# REGULATORY COMPLIANCE TEST REPORT

## FCC CFR 47 Part 15 Subpart E 15.407

## Report No.: RDWN73-U4 Rev A

**Company:** Radwin

**Model Name:** NEO, NEO DUO

# REGULATORY COMPLIANCE TEST REPORT

**Company Name:** Radwin

**Model Name:** NEO, NEO DUO

**To:** FCC CFR 47 Part 15 Subpart E 15.407

**Test Report Serial No.:** RDWN73-U4 Rev A

This report supersedes: NONE

Applicant: Radwin
27 Habarzel Street
Tel Aviv 6971039
Israel

Issue Date: 12th 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
Fax: +1 (925) 462-0306
www.micomlabs.com

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 test reports. MiCOM Labs test reports are accepted globally.

| Country | Recognition Body | Status | MRA Phase | Identification No. |
|---|---|---|---|---|
| USA | Federal Communications Commission (FCC) | TCB | - | US0159<br>Test Site Designation #: US1084 |
| Canada | Industry Canada (ISED) | FCB | APEC MRA 2 | US0159<br>Test Company #: 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 Phases*
*Phase 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 | 6th April 2021 | Draft for comment |
| Draft #2 | 8th April 2021 | |
| Rev A | 12th April 2021 | Initial release |
| | | |
| | | |
| | | |
| | | |

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





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

# 3. TEST RESULT CERTIFICATE

| | | | |
|---|---|---|---|
| **Manufacturer:** | Radwin<br>27 Habarzel Street<br>Tel Aviv 6971039<br>Israel | **Tested By:** | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton<br>California 94566 USA |
| **Model:** | NEO, NEO DUO | **Telephone:**<br>**Fax:** | +1 925 462 0304<br>+1 925 462 0306 |
| **Type Of Equipment:** | 5 GHz Single, Dual Carrier Beamforming Base Station | | |
| **S/N's:** | Prototype #1 | | |
| **Test Date(s):** | 16th – 26th March 2021 | **Website:** | www.micomlabs.com |

| STANDARD(S) | TEST RESULTS |
|---|---|
| FCC CFR 47 Part 15 Subpart E 15.407 | 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 | KDB 662911 D01 & D02 | Oct 31 2013 | Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band |
| II | KDB 905462 D07 v02 | 22nd August 2016 | Test guidance to demonstrate compliance for U-NII devices subject to DFS requirements. |
| III | KDB 926956 D01 v02 | 22nd August 2016 | U-NII Device Transition Plan |
| IV | A2LA | 5th October 2020 | R105 - Requirement's When Making Reference to A2LA Accreditation Status |
| V | ANSI C63.10 | 2013 | American National Standard for Testing Unlicensed Wireless Devices |
| VI | 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 |
| VII | CISPR 32 | 2015 | Electromagnetic compatibility of multimedia equipment - Emission requirements |
| VIII | 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 |
| IX | FCC 06-96 | Jun 30 2006 | Memorandum Opinion and Order |
| X | FCC 47 CFR Part 15.407 | 2020 | Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices |
| XI | ICES-003 | Issue 7 ; October 15,2020 | Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement. |
| XII | M 3003 | Edition 3 Nov.2012 | Expression of Uncertainty and Confidence in Measurements |
| XIII | RSS-247 Issue 2 | Feb 2017 | Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices |
| XIV | RSS-Gen Issue 5 | March 2019 Amendment 1 | General Requirements for Compliance of Radio Apparatus |
| XV | FCC 47 CFR Part 2.1033 | 2020 | FCC requirements and rules regarding photographs and test setup diagrams. |
| XVI | KDB 905462 D02 v02 | April 8 2016 | Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5250 to 5350 MHz and 5470 to 5725 MHz bands incorporating Dynamic Frequency Selection. |
| XVII | KDB 789033 D02 V02r01 | 14th December, 2017 | Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E |

## 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.





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# 5. PRODUCT DETAILS AND TEST CONFIGURATIONS

## 5.1. Technical Details

| Details | Description |
|---|---|
| Purpose: | Test of the Radwin NEO, NEO DUO to FCC CFR 47 Part 15 Subpart E 15.407.<br>Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5150 to 5250 MHz |
| Applicant: | Radwin<br>27 Habarzel Street<br>Tel Aviv 6971039 Israel |
| Manufacturer: | Radwin |
| Laboratory performing the tests: | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton California 94566 USA |
| Test report reference number: | RDWN73-U4 |
| Date EUT received: | 15 March 2021 |
| Standard(s) applied: | FCC CFR 47 Part 15 Subpart E 15.407. |
| Dates of test (from - to): | 16th – 31st March 2021 |
| No of Units Tested: | 1 |
| Product Family Name: | NEO |
| Model(s): | NEO, NEO DUO |
| Location for use: | Outdoors |
| Declared Frequency Range(s): | 5150 - 5250 MHz |
| Type of Modulation: | BPSK, QPSK, 16QAM, 64QAM, 256QAM |
| EUT Modes of Operation: | 10MHz; 20MHz; 40MHz; 80MHz; |
| Declared Nominal Output Power (dBm): | +26 dBm |
| Transmit/Receive Operation: | Transceiver |
| Rated Input Voltage and Current: | 55V DC |
| Operating Temperature Range: | -35 – 60 ºC |
| ITU Emission Designator: | 10M0W7W, 20M0W7W, 40M0W7W, 80M0W7W |
| Equipment Dimensions: | 3.5 / 13.4 / 12.8 in |
| Weight: | 7.74 lb |
| Hardware Rev: | Prototype |
| Software Rev: | Prototype |

## 5.2. Scope Of Test Program

**Radwin NEO, NEO DUO**

The scope of the test program was to test the Radwin NEO DUO, Dual Carrier 5.x GHz Base Station with Beamforming Antenna configurations in the frequency ranges 5150 - 5250 MHz for compliance against the following specification:

**FCC CFR 47 Part 15 Subpart E 15.407**
Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5150 to 5250 MHz.

**RSS-247 Issue 2**
Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and License-Exempt Local Area Network (LE-LEN) Devices.

As the RADWIN NEO DUO has integrated beamforming antenna this program was completed all radiatively. By observation the 256QAM was the worst-case modulation and was used for test purposes.

**System Test and Measurement Configurations**
The RADWIN NEO DUO consists of 2 identical radios each with 2 ports driving one cross polarized antenna per radio. Each radio can transmit on all available frequencies, but both radios cannot transmit on the same frequency simultaneously.

The RADWIN NEO consists of 1 radio with 2 antenna ports which drive a cross polarized antenna.

As the unit's RF modules were identical only a single radio of the RADWIN NEO DUO was exercised, and results duplicated where necessary for the 2nd radio.

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

| Type (EUT/ Support) | Equipment Description | Manufacturer | Model No. | Serial No. |
|---|---|---|---|---|
| EUT | Dual Carrier 5.x GHz Base Station with Beamforming Antenna | RADWIN | RADWIN NEO DUO | Prototype |
| Support | POE Power Supply | Sinpro | CPU55A-270-1 | -- |
| Support | Laptop | Dell | -- | -- |

## 5.4. Antenna Details

| Type | Manufacturer | Model | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|---|---|---|---|---|---|---|---|---|
| integral | RADWIN | MR0269440 | Sector | 10.0 | - | 90 | Yes | 5150 - 5250 |
| integral | RADWIN | MR0269440BF | Directional | 10.0 | 6.0 | 30 | Yes | 5150 – 5250 |

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

## 5.5. Cabling and I/O Ports

| Port Type | Max Cable Length | # of Ports | Screened | Conn Type | Data Type | Bit Rate | Environment | Config |
|---|---|---|---|---|---|---|---|---|
| Ethernet PoE IN | >30m | 1 | | | Packet Data | 1000 | End-User\| | Without Primary Protection.\| |

## 5.6. Test Configurations

Results for the following configurations are provided in this report:

| Operational Mode(s) | Data Rate with Highest Power MBit/s | Channel Frequency (MHz) | | |
|---|---|---|---|---|
| | | Low | Mid | High |
| **5150 - 5250 MHz** | | | | |
| 10MHz | 39.00 | 5,175.00 | 5,210.00 | 5,245.00 |
| 20MHz | 78.00 | 5,180.00 | 5,210.00 | 5240.00 |
| 40MHz | 180.00 | 5,190.00 | 5,210.00 | 5,230.00 |
| 80MHz | 390.00 | -- | 5,210.00 | -- |

## 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

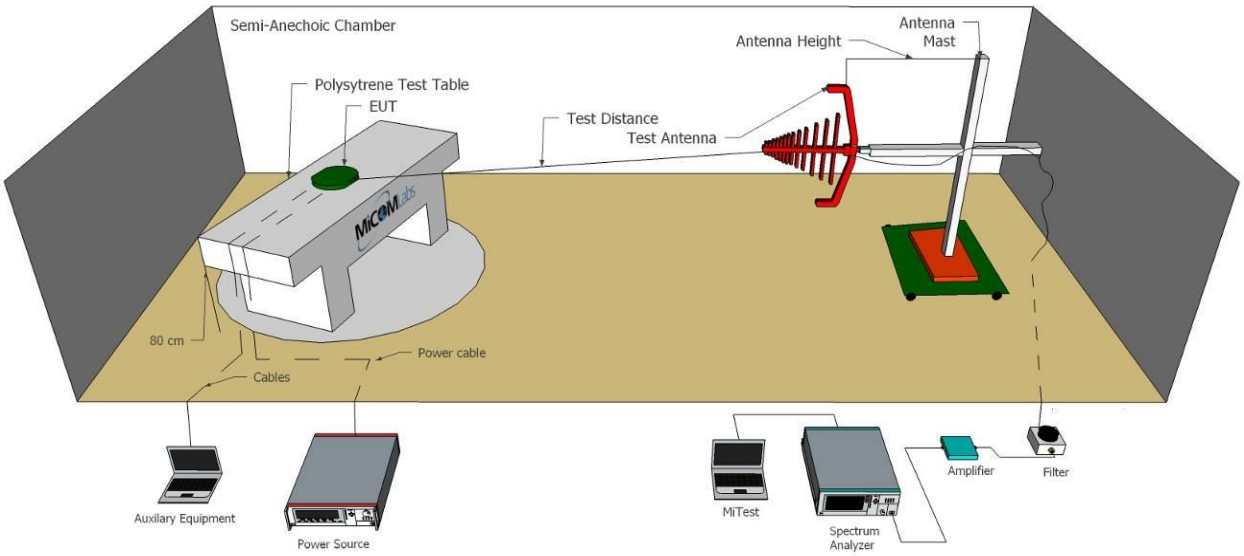
| Test Header | Result | Data Link |
|---|---|---|
| Peak Transmit Power | Complies | View Data |
| 26 dB & 99% Bandwidth | Complies | View Data |
| Power Spectral Density | Complies | View Data |
| Radiated | Complies | - |
| TX Spurious & Restricted Band Emissions | Complies | - |
| RADWIN MR0269440 | Complies | View Data |
| RADWIN MR0269440BF | Complies | View Data |
| Restricted Edge & Band-Edge Emissions | Complies | - |
| RADWIN MR0269440 | Complies | View Data |
| RADWIN MR0269440BF | Complies | View Data |
| Digital Emissions | Complies | View Data |
| AC Wireline | Complies | View Data |

# 7. TEST EQUIPMENT CONFIGURATION(S)

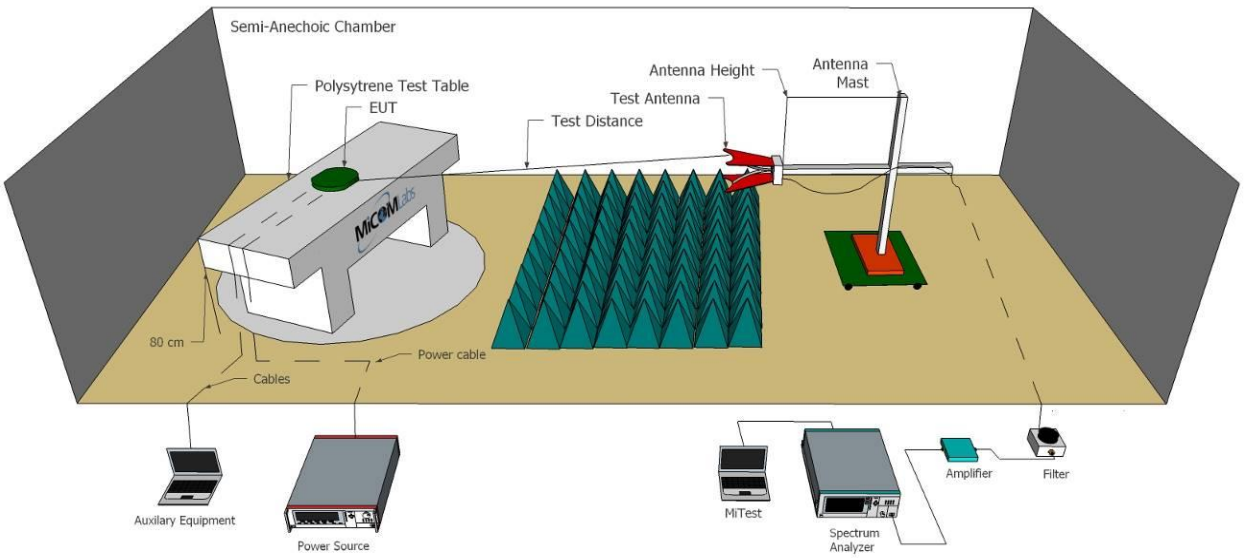
## 7.1. Radiated Emissions - 3m Chamber

**Test Setup for Radiated Emissions for above and below 1 GHz**

Radiated Emissions Below 1GHz Test Setup




Radiated Emissions Above 1GHz Test Setup



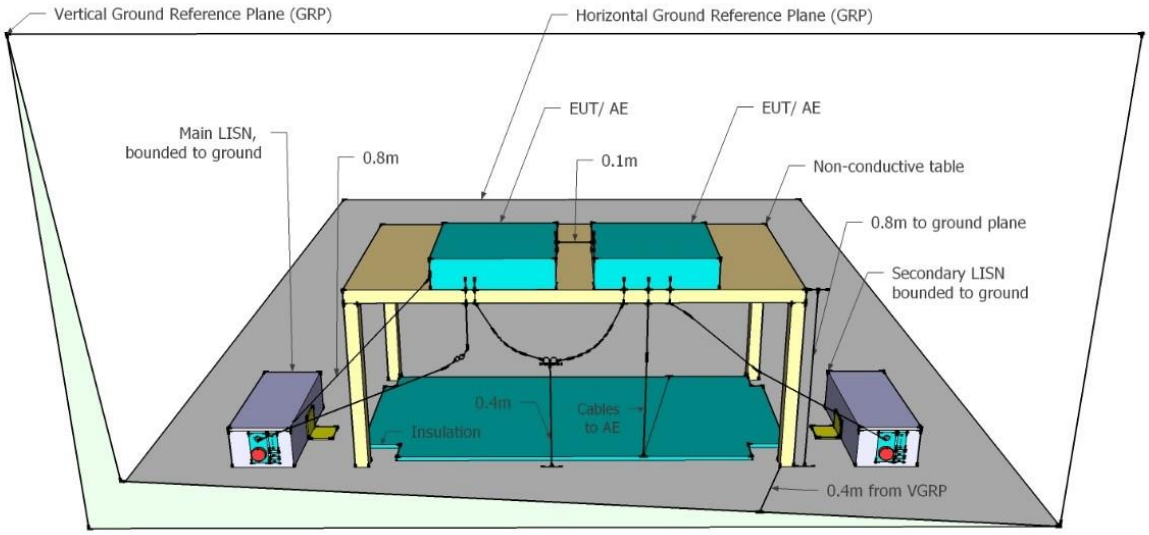
A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| 170 | Video System Controller for Semi Anechoic Chamber | Panasonic | WV-CU101 | 04R08507 | Not Required |
| 298 | 3M Radiated Emissions Chamber Maintenance Check | MiCOM | 3M Chamber | 298 | 26 Apr 2021 |
| 338 | Sunol 30 to 3000 MHz Antenna | Sunol | JB3 | A052907 | 4 Apr 2021 |
| 377 | Band Rejection Filter 5150 to 5880MHz | Microtronics | BRM50716 | 034 | 4 May 2021 |
| 378 | Rohde & Schwarz 40 GHz Receiver | 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 |
| 415 | Turntable Controller | Sunol Sciences | Turntable Controller | 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 |
| CC05 | Confidence Check | MiCOM | CC05 | None | 4 May 2021 |

## 7.2. ac Wireline

The ac Wireline Conducted Emissions test was performed using the conducted test set-up shown in the diagram below.

### Test Measurement Set up



**Assets Utilized for ac Wireline Emission Testing**

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

| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| 184 | Pulse Limiter | Rhode & Schwarz | ESH3Z2 | 357.8810.52 | 30 Aug 2021 |
| 190 | LISN (two-line V-network) | Rhode & Schwarz | ESH3Z5 | 836679/006 | 18 Apr 2021 |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 8 Oct 2021 |
| 295 | Conducted Emissions Chamber Maintenance Check | MiCOM | Conducted Emissions Chamber | 295 | 26 May 2021 |
| 307 | BNC-CABLE | Megaphase | 1689 1GVT4 | 15F50B002 | 28 Apr 2021 |
| 316 | Dell desktop computer workstation | Dell | Desktop | WS04 | Not Required |
| 372 | AC Variable PS | California Instruments | 1251P | L06951 | Cal when used |
| 378 | Rohde & Schwarz 40 GHz Receiver with Generator | Rhode & Schwarz | ESIB40 | 100107/040 | 12 Jun 2021 |
| 389 | LISN (3 Phase) 9kHz - 30 MHz for support equipment | Rohde & Schwarz | ESH2-Z5 | 881493/013 | Not Required |
| 496 | MiTest Conducted Emissions test software. | MiCOM | Conducted Emissions Test Software Version 1.0 | 496 | Not Required |
| 510 | Barometer/Thermometer | Control Company | 68000-49 | 170871375 | 20 Dec 2021 |
| CCEMC01 | Confidence Check. | MiCOM | CCEMC01 | None | 21 Apr 2021 |

# 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. Peak Transmit Power

| Conducted Test Conditions for Maximum Conducted Output Power | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Maximum Conducted Output Power | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (a)(1) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | KDB 789033 - D02 General UNII Test Procedures New Rules v01 | | |

**Test Procedure for Maximum Output Power Measurement**
Spectrum Analyzer Method. KDB 789033 defines a methodology using spectrum analyzer. Where power shall be calculated by integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99% occupied bandwidth of the signal. However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a). 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.
**KDB 662911 D01 & KDB 662911 D02**

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

Radiated measurements used for compliance with conducted limits, the following steps are required to ensure that the total emission power is determined for equipment driving cross polarized antennas:

(1) Measure radiated emissions with vertical and horizontal polarizations of the measurement antenna;
(2) Convert each radiated measurement to transmit power based on the antenna gain;

EIRP level to an equivalent electric field strength using the following relationship:
E = EIRP – 20*log (D) + 104.8

Where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

(3) Sum the powers across the two polarizations to compare the resultant electric field strength level to the applicable limit.

Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

**Limits Maximum Conducted Output Power**

**Operating Frequency Band 5150-5250 MHz**

15. 407 (a)(1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

**Consolidated Power Results, EIRP Limits**

The EUT was tested for Radiated Output Power and the following tables define the worst case compliant results defined for each Antenna

## *Output Power – Consolidated Summary Table*

**Antenna Type – Integrated (outdoor use only)**

| Antenna | Gain | Channel Bandwidth | Channel | Combined Output Power *(H+V)* | Calc EIRP | Limit | Margin | Power Setting |
|---|---|---|---|---|---|---|---|---|
| **Model Number** | **dBi** | **MHz** | **MHz** | **dBm** | **dBm/ EIRP** | **dBm/ EIRP** | **dB** | |
| MR0269440 | 10.0 | 10 | 5175 | 25.75 | 35.75 | 36.00 | -0.25 | 1.0 |
| | | | 5210 | 25.68 | 35.68 | 36.00 | -0.32 | 1.5 |
| | | | 5245 | 25.57 | 35.57 | 36.00 | -0.43 | 1.0 |
| | | 20 | 5180 | 25.65 | 35.65 | 36.00 | -0.35 | 1.5 |
| | | | 5210 | 25.56 | 35.56 | 36.00 | -0.44 | 2.0 |
| | | | 5240 | 25.75 | 35.75 | 36.00 | -0.25 | 2.0 |
| | | 40 | 5190 | 25.62 | 35.62 | 36.00 | -0.38 | 1.5 |
| | | | 5210 | 25.64 | 35.64 | 36.00 | -0.36 | 2.0 |
| | | | 5230 | 25.62 | 35.62 | 36.00 | -0.38 | 2.0 |
| | | 80 | 5210 | 25.84 | 35.84 | 36.00 | -0.16 | 2.0 |
| | | | | | | | | |
| MR0269440 BF | 16.0 | 10 | 5175 | 19.44 | 35.44 | 36.00 | -0.56 | -4.0 |
| | | | 5210 | 19.62 | 35.62 | 36.00 | -0.38 | -3.5 |
| | | | 5245 | 19.81 | 35.81 | 36.00 | -0.19 | -3.5 |
| | | 20 | 5180 | 19.54 | 35.54 | 36.00 | -0.46 | -3.0 |
| | | | 5210 | 19.55 | 35.55 | 36.00 | -0.45 | -2.5 |
| | | | 5240 | 19.84 | 35.84 | 36.00 | -0.16 | -2.5 |
| | | 40 | 5190 | 19.68 | 35.68 | 36.00 | -0.32 | -3.0 |
| | | | 5210 | 19.83 | 35.83 | 36.00 | -0.17 | -2.5 |
| | | | 5230 | 19.95 | 35.95 | 36.00 | -0.05 | -2.5 |
| | | 80 | 5210 | 19.26 | 35.26 | 36.00 | -0.74 | -3.0 |

### 9.1.1. Non-Beamforming

The following tables used the lowest gain antenna to calculate the maximum conducted power from the EUT.

The following table identifies the power referenced to the "antenna ports'

| Equipment Configuration for RF Output Power |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | 10MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 39 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dB | Numeric | Numeric |
| **5175** | 18.72 | 22.44 | 25.75 | 26.00 | -0.25 | 1.0 |
| **5210** | 18.61 | 22.39 | 25.68 | 26.00 | -0.32 | 1.5 |
| **5245** | 18.64 | 22.22 | 25.57 | 26.00 | -0.43 | 1.0 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 20MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 78 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dB | Numeric | Numeric |
| **5180** | 18.53 | 22.38 | 25.65 | 26.00 | -0.35 | 1.5 |
| **5210** | 18.61 | 22.22 | 25.56 | 26.00 | -0.44 | 2.0 |
| **5240** | 18.98 | 22.33 | 25.75 | 26.00 | -0.25 | 2.0 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 40MHz Bandwidth | **Duty Cycle (%):** | 90 |
| **Data Rate:** | 180 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dB | Numeric | Numeric |
| **5190** | 18.76 | 22.24 | 25.62 | 26.00 | -0.38 | 1.5 |
| **5210** | 18.77 | 22.26 | 25.64 | 26.00 | -0.36 | 2.0 |
| **5230** | 18.85 | 22.19 | 25.62 | 26.00 | -0.38 | 2.0 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 80MHz Bandwidth | **Duty Cycle (%):** | 85 |
| **Data Rate:** | 390 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dBm | dB | Numeric |
| **5210** | 19.02 | 22.44 | 25.84 | 26.00 | -0.16 | 2.0 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

## 9.1.2 Beamforming

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 10MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 39 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.0 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dB | Numeric | Numeric |
| **5175** | 18.71 | 21.99 | 19.44 | 20.00 | -0.56 | -4.0 |
| **5210** | 19.03 | 22.11 | 19.62 | 20.00 | -0.38 | -3.5 |
| **5245** | 19.52 | 22.15 | 19.81 | 20.00 | -0.19 | -3.5 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 20MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 78 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.0 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dB | Numeric | Numeric |
| **5180** | 18.92 | 22.05 | 19.54 | 20.00 | -0.46 | -3.0 |
| **5210** | 18.82 | 22.1 | 19.55 | 20.00 | -0.45 | -2.5 |
| **5240** | 19.56 | 22.17 | 19.84 | 20.00 | -0.16 | -2.5 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 40MHz Bandwidth | **Duty Cycle (%):** | 90 |
| **Data Rate:** | 180 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.0 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dB | Numeric | Numeric |
| **5190** | 19.2 | 22.12 | 19.68 | 20.00 | -0.32 | -3.0 |
| **5210** | 19.46 | 22.21 | 19.83 | 20.00 | -0.17 | -2.5 |
| **5230** | 19.72 | 22.25 | 19.95 | 20.00 | -0.05 | -2.5 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

| Equipment Configuration for RF Output Power | | | |
|---|---|---|---|
| **Variant:** | 80MHz Bandwidth | **Duty Cycle (%):** | 85 |
| **Data Rate:** | 390 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.0 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency MHz | Measured Output Power | | Calculated Total Power | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|
| | H | V | dBm | dBm | dB | Numeric |
| **5210** | 18.82 | 21.68 | 19.26 | 20.00 | -0.74 | -3.0 |

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

**NOTE: KDB 412172 D01** was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

## 9.2. 26 dB & 99% Bandwidth

| Conducted Test Conditions for 26 dB and 99% Bandwidth | | | |
|---|---|---|---|
| **Standards:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | 26 dB and 99 % Bandwidth | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (a) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**Test Procedure for 26 dB and 99% Bandwidth Measurement**
The bandwidth at 26 dB and 99 % is measured radiated, in a 3 meter chamber, while EUT is operating in transmission mode at the appropriate center frequency. The Resolution Bandwidth was set to approximately 1% of the emission bandwidth.
Testing was performed under ambient conditions at nominal voltage. Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured and reported. In this case Vertical a (V) and Horizontal for port b (H).

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

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 10 MHz Bandwidth | **Duty Cycle (%):** | Not Applicable |
| **Data Rate:** | 39 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5175.0** | 11.79 | 11.47 | 11.79 | 11.47 | | |
| **5210.0** | 11.54 | 11.70 | 11.70 | 11.54 | | |
| **5245.0** | 11.42 | 11.62 | 11.62 | 11.42 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5175.0** | 8.94 | 8.94 | 8.94 | 8.94 | | |
| **5210.0** | 8.98 | 8.98 | 8.98 | 8.98 | | |
| **5245.0** | 8.90 | 8.94 | 8.90 | 8.94 | | |

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

Note: click the links in the above matrix to view the graphical image (plot).

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 20 MHz Bandwidth | **Duty Cycle (%):** | Not Applicable |
| **Data Rate:** | 78 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5180.0** | 22.28 | 22.44 | 22.44 | 22.28 | | |
| **5210.0** | 21.72 | 22.20 | 22.20 | 21.72 | | |
| **5240.0** | 21.64 | 22.28 | 22.28 | 21.64 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5180.0** | 17.88 | 17.80 | 17.88 | 17.80 | | |
| **5210.0** | 17.88 | 17.88 | 17.88 | 17.88 | | |
| **5240.0** | 17.88 | 17.96 | 17.96 | 17.88 | | |

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

Note: click the links in the above matrix to view the graphical image (plot).





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| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 40 MHz Bandwidth | **Duty Cycle (%):** | Not Applicable |
| **Data Rate:** | 180 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5190.0** | 44.25 | 43.61 | 44.25 | 43.61 | | |
| **5210.0** | 44.25 | 43.93 | 44.25 | 43.93 | | |
| **5230.0** | 44.41 | 44.89 | 44.89 | 44.41 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5190.0** | 36.71 | 36.55 | 36.71 | 36.55 | | |
| **5210.0** | 36.71 | 36.55 | 36.71 | 36.55 | | |
| **5230.0** | 36.71 | 36.55 | 36.71 | 36.55 | | |

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

Note: click the links in the above matrix to view the graphical image (plot).





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| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 80MHz Bandwidth | **Duty Cycle (%):** | Not Applicable |
| **Data Rate:** | 390 MBit/s | **Antenna Gain (dBi):** | 10.0 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5210.0** | 87.86 | 87.21 | 87.86 | 87.21 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **Highest** | **Lowest** | | |
| **5210.0** | 76.63 | 76.63 | 76.63 | 76.63 | | |

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

Note: click the links in the above matrix to view the graphical image (plot).





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## 9.3. Power Spectral Density

| Conducted Test Conditions for Power Spectral Density | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Power Spectral Density | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (a) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | KDB 789033 - D02 General UNII Test Procedures New Rules v01 | | |

**Test Procedure for Power Spectral Density**

The In-Band power spectral density was measured using the measure and sum approach per FCC KDB 662911 (D01 Multiple Transmitter Output v02.)

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with N transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were calculated on a computer, and the results read back into the spectrum analyzer as a data file to produce a representative plot of total spectral power density.

Calculated Power = A + 10 log (1/x) dBm

A = Total Power Spectral Density [10 Log10 (10a/10 + 10 b/10 + 10c/10 + 10d/10)]

x = Duty Cycle

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.

**KDB 662911 D01 & KDB 662911 D02**

Radiated measurements used for compliance with conducted limits, the following steps are required to ensure that the total emission power s determined for equipment driving cross polarized antennas:

(1) Measure radiated emissions with vertical and horizontal polarizations of the measurement antenna;
(2) Convert each radiated measurement to transmit power based on the antenna gain;

EIRP level to an equivalent electric field strength using the following relationship:
E = EIRP – 20*log (D) + 104.8

Where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

(3) Sum the powers or PSDs across the two polarizations to compare the resultant electric field strength level to the applicable limit.

Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

**Limits Maximum Power Spectral Density**

**Operating Frequency Band 5150-5250 MHz**
15. 407 (a)(1)
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band

of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 9.3.1. Non-Beamforming

| Equipment Configuration for Power Spectral Density |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | 10 MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 39 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm/MHz) | | Summation Peak Marker + DCCF (+0.0 dB) | Limit | Margin |
|---|---|---|---|---|---|
| MHz | H | V | dBm/MHz | dBm/MHz | dB |
| 5175.0 | 4.57 | 10.06 | 12.91 | 13.00 | -0.09 |
| 5210.0 | 5.87 | 9.51 | 12.84 | 13.00 | -0.16 |
| 5245.0 | 6.21 | 9.44 | 12.90 | 13.00 | -0.10 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

| Equipment Configuration for Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 20 MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 78 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

| Test Measurement Results | | | | | |
|---|---|---|---|---|---|
| **Test Frequency** | **Measured Power Spectral Density (dBm/MHz)** | | **Summation Peak Marker + DCCF (+0.0 dB)** | **Limit** | **Margin** |
| **MHz** | **H** | **V** | **dBm/MHz** | **dBm/MHz** | **dB** |
| **5180.0** | 4.27 | 7.58 | 11.02 | 13.00 | -1.98 |
| **5210.0** | 5.92 | 9.01 | 12.52 | 13.00 | -0.48 |
| **5240.0** | 5.96 | 8.37 | 12.11 | 13.00 | -0.89 |

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

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

| Equipment Configuration for Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 40 MHz Bandwidth | **Duty Cycle (%):** | 90 |
| **Data Rate:** | 180 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

| Test Measurement Results | | | | | |
|---|---|---|---|---|---|
| **Test Frequency** | **Measured Power Spectral Density (dBm/MHz)** | | **Summation Peak Marker + DCCF (+0.41 dB)** | **Limit** | **Margin** |
| **MHz** | **H** | **V** | **dBm/MHz** | **dBm/MHz** | **dB** |
| **5190.0** | 0.87 | 4.68 | 8.37 | 13.00 | -4.63 |
| **5210.0** | 2.14 | 6.20 | 9.82 | 13.00 | -3.18 |
| **5230.0** | 3.08 | 6.59 | 10.37 | 13.00 | -2.63 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

| Equipment Configuration for Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 80 MHz Bandwidth | **Duty Cycle (%):** | 85 |
| **Data Rate:** | 390 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm/MHz) | | Summation Peak Marker + DCCF (+0.71 dB) | Limit | Margin |
|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **dBm/MHz** | **dBm/MHz** | **dB** |
| **5210.0** | -4.12 | -0.60 | 3.48 | 13.00 | -9.52 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

## 9.3.2. Beamforming

| Equipment Configuration for Power Spectral Density |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | 10 MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 39 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.00 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm/MHz) | | Summation Peak Marker + DCCF (+0.00 dB) | Limit | Margin |
|---|---|---|---|---|---|
| MHz | H | V | dBm/MHz | dBm/MHz | dB |
| 5175.0 | 6.28 | 9.03 | 6.65 | 7.00 | -0.35 |
| 5210.0 | 6.33 | 9.08 | 6.70 | 7.00 | -0.30 |
| 5245.0 | 6.39 | 9.33 | 6.89 | 7.00 | -0.11 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

| Equipment Configuration for Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 20 MHz Bandwidth | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 78 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.00 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

| Test Measurement Results | | | | | |
|---|---|---|---|---|---|
| **Test Frequency** | **Measured Power Spectral Density (dBm/MHz)** | | **Summation Peak Marker + DCCF (+0.00 dB)** | **Limit** | **Margin** |
| **MHz** | **H** | **V** | **dBm/MHz** | **dBm/MHz** | **dB** |
| **5180.0** | 4.00 | 7.93 | 5.18 | 7.00 | -1.82 |
| **5210.0** | 5.55 | 9.09 | 6.45 | 7.00 | -0.55 |
| **5240.0** | 5.61 | 8.89 | 6.34 | 7.00 | -0.66 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

| Equipment Configuration for Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 40 MHz Bandwidth | **Duty Cycle (%):** | 91 |
| **Data Rate:** | 180 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.00 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm/MHz) | | Summation Peak Marker + DCCF (+0.41 dB) | Limit | Margin |
|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **dBm/MHz** | **dBm/MHz** | **dB** |
| **5190.0** | 0.95 | 4.13 | 2.02 | 7.00 | -4.98 |
| **5210.0** | 2.61 | 6.07 | 3.87 | 7.00 | -3.13 |
| **5230.0** | 3.00 | 6.25 | 4.11 | 7.00 | -2.89 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

| Equipment Configuration for Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 80 MHz Bandwidth | **Duty Cycle (%):** | 85 |
| **Data Rate:** | 390 MBit/s | **Antenna Gain (dBi):** | 10.00 |
| **Modulation:** | 256QAM | **Beam Forming Gain (Y)(dB):** | 6.00 |
| **TPC:** | Not Applicable | **Tested By:** | JMH |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm/MHz) | | Summation Peak Marker + DCCF (+0.71 dB) | Limit | Margin |
|---|---|---|---|---|---|
| **MHz** | **H** | **V** | **dBm/MHz** | **dBm/MHz** | **dB** |
| **5210.0** | -5.93 | -2.78 | -4.59 | 7.00 | -11.59 |

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

DCCF – Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

KDB 789033 - D02 General UNII Test Procedures New Rules v01 was used to calculate the above Power Spectral Density

## 9.4. Radiated

| Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 20.0 - 24.5 |
| **Test Heading:** | Radiated Spurious and Band-Edge Emissions | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (b), 15.205, 15.209 | **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 peak 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.

Test configuration and setup for Undesirable Measurement were per the Radiated Test Set-up specified in this document.

15.407 (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

**Limits for Restricted Bands (15.205, 15.209)**
**Peak emission: 74 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**

**Example:**
**The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBµV/m);**

$$E = \frac{1000000 \times \sqrt{30P}}{3} \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dBuV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

**Restricted Bands of Operation (15.205)**
(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| Frequency Band | | | |
|---|---|---|---|
| **MHz** | **MHz** | **MHz** | **GHz** |
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | Above 38.6 |
| 13.36-13.41 | | | |

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

## 9.4.1. TX Spurious & Restricted Band Emissions

### 9.4.1.1. RADWIN MR0269440

**Equipment Configuration for TX Spurious & Restricted Band Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5175.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 3.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 1100.07 | 64.16 | 1.36 | -17.46 | 48.06 | Max Peak | Horizontal | 98 | 47 | 68.2 | -20.2 | Pass |
| #2 | 1100.07 | 59.62 | 1.36 | -17.46 | 43.52 | Max Avg | Horizontal | 98 | 47 | 54.0 | -10.5 | Pass |
| #3 | 4810.64 | 65.21 | 2.85 | -12.42 | 55.64 | Max Peak | Horizontal | 197 | 352 | 68.2 | -12.6 | Pass |
| #4 | 4810.64 | 51.72 | 2.85 | -12.42 | 42.15 | Max Avg | Horizontal | 197 | 352 | 54.0 | -11.9 | Pass |
| #5 | 4838.01 | 66.16 | 2.81 | -12.55 | 56.42 | Max Peak | Horizontal | 188 | 338 | 68.2 | -11.8 | Pass |
| #6 | 4838.01 | 52.44 | 2.81 | -12.55 | 42.70 | Max Avg | Horizontal | 188 | 338 | 54.0 | -11.3 | Pass |
| #7 | 5178.44 | 63.46 | 2.97 | -12.12 | 54.31 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| #8 | 6221.84 | 55.83 | 3.32 | -9.62 | 49.53 | Peak (NRB) | Vertical | 200 | 31 | -- | -- | Pass |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload. | | | | | | | | | | | | |

**Equipment Configuration for TX Spurious & Restricted Band Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5210.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 3.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 4778.36 | 64.54 | 2.87 | -12.45 | 54.96 | Max Peak | Horizontal | 187 | 335 | 68.2 | -13.3 | Pass |
| #2 | 4778.36 | 50.31 | 2.87 | -12.45 | 40.73 | Max Avg | Horizontal | 187 | 335 | 54.0 | -13.3 | Pass |
| #3 | 4807.58 | 65.10 | 2.85 | -12.43 | 55.52 | Max Peak | Horizontal | 196 | 335 | 68.2 | -12.7 | Pass |
| #4 | 4807.58 | 51.30 | 2.85 | -12.43 | 41.72 | Max Avg | Horizontal | 196 | 335 | 54.0 | -12.3 | Pass |
| #5 | 4838.18 | 65.78 | 2.81 | -12.55 | 56.04 | Max Peak | Horizontal | 193 | 334 | 68.2 | -12.2 | Pass |
| #6 | 4838.18 | 51.61 | 2.81 | -12.55 | 41.87 | Max Avg | Horizontal | 193 | 334 | 54.0 | -12.1 | Pass |
| #7 | 5211.71 | 66.57 | 2.99 | -12.36 | 57.20 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| #8 | 6250.62 | 53.82 | 3.25 | -9.49 | 47.58 | Peak (NRB) | Vertical | 200 | 0 | -- | -- | Pass |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload. | | | | | | | | | | | | |

## Equipment Configuration for TX Spurious & Restricted Band Emissions

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5245.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 3.0 | **Tested By:** | JMH |

## Test Measurement Results

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 4839.11 | 65.65 | 2.82 | -12.55 | 55.92 | Max Peak | Horizontal | 189 | 356 | 68.2 | -12.3 | Pass |
| #2 | 4839.11 | 51.77 | 2.82 | -12.55 | 42.04 | Max Avg | Horizontal | 189 | 356 | 54.0 | -12.0 | Pass |
| #3 | 5242.14 | 86.17 | 3.02 | -12.03 | 77.16 | Fundamental | Vertical | 200 | 0 | -- | -- | |
| #4 | 6247.65 | 54.90 | 3.25 | -9.51 | 48.64 | Peak (NRB) | Vertical | 200 | 67 | -- | -- | Pass |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload. | | | | | | | | | | | | |

### 9.4.1.2. RADWIN MR0269440BF

| Equipment Configuration for TX Spurious & Restricted Band Emissions | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6 | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5175.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 0.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 1100.02 | 65.56 | 1.36 | -17.46 | 49.46 | Max Peak | Horizontal | 154 | 34 | 68.2 | -18.8 | Pass |
| #2 | 1100.02 | 60.62 | 1.36 | -17.46 | 44.52 | Max Avg | Horizontal | 154 | 34 | 54.0 | -9.5 | Pass |
| #3 | 4748.66 | 64.56 | 2.84 | -12.35 | 55.05 | Max Peak | Horizontal | 184 | 0 | 68.2 | -13.2 | Pass |
| #4 | 4748.66 | 50.96 | 2.84 | -12.35 | 41.45 | Max Avg | Horizontal | 184 | 0 | 54.0 | -12.6 | Pass |
| #5 | 4778.32 | 64.94 | 2.87 | -12.45 | 55.36 | Max Peak | Horizontal | 186 | 1 | 68.2 | -12.9 | Pass |
| #6 | 4778.32 | 51.38 | 2.87 | -12.45 | 41.80 | Max Avg | Horizontal | 186 | 1 | 54.0 | -12.2 | Pass |
| #7 | 5176.55 | 80.57 | 2.96 | -12.14 | 71.39 | Fundamental | Vertical | 150 | 0 | -- | -- | |
| #8 | 6249.94 | 52.90 | 3.25 | -9.50 | 46.65 | Peak (NRB) | Vertical | 150 | 0 | -- | -- | Pass |

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

**Equipment Configuration for TX Spurious & Restricted Band Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6 | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5210.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 0.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 1100.05 | 63.75 | 1.36 | -17.46 | 47.65 | Max Peak | Horizontal | 194 | 28 | 68.2 | -20.6 | Pass |
| #2 | 1100.05 | 58.64 | 1.36 | -17.46 | 42.54 | Max Avg | Horizontal | 194 | 28 | 54.0 | -11.5 | Pass |
| #3 | 4750.59 | 63.66 | 2.82 | -12.36 | 54.12 | Max Peak | Horizontal | 195 | 350 | 68.2 | -14.1 | Pass |
| #4 | 4750.59 | 49.08 | 2.82 | -12.36 | 39.54 | Max Avg | Horizontal | 195 | 350 | 54.0 | -14.5 | Pass |
| #5 | 4809.28 | 65.34 | 2.85 | -12.42 | 55.77 | Max Peak | Horizontal | 182 | 0 | 68.2 | -12.5 | Pass |
| #6 | 4809.28 | 51.68 | 2.85 | -12.42 | 42.11 | Max Avg | Horizontal | 182 | 0 | 54.0 | -11.9 | Pass |
| #7 | 5209.62 | 84.43 | 2.99 | -12.37 | 75.05 | Fundamental | Vertical | 150 | 0 | -- | -- | |
| #8 | 6250.07 | 52.25 | 3.25 | -9.49 | 46.01 | Peak (NRB) | Vertical | 150 | 0 | -- | -- | Pass |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload. | | | | | | | | | | | | |

**Equipment Configuration for TX Spurious & Restricted Band Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6 | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5245.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 0.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 4809.83 | 65.59 | 2.85 | -12.42 | 56.02 | Max Peak | Horizontal | 185 | 357 | 68.2 | -12.2 | Pass |
| #2 | 4809.83 | 51.52 | 2.85 | -12.42 | 41.95 | Max Avg | Horizontal | 185 | 357 | 54.0 | -12.1 | Pass |
| #3 | 4836.91 | 66.02 | 2.81 | -12.54 | 56.29 | Max Peak | Horizontal | 177 | 0 | 68.2 | -11.9 | Pass |
| #4 | 4836.91 | 51.90 | 2.81 | -12.54 | 42.17 | Max Avg | Horizontal | 177 | 0 | 54.0 | -11.8 | Pass |
| #5 | 5243.02 | 68.44 | 3.02 | -12.03 | 59.43 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| #6 | 6250.07 | 55.51 | 3.25 | -9.49 | 49.27 | Peak (NRB) | Vertical | 150 | 0 | -- | -- | Pass |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload. | | | | | | | | | | | | |

## 9.4.2. Restricted Edge & Band-Edge Emissions

### 9.4.2.3. RADWIN MR0269440

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5150 - 5250 MHz

| RADWIN MR0269440 | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| 10MHz | 5175.00 | 5150.00 | 68.58 | 53.39 | 7.0 |
| 20MHz | 5180.00 | 5150.00 | 68.67 | 53.57 | 6.5 |
| 40MHz | 5190.00 | 5150.00 | 69.17 | 52.15 | 6.5 |
| 80MHz | 5210.00 | 5150.00 | 73.39 | 52.94 | 4.0 |

Click on the links to view the data.

