



Test Report Serial Number:

45461690 R6.0

Test Report Date:

15 February 2022

Project Number:

1557

EMC Test Report - Appendix F

Applicant:



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

FCC ID:

IPH-04247

Product Model Number / HVIN

A04247

IC Registration Number

1792A-04247

Product Marketing Name / PMN

A04247

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 Transmission 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



Industry
Canada

IC Registration 3874A-1



FCC Registration: CA3874

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Revision History				
Samples Tested By:		Art Voss, P.Eng.		Date(s) of Evaluation:
Report Prepared By:		Art Voss, P.Eng.		1 Oct - 1 Dec, 2021
		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	16.0	Art Voss	2 February, 2022
3.0	Revised Scope	3.0	Art Voss	3 February, 2022
4.0	Added DSS Equipment Class	Cover	Art Voss	9 February, 2022
5.0	Revised BLE Info	7-14	Art Voss	14 February, 2022
6.0	Revised Appendices	D-H	Art Voss	15 February, 2022
	Revised Filing from DSS to DTS	n/a		

Conducted Power Measurement Results: 802.11

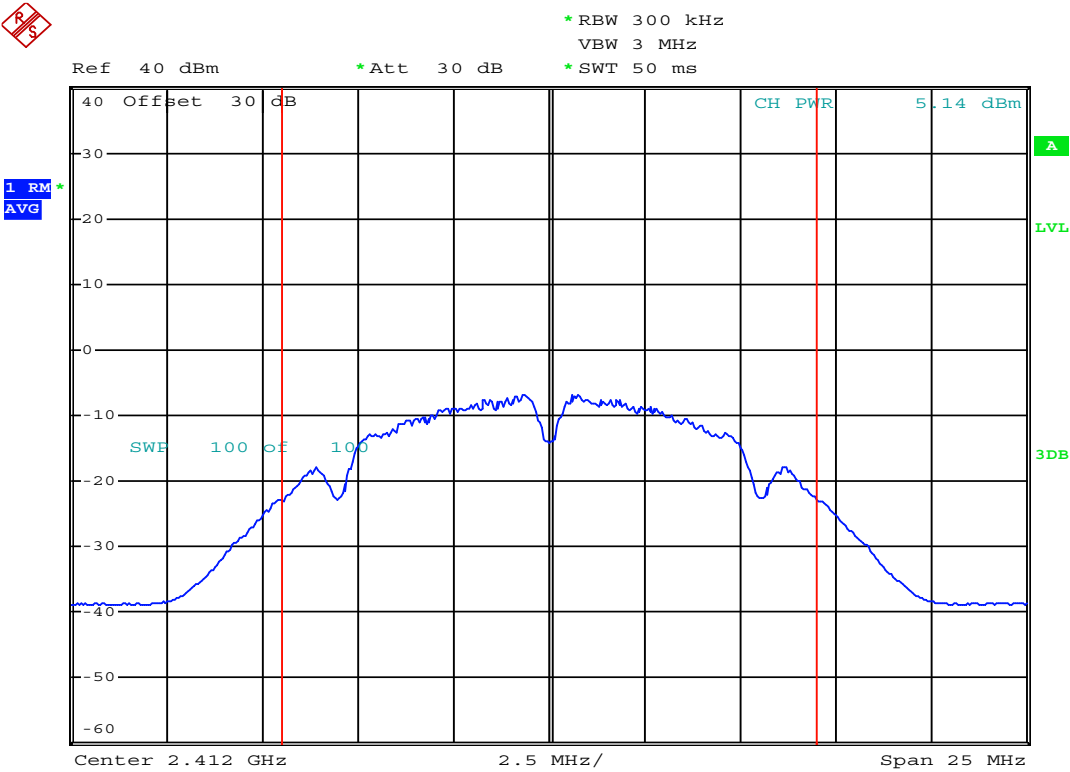
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Transmit Duty Cycle [DC] (%)	Duty Cycle Correction [CF] ⁽¹⁾ (dB)	Measured Power [P _{Meas}] (dBm)	Corrected Power [P _{Corr}] ⁽²⁾ (dBm)	Conducted Limit [P _{Lim}] (dBm)	Conducted Margin ⁽³⁾ (dB)
802.11b	1	2412	CCK	1	95.9	0.18	5.14	5.32	30	24.7
	2	2417		1	95.9	0.18	5.21	5.39	30	24.6
	3	2422		1	95.9	0.18	5.23	5.41	30	24.6
	6	2437		1	95.9	0.18	5.42	5.60	30	24.4
	10	2457		1	95.9	0.18	5.49	5.67	30	24.3
	11	2462		1	95.9	0.18	5.51	5.69	30	24.3
	11	2462	DSSS	5.5	83.4	0.79	3.20	3.99	30	26.0
802.11g	11	2462	OFDM	11	83.4	0.79	4.37	5.16	30	24.8
	11	2462		6	96.3	0.16	6.19	6.35	30	23.6
	11	2462		9	94.6	0.24	6.04	6.28	30	23.7
	11	2462		12	88.2	0.55	5.54	6.09	30	23.9
	11	2462		24	88.2	0.55	4.82	5.37	30	24.6
802.11n	11	2462	MCS0	54	88.2	0.55	3.66	4.21	30	25.8
	11	2462	MCS4	6.5	87.6	0.57	5.30	5.87	30	24.1
	11	2462	MCS7	36	87.6	0.57	3.08	3.65	30	26.3
									Result:	Complies

(1) Correction Factor [CF] = 10Log(1/[DC])

