FCC and ISED Canada Testing of the

Attenti US, Inc.
RTCVZ3

In accordance with FCC 47 CFR part 15.247 and ISED Canada's Radio Standards Specifications RSS-247

America

Add value.
Inspire trust.

Prepared for: Attenti US, Inc.
1838 Gunn Highway
Odessa, FL 33556

FCC ID: NC3-24074AVL
IC: 23669-24074AVL

COMMERCIAL-IN-CONFIDENCE

Document Number: TP72169129.300 | Version Number: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Peter Walsh	2021 -June-30	
Testing	Thierry Jean Charles	2021-June-30	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

FCC Accreditation Designation Number US1063 Tampa, FL Test Laboratory	Innovation, Science, and Economic Development Canada Accreditation Site Number 2087A-2 Tampa, FL Test Laboratory

EXECUTIVE SUMMARY
Samples of this product were tested and found to be in compliance with 15.247 and ISED Canada's RSS-247.

A2LA Cert. No. 2955.15

TÜV SÜD America
5610 West Sligh Ave., Suite 100
Tampa, FL 33634

Phone: 813-284-2715
www.tuv-sud-america.com

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2021-June-30

1.2 Introduction

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations Section 15.247 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein.

Applicant	Attenti US, Inc.
Manufacturer	Attenti US, Inc.
Applicant's Email Address	sdupont@attentigroup.com
Model Number(s)	RTCVZ3
Serial Number(s)	36090015 (RF Conducted Measurements) 36090009 (Radiated and Power Line Conducted Measurements)
FCC ID	NC3-24074AVL
ISED Certification Number	23669-24074AVL
Hardware Version(s)	Rev B00 and C00
Software Version(s)	V5.2.2.6
Number of Samples Tested	2
Test Specification/Issue/Date	US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2021 Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-247 — Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices, Issue 2, February 2017
Test Plan/Issue/Date	2021-March-11
Order Number	72169129
Date	2021-April-24
Date of Receipt of EUT	2021-May-12
Start of Test	2021-May-12
Finish of Test	2021-June-23
Name of Engineer(s)	Thierry Jean-Charles
Related Document(s)	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2021. FCC OET KDB Publication 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules.

FCC KDB Publication 996369 D04 Module Integration Guide v01: Modular Transmitter Integration Guide - Guidance for Host Product Manufacturers, February 1, 2019.

Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-GEN - General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1, March 2019.

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15.247 and ISED Canada's RSS-247 is shown below.

Table 1.3-1: Test Result Summary

Test Parameter	Test Plan (Yes/No)	Test Result	FCC 47 CFR Rule Part	ISED Canada's RSS	Test Report Page No
Antenna Requirement	Yes	Pass	15.203, 15.204	-------	11
6 dB Bandwidth	Yes	Pass	15.247(a)(2)	RSS-247 5.2(a)	12
99% Bandwidth	Yes	Pass	-------	RSS-GEN 6.7	20
Fundamental Emission Output Power	Yes	Pass	15.247(b)(3)	RSS-247 5.4(d)	28
Band-Edge Compliance of RF Conducted Emissions	Yes	Pass	15.247(d)	RSS-247 5.5	30
RF Conducted Spurious Emissions	Yes	Pass	15.247(d)	RSS-247 5.5	35
Radiated Spurious Emissions into Restricted Frequency Bands	Yes	Pass	15.205, 15.209	RSS-GEN 8.9, 8.10	41
Power Spectral Density	Yes	Pass	15.247(e)	RSS-247 5.2(b)	51
Duty Cycle	Yes	--------	-------	-------	59
Power Line Conducted Emissions	Yes	Pass	15.207	RSS-GEN 8.8	62

1.4 Product Information

1.4.1 Technical Description

The EUT is a Handheld Personnel Tracker. This handheld device wirelessly pairs with an ankle-worn non-intelligent bracelet. It can optionally be used with a BU2000 Table-top Base Unit (this is a charging and docking station) as well. The EUT includes 433 MHz ISM and 2.4 GHz Wi-Fi radios as well as an LTE module (FCC ID: RI7LE910NAV2 / IC: 5131A-LE910NAV2). The test report documents the compliance of the 2.4 GHz Wi-Fi radio.

Technical Details

Mode of Operation:	IEEE 802.11b/g/n
Frequency Range:	2412 MHz - 2462 MHz
Number of Channels:	11
Channel Separation:	5 MHz
Data Rate:	802.11b: 1, 2, 5.5, 11 Mbps
	802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	802.11n: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps
Modulations:	802.11b: CCK, DSSS
	802.11g/n: OFDM
Antenna Type/Gain:	Embedded SMD PCB Mount On-Ground Antenna, 3.6 dBi
Input Power:	12 VDC Power Supply / 3.7 VDC Battery

A full description and detailed product specification details are available from the manufacturer.

Table 1.4.1-1 – Cable Descriptions

Cable/Port	Description
Power	2.74 m, Not Shielded, Power Supply to EUT

Table 1.4.1-2 – Support Equipment Descriptions

Make/Model	Description
JFEC / JF024WR-1200200UH	12 VDC AC Adapter

Declaration of Build Status

EQUIPMENT DESCRIPTION	
Model Name/Number	Model Names: RTC AT&T / RTC MC Model # RTCVZ3
Part Number(s)	064000024 TOP ASSY RTC V2 AT&T AND 064000022 TOP ASSY RTC V2 MC
Hardware Version	Rev B00 and C00
Software Version	V5.2.2.6
FCC ID (if applicable)	NC3-24074AVL
ISED ID (if applicable)	23669-24074AVL
Technical Description (Please provide a brief description of the intended use of the equipment)	Handheld Personnel Tracker. This handheld device wirelessly pairs with an ankle-worn non-intelligent bracelet. It can optionally be used with a BU2000 Table-top Base Unit (this is a charging and docking station) as well.

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	During Normal Operation: 2.480 GHz (Wi-Fi ISM Band) During Idle (Non-Activated) 12 MHz (MCU Crystal)
Lowest frequency generated or used in the device or on which the device operates or tunes	32.768 kHz
Class A Digital Device (Use in commercial, industrial, or business environment) ☐ Class B Digital Device (Use in residential environment only) ☒	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	☒	☐	120VAC
External DC	Nominal Voltage	Maximum Current	
	12VDC	2.0 Amps	
Battery	Nominal Voltage	Battery Operating End Point Voltage	
	3.7VDC	3.4 to 4.2V	

EXTREME CONDITIONS					
Maximum temperature	+50C	°C	Minimum temperature	-20	°C

Ancillaries
Please list all ancillaries which will be used with the device.
1. **Wall Adapter (for Battery Charging Purposes) (FCC SD0C Approved)** 2. **Ankle worn non-intelligent bracelet** 3. **Belt Holster (Plastic)** 4. **BU2000 Table-top Base Unit (charging and docking station)**

I hereby declare that the information supplied is correct and complete.

Name: Stan DuPont

Position held: Electronics Engineer Date: 6/21/21

1.4.2 Modes of Operation

The was evaluated for the 2.4 GHz Wi-Fi Radio. The TX test power setting used for the evaluation was M3=72 (18 dBm).

The results are reported for the following modes of operation which were representative of the worst case configurations.

802.11b, 1 Mbps
802.11g, 6 Mbps
802.11n 20 MHz, 6.5 Mbps

1.4.3 Monitoring of Performance

Preliminary radiated emissions measurements were performed for the EUT in three orthogonal orientations. The results are reported for the orientations leading to the highest emissions.

The EUT was also evaluated for radiated intermodulation products from all radios transmitting simultaneously. All intermodulation products were found to be compliant to the FCC Section 15.209 limits.

The RF Conducted emissions was performed on a test sample configured with a temporary SMA connector at the antenna ports. Preliminary measurements were performed for multiple data rates. The results reported correspond to the worst case.

For the power line conducted emissions evaluation, all the transmitters were transmitting simultaneously.

1.4.4 Performance Criteria

The EUT was evaluated for the parameters listed below.

Table 1.4.4 -1: Performance Criteria

Parameter	Requirement
Antenna Requirement	FCC: Section 15.203. 15.204
6 dB Bandwidth	FCC: Section 15.247(a)(2); ISED Canada: RSS-247 5.2(a)
99% Bandwidth	ISED Canada: RSS-GEN 6.7
Peak Output Power	FCC: Section 15.247(b)(3); ISED Canada:RSS-247 5.4(d)
Band-Edge Compliance of RF Conducted Emissions	FCC: Section 15.247(d); ISED Canada: RSS-247 5.5
RF Conducted Spurious Emissions	FCC: Section 15.247(d); ISED Canada: RSS-247 5.5
Radiated Spurious Emissions into Restricted Frequency Bands	FCC: Sections 15.205, 15.209; ISED Canada: RSS-GEN 8.9, 8.10
Power Spectral Density	FCC: Section 15.247(e); ISED Canada: RSS-247(b)
Power Line Conducted Emissions	FCC: Section 15.207; ISED Canada: RSS-GEN 8.8

1.5 Deviations from the Standard

The EUT was evaluated without any deviation from the test standards.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
None			

The equipment was tested as provided without any modifications.

1.7 Test Location

TÜV SÜD Product Service conducted the following tests at our Tampa FL Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
AC Powered Operating		
Antenna Requirement	Thierry Jean-Charles	A2LA
6 dB Bandwidth	Thierry Jean-Charles	A2LA
99% Bandwidth	Thierry Jean-Charles	A2LA
Peak Output Power	Thierry Jean-Charles	A2LA
Band-Edge Compliance of RF Conducted Emissions	Thierry Jean-Charles	A2LA
RF Conducted Spurious Emissions	Thierry Jean-Charles	A2LA
Radiated Spurious Emissions into Restricted Frequency Bands	Thierry Jean-Charles	A2LA
Power Spectral Density	Thierry Jean-Charles	A2LA
Power Line Conducted Emissions	Thierry Jean-Charles	A2LA

Office Address:

TÜV SÜD America, Inc.
5610 W. Sligh Ave, Suite 100
Tampa, FL 33634
USA

2 Test Details

2.1 Antenna Requirements

2.1.1 Specification Reference

FCC: Section 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

S/N: 36090009

2.1.3 Date of Test

5/21/2021

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

Ambient Temperature	N/A
Relative Humidity	N/A
Atmospheric Pressure	N/A

2.1.6 Test Results

Limit Clause FCC Sections: 15.203, 15,204

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EUT uses an SMD Chip antenna that is directly soldered to the PCB. The antenna is not removable and therefore meets the requirements of FCC Section 15.203.

2.1.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

As this is a visual inspection, no test equipment was used.

2.2 6 dB Bandwidth

2.2.1 Specification Reference

FCC: Section 15.247(a)(2)
ISED Canada: RSS-247 5.2(a)

2.2.2 Equipment Under Test and Modification State

S/N: 36090015

2.2.3 Date of Test

5/24/2021 to 5/25/2021

2.2.4 Test Method

The 6dB bandwidth was measured in accordance with ANSI C63.10 Subclause 11.8.1 Option 1. The RBW of the spectrum analyzer was set to 100 kHz and VBW 300 kHz. Span was set large enough to capture the emissions and >> RBW. A peak detector was used for the measurements.

2.2.5 Environmental Conditions

Ambient Temperature	26.6°C
Relative Humidity	38.2 %
Atmospheric Pressure	1020.6 mbar

2.2.6 Test Results

AC Powered Operating

Limit Clause FCC Part 15.247(a)(2), ISED RSS-247 5.2(a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

Table 2.2.6-1: 6 dB Bandwidth Test Results - 802.11b

Frequency (MHz)	6 dB Bandwidth (MHz)
2412	9.505125
2437	9.526375
2462	9.498750

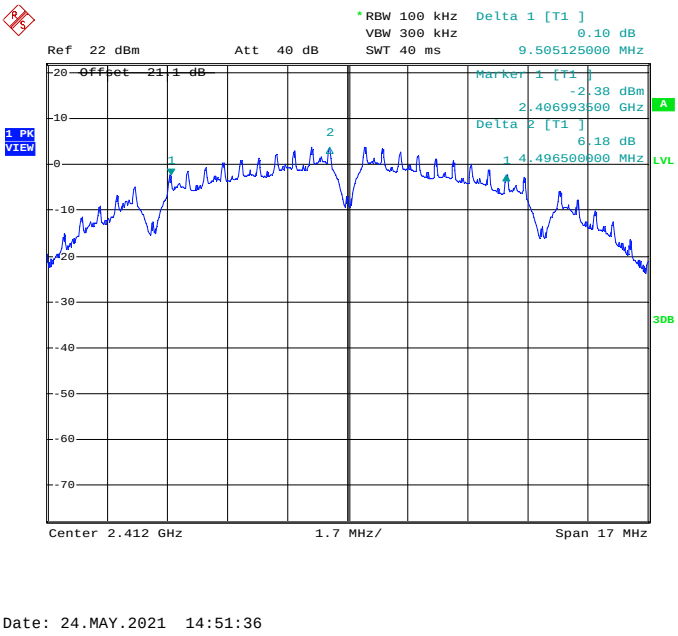
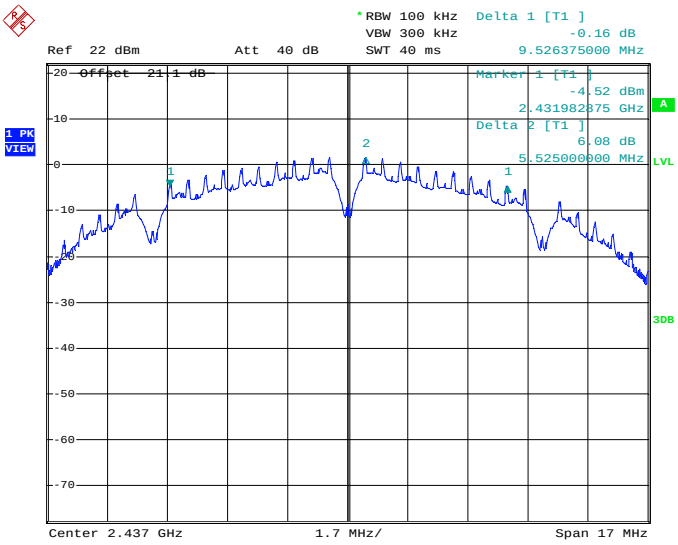
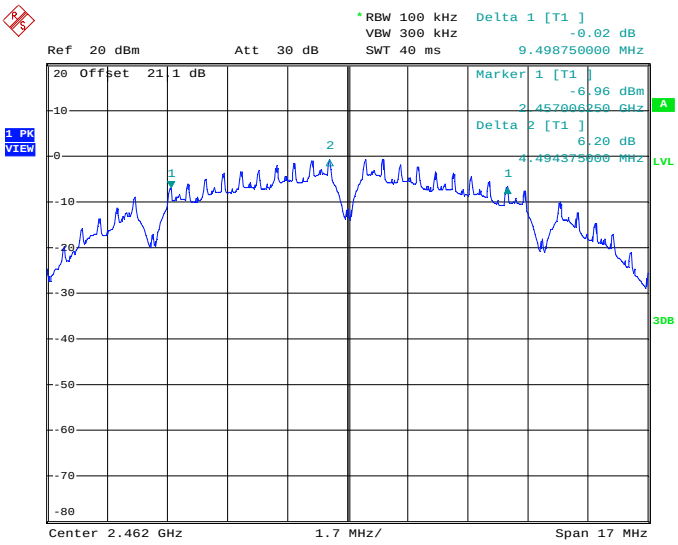


Figure 2.2.6-1: 6 dB Bandwidth Test Results Low Channel - 802.11b



Date: 24.MAY.2021 18:31:33

Figure 2.2.6-2: 6 dB Bandwidth Test Results Middle Channel - 802.11b



Date: 24.MAY.2021 19:07:47

Figure 2.2.6-3: 6 dB Bandwidth Test Results High Channel - 802.11b

Table 2.2.6-2: 6 dB Bandwidth Test Results - 802.11g

Frequency (MHz)	6 dB Bandwidth (MHz)
2412	15.428250
2437	15.449375
2462	15.458875

