NVLAP Lab Code 200087-0

Rogers Labs, a division of The Compatibility Center LLC

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47CFR, PART 15C - Intentional Radiators
47CFR Paragraph 15.249 and
Industry Canada RSS-GEN Issue 5 and RSS-210 Issue 11
Application For Grant of Certification

Model: A05043

2402-2480 MHz
Low Power Digital Transmitter (DXX)

FCC ID: IPH-05043 IC: 1792A-05043

Garmin International, Inc.

1200 East 151st Street
Olathe, KS 66062
Jeff Hailey
Staff Compliance Engineer

Test Report Number: 250404
Test Date: April 4, 2025 – May 27, 2025

Authorized Signatory:

Patrick Powell
Rogers Labs, a division of The Compatibility Center LLC
FCC Designation: US5305
ISED Registration: 3041A

Revisions

Revision 1 Issued – June 24, 2025

Executive Summary

License Exempt Digital Transmission System Intentional Radiator operating under Title 47 Code of Federal Regulations (47 CFR) Paragraph 15.249 and Industry Canada RSS-210 Issue 11 and RSS-GEN Issue 5, Low Power (DXX) Digital Device transmitter operations in the 2400 – 2483.5 MHz frequency band.

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

PMN: A05043
FCC ID: IPH-05043 IC: 1792A-05043
Operating Frequency Range: 2402-2480 MHz

A05043 was chosen for transmitter configuration testing and used for final measurements.

Operational communication mode 1

Mode	Peak Power (dBµV/m@3m)	Average power (dBµV/m@3m)	Limit@3m (dBuV/m)	Margin	99% OBW (kHz)
Mode 1, ANT (GFSK)	93.3	92.3	94.0	-1.7	989.3

This report addresses EUT Operations as Low Power Transmitter (DXX) using transmitter modulation mode 1. Note, the production device utilizes two non-user accessible integral antennas with 1.8 dBi (ANT) and 5.8 dBi (BT and WiFi) gain.

Opinion / Interpretation of Results

Tests Performed	Margin (dB)	Results
Restricted Bands 47 CFR 15.205, RSS-210 4.1	-7.7	Complies
Conducted Emissions per 47CFR 15.207, RSS-GEN 8.8	N/A	Complies
Radiated Emissions 47 CFR 15.209, RSS-GEN 8.9	-8.51	Complies
Harmonic Emissions per 47 CFR 15.249, RSS-210 B.10	-0.7	Complies

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Equipment Tested

Model: A05043

Garmin International, Inc.
1200 East 151st Street
Olathe, KS 66062

Equipment	Model / PN	Serial Number
EUT #1 Radiated	A05043	3495259652
EUT #2 Antenna Port	A05043	3495259647
Garmin GT56 Transducer	010-13073-00	6QR262970
Power Cable	320-01043-50	n/a
Garmin GCV20 Sonar Box	010-01156-02	5JW004749 5JW004754
Garmin Heading Sensor	010-1141710	543023755
HDMI Load	n/a	n/a
Garmin NMEA Starter Kit	010-11442-00	n/a

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 and is not capable of simultaneous transmission on more than one port.

Software (FVIN): 40.42; Antennas: 2.4 GHz ANT dipole (1.8 dBi), 2.4 GHz WiFi/BT dipole (5.8 dBi)

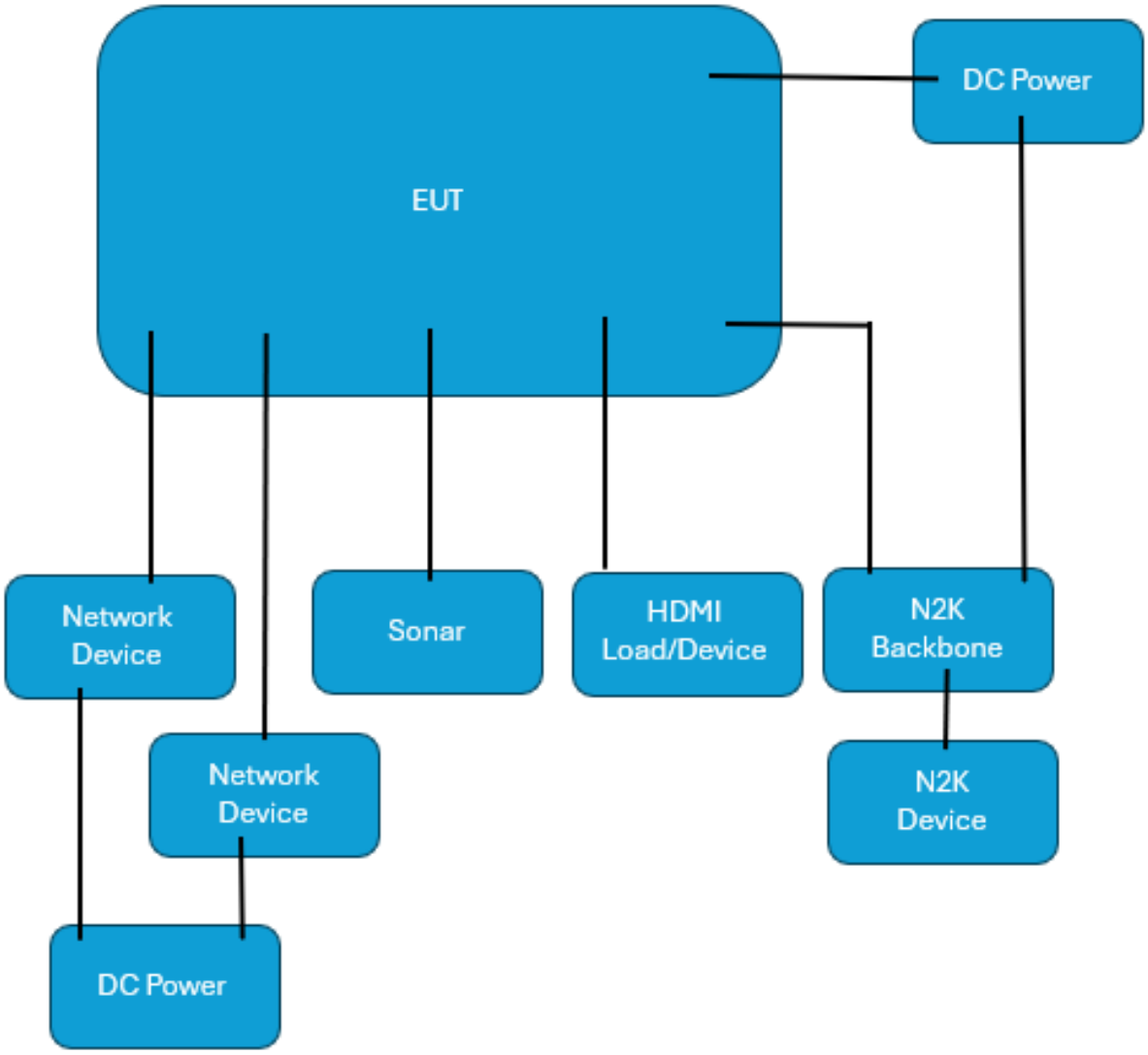
Equipment Operational Modes

Mode	Transmitter Operation
mode 1	ANT (GFSK)
mode 2	BT BR (GFSK)
mode 3	BT (2EDR π/4 DQPSK)
mode 4	BT (3EDR 8DPSK)
mode 5	BT BLE (GMSK)
mode 6	802.11b
mode 7	802.11g
mode 8	802.11n

Equipment Function

The EUT is a transceiver with display and GNSS. The radio supports 802.11b, 802.11g, 802.11n, BTC, BLE and ANT transmit and receive. For more detailed feature descriptions, please refer to the manufacturer's specifications or user's manual. The typical use configuration has the EUT and powered from direct current power. The design provides interface capability as presented below and wireless communications with compatible equipment. The EUT was arranged as described by the manufacturer emulating typical user configurations for testing purposes. The EUT offers no other interface connections than those presented in the configuration options as described by the manufacturer and presented below. For testing purposes, the EUT received power from external direct current power supply. During testing, the test system was configured to operate in a manufacturer defined modes. The manufacturer provided test software for testing transmitter and equipment function. The software provided the ability to operate the transmitters 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



Environmental Conditions

Ambient Temperature	22.2° C
Relative Humidity	31.0 %
Atmospheric Pressure	1016.7 mb

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Application for Certification

(1) Manufacturer: Garmin International, Inc.
1200 East 151st Street
Olathe, KS 66062

(2) Identification: HVIN: A05043
FCC ID: IPH-05043 IC: 1792A-05043

(3) Instruction Book:
Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions:
Refer to Exhibit of Operational Description.

(5) Block Diagram with Frequencies:
Refer to Exhibit of Operational Description.

(6) Report of Measurements:
Report of measurements follows in this Report.

(7) Photographs: Construction, Component Placement, etc.:
Refer to Exhibit for photographs of equipment.

(8) List of Peripheral Equipment Necessary for operation. The equipment operates from external direct current power provided from installation vehicle. The EUT provides interface ports for power, loads and communications as presented in this filing.

(9) Transition Provisions of 47 CFR 15.37 are not requested.

(10) Not Applicable. The unit is not a scanning receiver.

(11) Not Applicable. The EUT does not operate in the 59 – 64 GHz frequency band.

(12) The equipment is not software defined and this section is not applicable.

(13) Applications for certification of U-NII devices in the 5.15-5.35 GHz and the 5.47-5.85 GHz bands must include a high-level operational description of the security procedures that control the radio frequency operating parameters and ensure that unauthorized modifications cannot be made. This requirement is not applicable to his DTS device.

(14) Contain at least one drawing or photograph showing the test set-up for each of the required types of tests applicable to the device for which certification is requested. These drawings or photographs must show enough detail to confirm other information contained in the test report. Any photographs used must be focused originals without glare or dark spots and must clearly show the test configuration used. This information is provided in this report and Test Setup Exhibits provided with the application filing.