(2) Corrected Power [P_{Corr}] = P_{Meas} + CF

(3) Conducted Margin = P_{Limit} - P_{Corr}

Conducted Power: WiFi



Date: 16.NOV.2021 09:06:53

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	1	2412	CCK	1	5.14

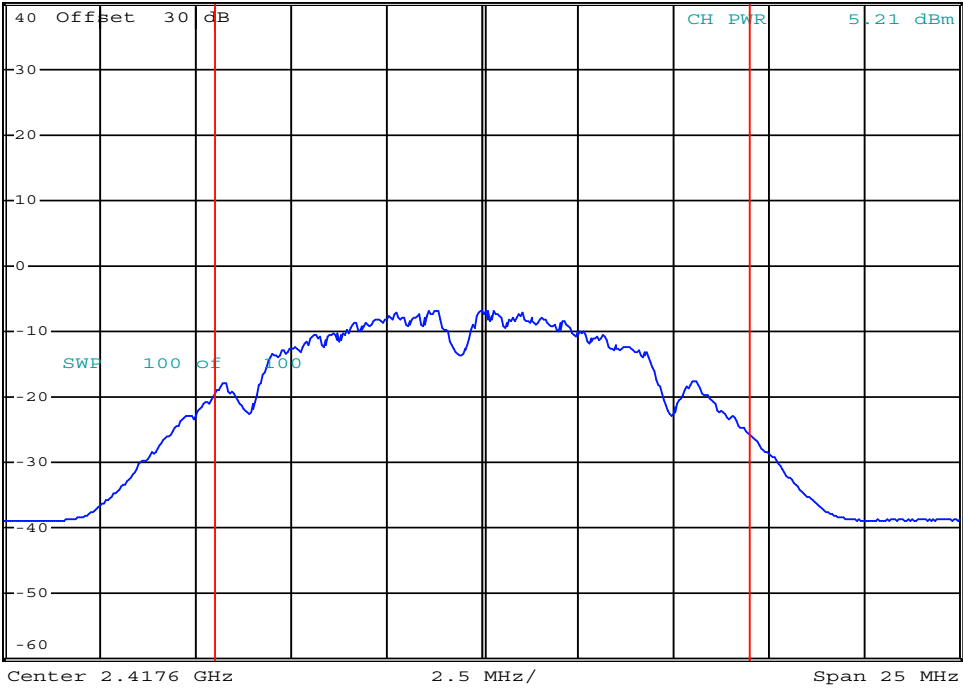
Conducted Power: WiFi



*RBW 300 kHz
VBW 3 MHz
*SWT 50 ms

Ref 40 dBm *Att 30 dB

1 RM
VIEW



Date: 16.NOV.2021 09:54:37

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	2	2417	CCK	1	5.21

Conducted Power: WiFi

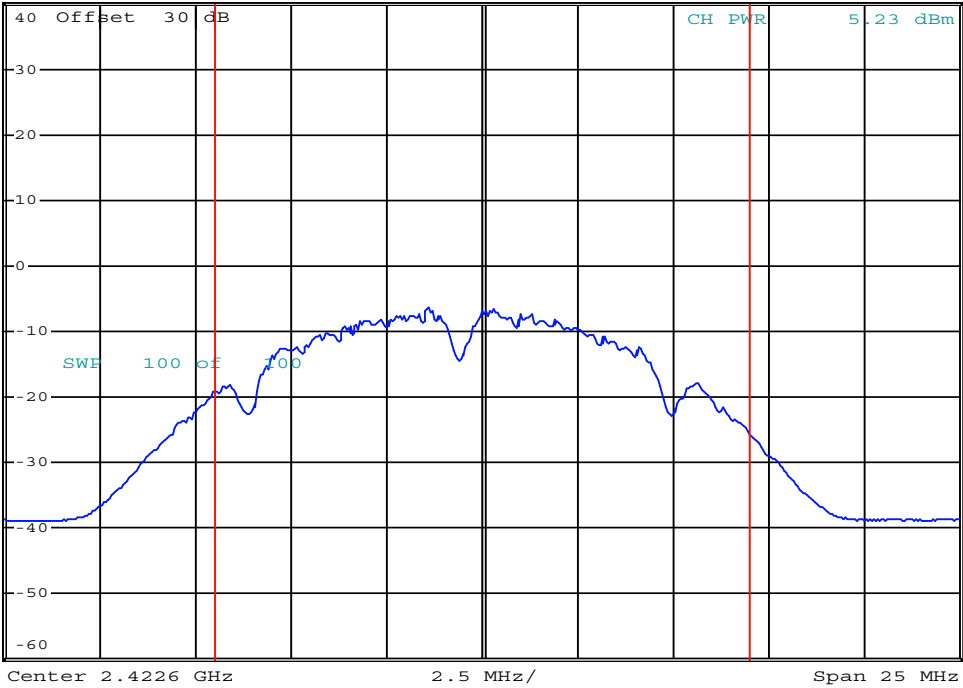


*RBW 300 kHz
VBW 3 MHz
*SWT 50 ms

Ref 40 dBm

*Att 30 dB

1 RM
VIEW



Date: 16.NOV.2021 09:56:10

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	3	2422	CCK	1	5.23

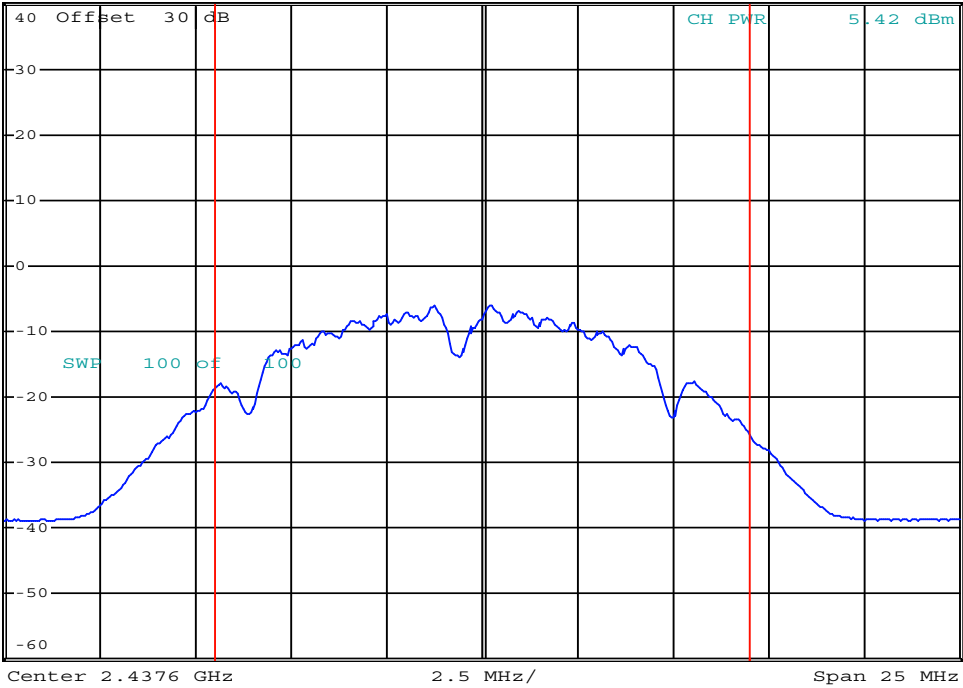
Conducted Power: WiFi



*RBW 300 kHz
VBW 3 MHz
*SWT 50 ms

Ref 40 dBm *Att 30 dB

1 RM
VIEW



Date: 16.NOV.2021 09:58:08

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	6	2437	CCK	1	5.42

