Test Report

Curtis-Straus LLC, *a wholly owned subsidiary of BV CPS*

Report No	ER2501-16
Client	Harman International Industries, Incorporated
Address	30001 Cabot Drive Novi, MI 48377
Phone	248-254-7751
Items tested	GEN3.1 MID VA
FCC ID	2AHPN-BE2837
IC	6434C-BE2837
Equipment Type	Digital Transmission System
Equipment Code	DTS
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2
Test Dates	October 20th to November 10th, 2017
Results	As detailed within this report
Prepared by	Zachary Johnson – EMC Engineer
Authorized by	Yunus Faziloglu – Sr. EMC Engineer
Issue Date	11/30/2017
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 16 of this report.

Contents

Report REV Sep-08-2017 - YF

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 GEN3.1 MID VA. It is a direct sequence spread spectrum transmitter that operates in the 2412 – 2462 MHz frequency range.

Antenna Type: PCB Trace
Gain: 0.38dBi maximum peak

We found that the product met the above requirements without modification.
Modifications: None

Test samples were received in good condition.

Issue No.	Reason for change	Date Issued
1	Original Release	November 30, 2017

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 ● Littleton, MA ● TEL (978) 486-8880 ● FAX (978) 486-8828

Test Methodology

All testing was performed according to the following rules/procedures/documents;
CFR 47 Part 15.247, RSS-247 Issue 2, RSS-Gen Issue 4, FCC KDB 558074 D01 DTS Measurement Guidance v04 and ANSI C63.10-2013.

Radiated emissions were maximized by testing the device in the in-vehicle setup orientation and varying the test antenna's height and polarity.

EUT operating voltage is 13.5V DC

The following bandwidths were used during radiated spurious and AC line conducted emissions testing.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-25GHz	1MHz	3MHz

Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	R2501		
Company:	Harman International Industries, Incorporated		
Company Address:	30001 Cabot Drive		
	Novi, MI, 48377		
Contact:	Mark Bowman		
	MN	**PN**	**SN**
EUT:	GEN3.1 MID VA		
EUT Description:	Car Stereo System		

EUT Components	**MN**	**SN**
audio Harness		
Back up camera		
GPS antenna		
Power Harness		
USB diag port		

Support Equipment	**MN**	**SN**
CS Supplied Laptop.		

Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
Audio	-	1	1	-	No	No	1	in	yes	
DC Power		1	1		No	No	1	in	yes	
Back up camera	-	1	1	-	No	No	0.1	in	yes	
Dab/XM	-	1	1	Coaxial	Yes	No	1	in	yes	
FM/AM antenna	-	1	1	Coaxial	Yes	No	0.1	in	yes	
Next gen port		1	0					in	no	

Software Operating Mode Description:

EUT may be operating in 1 of 2 modes. For immunity, EUT will connect with a CMW and operate as normal with traffic while doing emissions scans eut will operate by transmitting a constant signal. For Bluetooth eut will still need to be connected to CMW.

Performance Criteria:

Eut will connect to CMW and preform less than 10% PER during test.

Statement of Conformity

RSS-GEN	RSP-100	RSS 247	Part 15	Comments
6.3			15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
	3.1		15.19	The label is shown in the label exhibit.
	4		15.21	Information to the user is shown in the instruction manual exhibit.
			15.27	No special accessories are required for compliance.
3, 6.1			15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
8.1			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.
8.3			15.203	EUT employs PCB trace antenna with 0.38dBi maximum peak 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.

Refer to Appendix A of this report for antenna port conducted measurements.

Test Results

Radiated Spurious Emissions

LIMITS

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
[15.247(d)]

All results below are for the in-vehicle setup orientation only.

MEASUREMENTS / RESULTS

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
30-1000MHz Horizontal Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M	EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_109_Class_B (dbµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)
249.551	32.7	-23.1	9.6	46	-36.4	PASS		46	-36.4	PASS	
393.182	28	-18.3	9.8	46	-36.3	PASS		46	-36.3	PASS	
792.202	33	-9	24	46	-22	PASS		46	-22	PASS	
793.511	31.6	-9.1	22.5	46	-23.5	PASS		46	-23.5	PASS	
798.05	41.1	-9	32	46	-14	PASS	-14	46	-14	PASS	-14
800.838	31.7	-9	22.7	46	-23.3	PASS		46	-23.3	PASS	

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
30-1000MHz Vertical Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500MHz.	EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)
774.556	27.7	-8.9	18.8	46	-27.2	PASS		46	-27.2	PASS	
780.302	28.2	-8.7	19.5	46	-26.5	PASS		46	-26.5	PASS	
792.952	30.8	-9.1	21.7	46	-24.3	PASS		46	-24.3	PASS	
794.774	31.7	-9.1	22.6	46	-23.4	PASS		46	-23.4	PASS	
797.683	36.8	-9	27.7	46	-18.3	PASS	-18.3	46	-18.3	PASS	-18.3
800.08	32	-9	22.9	46	-23.1	PASS		46	-23.1	PASS	

30-1000MHz Center Channel

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
1-6GHz Horizontal Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M	EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1596.3	20.5	11.3	29.2	49.7	74	-24.3	PASS		40.5	54	-13.4	PASS	
2187.1	21.1	11.8	33.7	54.8	74	-19.2	PASS		45.5	54	-8.4	PASS	
2805.9	19.8	12	37.9	57.8	74	-16.2	PASS	-16.2	49.9	54	-4	PASS	-4
3567.2	20.2	12.4	36.1	56.3	74	-17.7	PASS		48.4	54	-5.5	PASS	
5821.9	17.7	9.4	40	57.6	74	-16.3	PASS		49.4	54	-4.6	PASS	

