.01.21    | 1 year       | <input type="checkbox"/>            |
| 84  | AMPLIFIER                                        | TK-PA1840H                       | 160010-L    | TESTEK                      | 2022.01.21    | 1 year       | <input checked="" type="checkbox"/> |
| 85  | Horn Antenna                                     | M19RH                            | T01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 86  | Horn Antenna                                     | M19RH                            | R01         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 87  | Horn Antenna                                     | M12RH                            | T02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 88  | Horn Antenna                                     | M12RH                            | R02         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 89  | Horn Antenna                                     | M08RH                            | T03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 90  | Horn Antenna                                     | M08RH                            | R03         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 91  | Horn Antenna                                     | M05RH                            | T04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 92  | Horn Antenna                                     | M05RH                            | R04         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 93  | Horn Antenna                                     | M03RH                            | T05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 94  | Horn Antenna                                     | M03RH                            | R05         | OML, Inc.                   | 2022.05.29    | 2 year       | <input checked="" type="checkbox"/> |
| 95  | Harmonic Mixer                                   | M12HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input checked="" type="checkbox"/> |
| 96  | Harmonic Mixer                                   | M08HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input checked="" type="checkbox"/> |
| 97  | Harmonic Mixer                                   | M05HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input checked="" type="checkbox"/> |
| 98  | Harmonic Mixer                                   | M03HWD                           | 200529-1    | OML, Inc.                   | 2022.07.12    | 1 year       | <input checked="" type="checkbox"/> |
| 99  | Source Module                                    | S19MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input checked="" type="checkbox"/> |
| 100 | Source Module                                    | S12MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input checked="" type="checkbox"/> |
| 101 | Source Module                                    | S08MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input checked="" type="checkbox"/> |
| 102 | Source Module                                    | S05MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input checked="" type="checkbox"/> |
| 103 | Source Module                                    | S03MS-A                          | 200529-1    | OML, Inc.                   | 2022.07.02    | 1 year       | <input checked="" type="checkbox"/> |

Note: The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards. Especially, all antenna(Up to 40 GHz) for measurement is calibrated in accordance with the requirements of C 63.5.

### 3.7 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.

| Parameter                            | Measurement uncertainty           |
|--------------------------------------|-----------------------------------|
| Radiated Disturbance(Below 1 GHz)    | 3.62 dB (CL: Approx 95 %, $k=2$ ) |
| Radiated Disturbance(1 GHz ~ 40 GHz) | 4.18 dB (CL: Approx 95 %, $k=2$ ) |
| Radiated Disturbance(Above 40 GHz)   | 5.38 dB (CL: Approx 95 %, $k=2$ ) |

## 4. SUMMARY TEST RESULTS

| Description of Test                                                                                                                                                                                                                    | FCC Rule      | ISED                                              | Reference Clause | Used                                | Test Result |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------|------------------|-------------------------------------|-------------|
| Equivalent Isotropically Radiated Power(EIRP)                                                                                                                                                                                          | 95.3367(a)(b) | RSS-251,<br>Section 8.1, 9.1                      | Clause 5.1       | <input checked="" type="checkbox"/> | Compliance  |
| Unwanted emissions                                                                                                                                                                                                                     | 95.3379(a)    | RSS-GEN<br>Section 6.13,<br>RSS-251<br>Section 10 | Clause 5.2       | <input checked="" type="checkbox"/> | Compliance  |
| Frequency stability                                                                                                                                                                                                                    | 95.3379(b)    | RSS-GEN<br>Section 8.11,<br>RSS-251<br>Section 11 | Clause 5.3       | <input checked="" type="checkbox"/> | Compliance  |
| Occupied Bandwidth                                                                                                                                                                                                                     | 2.1049        | RSS-GEN<br>Section 6.7,<br>RSS-251<br>Section 7   | Clause 5.4       | <input checked="" type="checkbox"/> | Compliance  |
| Modulation characteristics                                                                                                                                                                                                             | 2.1047        | RSS-251<br>Section 6                              | Clause 5.5       | <input checked="" type="checkbox"/> | Compliance  |
| Antenna requirements                                                                                                                                                                                                                   | 15.203        | RSS-GEN                                           | Clause 5.6       | <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 95. Subpart M  
 RSS-GEN Issue 5, RSS-251 Issue 2  
 KDB 653005 D01 76-81 GHz Radars v01r01  
 ANSI C 63.10-2013

## 5. MEASUREMENT RESULTS

### 5.1 Equivalent Isotropically Radiated Power(EIRP)

#### 5.1.1 Standard Applicable [FCC §95.3367(a)(b), RSS-251, Section 8.1, 9.1]

##### FCC

The fundamental radiated emission limits within the 76-81 GHz band are expressed in terms of Equivalent Isotropically Radiated Power (EIRP) and are as follows:

- (a) The maximum power (EIRP) within the 76-81 GHz band shall not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz Resolution Bandwidth (RBW).
- (b) The maximum peak power (EIRP) within the 76-81 GHz band shall not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW.

