



## **REGULATORY COMPLIANCE TEST REPORT**

**FCC CFR 47 Part 15.407 & ISED RSS-247**

**Report No.: MIKO114-U10b Rev A**

**Company:** Mikrotikls SIA

**Model Name:** RBD25G-5HPacQD2HPnD-US

## REGULATORY COMPLIANCE TEST REPORT

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**Model Name:** RBD25G-5HPacQD2HPnD-US

**To:** FCC CFR 47 Part 15.407 & ISED RSS-247

**Test Report Serial No.:** MIKO114-U10b Rev A

This report supersedes: NONE

Applicant: Mikrotikls SIA  
Brivibas gatve 214i  
Riga, LV-1039  
Latvia

Issue Date: 25th May 2021

| Test Report Sections           | Document Number                                  |
|--------------------------------|--|
| Master:                        | <input type="checkbox"/> MIKO114-U10a Master     |
| RF Report 5250 – 5350 MHz:     | <input checked="" type="checkbox"/> MIKO114-U10b |
| DFS 5250 – 5350 MHz Addendum:  | <input type="checkbox"/> MIKO114-U10c            |
| RF Report 5470 - 5725 MHz:     | <input type="checkbox"/> MIKO114-U10d            |
| DFS 5470 - 5725 MHz Addendum : | <input type="checkbox"/> MIKO114-U10e            |

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**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](http://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>



## 1.2. RECOGNITION

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

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

TCB – Telecommunications Certification Bodies (TCB)

FCB – Foreign Certification Body

CAB – Conformity Assessment Body

NB – Notified Body

AB – Approved Body

MRA – Mutual Recognition Agreement

MRA Phase I - recognition for product testing

MRA 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](http://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>



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            | 21st May 2021             | Draft report for client review. |
| Rev A            | 25 <sup>th</sup> May 2021 | Initial release.                |
| .                |                           |                                 |
| .                |                           |                                 |
| .                |                           |                                 |
| .                |                           |                                 |
| .                |                           |                                 |

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

### 3. TEST SUMMARY

#### List of Measurements

| Test Header                             | Result   | Data Link                 |
|---|----------|---------------------------|
| Peak Transmit Power                     | Complies | <a href="#">View Data</a> |
| 26 dB & 99% Bandwidth                   | Complies | <a href="#">View Data</a> |
| Power Spectral Density                  | Complies | <a href="#">View Data</a> |
| Radiated                                | Complies | -                         |
| TX Spurious & Restricted Band Emissions | Complies | -                         |
| MikroTik db_PIFA_2_4-5_5_AN             | Complies | <a href="#">View Data</a> |
| Restricted Edge & Band-Edge Emissions   | Complies | -                         |
| MikroTik db_PIFA_2_4-5_5_AN             | Complies | <a href="#">View Data</a> |



## 4. TEST RESULTS

### 4.1. Peak Transmit Power

| Conducted Test Conditions for Maximum Conducted Output Power |                                |                            |             |
|--|--------------------------------|----------------------------|-------------|
| <b>Standard:</b>   | FCC CFR 47:15.407              | <b>Ambient Temp. (°C):</b> | 24.0 - 27.5 |
| <b>Test Heading:</b>   | Maximum Conducted Output Power | <b>Rel. Humidity (%):</b>  | 32 - 45     |
| <b>Standard Section(s):</b>                                  | 15.407 (a)                     | <b>Pressure (mBars):</b>   | 999 - 1001  |
| <b>Reference Document(s):</b>                                | See Normative References       |                            |             |

#### Test Procedure for Maximum Conducted Output Power Measurement

Method PM (Measurement using an RF average power meter). KDB 789033 defines a methodology using an average wideband power meter. Measurements were made while the EUT was operating in a continuous transmission mode (100% duty cycle) at the appropriate center frequency. All operational modes and frequency bands were measured independently and the resultant calculated. Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured and reported separately. A summation ( $\Sigma$ ) of each antenna port output power is provided which includes any offset due to Duty Cycle Correction Factor (DCCF). Testing was performed under ambient conditions at nominal voltage.

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

Supporting Information

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

$A$  = Total Power [ $10 \cdot \log_{10} (10^{a/10} + 10^{b/10} + 10^{c/10} + 10^{d/10})$ ]

$G$  = 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).

(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.

**Operating Frequency Band 5250-5350 and 5470 – 5725 MHz**

15. 407 (a)(2)

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. 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.

**Operating Frequency Band 5725 – 5850 MHz**

15. 407 (a)(3)

For the band 5.725-5.85 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 30 dBm in any 500-kHz 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. 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.

#### Equipment Configuration for Peak Transmit Power

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11a        | <b>Duty Cycle (%):</b>            | 99.0           |
| <b>Data Rate:</b>              | 6.00 MBit/s    | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Conducted Output Power (dBm) |       |   |   | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|----------------|---------------------------------------|-------|---|---|------------------------|-------------------------|-------|--------|-------------------|
|                | Port(s)                               |       |   |   |                        |                         |       |        |                   |
| MHz            | a                                     | b     | c | d | Σ Port(s) dBm          | MHz                     | dBm   | dB     |                   |
| 5260.0         | 15.46                                 | 16.02 |   |   | 18.76                  | 19.200                  | 23.83 | -5.07  |                   |
| 5300.0         | 14.91                                 | 15.75 |   |   | 18.36                  | 19.200                  | 23.83 | -5.47  |                   |
| 5320.0         | 13.75                                 | 15.21 |   |   | 17.55                  | 19.130                  | 23.82 | -6.27  |                   |

#### Traceability to Industry Recognized Test Methodologies

|                          |                                  |
|--------------------------|----------------------------------|
| Work Instruction:        | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB                         |

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

#### Equipment Configuration for Peak Transmit Power

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11ac-80    | <b>Duty Cycle (%):</b>            | 82.0           |
| <b>Data Rate:</b>              | 29.30 MBit/s   | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Conducted Output Power (dBm) |       |   |   | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|----------------|---------------------------------------|-------|---|---|------------------------|-------------------------|-------|--------|-------------------|
|                | Port(s)                               |       |   |   |                        |                         |       |        |                   |
| MHz            | a                                     | b     | c | d | Σ Port(s) dBm          | MHz                     | dBm   | dB     |                   |
| 5290.0         | 14.73                                 | 16.28 |   |   | 18.58                  | 88.800                  | 24.00 | -5.42  |                   |

#### Traceability to Industry Recognized Test Methodologies

|                          |                                  |
|--------------------------|----------------------------------|
| Work Instruction:        | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: |                                  |

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

#### Equipment Configuration for Peak Transmit Power

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11n HT-20  | <b>Duty Cycle (%):</b>            | 92.0           |
| <b>Data Rate:</b>              | 6.50 MBit/s    | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Conducted Output Power (dBm) |       |   |   | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|----------------|---------------------------------------|-------|---|---|------------------------|-------------------------|-------|--------|-------------------|
|                | Port(s)                               |       |   |   |                        |                         |       |        |                   |
| MHz            | a                                     | b     | c | d | Σ Port(s) dBm          | MHz                     | dBm   | dB     |                   |
| 5260.0         | 15.00                                 | 16.07 |   |   | 18.58                  | 20.400                  | 24.00 | -5.42  |                   |
| 5300.0         | 14.95                                 | 15.76 |   |   | 18.38                  | 20.330                  | 24.00 | -5.62  |                   |
| 5320.0         | 13.77                                 | 15.24 |   |   | 17.58                  | 20.400                  | 24.00 | -6.42  |                   |

#### Traceability to Industry Recognized Test Methodologies

|                          |                                  |
|--------------------------|----------------------------------|
| Work Instruction:        | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB                         |

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

#### Equipment Configuration for Peak Transmit Power

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11n HT-40  | <b>Duty Cycle (%):</b>            | 92.0           |
| <b>Data Rate:</b>              | 13.50 MBit/s   | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Conducted Output Power (dBm) |       |   |   | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|----------------|---------------------------------------|-------|---|---|------------------------|-------------------------|-------|--------|-------------------|
|                | Port(s)                               |       |   |   |                        |                         |       |        |                   |
| MHz            | a                                     | b     | c | d | Σ Port(s) dBm          | MHz                     | dBm   | dB     |                   |
| 5270.0         | 17.17                                 | 17.98 |   |   | 20.60                  | 39.870                  | 24.00 | -3.40  |                   |
| 5310.0         | 16.14                                 | 17.46 |   |   | 19.86                  | 39.600                  | 24.00 | -4.14  |                   |

#### Traceability to Industry Recognized Test Methodologies

|                          |                                  |
|--------------------------|----------------------------------|
| Work Instruction:        | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB                         |

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

## 4.2. 26 dB & 99% Bandwidth

| Conducted Test Conditions for 26 dB and 99% Bandwidth   |                          |                     |             |
|---|--------------------------|---------------------|-------------|
| Standard:   | FCC CFR 47:15.407        | Ambient Temp. (°C): | 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 |                     |             |
| <b>Test Procedure for 26 dB and 99% Bandwidth Measurement</b><br>The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The Resolution Bandwidth was set to approximately 1% of the emission bandwidth.<br>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.<br><br>Test configuration and setup used for the measurement was per the Conducted Test Set-up section specified in this document. |                          |                     |             |

### Equipment Configuration for 26 dB & 99% Occupied Bandwidth

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11a        | <b>Duty Cycle (%):</b>            | 99.0           |
| <b>Data Rate:</b>              | 6.00 MBit/s    | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

### Test Measurement Results

| Test Frequency | Measured 26 dB Bandwidth (MHz) |                        |   |   | 26 dB Bandwidth (MHz) |        |  |  |
|----------------|--------------------------------|------------------------|---|---|-----------------------|--------|--|--|
|                | Port(s)                        |                        |   |   |                       |        |  |  |
| MHz            | a                              | b                      | c | d | Highest               | Lowest |  |  |
| 5260.0         | <a href="#">19.530</a>         | <a href="#">19.200</a> |   |   | 19.530                | 19.200 |  |  |
| 5300.0         | <a href="#">19.530</a>         | <a href="#">19.200</a> |   |   | 19.530                | 19.200 |  |  |
| 5320.0         | <a href="#">19.600</a>         | <a href="#">19.130</a> |   |   | 19.600                | 19.130 |  |  |

| Test Frequency | Measured 99% Bandwidth (MHz) |                        |   |   | 99% Bandwidth (MHz) |        |  |  |
|----------------|------------------------------|------------------------|---|---|---------------------|--------|--|--|
|                | Port(s)                      |                        |   |   |                     |        |  |  |
| MHz            | a                            | b                      | c | d | Highest             | Lowest |  |  |
| 5260.0         | <a href="#">16.517</a>       | <a href="#">16.434</a> |   |   | 16.517              | 16.434 |  |  |
| 5300.0         | <a href="#">16.513</a>       | <a href="#">16.433</a> |   |   | 16.513              | 16.433 |  |  |
| 5320.0         | <a href="#">16.547</a>       | <a href="#">16.451</a> |   |   | 16.547              | 16.451 |  |  |

### 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

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11ac-80    | <b>Duty Cycle (%):</b>            | 82.0           |
| <b>Data Rate:</b>              | 29.30 MBit/s   | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured 26 dB Bandwidth (MHz) |                        |   |   | 26 dB Bandwidth (MHz) |        |  |  |
|----------------|--------------------------------|------------------------|---|---|-----------------------|--------|--|--|
|                | Port(s)                        |                        |   |   |                       |        |  |  |
| MHz            | a                              | b                      | c | d | Highest               | Lowest |  |  |
| 5290.0         | <a href="#">88.800</a>         | <a href="#">93.870</a> |   |   | 93.870                | 88.800 |  |  |

| Test Frequency | Measured 99% Bandwidth (MHz) |                        |   |   | 99% Bandwidth (MHz) |        |  |  |
|----------------|------------------------------|------------------------|---|---|---------------------|--------|--|--|
|                | Port(s)                      |                        |   |   |                     |        |  |  |
| MHz            | a                            | b                      | c | d | Highest             | Lowest |  |  |
| 5290.0         | <a href="#">75.907</a>       | <a href="#">76.159</a> |   |   | 76.159              | 75.907 |  |  |

#### 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

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11n HT-20  | <b>Duty Cycle (%):</b>            | 92.0           |
| <b>Data Rate:</b>              | 6.50 MBit/s    | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured 26 dB Bandwidth (MHz) |                        |   |   | 26 dB Bandwidth (MHz) |        |  |  |
|----------------|--------------------------------|------------------------|---|---|-----------------------|--------|--|--|
|                | Port(s)                        |                        |   |   |                       |        |  |  |
| MHz            | a                              | b                      | c | d | Highest               | Lowest |  |  |
| 5260.0         | <a href="#">20.470</a>         | <a href="#">20.400</a> |   |   | 20.470                | 20.400 |  |  |
| 5300.0         | <a href="#">20.600</a>         | <a href="#">20.330</a> |   |   | 20.600                | 20.330 |  |  |
| 5320.0         | <a href="#">20.470</a>         | <a href="#">20.400</a> |   |   | 20.470                | 20.400 |  |  |

| Test Frequency | Measured 99% Bandwidth (MHz) |                        |   |   | 99% Bandwidth (MHz) |        |  |  |
|----------------|------------------------------|------------------------|---|---|---------------------|--------|--|--|
|                | Port(s)                      |                        |   |   |                     |        |  |  |
| MHz            | a                            | b                      | c | d | Highest             | Lowest |  |  |
| 5260.0         | <a href="#">17.663</a>       | <a href="#">17.661</a> |   |   | 17.663              | 17.661 |  |  |
| 5300.0         | <a href="#">17.672</a>       | <a href="#">17.644</a> |   |   | 17.672              | 17.644 |  |  |
| 5320.0         | <a href="#">17.697</a>       | <a href="#">17.657</a> |   |   | 17.697              | 17.657 |  |  |

#### 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

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11n HT-40  | <b>Duty Cycle (%):</b>            | 92.0           |
| <b>Data Rate:</b>              | 13.50 MBit/s   | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured 26 dB Bandwidth (MHz) |                        |   |   | 26 dB Bandwidth (MHz) |        |  |  |
|----------------|--------------------------------|------------------------|---|---|-----------------------|--------|--|--|
|                | Port(s)                        |                        |   |   |                       |        |  |  |
| MHz            | a                              | b                      | c | d | Highest               | Lowest |  |  |
| 5270.0         | <a href="#">40.000</a>         | <a href="#">39.870</a> |   |   | 40.000                | 39.870 |  |  |
| 5310.0         | <a href="#">40.000</a>         | <a href="#">39.600</a> |   |   | 40.000                | 39.600 |  |  |

| Test Frequency | Measured 99% Bandwidth (MHz) |                        |   |   | 99% Bandwidth (MHz) |        |  |  |
|----------------|------------------------------|------------------------|---|---|---------------------|--------|--|--|
|                | Port(s)                      |                        |   |   |                     |        |  |  |
| MHz            | a                            | b                      | c | d | Highest             | Lowest |  |  |
| 5270.0         | <a href="#">36.120</a>       | <a href="#">36.099</a> |   |   | 36.120              | 36.099 |  |  |
| 5310.0         | <a href="#">36.171</a>       | <a href="#">36.020</a> |   |   | 36.171              | 36.020 |  |  |

#### 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).

### 4.3. Power Spectral Density

| Conducted Test Conditions for Power Spectral Density |                          |                            |             |
|--|--------------------------|----------------------------|-------------|
| <b>Standard:</b>                                     | FCC CFR 47:15.407        | <b>Ambient Temp. (°C):</b> | 24.0 - 27.5 |
| <b>Test Heading:</b>                                 | Power Spectral Density   | <b>Rel. Humidity (%):</b>  | 32 - 45     |
| <b>Standard Section(s):</b>                          | 15.407 (a)               | <b>Pressure (mBars):</b>   | 999 - 1001  |
| <b>Reference Document(s):</b>                        | See Normative References |                            |             |

#### Test Procedure for Power Spectral Density

The in-band power spectral density was measured using the test technique specified in KDB 789033. A 1 MHz measurement bandwidth was implemented for the analyzer sweep. Once the sweep is complete the analyzer trace data is downloaded and used for post processing purposes.

Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured separately. The Peak Power Spectral Density is the highest level found across the emission bandwidth. With multiple antenna port measurements the numerical analyzer data from each port is summed (â) and a link to this additional graphic is provided.

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

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 multiple 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 post processed and the resulting numerical and graphical data presented.

NOTE: It may be observed that spectrum in some plots break the limit line however this in itself does NOT constitute a failure. In all cases a spectrum summation plot is provided in order to prove compliance. A failure occurs only after the summation of all spectrum plots have been summed and are found to be greater than the limit line.

#### Supporting Information

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

A = Total Power Spectral Density [ $10 \cdot \log_{10} (10^{a/10} + 10^{b/10} + 10^{c/10} + 10^{d/10})$ ]

x = Duty Cycle

#### Limits 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.

#### **Operating Frequency Band 5250-5350 and 5470 – 5725 MHz**

##### **15. 407 (a)(2)**

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. 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.

#### **Operating Frequency Band 5725 – 5850 MHz**

##### **15. 407 (a)(3)**

For the band 5.725-5.85 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 30 dBm in any 500-kHz 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. 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.

#### Equipment Configuration for Power Spectral Density

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11a        | <b>Duty Cycle (%):</b>            | 99.0           |
| <b>Data Rate:</b>              | 6.00 MBit/s    | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Power Spectral Density |                       |   |   | Summation Peak Marker + DCCF (+0.04 dB) | Limit   | Margin |
|----------------|---------------------------------|-----------------------|---|---|---|---------|--------|
|                | Port(s) (dBm/MHz)               |                       |   |   |   |         |        |
| MHz            | a                               | b                     | c | d | dBm/MHz                                 | dBm/MHz | dB     |
| 5260.0         | <a href="#">3.111</a>           | <a href="#">3.825</a> |   |   | <a href="#">6.496</a>                   | 11.0    | -4.5   |
| 5300.0         | <a href="#">3.081</a>           | <a href="#">3.533</a> |   |   | <a href="#">6.267</a>                   | 11.0    | -4.7   |
| 5320.0         | <a href="#">1.646</a>           | <a href="#">3.121</a> |   |   | <a href="#">5.348</a>                   | 11.0    | -5.7   |

#### 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).

#### Equipment Configuration for Power Spectral Density

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11ac-80    | <b>Duty Cycle (%):</b>            | 82.0           |
| <b>Data Rate:</b>              | 29.30 MBit/s   | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Power Spectral Density |        |   |   | Summation Peak Marker + DCCF (+0.86 dB) | Limit   | Margin |
|----------------|---------------------------------|--------|---|---|---|---------|--------|
|                | Port(s) (dBm/MHz)               |        |   |   |   |         |        |
| MHz            | a                               | b      | c | d | dBm/MHz                                 | dBm/MHz | dB     |
| 5290.0         | -3.727                          | -2.255 |   |   | 0.852                                   | 11.0    | -10.2  |

#### 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).

#### Equipment Configuration for Power Spectral Density

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11n HT-20  | <b>Duty Cycle (%):</b>            | 92.0           |
| <b>Data Rate:</b>              | 6.50 MBit/s    | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Power Spectral Density |                       |   |   | Summation Peak Marker + DCCF (+0.36 dB) | Limit   | Margin |
|----------------|---------------------------------|-----------------------|---|---|---|---------|--------|
|                | Port(s) (dBm/MHz)               |                       |   |   |   |         |        |
| MHz            | a                               | b                     | c | d | dBm/MHz                                 | dBm/MHz | dB     |
| 5260.0         | <a href="#">2.084</a>           | <a href="#">3.602</a> |   |   | <a href="#">6.236</a>                   | 11.0    | -4.8   |
| 5300.0         | <a href="#">2.773</a>           | <a href="#">3.251</a> |   |   | <a href="#">6.318</a>                   | 11.0    | -4.7   |
| 5320.0         | <a href="#">1.338</a>           | <a href="#">2.839</a> |   |   | <a href="#">5.381</a>                   | 11.0    | -5.6   |

#### 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).



#### Equipment Configuration for Power Spectral Density

|                                |                |                                   |                |
|--------------------------------|----------------|-----------------------------------|----------------|
| <b>Variant:</b>                | 802.11n HT-40  | <b>Duty Cycle (%):</b>            | 92.0           |
| <b>Data Rate:</b>              | 13.50 MBit/s   | <b>Antenna Gain (dBi):</b>        | 3.50           |
| <b>Modulation:</b>             | OFDM           | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>TPC:</b>                    | Not Applicable | <b>Tested By:</b>                 | SB             |
| <b>Engineering Test Notes:</b> |                |                                   |                |

#### Test Measurement Results

| Test Frequency | Measured Power Spectral Density |                       |   |   | Summation Peak Marker + DCCF (+0.36 dB) | Limit   | Margin |
|----------------|---------------------------------|-----------------------|---|---|---|---------|--------|
|                | Port(s) (dBm/MHz)               |                       |   |   |   |         |        |
| MHz            | a                               | b                     | c | d | dBm/MHz                                 | dBm/MHz | dB     |
| 5270.0         | <a href="#">1.801</a>           | <a href="#">2.607</a> |   |   | <a href="#">5.464</a>                   | 11.0    | -5.5   |
| 5310.0         | <a href="#">1.581</a>           | <a href="#">2.518</a> |   |   | <a href="#">5.320</a>                   | 11.0    | -5.7   |

#### 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).

#### 4.4. Radiated

| Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions |   |                            |             |
|--|---|----------------------------|-------------|
| <b>Standard:</b>   | FCC CFR 47:15.407                         | <b>Ambient Temp. (°C):</b> | 20.0 - 24.5 |
| <b>Test Heading:</b>   | Radiated Spurious and Band-Edge Emissions | <b>Rel. Humidity (%):</b>  | 32 - 45     |
| <b>Standard Section(s):</b>  | 15.407 (b), 15.205, 15.209                | <b>Pressure (mBars):</b>   | 999 - 1001  |
| <b>Reference Document(s):</b>  | 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);

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

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).

#### 4.4.1. TX Spurious & Restricted Band Emissions

##### 4.4.1.1. MikroTik db\_PIFA\_2\_4-5\_5\_AN

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

|                                 |                             |                        |             |
|---------------------------------|-----------------------------|------------------------|-------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11a     |
| <b>Antenna Gain (dBi):</b>      | 3.50                        | <b>Modulation:</b>     | OFDM        |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 99          |
| <b>Channel Frequency (MHz):</b> | 5260.00                     | <b>Data Rate:</b>      | 6.00 MBit/s |
| <b>Power Setting:</b>           | 24                          | <b>Tested By:</b>      | 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                     | 5257.25       | 77.60    | 2.95          | -12.20  | 68.35        | Fundamental      | Vertical | 100    | 0       | --           | --        |            |

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

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

|                                 |                             |                        |             |
|---------------------------------|-----------------------------|------------------------|-------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11a     |
| <b>Antenna Gain (dBi):</b>      | 3.50                        | <b>Modulation:</b>     | OFDM        |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 99          |
| <b>Channel Frequency (MHz):</b> | 5300.00                     | <b>Data Rate:</b>      | 6.00 MBit/s |
| <b>Power Setting:</b>           | 24                          | <b>Tested By:</b>      | 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                     | 5297.60       | 79.02    | 3.03          | -12.00  | 70.05        | Fundamental      | Vertical | 100    | 0       | --           | --        |            |

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

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

|                                 |                             |                        |             |
|---------------------------------|-----------------------------|------------------------|-------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11a     |
| <b>Antenna Gain (dBi):</b>      | 3.50                        | <b>Modulation:</b>     | OFDM        |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 99          |
| <b>Channel Frequency (MHz):</b> | 5320.00                     | <b>Data Rate:</b>      | 6.00 MBit/s |
| <b>Power Setting:</b>           | 24                          | <b>Tested By:</b>      | JMH         |

#### Test Measurement Results

| 10000.00 - 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                      | 5318.04       | 74.08    | 2.97          | -12.01  | 65.04        | Fundamental      | Vertical | 100    | 0       | --           | --        |            |

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

#### 4.4.2. Restricted Edge & Band-Edge Emissions

##### 4.4.2.2. MikroTik db\_PIFA\_2\_4-5\_5\_AN

#### RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5250 - 5350 MHz

| MikroTik db_PIFA_2_4-5_5_AN |                           | Band-Edge Freq | Limit 74.0dBμV/m | Limit 54.0dBμV/m | Power Setting |
|-----------------------------|---------------------------|----------------|------------------|------------------|---------------|
| Operational Mode            | Operating Frequency (MHz) | MHz            | dBμV/m           | dBμV/m           |               |
| 802.11a                     | 5320.00                   | 5350.00        | 63.52            | 49.54            | 24            |
| 802.11ac-80                 | 5290.00                   | 5350.00        | 73.10            | 51.33            | 20            |
| 802.11n HT-20               | 5320.00                   | 5350.00        | 65.10            | 50.70            | 24            |
| 802.11n HT-40               | 5310.00                   | 5350.00        | 67.28            | 52.17            | 24            |

Click on the links to view the data.



