Company: Itron, Inc.

Test of: NIC 510-06

To: FCC CFR 47 Part 15.247 (DTS); IC RSS-247

Report No.: ITRO01-U6 Rev A

**COMPLETE TEST REPORT**

# TEST REPORT

FROM

Test of: Itron, Inc. NIC 510-06

To: FCC CFR 47 Part 15.247 (DTS); IC RSS-247

Test Report Serial No.: ITRO01-U6 Rev A

This report supersedes: NONE

| | |
|---|---|
| Applicant: | Itron, Inc.<br>230 West Tasman Drive<br>San Jose,<br>California 95134<br>USA |
| Product function: | Plug in Radio Device |
| Issue Date: | 9th May 2018 |

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

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

A2LA ACCREDITED
TESTING CERT #2381.01

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

# Table of Contents

# 1. ACCREDITATION, LISTINGS & RECOGNITION

## 1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2005. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

ilac-MRA A2LA

**Accredited Laboratory**

A2LA has accredited

**MICOM LABS**

*Pleasanton, CA*

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 4th day of February 2016.

President and CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to May 31, 2018
Revised April 25, 2018

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

## 1.2. RECOGNITION

MiCOM Labs, Inc has widely recognized wireless testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA countries. MiCOM Labs test reports are accepted globally.

| Country | Recognition Body | Status | Phase | Identification No. |
|---|---|---|---|---|
| USA | Federal Communications Commission (FCC) | TCB | - | US0159<br>Listing #: 102167 |
| Canada | Industry Canada (IC) | FCB | APEC MRA 2 | US0159<br>Listing #: 4143A-2<br>4143A-3 |
| Japan | MIC (Ministry of Internal Affairs and Communication) | CAB | APEC MRA 2 | RCB 210 |
| | VCCI | -- | -- | A-0012 |
| Europe | European Commission | NB | EU MRA | NB 2280 |
| Australia | Australian Communications and Media Authority (ACMA) | CAB | APEC MRA 1 | US0159 |
| Hong Kong | Office of the Telecommunication Authority (OFTA) | CAB | APEC MRA 1 | |
| Korea | Ministry of Information and Communication Radio Research Laboratory (RRL) | CAB | APEC MRA 1 | |
| Singapore | Infocomm Development Authority (IDA) | CAB | APEC MRA 1 | |
| Taiwan | National Communications Commission (NCC)<br>Bureau of Standards, Metrology and Inspection (BSMI) | CAB | APEC MRA 1 | |
| Vietnam | Ministry of Communication (MIC) | CAB | APEC MRA 1 | |

EU MRA – European Union Mutual Recognition Agreement.
NB – Notified Body
APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. Recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing
Phase II – recognition for both product testing and certification

## 1.3. PRODUCT CERTIFICATION

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

**Accredited Product Certification Body**

A2LA has accredited

**MICOM LABS**

*Pleasanton, CA*

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

Presented this 4th day of February 2016.

President and CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to May 31, 2018
Revised April 25, 2018

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

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

## 2. DOCUMENT HISTORY

| Document History | | |
|---|---|---|
| Revision | Date | Comments |
| Draft | 16th April 2018 | Draft report for client review. |
| Rev A | 9th May 2018 | Initial release. |
| . | | |
| . | | |
| . | | |
| . | | |
| . | | |

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

# 3. TEST RESULT CERTIFICATE

| | | | |
|---|---|---|---|
| **Manufacturer:** | Itron, Inc.<br>230 West Tasman Drive<br>San Jose<br>California 95134 USA | **Tested By:** | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton<br>California 94566 USA |
| **Model:** | NIC 511-0603-13 | **Telephone:** | +1 925 462 0304 |
| **Type Of Equipment:** | Modular radio device | **Fax:** | +1 925 462 0306 |
| **S/N's:** | 0013500700001592<br>00135007000013D5 | | |
| **Test Date(s):** | 26 March - 03 April 2018 | **Website:** | www.micomlabs.com |

| STANDARD(S) | TEST RESULTS |
|---|---|
| FCC CFR 47 Part 15.247 (DTS); IC RSS-247 | EQUIPMENT COMPLIES |

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

**Notes:**

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

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

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

A2LA ACCREDITED
TESTING CERT #2381.01

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

Graeme Grieve
Quality Manager MiCOM Labs, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

# 4. REFERENCES AND MEASUREMENT UNCERTAINTY

## 4.1. Normative References

| REF. | PUBLICATION | YEAR | TITLE |
|---|---|---|---|
| I | KDB 662911 D01 & D02 | Oct 31 2013 | Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band |
| II | KDB 558074 D01 v04 | 5th April 2017 | Guidance for performing compliance measurements on Digital Transmission Systems (DTS) operating under section 15.247. |
| III | A2LA | August 2017 | R105 - Requirement's When Making Reference to A2LA Accreditation Status |
| IV | ANSI C63.10 | 2013 | American National Standard for Testing Unlicensed Wireless Devices |
| V | ANSI C63.4 | 2014 | American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| VI | ETSI TR 100 028 | 2001-12 | Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics |
| VII | FCC 47 CFR Part 15.247 | 2016 | Radio Frequency Devices; Subpart C – Intentional Radiators |
| VIII | ICES-003 | Issue 6 Jan 2016; Updated April 2017 | Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement. |
| IX | M 3003 | Edition 3 Nov.2012 | Expression of Uncertainty and Confidence in Measurements |
| X | RSS-247 Issue 2 | Feb 2017 | Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices |
| XI | RSS-Gen Issue 4; Amendment 1 | March 2018 | General Requirements for Compliance of Radio Apparatus |
| XII | KDB 644545 D03 v01 | August 14th 2014 | Guidance for IEEE 802.11ac New Rules |
| XIII | FCC 47 CFR Part 2.1033 | 2016 | FCC requirements and rules regarding photographs and test setup diagrams. |

## 4.2. Test and Uncertainty Procedure

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

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

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

# 5. PRODUCT DETAILS AND TEST CONFIGURATIONS

## 5.1. Technical Details

| Details | Description |
|---|---|
| Purpose: | Test of the Itron, Inc. NIC 510-06 to FCC CFR 47 Part 15.247 (DTS); & IC RSS-247. |
| Applicant: | Itron, Inc.<br>230 West Tasman Drive<br>San Jose California 95134 USA |
| Manufacturer: | Itron, Inc. |
| Laboratory performing the tests: | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton California 94566 USA |
| Test report reference number: | ITRO01-U6 Rev A |
| Date EUT received: | 27th March 2018 |
| Standard(s) applied: | FCC CFR 47 Part 15.247 (DTS); IC RSS-247 |
| Dates of test (from - to): | 27 March - 03 April 2018 |
| No of Units Tested: | 2 |
| Product Family Name: | NIC 510-06 |
| Model(s): | NIC 511-0603-13; NIC 511-0602-14 (for USB testing) |
| Location for use: | Indoor/Outdoor |
| Declared Frequency Range(s): | 2400 - 2483.5 MHz; |
| Type of Modulation: | NIC 510-06 |
| EUT Modes of Operation: | 2400 - 2483.5 MHz:<br>2400 kbps/OFDM; 250 kbps/OQPSK; |
| Declared Nominal Output Power : | 30dBm |
| Transmit/Receive Operation: | Transceiver – Half Duplex |
| Rated Input Voltage and Current: | 4VDC |
| Operating Temperature Range: | -40 to +85 degrees C. |
| ITU Emission Designator: | OFDM: 1M26G1D<br>OQPSK; 2M21G1D |
| Equipment Dimensions: | 110 mm x 45mm x 15mm |
| Weight: | 50g |
| Hardware Rev: | 173-0870-00 |
| Software Rev: | 4.4.0 |

## 5.2. Scope Of Test Program

**Itron, Inc. NIC 511-0603-13**

The scope of the test program was to test the Itron, Inc. NIC 511-0603-13 configurations in the frequency ranges 2400 - 2483.5 MHz; for compliance against the following specification:

**FCC CFR 47 Part 15.247 (DTS);** Radio Frequency Devices; Subpart C – Intentional Radiators

**Industry Canada RSS-247**
Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices

**The following product description was provided by Silver Spring.**

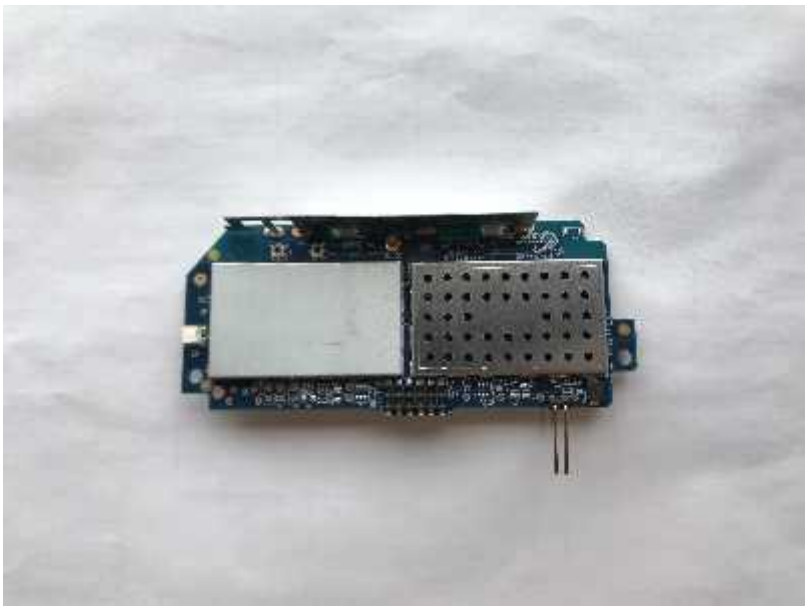
The NIC 510-06 is a plug-in radio device, will communicate over mesh and HAN networks. May be integrated into host devices (i.e., FSU 5.0, IOTR 5, energy meters, etc.) to be used in Itron Smart Energy Networks (SEN). NIC 510-06 may be configured for host applications on USB or Serial data communications and may support standard or extended last gasp (ELG). The NIC 510-06 family supports basic meter types including single phase meters and three phase meters.

This report is intended to cover the NIC 510-06 family of products which includes the NIC 511-0603-13 and NIC 511-0602-14 and represents a worst case configuration of the product family.

NIC 510-06 products include the following model numbers/configurations:

NIC 511-0603: 900+2.4,INT/EXT ANT, HW1
NIC 511-0602: 900+2.4, EXT ANT,HW1
NIC 511-0601: 900+2.4, INT ANT, HW1
NIC 511-0601-13 : 900+2.4, INT ANT, HW1, 75s ELG
NIC 511-0602-13 : 900+2.4, EXT ANT, HW1, 75s ELG
NIC 511-0602-13 : 900+2.4, INT/EXT ANT,HW1, 75s ELG
NIC 511-0602-14 : 900+2.4, EXT ANT,HW1, USB

**Itron, Inc. NIC 511-0603-13**



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

| Type (EUT | Equipment Description | Serial Number |
|---|---|---|
| EUT | NIC 511-0603-13 | 0013500700001592 |
| EUT | NIC 511-0602-14 | 00135007000013D5 |
| Support | IOTR5 SBC | Proto1 |

## 5.4. Antenna Details

| Type | Manufacturer | Model | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|---|---|---|---|---|---|---|---|---|
| integral | Tai Sheng Chen | 155-0010-00 | f type | 5.0 | - | 360 | - | 2400 - 2483.5 |
| external | WP | WPANT30017-CA | OMNI | 4.5 | - | 360 | - | 2400 - 2483.5 |
| external | WP | WPANT40020-SA | Wrap Around | 3.5 | - | 360 | - | 2400 - 2483.5 |

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

## 5.5. Cabling and I/O Ports

| Port Type | Max Cable Length | # of Ports | Screened | Conn Type | Data Type |
|---|---|---|---|---|---|
| RS232 | 0 (direct plug) | 1 | No | 12-PIN | Packet Data |
| USB | 0 (direct plug) | 1 | No | 4-PIN | Packet Data |

## 5.6. Test Configurations

Results for the following configurations are provided in this report:

| Operational Mode(s) | Data Rate with Highest Power MBit/s | Channel Frequency (MHz) | | |
|---|---|---|---|---|
| | | Low | Mid | High |
| **2400 - 2483.5 MHz** | | | | |
| OFDM | 2400 | 2401.2 | 2440.8 | 2476.8 |
| OQPSK | 250 | 2405.00 | 2440.0 | 2480.0 |

## 5.7. Equipment Modifications

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

## 5.8. Deviations from the Test Standard

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

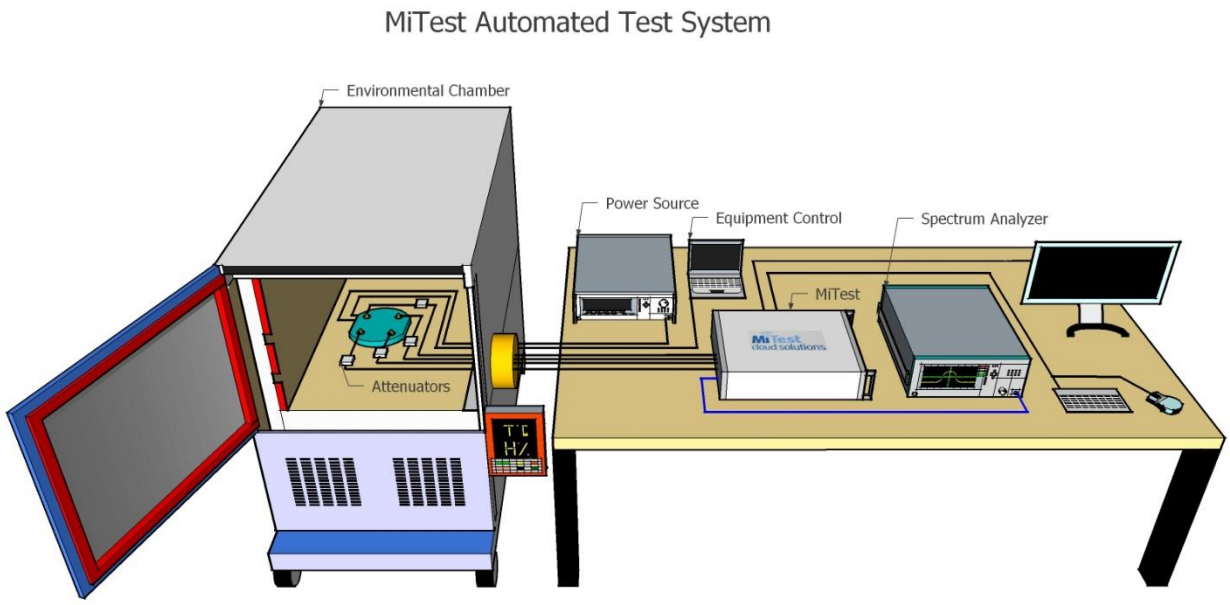
# 6. TEST SUMMARY

List of Measurements

| Test Header | Result | Data Link |
|---|---|---|
| 6 dB & 99% Bandwidth | Complies | View Data |
| Conducted Output Power | Complies | View Data |
| Power Spectral Density | Complies | View Data |
| Emissions | Complies | View Data |
| (1) Conducted Emissions | Complies | View Data |
| (i) Conducted Spurious Emissions | Complies | View Data |
| (ii) Conducted Band-Edge Emissions | Complies | View Data |
| (2) Radiated Emissions | Complies | View Data |
| (i) TX Spurious & Restricted Band Emissions | Complies | View Data |
| (ii) Restricted Edge & Band-Edge Emissions | Complies | View Data |
| (3) Digital Emissions (0.03 - 1 GHz) | Complies | View Data |
| (4) AC Wireline Emissions | Complies | View Data |

# 7. TEST EQUIPMENT CONFIGURATION(S)

## Conducted

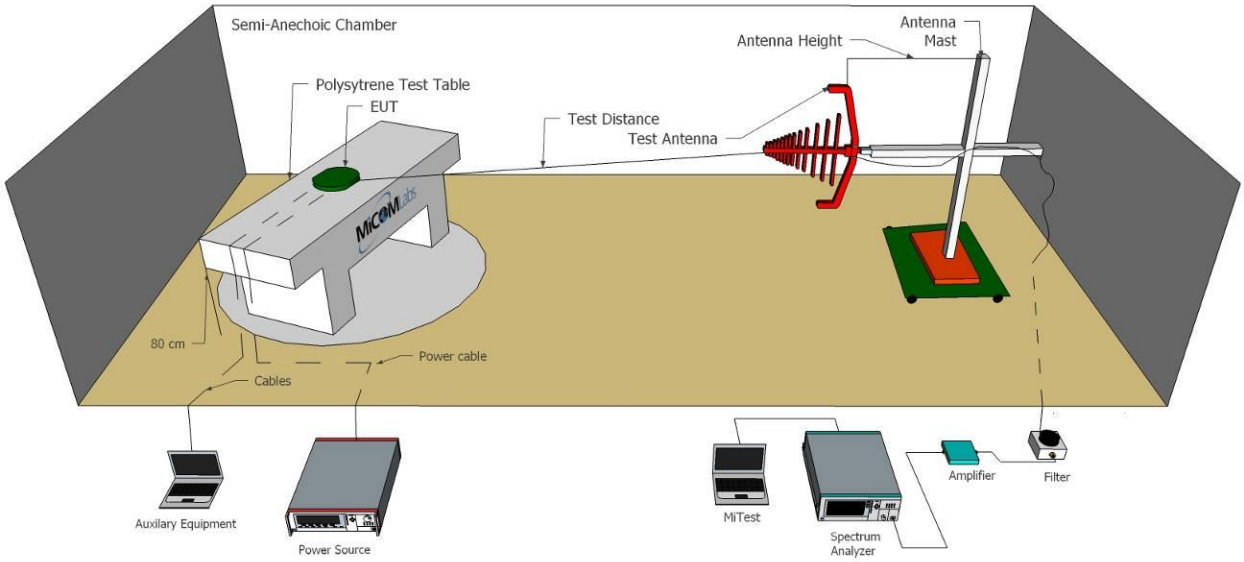



A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

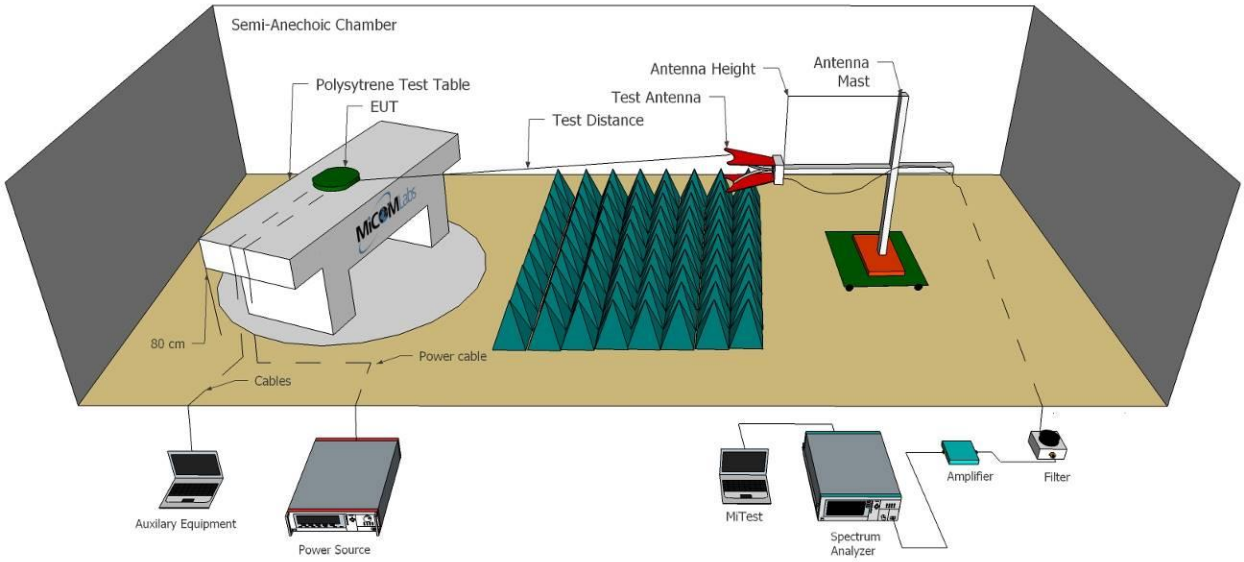
| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| #3 SA | MiTest Box to SA | Fairview Microwave | SCA1814-0101-72 | #3 SA | 8 May 2018 |
| #3P1 | EUT to MiTest box port 1 | Fairview Microwave | SCA1814-0101-72 | #3P1 | 8 May 2018 |
| #3P2 | EUT to MiTest box port 2 | Fairview Microwave | SCA1814-0101-72 | #3P2 | 8 May 2018 |
| #3P3 | EUT to MiTest box port 3 | Fairview Microwave | SCA1814-0101-72 | #3P3 | 8 May 2018 |
| #3P4 | EUT to MiTest box port 4 | Fairview Microwave | SCA1812-0101-72 | #3P4 | 8 May 2018 |
| 249 | Resistance Thermometer | Thermotronics | GR2105-02 | 9340 #2 | 30 Oct 2018 |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 2 May 2018 |
| 361 | Desktop for RF#1, Labview Software installed | Dell | Vostro 220 | WS RF#1 | Not Required |
| 390 | USB Power Head 50MHz - 24GHz -60 to +20dBm | Agilent | U2002A | MY50000103 | 17 Dec 2018 |
| 398 | MiTest RF Conducted Test Software | MiCOM | MiTest ATS | Version 4.1 | Not Required |
| 405 | DC Power Supply 0-60V | Agilent | 6654A | MY4001826 | Cal when used |
| 408 | USB to GPIB interface | National Instruments | GPIB-USB HS | 14C0DE9 | Not Required |
| 436 | USB Wideband Power Sensor | Boonton | 55006 | 8731 | 14 Sep 2018 |
| 441 | USB Wideband Power Sensor | Boonton | 55006 | 9179 | 20 Sep 2018 |
| 443 | 4x4 RF Switch Box | MiCOM Labs | MiTest 4X4 RF Switch Box | MIC003 | 8 May 2018 |
| 445 | PoE Injector | D-Link | DPE-101GL | QTAH1E2000625 | Not Required |
| 461 | Spectrum Analyzer | Agilent | E4440A | MY46185537 | 20 Sep 2018 |
| 510 | Barometer/Thermometer | Control Company | 68000-49 | 170871375 | 11 Dec 2018 |
| 75 | Environmental Chamber | Thermatron | SE-300-2-2 | 27946 | 24 Dec 2018 |

## Radiated Emissions - 3m Chamber

Radiated Emissions Below 1GHz Test Setup




Radiated Emissions Above 1GHz Test Setup



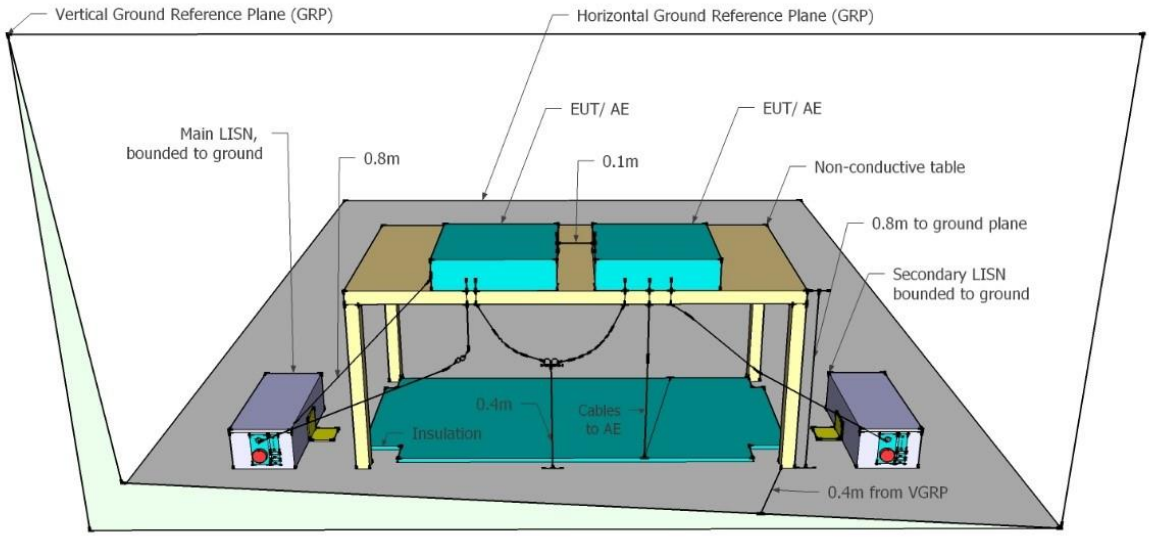

.

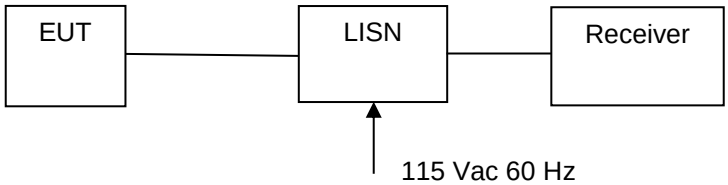
| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| 170 | Video System Controller for Semi Anechoic Chamber | Panasonic | WV-CU101 | 04R08507 | Not Required |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 2 May 2018 |
| 298 | 3M Radiated Emissions Chamber Maintenance Check | MiCOM | 3M Chamber | 298 | 28 Apr 2018 |
| 338 | Sunol 30 to 3000 MHz Antenna | Sunol | JB3 | A052907 | 5 Oct 2018 |
| 342 | 2.4 GHz Notch Filter | EWT | EWT-14-0203 | H1 | 6 Oct 2018 |
| 397 | Amp 10 - 2500MHz | MiCOM Labs | Amp 10 - 2500 MHz | NA | 12 Oct 2018 |
| 399 | ETS 1-18 GHz Horn Antenna | ETS | 3117 | 00154575 | 12 Oct 2018 |
| 406 | Amplifier for Radiated Emissions | MiCOM Labs | 40dB 1 to 18GHz Amp | 0406 | 12 Oct 2018 |
| 410 | Desktop Computer | Dell | Inspiron 620 | WS38 | Not Required |
| 411 | Mast/Turntable Controller | Sunol Sciences | SC98V | 060199-1D | Not Required |
| 412 | USB to GPIB Interface | National Instruments | GPIB-USB HS | 11B8DC2 | Not Required |
| 413 | Mast Controller | Sunol Science | TWR95-4 | 030801-3 | Not Required |
| 415 | Turntable Controller | Sunol Sciences | Turntable Controller | None | Not Required |
| 447 | MiTest Rad Emissions Test Software | MiCOM | Rad Emissions Test Software Version 1.0 | 447 | Not Required |
| 462 | Schwarzbeck cable from Antenna to Amplifier. | Schwarzbeck | AK 9513 | 462 | 4 Oct 2018 |
| 463 | Schwarzbeck cable from Amplifier to Bulkhead. | Schwarzbeck | AK 9513 | 463 | 4 Oct 2018 |
| 464 | Schwarzbeck cable from Bulkhead to Receiver | Schwarzbeck | AK 9513 | 464 | 4 Oct 2018 |
| 465 | Low Pass Filter DC-1000 MHz | Mini-Circuits | NLP-1200+ | VUU01901402 | 6 Oct 2018 |
| 466 | Low Pass Filter DC-1500 MHz | Mini-Circuits | NLP-1750+ | VUU10401438 | 6 Oct 2018 |
| 480 | Cable - Bulkhead to Amp | SRC Haverhill | 157-3050360 | 480 | 6 Oct 2018 |
| 481 | Cable - Bulkhead to Receiver | SRC Haverhill | 151-3050787 | 481 | 6 Oct 2018 |
| 482 | Cable - Amp to Antenna | SRC Haverhill | 157-3051574 | 482 | 6 Oct 2018 |
| 510 | Barometer/Thermometer | Control Company | 68000-49 | 170871375 | 11 Dec 2018 |
| CC05 | Confidence Check | MiCOM | CC05 | None | 19 Jul 2018 |
| VLF-1700 | Low pass filter DC-1700 MHz | Mini Circuits | VLF-1700 | None | 6 Oct 2018 |

## AC Wireline Emissions

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

**Test Measurement Set up**




115 Vac 60 Hz

**Assets Utilized for ac Wireline Emission Testing**

| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|---|---|---|---|---|---|
| 158 | Barometer/Thermometer | Control Company | 4196 | E2846 | 30 Nov 2018 |
| 184 | Pulse Limiter | Rhode & Schwarz | ESH3Z2 | 357.8810.52 | 6 Oct 2018 |
| 190 | LISN (two-line V-network) | Rhode & Schwarz | ESH3Z5 | 836679/006 | 18 Oct 2018 |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 2 May 2018 |
| 307 | BNC-CABLE | Megaphase | 1689 1GVT4 | 15F50B002 | 6 Oct 2018 |
| 316 | Dell desktop computer workstation | Dell | Desktop | WS04 | Not Required |
| 372 | AC Variable PS | California Instruments | 1251P | L06951 | Cal when used |
| 388 | LISN (3 Phase) 9kHz - 30MHz | Rohde & Schwarz | ESH2-Z5 | 892107/022 | 20 Oct 2018 |
| 496 | MiTest Conducted Emissions test software. | MiCOM | Conducted Emissions Test Software Version 1.0 | 496 | Not Required |
| CCEMC01 | Confidence Check. | MiCOM | CCEMC01 | None | 2 Jul 2018 |

# 8. MEASUREMENT AND PRESENTATION OF TEST DATA

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

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

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


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

# 9. TEST RESULTS

## 9.1. 6 dB & 99% Bandwidth

| Conducted Test Conditions for 6 dB and 99% Bandwidth | | | |
|---|---|---|---|
| **Rules and Sections:** | FCC CFR 47: 15.247 (a)(2)<br>IC RSS-247:5.2 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | 6 dB and 99 % Bandwidth | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10:2013<br>KDB 558074 D01 Measurement Guidance V04 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

Test Procedure for 6 dB and 99% Bandwidth Measurement
The bandwidth at 6 dB and 99 % was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

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.

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

**KDB 558074 D01 DTS Measurement Guidance v04:**
**8.0 DTS bandwidth**
One of the following procedures may be used to determine the modulated *DTS bandwidth*.
**8.1 Option 1**
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 □ RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**8.2 Option 2**
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

| Equipment Configuration for 6 dB & 99% Bandwidth | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 2400.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured 6 dB Bandwidth (MHz) Port(s) | | | | 6 dB Bandwidth (MHz) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Highest | Lowest | KHz | MHz |
| 2401.2 | 1.087 | | | | 1.087 | 1.087 | ≥500.0 | -0.59 |
| 2440.8 | 1.087 | | | | 1.087 | 1.087 | ≥500.0 | -0.59 |
| 2476.8 | 1.097 | | | | 1.097 | 1.097 | ≥500.0 | -0.60 |

| Test Frequency | Measured 99% Bandwidth (MHz) Port(s) | | | | Maximum 99% Bandwidth (MHz) | | |
|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | | | |
| 2401.2 | 1.241 | | | | 1.241 | | |
| 2440.8 | 1.255 | | | | 1.255 | | |
| 2476.8 | 1.260 | | | | 1.260 | | |

| 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 6 dB & 99% Bandwidth | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 250.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OQPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured 6 dB Bandwidth (MHz) Port(s) | | | | 6 dB Bandwidth (MHz) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Highest | Lowest | KHz | MHz |
| 2405.0 | 1.583 | | | | 1.583 | 1.583 | ≥500.0 | -1.08 |
| 2440.0 | 1.583 | | | | 1.583 | 1.583 | ≥500.0 | -1.08 |
| 2480.0 | 1.583 | | | | 1.583 | 1.583 | ≥500.0 | -1.08 |

| Test Frequency | Measured 99% Bandwidth (MHz) Port(s) | | | | Maximum 99% Bandwidth (MHz) | | |
|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | | | |
| 2405.0 | 2.184 | | | | 2.184 | | |
| 2440.0 | 2.204 | | | | 2.204 | | |
| 2480.0 | 2.184 | | | | 2.184 | | |

| 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).

## 9.2. Conducted Output Power

| Conducted Test Conditions for Fundamental Emission Output Power | | | |
|---|---|---|---|
| **Rules and Sections:** | FCC CFR 47: 15.247 (b) & (c)<br>IC RSS-247:5.2 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Output Power | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10: 11.9.1.3<br>KDB 558074 D01 Measurement Guidance V04 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**KDB 558074 D01 DTS Measurement Guidance v04:**

**9.1.3 PKPM1 Peak-reading power meter method**
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

| Equipment Configuration for Peak Output Power | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 2400.00 KBit/s | **Antenna Gain (dBi):** | 3.50 |
| **Modulation:** | OFDM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Output Power (dBm) Port(s) | | | | Calculated Total Power Σ Port(s) | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | dBm | dBm | dB | |
| **2401.2** | 24.91 | | | | 24.91 | 30.00 | -5.09 | 21.00 |
| **2440.8** | 25.13 | | | | 25.13 | 30.00 | -4.87 | 21.00 |
| **2476.8** | 25.17 | | | | 25.17 | 30.00 | -4.83 | 21.00 |

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

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

| Equipment Configuration for Peak Output Power |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 250.00 KBit/s | **Antenna Gain (dBi):** | 3.50 |
| **Modulation:** | OQPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Output Power (dBm) Port(s) | | | | Calculated Total Power Σ Port(s) | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | dBm | dBm | dB | |
| **2405.0** | 22.91 | | | | 22.91 | 30.00 | -7.09 | 18.00 |
| **2440.0** | 23.02 | | | | 23.02 | 30.00 | -6.98 | 21.00 |
| **2480.0** | 9.58 | | | | 9.58 | 30.00 | -20.42 | 10.00 |

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

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

## 9.3. Power Spectral Density

| Conducted Test Conditions for Power Spectral Density | | | |
|---|---|---|---|
| **Rules and Sections:** | FCC CFR 47: 15.247 (e)<br>IC RSS-247:5.2 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Power Spectral Density | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10: 11.10.2<br>KDB 558074 D01 Measurement Guidance V04 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**KDB 558074 D01 DTS Measurement Guidance v04:**

**10.2 Method PKPSD (peak PSD)**

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.
a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 × DTS bandwidth.

c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.

d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.

f) Sweep time = auto couple.
g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

| Equipment Configuration for Power Spectral Density - Peak | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 2400.00 KBit/s | **Antenna Gain (dBi):** | 3.50 |
| **Modulation:** | OFDM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density Port(s) (dBm/3KHz) | | | | Amplitude Summation | Limit | Margin |
|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | dBm/3KHz | dBm/3KHz | dB |
| 2401.2 | 2.153 | | | | 2.153 | 8.0 | -5.8 |
| 2440.8 | 1.754 | | | | 1.754 | 8.0 | -6.2 |
| 2476.8 | 1.087 | | | | 1.087 | 8.0 | -6.9 |

| 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 Power Spectral Density - Peak | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 250.00 KBit/s | **Antenna Gain (dBi):** | 3.50 |
| **Modulation:** | OQPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density Port(s) (dBm/3KHz) | | | | Amplitude Summation | Limit | Margin |
|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | dBm/3KHz | dBm/3KHz | dB |
| 2405.0 | 4.309 | | | | 4.309 | 8.0 | -3.7 |
| 2440.0 | 1.233 | | | | 1.233 | 8.0 | -6.8 |
| 2480.0 | -7.857 | | | | -7.857 | 8.0 | -15.9 |

| 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).

