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Unlicensed National Information Infrastructure (U-NII)
and License-Exempt Local Area Network (LE-LAN)

Devices, 47CFR, Part 15E (15.407)

Application For Grant of Certification

HVIN: GMN-03000

Frequency Range: 5180-5240 MHz

License-Exempt U-NII, Local Area Network equipment, U-NII-1 operation

FCC ID: IPH-04286

Garmin International, Inc.

1200 East 151st Street
Olathe, KS 66062

Test Report Number: 250128

Test Date: January 28, 2025 – April 4, 2025

Authorized Signatory: 

Patrick Powell

Rogers Labs, a division of The Compatibility Center LLC

FCC Designation: US5305

ISED Registration: 3041A

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Revisions

Revision 1 Issued May 20, 2025 – Initial Formal Release
 Revision 2 Issued May 25, 2025 – Incorporated internal review findings.
 Revision 3 Issued July 9, 2025 – Incorporated external review findings.
 Revision 4 Issued June 29, 2026 – Added MIMO tables

Executive Summary

The following information is submitted for consideration in obtaining Equipment Grants of Certification for License Exempt, Unlicensed National Information Infrastructure (U-NII) Intentional Radiator operating under 47 CFR Paragraph 15E (15.407), U-NII-1 new rules, 5180-5240 MHz bands, LE-LAN transmitter. This product is for use inside aircraft and installed only by authorized 3rd parties or OEMs. The default configuration for the device is 2.4G only and can only be changed to include U-NII-1 by said authorized 3rd parties or OEMs.

Name of Applicant: Garmin International, Inc.
1200 East 151st Street
Olathe, KS 66062

HVIN: GMN-03000

FCC ID: IPH-04286

Frequency Range: 5180-5240 MHz (U-NII-1 under new rules 15.407,
802.11a/n20/n40/ac20/ac40/ac80)

Radio #	Mode #	Standard	Channel Width (MHz)	Average Conducted Power (W)	Average e.i.r.p. Power (W)	99% OBW (kHz)
1	8	U-NII-1 802.11a	20	0.015	0.006	17,230.0
1	9	U-NII-1 802.11n20	20	0.015	0.005	18,362.5
1	10	U-NII-1 802.11n40	40	0.008	0.003	36,875.0
1	11	U-NII-1 802.11ac20	20	0.015	0.005	18,390.0
1	12	U-NII-1 802.11ac40	40	0.007	0.003	36,675.0
1	13	U-NII-1 802.11ac80	80	0.007	0.003	76,400.0
2	17	U-NII-1 802.11a	20	0.018	0.007	17,380.0
2	18	U-NII-1 802.11n20	20	0.011	0.004	18,180.0
2	19	U-NII-1 802.11n40	40	0.010	0.004	36,950.0
2	20	U-NII-1 802.11ac20	20	0.011	0.004	18,220.0
2	21	U-NII-1 802.11ac40	40	0.014	0.005	36,750.0
2	22	U-NII-1 802.11ac80	80	0.016	0.006	76,700.0

This report addresses EUT Operations as U-NII transmitter using modulations defined above in modes 8 through 13 (radio #1) and 17 through 22 (radio #2).

Opinion / Interpretation of Results

Tests Performed	Margin (dB)	Results
Restricted Frequency Bands 15.205, RSS-GEN 8.10	-1.1	Complies
AC Line Conducted 15.207, RSS-GEN 7.2.4	N/A	Complies
Radiated Emissions 15.209, RSS-GEN 7.2.5	-3.3	Complies
Harmonic Emissions per 15.407, RSS-247	-14.3	Complies

Equipment Tested

Model: GMN-03000

Garmin International, Inc.

1200 East 151st Street

Olathe, KS 66062

Description	Part Number	Serial Number
GMN-03000 (Radiated EUT #1)	011-05799-05	78F000512
GMN-03000 (Conducted EUT #2)	011-05799-05	78F000511
X3 Main Harness	T00-00846-00	N/A
SMA RF 50Ω Load	N/A	N/A
BNC RF 50Ω Load	N/A	N/A
USB-C Drive	N/A	N/A
RS-232 to serial adapter	N/A	N/A
Laptop Computer	Latitude 74870	EFSPSN2

Test results in this report relate only to the items tested. Worst-case configuration data recorded in this report.

The design may operate one transmitter chain at a time on a given radio (#1 or #2) but is capable of simultaneous transmission of one radio #1 transmitter and one radio #2 transmitter.

Software (FVIN): 1.00b; Antennas: Bluetooth & 2.4 GHz WiFi - PIFA (8.0 dBi); 5.2 GHz PIFA (-4.4 dBi)

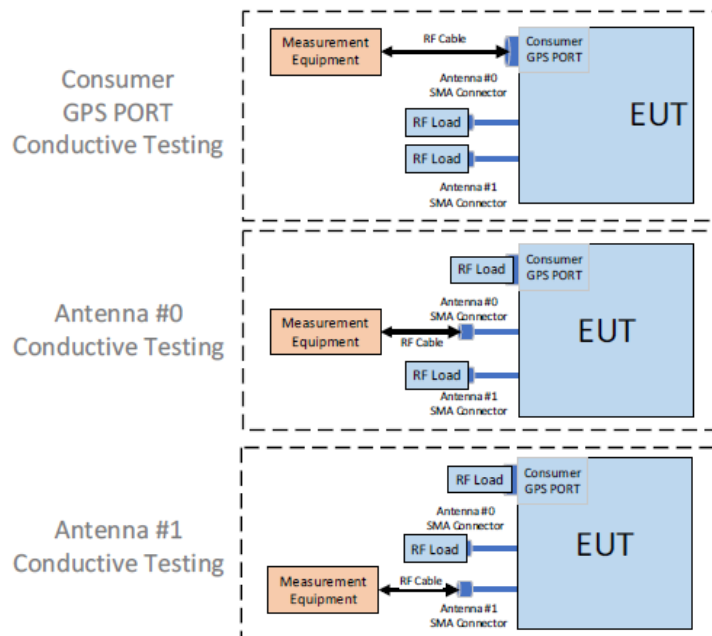
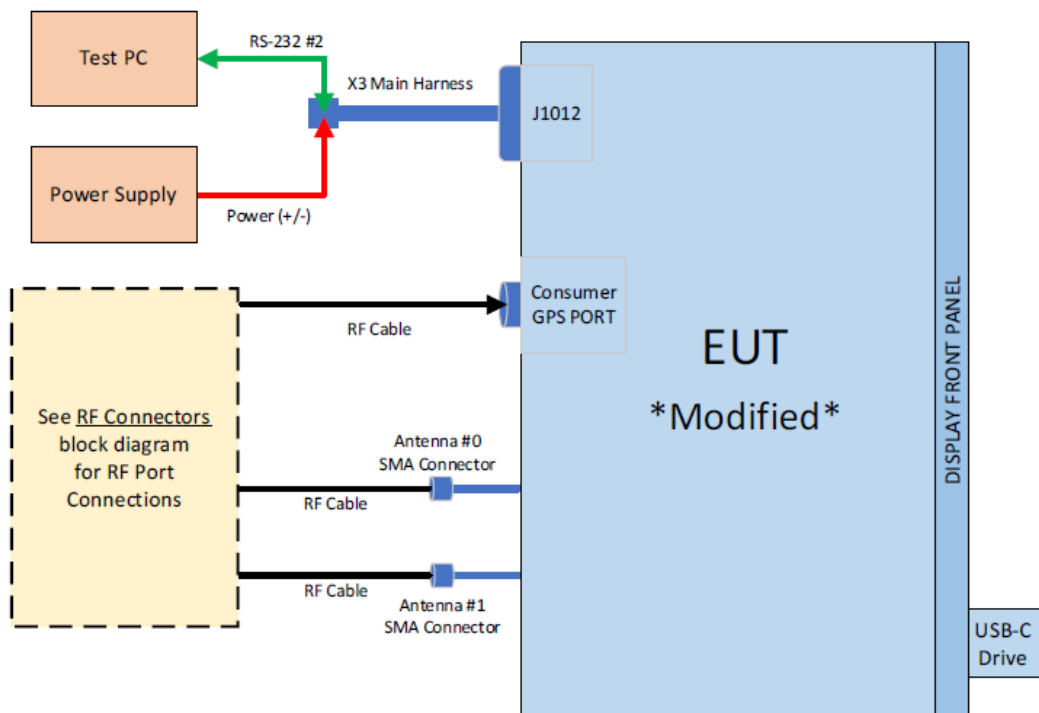
Equipment Operational Modes

Radio #	Mode #	Standard
1	1	BT BR (GFSK)
1	2	BT (2EDR $\pi/4$ DQPSK)
1	3	BT (3EDR 8DPSK)
1	4	BT BLE (GMSK)
1	5	2.4G 802.11b
1	6	2.4G 802.11g
1	7	2.4G 802.11n
1	8	U-NII-1 802.11a
1	9	U-NII-1 802.11n20
1	10	U-NII-1 802.11n40
1	11	U-NII-1 802.11ac20
1	12	U-NII-1 802.11ac40
1	13	U-NII-1 802.11ac80
2	14	2.4G 802.11b
2	15	2.4G 802.11g
2	16	2.4G 802.11n
2	17	U-NII-1 802.11a
2	18	U-NII-1 802.11n20
2	19	U-NII-1 802.11n40
2	20	U-NII-1 802.11ac20
2	21	U-NII-1 802.11ac40
2	22	U-NII-1 802.11ac80

Equipment Function

The GMN-03000 is an aeronautical display providing 2.4 GHz and 5 GHz wireless communication. The device is marketed as Aircraft Panel Mounted Display Unit. This report documents the performed testing and results for applicable configuration and product operation. The test software provided the ability to operate the transmitter at near 100% duty cycle for testing purposes. The testing mode of operation exceeds typical duty cycle operation of production equipment. As requested by the manufacturer, the equipment was tested for emissions compliance using the available configurations with the worst-case data presented. Test results in this report relate only to the products described in this report.

Equipment Configuration



Applicant Company information

Applicants Company	Garmin International, Inc.
Applicants Address	1200 East 151st Street, Olathe, KS 66062
FCC Identifier	IPH-04286
Manufacturer Company	Garmin International, Inc.
Manufacturer Address	1200 East 151st Street, Olathe, KS 66062

Equipment information

Hardware Version Identification Number (HVIN): The HVIN identifies hardware specifications of a product version. The HVIN replaces the ISED Model Number in the legacy E-filing System. An HVIN is required for all products for certification applications.	GMN-03000
Host Marketing Name (HMN) (if applicable): The HMN is the name or model number of a final product, which contains a certified radio module.	N/A
Brand Name	
Test Rule Part(s)	47 CFR 15E, 15.407, RSS-247
Test Frequency Range	5.15-5.25 GHz
Project Number	250128
Submission Type	FCC: Certification

Product Details

Items	Description
Product Type	Single chain 5 GHz U-NII-1
Radio Type	Transceiver
Power Type	External Direct Current
Frequency Range	5150-5250 MHz
Channel Number	Channels 36, 38, 40, 42, 44, 46, 48
Carrier Frequencies	Please refer to 802.11 Standard for Carrier Frequencies
Antenna	Integrated -4.4 dBi antenna PIFA (5.1G)
Communication Mode	Device provides 5 GHz, U-NII 1 operation
Beamforming Function	Without beamforming
Operating Mode	5150-5250 MHz (U-NII-1)

Antenna and Bandwidth

Antenna	Number of TX chains		
Bandwidth Mode	20 MHz	40 MHz	80 MHz
IEEE 802.11a	Single Chain	N/A	N/A
IEEE 802.11n	Single Chain	Single Chain	N/A
IEEE 802.11ac	Single Chain	Single Chain	Single Chain

Applicable Standards & Test Procedures

The following information is submitted in accordance with e-CFR dated October 18, 2024: Part 2, Subpart J, Part 15, Subpart 15E, Industry Canada RSS-GEN Issue 5, and RSS-247 Issue 3. Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in ANSI C63.10-2013, KDB 789033 D02 General UNII Test Procedures New Rules v02r01, KDB 926956 v02, RSS-247 Issue 3, and RSS-GEN Issue 5.

Testing Procedures

AC Line Conducted Emission Test Procedure

Testing for the AC line-conducted emissions were performed as required in CFR47 15B, RSS-GEN, and directed in ANSI C63.4-2014. The test setup, including the EUT, was arranged in the test configurations as presented during testing. The test configuration was placed on a 1 x 1.5-meter bench, 0.8 meters high located in a screen room. The power lines of the system were isolated from the power source using a standard LISN with a 50- μ Hy choke. EMI was coupled to the spectrum analyzer through a 0.1 μ F capacitor internal to the LISN. The LISN was positioned on the floor beneath the wooden bench supporting the EUT. The power lines and cables were draped over the back edge of the table. Refer to diagram one showing typical test arrangement and photographs in the test setup exhibit for EUT placement used during testing.

Radiated Emission Procedure

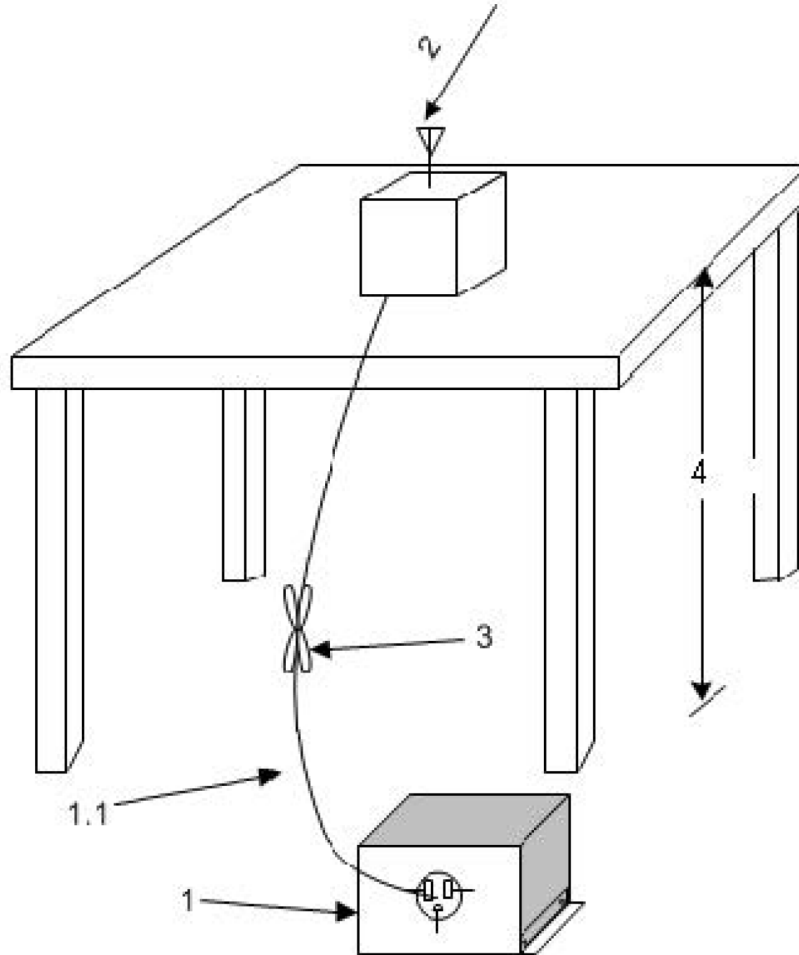
Radiated emissions testing was performed as required in 47CFR 15C, 15E, RSS-247 Issue 3, RSS-GEN and specified in ANSI C63.10-2013. The EUT was placed on a rotating 0.9 x 1.2-meter platform, elevated as required above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement permitting orientation in three orthogonal axes, raising, and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was taken and recorded. The frequency spectrum from 9 kHz to 40,000 MHz was searched for emissions and all significant results reported. All other unreported findings were at least 20 dB below limits. Refer to diagrams two and three showing typical test setup. Refer to photographs in the test setup exhibits for specific EUT placement during testing.

Antenna Port Conducted Emission Test Procedure

The EUT was assembled as required for operation placed on a benchtop. This configuration provided the ability to connect test equipment to the provided test antenna port. Antenna Port conducted emissions testing was performed presented in the regulations and specified in ANSI C63.10-2013. Testing was completed on a laboratory bench in a shielded room. The active antenna port of the device was connected to appropriate attenuation and the spectrum analyzer. Refer to diagram 4 showing typical test arrangement and photographs in the test setup exhibits for specific EUT placement during testing.

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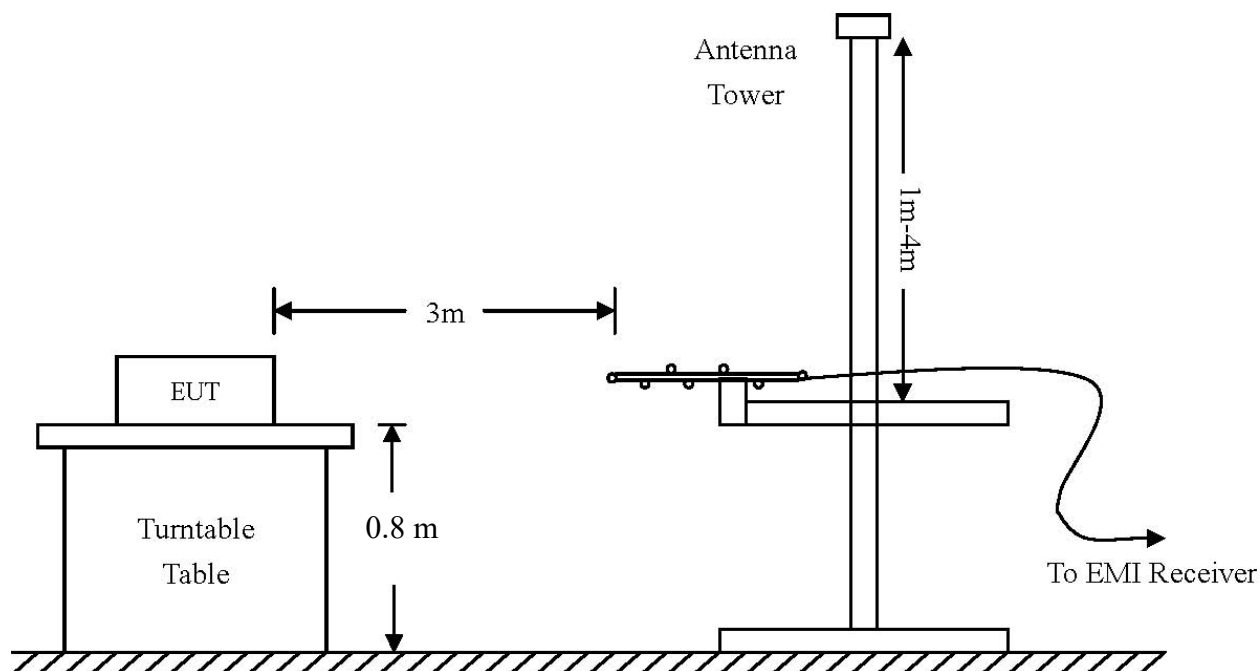
Diagram 2 Test arrangement for radiated emissions of tabletop equipment



1. A LISN is optional for radiated measurements between 30 MHz and 1000 MHz but not allowed for measurements below 30 MHz and above 1000 MHz (see 6.3.1). If used, then connect EUT to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. The LISN may be placed on top of, or immediately beneath, the reference ground plane (see 6.2.2 and 6.2.3.2).
 - 1.1. LISN spaced at least 80 cm from the nearest part of the EUT chassis.
2. Antenna can be integral or detachable, depending on the EUT (see 6.3.1).
3. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long (see 6.3.1).
4. For emission measurements at or below 1 GHz, the table height shall be 80 cm. For emission measurements above 1 GHz, the table height shall be 1.5 m for measurements, except as otherwise specified (see 6.3.1 and 6.6.3.1).

Diagram 3 Test arrangement for radiated emissions tested in Semi-Anechoic Chamber (SAC) and Outdoor Area Test Site (OATS)

Below 1 GHz



Above 1 GHz:

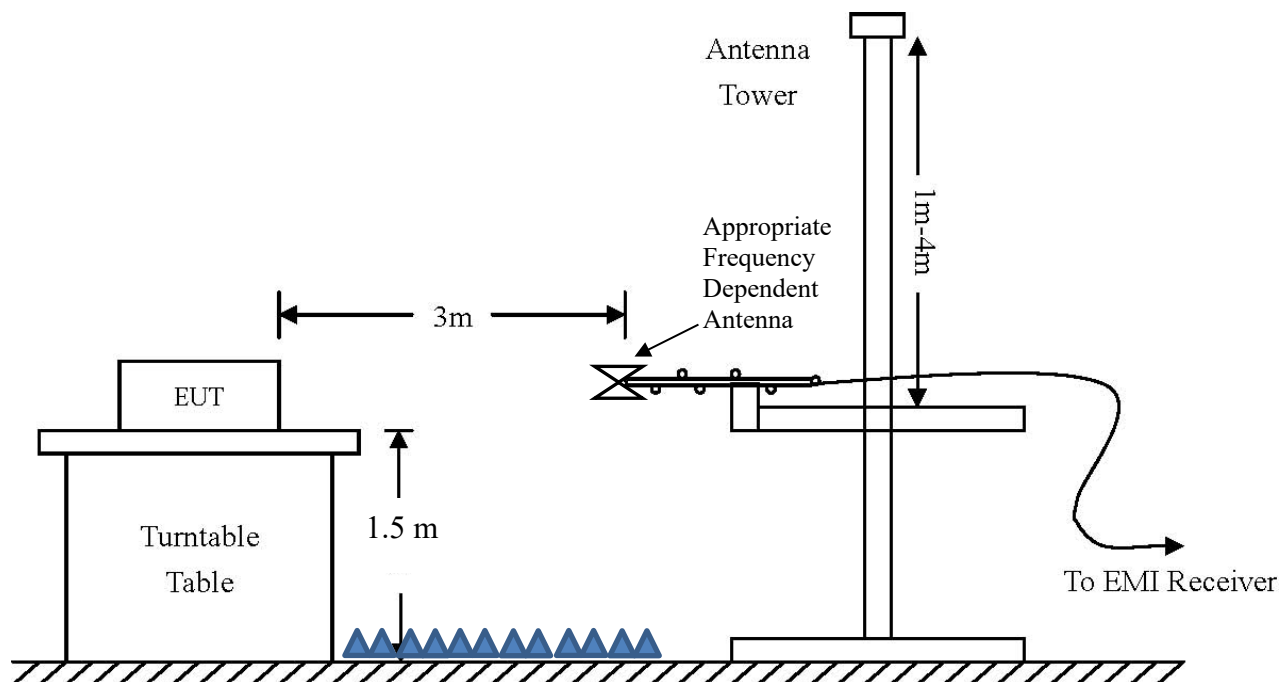
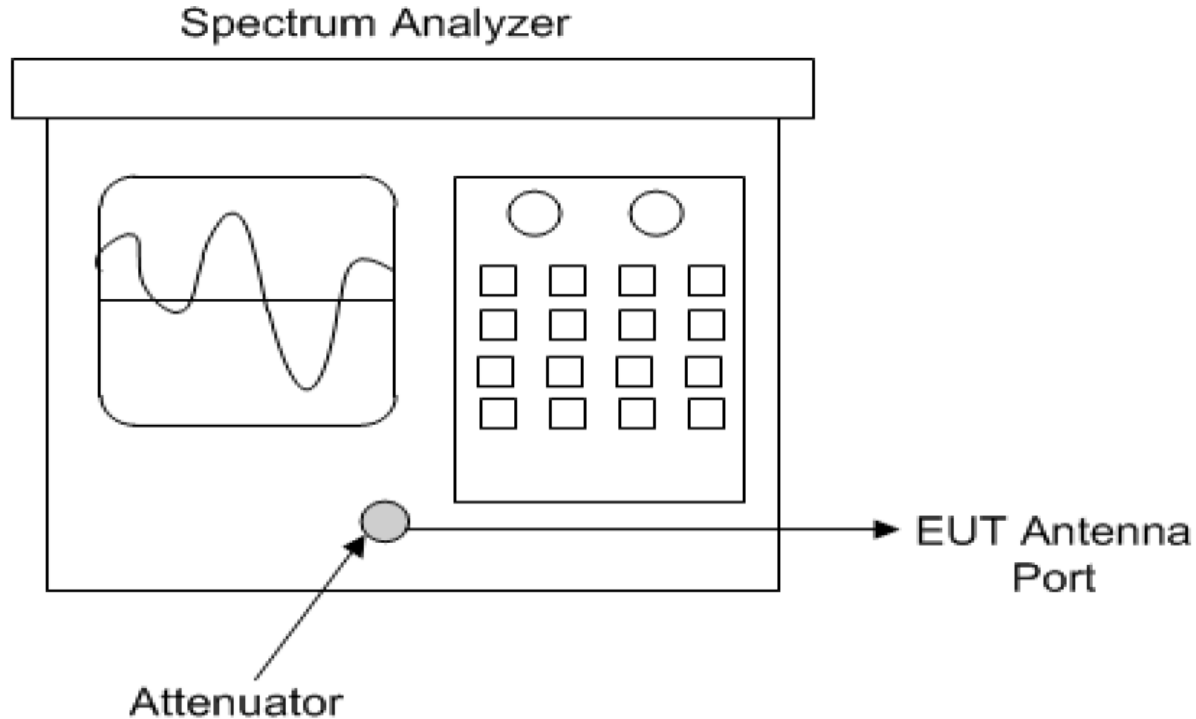


Diagram 4 Test arrangement for Antenna Port Conducted emissions



Test Site Locations

Conducted EMI AC line conducted emissions testing performed in a shielded screen room located at Rogers Labs, a division of The Compatibility Center LLC, 7915 Nieman Rd., Lenexa, KS (or satellite location).

Antenna port Antenna port conducted emissions testing was performed in a shielded screen room located at Rogers Labs, a division of The Compatibility Center LLC, 7915 Nieman Rd., Lenexa, KS (or satellite location).

Radiated EMI The radiated emissions tests were performed at the 3 meters Semi-Anechoic Chamber (SAC) located at Rogers Labs, a division of The Compatibility Center LLC, 7915 Nieman Rd., Lenexa, KS or at the 3 meters Outdoor Area Test Site (OATS) in the satellite location.

Registered Site information: FCC Site: US5305, ISED: 3041A, CAB Identifier: US0096

NVLAP Accreditation Lab code 200087-0

Units of Measurements

Conducted EMI Data presented in dBμV; dB referenced to one microvolt

Antenna port Conducted Data is in dBm; dB referenced to one milliwatt

Radiated EMI Data presented in dBμV/m; dB referenced to one microvolt per meter

Note: The limit is expressed for a measurement in dBμV/m when the measurement is taken at a distance of 3 or 10 meters. Data taken for this report was taken at distance of 3 meters. Sample calculation demonstrates corrected field strength reading for Semi-Anechoic Chamber using the measurement reading and correcting for receive antenna factor, cable losses, and amplifier gains.

Sample Calculation:

RFS = Radiated Field Strength, FSM = Field Strength Measured

A.F. = Receive antenna factor, Losses = attenuators/cable losses, Gain = amplification gains

$RFS (dB\mu V/m @ 3m) = FSM (dB\mu V) + A.F. (dB/m) + Losses (dB) - Gain (dB)$

Frequency: 9 kHz-30 MHz	Frequency: 30 MHz- 1 GHZ	Frequency: Above 1 GHZ
Loop Antenna	Broadband Biconilog	Horn
RBW = 9 kHz	RBW = 120 kHz	RBW = 1 MHz
VBW = 30 kHz	VBW = 500 kHz	VBW = 3 MHz
Sweep time = Auto	Sweep time = Auto	Sweep time = Auto
Detector = PK, QP	Detector = PK, QP	Detector = PK, AV
Antenna Height 1m	Antenna Height 1-4m	Antenna Height 1-4m

Environmental Conditions

Ambient Temperature 20.0° C

Relative Humidity 49.0 %

Atmospheric Pressure 1018.3 mb

Rogers Labs, a division of The Compatibility Center LLC

7915 Nieman Road

Lenexa, KS 66214

Phone: (913) 660-0666

Revision 4

HVIN: GMN-03000

Test #: 250128

Test to: 47CFR 15E

File: GMN-03000 FCC NII TstRpt 250128 r4

Garmin International, Inc

FCC ID: IPH-04286

SN: 78F000511 & 78F000512

Date: June 29, 2026

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Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to demonstrate compliance with the 47 CFR Part 15E, RSS-Gen, and RSS-247 Issue 3, and RSS-GEN Issue 5 emission requirements. There were no deviations to the specifications.

Intentional Radiators

Antenna Requirements

The EUT incorporates integral antenna system and offers no provision for connection to alternate antenna system. The antenna connection point complies with the unique antenna connection requirements. There are no deviations or exceptions to the specification.

Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at the OATS or SAC. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were investigated at the OATS or SAC, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. Test procedures of ANSI C63.10-2013 were used during testing. No other significant emission was observed which fell into the restricted bands of operation. Computed emission values consider the received radiated field strength, receive antenna correction factor, amplifier gain stage, and test system cable losses.

Table 1 Harmonic Radiated Emissions in Restricted Bands Data Radio 1, Mode 8 U-NII-1 (802.11a)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 1, Mode 8 U-NII-1 (802.11a)							
5150.0	62.3	47.8	59.2	45.5	54.0	-6.2	-8.5
5350.0	59.5	45.4	59.1	45.3	54.0	-8.6	-8.7
15540.0	61.6	48.4	61.7	48.5	54.0	-5.6	-5.5
15600.0	61.2	48.5	61.4	48.4	54.0	-5.5	-5.6
15720.0	61.2	48.3	61.5	48.3	54.0	-5.7	-5.7
20720.0	65.4	52.2	65.2	52.3	54.0	-1.8	-1.7
20800.0	64.9	52.3	65.2	52.3	54.0	-1.7	-1.7
20960.0	65.7	52.6	66.1	52.6	54.0	-1.4	-1.4

Table 2 Harmonic Radiated Emissions in Restricted Bands Data Radio 1, Mode 9 U-NII-1 (802.11n20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 1, Mode 9 U-NII-1 (802.11n)							
5150.0	64.6	48.2	60.2	45.1	54.0	-5.8	-8.9
5350.0	59.4	45.5	59.0	45.2	54.0	-8.5	-8.8
15540.0	61.6	48.6	61.2	48.5	54.0	-5.4	-5.5
15600.0	61.1	48.5	61.5	48.4	54.0	-5.5	-5.6
15720.0	61.7	48.4	61.1	48.4	54.0	-5.6	-5.6
20720.0	65.2	52.0	65.4	52.1	54.0	-2.0	-1.9
20800.0	65.6	52.2	64.9	52.2	54.0	-1.8	-1.8
20960.0	65.7	52.6	65.4	52.6	54.0	-1.4	-1.4

Table 3 Harmonic Radiated Emissions in Restricted Bands Data Radio 1, Mode 10 U-NII-1 (802.11n40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 1, Mode 10 U-NII-1 (802.11n40)							
5150.0	66.2	49.7	61.2	46.4	54.0	-4.3	-7.6
5350.0	59.0	45.5	59.3	45.3	54.0	-8.5	-8.7
15570.0	61.8	48.5	62.0	48.5	54.0	-5.5	-5.5
15690.0	60.8	48.0	61.7	48.0	54.0	-6.0	-6.0
20760.0	66.0	52.1	65.2	52.1	54.0	-1.9	-1.9
20920.0	65.4	52.7	65.6	52.7	54.0	-1.3	-1.3

Table 4 Harmonic Radiated Emissions in Restricted Bands Data Radio 1, Mode 11 U-NII-1 (802.11ac20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 1, Mode 11 U-NII-1 (802.11ac20)							
5150.0	63.7	48.3	60.4	45.7	54.0	-5.7	-8.3
5350.0	59.0	45.5	58.8	45.4	54.0	-8.5	-8.6
15540.0	61.2	48.5	61.4	48.6	54.0	-5.5	-5.4
15600.0	61.0	48.5	61.9	48.5	54.0	-5.5	-5.5
15720.0	60.9	48.3	61.9	48.2	54.0	-5.7	-5.8
20720.0	65.7	52.1	65.4	52.1	54.0	-1.9	-1.9
20800.0	65.9	52.7	65.8	52.6	54.0	-1.3	-1.4
20960.0	65.7	52.5	65.4	52.4	54.0	-1.5	-1.6

Table 5 Harmonic Radiated Emissions in Restricted Bands Data Radio 1, Mode 12 U-NII-1 (802.11ac40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 1, Mode 12 U-NII-1 (802.11ac40)							
5150.0	64.7	49.7	61.4	46.5	54.0	-4.3	-7.5
5350.0	59.3	45.7	58.9	45.5	54.0	-8.3	-8.5
15570.0	61.3	48.4	61.2	48.4	54.0	-5.6	-5.6
15690.0	60.6	48.0	61.3	48.0	54.0	-6.0	-6.0
20760.0	65.5	52.0	65.6	51.9	54.0	-2.0	-2.1
20920.0	65.5	52.6	65.9	52.5	54.0	-1.4	-1.5

Table 6 Harmonic Radiated Emissions in Restricted Bands Data Radio 1, Mode 13 U-NII-1 (802.11ac80)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 1, Mode 13 U-NII-1 (802.11ac80)							
5150.0	66.2	51.3	61.3	47.4	54.0	-2.7	-6.6
5350.0	61.1	47.0	59.4	45.6	54.0	-7.0	-8.4
15630.0	61.1	48.0	60.9	48.1	54.0	-6.0	-5.9
20840.0	65.6	52.5	65.5	52.4	54.0	-1.5	-1.6

Table 7 Harmonic Radiated Emissions in Restricted Bands Data Radio 2, Mode 17 U-NII-1 (802.11a)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 2, Mode 17 U-NII-1 (802.11a)							
5150.0	60.3	45.9	65.6	49.0	54.0	-8.1	-5.0
5350.0	59.5	45.6	58.9	45.4	54.0	-8.4	-8.6
15540.0	61.6	48.6	61.9	48.8	54.0	-5.4	-5.2
15600.0	61.4	48.6	61.7	48.6	54.0	-5.4	-5.4
15720.0	62.2	48.3	61.0	48.3	54.0	-5.7	-5.7
20720.0	65.2	52.1	65.3	52.1	54.0	-1.9	-1.9
20800.0	65.3	52.2	65.6	52.1	54.0	-1.8	-1.9
20960.0	65.8	52.6	65.6	52.5	54.0	-1.4	-1.5

Table 8 Harmonic Radiated Emissions in Restricted Bands Data Radio 2, Mode 18 U-NII-1 (802.11n20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 2, Mode 18 U-NII-1 (802.11n)							
5150.0	71.4	46.1	64.8	45.1	54.0	-7.9	-8.9
5350.0	58.9	45.5	58.8	45.5	54.0	-8.5	-8.5
15540.0	61.5	48.5	61.7	48.6	54.0	-5.5	-5.4
15600.0	61.6	48.7	61.3	48.5	54.0	-5.3	-5.5
15720.0	61.3	48.2	62.4	48.4	54.0	-5.8	-5.6
20720.0	65.0	52.0	65.7	52.0	54.0	-2.0	-2.0
20800.0	65.2	52.1	65.2	52.1	54.0	-1.9	-1.9
20960.0	65.5	52.5	65.6	52.5	54.0	-1.5	-1.5

Table 9 Harmonic Radiated Emissions in Restricted Bands Data Radio 2, Mode 19 U-NII-1 (802.11n40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 2, Mode 19 U-NII-1 (802.11n40)							
5150.0	66.3	47.1	61.0	45.3	54.0	-6.9	-8.7
5350.0	58.8	45.6	59.1	45.4	54.0	-8.4	-8.6
15570.0	61.5	48.4	61.7	48.5	54.0	-5.6	-5.5
15690.0	61.2	47.9	61.2	47.9	54.0	-6.1	-6.1
20760.0	65.2	52.0	65.3	51.9	54.0	-2.0	-2.1
20920.0	65.6	51.9	65.5	51.9	54.0	-2.1	-2.1

Table 10 Harmonic Radiated Emissions in Restricted Bands Data Radio 2, Mode 20 U-NII-1 (802.11ac20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 2, Mode 20 U-NII-1 (802.11ac20)							
5150.0	71.5	47.4	65.0	45.3	54.0	-6.6	-8.7
5350.0	59.2	45.3	58.8	45.2	54.0	-8.7	-8.8
15540.0	62.1	48.5	61.9	48.5	54.0	-5.5	-5.5
15600.0	61.8	48.5	61.8	48.5	54.0	-5.5	-5.5
15720.0	61.4	48.2	61.1	48.2	54.0	-5.8	-5.8
20720.0	65.2	52.0	65.6	52.0	54.0	-2.0	-2.0
20800.0	65.4	52.1	65.9	52.1	54.0	-1.9	-1.9
20960.0	65.3	52.5	65.4	52.9	54.0	-1.5	-1.1

Table 11 Harmonic Radiated Emissions in Restricted Bands Data Radio 2, Mode 21 U-NII-1 (802.11ac40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 2, Mode 21 U-NII-1 (802.11ac40)							
5150.0	65.0	46.5	67.4	50.0	54.0	-7.5	-4.0
5350.0	59.2	45.5	58.9	45.3	54.0	-8.5	-8.7
15570.0	62.0	48.6	61.6	48.3	54.0	-5.4	-5.7
15690.0	61.3	48.1	61.3	48.1	54.0	-5.9	-5.9
20760.0	65.4	51.9	65.5	51.9	54.0	-2.1	-2.1
20920.0	66.3	52.6	65.6	52.6	54.0	-1.4	-1.4

Table 12 Harmonic Radiated Emissions in Restricted Bands Data Radio 2, Mode 22 U-NII-1 (802.11ac80)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
Radio 2, Mode 22 U-NII-1 (802.11ac80)							
5150.0	66.7	49.5	58.8	45.2	54.0	-4.5	-8.8
5350.0	66.1	47.9	60.3	45.9	54.0	-6.1	-8.1
15630.0	61.4	48.0	61.8	48.0	54.0	-6.0	-6.0
20840.0	66.3	52.5	65.7	52.4	54.0	-1.5	-1.6

Summary of Results for Radiated Emissions in Restricted Bands

The EUT demonstrated compliance with the emissions requirements of 47 CFR 15.205, RSS-GEN Issue 5, and RSS-247 Issue 3. The EUT provided a worst-case minimum margin of -1.1 dB below the emissions requirements in restricted frequency bands. Peak, Quasi-peak, and average amplitudes were checked for compliance with the regulations. Worst-case emissions are reported with other emissions found in the restricted frequency bands at least 20 dB below the requirements.