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
1-6GHz Vertical Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M	EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
1596.2	21.8	13.6	29.2	51	74	-23	PASS		42.8	54	-11.2	PASS	
2167.1	21.2	11.8	33.5	54.7	74	-19.3	PASS		45.3	54	-8.7	PASS	
2808.1	21.3	12	37.8	59.1	74	-14.9	PASS		49.9	54	-4.1	PASS	-4.1
3557.6	22.6	12.3	36	58.6	74	-15.4	PASS		48.3	54	-5.6	PASS	
5837.8	19.4	9.5	39.9	59.2	74	-14.7	PASS	-14.7	49.3	54	-4.6	PASS	

1-6GHz Low Channel

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
1-6GHz Horizontal Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M	EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1592.8	20.3	11.1	29.2	49.5	74	-24.5	PASS		40.3	54	-13.7	PASS	
2153.8	21.8	11.8	33.4	55.2	74	-18.8	PASS		45.1	54	-8.8	PASS	
2802.3	21.3	12	38.1	59.4	74	-14.6	PASS	-14.6	50.1	54	-3.9	PASS	-3.9
3596.9	20.2	12.6	36.3	56.4	74	-17.5	PASS		48.9	54	-5.1	PASS	
5976.3	18.2	9.5	40.3	58.5	74	-15.4	PASS		49.8	54	-4.2	PASS	

Curtis Straus - a Bureau Veritas Company | Work Order - R2501
Radiated Emissions Electric Field 3m Distance | EUT Power Input - 13.8V DC
1-6GHz Vertical Data | Test Site - CH2
Operator: CCH | Conditions - 23.7°C; 25%RH; 1010mBar
Notes: | Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M | EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim. FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim. FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
1595.8	21.2	12.5	29.2	50.4	74	-23.6	PASS		41.7	54	-12.3	PASS	
2168.8	20.8	11.8	33.5	54.3	74	-19.6	PASS		45.4	54	-8.6	PASS	
2809.2	21.5	12	37.8	59.3	74	-14.7	PASS		49.8	54	-4.2	PASS	
3571.4	21.7	12.4	36.1	57.8	74	-16.2	PASS		48.5	54	-5.5	PASS	
5992.9	19.5	9.5	40.5	59.9	74	-14.1	PASS	-14.1	49.9	54	-4	PASS	-4

1-6GHz Mid Channel

Curtis Straus - a Bureau Veritas Company | Work Order - R2501
Radiated Emissions Electric Field 3m Distance | EUT Power Input - 13.8V DC
1-6GHz Horizontal Data | Test Site - CH2
Operator: CCH | Conditions - 23.7°C; 25%RH; 1010mBar
Notes: | Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M | EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim. FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim. FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1595.5	21.7	11.5	29.2	50.9	74	-23.1	PASS		40.7	54	-13.3	PASS	
2193.5	21.2	11.8	33.8	55	74	-19	PASS		45.6	54	-8.4	PASS	
2804.5	21.4	12	38	59.4	74	-14.5	PASS	-14.5	50	54	-4	PASS	-4
3572.1	21.3	12.4	36.1	57.4	74	-16.6	PASS		48.5	54	-5.5	PASS	
5372.6	19.6	9.4	39.7	59.3	74	-14.7	PASS		49.1	54	-4.9	PASS	

Curtis Straus - a Bureau Veritas Company | Work Order - R2501
Radiated Emissions Electric Field 3m Distance | EUT Power Input - 13.8V DC
1-6GHz Vertical Data | Test Site - CH2
Operator: CCH | Conditions - 23.7°C; 25%RH; 1010mBar
Notes: | Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M | EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim. FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim. FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
1597.3	21.7	12.7	29.2	50.9	74	-23.1	PASS		41.9	54	-12	PASS	
2198.9	21.2	11.9	33.8	55	74	-19	PASS		45.7	54	-8.3	PASS	
2803.5	20.5	12	38	58.6	74	-15.4	PASS		50	54	-4	PASS	-4
3578	20.6	12.4	36.1	56.7	74	-17.3	PASS		48.6	54	-5.4	PASS	
5763.4	19	9.4	40	59	74	-15	PASS	-15	49.4	54	-4.6	PASS	

1-6GHz High Channel

Curtis Straus - a Bureau Veritas Company | Work Order - R2501
Radiated Emissions Electric Field 1m Distance | EUT Power Input - 13.8V DC
6-18GHz Horizontal Data | Test Site - CH2
Operator: CCH | Conditions - 23.7°C; 25%RH; 1010mBar
Notes: | Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M | EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim. FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim. FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
7588.7	8.4	-0.2	43.5	52	83.5	-31.5	PASS		43.3	63.5	-20.2	PASS	
11823.6	9.2	0.9	47.9	57.1	83.5	-26.4	PASS		48.7	63.5	-14.8	PASS	
12507.5	11.6	1.4	48.8	60.5	83.5	-23	PASS		50.2	63.5	-13.3	PASS	
13492.1	10.7	1.2	51.6	62.3	83.5	-21.2	PASS		52.8	63.5	-10.7	PASS	
13851.5	10.6	1.7	52.3	62.8	83.5	-20.7	PASS		54	63.5	-9.5	PASS	
17673.7	13.5	4.5	58.1	71.6	83.5	-11.9	PASS	-11.9	62.6	63.5	-0.9	PASS	-0.9

Curtis Straus - a Bureau Veritas Company | Work Order - R2501
Radiated Emissions Electric Field 1m Distance | EUT Power Input - 13.8V DC
6-18GHz Vertical Data | Test Site - CH2
Operator: CCH | Conditions - 23.7°C; 25%RH; 1010mBar
Notes: | Witnessed by - Filtering 2300-2500MHz
EUT is Transmitting 2.4g 802.11b 5.5Mbps. Filtering 2300-2500M | EUT Maximum Frequency - 802.11b 5.5Mbps