## 9.4. Emission

### 9.4.1. Conducted Emissions

| Conducted Test Conditions for Transmitter Conducted Spurious and Band-Edge Emissions | | | |
|---|---|---|---|
| **Rules and Sections:** | FCC CFR 47:15.247 (d)<br>IC RSS-247:5.5 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Max Unwanted Emission Levels | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10:2013: Sect 6.10.4, Sect 11.11; 11.12; 11.13<br>KDB 558074 D01 Measurement Guidance V04; Sect 11; Sect 12. | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**Test Procedure for Conducted Spurious and Band-Edge Emissions**

Conducted Spurious Emissions and Band-edge were measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate frequency.

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

**From ANSI C63.10 sect 11.11 Emissions in non-restricted frequency bands:**

11.11.2: Reference Level easurement

The channel found to contain the maximum PSD level can be used to establish the reference level.

11.11.3 Emission level measurement

a) Set the center frequency and span to encompass frequency range to be measured.

b) Set the RBW = 100 kHz.

c) Set the VBW ≥ 3 × RBW.

d) Detector = peak.

e) Sweep time = auto couple.

f) Trace mode = max hold.

g) Allow trace to fully stabilize.

h) Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b).

**6.10.4 Authorized-band band-edge measurements (relative method)**
These procedures are applicable for determining compliance at authorized-band band-edges where the requirements are expressed as a value relative to the in-band signal level. Procedures for determining compliance with field strength limits at or close to the band-edges are given in 6.10.6 (see also Table A.2).

For other than frequency-hopping devices, this test sequence shall be performed once. For devices that support frequency hopping, this test sequence shall be performed twice: once with the hopping function turned OFF and then repeated with the hopping function turned ON. The purpose of the test with the hopping function turned on is to confirm that the RF power remains OFF while the device is changing frequencies, and that the oscillator stabilizes at the new frequency before RF power is turned back ON. Overshoot of any oscillator, including phase-lock-loop stabilized oscillators, can cause the device to be temporarily tuned to frequencies outside the authorized band, and it is important that no transmissions occur during such temporary periods. Particular attention to the hopping sequence requirements specified below is needed in the case of adaptive frequency-hopping devices:

a) Connect the EMI receiver or spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described in step e) (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

b) Set the EUT to the lowest frequency channel (for the hopping on test, the hopping sequence shall include the lowest frequency channel).

c) Set the EUT to operate at maximum output power and 100% duty cycle, or equivalent “normal mode of operation” as specified in 6.10.3.

d) If using the radiated method, then use the applicable procedure(s) of 6.4, 6.5, or 6.6, and orient the EUT and measurement antenna positions to produce the highest emission level.

e) Perform the test as follows:

1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.

2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

3) Attenuation: Auto (at least 10 dB preferred).

4) Sweep time: Coupled.

5) Resolution bandwidth: 100 kHz.

6) Video bandwidth: 300 kHz.

7) Detector: Peak.

8) Trace: Max hold.

f) Allow the trace to stabilize. For the test with the hopping function turned ON, this can take several minutes to achieve a reasonable probability of intercepting any emissions due to oscillator overshoot.

### 9.4.1.1. Conducted Spurious Emissions

| Equipment Configuration for Conducted Spurious Emissions - Peak | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 2400.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Frequency Range | Conducted Spurious Emissions - Peak (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Port a | | Port b | | Port c | | Port d | |
| MHz | MHz | SE | Limit | SE | Limit | SE | Limit | SE | Limit |
| **2401.2** | 30.0 - 26000.0 | -40.066 | -2.75 | | | | | | |
| **2440.8** | 30.0 - 26000.0 | -41.166 | -3.99 | | | | | | |
| **2476.8** | 30.0 - 26000.0 | -40.304 | -4.22 | | | | | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-05 MEASUREMENT OF SPURIOUS EMISSIONS |
| Measurement Uncertainty: | <=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB |

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

| Equipment Configuration for Conducted Spurious Emissions - Peak | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99 |
| **Data Rate:** | 250.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OQPSK | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Frequency Range | Conducted Spurious Emissions - Peak (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Port a | | Port b | | Port c | | Port d | |
| MHz | MHz | SE | Limit | SE | Limit | SE | Limit | SE | Limit |
| **2405.0** | 30.0 - 26000.0 | 14.953 | -5.05 | | | | | | |
| **2440.0** | 30.0 - 26000.0 | -40.595 | -7.43 | | | | | | |
| **2480.0** | 30.0 - 26000.0 | -40.440 | -17.07 | | | | | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-05 MEASUREMENT OF SPURIOUS EMISSIONS |
| Measurement Uncertainty: | <=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB |

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

### 9.4.1.2. Conducted Band-Edge Emissions

| Equipment Configuration for Conducted Low Band-Edge Emissions - Peak |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 2400.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

| Test Measurement Results |
|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| **Channel Frequency:** | 2401.2 MHz | | | | | |
| **Band-Edge Frequency:** | 2400.0 MHz | | | | | |
| **Test Frequency Range:** | 2300.0 - 2403.0 MHz | | | | | |
| **Port(s)** | **Band-Edge Markers and Limit** | | | **Revised Limit** | | **Margin** |
| | **M1 Amplitude (dBm)** | **Plot Limit (dBm)** | **M2 Frequency (MHz)** | **Amplitude (dBm)** | **M2A Frequency (MHz)** | **(MHz)** |
| **a** | -14.10 | -1.58 | 2400.30 | | | -0.300 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-05 MEASUREMENT OF SPURIOUS EMISSIONS |
| Measurement Uncertainty: | <=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB |

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

| Equipment Configuration for Conducted Low Band-Edge Emissions - Peak |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 250.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OQPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Channel Frequency:** | 2405.0 MHz | | | | | |
| **Band-Edge Frequency:** | 2400.0 MHz | | | | | |
| **Test Frequency Range:** | 2290.0 - 2410.0 MHz | | | | | |
| **Port(s)** | **Band-Edge Markers and Limit** | | | **Revised Limit** | | **Margin** |
| | **M1 Amplitude (dBm)** | **Plot Limit (dBm)** | **M2 Frequency (MHz)** | **Amplitude (dBm)** | **M2A Frequency (MHz)** | **(MHz)** |
| **a** | -38.08 | -3.43 | 2403.50 | | | -3.500 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-05 MEASUREMENT OF SPURIOUS EMISSIONS |
| Measurement Uncertainty: | <=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB |

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

| Equipment Configuration for Conducted High Band-Edge Emissions - Peak |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 2400.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Channel Frequency:** | 2476.8 MHz | | | | | |
| **Band-Edge Frequency:** | 2483.5 MHz | | | | | |
| **Test Frequency Range:** | 2475.0 - 2600.0 MHz | | | | | |
| **Port(s)** | **Band-Edge Markers and Limit** | | | **Revised Limit** | | **Margin** |
| | **M3 Amplitude (dBm)** | **Plot Limit (dBm)** | **M2 Frequency (MHz)** | **Amplitude (dBm)** | **M2A Frequency (MHz)** | **(MHz)** |
| **a** | -40.41 | -1.99 | 2477.80 | | | -5.700 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-05 MEASUREMENT OF SPURIOUS EMISSIONS |
| Measurement Uncertainty: | <=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB |

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

| Equipment Configuration for Conducted High Band-Edge Emissions - Peak |
|---|

| | | | |
|---|---|---|---|
| **Variant:** | DSSS | **Duty Cycle (%):** | 99.0 |
| **Data Rate:** | 250.00 KBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OQPSK | **Beam Forming Gain (Y)(dB):** | Not Applicable |
| **TPC:** | Not Applicable | **Tested By:** | SB |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Channel Frequency:** | 2480.0 MHz | | | | | |
| **Band-Edge Frequency:** | 2483.5 MHz | | | | | |
| **Test Frequency Range:** | 2475.0 - 2600.0 MHz | | | | | |
| **Port(s)** | **Band-Edge Markers and Limit** | | | **Revised Limit** | | **Margin** |
| | **M3 Amplitude (dBm)** | **Plot Limit (dBm)** | **M2 Frequency (MHz)** | **Amplitude (dBm)** | **M2A Frequency (MHz)** | **(MHz)** |
| **a** | -44.91 | -15.01 | 2481.30 | | | -2.200 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-05 MEASUREMENT OF SPURIOUS EMISSIONS |
| Measurement Uncertainty: | <=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB |

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

## 9.4.2. Radiated Emissions

| Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions (Restricted Bands) | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47: Part 15.205<br>IC RSS-GEN:8.9, 8.10 | **Ambient Temp. (ºC):** | 20.0 - 24.5 |
| **Test Heading:** | Radiated Spurious and Band-Edge Emissions | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.10: 6.3, 6.5 & 6.6, 6.10<br>KDB 558074 D01 Measurement Guidance V04 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

**Test Procedure for Radiated Spurious and Band-Edge Emissions** (Restricted Bands)
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 and waveguide 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 Radiated Spurious and Band-Edge Measurement were per the Radiated Test Set-up specified in this document.

Limits for Restricted Bands
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 or Waveguide Loss

Example:
Given receiver input reading of 51.5 dBmV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength (FS) of the measured emission is:

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

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

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

**Restricted Bands of Operation (15.205)**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 9.4.2.1. TX Spurious & Restricted Band Emissions

**Antenna:** Tai Sheng Chen 155-0010-00

| Equipment Configuration for TX Spurious & Restricted Band Emissions | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2401.20 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2401.25 | 57.85 | 2.24 | -12.41 | 47.68 | Fundamental | Horizontal | 100 | 95 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2440.84 | 62.59 | 2.27 | -12.06 | 52.80 | Fundamental | Horizontal | 100 | 0 | -- | -- | |
| #2 | 12204.26 | 54.92 | 4.67 | -4.74 | 54.85 | Max Peak | Horizontal | 185 | 123 | 74.0 | -19.2 | Pass |
| #3 | 12204.26 | 38.81 | 4.67 | -4.74 | 38.74 | Max Avg | Horizontal | 185 | 123 | 54.0 | -15.3 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2476.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00 - 18000.00 MHz**

| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 2476.89 | 63.21 | 2.25 | -11.86 | 53.60 | Fundamental | Horizontal | 200 | 0 | -- | -- | |
| #2 | 12383.71 | 57.31 | 4.84 | -5.54 | 56.61 | Max Peak | Horizontal | 189 | 127 | 74.0 | -17.4 | Pass |
| #3 | 12383.71 | 39.56 | 4.84 | -5.54 | 38.86 | Max Avg | Horizontal | 189 | 127 | 54.0 | -15.1 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2405.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00 - 18000.00 MHz**

| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 2405.23 | 58.78 | 2.24 | -12.40 | 48.62 | Fundamental | Horizontal | 200 | 0 | -- | -- | |
| #2 | 12027.37 | 54.29 | 4.44 | -6.98 | 51.75 | Max Peak | Horizontal | 174 | 94 | 74.0 | -22.3 | Pass |
| #3 | 12027.37 | 42.62 | 4.44 | -6.98 | 40.08 | Max Avg | Horizontal | 174 | 94 | 54.0 | -13.9 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00 - 18000.00 MHz**

| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 2440.51 | 61.29 | 2.27 | -12.06 | 51.50 | Fundamental | Horizontal | 200 | 0 | -- | -- | |
| #2 | 12202.51 | 52.82 | 4.67 | -4.76 | 52.73 | Max Peak | Horizontal | 174 | 116 | 74.0 | -21.3 | Pass |
| #3 | 12202.51 | 40.60 | 4.67 | -4.76 | 40.51 | Max Avg | Horizontal | 174 | 116 | 54.0 | -13.5 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2480.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00 - 18000.00 MHz**

| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 2464.93 | 43.64 | 2.28 | -11.96 | 33.96 | Fundamental | Horizontal | 200 | 0 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

## Antenna: WP WPANT30017-CA

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2401.20 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00 - 18000.00 MHz**

| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 2401.26 | 60.32 | 2.24 | -12.41 | 50.15 | Fundamental | Vertical | 100 | 98 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2440.73 | 57.03 | 2.27 | -12.06 | 47.24 | Fundamental | Vertical | 100 | 191 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2476.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2476.89 | 56.94 | 2.25 | -11.86 | 47.33 | Fundamental | Vertical | 100 | 174 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2405.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2405.56 | 79.90 | 2.24 | -12.39 | 69.75 | Fundamental | Horizontal | 100 | 159 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2439.51 | 63.04 | 2.27 | -12.08 | 53.23 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| #2 | 7318.50 | 54.60 | 3.49 | -7.86 | 50.23 | Max Peak | Vertical | 197 | 191 | 74.0 | -23.8 | Pass |
| #3 | 7318.50 | 42.91 | 3.49 | -7.86 | 38.54 | Max Avg | Vertical | 197 | 191 | 54.0 | -15.5 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2480.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2480.54 | 63.43 | 2.25 | -11.89 | 53.79 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| #2 | 7438.45 | 55.84 | 3.57 | -8.03 | 51.38 | Max Peak | Vertical | 197 | 186 | 74.0 | -22.6 | Pass |
| #3 | 7438.45 | 44.78 | 3.57 | -8.03 | 40.32 | Max Avg | Vertical | 197 | 186 | 54.0 | -13.7 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

## Antenna: WP WPANT40020-SA

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2401.20 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2268.18 | 62.84 | 2.22 | -12.71 | 52.35 | Max Peak | Horizontal | 186 | 49 | 74.0 | -21.7 | Pass |
| #2 | 2268.18 | 48.79 | 2.22 | -12.71 | 38.30 | Max Avg | Horizontal | 186 | 49 | 54.0 | -15.7 | Pass |
| #3 | 2401.36 | 53.70 | 2.24 | -12.41 | 43.53 | Fundamental | Horizontal | 100 | 112 | -- | -- | |
| #4 | 4802.63 | 61.04 | 2.96 | -12.40 | 51.60 | Max Peak | Horizontal | 123 | 125 | 74.0 | -22.4 | Pass |
| #5 | 4802.63 | 48.22 | 2.96 | -12.40 | 38.78 | Max Avg | Horizontal | 123 | 125 | 54.0 | -15.2 | Pass |
| #6 | 9604.86 | 50.19 | 4.56 | -6.62 | 48.13 | Peak (NRB) | Horizontal | 100 | 179 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2440.84 | 64.81 | 2.27 | -12.06 | 55.02 | Fundamental | Horizontal | 101 | 151 | -- | -- | |
| #2 | 9763.38 | 47.25 | 4.33 | -5.90 | 45.68 | Peak (NRB) | Vertical | 101 | 0 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2476.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

**1000.00 - 18000.00 MHz**

| Num | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB | Level dBµV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 2257.71 | 59.36 | 2.18 | -12.63 | 48.91 | Max Peak | Horizontal | 178 | 38 | 74.0 | -25.1 | Pass |
| #2 | 2257.71 | 45.53 | 2.18 | -12.63 | 35.08 | Max Avg | Horizontal | 178 | 38 | 54.0 | -18.9 | Pass |
| #3 | 2477.00 | 59.50 | 2.25 | -11.86 | 49.89 | Fundamental | Horizontal | 100 | 58 | -- | -- | |
| #4 | 9907.17 | 55.00 | 4.42 | -7.02 | 52.40 | Peak (NRB) | Horizontal | 100 | 231 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2405.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2405.34 | 58.18 | 2.24 | -12.40 | 48.02 | Fundamental | Vertical | 100 | 136 | -- | -- | |
| #2 | 4810.93 | 58.88 | 2.95 | -12.33 | 49.50 | Max Peak | Horizontal | 196 | 144 | 74.0 | -24.5 | Pass |
| #3 | 4810.93 | 49.73 | 2.95 | -12.33 | 40.35 | Max Avg | Horizontal | 196 | 144 | 54.0 | -13.7 | Pass |
| #4 | 9618.30 | 49.39 | 4.35 | -6.65 | 47.09 | Peak (NRB) | Horizontal | 200 | 136 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2440.51 | 65.16 | 2.27 | -12.06 | 55.37 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| #2 | 9758.10 | 49.61 | 4.37 | -5.96 | 48.02 | Peak (NRB) | Horizontal | 200 | 113 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2480.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2464.93 | 46.90 | 2.28 | -11.96 | 37.22 | Fundamental | Vertical | 200 | 0 | -- | -- | |
| #2 | 9921.83 | 50.65 | 4.48 | -6.96 | 48.17 | Peak (NRB) | Horizontal | 200 | 145 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

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

Lower Band Edge Emissions

| Tai Sheng Chen 155-0010-00 | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| OFDM | 2401.20 | 2390.00 | 60.01 | 47.18 | 21 |
| OQPSK | 2405.00 | 2390.00 | 59.11 | 45.77 | 21 |

| WP WPANT30017-CA | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| OFDM | 2401.20 | 2390.00 | 59.40 | 45.77 | 21 |
| OQPSK | 2405.00 | 2390.00 | 59.02 | 45.76 | 21 |

| WP WPANT40020-SA | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| OFDM | 2401.20 | 2390.00 | 62.74 | 48.99 | 21 |
| OQPSK | 2405.00 | 2390.00 | 59.43 | 46.26 | 21 |

Upper Band Edge Emissions

| Tai Sheng Chen 155-0010-00 | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| OFDM | 2476.80 | 2483.50 | 64.28 | 49.51 | 21 |
| OQPSK | 2480.00 | 2483.50 | 64.46 | 52.42 | 10 |

| WP WPANT30017-CA | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| OFDM | 2476.80 | 2483.50 | 62.52 | 48.40 | 21 |
| OQPSK | 2480.00 | 2483.50 | 63.82 | 51.91 | 18 |

| WP WPANT40020-SA | | Band-Edge Freq | Limit 74.0dBµV/m | Limit 54.0dBµV/m | Power Setting |
|---|---|---|---|---|---|
| Operational Mode | Operating Frequency (MHz) | MHz | dBµV/m | dBµV/m | |
| OFDM | 2476.80 | 2483.50 | 63.56 | 50.18 | 21 |
| OQPSK | 2480.00 | 2483.50 | 63.05 | 51.08 | 10 |

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2401.20 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2354.31 | 26.01 | 2.23 | 31.77 | 60.01 | Max Peak | Horizontal | 199 | 89 | 74.0 | -14.0 | Pass |
| #2 | 2390.00 | 12.96 | 2.26 | 31.96 | 47.18 | Max Avg | Horizontal | 199 | 89 | 54.0 | -6.8 | Pass |
| #3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC, | | | | | | | | | | | | |

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

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2405.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2389.90 | 24.89 | 2.26 | 31.96 | 59.11 | Max Peak | Horizontal | 171 | 82 | 74.0 | -14.9 | Pass |
| #2 | 2390.00 | 11.55 | 2.26 | 31.96 | 45.77 | Max Avg | Horizontal | 171 | 82 | 54.0 | -8.2 | Pass |
| #3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4V DC | | | | | | | | | | | | |

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2401.20 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2374.29 | 25.29 | 2.24 | 31.87 | 59.40 | Max Peak | Vertical | 156 | 148 | 74.0 | -14.6 | Pass |
| #2 | 2390.00 | 11.55 | 2.26 | 31.96 | 45.77 | Max Avg | Vertical | 156 | 148 | 54.0 | -8.2 | Pass |
| #3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC, | | | | | | | | | | | | |

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2405.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2383.62 | 24.83 | 2.26 | 31.93 | 59.02 | Max Peak | Vertical | 171 | 209 | 74.0 | -15.0 | Pass |
| #2 | 2390.00 | 11.54 | 2.26 | 31.96 | 45.76 | Max Avg | Vertical | 171 | 209 | 54.0 | -8.2 | Pass |
| #3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4V DC | | | | | | | | | | | | |

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2401.20 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2390.00 | 14.77 | 2.26 | 31.96 | 48.99 | Max Avg | Horizontal | 195 | 163 | 54.0 | -5.0 | Pass |
| #2 | 2390.00 | 28.52 | 2.26 | 31.96 | 62.74 | Max Peak | Horizontal | 195 | 163 | 74.0 | -11.3 | Pass |
| #3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC | | | | | | | | | | | | |

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

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2405.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2388.56 | 25.22 | 2.26 | 31.95 | 59.43 | Max Peak | Horizontal | 200 | 172 | 74.0 | -14.6 | Pass |
| #2 | 2390.00 | 12.04 | 2.26 | 31.96 | 46.26 | Max Avg | Horizontal | 200 | 172 | 54.0 | -7.7 | Pass |
| #3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4V DC | | | | | | | | | | | | |

**Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | Not Applicable | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2476.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #2 | 2484.86 | 29.70 | 2.25 | 32.33 | 64.28 | Max Peak | Horizontal | 186 | 88 | 74.0 | -9.7 | Pass |
| #3 | 2488.13 | 14.93 | 2.25 | 32.33 | 49.51 | Max Avg | Horizontal | 186 | 88 | 54.0 | -4.5 | Pass |
| #1 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC, | | | | | | | | | | | | |

**Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | Not Applicable | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2480.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 10 | **Tested By:** | JMH |

**Test Measurement Results**

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2483.50 | 17.84 | 2.25 | 32.33 | 52.42 | Max Avg | Horizontal | 166 | 86 | 54.0 | -1.6 | Pass |
| #2 | 2483.50 | 29.88 | 2.25 | 32.33 | 64.46 | Max Peak | Horizontal | 166 | 86 | 74.0 | -9.5 | Pass |
| #3 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC, Power reduced to meet band edge limit | | | | | | | | | | | | |

**Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2476.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #2 | 2484.45 | 27.94 | 2.25 | 32.33 | 62.52 | Max Peak | Vertical | 156 | 148 | 74.0 | -11.5 | Pass |
| #3 | 2488.13 | 13.82 | 2.25 | 32.33 | 48.40 | Max Avg | Vertical | 156 | 148 | 54.0 | -5.6 | Pass |
| #1 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC, | | | | | | | | | | | | |

**Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2480.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 18 | **Tested By:** | JMH |

**Test Measurement Results**

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2483.50 | 17.33 | 2.25 | 32.33 | 51.91 | Max Avg | Vertical | 152 | 8 | 54.0 | -2.1 | Pass |
| #2 | 2483.50 | 29.24 | 2.25 | 32.33 | 63.82 | Max Peak | Vertical | 152 | 8 | 74.0 | -10.2 | Pass |
| #3 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC, | | | | | | | | | | | | |

**Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | Not Applicable | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2476.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

**Test Measurement Results**

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #2 | 2488.54 | 15.61 | 2.25 | 32.32 | 50.18 | Max Avg | Horizontal | 189 | 150 | 54.0 | -3.8 | Pass |
| #3 | 2490.02 | 28.99 | 2.25 | 32.32 | 63.56 | Max Peak | Horizontal | 189 | 150 | 74.0 | -10.4 | Pass |
| #1 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC | | | | | | | | | | | | |

**Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2480.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 10 | **Tested By:** | JMH |

**Test Measurement Results**

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 2483.50 | 16.50 | 2.25 | 32.33 | 51.08 | Max Avg | Horizontal | 195 | 163 | 54.0 | -2.9 | Pass |
| #2 | 2483.50 | 28.47 | 2.25 | 32.33 | 63.05 | Max Peak | Horizontal | 195 | 163 | 74.0 | -11.0 | Pass |
| #3 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |
| Test Notes: EUT powered by 4 volt DC | | | | | | | | | | | | |

### 9.4.3. Digital Emissions (0.03 - 1 GHz) and Receiver Emissions (0.03 - 18 GHz)

| Radiated Test Conditions for Radiated Digital Receiver Emissions (0.03 – 18 GHz) | | | |
|---|---|---|---|
| **Rules and Sections:** | FCC CFR 47:15.209,<br>ICES-003: 6.2<br>RSS-GEN: 7 | **Ambient Temp. (ºC):** | 20.0 - 24.5 |
| **Test Heading:** | Digital Emissions, | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.4: 8.3 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

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

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

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

FS = R + AF + CORR

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

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

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

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

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

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

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

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

| Frequency (MHz) | Field Strength | | Measurement Distance (m) |
|---|---|---|---|
| | µV/m (microvolts/meter) | dBµV/m (dB microvolts/meter) | |
| 0.009-0.490 | 2400/F(kHz) | -- | 300 |
| 0.490-1.705 | 24000/F(kHz) | -- | 30 |
| 1.705-30.0 | 30 | 29.5 | 30 |
| 30-88 | 100** | 40 | 3 |
| 88-216 | 150** | 43.5 | 3 |
| 216-960 | 200** | 46.0 | 3 |
| Above 960 | 500 | 54.0 | 3 |

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241. (b) In the emission table above, the tighter limit applies at the band edges. (c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. (e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part. (f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device. (g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

USB Active and Downloading, Connected to SBC Computer

**Equipment Configuration for Radiated Digital Emissions**

| | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 3.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | |
| **Channel Frequency (MHz):** | 0.00 | **Data Rate:** | |
| **Power Setting:** | NA | **Tested By:** | JMH |

**Test Measurement Results**

| 30.00 - 1000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| #1 | 39.02 | 43.91 | 3.47 | -17.37 | 30.01 | MaxQP | Vertical | 104 | 71 | 40.0 | -10.0 | Pass |
| #2 | 431.96 | 49.59 | 4.99 | -14.31 | 40.27 | MaxQP | Horizontal | 204 | 154 | 46.0 | -5.7 | Pass |
| #3 | 443.99 | 49.98 | 5.02 | -14.21 | 40.79 | MaxQP | Horizontal | 101 | 356 | 46.0 | -5.2 | Pass |
| #4 | 456.01 | 50.18 | 5.04 | -13.93 | 41.29 | MaxQP | Horizontal | 282 | 349 | 46.0 | -4.7 | Pass |
| #5 | 468.02 | 47.67 | 5.07 | -13.37 | 39.37 | MaxQP | Horizontal | 101 | 301 | 46.0 | -6.6 | Pass |
| #6 | 503.99 | 48.65 | 5.20 | -13.23 | 40.62 | MaxQP | Horizontal | 159 | 160 | 46.0 | -5.4 | Pass |
| Test Notes: Powered by AC/DC PS. Digital Communications over USB. Connected to SBC. | | | | | | | | | | | | |

| Equipment Configuration for Digital Emissions (0.03 - 1 GHz) | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

| Test Measurement Results |
|---|
| Click here to view measurement data... |
| Test Notes: Powered by AC/DC PS. Digital Communications over USB. Connected to SBC. (NIC 511-0602-14) |

| Equipment Configuration for Digital Emissions (0.03 - 1 GHz) | | | |
|---|---|---|---|
| **Antenna:** | Tai Sheng Chen 155-0010-00 | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 5.00 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

| Test Measurement Results |
|---|
| Click here to view measurement data... |
| Test Notes: EUT powered by 4V DC |

| Equipment Configuration for Digital Emissions (0.03 - 1 GHz) | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

| Test Measurement Results |
|---|
| Click here to view measurement data... |
| Test Notes: EUT powered by 4V DC |

| Equipment Configuration for Digital Emissions (0.03 - 1 GHz) | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT30017-CA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 4.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

| Test Measurement Results |
|---|
| Click here to view measurement data... |
| Test Notes: EUT powered by 4V DC |

| Equipment Configuration for Radiated Digital Emissions (0.03 - 1 GHz) | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OFDM |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OFDM |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.80 | **Data Rate:** | 2400.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

| Test Measurement Results |
|---|
| Click here to view measurement data... |
| Test Notes: EUT powered by 4V DC |

| Equipment Configuration for Digital Emissions (0.03 - 1 GHz) | | | |
|---|---|---|---|
| **Antenna:** | WP WPANT40020-SA | **Variant:** | OQPSK |
| **Antenna Gain (dBi):** | 3.50 | **Modulation:** | OQPSK |
| **Beam Forming Gain (Y):** | Not Applicable | **Duty Cycle (%):** | 99 |
| **Channel Frequency (MHz):** | 2440.00 | **Data Rate:** | 250.00 KBit/s |
| **Power Setting:** | 21 | **Tested By:** | JMH |

| Test Measurement Results |
|---|
| Click here to view measurement data... |
| Test Notes: EUT powered by 4V DC |

### 9.4.4. AC Wireline Emissions

| Test Conditions for ac Wireline Emissions (0.15 – 30 MHz) | | | |
|---|---|---|---|
| **Rules and Sections:** | FCC CFR 47:15.207<br>ICES-003:6.1 | **Ambient Temp. (ºC):** | 20.0 - 24.5 |
| **Test Heading:** | Conducted (ac Wireline Emissions) | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | ANSI C63.4: 7.3 | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | See Normative References | | |

Test Procedure for ac Wireline Emissions (0.15 – 30 MHz)
The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Test configuration and setup for ac Wireline Emission Measurement were per the ac Wireline Test Set-up specified in this document.

**Limits for ac Wireline Emissions**

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency of Emission (MHz) | Conducted Limit (dBmV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency

The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

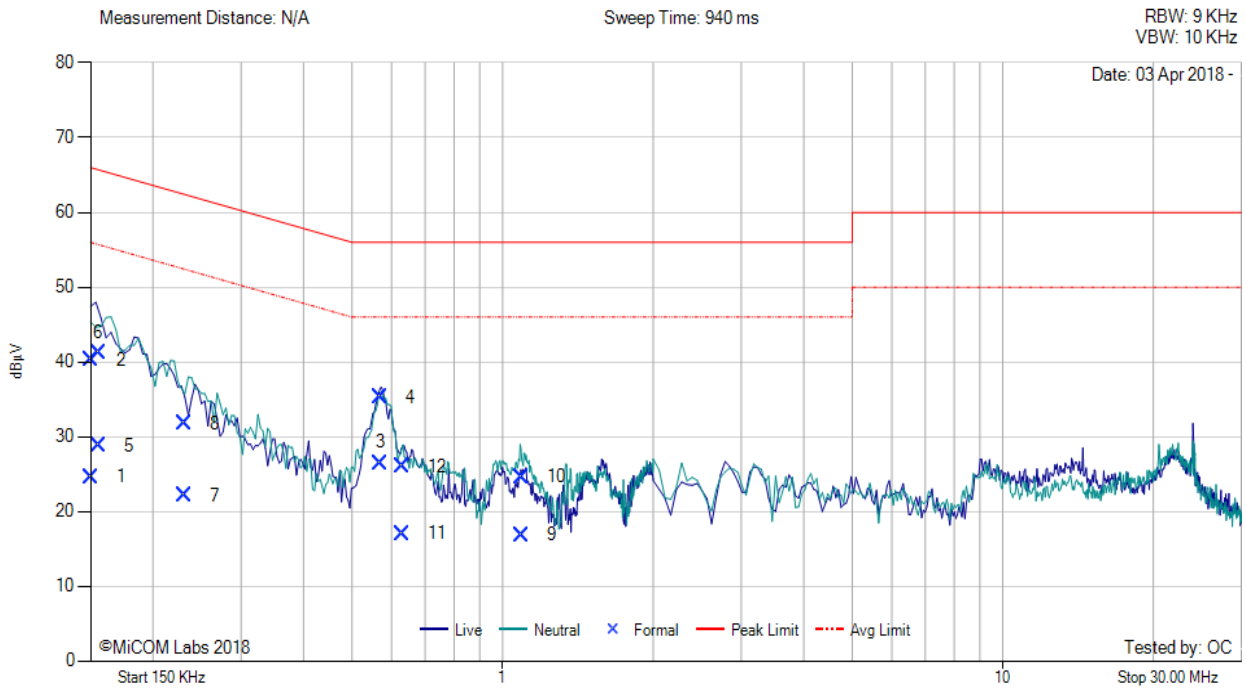
Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

## Measurement Results

| | | | |
|---|---|---|---|
| Model: | NIC-510-06 | Configuration tested: | AC/DC POWERED |
| Input power: | 120$V_{AC}$/60Hz | Standard: | FCC 15B |

MiTest

Variant: AC Wireline, Test Freq: 0.15 - 30 MHz




| Num | Frequency MHz | Raw dBµV | Cable Loss dB | Factor dB | Total Correction dBµV | Corrected Value dBµV | Measurement Type | Line | Limit dBµV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.150 | 14.64 | 0.05 | 9.92 | 9.97 | 24.61 | Max Avg | Live | 56.0 | -31.4 | Pass |
| 2 | 0.150 | 30.27 | 0.05 | 9.92 | 9.97 | 40.24 | Max Qp | Live | 66.0 | -25.8 | Pass |
| 3 | 0.570 | 16.43 | 0.10 | 9.92 | 10.02 | 26.45 | Max Avg | Live | 46.0 | -19.6 | Pass |
| 4 | 0.570 | 25.29 | 0.10 | 9.92 | 10.02 | 35.31 | Max Qp | Live | 56.0 | -20.7 | Pass |
| 5 | 0.156 | 18.81 | 0.05 | 9.92 | 9.97 | 28.78 | Max Avg | Neutral | 55.8 | -27.1 | Pass |
| 6 | 0.156 | 31.21 | 0.05 | 9.92 | 9.97 | 41.18 | Max Qp | Neutral | 65.8 | -24.7 | Pass |
| 7 | 0.231 | 12.13 | 0.07 | 9.92 | 9.99 | 22.12 | Max Avg | Live | 53.7 | -31.6 | Pass |
| 8 | 0.231 | 21.76 | 0.07 | 9.92 | 9.99 | 31.75 | Max Qp | Live | 63.7 | -31.9 | Pass |
| 9 | 1.091 | 6.83 | 0.08 | 9.94 | 10.02 | 16.85 | Max Avg | Neutral | 46.0 | -29.2 | Pass |
| 10 | 1.091 | 14.61 | 0.08 | 9.94 | 10.02 | 24.63 | Max Qp | Neutral | 56.0 | -31.4 | Pass |
| 11 | 0.631 | 6.98 | 0.11 | 9.93 | 10.04 | 17.02 | Max Avg | Neutral | 46.0 | -29.0 | Pass |
| 12 | 0.631 | 15.94 | 0.11 | 9.93 | 10.04 | 25.98 | Max Qp | Neutral | 56.0 | -30.0 | Pass |

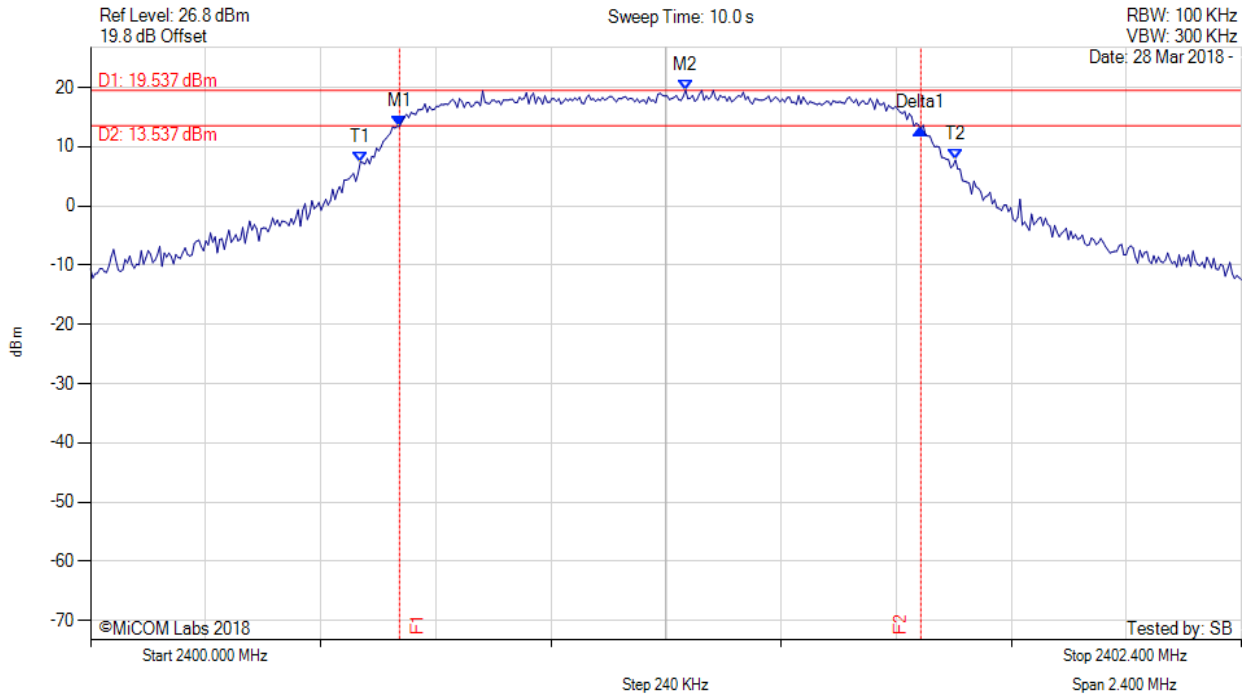
**Test Notes:** Model: NIC 510-06. AC/DC powered at 120Vac, 60Hz.

