Test Report Serial Number:	**45461666 R1.0**
Test Report Date:	**27 September 2021**
Project Number:	**1541**

EMC Test Report - New Certification

Applicant:

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

FCC ID:	IC Registration Number
IPH-04125	**1792A-04125**
Product Model Number / HVIN	Product Marketing Name / PMN
A04125	**A04125**

In Accordance With:

CFR Title 47, Part 15 Subpart C (§15.247), Part 15 Subpart B

Digital Transmission System (DTS)

RSS-Gen, RSS-247 Issue 2

Digital Transmissions Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

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:**	26 May - 6 June, 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	Initial Draft Release		n/a	Art Voss	21 June 2021
1.0	Initial Release		n/a	Art Voss	27 September 2021

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-04125**
	ISED ID:	**1792A-04125**
Device Model(s) / HVIN:	A04125	
Test Sample Serial No.:	3361277594 - Conducted, 3361277722 - OTA	
Device Type:	Extremity Worn Digital Transceiver	
FCC Equipment Class:	WiFi - Digital Transmission System (DTS)	
	BlueTooth - Spread Spectrum Transmitter (DSS)	
	BlueTooth LE/ANT - Low Power Communication Device Transmitter (DXX)	
	NFC - Low Power Communication Device Transmitter (DXX)	
ISED Equipment Class:	WiFi: Wi-Fi Device	
	BlueTooth: Spread Spectrum/Digital Device (2400-2483.5MHz)	
	BlueTooth LE/ANT - Low Power Device (2400-2483.5MHz)	
	NFC - RFID Device	
Transmit Frequency Range:	WiFi (DTS): 2412-2462MHz	
	BT/BLE/ANT: 2402-2480MHz	
	NFC: 13.56MHz	
Manuf. Max. Rated Output Power:	WiFi - Digital Transmission System (DTS): 18.34dBm	
	BlueTooth - Spread Spectrum Transmitter (DSS): 6.01dBm	
	BLE/ANT - Low Power Communication Device Transmitter (DXX): 5.73dBm	
	NFC - Low Power Communication Device Transmitter (DXX): -36dBm	
Antenna Type and Gain:	0.6dBi Max*	
Modulation:	WiFi: DSSS, OFDM, CCK, MCS0-7	
Modulation:	BT BR: GFSK	
Modulation:	BT EDR 2Mb: Pi/4-DQPSK, BT EDR 3Mb: 8-DPSK	
Modulation:	BLE: GMSK	
Modulation:	ANT: GFSK	
Modulation:	NFC:	
DUT Power Source:	3VDC Rechargeable Li-Ion	
DUT Dimensions [LxWxH]	H x W x D: 50mm x 45mm x 18mm	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

* Information regarding antenna type and 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: A04125 is an extremity worn digital transceiver device consisting of a WiFi, BlueTooth (BT), BlueTooth Low Energy (BLE), Adaptive Network Topology (ANT) and Near Field Communication (NFC) transceivers. The WiFi and BT/BLE/ANT 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 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)	26, 29 May 2021	Pass
8.0	DTS Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	§15.247(a)(2)	RSS-Gen (6.7) RSS-247 (5.2)(a)	26, 29 May 2021	Pass
9.0	Duty Cycle and Transmission Duration	ANSI C63.10-2013 KDB 558074 D01v05	n/a	n/a	26 May 2021	n/a
10.0	Conducted Power (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§2.1046 §15.247(b)(3)	RSS-Gen (6.12) RSS-247 (5.4)(d)	26, 29 May 2021	Pass
11.0	Conducted Power (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§2.1046 §15.247(b)(1)	RSS-Gen (6.12) RSS-247 (5.4)(b)	26, 29 May 2021	Pass
12.0	Power Spectral Density	ANSI C63.10-2013 KDB 558074 D01v05	§15.247(e)	RSS-247 (5.2)(b)	26, 29 May 2021	Pass
13.0	FHSS Hopping Characteristics	ANSI C63.4-2014 KDB 558074 D01v05	§15.247(a)(1)(iii)	RSS-247 (5.1)(d)	27 May 2021	Pass
14.0	FHSS Channel Separation	ANSI C63.4-2014 KDB 558074 D01v05	§15.247(a)(1)	RSS-247 (5.1)(b)	27 May 2021	Pass
15.0	FHSS Time of Occupancy	ANSI C63.4-2014 KDB 558074 D01v05	§15.247(a)(1)(iii)	RSS-247 (5.1)(d)	27 May 2021	Pass
16.0	Conducted Tx Spurious Emissions Band Edge	ANSI C63.10-2013 KDB 558074 D01v05	§2.1051 §15.247(d)	RSS-Gen (6.13) RSS-247 (5.5)	30 May 2021	Pass
17.0	Conducted Tx Spurious Emissions	ANSI C63.10-2013 KDB 558074 D01v05	§2.1051 §15.247(d)	RSS-Gen (6.13) RSS-247 (5.5)	30 May 2021	Pass
18.0	Radiated Tx Spurious Emissions And Restricted Band	ANSI C63.4-2014 KDB 558074 D01v05	§15.109 §15.247(d)	RSS-Gen (6.13)	2, 3 June 2021	Pass
19.0	Radiated Rx Spurious Emissions	ANSI C63.4-2014 KDB 558074 D01v05	§15.109	RSS-Gen (7.4) ICES-003(6.2)	2, 3 June 2021	Pass
20.0	Power Line Conducted Emissions	ANSI C63.4-2014	§15.107	ICES-003(6.1)	7 June 2021	Pass

Test Station Day Log					
Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
26 May 2021	23.1	16	101.9	**EMC**	**7, 8, 9, 10**
27 May 2021	24.0	15	100.7	**EMC**	**12, 13, 14**
29 May 2021	21.0	17	102.5	**EMC**	**8, 9, 10, 11**
30 May 2021	22.7	16	102.1	**EMC**	**14, 15**
31 May 2021	24.0	15	102.1	**EMC**	**16**
1 June 2021	27.3	17	101.9	**EMC**	**16**
1 June 2021	28.6	46	101.9	**ESD**	**21**
1 June 2021	27.2	35	101.9	**SAC**	**20**
1 June 2021	28.6	46	101.2	**LISN**	**20**
2 June 2021	22.0	50	101.2	**OATS**	**17, 18**
3 June 2021	21.0	50	101.1	**OATS**	**17, 18**
4 June 2021	25.3	16	101.5	**TC**	**19**

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

21 June 2021
Date

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA A. F. VOSS # 31327

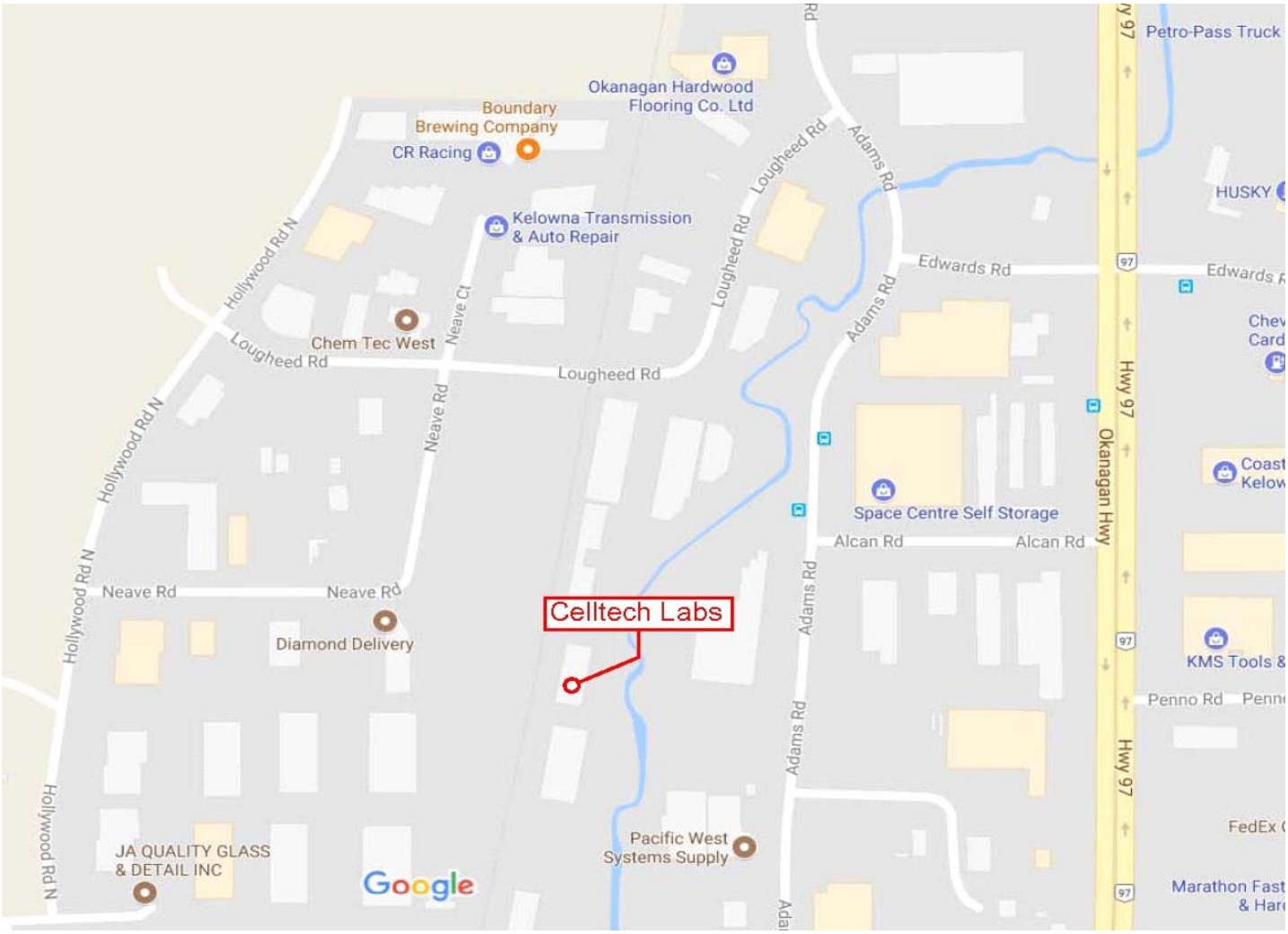
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
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 (15.247)	Code of Federal Regulations Telecommunication Radio Frequency Devices Intentional Radiators
CFR Title 47: Part 15: Subpart B:	Code of Federal Regulations Telecommunication Radio Frequency Devices Unintentional Radiators
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
ISED RSS-Gen Issue 5: Amendment 1: 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-247 Issue 2: February 2017	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licensed-Exempt Local Area Network (LE_LAN) Devices

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 CA3874 and Innovation, Science and Economic Development Canada under Test Site File Number ISED 3874A-1. 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, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d), KDB 558074 (8.3.2.1), ANSI C63.10 (6.9.3)

General Procedure	
KDB 558074 (8.3.2.1)	**8.3.2.1 General** Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth.
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 and used for the basis for measuring the Conducted Output Power (See Section 10.0) and Power Spectral Density (See Section 11.0).

Table 7.1 – Summary of Occupied Bandwidth Measurements (DTS)

See Appendix D for Measurement Plots

Occupied Bandwidth Measurement Results: 802.11						
Mode	**Channel Number**	**Channel Frequency (MHz)**	**Modulation**	**Bit Rate (Mbps)**	**Measured Occupied Bandwidth (MHz)**	**Emission Designator**
802.11b	1	2412	CCK	1	14.2	14M2D1D
	6	2437			14.3	14M3D1D
	11	2462			14.2	14M2D1D
	13	2472			14.2	14M2D1D
	1	2412		2	14.2	14M2D1D
	6	2437			14.2	14M2D1D
	11	2462			14.2	14M2D1D
	13	2472			14.2	14M2D1D
	1	2412	DSSS	5.5	13.9	13M9D1D
	6	2437			13.9	13M9D1D
	11	2462			13.9	13M9D1D
	13	2472			13.8	13M8D1D
	1	2412		11	13.9	13M9D1D
	6	2437			13.9	13M9D1D
	11	2462			13.9	13M9D1D
	13	2472			13.9	13M9D1D
					Result:	**Complies**

Table 7.2 – Summary of Occupied Bandwidth Measurements (DTS) (Cont.)

See Appendix D for Measurement Plots

Occupied Bandwidth Measurement Results: 802.11						
Mode	**Channel Number**	**Channel Frequency (MHz)**	**Modulation**	**Bit Rate (Mbps)**	**Measured Occupied Bandwidth (MHz)**	**Emission Designator**
802.11g	1	2412	OFDM	6	17.4	17M4D1D
	6	2437			17.4	17M4D1D
	11	2462			17.2	17M2D1D
	13	2472			17.3	17M3D1D
	1	2412		9	17.2	17M2D1D
				12	17.2	17M2D1D
				18	17.2	17M2D1D
				24	17.0	17M0D1D
				36	17.0	17M0D1D
				48	17.0	17M0D1D
				54	17.0	17M0D1D
802.11n	6	2437	OFDM	MCS0	18.0	18M0D1D
				MCS1	18.0	18M0D1D
				MCS3	18.0	18M0D1D
				MCS4	18.0	18M0D1D
				MCS6	18.1	18M1D1D
				MCS6*	18.0	18M0D1D
				MCS6**	18.0	18M0D1D
				MCS7	18.0	18M0D1D
					Result:	**Complies**

Table 7.3 – Summary of Occupied Bandwidth Measurements (DSS)

See Appendix D for Measurement Plots

Occupied Bandwidth Measurement Results: BlueTooth						
Mode	**Channel Number**	**Channel Frequency (MHz)**	**Modulation**	**Bit Rate (Mbps)**	**Measured Occupied Bandwidth (MHz)**	**Emission Designator**
BT BR	2	2402	GFSK	-	0.900	900KD1D
	41	2441			0.952	952KD1D
	80	2480			0.916	916KD1D
BT EDR 2	2	2402	P1/4-DQPSK	2	1.24	1M24D1D
	41	2441			1.25	1M25D1D
	80	2480			1.24	1M24D1D
BT EDR 3	2	2402	8-DPSK	3	1.26	1M26D1D
	41	2441			1.26	1M26D1D
	80	2480			1.24	1M24D1D
BLE 1	2	2402	GMSK	1	1.13	1M13D1D
	41	2441			1.13	1M13D1D
	80	2480			1.12	1M12D1D
BLE 2	2	2402	GMSK	2	2.08	2M08D1D
	41	2441			2.12	2M12D1D
	80	2480			2.09	2M09D1D
ANT	2	2402	GFSK	-	0.984	984KD1D
	41	2441			0.980	980KD1D
	80	2480			0.948	948KD1D
					Result:	**Complies**

8.0 DTS BANDWIDTH

Test Procedure	
Normative Reference	FCC 47 CFR §2.1049, §15.247(a)(2), RSS-Gen (6.7), RSS-247 (5.2)(a),
	KDB 558074 (8.2), ANSI C63.10 (11.8.2)

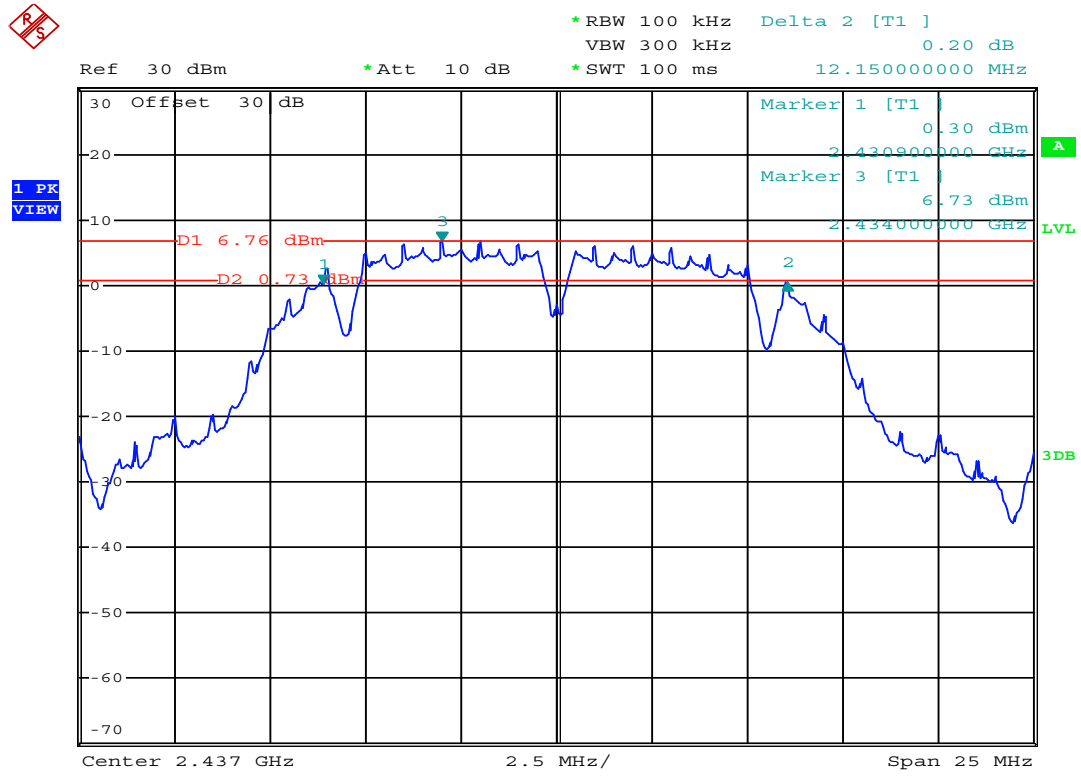
Limits	
47 CFR §15.247(a)(2)	(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions: (2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
RSS-247 (5.2)(a)	5.2 Digital transmission systems DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400 - 2483.5 MHz: a) The minimum 6 dB bandwidth shall be 500 kHz.
KDB 558074 (8.2) C63.10 (11.8.2)	**8.2 Option 2** The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 X RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
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 above using the Automatic 6dB Cursor Bandwidth measurement. 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 100% Duty Cycle.