Data Taken at 2:25:11 AM Monday November 20 2017

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim. FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim. FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
10459.6	9.9	1.1	45.5	55.3	83.5	-28.2	PASS		46.6	63.5	-16.9	PASS	
11918.2	10.5	1.1	48	58.4	83.5	-25.1	PASS		49	63.5	-14.5	PASS	
12522.9	10.6	1.3	48.7	59.2	83.5	-24.3	PASS		49.9	63.5	-13.6	PASS	
13927.6	10.1	1.5	52.4	62.4	83.5	-21.1	PASS		53.8	63.5	-9.7	PASS	
15054.4	11.9	2.5	48.2	60.1	83.5	-23.4	PASS		50.7	63.5	-12.8	PASS	
17681.2	13.9	4.6	58.2	72	83.5	-11.5	PASS	-11.5	62.8	63.5	-0.7	PASS	-0.7

6-18GHz Center Channel

Radiated Emissions Table

Date: 20-Nov-17 | **Company:** Harman International | **Work Order:** R2501
Engineer: Chris Hamel | **EUT Desc:** GEN3.1 MID VA | **EUT Operating Voltage/Frequency:** 13.8V DC
Temp: 24.4°C | **Humidity:** 26% | **Pressure:** 996mBar
Frequency Range: 18-40GHz | **Measurement Distance:** 0.1 m
Notes: No Emissons Found | **EUT Max Freq:**

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak: Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average: Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
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Table Result: Pass by N/A dB ***Worst Freq:*** N/A MHz

Test Site: EMI Chamber 2 | **Cable 1:** Asset #2323 | **Cable 2:** --- | **Cable 3:** ---
Analyzer: Gold | **Preamp:** 18-26.5GHz | **Antenna:** 18-26.5GHz Horn | **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.197
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Test Site: EMI Chamber 2 | **Cable 1:** Asset #2323 | **Cable 2:** Asset #2324 | **Cable 3:** ---
Analyzer: Gold | **Preamp:** 40GHz Mixer | **Antenna:** 40GHz Mixer | **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.197
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

18-40GHz Center Channel

Rev. 10/22/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/28/2018	2/28/2017
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz	1686	I	12/21/2018	12/21/2016
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/21/2018	12/21/2016

Mixers/Diplexers	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Mixer / Horn	26.5-40 GHz	11970A	Agilent	3003A10230	2154	I	3/12/2019	3/12/2016

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	2/28/2019	2/28/2017
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	III	Verify before Use	date of test
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017

Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2078		HTC-1	HDE		2078	II	3/23/2018	3/23/2017

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/9/2018	5/9/2017
2463 HF PA	.5-18GHz	PAM-118A	COM-POWER	443005	2463	II	10/9/2018	10/9/2017
HF (Yellow)	18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	II	10/16/2018	10/16/2017

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Test Equipment Used 30MHz to 40GHz

Radiated Band Edge

Radiated Emissions Table

Date: 03-Nov-17 **Company:** Harmon **Work Order:** R2501
Engineer: Aristotelis Casternopoulos **EUT Desc:** VG4 FCC Mid **EUT Operating Voltage/Frequency:** 12VDC
Temp: 24.5 **Humidity:** 37% **Pressure:** 1008

Frequency Range: 1-6GHz **Measurement Distance:** 3 m

Notes: 2.4GHz 802.11b 20MHz Tx Power=Default **EUT Max Freq:** None

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Low Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	2412.138	72.493		0.0	32.3	3.1	---	---	74.0	---	---	54.0	---	---
H Max	2412.498	70.424		0.0	32.3	3.1	---	---	74.0	---	---	54.0	---	---
				---	---	---	---	---	---	---	---	---	---	---
V	2390.0	22.58	12.5	0.0	32.2	3.1	57.9	47.8	74.0	-16.1	Pass	54.0	-6.2	Pass
V	2387.314	25.601	12.6	0.0	32.2	3.1	60.9	47.9	74.0	-13.1	Pass	54.0	-6.1	Pass
				---	---	---	---	---	---	---	---	---	---	---
High Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	2462.409	70.88		0.0	32.4	3.2	---	---	74.0	---	---	54.0	---	---
H Max	2461.918	68.431		0.0	32.4	3.2	---	---	74.0	---	---	54.0	---	---
				---	---	---	---	---	---	---	---	---	---	---
V	2483.5	21.734	12.9	0.0	32.4	3.2	57.3	48.5	74.0	-16.7	Pass	54.0	-5.5	Pass
V	2488.275	24.047	12.0	0.0	32.4	3.3	59.7	47.7	74.0	-14.3	Pass	54.0	-6.3	Pass
				---	---	---	---	---	---	---	---	---	---	---

Table Result: Pass by -5.5 dB ***Worst Freq:*** 2483.5 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2456 **Cable 2:** Asset #2457 **Cable 3:** ---
Analyzer: Rental SA#3 **Preamp:** None **Antenna:** Blue Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.196
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

802.11b

Radiated Emissions Table

Date: 03-Nov-17 **Company:** Harmon **Work Order:** R2501
Engineer: Aristotelis Casternopoulos **EUT Desc:** VG4 FCC Mid **EUT Operating Voltage/Frequency:** 12VDC
Temp: 24.5 **Humidity:** 37% **Pressure:** 1008