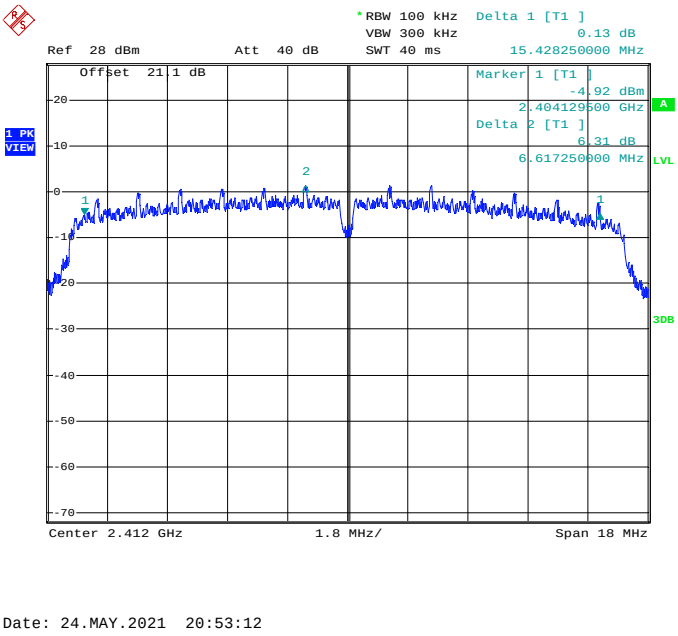


Figure 2.2.6-4: 6 dB Bandwidth Test Results Low Channel - 802.11g

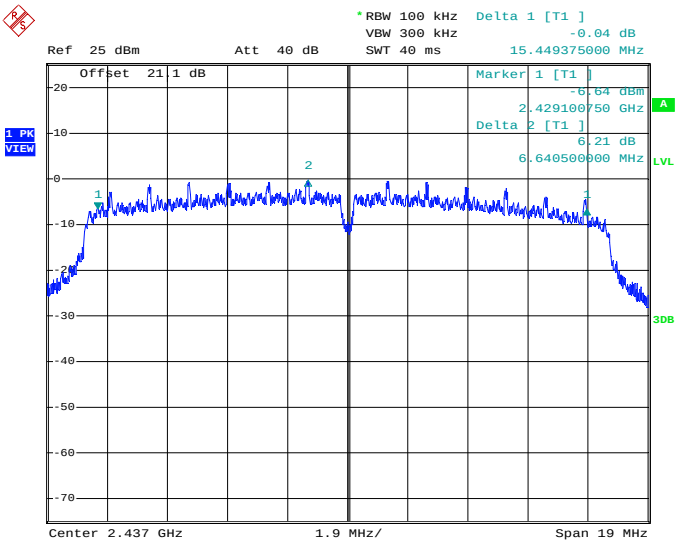


Figure 2.2.6-5: 6 dB Bandwidth Test Results Middle Channel - 802.11g

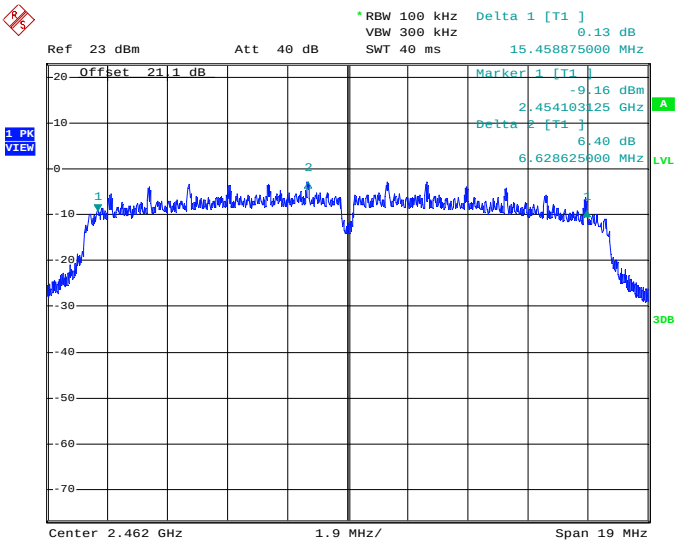


Figure 2.2.6-6: 6 dB Bandwidth Test Results High Channel - 802.11g

Table 2.2.6-3: 6 dB Bandwidth Test Results - 802.11n 20 MHz

Frequency (MHz)	6 dB Bandwidth (MHz)
2412	15.325000
2437	15.440000
2462	15.465000

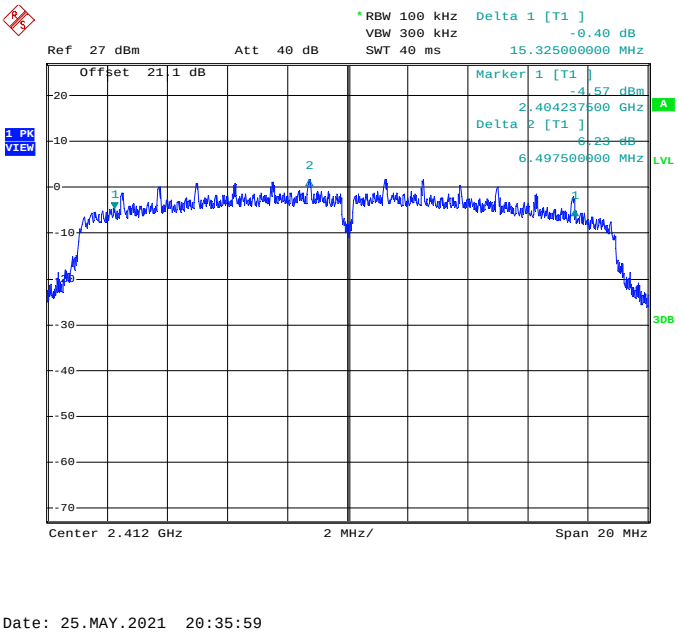


Figure 2.2.6-7: 6 dB Bandwidth Test Results Low Channel - 802.11n 20 MHz

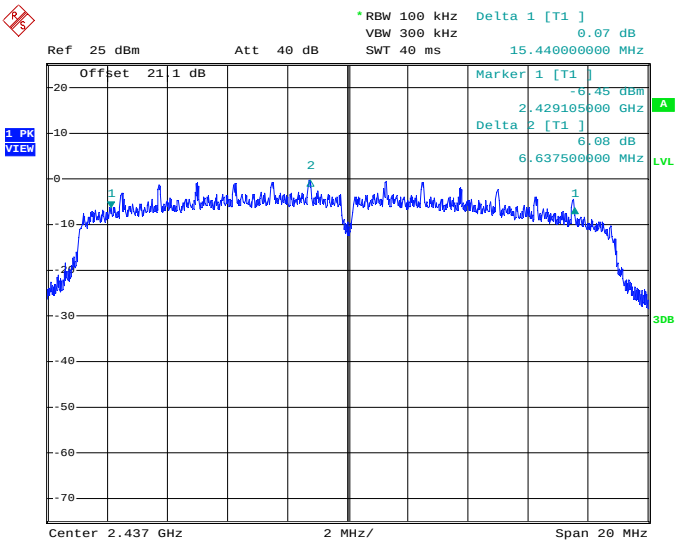


Figure 2.2.6-8: 6 dB Bandwidth Test Results Middle Channel - 802.11n 20 MHz

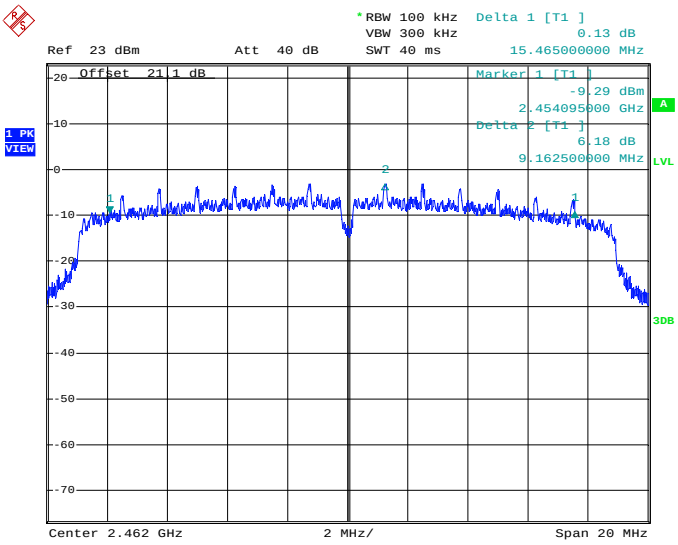


Figure 2.2.6-9: 6 dB Bandwidth Test Results High Channel - 802.11n 20 MHz

2.2.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP40	BEMC00283	4.50 SP5	24	04-Oct-2021
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable, 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.3 99% Bandwidth

2.3.1 Specification Reference

ISED Canada: RSS-GEN 6.7

2.3.2 Equipment Under Test and Modification State

S/N: 36090015

2.3.3 Date of Test

5/24/2021 to 5/25/2021

2.3.4 Test Method

The 99% occupied bandwidth was measured with the spectrum analyzer span set to fully display the emission. The RBW was set to 1% to 5% of the approximated bandwidth. The occupied 99% bandwidth was measured by using 99% bandwidth equipment function of the spectrum analyzer using a peak detector.

2.3.5 Environmental Conditions

Ambient Temperature	26.5°C
Relative Humidity	38.2 %
Atmospheric Pressure	1020.6 mbar