##### ISED

##### Average equivalent isotropically radiated power (e.i.r.p.)

The radar device's total average e.i.r.p. shall not exceed 50 dBm over the occupied bandwidth.

##### Peak e.i.r.p. spectral density

The radar device's peak e.i.r.p. spectral density shall not exceed 55 dBm/MHz.

#### 5.1.2 Test Environment conditions

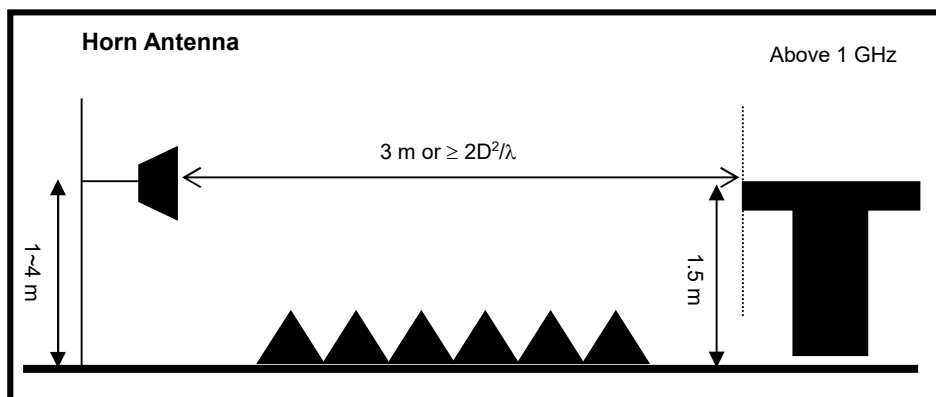
- Ambient temperature : (22 ~ 23) °C • Relative Humidity : (54 ~ 57) % R.H.

#### 5.1.3 Measurement Procedure

The measurements procedure of the Equivalent Isotropically Radiated Power is as following describe method.

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until the measurements for all frequencies are complete.

#### 5.1.4 Test setup



## 5.1.5 Measurement Result

### Average EIRP

| Freq. (GHz) | Reading (dBm) | Pol. (H/V) | Factor(dB) | Duty Factor(dB) | Meas Result (dBm) | Limit (dBm) | Margin. (dB) | Result     |
|-------------|---------------|------------|------------|-----------------|-------------------|-------------|--------------|------------|
| 76.5        | -38.95        | V          | 68.31      | 2.59            | 31.95             | 50          | 20.64        | Compliance |

### Peak EIRP

| Freq. (GHz) | Reading (dBm) | Pol. (H/V) | Factor(dB) | FMCW desensitization factor(dB) | Meas Result (dBm/MHz) | Limit (dBm/MHz) | Margin. (dB) | Result     |
|-------------|---------------|------------|------------|---------------------------------|-----------------------|-----------------|--------------|------------|
| 76.5        | -35.01        | V          | 68.31      | 0.003                           | 33.303                | 55              | 21.70        | Compliance |

#### ※Note

Wavelength = Speed of light / Measurement frequency = 30 / 7 700 = 0.0038

$R_{(Far\ Field)} = (2 * (\text{Max antenna length of EUT})^2) / \text{Wavelength} = (2 * (0.037)^2) / 0.0038 = 0.703\text{ m}$

Our measurement is performed at a minimum distance of 1 m >  $R_{(Far\ filed)}$

#### Calculation of test results

•Factor (dB): Mixer Loss(dB) + Cable Loss(dB) + FSPL(dB) - Antenna Gain(dBi)

•Meas Result (dBm): Reading(dBm) + Factor(dB)+Duty Factor(dB) or FMCW desensitization factor(dB)

•Duty factor = 10 \* log(1/x)

#### FSPL measurement

•FSPL = TxPower - RxPower;

•RxPower = S.A Measured Level - Rx Ant Gain + Mixer Conversion Loss + Cable Loss;

•TxPower = OML Source Output + Tx Ant Gain;