Frequency Range: 1-6GHz **Measurement Distance:** 3 m

Notes: 2.4GHz 802.11g 20MHz Tx Power=32 **EUT Max Freq:** None

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Power=32				---	---	---	---	---	---	---	---	---	---	---
Low Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	2416.37	61.66		0.0	32.3	3.1	---	---	74.0	---	---	54.0	---	---
H Max	2416.095	58.700		0.0	32.3	3.1	---	---	74.0	---	---	54.0	---	---
				---	---	---	---	---	---	---	---	---	---	---
V	2390.0	20.116	11.7	0.0	32.2	3.1	55.4	47.0	74.0	-18.6	Pass	54.0	-7.0	Pass
V	2359.176	22.46	11.0	0.0	32.0	3.1	57.6	46.1	74.0	-16.4	Pass	54.0	-7.9	Pass
V	2366.652	22.499	11.1	0.0	32.1	3.1	57.7	46.3	74.0	-16.3	Pass	54.0	-7.7	Pass
				---	---	---	---	---	---	---	---	---	---	---
High Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	2466.333	64.98		0.0	32.4	3.2	---	---	74.0	---	---	54.0	---	---
H Max	2466.036	60.157		0.0	32.4	3.2	---	---	74.0	---	---	54.0	---	---
				---	---	---	---	---	---	---	---	---	---	---
V	2483.5	25.021	15.3	0.0	32.4	3.2	60.6	50.9	74.0	-13.4	Pass	54.0	-3.1	Pass
V	2484.084	30.696	15.0	0.0	32.4	3.2	66.3	50.6	74.0	-7.7	Pass	54.0	-3.4	Pass
V	2484.445	31.454	14.7	0.0	32.4	3.2	67.1	50.3	74.0	-6.9	Pass	54.0	-3.7	Pass
V	2488.865	28.369	12.9	0.0	32.4	3.3	64.1	48.6	74.0	-9.9	Pass	54.0	-5.4	Pass

Table Result: Pass by -3.1 dB ***Worst Freq:*** 2483.5 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2456 **Cable 2:** Asset #2457 **Cable 3:** ---
Analyzer: Rental SA#3 **Preamp:** None **Antenna:** Blue Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.196
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

802.11g

Radiated Emissions Table

Date: 07-Nov-17 **Company:** Harmon **Work Order:** R2501
Engineer: Aristotelis Casternopoulos **EUT Desc:** VG4 FCC Mid **EUT Operating Voltage/Frequency:** 12VDC
Temp: 23.6 **Humidity:** 22% **Pressure:** 1015

Frequency Range: 1-6GHz **Measurement Distance:** 3 m

Notes: 2.4GHz 802.11a 20MHz Tx Power=38 **EUT Max Freq:** None

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	FCC Class B High Frequency - Peak Margin (dB)	FCC Class B High Frequency - Peak Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	FCC Class B High Frequency - Average Margin (dB)	FCC Class B High Frequency - Average Result (Pass/Fail)
Power=38				---	---	---	---	---	---	---	---	---	---	---
Low Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	2418.087	60.653		0.0	32.3	3.1	---	---	74.0	---	---	54.0	---	---
H Max	2419.275	59.897		0.0	32.3	3.1	---	---	74.0	---	---	54.0	---	---
				---	---	---	---	---	---	---	---	---	---	---
V	2390.0	20.397	11.5	0.0	32.2	3.1	55.7	46.8	74.0	-18.3	Pass	54.0	-7.2	Pass
V	2385.898	22.12	11.1	0.0	32.2	3.1	57.4	46.4	74.0	-16.6	Pass	54.0	-7.6	Pass
V	2353.87	22.761	10.9	0.0	32.0	3.1	57.9	46.0	74.0	-16.1	Pass	54.0	-8.0	Pass
				---	---	---	---	---	---	---	---	---	---	---
High Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	2467.522	63.306		0.0	32.4	3.2	---	---	74.0	---	---	54.0	---	---
H Max	2469.189	66.289		---	---	---	---	---	---	---	---	---	---	---
V	2483.5	27.984	14.4	0.0	32.4	3.2	63.6	50.0	74.0	-10.4	Pass	54.0	-4.0	Pass
V	2483.925	34.326	14.2	0.0	32.4	3.2	69.9	49.8	74.0	-4.1	Pass	54.0	-4.2	Pass
V	2484.587	33.32	13.8	0.0	32.4	3.2	68.9	49.4	74.0	-5.1	Pass	54.0	-4.6	Pass
V	2486.285	31.148	12.8	0.0	32.4	3.3	66.8	48.5	74.0	-7.2	Pass	54.0	-5.5	Pass

Table Result: Pass by -4.0 dB ***Worst Freq:*** 2483.5 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2456 **Cable 2:** Asset #2457 **Cable 3:** ---
Analyzer: Rental SA#3 **Preamp:** None **Antenna:** Blue Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.197

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

802.11a

Rev. 11/5/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/21/2018	12/21/2016

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017

Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2081		HTC-1	HDE		2081	II	3/23/2018	3/23/2017

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
Asset #2456	9KHz-18GHz	MegaPhase	II	10/29/2018	10/29/2017
Asset #2457	9KHz-18GHz	MegaPhase	II	10/29/2018	10/29/2017

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Band Edge Test Equipment Used

AC Line Conducted Emissions

LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

[47 CFR 15.207(a)]

MEASUREMENTS / RESULTS

N/A. EUT is powered by a vehicle battery only.

Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz) NIST CISPR	 5.6dB 4.6dB	 N/A 5.2dB (Ucispr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions NIST CISPR	 3.9dB 3.6dB	 N/A 3.6dB (Ucispr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation: • Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	 3.4% 0.3dB	 5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS", "MTL", "ACTS", "MTL-ACTS" and CURTIS-STRAUS** (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.
14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B)NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.
Rev.160009121(2)_#684340 v14CS

Appendix A:

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

DUT Information

Model:	GEN3.1 MID VA
Manufacturer:	Harman International Industries, Inc.
Serial Number:	096

Mode	Channel	Frequency
802.11b/g/n(HT20)	1	2412 MHz
802.11b/g/n(HT20)	2	2417 MHz
802.11b/g/n(HT20)	3	2422 MHz
802.11b/g/n(HT20)	4	2427 MHz
802.11b/g/n(HT20)	5	2432 MHz
802.11b/g/n(HT20)	6	2437 MHz
802.11b/g/n(HT20)	7	2442 MHz
802.11b/g/n(HT20)	8	2447 MHz
802.11b/g/n(HT20)	9	2452 MHz
802.11b/g/n(HT20)	10	2457 MHz
802.11b/g/n(HT20)	11	2462 MHz

