# REGULATORY COMPLIANCE TEST REPORT

## FCC Part 15 Subpart F 15.519
## Hand-Held UWB Device

## Report No.: ALER03-U2 Rev C

**Company:** Alereon Inc.

**Model Name:** AL5350B Based UWB Modules

# REGULATORY COMPLIANCE TEST REPORT

**Company Name:** Alereon Inc.

**Model Name:** AL5350B Based UWB Modules

**To:** FCC CFR 47 Part 15 Subpart F 15.519

Test Report Serial No.: ALER03-U2 Rev C

This report supersedes: NONE

Applicant: Alereon Inc.
10800 Pecan Park Blvd, STE 100
Austin, Texas 78750
USA

Issue Date: 20th April 2021

**This Test Report is Issued Under the Authority of:**

**MiCOM Labs, Inc.**
575 Boulder Court
Pleasanton California 94566
USA
Phone: +1 (925) 462-0304
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A2LA ACCREDITED
TESTING CERT #2381.01

**MiCOM Labs is an ISO 17025 Accredited Testing Laboratory**

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# 1. ACCREDITATION, LISTINGS & RECOGNITION

## 1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2017. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 24th day of February 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2021

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

## 1.2. RECOGNITION

MiCOM Labs, Inc is widely recognized for its wireless testing and certification capabilities. In addition to being recognized for Testing and Certification under Phase 2 Mutual Recognition Agreements (MRA) with Canada, Europe, United Kingdom and Japan, our international recognition includes Conformity Assessment Body (CAB) designation status under agreements with Asia Pacific (APEC) MRA Phase 1 countries giving acceptance of MiCOM Labs test reports. MiCOM Labs test reports are accepted globally.

| Country | Recognition Body | Status | MRA Phase | Identification No. |
|---|---|---|---|---|
| USA | Federal Communications Commission (FCC) | TCB | - | US0159 Test Firm Designation#: US1084 |
| Canada | Industry Canada (ISED) | FCB | APEC MRA 2 | US0159 ISED#: 4143A |
| Japan | MIC (Ministry of Internal Affairs and Communication) | CAB | Japan MRA 2 | RCB 210 |
| | Japan Approvals Institute for Telecommunication Equipment (JATE) | | | |
| | VCCI | -- | -- | A-0012 |
| Europe | European Commission | NB | EU MRA 2 | NB 2280 |
| United Kingdom | Department for Business, Energy & Industrial Strategy (BEIS) | AB | UK MRA 2 | AB 2280 |
| Mexico | Instituto Federal de Telecomunicaciones (IFT) | CAB | Mexico MRA 1 | US0159 |
| Australia | Australian Communications and Media Authority (ACMA) | CAB | APEC MRA 1 | US0159 |
| Hong Kong | Office of the Telecommunication Authority (OFTA) | | | |
| Korea | Ministry of Information and Communication Radio Research Laboratory (RRL) | | | |
| Singapore | Infocomm Development Authority (IDA) | | | |
| Taiwan | National Communications Commission (NCC)<br>Bureau of Standards, Metrology and Inspection (BSMI) | | | |
| Vietnam | Ministry of Communication (MIC) | | | |

TCB – Telecommunications Certification Bodies (TCB)
FCB – Foreign Certification Body
CAB – Conformity Assessment Body
NB – Notified Body
AB – Approved Body
MRA – Mutual Recognition Agreement
MRA PhasePhase I - recognition for product testing
Phase II – recognition for both product testing and certification

## 1.3. PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

Accredited Product Certification Body

A2LA has accredited

MiCOM LABS

Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This product certification body also meets the *A2LA R322 – Specific Requirements – Notified Body Accreditation Requirements* and *A2LA R308 - Specific Requirements - ISO-IEC 17065 - Telecommunication Certification Body Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 24th day of February 2020

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2021

*For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.*

United States of America – Telecommunication Certification Body (TCB)
Industry Canada – Certification Body, CAB Identifier – US0159
Europe – Notified Body (NB), NB Identifier - 2280
UK – Approved Body (AB), AB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210

## 2. DOCUMENT HISTORY

| Document History | | |
|---|---|---|
| Revision | Date | Comments |
| Draft | 16th March 2021 | Draft for review |
| Draft #2 | 22nd March 2021 | |
| Draft #3 | 23rd March 2021 | |
| Rev A | 24th March 2021 | Initial Release |
| Rev B | 12th April 2021 | Updated the results table on Section 6 Test Summary to break out the results for each module tested |
| Rev C | 20th April 2021 | Modified title of Section 9.1 to UWB Bandwidth |
| | | |
| | | |

In the above table the latest report revision will replace all earlier versions.

# 3. TEST RESULT CERTIFICATE

| | | | |
|---|---|---|---|
| **Manufacturer:** | Alereon Inc.<br>10800 Pecan Park Blvd, STE 100<br>Austin, Texas 78750<br>USA | **Tested By:** | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton, California 94566<br>USA |
| **Model:** | AL5350B Based UWB Modules | **Telephone:** | +1 925 462 0304 |
| **Equipment Type:** | Mobile & Portable Client Device | **Fax:** | +1 925 462 0306 |
| **S/N's:** | AL5804 Impact: 21062294<br>AL5808 Octal: 21030754<br>AL5830 Commander 256: 20510133<br>AL5833 Destroyer 256: 1037463-101<br>AL5834 Combat 256: 20510161<br>AL5835 Camouflage 256: 20510302 | | |
| **Test Date(s):** | 5th – 12th March 2021 | **Website:** | www.micomlabs.com |

| STANDARD(S) | TEST RESULTS |
|---|---|
| **FCC CFR 47 Part 15 Subpart F 15.519** | **EQUIPMENT COMPLIES** |

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

**Notes:**

1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

3. Test results apply only to the item(s) tested.

A2LA ACCREDITED
TESTING CERT #2381.01

**Approved & Released for MiCOM Labs, Inc. by**:

Graeme Grieve
Quality Manager MiCOM Labs, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

# 4. REFERENCES AND MEASUREMENT UNCERTAINTY

## 4.1. Normative References

| REF. | PUBLICATION | YEAR | TITLE |
|---|---|---|---|
| I | FCC 47 CFR Part F | 2018 | Radio Frequency Devices; Subpart F –Ultra Wide Band Devices |
| II | A2LA | August 2018 | R105 - Requirement's When Making Reference to A2LA Accreditation Status |
| III | ANSI C63.10 | 2013 | American National Standard for Testing Unlicensed Wireless Devices |
| IV | ANSI C63.4 | 2014 | American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| V | ETSI TR 100 028 | 2001-12 | Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics |
| VI | M 3003 | Edition 3 Nov.2012 | Expression of Uncertainty and Confidence in Measurements |
| VII | FCC 47 CFR Part 2.1033 | 2016 | FCC requirements and rules regarding photographs and test setup diagrams. |
| VIII | KDB 393764 D01 UWB FAQ v02 | January 29, 2018 | Ultra-Wideband (UWB) Devices frequently asked questions |

## 4.2. Test and Uncertainty Procedure

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.





MiCOM Labs, 575 Boulder Court, Pleasanton, California 94566 USA, Phone: +1 (925) 462 0304, Fax: +1 (925) 462 0306, www.micomlabs.com

# 5. PRODUCT DETAILS AND TEST CONFIGURATIONS

## 5.1. Technical Details

| Details | Description |
|---|---|
| Purpose: | Test of the Alereon AL5350B Based UWB Modules to FCC CFR 47 Part 15 Subpart F 15.519 Ultra-Wideband (UWB); Hand-Held Device |
| Applicant: | Alereon Inc.<br>10800 Pecan Park Blvd, STE 100<br>Austin, TX 78750<br>USA |
| Manufacturer: | As applicant |
| Laboratory performing the tests: | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton California 94566 USA |
| Test report reference number: | ALER03-U2 |
| Date EUT received: | 5th March 2021 |
| Standard(s) applied: | FCC Part 15 Subpart F 15.519 |
| Dates of test (from - to): | 8th – 12h March 2021 |
| No of Units Tested: | 1 |
| Product Name: | AL5350B Based UWB Modules |
| Model(s): | AL5804 Impact: 1.7g, L1.215” x W0.565”, Rev 1, SW Rev 30006<br>AL5808 Octal: 1.5g, L1.040” x W0.565”, Rev 1, SW Rev 30006<br>AL5830 Commander 256: 2.8g, L1.040” x W0.565”, Rev 1, SW Rev 30006<br>AL5833 Destroyer 256: 5.2g, L1.690” x W1.252”, Rev 1, SW Rev 30006<br>AL5834 Combat 256: 5.2g, L1.790” x W0.710”, Rev 1, SW Rev 30006<br>AL5835 Camouflage 256: 4.1g, L1.980” x W0.860”, Rev 1, SW Rev 30006 |
| Location for use: | Indoors and Outdoors |
| Declared Frequency Range(s): | 3100-10600 MHz |
| Type of Modulation: | BPM/BPSK |
| EUT Modes of Operation: | UWB |
| Declared Nominal Output Power (dBm): | -41.3 dBm |
| Rated Input Voltage and Current: | AL5804 Impact: 5.0 VDC, 180mA<br>AL5808 Octal: 3.3 VDC, 180mA<br>AL5830 Commander 256: 3.3 VDC, 180mA<br>AL5833 Destroyer 256: 3.3 VDC, 180mA<br>AL5834 Combat 256: 5.0 VDC, 180mA<br>AL5835 Camouflage 256: 5.0 VDC, 180mA |
| Operating Temp Range: (manufacturers declaration) | -40 to +85°C |
| Product Application: | Mobile & Portable Client Devices |

## 5.2. Scope Of Test Program

**Alereon Inc. Company: AL5350B Based UWB Modules**

The scope of the test program was to test the Alereon Inc. Company AL5350B Based UWB Modules configurations in the frequency ranges 3100 - 10600 MHz for compliance against the following specification:

**FCC CFR 47 Part 15 Subpart F – 15.519**
Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 3100 - 10600 MHz bands.

**Model Differences**
AL5804 Impact – USB Interface
AL5808 Octal – Serial Interface
AL5830 Commander 256 – Serial Interface
AL5833 Destroyer 256 – Serial Interface
AL5834 Combat 256 – USB Interface
AL5835 Camouflage 256 – Serial Interface

The manufacturer declares that all 6 Models use the same RF chipset, see Appendix B Manufacturers Declaration on Similarities. Conducted testing was performed on the AL5834 Combat 256 model with USB Interface.

## 5.3. Equipment Model(s) and Serial Number(s)

| Type (EUT/ Support) | Equipment Description (Including Brand Name) | Mfr. | Model No. | Serial No. |
|---|---|---|---|---|
| EUT | Combat 256 | Alereon Inc | AL5834 | 20510161 |
| | Impact | Alereon Inc | AL5804 | 21062294 |
| | Commander 256 | Alereon Inc | AL5830 | 20510133 |
| | Camouflage 256 | Alereon Inc | AL5835 | 20510302 |
| | Octal | Alereon Inc | AL5808 | 21030754 |
| | Destroyer 256 | Alereon Inc | AL5833 | 1037463-101 |
| Support | Host Board | Alereon Inc | N/A | N/A |
| Support | Laptop | Lenovo | N/A | N/A |

## 5.4. Antenna Details

| Type | Manufacturer | Model | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|---|---|---|---|---|---|---|---|---|
| Chip | Taiyo Yuden | AH086M555003 | Patch | 1.0/0.2/0.2 | N/A | -- | No | 3168-3696 |
| Chip | Taiyo Yuden | AH086M555003 | Patch | 0.2/-0.2/0.1 | N/A | -- | No | 6600-7656 |
| Chip | Taiyo Yuden | AH086M555003 | Patch | 0.1/-1.8/-1.8 | N/A | -- | No | 7656-8712 |

BF Gain - Beamforming Gain
Dir BW - Directional BeamWidth
X-Pol - Cross Polarization

## 5.5. Cabling and I/O Ports

Custom 60 pin interface to Host Board/ USB

a. USB Type A Port
b. Custom USB Port
c. Serial Port
d. Parallel Interface

## 5.6. Test Configurations

Results for the following configurations are provided in this report:

| Band(s) | Transmission Rate | Channel Frequency (MHz) | | |
|---|---|---|---|---|
| | | Low | Mid | High |
| 1 | Max | 3432 | 3960 | 4488 |
| 3 | Max | 6600 | 7128 | 7656* |
| 6 | Max | 7656* | 8184 | 8712 |

*These frequencies are the same for Band 3 and Band 6. As a result, radiated testing only presents a single set of results.

## 5.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:
1. NONE

## 5.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:
1. NONE

# 6. TEST SUMMARY

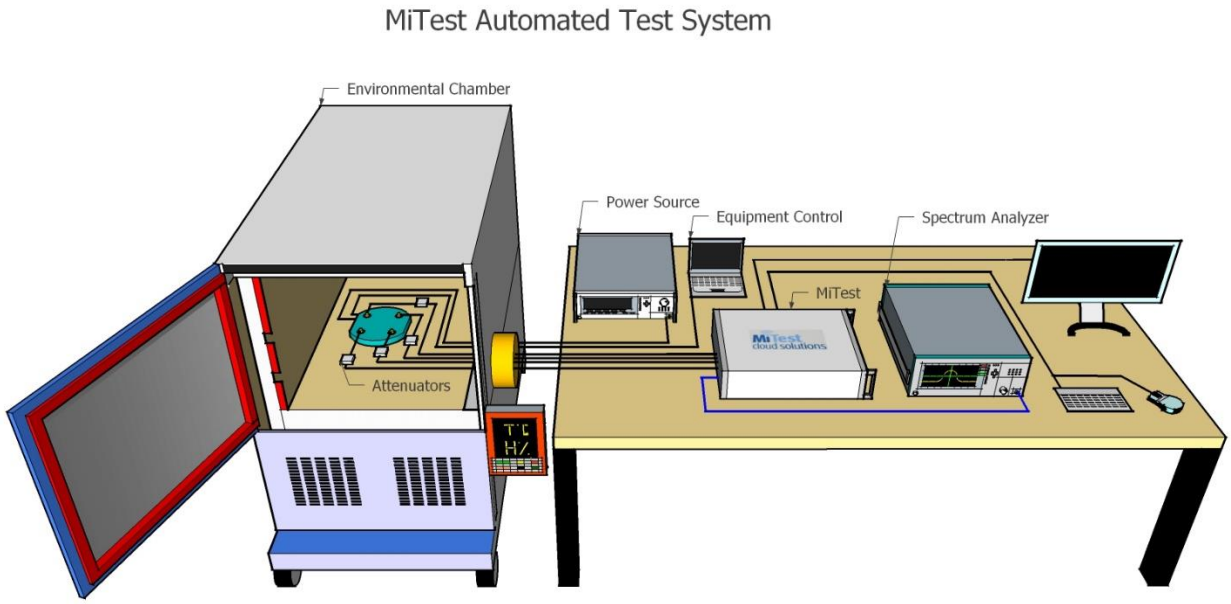
List of Measurements

| Test Header | Result | Data Link |
|---|---|---|
| UWB Bandwidth | Complies | View Data |
| Peak Power | Complies | View Data |
| Peak Power Density | Complies | View Data |
| Spurious Radiated Emissions | Complies | View Data |
| Spurious Radiated Emissions in GPS Bands | Complies | View Data |
| Shutdown Timing Requirements | Complies | View Data |
| Emissions below 1 GHz | Complies | -- |
| - AL5804 Impact | Complies | See MiCOM Labs test report ALER03-U4 |
| - AL5808 Octal | Complies | |
| - AL5830 Commander 256 | Complies | |
| - AL5833 Destroyer 256 | Complies | |
| - AL5834 Combat 256 | Complies | |
| - AL5835 Camouflage 256 | Complies | |
| AC Wireline Emissions | *Not Applicable | Vdc Modules |
| Comments: None | | |

*Modules are dc powered

# 7. TEST EQUIPMENT CONFIGURATION(S)

## 7.1. Conducted Test Setup




A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

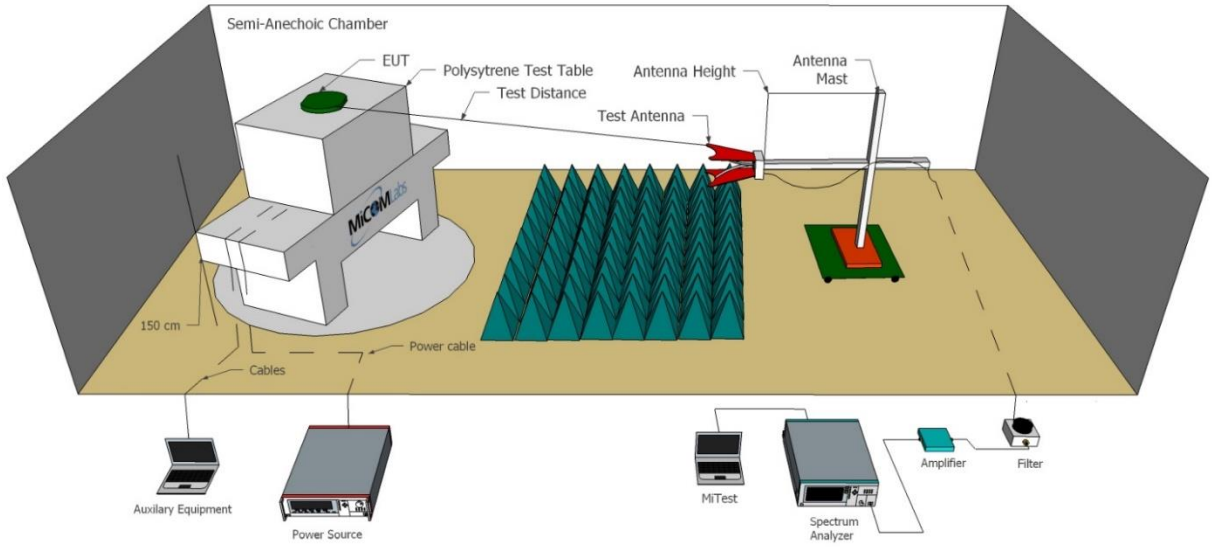
| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| #3 SA | MiTest Box to SA | Fairview Microwave | SCA1814-0101-72 | #3 SA | 4 Jun 2021 |
| #3P1 | EUT to MiTest box port 1 | Fairview Microwave | SCA1814-0101-72 | #3P1 | 4 Jun 2021 |
| #3P2 | EUT to MiTest box port 2 | Fairview Microwave | SCA1814-0101-72 | #3P2 | 4 Jun 2021 |
| #3P3 | EUT to MiTest box port 3 | Fairview Microwave | SCA1814-0101-72 | #3P3 | 4 Jun 2021 |
| #3P4 | EUT to MiTest box port 4 | Fairview Microwave | SCA1812-0101-72 | #3P4 | 4 Jun 2021 |
| 249 | Thermocouple; Resistance Thermometer | Thermotronics | GR2105-02 | 9340 #2 | 30 Oct 2021 |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 8 Oct 2021 |
| 378 | Rohde & Schwarz 40 GHz Receiver with Generator | Rhode & Schwarz | ESIB40 | 100107/040 | 12 Jun 2021 |
| 398 | MiTest RF Conducted Test Software | MiCOM | MiTest ATS | Version 4.2.3.0 | Not Required |
| 405 | DC Power Supply 0-60V | Agilent | 6654A | MY4001826 | Cal when used |

| | | | | | |
|---|---|---|---|---|---|
| 408 | USB to GPIB interface | National Instruments | GPIB-USB HS | 14C0DE9 | Not Required |
| 440 | USB Wideband Power Sensor | Boonton | 55006 | 9178 | 22 Jun 2021 |
| 441 | USB Wideband Power Sensor | Boonton | 55006 | 9179 | 20 Jun 2021 |
| 442 | USB Wideband Power Sensor | Boonton | 55006 | 9181 | 19 Jun 2021 |
| 445 | PoE Injector | D-Link | DPE-101GL | QTAH1E2000625 | Not Required |
| 461 | Spectrum Analyzer | Agilent | E4440A | MY46185537 | 20 Jun 2021 |
| 510 | Barometer/Thermometer | Control Company | 68000-49 | 170871375 | 20 Dec 2021 |
| 515 | MiTest Cloud Solutions RF Test Box | MiCOM | 2nd Gen with DFS | 515 | 4 Jun 2021 |
| 534 | Power Sensor 50 GHz -70dBm to +20dBm | R&S | NRP50SN | 1419.0093K02-100888-SB | 26 Feb 2022 |
| 75 | Environmental Chamber | Thermatron | SE-300-2-2 | 27946 | 20 Feb 2022 |

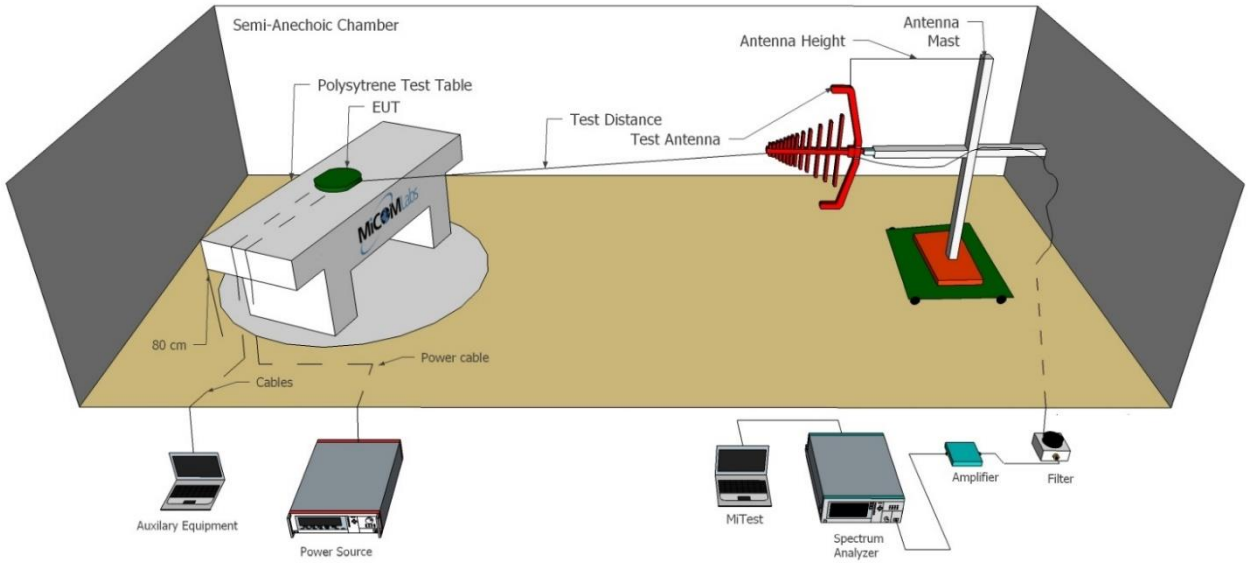
## 7.2. Radiated Emissions - 3m Chamber

The following tests were performed using the radiated test set-up shown in the diagram below. Radiated emissions above and below 1GHz.

Radiated Emissions Above 1GHz Test Setup




Radiated Emissions Below 1GHz Test Setup



A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| 170 | Video System Controller for Semi Anechoic Chamber | Panasonic | WV-CU101 | 04R08507 | Not Required |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 8 Oct 2021 |
| 298 | 3M Radiated Emissions Chamber Maintenance Check | MiCOM | 3M Chamber | 298 | 26 Apr 2021 |
| 330 | Variac 0-280 Vac | Staco Energy Co | 3PN1020B | 0546 | Cal when used |
| 336 | Active loop Ant 10kHz to 30 MHz | EMCO | EMCO 6502 | 00060498 | 29 Nov 2021 |
| 338 | Sunol 30 to 3000 MHz Antenna | Sunol | JB3 | A052907 | 4 Apr 2021 |
| 341 | 900MHz Notch Filter | EWT | EWT-14-0199 | H1 | 4 May 2021 |
| 342 | 2.4 GHz Notch Filter | EWT | EWT-14-0203 | H1 | 4 May 2021 |
| 346 | 1.6 TO 10GHz High Pass Filter | EWT | EWT-57-0112 | H1 | 4 May 2021 |
| 373 | 26III RMS Multimeter | Fluke | Fluke 26 series III | 76080720 | 21 Jun 2021 |
| 378 | Rohde & Schwarz 40 GHz Receiver with Generator | Rhode & Schwarz | ESIB40 | 100107/040 | 12 Jun 2021 |
| 397 | Amp 10 - 2500MHz | MiCOM Labs | Amp 10 - 2500 MHz | NA | 9 May 2021 |
| 399 | ETS 1-18 GHz Horn Antenna | ETS | 3117 | 00154575 | 12 May 2021 |
| 406 | Amplifier for Radiated Emissions | MiCOM Labs | 40dB 1 to 18GHz Amp | 0406 | 9 May 2021 |
| 410 | Desktop Computer | Dell | Inspiron 620 | WS38 | Not Required |
| 411 | Mast/Turntable Controller | Sunol Sciences | SC98V | 060199-1D | Not Required |
| 412 | USB to GPIB Interface | National Instruments | GPIB-USB HS | 11B8DC2 | Not Required |
| 413 | Mast Controller | Sunol Science | TWR95-4 | 030801-3 | Not Required |
| 414 | DC Power Supply 0-60V | HP | 6274 | 1029A01285 | Cal when used |
| 415 | Turntable Controller | Sunol Sciences | Turntable Controller | None | Not Required |
| 416 | Gigabit ethernet filter | ETS-Lingren | Gigafoil 260366 | None | Not Required |
| 447 | MiTest Rad Emissions Test Software | MiCOM | Rad Emissions Test Software Version 1.0 | 447 | Not Required |
| 462 | Schwarzbeck cable from Antenna to Amplifier. | Schwarzbeck | AK 9513 | 462 | 4 May 2021 |

| | | | | | |
|---|---|---|---|---|---|
| 463 | Schwarzbeck cable from Amplifier to Bulkhead. | Schwarzbeck | AK 9513 | 463 | 4 May 2021 |
| 464 | Schwarzbeck cable from Bulkhead to Receiver | Schwarzbeck | AK 9513 | 464 | 4 May 2021 |
| 466 | Low Pass Filter DC-1500 MHz | Mini-Circuits | NLP-1750+ | VUU10401438 | 4 May 2021 |
| 480 | Cable - Bulkhead to Amp | SRC Haverhill | 157-3050360 | 480 | 4 May 2021 |
| 481 | Cable - Bulkhead to Receiver | SRC Haverhill | 151-3050787 | 481 | 4 May 2021 |
| 510 | Barometer/Thermometer | Control Company | 68000-49 | 170871375 | 20 Dec 2021 |
| 518 | Cable - Amp to Antenna | SRC Haverhill | 157-3051574 | 518 | 4 May 2021 |
| 87 | Uninterruptible Power Supply | Falcon Electric | ED2000-1/2LC | F3471 02/01 | Cal when used |

# 8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.


The MiCOM Labs "MiTest" Automated Test System" (Patent Pending)

# 9. TEST RESULTS

## 9.1. UWB Bandwidth

| Conducted Test Conditions for UWB Bandwidth | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.519 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | UWB Bandwidth | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10 Section 10.1 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

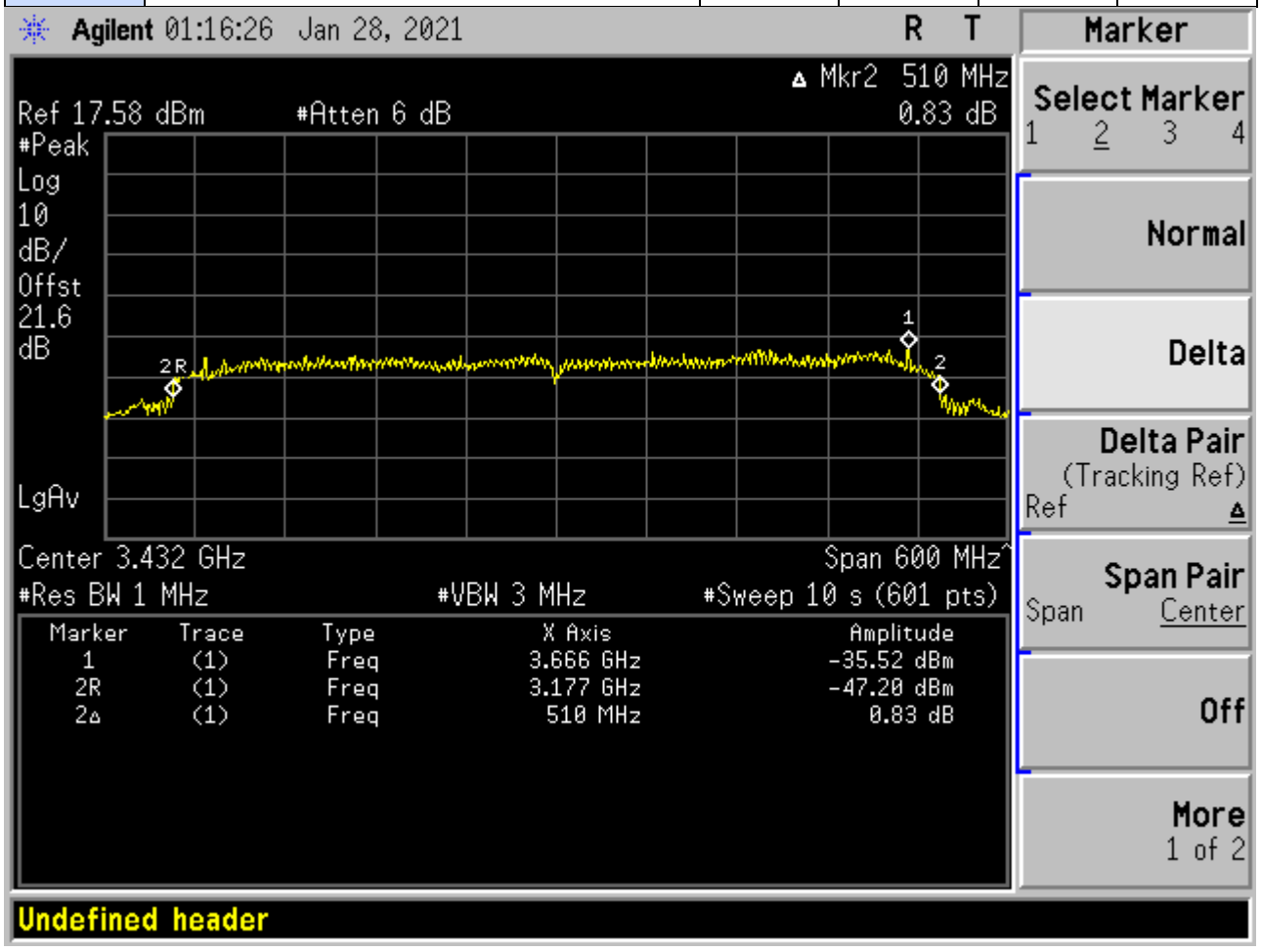
**Test Procedure for UWB Bandwidth Measurement**
The UWB Bandwidth is measured radiated, at a 3-meter distance, while EUT is operating in transmission mode at the appropriate center frequency. The Resolution Bandwidth was set to 1MHz RBW IAW ANSI C63.10.
Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Conducted Test Set-up section specified in this document.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 1 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **3432.00** | 510.0 | 510.0 | 510.0 | | |



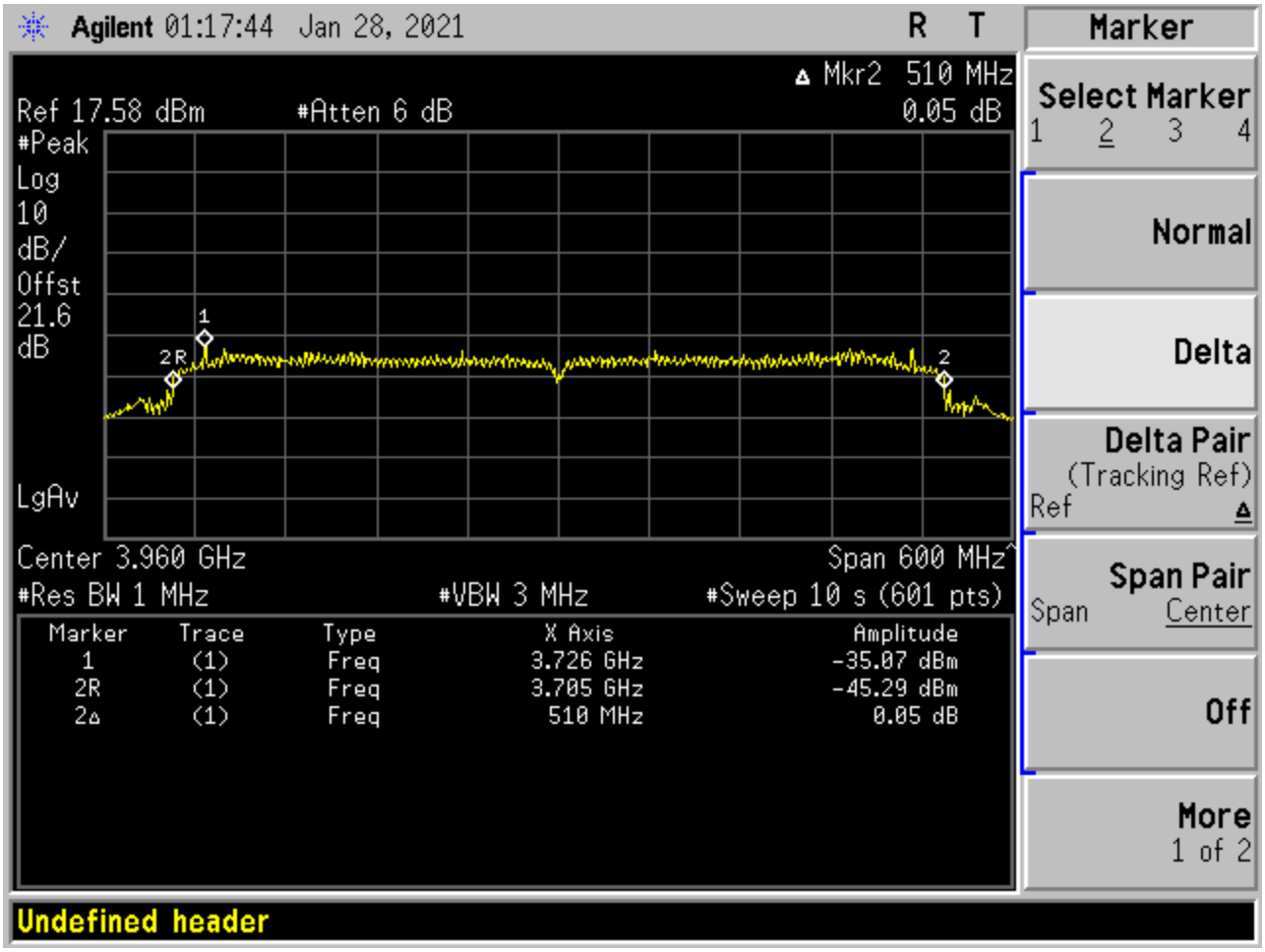

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 1 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **3960.00** | 510.0 | 510.0 | 510.0 | | |



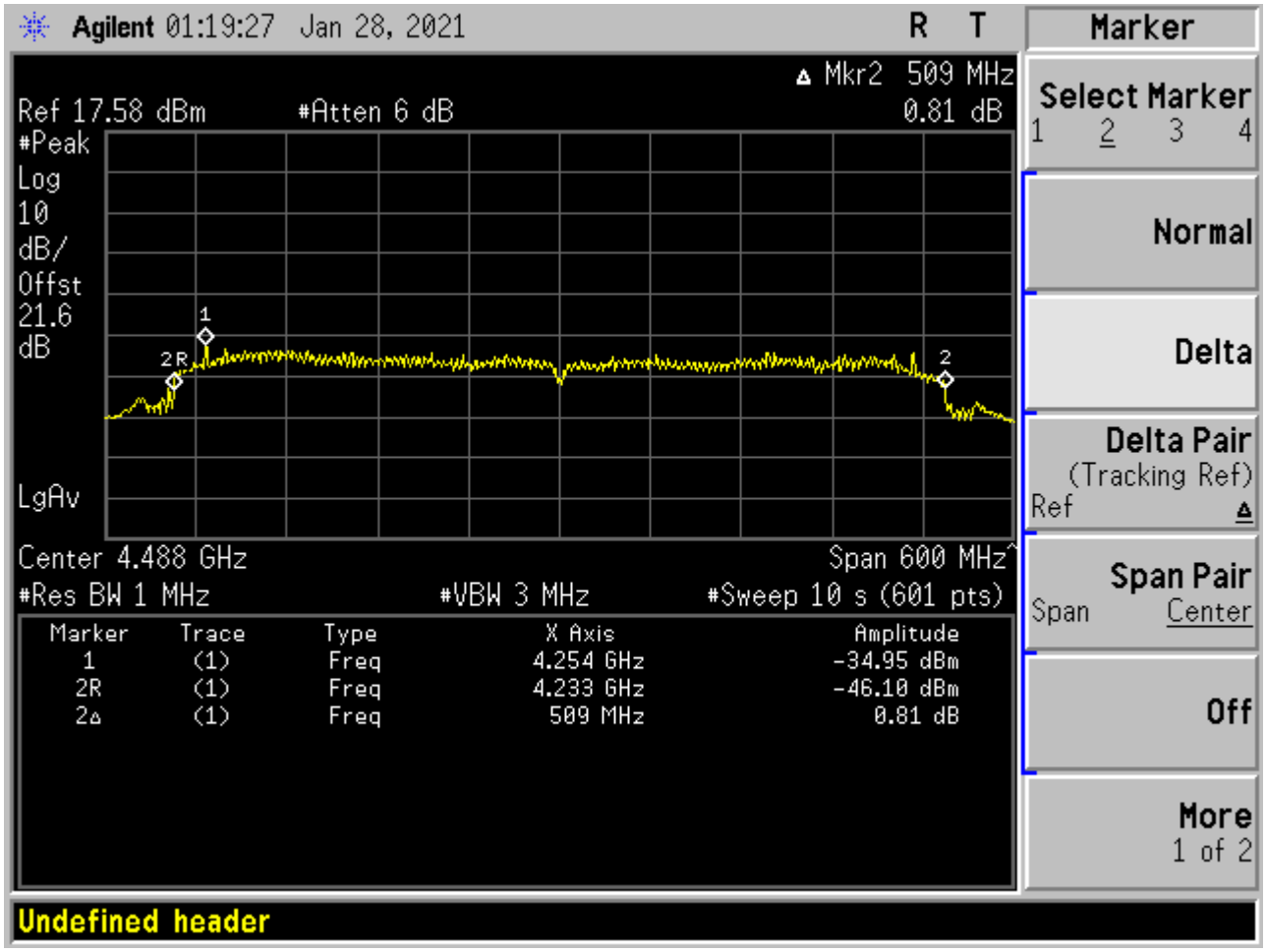

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 1 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **4488.00** | 509.00 | 509.00 | 509.00 | | |



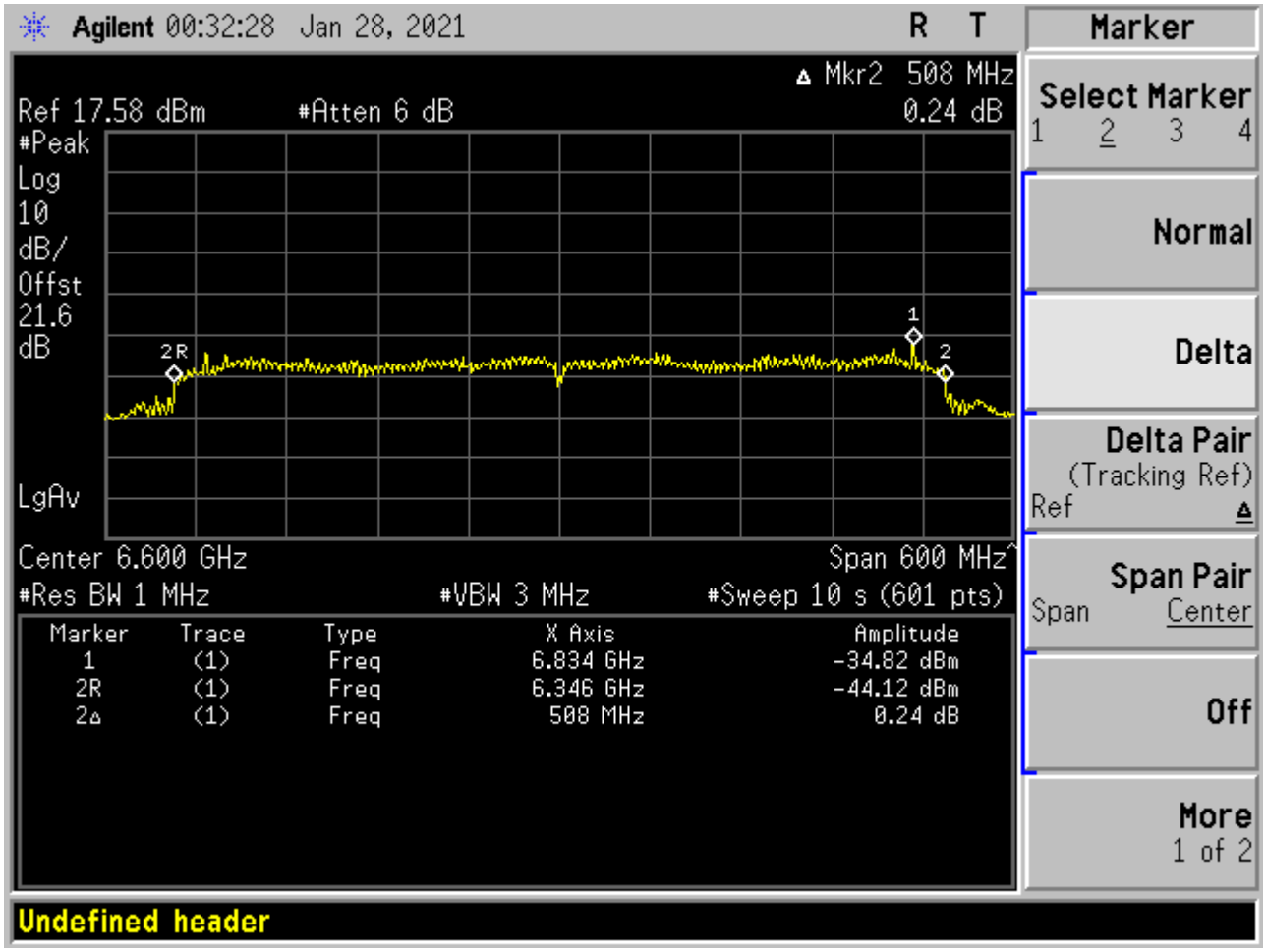

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 3 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **6600.00** | 508.00 | 508.00 | 508.00 | | |



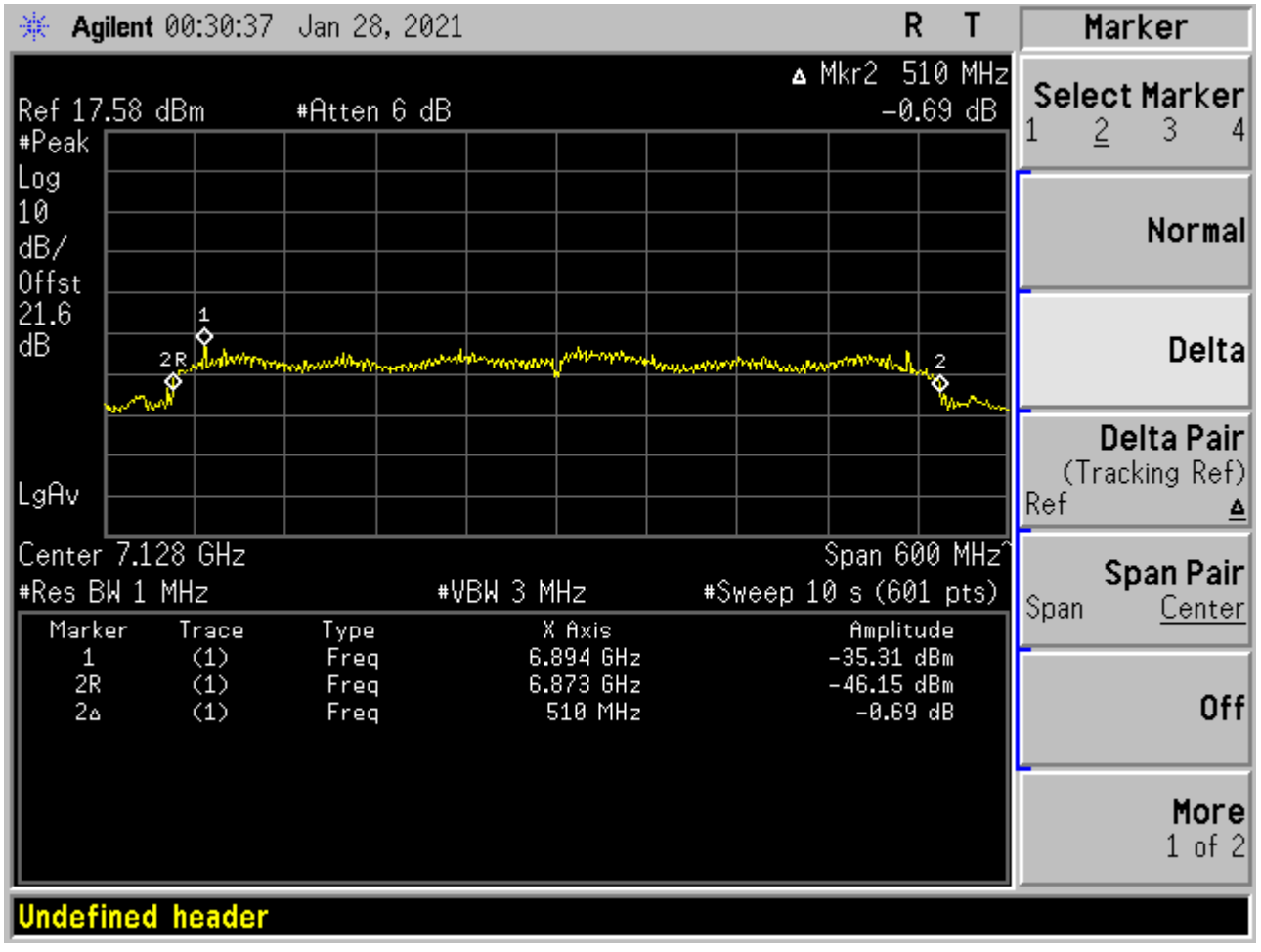

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 3 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **7128.00** | 510.00 | 510.00 | 510.00 | | |



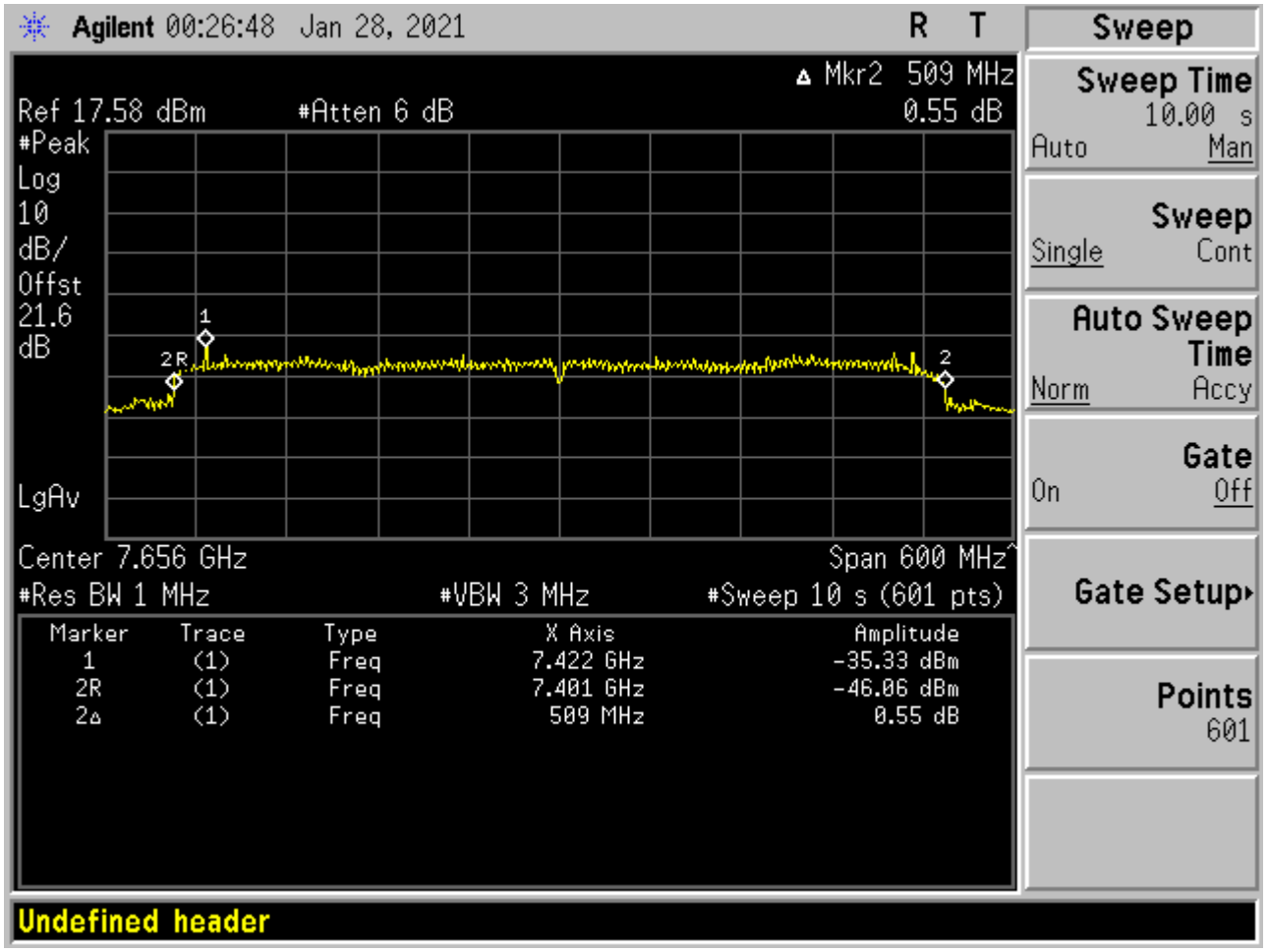

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 3 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **7656.00** | 509.00 | 509.00 | 509.00 | | |



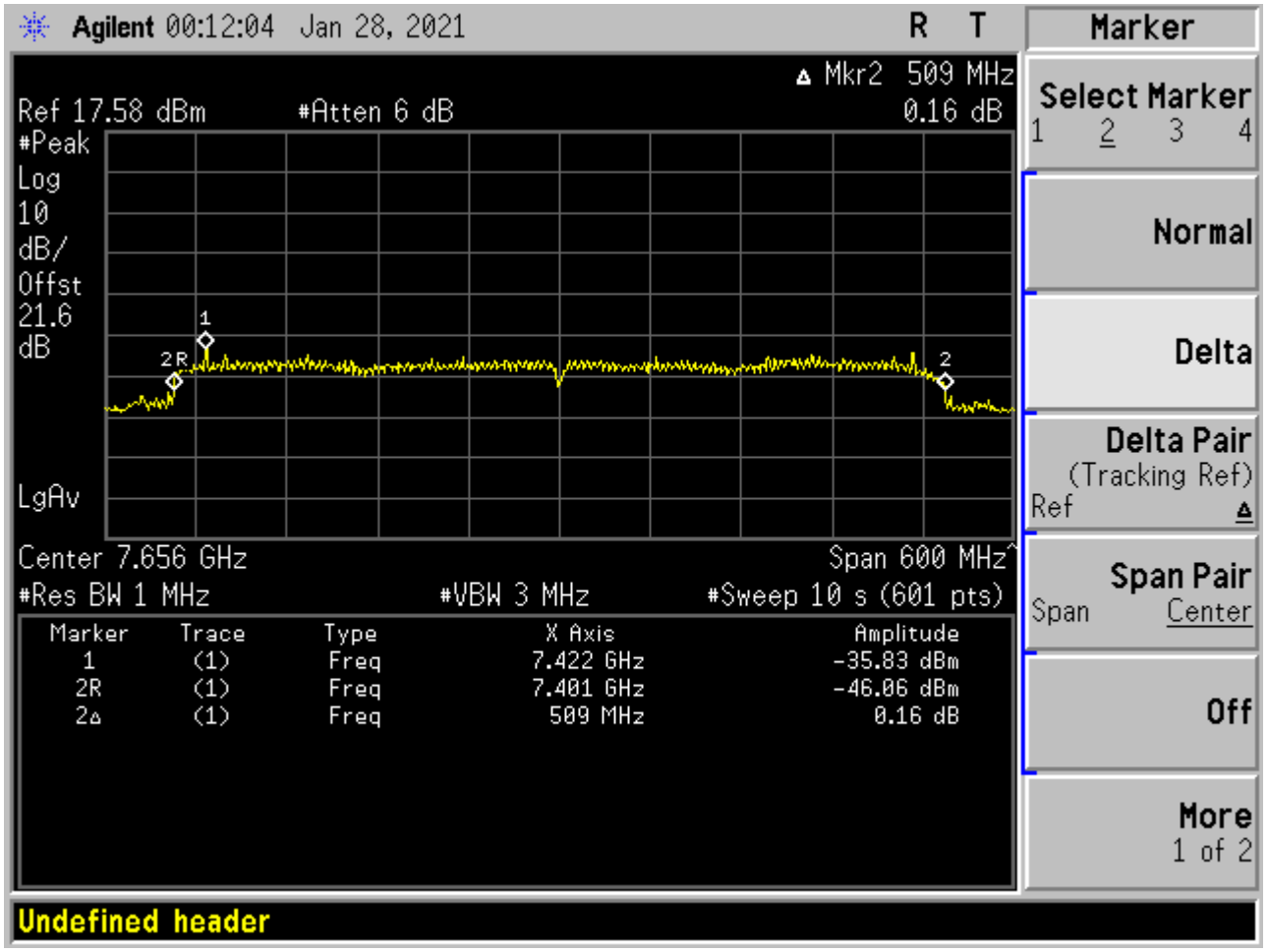

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 3 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **7656.00** | 509.00 | 509.00 | 509.00 | | |



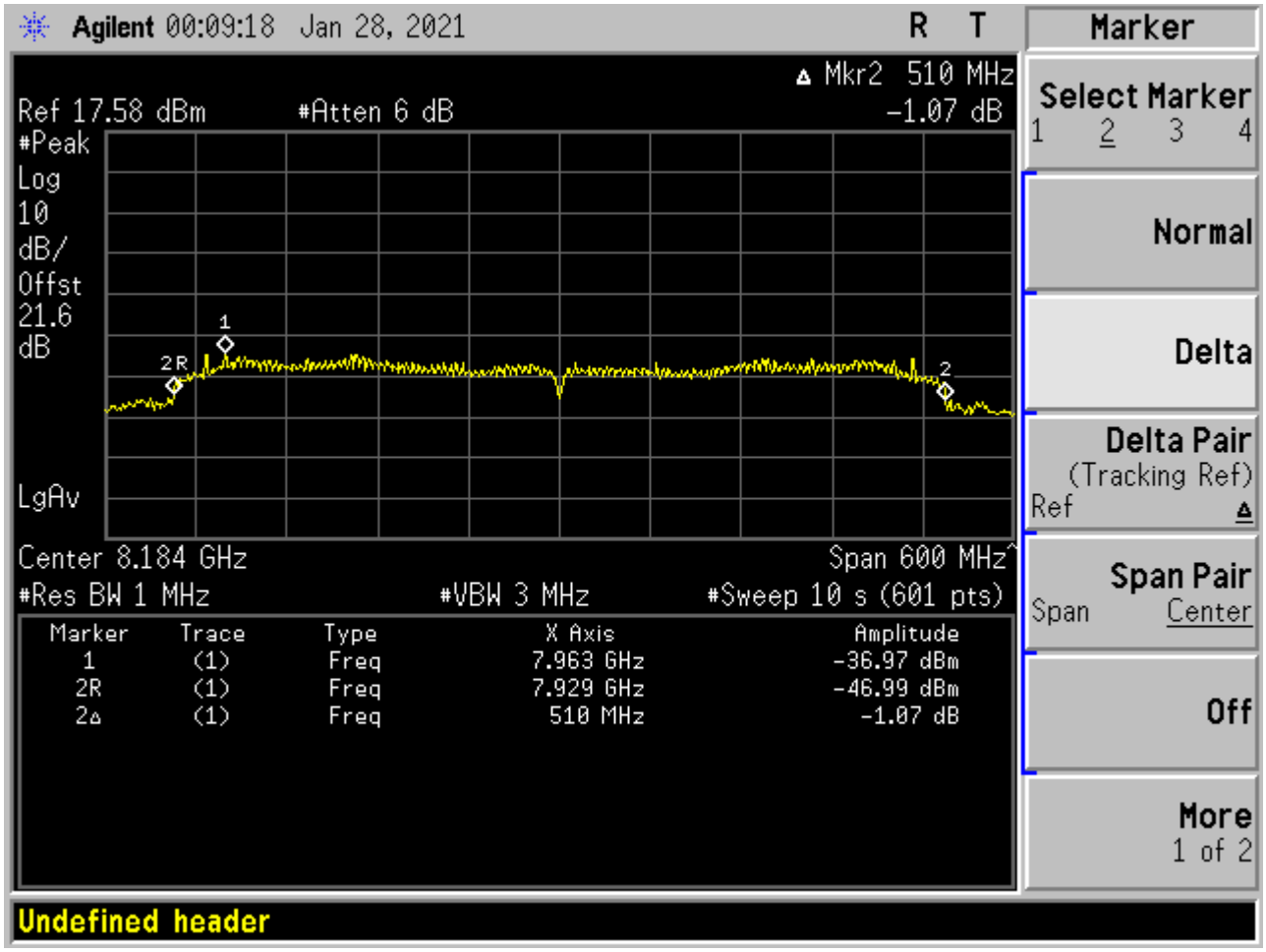

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | Band Group 3 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| | | | | | |
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **8184.00** | 510.00 | 510.00 | 510.00 | | |

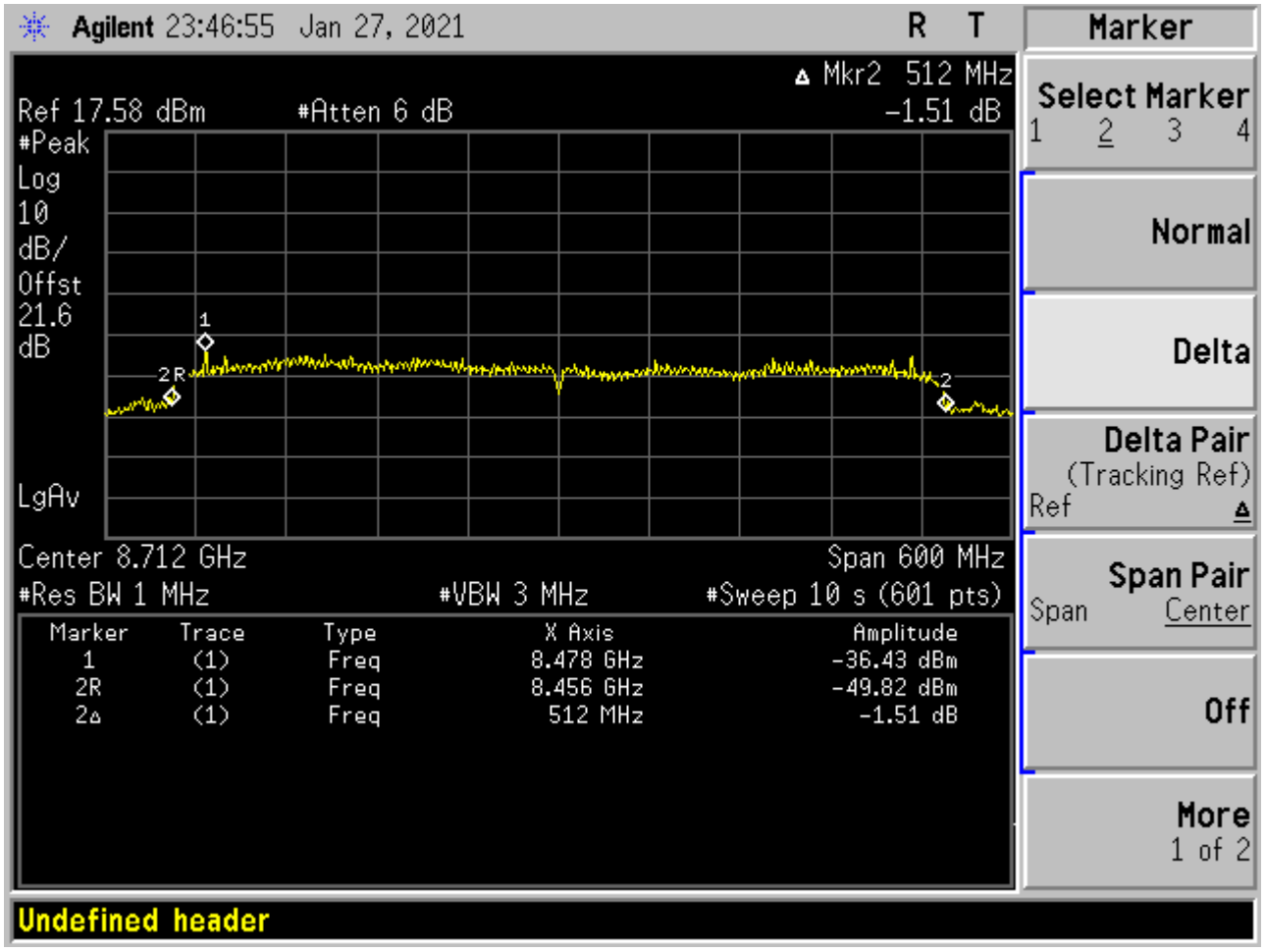



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

| Equipment Configuration for UWB Bandwidth | | | |
|---|---|---|---|
| **Variant:** | UWB | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured Bandwidth (MHz) | Bandwidth (MHz) | | | |
|---|---|---|---|---|---|
| **MHz** | **Port A** | **Highest** | **Lowest** | | |
| **8712.00** | 512.00 | 512.00 | 512.00 | | |




| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

The above values are representative of the worst-case value between polarities and based on the power measurements.

## 9.2. Average Transmit Power

| Conducted Test Conditions for Average Output Power | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.519 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Radiated Emissions UWB Transmission | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.519 ( c ) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | None | | |

**Test Procedure for UWB Transmission**

Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Conducted Test Set-up section specified in this document. Supporting KDB's referenced below.

**Operating Frequency Band:**
3100-10600 MHz

**Limits Maximum EIRP (dBm)**

| Frequency (MHz) | EIRP Limit (dBm) |
|---|---|
| 3100 - 10600 | -41.3 |

| Equipment Configuration for Average RF Output Power | | | |
|---|---|---|---|
| **Variant:** | Band Group 1 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power(dBm) | Calculated EIRP | EIRP Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|
| | Port A | dBm | dBm | dB | Numeric |
| 3432.00 | -45.67 | -44.67 | -41.3 | -3.37 | Max |
| 3960.00 | -44.93 | -43.93 | -41.3 | -2.63 | Max |
| 4488.00 | -45.30 | -44.30 | -41.3 | -3.00 | Max |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | Band Group 3 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power(dBm) | Calculated EIRP | EIRP Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|
| | Port A | dBm | dBm | dB | Numeric |
| 6600.00 | -46.35 | -46.15 | -41.3 | -4.85 | Max |
| 7128.00 | -46.23 | -46.03 | -41.3 | -4.73 | Max |
| 7656.00 | -47.17 | -46.97 | -41.3 | -5.67 | Max |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | Band Group 6 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power(dBm) | Calculated EIRP | EIRP Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|
| | Port A | dBm | dBm | dB | Numeric |
| 7656.00 | -47.09 | -46.89 | -41.3 | -5.59 | Max |
| 8184.00 | -47.27 | -47.07 | -41.3 | -5.77 | Max |
| 8712.00 | -47.41 | -47.21 | -41.3 | -5.91 | Max |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

## 9.3. Peak Power Density

| Test Conditions for Maximum Peak Power Density | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.519 (e) | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Peak Power Density | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10 Section 10.3.6 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | None | | |

**Test Procedure for UWB Transmission**

Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document. Supporting KDB's referenced below.