Applicable Standards

The following information is submitted in accordance with the eCFR Title 47 Code of Federal Regulations (47CFR), dated November 18, 2024: Part 2, Subpart J, Part 15C Paragraph 15.249, Industry Canada RSS-210 Issue 11, and RSS-GEN Issue 5. Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in ANSI C63.10-2013. This report documents compliance with the EUT operations as Low Power Transmitter (DXX).

Equipment Testing Procedures

AC Line Conducted Emission Test Procedure

The design operates from Direct Current power only and offers no provision to interface with Utility AC Power systems. Therefore, No AC Line conducted emissions testing was required or preformed.

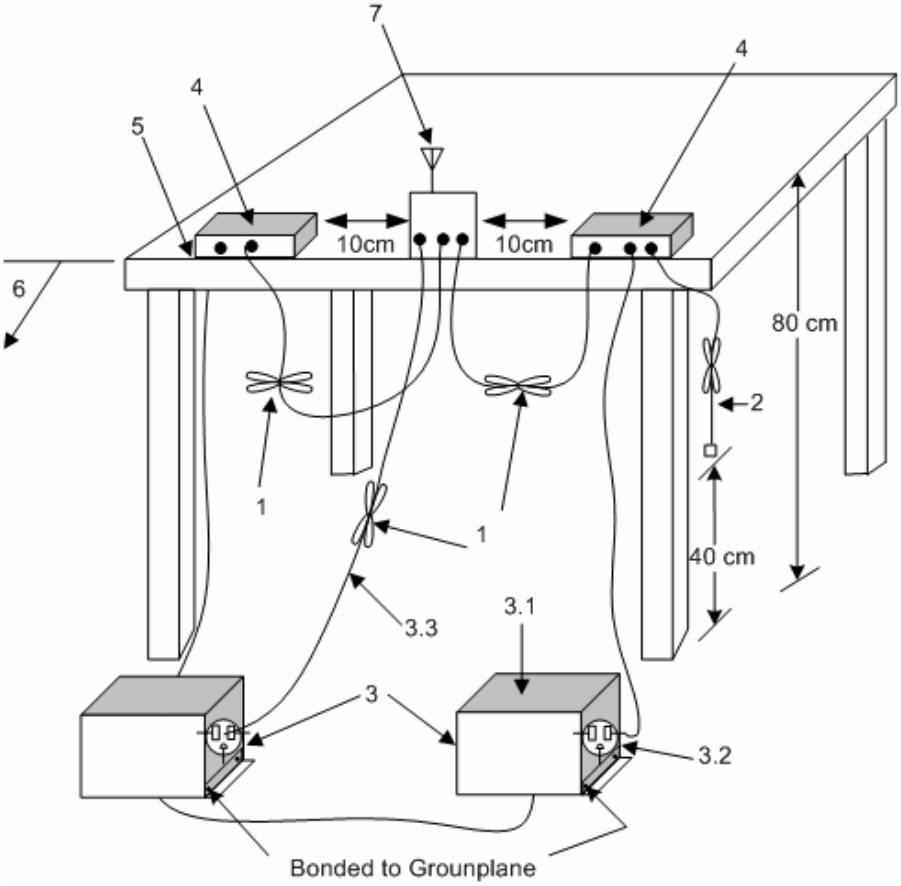
Radiated Emission Test Procedure

Radiated emissions testing was performed as required in 47 CFR 15C, RSS-210 Issue 11, 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. Per above requirements, the frequency spectrum from 9 kHz to 25,000 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

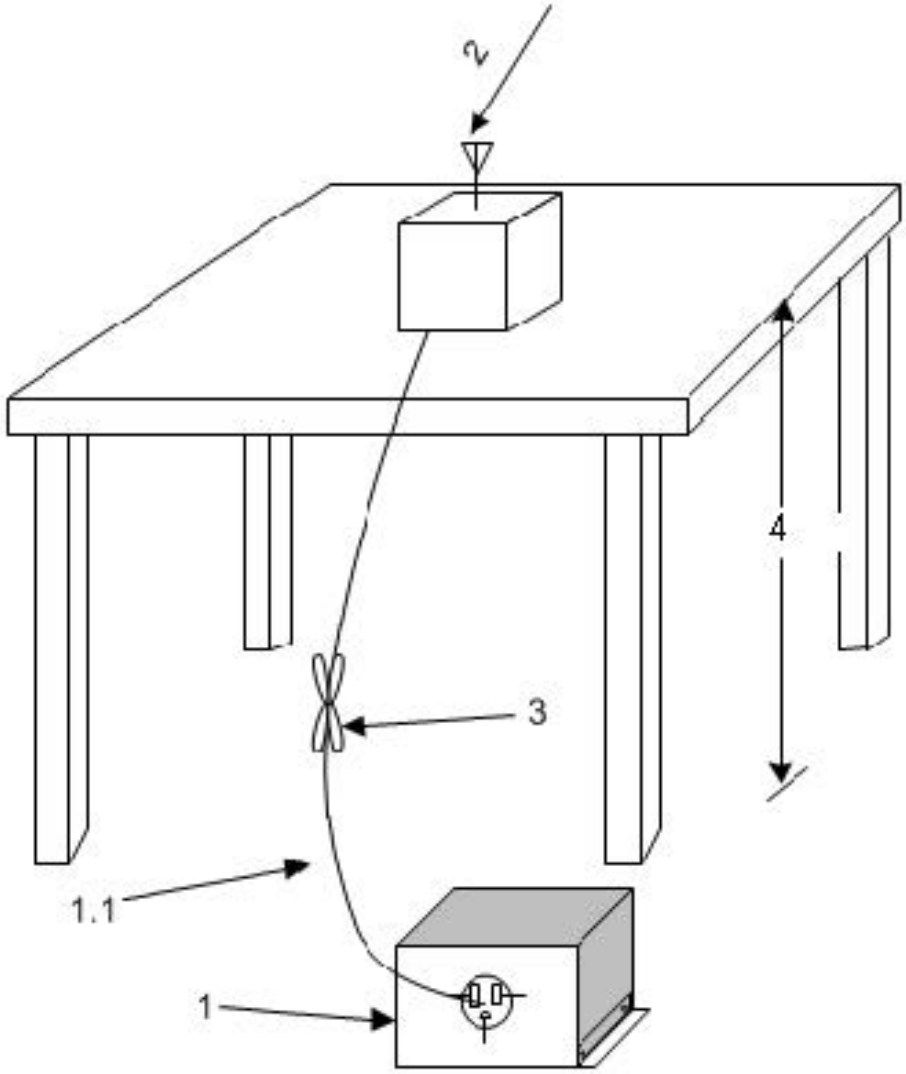
The EUT was assembled as required for operation placed on a benchtop. This configuration provided the ability to connect test equipment to the provided test antenna port Antenna Port conducted emissions testing was performed presented in the regulations and specified in ANSI C63.10-2013. Testing was 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 three showing typical test arrangement and photographs in the test setup exhibits for specific EUT placement during testing.

Diagram 1 Test arrangement for power-line conducted emissions



1. 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 (see 6.2.3.1).
2. I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m (see 6.2.2).
3. EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN can be placed on top of, or immediately beneath, reference ground plane (see 6.2.2 and 6.2.3).
   3.1 All other equipment powered from additional LISN(s).
   3.2 Multiple-outlet strip can be used for multiple power cords of non-EUT equipment.
   3.3 LISN at least 80 cm from nearest part of EUT chassis.
4. Non-EUT components of EUT system being tested.
5. Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop (see 6.2.3.1).
6. Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane (see 6.2.2 for options).
7. Antenna may be integral or detachable. If detachable, the antenna shall be attached for this test

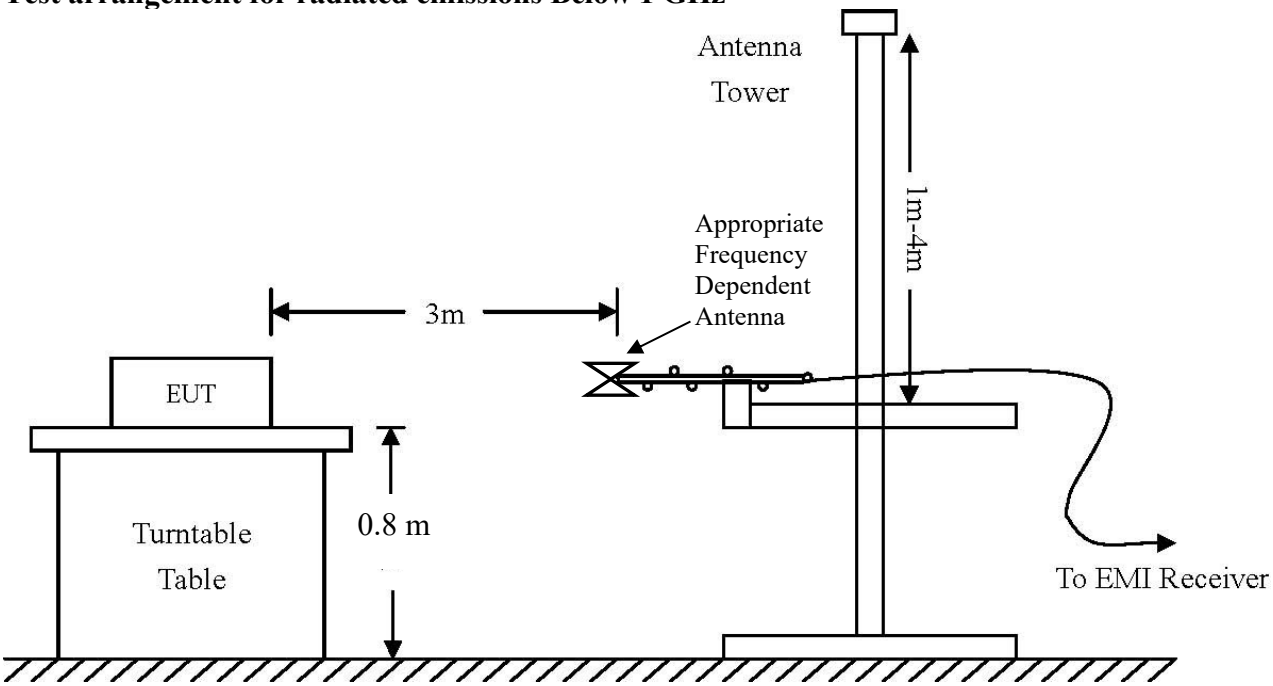
Diagram 2 Test arrangement for radiated emissions of tabletop equipment