# A. APPENDIX - GRAPHICAL IMAGES

## A.1. 6 dB & 99% Bandwidth

6 dB & 99% BANDWIDTH

Variant: 2400 kbps_OFDM, Channel: 2401.20 MHz, Chain a, Temp: 20, Voltage:  Vdc

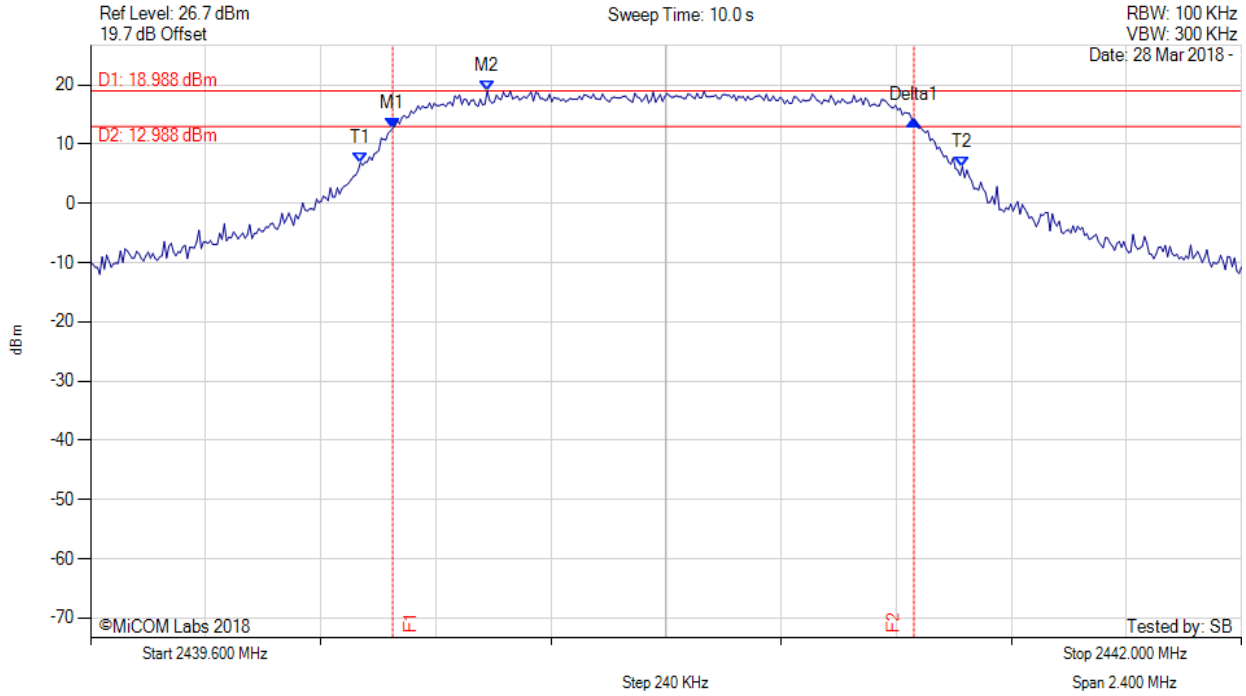



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2400.644 MHz : 13.446 dBm<br>M2 : 2401.241 MHz : 19.537 dBm<br>Delta1 : 1.087 MHz : -0.354 dB<br>T1 : 2400.563 MHz : 7.463 dBm<br>T2 : 2401.804 MHz : 7.760 dBm<br>OBW : 1.241 MHz | Measured 6 dB Bandwidth: 1.087 MHz<br>Limit: ≥500.0 kHz<br>Margin: -0.59 MHz |

back to matrix

6 dB & 99% BANDWIDTH

Variant: 2400 kbps_OFDM, Channel: 2440.80 MHz, Chain a, Temp: 20, Voltage: Vdc

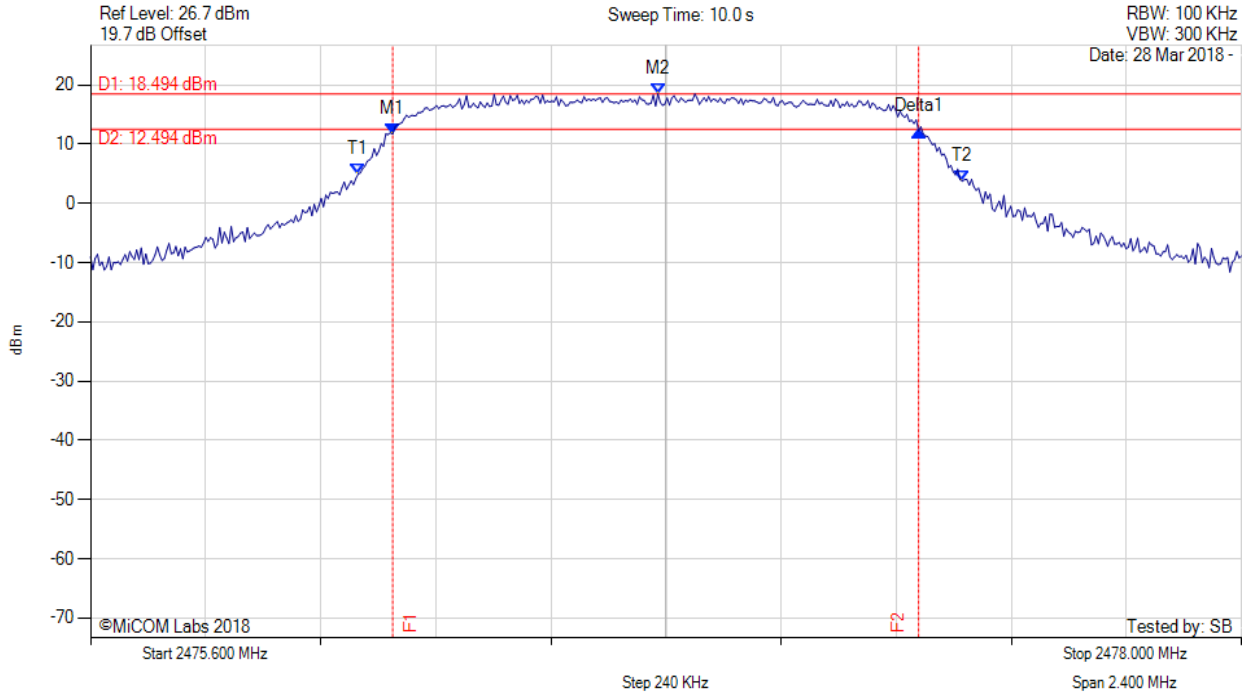



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2440.230 MHz : 12.669 dBm<br>M2 : 2440.427 MHz : 18.988 dBm<br>Delta1 : 1.087 MHz : 1.479 dB<br>T1 : 2440.163 MHz : 6.875 dBm<br>T2 : 2441.418 MHz : 6.204 dBm<br>OBW : 1.255 MHz | Measured 6 dB Bandwidth: 1.087 MHz<br>Limit: ≥500.0 kHz<br>Margin: -0.59 MHz |

back to matrix

6 dB & 99% BANDWIDTH

Variant: 2400 kbps_OFDM, Channel: 2476.80 MHz, Chain a, Temp: 20, Voltage: Vdc

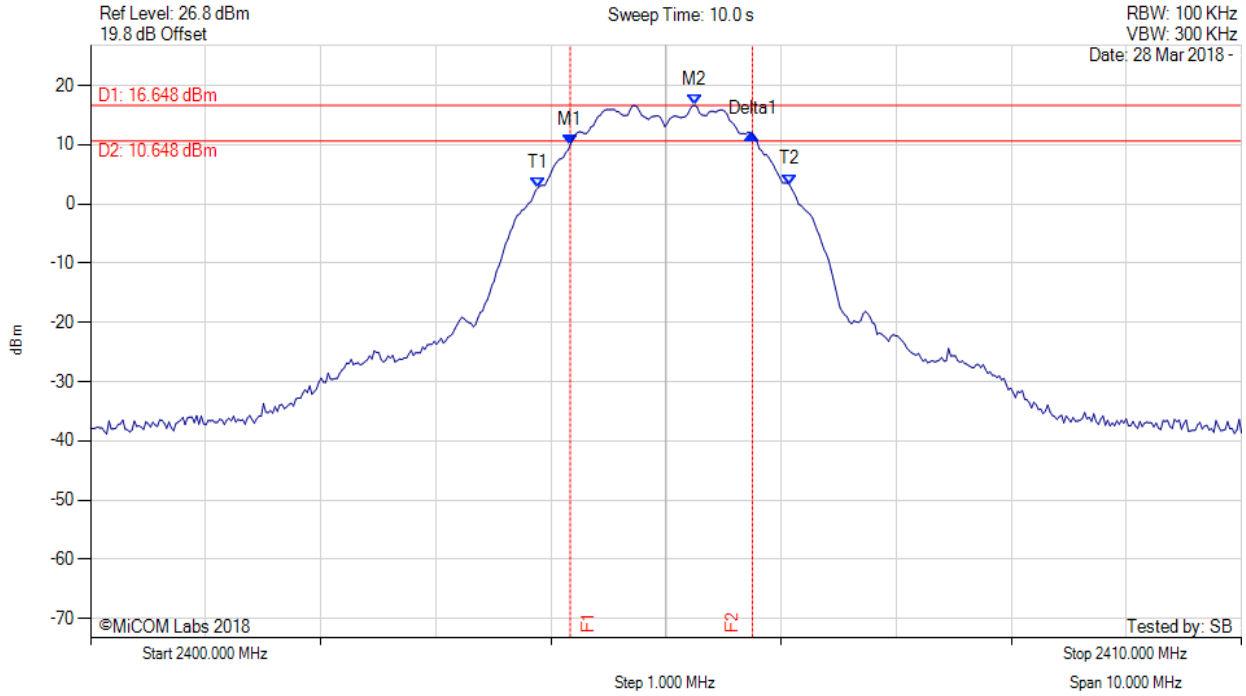



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2476.230 MHz : 11.726 dBm<br>M2 : 2476.783 MHz : 18.494 dBm<br>Delta1 : 1.097 MHz : 0.555 dB<br>T1 : 2476.158 MHz : 4.945 dBm<br>T2 : 2477.418 MHz : 3.759 dBm<br>OBW : 1.260 MHz | Measured 6 dB Bandwidth: 1.097 MHz<br>Limit: ≥500.0 kHz<br>Margin: -0.60 MHz |

back to matrix

6 dB & 99% BANDWIDTH

Variant: 250 kbps_OQPSK, Channel: 2405.00 MHz, Chain a, Temp: 20, Voltage: Vdc

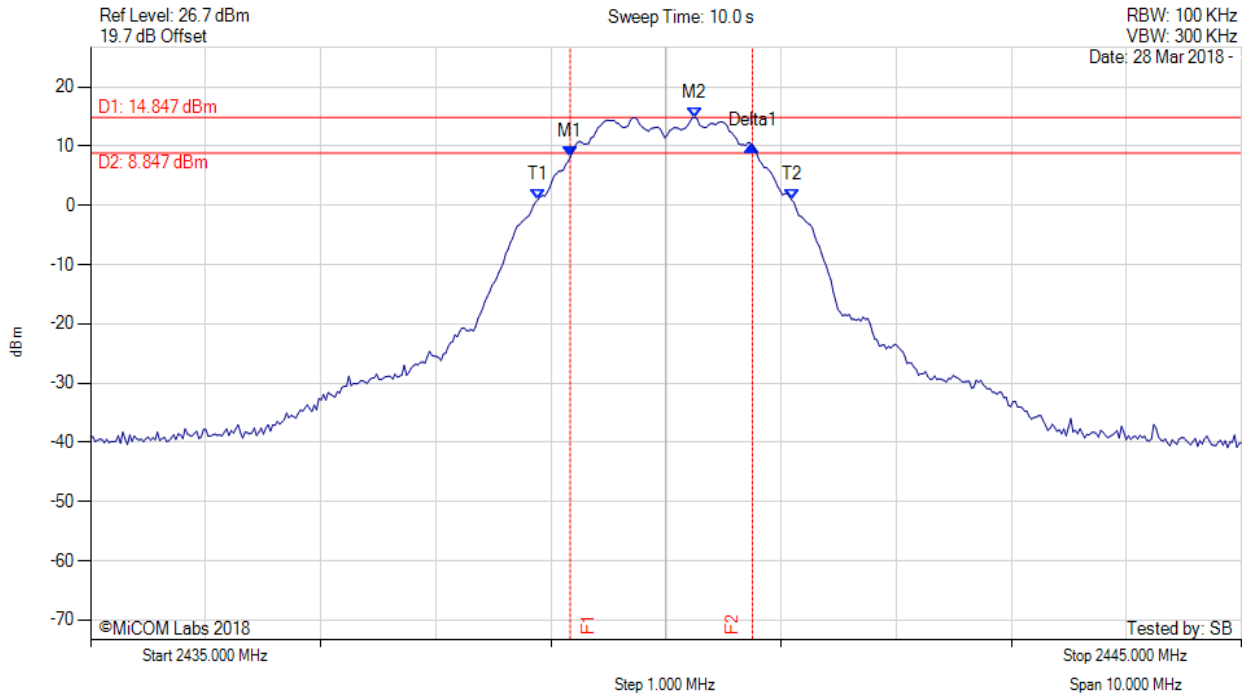



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2404.168 MHz : 9.946 dBm<br>M2 : 2405.251 MHz : 16.648 dBm<br>Delta1 : 1.583 MHz : 1.885 dB<br>T1 : 2403.888 MHz : 2.741 dBm<br>T2 : 2406.072 MHz : 3.296 dBm<br>OBW : 2.184 MHz | Measured 6 dB Bandwidth: 1.583 MHz<br>Limit: ≥500.0 kHz<br>Margin: -1.08 MHz |

back to matrix

6 dB & 99% BANDWIDTH

Variant: 250 kbps_OQPSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: Vdc

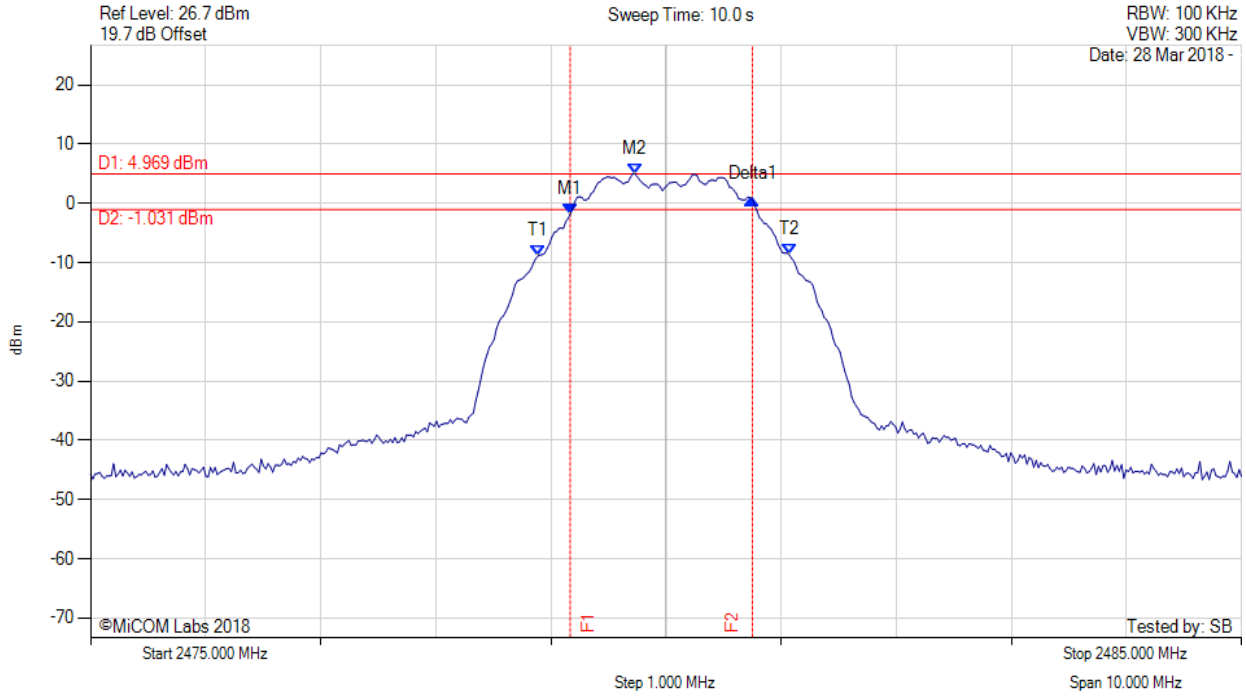



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2439.168 MHz : 8.154 dBm<br>M2 : 2440.251 MHz : 14.847 dBm<br>Delta1 : 1.583 MHz : 1.942 dB<br>T1 : 2438.888 MHz : 1.034 dBm<br>T2 : 2441.092 MHz : 0.918 dBm<br>OBW : 2.204 MHz | Measured 6 dB Bandwidth: 1.583 MHz<br>Limit: ≥500.0 kHz<br>Margin: -1.08 MHz |

back to matrix

6 dB & 99% BANDWIDTH

Variant: 250 kbps_OQPSK, Channel: 2480.00 MHz, Chain a, Temp: 20, Voltage: Vdc



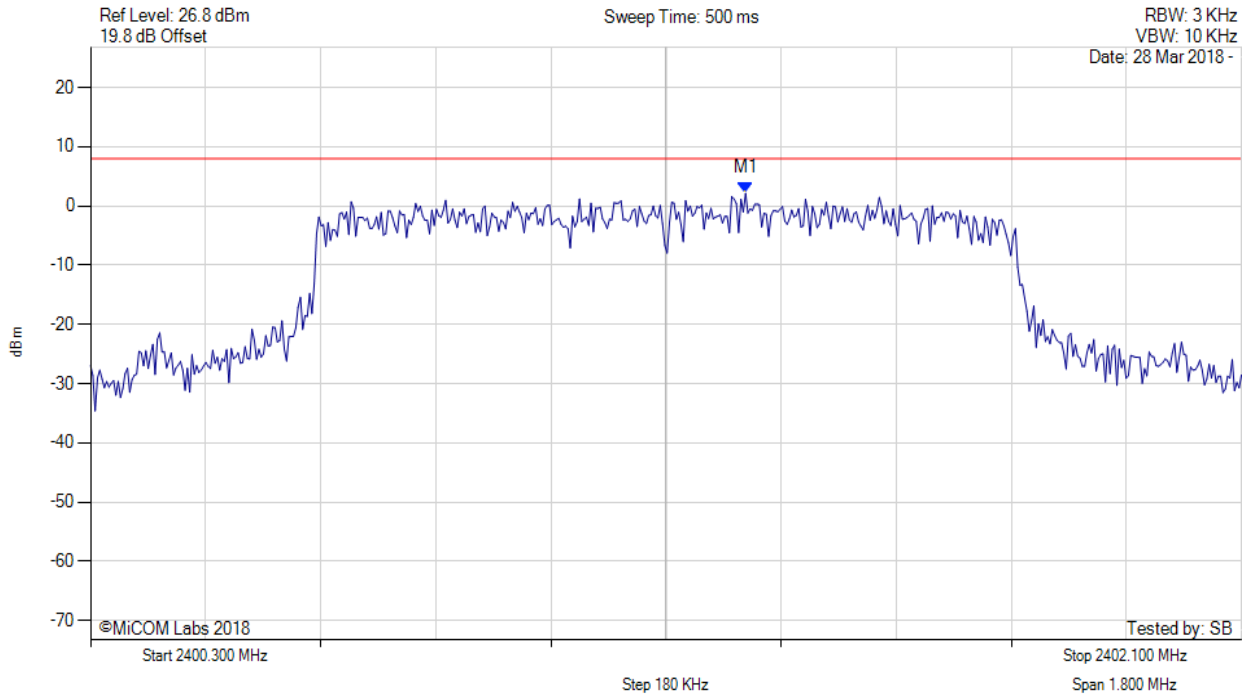

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2479.168 MHz : -1.819 dBm<br>M2 : 2479.729 MHz : 4.969 dBm<br>Delta1 : 1.583 MHz : 2.534 dB<br>T1 : 2478.888 MHz : -8.872 dBm<br>T2 : 2481.072 MHz : -8.701 dBm<br>OBW : 2.184 MHz | Measured 6 dB Bandwidth: 1.583 MHz<br>Limit: ≥500.0 kHz<br>Margin: -1.08 MHz |

back to matrix

## A.2. Power Spectral Density

POWER SPECTRAL DENSITY - PEAK

Variant: 2400 kbps_OFDM, Channel: 2401.20 MHz, Chain a, Temp: 20, Voltage:  Vdc

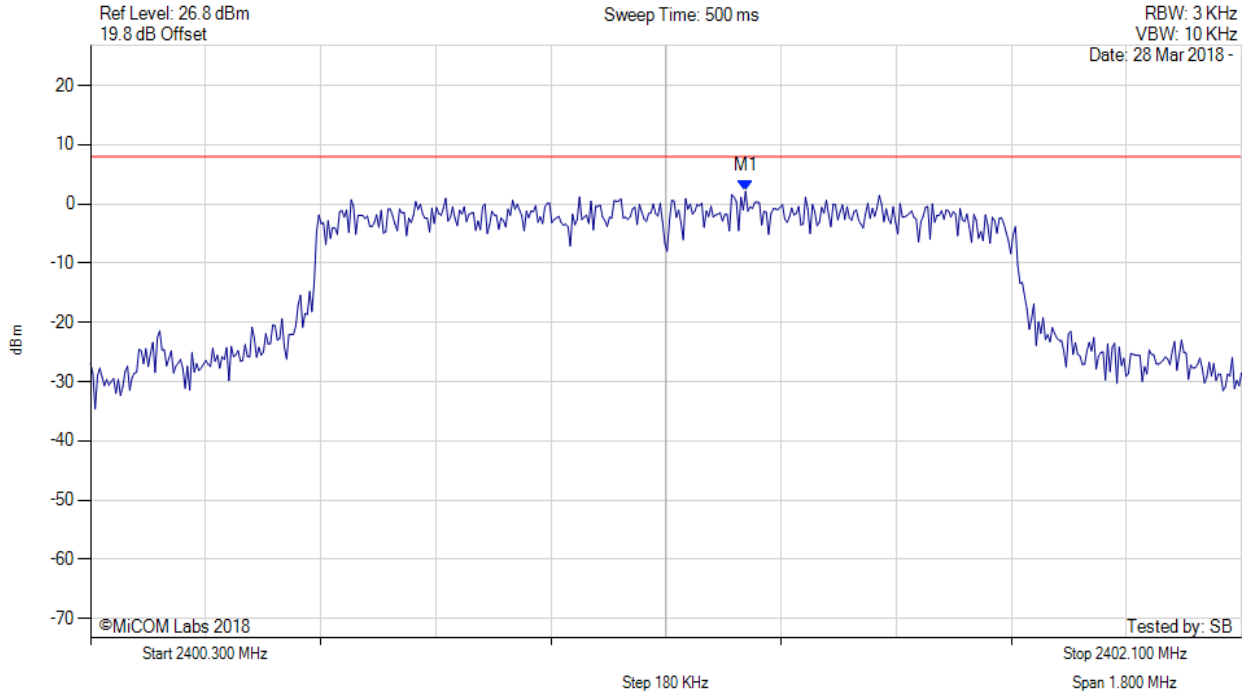



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2401.324 MHz : 2.153 dBm | Limit: ≤ 8.000 dBm<br>Margin:  -5.85 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 2400 kbps_OFDM, Channel: 2401.20 MHz, SUM, Temp: 20, Voltage: Vdc

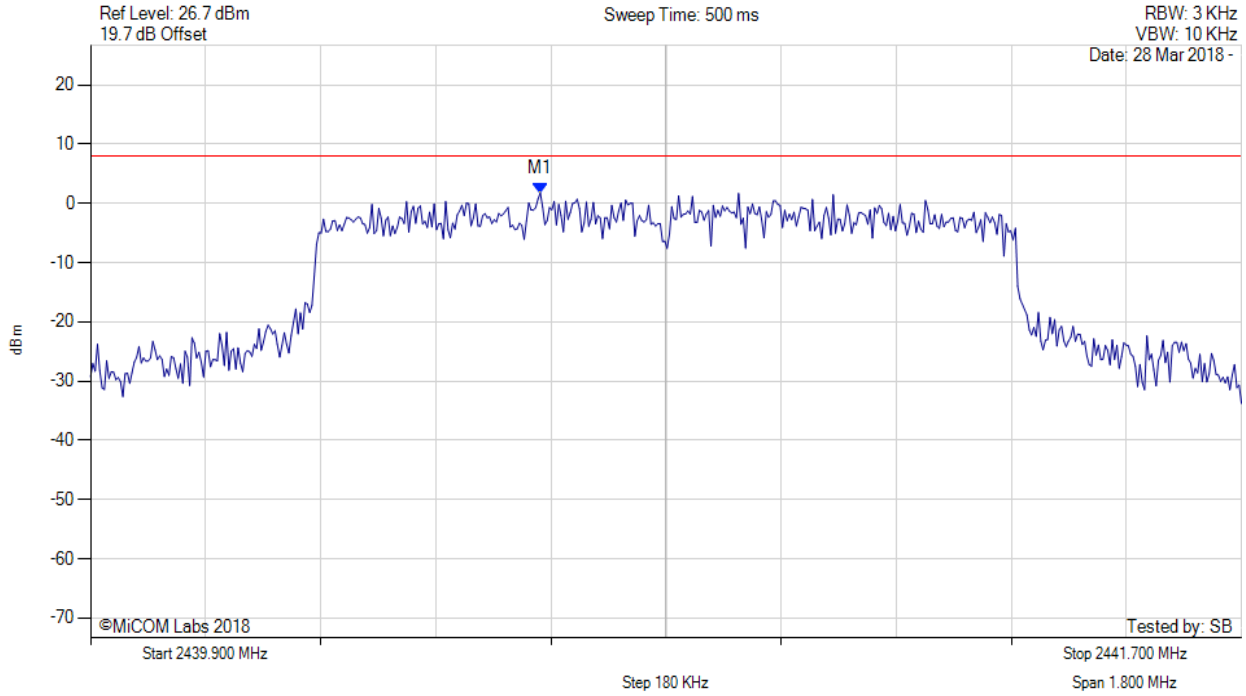



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2401.324 MHz : 2.153 dBm | Limit: ≤ 8.0 dBm<br>Margin: -5.8 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 2400 kbps_OFDM, Channel: 2440.80 MHz, Chain a, Temp: 20, Voltage: Vdc

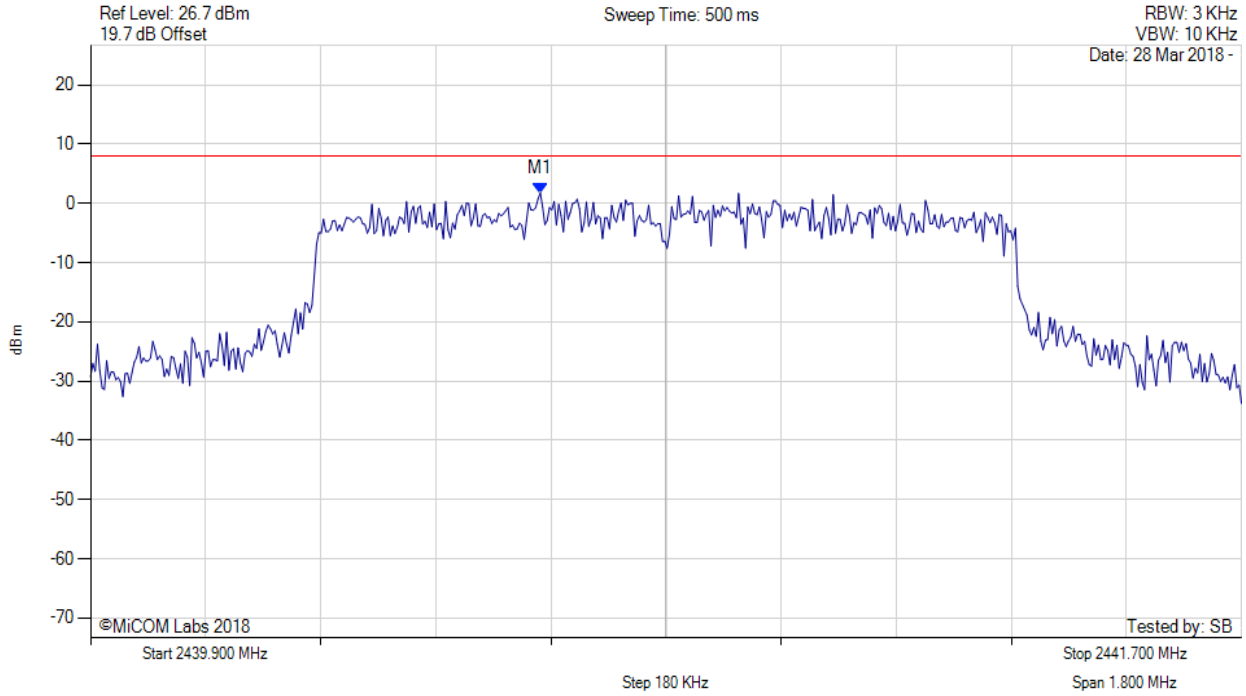



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2440.603 MHz : 1.754 dBm | Limit: ≤ 8.000 dBm<br>Margin: -6.25 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 2400 kbps_OFDM, Channel: 2440.80 MHz, SUM, Temp: 20, Voltage: Vdc