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5175.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 7.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 5132.77 | 16.23 | 2.98 | 34.18 | 53.39 | Max Avg | Vertical | 189 | 33 | 54.0 | -0.6 | Pass |
| #2 | 5146.99 | 31.46 | 2.91 | 34.21 | 68.58 | Max Peak | Vertical | 189 | 33 | 74.0 | -5.4 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE, connected to laptop outside chamber. | | | | | | | | | | | | |

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 20MHz |
| **Antenna Gain (dBi):** | 10.0 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5180.00 | **Data Rate:** | 78.00 MBit/s |
| **Power Setting:** | 6.5 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 5014.73 | 16.57 | 2.92 | 34.08 | 53.57 | Max Avg | Vertical | 189 | 33 | 54.0 | -0.4 | Pass |
| #2 | 5148.50 | 31.55 | 2.91 | 34.21 | 68.67 | Max Peak | Vertical | 189 | 33 | 74.0 | -5.3 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE, connected to laptop outside chamber. | | | | | | | | | | | | |

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 40MHz |
| **Antenna Gain (dBi):** | 10.0 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 90 |
| **Channel Frequency (MHz):** | 5190.00 | **Data Rate:** | 180.00 MBit/s |
| **Power Setting:** | 6.5 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 5150.00 | 15.01 | 2.93 | 34.21 | 52.15 | Max Avg | Vertical | 189 | 33 | 54.0 | -1.9 | Pass |
| #2 | 5150.00 | 32.03 | 2.93 | 34.21 | 69.17 | Max Peak | Vertical | 189 | 33 | 74.0 | -4.8 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE, connected to laptop outside chamber. 0.4 DCCF added to average measurement. | | | | | | | | | | | | |





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

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 80MHz |
| **Antenna Gain (dBi):** | 10.0 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 85 |
| **Channel Frequency (MHz):** | 5210.00 | **Data Rate:** | 390.00 MBit/s |
| **Power Setting:** | 4.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 5148.50 | 36.27 | 2.91 | 34.21 | 73.39 | Max Peak | Vertical | 189 | 33 | 74.0 | -0.6 | Pass |
| #2 | 5150.00 | 15.80 | 2.93 | 34.21 | 52.94 | Max Avg | Vertical | 189 | 33 | 54.0 | -1.1 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE, connected to laptop outside chamber. 0.71 DCCF added to average measurement. | | | | | | | | | | | | |

### 9.4.2.4. RADWIN MR0269440BF

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5150 - 5250 MHz

| RADWIN MR0269440BF | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| 10MHz | 5175.00 | 5150.00 | 67.06 | 53.46 | 1.0 |
| 20MHz | 5180.00 | 5150.00 | 66.63 | 53.56 | 1.0 |
| 40MHz | 5190.00 | 5150.00 | 69.39 | 53.92 | -0.5 |
| 80MHz | 5210.00 | 5150.00 | 72.68 | 53.39 | -3.0 |

Click on the links to view the data.

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6.00 | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5175.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 1.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 4961.72 | 16.34 | 2.90 | 34.22 | 53.46 | Max Avg | Vertical | 185 | 1 | 54.0 | -0.5 | Pass |
| #2 | 5005.01 | 30.13 | 2.91 | 34.02 | 67.06 | Max Peak | Vertical | 185 | 1 | 74.0 | -6.9 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. | | | | | | | | | | | | |

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 20MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6.00 | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 5180.00 | **Data Rate:** | 78.00 MBit/s |
| **Power Setting:** | 1.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 4953.91 | 29.71 | 2.91 | 34.01 | 66.63 | Max Peak | Vertical | 185 | 1 | 74.0 | -7.4 | Pass |
| #2 | 5000.50 | 16.62 | 2.88 | 34.06 | 53.56 | Max Avg | Vertical | 185 | 1 | 54.0 | -0.4 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. | | | | | | | | | | | | |

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 40MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6.00 | **Duty Cycle (%):** | 90 |
| **Channel Frequency (MHz):** | 5190.00 | **Data Rate:** | 180.00 MBit/s |
| **Power Setting:** | -0.5 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 5150.00 | 16.78 | 2.93 | 34.21 | 53.92 | Max Avg | Vertical | 185 | 0 | 54.0 | -0.1 | Pass |
| #2 | 5150.00 | 32.25 | 2.93 | 34.21 | 69.39 | Max Peak | Vertical | 185 | 0 | 74.0 | -4.6 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 0.4 DCCF added to average measurement | | | | | | | | | | | | |

**Equipment Configuration for Restricted Lower Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440BF | **Variant:** | 80MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | 6.00 | **Duty Cycle (%):** | 85 |
| **Channel Frequency (MHz):** | 5210.00 | **Data Rate:** | 390.00 MBit/s |
| **Power Setting:** | -3.0 | **Tested By:** | JMH |

**Test Measurement Results**

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 5150.00 | 16.25 | 2.93 | 34.21 | 53.39 | Max Avg | Vertical | 185 | 0 | 54.0 | -0.6 | Pass |
| #2 | 5150.00 | 35.54 | 2.93 | 34.21 | 72.68 | Max Peak | Vertical | 185 | 0 | 74.0 | -1.3 | Pass |
| #3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by POE. Connected to laptop outside chamber. 0.71 DCCF added to average measurement | | | | | | | | | | | | |





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

## 9.4.3. Digital Emissions

| Radiated Test Conditions for Radiated Digital Emissions (0.03 – 1 GHz) | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.247 | **Ambient Temp. (ºC):** | 20.0 - 24.5 |
| **Test Heading:** | Digital Emissions | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.209 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**Test Procedure for Radiated Digital Emissions (0.03 – 1 GHz)**
Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed.

Test configuration and setup for Radiated Spurious and Band-Edge Measurement were per the Radiated Test Set-up specified in this document.

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

FS = R + AF + CORR

where:
FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBmV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3dBmV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are done as:

Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100mV/m
48 dBmV/m = 250mV/m

Limits for Radiated Digital Emissions (0.03 – 1 GHz) (15.209)

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength | | Measurement Distance (m) |
|---|---|---|---|
| | μV/m (microvolts/meter) | dBμV/m (dB microvolts/meter) | |
| 0.009-0.490 | 2400/F(kHz) | -- | 300 |
| 0.490-1.705 | 24000/F(kHz) | -- | 30 |

| | | | |
|---|---|---|---|
| 1.705-30.0 | 30 | 29.5 | 30 |
| 30-88 | 100** | 40 | 3 |
| 88-216 | 150** | 43.5 | 3 |
| 216-960 | 200** | 46.0 | 3 |
| Above 960 | 500 | 54.0 | 3 |

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges. (c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. (e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part. (f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device. (g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.





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

**Equipment Configuration for Digital Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | RADWIN MR0269440 | **Variant:** | 10MHz |
| **Antenna Gain (dBi):** | 10.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 91 |
| **Channel Frequency (MHz):** | 5230.00 | **Data Rate:** | 39.00 MBit/s |
| **Power Setting:** | 10.5 | **Tested By:** | JMH |

**Test Measurement Results**

| 30.00 - 1000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 30.22 | 47.02 | 3.54 | -8.20 | 42.36 | MaxQP | Vertical | 101 | 25 | 49.5 | -7.1 | Pass |
| #2 | 33.07 | 51.41 | 3.59 | -10.42 | 44.58 | MaxQP | Vertical | 98 | 3 | 49.5 | -4.9 | Pass |
| #3 | 34.13 | 49.53 | 3.59 | -10.92 | 42.20 | MaxQP | Vertical | 139 | 217 | 49.5 | -7.3 | Pass |
| #4 | 50.94 | 57.08 | 3.73 | -20.71 | 40.10 | MaxQP | Vertical | 126 | 107 | 49.5 | -9.4 | Pass |
| #5 | 760.00 | 39.99 | 6.38 | -6.31 | 40.06 | MaxQP | Horizontal | 144 | 23 | 57.0 | -16.9 | Pass |
| #6 | 799.99 | 38.00 | 6.48 | -5.93 | 38.55 | MaxQP | Horizontal | 136 | 40 | 57.0 | -18.5 | Pass |
| Test Notes: Modem 1 5230MHz HT40 PS 10.5. Modem 2 5210MHz HT40 PS 10.5 | | | | | | | | | | | | |

## 9.5. AC Wireline

**Scope**

This test assesses the ability of the EUT to limit its internal noise from being present on the AC mains power input/output ports.

**Test Procedure**

The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

## Limits

The equipment shall meet the class B limits given in FCC Part 15: 107. Alternatively, for equipment intended to be used in non-residential environments, the class A limits given in FCC Part 15: 107 may be used.

Limits for conducted disturbance at the mains ports of class B ITE

| Frequency of emission (MHz) | Quasi-peak dBuV | Average dBuV |
|---|---|---|
| 0.15–0.5 | 66 to 56* | 56 to 46* |
| 0.5–5 | 56 | 46 |
| 5–30 | 60 | 50 |
| Note 1 | * Decreases with the logarithm of the frequency | |
| Note 2 | * The lower limit applies at the boundary between frequency ranges | |

Limits for conducted disturbance at the mains ports of class A ITE

| Frequency of emission (MHz) | Quasi-peak dBuV | Average dBuV |
|---|---|---|
| 0.15–0.5 | 79 | 66 |
| 0.5–30 | 73 | 60 |
| Note 1 | * The lower limit shall apply at the transition frequency. | |

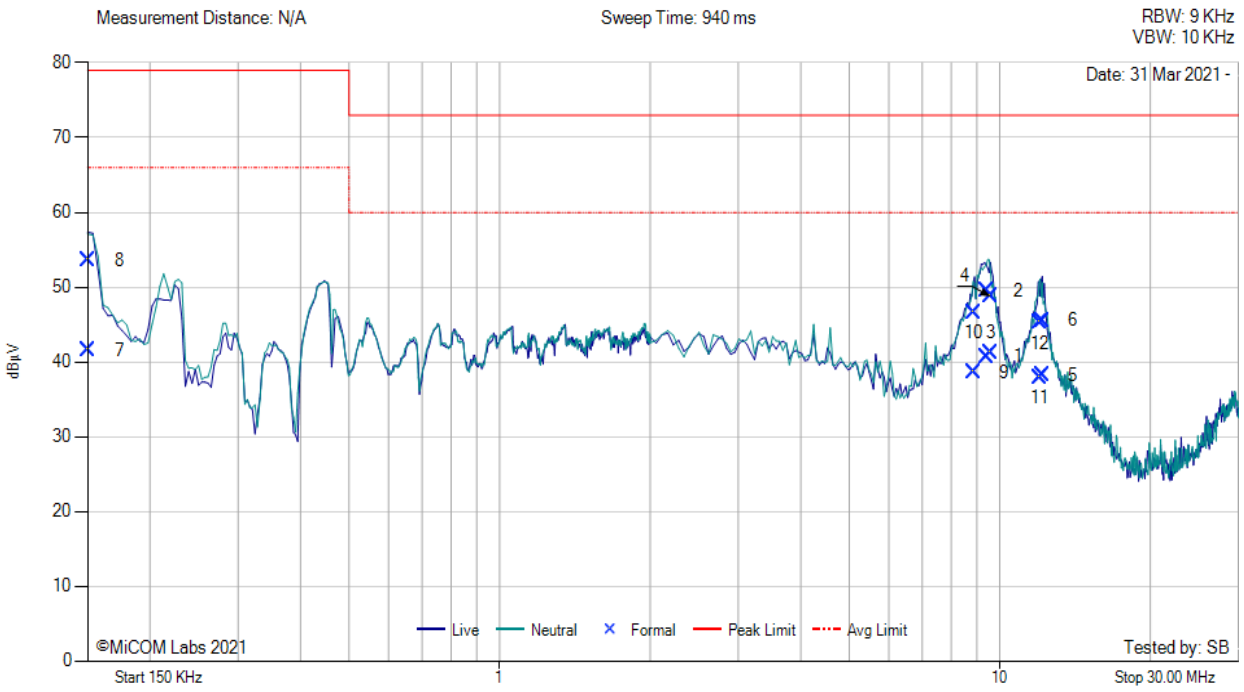
### Traceability

All conducted emission measurements are traceable to national standards. The uncertainty of measurement at a confidence level of not less than 95 %, with a coverage factor of k=2, in the range 9 kHz – 30 MHz (Average & Quasi-peak) is ±2.64 dB.

| Laboratory Measurement Uncertainty | |
|---|---|
| Measurement uncertainty | ±2.64 dB |

| Method |
|---|
| Measurements were made per work instruction WI-EMC-01 ‘Measurement of Conducted Emissions’ |

| Model: | RADWIN Neo | Configuration tested: | PoE Powered |
|---|---|---|---|
| Input power: | 120$V_{AC}$/60Hz | Standard: | FCC 15B |




| Num | Frequency MHz | Raw dBµV | Cable Loss dB | Factor dB | Total Correction dBµV | Corrected Value dBµV | Measurement Type | Line | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.446 | 30.04 | 0.44 | 10.22 | 10.66 | 40.70 | Max Avg | Neutral | 60.0 | -19.3 | Pass |
| 2 | 9.446 | 38.81 | 0.44 | 10.22 | 10.66 | 49.47 | Max Qp | Neutral | 73.0 | -23.5 | Pass |
| 3 | 9.589 | 30.52 | 0.45 | 10.21 | 10.66 | 41.18 | Max Avg | Live | 60.0 | -18.8 | Pass |
| 4 | 9.589 | 38.08 | 0.45 | 10.21 | 10.66 | 48.74 | Max Qp | Live | 73.0 | -24.3 | Pass |
| 5 | 12.179 | 27.40 | 0.45 | 10.35 | 10.80 | 38.20 | Max Avg | Live | 60.0 | -21.8 | Pass |
| 6 | 12.179 | 34.72 | 0.45 | 10.35 | 10.80 | 45.52 | Max Qp | Live | 73.0 | -27.5 | Pass |
| 7 | 0.151 | 31.58 | 0.05 | 9.92 | 9.97 | 41.55 | Max Avg | Live | 66.0 | -24.5 | Pass |
| 8 | 0.151 | 43.66 | 0.05 | 9.92 | 9.97 | 53.63 | Max Qp | Live | 79.0 | -25.4 | Pass |
| 9 | 8.883 | 27.92 | 0.44 | 10.21 | 10.65 | 38.57 | Max Avg | Live | 60.0 | -21.4 | Pass |
| 10 | 8.883 | 35.97 | 0.44 | 10.21 | 10.65 | 46.62 | Max Qp | Live | 73.0 | -26.4 | Pass |
| 11 | 12.032 | 27.17 | 0.45 | 10.36 | 10.81 | 37.98 | Max Avg | Neutral | 60.0 | -22.0 | Pass |
| 12 | 12.032 | 34.50 | 0.45 | 10.36 | 10.81 | 45.31 | Max Qp | Neutral | 73.0 | -27.7 | Pass |

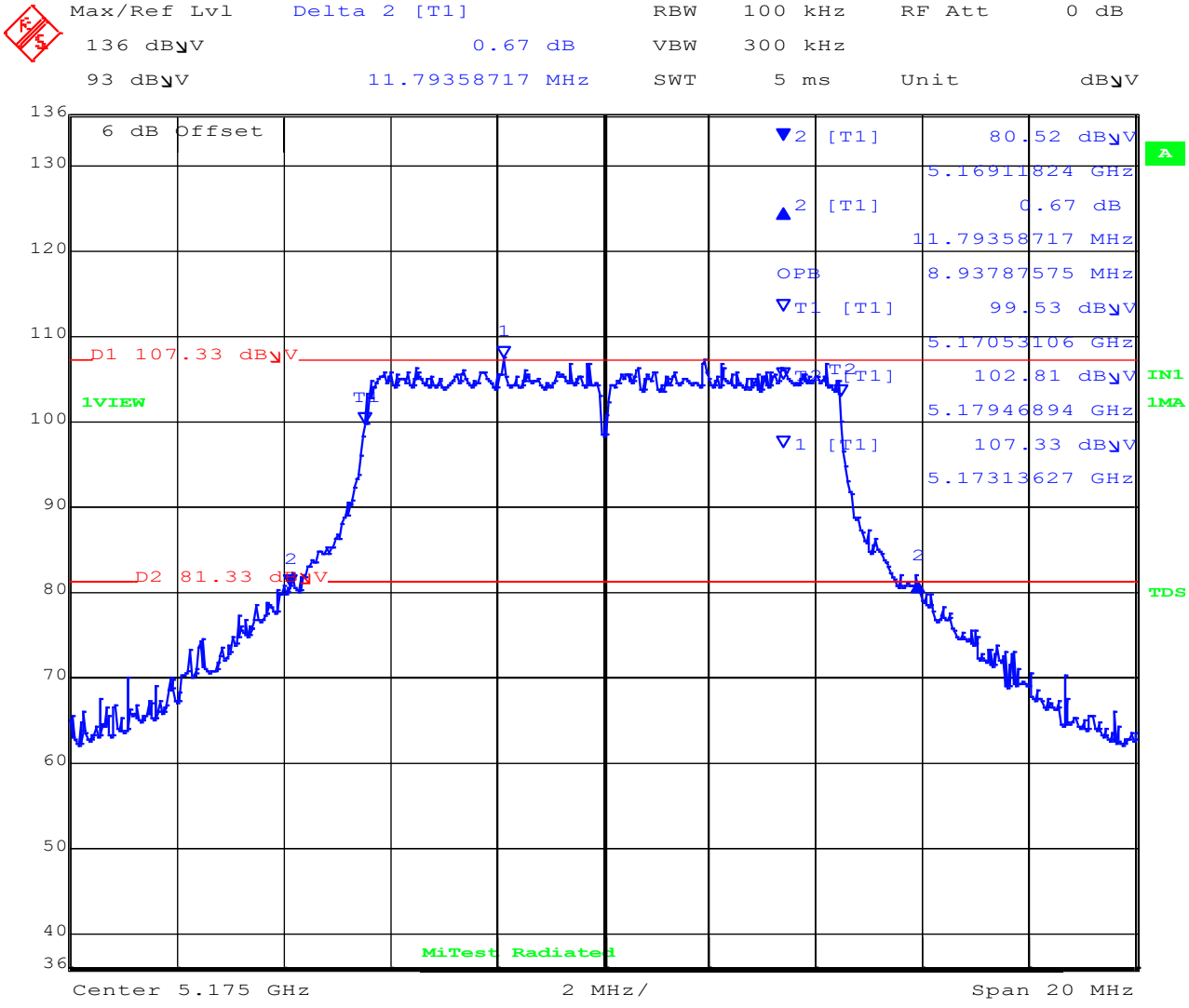
**Test Notes:** POE Injector 120VAC, Model Number: CPU55A-270-1 Rev.A. Output 55VDC .5A. EUT transmitting Max Power 99% Duty Cycle

# A. APPENDIX - GRAPHICAL IMAGES

## A.1. 26 dB & 99% Bandwidth

26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5175.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

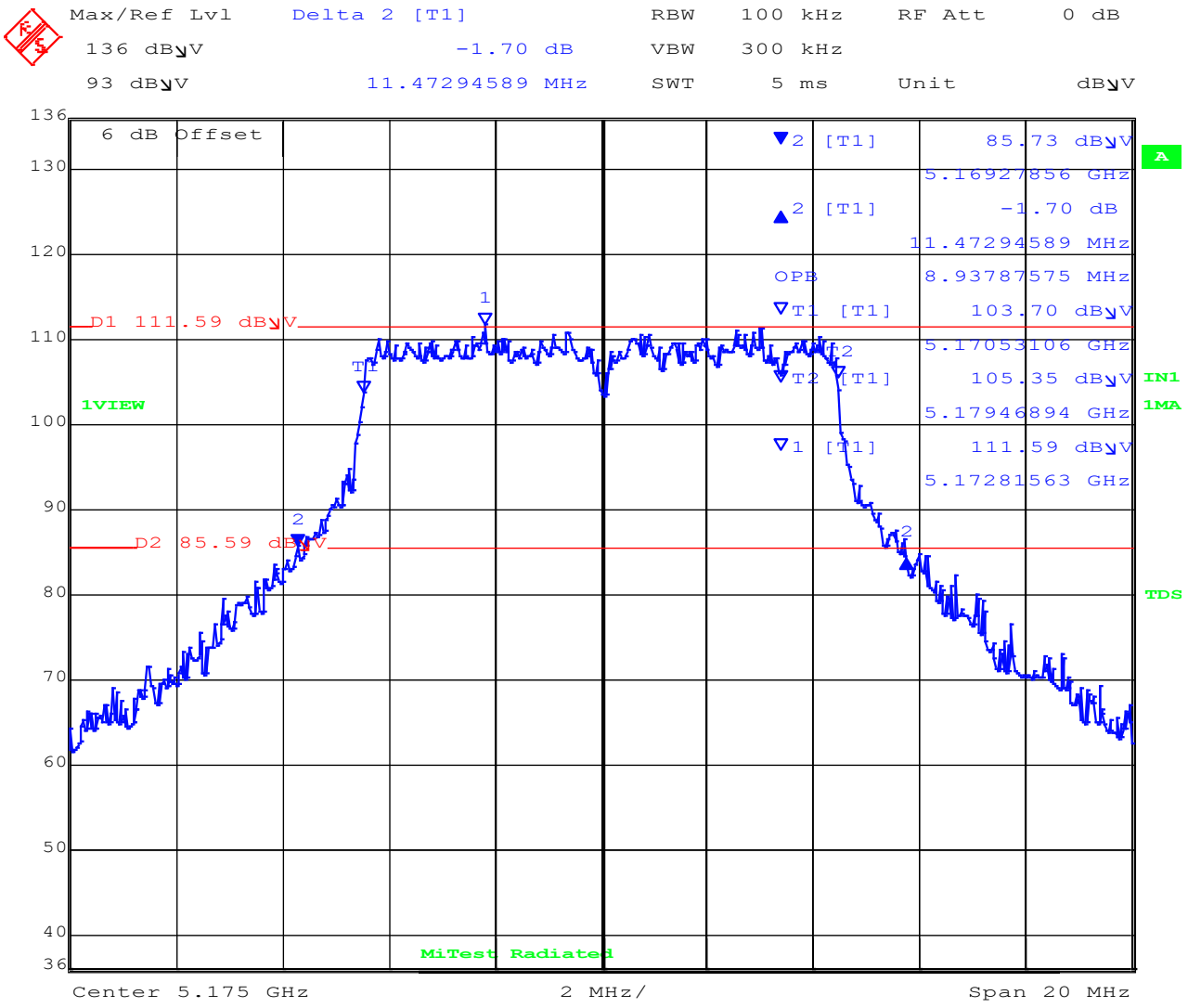



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 11.79 MHz<br>Measured 99% Bandwidth: 8.94 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5175.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

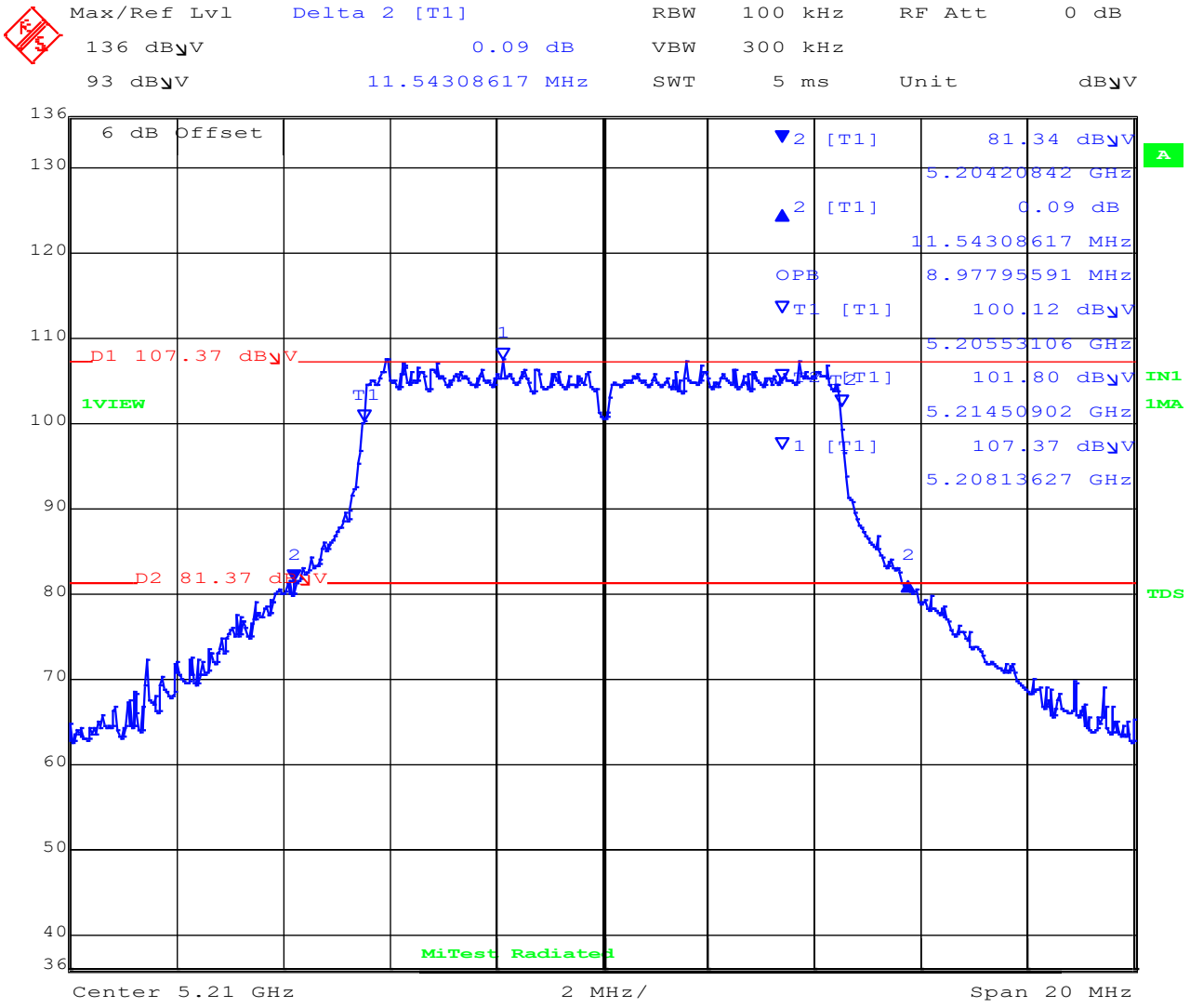



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 11.47 MHz<br>Measured 99% Bandwidth: 8.94 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

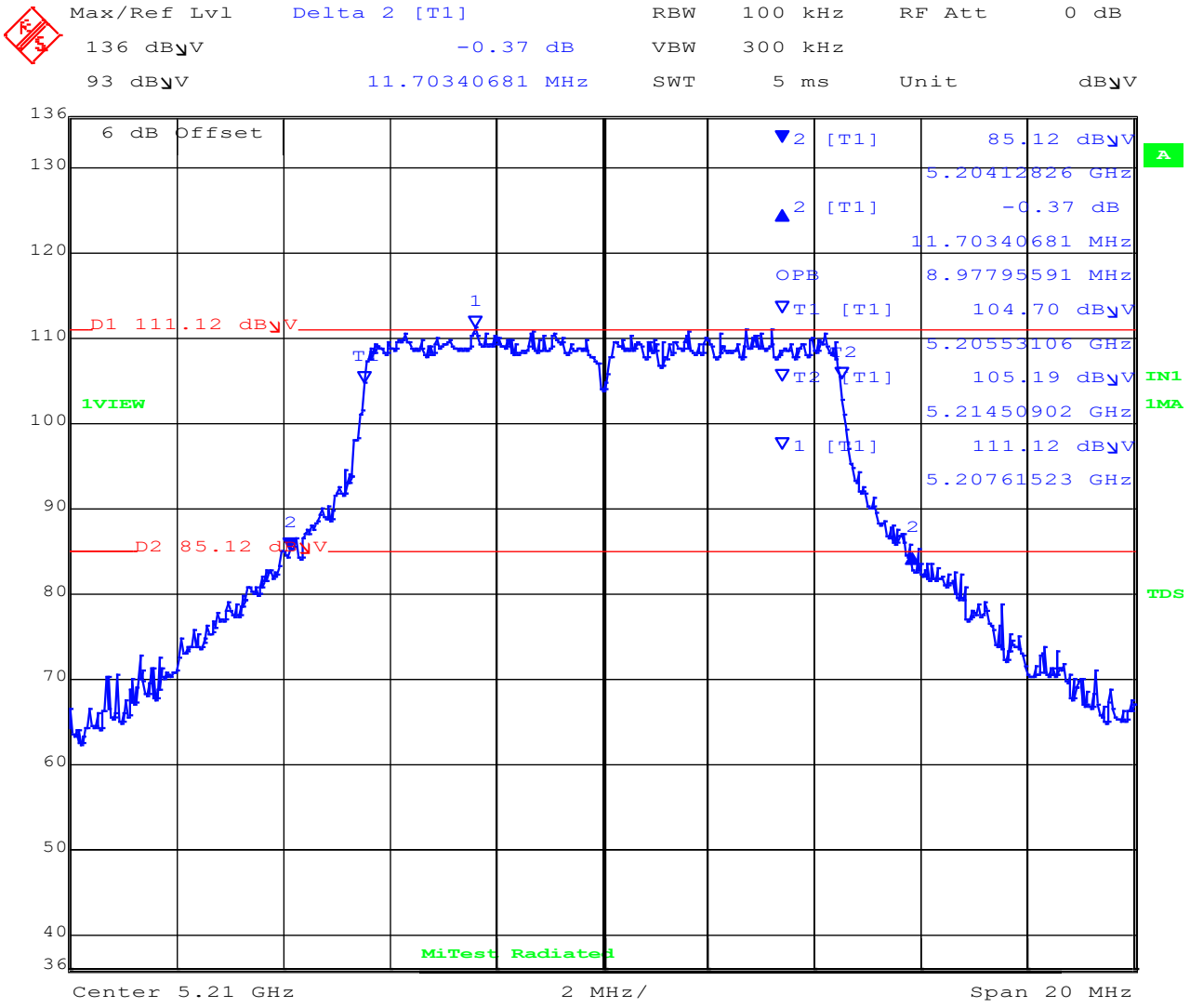



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 11.54 MHz<br>Measured 99% Bandwidth: 8.98 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

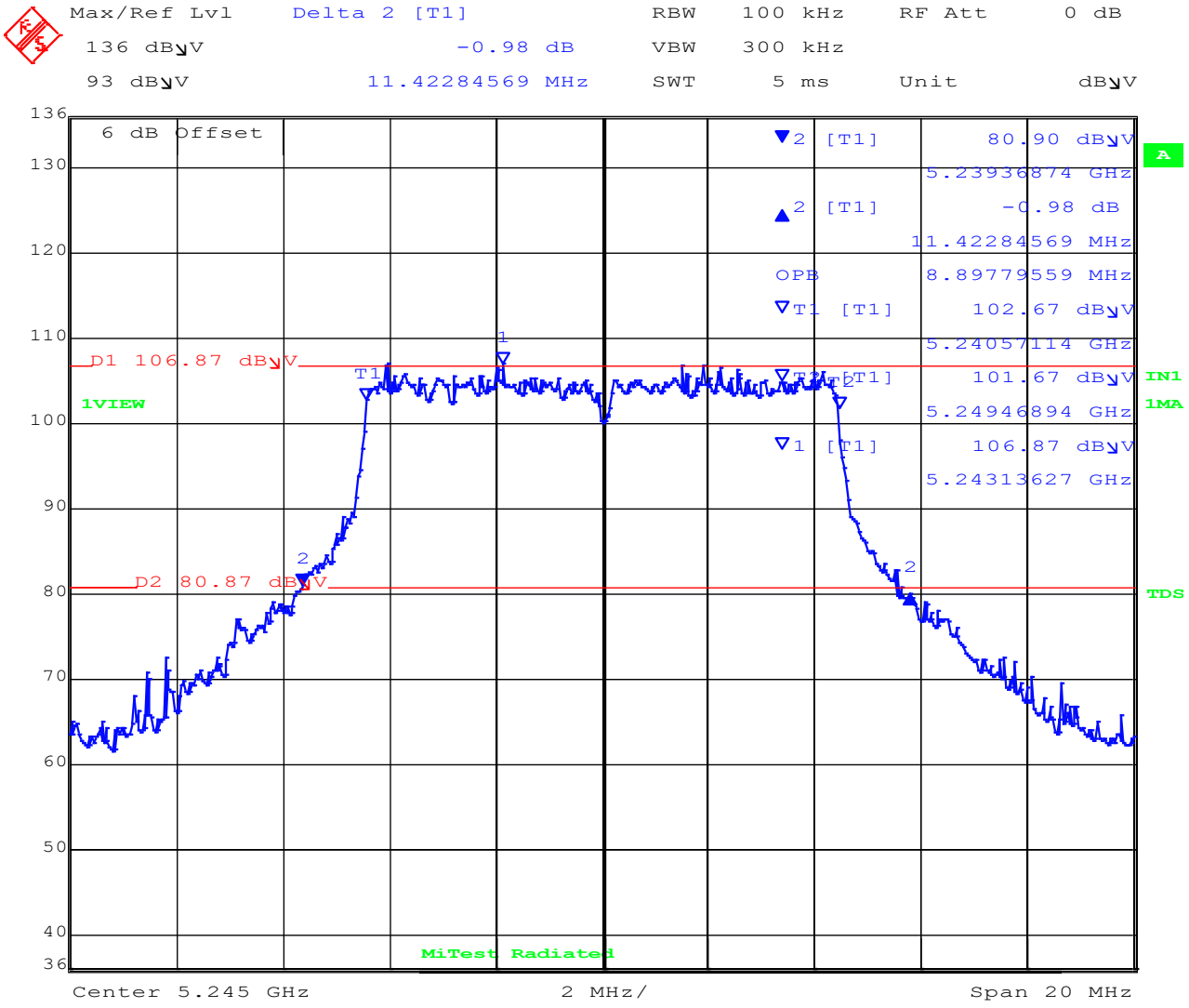



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 11.70 MHz<br>Measured 99% Bandwidth: 8.98 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5245.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

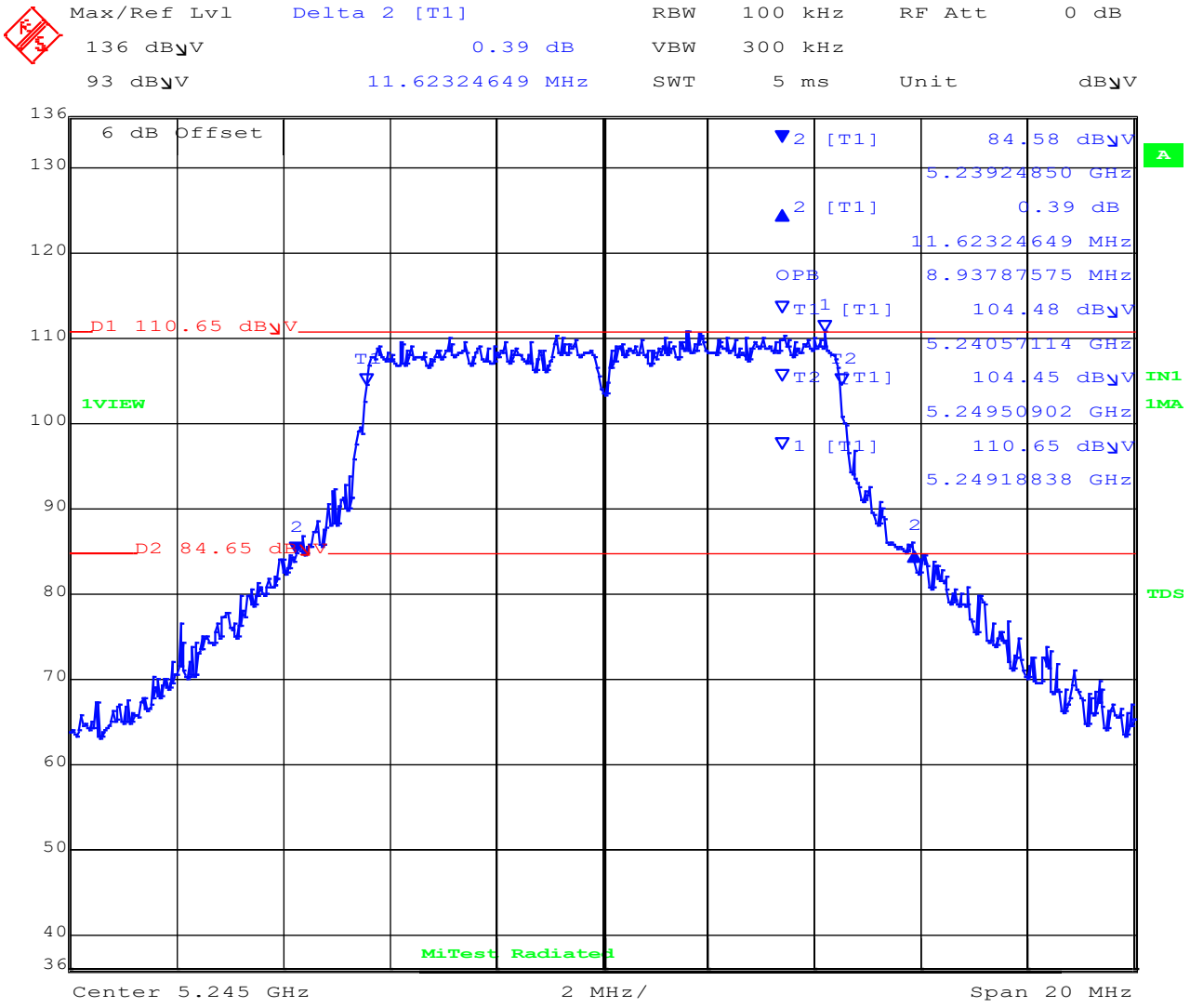



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 11.42 MHz<br>Measured 99% Bandwidth: 8.98 MHz |

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5245.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc



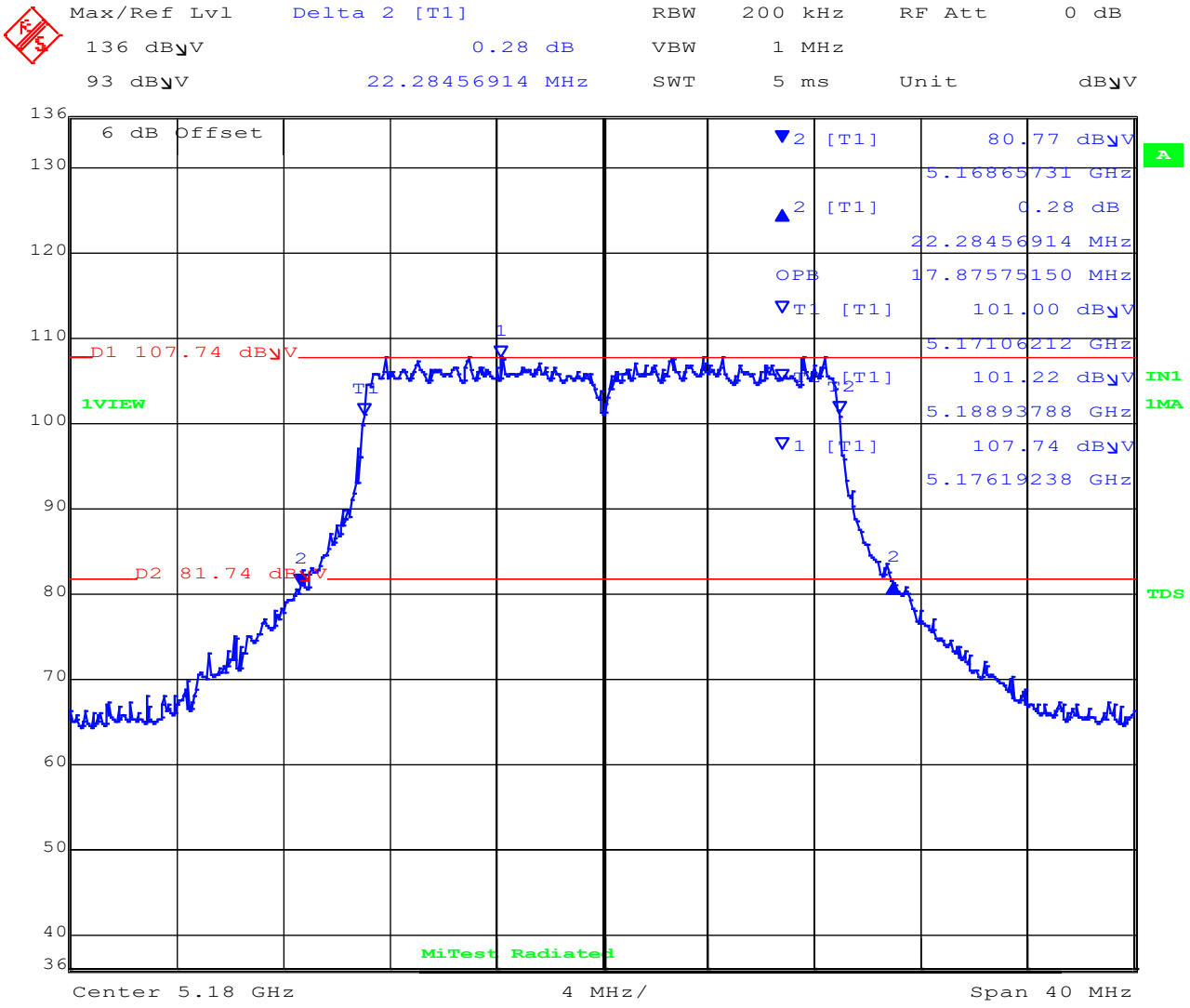

Date: 25.MAR.2021 18:09:42

| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 11.62 MHz<br>Measured 99% Bandwidth: 8.94 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5180.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

