Regulatory Test Report

Prepared for Harman Becker Automotive Systems

This report presents detailed information on

CY20 DA UPPER

Prepared by

Aravind Buddana

Engineer II

Approved by

Jason Kanakry

General Manager

Issue date: 12/13/2021

Report No: AH21100601-HAR-134-TR1 v2

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• Test Request Information

Test Request #:	7700096778
Test Requested By:	Mark Bowman Harman International Industries, Inc. 30001 Cabot Drive, Novi, MI 48377
Test item Description:	CY20 DA UPPER
Part Number:	T077
DUT Sample Number:	AH21100601-HAR-134#1, AH21100601-HAR-134#3, AH21100601-HAR-134#4
Hardware Version of DUT:	PV1
Software Version of DUT:	1.20.020
Component Category of DUT:	N/A
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, FCC KDB 558074 D01 15.247 Measurement Guidance v05 and ANSI C63.10-2013
Deviations from standard:	None
Approved Test Plan Number:	N/A
Test Plan Revision:	N/A
Date test sample received:	10-20-2021
Date test started:	10-28-2021
Date test finished:	12-10-2021

• 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 detachable external antenna with 3.4dBi 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

The product is the **CY20 DA UPPER**, It is a direct sequence spread spectrum transmitter that operates in the 2412-2462MHz frequency range.

Details	Description
Frequency Range (MHz)	2412 – 2462
Tested Modes	802.11b 802.11g 802.11n (HT20).
Number of Channels	11
Tested Channels	1, 6 ,11
DUT Antenna Type	External detachable
DUT Antenna Gain	3.4dBi

We found that the product met the requirements.

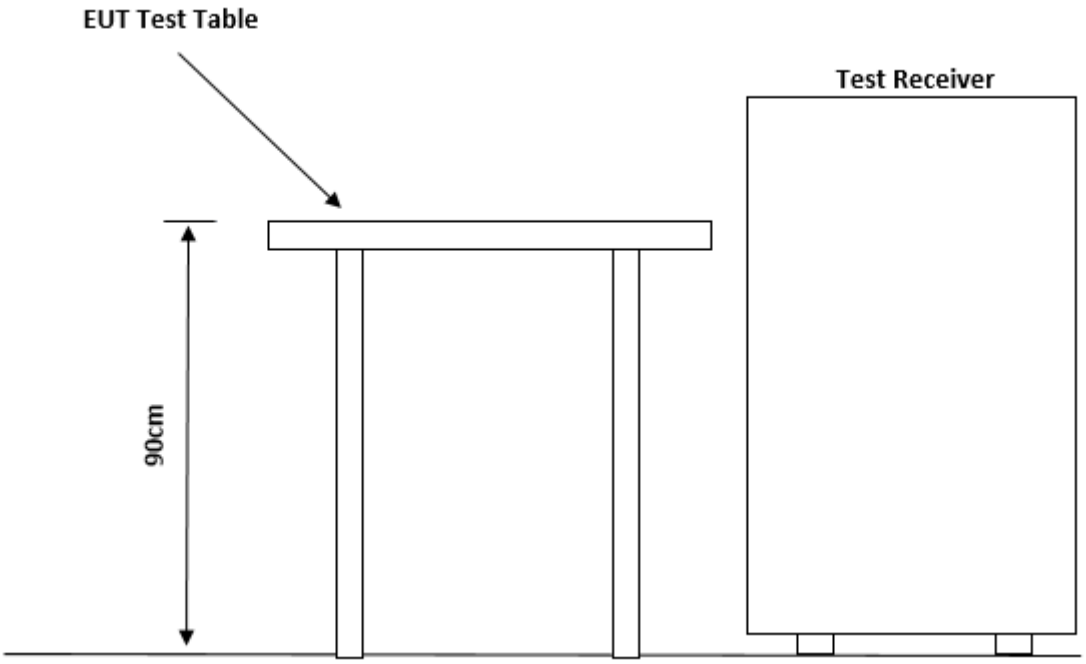
Test samples were received in good condition and remains good and functional post testing.

Test Item	Sample #	Result
FCC 15.247 2.4G WLAN	AH21100601-HAR-134#1	Meets Requirements

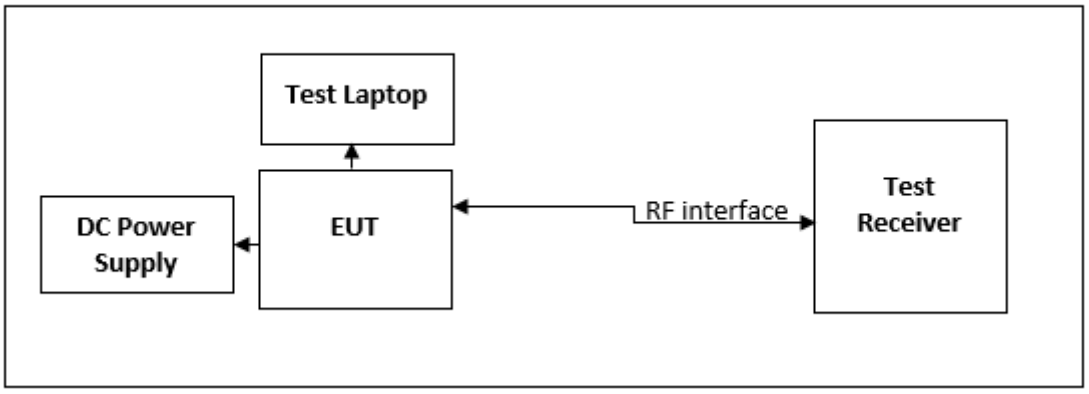
Test Setup

Conducted Test Site Description

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



TEST SETUP DIAGRAM



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	11/19/2022
BVD0225	Signal Generator 100k-6GHz with GPS simulator	Rohde & Schwarz	SMW200A	107664	11/18/2022
BVD0250	Wireless Connectivity Tester 70M-6GHz	Rohde & Schwarz	CMW270	102113	11/18/2022
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	Cable Harness	Harman	N/A	N/A	N/A
N/A	USB Hub	Harman	N/A	N/A	N/A
N/A	USB 2.0 Ethernet Adapter	Harman	USB2-E100	N/As	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 2.4G WLAN

Channels and modes available

802.11b, 802.11g and 802.11n (HT20)

Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	**2412**	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	**11**	**2462**
5	2432		
6	**2437**		
7	2442		

Notes:

1. Channels which were marked bold were tested.
2. Output power measurements were performed at the lowest and highest data rate of each supported 802.11 mode.

Antenna Gain	3.4dBi
Number of transmit Chains	1
Equipment Type	Equipment with wideband modulation other than frequency hopping

Power Settings

802.11b		802.11g	
Channel	**Power Setting**	**Channel**	**Power Setting**
1	13	**1**	13
6	13	**6**	13
11	13	**11**	13
802.11n (HT20)			
Channel	**Power Setting**		
1	13		
6	13		
11	13		

Test Results Summary

Test	Frequency (MHz)	802.11b	802.11g	802.11n (HT20)
RF Output Power	**2412/2437/2462**	PASS	PASS	PASS
Power Spectral Density	**2412/2437/2462**	PASS	PASS	PASS
DTS Bandwidth (6dB)	**2412/2437/2462**	PASS	PASS	PASS
Occupied Channel Bandwidth 99%	**2412/2437/2462**	PASS	PASS	PASS
Band Edges Low	**2412**	PASS	PASS	PASS
Band Edges High	**2462**	PASS	PASS	PASS
Conducted Spurious Emissions	**2412/2437/2462**	PASS	PASS	PASS

RF 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 11.9.2.3.2

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1.

Expanded Combined Uncertainty of absolute Level Measurement (K=2) < 1 dB

802.11b

Data Rate	Gated RMS (dBm) 2412 MHz	Gated RMS (dBm) 2437 MHz	Gated RMS (dBm) 2462 MHz	Limit (dBm)	Duty Cycle (%)	Power Setting
1 Mbps	10.920	10.790	10.717	30	99.770	13 €
11 Mbps	10.152	10.224	10.168	30	97.754	13 €

802.11g

Data Rate	Gated RMS (dBm) 2412 MHz	Gated RMS (dBm) 2437 MHz	Gated RMS (dBm) 2462 MHz	Limit (dBm)	Duty Cycle (%)	Power Setting
6 Mbps	11.279	**11.592**	11.384	30	98.588	13 €
54 Mbps	11.009	11.458	11.193	30	89.817	13 €

802.11n (HT20)

Data Rate	Gated RMS (dBm) 2412 MHz	Gated RMS (dBm) 2437 MHz	Gated RMS (dBm) 2462 MHz	Limit (dBm)	Duty Cycle (%)	Power Setting
MCS0	11.394	11.458	11.549	30	98.491	13 €
MCS7	11.115	11.341	11.419	30	89.175	13 €

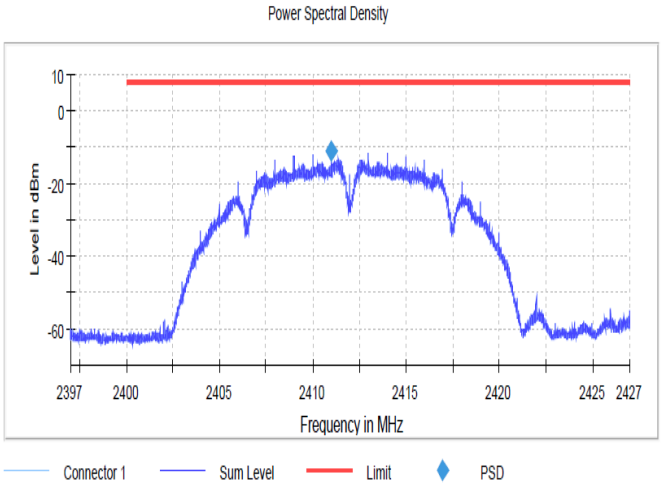
Power Spectral Density

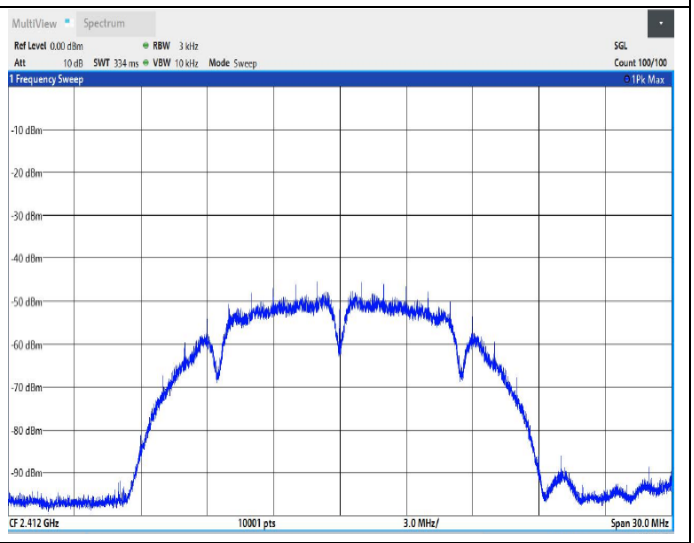
Test according to FCC title 47 part 15 §15.247(a),€, KDB 558074 D01 DTS Meas Guidance v05 F and ANSI C63.10-2013

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.3 dB

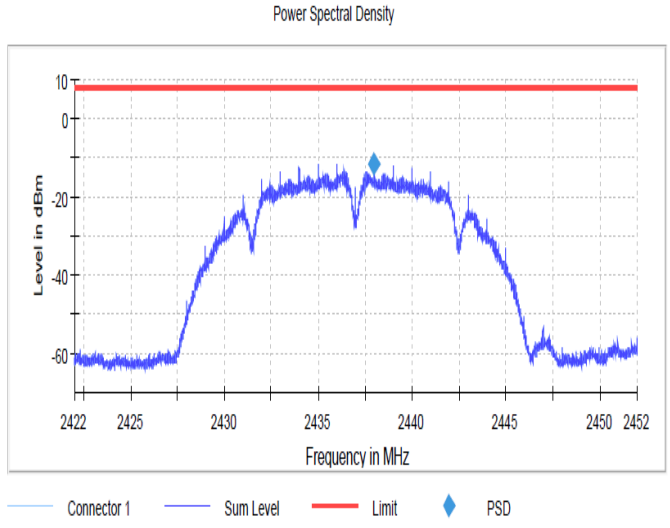
Mode	Data Rate	PSD (dBm) 2412 MHz	PSD (dBm) 2437 MHz	PSD (dBm) 2462 MHz	Limit (dBm)
802.11b	**1 Mbps**	-11.193	-11.282	-11.438	8.0

802.11b 2412MHz 1Mbps

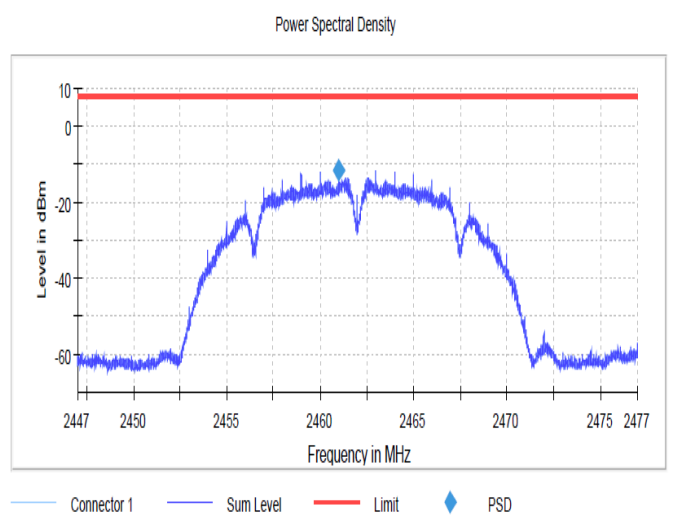




802.11b 2437MHz 1Mbps

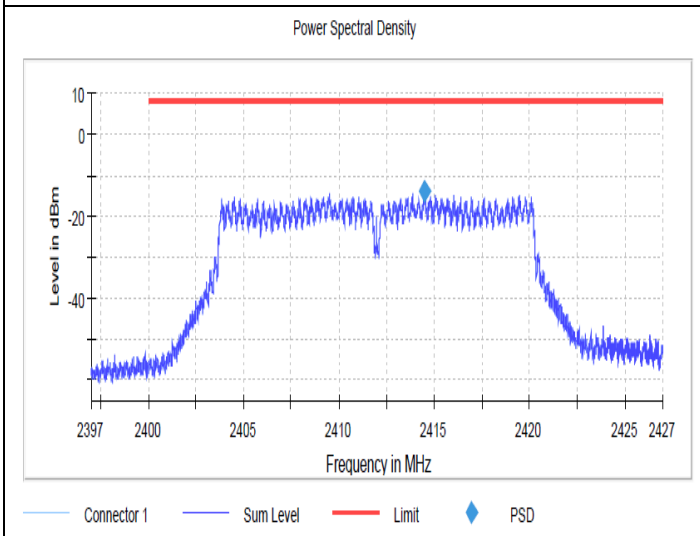


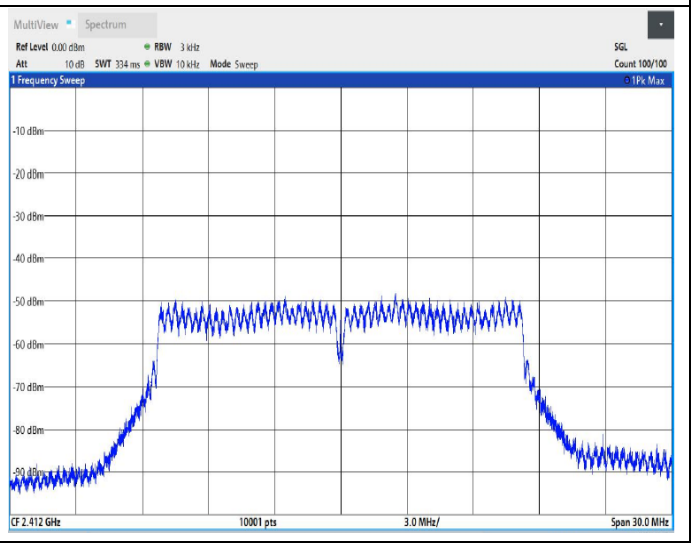
802.11b 2462MHz 1Mbps



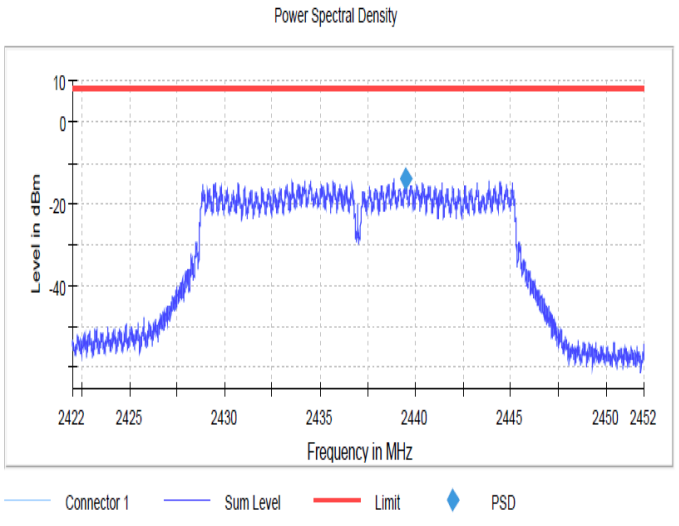
Mode	Data Rate	PSD (dBm) 2412 MHz	PSD (dBm) 2437 MHz	PSD (dBm) 2462 MHz	Limit (dBm)
802.11g	**6 Mbps**	-13.784	-13.911	-13.681	8.0

802.11g 2412MHz 6Mbps

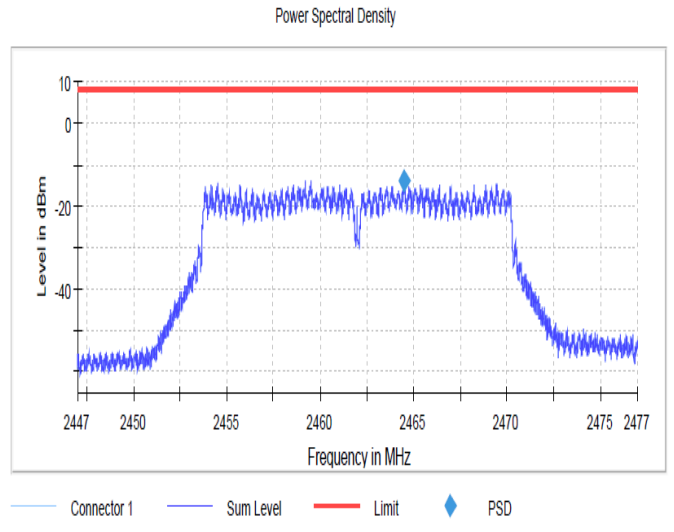




802.11g 2437MHz 6Mbps

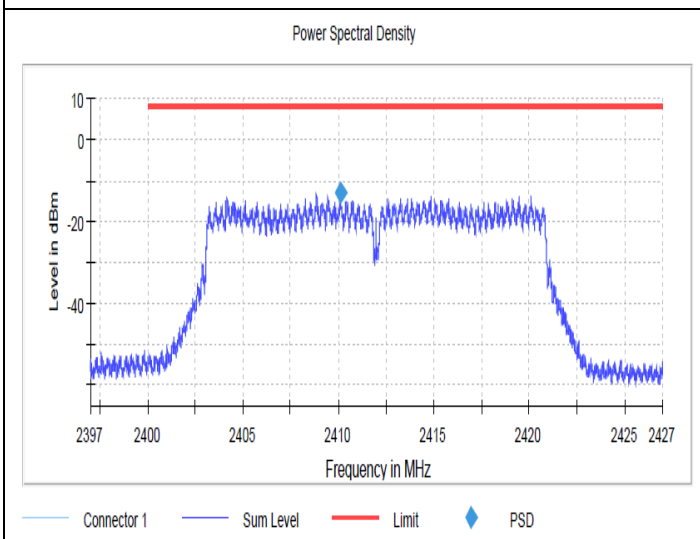


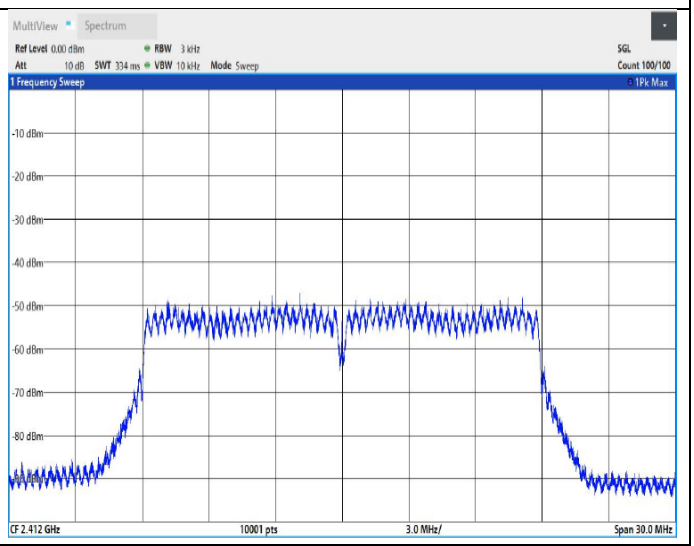
802.11g 2462MHz 6Mbps



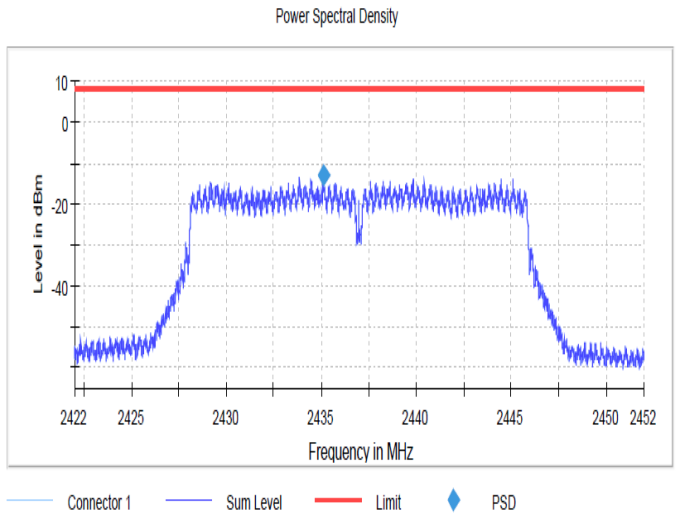
Mode	Data Rate	PSD (dBm) 2412 MHz	PSD (dBm) 2437 MHz	PSD (dBm) 2462 MHz	Limit (dBm)
802.11n	**MCS0**	-12.768	-12.735	-12.536	8.0

802.11n (HT20) 2412MHz MCS0

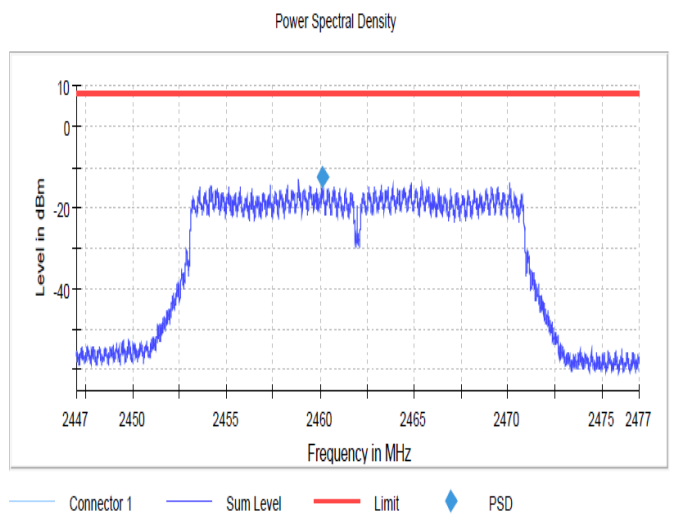




802.11n (HT20) 2437MHz MCS0



802.11n (HT20) 2462MHz MCS0



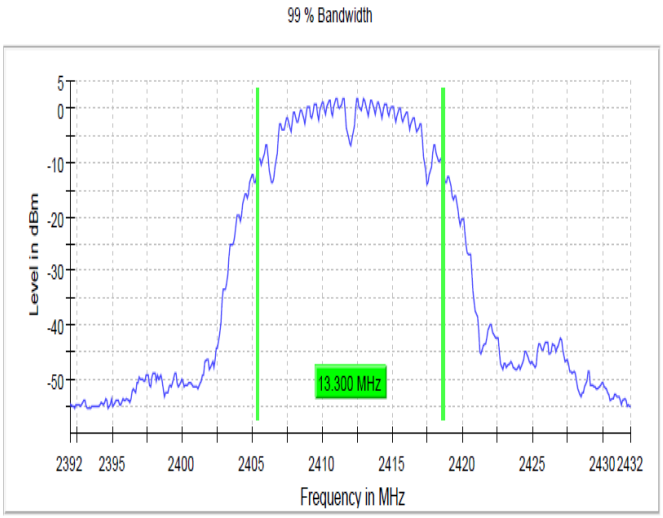
Occupied Channel Bandwidth

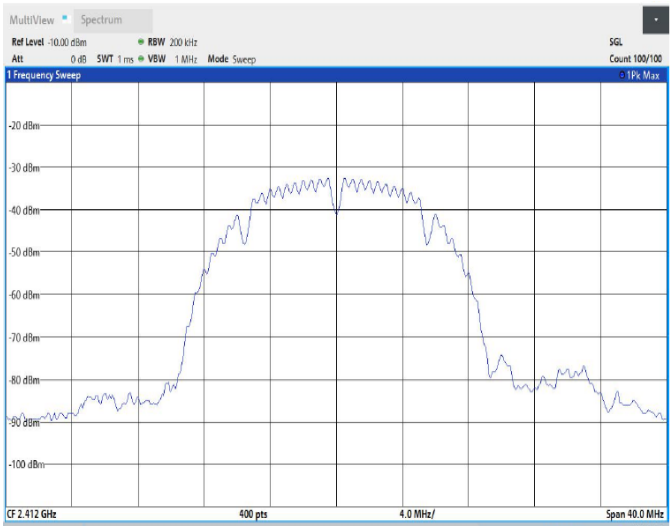
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.8.1

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

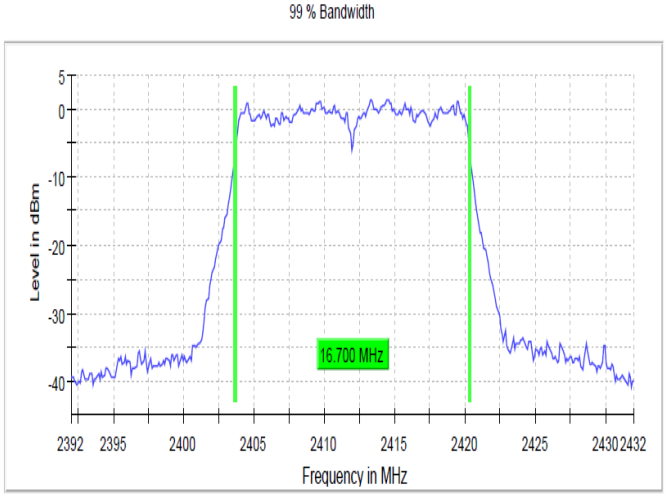
Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
802.11b 1Mbps	2412.000	13.300000	2405.350000	2418.650000
802.11g 6Mbps	2412.000	16.700000	2403.650000	2420.350000
802.11n (HT20) MCS0	2412.000	17.700000	2403.150000	2420.850000
802.11b 1Mbps	2437.000	13.200000	2430.350000	2443.550000
802.11g 6Mbps	2437.000	16.600000	2428.650000	2445.250000
802.11n (HT20) MCS0	2437.000	17.700000	2428.150000	2445.850000
802.11b 1Mbps	2462.000	13.200000	2455.350000	2468.550000
802.11g 6Mbps	2462.000	16.600000	2453.650000	2470.250000
802.11n (HT20) MCS0	2462.000	17.700000	2453.150000	2470.850000