Plot 8.1 – 6dB DTS Bandwidth 802.11b

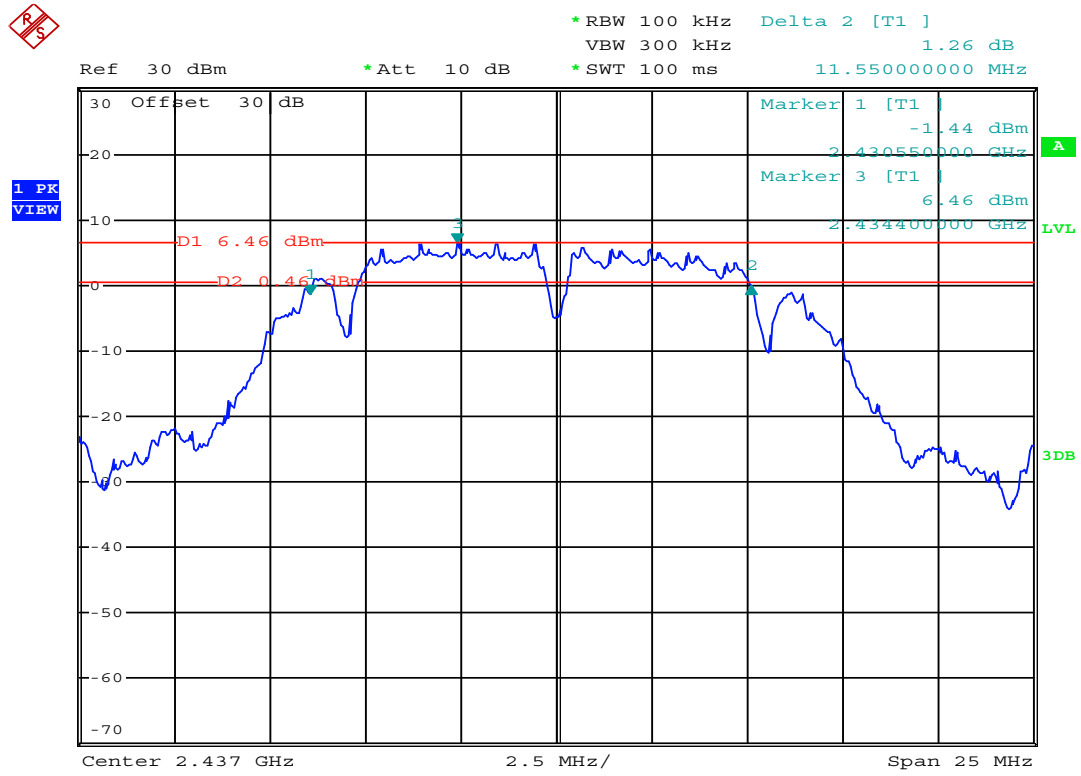
DTS Bandwidth: 802.11b



Channel Number:	6	Channel Frequency (MHz):	2437	DTS Bandwidth (MHz):	12.15
Modulation:	CCK	Bit Rate (Mbps):	1		

Plot 8.2 – 6dB DTS Bandwidth 802.11b

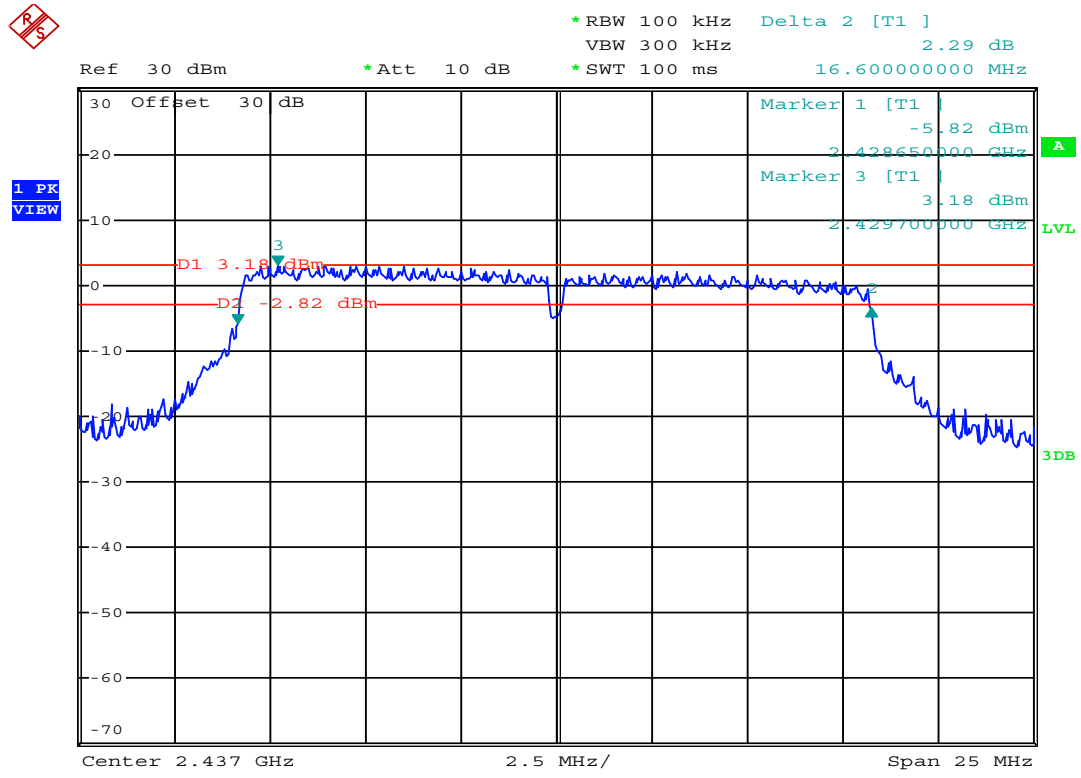
DTS Bandwidth: 802.11b



Channel Number:	6	Channel Frequency (MHz):	2437	DTS Bandwidth (MHz):	11.55
Modulation:	CCK	Bit Rate (Mbps):	2		

Plot 8.3 – 6dB DTS Bandwidth 802.11g

DTS Bandwidth: 802.11g

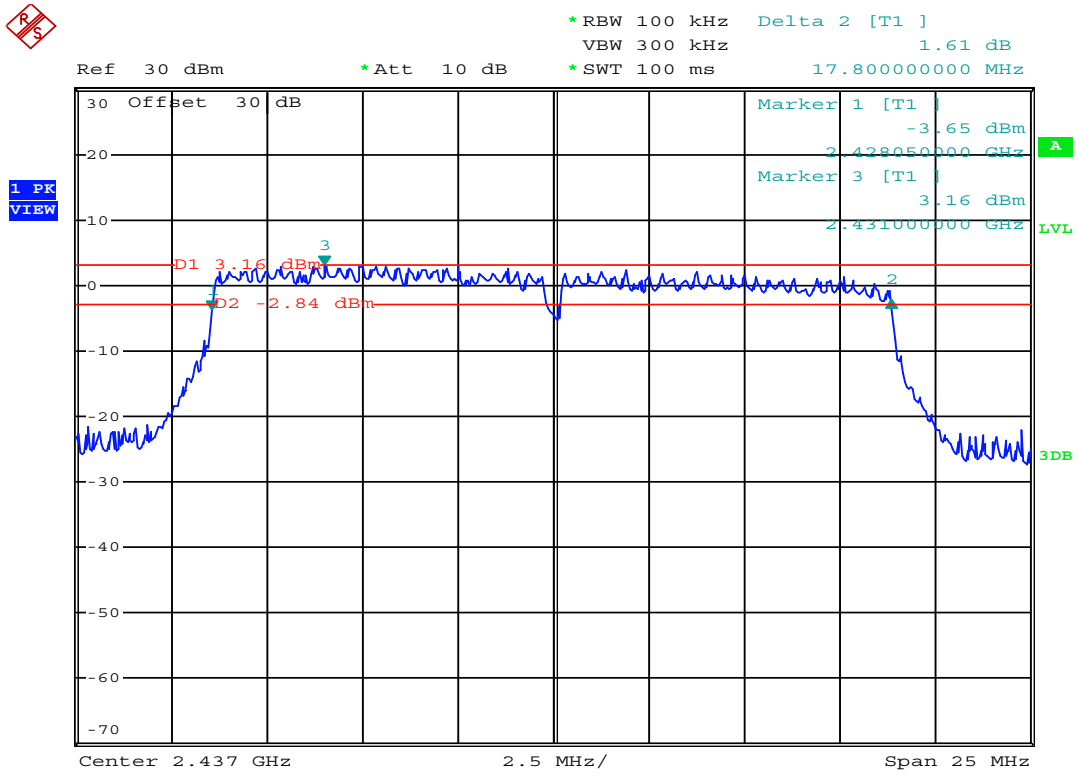


Date: 26.MAY.2021 10:57:55

Channel Number:	6	Channel Frequency (MHz):	2437	DTS Bandwidth (MHz):	16.60
Modulation:	OFDM	Bit Rate (Mbps):	6		

Plot 8.4 – 6dB DTS Bandwidth 802.11n

DTS Bandwidth: 802.11n



Date: 26.MAY.2021 11:00:11

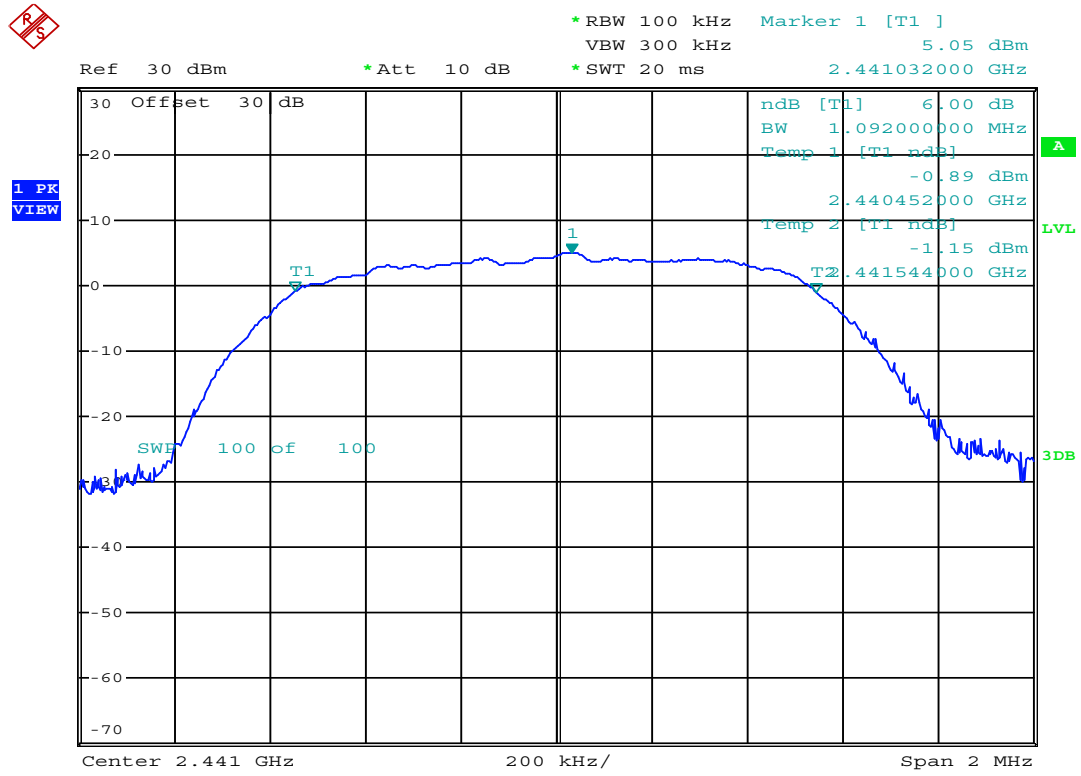
Channel Number:	6	Channel Frequency (MHz):	2437	DTS Bandwidth (MHz):	17.80
Modulation:	OFDM	Bit Rate (Mbps):	MCS0		

Table 8.1 – Summary of 6dB DTS Bandwidth Measurements, (WiFi)

Occupied Bandwidth Measurement Results: 802.11							
Mode	Channel Number	Channel Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured DTS Bandwidth (MHz)	Minimum DTS Bandwidth (MHz)	Margin (MHz)
802.11b	6	2437	CCK	1	12.2	0.5	11.7
802.11b	6	2437	CCK	2	11.6		11.1
802.11g	6	2437	OFDM	6	16.6		16.1
802.11n	6	2437	OFDM	MCS0	17.8		17.3
					Result:		Complies