### Equipment Configuration for Restricted Upper Band-Edge Emissions

|                                 |                             |                        |             |
|---------------------------------|-----------------------------|------------------------|-------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11a     |
| <b>Antenna Gain (dBi):</b>      | Not Applicable              | <b>Modulation:</b>     | OFDM        |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 99          |
| <b>Channel Frequency (MHz):</b> | 5320.00                     | <b>Data Rate:</b>      | 6.00 MBit/s |
| <b>Power Setting:</b>           | 24                          | <b>Tested By:</b>      | JMH         |

### Test Measurement Results

| 5300.00 - 5460.00 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                    | 5350.00       | 12.02    | 3.06          | 34.46   | 49.54        | Max Avg          | Vertical | 158    | 356     | 54.0         | -4.5      | Pass       |
| #3                    | 5351.28       | 26.00    | 3.06          | 34.46   | 63.52        | Max Peak         | Vertical | 158    | 356     | 74.0         | -11.5     | Pass       |
| #2                    | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

Test Notes: EUT powered by AC/DC ps. Connected to laptop outside chamber.

### Equipment Configuration for Restricted Upper Band-Edge Emissions

|                                 |                             |                        |              |
|---------------------------------|-----------------------------|------------------------|--------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11ac-80  |
| <b>Antenna Gain (dBi):</b>      | Not Applicable              | <b>Modulation:</b>     | OFDM         |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 76           |
| <b>Channel Frequency (MHz):</b> | 5290.00                     | <b>Data Rate:</b>      | 29.30 MBit/s |
| <b>Power Setting:</b>           | 20                          | <b>Tested By:</b>      | JMH          |

### Test Measurement Results

| 5300.00 - 5460.00 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                    | 5350.00       | 12.62    | 3.06          | 34.46   | 51.33        | Max Avg          | Vertical | 158    | 356     | 54.0         | -2.7      | Pass       |
| #3                    | 5352.59       | 35.58    | 3.05          | 34.47   | 73.10        | Max Peak         | Vertical | 158    | 356     | 74.0         | -0.9      | Pass       |
| #2                    | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

Test Notes: EUT powered by AC/DC ps. Connected to laptop outside chamber. 1.19 DCCF added to average measurement.

### Equipment Configuration for Restricted Upper Band-Edge Emissions

|                                 |                             |                        |               |
|---------------------------------|-----------------------------|------------------------|---------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11n HT-20 |
| <b>Antenna Gain (dBi):</b>      | 3.50                        | <b>Modulation:</b>     | OFDM          |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 99            |
| <b>Channel Frequency (MHz):</b> | 5320.00                     | <b>Data Rate:</b>      | 6.50 MBit/s   |
| <b>Power Setting:</b>           | 24                          | <b>Tested By:</b>      | JMH           |

### Test Measurement Results

| 5300.00 - 5460.00 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                    | 5350.00       | 13.18    | 3.06          | 34.46   | 50.70        | Max Avg          | Vertical | 158    | 356     | 54.0         | -3.3      | Pass       |
| #3                    | 5350.64       | 27.58    | 3.06          | 34.46   | 65.10        | Max Peak         | Vertical | 158    | 356     | 74.0         | -8.9      | Pass       |
| #2                    | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

Test Notes: EUT powered by AC/DC ps. Connected to laptop outside chamber.

### Equipment Configuration for Restricted Upper Band-Edge Emissions

|                                 |                             |                        |               |
|---------------------------------|-----------------------------|------------------------|---------------|
| <b>Antenna:</b>                 | MikroTik db_PIFA_2_4-5_5_AN | <b>Variant:</b>        | 802.11n HT-40 |
| <b>Antenna Gain (dBi):</b>      | 3.50                        | <b>Modulation:</b>     | OFDM          |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable              | <b>Duty Cycle (%):</b> | 90            |
| <b>Channel Frequency (MHz):</b> | 5310.00                     | <b>Data Rate:</b>      | 13.50 MBit/s  |
| <b>Power Setting:</b>           | 24                          | <b>Tested By:</b>      | JMH           |

### Test Measurement Results

| 5300.00 - 5460.00 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 |
| #2                    | 5351.92       | 29.76    | 3.06          | 34.46   | 67.28        | Max Peak         | Vertical | 158    | 356     | 74.0         | -6.7      | Pass       |
| #3                    | 5360.26       | 14.20    | 3.04          | 34.48   | 52.17        | Max Avg          | Vertical | 158    | 356     | 54.0         | -1.8      | Pass       |
| #1                    | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

Test Notes: EUT powered by AC/DC ps. Connected to laptop outside chamber. 0.45 DCCF added to average measurement.

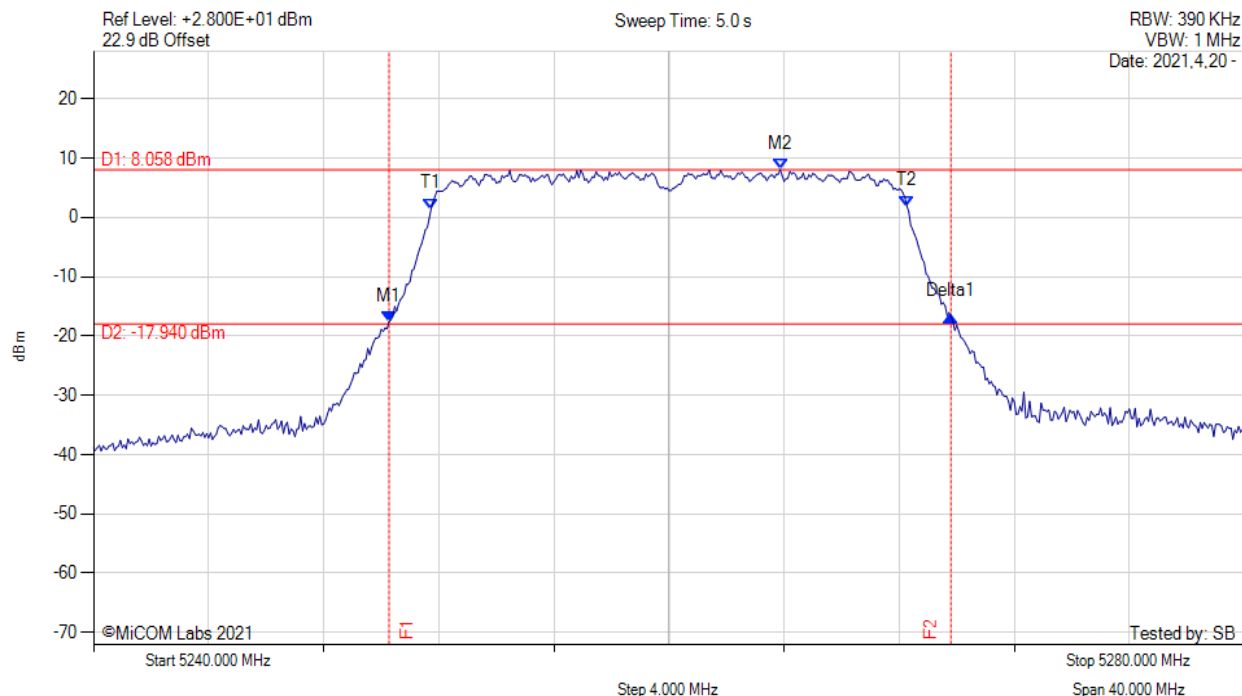
## **A. APPENDIX - GRAPHICAL IMAGES**

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



### 26 dB & 99% BANDWIDTH

Variant: 802.11a, Channel: 5260.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



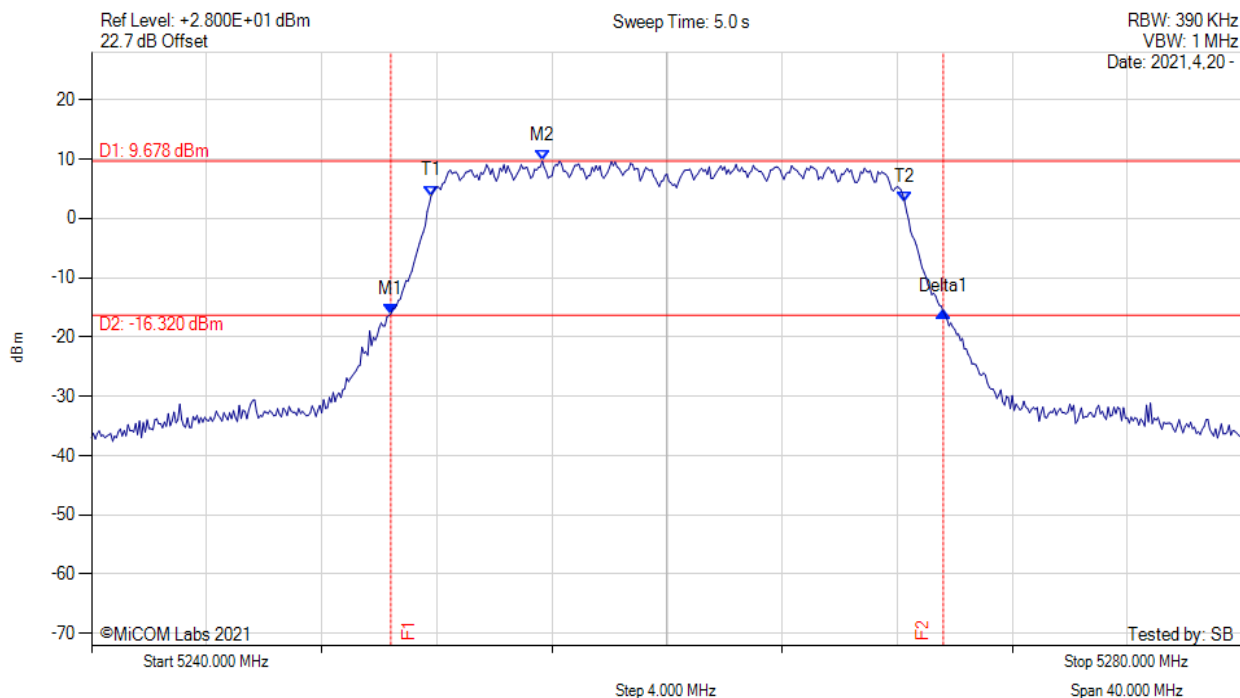
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5250.270 MHz : -17.656 dBm<br>M2 : 5263.870 MHz : 8.058 dBm<br>Delta1 : 19.530 MHz : 0.967 dB<br>T1 : 5251.733 MHz : 1.438 dBm<br>T2 : 5268.267 MHz : 1.915 dBm<br>OBW : 16.517 MHz | Measured 26 dB Bandwidth: 19.530 MHz<br>Measured 99% Bandwidth: 16.517 MHz |

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26 dB & 99% BANDWIDTH



Variant: 802.11a, Channel: 5260.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



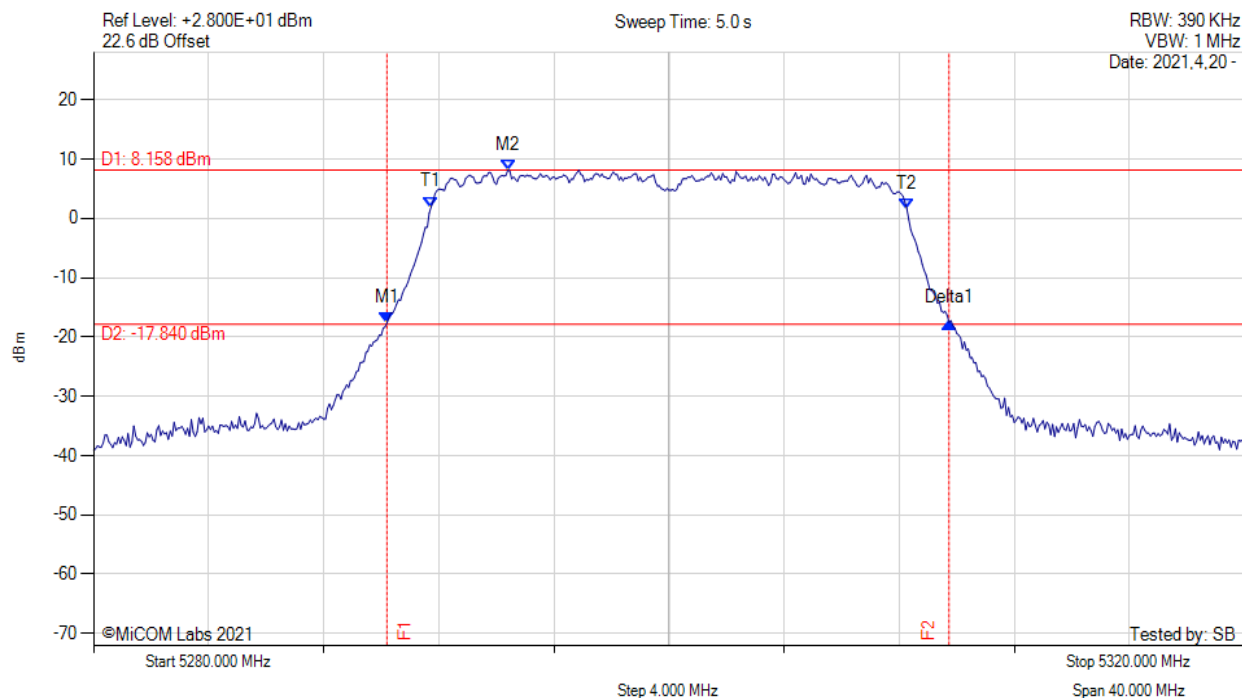
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5250.400 MHz : -16.119 dBm<br>M2 : 5255.670 MHz : 9.678 dBm<br>Delta1 : 19.200 MHz : 0.485 dB<br>T1 : 5251.800 MHz : 3.782 dBm<br>T2 : 5268.267 MHz : 2.656 dBm<br>OBW : 16.434 MHz | Measured 26 dB Bandwidth: 19.200 MHz<br>Measured 99% Bandwidth: 16.434 MHz |

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26 dB & 99% BANDWIDTH



Variant: 802.11a, Channel: 5300.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5290.200 MHz : -17.624 dBm<br>M2 : 5294.400 MHz : 8.158 dBm<br>Delta1 : 19.530 MHz : 0.115 dB<br>T1 : 5291.733 MHz : 1.914 dBm<br>T2 : 5308.267 MHz : 1.642 dBm<br>OBW : 16.513 MHz | Measured 26 dB Bandwidth: 19.530 MHz<br>Measured 99% Bandwidth: 16.513 MHz |

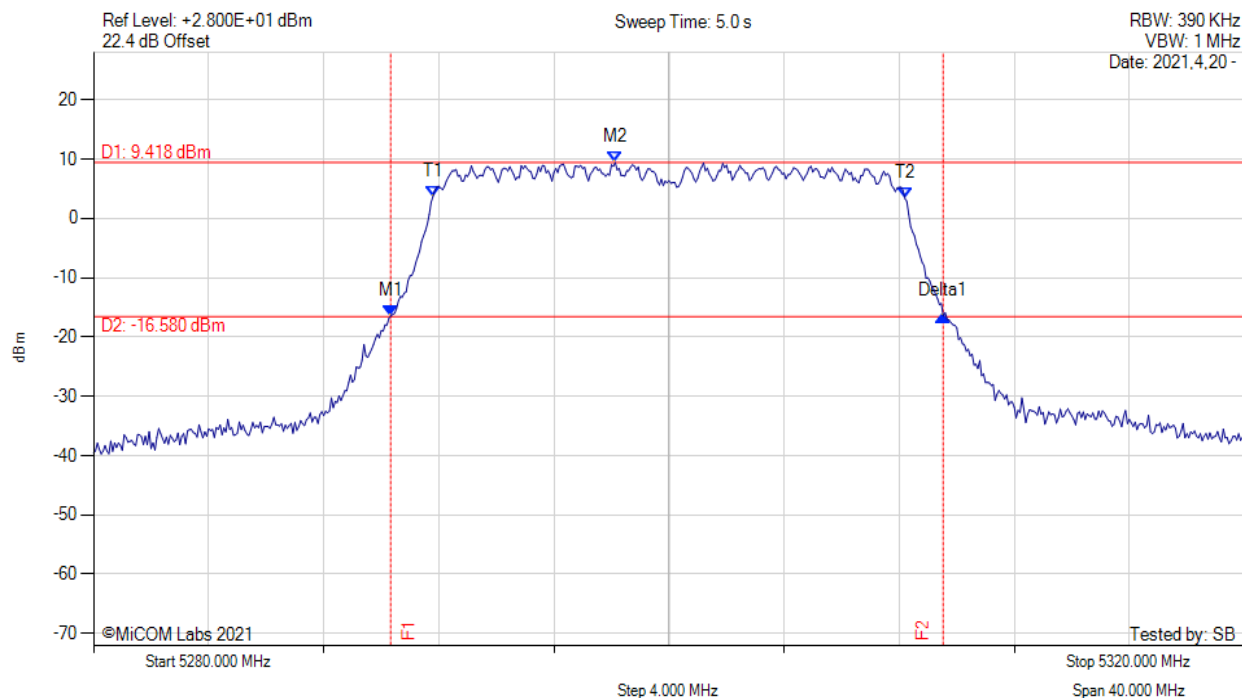
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26 dB & 99% BANDWIDTH



Variant: 802.11a, Channel: 5300.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



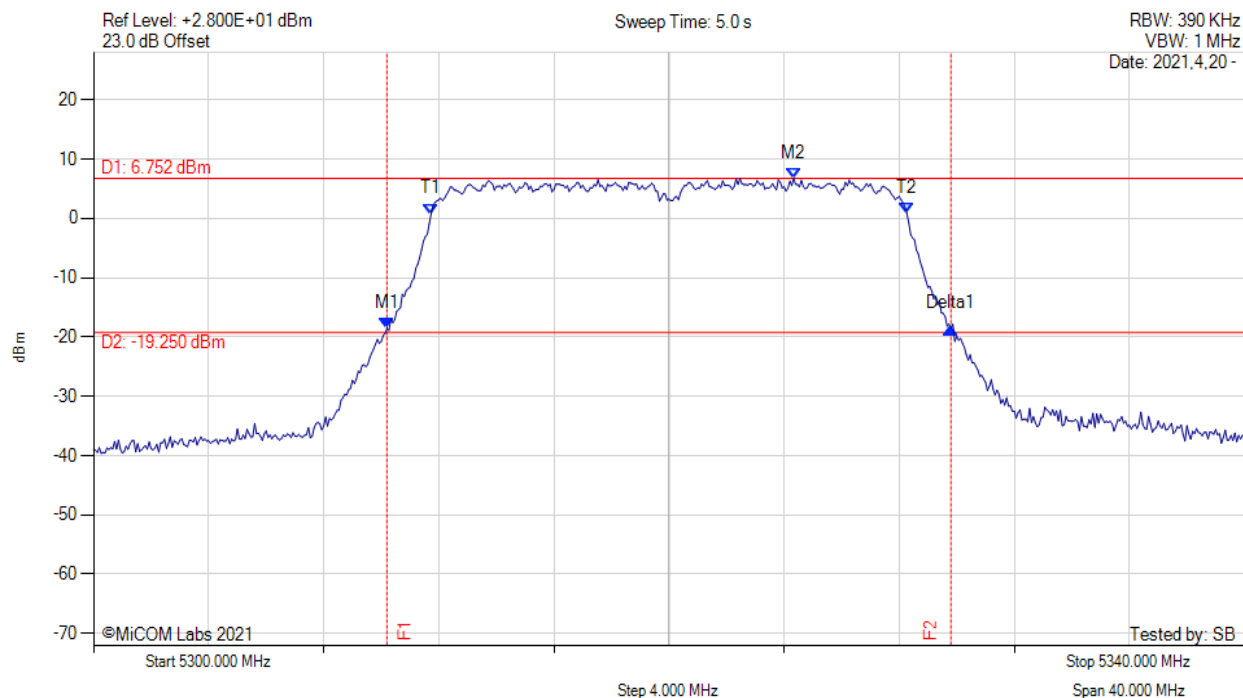
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5290.330 MHz : -16.422 dBm<br>M2 : 5298.130 MHz : 9.418 dBm<br>Delta1 : 19.200 MHz : -0.046 dB<br>T1 : 5291.800 MHz : 3.719 dBm<br>T2 : 5308.200 MHz : 3.349 dBm<br>OBW : 16.433 MHz | Measured 26 dB Bandwidth: 19.200 MHz<br>Measured 99% Bandwidth: 16.433 MHz |

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# 26 dB & 99% BANDWIDTH



Variant: 802.11a, Channel: 5320.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



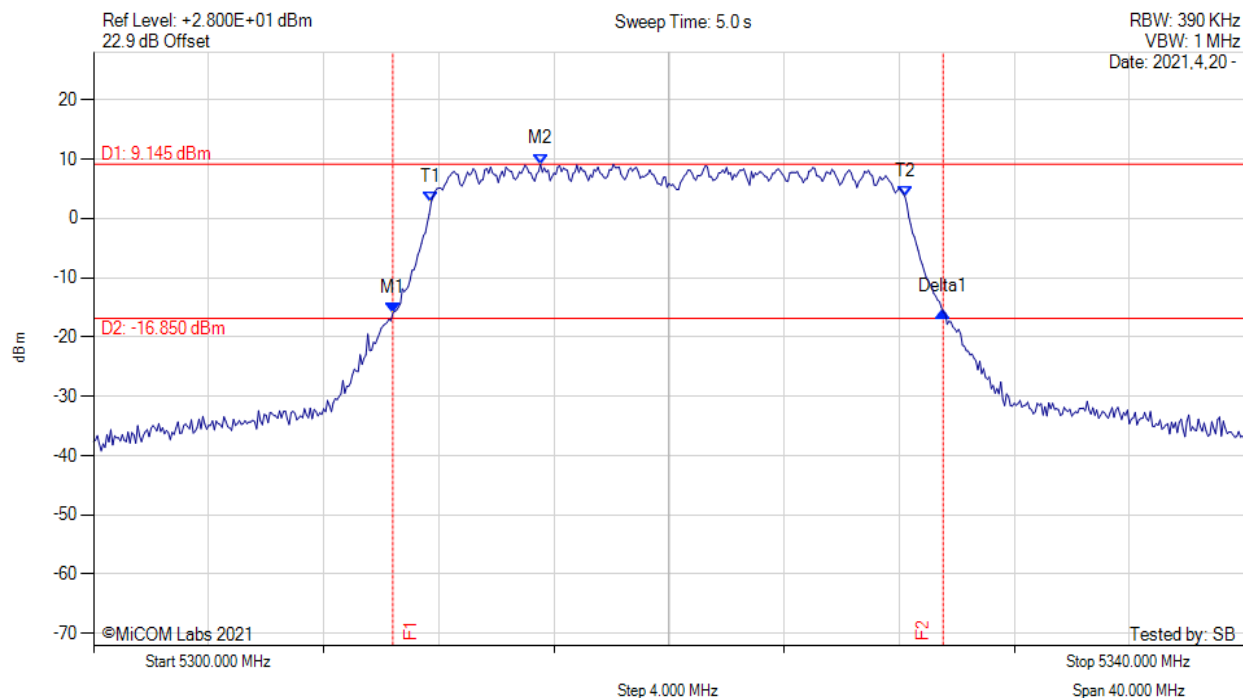
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5310.200 MHz : -18.517 dBm<br>M2 : 5324.330 MHz : 6.752 dBm<br>Delta1 : 19.600 MHz : -0.032 dB<br>T1 : 5311.733 MHz : 0.754 dBm<br>T2 : 5328.267 MHz : 0.829 dBm<br>OBW : 16.547 MHz | Measured 26 dB Bandwidth: 19.600 MHz<br>Measured 99% Bandwidth: 16.547 MHz |

