



Test Report Serial Number:

45461523 R2.0

Test Report Date:

10 September 2019

Project Number:

1452

## EMC Test Report - New Filing

Applicant:



**Myriota Pty Ltd.**  
**Lot 14**  
**Frome Road**  
**Adelaide, Australia 5000**



**Myriota Canada Inc.**  
**c/o PwC Law LLP**  
**18 York Street, Suite 2500-C**  
**Toronto, ON, M5J 0B2**

FCC ID:

**2ATKL-SL2-1**

Product Model Number / HVIN

**SL2-1**

IC Registration Number

**25148-SL21**

Product Name / PMN

**Sense&Locate**

In Accordance With:

**FCC 47 CFR Part 15 SubPart C**

Intentional Radiators

**RSS-GEN, RSS-210 Issue 9**

Licence-Exempt Radio Apparatus:

Category I Equipment

Approved By:

**Ben Hewson, President**

Celltech Labs Inc.  
21-364 Lougheed Rd.  
Kelowna, BC, V1X 7R8  
Canada



Test Lab Certificate: 2470.01



**Industry  
Canada**

IC Registration 3874A-1



FCC Registration: CA3874

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## 1.0 DOCUMENT CONTROL

| Revision History    |                                      |                  |                        |            |                        |
|---------------------|--------------------------------------|------------------|------------------------|------------|------------------------|
| Samples Tested By:  |                                      | Art Voss, P.Eng. | Date(s) of Evaluation: |            | May 31 - June 13, 2019 |
| Report Prepared By: |                                      | Art Voss, P.Eng. | Report Reviewed By:    |            | Ben Hewson             |
| Report Revision     | Description of Revision              |                  | Revised Section        | Revised By | Revision Date          |
| 0.1                 | Draft Release                        |                  | n/a                    | Art Voss   | 29 August 2019         |
| 1.0                 | Initial Release                      |                  | n/a                    | Art Voss   | 29 August 2019         |
| 2.0                 | Corrected Plots 7.5, 7.6, ppg. 17,18 |                  | 7.0                    | Art Voss   | 10 September 2019      |
|                     | Corrected Table 7.1, pg. 20          |                  |                        |            |                        |

## 2.0 CLIENT AND DUT INFORMATION

| Client Information                    |                                                         |
|---------------------------------------|---------------------------------------------------------|
| Applicant Name                        | Myriota Pty Ltd                                         |
| Applicant Address (FCC)               | Lot 14                                                  |
|                                       | Frome Road                                              |
|                                       | Adelaide, Australia 5000                                |
| Applicant Address (ISED)              | Myriota Canada Inc.                                     |
|                                       | c/o PwC Law LLP                                         |
|                                       | 18 York Street, Suite 2500-C                            |
|                                       | Toronto, ON, M5J 0B2                                    |
| DUT Information                       |                                                         |
| Device Identifier(s):                 | FCC ID: 2ATKL-SL2-1                                     |
|                                       | IC: 25148-SL21                                          |
| Device Type:                          | Asset Tracking Device                                   |
| Equipment Class (FCC):                | Low Power Communication Device Transmitter (DXX)        |
| Equipment Class (ISED):               | Low Power Transmitter General Field Limits above 30 MHz |
| Device Model(s) / HVIN:               | SL2-1                                                   |
| Device Marketing Name / PMN:          | Sense&Locate                                            |
| Firmware Version ID Number / FVIN:    | n/a                                                     |
| Host Marketing Name / HMN:            | n/a                                                     |
| Test Sample Serial No.:               | T/A Sample - Identical Prototype                        |
| Transmit Frequency Range:             | 433.5 - 434.5MHz                                        |
| Number of Channels:                   | n/a                                                     |
| Manuf. Max. Rated Output Power:       | 0.5W                                                    |
| Manuf. Max. Rated BW/Data Rate:       | 7kHz                                                    |
| Antenna Make and Model:               | n/a                                                     |
| Antenna Type and Gain:                | Dipole - Helical Coil w/ Ground Plane, -2.5dBi (UHF)    |
| Modulation:                           | MSK                                                     |
| Mode:                                 | n/a                                                     |
| Emission Designator:                  | n/a                                                     |
| DUT Power Source:                     | 3.6VDC Alkaline                                         |
| Deviation(s) from standard/procedure: | None                                                    |
| Modification of DUT:                  | None                                                    |

### 3.0 SCOPE

This Certification Report was prepared on behalf of:

**Myriota Pty Ltd**

„(the '*Applicant*'), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and, unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

As per FCC 47 CFR Part §2.1091 and §2.1093, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in a separate exhibit from this report.

The Receiver of this *Equipment* is subject to Equipment Certification or Supplier's Declaration of Conformity (SDoC) in accordance with 47 CFR Part §15.101. The Receiver was evaluated in accordance with 47 CFR Part §15 Subpart B and ICES-003. A statement of the application of the SDoC procedure appears in a separate exhibit from this report.

Application: This is an application for a new FCC and ISED certification.

#### 4.0 TEST RESULT SUMMARY

| TEST SUMMARY |                                |                     |                             |                              |              |          |
|--------------|--------------------------------|---------------------|-----------------------------|------------------------------|--------------|----------|
| Section      | Description of Test            | Procedure Reference | Applicable Rule Part(s) FCC | Applicable Rule Part(s) ISED | Test Date    | Result   |
| 7.0          | Field Strength (Fundamental)   | ANSI C63.10-2013    | §2.1046<br>§15.240          | RSS-Gen<br>RSS-210 Annex D   | 12 June 2019 | Complies |
| 8.0          | Band Edge                      | ANSI C63.10-2013    | §15.215                     |                              | 13 June 2019 | Complies |
| 9.0          | Radiated TX Spurious Emissions | ANSI C63.10-2013    | §15.240( c)<br>§15.209      | RSS-Gen<br>RSS-210 Annex D   | 13 June 2019 | Complies |

| Test Station Day Log |                   |                       |                           |              |                            |
|----------------------|-------------------|-----------------------|---------------------------|--------------|----------------------------|
| Date                 | Ambient Temp (°C) | Relative Humidity (%) | Barometric Pressure (kPa) | Test Station | Tests Performed Section(s) |
| 31 May 2019          | 28.6              | 14                    | 101.7                     | SAC          | 9                          |
| 31 May 2019          | 29.6              | 13                    | 101.1                     | OATS         | 9                          |
| 3 June 2019          | 25.1              | 31                    | 101.1                     | OATS         | 9                          |
| 3 June 2019          | 23.6              | 16                    | 101.1                     | EMC          | 8                          |
| 12 June 2019         | 25.4              | 18                    | 101.9                     | OATS         | 7                          |
| 13 June 2019         | 27.0              | 43                    | 100.7                     | OATS         | 9                          |

EMC - EMC Test Bench

OATS - Open Area Test Site

LISN - LISN Test Area

IMM - Immunity Test Area

SAC - Semi-Anechoic Chamber

TC - Temperature Chamber

ESD - ESD Test Bench

RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.



Art Voss, P.Eng.  
Technical Manager  
Celltech Labs Inc.

29 August 2019

Date



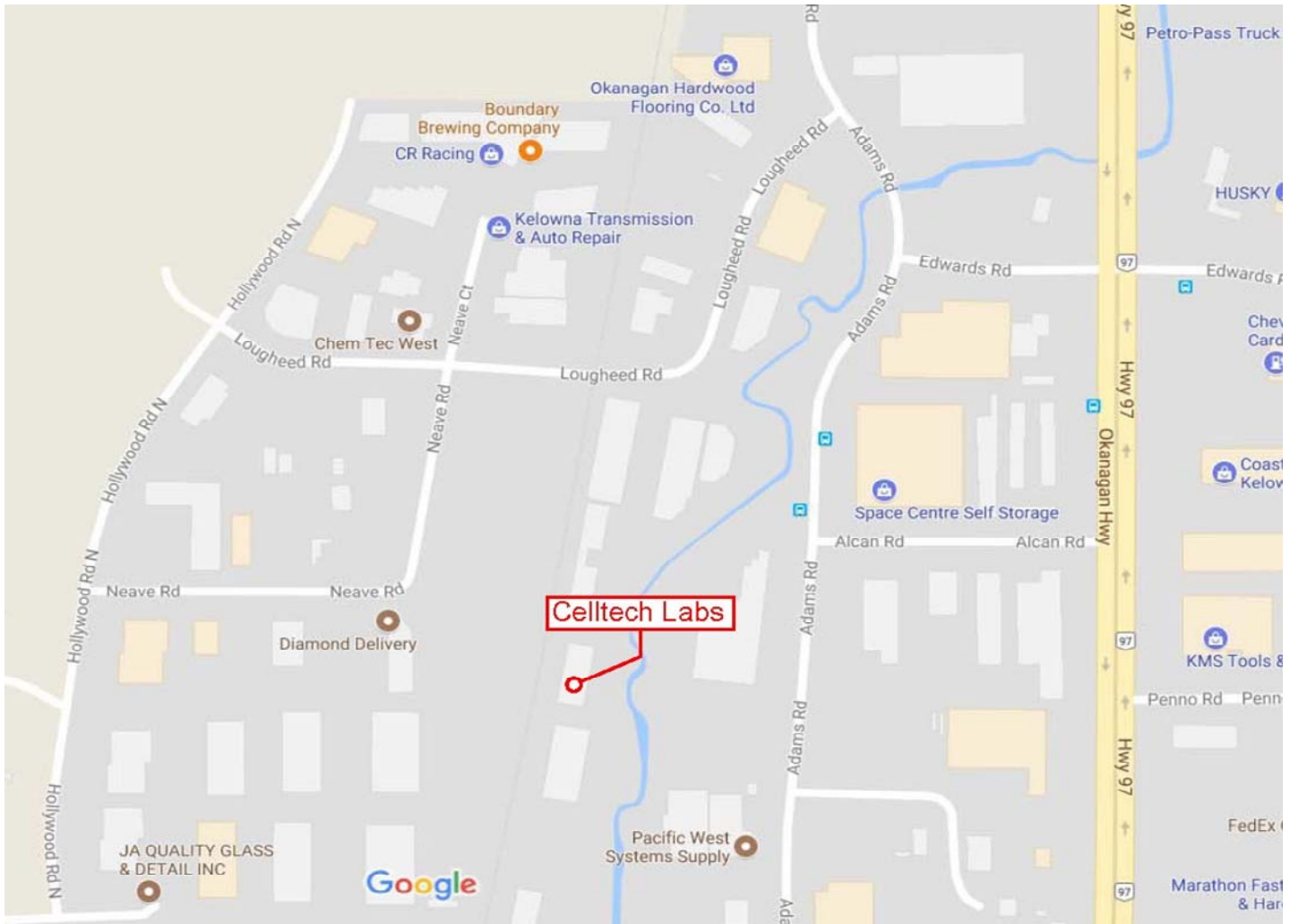
## 5.0 NORMATIVE REFERENCES

| Normative References |                                                                                                                                                                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISO/IEC 17025:2017   | General requirements for the competence of testing and calibration laboratories                                                                                                                                                                |
| ANSI C63.10-2013     | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                                                                                                                                                 |
| CFR                  | Code of Federal Regulations<br>Title 47: Telecommunication<br>Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations                                                                                            |
| CFR                  | Code of Federal Regulations<br>Title 47: Telecommunication<br>Part 15: Radio Frequency Devices<br>Subpart C: Intentional Radiators                                                                                                             |
| ISED                 | Innovation, Science and Economic Development Canada<br>Spectrum Management and Telecommunications Radio Standards Specification<br>RSS-Gen Issue 5: General Requirements and Information for the Certification of Radiocommunication Equipment |
| ISED                 | Innovation, Science and Economic Development Canada<br>Spectrum Management and Telecommunications Radio Standards Specification<br>RSS-210 Issue 9: Licence-Exempt Radio Apparatus: Category I Equipment                                       |