2.3.6 Test Results

AC Powered Operating

Limit Clause ISED RSS-GEN 6.7

Table 2.3.6-1: 99% Bandwidth Test Results - 802.11b

Frequency (MHz)	99% Bandwidth (MHz)
2412	14.077089
2437	14.045437
2462	14.118702

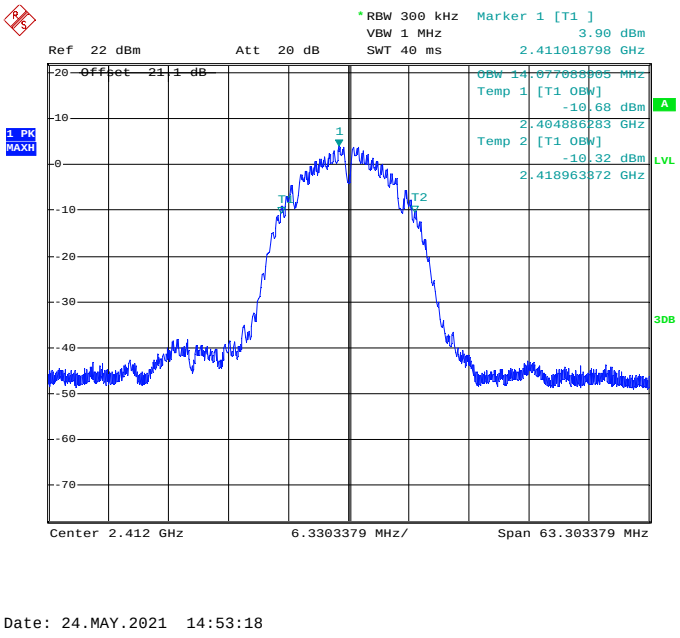


Figure 2.3.6-1: 99% Bandwidth Test Results Low Channel - 802.11b

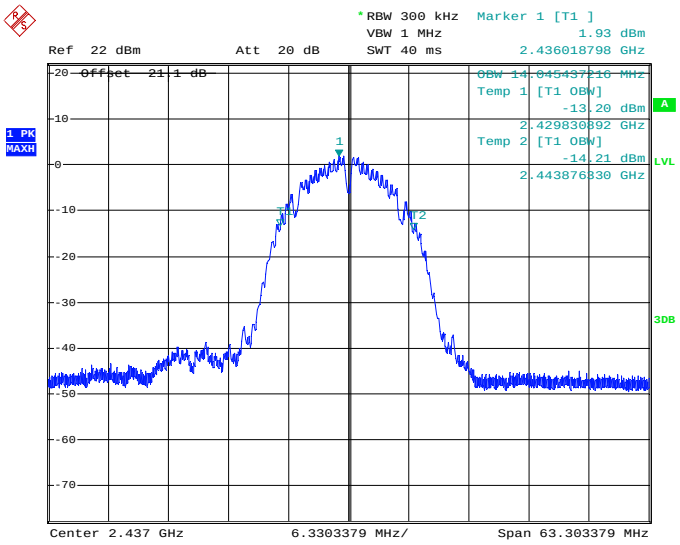


Figure 2.3.6-2: 99% Bandwidth Test Results Middle Channel - 802.11b

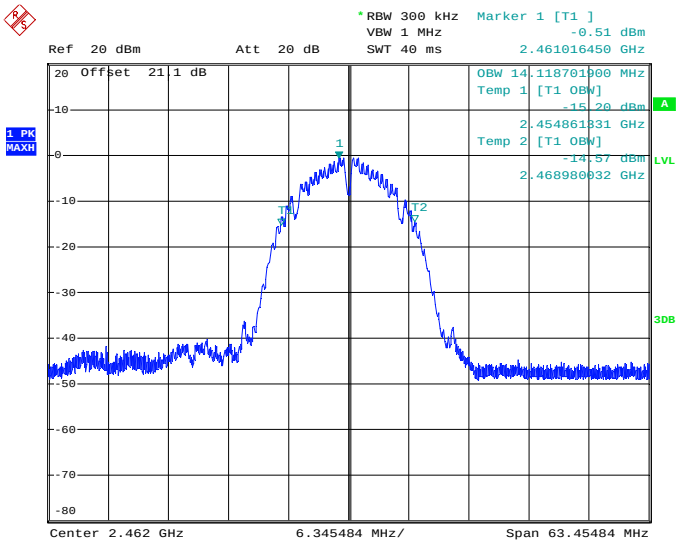


Figure 2.3.6-3: 99% Bandwidth Test Results High Channel - 802.11b

Table 2.3.6-2: 99% Bandwidth Test Results - 802.11g

Frequency (MHz)	99% Bandwidth (MHz)
2412	16.622761
2437	16.654296
2462	16.703187

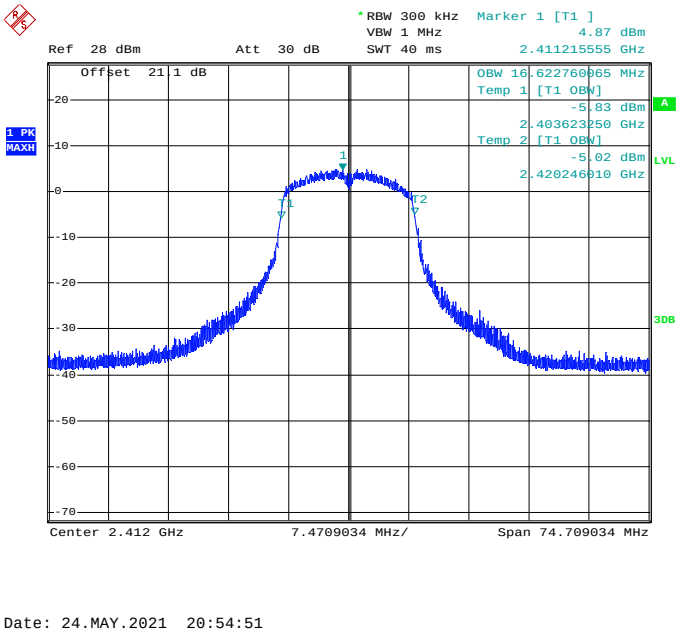


Figure 2.3.6-4: 99% Bandwidth Test Results Low Channel - 802.11g

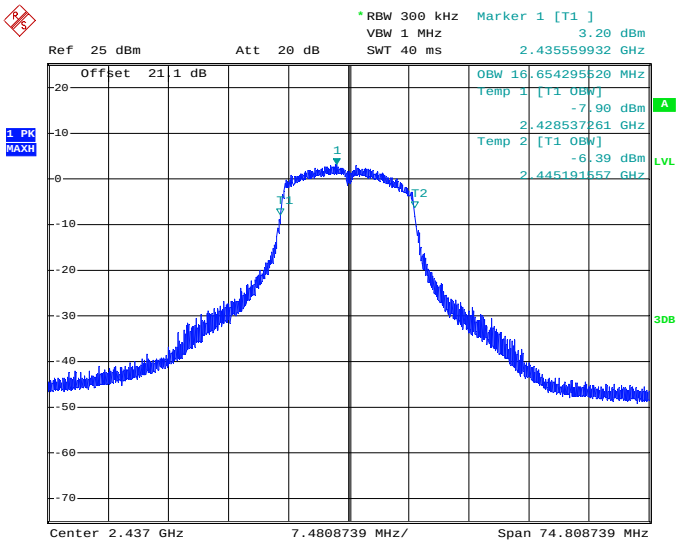


Figure 2.3.6-5: 99% Bandwidth Test Results Middle Channel - 802.11g

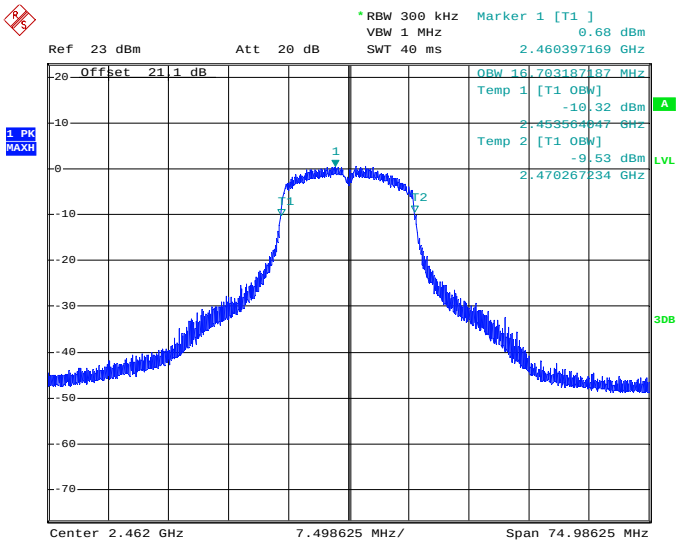


Figure 2.3.6-6: 99% Bandwidth Test Results High Channel - 802.11g

Table 2.3.6-3: 99% Bandwidth Test Results - 802.11n 20 MHz

Frequency (MHz)	99% Bandwidth (MHz)
2412	17.711016
2437	17.723472
2462	17.785711

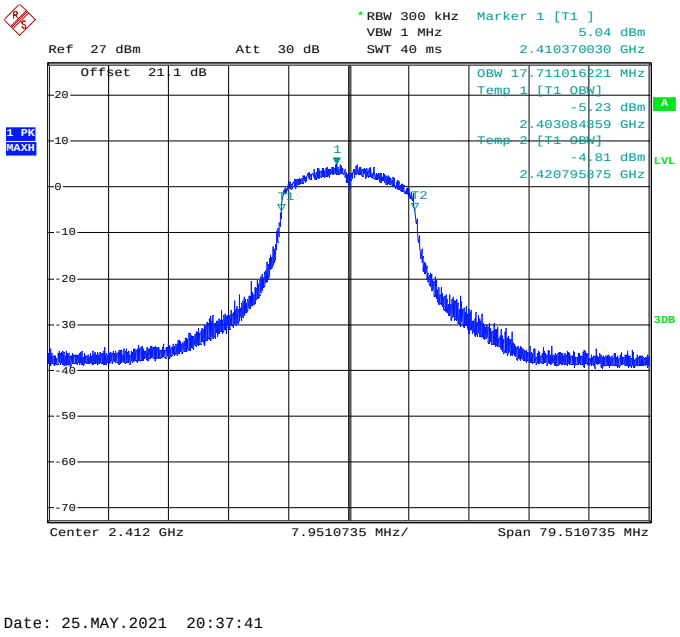


Figure 2.3.6-7: 99% Bandwidth Test Results Low Channel - 802.11n 20 MHz

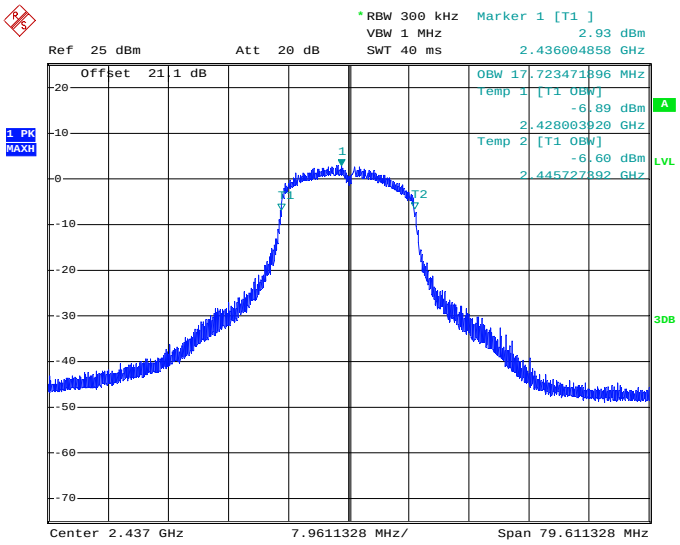


Figure 2.3.6-8: 99% Bandwidth Test Results Middle Channel - 802.11n 20 MHz

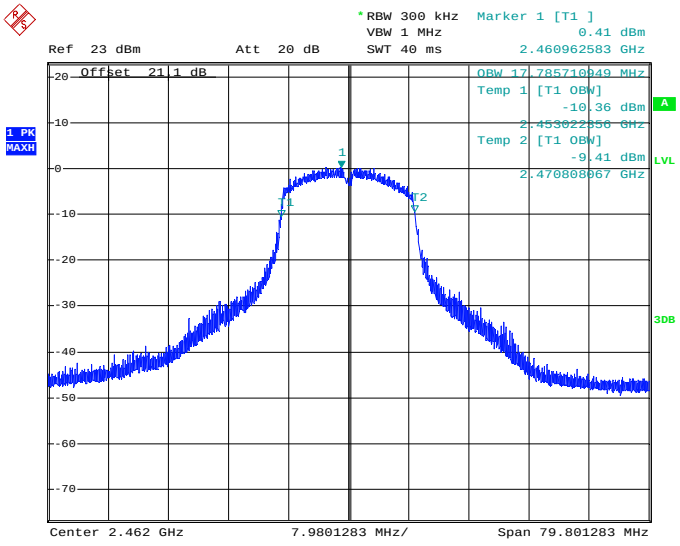


Figure 2.3.6-9: 99% Bandwidth Test Results High Channel - 802.11n 20 MHz

2.3.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP40	BEMC00283	4.50 SP5	24	04-Oct-2021
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable, 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.4 Fundamental Emission Output Power

2.4.1 Specification Reference

FCC Section 15.247(b)(3)
ISED Canada: RSS-247 5.4(d)

2.4.2 Equipment Under Test and Modification State

S/N: 36090015

2.4.3 Date of Test

5/24/2021

2.4.4 Test Method

The fundamental emission output power was measured in accordance with ANSI C63.10 Subclause 11.9.1.3 PKPM1 Peak Power Meter Method. The RF output of the equipment under test was directly connected to the input of the power meter through suitable attenuation.

2.4.5 Environmental Conditions

Ambient Temperature	26.4°C
Relative Humidity	38.7 %
Atmospheric Pressure	1020.8 mbar

2.4.6 Test Results

AC Powered Operating

Limit Clause FCC Part 15.247(b)(3), ISED RSS-247 5.4(d)

The Maximum Output Power allowed for systems using digital modulation is 1 Watt (30 dBm)

Table 2.4.6-1: Maximum Output Power Results - 802.11b

Frequency (MHz)	Output Power (dBm)
2412	15.00
2437	13.10
2462	11.49

Table 2.4.6-2: Maximum Output Power Results - 802.11g

Frequency (MHz)	Output Power (dBm)
2412	20.71
2437	18.52
2462	16.18

Table 2.4.6-3: Maximum Output Power Results - 802.11n 20 MHz

Frequency (MHz)	Output Power (dBm)
2412	20.52
2437	18.42
2462	15.90

2.4.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
USB Wideband Power Sensor 50MHz - 18GHz	Keysight Technologies	U2021XA	TEMC00197	N/A	12	29-Oct-2021
2.92mm Attenuator M/F 40GHz 30dB 2W VSWR 1.45	Centric RF	C402-30	TEMC00222	N/A	12	08-Mar-2022

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.5 Band-Edge Compliance of RF Conducted Emissions

2.5.1 Specification Reference

FCC: Section 15.247(d)
ISED Canada: RSS-247 5.5

2.5.2 Equipment Under Test and Modification State

S/N: 36090015

2.5.3 Date of Test

5/24/2021 to 5/25/2021

2.5.4 Test Method

The RF Conducted Emissions at the Band-Edges were measured in accordance with Subclause 11.11 of ANSI C63.10. The RF output port of the EUT was connected to the input of the spectrum analyzer through suitable attenuation. The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement the spectrum analyzer's RBW was set to 100 kHz, and the VBW was set to >= kHz.

2.5.5 Environmental Conditions

Ambient Temperature	26.6 °C
Relative Humidity	37.8 %
Atmospheric Pressure	1020.4 mbar

2.5.6 Test Results

AC Powered Operating

Limit Clause FCC Section 15.247(d), ISED Canada: RSS-247 5.5

In any 100 kHz bandwidth outside of the frequency band the radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

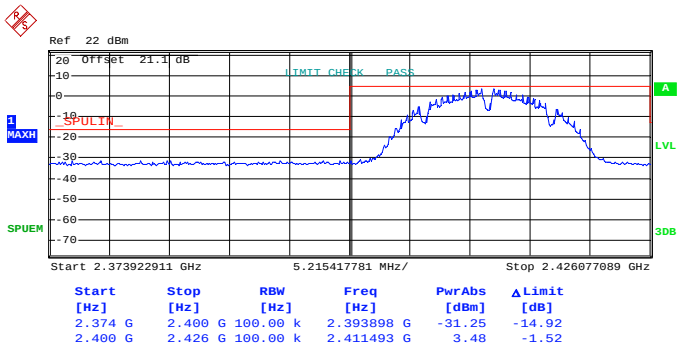


Figure 2.5.6-1: RF Conducted Band-Edge Results Low Channel - 802.11b

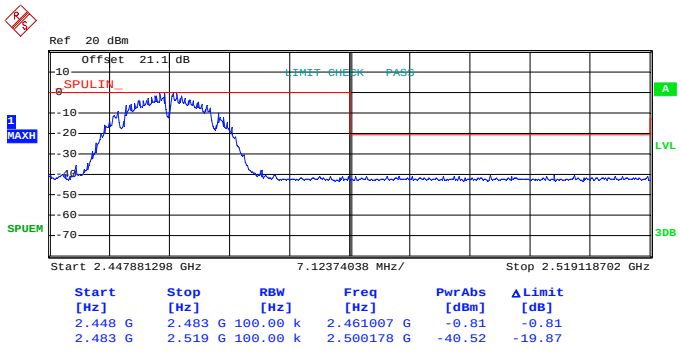


Figure 2.5.6-2: RF Conducted Band-Edge Results High Channel - 802.11b

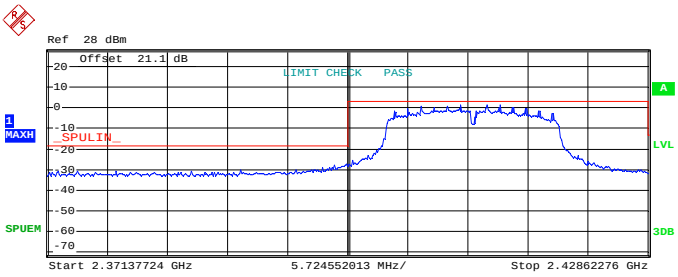


Figure 2.5.6-3: RF Conducted Band-Edge Results Low Channel - 802.11g

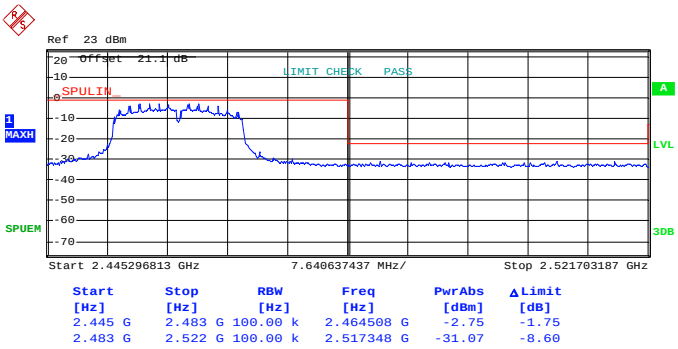


Figure 2.5.6-4: RF Conducted Band-Edge Results High Channel - 802.11g

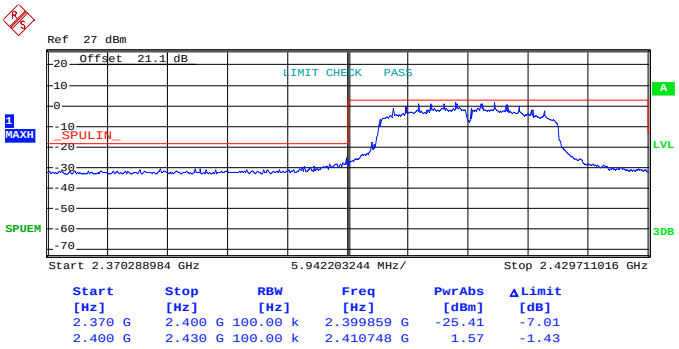


Figure 2.5.6-5: RF Conducted Band-Edge Results Low Channel - 802.11n 20 MHz

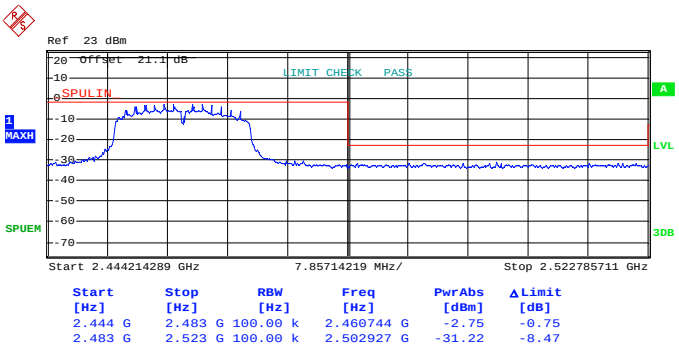


Figure 2.5.6-6: RF Conducted Band-Edge Results High Channel - 802.11n 20 MHz

2.5.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP40	BEMC00283	4.50 SP5	24	04-Oct-2021
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable, 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.6 RF Conducted Spurious Emissions

2.6.1 Specification Reference

FCC: Section 15.247(d)
ISED Canada: RSS-247 5.5

2.6.2 Equipment Under Test and Modification State

S/N: 36090015

2.6.3 Date of Test

5/25/2021

2.6.4 Test Method

The RF Conducted Spurious Emissions were measured in accordance with Subclause 11.11 of ANSI C63.10. The RF output port of the equipment under test was directly connected to the input of the spectrum analyzer. The EUT was investigated for conducted spurious emissions from 30 MHz to 25 GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100 kHz and the VBW was set to 300 kHz. The peak Max Hold function of the analyzer was utilized.