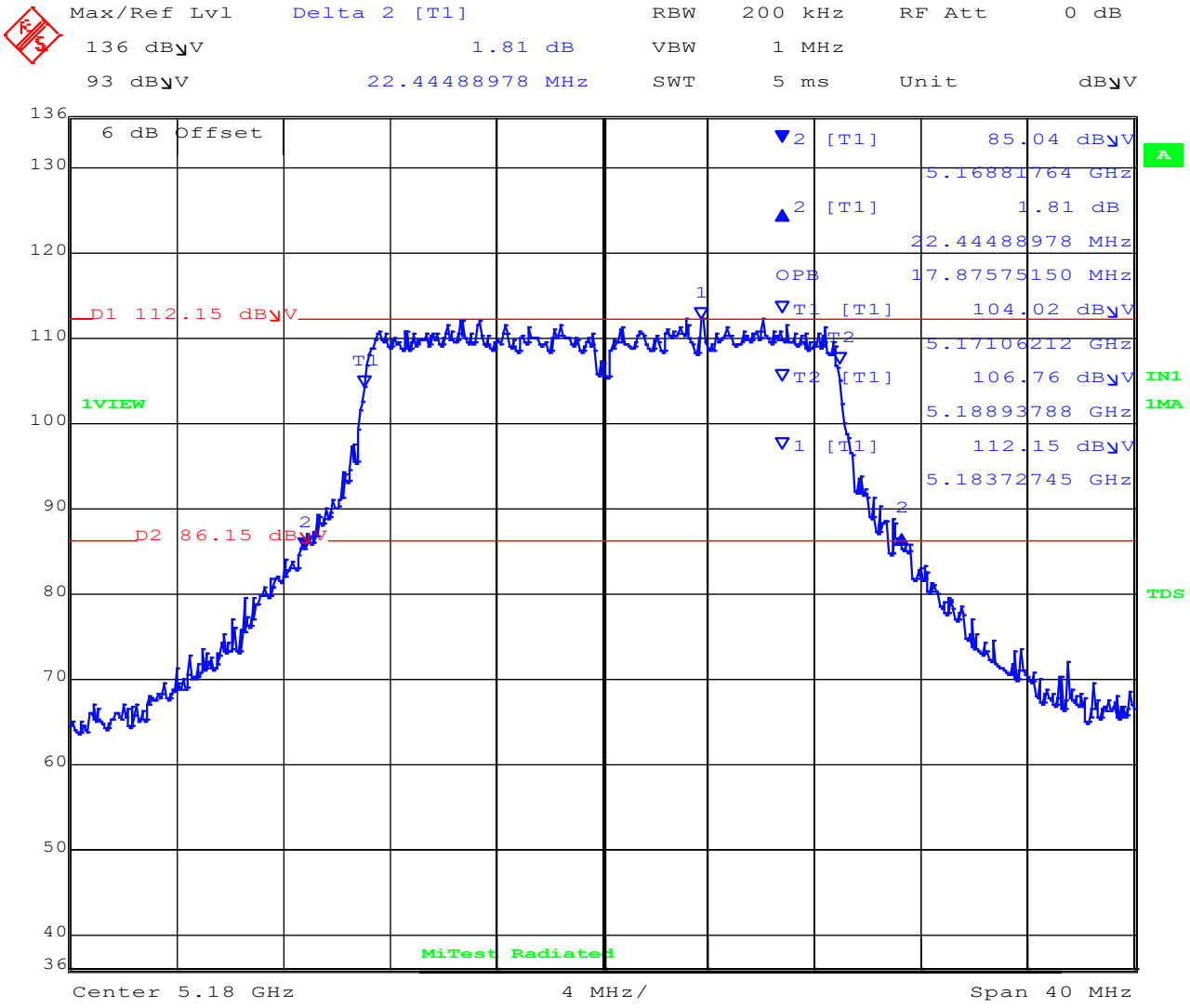



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 22.28 MHz<br>Measured 99% Bandwidth: 17.88 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5180.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

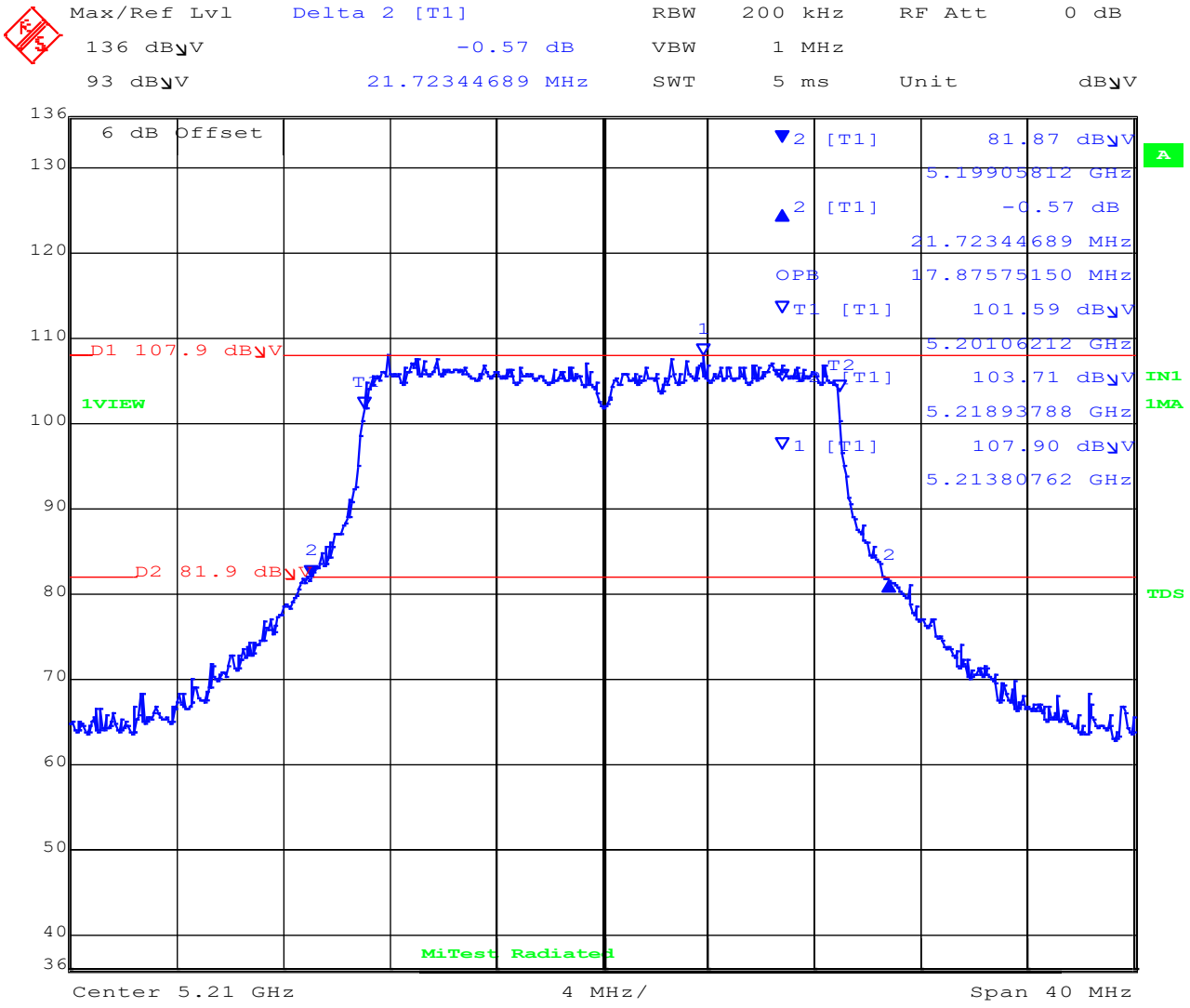



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 22.44 MHz<br>Measured 99% Bandwidth: 17.88 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

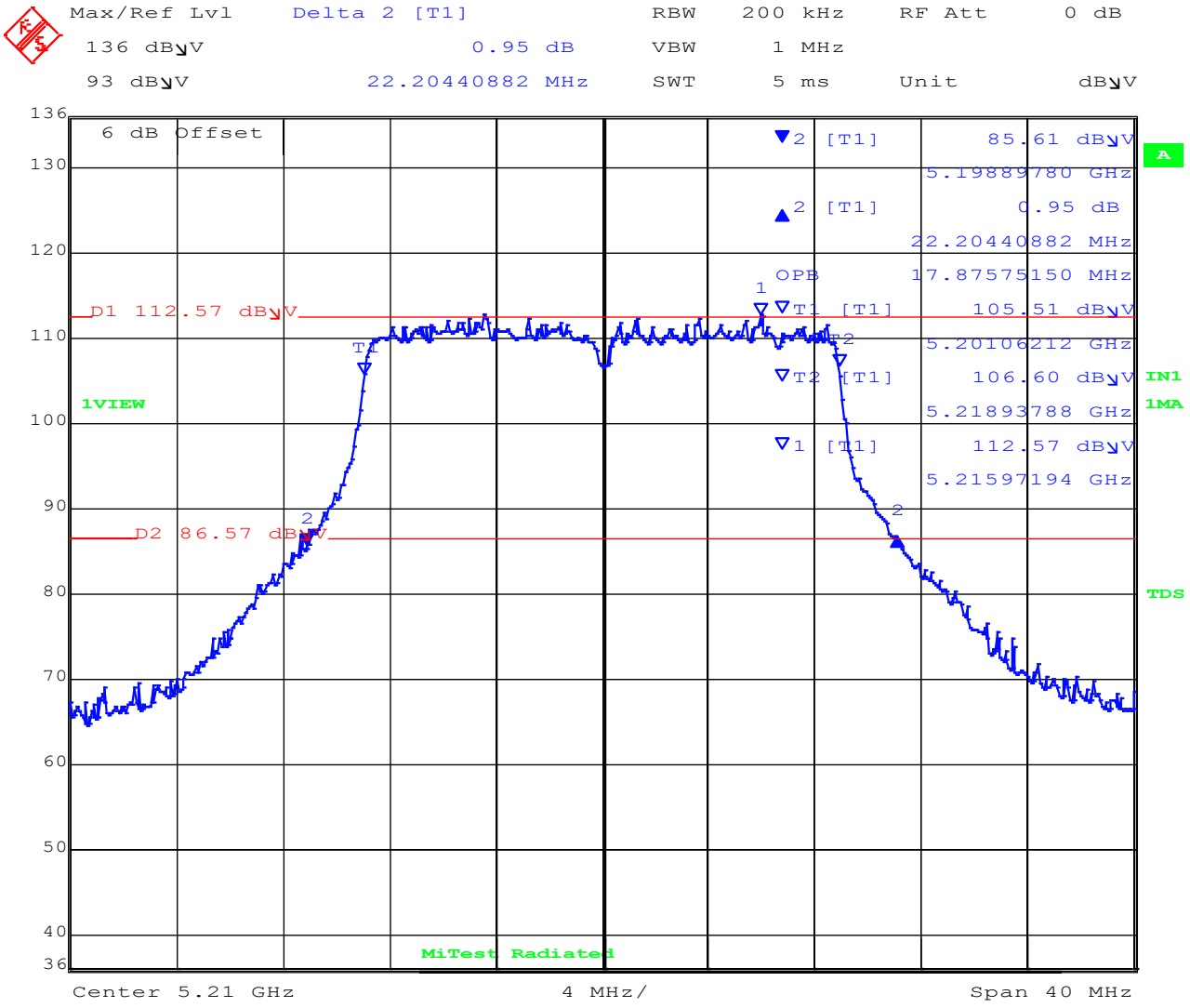



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 21.72 MHz<br>Measured 99% Bandwidth: 17.88 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

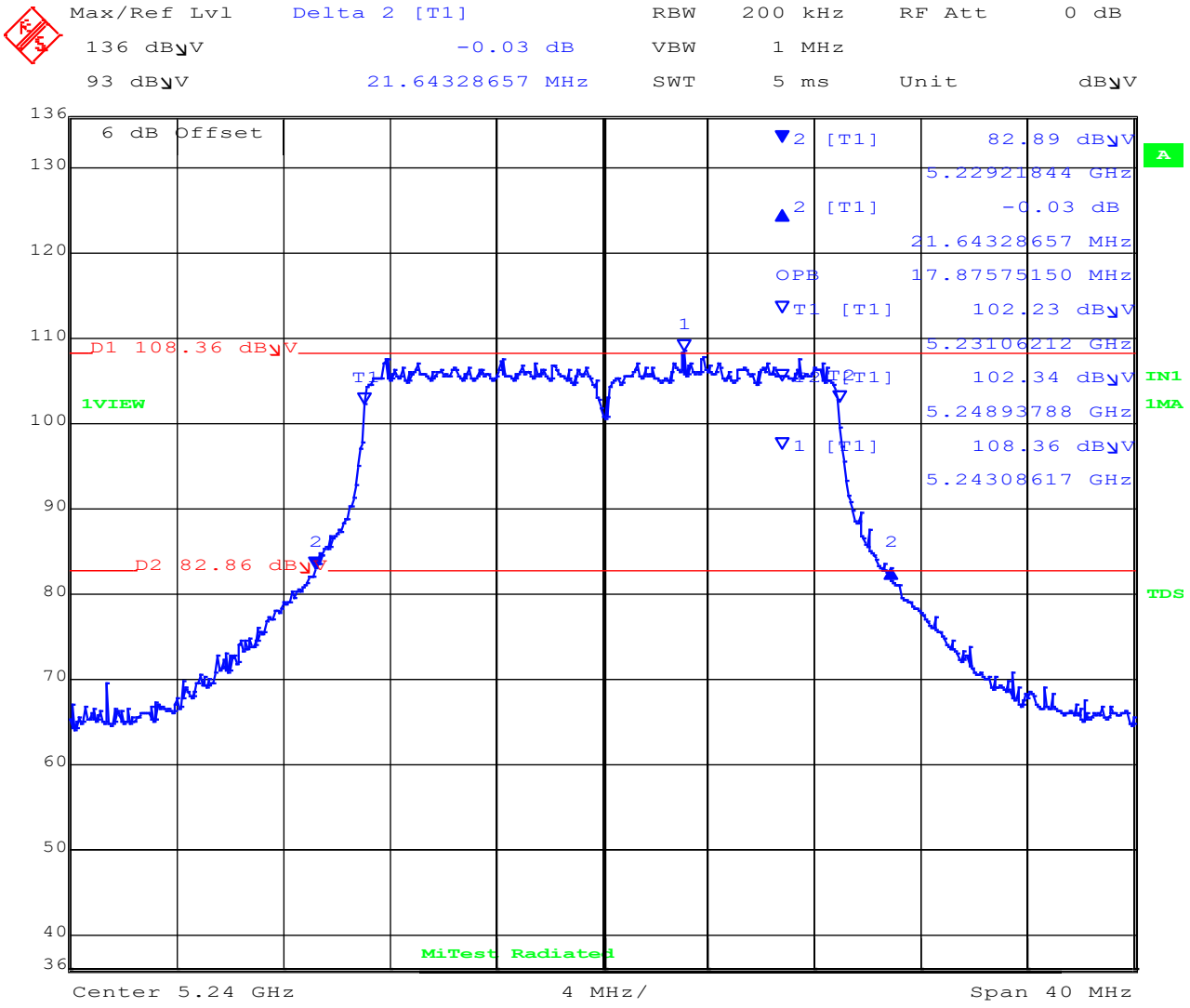



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 22.20 MHz<br>Measured 99% Bandwidth: 17.88 MHz |

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5240.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

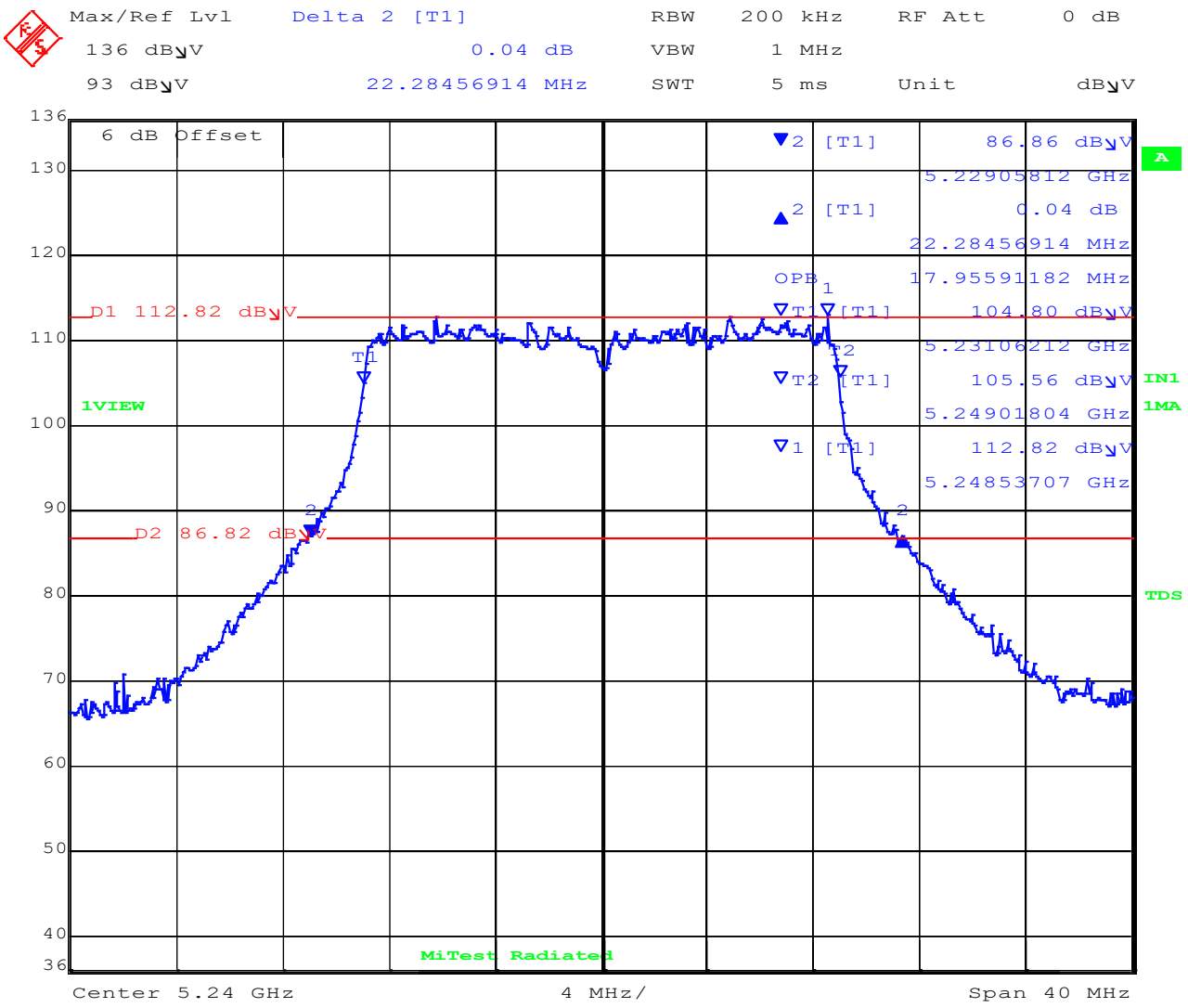



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 21.64MHz<br>Measured 99% Bandwidth: 17.88 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5240.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

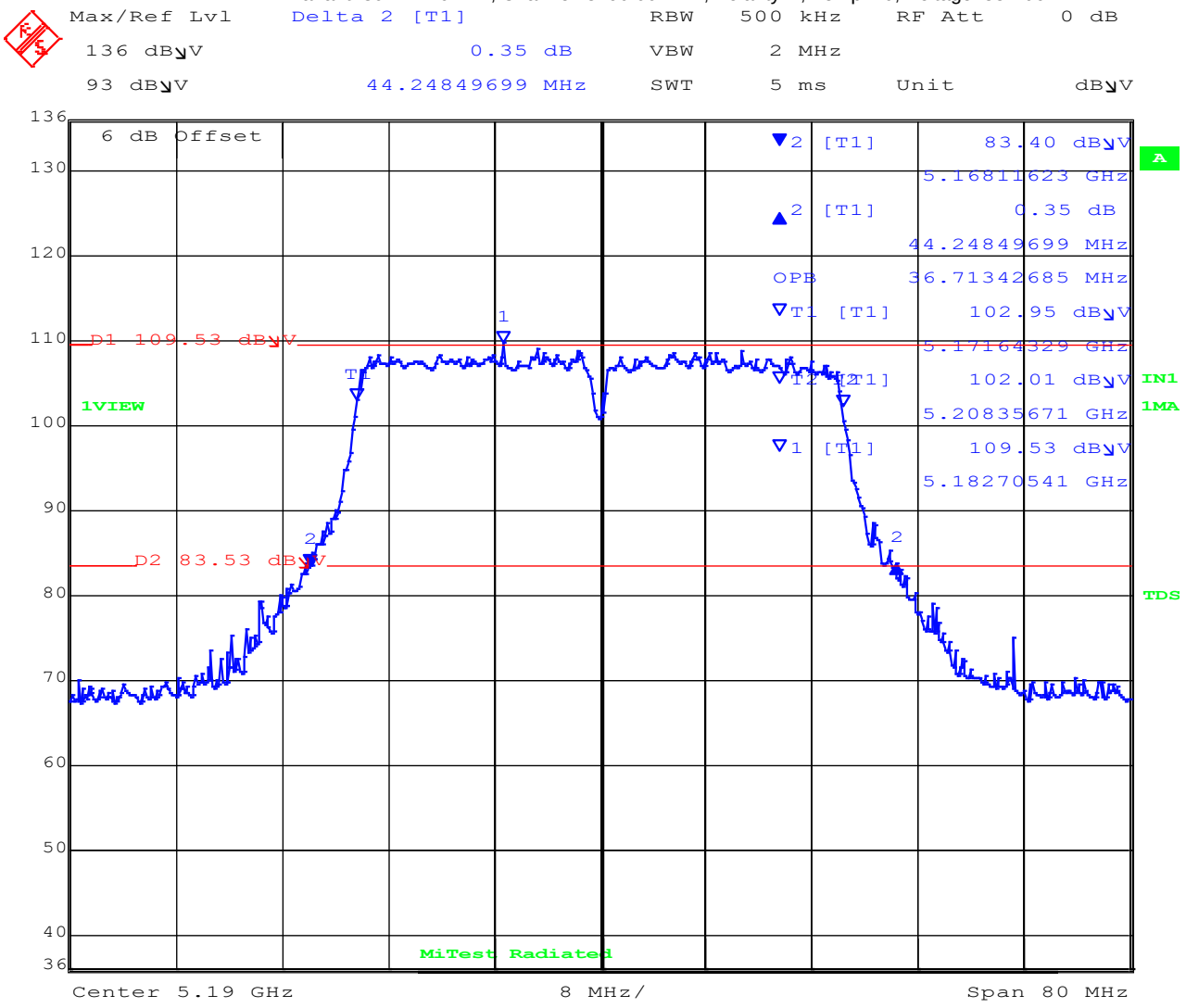



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 22.28 MHz<br>Measured 99% Bandwidth: 17.96 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5190.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

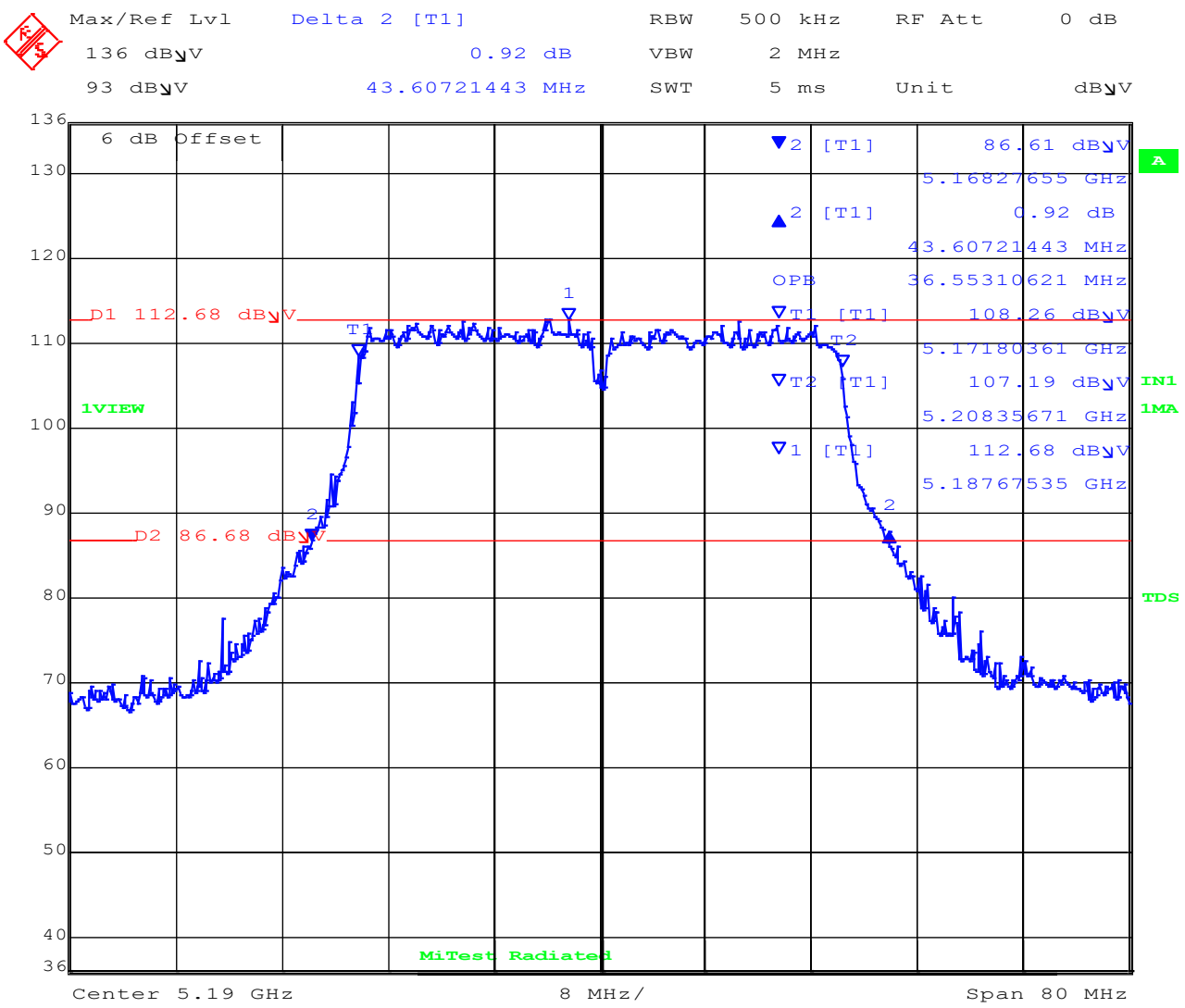



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 44.25 MHz<br>Measured 99% Bandwidth: 36.71 MHz |

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5190.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

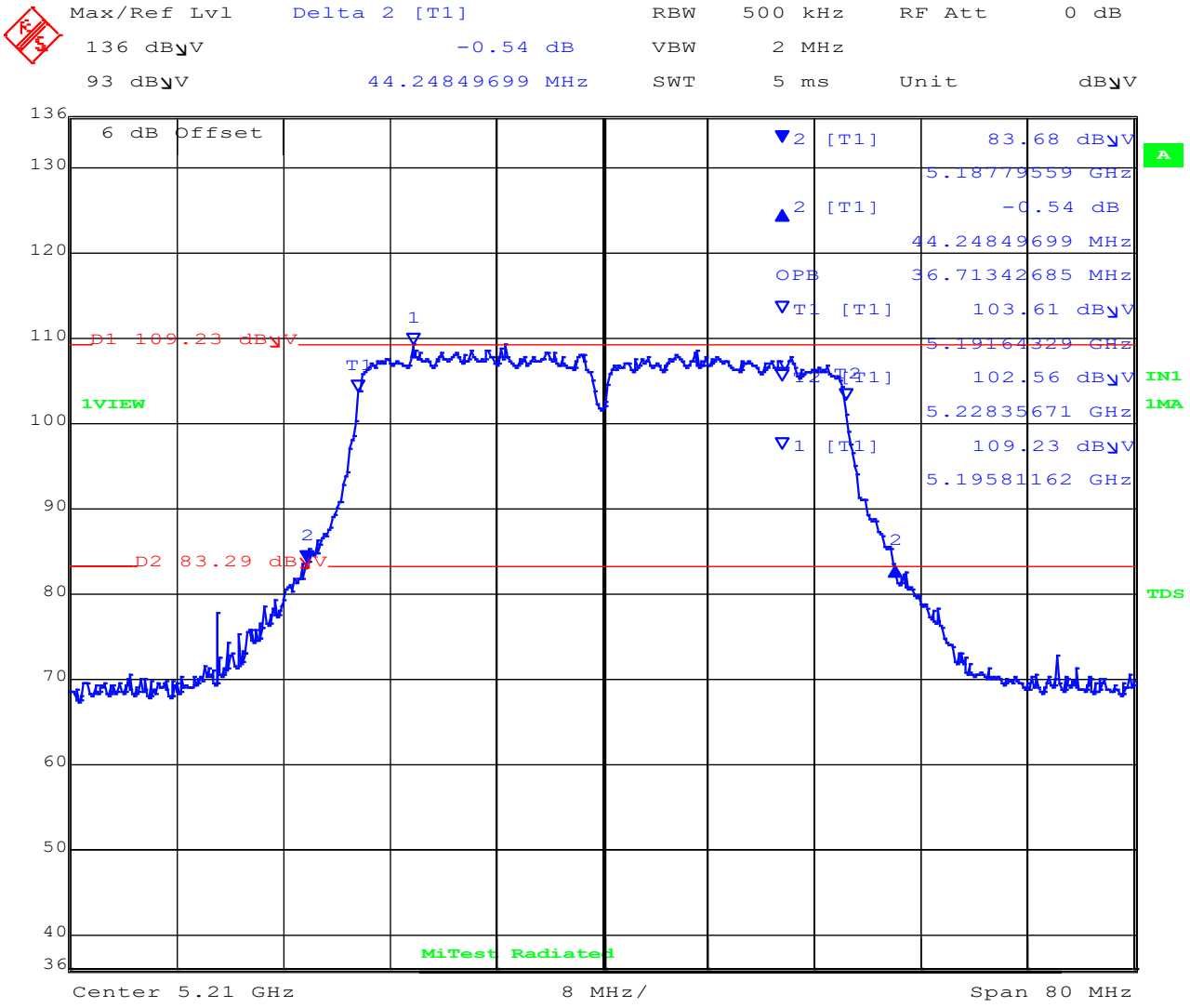



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 43.61 MHz<br>Measured 99% Bandwidth: 36.55 MHz |

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

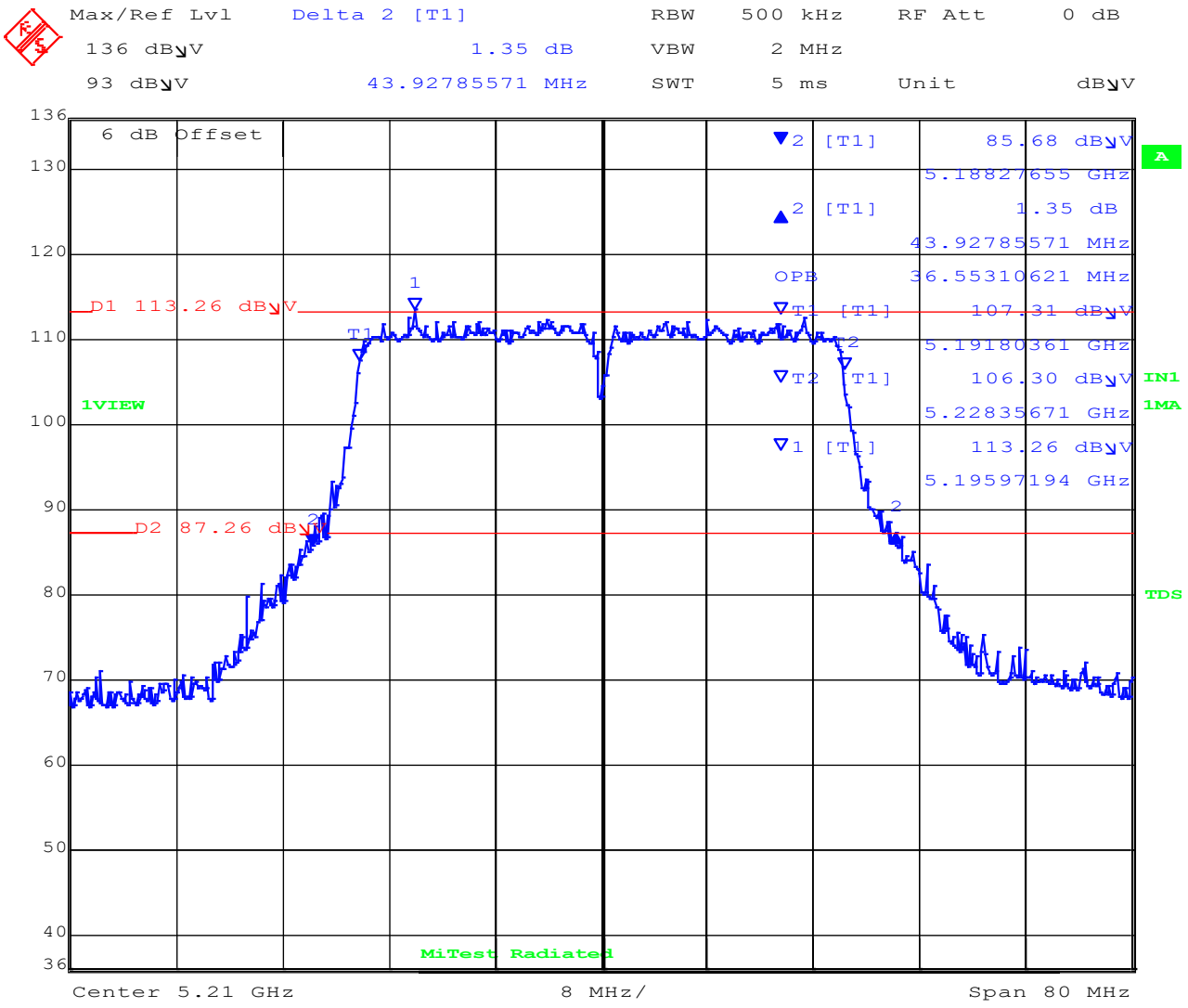



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 44.25 MHz<br>Measured 99% Bandwidth: 36.71 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

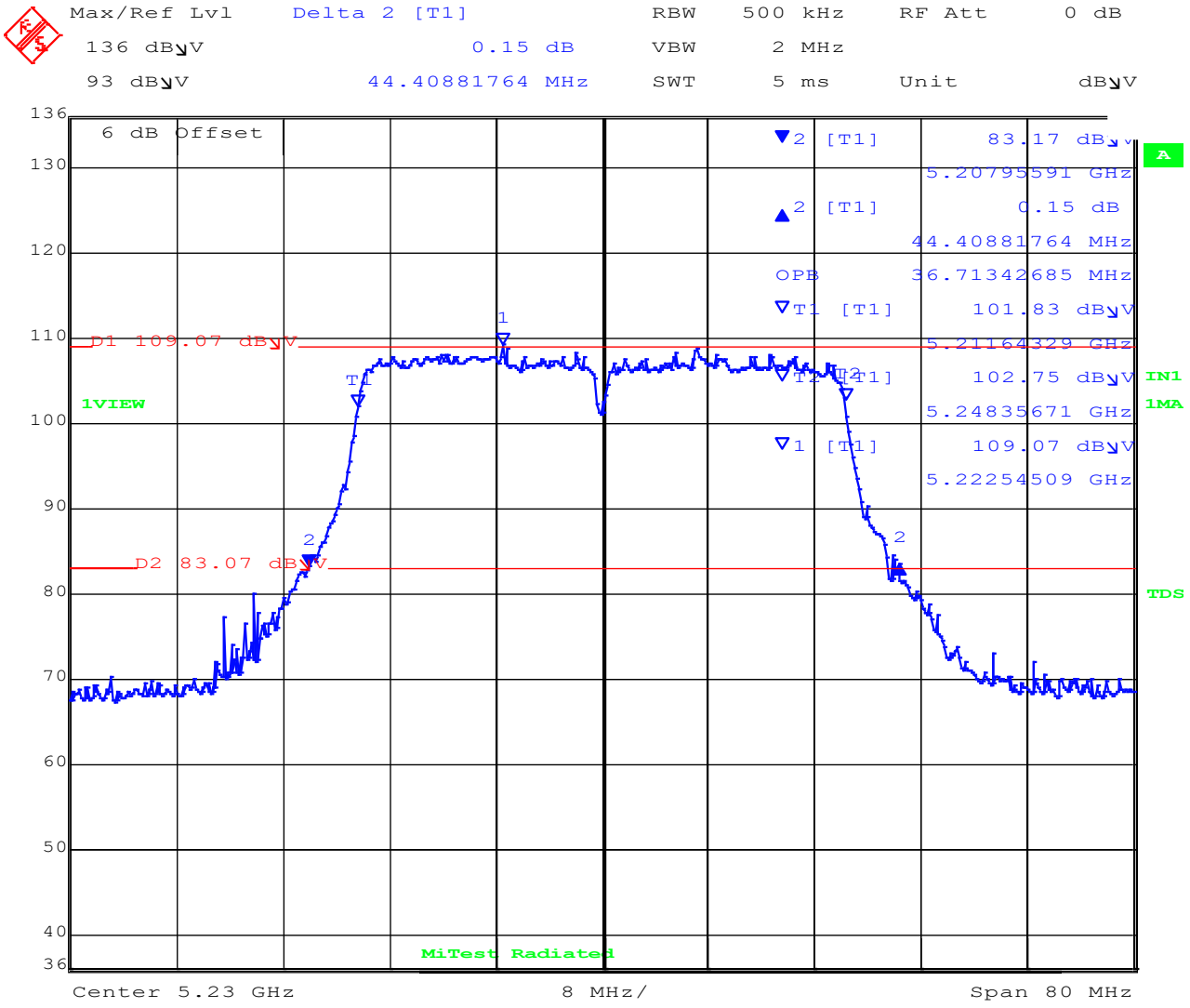



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 43.93 MHz<br>Measured 99% Bandwidth: 36.55 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5230.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

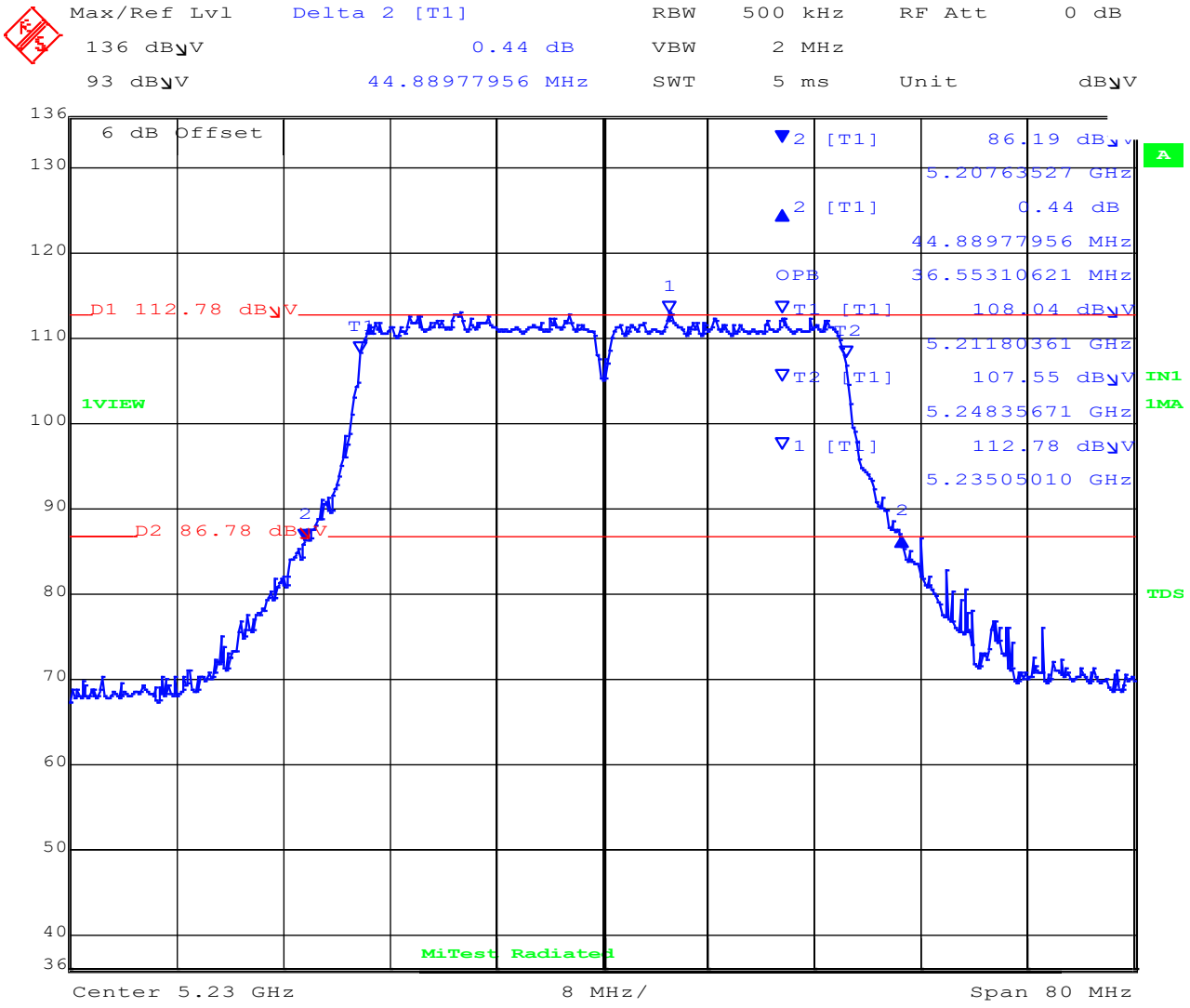



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 44.41 MHz<br>Measured 99% Bandwidth: 36.71 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5230.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