Plot 8.5 – 6dB DTS Bandwidth BT EDR 2MB, 2441MHz

DTS Bandwidth: BlueTooth

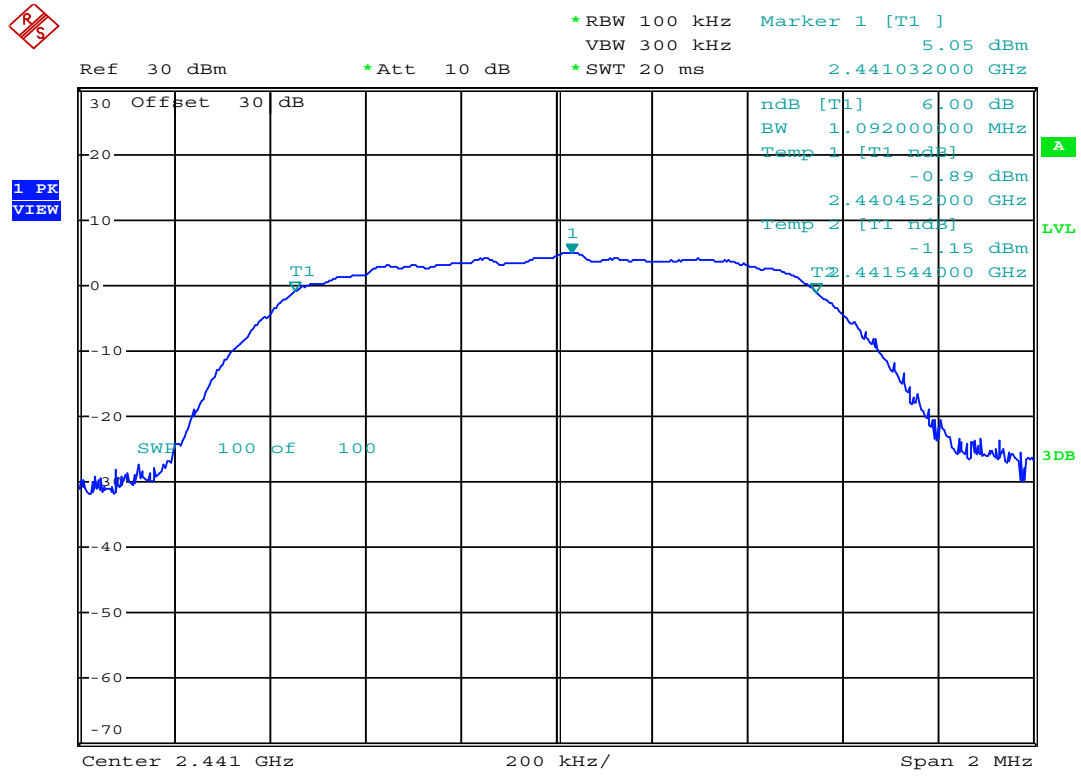


Date: 26.MAY.2021 14:52:27

Channel Number:	41	Channel Frequency (MHz):	2441	DTS Bandwidth (MHz):	1.09
Modulation:	Pi/4-DQPSK	Bit Rate (Mbps):	2		

Plot 8.6 – 6dB DTS Bandwidth BT EDR 3MB, 2441MHz

DTS Bandwidth: BlueTooth



Date: 26.MAY.2021 14:52:27

Channel Number:	41	Channel Frequency (MHz):	2441	DTS Bandwidth (MHz):	1.09
Modulation:	Pi/4-DQPSK	Bit Rate (Mbps):	2		

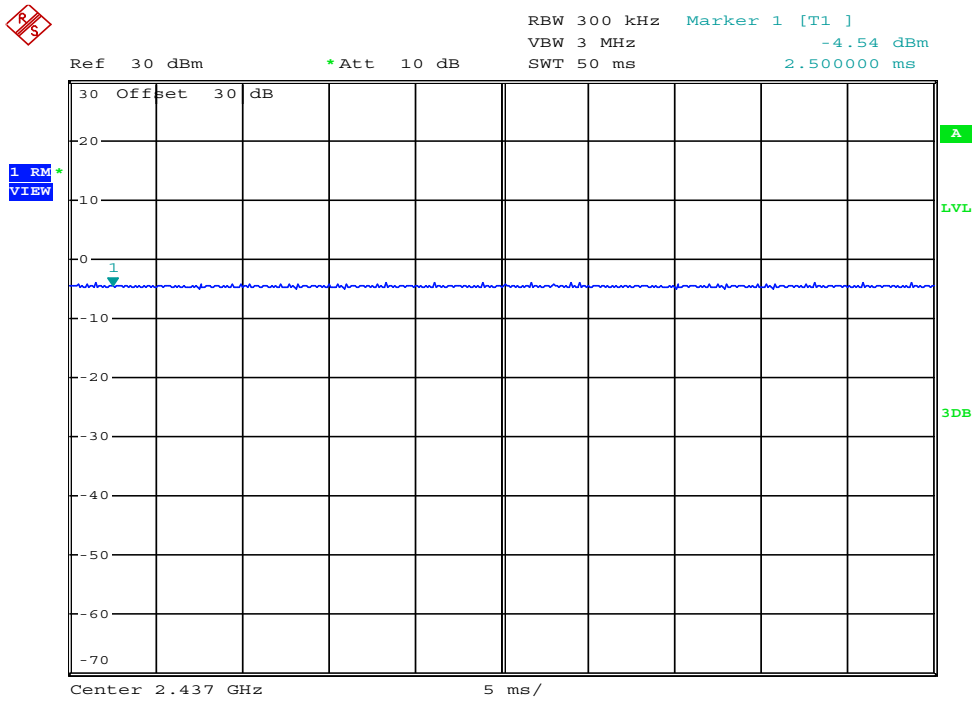
Table 8.2 – Summary of 6dB DTS Bandwidth Measurements, (BlueTooth)

Occupied Bandwidth Measurement Results: 802.11							
Mode	Channel Number	Channel Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured DTS Bandwidth (MHz)	Minimum DTS Bandwidth (MHz)	Margin (MHz)
BT EDR2	41	2441	Pi/4-DQPSK	2	1.09	0.5	0.6
BT EDR3	41	2441	8-DPSK	3	1.06		0.6
					Result:		Complies

9.0 DUTY CYCLE AND TRANSMISSION DURATION

Plot 9.1 – Duty Cycle – WiFi - DSSS

Transmit Duty Cycle

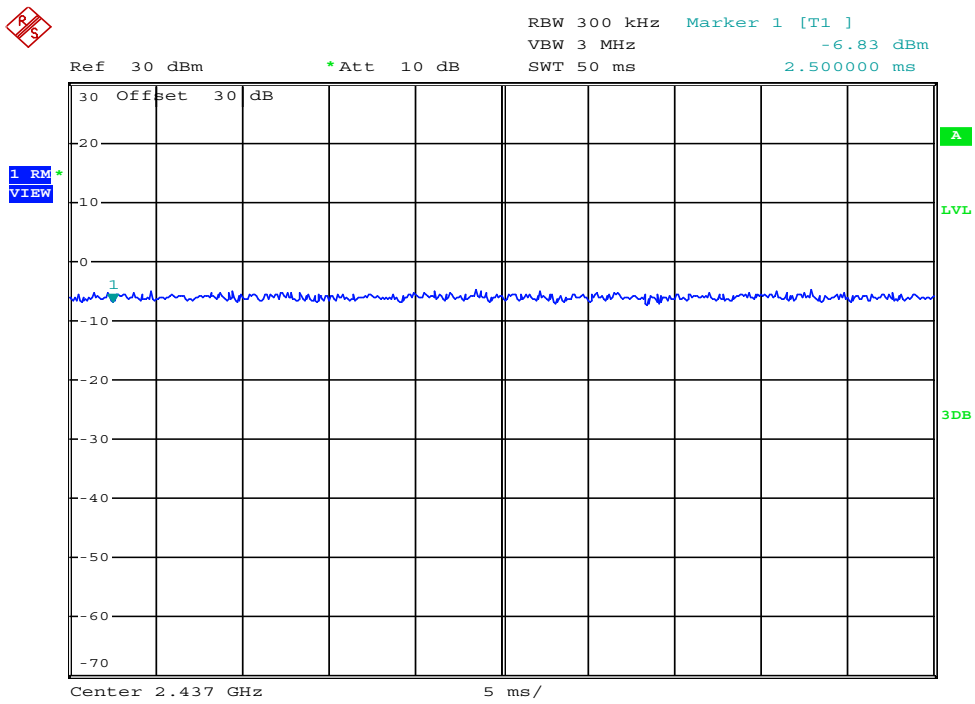


Date: 27.MAY.2021 16:57:10

Channel Frequency:	Modulation:	Measured Duty Cycle:
2437.00 MHz	**DSSS**	**100.0** %

Plot 9.2 – Duty Cycle – WiFi - OFDM

Transmit Duty Cycle

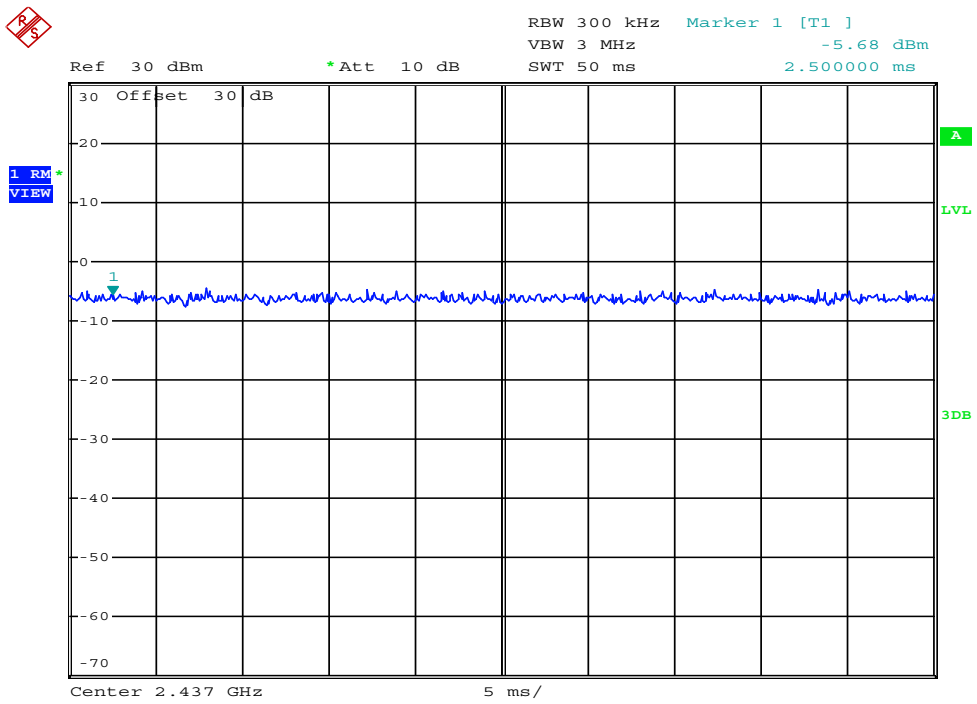


Date: 27.MAY.2021 16:57:43

Channel Frequency:	Modulation:	Measured Duty Cycle:
2437.00 MHz	**OFDM**	**100.0** %

Plot 9.3 – Duty Cycle – WiFi – MCS0

Transmit Duty Cycle

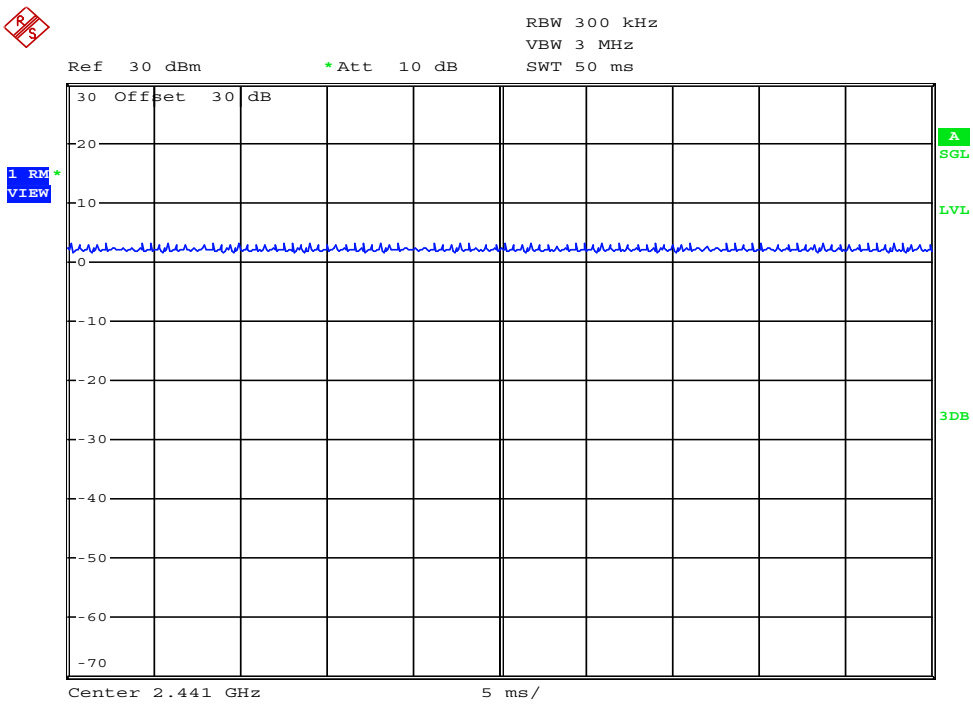


Date: 27.MAY.2021 16:58:11

Channel Frequency:	Modulation:	Measured Duty Cycle:
2437.00 MHz	**MCS0**	**100.0** %

Plot 9.4 – Duty Cycle – BT – EDR 2MB

Transmit Duty Cycle

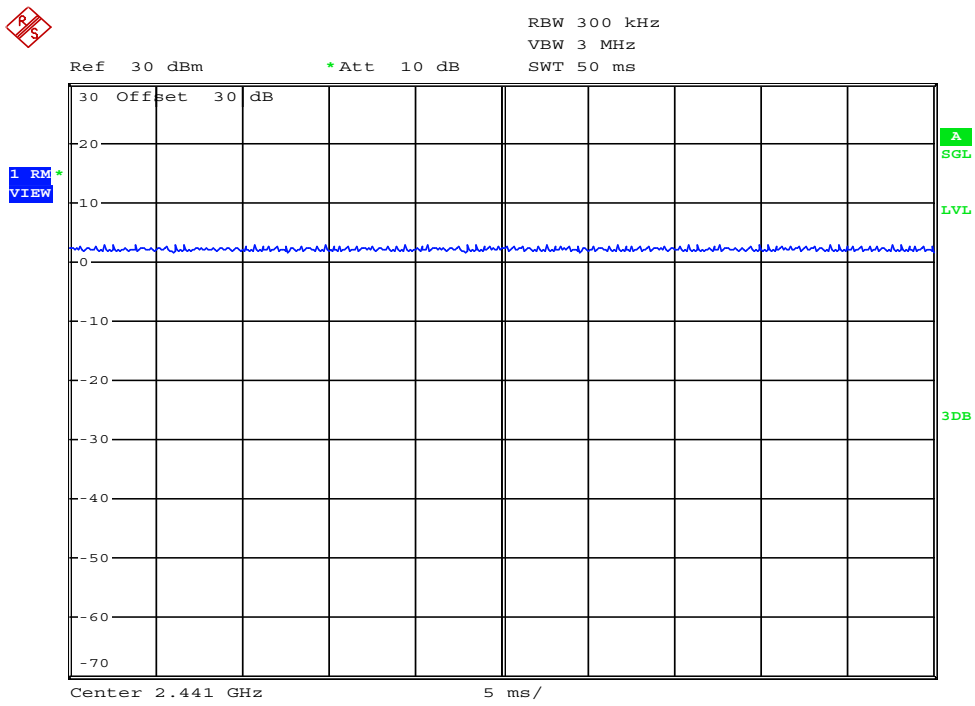


Date: 27.MAY.2021 16:12:14

Channel Frequency:	Modulation:	Measured Duty Cycle:
2441.00 MHz	**EDR Pi/4-DQPSK**	**100.0** %

Plot 9.5 – Duty Cycle – BT – EDR 3MB

Transmit Duty Cycle



Date: 27.MAY.2021 16:12:47

Channel Frequency:	Modulation:	Measured Duty Cycle:
2441.00 MHz	**EDR 8-DPSK**	**100.0** %

Table 9.2 – Summary Duty Cycle Measurement - WiFi

Transmit Duty Cycle Results DTS		
Frequency (MHz)	**Modulation**	**Measured Duty Cycle Cycle (%)**
2437.00	DSSS	100
2437.00	OFDM	100
2437.00	MCS0	100

Transmit Duty Cycle = 100%. Duty Cycle Correction not Required

Transmit Duty Cycle Results DSS		
Frequency (MHz)	**Modulation**	**Measured Duty Cycle Cycle (%)**
2441.00	BR GFSK	100
2441.00	EDR Pi/4-DQPSK	100
2441.00	EDR 8-DPSK	100
2441.00	BLE 1MB GMSK	63
2441.00	BLE 2MB GMSK	35
2441.00	ANT GFSK	100

10.0 ANTENNA PORT CONDUCTED POWER, (DTS)

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d),
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.2)

Limits	
47 CFR §15.247(b)(3)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.
RSS-247 (5.4)(d)	**5.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.)** Devices shall comply with the following requirements, where applicable: d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.