## 6.0 FACILITIES AND ACCREDITATIONS

### Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Loughheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Innovation, Science and Economic Development Canada under Test Site File Number ISED 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



## 7.0 RADIATED FIELD STRENGTH

### Test Procedure

|                            |                                                                     |
|----------------------------|---------------------------------------------------------------------|
| <b>Normative Reference</b> | FCC 47 CFR §2.1046, §15.240, RSS-Gen (6.12), RSS-210<br>ANSI C63.10 |
|----------------------------|---------------------------------------------------------------------|

### Limits

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 47 CFR §15.240 | <b>Operation in the band 433.5-434.5 MHz.</b><br>(b) The field strength of any emissions radiated within the specified frequency band shall not exceed 11,000 microvolts per meter measured at a distance of 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The peak level of any emissions within the specified frequency band shall not exceed 55,000 microvolts per meter measured at a distance of 3 meters. |
| RSS-210        | <b>Annex D - Radio Frequency Identification (RFID) Devices in the Band 433.5-434.5 MHz</b><br>(b) The field strength of any emissions radiated within the band 433.5-434.5 MHz shall not exceed 11,000 $\mu\text{V}/\text{m}$ measured at 3 m with an average detector. The peak level of any emission within this specified frequency band shall not exceed 55,000 $\mu\text{V}/\text{m}$ measured at 3m                                                                               |

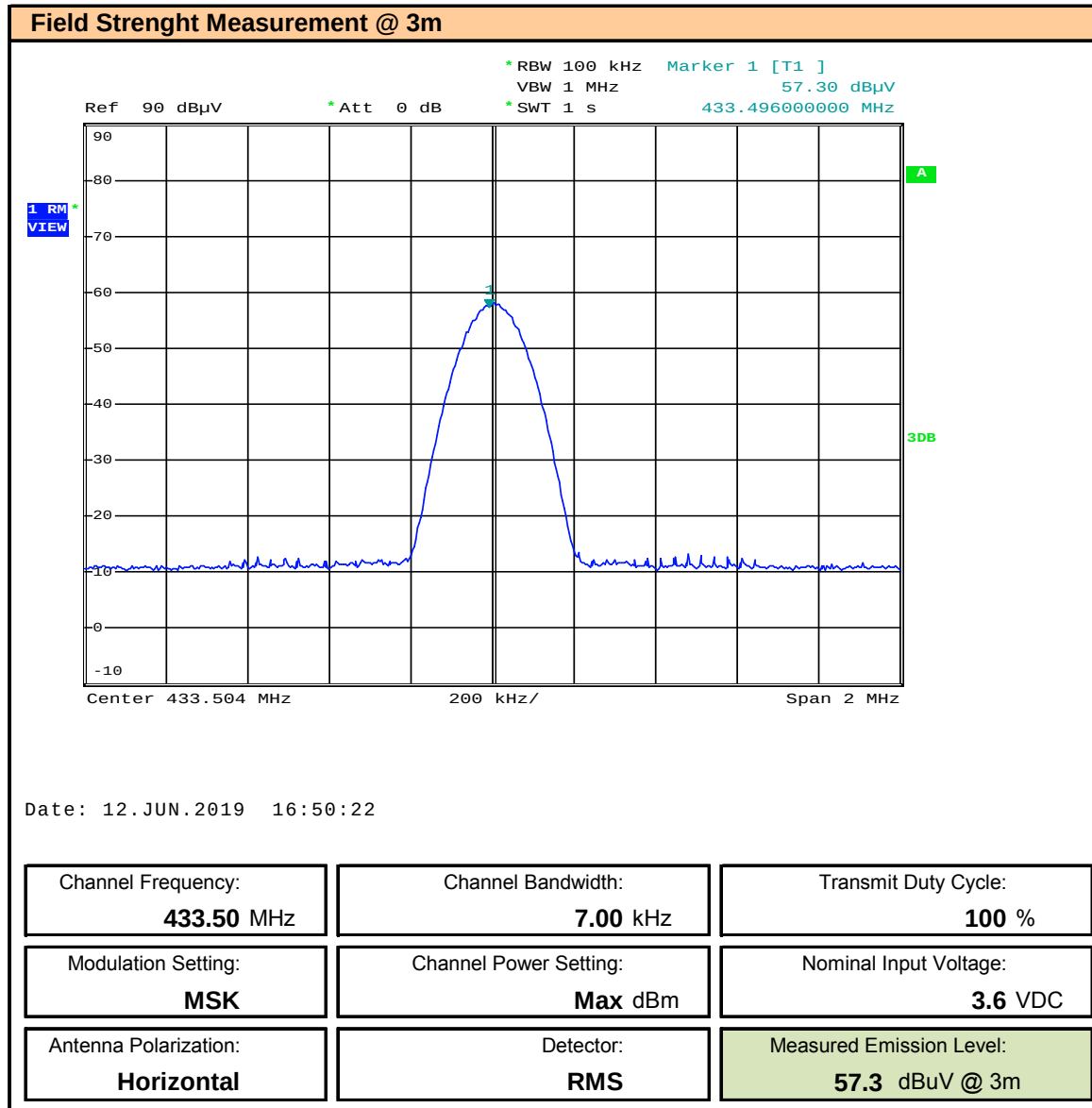
### Test Setup

Appendix A - Figure A2

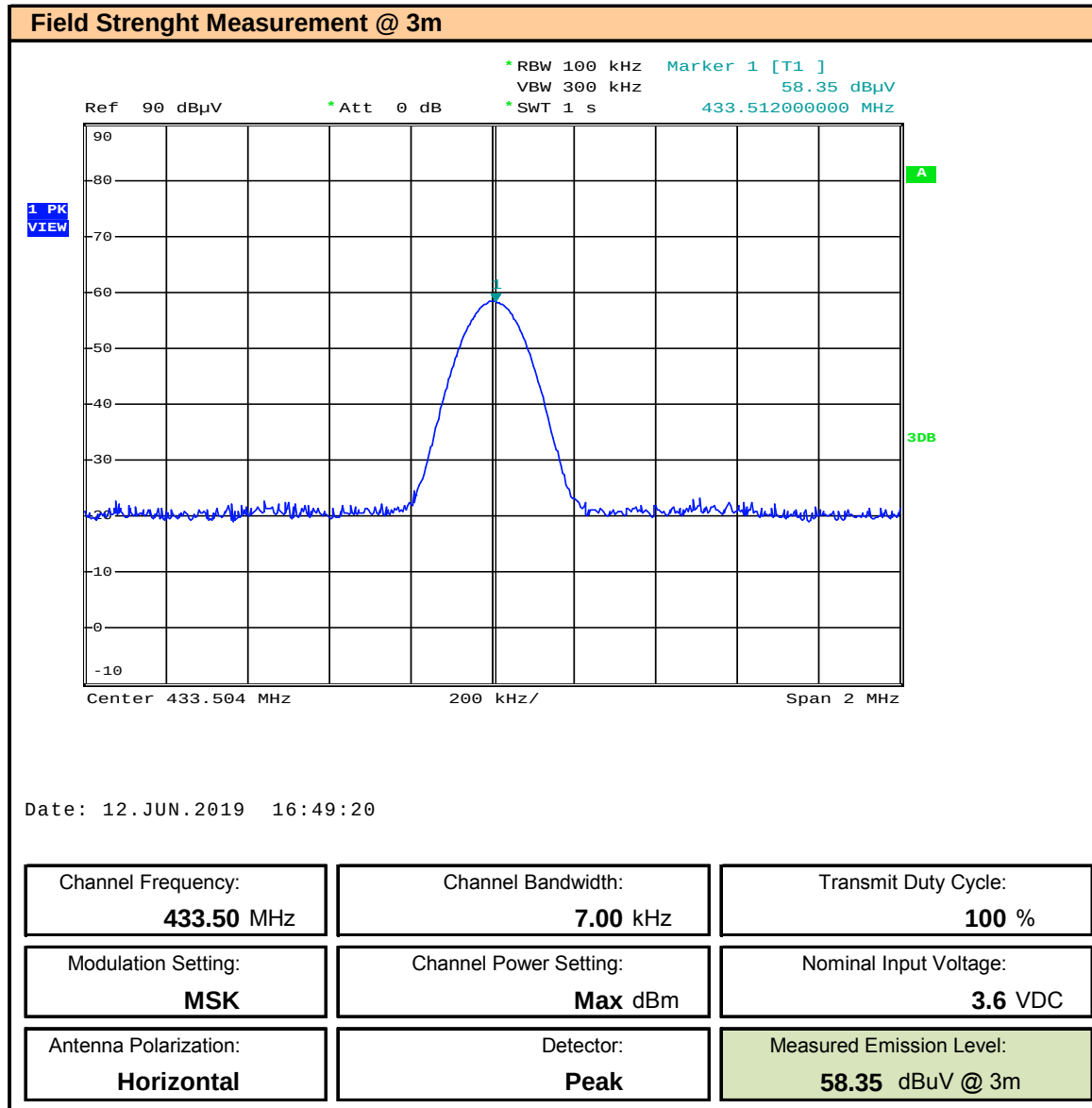
### Measurement Procedure

The DUT was placed on an 80cm turntable on an Open Area Test Site (OATS) at a test distance of 3m. The output power of the DUT was set to the manufacturer's highest output power setting. The DUT was set to transmit at its maximum Duty Cycle. Emissions were evaluated while the DUT was rotated from  $0^\circ$  through  $360^\circ$  with the receive antenna elevated from 1 to 4 meters in both horizontal and vertical polarizations.

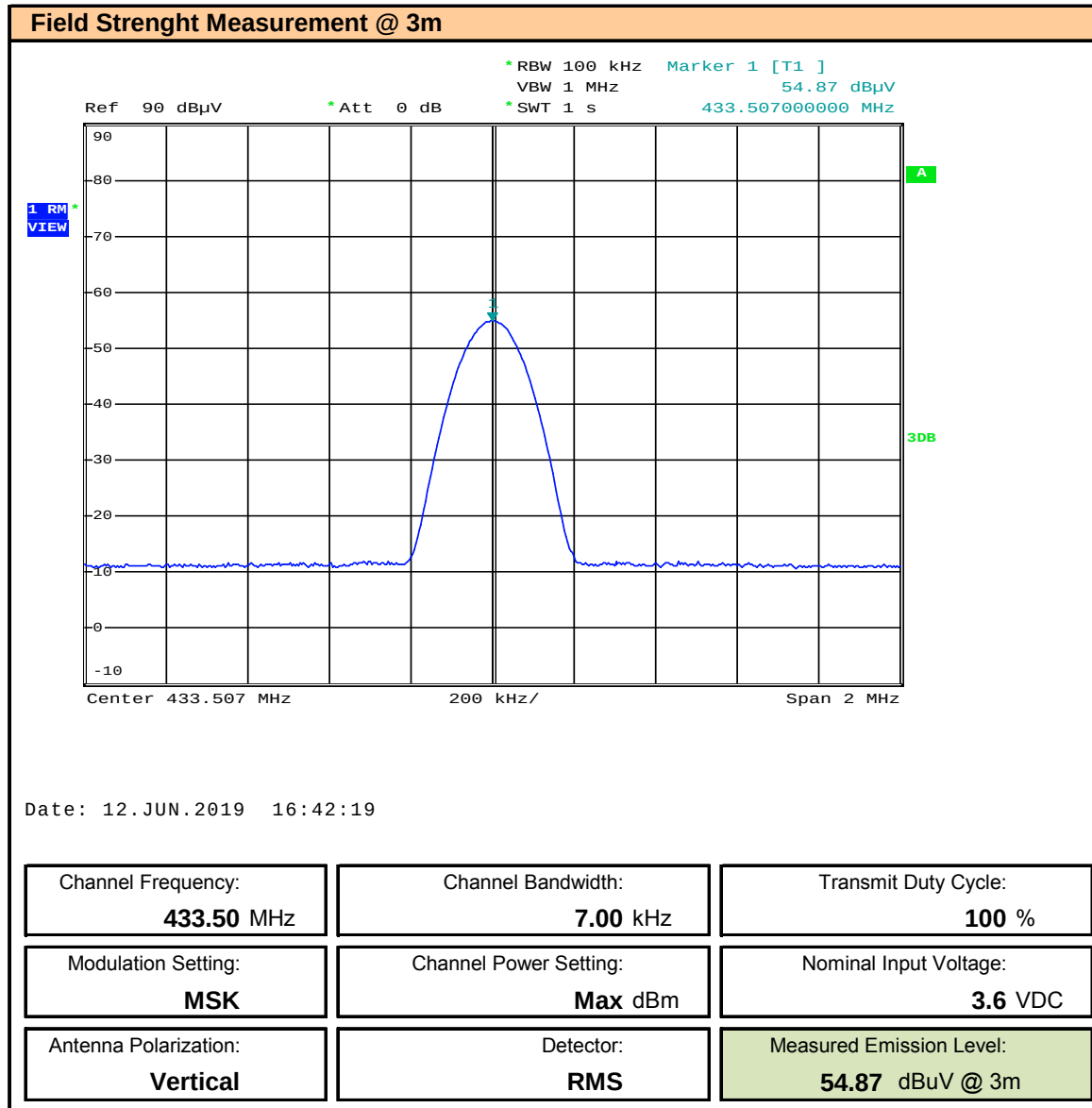
**Plot 7.1 – Radiated Field Strength – Lower Band Edge, Horizontal, Average**