Measurements were gathered with a RBW of 1MHz and converted to 50MHz using the following formula:

$EIRP_{1\ MHz} = EIRP_{50\ MHz} + 20\log(1MHz/50MHz) = 0dBm + (-34dBm) = -34dBm$

(dBuV/m) = P(e.i.r.p.(dBm)) + 95.2

**Operating Frequency Band:**
3100-10600 MHz

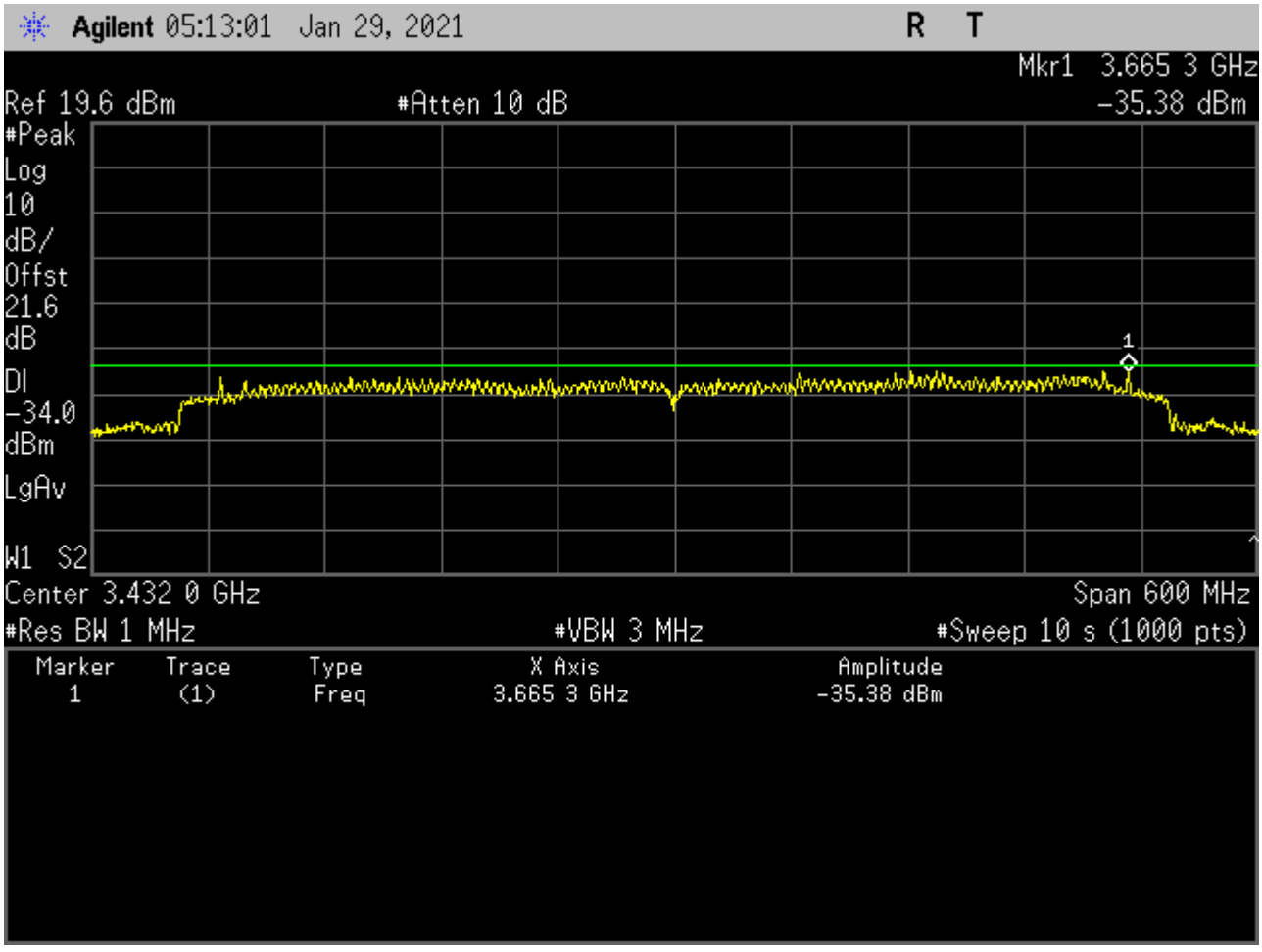
**Limits Maximum EIRP (dBm)**

| Frequency (MHz) | EIRP Limit (dBm/50MHz) | EIRP Limit (dBm/1MHz) |
|---|---|---|
| 3100 - 10600 | 0 | -34.0 |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 1 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **3432.00** | -35.38 | -34.38 | -34.00 | -0.38 | Max |

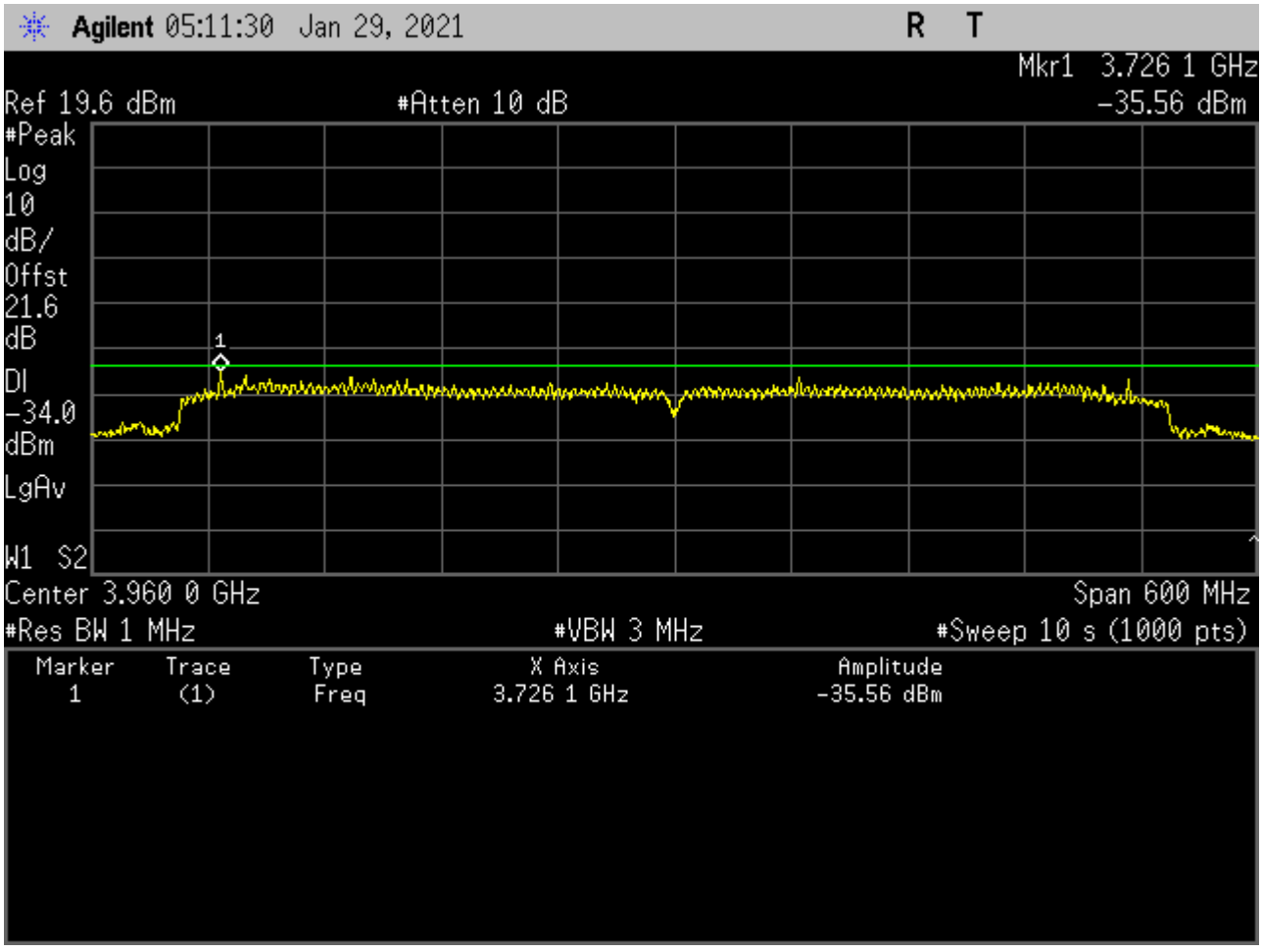



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 1 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **3960.00** | -35.56 | -34.56 | -34.00 | -0.56 | Max |

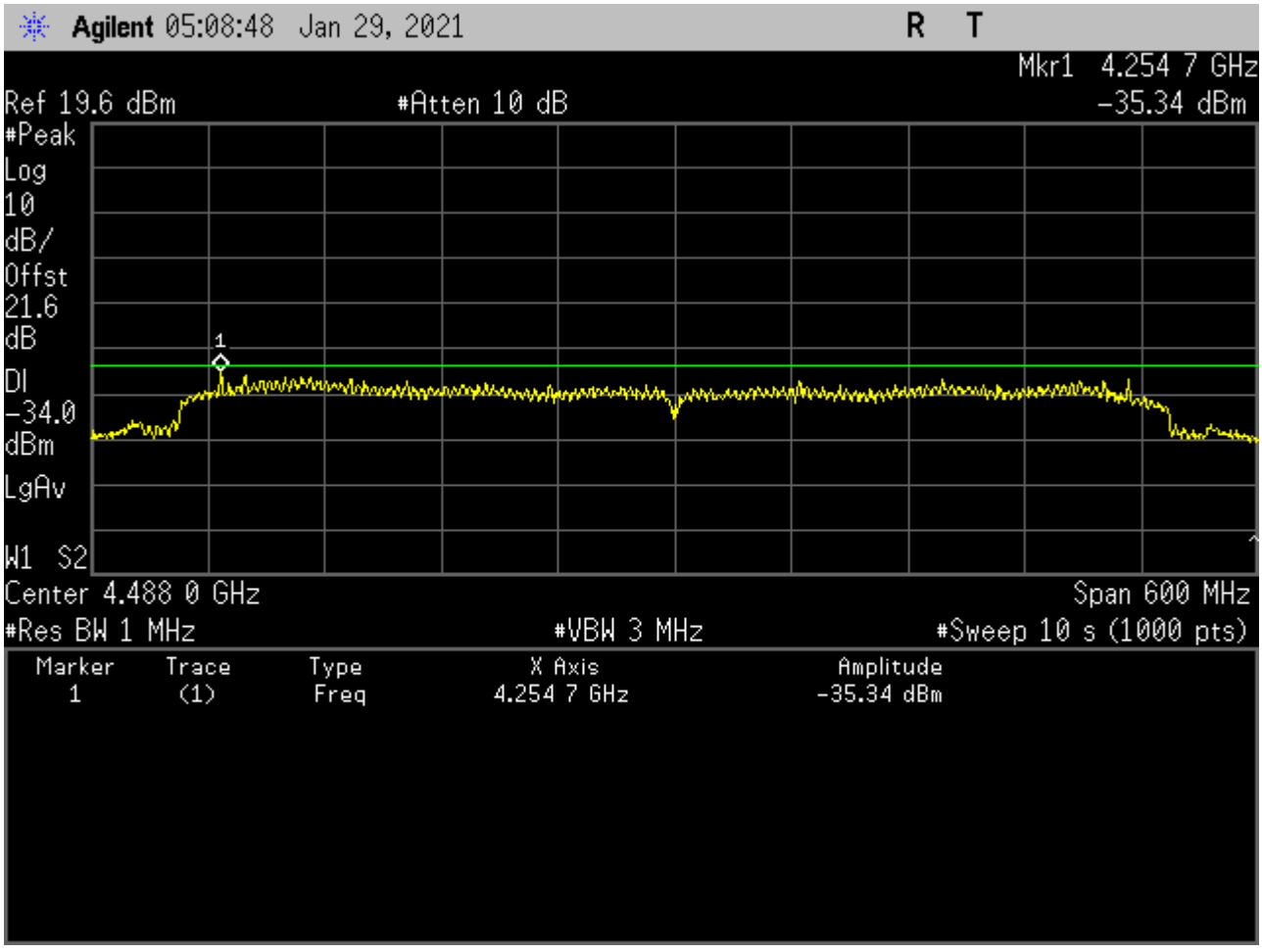



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 1 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 1.0/0.2/0.2 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **4488.00** | -35.34 | -34.34 | -34.00 | -0.34 | Max |

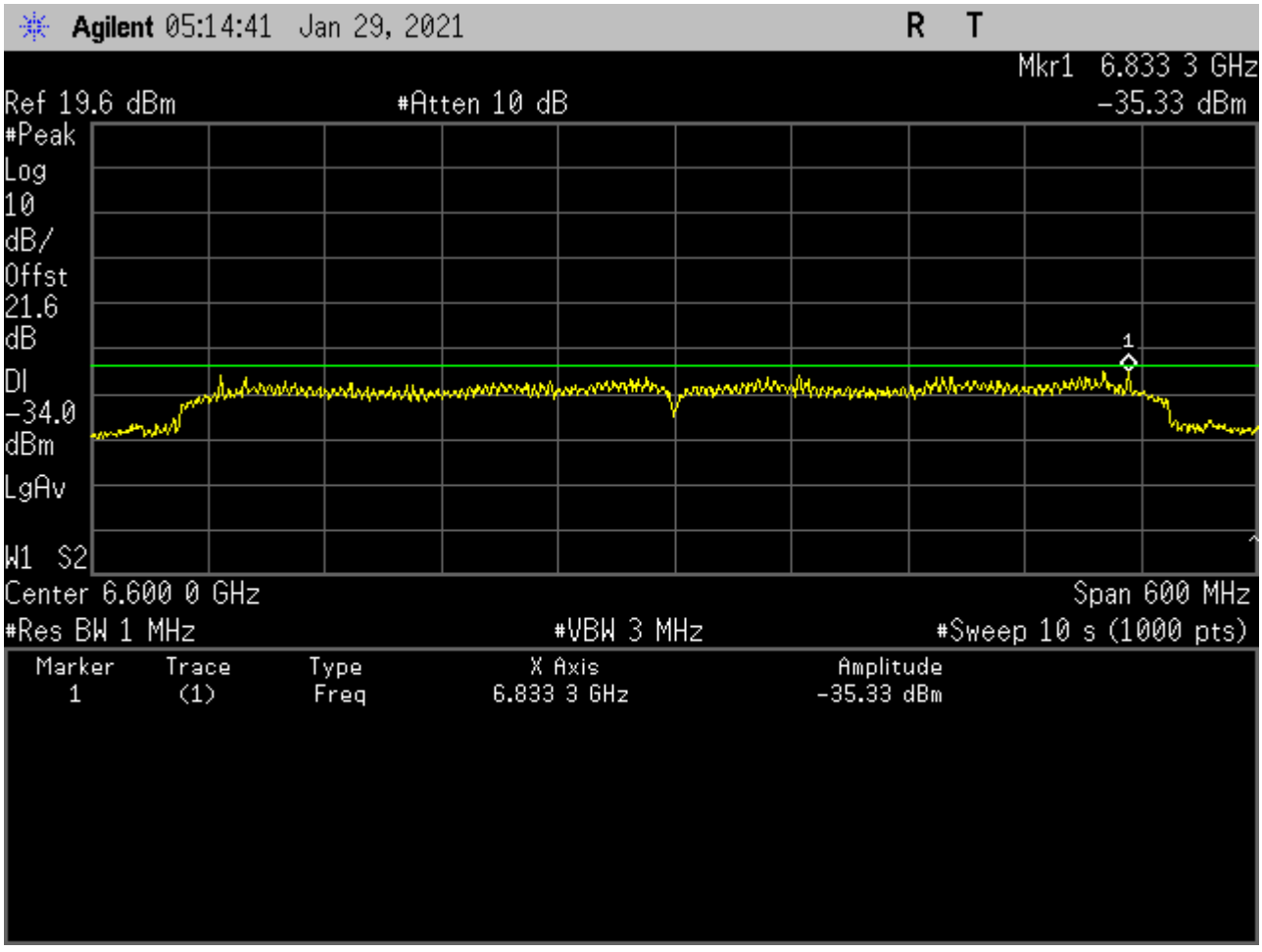



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 3 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **6600.00** | -35.33 | -35.13 | -34.00 | -1.13 | Max |

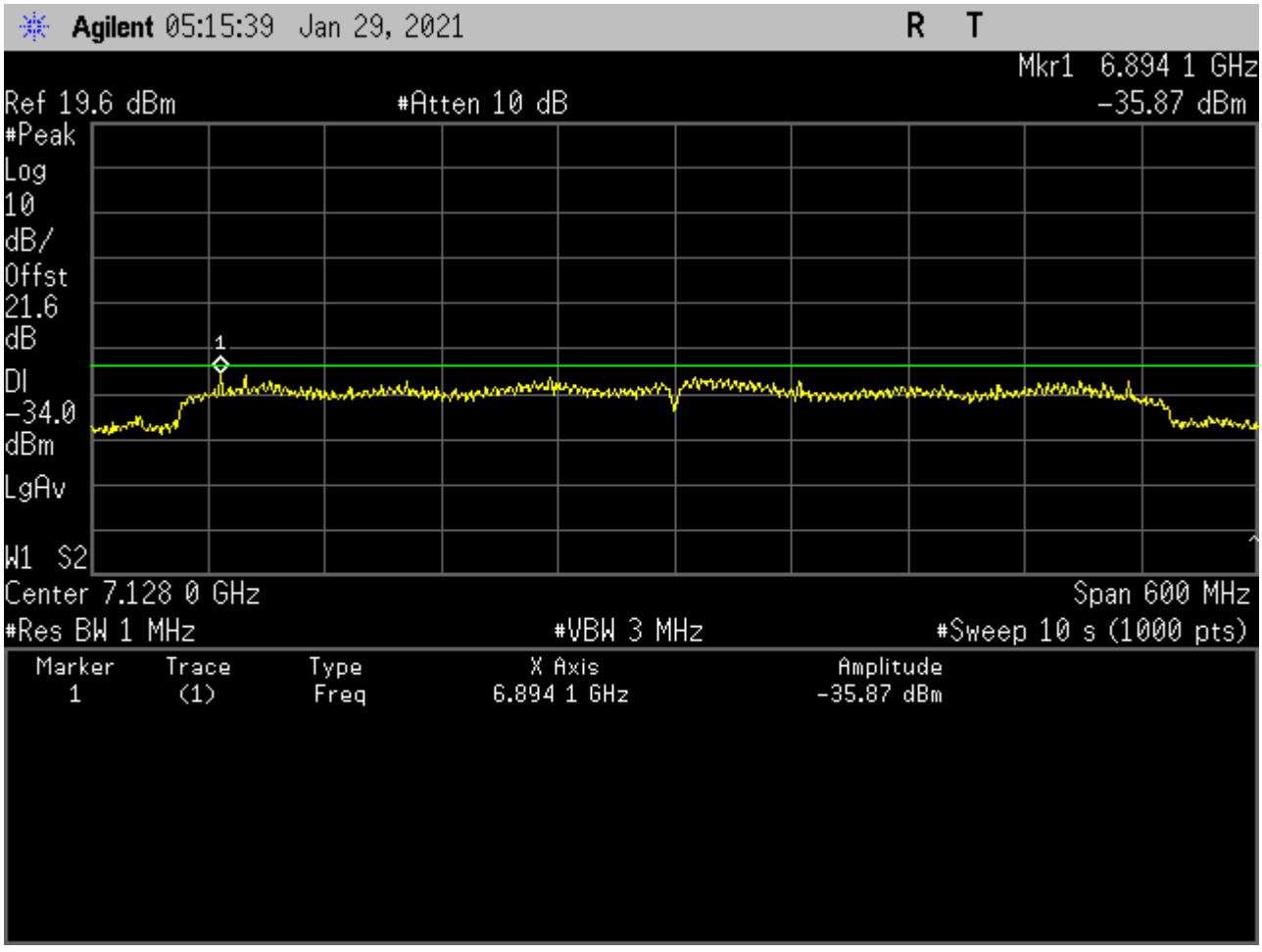



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 3 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **7128.00** | -35.87 | -35.67 | -34.00 | -1.67 | Max |

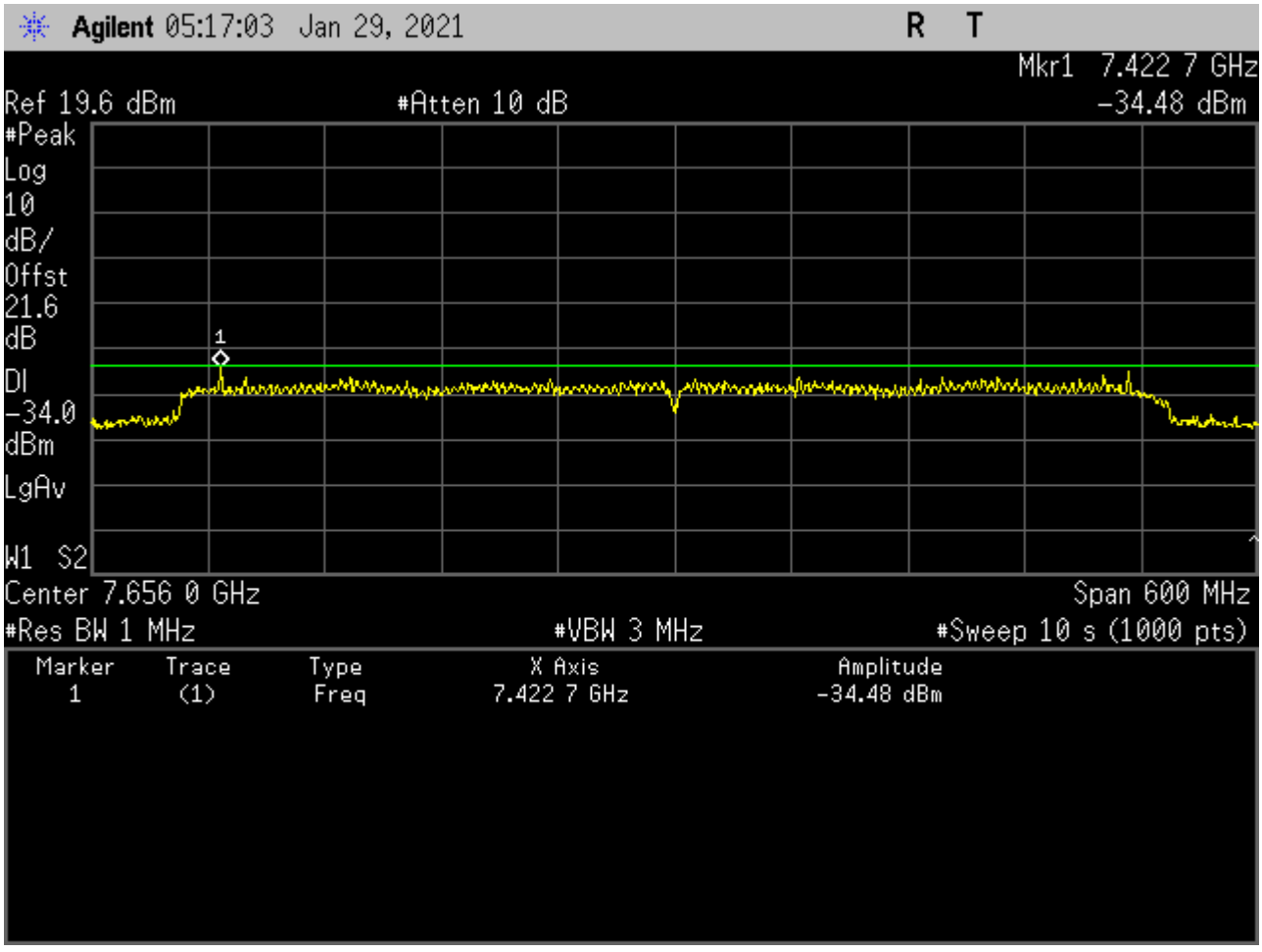



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 3 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.2/-0.2/0.1 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **7656.00** | -34.48 | -34.28 | -34.00 | -0.28 | Max |

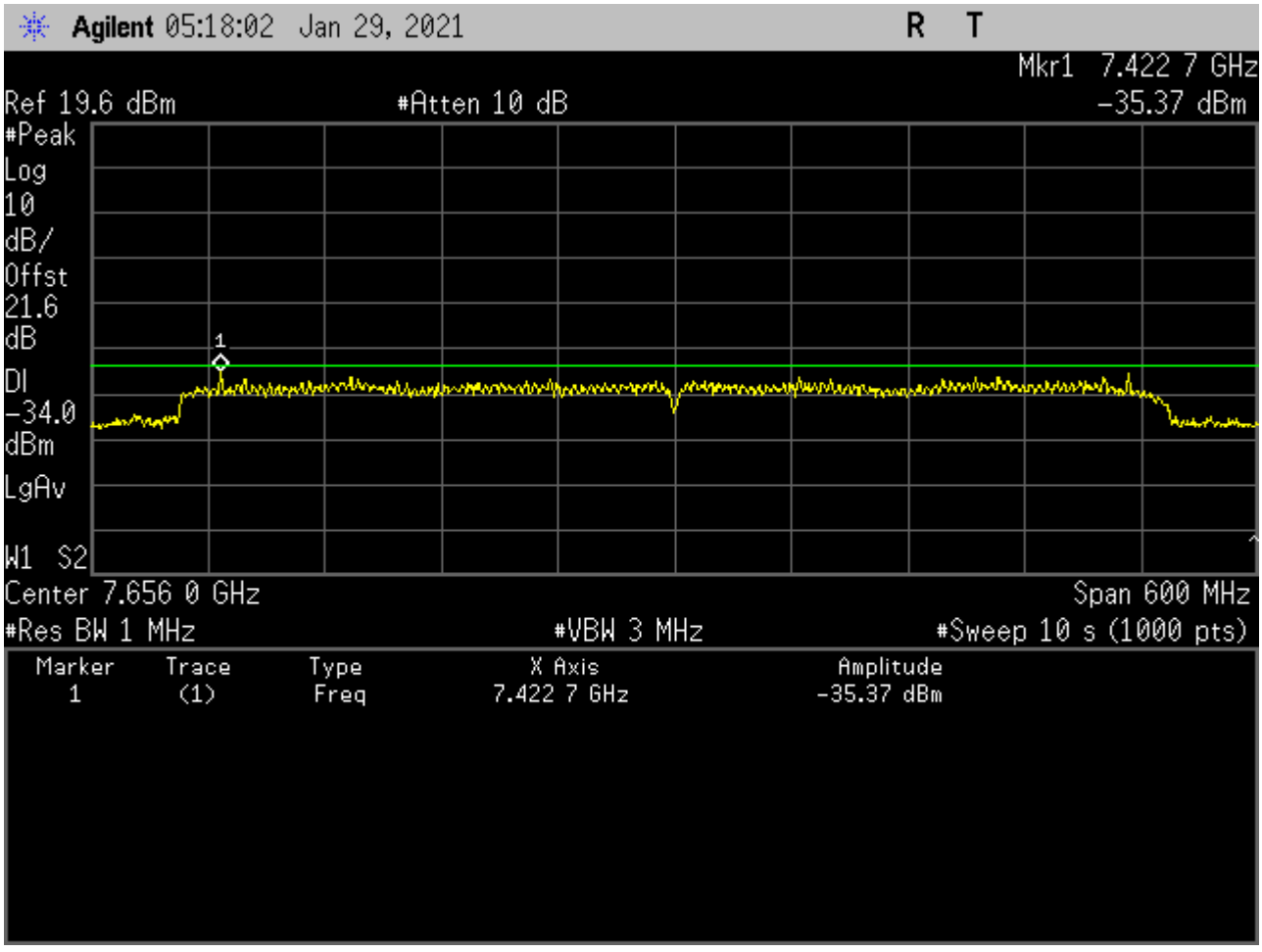



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 6 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **7656.00** | -35.37 | -35.17 | -34.00 | -1.17 | Max |

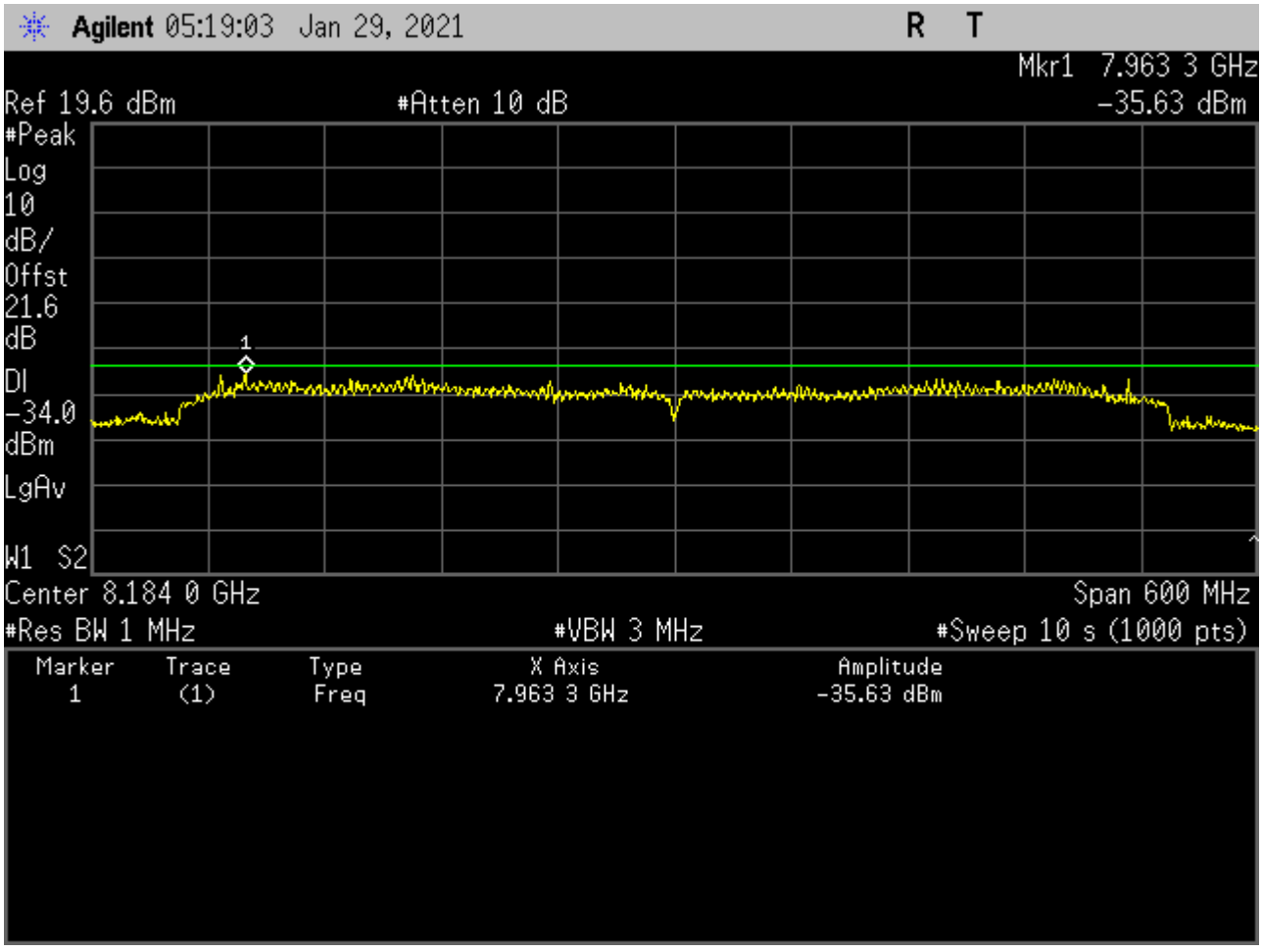



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 6 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **8184.00** | -35.63 | -35.43 | -34.00 | -1.43 | Max |

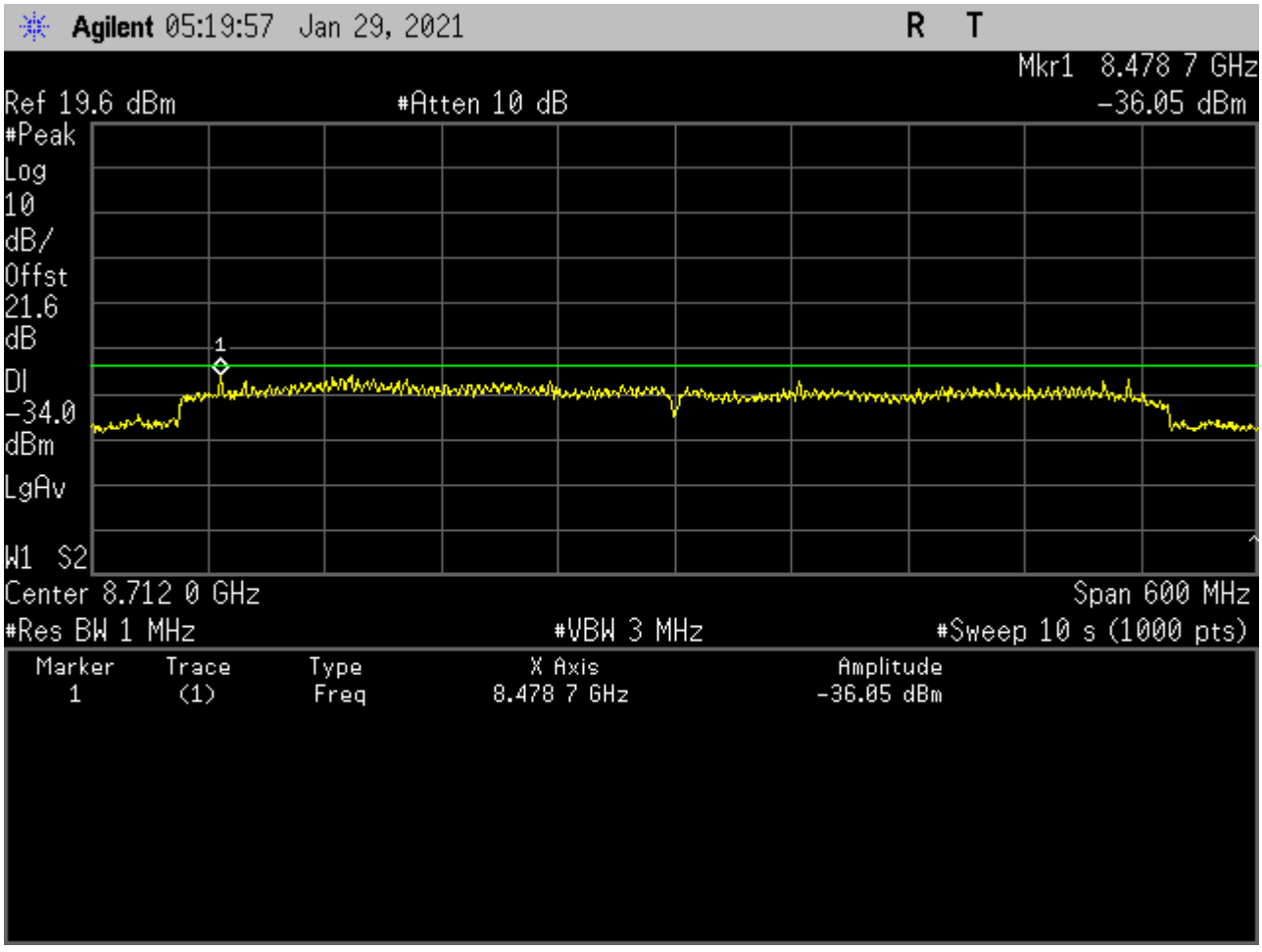



| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

| Equipment Configuration for Peak Power Density | | | |
|---|---|---|---|
| **Variant:** | Band 6 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Peak Power Density (dBm) | Calculated EIRP (dBm) | EIRP Limit (dBm) | Margin (dB) | EUT Power Setting |
|---|---|---|---|---|---|
| **8712.00** | -36.05 | -35.85 | -34.00 | -1.85 | Max |




| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

## 9.4. Transmitter Spurious Band Emissions

| Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47 15.519 | **Ambient Temp. (ºC):** | 20.0 - 24.5 |
| **Test Heading:** | Radiated Spurious and Band-Edge Emissions | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10 Section 10.2 + 10.3 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**Test Procedure for Radiated Spurious and Band-Edge Emissions**
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in max hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.
Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

**Limits for Restricted Bands (15.205, 15.209)**
Peak emission: 68.23 dBuV/m
Average emission: 54 dBuV/m

**Field Strength Calculation**
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.
FS = R + AF + CORR - FO

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss

Measurements made at 1 meter to meet noise floor to limit requirements

| Frequency Range | | Average Limit | |
|---|---|---|---|
| **MHz** | **MHz** | **EIRP (dBm)** | **EIRP at 1 Meters (dBuV/m)** |
| 960 | 1610 | -75.3 | 29.4 |
| 1610 | 1990 | -63.3 | 41.4 |
| 1990 | 3100 | -61.3 | 43.4 |
| 3100 | 10600 | -41.3 | 63.4 |
| 10600 | 18000 | -61.3 | 43.4 |

Radiated Spurious Emissions in the GPS Bands 15.519 (d)

| Frequency Range | | Average Limit | |
|---|---|---|---|
| MHz | MHz | EIRP (dBm) | EIRP at 1 Meters (dBuV/m) |
| 1164 | 1240 | -85.3 | 19.47 |
| 1559 | 1610 | -85.3 | 19.47 |

50 MHz Peak Emissions 15.519 (e)
Within 50 MHz bandwidth centered on highest radiated emissions $f_{M,}$ Limit is 0.0 dBm EIRP. At 1-meter distance the equivalent level is 104.77 dBuV/m

## 9.4.1. Transmitter Spurious Emissions

## 9.4.2. Band 1

| Equipment Configuration for Spurious Emissions |
|---|

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 1 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 3432.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00– 1610.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1597.77 | 28.98 | Average | Vertical | 150 | 0 | 29.40 | -0.42 | Pass |
| 2 | 1597.77 | 28.98 | Average | Horizontal | 150 | 0 | 29.40 | -0.42 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

| 1610-1990 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1920.70 | 29.55 | Average | Vertical | 150 | 0 | 41.40 | -11.85 | Pass |
| 2 | 1920.70 | 28.76 | Average | Horizontal | 150 | 0 | 41.40 | -12.64 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

| 1990-3100 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2655.11 | 29.32 | Average | Vertical | 150 | 0 | 43.40 | -14.08 | Pass |
| 2 | 3100.00 | 30.03 | Average | Horizontal | 150 | 0 | 43.40 | -13.37 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

| 3100-10600 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 3460.72 | 50.78 | Average | Vertical | 150 | 0 | 63.40 | -12.62 | Pass |
| 2 | 3641.08 | 59.72 | Average | Horizontal | 150 | 0 | 63.40 | -3.68 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

| 10600-18000 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 15701.40 | 40.22 | Average | Vertical | 150 | 0 | 43.4 | -3.18 | Pass |
| 2 | 15671.74 | 40.36 | Average | Horizontal | 150 | 0 | 43.4 | -3.04 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

| Equipment Configuration for Spurious Emissions | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 1 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 3960.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00– 1610.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1443.74 | 27.23 | Average | Vertical | 150 | 0 | 29.4 | -2.17 | Pass |
| 2 | 1597.77 | 29.18 | Average | Horizontal | 150 | 0 | 29.4 | -0.22 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 1610-1990 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1920.07 | 29.90 | Average | Vertical | 150 | 0 | 41.40 | -11.50 | Pass |
| 2 | 1631.32 | 30.77 | Average | Horizontal | 150 | 0 | 41.40 | -10.63 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 1990-3100 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2655.11 | 29.36 | Average | Vertical | 150 | 0 | 43.40 | -14.04 | Pass |
| 2 | 2657.33 | 30.52 | Average | Horizontal | 150 | 0 | 43.40 | -12.88 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 3100-10600 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 3926.65 | 52.94 | Average | Vertical | 150 | 0 | 63.40 | -10.46 | Pass |
| 2 | 3761.32 | 59.48 | Average | Horizontal | 150 | 0 | 63.40 | -3.92 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 10600-18000 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1567.17 | 40.23 | Average | Vertical | 150 | 0 | 43.4 | -3.17 | Pass |
| 2 | 1567.17 | 40.11 | Average | Horizontal | 150 | 0 | 43.4 | -3.29 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

## Equipment Configuration for Spurious Emissions

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 1 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 4488.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

## Test Measurement Results

**1000.00– 1610.00 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1413.18 | 28.72 | Average | Vertical | 150 | 0 | 29.4 | -0.68 | Pass |
| 2 | 1299.49 | 28.00 | Average | Horizontal | 150 | 0 | 29.4 | -1.40 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1610-1990 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1920.70 | 29.67 | Average | Vertical | 150 | 0 | 41.40 | -11.73 | Pass |
| 2 | 1830.84 | 30.67 | Average | Horizontal | 150 | 0 | 41.40 | -10.73 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1990-3100 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2655.11 | 29.15 | Average | Vertical | 150 | 0 | 43.40 | -14.25 | Pass |
| 2 | 1996.67 | 30.88 | Average | Horizontal | 150 | 0 | 43.40 | -12.52 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**3100-10600 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4678.15 | 54.41 | Average | Vertical | 150 | 0 | 63.40 | -8.99 | Pass |
| 2 | 4678.15 | 60.50 | Average | Horizontal | 150 | 0 | 63.40 | -2.90 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**10600-18000 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15671.74 | 40.30 | Average | Vertical | 150 | 0 | 43.4 | -3.10 | Pass |
| 2 | 15671.74 | 40.23 | Average | Horizontal | 150 | 0 | 43.4 | -3.17 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

### 9.4.3. Band 2

**Equipment Configuration for Spurious Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 3 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 6600.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00– 1610.00 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1243.26 | 26.92 | Average | Vertical | 150 | 0 | 29.4 | -2.48 | Pass |
| 2 | 1410.74 | 28.20 | Average | Horizontal | 150 | 0 | 29.4 | -1.20 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1610-1990 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1887.95 | 30.17 | Average | Vertical | 150 | 0 | 41.40 | -11.23 | Pass |
| 2 | 1859.01 | 29.96 | Average | Horizontal | 150 | 0 | 41.40 | -11.44 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1990-3100 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2801.92 | 30.17 | Average | Vertical | 150 | 0 | 43.40 | -13.23 | Pass |
| 2 | 2659.55 | 29.76 | Average | Horizontal | 150 | 0 | 43.40 | -13.64 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**3100-10600 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6376.55 | 51.20 | Average | Vertical | 150 | 0 | 63.40 | -12.20 | Pass |
| 2 | 6376.55 | 61.08 | Average | Horizontal | 150 | 0 | 63.40 | -2.32 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**10600-18000 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15671.74 | 40.55 | Average | Vertical | 150 | 0 | 43.4 | -2.85 | Pass |
| 2 | 15671.74 | 40.55 | Average | Horizontal | 150 | 0 | 43.4 | -2.85 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

| Equipment Configuration for Spurious Emissions | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 3 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 7128.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00– 1610.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1272.60 | 27.99 | Average | Vertical | 150 | 0 | 29.4 | -1.41 | Pass |
| 2 | 1602.66 | 28.00 | Average | Horizontal | 150 | 0 | 29.4 | -1.40 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 1610-1990 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1920.70 | 31.85 | Average | Vertical | 150 | 0 | 41.40 | -9.55 | Pass |
| 2 | 1920.70 | 33.46 | Average | Horizontal | 150 | 0 | 41.40 | -7.94 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 1990-3100 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2655.11 | 32.60 | Average | Vertical | 150 | 0 | 43.40 | -10.80 | Pass |
| 2 | 1996.67 | 31.81 | Average | Horizontal | 150 | 0 | 43.40 | -11.59 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 3100-10600 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 6917.63 | 51.01 | Average | Vertical | 150 | 0 | 63.40 | -12.39 | Pass |
| 2 | 7338.47 | 60.36 | Average | Horizontal | 150 | 0 | 63.40 | -3.04 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| 10600-18000 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 15671.74 | 40.55 | Average | Vertical | 150 | 0 | 43.4 | -2.85 | Pass |
| 2 | 15671.74 | 40.61 | Average | Horizontal | 150 | 0 | 43.4 | -2.79 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

## 9.4.4. Band 3 & 6

**Equipment Configuration for Spurious Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 3/6 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 7656.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00– 1610.00 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1270.16 | 27.03 | Average | Vertical | 150 | 0 | 29.4 | -2.37 | Pass |
| 2 | 1594.10 | 28.57 | Average | Horizontal | 150 | 0 | 29.4 | -0.83 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1610-1990 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1920.70 | 31.77 | Average | Vertical | 150 | 0 | 41.40 | -9.63 | Pass |
| 2 | 1920.70 | 34.68 | Average | Horizontal | 150 | 0 | 41.40 | -6.72 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1990-3100 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2655.11 | 29.19 | Average | Vertical | 150 | 0 | 43.40 | -14.21 | Pass |
| 2 | 1996.67 | 30.05 | Average | Horizontal | 150 | 0 | 43.40 | -13.35 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**3100-10600 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7819.43 | 52.36 | Average | Vertical | 150 | 0 | 63.40 | -11.04 | Pass |
| 2 | 7864.52 | 60.79 | Average | Horizontal | 150 | 0 | 63.40 | -2.61 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**10600-18000 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15671.74 | 40.55 | Average | Vertical | 150 | 0 | 43.4 | -2.85 | Pass |
| 2 | 15671.74 | 40.55 | Average | Horizontal | 150 | 0 | 43.4 | -2.85 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

## 9.4.5. Band 6

**Equipment Configuration for Spurious Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 6 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 8184.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00– 1610.00 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1270.01 | 27.84 | Average | Vertical | 150 | 0 | 29.4 | -1.56 | Pass |
| 2 | 1597.77 | 28.17 | Average | Horizontal | 150 | 0 | 29.4 | -1.23 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1610-1990 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1920.70 | 30.79 | Average | Vertical | 150 | 0 | 41.40 | -10.61 | Pass |
| 2 | 1920.70 | 34.08 | Average | Horizontal | 150 | 0 | 41.40 | -7.32 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1990-3100 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3017.69 | 28.78 | Average | Vertical | 150 | 0 | 43.40 | -14.62 | Pass |
| 2 | 2659.55 | 29.84 | Average | Horizontal | 150 | 0 | 43.40 | -13.56 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**3100-10600 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8029.85 | 50.88 | Average | Vertical | 150 | 0 | 63.40 | -12.52 | Pass |
| 2 | 7969.73 | 61.75 | Average | Horizontal | 150 | 0 | 63.40 | -1.65 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**10600-18000 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15671.74 | 40.48 | Average | Vertical | 150 | 0 | 43.4 | -2.92 | Pass |
| 2 | 15671.74 | 40.48 | Average | Horizontal | 150 | 0 | 43.4 | -2.92 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

## Equipment Configuration for Spurious Emissions

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | Band Group 6 |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 8712.00 | **Data Rate:** | 200Mbp/s |
| **Power Setting:** | Max | **Tested By:** | JMH |

## Test Measurement Results

**1000.00– 1610.00 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1271.38 | 26.68 | Average | Vertical | 150 | 0 | 29.4 | -2.72 | Pass |
| 2 | 1594.10 | 28.70 | Average | Horizontal | 150 | 0 | 29.4 | -0.70 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1610-1990 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1920.70 | 30.05 | Average | Vertical | 150 | 0 | 41.40 | -11.35 | Pass |
| 2 | 1920.70 | 35.82 | Average | Horizontal | 150 | 0 | 41.40 | -5.58 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**1990-3100 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2655.11 | 29.36 | Average | Vertical | 150 | 0 | 43.40 | -14.04 | Pass |
| 2 | 2657.33 | 30.19 | Average | Horizontal | 150 | 0 | 43.40 | -13.21 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**3100-10600 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8570.94 | 51.56 | Average | Vertical | 150 | 0 | 63.40 | -11.84 | Pass |
| 2 | 8915.53 | 60.15 | Average | Horizontal | 150 | 0 | 63.40 | -3.25 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

**10600-18000 MHz**

| Num | Frequency MHz | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15671.74 | 40.48 | Average | Vertical | 150 | 0 | 43.4 | -2.92 | Pass |
| 2 | 15671.74 | 40.42 | Average | Horizontal | 150 | 0 | 43.4 | -2.98 | Pass |

**Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter

## 9.4.6. GPS Band Emissions

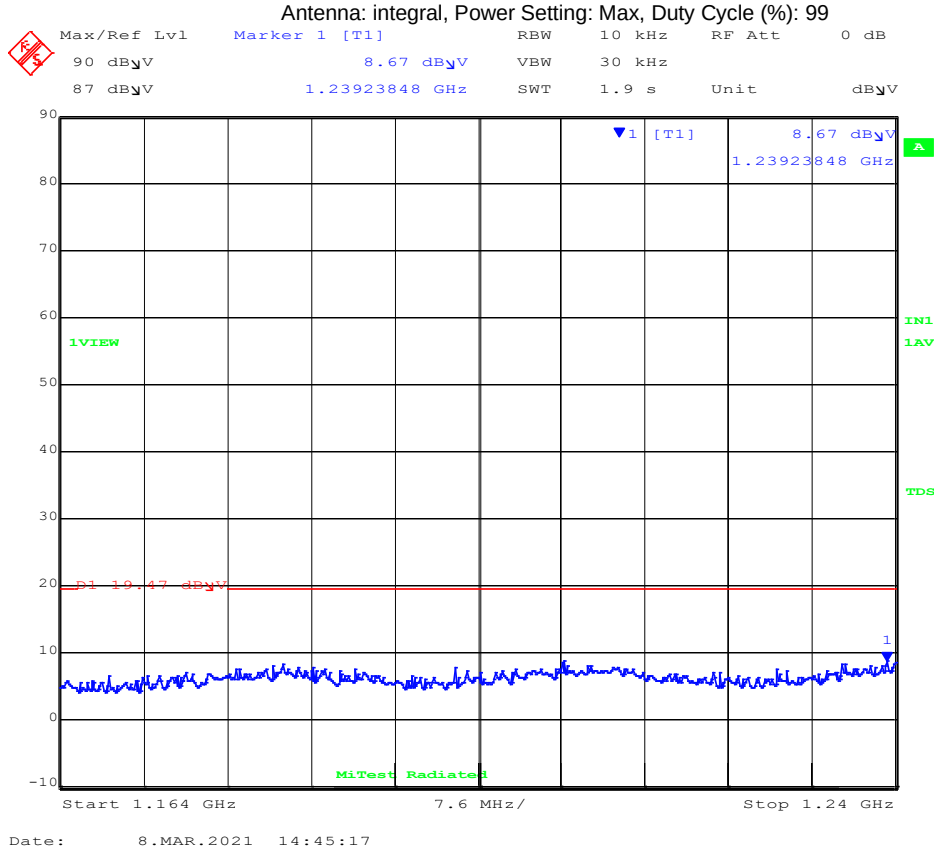
9.4.6.0.1. 3432 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 3432.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

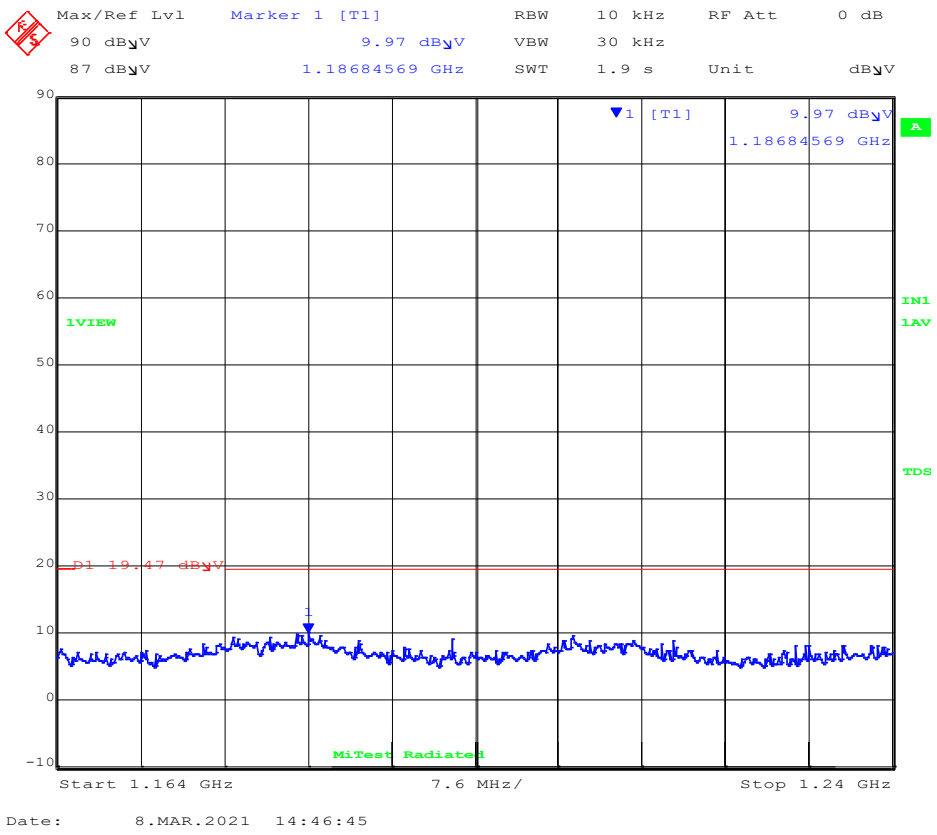
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

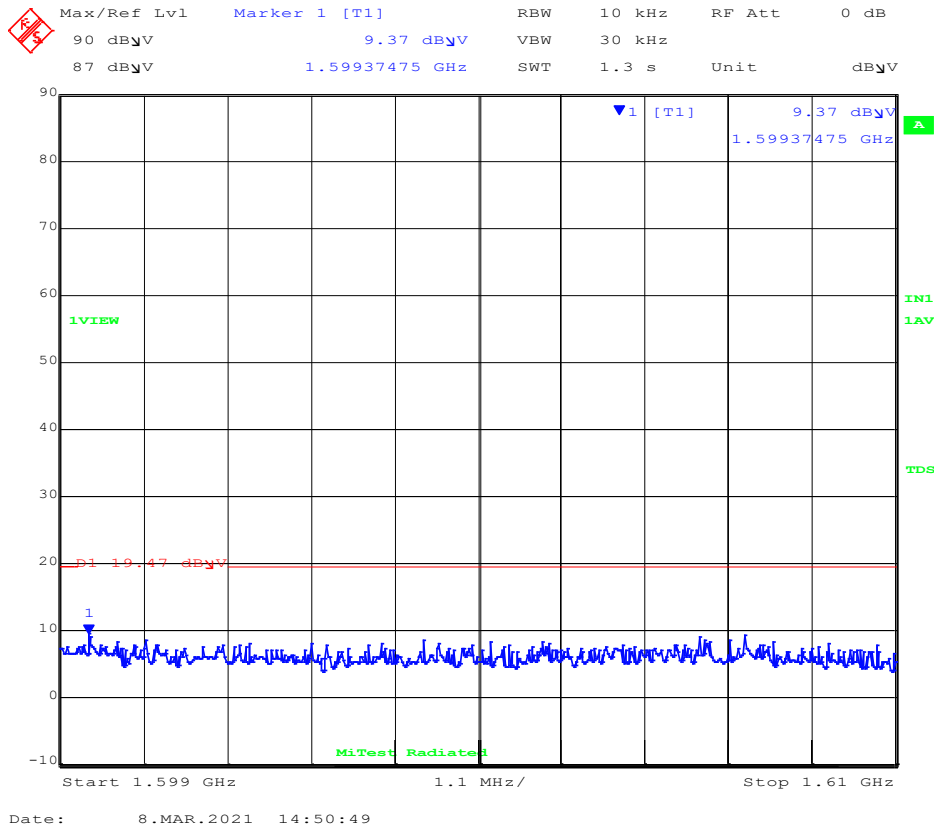
| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1239.23 | 8.67 | Average | Vertical | 150 | 0 | 19.47 | -10.8 | Pass |
| 2 | 1186.84 | 9.97 | Average | Horizontal | 150 | 0 | 19.47 | -9.5 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 3432.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

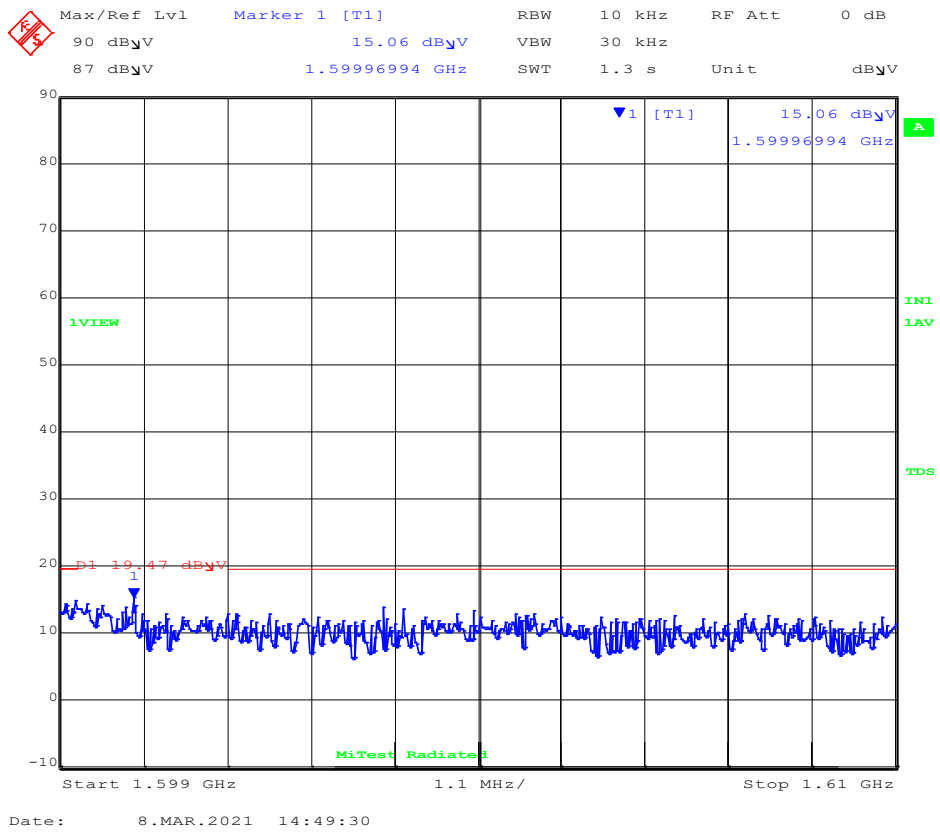
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1599.37 | 9.37 | Average | Vertical | 150 | 0 | 19.47 | -10.1 | Pass |
| 2 | 1599.96 | 15.06 | Average | Horizontal | 150 | 0 | 19.47 | -4.41 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

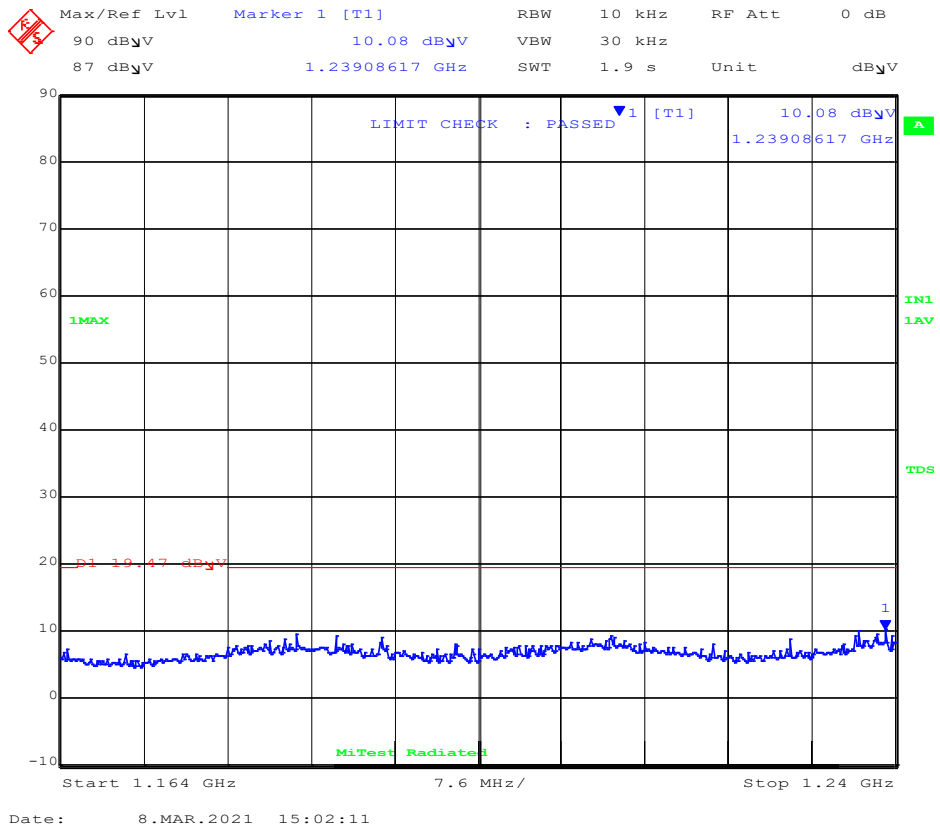
9.4.6.0.2. 3960 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 3960.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

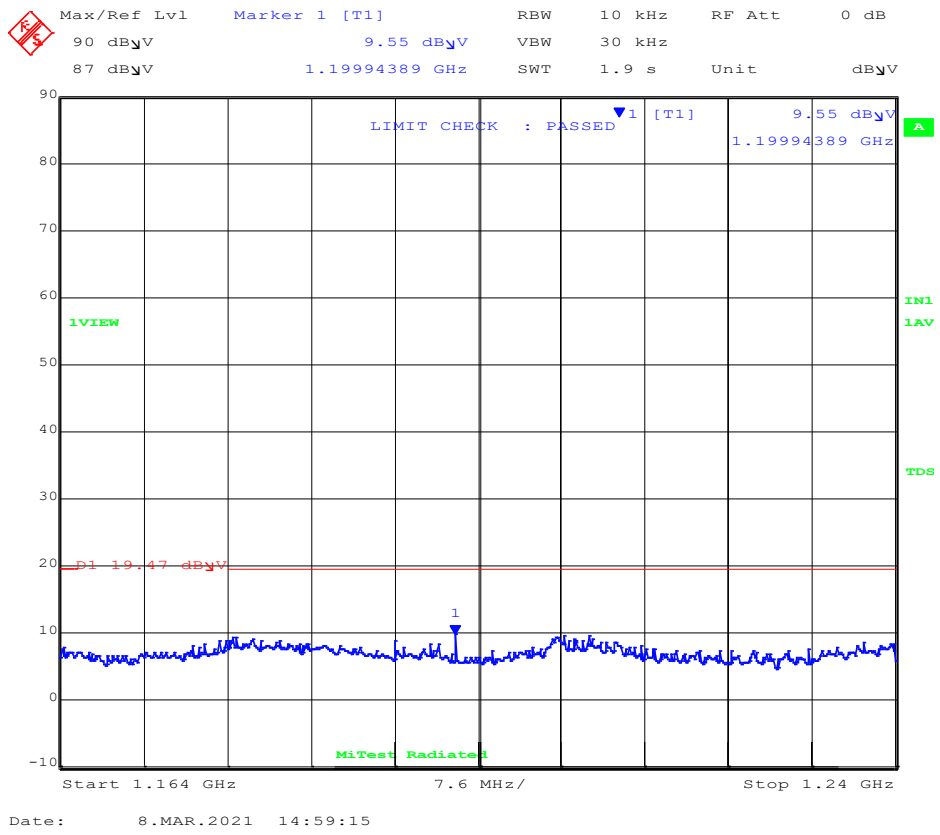
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