#### FMCW desensitization factor

The derivation of the FMCW desensitization factor is given in Keysight Application Note 5952-1039 Appendix B.

$$\alpha = \frac{1}{\sqrt[4]{1 + \left(\frac{2\ln(2)}{\pi}\right)^2 \left(\frac{F_s}{T_s B^2}\right)^2}}$$

and

FMCW desensitization factor = 20 Log( $\alpha$ )

Where

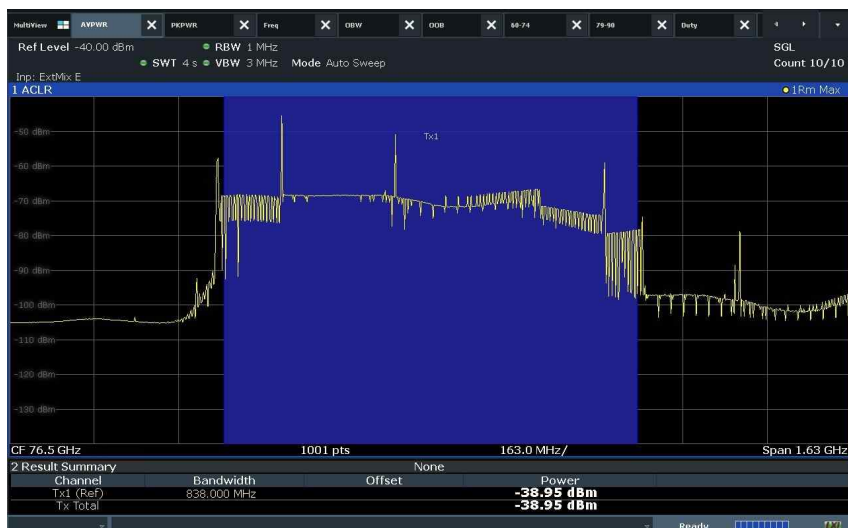
$F_s$  = FMCW Sweep Width or Chirp Width

$T_s$  = FMCW Sweep Time

$B$  = 3-dB bandwidth of Gaussian RBW Filter

| FMCW Sweep Width (MHz) | FMCW Sweep Time (us) | 3-dB bandwidth of Gaussian RBW Filter(MHz) | FMCW desensitization factor(dB) |
|------------------------|----------------------|--------------------------------------------|---------------------------------|
| 838                    | 10 486               | 1                                          | 0.003                           |

### Average EIRP



### Peak EIRP



## 5.2 Unwanted Emissions

### 5.2.1 Standard Applicable [FCC §95.3379(b), RSS-251 10, RSS-GEN 6.13, 7]

#### FCC

(a) The power density of any emissions outside the 76-81 GHz band shall consist solely of spurious emissions and shall not exceed the following:

(1) Radiated emissions below 40 GHz shall not exceed the field strength as shown in the following emissions table.

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 0.009-0.490     | 2400/F(kHz)                       | 300                           |
| 0.490-1.705     | 24000/F(kHz)                      | 30                            |
| 1.705-30.0      | 30                                | 30                            |
| 30-88           | 100                               | 3                             |
| 88-216          | 150                               | 3                             |
| 216-960         | 200                               | 3                             |
| Above 960       | 500                               | 3                             |

(i) In the emissions table in paragraph (a)(1) of this section, the tighter limit applies at the band edges.

(ii) The limits in the table in paragraph (a)(1) of this section are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(iii) The emissions limits shown in the table in paragraph (a)(1) of this section are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9.0-90.0 kHz, 110.0-490.0 kHz, and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector with a 1 MHz RBW.

(2) The power density of radiated emissions outside the 76-81 GHz band above 40.0 GHz shall not exceed the following, based on measurements employing an average detector with a 1 MHz RBW:

(i) For radiated emissions outside the 76-81 GHz band between 40 GHz and 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 600 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.

(ii) For radiated emissions above 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 1000 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.

(3) For field disturbance sensors and radar systems operating in the 76-81 GHz band, the spectrum shall be investigated up to 231.0 GHz.

