Test Report Serial Number:	**45461691 R3.0**
Test Report Date:	**3 February 2022**
Project Number:	**1557**

EMC Test Report - New Certification

Applicant:

Garmin International Inc.
1200 East 151 St
Olathe, KS, 66062
USA

FCC ID:	IC Registration Number
IPH-04247	**1792A-04247**
Product Model Number / HVIN	Product Marketing Name / PMN
A04247	**A04247**

In Accordance With:

CFR Title 47, Part 15 Subpart C (§15.249), Part 15 Subpart B
Part 15 Low Power Communication Device Transmitter (DXX)

RSS-Gen, RSS-210 Issue 10
Licence-Exempt Radio Apparatus: Category I Equipment

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01 **IC Registration 3874A-1** **FCC Registration: CA3874**

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1.0 DOCUMENT CONTROL

Revision History					
Samples Tested By:	Art Voss, P.Eng.		**Date(s) of Evaluation:**	1 Oct - 1 Dec, 2021	
Report Prepared By:	Art Voss, P.Eng.		**Report Reviewed By:**	Ben Hewson	
Report Revision	**Description of Revision**		**Revised Section**	**Revised By**	**Revision Date**
0.1	Draft Release		n/a	Art Voss	4 December, 2022
1.0	Initial Release		n/a	Art Voss	25 January, 2022
2.0	Revised Plot Headings		12.0	Art Voss	2 February, 2022
3.0	Revised Scope		3.0	Art Voss	3 February, 2022

2.0 CLIENT AND DUT INFORMATION

Client Information		
Applicant Name	**Garmin International Inc.**	
Applicant Address	1200 East 151 St	
	Olathe, KS, 66062	
	USA	
DUT Information		
Device Identifier(s):	**FCC ID:**	**IPH-04247**
	ISED ID:	**1792A-04247**
Device Model(s) / HVIN:	A04247	
Device Marketing Name / PMN:	A04247	
Test Sample Serial No.:	Conducted: 3383564979, 3383564988 OTA: 3383564975, 3383565083	
Device Type:	Radar Device	
FCC Equipment Class:	Digital Transmission System (DTS)	
ISED Equipment Class:	Wireless Local Area Network Device	
Transmit Frequency Range:	WiFi (DTS): 2412-2462MHz	
	BLE/ANT: 2402-2480MHz	
	Radar: 24.0236GHz - 24.2176GHz	
Manuf. Max. Rated Output Power:	WiFi - Digital Transmission System (DTS): 6.42dBm	
	ANT - Low Power Communication Device Transmitter (DXX): 6.51dBm	
	BLE - Low Power Communication Device Transmitter (DXX): 1.56dBm	
	Radar: -11dBm EIRP	
Antenna Type and Gain:*	BLE/WiFi: -0.4dBi, ANT: -0.5dBi, Radar: 10.5dBi	
Modulation:	WiFi: DSSS, OFDM, CCK, MCS0-7	
Modulation:	BLE: GMSK	
Modulation:	ANT: GFSK	
DUT Power Source:	3.8VDC Rechargeable Li-Ion	
DUT Dimensions [LxWxH]	L x W x H: 105mm x 40mm x 38mm	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

* Information on antenna gain provided by applicant.

3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

Garmin International Inc.

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The Garmin Model/HVIN: A04247 is a radar device consisting of a WiFi, BlueTooth Low Energy (BLE), Adaptive Network Topology (ANT) and 24GHz radar transmitters/transceivers. The BLE and WiFi transceivers share the same antenna and cannot simultaneously transmit.

Requirement:

The transceivers of this *equipment* are subject to emissions evaluation in accordance with FCC: 47 CFR 2, 15C, ISED: RSS-Gen, RSS-210 and RSS-247. As per FCC 47 CFR §2.1093 and Health Canada Safety Code 6, an RF Exposure (SAR) evaluation is required for this *Equipment* and the results of the RF Exposure (SAR) evaluation appear in a separate report.

Application:

This is an application for a New Certification.

Scope:

The scope of this investigation is limited to the evaluation and reporting of the wanted and spurious emissions in accordance with the rule parts cited in Normative References section of this report.

4.0 TEST RESULT SUMMARY

TEST SUMMARY

Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Applicable Rule Part(s) ISED	Test Date	Result
7.0	Occupied Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	§2.1049	RSS-Gen (6.7)	27 Nov 2021 22 Nov 2021	Pass
8.0	Field Strength (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(a)(e)	RSS-Gen (6.12) RSS-210 (B.10)	29 Nov 2021	Pass
9.0	20dB BW	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(a)(e)	RSS-Gen (6.12) RSS-210 (B.10)	17 Nov 2021 22 Nov 2021	Pass
10.0	Restricted Bands	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(d)(e) §15.209	RSS-Gen (8.10)	29 Nov 2021	Pass
11.0	Radiated Rx Emissions	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(d)(e) §15.209	RSS-Gen (8.10)	29 Nov 2021	Pass
12.0	Power Line Conducted Emissions	ANSI C63.4-2014	§15.107	ICES-003(6.1)	1 Oct 2021	Pass

Test Station Day Log

Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
1 Oct 2021	22.8	15	102.6	**LISN**	**12**
17 Nov 2021	21.0	17	103.2	**EMC**	**8, 9**
22 Nov 2021	23.5	17	101.6	**EMC**	**7, 9**
23 Nov 2021	23.5	17	101.6	**EMC**	**8**
29 Nov 2021	10.0	90	102.2	**OATS**	**9, 10, 11**

EMC - EMC Test Bench
OATS - Open Area Test Site
LISN - LISN Test Area
IMM - Immunity Test Area
SAC - Semi-Anechoic Chamber
TC - Temperature Chamber
ESD - ESD Test Bench
RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

4 January 2022
Date

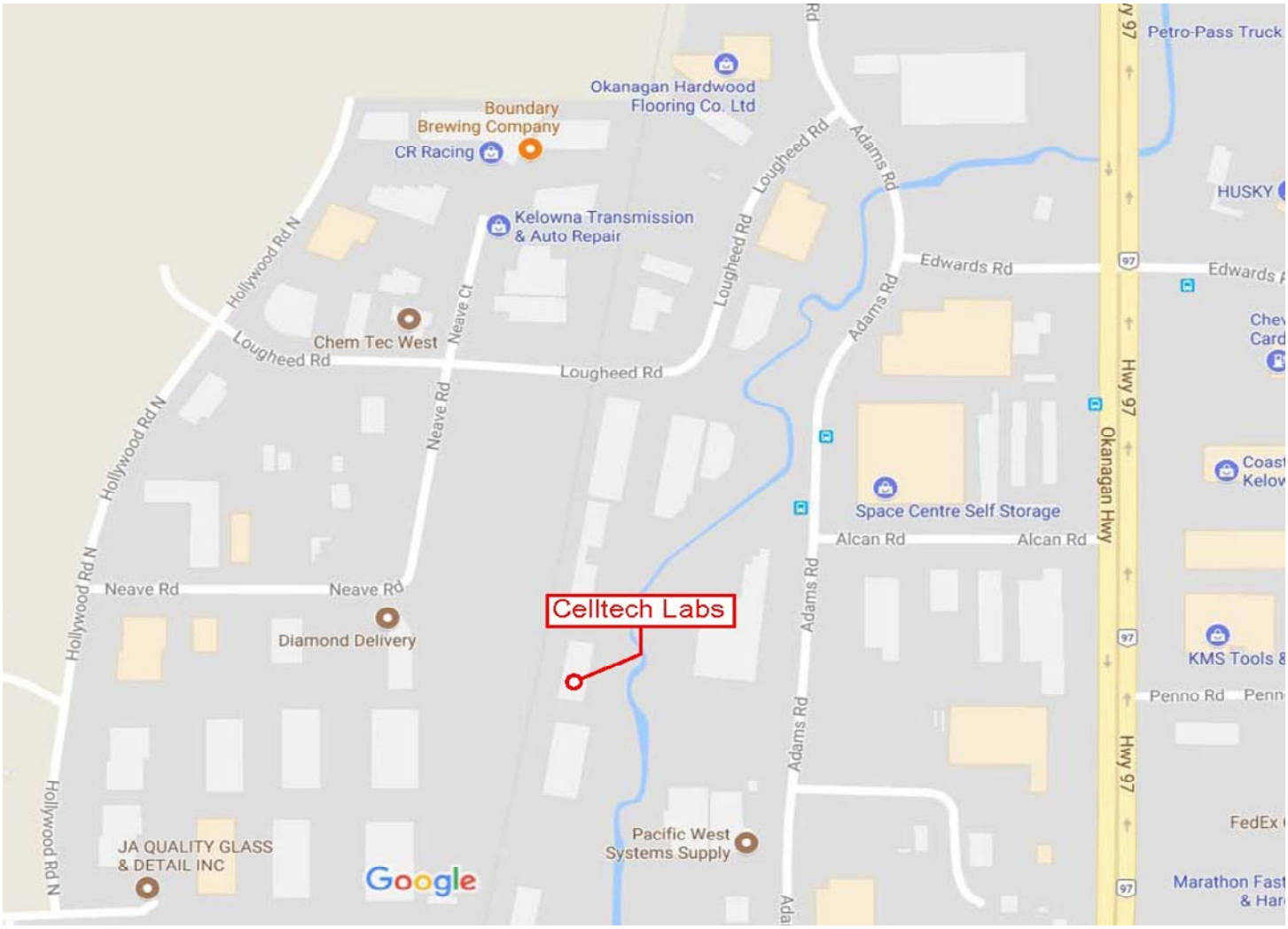
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.4-2014	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 15: Sub Part C (15.249)	Code of Federal Regulations Telecommunication Radio Frequency Devices Intentional Radiators
ISED RSS-Gen Issue 5A1: March 2019	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment
ISED RSS-210 Issue 10A1: December 2029	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Licence-Exempt Radio Apparatus: Category I Equipment
FCC KDB 558074 D01v05r02	OET Major Guidance Publications, Knowledge Data Base Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874A-1 and Industry Canada under Test Site File Number IC 3874A. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 OCCUPIED BANDWIDTH

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, RSS-Gen (6.1.2)
	KDB 558074 (8.3.2.1), ANSI C63.10 (6.9.3)

General Procedure	
C63.10 (6.9.3)	**6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure** The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

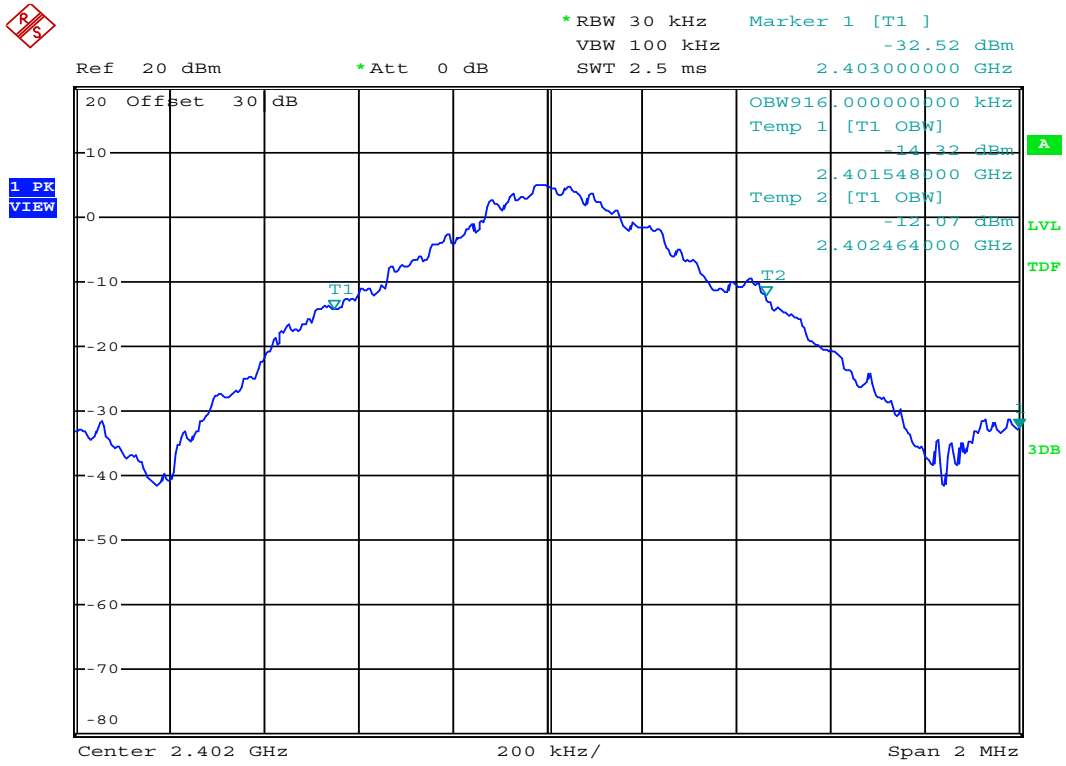
Test Setup	Appendix A - Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at its maximum Duty Cycle. The 99% Occupied Bandwidth was measured and recorded.