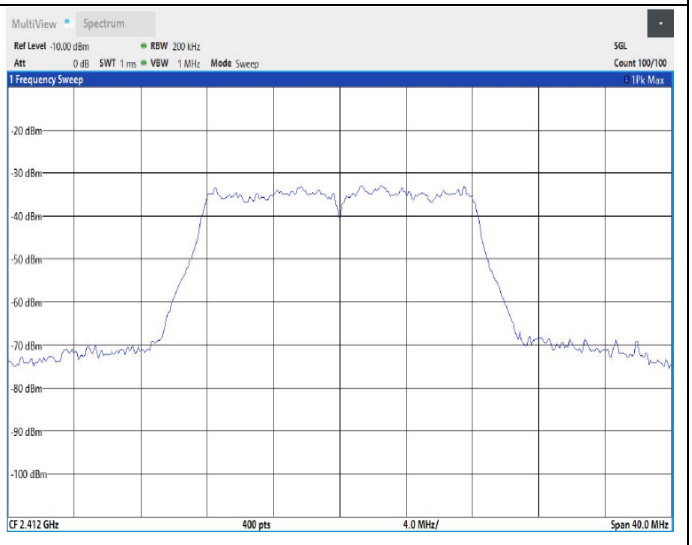
802.11b 2412MHz 1Mbps



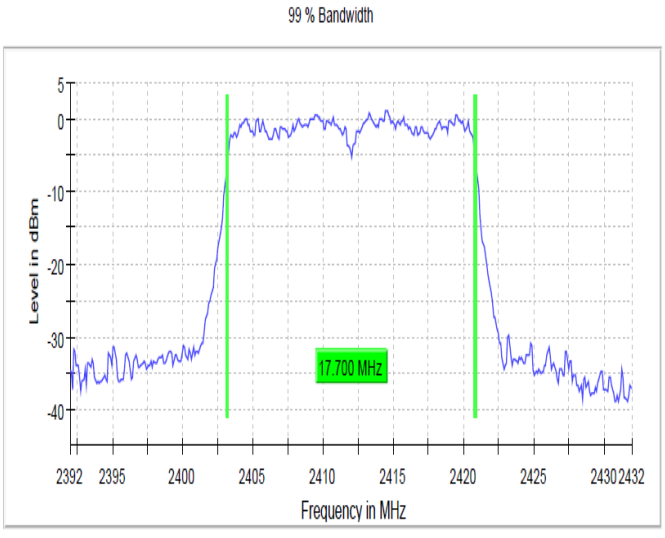


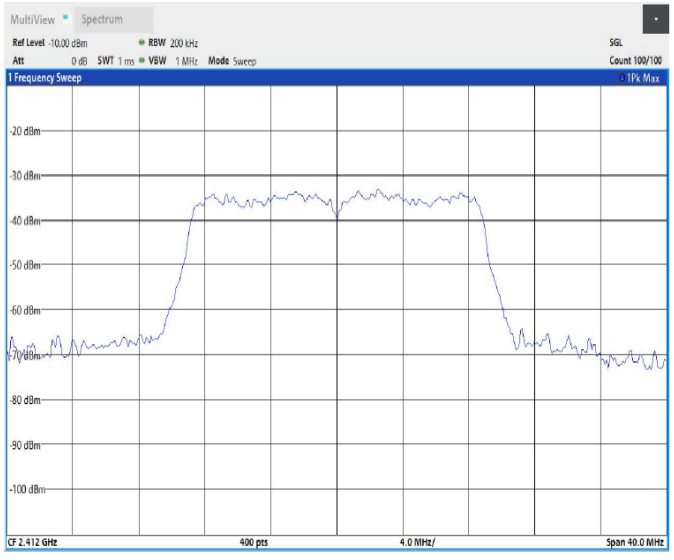
802.11g 2412MHz 6Mbps





802.11n (HT20) 2412MHz MCS0





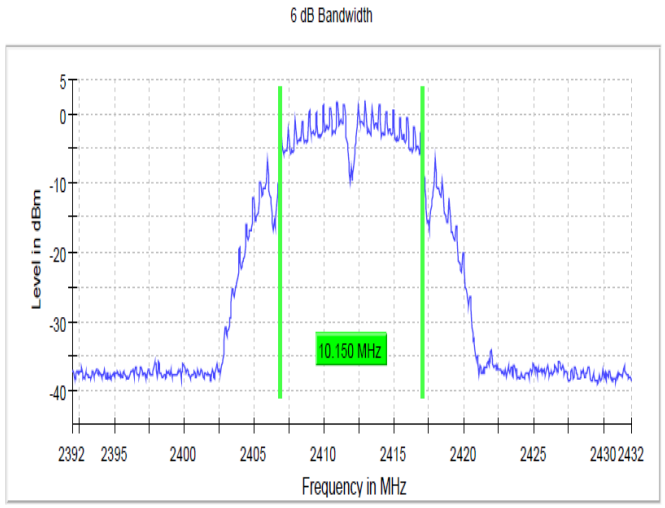
DTS Bandwidth (6dB)

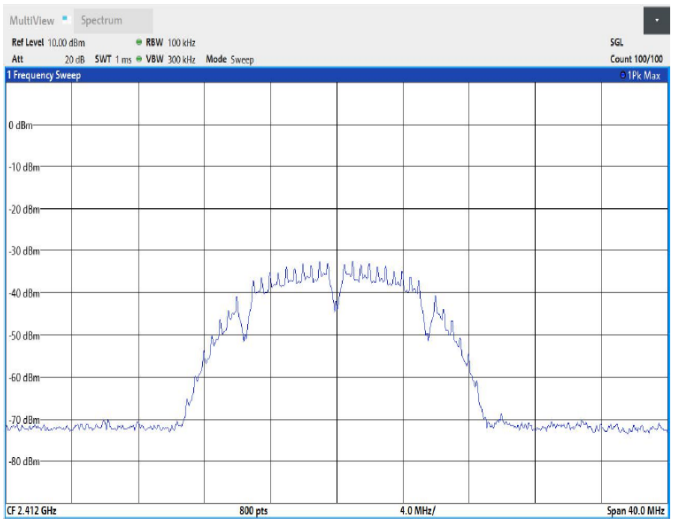
Definition: Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.8.1

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

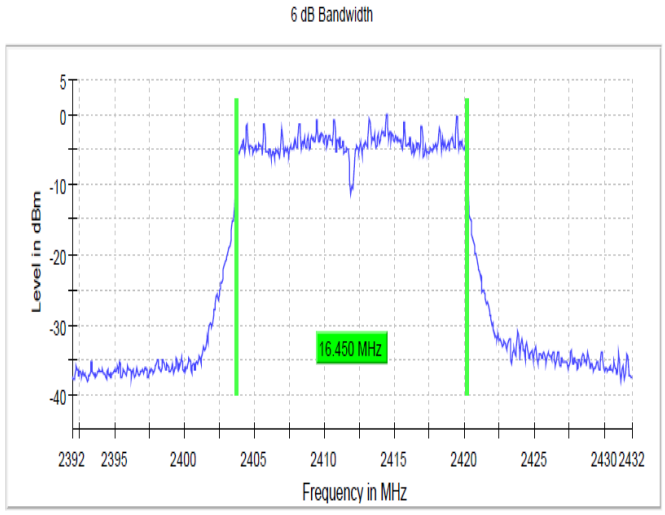
Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Minimum Limit (MHz)
802.11b 1Mbps	2412.000	10.150000	2406.875000	2417.025000	0.5
802.11g 6Mbps	2412.000	16.450000	2403.725000	2420.175000	0.5
802.11n (HT20) MCS0	2412.000	17.600000	2403.175000	2420.775000	0.5
802.11b 1Mbps	2437.000	10.150000	2431.875000	2442.025000	0.5
802.11g 6Mbps	2437.000	16.450000	2428.725000	2445.175000	0.5
802.11n (HT20) MCS0	2437.000	17.650000	2428.125000	2445.775000	0.5
802.11b 1Mbps	2462.000	10.150000	2456.875000	2467.025000	0.5
802.11g 6Mbps	2462.000	16.450000	2453.725000	2470.175000	0.5
802.11n (HT20) MCS0	2462.000	17.650000	2453.125000	2470.775000	0.5

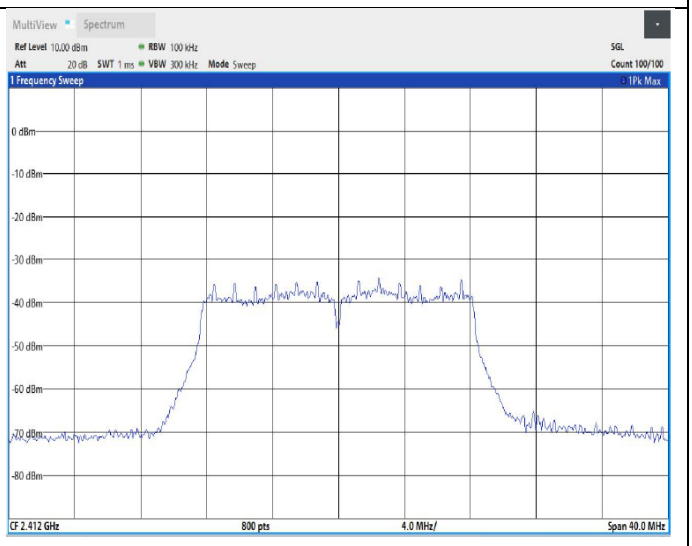
802.11b 2412MHz 1Mbps



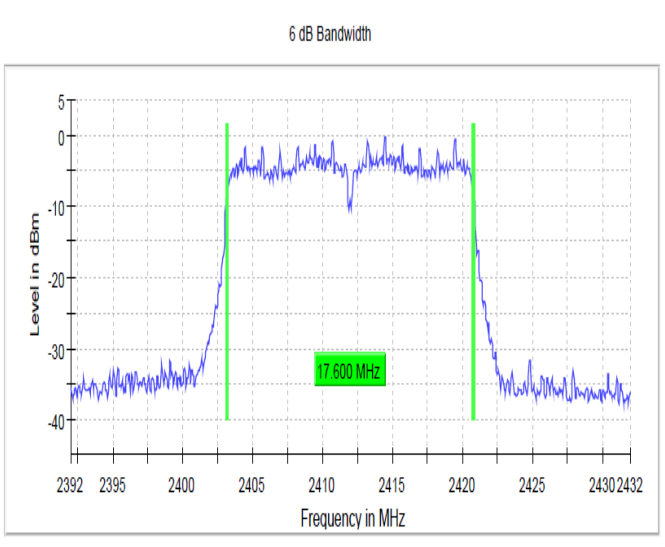


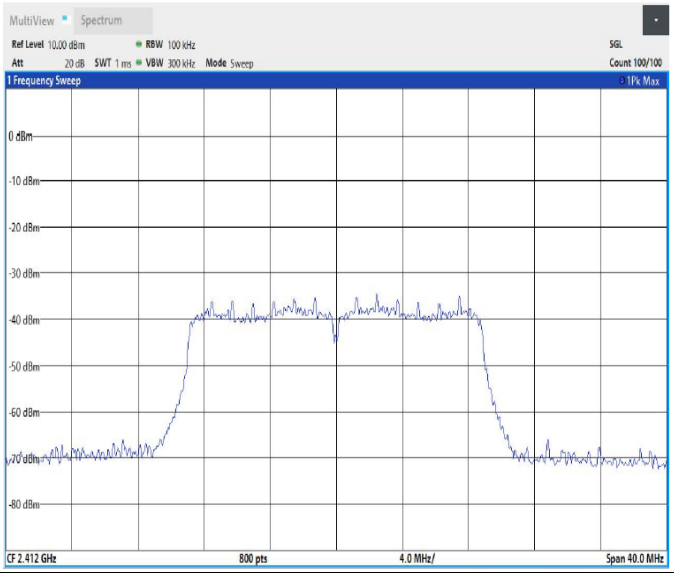
802.11g 2412MHz 6Mbps





802.11n (HT20) 2412MHz MCS0





Conducted Band Edge

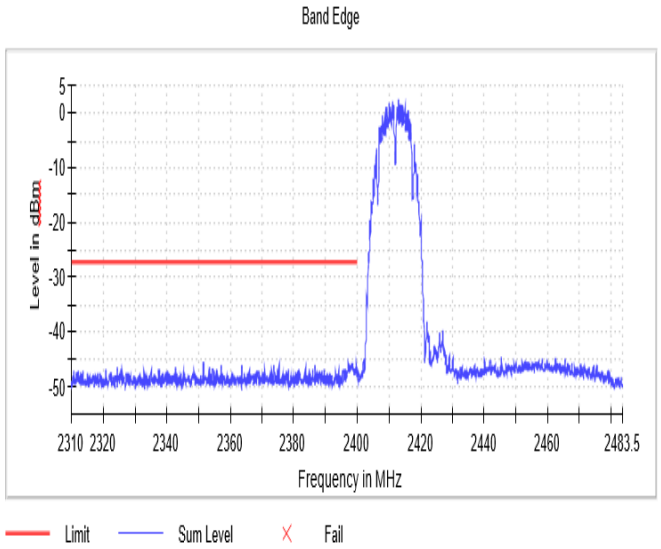
Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 8.7 andANSI C63.10-2013

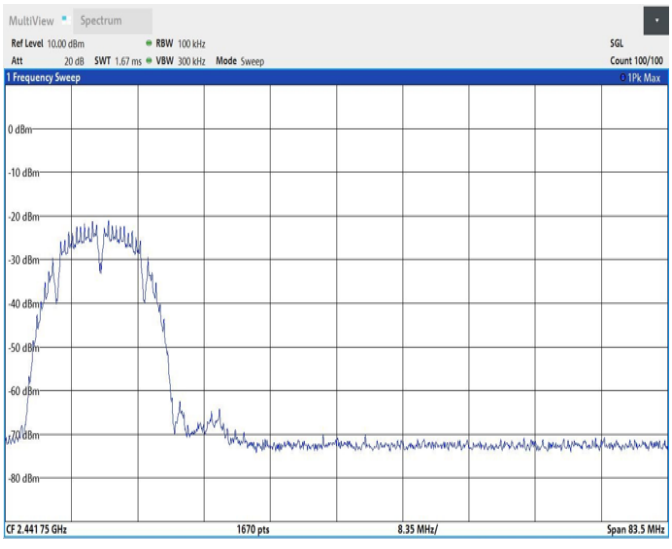
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1.Expanded Uncertainty (K=2) < 0.8 dB

Band Edge Low 802.11b 2412MHz 1Mbps

Frequency (MHz)	Level (dBm)
2412.975000	2.7

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2351.625000	-45.4	18.1	-27.3	PASS
2351.575000	-45.5	18.2	-27.3	PASS
2398.525000	-45.5	18.2	-27.3	PASS
2398.475000	-45.6	18.3	-27.3	PASS
2399.725000	-45.6	18.3	-27.3	PASS
2397.275000	-45.7	18.4	-27.3	PASS
2399.775000	-45.7	18.4	-27.3	PASS
2375.375000	-45.7	18.4	-27.3	PASS
2398.125000	-45.7	18.4	-27.3	PASS
2375.425000	-45.8	18.5	-27.3	PASS
2397.225000	-45.8	18.5	-27.3	PASS
2373.825000	-45.8	18.5	-27.3	PASS
2397.625000	-45.8	18.5	-27.3	PASS
2373.775000	-45.9	18.6	-27.3	PASS
2398.075000	-46.0	18.7	-27.3	PASS

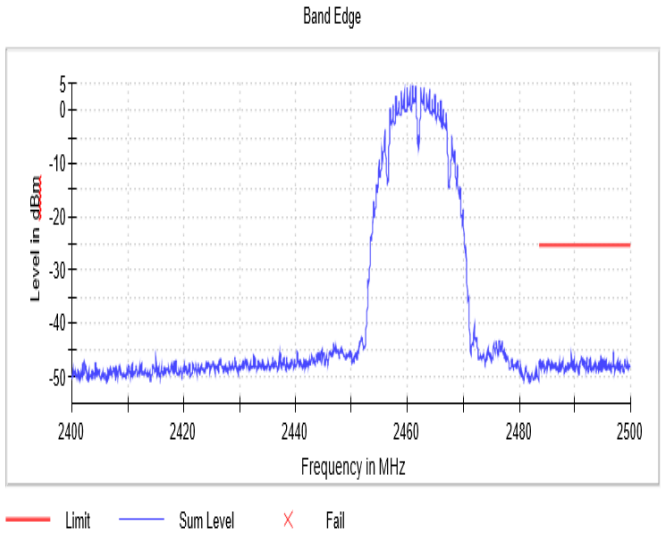


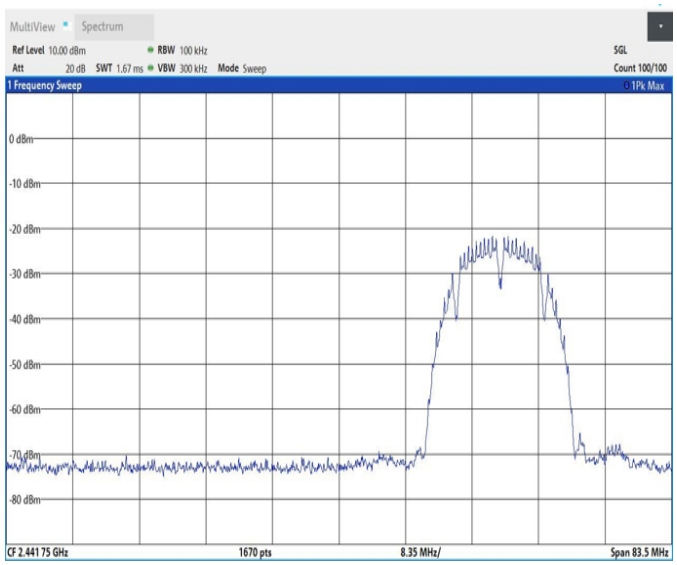


Band Edge High 802.11b 2462MHz 1Mbps

Frequency (MHz)	Level (dBm)
2460.975000	4.6

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2496.925000	-45.1	19.8	-25.4	PASS
2489.375000	-45.6	20.3	-25.4	PASS
2496.875000	-45.6	20.3	-25.4	PASS
2489.425000	-45.7	20.3	-25.4	PASS
2494.575000	-46.1	20.8	-25.4	PASS
2491.225000	-46.2	20.9	-25.4	PASS
2492.825000	-46.3	20.9	-25.4	PASS
2494.625000	-46.4	21.0	-25.4	PASS
2492.225000	-46.4	21.1	-25.4	PASS
2492.875000	-46.6	21.2	-25.4	PASS
2491.275000	-46.6	21.2	-25.4	PASS
2498.975000	-46.7	21.3	-25.4	PASS
2494.925000	-46.7	21.3	-25.4	PASS
2491.125000	-46.7	21.3	-25.4	PASS
2491.075000	-46.7	21.3	-25.4	PASS

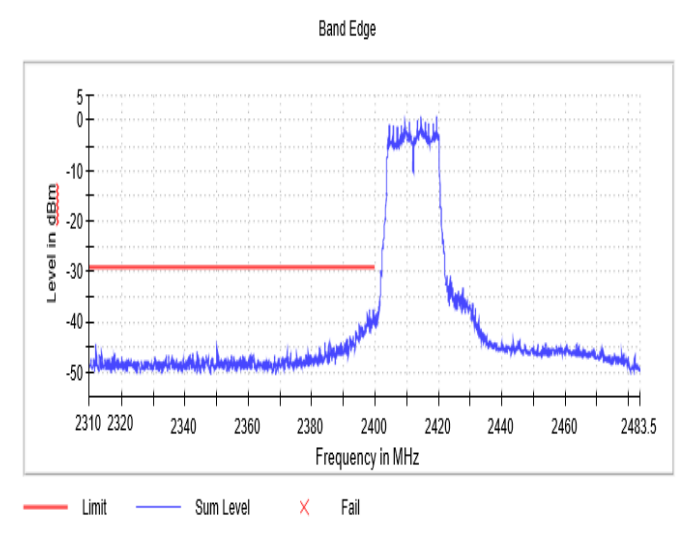


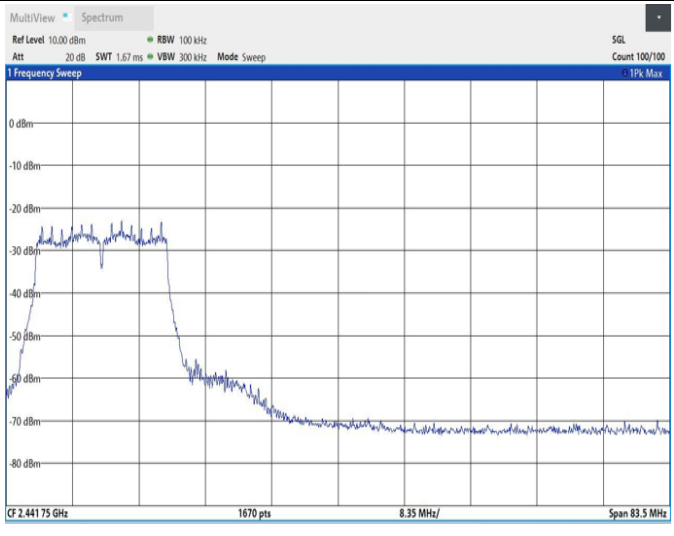


Band Edge Low 802.11g 2412MHz 6Mbps

Frequency (MHz)	Level (dBm)
2414.475000	1.0

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.225000	-37.8	8.8	-29.0	PASS
2398.225000	-37.8	8.9	-29.0	PASS
2398.175000	-37.9	8.9	-29.0	PASS
2399.475000	-38.0	9.0	-29.0	PASS
2399.525000	-38.0	9.0	-29.0	PASS
2399.175000	-38.2	9.2	-29.0	PASS
2399.275000	-38.3	9.4	-29.0	PASS
2399.575000	-38.4	9.4	-29.0	PASS
2397.625000	-38.4	9.5	-29.0	PASS
2397.575000	-38.8	9.9	-29.0	PASS
2398.275000	-38.9	9.9	-29.0	PASS
2397.675000	-39.2	10.2	-29.0	PASS
2399.425000	-39.3	10.3	-29.0	PASS
2399.825000	-39.3	10.3	-29.0	PASS
2399.775000	-39.3	10.3	-29.0	PASS

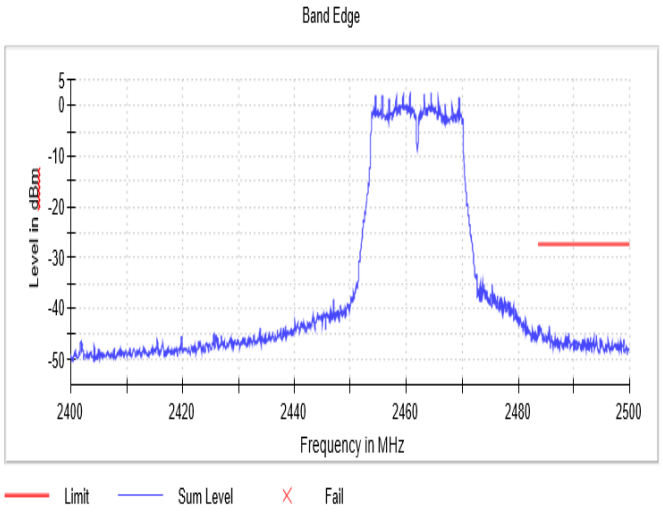


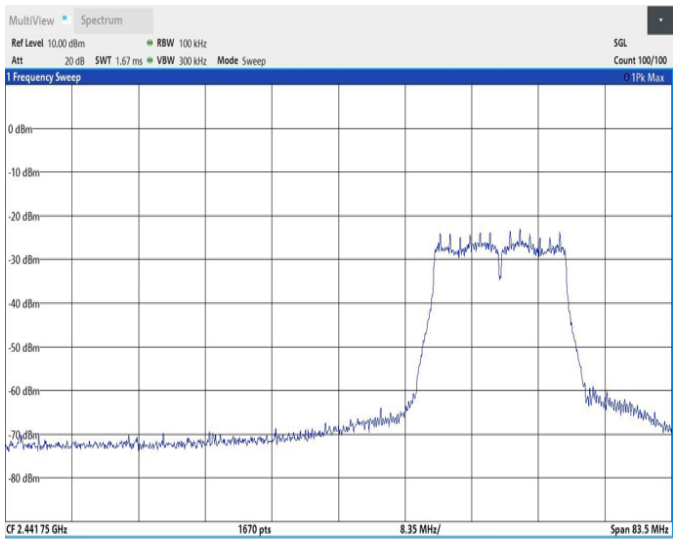


Band Edge High 802.11g 2462MHz 6Mbps

Frequency (MHz)	Level (dBm)
2464.475000	2.8

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2494.525000	2483.575000	-43.4	16.2	PASS
2485.825000	2485.675000	-43.5	16.3	PASS
2485.775000	2485.725000	-43.5	16.4	PASS
2494.375000	2483.875000	-43.5	16.4	PASS
2499.825000	2483.925000	-43.8	16.6	PASS
2495.825000	2484.225000	-43.9	16.7	PASS
2488.675000	2484.075000	-43.9	16.7	PASS
2497.725000	2483.625000	-43.9	16.8	PASS
2490.575000	2484.025000	-44.0	16.8	PASS
2491.625000	2484.175000	-44.0	16.9	PASS
2494.325000	2483.825000	-44.1	16.9	PASS
2494.825000	2483.975000	-44.3	17.2	PASS
2496.025000	2484.125000	-44.4	17.3	PASS
2494.475000	2483.525000	-44.7	17.5	PASS
2490.625000	2485.475000	-44.8	17.6	PASS