AC Line Conducted EMI Procedure

The equipment operates solely from direct current power and offers no provision for connection to utility power systems. Therefore, no AC line conducted emissions testing was required or performed.

General Radiated Emissions Procedure

Testing for the radiated emissions were performed as specified in CFR47 15B, RSS-GEN, and directed in ANSI C63.4-2014. For testing purposes, the EUT was arranged as presented in the applicable configuration diagrams above and operated through all modes as presented.

Exploratory radiated emissions measurements were performed in the SAC chamber or screen room, finding maximized emissions over frequency, EUT orientation, antenna height and polarity. This data is then used to focus the final radiated emissions measurements on these maximized points.

Final radiated emissions data were taken with the EUT located in the OATS or SAC at distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 9 kHz to 6,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, changing cable location, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Loop, Biconical, Broadband Biconilog, Log Periodic, and Double Ridge or Pyramidal Horns and mixers above 1 GHz.

Table 13 General Radiated Emissions Data – Worst Case (Horizontal Polarization)

Frequency (MHz)	Peak (dBμV/m)	Quasi-Peak (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dBm)
676.2	38.5	29.7	47	-17.3
707.0	41.1	43.7	47	-3.3
740.4	38.9	31.7	47	-15.3
746.4	41.2	36.1	47	-10.9
766.1	40.1	34.7	47	-12.3

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Figure 1 Plot of General Radiated Emissions – Horizontal Polarization

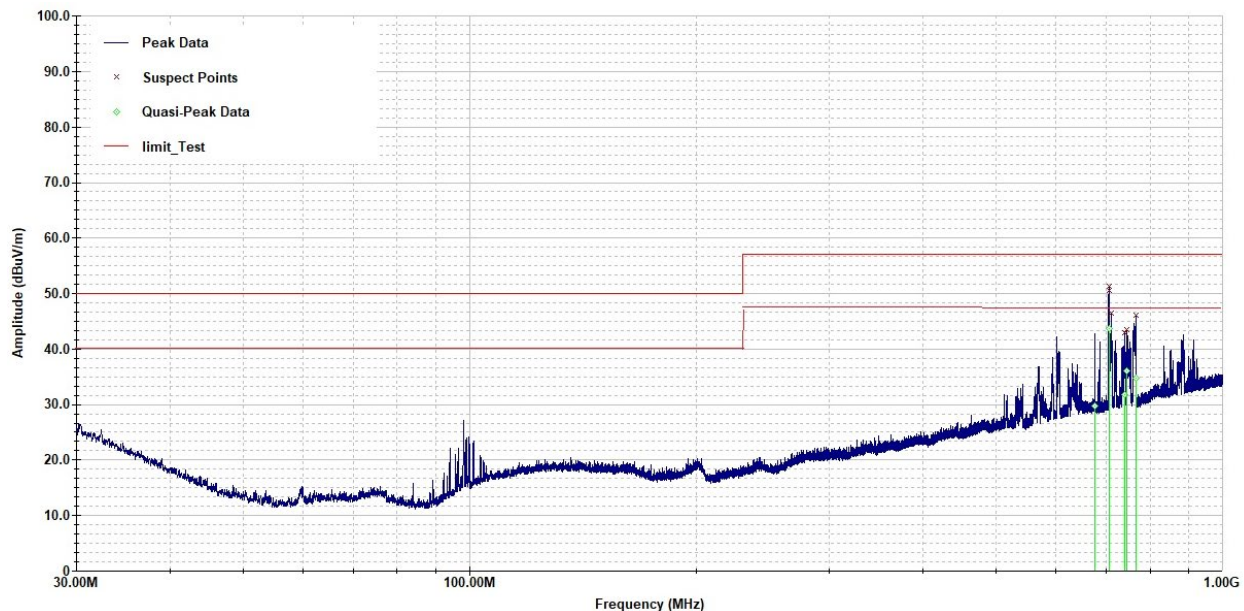
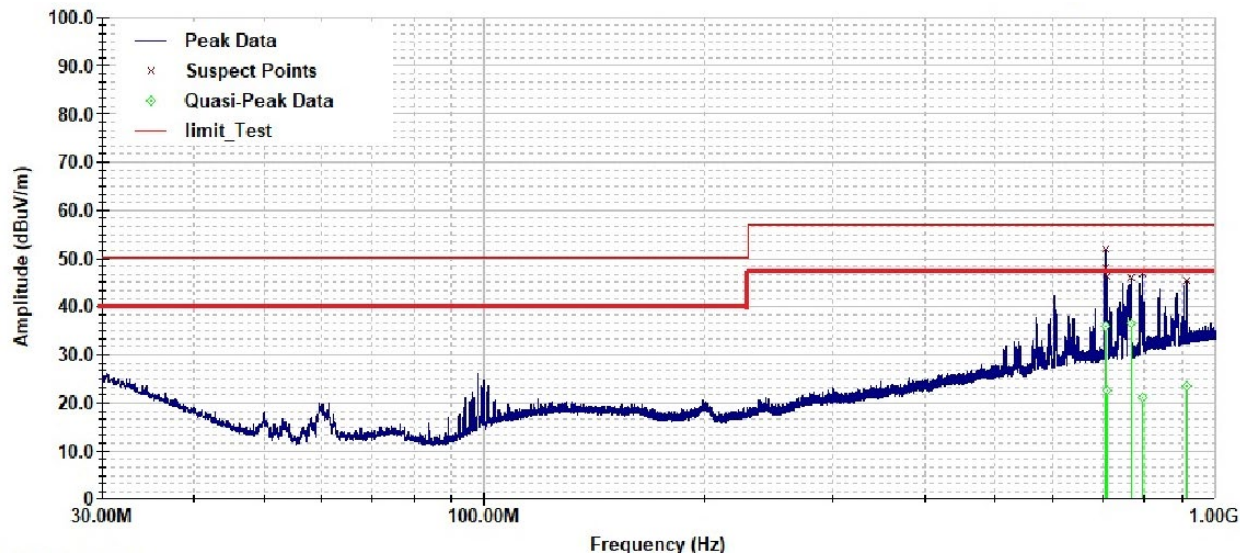


Table 14 General Radiated Emissions Data – Worst Case (Vertical Polarization)

Frequency (MHz)	Peak (dBμV/m)	Quasi-Peak (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dBm)
707.2	27.6	35.9	47	-11.1
712.1	28.0	22.7	47	-24.3
766.3	41.6	36.7	47	-10.3
796.8	29.5	21.3	47	-25.7
913.6	31.2	23.4	47	-23.6

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Figure 2 Plot of General Radiated Emissions – Vertical Polarization



Summary of Results for General Radiated Emissions

The EUT demonstrated compliance with the radiated emissions requirements of 47 CFR part 15 and Industry Canada RSS-247 Issue 3 Intentional Radiators. The EUT demonstrated a minimum margin of -3.3 dB below the requirements. Other emissions were present with amplitudes at least 20 dB below the Limits.

Operation in the 5150-5250 MHz Frequency U-NII-1 Band

Testing followed FCC 789033 D02 General U-NII Test Procedures New Rules v02r01.

The manufacturer provided a second test sample which provided direct connection to the antenna port. A power meter was used to measure fundamental transmitter output power. A spectrum analyzer / receiver was used to produce plots and make other antenna port conducted measurements for compliance testing. Test software was provided to operate the transmitter. This software provided the ability to set test channel, operational mode, and modulation scheme. The antenna port was connected to coaxial cable with 50-ohm attenuator and receiver, spectrum analyzer, or power meter during testing. The design was also tested for radiated emissions using sample EUT Tx Radiated #1 representative of production equipment. Radiated emissions testing was performed on the Open Area Test Site (OATS) or Semi Anechoic Chamber (SAC) with the transmitter operating. The test sample was placed on a turntable elevated as required above the ground plane as required at a 3 meters distance from the FSM antenna. Radiated emission investigations were performed from 9 kHz to 40,000 MHz. The peak and quasi-peak amplitude of the frequencies below 1000 MHz were measured using a spectrum analyzer. The peak and average amplitude of emissions above 1000 MHz were measured using a spectrum analyzer. Emissions data was recorded from the measurement results. Data presented reflects measurement result corrected to account for measurement system gains and losses. Plots were made of transmitter performance for reference and demonstration of compliance. In addition, all Manufacturers of U-NII devices are responsible for ensuring frequency stability such that the emissions are maintained within the band of operation under all conditions of normal operation as specified in the user's manual. The manufacturer has attested the equipment operates within the required frequency spectrum under normal operational conditions. This report documents emissions governed under the U-NII-1 band operating in the 5180-5240 MHz frequency range.

47CFR 15.407 General Technical Requirements

(a) power limitations

(1) For the Band 5.15-5.25 GHz

- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1-megahertz band. If transmitting antennas of**

- directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1-megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (11) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.
- (12) Power spectral density measurement. The maximum power spectral density is measured as either a conducted emission by direct connection of a calibrated test instrument to the equipment under test or a radiated measurement. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in all other bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.
- (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- (7) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (8) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (9) The provisions of §15.205 apply to intentional radiators operating under this section.
- (10) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.
- (c) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information, or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.
- (e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
- (f) Radio frequency devices operating under the provisions of this part are subject to the radio frequency radiation exposure requirements specified in §§1.1307(b), 1.1310, 2.1091, and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request.
- (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user’s manual.

6. Technical requirements for license-exempt local area network devices and digital transmission systems operating in the 5 GHz band

This section provides standards for License-Exempt Local Area Network (LE-LAN) devices operating in the bands 5150-5250 MHz, 5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz, and 5725-5850 MHz and for DTS's operating in the band 5725-5850 MHz that employ digital modulation technology but are not designed for LE-LAN operation. Please note that this device only operates in the 5150-5250 MHz / U-NII-1 part of the 5 GHz band.

Devices with occupied bandwidths which overlap different bands shall comply with all operational requirements for each band.

6.2.1 Frequency band 5150-5250 MHz

LE-LAN devices are restricted to indoor operation only in the band 5150-5250 MHz. However, original equipment manufacturer (OEM) devices, which are installed in vehicles-by-vehicles manufacturers, are permitted.

Figure 3 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 1, Mode 8 U-NII-1 (802.11a)

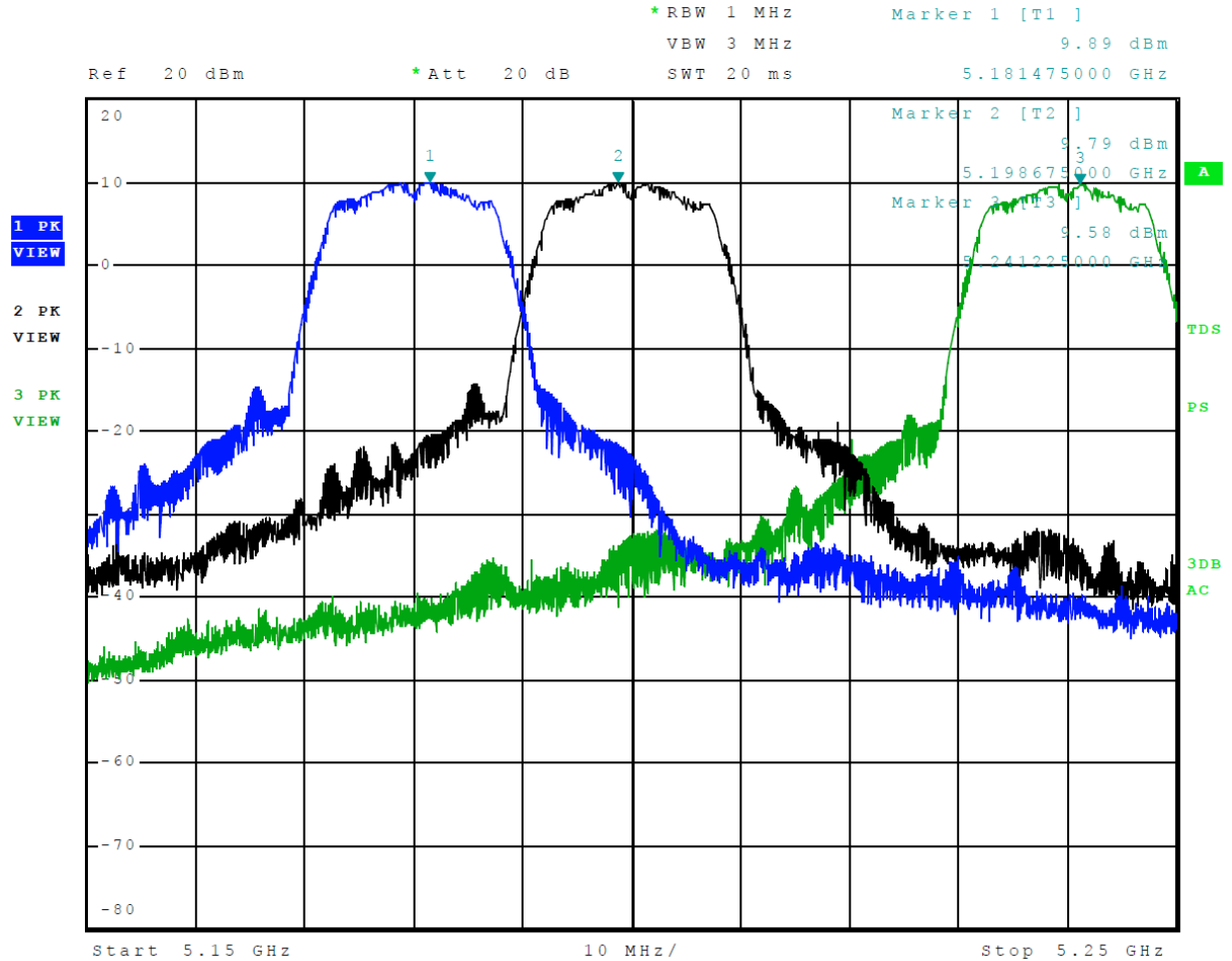


Figure 4 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 1, Mode 9 U-NII-1 (802.11n20)

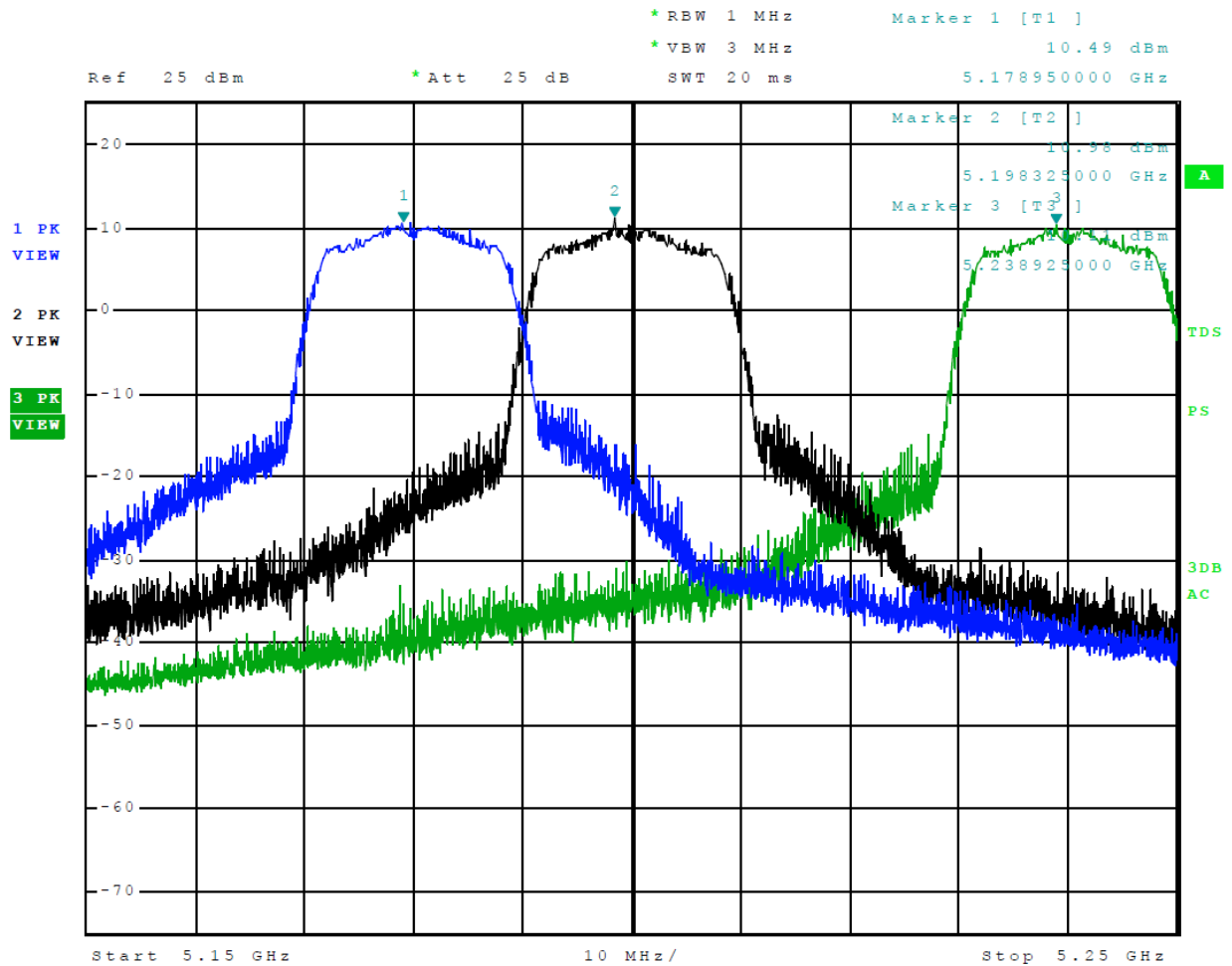


Figure 5 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)

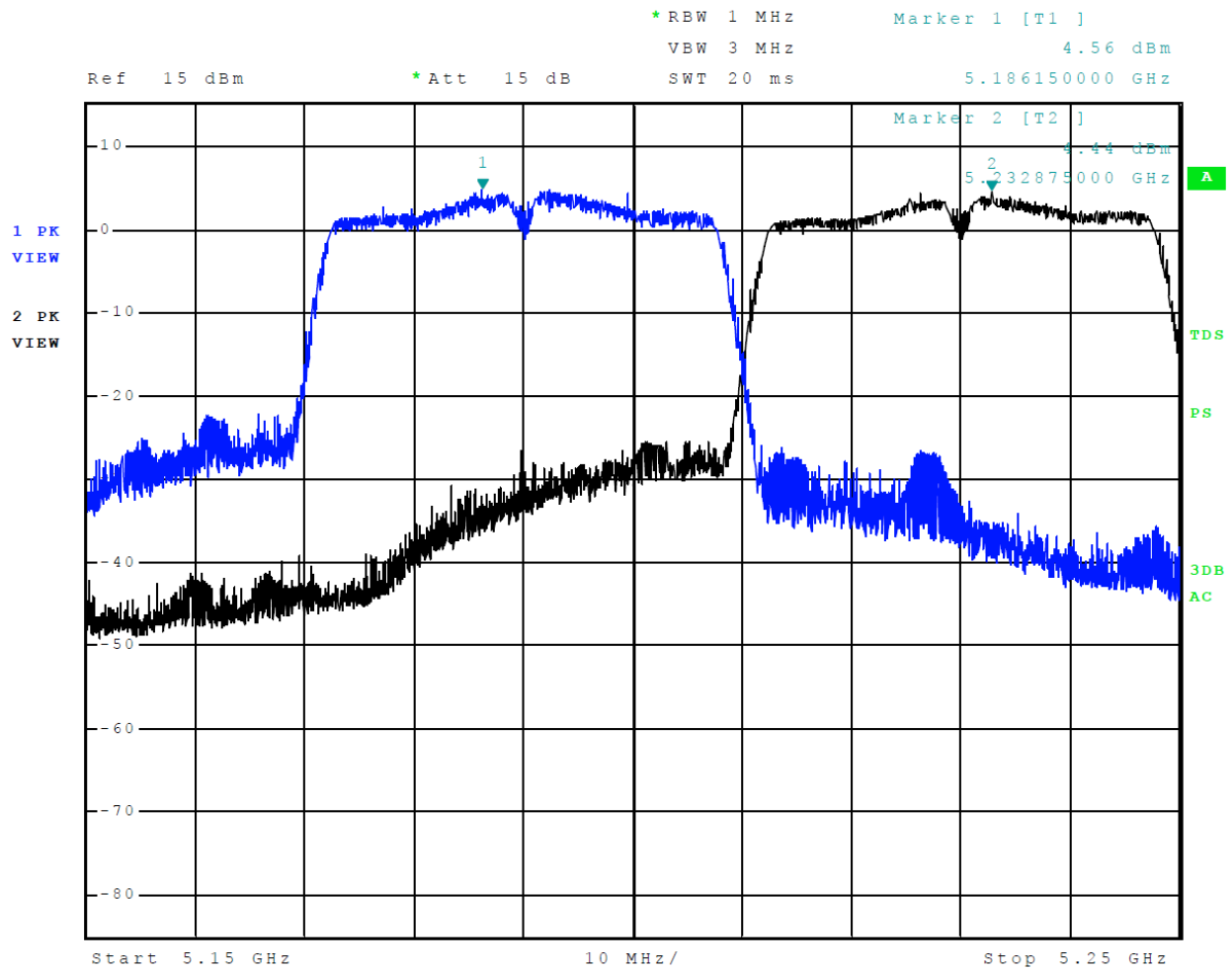


Figure 6 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)

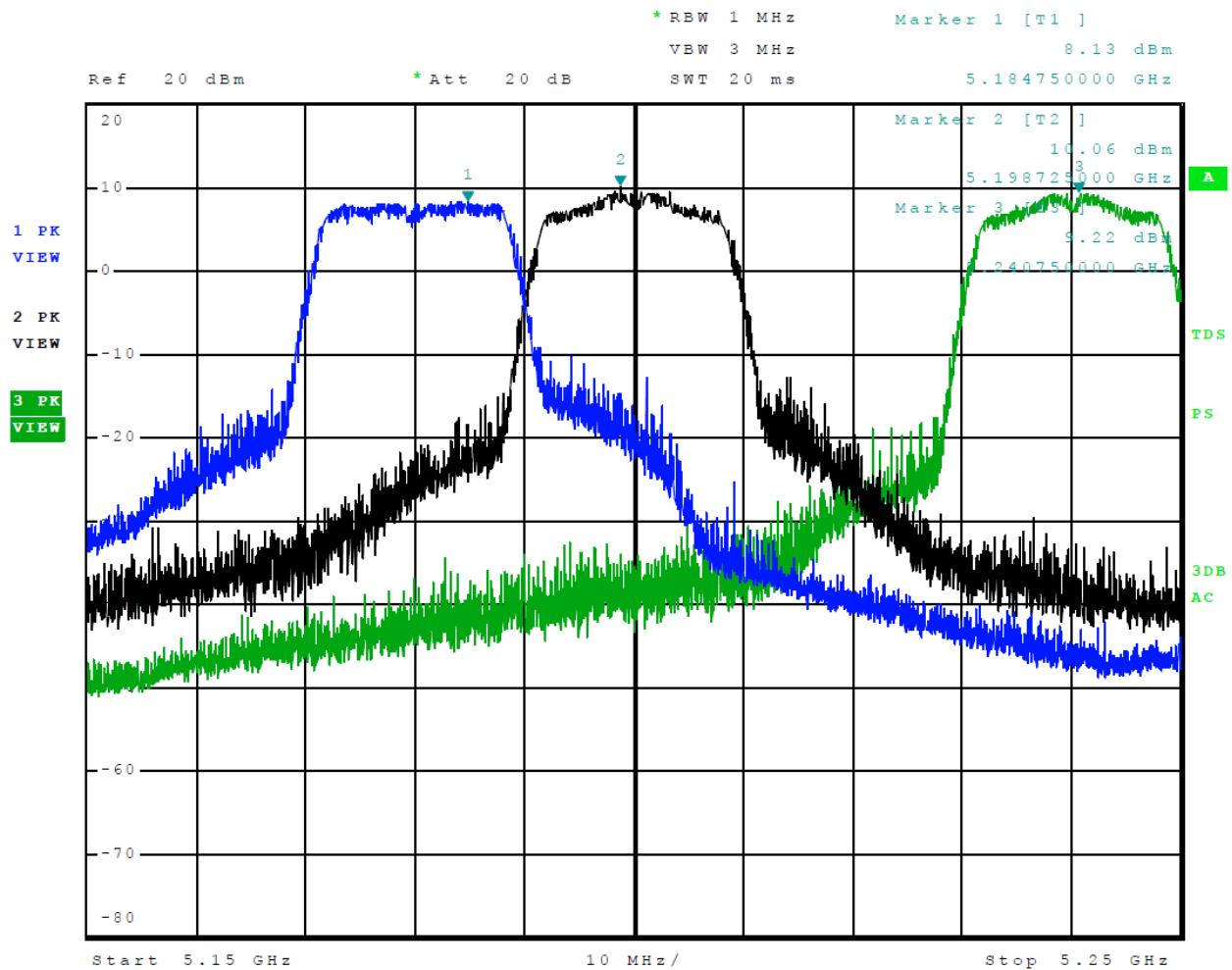


Figure 7 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)

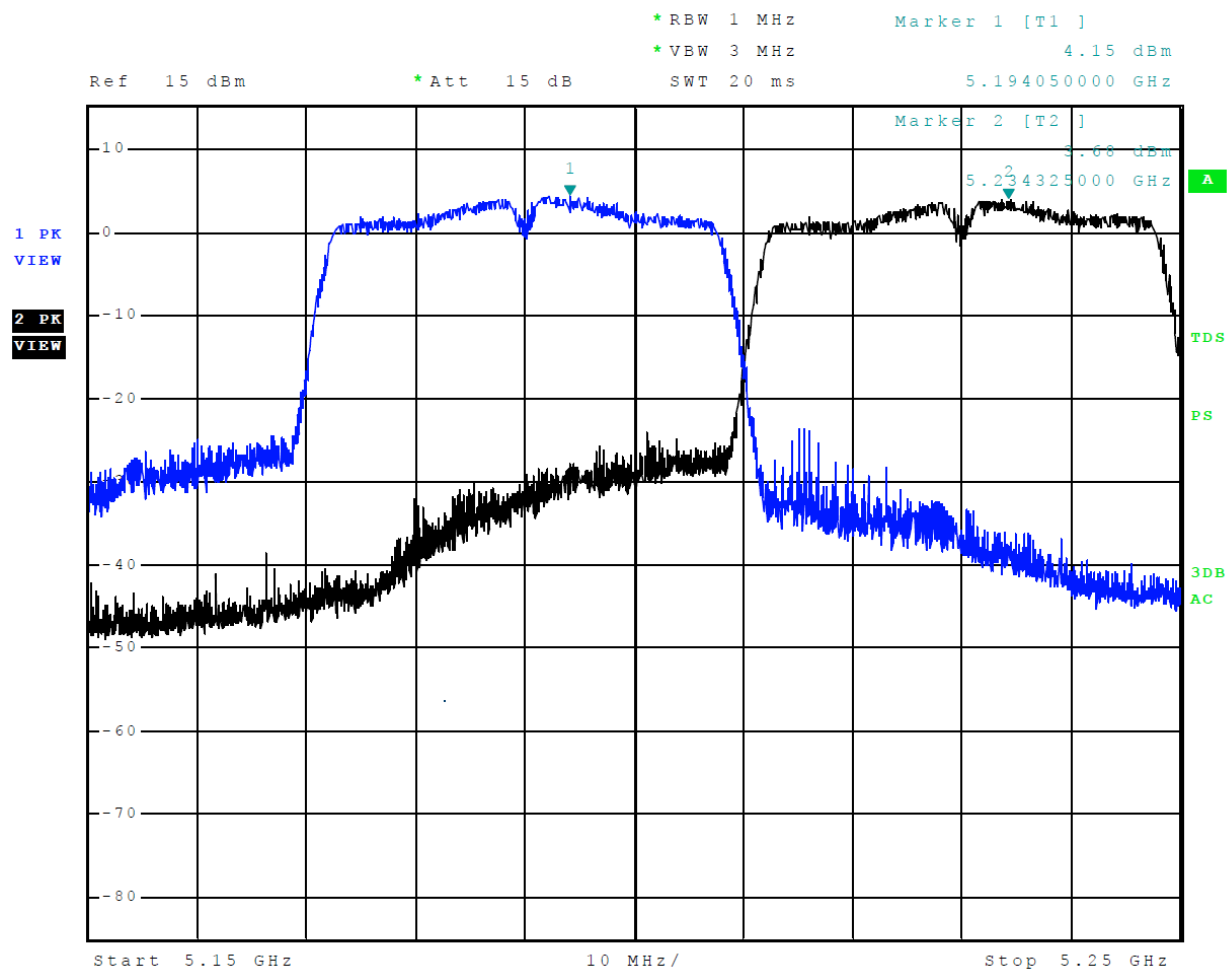


Figure 8 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)

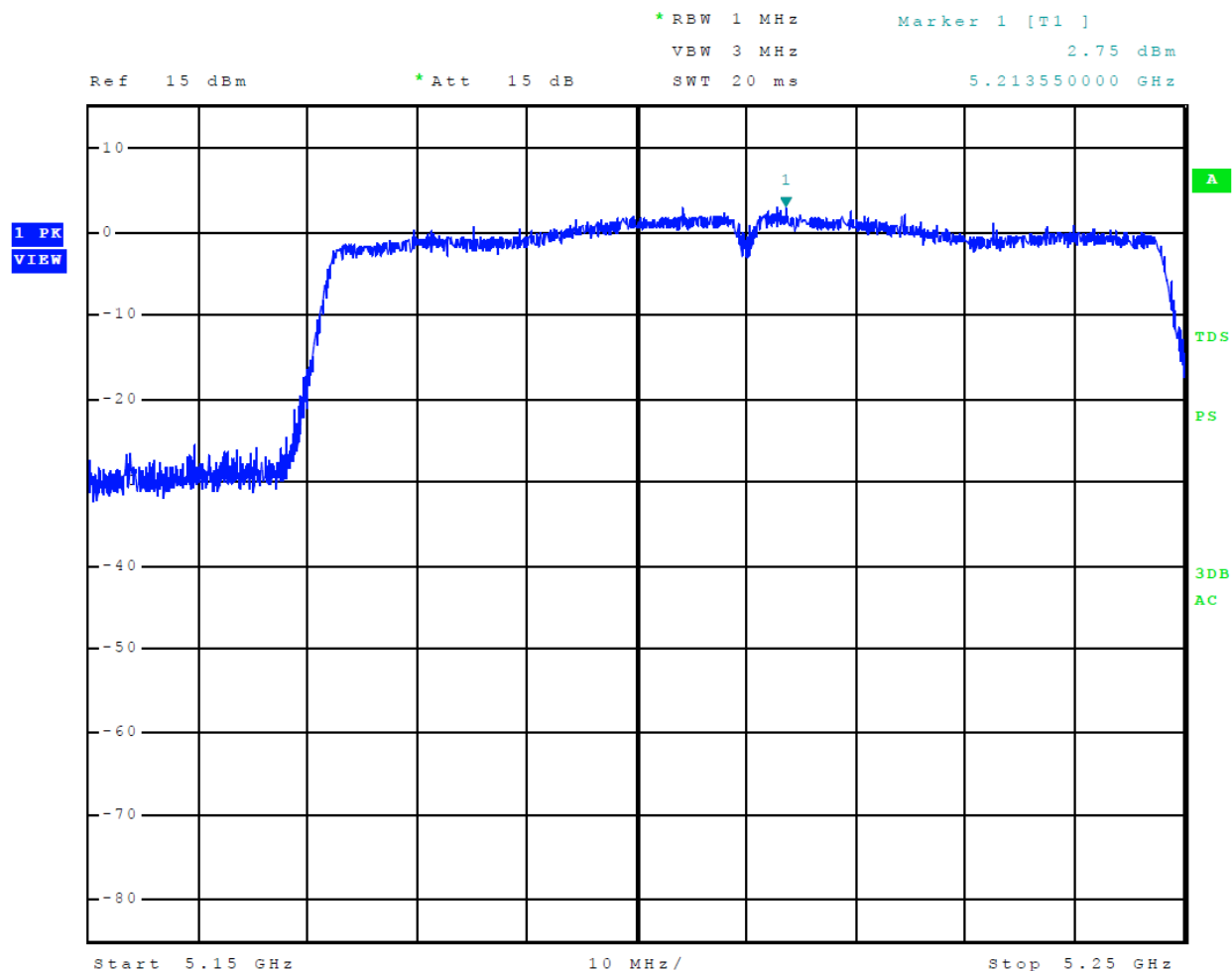


Figure 9 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 2, Mode 17 U-NII-1 (802.11a)

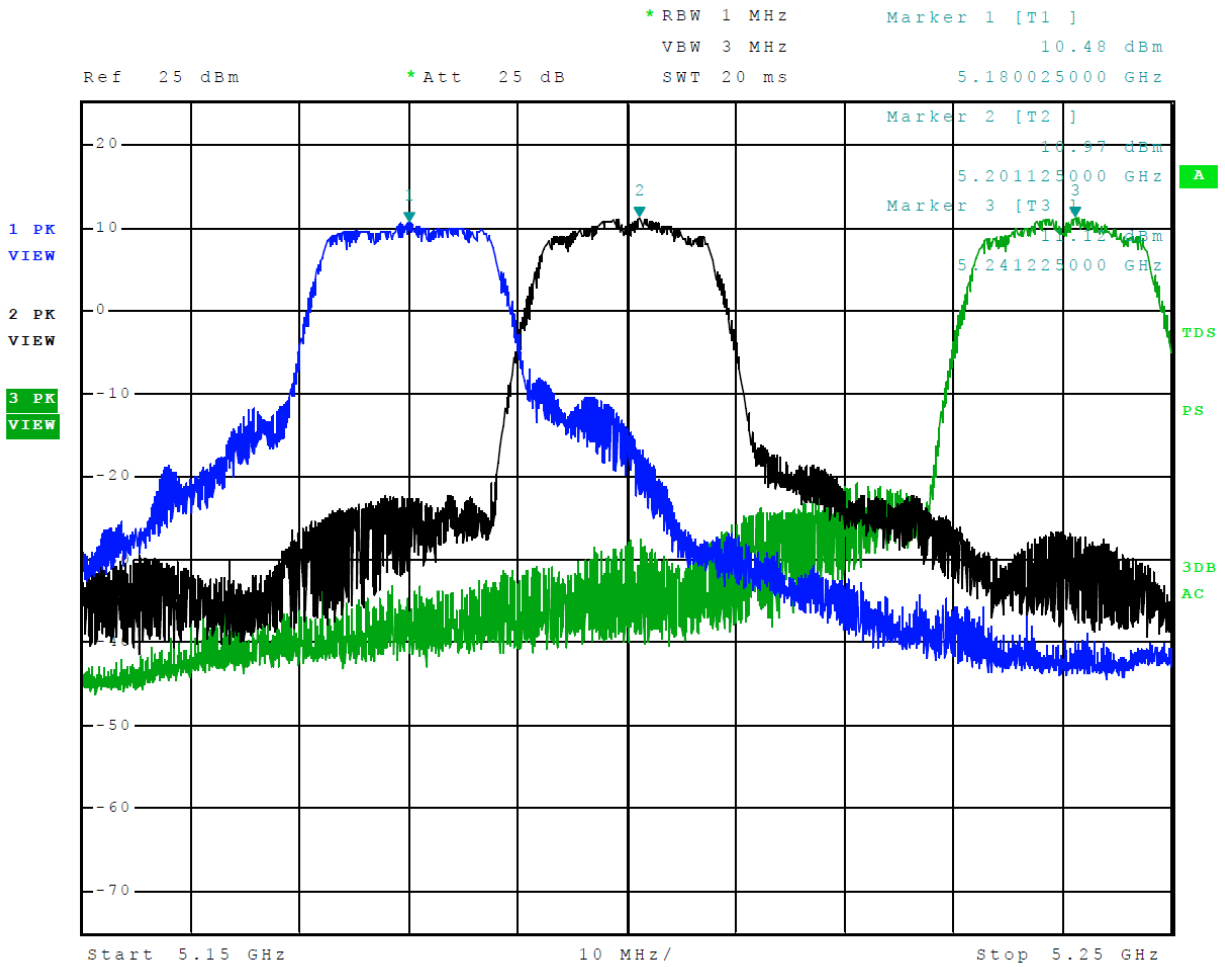


Figure 10 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 2, Mode 18 U-NII-1 (802.11n20)