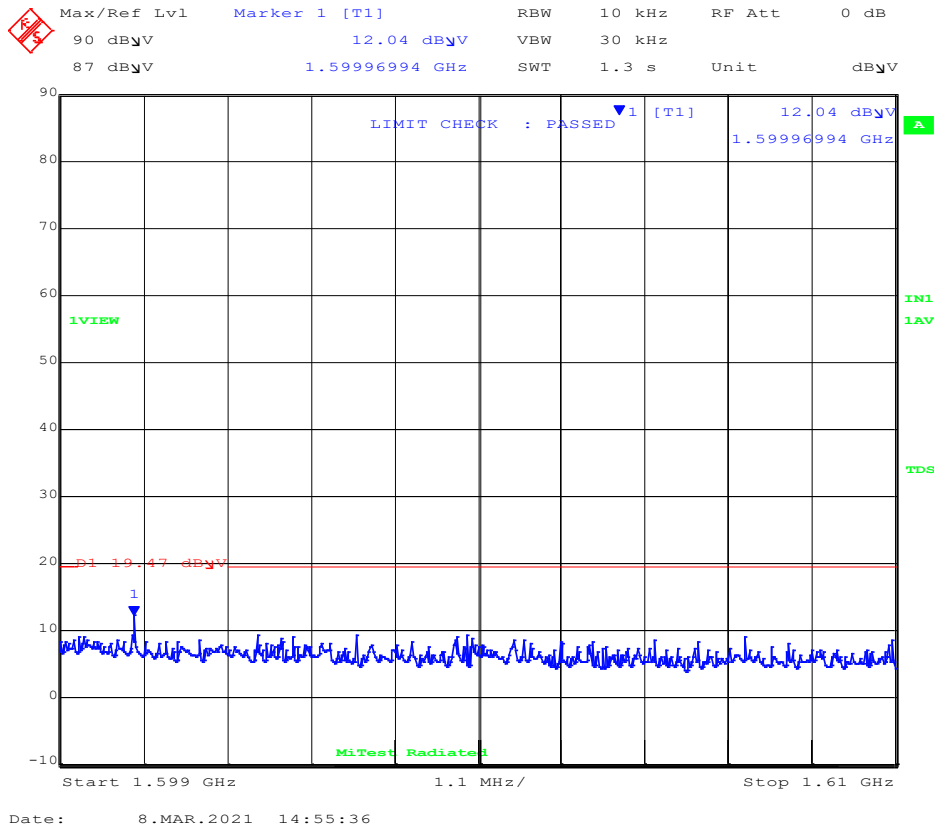
| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1239.08 | 10.08 | Average | Vertical | 150 | 0 | 19.47 | -9.39 | Pass |
| 2 | 1199.94 | 9.55 | Average | Horizontal | 150 | 0 | 19.47 | -9.92 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 3960.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

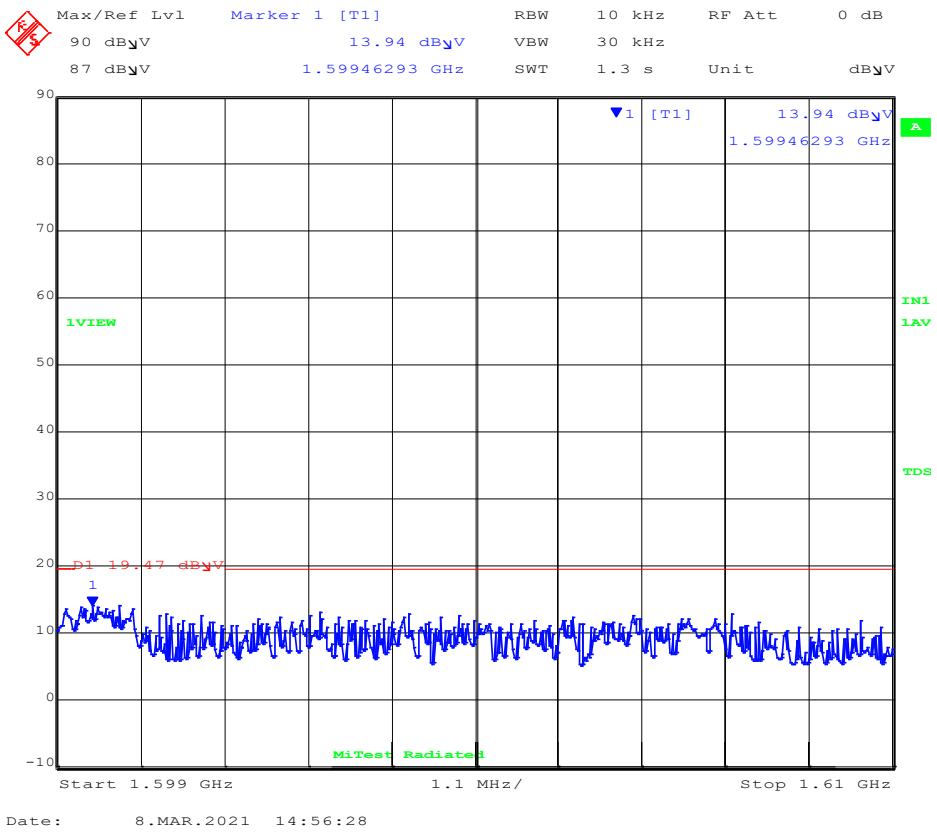
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1599.96 | 12.04 | Average | Vertical | 150 | 0 | 19.47 | -7.43 | Pass |
| 2 | 1599.46 | 13.94 | Average | Horizontal | 150 | 0 | 19.47 | -5.53 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

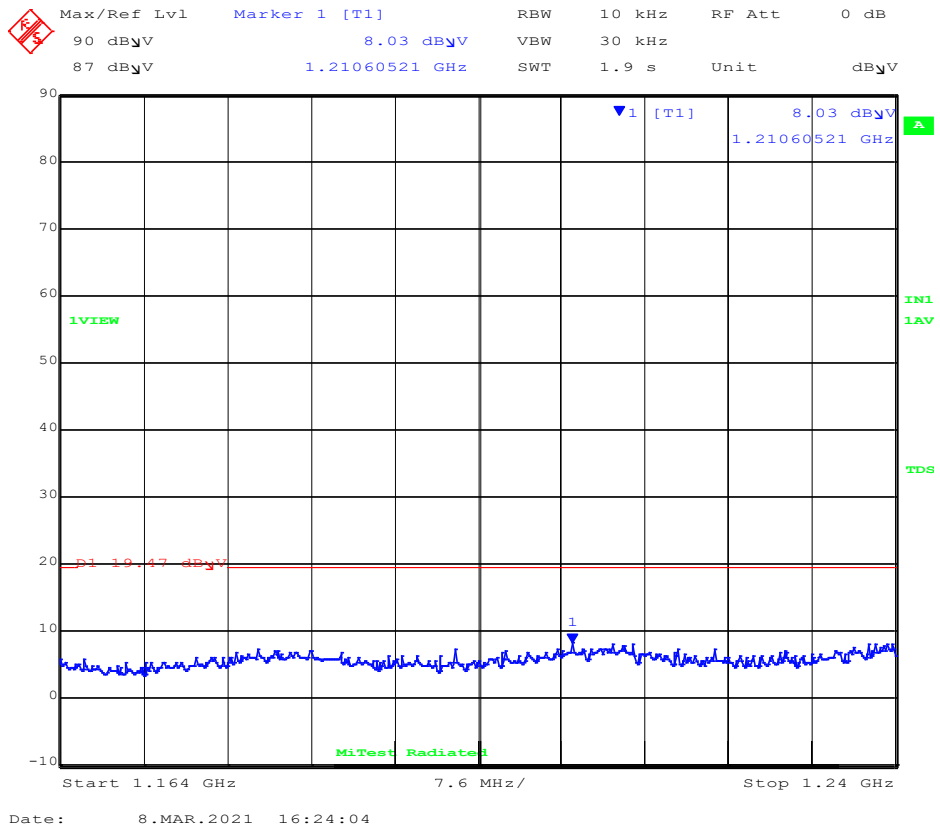
9.4.6.0.3. 4488 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 4488.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

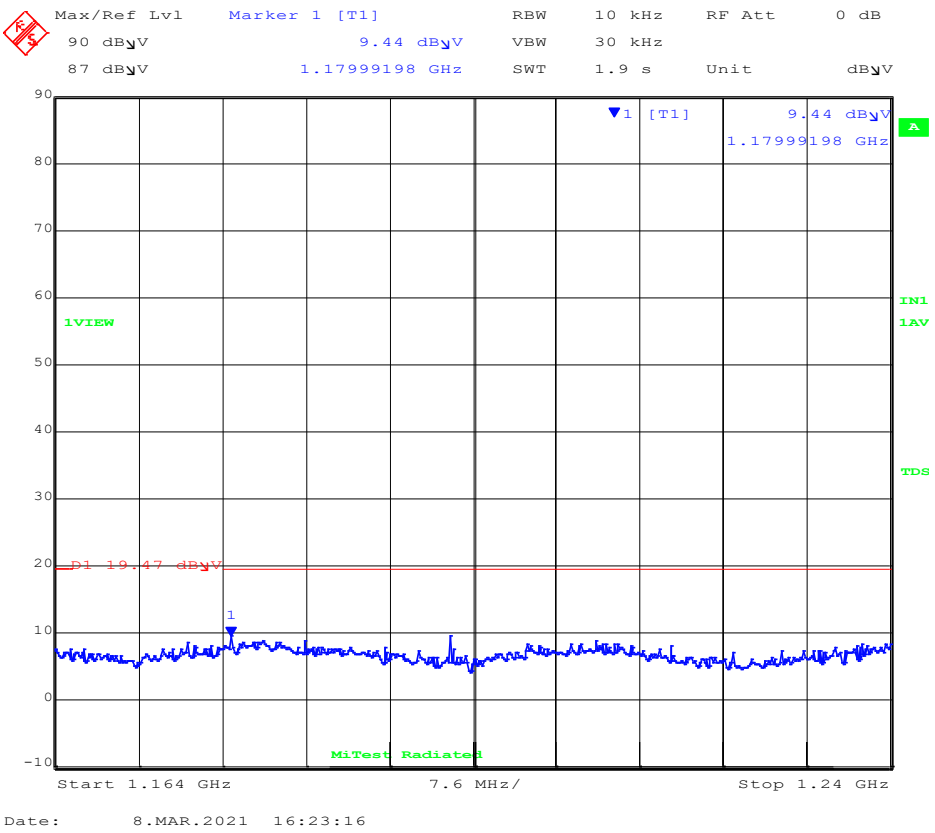
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1210.60 | 8.03 | Average | Vertical | 150 | 0 | 19.47 | -11.44 | Pass |
| 2 | 1179.99 | 9.44 | Average | Horizontal | 150 | 0 | 19.47 | -10.03 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

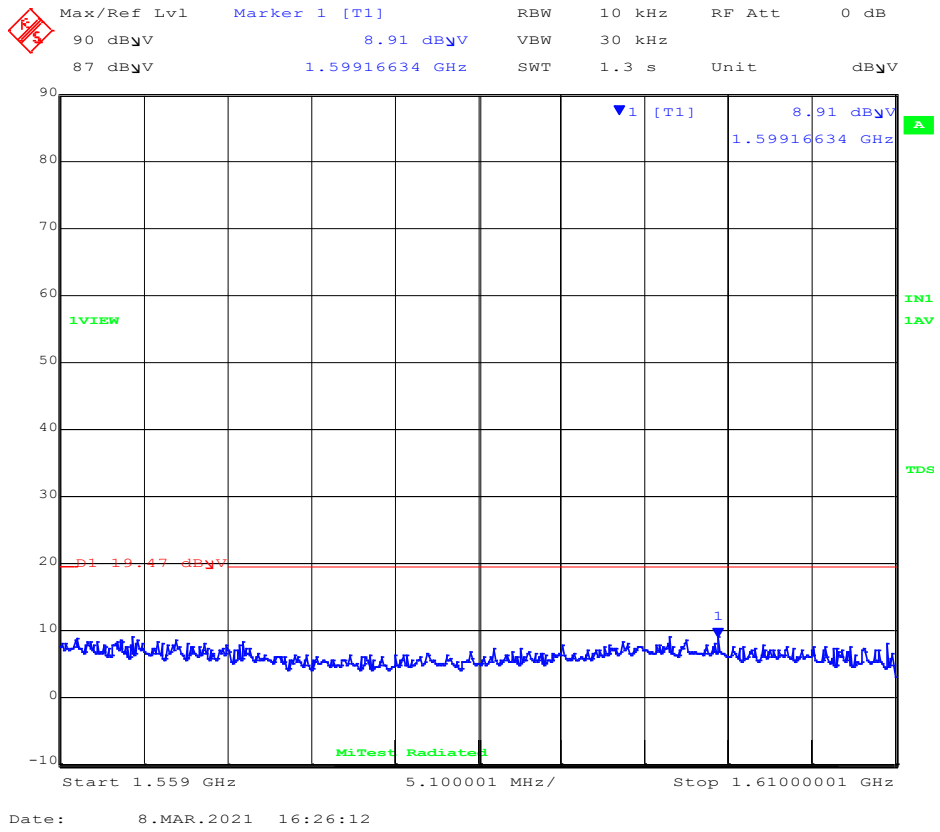
**Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz**

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 1.0/0.2/0.2 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 4488.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

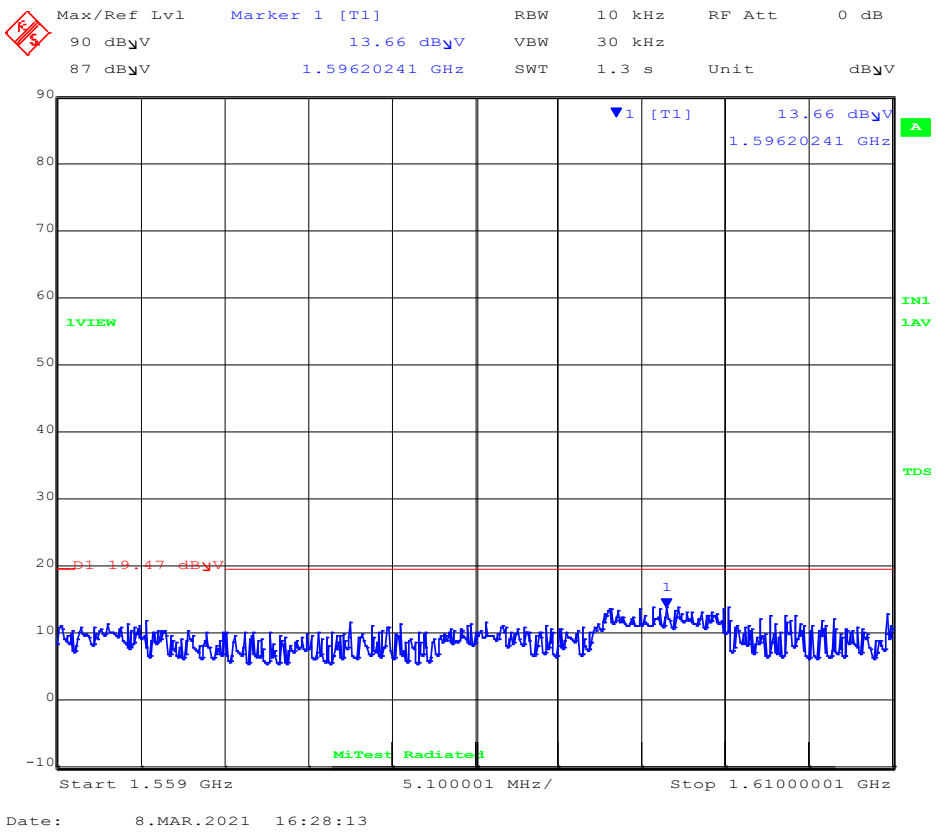
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1599.16 | 8.91 | Average | Vertical | 150 | 0 | 19.47 | -10.56 | Pass |
| 2 | 1596.20 | 13.66 | Average | Horizontal | 150 | 0 | 19.47 | -5.81 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

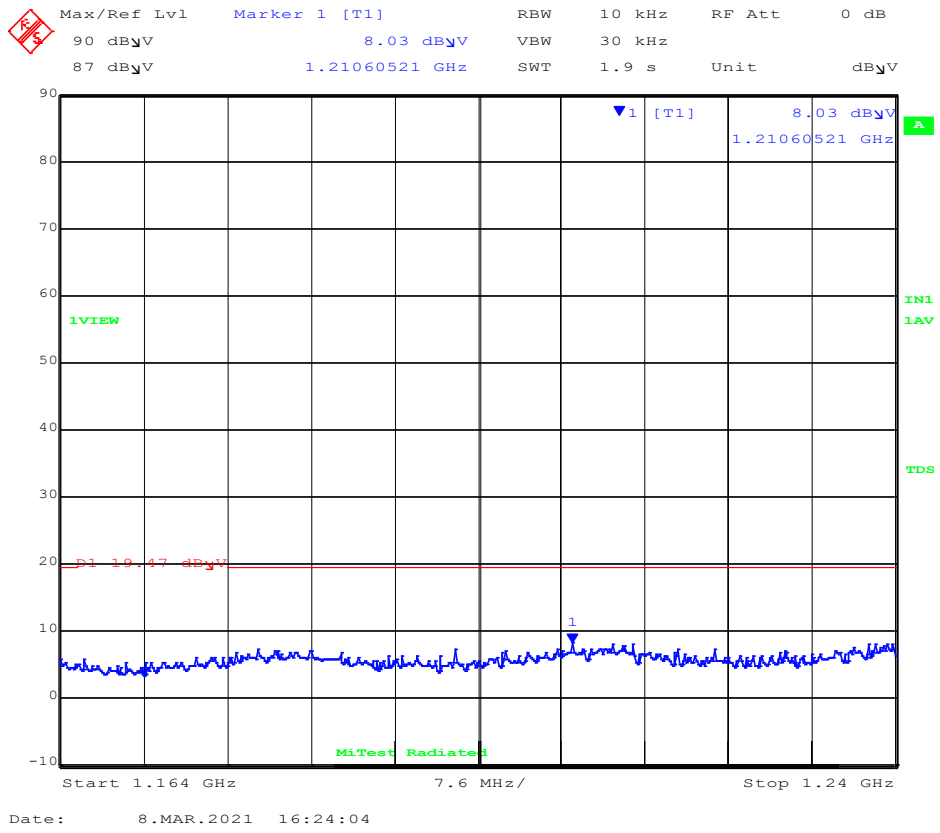
9.4.6.0.4. 6600 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.2/-0.2/0.1 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 6600.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

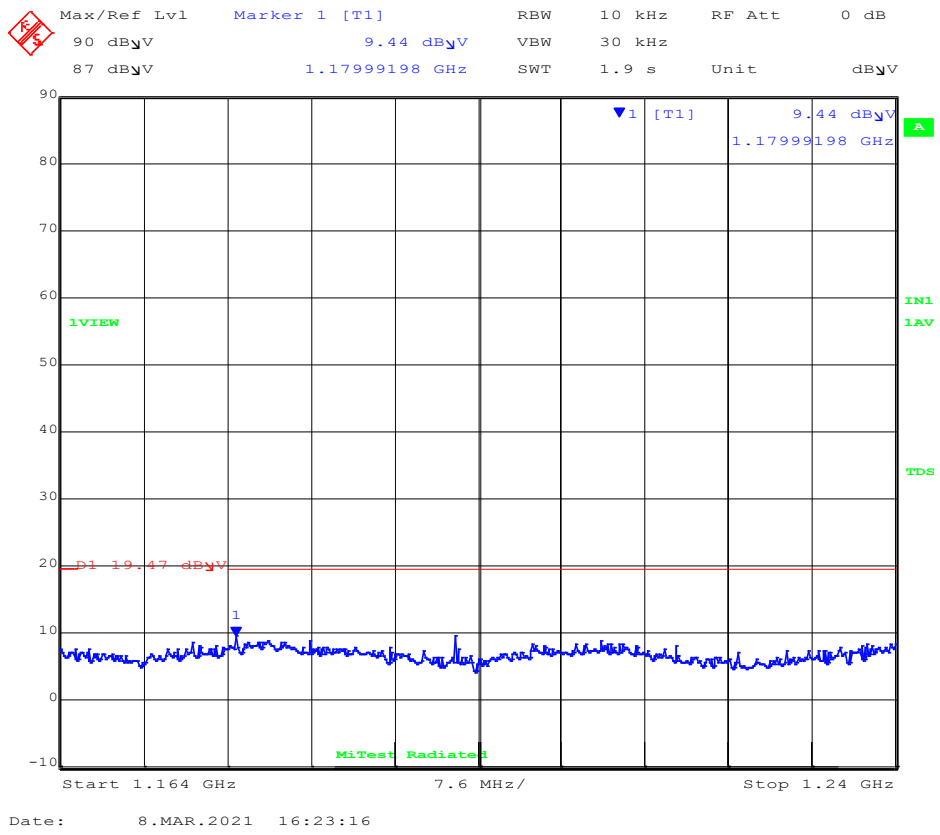
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1210.60 | 8.03 | Average | Vertical | 150 | 0 | 19.47 | -11.44 | Pass |
| 2 | 1179.99 | 9.44 | Average | Horizontal | 150 | 0 | 19.47 | -10.03 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

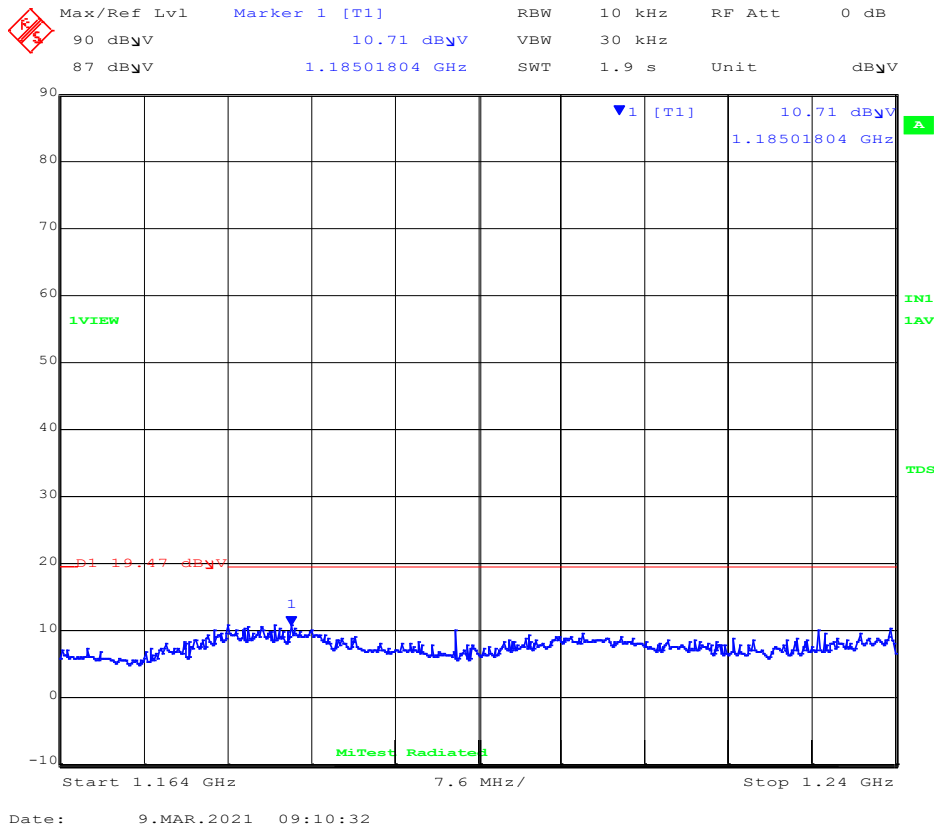
**Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz**

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.2/-0.2/0.1 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 6600.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

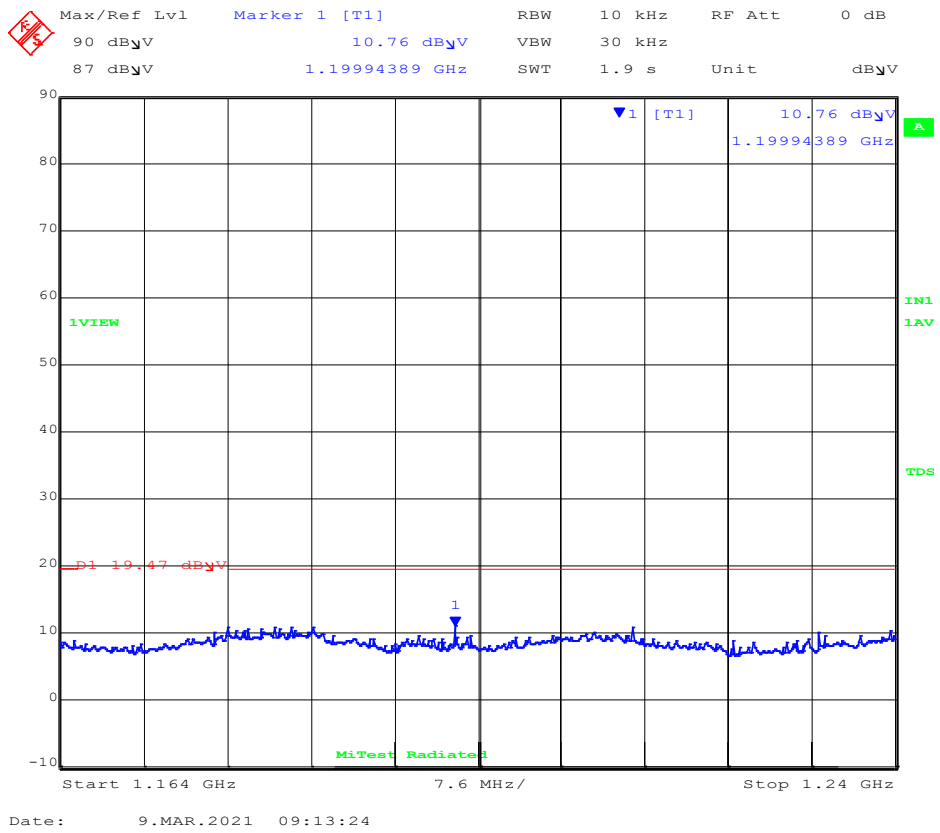
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1185.01 | 10.71 | Average | Vertical | 150 | 0 | 19.47 | -8.76 | Pass |
| 2 | 1199.94 | 10.76 | Average | Horizontal | 150 | 0 | 19.47 | -8.71 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

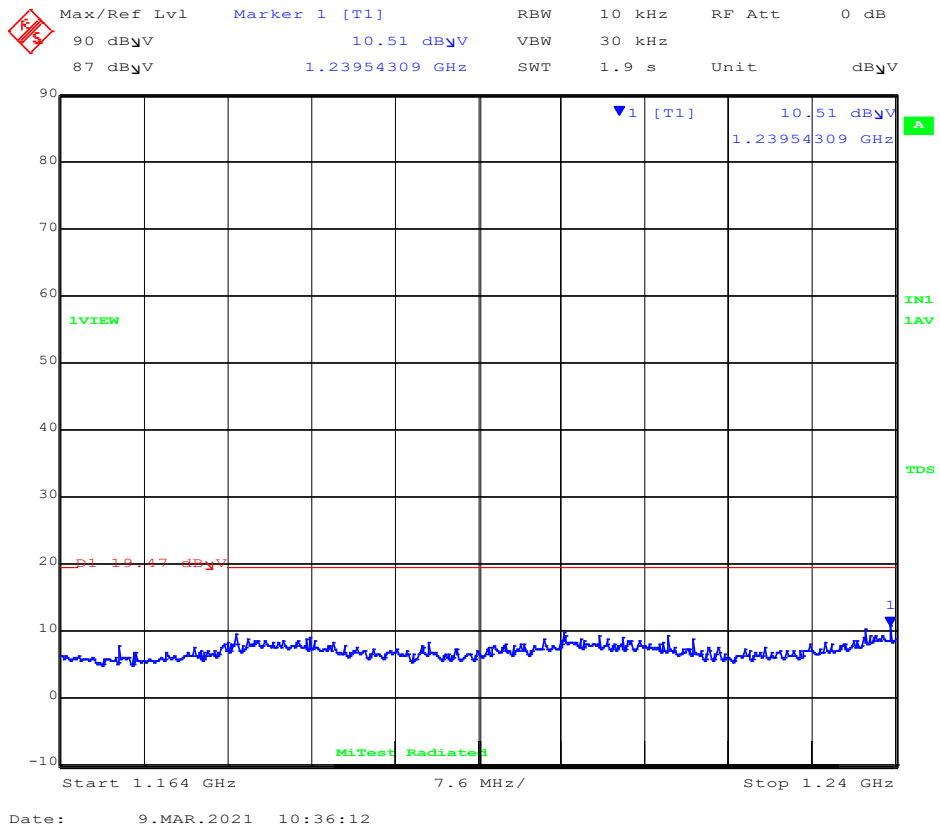
9.4.6.0.5. 7128 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.2/-0.2/0.1 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 7128.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

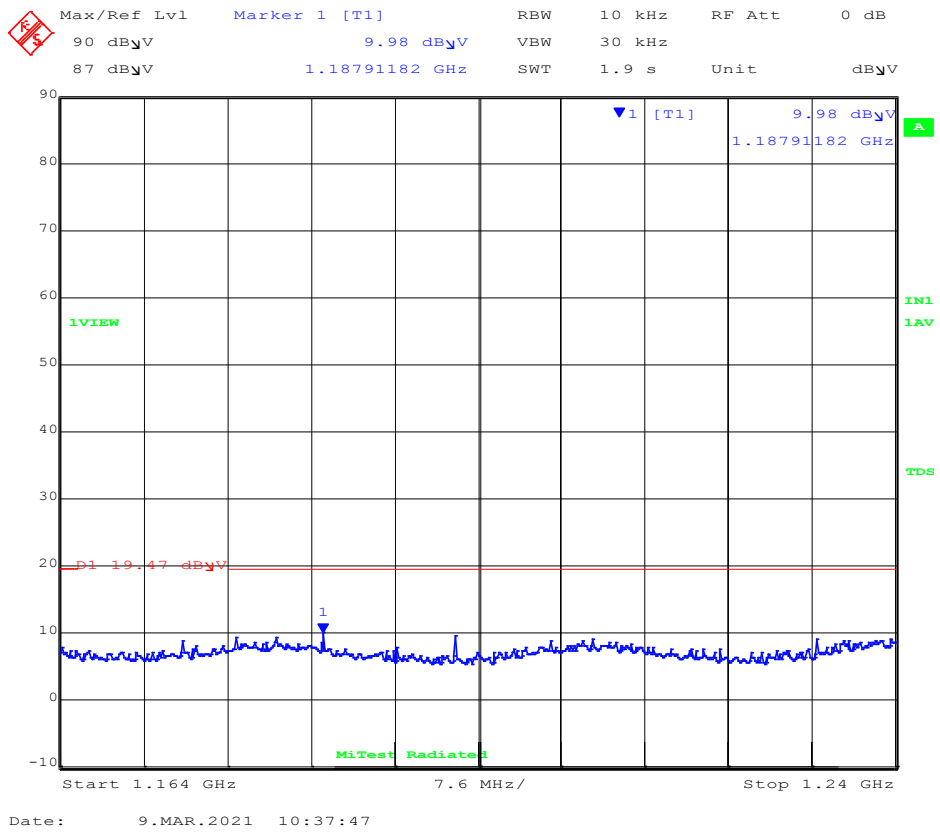
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1239.54 | 10.51 | Average | Vertical | 150 | 0 | 19.47 | -8.96 | Pass |
| 2 | 1187.11 | 9.98 | Average | Horizontal | 150 | 0 | 19.47 | -9.49 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

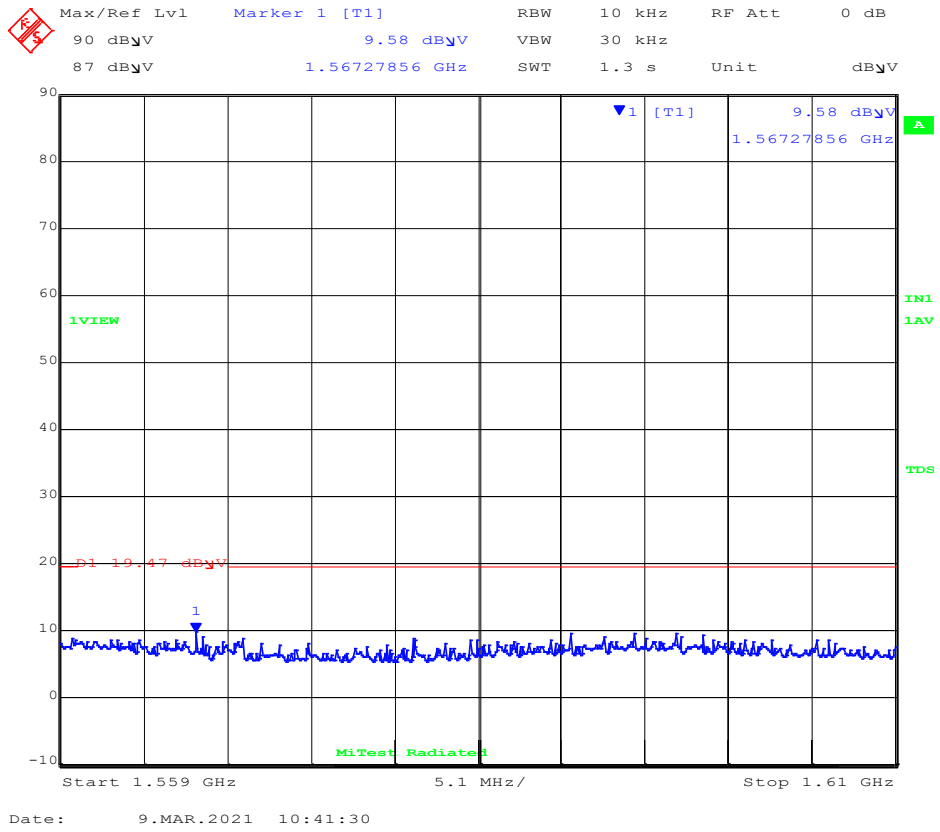
## Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.2/-0.2/0.1 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 7128.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

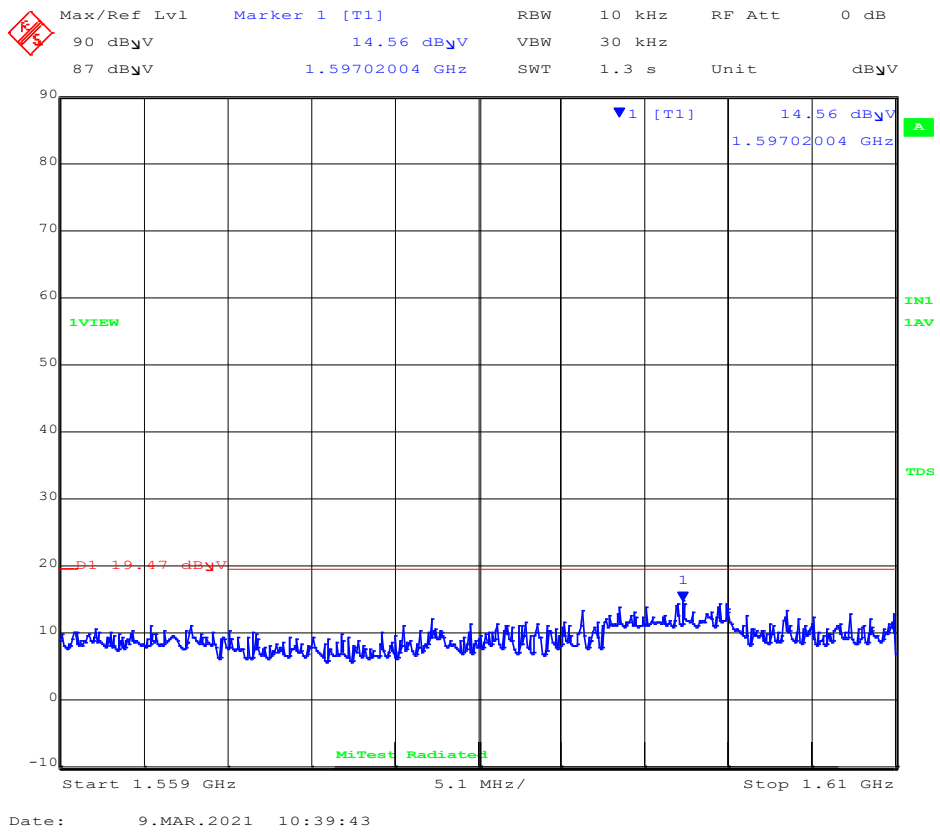
## Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1567.27 | 9.58 | Average | Vertical | 150 | 0 | 19.47 | -9.89 | Pass |
| 2 | 1597.02 | 14.56 | Average | Horizontal | 150 | 0 | 19.47 | -4.91 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

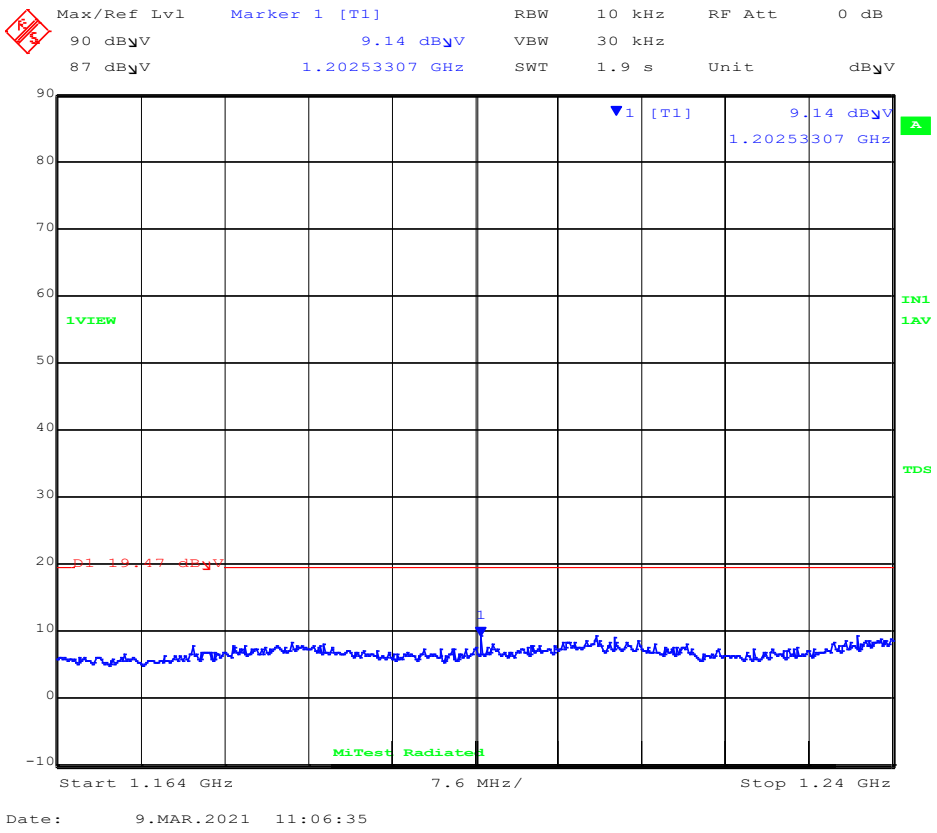
9.4.6.0.6. 7656 MHz (Covers Band Group 3 TFC 7 and Band Group 6 TFC 5

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.2/-0.2/0.1 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 7656.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

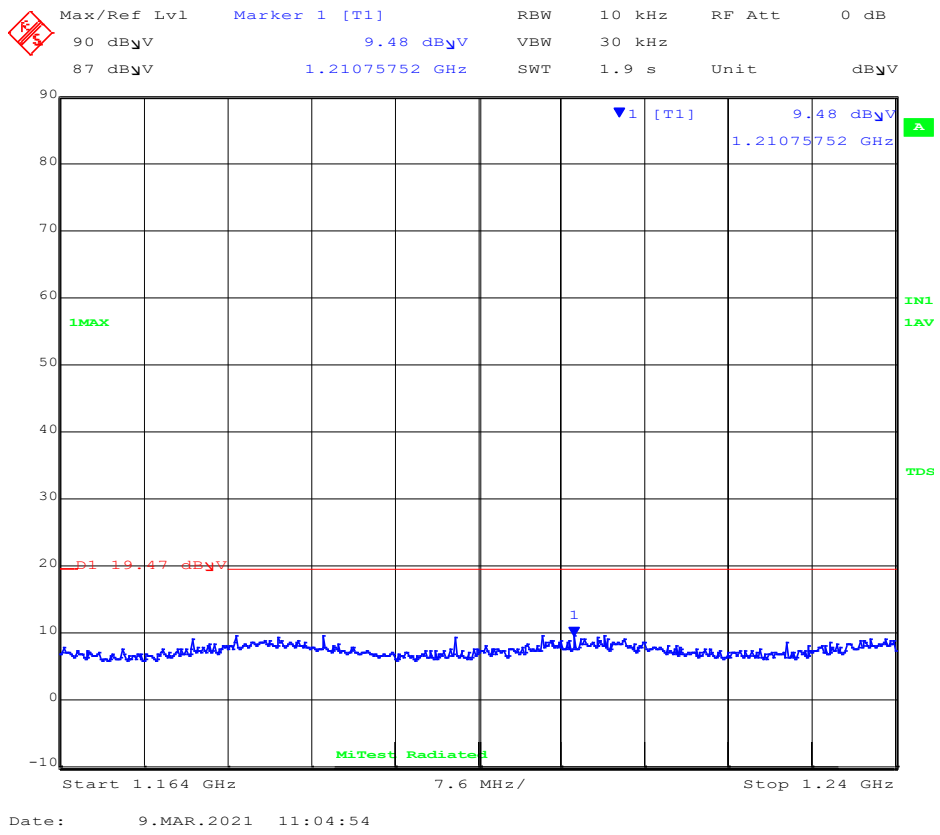
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1202.53 | 9.14 | Average | Vertical | 150 | 0 | 19.47 | -10.33 | Pass |
| 2 | 1210.75 | 9.48 | Average | Horizontal | 150 | 0 | 19.47 | -9.99 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

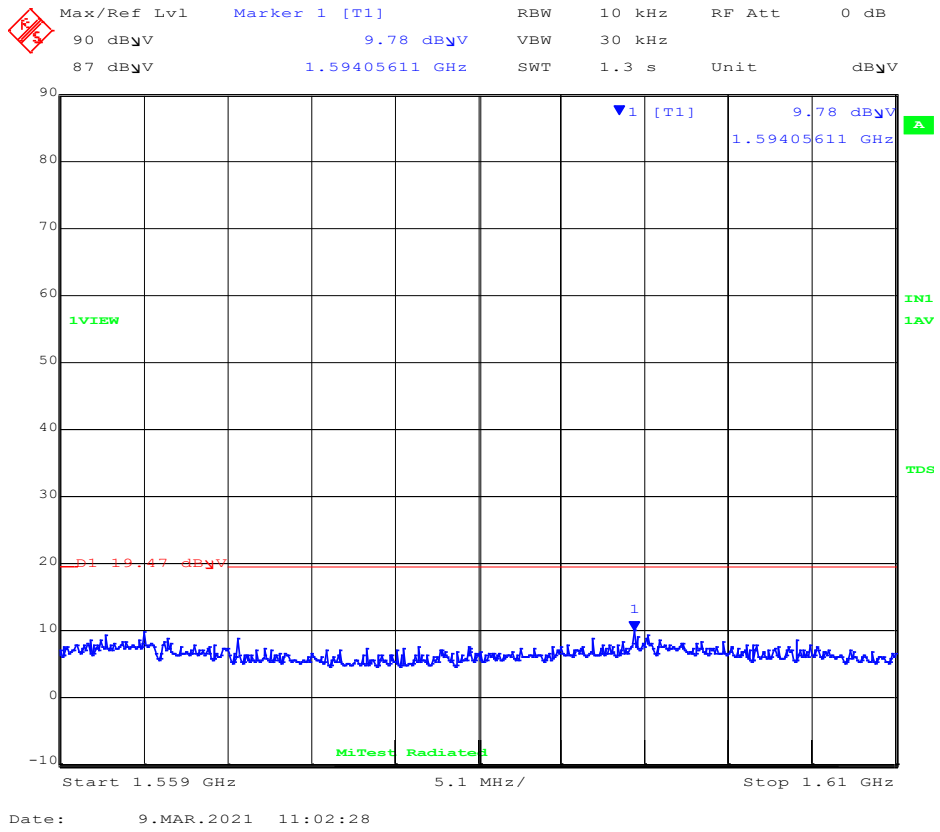
**Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz**

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.2/-0.2/0.1 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 7656.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

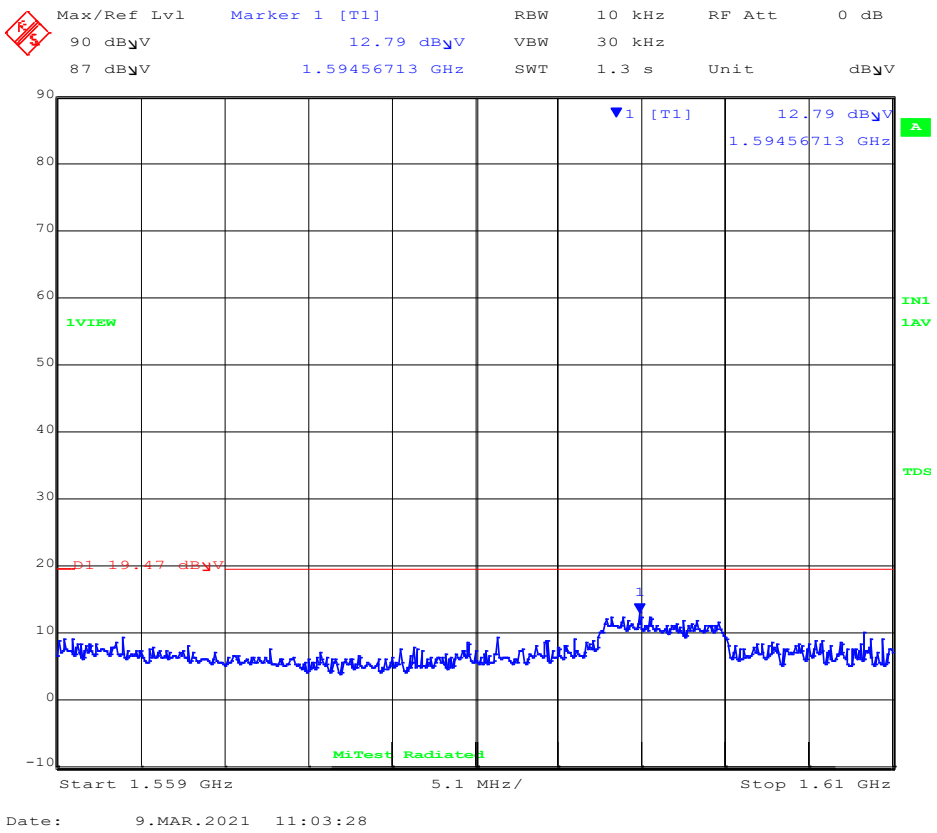
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1594.05 | 9.78 | Average | Vertical | 150 | 0 | 19.47 | -9.69 | Pass |
| 2 | 1594.56 | 12.79 | Average | Horizontal | 150 | 0 | 19.47 | -6.68 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

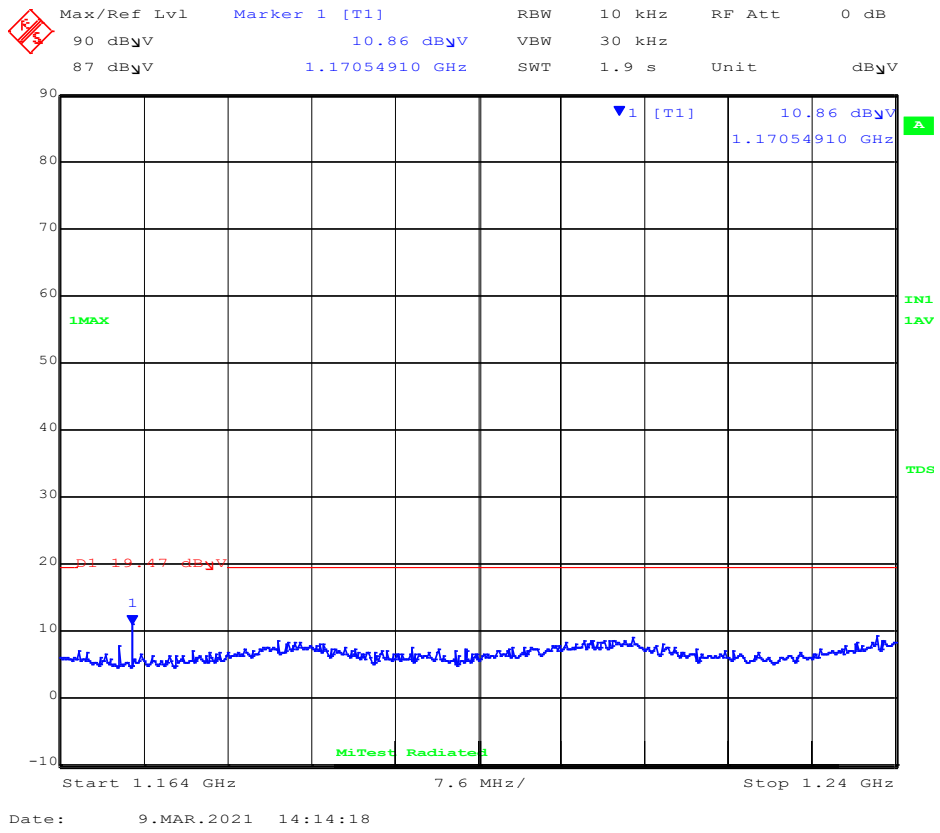
9.4.6.0.7. 8184 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 8184.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

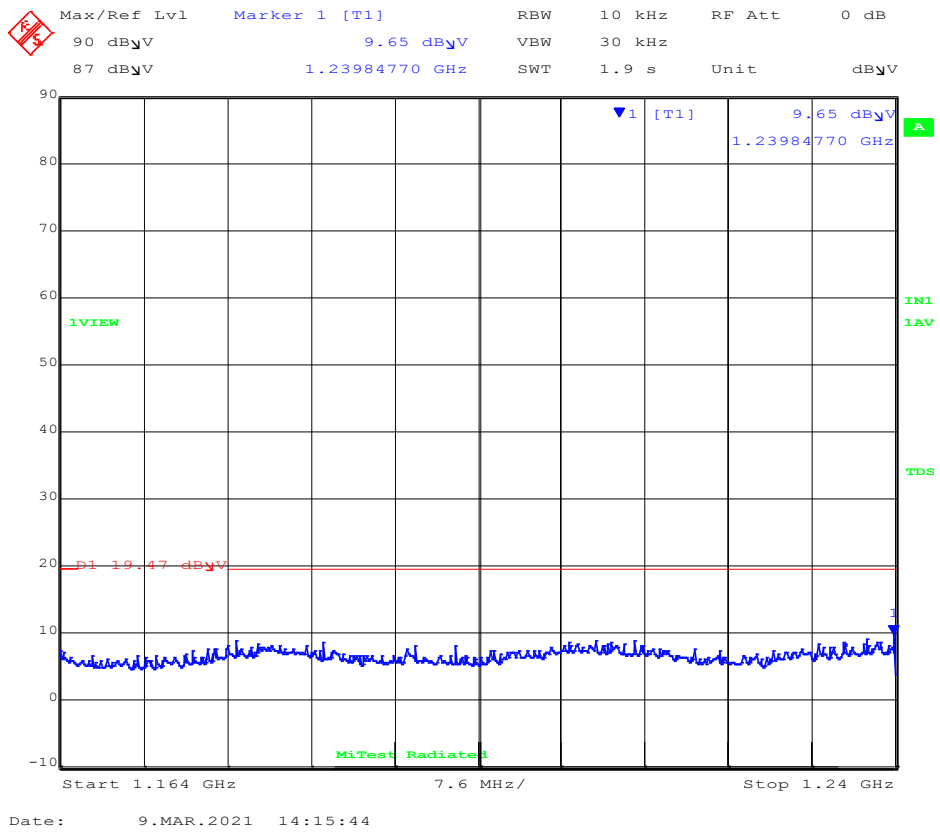
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

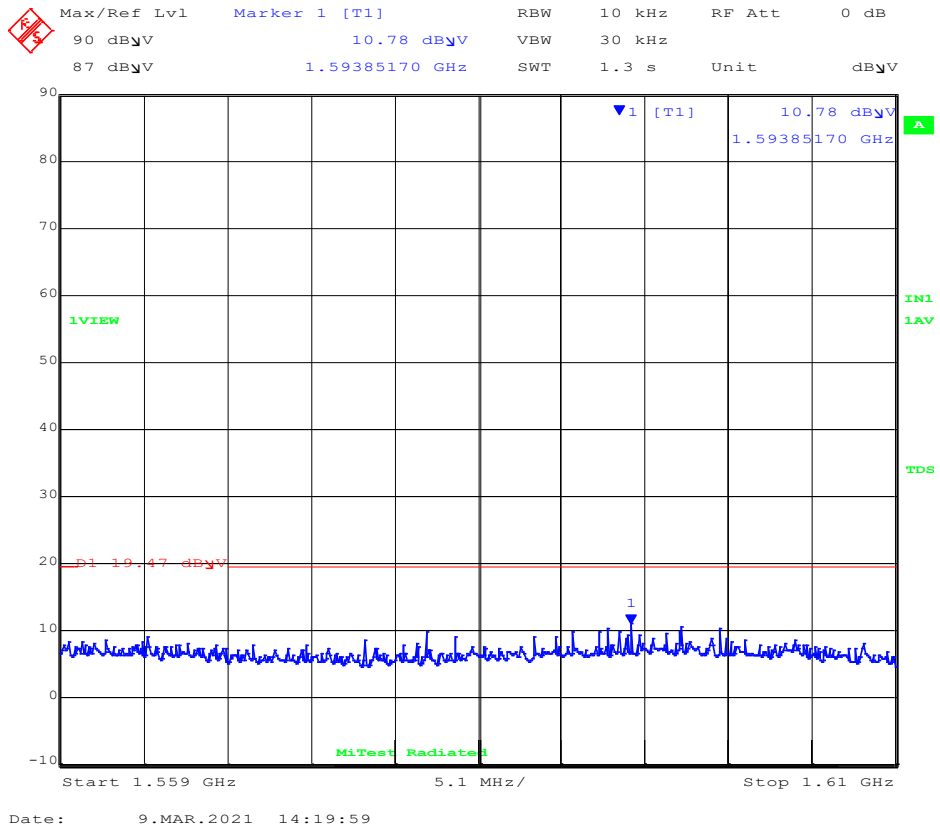
| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1170.54 | 10.86 | Average | Vertical | 150 | 0 | 19.47 | -8.61 | Pass |
| 2 | 1239.84 | 9.65 | Average | Horizontal | 150 | 0 | 19.47 | -9.82 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

| Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 8184.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

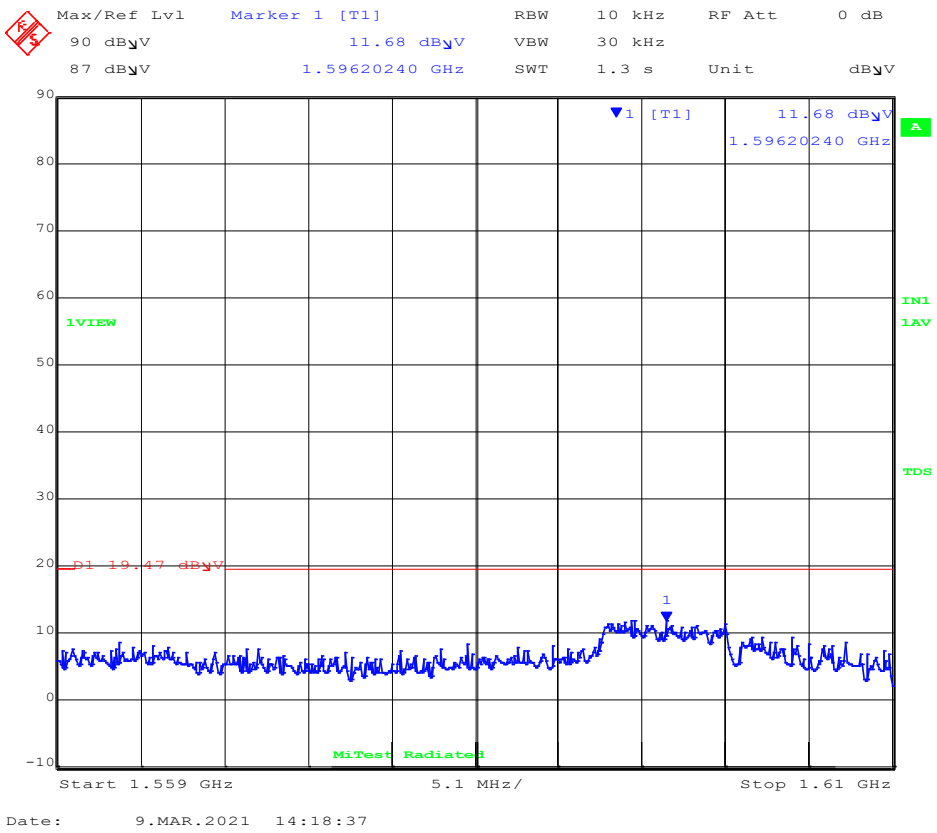
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1593.85 | 10.78 | Average | Vertical | 150 | 0 | 19.47 | -8.69 | Pass |
| 2 | 1596.20 | 11.68 | Average | Horizontal | 150 | 0 | 19.47 | -7.79 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

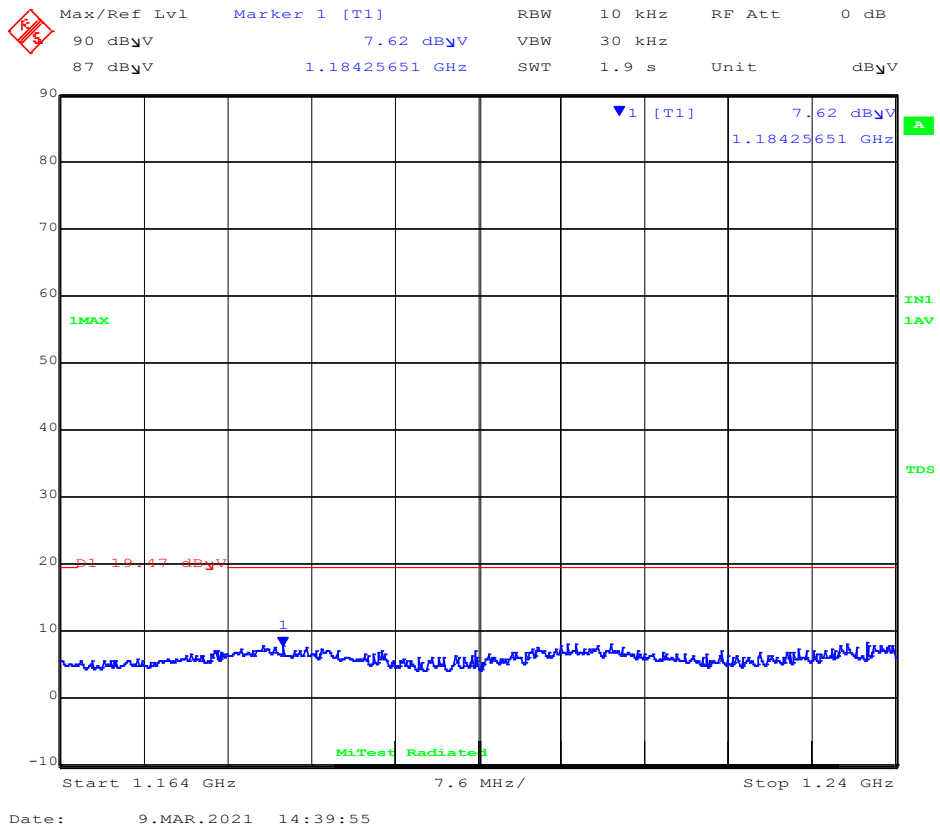
9.4.6.0.8. 8712 MHz

| Equipment Configuration for Spurious Emissions 1.164 – 1.24 GHz | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 8712.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

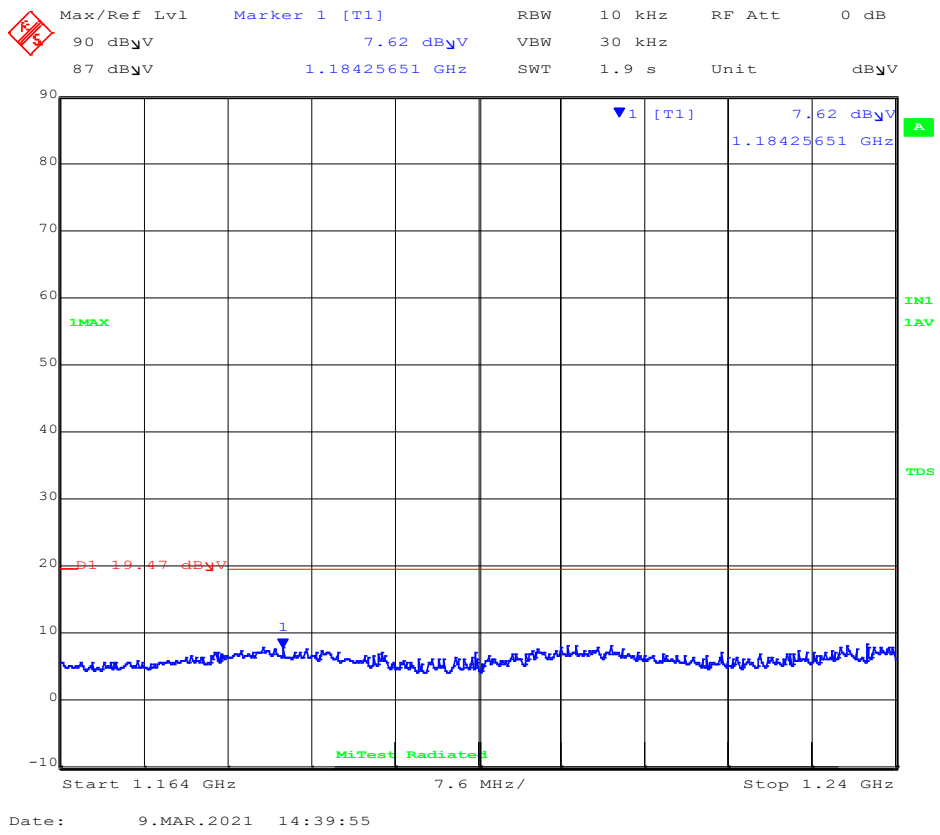
**Test Measurement Results**

RADIATED SPURIOUS EMISSIONS 1.164-1.24GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1164.00 – 1240.00 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1184.25 | 7.62 | Average | Vertical | 150 | 0 | 19.47 | -11.85 | Pass |
| 2 | 1184.25 | 7.62 | Average | Horizontal | 150 | 0 | 19.47 | -11.85 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

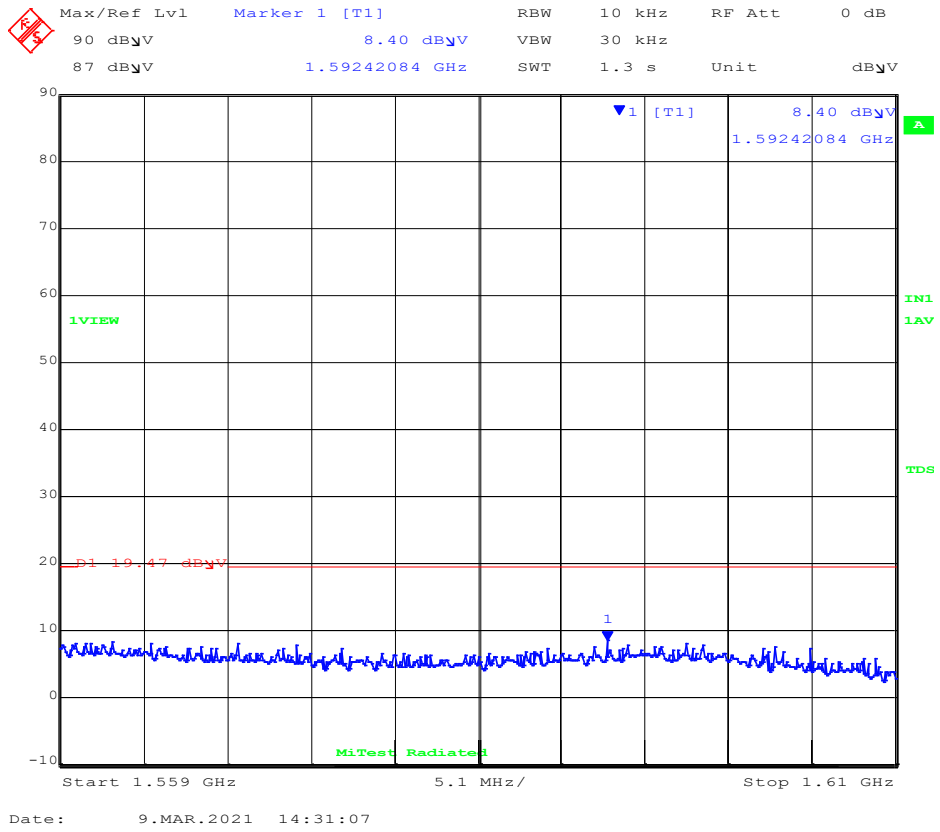
## Equipment Configuration for Spurious Emissions 1.559 – 1.610 GHz

| | | | |
|---|---|---|---|
| **Antenna:** | Chip | **Variant:** | 500 MHz Bandwidth |
| **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 | **Modulation:** | BPM/BPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99% |
| **Channel Frequency (MHz):** | 8712.00 | **Data Rate:** | |
| **Power Setting:** | Max | **Tested By:** | SB |

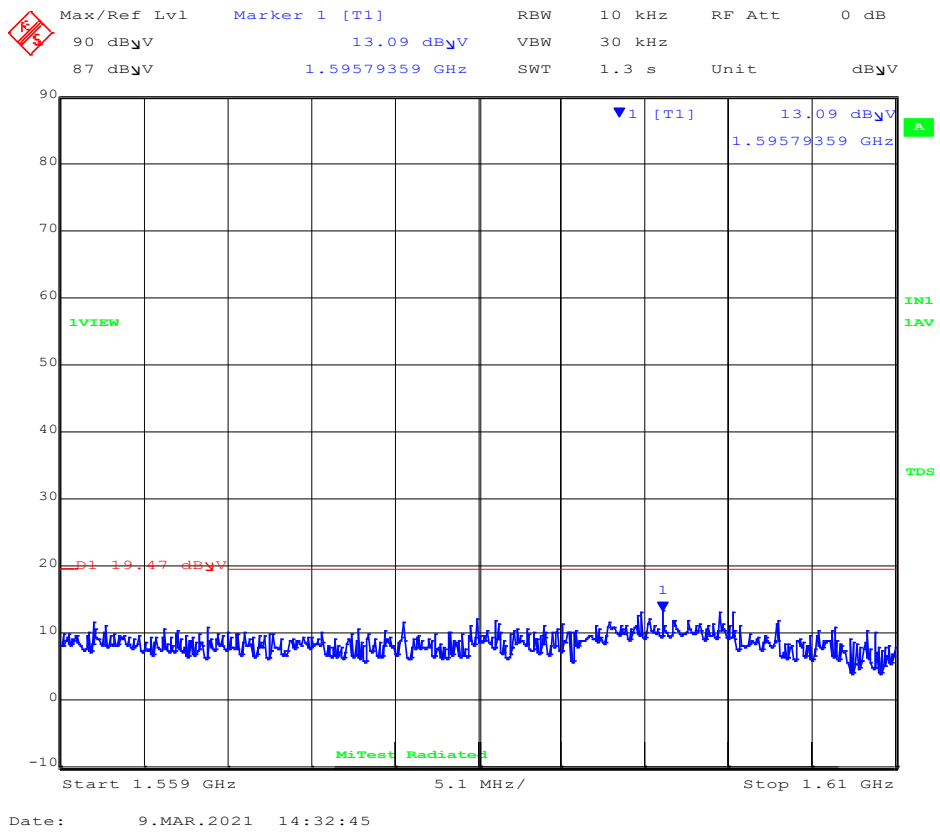
## Test Measurement Results

RADIATED SPURIOUS EMISSIONS 1.559-1.610GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99




Antenna Polarity: Vertical




Antenna Polarity: Horizontal

| 1559 - 1610 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1592.42 | 8.40 | Average | Vertical | 150 | 0 | 19.47 | -11.07 | Pass |
| 2 | 1595.79 | 13.09 | Average | Horizontal | 150 | 0 | 19.47 | -6.38 | Pass |
| **Test Notes:** EUT powered by USB or 3.3V, Measurement distance 1 meter | | | | | | | | | |

## 9.4. Shutoff Timing Requirements

| Radiated Test Conditions for Shutoff Timing Requirements | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.519 (a)(1) | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Shutoff Timing Requirements | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10 Section 10.3.6 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | None | | |

**Test Procedure for UWB Transmission**

Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document.