Table 10.1 – Summary of Conducted Power Measurements, (DTS)

See Appendix E for Measurement Plots

Conducted Power Measurement Results: 802.11													
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Transmit Duty Cycle (%)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain [G_T] (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
802.11b	1	2412.00	CCK	1	100	17.55	30	12.5	0.6	18.15	36	17.9	Complies
	2	2417.00				18.05	30	12.0	0.6	18.65	36	17.4	Complies
	3	2422.00				18.15	30	11.9	0.6	18.75	36	17.3	Complies
	4	2427.00				17.97	30	12.0	0.6	18.57	36	17.4	Complies
	5	2432.00				17.77	30	12.2	0.6	18.37	36	17.6	Complies
	6	2437.00				17.89	30	12.1	0.6	18.49	36	17.5	Complies
	7	2442.00				17.60	30	12.4	0.6	18.20	36	17.8	Complies
	8	2447.00				17.51	30	12.5	0.6	18.11	36	17.9	Complies
	9	2452.00				17.41	30	12.6	0.6	18.01	36	18.0	Complies
	10	2457.00				17.51	30	12.5	0.6	18.11	36	17.9	Complies
	11	2462.00				17.59	30	12.4	0.6	18.19	36	17.8	Complies
	12	2467.00				17.57	30	12.4	0.6	18.17	36	17.8	Complies
	13	2472.00				17.25	30	12.8	0.6	17.85	36	18.2	Complies
	3	2422.00		2		18.09	30	11.9	0.6	18.69	36	17.3	Complies
	5	2432.00				17.99	30	12.0	0.6	18.59	36	17.4	Complies
	11	2462.00				17.55	30	12.5	0.6	18.15	36	17.9	Complies
	12	2467.00				17.58	30	12.4	0.6	18.18	36	17.8	Complies
	3	2422.00	DSSS	5.5		18.34	30	11.7	0.6	18.94	36	17.1	Complies
	5	2432.00				18.16	30	11.8	0.6	18.76	36	17.2	Complies
	11	2462.00				17.82	30	12.2	0.6	18.42	36	17.6	Complies
	12	2467.00				17.87	30	12.1	0.6	18.47	36	17.5	Complies
	3	2422.00		11		18.24	30	11.8	0.6	18.84	36	17.2	Complies
	5	2432.00				**18.34**	**30**	**11.7**	**0.6**	**18.94**	**36**	**17.1**	**Complies**
	5*	2432.00				16.69	30	13.3	0.6	17.29	36	18.7	Complies
	5**	2432.00				17.31	30	12.7	0.6	17.91	36	18.1	Complies
	11	2462.00				17.68	30	12.3	0.6	18.28	36	17.7	Complies
	12	2467.00				17.69	30	12.3	0.6	18.29	36	17.7	Complies

EIRP $E_{Meas} = P_{Meas} + G_T$

Conducted Margin = $P_{Limit} - P_{Meas}$

EIRP Margin = $E_{Limit} - E_{Meas}$

* Antenna Gain information provided by applicant.

Table 10.1 – Summary of Conducted Power Measurements, (DTS) Cont.

See Appendix E for Measurement Plots

Conducted Power Measurement Results: 802.11													
Mode	**Channel Number**	**Frequency (MHz)**	**Modulation**	**Bit Rate (Mbps)**	**Transmit Duty Cycle (%)**	**Measured Power [P_{Meas}] (dBm)**	**Conducted Limit [P_{Lim}] (dBm)**	**Conducted Margin (dB)**	**Antenna Gain (dBi)**	**EIRP [E_{Meas}] (dBm)**	**EIRP Limit [E_{Lim}] (dBm)**	**EIRP Margin (dB)**	**Result**
802.11g	3	2422.00	OFDM	6	100	**16.44**	**30**	**13.6**	**0.6**	**17.04**	**36**	**19.0**	Complies
	11	2462.00				15.97	30	14.0	0.6	16.57	36	19.4	Complies
	12	2467.00				15.98	30	14.0	0.6	16.58	36	19.4	Complies
	3	2422.00		24		16.43	30	13.6	0.6	17.03	36	19.0	Complies
	11	2462.00				15.92	30	14.1	0.6	16.52	36	19.5	Complies
	12	2467.00				15.77	30	14.2	0.6	16.37	36	19.6	Complies
	3	2422.00		54		16.34	30	13.7	0.6	16.94	36	19.1	Complies
	11	2462.00				15.84	30	14.2	0.6	16.44	36	19.6	Complies
	12	2467.00				15.93	30	14.1	0.6	16.53	36	19.5	Complies
802.11n	3	2422.00	OFDM	MCS0		16.29	30	13.7	0.6	16.89	36	19.1	Complies
	11	2462.00				15.86	30	14.1	0.6	16.46	36	19.5	Complies
	12	2467.00				15.90	30	14.1	0.6	16.50	36	19.5	Complies
	3	2422.00		MCS7		**16.36**	**30**	**13.6**	**0.6**	**16.96**	**36**	**19.0**	Complies
	11	2462.00				15.89	30	14.1	0.6	16.49	36	19.5	Complies
	12	2467.00				15.82	30	14.2	0.6	16.42	36	19.6	Complies

EIRP $E_{Meas} = P_{Meas} + G_T$

Conducted Margin = $P_{Limit} - P_{Meas}$

EIRP Margin = $E_{Limit} - E_{Meas}$

* Antenna Gain information provided by applicant.

12.0 ANTENNA PORT CONDUCTED POWER, (DSS)

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d),
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.2)

Limits	
47 CFR §15.247(b)(3)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.
RSS-247 (5.4)(d)	**5.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.)** Devices shall comply with the following requirements, where applicable: d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.

Table 11.1 – Summary of Conducted Power Measurements, (DSS)

See Appendix E for Measurement Plots

Conducted Power Measurement Results: BlueTooth													
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Transmit Duty Cycle (%)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
BT BR	2	2402.00	GFSK	-	100	-0.20	30	30.2	0.6	0.40	36	35.6	Complies
	42	2442.00				-0.59	30	30.6	0.6	0.01	36	36.0	Complies
	80	2480.00				-1.33	30	31.3	0.6	-0.73	36	36.7	Complies
BT EDR2	2	2402.00	P1/4-DQPSK	2	100	5.01	30	25.0	0.6	5.61	36	30.4	Complies
	41	2441.00				5.98	30	24.0	0.6	6.58	36	29.4	Complies
	80	2480.00				5.60	30	24.4	0.6	6.20	36	29.8	Complies
BT EDR3	2	2402.00	8-DPSK	3	100	6.01	30	24.0	0.6	6.61	36	29.4	Complies
	41	2441.00				5.95	30	24.1	0.6	6.55	36	29.5	Complies
	80	2480.00				5.35	30	24.7	0.6	5.95	36	30.1	Complies
BLE1	2	2402.00	GMSK	1	63	4.58	30	25.4	0.6	5.18	36	30.8	Complies
	42	2442.00				4.42	30	25.6	0.6	5.02	36	31.0	Complies
	80	2480.00				3.45	30	26.6	0.6	4.05	36	32.0	Complies
BLE2	2	2402.00	GMSK	2	35	5.73	30	24.3	0.6	6.33	36	29.7	Complies
	42	2442.00				5.68	30	24.3	0.6	6.28	36	29.7	Complies
	80	2480.00				5.57	30	24.4	0.6	6.17	36	29.8	Complies
ANT	2	2402.00	GFSK	-	100	-0.11	30	30.1	0.6	0.49	36	35.5	Complies
	41	2441.00				-0.52	30	30.5	0.6	0.08	36	35.9	Complies
	80	2480.00				-1.27	30	31.3	0.6	-0.67	36	36.7	Complies

Conducted Margin = P_{Limit} - P_{Meas}

EIRP Margin = E_{Limit} - E_{Meas}

* At Extreme Temperature, -30°C

** At Extreme Temperature, +40°C

12.0 POWER SPECTRAL DENSITY

Test Procedure	
Normative Reference	FCC 47 CFR §15.247(e), RSS-247 (5.2)(b),
	KDB 558074 (10.3), ANSI C63.10 (11.10.3)

Limits	
47 CFR §15.247(e)	(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
RSS-247 (5.2)(b)	b) The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).
KDB 558074 (10.3) C63.10 (11.10.3)	**Method AVGPSD-1** (trace averaging with EUT transmitting at full power throughout each sweep) This procedure may be used when the maximum (average) conducted output power was used to demonstrate compliance to the output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has an RMS power averaging detector, it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously (duty cycle ≥ 98 %); otherwise sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter off time is to be considered). a) Set instrument center frequency to DTS channel center frequency. b) Set span to at least 1.5 X OBW. c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. . d) Set VBW ≥ 3 X RBW. e) Detector = RMS f) Ensure that the number of measurement points in the sweep ≥ 2 X span/RBW. g) Sweep time = auto couple. h) Employ trace averaging (RMS) mode over a minimum of 100 traces. i) Use the peak marker function to determine the maximum amplitude level. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).
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. Number of Sweep Points ≥ 2 X Span / RBW = 2 X (1.5MHz / 3kHz) = 1000, the SA was configured for 1001 Points. 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 100% Duty Cycle. The Power Spectral Density was measured and recorded.

Table 12.1 – Summary of Power Spectral Density Measurements, (DTS)

See Appendix F for Power Density Measurement Plots

Power Spectral Density Measurement Results: 802.11							
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	PSD Limit [P_{Lim}] (dBm)	Conducted Margin (dB)
802.11b	3	2422	DSSS	5.5	-0.87	8	8.9
802.11g	3	2422	OFDM	6	-3.44	8	11.4
802.11n	3	2422	OFDM	MCS7	-3.87	8	11.9
					Result:	Complies	

Margin = P_{Limit} - P_{Meas}

Table 12.2 – Summary of Power Spectral Density Measurements, (DSS)

See Appendix F for Power Density Measurement Plots

Power Spectral Density Measurement Results: BlueTooth							
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	PSD Limit [P_{Lim}] (dBm)	Conducted Margin (dB)
BT BR	2	2402	GFSK	-	0.64	8	7.4
BT EDR2	41	2442	P1/4-DQPSK	2.0	-2.70	8	10.7
BT EDR3	41	2442	8-DPSK	3.0	-2.54	8	10.5
BLE1	2	2402	GMSK	1.0	0.40	8	7.6
BLE2	42	2442	GMSK	2.0	0.05	8	8.0
ANT	2	2402	GFSK	-	0.63	8	7.4
						Result:	Complies

Margin = P_{Limit} - P_{Meas}

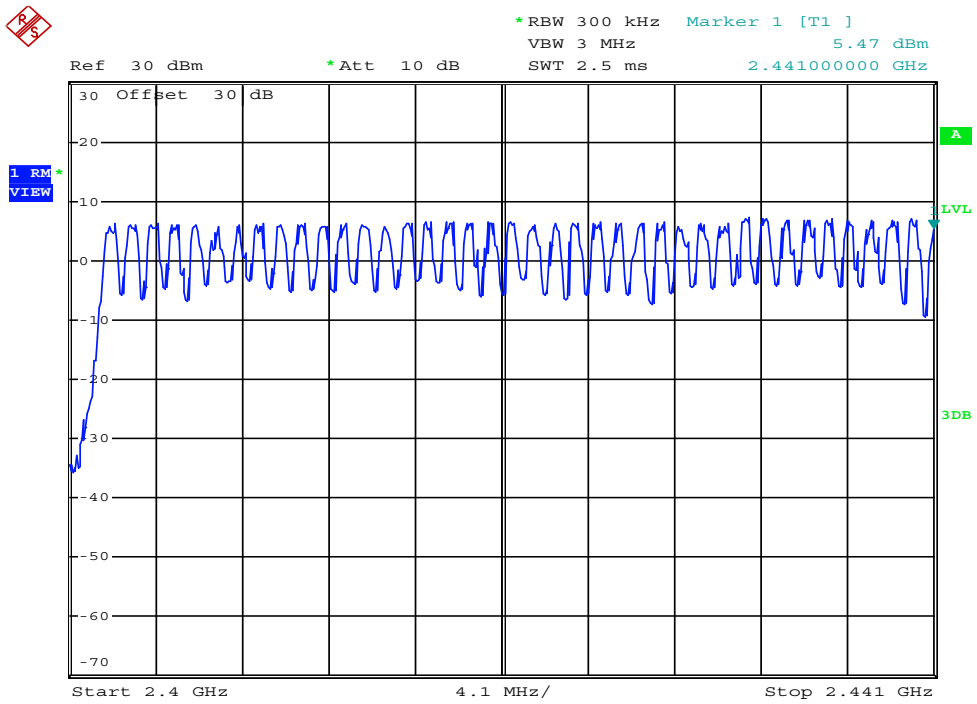
13.0 FHSS NUMBER OF HOPPING CHANNELS

Test Procedure	
Normative Reference	FCC 47 CFR §15.247, RSS-247
	KDB 558074, ANSI C63.10

Limits	
47 CFR §15.247(a)(1)	(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
RSS-247 (5.1)(d)	**5.1 Frequency hopping systems (FHS)** The following applies to FHSs in each of the three bands: FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

Plot 13.1 – Number of Hopping Channels, EDR 2MB, 2400-2441MHz

Number of Hopping Channels

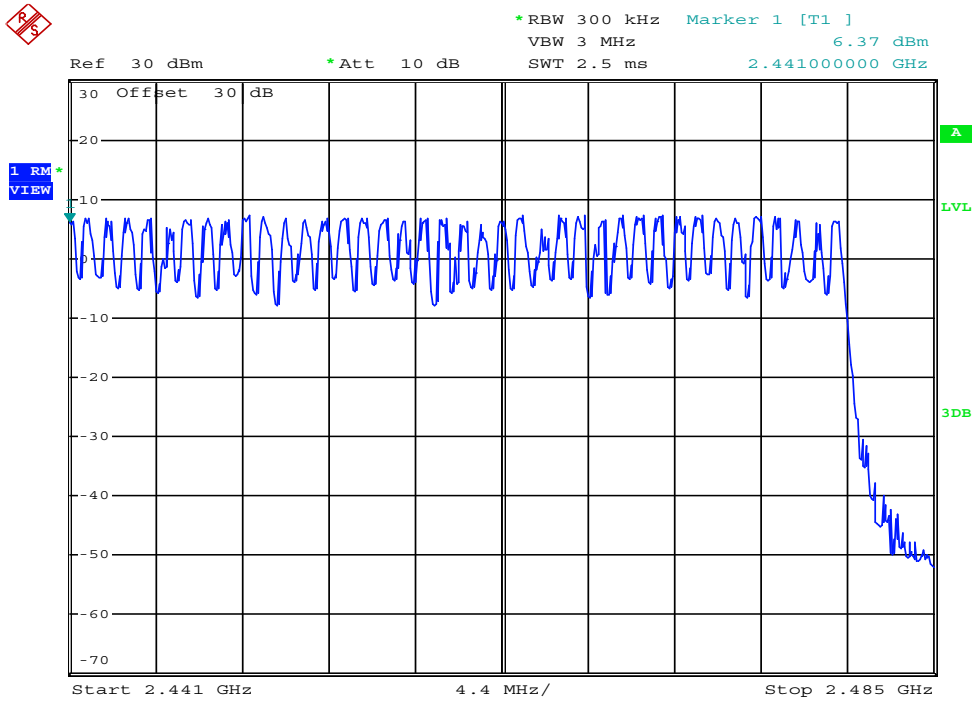


Date: 26.MAY.2021 15:49:42

Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2400-2441 MHz	**Pi/4-DQPSK**	**40**