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) or Open Area Test Site (OATS)

Test arrangement for radiated emissions Below 1 GHz



Test arrangement for radiated emissions Above 1 GHz

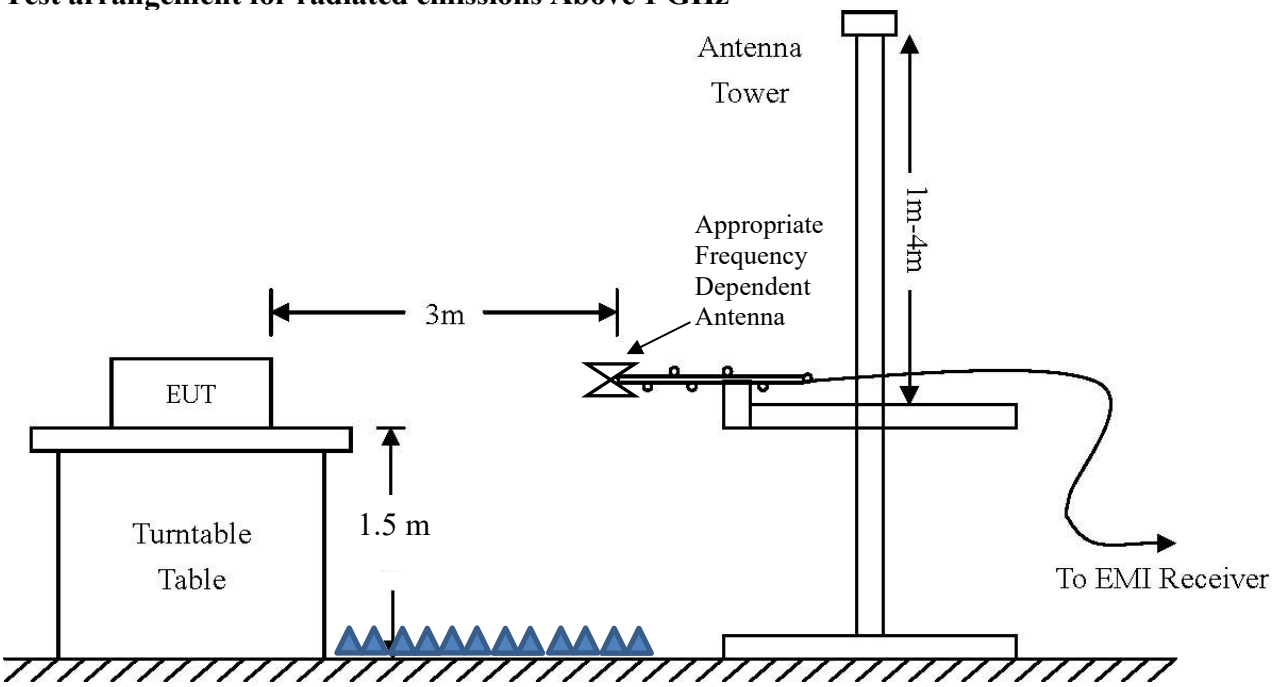
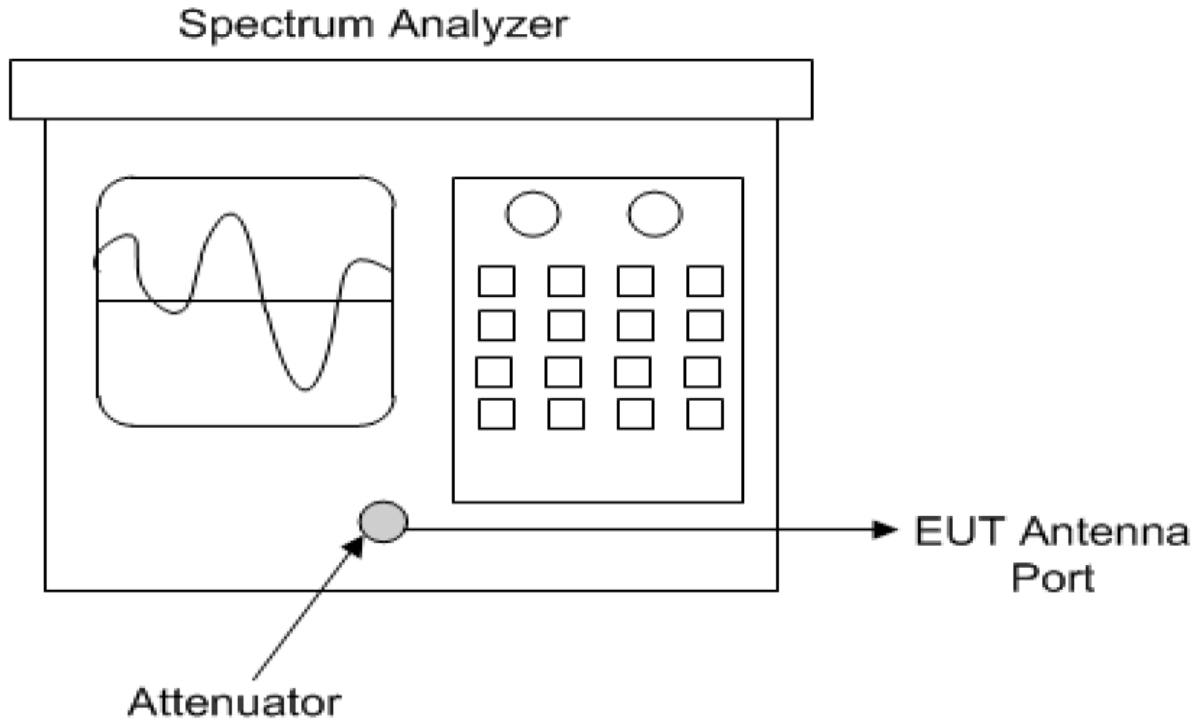


Diagram 4 Test arrangement for Antenna Port Conducted emissions



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: Radiated limit may be expressed for 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 (dBµV/m @ 3m) = FSM (dBµV) + A.F. (dB/m) + Losses (dB) - Gain (dB)

Statement of Modifications and Deviations

No modifications to the EUT were required for the equipment to demonstrate compliance with the 47 CFR Part 15C, Industry Canada RSS-210 Issue 11, and RSS-GEN Issue 5 emission requirements. There were no deviations to the specifications.

Intentional Radiators

The following information is submitted supporting compliance with the requirements of 47 CFR, Subpart C, paragraph 15.249, Industry Canada RSS-210 Issue 11, and RSS-GEN Issue 5.

Per 47 CFR, Subpart A, paragraph 15.31, all testing was performed over three frequencies (1 near top, 1 near middle and 1 near bottom).

Antenna Requirements

The EUT incorporates integral non-user accessible systems. Production equipment 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 in the 3 meters Semi-Anechoic Chamber (SAC). The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were investigated in the 3m SAC, using appropriate antennas or pyramidal horns, amplification stages, and receiver / 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 Radiated Emissions in Restricted Frequency Bands Data Mode 1 ANT (GFSK)

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)
2390.0	50.3	36.5	53.7	36.6	54.0	-17.5	-17.4
2483.5	57.4	37.3	60.3	37.9	54.0	-16.7	-16.1
4804.0	49.9	36.0	49.3	36.0	54.0	-18.0	-18.0
4914.0	49.4	36.2	50.1	36.2	54.0	-17.8	-17.8
4960.0	49.2	36.2	49.9	36.6	54.0	-17.8	-17.4
7206.0	52.6	39.7	54.2	42.4	54.0	-14.3	-11.6
7371.0	53.3	40.4	55.0	43.7	54.0	-13.6	-10.3
7440.0	54.4	42.4	54.2	41.7	54.0	-11.6	-12.3
12010.0	58.6	45.1	58.3	45.1	54.0	-8.9	-8.9
12285.0	59.4	46.3	59.4	46.3	54.0	-7.7	-7.7
12400.0	59.0	45.7	59.2	45.7	54.0	-8.3	-8.3

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.

Summary of Results for Radiated Emissions in Restricted Bands

The EUT demonstrated compliance with the radiated emissions requirements of 47CFR Part 15C and RSS-210 Issue 11 Intentional Radiator requirements. The EUT demonstrated a worst-case minimum margin of -7.7 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 design operates from Direct Current power only and offers no provision to interface with Utility AC Power systems. Therefore, No AC Line conducted emissions testing was required or preformed.

General Radiated Emissions Procedure

The EUT was arranged in a manufacturer defined equipment configuration and operated with transmitter active during testing. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies which produced the highest emissions. Each radiated emission was then maximized in the SAC before final radiated measurements were performed. Final data was taken with the EUT located in the SAC at 3 meters distance between the EUT and the receiving antenna. The frequency spectrum from 9 kHz to 25,000 MHz was searched for general radiated emissions. Measured emission levels were maximized by EUT placement on the table, 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 from 9 kHz to 30 MHz, Broadband Biconical from 30 to 200 MHz, Biconilog from 30 to 1000 MHz, Log Periodic from 200 MHz to 1 GHz and or double Ridge or pyramidal horns and mixers above 1 GHz, notch filters and appropriate amplifiers and external mixers were utilized.