2.6.5 Environmental Conditions

Ambient Temperature	24.1 °C
Relative Humidity	43.1 %
Atmospheric Pressure	1022.2 mbar

2.6.6 Test Results

AC Powered Operating

Limit Clause FCC Section 15.247(d), ISED Canada: RSS-247 5.5

In any 100 kHz bandwidth outside of the frequency band the radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

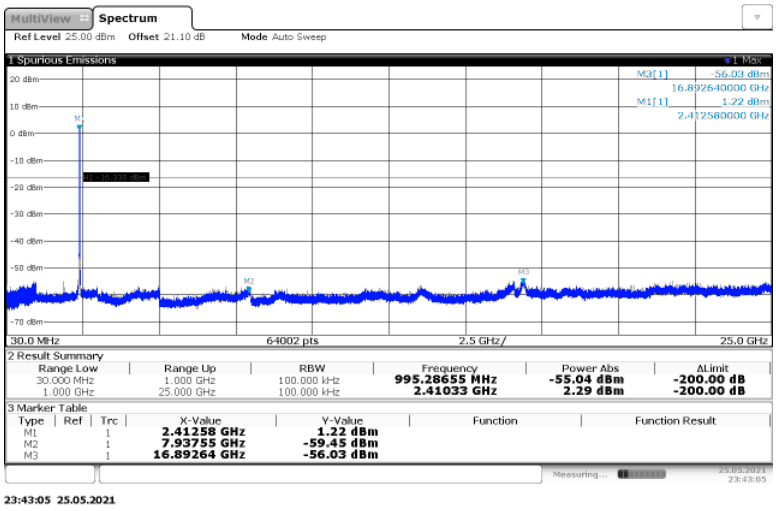


Figure 2.6.6-1: RF Conducted Spurious Emissions Results Low Channel - 802.11b

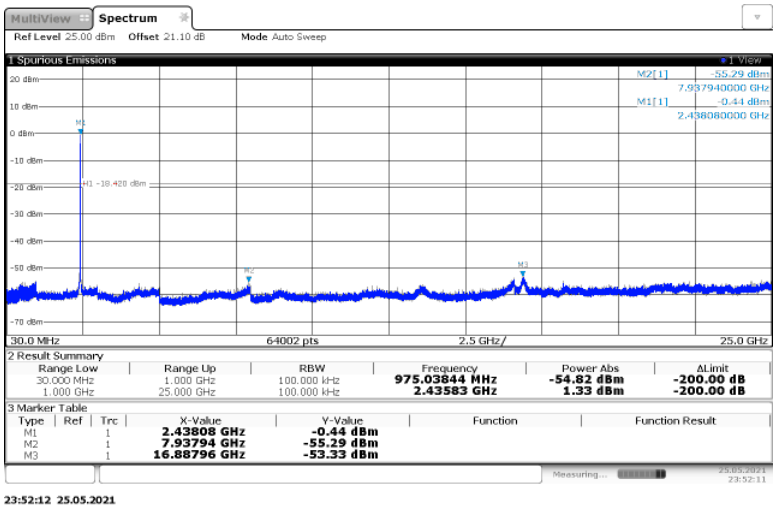


Figure 2.6.6-2: RF Conducted Spurious Emissions Results Middle Channel - 802.11b

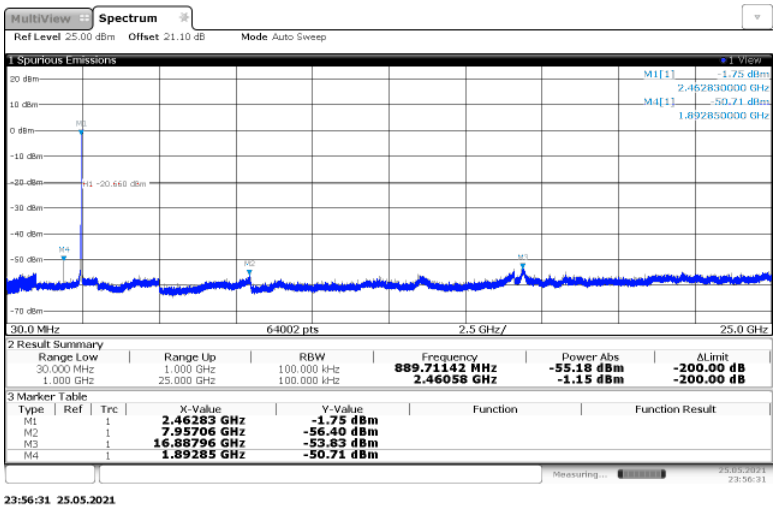


Figure 2.6.6-3: RF Conducted Spurious Emissions Results High Channel - 802.11b

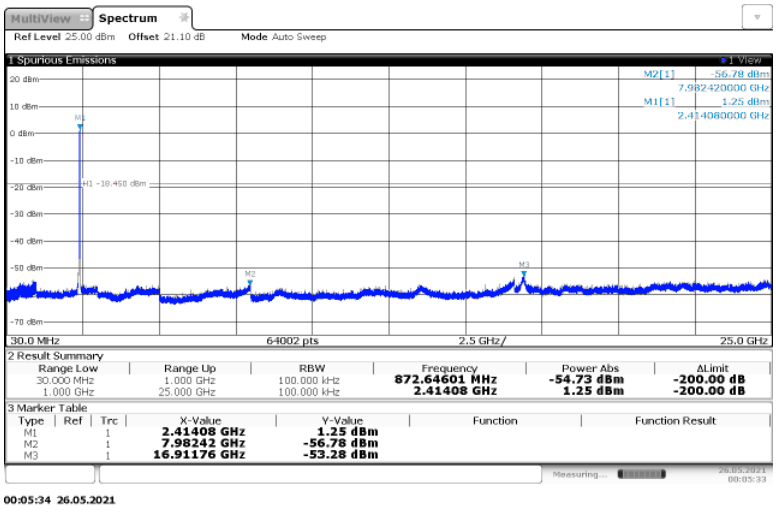


Figure 2.6.6-4: RF Conducted Spurious Emissions Results Low Channel - 802.11g

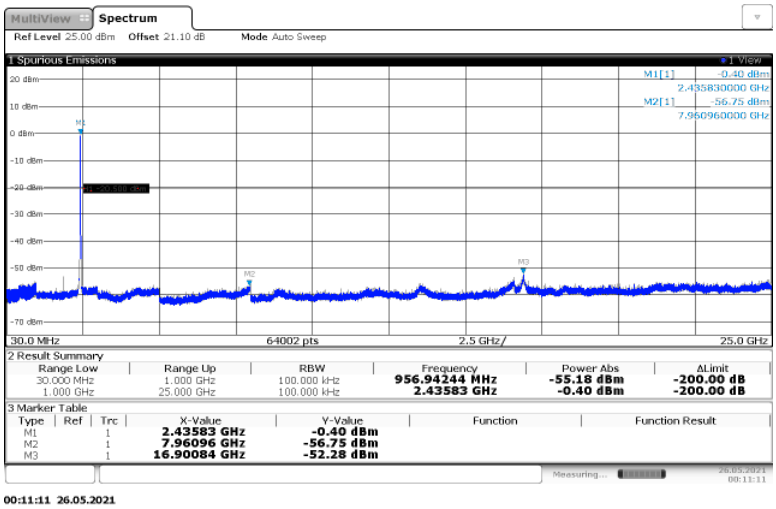


Figure 2.6.6-5: RF Conducted Spurious Emissions Results Middle Channel - 802.11g

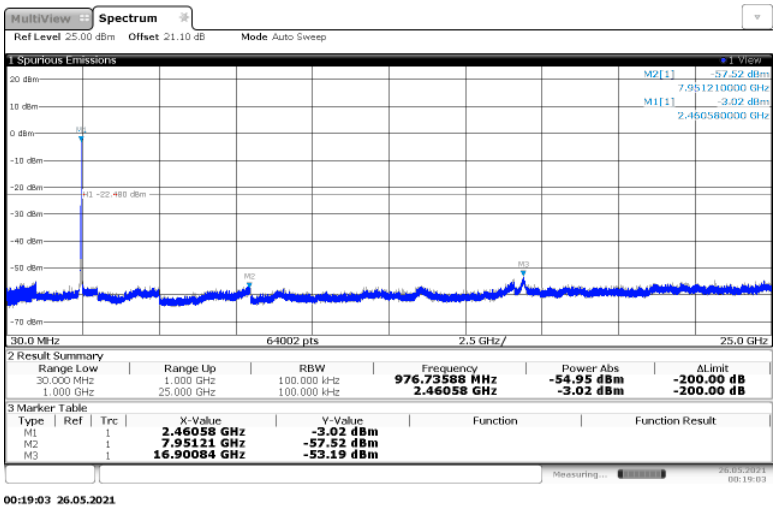


Figure 2.6.6-6: RF Conducted Spurious Emissions Results High Channel - 802.11g

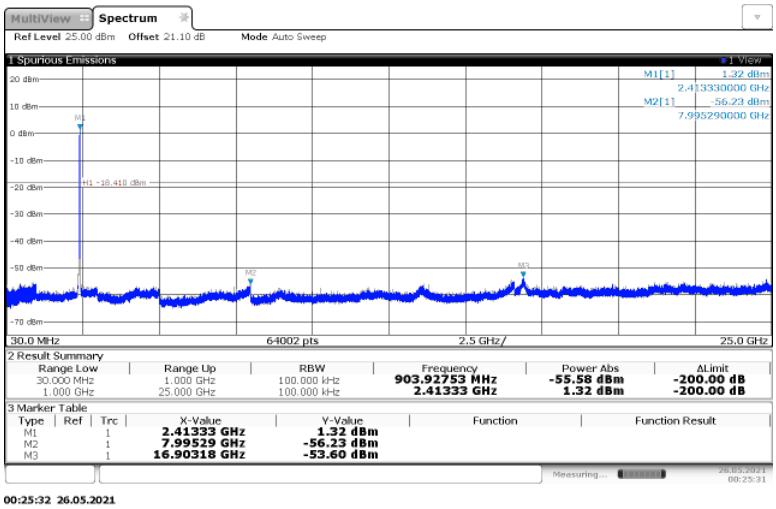


Figure 2.6.6-7: RF Conducted Spurious Emissions Results Low Channel - 802.11n 20 MHz

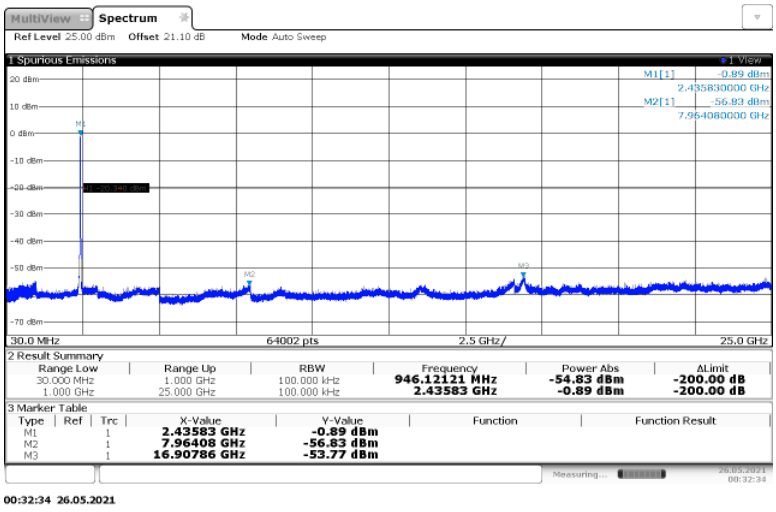


Figure 2.6.6-8: RF Conducted Spurious Emissions Results Middle Channel - 802.11n 20 MHz

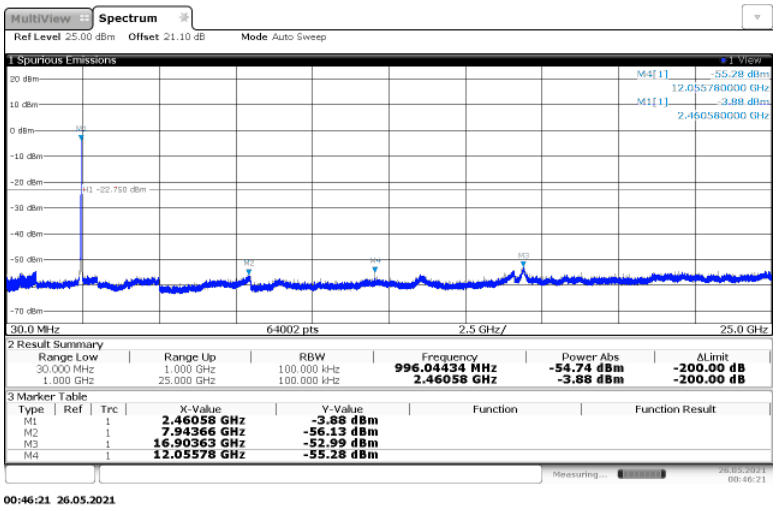


Figure 2.6.6-9: RF Conducted Spurious Emissions Results High Channel - 802.11n 20 MHz

2.6.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	N/A	24	07-Dec-2022
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable, 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.7 Radiated Spurious Emissions into Restricted Frequency Bands

2.7.1 Specification Reference

FCC Sections: 15.205, 15.209;
ISED Canada: RSS-GEN 8.9, 8.10

2.7.2 Equipment Under Test and Modification State

S/N: 36090009

2.7.3 Date of Test

5/12/2021 to 6/23/2021

2.7.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 26 GHz, 10 times the highest fundamental frequency. Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in Section 15.209.

For measurements below 30 MHz, the receive antenna height was set to 1 m and the EUT was rotated through 360 degrees. The resolution bandwidth was set to 200 Hz below 150 kHz and to 9 kHz above 150 kHz.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 30 Hz.

2.7.5 Duty Cycle Correction

The EUT was configured to transmit at > 98 duty cycle during the evaluation. No duty cycle correction factors were used for the average measurements.

2.7.6 Environmental Conditions

Ambient Temperature	24.7 °C
Relative Humidity	41.8 %
Atmospheric Pressure	1018.2 mbar

2.7.7 Test Results

AC Powered Operating

Limit Clause FCC Sections 15.205, 15.209, ISED Canada: RSS-GEN 8.9, 8.10

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.4090-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Table 2.7.7-1: Radiated Emissions Test Results - 802.11b

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2390	56.90	46.12	H	-5.37	51.53	40.75	74.0	54.0	22.5	13.3
2390	56.96	45.63	V	-5.37	51.59	40.26	74.0	54.0	22.4	13.7
4824	43.15	31.40	H	-0.18	42.97	31.22	74.0	54.0	31.0	22.8
4824	44.42	31.00	V	-0.18	44.24	30.82	74.0	54.0	29.8	23.2
14472	43.47	27.30	H	11.61	55.08	38.91	74.0	54.0	18.9	15.1
14472	43.37	27.78	V	11.61	54.98	39.39	74.0	54.0	19.0	14.6
19296	44.03	28.14	H	11.72	55.75	39.86	83.5	63.5	27.8	23.6
19296	44.04	26.90	V	11.72	55.76	38.62	83.5	63.5	27.7	24.9
Middle Channel										
4874	43.76	31.80	H	-0.10	43.66	31.70	74.0	54.0	30.3	22.3
4874	43.58	30.94	V	-0.10	43.48	30.84	74.0	54.0	30.5	23.2
7311	45.40	33.91	H	5.09	50.49	39.00	74.0	54.0	23.5	15.0
7311	44.98	31.82	V	5.09	50.07	36.91	74.0	54.0	23.9	17.1
19496	43.70	28.29	H	11.64	55.34	39.93	83.5	63.5	28.2	23.6
19496	42.47	26.62	V	11.64	54.11	38.26	83.5	63.5	29.4	25.2
High Channel										
2483.5	56.01	43.55	H	-5.21	50.80	38.34	74.0	54.0	23.2	15.7
2483.5	55.56	43.81	V	-5.21	50.35	38.60	74.0	54.0	23.6	15.4
4924	43.14	30.90	H	-0.02	43.12	30.88	74.0	54.0	30.9	23.1
4924	43.08	29.95	V	-0.02	43.06	29.93	74.0	54.0	30.9	24.1
7386	44.89	32.58	H	5.22	50.11	37.80	74.0	54.0	23.9	16.2
7386	44.56	31.13	V	5.22	49.78	36.35	74.0	54.0	24.2	17.6
19696	43.59	27.54	H	11.66	55.25	39.20	83.5	63.5	28.2	24.3
19696	43.42	26.16	V	11.66	55.08	37.82	83.5	63.5	28.4	25.7

Notes:

- The emissions above 18 GHz were performed at a test distance of 1m. The limits are adjusted correspondingly.
- All the emissions above 19.7 GHz were attenuated below the limits and the noise floor of the measurement equipment.

Table 2.7.7-2: Radiated Emissions Test Results - 802.11g

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2390	67.27	52.27	H	-5.37	61.90	46.90	74.0	54.0	12.1	7.1
2390	63.67	49.40	V	-5.37	58.30	44.03	74.0	54.0	15.7	10.0
14472	42.56	27.36	H	11.61	54.17	38.97	74.0	54.0	19.8	15.0
14472	42.69	27.81	V	11.61	54.30	39.42	74.0	54.0	19.7	14.6
19296	43.97	28.55	H	11.72	55.69	40.27	83.5	63.5	27.8	23.2
19296	43.91	26.93	V	11.72	55.63	38.65	83.5	63.5	27.9	24.9
Middle Channel										
7311	44.44	30.28	H	5.09	49.53	35.37	74.0	54.0	24.5	18.6
7311	44.80	29.80	V	5.09	49.89	34.89	74.0	54.0	24.1	19.1
19496	43.54	27.91	H	11.64	55.18	39.55	83.5	63.5	28.3	23.9
19496	43.22	26.41	V	11.64	54.86	38.05	83.5	63.5	28.6	25.4
High Channel										
2483.5	70.77	51.74	H	-5.21	65.56	46.53	74.0	54.0	8.4	7.5
2483.5	65.22	48.97	V	-5.21	60.01	43.76	74.0	54.0	14.0	10.2
7386	44.47	30.37	H	5.22	49.69	35.59	74.0	54.0	24.3	18.4
7386	44.44	29.95	V	5.22	49.66	35.17	74.0	54.0	24.3	18.8
19696	42.36	26.73	H	11.66	54.02	38.39	83.5	63.5	29.5	25.1
19696	42.20	25.76	V	11.66	53.86	37.42	83.5	63.5	29.6	26.1

Notes:

- The emissions above 18 GHz were performed at a test distance of 1m. The limits are adjusted correspondingly.
- All the emissions above 19.7 GHz were attenuated below the limits and the noise floor of the measurement equipment.