Plot 13.2 – Number of Hopping Channels, EDR 2MB, 2441-2485MHz

Number of Hopping Channels

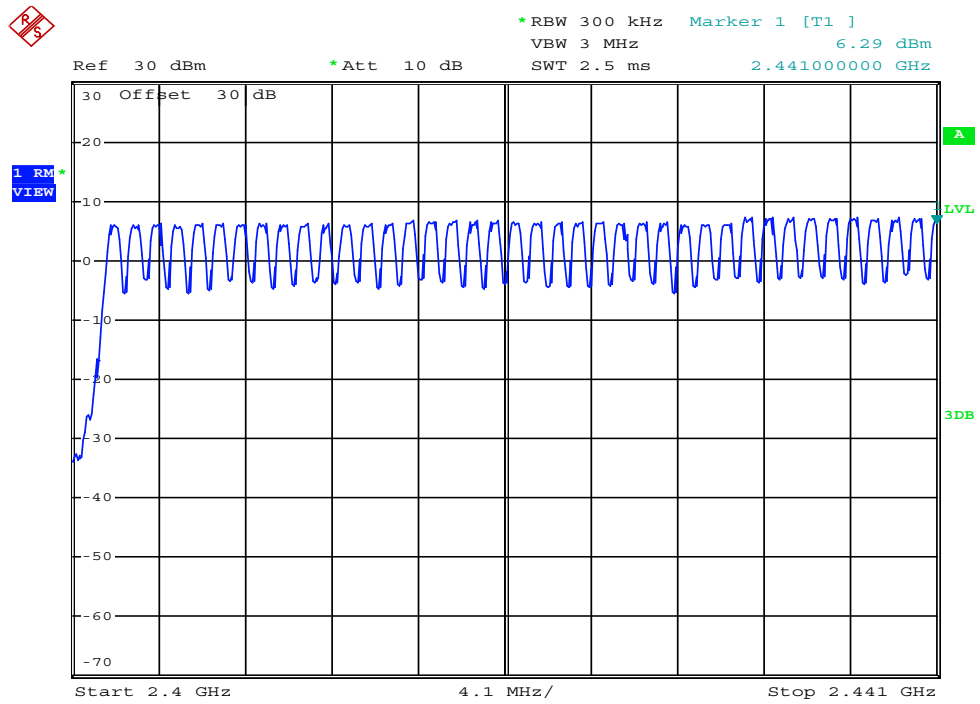


Date: 26.MAY.2021 15:47:04

Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2441-2485 MHz	**Pi/4-DQPSK**	**39**

Plot 13.3 – Number of Hopping Channels, EDR 3MB, 2400 - 2441MHz

Number of Hopping Channels

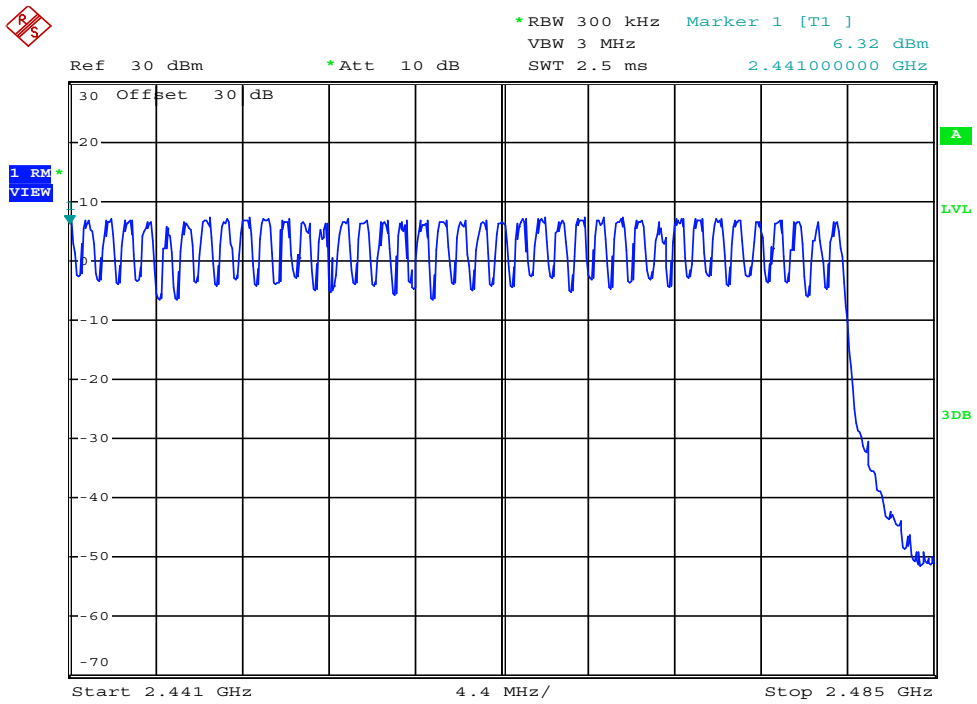


Date: 26.MAY.2021 15:40:00

Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2400-2441 MHz	**8-DPSK**	**40**

Plot 13.4 – Number of Hopping Channels, EDR 3MB, 2441 - 2485MHz

Number of Hopping Channels



Date: 26.MAY.2021 15:44:15

Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2441-2485 MHz	**8-DPSK**	**39**

Table 13.2 – Summary of FHSS Number of Hopping Channels

Hopping Channel Results DSS		
Frequency Range (MHz)	**Modulation**	**Number of Hopping Channels**
2400-2441	Pi/4-DQPSK	40
2441-2485	Pi/4-DQPSK	39
	Total:	79
2400-2441	8-DPSK	40
2441-2485	8-DPSK	39
	Total:	79
	Result:	**Complies**

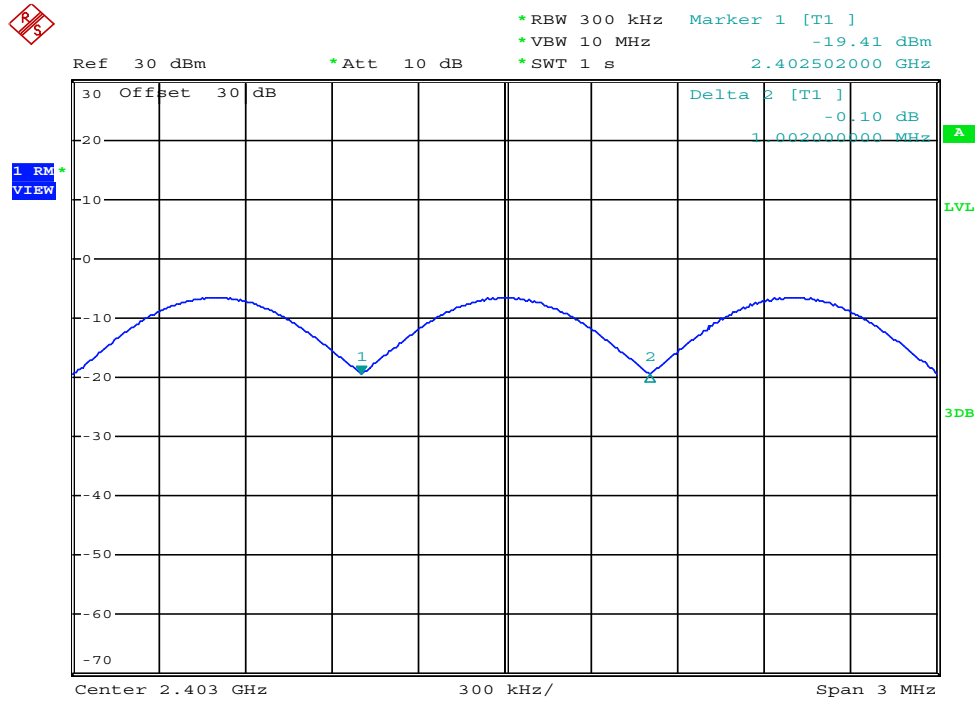
14.0 FHSS CHANNEL SEPARATION

Test Procedure	
Normative Reference	FCC 47 CFR §15.247, RSS-247
	KDB 558074, ANSI C63.10

Limits	
47 CFR §15.247(a)(1)	(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400- 2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
RSS-247 (5.1)(db)	**5.1 Frequency hopping systems (FHS)** The following applies to FHSs in each of the three bands: FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

Plot 14.1 – Channel Separation, BT EDR 2MB, 2403MHz

Channel Separation

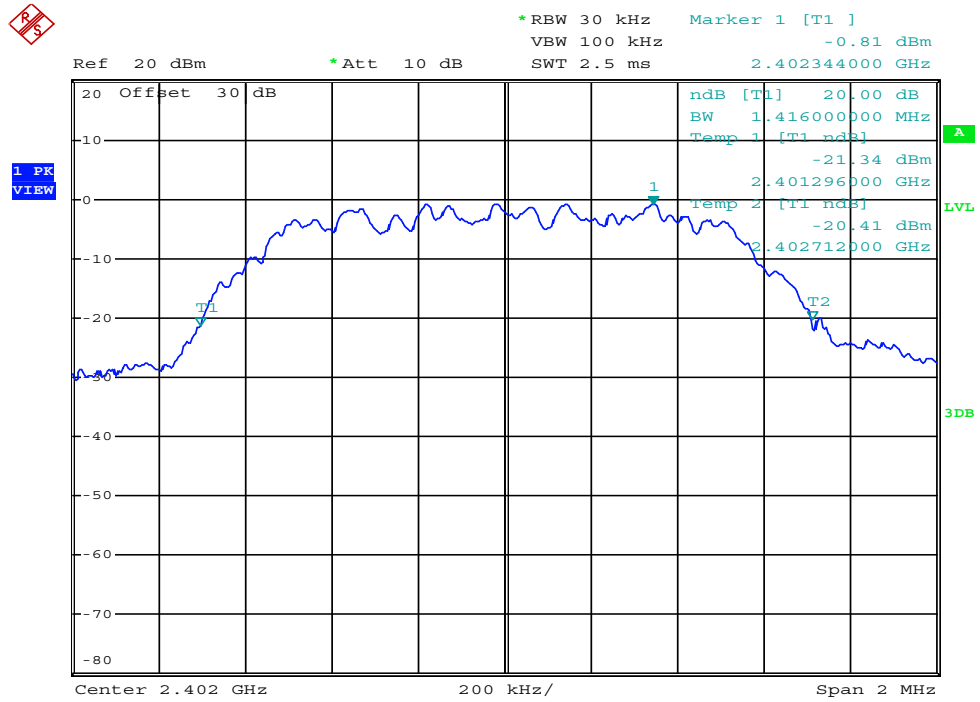


Date: 27.MAY.2021 11:33:36

Channel Frequency:	Modulation Setting:	Channel Separation:
2403.00 MHz	**Pi/4-DQPSK**	**1.002** MHz

Plot 14.2 – BT ERD 2MB 20dB BW

20dB Bandwidth

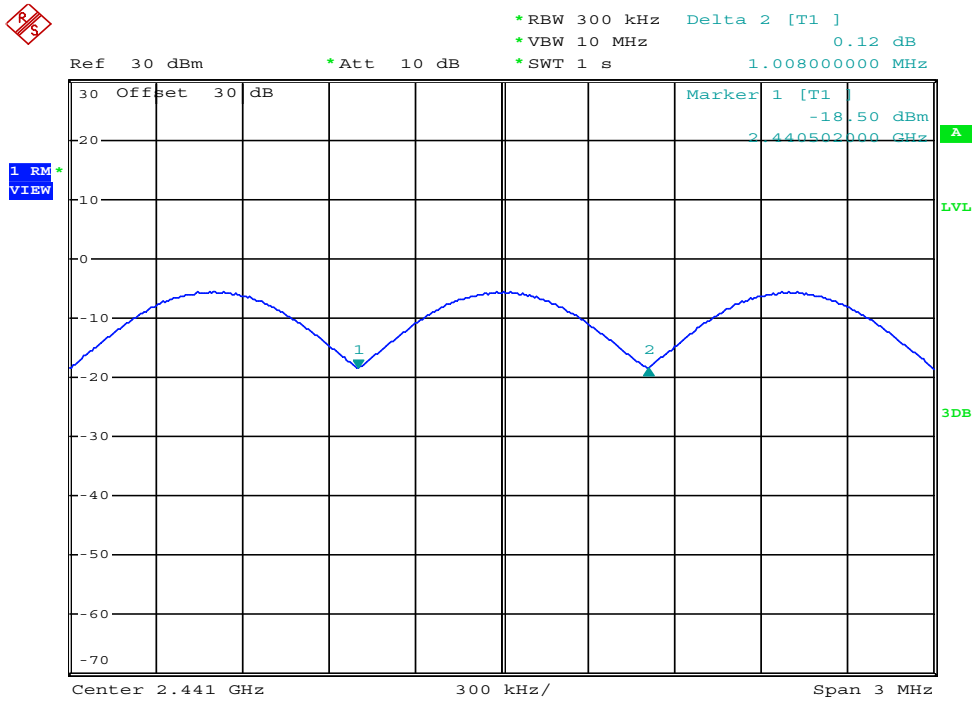


Date: 29.MAY.2021 16:49:13

Channel Frequency:	Modulation Setting:	Channel Bandwidth:
2403.00 MHz	**Pi/4-DQPSK**	**1.416** MHz

Plot 14.3 – Channel Separation, BT EDR 3MB, 2403MHz

Channel Separation

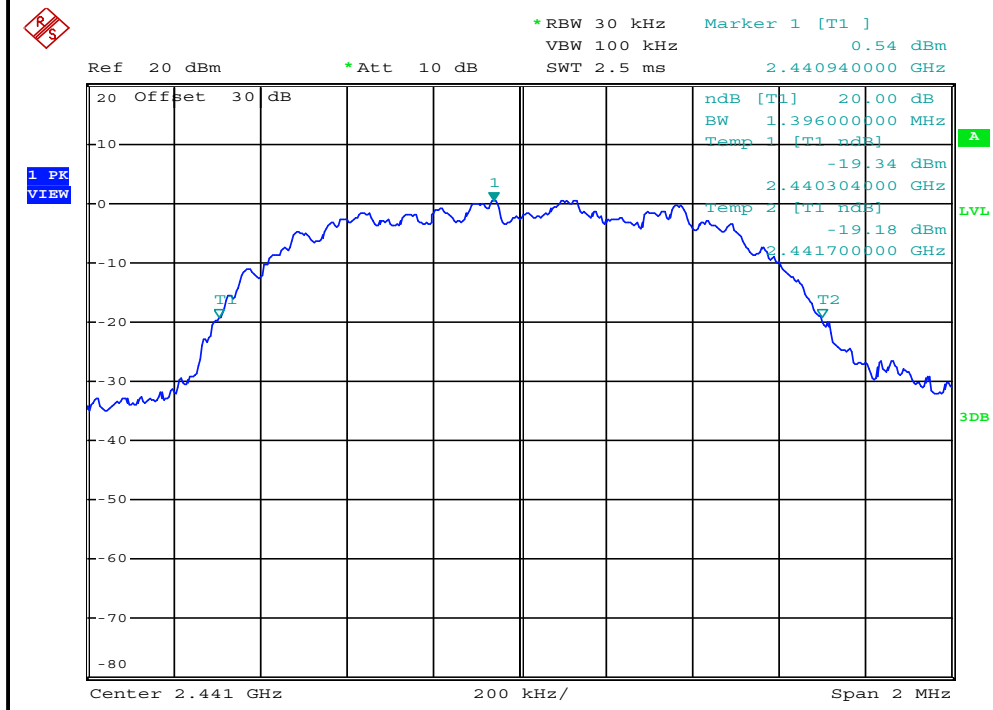


Date: 27.MAY.2021 11:53:37

Channel Frequency:	Modulation Setting:	Channel Bandwidth:
2442.00 MHz	**8-DPSK**	**1.008** MHz

Plot 14.4 – BT EDR 3MB 20dB BW

20dB Bandwidth



Channel Frequency:	Modulation Setting:	Channel Bandwidth:
2442.00 MHz	**8-DPSK**	**1.396** MHz