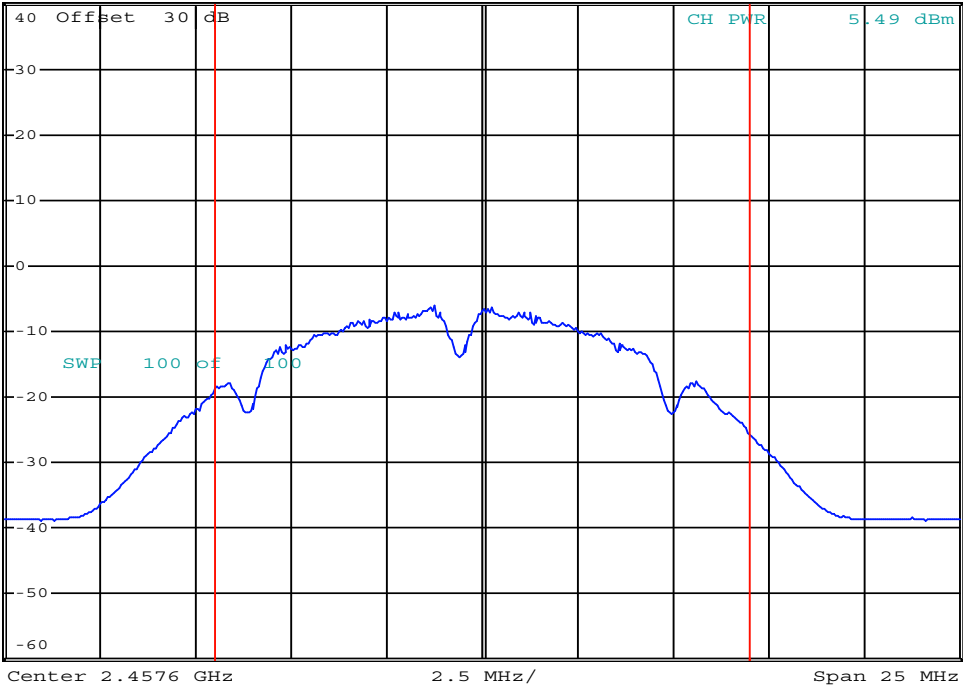
Conducted Power: WiFi



*RBW 300 kHz
VBW 3 MHz
*SWT 50 ms

Ref 40 dBm *Att 30 dB

1 RM
VIEW



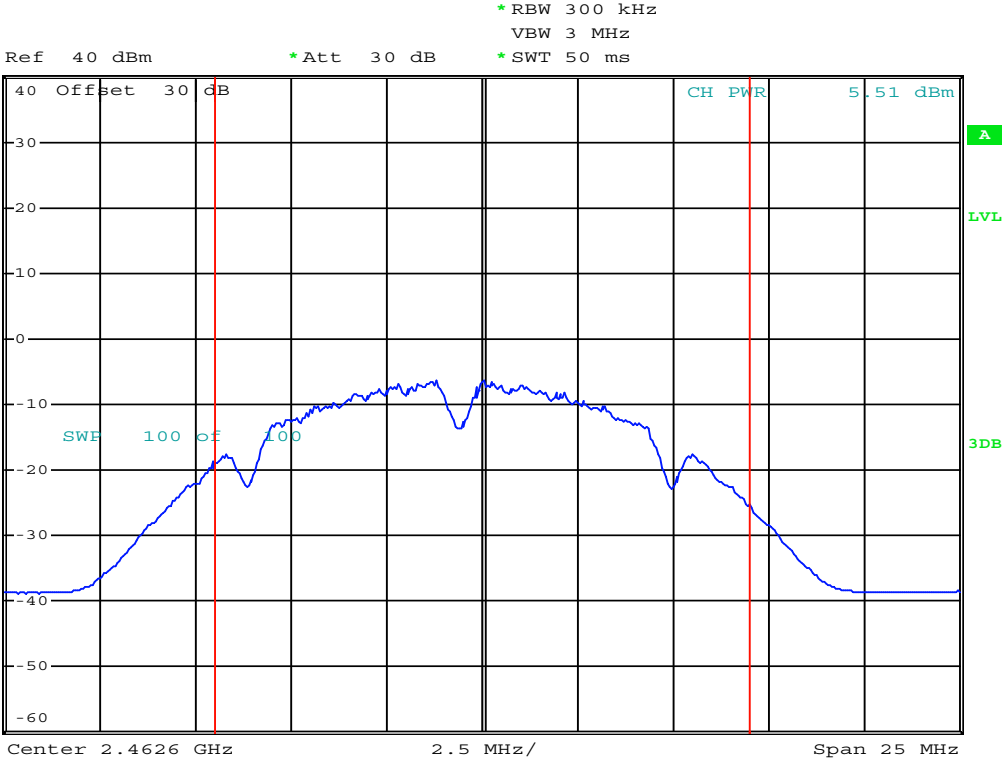
Date: 16.NOV.2021 10:01:15

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	10	2457	CCK	1	5.49

Conducted Power: WiFi



1 RM
VIEW



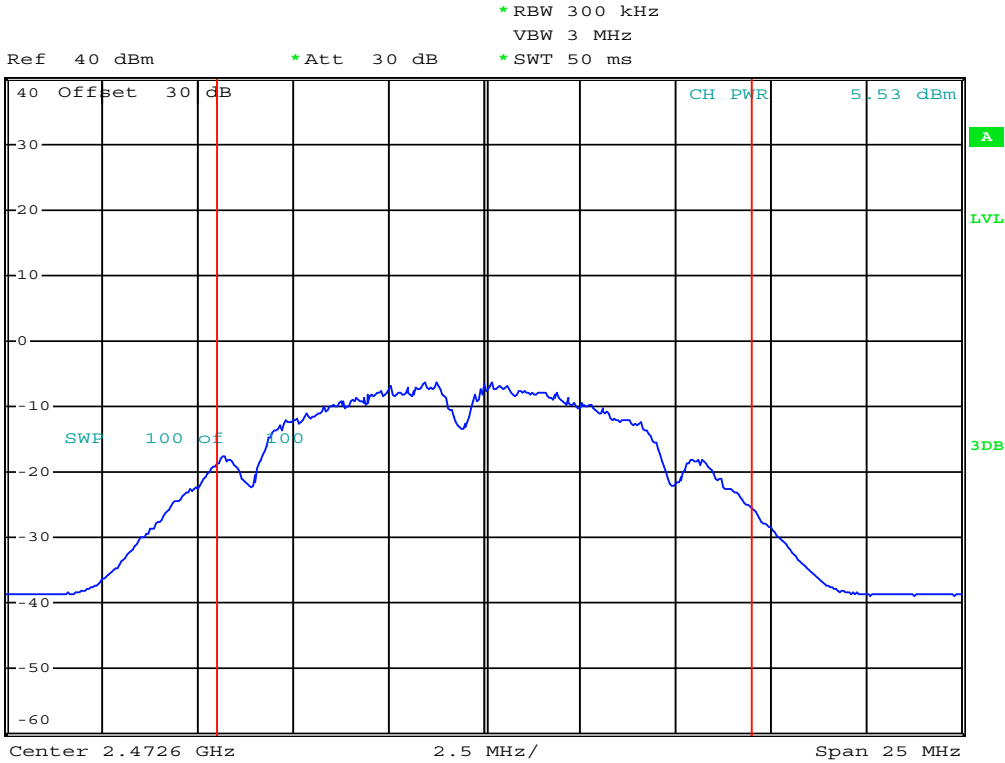
Date: 16.NOV.2021 10:02:23

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	11	2462	CCK	1	5.51

Conducted Power: WiFi



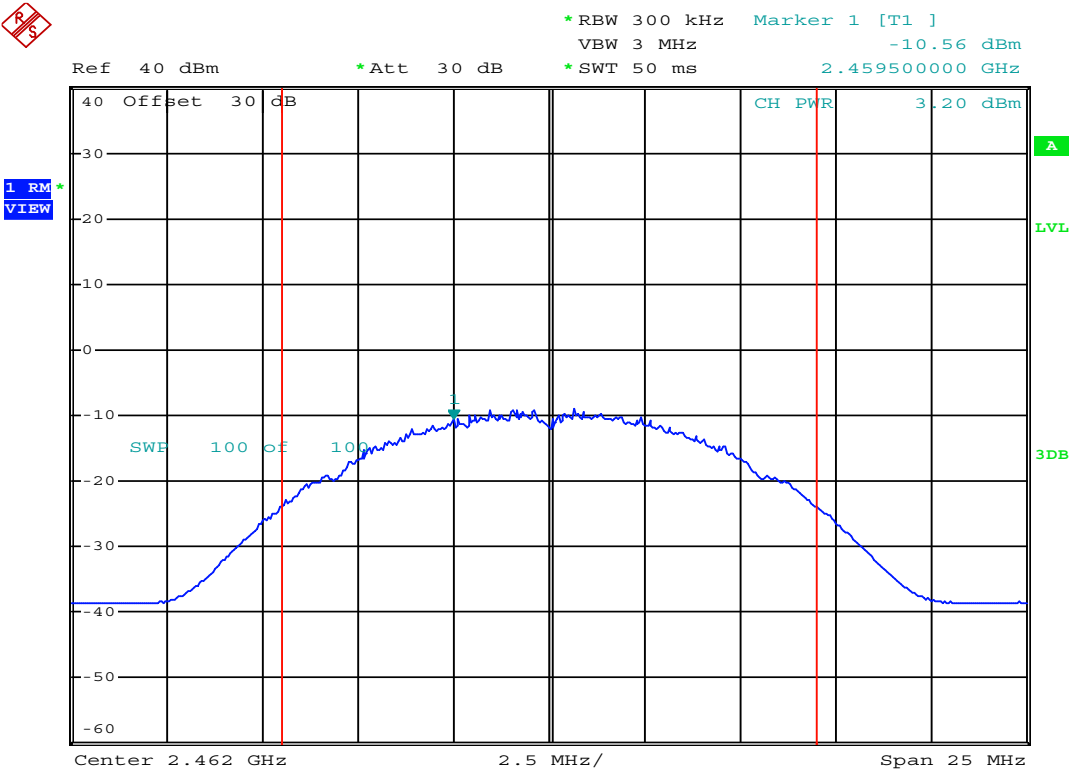
1 RM
VIEW



Date: 16.NOV.2021 10:07:13

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	13	2472	CCK	1	5.53

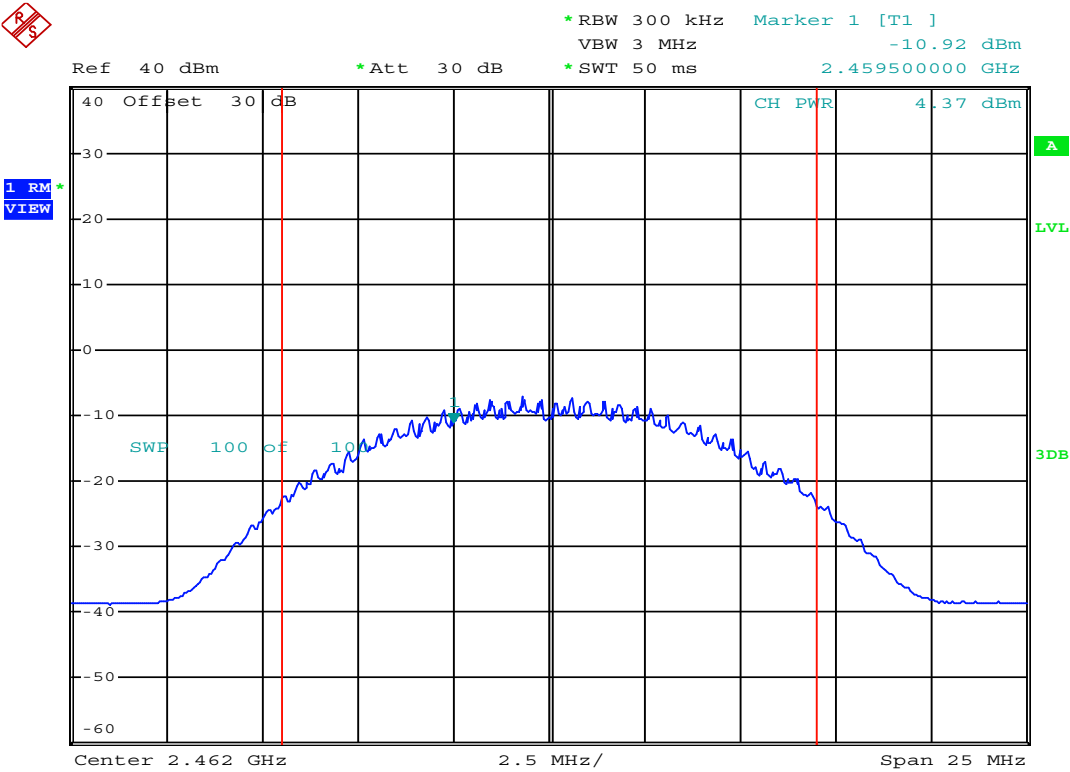
Conducted Power: WiFi



Date: 16.NOV.2021 10:16:29

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	11	2462	DSSS	5.5	3.20

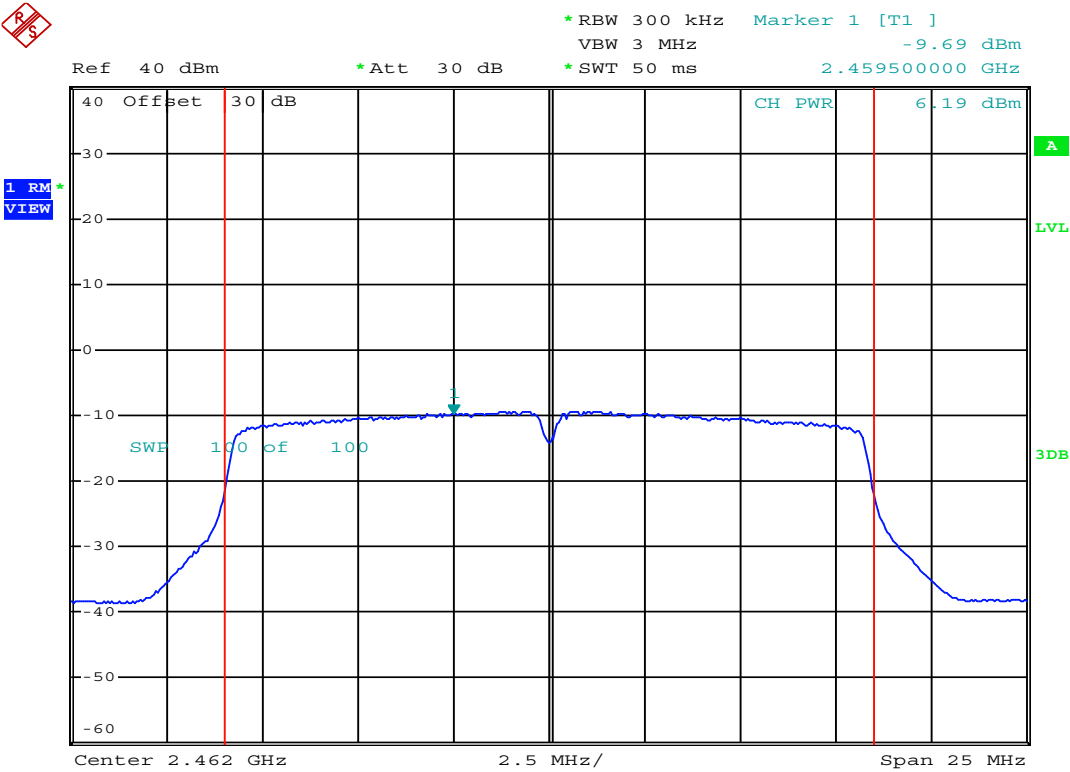