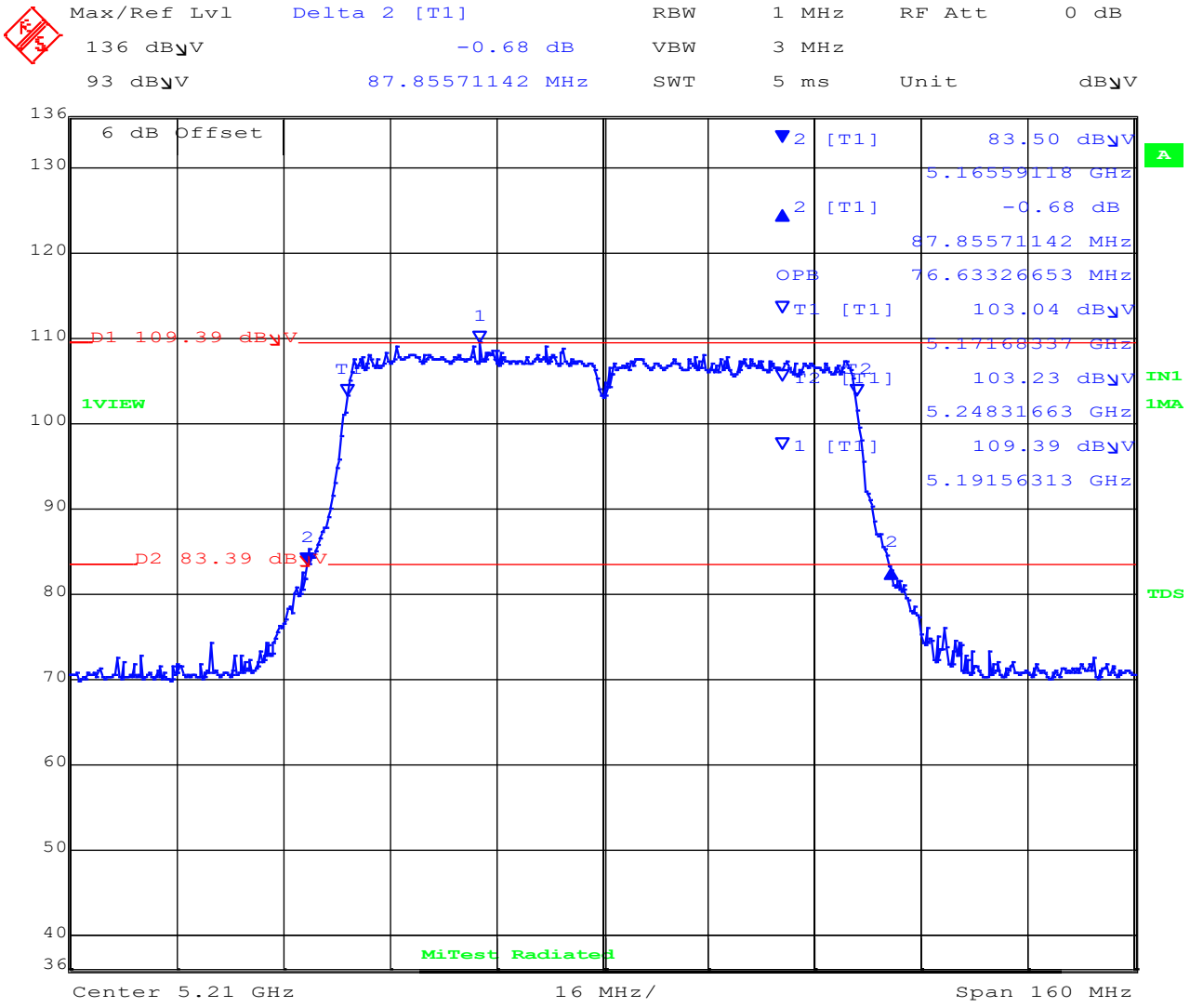



| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 44.89 MHz<br>Measured 99% Bandwidth: 36.55 MHz |

back to matrix

26 dB & 99% BANDWIDTH HORIZONTAL

Variant: 802.11 80MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc



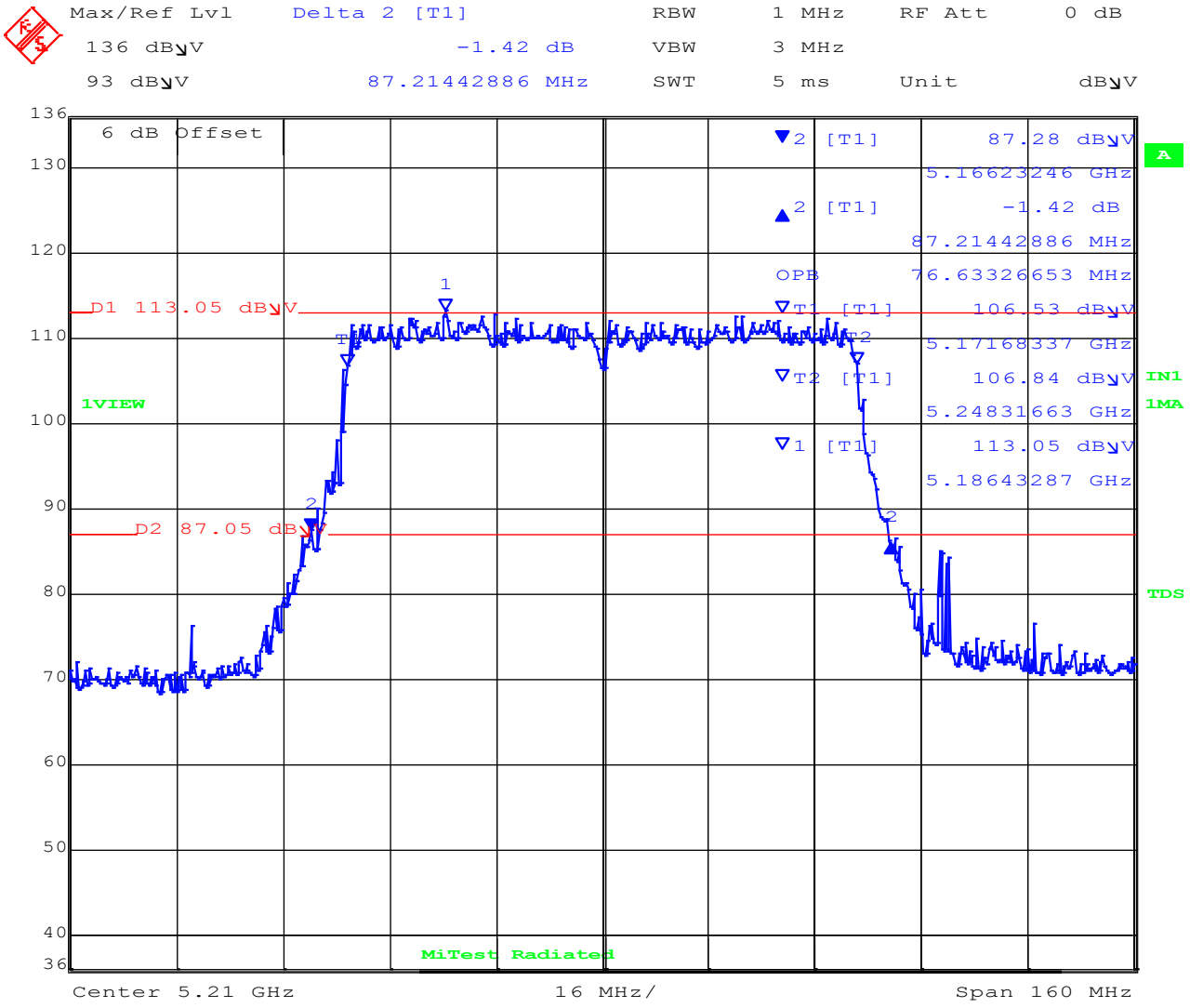

Date: 25.MAR.2021 15:32:03

| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 87.86 MHz<br>Measured 99% Bandwidth: 76.63 MHz |

back to matrix

## 26 dB & 99% BANDWIDTH

Variant: 802.11 80MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc




Date: 25.MAR.2021 15:29:44

| Analyzer Setup | | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 0<br>Trace Mode = MAX HOLD | | Measured 26 dB Bandwidth: 87.21 MHz<br>Measured 99% Bandwidth: 76.63 MHz |

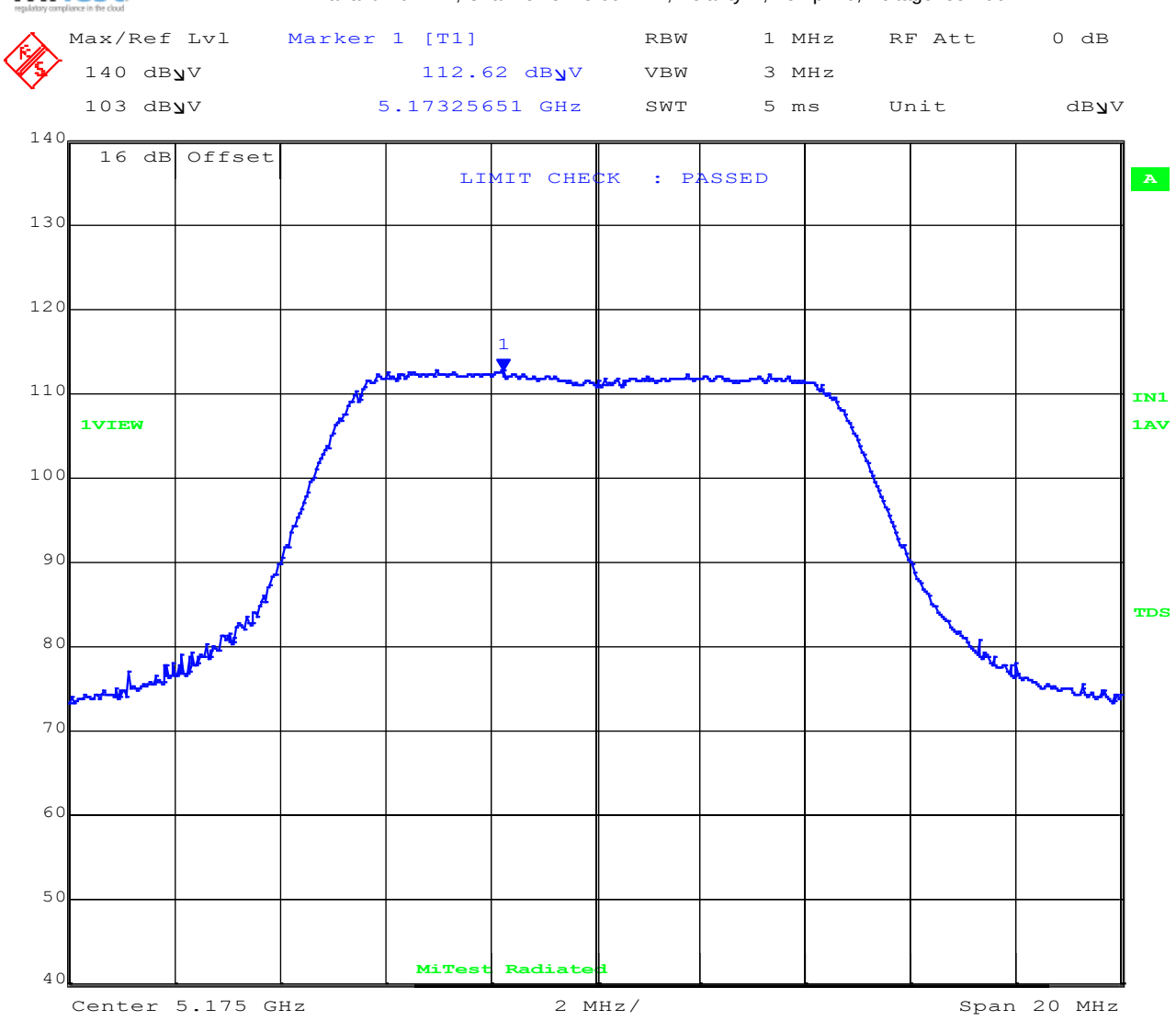
back to matrix

## A.2. Power Spectral Density

### A.1.1 Non-Beamforming

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5175.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

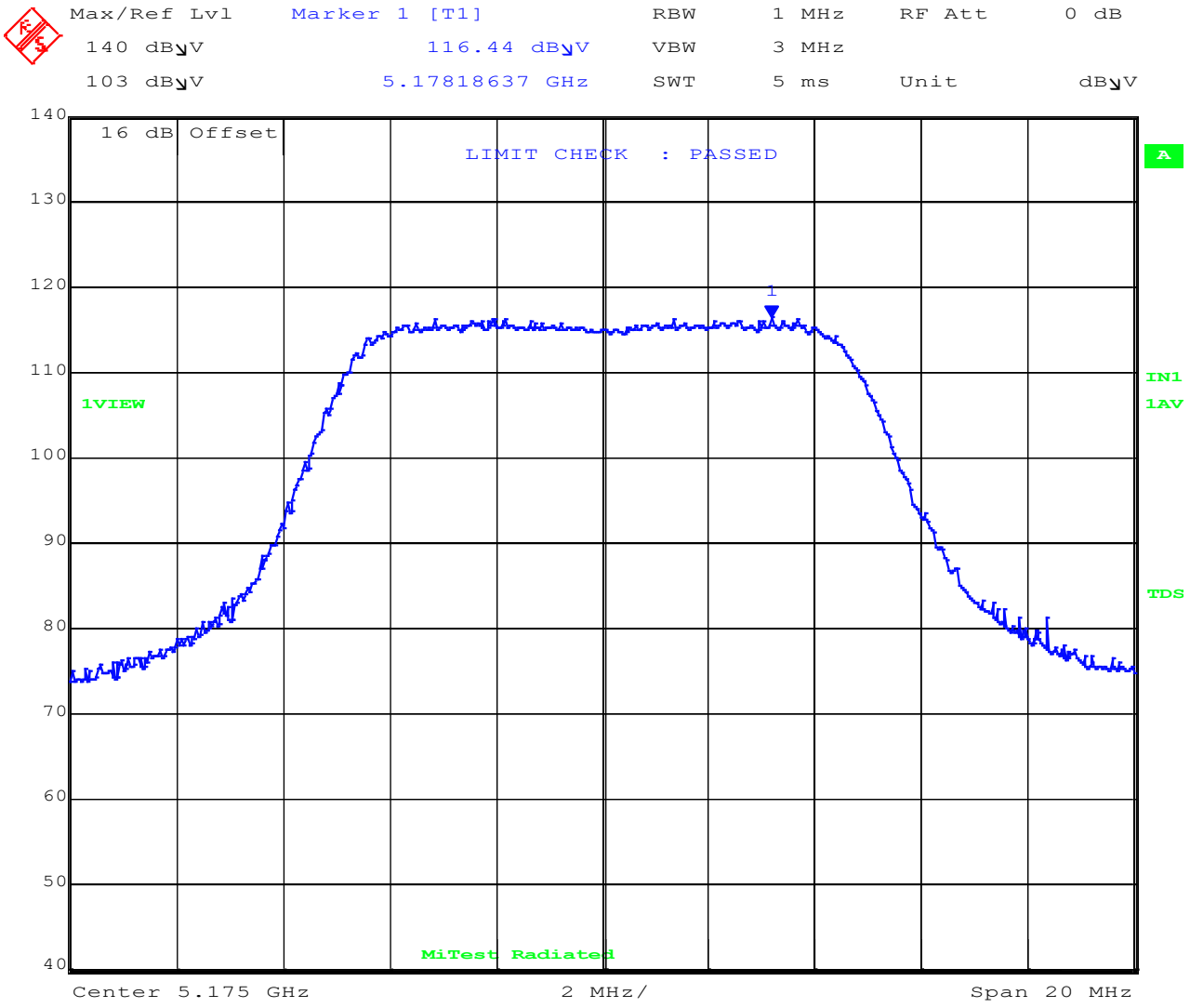



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5173.26 MHz : 112.62 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5175.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc

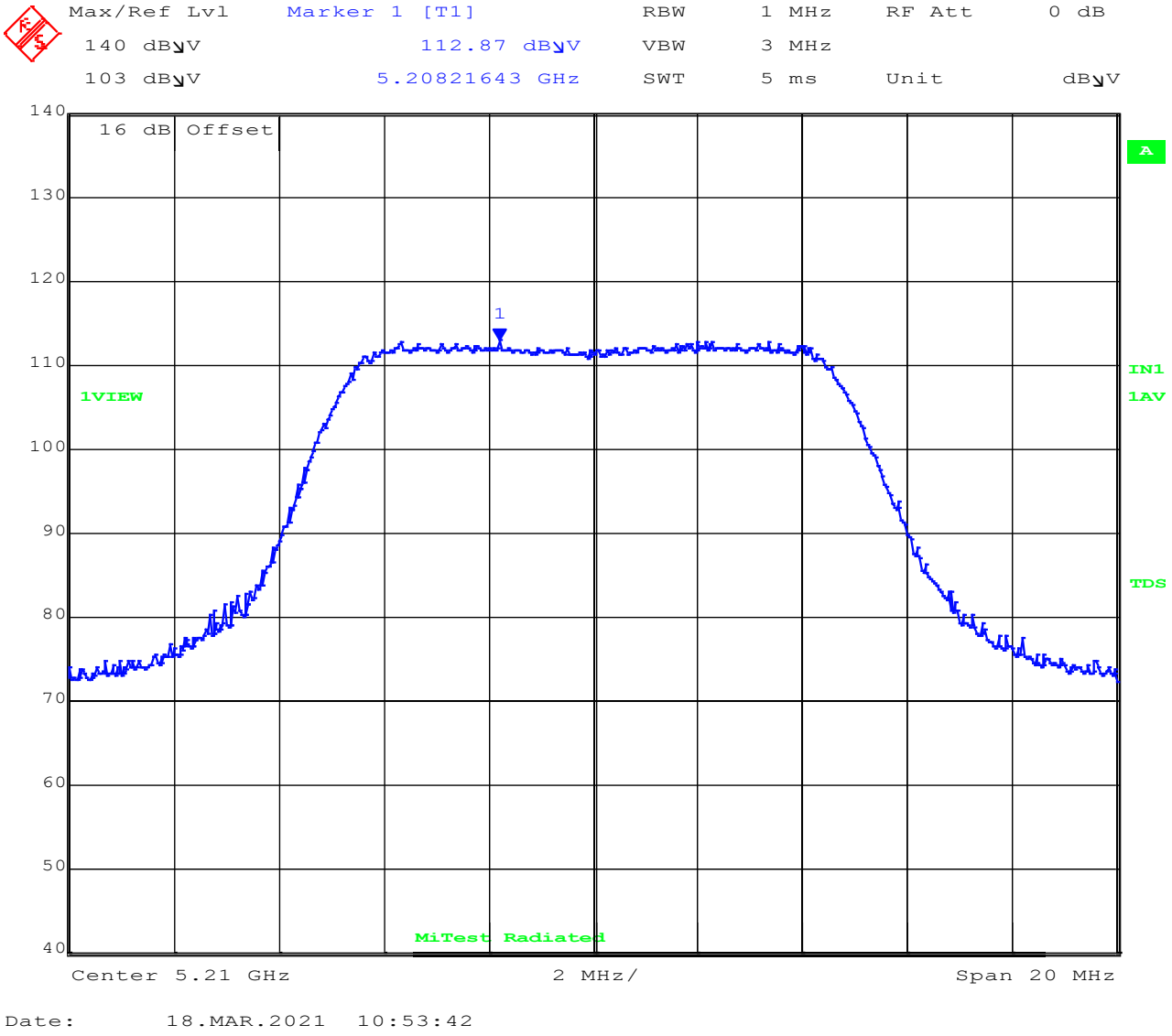



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 517.19 MHz :116.44 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

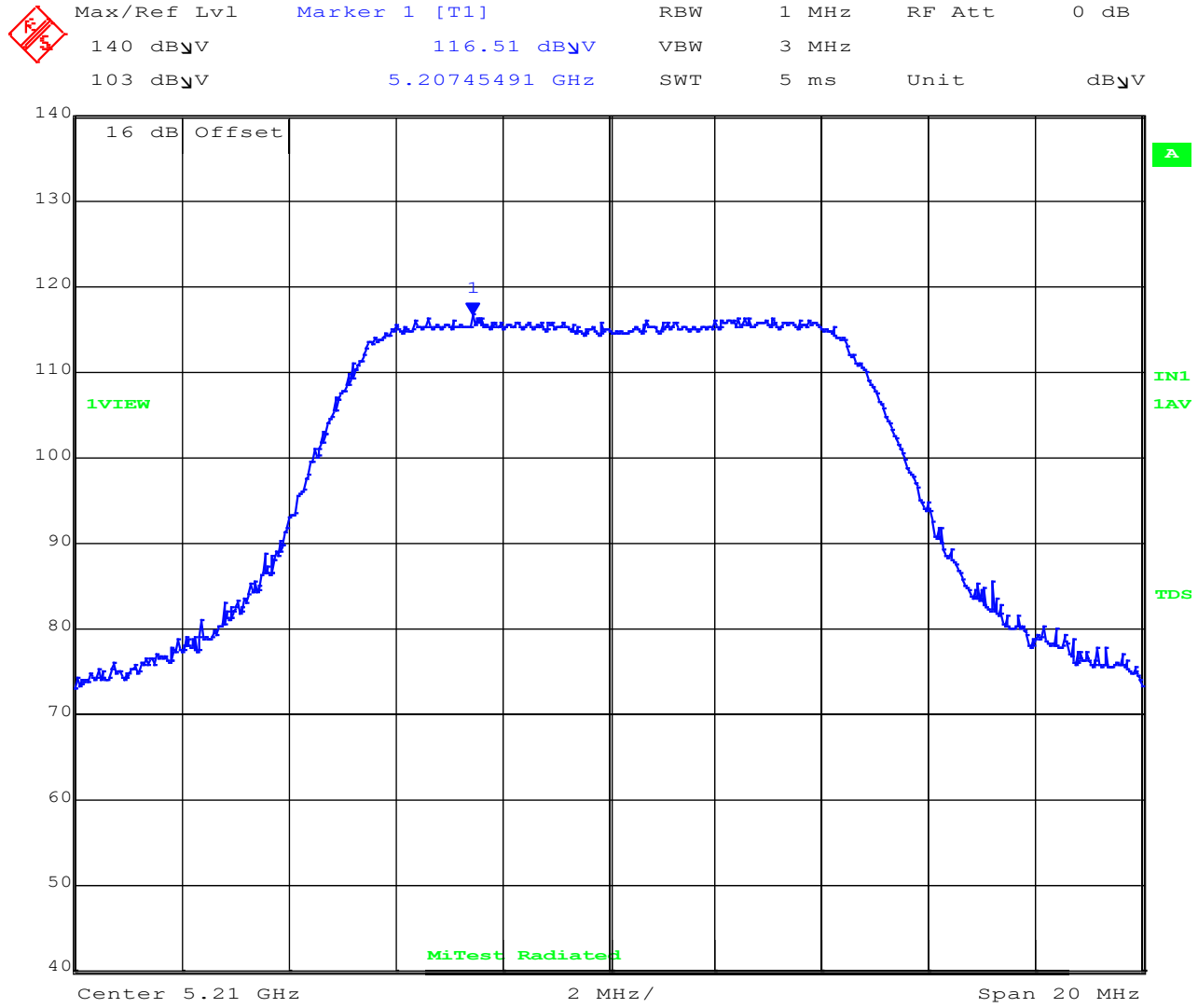



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5208.22 MHz : 112.87 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

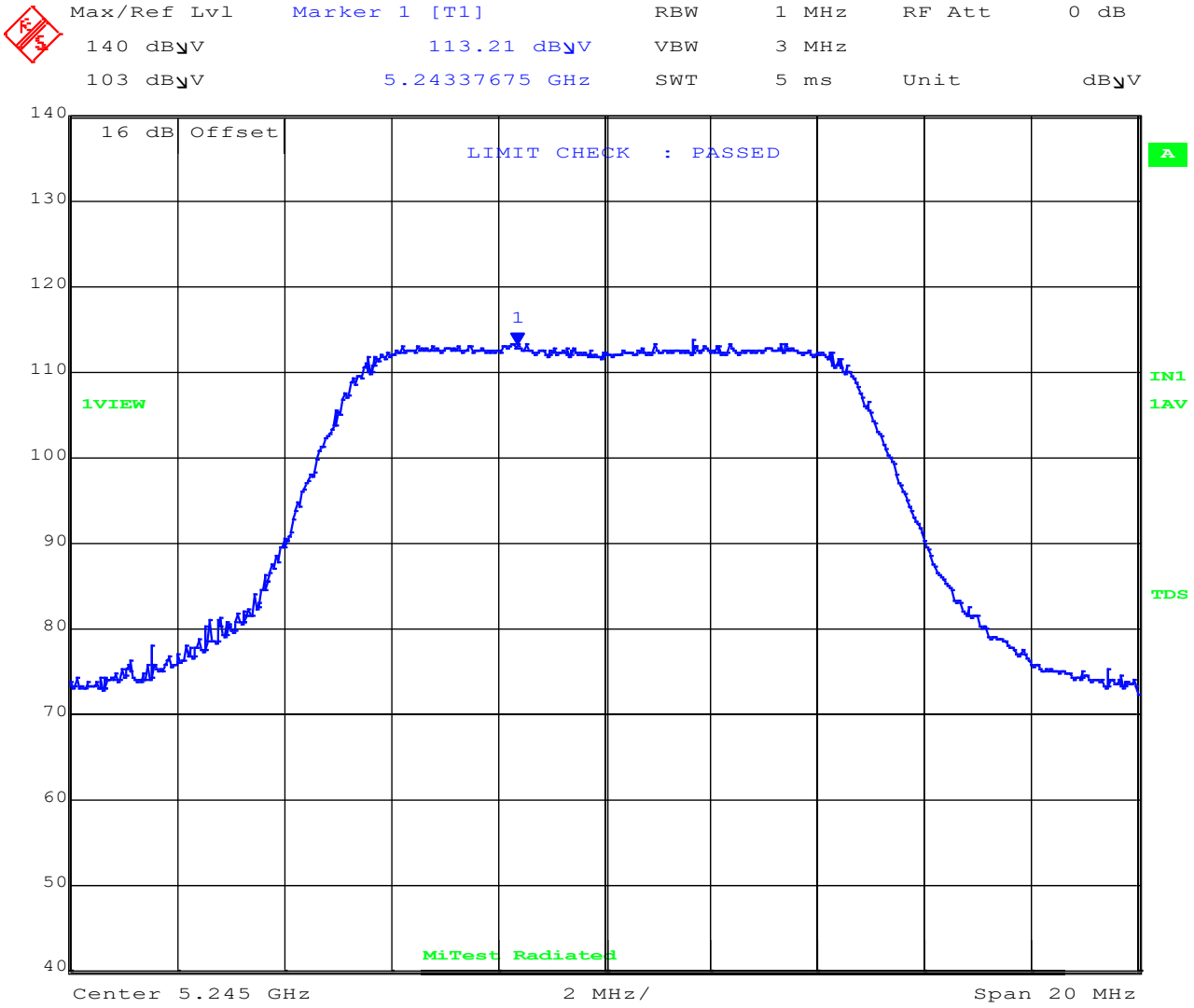



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5207.45 MHz : 116.51 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5245.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

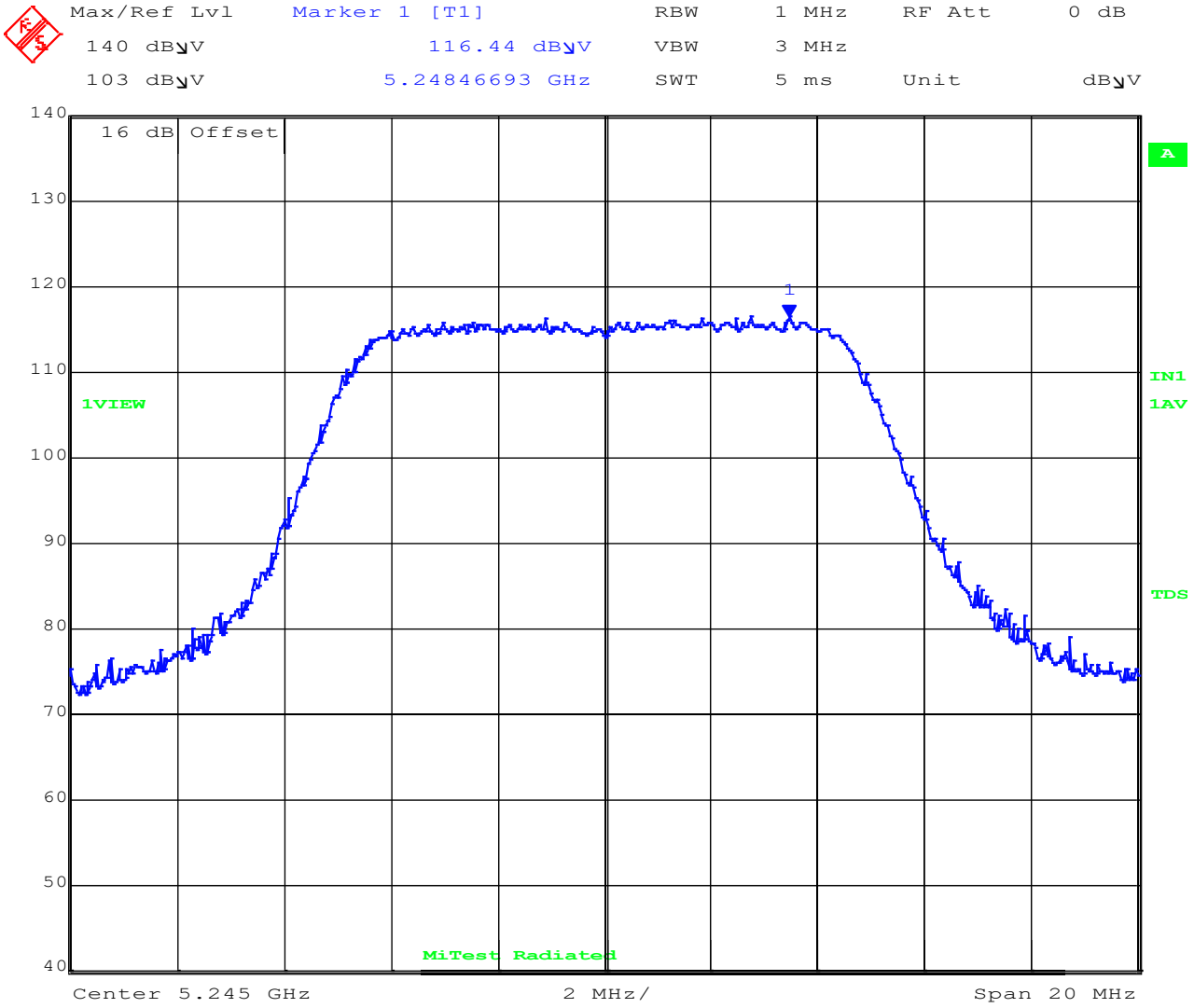



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5243.38 MHz : 113.21 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5245.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

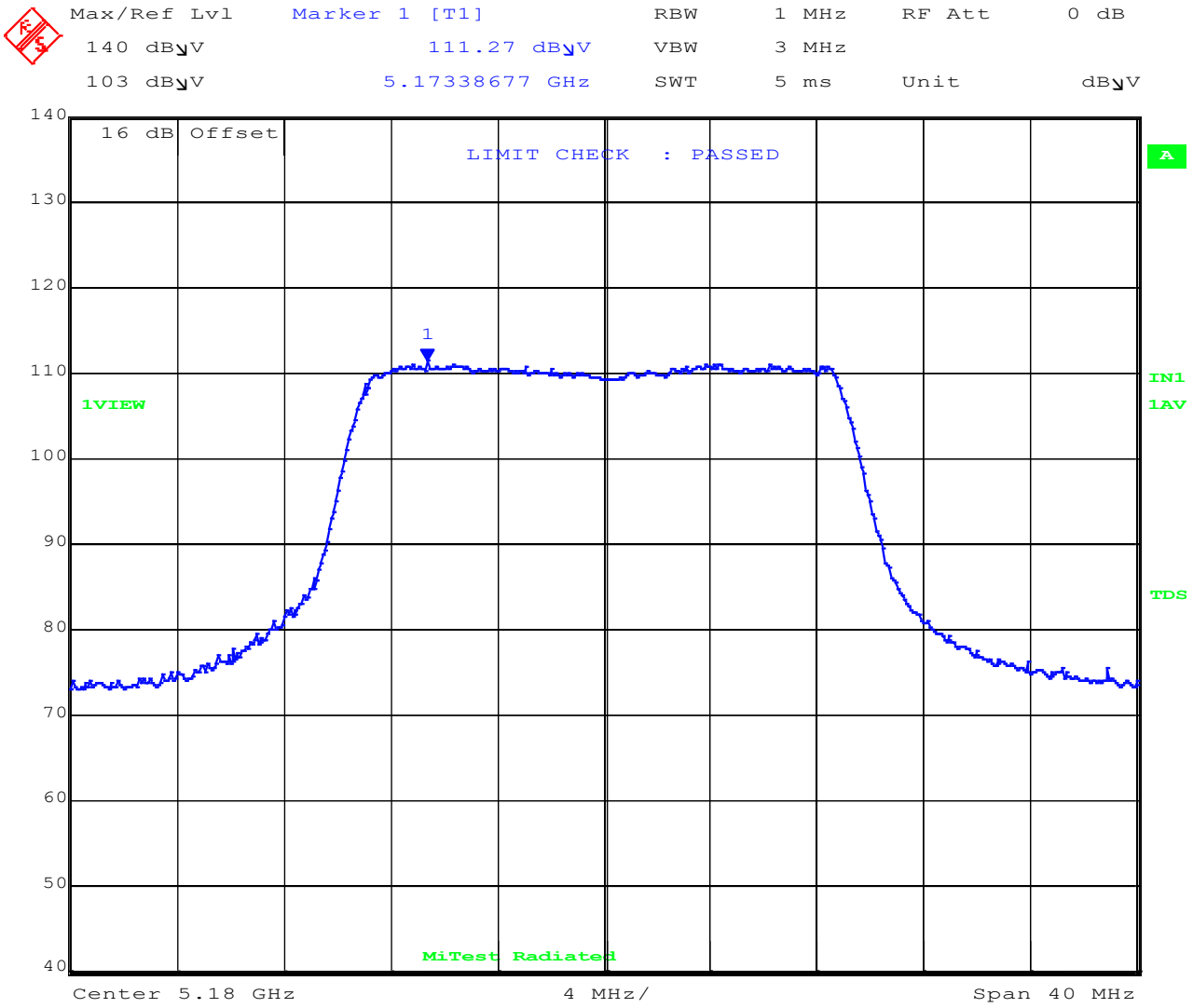



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5248.46 MHz : 116.44 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5180.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

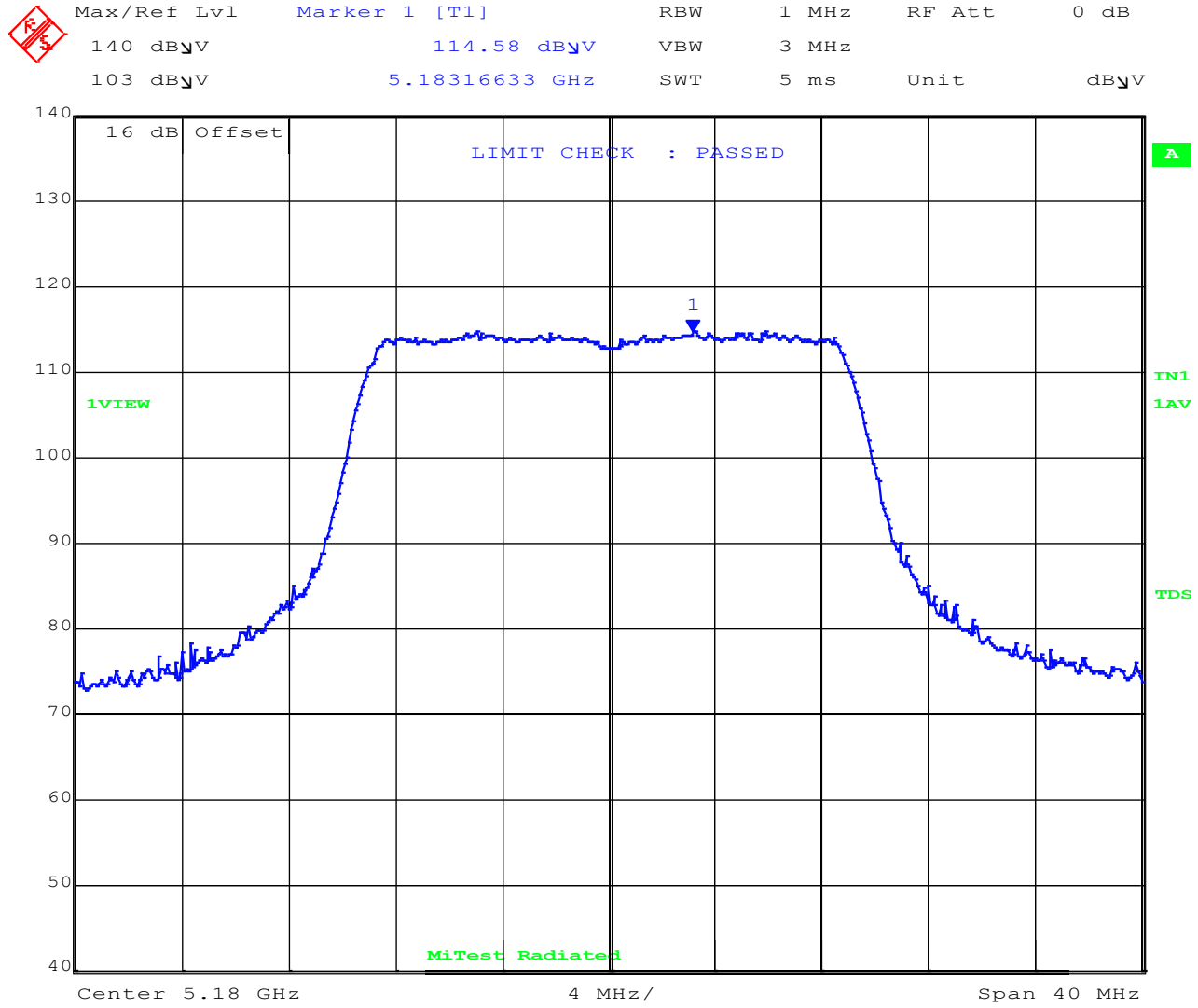



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5173.39 MHz : 111.27 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5180.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc

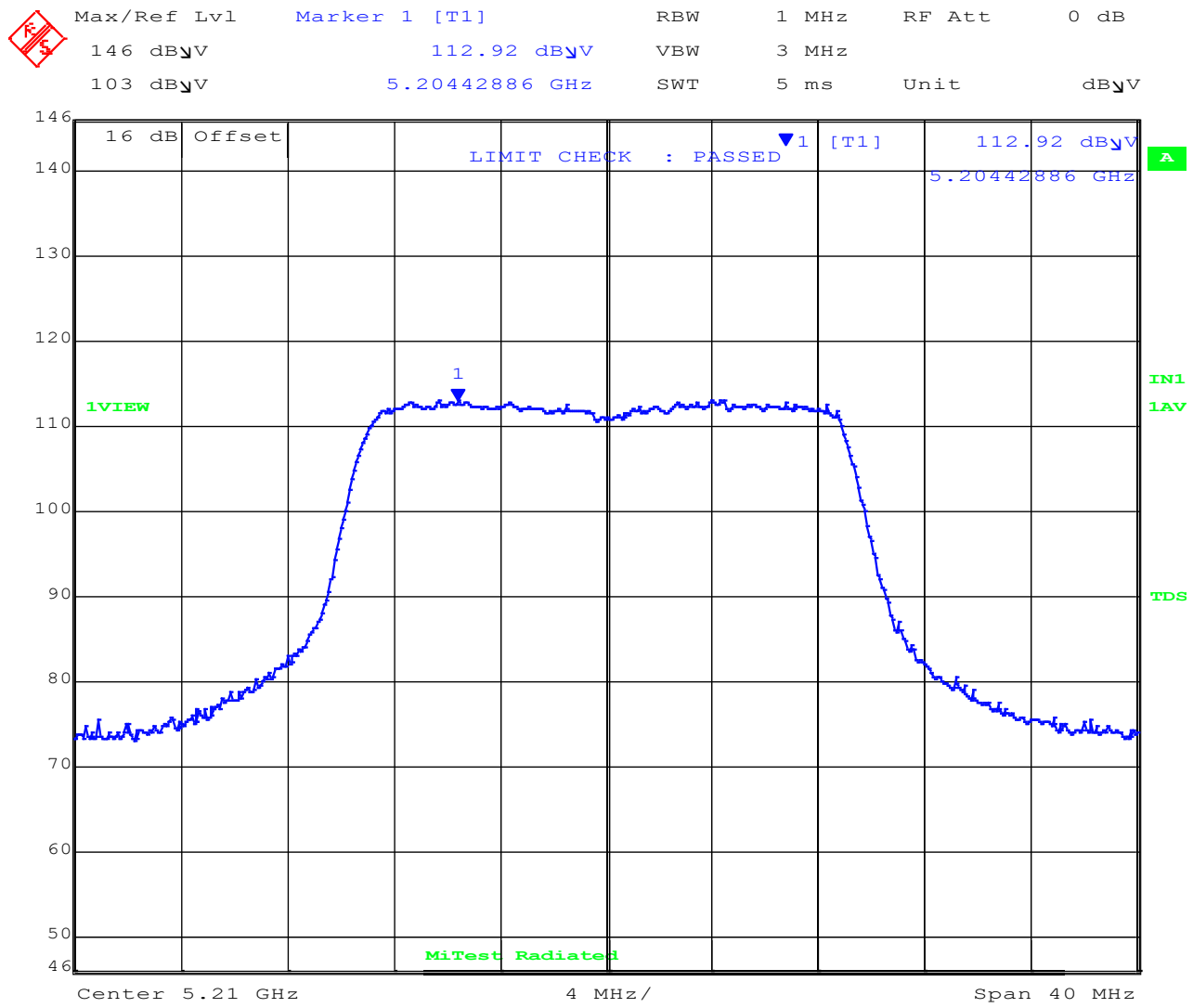



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5183.17 MHz :114.58 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