Table 14.1 – Summary of FHSS Channel Separation

Hopping Channel Separation Results DSS					
Channel Frequency (MHz)	Modulation	Channel Separation (MHz)	20dB BW (MHz)	Minimum Bandwidth (MHz)	Margin (MHz)
2403.00	Pi/4-DQPSK	1.008	1.416	0.944	0.064
2441.00	8-DPSK	1.020	1.396	0.931	0.089
				Result:	Complies

Minimum Bandwidth = 20dB BW X 2/3

Margin = Channel Separation - Minimum Bandwidth

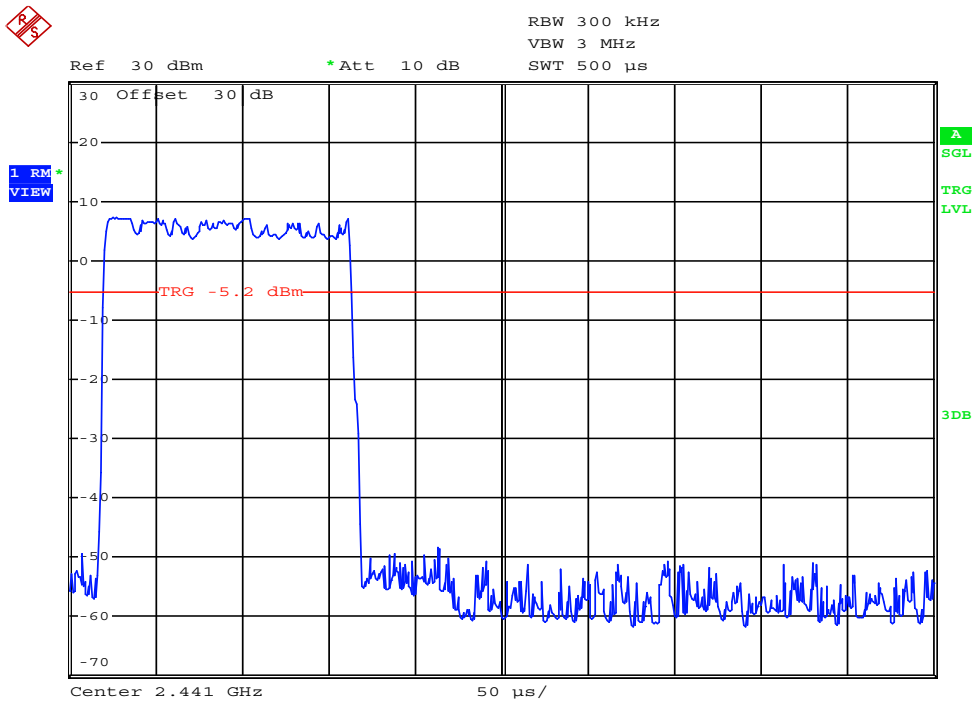
15.0 FHSS TIME OF OCCUPANCY

Test Procedure	
Normative Reference	FCC 47 CFR §15.247, RSS-247
	KDB 558074, ANSI C63.10

Limits	
47 CFR §15.247(a)(1)	(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
RSS-247 (5.1)(d)	**5.1 Frequency hopping systems (FHS)** FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

Plot 15.1 – Time of Occupancy, BT EDR 2MB

Time of Occupancy

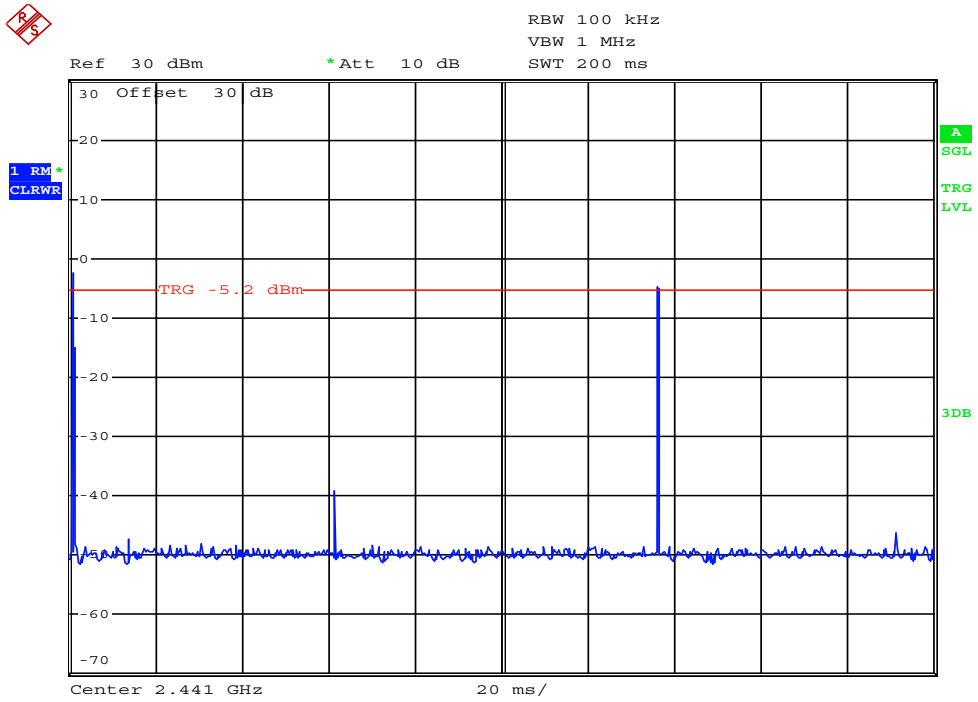


Date: 27.MAY.2021 14:57:00

Channel Frequency:	Modulation Setting:	Channel On Time:
2441.00 MHz	**Pi/4-DQPSK**	**147.0** uSec

Plot 15.2 – Time of Occupancy, BT EDR 2MB

Time of Occupancy

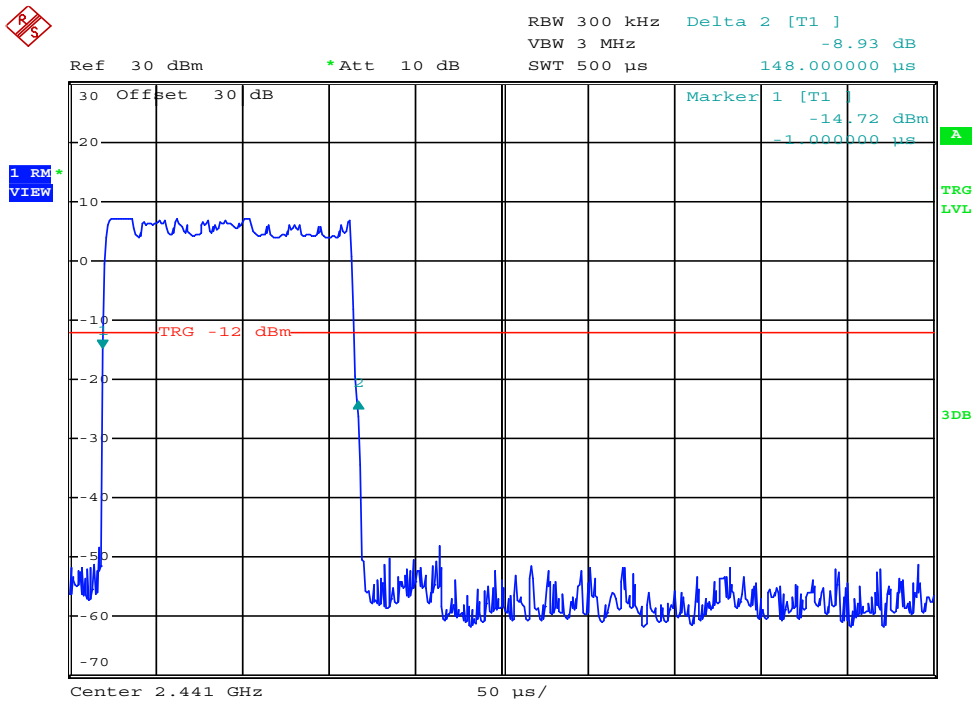


Date: 27.MAY.2021 15:01:31

Channel Frequency:	Modulation Setting:	Transmit Count per 200mSec Period:
2441.00 MHz	**Pi/4-DQPSK**	**3**

Plot 15.3 – Time of Occupancy, BT EDR 3MB

Time of Occupancy

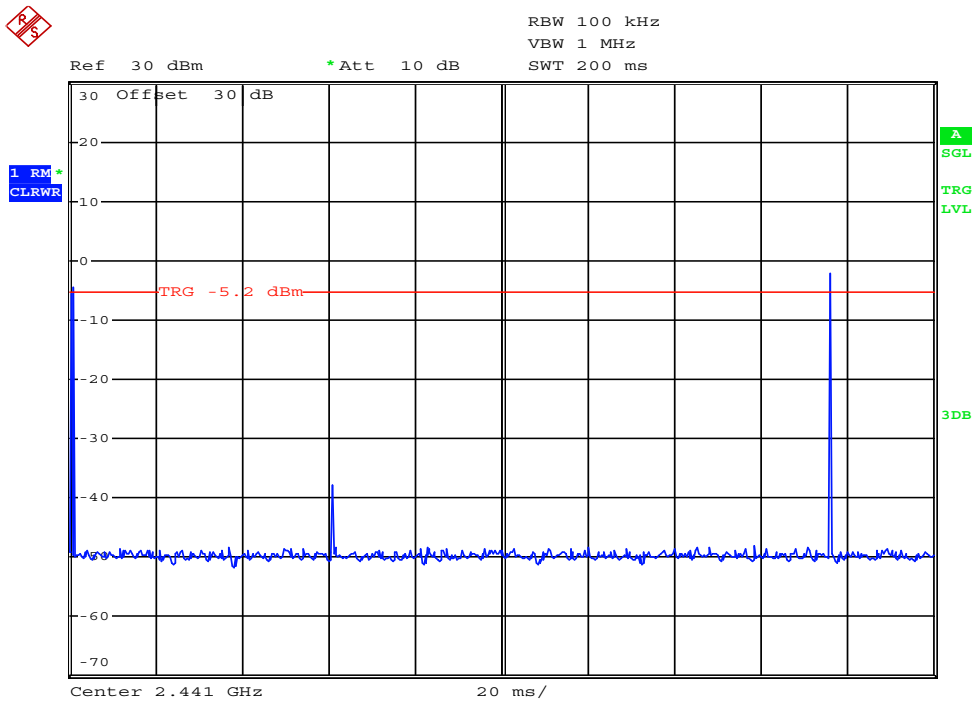


Date: 27.MAY.2021 12:03:19

Channel Frequency:	Modulation Setting:	Channel On Time:
2442.00 MHz	**8-DPSK**	**148.0** uSec

Plot 15.3 – Time of Occupancy, BT EDR 3MB

Time of Occupancy



Date: 27.MAY.2021 13:47:04

Channel Frequency:	Modulation Setting:	Transmit Count per 200mSec Period:
2442.00 MHz	**8-DPSK**	**3**

Table 15.1 – Summary of FHSS Time of Occupancy

Hopping Channel Time of Occupancy DSS										
Channel Frequency (MHz)	Modulation	Channel On Time [t_{on}] (uSec)	Number of Period Transmits [N_{Period}]	Observation Period [T_{Period}] (mSec)	Time of Occupancy [T_{Occ}] (mSec)	Total Observation Period [TT_{Period}] (mSec)	Accumulated Time of Occupancy [TT_{Occ}] (mSec)	Number of Hopping Channels [N_{Hop}]	Limit [Limit] (mSec)	Margin (mSec)
2442.00	Pi/4-DQPSK	147.0	3	200	0.444	1185	2.63	79	400	397
2442.00	8-DPSK	148.0	3	200	0.444	1185	2.63	79	400	397
									Result:	Complies

Time of Occupancy within the measurement (Observation) period [T_{Occ}] = On Time [T_{on}] X Number of Transmits within the Observation Period [N_{period}]

Total Observation Period [TT_{Period}] = 15mSec X Number of Hopping Channels = 15mSec X [N_{Hop}]

Accumulated Time of Occupancy [TT_{Occ}] = Time of Occupancy [T_{Occ}] X Total Observation Peroid [TT_{Period}] / Observation Period [T_{Period}]

Margin = Limit - TT_{Occ}

16.0 CONDUCTED SPURIOUS EMISSIONS -BAND EDGE

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5),
	KDB 558074 (11.3), ANSI C63.10 (11.11.3)

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.
RSS-247 (5.5)	**5.5 Unwanted emissions** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required. d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.
KDB 558074 (11.3) C63.10 (11.11.3)	**11.1 General** The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions: b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc). **11.2 Reference level measurement** a) Set instrument center frequency to DTS channel center frequency. b) Set the span to ≥ 1.5 X *DTS bandwidth.* c) Set the RBW = 100 kHz. d) Set the VBW ≥ 3 X RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum PSD level. Note that the channel found to contain the maximum PSD level can be used to establish the reference

Table 16.1 – Summary of Spurious Emission Measurements – Band Edge, (DTS)

See Appendix G for Measurement Plots

Band Edge Measurement Results: 802.11												
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Transmit Duty Cycle (%)	Emission Power [P_{Em}] (dBm)	Antenna Gain* [G_T] (dBi)	Emission EIRP [E_{Em}] (dBm)	Fundamental EIRP [E_{Fund}] (dBm)	Attenuation [Atten] (dB)	Limit (dB)	Margin (dB)
802.11b	1	2412.00	DSSS	5.5	100.00	-24.92	0.6	-24.32	18.94	43.26	30	13.3
	11	2462.00				-39.15		-38.55		57.49		27.5
802.11g	1	2412.00	OFDM	6		-25.22		-24.62	17.04	41.66		11.7
	11	2462.00				-34.77		-34.17		51.21		21.2
802.11n	1	2412.00	OFDM	MCS0		-24.99		-24.39	16.96	41.35		11.4
	11	2462.00				-33.93		-33.33		50.29		20.3
										Result:		Complies

Emission [E_{Em}] = [P_{Em}] + [G_T]

Fundamental Power [E_{Fund}] : See Section 10.0

Attenuation [Atten] = [E_{Fund}] - [E_{Em}]

Margin = Attenuation - Limit

* Information regarding antenna gain provided by applicant

Table 16.2 – Summary of Spurious Emission Measurements – Band Edge, BT EDR

See Appendix G for Measurement Plots

Band Edge Measurement Results: FHSS												
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Transmit Duty Cycle (%)	Emission Power [P_{Em}] (dBm)	Antenna Gain* [G_T] (dBi)	Emission EIRP [E_{Em}] (dBm)	Fundamental EIRP [E_{Fund}] (dBm)	Attenuation [Atten] (dB)	Limit (dB)	Margin (dB)
BT EDR2	2	2402.00	Pi/4-DQPSK	2.0	100.00	-31.74	0.6	-31.14	6.58	37.72	30	7.7
	80	2480.00				-39.13		-38.53		45.11		15.1
BT EDR3	2	2402.00	8-DPSK	3		-36.91		-36.31	6.61	42.92		12.9
	80	2480.00				-39.13		-38.53		45.14		15.1
										Result:		Complies

Emission [E_{Em}] = [P_{Em}] + [G_T]

Fundamental Power [E_{Fund}] : See Section 10.0

Attenuation [Atten] = [E_{Fund}] - [E_{Em}]

Margin = Attenuation - Limit

* Information regarding antenna gain provided by applicant

17.0 CONDUCTED SPURIOUS EMISSIONS

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5), KDB 558074 (11.3), ANSI C63.10 (11.11.3)

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.
RSS-247 (5.5)	**5.5 Unwanted emissions** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required. d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.
KDB 558074 (11.3) C63.10 (11.11.3)	**11.1 General** The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions: b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc). **11.2 Reference level measurement** a) Set instrument center frequency to DTS channel center frequency. b) Set the span to ≥ 1.5 X *DTS bandwidth.* c) Set the RBW = 100 kHz. d) Set the VBW ≥ 3 X RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum PSD level. Note that the channel found to contain the maximum PSD level can be used to establish the reference

