Regulatory Test Report

Prepared for Harman International

This report presents detailed information on

INFO3.7-3.8 CSM

Automotive Infotainment Unit.

Prepared by

Aravind Buddana

Engineer II

Approved by

Jason Kanakry

General Manager

Issue date: 09/01/2021

Report No: AH20110901-HAR-279-TR3 v4

Contents

- # Test Request Information

Test Request #:	7700040166
Test Requested By:	Mark Bowman Harman International Industries, Inc. 30001 Cabot Drive, Novi, MI 48377
Test item Description:	INFO3.7-3.8 CSM (Automotive Infotainment Unit with Bluetooth/WLAN)
Part Number:	84375197
DUT Sample Number:	AH20110901-HAR-279-08, AH20110901-HAR-279-10
Hardware Version of DUT:	PV
Software Version of DUT:	W156
Component Category of DUT:	N/A
FCC ID:	2AHPN-BE2854
IC:	6434C-BE2854
Type of Test:	FCC/ISED Certification
Test Method:	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2, ISED Canada RSS-Gen Issue 5 and ANSI C63.10-2013
Deviations from standard:	None
Approved Test Plan Number:	N/A
Test Plan Revision:	N/A
Date test sample received:	01/14/2021
Date test started:	02/05/2021
Date test finished:	08/26/2021

- # Test Laboratory Information

Location of Test Lab:	The radiated and conducted emissions test sites are located at Bureau Veritas 815 N. Opdyke Rd #100, Auburn Hills, MI 48326, Phone: +1-248-836-4700
Key Contact:	Jason Kanakry (General Manager) Jason.Kanakry@BureauVeritas.com Phone: +1-248-836-4747
Laboratory Accreditations:	BUREAU VERITAS CONSUMER PRODUCTS SERVICES, INC is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
ISO/IEC 17025:2017:	5678.01
FCC Test Site Number:	US1278 (242530)
IC Test Site Number:	US0229 (26240)

- **Statement of Conformity**

RSS-GEN	RSS 247	Part 15	Comments
6.4		15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
		15.19	The label is shown in the label exhibit.
		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
3.2		15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13.2		15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
6.13.1		15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
6.8		15.203	EUT employs a non-detachable internal PCB trace antenna with 5.0dBi gain.
8.10		15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable
8.8		15.207	N/A. EUT is vehicle battery powered only.

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

- **Conducted Testing**

Test Summary

This test report supports an application for certification of a transmitter operating pursuant to:
CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2, ISED Canada RSS-Gen Issue 5 and ANSI C63.10-2013

The product is the INFO3.7-3.8 CSM. It is a frequency hopping spread spectrum transmitter that operates in the 2402 – 2480 MHz frequency range.

Details	Description
Frequency Range (MHz)	2402 – 2480
Modulation	GFSK, π/4 DQPSK, 8DPSK
Number of Channels	79
Tested Channels	0,39,78
DUT Antenna Type	Non-detachable PCB trace
DUT Antenna Gain	5.0dBi

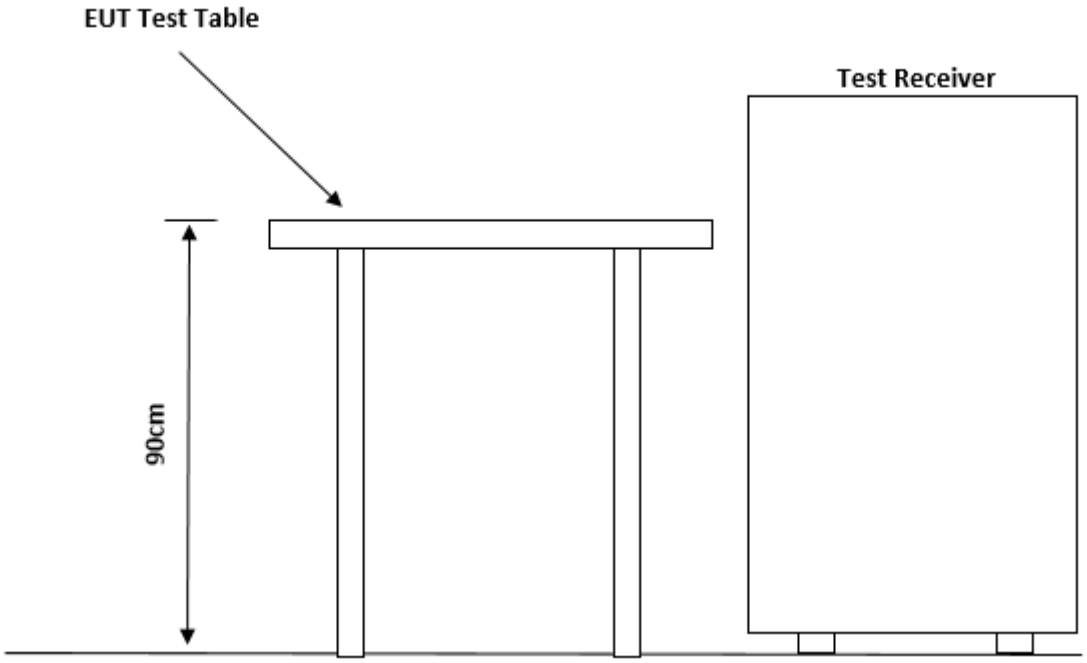
We found that the product met the above requirements without modification.
Test samples were received in good condition.

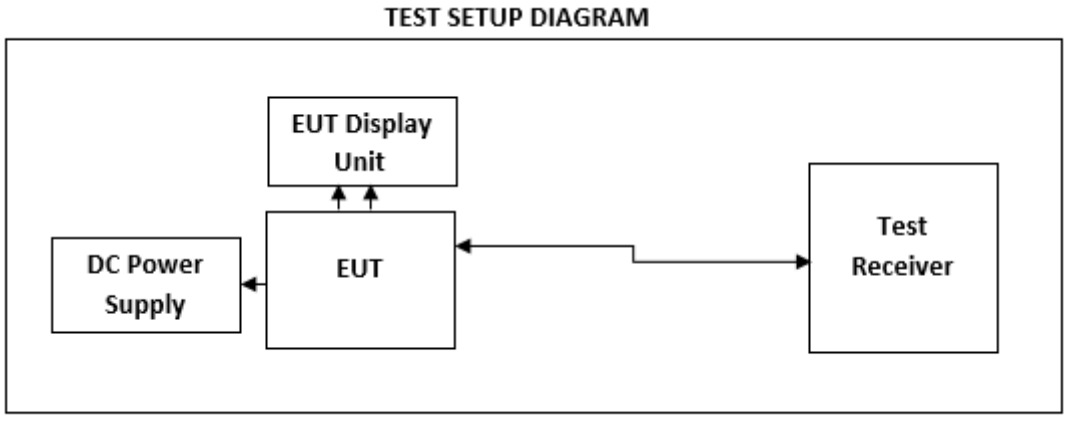
Test Item	Sample #	Result
FCC 15.247 Bluetooth Classic	AH20110901-HAR-279-10	Meets Requirement

Test Setup

Conducted Test Site Description

The site is accommodated to test tabletop and floor standing test equipment.





Test Equipment Used

ID #	Equipment	Manufacturer	Model #	Serial #	Cal Due
BVD0226	Spectrum Analyzer 10Hz-44GHz	Rohde & Schwarz	FSV3044	101018	1/14/2022
BVD0227	8 port switch unit for Wireless Test system	Rohde & Schwarz	OSP150	101100	N/A
BVD0228	8 port switch unit for Wireless Test system	Rohde & Schwarz	OSP220	101632	N/A
BVD0224	Signal Generator 100kHz-40GHz	Rohde & Schwarz	SMB100A	181741	11/19/2021
BVD0225	Signal Generator 100k-6GHz with GPS simulator	Rohde & Schwarz	SMW200A	107664	11/18/2021
BVD0250	Wireless Connectivity Tester 70M-6GHz	Rohde & Schwarz	CMW270	102113	11/18/2021
BVD0343	DC Regulated Power Supply	Circuit Specialists, INC	CSI3020X	595215	N/A
BVD0321	Fixed Attenuator 2W 20dB - 40GHz	Mini-Circuits	BW-K20-2W44+	2103	N/A
BVD0477	10db Attenuator -18GHz	Mouser	BW-S10W2+	2043	N/A
BVD0229	Temp and Humidity Meter	Fluke	971	12001009	3/26/2022

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	DUT Display	Harman	N/A	2133	N/A
N/A	Display Harness	Harman	N/A	N/A	N/A
N/A	Blue Molex Connector Harness	Harman	N/A	N/A	N/A
N/A	DUT 1M Harness	Harman	N/A	N/A	N/A
N/A	USB to DUT Harness	Harman	N/A	102161025	N/A

Equipment List (Software)

ID #	Equipment	Manufacturer	Model	Version No.	
N/A	EMC Test Software	Rodhe & Schwarz	EMC32	11.20.00	N/A

FCC 15.247 Bluetooth Classic

DUT Information

DUT Name:	INFO3.7-3.8 CSM
Manufacturer:	Harman International Industries, Inc.
Serial Number:	AH20110901-HAR-279-10

79 channels are provided for BT mode:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	**2402**	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	**78**	**2480**
19	2421	**39**	**2441**	59	2461		

Notes: The channels 0, 39 and 78 were selected as representative test channels.

Antenna gain	5.0 dBi
Number of transmit chains	1
Equipment type	Frequency Hopping Spread Spectrum

Test Results Summary

Test	Frequency (MHz)	DH1 Result	DH3 Result	DH5 Result	2-DH1 Result	2-DH3 Result	2-DH5 Result	3-DH1 Result	3-DH3 Result	3-DH5 Result
RF Output Power	--- (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Hopping Frequencies	--- (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Band Edge High	--- (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Carrier Frequency Separation	2402.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Carrier Frequency Separation	2480.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Time of Channel Occupancy	2402.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Time of Channel Occupancy	2441.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Time of Channel Occupancy	2480.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Emissions Bandwidth 20dB	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Occupied Channel Bandwidth 99%	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Band Edge Low	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peak Output Power	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Tx Spurious	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Emissions Bandwidth 20dB	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Occupied Channel Bandwidth 99%	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peak Output Power	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Tx Spurious	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Emissions Bandwidth 20dB	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Occupied Channel Bandwidth 99%	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Band Edge High	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peak Output Power	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Tx Spurious	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Number of Hopping Frequencies

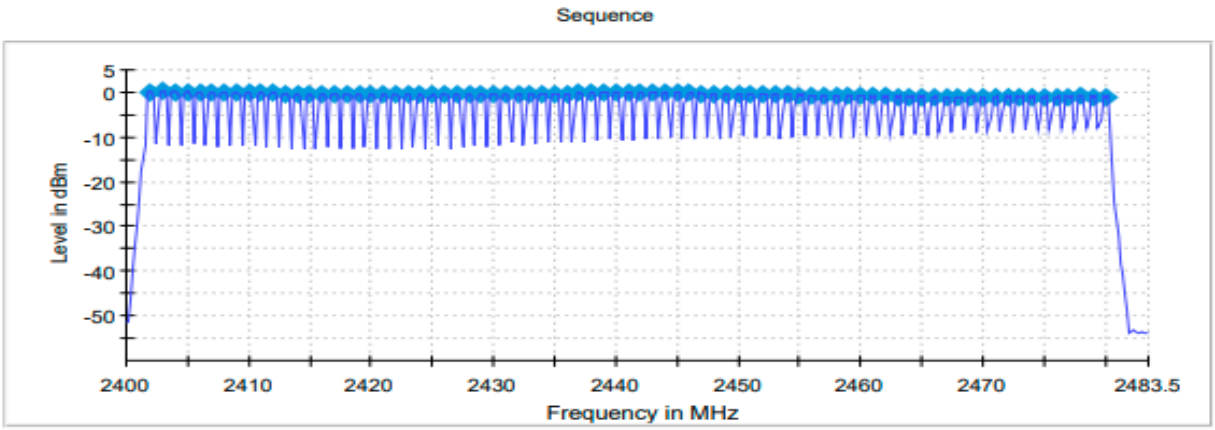
Test according to FCC title 47 part 15 §15.247(a)(g), KDB 558074 D01 DTS Meas Guidance v05 9 and ANSI C63.10-2013 7.8.3

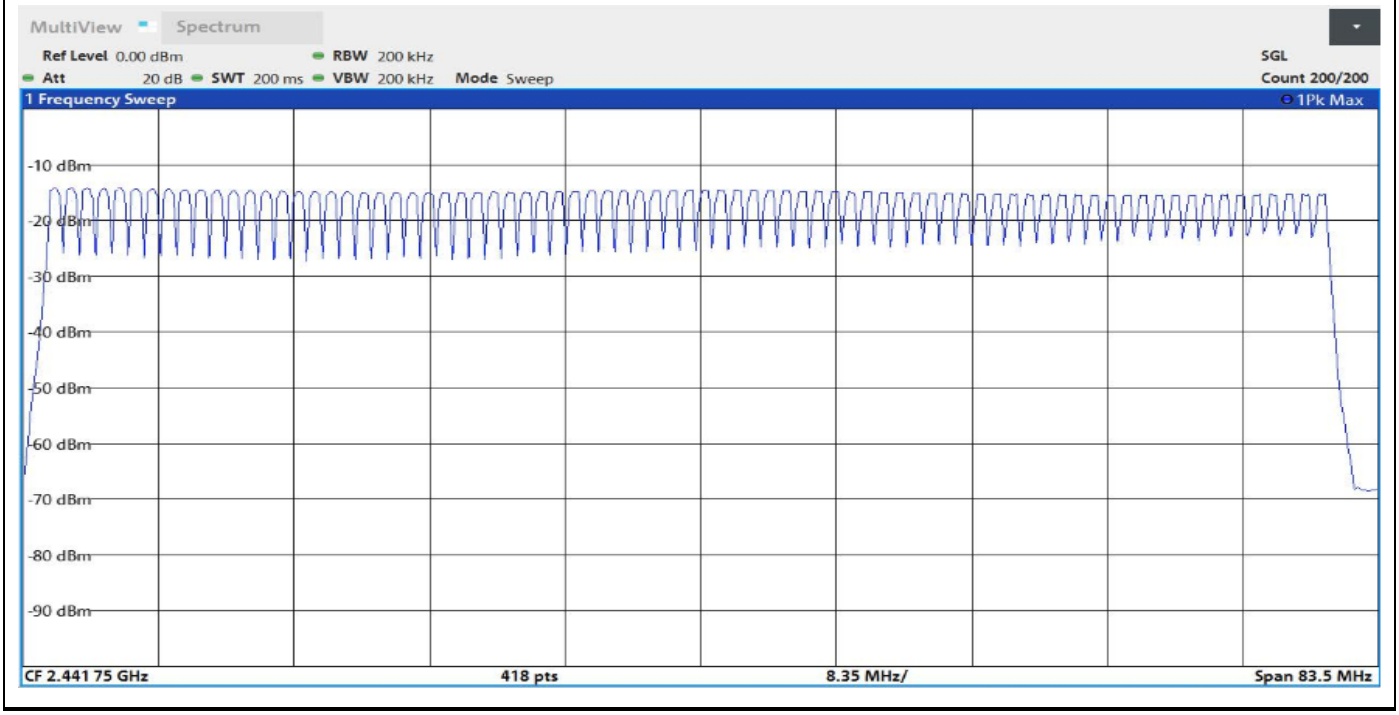
Channels

Channels	Limit Min	Result
79	15	PASS

Plot for packet type DH1 shown below.

Hopping Frequencies





Band Edge (Hopping)

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.6

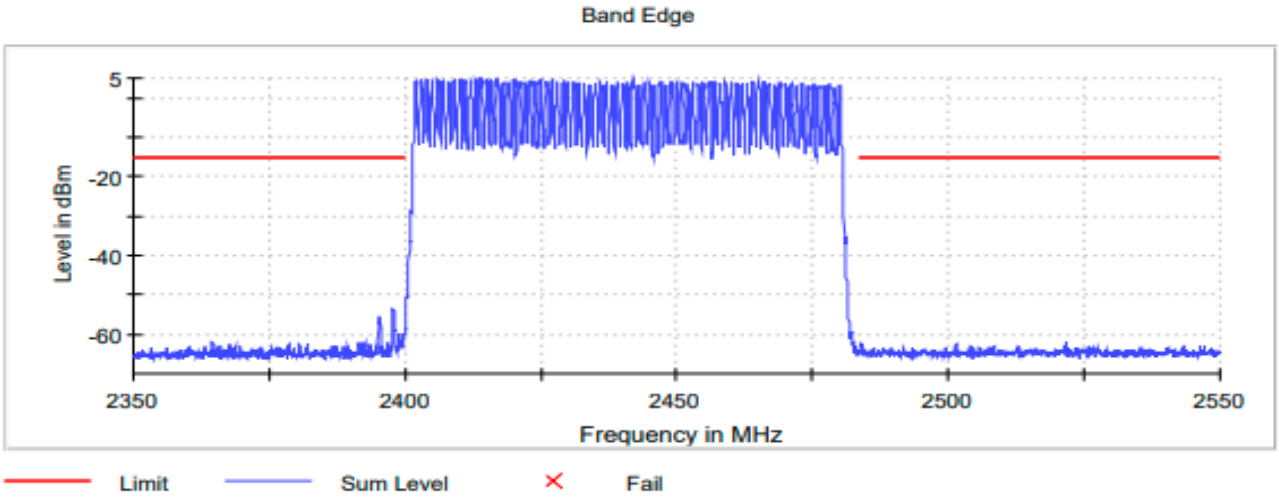
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

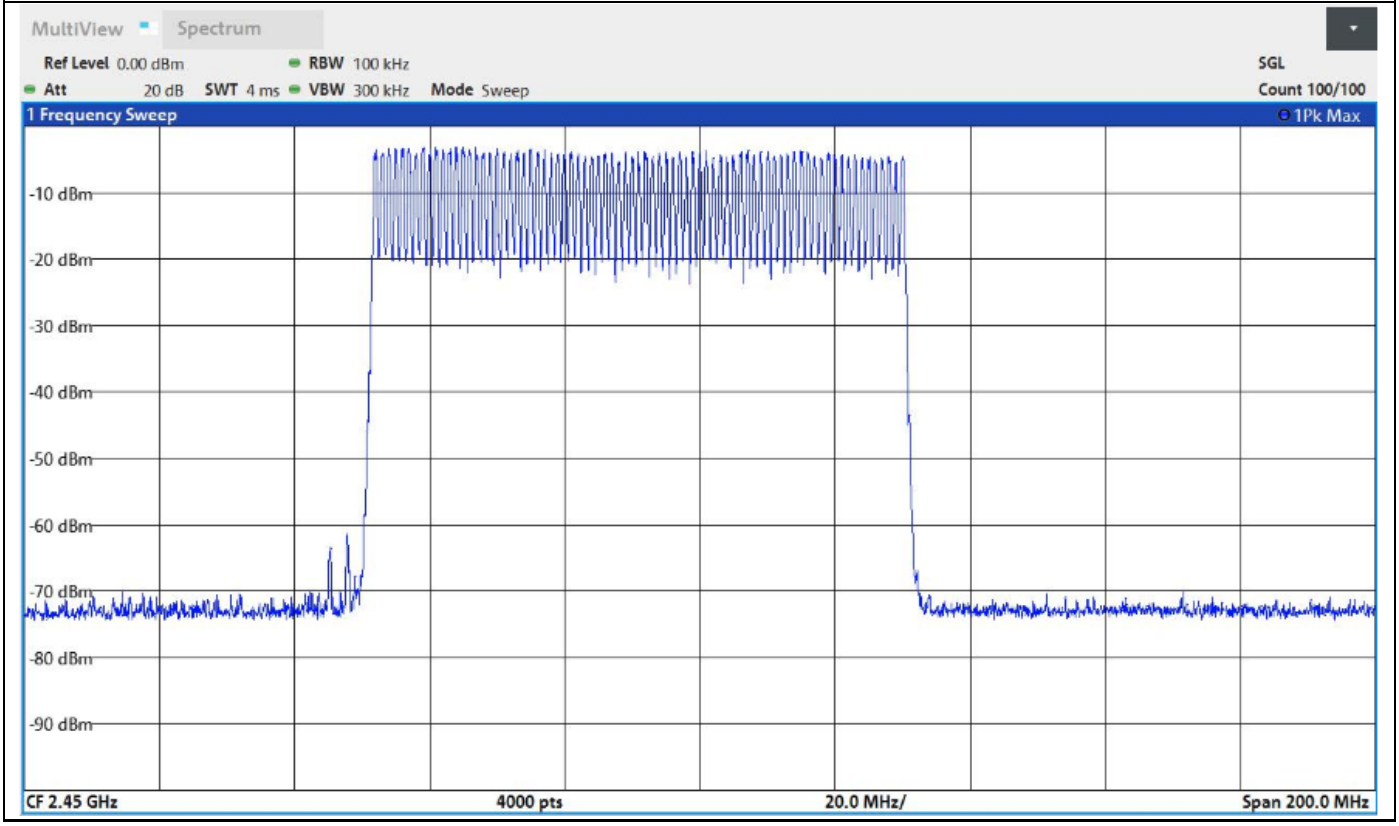
Data Rate	Frequency (MHz)	Inband Peak Level (dBm)
DH1	2416.825000	4.8
DH3	2411.175000	6.1
DH5	2416.175000	6.0
2-DH1	2461.025000	2.1
2-DH3	2453.025000	1.8
2-DH5	2456.175000	2.0
3-DH1	2461.825000	2.2
3-DH3	2462.025000	2.0
3-DH5	2458.175000	2.1

Measurements for DH1

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2397.825000	-53.4	38.2	-15.2
2397.775000	-53.4	38.2	-15.2
2397.725000	-53.9	38.7	-15.2
2397.675000	-54.1	38.9	-15.2
2397.875000	-54.2	39.0	-15.2
2397.925000	-55.2	40.0	-15.2
2395.325000	-55.4	40.2	-15.2
2395.375000	-55.5	40.3	-15.2
2395.275000	-56.0	40.8	-15.2
2395.175000	-56.1	40.9	-15.2
2395.225000	-56.1	40.9	-15.2
2395.125000	-56.8	41.6	-15.2
2395.025000	-56.9	41.7	-15.2
2397.625000	-57.2	42.0	-15.2
2395.075000	-57.5	42.3	-15.2

Plots for packet type DH1 shown below





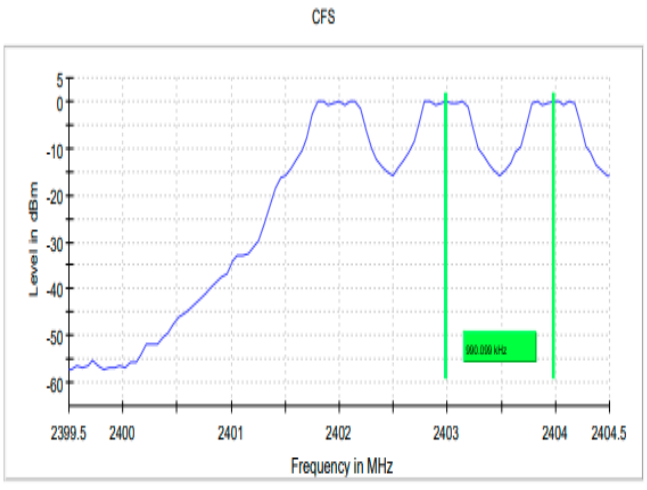
Carrier Frequency Separation

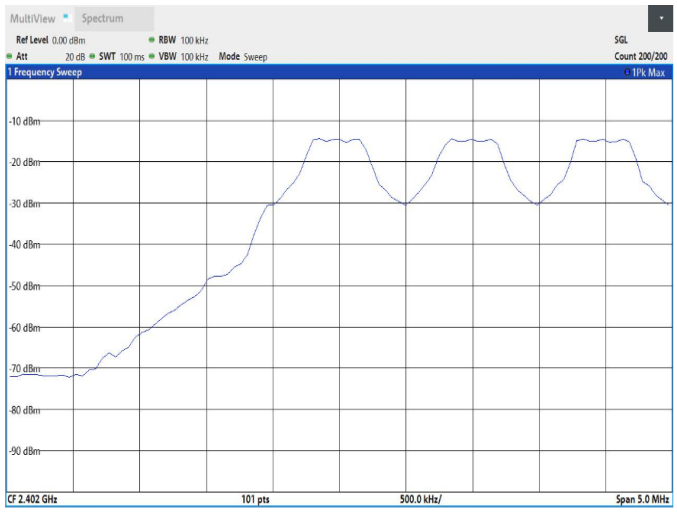
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 9 and ANSI C63.10-2013 7.8.2

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (k = 2) < 1%

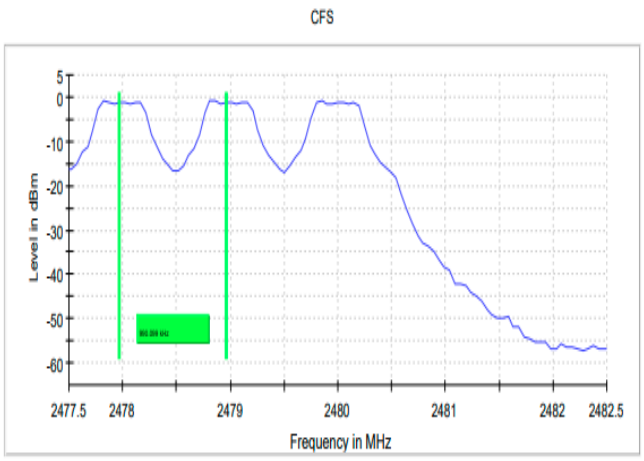
Hopping Mode				
Packet Type	2402MHz		2480MHz	
	Frequency Separation (MHz)	Minimum Limit (MHz)	Frequency Separation (MHz)	Minimum Limit (MHz)
DH1	0.990099	0.666667	0.990099	0.666667
DH3	0.990099	0.666667	0.990099	0.666667
DH5	0.990099	0.666667	0.990099	0.666667
2-DH1	0.990099	0.666667	0.990099	0.666667
2-DH3	0.990099	0.666667	0.990099	0.666667
2-DH5	0.990099	0.666667	0.990099	0.666667
3-DH1	0.990099	0.666667	0.990099	0.666667
3-DH3	0.940594	0.666667	0.990099	0.666667
3-DH5	0.940594	0.666667	0.990099	0.666667

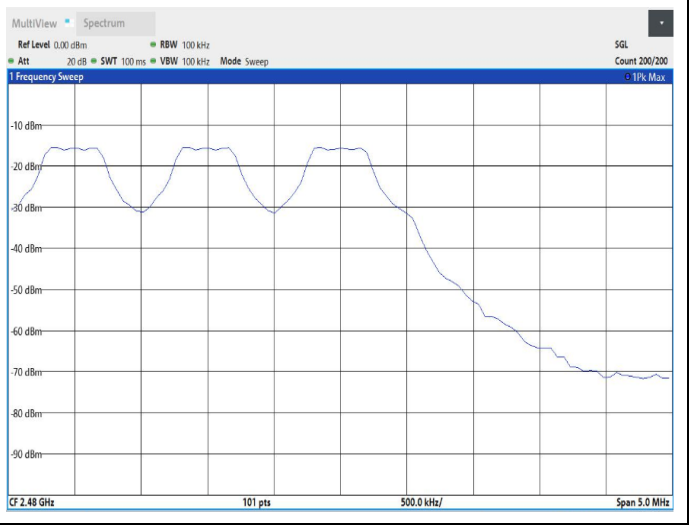
2402MHz DH1





2480MHz DH1


CFS
Level in dBm
5
0
-10
-20
-30
-40
-50
-60
2477.5
2478
2479
2480
2481
2482
2482.5
Frequency in MHz


MultiView
Spectrum
Ref Level 0.00 dBm
RBW 100 kHz
SGL
Att 20 dB SWT 100 ms VBW 100 kHz Mode Sweep
Count 200/200
1 Frequency Sweep
1Pk Max
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
CF 2.48 GHz
101 pts
500.0 kHz/
Span 5.0 MHz

Time of Channel Occupancy

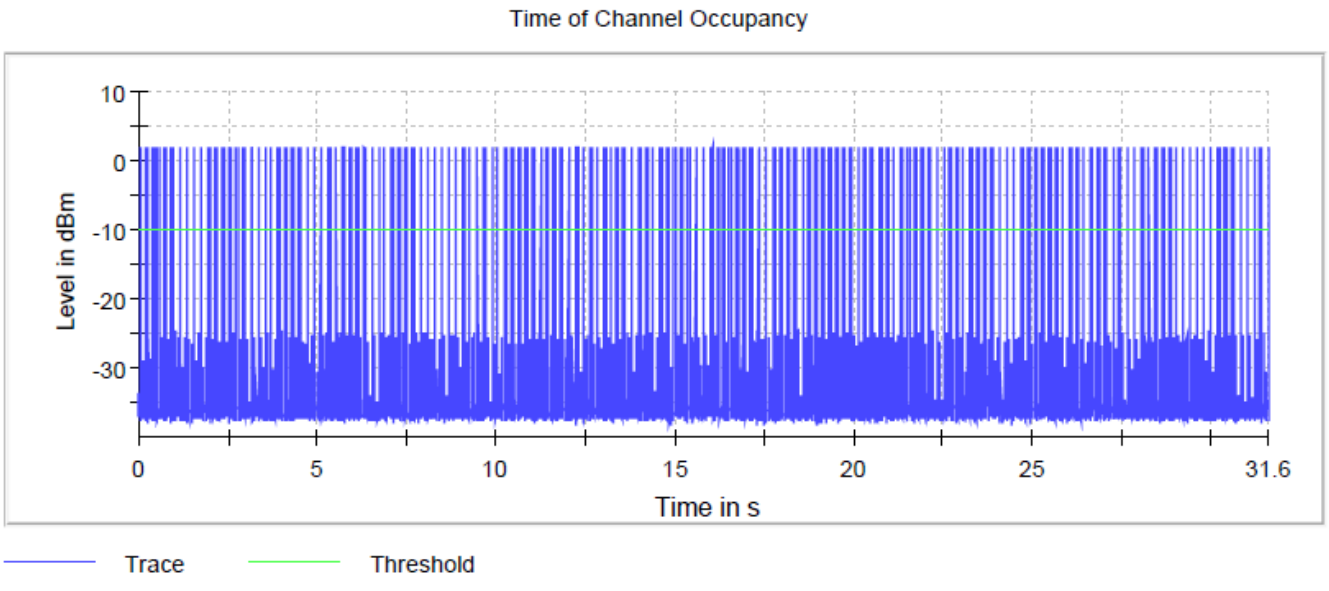
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.4

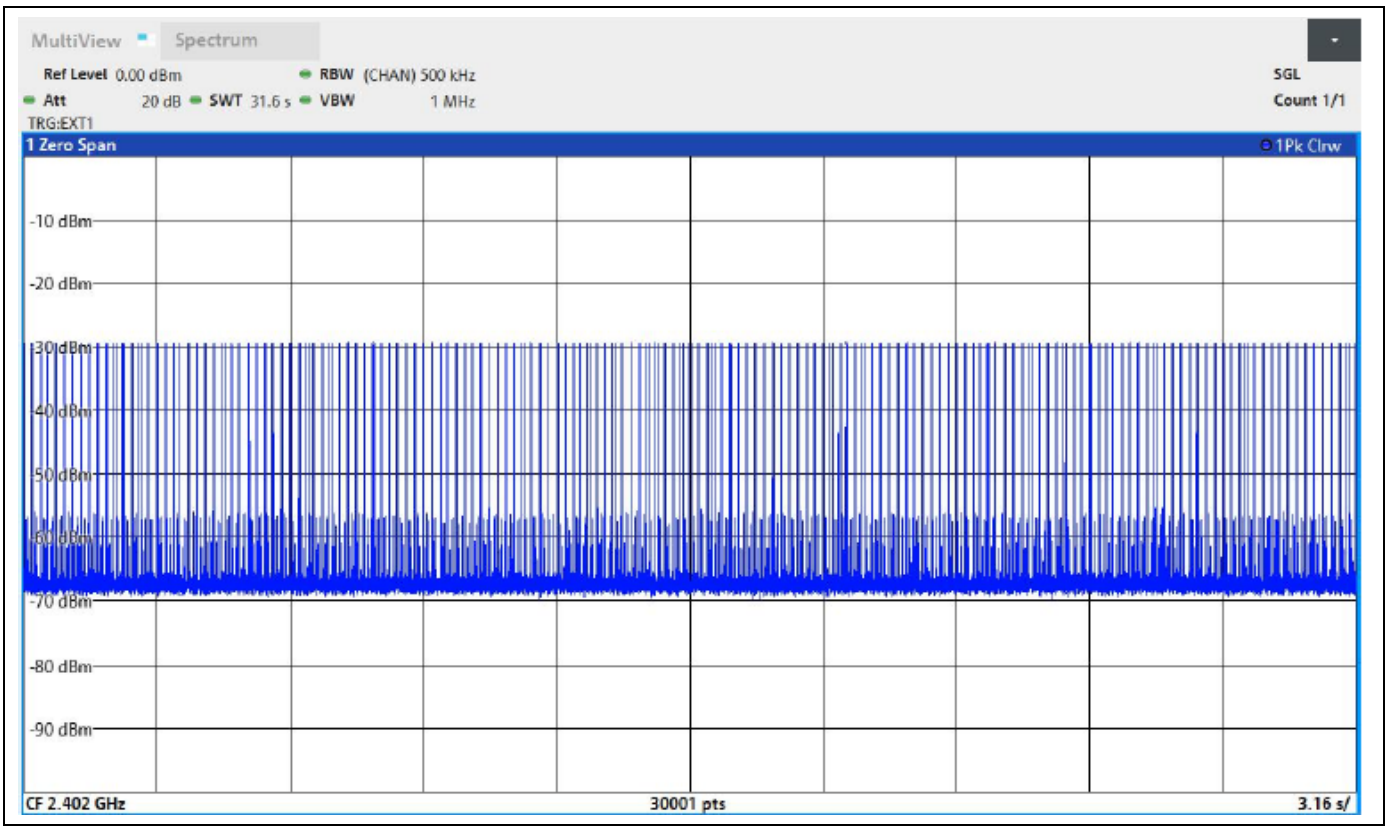
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1%

2402MHz

Data Rate	Time (ms)	Limit Max (ms)	Result
DH1	125.180	400.000	PASS
DH3	257.350	400.000	PASS
DH5	289.740	400.000	PASS
2-DH1	114.740	400.000	PASS
2-DH3	239.800	400.000	PASS
2-DH5	276.500	400.000	PASS
3-DH1	112.940	400.000	PASS
3-DH3	242.950	400.000	PASS
3-DH5	296.840	400.000	PASS

2402MHz DH1

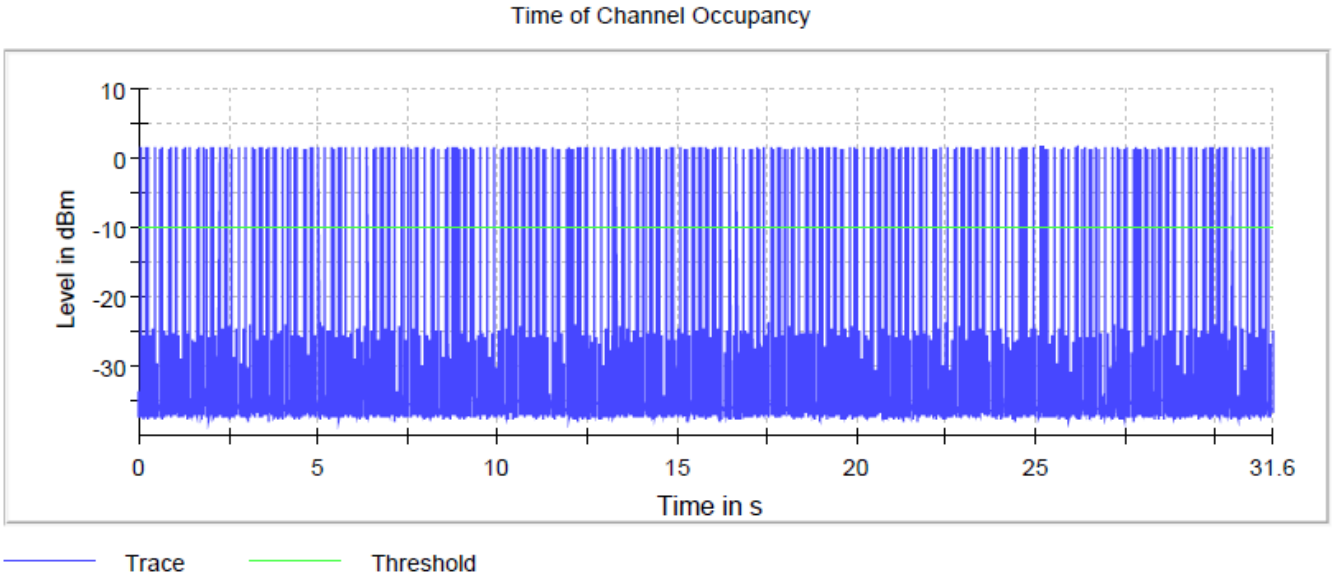



MultiView
Spectrum
Ref Level 0.00 dBm
RBW (CHAN) 500 kHz
SGL
Att 20 dB SWT 31.6 s VBW 1 MHz
Count 1/1
TRG:EXT1
1 Zero Span
1Pk Clrw
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
CF 2.402 GHz
30001 pts
3.16 s/

2441MHz

Data Rate	Time (ms)	Limit Max (ms)	Result
DH1	125.500	400.000	PASS
DH3	257.330	400.000	PASS
DH5	275.230	400.000	PASS
2-DH1	117.160	400.000	PASS
2-DH3	225.430	400.000	PASS
2-DH5	275.020	400.000	PASS
3-DH1	115.260	400.000	PASS
3-DH3	226.570	400.000	PASS
3-DH5	287.910	400.000	PASS

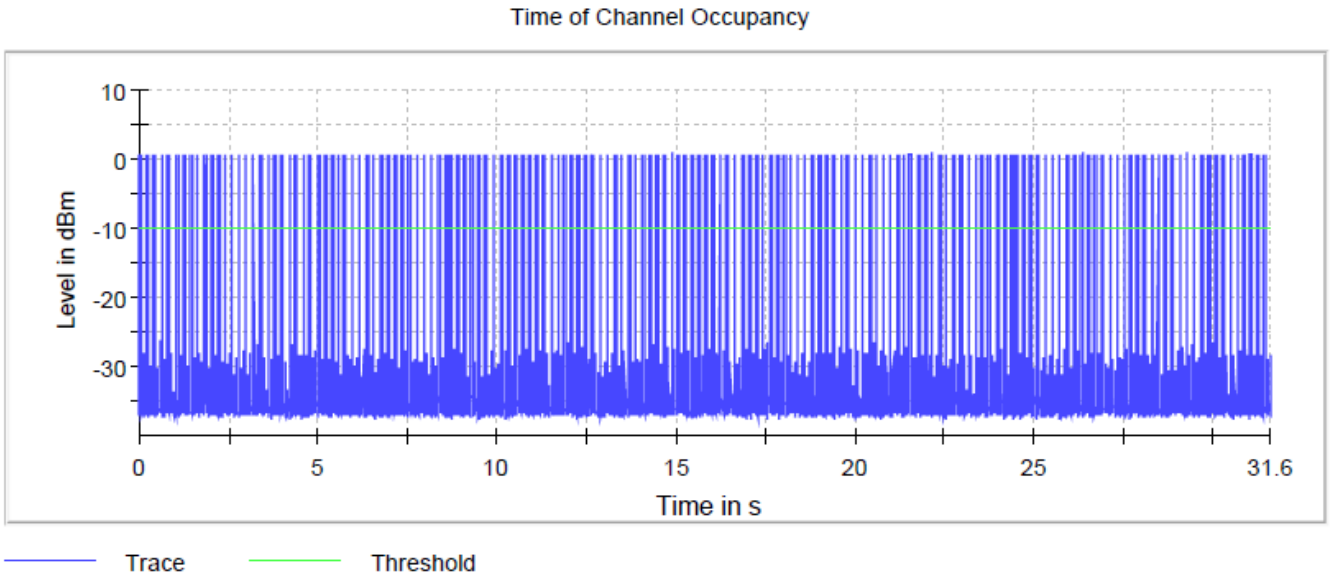
2441MHz DH1



2480MHz

Data Rate	Time (ms)	Limit Max (ms)	Result
DH1	125.940	400.000	PASS
DH3	273.780	400.000	PASS
DH5	318.670	400.000	PASS
2-DH1	114.230	400.000	PASS
2-DH3	241.090	400.000	PASS
2-DH5	269.420	400.000	PASS
3-DH1	114.510	400.000	PASS
3-DH3	237.370	400.000	PASS
3-DH5	287.600	400.000	PASS