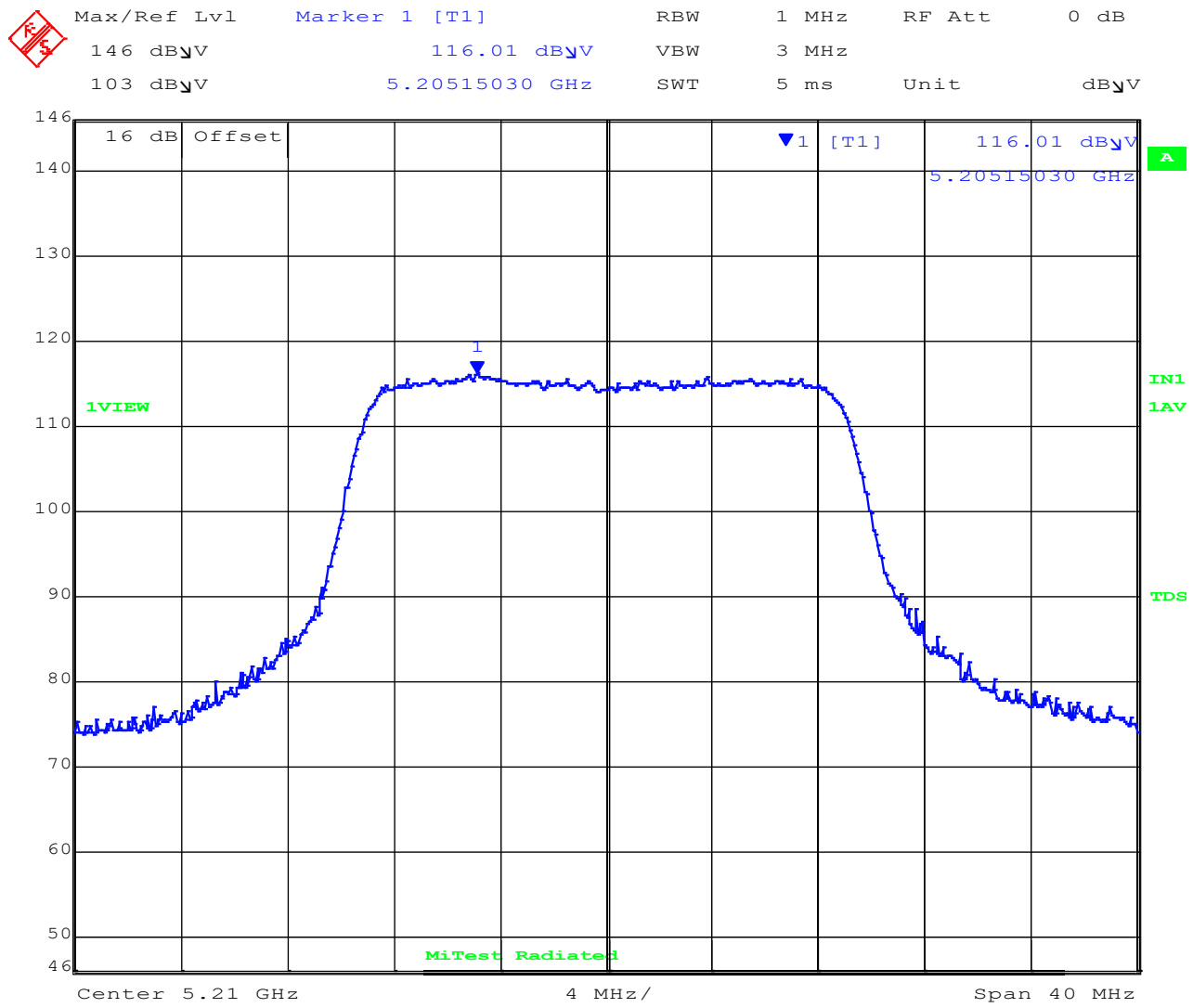



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5204.29 MHz : 112.92 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc



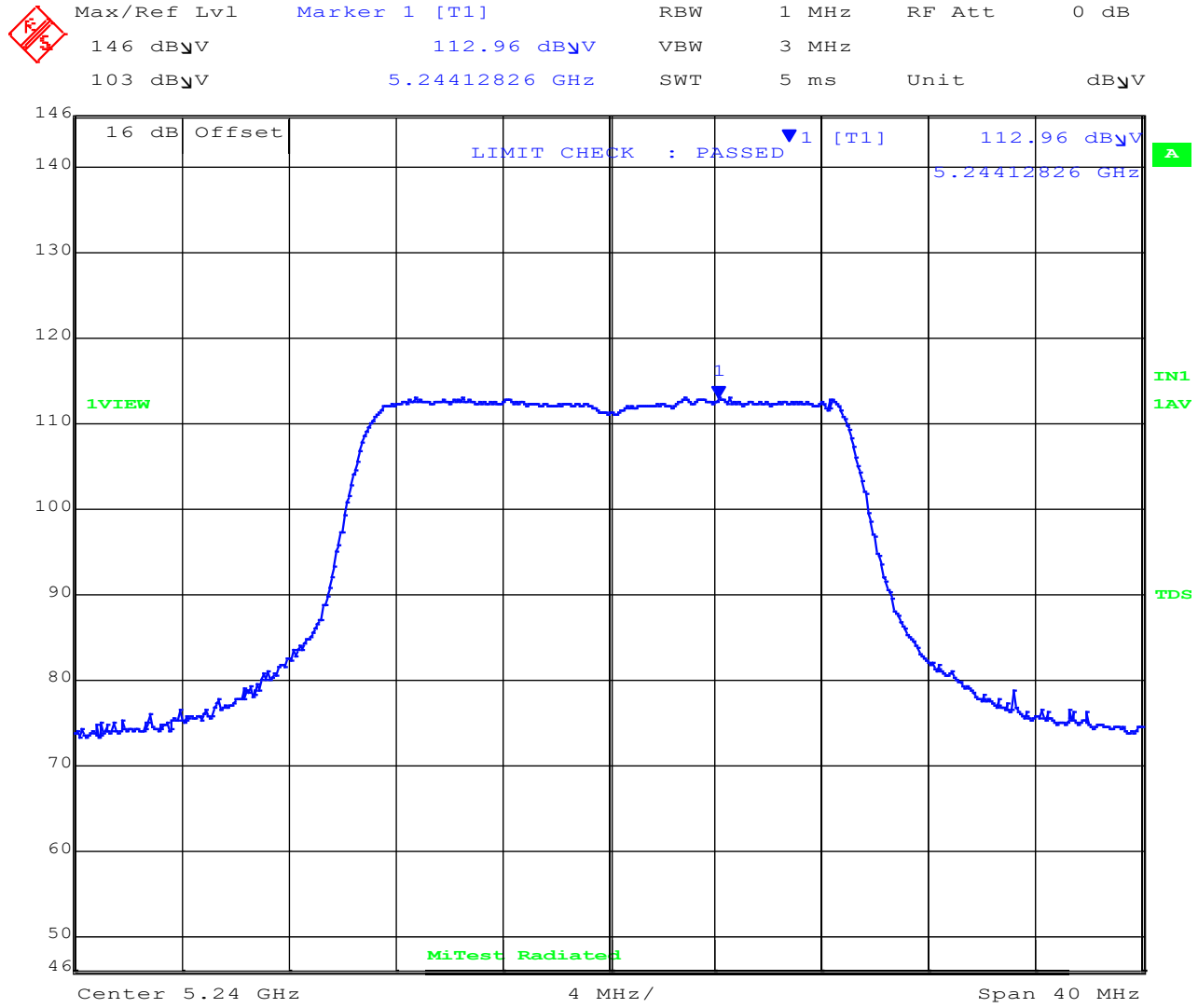

Date: 24.MAR.2021 10:28:01

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5205.15 MHz : 116.01 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5240.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

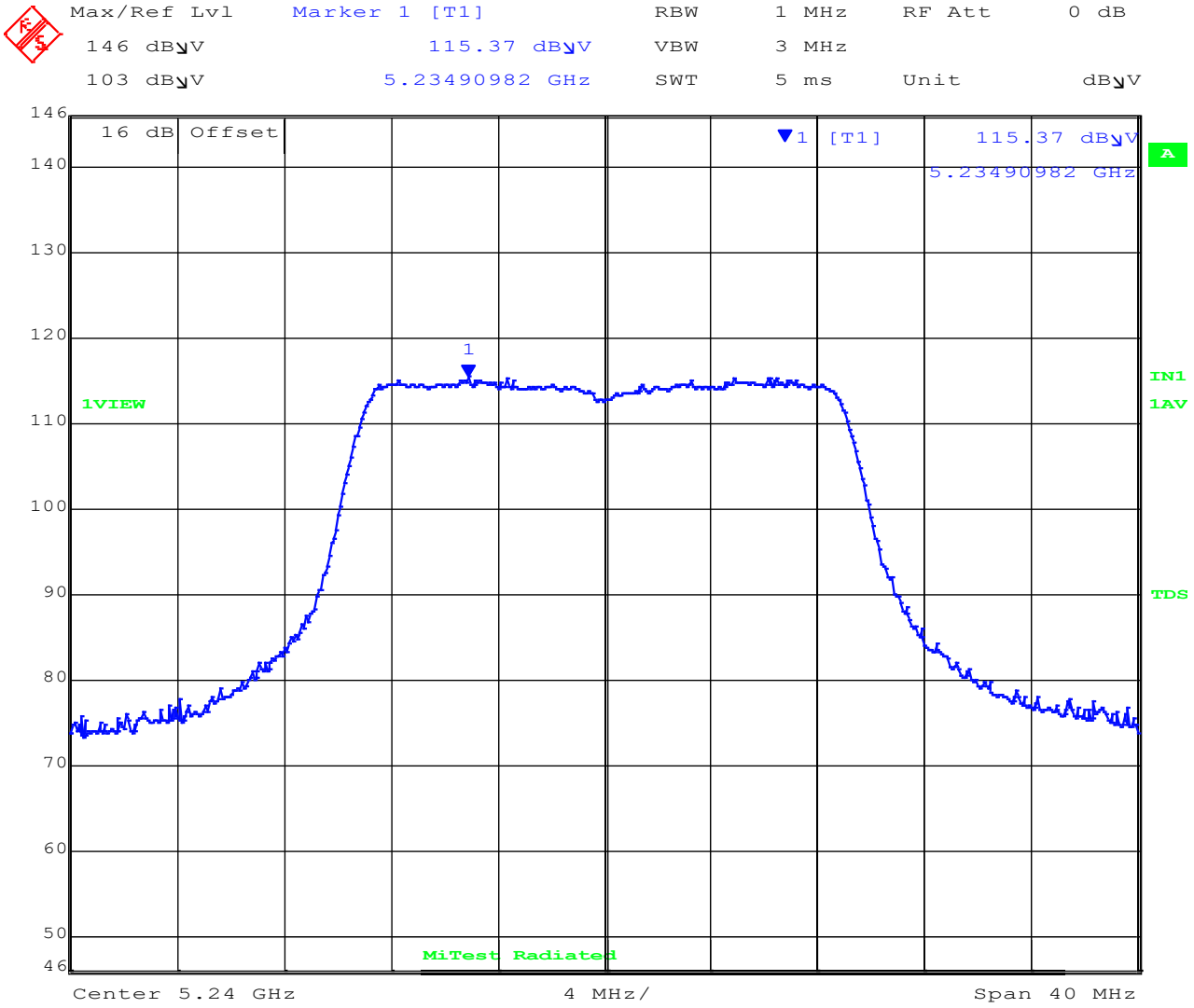



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5244.13 MHz : 112.96 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5240.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

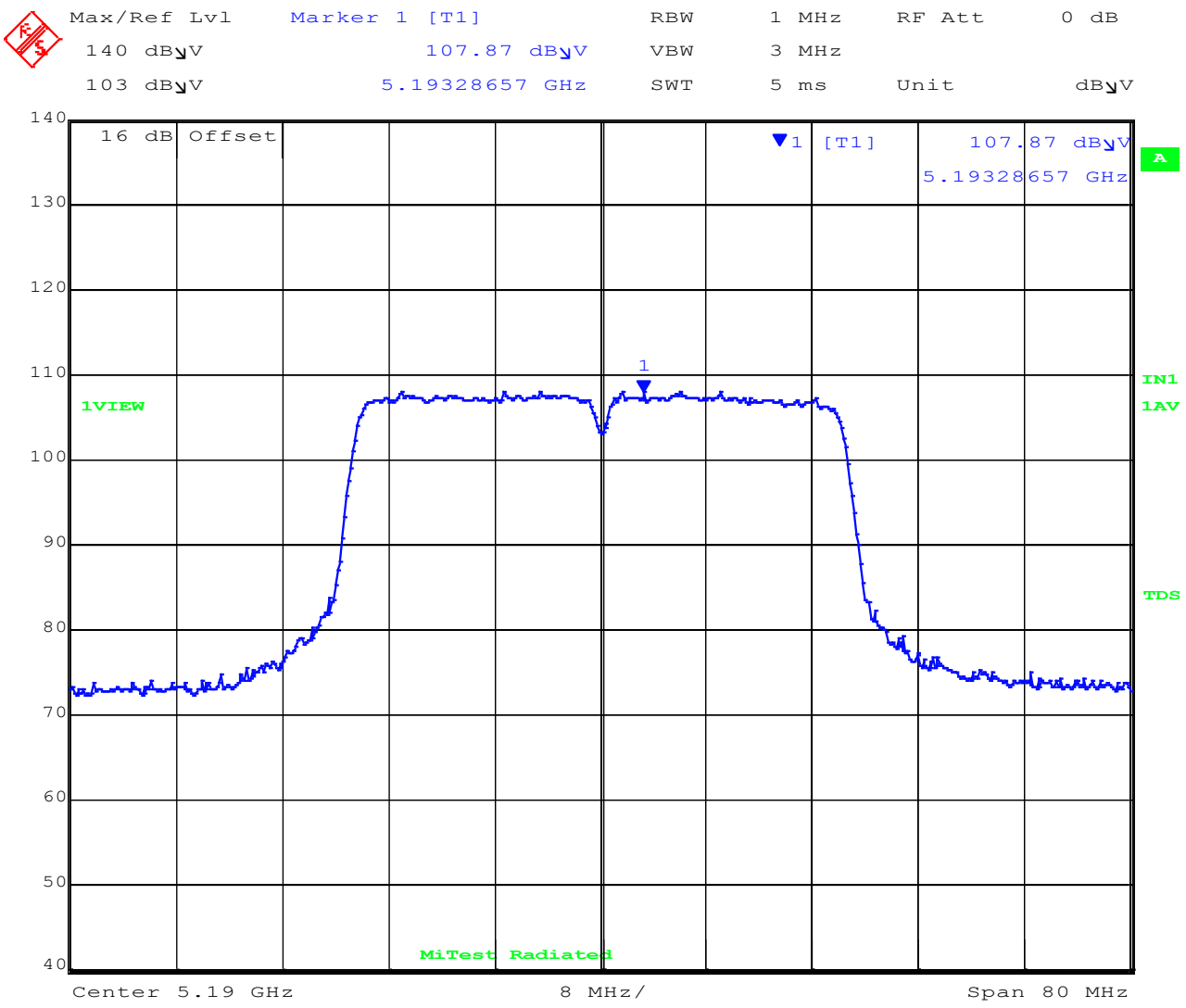



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5234.91 MHz : 115.37 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5190.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

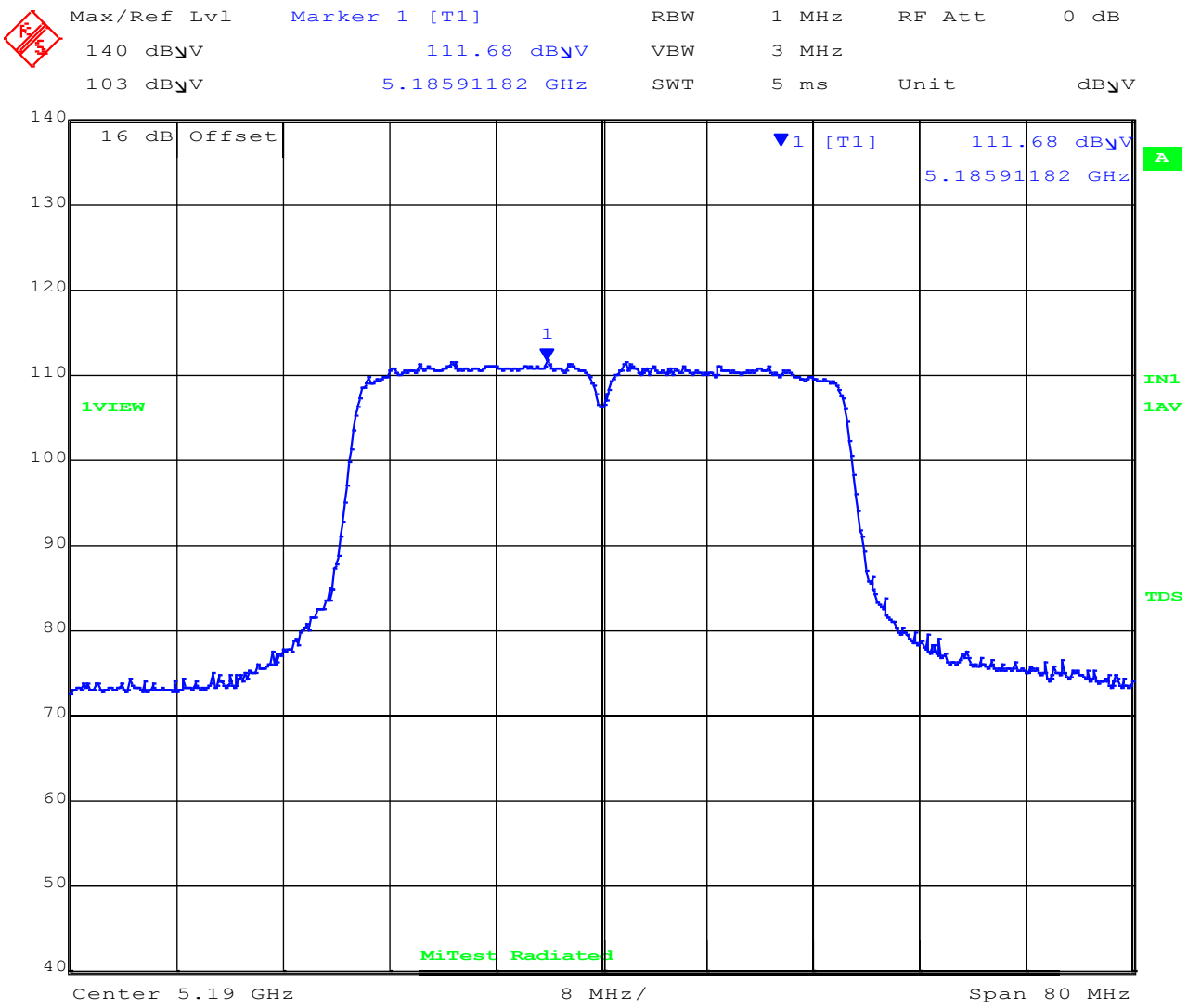



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5193.29 MHz : 107.87 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5190.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc

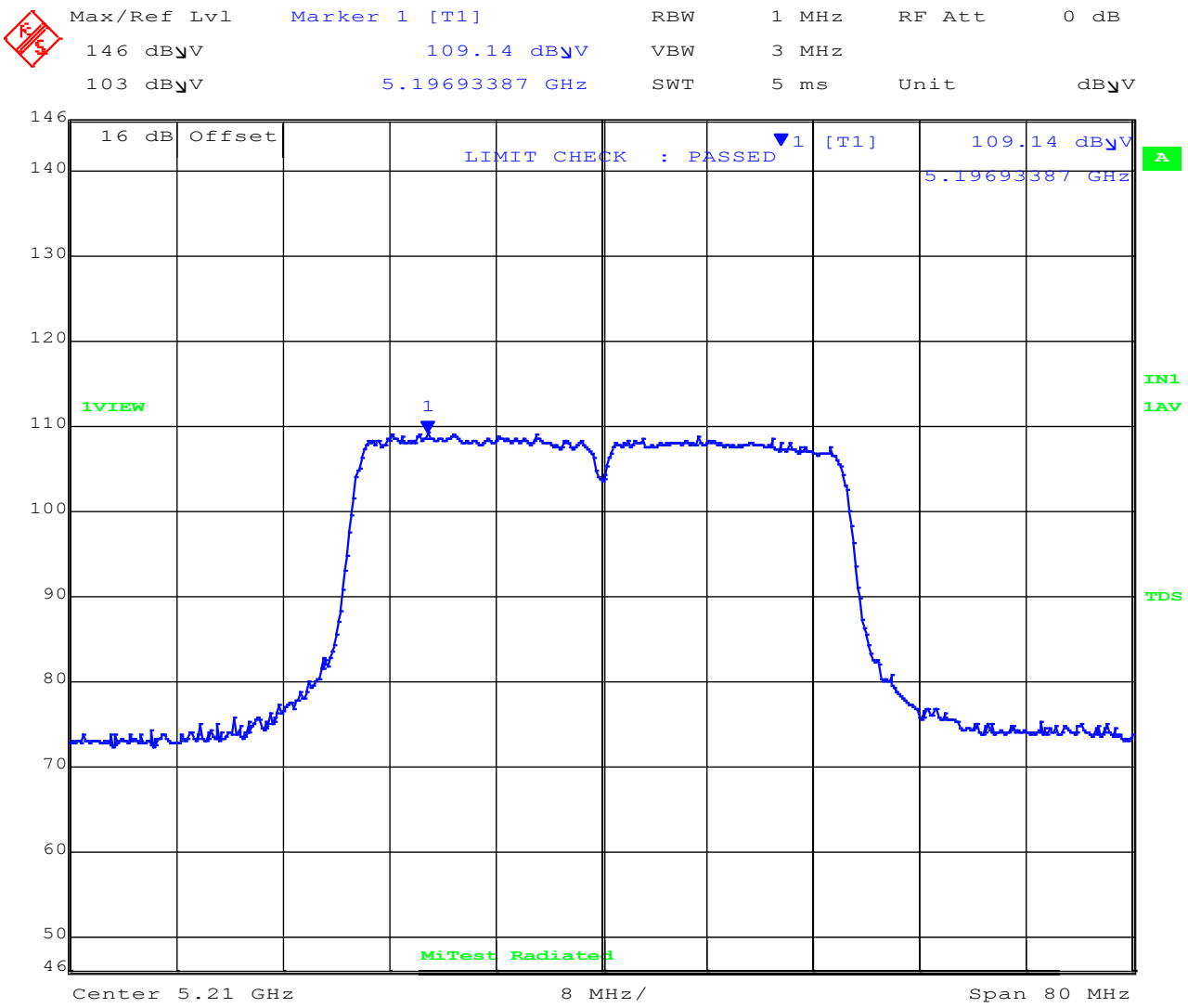



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5185.91 MHz :111.68 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

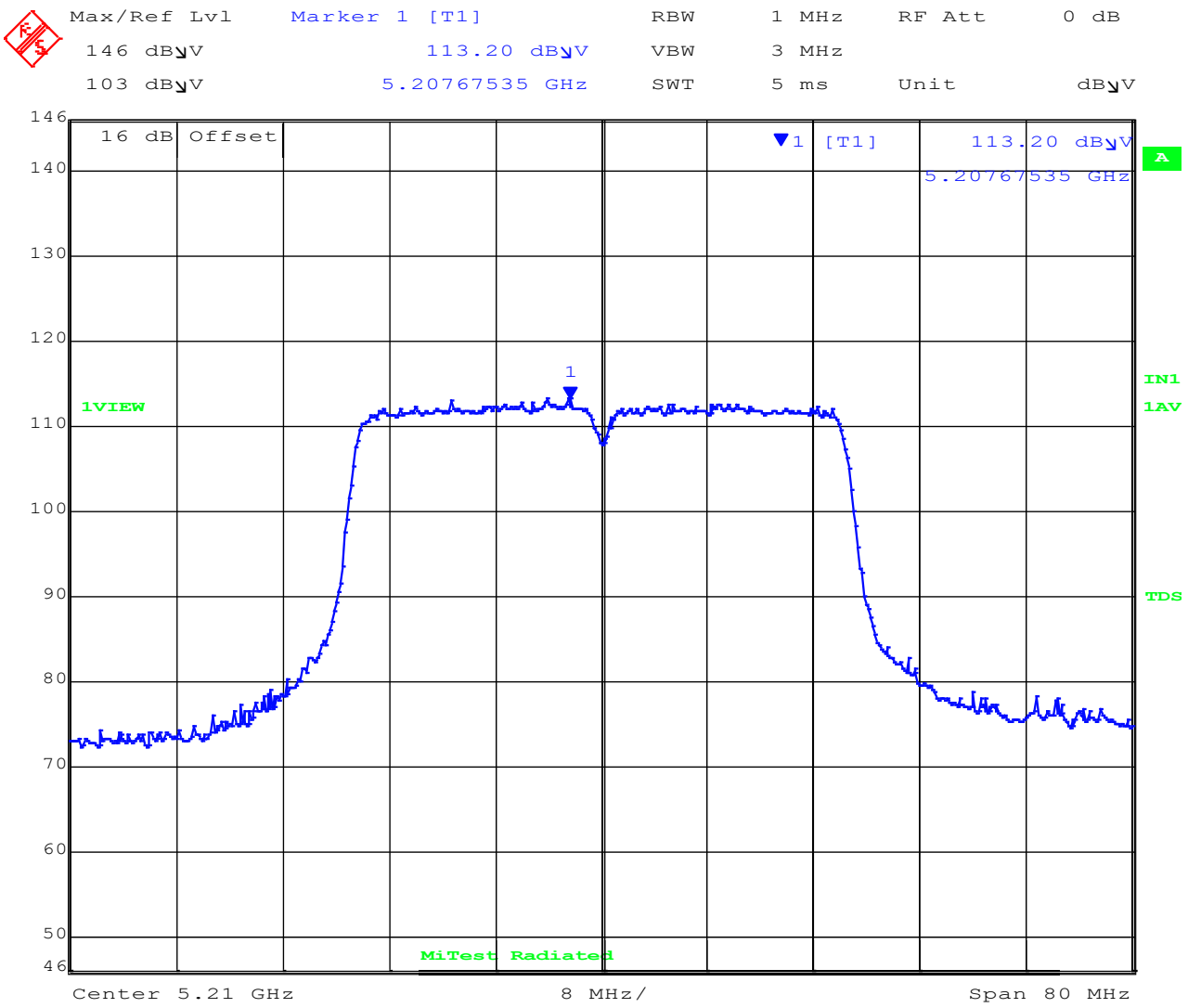



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5196.93 MHz : 109.14 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

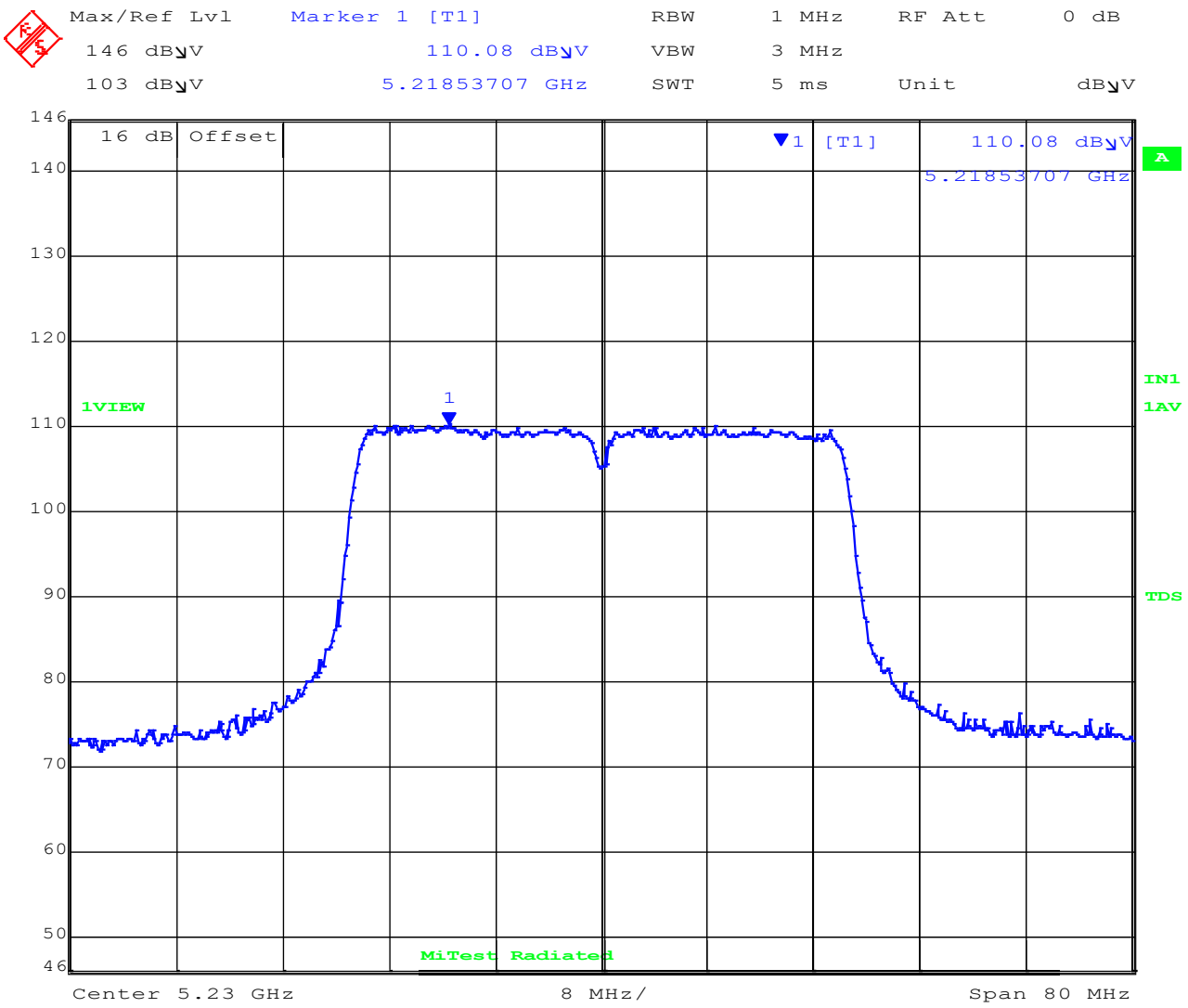



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5207.68 MHz : 113.20 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5230.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

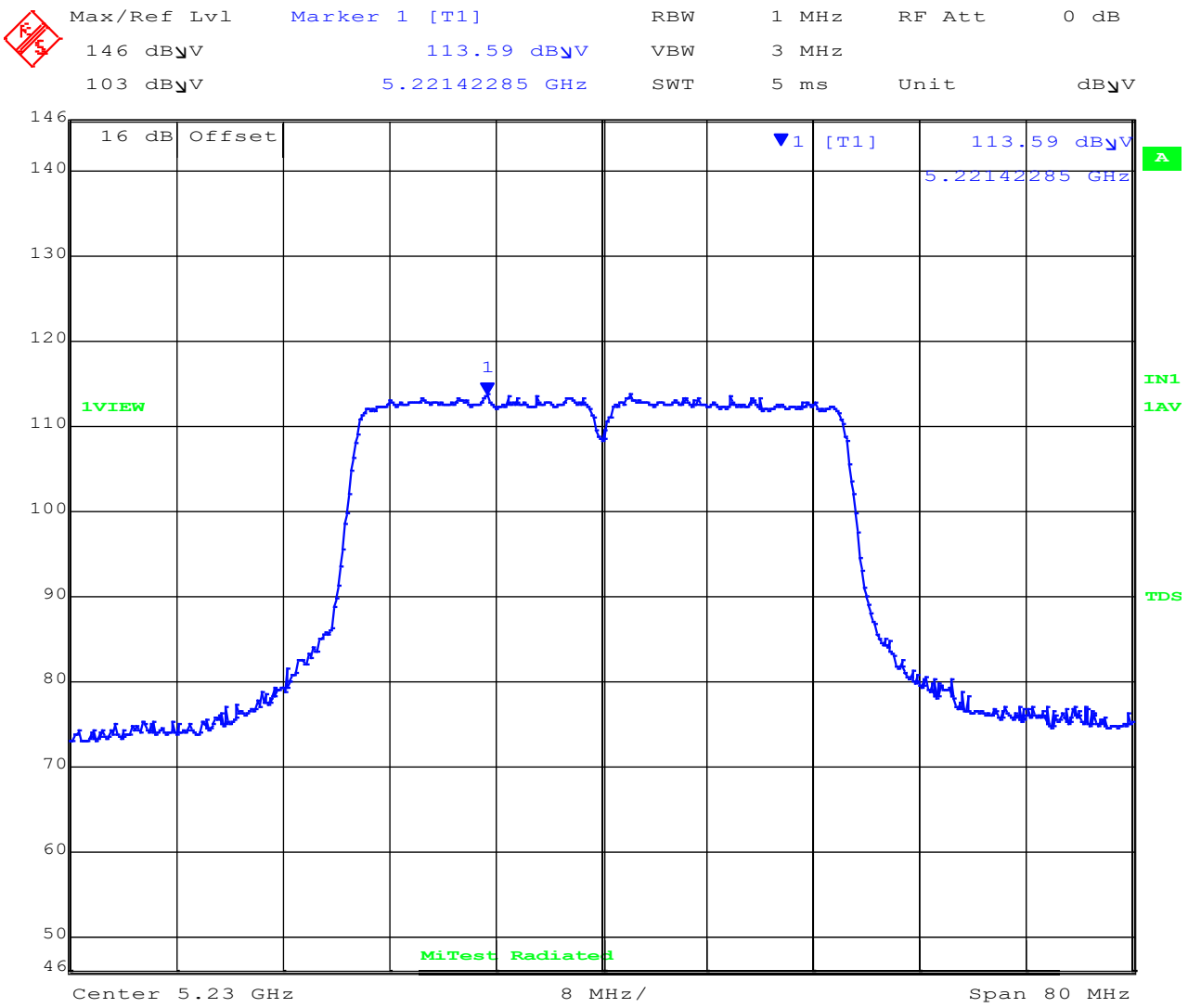



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5218.54 MHz : 110.08 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5230.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

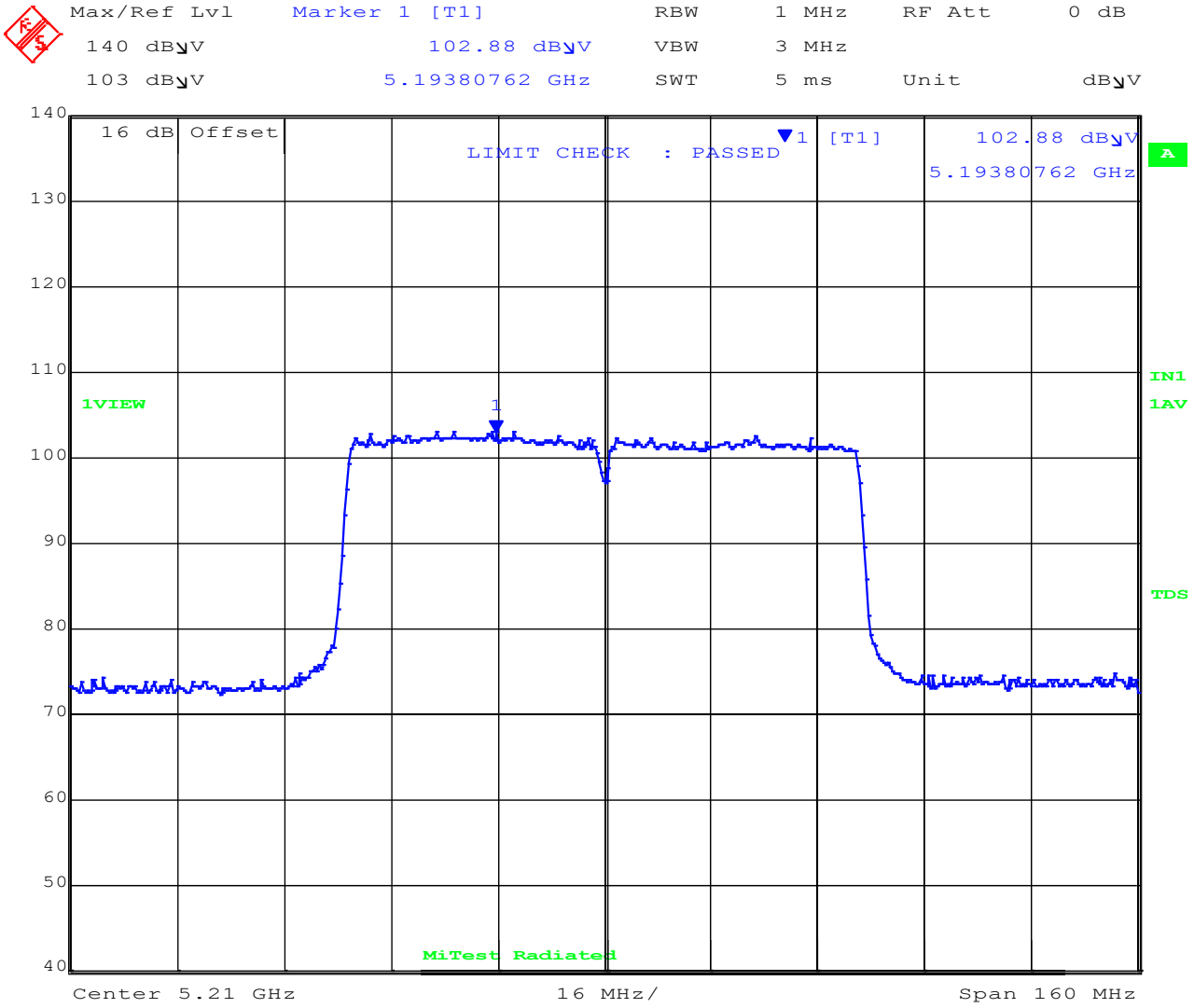



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5221.42 MHz : 113.59 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

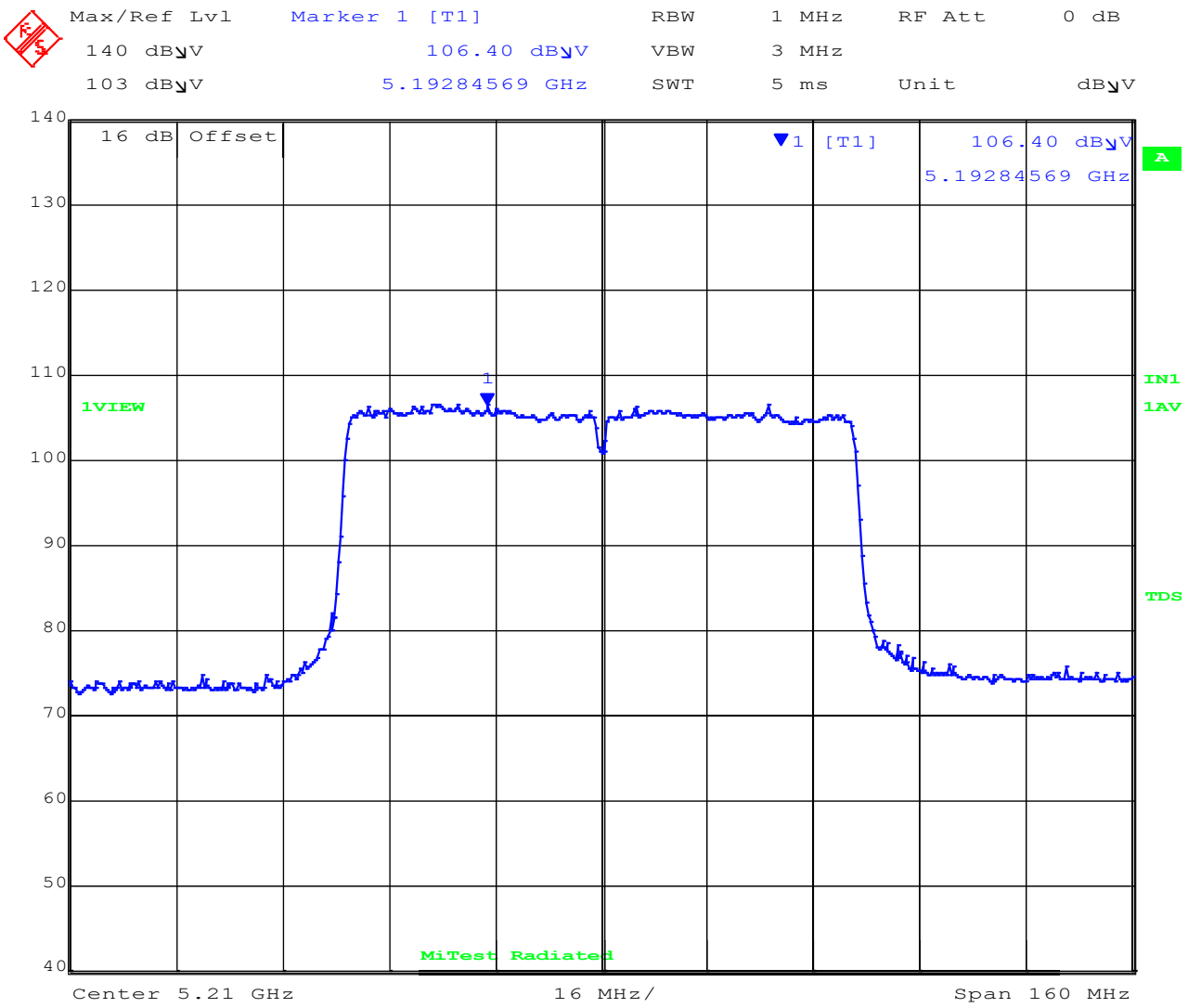



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5193.81 MHz : 102.88 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc



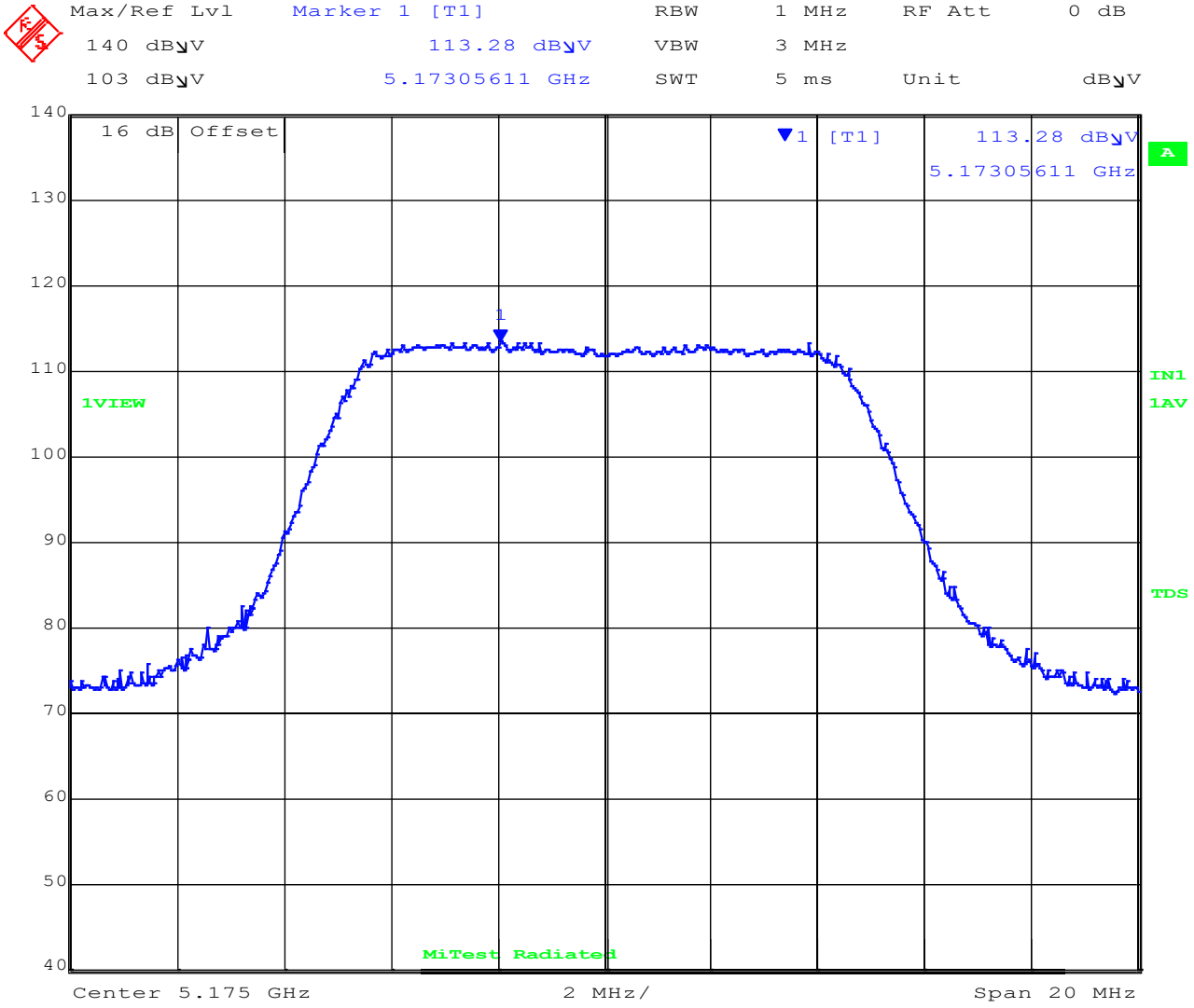

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5192.85 MHz : 106.40 dBuV/m | Limit: ≤ 13.00 dBm, Pass |

back to matrix

### A.1.1 Beamforming

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5175.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