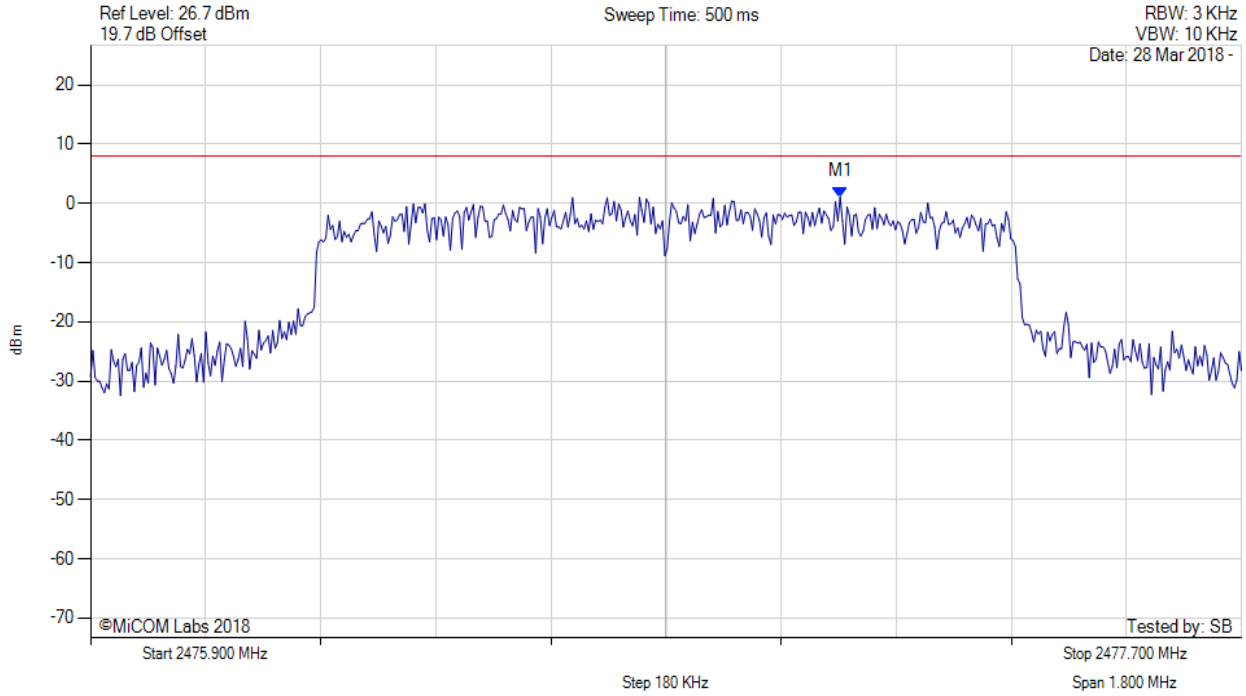



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2440.603 MHz : 1.754 dBm | Limit: ≤ 8.0 dBm<br>Margin: -6.2 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 2400 kbps_OFDM, Channel: 2476.80 MHz, Chain a, Temp: 20, Voltage: Vdc

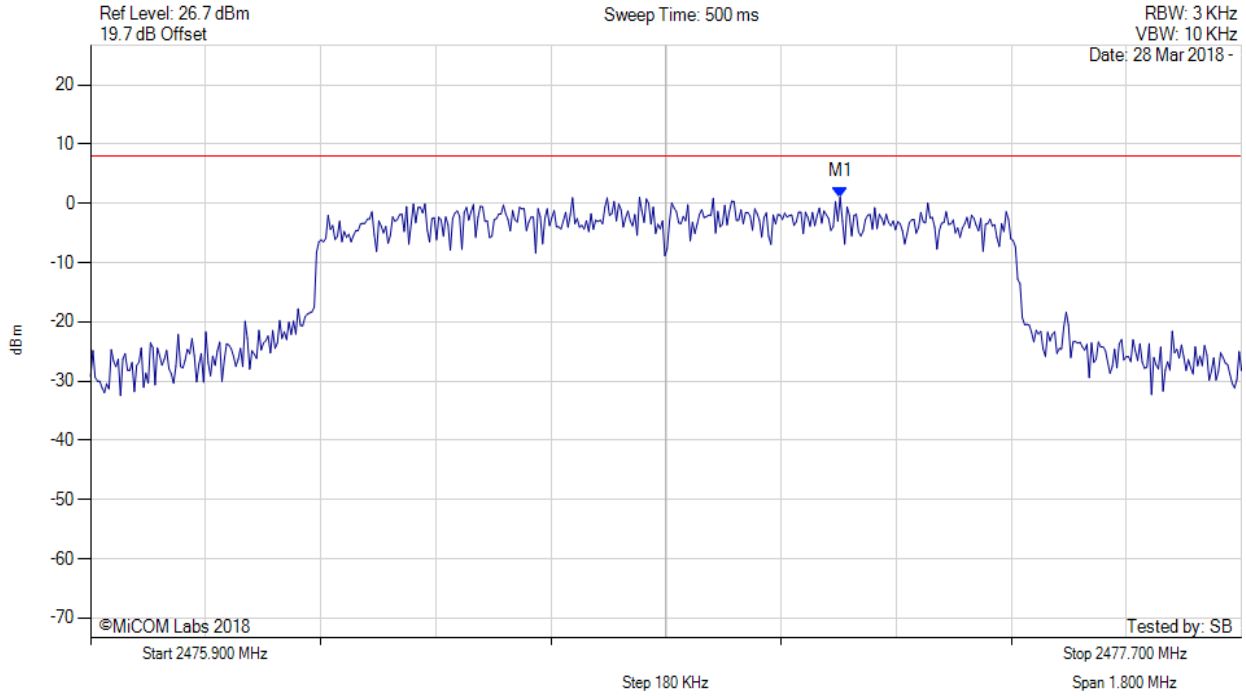



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2477.072 MHz : 1.087 dBm | Limit: ≤ 8.000 dBm<br>Margin: -6.91 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 2400 kbps_OFDM, Channel: 2476.80 MHz, SUM, Temp: 20, Voltage: Vdc

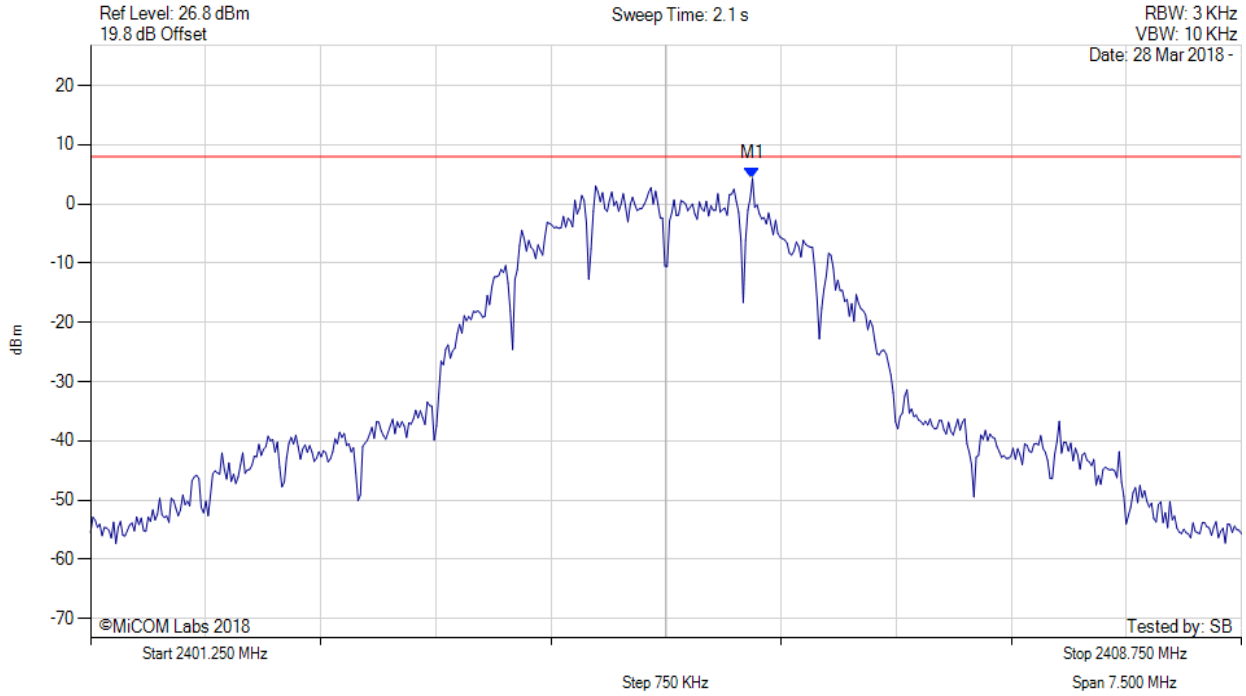



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2477.072 MHz : 1.087 dBm | Limit: ≤ 8.0 dBm<br>Margin: -6.9 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 250 kbps_OQPSK, Channel: 2405.00 MHz, Chain a, Temp: 20, Voltage: Vdc

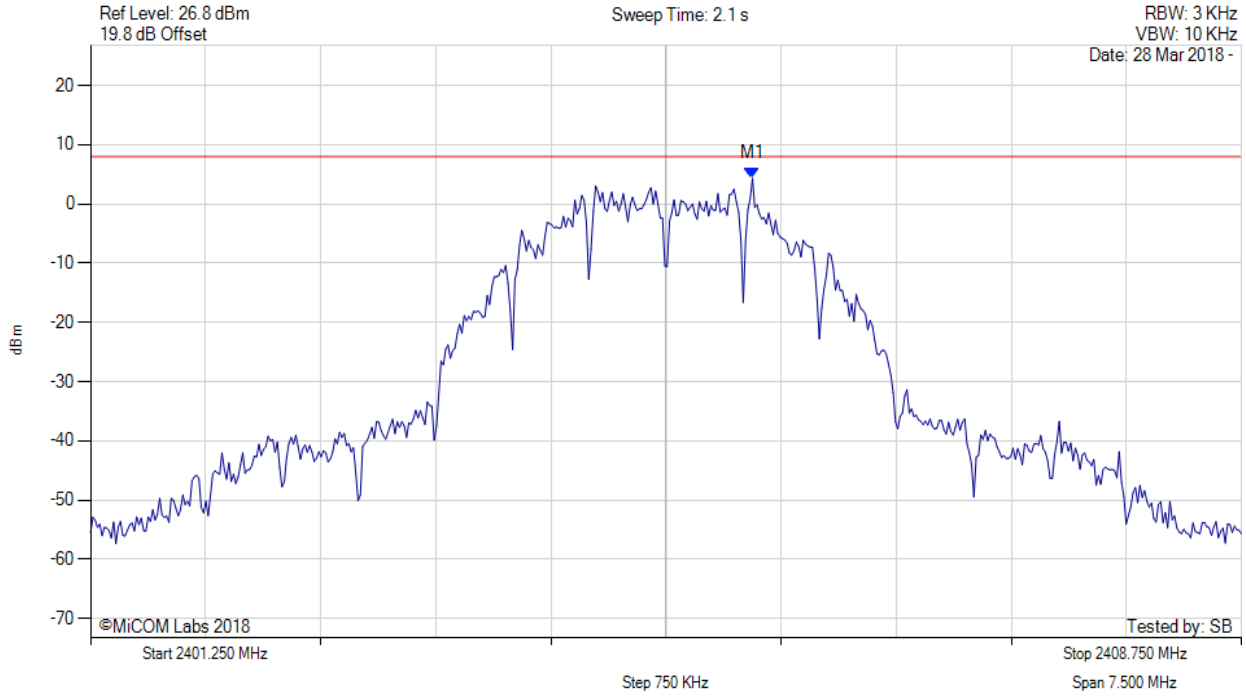



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2405.564 MHz : 4.309 dBm | Limit: ≤ 8.000 dBm<br>Margin: -3.69 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 250 kbps_OQPSK, Channel: 2405.00 MHz, SUM, Temp: 20, Voltage: Vdc

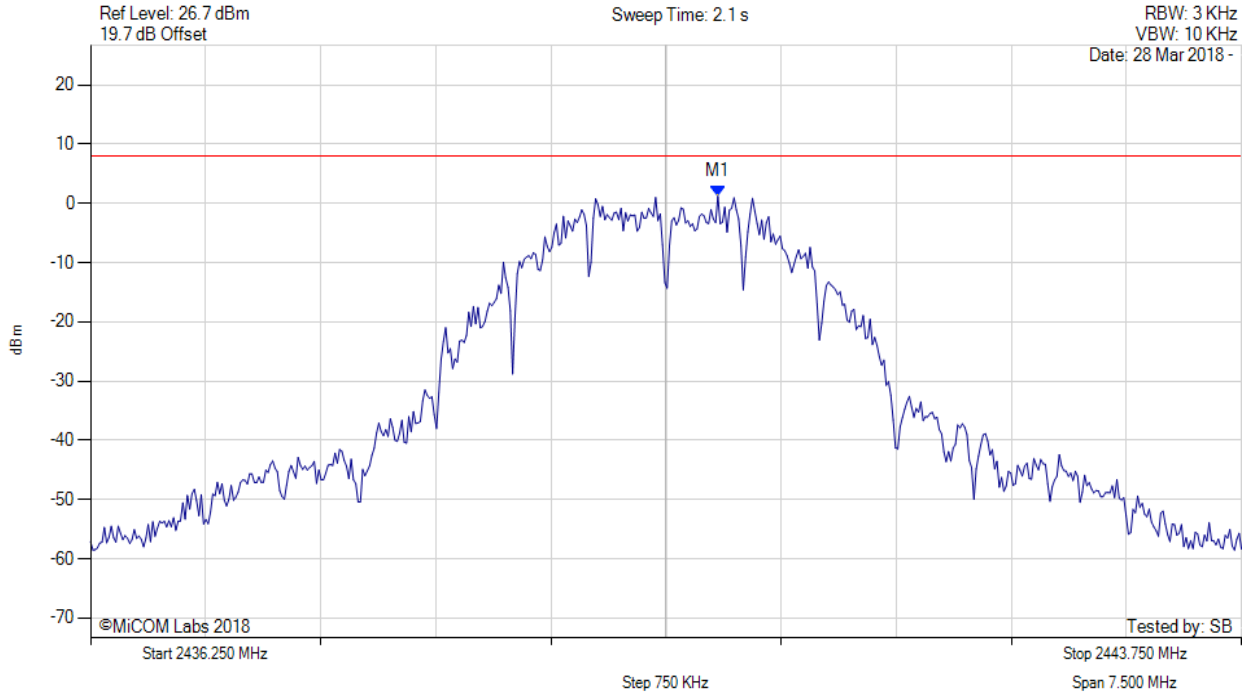



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2405.564 MHz : 4.309 dBm | Limit: ≤ 8.0 dBm<br>Margin: -3.7 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 250 kbps_OQPSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: Vdc

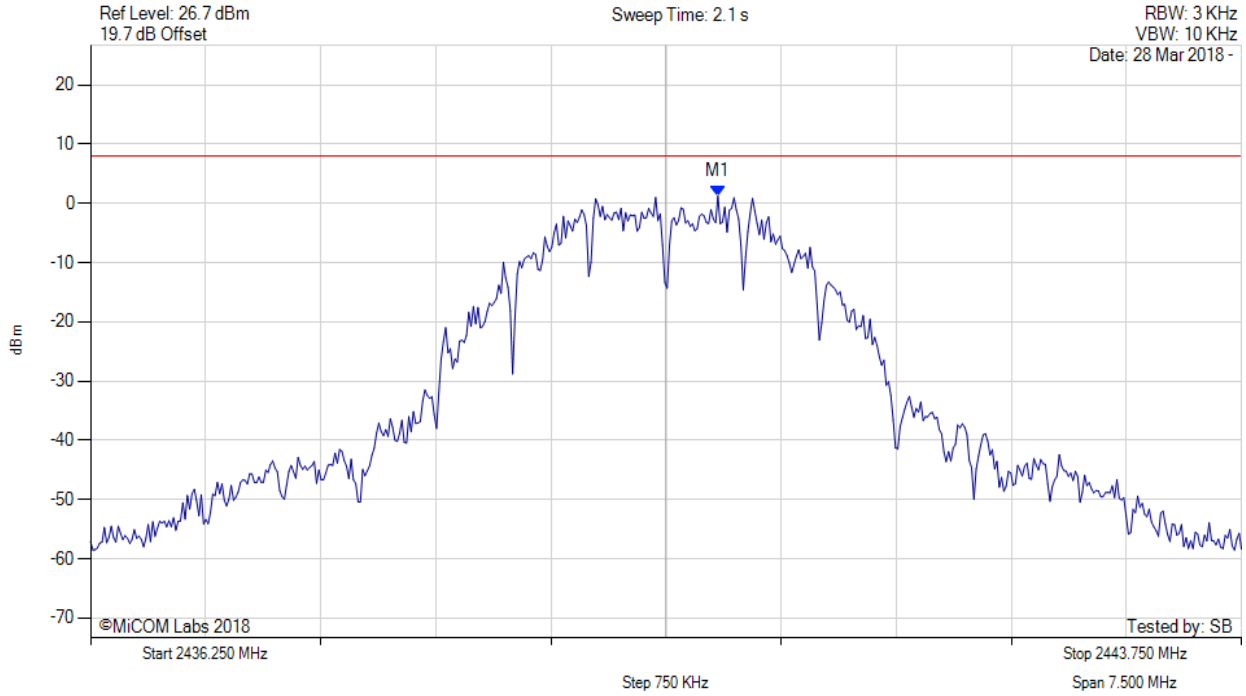



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2440.338 MHz : 1.233 dBm | Limit: ≤ 8.000 dBm<br>Margin: -6.77 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 250 kbps_OQPSK, Channel: 2440.00 MHz, SUM, Temp: 20, Voltage: Vdc

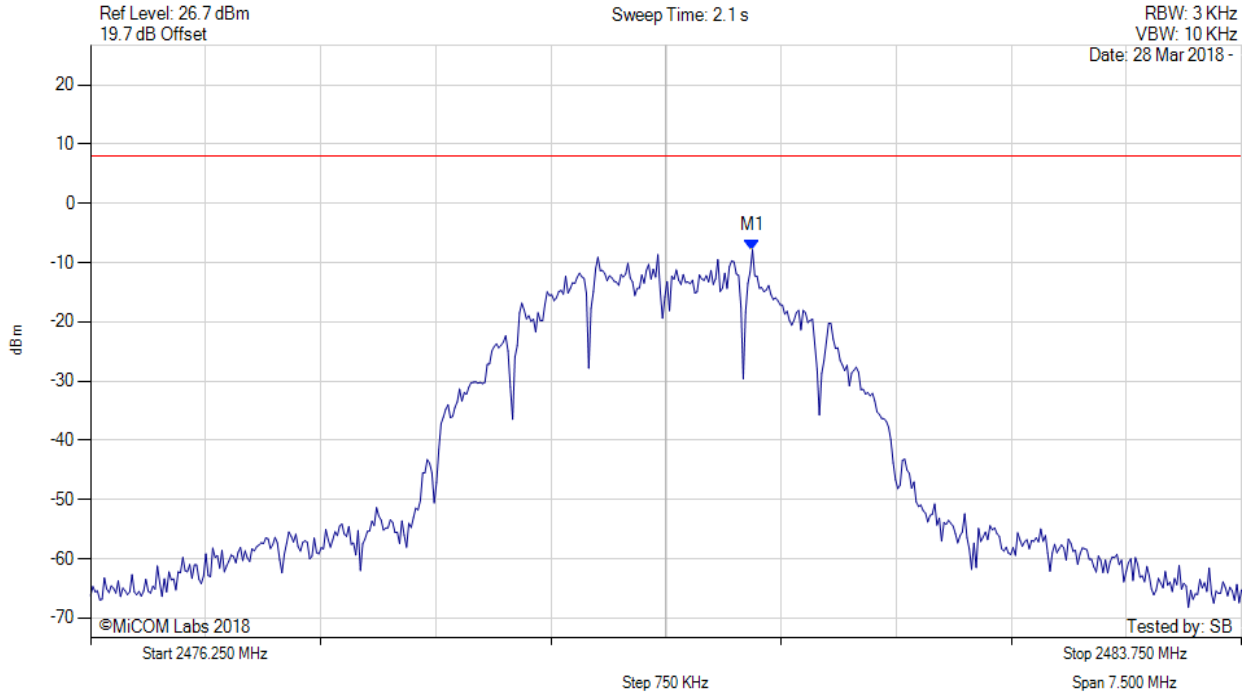



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2440.338 MHz : 1.233 dBm | Limit: ≤ 8.0 dBm<br>Margin: -6.8 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 250 kbps_OQPSK, Channel: 2480.00 MHz, Chain a, Temp: 20, Voltage: Vdc

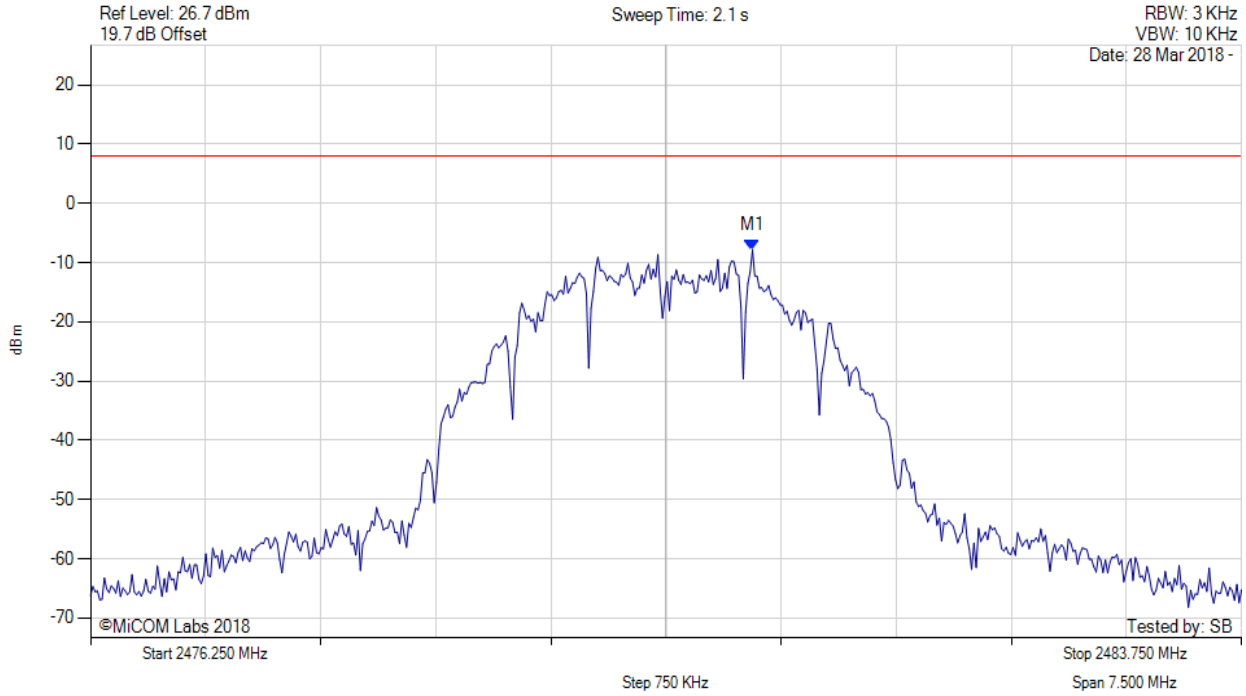



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2480.564 MHz : -7.857 dBm | Limit: ≤ 8.000 dBm<br>Margin: 15.86 dB |

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 250 kbps_OQPSK, Channel: 2480.00 MHz, SUM, Temp: 20, Voltage: Vdc



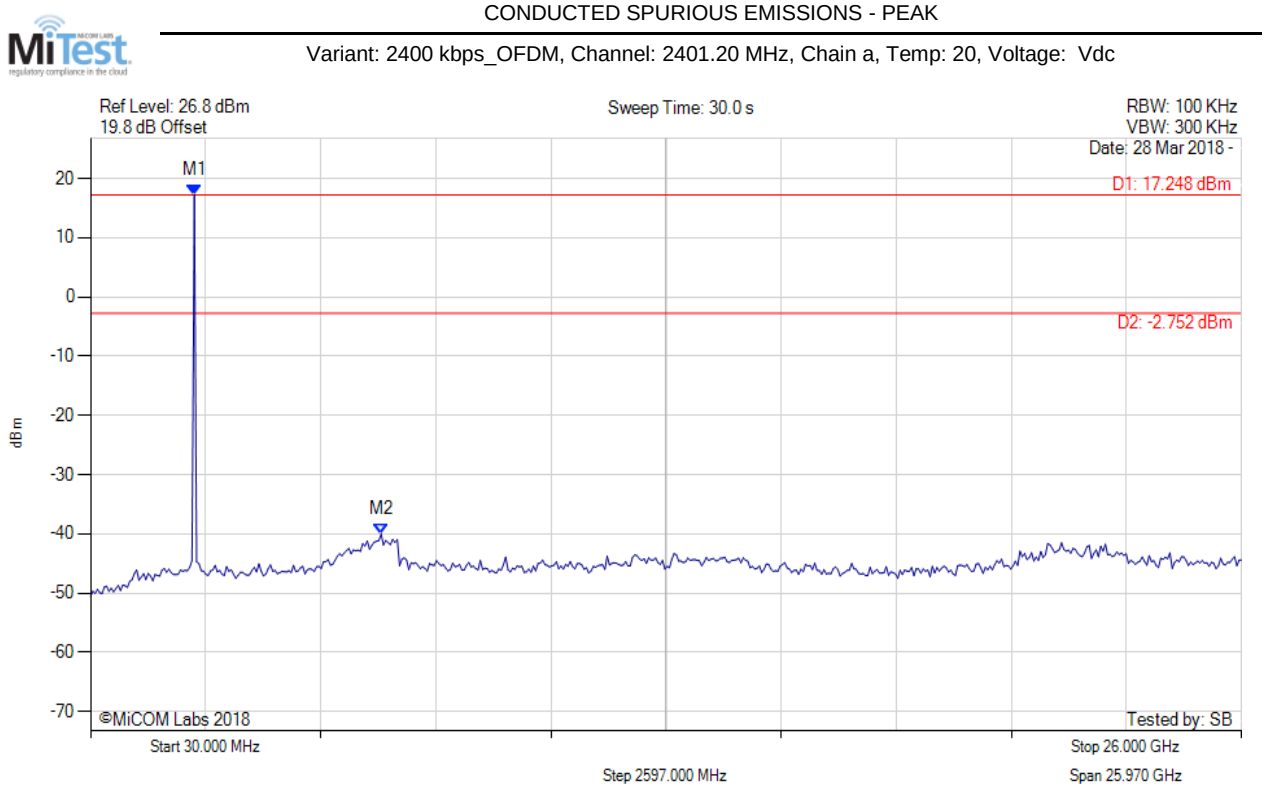

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2480.564 MHz : -7.857 dBm | Limit: ≤ 8.0 dBm<br>Margin: -15.9 dB |

back to matrix

# A.3. Emissions

## A.3.1. Conducted Emissions

### A.3.1.1. Conducted Spurious Emissions

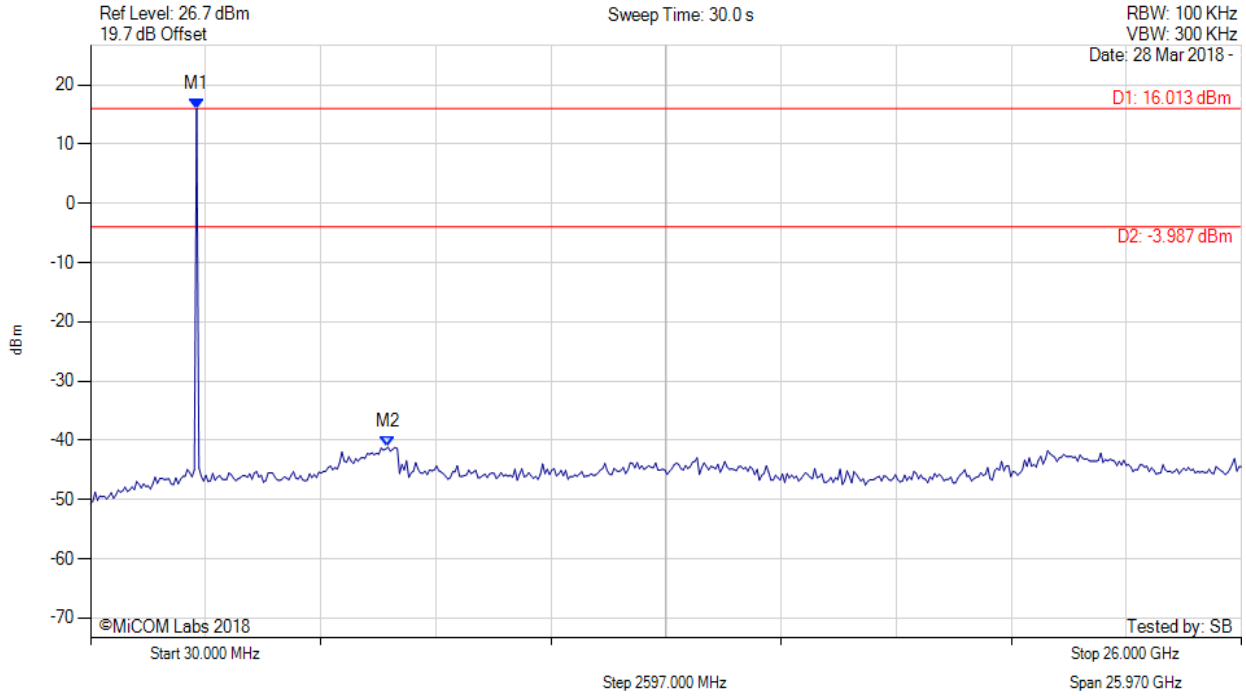



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2371.984 MHz : 17.248 dBm<br>M2 : 6587.555 MHz : -40.066 dBm | Limit: -2.75 dBm<br>Margin: -37.32 dB |

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 2400 kbps_OFDM, Channel: 2440.80 MHz, Chain a, Temp: 20, Voltage: Vdc

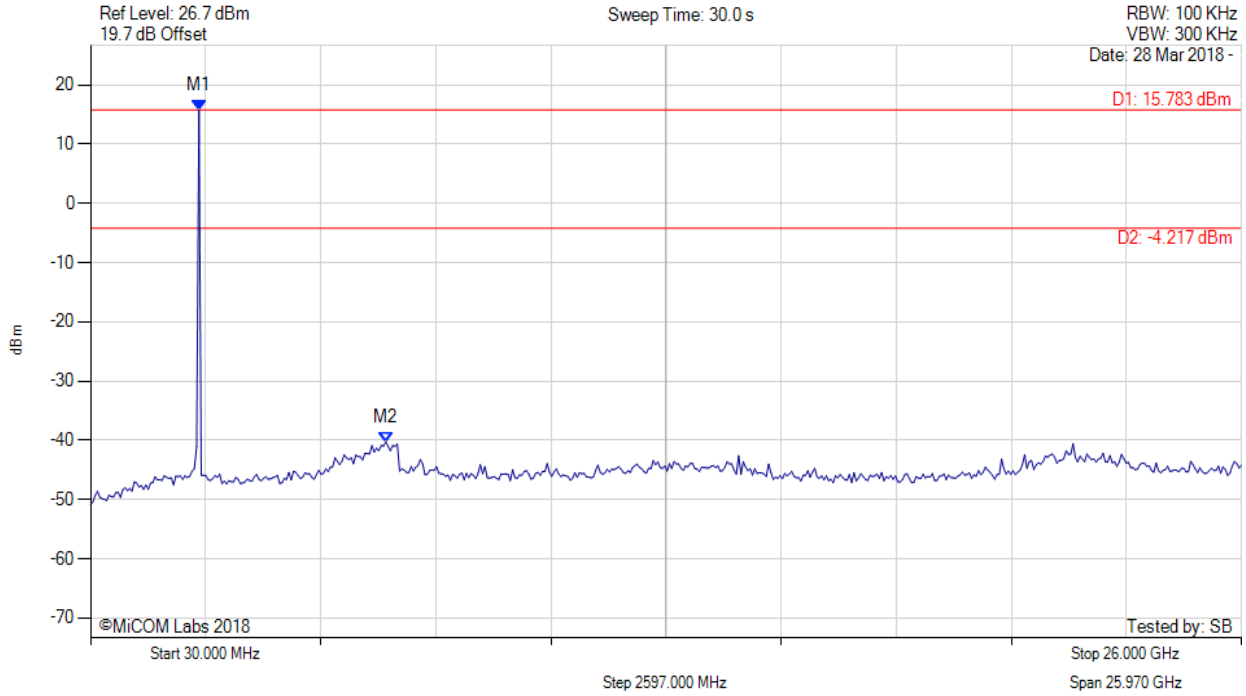



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2424.028 MHz : 16.013 dBm<br>M2 : 6743.687 MHz : -41.166 dBm | Limit: -3.99 dBm<br>Margin: -37.18 dB |

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 2400 kbps_OFDM, Channel: 2476.80 MHz, Chain a, Temp: 20, Voltage: Vdc

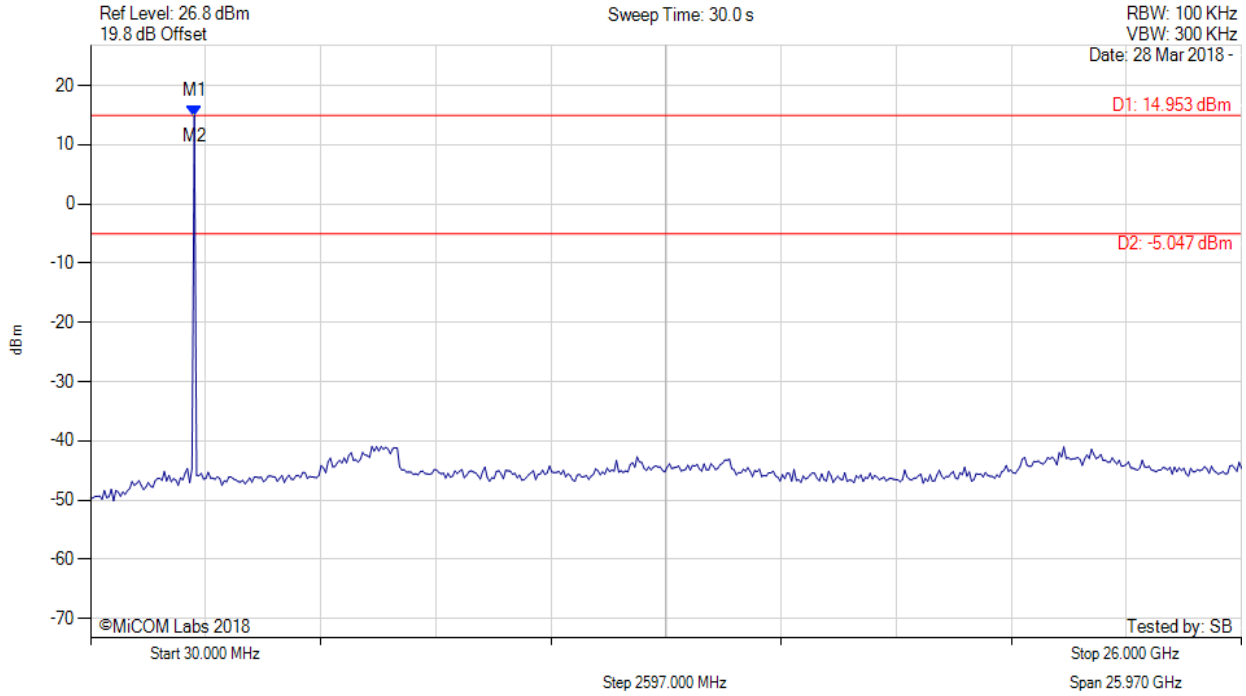



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2476.072 MHz : 15.783 dBm<br>M2 : 6691.643 MHz : -40.304 dBm | Limit: -4.22 dBm<br>Margin: -36.08 dB |