Conducted Power: WiFi



Date: 16.NOV.2021 10:19:19

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	11	2462	DSSS	11	4.37

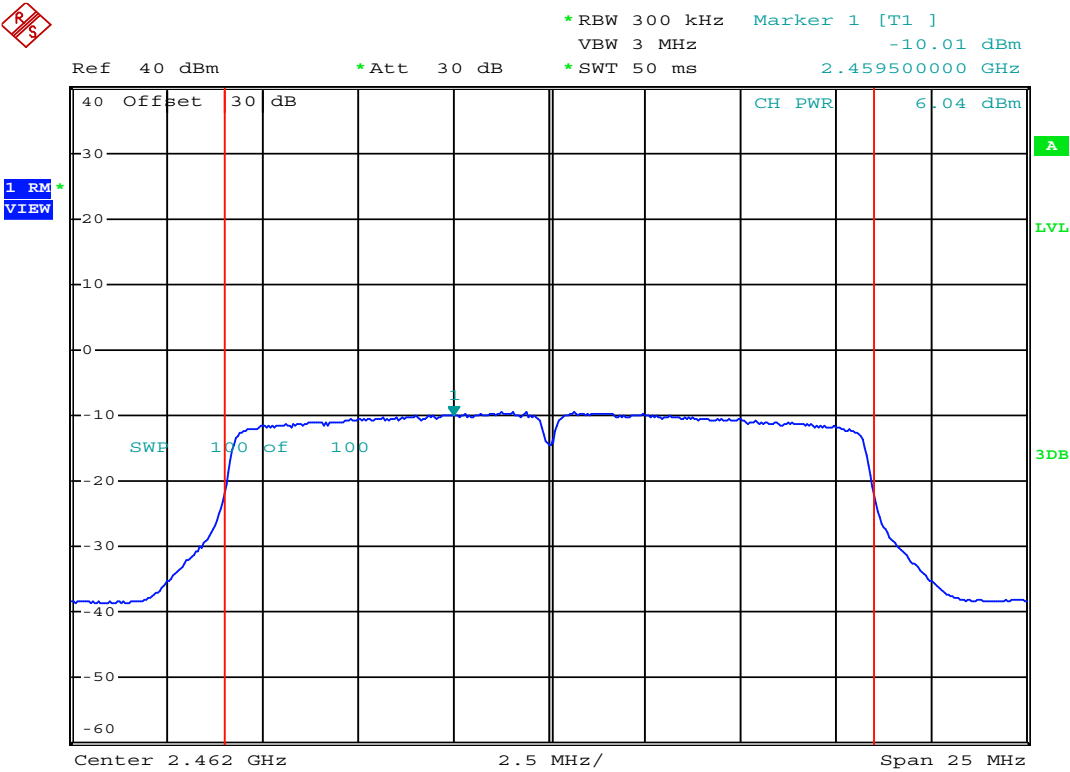
Conducted Power: WiFi



Date: 16.NOV.2021 10:37:45

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11g	11	2462	OFDM	6	6.19

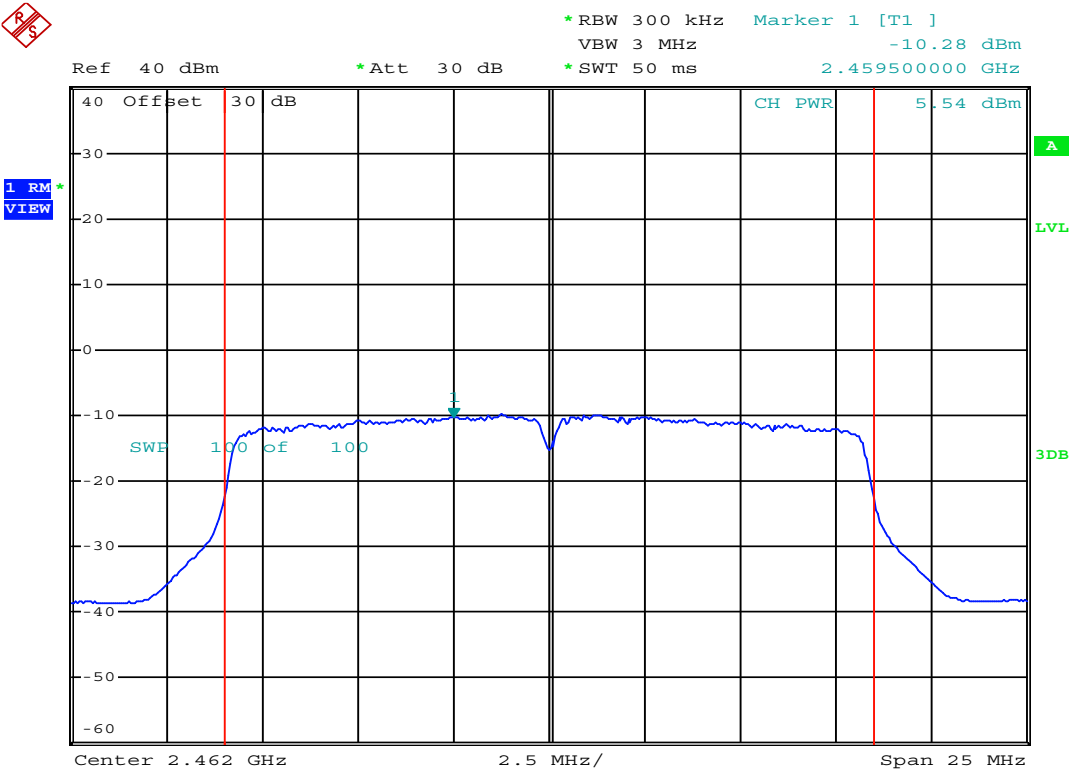
Conducted Power: WiFi



Date: 16.NOV.2021 10:40:26

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11g	11	2462	OFDM	9	6.04

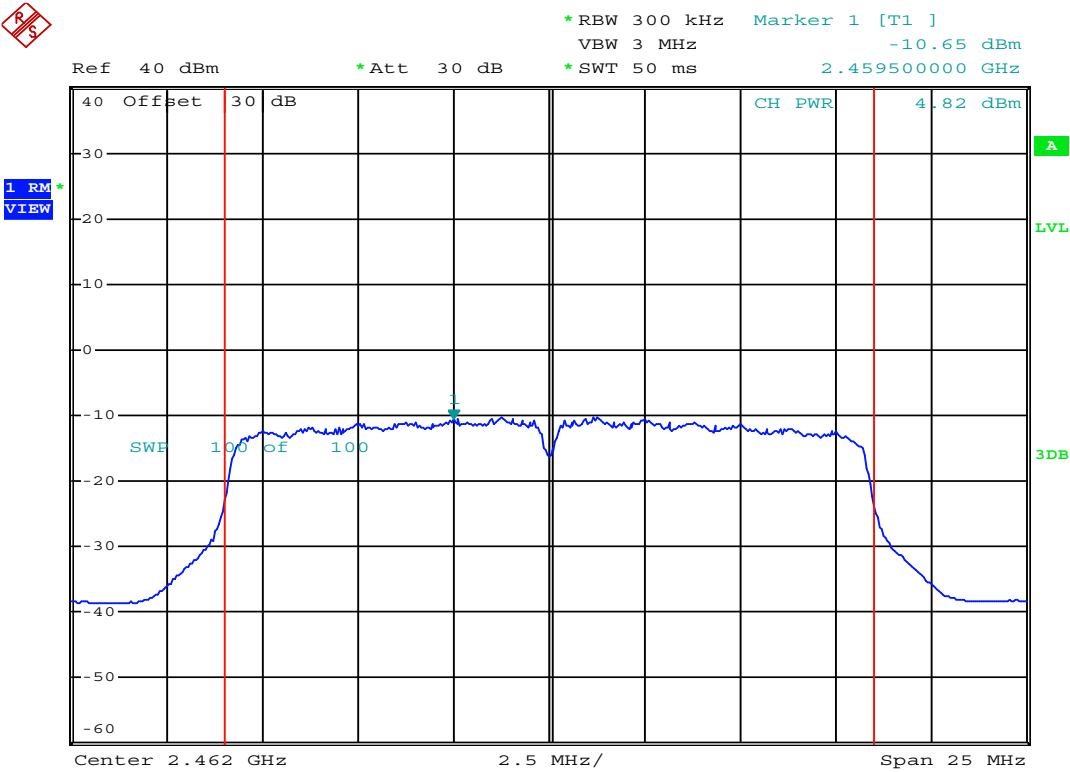
Conducted Power: WiFi



Date: 16.NOV.2021 10:41:41

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11g	11	2462	OFDM	12	5.54

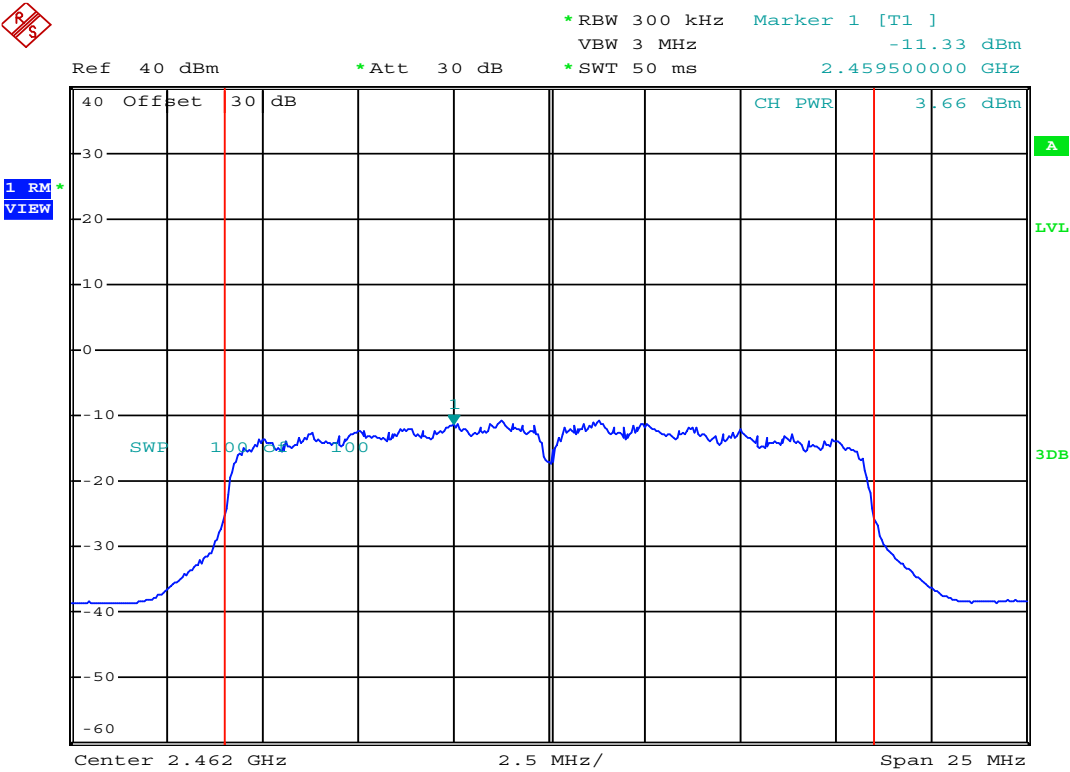
Conducted Power: WiFi



Date: 16.NOV.2021 10:44:20

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11g	11	2462	OFDM	24	4.82

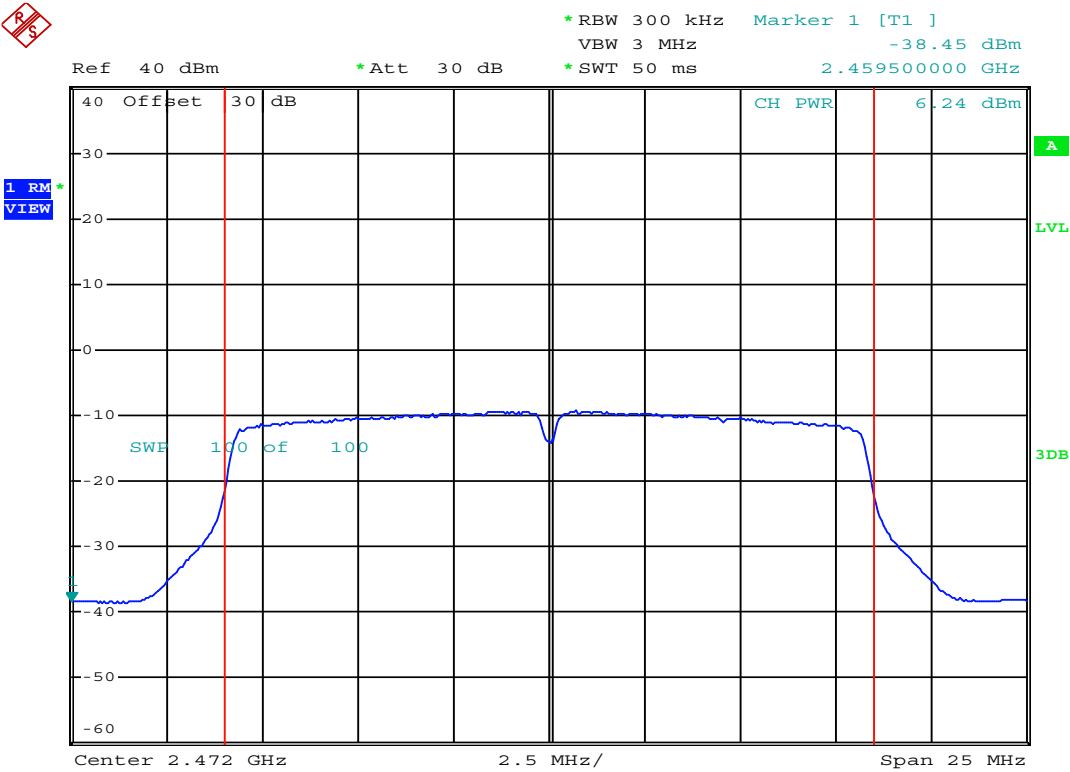
Conducted Power: WiFi



Date: 16.NOV.2021 10:45:18