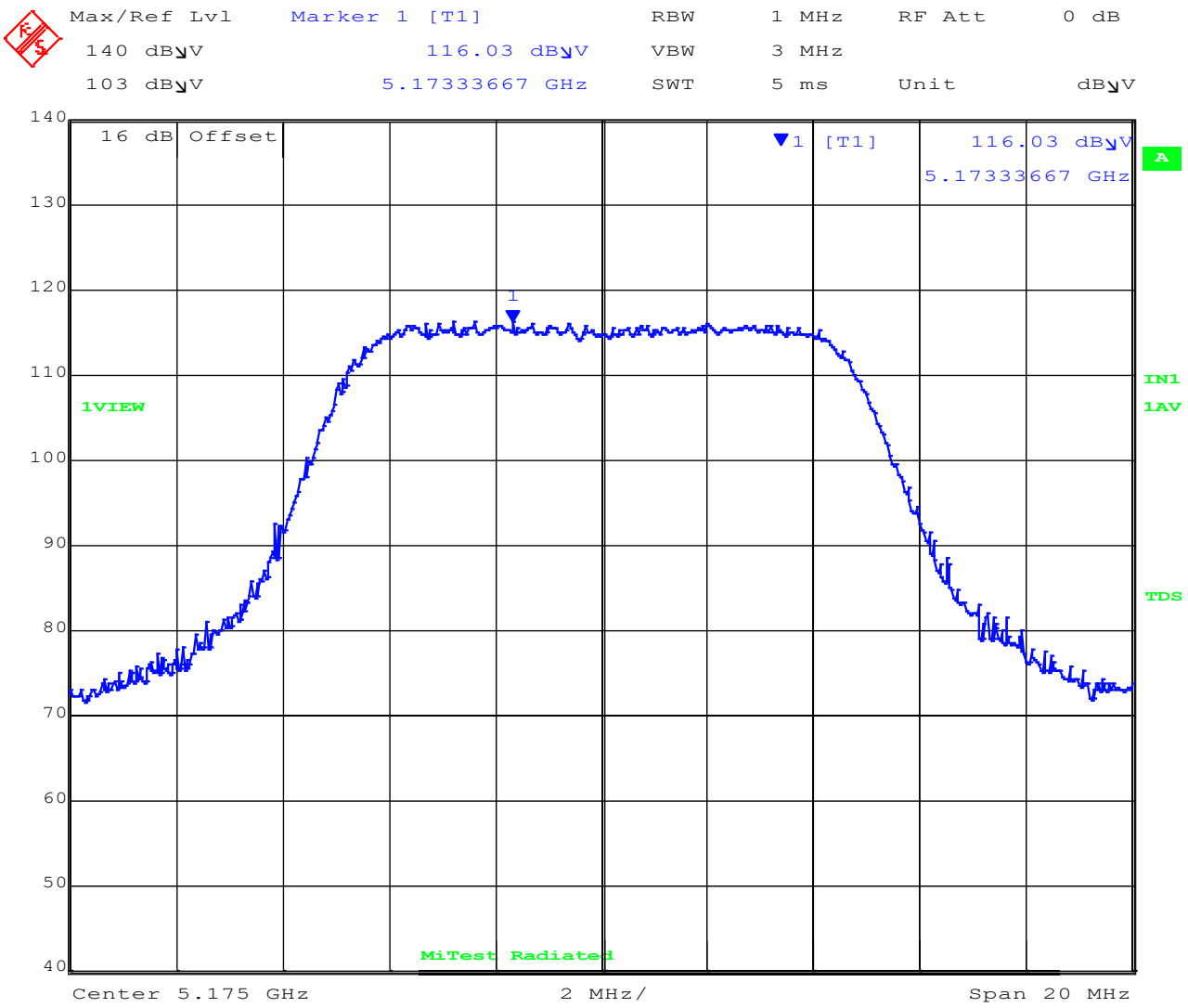



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5173.05 MHz : 113.28 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5175.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc

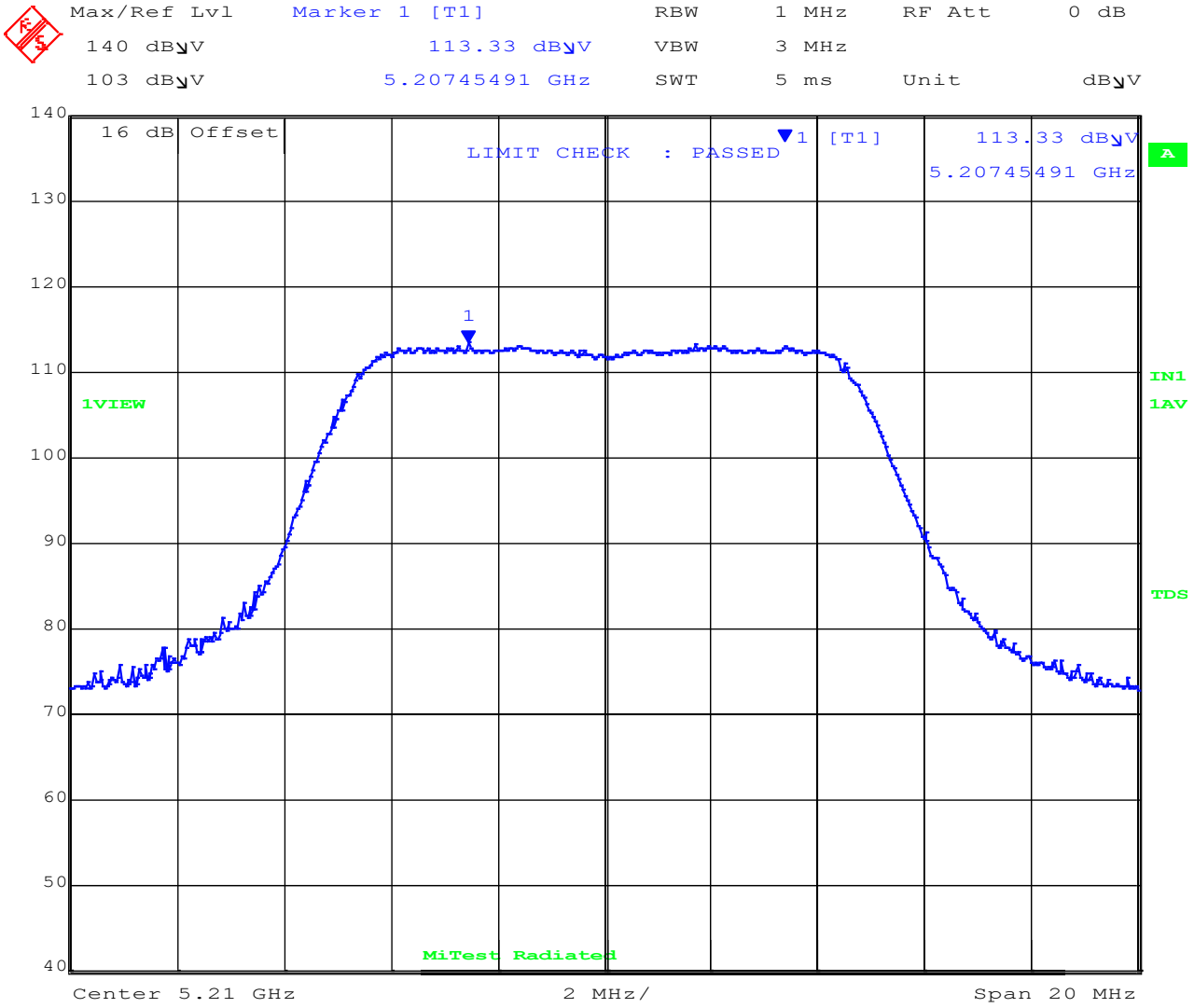



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5173.33 MHz :116.03 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

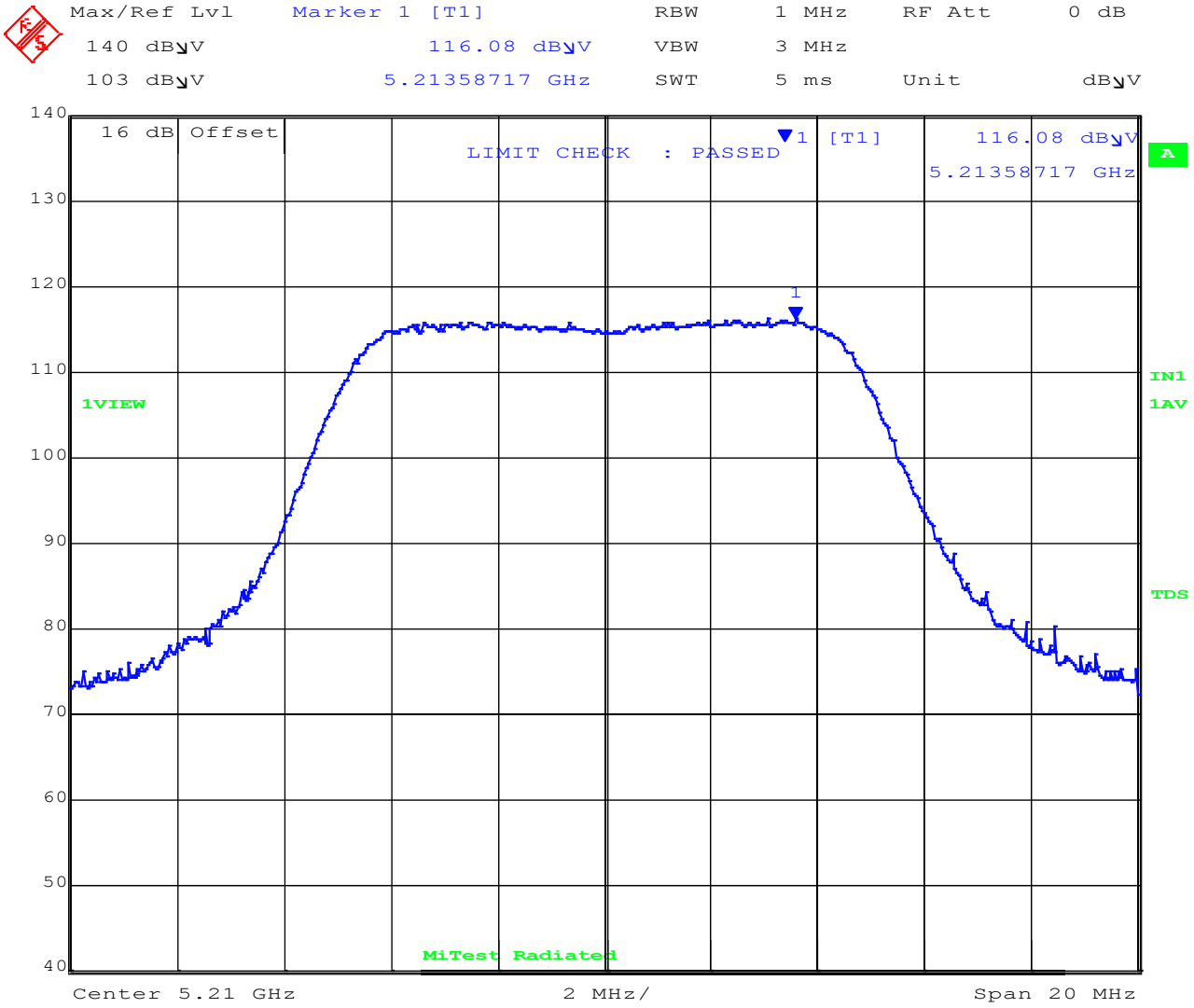



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5207.45 : 113.33 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

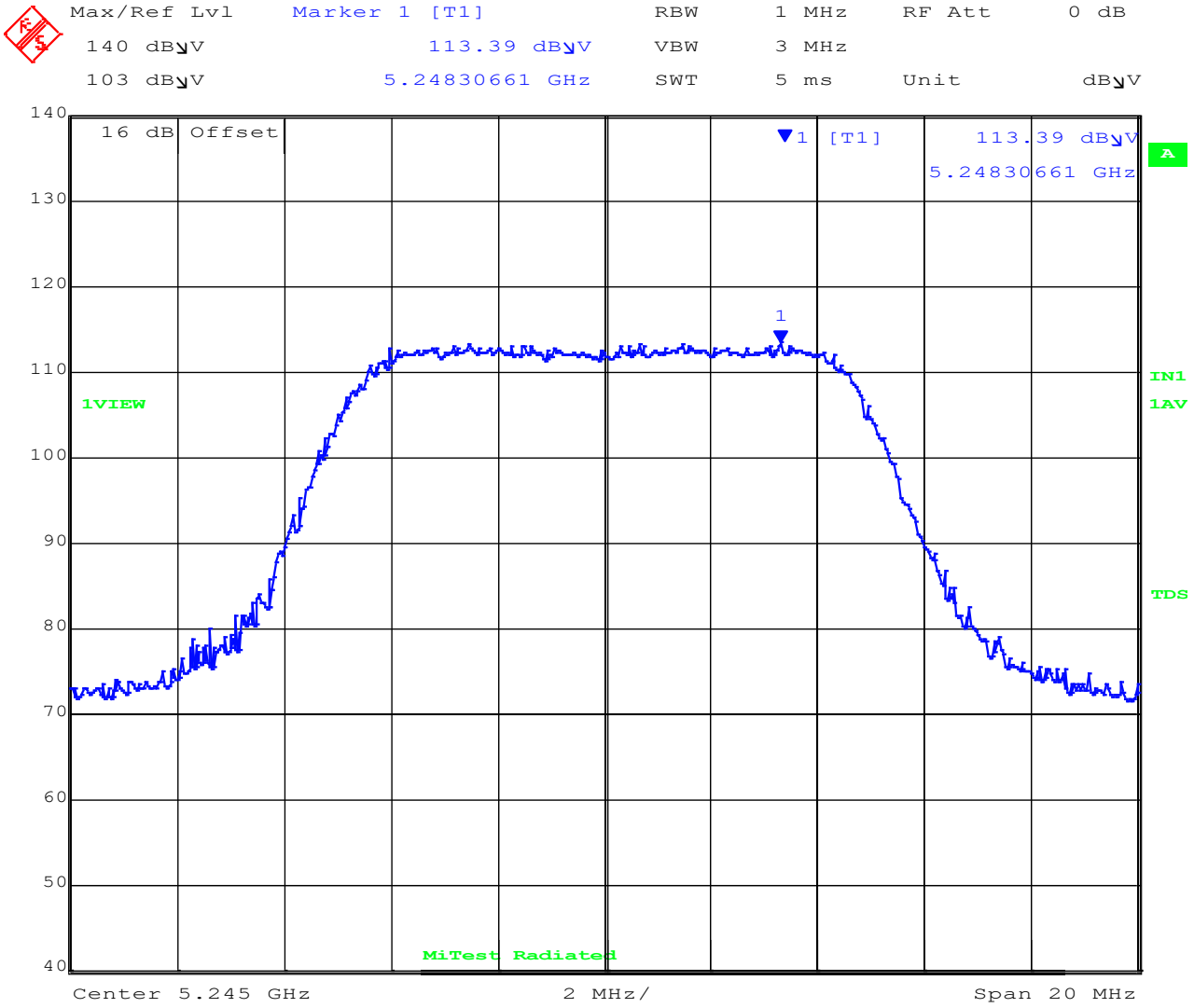



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5213.59 MHz : 116.08 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5245.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

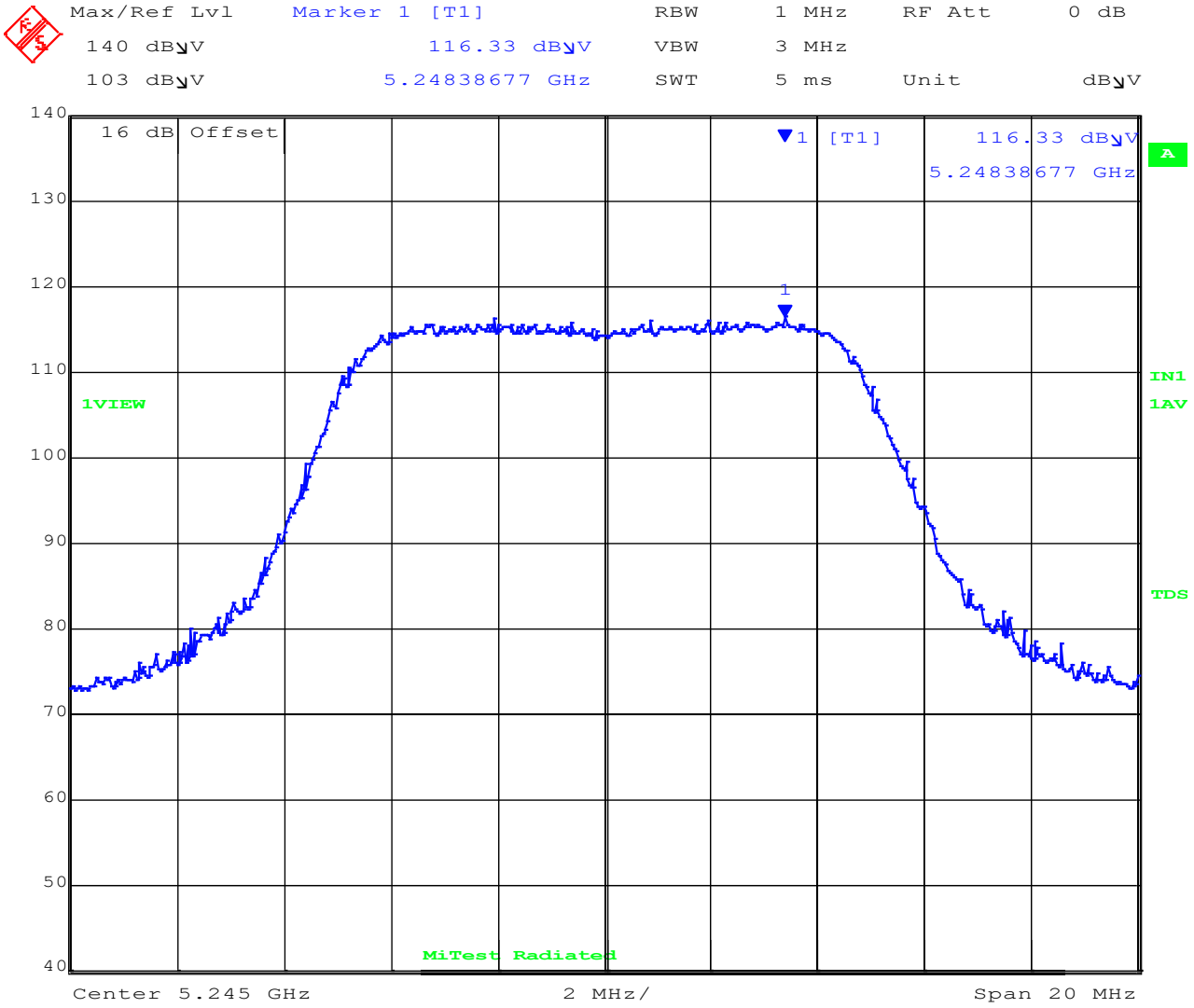



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5248.31 MHz : 113.39 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5245.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

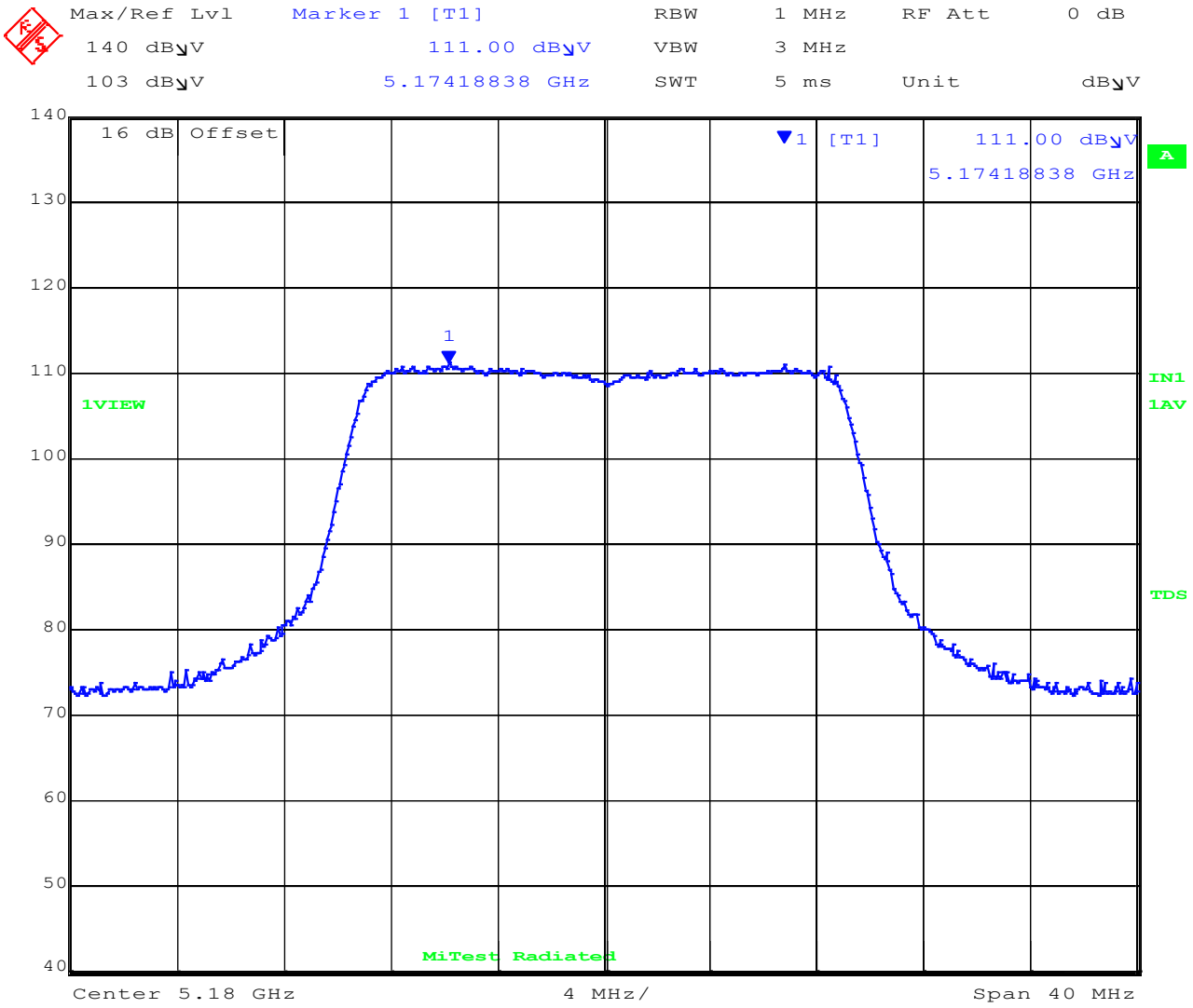



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5248.39 MHz : 116.33 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5180.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

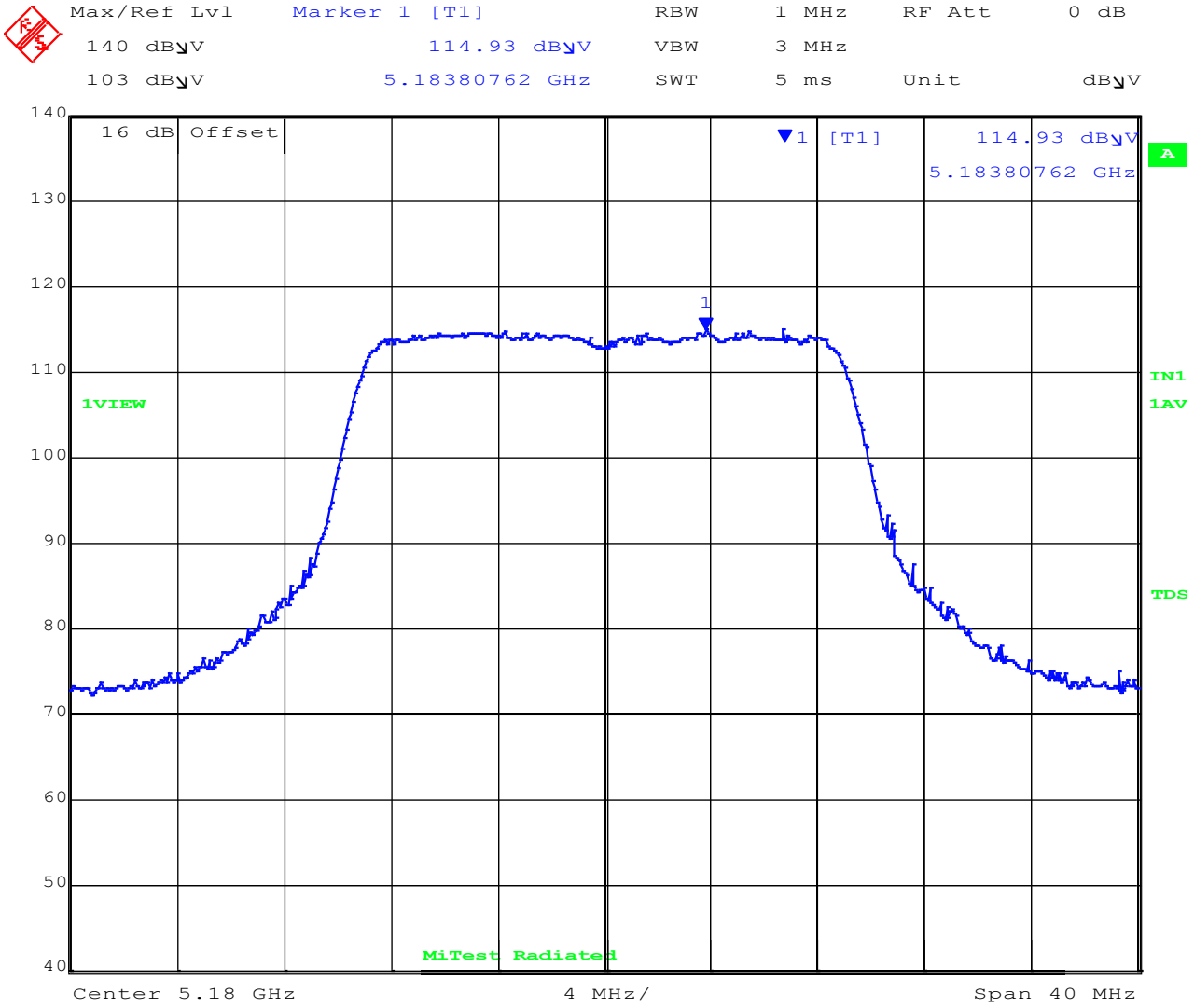



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5174.19 MHz : 111.00 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5180.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc



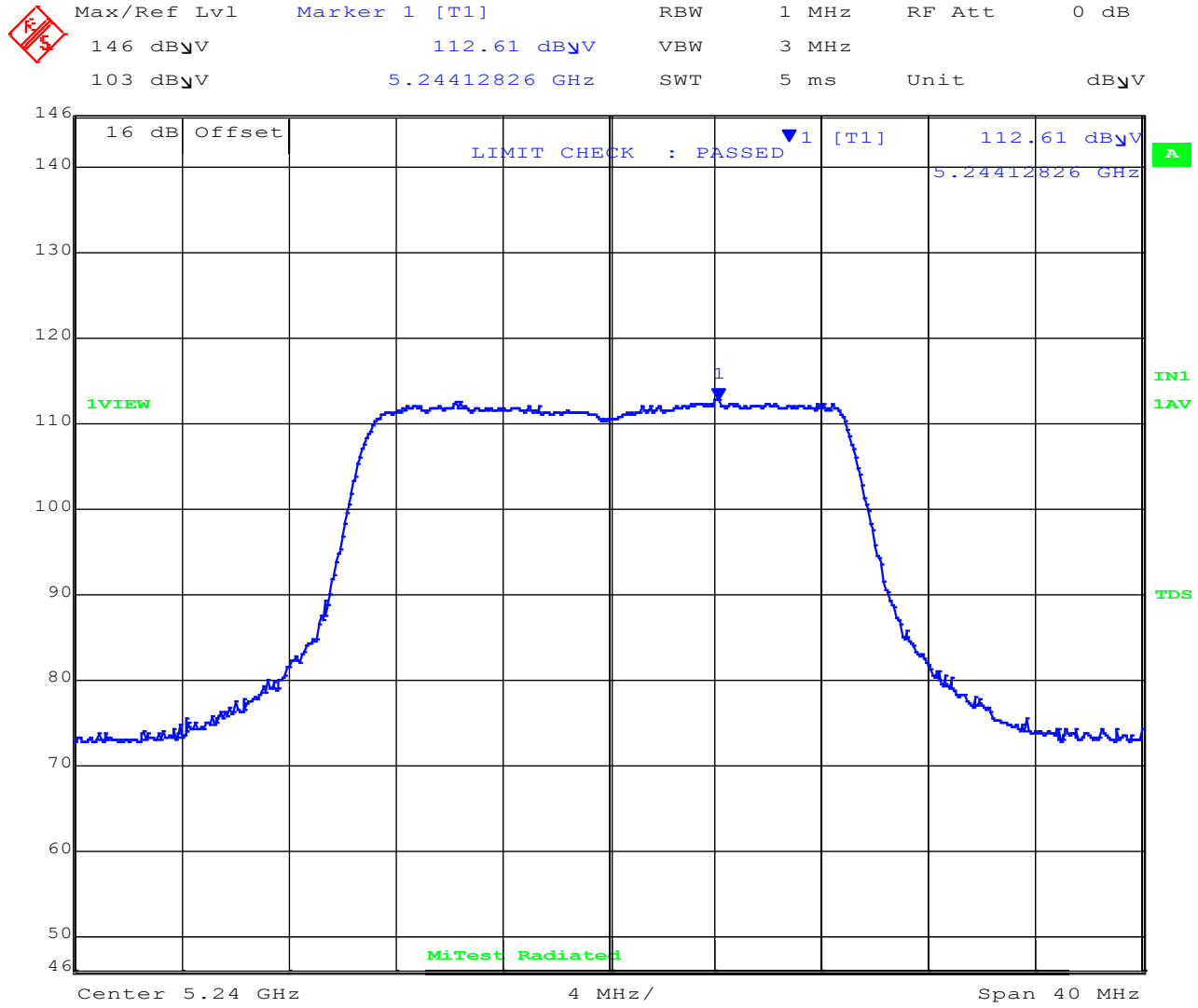

Date: 19.MAR.2021 15:42:39

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5183.81 MHz :114.93 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

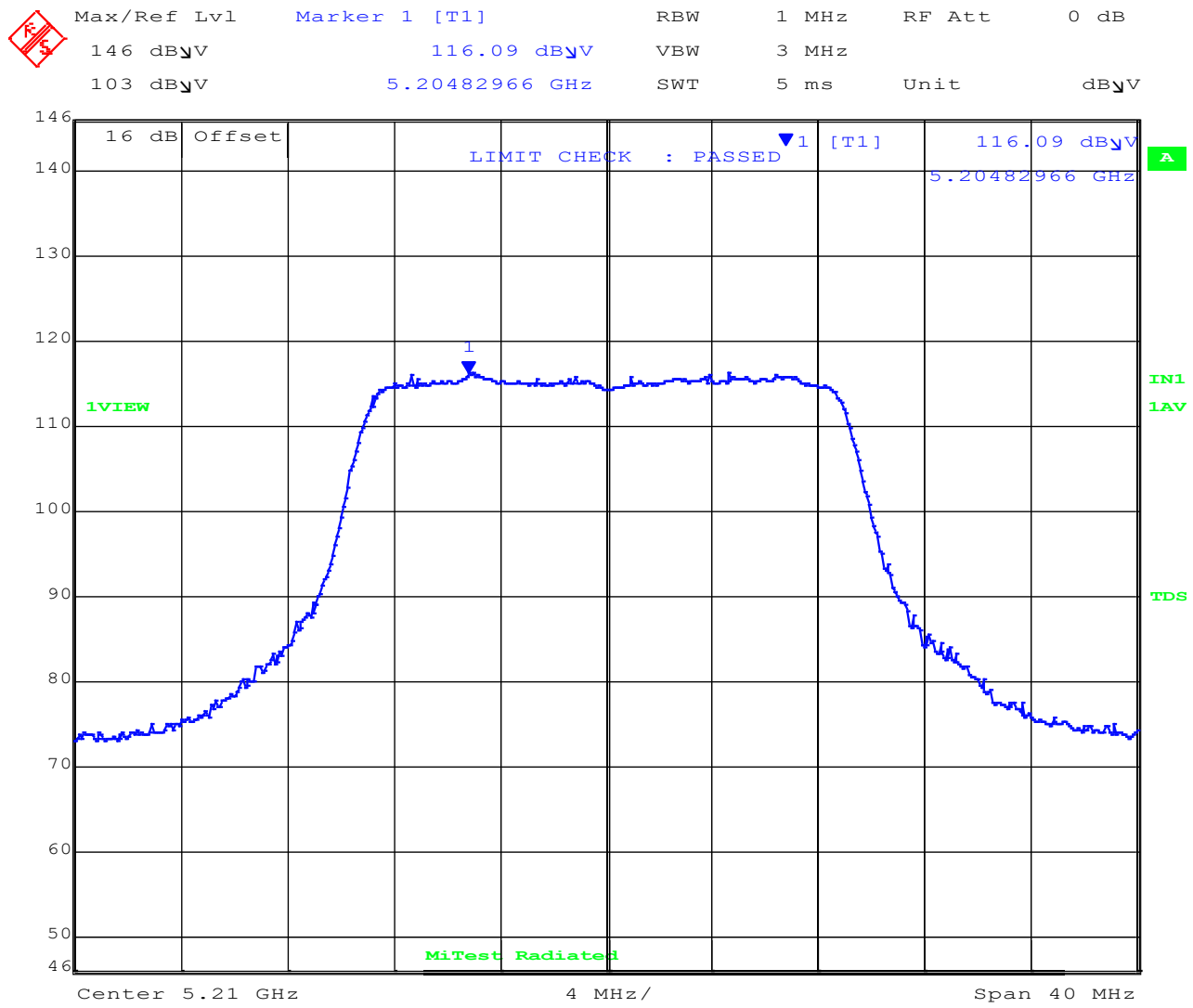



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5244.13 MHz : 112.61 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

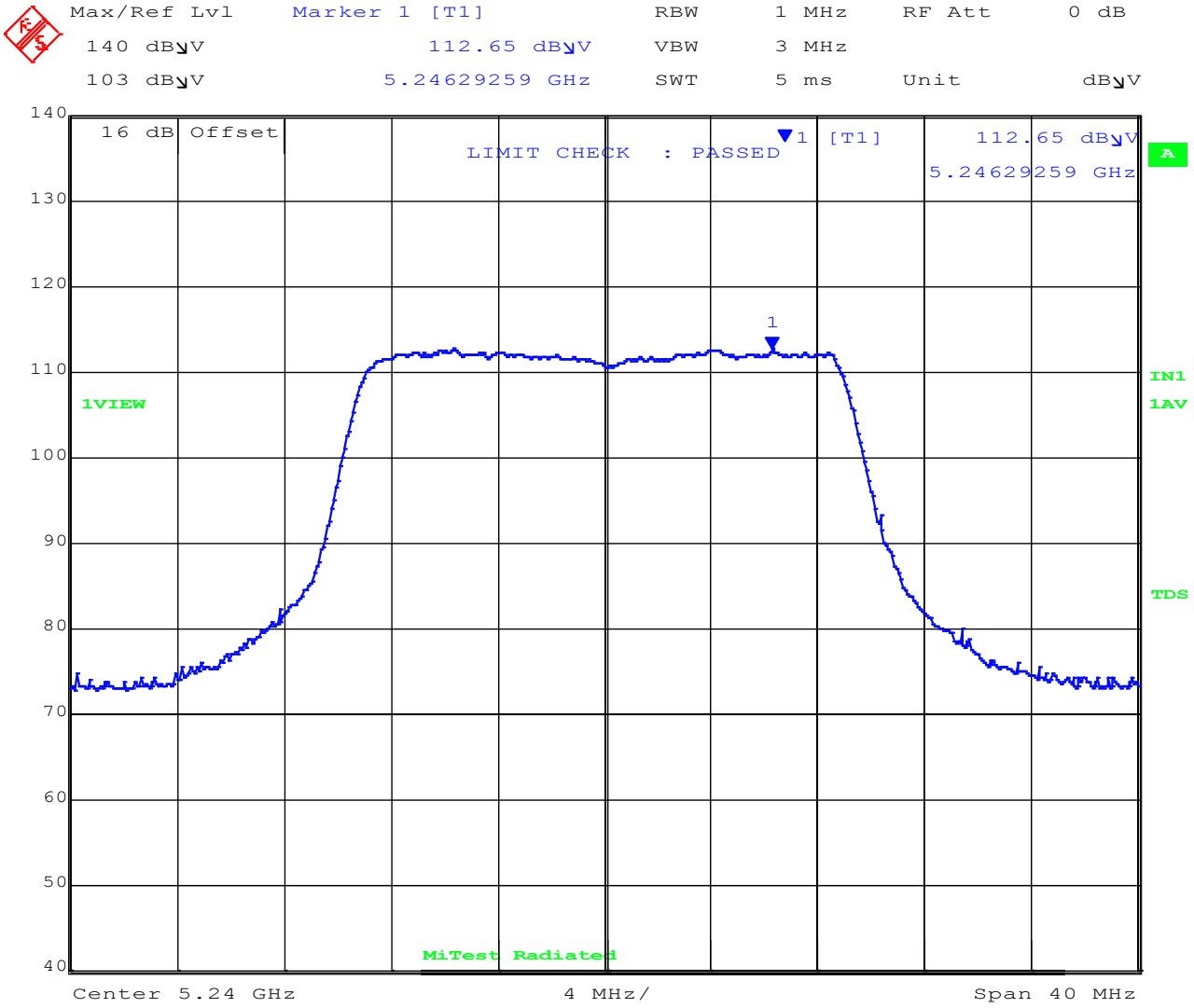



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5204.83 MHz : 116.09 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5240.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

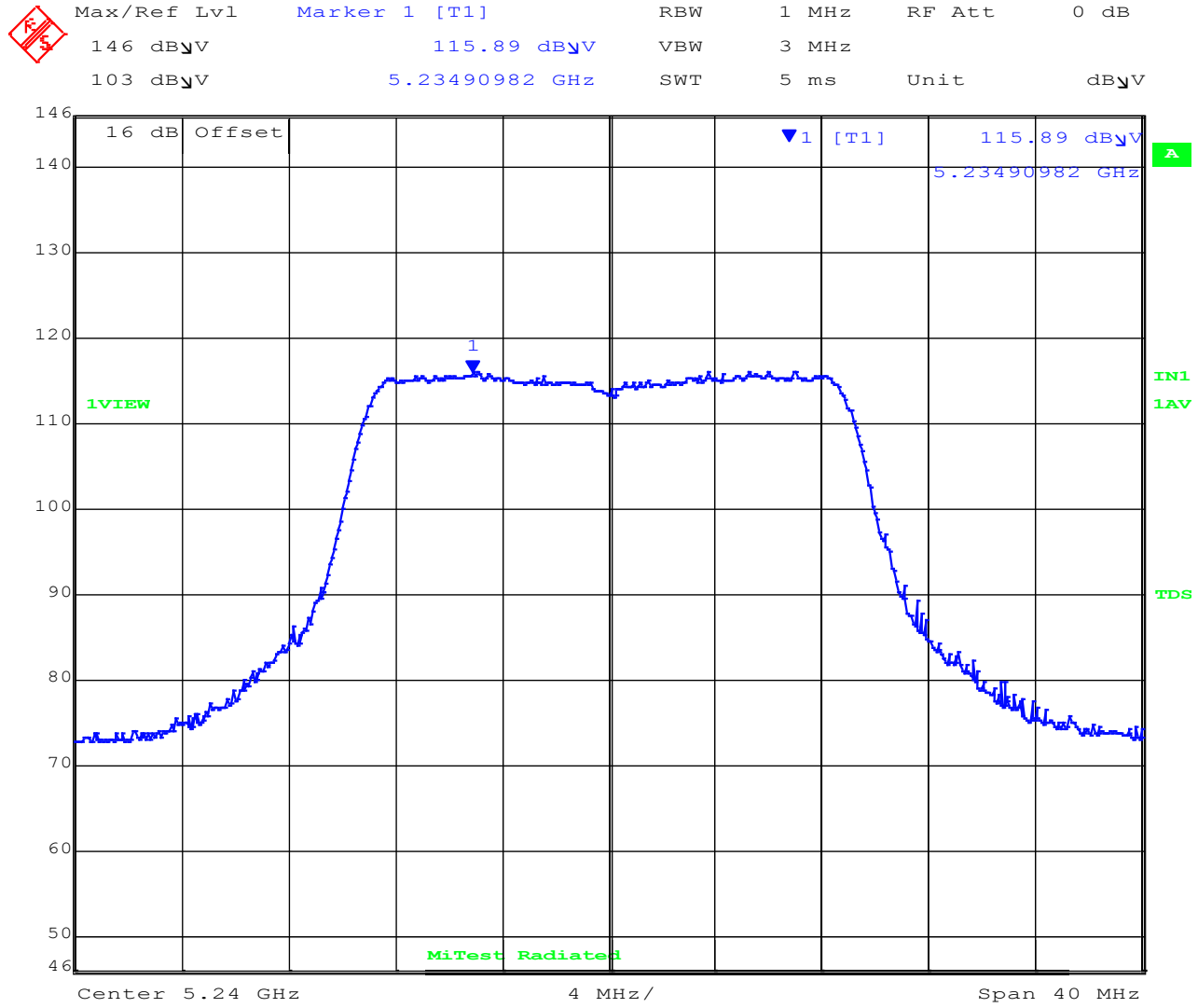



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5246.29 MHz : 112.65 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5240.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