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 250 kbps_OQPSK, Channel: 2405.00 MHz, Chain a, Temp: 20, Voltage: Vdc

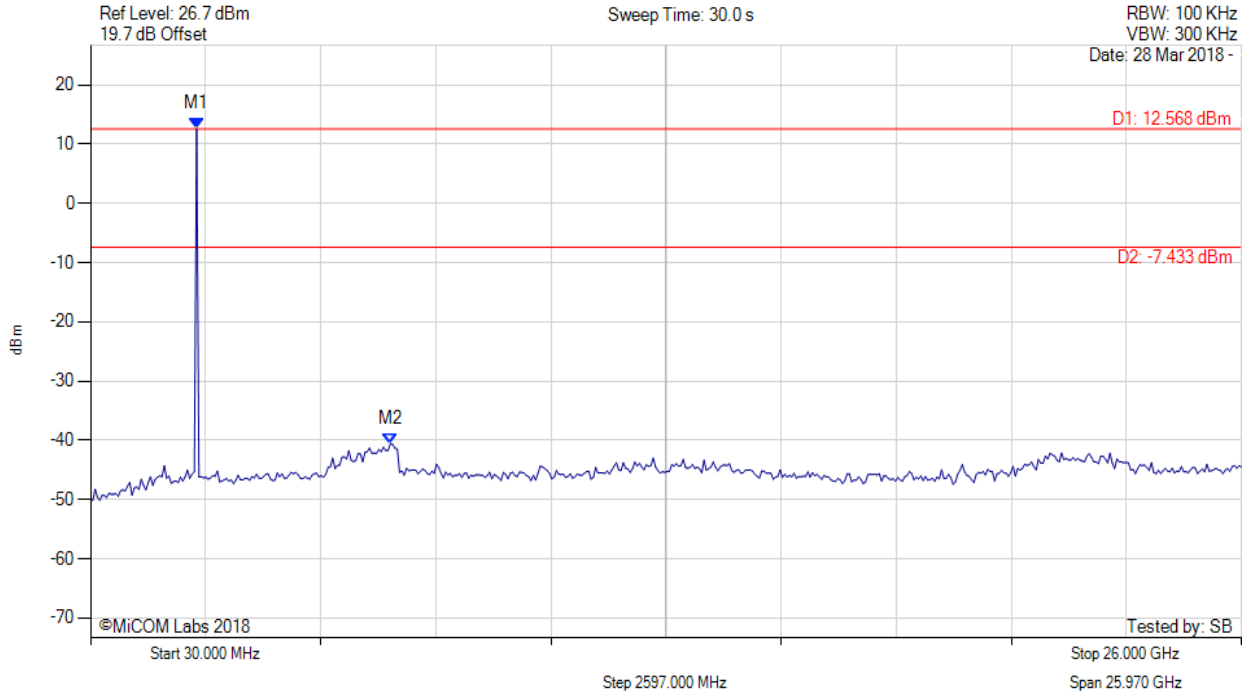



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2371.984 MHz : 14.953 dBm<br>M2 : 2371.984 MHz : 14.953 dBm | Limit: -5.05 dBm<br>Margin: 20.00 dB |

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 250 kbps_OQPSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: Vdc

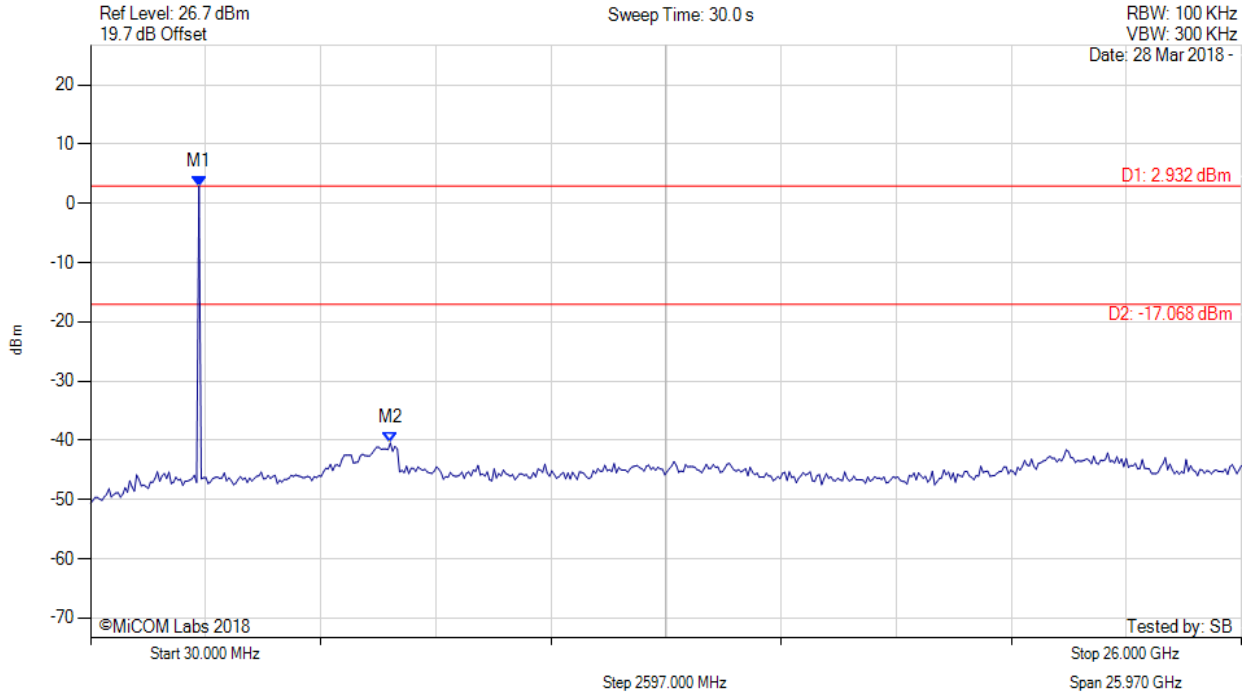



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2424.028 MHz : 12.568 dBm<br>M2 : 6795.731 MHz : -40.595 dBm | Limit: -7.43 dBm<br>Margin: -33.16 dB |

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 250 kbps_OQPSK, Channel: 2480.00 MHz, Chain a, Temp: 20, Voltage: Vdc



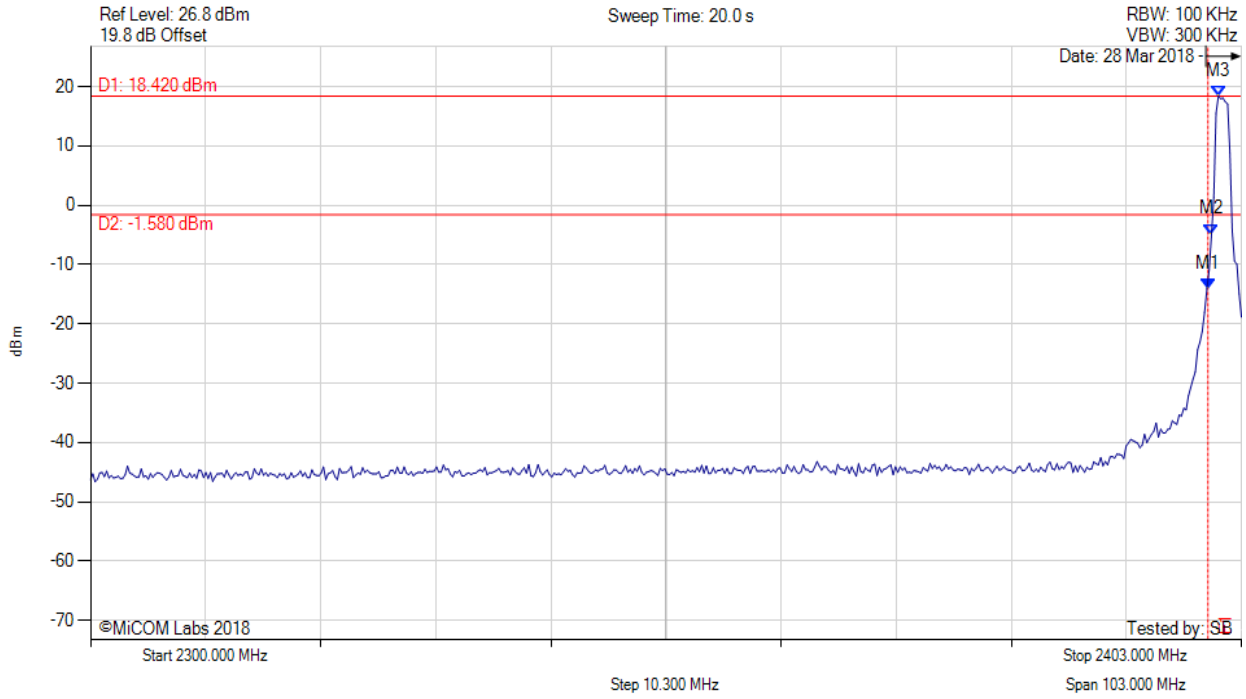

| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2476.072 MHz : 2.932 dBm<br>M2 : 6795.731 MHz : -40.440 dBm | Limit: -17.07 dBm<br>Margin: -23.37 dB |

back to matrix

### A.3.1.2. Conducted Band-Edge Emissions

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 2400 kbps_OFDM, Channel: 2401.20 MHz, Chain a, Temp: 20, Voltage:  Vdc

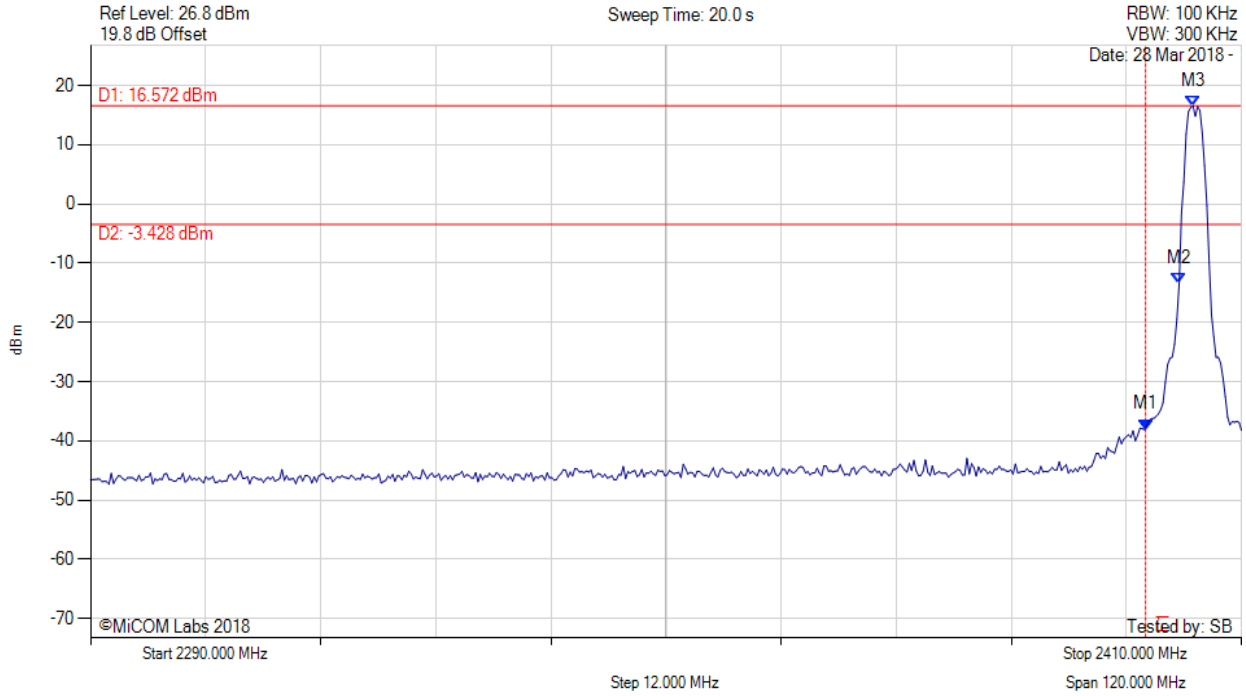



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2400.000 MHz : -14.101 dBm<br>M2 : 2400.317 MHz : -4.904 dBm<br>M3 : 2400.936 MHz : 18.421 dBm | Channel Frequency: 2401.20 MHz |

back to matrix

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 250 kbps_OQPSK, Channel: 2405.00 MHz, Chain a, Temp: 20, Voltage: Vdc

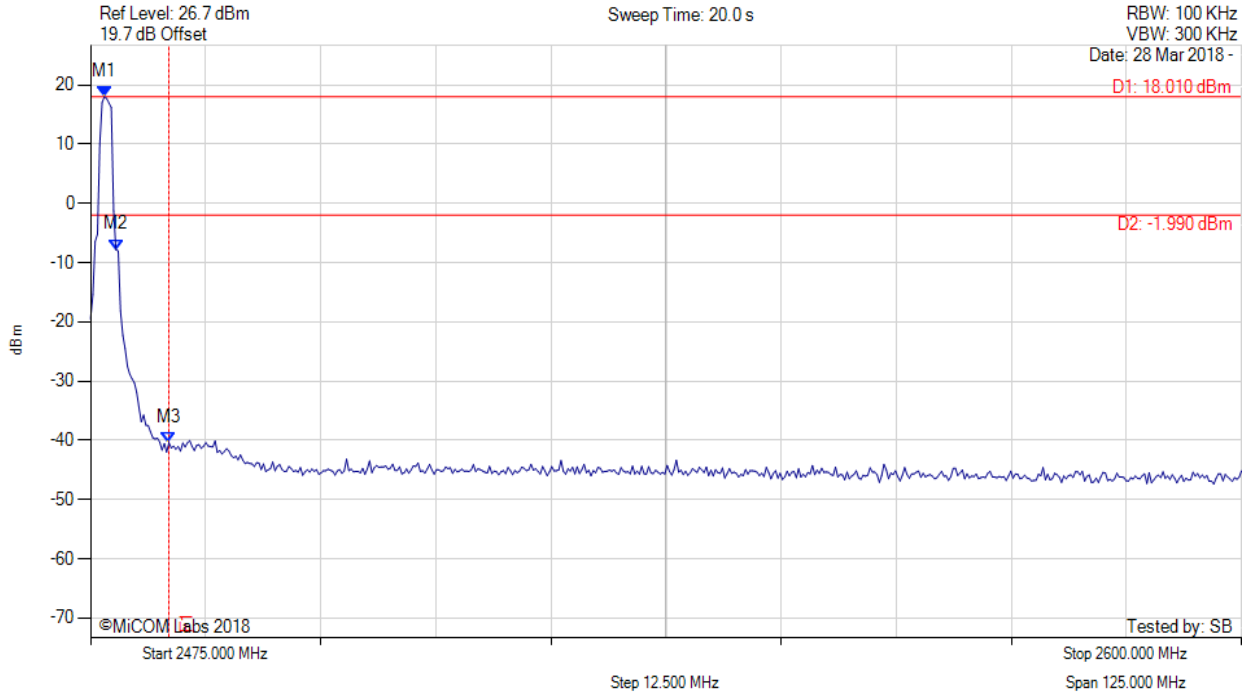



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2400.000 MHz : -38.083 dBm<br>M2 : 2403.507 MHz : -13.442 dBm<br>M3 : 2404.950 MHz : 16.572 dBm | Channel Frequency: 2405.00 MHz |

back to matrix

CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 2400 kbps_OFDM, Channel: 2476.80 MHz, Chain a, Temp: 20, Voltage: Vdc

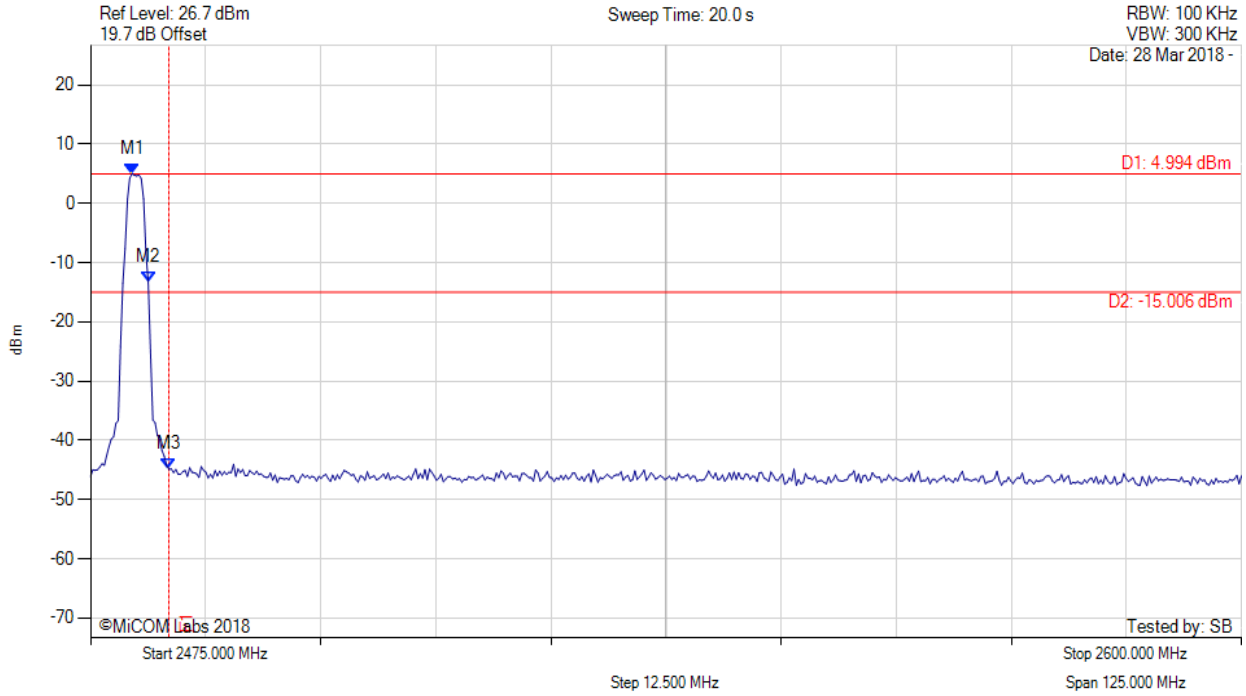



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = MAX HOLD | M1 : 2476.503 MHz : 18.006 dBm<br>M2 : 2477.756 MHz : -7.805 dBm<br>M3 : 2483.500 MHz : -40.412 dBm | Channel Frequency: 2476.80 MHz |

back to matrix

CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 250 kbps_OQPSK, Channel: 2480.00 MHz, Chain a, Temp: 20, Voltage: Vdc

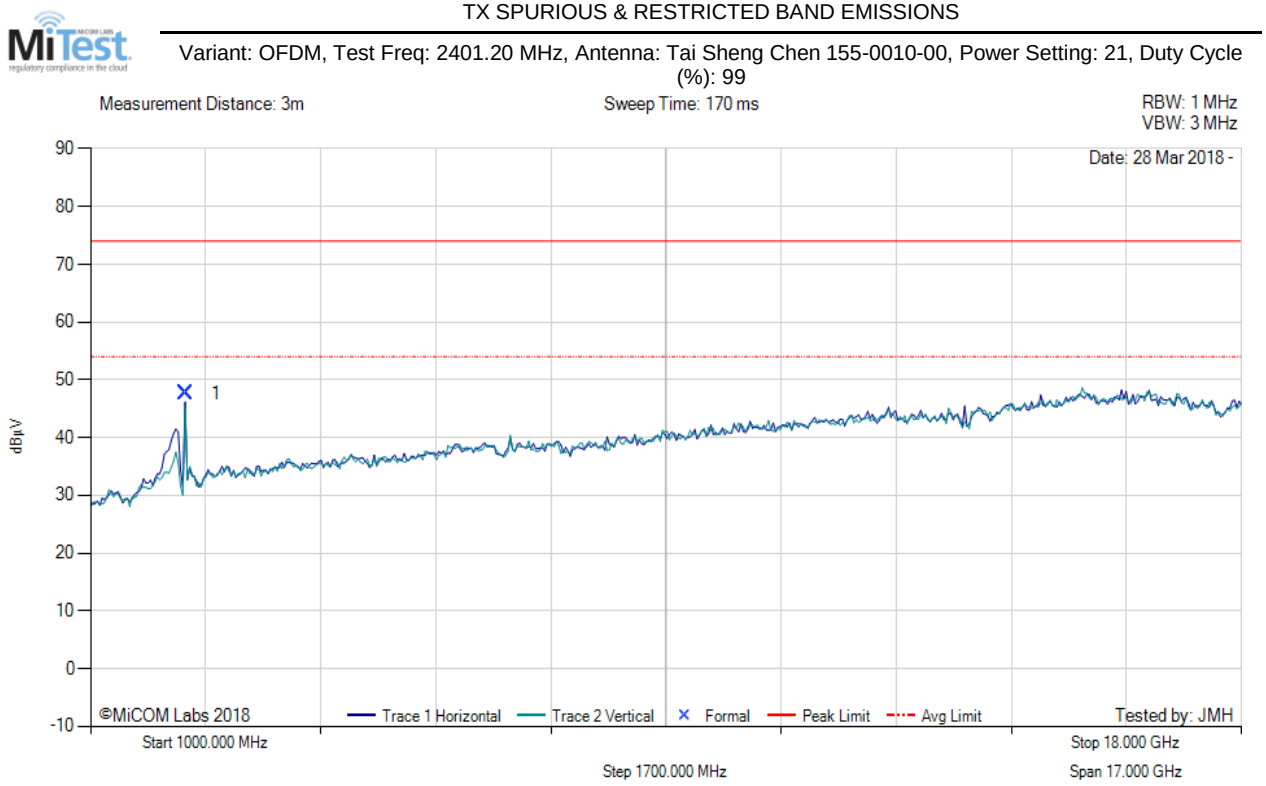



| Analyzer Setup | Marker:Frequency:Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 2479.509 MHz : 4.994 dBm<br>M2 : 2481.263 MHz : -13.308 dBm<br>M3 : 2483.500 MHz : -44.914 dBm | Channel Frequency: 2480.00 MHz |

back to matrix

## A.3.2. Radiated Emissions

### A.3.2.3. TX Spurious & Restricted Band Emissions



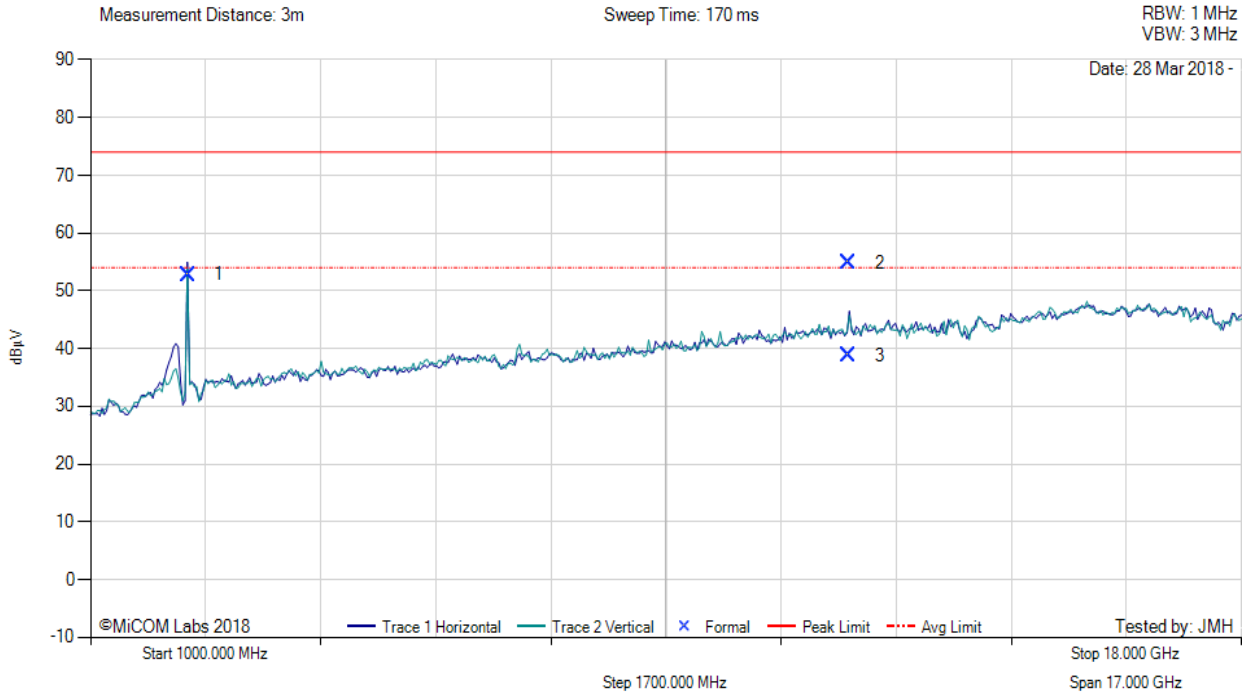

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2401.25 | 57.85 | 2.24 | -12.41 | 47.68 | Fundamental | Horizontal | 100 | 95 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2440.80 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



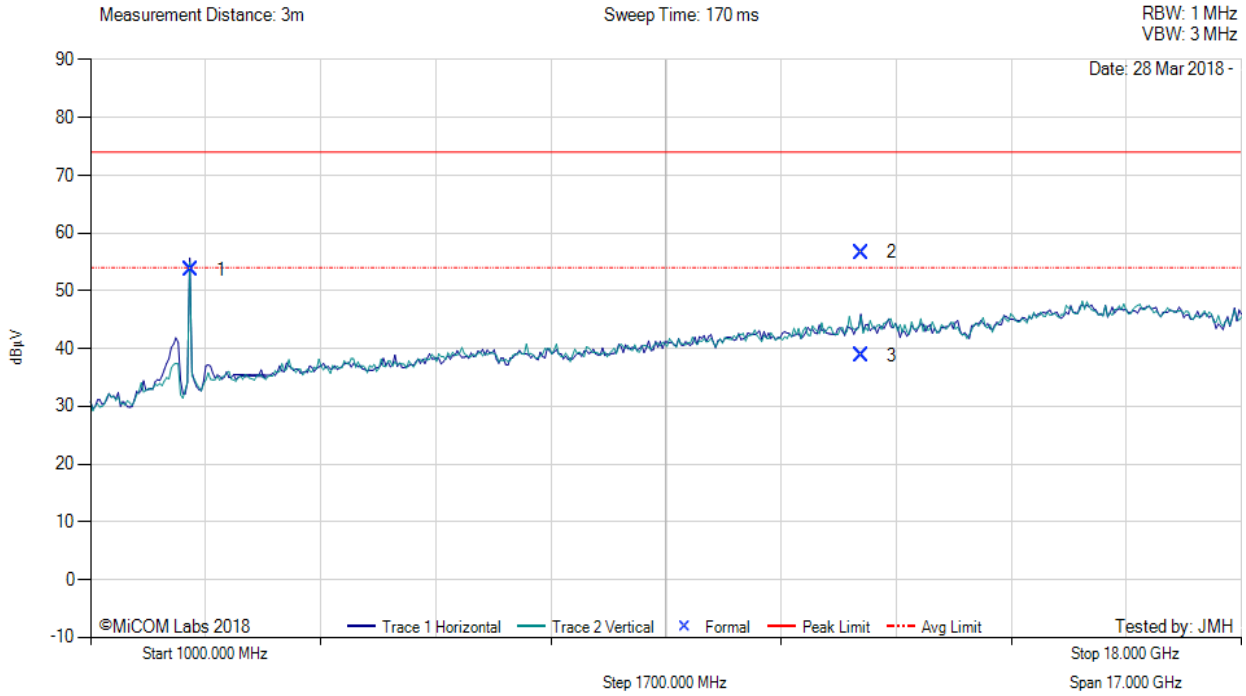

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2440.84 | 62.59 | 2.27 | -12.06 | 52.80 | Fundamental | Horizontal | 100 | 0 | -- | -- | |
| 2 | 12204.26 | 54.92 | 4.67 | -4.74 | 54.85 | Max Peak | Horizontal | 185 | 123 | 74.0 | -19.2 | Pass |
| 3 | 12204.26 | 38.81 | 4.67 | -4.74 | 38.74 | Max Avg | Horizontal | 185 | 123 | 54.0 | -15.3 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2476.80 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



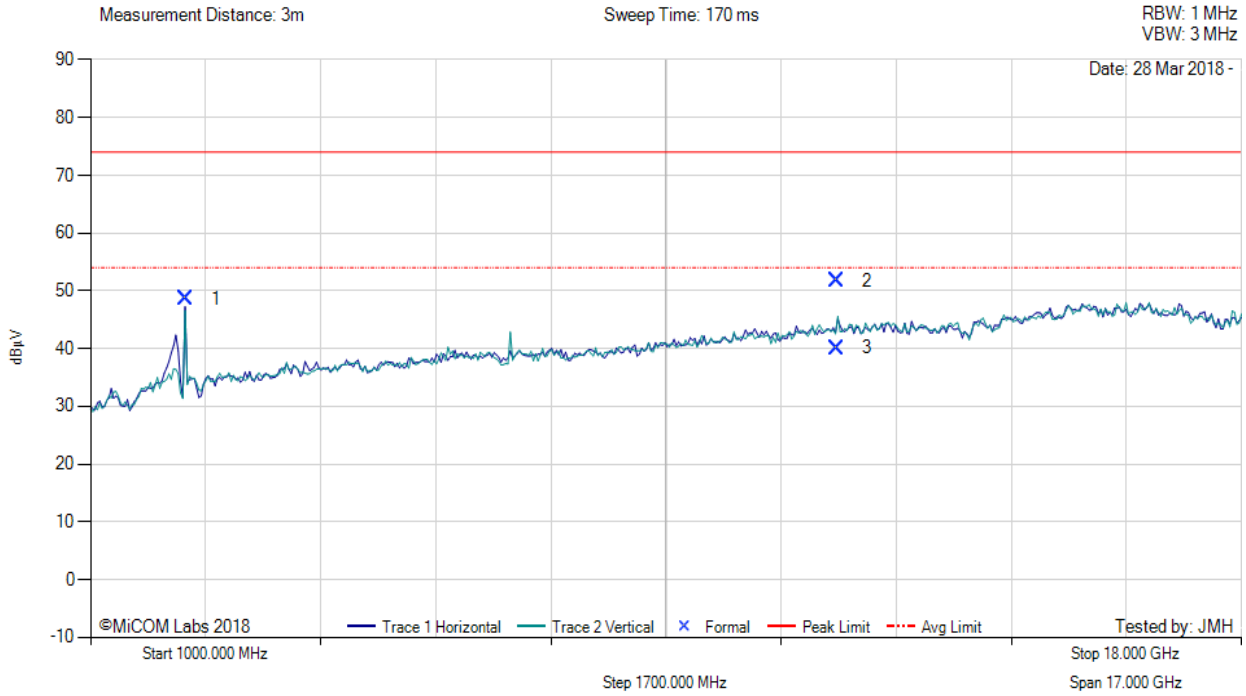

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2476.89 | 63.21 | 2.25 | -11.86 | 53.60 | Fundamental | Horizontal | 200 | 0 | -- | -- | |
| 2 | 12383.71 | 57.31 | 4.84 | -5.54 | 56.61 | Max Peak | Horizontal | 189 | 127 | 74.0 | -17.4 | Pass |
| 3 | 12383.71 | 39.56 | 4.84 | -5.54 | 38.86 | Max Avg | Horizontal | 189 | 127 | 54.0 | -15.1 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2405.00 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



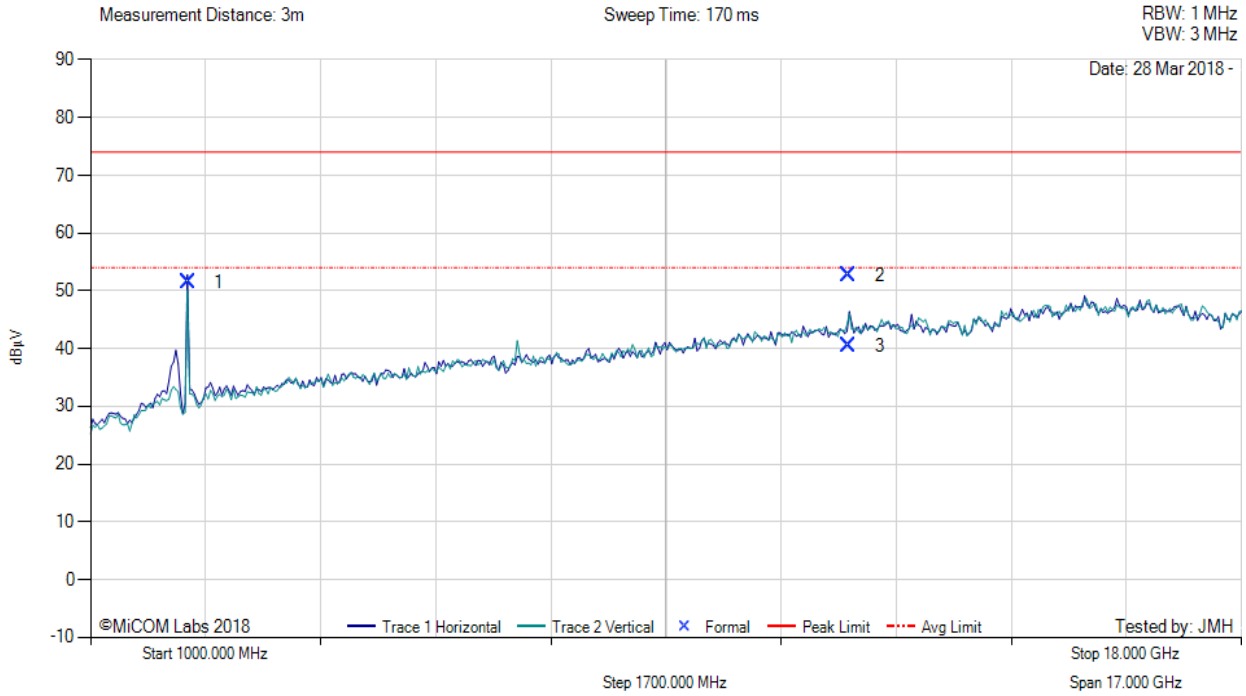

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2405.23 | 58.78 | 2.24 | -12.40 | 48.62 | Fundamental | Horizontal | 200 | 0 | -- | -- | |
| 2 | 12027.37 | 54.29 | 4.44 | -6.98 | 51.75 | Max Peak | Horizontal | 174 | 94 | 74.0 | -22.3 | Pass |
| 3 | 12027.37 | 42.62 | 4.44 | -6.98 | 40.08 | Max Avg | Horizontal | 174 | 94 | 54.0 | -13.9 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2440.00 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