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11g	11	2462	OFDM	54	3.66

Conducted Power: WiFi



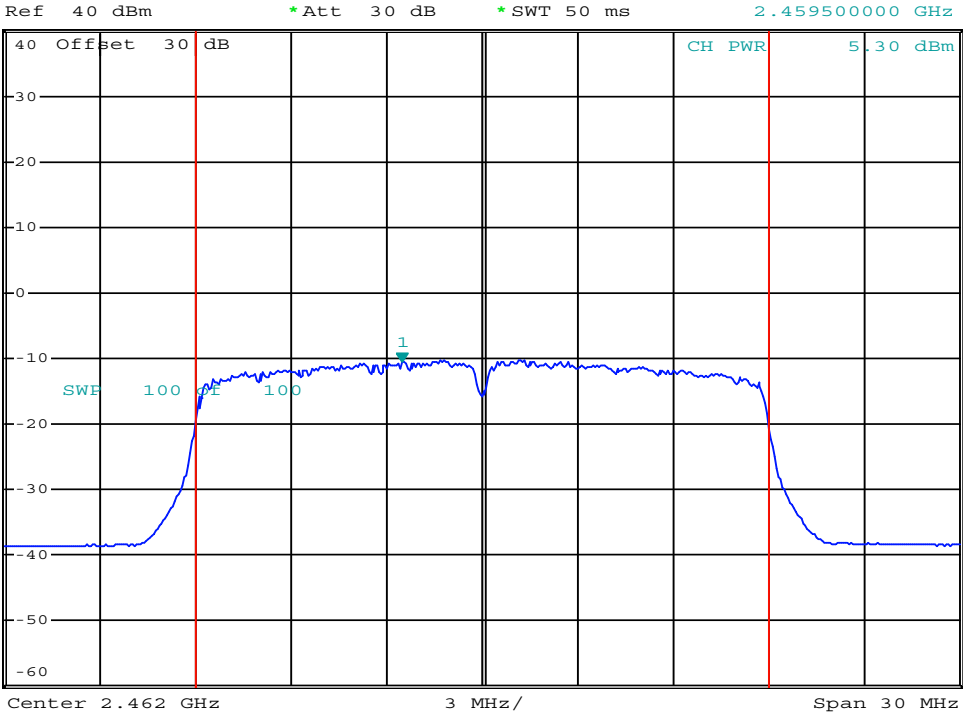
Date: 16.NOV.2021 10:39:10

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11g	13	2472	OFDM	6	6.24

Conducted Power: WiFi



*RBW 300 kHz Marker 1 [T1]
VBW 3 MHz -10.55 dBm
*SWT 50 ms 2.459500000 GHz



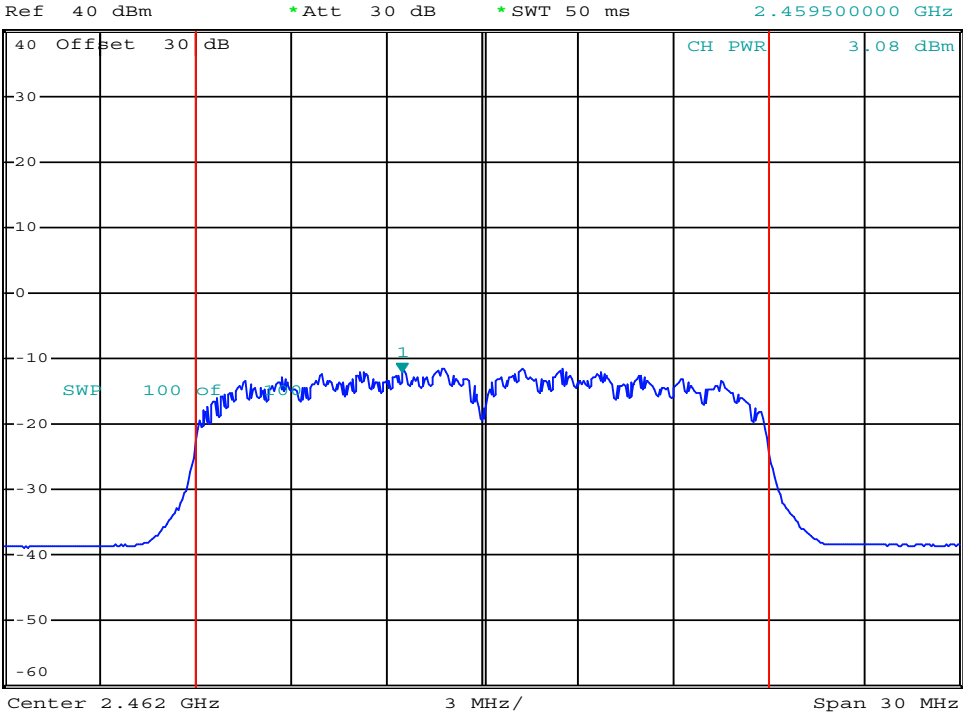
Date: 16.NOV.2021 11:06:01

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11n	11	2462	MCS0	6.5	5.30

Conducted Power: WiFi



*RBW 300 kHz Marker 1 [T1]
VBW 3 MHz -12.18 dBm
*SWT 50 ms 2.459500000 GHz



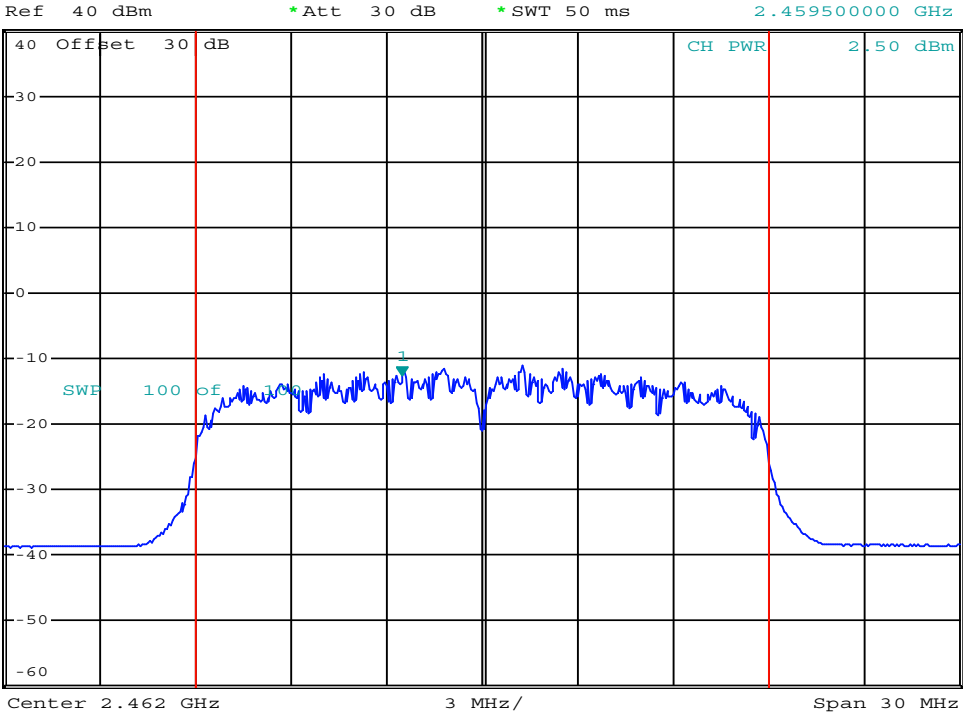
Date: 16.NOV.2021 11:12:13

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11n	11	2462	MCS4	36	3.08

Conducted Power: WiFi



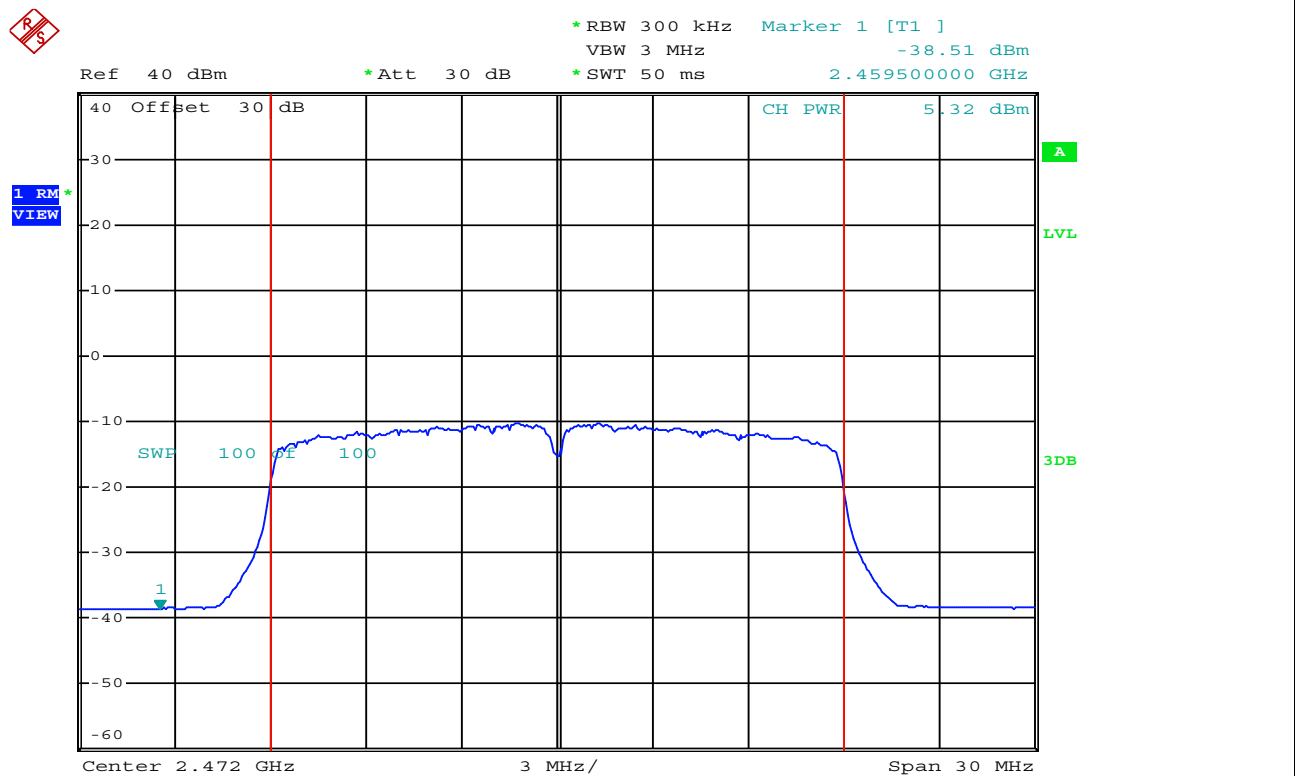
*RBW 300 kHz Marker 1 [T1]
VBW 3 MHz -12.51 dBm
*SWT 50 ms 2.459500000 GHz