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26 dB & 99% BANDWIDTH



Variant: 802.11a, Channel: 5320.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



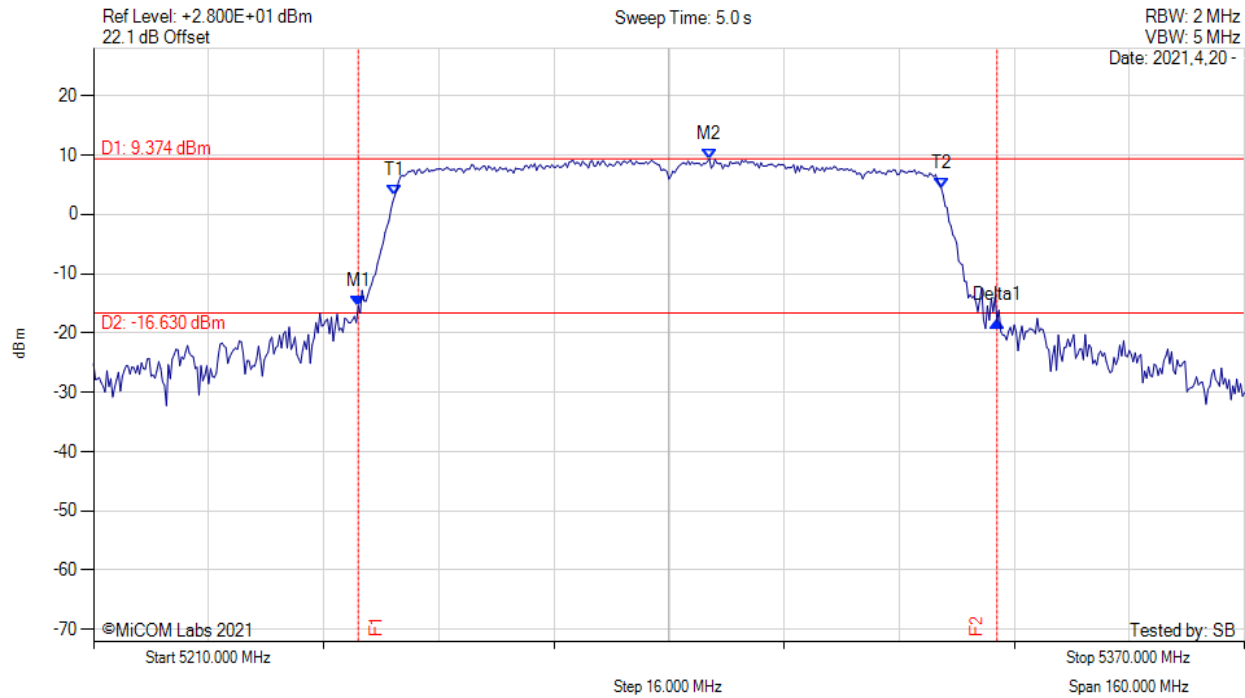
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5310.400 MHz : -16.015 dBm<br>M2 : 5315.530 MHz : 9.145 dBm<br>Delta1 : 19.130 MHz : 0.191 dB<br>T1 : 5311.733 MHz : 2.663 dBm<br>T2 : 5328.200 MHz : 3.684 dBm<br>OBW : 16.451 MHz | Measured 26 dB Bandwidth: 19.130 MHz<br>Measured 99% Bandwidth: 16.451 MHz |

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26 dB & 99% BANDWIDTH

Variant: 802.11ac-80, Channel: 5290.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



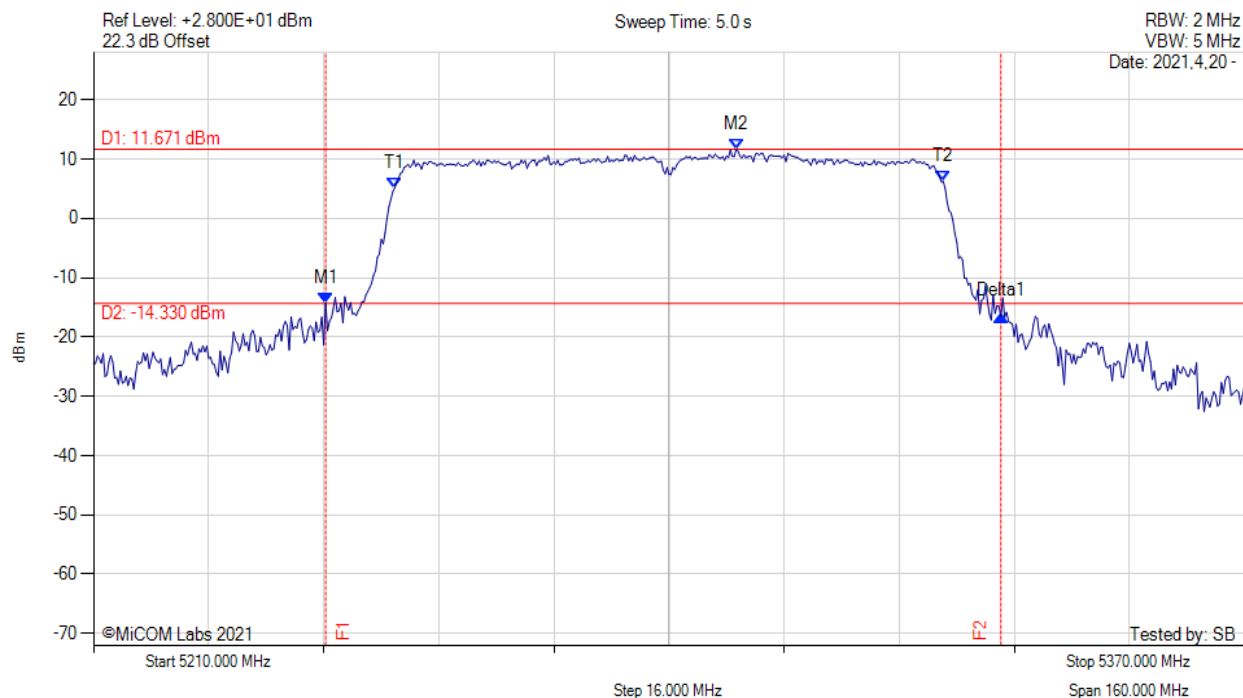
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5246.800 MHz : -15.449 dBm<br>M2 : 5295.600 MHz : 9.374 dBm<br>Delta1 : 88.800 MHz : -2.511 dB<br>T1 : 5251.867 MHz : 3.134 dBm<br>T2 : 5327.867 MHz : 4.392 dBm<br>OBW : 75.907 MHz | Measured 26 dB Bandwidth: 88.800 MHz<br>Measured 99% Bandwidth: 75.907 MHz |

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26 dB & 99% BANDWIDTH



Variant: 802.11ac-80, Channel: 5290.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



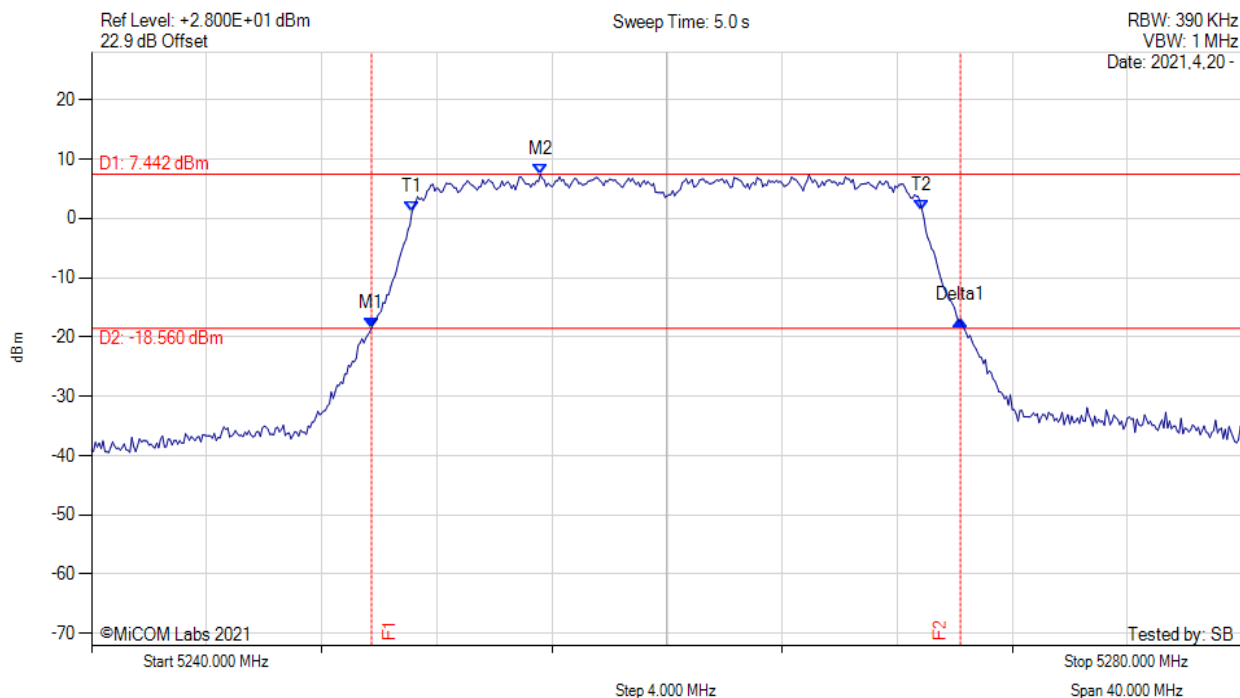
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5242.270 MHz : -14.299 dBm<br>M2 : 5299.330 MHz : 11.671 dBm<br>Delta1 : 93.870 MHz : -2.229 dB<br>T1 : 5251.867 MHz : 5.143 dBm<br>T2 : 5328.133 MHz : 6.217 dBm<br>OBW : 76.159 MHz | Measured 26 dB Bandwidth: 93.870 MHz<br>Measured 99% Bandwidth: 76.159 MHz |

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# 26 dB & 99% BANDWIDTH



Variant: 802.11n HT-20, Channel: 5260.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



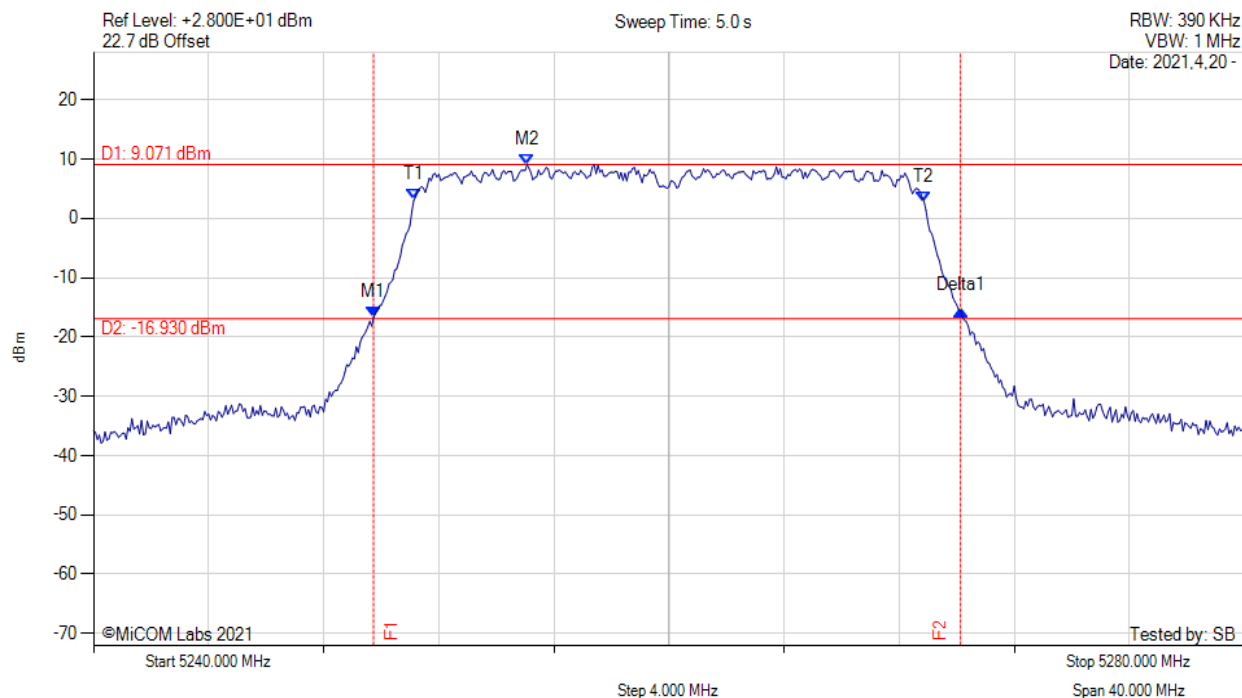
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5249.730 MHz : -18.469 dBm<br>M2 : 5255.600 MHz : 7.442 dBm<br>Delta1 : 20.470 MHz : 1.262 dB<br>T1 : 5251.133 MHz : 1.050 dBm<br>T2 : 5268.867 MHz : 1.404 dBm<br>OBW : 17.663 MHz | Measured 26 dB Bandwidth: 20.470 MHz<br>Measured 99% Bandwidth: 17.663 MHz |

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26 dB & 99% BANDWIDTH

Variant: 802.11n HT-20, Channel: 5260.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



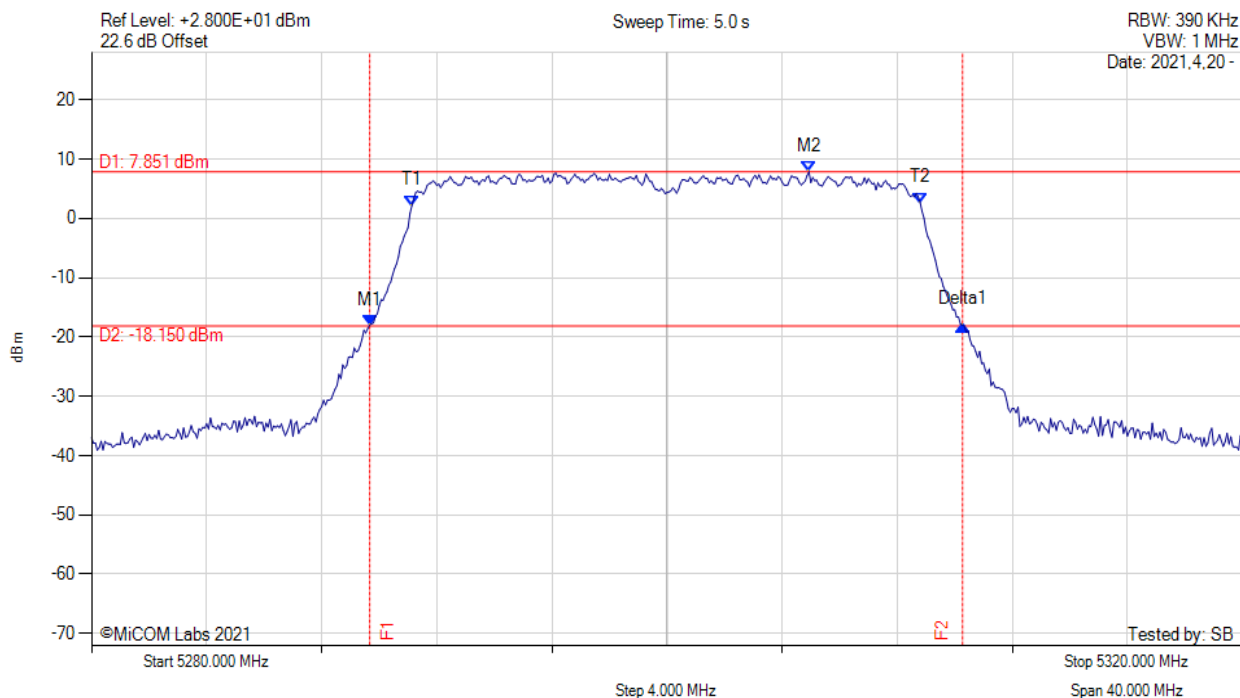
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5249.730 MHz : -16.733 dBm<br>M2 : 5255.070 MHz : 9.071 dBm<br>Delta1 : 20.400 MHz : 1.178 dB<br>T1 : 5251.133 MHz : 3.103 dBm<br>T2 : 5268.867 MHz : 2.782 dBm<br>OBW : 17.661 MHz | Measured 26 dB Bandwidth: 20.400 MHz<br>Measured 99% Bandwidth: 17.661 MHz |

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26 dB & 99% BANDWIDTH

Variant: 802.11n HT-20, Channel: 5300.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5289.670 MHz : -17.974 dBm<br>M2 : 5304.930 MHz : 7.851 dBm<br>Delta1 : 20.600 MHz : 0.031 dB<br>T1 : 5291.133 MHz : 2.142 dBm<br>T2 : 5308.800 MHz : 2.603 dBm<br>OBW : 17.672 MHz | Measured 26 dB Bandwidth: 20.600 MHz<br>Measured 99% Bandwidth: 17.672 MHz |

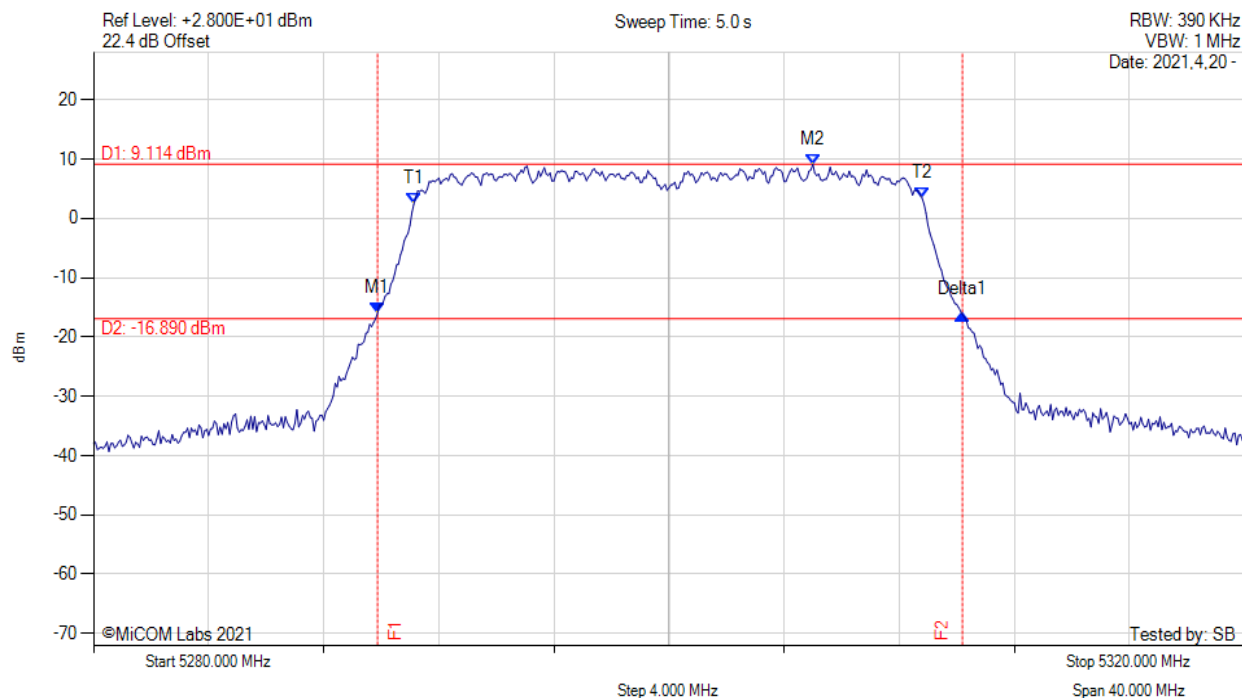
[back to matrix](#)





26 dB & 99% BANDWIDTH

Variant: 802.11n HT-20, Channel: 5300.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



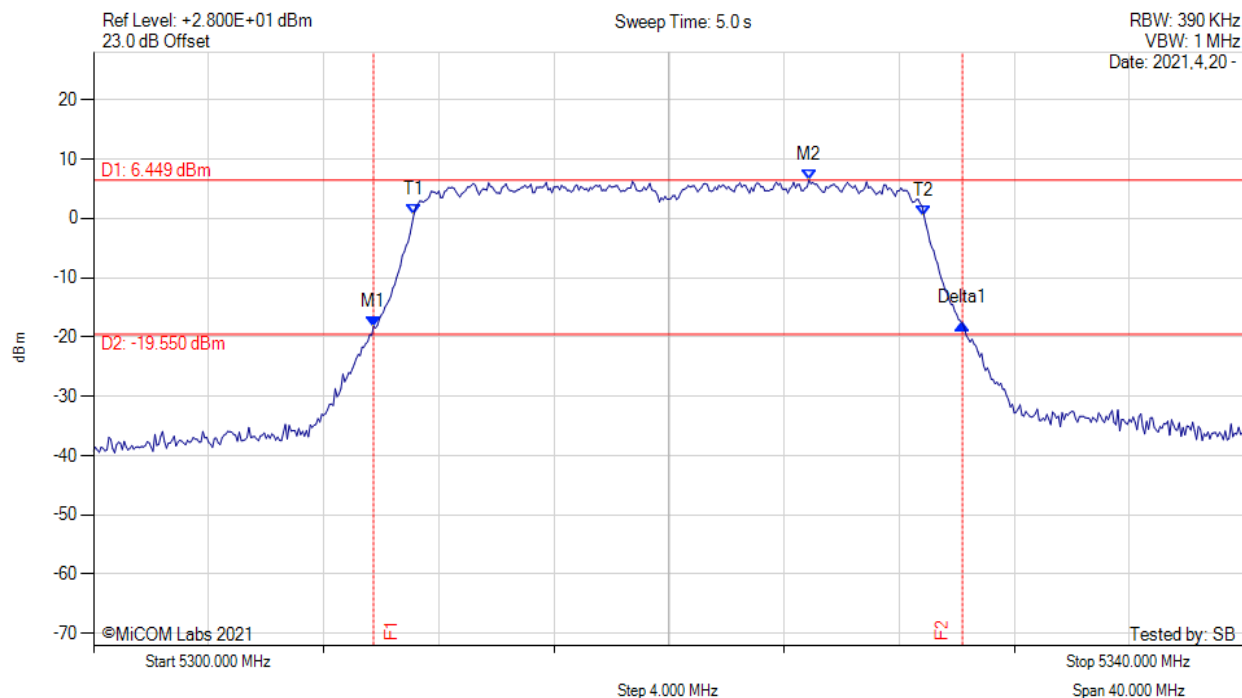
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5289.870 MHz : -16.040 dBm<br>M2 : 5305.000 MHz : 9.114 dBm<br>Delta1 : 20.330 MHz : -0.135 dB<br>T1 : 5291.133 MHz : 2.417 dBm<br>T2 : 5308.800 MHz : 3.369 dBm<br>OBW : 17.644 MHz | Measured 26 dB Bandwidth: 20.330 MHz<br>Measured 99% Bandwidth: 17.644 MHz |