Plot 7.1 – Occupied Bandwidth, ANT, CH 2

Occupied Bandwidth: ANT

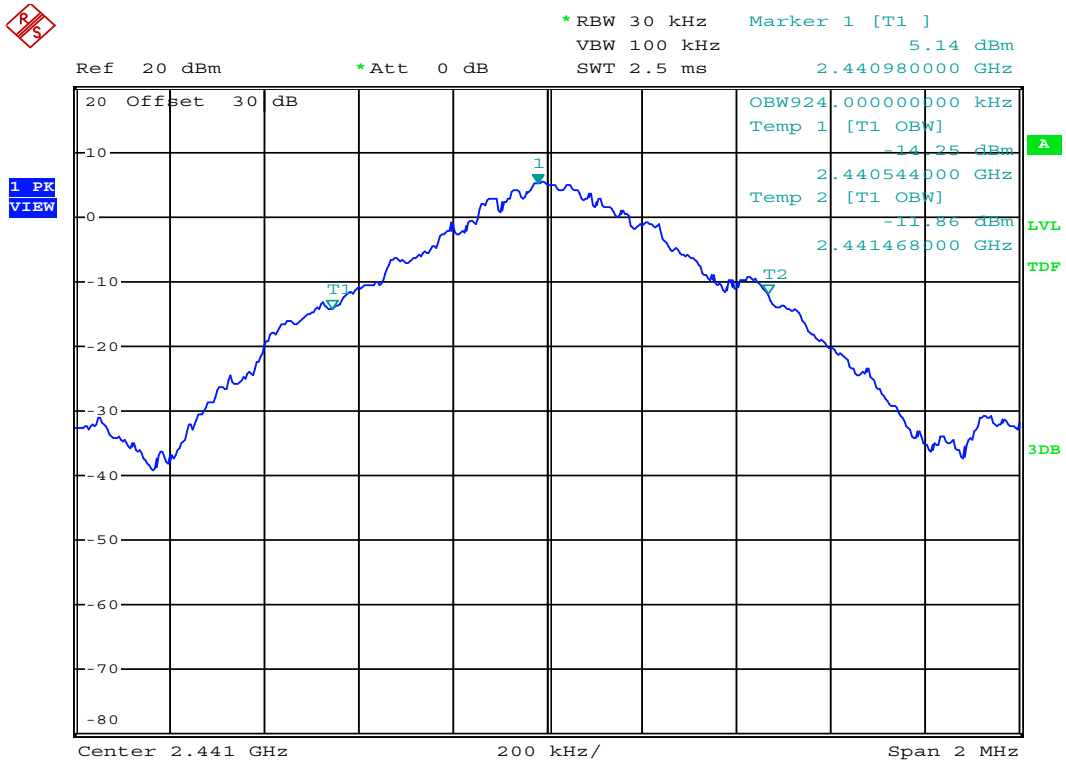


Date: 17.NOV.2021 13:38:50

Channel Number:	2	Channel Frequency (MHz):	2402	Occupied Bandwidth (kHz):	916.0
Modulation:	GFSK	Bit Rate (Mbps):	-		

Plot 7.2 – Occupied Bandwidth, ANT, CH 41

Occupied Bandwidth: ANT

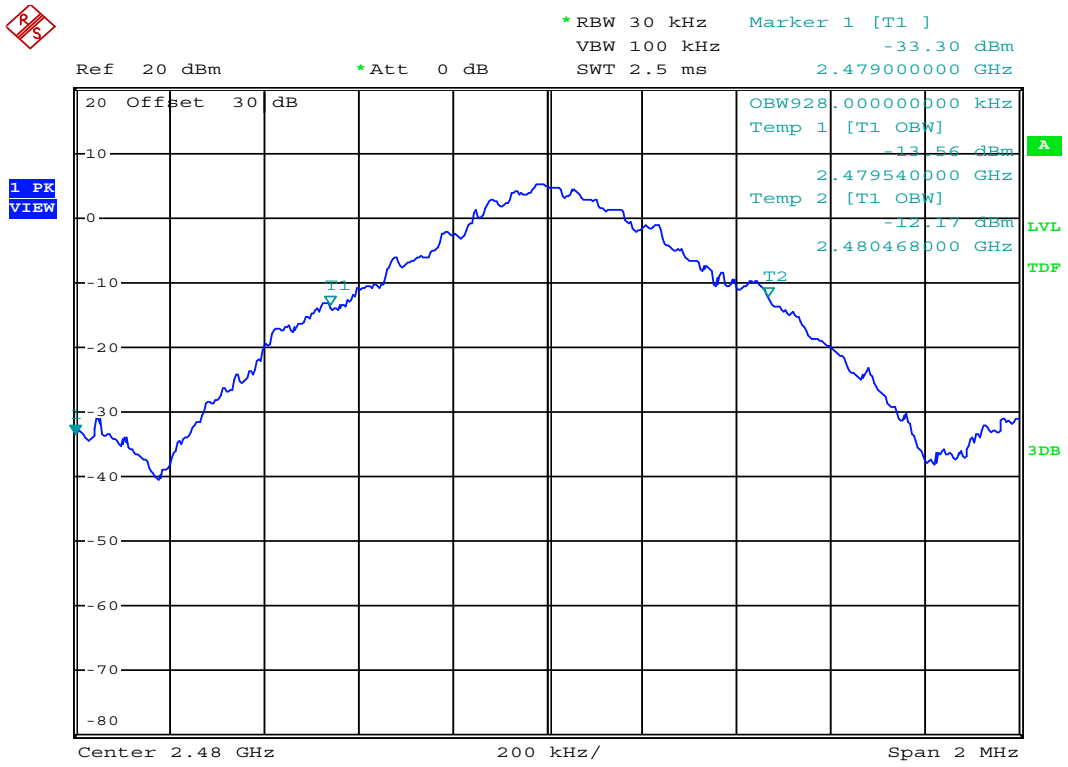


Date: 17.NOV.2021 13:35:44

Channel Number:	41	Channel Frequency (MHz):	2441	Occupied Bandwidth (kHz):	924.0
Modulation:	GFSK	Bit Rate (Mbps):	-		

Plot 7.3 – Occupied Bandwidth, ANT, CH 80

Occupied Bandwidth: ANT



Date: 17.NOV.2021 13:37:31

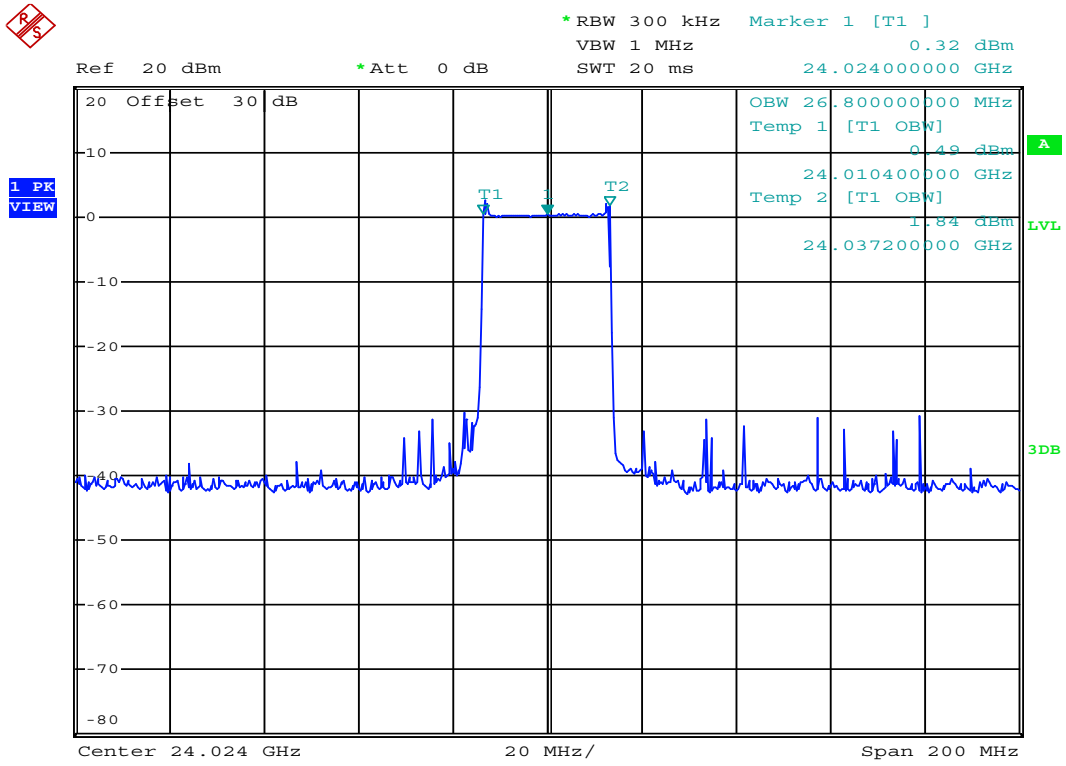
Channel Number:	80	Channel Frequency (MHz):	2480	Occupied Bandwidth (kHz):	928.0
Modulation:	GFSK	Bit Rate (Mbps):	-		

Table 7.1 - Summary of Occupied Bandwidth Measurements, ANT

Occupied Bandwidth Measurement Results: ANT						
Mode	Channel Number	Channel Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured Occupied Bandwidth (kHz)	Emission Designator
ANT	2	2402	GFSK	-	916.0	916KD1D
	41	2441			924.0	924KD1D
	80	2480			928.0	928KD1D
					Result:	Complies