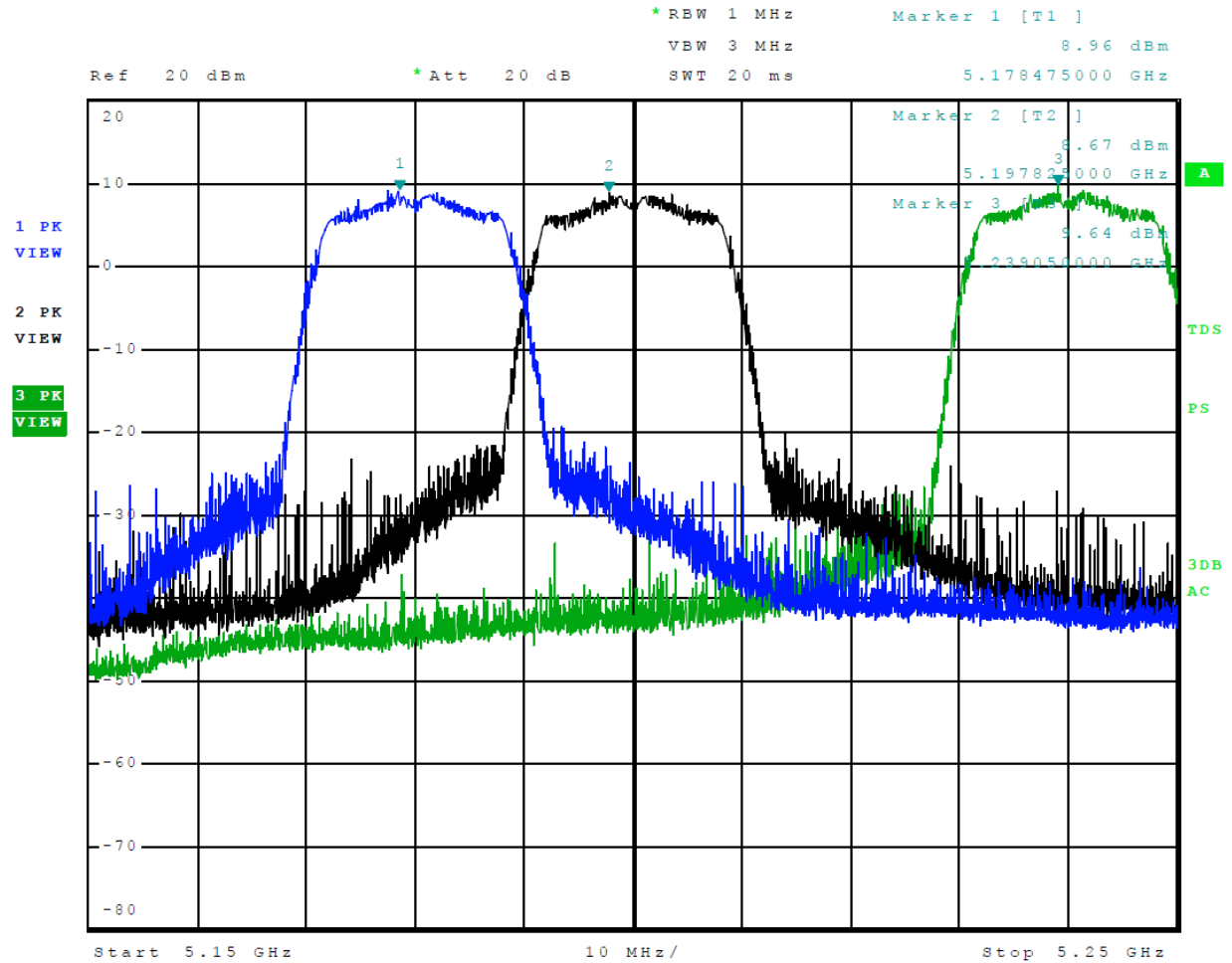


Figure 11 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 2, Mode 19 U-NII-1 (802.11n40)

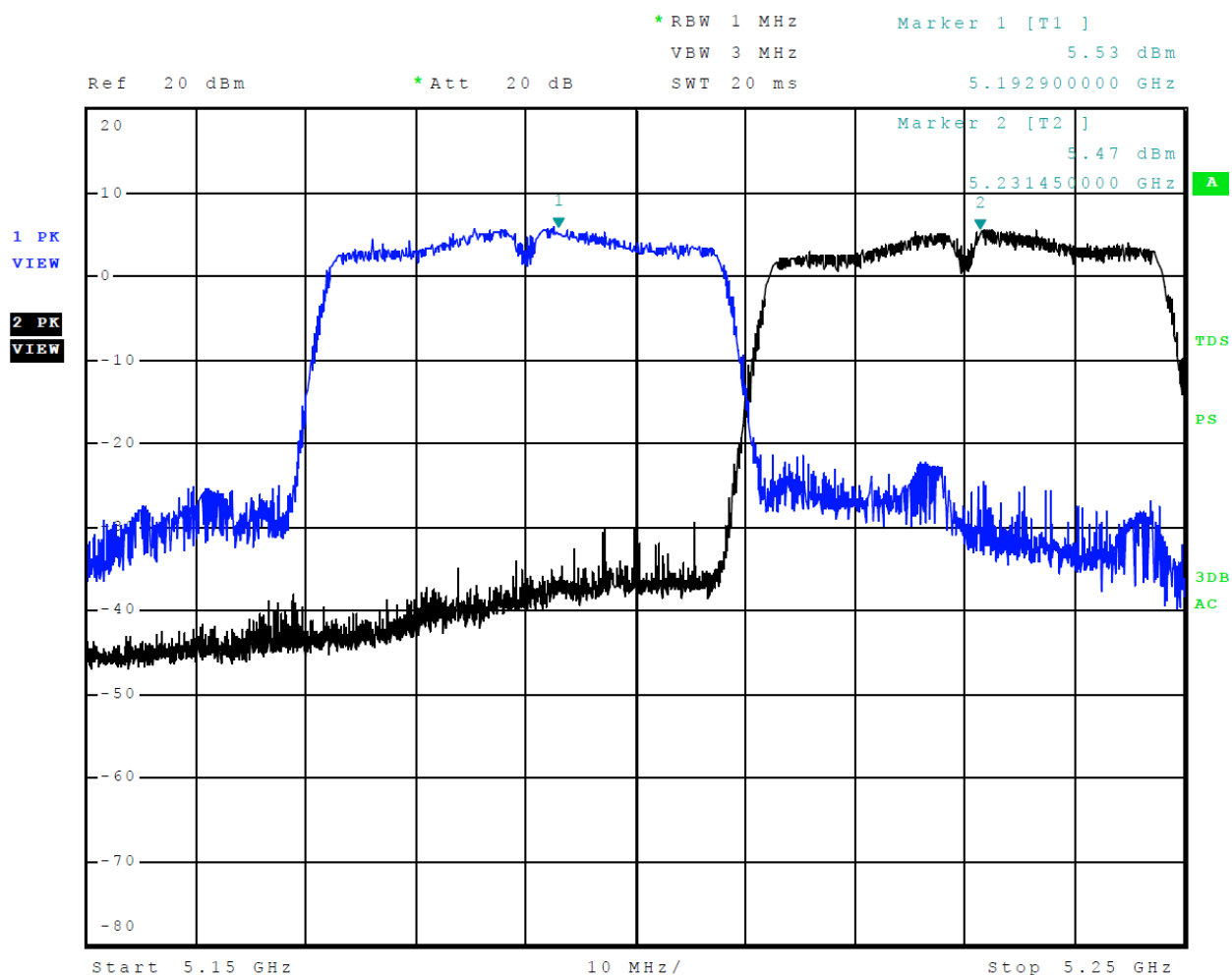


Figure 12 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 2, Mode 20 U-NII-1 (802.11ac20)

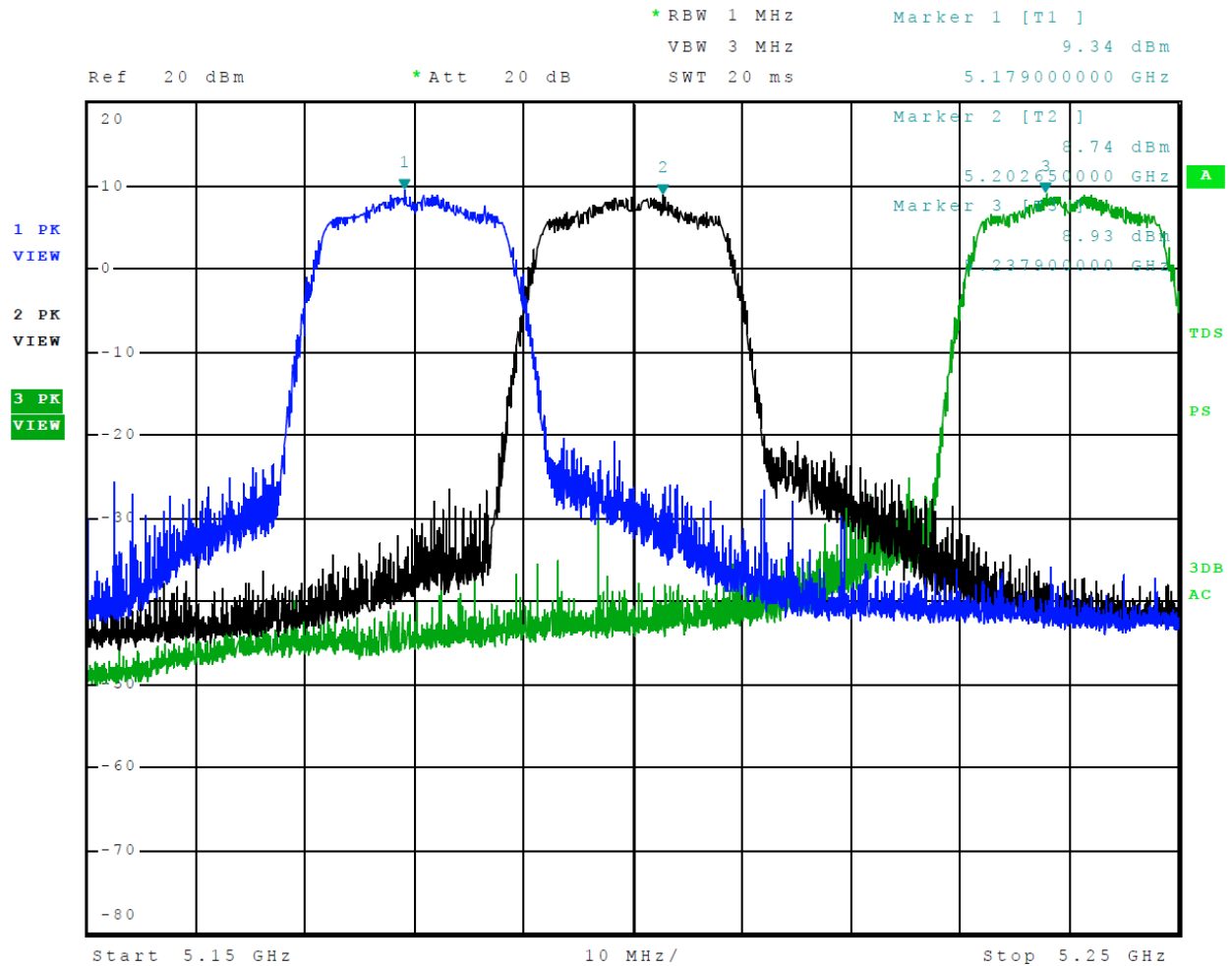


Figure 13 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 2, Mode 21 U-NII-1 (802.11ac40)

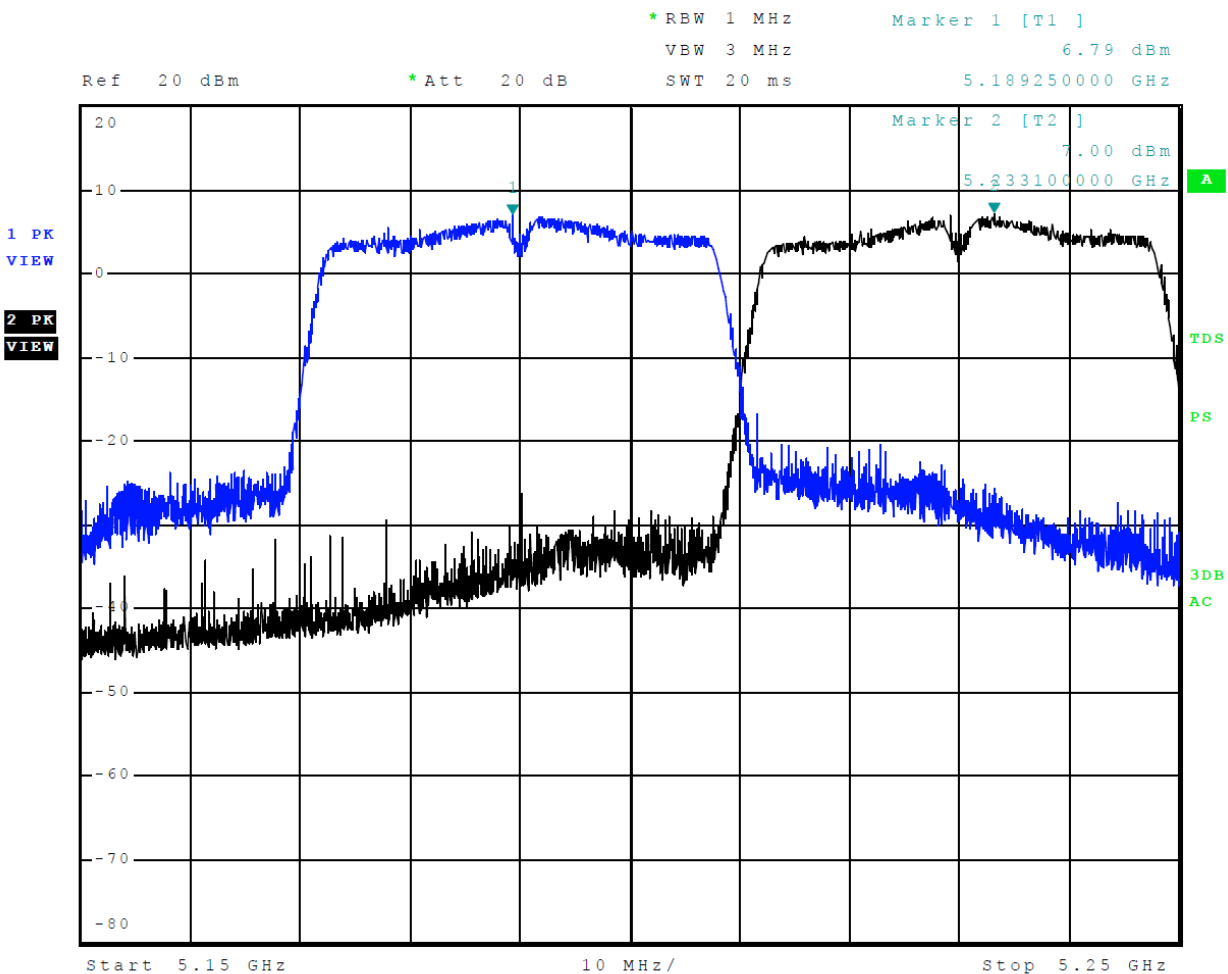


Figure 14 Plot of Transmitter Emissions Across 5150-5250 MHz Radio 2, Mode 22 U-NII-1 (802.11ac80)

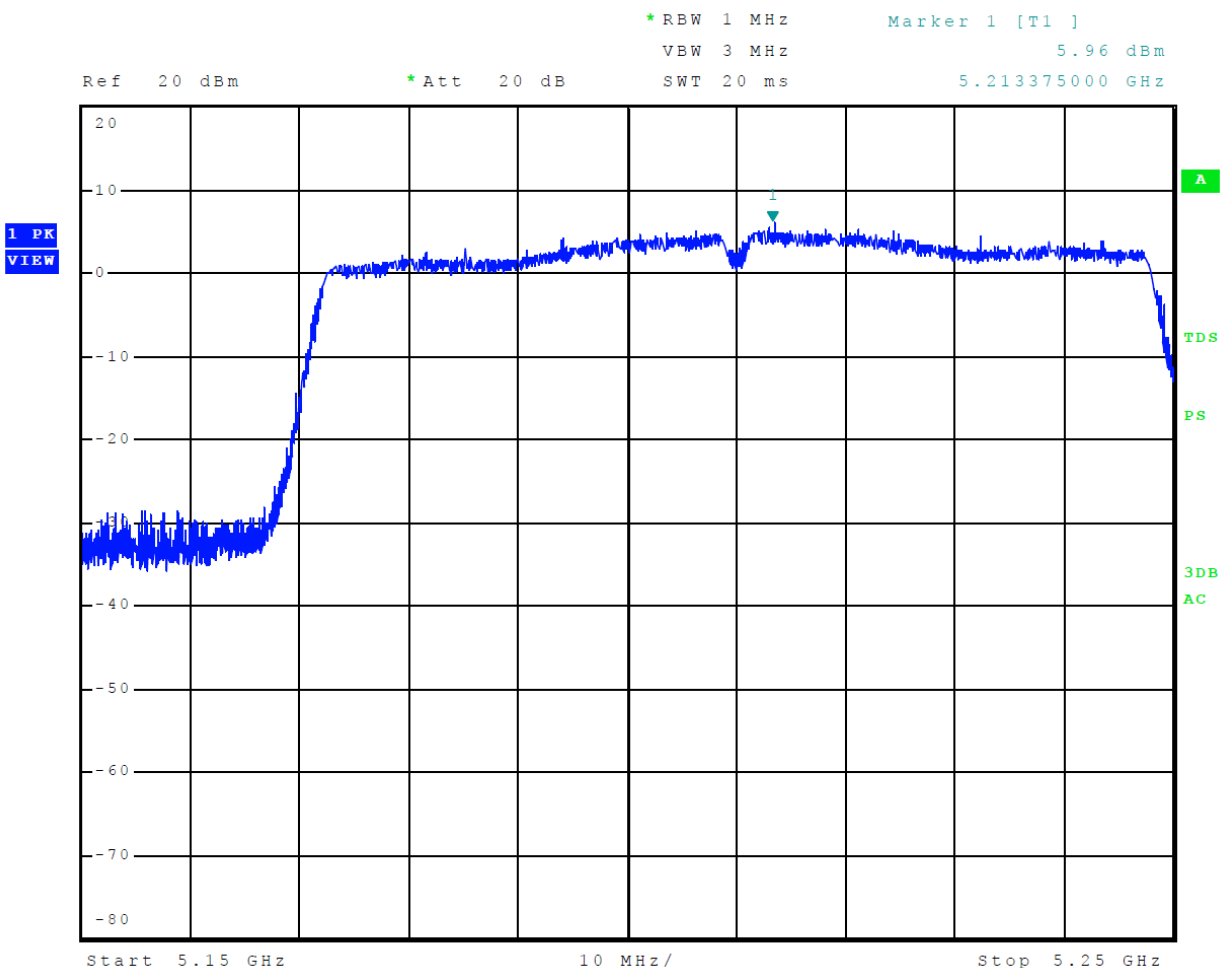


Figure 15 Plot of Lower Band Edge Across 5150-5250 MHz Radio 1, Mode 8 U-NII-1 (802.11a)

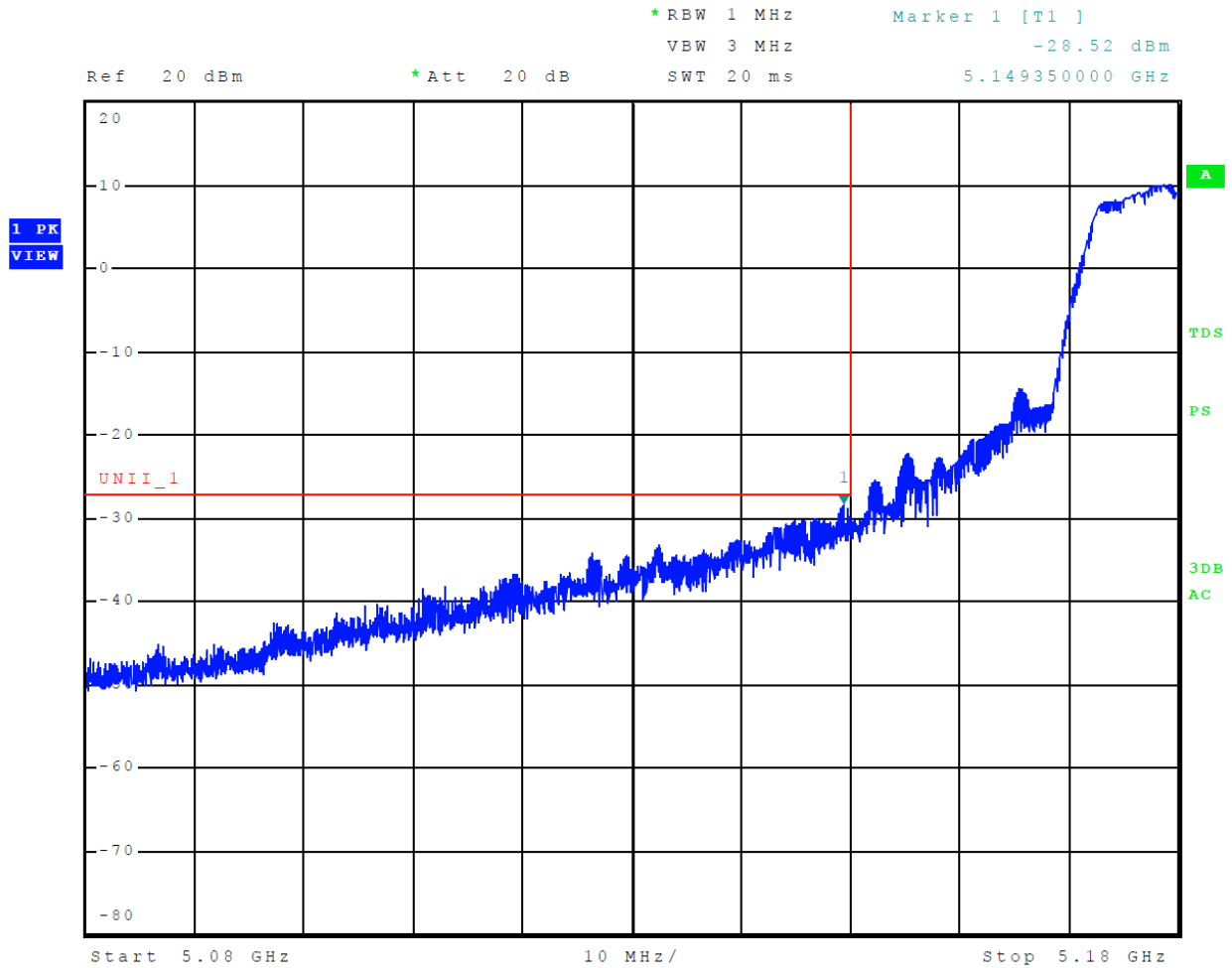


Figure 16 Plot of Lower Band Edge Across 5150-5250 MHz Radio 1, Mode 9 U-NII-1 (802.11n20)

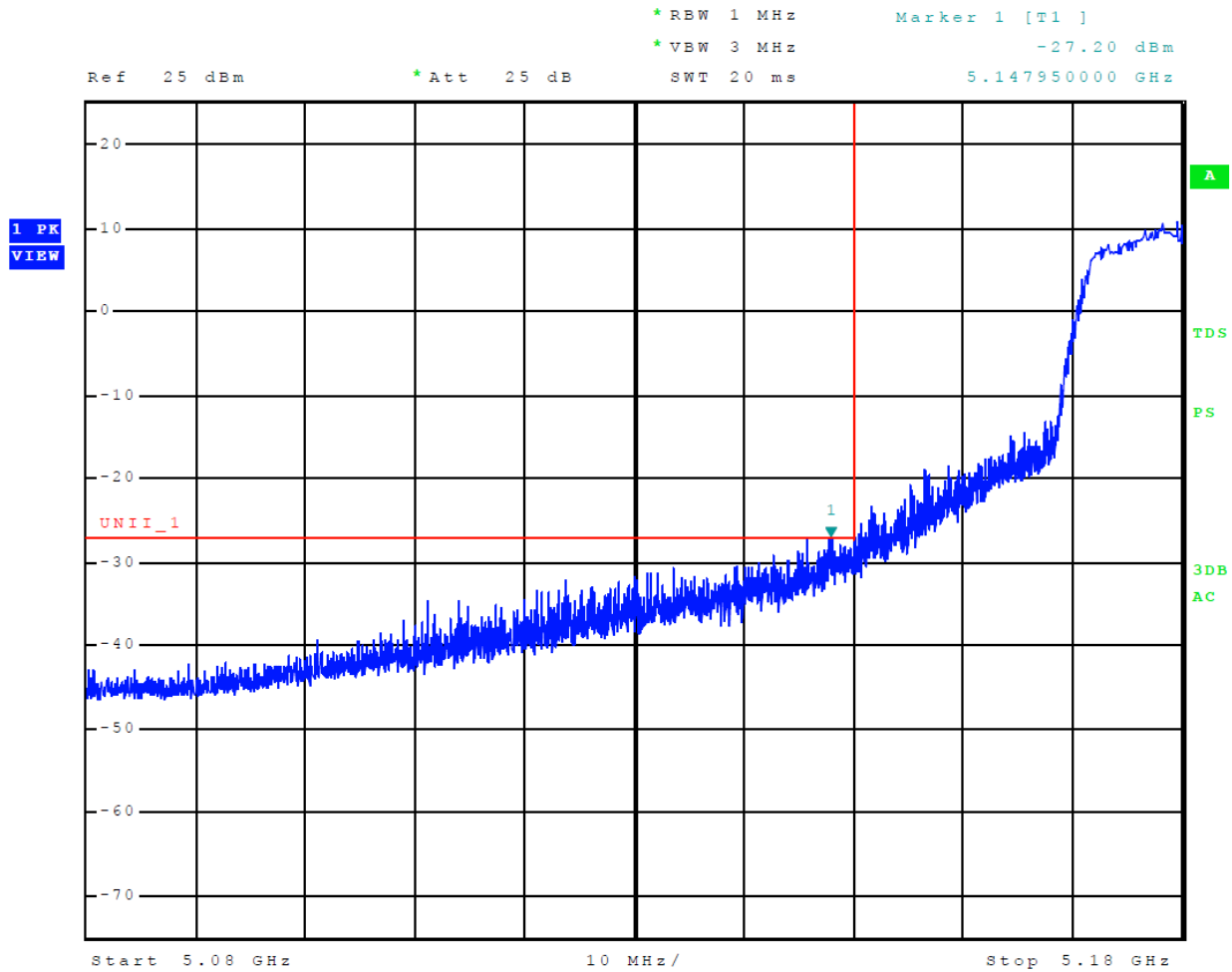


Figure 17 Plot of Lower Band Edge Across 5150-5250 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)

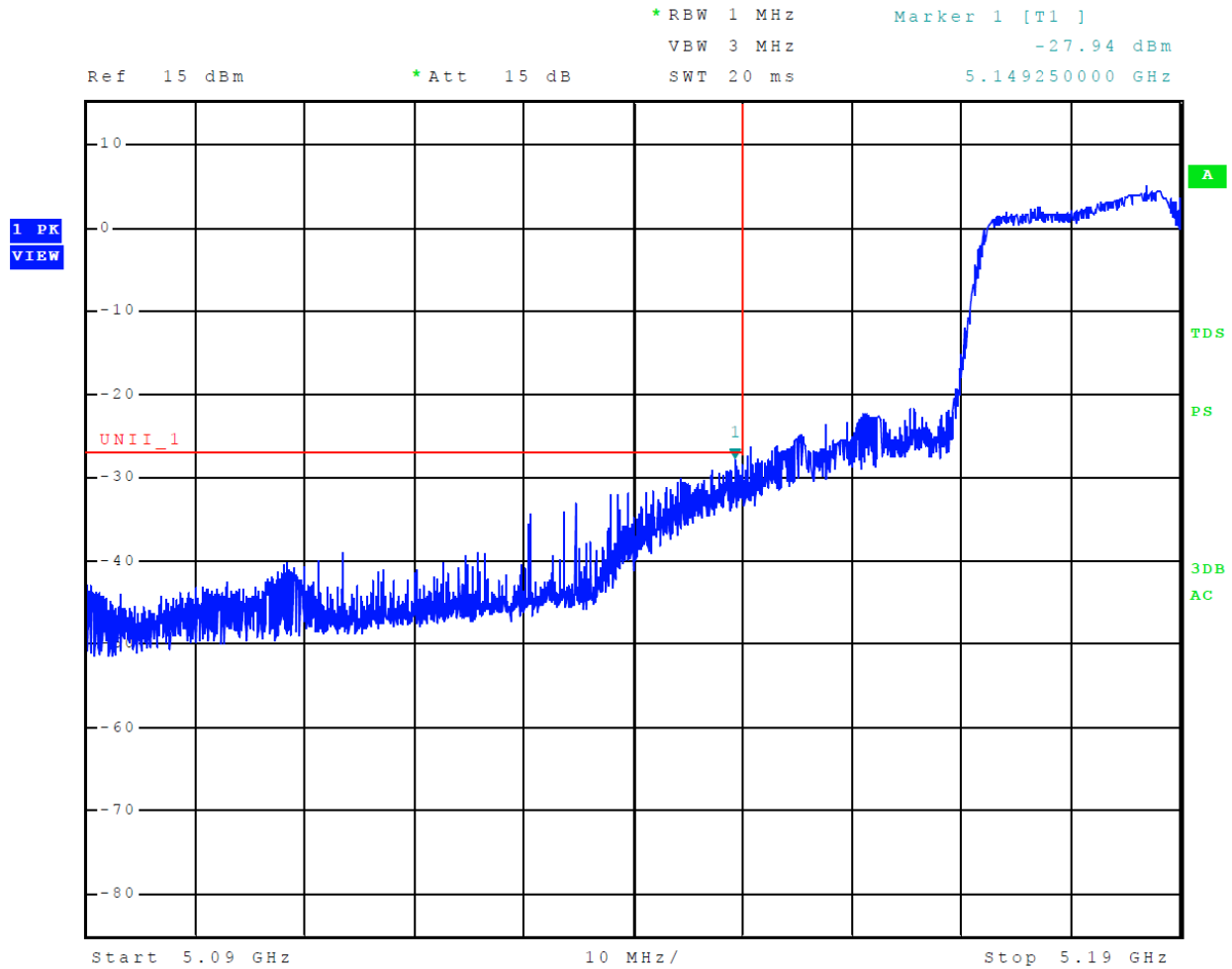


Figure 18 Plot of Lower Band Edge Across 5150-5250 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)

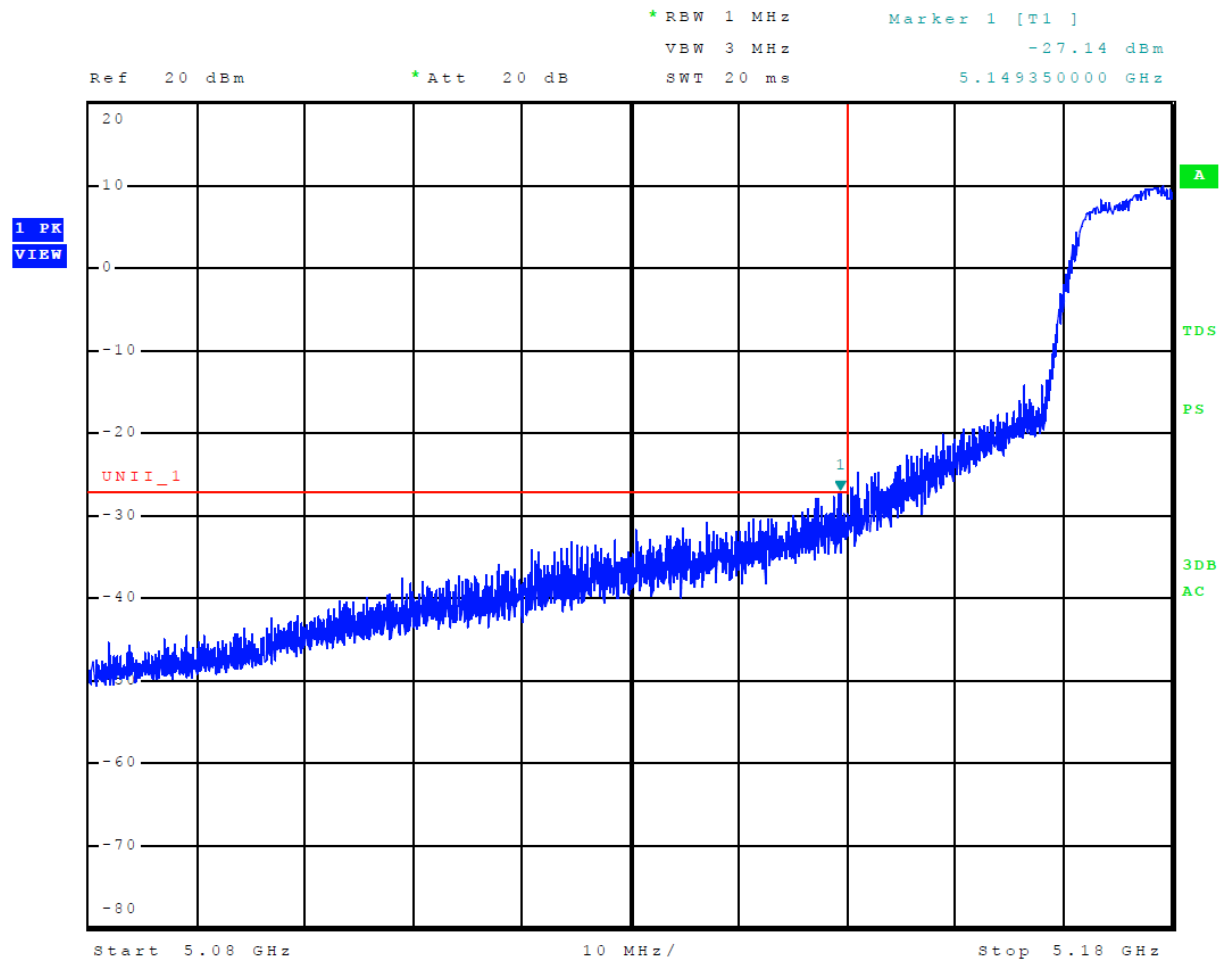


Figure 19 Plot of Lower Band Edge Across 5150-5250 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)

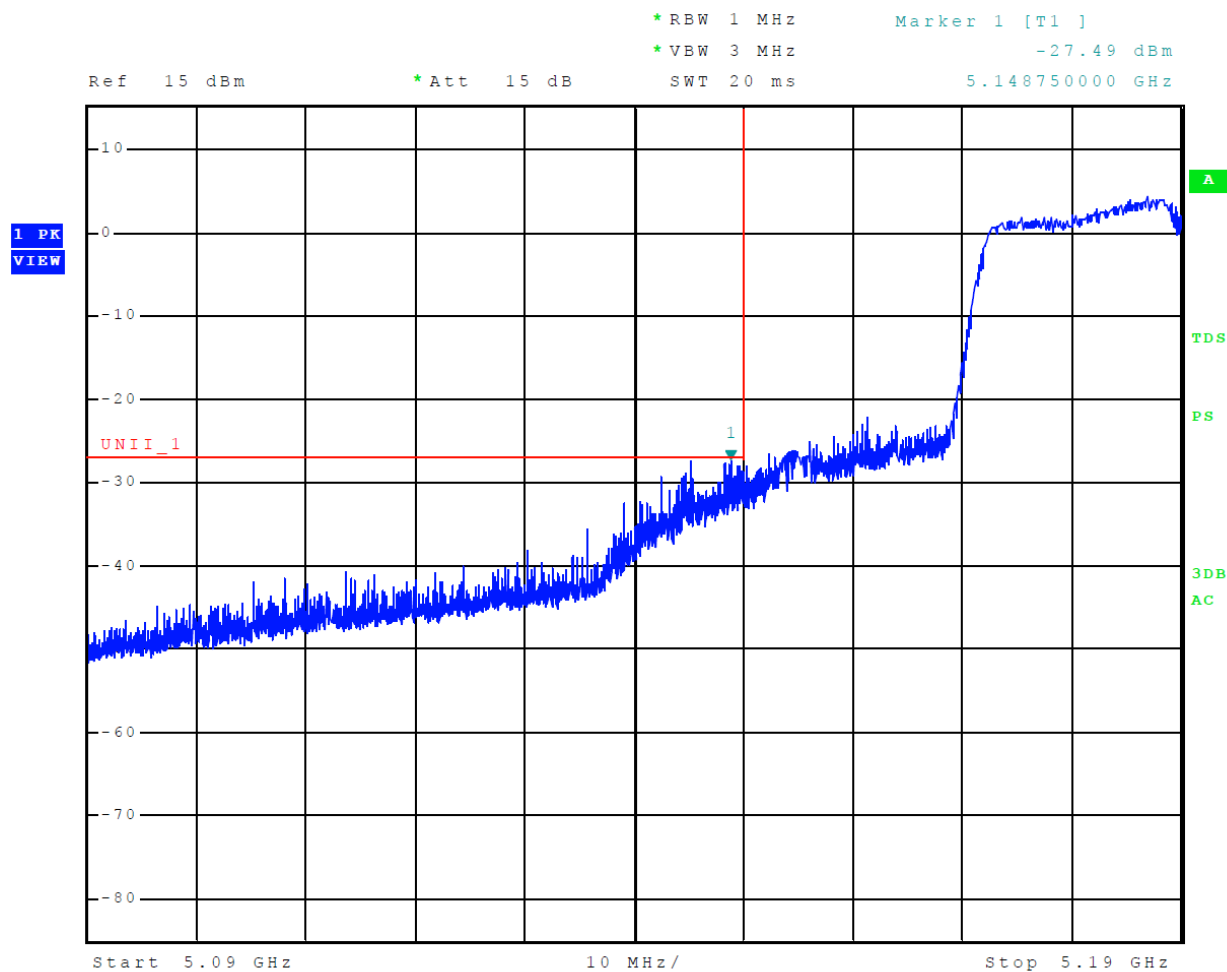


Figure 20 Plot of Lower Band Edge Across 5150-5250 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)