#### ISED

RSS-251, 10 Unwanted emissions

| Emission frequency range | Limit                                                                    | Applicable detector  |
|--------------------------|--------------------------------------------------------------------------|----------------------|
| Below 40 GHz             | RSS-Gen general field strength limits for licence-exempt radio apparatus | RSS-Gen requirements |
| 40-162 GHz *             | -30 dBm/MHz (e.i.r.p.)                                                   | RMS detector         |

Note:

\* For radar devices that operate solely in the 76-77 GHz band (i.e. the occupied bandwidth is entirely contained in the 76-77 GHz band), an unwanted emissions limit of 0 dBm/MHz shall apply for the unwanted emission that fall in the 73.5-76 GHz band. Outside of the 73.5-76 GHz band, the unwanted emission limits prescribed in table 1 shall apply.

#### RSS GEN 7.3 Receiver radiated emission limits

Radiated emission measurements shall be performed with the receiver antenna connected to the receiver antenna ports. The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least five times the highest tunable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.

Spurious emissions from receivers shall not exceed the radiated emissions limits shown in table 3.

| Table 3 – Receiver radiated emissions limits |                                                                 |
|----------------------------------------------|-----------------------------------------------------------------|
| Frequency (MHz)                              | Field strength ( $\mu\text{V/m}$ at 3 metres) <sup>Note 1</sup> |
| 30-88                                        | 100                                                             |
| 88-216                                       | 150                                                             |
| 216-960                                      | 200                                                             |
| Above 960                                    | 500                                                             |

Note 1: Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with section 6.6.

#### 5.2.2 Test Environment conditions

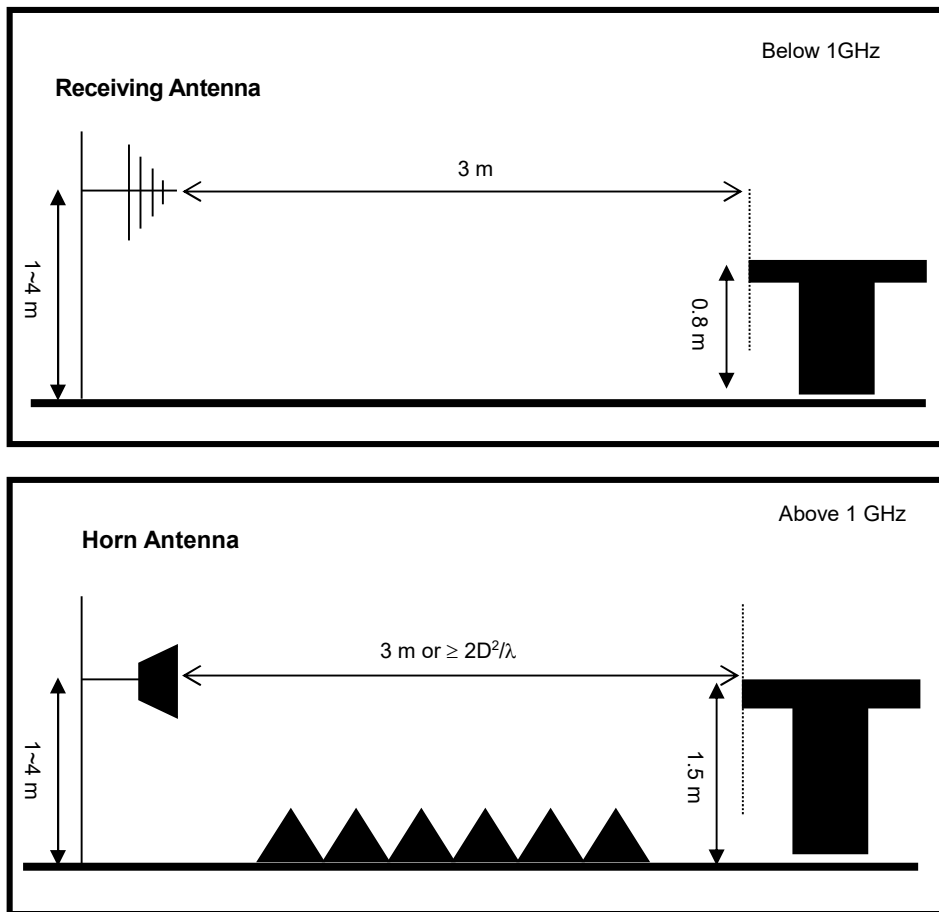
- Ambient temperature : (22 ~ 23) °C • Relative Humidity : (54 ~ 57) % R.H.

#### 5.2.3 Measurement Procedure

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

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until the measurements for all frequencies are complete.