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# 26 dB & 99% BANDWIDTH



Variant: 802.11n HT-20, Channel: 5320.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



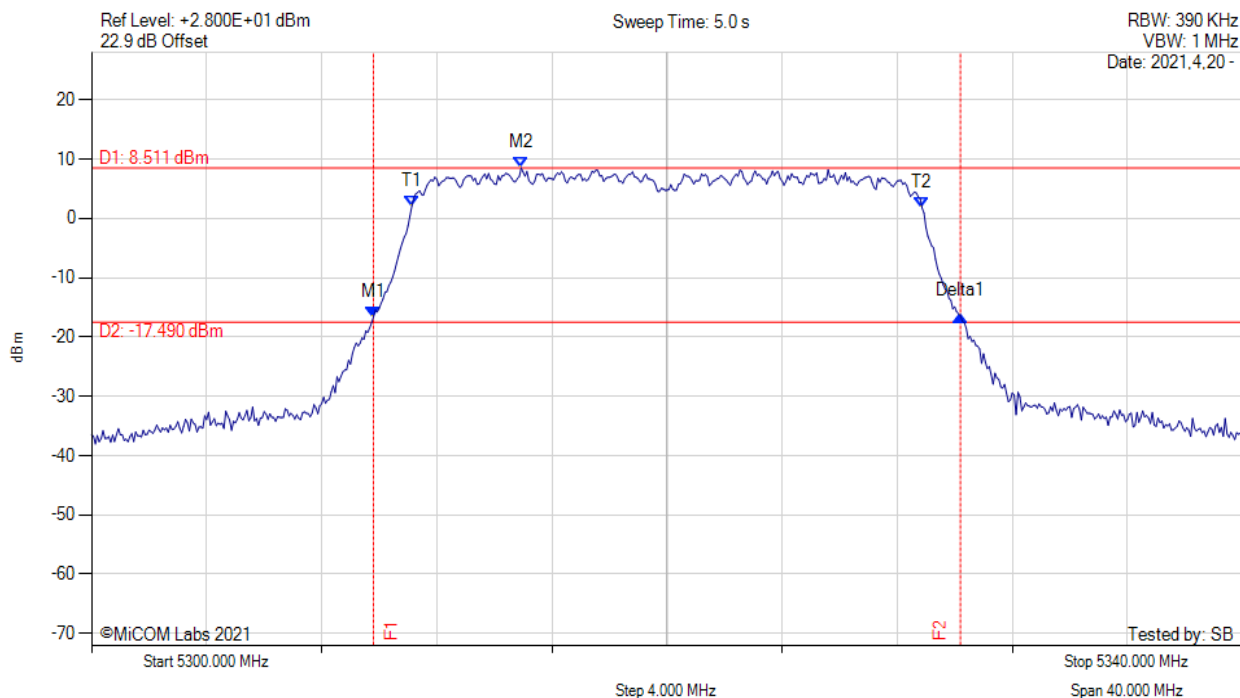
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5309.730 MHz : -18.233 dBm<br>M2 : 5324.870 MHz : 6.449 dBm<br>Delta1 : 20.470 MHz : 0.520 dB<br>T1 : 5311.133 MHz : 0.654 dBm<br>T2 : 5328.867 MHz : 0.383 dBm<br>OBW : 17.697 MHz | Measured 26 dB Bandwidth: 20.470 MHz<br>Measured 99% Bandwidth: 17.697 MHz |

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26 dB & 99% BANDWIDTH

Variant: 802.11n HT-20, Channel: 5320.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



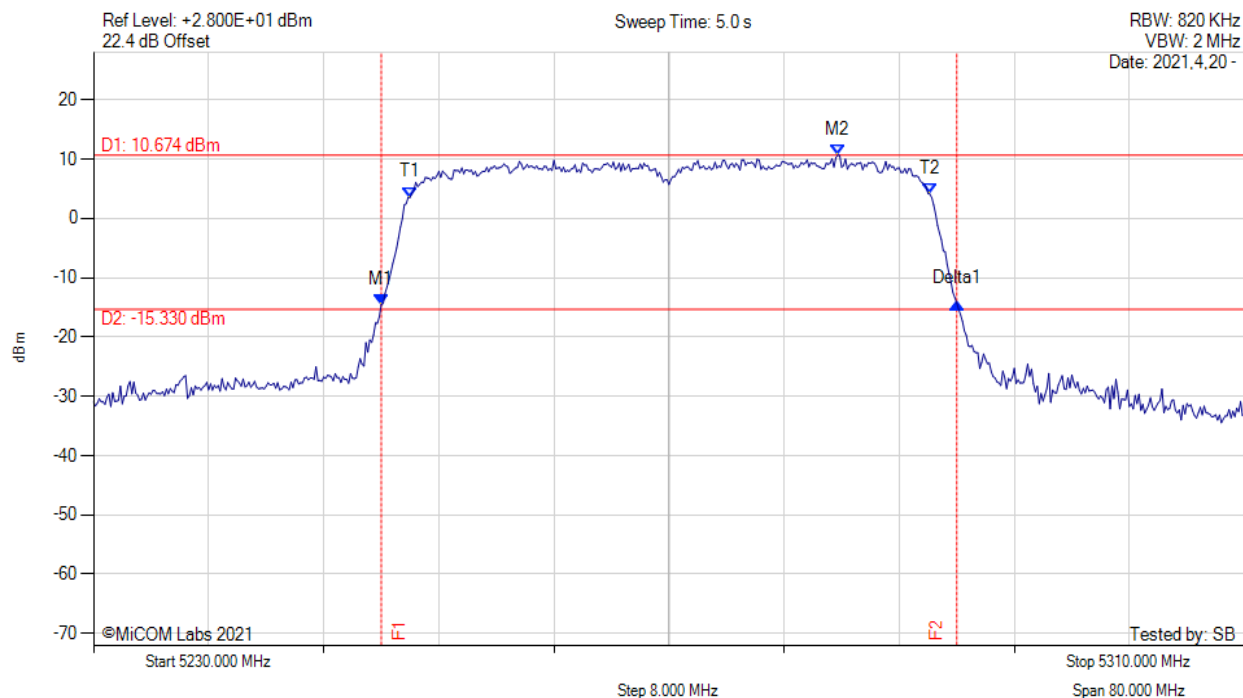
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results   |
|--|--|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5309.800 MHz : -16.595 dBm<br>M2 : 5314.930 MHz : 8.511 dBm<br>Delta1 : 20.400 MHz : 0.195 dB<br>T1 : 5311.133 MHz : 2.078 dBm<br>T2 : 5328.867 MHz : 1.765 dBm<br>OBW : 17.657 MHz | Measured 26 dB Bandwidth: 20.400 MHz<br>Measured 99% Bandwidth: 17.657 MHz |

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26 dB & 99% BANDWIDTH

Variant: 802.11n HT-40, Channel: 5270.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



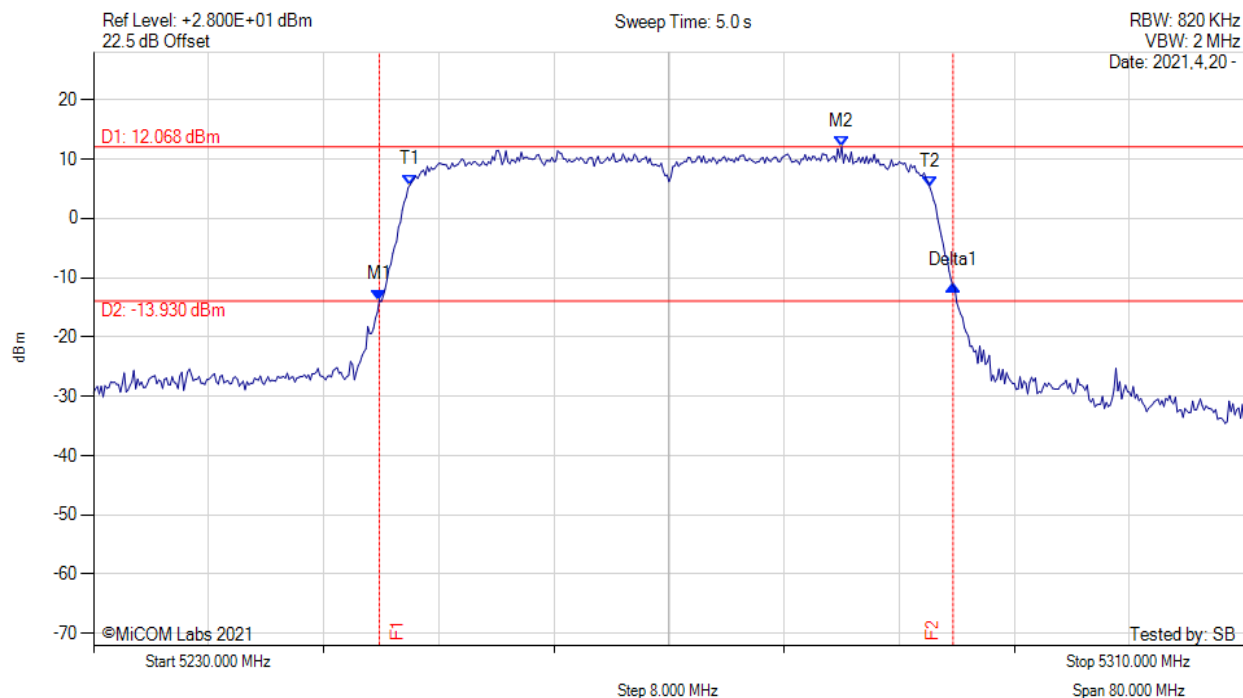
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5250.000 MHz : -14.527 dBm<br>M2 : 5281.730 MHz : 10.674 dBm<br>Delta1 : 40.000 MHz : 0.281 dB<br>T1 : 5252.000 MHz : 3.558 dBm<br>T2 : 5288.133 MHz : 4.097 dBm<br>OBW : 36.120 MHz | Measured 26 dB Bandwidth: 40.000 MHz<br>Measured 99% Bandwidth: 36.120 MHz |

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26 dB & 99% BANDWIDTH



Variant: 802.11n HT-40, Channel: 5270.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



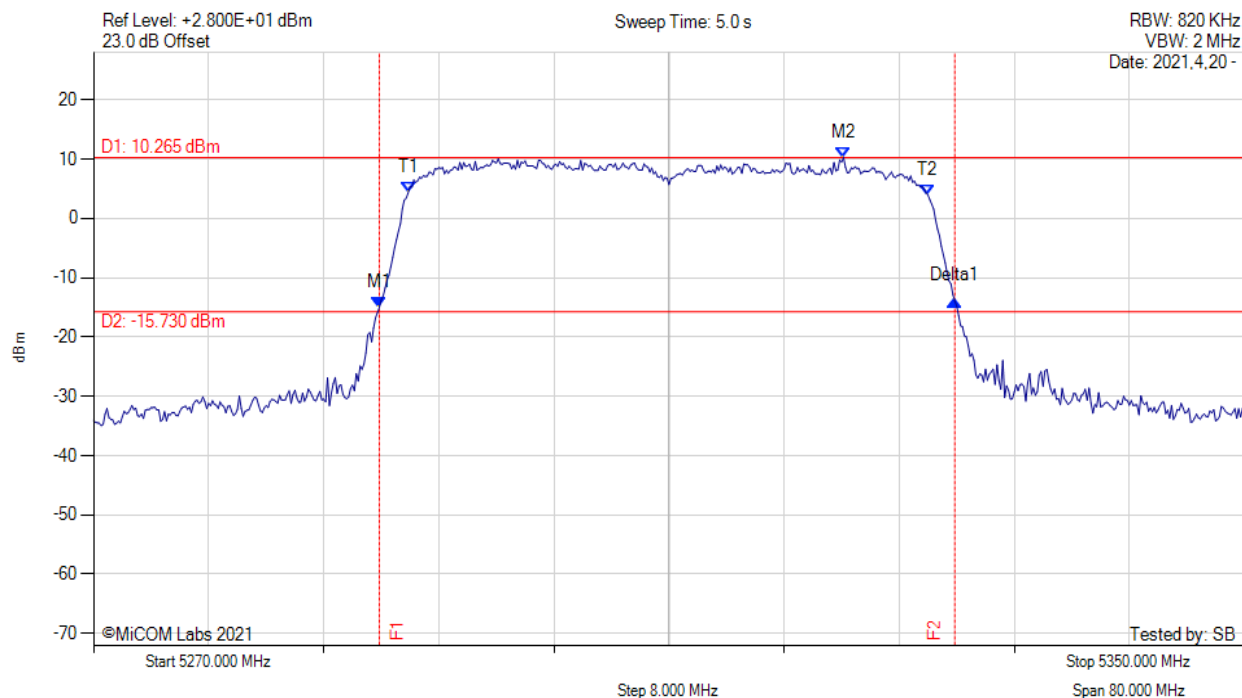
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5249.870 MHz : -13.748 dBm<br>M2 : 5282.000 MHz : 12.068 dBm<br>Delta1 : 39.870 MHz : 2.404 dB<br>T1 : 5252.000 MHz : 5.648 dBm<br>T2 : 5288.133 MHz : 5.214 dBm<br>OBW : 36.099 MHz | Measured 26 dB Bandwidth: 39.870 MHz<br>Measured 99% Bandwidth: 36.099 MHz |

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26 dB & 99% BANDWIDTH

Variant: 802.11n HT-40, Channel: 5310.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



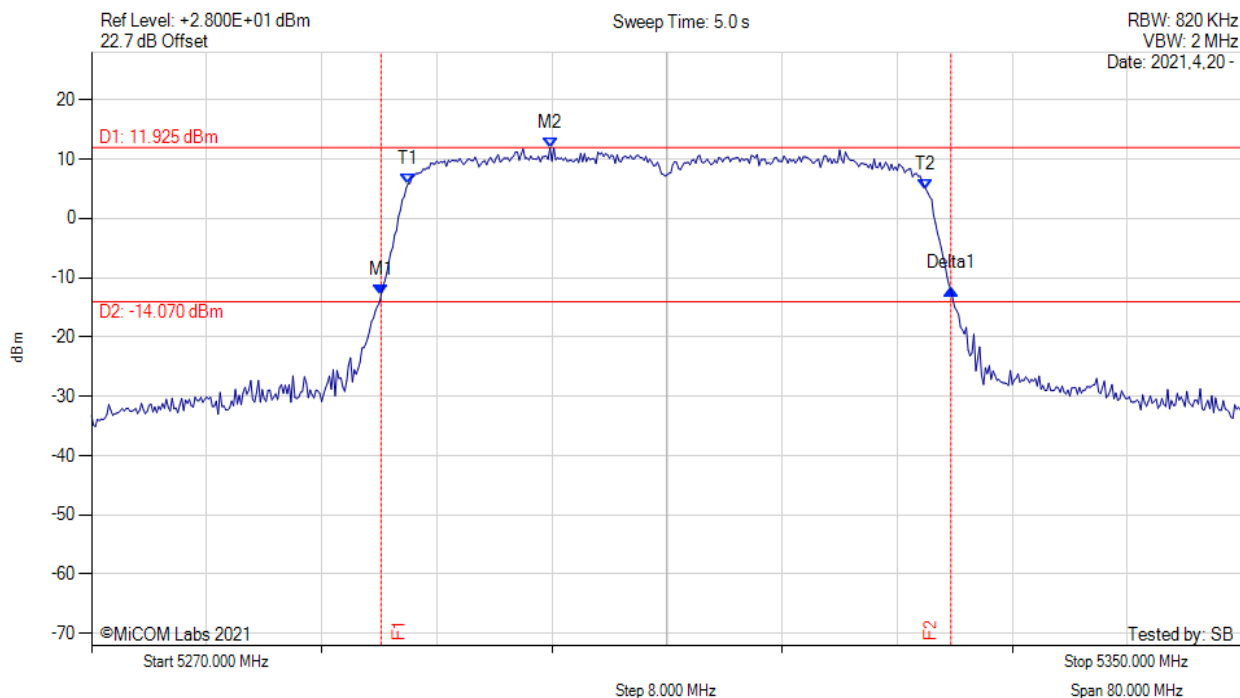
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5289.870 MHz : -15.039 dBm<br>M2 : 5322.130 MHz : 10.265 dBm<br>Delta1 : 40.000 MHz : 1.089 dB<br>T1 : 5291.867 MHz : 4.275 dBm<br>T2 : 5328.000 MHz : 3.942 dBm<br>OBW : 36.171 MHz | Measured 26 dB Bandwidth: 40.000 MHz<br>Measured 99% Bandwidth: 36.171 MHz |

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26 dB & 99% BANDWIDTH



Variant: 802.11n HT-40, Channel: 5310.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results   |
|--|---|--|
| Detector = POS<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAXH | M1 : 5290.130 MHz : -12.881 dBm<br>M2 : 5301.870 MHz : 11.925 dBm<br>Delta1 : 39.600 MHz : 0.995 dB<br>T1 : 5292.000 MHz : 5.864 dBm<br>T2 : 5328.000 MHz : 4.932 dBm<br>OBW : 36.020 MHz | Measured 26 dB Bandwidth: 39.600 MHz<br>Measured 99% Bandwidth: 36.020 MHz |

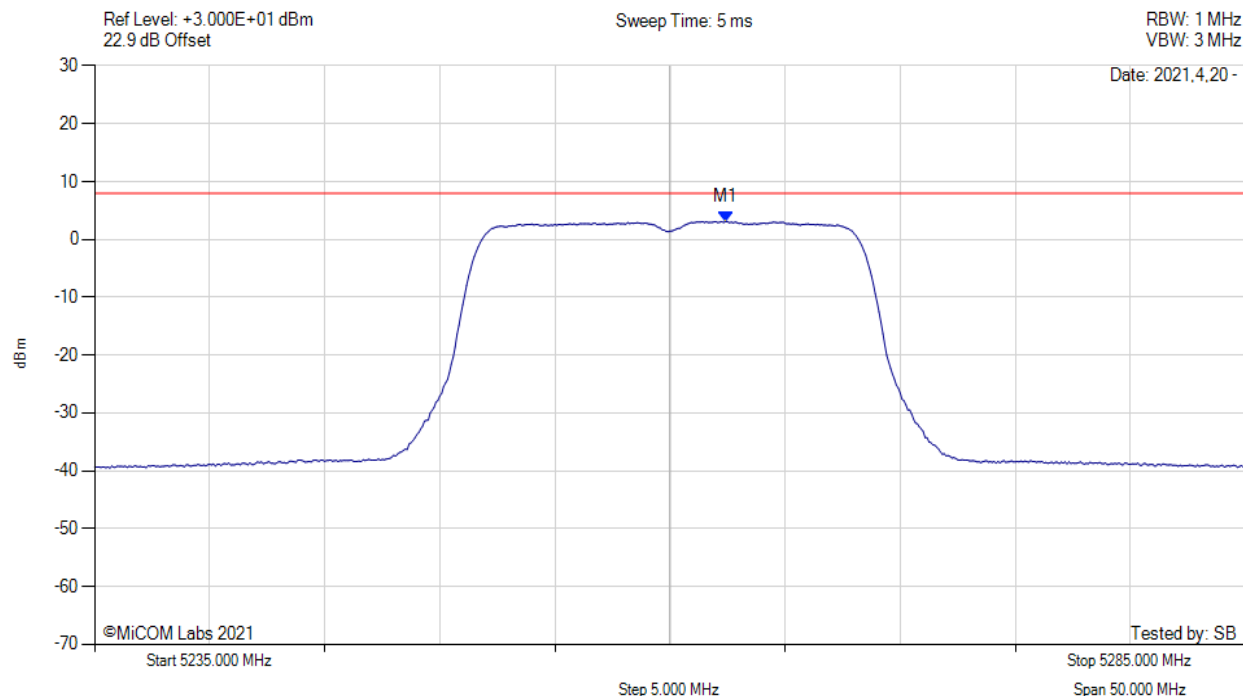
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## A.2. Power Spectral Density



### POWER SPECTRAL DENSITY

Variant: 802.11a, Channel: 5260.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5262.420 MHz : 3.111 dBm | Limit: ≤ 7.990 dBm |

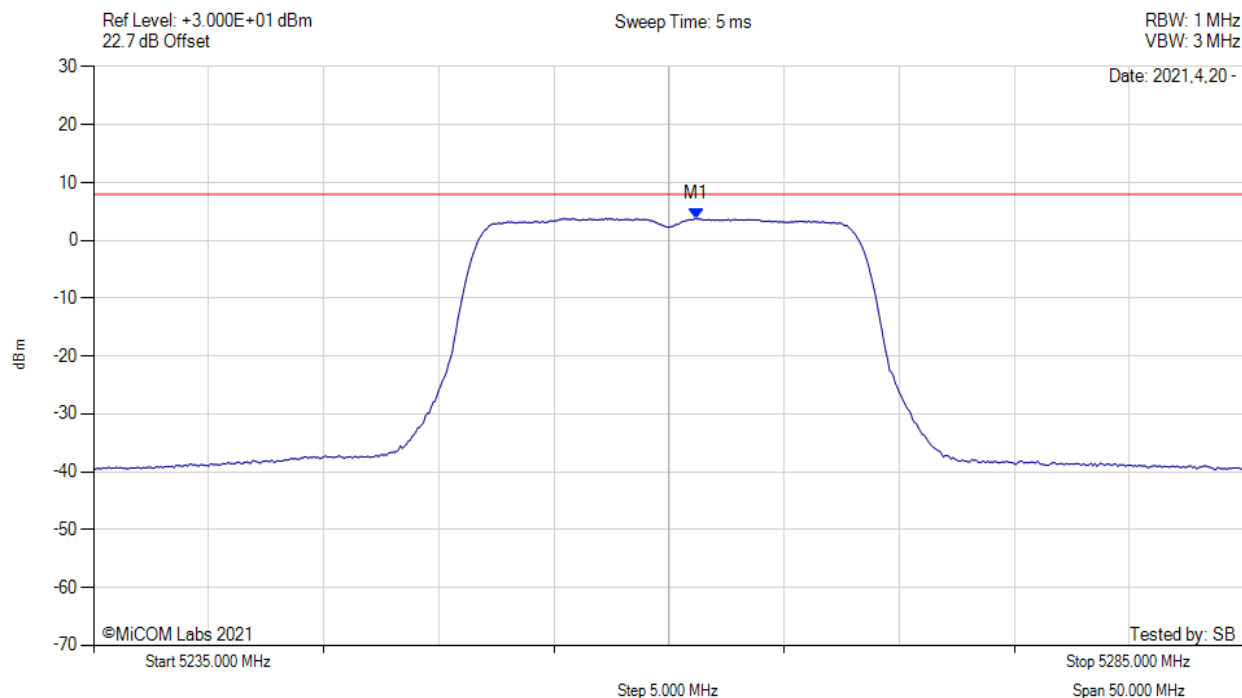
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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5260.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