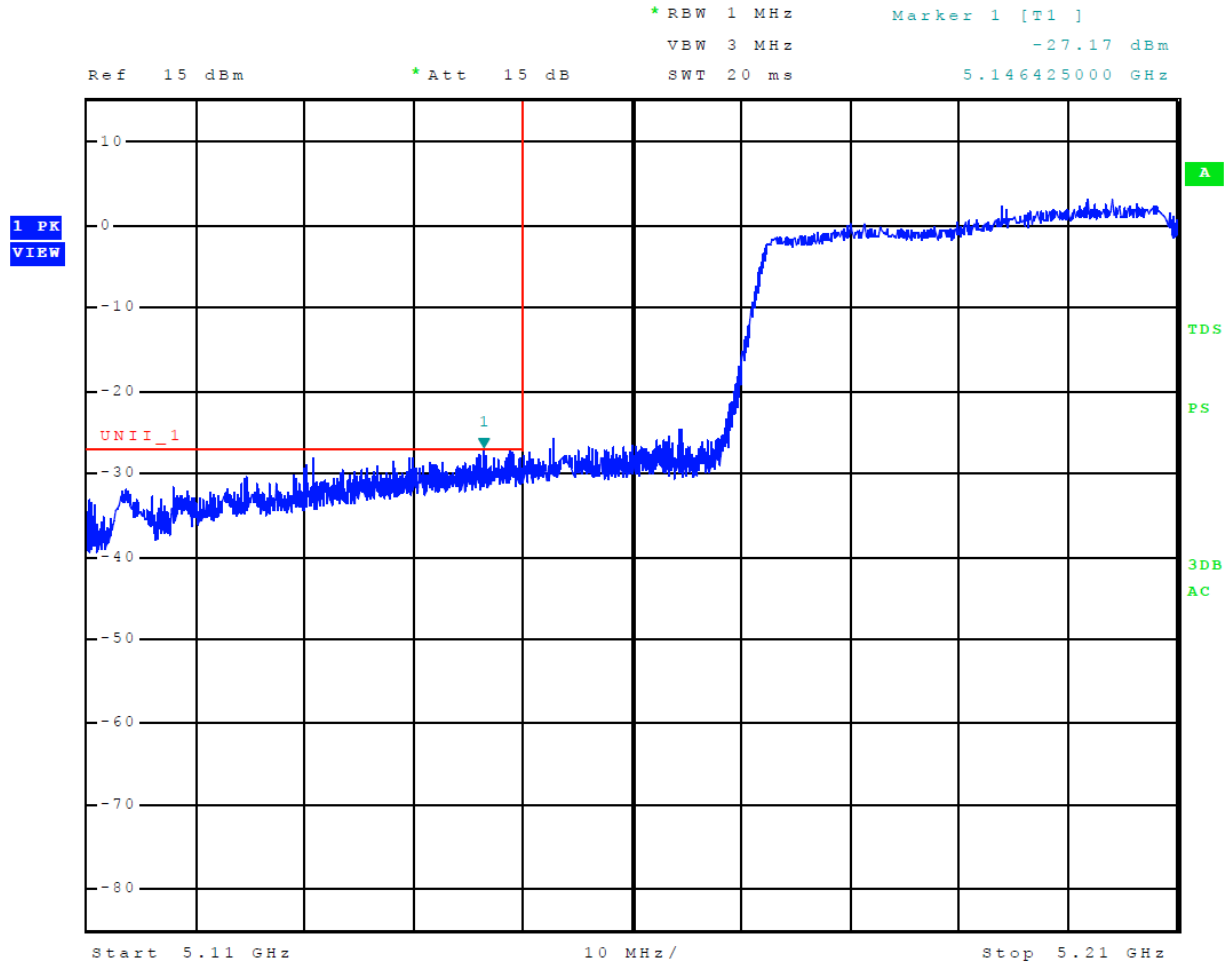


Figure 21 Plot of Lower Band Edge Across 5150-5250 MHz Radio 2, Mode 17 U-NII-1 (802.11a)

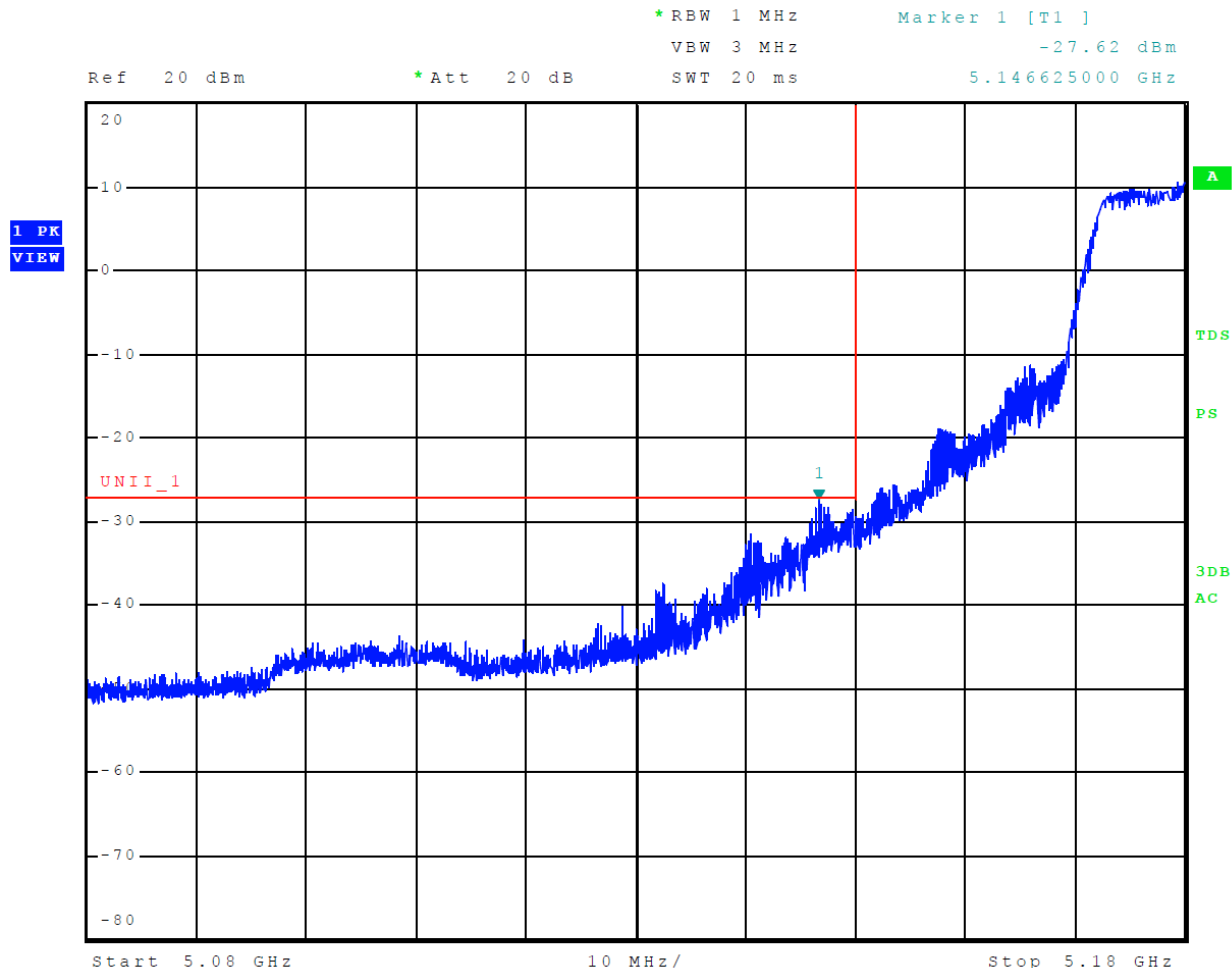


Figure 22 Plot of Lower Band Edge Across 5150-5250 MHz Radio 2, Mode 18 U-NII-1 (802.11n20)

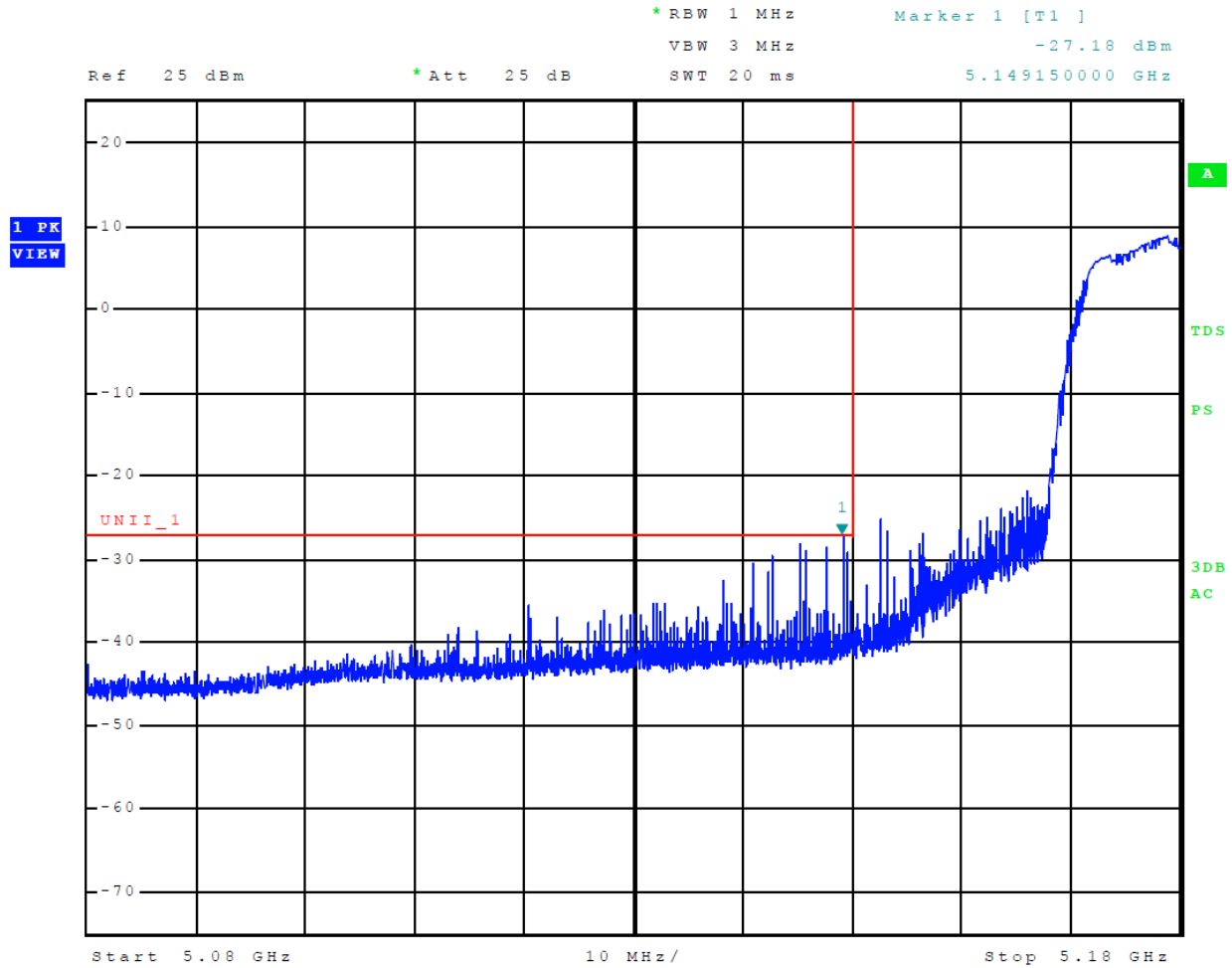


Figure 23 Plot of Lower Band Edge Across 5150-5250 MHz Radio 2, Mode 19 U-NII-1 (802.11n40)

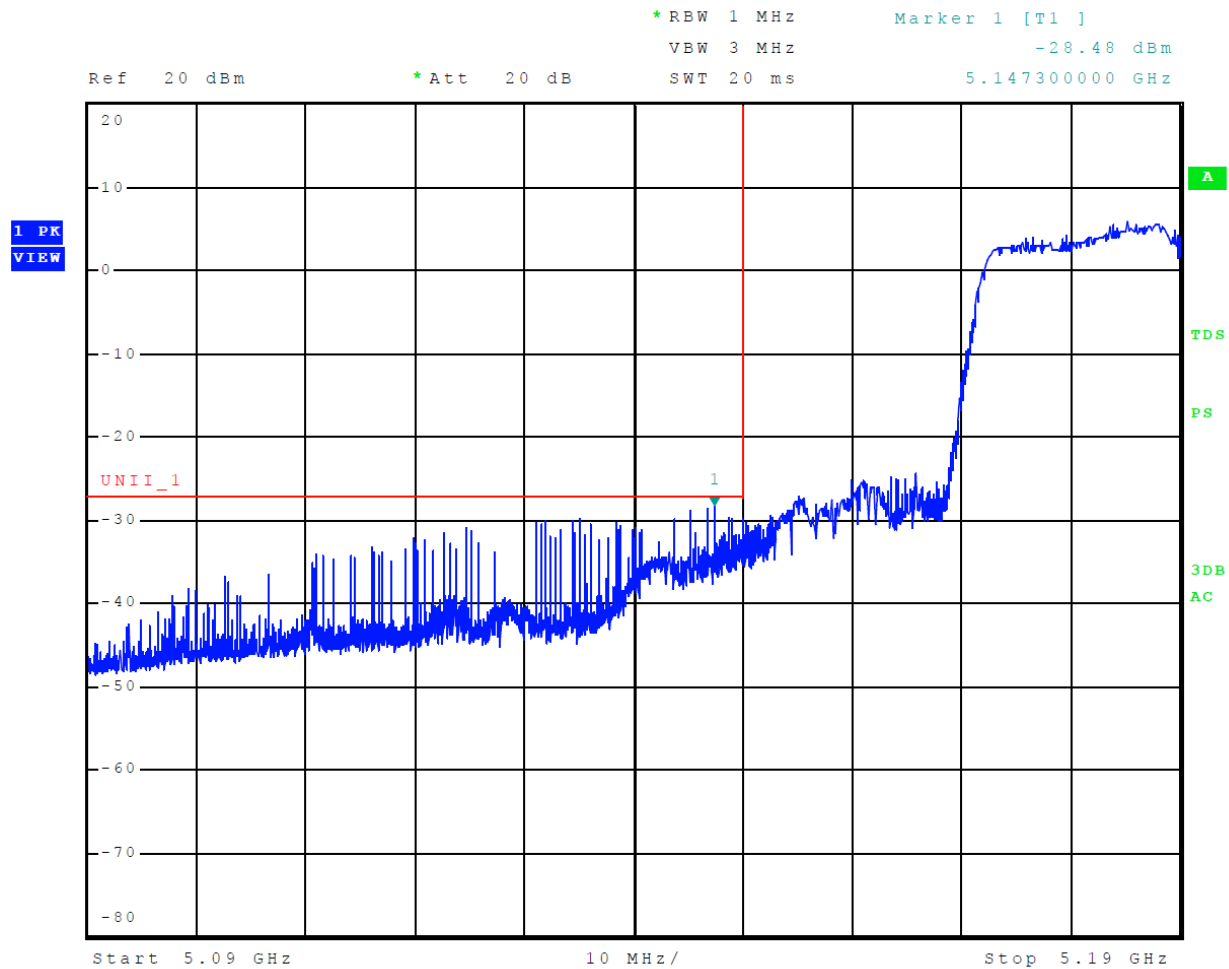


Figure 24 Plot of Lower Band Edge Across 5150-5250 MHz Radio 2, Mode 20 U-NII-1 (802.11ac20)

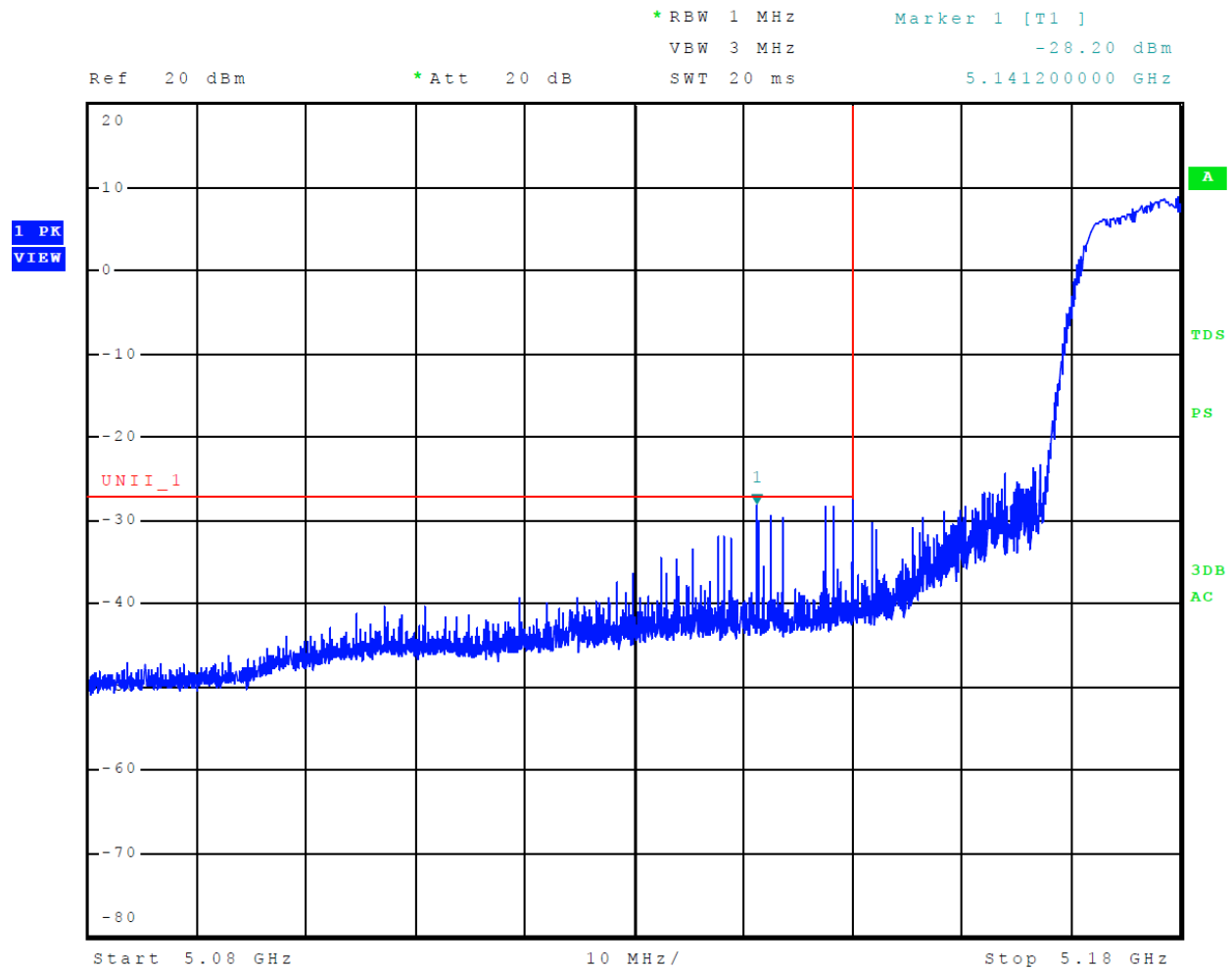


Figure 25A Plot of Lower Band Edge Across 5150-5250 MHz Radio 2, Mode 21 U-NII-1 (802.11ac40)

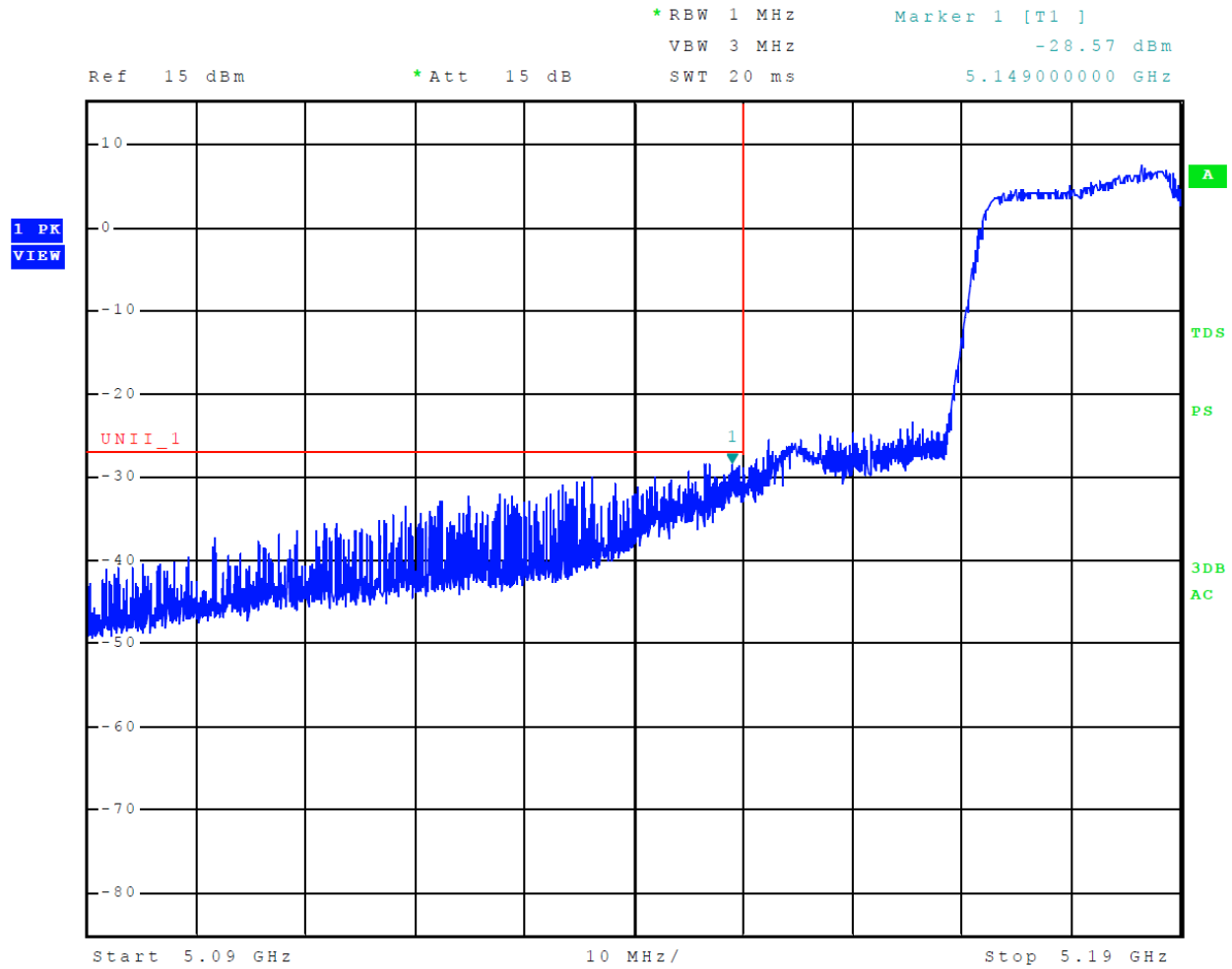


Figure 25B Plot of Lower Band Edge Across 5150-5250 MHz Radio 2, Mode 22 U-NII-1 (802.11ac80)

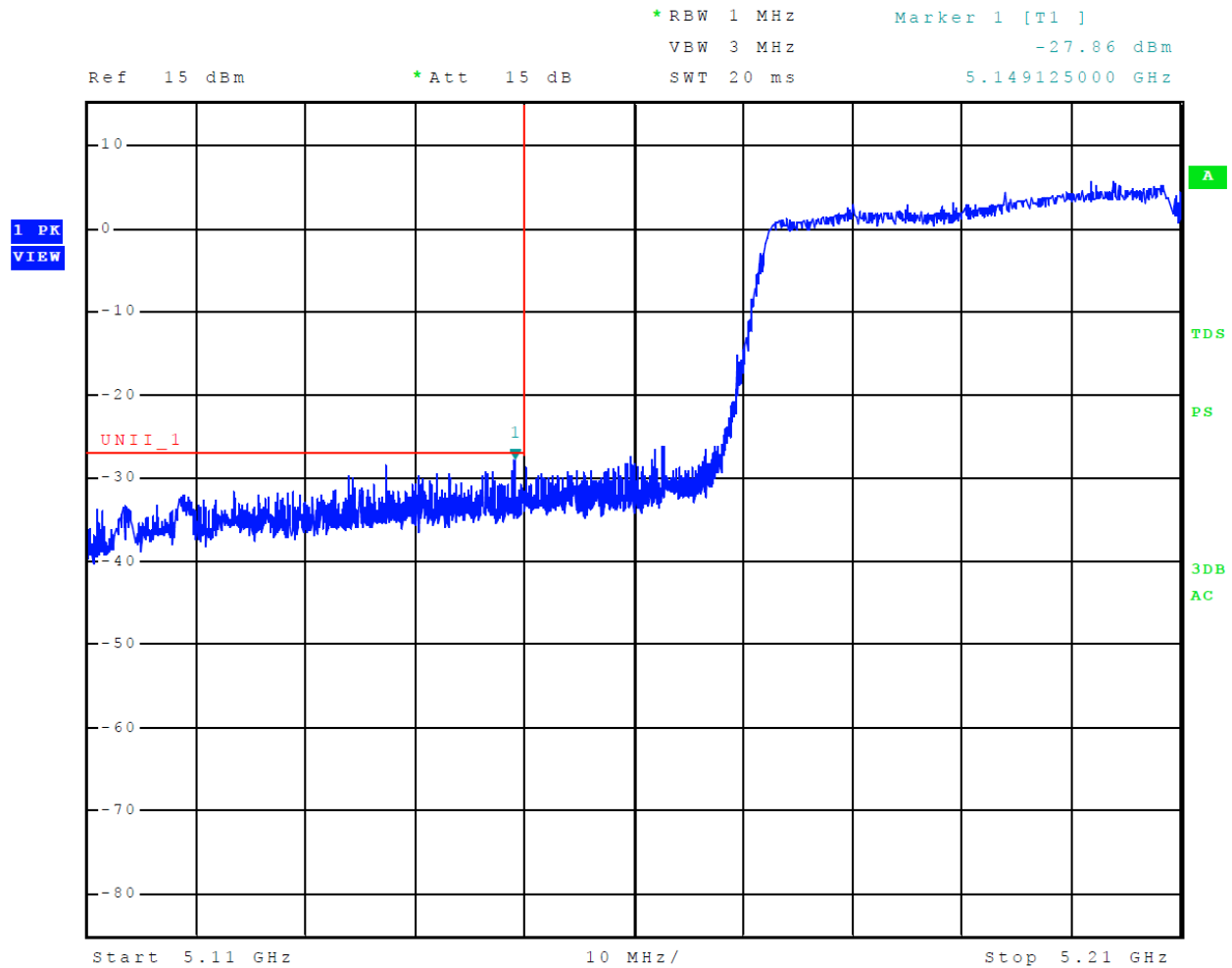


Figure 26 Plot of Upper Band Edge Across 5150-5250 MHz Radio 1, Mode 8 U-NII-1 (802.11a)

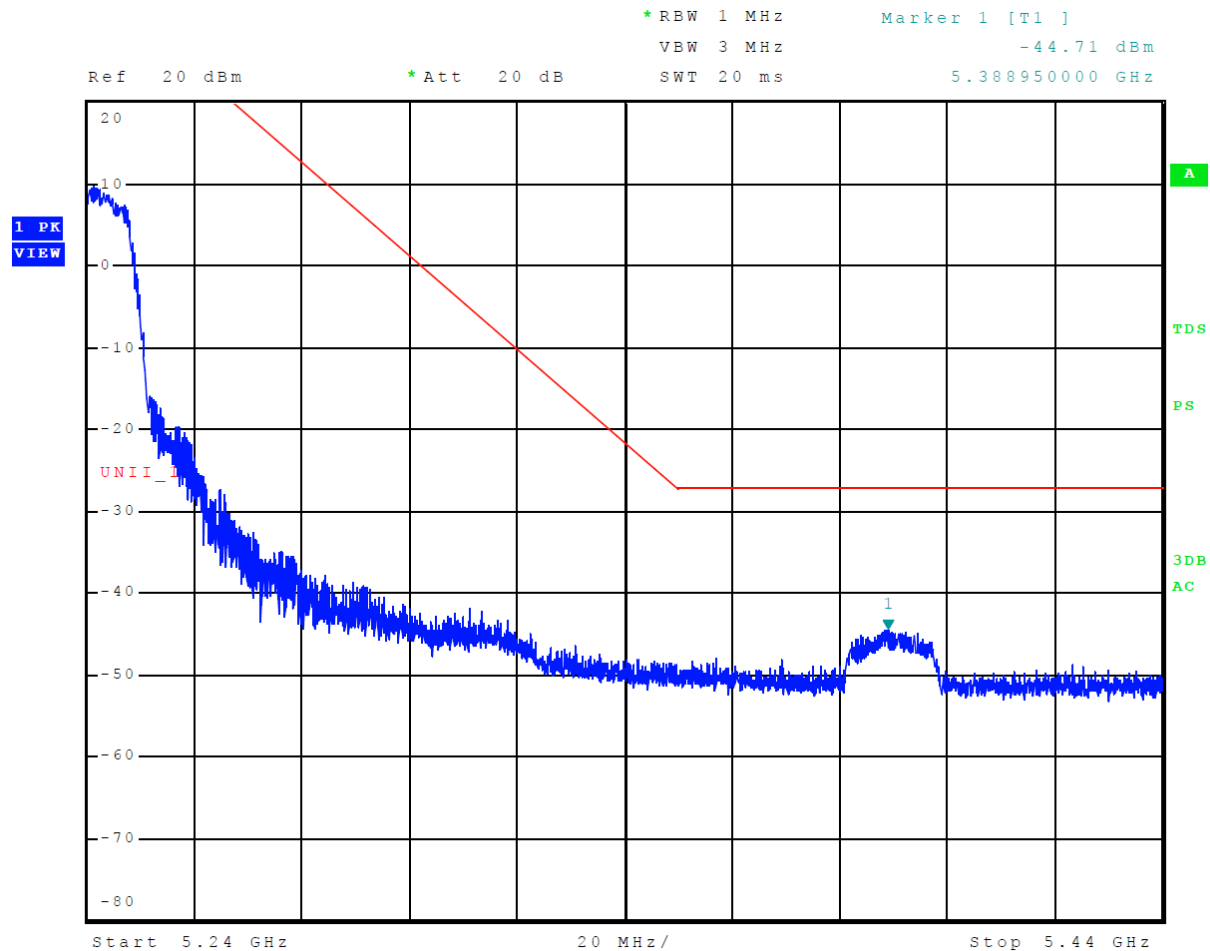


Figure 27 Plot of Upper Band Edge Across 5150-5250 MHz Radio 1, Mode 9 U-NII-1 (802.11n20)

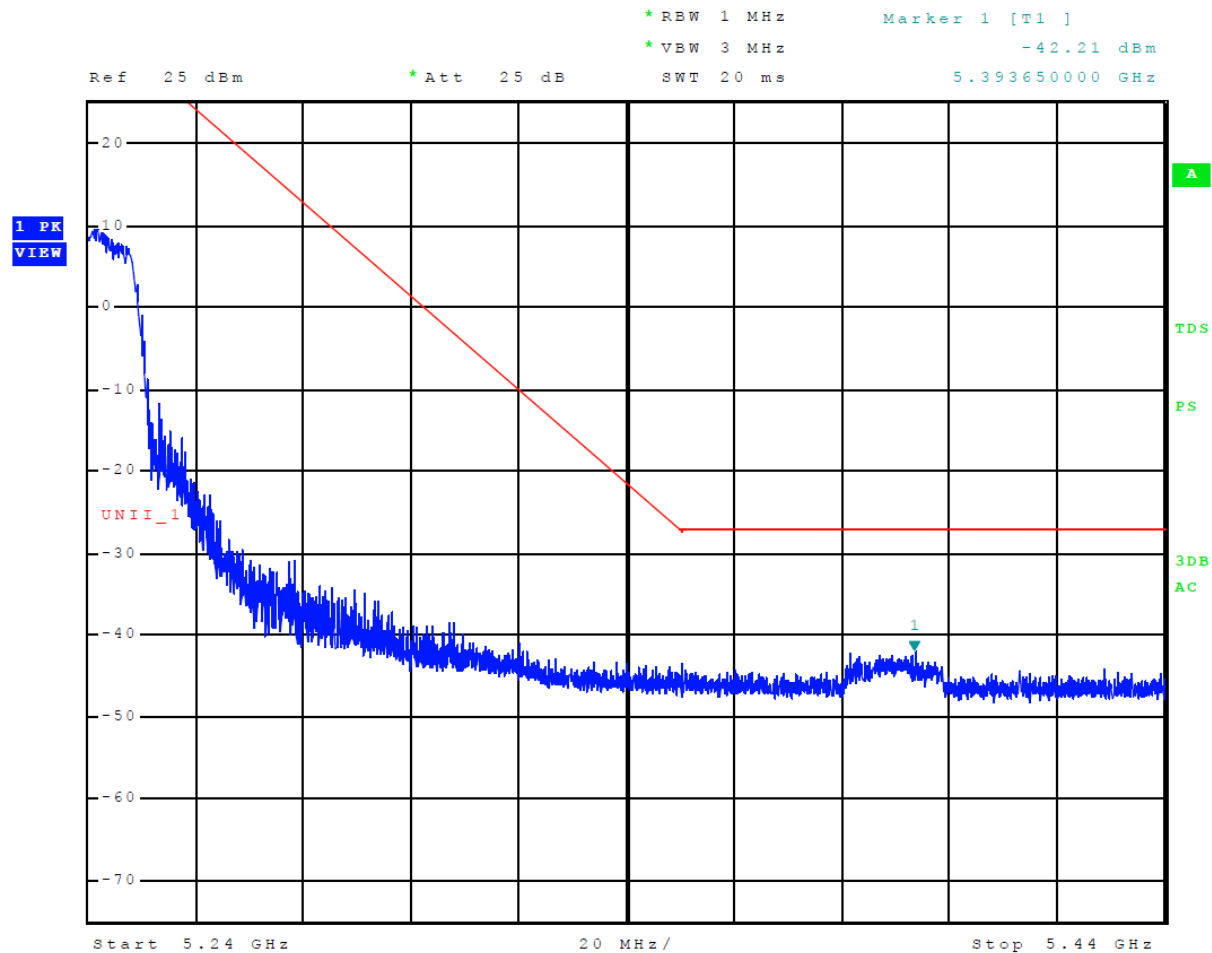


Figure 28 Plot of Upper Band Edge Across 5150-5250 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)

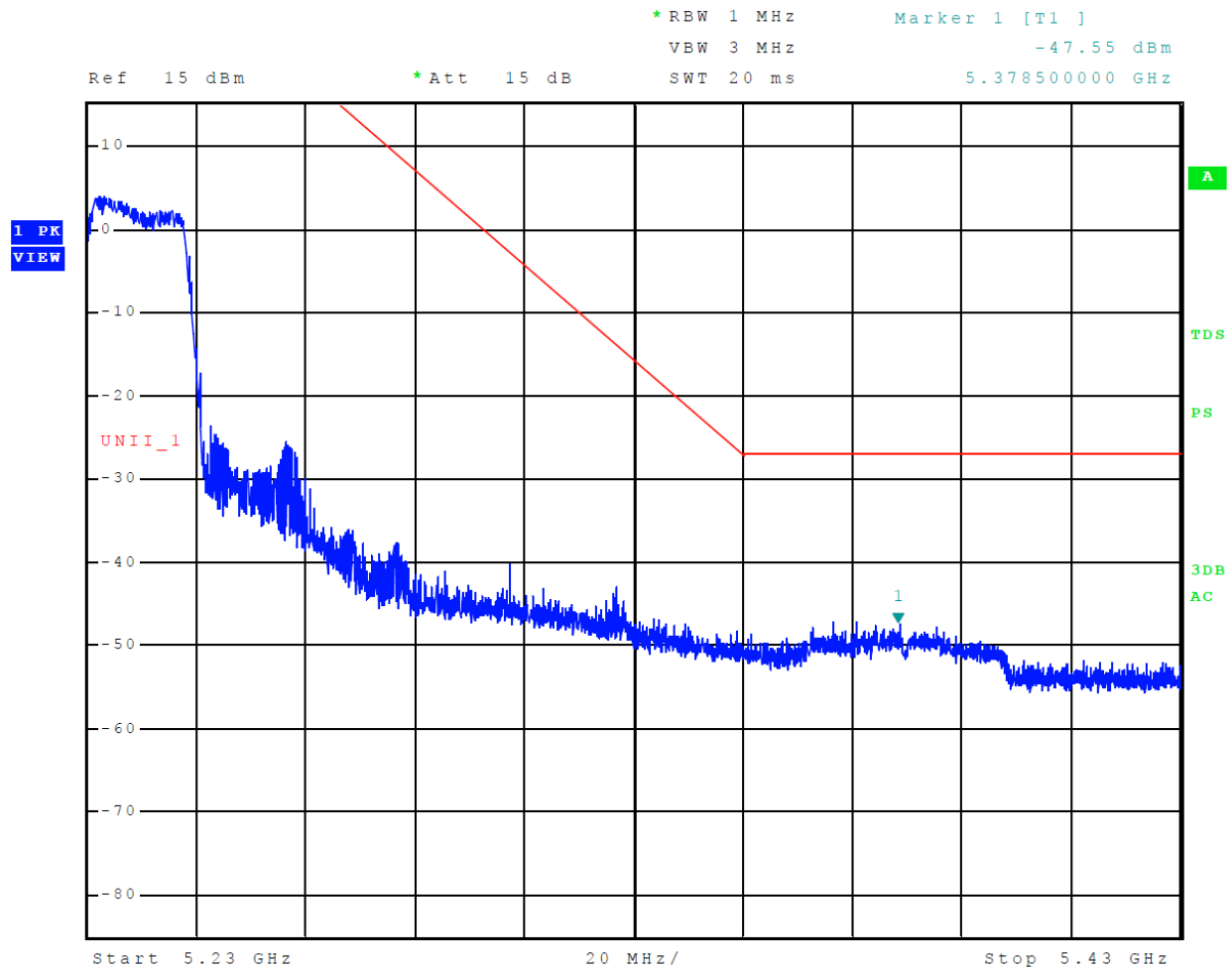


Figure 29 Plot of Upper Band Edge Across 5150-5250 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)