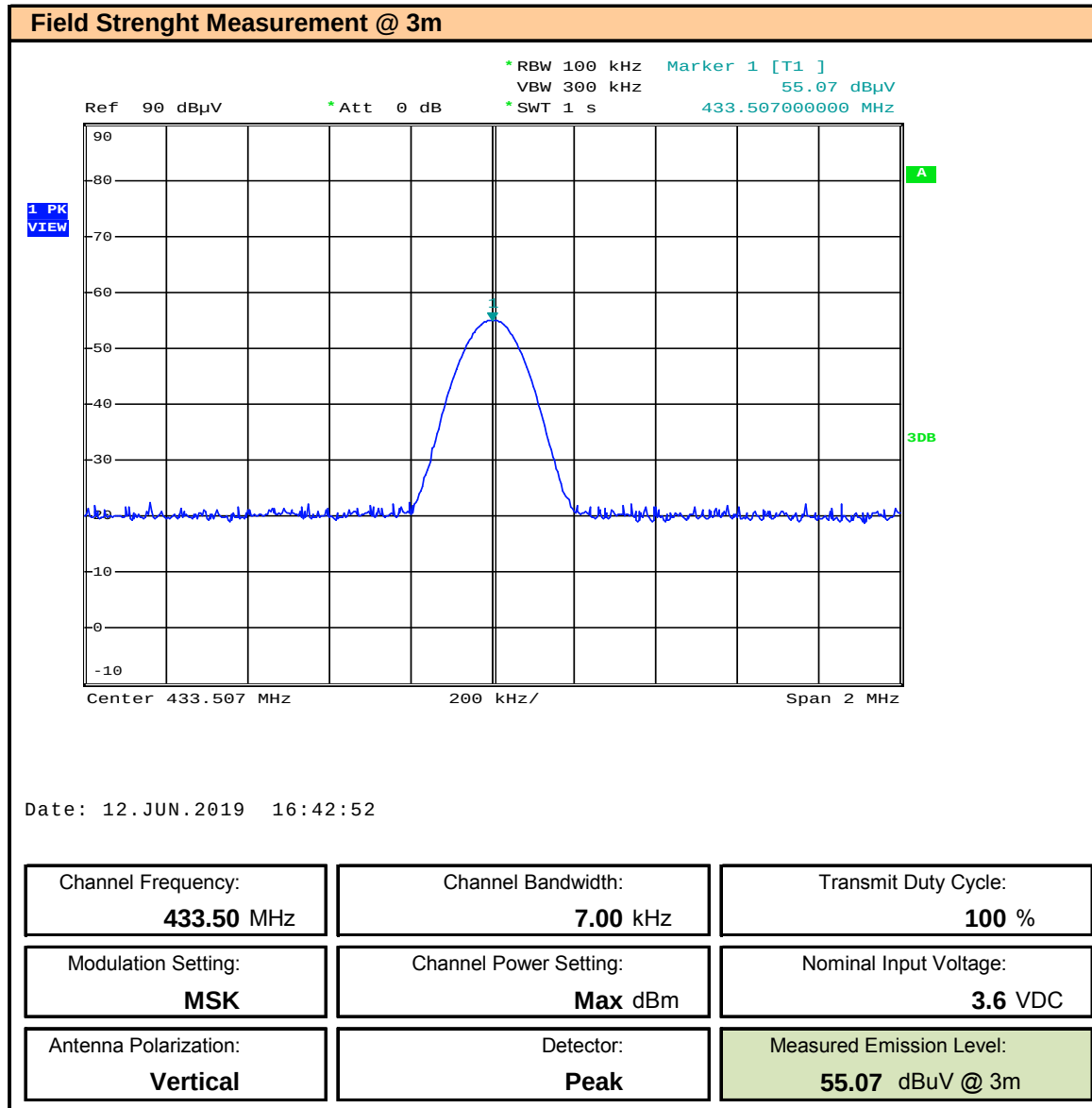
**Plot 7.2 – Radiated Field Strength – Lower Band Edge, Horizontal, Peak**



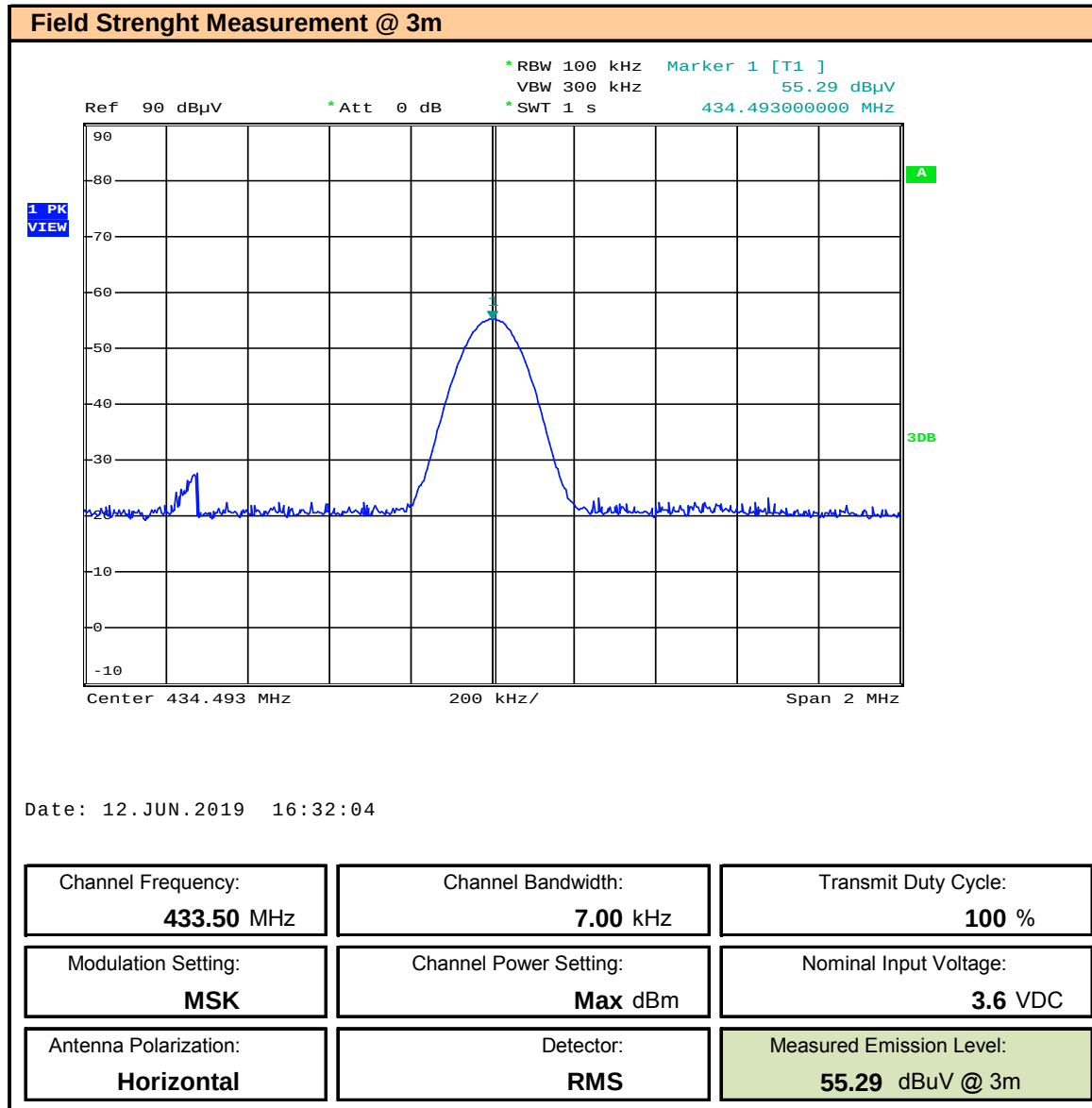
Plot 7.3 – Radiated Field Strength – Lower Band Edge, Vertical, Average



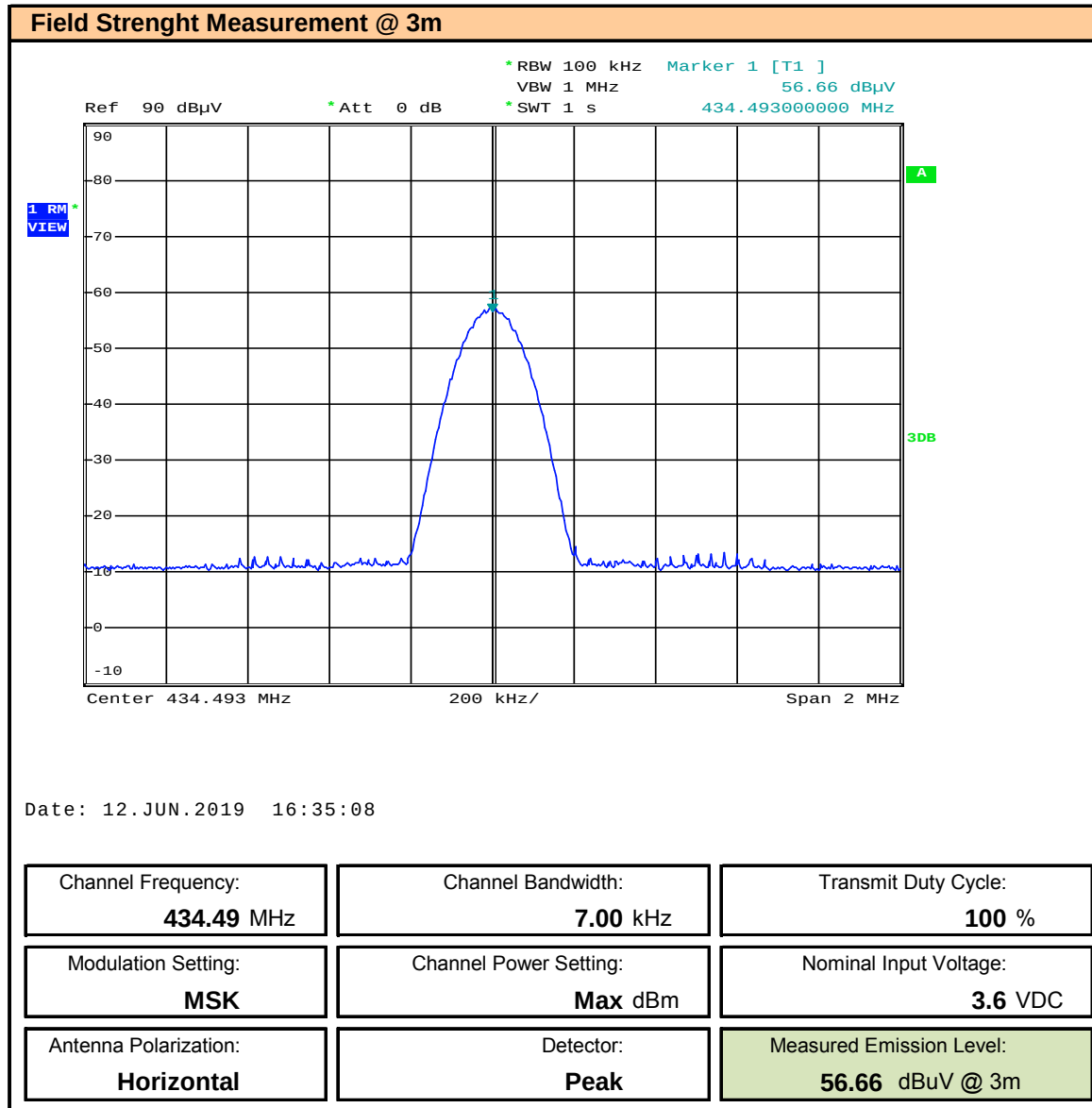
Plot 7.4 – Radiated Field Strength – Lower Band Edge, Vertical, Peak