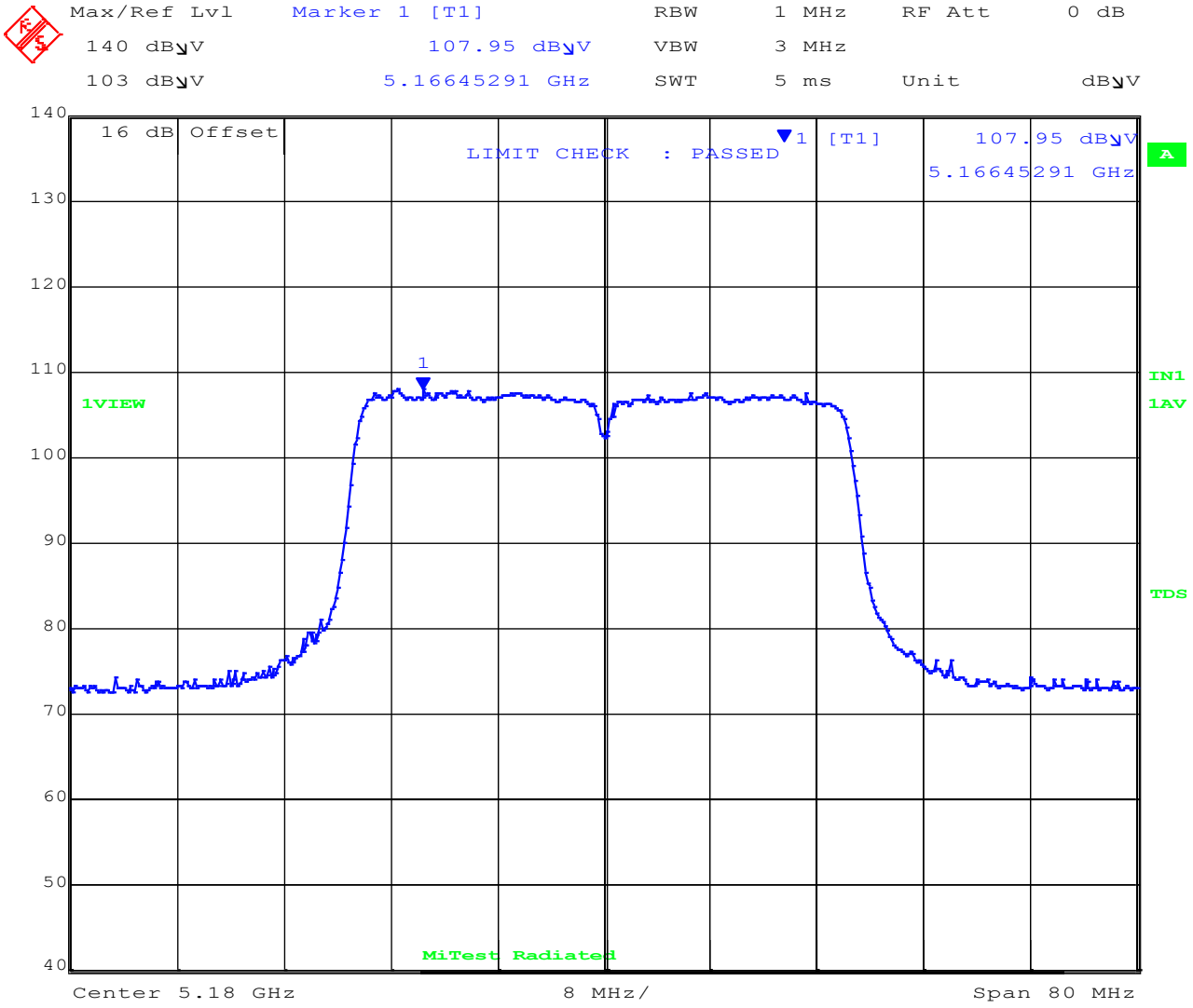



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5234. 19 MHz : 115.89 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5190.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

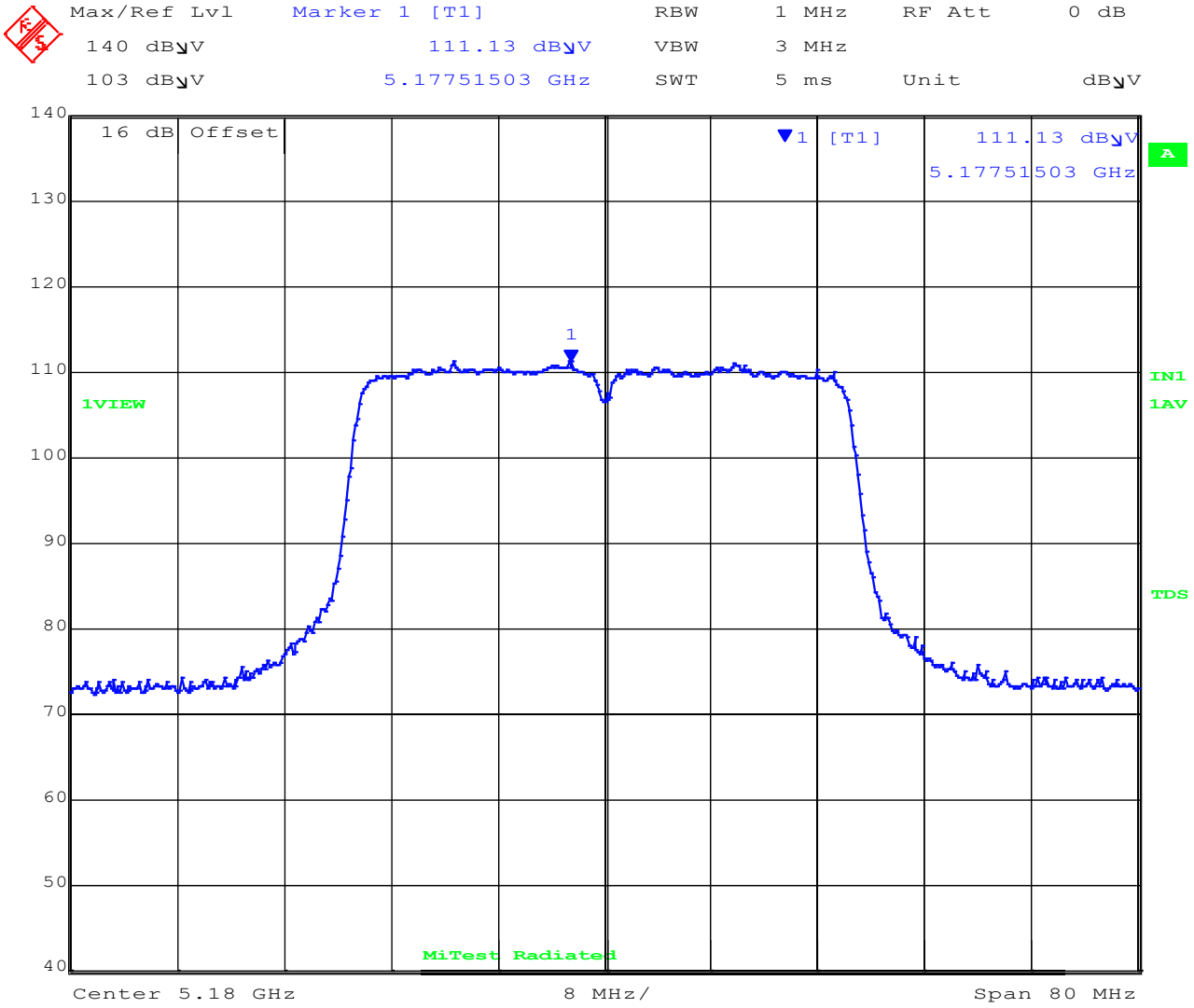



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5166.45 MHz : 107.95 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5190.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc

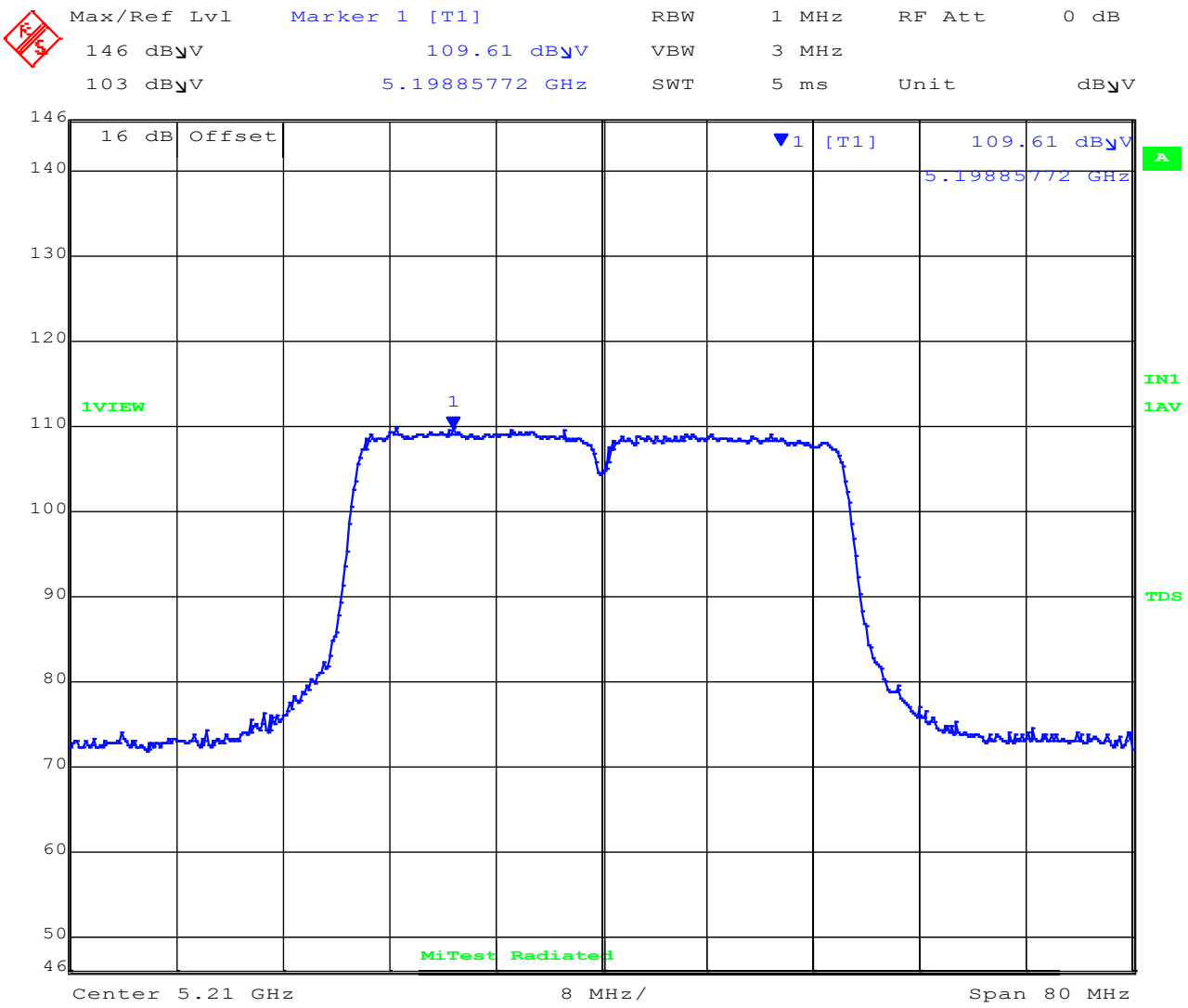



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5177.52 MHz :111.13 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

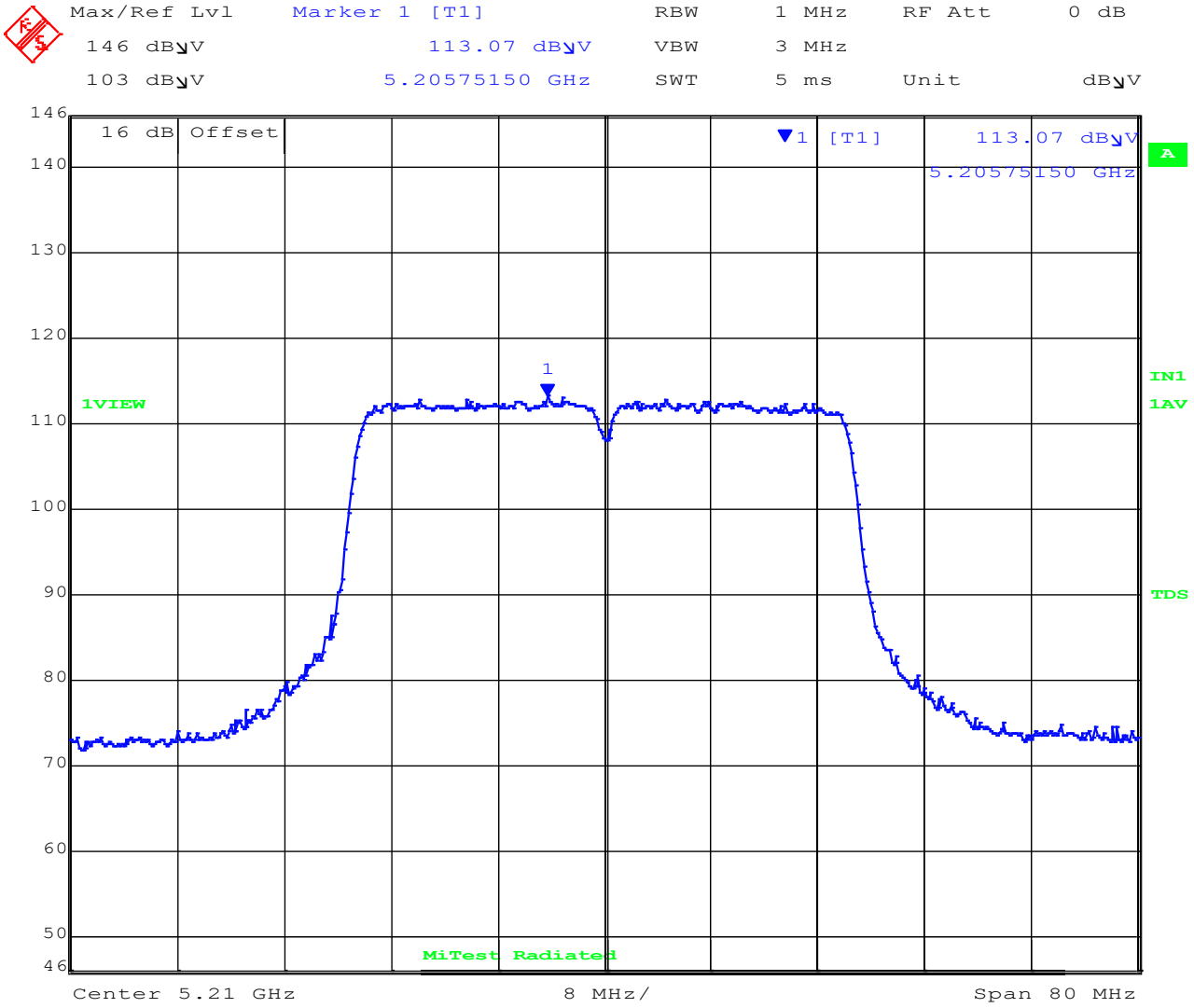



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5198.86 MHz : 109.61 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

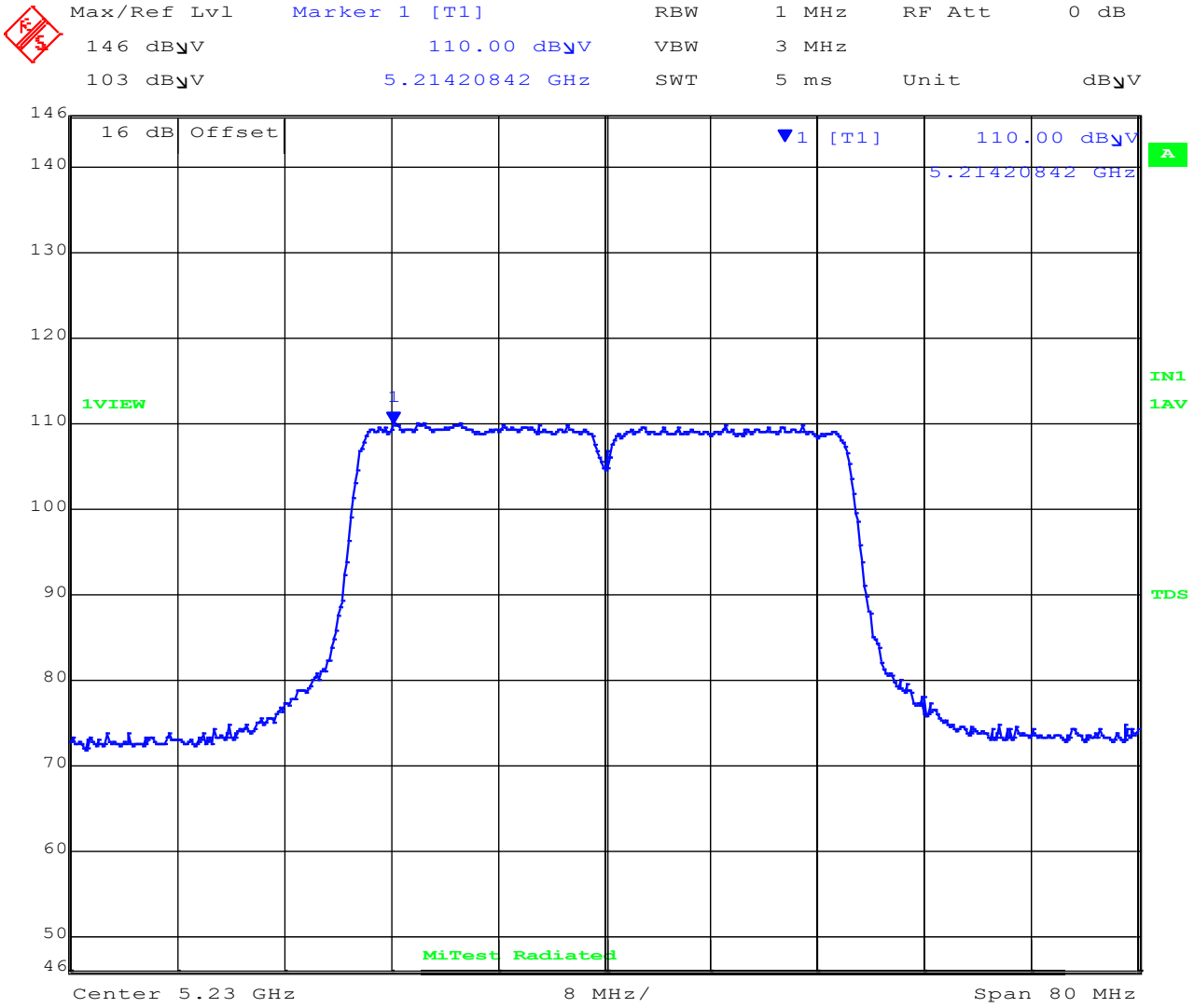



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5205.75 MHz : 113.07 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5230.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

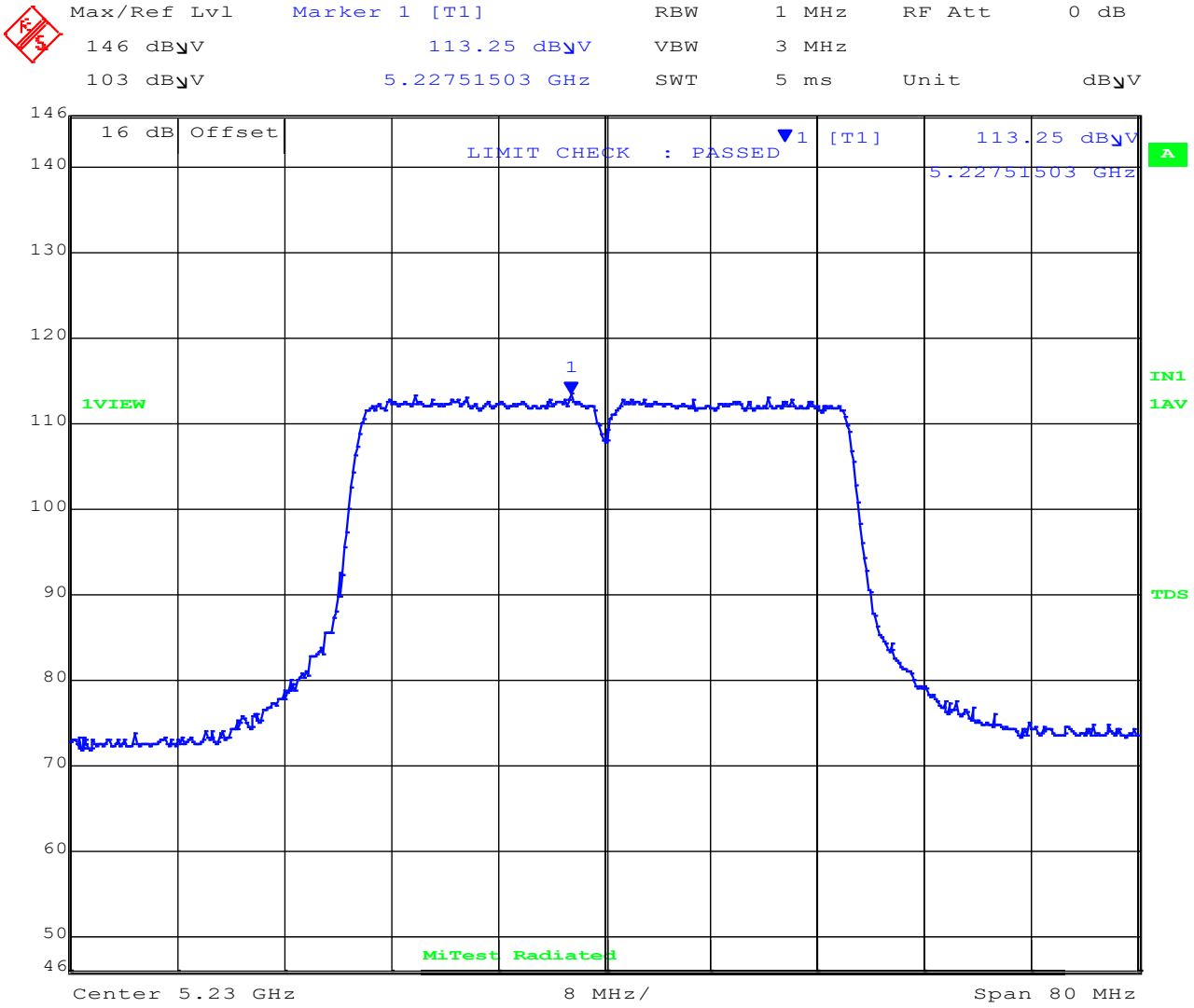



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5214.21 MHz : 110.00 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5230.00 MHz, Polarity V, Temp: 20, Voltage: 55 Vdc

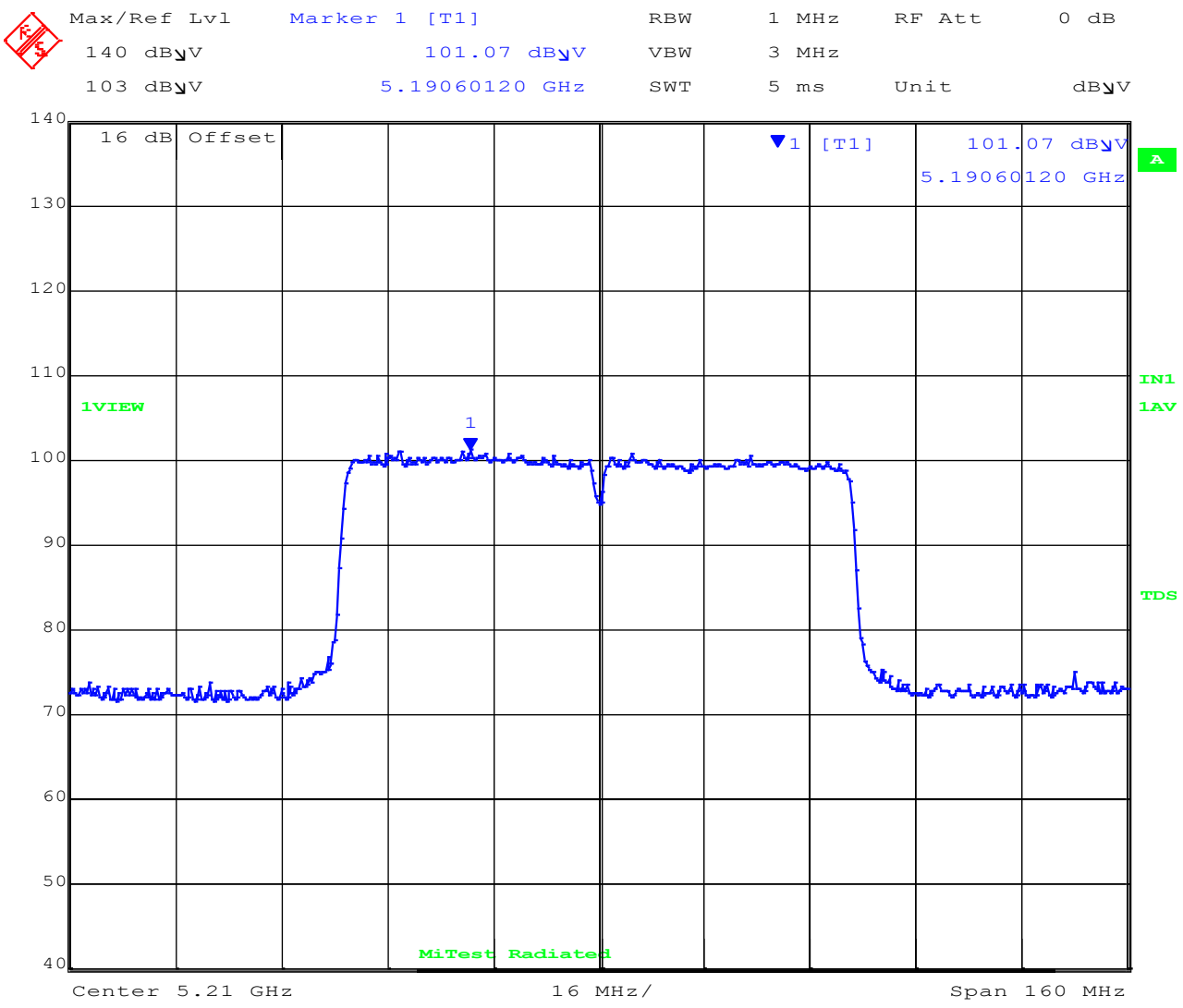



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5227.52 MHz : 113.25 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 55 Vdc

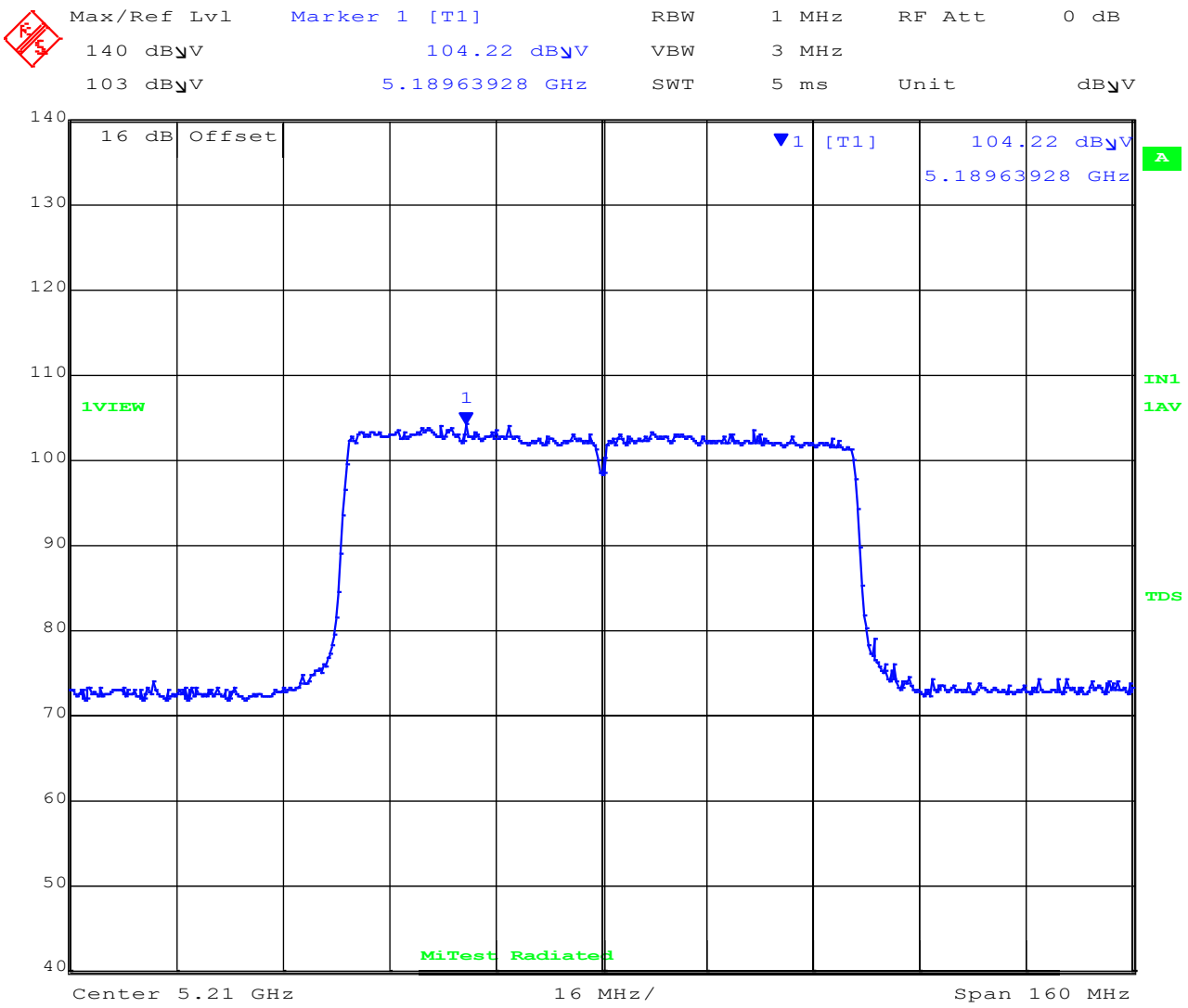



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5190.60 MHz : 101.07 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5210.00 MHz, Polarity V Temp: 20, Voltage: 55 Vdc



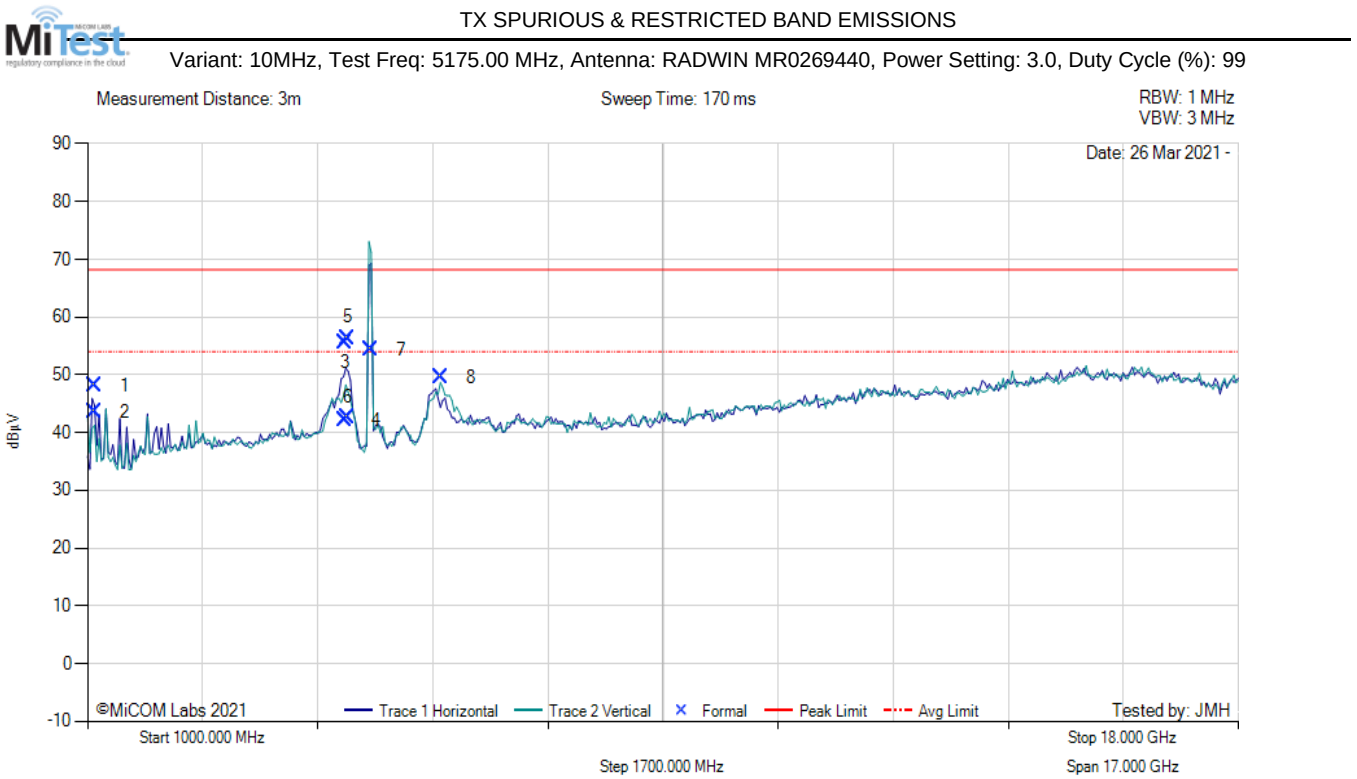

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = Average<br>Sweep Count = 100<br>RF Atten (dB) = 0<br>Trace Mode = VIEW | M1 : 5189.64 MHz : 104.22 dBuV/m | Limit: ≤ 7.00 dBm, Pass |

back to matrix

# A.3. Radiated

## A.3.1. TX Spurious & Restricted Band Emissions

### A.3.1.1. RADWIN MR0269440



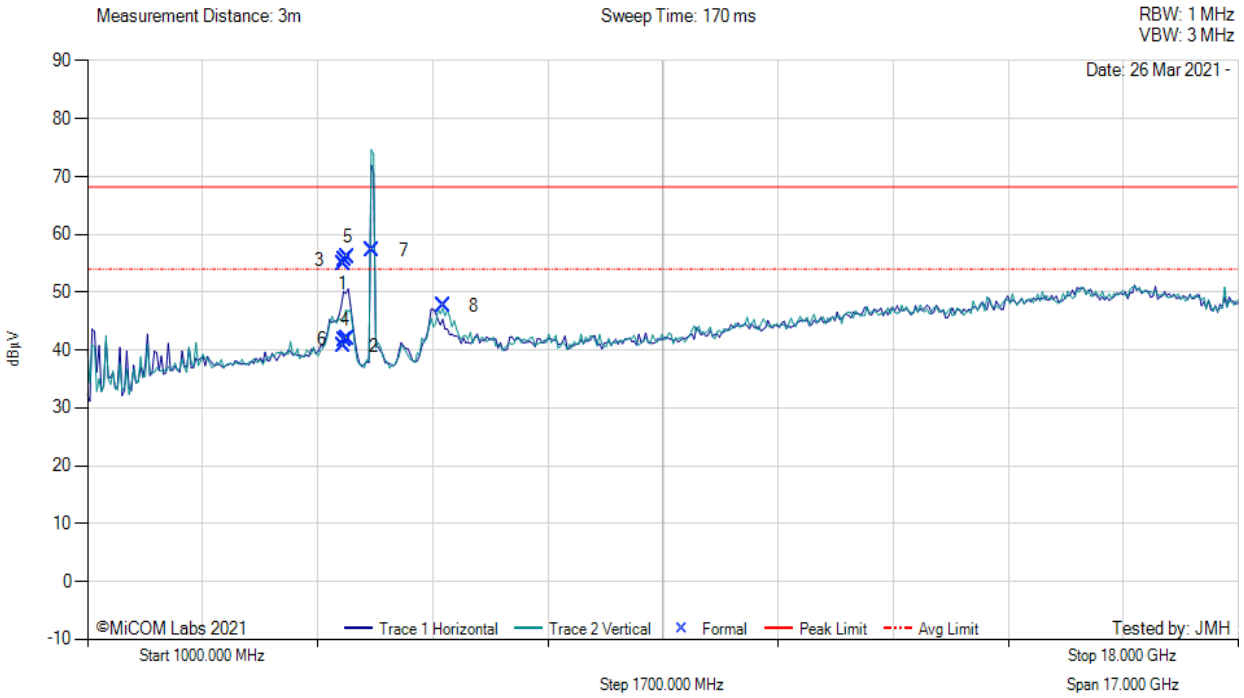

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB/m | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
| 1 | 1100.07 | 64.16 | 1.36 | -17.46 | 48.06 | Max Peak | Horizontal | 98 | 47 | 68.2 | -20.2 | Pass |
| 2 | 1100.07 | 59.62 | 1.36 | -17.46 | 43.52 | Max Avg | Horizontal | 98 | 47 | 54.0 | -10.5 | Pass |
| 3 | 4810.64 | 65.21 | 2.85 | -12.42 | 55.64 | Max Peak | Horizontal | 197 | 352 | 68.2 | -12.6 | Pass |
| 4 | 4810.64 | 51.72 | 2.85 | -12.42 | 42.15 | Max Avg | Horizontal | 197 | 352 | 54.0 | -11.9 | Pass |
| 5 | 4838.01 | 66.16 | 2.81 | -12.55 | 56.42 | Max Peak | Horizontal | 188 | 338 | 68.2 | -11.8 | Pass |
| 6 | 4838.01 | 52.44 | 2.81 | -12.55 | 42.70 | Max Avg | Horizontal | 188 | 338 | 54.0 | -11.3 | Pass |
| 7 | 5178.44 | 63.46 | 2.97 | -12.12 | 54.31 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| 8 | 6221.84 | 55.83 | 3.32 | -9.62 | 49.53 | Peak (NRB) | Vertical | 200 | 31 | -- | -- | Pass |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5210.00 MHz, Antenna: RADWIN MR0269440, Power Setting: 3.0, Duty Cycle (%): 99



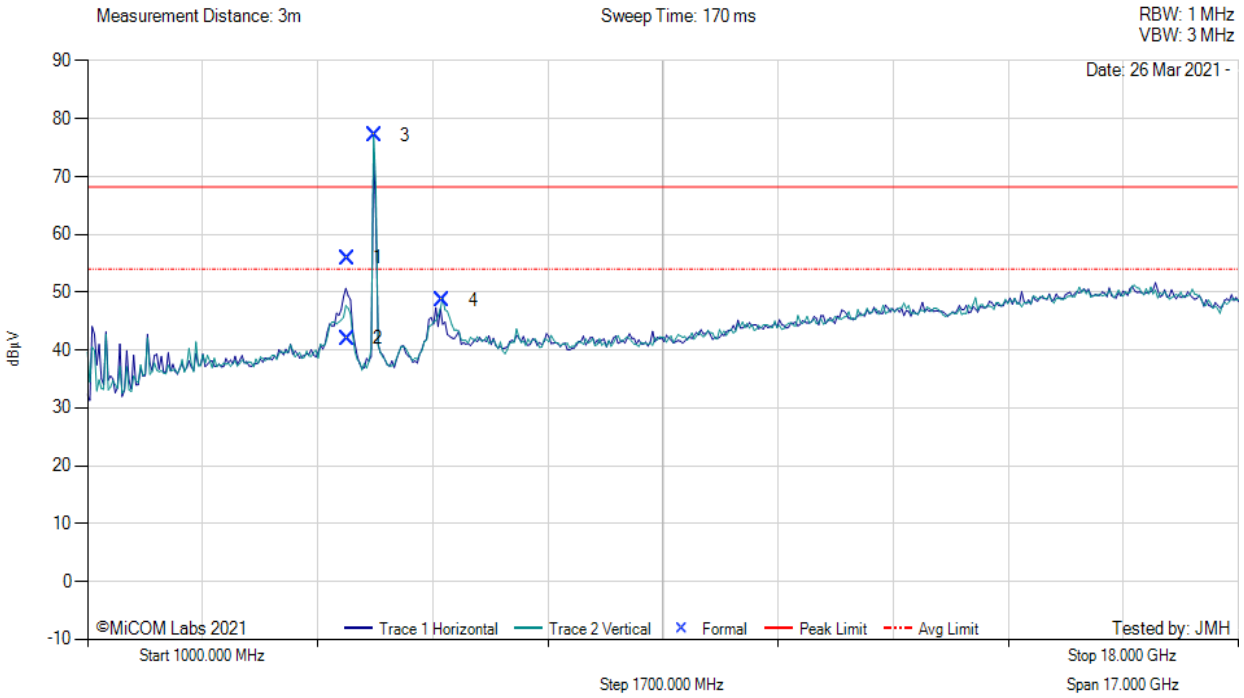

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 4778.36 | 64.54 | 2.87 | -12.45 | 54.96 | Max Peak | Horizontal | 187 | 335 | 68.2 | -13.3 | Pass |
| 2 | 4778.36 | 50.31 | 2.87 | -12.45 | 40.73 | Max Avg | Horizontal | 187 | 335 | 54.0 | -13.3 | Pass |
| 3 | 4807.58 | 65.10 | 2.85 | -12.43 | 55.52 | Max Peak | Horizontal | 196 | 335 | 68.2 | -12.7 | Pass |
| 4 | 4807.58 | 51.30 | 2.85 | -12.43 | 41.72 | Max Avg | Horizontal | 196 | 335 | 54.0 | -12.3 | Pass |
| 5 | 4838.18 | 65.78 | 2.81 | -12.55 | 56.04 | Max Peak | Horizontal | 193 | 334 | 68.2 | -12.2 | Pass |
| 6 | 4838.18 | 51.61 | 2.81 | -12.55 | 41.87 | Max Avg | Horizontal | 193 | 334 | 54.0 | -12.1 | Pass |
| 7 | 5211.71 | 66.57 | 2.99 | -12.36 | 57.20 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| 8 | 6250.62 | 53.82 | 3.25 | -9.49 | 47.58 | Peak (NRB) | Vertical | 200 | 0 | -- | -- | Pass |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5245.00 MHz, Antenna: RADWIN MR0269440, Power Setting: 3.0, Duty Cycle (%): 99




| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 4839.11 | 65.65 | 2.82 | -12.55 | 55.92 | Max Peak | Horizontal | 189 | 356 | 68.2 | -12.3 | Pass |
| 2 | 4839.11 | 51.77 | 2.82 | -12.55 | 42.04 | Max Avg | Horizontal | 189 | 356 | 54.0 | -12.0 | Pass |
| 3 | 5242.14 | 86.17 | 3.02 | -12.03 | 77.16 | Fundamental | Vertical | 200 | 0 | -- | -- | |
| 4 | 6247.65 | 54.90 | 3.25 | -9.51 | 48.64 | Peak (NRB) | Vertical | 200 | 67 | -- | -- | Pass |