Table 2.7.7-3: Radiated Emissions Test Results - 802.11n 20 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2390	68.92	53.35	H	-5.37	63.55	47.98	74.0	54.0	10.5	6.0
2390	64.40	49.68	V	-5.37	59.03	44.31	74.0	54.0	15.0	9.7
14472	42.52	27.22	H	11.61	54.13	38.83	74.0	54.0	19.9	15.2
14472	42.70	27.10	V	11.61	54.31	38.71	74.0	54.0	19.7	15.3
19296	44.02	28.97	H	11.72	55.74	40.69	83.5	63.5	27.8	22.8
19296	43.89	26.94	V	11.72	55.61	38.66	83.5	63.5	27.9	24.8
Middle Channel										
7311	44.36	30.29	H	5.09	49.45	35.38	74.0	54.0	24.6	18.6
7311	45.20	29.89	V	5.09	50.29	34.98	74.0	54.0	23.7	19.0
19496	42.57	28.46	H	11.64	54.21	40.10	83.5	63.5	29.3	23.4
19496	43.31	26.64	V	11.64	54.95	38.28	83.5	63.5	28.5	25.2
High Channel										
2483.5	69.59	49.42	H	-5.21	64.38	44.21	74.0	54.0	9.6	9.8
2483.5	67.17	49.82	V	-5.21	61.96	44.61	74.0	54.0	12.0	9.4
7386	44.09	30.07	H	5.22	49.31	35.29	74.0	54.0	24.7	18.7
7386	44.32	29.92	V	5.22	49.54	35.14	74.0	54.0	24.5	18.9
19696	42.82	26.63	H	11.66	54.48	38.29	83.5	63.5	29.0	25.2
19696	42.71	25.70	V	11.66	54.37	37.36	83.5	63.5	29.1	26.1

Notes:

- The emissions above 18 GHz were performed at a test distance of 1m. The limits are adjusted correspondingly.
- All the emissions above 19.7 GHz were attenuated below the limits and the noise floor of the measurement equipment.

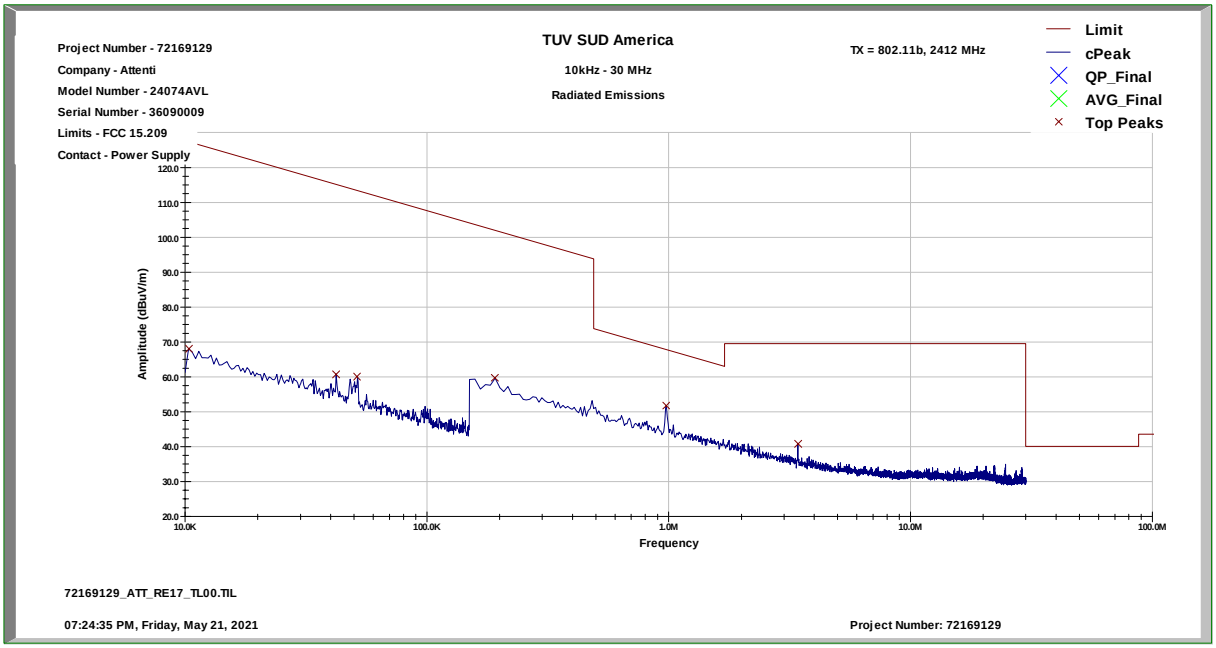


Figure 2.7.7-1: Radiated Emissions Representative Scan below 30 MHz

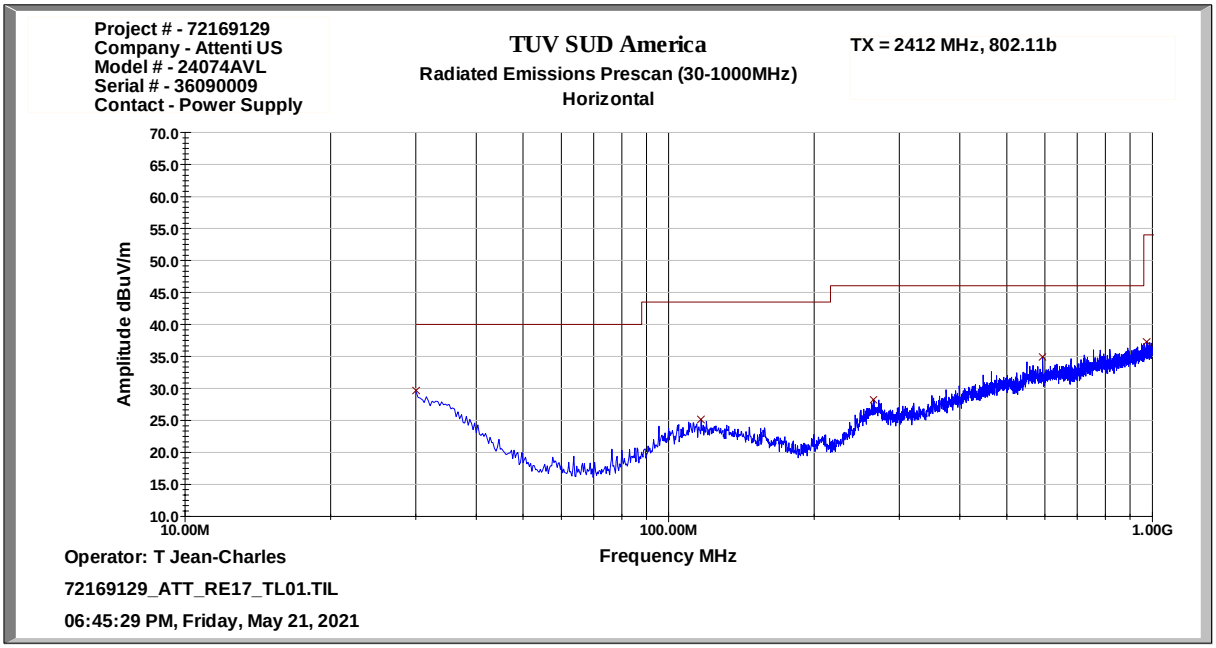


Figure 2.7.7-2: Radiated Emissions Representative Scan - 30 MHz – 1 GHz – Horizontal Polarization

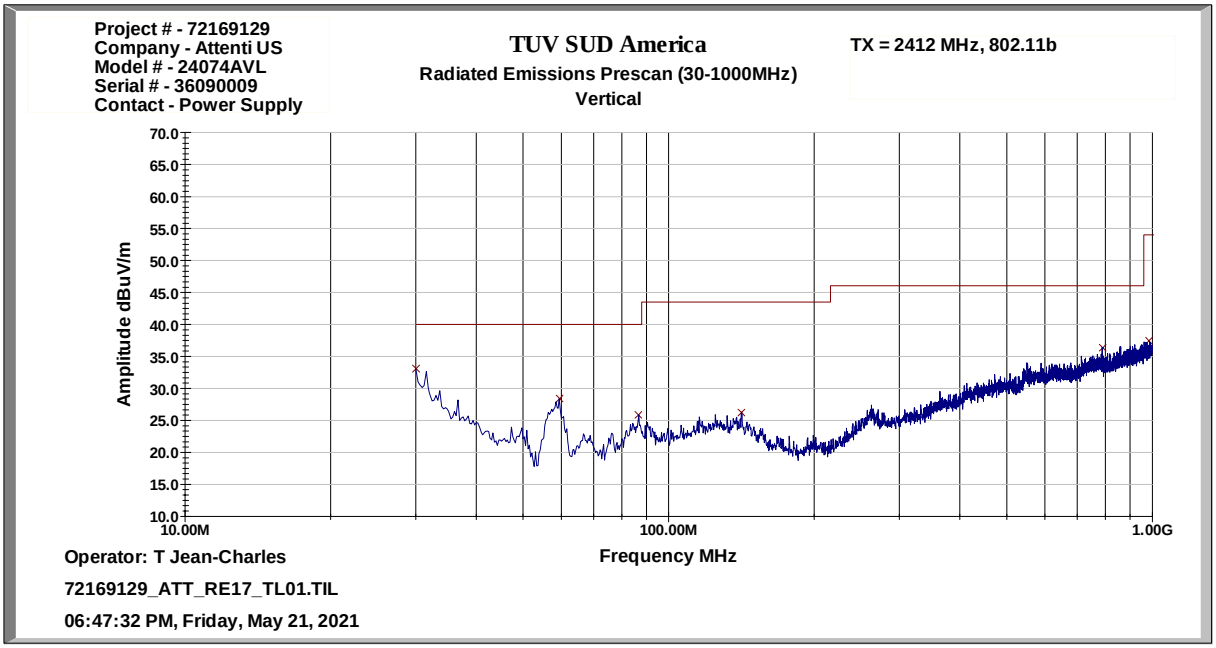


Figure 2.7.7-3: Radiated Emissions Representative Scan - 30 MHz – 1 GHz – Vertical Polarization

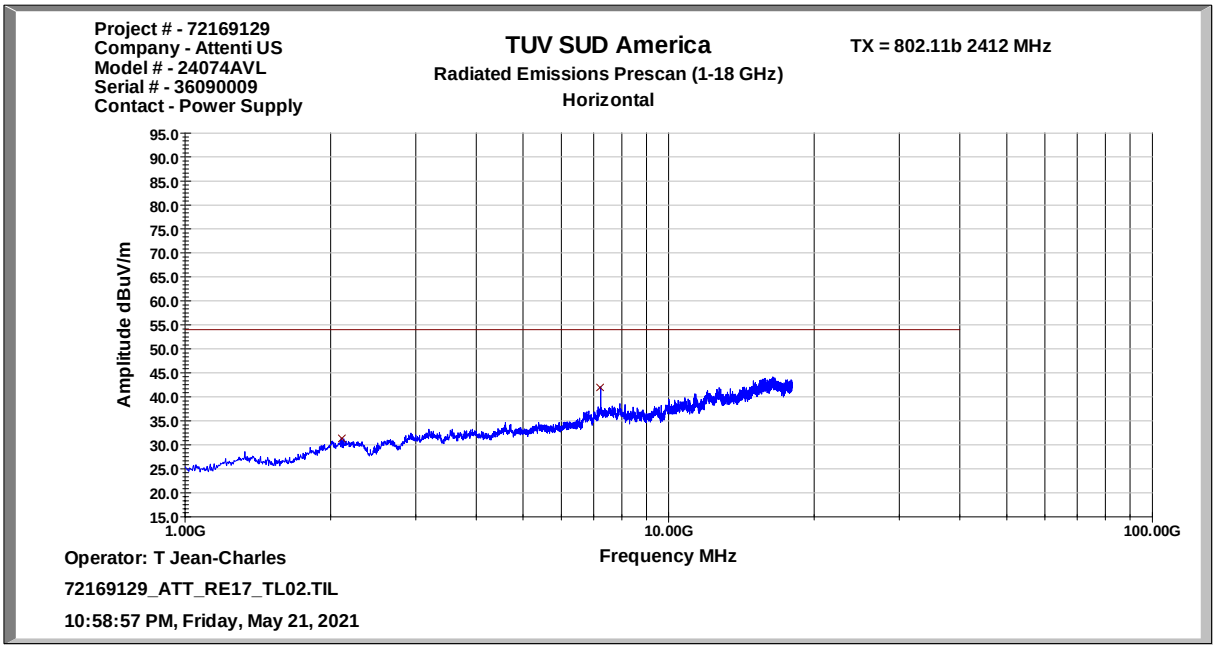


Figure 2.7.7-4: Radiated Emissions Representative Scan – 1 GHz – 18 GHz – Horizontal Polarization

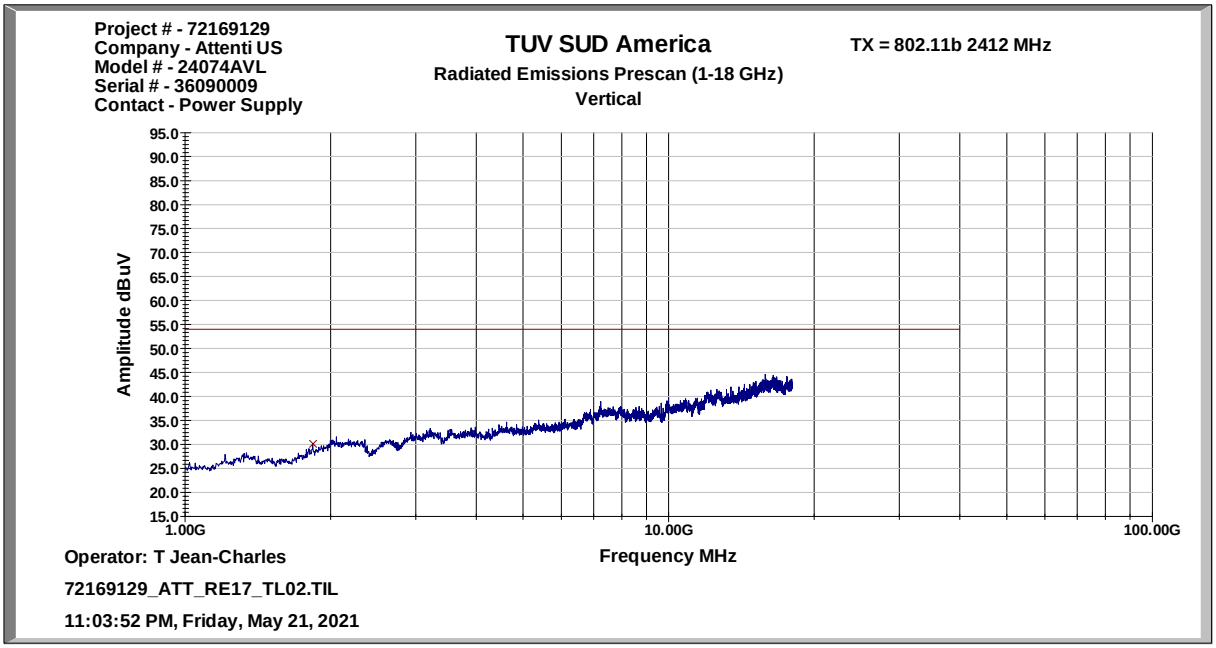


Figure 2.7.7-5: Radiated Emissions Representative Scan – 1 GHz – 18 GHz – Vertical Polarization