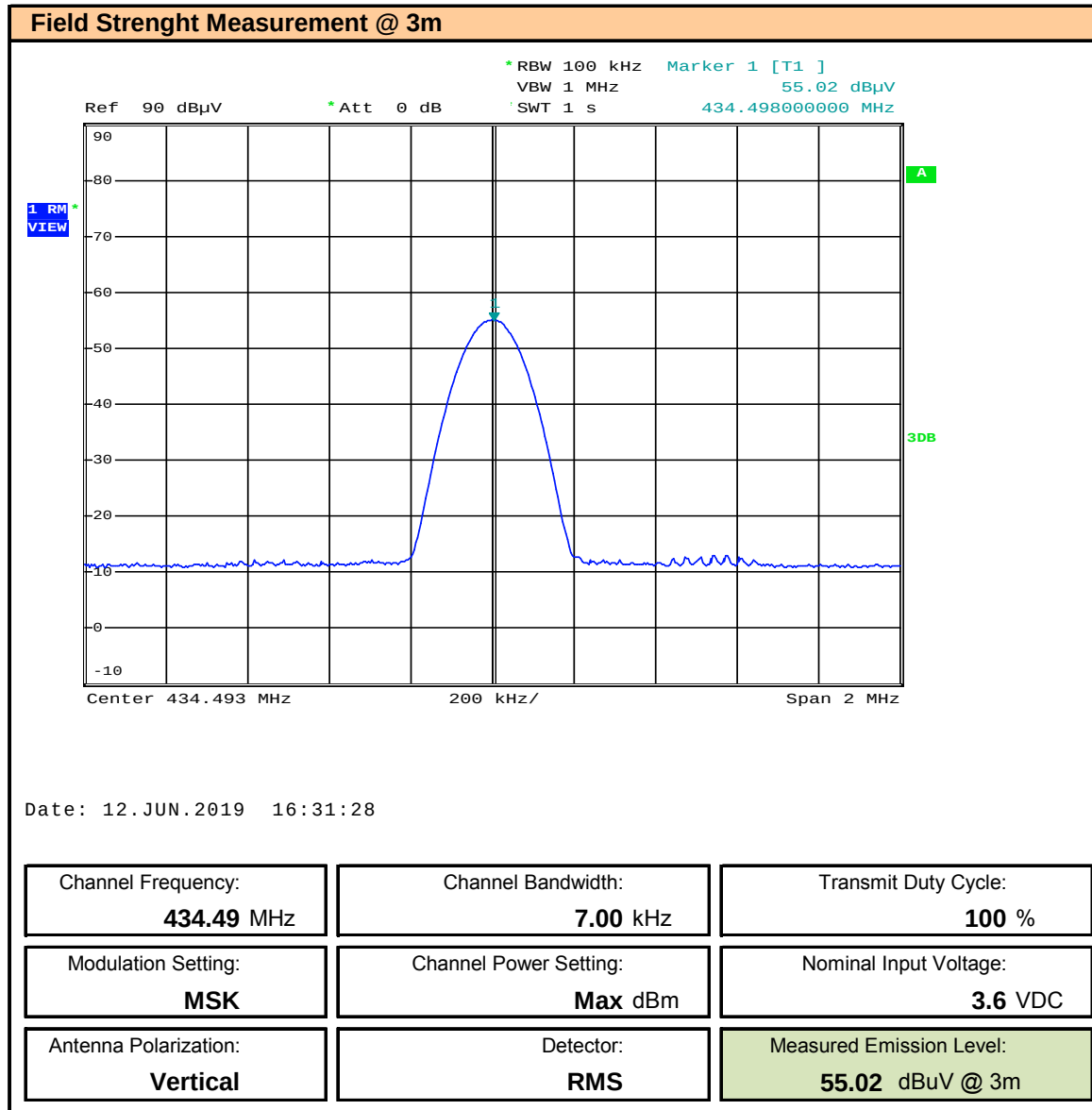
**Plot 7.5 – Radiated Field Strength – Upper Band Edge, Horizontal, Average**



Plot 7.6 – Radiated Field Strength – Upper Band Edge, Horizontal, Peak



Plot 7.7 – Radiated Field Strength – Upper Band Edge, Vertical, Average



**Plot 7.8 – Radiated Field Strength – Upper Band Edge, Vertical, Peak**

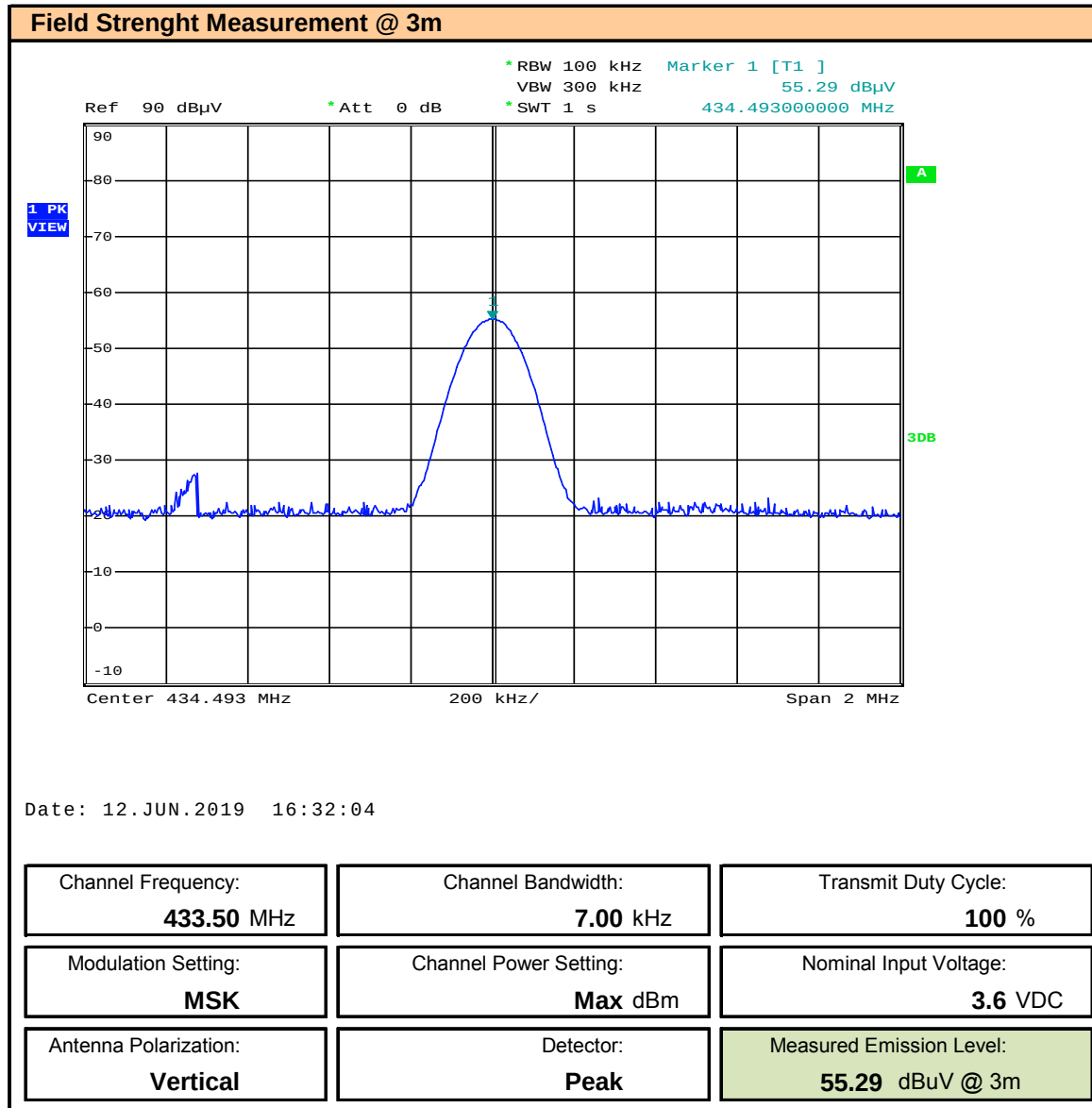


**Table 7.1 – Summary of Radiated Field Strength**

| Field Strength of Fundamental |                 |            |                                   |                                      |              |                                                                     |                                                    |                                                  |                                                 |                                                           |                                                             |                         |
|-------------------------------|-----------------|------------|-----------------------------------|--------------------------------------|--------------|---------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|-------------------------|
| Frequency<br><br>(MHz)        | BW<br><br>(kHz) | Modulation | Power<br><br>Setting<br><br>(dBm) | Transmit<br>Duty<br>Cycle<br><br>(%) | Polarization | Measured<br><br>Emission<br><br>[E <sub>MEAS</sub> ]<br>(dBuV @ 3m) | Cable<br><br>Loss<br><br>[L <sub>C</sub> ]<br>(dB) | Antenna<br>Correction<br>Factor<br>[AFC]<br>(dB) | Field<br><br>Strength<br><br>[E]<br>(dBuV/m@3m) | Field<br>Strength<br>Limit<br>[E <sub>L</sub> ]<br>(uV/m) | Field<br>Strength<br>Limit<br>[E <sub>L</sub> ]<br>(dBuV/m) | Margin<br><br><br>(dBm) |
| Average (RMS) Measurement     |                 |            |                                   |                                      |              |                                                                     |                                                    |                                                  |                                                 |                                                           |                                                             |                         |
| 433.504                       | 7               | MSK        | Max                               | 100                                  | Horizontal   | 57.30                                                               | 1.25                                               | 22.00                                            | 80.55                                           | 11000.00                                                  | 80.83                                                       | 0.28                    |
| 433.504                       | 7               | MSK        | Max                               | 100                                  | Vertical     | 54.87                                                               | 1.25                                               | 22.00                                            | 78.12                                           |                                                           | 80.83                                                       | 2.71                    |
| 434.493                       | 7               | MSK        | Max                               | 100                                  | Horizontal   | 55.29                                                               | 1.25                                               | 22.00                                            | 78.54                                           |                                                           | 80.83                                                       | 2.29                    |
| 434.493                       | 7               | MSK        | Max                               | 100                                  | Vertical     | 55.02                                                               | 1.25                                               | 22.00                                            | 78.27                                           |                                                           | 80.83                                                       | 2.56                    |
| Peak Measurement              |                 |            |                                   |                                      |              |                                                                     |                                                    |                                                  |                                                 |                                                           |                                                             |                         |
| 433.504                       | 7               | MSK        | Max                               | 100                                  | Horizontal   | 58.35                                                               | 1.25                                               | 22.00                                            | 81.60                                           | 55000.00                                                  | 94.81                                                       | 13.21                   |
| 433.504                       | 7               | MSK        | Max                               | 100                                  | Vertical     | 55.07                                                               | 1.25                                               | 22.00                                            | 78.32                                           |                                                           | 94.81                                                       | 16.49                   |
| 434.493                       | 7               | MSK        | Max                               | 100                                  | Horizontal   | 56.66                                                               | 1.25                                               | 22.00                                            | 79.91                                           |                                                           | 94.81                                                       | 14.90                   |
| 434.493                       | 7               | MSK        | Max                               | 100                                  | Vertical     | 55.29                                                               | 1.25                                               | 22.00                                            | 78.54                                           |                                                           | 94.81                                                       | 16.27                   |
| Result:                       |                 |            |                                   |                                      |              |                                                                     |                                                    |                                                  |                                                 |                                                           | Complies                                                    |                         |

$$E = E_{MEAS} + L_C + AFC$$

$$\text{Margin} = E_L - E$$

A Negative Margin (-) indicates non-compliance

## 8.0 BAND EDGE EVALUATION

### Test Procedure

|                  |                             |
|------------------|-----------------------------|
| <b>Normative</b> | FCC 47 CFR §2.1046, §15.215 |
| <b>Reference</b> | ANSI C63.10                 |