2480MHz DH1



Peak Output Power

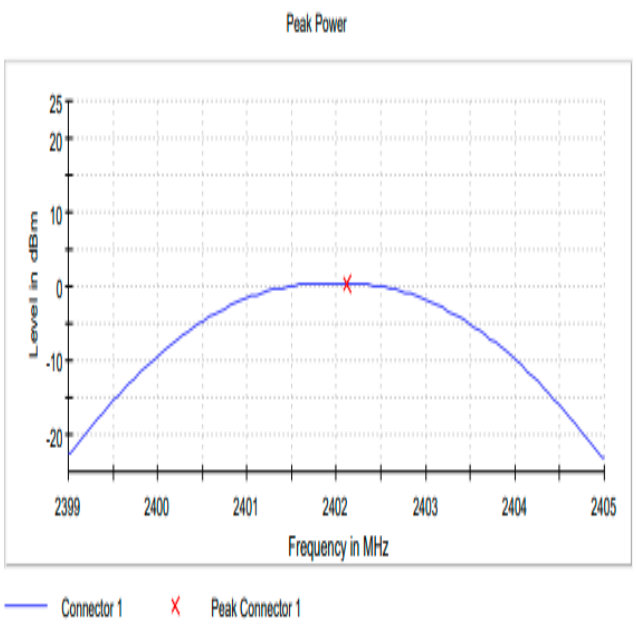
Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.5

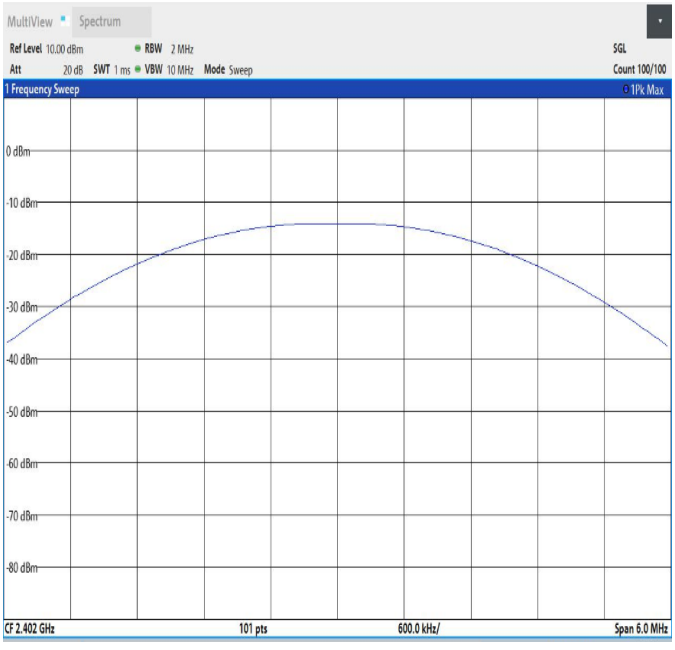
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Combined Uncertainty of absolute Level Measurement (K=2) < 1 dB

2402MHz

Data Rate	2402 MHz	2441 MHz	2480 MHz	Limit dBm
DH1	0.3	0.0	-0.7	21.0
DH3	0.5	0.2	-0.5	21.0
DH5	0.5	0.2	-0.6	21.0
2-DH1	-1.6	-1.3	-1.8	21.0
2-DH3	-1.5	-1.3	-1.8	21.0
2-DH5	-1.6	-1.3	-1.8	21.0
3-DH1	-1.1	-0.9	-1.5	21.0
3-DH3	-1.1	-0.9	-1.5	21.0
3-DH5	-1.3	-1.1	-1.7	21.0

2402MHz DH1





Emission Bandwidth 20dB

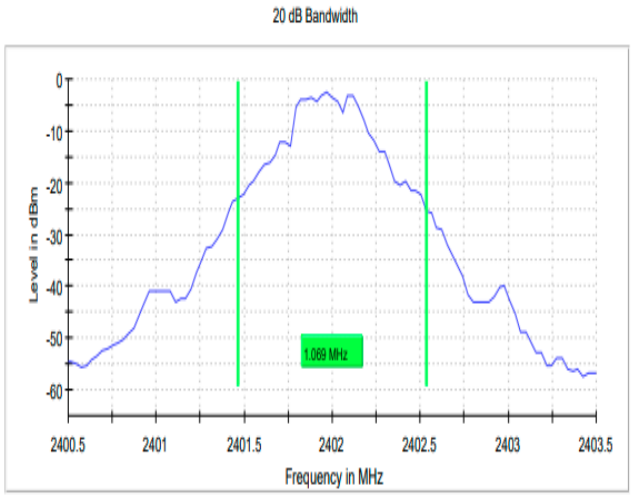
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.7

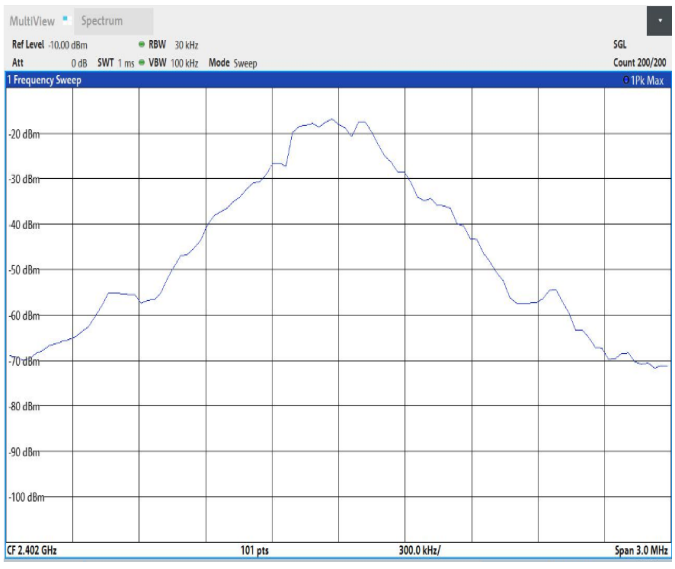
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

2402MHz DH1

Data Rate	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
DH1	1.069306	2401.465347	2402.534653	PASS
DH3	1.069306	2401.465347	2402.534653	PASS
DH5	1.069306	2401.465347	2402.534653	PASS
2-DH1	1.396039	2401.287129	2402.683168	PASS
2-DH3	1.396039	2401.287129	2402.683168	PASS
2-DH5	1.396039	2401.287129	2402.683168	PASS
3-DH1	1.366336	2401.316832	2402.683168	PASS
3-DH3	1.396039	2401.287129	2402.683168	PASS
3-DH5	1.396039	2401.287129	2402.683168	PASS

DH1

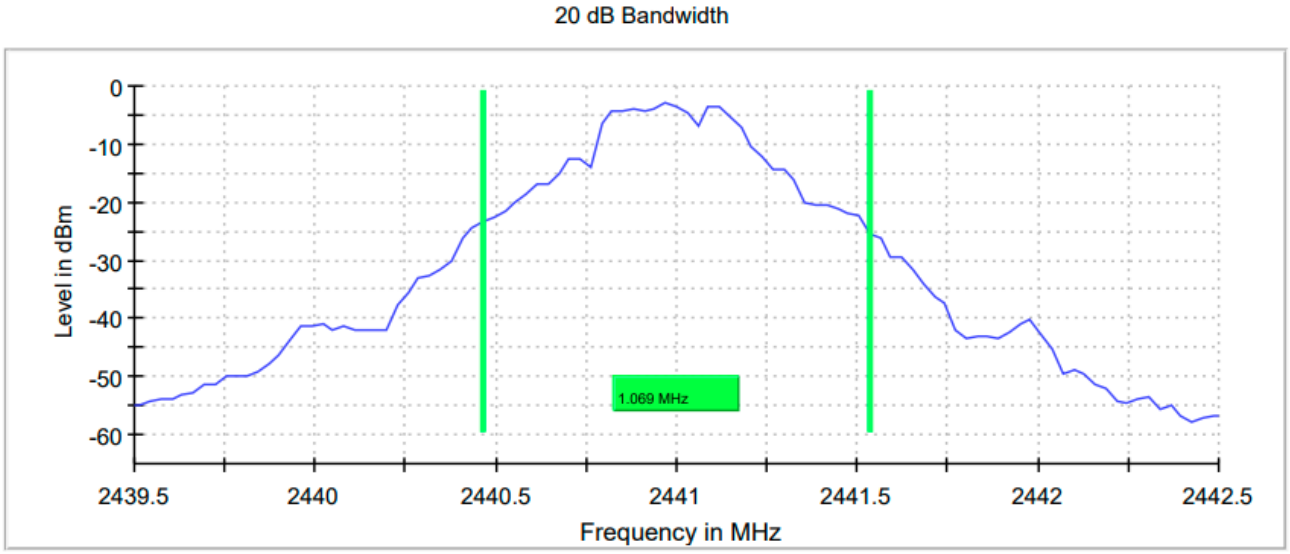




2441MHz

Data Rate	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
DH1	1.069306	2440.465347	2441.534653	PASS
DH3	1.039603	2440.495050	2441.534653	PASS
DH5	1.069306	2440.465347	2441.534653	PASS
2-DH1	1.396039	2440.287129	2441.683168	PASS
2-DH3	1.425742	2440.287129	2441.712871	PASS
2-DH5	1.425742	2440.287129	2441.712871	PASS
3-DH1	1.366336	2440.316832	2441.683168	PASS
3-DH3	1.396039	2440.287129	2441.683168	PASS
3-DH5	1.396039	2440.287129	2441.683168	PASS

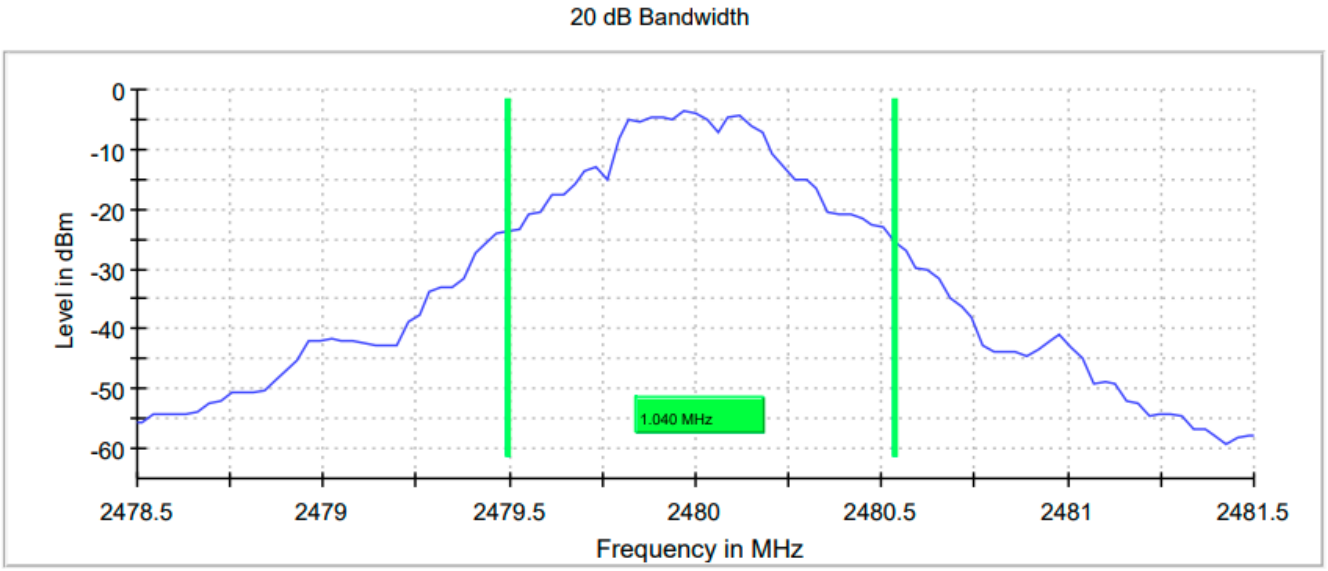
DH1



2480MHz

Data Rate	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
DH1	1.039603	2479.495050	2480.534653	PASS
DH3	1.039603	2479.495050	2480.534653	PASS
DH5	1.069306	2479.465347	2480.534653	PASS
2-DH1	1.425742	2479.287129	2480.712871	PASS
2-DH3	1.425742	2479.287129	2480.712871	PASS
2-DH5	1.425742	2479.287129	2480.712871	PASS
3-DH1	1.366336	2479.316832	2480.683168	PASS
3-DH3	1.396039	2479.287129	2480.683168	PASS
3-DH5	1.396039	2479.287129	2480.683168	PASS

DH1



Occupied Channel Bandwidth

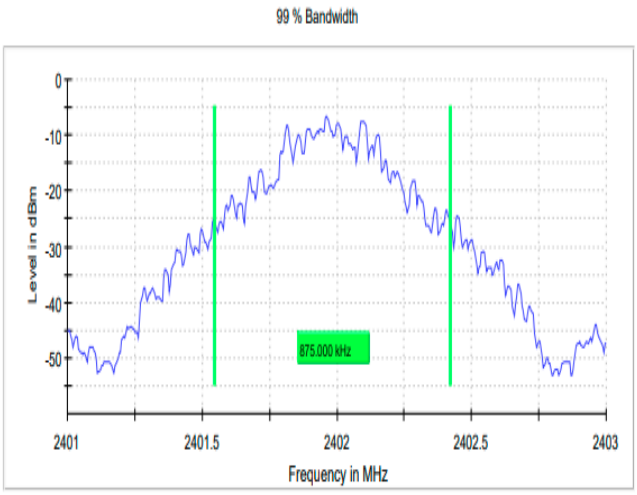
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.7

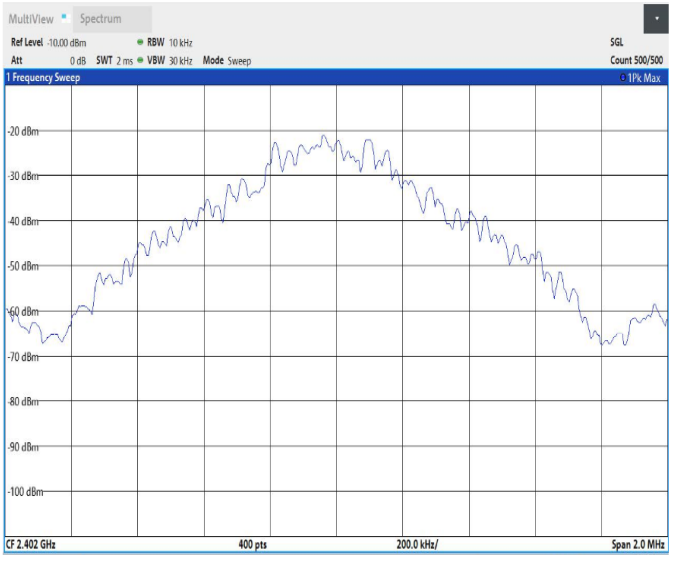
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

2402MHz DH1

Data Rate	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
DH1	0.875000	2401.547500	2402.422500	PASS
DH3	0.875000	2401.547500	2402.422500	PASS
DH5	0.885000	2401.542500	2402.427500	PASS
2-DH1	1.190000	2401.382500	2402.572500	PASS
2-DH3	1.210000	2401.387500	2402.597500	PASS
2-DH5	1.210000	2401.387500	2402.597500	PASS
3-DH1	1.180000	2401.407500	2402.587500	PASS
3-DH3	1.210000	2401.377500	2402.587500	PASS
3-DH5	1.210000	2401.377500	2402.587500	PASS

DH1

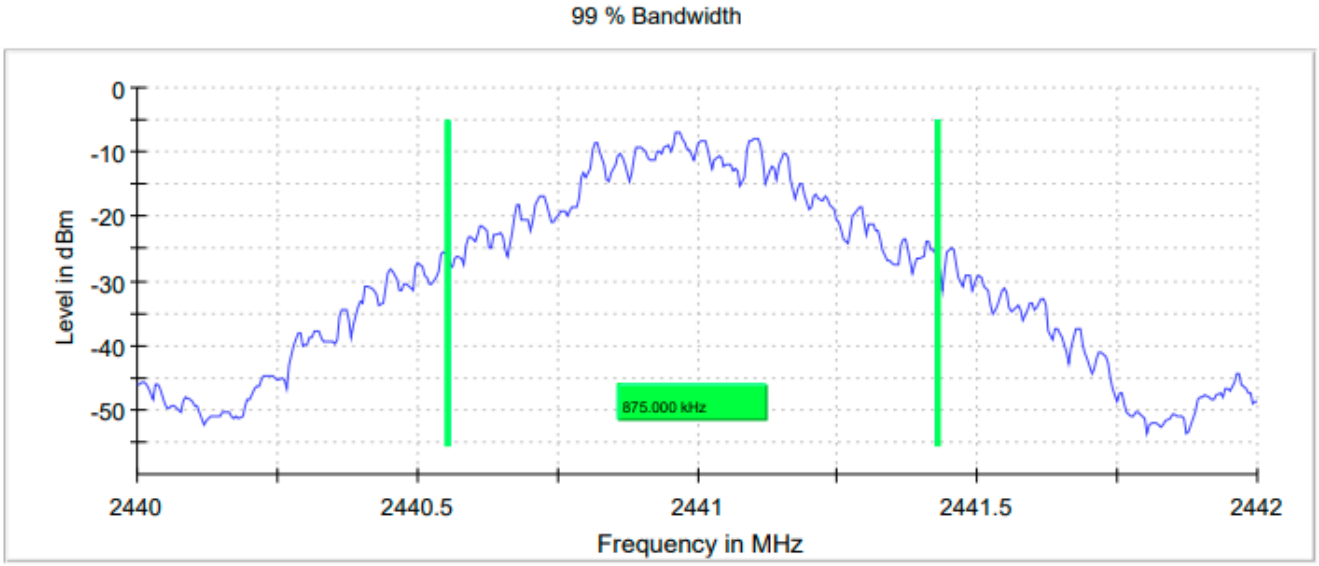




2441MHz DH1

Data Rate	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
DH1	0.875000	2440.552500	2441.427500	PASS
DH3	0.875000	2440.552500	2441.427500	PASS
DH5	0.885000	2440.547500	2441.432500	PASS
2-DH1	1.190000	2440.387500	2441.577500	PASS
2-DH3	1.215000	2440.392500	2441.607500	PASS
2-DH5	1.210000	2440.392500	2441.602500	PASS
3-DH1	1.180000	2440.412500	2441.592500	PASS
3-DH3	1.210000	2440.382500	2441.592500	PASS
3-DH5	1.220000	2440.377500	2441.597500	PASS

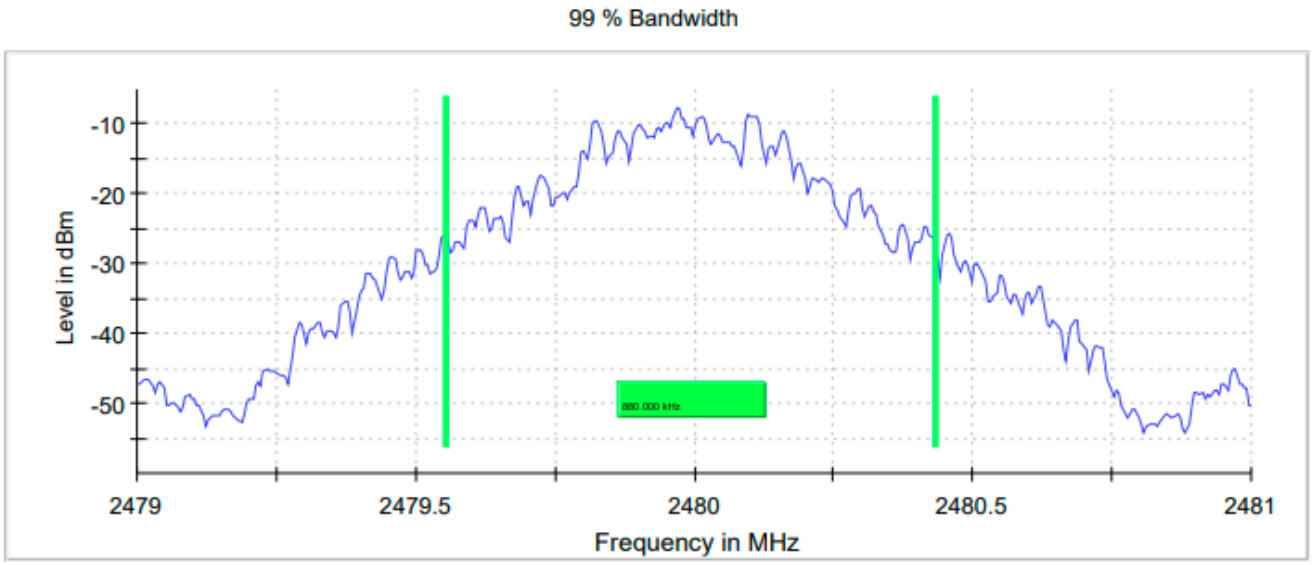
DH1



2480MHz DH1

Data Rate	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
DH1	0.880000	2479.552500	2480.432500	PASS
DH3	0.875000	2479.557500	2480.432500	PASS
DH5	0.885000	2479.552500	2480.437500	PASS
2-DH1	1.195000	2479.392500	2480.587500	PASS
2-DH3	1.215000	2479.397500	2480.612500	PASS
2-DH5	1.215000	2479.397500	2480.612500	PASS
3-DH1	1.180000	2479.417500	2480.597500	PASS
3-DH3	1.220000	2479.382500	2480.602500	PASS
3-DH5	1.220000	2479.382500	2480.602500	PASS

DH1



Band Edge Low (2402 MHz)

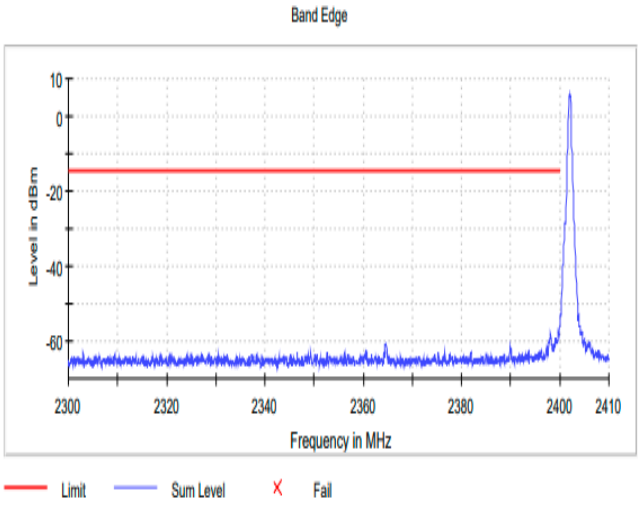
Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.6

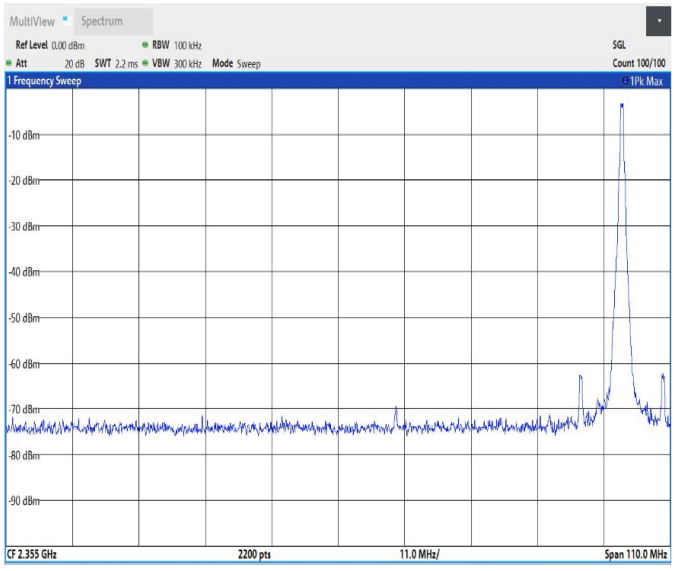
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

Data Rate	Frequency (MHz)	Level(dBm)
DH1	2401.975000	5.7
DH3	2402.125000	6.0
DH5	2402.125000	5.9
2-DH1	2402.025000	1.4
2-DH3	2401.825000	0.9
2-DH5	2402.025000	1.3
3-DH1	2401.825000	1.6
3-DH3	2401.975000	1.4
3-DH5	2402.125000	1.3

2402MHz DH1

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-56.0	41.7	-14.3	PASS
2399.925000	-56.7	42.4	-14.3	PASS
2399.625000	-57.4	43.1	-14.3	PASS
2399.675000	-57.6	43.3	-14.3	PASS
2399.875000	-57.9	43.7	-14.3	PASS
2398.125000	-58.2	43.9	-14.3	PASS
2399.825000	-58.3	44.0	-14.3	PASS
2399.775000	-58.4	44.2	-14.3	PASS
2398.075000	-58.5	44.2	-14.3	PASS
2399.725000	-58.6	44.4	-14.3	PASS
2397.975000	-58.8	44.5	-14.3	PASS
2398.025000	-58.8	44.6	-14.3	PASS
2399.125000	-59.1	44.8	-14.3	PASS
2399.175000	-59.2	44.9	-14.3	PASS
2399.575000	-59.2	44.9	-14.3	PASS





Band Edge High (2480 MHz)

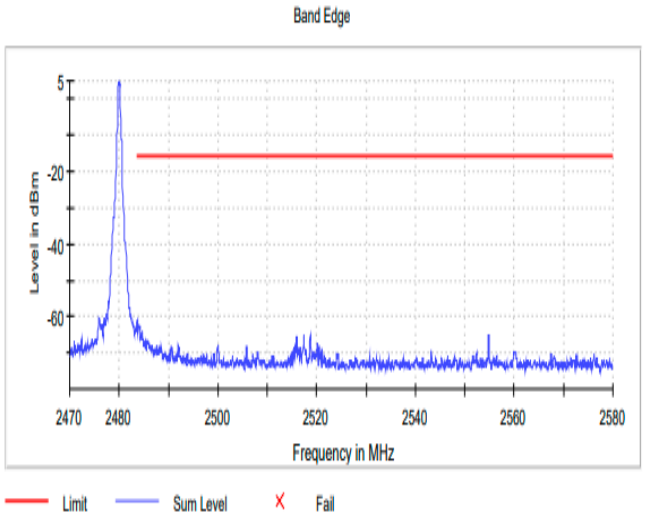
Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.6

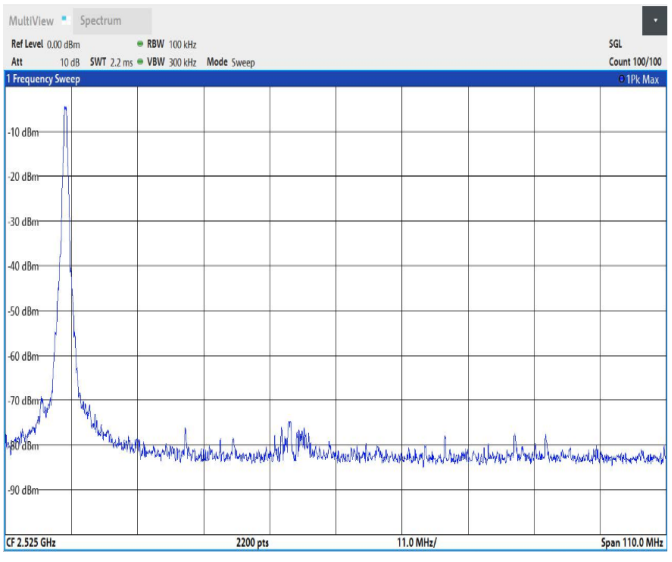
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

Data Rate	Frequency (MHz)	Level(dBm)
DH1	2480.025000	4.5
DH3	2480.025000	4.4
DH5	2480.025000	4.4
2-DH1	2479.875000	1.4
2-DH3	2480.025000	1.3
2-DH5	2479.875000	1.4
3-DH1	2479.875000	1.5
3-DH3	2480.175000	1.5
3-DH5	2480.175000	1.4

2480MHz DH1

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.675000	-61.1	45.7	-15.5	PASS
2483.625000	-61.5	46.0	-15.5	PASS
2483.725000	-61.6	46.1	-15.5	PASS
2484.175000	-62.4	46.9	-15.5	PASS
2483.925000	-62.5	47.0	-15.5	PASS
2483.975000	-62.5	47.0	-15.5	PASS
2484.025000	-62.7	47.2	-15.5	PASS
2484.075000	-62.7	47.2	-15.5	PASS
2484.125000	-63.1	47.6	-15.5	PASS
2484.225000	-63.1	47.6	-15.5	PASS
2483.575000	-63.8	48.3	-15.5	PASS
2483.775000	-63.8	48.3	-15.5	PASS
2483.525000	-64.0	48.6	-15.5	PASS
2484.675000	-64.1	48.7	-15.5	PASS
2484.725000	-64.4	49.0	-15.5	PASS





Tx Spurious Emission

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 7.8.8 and ANSI C63.10-2013

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB

Measurements with DH5 are shown below.

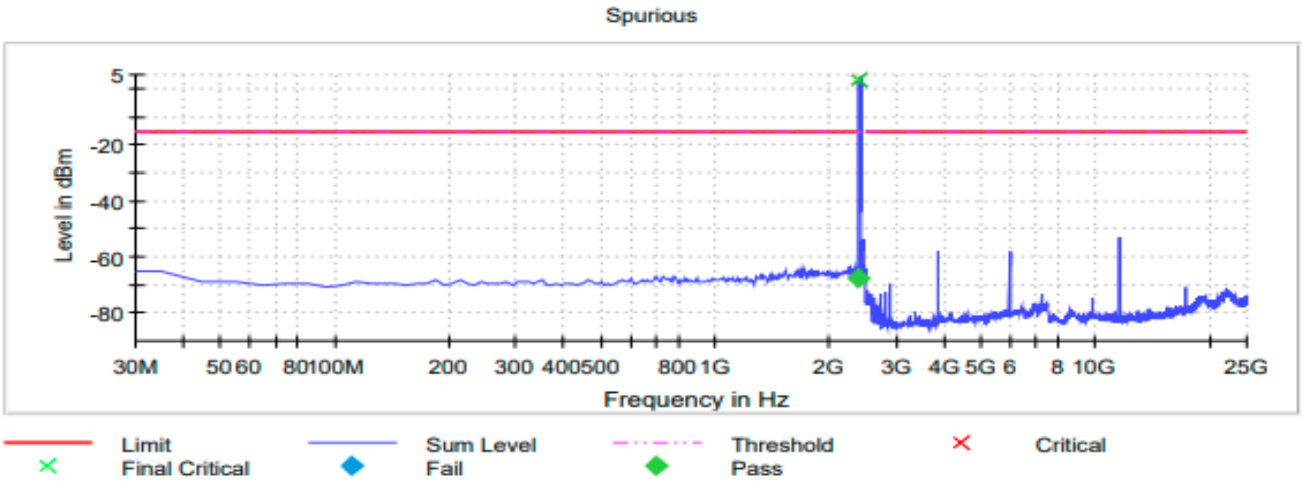
2402 MHz

Final Measurement

Frequency (MHz)	Level Pre Measurement (dBm)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.170634	3.0	-67.6	52.2	-15.4

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	3.0	-18.5	-15.4
11553.062250	-53.1	37.7	-15.4
5956.417776	-58.0	42.6	-15.4
3847.682091	-58.3	42.9	-15.4
5946.423768	-58.5	43.1	-15.4
5966.411784	-59.4	44.0	-15.4
5976.405792	-59.6	44.2	-15.4
5986.399800	-62.4	47.0	-15.4
2355.189076	-63.7	48.2	-15.4
2245.651261	-64.0	48.5	-15.4
2295.441176	-64.5	49.1	-15.4
2335.273109	-64.5	49.1	-15.4
1697.962185	-64.6	49.1	-15.4
1717.878151	-64.7	49.2	-15.4
2385.063025	-65.0	49.6	-15.4

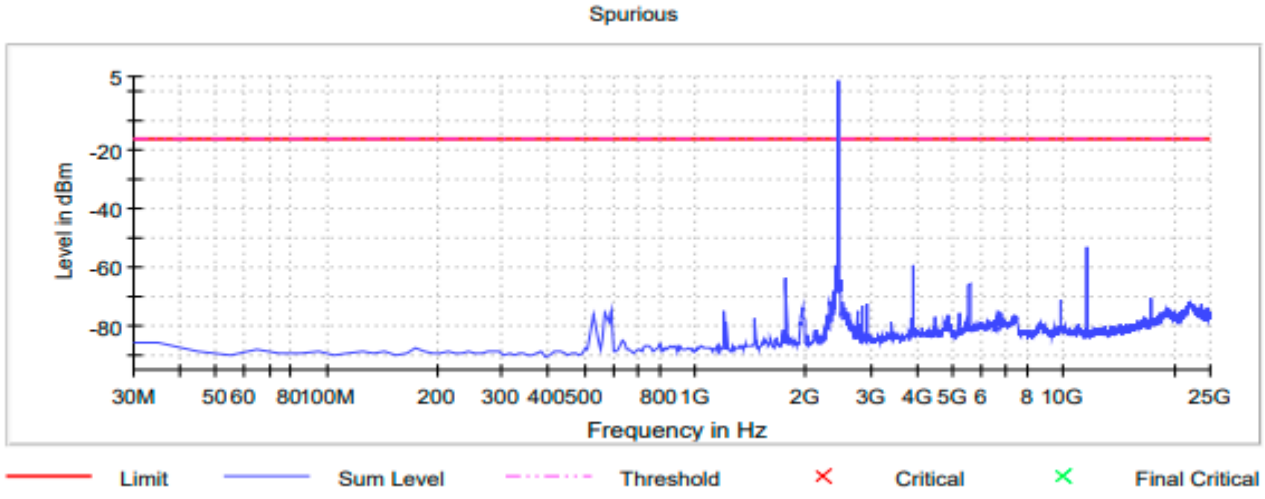

Spurious
Level in dBm
5
-20
-40
-60
-80
30M
50 60
80 100M
200
300 400 500
800 1G
2G
3G
4G 5G 6
8 10G
25G
Frequency in Hz
Limit
Final Critical
Sum Level
Fail
Threshold
Pass
Critical


MultiView
Spectrum
Ref Level -30.00 dBm
RBW 100 kHz
SGL
Att 0 dB
SWT 226 ms
VBW 300 kHz
Mode Sweep
Count 3/3
1 Frequency Sweep
1Pk Max
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
-100 dBm
-110 dBm
-120 dBm
CF 13.741 75 GHz
2253 pts
2.25 GHz/
Span 22.516 5 GHz

2441 MHz

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
11553.062250	-53.2	37.0	-16.3
3907.646138	-59.2	43.0	-16.3
1757.710084	-63.8	47.6	-16.3
5546.663449	-65.9	49.7	-16.3
5526.675433	-66.2	50.0	-16.3
5516.681425	-66.2	50.0	-16.3
5536.669441	-66.2	50.0	-16.3
1767.668067	-67.1	50.9	-16.3
2365.147059	-68.2	52.0	-16.3
5506.687417	-68.8	52.5	-16.3
2385.063025	-70.4	54.2	-16.3
17239.652796	-70.8	54.6	-16.3
9764.134820	-71.2	55.0	-16.3
21896.860519	-71.7	55.5	-16.3
2518.479028	-71.8	55.6	-16.3



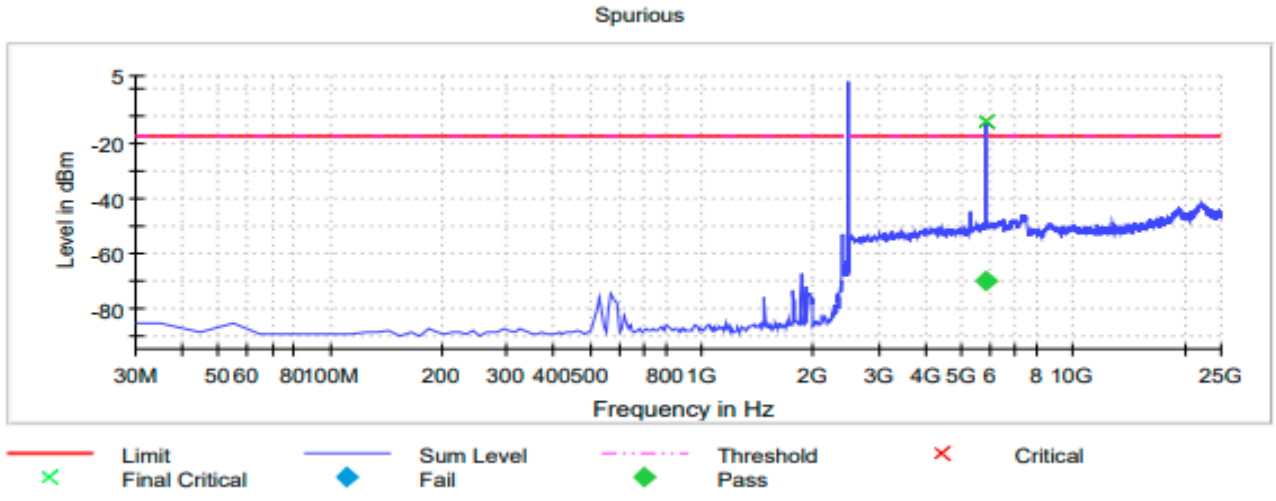
2480 MHz

Final Measurement

Frequency (MHz)	Level Pre Measurement (dBm)	Level (dBm)	Margin (dB)	Limit (dBm)
5798.807912	-20.4	-69.8	52.7	17.1

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
5796.513648	-11.7	-5.4	-17.1
22076.752663	-41.6	24.4	-17.1
22186.686751	-41.6	24.5	-17.1
22136.716711	-41.6	24.5	-17.1
21986.806591	-42.0	24.8	-17.1
22096.740679	-42.0	24.8	-17.1
22126.722703	-42.0	24.9	-17.1
22296.620839	-42.3	25.1	-17.1
22446.530959	-42.3	25.2	-17.1
21966.818575	-42.3	25.2	-17.1
22596.441079	-42.3	25.2	-17.1
22166.698735	-42.4	25.2	-17.1
21926.842543	-42.4	25.2	-17.1
22086.746671	-42.4	25.2	-17.1
22196.680759	-42.4	25.3	-17.1



- **Radiated Testing**

Test Summary

Start: 8/10/2021	End: 8/26/2021	Temperature: 24°C Humidity: 48%	Initials: RP

DUT S/N	AH20110901-HAR-279-08	DUT Operating Mode	2.4GHz Bluetooth Classic
Comment			

Antenna	Frequency Range	Polarization	Result Over/Under Limit	Notes
Loop	9kHz-30MHz	Parallel	☐Over ☒Under	√
		Perpendicular	☐Over ☒Under	√
		Ground-Parallel	☐Over ☒Under	√
Log Periodic	30MHz-1GHz	Horizontal	☐Over ☒Under	√
		Vertical	☐Over ☒Under	√
Horn	1GHz-18GHz	Horizontal	☐Over ☒Under	√
		Vertical	☐Over ☒Under	√
Horn	18GHz-25GHz	Horizontal	☐Over ☒Under	√
		Vertical	☐Over ☒Under	√

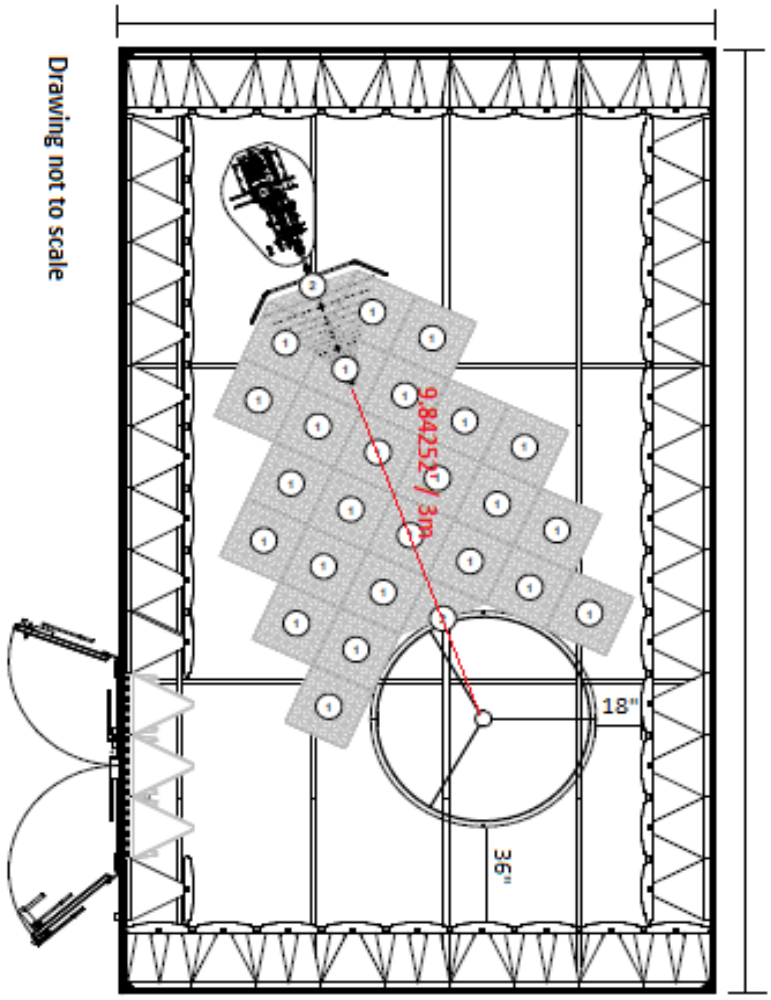
Notes: √ meets the requirements of the acceptance criteria.