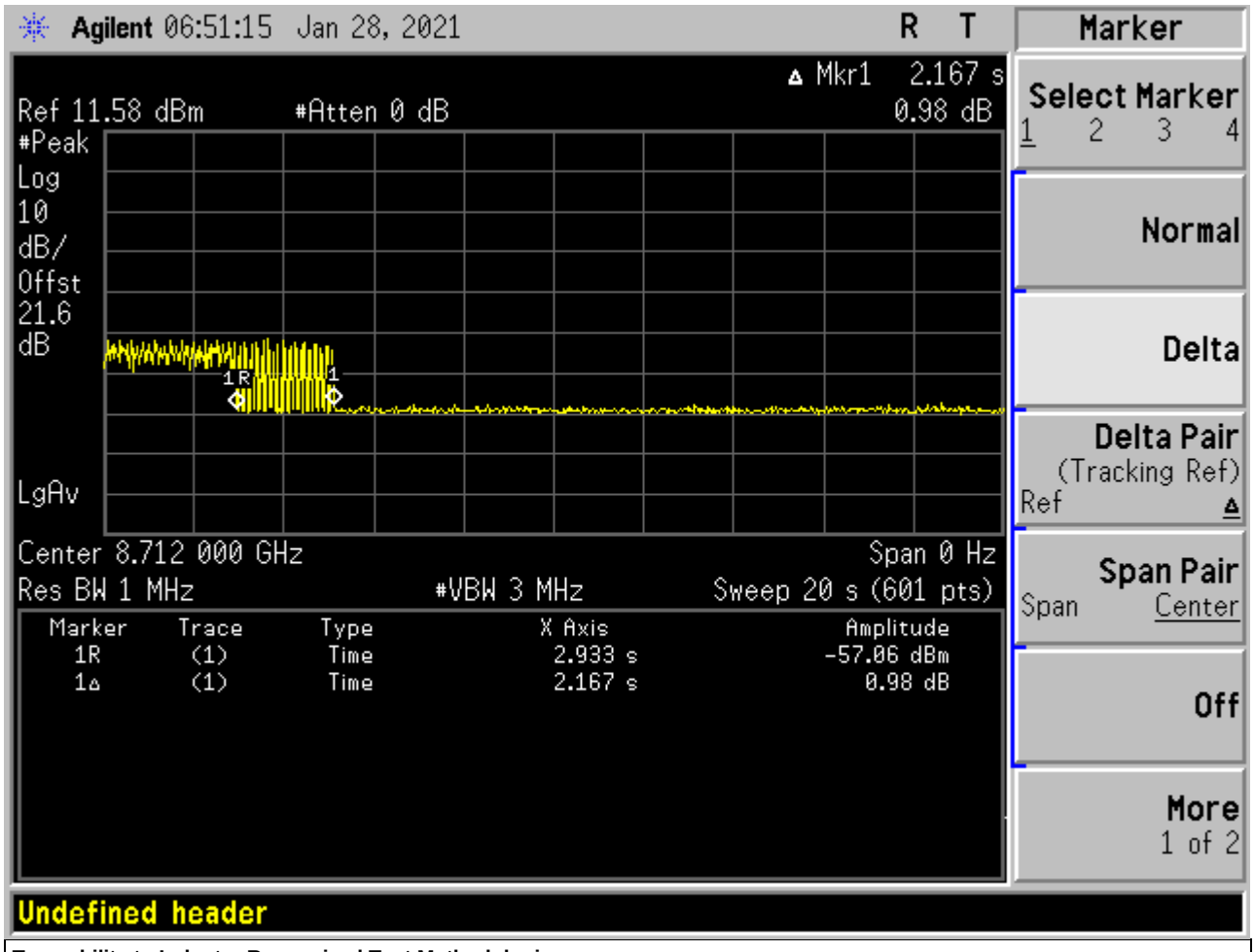
**Operating Frequency Band:**
3100-10600 MHz

**Limits**
The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received.

| Equipment Configuration for Shutdown Timing Requirements | | | |
|---|---|---|---|
| **Variant:** | Band 6 | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 200Mbp/s | **Antenna Gain (dBi):** | 0.1/-1.8/-1.8 |
| **Modulation:** | BPM/BPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Frequency (MHz) | Shutdown Time | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|
| | (s) | (s) | (s) | Numeric |
| **8712.00** | 2.167 | 10 | -7.83 | Max |




| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| **Work Instruction:** | WI-01 MEASURING RF OUTPUT POWER |
| **Uncertainty:** | ±1.33 dB |

# A. APPENDIX - GRAPHICAL IMAGES

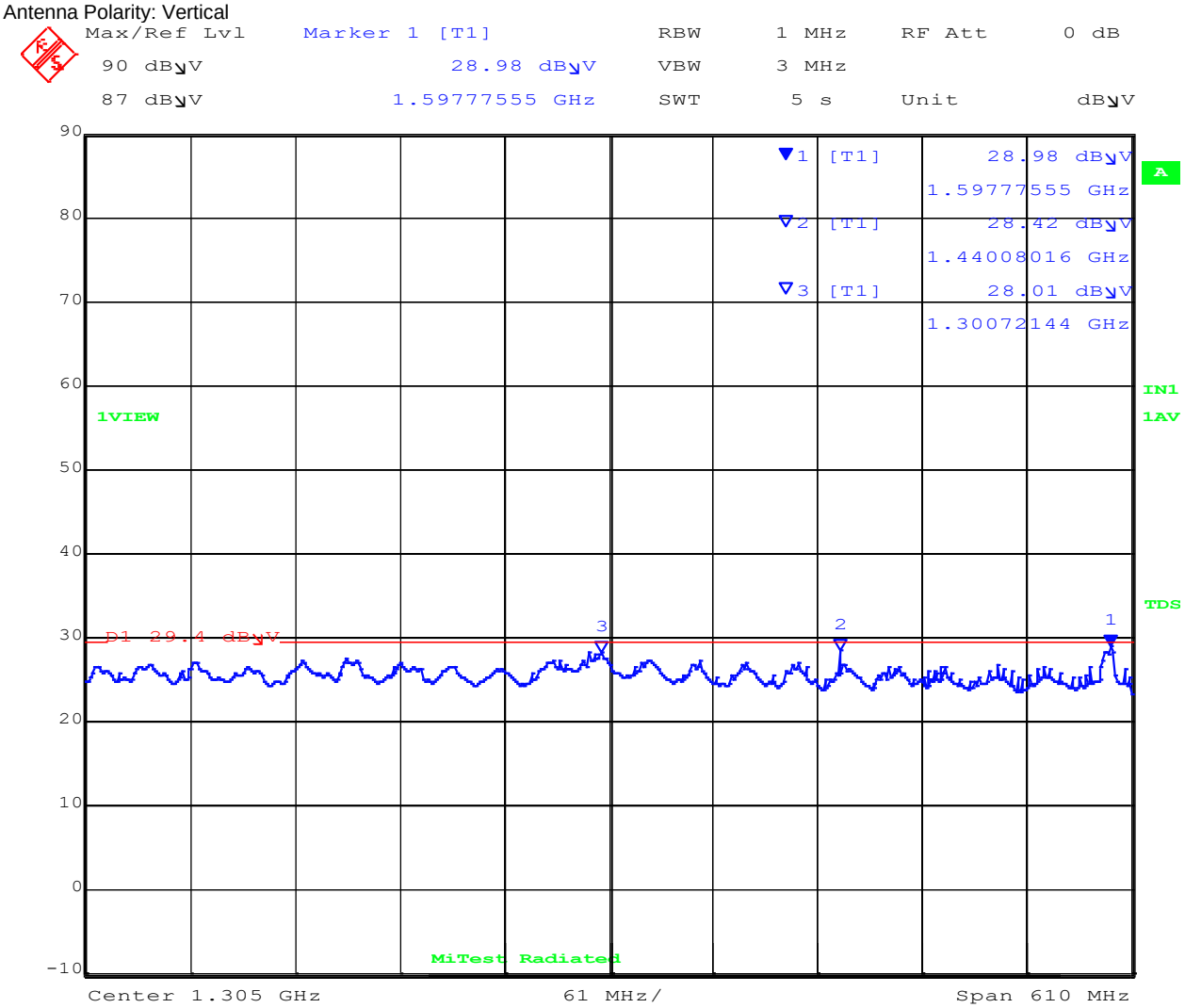
# A.1 Transmitter Spurious Emissions

## A.1.1 Band 1

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

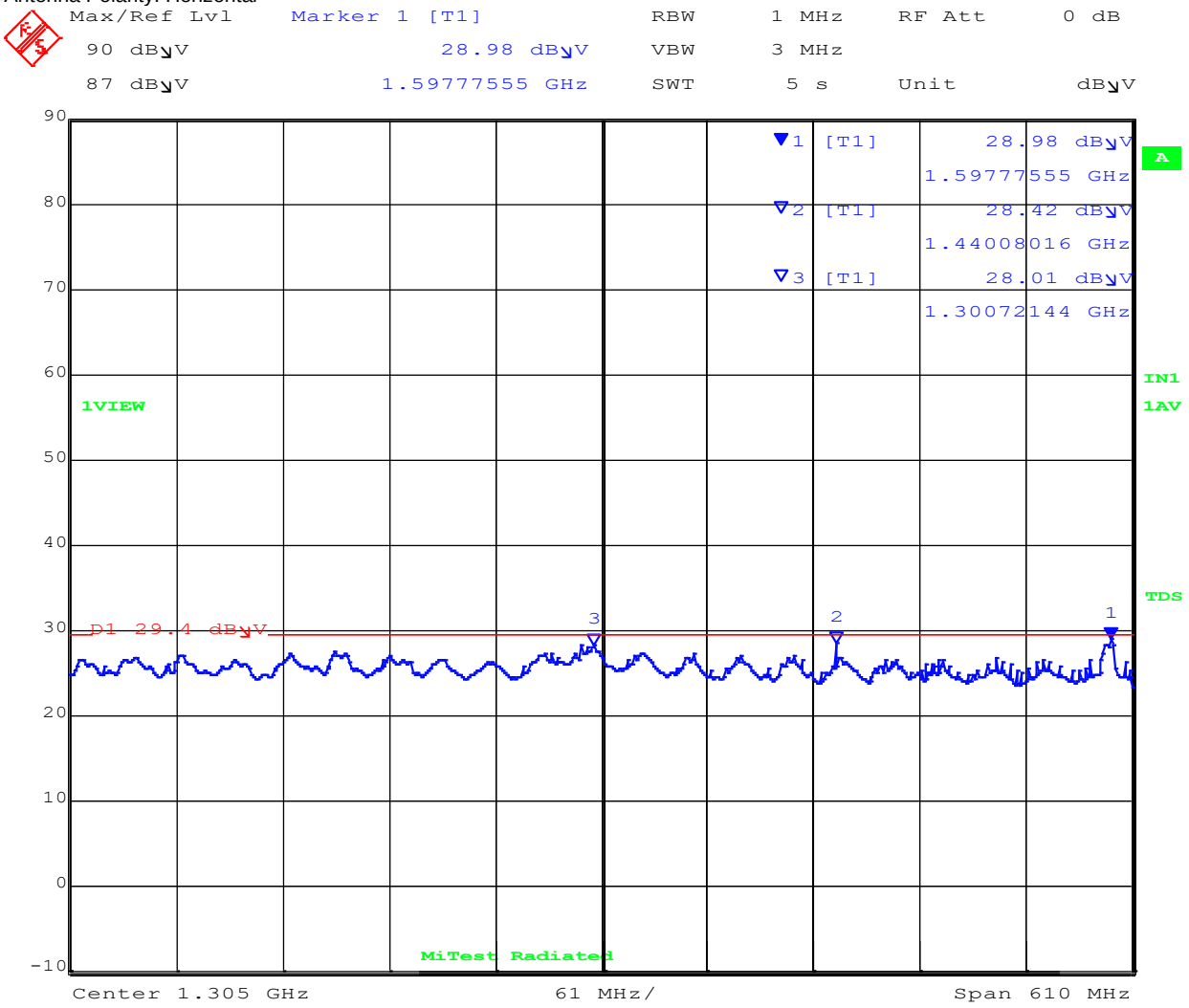
Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

Antenna Polarity: Vertical




Back to Matrix

Antenna Polarity: Horizontal



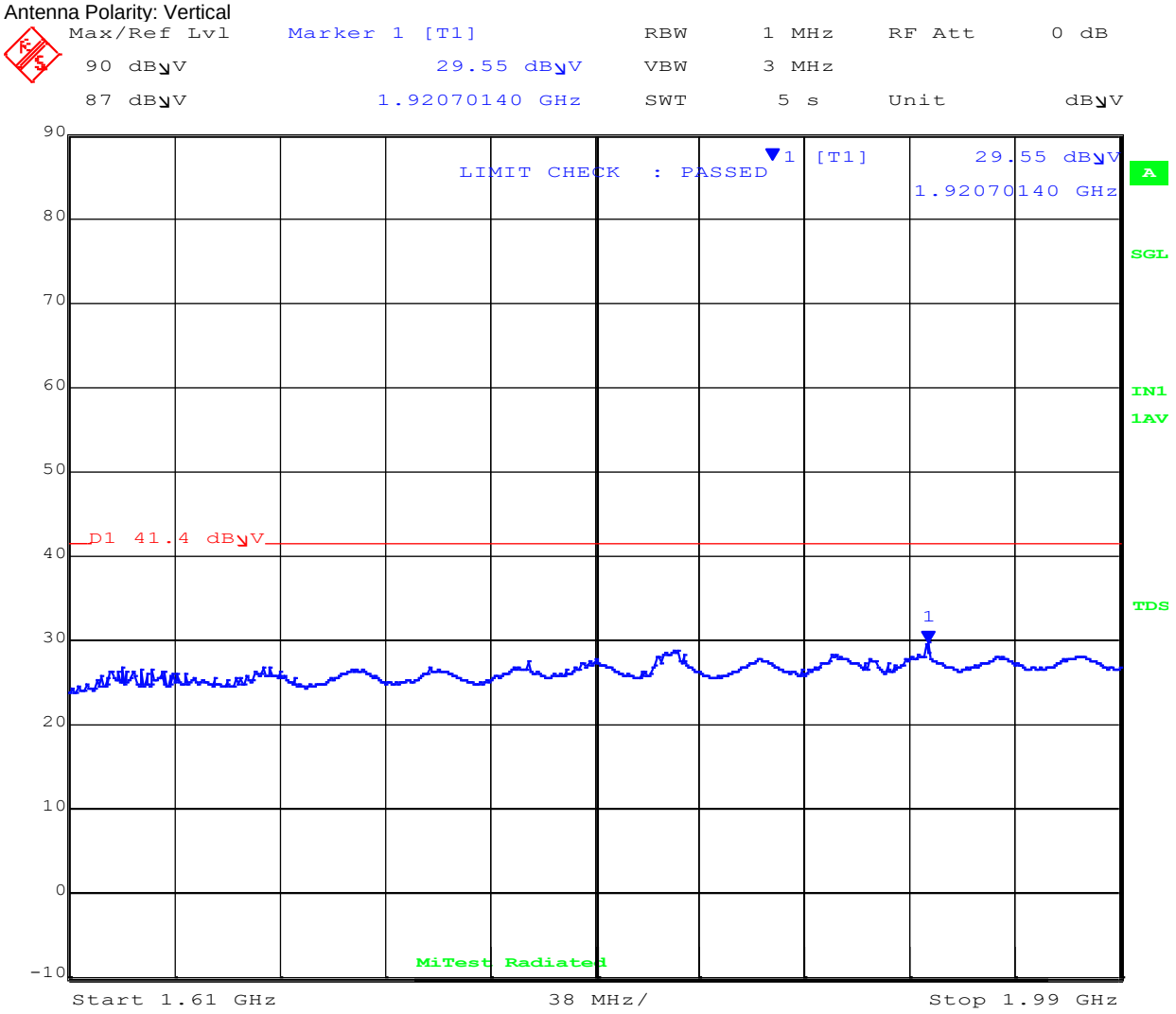

Date: 8.MAR.2021 14:12:42

[Back to Matrix]

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

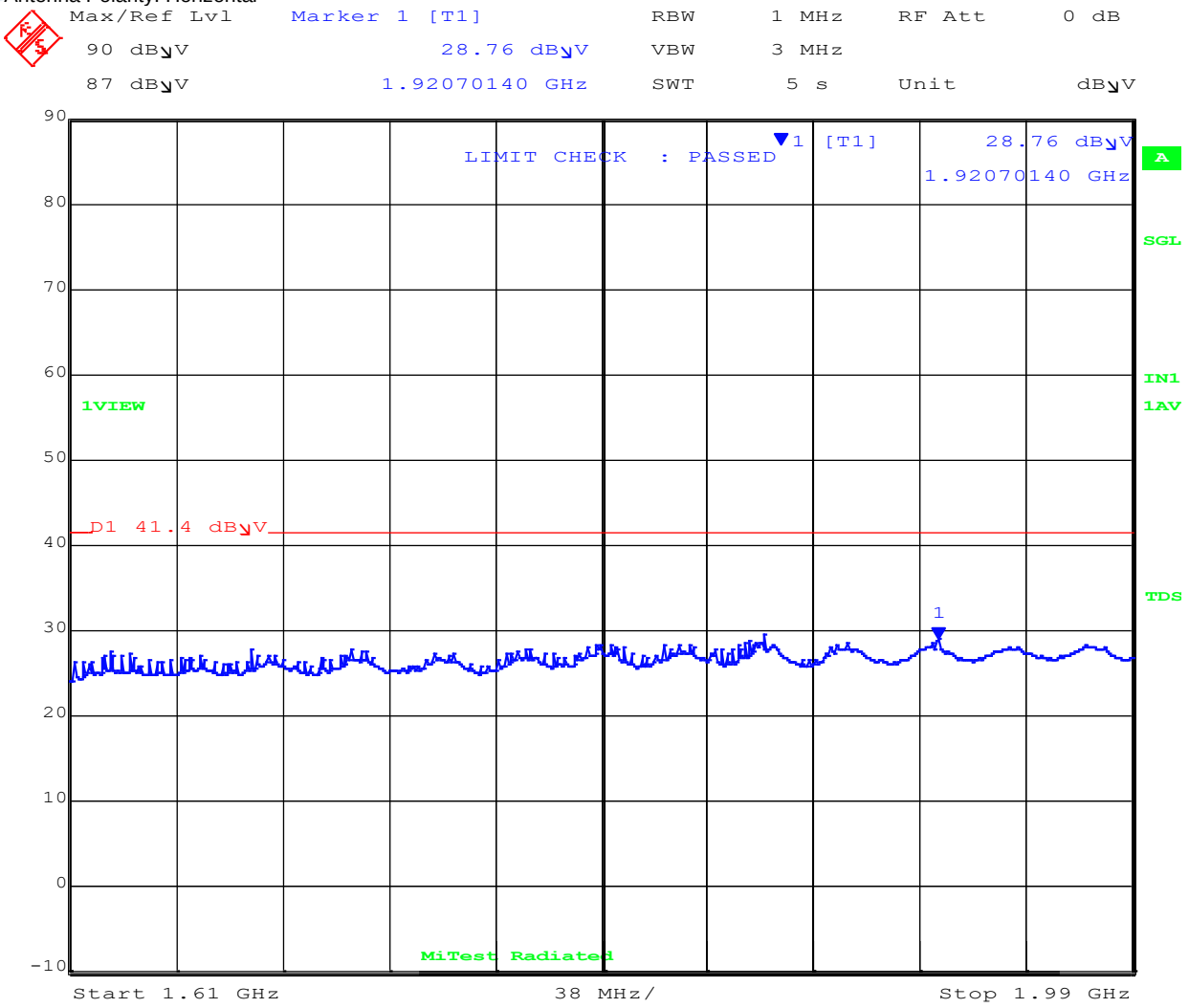
Antenna Polarity: Vertical




Date: 8.MAR.2021 14:15:54

Back to Matrix

Antenna Polarity: Horizontal



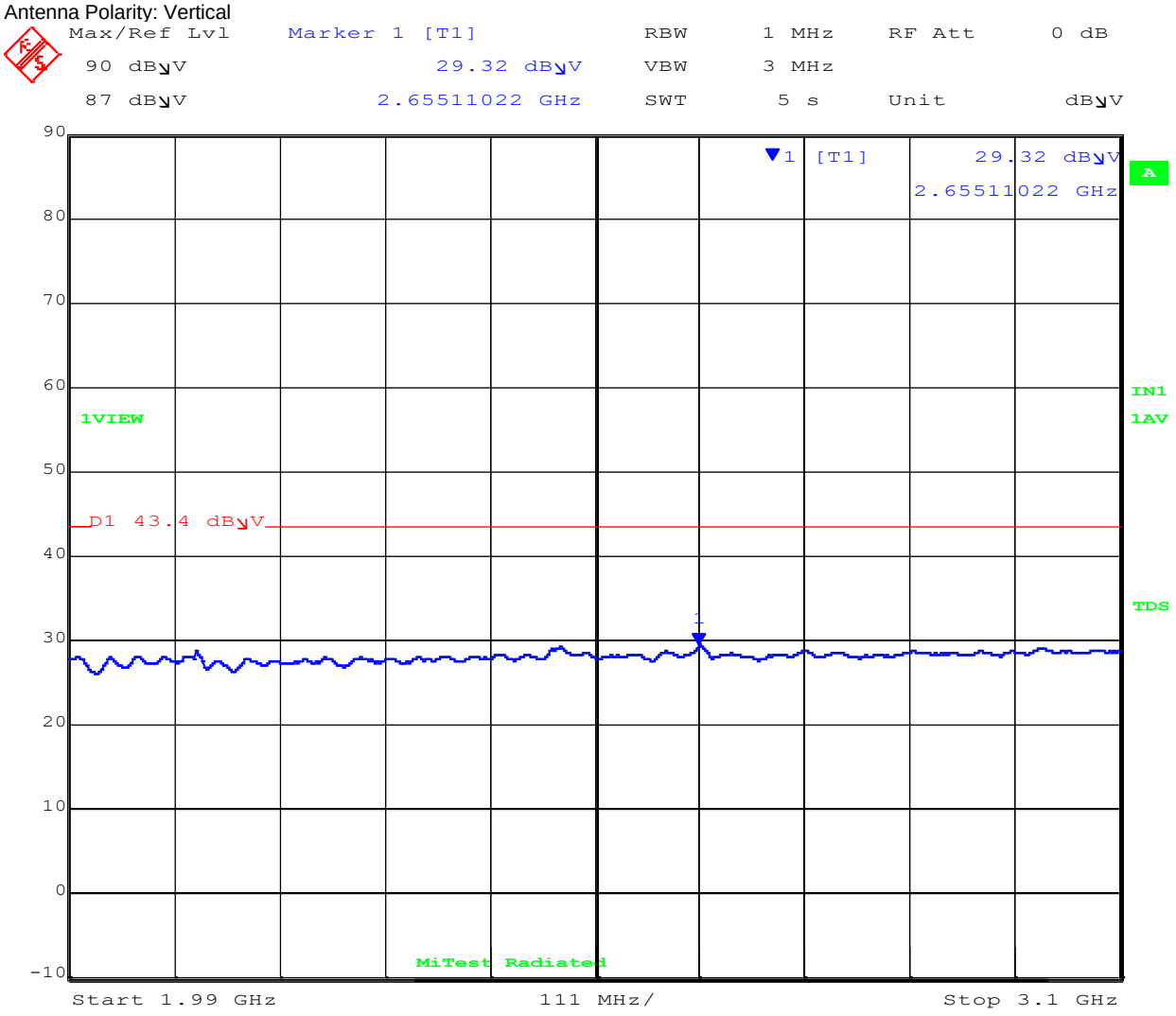

Date: 8.MAR.2021 14:17:26

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

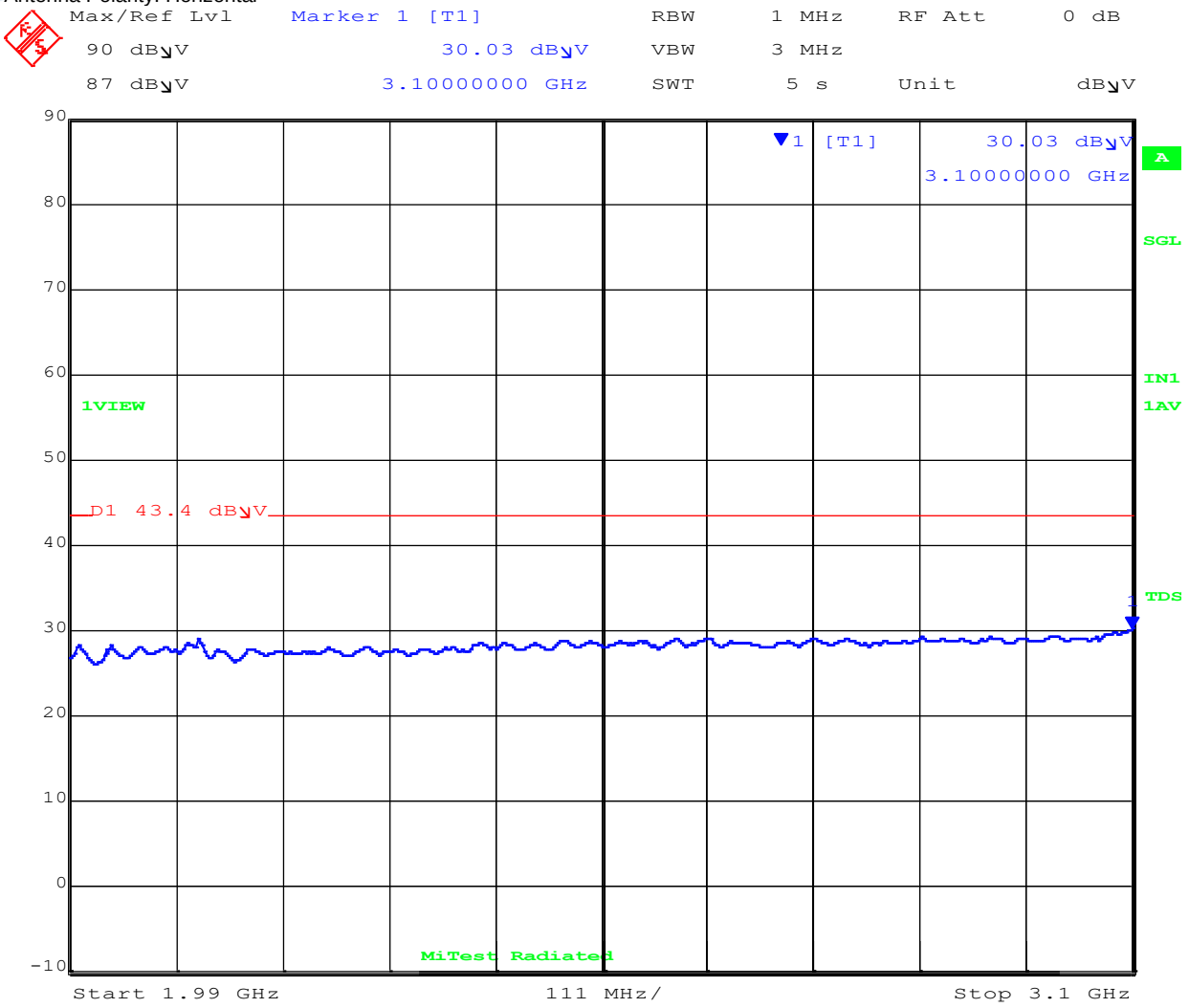
Antenna Polarity: Vertical




Date: 8.MAR.2021 14:26:50

Back to Matrix

Antenna Polarity: Horizontal



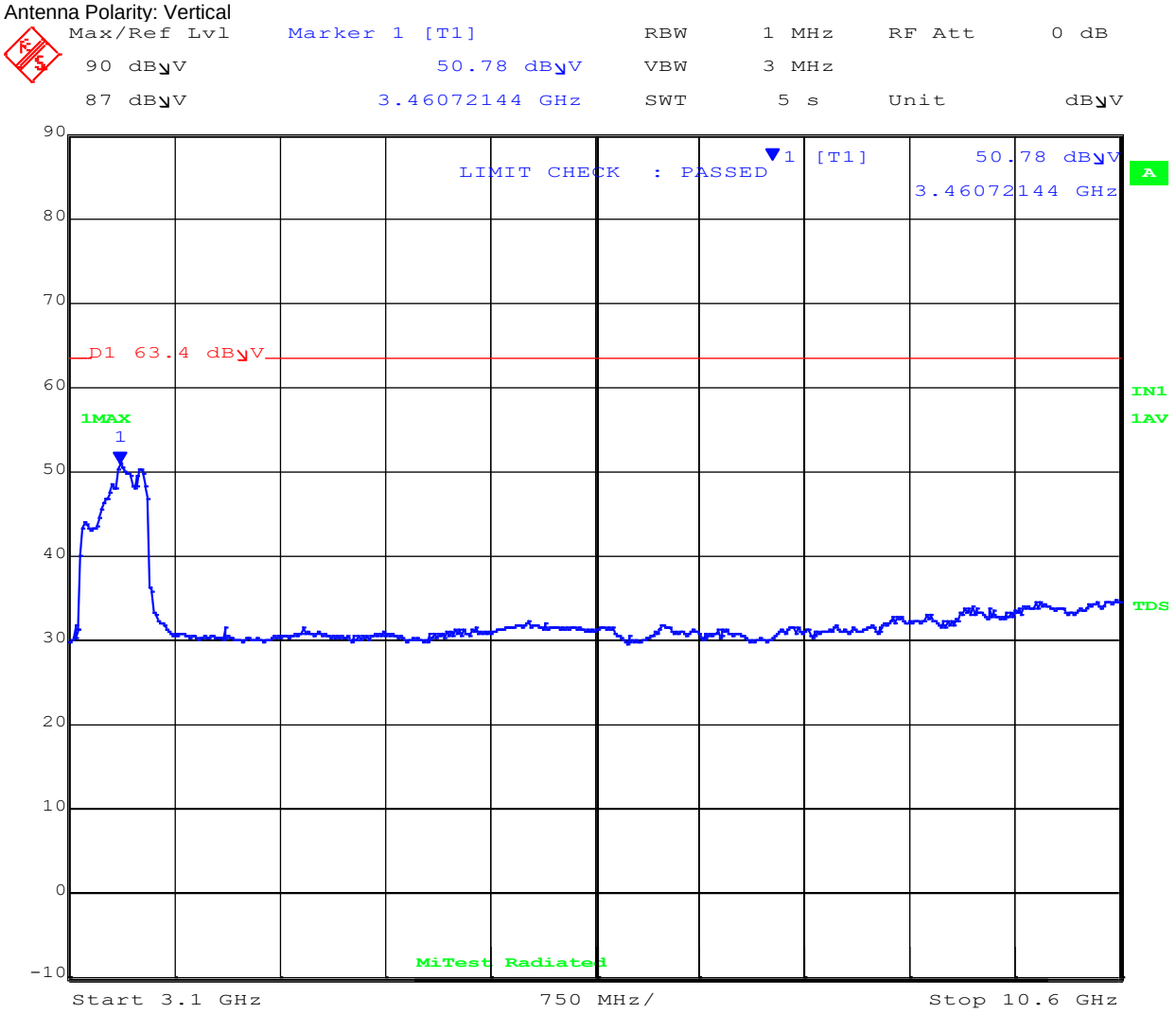

Date: 8.MAR.2021 14:25:04

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

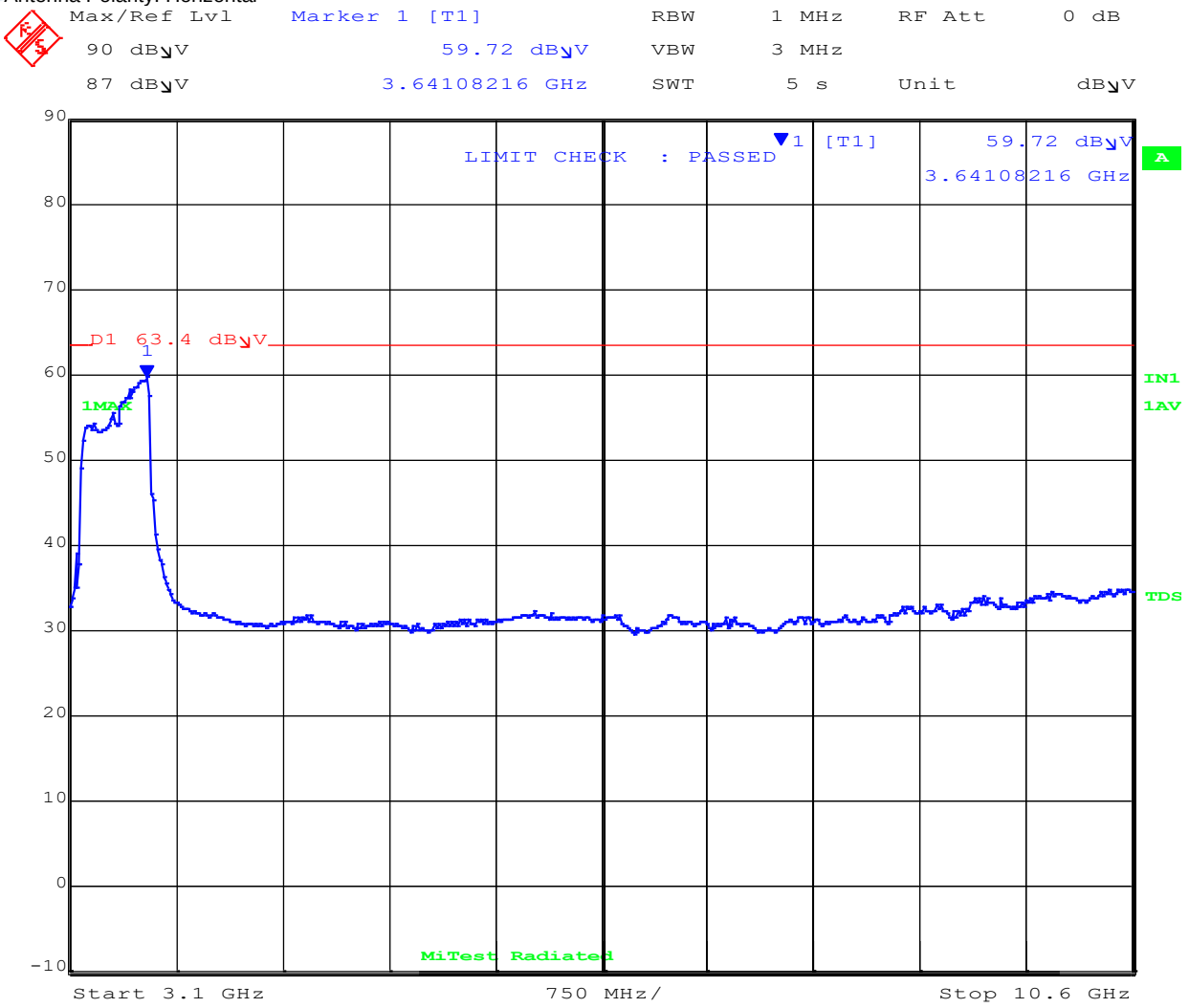
Antenna Polarity: Vertical




Date: 8.MAR.2021 14:32:40

Back to Matrix

Antenna Polarity: Horizontal

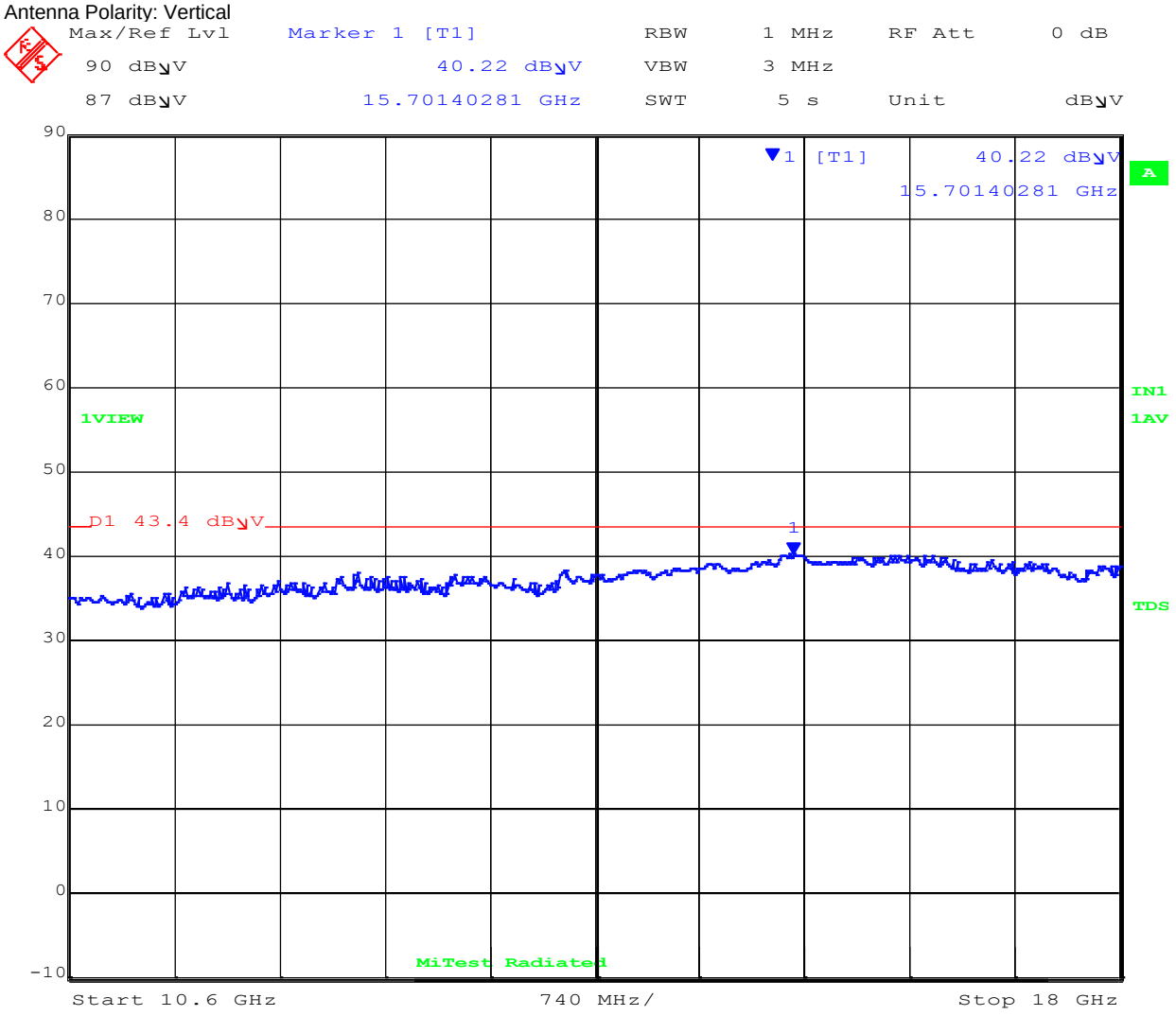



Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

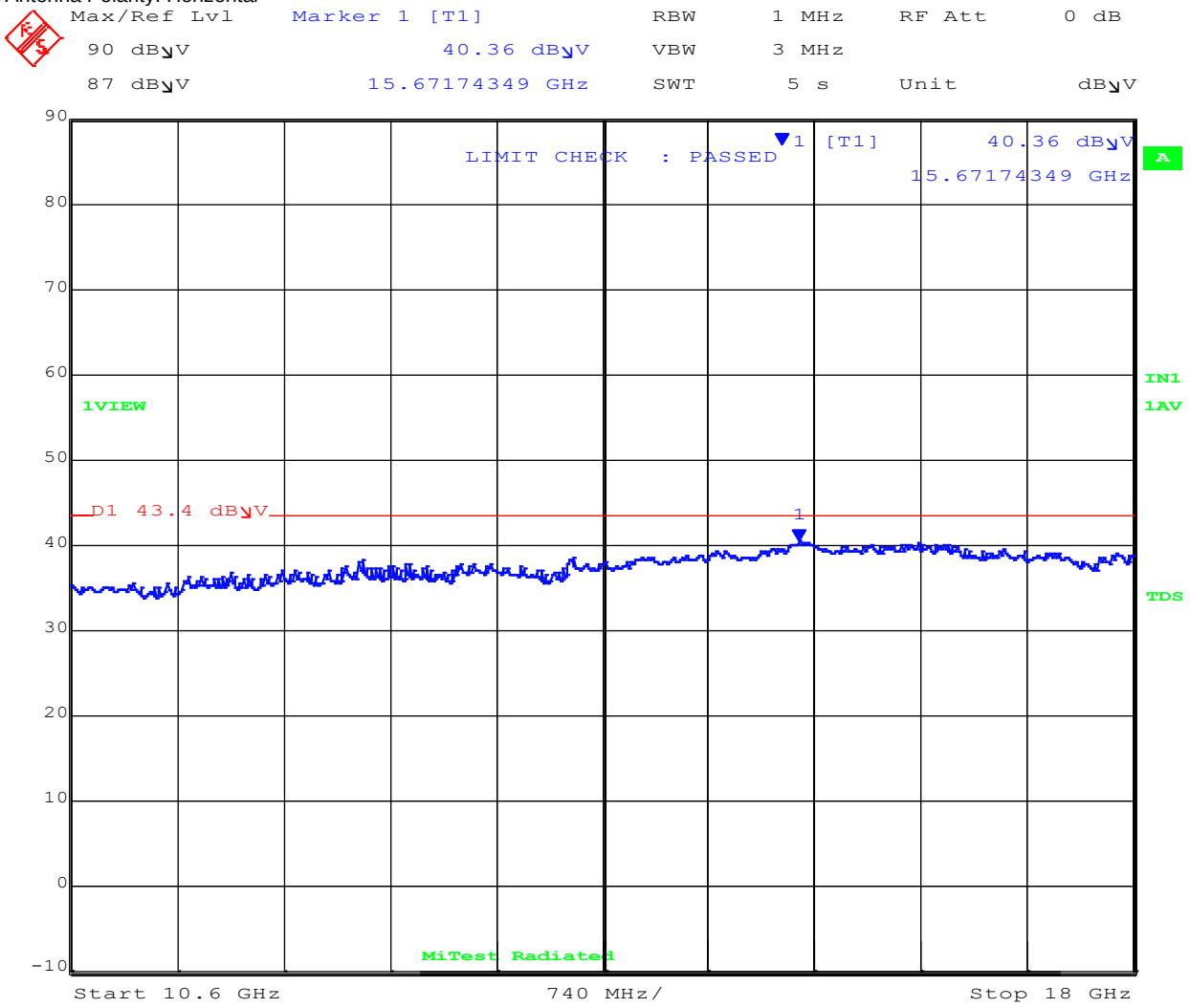
Antenna Polarity: Vertical




Date: 8.MAR.2021 14:40:43

[Back to Matrix]