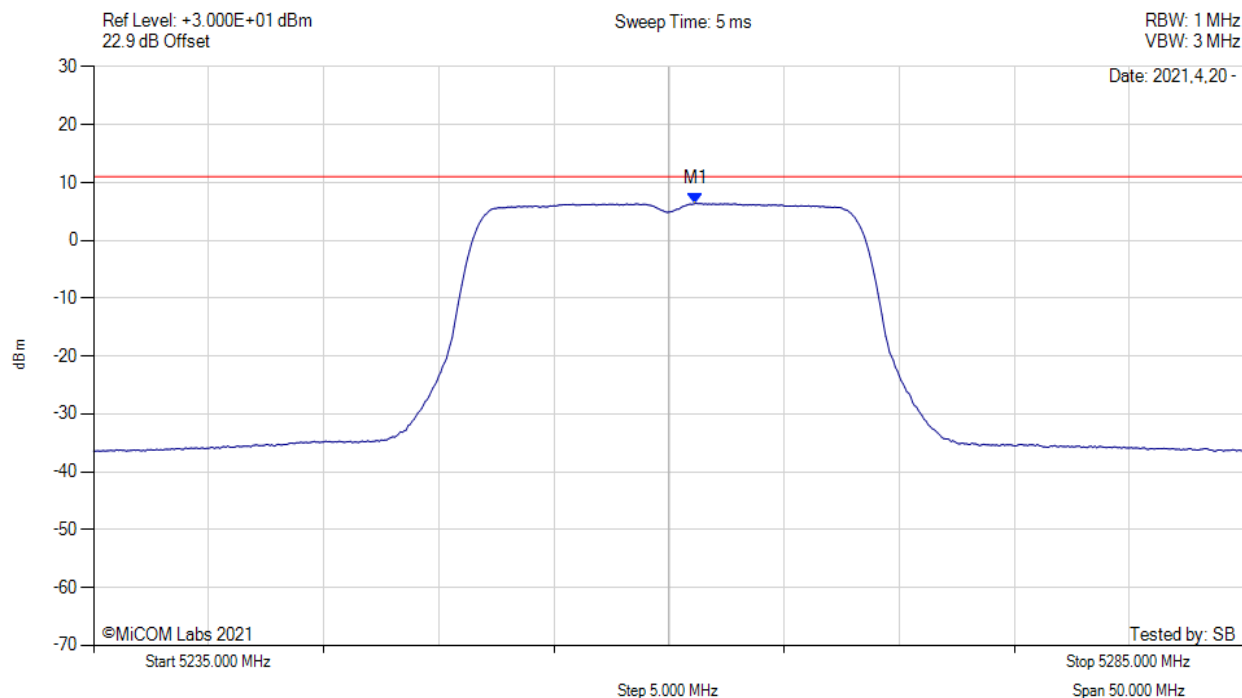
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5261.170 MHz : 3.825 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5260.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



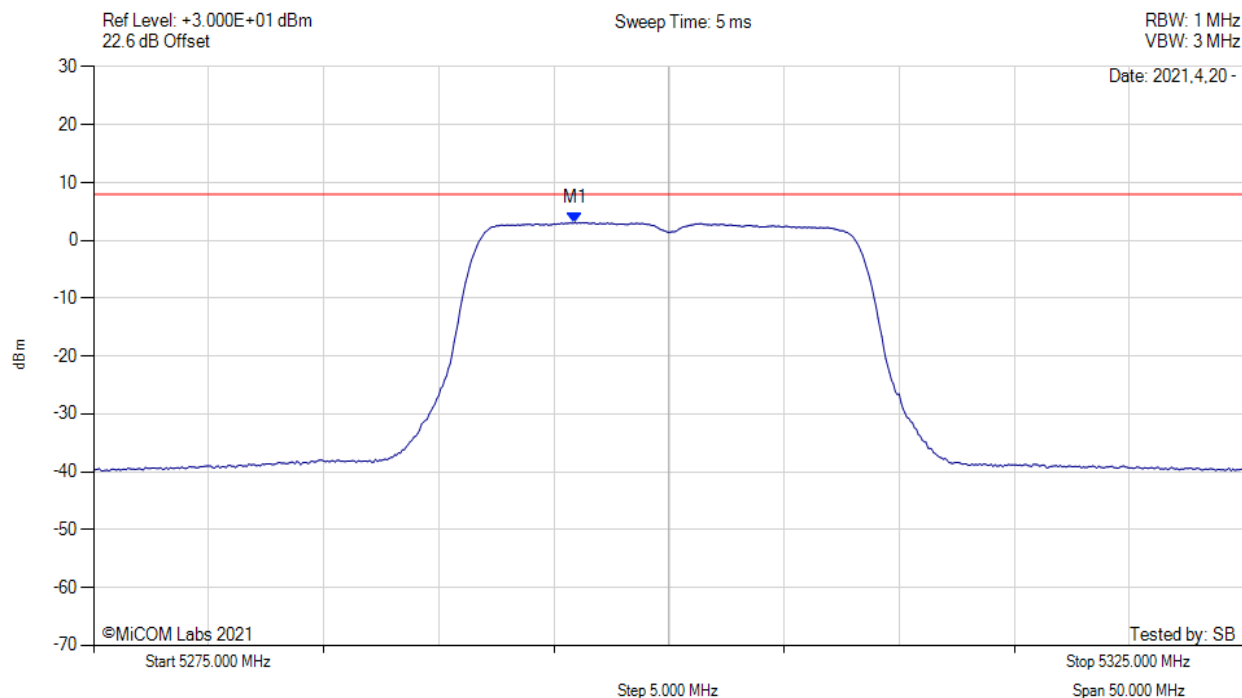
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5261.200 MHz : 6.452 dBm<br>M1 + DCCF : 5261.200 MHz : 6.496 dBm<br>Duty Cycle Correction Factor : +0.04 dB | Limit: $\leq 11.0$ dBm<br>Margin: -4.5 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5300.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



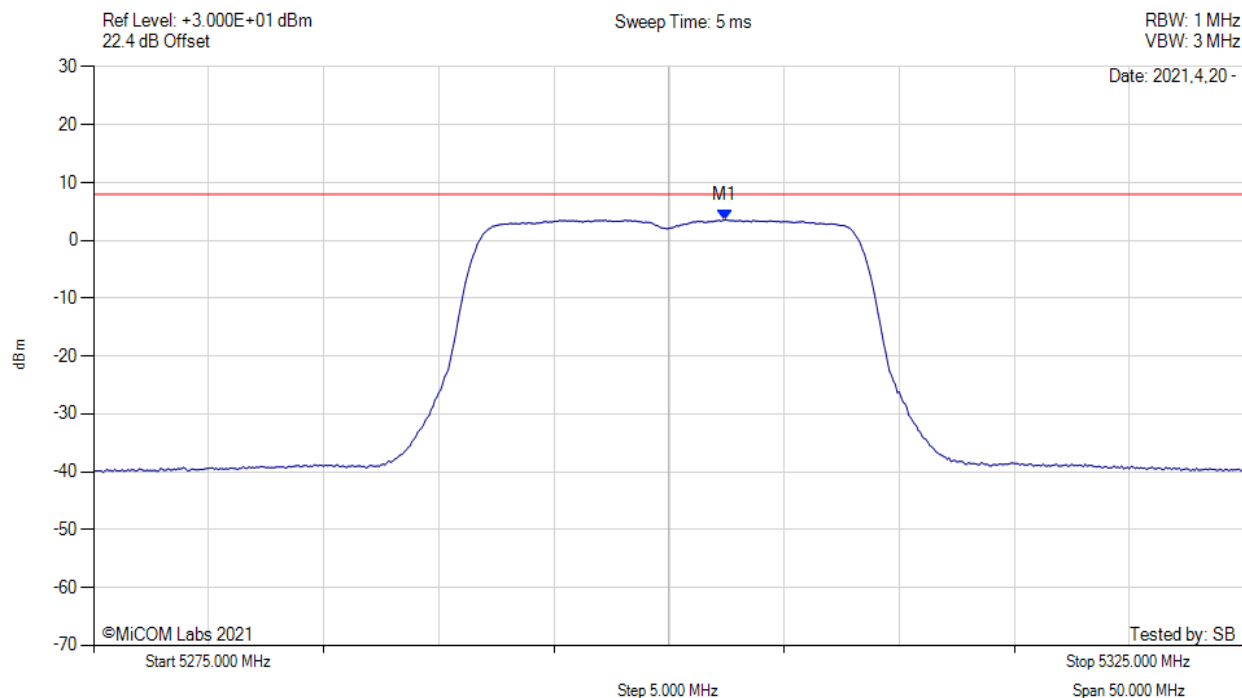
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5295.920 MHz : 3.081 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5300.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



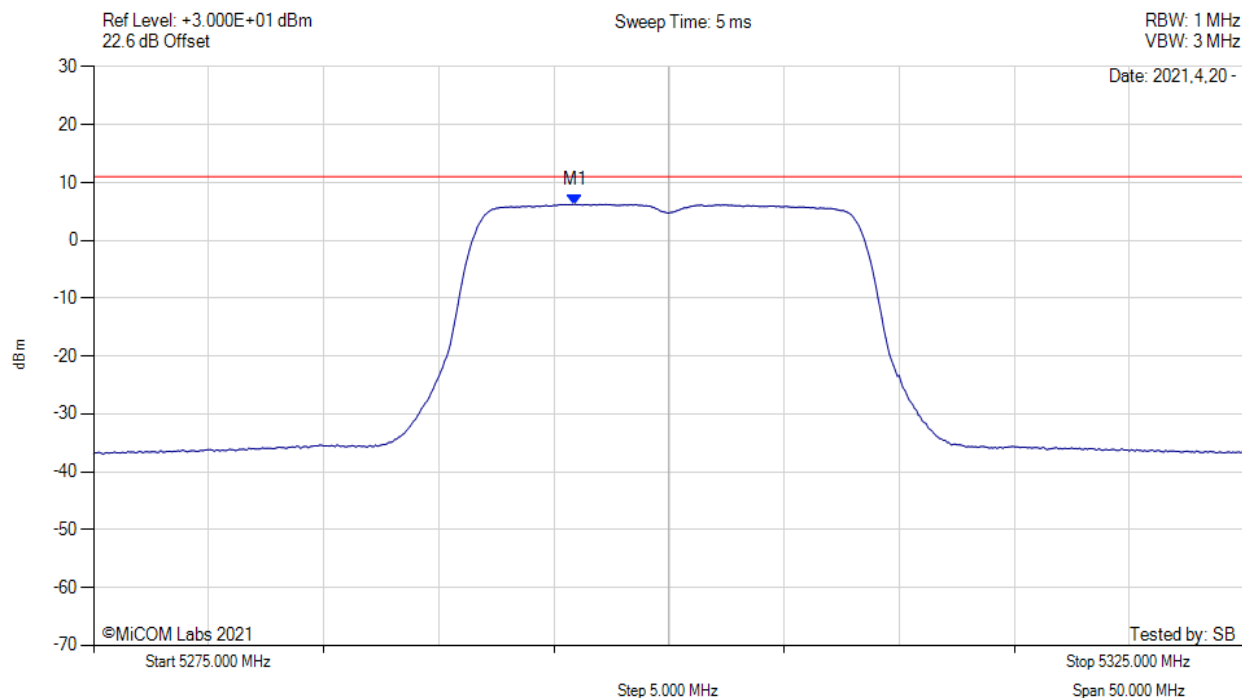
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results                   |
|--|-------------------------------|--------------------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5302.420 MHz : 3.533 dBm | Channel Frequency: 5300.00 MHz |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5300.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



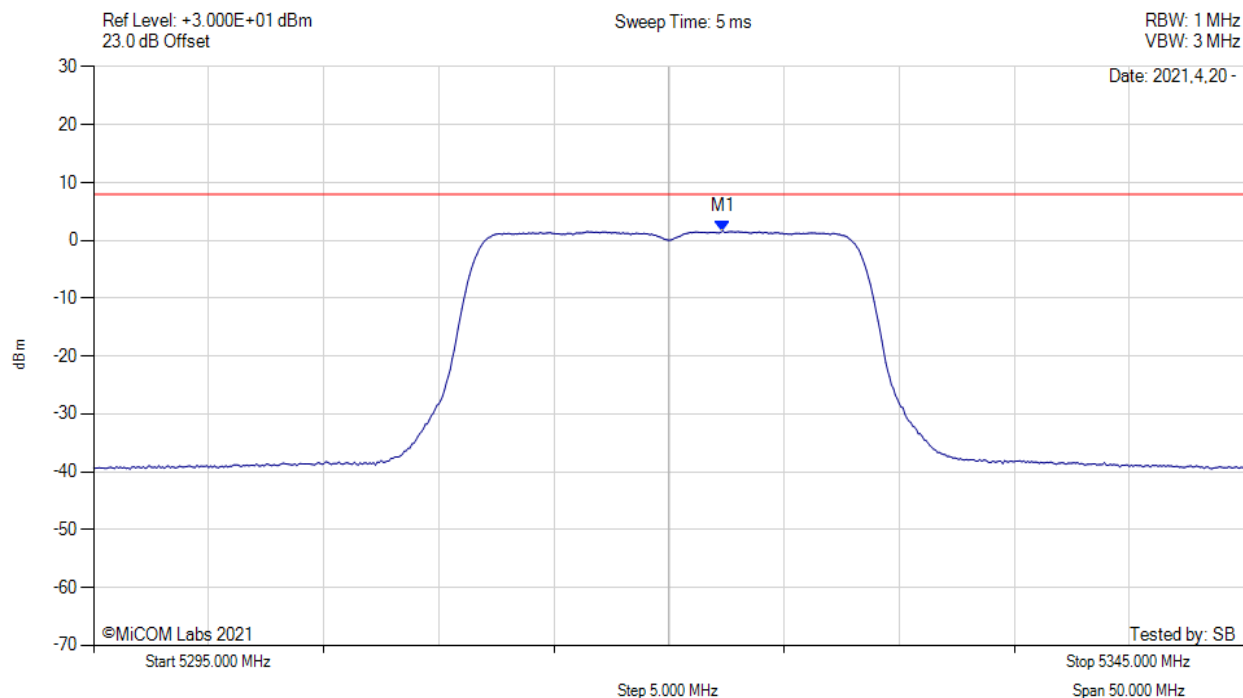
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5295.900 MHz : 6.223 dBm<br>M1 + DCCF : 5295.900 MHz : 6.267 dBm<br>Duty Cycle Correction Factor : +0.04 dB | Limit: $\leq 11.0$ dBm<br>Margin: -4.7 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5320.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



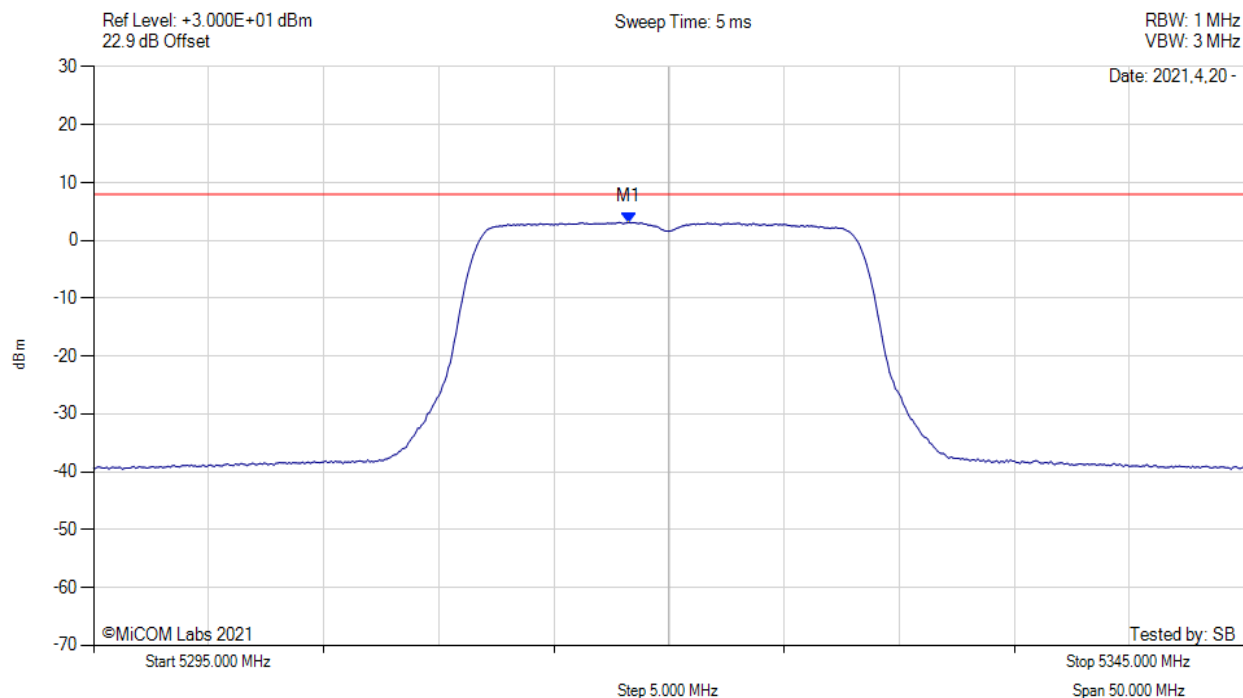
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5322.330 MHz : 1.646 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5320.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



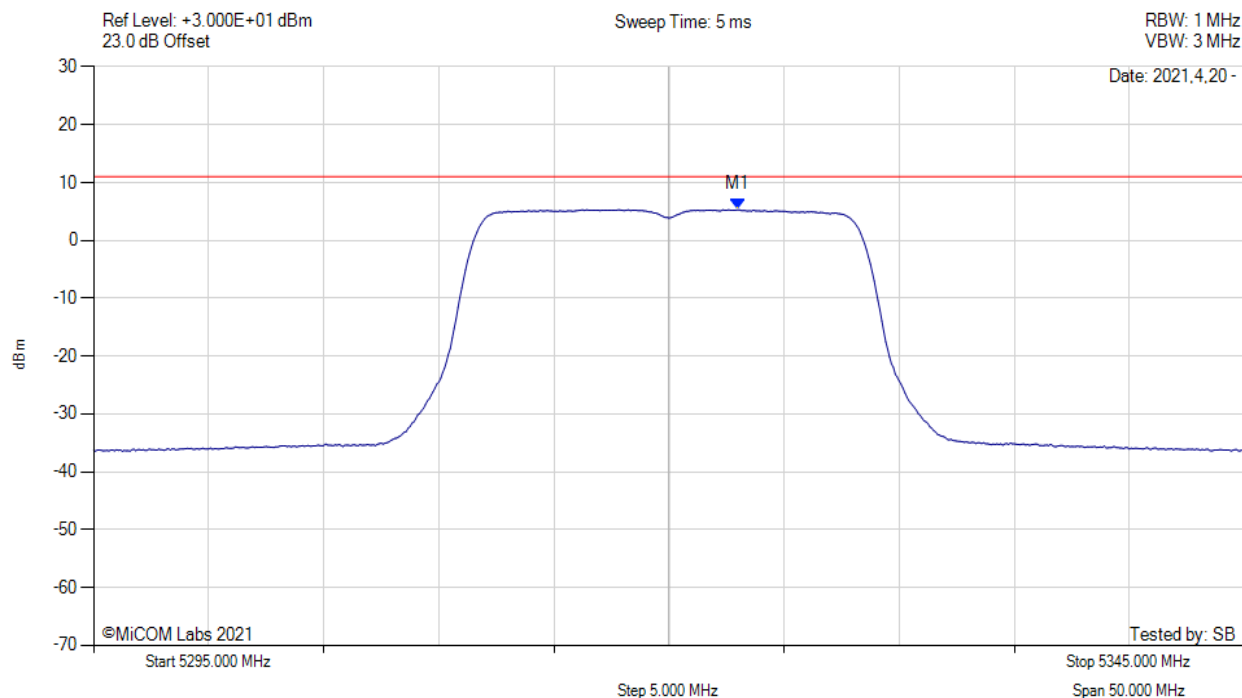
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5318.250 MHz : 3.121 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11a, Channel: 5320.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5323.000 MHz : 5.304 dBm<br>M1 + DCCF : 5323.000 MHz : 5.348 dBm<br>Duty Cycle Correction Factor : +0.04 dB | Limit: $\leq 11.0$ dBm<br>Margin: -5.7 dB |

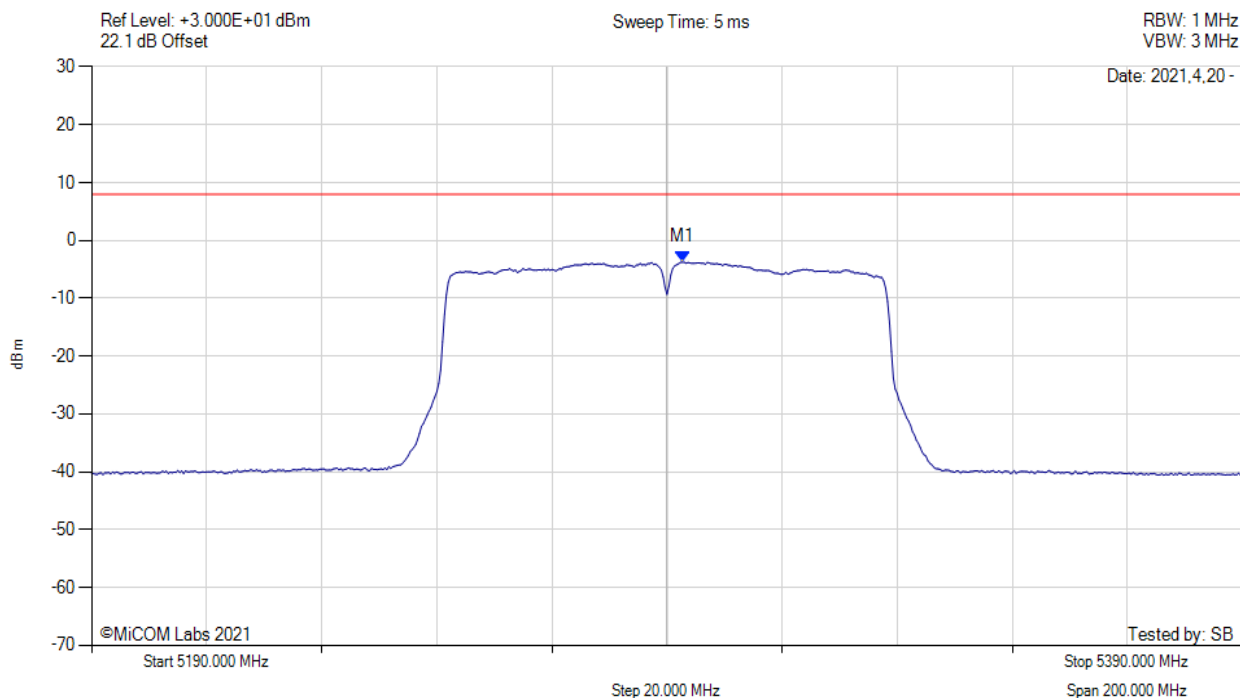
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# POWER SPECTRAL DENSITY



Variant: 802.11ac-80, Channel: 5290.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



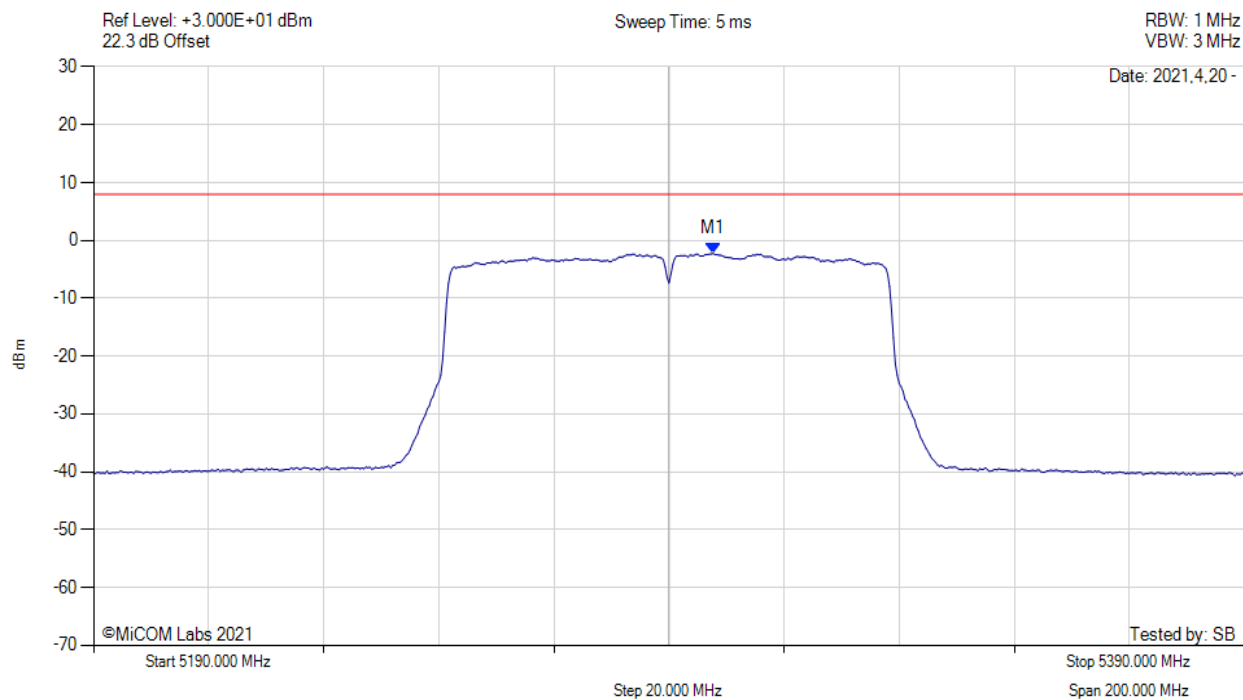
| Analyzer Setup   | Marker:Frequency:Amplitude     | Test Results       |
|--|--------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5292.700 MHz : -3.727 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11ac-80, Channel: 5290.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