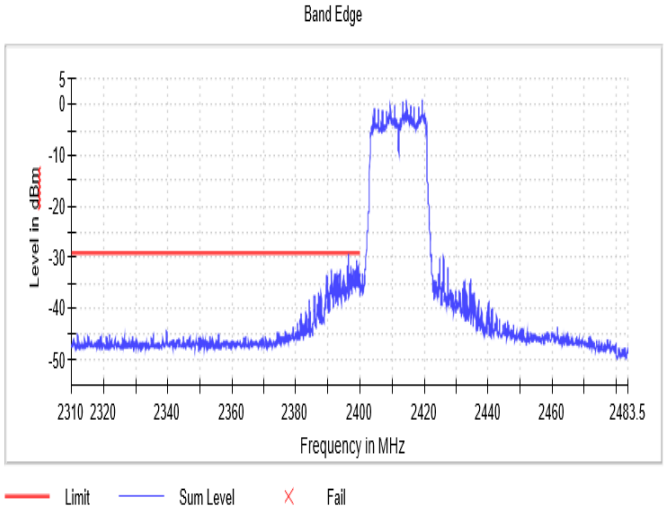


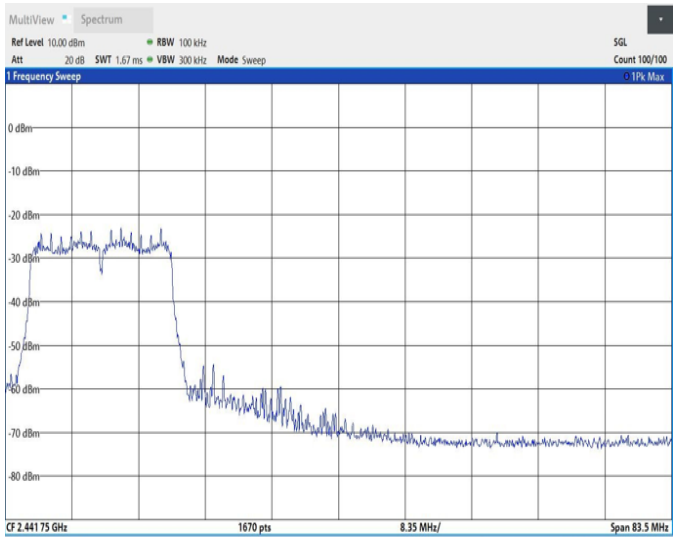


Band Edge Low 802.11n (HT20) 2412MHz MCS0

Frequency (MHz)	Level (dBm)
2414.475000	1.0

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2396.375000	-29.6	0.6	-29.0	PASS
2396.325000	-29.7	0.7	-29.0	PASS
2396.425000	-30.6	1.5	-29.0	PASS
2398.825000	-30.7	1.7	-29.0	PASS
2398.875000	-30.8	1.7	-29.0	PASS
2396.275000	-31.5	2.5	-29.0	PASS
2397.225000	-31.7	2.6	-29.0	PASS
2397.275000	-31.7	2.6	-29.0	PASS
2396.025000	-31.8	2.8	-29.0	PASS
2396.075000	-31.9	2.8	-29.0	PASS
2399.525000	-32.0	3.0	-29.0	PASS
2399.475000	-32.0	3.0	-29.0	PASS
2399.125000	-32.3	3.3	-29.0	PASS
2393.875000	-32.3	3.3	-29.0	PASS
2398.475000	-32.5	3.4	-29.0	PASS

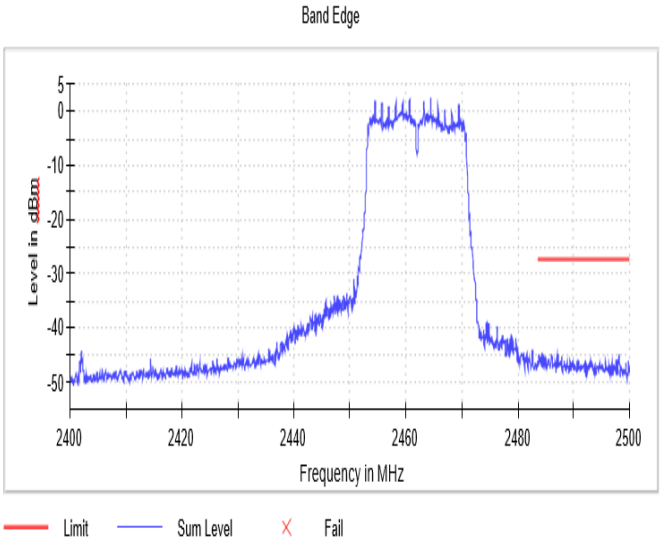


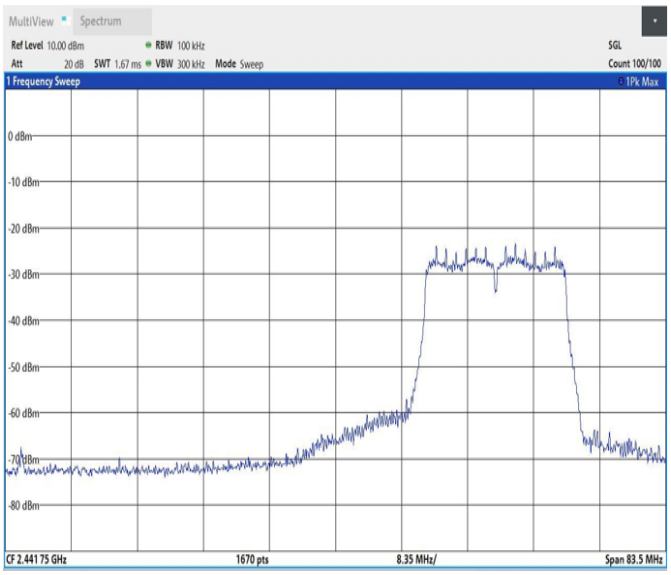


Band Edge High 802.11n (HT20) 2462MHz MCS0

Frequency (MHz)	Level (dBm)
2464.475000	2.6

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.375000	-44.4	16.9	-27.4	PASS
2484.425000	-44.4	17.0	-27.4	PASS
2486.025000	-44.8	17.3	-27.4	PASS
2483.825000	-44.8	17.4	-27.4	PASS
2487.225000	-44.9	17.4	-27.4	PASS
2487.275000	-44.9	17.5	-27.4	PASS
2486.975000	-45.0	17.6	-27.4	PASS
2484.575000	-45.0	17.6	-27.4	PASS
2498.125000	-45.0	17.6	-27.4	PASS
2487.925000	-45.2	17.7	-27.4	PASS
2485.025000	-45.3	17.9	-27.4	PASS
2484.825000	-45.3	17.9	-27.4	PASS
2484.625000	-45.3	17.9	-27.4	PASS
2484.225000	-45.3	17.9	-27.4	PASS
2486.175000	-45.4	17.9	-27.4	PASS





Tx Spurious Emissions

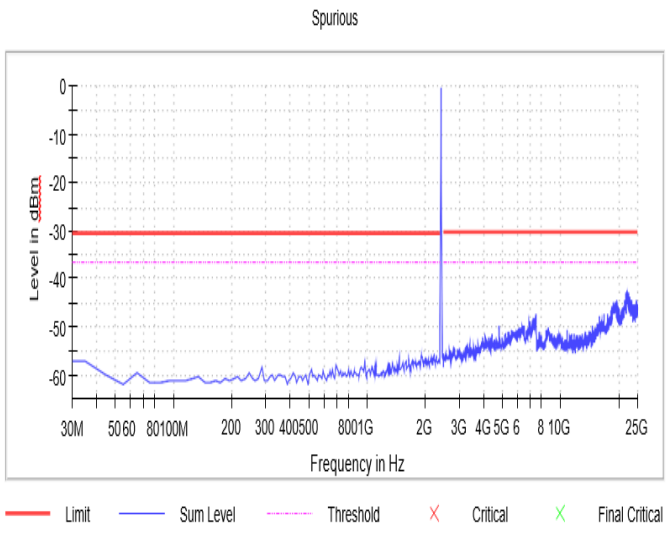
Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 8.5 and ANSI C63.10-2013 11.11.2 & 11.11.3

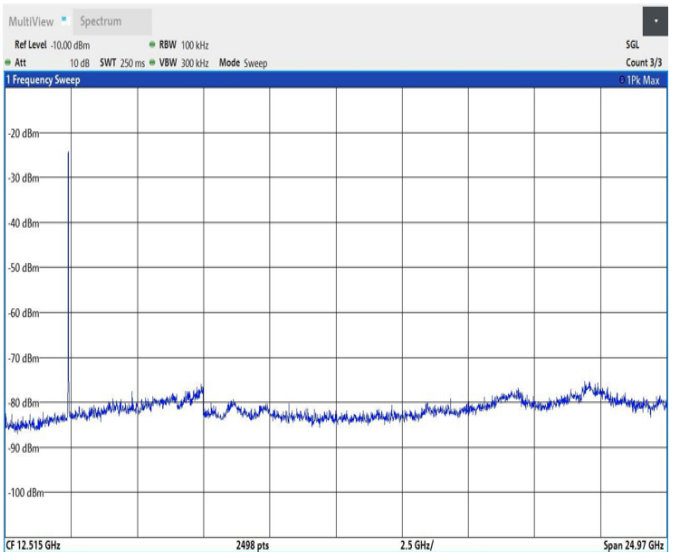
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB

802.11b 2412MHz 1Mbps

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22086.166934	-42.6	12.2	-30.5
22396.042834	-42.9	12.4	-30.5
21906.238991	-43.1	12.6	-30.5
22056.178943	-43.1	12.6	-30.5
22296.082866	-43.2	12.7	-30.5
21946.222978	-43.6	13.1	-30.5
22046.182946	-43.7	13.2	-30.5
22755.898719	-43.7	13.2	-30.5
22016.194956	-43.8	13.4	-30.5
22076.170937	-43.9	13.4	-30.5
22126.150921	-43.9	13.4	-30.5
22026.190953	-43.9	13.4	-30.5
22136.146918	-43.9	13.5	-30.5
22066.174940	-44.0	13.5	-30.5
22316.074860	-44.0	13.5	-30.5

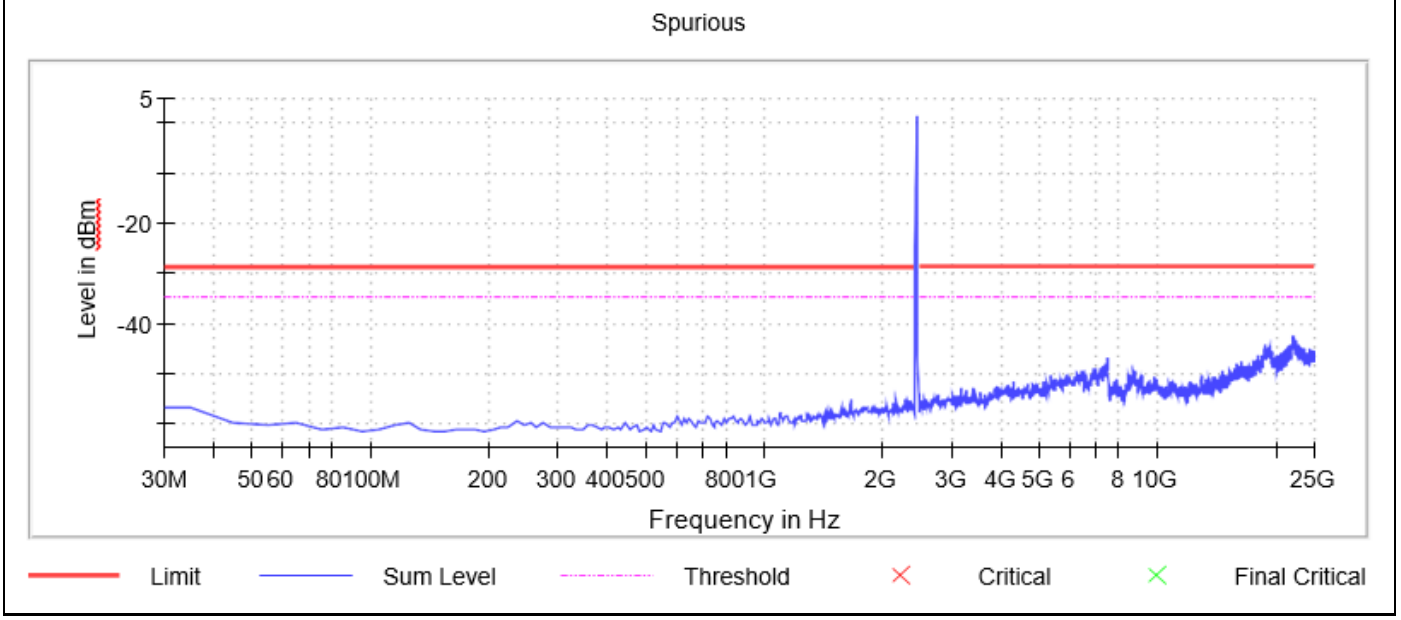




802.11b 2437MHz 1Mbps

Pre Measurement

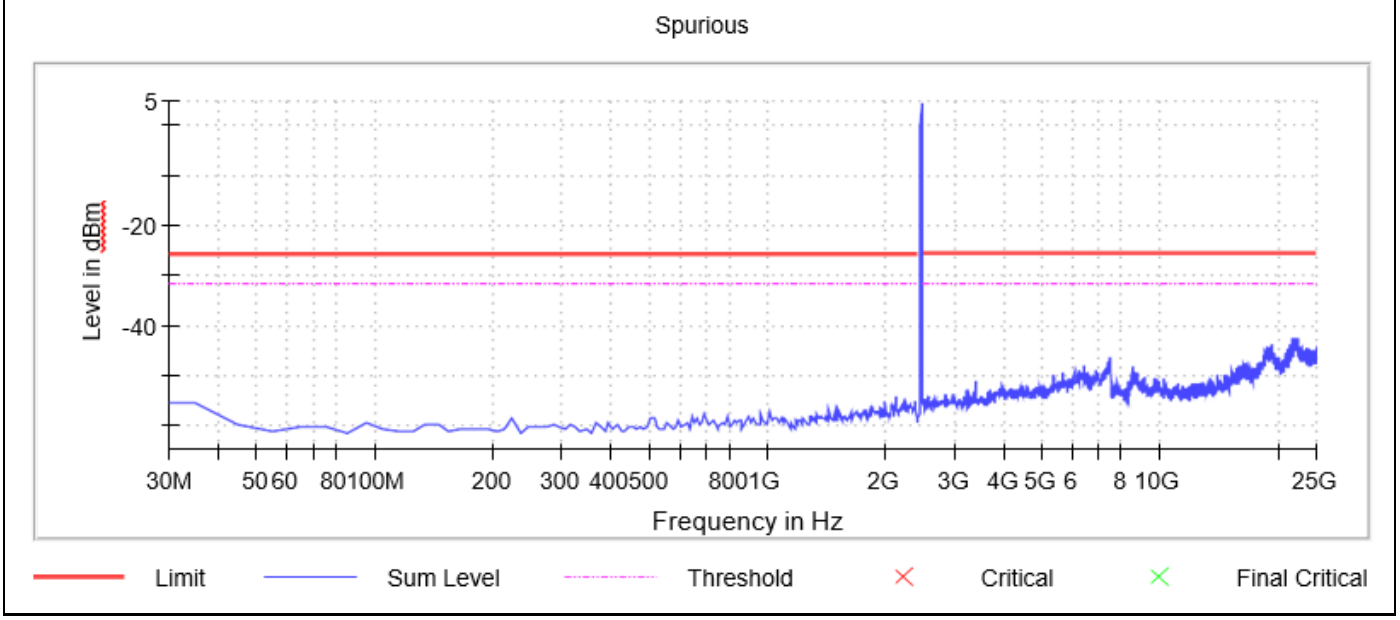
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22066.174940	-42.8	14.1	-28.6
22116.154924	-42.8	14.2	-28.6
22056.178943	-42.9	14.3	-28.6
21986.206966	-43.0	14.4	-28.6
22076.170937	-43.5	14.8	-28.6
21956.218975	-43.5	14.9	-28.6
22136.146918	-43.5	14.9	-28.6
22026.190953	-43.6	14.9	-28.6
22336.066853	-43.7	15.1	-28.6
22086.166934	-43.8	15.2	-28.6
22196.122898	-43.9	15.2	-28.6
22456.018815	-43.9	15.3	-28.6
21966.214972	-43.9	15.3	-28.6
22226.110889	-44.0	15.4	-28.6
22206.118895	-44.0	15.4	-28.6



802.11b 2462MHz 1Mbps

Pre Measurement

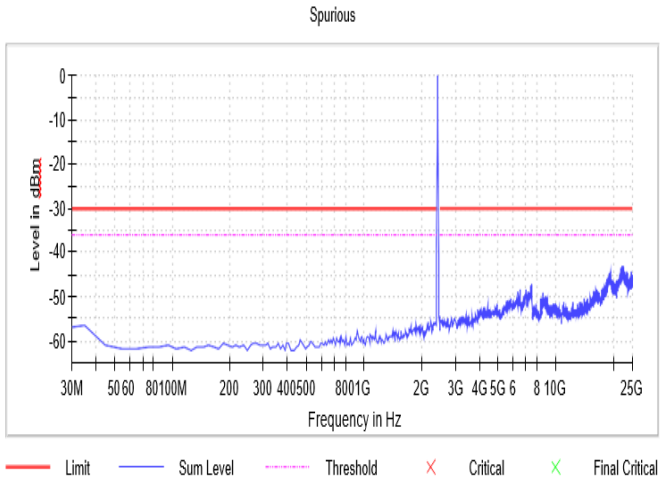
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22016.194956	-42.8	17.2	-25.6
21846.263010	-42.8	17.2	-25.6
22505.998799	-42.9	17.3	-25.6
22116.154924	-42.9	17.3	-25.6
22066.174940	-43.2	17.5	-25.6
22336.066853	-43.3	17.7	-25.6
21916.234988	-43.4	17.7	-25.6
22106.158927	-43.5	17.8	-25.6
22356.058847	-43.5	17.9	-25.6
22366.054844	-43.7	18.1	-25.6
22286.086869	-43.9	18.2	-25.6
22076.170937	-43.9	18.3	-25.6
21956.218975	-43.9	18.3	-25.6
21986.206966	-43.9	18.3	-25.6
22026.190953	-43.9	18.3	-25.6

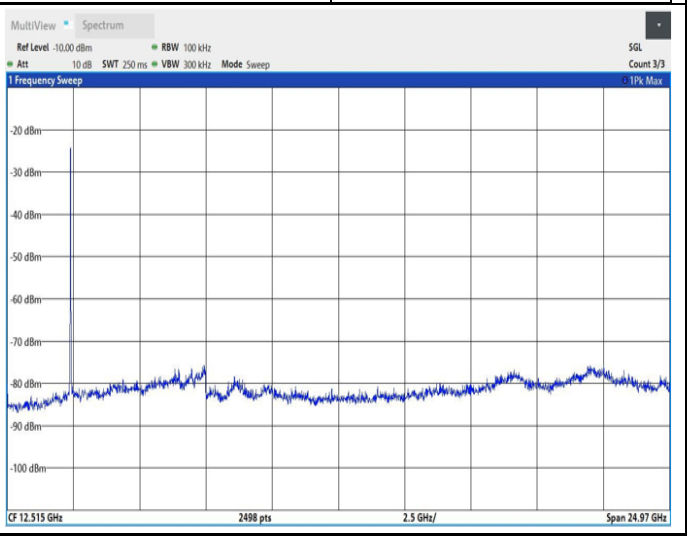


802.11g 2412MHz 6Mbps

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2394.053243	-39.3	9.1	-30.2
22515.994796	-43.1	12.9	-30.2
21996.202962	-43.2	13.0	-30.2
22016.194956	-43.3	13.2	-30.2
21926.230985	-43.6	13.4	-30.2
22446.022818	-43.7	13.5	-30.2
22066.174940	-43.7	13.5	-30.2
22146.142914	-43.7	13.5	-30.2
21906.238991	-43.8	13.6	-30.2
22076.170937	-43.8	13.7	-30.2
22136.146918	-43.9	13.7	-30.2
22346.062850	-43.9	13.7	-30.2
22176.130905	-44.0	13.8	-30.2
22046.182946	-44.0	13.8	-30.2
22036.186950	-44.0	13.8	-30.2

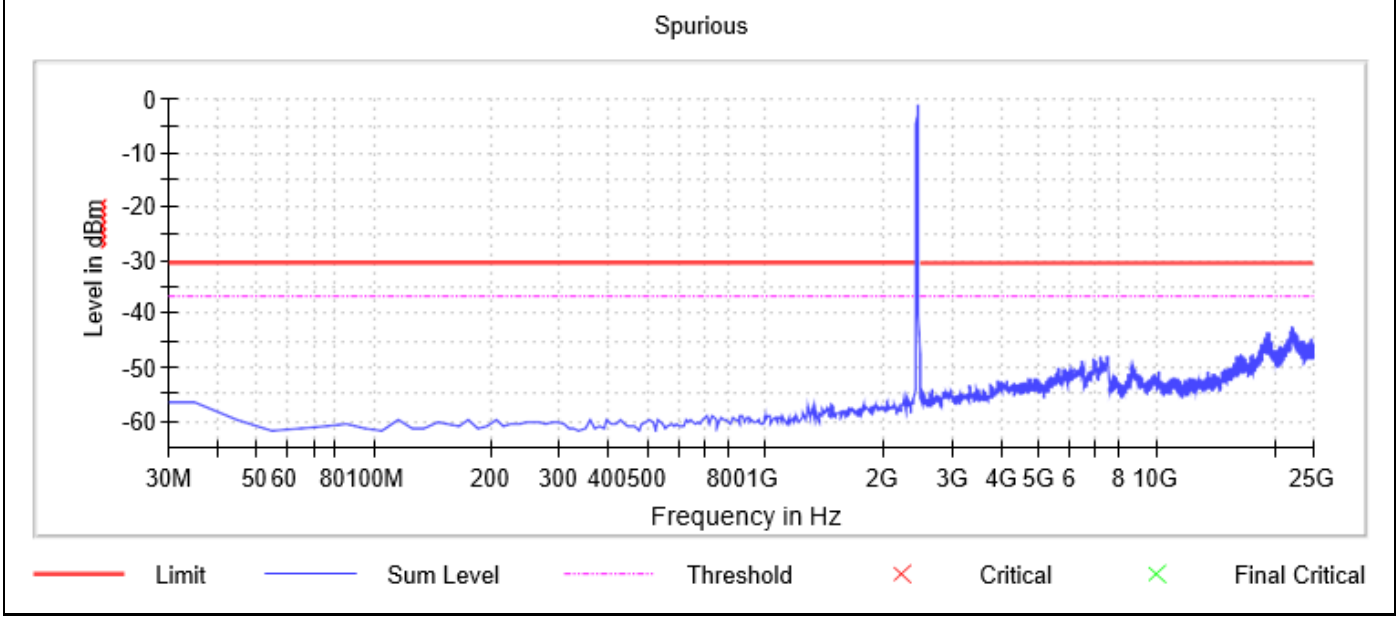




802.11g 2437MHz 6Mbps

Pre Measurement

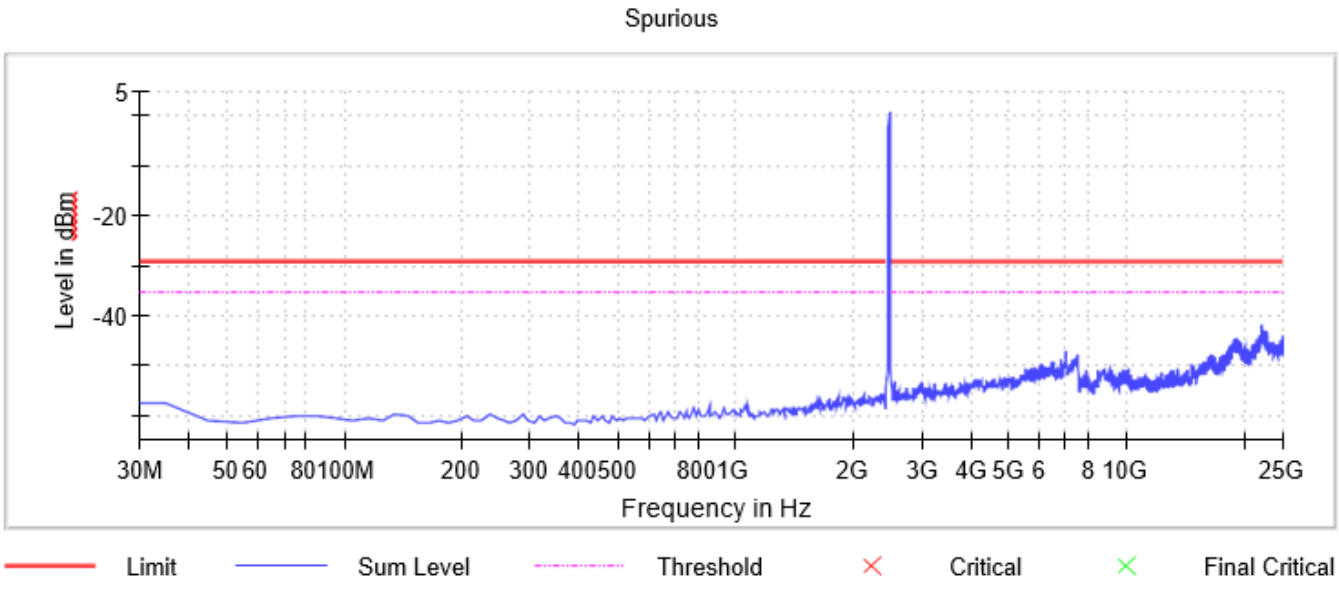
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22186.126902	-42.1	11.5	-30.6
21986.206966	-42.6	12.0	-30.6
22126.150921	-42.7	12.1	-30.6
22076.170937	-42.9	12.3	-30.6
22056.178943	-43.0	12.3	-30.6
21936.226982	-43.0	12.4	-30.6
22016.194956	-43.0	12.4	-30.6
22166.134908	-43.1	12.4	-30.6
22106.158927	-43.2	12.6	-30.6
22146.142914	-43.2	12.6	-30.6
19227.311849	-43.3	12.7	-30.6
22036.186950	-43.4	12.7	-30.6
22026.190953	-43.4	12.8	-30.6
22216.114892	-43.4	12.8	-30.6
22256.098879	-43.5	12.9	-30.6



802.11g 2462MHz 6Mbps

Pre Measurement

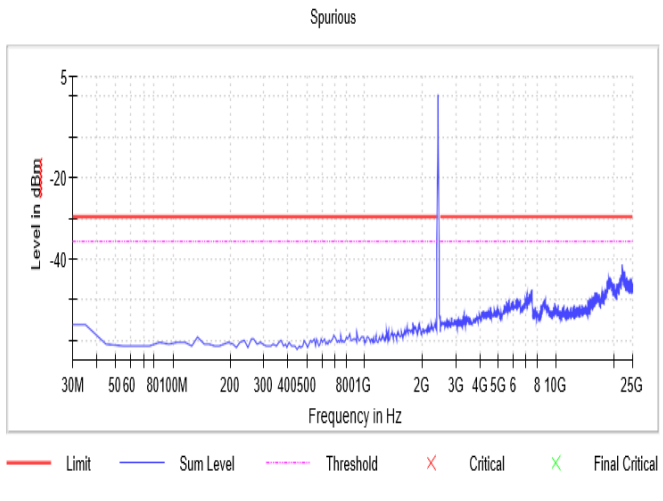
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2484.017214	-40.3	11.2	-29.1
22096.162930	-41.6	12.5	-29.1
22136.146918	-42.7	13.6	-29.1
22066.174940	-43.0	13.9	-29.1
22486.006805	-43.1	14.0	-29.1
22755.898719	-43.2	14.1	-29.1
22056.178943	-43.5	14.4	-29.1
22146.142914	-43.6	14.4	-29.1
22126.150921	-43.6	14.5	-29.1
21956.218975	-43.7	14.6	-29.1
22046.182946	-43.7	14.6	-29.1
22016.194956	-43.8	14.7	-29.1
22026.190953	-43.8	14.7	-29.1
22246.102882	-43.8	14.7	-29.1
21996.202962	-43.8	14.7	-29.1