Antenna Gain:

Frequency	Efficiency [%]	Peak Gain [dBi]	Efficiency [dB]
2400	27.5759	-0.346604	-5.594703045
2402	27.8658	-0.346006	-5.549284843
2405	27.8566	-0.171463	-5.550718919
2410	28.2118	-0.0276734	-5.495692036
2415	28.3198	0.0703329	-5.47909818
2420	28.4283	0.101875	-5.462491102
2425	28.7202	0.144621	-5.418125401
2430	29.0618	0.160079	-5.366774903
2435	29.1796	0.142808	-5.349206658
2440	29.2362	0.112557	-5.340790758
2441	29.2928	0.082306	-5.332391136
2445	29.1799	0.0388361	-5.349162008
2450	28.7984	-0.0614676	-5.406316404
2455	28.6374	-0.16971	-5.430664143
2460	28.8522	-0.228147	-5.39821066
2462	29.067	-0.286584	-5.365997894
2465	28.8558	-0.325766	-5.397668808
2470	28.7344	-0.448801	-5.415978669
2475	29.2672	-0.342111	-5.336188246
2480	29.8094	-0.21967	-5.256467653
2485	29.9644	-0.0947805	-5.233944141
2490	30.2587	0.0513981	-5.191497344
2495	31.19	0.216943	-5.059846252
2500	31.6833	0.378915	-4.991695904

Number of transmission chains	1
Equipment Type	Digital Transmission System (DTS)

Test Equipment Used:

Rev. 11/9/2017								
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
FSV40 Signal/Spectrum Analyzer	10Hz-40GHz	FSV40	ROHDE & SCHWARZ	101551	2200	I	6/30/2018	6/30/2017
Signal Generators/Comparaison Noise Emitter	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
SMBV100A Vector Signal Generator	9KHz-6GHz	SMBV100A	ROHDE & SCHWARZ	261919	2201	I	6/26/2018	6/26/2017
SMB100A Signal Generator	100kHz-40GHz	SMB100A	ROHDE & SCHWARZ	179846	2434	I	5/30/2018	5/30/2017
Power/Noise Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
OSP - open switch and control platform	30MHz-18GHz	OSP120	ROHDE & SCHWARZ	101674		I	6/1/2018	6/1/2017
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
DUT1	30MHz-26GHz		Micro-Coax			II	6/21/2018	6/21/2017
DUT2	30MHz-26GHz		Micro-Coax			II	6/22/2018	6/22/2017
DUT3	30MHz-26GHz		Micro-Coax			II	6/23/2018	6/23/2017
DUT4	30MHz-26GHz		Micro-Coax			II	6/24/2018	6/24/2017
Attenuators / Couplers	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
10dB Attenuator-01 Brown	30MHz-26GHz		Mini Curcuits			II	7/13/2018	7/14/2017
10dB Attenuator-02 Yellow	30MHz-26GHz		Mini Curcuits			II	7/13/2018	7/14/2017
10dB Attenuator-03 Red	30MHz-26GHz		Mini Curcuits			II	7/13/2018	7/14/2017
10dB Attenuator-04 orange	30MHz-26GHz		Mini Curcuits			II	7/13/2018	7/14/2017
API - 30dB 20W Attenuator	9KHz-40GHz	89-30-11	API Weinschel	703	2121	I	3/22/2018	3/22/2217
Directional Coupler	0.5GHz-18GHz	UDC	AA MCS	001040		II	8/11/2018	8/11/2017
Communication Tester	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
CMW500 Wideband Radio Communication Tester	DC to 6GHz	CMW500	ROHDE & SCHWARZ	155905		I	6/2/2018	6/2/2017
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Temp/Humidity Chamber #18		EPX-2H	Espec	137664	1645	I	4/21/2018	4/21/2017
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.								

Test Results Summary

Test	Frequency (MHz)	802.11b	802.11g	802.11n (HT20)
Average Output Power	2412.000	PASS	PASS	PASS
Peak Power Spectral Density	2412.000	PASS	PASS	PASS
DTS Bandwidth (6dB)	2412.000	PASS	PASS	PASS
Conducted Band Edges	2412.000	PASS	PASS	PASS
Conducted Spurious Emissions	2412.000	PASS	PASS	PASS
Average Output Power	2437.000	PASS	PASS	PASS
Peak Power Spectral Density	2437.000	PASS	PASS	PASS
DTS Bandwidth (6dB)	2437.000	PASS	PASS	PASS
Conducted Band Edges	2437.000	PASS	PASS	PASS
Conducted Spurious Emissions	2437.000	PASS	PASS	PASS
Average Output Power	2462.000	PASS	PASS	PASS
Peak Power Spectral Density	2462.000	PASS	PASS	PASS
DTS Bandwidth (6dB)	2462.000	PASS	PASS	PASS
Conducted Band Edges	2462.000	PASS	PASS	PASS
Conducted Spurious Emissions	2462.000	PASS	PASS	PASS

Average Output Power (Gated)

Test according to FCC KDB 558074 DTS Measurement Guidance v04 Section 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 (Power Setting: Default)

Data Rate	Gated RMS (dBm) 2412 MHz	Gated RMS (dBm) 2437 MHz	Gated RMS (dBm) 2462 MHz	Limit (dBm)	Duty Cycle (%)
1 Mbps	18.563	18.544	17.979	30	98.906
2 Mbps	18.872	18.779	18.219	30	97.839
5.5 Mbps	19.031	18.721	18.216	30	94.475
11 Mbps	18.871	18.494	18.276	30	90.058

802.11g (Power Setting: 32)