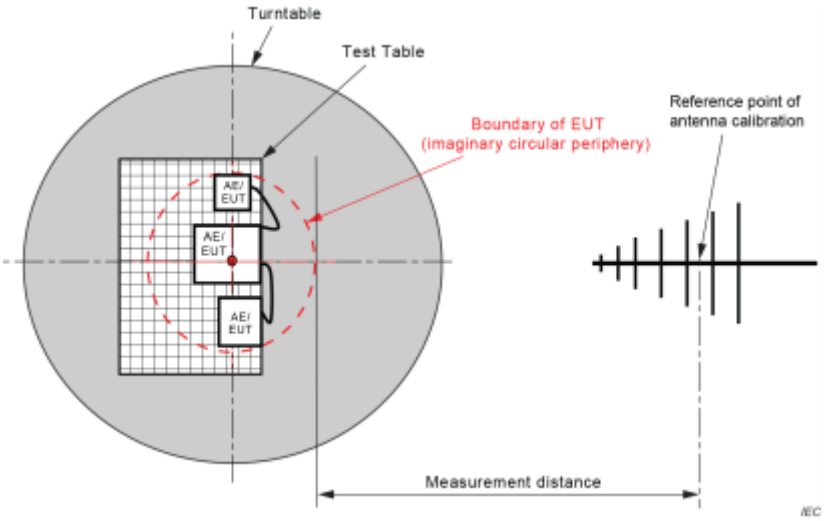
Test Setup

Semi-Anechoic Chamber Test Site-3 meter

Chamber Location	815 N Opdyke Rd Auburn Hills, Michigan 48326
Chamber Manufacturer:	ETS-Lindgren
Chamber Type	Semi-Anechoic
Model	FACT™ 3-2.0 Plus
Chamber Dimensions (L x W x H)	18'x18'x30'
Quiet Zone Diameter	2.0 meters
Quiet Zone Test Heights	1 & 2 meters (front only)
Test Distance	3.0 meters
Test Frequency Range	1-40 GHz
Measured Performance	4.87 dB Site *s*VSWR
Test Completion	December 18th, 2019

Chamber Dimensions




Turntable
Test Table
Boundary of EUT
(imaginary circular periphery)
Reference point of
antenna calibration
AE/
EUT
AE/
EUT
AE/
EUT
Measurement distance
IEC

Test Equipment Used

ID #	Equipment	Manufacturer	Model	Serial #	Cal Due
BVD0011	Loop Antenna 9kHz-30MHz	Rohde & Schwarz	FMZB1519B	145	3/23/2022
BVD0021	UltraLog Antenna 30-6000 MHz	Rohde & Schwarz	HL562E	101113	7/22/2021
BVD0069	Bore Sight Tower	ETS	2171B	226732	N/A
BVD0111	3 Meter Anechoic Chamber	ETS	N/A	N/A	10/16/2022
BVD0118	Antenna Mast Position Controller	ETS	7006-001	00214778/ 00214648	N/A
BVD0165	Multimeter	Fluke	287	46320228	2/26/2022
BVD0184	Preamplifier 29dB 1-18GHz	Rohde & Schwarz	TS-PR18	101646	4/26/2022
BVD0185	Preamplifier 45dB 18-40GHz	Rohde & Schwarz	TS-PR1840	100064	3/2/2022
BVD0190	Preamplifier 25dB 30MHz-8GHz	Rohde & Schwarz	TS-PR8	102351	3/5/2022
BVD0218	Receiver 2Hz-44GHz	Rohde & Schwarz	ESW44	101870	9/25/2021
BVD0247	Turn Table	ETS	920250	N/A	N/A
BVD0258	Optima 12V Blue top Marine battery	Optima	D34M	N/A	N/A
BVD0267	Double Ridge Waveguide 800MHz-18GHz	Rohde & Schwarz	HF907	102832	8/28/2021
BVD0307	Optima 12V Blue top Marine battery	Optima	D34M	N/A	N/A
BVD0320	18-40GHz Horn Antenna	L3 Narda ATM	PNR 180-442-KF	136164-01	3/8/2022
BVD0323	Foam Test Table For 3 Meter Chamber	ETS-Lindgren	LDT-1.5	N/A	N/A
BVD0394	Double Shielded N-Type Cable 6.9 Meter	Rohde & Schwarz	N-Type	N/A	12/29/2022
BVD0398	Double Shielded N-Type Cable 2 Meter	Rohde & Schwarz	N-Type	N/A	12/29/2022
BVD0407	Double Shielded N-Type Cable 410mm (For PreAmp)	Rohde & Schwarz	N-Type	N/A	8/5/2022
BVD0480	Band Reject Filter 50dB from 2400 to 2500MHz	Micro-Tronics	BRM50702	G482	N/A
BVD0481	Band Reject Filter 40dB from 5150 to 5880MHz	Micro-Tronics	BRM50716	G336	N/A
N/A	Support Laptop	Lenovo	E560	LW10USA UH01ABU D	N/A

Equipment List (Software)

Equipment	Manufacturer	Model	Version No.
EMC Test Software	Nexio	BAT-EMC	3.20.0.21

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	Display	Harman	N/A	1683	N/A
N/A	Display Harness	Harman	N/A	N/A	N/A
N/A	Bluetooth LAN	Harman	N/A	84375197	N/A
N/A	Antenna	Harman	N/A	20072	N/A
N/A	Blue Molex Connector Harness	Harman	N/A	N/A	N/A
N/A	DUT 1M Harness	Harman	N/A	N/A	N/A
N/A	USB to DUT Harness	Harman	N/A	102161025	N/A

Radiated Emissions

Radiated emissions were maximized by rotating the EUT and its external antenna around Horizontal and vertical Polarizations.

Test Plots

Uncertainty

Radiated Emissions (30MHz to 18GHz)

Test Engineer: Ryan Phillips

The test is to measure the radiated emissions of the EUT. Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

30MHz to 1GHZ

Source of Uncertainty	Value(dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508 1
PRF Response	1.5	Rectangular	1.732	1	0.8660508 1
Mismatch Filter - Receiver	0.25	U-Shape	2.449	1	0.1768033
NSA Calibration	4.0	Triangular	1.414	1	1.633332
ETS Foam Table (LDT-1.5)	1.8	Rectangular	1.732	1	1.039261
Combined Standard Uncertainty (square root of the sum of the squares)					2.113781
Expanded Uncertainty (K=2)					**4.227562**

The total derived measurement uncertainty is +/- 4.228 dB

1GHz to 40GHz

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105000
Filter Insertion Loss	0.25	Normal	2	1	0.125000
Antenna Factor	0.65	Normal	2	1	0.325000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.866051
PRF Response	1.5	Rectangular	1.732	1	0.866051
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.176803
VSWR Calibration	2.0	Triangular	2.449	1	0.816659
ETS Foam Table (LDT-1.5)	1.8	Rectangular	1.732	1	1.039261
Combined Standard Uncertainty (square root of the sum of the squares)					1.869213
Expanded Uncertainty (K=2)					**3.738426**

The total derived measurement uncertainty is +/- 3.738 dB.

Remarks:

1. Raw Peak Level (dBuV/m) = Level Peak Reading - Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level – Limit

1. Raw Avg Level (dBuV/m) = Level Avg Reading - Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level – Limit

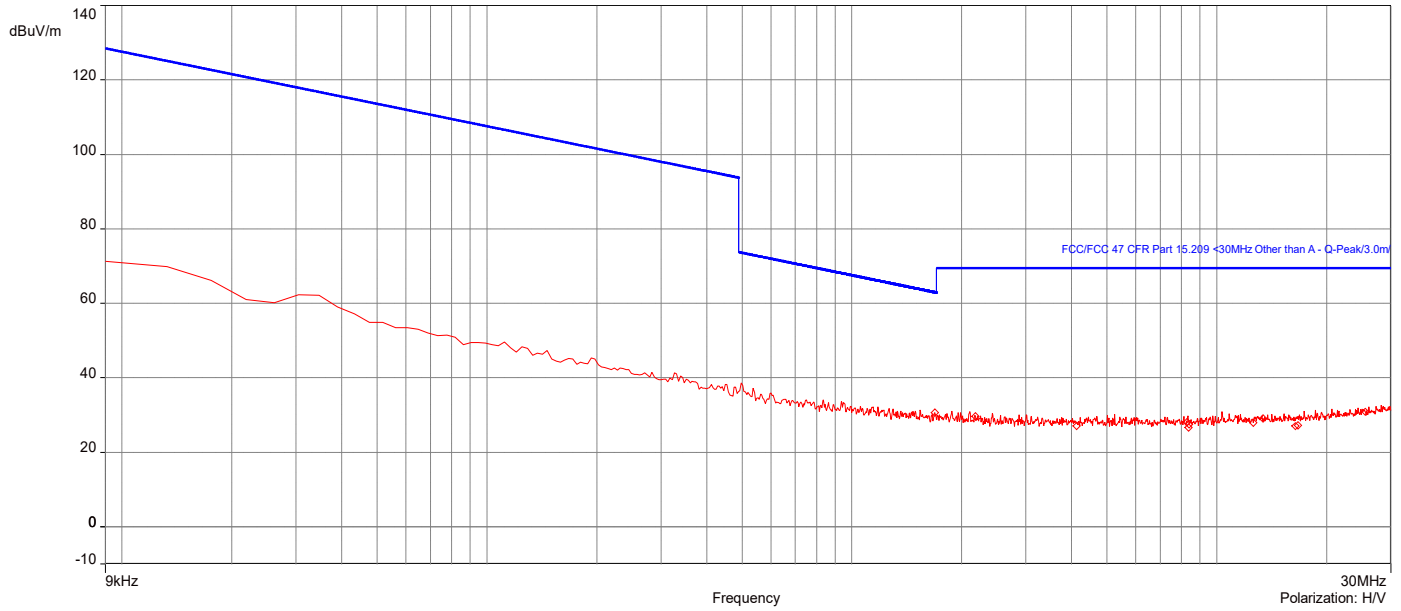
1. Raw Q-Peak Level (dBuV/m) = Level Q-Peak Reading - Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level – Limit

AH20110901-HAR-279-08_2.4G BTClassic_2441MHz_GFSK_9kHz-30MHz_Ground-Parallel

8/25/2021 15:30:22

No	Frequency	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	1.688736MHz	30.63	19.13	63.05	-32.42	1.00	339.30	H/V	Passed
2.	2.177231MHz	29.67	19.10	69.54	-39.87	1.00	84.90	H/V	Passed
3.	8.291984MHz	28.06	19.14	69.54	-41.49	1.00	21.90	H/V	Passed
4.	12.577024MHz	27.92	19.57	69.54	-41.62	1.00	224.80	H/V	Passed
5.	13.369757MHz	29.10	19.61	69.54	-40.44	1.00	332.60	H/V	Passed
6.	25.500707MHz	30.98	20.69	69.54	-38.56	1.00	336.00	H/V	Passed

Overall Graphs:

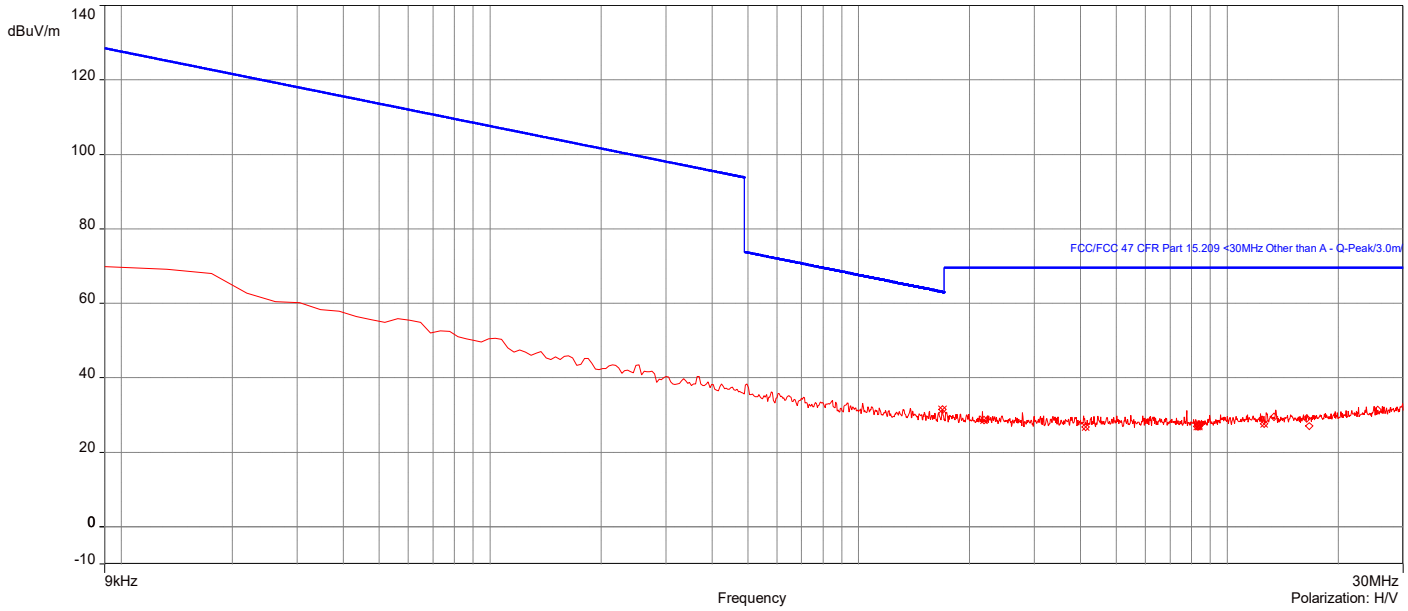


AH20110901-HAR-279-08_2.4G BTClassic_2441MHz_GFSK_9kHz-30MHz_Parallel

8/25/2021 15:33:16

No	Frequency	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
7.	1.688736MHz	31.50	19.13	63.05	-31.56	1.00	288.90	H/V	Passed
8.	2.190086MHz	28.65	19.10	69.54	-40.89	1.00	174.50	H/V	Passed
9.	8.291984MHz	26.92	19.14	69.54	-42.62	1.00	67.30	H/V	Passed
10	8.364829MHz	27.19	19.14	69.54	-42.35	1.00	222.60	H/V	Passed
11	8.38197MHz	27.00	19.14	69.54	-42.55	1.00	336.60	H/V	Passed
12	12.577024MHz	27.63	19.57	69.54	-41.91	1.00	7.40	H/V	Passed

Overall Graphs:

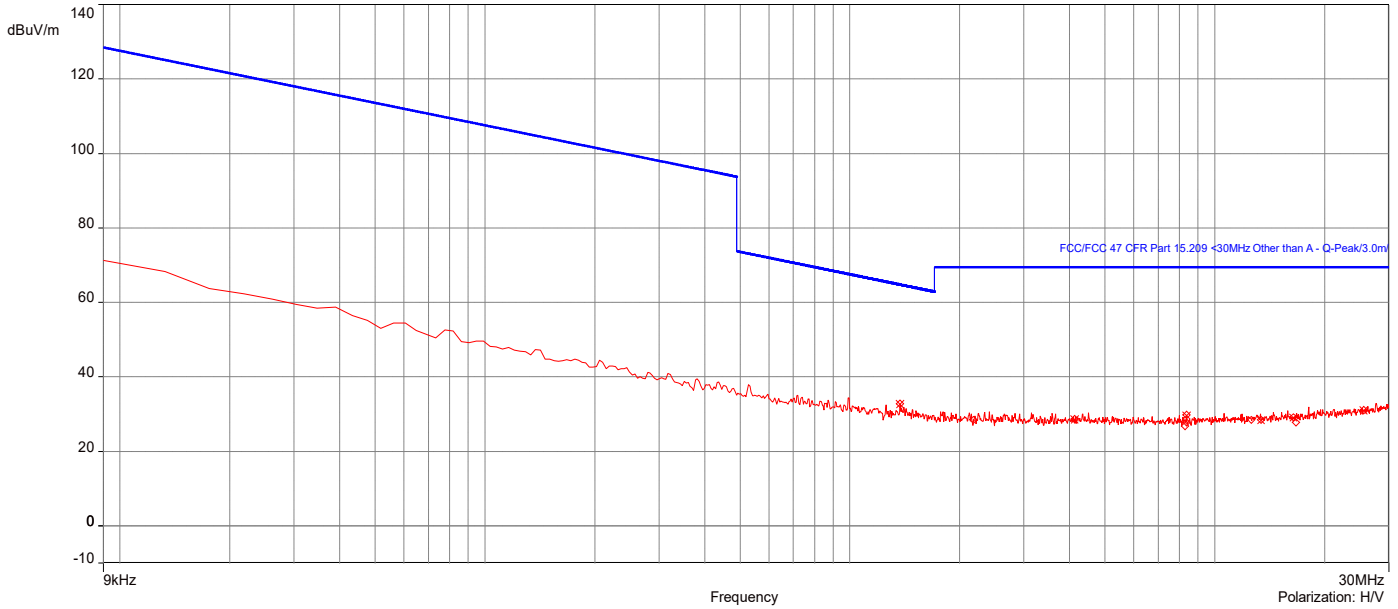


AH20110901-HAR-279-08_2.4G BTClassic_2441MHz_GFSK_9kHz-30MHz_Perpendicular

8/25/2021 15:42:12

No	Frequency	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	1.371643MHz	32.73	19.16	64.86	-32.13	1.00	37.20	H/V	Passed
2.	4.126924MHz	28.58	19.21	69.54	-40.96	1.00	339.30	H/V	Passed
3.	8.364829MHz	29.80	19.14	69.54	-39.74	1.00	144.80	H/V	Passed
4.	13.395467MHz	28.55	19.62	69.54	-40.99	1.00	0.70	H/V	Passed
5.	16.420706MHz	29.22	19.70	69.54	-40.32	1.00	260.70	H/V	Passed
6.	25.573553MHz	31.01	20.70	69.54	-38.54	1.00	0.70	H/V	Passed

Overall Graphs:

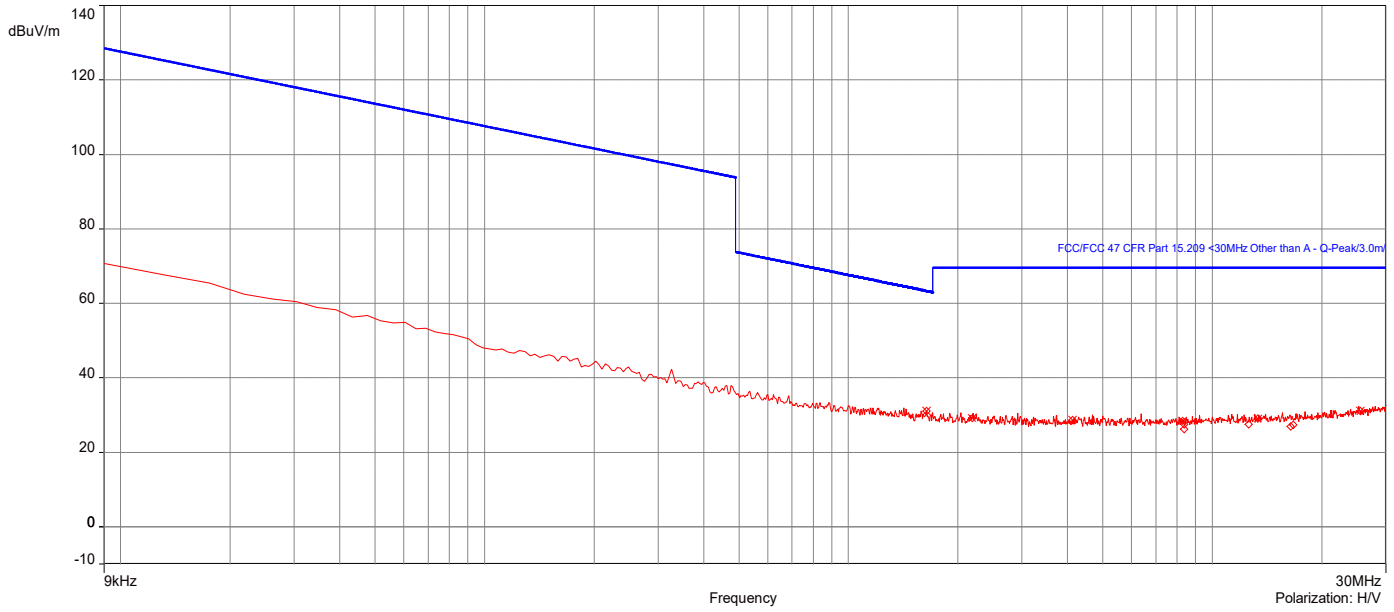


AH20110901-HAR-279-08_2.4G BTClassic_2441MHz_8DPSK_9kHz-30MHz_Ground-Parallel

8/25/2021 15:50:37

No	Frequency	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	1.641601MHz	31.09	19.13	63.30	-32.21	1.00	318.00	H/V	Passed
2.	2.190086MHz	29.27	19.10	69.54	-40.27	1.00	265.20	H/V	Passed
3.	4.126924MHz	28.59	19.21	69.54	-40.95	1.00	97.50	H/V	Passed
4.	8.291984MHz	28.57	19.14	69.54	-40.97	1.00	192.90	H/V	Passed
5.	13.361187MHz	29.03	19.61	69.54	-40.51	1.00	25.80	H/V	Passed
6.	25.534988MHz	31.14	20.69	69.54	-38.41	1.00	222.40	H/V	Passed

Overall Graphs:

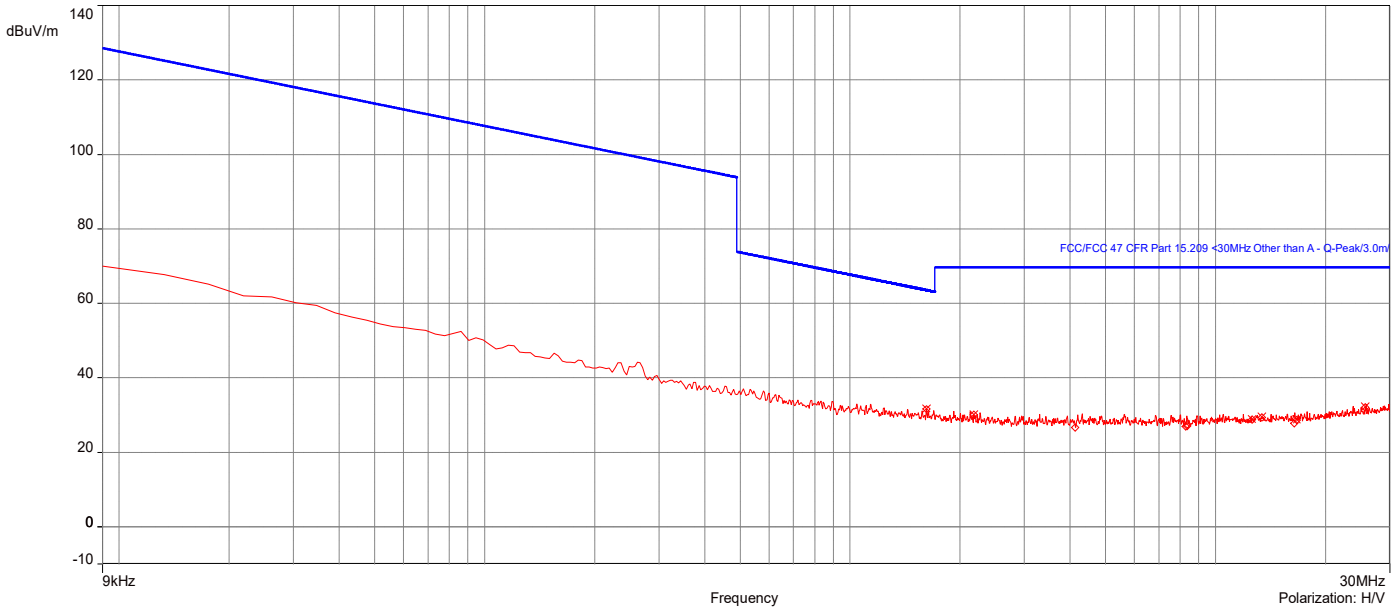


AH20110901-HAR-279-08_2.4G BTClassic_2441MHz_8DPSK_9kHz-30MHz_Parallel

8/25/2021 15:48:13

No	Frequency	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	1.61589MHz	31.72	19.14	63.44	-31.72	1.00	192.90	H/V	Passed
2.	2.181516MHz	30.03	19.10	69.54	-39.52	1.00	244.40	H/V	Passed
3.	12.577024MHz	28.77	19.57	69.54	-40.77	1.00	316.70	H/V	Passed
4.	13.382612MHz	29.37	19.61	69.54	-40.17	1.00	205.10	H/V	Passed
5.	16.694949MHz	28.66	19.70	69.54	-40.89	1.00	288.80	H/V	Passed
6.	25.663539MHz	32.02	20.71	69.54	-37.53	1.00	73.60	H/V	Passed

Overall Graphs:

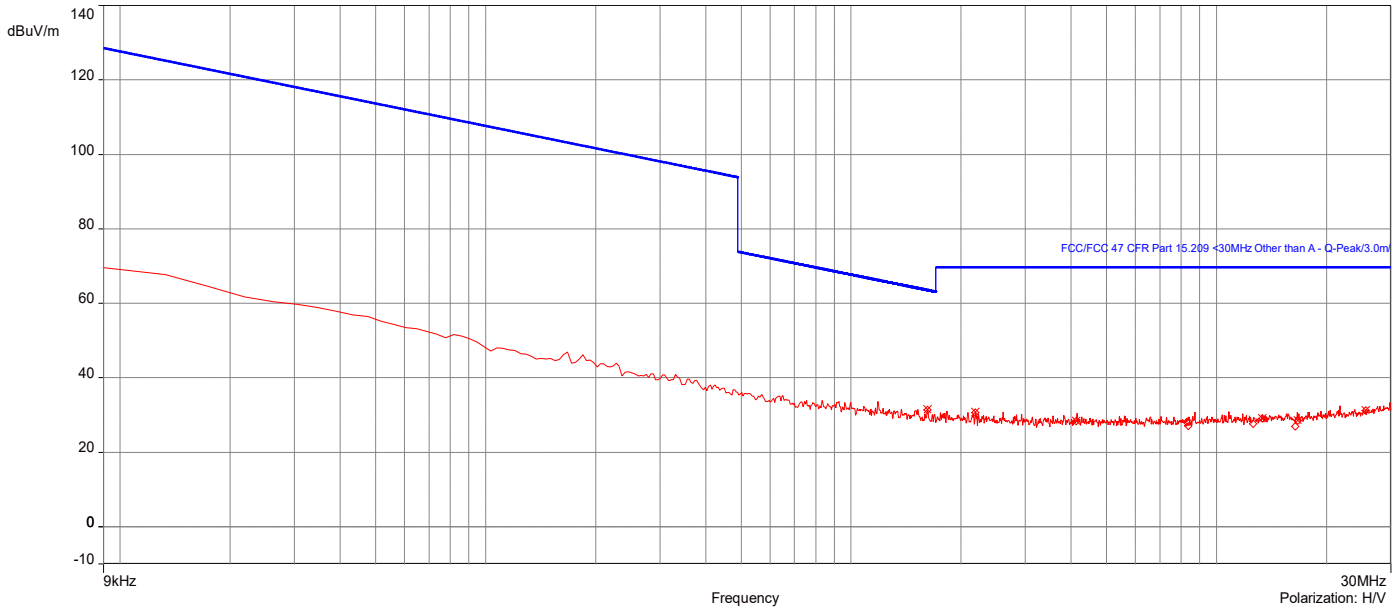


AH20110901-HAR-279-08_2.4G BTClassic_2441MHz_8DPSK_9kHz-30MHz_Perpendicular

8/25/2021 15:45:39

No	Frequency	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	1.61589MHz	31.35	19.14	63.44	-32.09	1.00	237.10	H/V	Passed
2.	2.190086MHz	30.69	19.10	69.54	-38.85	1.00	293.50	H/V	Passed
3.	4.126924MHz	28.30	19.21	69.54	-41.24	1.00	260.20	H/V	Passed
4.	13.361187MHz	29.13	19.61	69.54	-40.41	1.00	180.90	H/V	Passed
5.	16.694949MHz	28.49	19.70	69.54	-41.05	1.00	312.10	H/V	Passed
6.	25.612118MHz	31.26	20.70	69.54	-38.28	1.00	189.40	H/V	Passed

Overall Graphs:



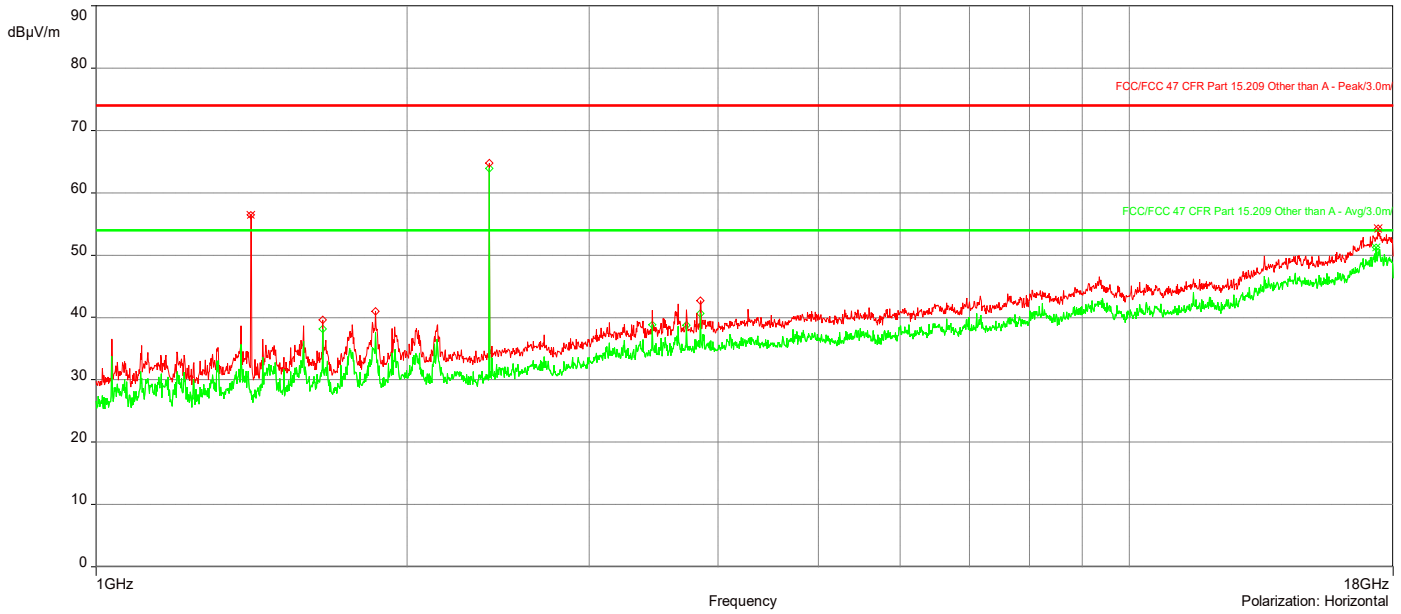
AH20110901-HAR-279-08_2.4G BT GFSK DH1_2402MHz_1-18GHz

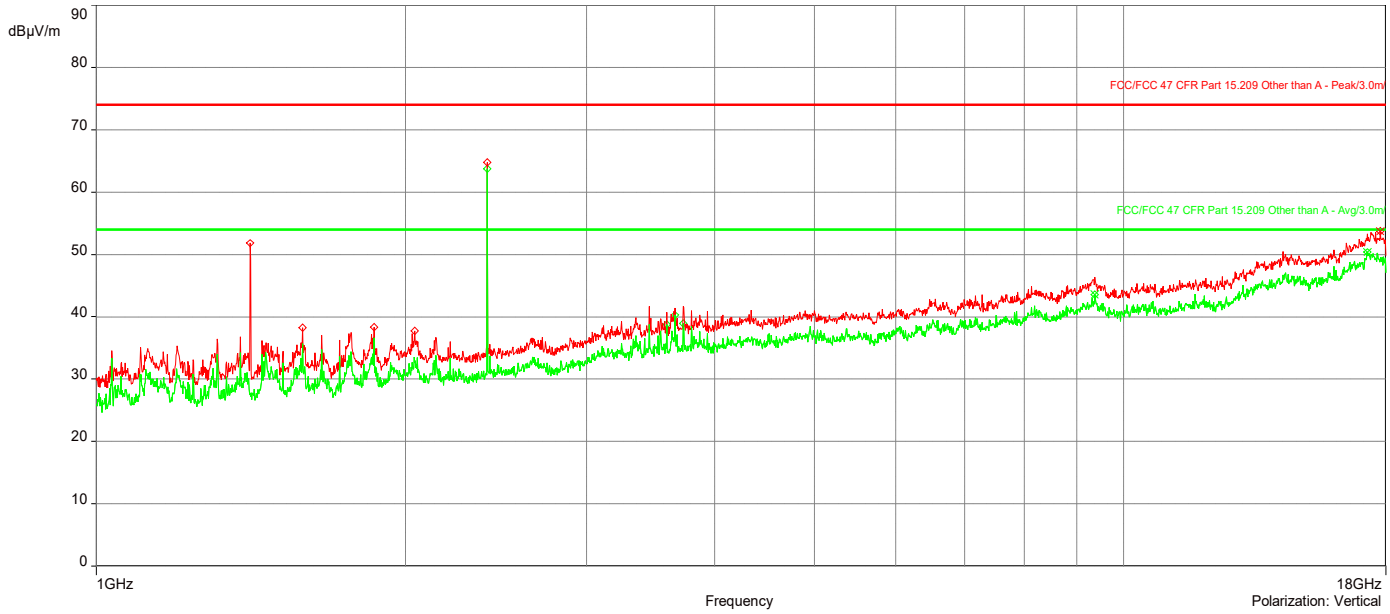
8/26/2021 08:45:13

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	17.766993GHz	53.76	18.87	74.00	-20.24	2.00	23.90	Vertical	Passed
2.	1.4120121GHz	56.48	-7.59	74.00	-17.52	4.00	358.90	Horizontal	Passed
3.	17.413983GHz	54.27	18.74	74.00	-19.73	2.00	72.30	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	9.3692462GHz	43.58	9.45	54.00	-10.42	2.00	220.90	Vertical	Passed
2.	17.274479GHz	50.38	18.20	54.00	-3.62	1.00	121.60	Vertical	Passed
3.	17.33448GHz	51.24	18.40	54.00	-2.76	1.00	346.20	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
1GHz
Frequency
18GHz
Polarization: Vertical

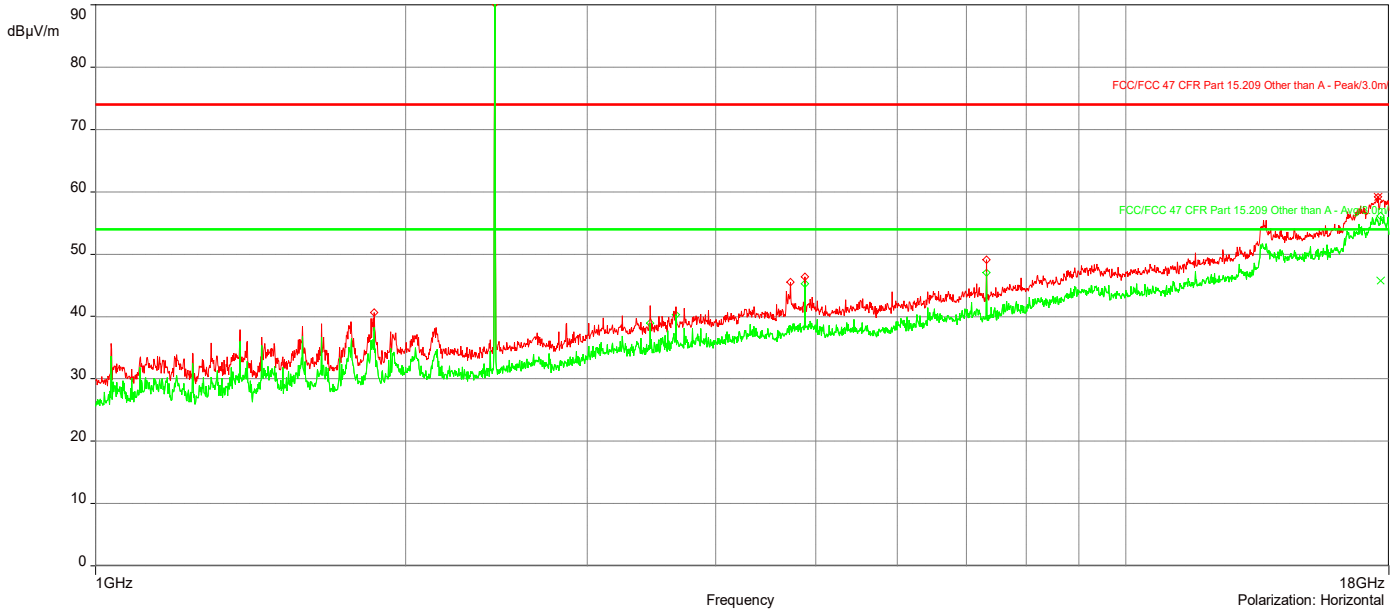
AH20110901-HAR-279-08_2.4G BT GFSK DH1_2441MHz_1-18GHz