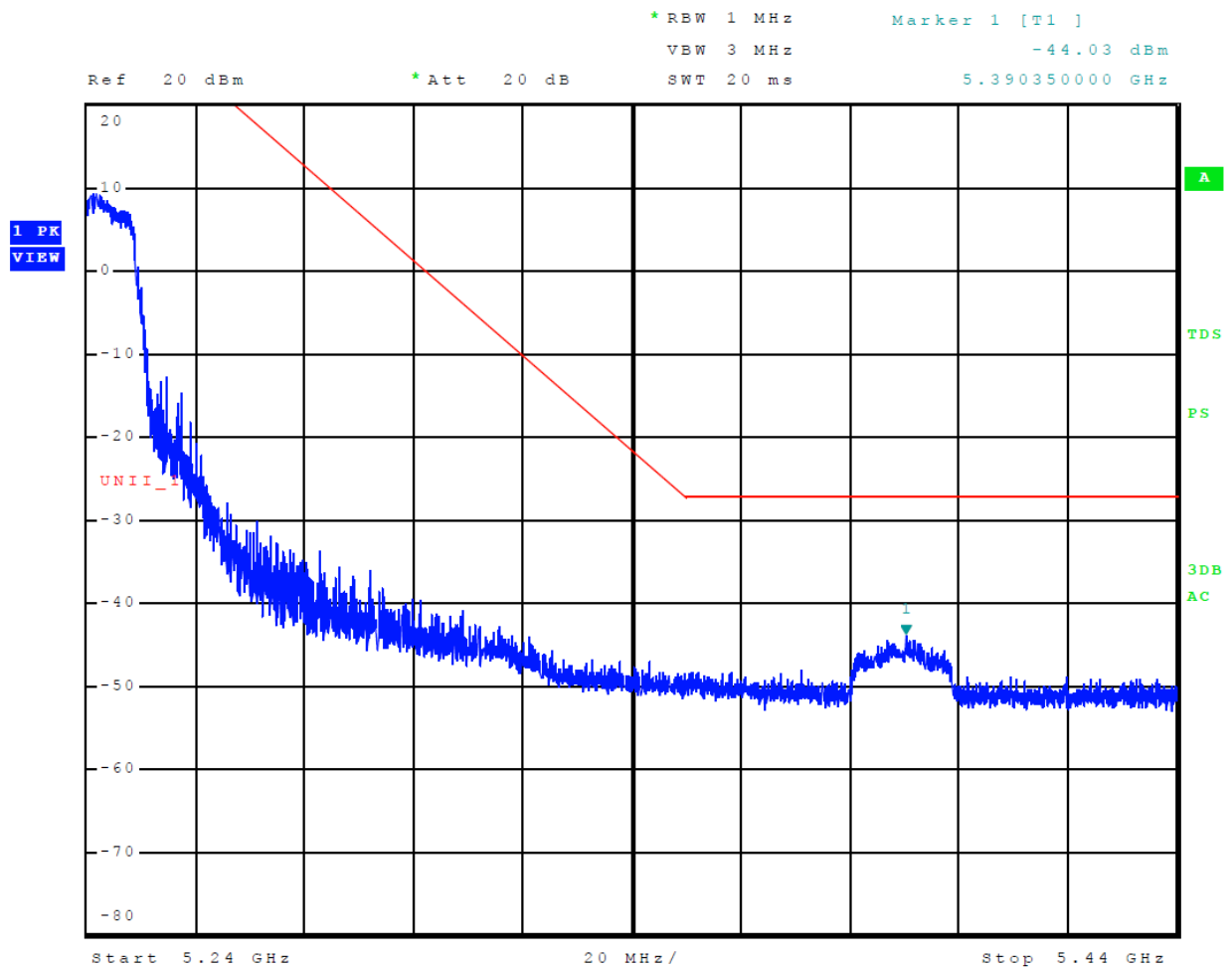


Figure 30 Plot of Upper Band Edge Across 5150-5250 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)

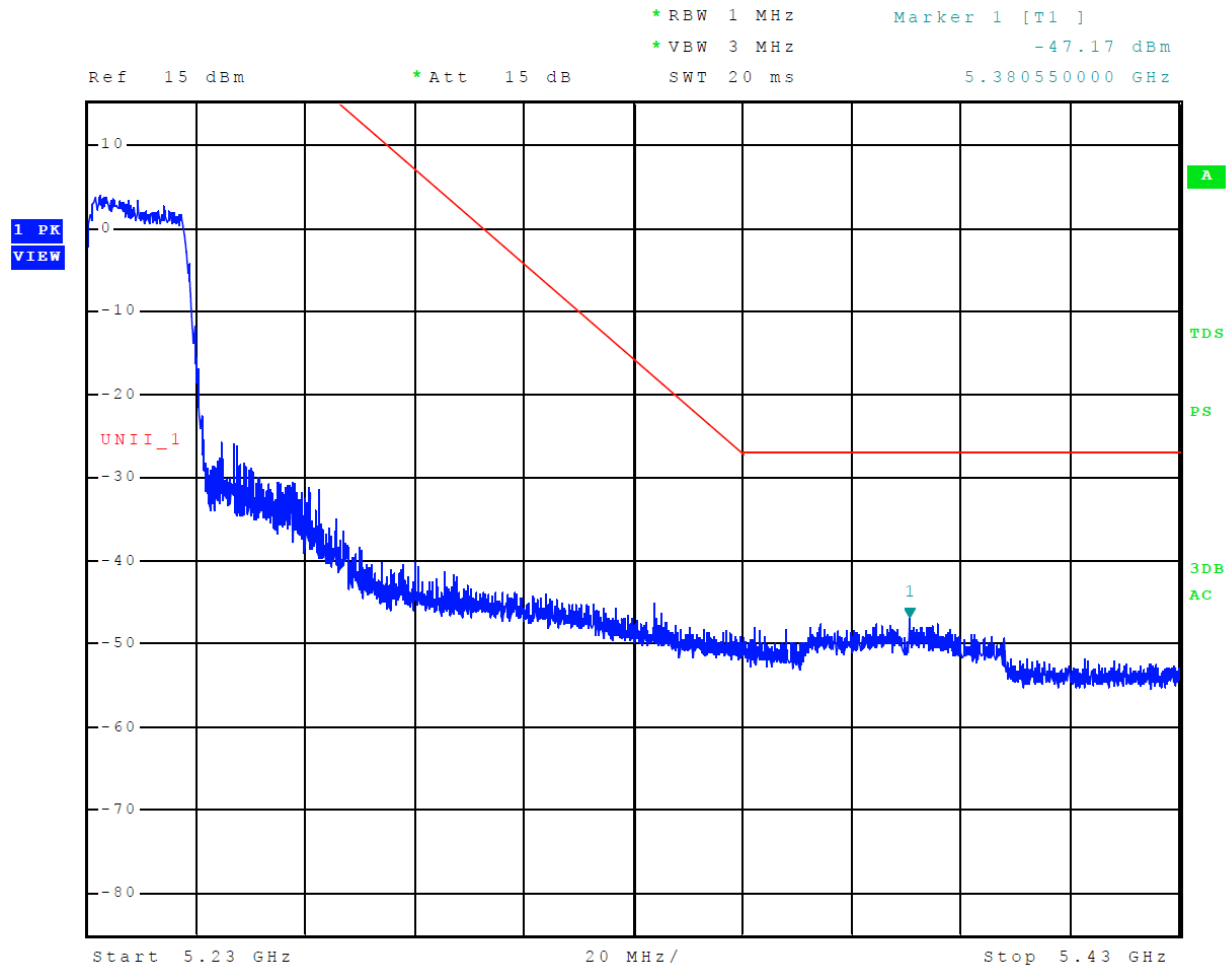


Figure 31 Plot of Upper Band Edge Across 5150-5250 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)

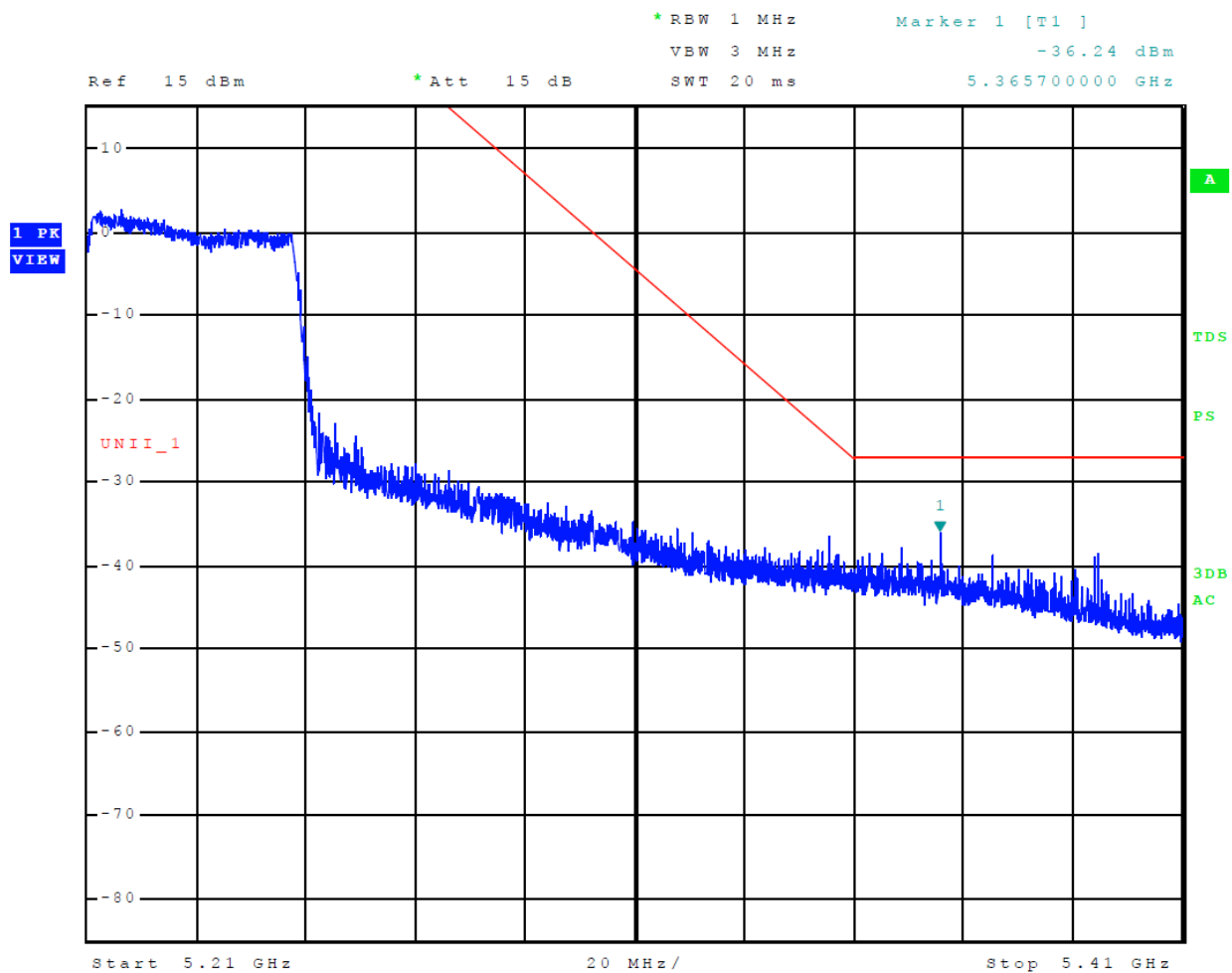


Figure 32 Plot of Upper Band Edge Across 5150-5250 MHz Radio 2, Mode 17 U-NII-1 (802.11a)

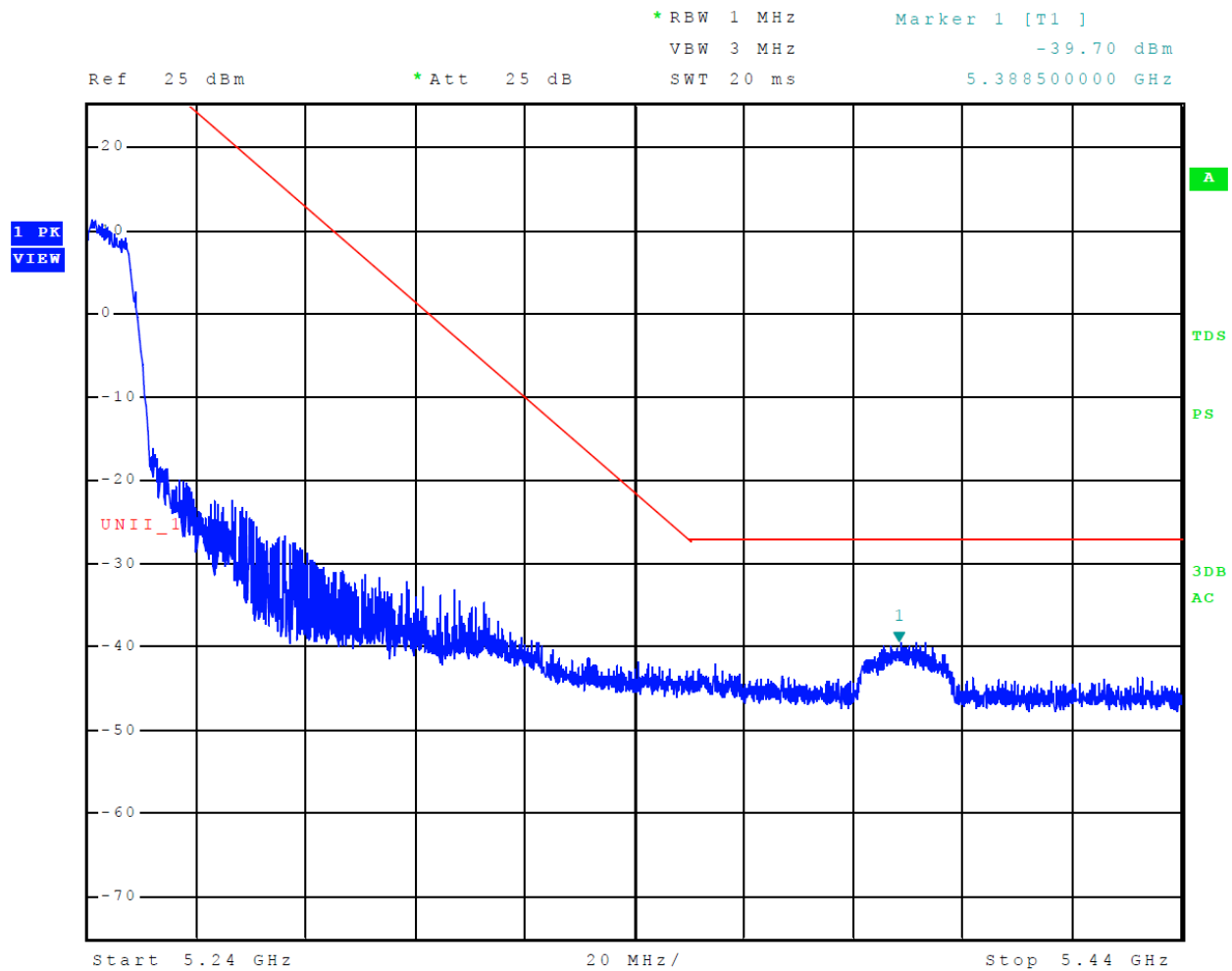


Figure 33 Plot of Upper Band Edge Across 5150-5250 MHz Radio 2, Mode 18 U-NII-1 (802.11n20)

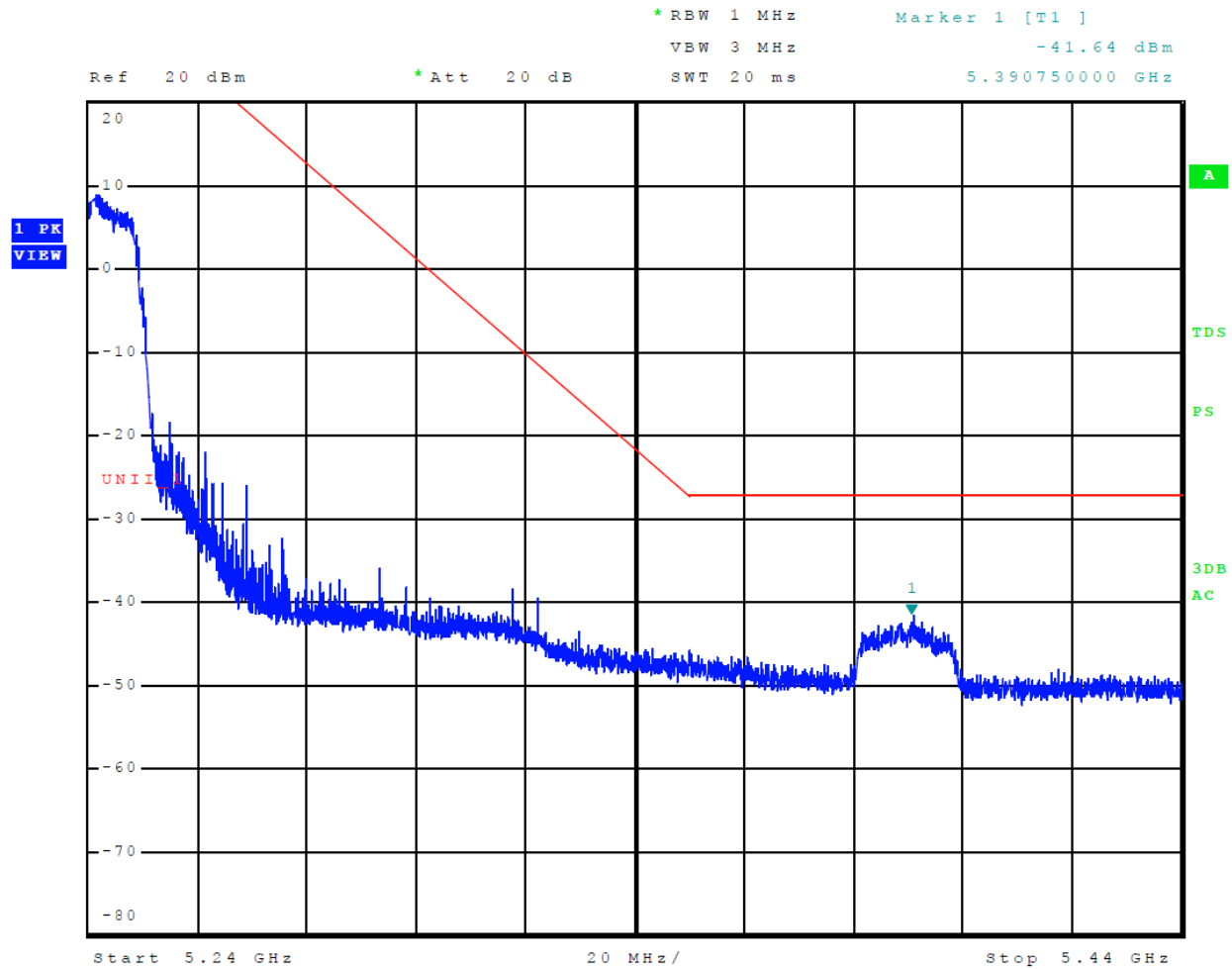


Figure 34 Plot of Upper Band Edge Across 5150-5250 MHz Radio 2, Mode 19 U-NII-1 (802.11n40)

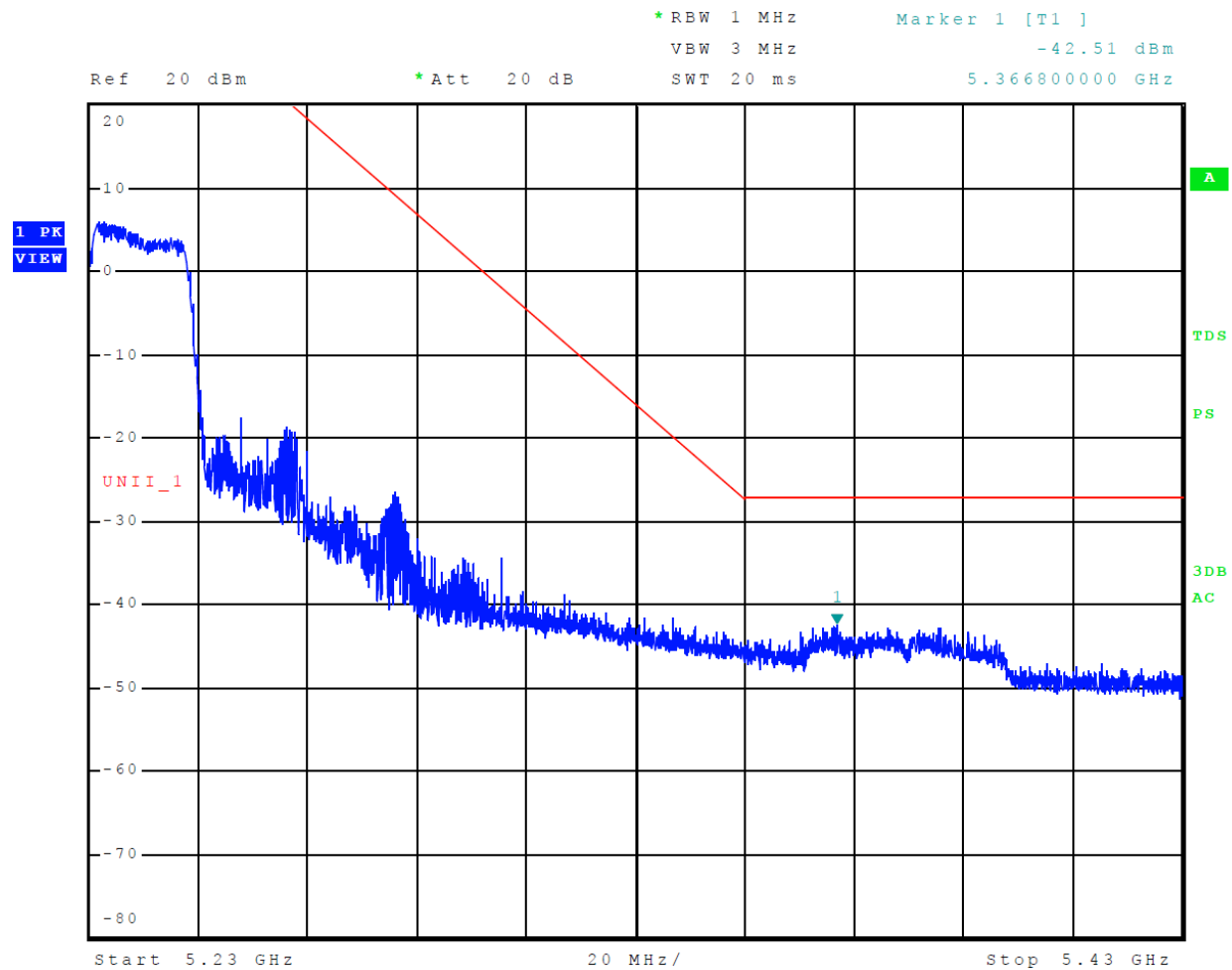


Figure 35 Plot of Upper Band Edge Across 5150-5250 MHz Radio 2, Mode 20 U-NII-1 (802.11ac20)

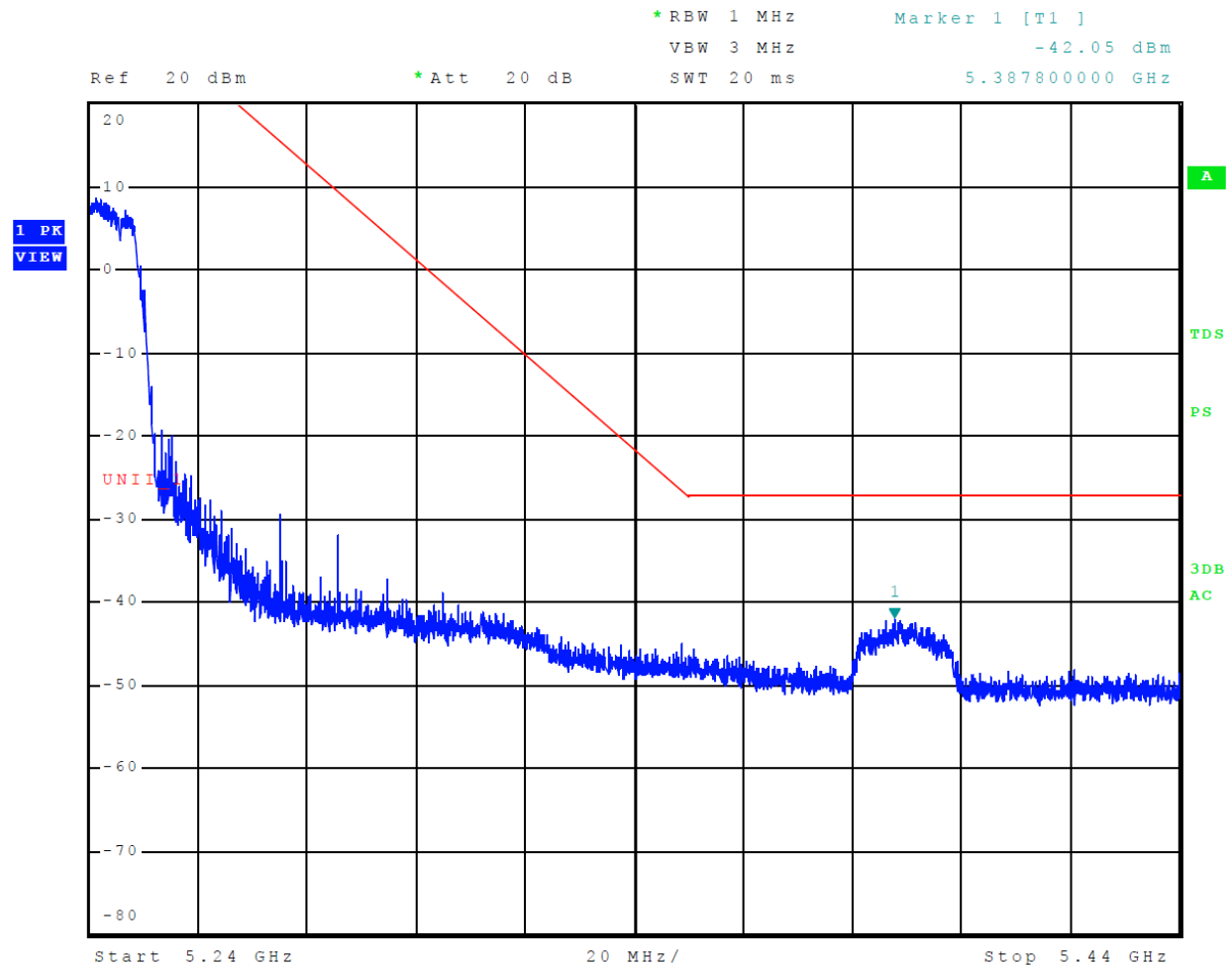


Figure 36 Plot of Upper Band Edge Across 5150-5250 MHz Radio 2, Mode 21 U-NII-1 (802.11ac40)

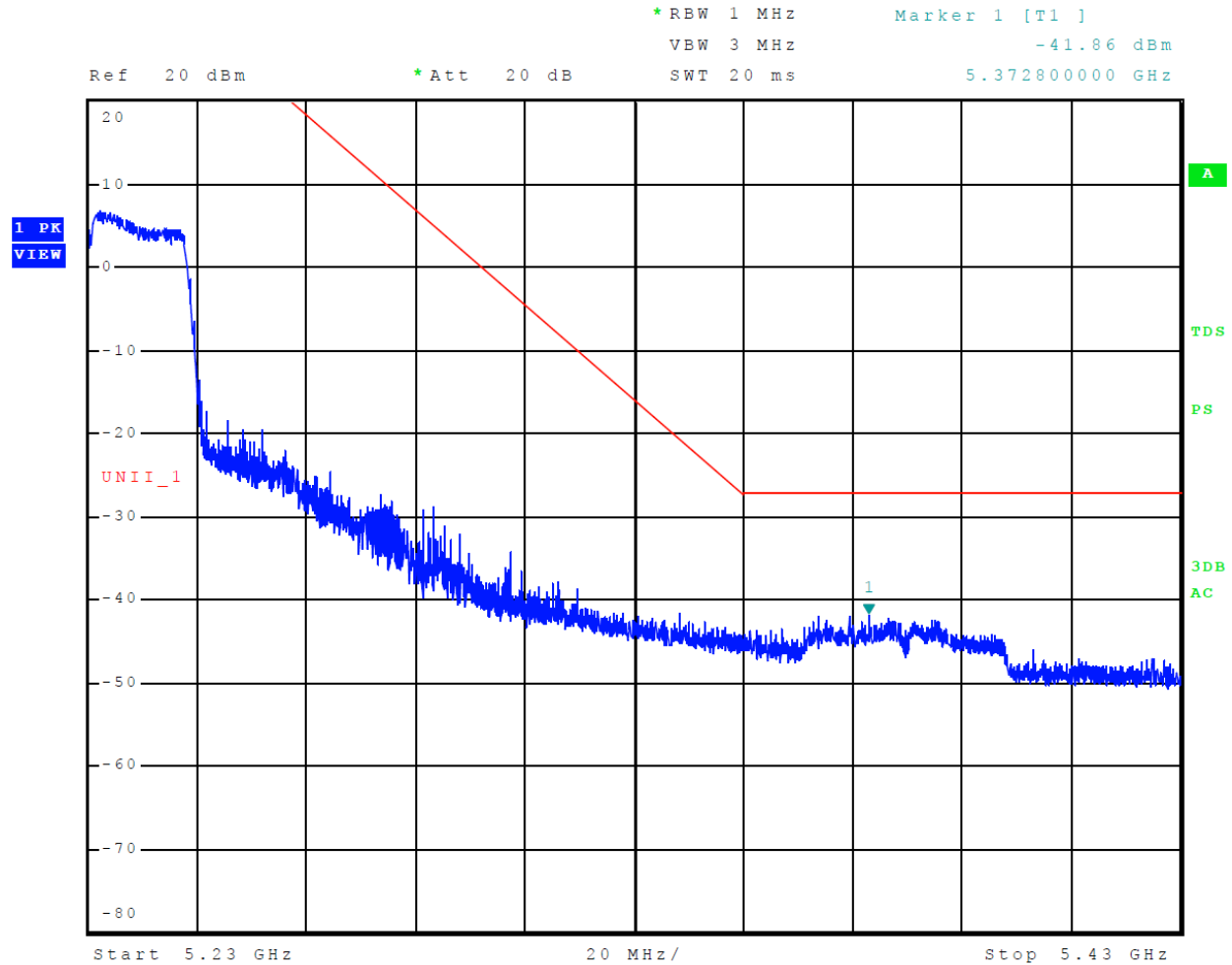


Figure 37 Plot of Upper Band Edge Across 5150-5250 MHz Radio 2, Mode 22 U-NII-1 (802.11ac80)

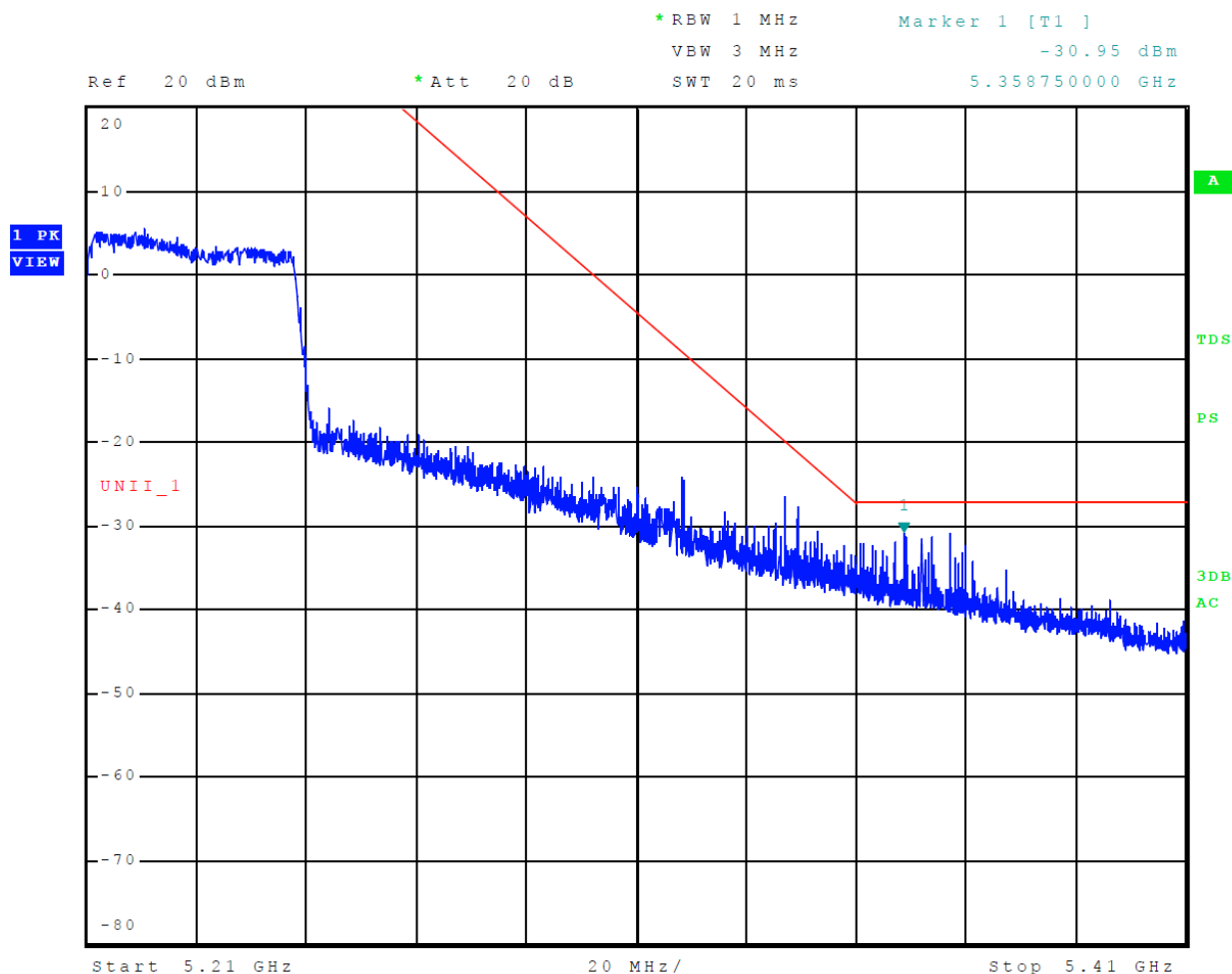


Figure 38 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 8 U-NII-1 (802.11a)

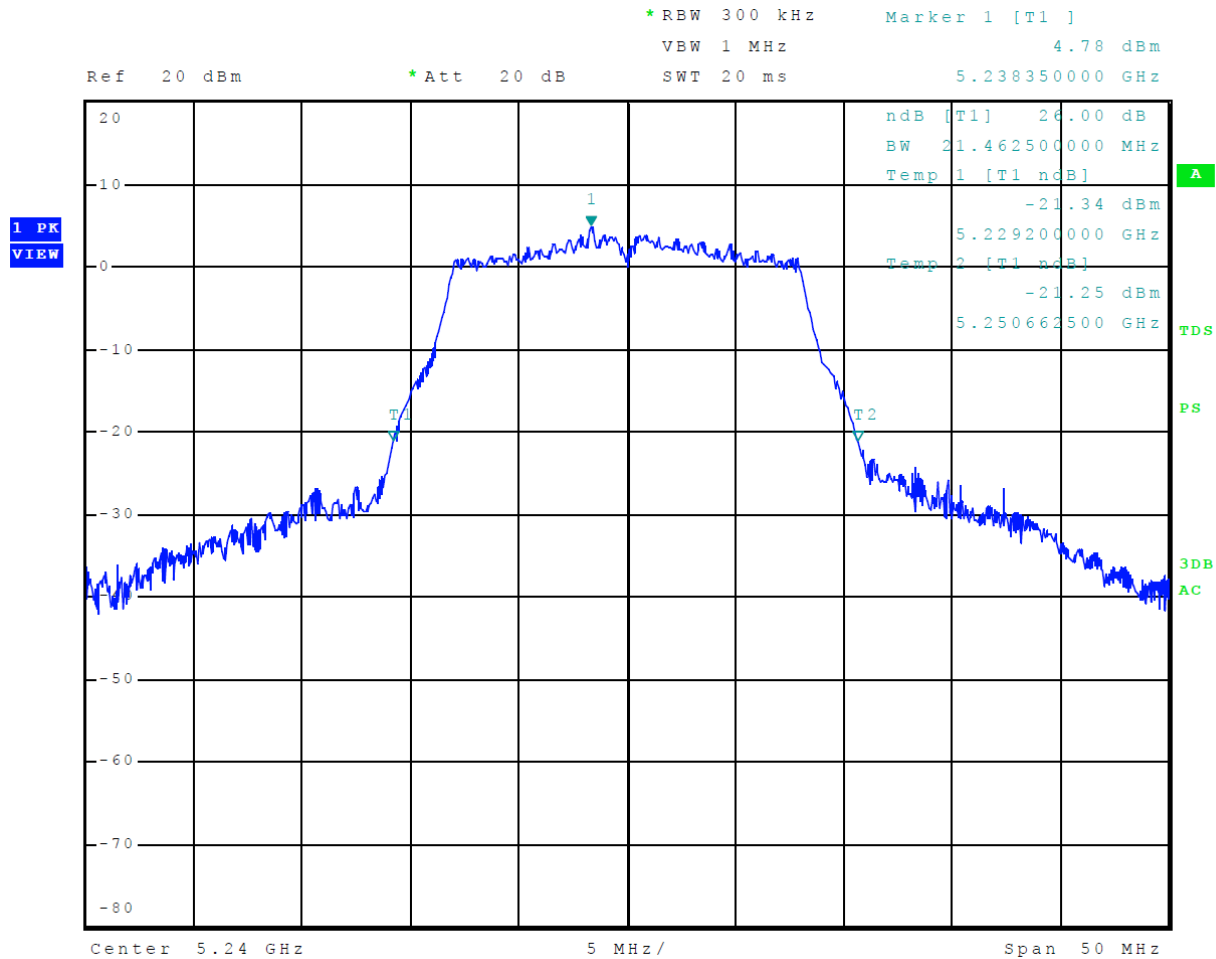


Figure 39 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 9 U-NII-1 (802.11n20)