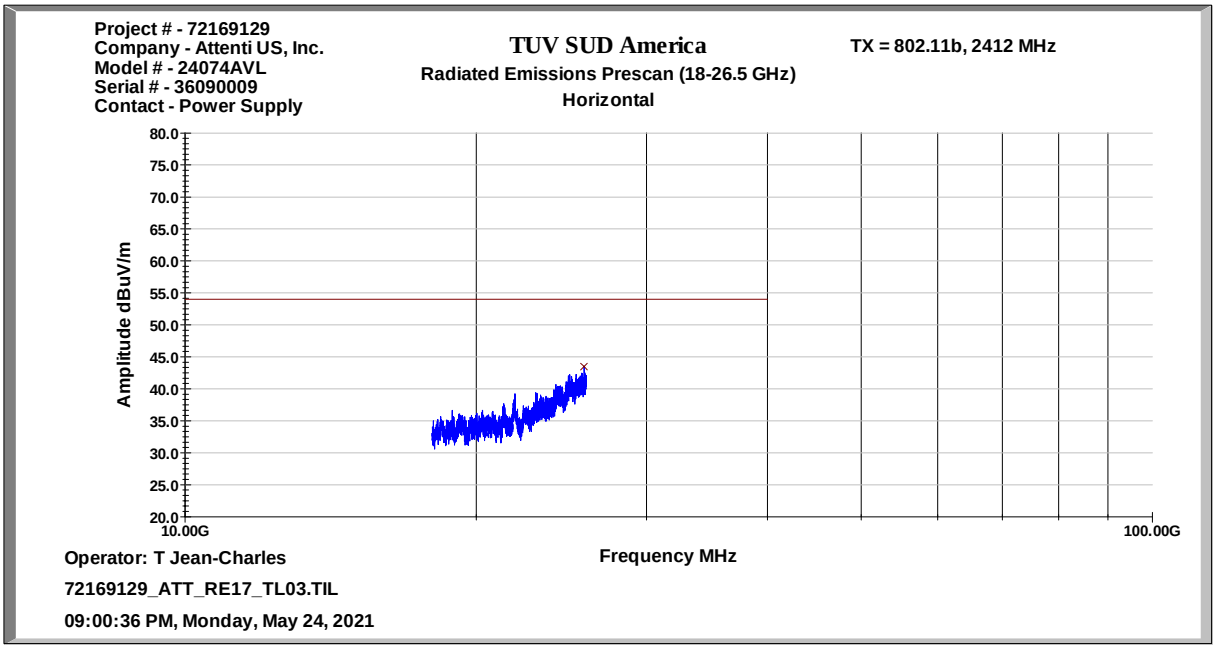


Figure 2.7.7-6: Radiated Emissions Representative Scan – 18 GHz – 26 GHz – Horizontal Polarization

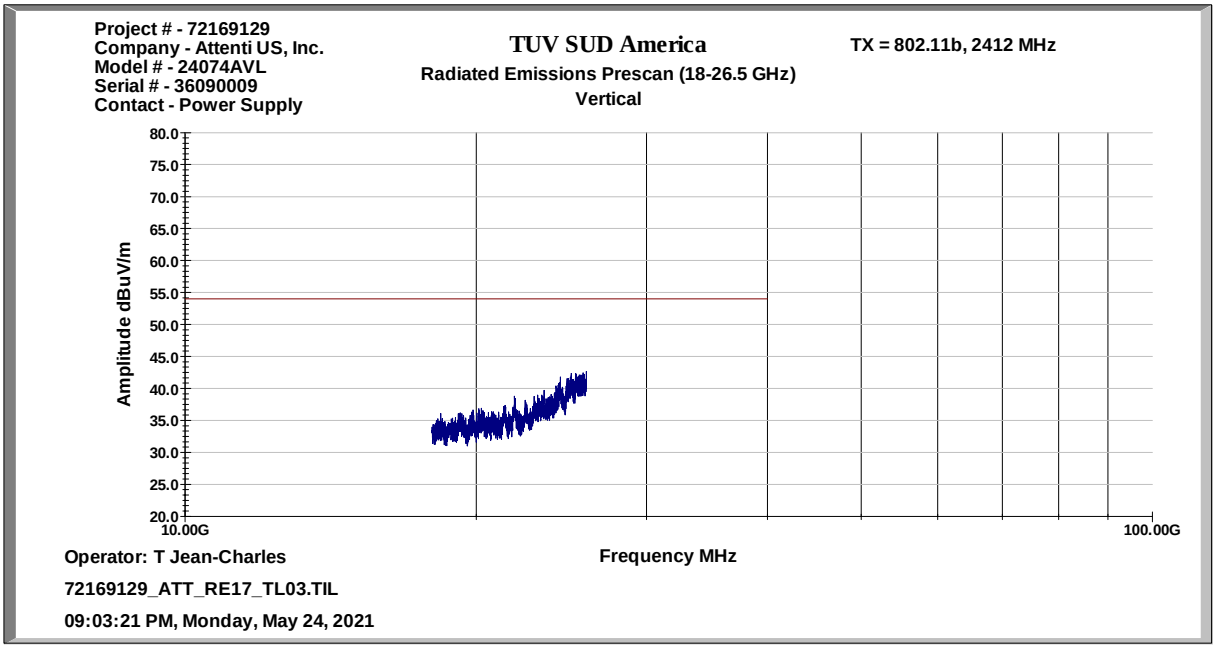


Figure 2.7.7-7: Radiated Emissions Representative Scan – 18 GHz – 26 GHz – Vertical Polarization

2.7.8 Sample Calculations

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak
Corrected Level: 56.9 + -5.37 = 51.53 dBµV/m
Margin: 74 dBµV/m – 51.53 dBµV/m = 22.47 dB

Example Calculation: Average
Corrected Level: 46.12 + -5.37 -0 = 40.75 dBµV/m
Margin: 54 dBµV/m – 40.75 dBµV/m = 13.25 dB

2.7.9 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
9kHz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	12	25-Feb-2022
10dB Attenuator	Merrimac	FAN-6-10K	BEMC02086	N/A	12	19-Oct-2021
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	31-Oct-2021
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	26-Sep-2021
Horn Antenna	Schwarzbeck	BBHA-9170	TEMC00029	N/A	60	23-Aug-2021
EMC Chamber	Panasheild	N/A	TEMC00031	N/A	36	28-Jan-2024
Double Ridge Guide Horn	ETS Lindgren	3117	TEMC00061	N/A	24	07-Feb-2022
18 GHz-40 GHz Microwave Preamplifier	COM-power	PAM-840A	TEMC00147	N/A	12	06-Jul-2021
PAM-118A	Com-Power Corporation	PAM-118A	TEMC00160	N/A	12	10-Apr-2022
2.4 GHz Notch Filter	Micro-Tronics	BRM50702-01	TEMC00176	N/A	12	09-Mar-2022
A81-0303 18 GHz Cable Set	Teledyne Storm Products	A81-0303-360/96	TEMC00201	N/A	12	10-Apr-2022

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

2.8 Power Spectral Density

2.8.1 Specification Reference

FCC: Section 15.247(e)
ISED Canada: RSS-247 5.2(b)

2.8.2 Equipment Under Test and Modification State

S/N: 36090009

2.8.3 Date of Test

5/24/2021 to 5/25/2021

2.8.4 Test Method

The power spectral density was measured in accordance with ANSI C63.10 Subclause 11.10.2 Method PKPSD (peak PSD). The RF output port of the EUT was directly connected to the input of the spectrum analyzer. Offset values were input for cable and external attenuation. The spectrum analyzer's RBW was set to 3 kHz and VBW to 10 kHz. The Span was adjusted to 1.5 times the DTS bandwidth and the sweep time was set to auto. The measurements were performed using a Peak detector.

2.8.5 Environmental Conditions

Ambient Temperature	26.1 °C
Relative Humidity	38.1 %
Atmospheric Pressure	1021.6 mbar

2.8.6 Test Results

AC Powered Operating

Limit FCC: Section 15.247(e), ISED Canada: RSS-247 5.2(b)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time of continuous transmission.

Table 2.8.6-1: Power Spectral Density Results - 802.11b

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
2412	-9.64	8	17.64
2437	-12.41	8	20.41
2462	-13.74	8	21.74

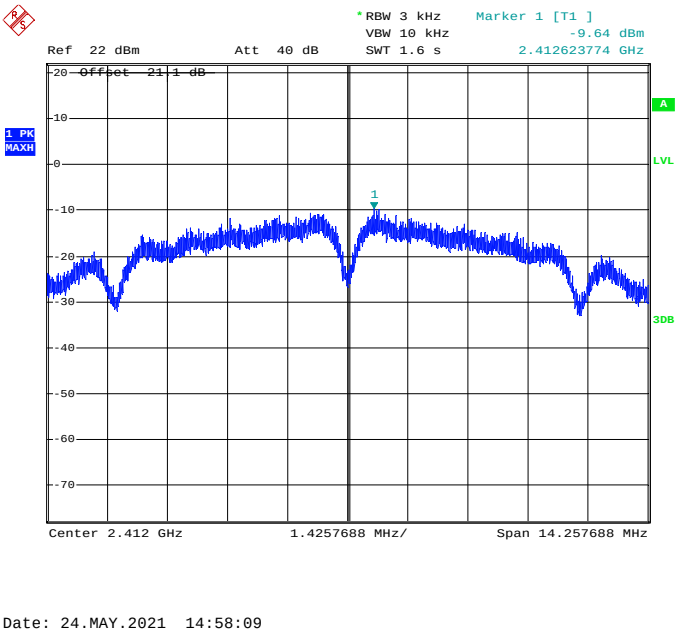


Figure 2.8.6-1: Power Spectral Density Results – Low Channel - 802.11b

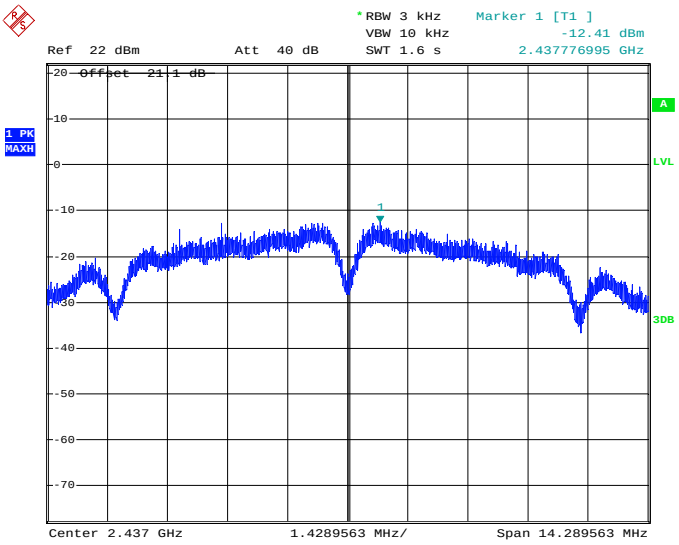


Figure 2.8.6-2: Power Spectral Density Results – Middle Channel - 802.11b

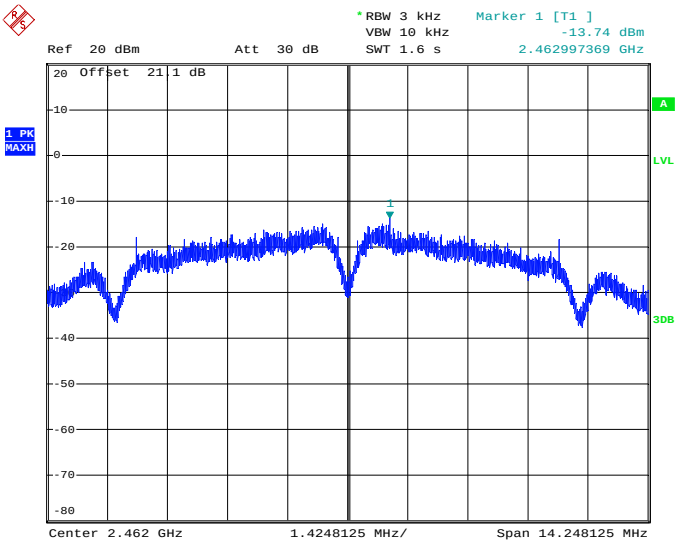


Figure 2.8.6-3: Power Spectral Density Results – High Channel - 802.11b

Table 2.8.6-2: Power Spectral Density Results - 802.11g

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
2412	-12.24	8	20.24
2437	-14.50	8	22.5
2462	-16.82	8	24.82

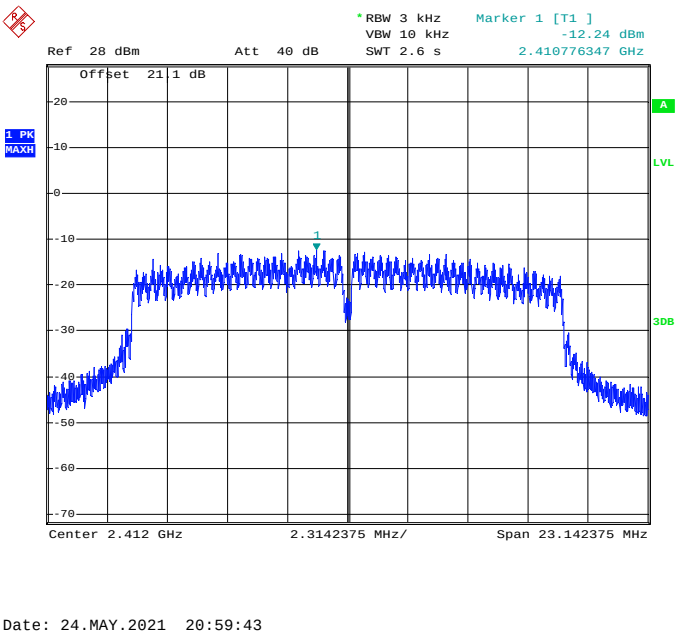


Figure 2.8.6-4: Power Spectral Density Results – Low Channel - 802.11g

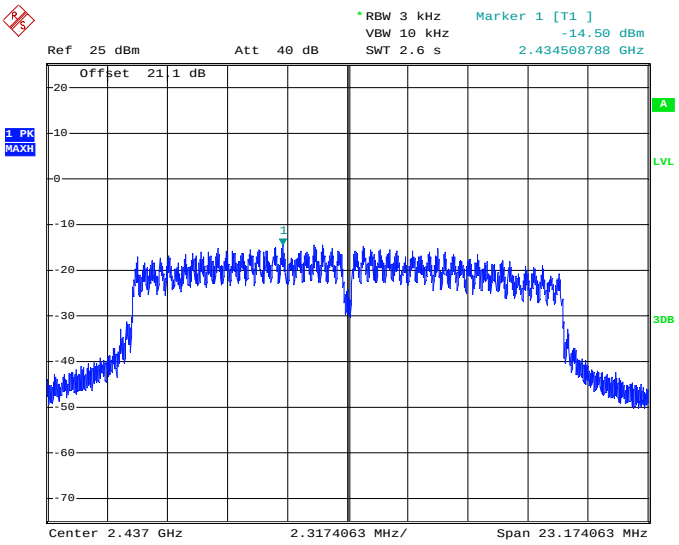


Figure 2.8.6-5: Power Spectral Density Results – Middle Channel - 802.11g

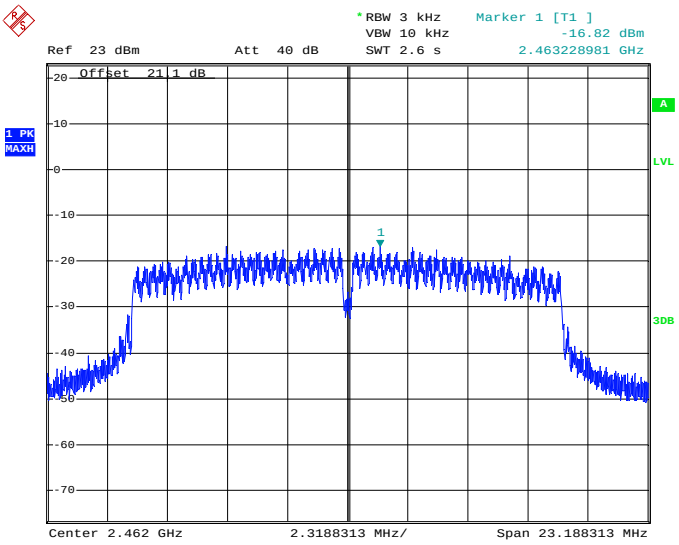


Figure 2.8.6-6: Power Spectral Density Results – High Channel - 802.11g

Table 2.8.6-3: Power Spectral Density Results - 802.11n 20 MHz

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
2412	-12.17	8	20.17
2437	-13.94	8	21.94
2462	-16.34	8	24.34