### Limits

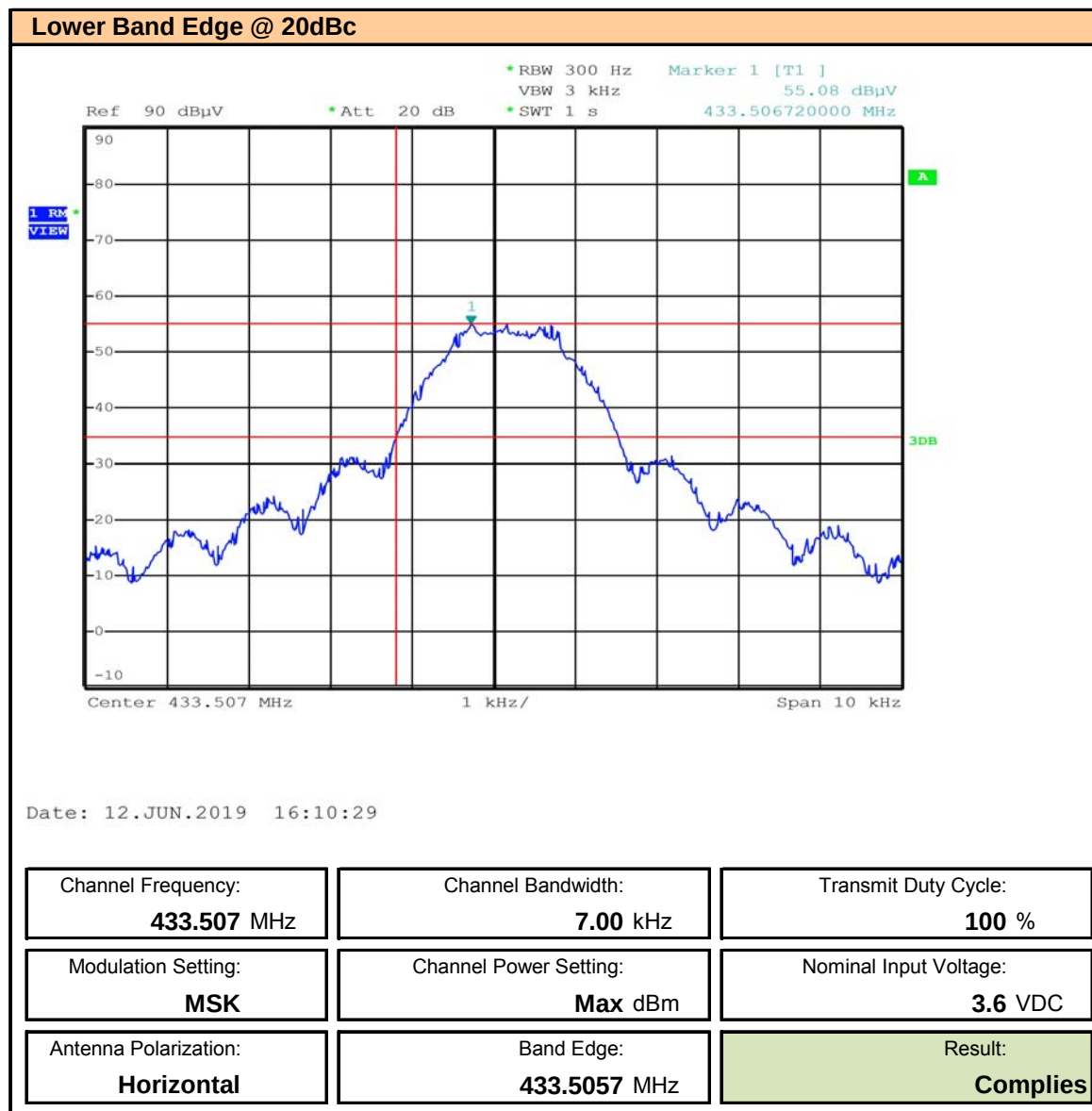
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>47 CFR §15.215</b> | <p><b>Additional provisions to the general radiated emission limitations.</b></p> <p>(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.</p> |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                   |                                |
|-------------------|--------------------------------|
| <b>Test Setup</b> | <b>Appendix A - Figure A.1</b> |
|-------------------|--------------------------------|

### Measurement Procedure

The DUT was placed on an 80cm turntable on an Open Area Test Site (OATS) at a test distance of 3m. The output power of the DUT was set to the manufacturer's highest output power setting. The DUT was set to transmit at its maximum Duty Cycle. Emissions were evaluated while the DUT was rotated from 0° through 360° with the receive antenna elevated from 1 to 4 meters in both horizontal and vertical polarizations.

### Plot 8.1 – Lower Band Edge



Plot 8.1 – Upper Band Edge



## 9.0 RADIATED OUT OF BAND SPURIOUS EMISSIONS

### Test Procedure

|                  |                                                      |
|------------------|------------------------------------------------------|
| <b>Normative</b> | FCC 47 CFR §2.1046, §15.240, RSS-Gen (6.12), RSS-210 |
| <b>Reference</b> | ANSI C63.10                                          |

### Limits

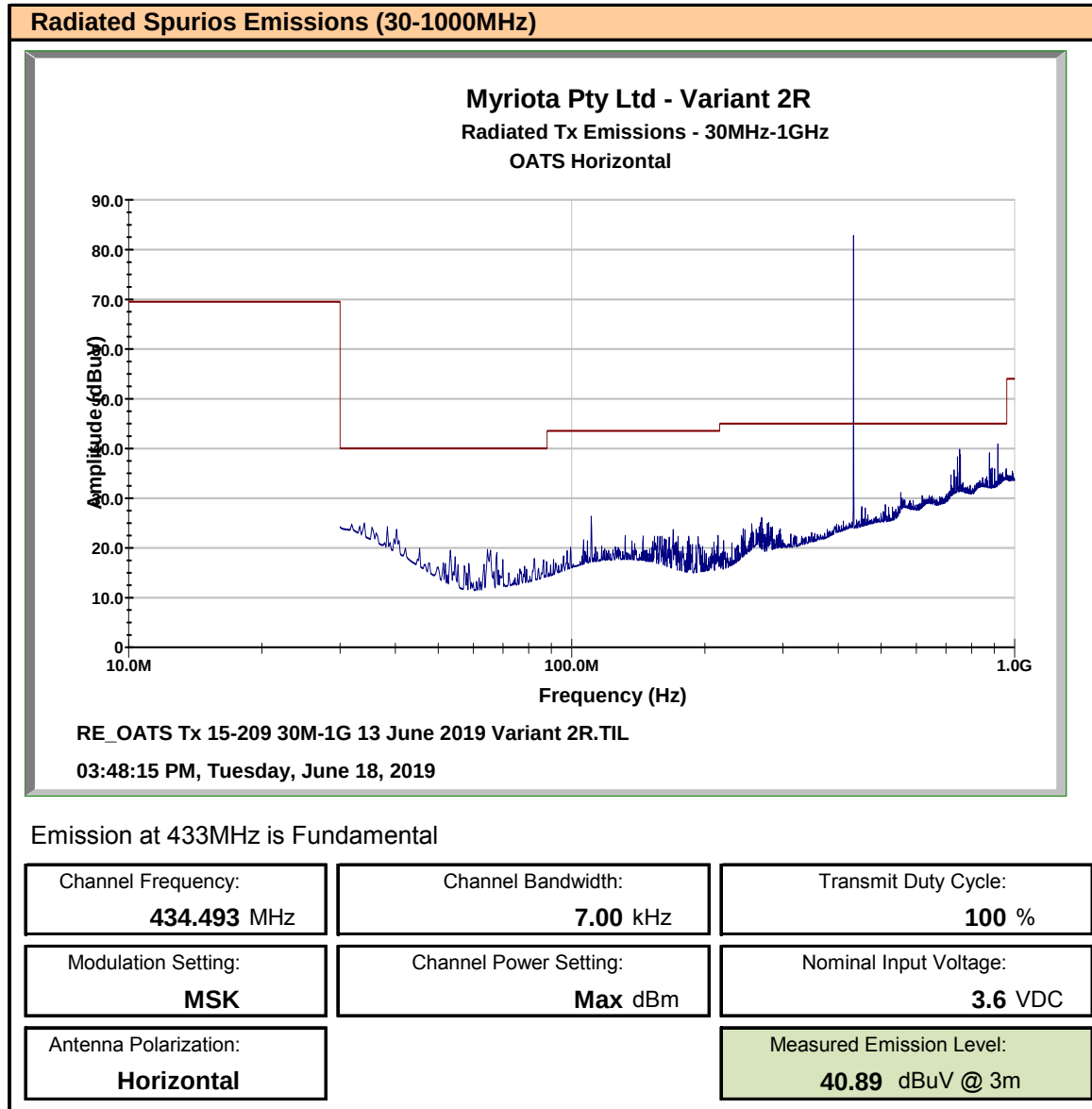
|                       |                                                                                                                                                                                                                                                            |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>47 CFR §15.240</b> | <b>Operation in the band 433.5-434.5 MHz.</b><br>(c) The field strength of emissions radiated on any frequency outside of the specified band shall not exceed the general radiated emission limits in §15.209.                                             |
| <b>RSS-210</b>        | <b>Annex D - Radio Frequency Identification (RFID) Devices in the Band 433.5-434.5 MHz</b><br>(c ) The field strength of emissions on any frequencies outside this specified band shall not exceed the general field strength limits specified in RSS-Gen. |

|                   |                                |
|-------------------|--------------------------------|
| <b>Test Setup</b> | <b>Appendix A - Figure A.2</b> |
|-------------------|--------------------------------|