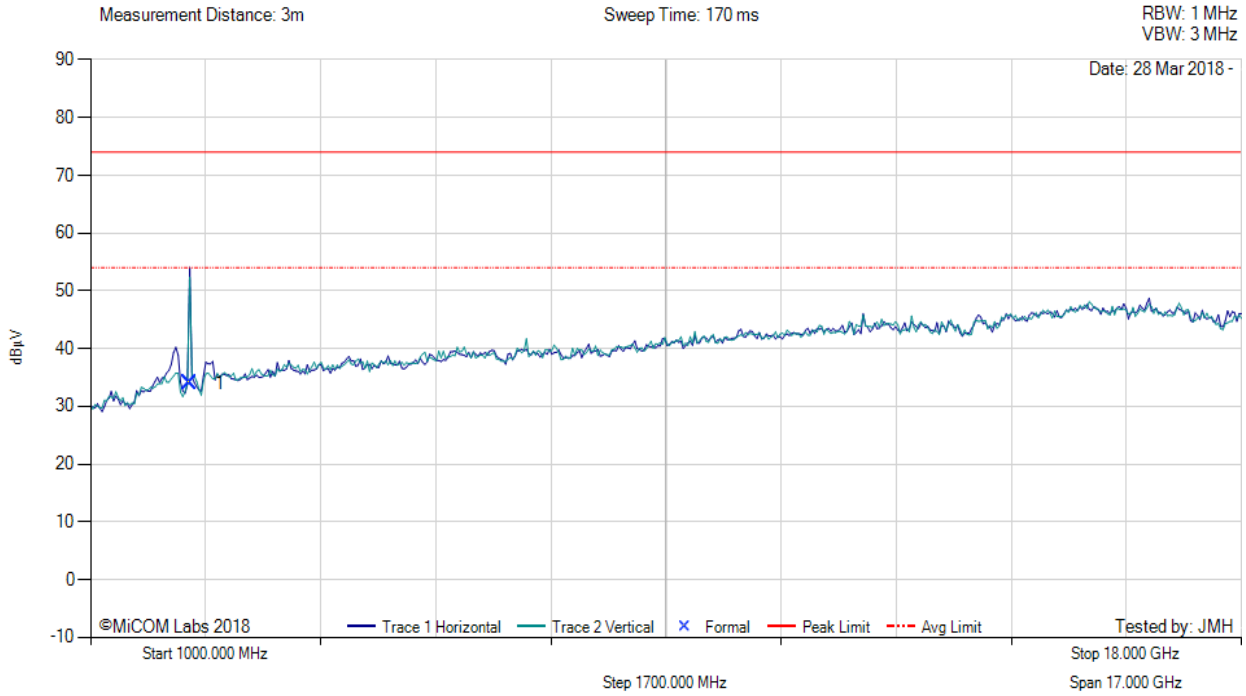

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2440.51 | 61.29 | 2.27 | -12.06 | 51.50 | Fundamental | Horizontal | 200 | 0 | -- | -- | |
| 2 | 12202.51 | 52.82 | 4.67 | -4.76 | 52.73 | Max Peak | Horizontal | 174 | 116 | 74.0 | -21.3 | Pass |
| 3 | 12202.51 | 40.60 | 4.67 | -4.76 | 40.51 | Max Avg | Horizontal | 174 | 116 | 54.0 | -13.5 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2480.00 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



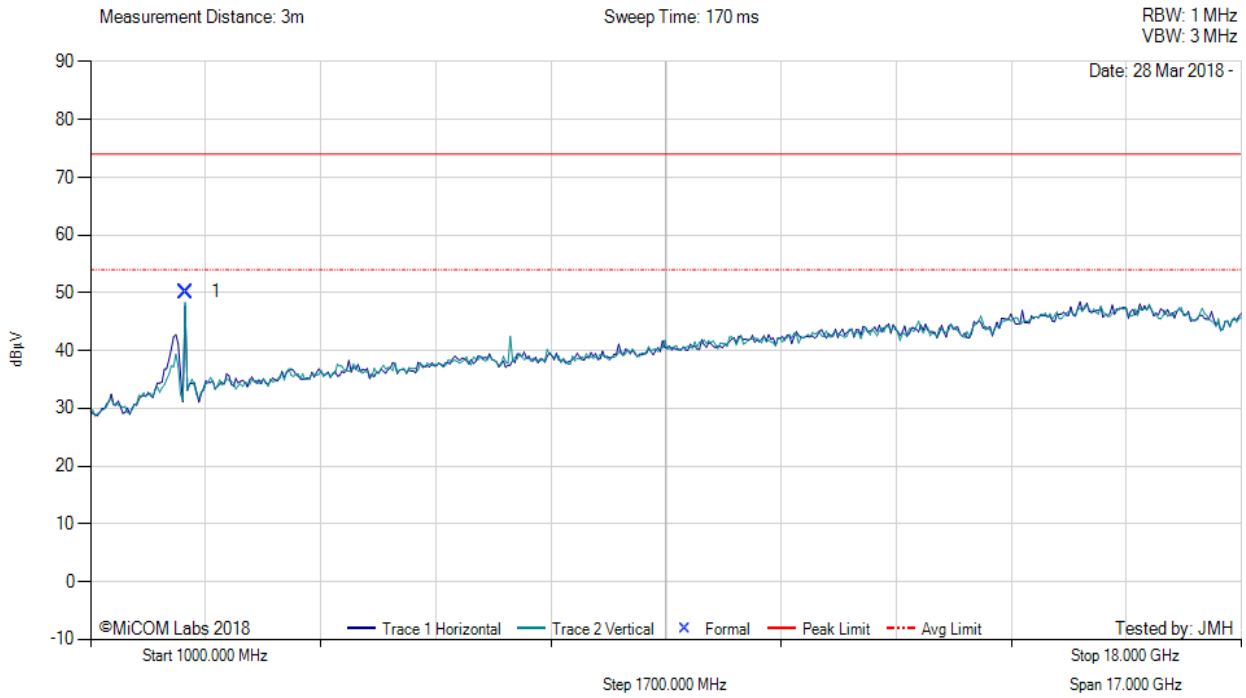

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2464.93 | 43.64 | 2.28 | -11.96 | 33.96 | Fundamental | Horizontal | 200 | 0 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2401.20 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



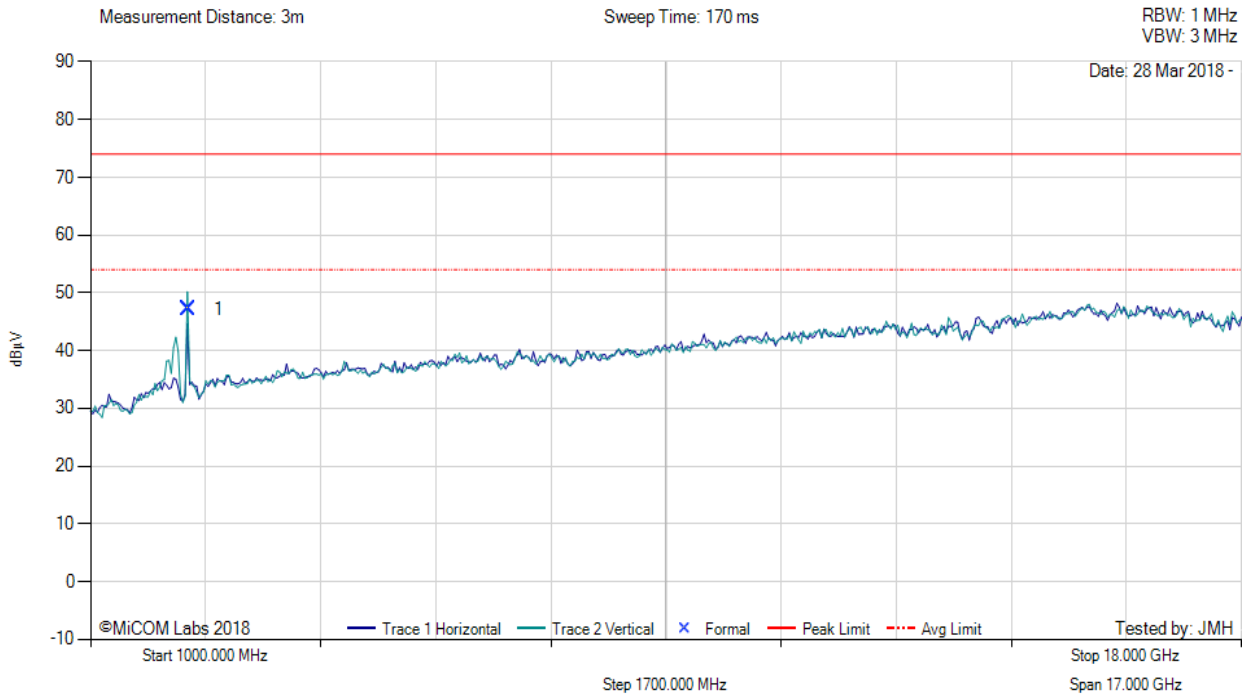

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2401.26 | 60.32 | 2.24 | -12.41 | 50.15 | Fundamental | Vertical | 100 | 98 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2440.80 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



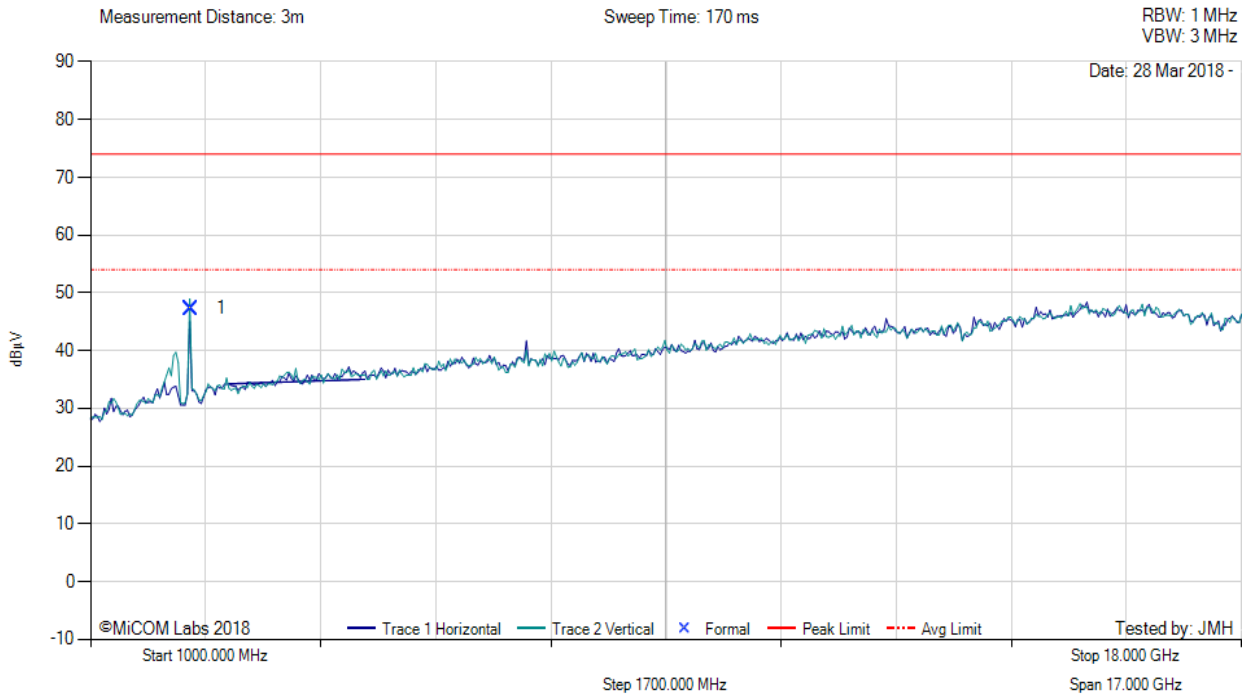

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2440.73 | 57.03 | 2.27 | -12.06 | 47.24 | Fundamental | Vertical | 100 | 191 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2476.80 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



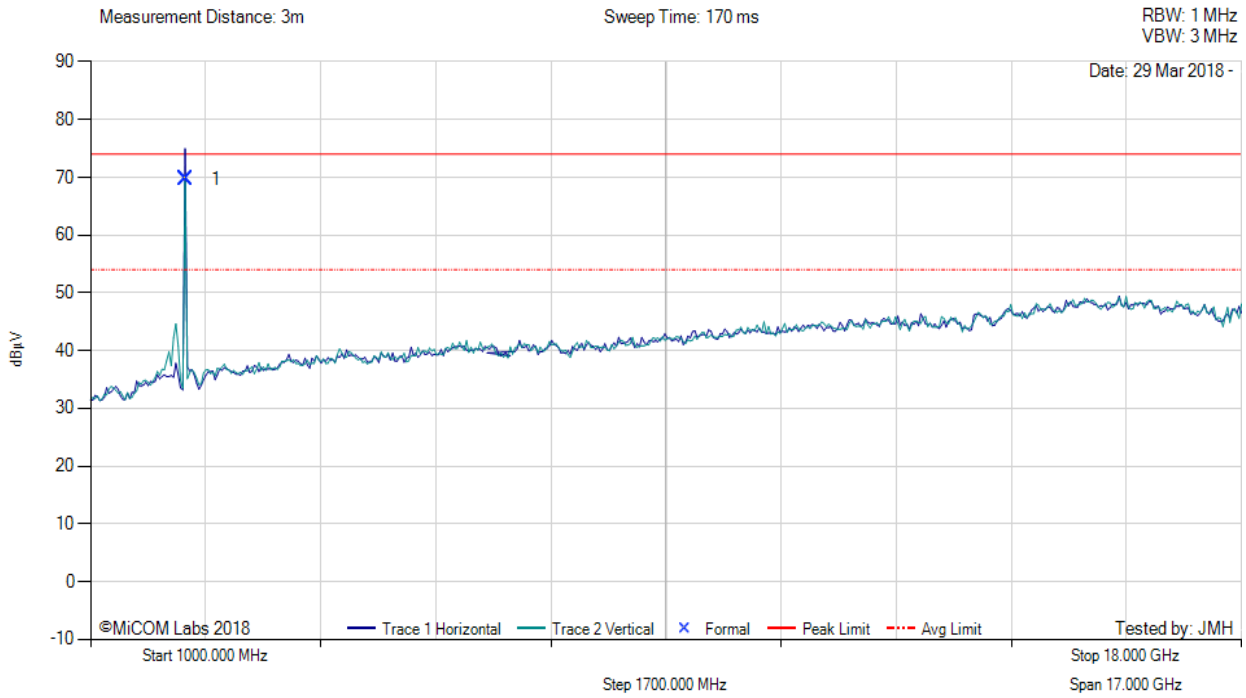

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2476.89 | 56.94 | 2.25 | -11.86 | 47.33 | Fundamental | Vertical | 100 | 174 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2405.00 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



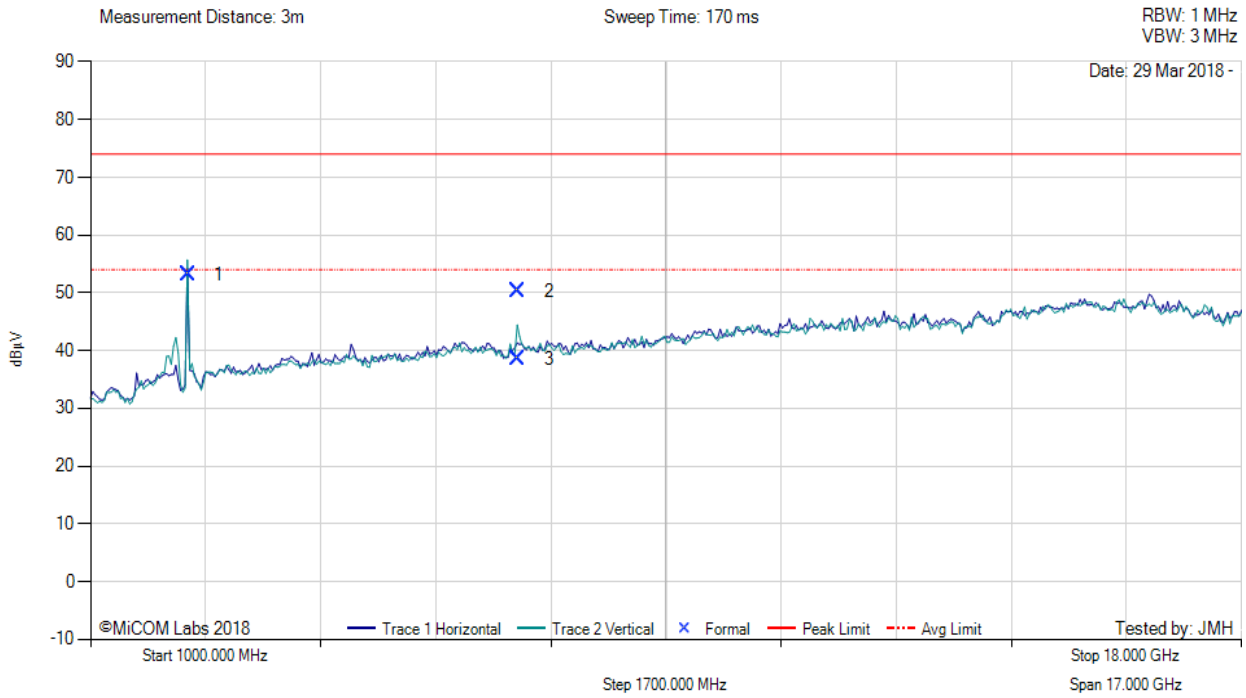

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2405.56 | 79.90 | 2.24 | -12.39 | 69.75 | Fundamental | Horizontal | 100 | 159 | -- | -- | |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2440.00 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



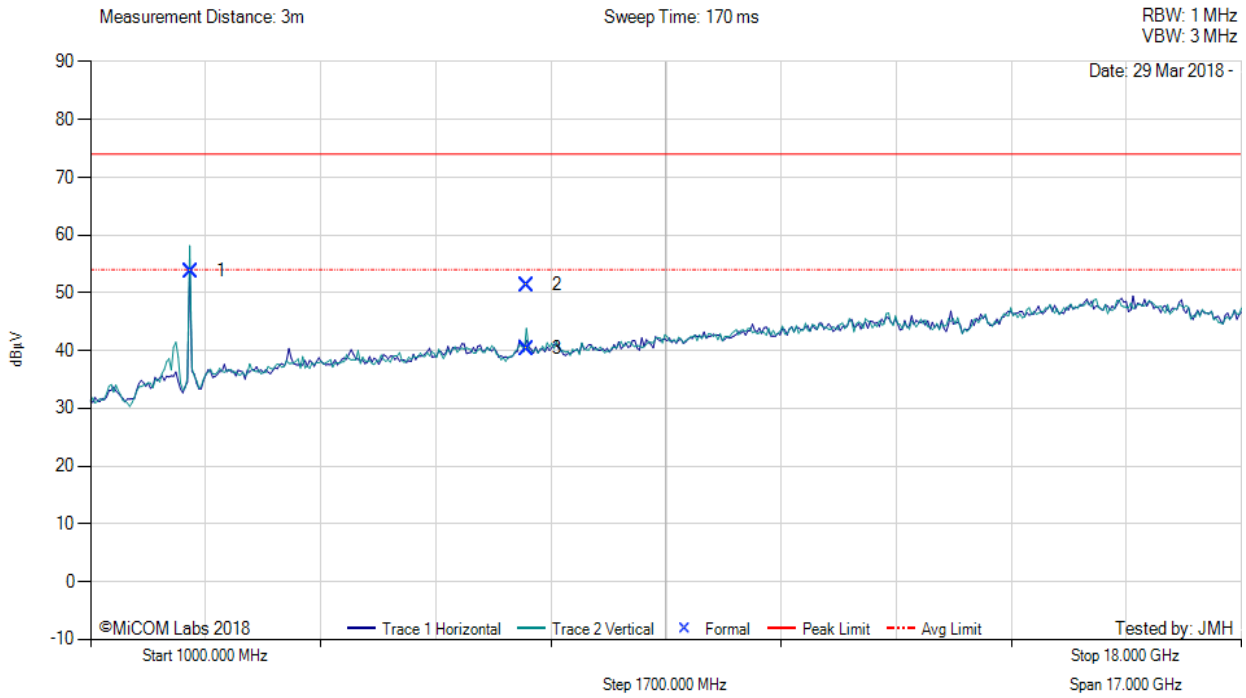

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2439.51 | 63.04 | 2.27 | -12.08 | 53.23 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| 2 | 7318.50 | 54.60 | 3.49 | -7.86 | 50.23 | Max Peak | Vertical | 197 | 191 | 74.0 | -23.8 | Pass |
| 3 | 7318.50 | 42.91 | 3.49 | -7.86 | 38.54 | Max Avg | Vertical | 197 | 191 | 54.0 | -15.5 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2480.00 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



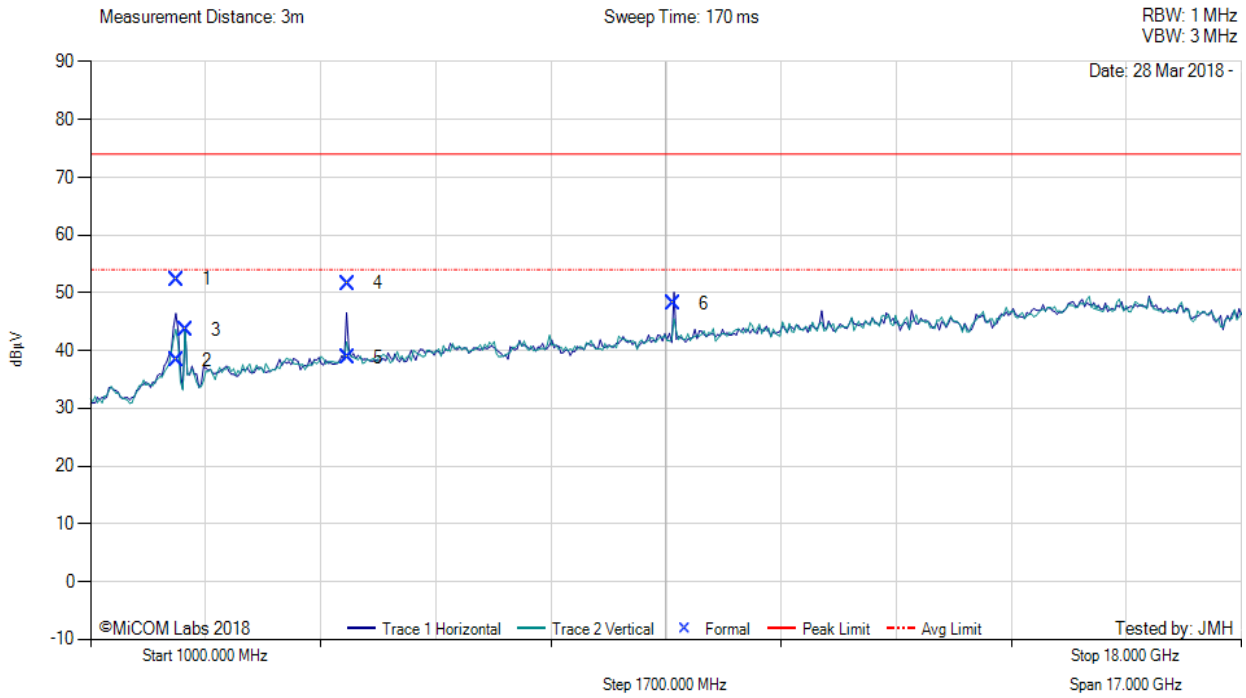

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2480.54 | 63.43 | 2.25 | -11.89 | 53.79 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| 2 | 7438.45 | 55.84 | 3.57 | -8.03 | 51.38 | Max Peak | Vertical | 197 | 186 | 74.0 | -22.6 | Pass |
| 3 | 7438.45 | 44.78 | 3.57 | -8.03 | 40.32 | Max Avg | Vertical | 197 | 186 | 54.0 | -13.7 | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2401.20 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



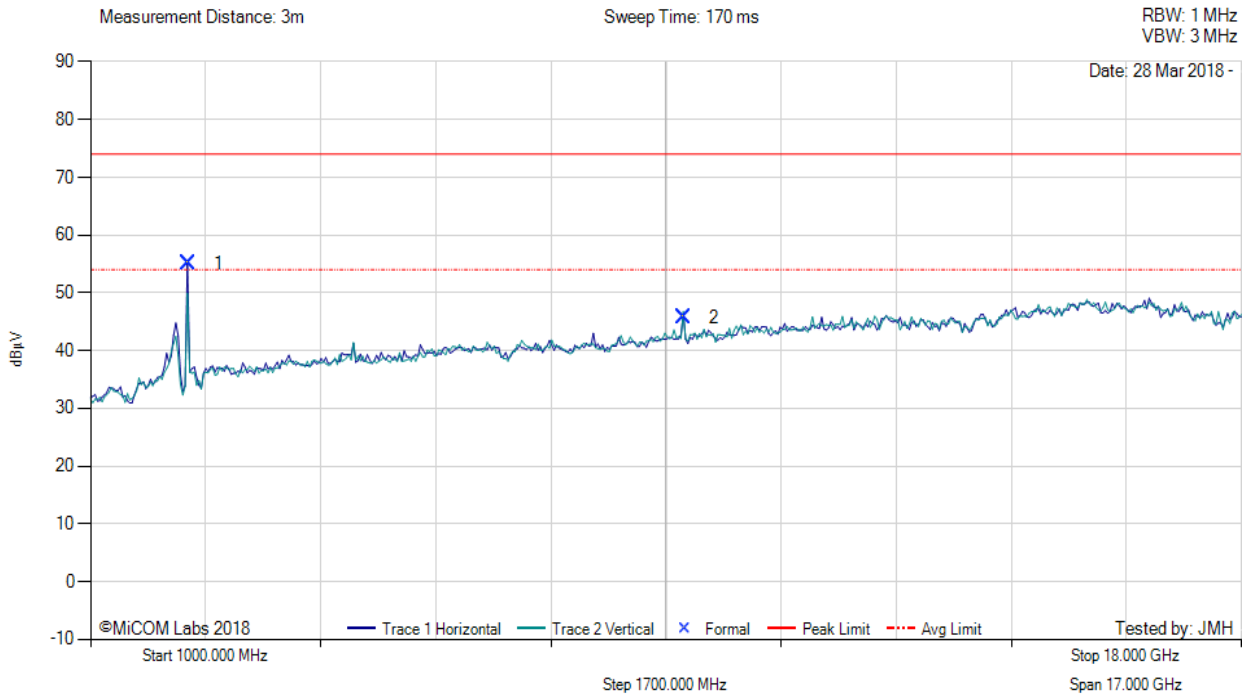

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2268.18 | 62.84 | 2.22 | -12.71 | 52.35 | Max Peak | Horizontal | 186 | 49 | 74.0 | -21.7 | Pass |
| 2 | 2268.18 | 48.79 | 2.22 | -12.71 | 38.30 | Max Avg | Horizontal | 186 | 49 | 54.0 | -15.7 | Pass |
| 3 | 2401.36 | 53.70 | 2.24 | -12.41 | 43.53 | Fundamental | Horizontal | 100 | 112 | -- | -- | |
| 4 | 4802.63 | 61.04 | 2.96 | -12.40 | 51.60 | Max Peak | Horizontal | 123 | 125 | 74.0 | -22.4 | Pass |
| 5 | 4802.63 | 48.22 | 2.96 | -12.40 | 38.78 | Max Avg | Horizontal | 123 | 125 | 54.0 | -15.2 | Pass |
| 6 | 9604.86 | 50.19 | 4.56 | -6.62 | 48.13 | Peak (NRB) | Horizontal | 100 | 179 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2440.80 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



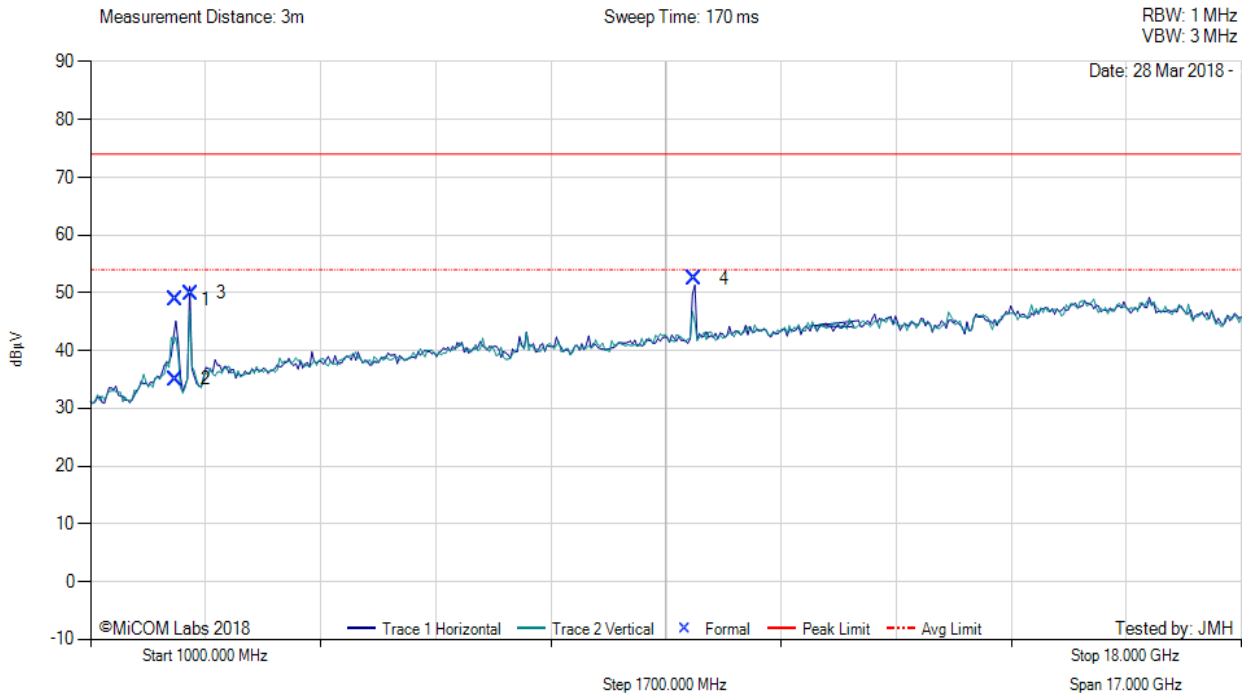

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2440.84 | 64.81 | 2.27 | -12.06 | 55.02 | Fundamental | Horizontal | 101 | 151 | -- | -- | |
| 2 | 9763.38 | 47.25 | 4.33 | -5.90 | 45.68 | Peak (NRB) | Vertical | 101 | 0 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OFDM, Test Freq: 2476.80 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



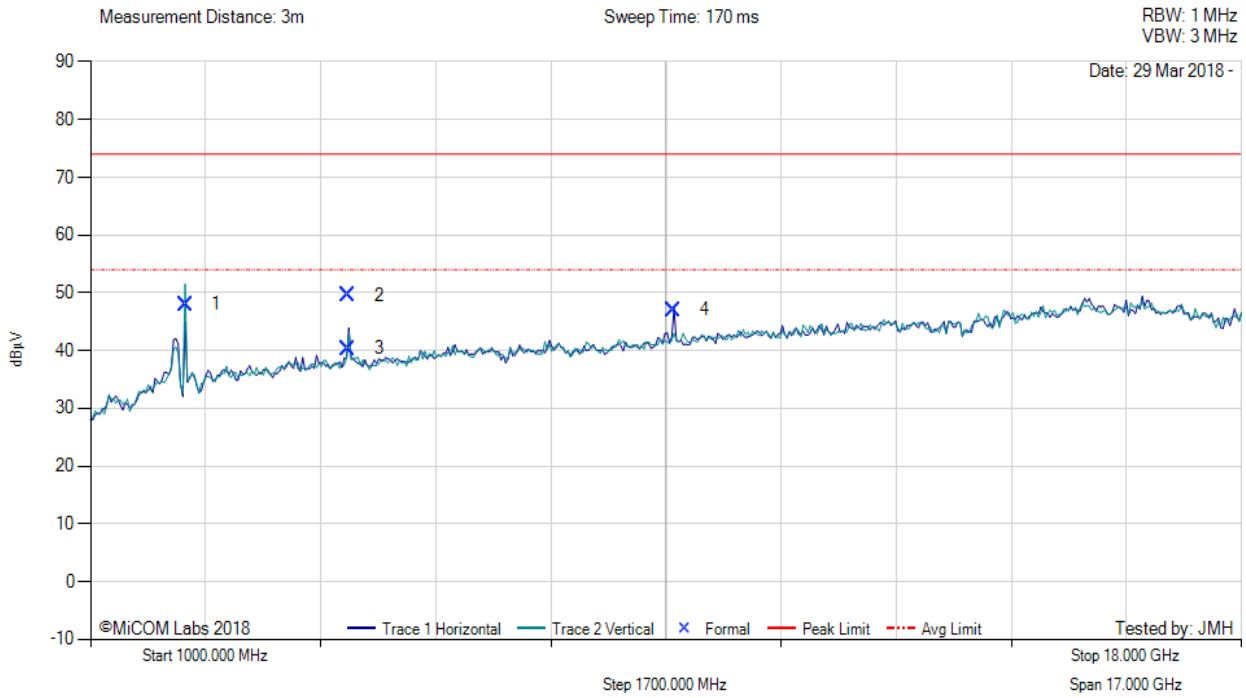

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2257.71 | 59.36 | 2.18 | -12.63 | 48.91 | Max Peak | Horizontal | 178 | 38 | 74.0 | -25.1 | Pass |
| 2 | 2257.71 | 45.53 | 2.18 | -12.63 | 35.08 | Max Avg | Horizontal | 178 | 38 | 54.0 | -18.9 | Pass |
| 3 | 2477.00 | 59.50 | 2.25 | -11.86 | 49.89 | Fundamental | Horizontal | 100 | 58 | -- | -- | |
| 4 | 9907.17 | 55.00 | 4.42 | -7.02 | 52.40 | Peak (NRB) | Horizontal | 100 | 231 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2405.00 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