Data Rate	Gated RMS (dBm) 2412 MHz	Gated RMS (dBm) 2437 MHz	Gated RMS (dBm) 2462 MHz	Limit (dBm)	Duty Cycle (%)
6 Mbps	12.374	12.425	12.866	30	93.333
9 Mbps	12.448	12.505	12.955	30	90.333
12 Mbps	12.508	12.468	12.966	30	87.647
18 Mbps	12.51	12.578	13.003	30	82.767
24 Mbps	12.605	12.567	13.024	30	78.472
36 Mbps	12.692	12.587	13.042	30	71.474
48 Mbps	12.791	12.802	13.114	30	65.613
54 Mbps	12.767	12.794	13.159	30	63.737

802.11n(HT20) (Power Setting: 38)

Data Rate	Gated RMS (dBm) 2412 MHz	Gated RMS (dBm) 2437 MHz	Gated RMS (dBm) 2462 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	11.264	11.196	11.717	30	92.867
MCS1	11.23	11.326	11.798	30	87.018
MCS2	11.259	11.268	11.767	30	82.153
MCS3	11.324	11.316	11.803	30	78.085
MCS4	11.434	11.422	11.836	30	71.426
MCS5	11.437	11.475	11.835	30	66.198
MCS6	11.534	11.488	11.968	30	64.208
MCS7	11.521	11.529	11.874	30	62.092

Peak Power Spectral Density

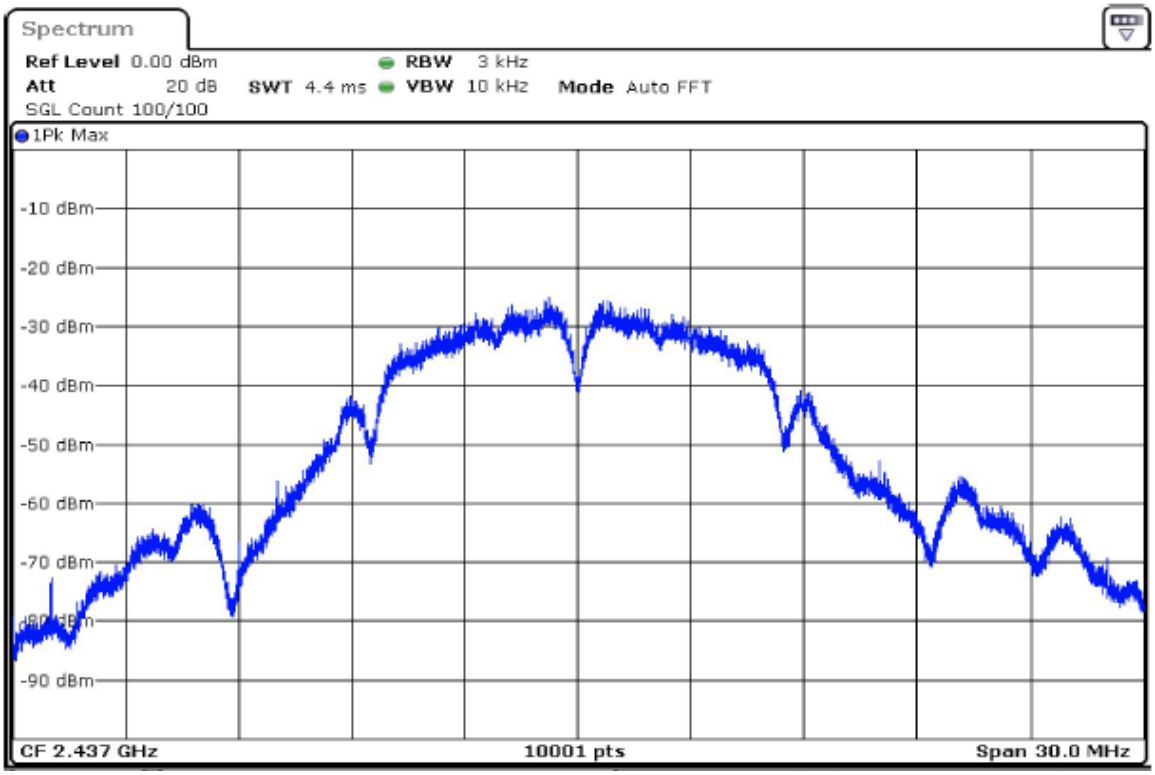
Test according to FCC KDB 558074 DTS Measurement Guidance v04 Section 10.2

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

802.11b (Power Setting: Default)

Data Rate	Peak PSD (dBm) 2412 MHz	Peak PSD (dBm) 2437 MHz	Peak PSD (dBm) 2462 MHz	Limit (dBm)
1 Mbps	-3.861	-3.301	-4.958	8
2 Mbps	-3.242	-3.180	-4.227	8
5.5 Mbps	-3.675	-3.419	-4.682	8
11 Mbps	-4.082	-4.765	-4.388	8