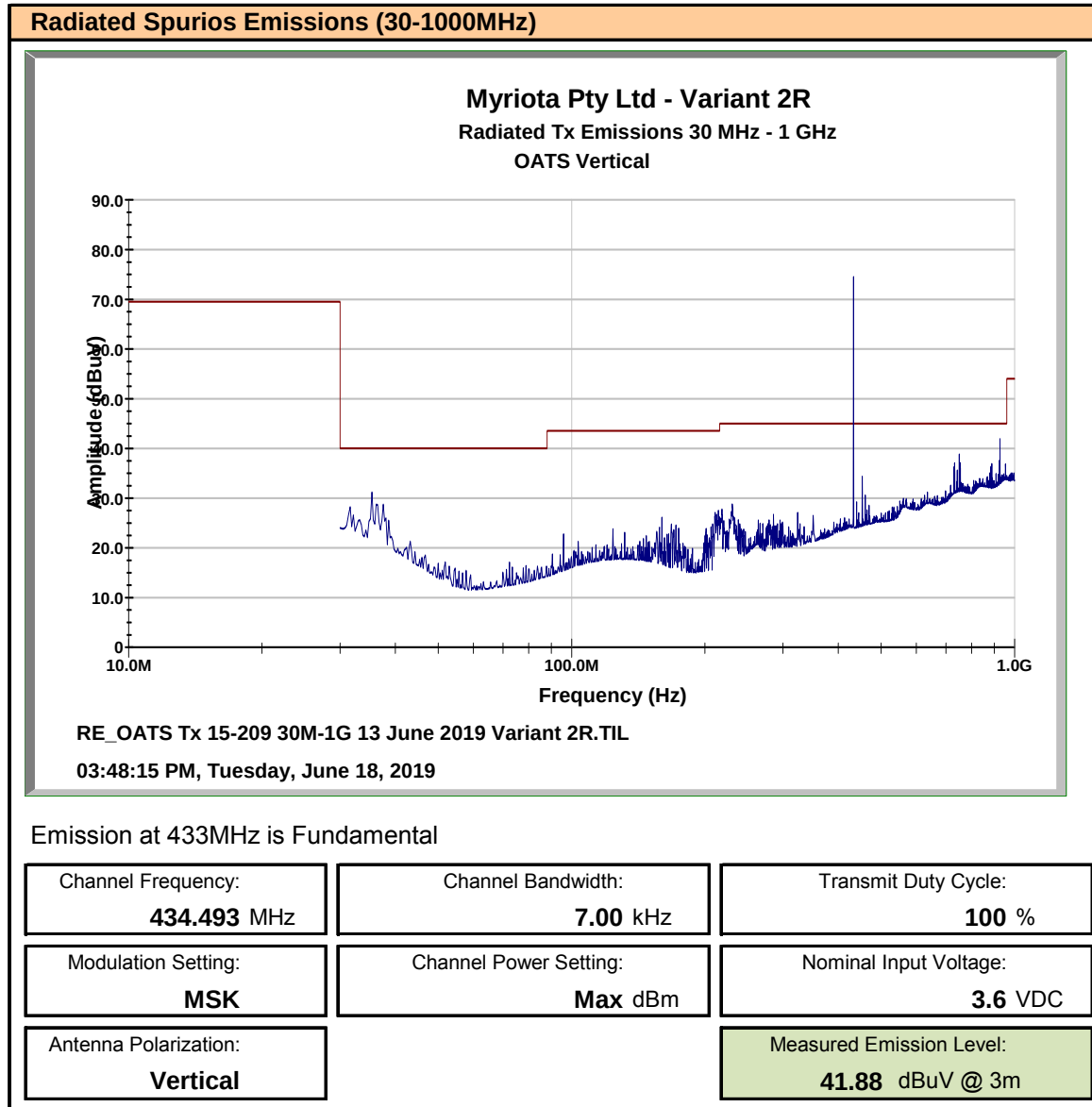
### Measurement Procedure

The DUT was placed on an 80cm turntable on an Open Area Test Site (OATS) at a test distance of 3m. The output power of the DUT was set to the manufacturer's highest output power setting. The DUT was set to transmit at its maximum Duty Cycle. Emissions were evaluated while the DUT was rotated from 0° through 360° with the receive antenna elevated from 1 to 4 meters in both horizontal and vertical polarizations.

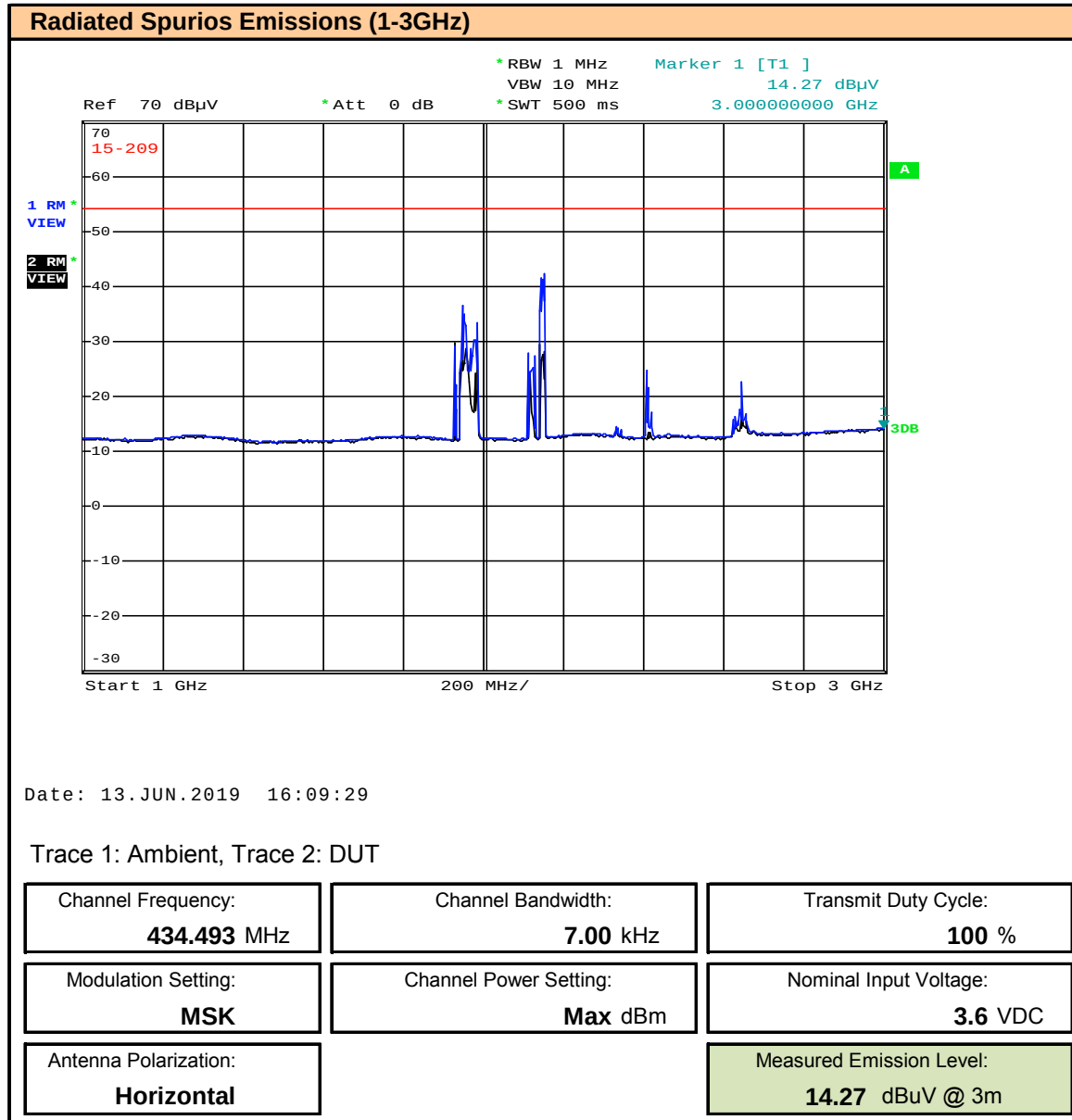
**Plot 9.1 – Radiated Spurious Emissions 30-1000Mhz, Horizontal**



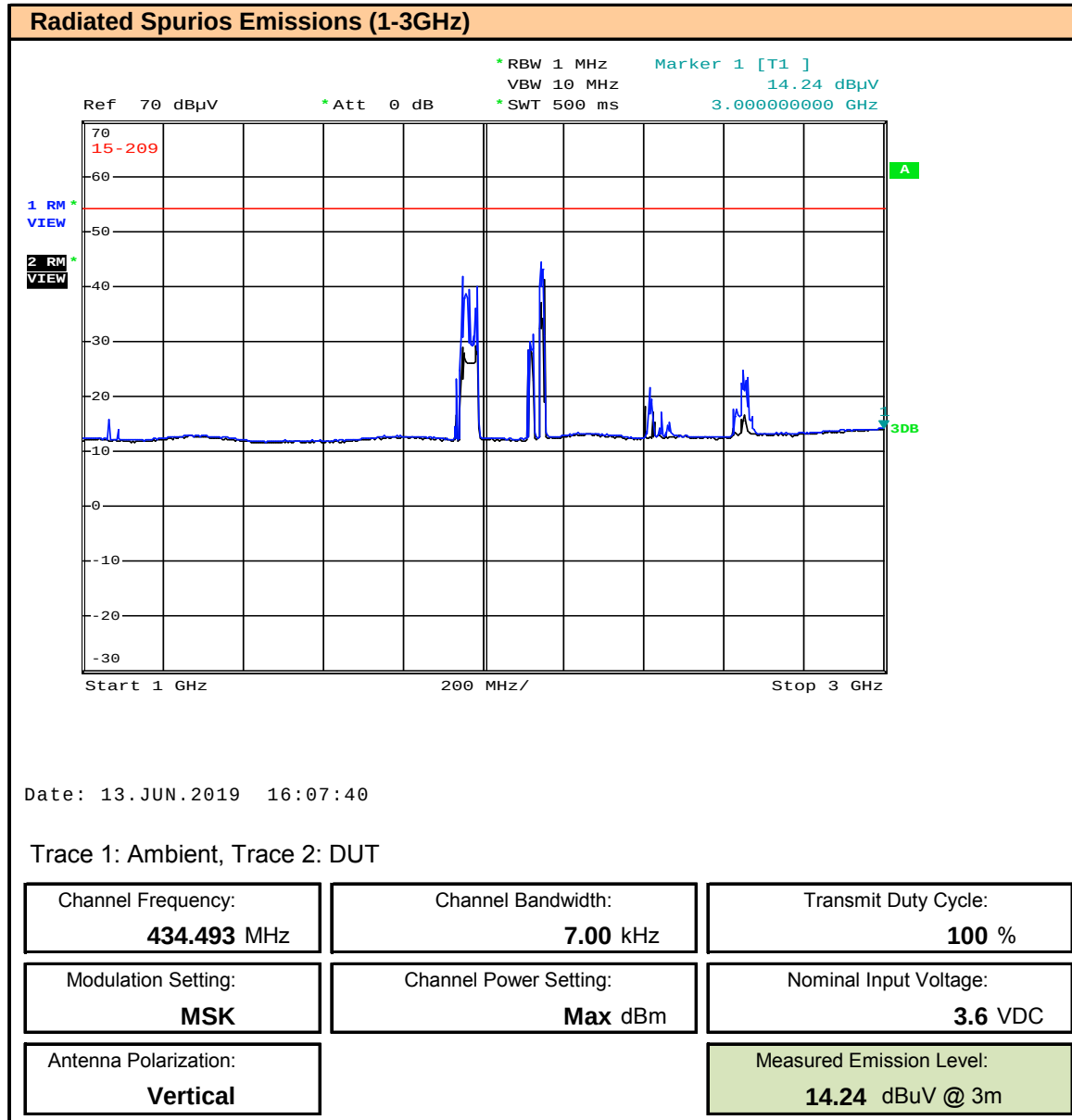
Plot 9.2 – Radiated Spurious Emissions 30-1000MHz, Vertical