8/26/2021 10:00:34

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	1.4235125GHz	69.21	-7.54	74.00	-4.79	3.50	358.90	Vertical	Passed
2.	17.767993GHz	59.25	18.87	74.00	-14.75	1.00	227.40	Vertical	Passed
3.	17.576488GHz	59.21	18.87	74.00	-14.79	2.50	208.10	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.56637GHz	52.66	12.67	54.00	-1.34	1.00	167.80	Vertical	Passed
2.	17.500485GHz	45.92	18.79	54.00	-8.08	1.50	132.90	Vertical	Passed
3.	17.67099GHz	45.80	18.98	54.00	-8.20	2.00	127.10	Horizontal	Passed

Overall Graphs:



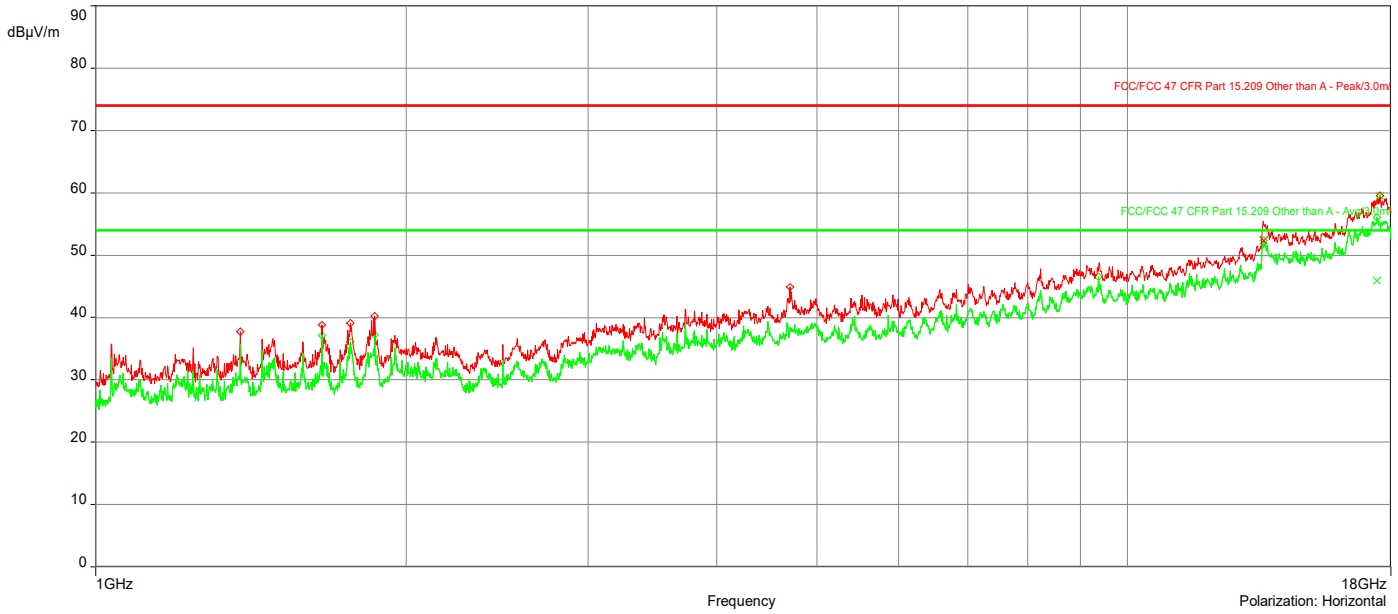
AH20110901-HAR-279-08_2.4G BT GFSK DH1_2480MHz_1-18GHz

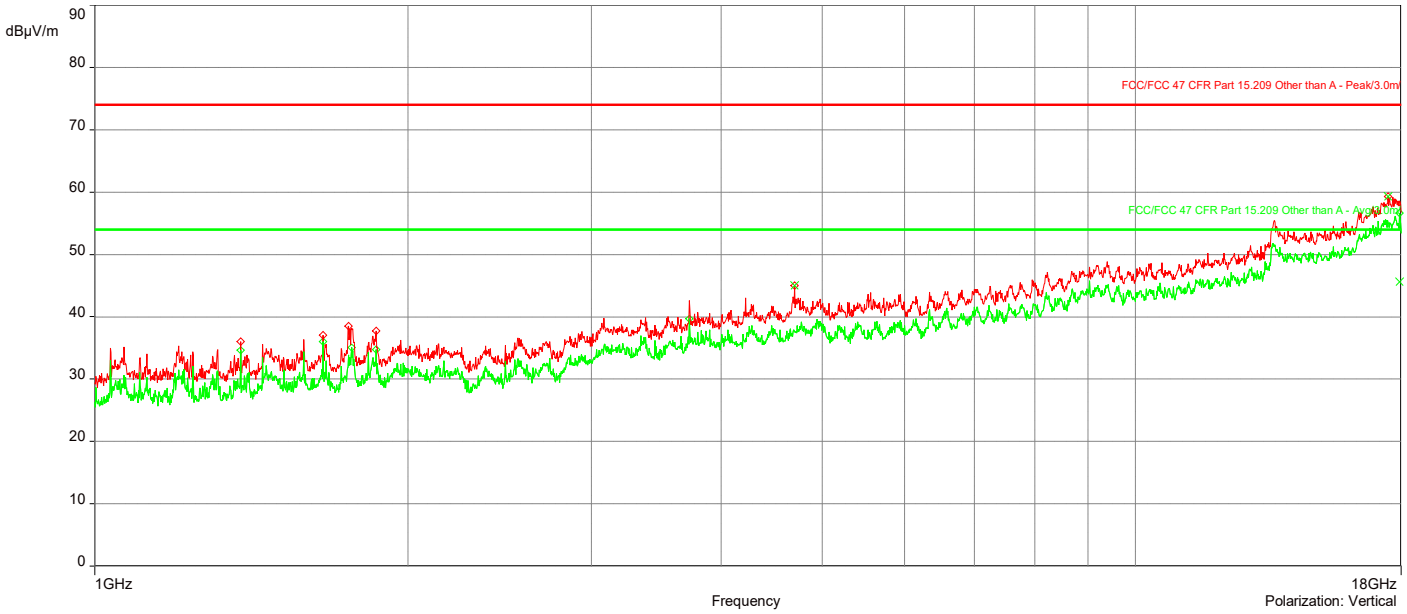
8/26/2021 11:25:08

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	4.7026089GHz	45.00	3.56	74.00	-29.00	3.97	135.10	Vertical	Passed
2.	17.492485GHz	59.27	18.80	74.00	-14.73	1.00	225.00	Vertical	Passed
3.	17.569487GHz	59.53	18.87	74.00	-14.47	3.50	90.10	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	17.936998GHz	45.65	19.02	54.00	-8.35	1.99	23.10	Vertical	Passed
2.	13.555869GHz	52.40	12.64	54.00	-1.60	2.01	157.60	Horizontal	Passed
3.	17.449484GHz	45.93	18.81	54.00	-8.07	2.64	134.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
1GHz
Frequency
18GHz
Polarization: Vertical

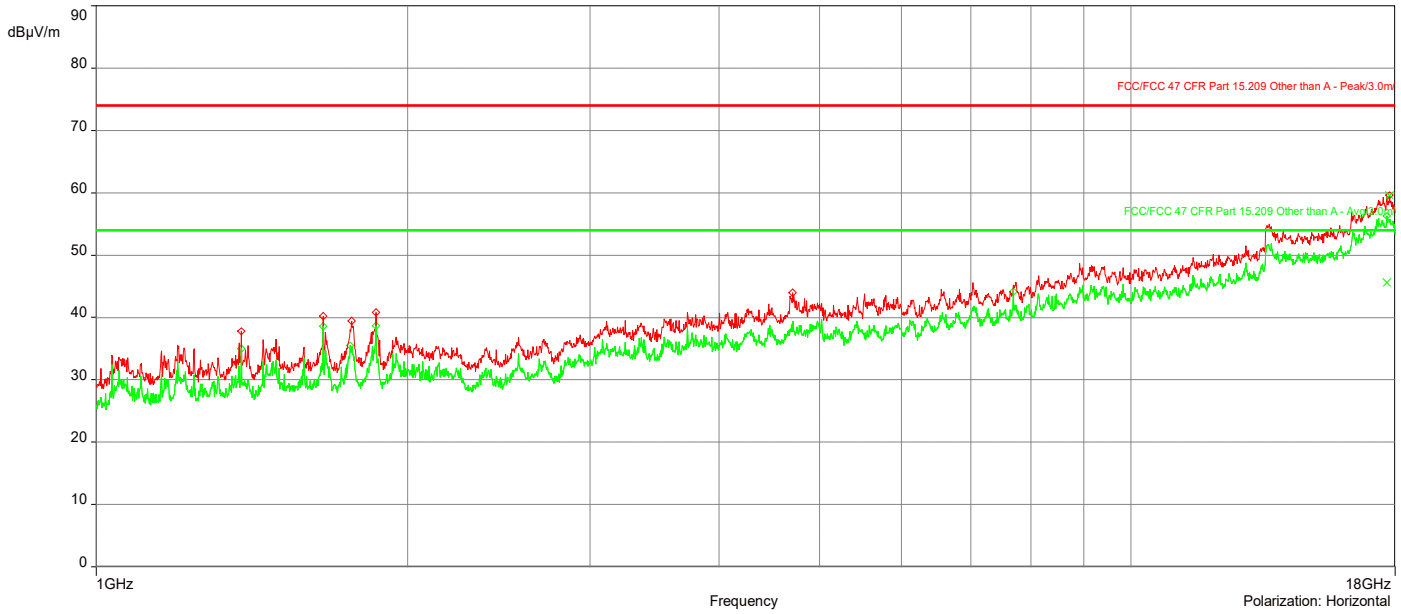
AH20110901-HAR-279-08_2.4G BT 8DPSK 3-DH1_2402MHz_1-18GHz

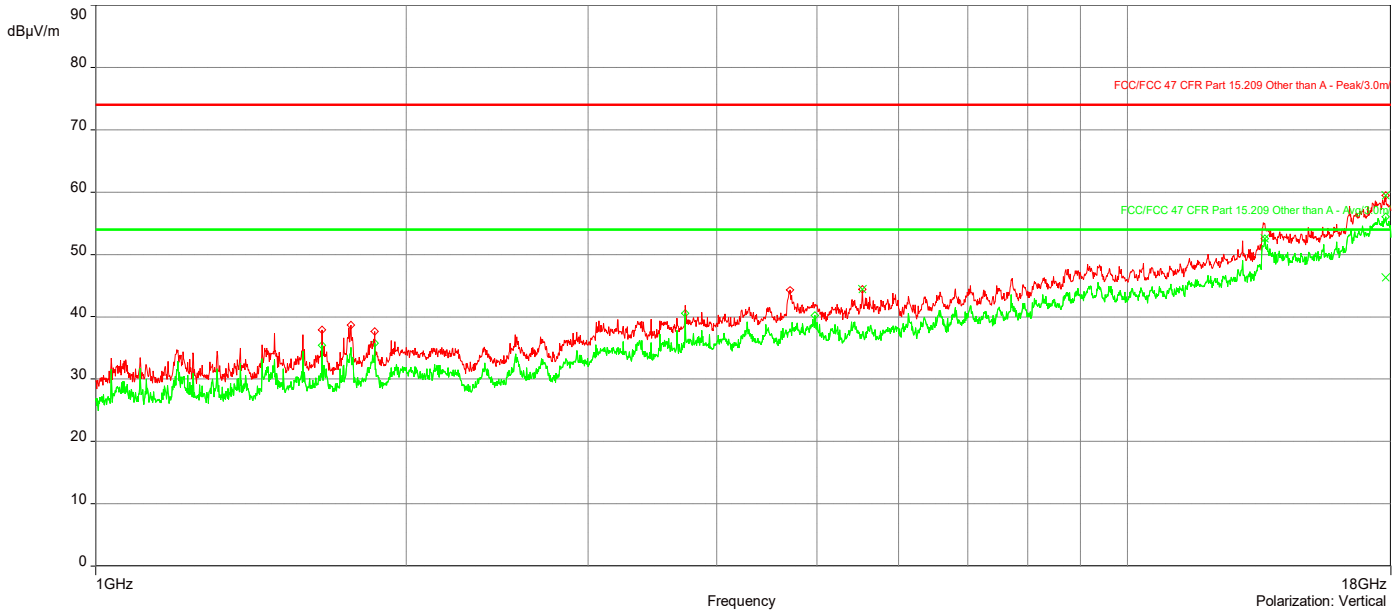
8/26/2021 14:41:49

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	5.5371334GHz	44.39	4.61	74.00	-29.61	3.97	22.40	Vertical	Passed
2.	17.789494GHz	59.43	18.88	74.00	-14.57	1.00	0.10	Vertical	Passed
3.	17.766493GHz	59.62	18.87	74.00	-14.38	1.00	134.90	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.58087GHz	52.55	12.72	54.00	-1.45	3.91	44.90	Vertical	Passed
2.	17.789494GHz	46.30	18.88	54.00	-7.70	1.00	0.10	Vertical	Passed
3.	17.66499GHz	45.62	18.99	54.00	-8.38	1.00	0.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Average
1GHz
Frequency
18GHz
Polarization: Vertical

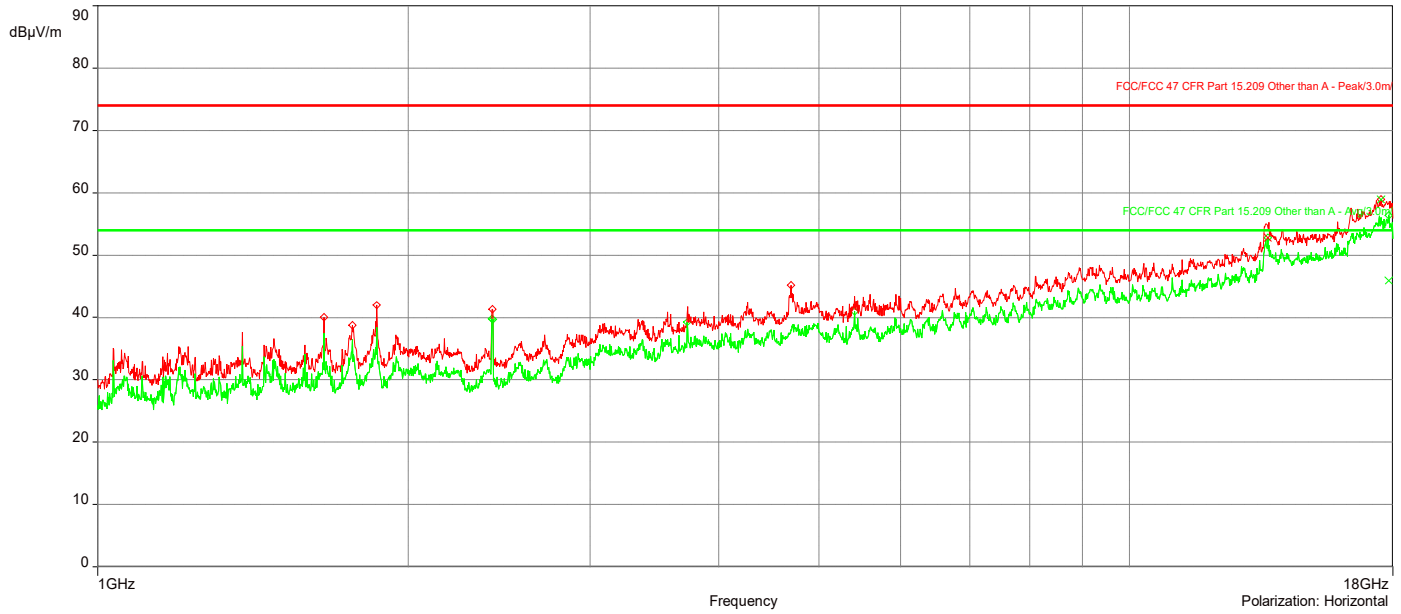
AH20110901-HAR-279-08_2.4G BT 8DPSK 3-DH1_2441MHz_1-18GHz

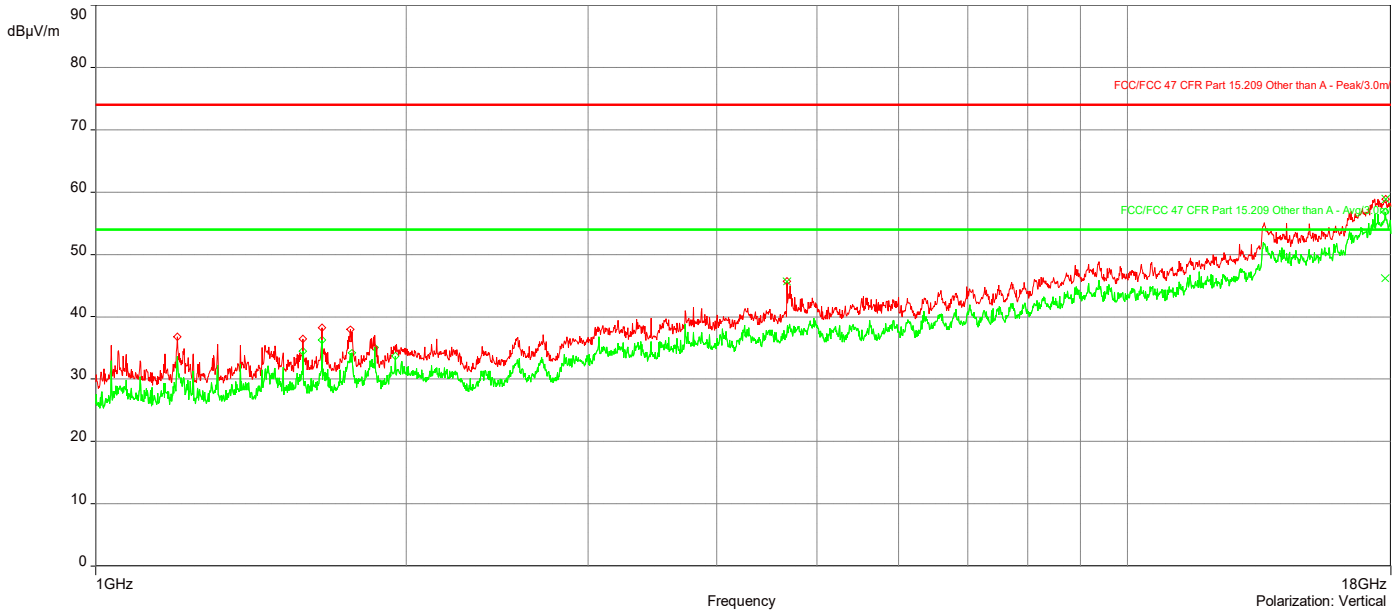
8/26/2021 16:15:12

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	4.6771081GHz	45.71	3.40	74.00	-28.29	3.97	22.40	Vertical	Passed
2.	17.792994GHz	58.88	18.88	74.00	-15.12	2.47	0.10	Vertical	Passed
3.	17.536486GHz	58.93	18.87	74.00	-15.07	4.00	202.40	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	17.779994GHz	46.23	18.87	54.00	-7.77	1.34	247.10	Vertical	Passed
2.	13.618871GHz	52.77	12.82	54.00	-1.23	1.06	269.90	Horizontal	Passed
3.	17.834495GHz	45.98	18.90	54.00	-8.02	3.38	180.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3
1GHz
Frequency
18GHz
Polarization: Vertical

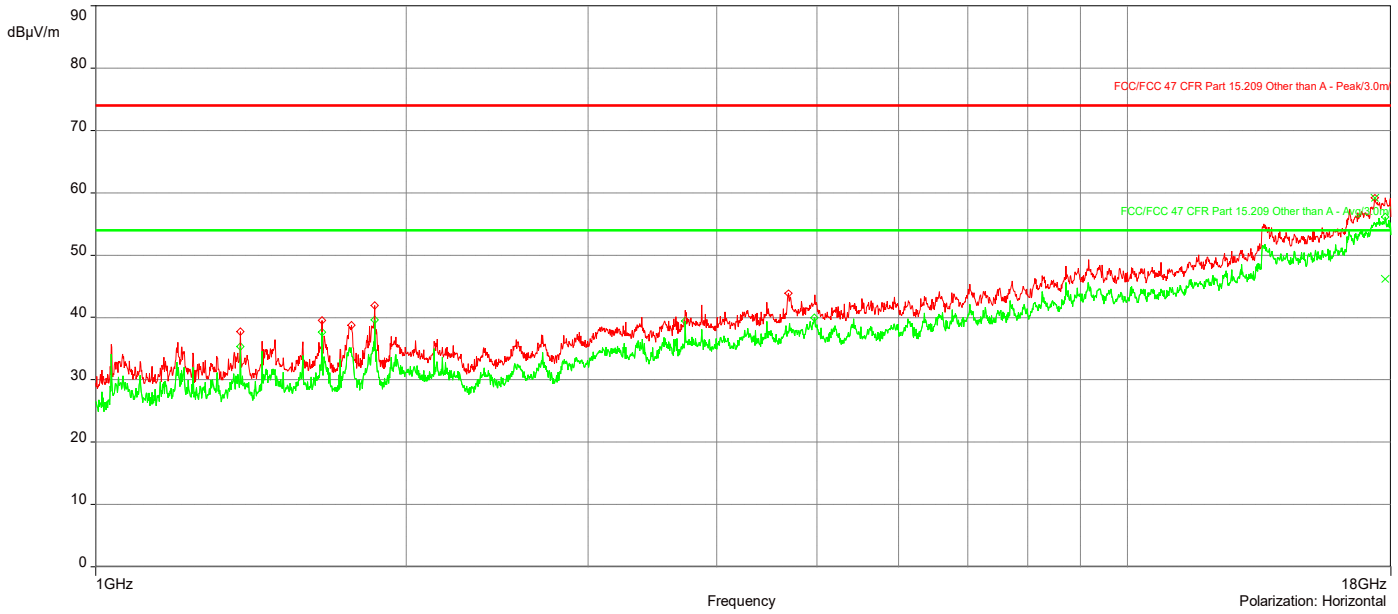
AH20110901-HAR-279-08_2.4G BT 8DPSK 3-DH1_2480MHz_1-18GHz

8/26/2021 17:03:12

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	13.625871GHz	55.52	12.83	74.00	-18.48	2.67	135.10	Vertical	Passed
2.	17.797494GHz	59.78	18.88	74.00	-14.22	1.00	135.10	Vertical	Passed
3.	17.361481GHz	59.21	18.53	74.00	-14.79	1.00	157.50	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.511368GHz	52.19	12.53	54.00	-1.81	3.35	292.60	Vertical	Passed
2.	17.797494GHz	46.30	18.88	54.00	-7.70	1.00	135.10	Vertical	Passed
3.	17.780494GHz	46.18	18.87	54.00	-7.82	3.17	224.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Average
1GHz
Frequency
18GHz
Polarization: Vertical

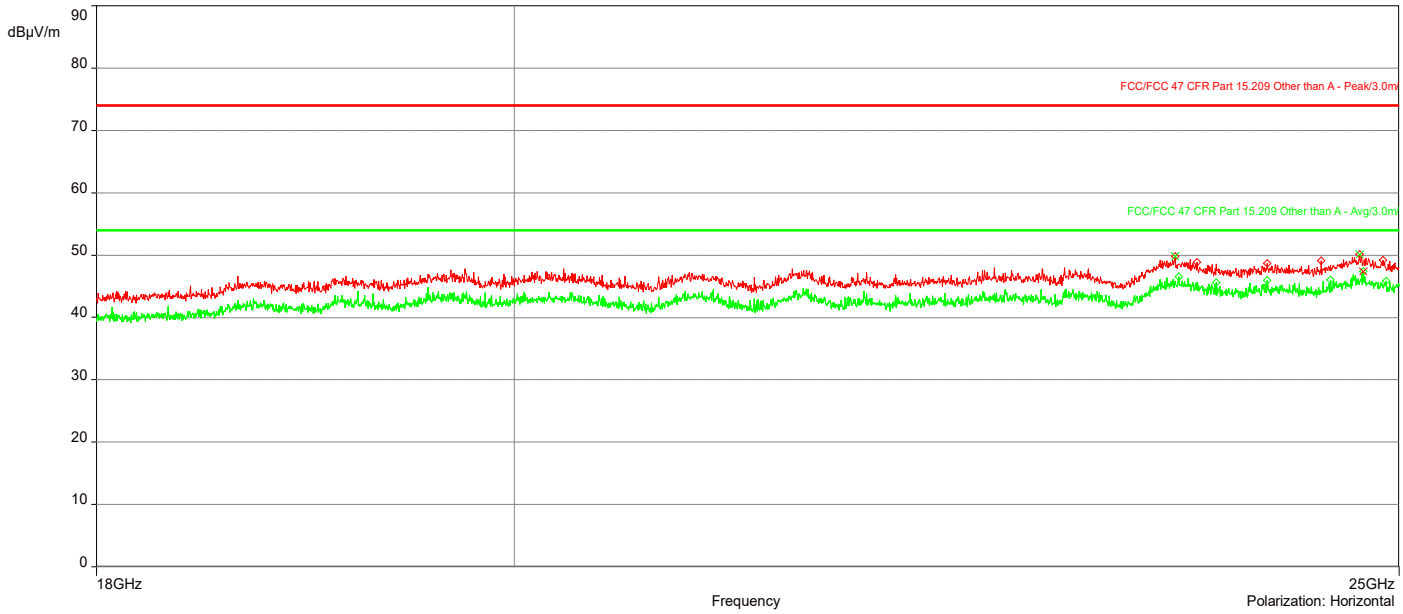
AH20110901-HAR-279-08_BT_8DPSK_2402MHz_3-DH1_18-25GHz

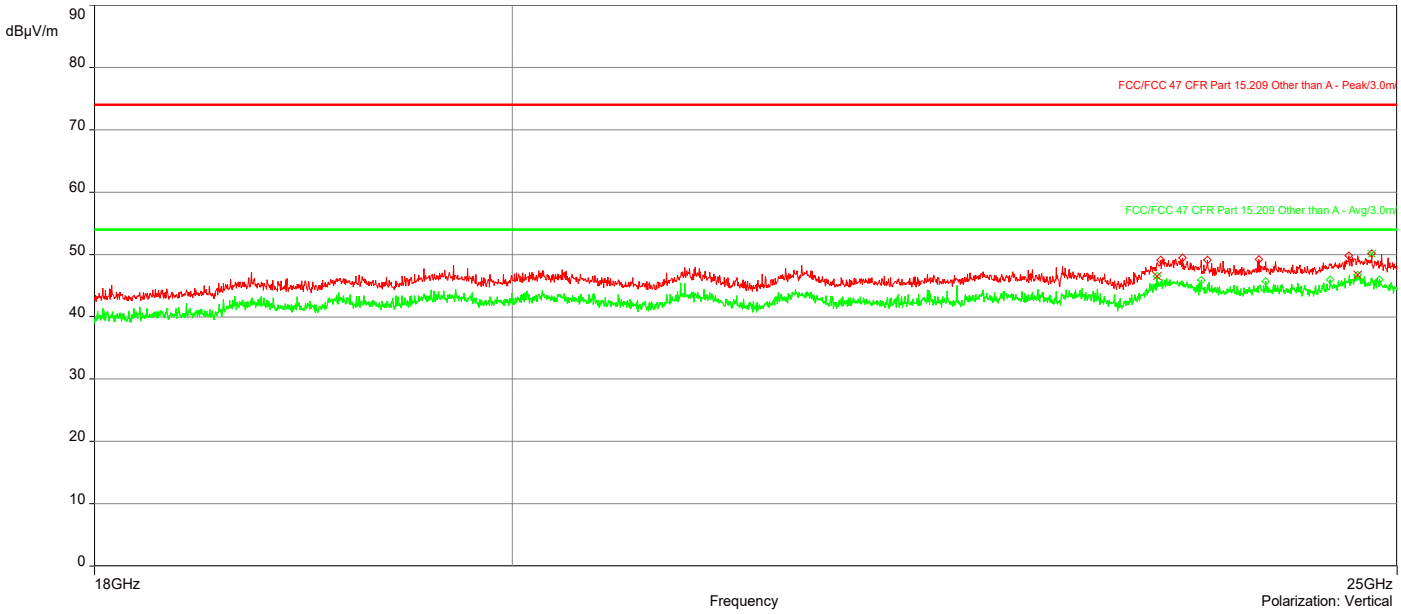
8/18/2021 19:15:50

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	24.839989GHz	50.17	2.78	74.00	-23.83	1.40	67.70	Vertical	Passed
2.	23.626902GHz	49.80	1.99	74.00	-24.20	1.41	135.20	Horizontal	Passed
3.	24.751482GHz	50.12	2.98	74.00	-23.88	3.27	270.10	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	23.530895GHz	46.59	2.06	54.00	-7.41	1.68	337.40	Vertical	Passed
2.	24.752482GHz	46.71	2.95	54.00	-7.29	2.72	292.60	Vertical	Passed
3.	24.774484GHz	47.44	2.90	54.00	-6.56	3.67	292.60	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
18GHz
25GHz
Frequency
Polarization: Vertical

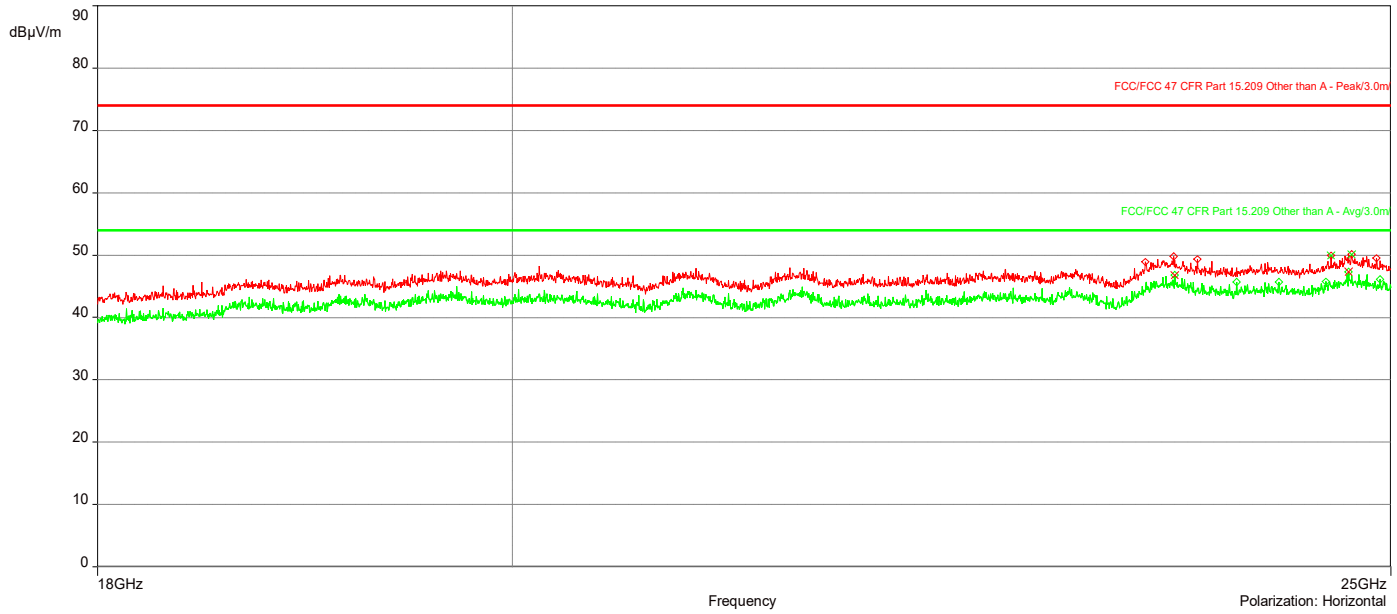
AH20110901-HAR-279-08_BT_8DPSK_2441MHz_3-DH1_18-25GHz

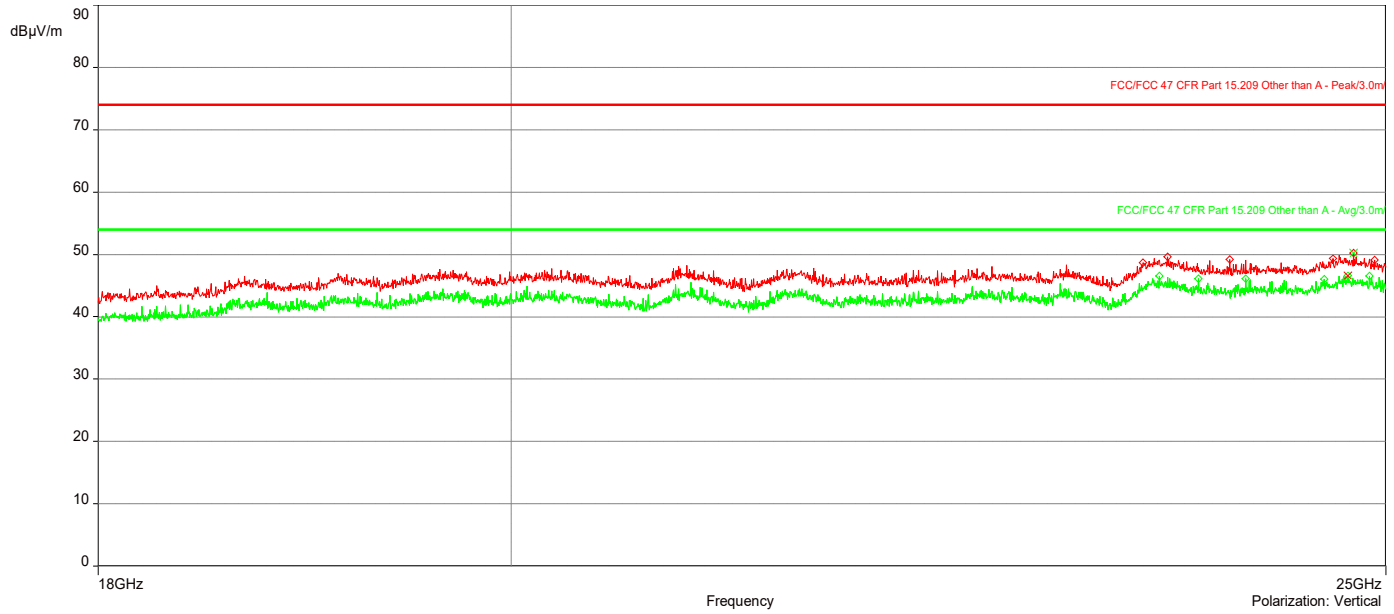
8/18/2021 19:41:19

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	24.793985GHz	50.26	2.81	74.00	-23.74	1.02	0.10	Vertical	Passed
2.	24.623973GHz	49.93	2.42	74.00	-24.07	3.38	269.90	Horizontal	Passed
3.	24.752982GHz	50.13	2.97	74.00	-23.87	2.44	157.40	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	24.758483GHz	46.66	2.93	54.00	-7.34	3.25	179.90	Vertical	Passed
2.	23.664405GHz	46.78	1.91	54.00	-7.22	2.05	22.40	Horizontal	Passed
3.	24.732981GHz	47.30	2.93	54.00	-6.70	3.37	44.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
18GHz
Frequency
25GHz
Polarization: Vertical

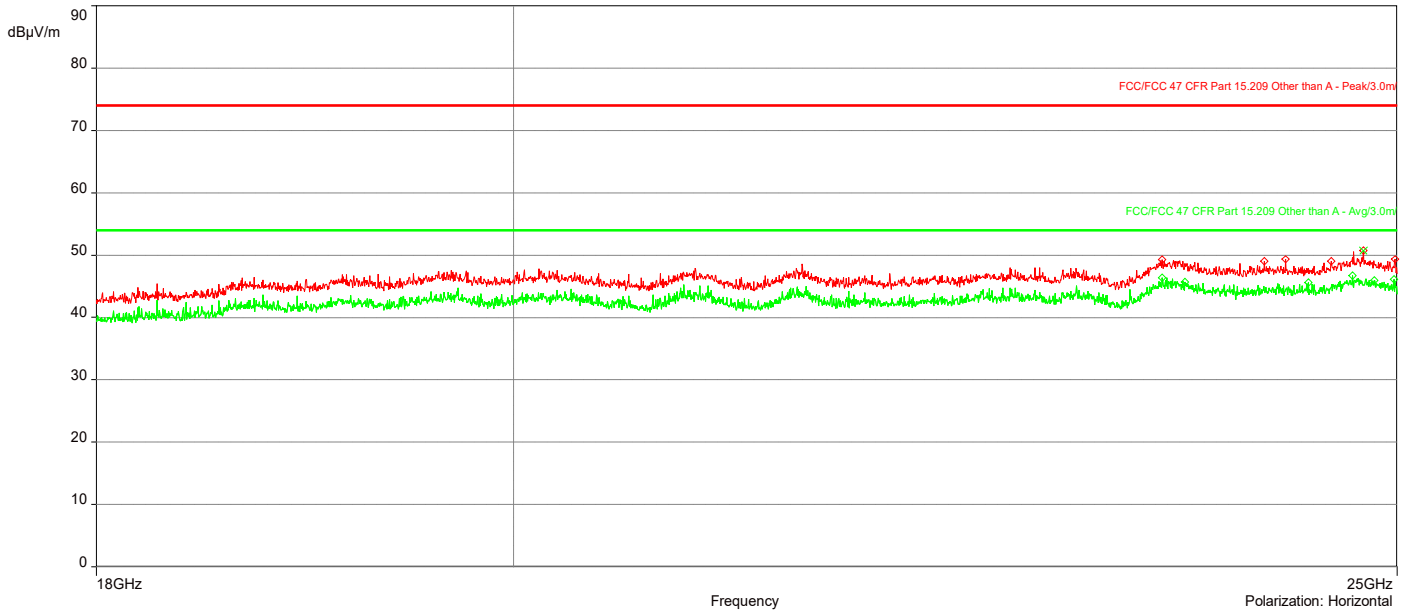
AH20110901-HAR-279-08_BT_8DPSK_2480MHz_3-DH1_18-25GHz