Refer to tables 2 and 3 for general radiated emissions data and figures one through seven for plots of the worst case radiated emissions taken in the SAC (30 MHz to 1 GHz) and screen room (1 to 25 GHz).

Table 2 General Radiated Emissions Data - Horizontal Polarization

Frequency (MHz)	Peak (dBµV/m)	Quasi-Peak (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dBm)
349.99	39.54	37.08	47	-9.92
439.13	36.099	29.93	47	-17.07
448.9	35.434	27.53	47	-19.47
825.35	40.372	33.02	47	-13.98
861.11	50.02	37.43	47	-9.57
878.75	42.532	33.66	47	-13.34

Table 3 General Radiated Emissions Data - Vertical Polarization

Frequency (MHz)	Peak (dBµV/m)	Quasi-Peak (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dBm)
439.43	42.023	38.49	47	-8.51
450.11	34.95	28.49	47	-18.51
826.12	40.804	32.58	47	-14.42
861.38	48.53	36.82	47	-10.18
872.45	43.019	34.41	47	-12.59
879.02	40.355	31.42	47	-15.58

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 (30 MHz – 230 MHz)

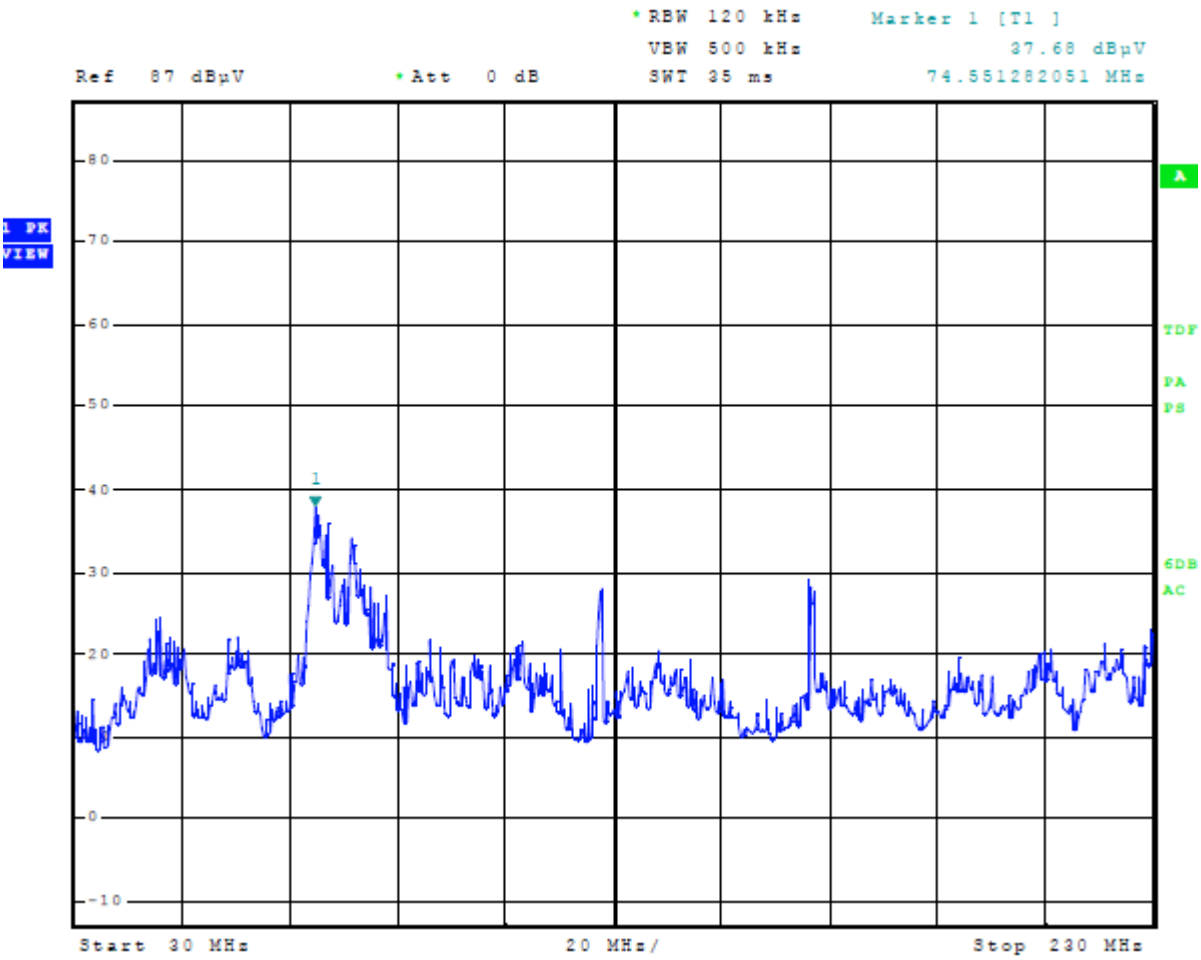


Figure 2 Plot of General Radiated Emissions (200 MHz – 1.2 GHz)

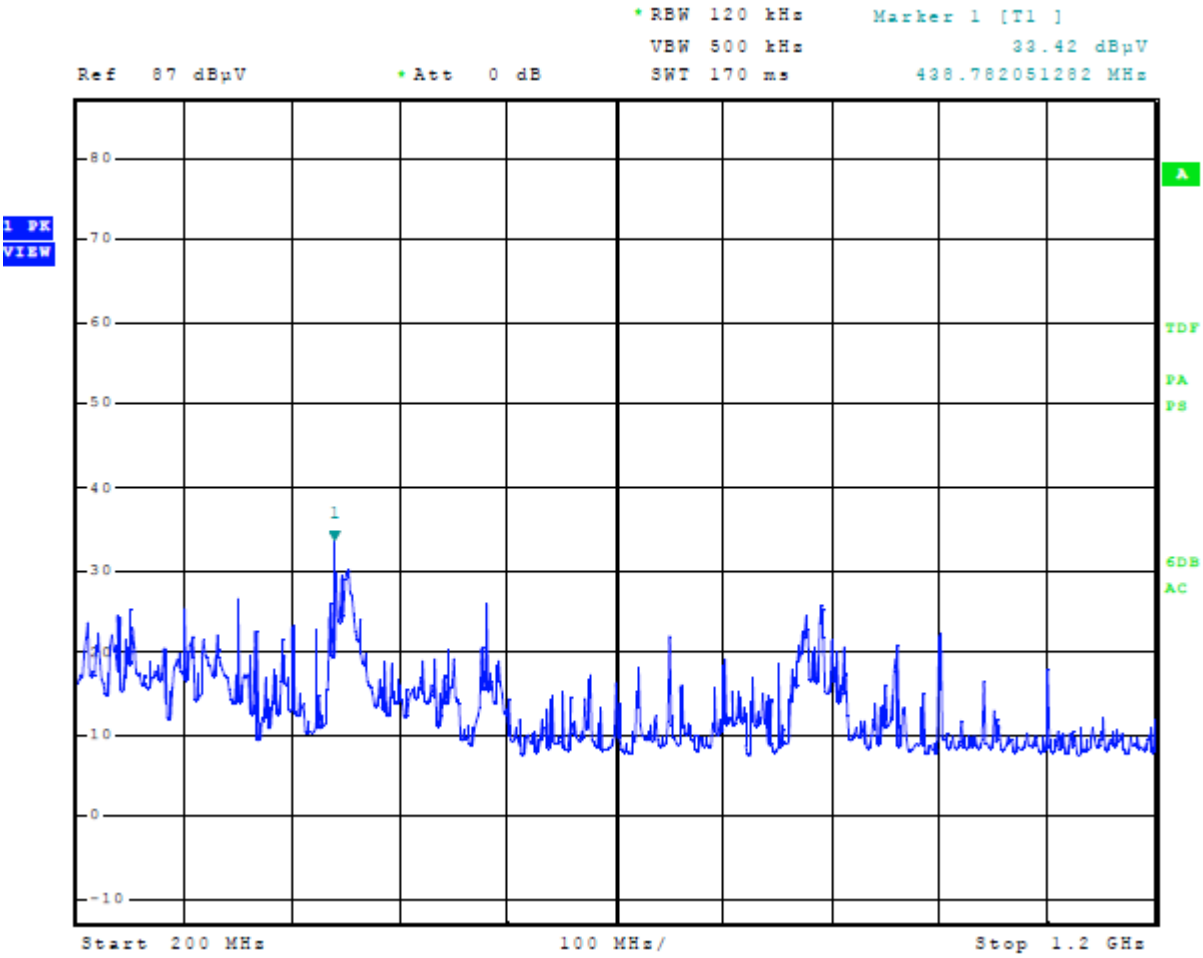


Figure 3 Plot of General Radiated Emissions (1 GHz – 3 GHz)