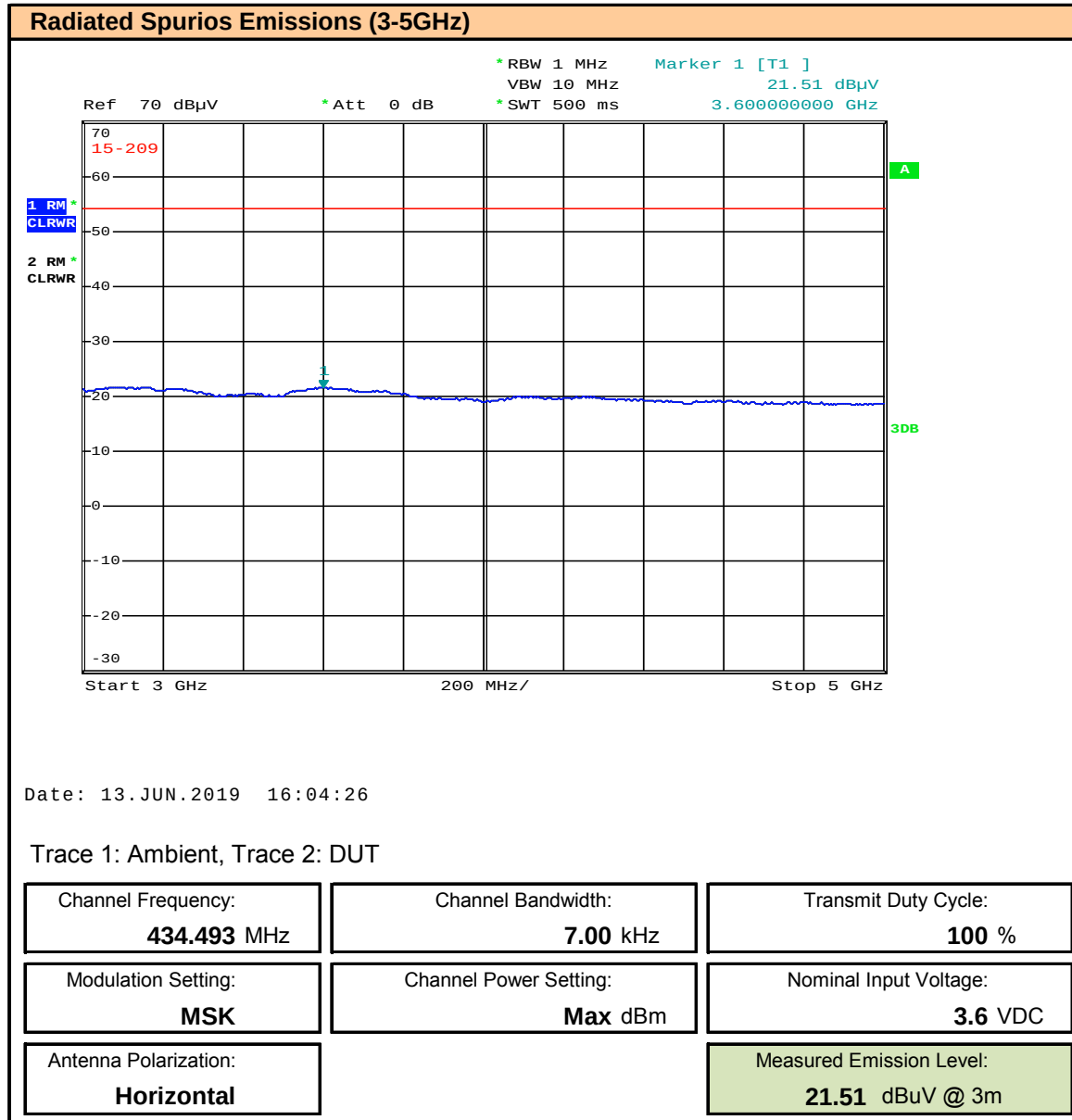
Plot 9.3 – Radiated Spurious Emissions 1-3GHz, Horizontal



Plot 9.4 – Radiated Spurious Emissions 1-3GHz, Vertical



**Plot 9.5 – Radiated Spurious Emissions 3-5GHz, Horizontal**



Plot 9.6 – Radiated Spurious Emissions 3-5GHz, Vertical

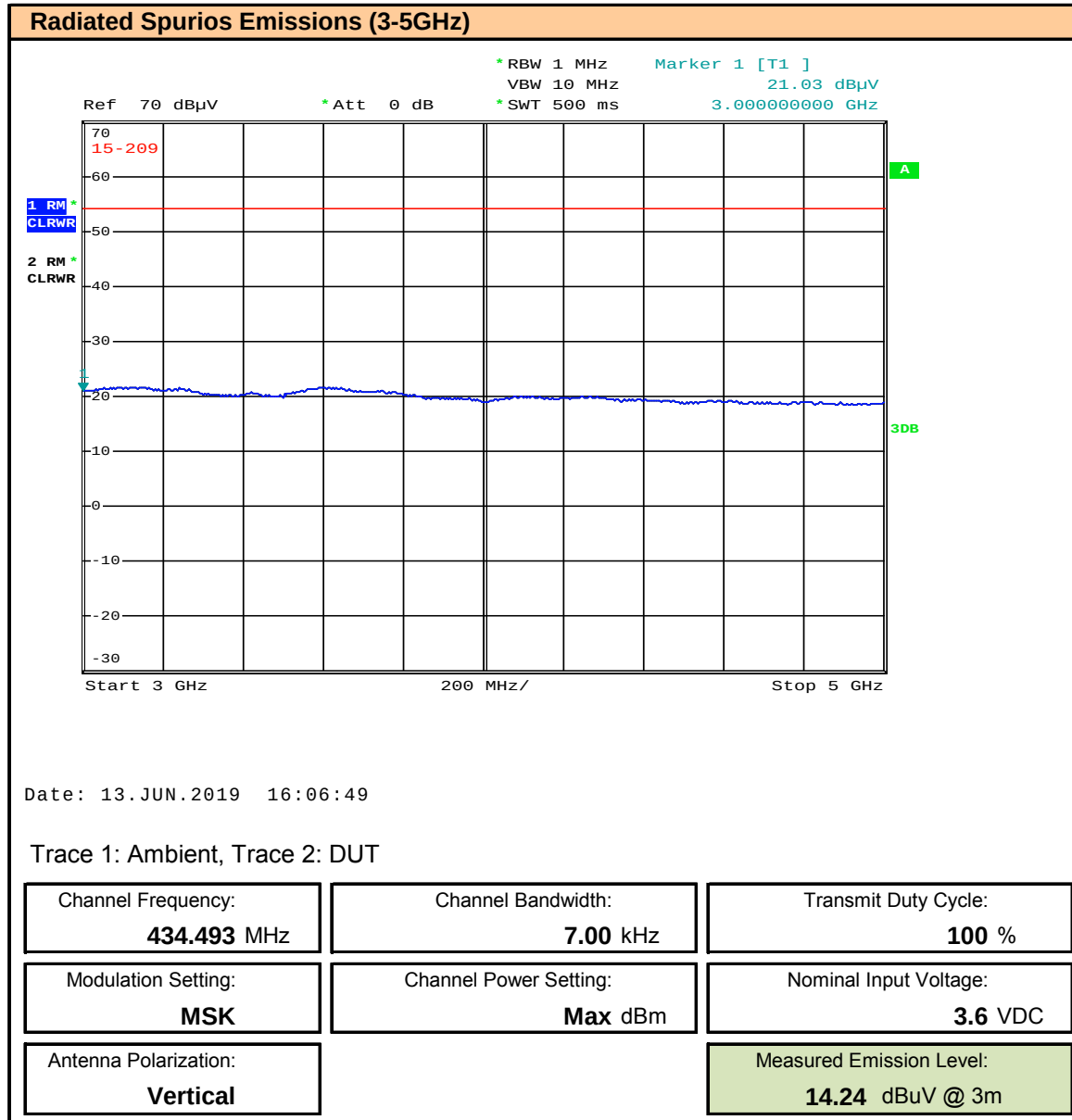


**Table 9.1 – Summary of Radiated Spurious Emissions**

| <b>Radiated Spurious Emissions</b> |              |                   |                      |                            |                     |                          |                           |                 |               |
|------------------------------------|--------------|-------------------|----------------------|----------------------------|---------------------|--------------------------|---------------------------|-----------------|---------------|
| <b>Emission Frequency</b>          | <b>BW</b>    | <b>Modulation</b> | <b>Power Setting</b> | <b>Transmit Duty Cycle</b> | <b>Polarization</b> | <b>Measured Emission</b> | <b>Corrected Emission</b> | <b>Limit</b>    | <b>Margin</b> |
| <b>(MHz)</b>                       | <b>(kHz)</b> |                   | <b>(dBm)</b>         | <b>(%)</b>                 |                     | <b>(dBuV/m @ 3m)</b>     | <b>(dBuV/m @ 3m)</b>      | <b>(dBuV)</b>   | <b>(dBm)</b>  |
| 916.7**                            | 7            | MSK               | Max                  | 100                        | Horizontal          | 40.89                    | 40.89                     | 46.00           | 5.11          |
| 927.2**                            | 7            | MSK               | Max                  | 100                        | Vertical            | 41.88                    | 41.88                     | 46.00           | 4.12          |
| 3000*                              | 7            | MSK               | Max                  | 100                        | Horizontal          | 14.27                    | 44.36                     | 54.00           | 9.64          |
| 3000*                              | 7            | MSK               | Max                  | 100                        | Vertical            | 14.24                    | 44.33                     | 54.00           | 9.67          |
| 3600*                              | 7            | MSK               | Max                  | 100                        | Horizontal          | 21.51                    | 52.70                     | 54.00           | 1.30          |
| 3000*                              | 7            | MSK               | Max                  | 100                        | Vertical            | 21.03                    | 51.12                     | 54.00           | 2.88          |
| <b>Result:</b>                     |              |                   |                      |                            |                     |                          |                           | <b>Complies</b> |               |

\* Noise Floor

\*\* Measurement automatically corrected for Antenna Correction Factor and Cable Loss

## APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment

| Equipment List |              |              |                   |
|----------------|--------------|--------------|-------------------|
| Asset Number   | Manufacturer | Model Number | Description       |
| 00241          | R&S          | FSU40        | Spectrum Analyzer |

Figure A.1 – Test Setup Conducted Measurements

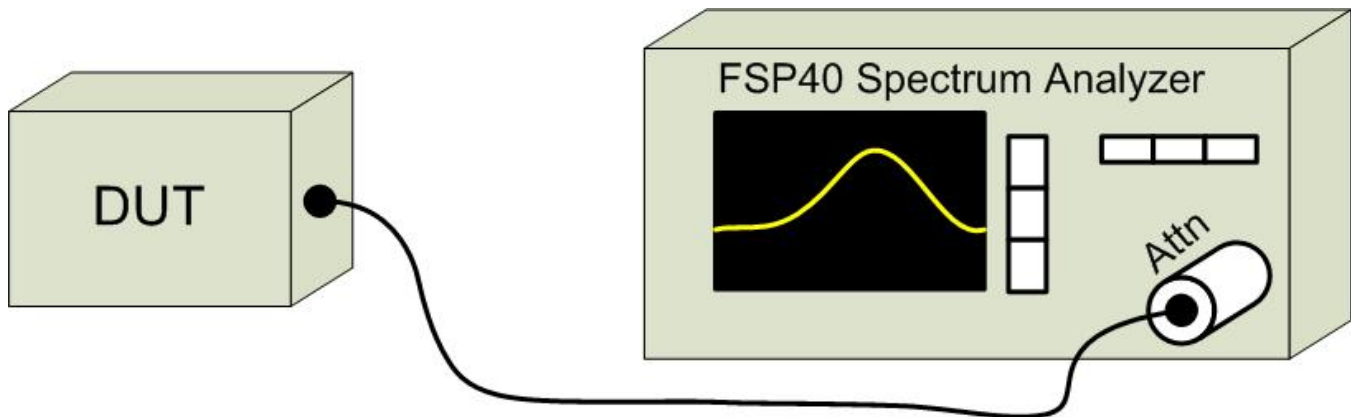


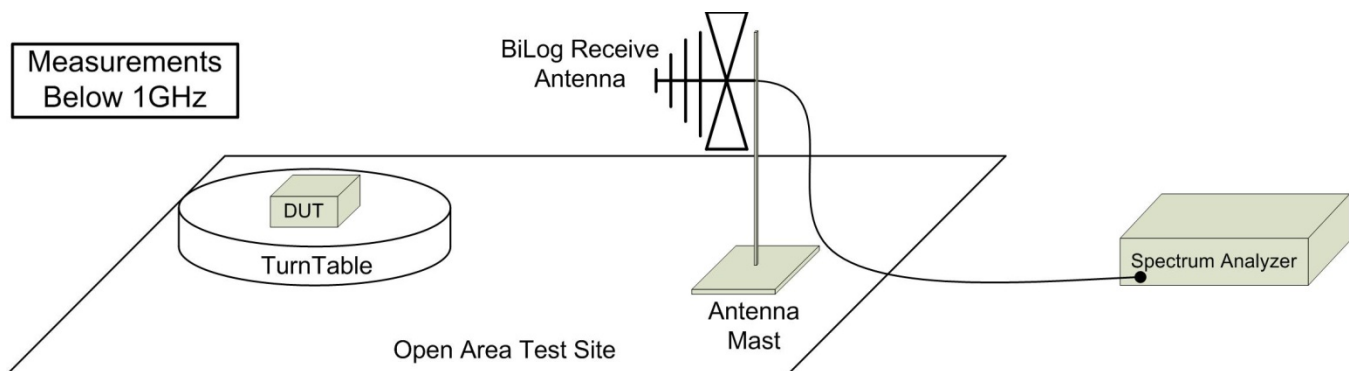
Table A.2 – Setup - Radiated Emissions Equipment