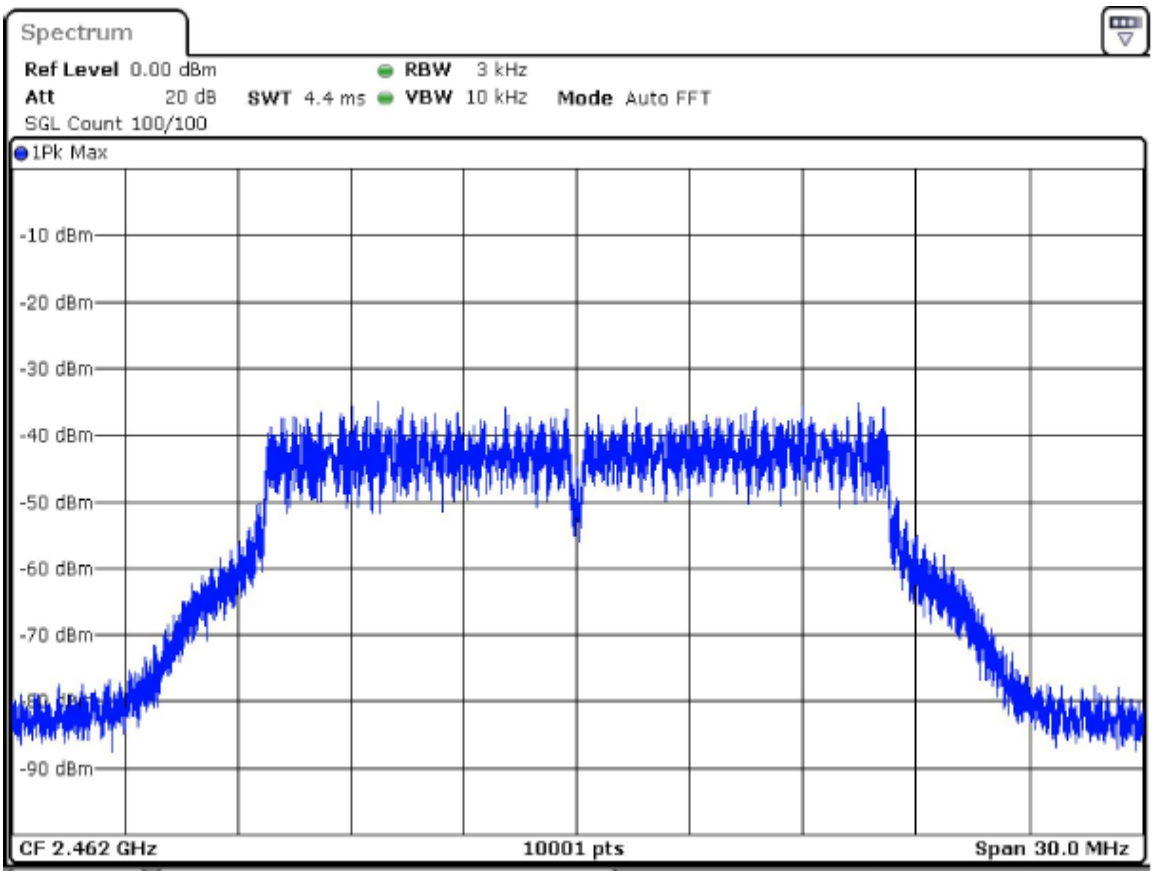
802.11b 2Mbps 2437MHz



802.11g (Power Setting: 32)

Data Rate	Peak PSD (dBm) 2412 MHz	Peak PSD (dBm) 2437 MHz	Peak PSD (dBm) 2462 MHz	Limit (dBm)
6 Mbps	-13.467	-13.430	-13.065	8
9 Mbps	-14.415	-14.260	-13.763	8
12 Mbps	-13.370	-13.444	-13.058	8
18 Mbps	-14.490	-14.402	-14.010	8
24 Mbps	-13.760	-13.730	-13.285	8
36 Mbps	-14.713	-14.759	-14.409	8
48 Mbps	-15.313	-15.320	-15.018	8
54 Mbps	-15.665	-15.590	-15.338	8

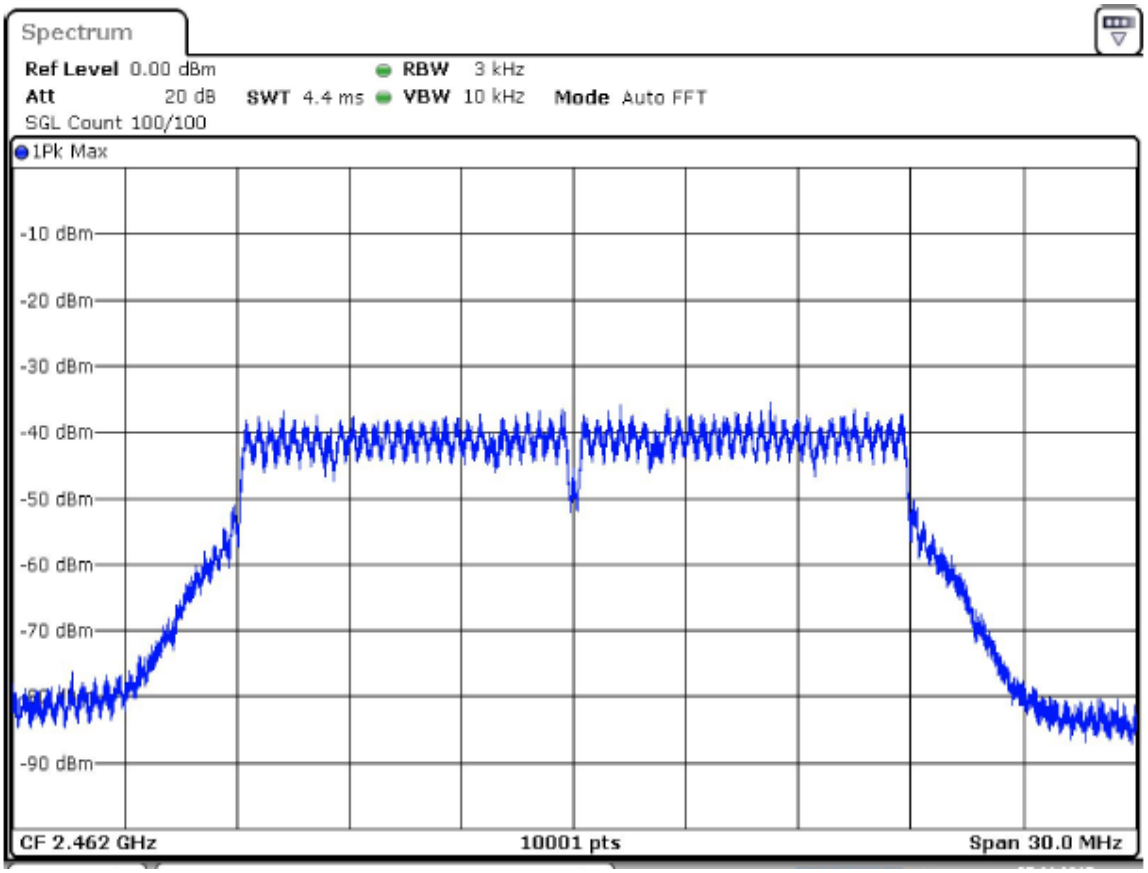
802.11g 12Mbps 2462MHz



802.11n(HT20) (Power Setting: 38)