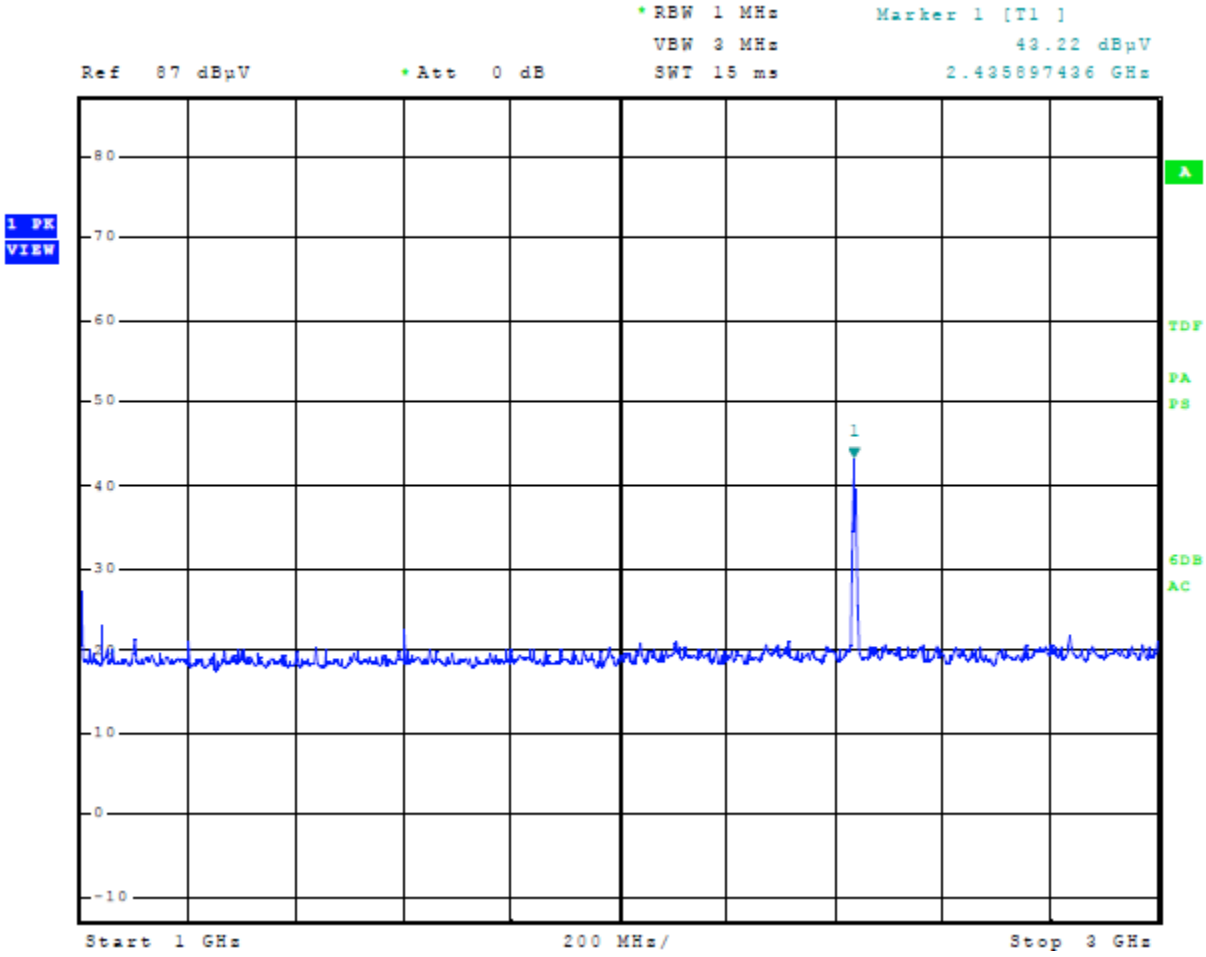


Figure 4 Plot of General Radiated Emissions (3 GHz – 6 GHz)

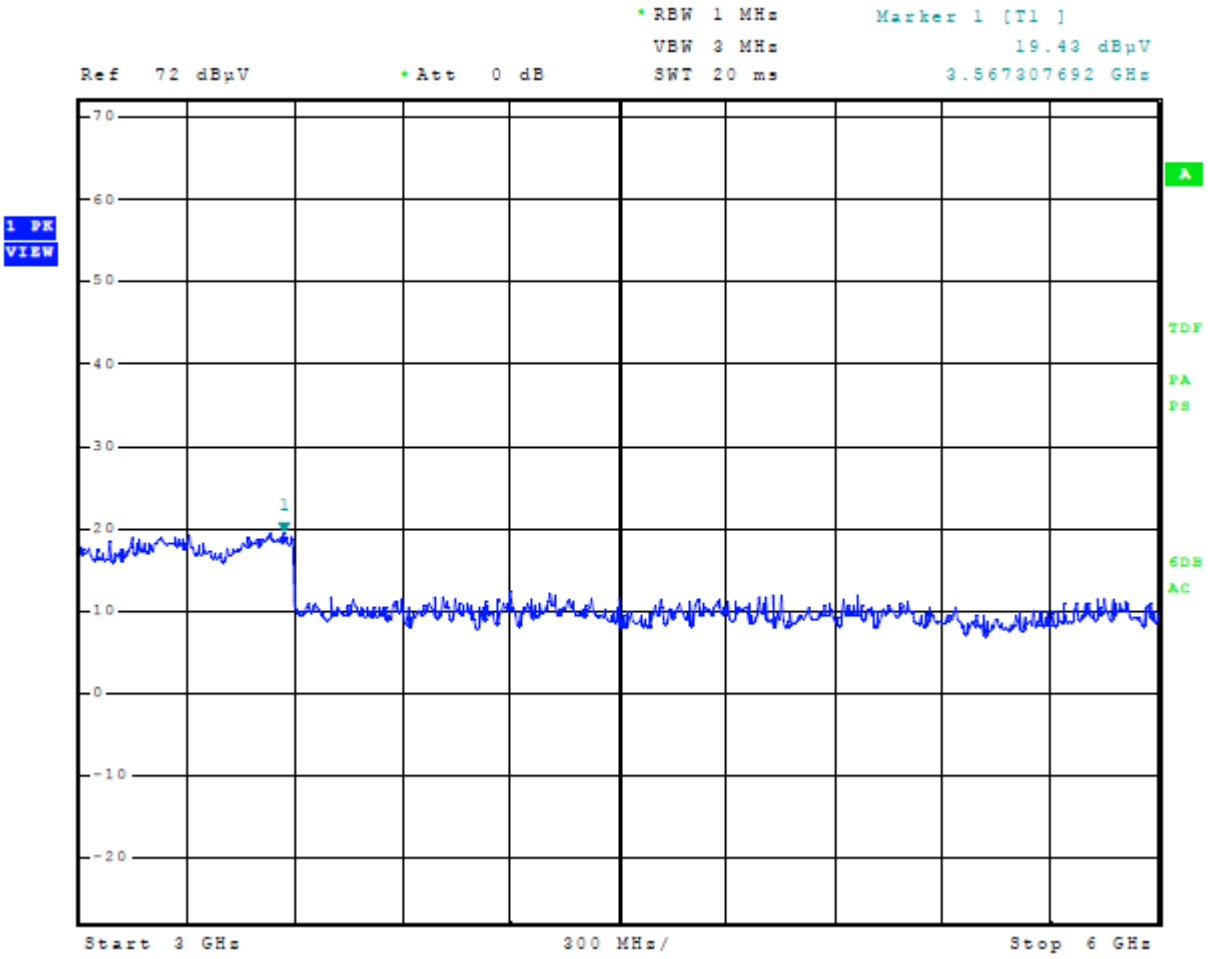


Figure 5 Plot of General Radiated Emissions (6 GHz – 12 GHz)

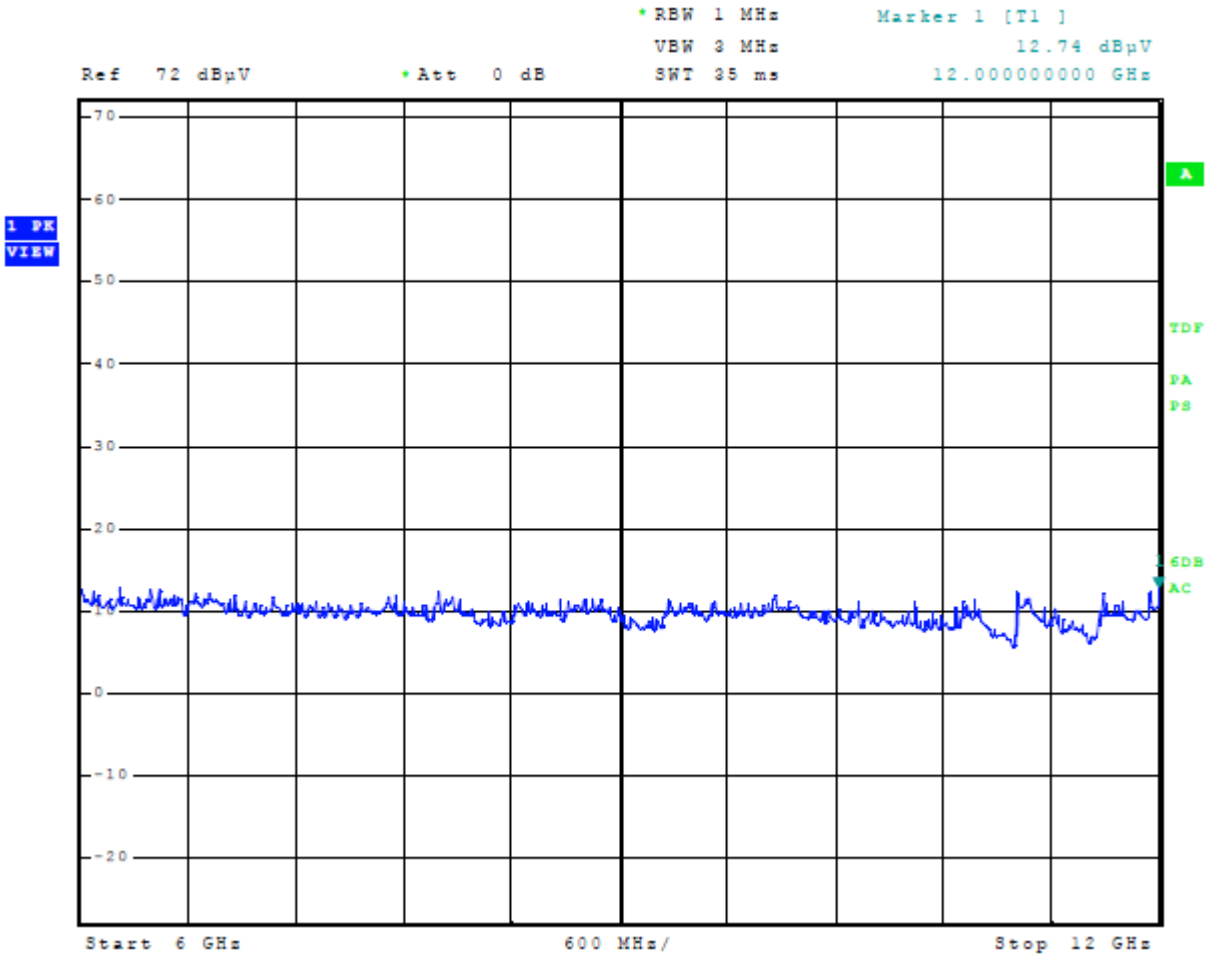


Figure 6 Plot of General Radiated Emissions (12 GHz – 18 GHz)