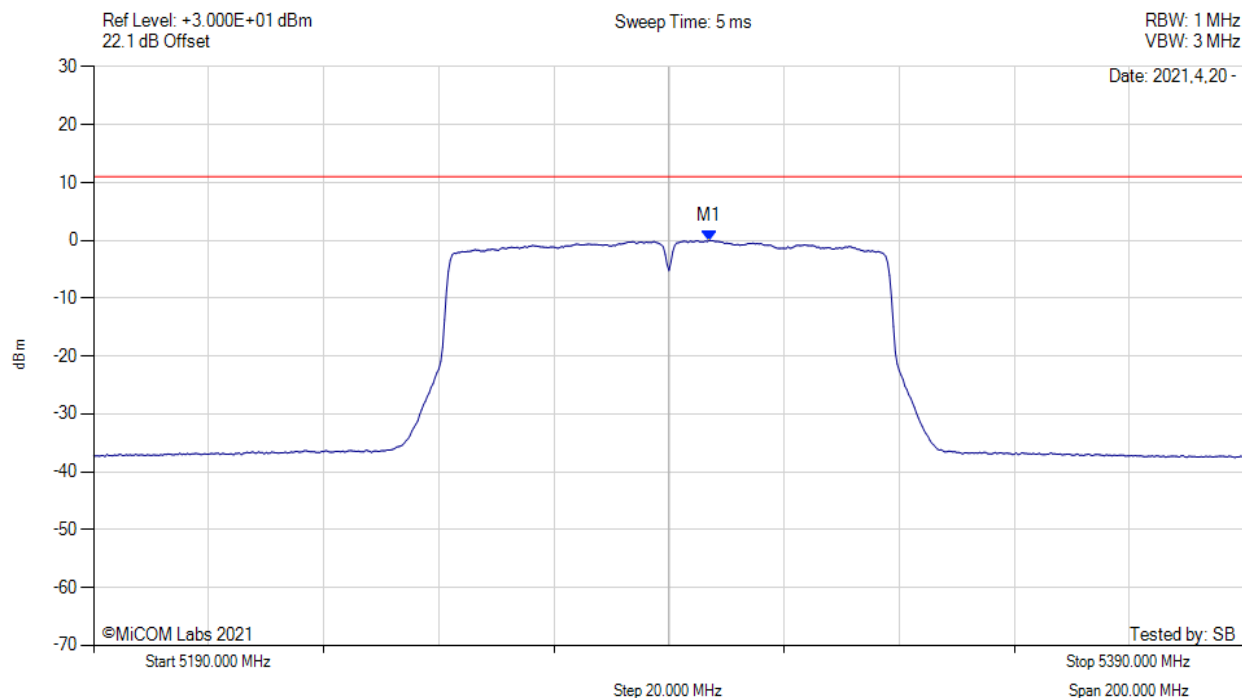
| Analyzer Setup   | Marker:Frequency:Amplitude     | Test Results       |
|--|--------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5297.700 MHz : -2.255 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11ac-80, Channel: 5290.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



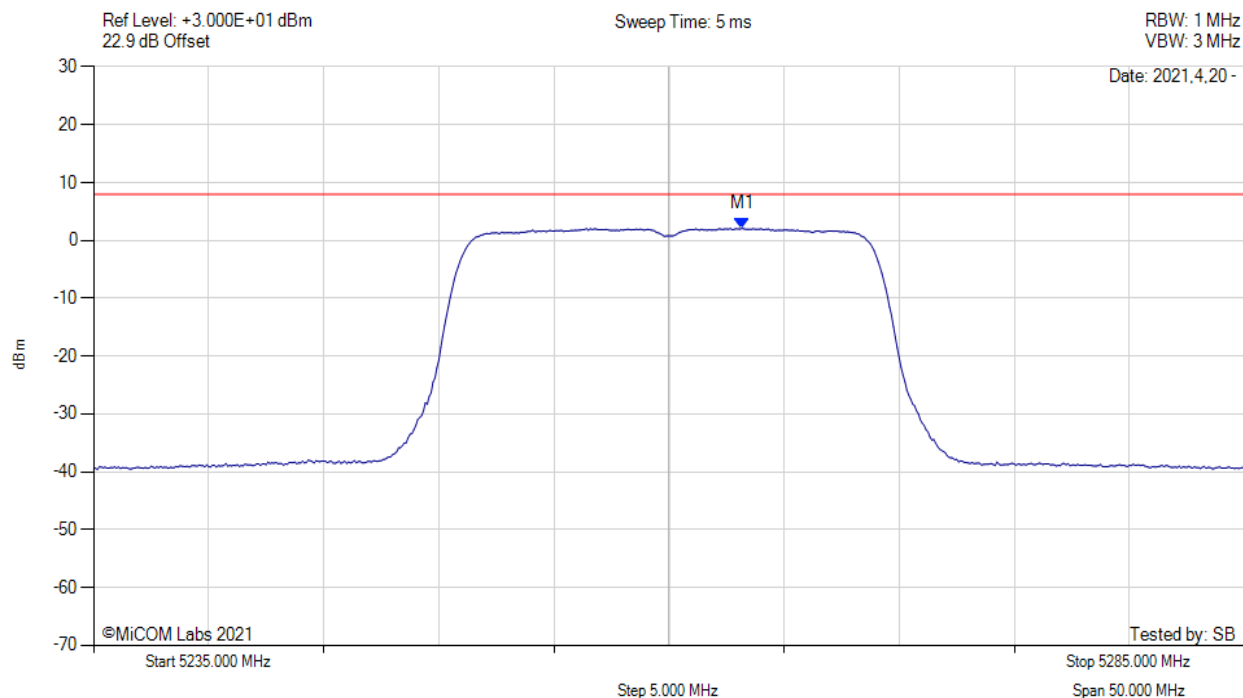
| Analyzer Setup   | Marker:Frequency:Amplitude  | Test Results                               |
|--|---|--|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5297.000 MHz : -0.010 dBm<br>M1 + DCCF : 5297.000 MHz : 0.852 dBm<br>Duty Cycle Correction Factor : +0.86 dB | Limit: $\leq 11.0$ dBm<br>Margin: -10.2 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5260.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



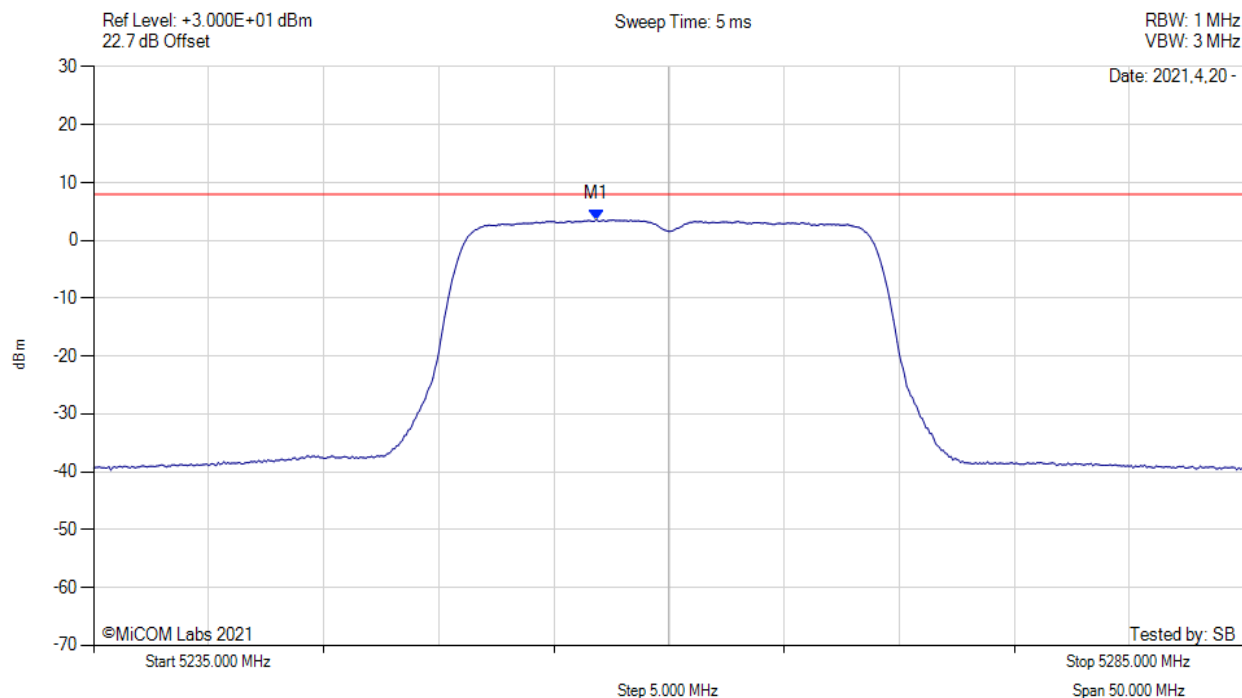
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5263.170 MHz : 2.084 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5260.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



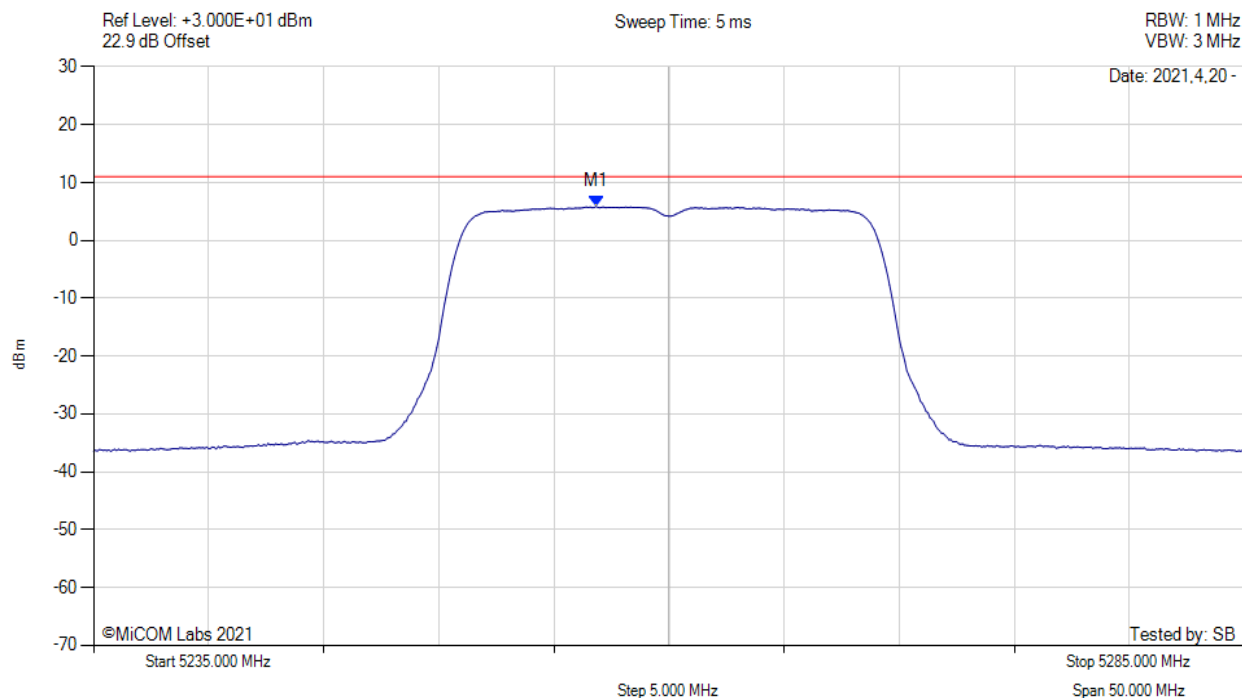
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5256.830 MHz : 3.602 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5260.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



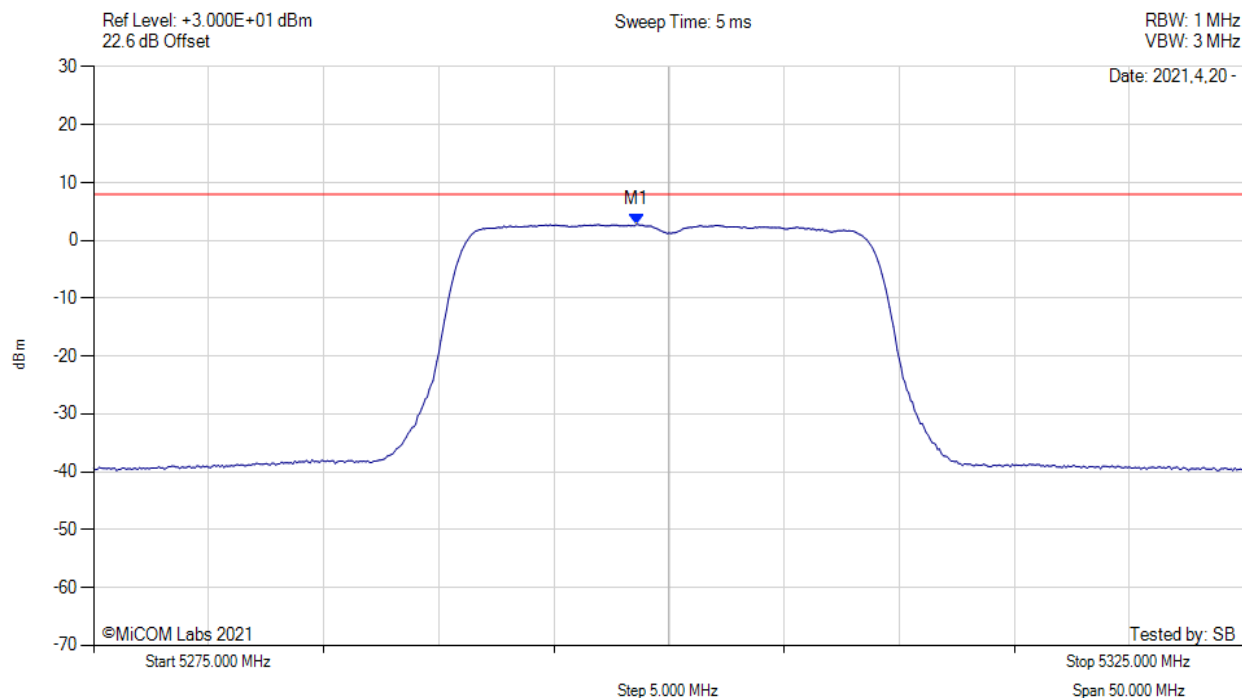
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5256.800 MHz : 5.874 dBm<br>M1 + DCCF : 5256.800 MHz : 6.236 dBm<br>Duty Cycle Correction Factor : +0.36 dB | Limit: $\leq 11.0$ dBm<br>Margin: -4.8 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5300.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



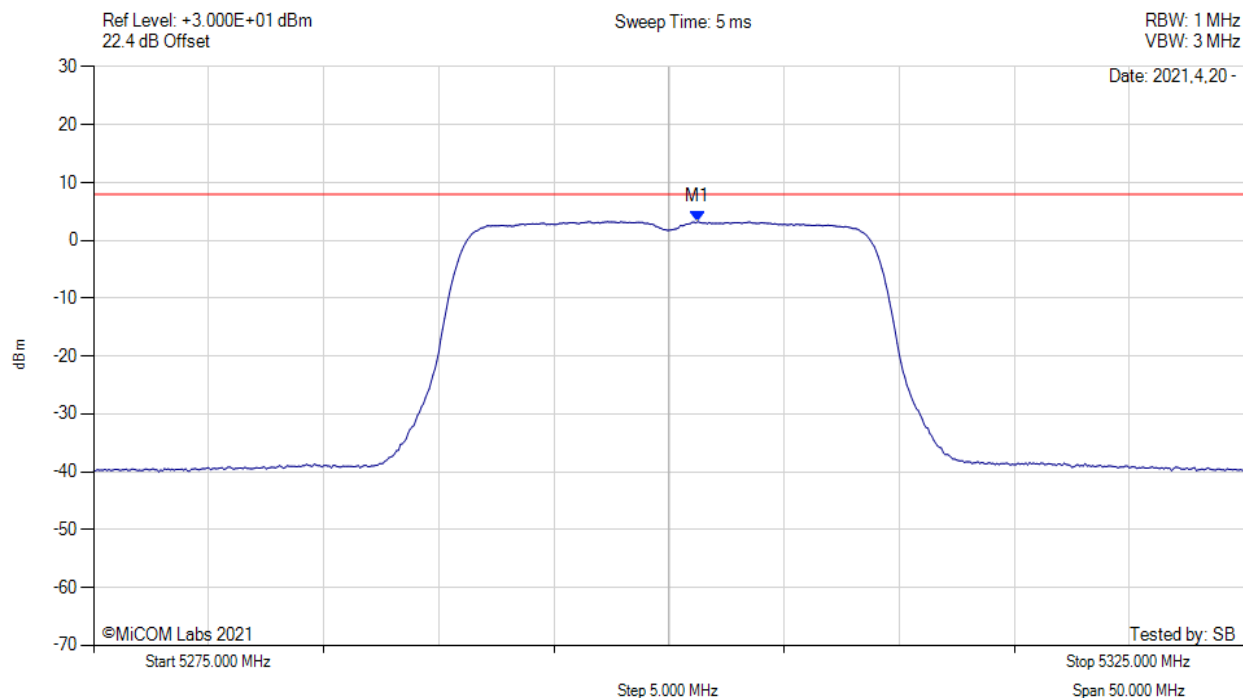
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5298.580 MHz : 2.773 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5300.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results                   |
|--|-------------------------------|--------------------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5301.250 MHz : 3.251 dBm | Channel Frequency: 5300.00 MHz |

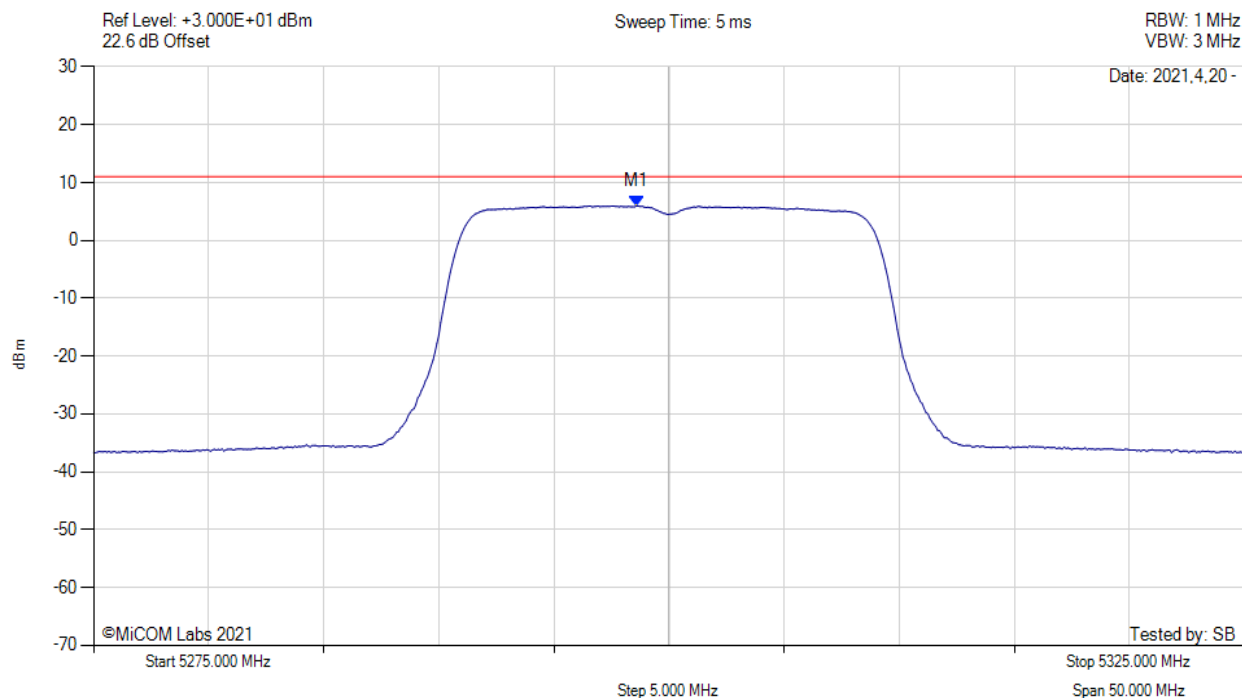
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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5300.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



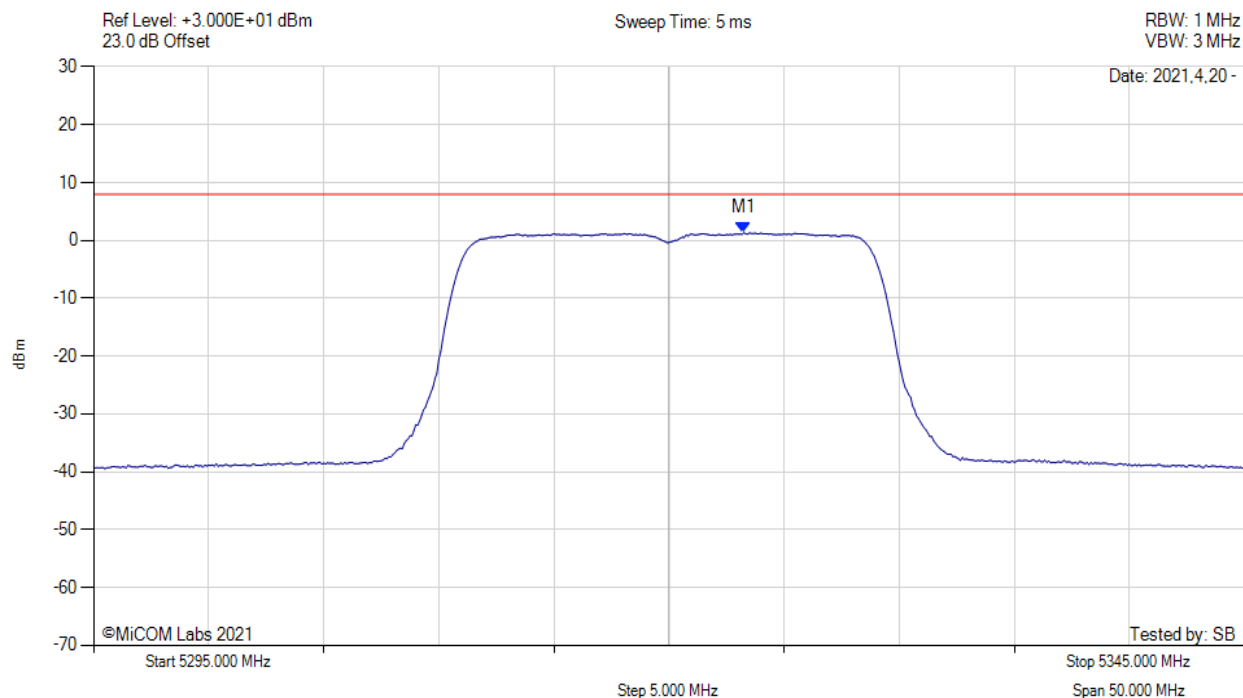
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5298.600 MHz : 5.956 dBm<br>M1 + DCCF : 5298.600 MHz : 6.318 dBm<br>Duty Cycle Correction Factor : +0.36 dB | Limit: $\leq 11.0$ dBm<br>Margin: -4.7 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5320.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