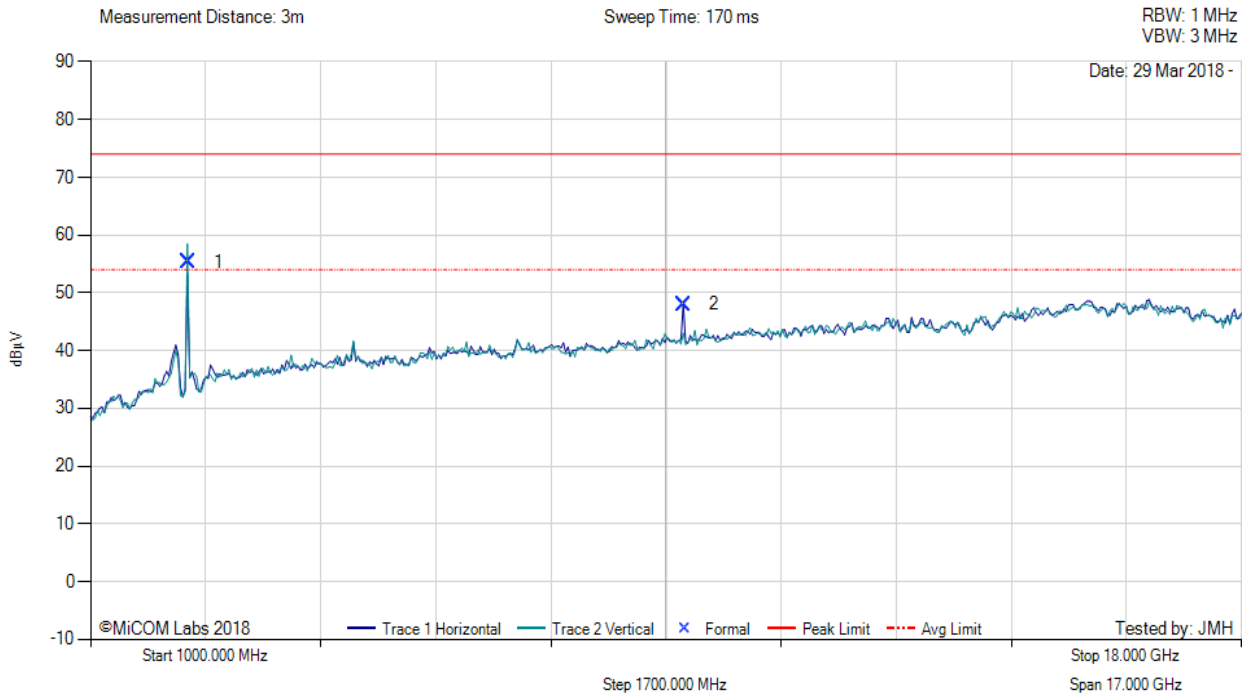

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2405.34 | 58.18 | 2.24 | -12.40 | 48.02 | Fundamental | Vertical | 100 | 136 | -- | -- | |
| 2 | 4810.93 | 58.88 | 2.95 | -12.33 | 49.50 | Max Peak | Horizontal | 196 | 144 | 74.0 | -24.5 | Pass |
| 3 | 4810.93 | 49.73 | 2.95 | -12.33 | 40.35 | Max Avg | Horizontal | 196 | 144 | 54.0 | -13.7 | Pass |
| 4 | 9618.30 | 49.39 | 4.35 | -6.65 | 47.09 | Peak (NRB) | Horizontal | 200 | 136 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2440.00 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



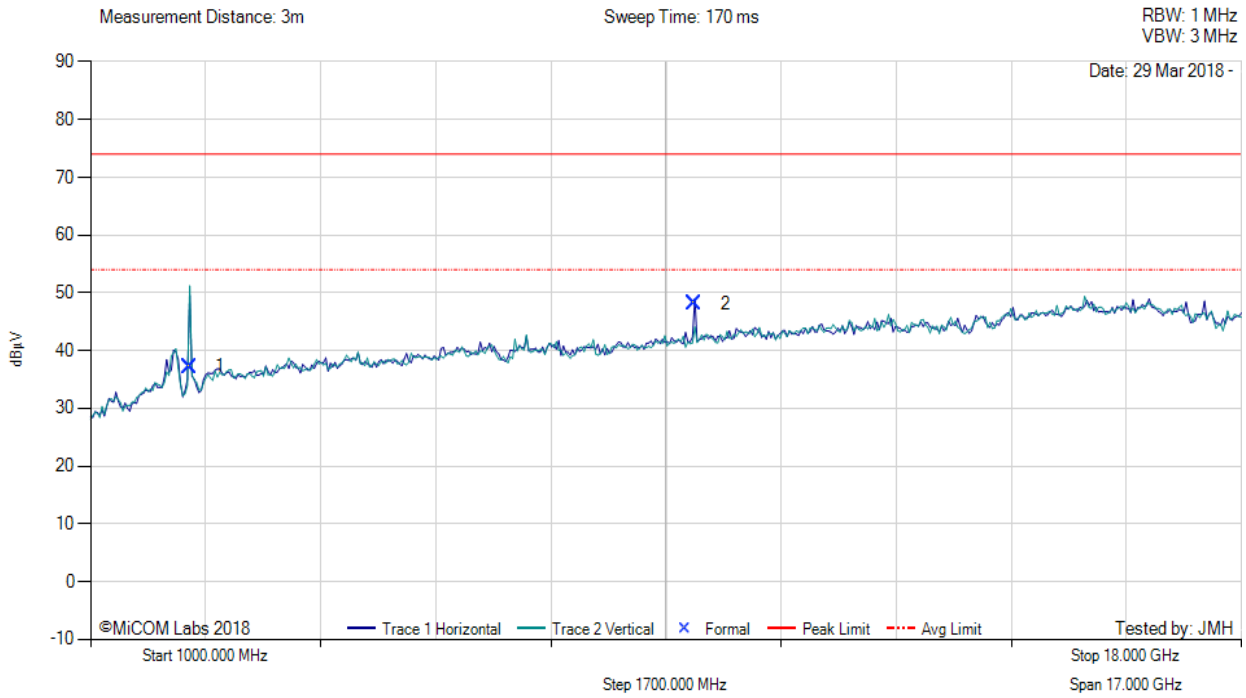

| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2440.51 | 65.16 | 2.27 | -12.06 | 55.37 | Fundamental | Vertical | 100 | 0 | -- | -- | |
| 2 | 9758.10 | 49.61 | 4.37 | -5.96 | 48.02 | Peak (NRB) | Horizontal | 200 | 113 | -- | -- | Pass |

**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: OQPSK, Test Freq: 2480.00 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99




| 1000.00 - 18000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2464.93 | 46.90 | 2.28 | -11.96 | 37.22 | Fundamental | Vertical | 200 | 0 | -- | -- | |
| 2 | 9921.83 | 50.65 | 4.48 | -6.96 | 48.17 | Peak (NRB) | Horizontal | 200 | 145 | -- | -- | Pass |

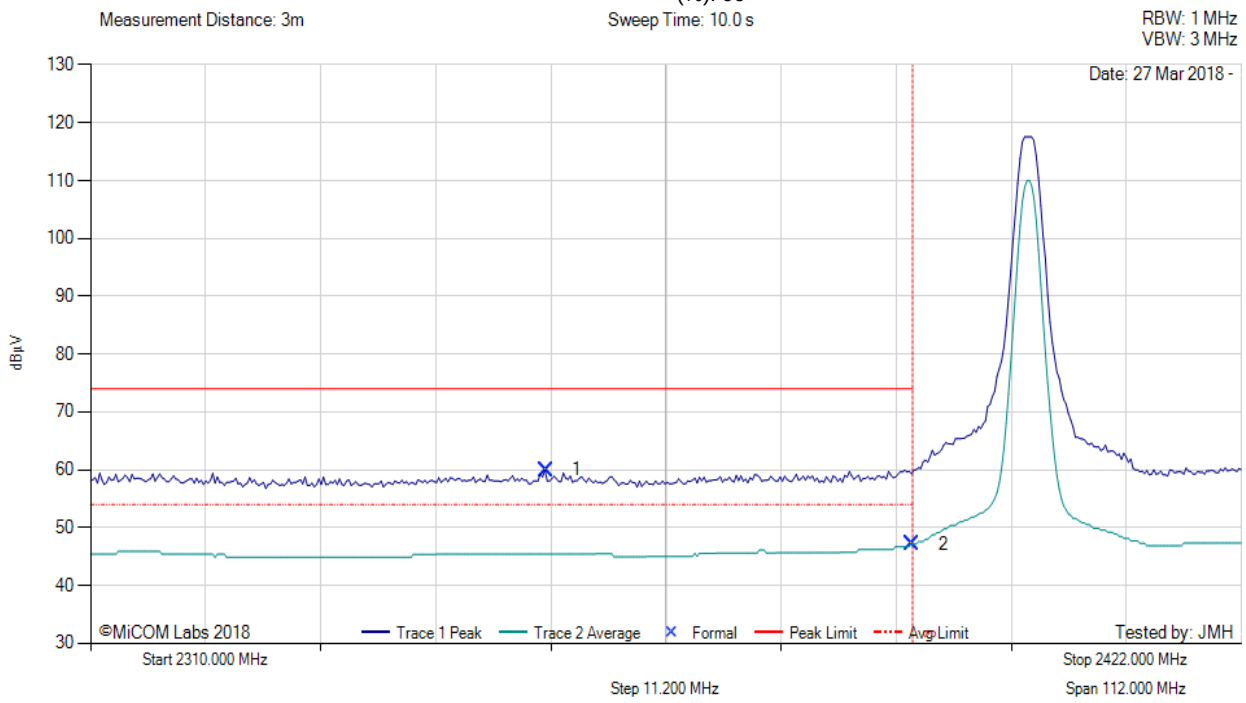
**Test Notes:** EUT powered by 4 volt DC. 2.4 GHz Notch placed in front of amp to prevent overloads.

back to matrix

### A.3.2.4. Restricted Band-Emissions

RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: OFDM, Test Freq: 2401.20 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



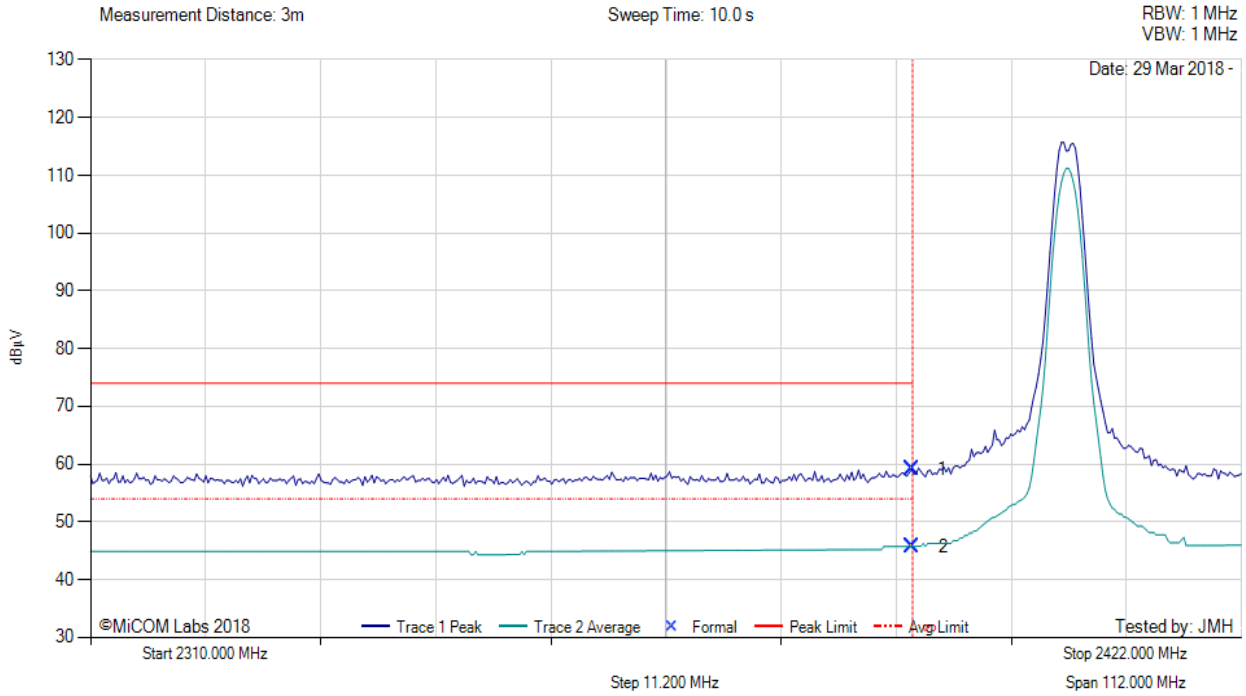

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2354.31 | 26.01 | 2.23 | 31.77 | 60.01 | Max Peak | Horizontal | 199 | 89 | 74.0 | -14.0 | Pass |
| 2 | 2390.00 | 12.96 | 2.26 | 31.96 | 47.18 | Max Avg | Horizontal | 199 | 89 | 54.0 | -6.8 | Pass |
| 3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC,

back to matrix

RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: OQPSK, Test Freq: 2405.00 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



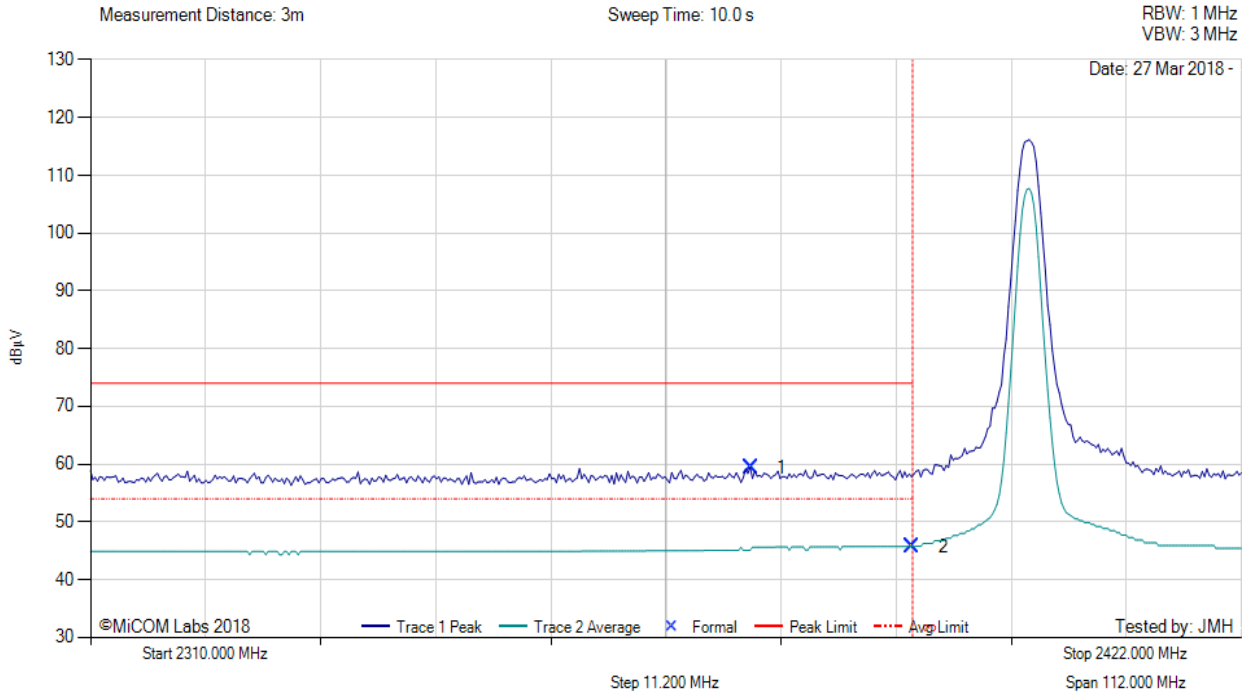

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2389.90 | 24.89 | 2.26 | 31.96 | 59.11 | Max Peak | Horizontal | 171 | 82 | 74.0 | -14.9 | Pass |
| 2 | 2390.00 | 11.55 | 2.26 | 31.96 | 45.77 | Max Avg | Horizontal | 171 | 82 | 54.0 | -8.2 | Pass |
| 3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4V DC

back to matrix

RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: OFDM, Test Freq: 2401.20 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



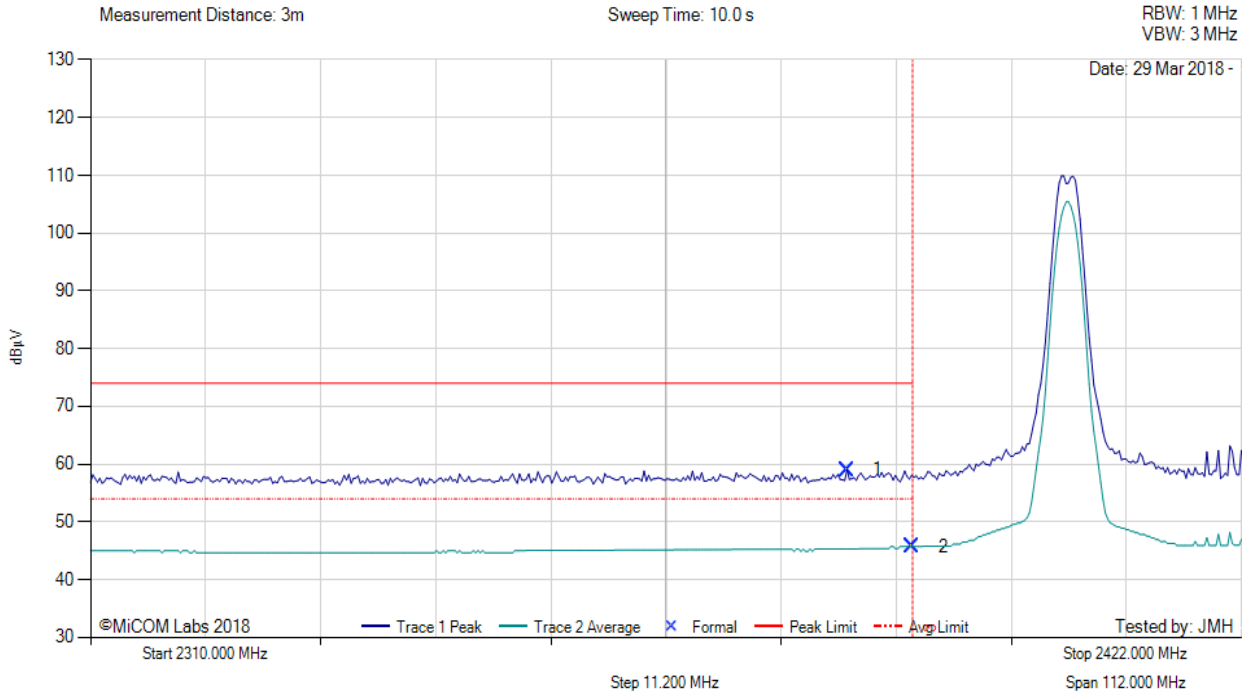

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2374.29 | 25.29 | 2.24 | 31.87 | 59.40 | Max Peak | Vertical | 156 | 148 | 74.0 | -14.6 | Pass |
| 2 | 2390.00 | 11.55 | 2.26 | 31.96 | 45.77 | Max Avg | Vertical | 156 | 148 | 54.0 | -8.2 | Pass |
| 3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC,

back to matrix

RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: OQPSK, Test Freq: 2405.00 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



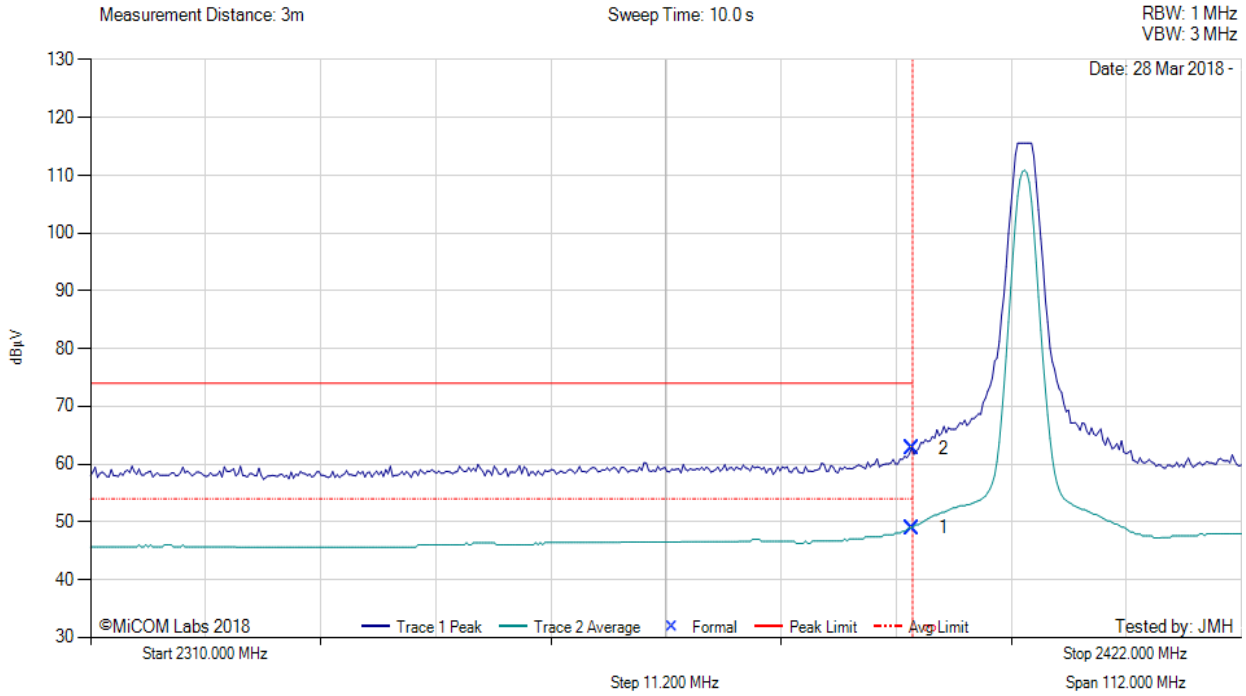

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2383.62 | 24.83 | 2.26 | 31.93 | 59.02 | Max Peak | Vertical | 171 | 209 | 74.0 | -15.0 | Pass |
| 2 | 2390.00 | 11.54 | 2.26 | 31.96 | 45.76 | Max Avg | Vertical | 171 | 209 | 54.0 | -8.2 | Pass |
| 3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4V DC

back to matrix

RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: OFDM, Test Freq: 2401.20 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



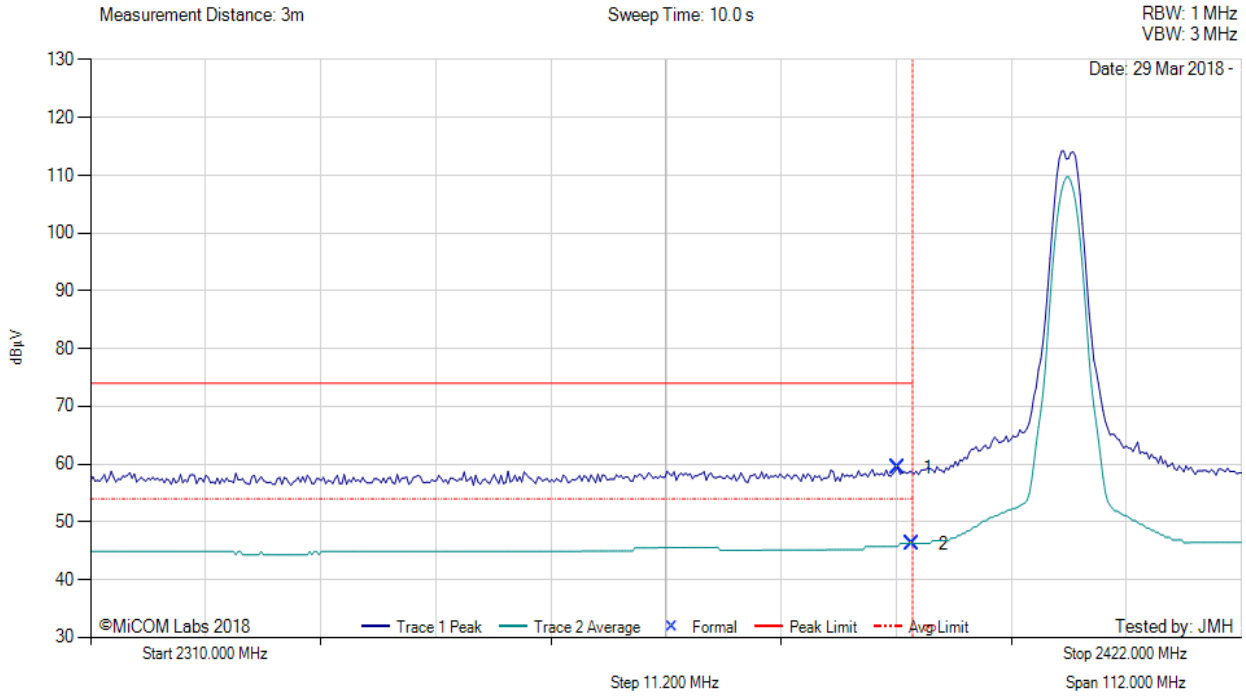

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2390.00 | 14.77 | 2.26 | 31.96 | 48.99 | Max Avg | Horizontal | 195 | 163 | 54.0 | -5.0 | Pass |
| 2 | 2390.00 | 28.52 | 2.26 | 31.96 | 62.74 | Max Peak | Horizontal | 195 | 163 | 74.0 | -11.3 | Pass |
| 3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC

back to matrix

RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: OQPSK, Test Freq: 2405.00 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



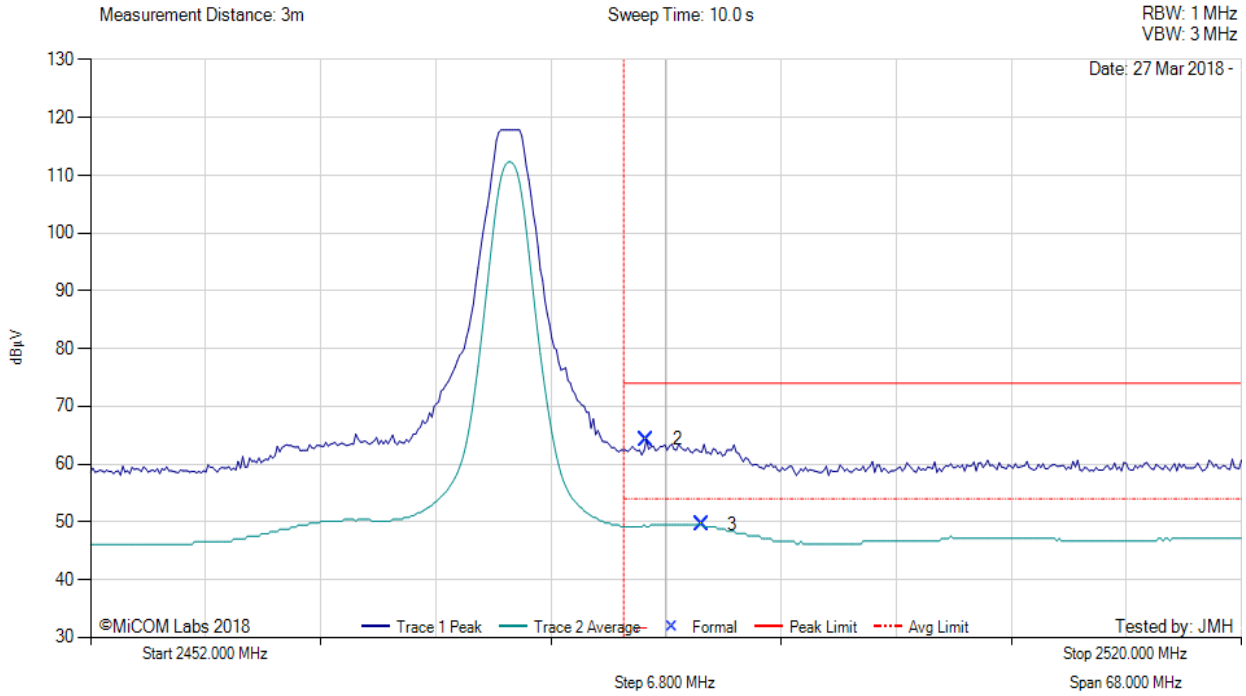

| 2310.00 - 2422.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2388.56 | 25.22 | 2.26 | 31.95 | 59.43 | Max Peak | Horizontal | 200 | 172 | 74.0 | -14.6 | Pass |
| 2 | 2390.00 | 12.04 | 2.26 | 31.96 | 46.26 | Max Avg | Horizontal | 200 | 172 | 54.0 | -7.7 | Pass |
| 3 | 2390.00 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4V DC

back to matrix

RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: OFDM, Test Freq: 2476.80 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



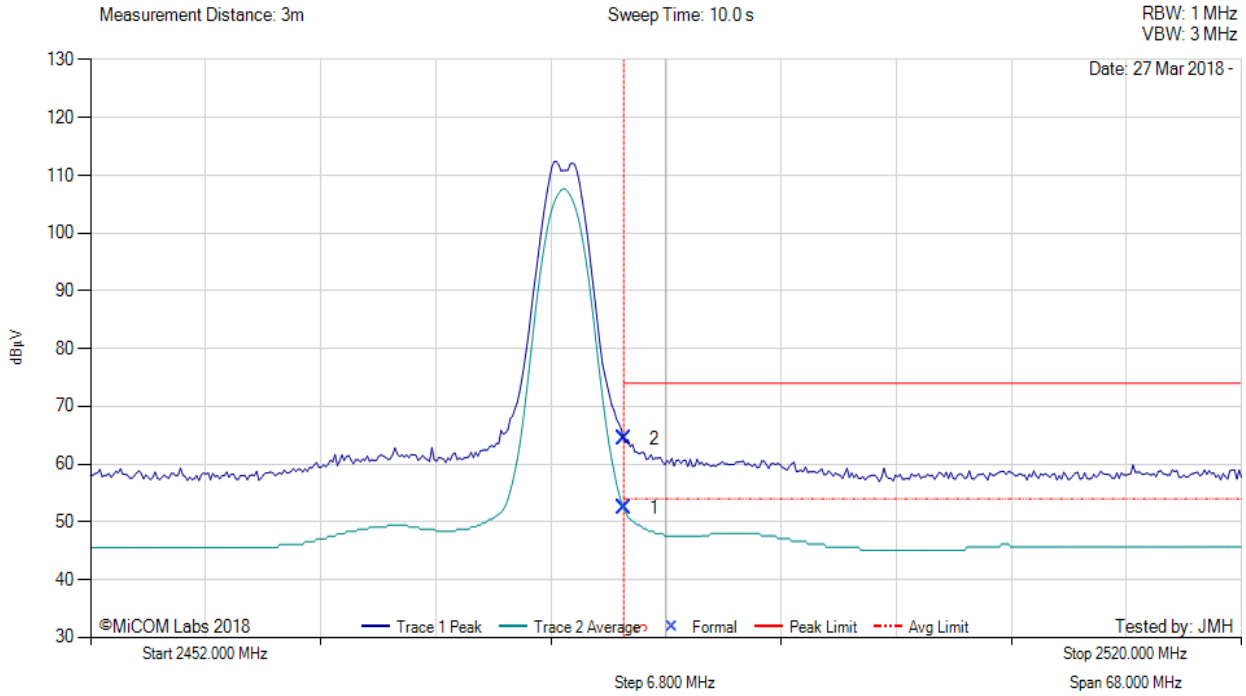

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 2 | 2484.86 | 29.70 | 2.25 | 32.33 | 64.28 | Max Peak | Horizontal | 186 | 88 | 74.0 | -9.7 | Pass |
| 3 | 2488.13 | 14.93 | 2.25 | 32.33 | 49.51 | Max Avg | Horizontal | 186 | 88 | 54.0 | -4.5 | Pass |
| 1 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC,

back to matrix

RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: OQPSK, Test Freq: 2480.00 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 10, Duty Cycle (%): 99



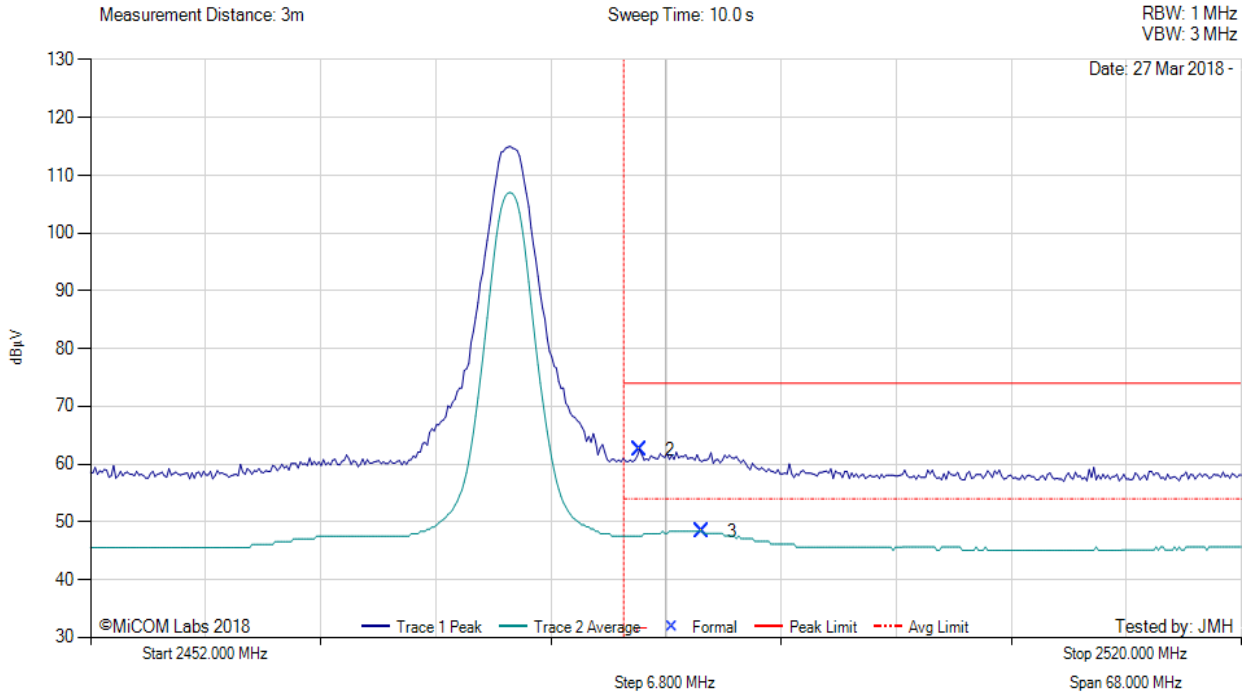

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2483.50 | 17.84 | 2.25 | 32.33 | 52.42 | Max Avg | Horizontal | 166 | 86 | 54.0 | -1.6 | Pass |
| 2 | 2483.50 | 29.88 | 2.25 | 32.33 | 64.46 | Max Peak | Horizontal | 166 | 86 | 74.0 | -9.5 | Pass |
| 3 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC, Power reduced to meet band edge limit

back to matrix

RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: OFDM, Test Freq: 2476.80 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