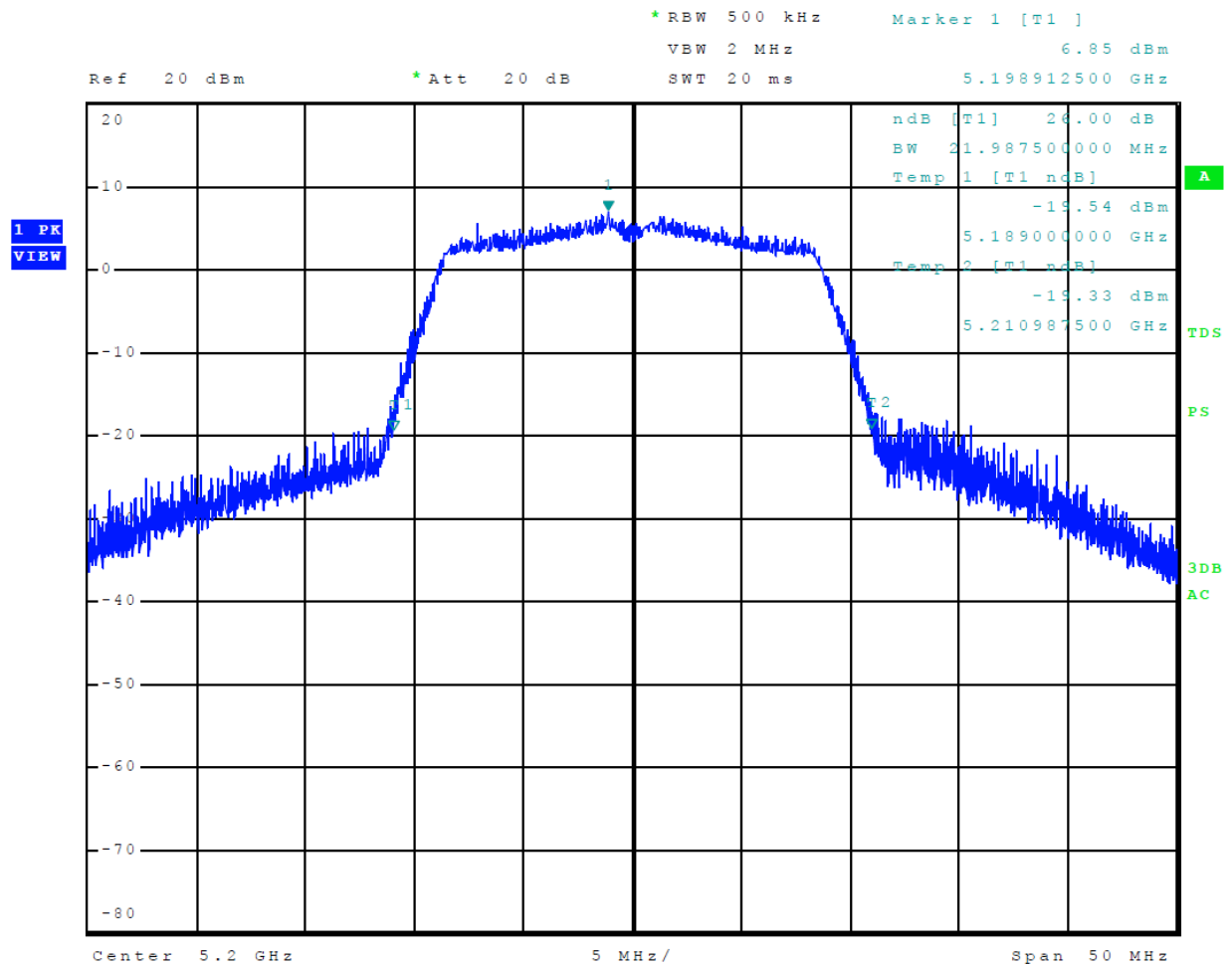


Figure 40 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)

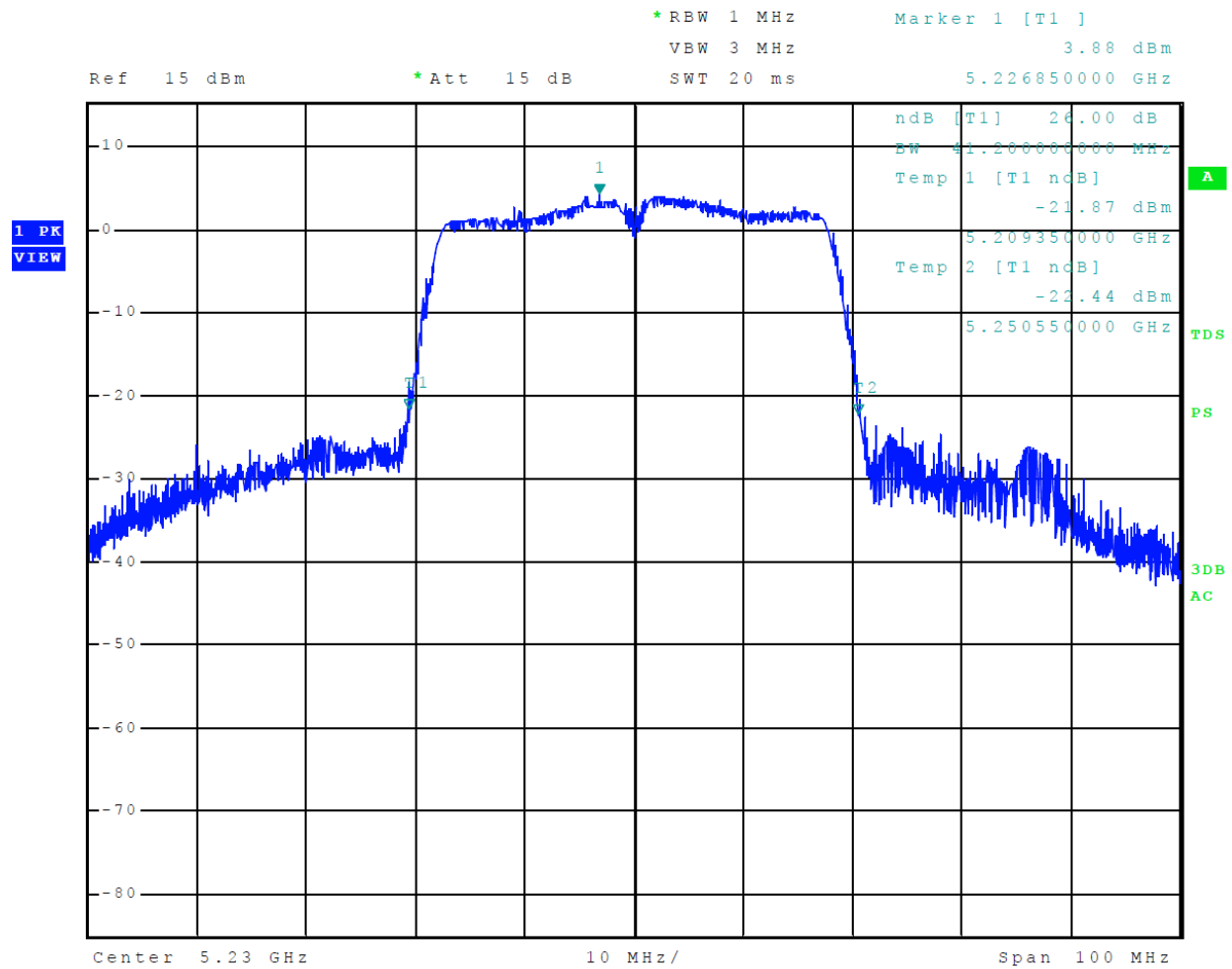


Figure 41 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)

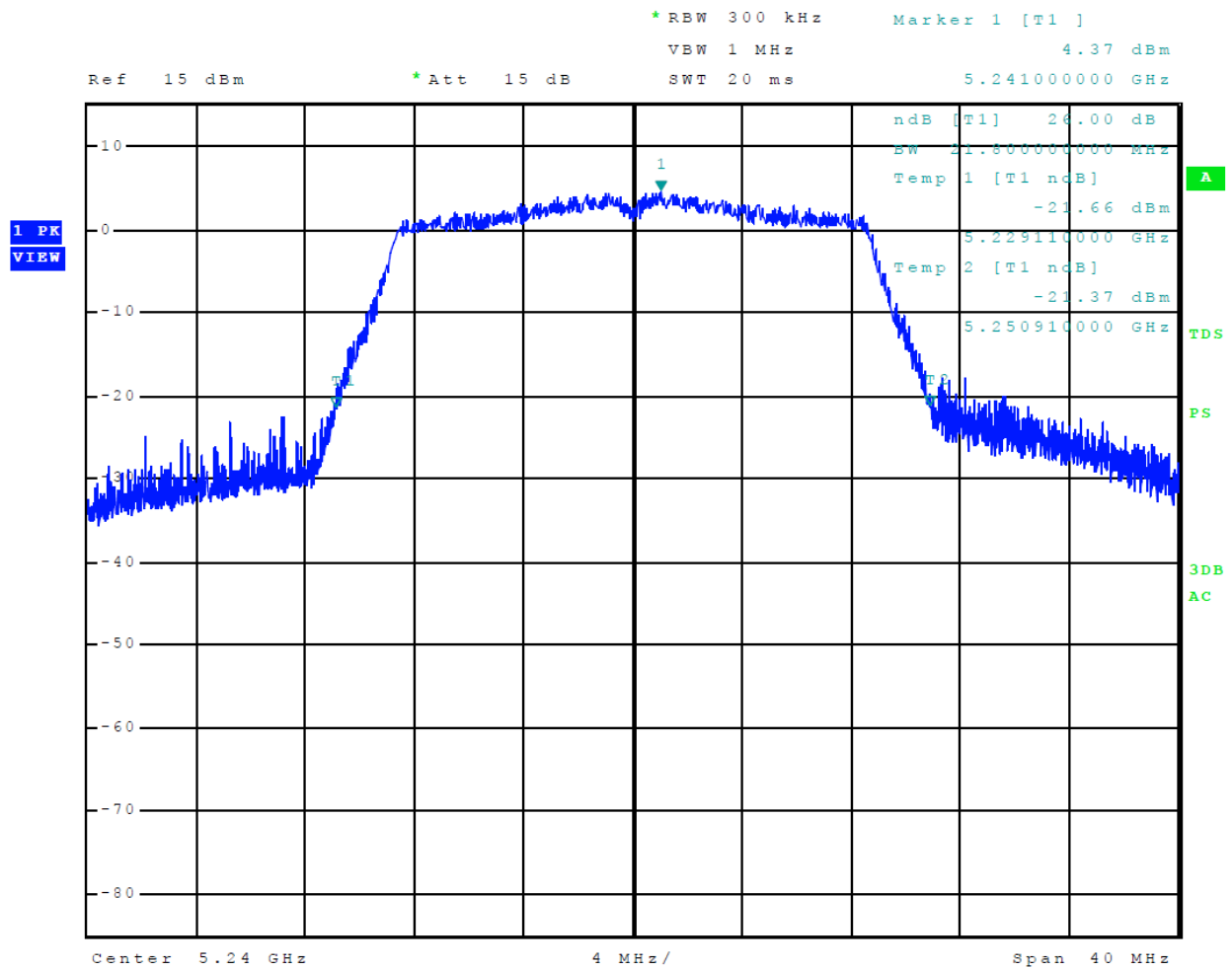


Figure 42 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)

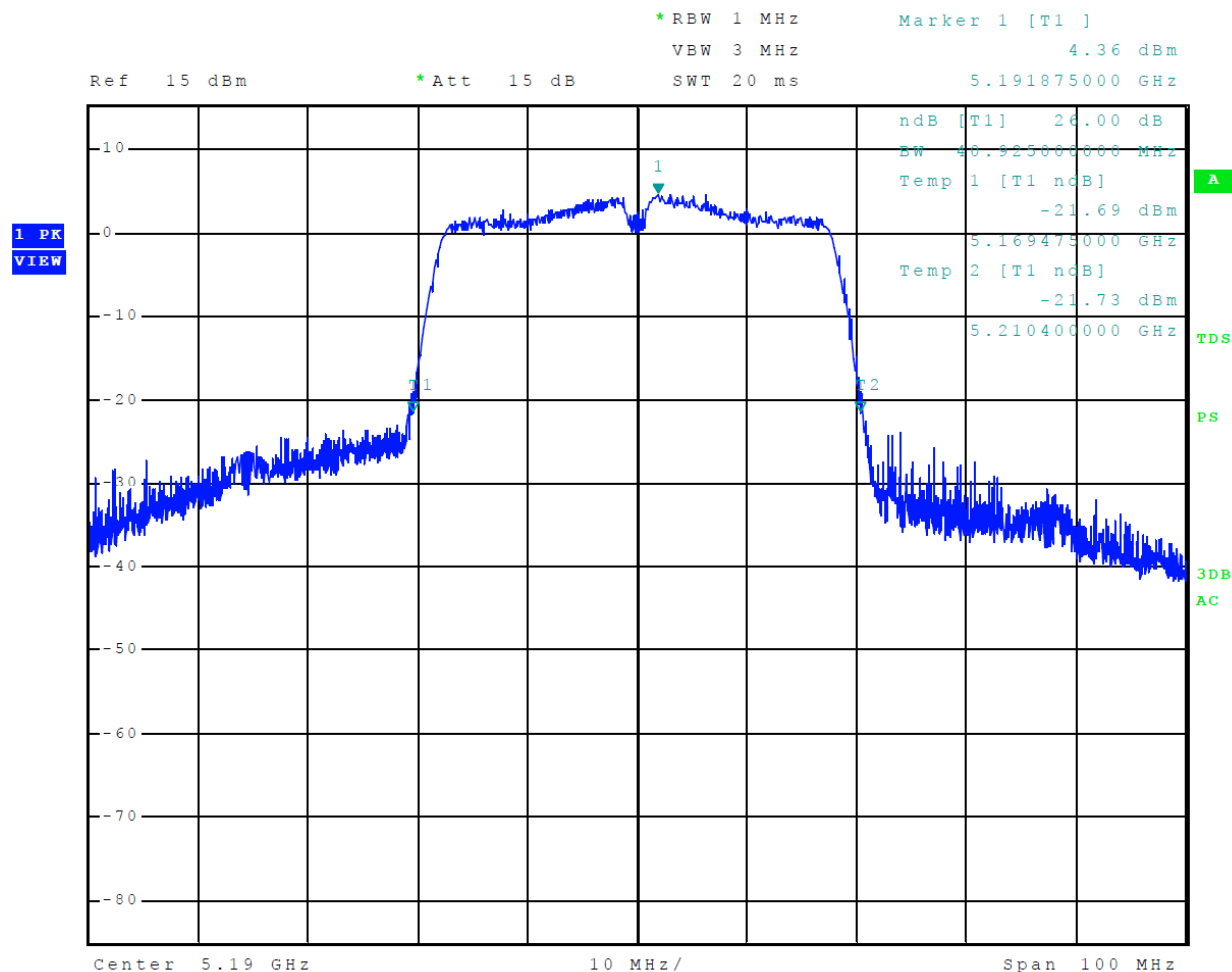


Figure 43 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)

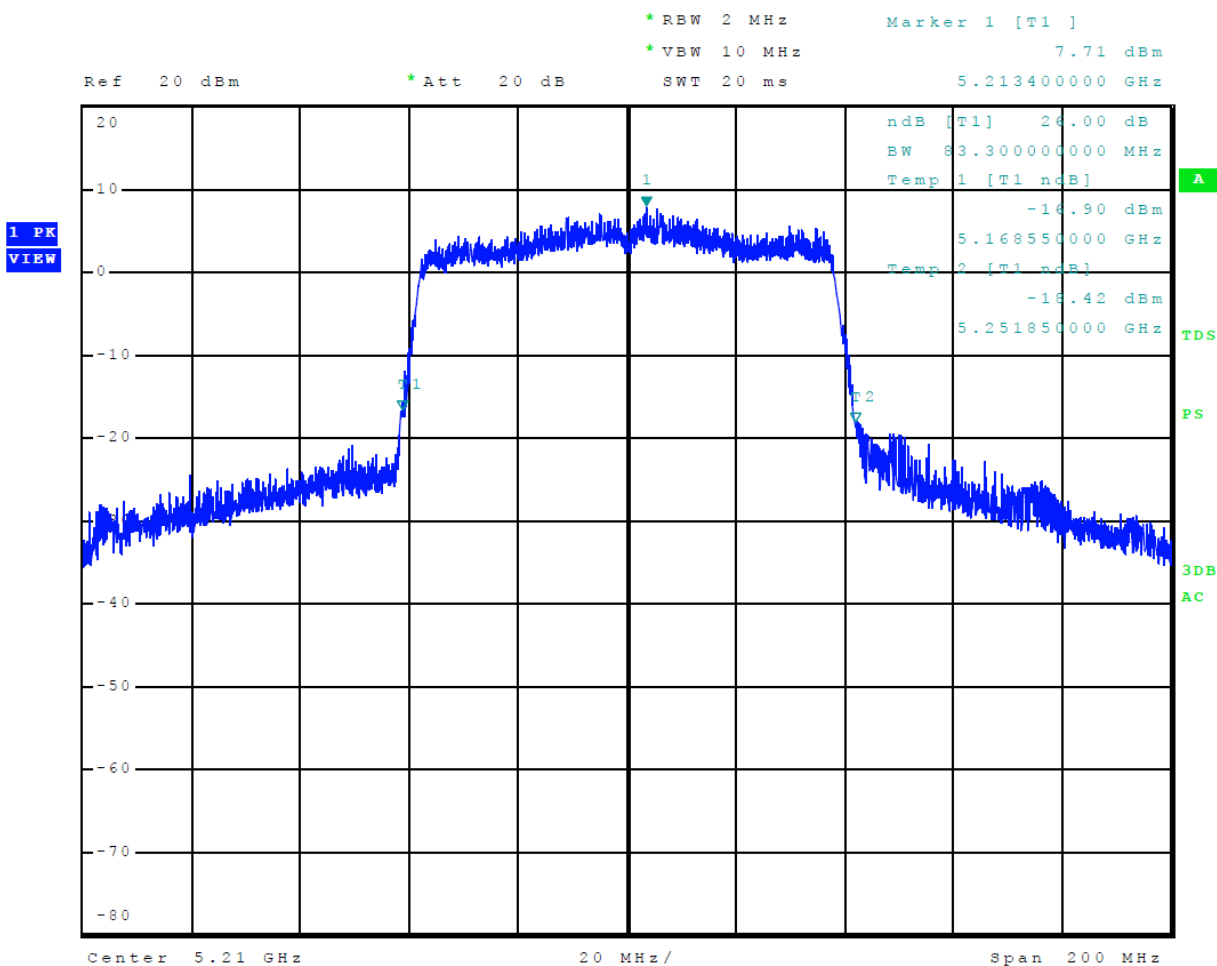


Figure 44 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 17 U-NII-1 (802.11a)

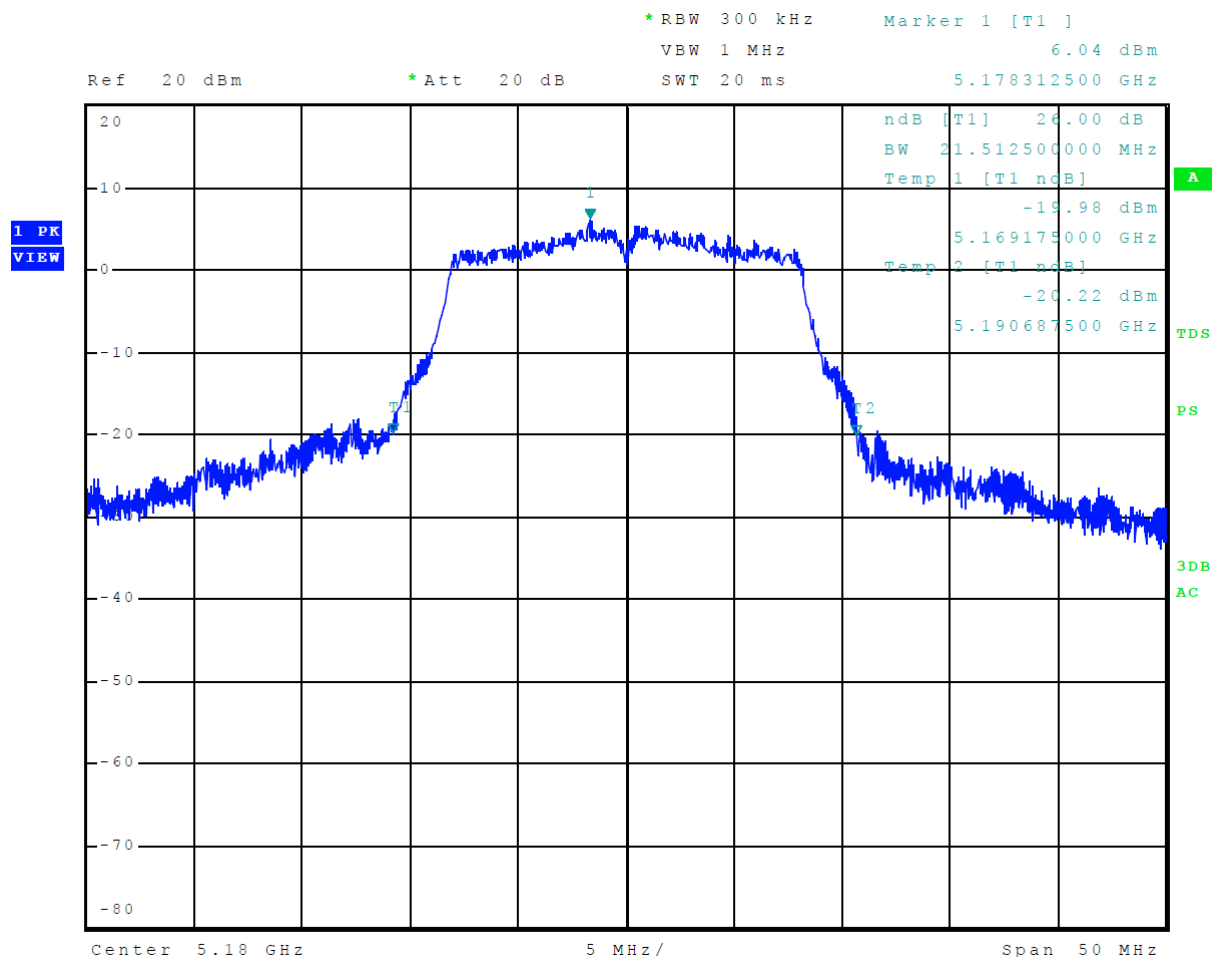


Figure 45 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 18 U-NII-1 (802.11n20)

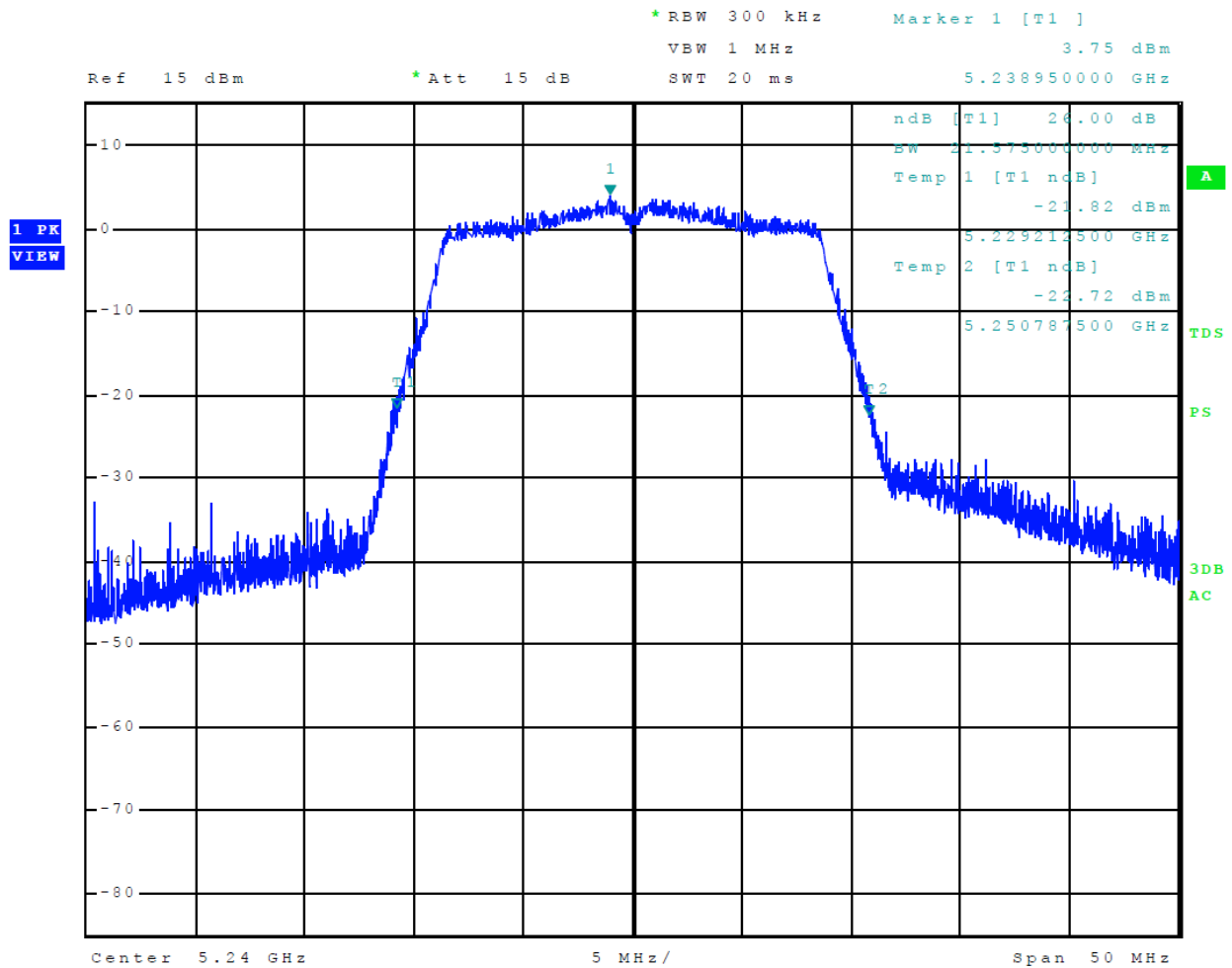


Figure 46 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 19 U-NII-1 (802.11n40)

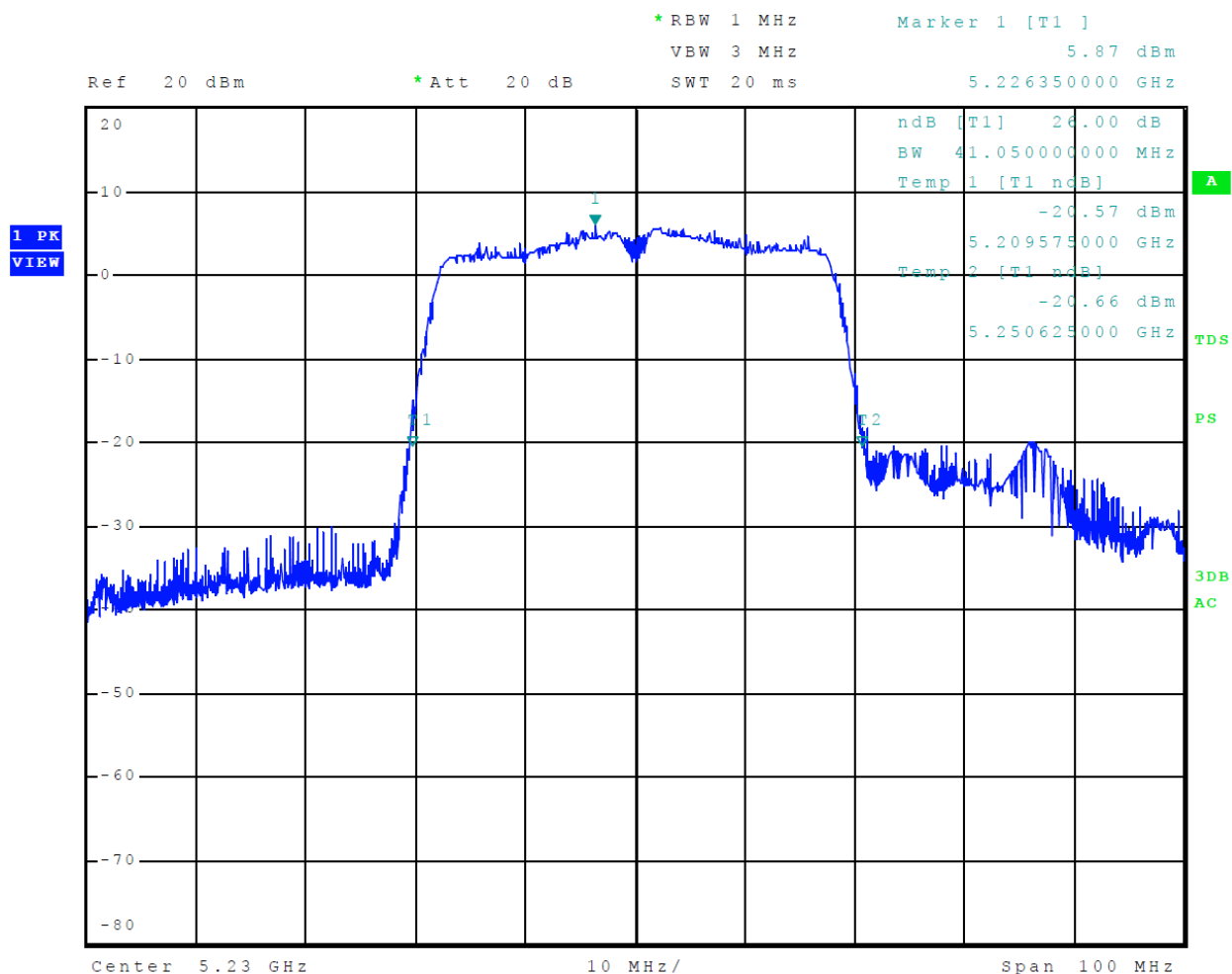


Figure 47 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 20 U-NII-1 (802.11ac20)

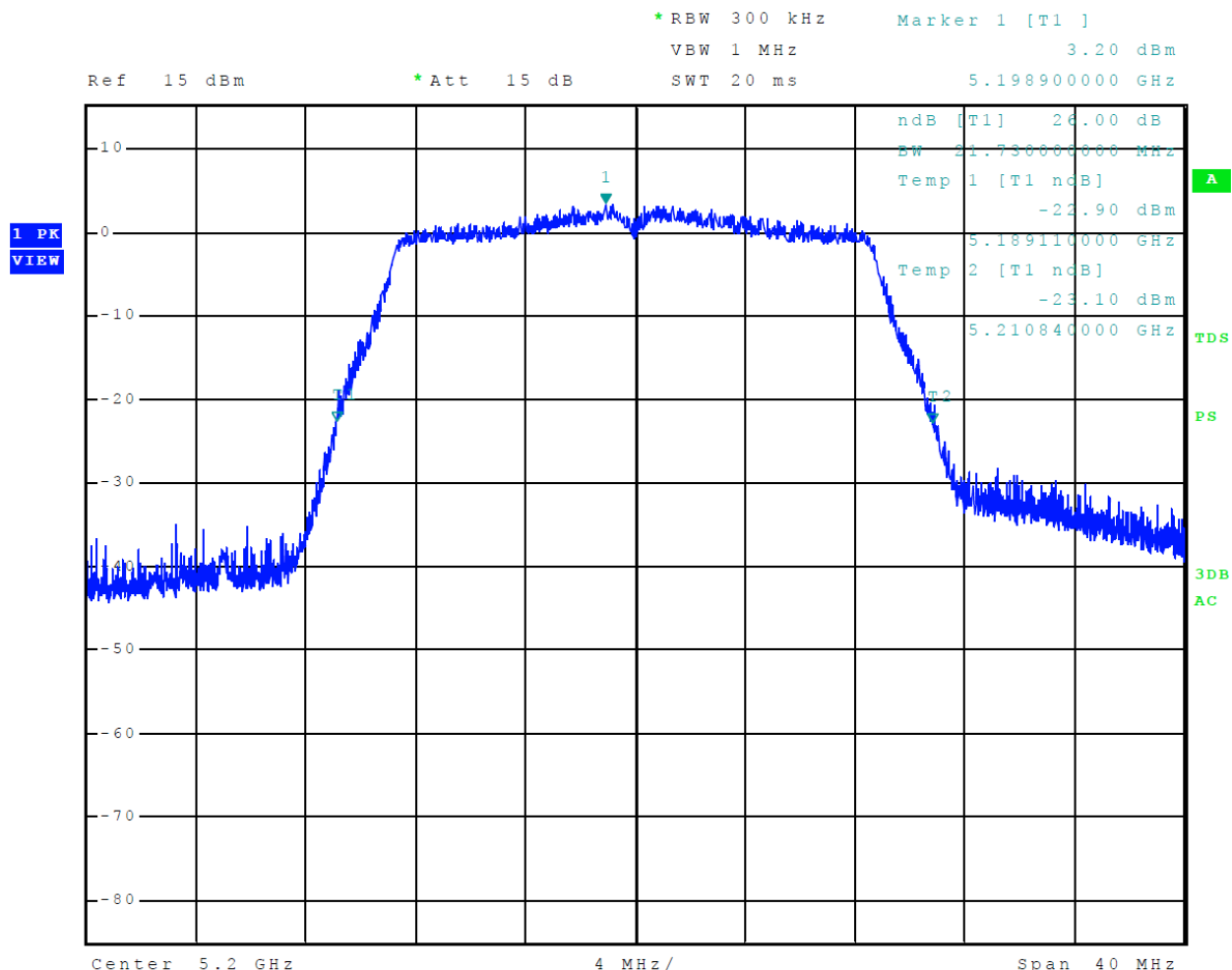


Figure 48 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 21 U-NII-1 (802.11ac40)

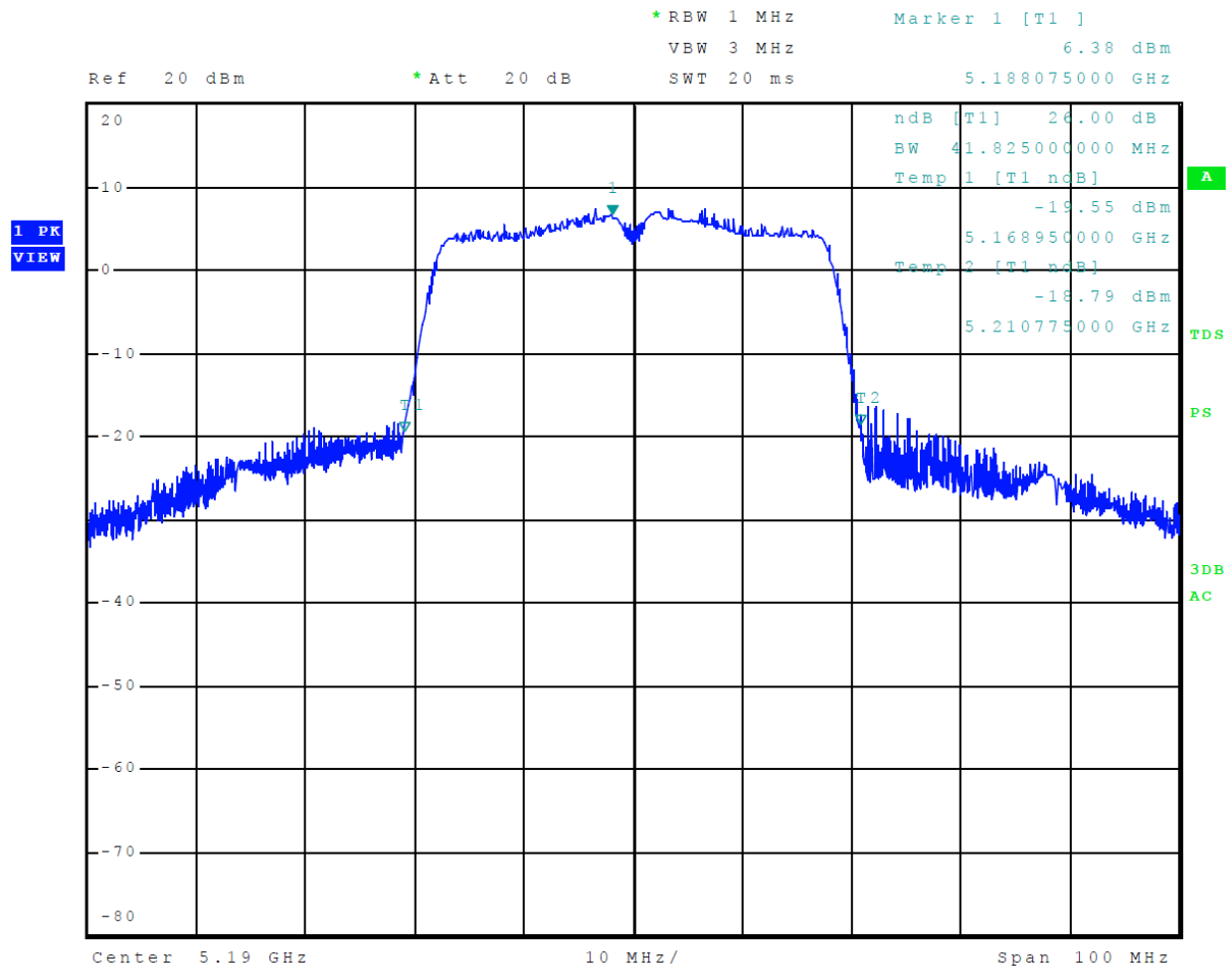


Figure 49 Plot of 26-dB Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 22 U-NII-1 (802.11ac80)