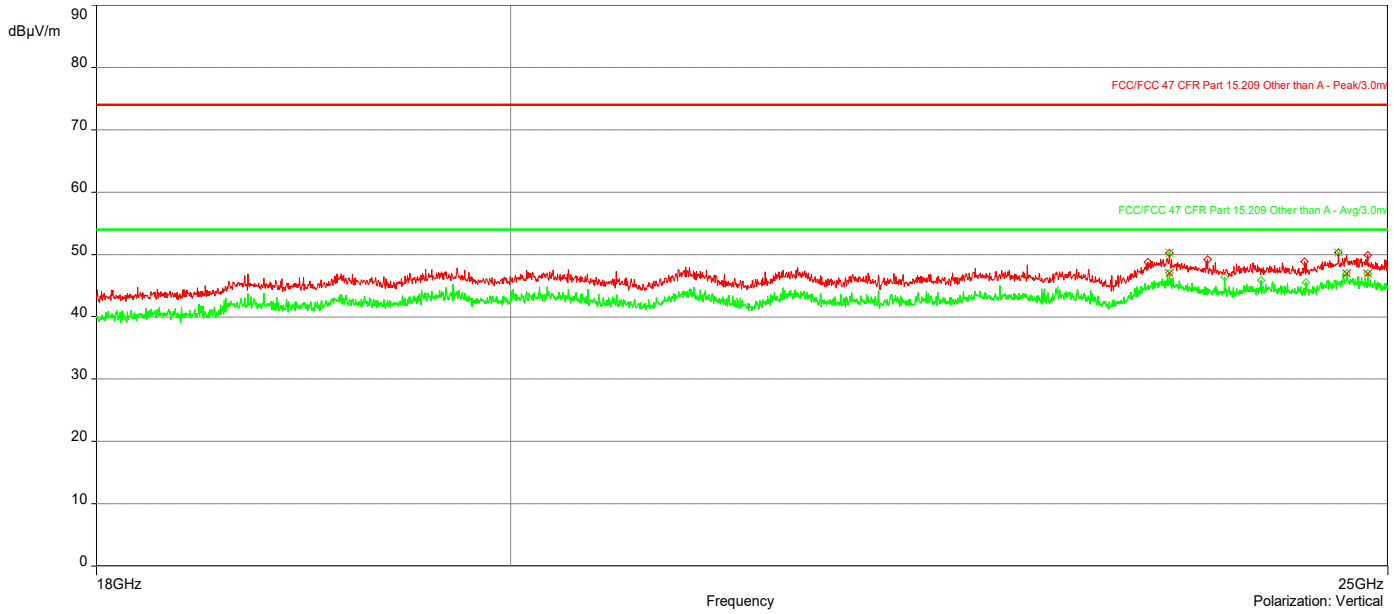
8/18/2021 20:07:22

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	23.648903GHz	50.24	1.95	74.00	-23.76	4.00	22.70	Vertical	Passed
2.	24.688478GHz	50.34	2.74	74.00	-23.66	1.00	225.10	Vertical	Passed
3.	24.786985GHz	50.70	2.85	74.00	-23.30	2.83	315.10	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	23.648903GHz	47.08	1.95	54.00	-6.92	4.00	22.70	Vertical	Passed
2.	24.737981GHz	46.95	2.93	54.00	-7.05	3.23	315.10	Vertical	Passed
3.	24.871991GHz	47.00	2.78	54.00	-7.00	4.00	22.70	Vertical	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
18GHz
Frequency
25GHz
Polarization: Vertical

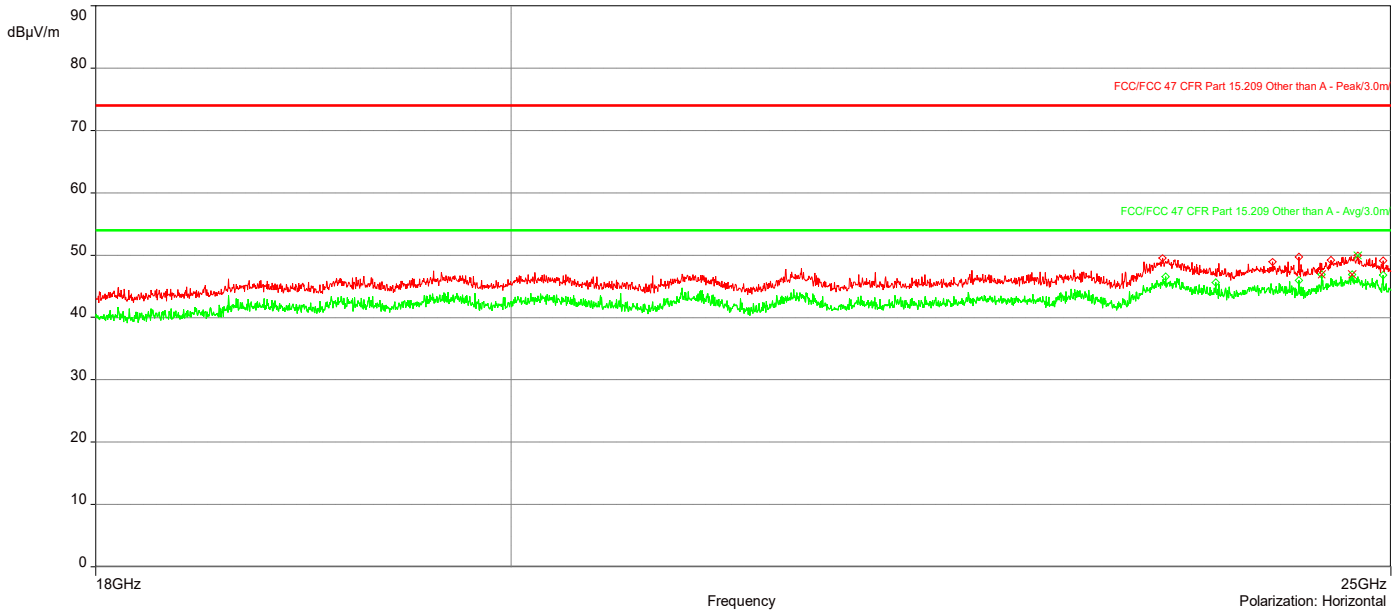
AH20110901-HAR-279-08_BT_GFSK_2402MHz_DH1_18-25GHz

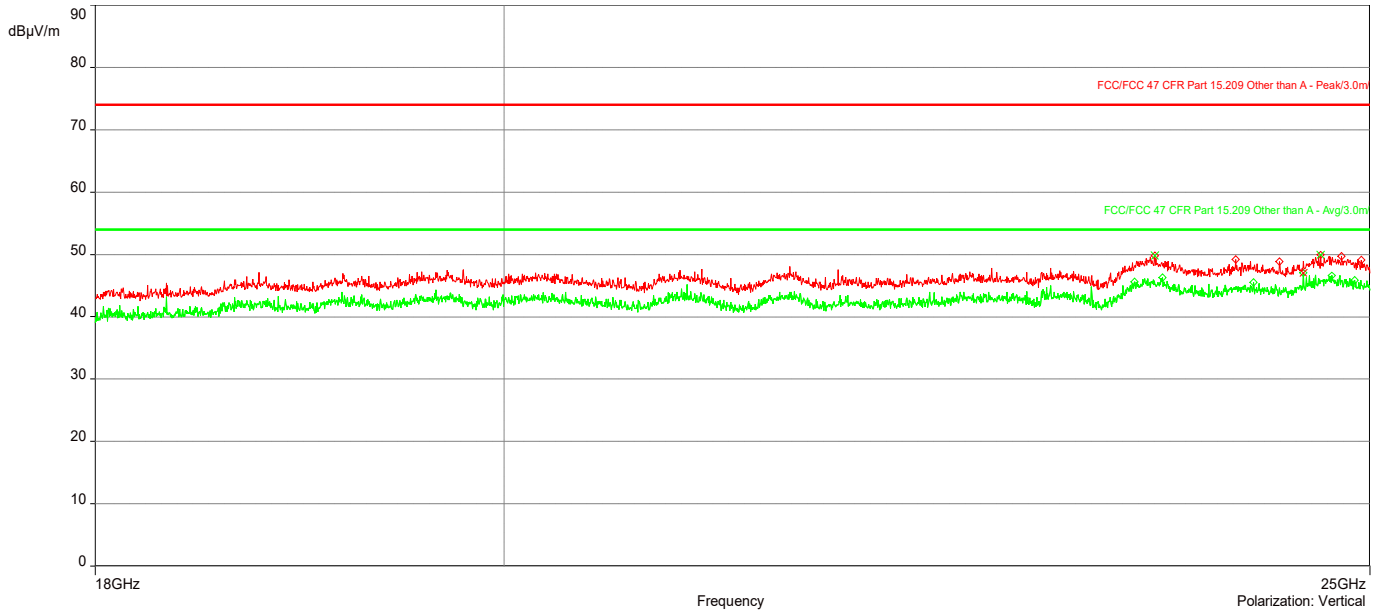
8/18/2021 14:41:42

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	23.650904GHz	49.78	1.94	74.00	-24.22	1.41	134.90	Vertical	Passed
2.	24.685978GHz	49.99	2.73	74.00	-24.01	1.16	44.90	Vertical	Passed
3.	24.791985GHz	49.93	2.84	74.00	-24.07	3.80	337.40	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	24.57347GHz	47.05	2.16	54.00	-6.95	1.92	314.90	Vertical	Passed
2.	24.563469GHz	46.90	2.14	54.00	-7.10	2.58	337.40	Horizontal	Passed
3.	24.756983GHz	46.88	2.96	54.00	-7.12	1.34	359.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
18GHz
Frequency
25GHz
Polarization: Vertical

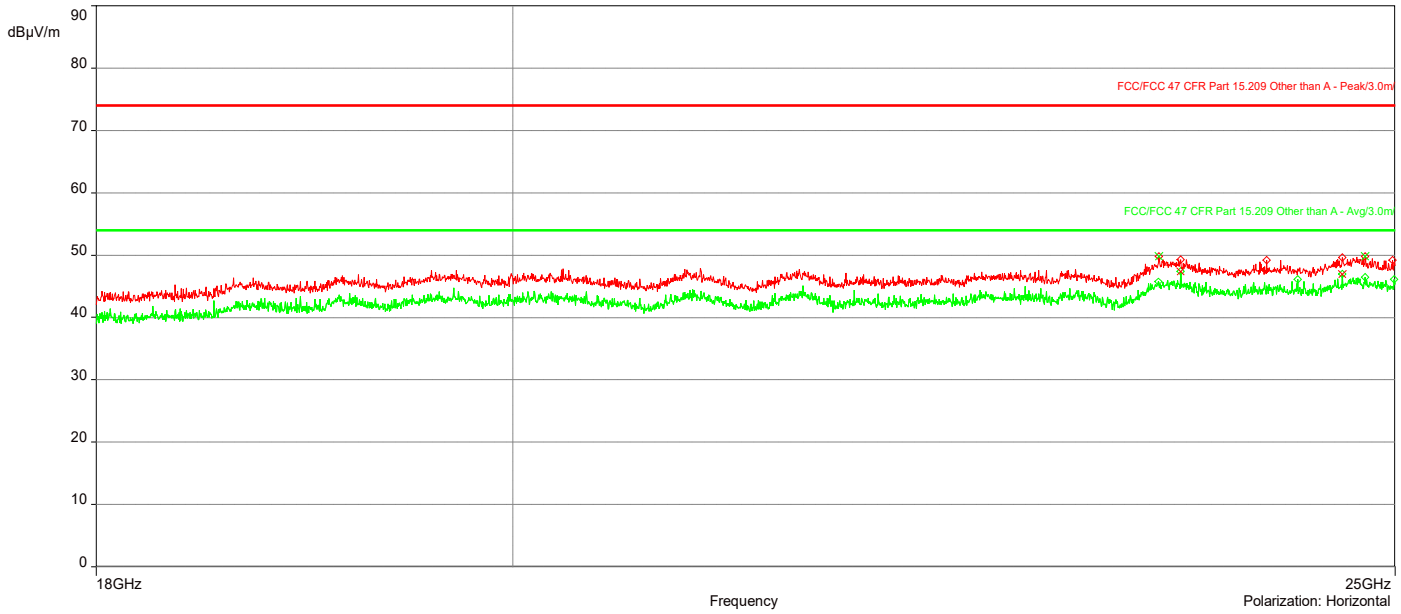
AH20110901-HAR-279-08_BT_GFSK_2441MHz_DH1_18-25GHz

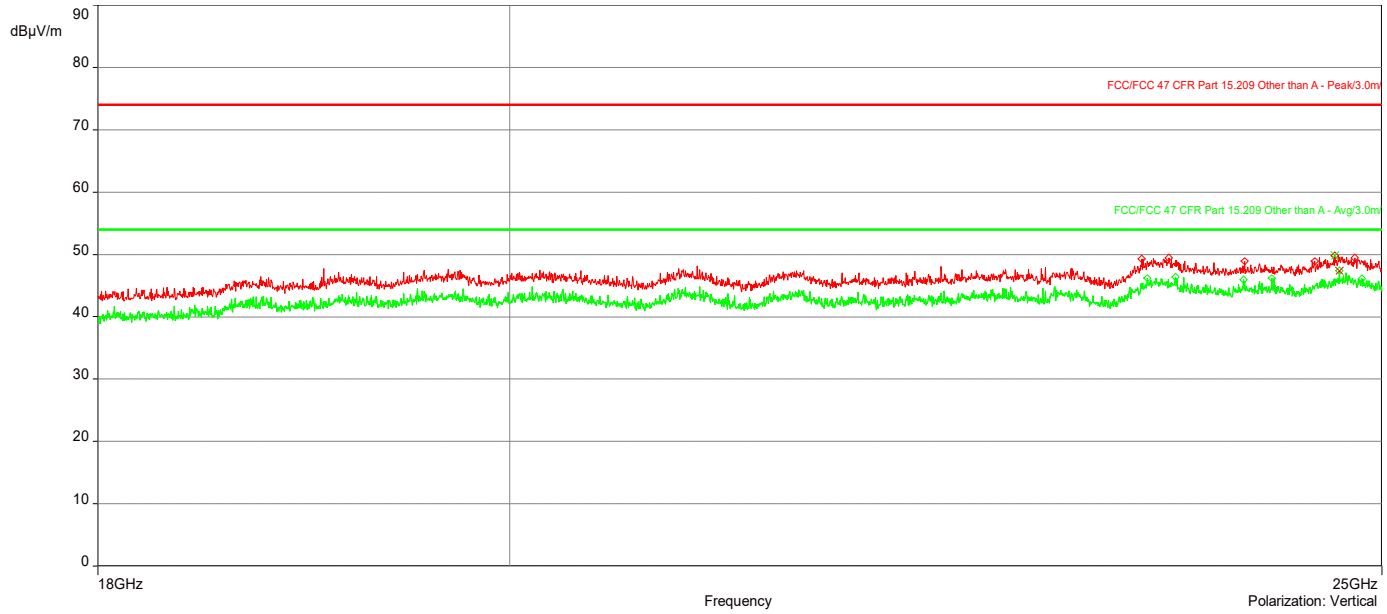
8/18/2021 15:20:19

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	24.699479GHz	49.83	2.80	74.00	-24.17	1.91	112.70	Vertical	Passed
2.	23.551397GHz	49.83	2.22	74.00	-24.17	2.45	90.00	Horizontal	Passed
3.	24.812487GHz	49.83	2.80	74.00	-24.17	3.08	112.70	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	24.730481GHz	47.36	2.90	54.00	-6.64	3.55	292.60	Vertical	Passed
2.	23.680406GHz	47.40	1.88	54.00	-6.60	2.27	157.50	Horizontal	Passed
3.	24.666976GHz	46.97	2.64	54.00	-7.03	2.98	270.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
18GHz
Frequency
25GHz
Polarization: Vertical

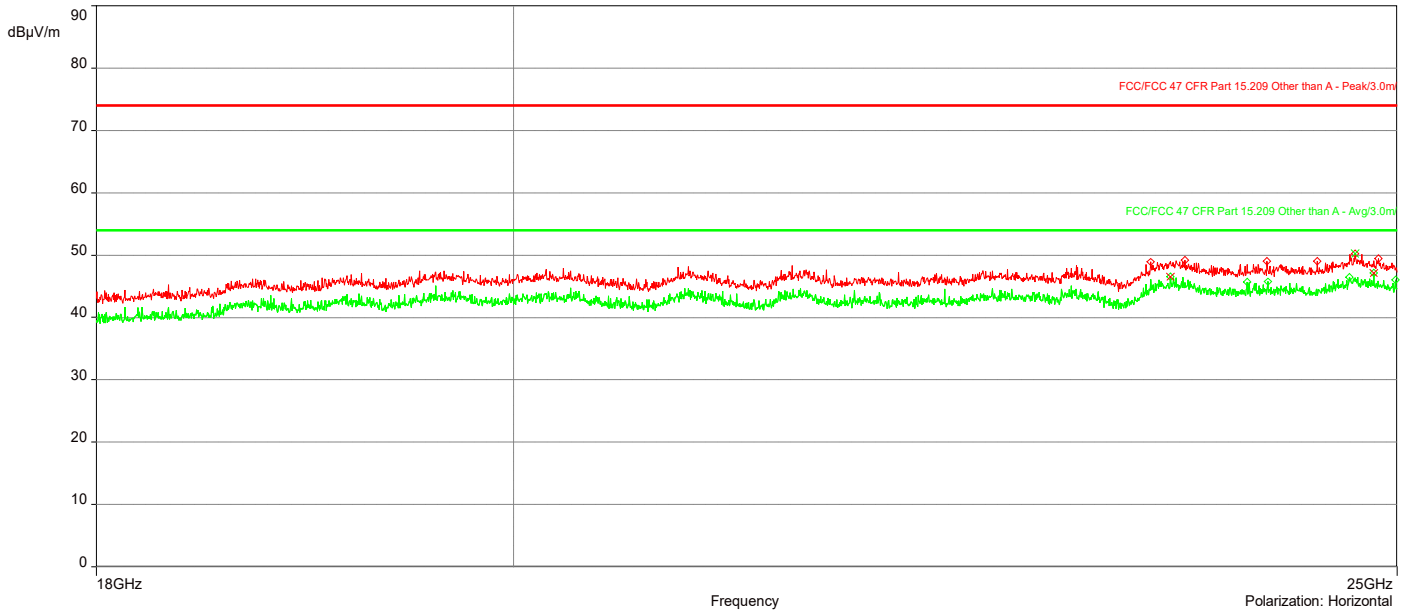
AH20110901-HAR-279-08_BT_GFSK_2480MHz_DH1_18-25GHz

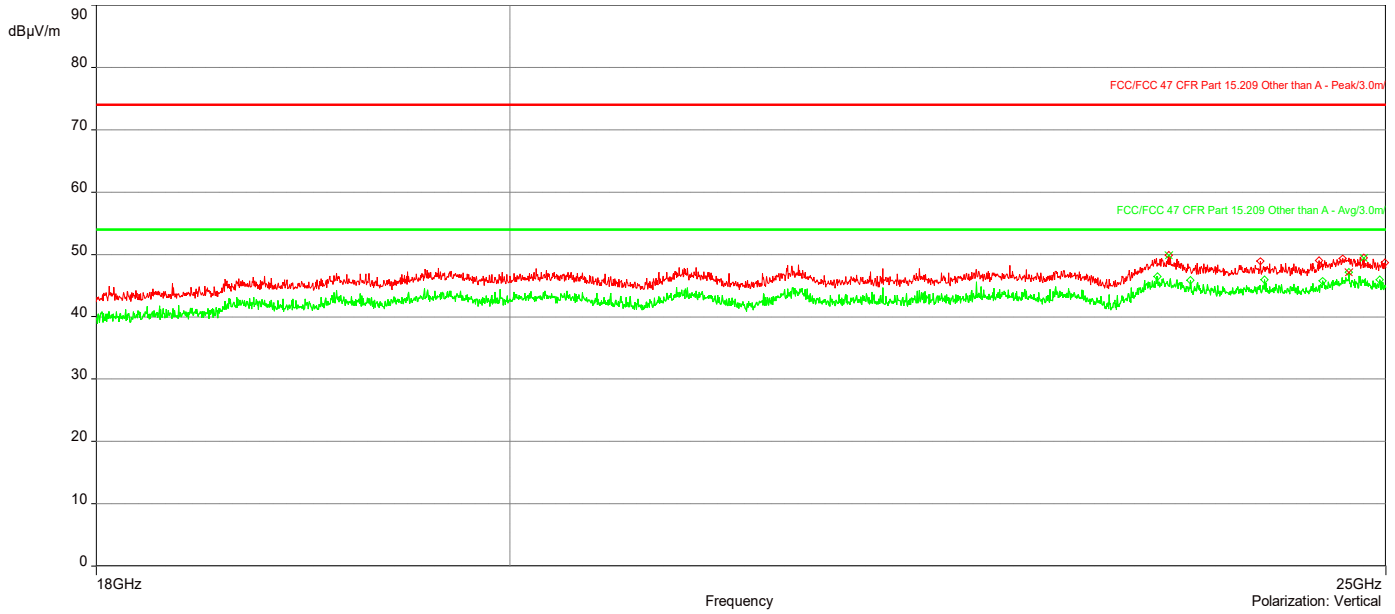
8/18/2021 16:44:17

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	23.655404GHz	49.90	1.93	74.00	-24.10	2.88	0.10	Vertical	Passed
2.	24.86049GHz	49.49	2.78	74.00	-24.51	3.09	112.40	Vertical	Passed
3.	24.736981GHz	50.25	2.95	74.00	-23.75	1.08	179.90	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	24.765983GHz	47.16	2.91	54.00	-6.84	2.72	314.90	Vertical	Passed
2.	23.608901GHz	46.54	2.02	54.00	-7.46	2.98	157.40	Horizontal	Passed
3.	24.852989GHz	47.16	2.78	54.00	-6.84	4.00	67.40	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
18GHz
Frequency
25GHz
Polarization: Vertical

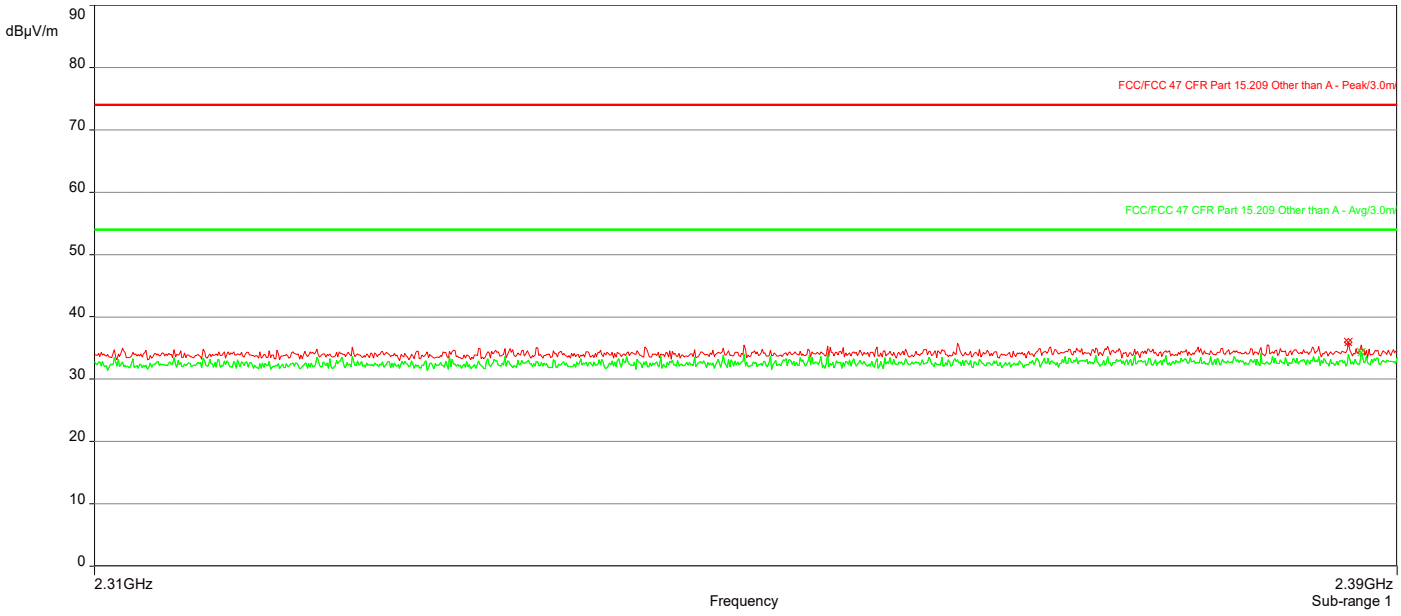
AH20110901-HAR-279-08_Restricted Bandedge_2.4G BT GFSK DH1_2402MHz

8/26/2021 09:05:54

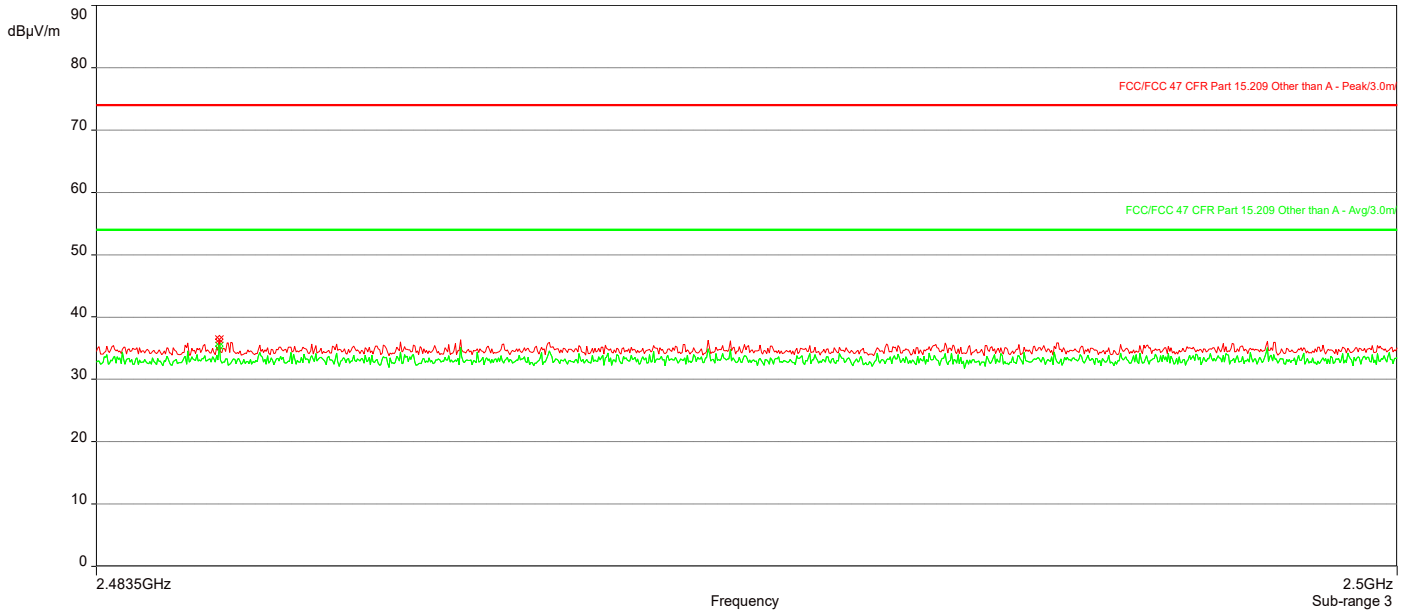
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.386957GHz	35.93	-3.15	74.00	-38.07	2.50	358.90	Vertical	Passed
2.	2.3863964GHz	45.17	-3.16	74.00	-28.83	3.00	323.30	Horizontal	Passed
3.	2.4850526GHz	36.45	-2.47	74.00	-37.55	3.50	206.50	Vertical	Passed
4.	2.486985GHz	36.40	-2.46	74.00	-37.60	3.50	0.10	Horizontal	Passed

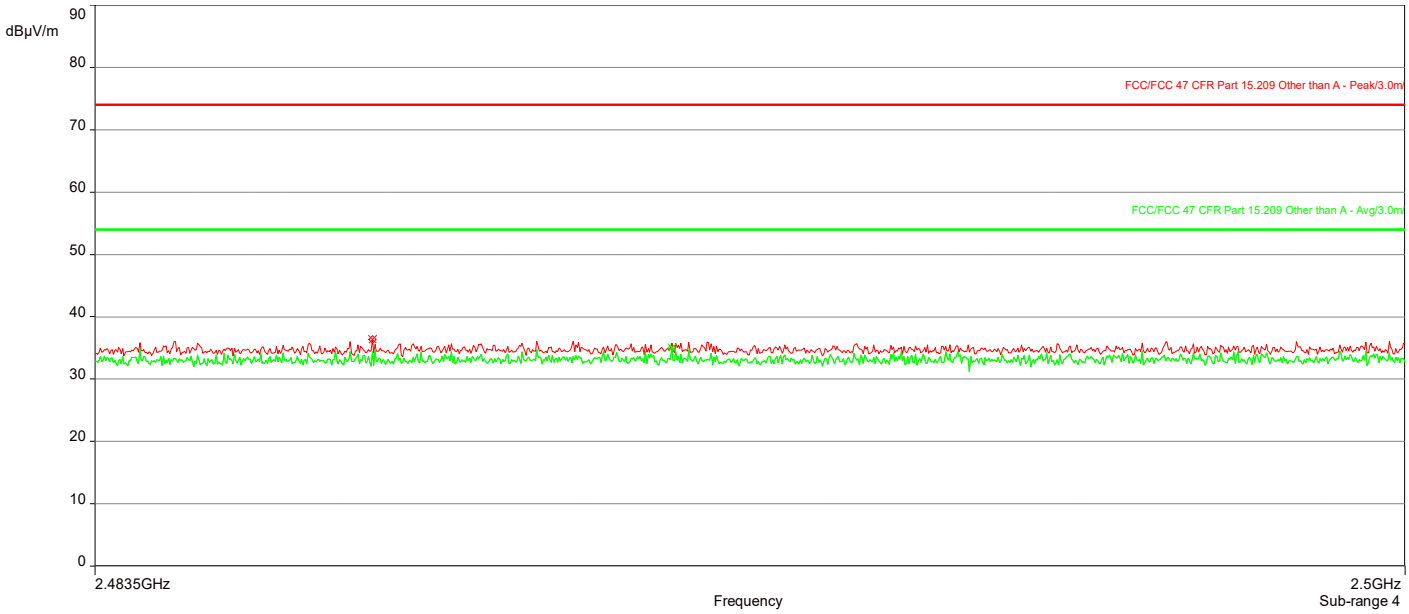
No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3877578GHz	34.35	-3.15	54.00	-19.65	2.00	346.80	Vertical	Passed
2.	2.3863964GHz	43.55	-3.16	54.00	-10.45	3.00	323.30	Horizontal	Passed
3.	2.4850526GHz	35.36	-2.47	54.00	-18.64	3.50	206.50	Vertical	Passed
4.	2.4907508GHz	35.07	-2.45	54.00	-18.93	1.00	231.30	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

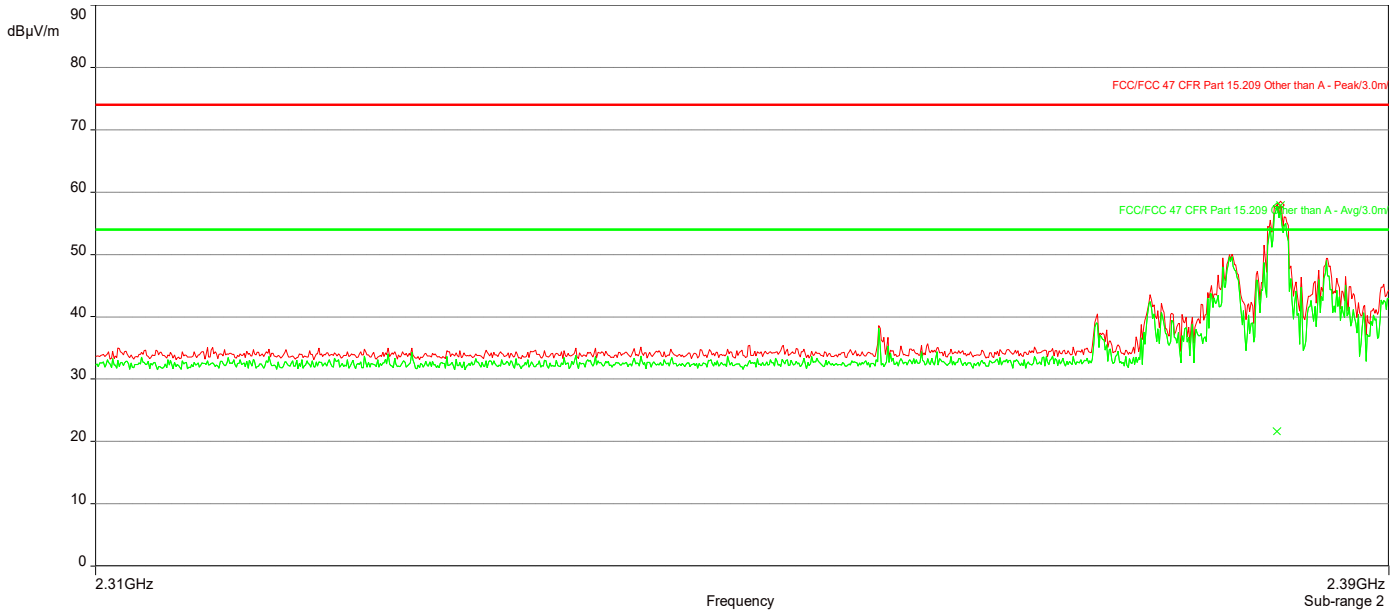
AH20110901-HAR-279-08_Restricted Bandedge_2.4G BT GFSK DH1_2441MHz

8/26/2021 10:32:25

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.39GHz	47.12	-3.13	74.00	-26.88	3.00	278.20	Vertical	Passed
2.	2.3831932GHz	57.92	-3.17	74.00	-16.08	4.00	264.40	Horizontal	Passed
3.	2.4884219GHz	41.33	-2.45	74.00	-32.67	3.50	50.50	Vertical	Passed
4.	2.4945GHz	37.02	-2.43	74.00	-36.98	1.00	191.70	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3899199GHz	46.68	-3.13	54.00	-7.32	3.00	278.20	Vertical	Passed
2.	2.382953GHz	21.69	-3.18	54.00	-32.31	4.00	263.90	Horizontal	Passed
3.	2.4884219GHz	40.81	-2.45	54.00	-13.19	3.50	50.50	Vertical	Passed
4.	2.4985465GHz	35.33	-2.42	54.00	-18.67	4.00	94.40	Horizontal	Passed

Overall Graphs:


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

AH20110901-HAR-279-08_Restricted Bandedge_2.4G BT GFSK DH1_2480MHz

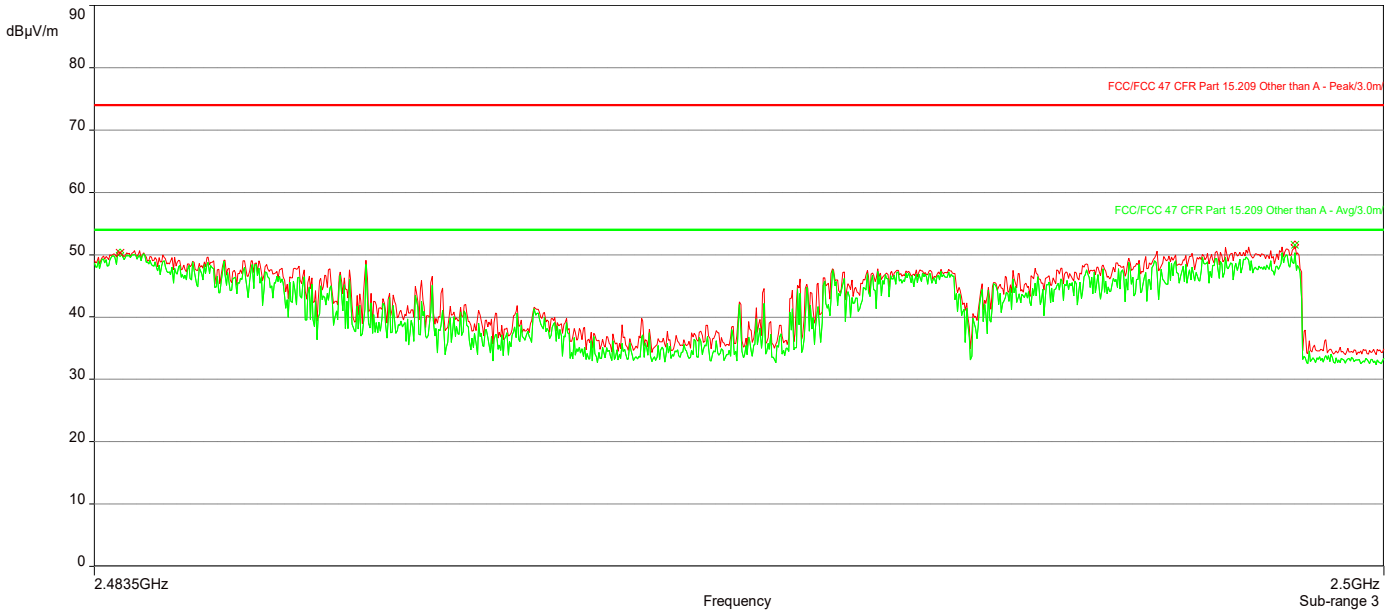
8/26/2021 12:44:55

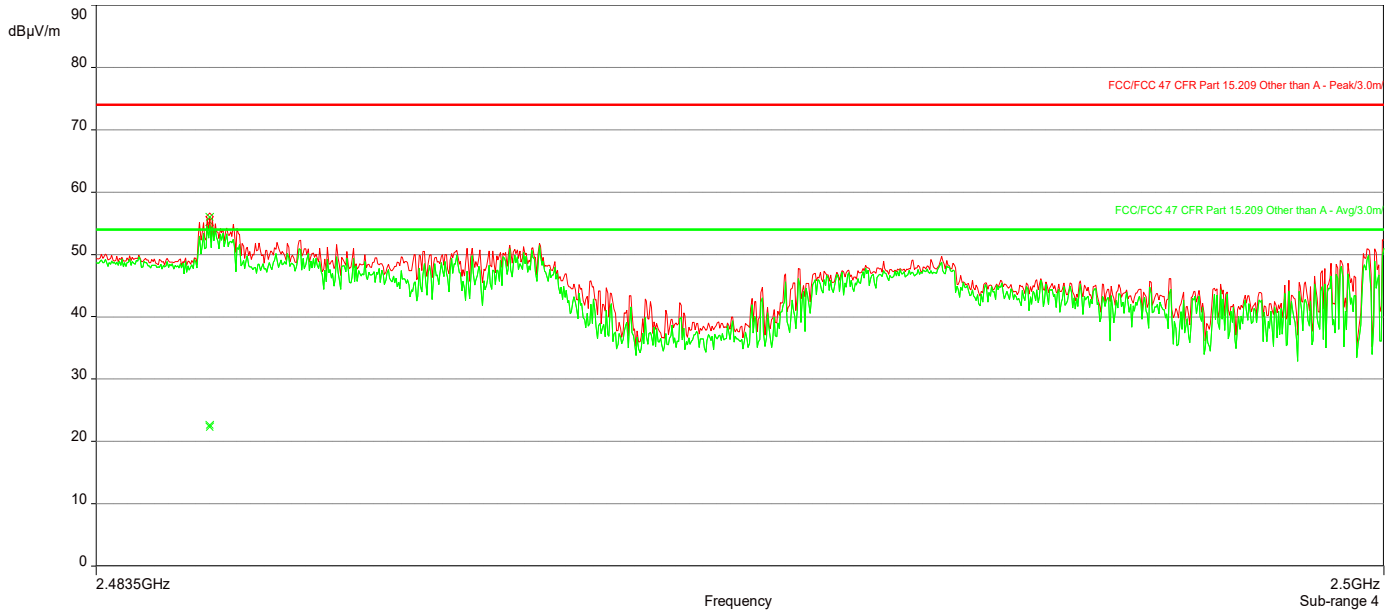
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3328228GHz	41.11	-3.43	74.00	-32.89	1.82	270.10	Vertical	Passed
2.	2.3629329GHz	53.60	-3.28	74.00	-20.40	1.91	135.10	Horizontal	Passed
3.	2.4988604GHz	51.55	-2.41	74.00	-22.45	3.86	90.00	Vertical	Passed
4.	2.4849535GHz	56.06	-2.47	74.00	-17.94	2.49	247.60	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3328228GHz	39.83	-3.43	54.00	-14.17	1.82	270.10	Vertical	Passed
2.	2.3633333GHz	53.24	-3.28	54.00	-0.76	1.91	135.10	Horizontal	Passed
3.	2.4838303GHz	50.32	-2.47	54.00	-3.68	2.68	180.10	Vertical	Passed
4.	2.4849535GHz	22.66	-2.47	54.00	-31.34	2.49	247.60	Horizontal	Passed