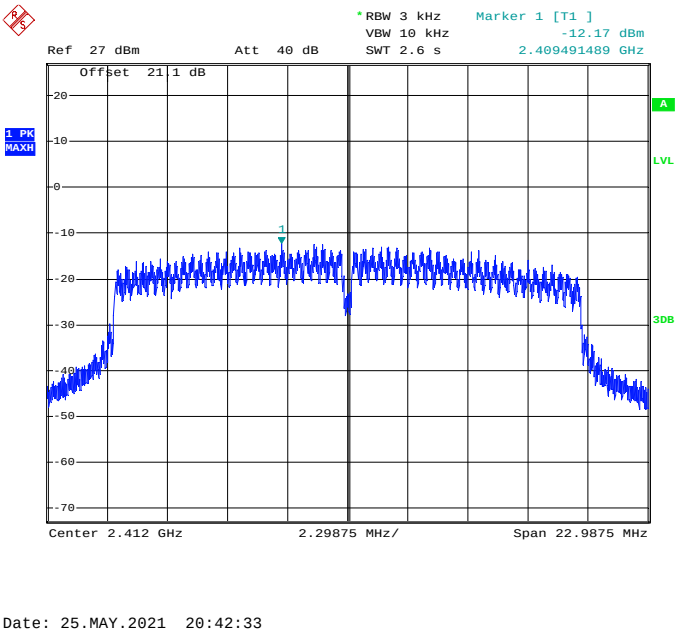


Figure 2.8.6-7: Power Spectral Density Results – Low Channel - 802.11n 20 MHz

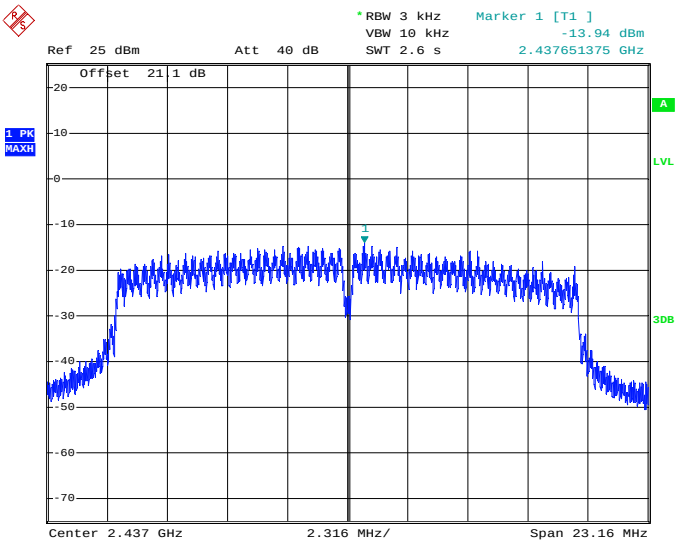


Figure 2.8.6-8: Power Spectral Density Results – Middle Channel - 802.11n 20 MHz

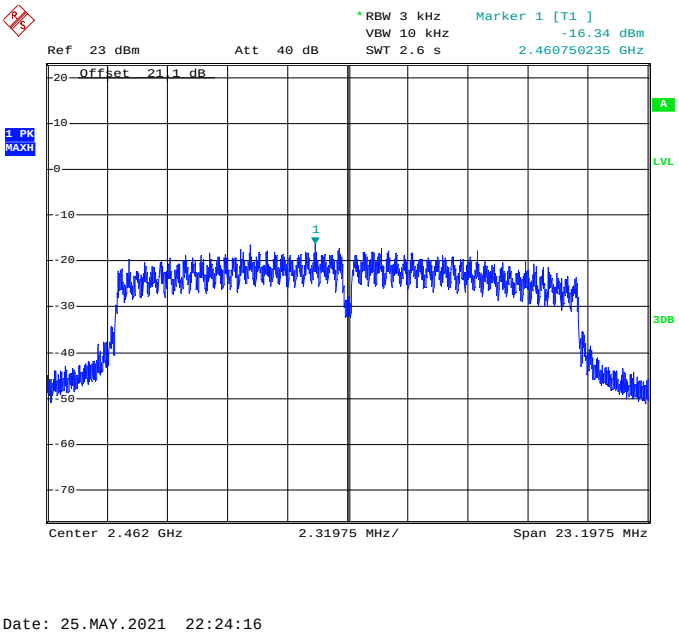


Figure 2.8.6-9: Power Spectral Density Results – High Channel - 802.11n 20 MHz

2.8.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP40	BEMC00283	4.50 SP5	24	04-Oct-2021
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable, 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.9 Duty Cycle

2.9.1 Specification Reference

None

2.9.2 Equipment Under Test and Modification State

S/N: 36090009

2.9.3 Date of Test

5/24/2021 to 5/25/2021

2.9.4 Test Method

The duty cycle was measured in accordance with ANSI C63.10 Section 11.6 Duty cycle (D), transmission duration (T), and maximum power control level. The unit was connected directly to the input of the spectrum analyzer via suitable attenuation. The RBW and VBW were set to 10 MHz and the number of sweep points across duration T was set to exceed 100.

2.9.5 Environmental Conditions

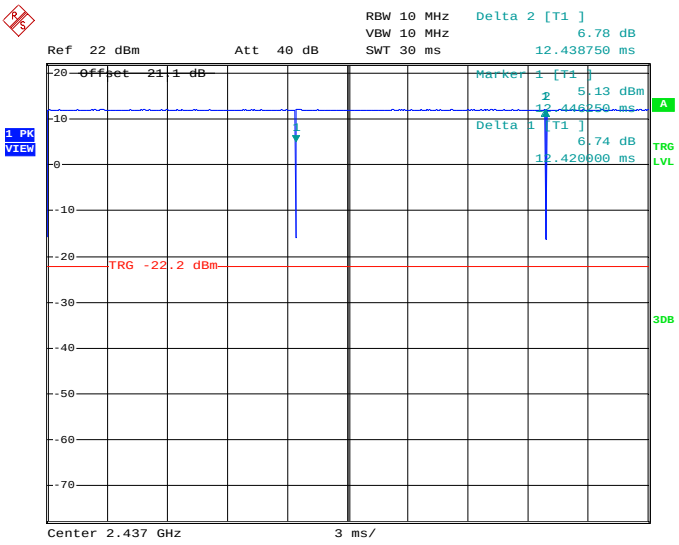
Ambient Temperature	26.2 °C
Relative Humidity	38.9 %
Atmospheric Pressure	1018.5 mbar

2.9.6 Test Results

AC Powered Operating

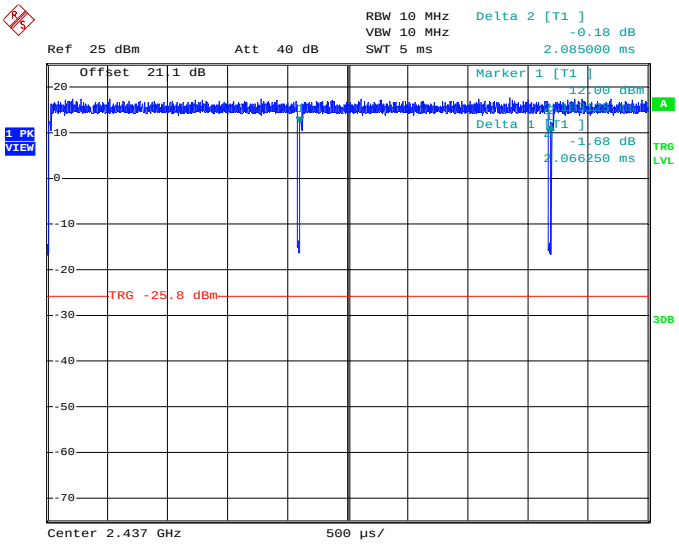
Table 2.9.6-1: Duty Cycle Correction

Mode	Time On (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction (dB)
802.11b	12.42	12.43875	99.85	N/A
802.11g	2.06625	2.085	99.1	N/A
802.11n 20 MHz	1.92	1.94375	98.78	N/A



Date: 24.MAY.2021 18:50:11

Figure 2.9.6-1: Duty Cycle – 802.11b



Date: 25.MAY.2021 19:37:15

Figure 2.9.6-2: Duty Cycle – 802.11g

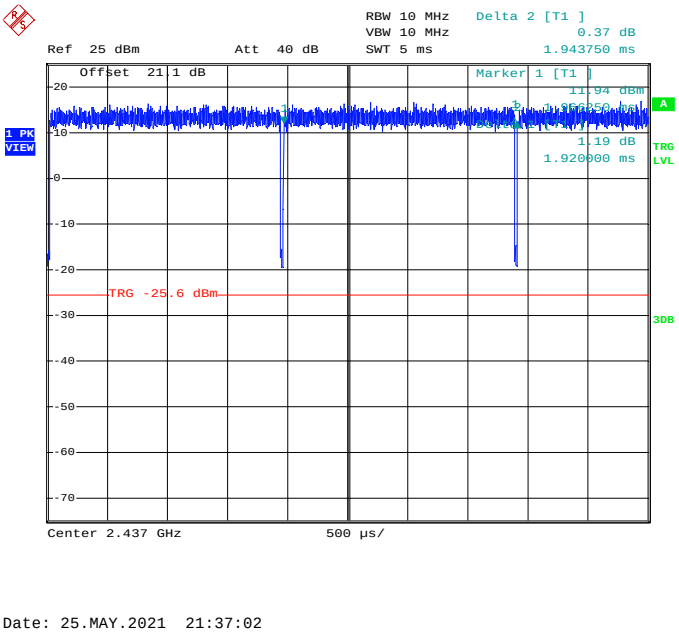


Figure 2.9.6-3: Duty Cycle – 802.11n 20 MHz

2.9.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP40	BEMC00283	4.50 SP5	24	04-Oct-2021
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable, 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable

2.10 Power Line Conducted Emissions

2.10.1 Specification Reference

FCC: Section 15.207
ISED Canada; RSS-GEN 8.8

2.10.2 Equipment Under Test and Modification State

S/N: 36090009

2.10.3 Date of Test

5/25/2021

2.10.4 Test Method

ANSI C63.10 section 6.2 was the guiding document for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

2.10.5 Environmental Conditions

Ambient Temperature	24.4 °C
Relative Humidity	43.9 %
Atmospheric Pressure	1022.2 mbar

2.10.6 Test Results

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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.

Table 2.10.6-1: Power Line Conducted Emissions – Quasi-Peak Detector Results

Frequency (MHz)	Quasi-peak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.447000	44.83	L1	10.0	12.10	56.93
0.600000	30.15	N	10.4	25.85	56.00
0.897000	32.29	N	10.4	23.71	56.00
1.203000	29.00	N	10.5	27.00	56.00
1.648500	28.48	N	10.5	27.52	56.00
2.094000	30.37	L1	10.2	25.63	56.00
4.110000	26.93	L1	10.4	29.07	56.00
10.288500	27.79	L1	10.8	32.21	60.00
10.684500	28.15	L1	10.8	31.85	60.00

Table 2.10.6-2: Power Line Conducted Emissions – Average Detector Results

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.451500	25.95	L1	10.0	20.90	46.85
0.969000	18.88	L1	10.1	27.12	46.00

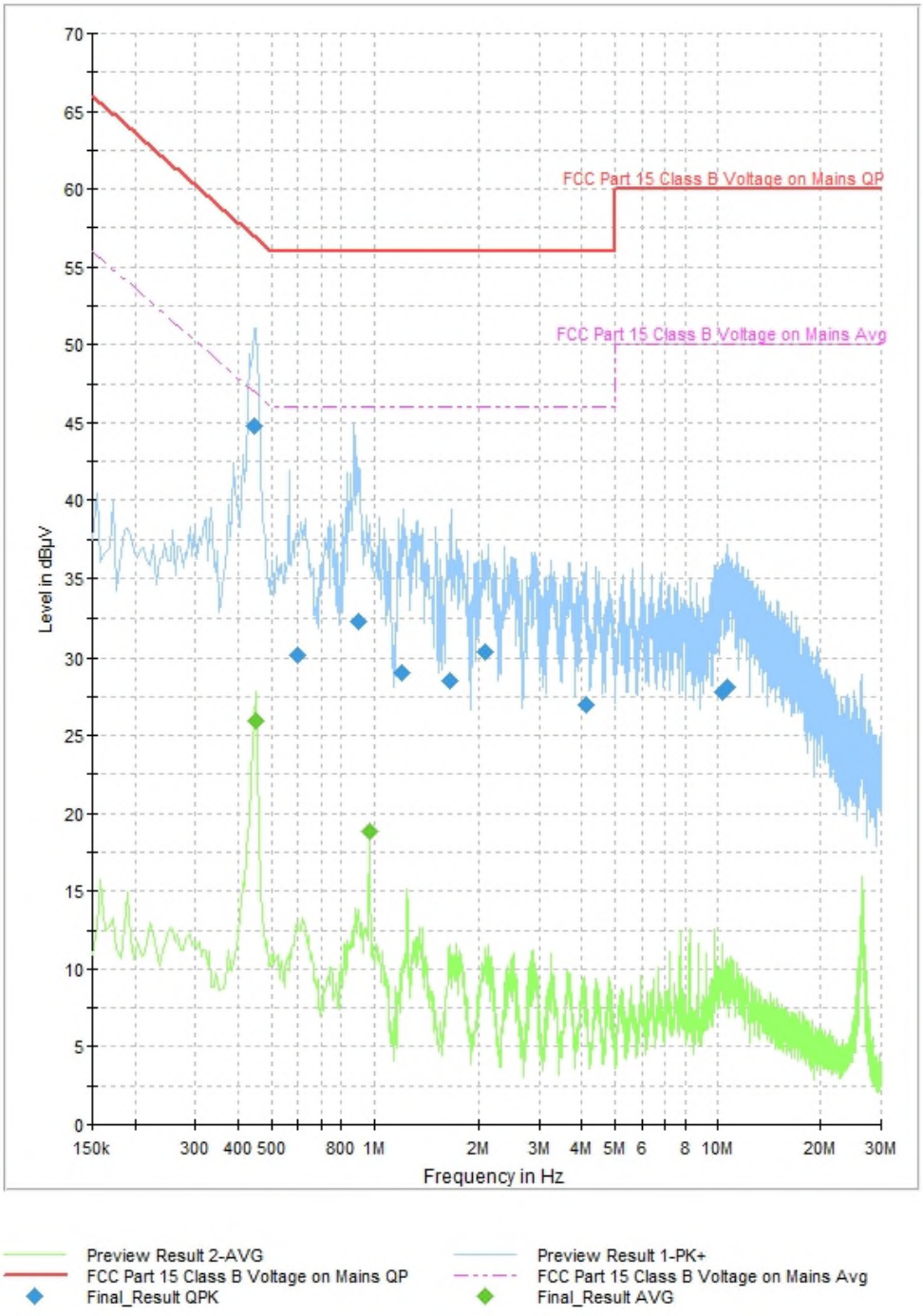


Figure 2.10.6-1: Composite Power Line Conducted Emissions Plots

2.10.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
LISN	Rohde & Schwarz	ESH3-Z5	TEMC00002	N/A	12	04-Feb-2022
EMI Test Receiver	Rohde & Schwarz	ESCS30	TEMC00011	2.3002.0102.36	24	03-Oct-2021
RFI/EMI Shielded Enclosure	UNIVERSAL SHIELDING CORP.	N/A	TEMC00100	N/A	N/A	NCR
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP40	BEMC00283	4.50 SP5	24	04-Oct-2021
9kHz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	12	25-Feb-2022
10dB Attenuator	Merrimac	FAN-6-10K	BEMC02086	N/A	12	19-Oct-2021
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
Attenuator 20dB, 2.9 mm-M/F, DC-40GHz 2 W	Aeroflex Inmet	40AH2W-20	BEMC02111	N/A	12	25-Jul-2021
Duratest High Frequency Cable Max. frequency 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	19-Oct-2021
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	N/A	24	07-Dec-2022
LISN	Rohde & Schwarz	ESH3-Z5	TEMC00002	N/A	12	04-Feb-2022
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	31-Oct-2021
EMI Test Receiver	Rohde & Schwarz	ESCS30	TEMC00011	2.3002.010 2.36	24	03-Oct-2021
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	26-Sep-2021
Horn Antenna	Schwarzbeck	BBHA-9170	TEMC00029	N/A	60	23-Aug-2021
EMC Chamber	Panasheild	N/A	TEMC00031	N/A	36	28-Jan-2024
Double Ridge Guide Horn	ETS Lindgren	3117	TEMC00061	N/A	24	07-Feb-2022
RFI/EMI Shielded Enclosure	UNIVERSAL SHIELDING CORP.	N/A	TEMC00100	N/A	N/A	NCR
18 GHz-40 GHz Microwave Preamplifier	COM-power	PAM-840A	TEMC00147	N/A	12	06-Jul-2021
PAM-118A	Com-Power Corporation	PAM-118A	TEMC00160	N/A	12	10-Apr-2022
2.4 GHz Notch Filter	Micro-Tronics	BRM50702-01	TEMC00176	N/A	12	09-Mar-2022
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR
USB Wideband Power Sensor 50MHz - 18GHz	Keysight Technologies	U2021XA	TEMC00197	N/A	12	29-Oct-2021
A81-0303 18 GHz Cable Set	Teledyne Storm Products	A81-0303-360/96	TEMC00201	N/A	12	10-Apr-2022
2.92mm Attenuator M/F 40GHz 30dB 2W VSWR 1.45	Centric RF	C402-30	TEMC00222	N/A	12	08-Mar-2022