Antenna Polarity: Horizontal



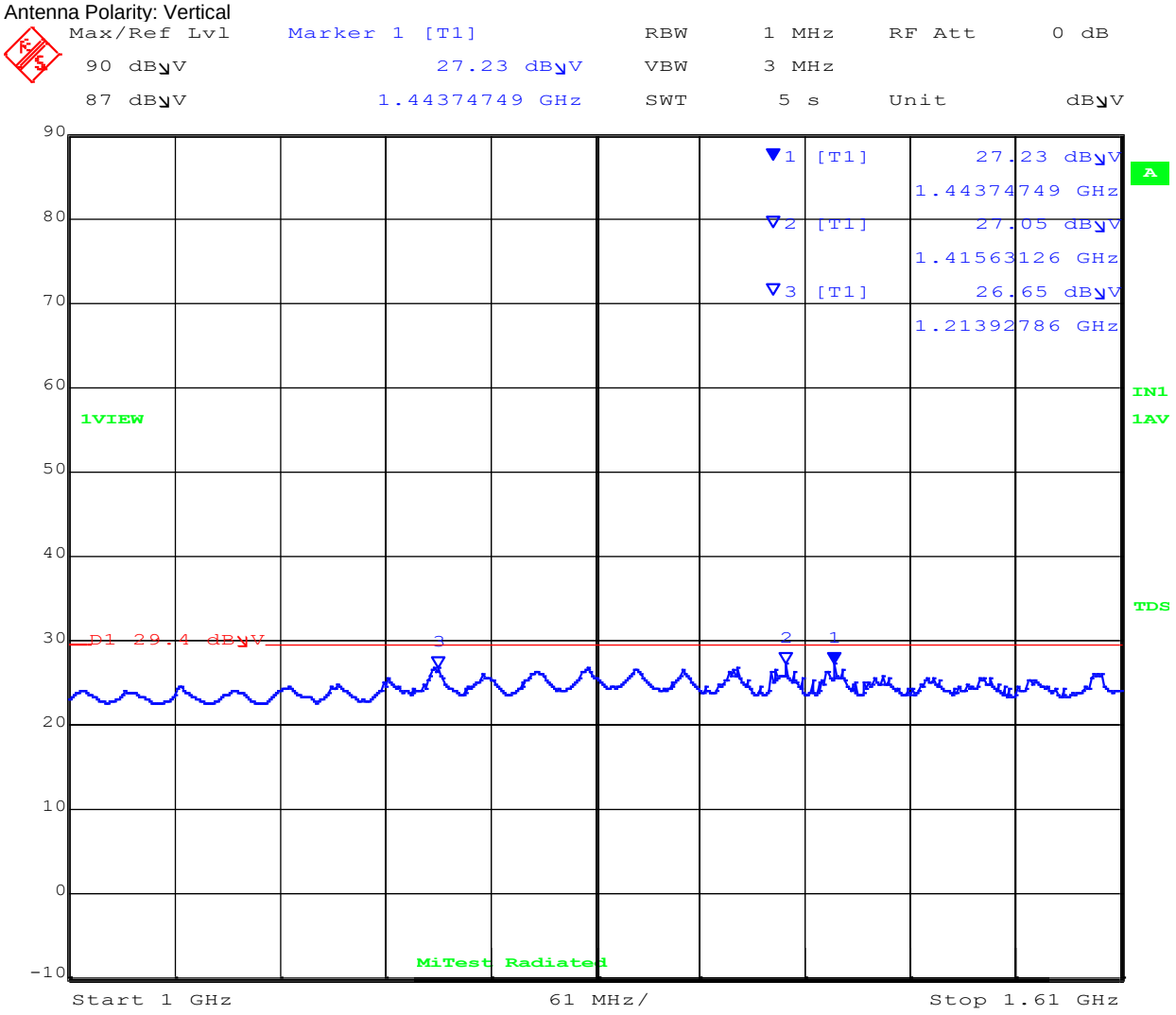

Date: 8.MAR.2021 14:39:11

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

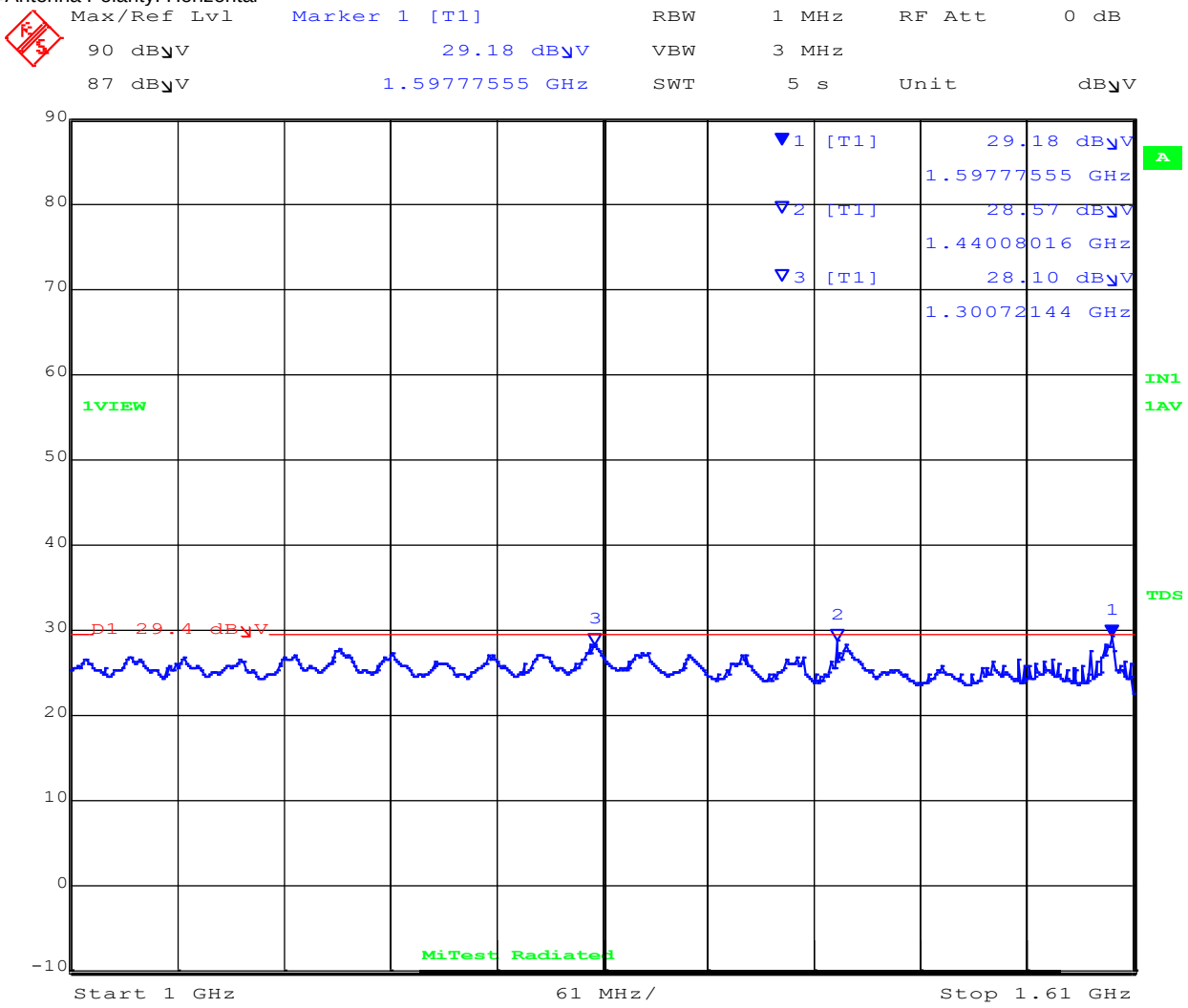
Antenna Polarity: Vertical




Date: 8.MAR.2021 15:05:30

Back to Matrix

Antenna Polarity: Horizontal



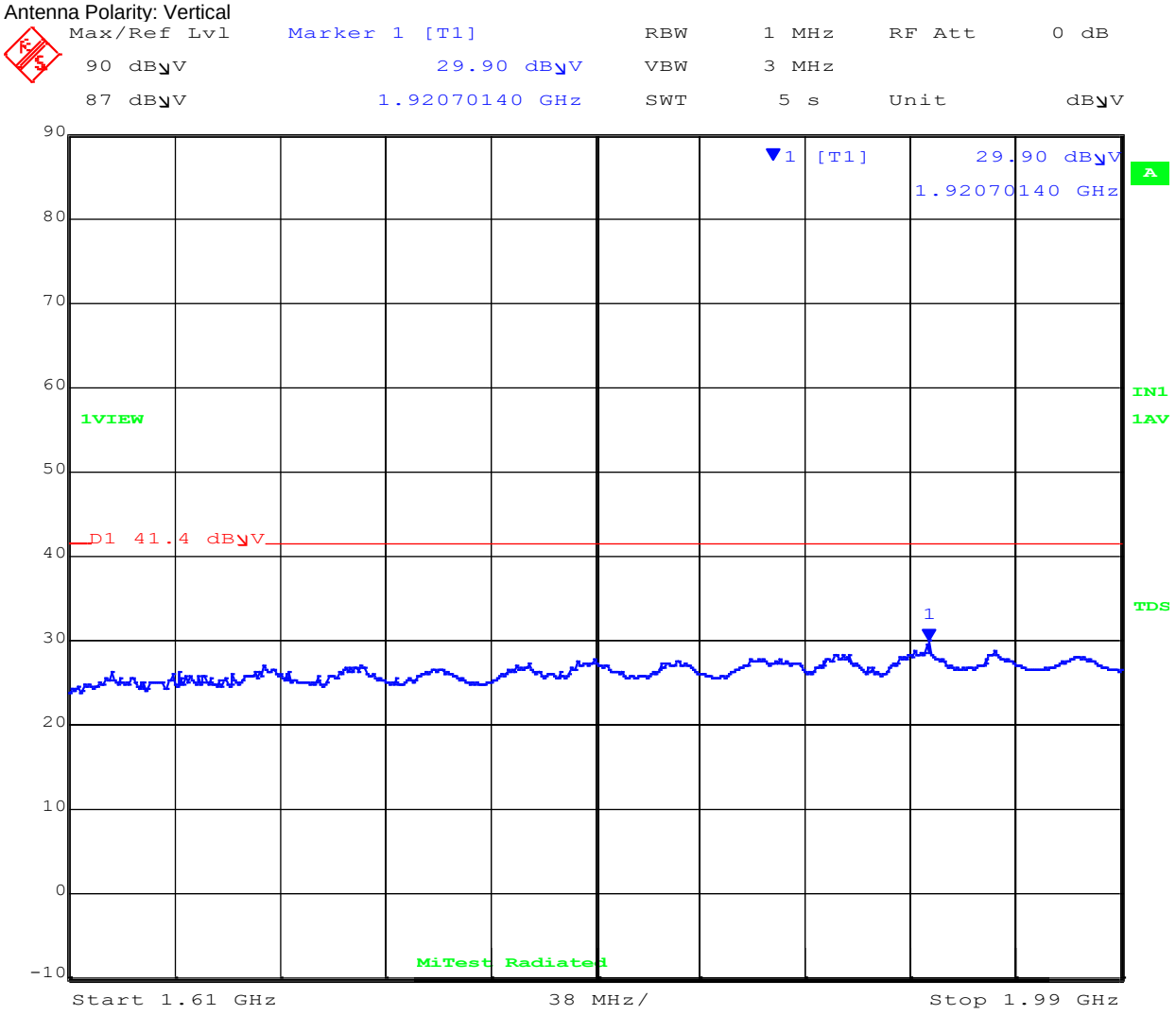

Date: 8.MAR.2021 15:22:58

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

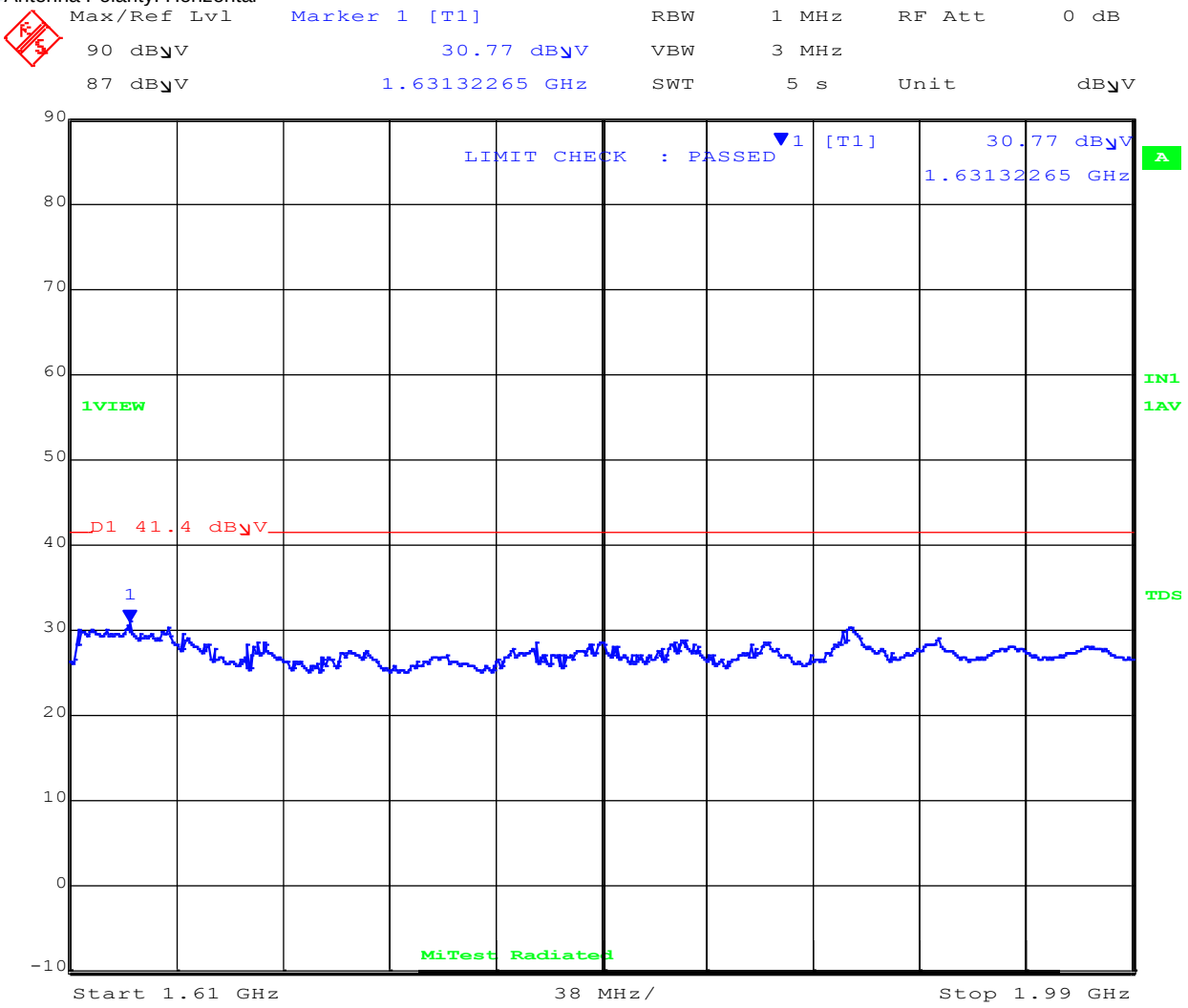
Antenna Polarity: Vertical




Date: 8.MAR.2021 15:25:58

Back to Matrix

Antenna Polarity: Horizontal



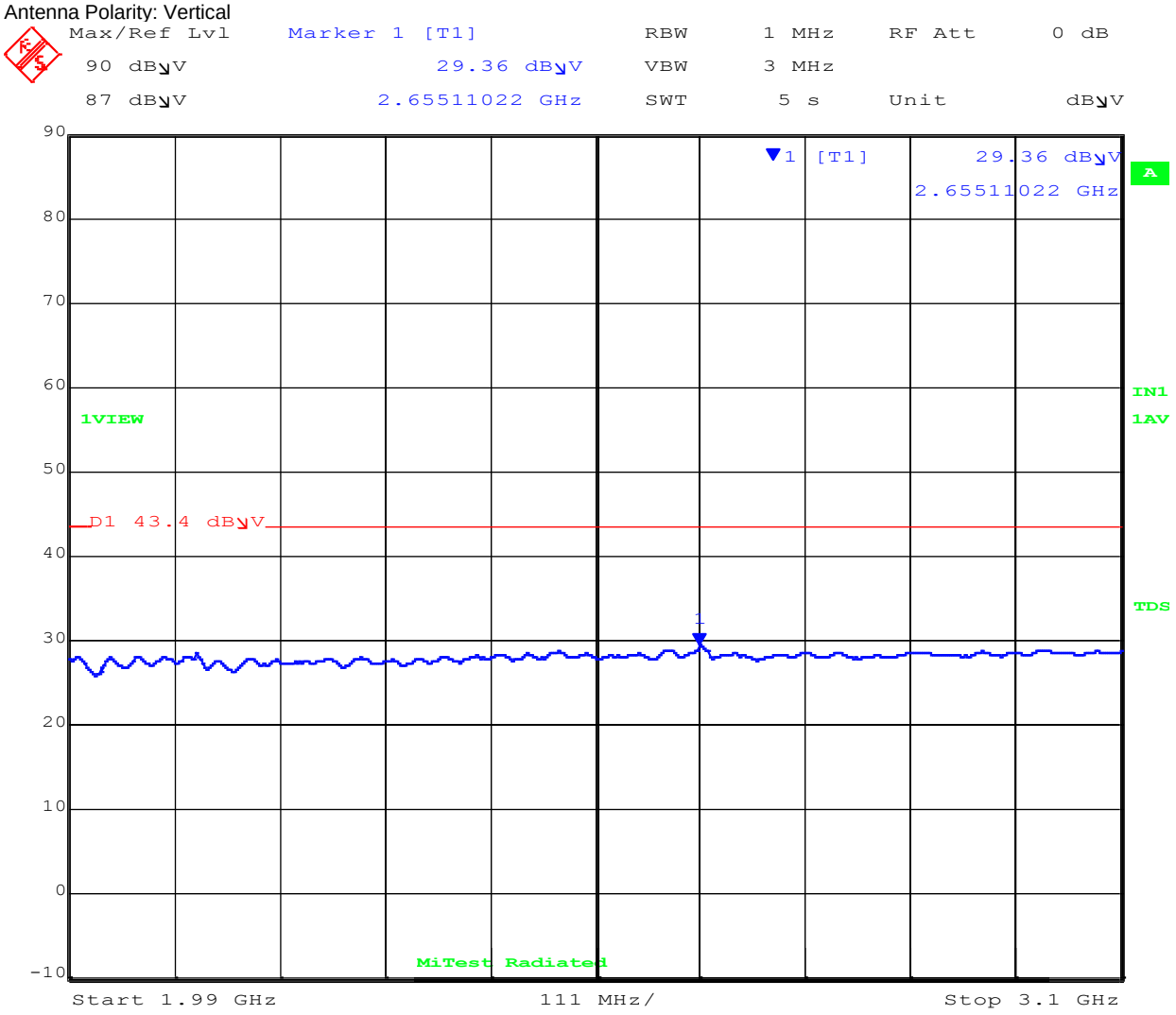

Date: 8.MAR.2021 15:25:03

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

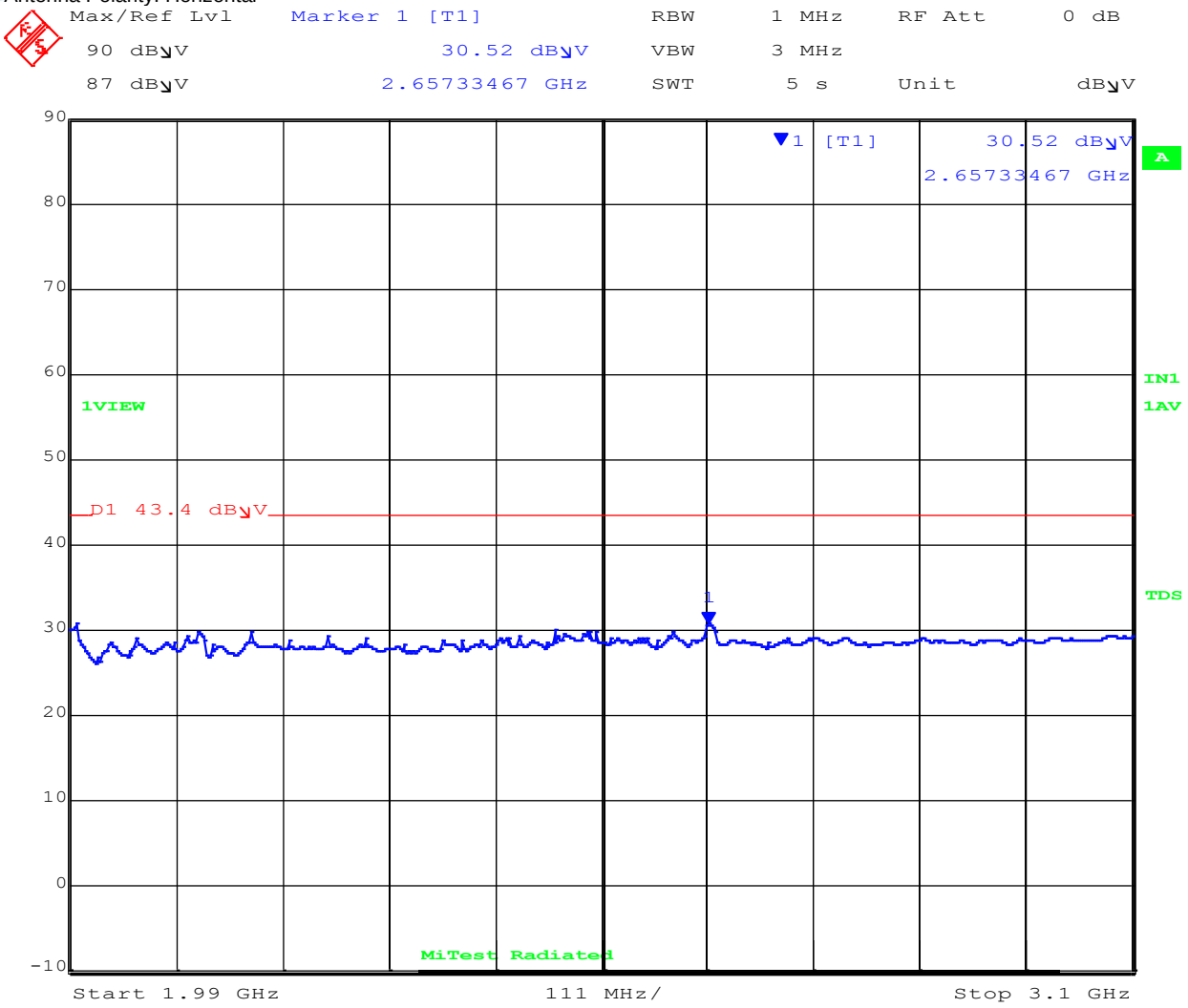
Antenna Polarity: Vertical




Date: 8.MAR.2021 15:27:27

Back to Matrix

Antenna Polarity: Horizontal



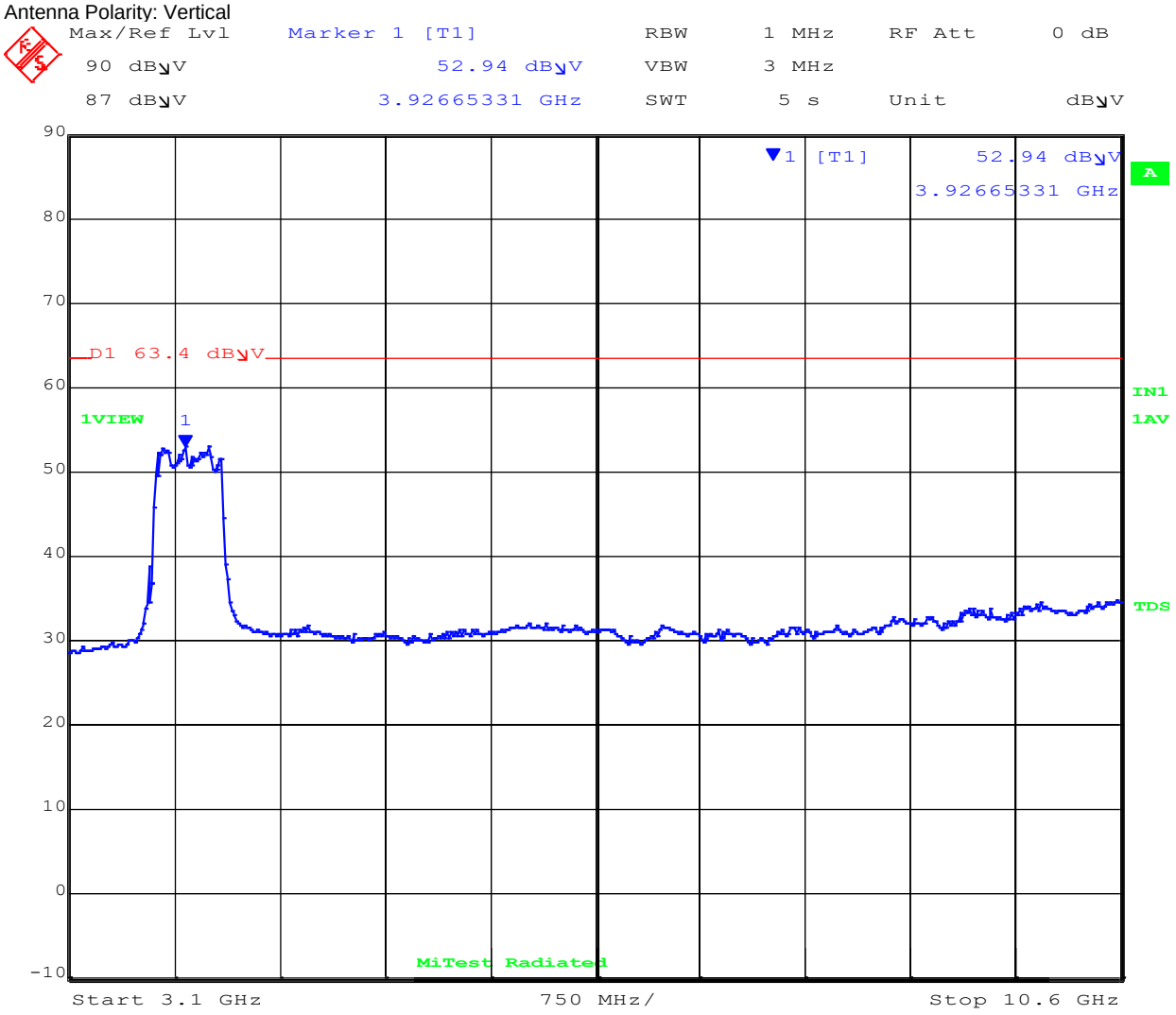

Date: 8.MAR.2021 15:29:01

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

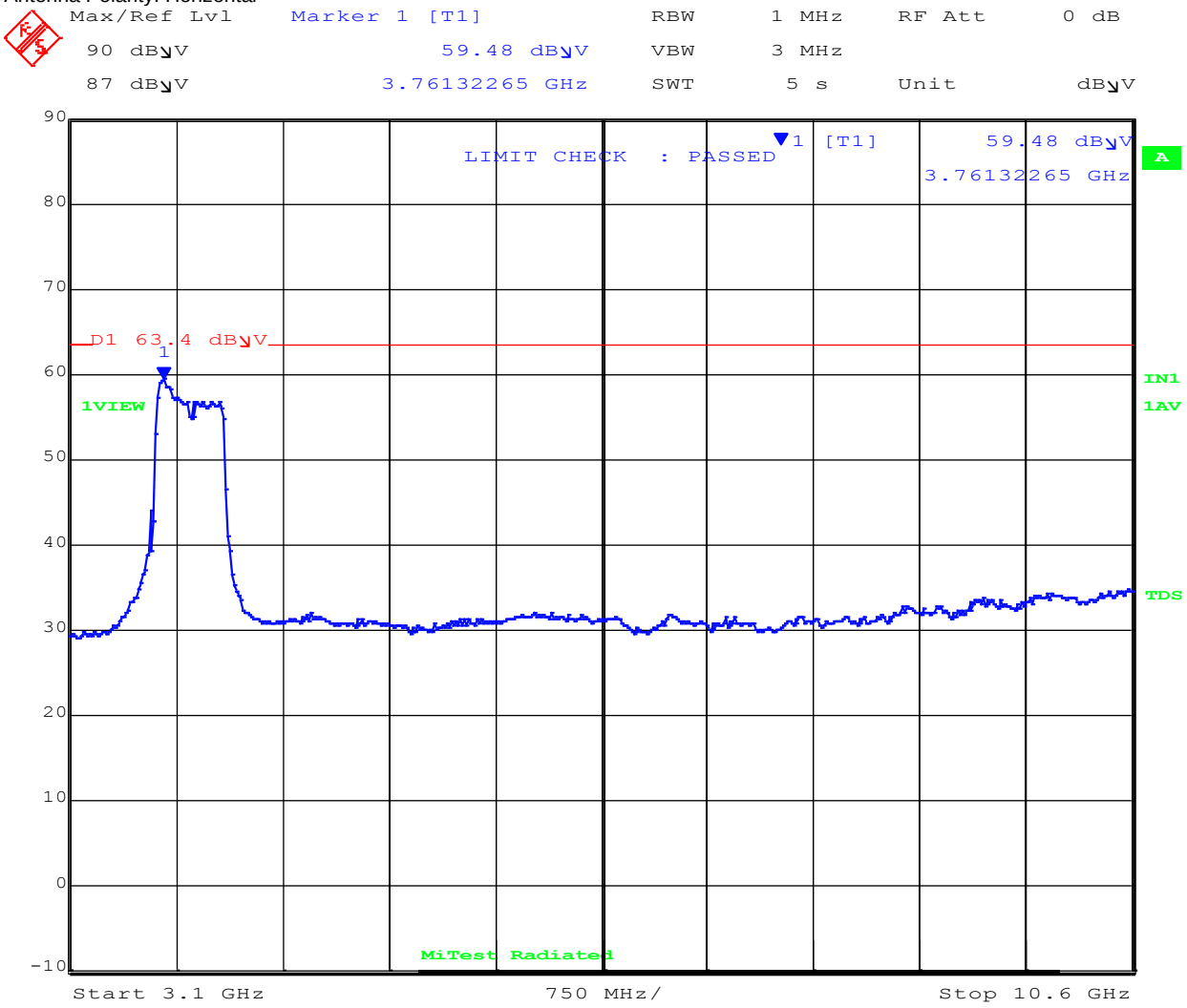
Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

Antenna Polarity: Vertical




Back to Matrix

Antenna Polarity: Horizontal



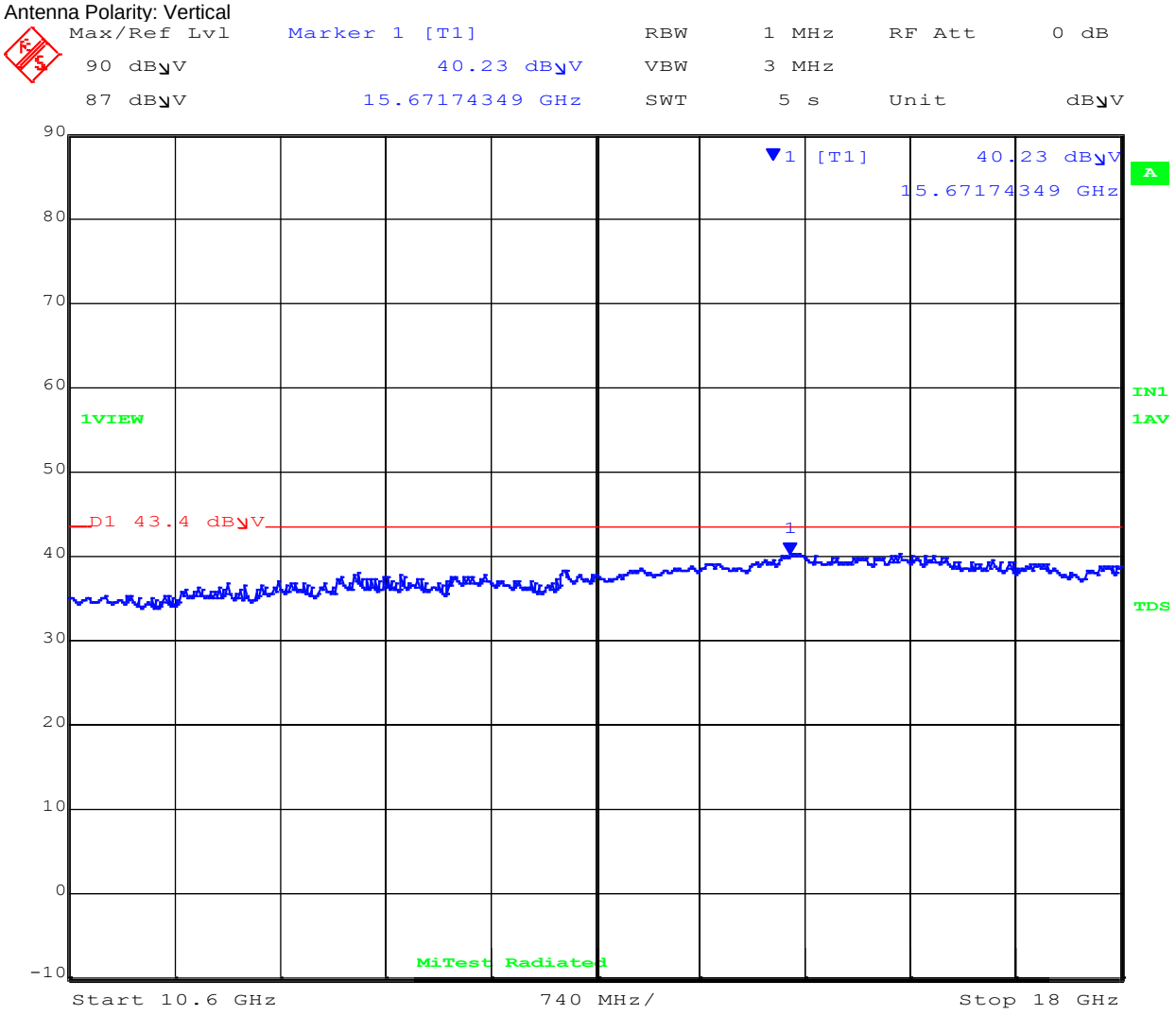

Date: 8.MAR.2021 15:33:10

Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

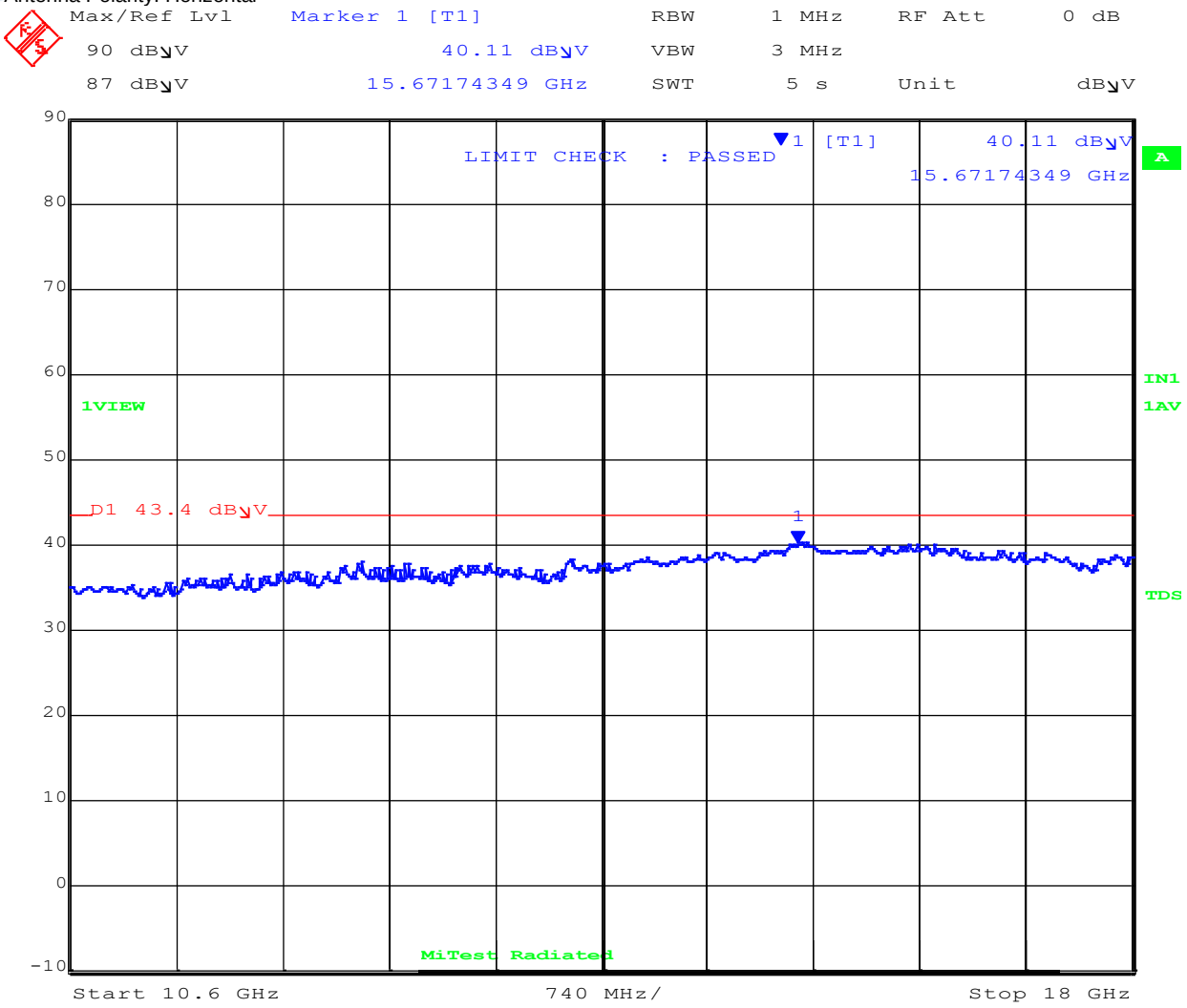
Antenna Polarity: Vertical




Date: 8.MAR.2021 15:37:44

Back to Matrix

Antenna Polarity: Horizontal



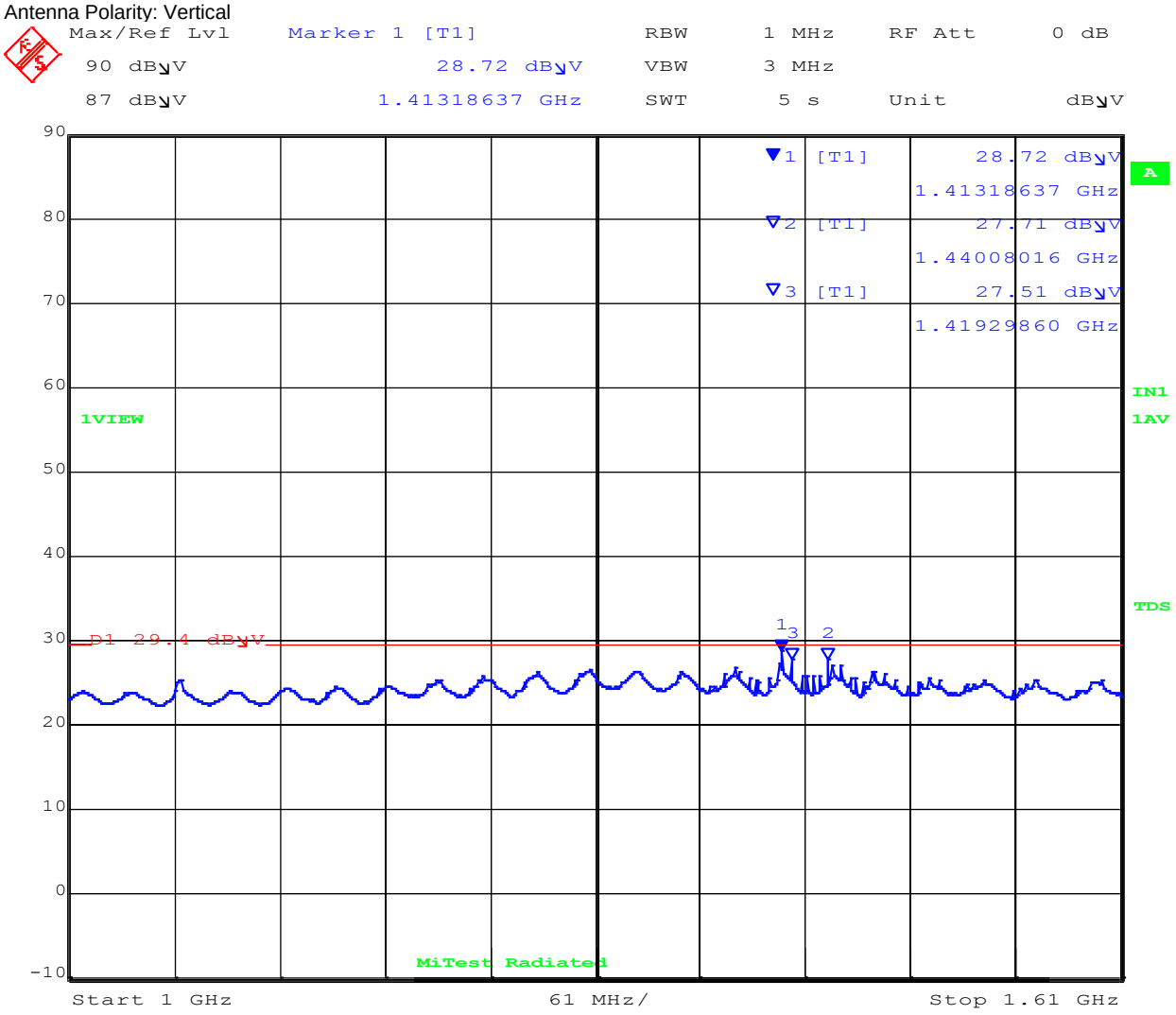

Date: 8.MAR.2021 15:38:59

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

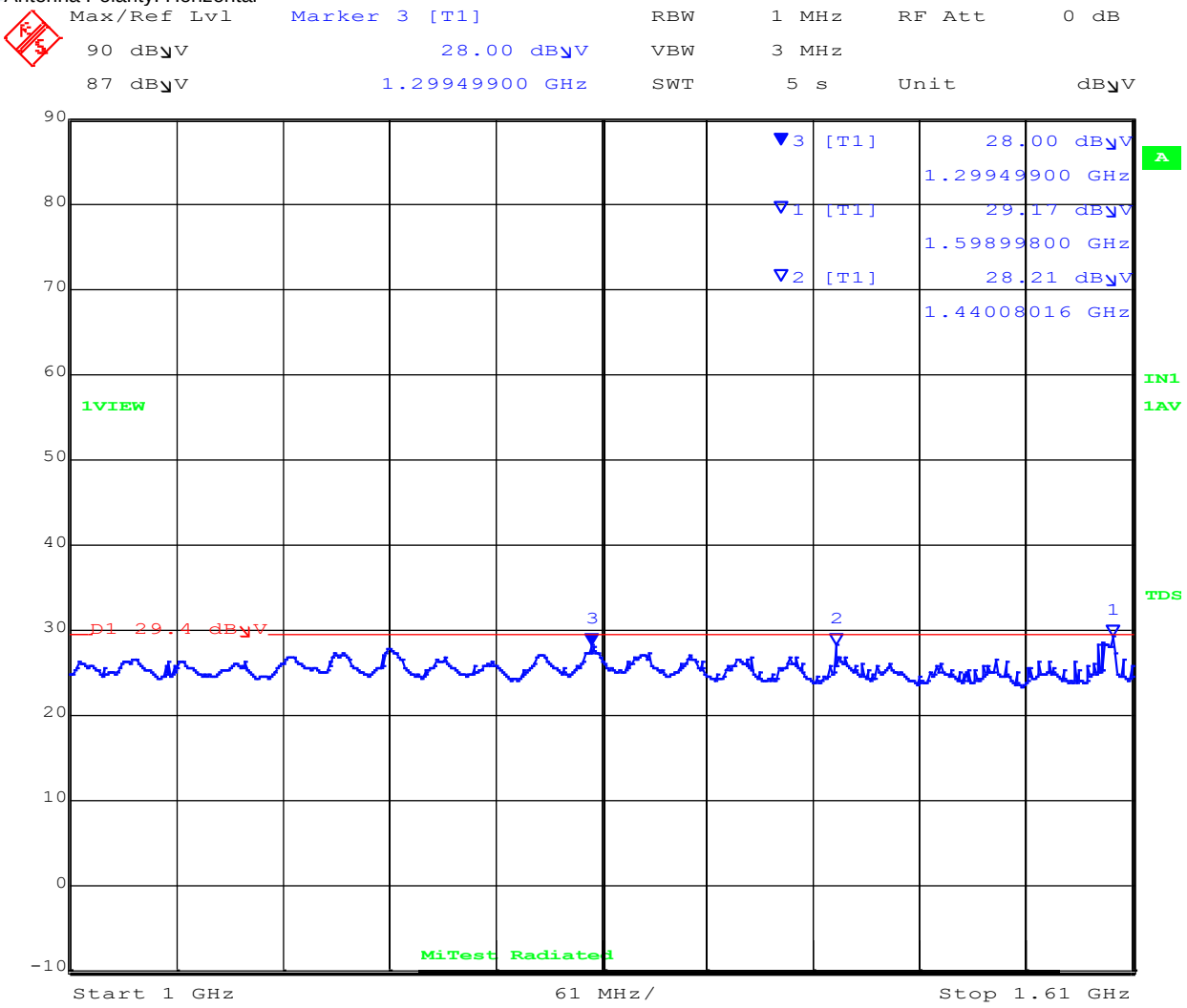
Antenna Polarity: Vertical




Date: 8.MAR.2021 16:18:20

Back to Matrix

Antenna Polarity: Horizontal



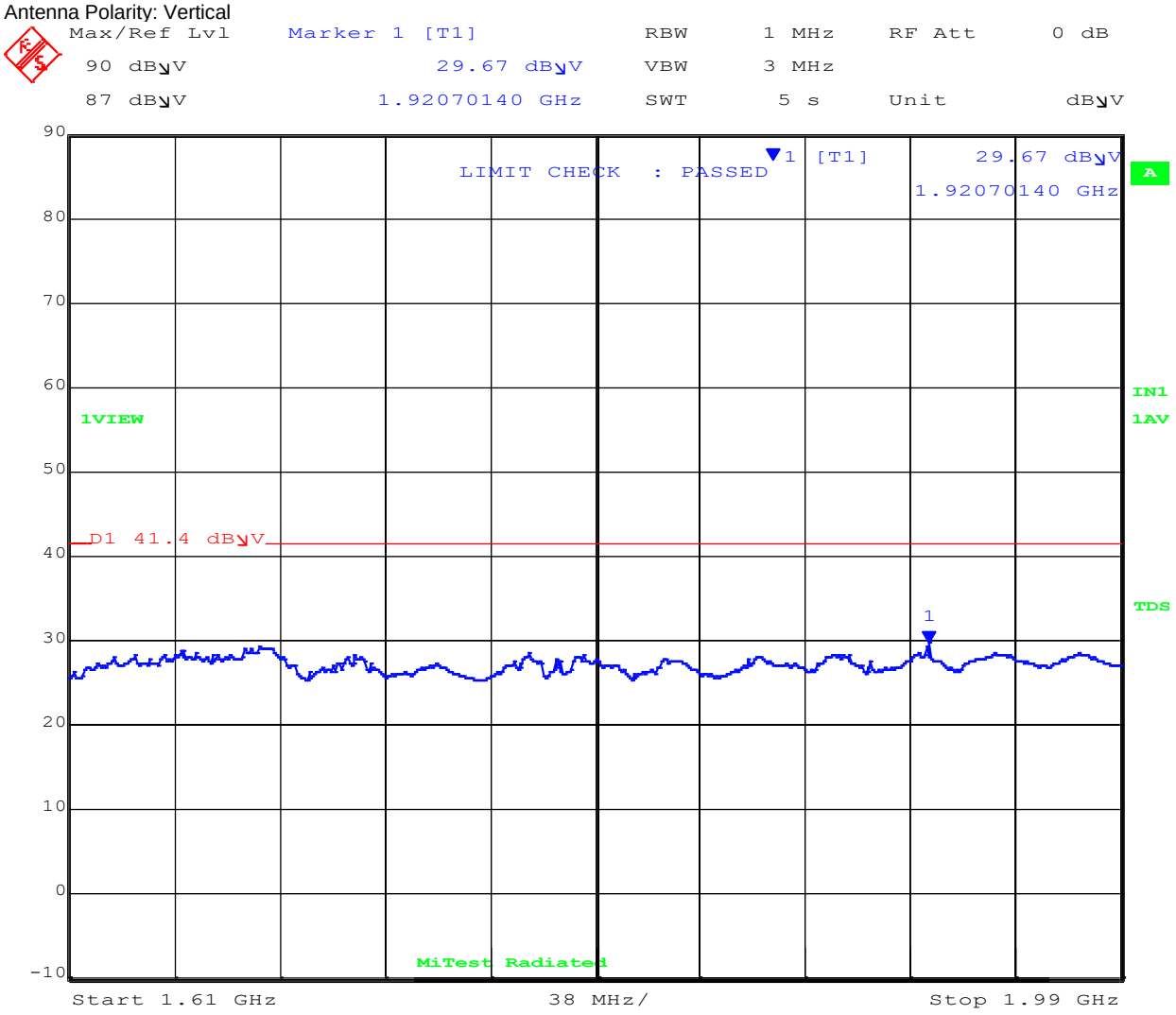

Date: 8.MAR.2021 16:17:02

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

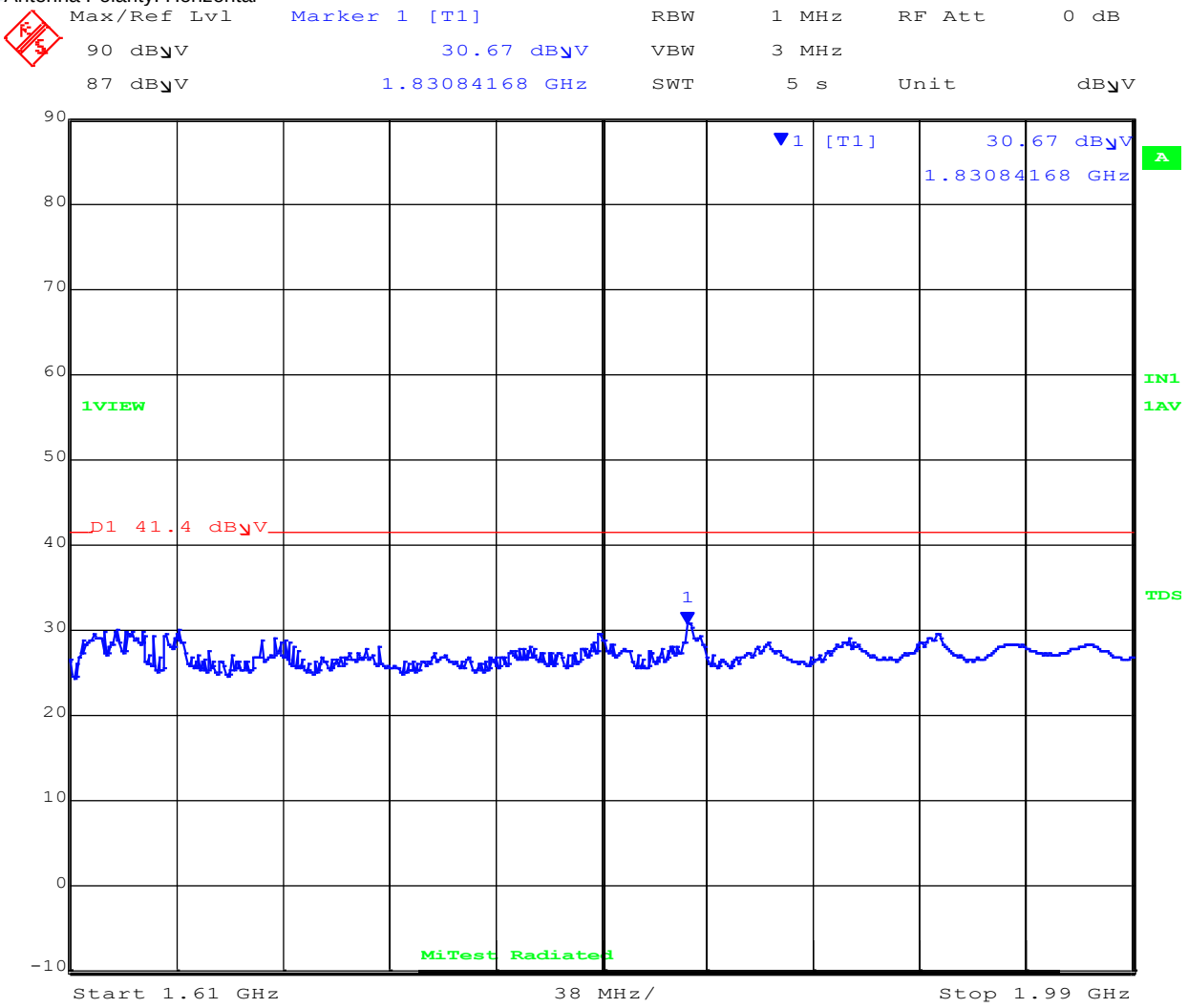
Antenna Polarity: Vertical




Date: 8.MAR.2021 16:12:54

Back to Matrix

Antenna Polarity: Horizontal



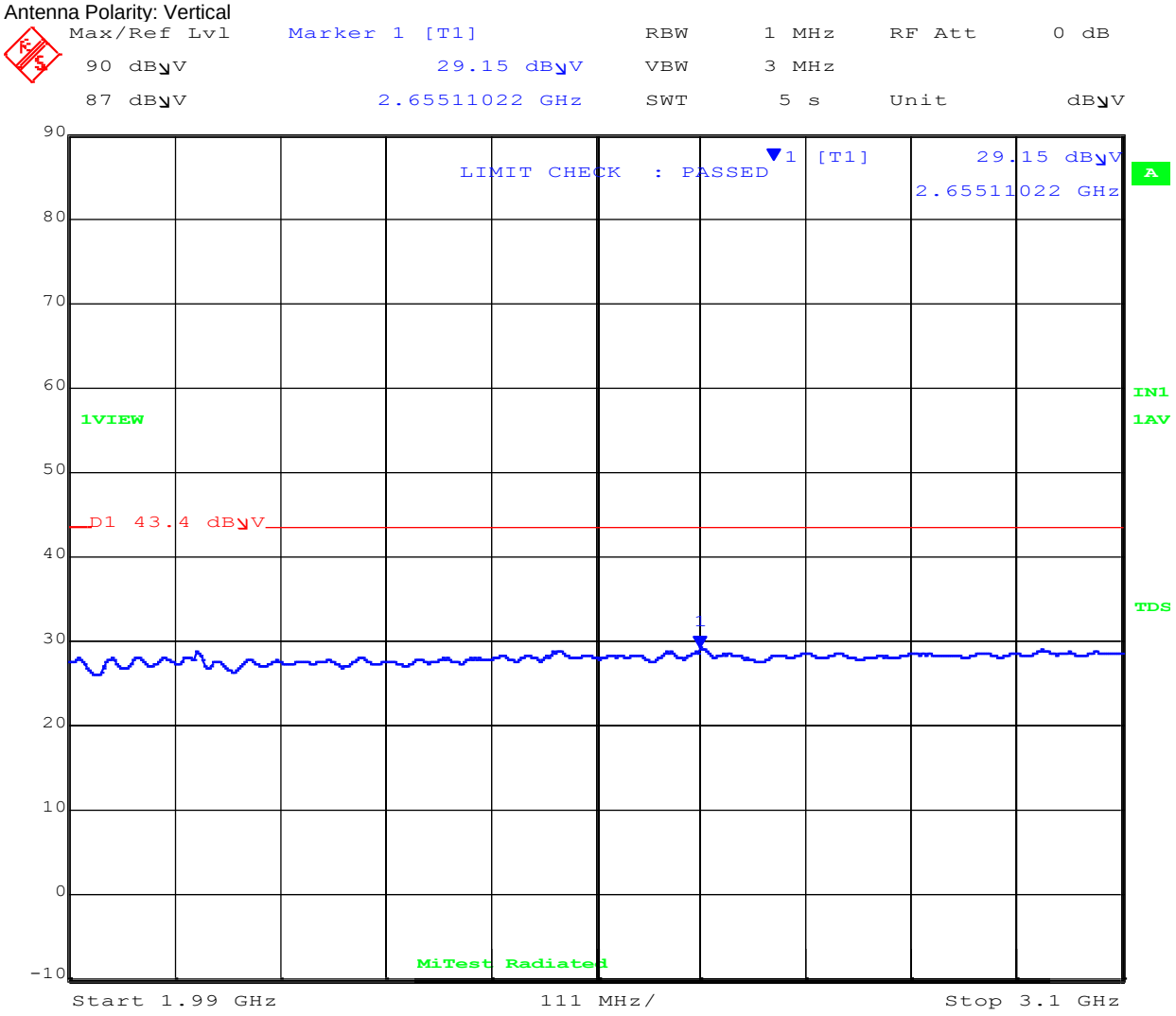

Date: 8.MAR.2021 16:14:38

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

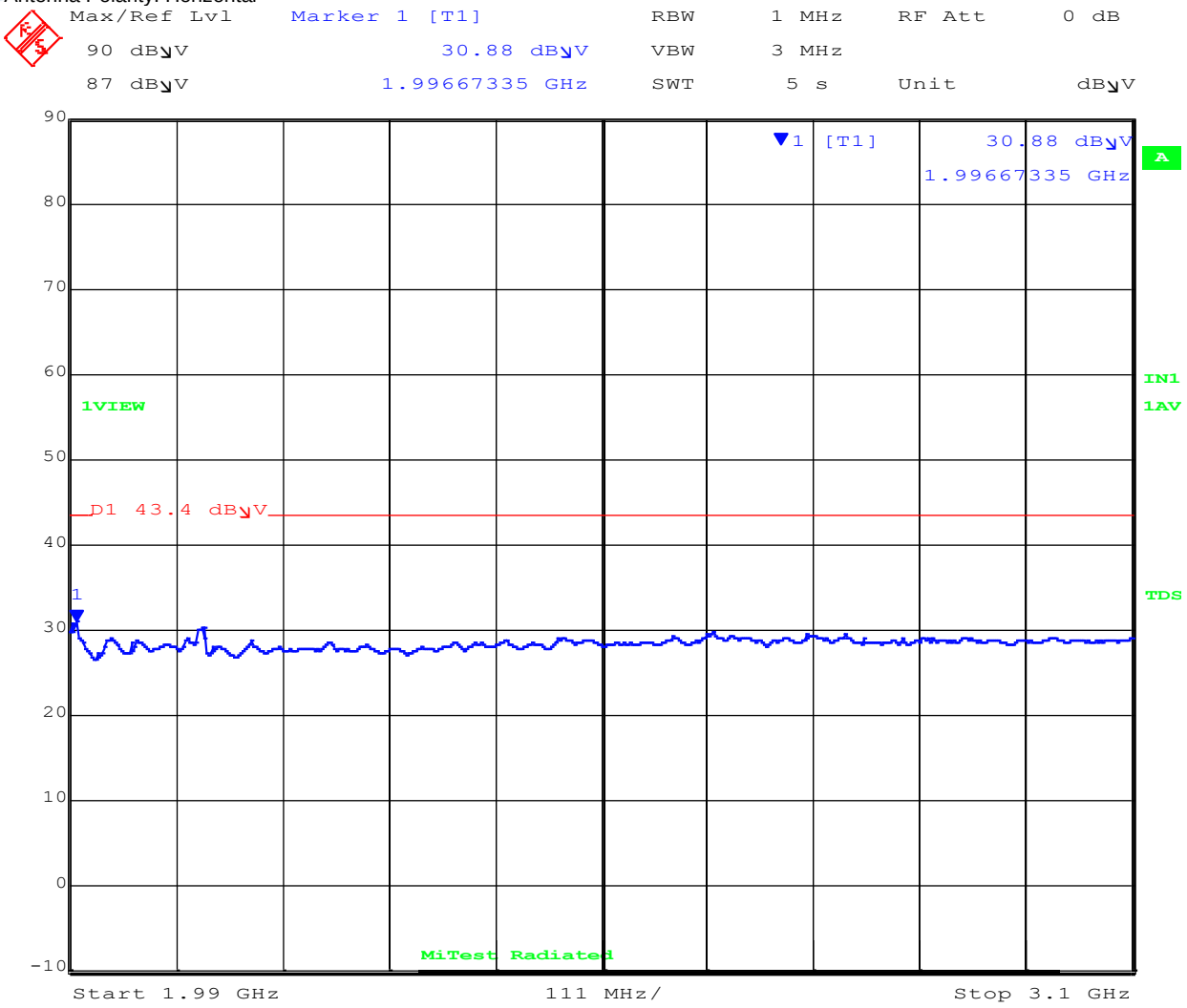
Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

Antenna Polarity: Vertical




[Back to Matrix]

Antenna Polarity: Horizontal



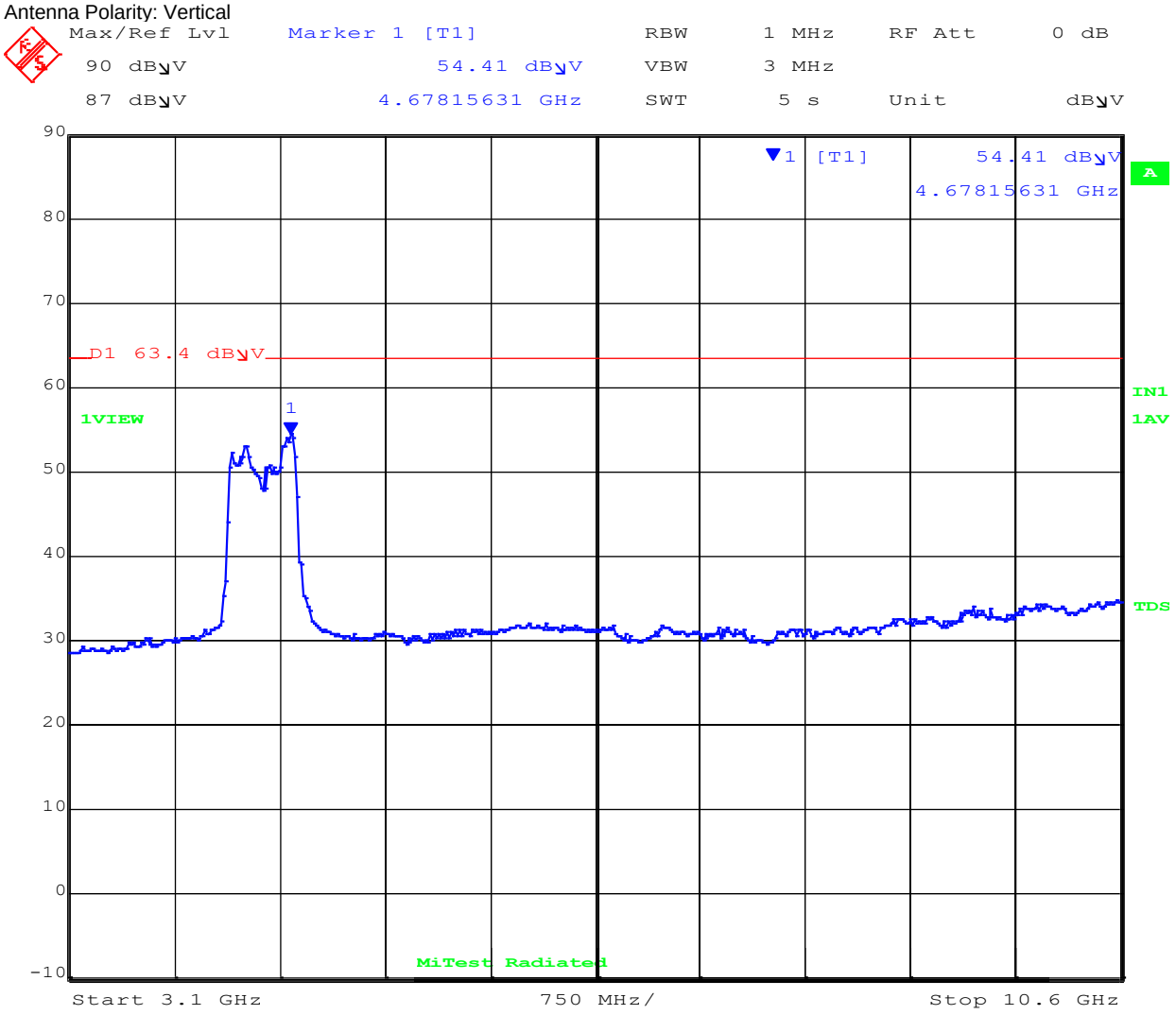

Date: 8.MAR.2021 16:09:04

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

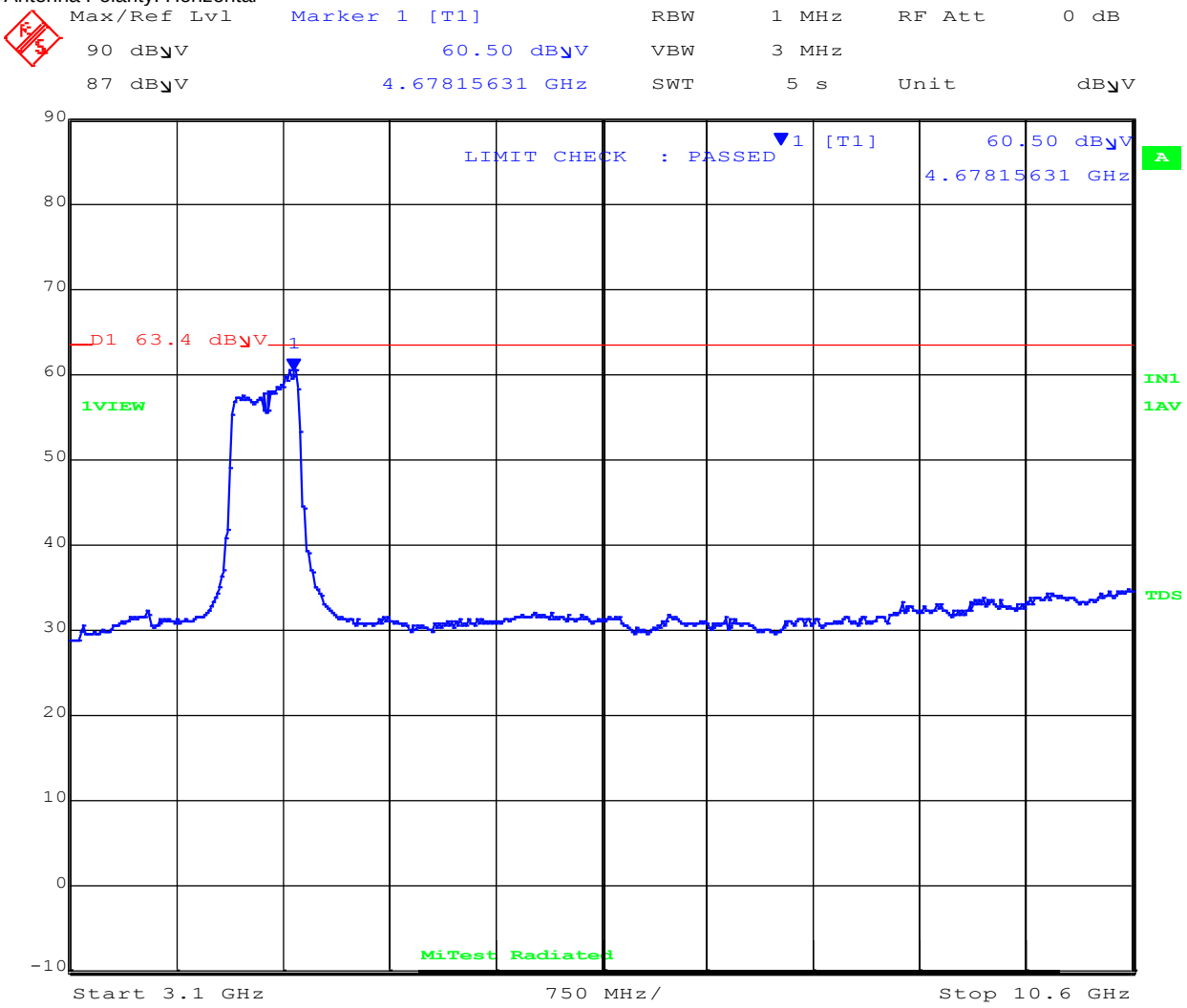
Antenna Polarity: Vertical




Date: 8.MAR.2021 16:01:18

Back to Matrix

Antenna Polarity: Horizontal



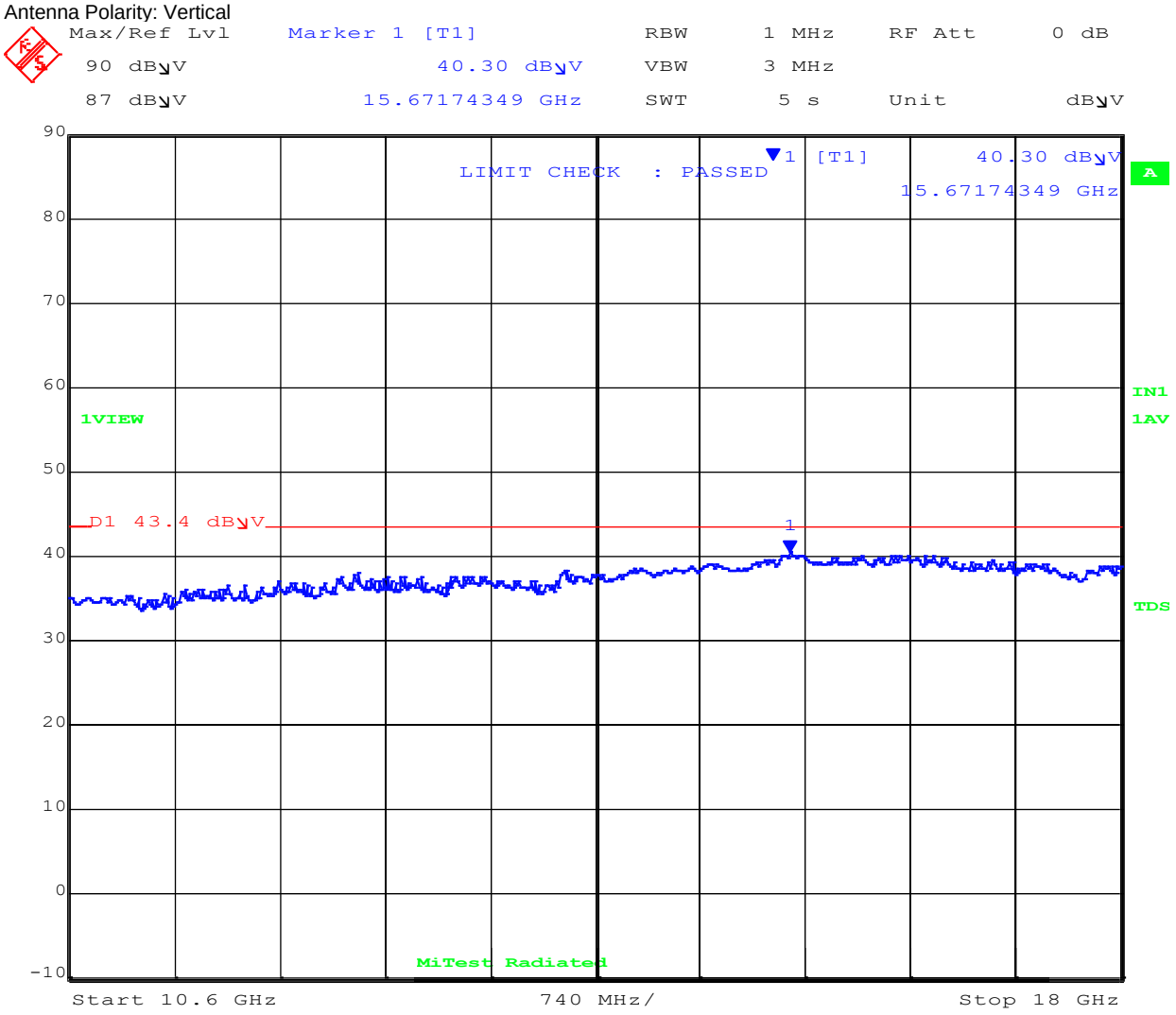

Date: 8.MAR.2021 16:02:34

Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

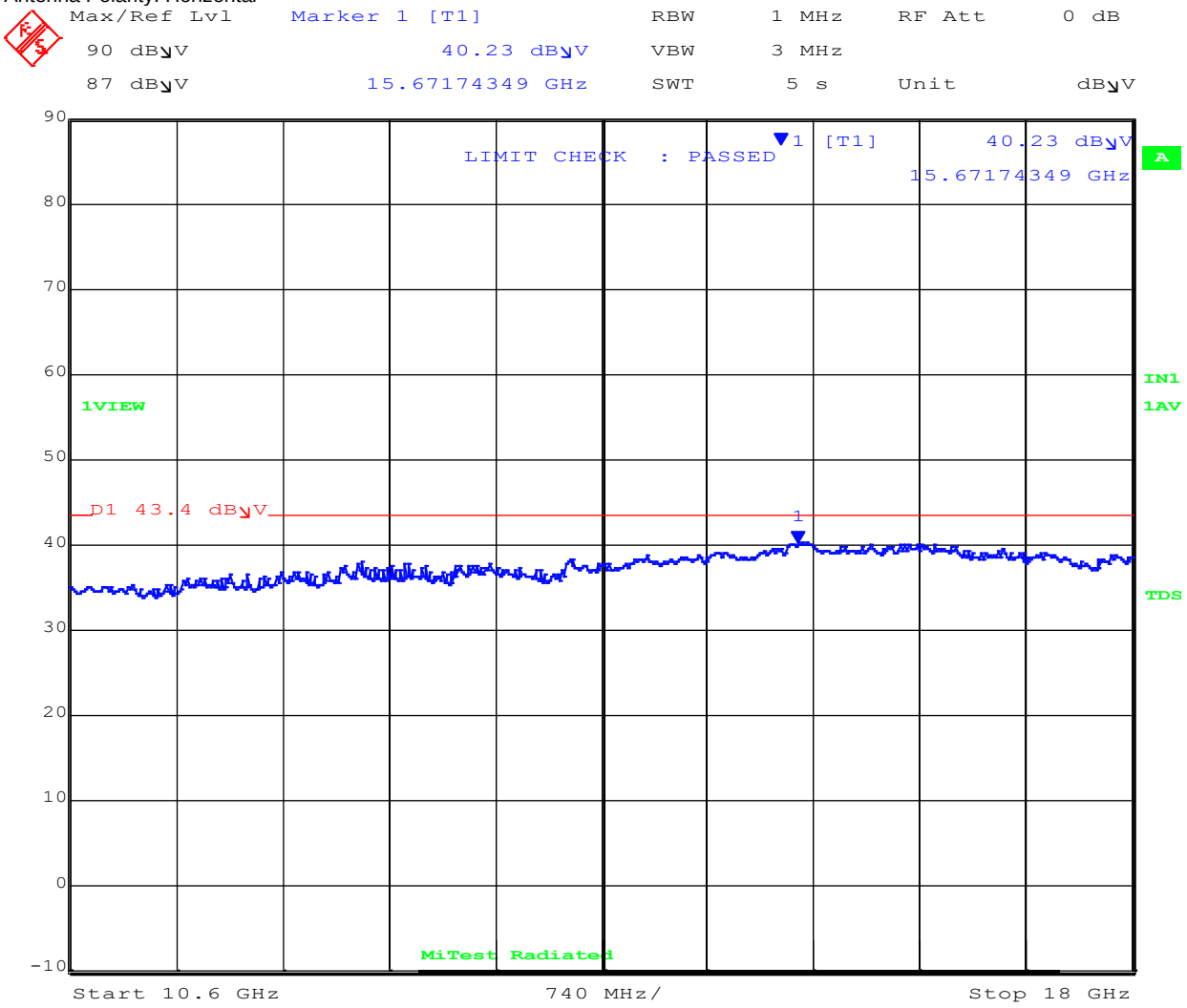
Antenna Polarity: Vertical




Date: 8.MAR.2021 15:58:48

Back to Matrix

Antenna Polarity: Horizontal



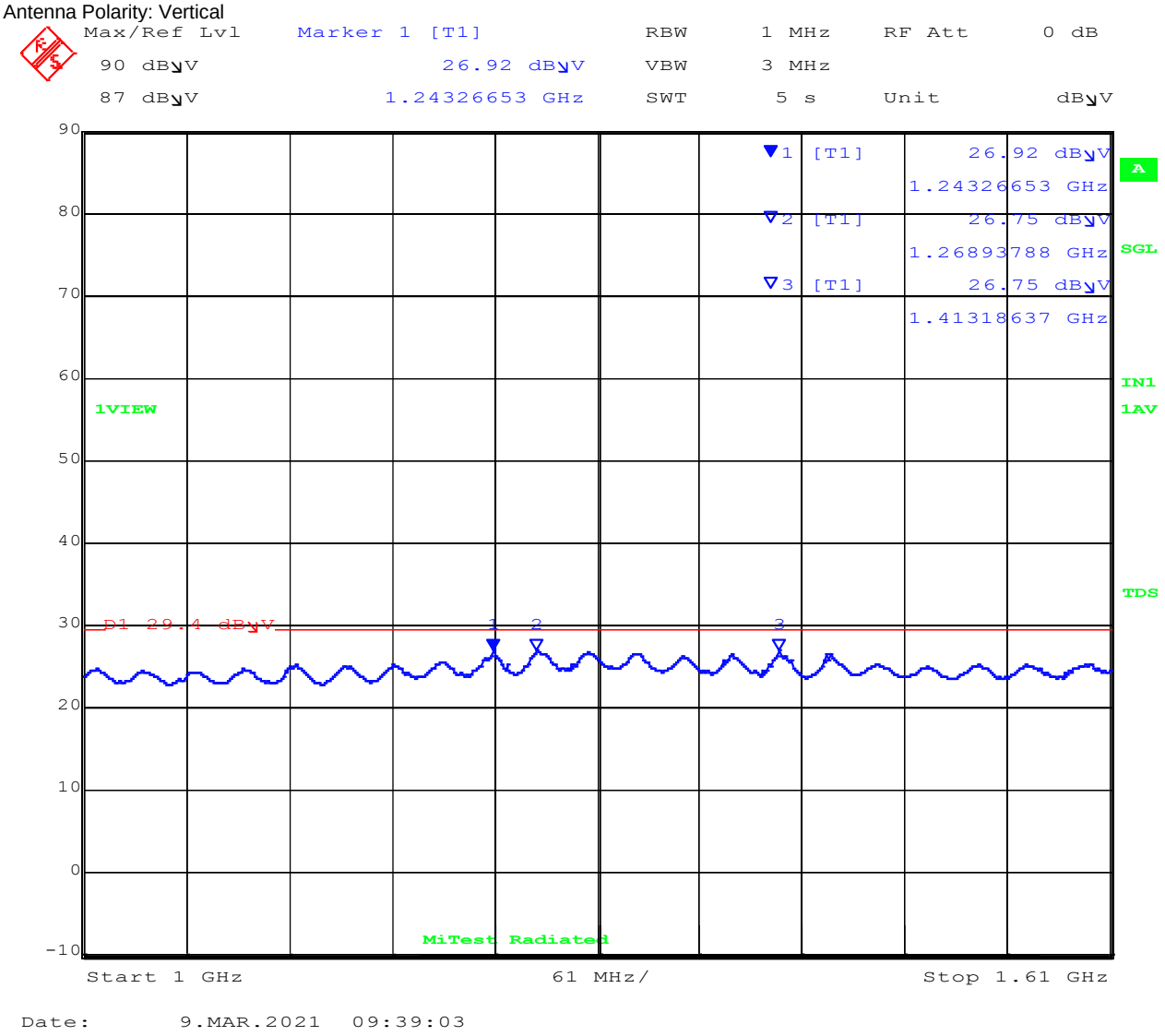

[Back to Matrix]