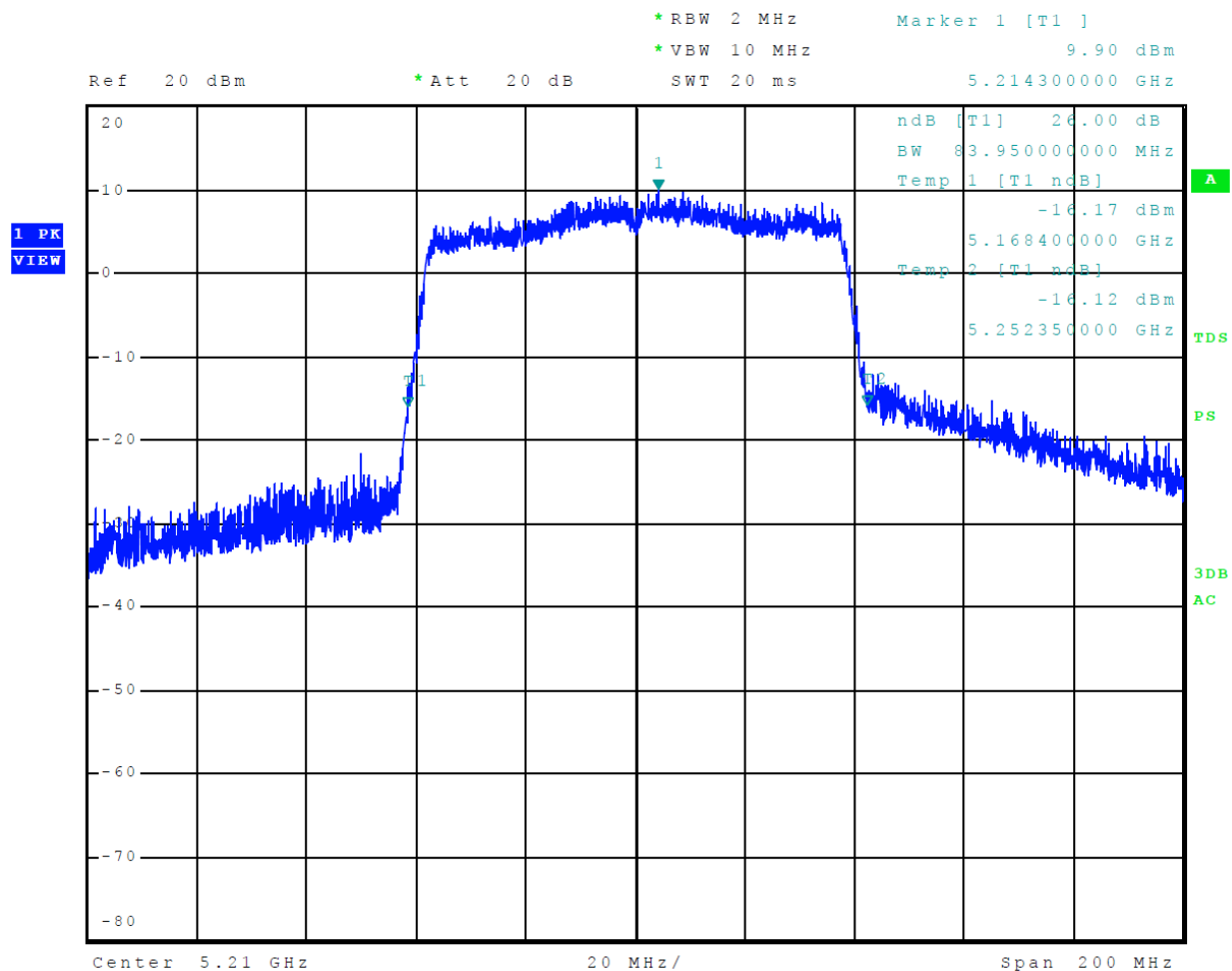


Figure 50 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 8 U-NII-1 (802.11a)

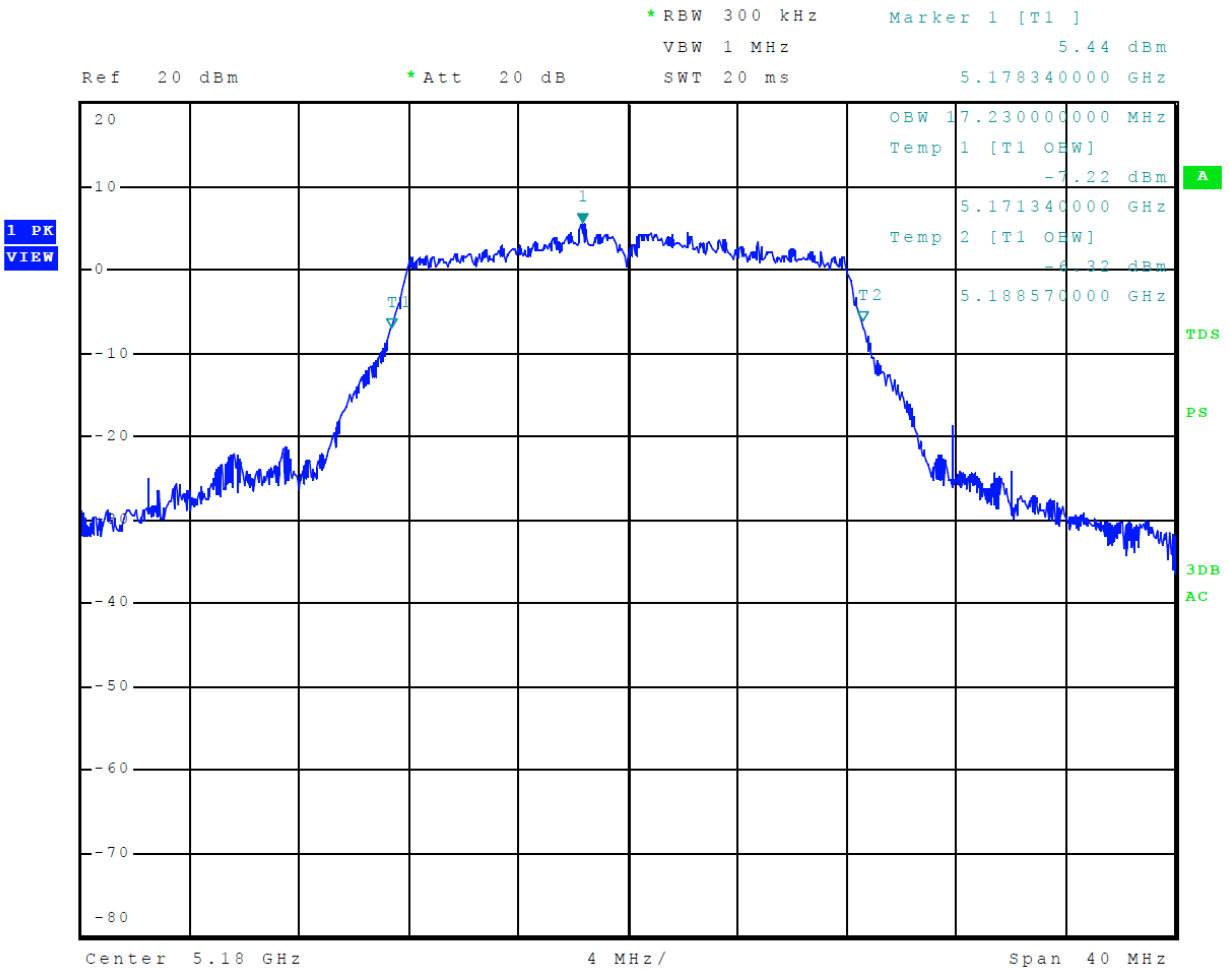


Figure 51 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 9 U-NII-1 (802.11n20)

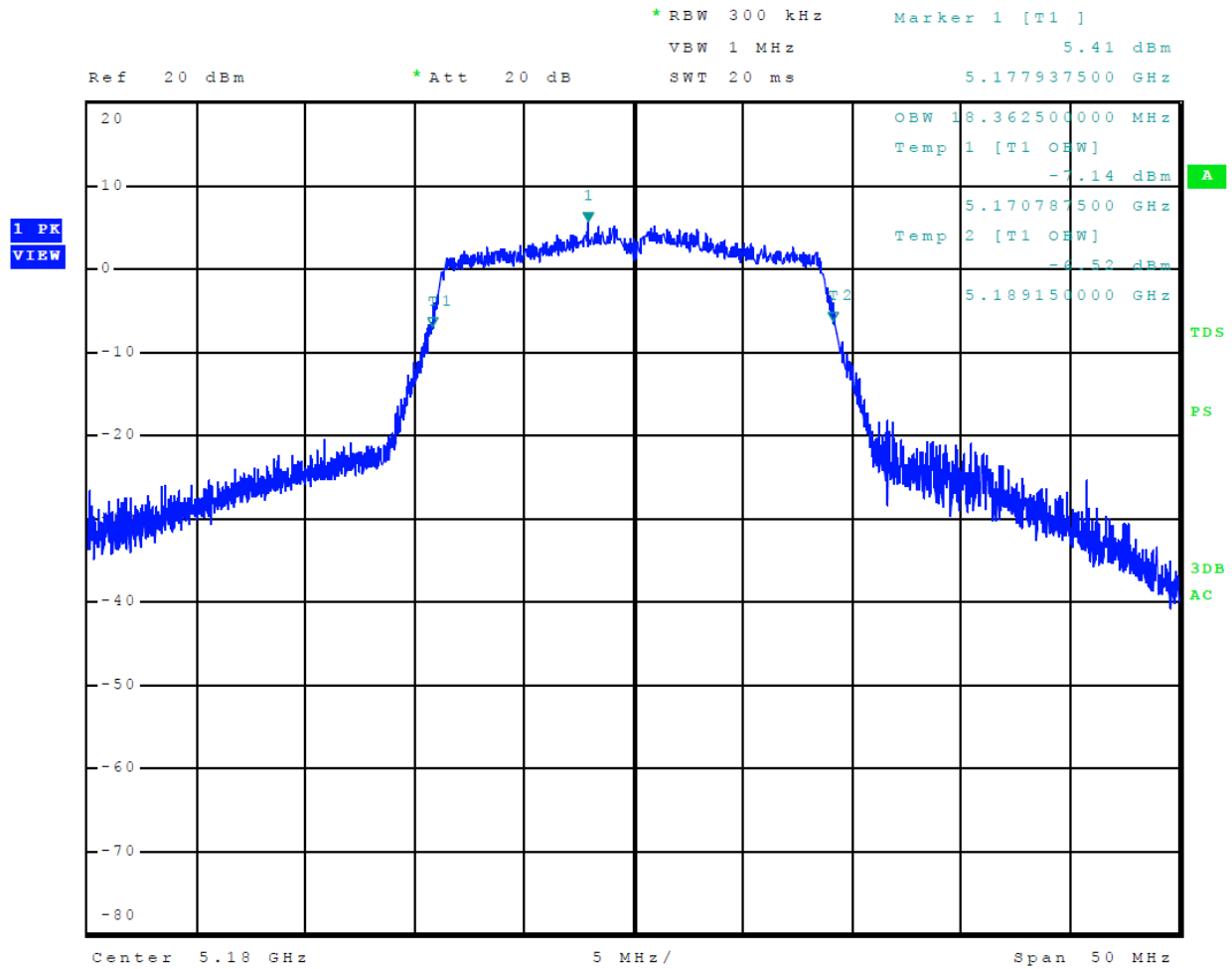


Figure 52 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)

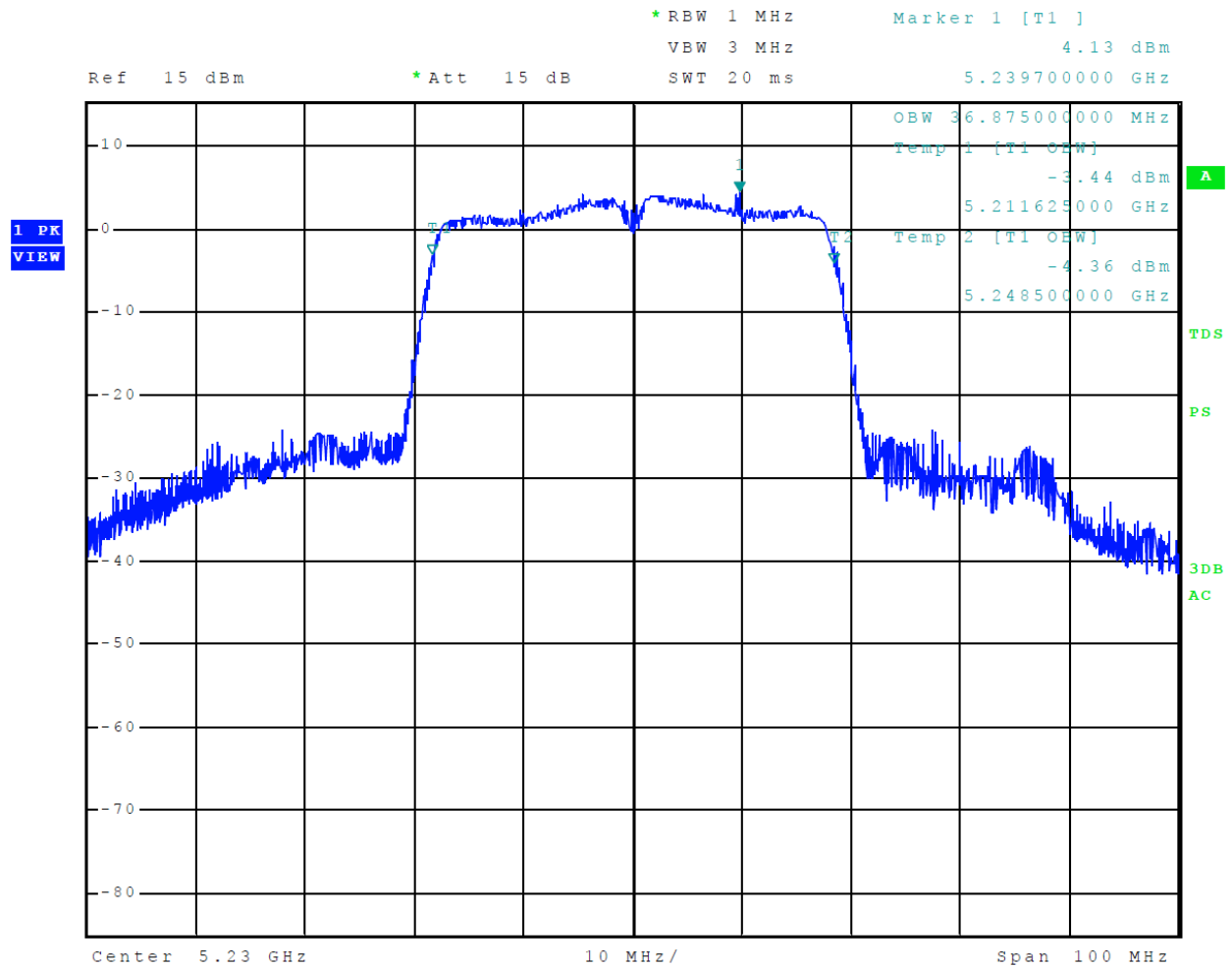


Figure 53 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)

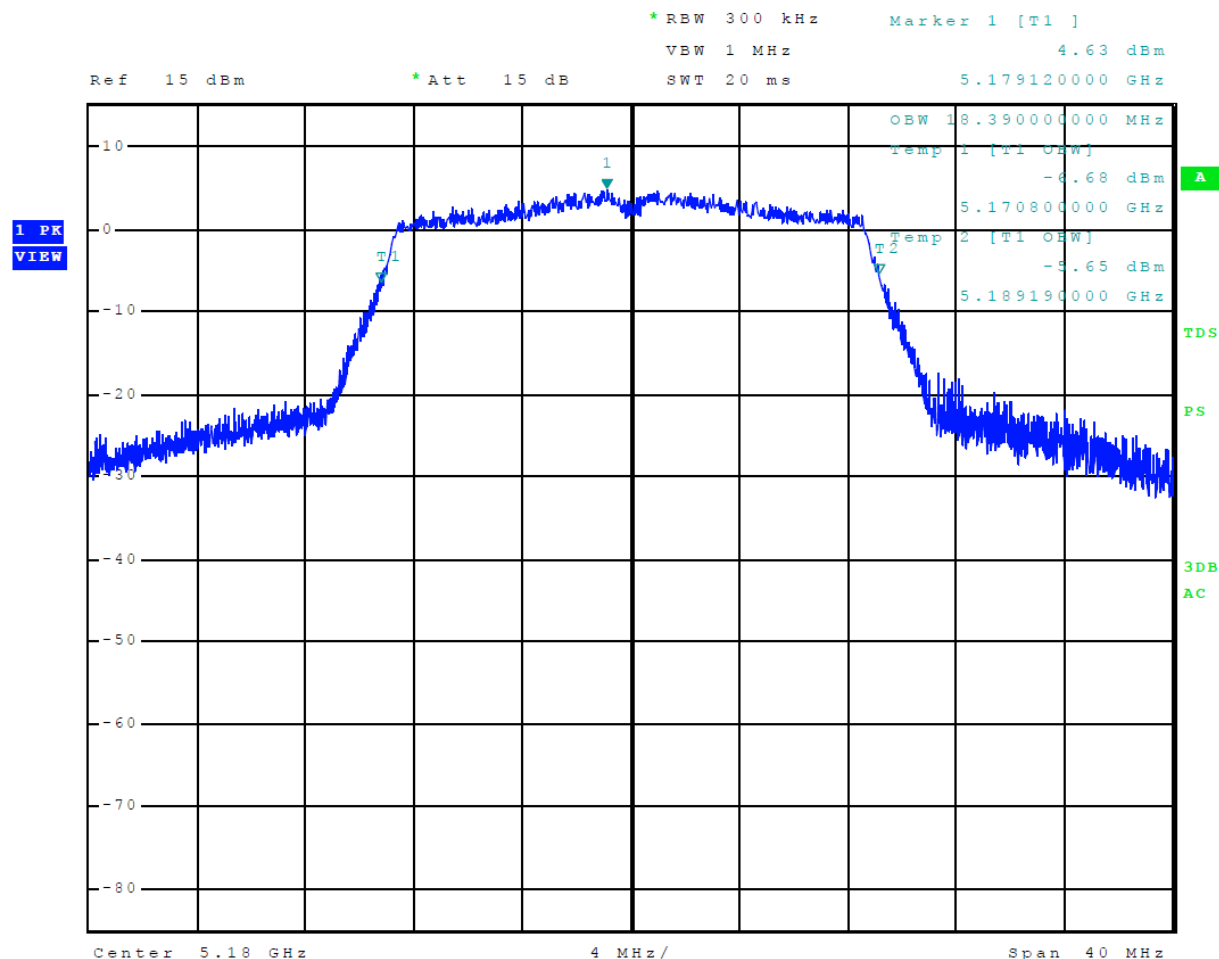


Figure 54 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)

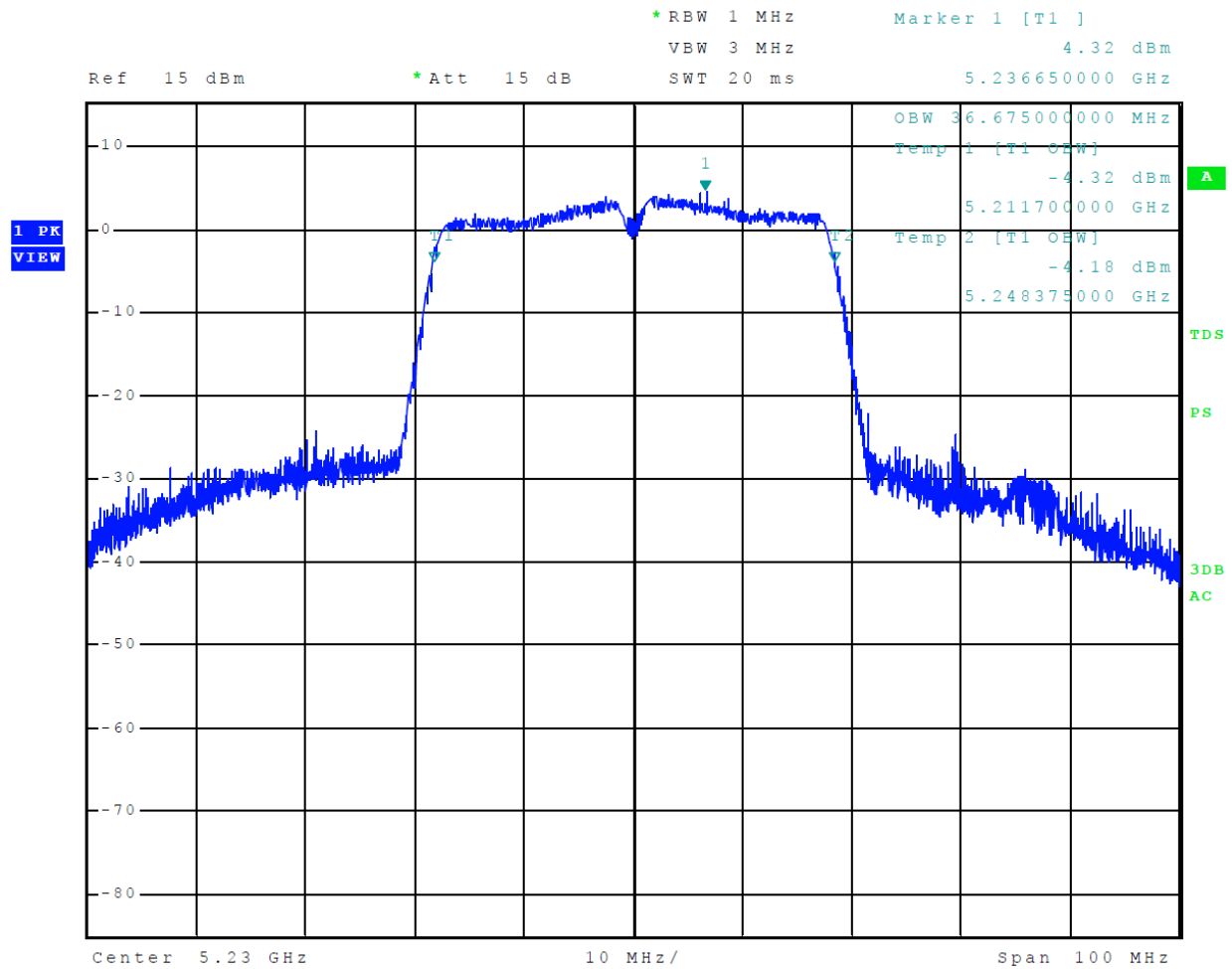


Figure 55 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)

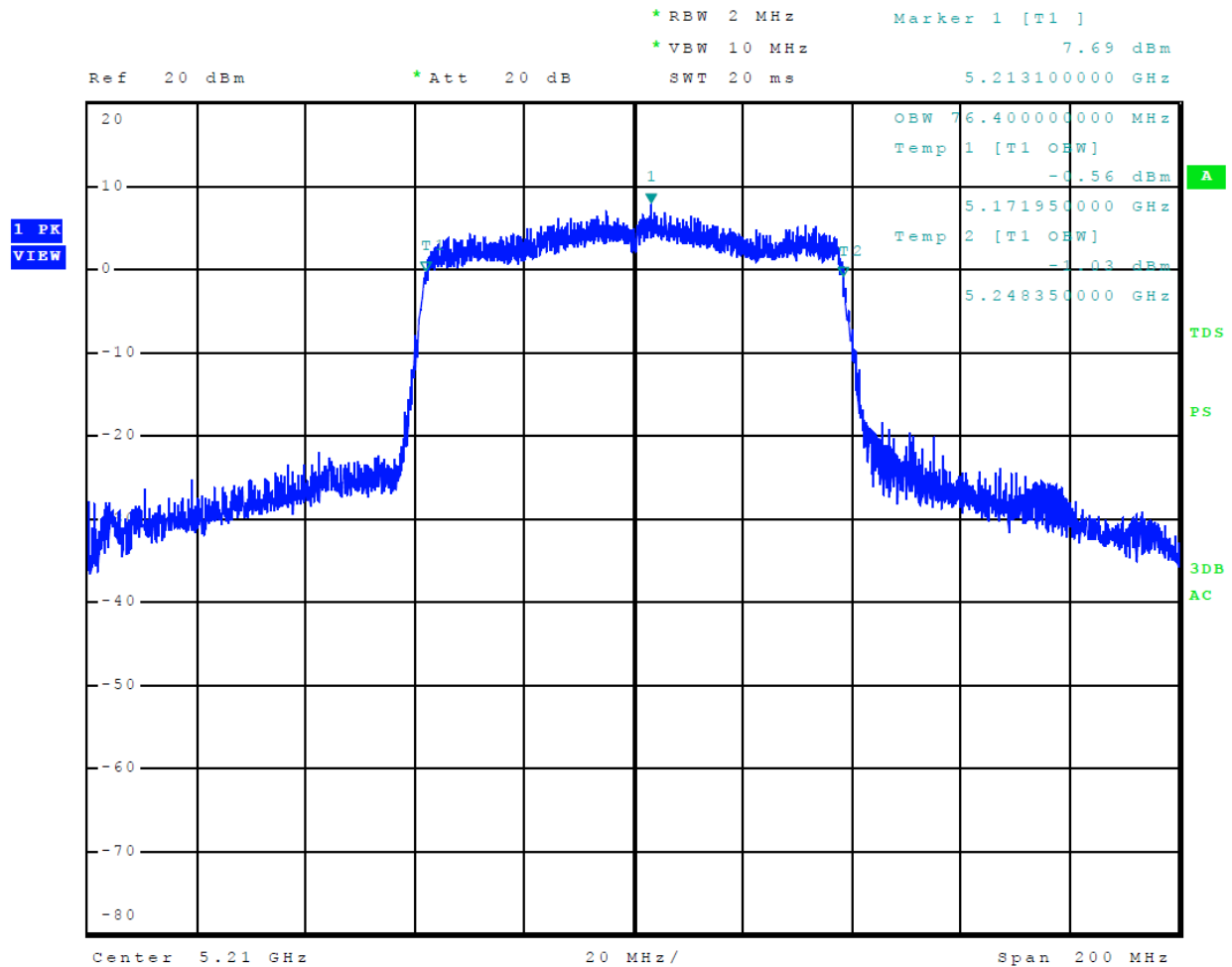


Figure 56 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 17 U-NII-1 (802.11a)

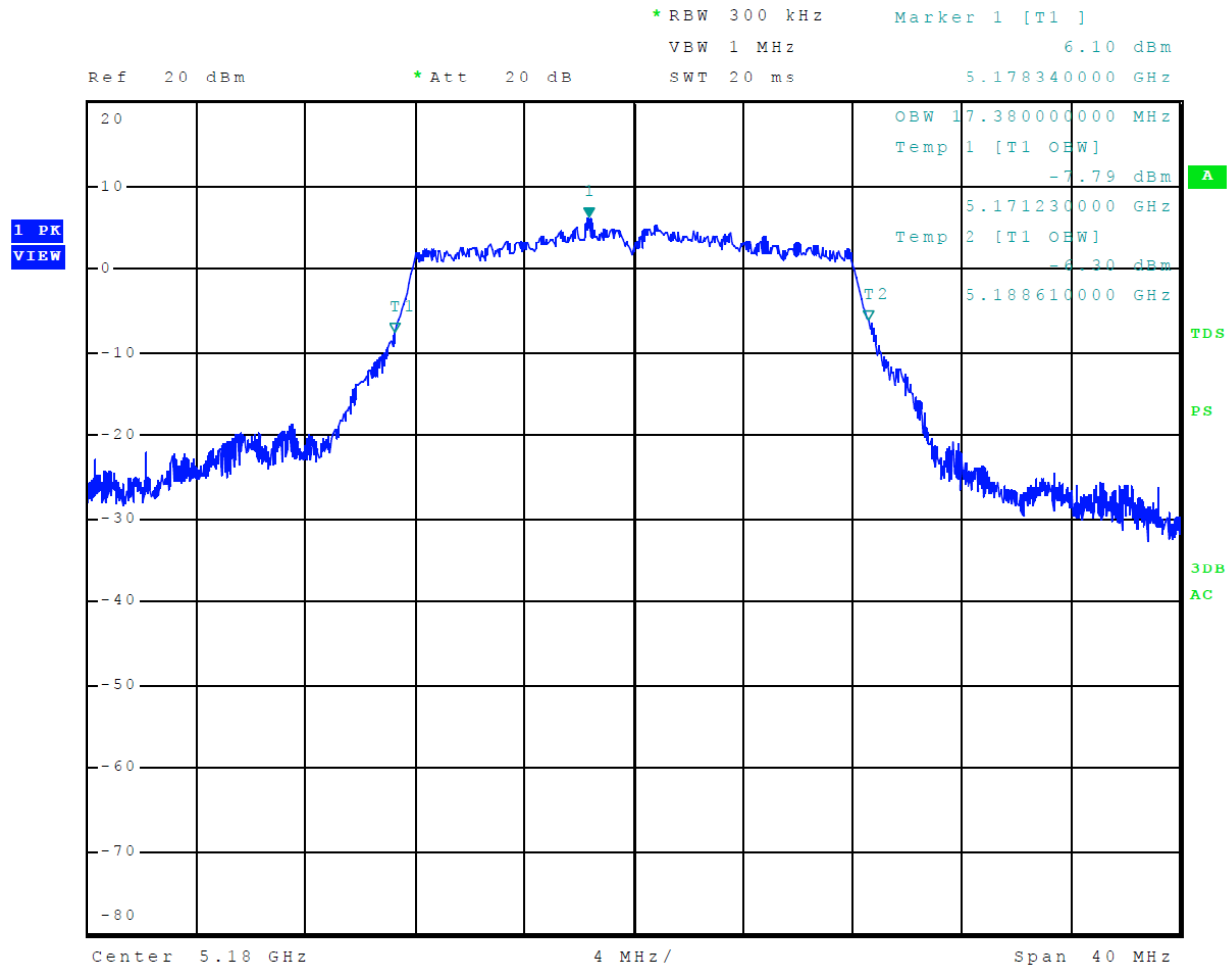


Figure 57 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 18 U-NII-1 (802.11n20)

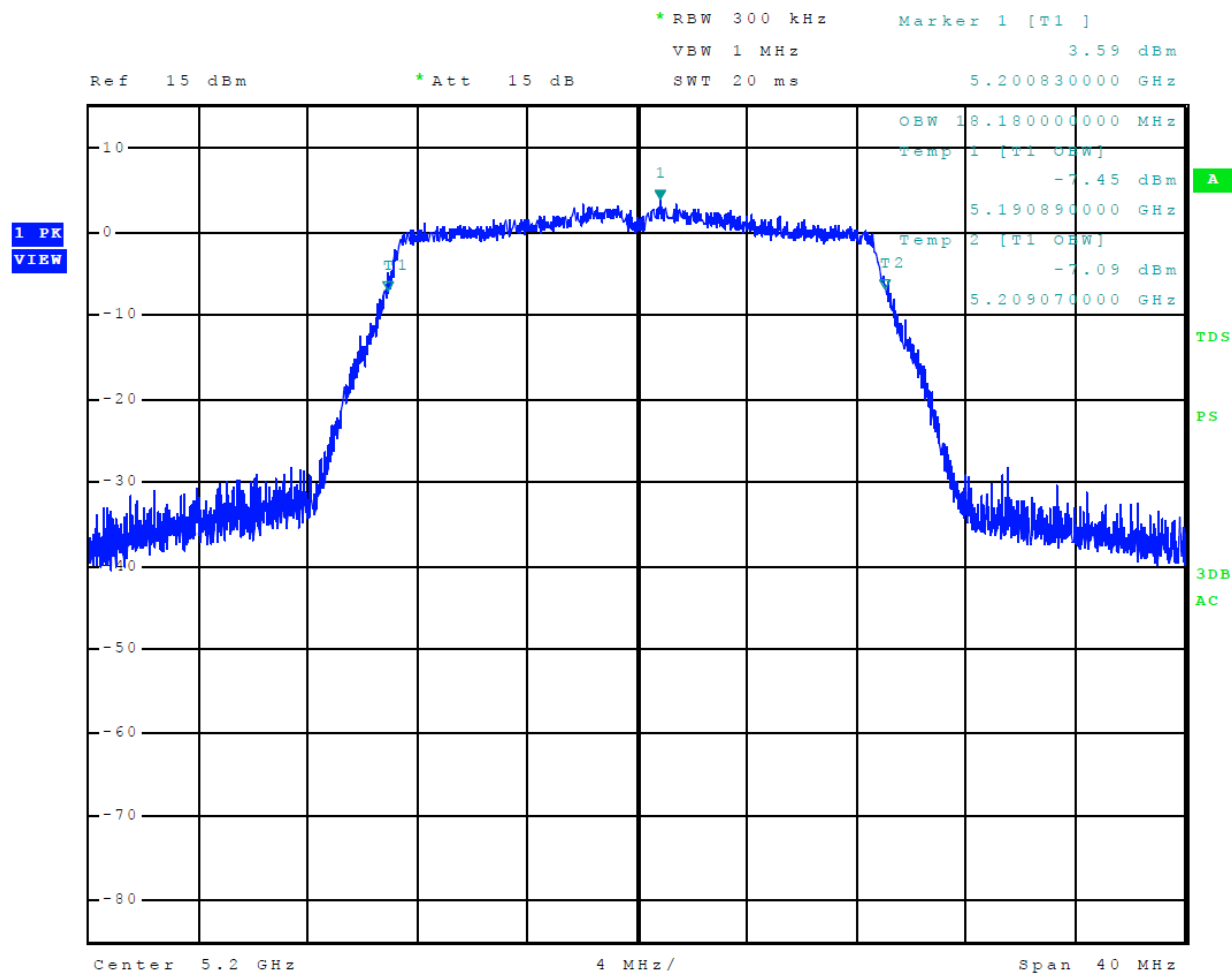


Figure 58 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 19 U-NII-1 (802.11n40)

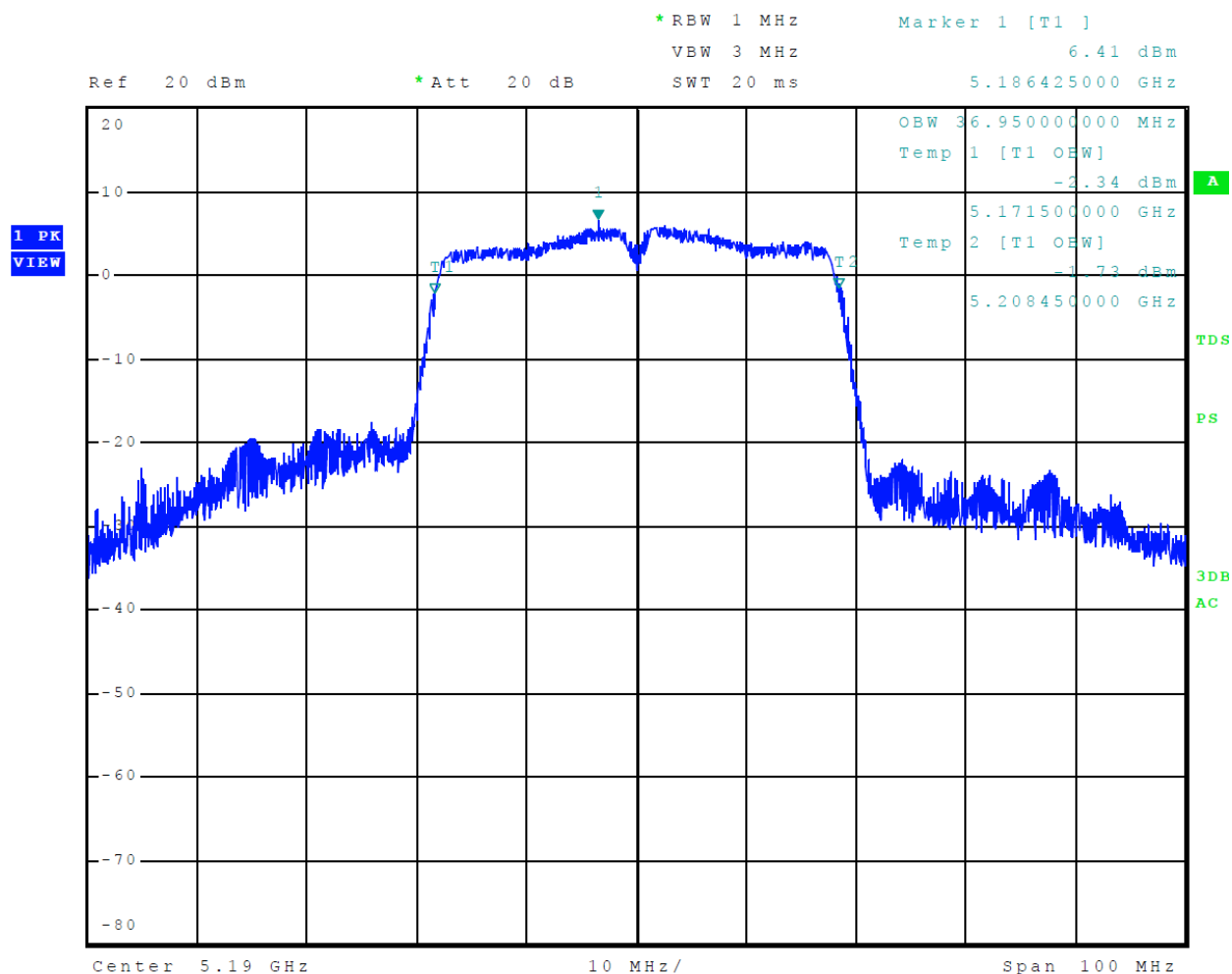


Figure 59 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 20 U-NII-1 (802.11ac20)

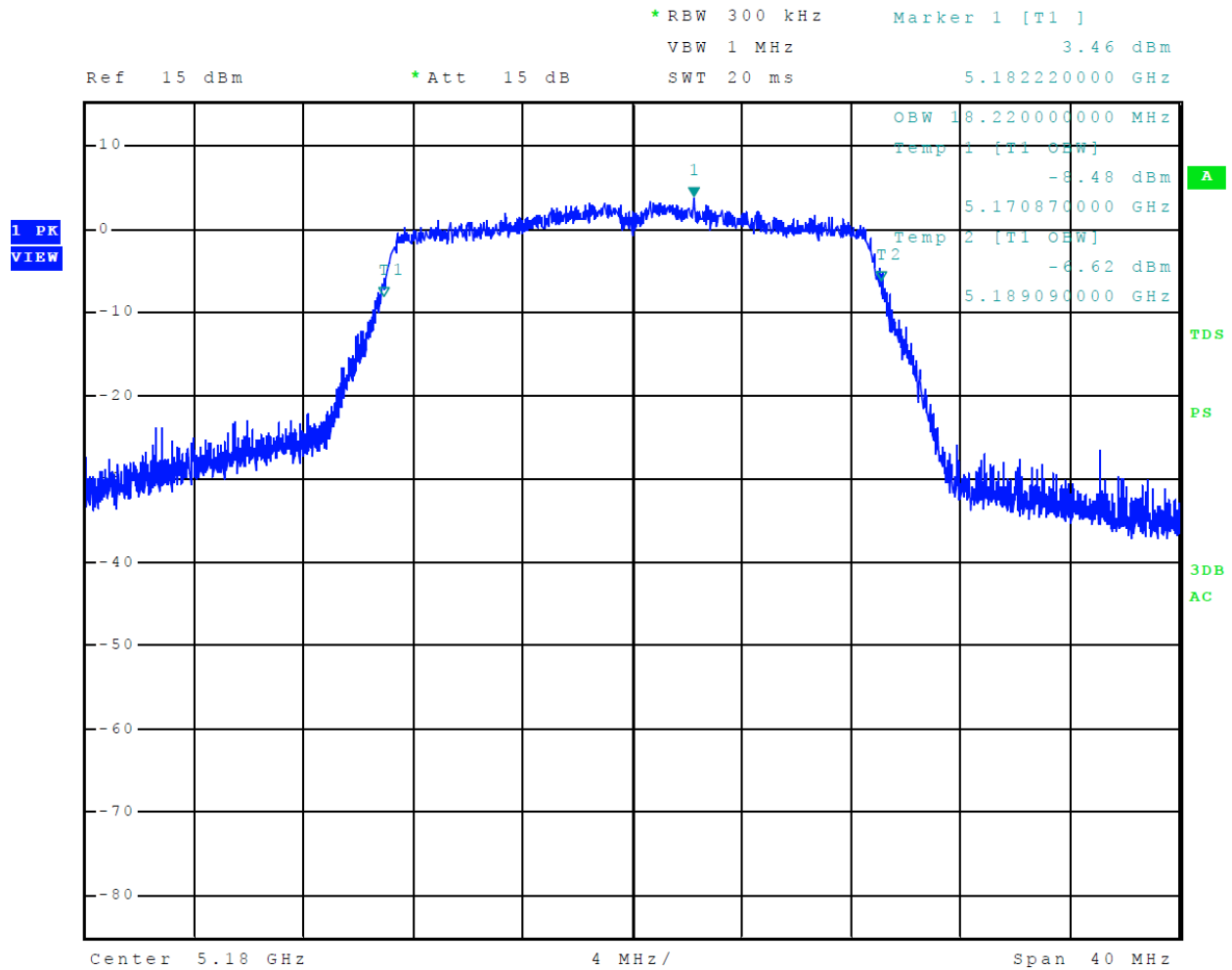


Figure 60 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 21 U-NII-1 (802.11ac40)