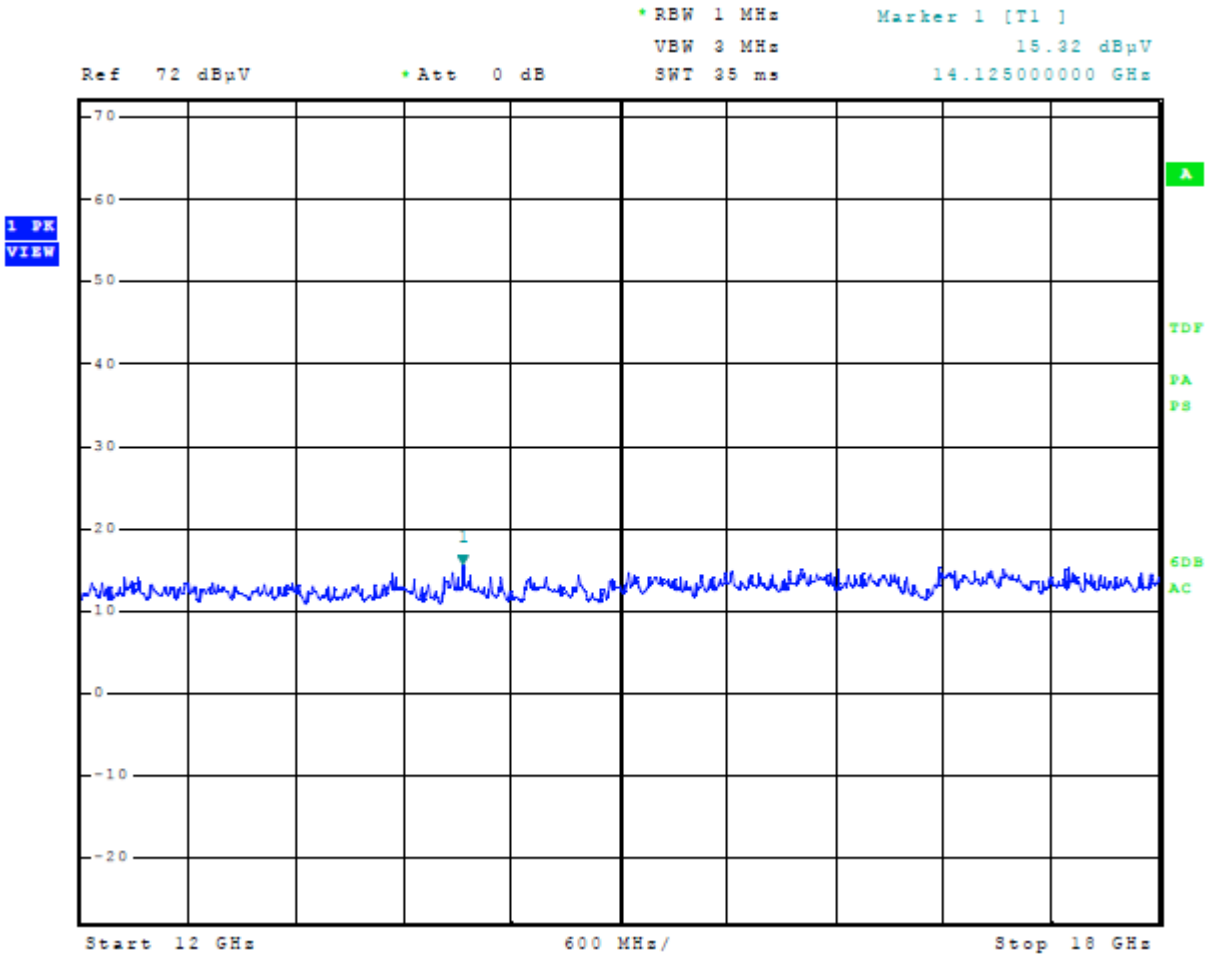
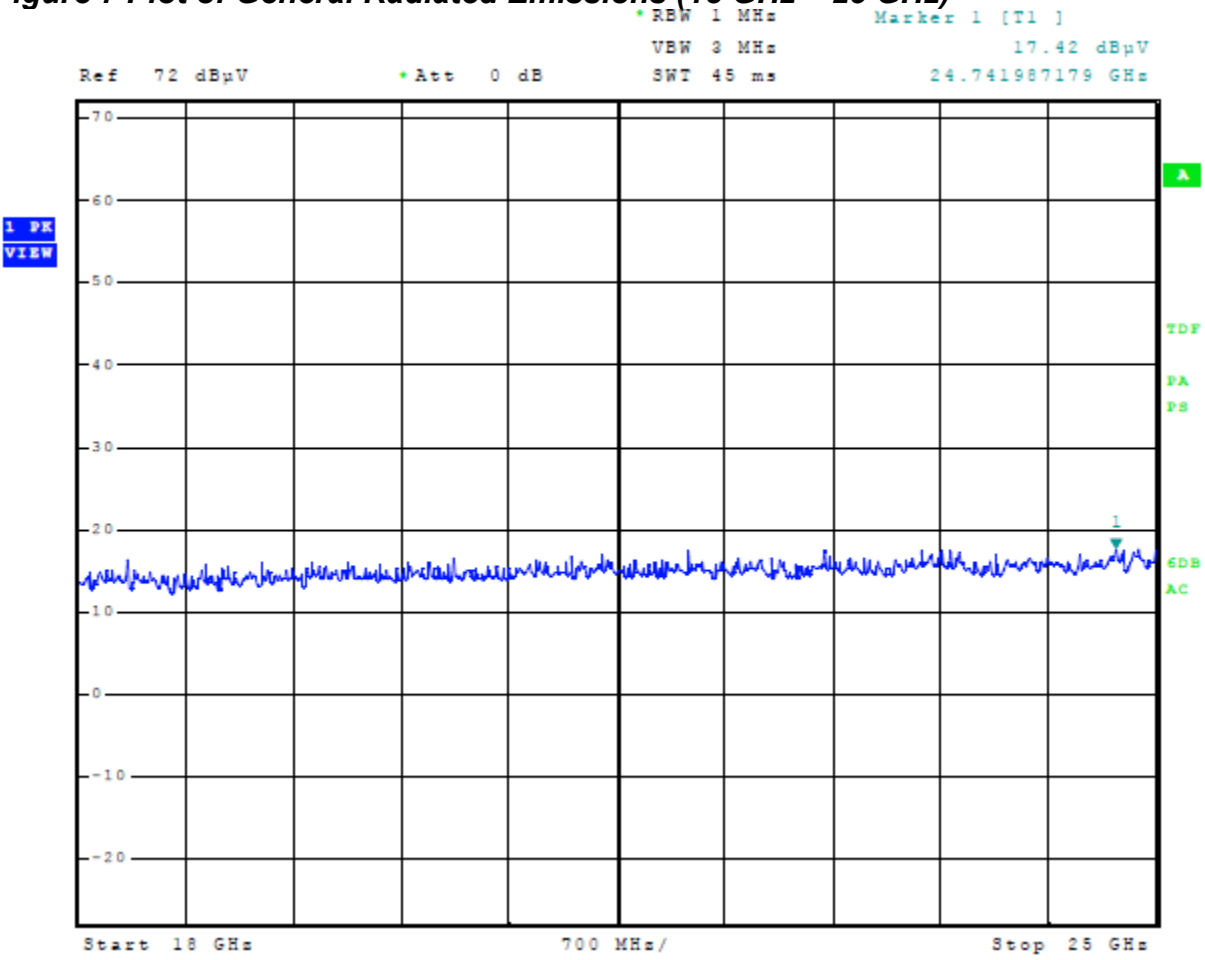


Figure 7 Plot of General Radiated Emissions (18 GHz – 25 GHz)



Summary of Results for General Radiated Emissions

The EUT demonstrated compliance with the radiated emissions requirements of 47CFR Part 15C paragraph 15.209, RSS-210 Issue 11, and RSS-GEN Issue 5 Intentional Radiators. The EUT worst-case transmitter configuration demonstrated a minimum margin of -8.51 dB below the requirements. Other emissions were present with amplitudes at least 20 dB below the Limits.

Operation in the Band 2400 – 2483.5 MHz

The transmitter output power, harmonic, and general emissions were measured in the semi anechoic chamber (SAC) @ 3 meters. The amplitude of radiated emission was measured in the SAC at distance of 3 meters from the FSM antenna (radiated emission testing was performed on sample #1) representative of production equipment with integral antennas. The EUT was placed on a turntable elevated as required above the ground plane and at a distance of 3 meters from the FSM antenna. The peak and quasi-peak amplitude of frequencies below 1000 MHz were measured using a spectrum analyzer. The peak and average amplitude of frequencies above 1000 MHz were measured using a spectrum analyzer. The amplitude of each emission was then recorded from the analyzer display. Emissions radiated outside of the specified bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits, whichever is the lesser attenuation. Antenna port emission plots were taken of transmitter performance for reference in this and other documentation using test sample #4. The amplitude of each radiated emission was maximized by equipment orientation and placement on the turn table, raising and lowering the FSM (Field Strength Measuring) antenna, changing the FSM antenna polarization, and by rotating the turntable. A Loop antenna was used for measuring emissions from 0.009 to 30 MHz, Biconilog Antenna for 30 to 1000 MHz, Double-Ridge, and/or Pyramidal Horn Antennas from 1 GHz to 25 GHz. Emissions were measured in dBµV/m @ 3 meters.