## A.1.2 Band 3

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

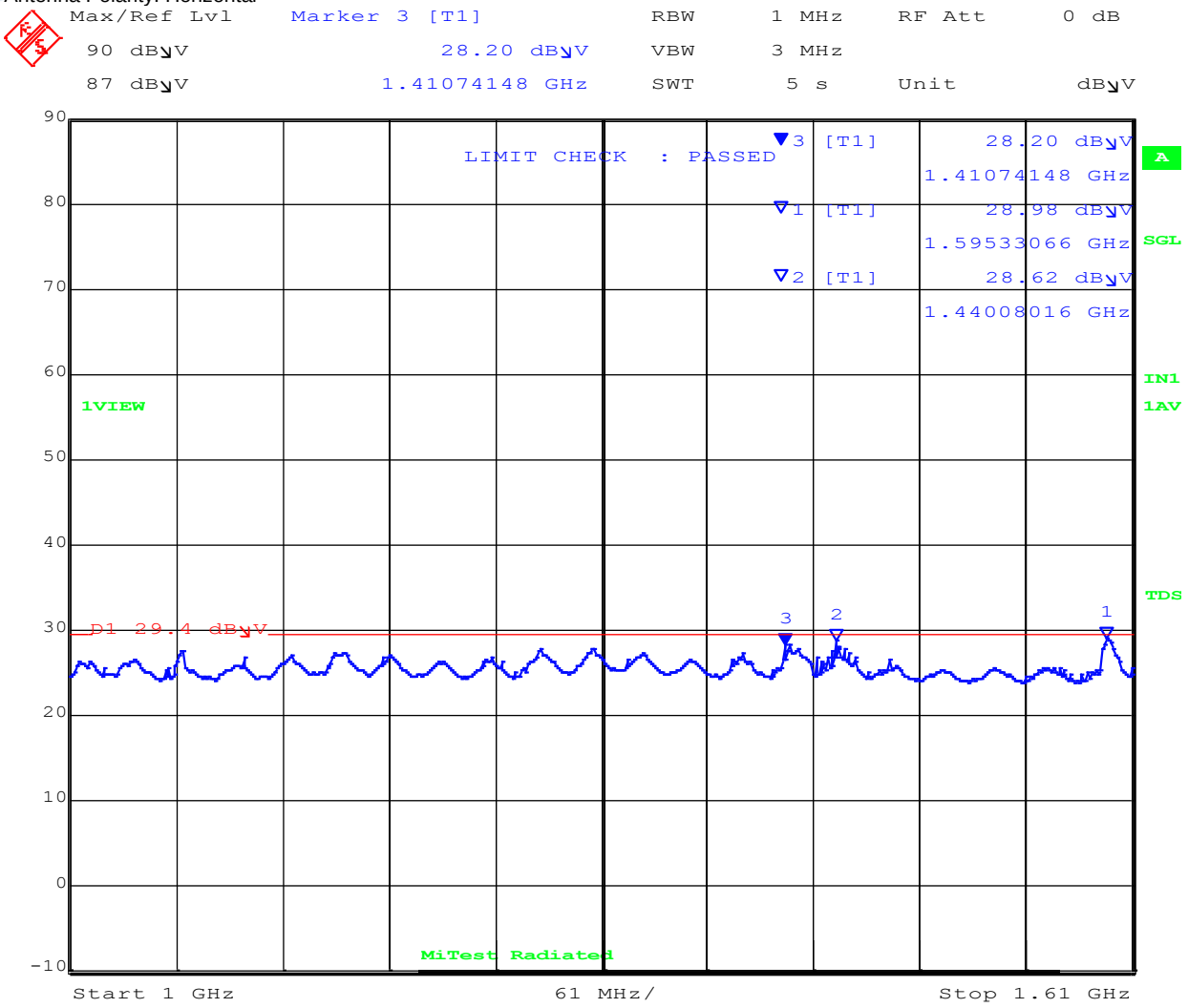
Antenna Polarity: Vertical




Date: 9.MAR.2021 09:39:03

Back to Matrix

Antenna Polarity: Horizontal



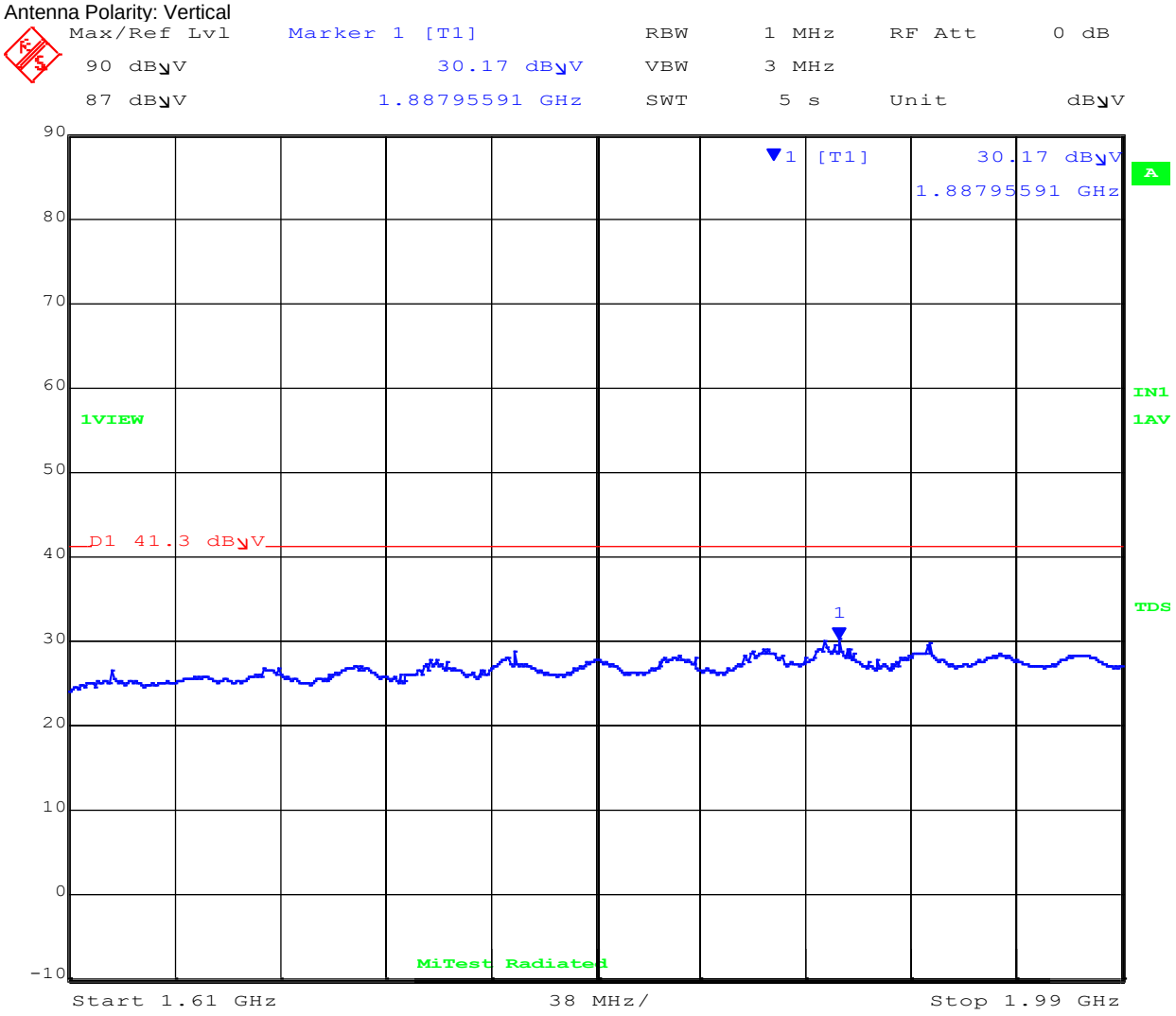

Date: 9.MAR.2021 09:37:31

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

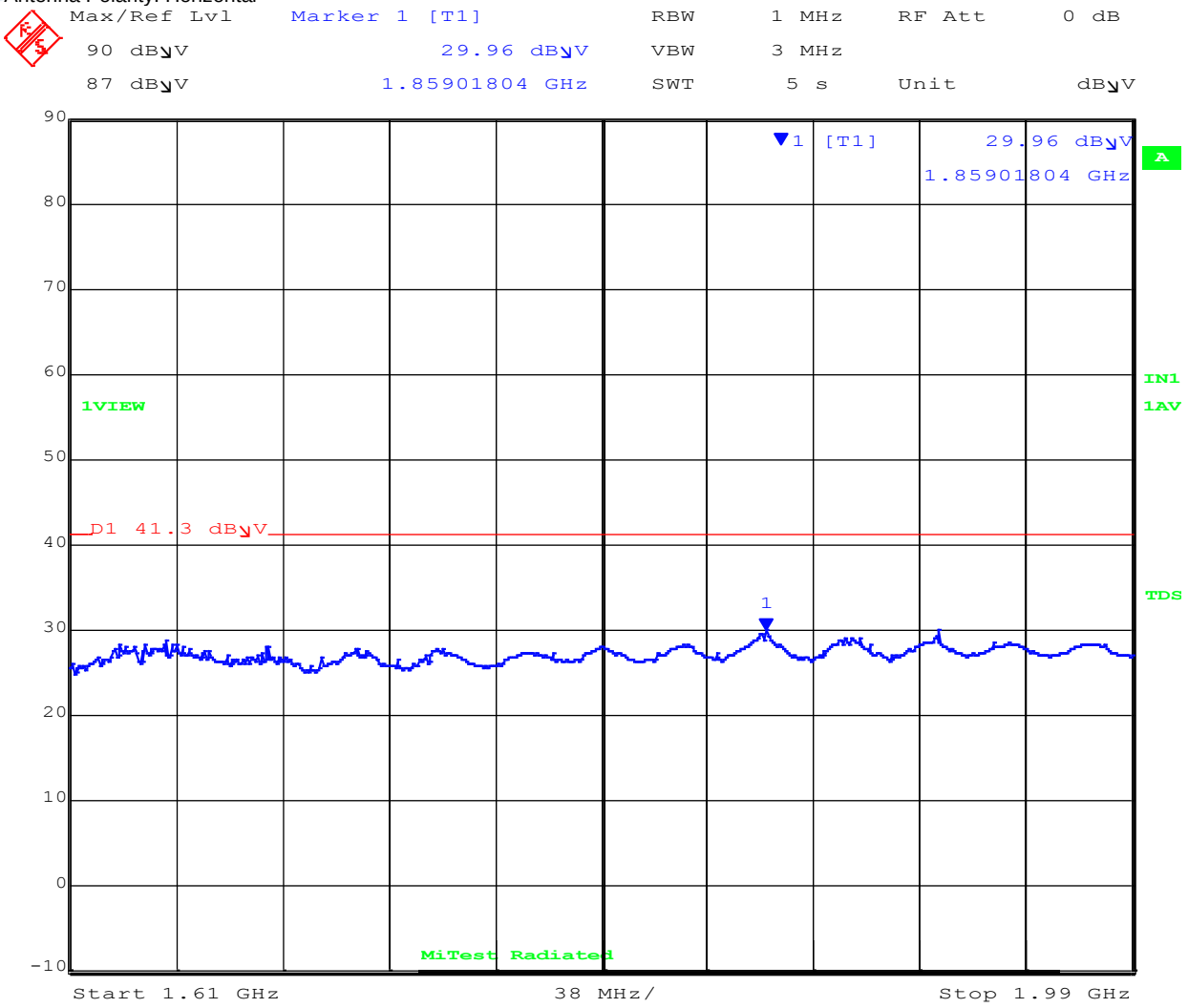
Antenna Polarity: Vertical




Date: 9.MAR.2021 09:44:52

[Back to Matrix]

Antenna Polarity: Horizontal



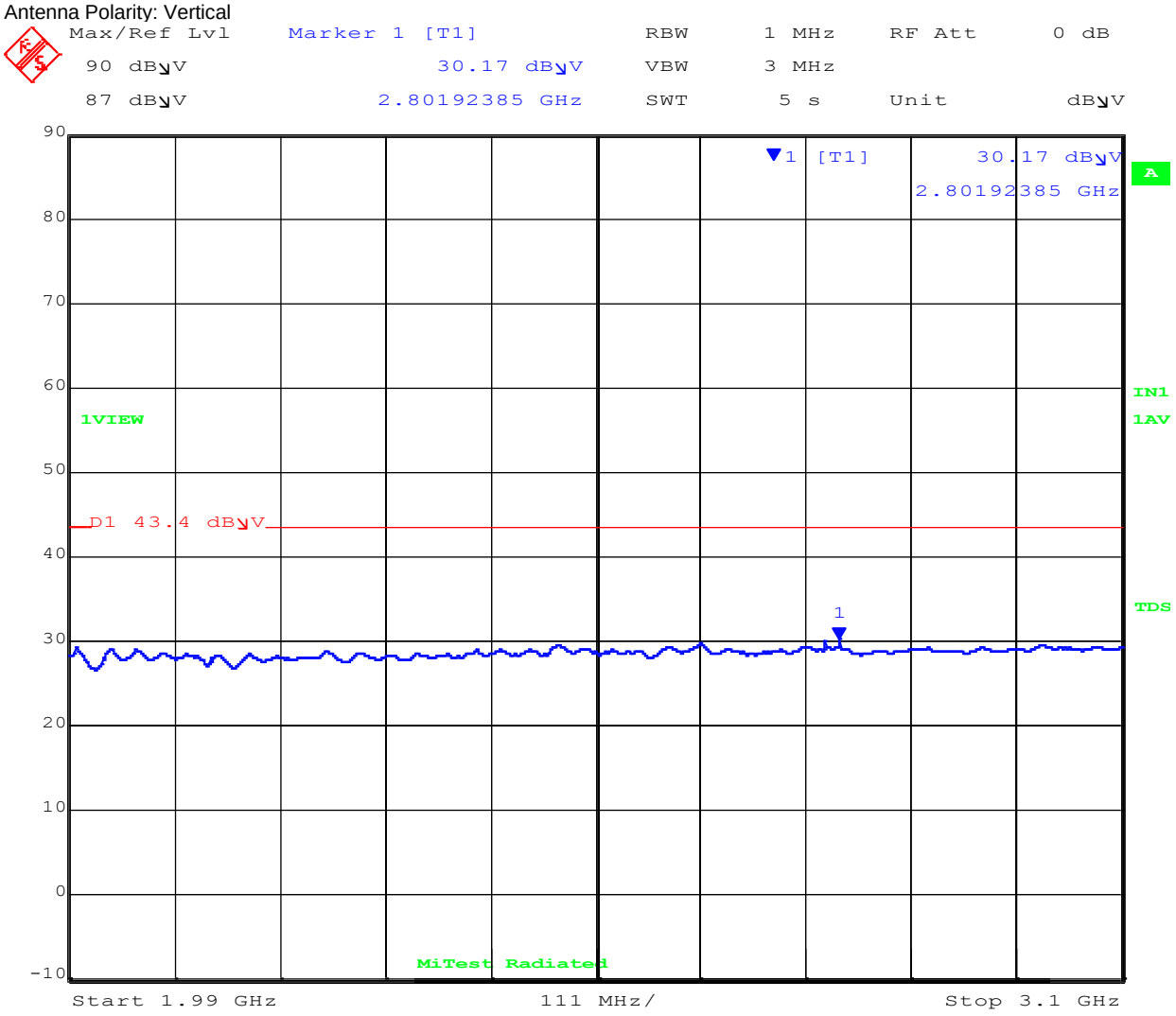

Date: 9.MAR.2021 09:42:27

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

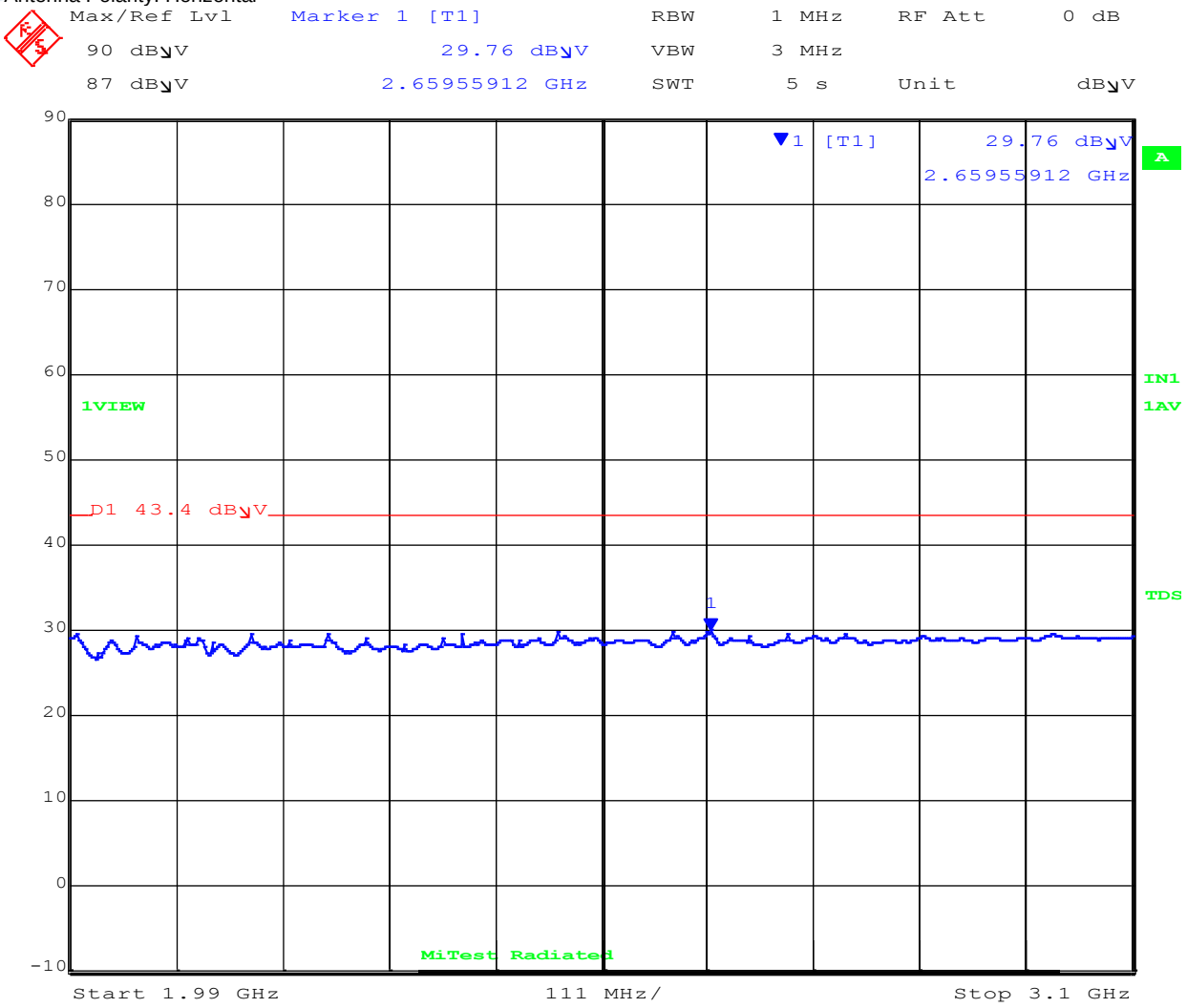
Antenna Polarity: Vertical




Date: 9.MAR.2021 09:51:52

Back to Matrix

Antenna Polarity: Horizontal



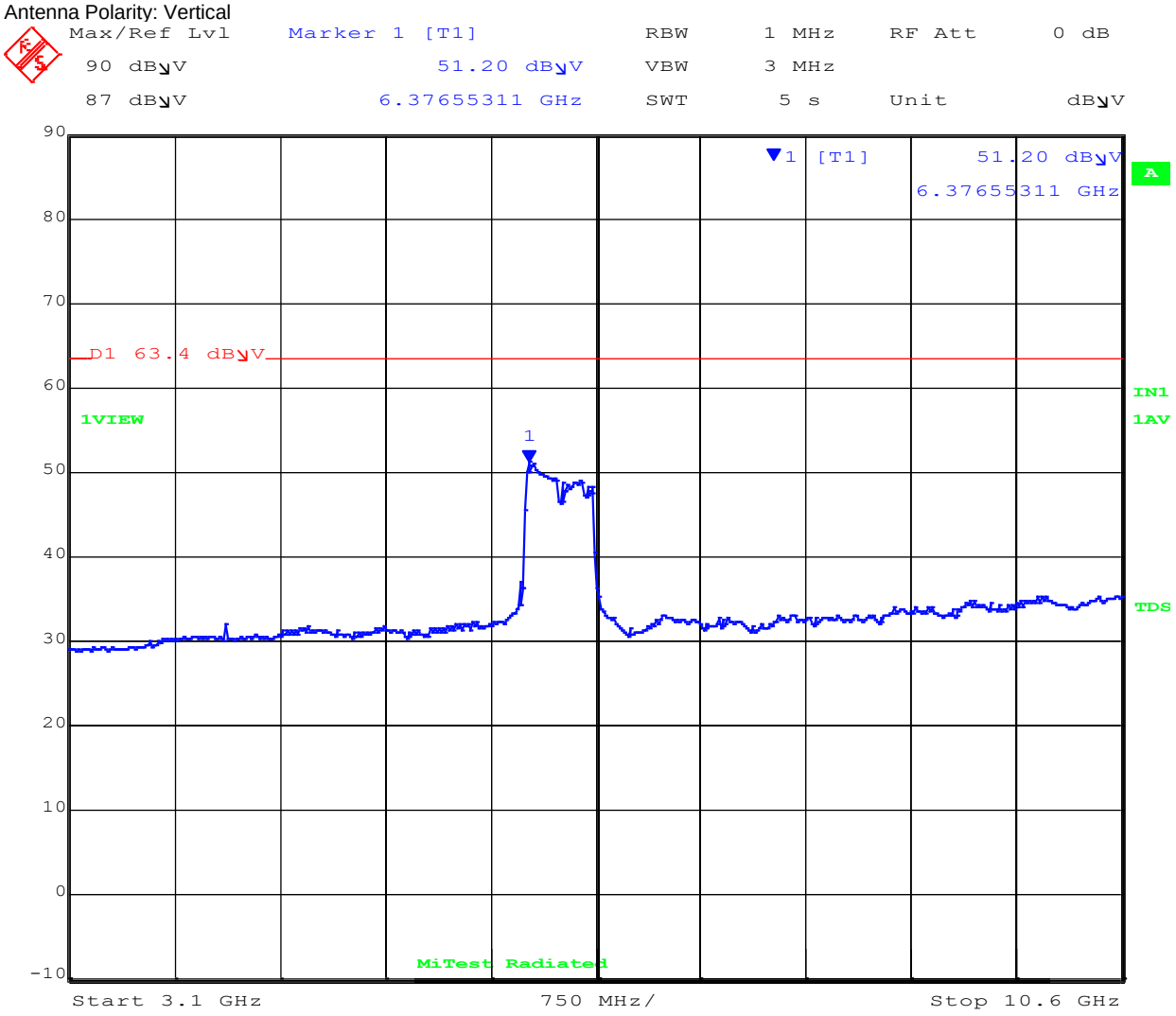

Date: 9.MAR.2021 09:55:43

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

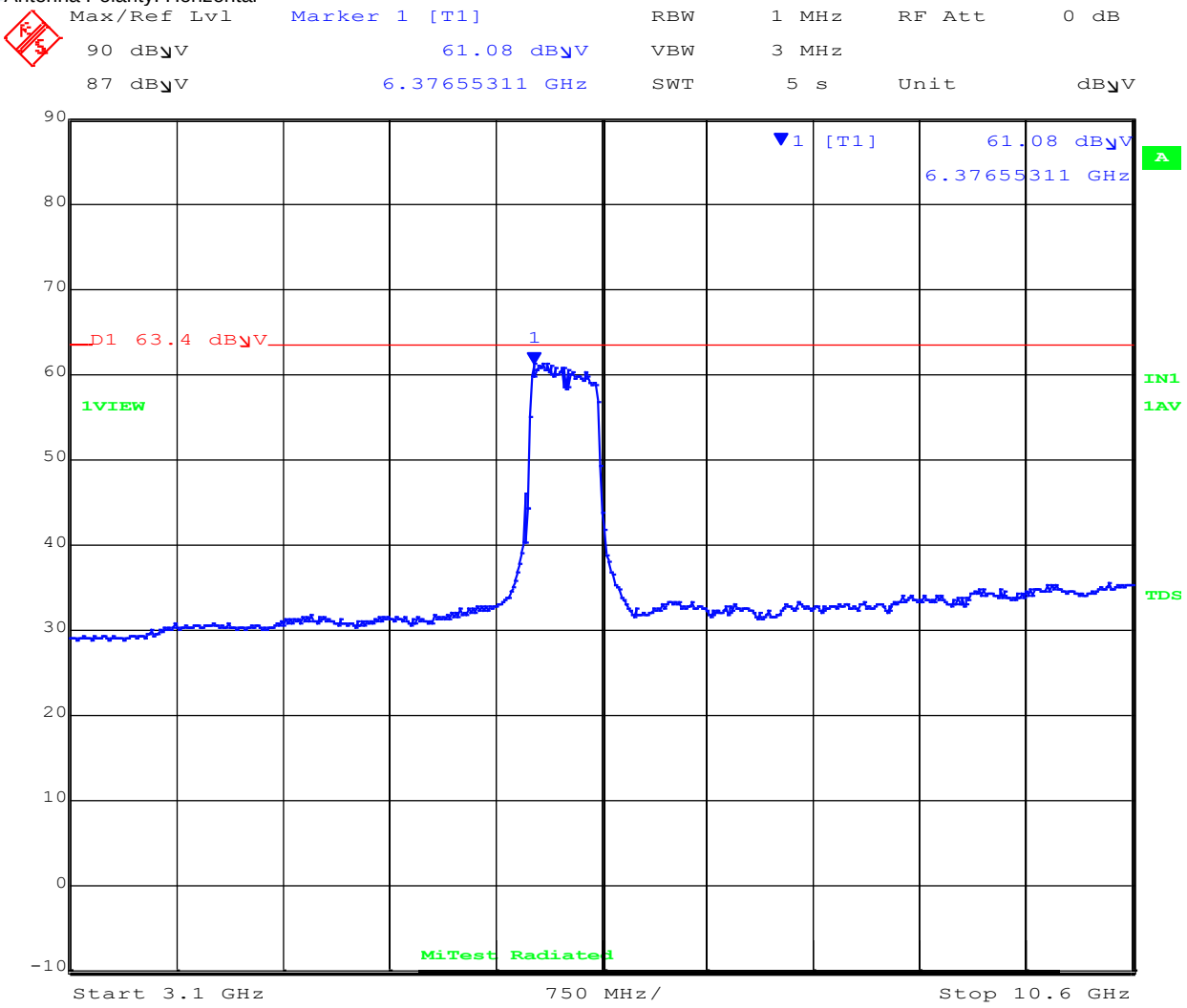
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:02:18

Back to Matrix

Antenna Polarity: Horizontal



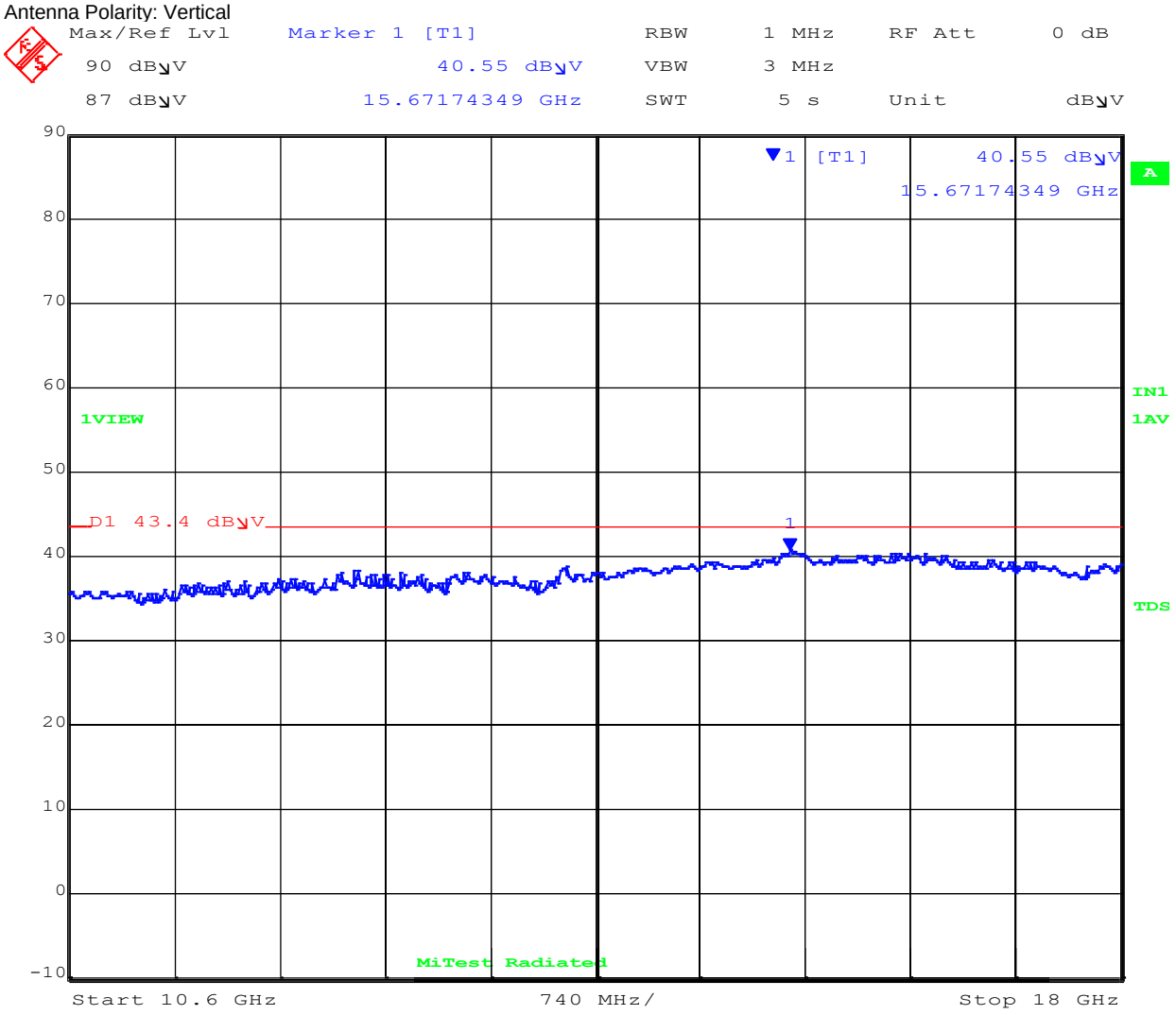

Date: 9.MAR.2021 09:59:36

Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

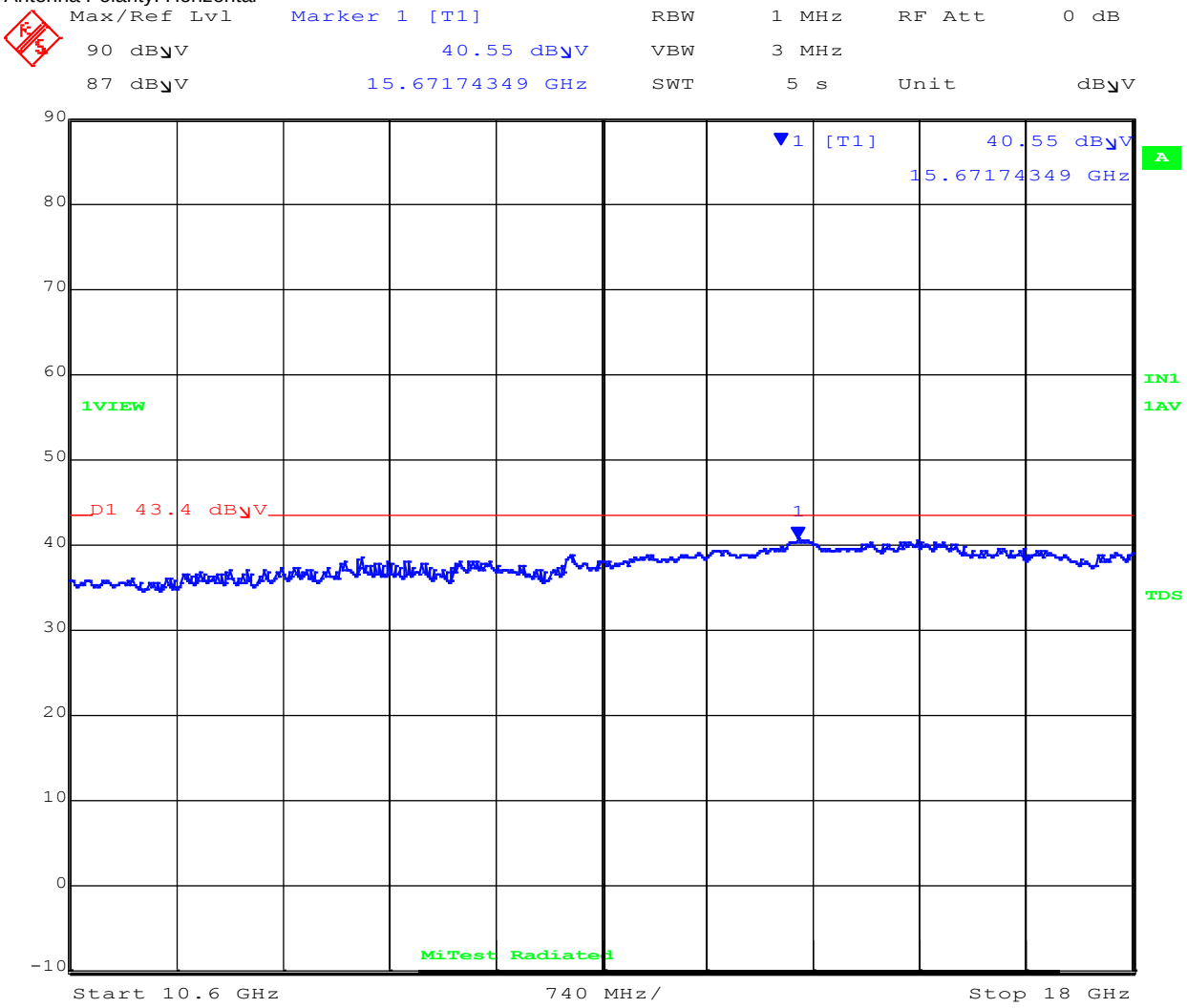
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:03:24

Back to Matrix

Antenna Polarity: Horizontal



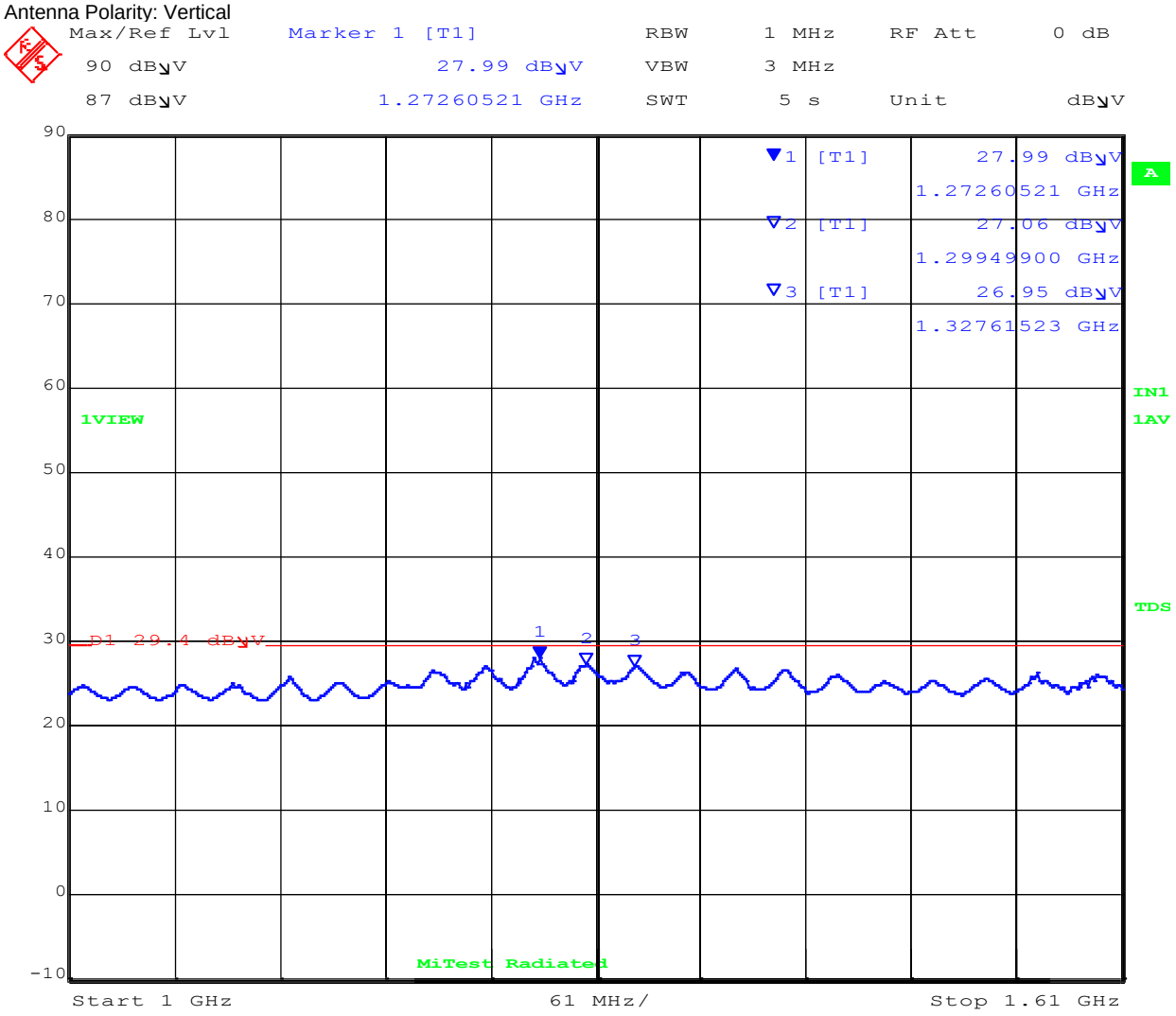

Date: 9.MAR.2021 10:05:35

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

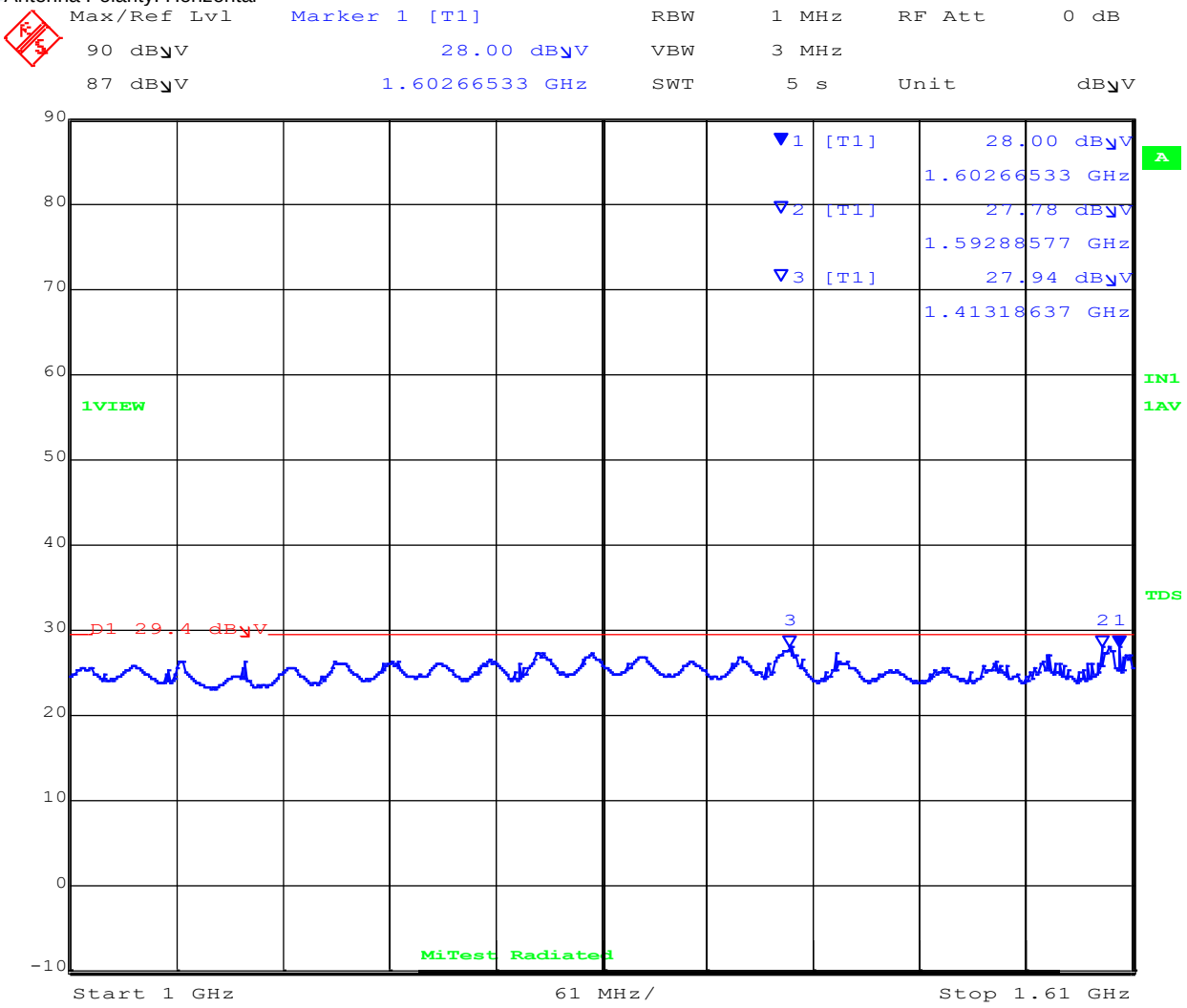
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:33:06

Back to Matrix

Antenna Polarity: Horizontal



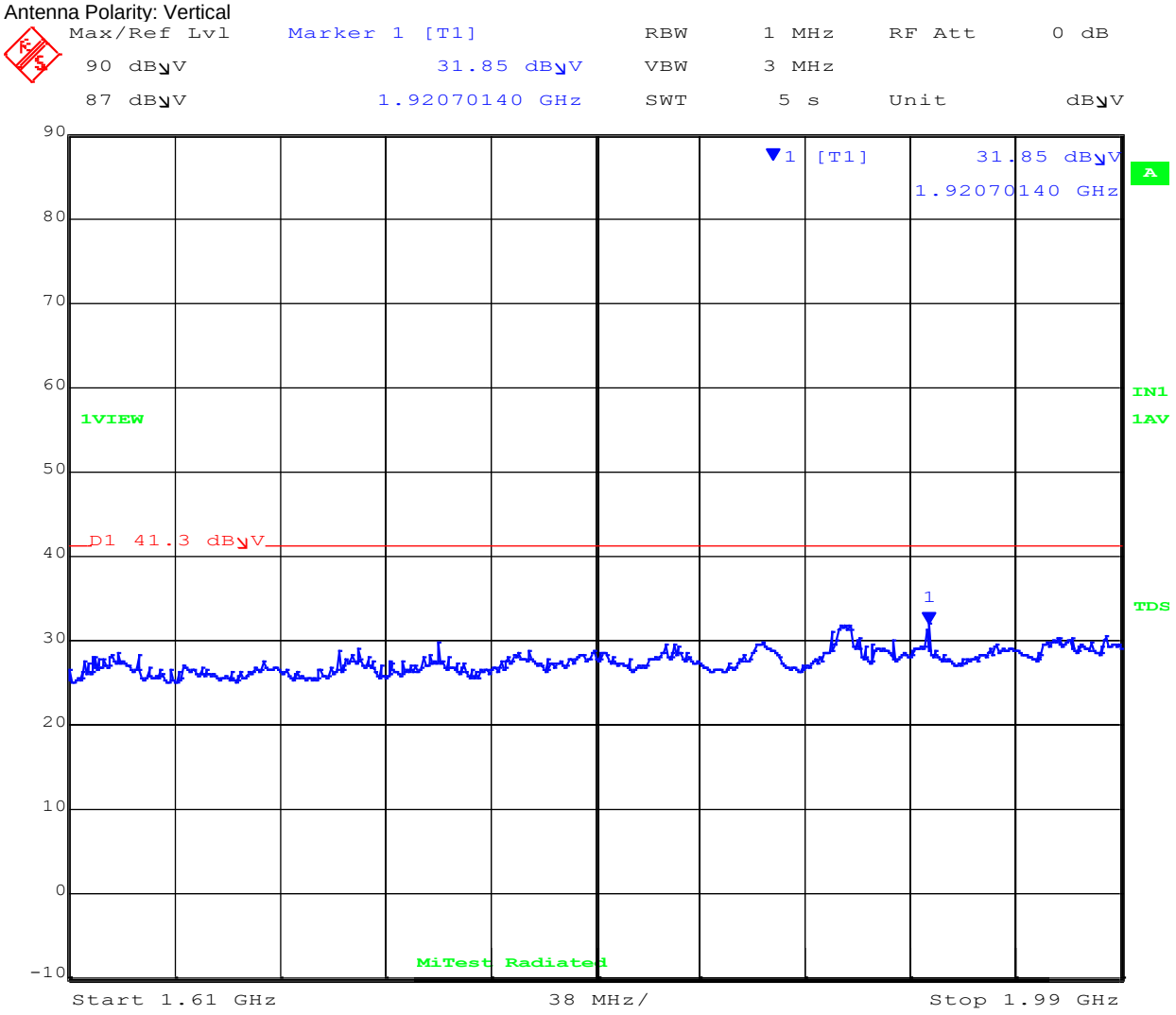

Date: 9.MAR.2021 10:31:04

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

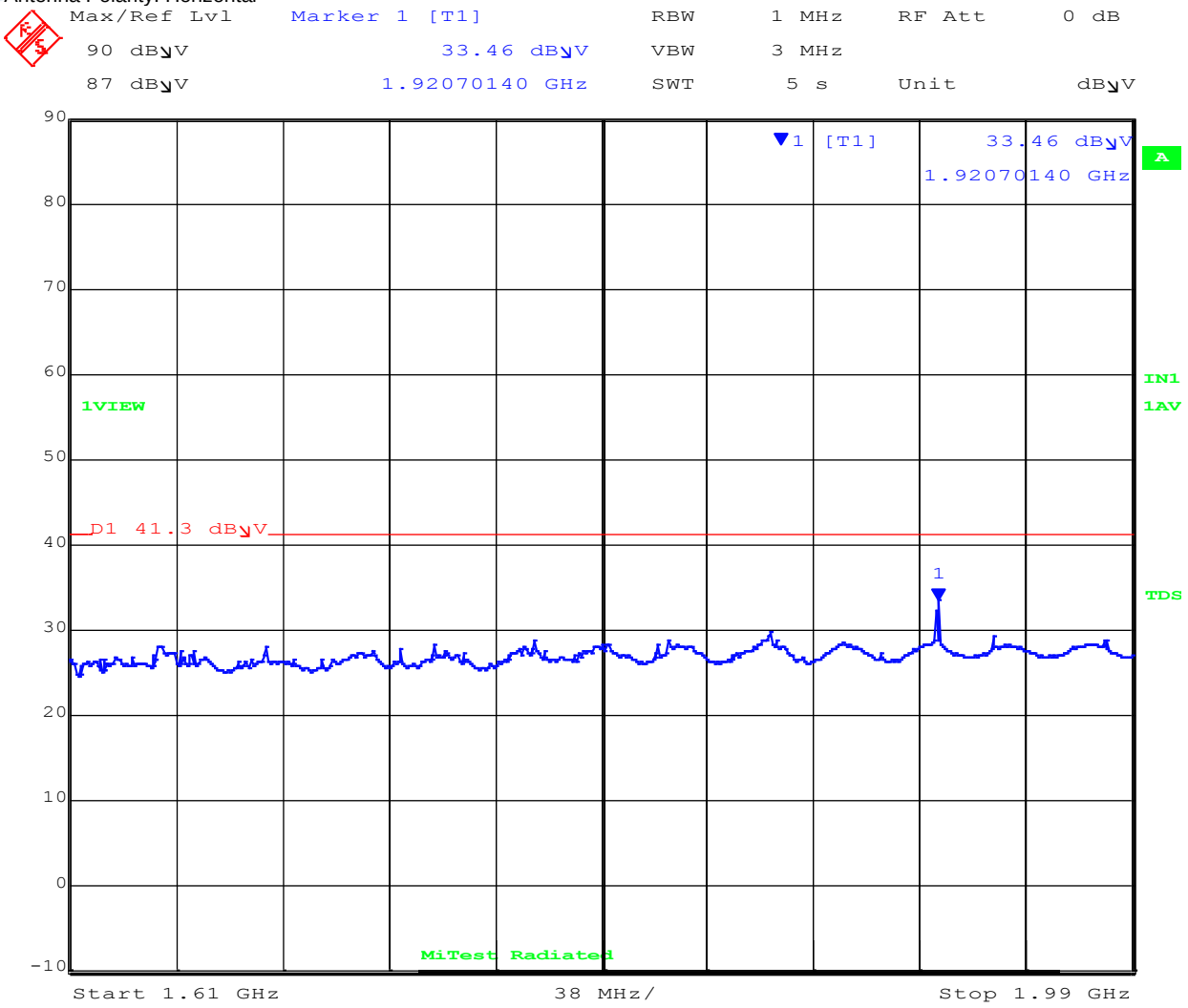
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:24:18

Back to Matrix

Antenna Polarity: Horizontal



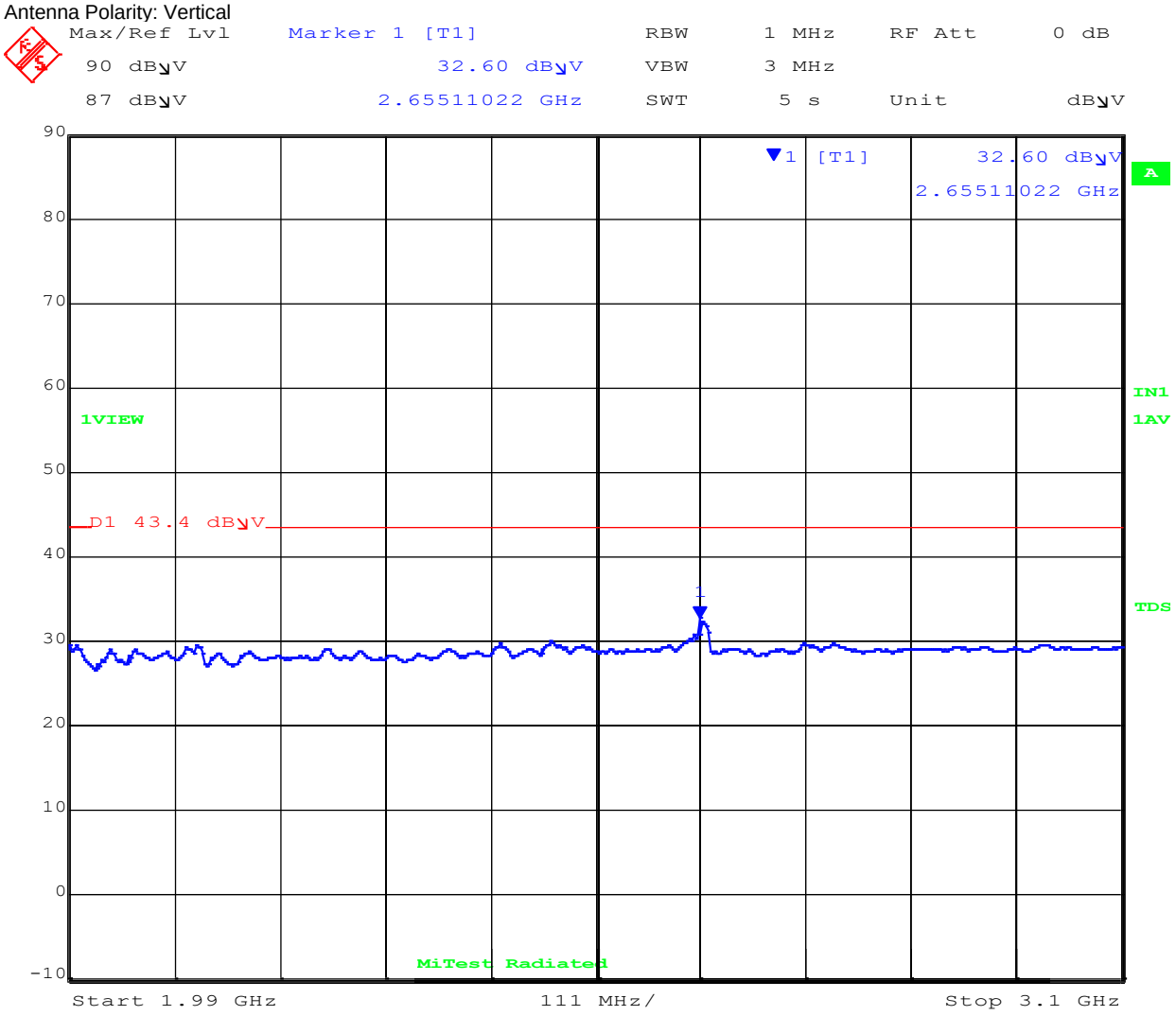

Date: 9.MAR.2021 10:29:18

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

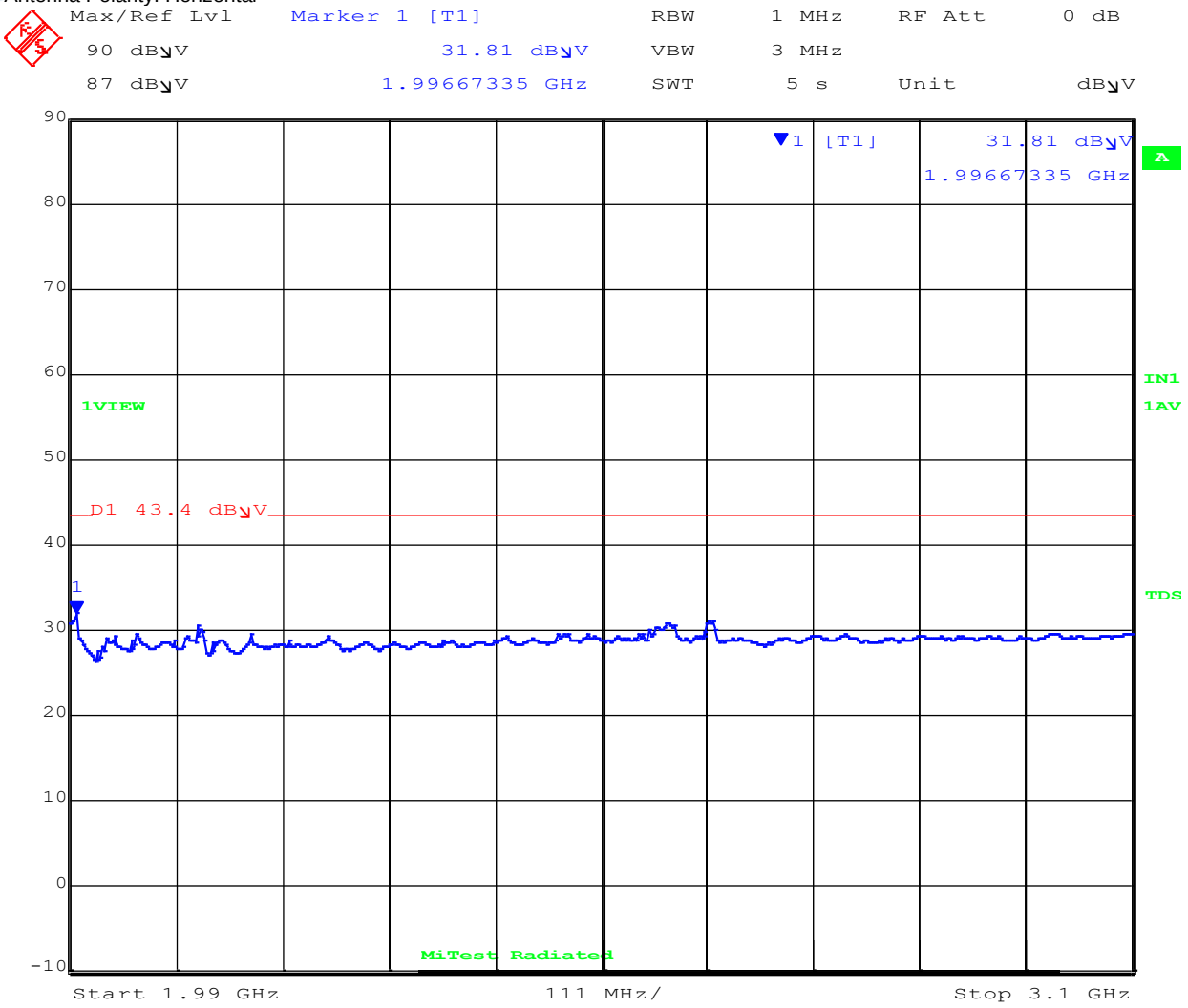
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:22:24

Back to Matrix

Antenna Polarity: Horizontal



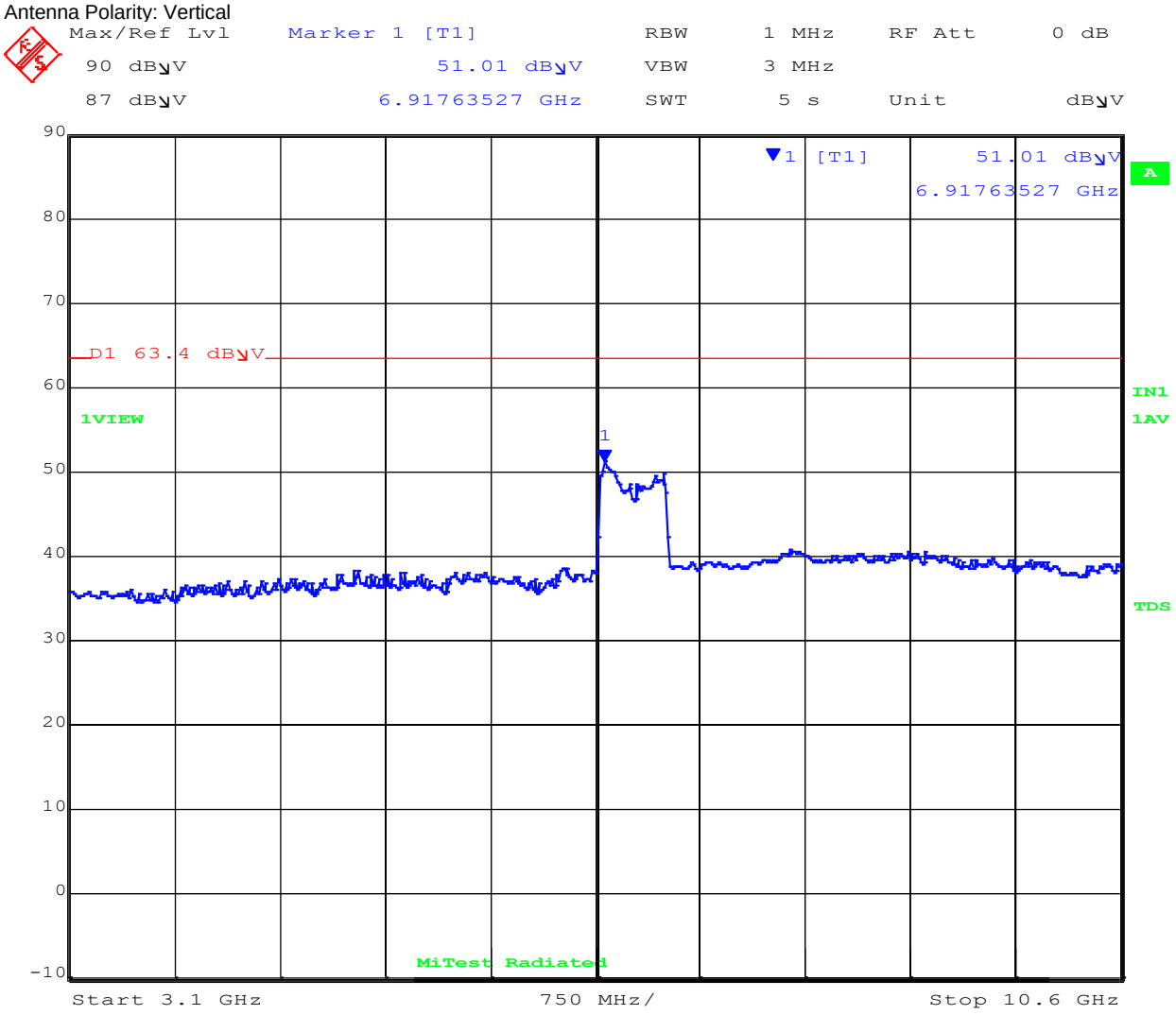

Date: 9.MAR.2021 10:20:53

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

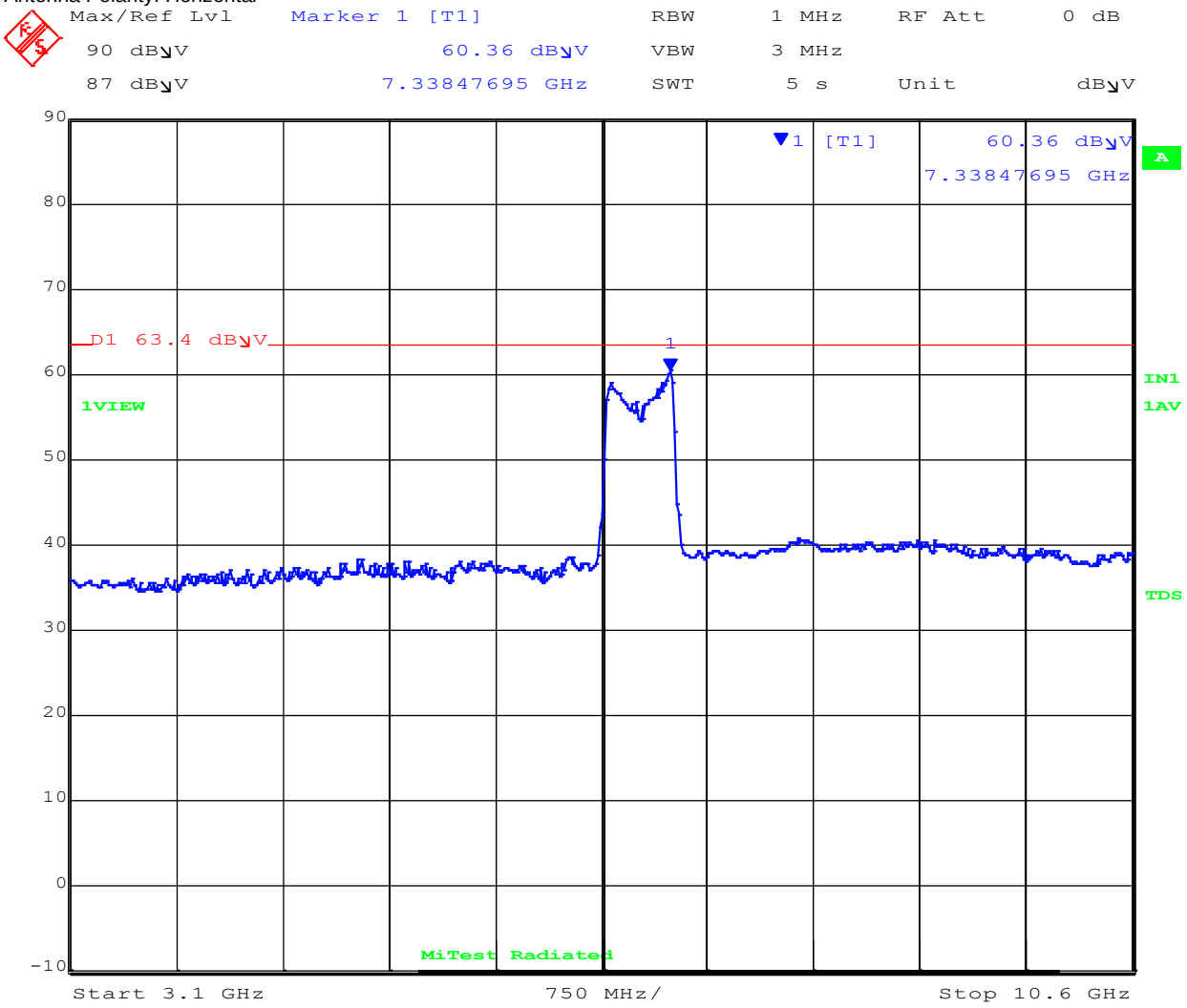
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:16:40