Table 17.1 – Summary of Conducted Spurious Emissions, (DTS)

See Appendix H for Band Edge Measurement Plots

Conducted Spurious Emissions Measurement Results: 802.11										
Mode	**Channel Number**	**Frequency (MHz)**	**Modulation**	**Bit Rate (Mbps)**	**Reference Measurement [P_{Ref}] (dBm)**	**Measured Emission [P_{Em}] (dBm)**	**Emission Frequency (MHz)**	**Attenuation [Attn] (dBi)**	**Limit (dB)**	**Margin (dB)**
802.11b	6	2437.00	DSSS	11	6.5	-37.2	2994	43.7	30	13.7
						-36.7	7564	43.2		13.2
						-35.7	10497	42.2		12.2
						-31.5	14304	38.0		8.0
						-32.2	20436	38.7		8.7
802.11g	1	2412.00	OFDM	6	2.6	-37.0	2915	39.6		9.6
						-36.3	7620	38.8		8.8
						-36.4	13240	38.9		8.9
						-31.8	14797	34.3		4.3
						-31.6	23236	34.2		4.2
802.11n	6	2437.00	OFDM	MCS7	3.8	-37.2	2600	41.0		11.0
						-36.5	3854	40.3		10.3
						-37.0	10770	40.8		10.8
						-31.1	15879	34.9		4.9
						-32.6	21752	36.4		6.4
									Results:	**Complies**
Ref *	6	2437.00	DSSS	11	6.5					
	1	2412.00	OFDM	6	2.6					
	6	2437.00	OFDM	MCS7	3.8					

Attenuation = [P_{Ref}] - [P_{Em}]
Margin = Attn - Limit
* Reference Measurement

Table 17.2 – Summary of Conducted Spurious Emissions, BT EDR

See Appendix H for Band Edge Measurement Plots

Conducted Spurious Emissions Measurement Results: FHSS										
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Reference Measurement [P_{Ref}] (dBm)	Measured Emission [P_{Em}] (dBm)	Emission Frequency (MHz)	Attenuation [Attn] (dBi)	Limit (dB)	Margin (dB)
BT EDR2	41	2441.00	Pi/4-DQPSK	2	4.93	-37.2	2552	42.1	30	12.1
						-36.3	4442	41.3		11.3
						-37.0	13204	41.9		11.9
						-32.4	14427	37.3		7.3
						-31.2	24608	36.1		6.1
BT EDR3			8-DPSK	3	4.91	-37.5	2493	42.4		12.4
						-36.9	4120	41.8		11.8
						-36.0	13088	40.9		10.9
						-32.5	17049	37.4		7.4
						-32.3	21892	37.2		7.2
								Results:		Complies
Ref *	41	2441.00	Pi/4-DQPSK	2	4.93					
			8-DPSK	3	4.91					

Attenuation = [P_{Ref}] - [P_{Em}]
Margin = Attn - Limit
* Reference Measurement

18.0 RADIATED TX SPURIOUS EMISSIONS, RESTRICTED BAND

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

Table 18.1 – Summary of Radiated Tx Spurious Emissions, Restricted Band, (DTS)

See Appendix I Radiated Tx Spurious Measurement Plots

Summary of Radiated Tx Emissions (Restricted Band)										
Measured Frequency Range (MHz)	Channel Frequency	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)
9kHz - 30MHz	2412.0	Front	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	2412.0	Side	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	2412.0	Horizontal	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	46.0	**n/a**
30-1000MHz	2412.0	Vertical	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	43.5	**n/a**
1 - 3GHz	2412.0	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	**n/a**
1 - 3GHz	2412.0	Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	**n/a**
3-13GHz	2412.0	Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	**n/a**
3-13GHz	2412.0	Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	**n/a**
13-18GHz	2412.0	Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	**n/a**
13-18GHz	2412.0	Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	**n/a**
18-26GHz	2412.0	Horizontal	ND	ND (1)	43.50	21.86	26.00	ND	54.0	**n/a**
18-26GHz	2412.0	Vertical	ND	ND (1)	43.50	21.86	26.00	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 18.2 – Summary of Radiated Tx Spurious Emissions, Restricted Band, (BlueTooth)

See Appendix I Radiated Tx Spurious Measurement Plots

Summary of Radiated Tx Emissions (Restricted Band)										
Measured Frequency Range (MHz)	Channel Frequency	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)
9kHz - 30MHz	2412.0	Front	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	2412.0	Side	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	2412.0	Horizontal	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	2412.0	Vertical	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
1 - 3GHz	2412.0	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	**n/a**
1 - 3GHz	2412.0	Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	**n/a**
3-13GHz	2412.0	Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	**n/a**
3-13GHz	2412.0	Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	**n/a**
13-18GHz	2412.0	Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	**n/a**
13-18GHz	2412.0	Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	**n/a**
18-26GHz	2412.0	Horizontal	ND	ND (1)	43.50	21.86	26.00	ND	54.0	**n/a**
18-26GHz	2412.0	Vertical	ND	ND (1)	43.50	21.86	26.00	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

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

19.0 RADIATED RX SPURIOUS EMISSIONS

Test Procedure	
Normative Reference	**FCC 47 CFR §15.109, ICES-003(6.2)** **ANSI C63.4:2014**

Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m
ICES-003(6.2.1)	6.2.1 - Radiated Emissions Limits Below 1 GHz 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 5 determined at a distance of 3 metres. 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m

Test Setup	Appendix A Figure A.2

Measurement Procedure
The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

Table 19.1 – Summary of Radiated Rx Spurious Emissions

See Appendix J Radiated Rx Spurious Measurement Plots

Measurement Results				
Frequency Range	**Antenna Polarization**	**Measured Emission [E_{Meas}] (dBm)**	**Limit e.r.p./e.r.i.p. [A_L] (dBm)**	**Margin (dB)**
9kHz - 30MHz	Front	ND	-57.0	**n/a**
30-1000MHz	Horizontal	ND	-57.0	**n/a**
1 - 3GHz		ND	-47.0	**n/a**
3 - 13.6GHz		ND	-47.0	**n/a**
13.6 - 18GHz		ND	-47.0	**n/a**
18 - 25GHz		ND	-47.0	**n/a**
9kHz - 30MHz	Side	ND	-57.0	**n/a**
30-1000MHz	Vertical	ND	-57.0	**n/a**
1 - 3GHz		ND	-47.0	**n/a**
3 - 13.6GHz		ND	-47.0	**n/a**
13.6 - 18GHz		ND	-47.0	**n/a**
18 - 25GHz		ND	-47.0	**n/a**
		Results:	**Complies**	

20.0 POWER LINE CONDUCTED EMISSIONS

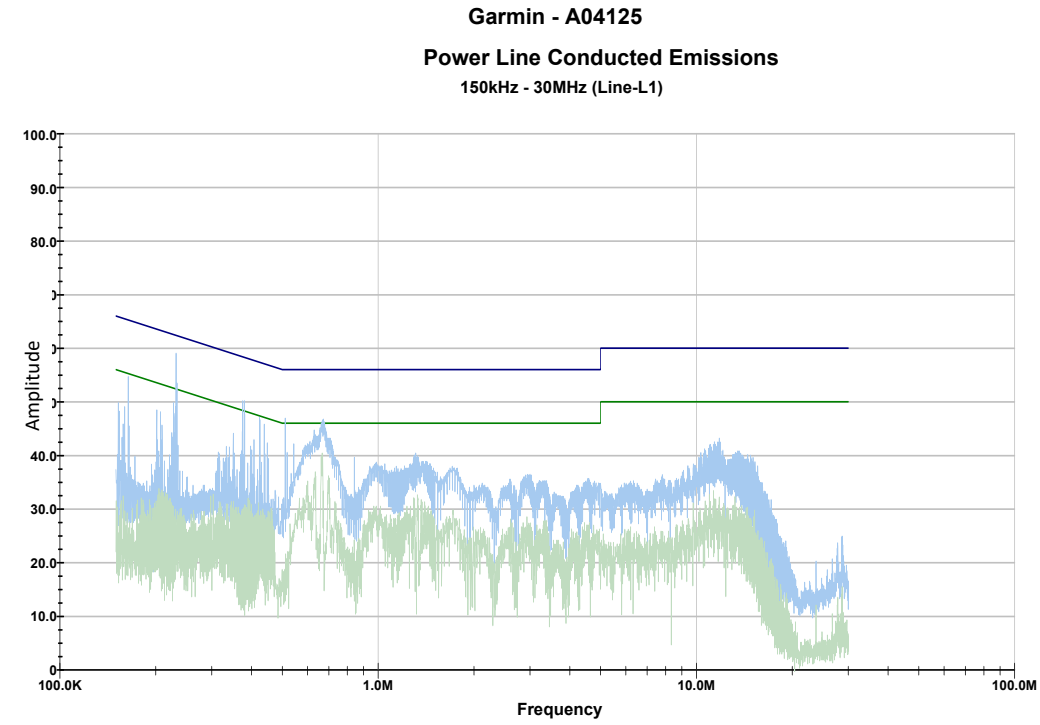
Test Procedure	
Normative Reference	FCC 47 CFR §15.107, ICES-003(6.1) ANSI C63.4-2014

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 20.1 – Power Line Conducted Emissions, Line 1

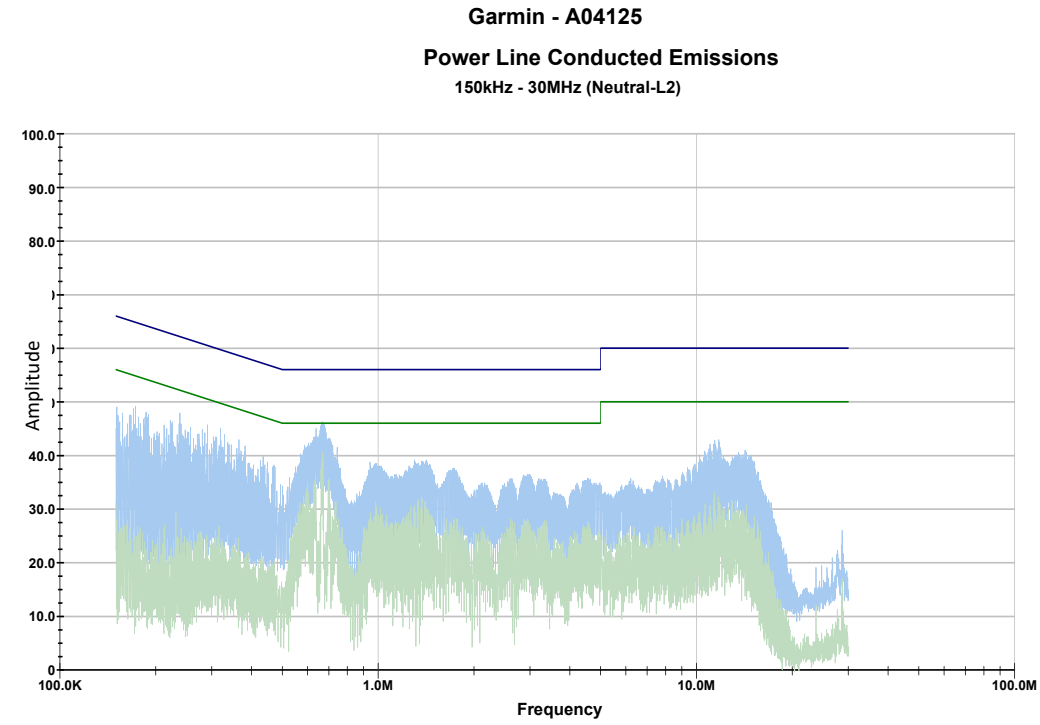
Power Line Conducted Emissions - L1



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

Plot 20.2 – 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 20.1 – 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	164.00 kHz	54.70	Peak	0.40	0.25	0.00 (3)	54.70 (2)	65.7	**11.0**
			231.70 kHz	59.00		0.30	0.26		59.00 (2)	62.7	**3.7**
			375.40 kHz	50.20		0.30	0.26		50.20 (2)	58.5	**8.3**
			423.40 kHz	47.10		0.30	0.27		47.10 (2)	57.4	**10.3**
			510.20 kHz	46.90		0.40	0.25		46.90 (2)	56.0	**9.1**
			673.30 kHz	46.70		0.30	0.26		46.70 (2)	56.0	**9.3**
			841.50 kHz	39.60		0.30	0.26		39.60 (2)	56.0	**16.4**
			1.31 MHz	40.40		0.30	0.27		40.40 (2)	56.0	**15.6**
			11.78 MHz	43.20		0.30	0.27		43.20 (2)	60.0	**16.8**
			669.20 kHz	40.10	Average	0.30	0.26		40.10 (2)	46.0	**5.9**
			11.31 MHz	33.40		0.30	0.27		33.40 (2)	50.0	**16.6**
									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 20.1 – 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	668.20	kHz	46.20	Peak	0.40	0.25	0.00	(3)	46.20 (2)	56.0	**9.8**
			11.75	MHz	42.90		0.30	0.26			42.90 (2)	60.0	**17.1**
			670.20	kHz	39.70	Average	0.30	0.26			39.70 (2)	46.0	**6.3**
			11.85	MHz	31.10		0.30	0.27			31.10 (2)	50.0	**18.9**
											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

Table A.1 – Conducted Measurement Setup

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

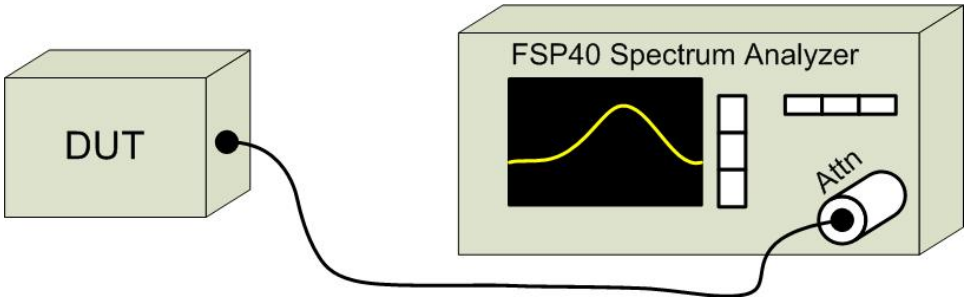


Table A.2 – Radiated Emissions Measurement Equipment

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 Measurements 9kHzMHz – 30MHz