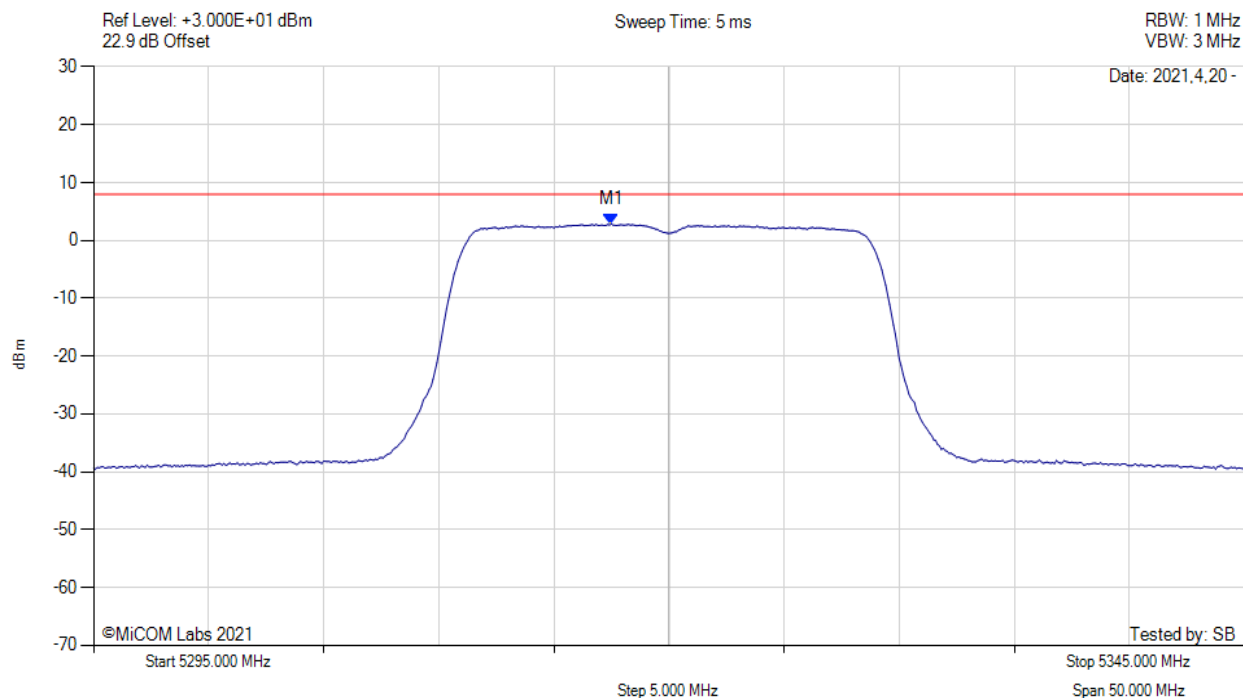
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5323.250 MHz : 1.338 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5320.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



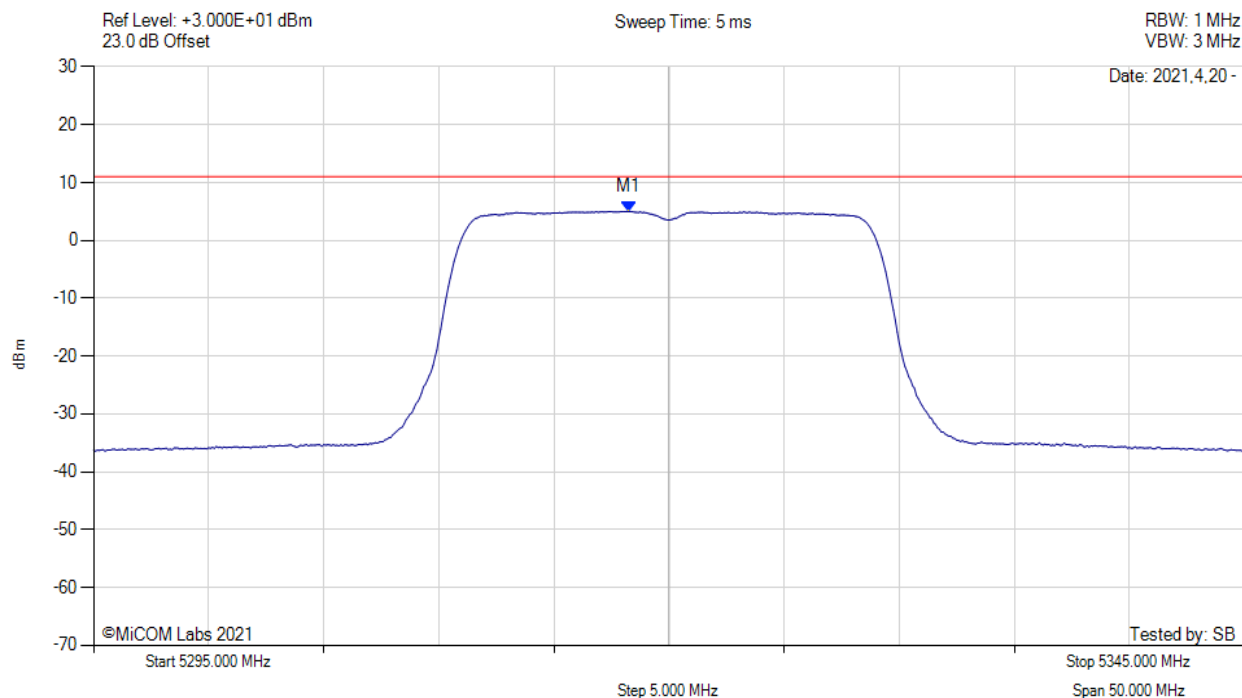
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5317.500 MHz : 2.839 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-20, Channel: 5320.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



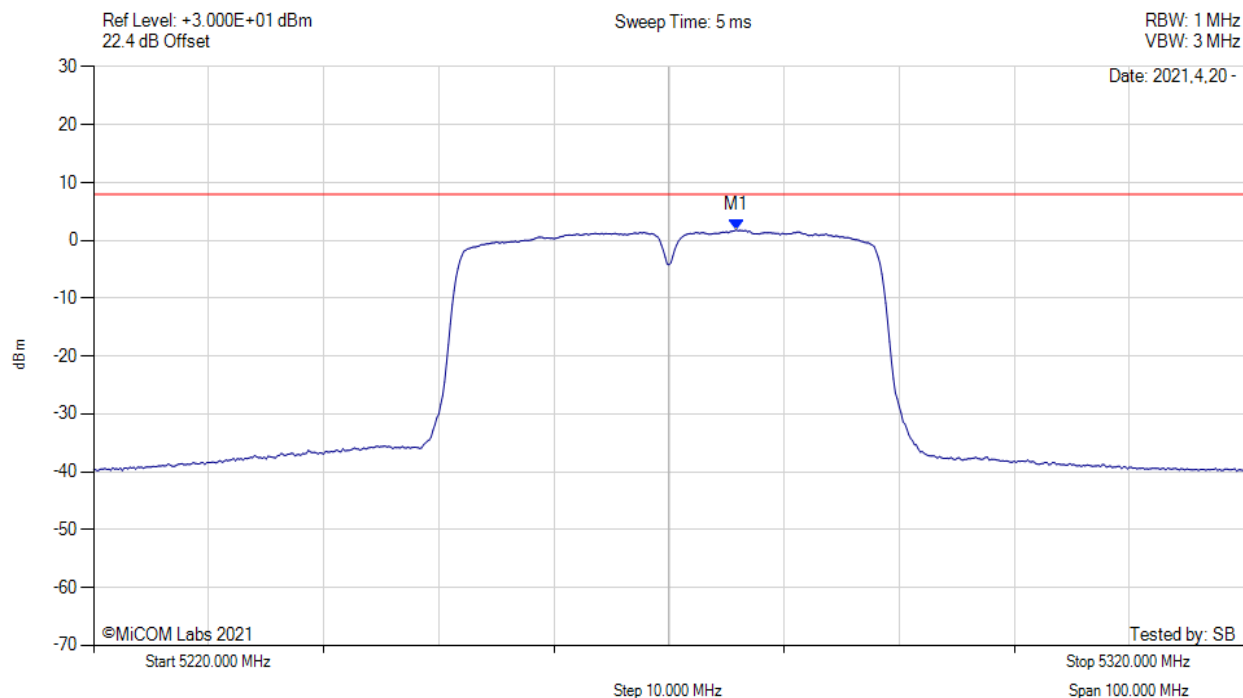
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5318.300 MHz : 5.019 dBm<br>M1 + DCCF : 5318.300 MHz : 5.381 dBm<br>Duty Cycle Correction Factor : +0.36 dB | Limit: $\leq 11.0$ dBm<br>Margin: -5.6 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-40, Channel: 5270.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



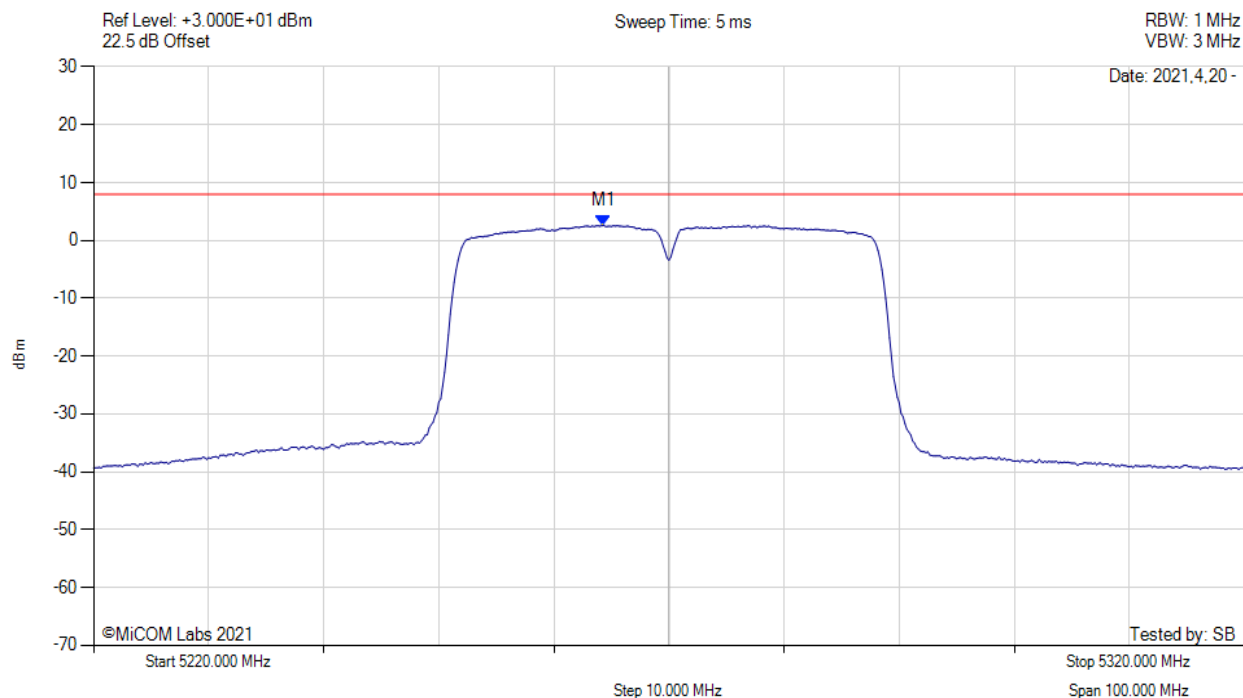
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5275.830 MHz : 1.801 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-40, Channel: 5270.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



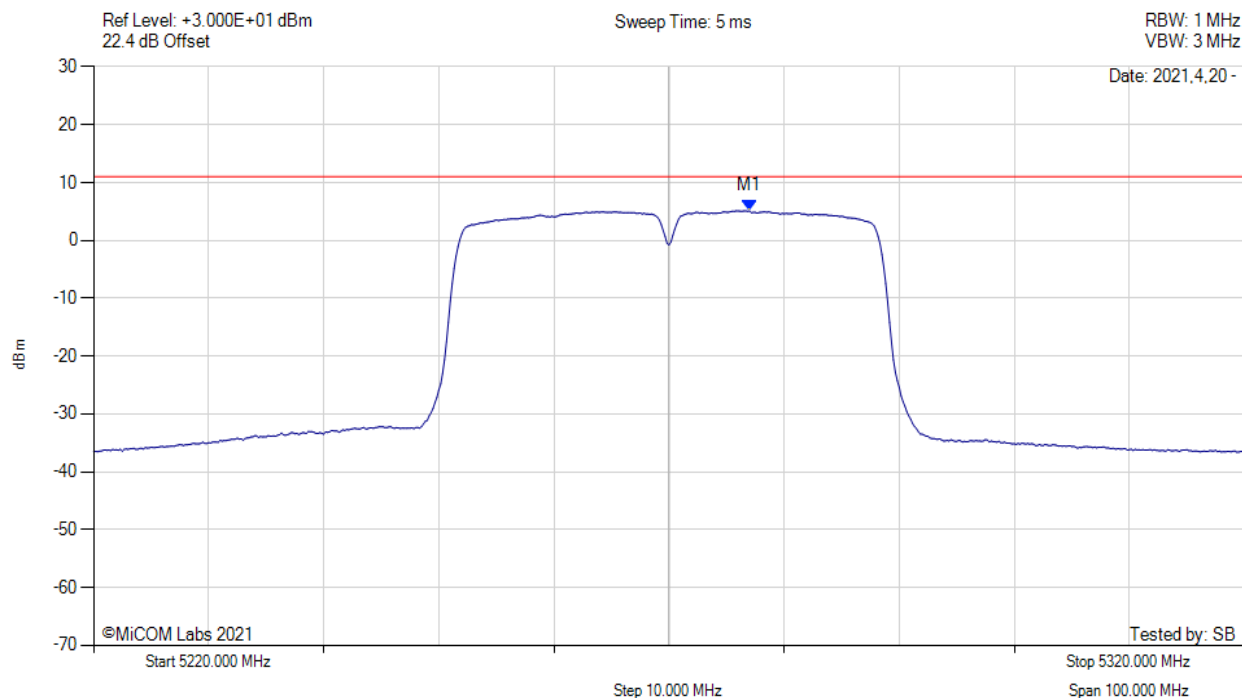
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5264.330 MHz : 2.607 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-40, Channel: 5270.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



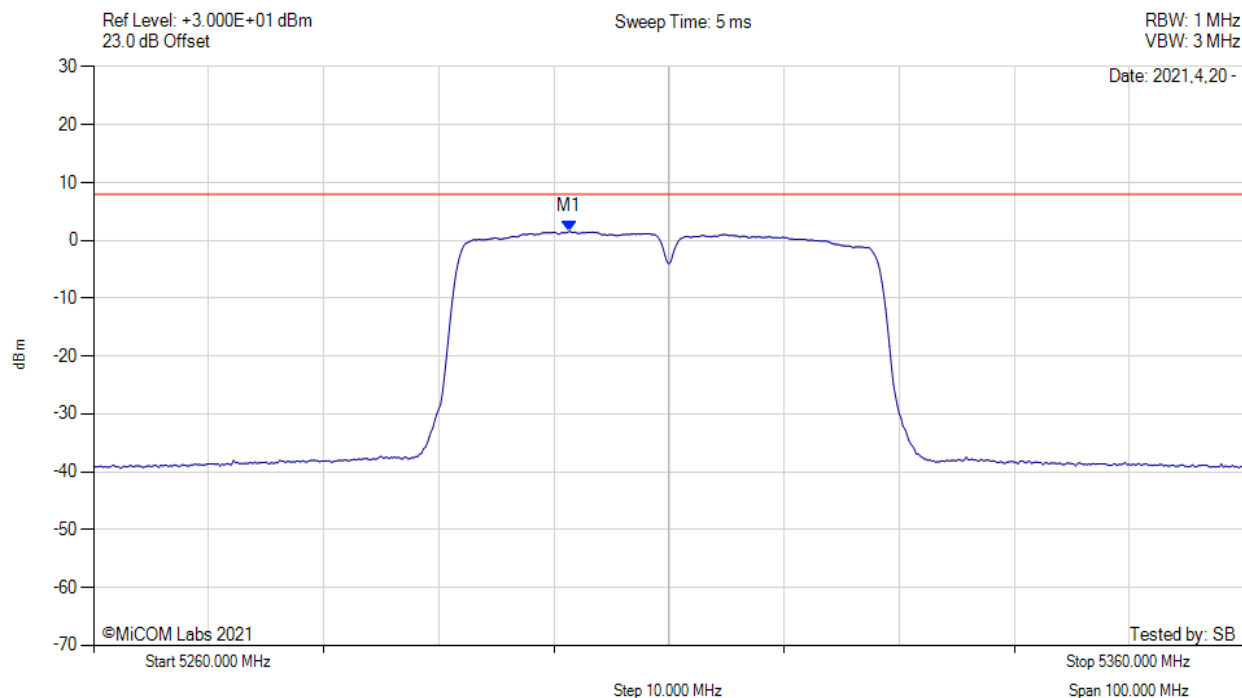
| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5277.000 MHz : 5.102 dBm<br>M1 + DCCF : 5277.000 MHz : 5.464 dBm<br>Duty Cycle Correction Factor : +0.36 dB | Limit: $\leq 11.0$ dBm<br>Margin: -5.5 dB |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-40, Channel: 5310.00 MHz, Chain a, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5301.330 MHz : 1.581 dBm | Limit: ≤ 7.990 dBm |

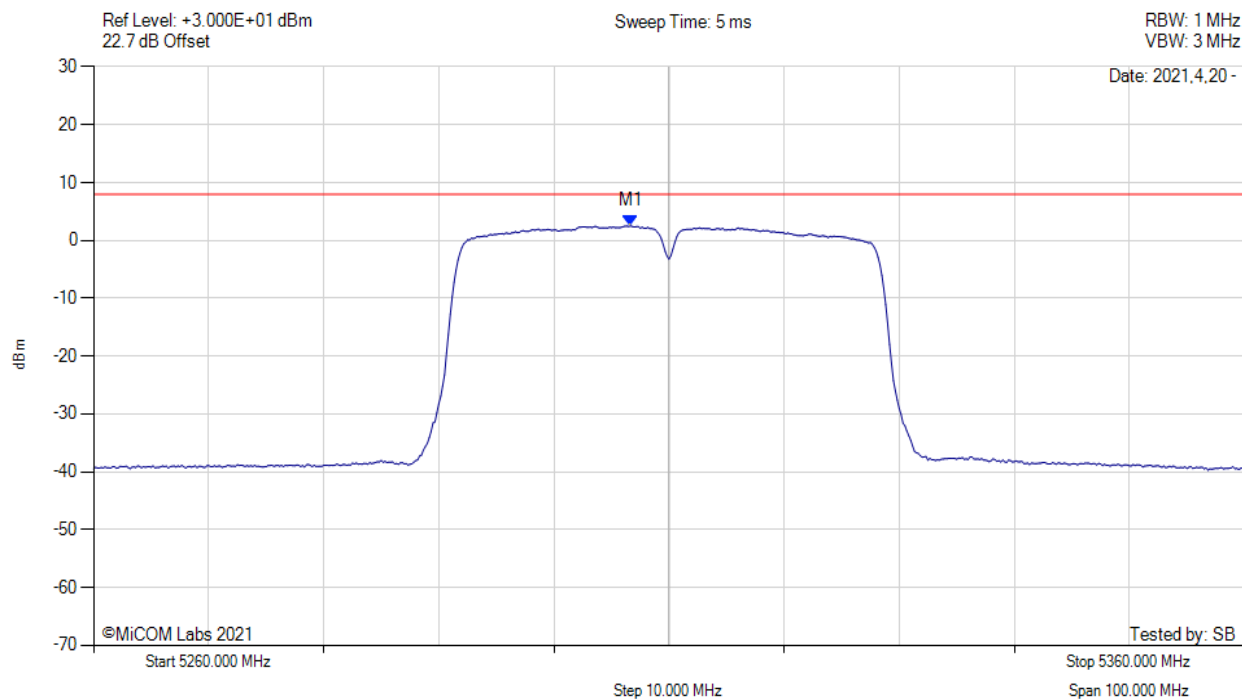
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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-40, Channel: 5310.00 MHz, Chain b, Temp: 20, Voltage: 24 Vdc



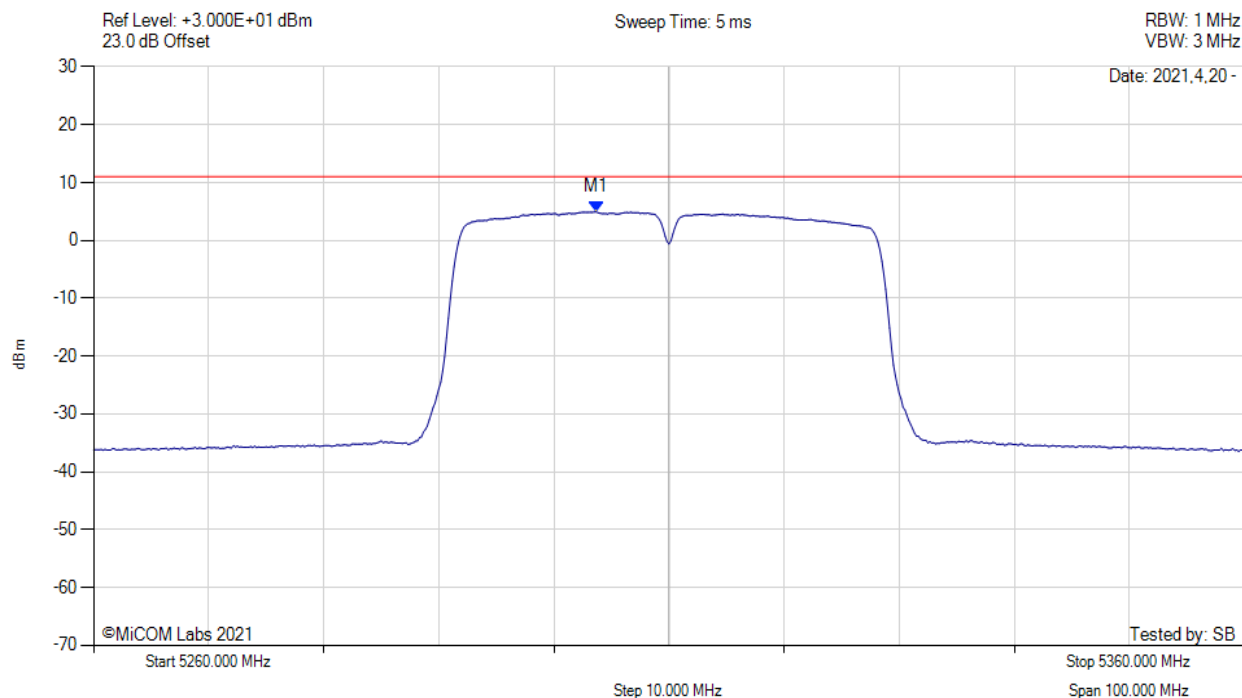
| Analyzer Setup   | Marker:Frequency:Amplitude    | Test Results       |
|--|-------------------------------|--------------------|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5306.670 MHz : 2.518 dBm | Limit: ≤ 7.990 dBm |