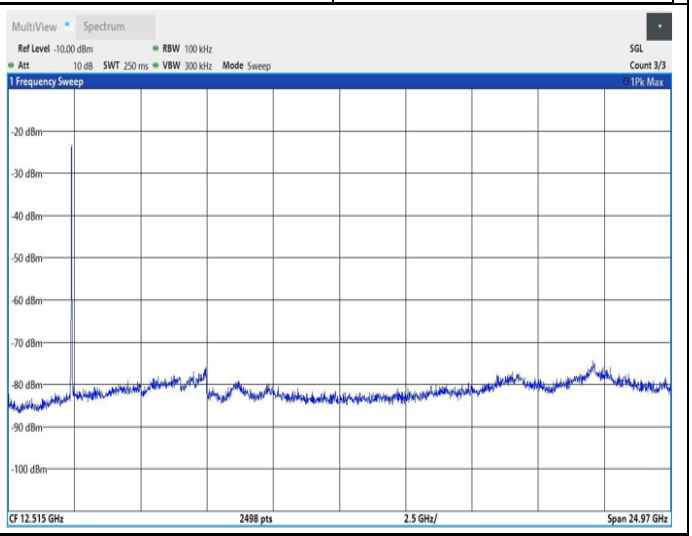


802.11n (HT20) 2412MHz MCS0

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2394.053243	-37.6	8.1	-29.6
22056.178943	-41.6	12.0	-29.6
22126.150921	-42.4	12.9	-29.6
22036.186950	-42.9	13.3	-29.6
22106.158927	-43.0	13.4	-29.6
22026.190953	-43.1	13.5	-29.6
22116.154924	-43.2	13.6	-29.6
22725.910729	-43.2	13.6	-29.6
22446.022818	-43.2	13.7	-29.6
22006.198959	-43.2	13.7	-29.6
22046.182946	-43.3	13.8	-29.6
22066.174940	-43.4	13.8	-29.6
22096.162930	-43.5	14.0	-29.6
22086.166934	-43.5	14.0	-29.6
22136.146918	-43.6	14.1	-29.6

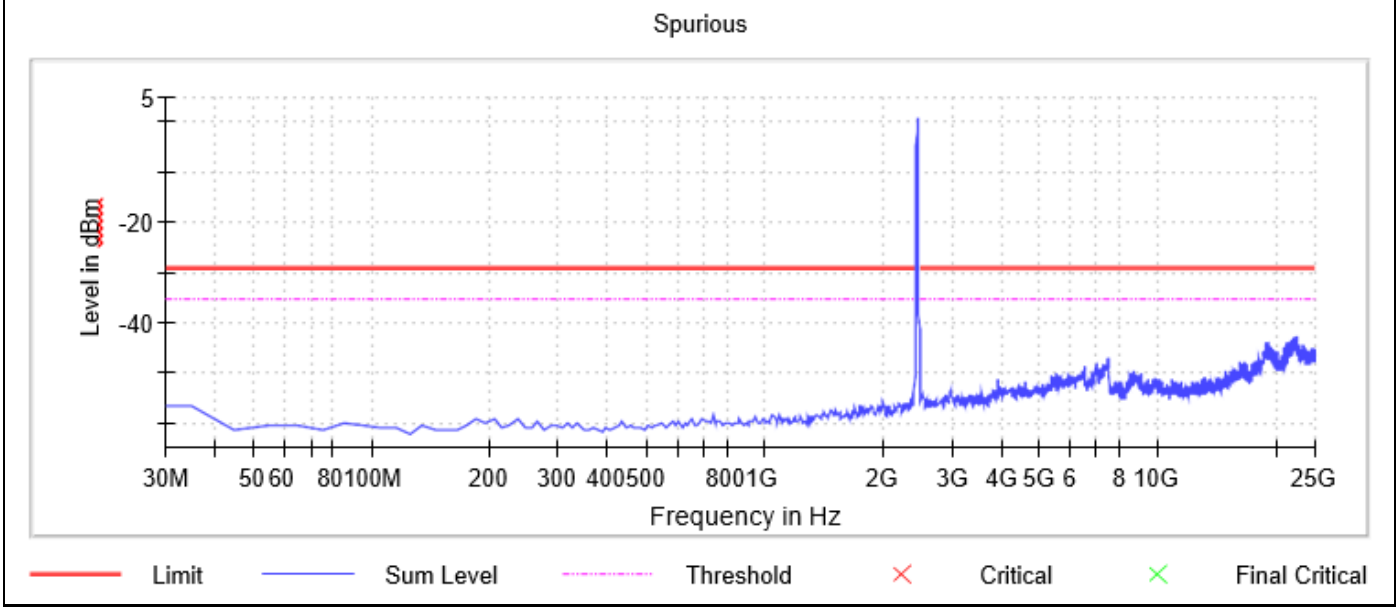




802.11n (HT20) 2437MHz MCS0

Pre Measurement

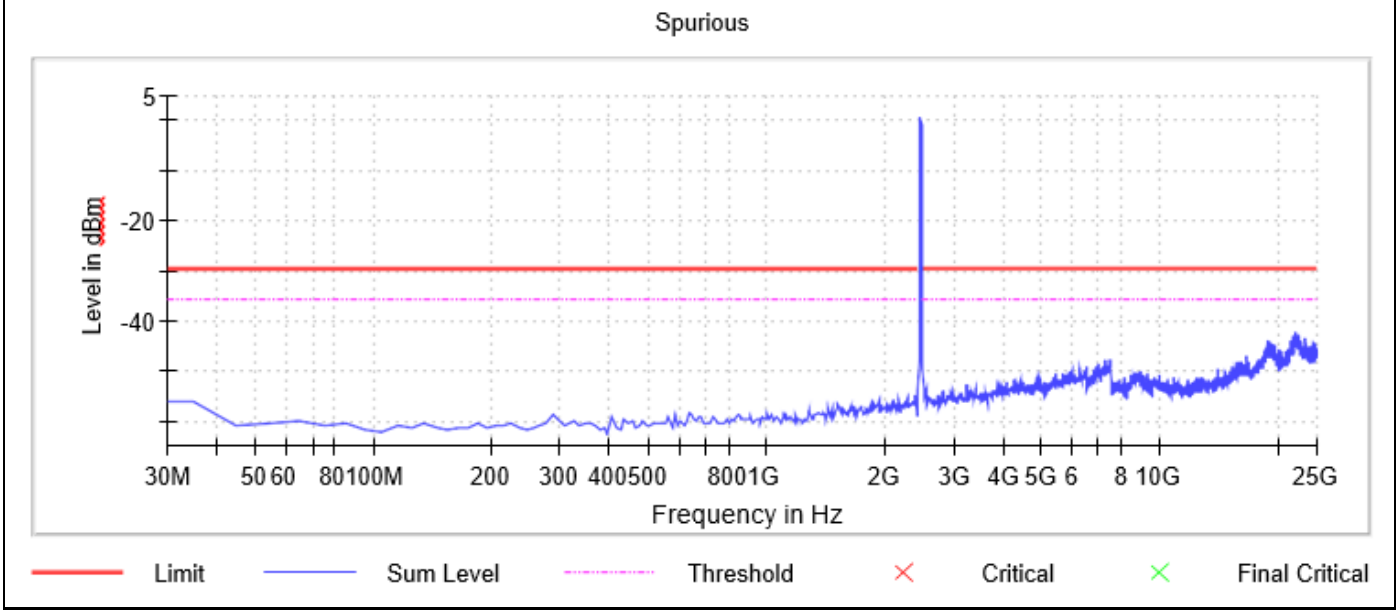
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22346.062850	-42.7	13.5	-29.1
22036.186950	-43.0	13.9	-29.1
22156.138911	-43.0	13.9	-29.1
22046.182946	-43.3	14.2	-29.1
22396.042834	-43.3	14.2	-29.1
22146.142914	-43.4	14.2	-29.1
22496.002802	-43.5	14.4	-29.1
22006.198959	-43.6	14.5	-29.1
22106.158927	-43.7	14.6	-29.1
21866.255004	-43.7	14.6	-29.1
21976.210969	-43.8	14.7	-29.1
22326.070857	-43.9	14.7	-29.1
21996.202962	-43.9	14.8	-29.1
22276.090873	-43.9	14.8	-29.1
22066.174940	-44.0	14.8	-29.1



802.11n (HT20) 2462MHz MCS0

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2484.017214	-41.5	12.0	-29.5
22086.166934	-42.3	12.7	-29.5
22545.982786	-42.9	13.4	-29.5
21906.238991	-42.9	13.4	-29.5
22535.986789	-43.3	13.7	-29.5
22026.190953	-43.3	13.7	-29.5
21956.218975	-43.3	13.7	-29.5
22246.102882	-43.3	13.7	-29.5
21986.206966	-43.4	13.8	-29.5
22266.094876	-43.4	13.8	-29.5
23345.662530	-43.5	13.9	-29.5
21946.222978	-43.6	14.1	-29.5
22466.014812	-43.7	14.1	-29.5
22156.138911	-43.7	14.1	-29.5
22436.026821	-43.7	14.2	-29.5



- **Radiated Testing**

Test Summary

Start: 11/11/2021	End: 12/10/2021	Temperature: 22.6°C Humidity:27 %R.H.	Initials: RP

DUT S/N	AH21100601-HAR-134#004		DUT Operating Mode		2.4GHz WLAN
Comment	802.11b 1Mbps, 802.11g 6Mbps, 802.11n MCS0				
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-27.5GHz	Horizontal	☐Over	☒Under	√
		Vertical	☐Over	☒Under	√

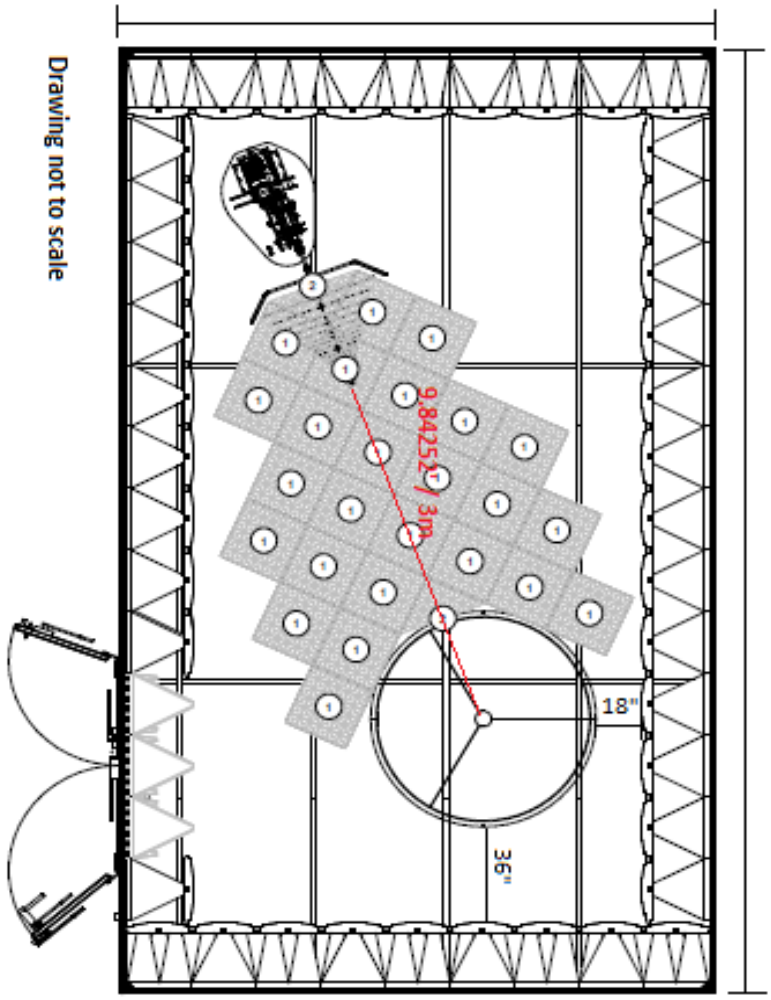
Notes: √ meets the requirements of the acceptance criteria.

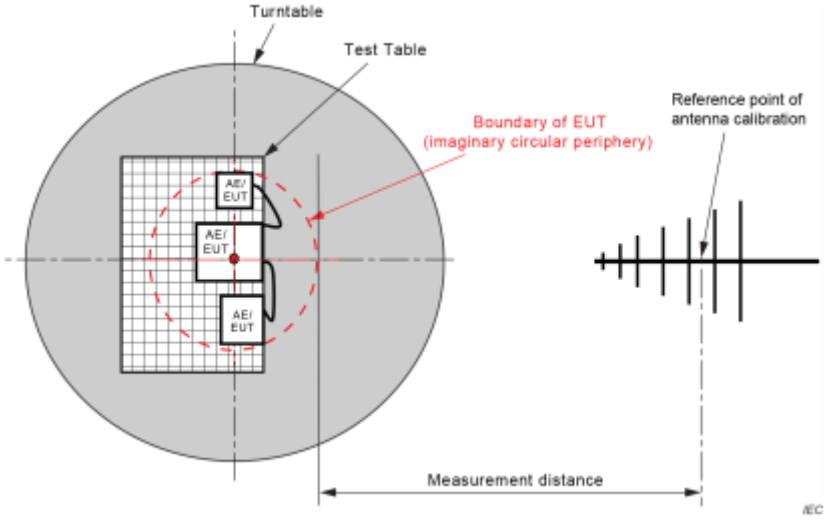
Test Setup

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

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
BVD0217	Receiver 2Hz-44GHz	Rohde & Schwarz	ESW44	101871	4/16/2022
BVD0398	Double Shielded N-Type Cable 2 Meter	Rohde & Schwarz	N-Type	N/A	12/29/2022
BVD0404	Double Shielded N-Type Cable 440mm (For PreAmp)	Rohde & Schwarz	N-Type	N/A	8/10/2022
BVD0407	Double Shielded N-Type Cable 410mm (For PreAmp)	Rohde & Schwarz	N-Type	N/A	8/5/2022
BVD0187	Preamplifier 25dB cal to 100kHz-1GHz	Rohde & Schwarz	TS-PR1	102080	11/19/2021
BVD0184	Preamplifier 29dB 1-18GHz	Rohde & Schwarz	TS-PR18	101646	4/26/2022
BVD0394	Double Shielded N-Type Cable 6.9 Meter	Rohde & Schwarz	N-Type	N/A	12/29/2022
BVD0011	Loop Antenna 9kHz-30MHz	Rohde & Schwarz	FMZB1519B	145	3/23/2022
BVD0021	UltraLog Antenna 30-6000 MHz	Rohde & Schwarz	HL562E	101113	7/23/2022
BVD0267	Double Ridge Waveguide 800MHz-18GHz	Rohde & Schwarz	HF907	102832	9/9/2022
BVD0320	18-40GHz Horn Antenna	L3 Narda ATM	PNR 180-442-KF	136164-01	3/8/2022
BVD0496	SMA Shielded Cable approx 100mm (for Pre-Amp)	Rohde & Schwarz	SMA-Type	N/A	N/A
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
BVD0495	SMA Shielded Cable approx 100mm (for Pre-Amp)	Rohde & Schwarz	SMA-Type	N/A	N/A
BVD0185	Preamplifier 45dB 18-40GHz	Rohde & Schwarz	TS-PR1840	100064	3/2/2022
BVD0118	Antenna Mast Position Controller	ETS	7006-001	00214778/0 0214648	N/A
BVD0112	Equipment Chamber for 3 Meter Chamber	ETS	N/A	N/A	N/A
BVD0111	3 Meter Anechoic Chamber	ETS	N/A	N/A	10/16/2022
BVD0247	Turn Table	ETS	920250	N/A	N/A
BVD0258	Optima 12V Blue top Marine battery	Optima	D34M	N/A	N/A
BVD0323	Foam Test Table For 3 Meter Chamber	ETS-Lindgren	LDT-1.5	N/A	N/A
BVD0069	Bore Sight Tower	ETS	2171B	226732	N/A

Equipment List (Software)

Equipment	Manufacturer	Model	Version No.
EMC Test Software	Nexio	BAT-EMC	3.21.0.18

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	Harness	Harman	1m	N/A	N/A

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)	ProbabilityDistribution	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	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
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:

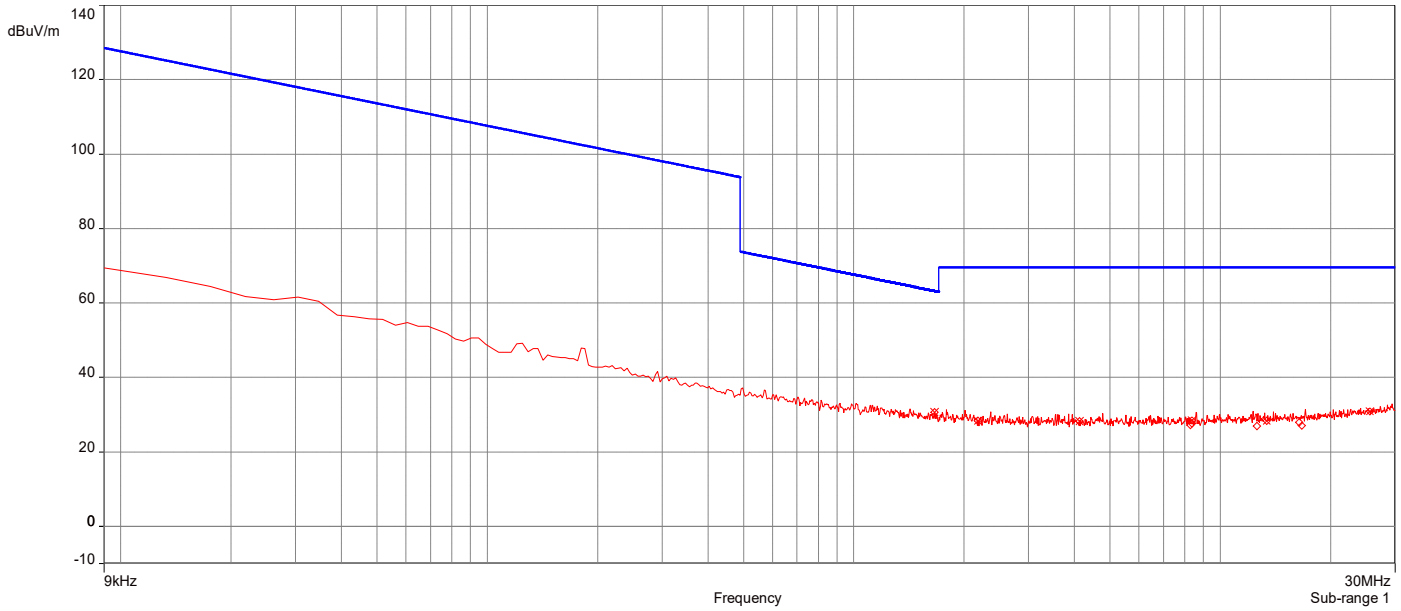
1. Raw Peak Level (dBuV/m) = Level Peak Reading - Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level – Limit

AH21100601-HAR-134#004_2.4G 802.11b_Ch 6_9kHz-30MHz_Ground-Parallel

11/16/2021 7:45:23 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Judgement
1.	1.663026MHz	30.59	19.12	63.19	-32.60	1.00	355.00	Passed
2.	2.177231MHz	28.36	19.09	69.54	-41.18	1.00	283.90	Passed
3.	4.126924MHz	28.21	19.21	69.54	-41.33	1.00	0.20	Passed
4.	8.377685MHz	28.47	19.14	69.54	-41.08	1.00	271.70	Passed
5.	13.369757MHz	28.33	19.62	69.54	-41.21	1.00	243.60	Passed
6.	25.582123MHz	30.90	20.72	69.54	-38.64	1.00	226.30	Passed

Overall Graphs:

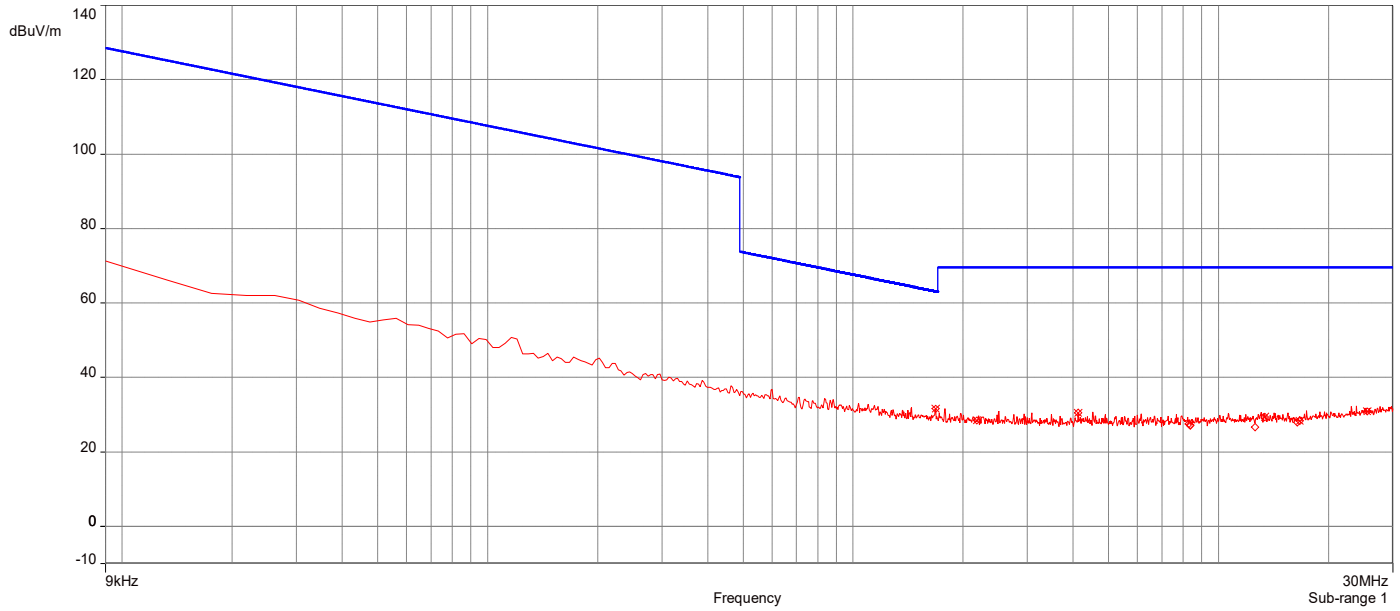


AH21100601-HAR-134#004_2.4G 802.11b_Ch 6_9kHz-30MHz_Parallel

11/16/2021 8:05:59 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Judgement
1.	1.680166MHz	31.59	19.12	63.10	-31.51	1.00	330.20	Passed
2.	2.181516MHz	28.48	19.09	69.54	-41.06	1.00	269.70	Passed
3.	4.126924MHz	30.55	19.21	69.54	-39.00	1.00	278.90	Passed
4.	13.391182MHz	29.42	19.62	69.54	-40.12	1.00	157.10	Passed
5.	16.694949MHz	28.41	19.68	69.54	-41.14	1.00	245.20	Passed
6.	25.526417MHz	30.91	20.72	69.54	-38.64	1.00	132.40	Passed

Overall Graphs:

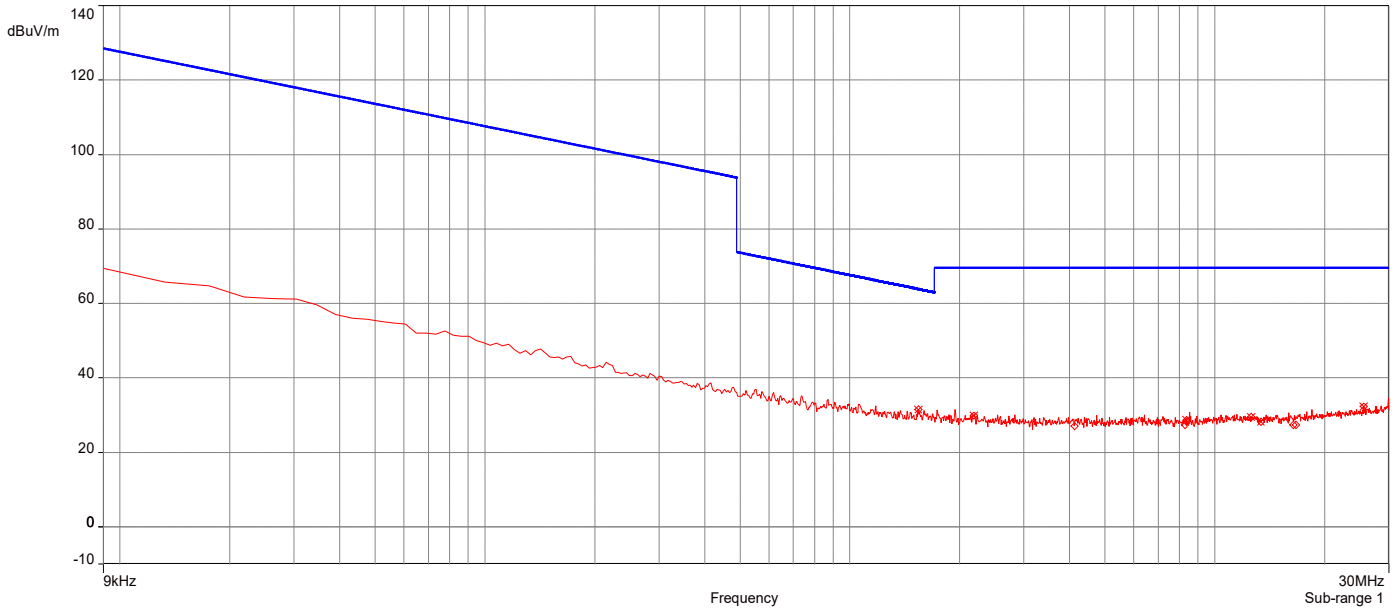


AH21100601-HAR-134#004_2.4G 802.11b_Ch 6_9kHz-30MHz_Perpendicular

11/16/2021 8:10:56 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Judgement
1.	1.543045 MHz	31.54	19.13	63.84	-32.30	1.00	210.40	Passed
2.	2.190086 MHz	29.94	19.09	69.54	-39.61	1.00	0.10	Passed
3.	8.364829 MHz	28.66	19.14	69.54	-40.88	1.00	77.70	Passed
4.	12.577024 MHz	29.44	19.58	69.54	-40.10	1.00	340.30	Passed
5.	13.391182 MHz	28.22	19.62	69.54	-41.32	1.00	270.90	Passed
6.	25.594978 MHz	32.42	20.72	69.54	-37.12	1.00	295.20	Passed

Overall Graphs:

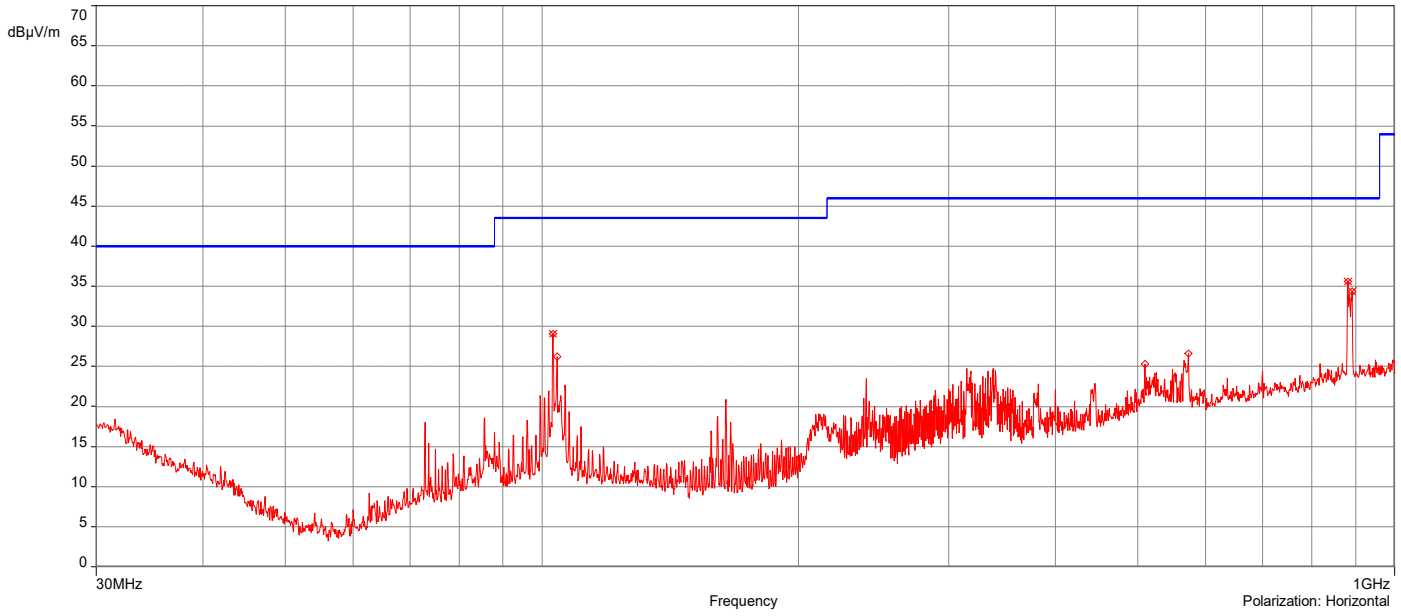


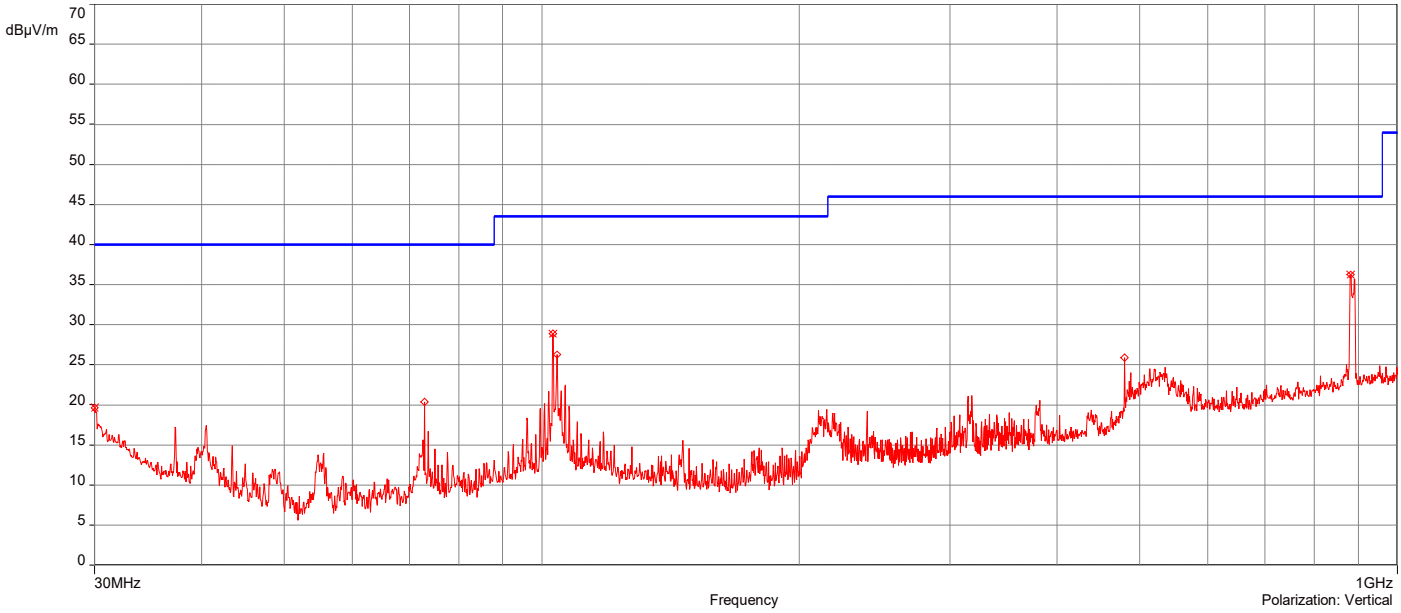
AH21100601-HAR-134#004_2.4G 802.11b_Ch 1_30MHz-1GHz

11/11/2021 7:55:12 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	30MHz	19.65	-7.02	29.50	-9.85	1.00	10.70	Vertical	Passed
2.	103.03959MHz	28.85	-13.04	43.50	-14.65	1.00	105.70	Vertical	Passed
3.	881.53891MHz	36.24	-1.59	46.00	-9.76	2.00	353.20	Vertical	Passed
4.	102.98253MHz	29.08	-13.74	43.50	-14.42	2.50	227.20	Horizontal	Passed
5.	881.88129MHz	35.59	-0.49	46.00	-10.41	1.00	327.70	Horizontal	Passed
6.	891.41067MHz	34.36	-0.36	46.00	-11.64	2.00	63.90	Horizontal	Passed

Overall Graphs:



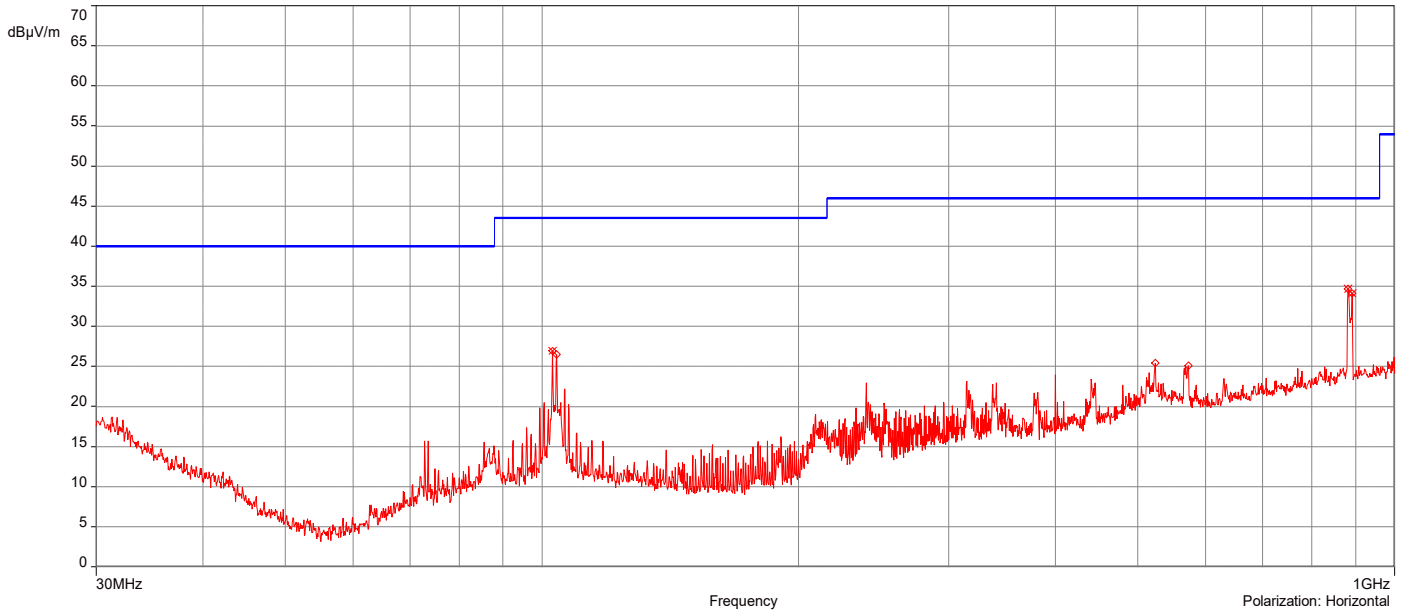

dBµV/m
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30MHz
Frequency
1GHz
Polarization: Vertical

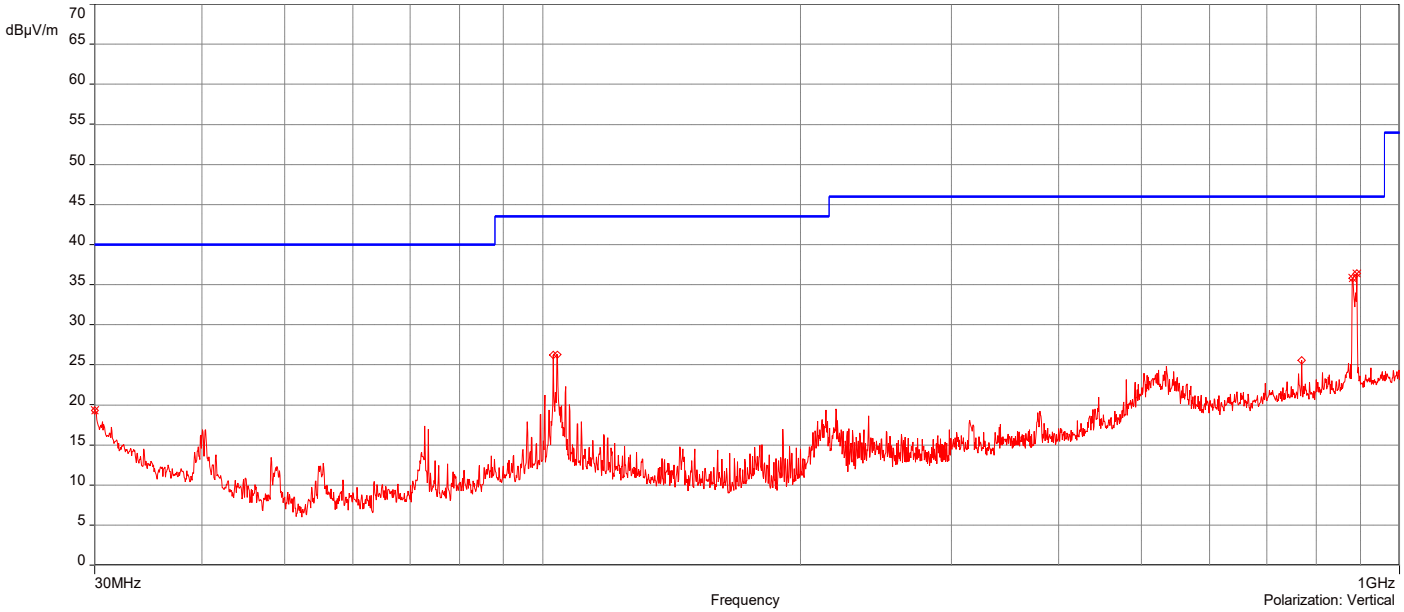
AH21100601-HAR-134#004_2.4G 802.11b_Ch 6_30MHz-1GHz

11/11/2021 10:10:35 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	30MHz	19.28	-7.02	29.50	-10.22	1.00	20.10	Vertical	Passed
2.	881.53891MHz	35.83	-1.59	46.00	-10.17	2.00	357.30	Vertical	Passed
3.	891.23948MHz	36.37	-1.60	46.00	-9.63	1.00	0.10	Vertical	Passed
4.	102.8684MHz	26.97	-13.74	43.50	-16.53	2.00	235.00	Horizontal	Passed
5.	882.33779MHz	34.64	-0.50	46.00	-11.36	2.00	45.00	Horizontal	Passed
6.	891.23948MHz	34.13	-0.38	46.00	-11.87	2.00	62.60	Horizontal	Passed

Overall Graphs:



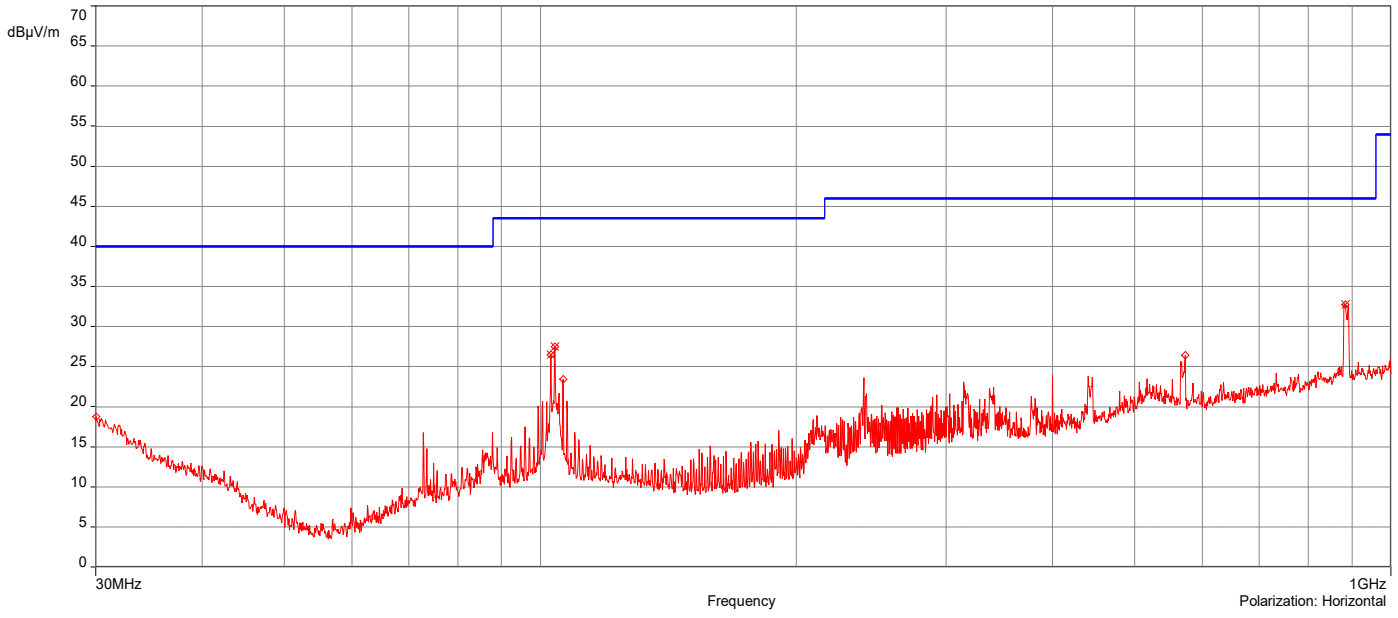

dBµV/m
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30MHz
Frequency
1GHz
Polarization: Vertical

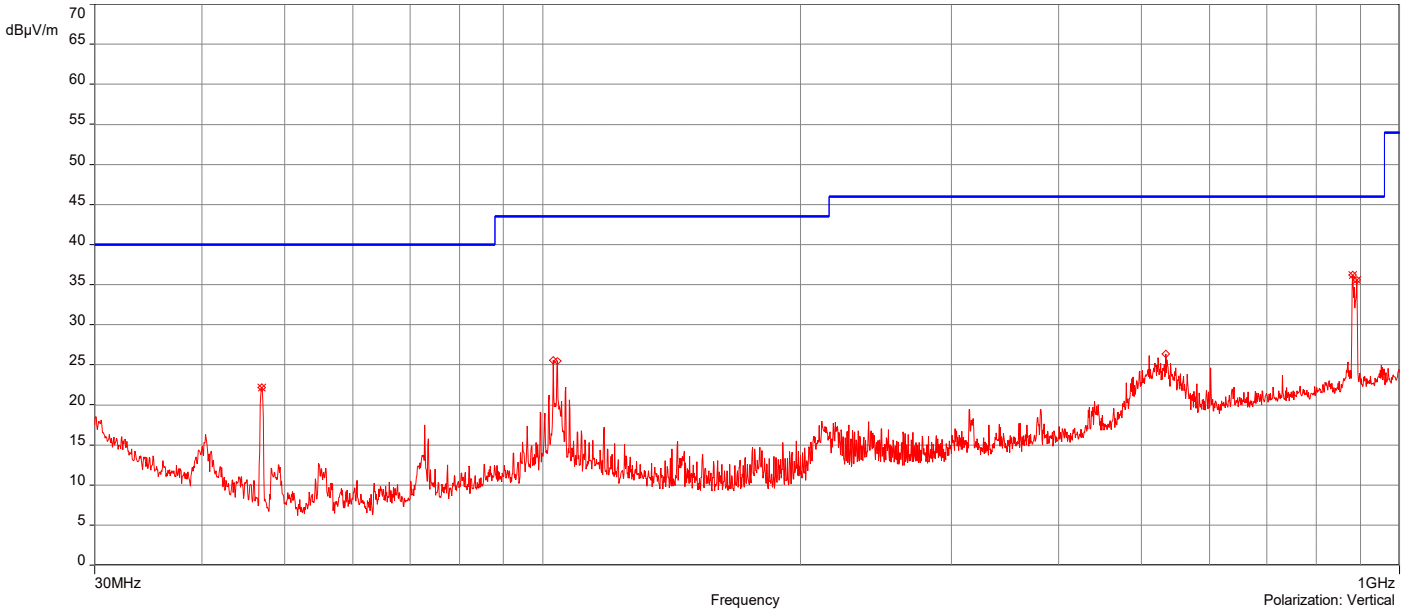
AH21100601-HAR-134#004_2.4G 802.11b_Ch 11_30MHz-1GHz

11/11/2021 10:58:26 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	47.00453MHz	22.14	-16.88	40.00	-17.86	1.50	283.60	Vertical	Passed
2.	881.59598MHz	36.24	-1.59	46.00	-9.76	2.00	1.80	Vertical	Passed
3.	891.75304MHz	35.57	-1.60	46.00	-10.43	2.00	0.10	Vertical	Passed
4.	102.8684MHz	26.48	-13.74	43.50	-17.02	2.50	231.00	Horizontal	Passed
5.	104.00965MHz	27.48	-13.67	43.50	-16.02	2.50	219.50	Horizontal	Passed
6.	883.87846MHz	32.75	-0.50	46.00	-13.25	2.00	63.10	Horizontal	Passed

Overall Graphs:




dBµV/m
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30MHz
Frequency
1GHz
Polarization: Vertical

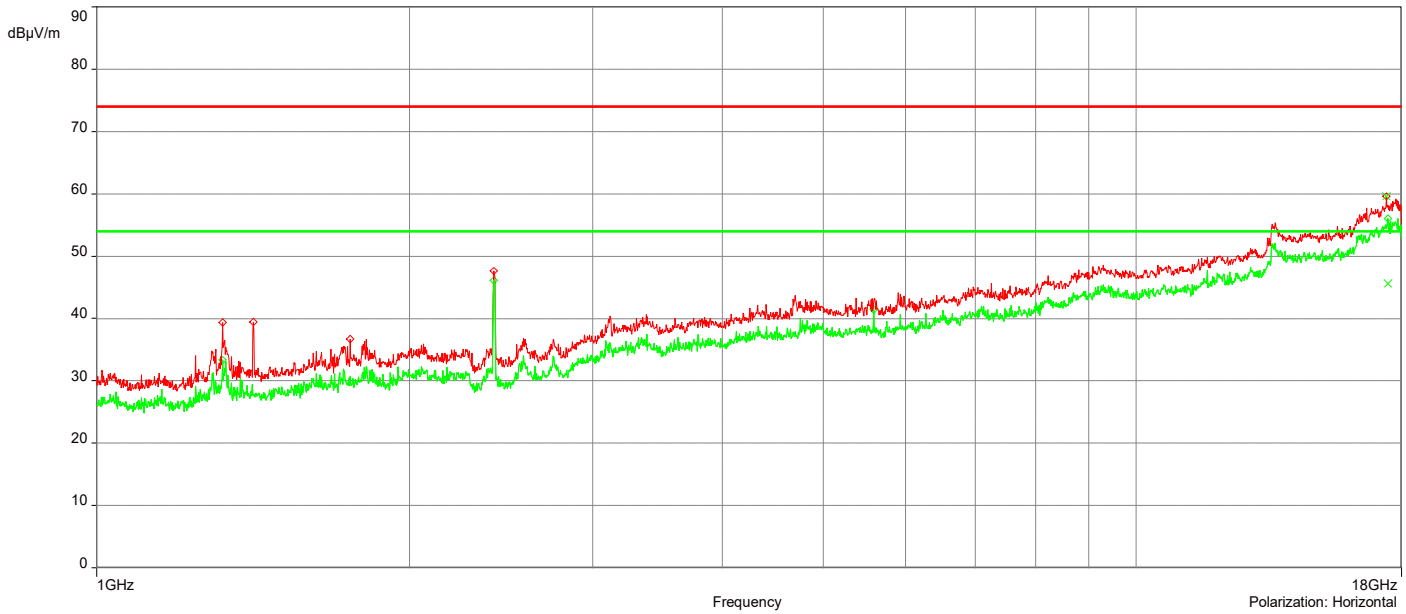
AH21100601-HAR-134#004_2.4G 802.11b_Ch 1_1-18GHz

12/1/2021 4:18:59 PM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	17.412983GHz	59.62	18.18	74.00	-14.38	4.00	45.30	Horizontal	Passed
2.	17.769493GHz	58.93	18.29	74.00	-15.07	1.00	127.40	Vertical	Passed
3.	13.540369GHz	56.59	12.52	74.00	-17.41	2.50	1.70	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.540369GHz	53.14	12.52	54.00	-0.86	2.50	1.70	Vertical	Passed
2.	17.893997GHz	45.94	18.36	54.00	-8.06	3.00	219.90	Vertical	Passed
3.	17.469484GHz	45.57	18.34	54.00	-8.43	4.00	215.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

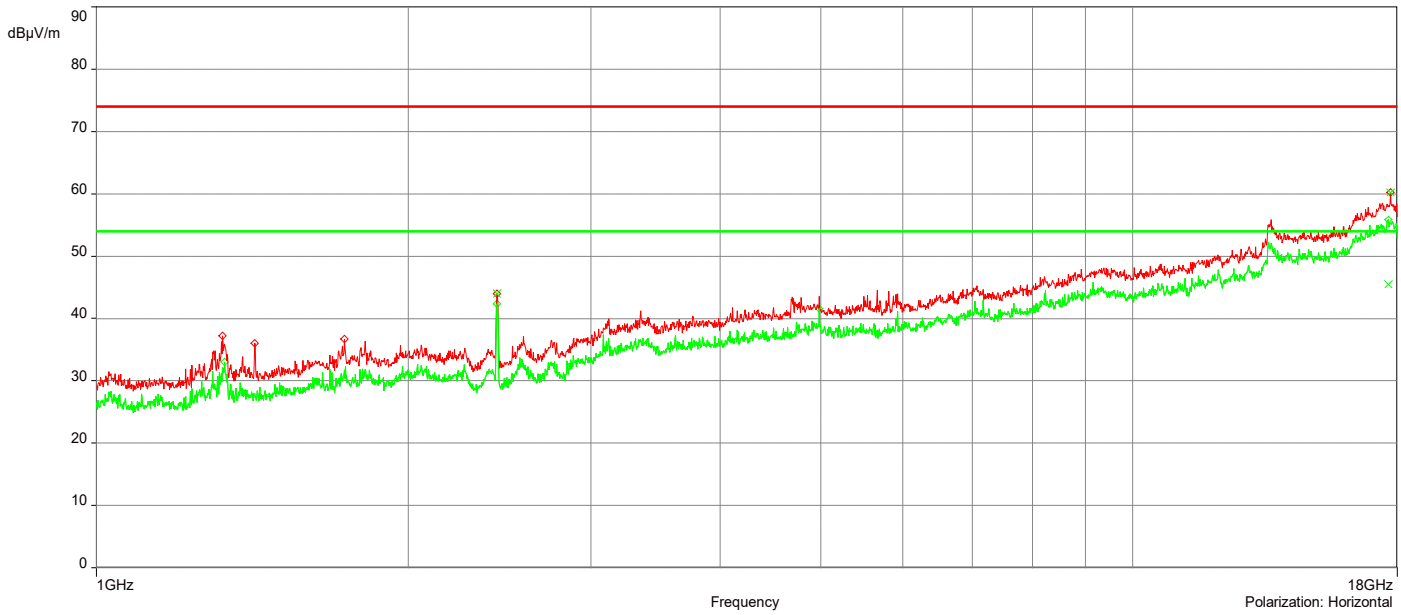
AH21100601-HAR-134#004_2.4G 802.11b_Ch 6_1-18GHz

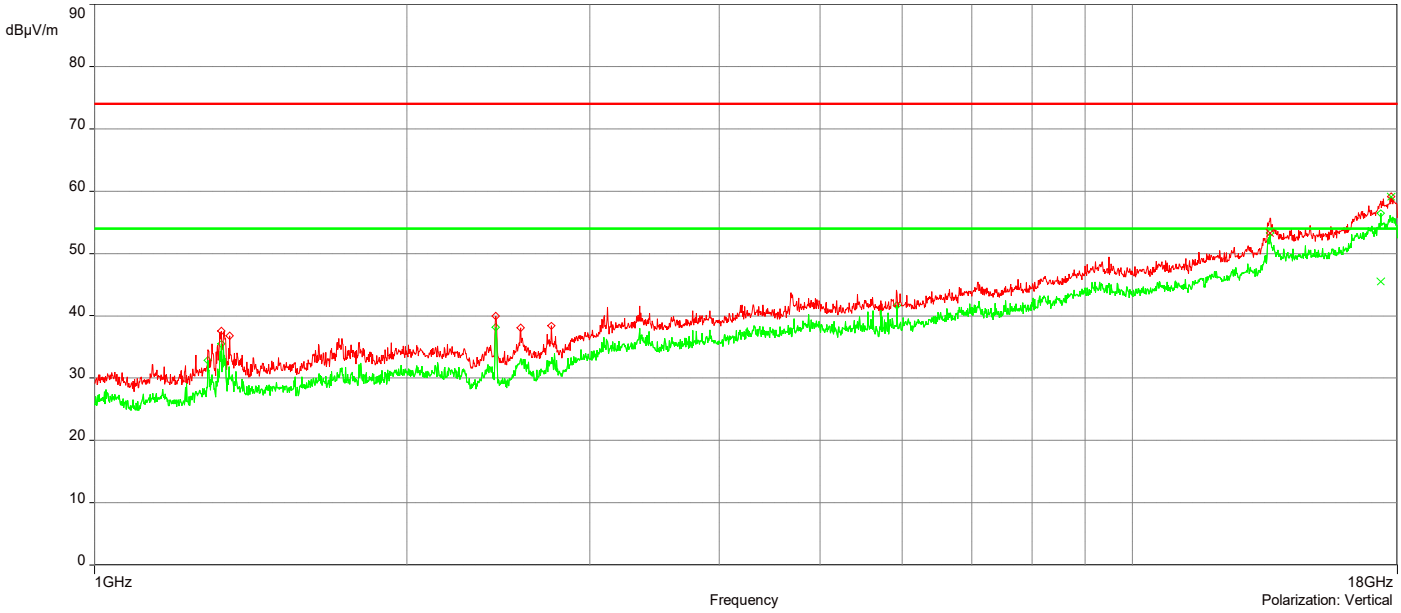
12/1/2021 4:44:49 PM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.4360422GHz	43.96	-2.63	74.00	-30.04	2.00	334.70	Horizontal	Passed
2.	17.751993GHz	59.15	18.26	74.00	-14.85	2.50	179.60	Vertical	Passed
3.	17.741492GHz	60.26	18.22	74.00	-13.74	3.00	203.50	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.57087GHz	53.33	12.57	54.00	-0.67	1.00	27.50	Vertical	Passed
2.	17.64649GHz	45.54	18.29	54.00	-8.46	3.00	354.90	Horizontal	Passed
3.	17.344981GHz	45.51	17.83	54.00	-8.49	3.50	116.10	Vertical	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