Plot 7.4 – Occupied Bandwidth, 24GHz Radar, 24MHz BW, Channel Lo

Occupied Bandwidth: Radar



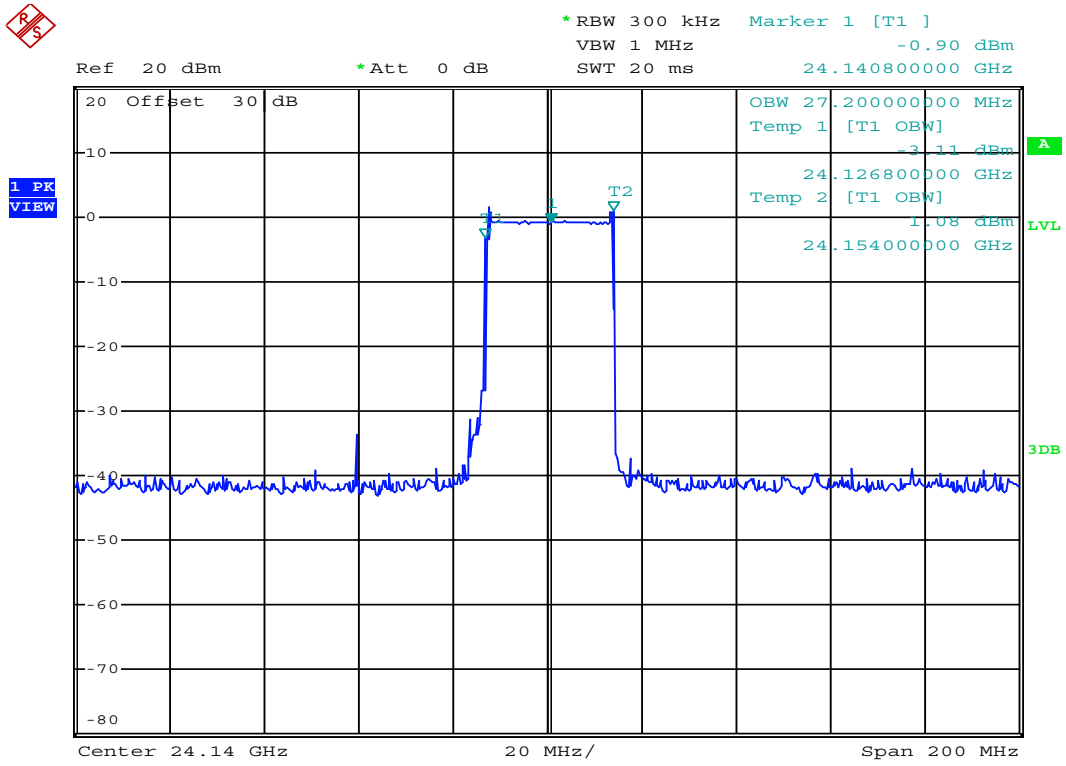
Date: 22.NOV.2021 13:45:19

Channel Frequency (GHz):	24.02
Bandwidth (MHz):	24

Occupied Bandwidth (MHz):	26.8

Plot 7.5 – Occupied Bandwidth, 24GHz Radar, 24MHz BW, Channel Mid

Occupied Bandwidth: Radar

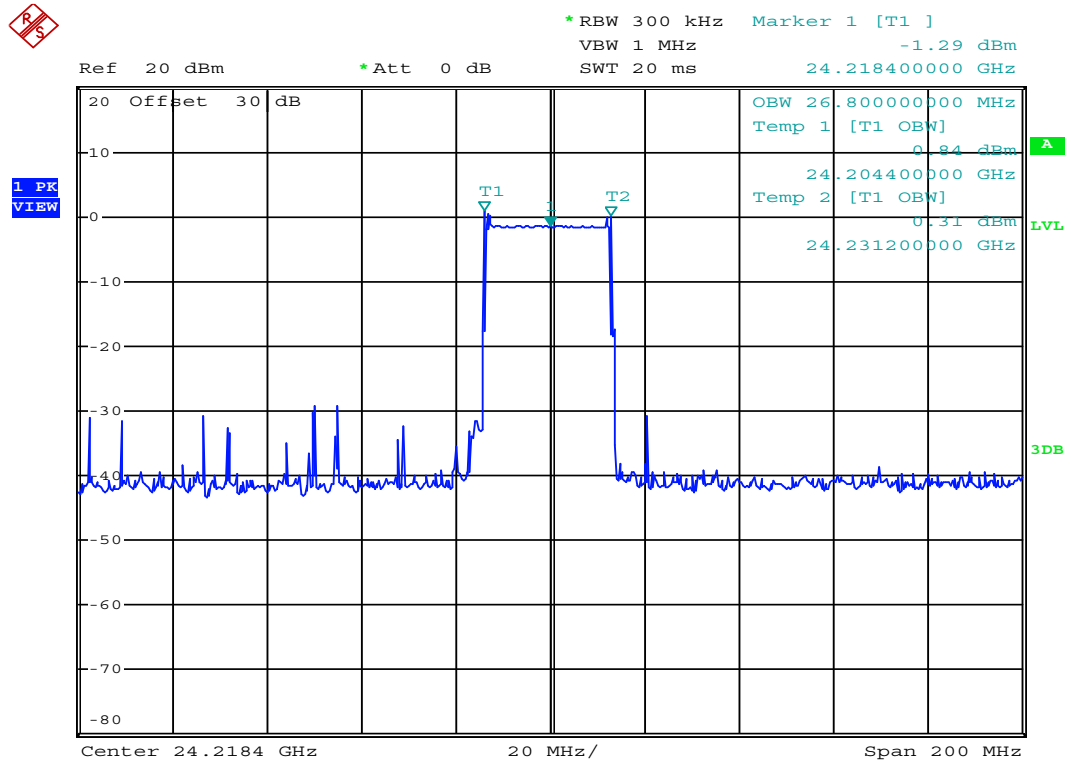


Date: 22.NOV.2021 13:44:30

Channel Frequency (GHz):	24.14
Bandwidth (MHz):	24
Occupied Bandwidth (MHz):	27.2

Plot 7.6 – Occupied Bandwidth, 24GHz Radar, 24MHz BW, Channel Hi

Occupied Bandwidth: Radar

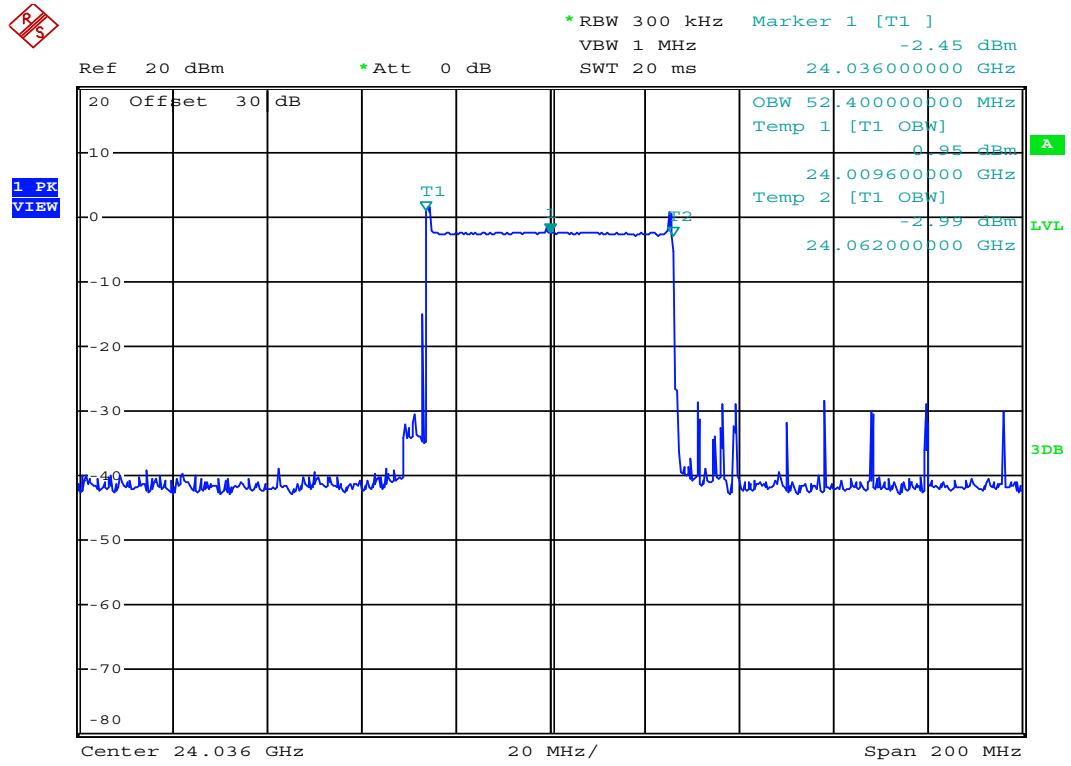


Date: 22.NOV.2021 13:43:27

Channel Frequency (GHz):	24.22
Bandwidth (MHz):	24
Occupied Bandwidth (MHz):	26.8

Plot 7.7 – Occupied Bandwidth, 24GHz Radar, 48MHz BW, Channel Lo

Occupied Bandwidth: Radar

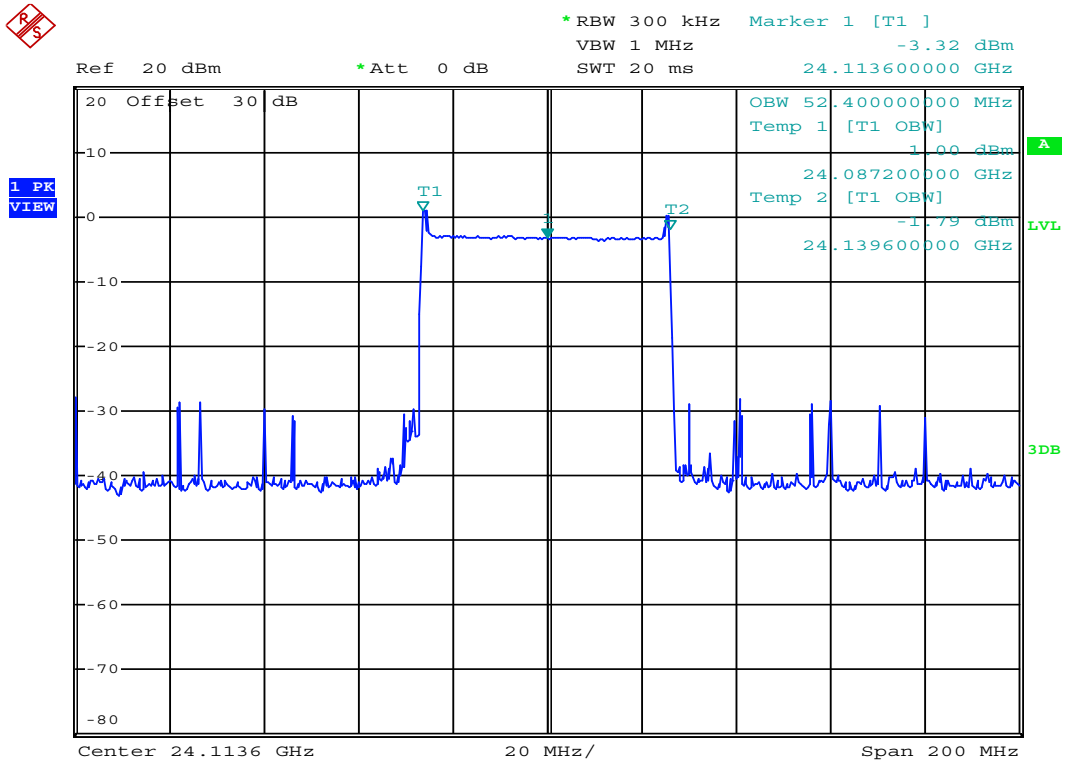


Date: 22.NOV.2021 13:50:41

Channel Frequency (GHz):	24.04
Bandwidth (MHz):	48
Occupied Bandwidth (MHz):	53.4

Plot 7.8 – Occupied Bandwidth, 24GHz Radar, 48MHz BW, Channel Mid

Occupied Bandwidth: Radar

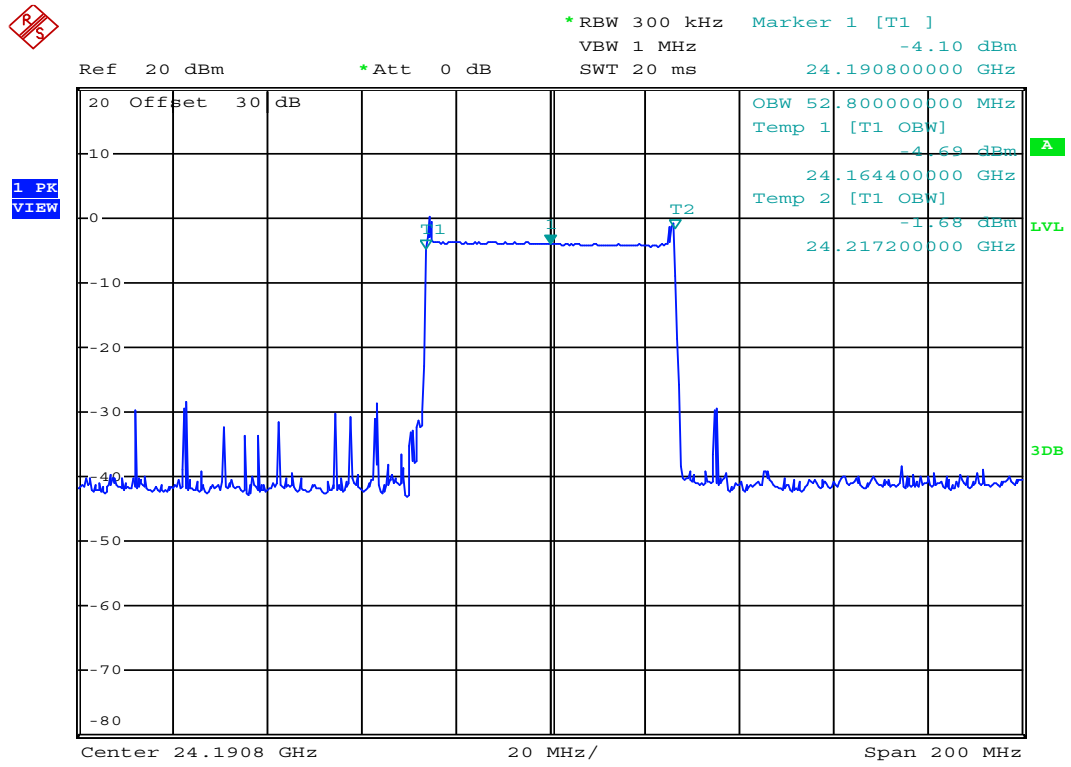


Date: 22.NOV.2021 13:49:26

Channel Frequency (GHz):	24.11
Bandwidth (MHz):	48
Occupied Bandwidth (MHz):	52.4

Plot 7.9 – Occupied Bandwidth, 24GHz Radar, 48MHz BW, Channel Hi

Occupied Bandwidth: Radar



Channel Frequency (GHz):	24.19
Bandwidth (MHz):	48
Occupied Bandwidth (MHz):	52.8