#### 5.2.4 Test setup



All tests is performed by radiated measurement and applied below conditions.(EIRP, OBW)

$$\text{Wavelength} = \text{Speed of light} / \text{Measurement frequency} = 30 / 7\,700 = 0.0038$$

$$(2 * (\text{Max antenna length of EUT})^2) / \text{Wavelength} = (2 * (0.037)^2) / 0.0038 = 0.703\,m$$

## 5.2.5 Measurement Result

### ■ 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) |            |             |                                  |                         |             |            |
| 67.79          | 46.09                     | 0              | 1.0           | H             | 17.73           | 1.08       | 46.48       | 18.42                            | 40.0                    | 21.58       | Compliance |
| 412.54         | 43.36                     | 0              | 1.0           | V             | 21.99           | 2.70       | 46.18       | 21.87                            | 46.0                    | 24.13       | Compliance |
| 646.82         | 43.41                     | 0              | 1.0           | H             | 26.46           | 3.41       | 45.83       | 27.45                            | 46.0                    | 18.55       | Compliance |
| 665.26         | 43.10                     | 0              | 1.0           | V             | 26.66           | 3.45       | 45.79       | 27.41                            | 46.0                    | 18.59       | Compliance |
| 809.92         | 42.41                     | 0              | 1.0           | H             | 28.82           | 3.77       | 45.58       | 29.42                            | 46.0                    | 16.58       | 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)  
 • The transmitter radiated spectrum was investigated from 9 kHz to 1 GHz.

■ 1 GHz – 40 GHz

| 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 |        |
| No critical peaks found |                           |    |                |               |               |                 |            |             |                               |    |                          |    |              |    |        |

**※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.
- The transmitter radiated spectrum was investigated from 1 GHz to 40 GHz.

■ 40 GHz – 243 GHz

Measurement distance: 3 m

| Freq.<br>(GHz) | Reading<br>(dBm) | Pol.<br>(H/V) | Factor<br>(dB) | Meas Result<br>(dBm) | Limit<br>(dBm ) |    | Margin.<br>(dB) |       | Result     |
|----------------|------------------|---------------|----------------|----------------------|-----------------|----|-----------------|-------|------------|
|                |                  |               |                |                      | FCC             | IC | FCC             | IC    |            |
| 75.887 8       | -104.41          | V             | 77.42          | -26.99               | -1.7            | 0  | 25.29           | 26.99 | Compliance |

※Note

**Calculation of test results**

- Factor (dB): Mixer Loss(dB) + Cable Loss(dB) + FSPL(dB) - Antenna Gain(dBi)
- Meas Result (dBm): Reading(dBm) + Factor(dB)

**FSPL measurement**

- FSPL = TxPower - RxPower;
- RxPower = S.A Measured Level - Rx Ant Gain + Mixer Conversion Loss + Cable Loss;
- TxPower = OML Source Output + Tx Ant Gain;

**FCC Limit**

- For radiated emissions outside the 76-81 GHz band between 40 GHz and 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 600 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.
- For radiated emissions above 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 1000 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.

Notes:

$$P(\text{mW}) = \text{Power density (mW/m}^2) * 4\pi(r)^2$$

$$600 \text{ pW/cm}^2 = -1.7 \text{ dBm @ 3 m} = 7.84 \text{ dBm @ 1 m}$$

$$1000 \text{ pW/cm}^2 = 0.5 \text{ dBm @ 3 m} = 10.04 \text{ dBm @ 1 m}$$

P: Power

r: Measurement distance(m)

**ISED Limit**

- For radar devices that operate solely in the 76-77 GHz band (i.e. the occupied bandwidth is entirely contained in the 76-77 GHz band), an unwanted emissions limit of 0 dBm/MHz shall apply for the unwanted emission that fall in the 73.5-76 GHz band. Outside of the 73.5-76 GHz band, the unwanted emission limits prescribed in table 1 shall apply.

☐ Receiver Spurious Emissions Results

| Freq.<br>(GHz)          | Reading<br>(dBm) | Pol.<br>(H/V) | Factor<br>(dB) | Meas Result<br>(dBm) | Limit<br>(dBuV/m ) | Margin.<br>(dB) | Result |
|-------------------------|------------------|---------------|----------------|----------------------|--------------------|-----------------|--------|
| No critical peaks found |                  |               |                |                      |                    |                 |        |

※Note

**Test method**

- Below 1 GHz: RBW 120 kHz, VBW: 300 kHz(Quasi Peak)
- Above 1 GHz: RBW 1 MHz, VBW 1 MHz(Peak)

**Calculation of test results**

- Factor (dB): Mixer Loss(dB) + Cable Loss(dB) + FSPL(dB) - Antenna Gain(dBi)
- Meas Result (dBm): Reading(dBm) + Factor(dB)