Refer to figures eight through eleven showing plots of mode 1 taken of the 2402-2480 MHz transmitter operation displaying compliance with the specifications.

Figure 8 Plot of Transmitter Emissions in 2402-2480 MHz Mode 1 ANT (GFSK)

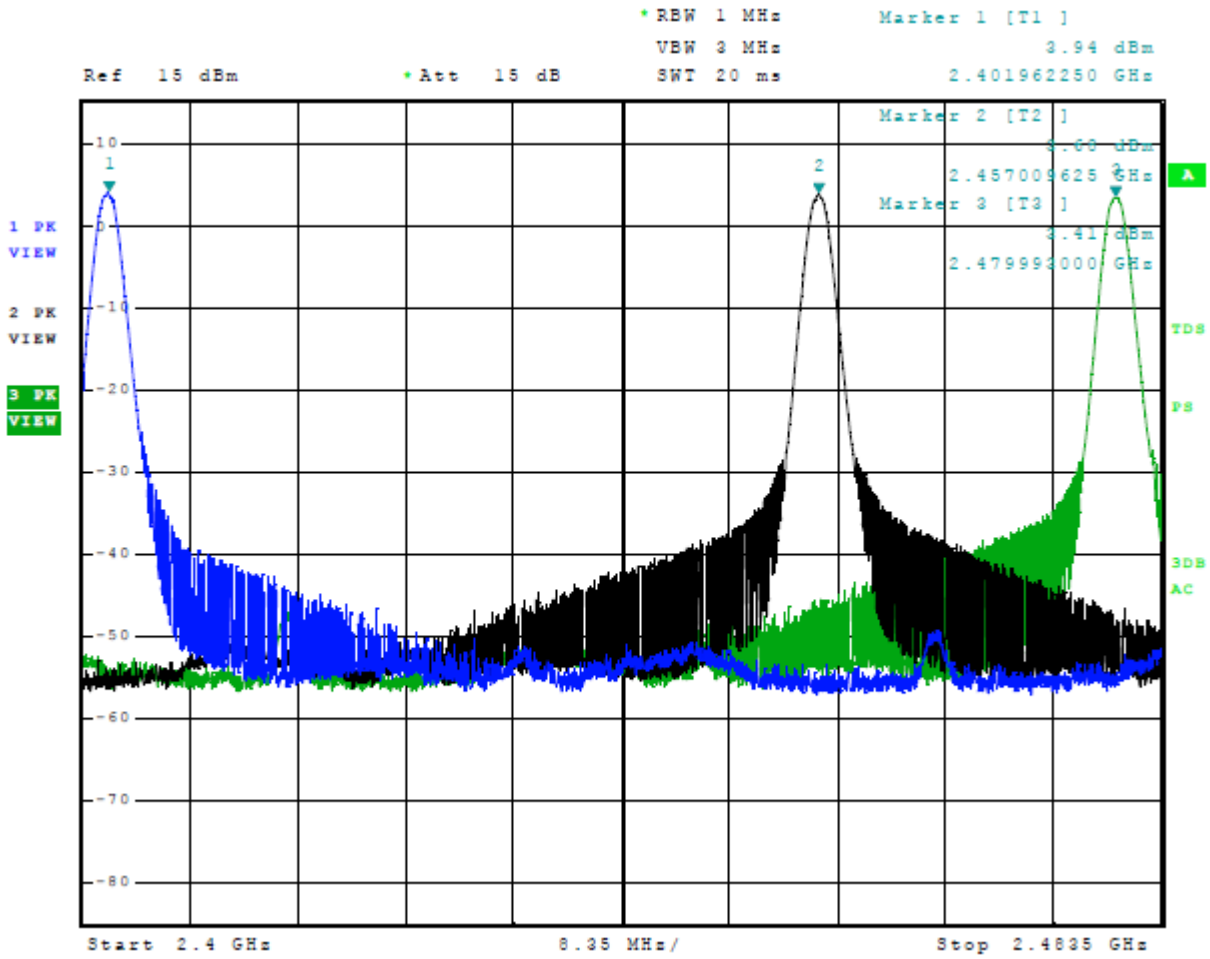


Figure 9 Plot of Transmitter Emissions Low Band Edge Mode 1 ANT (GFSK)

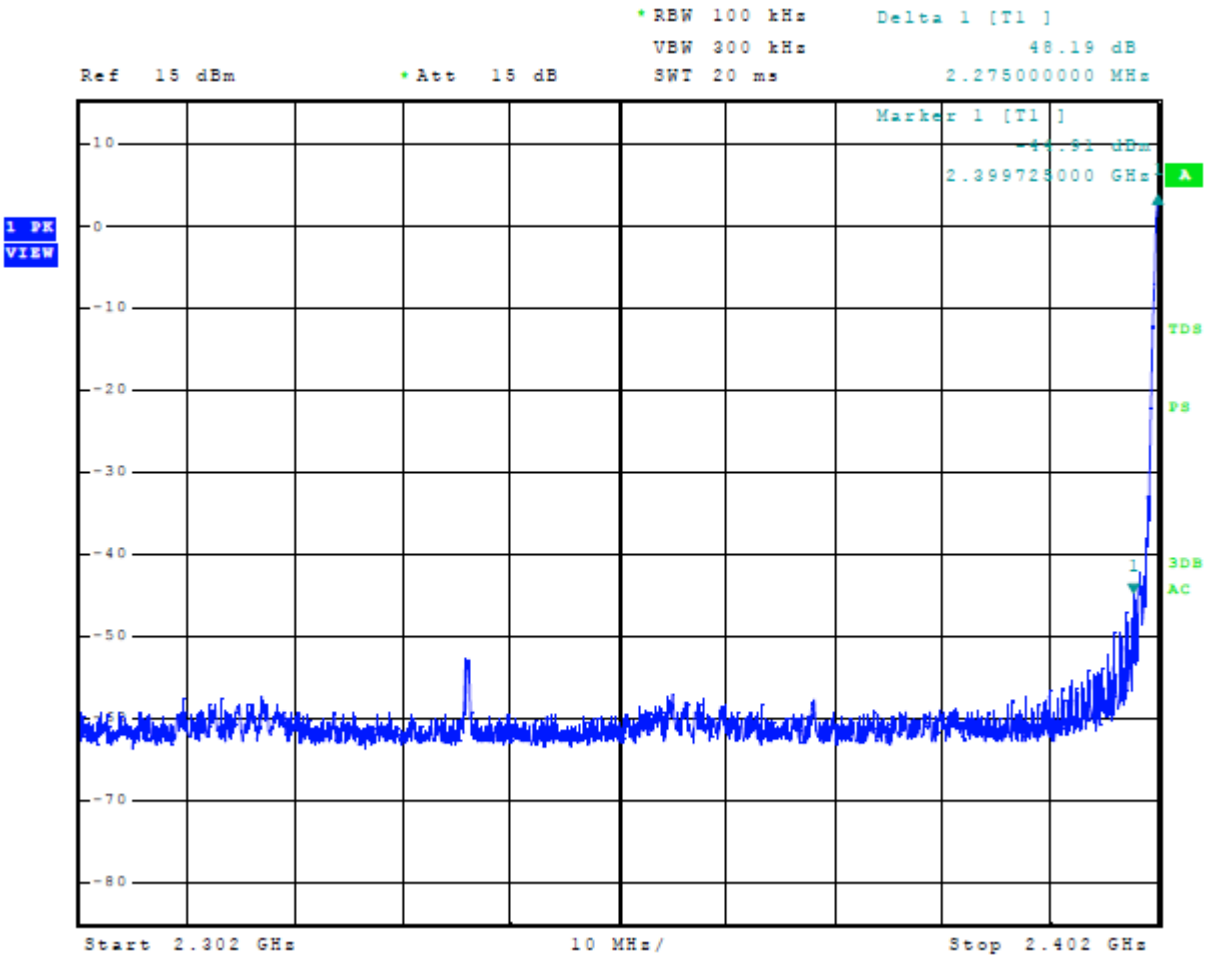


Figure 10 Plot of Transmitter Emissions High Band Edge Mode 1 ANT (GFSK)