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# POWER SPECTRAL DENSITY



Variant: 802.11n HT-40, Channel: 5310.00 MHz, SUM, Temp: 20, Voltage: 24 Vdc



| Analyzer Setup   | Marker:Frequency:Amplitude   | Test Results                              |
|--|--|---|
| Detector = AVER<br>Sweep Count = +100<br>RF Atten (dB) = 30<br>Trace Mode = VIEW | M1 : 5303.700 MHz : 4.958 dBm<br>M1 + DCCF : 5303.700 MHz : 5.320 dBm<br>Duty Cycle Correction Factor : +0.36 dB | Limit: $\leq 11.0$ dBm<br>Margin: -5.7 dB |

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### A.3. Radiated

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

##### A.3.1.1. MikroTik db\_PIFA\_2\_4-5\_5\_AN



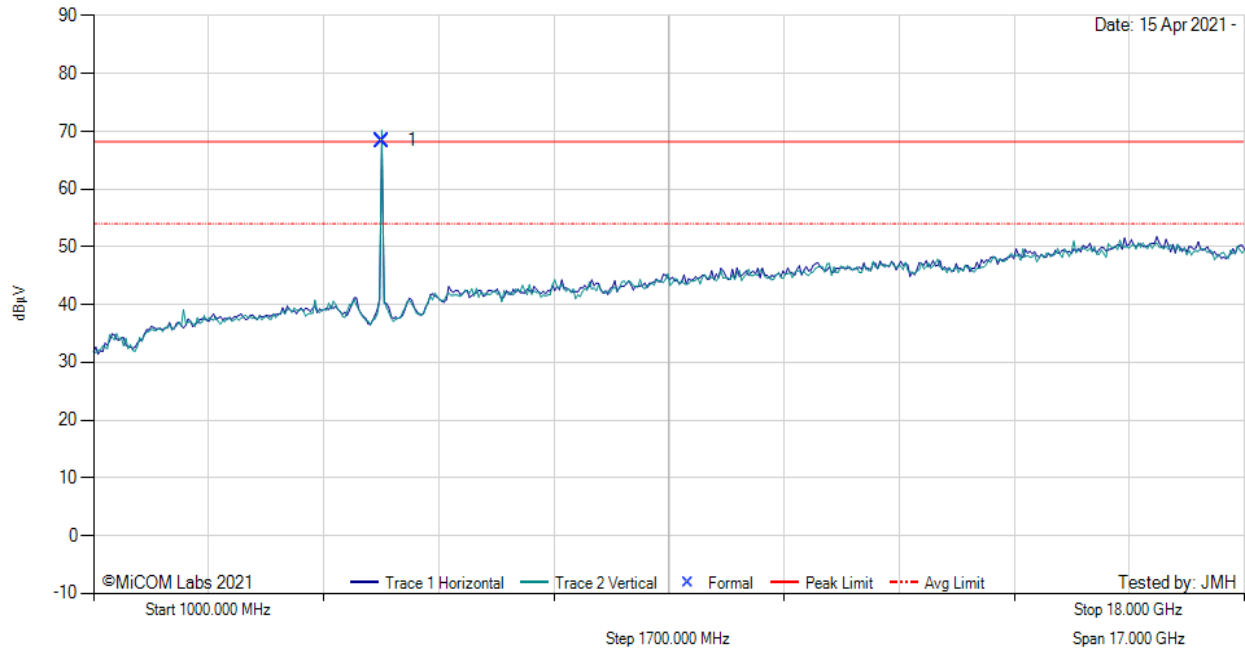
#### TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5260.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 24, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 170 ms

RBW: 1 MHz  
VBW: 3 MHz



| 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                      | 5257.25       | 77.60    | 2.95          | -12.20  | 68.35        | Fundamental      | Vertical | 100    | 0       | --           | --        |            |

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

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# TX SPURIOUS & RESTRICTED BAND EMISSIONS

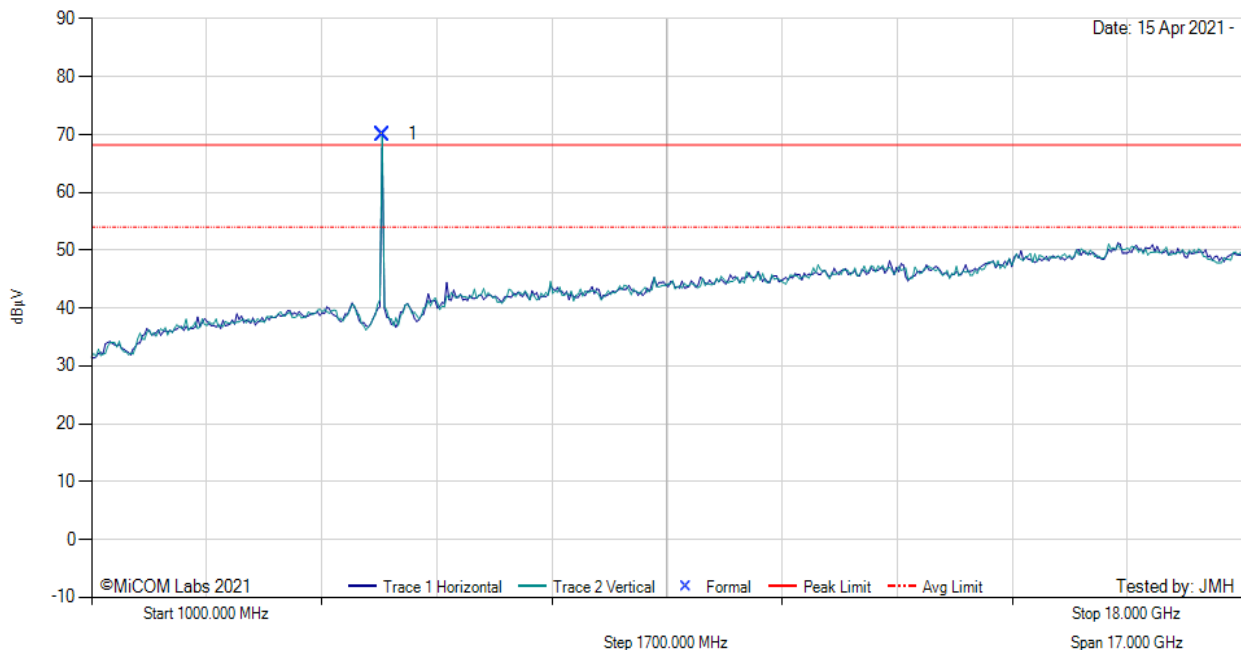


Variant: 802.11a, Test Freq: 5300.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 24, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 170 ms

RBW: 1 MHz  
VBW: 3 MHz



| 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                      | 5297.60       | 79.02    | 3.03          | -12.00  | 70.05        | Fundamental      | Vertical | 100    | 0       | --           | --        |            |

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

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# TX SPURIOUS & RESTRICTED BAND EMISSIONS

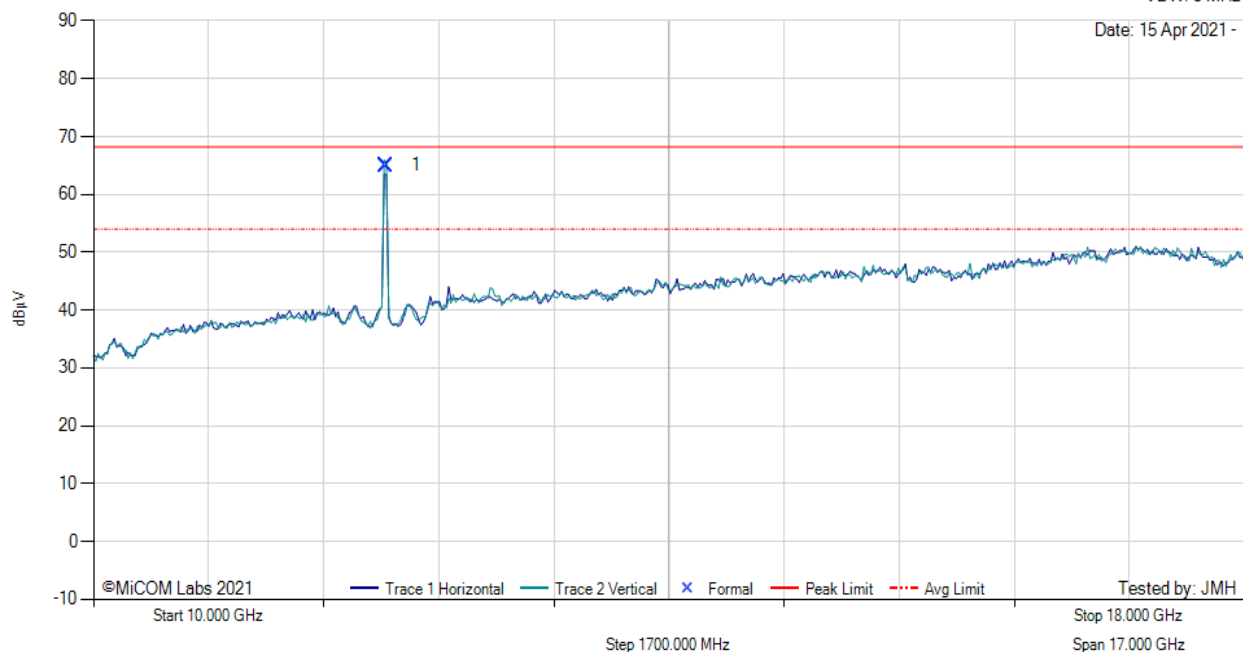


Variant: 802.11a, Test Freq: 5320.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 24, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 170 ms

RBW: 1 MHz  
VBW: 3 MHz



| 10000.00 - 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                       | 5318.04       | 74.08    | 2.97          | -12.01  | 65.04        | Fundamental      | Vertical | 100    | 0       | --           | --        |            |

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

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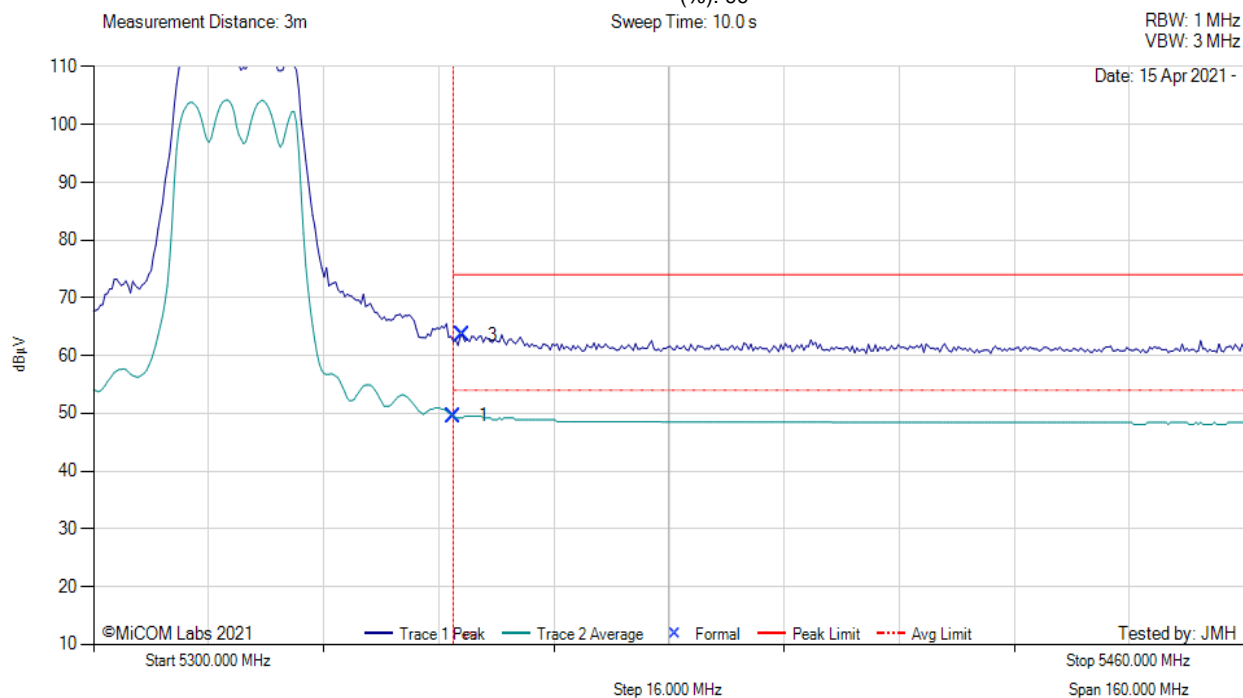
### A.3.2. Restricted Edge & Band-Edge Emissions

#### A.3.2.2. MikroTik db\_PIFA\_2\_4-5\_5\_AN



#### RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 802.11a, Test Freq: 5320.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 24, Duty Cycle (%): 99



| 5300.00 - 5460.00 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                     | 5350.00       | 12.02    | 3.06          | 34.46   | 49.54        | Max Avg          | Vertical | 158    | 356     | 54.0         | -4.5      | Pass       |
| 3                     | 5351.28       | 26.00    | 3.06          | 34.46   | 63.52        | Max Peak         | Vertical | 158    | 356     | 74.0         | -11.5     | Pass       |
| 2                     | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

**Test Notes:** EUT powered by AC/DC ps. Connected to laptop outside chamber.

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# RESTRICTED UPPER BAND-EDGE EMISSIONS

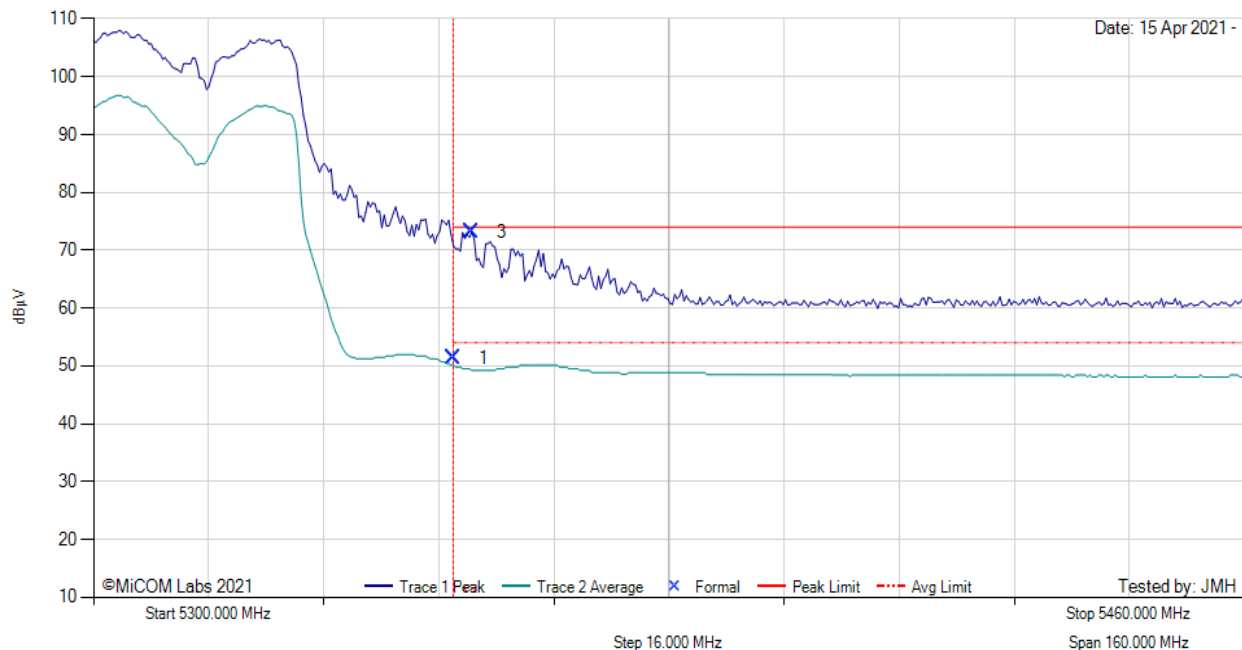


Variant: 802.11ac-80, Test Freq: 5290.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 20, Duty Cycle (%): 76

Measurement Distance: 3m

Sweep Time: 10.0 s

RBW: 1 MHz  
VBW: 3 MHz



## 5300.00 - 5460.00 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   | 5350.00       | 12.62    | 3.06          | 34.46   | 51.33        | Max Avg          | Vertical | 158    | 356     | 54.0         | -2.7      | Pass       |
| 3   | 5352.59       | 35.58    | 3.05          | 34.47   | 73.10        | Max Peak         | Vertical | 158    | 356     | 74.0         | -0.9      | Pass       |
| 2   | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

**Test Notes:** EUT powered by AC/DC ps. Connected to laptop outside chamber. 1.19 DCCF added to average measurement.

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# RESTRICTED UPPER BAND-EDGE EMISSIONS



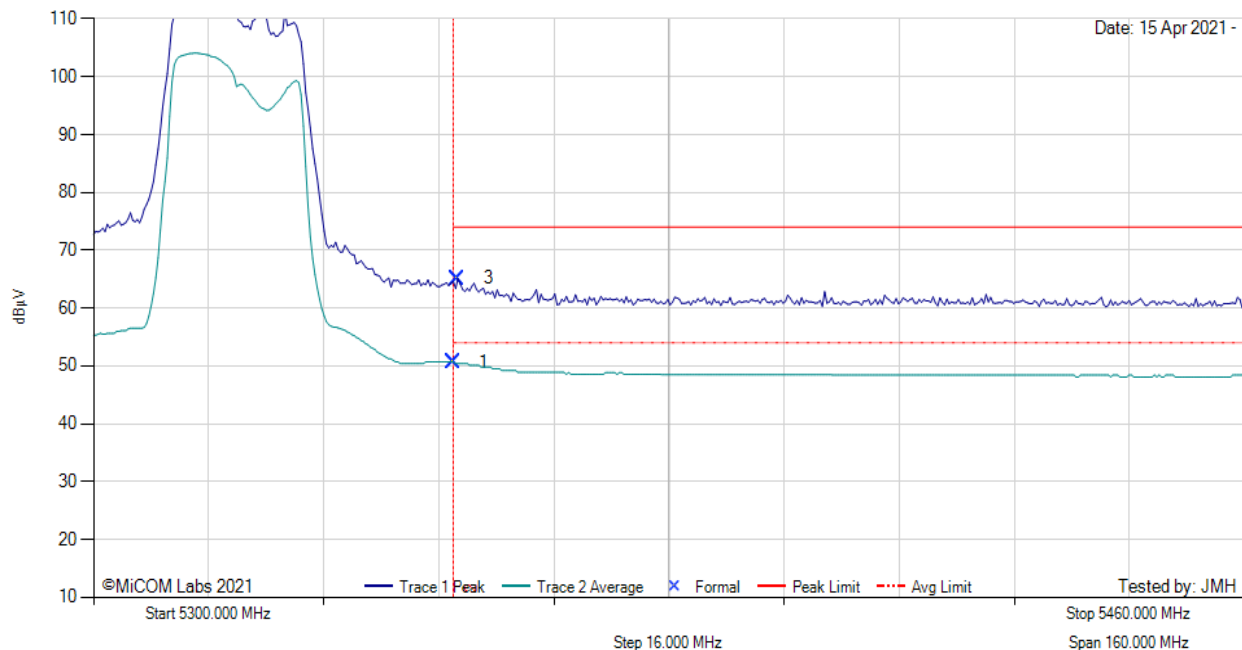
Variant: 802.11n HT-20, Test Freq: 5320.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 24, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 10.0 s

RBW: 1 MHz

VBW: 3 MHz



| 5300.00 - 5460.00 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                     | 5350.00       | 13.18    | 3.06          | 34.46   | 50.70        | Max Avg          | Vertical | 158    | 356     | 54.0         | -3.3      | Pass       |
| 3                     | 5350.64       | 27.58    | 3.06          | 34.46   | 65.10        | Max Peak         | Vertical | 158    | 356     | 74.0         | -8.9      | Pass       |
| 2                     | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

**Test Notes:** EUT powered by AC/DC ps. Connected to laptop outside chamber.

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# RESTRICTED UPPER BAND-EDGE EMISSIONS

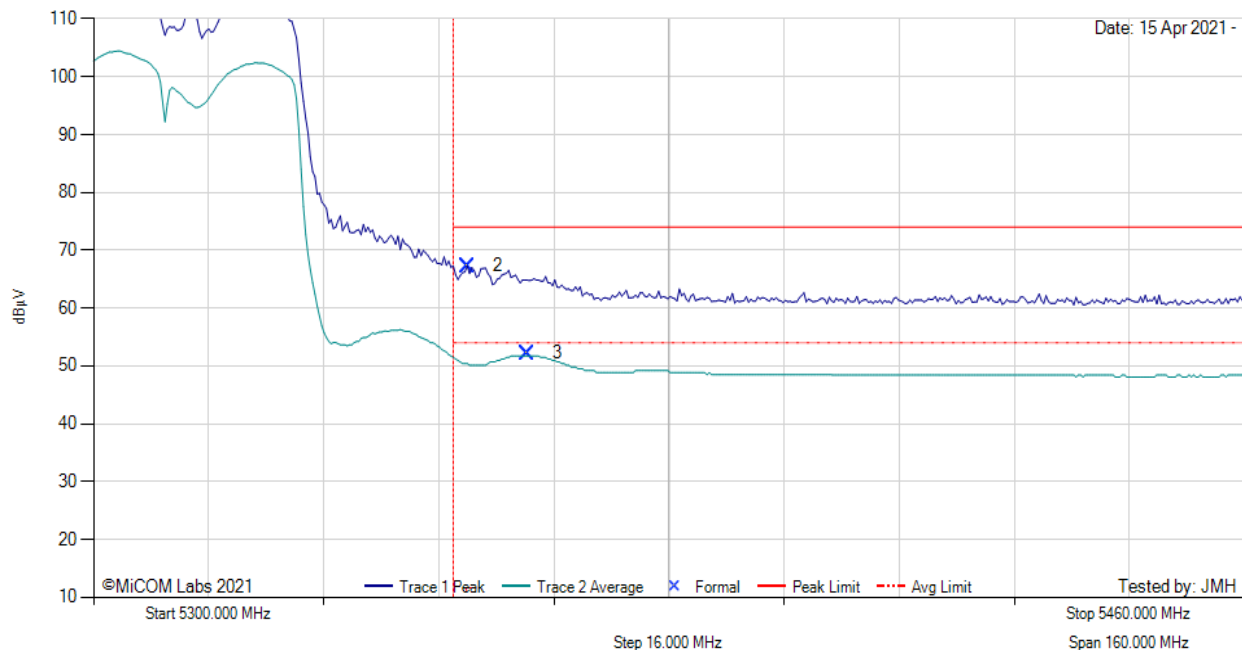


Variant: 802.11n HT-40, Test Freq: 5310.00 MHz, Antenna: MikroTik db\_PIFA\_2\_4-5\_5\_AN, Power Setting: 24, Duty Cycle (%): 90

Measurement Distance: 3m

Sweep Time: 10.0 s

RBW: 1 MHz  
VBW: 3 MHz



| 5300.00 - 5460.00 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 |
| 2                     | 5351.92       | 29.76    | 3.06          | 34.46   | 67.28        | Max Peak         | Vertical | 158    | 356     | 74.0         | -6.7      | Pass       |
| 3                     | 5360.26       | 14.20    | 3.04          | 34.48   | 52.17        | Max Avg          | Vertical | 158    | 356     | 54.0         | -1.8      | Pass       |
| 1                     | 5350.00       | --       | --            | --      | --           | Restricted-Band  | --       | --     | --      | --           | --        | --         |

**Test Notes:** EUT powered by AC/DC ps. Connected to laptop outside chamber. 0.45 DCCF added to average measurement.

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