Table 7.2 - Summary of Occupied Bandwidth Measurements, 24GHz Radar

Occupied Bandwidth Measurement Results: Radar				
Mode	Channel Frequency (GHz)	Bandwidth (MHz)	Measured Occupied Bandwidth (MHz)	Emission Designator
Radar	24.02	24	26.8	26M8P1D
	24.14		27.2	27M2P1D
	24.22		26.8	26M8P1D
	24.04	48	53.4	53M4P1D
	24.11		52.4	52M4P1D
	24.19		52.8	52M8P1D
			Result:	Complies

8.0 FIELD STRENGTH

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.249, RSS-210
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)

Limits	
§15.249(a)	**Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz.** (a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:
	2400-2483.5MHz, Fundamental Field Strength: 50mV/m, Harmonic: 500uV/m
	24.0-24.25GHz, Fundamental Field Strength: 250mV/m, Harmonic: 2500uV/m
RSS-210 B.10(F.1)	**Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24-24.25 GHz** (a) The field strength of fundamental and harmonic emissions measured at 3 m shall not exceed the limits in table B2.
	2400-2483.5MHz, Fundamental Field Strength: 50mV/m, Harmonic: 500uV/m
	2400-2483.5MHz, Fundamental Field Strength: 2500mV/m, Harmonic: 25mV/m

General Procedure	
C63.10 (6.5.4)	**6.5.4 Final radiated emission tests** Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

Test Setup	Appendix A Figure A.2

Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

See Appendix I for Measurement Plots

Table 8.1 - Summary of Field Strength Measurements, ANT

Field Strength Measurement Results: ANT									
Frequency (MHz)	DUT Modulation	Instrument Detector	Receive Antenna Polarity	Measured FS [FS_{Meas}] (dBuV)	Receive ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Corrected FS [FS_{Corr}] (dBuV/m@3m)	Limit [FS_{Limit}] (dBuV/m)	Margin (dB)
2402.00	GFSK	RMS	Horizontal	61.27	28.281	2.97	92.52	94	1.5
2402.00			Vertical	50.95	28.281	2.97	82.20		11.8
2441.00			Horizontal	60.52	28.222	2.97	91.71		2.3
2441.00			Vertical	50.60	28.222	2.97	81.79		12.2
2480.00			Horizontal	60.36	28.172	2.97	91.50		2.5
2480.00			Vertical	49.56	28.172	2.97	80.70		13.3
2402.00		Peak	Horizontal	61.62	28.281	2.97	92.87	114	21.1
2402.00			Vertical	51.43	28.281	2.97	82.68		31.3
2441.00			Horizontal	61.43	28.222	2.97	92.62		21.4
2441.00			Vertical	51.63	28.222	2.97	82.82		31.2
2480.00			Horizontal	60.76	28.172	2.97	91.90		22.1
2480.00			Vertical	50.77	28.172	2.97	81.91		32.1
								Result:	Complies

Corrected Field Strength [FSC_{orr}] = Measured FS [FS_{Meas}] + ACF [ACF] + Cable Los [L_C]

Margin = Limit [FS_{Limit}] - Corrected Field Strength [FS_{Corr}]

See Appendix I for Measurement Plots

Table 8.2 - Summary of Field Strength Measurements, Radar

Conducted Power Measurement Results:									
Frequency (GHz)	Channel Bandwidth (MHz)	Instrument Detector	Receive Antenna Polarity	Measured FS [FS_{Meas}] (dBuV)	Receive ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Corrected FS [FS_{Corr}] (dBuV/m@3m)	Limit [FS_{Limit}] (dBuV/m)	Margin (dB)
24.14	24.00	RMS	Horizontal*	34.10	42.8	2.39	79.29	108	28.7
24.02	24.00	RMS	Vertical	43.02	42.8	2.39	88.21		19.8
24.14				48.12	42.8	2.39	93.31		14.7
24.22				48.91	42.8	2.39	94.10		13.9
24.04	48.00			48.17	42.8	2.39	93.36		14.6
24.11				48.32	42.8	2.39	93.51		14.5
24.19				46.33	42.8	2.39	91.52		16.5
24.02	24.00	Peak		60.83	42.8	2.39	106.02	128	22.0
24.14				58.21	42.8	2.39	103.40		24.6
24.22				59.75	42.8	2.39	104.94		23.1
24.04	48.00			60.14	42.8	2.39	105.33		22.7
24.11				60.24	42.8	2.39	105.43		22.6
24.19				59.02	42.8	2.39	104.21		23.8
								Result:	Complies

Corrected Field Strength [FSC_{orr}] = Measured FS [FS_{Meas}] + ACF [ACF] + Cable Los [L_C]

Margin = Limit [FS_{Limit}] - Corrected Field Strength [FS_{Corr}]

*Due to the highly polarized nature of radar, field strength measurements in the Horizontal Polarization were non-existent.

9.0 20DB BW

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.215
	ANSI C63.10 (6.10.3)

Limits	
§15.215(c)	**Additional provisions to the general radiated emission limitations.** (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

General Procedure	
C63.10 (6.3.10)	**6.10.3 Unlicensed wireless device operational configuration** Set the EUT to operate at 100% duty cycle or equivalent "normal mode of operation."[54] Testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.[55] Testing shall be performed for each frequency with every applicable unlicensed wireless device configuration. If more than one power output level is available, then testing shall be done with the appropriate maximum power output for each antenna combination or modulation, as recorded in the unlicensed wireless device conducted power measurement results. The highest gain of each antenna type shall be used for this test.

[54] For unlicensed wireless devices unable to be configured for 100% duty cycle even in test mode, configure the system for the longest duration duty cycle supported.

[55] Some radios operating, for example, in the 2.4 GHz band, have hardware capability to operate at frequencies outside the band permitted by the regulatory authority. Testing shall only be done at the lowest and highest frequencies within the allowed frequency band (see Annex A for examples of regulatory requirements and frequency ranges).

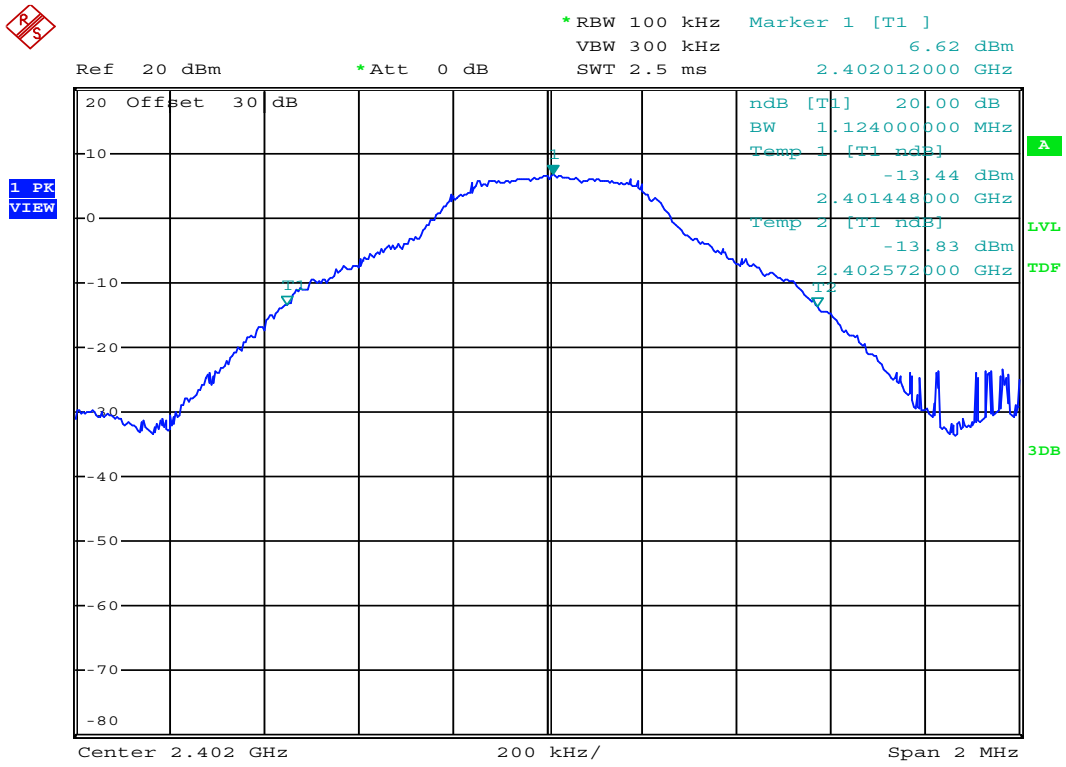
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above. The output power of the DUT was set to the manufacturer's highest output power setting at the Low and High frequency channels as permitted by the device. The unwanted band edge emissions were measured and recorded.

Plot 9.1 – 20dB BW, ANT, Ch 2

20dB Bandwidth: ANT

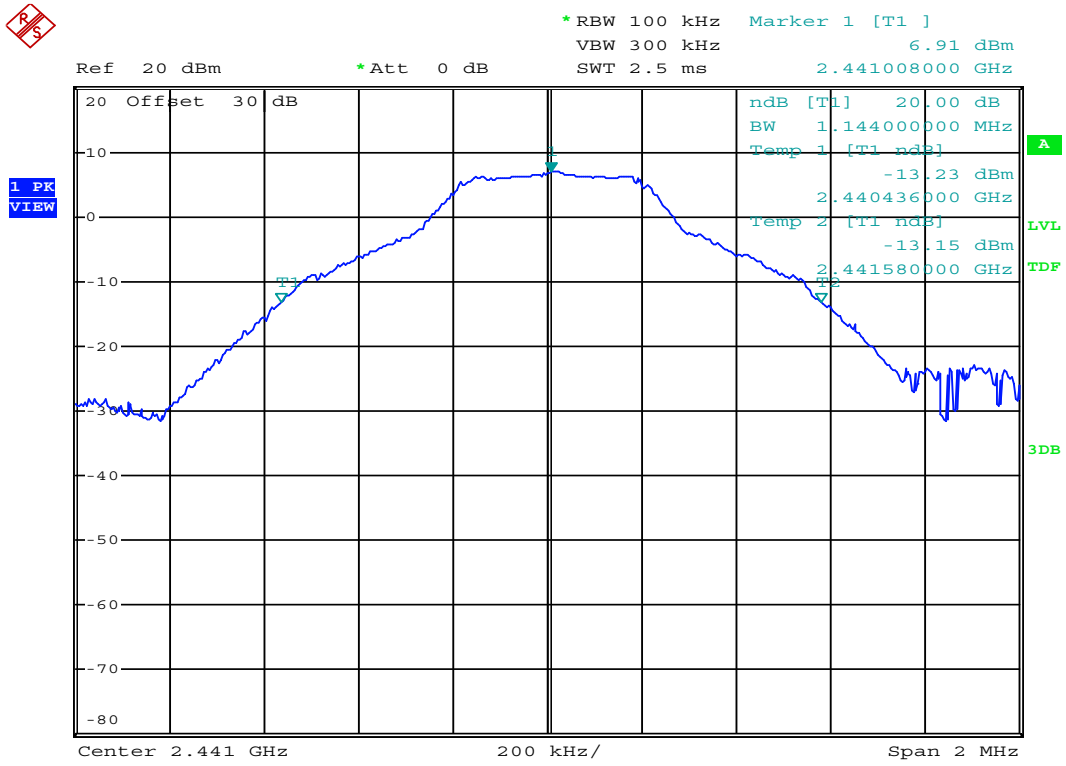


Date: 17.NOV.2021 13:46:54

Channel Number:	2	Channel Frequency (MHz):	2402	20dB Bandwidth (MHz):	1.124
Modulation:	GFSK	Bit Rate (Mbps):	-		