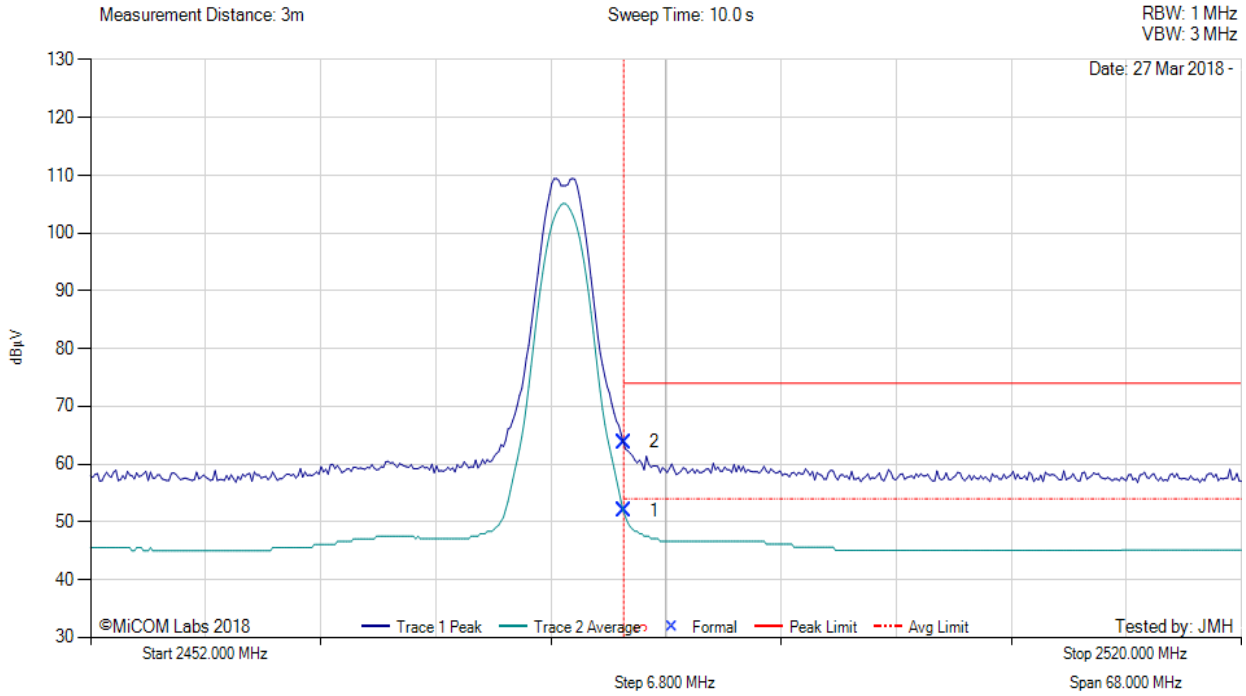

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 2 | 2484.45 | 27.94 | 2.25 | 32.33 | 62.52 | Max Peak | Vertical | 156 | 148 | 74.0 | -11.5 | Pass |
| 3 | 2488.13 | 13.82 | 2.25 | 32.33 | 48.40 | Max Avg | Vertical | 156 | 148 | 54.0 | -5.6 | Pass |
| 1 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC,

back to matrix

RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: OQPSK, Test Freq: 2480.00 MHz, Antenna: WP WPANT30017-CA, Power Setting: 18, Duty Cycle (%): 99



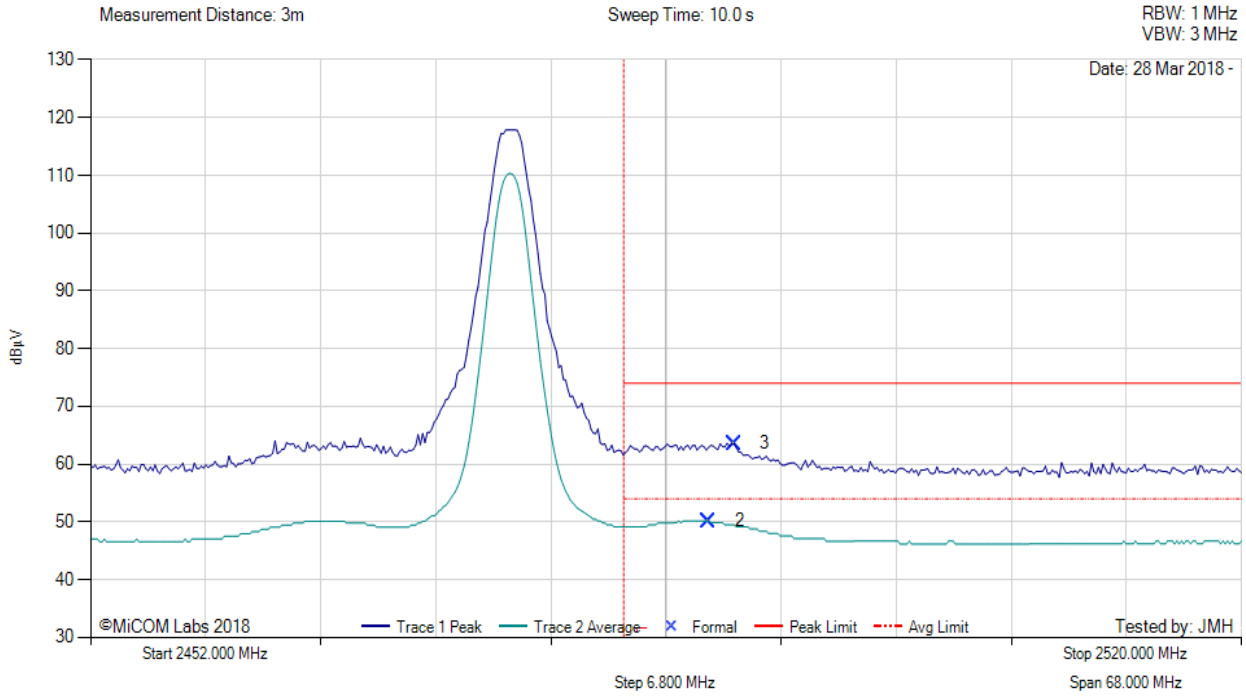

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2483.50 | 17.33 | 2.25 | 32.33 | 51.91 | Max Avg | Vertical | 152 | 8 | 54.0 | -2.1 | Pass |
| 2 | 2483.50 | 29.24 | 2.25 | 32.33 | 63.82 | Max Peak | Vertical | 152 | 8 | 74.0 | -10.2 | Pass |
| 3 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC,

back to matrix

RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: OFDM, Test Freq: 2476.80 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



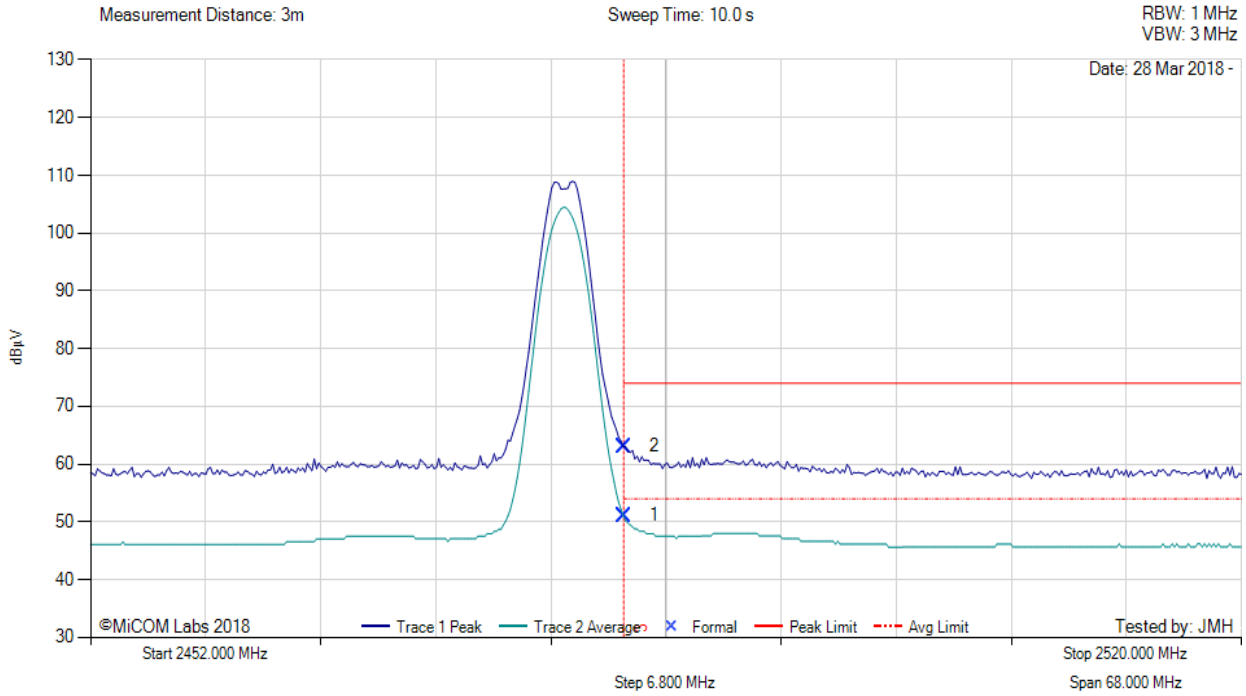

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 2 | 2488.54 | 15.61 | 2.25 | 32.32 | 50.18 | Max Avg | Horizontal | 189 | 150 | 54.0 | -3.8 | Pass |
| 3 | 2490.02 | 28.99 | 2.25 | 32.32 | 63.56 | Max Peak | Horizontal | 189 | 150 | 74.0 | -10.4 | Pass |
| 1 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC

back to matrix

RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: OQPSK, Test Freq: 2480.00 MHz, Antenna: WP WPANT40020-SA, Power Setting: 10, Duty Cycle (%): 99



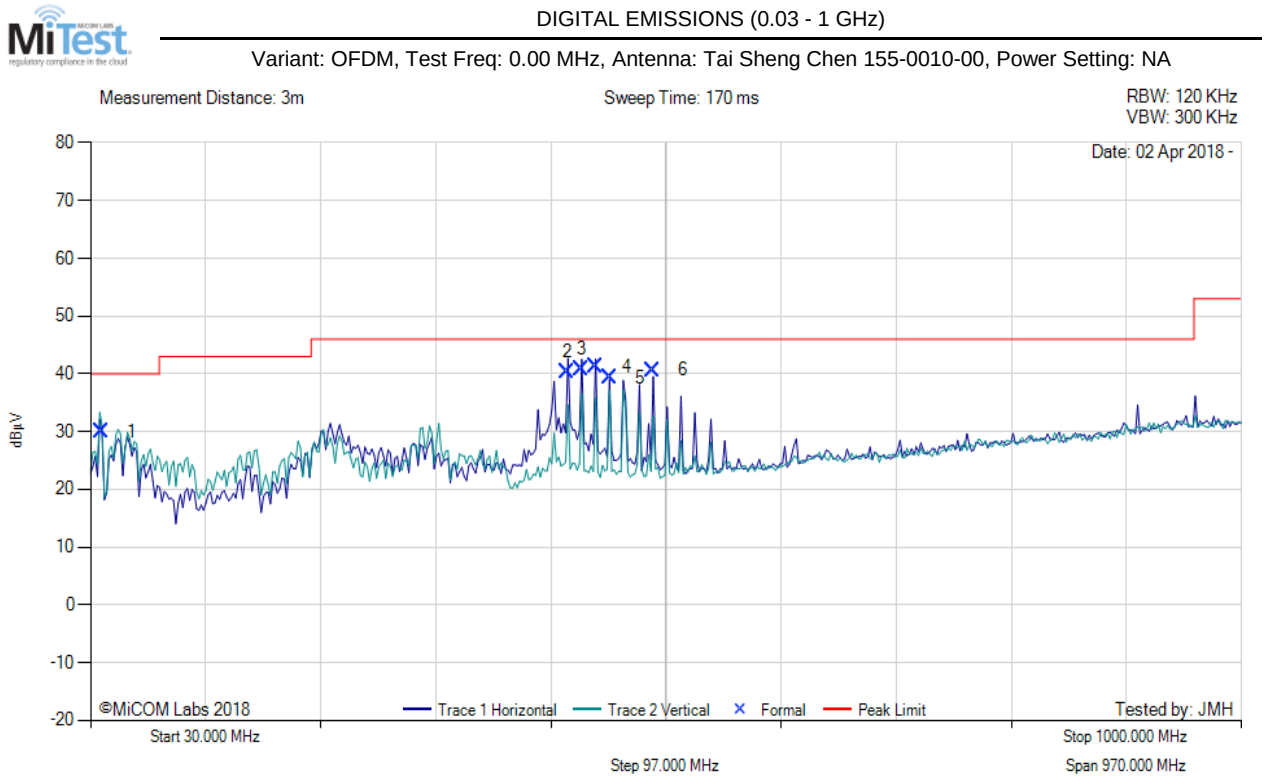

| 2452.00 - 2520.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 2483.50 | 16.50 | 2.25 | 32.33 | 51.08 | Max Avg | Horizontal | 195 | 163 | 54.0 | -2.9 | Pass |
| 2 | 2483.50 | 28.47 | 2.25 | 32.33 | 63.05 | Max Peak | Horizontal | 195 | 163 | 74.0 | -11.0 | Pass |
| 3 | 2483.50 | -- | -- | -- | -- | Restricted-Band | -- | -- | -- | -- | -- | -- |

**Test Notes:** EUT powered by 4 volt DC

back to matrix

### A.3.3. Digital Emissions (0.03 - 1 GHz)

USB Active and downloading, Connected to SBC computer



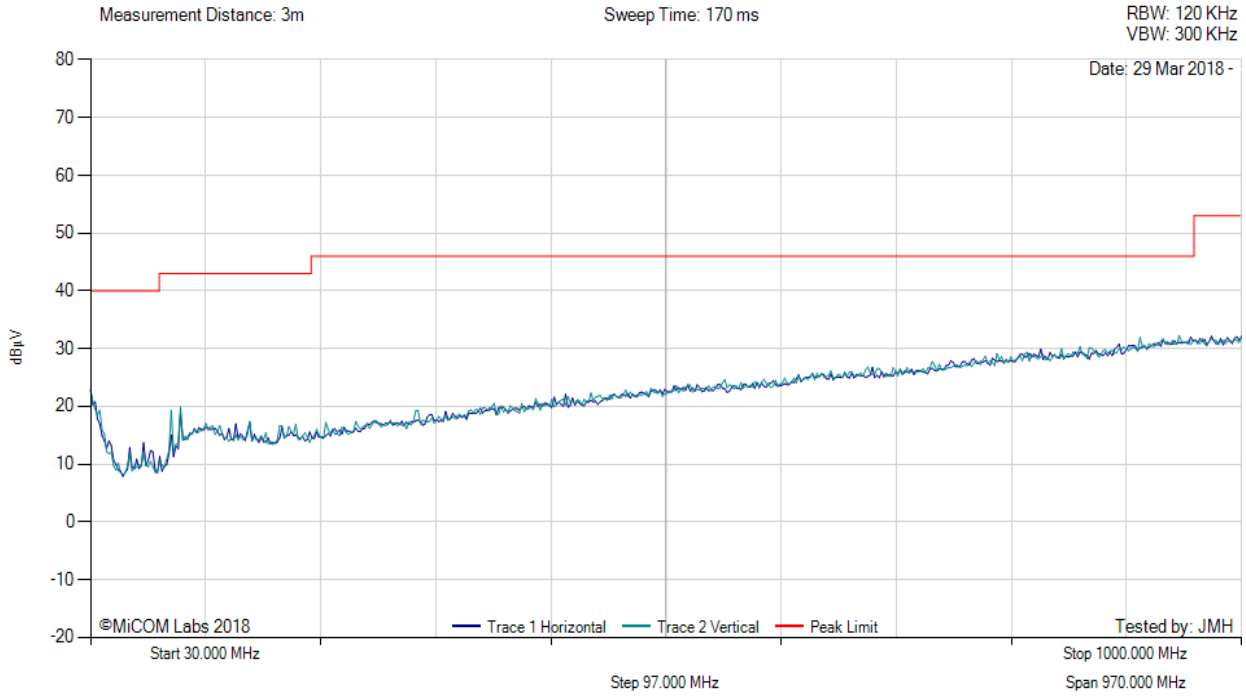

| 30.00 - 1000.00 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Num** | **Frequency MHz** | **Raw dBµV** | **Cable Loss dB** | **AF dB** | **Level dBµV/m** | **Measurement Type** | **Pol** | **Hgt cm** | **Azt Deg** | **Limit dBµV/m** | **Margin dB** | **Pass /Fail** |
| 1 | 39.02 | 43.91 | 3.47 | -17.37 | 30.01 | MaxQP | Vertical | 104 | 71 | 40.0 | -10.0 | Pass |
| 2 | 431.96 | 49.59 | 4.99 | -14.31 | 40.27 | MaxQP | Horizontal | 204 | 154 | 46.0 | -5.7 | Pass |
| 3 | 443.99 | 49.98 | 5.02 | -14.21 | 40.79 | MaxQP | Horizontal | 101 | 356 | 46.0 | -5.2 | Pass |
| 4 | 456.01 | 50.18 | 5.04 | -13.93 | 41.29 | MaxQP | Horizontal | 282 | 349 | 46.0 | -4.7 | Pass |
| 5 | 468.02 | 47.67 | 5.07 | -13.37 | 39.37 | MaxQP | Horizontal | 101 | 301 | 46.0 | -6.6 | Pass |
| 6 | 503.99 | 48.65 | 5.20 | -13.23 | 40.62 | MaxQP | Horizontal | 159 | 160 | 46.0 | -5.4 | Pass |

**Test Notes:** Powered by AC/DC PS. Digital Communications over USB. Connected to SBC.

back to matrix

DIGITAL EMISSIONS (0.03 - 1 GHz)

Variant: OFDM, Test Freq: 2440.80 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



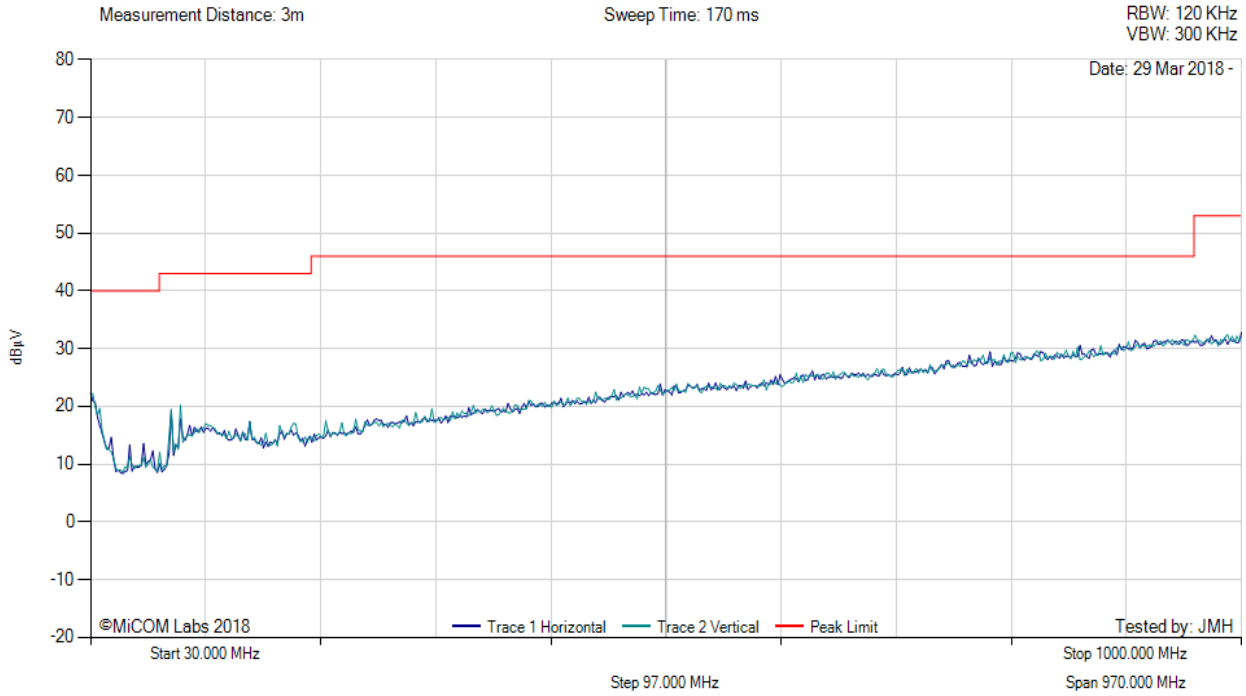

There are no emissions found within 6dB of the limit line.

**Test Notes:** EUT powered by 4V DC

back to matrix

DIGITAL EMISSIONS (0.03 - 1 GHz)

Variant: OQPSK, Test Freq: 2440.00 MHz, Antenna: Tai Sheng Chen 155-0010-00, Power Setting: 21, Duty Cycle (%): 99



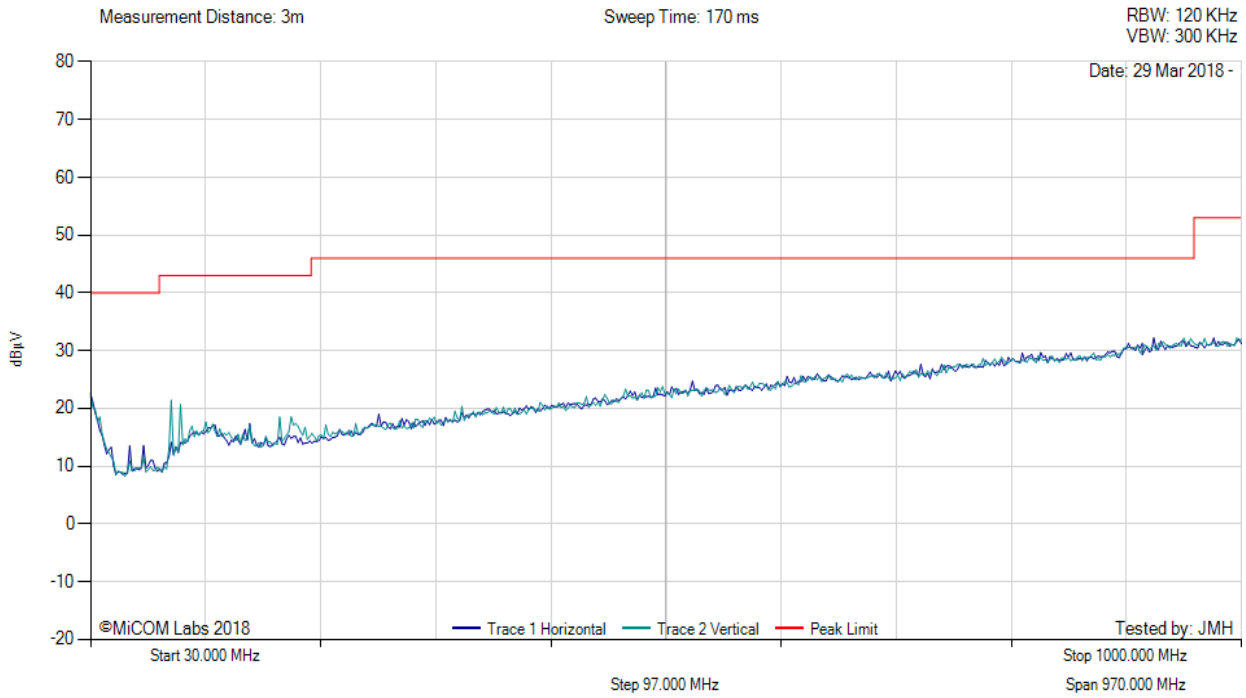

There are no emissions found within 6dB of the limit line.

**Test Notes:** EUT powered by 4V DC

back to matrix

DIGITAL EMISSIONS (0.03 - 1 GHz)

Variant: OFDM, Test Freq: 2440.80 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



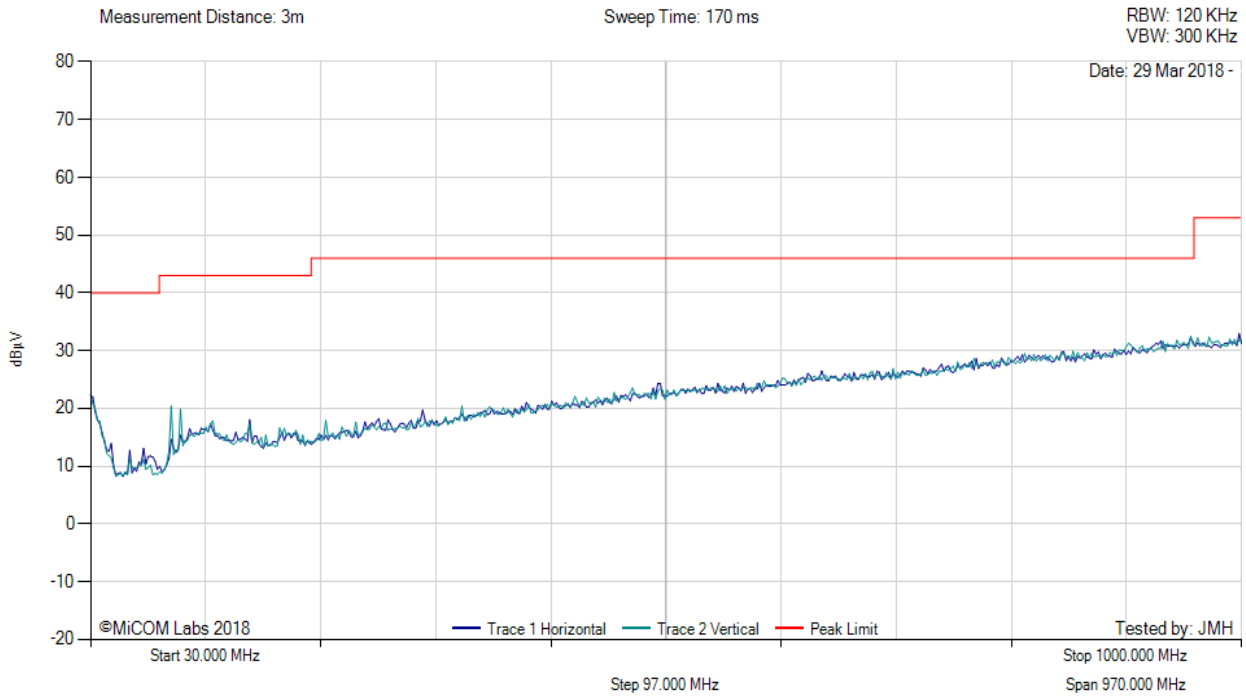

There are no emissions found within 6dB of the limit line.

**Test Notes:** EUT powered by 4V DC

back to matrix

DIGITAL EMISSIONS (0.03 - 1 GHz)

Variant: OQPSK, Test Freq: 2440.00 MHz, Antenna: WP WPANT30017-CA, Power Setting: 21, Duty Cycle (%): 99



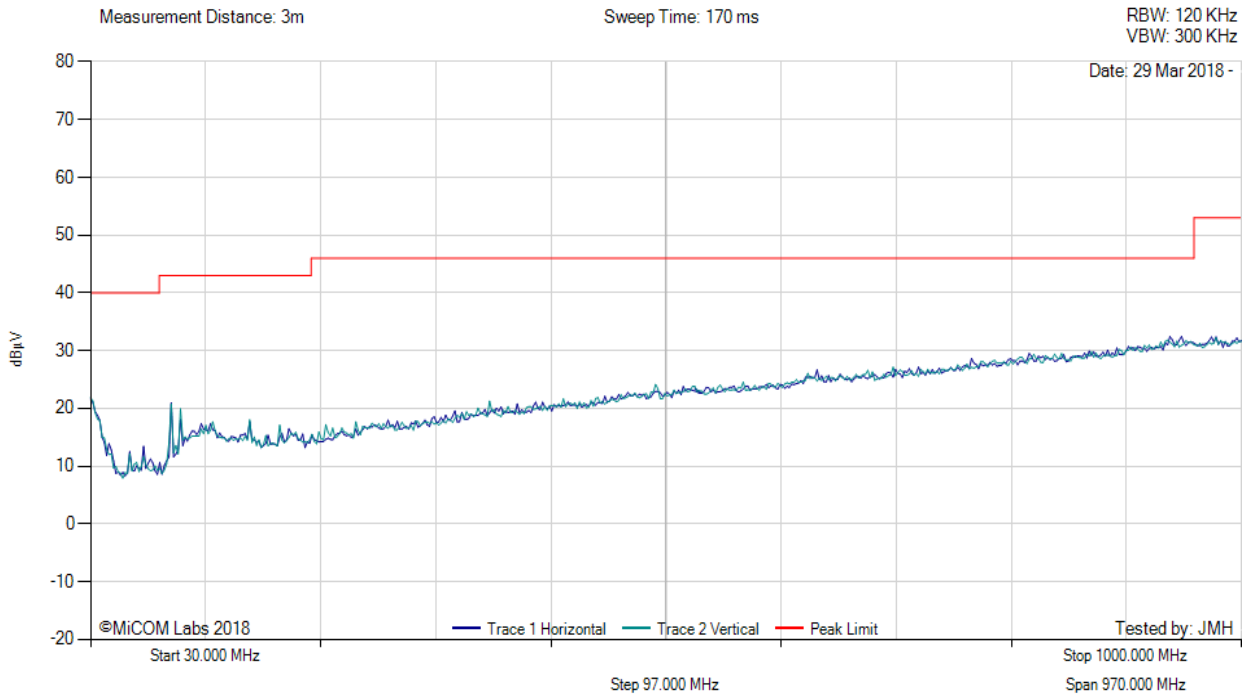

There are no emissions found within 6dB of the limit line.

**Test Notes:** EUT powered by 4V DC

back to matrix

RADIATED DIGITAL EMISSIONS

Variant: OFDM, Test Freq: 2440.80 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99



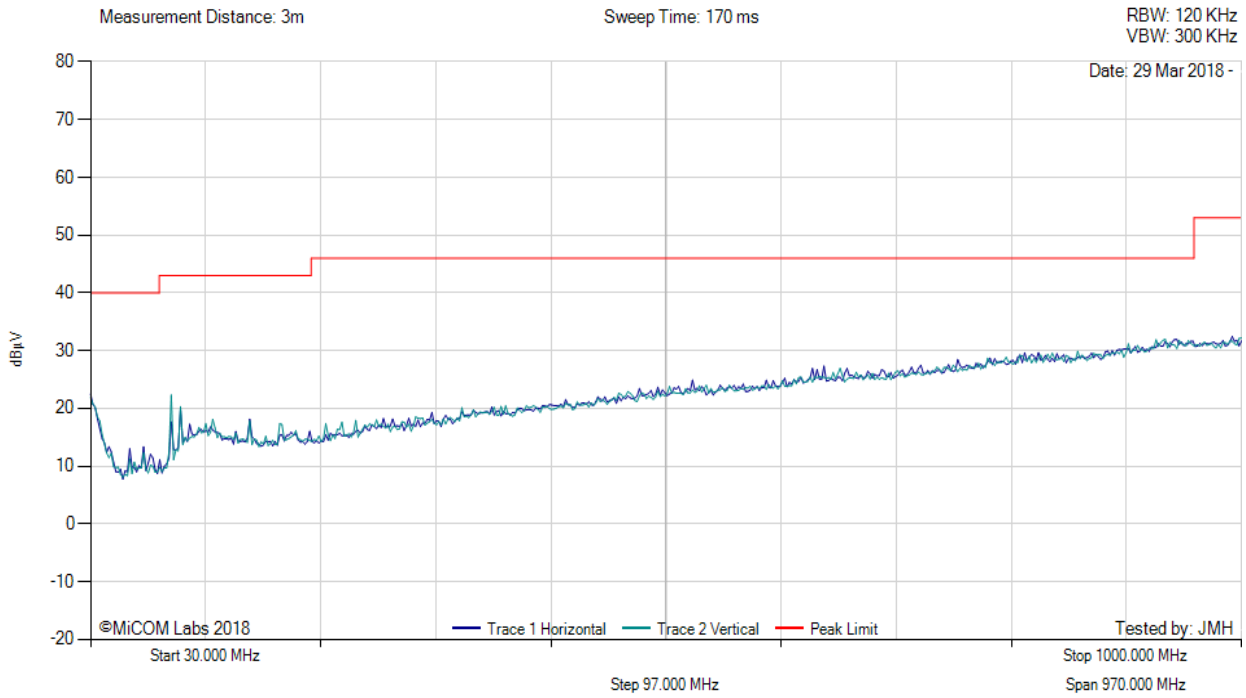

There are no emissions found within 6dB of the limit line.

**Test Notes:** EUT powered by 4V DC

back to matrix

DIGITAL EMISSIONS (0.03 - 1 GHz)

Variant: OQPSK, Test Freq: 2440.00 MHz, Antenna: WP WPANT40020-SA, Power Setting: 21, Duty Cycle (%): 99




There are no emissions found within 6dB of the limit line.

**Test Notes:** EUT powered by 4V DC

back to matrix


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