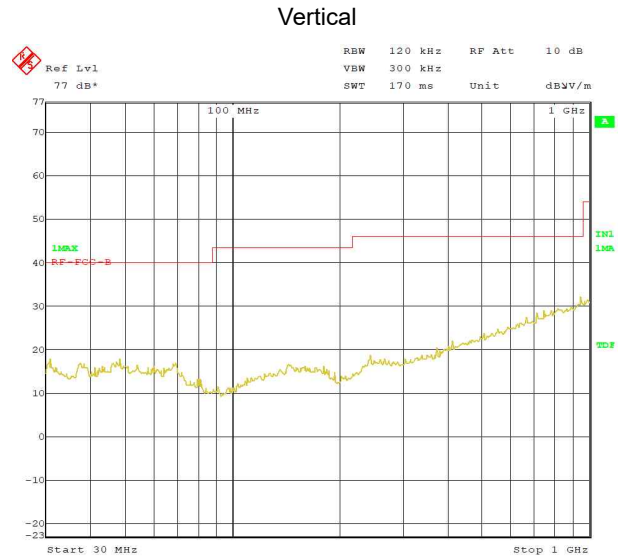
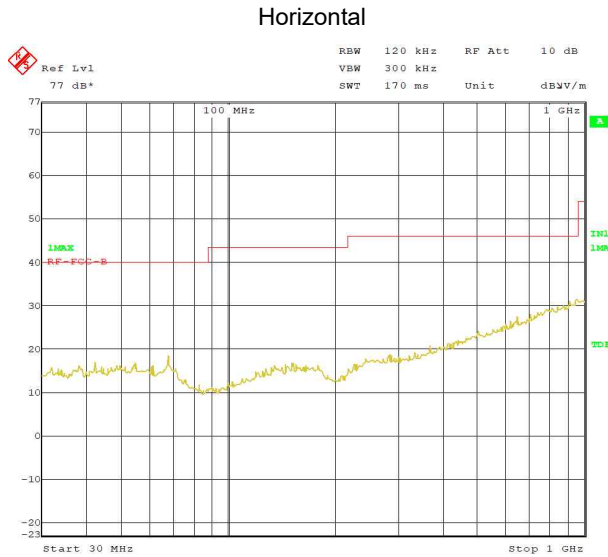
**FSPL measurement**

- FSPL = TxPower - RxPower;
- RxPower = S.A Measured Level - Rx Ant Gain + Mixer Conversion Loss + Cable Loss;
- TxPower = OML Source Output + Tx Ant Gain;

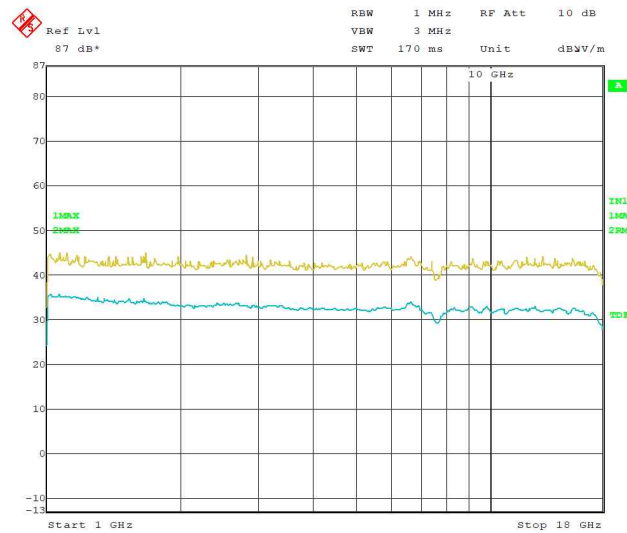
## 5.2.6 Plots

\*The worst case only.

- Below 1 GHz



- Above 1 GHz



- Above 40 GHz

Band Edge\_V



Band Edge\_H



## 5.3 Frequency Stability

### 5.3.1 Standard Applicable [FCC §95.3379(b), RSS-GEN 8.11]

#### FCC

(b) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

#### ISED

If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.