Plot 9.2 – 20dB BW, ANT, Ch 41

20dB Bandwidth: ANT

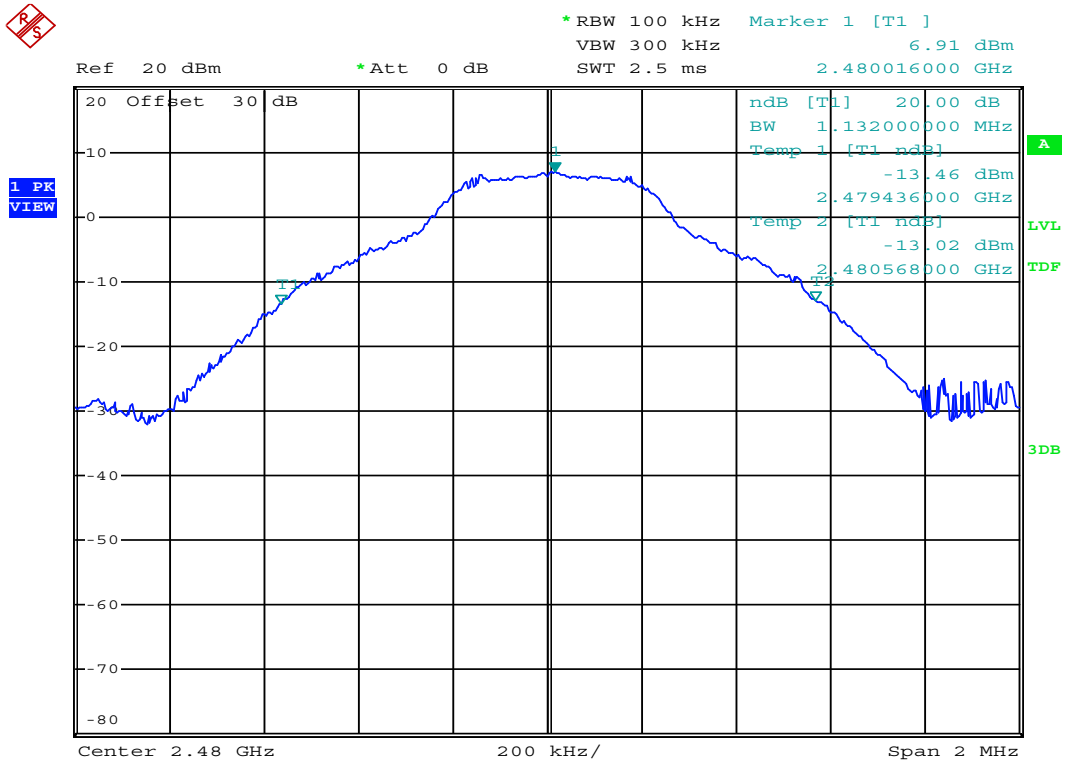


Date: 17.NOV.2021 15:16:09

Channel Number:	41	Channel Frequency (MHz):	2441	20dB Bandwidth (MHz):	1.144
Modulation:	GFSK	Bit Rate (Mbps):	-		

Plot 9.3 – 20dB BW, ANT, Ch 80

20dB Bandwidth: ANT



Date: 17.NOV.2021 15:14:23

Channel Number:	80	Channel Frequency (MHz):	2480	20dB Bandwidth (MHz):	1.132
Modulation:	GFSK	Bit Rate (Mbps):	-		

Table 9.1 - Summary of 20dB BW Measurements, ANT

20dB BW Bandwidth Measurement Results					
Mode	Channel Number	Channel Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured 20dB Bandwidth (MHz)
ANT	2	2402	GFSK	-	1.124
	41	2441		-	1.144
	80	2480		-	1.132
Result:					Complies

Compliance to §15.215(c):

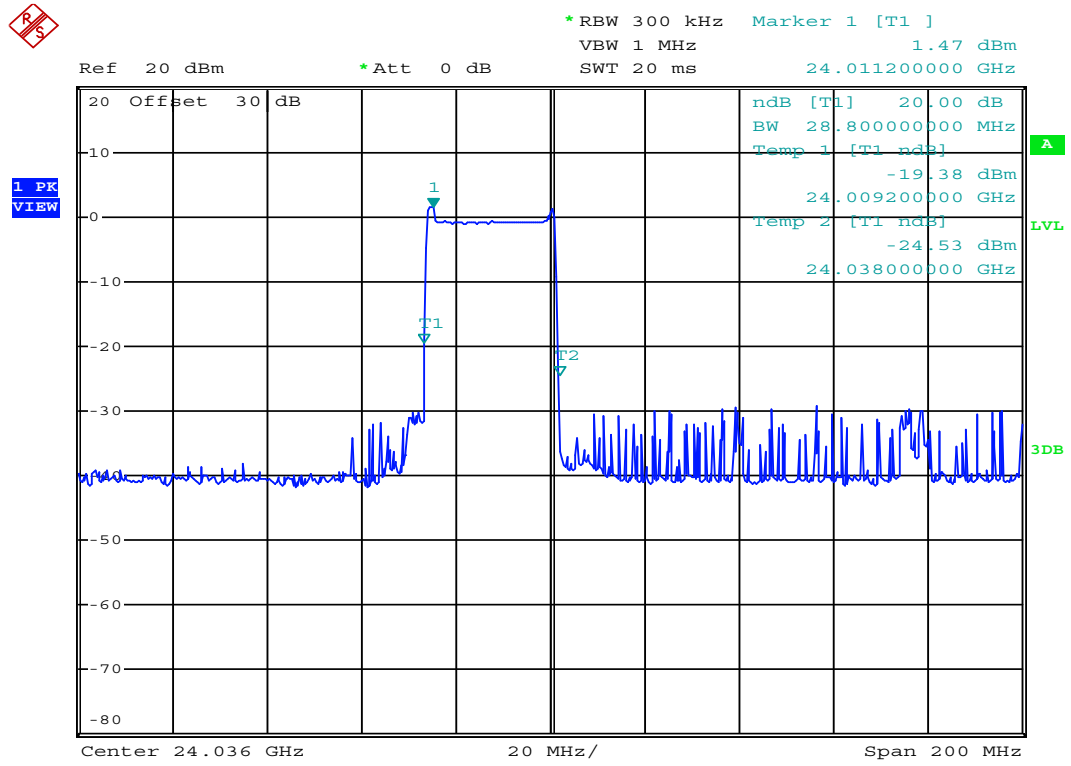
Largest Measured 20dB BW < 1.15MHz, 50% BW < 0.575MHz

LBE = 2402MHz - 0.575MHz = 2401.4MHz > 2400MHz

UBE = 2480MHz + 0.575MHz = 2480.6MHz < 2483.5MHz

Plot 9.4 – 20dB BW, 24GHz Radar, 24MHz BW, Channel Lo

20dB Bandwidth: Radar

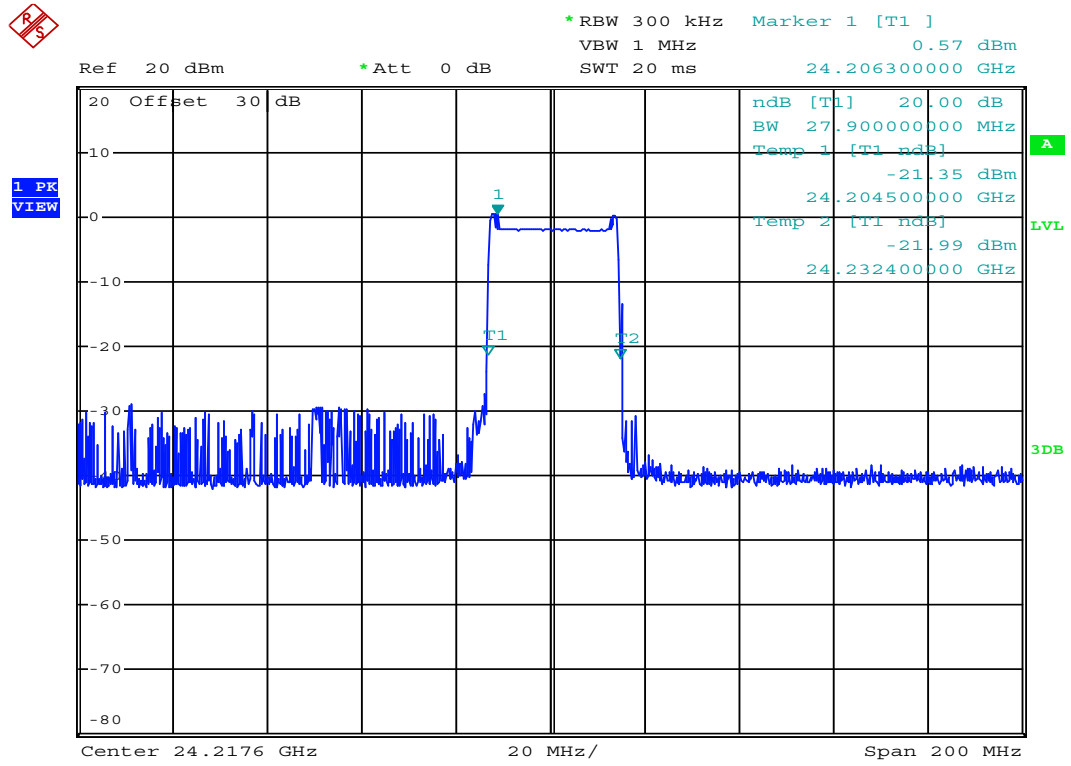


Channel Frequency (GHz):	24.02
Channel Bandwidth (MHz)	24

20dB Bandwidth (MHz):	28.8

Plot 9.5 – 20dB BW, 24GHz Radar, 24MHz BW, Channel Hi

20dB Bandwidth: Radar

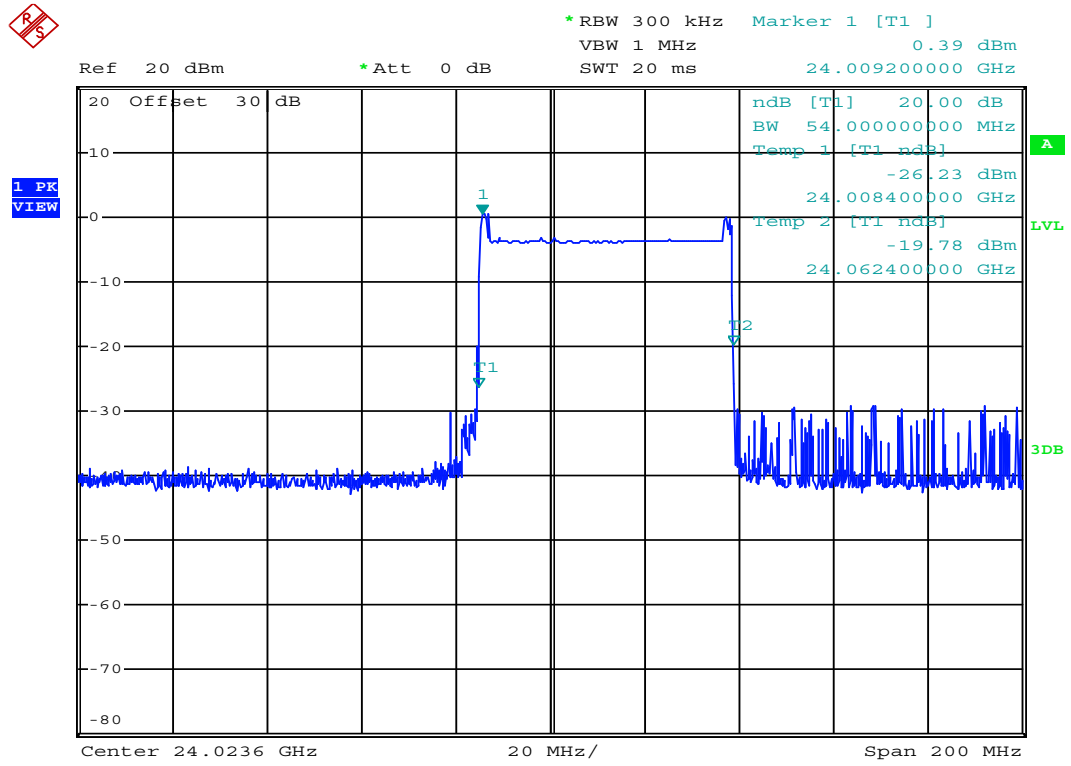


Date: 22.NOV.2021 14:49:46

Channel Frequency (GHz):	24.22
Channel Bandwidth (MHz)	24
20dB Bandwidth (MHz):	27.9