Overall Graphs:


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

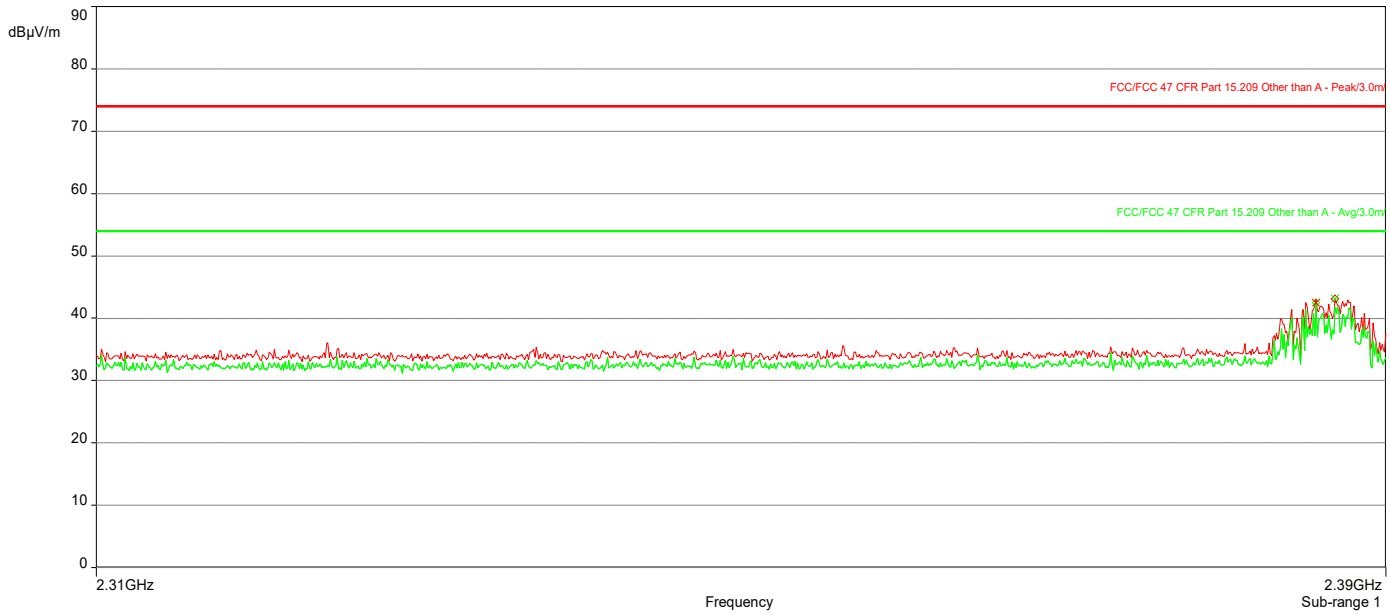
AH20110901-HAR-279-08_Restricted Bandedge_2.4G BT 8DPSK 3-DH1_2402MHz

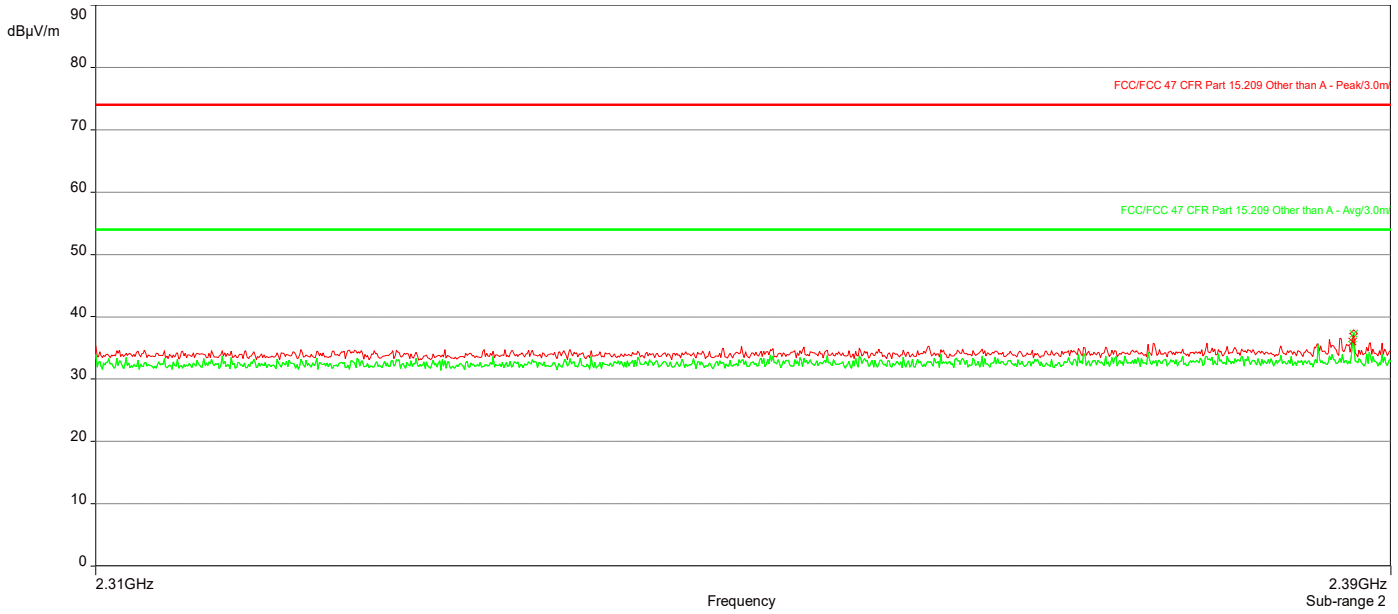
8/26/2021 13:46:51

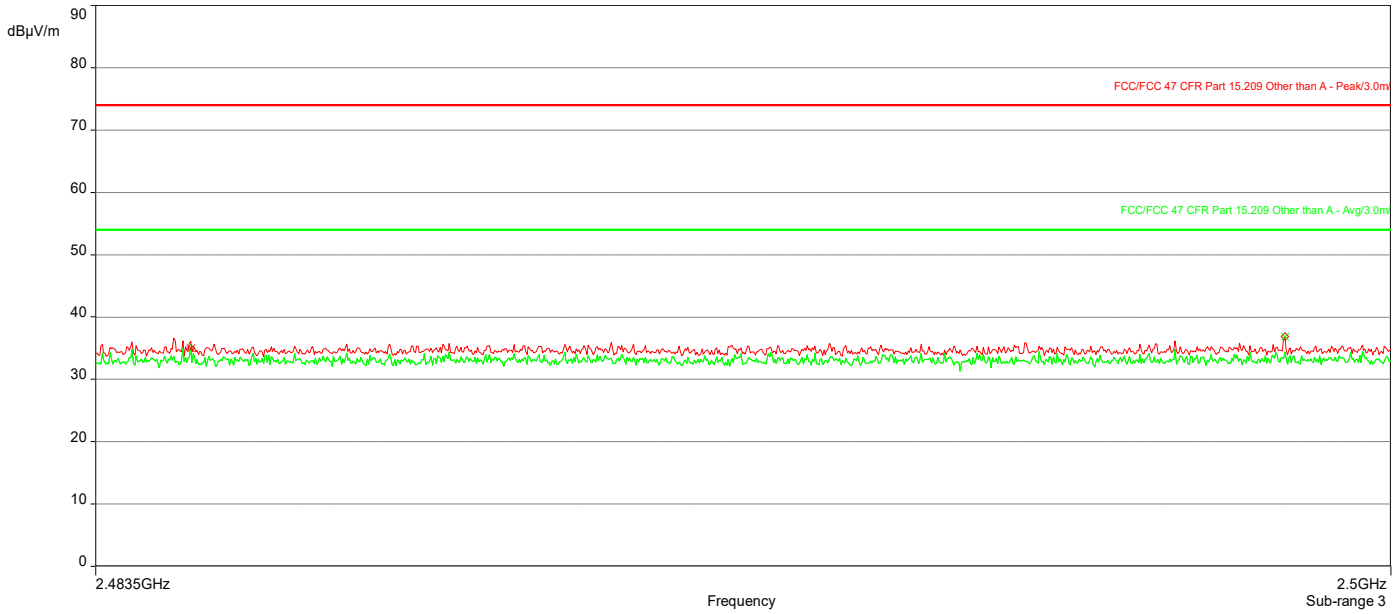
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3867968GHz	43.11	-3.15	74.00	-30.89	1.13	292.60	Vertical	Passed
2.	2.3876777GHz	37.28	-3.15	74.00	-36.72	3.77	45.20	Horizontal	Passed
3.	2.4986456GHz	36.90	-2.42	74.00	-37.10	3.19	292.60	Vertical	Passed
4.	2.4945165GHz	36.41	-2.43	74.00	-37.59	2.21	135.10	Horizontal	Passed

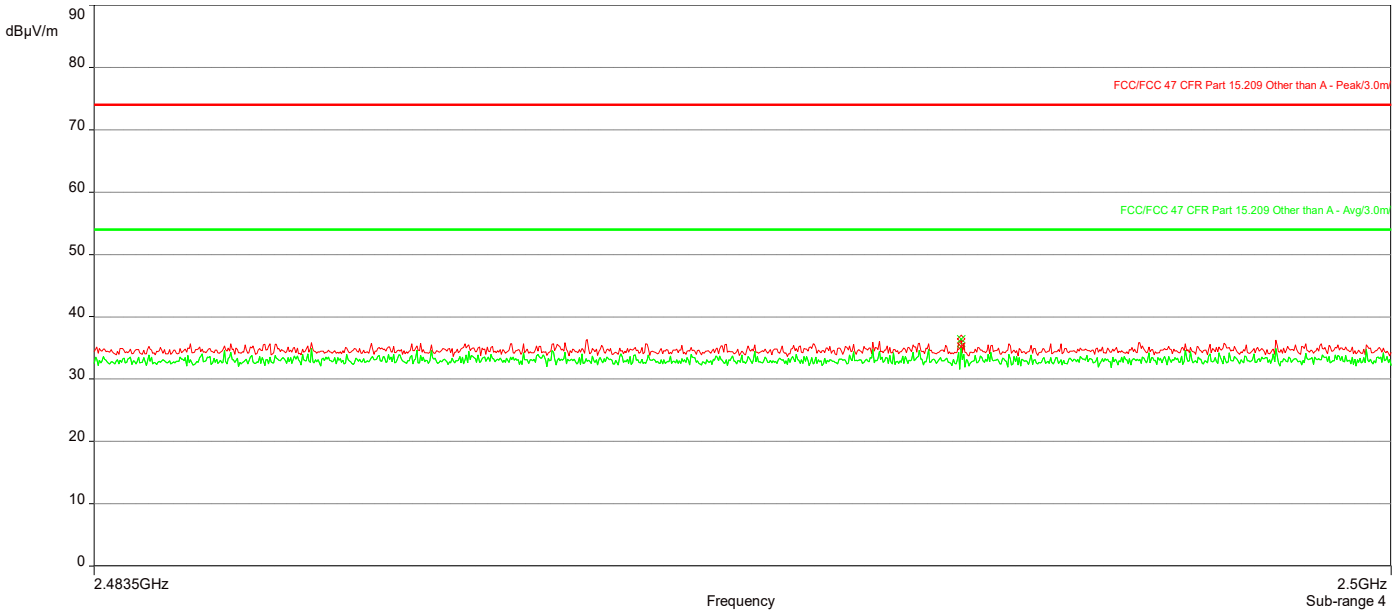
No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3855956GHz	42.55	-3.16	54.00	-11.45	1.13	292.60	Vertical	Passed
2.	2.3875976GHz	36.00	-3.15	54.00	-18.00	3.77	45.20	Horizontal	Passed
3.	2.4847057GHz	34.98	-2.47	54.00	-19.02	3.97	157.60	Vertical	Passed
4.	2.4945165GHz	35.29	-2.43	54.00	-18.71	2.21	135.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

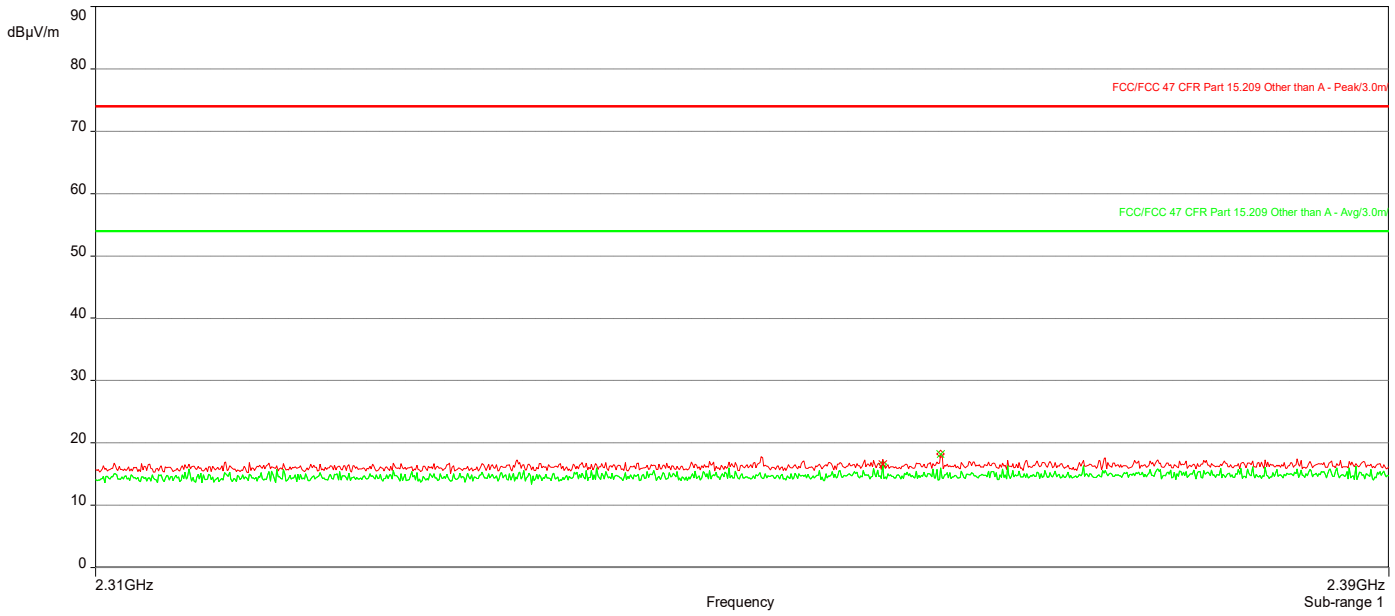
AH20110901-HAR-279-08_Restricted Bandedge_2.4G BT 8DPSK 3-DH1_2441MHz

8/26/2021 18:16:51

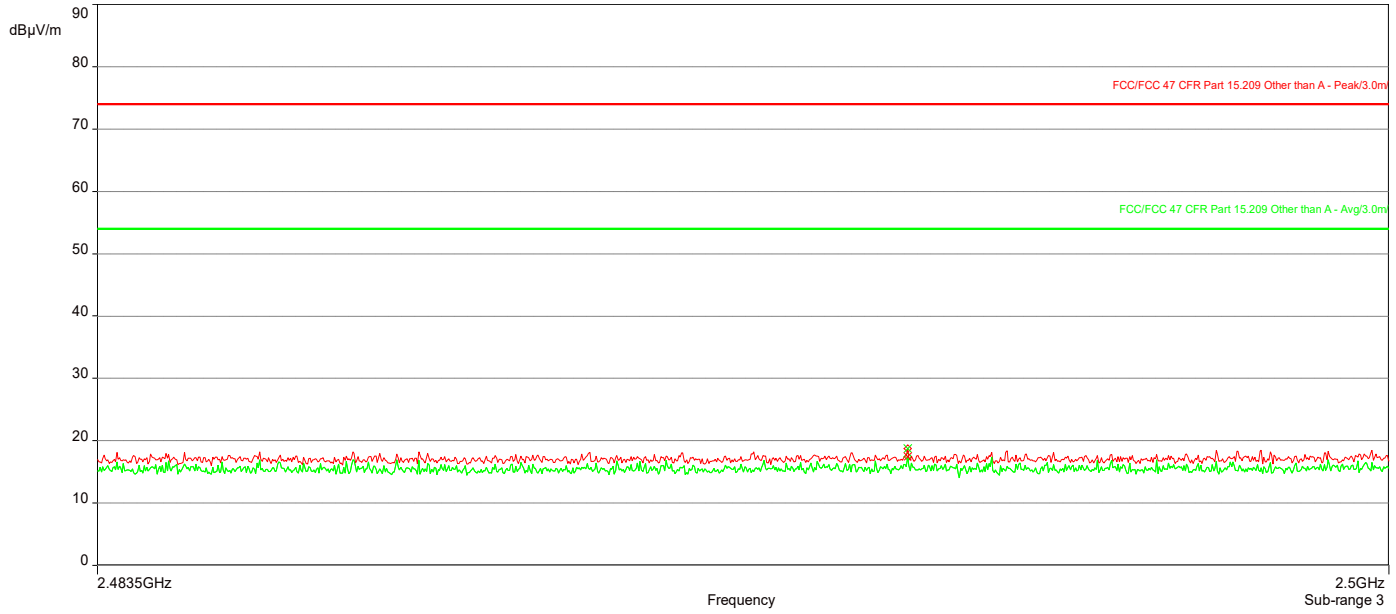
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.361972GHz	18.27	-3.29	74.00	-55.73	2.65	22.40	Vertical	Passed
2.	2.3463564GHz	18.15	-3.37	74.00	-55.85	3.14	179.90	Horizontal	Passed
3.	2.4938393GHz	18.77	-2.43	74.00	-55.23	2.84	89.90	Vertical	Passed
4.	2.4940375GHz	18.58	-2.43	74.00	-55.42	1.00	337.40	Horizontal	Passed

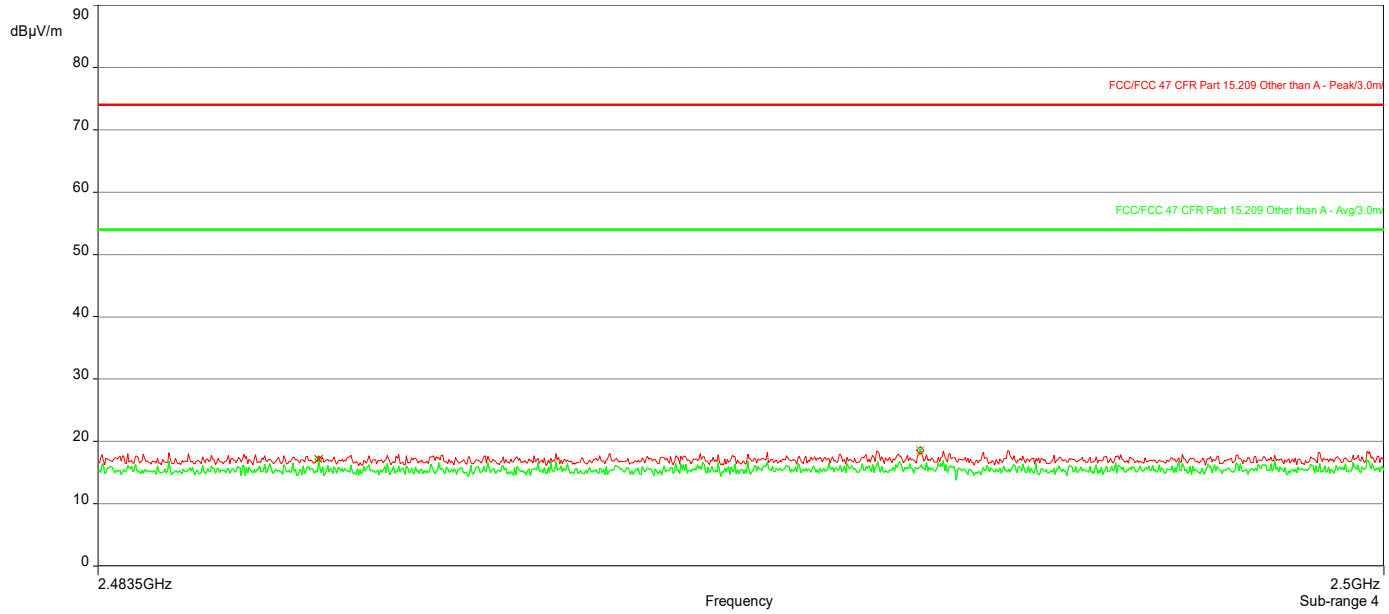
No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3583684GHz	16.63	-3.31	54.00	-37.37	3.12	224.90	Vertical	Passed
2.	2.3719019GHz	16.29	-3.24	54.00	-37.71	1.36	224.90	Horizontal	Passed
3.	2.4938393GHz	17.47	-2.43	54.00	-36.53	2.84	89.90	Vertical	Passed
4.	2.4863243GHz	17.23	-2.46	54.00	-36.77	2.84	247.40	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

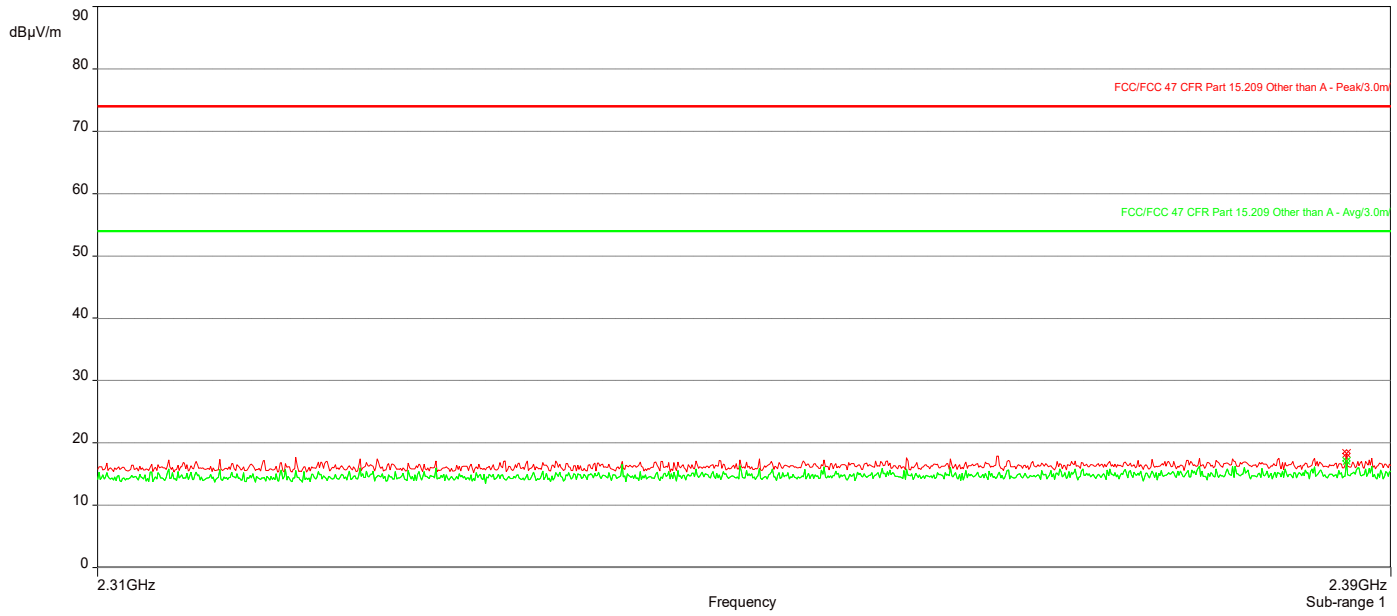
AH20110901-HAR-279-08_Restricted Bandedge_2.4G BT 8DPSK 3-DH1_2480MHz

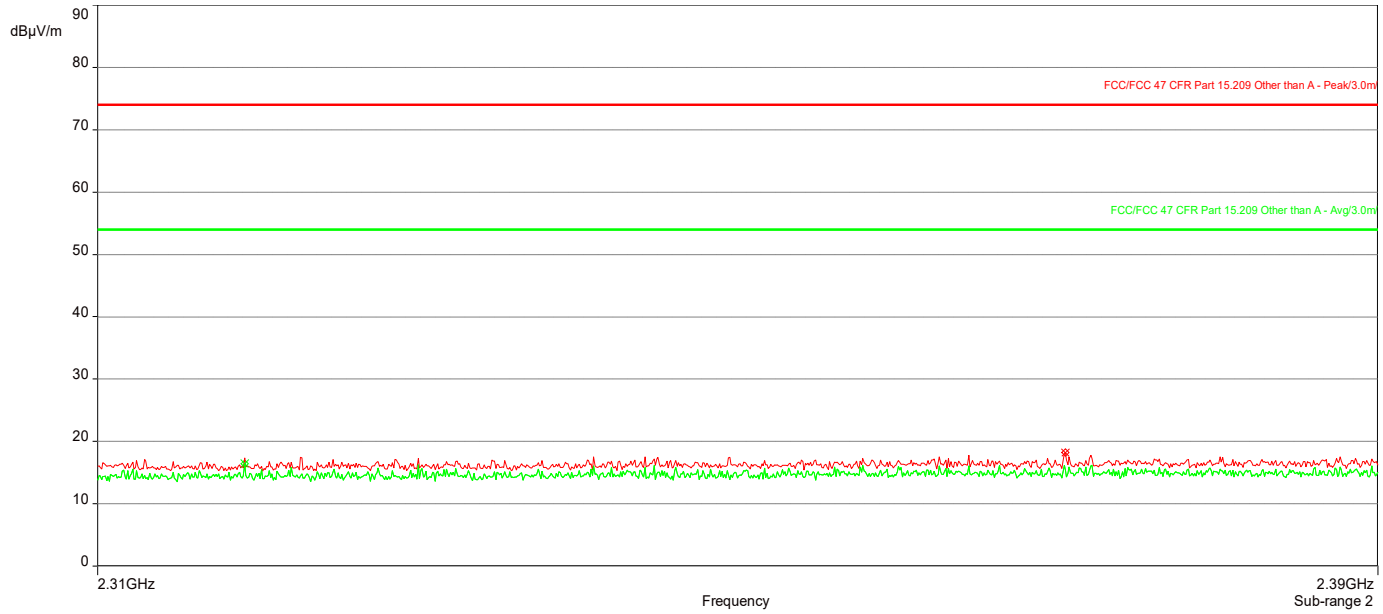
8/26/2021 17:32:17

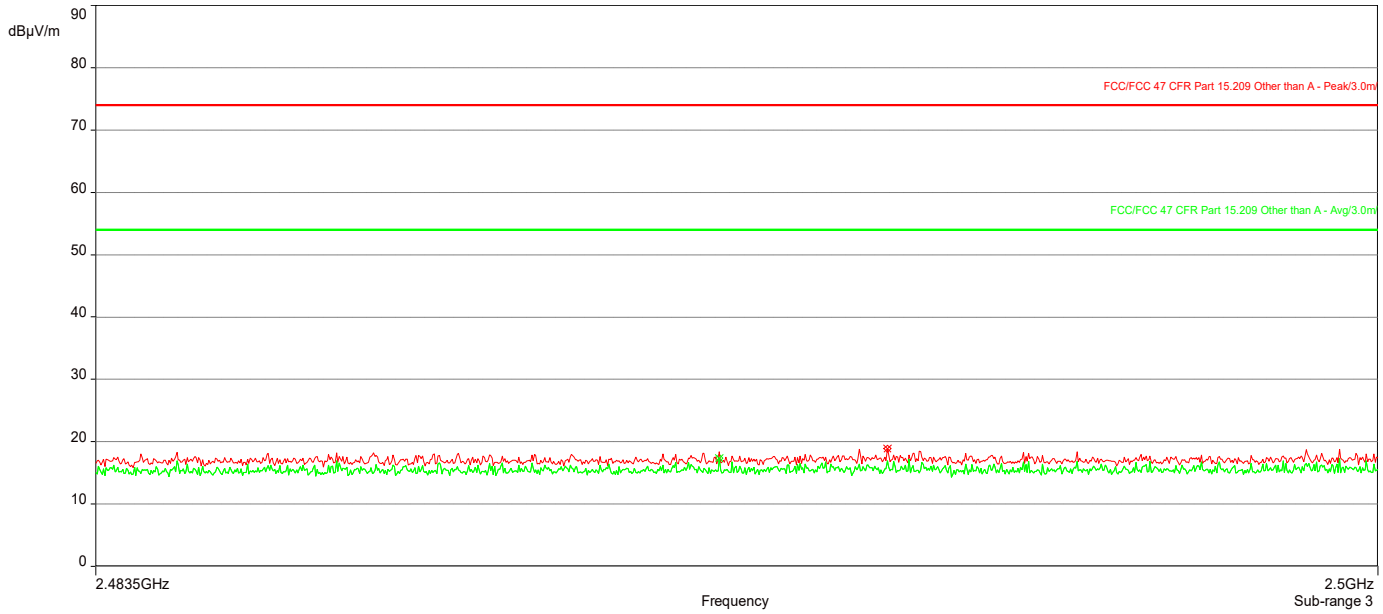
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3871972GHz	18.31	-3.15	74.00	-55.69	1.02	0.10	Vertical	Passed
2.	2.3702202GHz	18.23	-3.25	74.00	-55.77	1.02	337.40	Horizontal	Passed
3.	2.4936742GHz	18.89	-2.43	74.00	-55.11	2.69	337.40	Vertical	Passed
4.	2.4982823GHz	19.00	-2.42	74.00	-55.00	1.99	67.60	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	2.3871972GHz	17.11	-3.15	54.00	-36.89	1.02	0.10	Vertical	Passed
2	2.319049GHz	16.42	-3.48	54.00	-37.58	3.39	157.60	Horizontal	Passed
3	2.4915105GHz	17.39	-2.44	54.00	-36.61	3.70	90.10	Vertical	Passed
4	2.4982823GHz	17.69	-2.42	54.00	-36.31	1.99	67.60	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

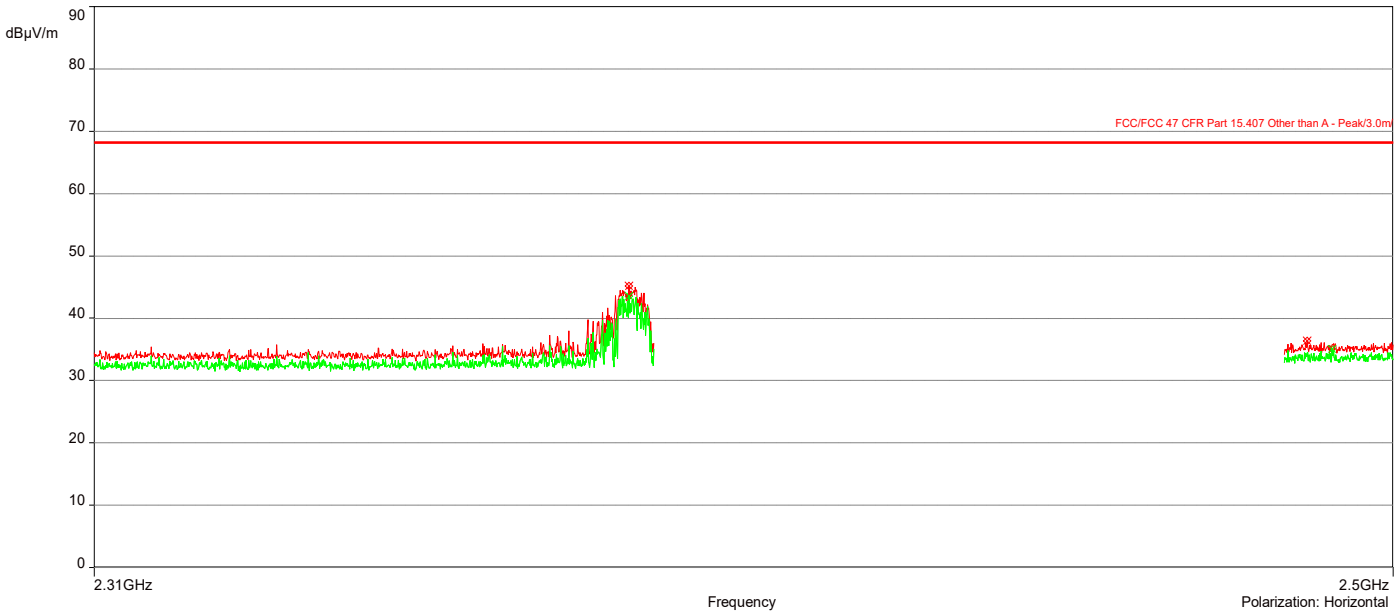
AH20110901-HAR-279-08_Unrestricted Bandedge_2.4G BT GFSK DH1_2402MHz

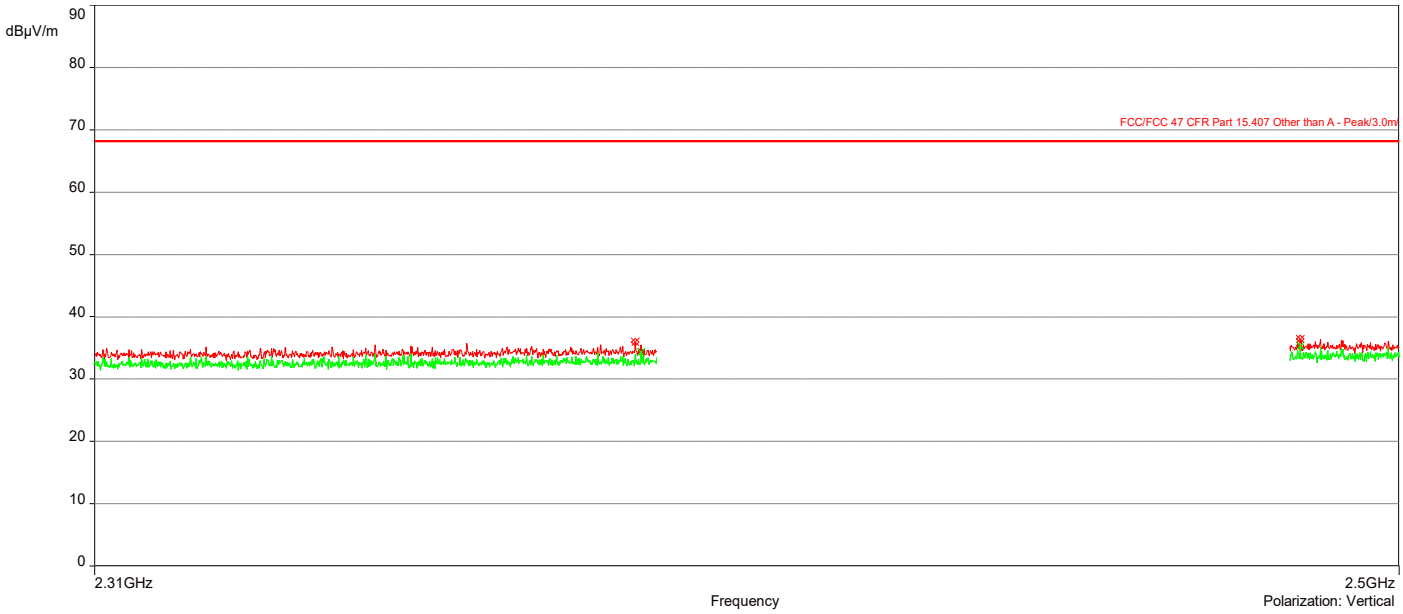
8/26/2021 09:05:54

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.386957GHz	35.93	-3.15	68.23	-32.30	2.50	358.90	Vertical	Passed
2.	2.3863964GHz	45.17	-3.16	68.23	-23.06	3.00	323.30	Horizontal	Passed
3.	2.4850526GHz	36.45	-2.47	68.23	-31.78	3.50	206.50	Vertical	Passed
4.	2.486985GHz	36.40	-2.46	68.23	-31.83	3.50	0.10	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3877578GHz	34.35	-3.15	54.00	-19.65	2.00	346.80	Vertical	Passed
2.	2.3863964GHz	43.55	-3.16	54.00	-10.45	3.00	323.30	Horizontal	Passed
3.	2.4850526GHz	35.36	-2.47	54.00	-18.64	3.50	206.50	Vertical	Passed
4.	2.4907508GHz	35.07	-2.45	54.00	-18.93	1.00	231.30	Horizontal	Passed

Overall Graphs:



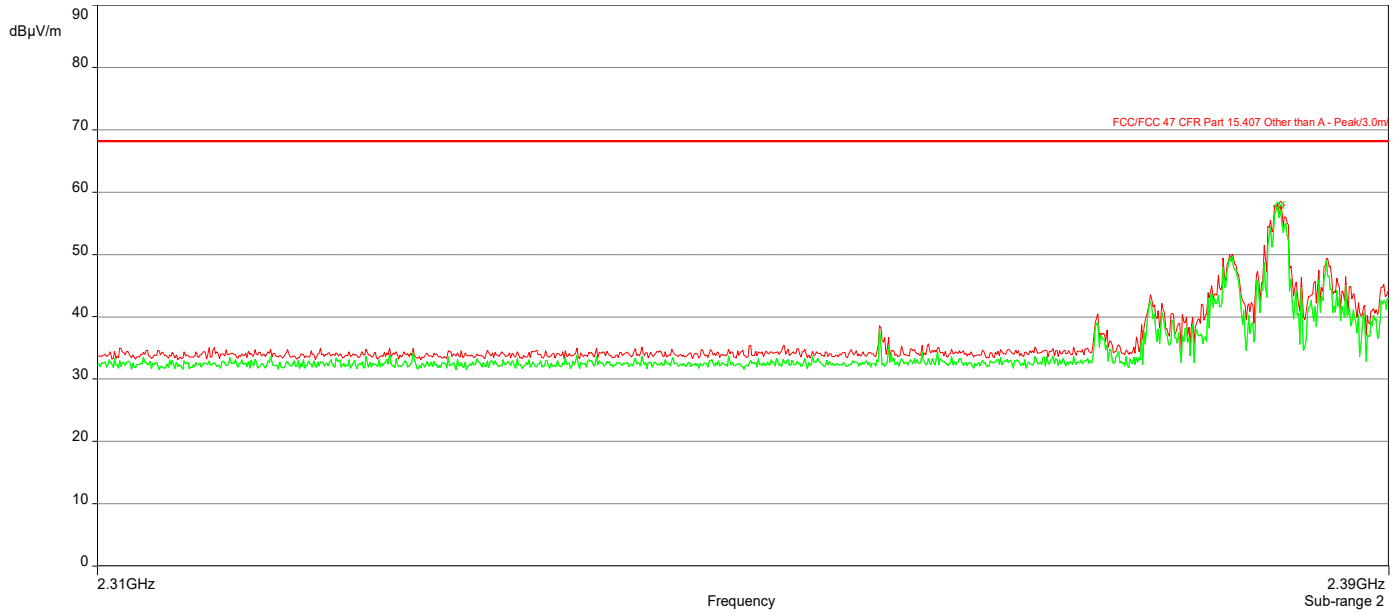

dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

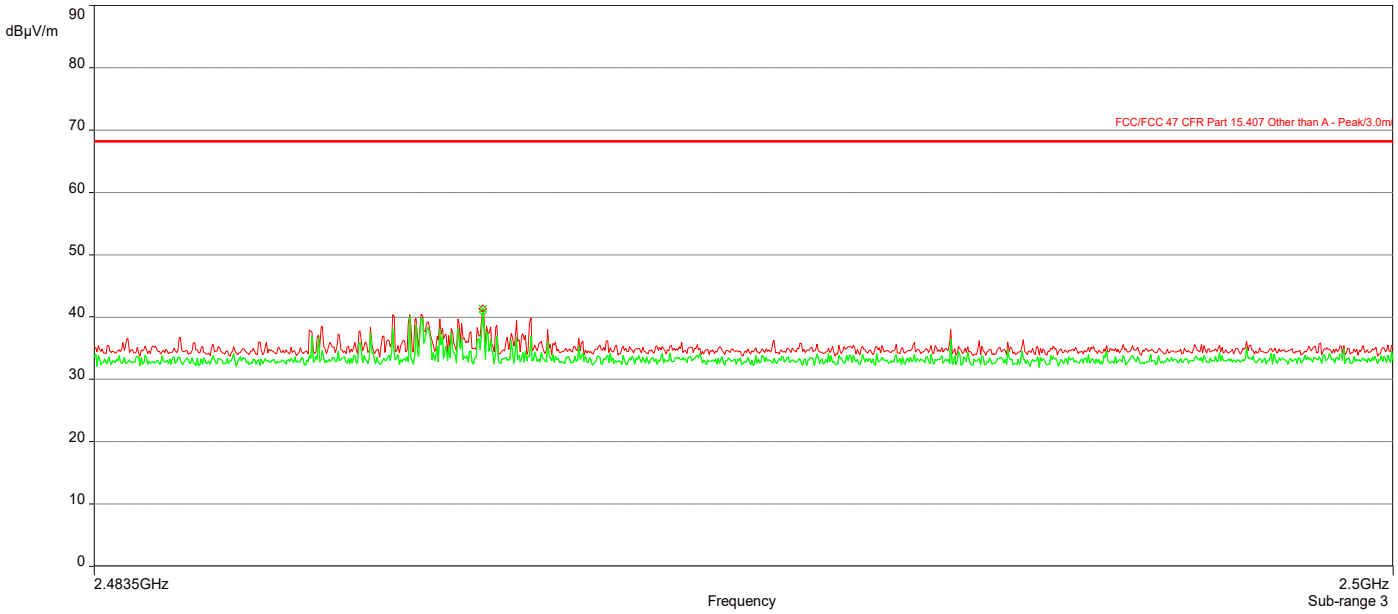
AH20110901-HAR-279-08_Unrestricted Bandedge_2.4G BT GFSK DH1_2441MHz

8/26/2021 10:32:25

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.39GHz	47.12	-3.13	68.23	-21.11	3.00	278.20	Vertical	Passed
2.	2.3831932GHz	57.92	-3.17	68.23	-10.31	4.00	264.40	Horizontal	Passed
3.	2.4884219GHz	41.33	-2.45	68.23	-26.90	3.50	50.50	Vertical	Passed
4.	2.4945GHz	37.02	-2.43	68.23	-31.21	1.00	191.70	Horizontal	Passed

Overall Graphs:


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3

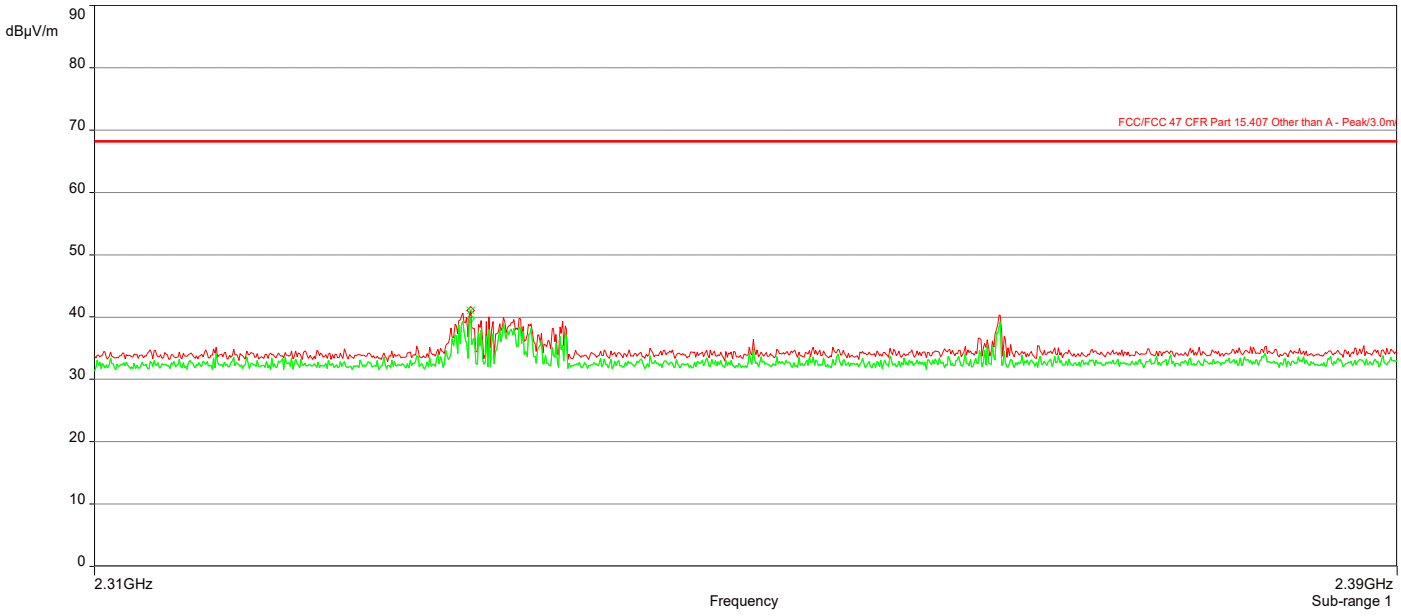

dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

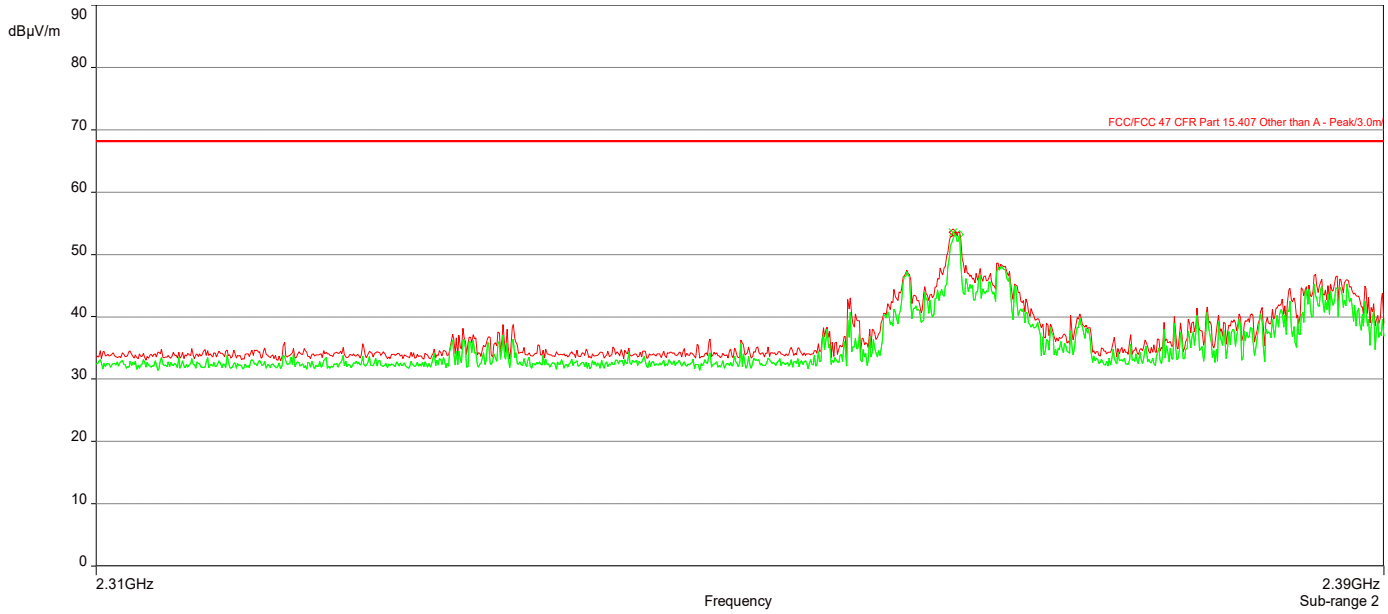
AH20110901-HAR-279-08_Unrestricted Bandedge_2.4G BT GFSK DH1_2480MHz

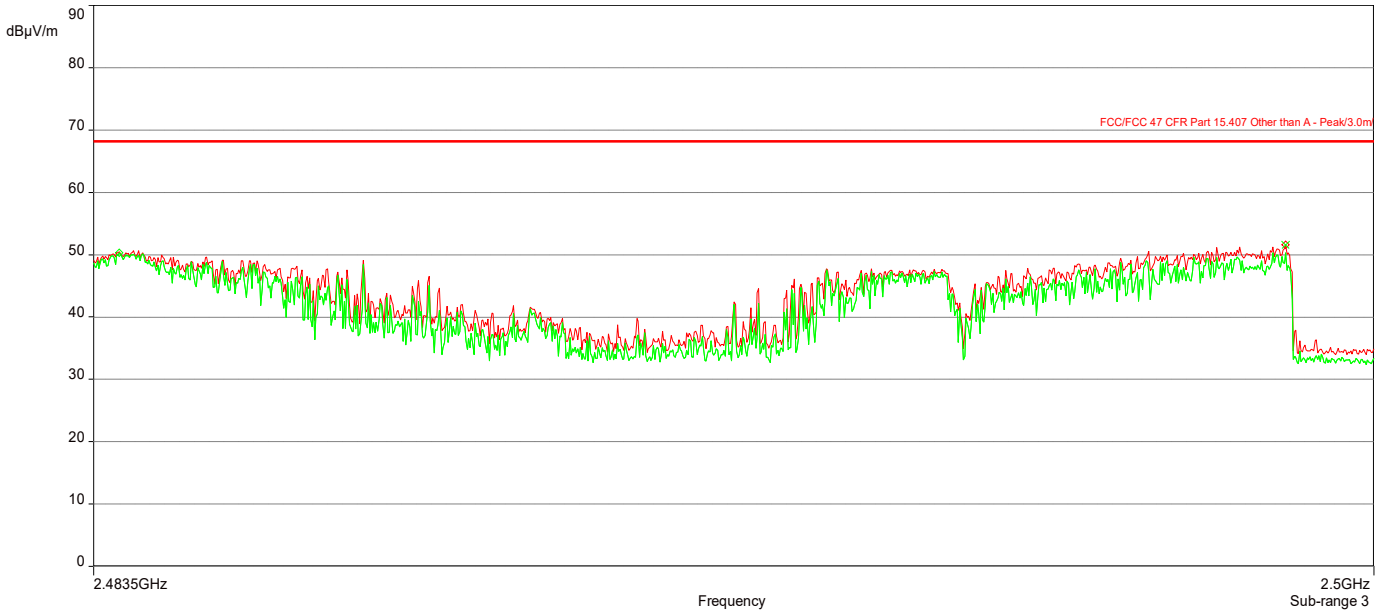
8/26/2021 12:44:55

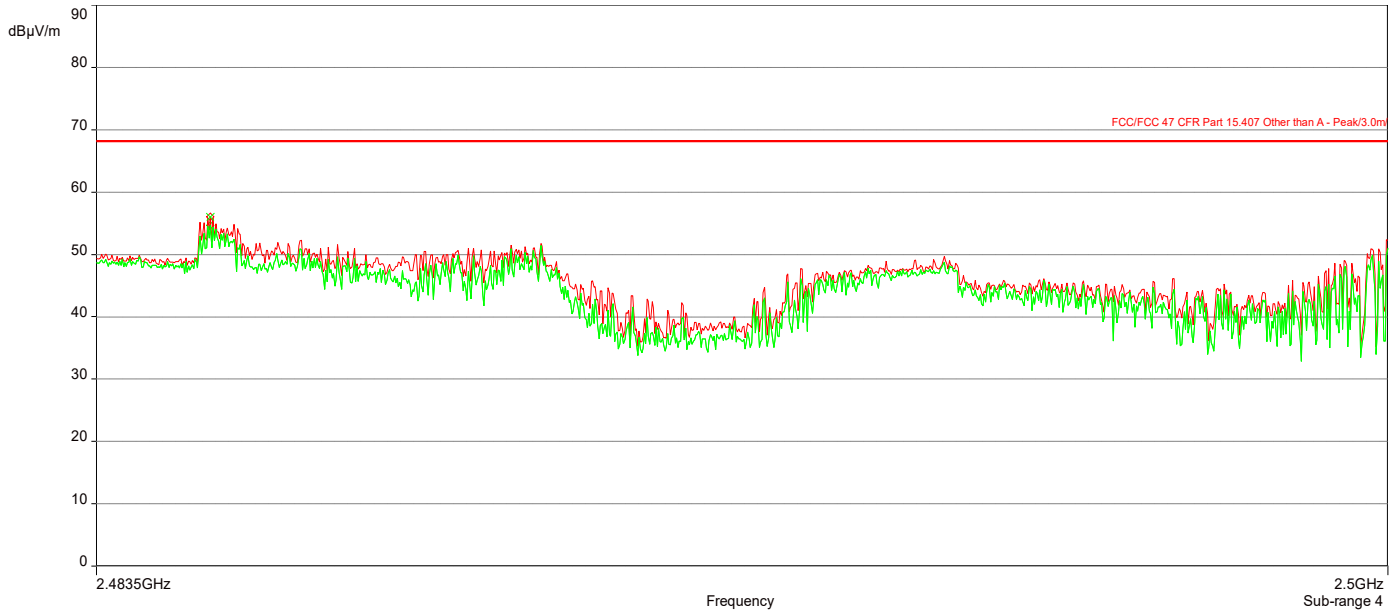
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3328228GHz	41.11	-3.43	68.23	-27.12	1.82	270.10	Vertical	Passed
2.	2.3629329GHz	53.60	-3.28	68.23	-14.63	1.91	135.10	Horizontal	Passed
3.	2.4988604GHz	51.55	-2.41	68.23	-16.68	3.86	90.00	Vertical	Passed
4.	2.4849535GHz	56.06	-2.47	68.23	-12.17	2.49	247.60	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3

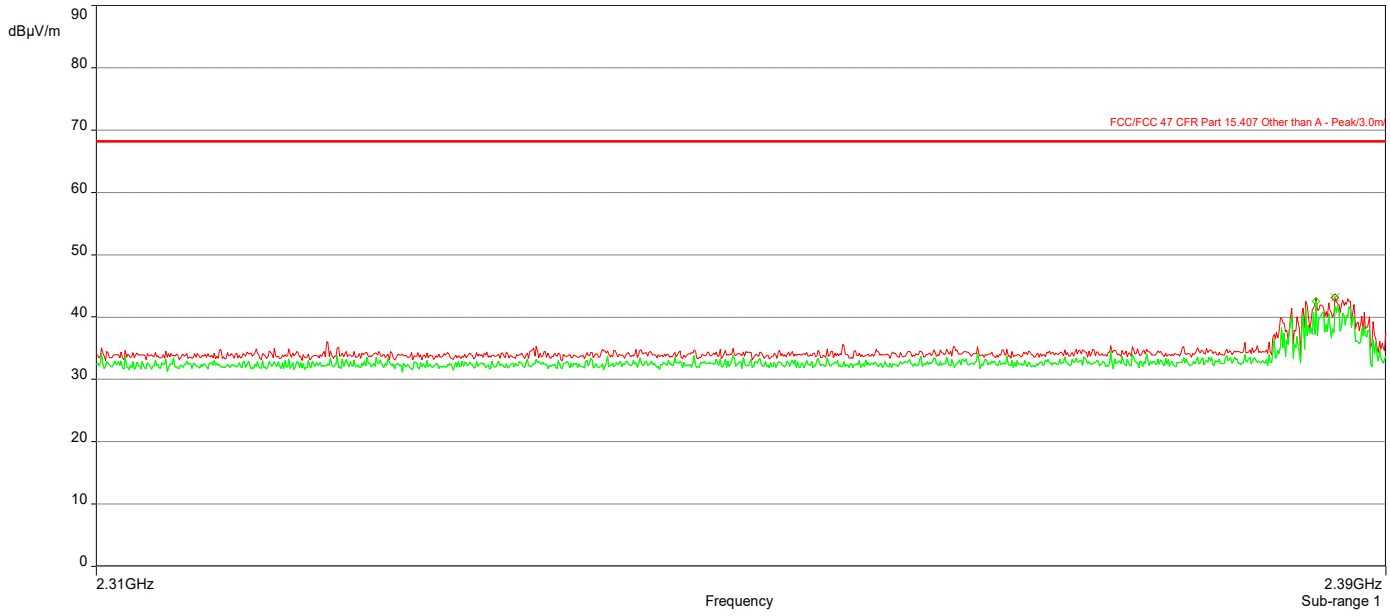

dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

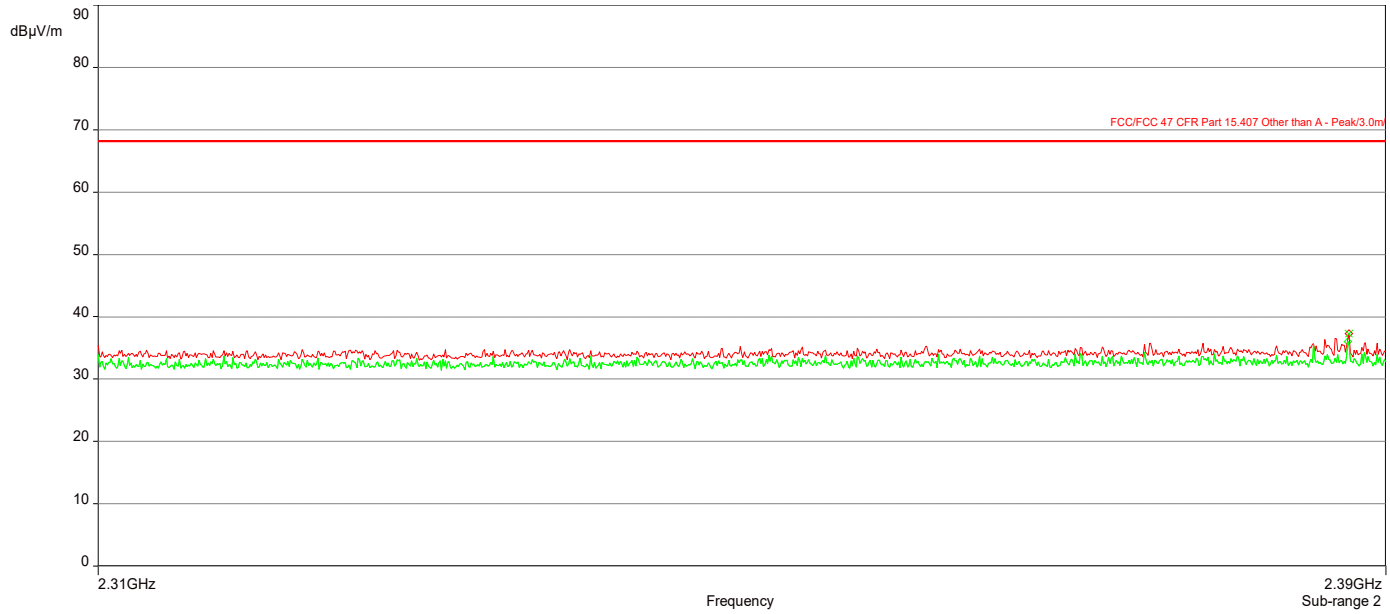
AH20110901-HAR-279-08_Unrestricted Bandedge_2.4G BT 8DPSK 3-DH1_2402MHz

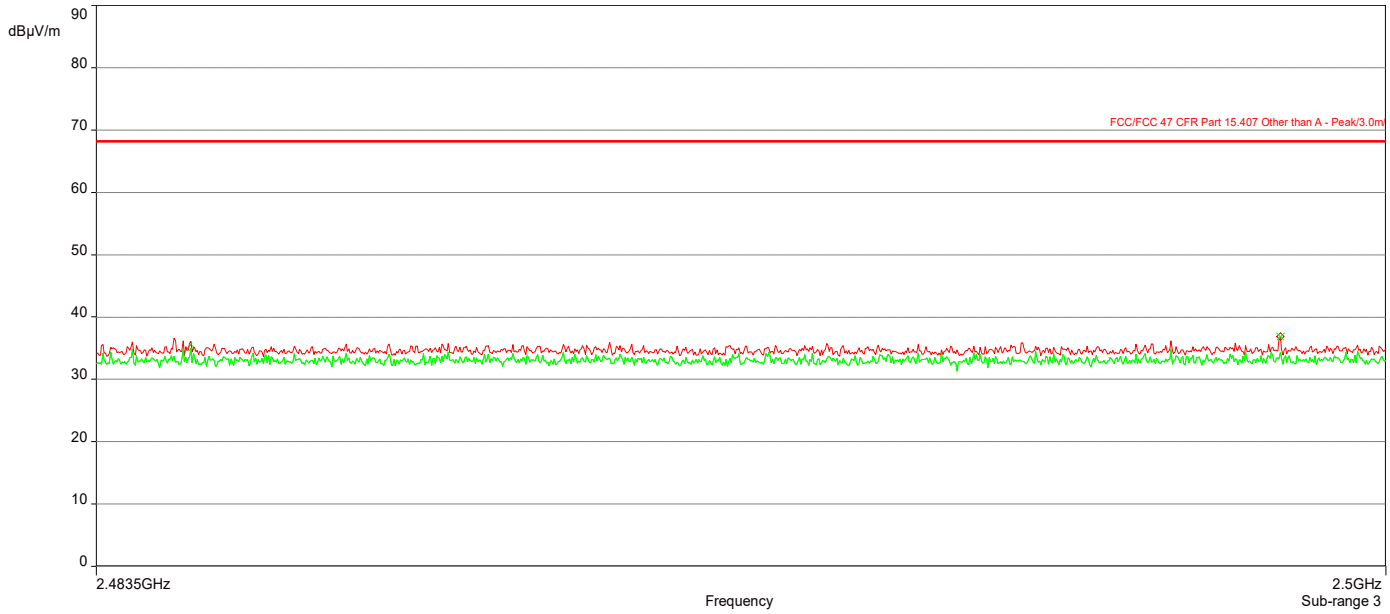
8/26/2021 13:46:51

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3867968GHz	43.11	-3.15	68.23	-25.12	1.13	292.60	Vertical	Passed
2.	2.3876777GHz	37.28	-3.15	68.23	-30.95	3.77	45.20	Horizontal	Passed
3.	2.4986456GHz	36.90	-2.42	68.23	-31.33	3.19	292.60	Vertical	Passed
4.	2.4945165GHz	36.41	-2.43	68.23	-31.82	2.21	135.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3

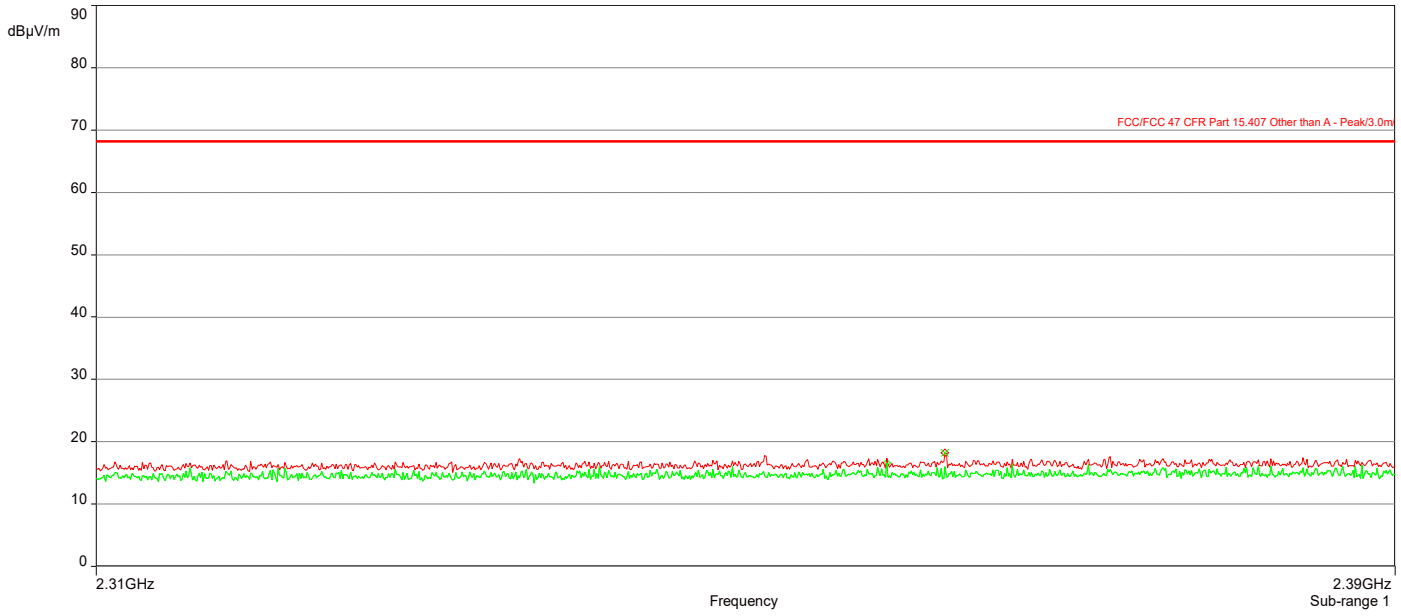

dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

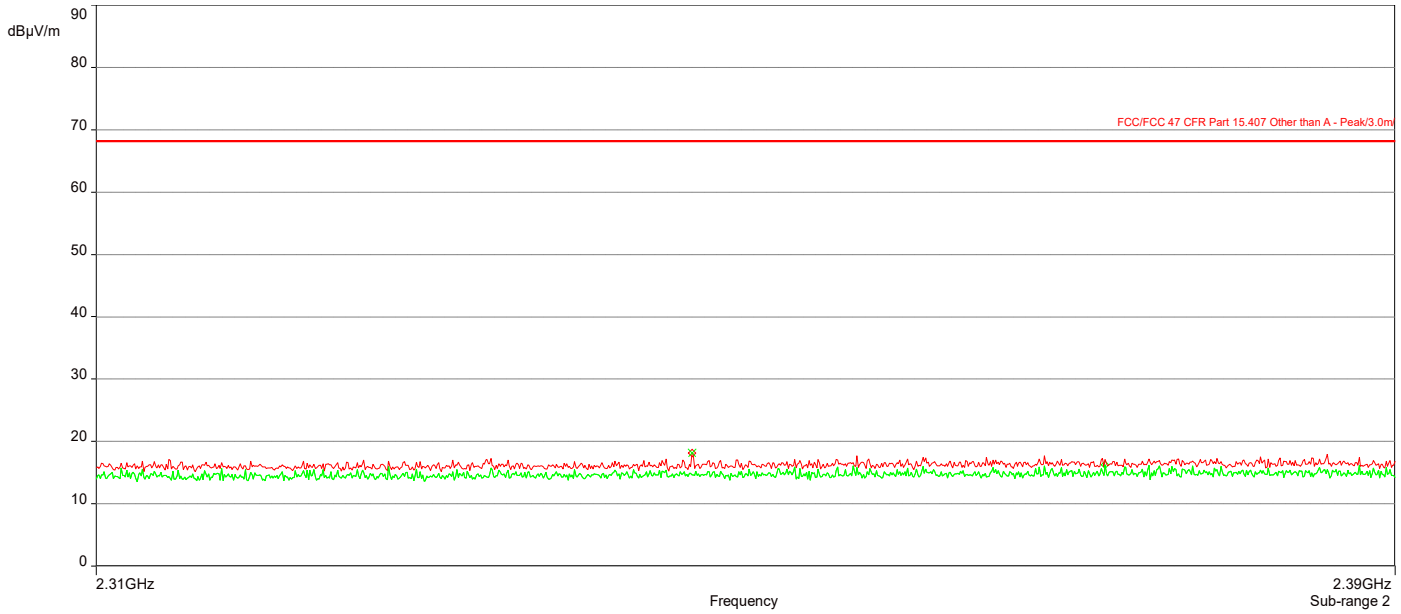
AH20110901-HAR-279-08_Unrestricted Bandedge_2.4G BT 8DPSK 3-DH1_2441MHz

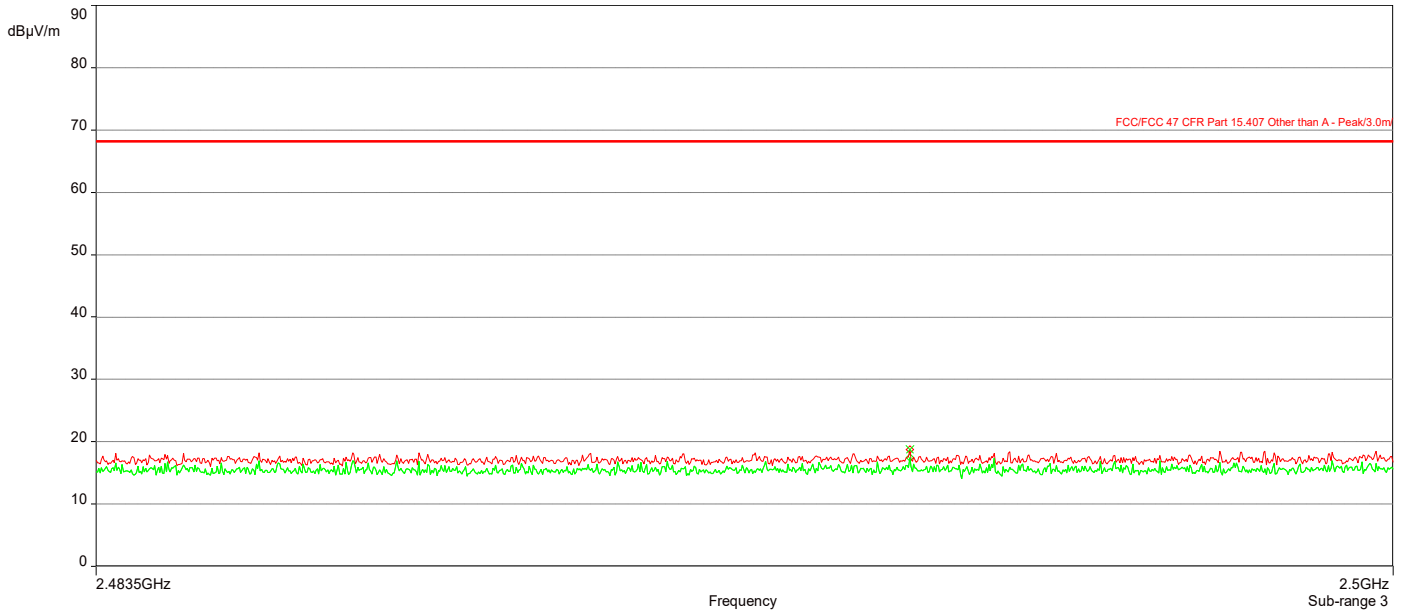
8/26/2021 18:16:51

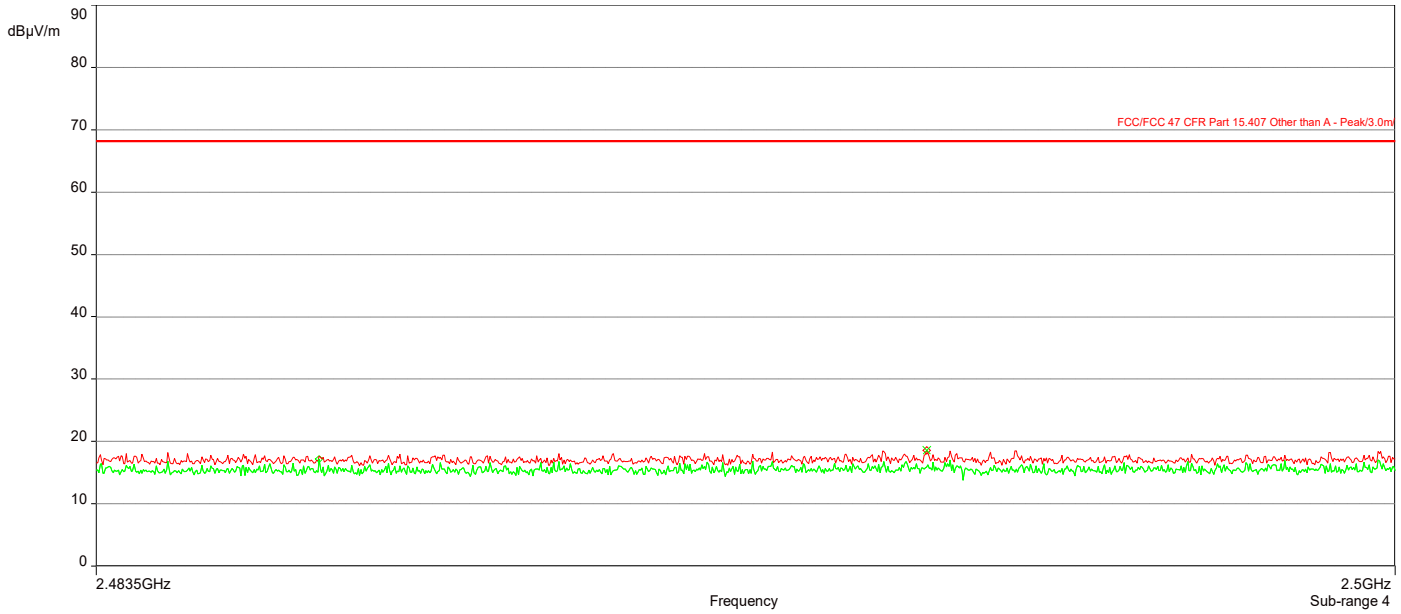
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.361972GHz	18.27	-3.29	68.23	-49.96	2.65	22.40	Vertical	Passed
2.	2.3463564GHz	18.15	-3.37	68.23	-50.08	3.14	179.90	Horizontal	Passed
3.	2.4938393GHz	18.77	-2.43	68.23	-49.46	2.84	89.90	Vertical	Passed
4.	2.4940375GHz	18.58	-2.43	68.23	-49.65	1.00	337.40	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3

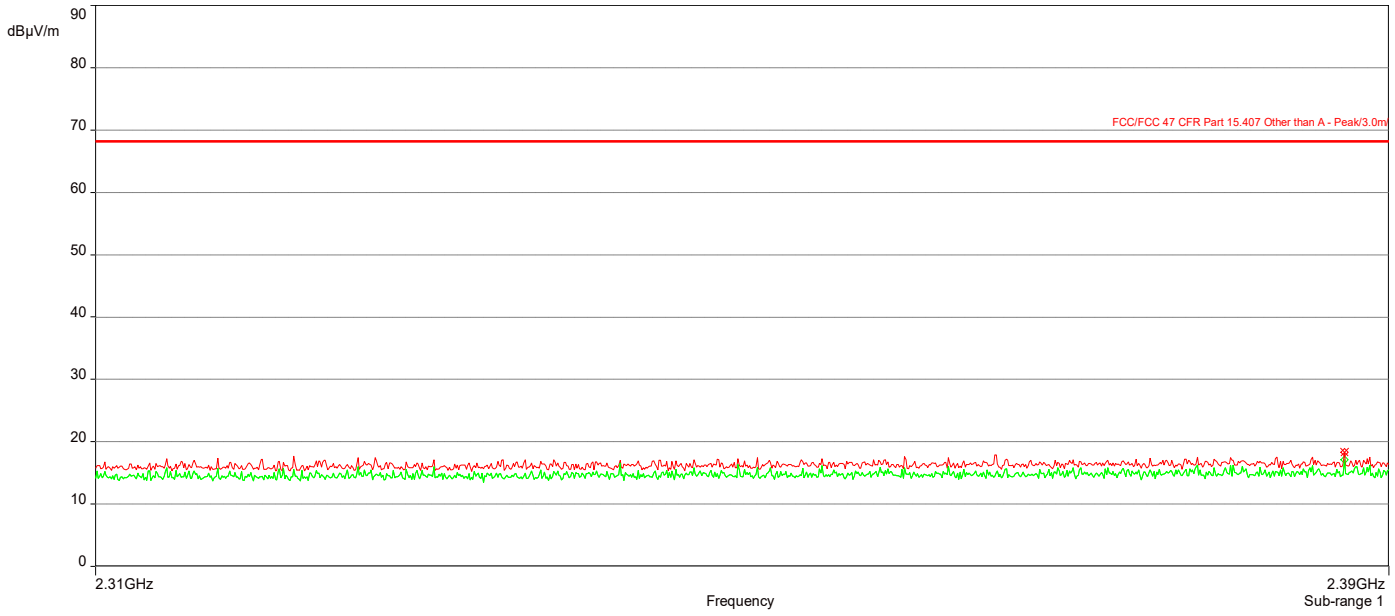

dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

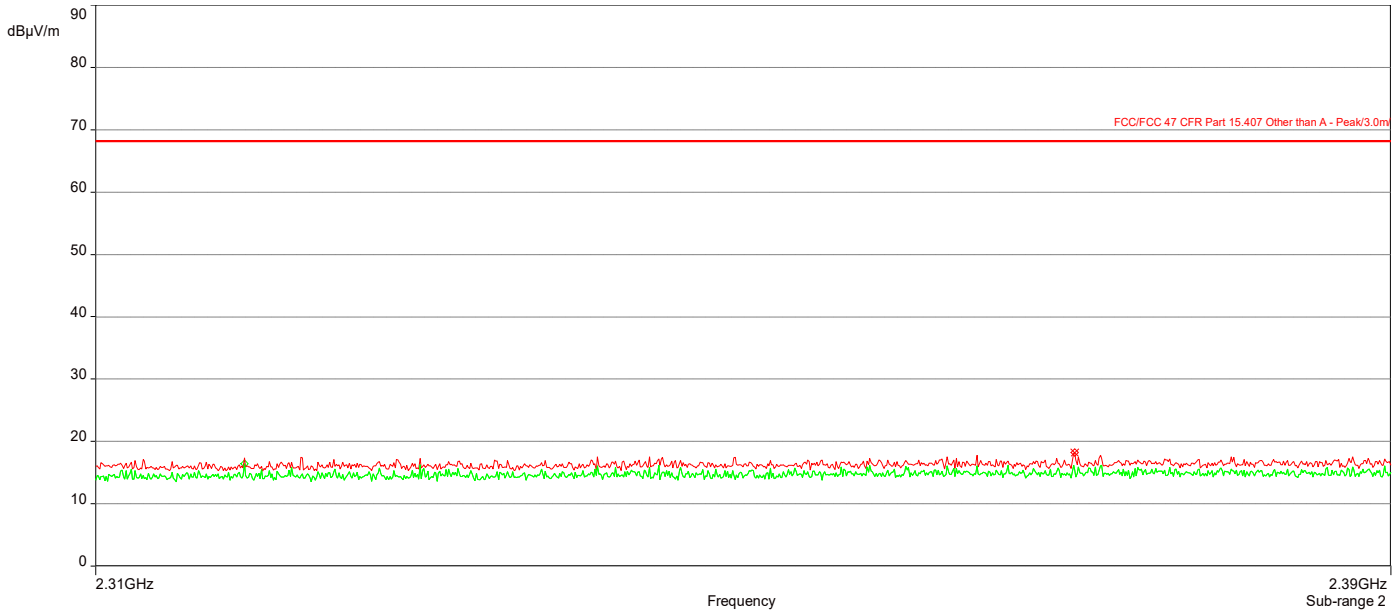
AH20110901-HAR-279-08_Unrestricted Bandedge_2.4G BT 8DPSK 3-DH1_2480MHz