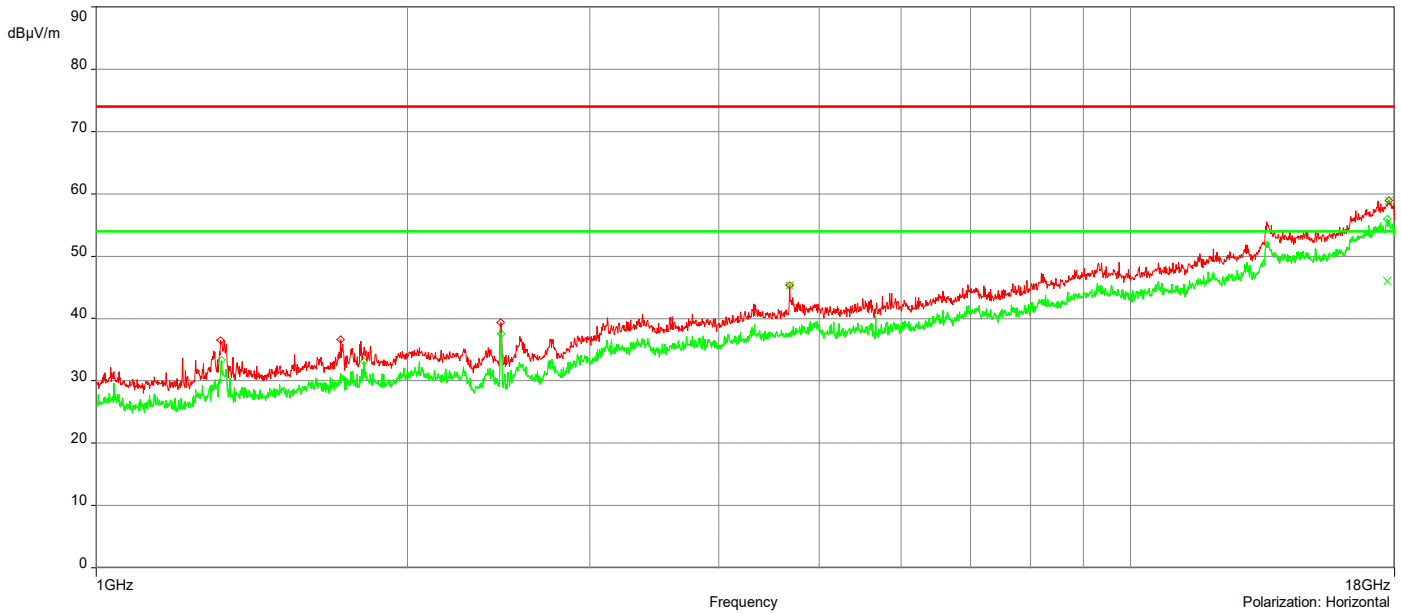
AH21100601-HAR-134#004_2.4G 802.11b_Ch 11_1-18GHz

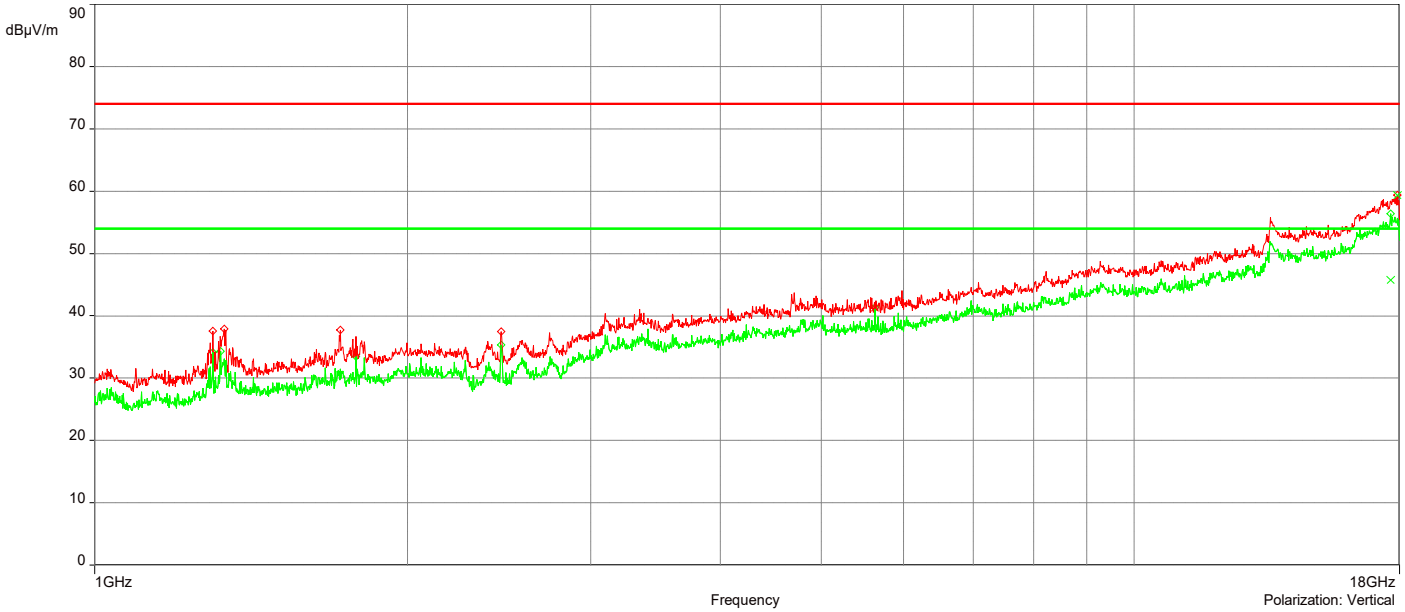
12/1/2021 5:09:40 PM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	4.6841084GHz	45.33	3.49	74.00	-28.67	4.00	0.10	Horizontal	Passed
2.	17.775993GHz	58.91	18.26	74.00	-15.09	2.50	261.50	Horizontal	Passed
3.	17.925998GHz	59.42	18.44	74.00	-14.58	2.50	127.00	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	17.711992GHz	46.02	18.23	54.00	-7.98	4.00	29.10	Horizontal	Passed
2.	17.65749GHz	45.78	18.28	54.00	-8.22	2.50	254.10	Vertical	Passed
3.	5.6306362GHz	41.37	4.44	54.00	-12.63	1.50	23.10	Vertical	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

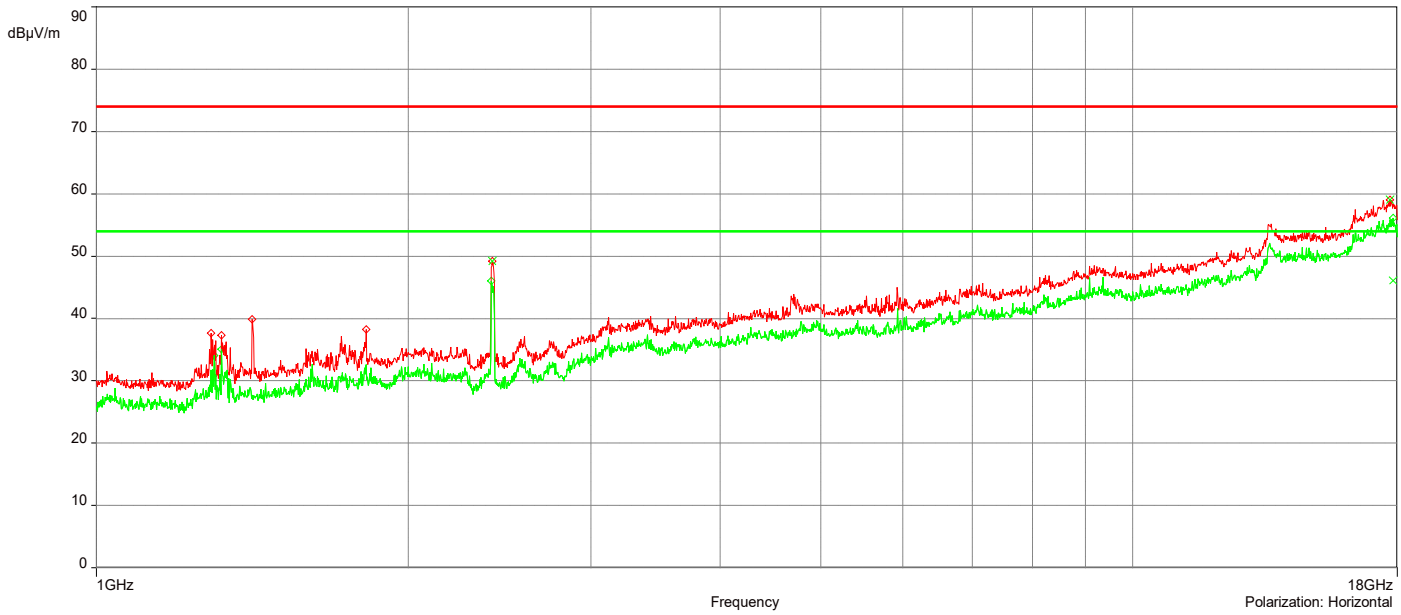
AH21100601-HAR-134#004_2.4G 802.11g_Ch 1_1-18GHz

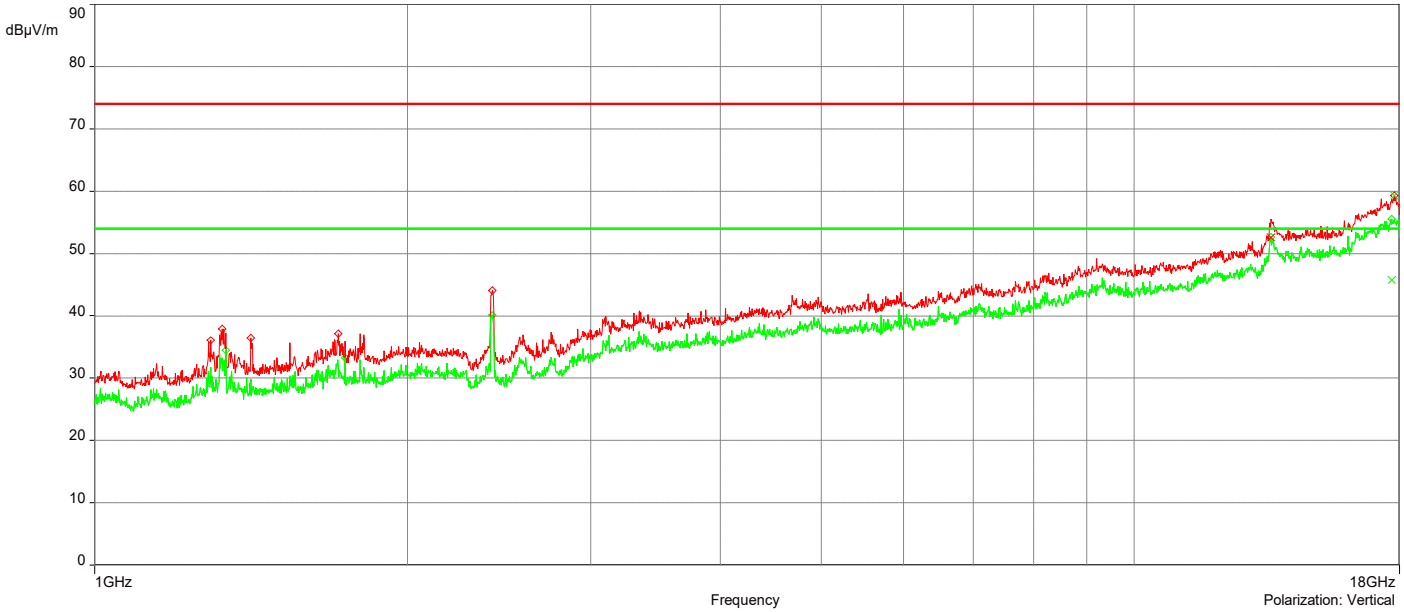
12/1/2021 5:42:28 PM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.4090414GHz	49.18	-2.87	74.00	-24.82	2.00	325.10	Horizontal	Passed
2.	17.703991GHz	59.07	18.23	74.00	-14.93	3.50	57.40	Horizontal	Passed
3.	17.794994GHz	59.26	18.32	74.00	-14.74	1.00	85.90	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.537369GHz	52.59	12.52	54.00	-1.41	3.00	249.10	Vertical	Passed
2.	17.830495GHz	46.11	18.28	54.00	-7.89	1.00	128.90	Horizontal	Passed
3.	17.698991GHz	45.78	18.23	54.00	-8.22	3.50	8.10	Vertical	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

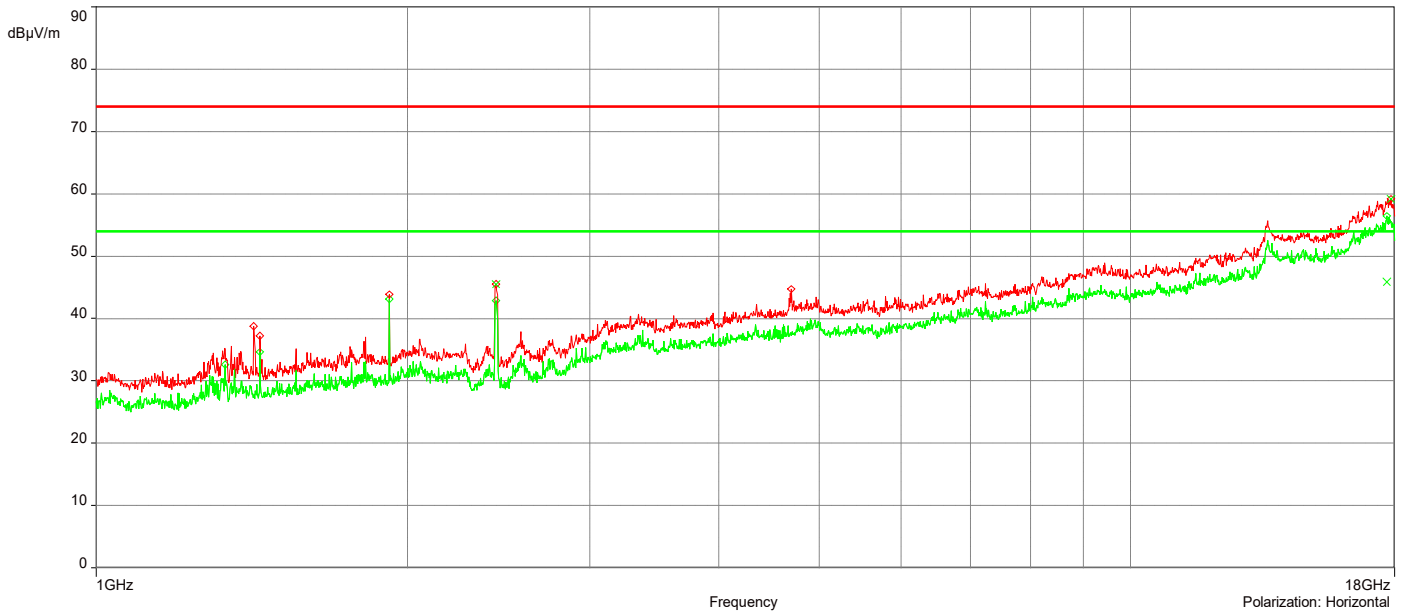
AH21100601-HAR-134#004_2.4G 802.11g_Ch 6_1-18GHz

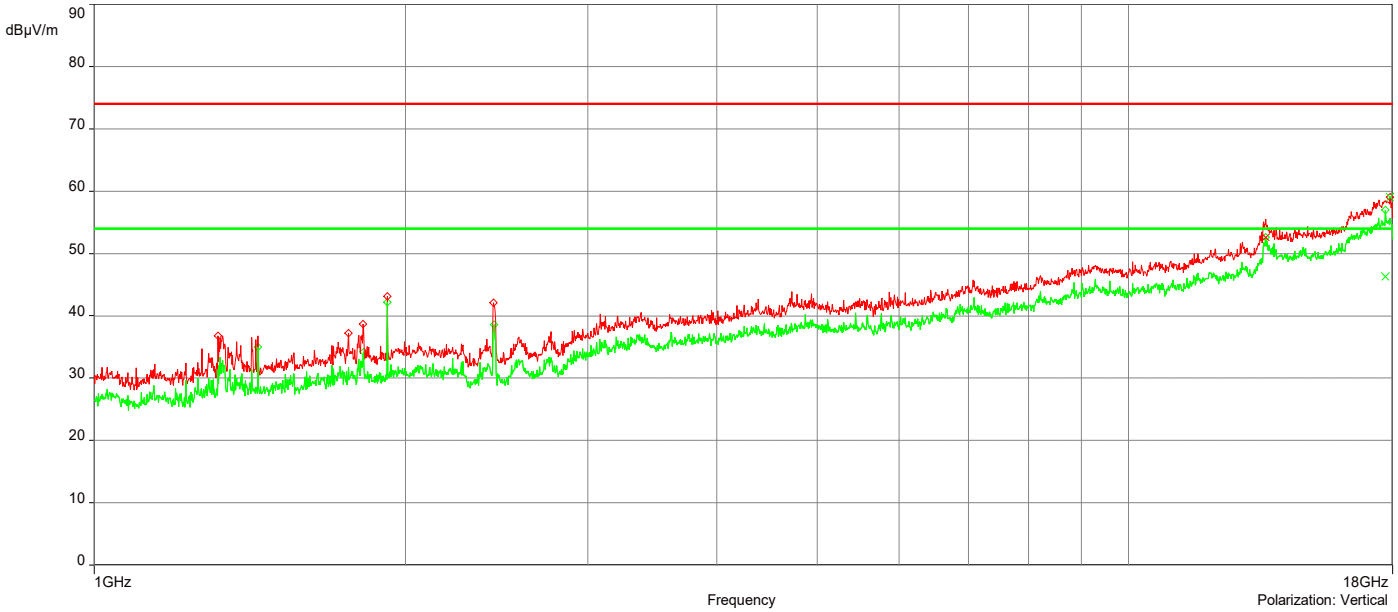
12/2/2021 6:46:54 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.4350422GHz	45.54	-2.64	74.00	-28.46	2.00	330.50	Horizontal	Passed
2.	17.891997GHz	59.00	18.36	74.00	-15.00	3.50	313.30	Vertical	Passed
3.	17.860996GHz	59.19	18.28	74.00	-14.81	3.50	304.30	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	13.57287GHz	52.64	12.58	54.00	-1.36	2.50	207.00	Vertical	Passed
2.	17.714492GHz	46.31	18.24	54.00	-7.69	3.00	301.90	Vertical	Passed
3.	17.699991GHz	45.85	18.23	54.00	-8.15	2.00	0.10	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

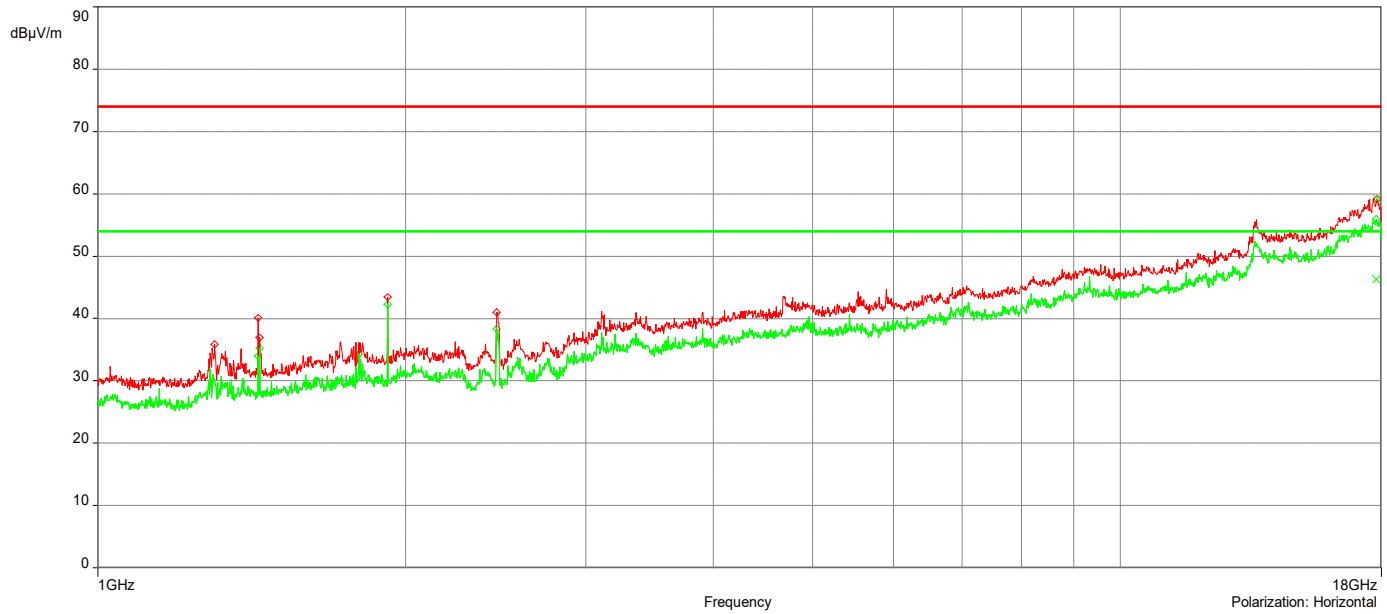
AH21100601-HAR-134#004_2.4G 802.11g_Ch 11_1-18GHz

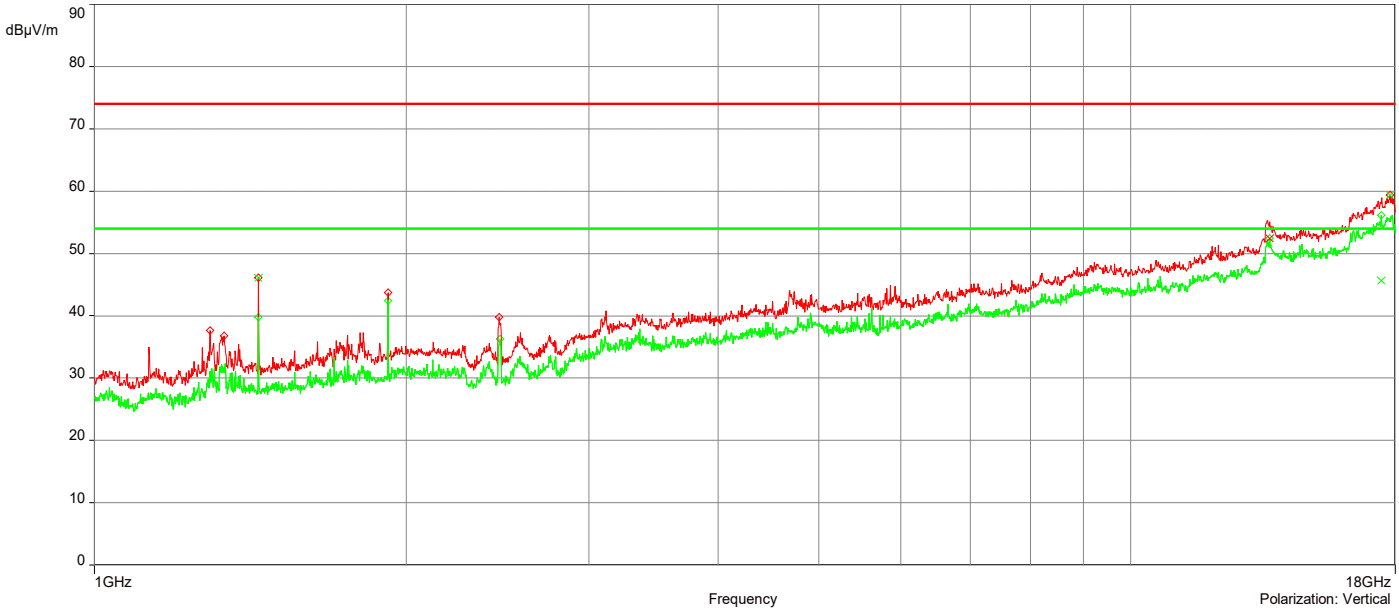
12/2/2021 7:16:30 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	17.787494GHz	59.41	18.31	74.00	-14.59	3.50	269.90	Vertical	Passed
2.	17.830495GHz	59.18	18.28	74.00	-14.82	1.02	202.40	Horizontal	Passed
3.	1.4400129GHz	46.13	-7.06	74.00	-27.87	1.02	134.90	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	17.451984GHz	45.68	18.33	54.00	-8.32	4.00	180.10	Vertical	Passed
2.	17.783494GHz	46.30	18.30	54.00	-7.70	4.00	112.10	Horizontal	Passed
3.	13.614371GHz	52.46	12.63	54.00	-1.54	3.81	134.90	Vertical	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

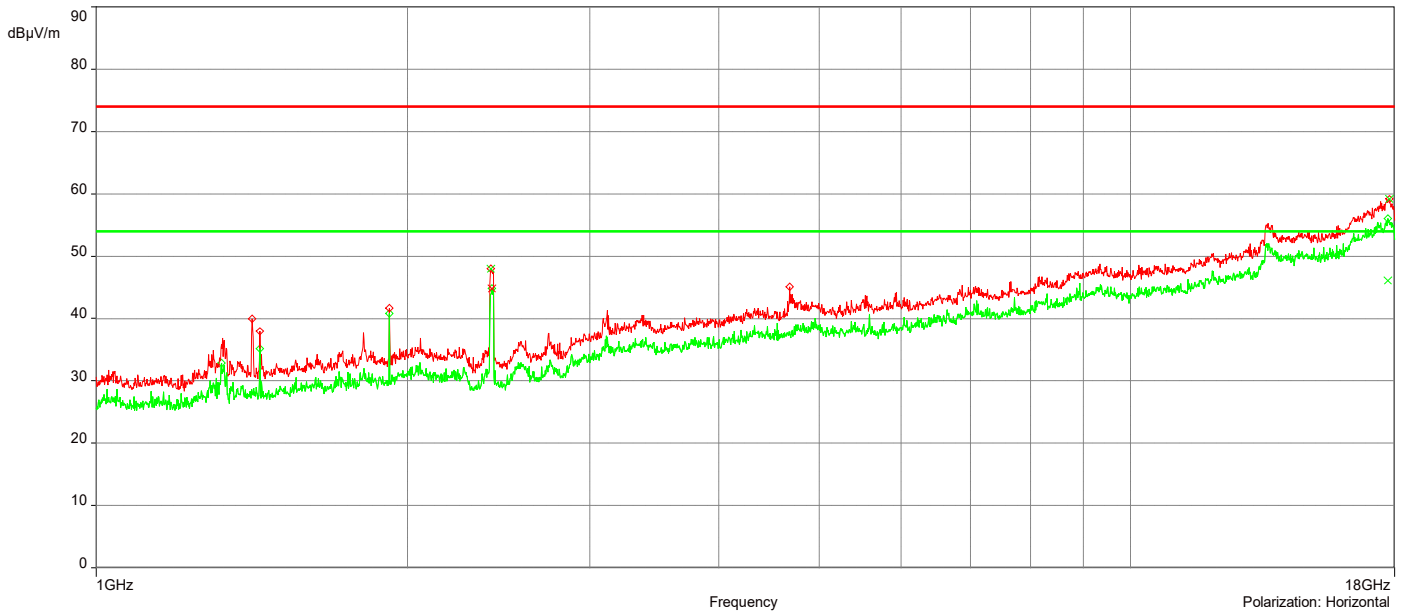
AH21100601-HAR-134#004_2.4G 802.11n_Ch 1_1-18GHz