Plot 9.6 – 20dB BW, 24GHz Radar, 48MHz BW, Channel Lo

20dB Bandwidth: Radar

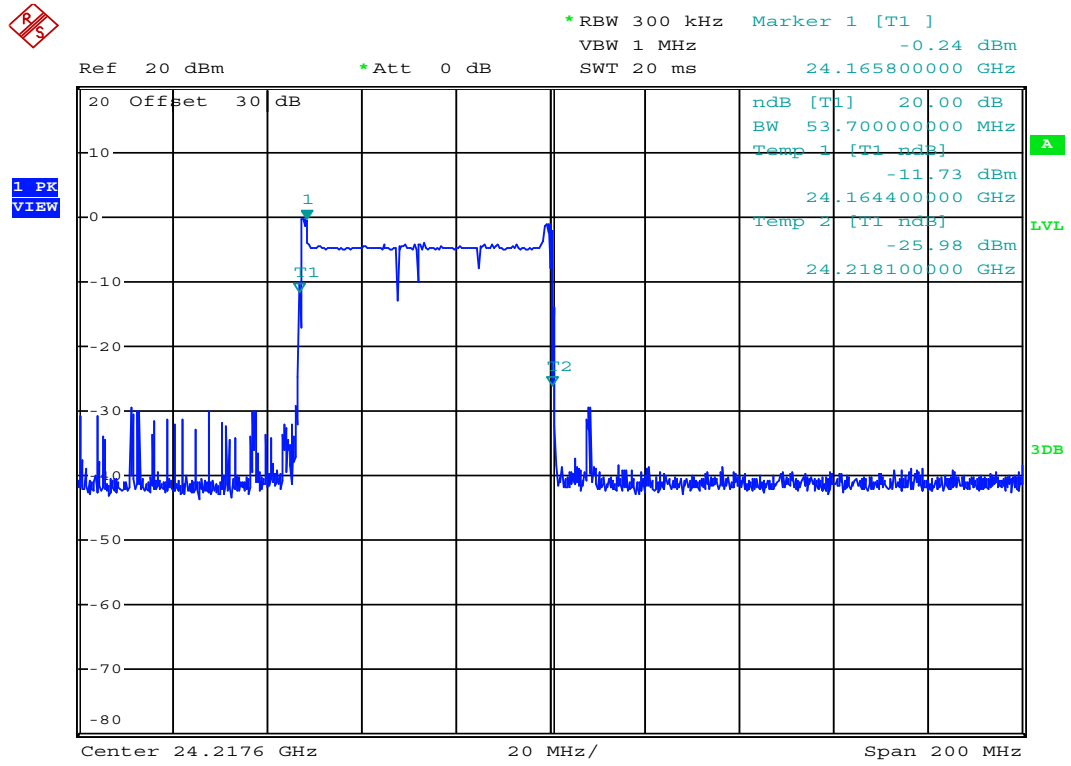


Date: 22.NOV.2021 14:52:52

Channel Frequency (GHz):	24.04
Channel Bandwidth (MHz)	48
20dB Bandwidth (MHz):	54.0

Plot 9.7 – 20dB BW, 24GHz Radar, 24MHz BW, Channel Hi

20dB Bandwidth: Radar



Date: 22.NOV.2021 14:50:30

Channel Frequency (GHz):	24.19
Channel Bandwidth (MHz)	48
20dB Bandwidth (MHz):	53.7

Table 9.2 - Summary of 20dB BW Measurements, 24GHz Radar

20dB BW Bandwidth Measurement Results				
Mode	Channel Frequency (GHz)	Modulation	Channel Bandwidth (MHz)	Measured 20dB Bandwidth (MHz)
Radar	24.02	-	24	28.800
	24.22		24	27.900
	24.04		48	54.000
	24.19		48	53.700
Result:				Complies

Compliance to §15.215(c):

Largest Measured 20dB BW = 54MHz, 50% BW = 27MHz (0.027GHz)

LBE = 24.04GHz - 0.027GHzMHz = 24.013GHz > 24.00GHz

UBE = 24.19GHz + 0.027GHz = 24.217GHz < 24.25GHz

10.0 RADIATED SPURIOUS EMISSIONS – RESTRICTED BANDS

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), §15.205(a), §15.205(c), §15.209(a)
	KDB 558074 (8.6), ANSI C63.10 (11.12)

Limits	
47 CFR §15.247(d)	(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
47 CFR §15.209(a)	**§15.209 Radiated emission limits; general requirements.** (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)
0.009 - 0.490	2400/F (kHz) @300m
0.490 - 1.705	24000/F (kHz) @30m
1.705 - 30	30 @ 30m
30 - 88	100 @3m
88 - 216	150 @3m
216 - 960	200 @3m
Above 960	500 @3m

See Appendix H for Measurement Plots

Table 10.1 – Summary of Radiated Emissions, Restricted Band, ANT + WiFi + Radar

Summary of Radiated Simultaneous Tx Emissions WiFi + ANT + Radar									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
30-1000MHz	Horizontal	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	46.0	n/a
30-1000MHz	Vertical	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	43.5	n/a
1 - 3GHz	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
1 - 3GHz	Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
3-13GHz	Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
3-13GHz	Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
13-18GHz	Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
13-18GHz	Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
18-22GHz	Horizontal	ND	ND (1)	43.05	18.83	0.00 (3)	ND	54.0	n/a
18-22GHz	Vertical	ND	ND (1)	43.05	18.83	0.00 (3)	ND	54.0	n/a
22 -25GHz	Horizontal	ND	ND (1)	42.96	21.86	0.00 (3)	ND	54.0	n/a
22-25GHz	Vertical	ND	ND (1)	42.96	21.86	0.00 (3)	ND	54.0	n/a
							Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

See Appendix H for Measurement Plots

Table 10.2 – Summary of Radiated Emissions, Restricted Band, ANT + BLE + Radar

Summary of Radiated Simultaneous Tx Emissions BLE + ANT + Radar									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
30-1000MHz	Horizontal	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	46.0	n/a
30-1000MHz	Vertical	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	43.5	n/a
1 - 3GHz	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
1 - 3GHz	Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
3-13GHz	Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
3-13GHz	Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
13-18GHz	Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
13-18GHz	Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
18-22GHz	Horizontal	ND	ND (1)	43.05	18.83	0.00 (3)	ND	54.0	n/a
18-22GHz	Vertical	ND	ND (1)	43.05	18.83	0.00 (3)	ND	54.0	n/a
22 -25GHz	Horizontal	ND	ND (1)	42.96	21.86	0.00 (3)	ND	54.0	n/a
22-25GHz	Vertical	ND	ND (1)	42.96	21.86	0.00 (3)	ND	54.0	n/a
							Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

Table 10.3 – Summary of Radiated Emissions, Restricted Band, Radar

Summary of Radiated Simultaneous Tx Emissions WiFi + ANT + Radar										
Channel Frequency (GHz)	Channel Bandwidth (MHz)	Antenna* Polarization	Emission Frequency (GHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Conversion Loss [CL] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
24.02	24.0	Vertical	48.04	-37.56	43.82	2.50	23.00	31.8	67.96	**36.2**
24.14		Vertical	48.28	-32.96	43.82	2.50	23.00	36.4	67.96	**31.6**
24.22		Vertical	48.44	-32.26	43.82	2.50	23.00	37.1	67.96	**30.9**
24.02		Vertical	72.06	-33.09	47.35	2.50	35.00	51.8	67.96	**16.2**
24.14		Vertical	72.42	-32.69	47.35	2.50	35.00	52.2	67.96	**15.8**
24.22		Vertical	72.66	-31.99	47.35	2.50	35.00	52.9	67.96	**15.1**
24.02		Vertical	96.08	-36.79	49.85	2.50	39.80	55.4	67.96	**12.6**
24.14		Vertical	96.56	-36.09	49.85	2.50	39.80	56.1	67.96	**11.9**
24.22		Vertical	96.88	-35.69	49.85	2.50	39.80	56.5	67.96	**11.5**
24.04	48.0	Vertical	48.08	-35.16	43.82	2.50	23.00	34.2	67.96	**33.8**
24.11		Vertical	48.22	-34.26	43.82	2.50	23.00	35.1	67.96	**32.9**
24.19		Vertical	48.38	-33.76	43.82	2.50	23.00	35.6	67.96	**32.4**
24.04		Vertical	72.12	-31.69	47.35	2.50	35.00	53.2	67.96	**14.8**
24.11		Vertical	72.33	-31.99	47.35	2.50	35.00	52.9	67.96	**15.1**
24.19		Vertical	72.57	-31.59	47.35	2.50	35.00	53.3	67.96	**14.7**
24.04		Vertical	96.16	-34.39	49.85	2.50	39.80	57.8	67.96	**10.2**
24.11		Vertical	96.44	-34.29	49.85	2.50	39.80	57.9	67.96	**10.1**
24.19		Vertical	96.76	-34.09	49.85	2.50	39.80	58.1	67.96	**9.9**
								Results:	**Complies**	

*Due to the highly polarized nature of radar, field strength measurements in the Horizontal Pol

$E_{Corr} = E_{Meas} + ACF + L_C - C_L$

Margin = Limit - E_{Corr}

11.0 RADIATED RX SPURIOUS EMISSIONS

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)

General Procedure	
C63.10 (6.5.4)	**6.5.4 Final radiated emission tests** Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

Test Setup	Appendix A Figure A.2

Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

Table 11.1 – Summary of Radiated Rx Emissions

See Appendix H for Measurement Plots

Measurement Results				
Frequency Range	**Antenna Polarization**	**Measured Emission [E_{Meas}] (dBm)**	**Limit e.r.p./e.r.i.p. [A_L] (dBuV/m)**	**Margin (dB)**
30-1000MHz	Horizontal	ND	-	**n/a**
1 - 18GHz		ND	-	**n/a**
30-1000MHz	Vertical	ND	-	**n/a**
1 - 18GHz		ND	-	**n/a**
		Results:	**Complies**	

ND: No emissions detected above ambient or within 20dB of the limit

12.0 POWER LINE CONDUCTED EMISSIONS

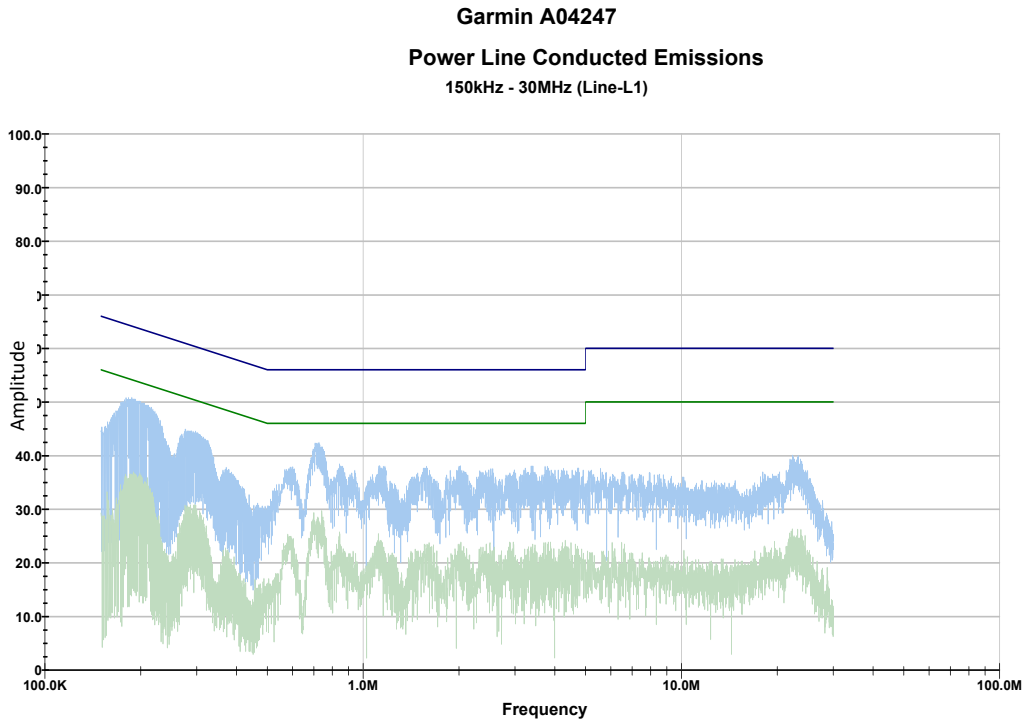
Test Procedure	
Normative Reference	**FCC 47 CFR §15.107, ICES-003(6.1)** **ANSI C63.4-2014**

Limits	
47 CFR §15.107	(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges. 0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logrithm of the frequency 0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average 5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average
ICES-003(6.1)	6.1 - AC Power Line Conducted Emissions Limits Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 2. 0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logrithm of the 0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average 5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average