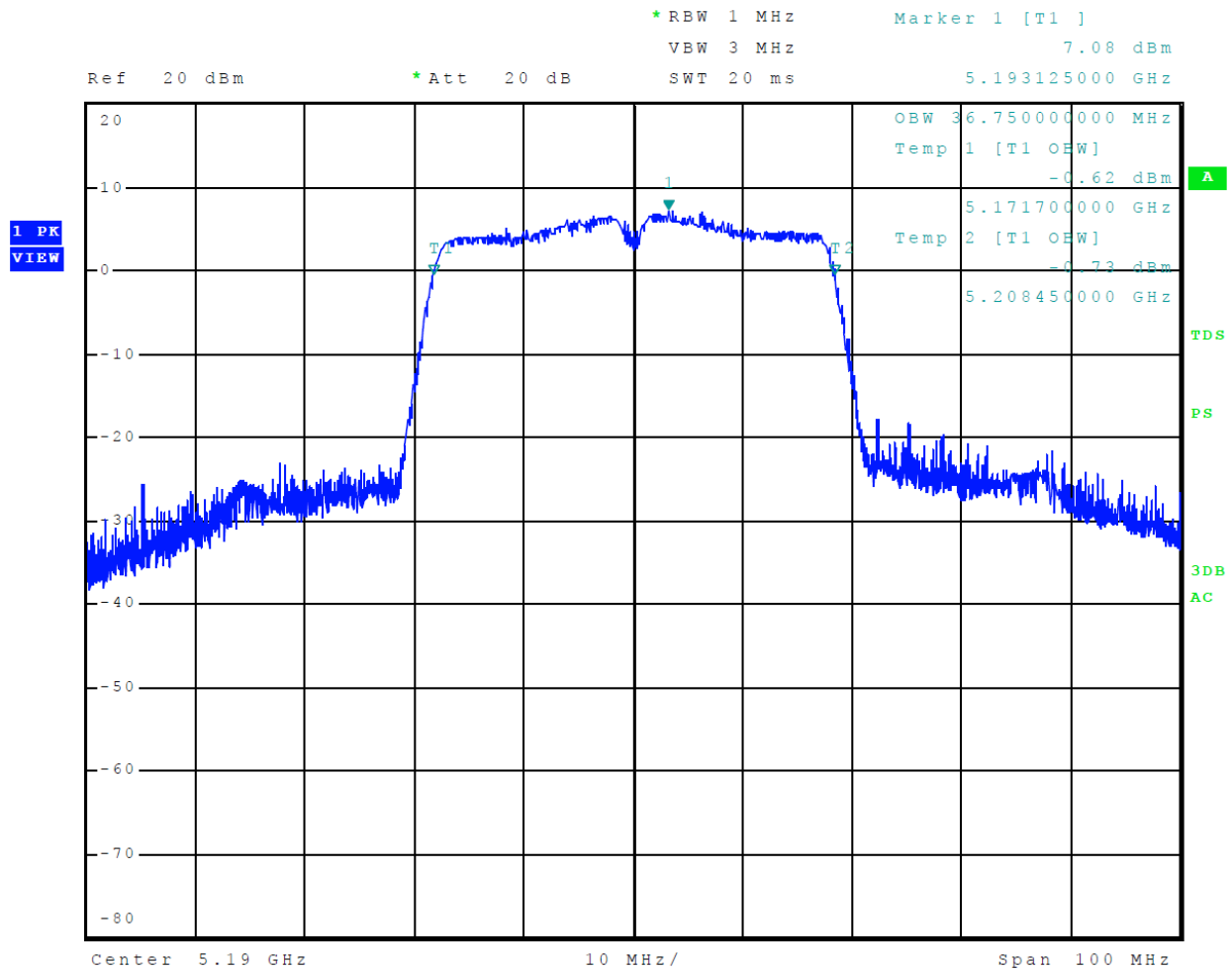
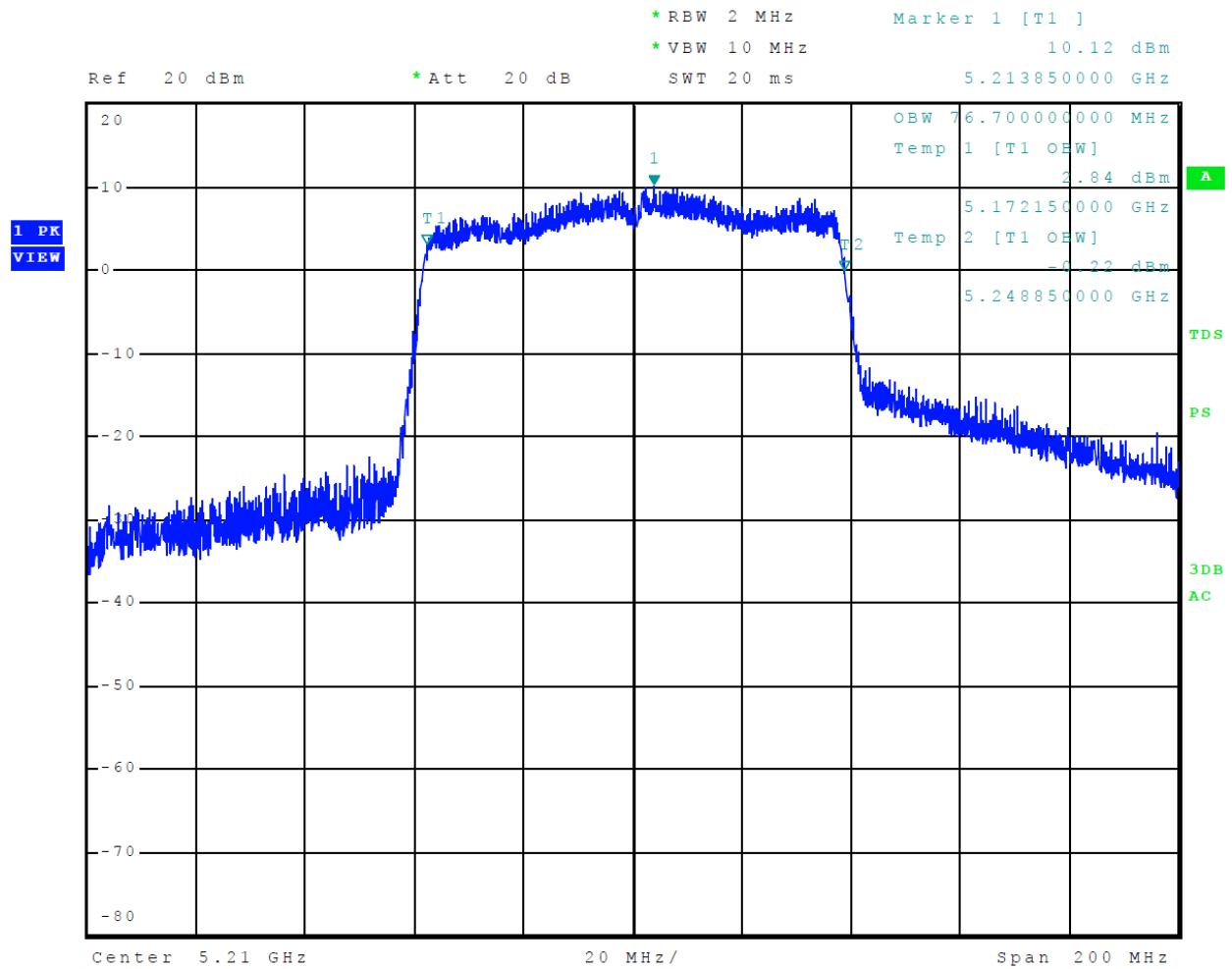


Figure 61 Plot of 99% Occupied Bandwidth 5150-5250 MHz Radio 2, Mode 22 U-NII-1 (802.11ac80)



Transmitter Emissions Data

Table 15 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 1, Mode 8 U-NII-1 (802.11a)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5180.0	--	--	--	--	--	--	--
10360.0	56.8	43.9	57.4	44.5	68.3	-24.4	-23.8
15540.0	61.6	48.4	61.7	48.5	68.3	-19.9	-19.8
20720.0	65.4	52.2	65.2	52.3	68.3	-16.1	-16.0
25900.0	66.4	53.3	67.1	53.3	68.3	-15.0	-15.0
5200.0	--	--	--	--	--	--	--
10400.0	57.7	44.6	58.1	44.7	68.3	-23.7	-23.6
15600.0	61.2	48.5	61.4	48.4	68.3	-19.8	-19.9
20800.0	64.9	52.3	65.2	52.3	68.3	-16.0	-16.0
26000.0	66.7	53.9	66.5	53.9	68.3	-14.4	-14.4
5240.0	--	--	--	--	--	--	--
10480.0	58.1	45.4	57.0	44.0	68.3	-22.9	-24.3
15720.0	61.2	48.3	61.5	48.3	68.3	-20.0	-20.0
20960.0	65.7	52.6	66.1	52.6	68.3	-15.7	-15.7
26200.0	66.1	53.3	66.3	53.2	68.3	-15.0	-15.1
Band Edges							
5150.0	62.3	47.8	59.2	45.5	54.0	-6.2	-8.5
5350.0	59.5	45.4	59.1	45.3	54.0	-8.6	-8.7

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 16 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 1, Mode 9 U-NII-1 (802.11n20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5180.0	--	--	--	--	--	--	--
10360.0	58.7	45.7	58.1	44.7	68.3	-22.6	-23.6
15540.0	61.6	48.6	61.2	48.5	68.3	-19.7	-19.8
20720.0	65.2	52.0	65.4	52.1	68.3	-16.3	-16.2
25900.0	66.3	53.0	67.0	53.0	68.3	-15.3	-15.3
5200.0	--	--	--	--	--	--	--
10400.0	57.9	45.0	57.1	43.8	68.3	-23.3	-24.5
15600.0	61.1	48.5	61.5	48.4	68.3	-19.8	-19.9
20800.0	65.6	52.2	64.9	52.2	68.3	-16.1	-16.1
26000.0	66.5	53.8	67.0	53.8	68.3	-14.5	-14.5
5240.0	--	--	--	--	--	--	--
10480.0	58.3	44.8	57.3	43.9	68.3	-23.3	-24.5
15720.0	61.7	48.4	61.1	48.4	68.3	-19.8	-19.9
20960.0	65.7	52.6	65.4	52.6	68.3	-16.1	-16.1
26200.0	66.3	53.1	66.2	53.1	68.3	-14.5	-14.5
Band Edges							
5150.0	64.6	48.2	60.2	45.1	54.0	-5.8	-8.9
5350.0	59.4	45.5	59.0	45.2	54.0	-8.5	-8.8

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 17 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 1, Mode 10 U-NII-1 (802.11n40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5190.0	--	--	--	--	--	--	--
10380.0	56.8	43.9	57.3	44.6	68.3	-24.4	-23.7
15570.0	61.8	48.5	62.0	48.5	68.3	-19.8	-19.8
20760.0	66.0	52.1	65.2	52.1	68.3	-16.2	-16.2
25950.0	66.3	52.9	66.7	52.9	68.3	-15.4	-15.4
5230.0	--	--	--	--	--	--	--
10460.0	57.5	44.4	57.6	44.5	68.3	-23.9	-23.8
15690.0	60.8	48.0	61.7	48.0	68.3	-20.3	-20.3
20920.0	65.4	52.7	65.6	52.7	68.3	-15.6	-15.6
26150.0	66.9	53.7	67.3	53.6	68.3	-14.6	-14.7
Band Edges							
5150.0	66.2	49.7	61.2	46.4	54.0	-4.3	-7.6
5350.0	59.0	45.5	59.3	45.3	54.0	-8.5	-8.7

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 18 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 1, Mode 11 U-NII-1 (802.11ac20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5180.0	--	--	--	--	--	--	--
10360.0	57.5	44.6	57.6	44.4	68.3	-23.7	-23.9
15540.0	61.2	48.5	61.4	48.6	68.3	-19.8	-19.7
20720.0	65.7	52.1	65.4	52.1	68.3	-16.2	-16.2
25900.0	67.1	53.0	67.1	53.0	68.3	-15.3	-15.3
5200.0	--	--	--	--	--	--	--
10400.0	57.3	44.3	57.7	44.6	68.3	-24.0	-23.7
15600.0	61.0	48.5	61.9	48.5	68.3	-19.8	-19.8
20800.0	65.9	52.7	65.8	52.6	68.3	-15.6	-15.7
26000.0	67.0	53.1	66.3	53.0	68.3	-15.2	-15.3
5240.0	--	--	--	--	--	--	--
10480.0	57.9	44.9	56.8	43.5	68.3	-23.4	-24.8
15720.0	60.9	48.3	61.9	48.2	68.3	-20.0	-20.1
20960.0	65.7	52.5	65.4	52.4	68.3	-15.8	-15.9
26200.0	66.8	53.0	66.6	53.0	68.3	-15.3	-15.3
Band Edges							
5150.0	63.7	48.3	60.4	45.7	54.0	-5.7	-8.3
5350.0	59.0	45.5	58.8	45.4	54.0	-8.5	-8.6

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 19 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 1, Mode 12 U-NII-1 (802.11ac40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5190.0	--	--	--	--	--	--	--
10380.0	56.4	43.4	56.9	44.0	68.3	-24.9	-24.3
15570.0	61.3	48.4	61.2	48.4	68.3	-19.9	-19.9
20760.0	65.5	52.0	65.6	51.9	68.3	-16.3	-16.4
25950.0	66.4	52.9	66.4	52.9	68.3	-15.4	-15.4
5230.0	--	--	--	--	--	--	--
10460.0	57.6	44.3	56.9	43.8	68.3	-24.0	-24.5
15690.0	60.6	48.0	61.3	48.0	68.3	-20.3	-20.3
20920.0	65.5	52.6	65.9	52.5	68.3	-15.7	-15.8
26150.0	66.7	53.6	67.0	53.6	68.3	-14.7	-14.7
Band Edges							
5150.0	64.7	49.7	61.4	46.5	54.0	-4.3	-7.5
5350.0	59.3	45.7	58.9	45.5	54.0	-8.3	-8.5

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 20 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 1, Mode 13 U-NII-1 (802.11ac80)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5210.0	--	--	--	--	--	--	--
10420.0	57.1	43.8	57.2	44.3	68.3	-24.5	-24.0
15630.0	61.1	48.0	60.9	48.1	68.3	-20.3	-20.2
20840.0	65.6	52.5	65.5	52.4	68.3	-15.8	-15.9
26050.0	67.4	53.7	67.5	53.7	68.3	-14.6	-14.6
Band Edges							
5150.0	66.2	51.3	61.3	47.4	54.0	-2.7	-6.6
5350.0	61.1	47.0	59.4	45.6	54.0	-7.0	-8.4

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 21 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 2, Mode 17 U-NII-1 (802.11a)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5180.0	--	--	--	--	--	--	--
10360.0	56.2	43.2	56.2	43.5	68.3	-25.1	-24.8
15540.0	61.6	48.6	61.9	48.8	68.3	-19.7	-19.5
20720.0	65.2	52.1	65.3	52.1	68.3	-16.2	-16.2
25900.0	66.5	53.0	66.4	53.1	68.3	-15.3	-15.2
5200.0	--	--	--	--	--	--	--
10400.0	57.5	44.0	56.9	43.8	68.3	-24.3	-24.5
15600.0	61.4	48.6	61.7	48.6	68.3	-19.7	-19.7
20800.0	65.3	52.2	65.6	52.1	68.3	-16.1	-16.2
26000.0	66.9	53.8	67.1	53.8	68.3	-14.5	-14.5
5240.0	--	--	--	--	--	--	--
10480.0	57.0	43.9	56.7	43.6	68.3	-24.4	-24.7
15720.0	62.2	48.3	61.0	48.3	68.3	-20.0	-20.0
20960.0	65.8	52.6	65.6	52.5	68.3	-15.7	-15.8
26200.0	66.4	53.0	66.5	52.9	68.3	-15.3	-15.4
Band Edges							
5150.0	60.3	45.9	65.6	49.0	54.0	-8.1	-5.0
5350.0	59.5	45.6	58.9	45.4	54.0	-8.4	-8.6

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 22 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 2, Mode 18 U-NII-1 (802.11n20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5180.0	--	--	--	--	--	--	--
10360.0	56.4	44.0	56.5	43.4	68.3	-24.3	-24.9
15540.0	61.5	48.5	61.7	48.6	68.3	-19.8	-19.7
20720.0	65.0	52.0	65.7	52.0	68.3	-16.3	-16.3
25900.0	66.3	52.9	66.1	52.9	68.3	-15.4	-15.4
5200.0	--	--	--	--	--	--	--
10400.0	56.7	43.6	57.1	43.8	68.3	-24.7	-24.5
15600.0	61.6	48.7	61.3	48.5	68.3	-19.6	-19.8
20800.0	65.2	52.1	65.2	52.1	68.3	-16.2	-16.2
26000.0	66.8	53.7	66.9	53.7	68.3	-14.6	-14.6
5240.0	--	--	--	--	--	--	--
10480.0	56.3	43.7	56.9	43.6	68.3	-24.6	-24.7
15720.0	61.3	48.2	62.4	48.4	68.3	-20.1	-19.9
20960.0	65.5	52.5	65.6	52.5	68.3	-15.8	-15.8
26200.0	66.4	52.9	66.1	52.9	68.3	-15.4	-15.4
Band Edges							
5150.0	71.4	46.1	64.8	45.1	54.0	-7.9	-8.9
5350.0	58.9	45.5	58.8	45.5	54.0	-8.5	-8.5

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 23 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 2, Mode 19 U-NII-1 (802.11n40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5190.0	--	--	--	--	--	--	--
10380.0	57.1	43.3	57.3	44.4	68.3	-25.0	-23.9
15570.0	61.5	48.4	61.7	48.5	68.3	-19.9	-19.8
20760.0	65.2	52.0	65.3	51.9	68.3	-16.3	-16.4
25950.0	65.8	52.8	66.2	52.8	68.3	-15.5	-15.5
5230.0	--	--	--	--	--	--	--
10460.0	56.5	43.5	57.4	43.8	68.3	-24.8	-24.5
15690.0	61.2	47.9	61.2	47.9	68.3	-20.4	-20.4
20920.0	65.6	51.9	65.5	51.9	68.3	-16.4	-16.4
26150.0	66.1	52.8	66.3	52.8	68.3	-15.5	-15.5
Band Edges							
5150.0	66.3	47.1	61.0	45.3	54.0	-6.9	-8.7
5350.0	58.8	45.6	59.1	45.4	54.0	-8.4	-8.6

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 24 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 2, Mode 20 U-NII-1 (802.11ac20)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5180.0	--	--	--	--	--	--	--
10360.0	57.0	43.8	56.8	43.3	68.3	-24.5	-25.0
15540.0	62.1	48.5	61.9	48.5	68.3	-19.8	-19.8
20720.0	65.2	52.0	65.6	52.0	68.3	-16.3	-16.3
25900.0	66.7	52.9	66.5	52.9	68.3	-15.4	-15.4
5200.0	--	--	--	--	--	--	--
10400.0	56.5	43.1	57.0	43.1	68.3	-25.2	-25.2
15600.0	61.8	48.5	61.8	48.5	68.3	-19.8	-19.8
20800.0	65.4	52.1	65.9	52.1	68.3	-16.2	-16.2
26000.0	66.9	53.7	67.3	53.7	68.3	-14.6	-14.6
5240.0	--	--	--	--	--	--	--
10480.0	56.4	43.6	57.1	44.0	68.3	-24.7	-24.3
15720.0	61.4	48.2	61.1	48.2	68.3	-20.1	-20.1
20960.0	65.3	52.5	65.4	52.9	68.3	-15.8	-15.4
26200.0	66.4	52.9	65.9	52.9	68.3	-15.4	-15.4
Band Edges							
5150.0	71.5	47.4	65.0	45.3	54.0	-6.6	-8.7
5350.0	59.2	45.3	58.8	45.2	54.0	-8.7	-8.8

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 25 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 2, Mode 21 U-NII-1 (802.11ac40)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5190.0	--	--	--	--	--	--	--
10380.0	56.8	43.8	56.9	43.2	68.3	-24.5	-25.1
15570.0	62.0	48.6	61.6	48.3	68.3	-19.7	-20.0
20760.0	65.4	51.9	65.5	51.9	68.3	-16.4	-16.4
25950.0	65.9	52.9	66.3	52.9	68.3	-15.4	-15.4
5230.0	--	--	--	--	--	--	--
10460.0	56.8	43.7	56.9	43.6	68.3	-24.6	-24.7
15690.0	61.3	48.1	61.3	48.1	68.3	-20.2	-20.2
20920.0	66.3	52.6	65.6	52.6	68.3	-15.7	-15.7
26150.0	66.4	53.6	67.1	53.6	68.3	-14.7	-14.7
Band Edges							
5150.0	65.0	46.5	67.4	50.0	54.0	-7.5	-4.0
5350.0	59.2	45.5	58.9	45.3	54.0	-8.5	-8.7

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 26 Transmitter Radiated Emission 5150-5250 MHz Band, Radio 2, Mode 22 U-NII-1 (802.11ac80)

Frequency in MHz	Horizontal Peak (dBμV/m)	Horizontal Average (dBμV/m)	Vertical Peak (dBμV/m)	Vertical Average (dBμV/m)	Limit @ 3m (dBμV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
5210.0	--	--	--	--	--	--	--
10420.0	57.0	43.9	56.5	43.5	68.3	-24.4	-24.8
15630.0	61.4	48.0	61.8	48.0	68.3	-20.3	-20.3
20840.0	66.3	52.5	65.7	52.4	68.3	-15.8	-15.9
26050.0	67.5	54.0	67.3	54.0	68.3	-14.3	-14.3
Band Edges							
5150.0	66.7	49.5	58.8	45.2	54.0	-4.5	-8.8
5350.0	66.1	47.9	60.3	45.9	54.0	-6.1	-8.1

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Table 27 Transmitter Antenna Port Radio 1, Data Modes 8-13 (U-NII-1)

Frequency MHz	Antenna Port Conducted Output Power (Watts)	99% Occupied Bandwidth (kHz)	Peak Power Spectral Density (dBm/MHz)
20 MHz Radio 1, Mode 8 U-NII-1 (802.11a)			
5180	0.015	17,230.0	10.4
5200	0.014	17,190.0	9.9
5240	0.014	17,170.0	9.6
20 MHz Radio 1, Mode 9 U-NII-1 (802.11n)			
5180	0.015	18362.5	10.9
5200	0.015	18300.0	11.1
5240	0.014	18275.0	10.2
40 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)			
5190	0.008	36,650.0	5.0
5230	0.007	36,875.0	4.6
20 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)			
5180	0.014	18,390.0	10.7
5200	0.015	18,230.0	10.4
5240	0.014	18,290.0	10.4
40 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)			
5190	0.007	36,650.0	4.4
5230	0.007	36,675.0	4.4
80 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)			
5210	0.007	76,400.00	3.19

Table 28 Transmitter Antenna Port Radio 2, Data Modes 17-22 (U-NII-1)

Frequency MHz	Antenna Port Conducted Output Power (Watts)	99% Occupied Bandwidth (kHz)	Peak Power Spectral Density (dBm/MHz)
20 MHz Radio 2, Mode 17 U-NII-1 (802.11a)			
5180	0.018	17,380.00	11.1
5200	0.017	17,210.00	11.0
5240	0.018	17,140.00	11.9
20 MHz Radio 2, Mode 18 U-NII-1 (802.11n20)			
5180	0.011	18,170.00	9.8
5200	0.011	18,180.00	9.9
5240	0.011	18,180.00	10.5
40 MHz Radio 2, Mode 19 U-NII-1 (802.11n40)			
5190	0.010	36,950.0	6.1
5230	0.010	36,800.0	5.9
20 MHz Radio 2, Mode 20 U-NII-1 (802.11ac20)			
5180	0.011	18,220.0	9.2
5200	0.011	18,130.0	9.1
5240	0.011	18,170.0	9.4
40 MHz Radio 2, Mode 21 U-NII-1 (802.11ac40)			
5190	0.014	36,750.0	7.1
5230	0.013	36,725.0	7.9
80 MHz Radio 2, Mode 22 U-NII-1 (802.11ac80)			
5210	0.016	76,700.00	6.13

Table 29 Transmitter Antenna Port Conducted Combined Output Power*

Frequency MHz	Antenna Port Conducted Output Power (dBm)			Total Output e.i.r.p. (dBm)	FCC Limit Conducted (dBm)	ISED Limit e.i.r.p. (dBm)	Results
	Radio 1	Radio 2	Total				
20 MHz							
5180	11.9	12.6	15.3	10.9	24.0	23.0	PASS
5200	11.6	12.4	15.0	10.6	24.0	23.0	PASS
5240	11.5	12.6	15.1	10.7	24.0	23.0	PASS
20 MHz							
5180	11.8	10.4	14.2	9.8	24.0	23.0	PASS
5200	11.7	10.5	14.2	9.8	24.0	23.0	PASS
5240	11.4	10.5	14.0	9.6	24.0	23.0	PASS
40 MHz							
5190	8.8	10.2	12.5	8.1	24.0	23.0	PASS
5230	8.3	9.9	12.2	7.8	24.0	23.0	PASS
20 MHz							
5180	11.6	10.4	14.0	9.6	24.0	23.0	PASS
5200	11.7	10.3	14.1	9.7	24.0	23.0	PASS
5240	11.4	10.4	13.9	9.5	24.0	23.0	PASS
40 MHz							
5190	8.7	11.3	13.2	8.8	24.0	23.0	PASS
5230	8.3	11.1	13.0	8.6	24.0	23.0	PASS
80 MHz							
5210	8.5	12.1	13.7	9.3	24.0	23.0	PASS

* See KDB 662911 D01 v02r01

Table 30 Transmitter Antenna Port Conducted Combined PSD*

Frequency MHz	Peak Power Spectral Density (dBm)			Total Ouput e.i.r.p. (dBm)	FCC Limit e.i.r.p. (dBm)	ISED Limit e.i.r.p. (dBm)	Results
	Radio 1	Radio 2	Total				
20 MHz Radio 1, Mode 8 U-NII-1 (802.11a)							
5180	10.4	11.1	13.8	9.4	11.0	14.8	PASS
5200	9.9	11.0	13.5	9.1	11.0	14.8	PASS
5240	9.6	11.9	13.9	9.5	11.0	14.8	PASS
20 MHz Radio 1, Mode 9 U-NII-1 (802.11n20)							
5180	10.9	9.8	13.4	9.0	11.0	14.8	PASS
5200	11.1	9.9	13.6	9.2	11.0	14.8	PASS
5240	10.2	10.5	13.4	9.0	11.0	14.8	PASS
40 MHz Radio 1, Mode 10 U-NII-1 (802.11n40)							
5190	5.0	6.1	8.6	4.2	11.0	17.8	PASS
5230	4.6	5.9	8.3	3.9	11.0	17.8	PASS
20 MHz Radio 1, Mode 11 U-NII-1 (802.11ac20)							
5180	10.7	9.2	13.0	8.6	11.0	14.8	PASS
5200	10.4	9.1	12.8	8.4	11.0	14.8	PASS
5240	10.4	9.4	12.9	8.5	11.0	14.8	PASS
40 MHz Radio 1, Mode 12 U-NII-1 (802.11ac40)							
5190	4.4	7.1	9.0	4.6	11.0	17.8	PASS
5230	4.4	7.9	9.5	5.1	11.0	17.8	PASS
80 MHz Radio 1, Mode 13 U-NII-1 (802.11ac80)							
5210	3.2	6.1	7.9	3.5	11.0	20.8	PASS

* See KDB 662911 D01 v02r01

Summary of Results for Transmitter Radiated Emissions of Intentional Radiator

The EUT demonstrated compliance with the radiated emissions requirements of 47 CFR Part 15.407 and Industry Canada RSS-247 Issue 3. The maximum average conducted power delivered to antenna for U-NII-1 was 0.018-Watts. The radiated harmonic emissions provided a minimum margin of -14.3 dB below requirements. There were no other significantly measurable emissions in the restricted bands other than those presented in this report. Other emissions were present with amplitudes at least 20 dB below the requirements. There were no other deviations or exceptions to the requirements.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Additional Test Equipment
- Annex C Rogers Labs Certificate of Accreditation

Annex A Measurement Uncertainty Calculations

The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16–4. Result of measurement uncertainty calculations are recorded below. Component and process variability of production devices similar to those tested may result in additional deviations. The manufacturer has the sole responsibility of continued compliance.

Measurement	Expanded Measurement Uncertainty $U_{(lab)}$
3 Meter Horizontal 0.009-1000 MHz Measurements	4.16
3 Meter Vertical 0.009-1000 MHz Measurements	4.33
3 Meter Measurements 1-18 GHz	5.46
3 Meter Measurements 18-40 GHz	5.16
10 Meter Horizontal Measurements 0.009-1000 MHz	4.15
10 Meter Vertical Measurements 0.009-1000 MHz	4.32
AC Line Conducted	1.75
Antenna Port Conducted power	1.17
Frequency Stability	1.00E-11
Temperature	1.6°C
Humidity	3%

Annex B Test Equipment

Equipment	Manufacturer	Model (SN)	Band	Cal Date(m/d/y)	Due
☒ LISN	FCC	FCC-LISN-50-25-10(1PA) (160611)	.15-30MHz	3/20/2025	3/20/2026
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(L10M)(303073)	9kHz-40 GHz	9/16/2024	9/16/2025
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(1.5M)(303069)	9kHz-40 GHz	9/16/2024	9/16/2025
☒ Cable	Belden	RG-58 (L1-CAT3-11509)	9kHz-30 MHz	9/16/2024	9/16/2025
☐ Cable	Belden	RG-58 (L2-CAT3-11509)	9kHz-30 MHz	9/16/2024	9/16/2025
☒ Antenna	Com Power	AL-130 (121055)	.001-30 MHz	9/16/2024	9/16/2025
☐ Antenna:	EMCO	6509	.001-30 MHz	9/16/2024	9/16/2026
☒ Antenna	ARA	BCD-235-B (169)	20-350MHz	9/16/2024	9/16/2025
☒ Antenna	Sunol	JB-6 (A100709)	30-1000 MHz	9/16/2024	9/16/2025
☐ Antenna	ETS-Lindgren	3147 (40582)	200-1000MHz	9/16/2024	9/16/2026
☒ Antenna	ETS-Lindgren	3117 (200389)	1-18 GHz	3/17/2025	3/17/2027
☒ Antenna	Com Power	AH-118 (10110)	1-18 GHz	9/16/2024	9/16/2026
☒ Antenna	Com Power	AH-840 (101046)	18-40 GHz	3/17/2025	3/17/2027
☒ Analyzer	Rohde & Schwarz	ESU40 (100108)	20Hz-40GHz	7/8/2024	7/8/2025
☒ Analyzer	Rohde & Schwarz	ESW44 (101534)	20Hz-44GHz	1/21/2025	1/21/2026
☐ Analyzer	Rohde & Schwarz	FS-Z60, 90, 140, and 220	40GHz-220GHz	12/22/2017	12/22/2027
☐ Amplifier	Com-Power	PA-010 (171003)	100Hz-30MHz	9/16/2024	9/16/2025
☐ Amplifier	Com-Power	CPPA-102 (01254)	1-1000 MHz	9/16/2024	9/16/2025
☒ Amplifier	Com-Power	PAM-118A (551014)	0.5-18 GHz	9/16/2024	9/16/2025
☒ Amplifier	Com-Power	PAM-840A (461328)	18-40 GHz	9/16/2024	9/16/2025
☒ Pwr Sensor	Rohde & Schwarz	NRP33T	0.05-33 GHz	9/26/2023	9/26/2025
☒ Generator	Rohde & Schwarz	SMBV100A6 (260771)	20Hz-6 GHz	3/19/2025	3/19/2026
☐ RF Filter	Micro-Tronics	BRC50722 (009).9G notch	30-18000 MHz	3/21/2025	3/21/2026
☐ RF Filter	Micro-Tronics	HPM50117 (063) 3G HPF	30-18000 MHz	3/21/2025	3/21/2026
☒ RF Filter	Micro-Tronics	BRM50702 (172) 2G notch	30-18000 MHz	3/21/2025	3/21/2026
☒ RF Filter	Micro-Tronics	BRC50703 (G102) 5G notch	30-18000 MHz	3/21/2025	3/21/2026
☒ RF Filter	Micro-Tronics	BRC50705 (024) 5G notch	30-18000 MHz	3/21/2025	3/21/2026
☐ Attenuator	Fairview	SA6NFNF100W-40 (1625)	30-18000 MHz	3/21/2025	3/21/2026
☒ Attenuator	Mini-Circuits	VAT-3W2+ (1445)	30-6000 MHz	3/21/2025	3/21/2026
☒ Attenuator	Mini-Circuits	VAT-3W2+ (1735)	30-6000 MHz	3/21/2025	3/21/2026
☒ Attenuator	Mini-Circuits	VAT-6W2+ (1438)	30-6000 MHz	3/21/2025	3/21/2026
☒ Weather station	Davis	6152 (A70927D44N)		7/11/2024	7/11/2025

<u>Equipment</u>	<u>Manufacturer</u>	<u>Model (SN)</u>	<u>Band</u>	<u>Cal Date(m/d/y)</u>	<u>Due</u>
☐ Frequency Counter: Leader		LDC-825 (8060153)		3/19/2025	3/19/2026
☐ ISN	Com-Power	Model ISN T-8 (600111)		3/19/2025	3/19/2026
☐ LISN	Compliance Design	FCC-LISN-2.Mod.cd,(126)	.15-30MHz	9/16/2024	9/16/2025
☐ LISN:	Com-Power	Model LI-220A		9/16/2024	9/16/2026
☒ LISN:	Com-Power	Model LI-550C		9/16/2024	9/16/2025
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(1.5M)(303072)	9kHz-40 GHz	9/16/2024	9/16/2025
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(L1M)(281183)	9kHz-40 GHz	9/16/2024	9/16/2025
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(4M)(281184)	9kHz-40 GHz	9/16/2024	9/16/2025
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(L10M)(317546)	9kHz-40 GHz	9/16/2024	9/16/2025
☒ Cable	Time Microwave	4M-750HF290-750 (L4M)	9kHz-24 GHz	9/16/2024	9/16/2025
☒ Cable	Mini-Circuits	KBL-2M-LOW+ (23090329)	9kHz-40 GHz	3/22/2025	3/22/2026
☒ Analyzer	HP	8562A (3051A05950)	9kHz-125GHz	3/20/2025	3/20/2026
☐ Antenna:	Solar	9229-1 & 9230-1		2/5/2025	2/5/2026
☐ CDN:	Com-Power	Model CDN M325E		9/16/2024	9/16/2025
☐ Oscilloscope Scope: Tektronix		MDO 4104		2/5/2025	2/5/2026
☐ EMC Transient Generator HVT		TR 3000		2/5/2025	2/5/2026
☐ AC Power Source (Ametech, California Instruments)				2/5/2025	2/5/2026
☒ Field Intensity Meter: EFM-018				2/5/2025	2/5/2026
☒ ESD Simulator: MZ-15				2/5/2025	2/5/2026
☐ Injection Clamp Luthi Model EM101				not required	
☐ R.F. Power Amp ACS 230-50W				not required	
☐ R.F. Power Amp EIN Model: A301				not required	
☐ R.F. Power Amp A.R. Model: 10W 1010M7				not required	
☐ R.F. Power Amp A.R. Model: 50U1000				not required	
☒ Temperature Chamber				not required	
☒ Shielded Room				not required	
POSSIBLY USE FOR GARMIN GPS TESTING					
☐ GNSS Sig Gen SG80K, SN: GNSS-00952				not required	

Annex C Laboratory Certificate of Accreditation

United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®] **ilac-MRA**

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200087-0

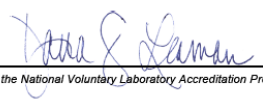
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*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2024-03-18 through 2025-03-31
Effective Dates

 
For the National Voluntary Laboratory Accreditation Program

United States Department of Commerce
National Institute of Standards and Technology

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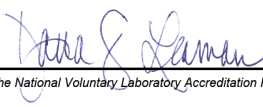
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2025-03-11 through 2026-03-31
Effective Dates

 
For the National Voluntary Laboratory Accreditation Program

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Revision 4

HVIN: GMN-03000
Test #: 250128
Test to: 47CFR 15E
File: GMN-03000 FCC NII TstRpt 250128 r4

Garmin International, Inc
FCC ID: IPH-04286
SN: 78F000511 & 78F000512
Date: June 29, 2026
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