Date: 16.NOV.2021 11:13:53

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11n	11	2462	MCS7	65	2.50

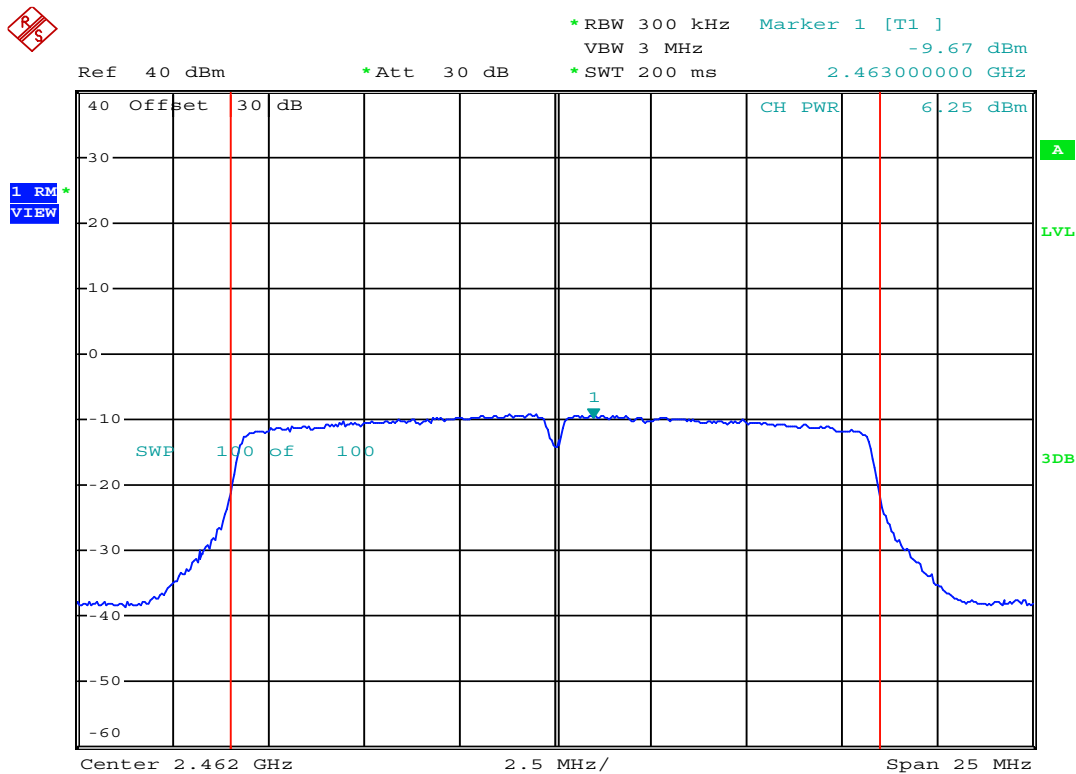
Conducted Power: WiFi



Date: 16.NOV.2021 11:11:03

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11n	13	2462	MCS0	6.5	5.32

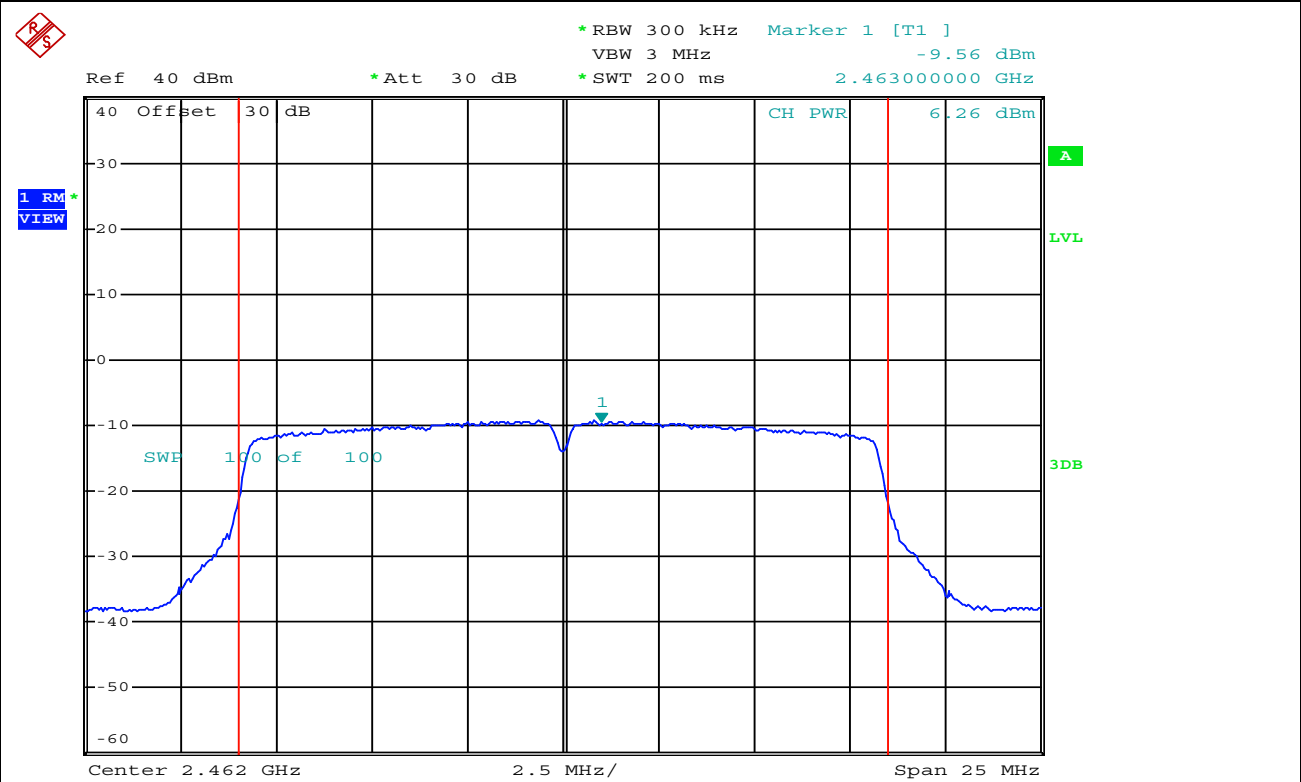
Conducted Power: WiFi @ -30°C



Date: 20.NOV.2021 11:59:20

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	11	2462	OFDM	6	6.25

Conducted Power: WiFi @ +40°C



Date: 20.NOV.2021 12:50:12

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.11b	11	2462	OFDM	6	6.26

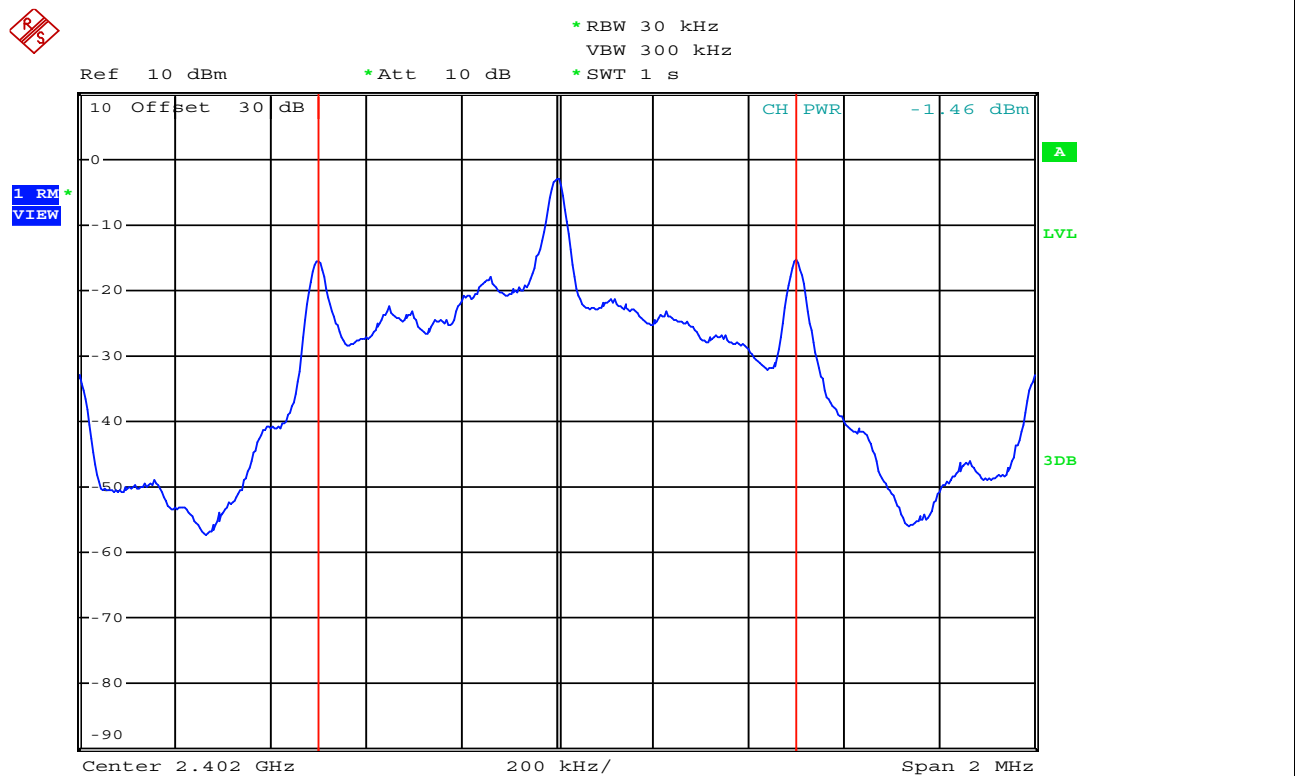
Conducted Power Measurement Results: 802.15 (BLE)										
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Transmit Duty Cycle [DC] (%)	Duty Cycle Correction [CF] ⁽¹⁾ (dB)	Measured Power [P _{Meas}] (dBm)	Corrected Power [P _{Corr}] ⁽²⁾ (dBm)	Conducted Limit [P _{Lim}] (dBm)	Conducted Margin ⁽³⁾ (dB)
BLE	2	2402	GMSK	-	60.8	2.16	-1.46	0.70	30	29.3
	18	2442			60.8	2.16	-0.98	1.18	30	28.8
	39	2480			60.8	2.16	-0.93	1.23	30	28.8
	39	2442			60.8	2.16	-0.60	1.56	30	28.4
	39	2480			60.8	2.16	-0.74	1.42	30	28.6
									Result:	Complies

(1) Correction Factor [CF] = 10Log(1/[DC])