TU - Traceability Unscheduled

O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

4 Diagram of Test Set-ups

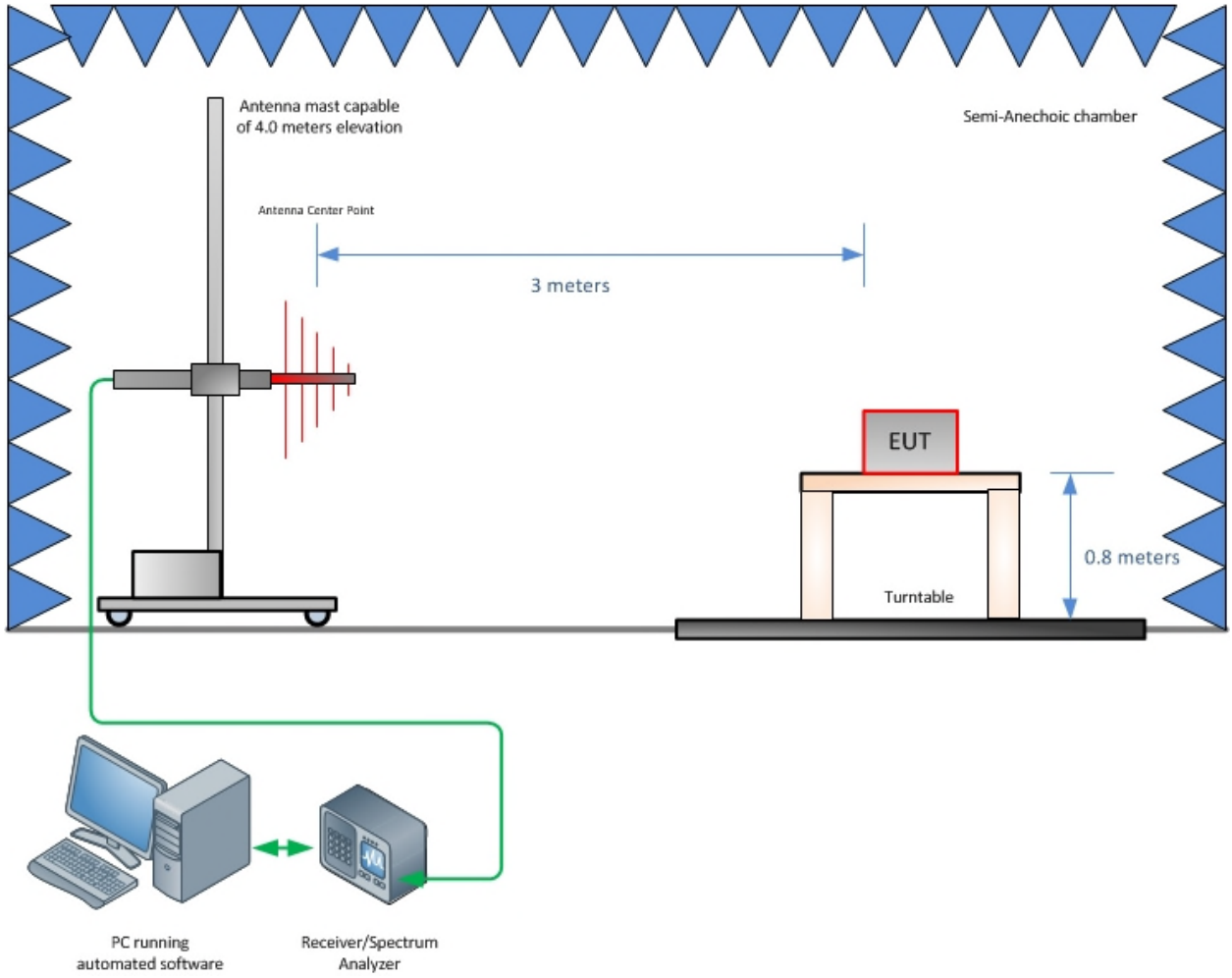


Figure 4-1 - Radiated Emissions Test Setup up to 1 GHz

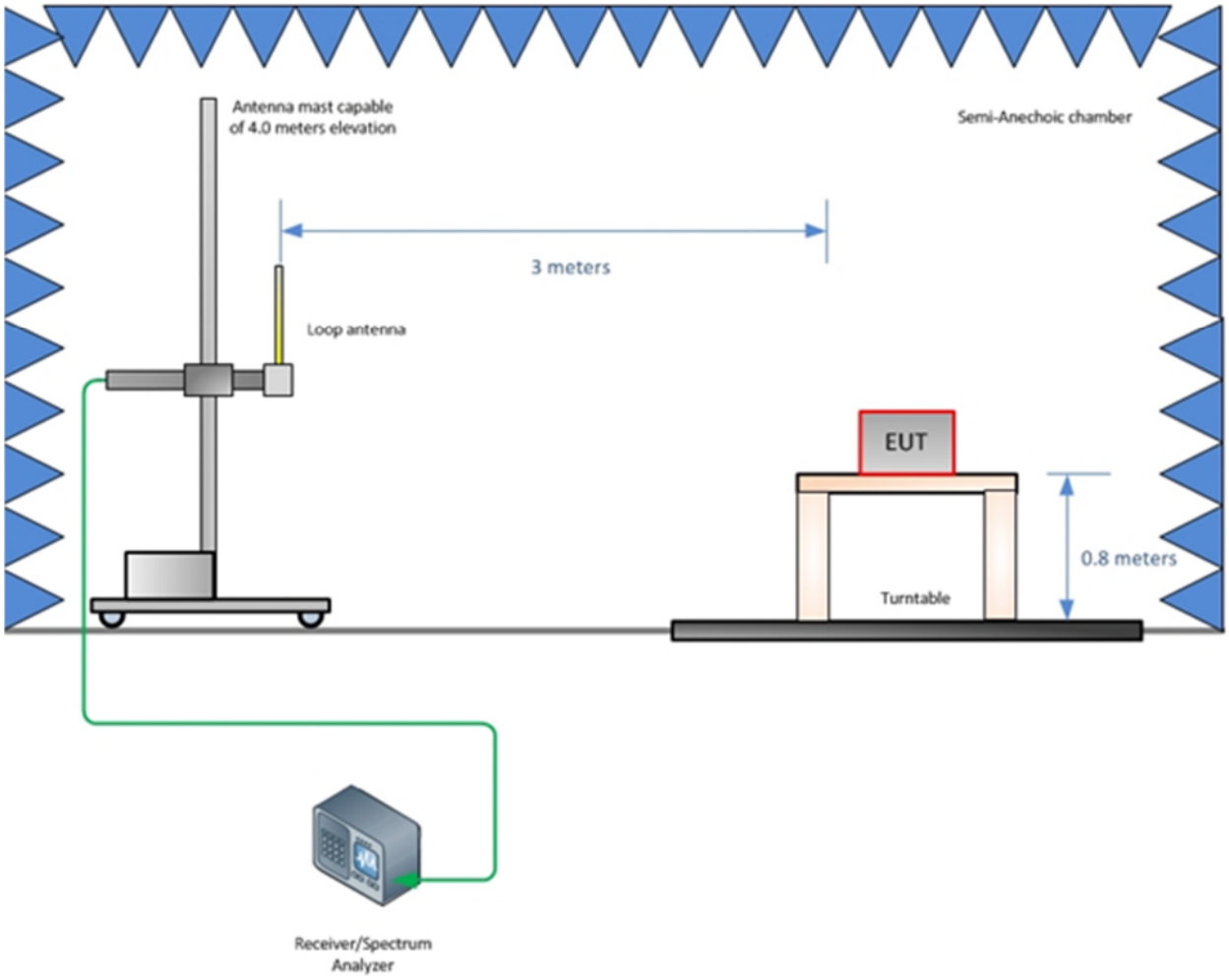


Figure 4-2 - Radiated Emissions Test Setup up to 30 MHz

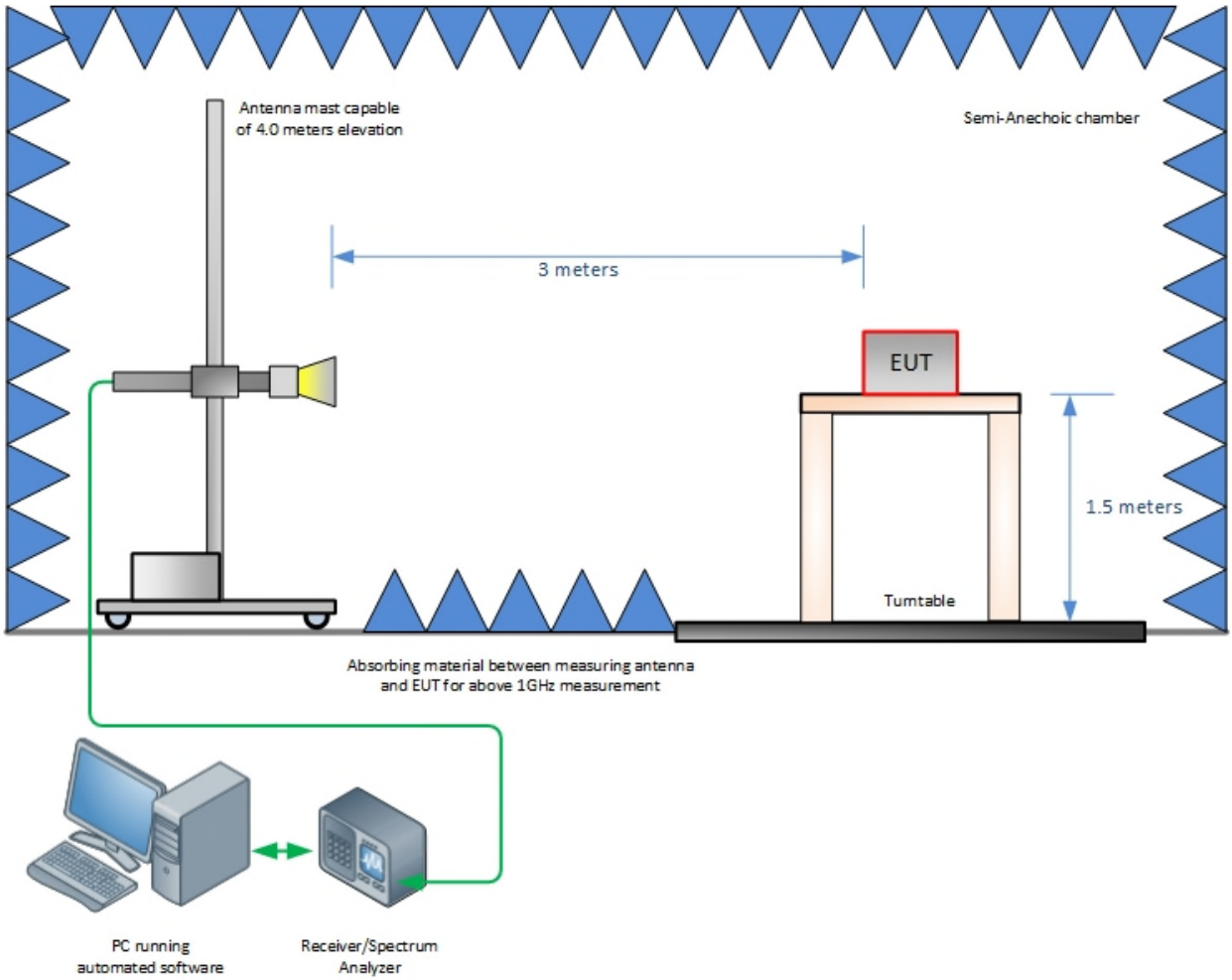


Figure 4-3 - Radiated Emissions Test Setup above 1 GHz

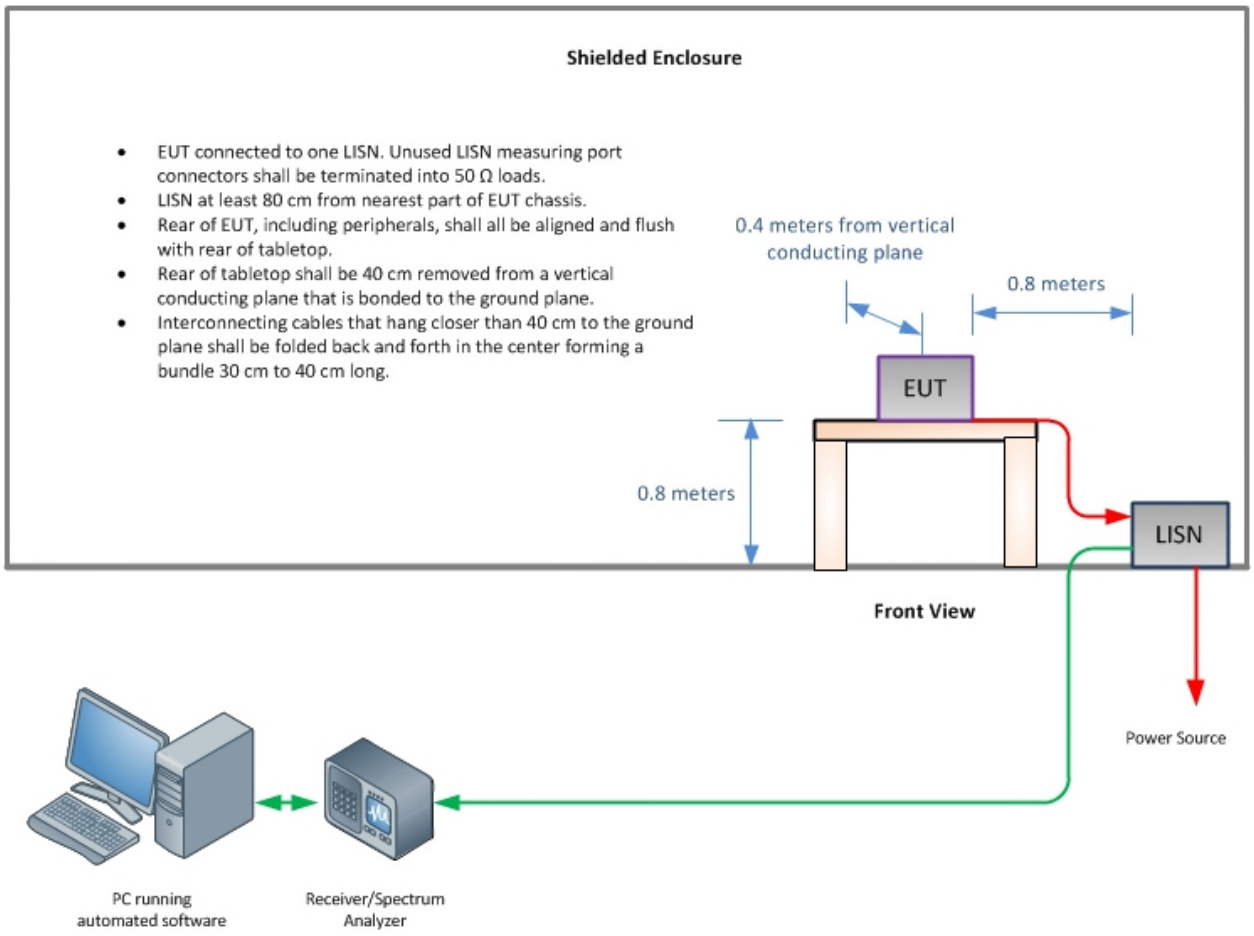


Figure 4-4 – Conducted Emissions Test Setup

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Table 5-1 - Values of U_{cispr} and U_{Lab}

Measurement	U_{cispr}	U_{Lab}
Conducted disturbance (mains port) (9 kHz – 150 kHz) (150 kHz – 30 MHz)	 3.8 dB 3.4 dB	 3.71 dB 3.31 dB
Conducted disturbance (telecom port) (150 kHz – 30 MHz 55 dB LCL) (150 kHz – 30 MHz 65 dB LCL) (150 kHz – 30 MHz 75 dB LCL)	 5.0 dB 5.0 dB 5.0 dB	 4.11 dB 4.50 dB 4.94 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1 000 MHz) (1 – 6 GHz) (6-18 GHz)	 6.3 dB 5.2 dB 5.5 dB	 5.85 dB 4.48 dB 4.48 dB

Notes:

U_{cispr} resembles a value of measurement uncertainty for a specific test, which was determined by considering uncertainties associated with the quantities listed in CISPR 16-4-2:2011.

6 Accreditation, Disclaimers and Copyright

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and TÜV SÜD America, Inc., extracts from the test report shall not be reproduced, except in full without TÜV SÜD America, Inc.'s written approval.

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal government.