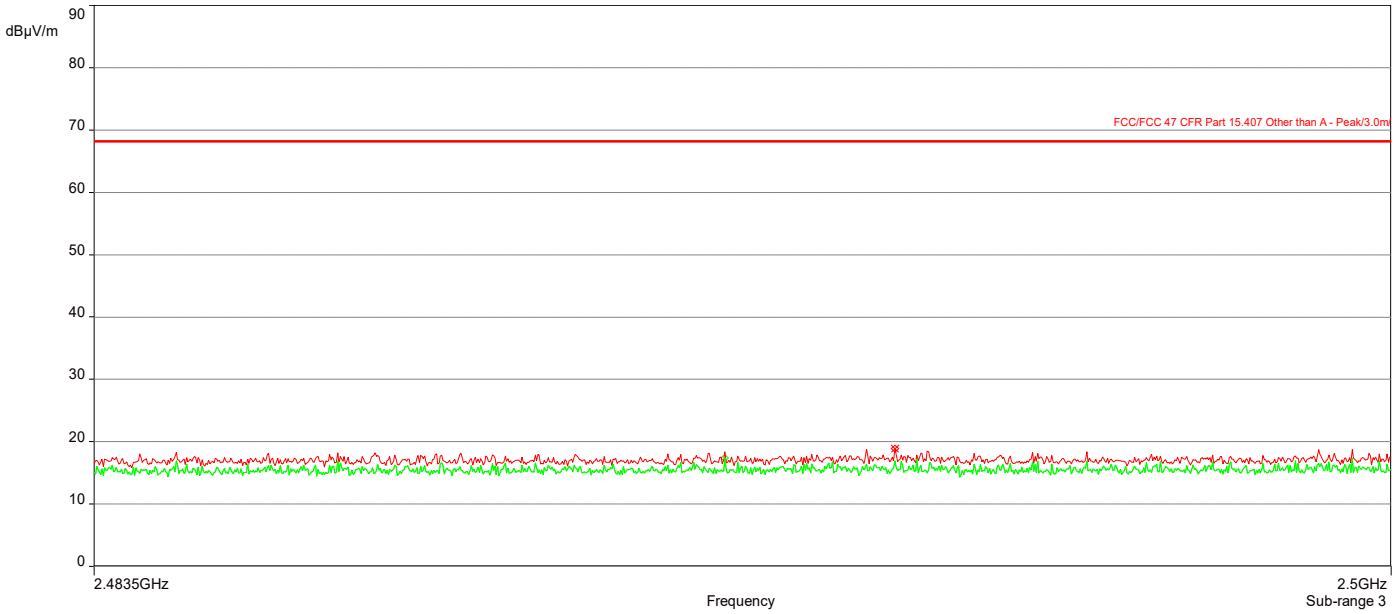
8/26/2021 17:32:17

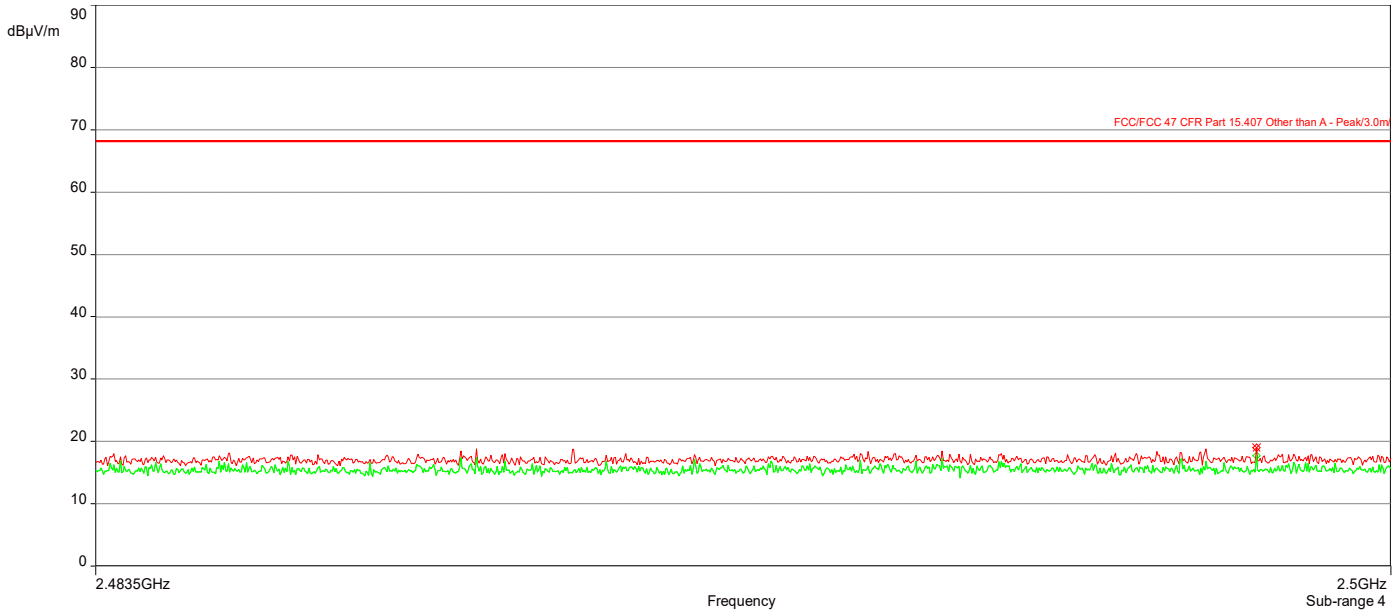
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3871972GHz	18.31	-3.15	68.23	-49.92	1.02	0.10	Vertical	Passed
2.	2.3702202GHz	18.23	-3.25	68.23	-50.00	1.02	337.40	Horizontal	Passed
3.	2.4936742GHz	18.89	-2.43	68.23	-49.34	2.69	337.40	Vertical	Passed
4.	2.4982823GHz	19.00	-2.42	68.23	-49.23	1.99	67.60	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.407 Other than A - Peak/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

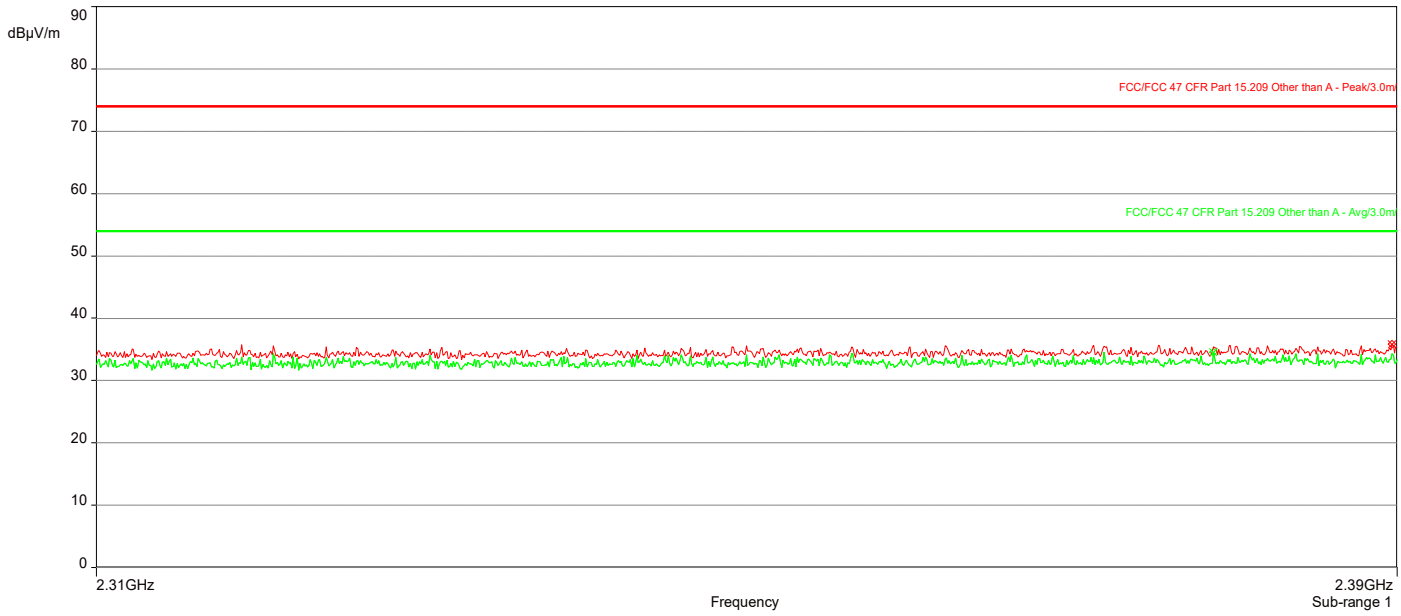
AH20110901-HAR-279-08_Bandedge_BT_GFSK_2402MHz_DH1

8/12/2021 12:16:43

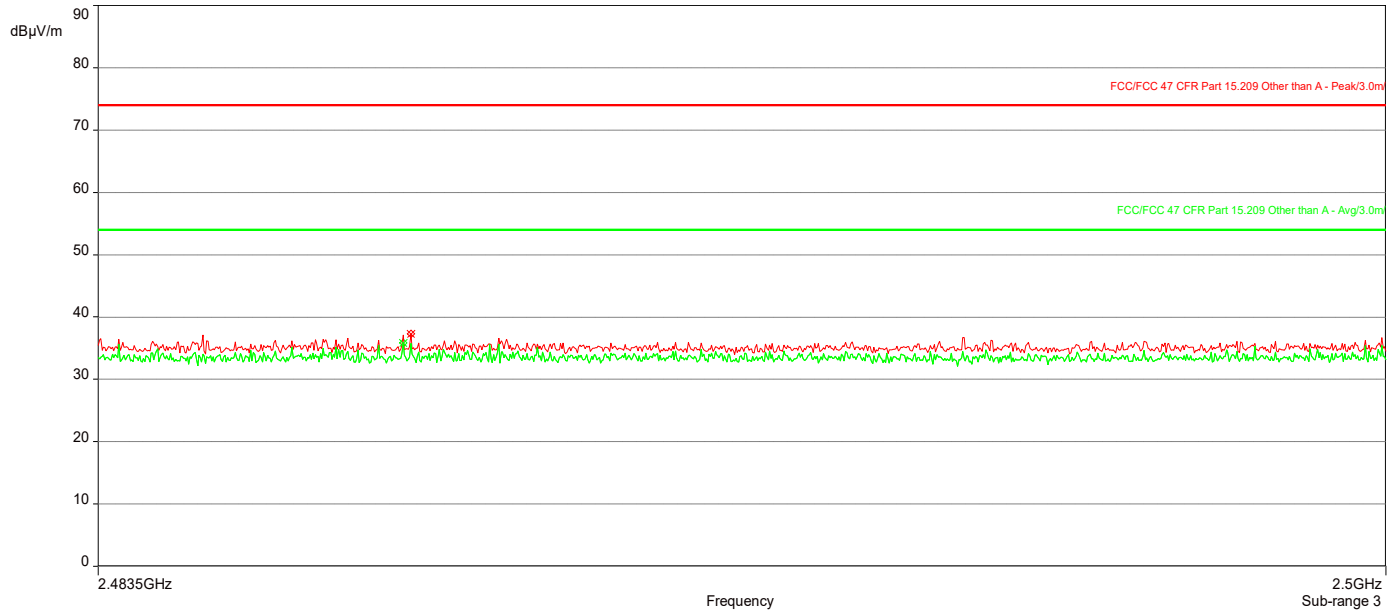
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
5.	2.3896797GHz	35.83	-2.81	74.00	-38.17	2.00	106.10	Vertical	Passed
6.	2.3871972GHz	45.78	-2.83	74.00	-28.22	2.50	142.40	Horizontal	Passed
7.	2.487497GHz	37.32	-2.12	74.00	-36.68	1.50	256.30	Vertical	Passed
8.	2.4835826GHz	42.76	-2.13	74.00	-31.24	3.50	201.60	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
5.	2.3785485GHz	34.60	-2.88	54.00	-19.40	1.50	358.90	Vertical	Passed
6.	2.3856757GHz	44.52	-2.84	54.00	-9.48	2.50	142.40	Horizontal	Passed
7.	2.4873979GHz	35.86	-2.12	54.00	-18.14	2.50	303.50	Vertical	Passed
8.	2.4835826GHz	41.97	-2.13	54.00	-12.03	3.50	201.60	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
2.5GHz
Frequency
Sub-range 4

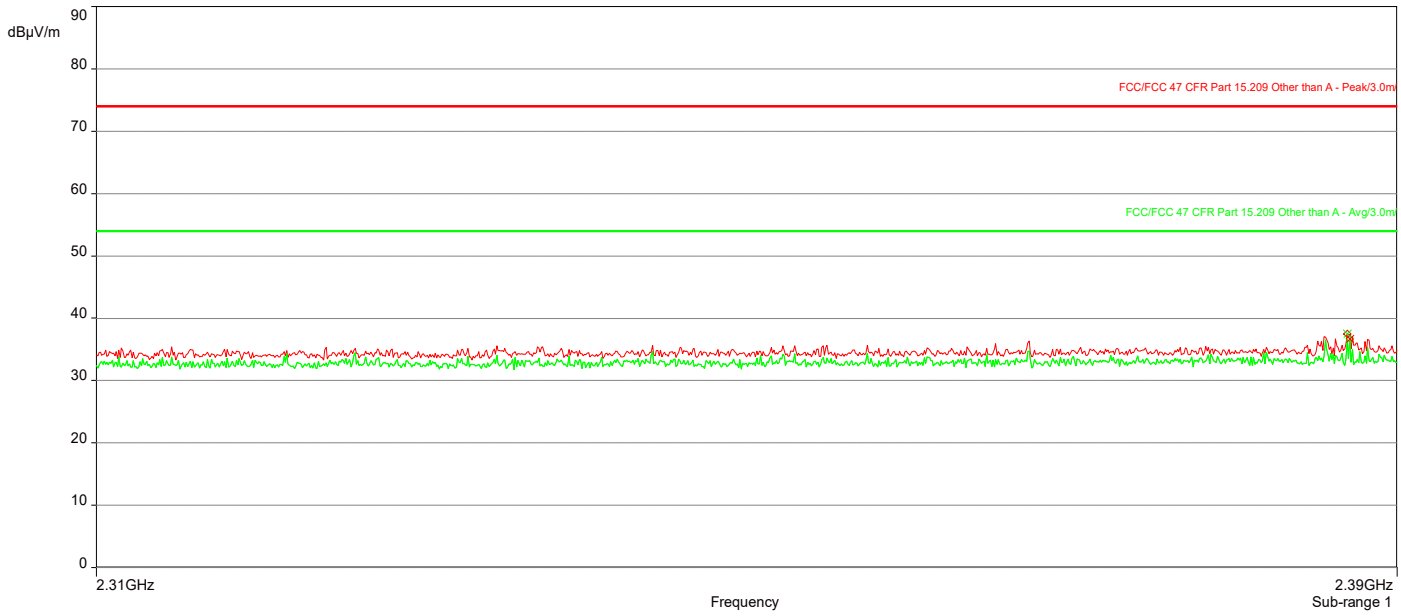
AH20110901-HAR-279-08_Bandedge_BT_GFSK_2480MHz_DH1

8/12/2021 11:30:05

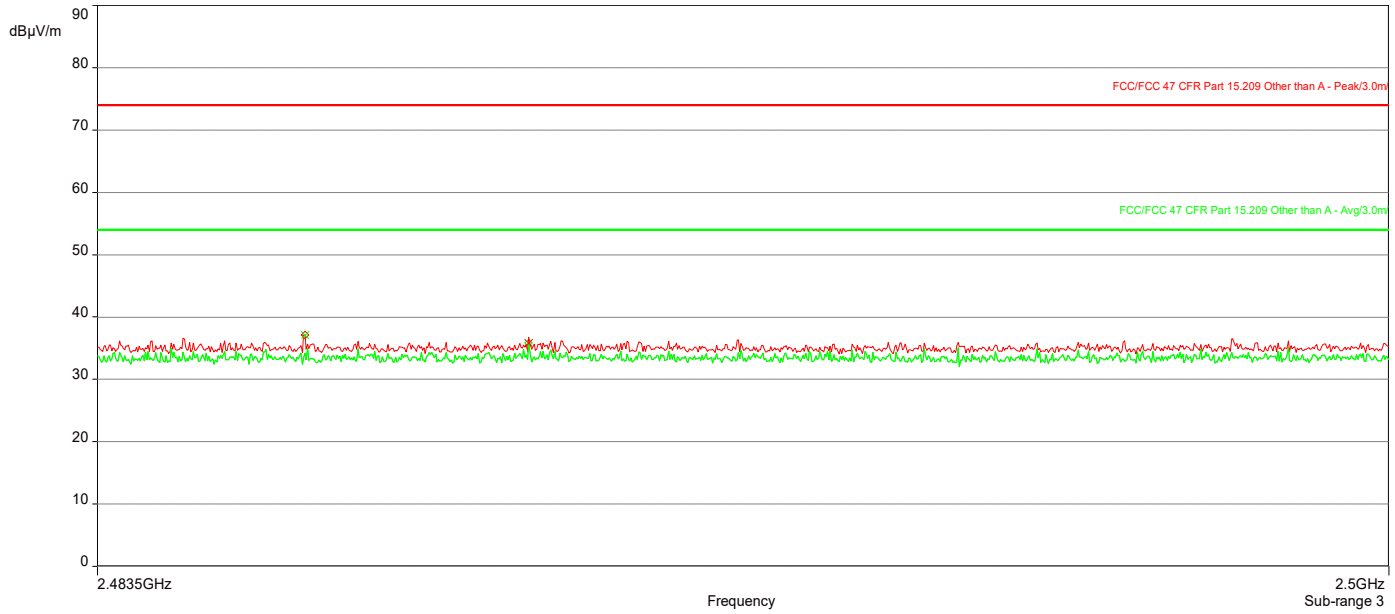
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3868769GHz	37.47	-2.83	74.00	-36.53	3.00	172.50	Vertical	Passed
2.	2.3882382GHz	38.08	-2.82	74.00	-35.92	2.00	189.60	Horizontal	Passed
3.	2.4861426GHz	37.17	-2.12	74.00	-36.83	4.00	135.80	Vertical	Passed
4.	2.4968123GHz	36.74	-2.08	74.00	-37.26	1.00	255.60	Horizontal	Passed

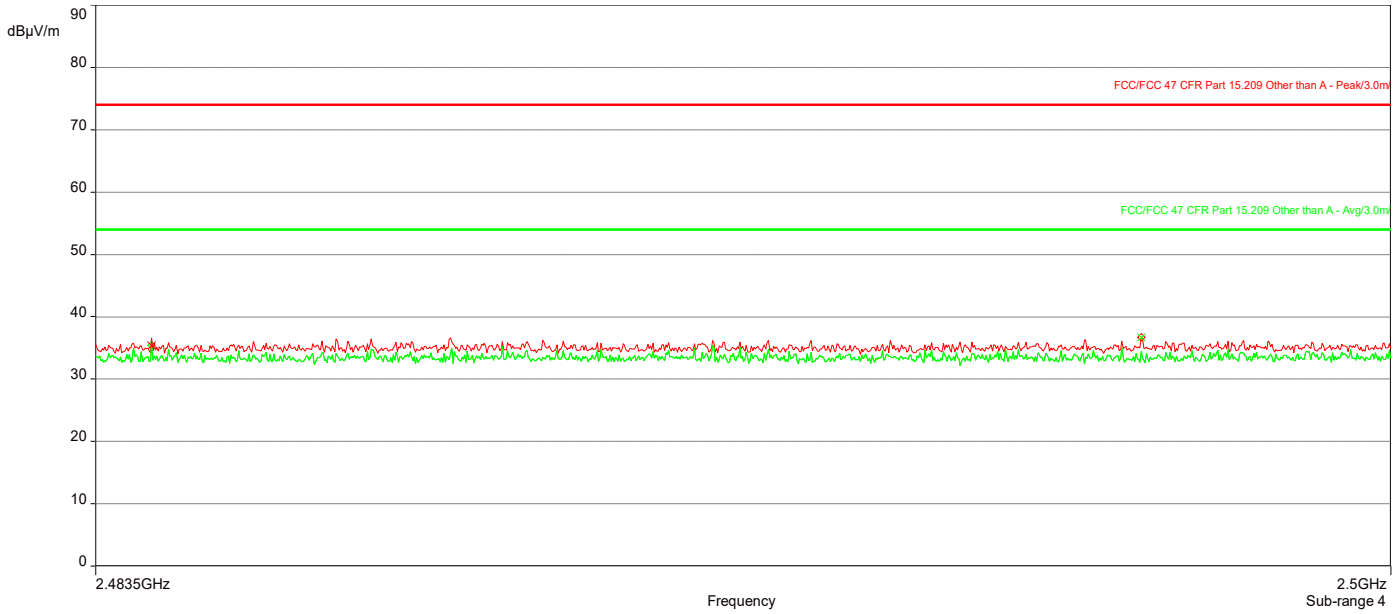
No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.387037GHz	36.75	-2.83	54.00	-17.25	3.00	172.50	Vertical	Passed
2.	2.3881582GHz	36.14	-2.82	54.00	-17.86	2.00	189.60	Horizontal	Passed
3.	2.489GHz	35.87	-2.11	54.00	-18.13	1.00	57.50	Vertical	Passed
4.	2.4842102GHz	35.41	-2.13	54.00	-18.59	1.50	103.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

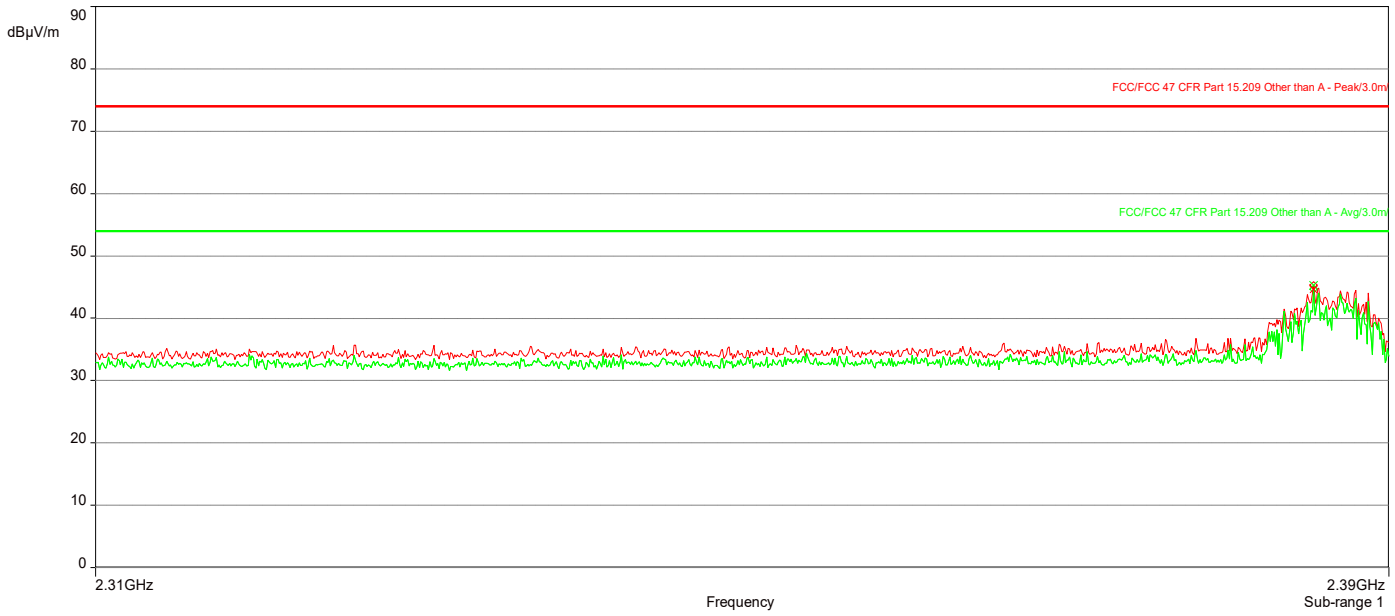
AH20110901-HAR-279-08_Bandedge_BT_8DPSK_2402MHz_DH1

8/12/2021 13:02:34

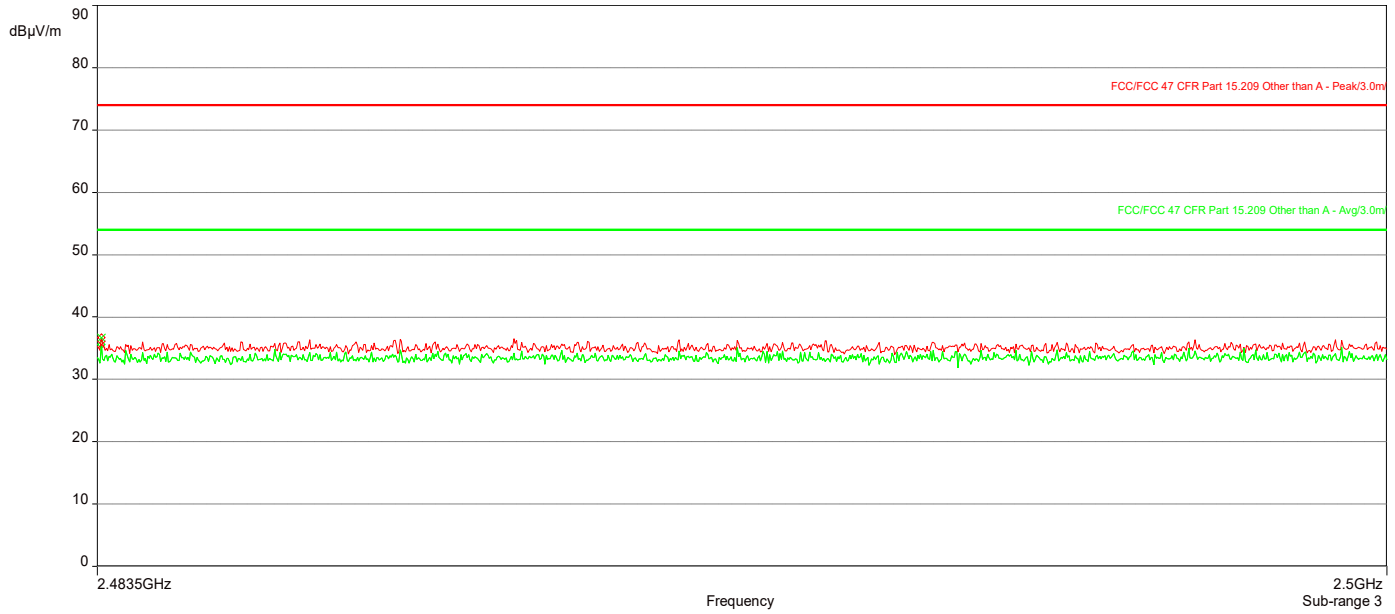
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3852753GHz	45.32	-2.84	74.00	-28.68	3.00	79.80	Vertical	Passed
2.	2.387037GHz	47.75	-2.83	74.00	-26.25	2.00	100.40	Horizontal	Passed
3.	2.4835496GHz	36.68	-2.13	74.00	-37.32	2.50	245.20	Vertical	Passed
4.	2.4863243GHz	37.34	-2.12	74.00	-36.66	2.00	174.40	Horizontal	Passed

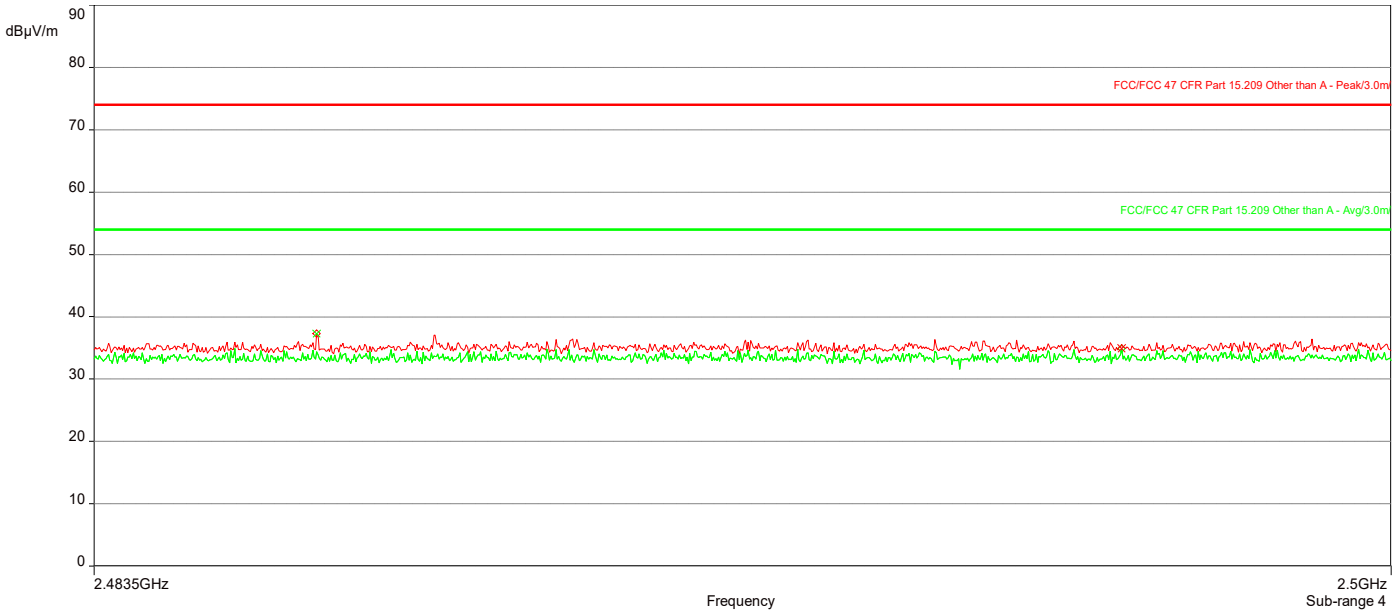
No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3852753GHz	44.66	-2.84	54.00	-9.34	3.00	79.80	Vertical	Passed
2.	2.387037GHz	46.99	-2.83	54.00	-7.01	2.00	100.40	Horizontal	Passed
3.	2.4835496GHz	35.60	-2.13	54.00	-18.40	2.50	245.20	Vertical	Passed
4.	2.4965646GHz	34.89	-2.08	54.00	-19.11	3.00	272.40	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

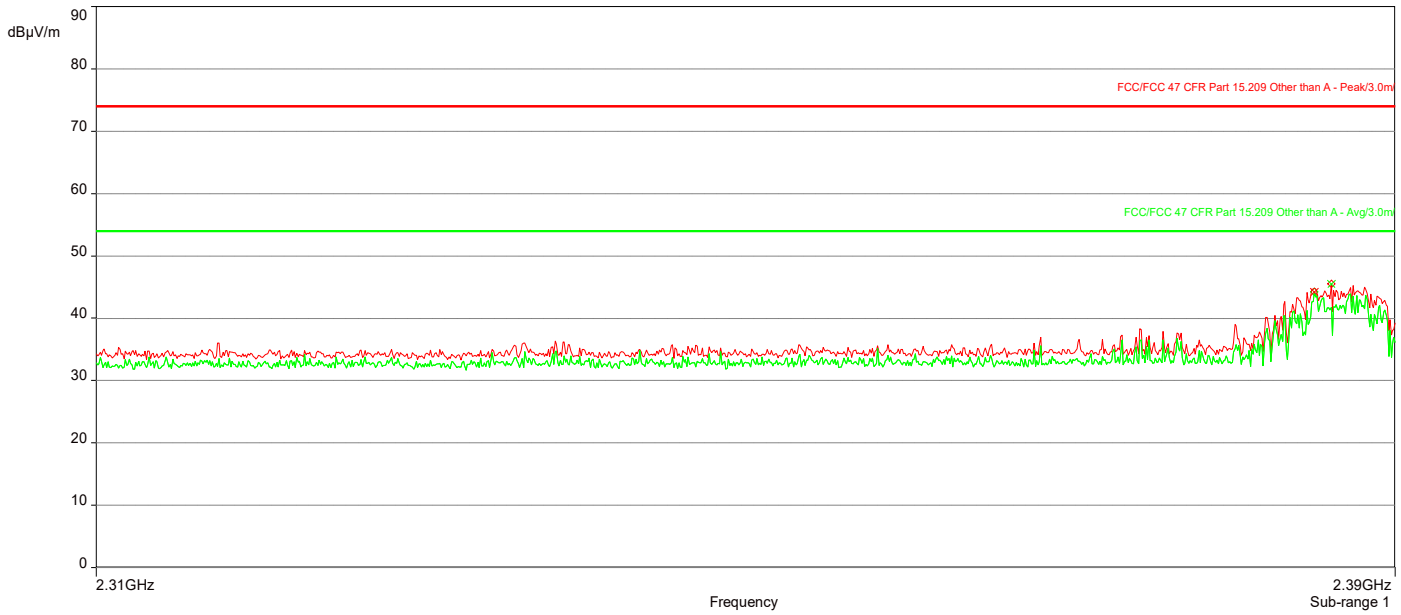
AH20110901-HAR-279-08_Bandedge_BT_8DPSK_2480MHz_DH1

8/12/2021 13:54:44

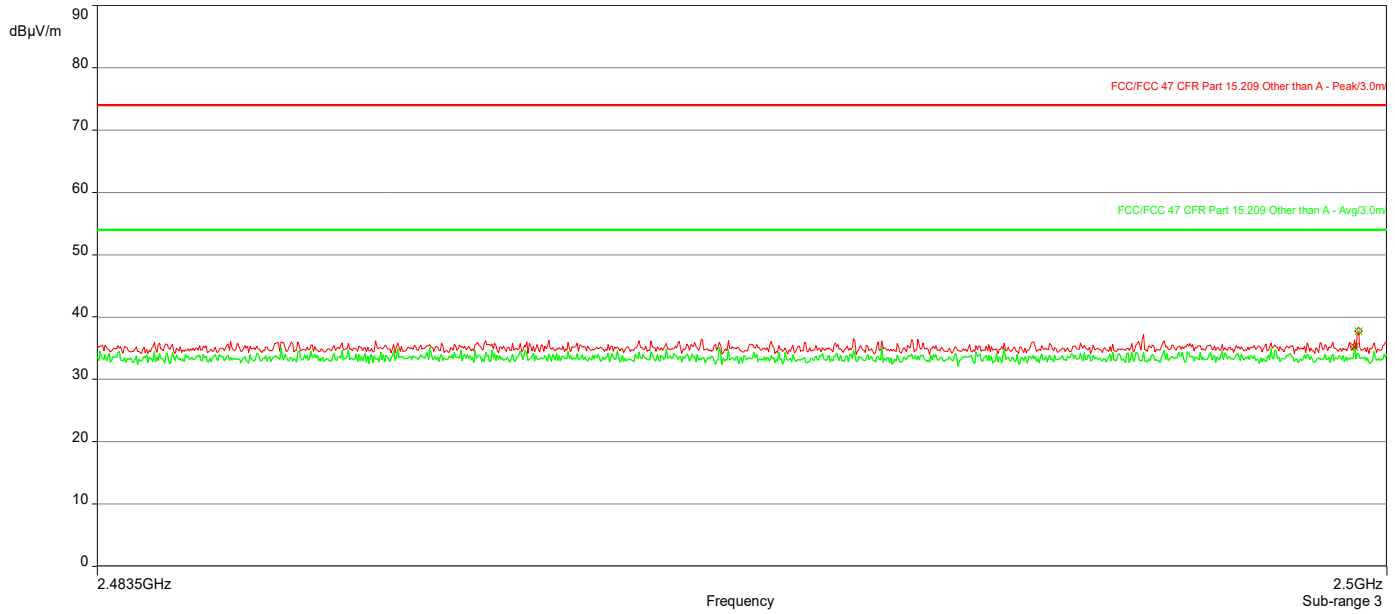
No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.385996GHz	45.50	-2.83	74.00	-28.50	3.00	41.70	Vertical	Passed
2.	2.3881582GHz	39.69	-2.82	74.00	-34.31	1.00	0.10	Horizontal	Passed
3.	2.4996366GHz	37.72	-2.07	74.00	-36.28	4.00	308.10	Vertical	Passed
4.	2.4866051GHz	41.38	-2.12	74.00	-32.62	3.00	285.00	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.384955GHz	44.23	-2.84	54.00	-9.77	3.00	41.70	Vertical	Passed
2.	2.3881582GHz	37.94	-2.82	54.00	-16.06	1.00	0.10	Horizontal	Passed
3.	2.4995871GHz	35.24	-2.07	54.00	-18.76	4.00	358.30	Vertical	Passed
4.	2.4866051GHz	40.18	-2.12	54.00	-13.82	3.00	285.00	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.31GHz
Frequency
2.39GHz
Sub-range 2


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 3


dBµV/m
90
80
70
60
50
40
30
20
10
0
FCC/FCC 47 CFR Part 15.209 Other than A - Peak/3.0m
FCC/FCC 47 CFR Part 15.209 Other than A - Avg/3.0m
2.4835GHz
Frequency
2.5GHz
Sub-range 4

Document Revisions

Version	Date	Modifier	Changes
1.0	04-28-2021	Aravind Buddana	• Initial Draft
2.0	05-06-2021	Aravind Buddana	• Updated Report Number. Test Request Addition Information, Laboratory Additional Information • Updated Test Setup Information, Statement of conformity • Moved DUT and Test setup pictures to additional document.
3.0	07-16-2021	Aravind Buddana	• Updated FCC designation and ISED Identifier of Test Firm. • Removed RF Output power measured in hopping mode • Updated Channel occupancy times tests • Updated band edge margin to limit values
3.0	07-16-2021	Ryan Philips	• Updated H-field measurement 9kHz – 30MHz
4.0	09-01-2021	Ryan Philips	• Updated Band Edge Tests

End of Report