(2) Corrected Power [P_{Corr}] = P_{Meas} + CF

(3) Conducted Margin = P_{Limit} - P_{Corr}

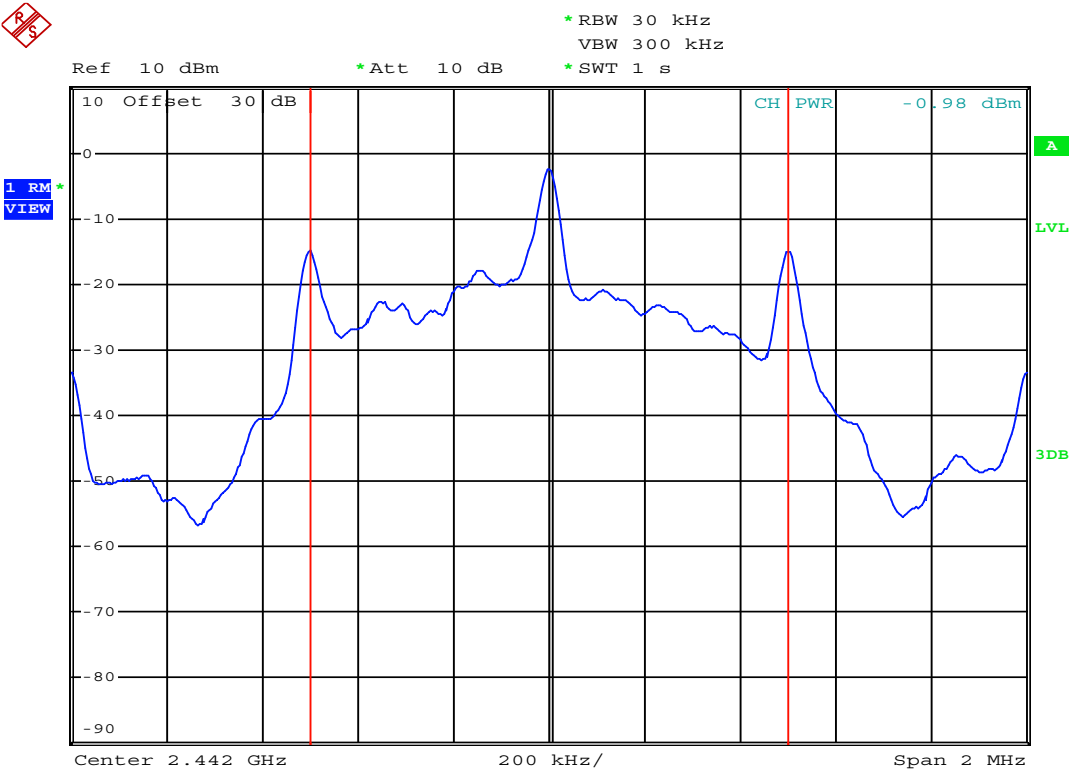
Conducted Power: 802.15



Date: 16.NOV.2021 13:40:26

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.15	2	2480	GMSK	-	-1.46

Conducted Power: 802.15



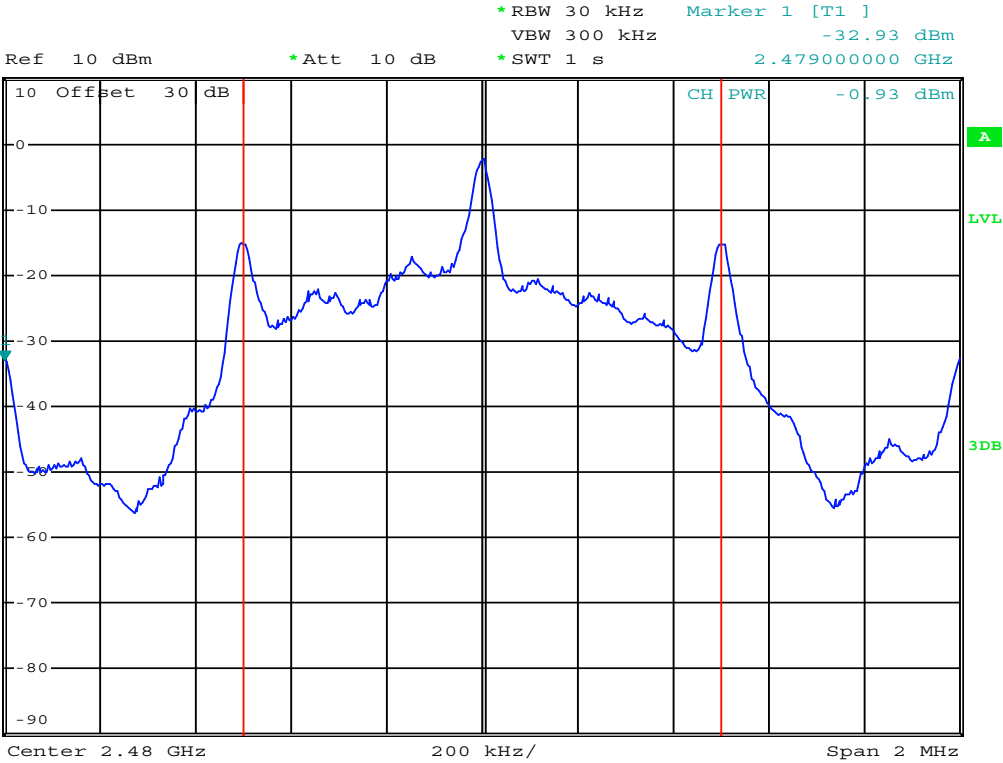
Date: 16.NOV.2021 13:39:01

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.15	18	2442	GMSK	-	-0.98

Conducted Power: 802.15



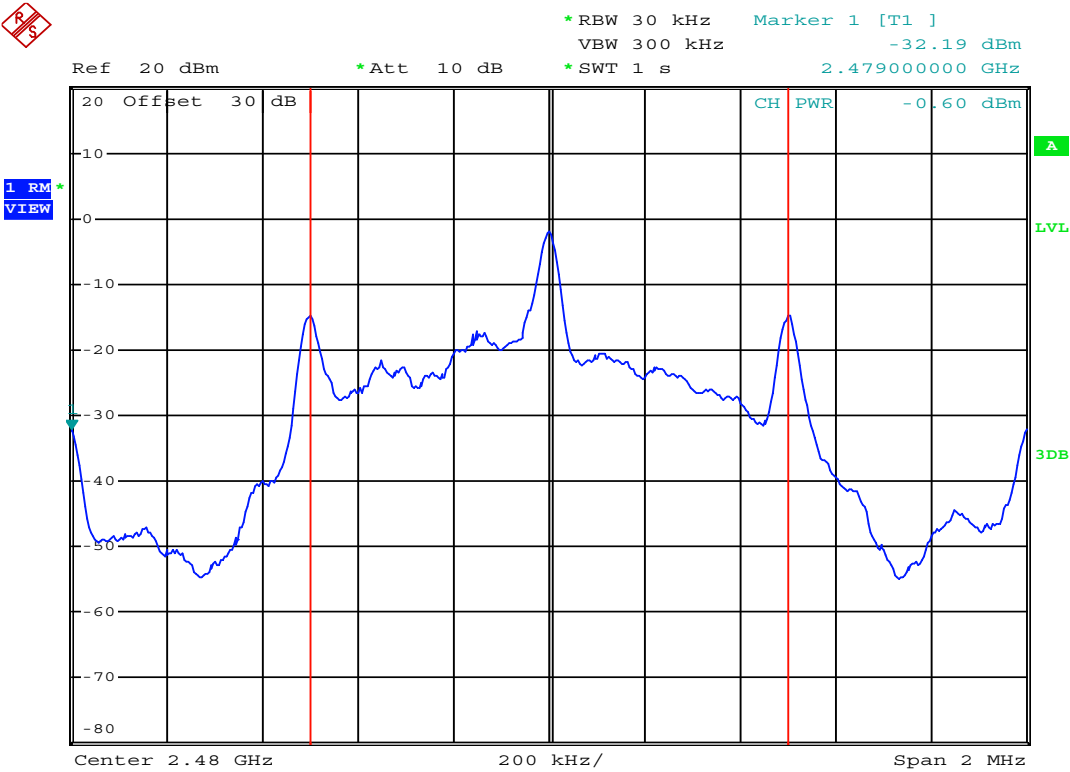
1 RM
VIEW



Date: 16.NOV.2021 13:41:26

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.15	39	2480	GMSK	-	-0.93

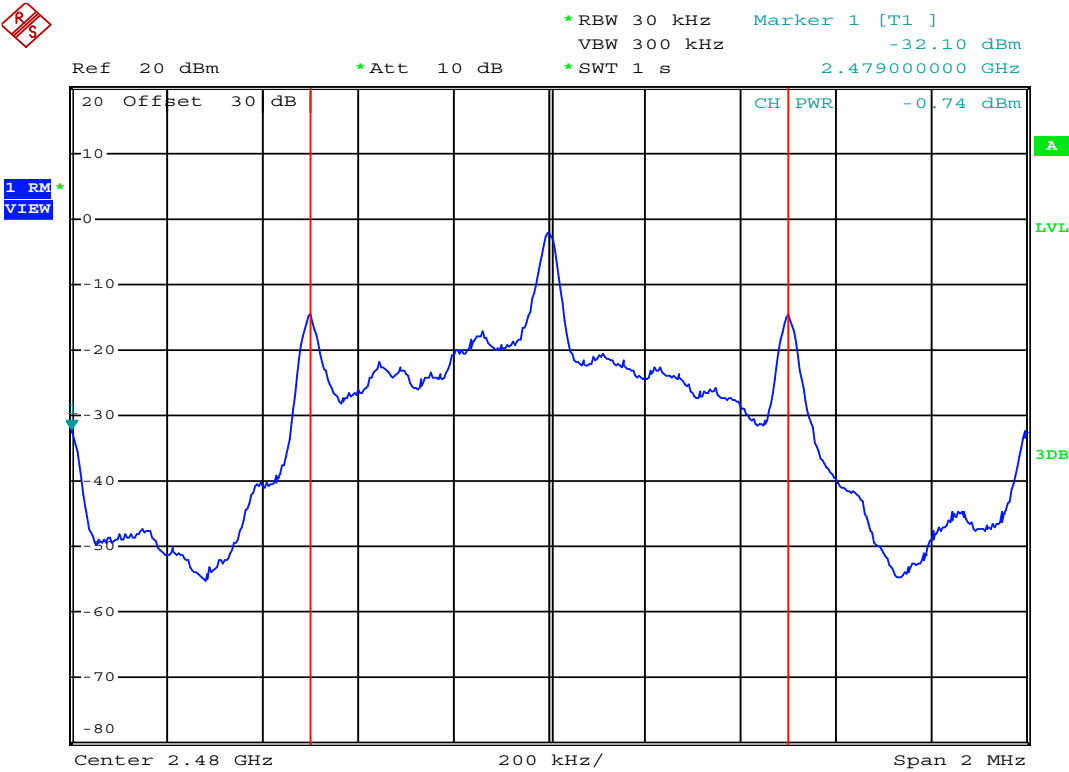
Conducted Power: 802.15 @ -30°C



Date: 20.NOV.2021 11:51:20

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.15	39	2480	GMSK	-	-0.60

Conducted Power: 802.15 @ +40°C



Date: 20.NOV.2021 12:41:50

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Conducted Power (dBm)
802.15	39	2480	GMSK	-	-0.74

Power Spectral Density Measurement Results: WiFi										
Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [PSD _{Meas}] (dBm)	Transmit Duty Cycle [DC] (%)	Duty Cycle Correction [CF] ⁽¹⁾ (dB)	Corrected PSD [PSD _{Corr}] ⁽²⁾ (dBm)	PSD Limit [PSD _{Lim}] (dBm)	Margin ⁽³⁾ (dB)
802.11b	11	2462	CCK	1.0	-8.090	95.9	0.18	-7.91	10	17.9
802.11g	11	2462	OFDM	6.0	-10.860	92.4	0.34	-10.52	10	20.5
802.11n	11	2462	MCS0	6.5	-10.860	87.6	0.57	-10.29	10	20.3
Result:										Complies

(1) Duty Cycle Correction Factor [CF] = 10Log(1/[DC])

(2) Corrected PSD [PSDCorr] = [PSDMeas] + [CF]

(3) Margin = [PSD_{Limit}] - [PSDCorr]

Power Spectral Density: WiFi

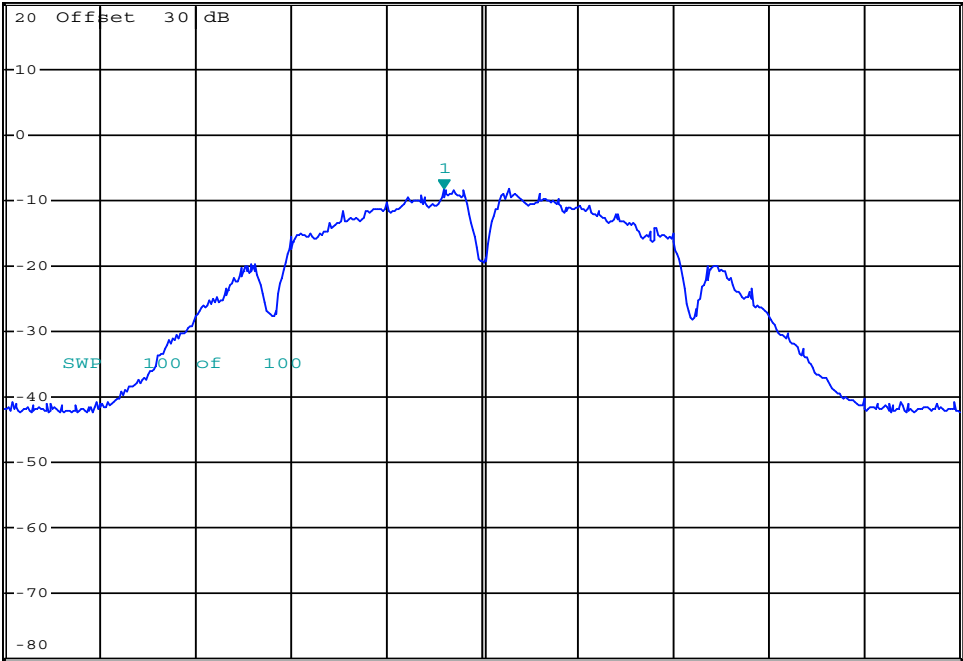


*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -8.09 dBm
*SWT 50 ms 2.461000000 GHz

Ref 20 dBm

*Att 30 dB

1 RM
VIEW



A

LVL

3DB

Date: 21.NOV.2021 13:12:48

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Measured PSD (dBm)
802.11b	11	2462	CCK	1	-8.09

Power Spectral Density: WiFi

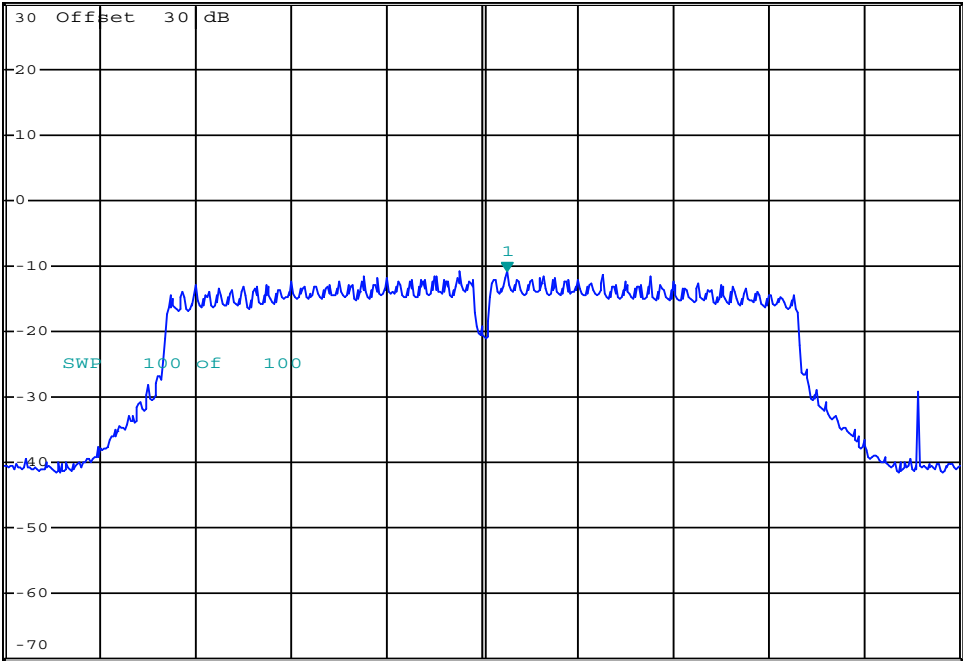


*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -10.86 dBm
*SWT 50 ms 2.462650000 GHz

Ref 30 dBm

*Att 30 dB

1 RM
VIEW



Center 2.462 GHz

2.5 MHz/

Span 25 MHz

Date: 21.NOV.2021 13:38:41

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Measured PSD (dBm)
802.11g	11	2462	OFDM	6	-10.86