Back to Matrix

Antenna Polarity: Horizontal



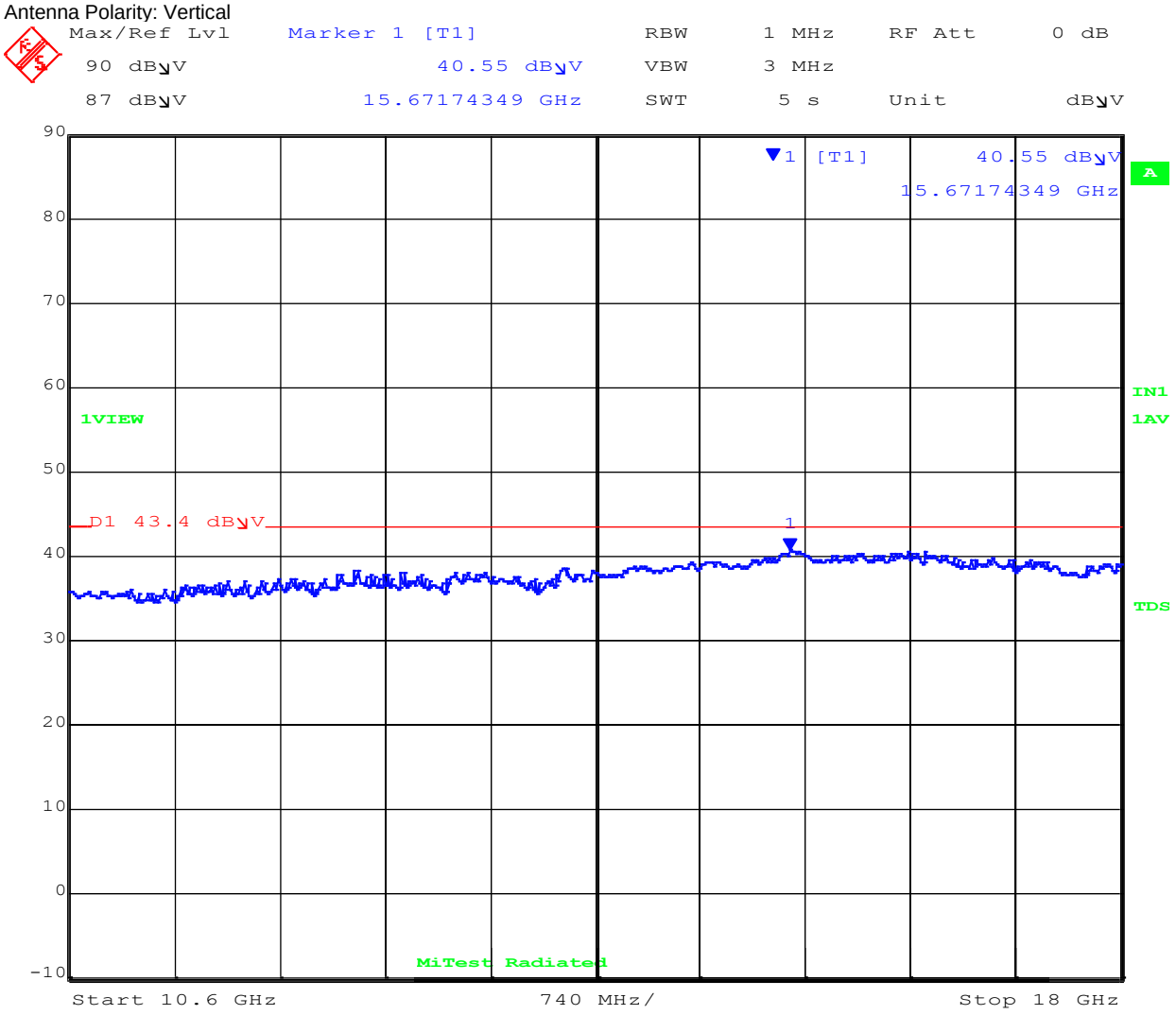

Date: 9.MAR.2021 10:18:56

Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

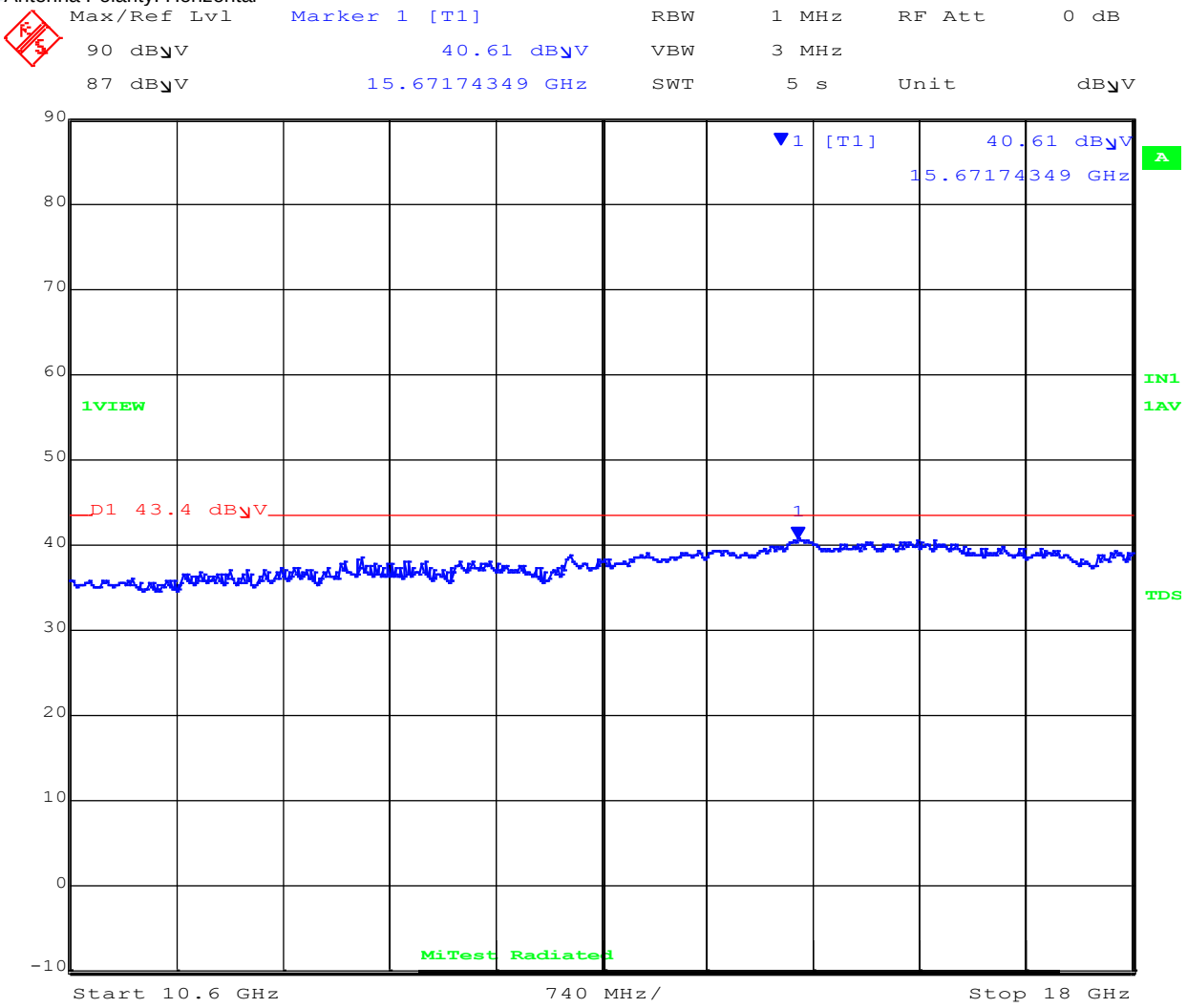
Antenna Polarity: Vertical




Date: 9.MAR.2021 10:13:27

Back to Matrix

Antenna Polarity: Horizontal




Date: 9.MAR.2021 10:12:21

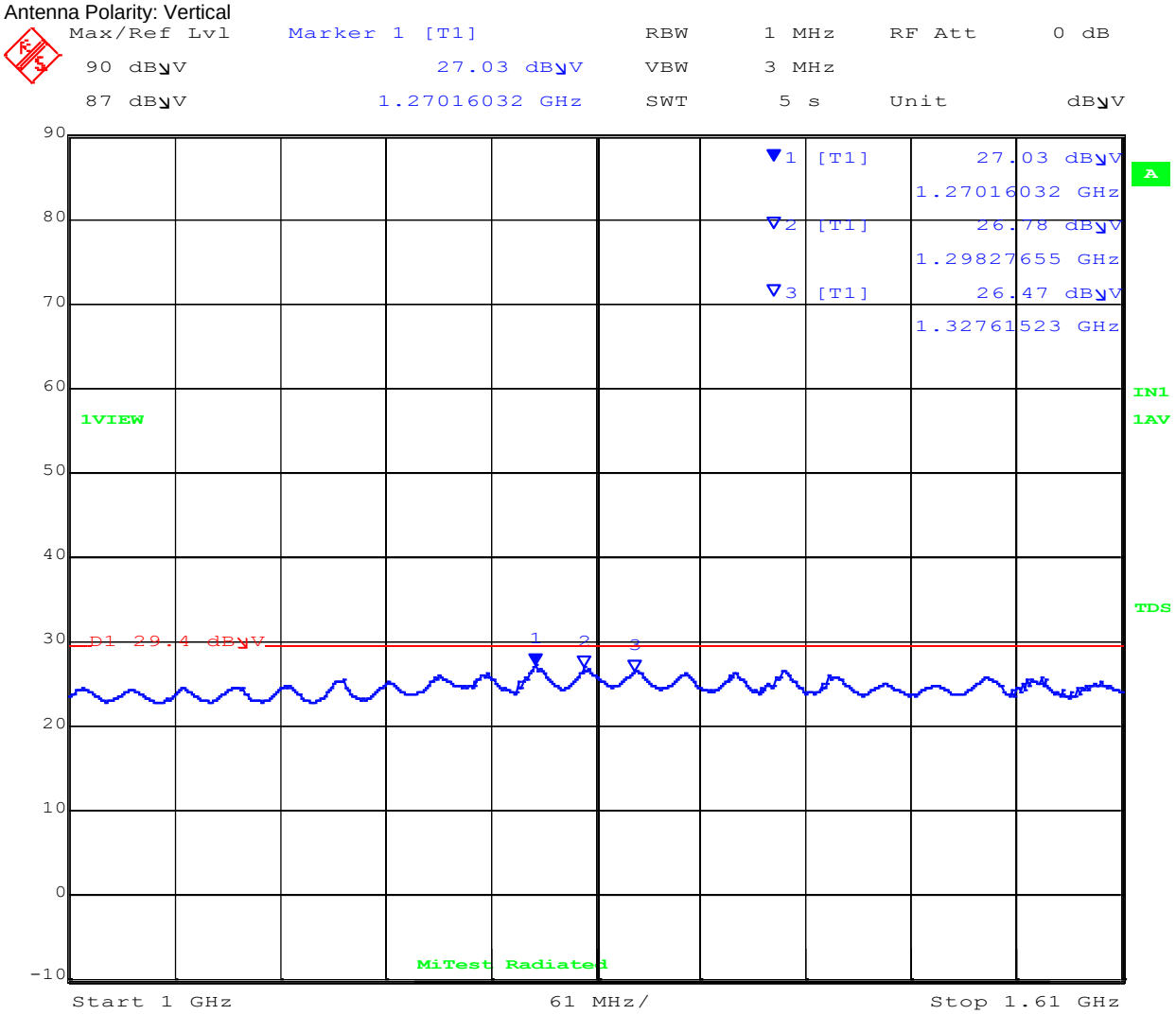
Back to Matrix

## A.1.3 Band 3 & 6

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

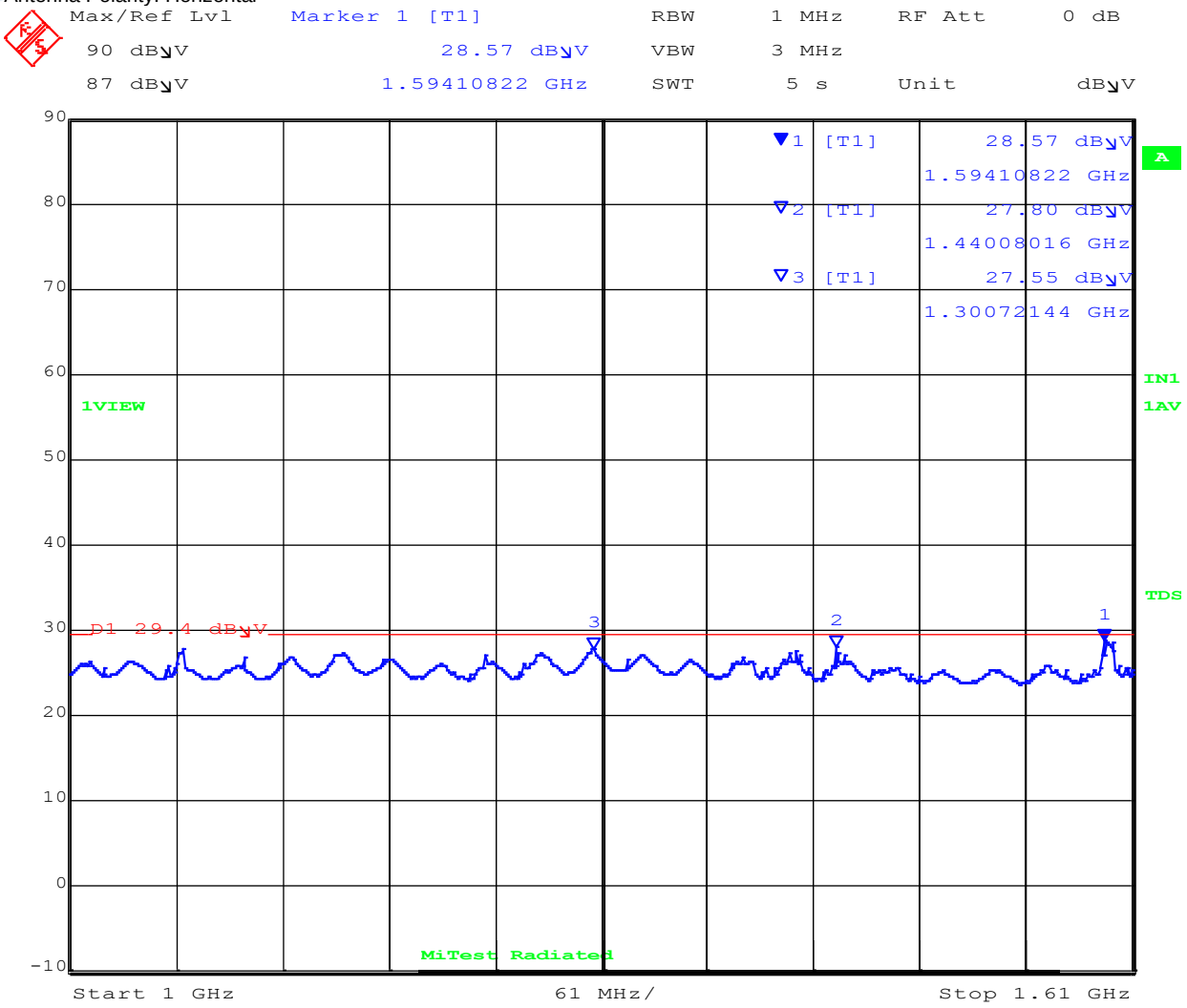
Antenna Polarity: Vertical




Date: 9.MAR.2021 11:10:53

Back to Matrix

Antenna Polarity: Horizontal



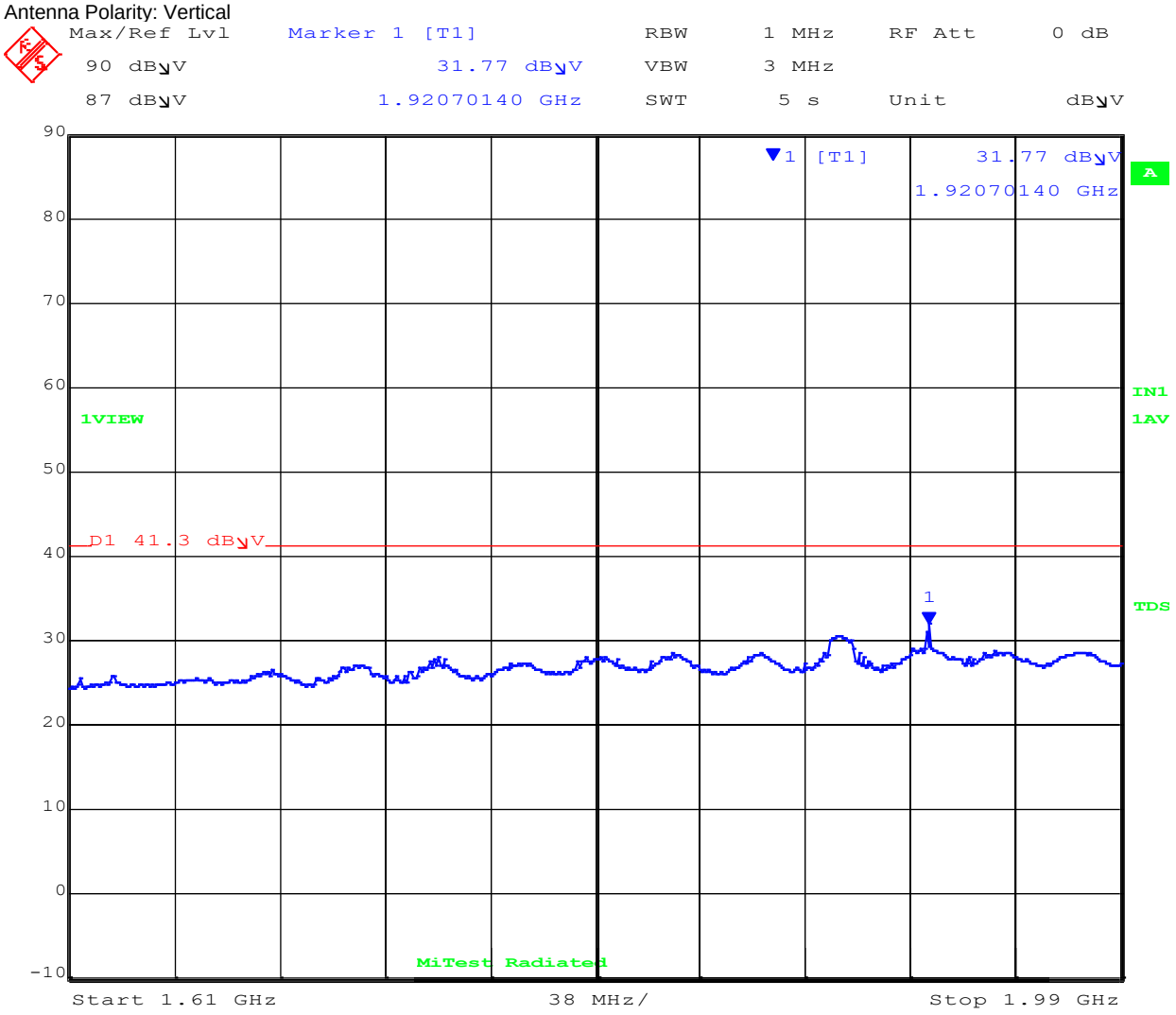

Date: 9.MAR.2021 11:13:09

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

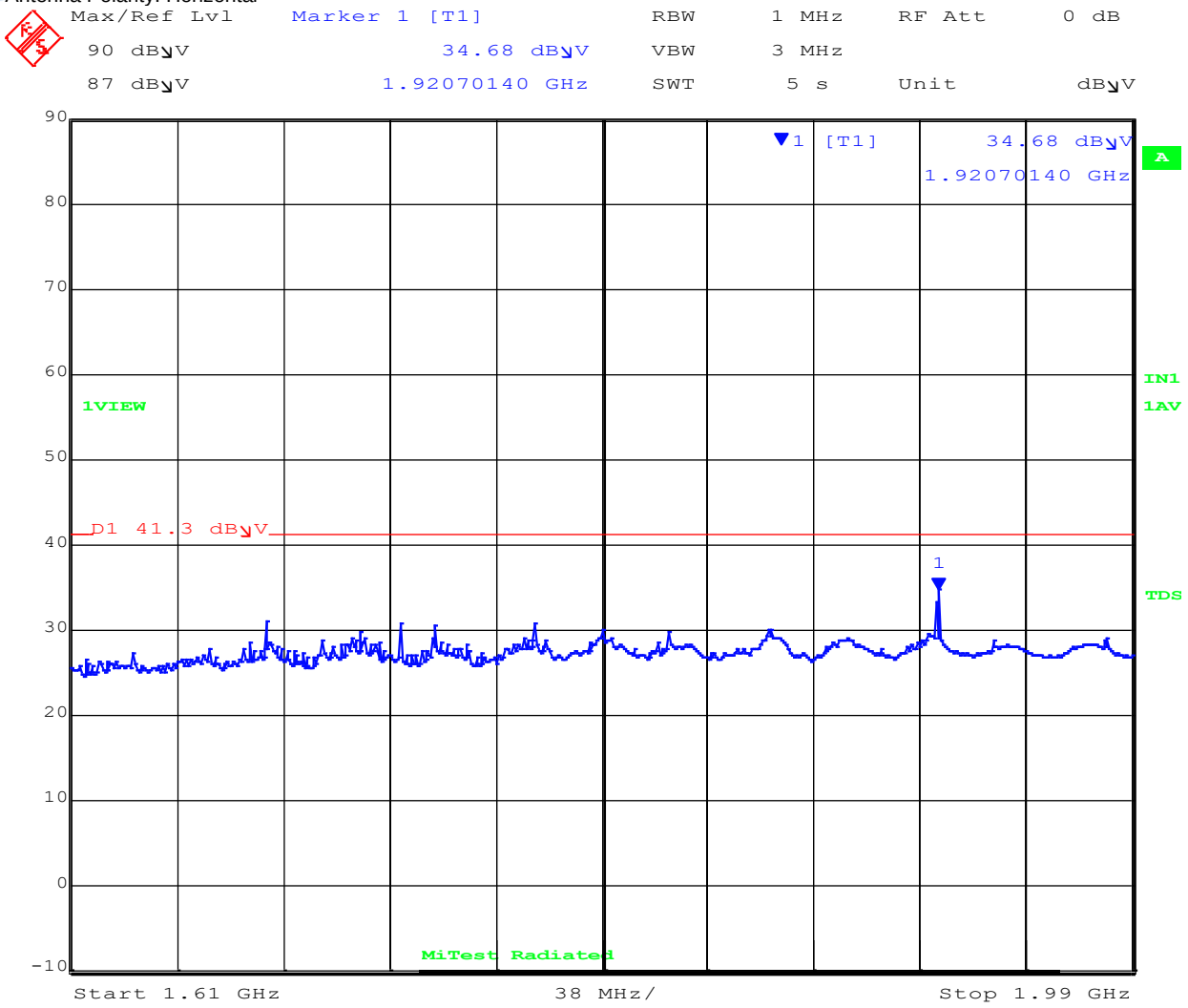
Antenna Polarity: Vertical




Date: 9.MAR.2021 11:29:14

Back to Matrix

Antenna Polarity: Horizontal



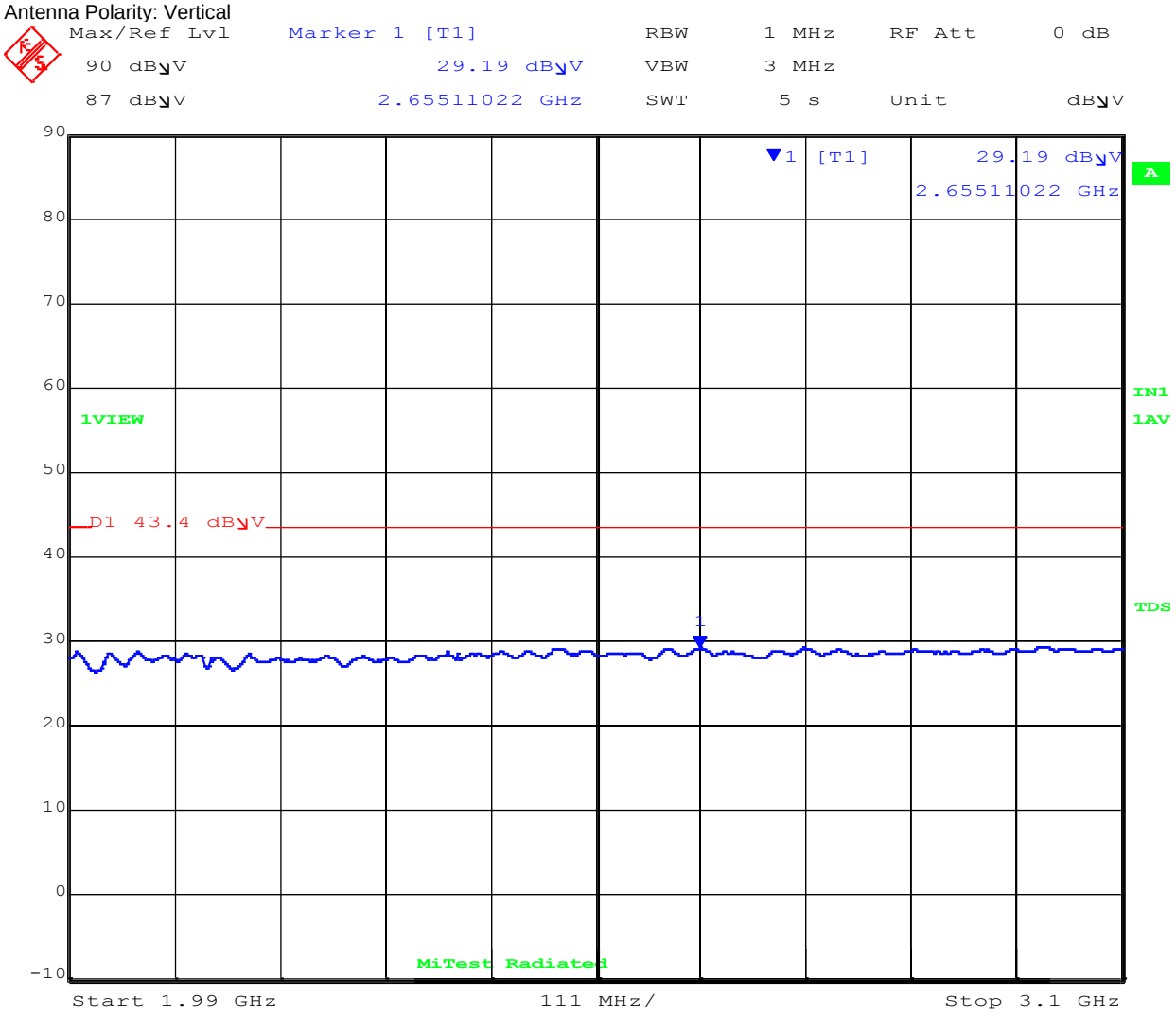

Date: 9.MAR.2021 11:28:06

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

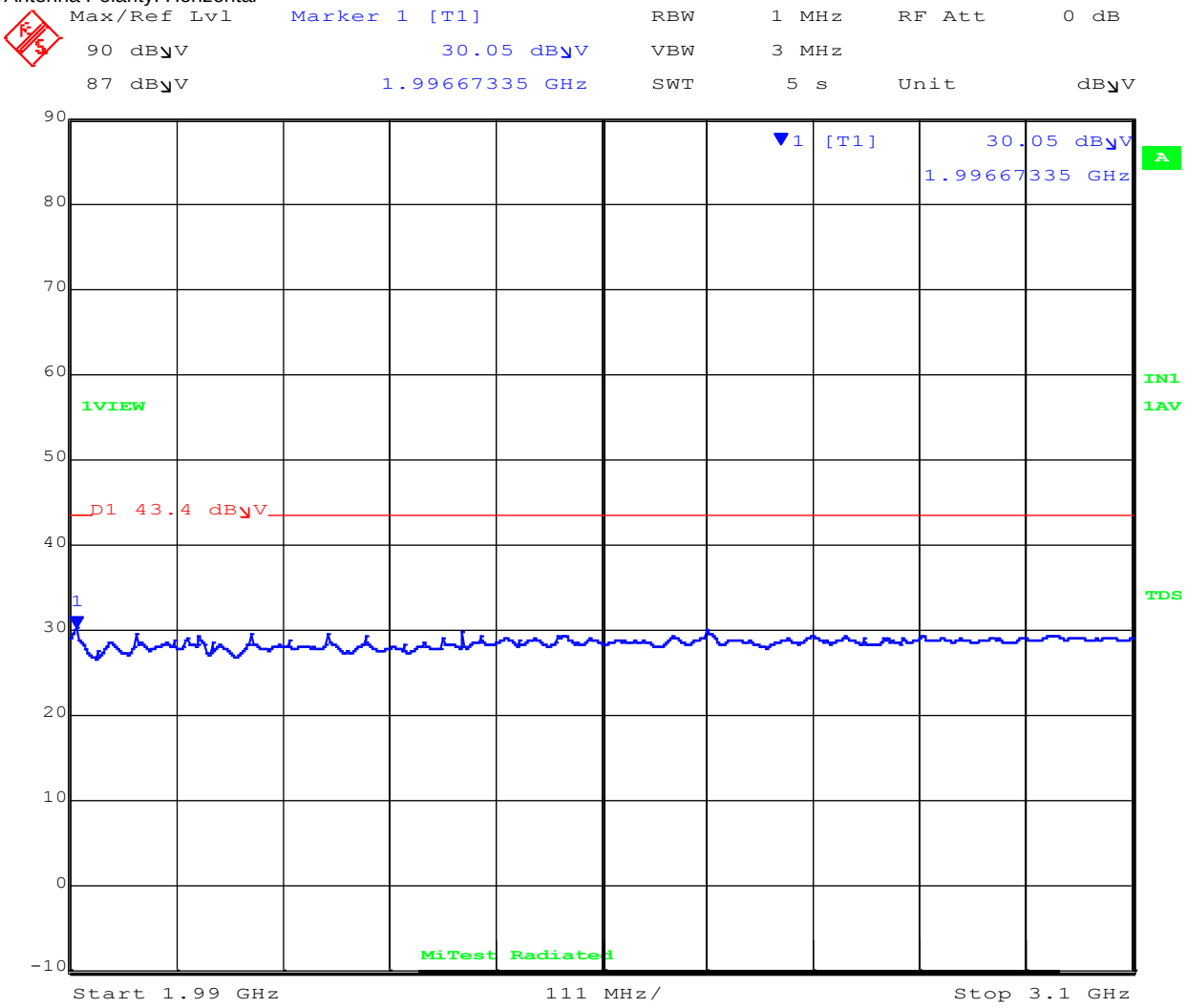
Antenna Polarity: Vertical




Date: 9.MAR.2021 11:31:39

Back to Matrix

Antenna Polarity: Horizontal



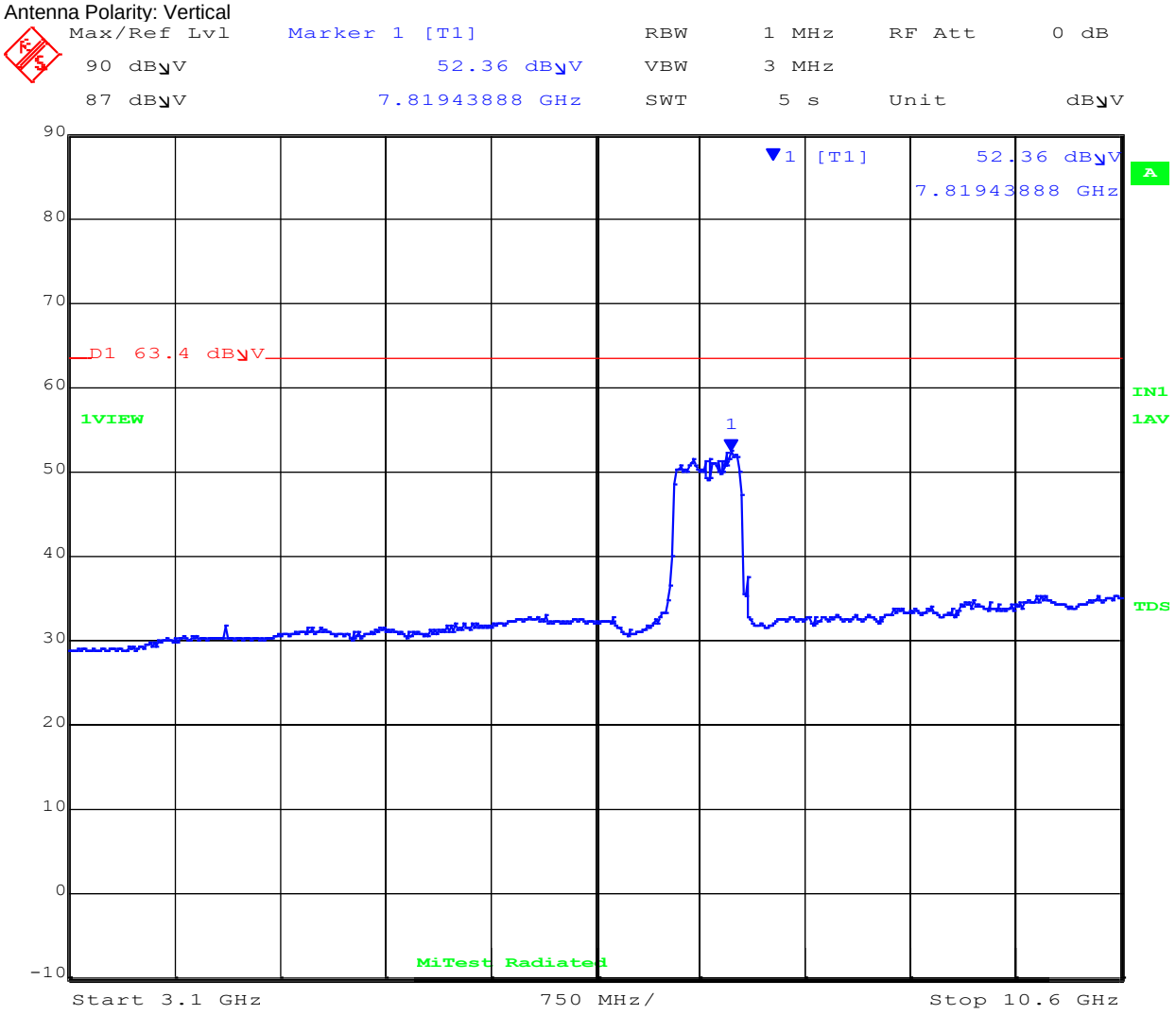

Date: 9.MAR.2021 11:33:10

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

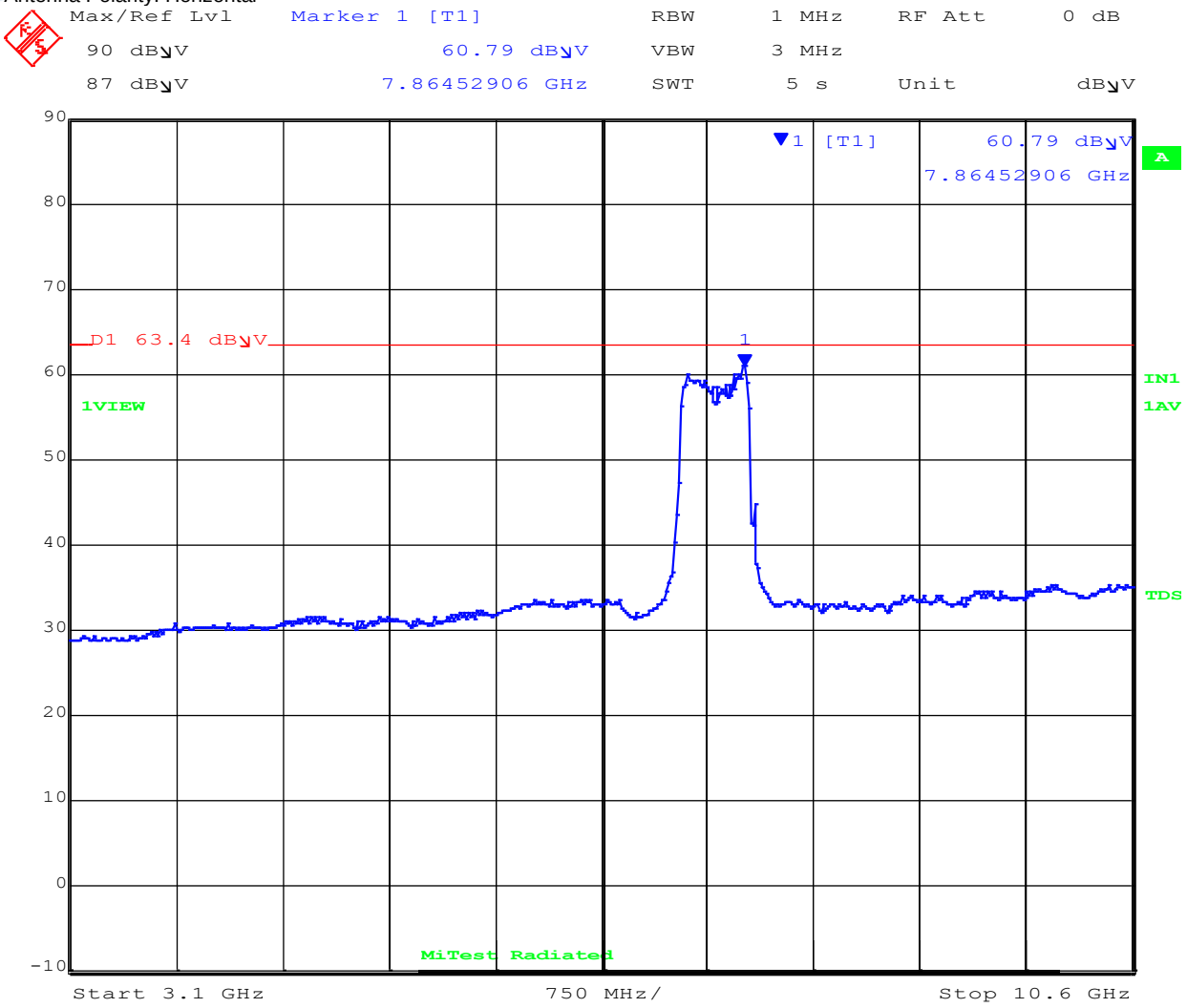
Antenna Polarity: Vertical




Date: 9.MAR.2021 11:37:51

Back to Matrix

Antenna Polarity: Horizontal



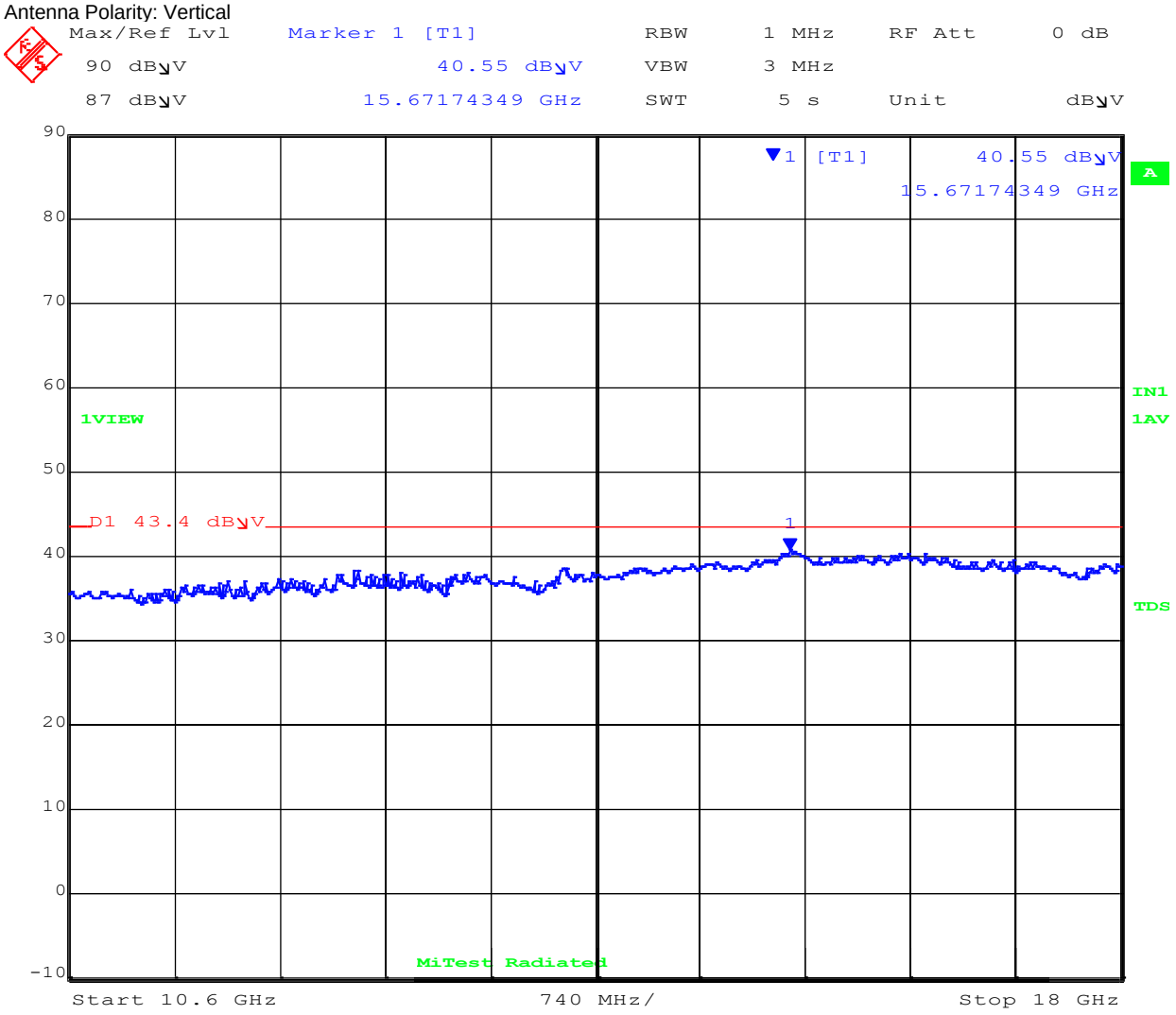

Date: 9.MAR.2021 11:36:13

Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

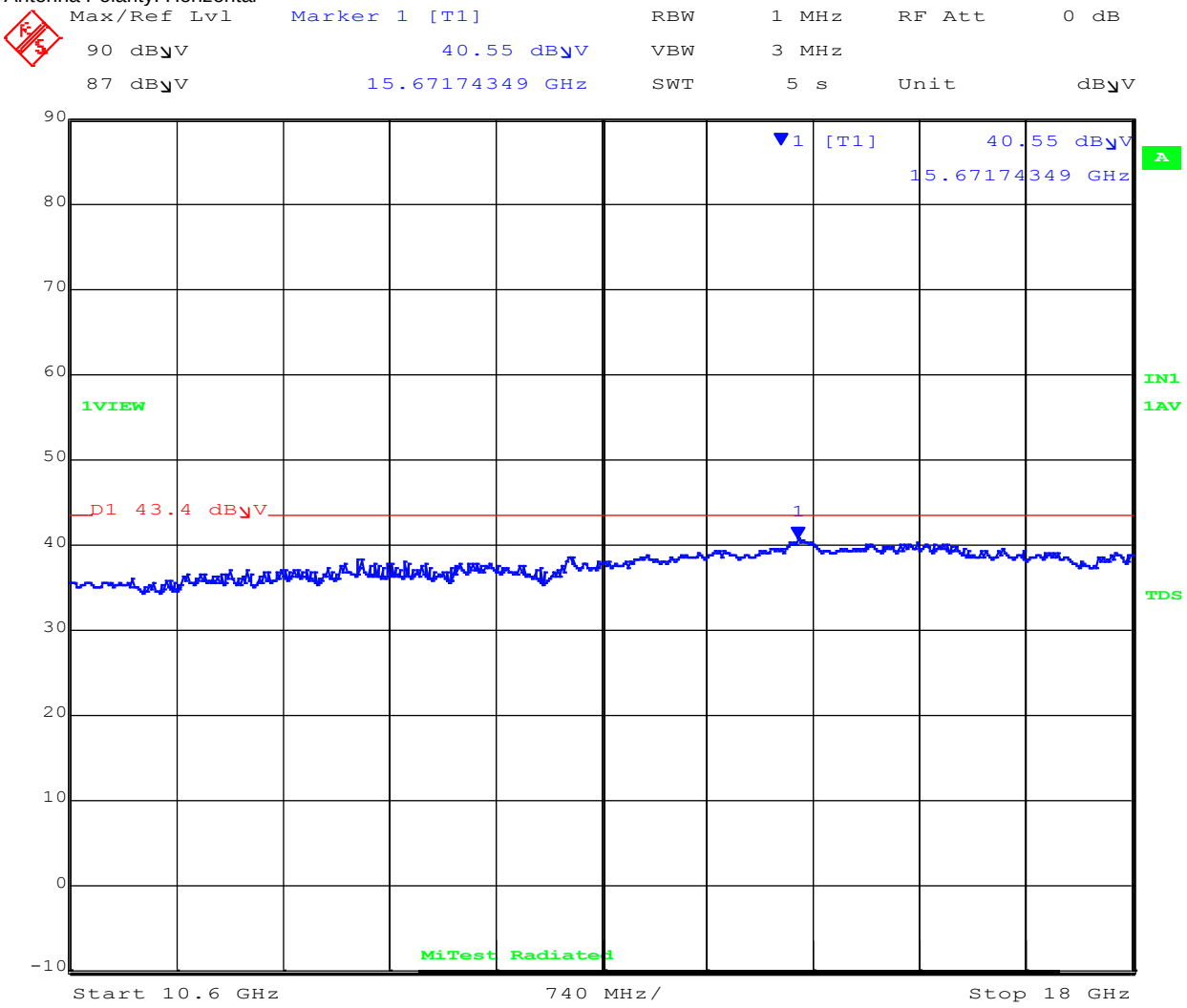
Antenna Polarity: Vertical




Date: 9.MAR.2021 11:39:07

Back to Matrix

Antenna Polarity: Horizontal




Date: 9.MAR.2021 11:40:07

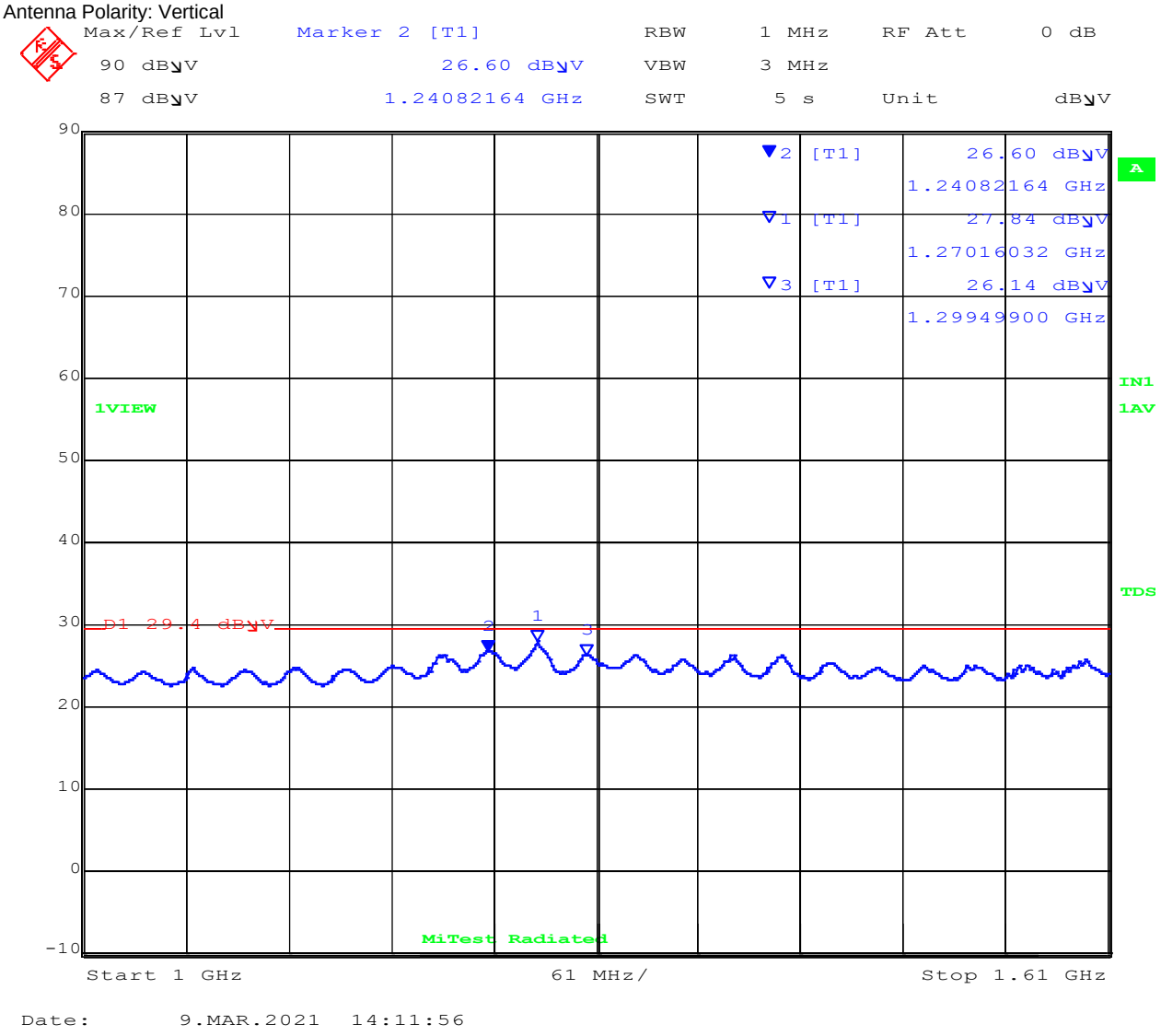
Back to Matrix

## A.1.4 Band 6

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

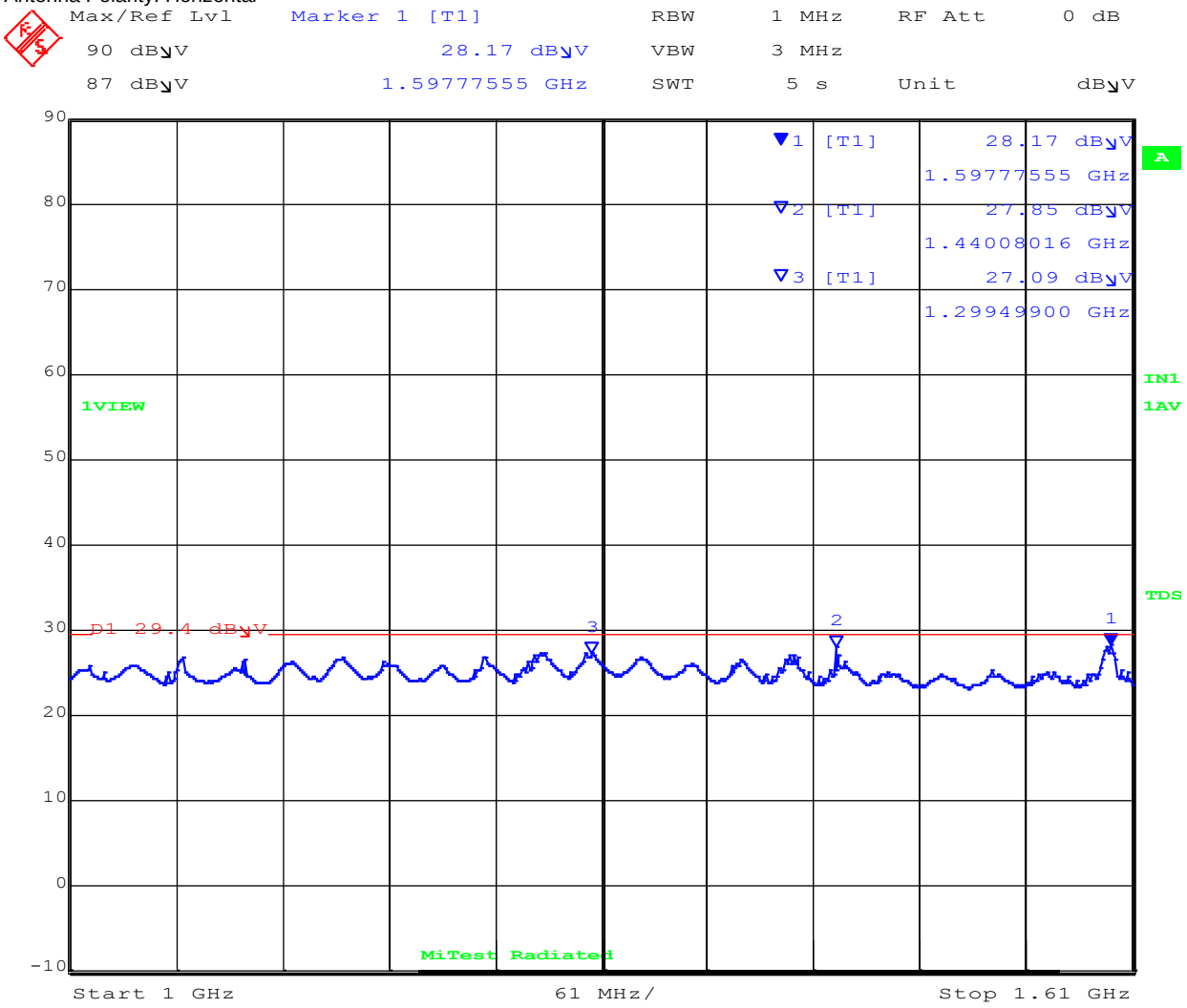
Antenna Polarity: Vertical




Date: 9.MAR.2021 14:11:56

Back to Matrix

Antenna Polarity: Horizontal



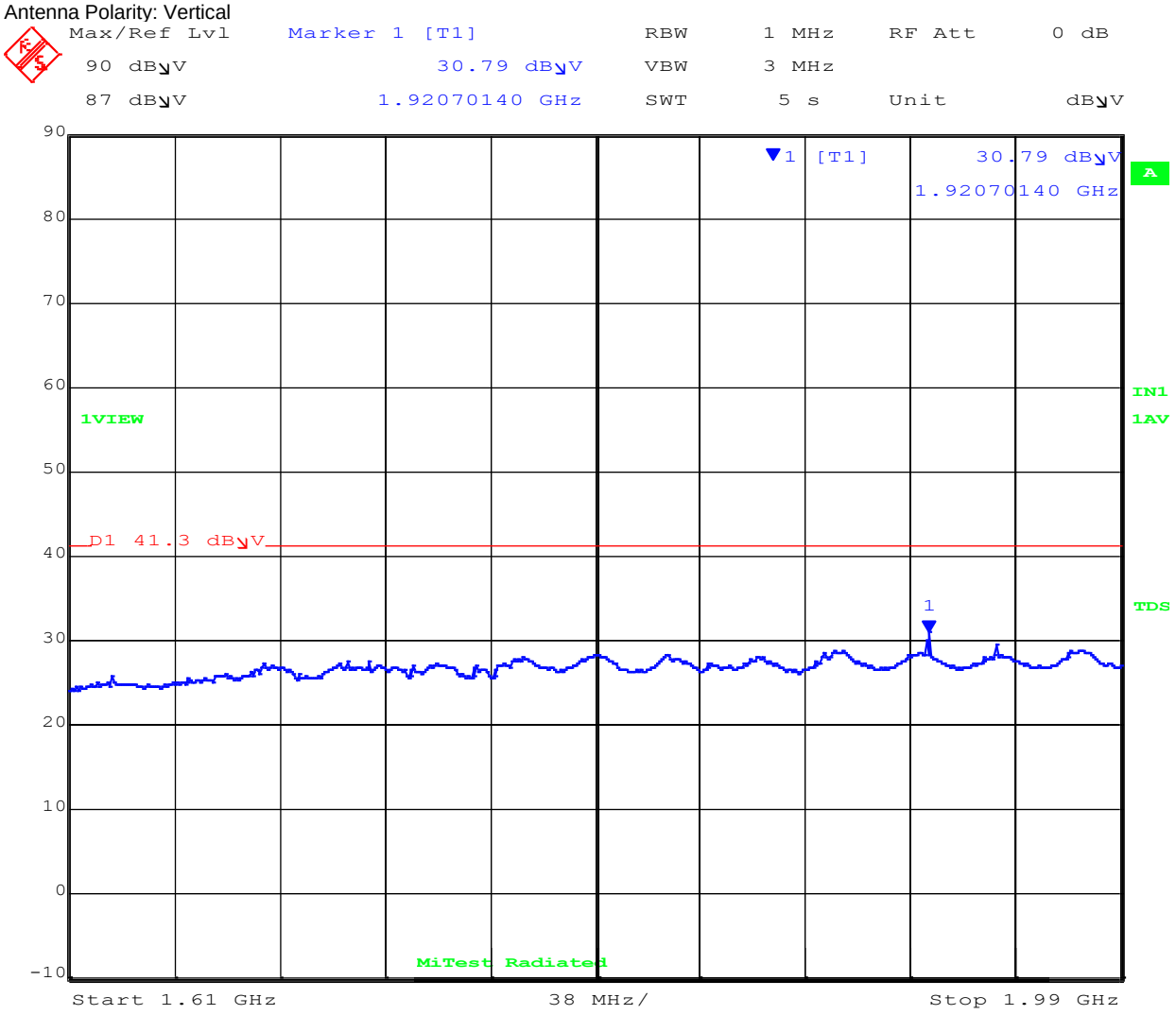

Date: 9.MAR.2021 14:10:13

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

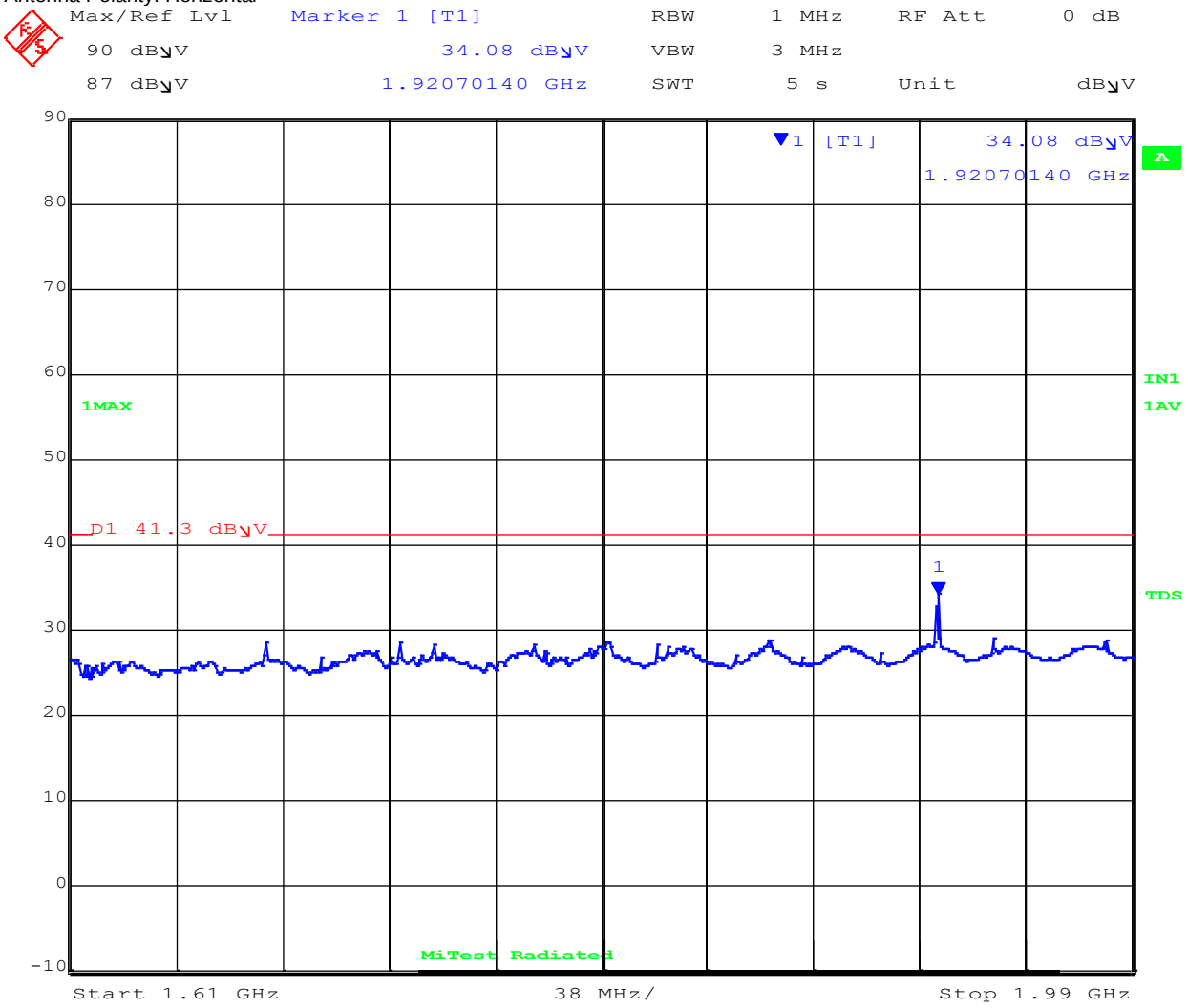
Antenna Polarity: Vertical




Date: 9.MAR.2021 14:04:06

Back to Matrix

Antenna Polarity: Horizontal



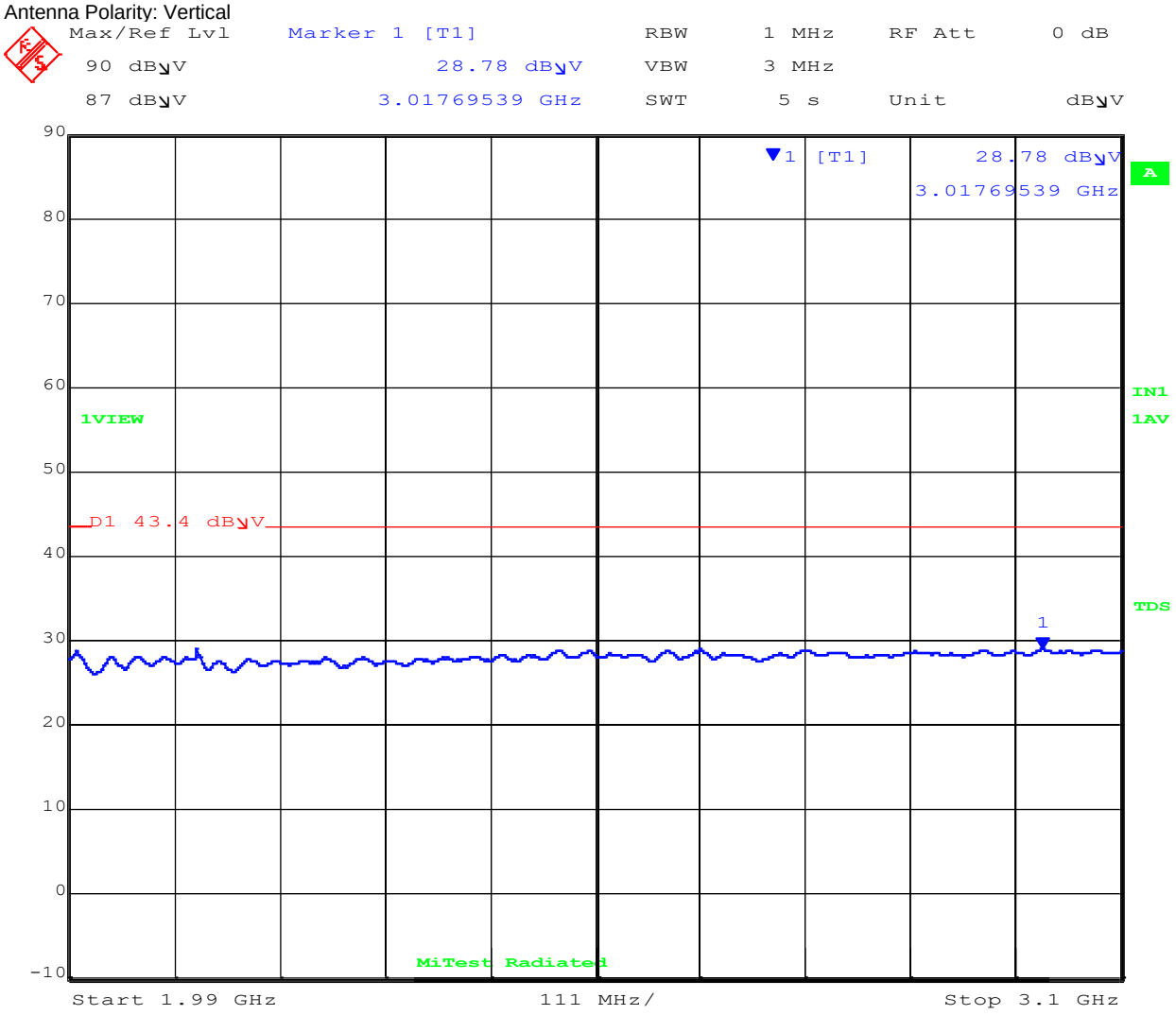

Date: 9.MAR.2021 14:05:20

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

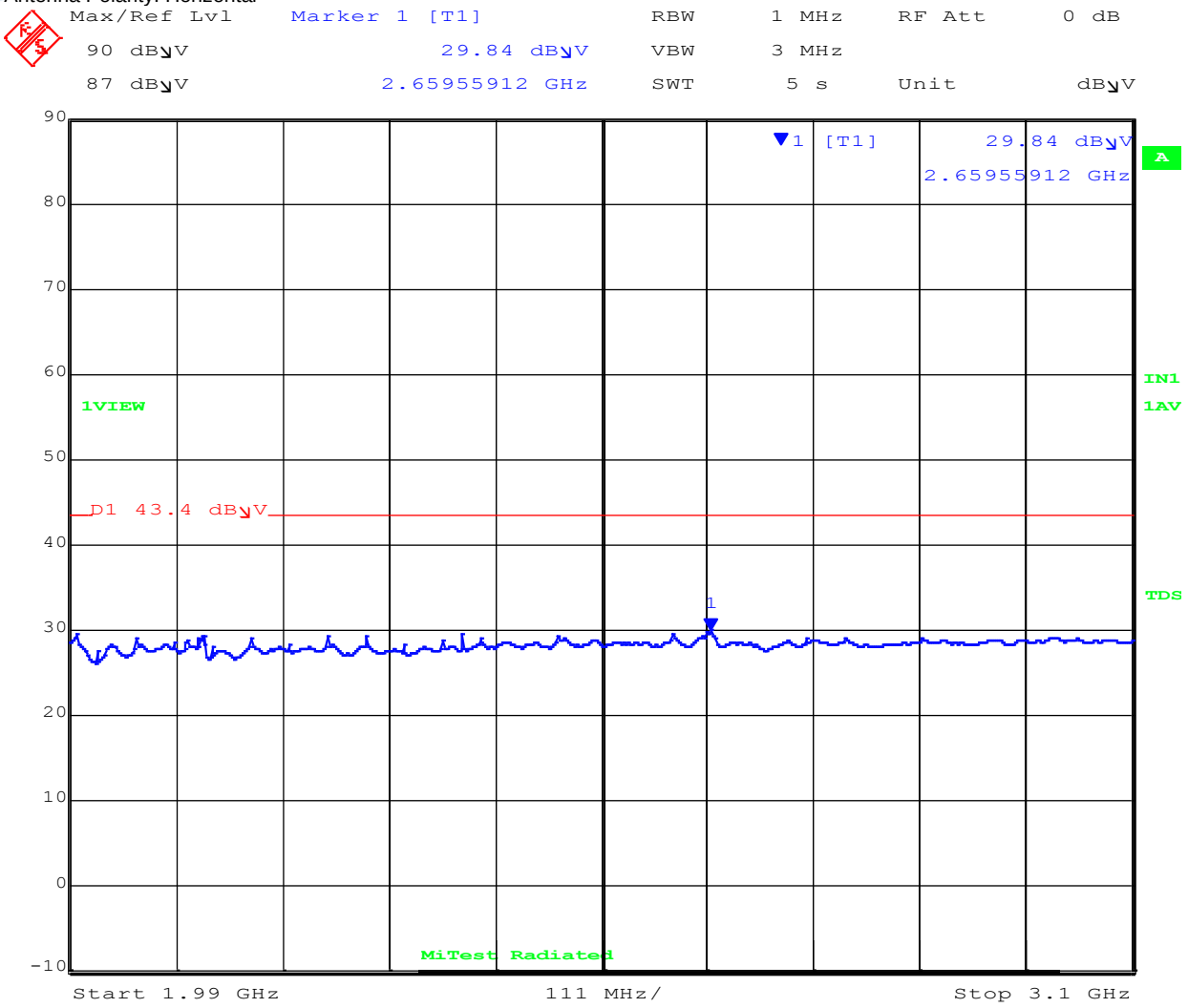
Antenna Polarity: Vertical




Date: 9.MAR.2021 14:01:44

[Back to Matrix]