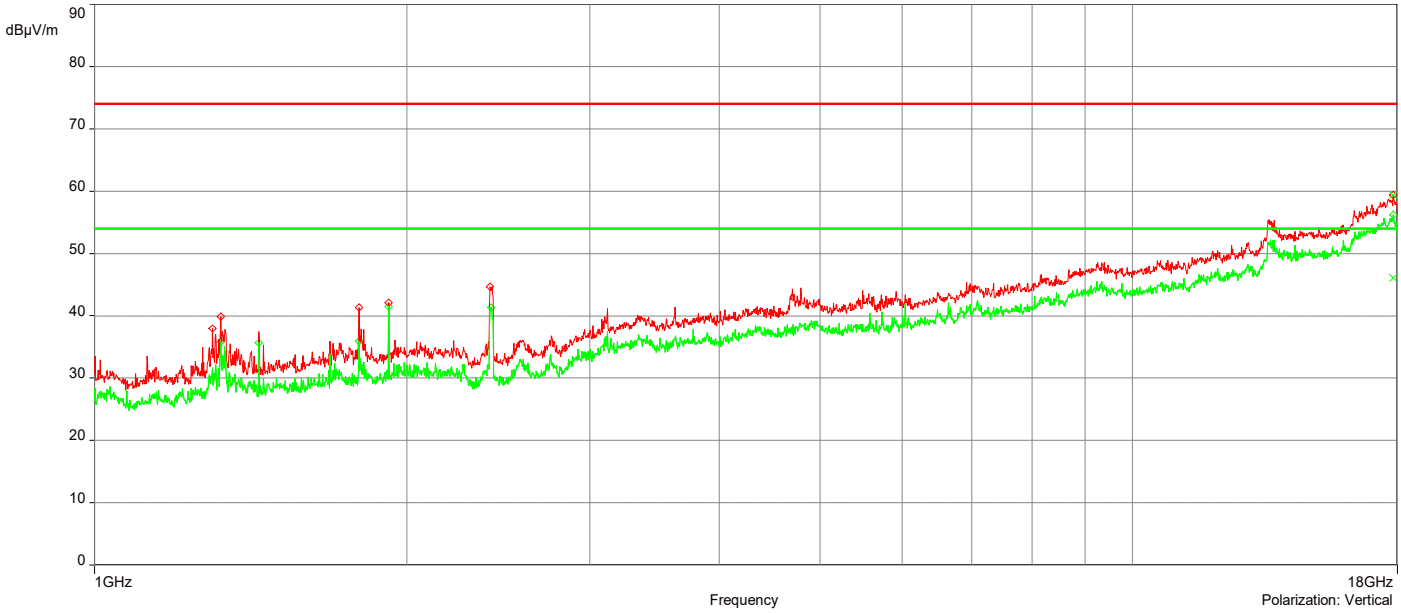
12/2/2021 7:49:11 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	17.842995GHz	59.36	18.35	74.00	-14.64	4.00	134.90	Vertical	Passed
2.	17.787494GHz	59.25	18.27	74.00	-14.75	3.26	67.40	Horizontal	Passed
3.	2.4080414GHz	48.02	-2.88	74.00	-25.98	2.88	314.90	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	17.842995GHz	46.12	18.35	54.00	-7.88	4.00	134.90	Vertical	Passed
2.	17.727992GHz	46.10	18.25	54.00	-7.90	2.27	67.10	Horizontal	Passed
3.	2.4135416GHz	44.87	-2.83	54.00	-9.13	2.55	314.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

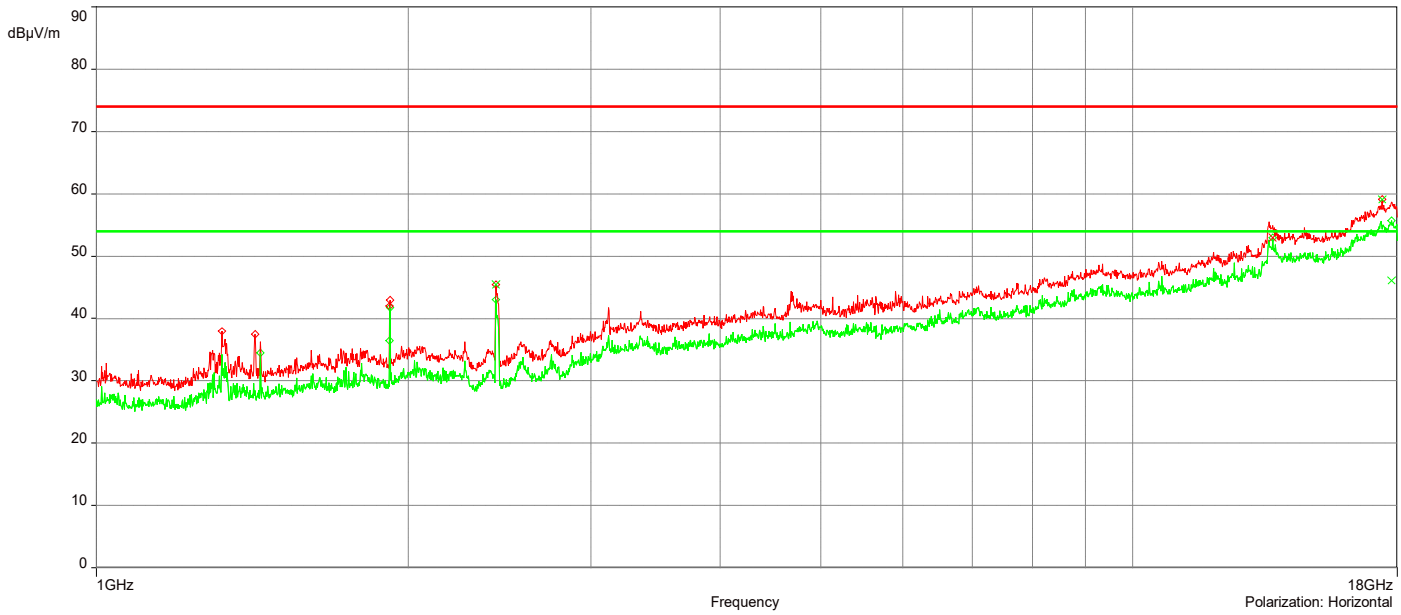
AH21100601-HAR-134#004_2.4G 802.11n_Ch 6_1-18GHz

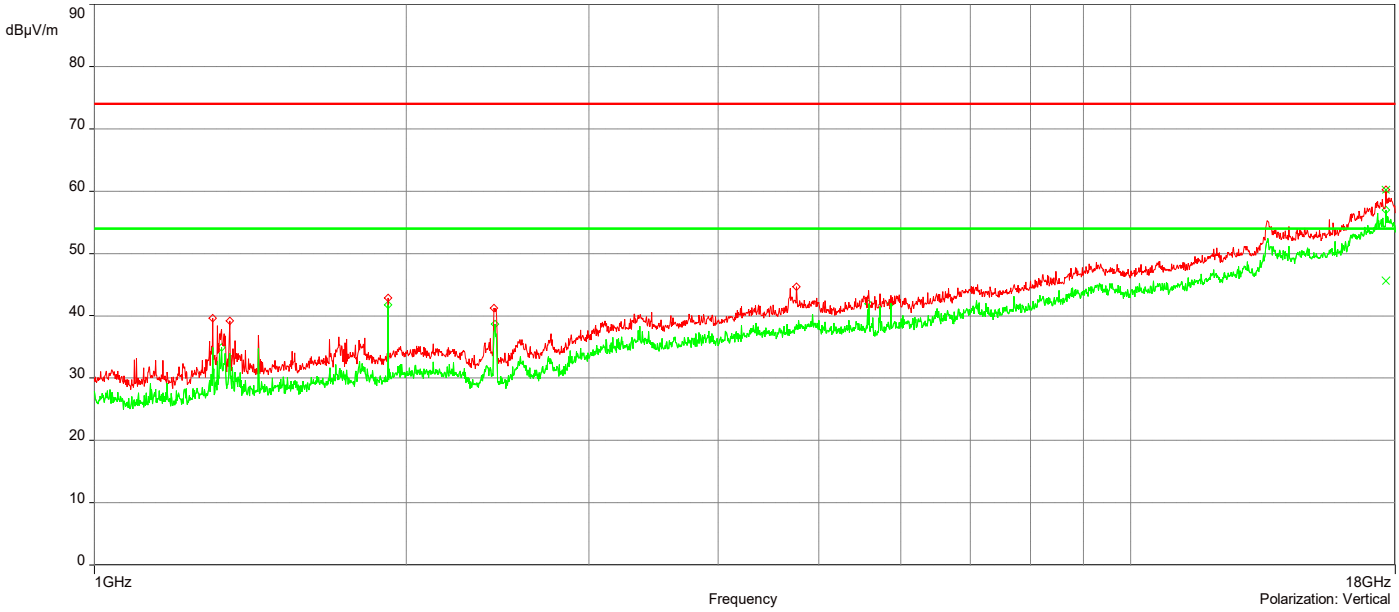
12/2/2021 8:22:26 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	17.640989GHz	60.26	18.29	74.00	-13.74	1.02	134.90	Vertical	Passed
2.	17.409983GHz	59.16	18.17	74.00	-14.84	3.97	0.10	Horizontal	Passed
3.	2.429542GHz	45.46	-2.66	74.00	-28.54	2.12	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.	13.643372GHz	52.92	12.77	54.00	-1.08	1.97	247.40	Horizontal	Passed
2.	17.774993GHz	46.15	18.29	54.00	-7.85	3.05	269.90	Horizontal	Passed
3.	17.640989GHz	45.58	18.29	54.00	-8.42	1.02	134.90	Vertical	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

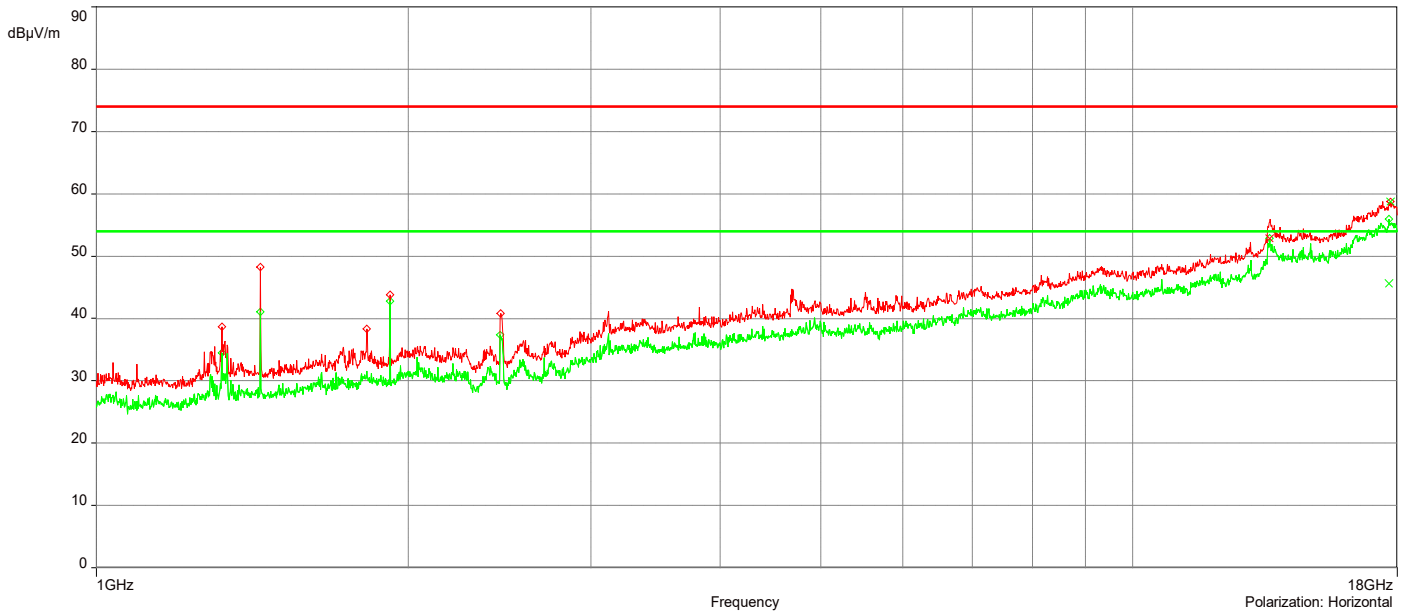
AH21100601-HAR-134#004_2.4G 802.11n_Ch 11_1-18GHz

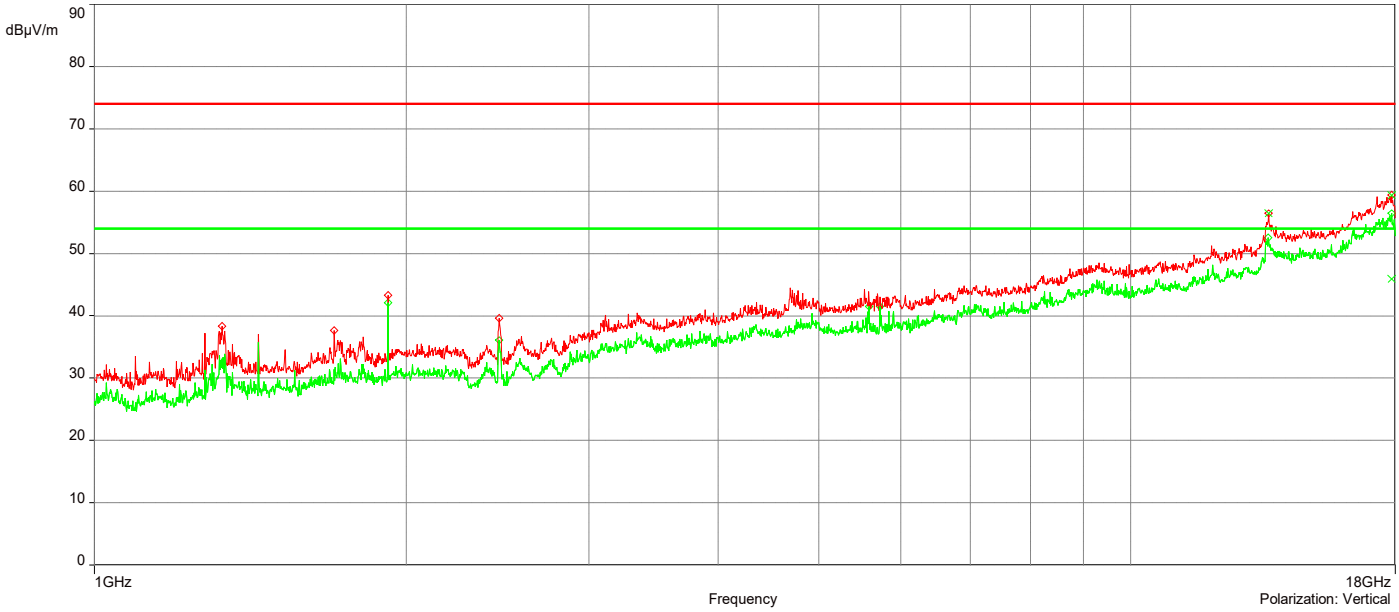
12/2/2021 8:48:52 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	13.58287GHz	56.50	12.60	74.00	-17.50	1.90	45.00	Vertical	Passed
2.	17.864496GHz	59.35	18.36	74.00	-14.65	1.65	22.60	Vertical	Passed
3.	17.739992GHz	58.82	18.22	74.00	-15.18	2.06	247.60	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	17.66399GHz	45.58	18.27	54.00	-8.42	1.40	67.90	Horizontal	Passed
2.	17.864496GHz	45.92	18.36	54.00	-8.08	1.65	22.60	Vertical	Passed
3.	13.551369GHz	52.84	12.58	54.00	-1.16	2.12	0.20	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
1GHz
Frequency
18GHz
Polarization: Vertical

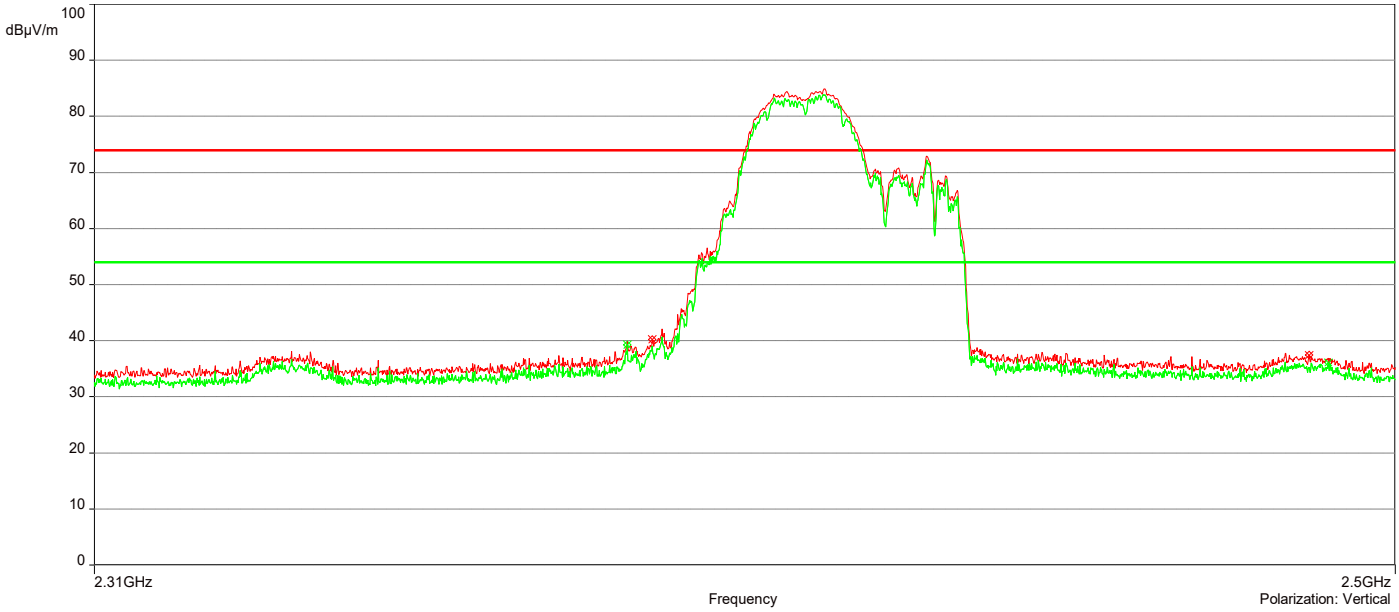
AH21100601-HAR-134#004_Restricted Bandedge_2.4G 802.11b_Ch 1

12/2/2021 9:37:42 AM

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.389935GHz	42.90	-3.00	74.00	-31.10	2.00	328.50	Horizontal	Passed
2.	2.3896498GHz	40.23	-2.91	74.00	-33.77	3.50	297.60	Vertical	Passed
3.	2.4847924GHz	38.62	-2.39	74.00	-35.38	2.50	337.10	Horizontal	Passed
4.	2.4869785GHz	37.49	-2.42	74.00	-36.51	4.00	306.20	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3896498GHz	41.69	-3.00	54.00	-12.31	3.00	324.90	Horizontal	Passed
2.	2.386038GHz	39.24	-2.90	54.00	-14.76	3.50	307.00	Vertical	Passed
3.	2.4847924GHz	37.36	-2.39	54.00	-16.64	2.50	337.10	Horizontal	Passed
4.	2.4898299GHz	36.12	-2.45	54.00	-17.88	2.00	23.80	Vertical	Passed

Overall Graphs:


dBµV/m
100
90
80
70
60
50
40
30
20
10
0
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

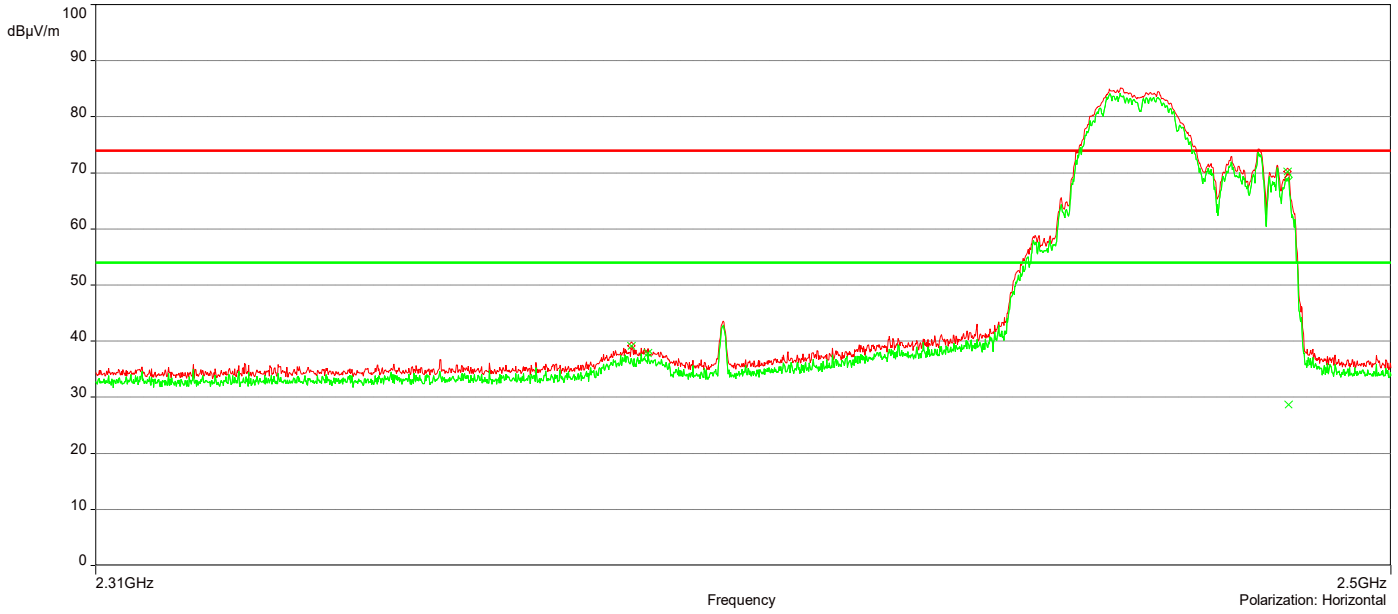
AH21100601-HAR-134#004_Restricted Bandedge_2.4G 802.11b_Ch 11

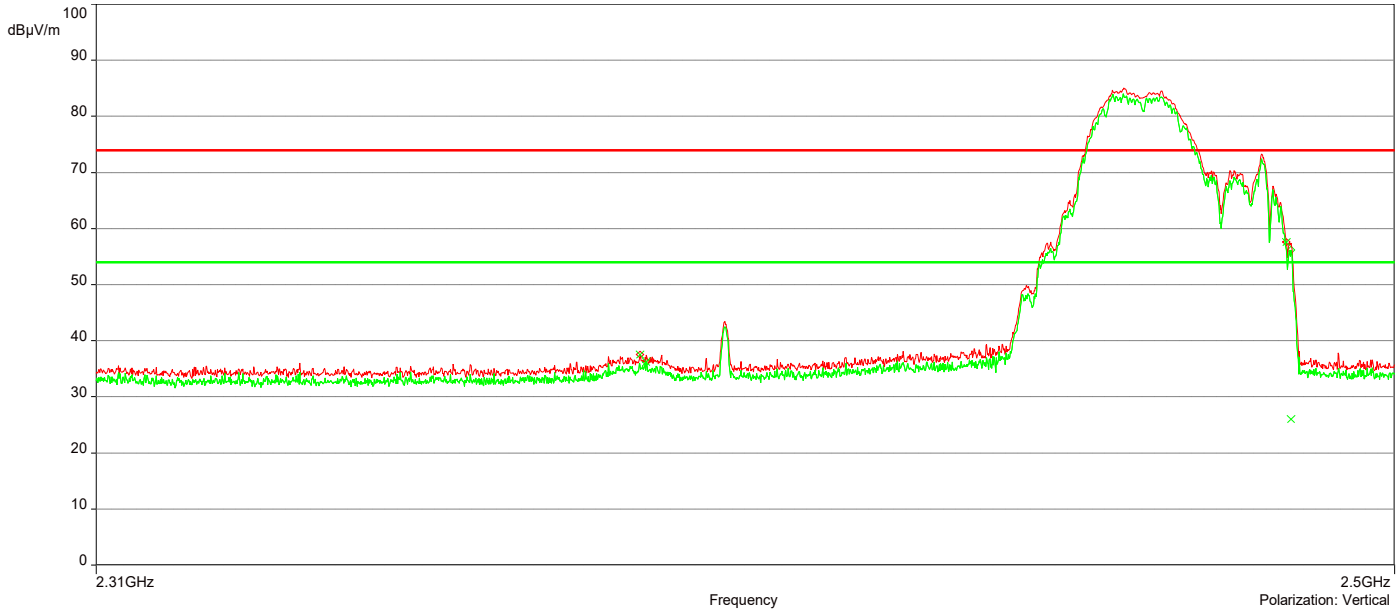
12/2/2021 10:08:56 AM

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.4843172GHz	70.27	-2.39	74.00	-3.73	3.10	314.90	Horizontal	Passed
2.	2.4835568GHz	57.65	-2.37	74.00	-16.35	3.45	269.90	Vertical	Passed
3.	2.3867984GHz	39.16	-2.99	74.00	-34.84	3.84	44.90	Horizontal	Passed
4.	2.3877489GHz	37.57	-2.91	74.00	-36.43	2.63	44.90	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3891746GHz	37.81	-3.00	54.00	-16.19	3.84	44.90	Horizontal	Passed
2.	2.3886993GHz	36.27	-2.91	54.00	-17.73	3.22	314.90	Vertical	Passed
3.	2.4844122GHz	28.69	-2.39	54.00	-25.31	3.10	314.90	Horizontal	Passed
4.	2.4843172GHz	26.08	-2.39	54.00	-27.92	3.45	270.10	Vertical	Passed

Overall Graphs:




dBµV/m
100
90
80
70
60
50
40
30
20
10
0
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

AH21100601-HAR-134#004_Restricted Bandedge_2.4G 802.11g_Ch 1

12/2/2021 10:43:43 AM

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3895548GHz	72.25	-3.00	74.00	-1.75	2.74	314.90	Horizontal	Passed
2.	2.3896498GHz	65.86	-2.91	74.00	-8.14	4.00	314.90	Vertical	Passed
3.	2.4852676GHz	41.85	-2.39	74.00	-32.15	3.34	314.90	Horizontal	Passed
4.	2.4848874GHz	39.71	-2.39	74.00	-34.29	1.56	22.40	Vertical	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3895548GHz	53.82	-3.00	54.00	-0.18	2.74	314.90	Horizontal	Passed
2.	2.3896498GHz	42.85	-2.91	54.00	-11.15	4.00	314.90	Vertical	Passed
3.	2.4841271GHz	40.43	-2.39	54.00	-13.57	1.93	337.40	Horizontal	Passed
4.	2.4848874GHz	38.94	-2.39	54.00	-15.06	1.56	22.40	Vertical	Passed

Overall Graphs:


dBµV/m
100
90
80
70
60
50
40
30
20
10
0
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