### 5.3.2 Test Environment conditions

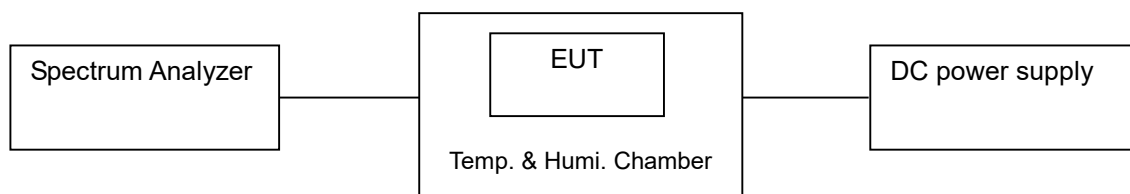
- Ambient temperature : (22 ~ 23) °C • Relative Humidity : (54 ~ 57) % R.H.

### 5.3.3 Measurement Procedure

The spectrum analyzer is set to the as follows :

- Set the RBW: 1 % to 3 % of the 99 % bandwidth.
- Set the VBW:  $\geq 3 \times$  RBW.
- Detector = Peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- The frequency drift was investigated for every 10 °C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -40 °C to 85 °C. (Manufacturer declaration)
- Voltage supplied to EUT is 12 V reference temperature was done at 20 °C.
- The voltage was varied by  $\pm 15$  % of nominal.

### 5.3.4 Test setup



### 5.3.5 Measurement Result

| Temp(℃)         | Power Supply | Frequency Range(GHz) | Limit(GHz) | Result     |
|-----------------|--------------|----------------------|------------|------------|
| 85              | DC 12 (Vnom) | 76.147 ~ 76.981      | 76~81      | Compliance |
| 80              |              | 76.142 ~ 76.977      |            | Compliance |
| 70              |              | 76.137 ~ 76.973      |            | Compliance |
| 60              |              | 76.133 ~ 76.970      |            | Compliance |
| 50              |              | 76.128 ~ 76.966      |            | Compliance |
| 40              |              | 76.124 ~ 76.962      |            | Compliance |
| 30              |              | 76.120 ~ 76.957      |            | Compliance |
| 20(Ref.)        |              | 76.116 ~ 76.954      |            | Compliance |
| 10              |              | 76.113 ~ 76.950      |            | Compliance |
| 0               |              | 76.109 ~ 76.945      |            | Compliance |
| -10             |              | 76.106 ~ 76.942      |            | Compliance |
| -20             |              | 76.103 ~ 76.938      |            | Compliance |
| -30             |              | 76.100 ~ 76.934      |            | Compliance |
| -40             |              | 76.097 ~ 76.929      |            | Compliance |
| Nom Temperature | DC 9 (Vmin)  | 76.114 ~ 76.952      |            | Compliance |
| Nom Temperature | DC 16 (Vmax) | 76.115 ~ 76.956      |            | Compliance |

## 5.4 Occupied Bandwidth

### 5.4.1 Standard Applicable [FCC §2.1049, RSS-GEN 6.7]

#### FCC

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

#### ISED

Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

### 5.4.2 Test Environment conditions

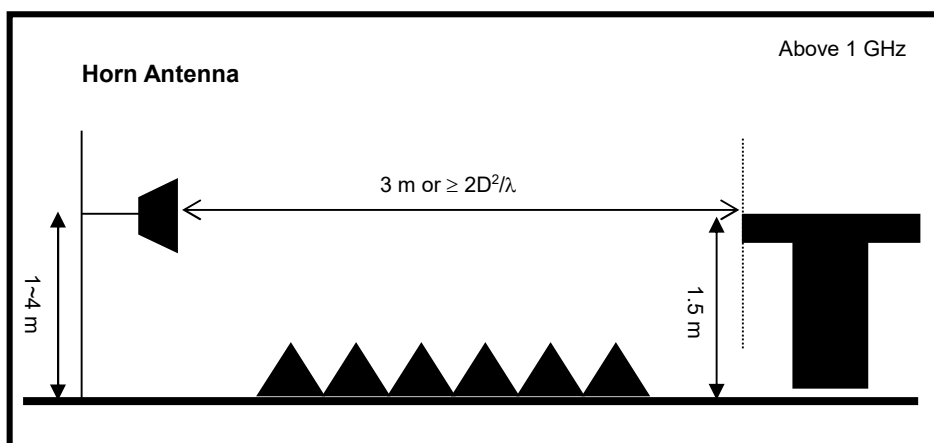
- Ambient temperature : (22 ~ 23) °C • Relative Humidity : (54 ~ 57) % R.H.