Antenna Polarity: Horizontal



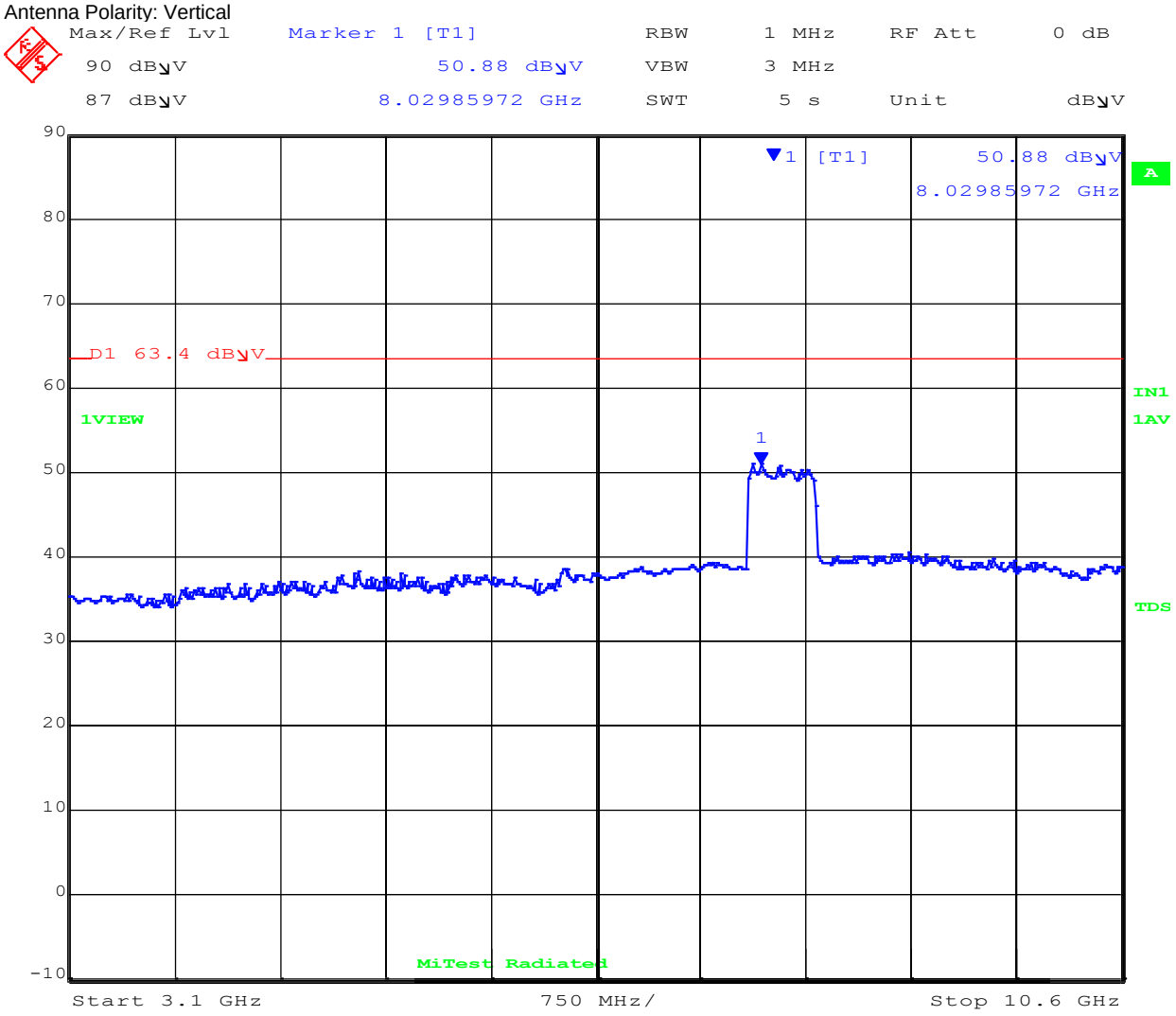

Date: 9.MAR.2021 13:59:59

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

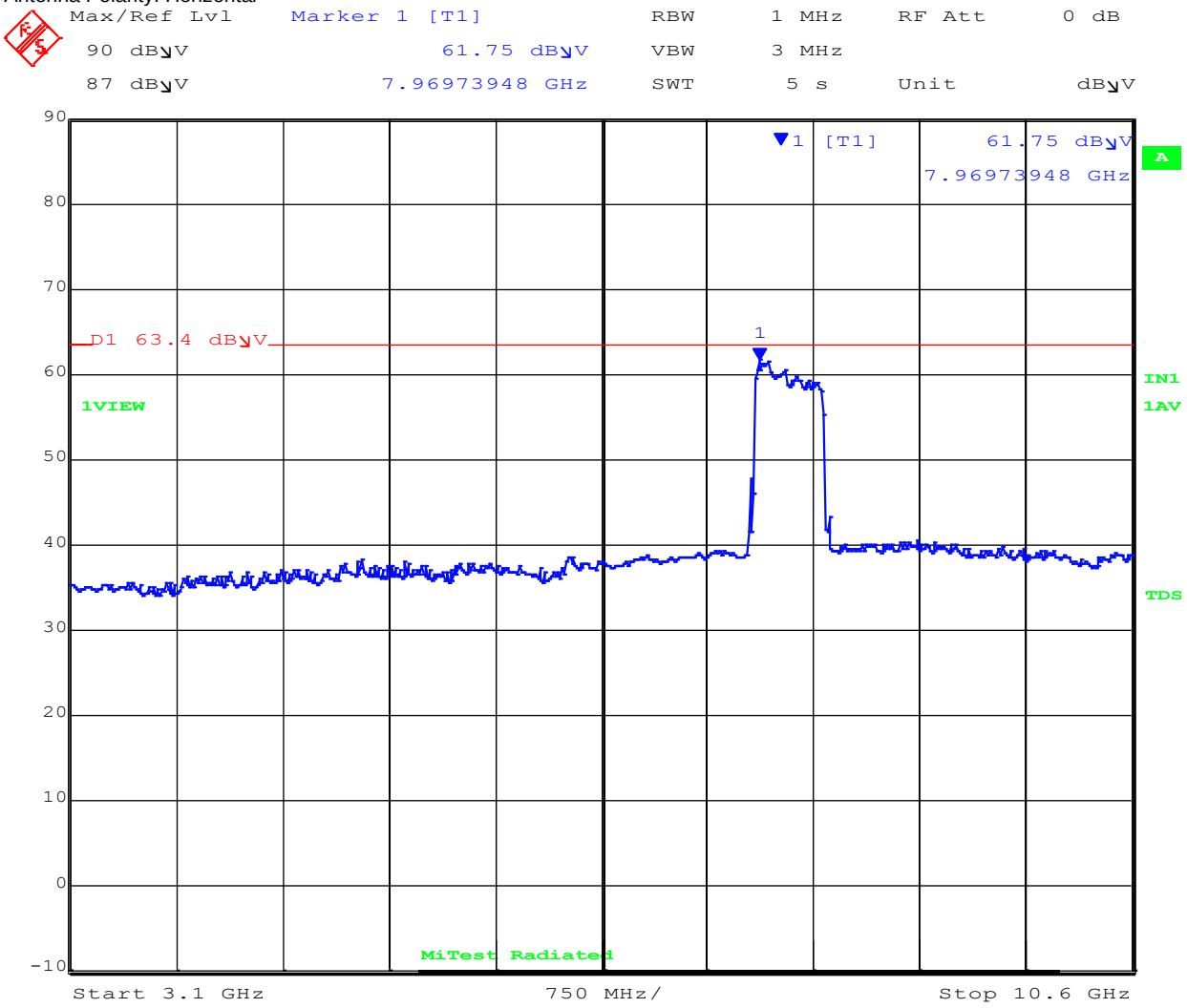
Antenna Polarity: Vertical




Date: 9.MAR.2021 13:55:07

Back to Matrix

Antenna Polarity: Horizontal



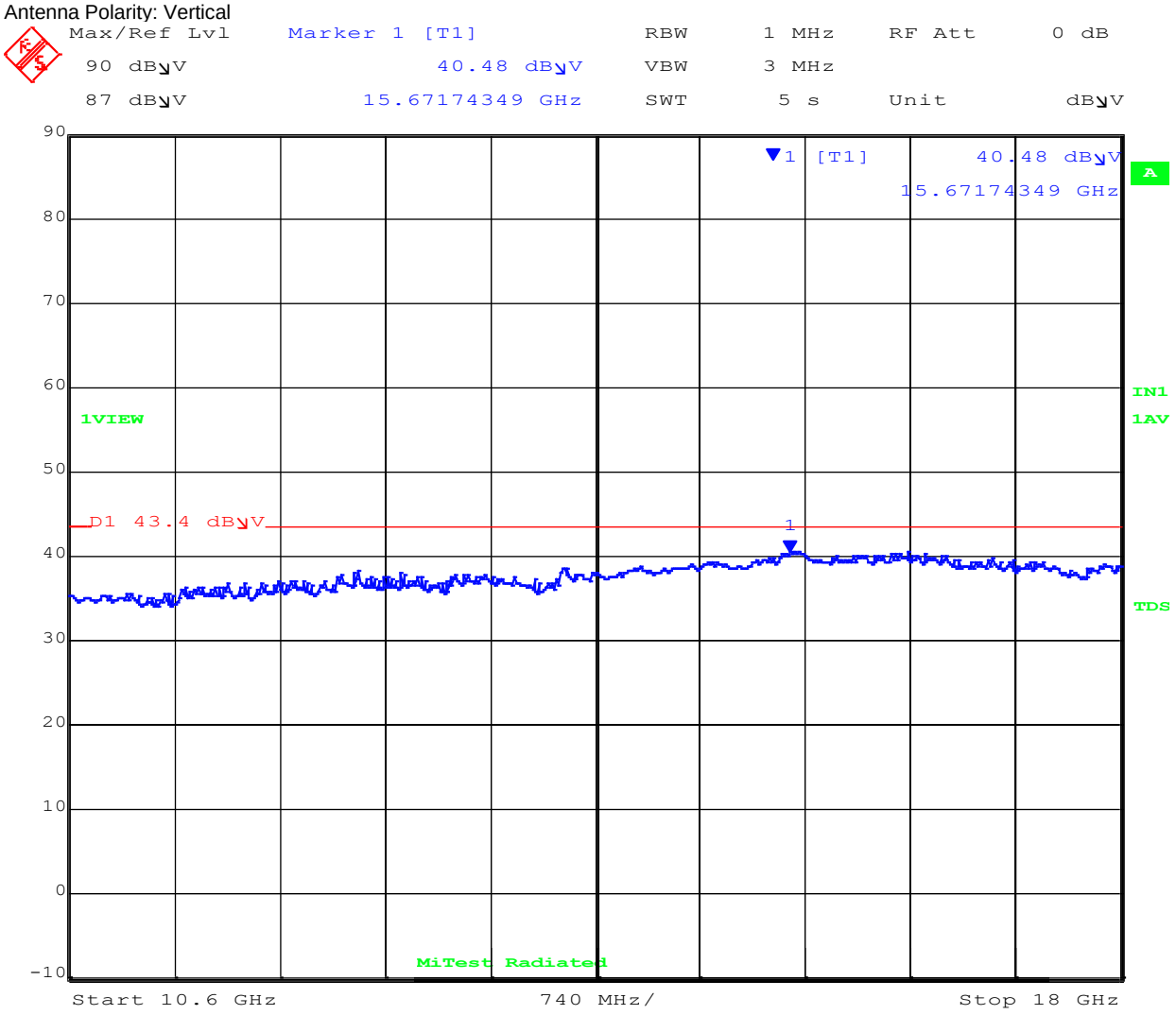

Date: 9.MAR.2021 13:56:34

Back to Matrix

RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

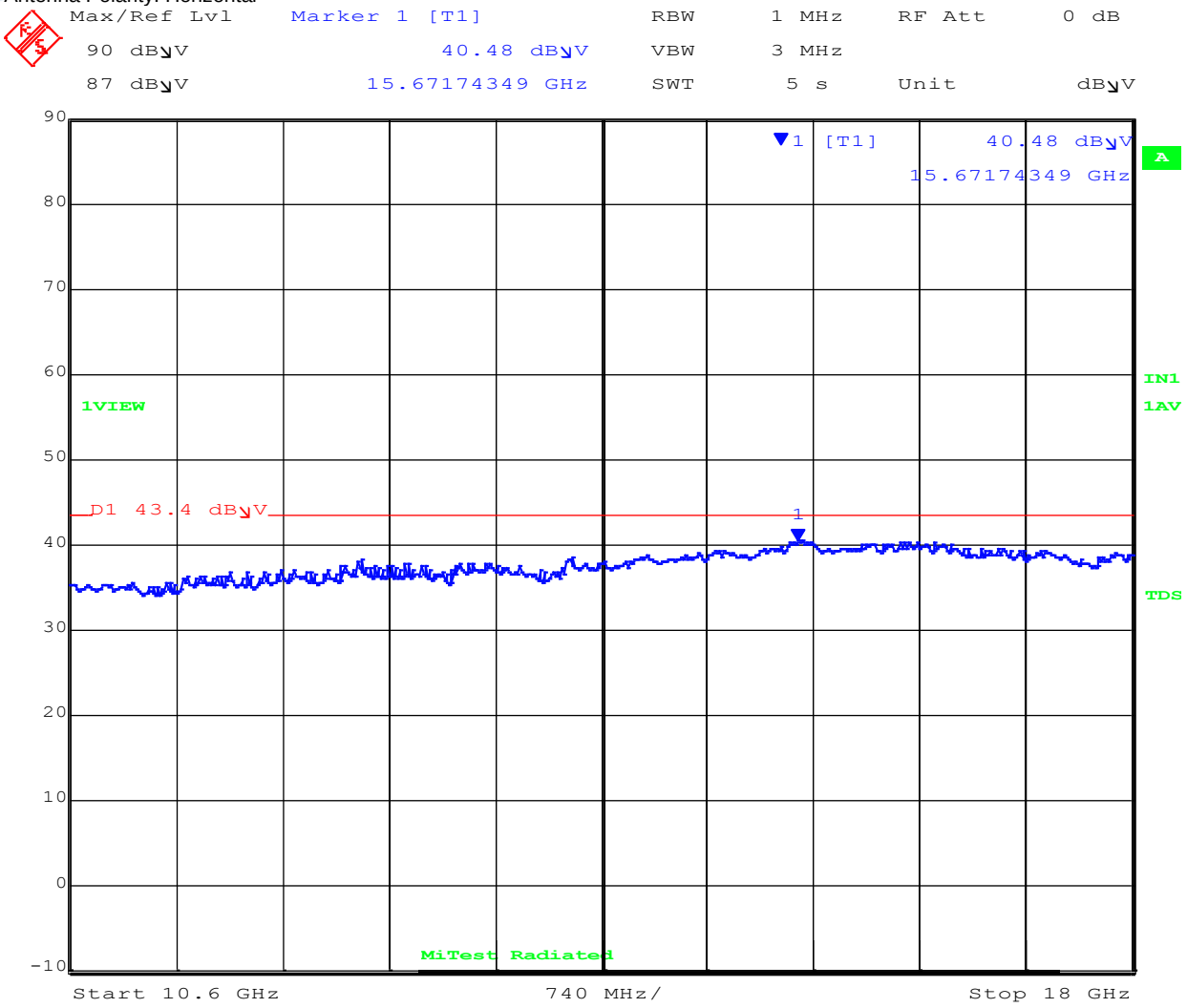
Antenna Polarity: Vertical




Date: 9.MAR.2021 13:52:55

Back to Matrix

Antenna Polarity: Horizontal



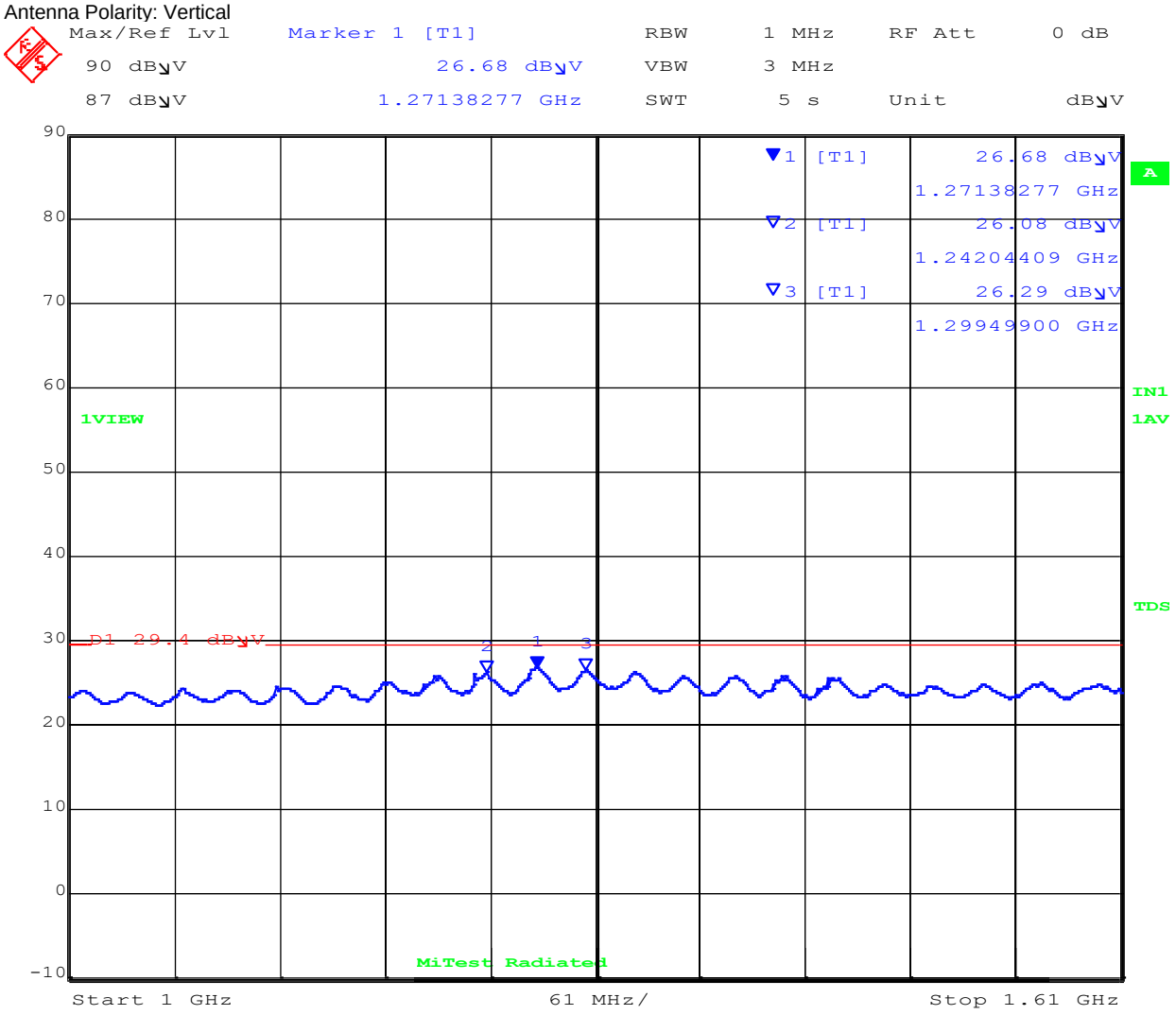

Date: 9.MAR.2021 13:50:52

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.0-1.61GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

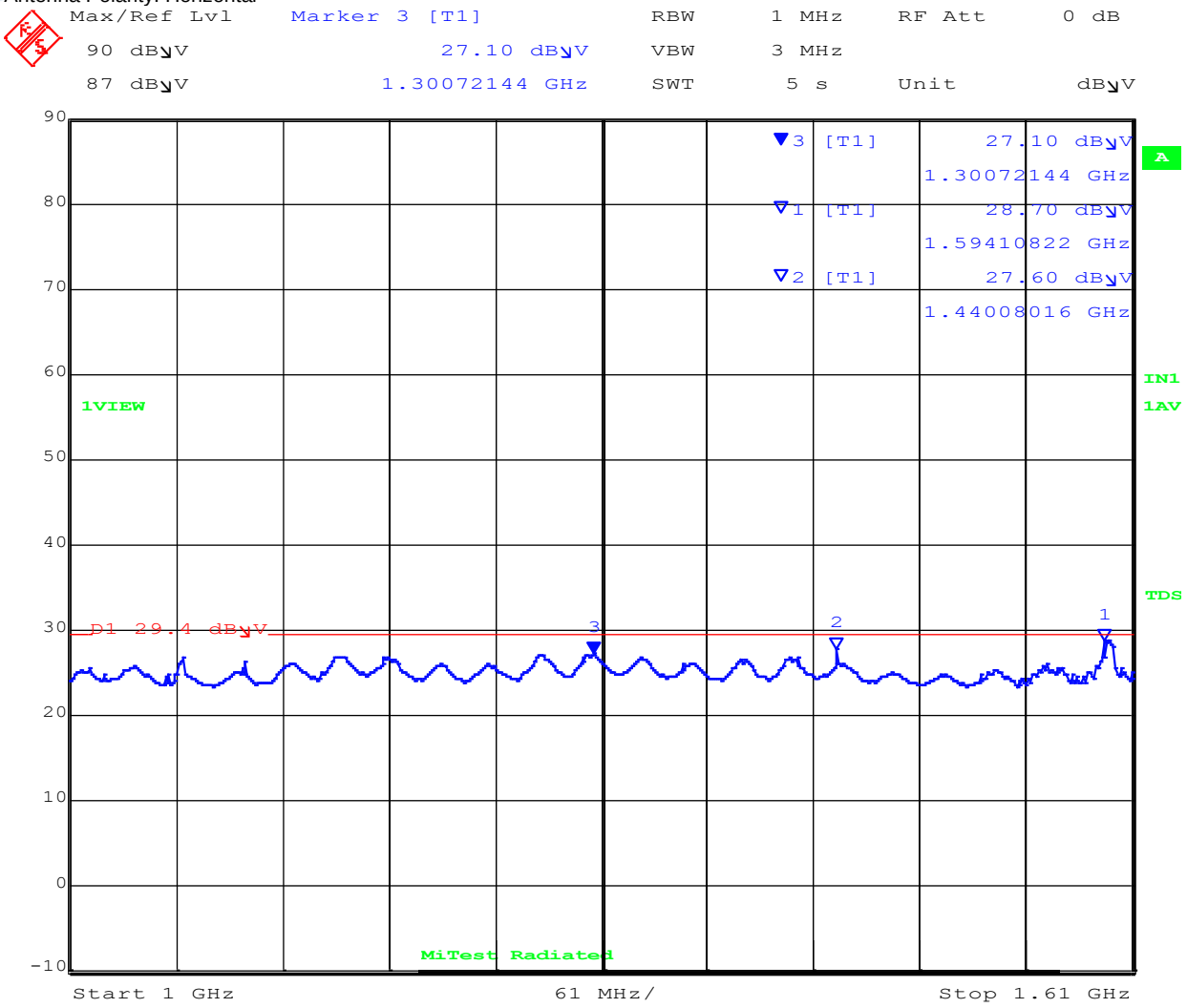
Antenna Polarity: Vertical




Date: 9.MAR.2021 14:42:21

[Back to Matrix]

Antenna Polarity: Horizontal



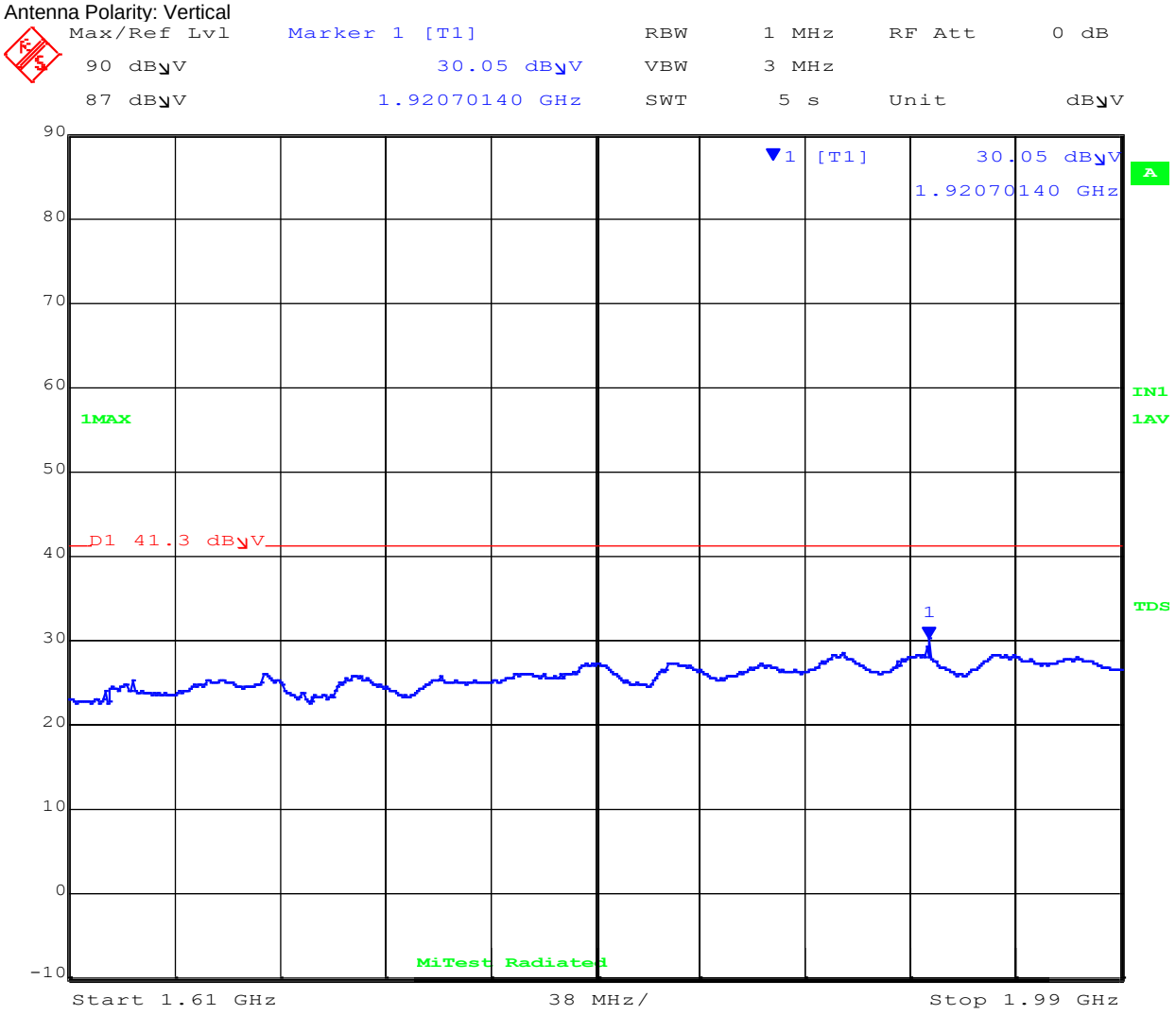

Date: 9.MAR.2021 14:44:53

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.61-1.99GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

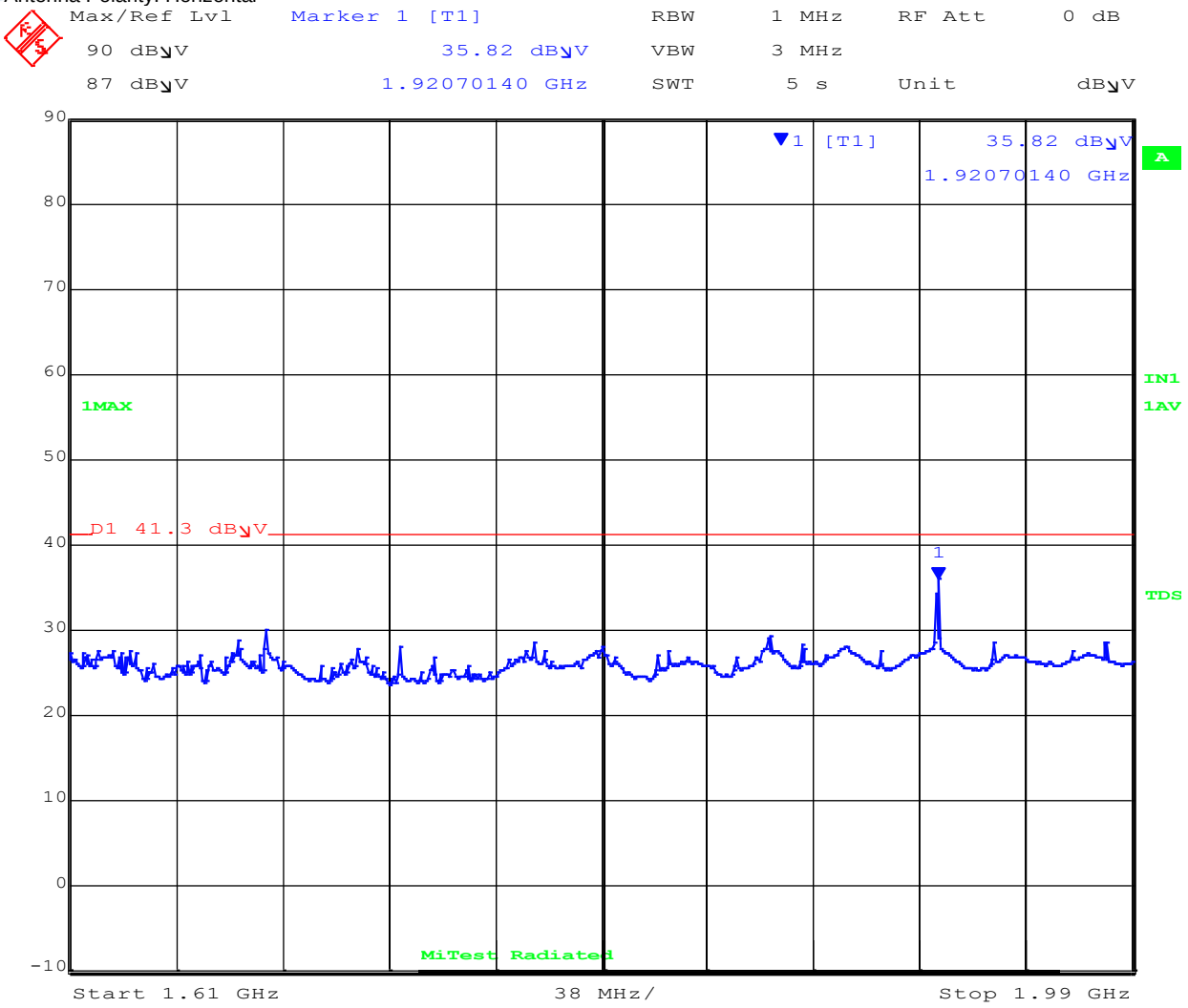
Antenna Polarity: Vertical




Date: 9.MAR.2021 14:54:54

Back to Matrix

Antenna Polarity: Horizontal



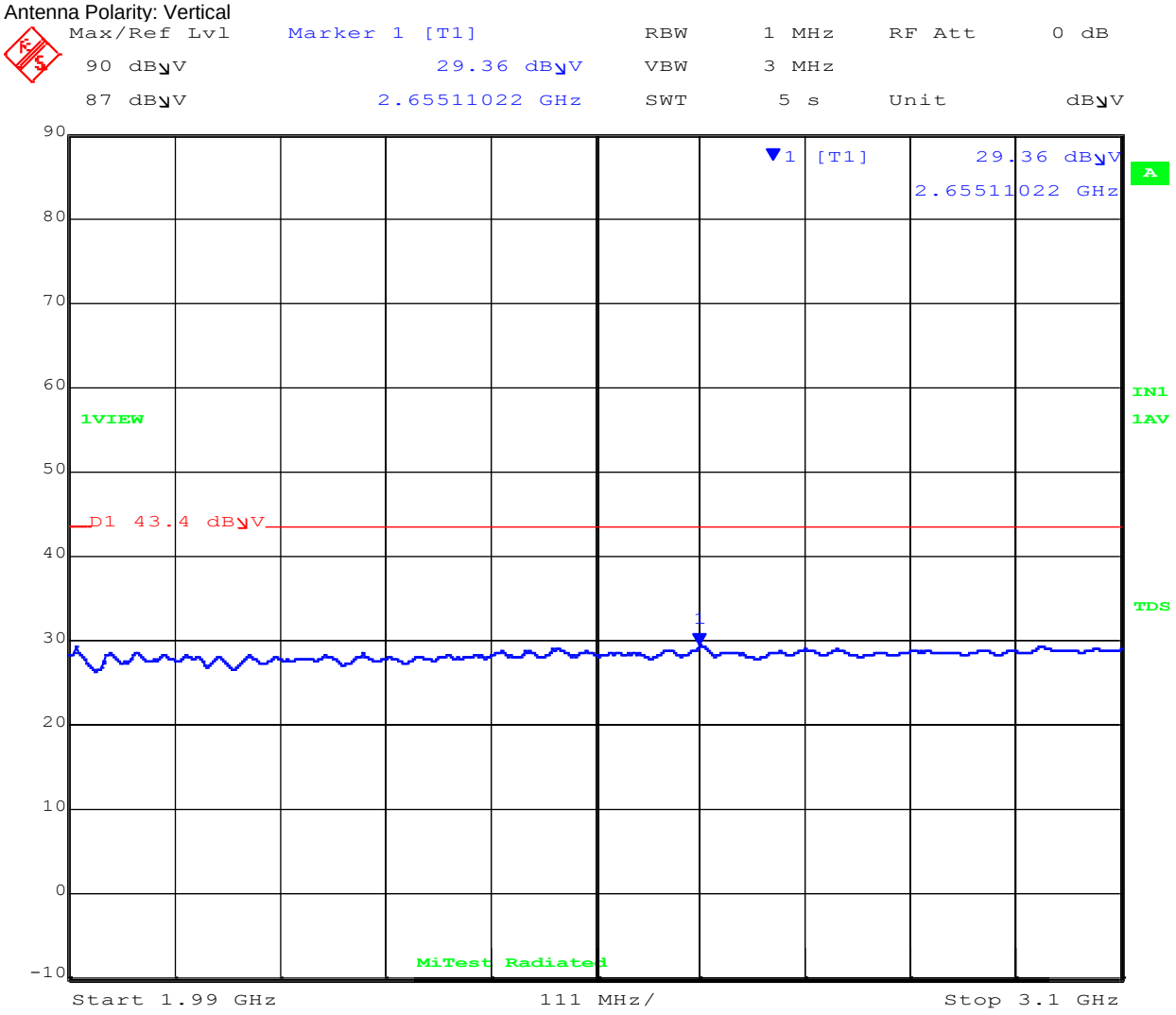

Date: 9.MAR.2021 14:55:53

Back to Matrix

RADIATED SPURIOUS EMISSIONS 1.99-3.1GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

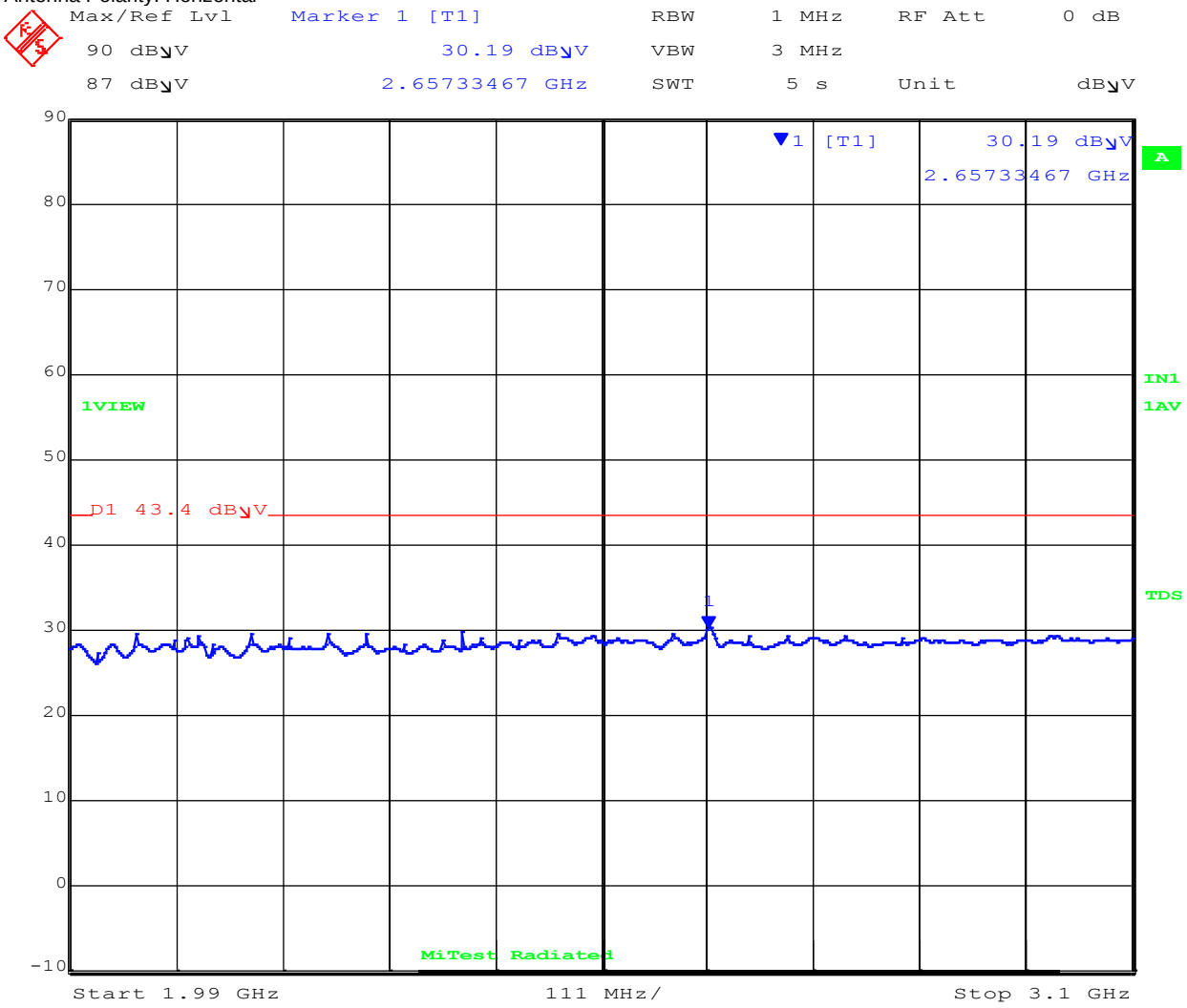
Antenna Polarity: Vertical




Date: 9.MAR.2021 15:00:05

Back to Matrix

Antenna Polarity: Horizontal



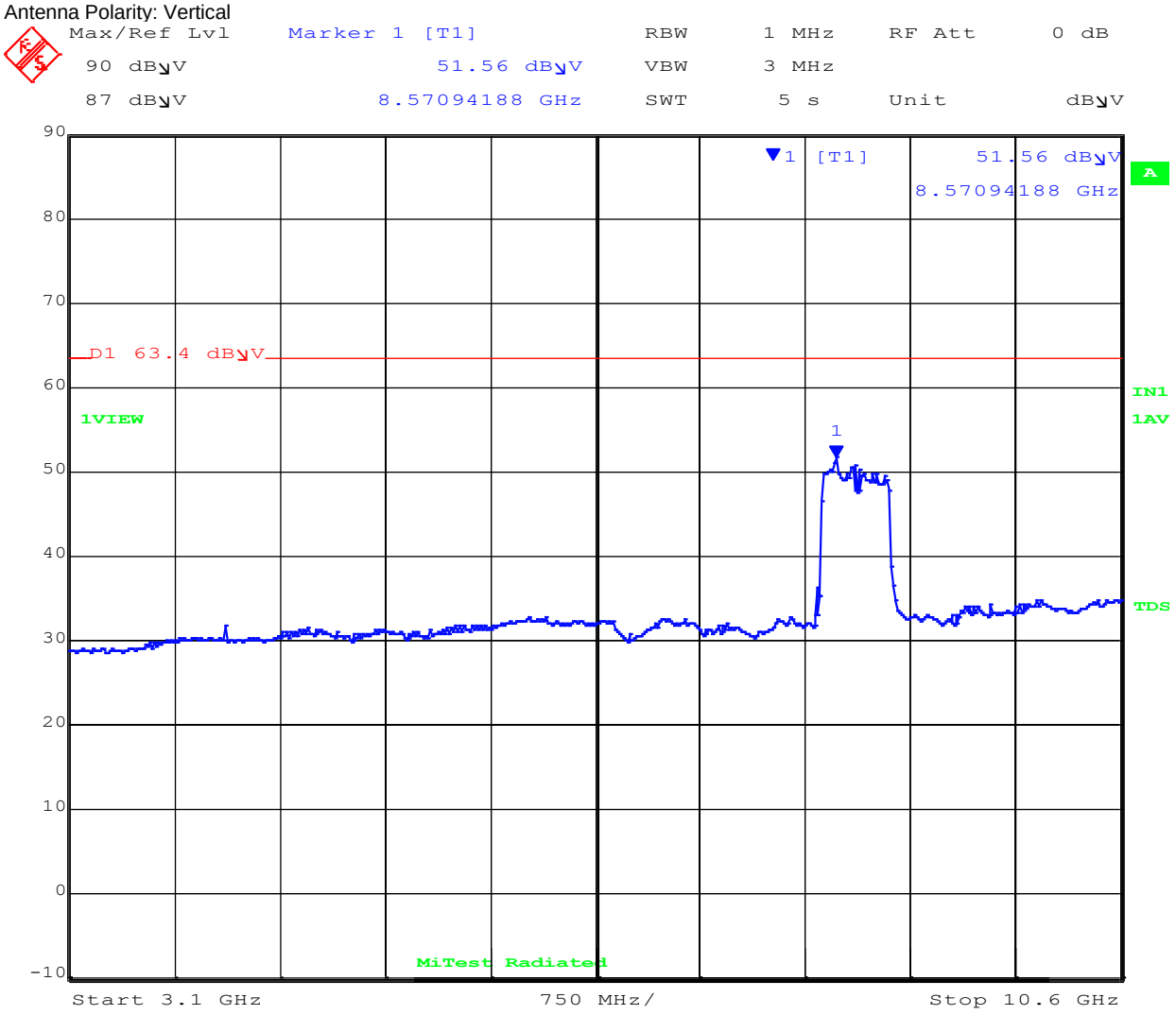

Date: 9.MAR.2021 14:57:38

Back to Matrix

RADIATED SPURIOUS EMISSIONS 3.1-10.6GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

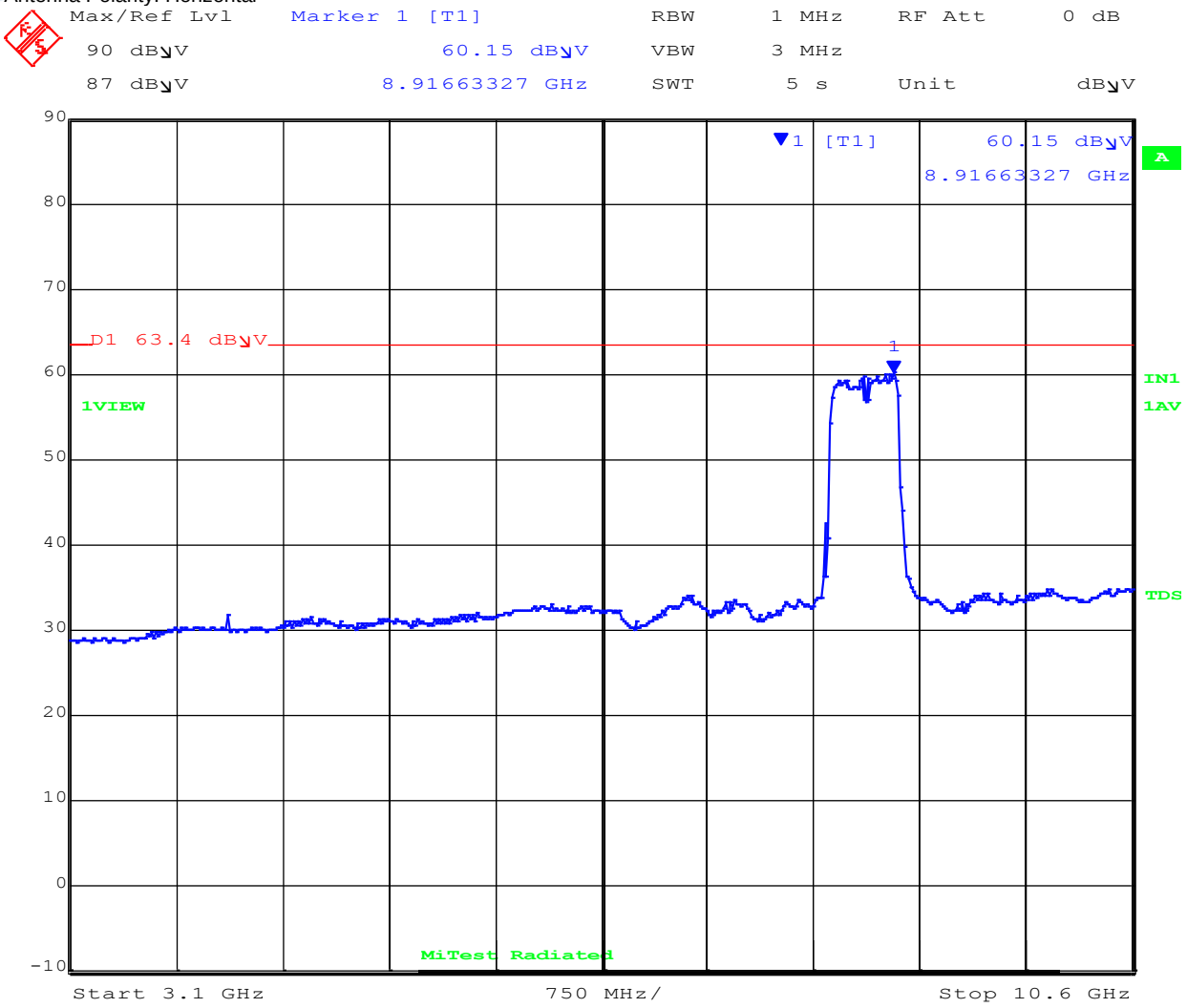
Antenna Polarity: Vertical




Date: 9.MAR.2021 15:02:34

Back to Matrix

Antenna Polarity: Horizontal




Date: 9.MAR.2021 15:03:46

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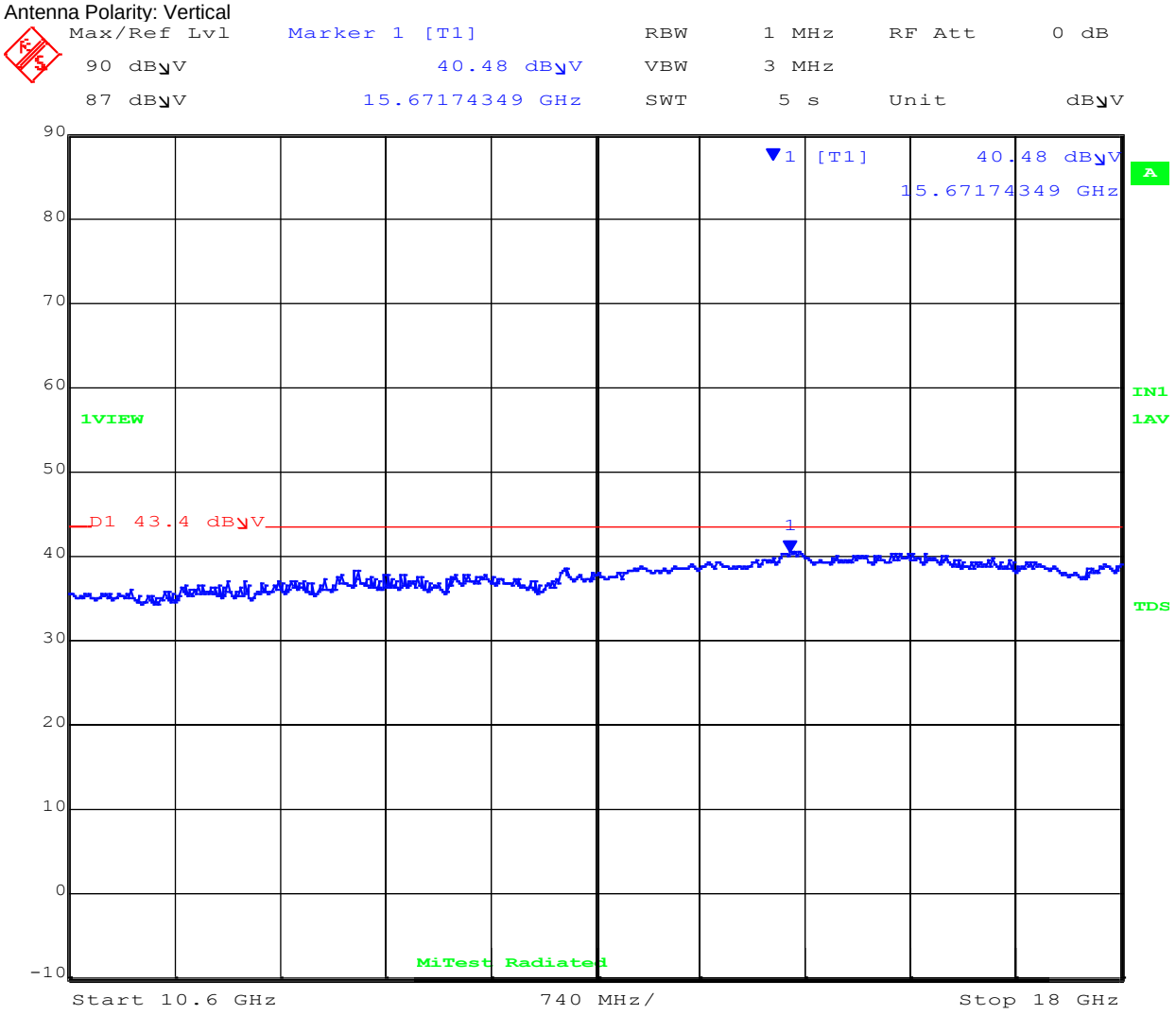
RADIATED SPURIOUS EMISSIONS 10.6-16GHz

Antenna: integral, Power Setting: Max, Duty Cycle (%): 99

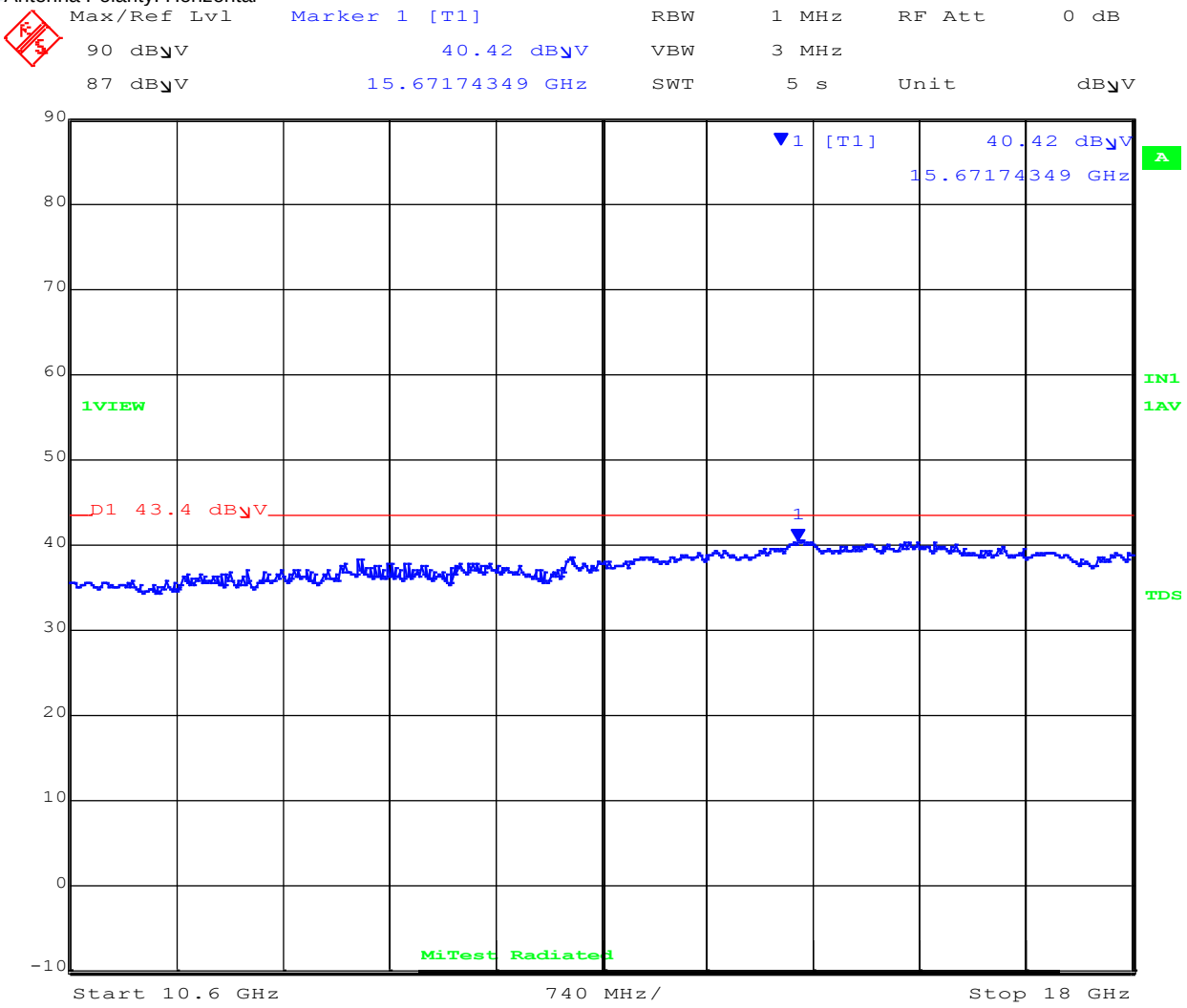
Antenna Polarity: Vertical




Date: 9.MAR.2021 15:07:47

Back to Matrix

Antenna Polarity: Horizontal




Date: 9.MAR.2021 15:05:20

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# B. APPENDIX – Manufacturer Declaration on Similarity of Models

www.alereon.com | 10800 Pecan Park Blvd. | Suite 100 | Austin,Tx 78750 | 512.345.4200 | 512.345.4201

To whom it may concern,

This is to inform you that the boards listed below all use the exact same Alereon chipset AL5350B/AL5100 and therefore the same radio. We are transmitting UWB that operates in frequencies of: 3168 MHz – 4752 MHz & 6336 MHz – 8968 MHz

1. AL5804_Impact – uses USB interface
2. AL5834_Combat256 – uses USB interface
3. AL5830_Commander256 – uses compact flash interface (parallel port)
4. AL5833_Destroyer256 - uses compact flash interface (parallel port)
5. AL5835_Camouflage256 – uses I2C_UART interface
6. AL5808_Octal – uses Octal SPI interface

All these boards have the same radio design/layout except for the external connector (USB, parallel port or serial) and form factor, therefore for the conducted tests, testing just the AL5834_Combat256 is perfectly adequate.

Sincerely,

David Shoemaker
CEO
Alereon, Inc.

03/23/2021

3/23/2021 CONFIDENTIAL 1 of 1


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