Test Setup	Appendix A Figure A.7

Plot 12.1 – Power Line Conducted Emissions, Line 1

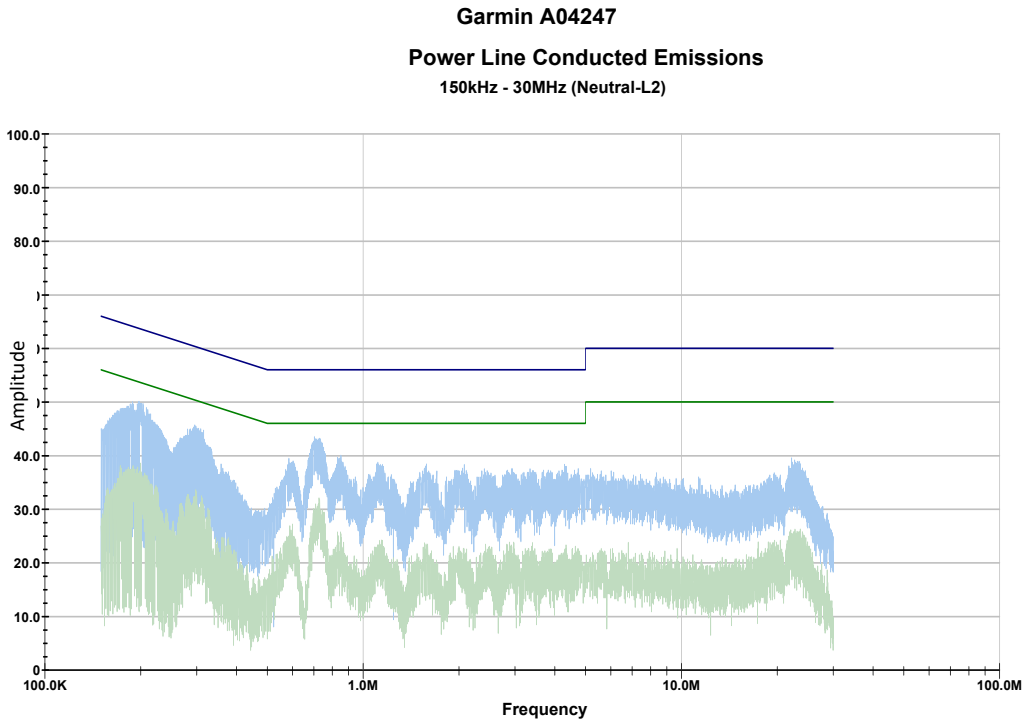
Power Line Conducted Emissions - L1



Green Limit:	Green Trace:	Frequency Range:
Quasi Peak	**Peak**	**0.15 - 30** MHz
Blue Limit:	Blue Trace:	Measured Emission:
Average	**RMS**	

Plot 12.2 – Power Line Conducted Emissions, Line 2

Power Line Conducted Emissions - L2



Blue Limit: **Quasi Peak**	Blue Trace: **Peak**	Frequency Range: **0.15 - 30** MHz
Green Limit: **Average**	Green Trace: **RMS**	Measured Emission:

Table 12.1 – Summary of Power Line Conducted Emissions – L1

Summary of Power Line Conducted Tx Emissions												
Measured Frequency Range (MHz)	Channel Frequency (MHz)	LISN Port	Emission Frequency [f_{Emm}]		Measured Emission [E_{Meas}] (dBuV)	Detector*	Insertion Loss [L_{LISN}] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV)	Limit (dBuV)	Margin (dB)
150kHz - 30MHz	2442.0	L1	658.90	kHz	45.95	Peak	0.40	0.25	0.00	(3)	46.6 (2)	56.0	**9.4**
			1.38	MHz	38.16		0.30	0.26			38.7 (2)	56.0	**17.3**
			10.74	MHz	44.73		0.30	0.26			45.3 (2)	60.0	**14.7**
			11.15	MHz	44.32		0.30	0.27			44.9 (2)	60.0	**15.1**
			663.10	kHz	38.71	Average	0.40	0.25			39.4 (2)	46.0	**6.6**
			1.40	MHz	28.66		0.30	0.26			29.2 (2)	46.0	**16.8**
			10.83	MHz	32.83		0.30	0.26			33.4 (2)	50.0	**16.6**
			11.10	MHz	33.42		0.30	0.27			34.0 (2)	50.0	**16.0**
											Results:	**Complies**	

* In accordance with FCC §15.35 and ANSI C63.4, a Peak detector may be used to demonstrate compliance to Quasi-Peak limits provided the Resolution Bandwidth (RBW) is equal to or greater than Quasi-Peak bandwidth. The Detector RBW employed was ≥ 9kHz.
(2) LISN Insertion Loss, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used
$E_{Corr} = E_{Meas} + L_{LISN} + L_C - G_A$
Class B QP Limit = 56 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz
Class B Avg Limit = 46 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz
Class A QP Limit = 79dBuV for f_{Emm} = 150kHz to 500kHz
Class A Avg Limit = 66dBuV for f_{Emm} = 150kHz to 500kHz
Margin = Limit - E_{corr}

Table 12.1 – Summary of Power Line Conducted Emissions – L2

Summary of Power Line Conducted Tx Emissions

Measured Frequency Range (MHz)	Channel Frequency (MHz)	LISN Port	Emission Frequency [f_{Emm}]	Measured Emission [E_{Meas}] (dBuV)	Detector*	Insertion Loss [L_{LISN}] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV)	Limit (dBuV)	Margin (dB)
150kHz - 30MHz	2442.0	L2	652.80 kHz	45.18	Peak	0.40	0.25	0.00 (3)	45.8 (2)	56.0	**10.2**
			1.38 MHz	37.06		0.30	0.26		37.6 (2)	56.0	**18.4**
			10.72 MHz	45.03		0.30	0.26		45.6 (2)	60.0	**14.4**
			11.26 MHz	43.42		0.30	0.27		44.0 (2)	60.0	**16.0**
			662.04 kHz	38.99	Average	0.40	0.25		39.6 (2)	46.0	**6.4**
			1.38 MHz	28.56		0.30	0.26		29.1 (2)	46.0	**16.9**
			10.75 MHz	32.43		0.30	0.26		33.0 (2)	50.0	**17.0**
			11.06 MHz	34.02		0.30	0.27		34.6 (2)	50.0	**15.4**
									Results:	**Complies**	

* In accordance with FCC §15.35 and ANSI C63.4, a Peak detector may be used to demonstrate compliance to Quasi-Peak limits provided the Resolution Bandwidth (RBW) is equal to or greater than Quasi-Peak bandwidth. The Detector RBW employed was ≥ 9kHz.
(2) LISN Insertion Loss, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used
$E_{Corr} = E_{Meas} + L_{LISN} + L_C - G_A$
Class B QP Limit = 56 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz
Class B Avg Limit = 46 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz
Class A QP Limit = 79dBuV for f_{Emm} = 150kHz to 500kHz
Class A Avg Limit = 66dBuV for f_{Emm} = 150kHz to 500kHz
Margin = Limit - E_{corr}

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment List

Equipment List				
Asset Number	**Manufacturer**	**Model Number**	**Serial Number**	**Description**
00241	R&S	FSU40	100500	Spectrum Analyzer
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable

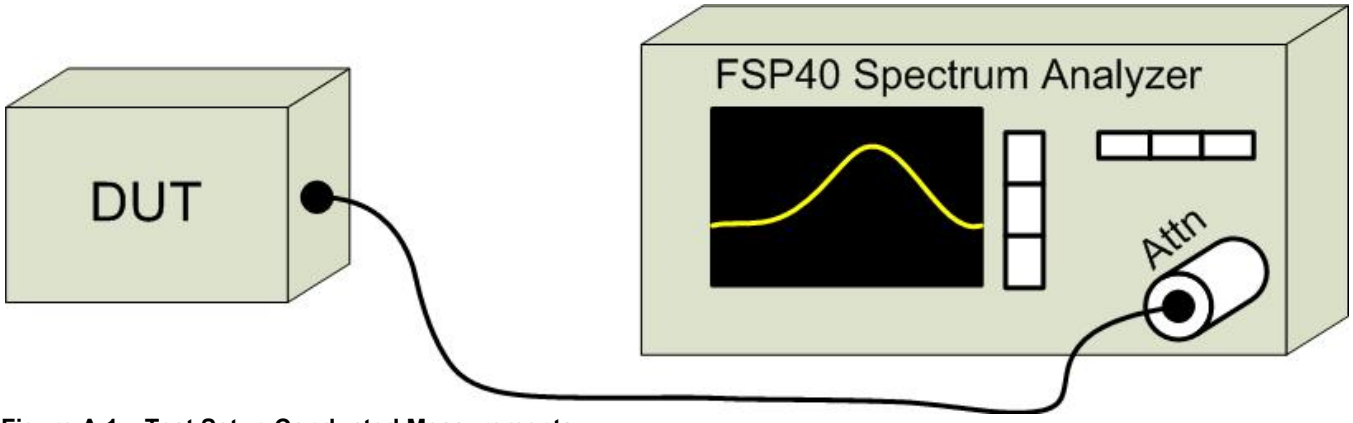


Figure A.1 – Test Setup Conducted Measurements

Table A.2 – Setup - Radiated Emissions Equipment List

Equipment List				
Asset Number	**Manufacturer**	**Model Number**	**Serial Number**	**Description**
00050	Chase	CBL-6111A	1607	Bilog Antenna
00034	ETS	3115	6267	Double Ridged Guide Horn
00035	ETS	3115	6276	Double Ridged Guide Horn
00085	EMCO	6502	9203-2724	Loop Antenna
00161	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00162	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00165	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00166	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00241	R&S	FSU40	100500	Spectrum Analyzer
00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier
00071	EMCO	2090	9912-1484	Multi-Device Controller
00072	EMCO	2075	0001-2277	Mini-mast
00073	EMCO	2080	0002-1002	Turn Table
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable
00275	TMS	LMR400	n/a	25m Cable
00278	TILE	34G3	n/a	TILE Test Software