### 5.4.3 Measurement Procedure

The spectrum analyzer is set to the as follows :

- Set the RBW: 100 kHz.
- Set the VBW:  $\geq 3 \times \text{RBW}$ .
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Using the automatic bandwidth measurement capability of a spectrum analyzer

### 5.4.4 Test setup



## 5.4.5 Measurement Result

| Channel | Frequency [GHz] | Occupied Bandwidth [MHz] | Limit [MHz] | Test Results |
|---------|-----------------|--------------------------|-------------|--------------|
| 1       | 76.5            | 837.66                   | -           | Compliance   |

Occupied Bandwidth



## 5.5 Modulation characteristics

### 5.5.1 Standard Applicable [FCC §2.1047, RSS-251 6]

#### FCC

Concerning the Section 2.1047 modulation characteristics requirement, the following information should be provided:

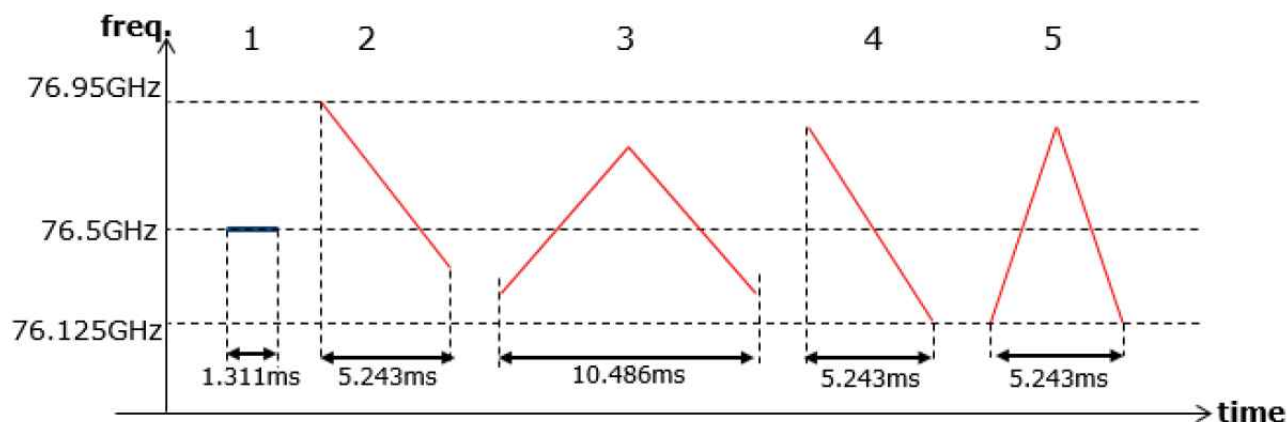
- 1) Pulsed radar: pulse width and pulse repetition frequency (if PRF is variable, then report maximum and minimum values).
- 2) Non-pulsed radar (e.g., FMCW): modulation type (i.e., sawtooth, sinusoid, triangle, or square wave) and sweep characteristics (sweep bandwidth, sweep rate, sweep time).

#### ISED

In addition to the reporting requirements of RSS-Gen, the following information shall be provided, as per the applicable modulation type:

- a. Pulsed radar: pulse width and pulse repetition frequency (PRF). If the PRF is variable, the maximum and minimum values shall be reported.
- b. Non-pulsed radar (e.g. frequency modulated continuous wave (FMCW)): modulation type (i.e. sawtooth, sinusoid, triangle, or square wave) and sweep characteristics (sweep bandwidth, sweep rate, sweep time).

### 5.5.2 Result



| Chirp# | Modulation Type   | Sweep Time | Sweep Bandwidth | Center Frequency |
|--------|-------------------|------------|-----------------|------------------|
| 1      | Unmodulated       | 1.311 ms   | -               | 76.5 GHz         |
| 2      | Negative sawtooth | 5.243 ms   | 500 MHz         | 76.5 GHz         |
| 3      | Triangle          | 10.486 ms  | 500 MHz         | 76.5 GHz         |
| 4      | Negative sawtooth | 5.243 ms   | 750 MHz         | 76.5 GHz         |
| 5      | Triangle          | 5.243 ms   | 750 MHz         | 76.5 GHz         |

Average cycle time: 60 ms

RF on time: 27.53 ms

Duty cycle: 55.1 %

## 5.6 Antenna requirement

### 5.6.1 Standard applicable [FCC §15.203, RSS-GEN]

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    |
|----------------|-------------------------------------|------------|------------|
| 76~77          | Internal patch array antenna(Fixed) | 21.8 dBi   | Compliance |

※ The antennas of this E.U.T permanently attached