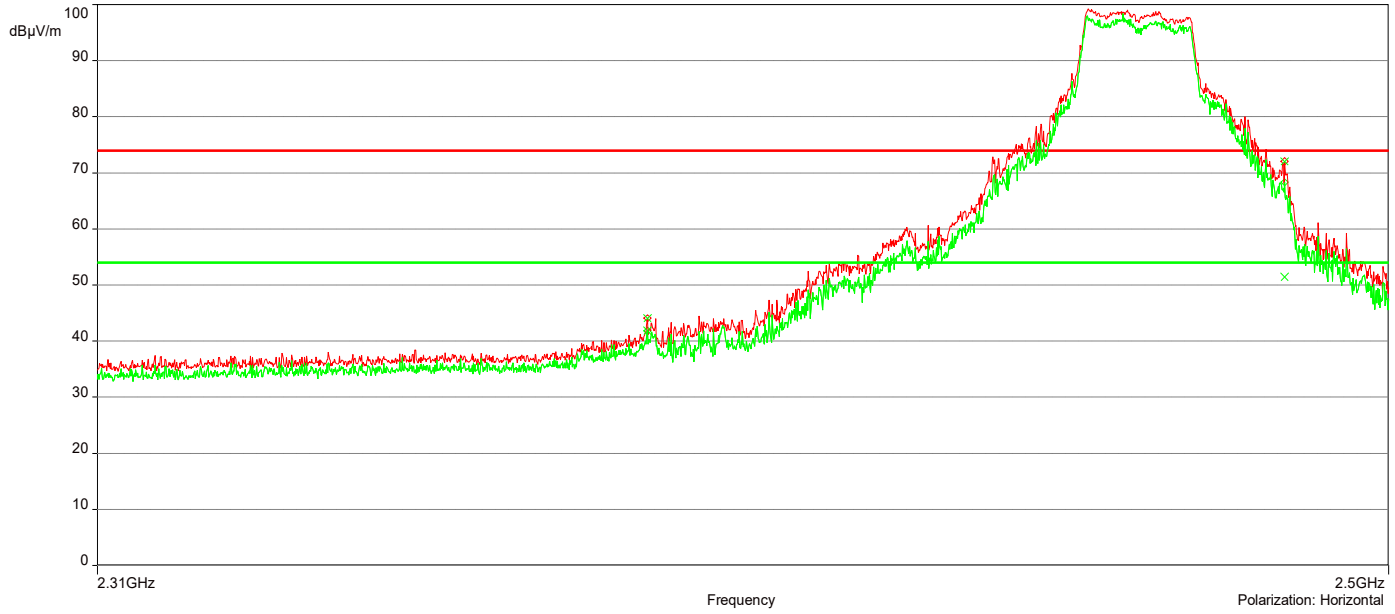
AH21100601-HAR-134#004_Restricted Bandedge_2.4G 802.11g_Ch 11

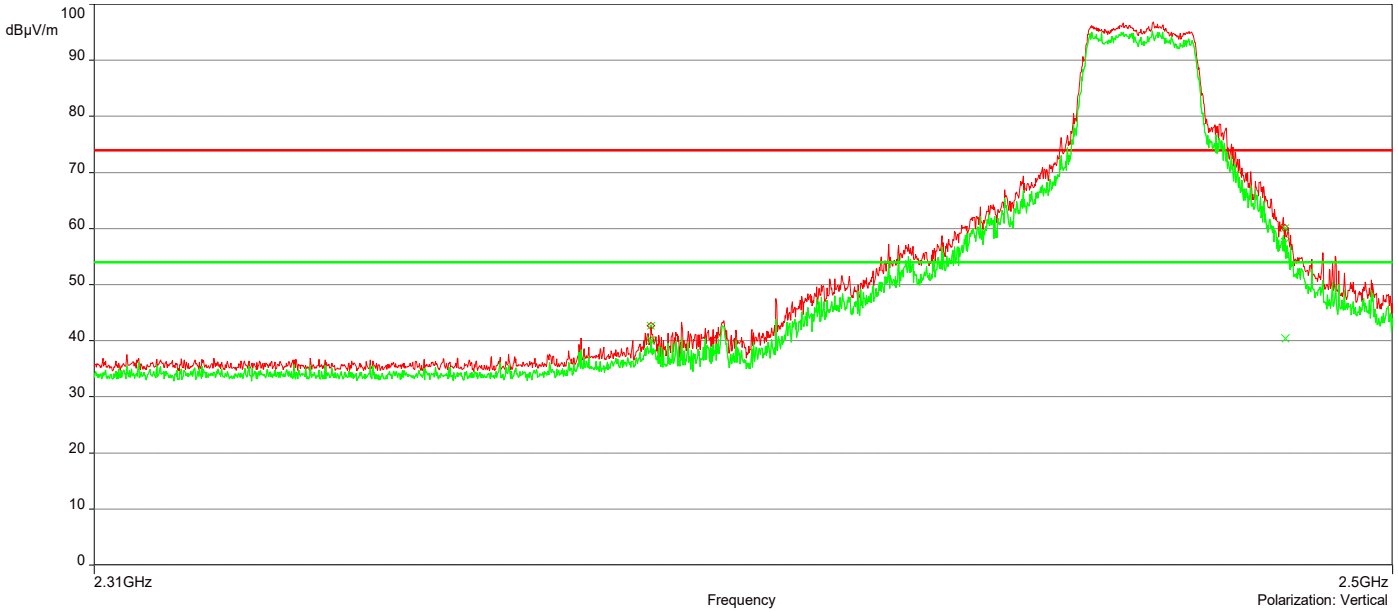
12/2/2021 11:34:37 AM

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3896498GHz	42.70	-2.91	74.00	-31.30	4.00	314.10	Vertical	Passed
2.	2.4836518GHz	60.07	-2.38	74.00	-13.93	1.78	21.60	Vertical	Passed
3.	2.3890795GHz	44.10	-3.00	74.00	-29.90	2.73	314.10	Horizontal	Passed
4.	2.4841271GHz	72.03	-2.39	74.00	-1.97	3.10	314.10	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3896498GHz	40.08	-2.91	54.00	-13.92	4.00	314.10	Vertical	Passed
2.	2.4837469GHz	40.43	-2.39	54.00	-13.57	2.49	22.10	Vertical	Passed
3.	2.3890795GHz	41.82	-3.00	54.00	-12.18	2.73	314.10	Horizontal	Passed
4.	2.4841271GHz	51.46	-2.39	54.00	-2.54	3.10	314.10	Horizontal	Passed

Overall Graphs:




dBµV/m
100
90
80
70
60
50
40
30
20
10
0
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

AH21100601-HAR-134#003_Restricted Bandedge_2.4G 802.11n_Ch 1

12/10/2021 8:54:30 AM

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3892696GHz	73.99	-3.42	74.00	-1.20	2.97	247.20	Vertical	Passed
2.	2.3895548GHz	67.05	-3.42	74.00	-6.95	3.38	315.10	Horizontal	Passed
3.	2.484032GHz	49.25	-2.82	74.00	-24.75	3.97	0	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3898399GHz	53.99	-3.33	54.00	-0.01	3.41	336.90	Horizontal	Passed
2.	2.3892696GHz	50.69	-3.42	54.00	-3.31	2.97	247.20	Vertical	Passed
3.	2.484032GHz	46.89	-2.82	54.00	-7.11	3.97	0	Horizontal	Passed
4.	2.4915408GHz	42.45	-2.89	54.00	-11.55	1.66	269.90	Vertical	Passed

Overall Graphs:


dBµV/m
100
90
80
70
60
50
40
30
20
10
0
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

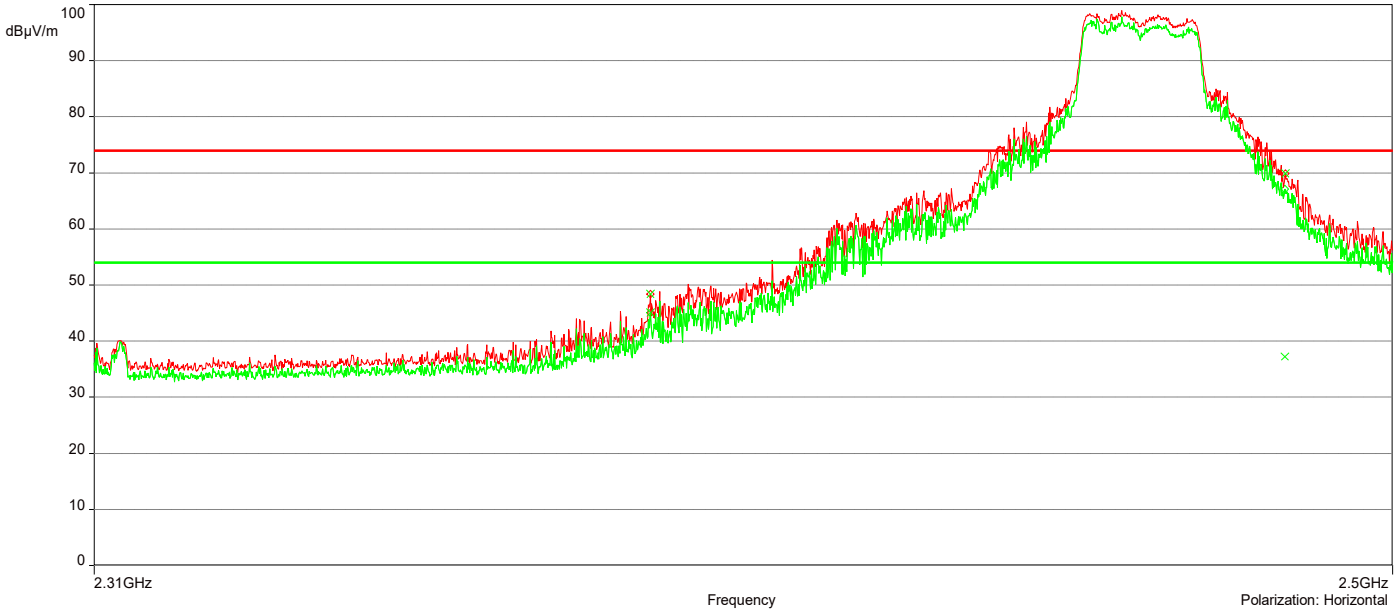
AH21100601-HAR-134#003_Restricted Bandedge_2.4G 802.11n_Ch 11

12/8/2021 1:57:01 PM

No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.4844122GHz	66.03	-2.39	74.00	-7.97	3.80	269.20	Vertical	Passed
2.	2.4837469GHz	69.86	-2.39	74.00	-4.14	1.80	336.60	Horizontal	Passed
3.	2.3898399GHz	47.15	-2.91	74.00	-26.85	2.84	269.20	Vertical	Passed
4.	2.3895548GHz	48.38	-3.00	74.00	-25.62	3.75	336.60	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.314087GHz	46.42	-3.28	54.00	-7.58	1.38	156.50	Vertical	Passed
2.	2.3895548GHz	45.04	-3.00	54.00	-8.96	3.75	336.60	Horizontal	Passed
3.	2.4844122GHz	42.45	-2.39	54.00	-11.55	3.80	269.20	Vertical	Passed
4.	2.4836518GHz	37.30	-2.38	54.00	-16.70	2.10	336.90	Horizontal	Passed

Overall Graphs:




dBµV/m
100
90
80
70
60
50
40
30
20
10
0
2.31GHz
Frequency
2.5GHz
Polarization: Vertical

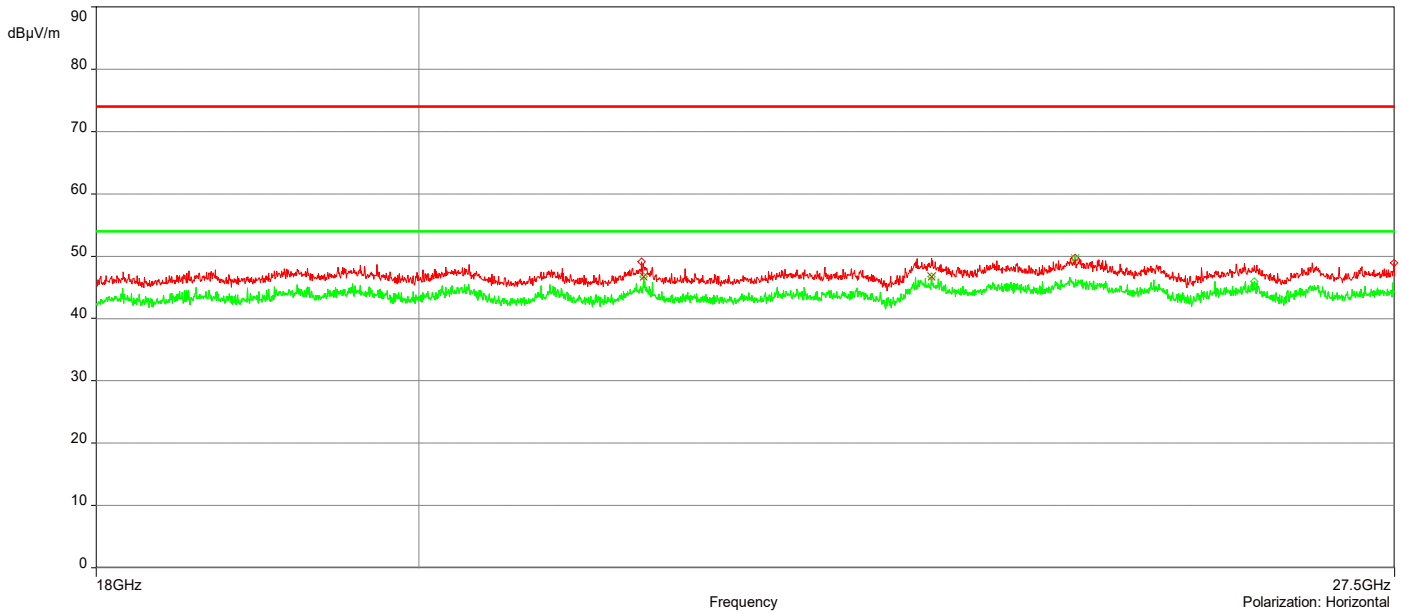
AH21100601-HAR-134#004_2.4G 802.11b_Ch 1_18-27.5GHz

12/7/2021 7:19:16 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	19.075454GHz	49.50	-1.44	74.00	-24.50	1.87	134.90	Vertical	Passed
2.	24.119731GHz	49.81	2.02	74.00	-24.19	1.44	269.90	Vertical	Passed
3.	24.776689GHz	49.72	2.89	74.00	-24.28	1.02	292.40	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	24.752938GHz	46.71	2.95	54.00	-7.29	1.43	22.40	Vertical	Passed
2.	21.521826GHz	46.76	0.74	54.00	-7.24	1.28	134.90	Horizontal	Passed
3.	23.644707GHz	46.69	1.95	54.00	-7.31	3.97	269.90	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
18GHz
Frequency
27.5GHz
Polarization: Vertical

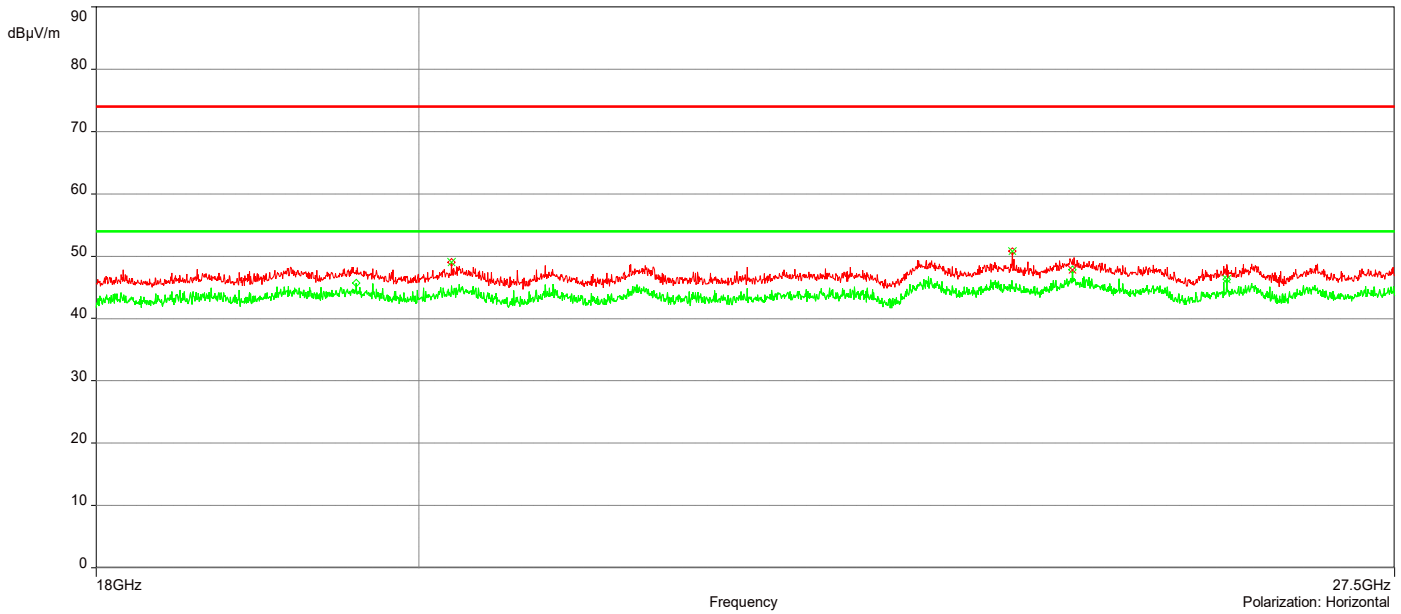
AH21100601-HAR-134#004_2.4G 802.11b_Ch 6_18-27.5GHz

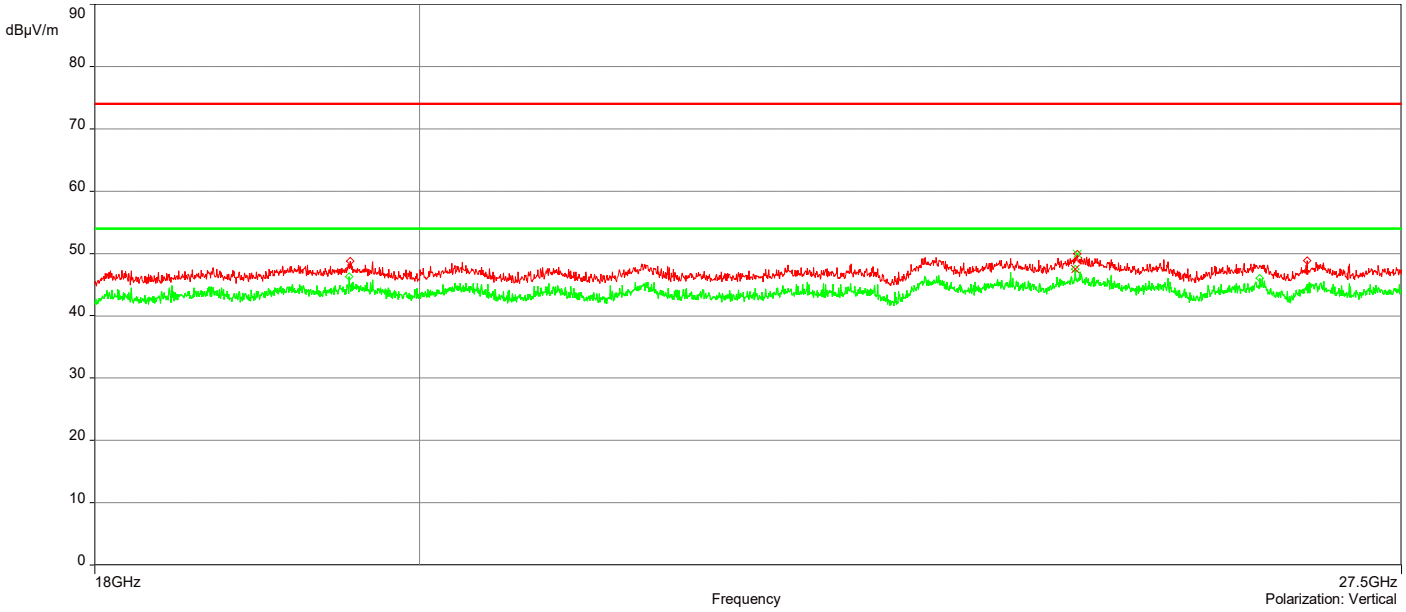
12/7/2021 8:12:53 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	24.754838GHz	49.97	2.95	74.00	-24.03	1.42	225.00	Vertical	Passed
2.	20.211711GHz	48.99	-0.53	74.00	-25.01	1.84	247.70	Horizontal	Passed
3.	24.275064GHz	50.80	1.87	74.00	-23.20	4.00	135.00	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	24.740112GHz	47.49	2.94	54.00	-6.51	2.01	22.70	Vertical	Passed
2.	24.756738GHz	47.81	2.96	54.00	-6.19	4.00	90.10	Horizontal	Passed
3.	26.032177GHz	46.30	2.96	54.00	-7.70	2.30	0	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
18GHz
Frequency
27.5GHz
Polarization: Vertical

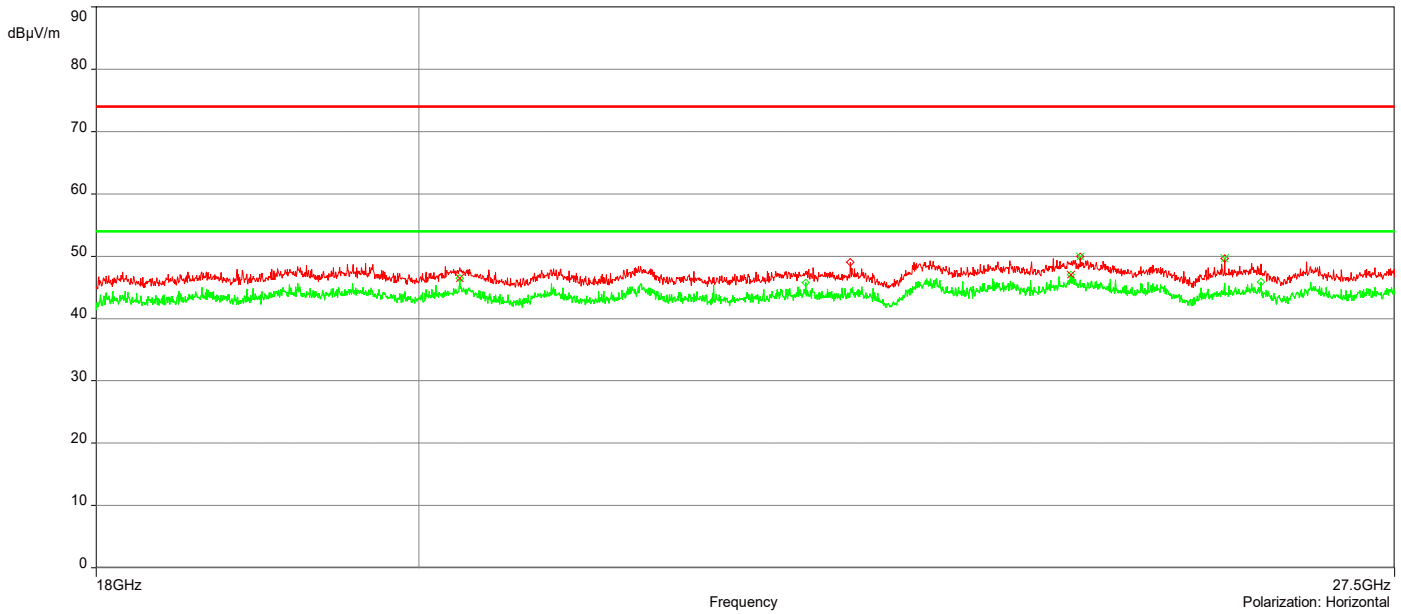
AH21100601-HAR-134#004_2.4G 802.11b_Ch 11_18-27.5GHz

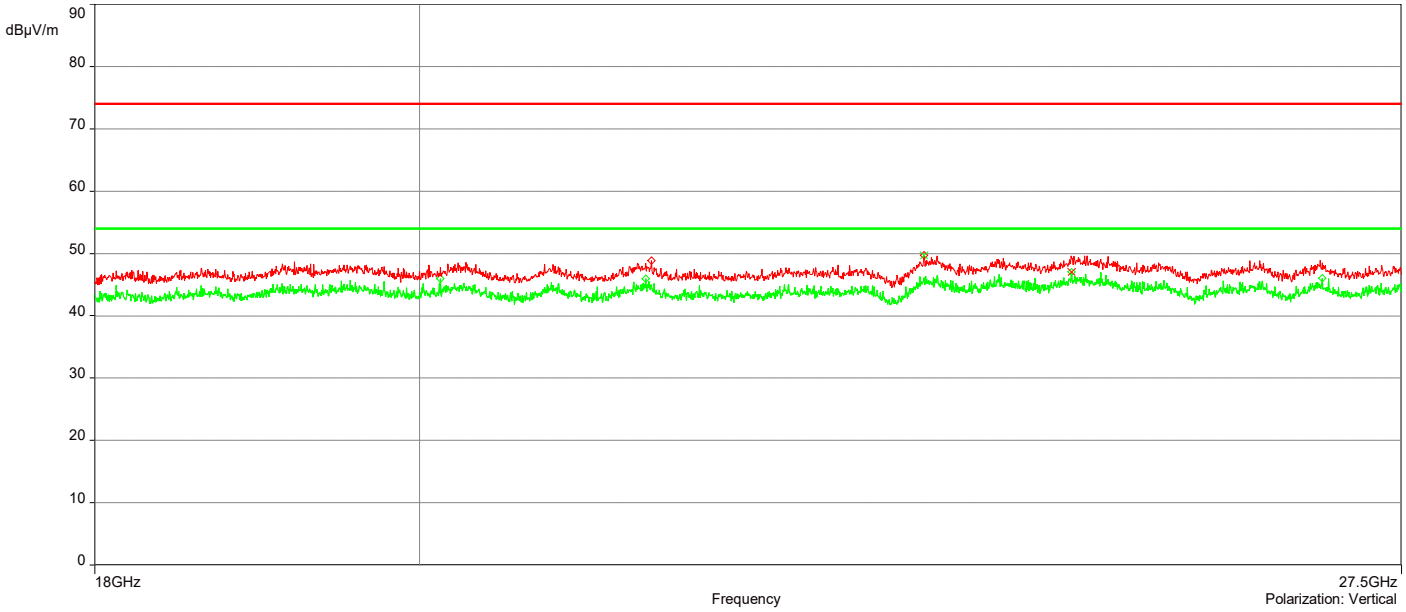
12/7/2021 8:46:52 AM

No	Frequency (MHz)	Level Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	23.556828GHz	49.69	2.22	74.00	-24.31	3.95	157.50	Vertical	Passed
2.	24.816591GHz	49.94	2.80	74.00	-24.06	1.13	112.50	Horizontal	Passed
3.	26.018876GHz	49.60	2.93	74.00	-24.40	3.18	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.	24.70971GHz	47.06	2.83	54.00	-6.94	3.48	292.60	Vertical	Passed
2.	20.268238GHz	46.49	-0.40	54.00	-7.51	1.17	315.10	Horizontal	Passed
3.	24.742487GHz	47.09	2.96	54.00	-6.91	1.59	135.20	Horizontal	Passed

Overall Graphs:




dBµV/m
90
80
70
60
50
40
30
20
10
0
18GHz
Frequency
27.5GHz
Polarization: Vertical

Document Revisions

Version	Date	Modifier	Changes
1.0	12/03/2021	Aravind Buddana	• Initial Release
2.0	12/13/2021	Aravind Buddana Ryan Philips	• Updated the Radiated test data

End of Report