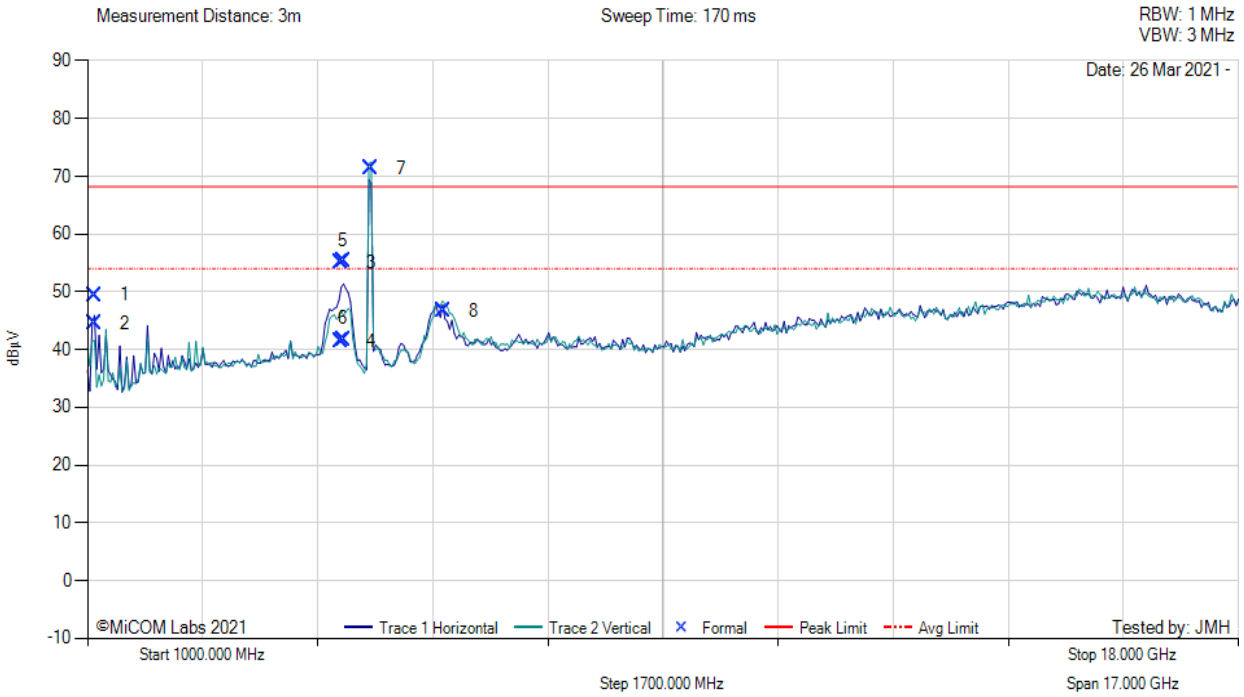
**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

## A.3.1.2. RADWIN MR0269440BF

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5175.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: 0.0, Duty Cycle (%): 99



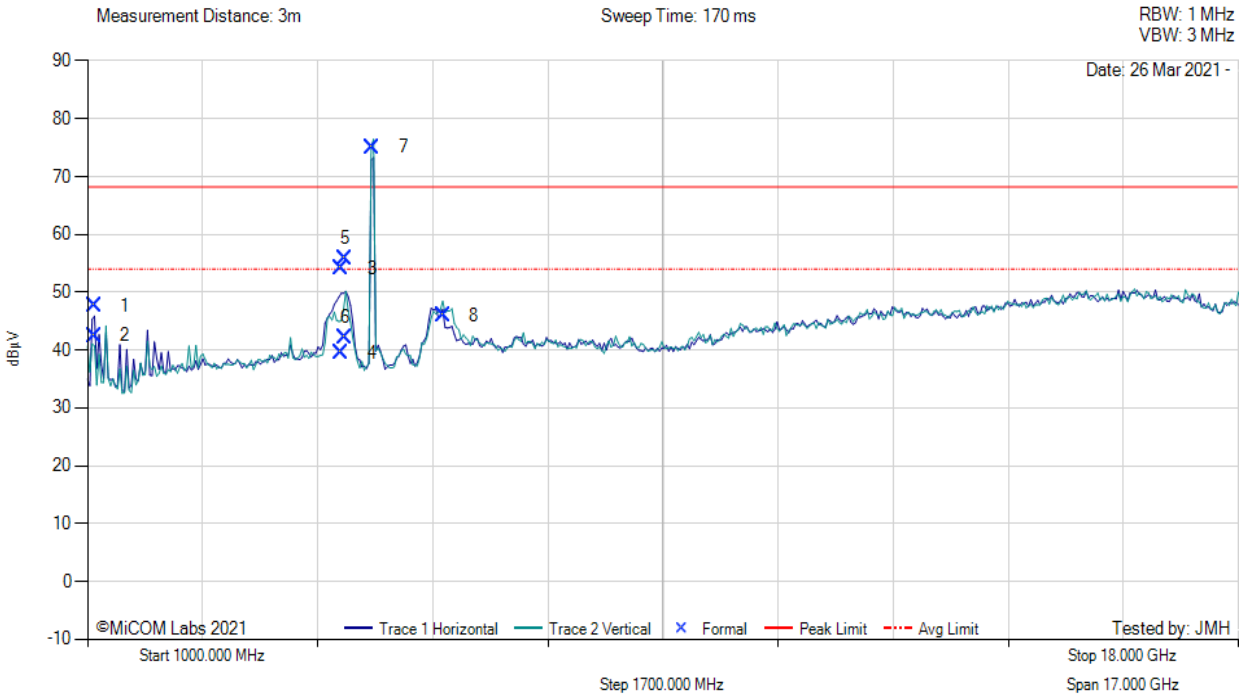

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1100.02 | 65.56 | 1.36 | -17.46 | 49.46 | Max Peak | Horizontal | 154 | 34 | 68.2 | -18.8 | Pass |
| 2 | 1100.02 | 60.62 | 1.36 | -17.46 | 44.52 | Max Avg | Horizontal | 154 | 34 | 54.0 | -9.5 | Pass |
| 3 | 4748.66 | 64.56 | 2.84 | -12.35 | 55.05 | Max Peak | Horizontal | 184 | 0 | 68.2 | -13.2 | Pass |
| 4 | 4748.66 | 50.96 | 2.84 | -12.35 | 41.45 | Max Avg | Horizontal | 184 | 0 | 54.0 | -12.6 | Pass |
| 5 | 4778.32 | 64.94 | 2.87 | -12.45 | 55.36 | Max Peak | Horizontal | 186 | 1 | 68.2 | -12.9 | Pass |
| 6 | 4778.32 | 51.38 | 2.87 | -12.45 | 41.80 | Max Avg | Horizontal | 186 | 1 | 54.0 | -12.2 | Pass |
| 7 | 5176.55 | 80.57 | 2.96 | -12.14 | 71.39 | Fundamental | Vertical | 150 | 0 | -- | -- | |
| 8 | 6249.94 | 52.90 | 3.25 | -9.50 | 46.65 | Peak (NRB) | Vertical | 150 | 0 | -- | -- | Pass |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5210.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: 0.0, Duty Cycle (%): 99



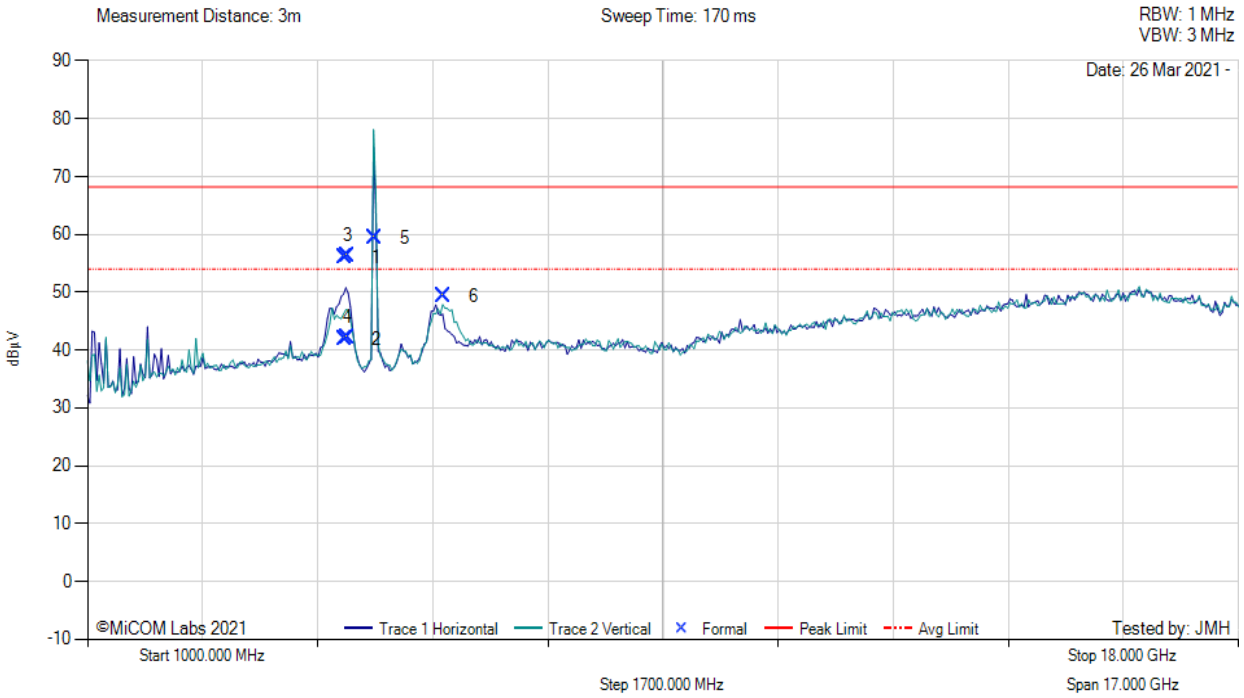

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 1100.05 | 63.75 | 1.36 | -17.46 | 47.65 | Max Peak | Horizontal | 194 | 28 | 68.2 | -20.6 | Pass |
| 2 | 1100.05 | 58.64 | 1.36 | -17.46 | 42.54 | Max Avg | Horizontal | 194 | 28 | 54.0 | -11.5 | Pass |
| 3 | 4750.59 | 63.66 | 2.82 | -12.36 | 54.12 | Max Peak | Horizontal | 195 | 350 | 68.2 | -14.1 | Pass |
| 4 | 4750.59 | 49.08 | 2.82 | -12.36 | 39.54 | Max Avg | Horizontal | 195 | 350 | 54.0 | -14.5 | Pass |
| 5 | 4809.28 | 65.34 | 2.85 | -12.42 | 55.77 | Max Peak | Horizontal | 182 | 0 | 68.2 | -12.5 | Pass |
| 6 | 4809.28 | 51.68 | 2.85 | -12.42 | 42.11 | Max Avg | Horizontal | 182 | 0 | 54.0 | -11.9 | Pass |
| 7 | 5209.62 | 84.43 | 2.99 | -12.37 | 75.05 | Fundamental | Vertical | 150 | 0 | -- | -- | |
| 8 | 6250.07 | 52.25 | 3.25 | -9.49 | 46.01 | Peak (NRB) | Vertical | 150 | 0 | -- | -- | Pass |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5245.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: 0.0, Duty Cycle (%): 99




| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 4809.83 | 65.59 | 2.85 | -12.42 | 56.02 | Max Peak | Horizontal | 185 | 357 | 68.2 | -12.2 | Pass |
| 2 | 4809.83 | 51.52 | 2.85 | -12.42 | 41.95 | Max Avg | Horizontal | 185 | 357 | 54.0 | -12.1 | Pass |
| 3 | 4836.91 | 66.02 | 2.81 | -12.54 | 56.29 | Max Peak | Horizontal | 177 | 0 | 68.2 | -11.9 | Pass |
| 4 | 4836.91 | 51.90 | 2.81 | -12.54 | 42.17 | Max Avg | Horizontal | 177 | 0 | 54.0 | -11.8 | Pass |
| 5 | 5243.02 | 68.44 | 3.02 | -12.03 | 59.43 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| 6 | 6250.07 | 55.51 | 3.25 | -9.49 | 49.27 | Peak (NRB) | Vertical | 150 | 0 | -- | -- | Pass |

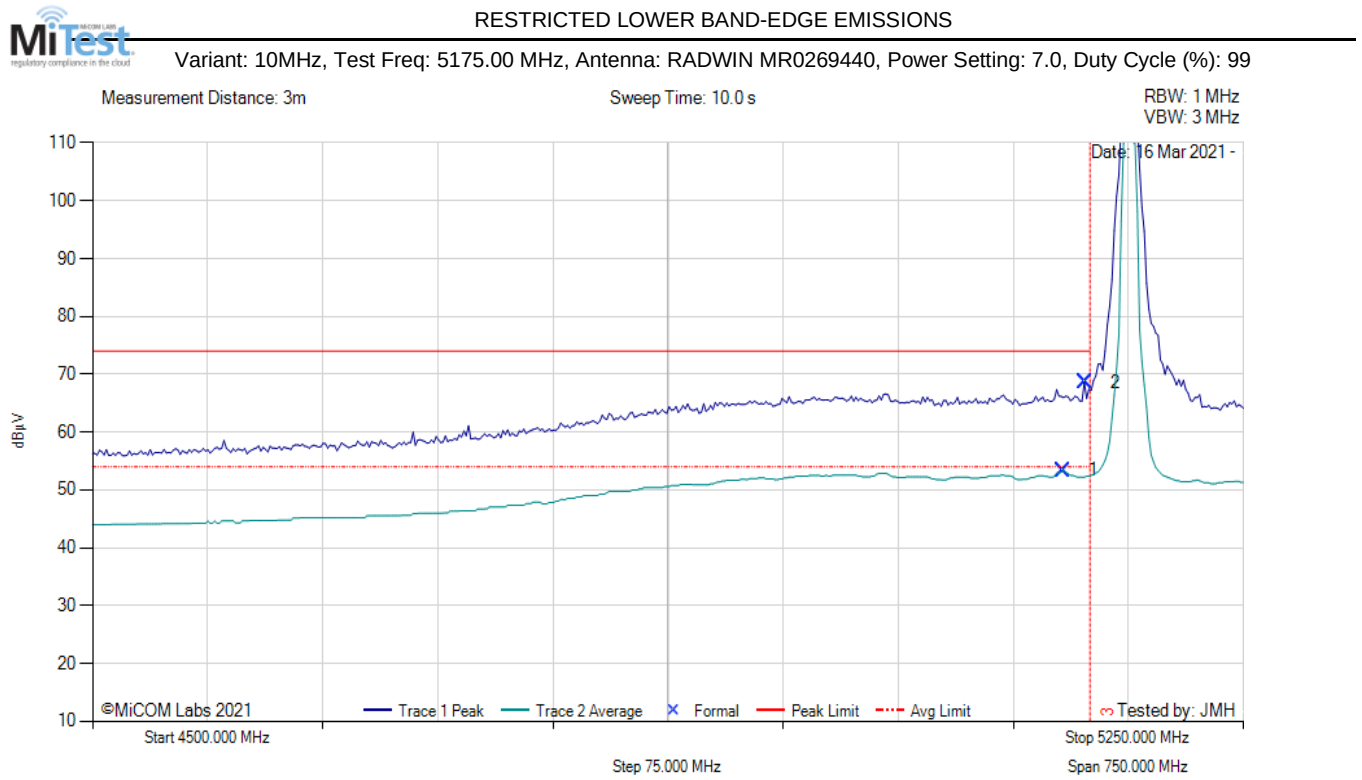
**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

## A.3.2. Restricted Edge & Band-Edge Emissions

### A.3.2.3. RADWIN MR0269440

<br>



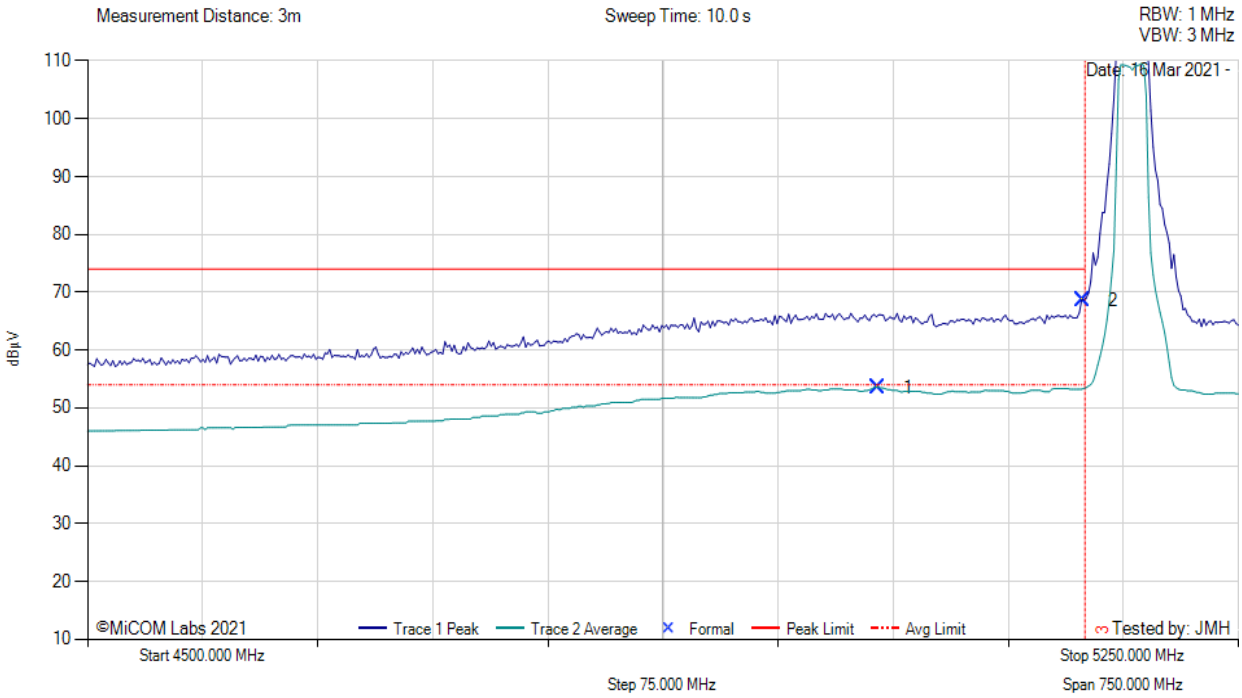

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB/m | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
| 1 | 5132.77 | 16.23 | 2.98 | 34.18 | 53.39 | Max Avg | Vertical | 189 | 33 | 54.0 | -0.6 | Pass |
| 2 | 5146.99 | 31.46 | 2.91 | 34.21 | 68.58 | Max Peak | Vertical | 189 | 33 | 74.0 | -5.4 | Fail |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE, connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20MHz, Test Freq: 5180.00 MHz, Antenna: RADWIN MR0269440, Power Setting: 6.5, Duty Cycle (%): 99



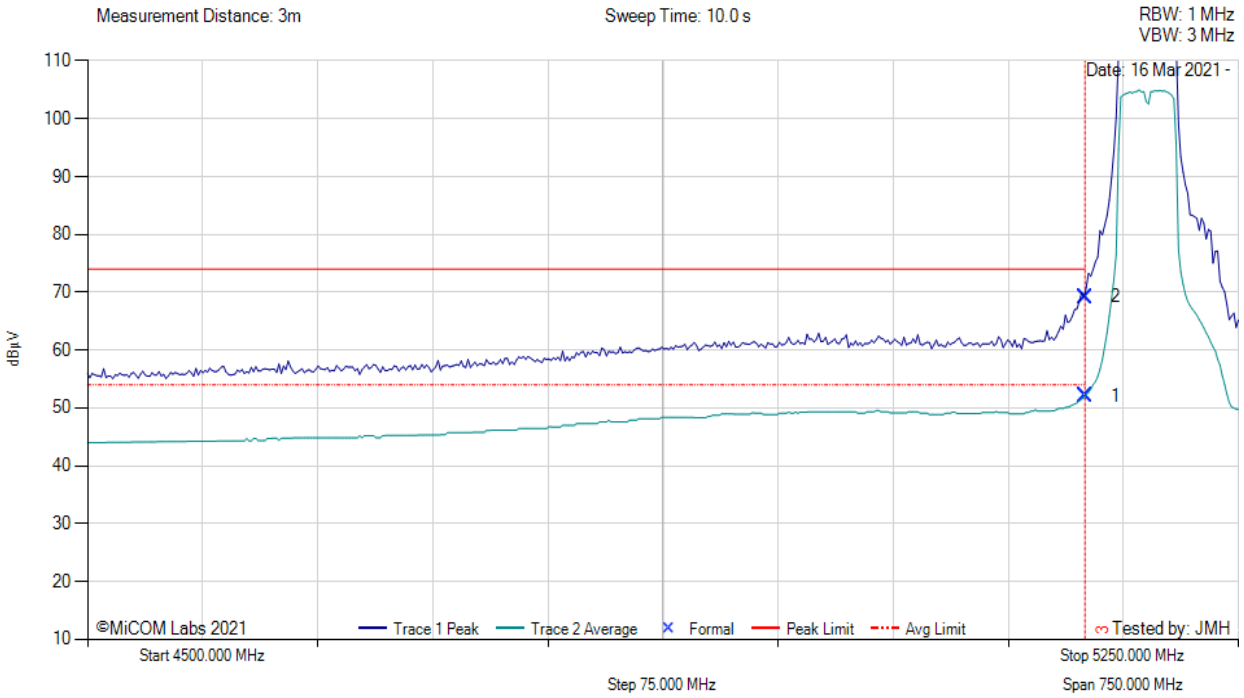

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 5014.73 | 16.57 | 2.92 | 34.08 | 53.57 | Max Avg | Vertical | 189 | 33 | 54.0 | -0.4 | Pass |
| 2 | 5148.50 | 31.55 | 2.91 | 34.21 | 68.67 | Max Peak | Vertical | 189 | 33 | 74.0 | -5.3 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE, connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40MHz, Test Freq: 5190.00 MHz, Antenna: RADWIN MR0269440, Power Setting: 6.5, Duty Cycle (%): 90



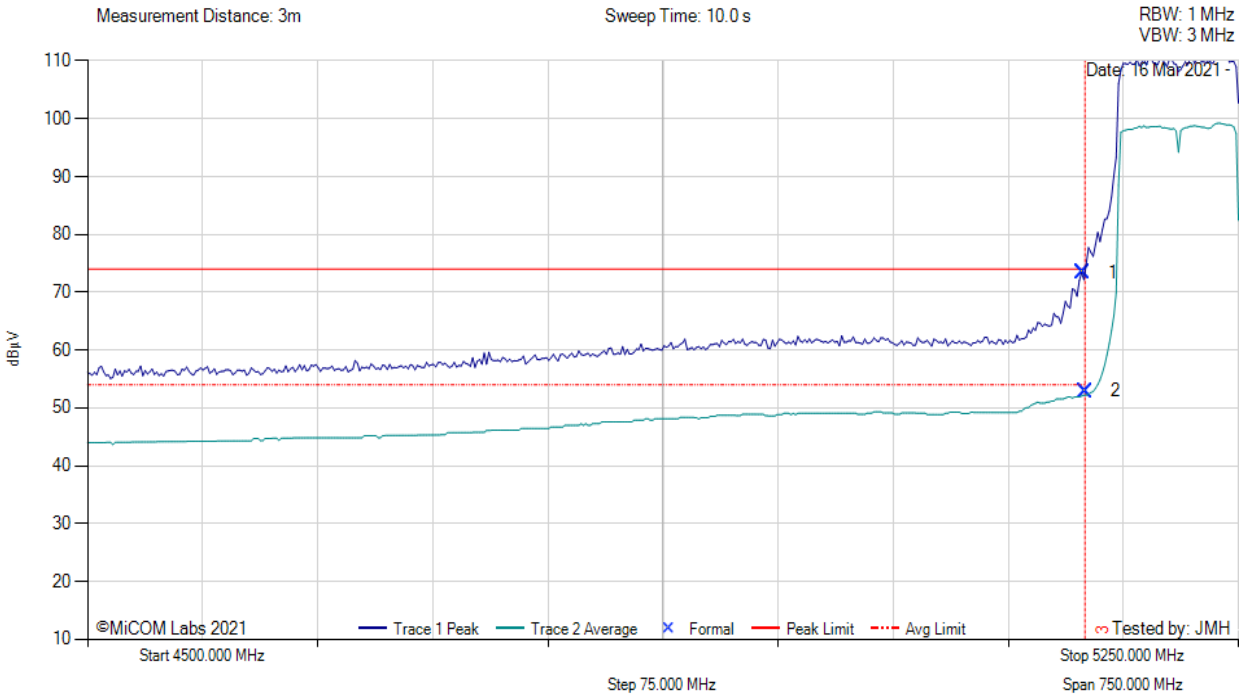

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 5150.00 | 15.01 | 2.93 | 34.21 | 52.15 | Max Avg | Vertical | 189 | 33 | 54.0 | -1.9 | Pass |
| 2 | 5150.00 | 32.03 | 2.93 | 34.21 | 69.17 | Max Peak | Vertical | 189 | 33 | 74.0 | -4.8 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE, connected to laptop outside chamber. 0.4 DCCF added to average measurement.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80MHz, Test Freq: 5210.00 MHz, Antenna: RADWIN MR0269440, Power Setting: 4.0, Duty Cycle (%): 85




| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 5148.50 | 36.27 | 2.91 | 34.21 | 73.39 | Max Peak | Vertical | 189 | 33 | 74.0 | -0.6 | Pass |
| 2 | 5150.00 | 15.80 | 2.93 | 34.21 | 52.94 | Max Avg | Vertical | 189 | 33 | 54.0 | -1.1 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE, connected to laptop outside chamber. 0.71 DCCF added to average measurement.

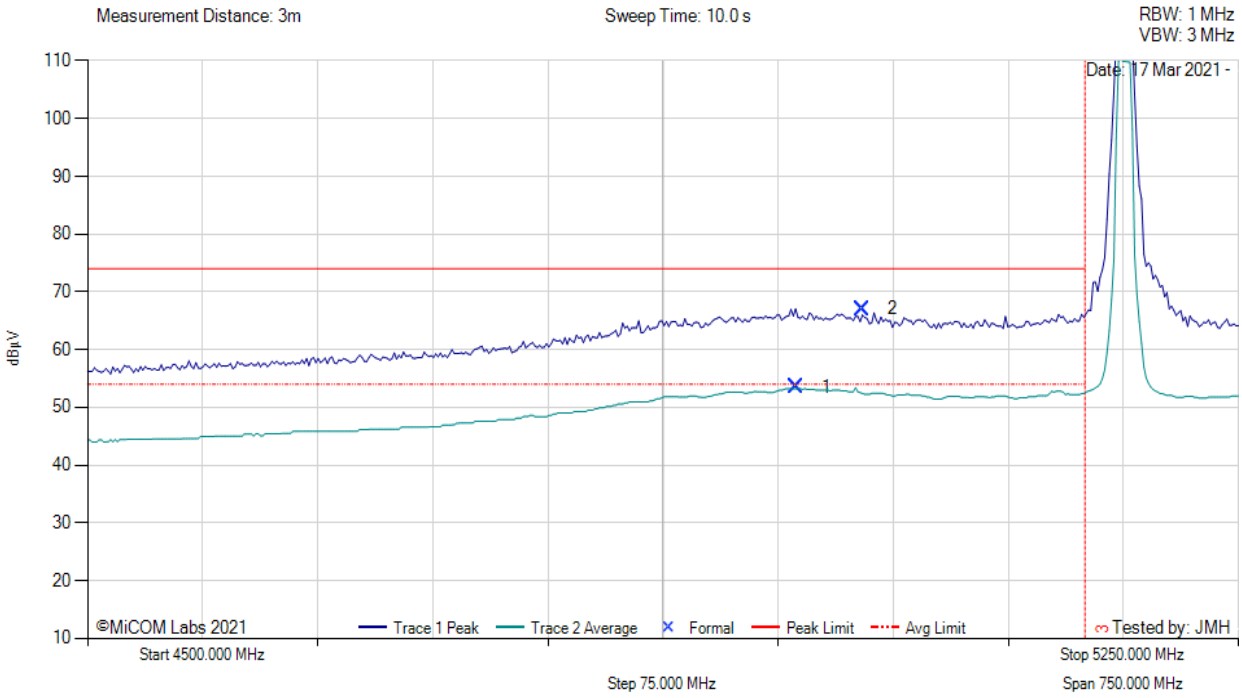
back to matrix

### A.3.2.4. RADWIN MR0269440BF

<br>

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 10MHz, Test Freq: 5175.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: 1.0, Duty Cycle (%): 99



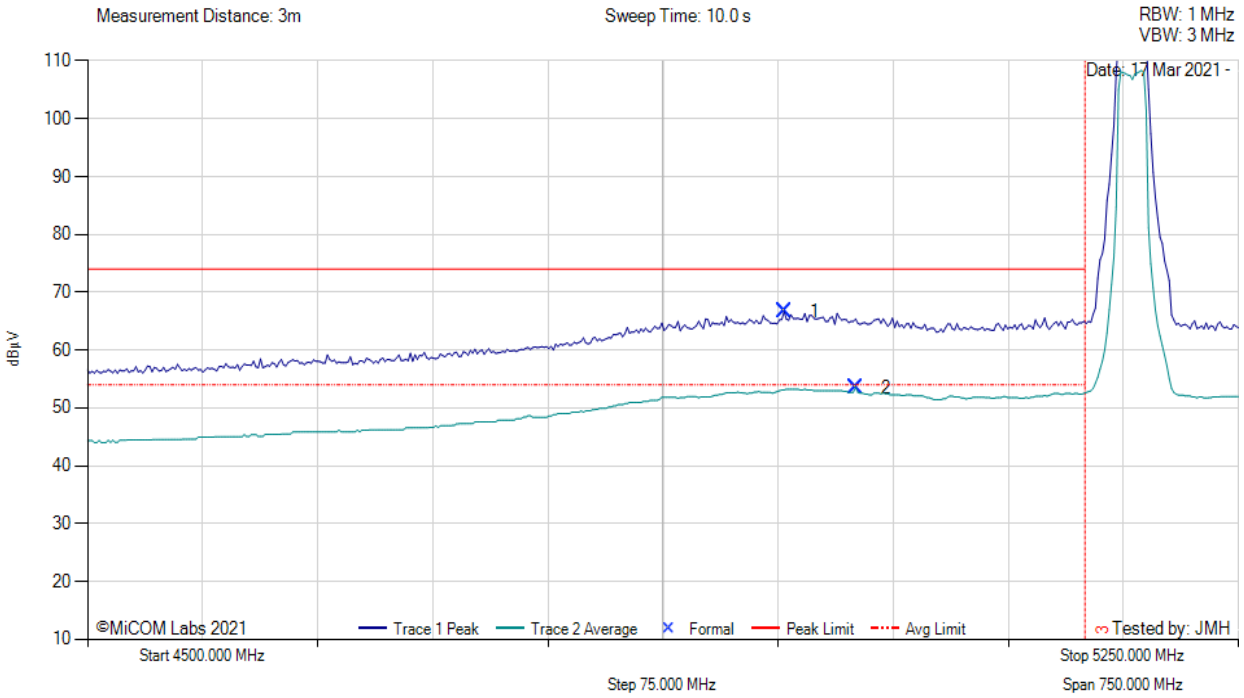

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 4961.72 | 16.34 | 2.90 | 34.22 | 53.46 | Max Avg | Vertical | 185 | 1 | 54.0 | -0.5 | Pass |
| 2 | 5005.01 | 30.13 | 2.91 | 34.02 | 67.06 | Max Peak | Vertical | 185 | 1 | 74.0 | -6.9 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20MHz, Test Freq: 5180.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: 1.0, Duty Cycle (%): 99



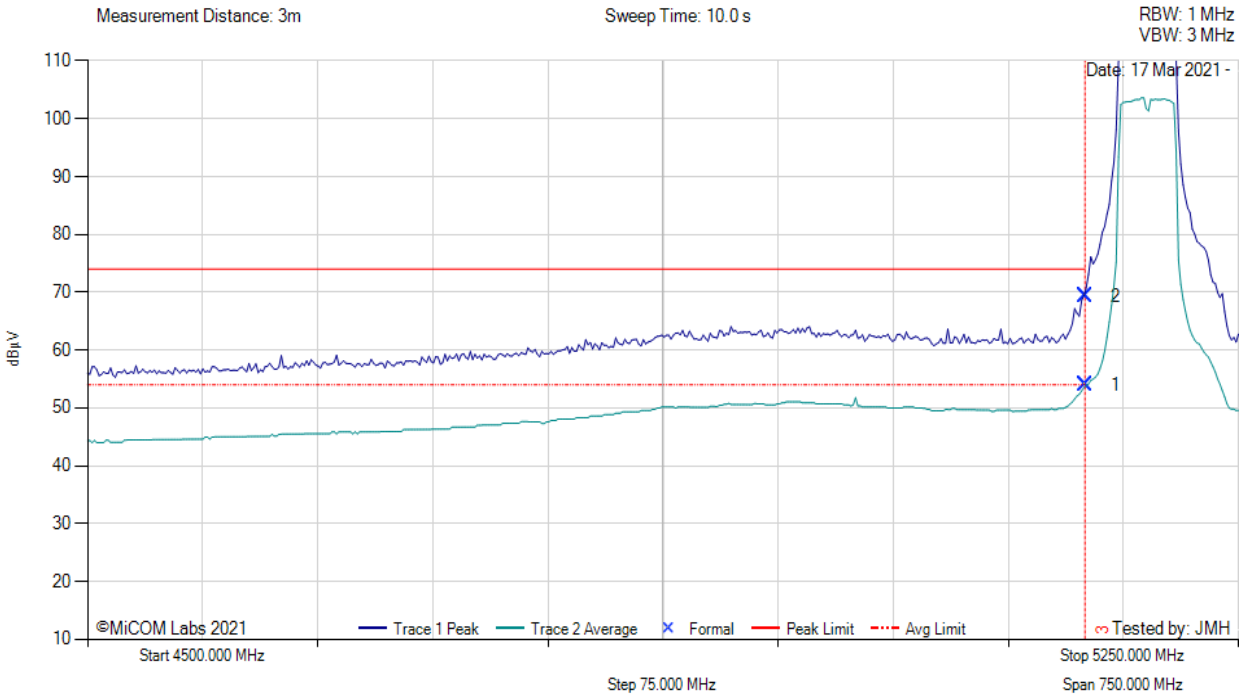

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 4953.91 | 29.71 | 2.91 | 34.01 | 66.63 | Max Peak | Vertical | 185 | 1 | 74.0 | -7.4 | Pass |
| 2 | 5000.50 | 16.62 | 2.88 | 34.06 | 53.56 | Max Avg | Vertical | 185 | 1 | 54.0 | -0.4 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40MHz, Test Freq: 5190.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: -0.5, Duty Cycle (%): 90



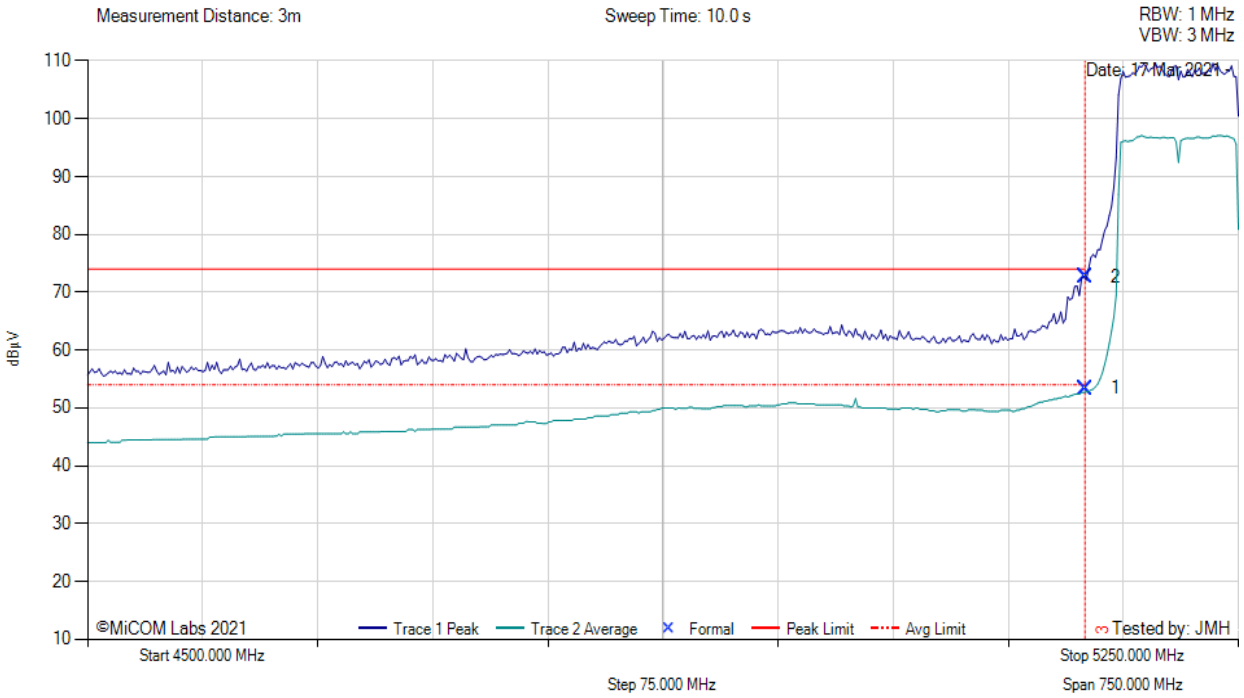

| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 5150.00 | 16.78 | 2.93 | 34.21 | 53.92 | Max Avg | Vertical | 185 | 0 | 54.0 | -0.1 | Pass |
| 2 | 5150.00 | 32.25 | 2.93 | 34.21 | 69.39 | Max Peak | Vertical | 185 | 0 | 74.0 | -4.6 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 0.4 DCCF added to average measurement

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80MHz, Test Freq: 5210.00 MHz, Antenna: RADWIN MR0269440BF, Power Setting: -3.0, Duty Cycle (%): 85

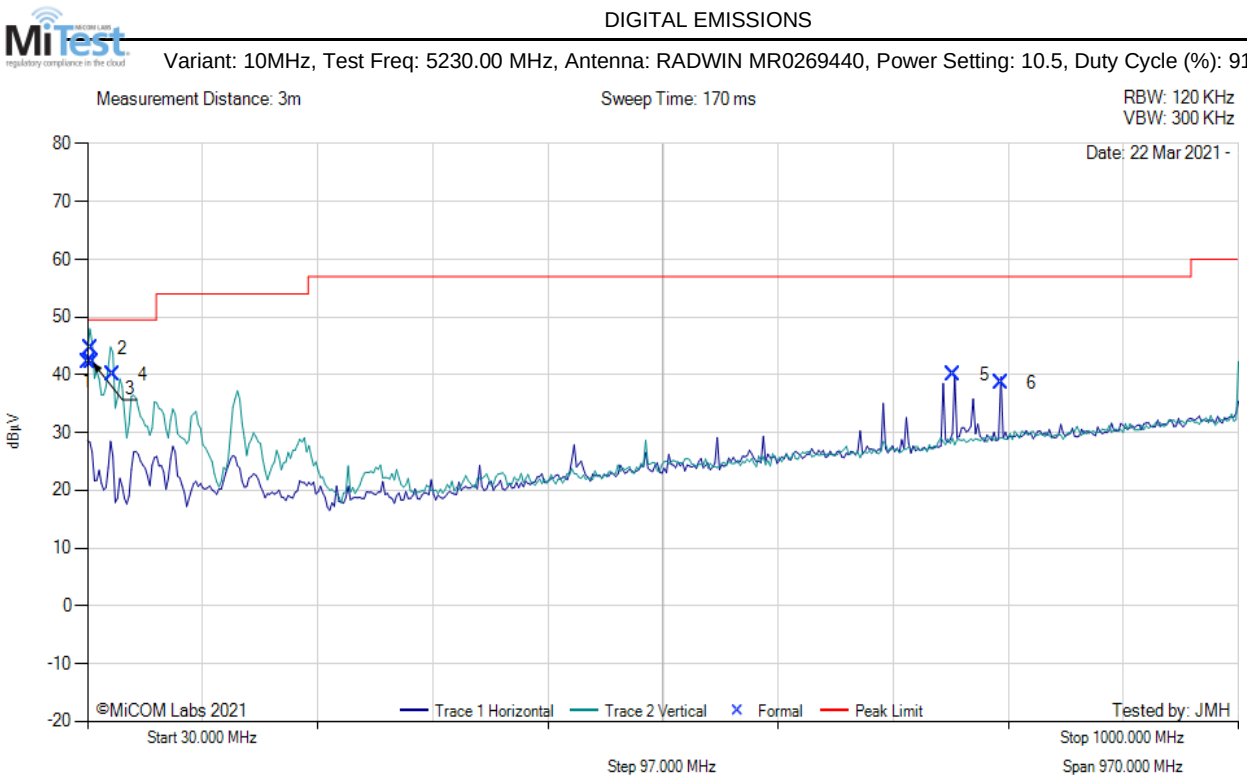



| 4500.00 - 5250.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB/m** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 5150.00 | 16.25 | 2.93 | 34.21 | 53.39 | Max Avg | Vertical | 185 | 0 | 54.0 | -0.6 | Pass |
| 2 | 5150.00 | 35.54 | 2.93 | 34.21 | 72.68 | Max Peak | Vertical | 185 | 0 | 74.0 | -1.3 | Pass |
| 3 | 5150.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by POE. Connected to laptop outside chamber. 0.71 DCCF added to average measurement

back to matrix

## A.3.3. Digital Emissions




| 30.00 - 1000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB/m | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
| 1 | 30.22 | 47.02 | 3.54 | -8.20 | 42.36 | MaxQP | Vertical | 101 | 25 | 49.5 | -7.1 | Pass |
| 2 | 33.07 | 51.41 | 3.59 | -10.42 | 44.58 | MaxQP | Vertical | 98 | 3 | 49.5 | -4.9 | Pass |
| 3 | 34.13 | 49.53 | 3.59 | -10.92 | 42.20 | MaxQP | Vertical | 139 | 217 | 49.5 | -7.3 | Pass |
| 4 | 50.94 | 57.08 | 3.73 | -20.71 | 40.10 | MaxQP | Vertical | 126 | 107 | 49.5 | -9.4 | Pass |
| 5 | 760.00 | 39.99 | 6.38 | -6.31 | 40.06 | MaxQP | Horizontal | 144 | 23 | 57.0 | -16.9 | Pass |
| 6 | 799.99 | 38.00 | 6.48 | -5.93 | 38.55 | MaxQP | Horizontal | 136 | 40 | 57.0 | -18.5 | Pass |

**Test Notes:** Modem 1 5230MHz HT40 PS 10.5. Modem 2 5210MHz HT40 PS 10.5

back to matrix


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