Power Spectral Density: WiFi

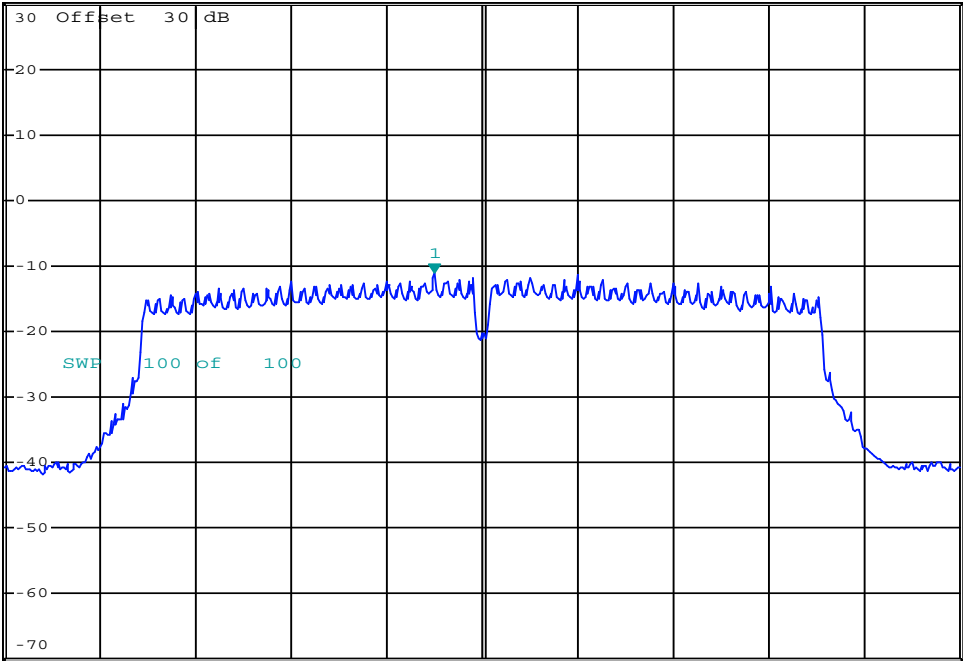


*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -11.00 dBm
*SWT 50 ms 2.460750000 GHz

Ref 30 dBm

*Att 30 dB

1 RM
VIEW



Center 2.462 GHz 2.5 MHz/ Span 25 MHz

Date: 21.NOV.2021 13:40:11

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Measured PSD (dBm)
802.11n	11	2462	MCS0	6.5	-10.86

Power Spectral Density Measurement Results: BLE

Mode	Channel Number	Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [PSD _{Meas}] (dBm)	Transmit Duty Cycle [DC] (%)	Duty Cycle Correction [CF] ⁽¹⁾ (dB)	Corrected PSD [PSD _{Corr}] ⁽²⁾ (dBm)	PSD Limit [PSD _{Lim}] (dBm)	Margin ⁽³⁾ (dB)
BLE	2	2402	GMSK	-	-13.910	60.8	2.16	-11.75	8	19.7
BLE	18	2442	GMSK	-	-14.190	60.8	2.16	-12.03	8	20.0
BLE	39	2480	GMSK	-	-11.920	60.8	2.16	-9.76	8	17.8

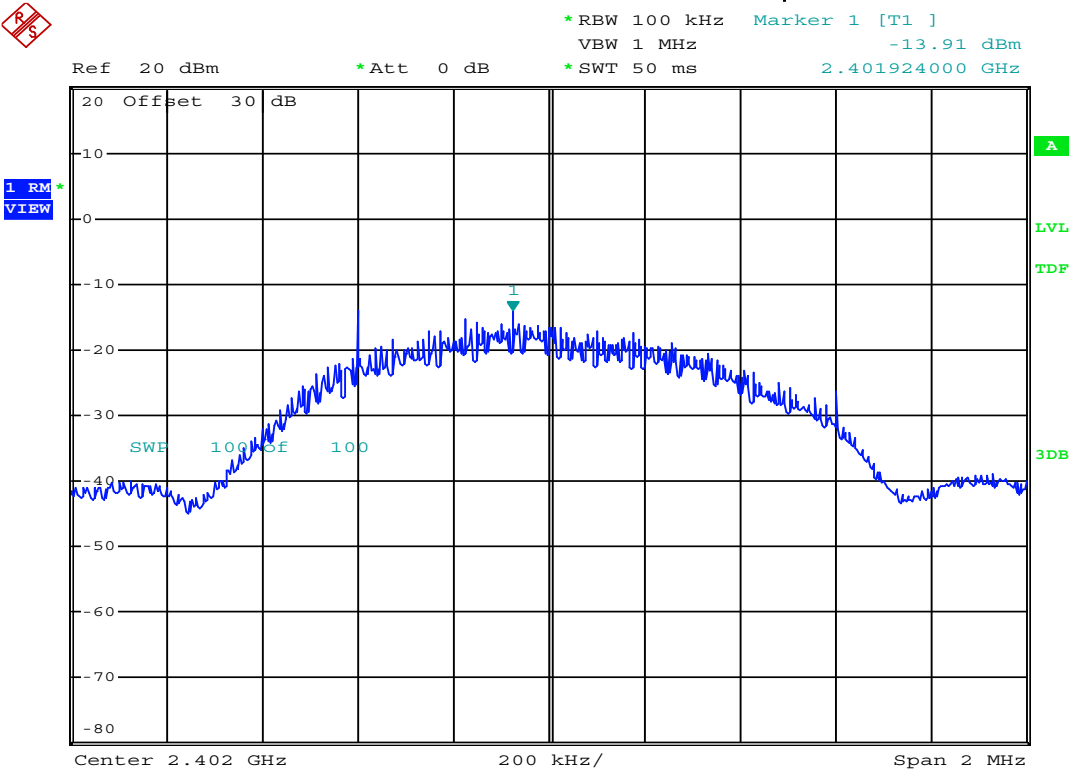
Result: Complies

(1) Duty Cycle Correction Factor [CF] = 10Log(1/[DC])

(2) Corrected PSD [PSDCorr] = [PSDMeas] + [CF]

(3) Margin = [PSD_{Limit}] - [PSD_{Corr}]

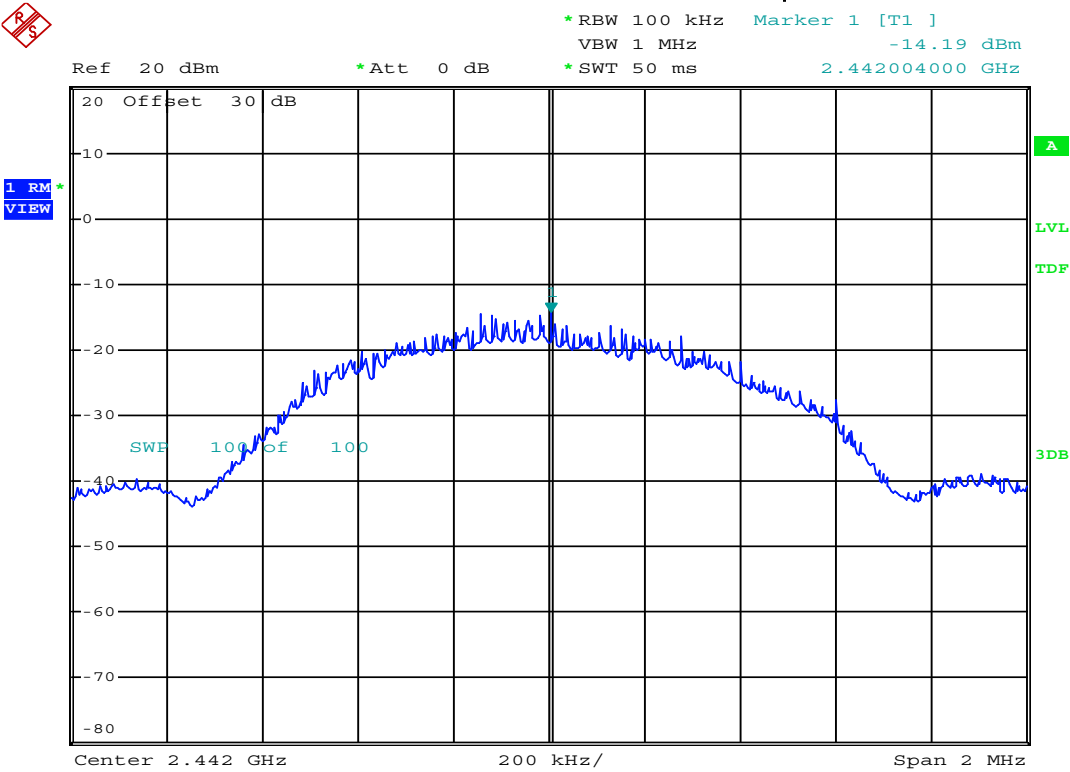
Power Spectral Density: BLE



Date: 17.NOV.2021 15:37:24

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Measured PSD (dBm)
BLE	2	2402	GMSK	-	-13.91

Power Spectral Density: BLE



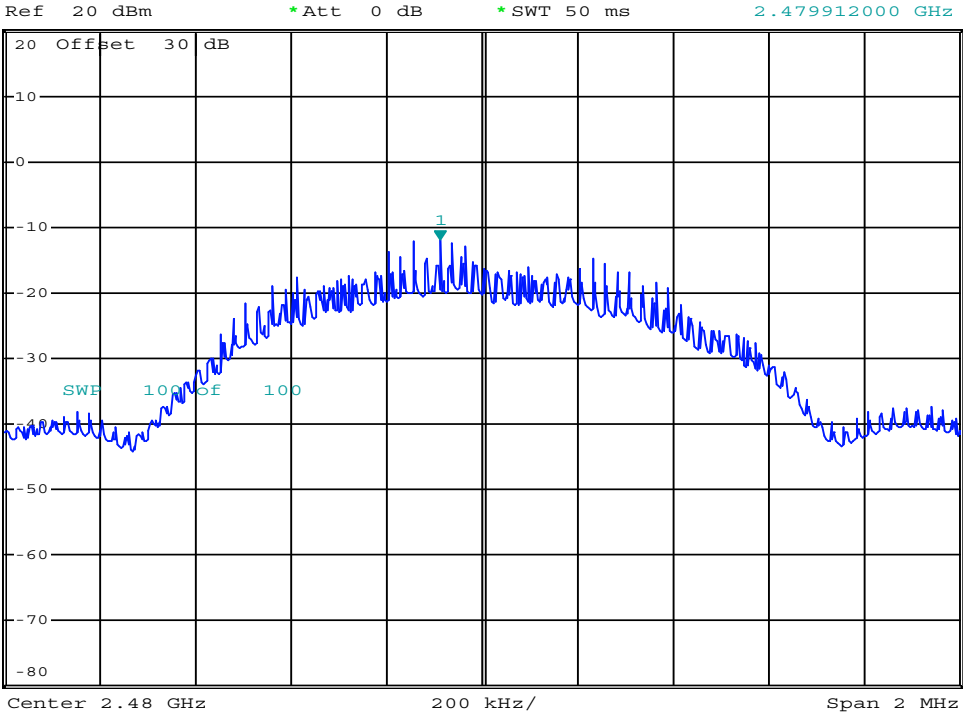
Date: 17.NOV.2021 15:38:34

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Measured PSD (dBm)
BLE	18	2442	GMSK	-	-14.19

Power Spectral Density: BLE



*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -11.92 dBm
*SWT 50 ms 2.479912000 GHz



Date: 17.NOV.2021 15:39:44

Mode	Channel Number	Channel Frequency (MHz)	Modulation	Data Rate (mbps)	Measured PSD (dBm)
BLE	39	2480	GMSK	-	-11.92