| Equipment List |              |                     |                          |
|----------------|--------------|---------------------|--------------------------|
| Asset Number   | Manufacturer | Model Number        | Description              |
| 00051          | HP           | 8566B               | Spectrum Analyzer        |
| 00049          | HP           | 85650A              | Quasi-peak Adapter       |
| 00047          | HP           | 85685A              | RF Preselector           |
| 00072          | EMCO         | 2075                | Mini-mast                |
| 00073          | EMCO         | 2080                | Turn Table               |
| 00071          | EMCO         | 2090                | Multi-Device Controller  |
| 00265          | Miteq        | JS32-00104000-58-5P | Microwave L/N Amplifier  |
| 00241          | R&S          | FSU40               | Spectrum Analyzer        |
| 00050          | Chase        | CBL-6111A           | Bilog Antenna            |
| 00275          | Coaxis       | LMR400              | 25m Cable                |
| 00276          | Coaxis       | LMR400              | 4m Cable                 |
| 00278          | TILE         | 34G3                | TILE Test Software       |
| 00034          | ETS          | 3115                | Double Ridged Guide Horn |

CNR: Calibration Not Required

COU: Calibrate On Use

Figure A.3 – Test Setup Radiated Emissions Measurements



## APPENDIX B – EQUIPMENT LIST AND CALIBRATION

| Equipment List   |              |               |                     |                |                             |                 |                      |                 |
|------------------|--------------|---------------|---------------------|----------------|-----------------------------|-----------------|----------------------|-----------------|
| (*)              | Asset Number | Manufacturer  | Model Number        | Serial Number  | Description                 | Last Calibrated | Calibration Interval | Calibration Due |
| *                | 00050        | Chase         | CBL-6111A           | 1607           | Bilog Antenna               | 3 Jan 2019      | Triennial            | 3 Jan 2022      |
| *                | 00034        | ETS           | 3115                | 6267           | Double Ridged Guide Horn    | 26 Nov 2018     | Triennial            | 26 Nov 2021     |
|                  | 00035        | ETS           | 3115                | 6276           | Double Ridged Guide Horn    | 22 Mar 2019     | Triennial            | 21 Mar 2022     |
| *                | 00085        | EMCO          | 6502                | 9203-2724      | Loop Antenna                | 11 Jun 2019     | Triennial            | 11 Jun 2022     |
| *                | 00161        | Waveline Inc. | 889                 |                | Standard Gain Horn 18-26GHz | NCR             | n/a                  | NCR             |
|                  | 00162        | Waveline Inc. | 889                 |                | Standard Gain Horn 18-26GHz | NCR             | n/a                  | NCR             |
|                  | 00163        | Waveline Inc. | 1099                |                | Standard Gain Horn 26-40GHz | NCR             | n/a                  | NCR             |
|                  | 00164        | Waveline Inc. | 1099                |                | Standard Gain Horn 26-40GHz | NCR             | n/a                  | NCR             |
| *                | 00165        | Waveline Inc. | 801-KF              |                | Waveguide Adapter 18-26GHz  | NCR             | n/a                  | NCR             |
|                  | 00166        | Waveline Inc. | 801-KF              |                | Waveguide Adapter 18-26GHz  | NCR             | n/a                  | NCR             |
|                  | 00167        | Waveline Inc. | 1001-KF             |                | Waveguide Adapter 26-40GHz  | NCR             | n/a                  | NCR             |
|                  | 00168        | Waveline Inc. | 1001-KF             |                | Waveguide Adapter 26-40GHz  | NCR             | n/a                  | NCR             |
| *                | 00047        | HP            | 85685A              | 2837A00826     | RF Preselector              | 23 Jun 2017     | Triennial            | 23 Jun 2020     |
| *                | 00049        | HP            | 85650A              | 2043A00162     | Quasi-peak Adapter          | 23 Jun 2017     | Triennial            | 23 Jun 2020     |
| *                | 00051        | HP            | 8566B               | 2747A05510     | Spectrum Analyzer           | 23 Jun 2017     | Triennial            | 23 Jun 2020     |
|                  | 00223        | HP            | 8901A               | 3749A07154     | Modulation Analyzer         | 27 Dec 2017     | Triennial            | 27 Dec 2020     |
|                  | 00224        | HP            | 8903B               | 3729A18691     | Audio Analyzer              | 28 Dec 2017     | Triennial            | 28 Dec 2020     |
| *                | 00241        | R&S           | FSU40               | 100500         | Spectrum Analyzer           | 15 May 2018     | Triennial            | 15 May 2021     |
| *                | 00005        | HP            | 8648D               | 3847A00611     | Signal Generator            | 21 Jun 2017     | Triennial            | 21 Jun 2020     |
|                  | 00006        | R&S           | SMR20               | 100104         | Signal Generator            | 29 May 2017     | Triennial            | 29 May 2020     |
|                  | 00243        | Rigol         | DS1102E             | DS1ET150502164 | Oscilloscope                | 7 Nov 2017      | Triennial            | 7 Nov 2020      |
|                  | 00254        | LeCroy        | WM8600A             | 532            | Oscilloscope                | NCR             | n/a                  | NCR             |
|                  | 00110        | Gigatronics   | 8652A               | 1875801        | Power Meter                 | 26 Mar 2019     | Triennial            | 26 Mar 2022     |
|                  | 00237        | Gigatronics   | 80334A              | 1837001        | Power Sensor                | 26 Mar 2019     | Triennial            | 26 Mar 2022     |
|                  | 00232        | ETS Lindgren  | HI-6005             | 91440          | Isotropic E-Field Probe     | 18 Dec 2017     | Triennial            | 18 Dec 2020     |
|                  | 00003        | HP            | 53181A              | 3736A05175     | Frequency Counter           | 21 Jun 2017     | Triennial            | 21 Jun 2020     |
|                  | 00257        | Com-Power     | LI-215A             | 191934         | LISN                        | 5 Jan 2018      | Triennial            | 5 Jan 2021      |
|                  | 00041        | AR            | 10W1000C            | 27887          | Power Amplifier             | NCR             | n/a                  | NCR             |
|                  | 00106        | AR            | 5SIG4               | 26235          | Power Amplifier             | NCR             | n/a                  | NCR             |
|                  | 00280        | AR            | 25A250AM6           | 22702          | Power Amplifier             | NCR             | n/a                  | NCR             |
| *                | 00265        | Miteq         | JS32-00104000-58-5P | 1939850        | Microwave L/N Amplifier     | COU             | n/a                  | COU             |
|                  | 00071        | EMCO          | 2090                | 9912-1484      | Multi-Device Controller     | n/a             | n/a                  | n/a             |
| *                | 00072        | EMCO          | 2075                | 0001-2277      | Mini-mast                   | n/a             | n/a                  | n/a             |
| *                | 00073        | EMCO          | 2080                | 0002-1002      | Turn Table                  | n/a             | n/a                  | n/a             |
|                  | 00081        | ESPEC         | ECT-2               | 0510154-B      | Environmental Chamber       | NCR             | n/a                  | CNR             |
| *                | 00234        | VWR           | 61161-378           | 140320430      | Temp/Humidity Meter         | New             | Triennial            | New             |
|                  | 00236        | Nokia         | -                   | 236            | ESD Table                   | NCR             | n/a                  | NCR             |
|                  | 00255        | Expert ESD    | A4001               | A4001-155      | ESD Target                  | COU             | n/a                  | COU             |
|                  | 00064        | NARDA         | 3020A               | n/a            | Bi-Directional Coupler      | COU             | n/a                  | COU             |
|                  | 00263        | Koaxis        | KP10-1.00M-TD       | 263            | 1m Armoured Cable           | COU             | n/a                  | COU             |
| *                | 00263B       | Koaxis        | KP10-1.00M-TD       | 263B           | 1m Armoured Cable           | COU             | n/a                  | COU             |
| *                | 00264        | Koaxis        | KP10-7.00M-TD       | 264            | 7m Armoured Cable           | COU             | n/a                  | COU             |
| *                | 00275        | TMS           | LMR400              | n/a            | 25m Cable                   | COU             | n/a                  | COU             |
| *                | 00276        | TMS           | LMR400              | n/a            | 4m Cable                    | COU             | n/a                  | COU             |
| *                | 00277        | TMS           | LMR400              | n/a            | 4m Cable                    | COU             | n/a                  | COU             |
| *                | 00278        | TILE          | 34G3                | n/a            | TILE Test Software          | NCR             | n/a                  | NCR             |
| Rented Equipment |              |               |                     |                |                             |                 |                      |                 |
|                  |              |               |                     |                |                             |                 |                      |                 |

\* Used during the course of this investigation

NCR: No Calibration Required

COU: Calibrate On Use



## APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

| CISPR 16-4 Measurement Uncertainty ( $U_{LAB}$ )                                                                                          |                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2 |                                                                                                                                                    |
| <b>30MHz - 200MHz</b>                                                                                                                     |                                                                                                                                                    |
| $U_{LAB} = 5.14\text{dB}$ $U_{CISPR} = 6.3\text{dB}$                                                                                      |                                                                                                                                                    |
| <b>200MHz - 1000MHz</b>                                                                                                                   |                                                                                                                                                    |
| $U_{LAB} = 5.90\text{dB}$ $U_{CISPR} = 6.3\text{dB}$                                                                                      |                                                                                                                                                    |
| <b>1GHz - 6GHz</b>                                                                                                                        |                                                                                                                                                    |
| $U_{LAB} = 4.80\text{dB}$ $U_{CISPR} = 5.2\text{dB}$                                                                                      |                                                                                                                                                    |
| <b>6GHz - 18GHz</b>                                                                                                                       |                                                                                                                                                    |
| $U_{LAB} = 5.1\text{dB}$ $U_{CISPR} = 5.5\text{dB}$                                                                                       |                                                                                                                                                    |
| If the calculated uncertainty $U_{lab}$ is <b>less</b> than $U_{CISPR}$ then:                                                             |                                                                                                                                                    |
| 1                                                                                                                                         | Compliance is deemed to occur if <b>NO</b> measured disturbance exceeds the disturbance limit                                                      |
| 2                                                                                                                                         | Non-Compliance is deemed to occur if <b>ANY</b> measured disturbance <b>EXCEEDS</b> the disturbance limit                                          |
| If the calculated uncertainty $U_{lab}$ is <b>greater</b> than $U_{CISPR}$ then:                                                          |                                                                                                                                                    |
| 3                                                                                                                                         | Compliance is deemed to occur if <b>NO</b> measured disturbance, increased by ( $U_{lab} - U_{CISPR}$ ), exceeds the disturbance limit             |
| 4                                                                                                                                         | Non-Compliance is deemed to occur if <b>ANY</b> measured disturbance, increased by ( $U_{lab} - U_{CISPR}$ ), <b>EXCEEDS</b> the disturbance limit |