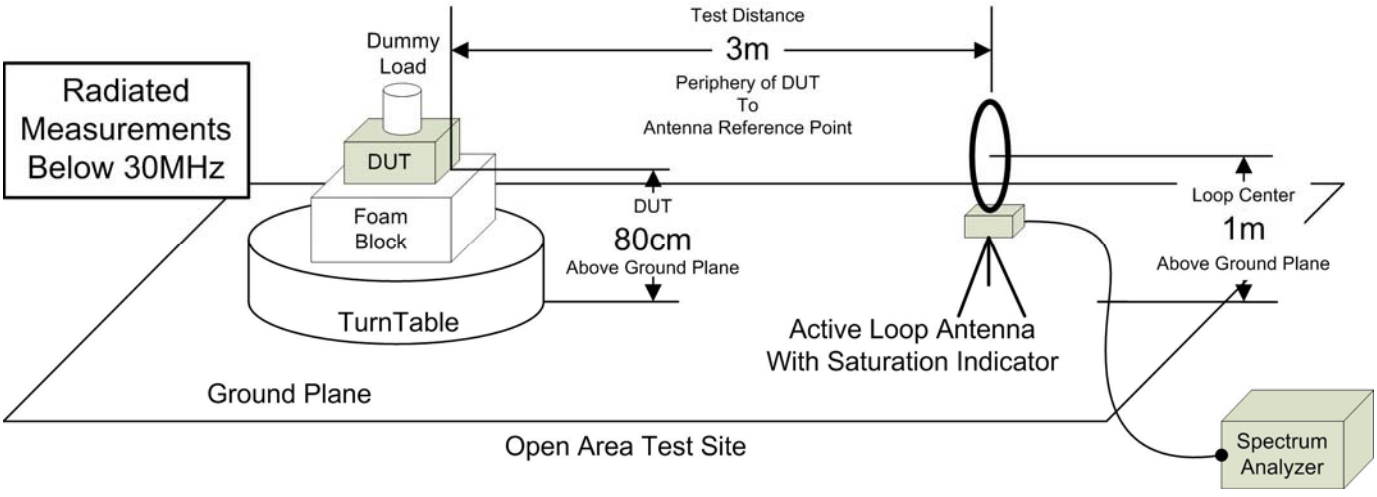


Figure A.3 – Test Setup Radiated Measurements 30MHz – 1GHz

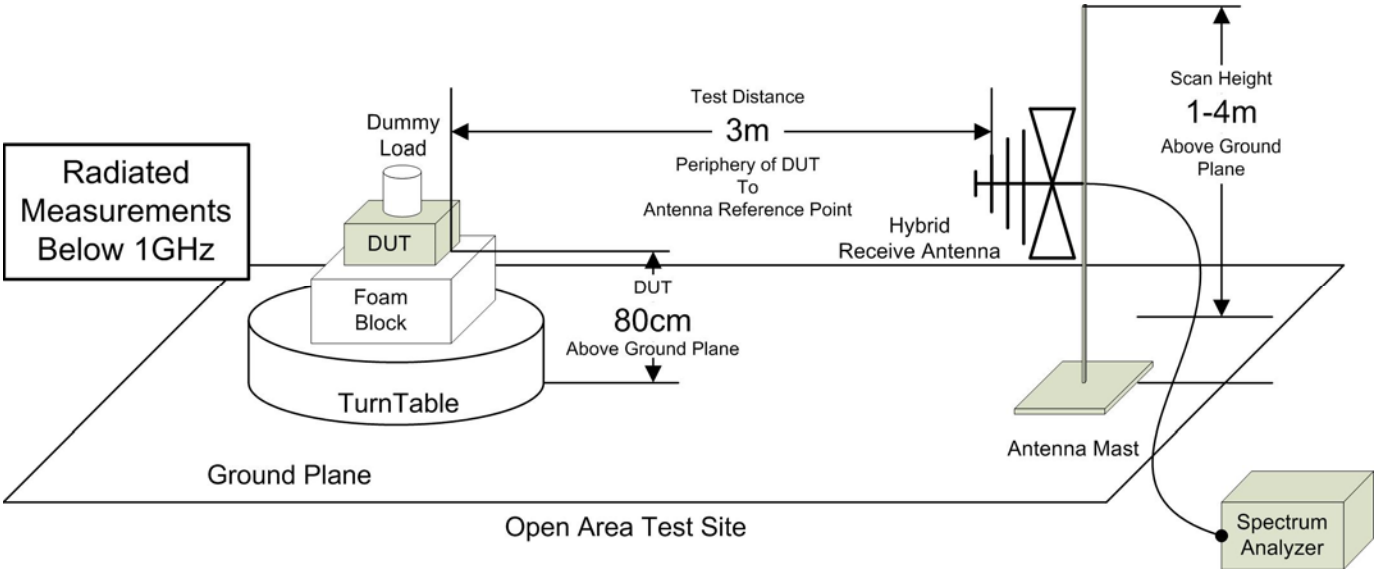


Figure A.4 – Test Setup Radiated Measurements 30MHz – 1GHz, Signal Substitution

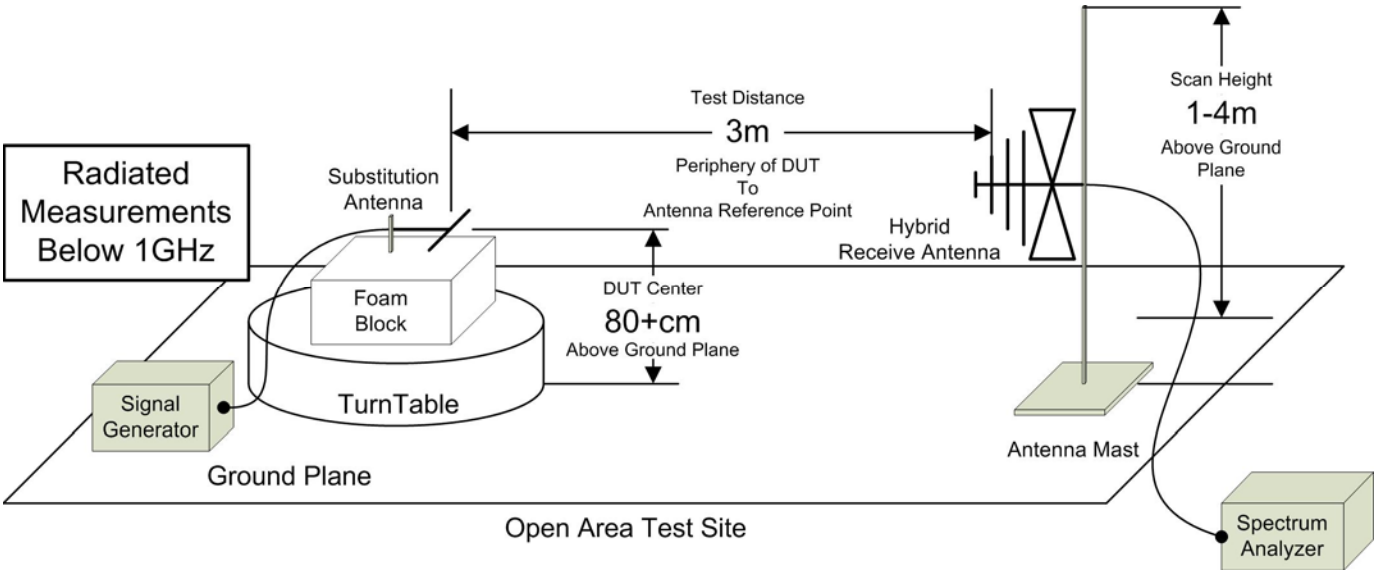


Figure A.5 – Test Setup Radiated Measurements 1 – 18GHz,

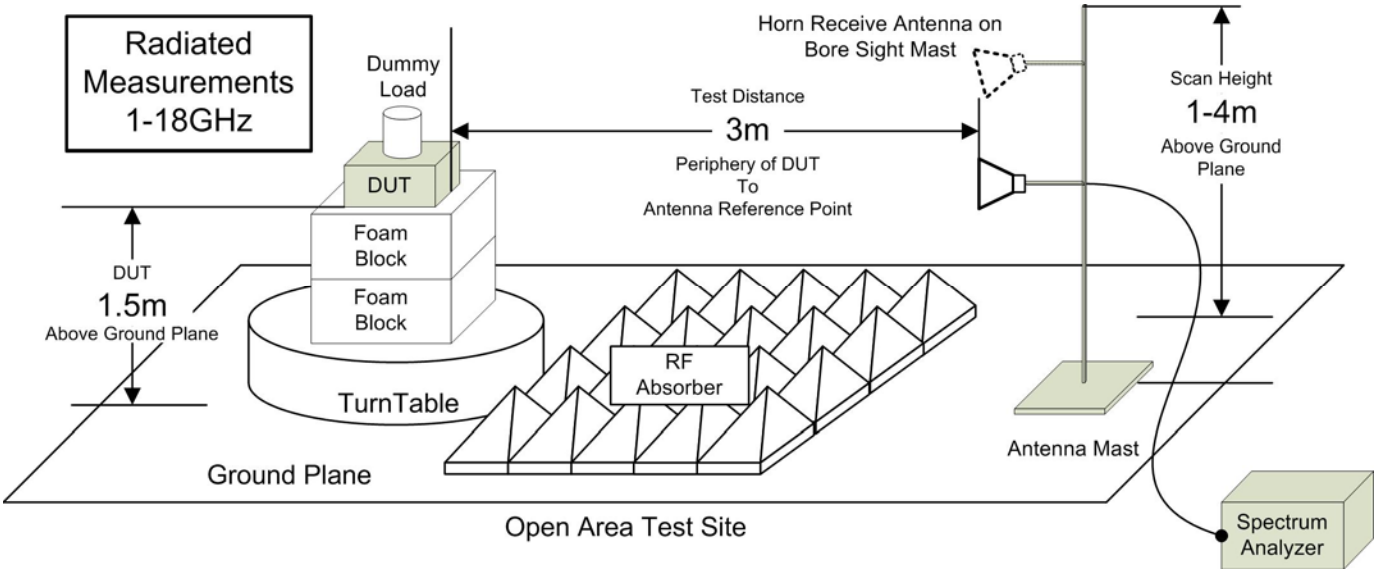


Figure A.6 – Test Setup Radiated Measurements 18 – 26.5GHz,

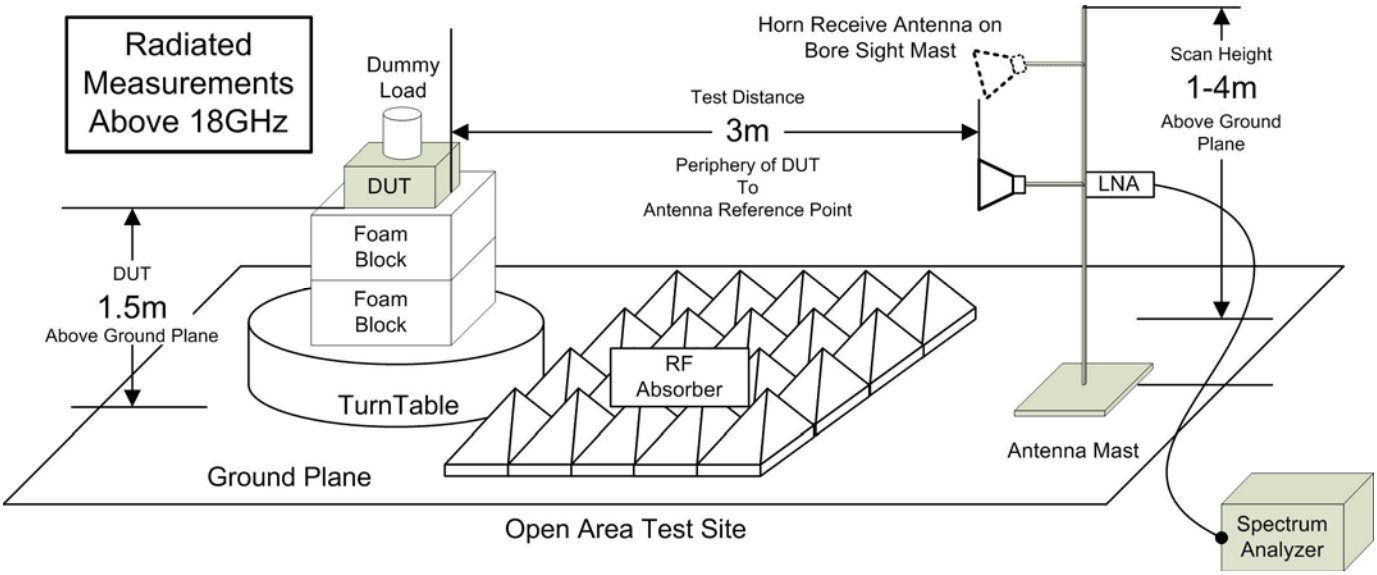


Table A.3 – Setup – Conducted Emissions Equipment List

Equipment List				
Asset Number	**Manufacturer**	**Model Number**	**Serial Number**	**Description**
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00223	HP	8901A	3749A07154	Modulation Analyzer
00257	Com-Power	LI-215A	191934	LISN
00276	TMS	LMR400	n/a	4m Cable

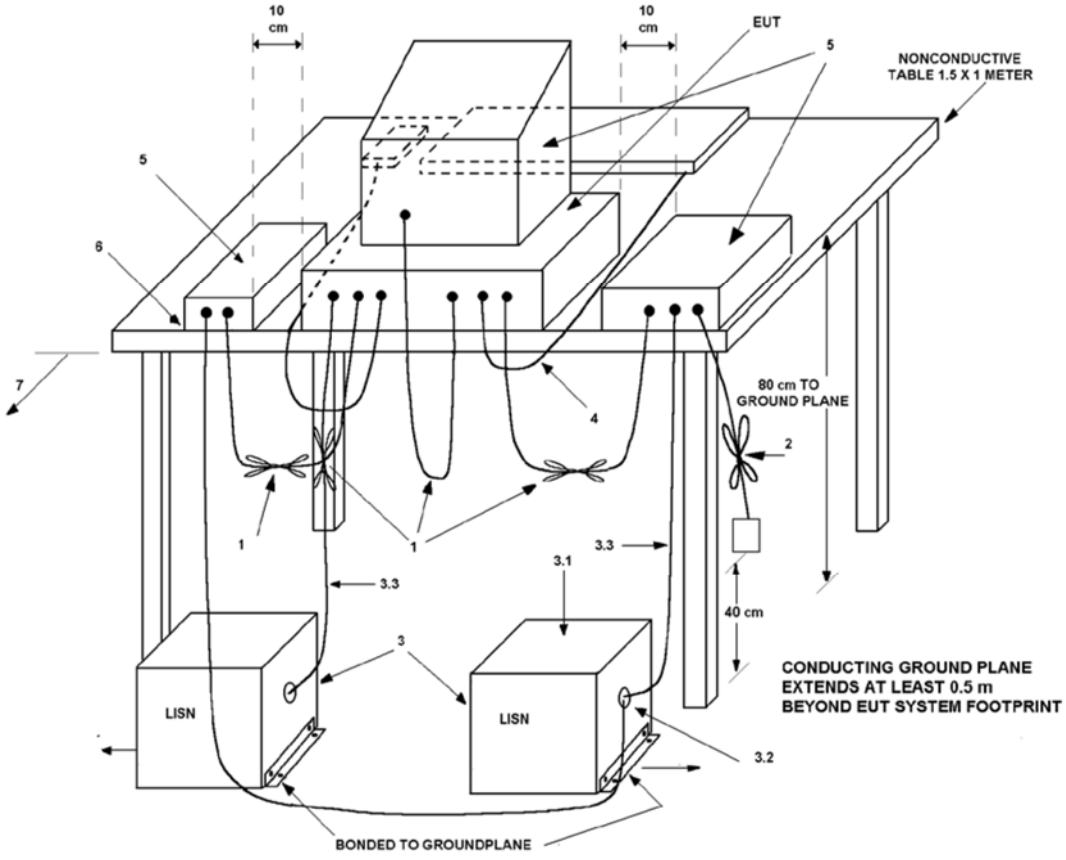


Figure A.7 – Test Setup Conducted Emissions Measurements

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
00162	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
00166	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz	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	15 July 2018	Triennial	15 July 2021
00005	HP	8648D	3847A00611	Signal Generator	23 Jun 2020	Triennial	23 Jun 2023
00006	R&S	SMR20	100104	Signal Generator	29 May 2017	Triennial	29 May 2020
00257	Com-Power	LI-215A	191934	LISN	5 Jan 2019	Triennial	5 Jan 2022
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
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber	NCR	n/a	CNR
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
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
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 D – OCCUPIED BANDWIDTH MEASUREMENT PLOTS

APPENDIX E – ANTENNA PORT CONDUCTED POWER MEASUREMENT PLOTS

APPENDIX F – POWER SPECTRAL DENSITY MEASUREMENT PLOTS

APPENDIX G – CONDUCTED SPURIOUS EMISSIONS, BAND EDGE MEASUREMENT PLOTS

APPENDIX H – CONDUCTED SPURIOUS EMISSIONS

APPENDIX I – RADIATED TX SPURIOUS EMISSIONS, RESTRICTED BAND MEASUREMENT PLOTS

APPENDIX J – RADIATED RX SPURIOUS EMISSIONS MEASUREMENT PLOTS