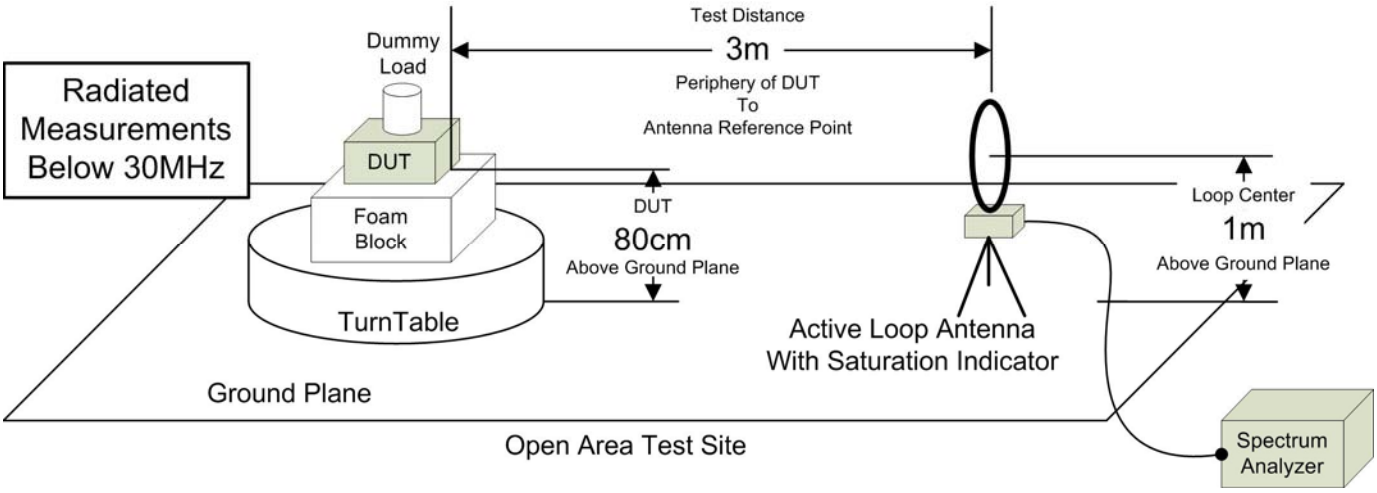


Figure A.2 – Test Setup Radiated Emissions Measurements Below 30MHz

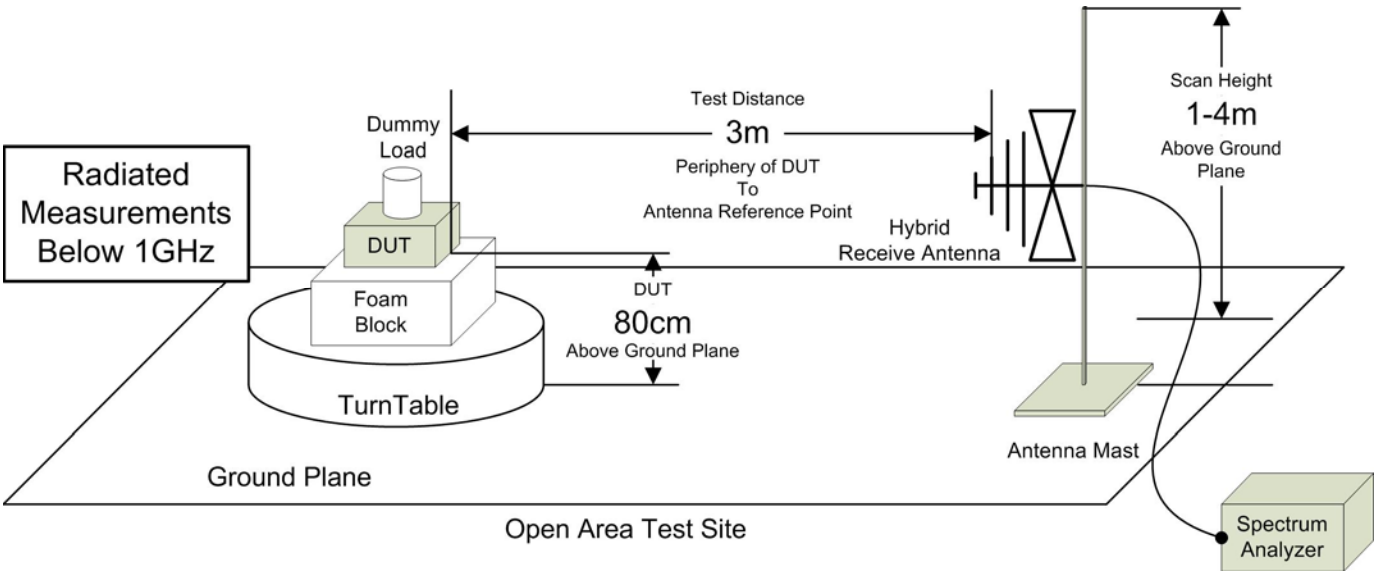


Figure A.3 – Test Setup Radiated Emissions Measurements 30 – 1000MHz

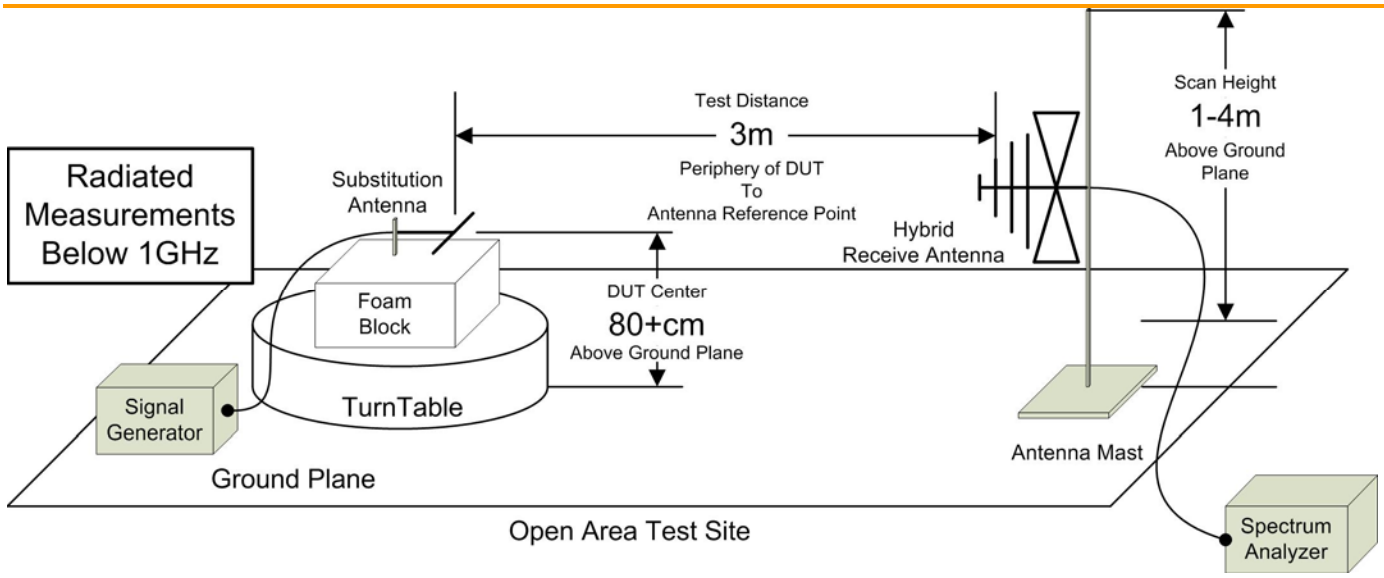


Figure A.4 – Test Setup Radiated Emissions Measurements 30 – 1000MHz Signal Substitution

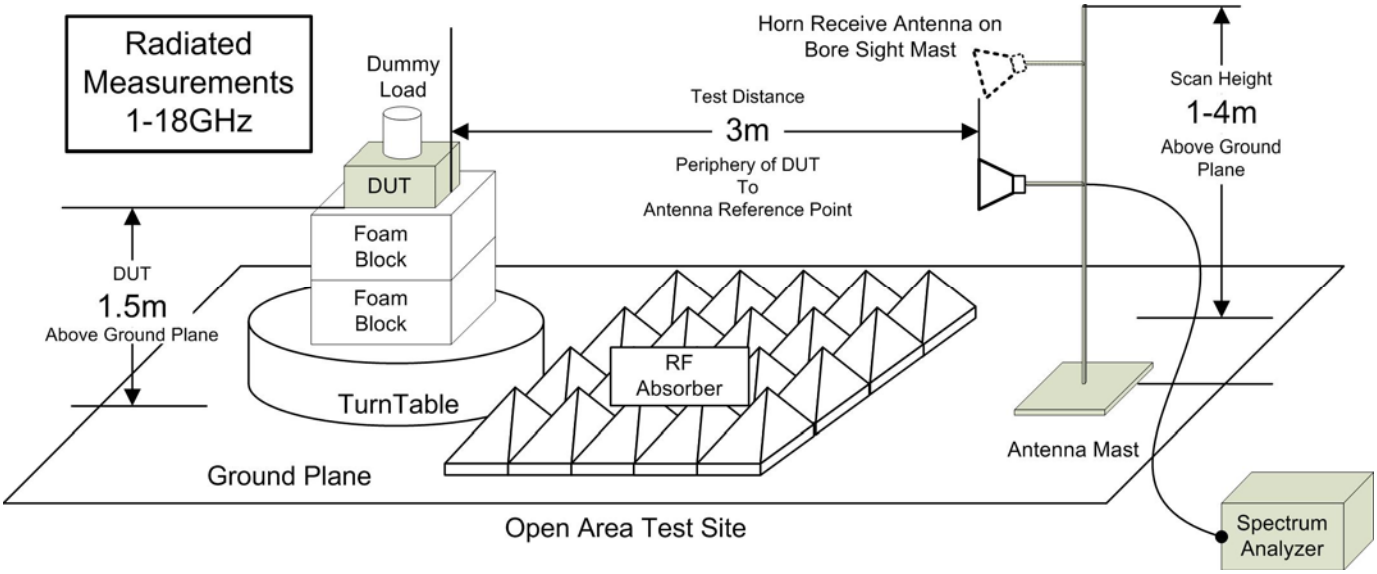


Figure A.5 – Test Setup Radiated Emissions Measurements 1 – 18GHz

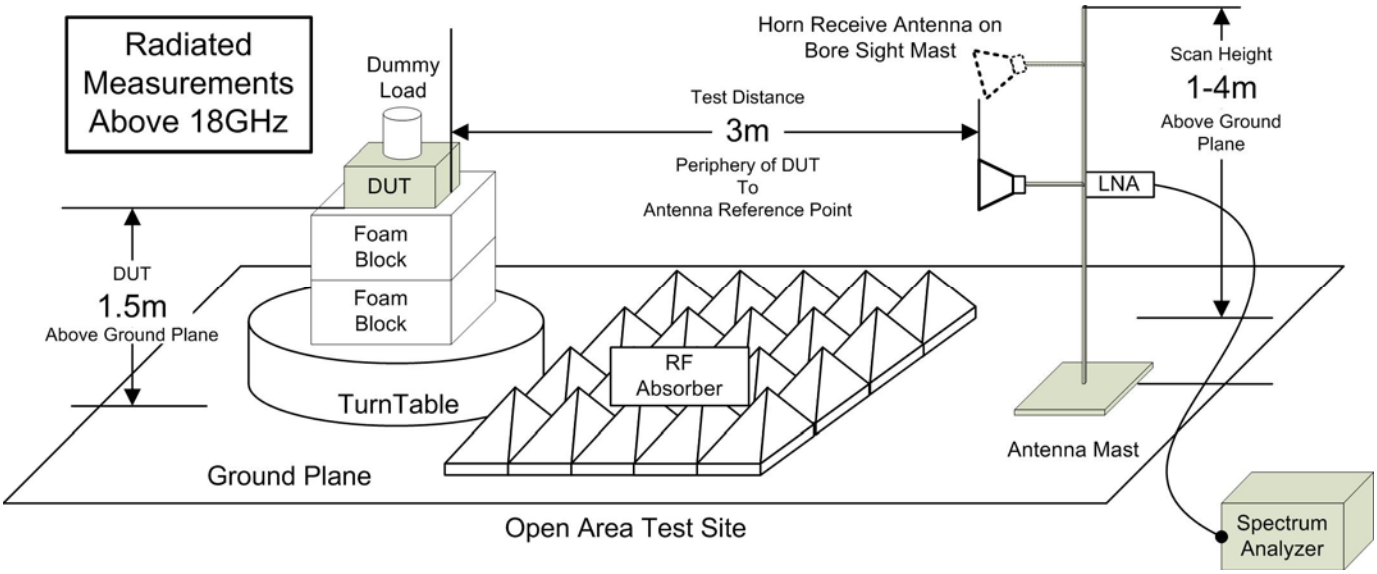


Figure A.6 – Test Setup Radiated Emissions Measurements Above 18 GHz

APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	3 Jan 2019	Triennial	3 Jan 2022
00034	ETS	3115	6267	Double Ridged Guide Horn	26 Nov 2018	Triennial	26 Nov 2021
00035	ETS	3115	6276	Double Ridged Guide Horn	22 Mar 2019	Triennial	21 Mar 2022
00085	EMCO	6502	9203-2724	Loop Antenna	11 Jun 2019	Triennial	11 Jun 2022
00161	Waveline Inc.	889		Standard Gain Horn 18-26GHz	NCR	n/a	NCR
00165	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz	NCR	n/a	NCR
00345	HP	11970U	2332A00174	Harmonic Mixer 40-60GHz	COU	n/a	COU
00346	Dorado	GH-19		Standard Gain Horn 40-60GHz	NCR	n/a	NCR
00347	HP	11970V	2521A01347	Harmonic Mixer 50-75GHz	COU	n/a	COU
00348	Dorado	GH-15	99005	Standard Gain Horn 50-75GHz	NCR	n/a	NCR
00349	HP	11970W	2521A01604	Harmonic Mixer 75-110GHz	COU	n/a	COU
00350	Dorado	GH-10	99001	Standard Gain Horn 75-110GHz	NCR	n/a	NCR
00333	HP	85685A	3010A01095	RF Preselector	23 Jun 2020	Triennial	30 Jun 2023
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2020	Triennial	23 Jun 2023
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2020	Triennial	23 Jun 2023
00241	R&S	FSU40	100500	Spectrum Analyzer	10 Aug 2021	Triennial	10 Aug 2024
00257	Com-Power	LI-215A	191934	LISN	27 Dec 2021	Triennial	27 Dec 2024
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00264	Koaxis	KP10-7.00M-TD	264	7m Armoured Cable	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required
COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2
Radiated Emissions 30MHz - 200MHz
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB
Radiated Emissions 200MHz - 1000MHz
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB
Radiated Emissions 1GHz - 6GHz
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB
Radiated Emissions 6GHz - 18GHz
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB
Power Line Conducted Emissions 9kHz to 150kHz
U_{LAB} = 2.96dB U_{CISPR} = 3.8dB
Power Line Conducted Emissions 150kHz to 30MHz
U_{LAB} = 3.12dB U_{CISPR} = 3.4dB

	If the calculated uncertainty U_{lab} is **less** than U_{CISPR} then:
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
	If the calculated uncertainty U_{lab} is **greater** than U_{CISPR} then:
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (U_{lab} - U_{CISPR}), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (U_{lab} - U_{CISPR}), **EXCEEDS** the disturbance limit

Other Measurement Uncertainties (U_{LAB})
RF Conducted Emissions 9kHz - 40GHz
U_{LAB} = 1.0dB U_{CISPR} = n/a
Frequency/Bandwidth 9kHz - 40GHz
U_{LAB} = 0.1ppm U_{CISPR} = n/a
Temperature
U_{LAB} = 1^{O}C U_{CISPR} = n/a

END OF REPORT

APPENDIX H – RADIATED TX AND RX MEASUREMENT PLOTS

APPENDIX I – FIELD STRENGTH MEASUREMENT PLOTS