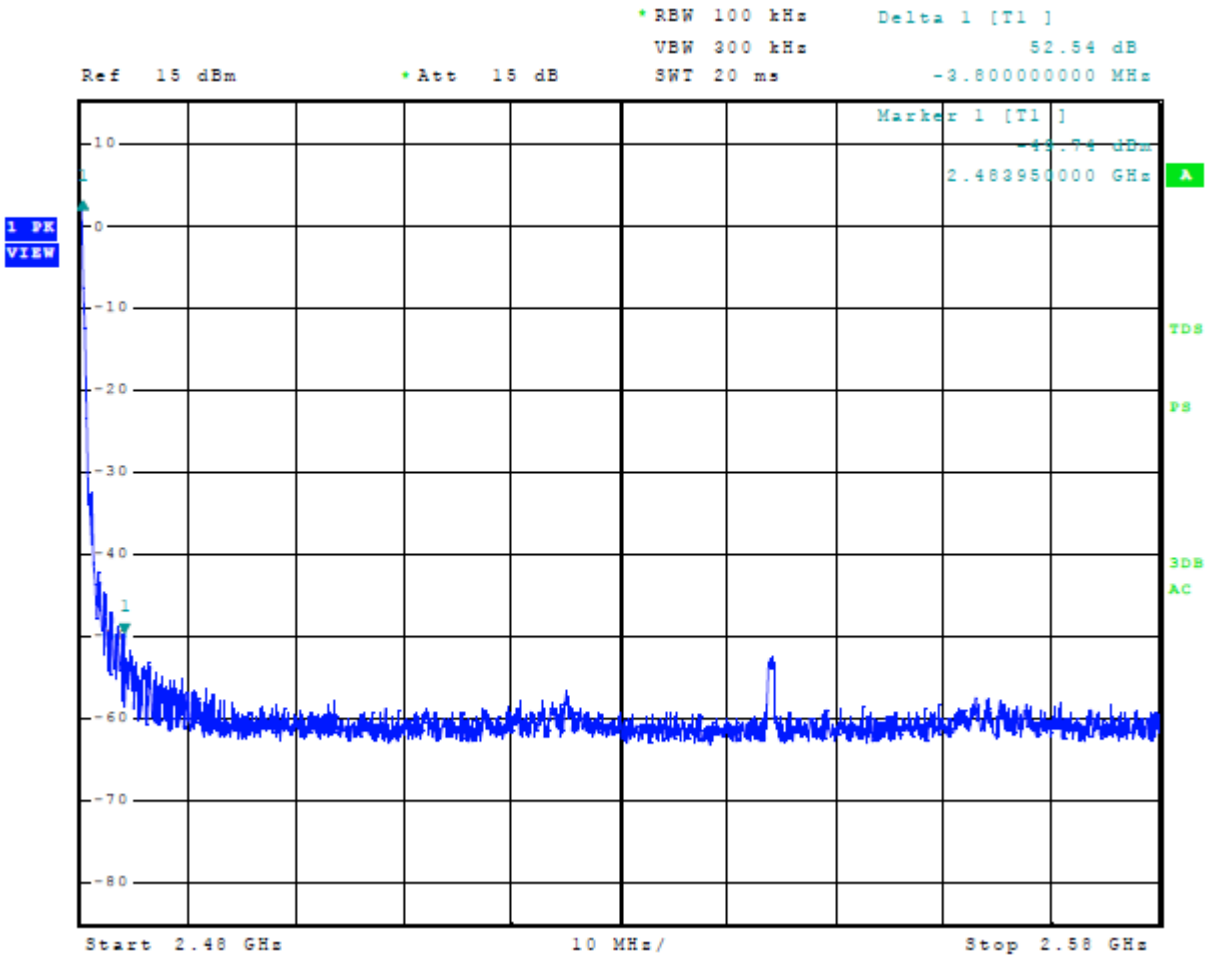
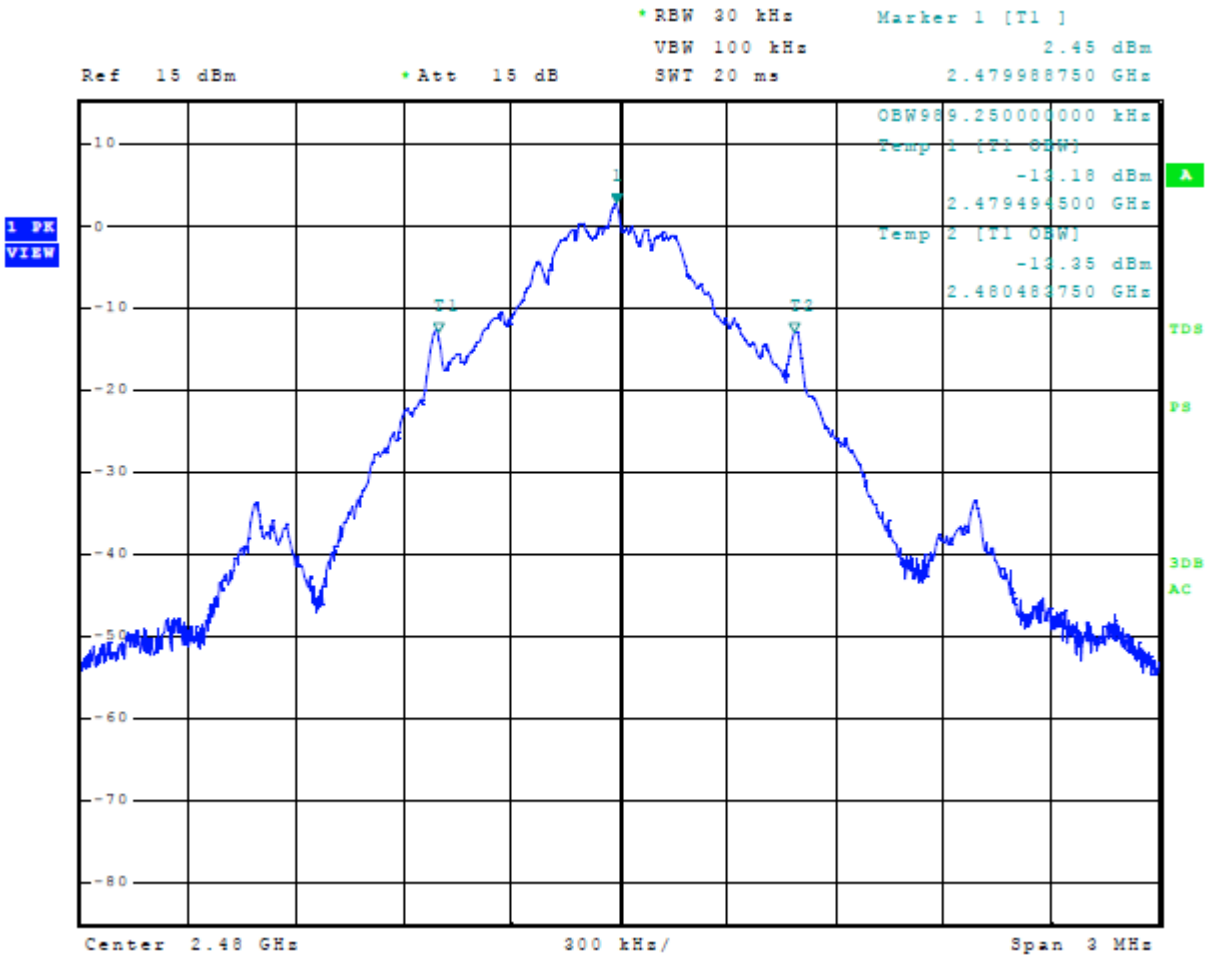


Figure 11 Plot of Transmitter 99% Occupied Bandwidth Mode 1 ANT (GFSK)



Transmitter Emissions Data

Table 4 Transmitter Radiated Emissions Mode 1 ANT (GFSK)

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)
2402.0	88.8	87.9	92.1	91.2	94.0	-6.1	-2.8
4804.0	49.9	36.0	49.3	36.0	54.0	-18.0	-18.0
7206.0	52.6	39.7	54.2	42.4	54.0	-14.3	-11.6
9608.0	56.1	43.4	56.7	43.4	54.0	-10.6	-10.6
12010.0	58.6	45.1	58.3	45.1	54.0	-8.9	-8.9
14412.0	60.4	47.0	60.5	47.0	54.0	-7.0	-7.0
16814.0	65.4	52.4	65.3	52.4	54.0	-1.6	-1.6
19216.0	63.7	50.6	64.4	50.6	54.0	-3.4	-3.4
21618.0	65.1	52.1	65.1	52.1	54.0	-1.9	-1.9
24020.0	66.2	53.2	66.2	53.3	54.0	-0.8	-0.7
2457.0	86.8	85.9	92.4	91.5	94.0	-8.1	-2.5
4914.0	49.4	36.2	50.1	36.2	54.0	-17.8	-17.8
7371.0	53.3	40.4	55.0	43.7	54.0	-13.6	-10.3
9828.0	57.3	44.1	57.4	44.1	54.0	-9.9	-9.9
12285.0	59.4	46.3	59.4	46.3	54.0	-7.7	-7.7
14742.0	60.7	47.2	60.6	47.2	54.0	-6.8	-6.8
17199.0	63.4	50.3	63.0	50.3	54.0	-3.7	-3.7
19656.0	63.6	50.7	63.4	50.8	54.0	-3.3	-3.2
22113.0	64.9	51.9	64.7	51.9	54.0	-2.1	-2.1
24570.0	65.6	52.6	66.1	52.6	54.0	-1.4	-1.4
2480.0	87.8	86.9	93.3	92.3	94.0	-7.1	-1.7
4960.0	49.2	36.2	49.9	36.6	54.0	-17.8	-17.4
7440.0	54.4	42.4	54.2	41.7	54.0	-11.6	-12.3
9920.0	57.2	43.6	56.5	43.6	54.0	-10.4	-10.4
12400.0	59.0	45.7	59.2	45.7	54.0	-8.3	-8.3
14880.0	59.9	47.1	60.2	47.1	54.0	-6.9	-6.9
17360.0	64.9	50.9	64.0	50.9	54.0	-3.1	-3.1
19840.0	64.3	50.8	64.3	50.9	54.0	-3.2	-3.1
22320.0	65.7	52.0	65.0	52.0	54.0	-2.0	-2.0
24800.0	65.0	52.0	65.1	52.0	54.0	-2.0	-2.0

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.

Summary of Results for Transmitter Radiated Emissions of Intentional Radiator

The EUT demonstrated compliance with the radiated emissions requirements of 47CFR Part 15.249, Industry Canada RSS-210 Issue 11, and RSS-GEN Issue 5 Intentional Radiator regulations. The EUT worst-case test sample configuration demonstrated minimum average margin of -1.7 dB below the average emission limit for the fundamental. The EUT worst-case configuration demonstrated minimum radiated harmonic emission margin of -0.7 dB below the limit. No other radiated emissions were found in the restricted bands less than 20 dB below limits than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the limits.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Test Equipment
- Annex C Laboratory 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

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Equipment	Manufacturer	Model (SN)	Band	Cal Date(m/d/y)	Due
☐ 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	

NVLAP Lab Code 200087-0

Annex C Laboratory Certificate of Accreditation

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200087-0

Rogers Labs, a division of The Compatibility Center LLC
Lenexa, KS

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

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 on ISO/IEC 17025).

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

For the National Voluntary Laboratory Accreditation Program