Data Rate	Peak PSD (dBm) 2412 MHz	Peak PSD (dBm) 2437 MHz	Peak PSD (dBm) 2462 MHz	Limit (dBm)
MCS0	-14.307	-13.953	-13.570	8
MCS1	-14.288	-14.499	-14.410	8
MCS2	-14.658	-13.660	-14.815	8
MCS3	-14.502	-14.276	-14.654	8
MCS4	-15.252	-14.229	-14.633	8
MCS5	-15.377	-14.955	-14.436	8
MCS6	-15.019	-14.494	-14.297	8
MCS7	-15.120	-14.676	-14.503	8

802.11n(HT20) MCS0 2462MHz



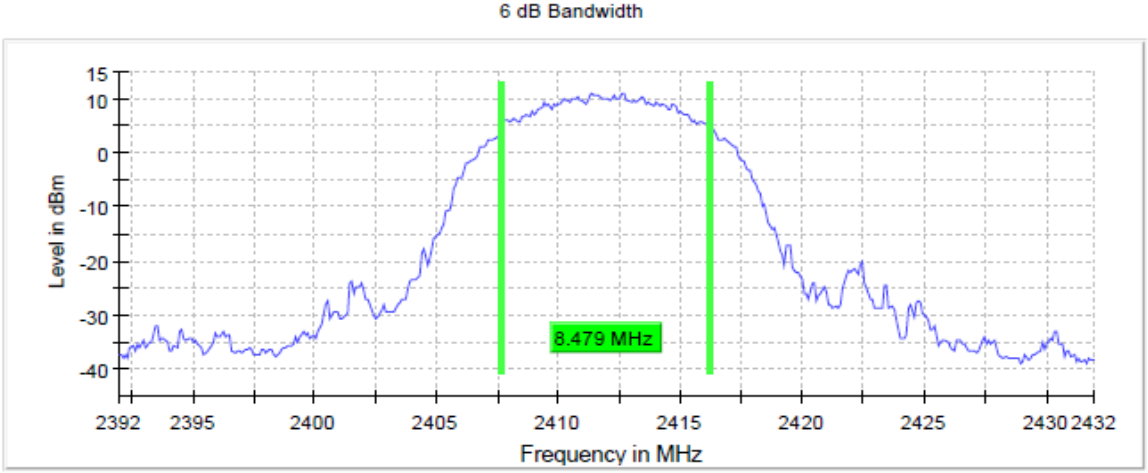
DTS Bandwidth (6dB)

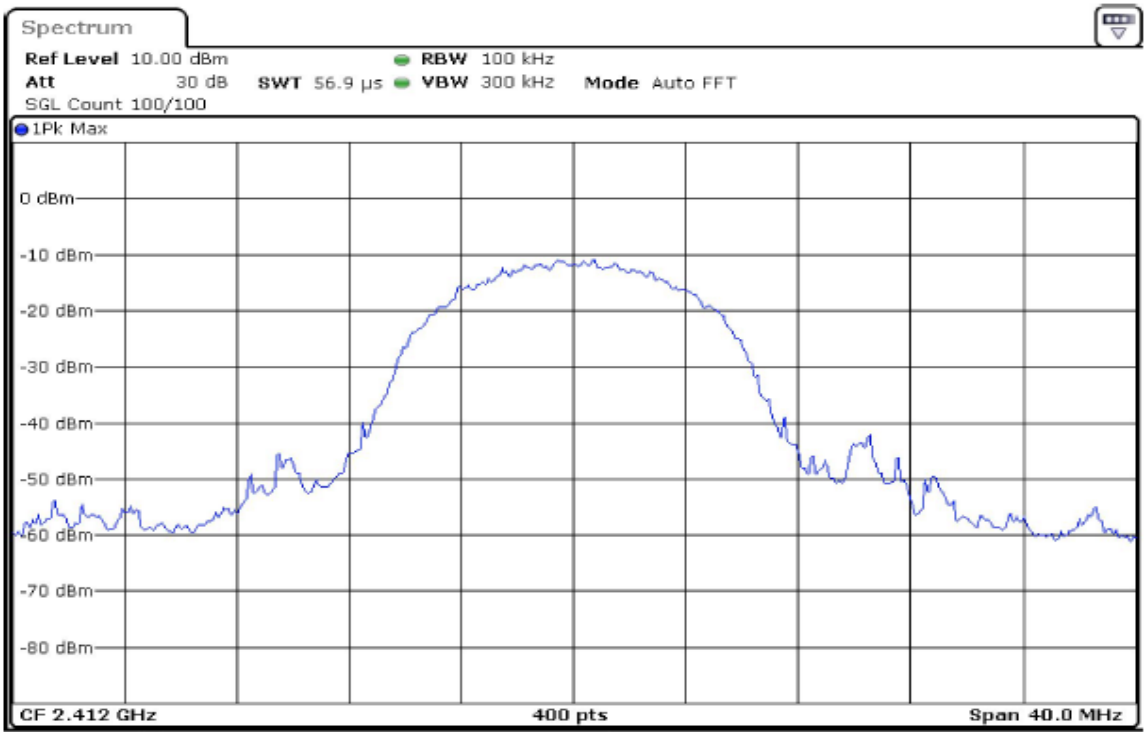
Test according to FCC KDB 558074 DTS Measurement Guidance v04 Section 8.1

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

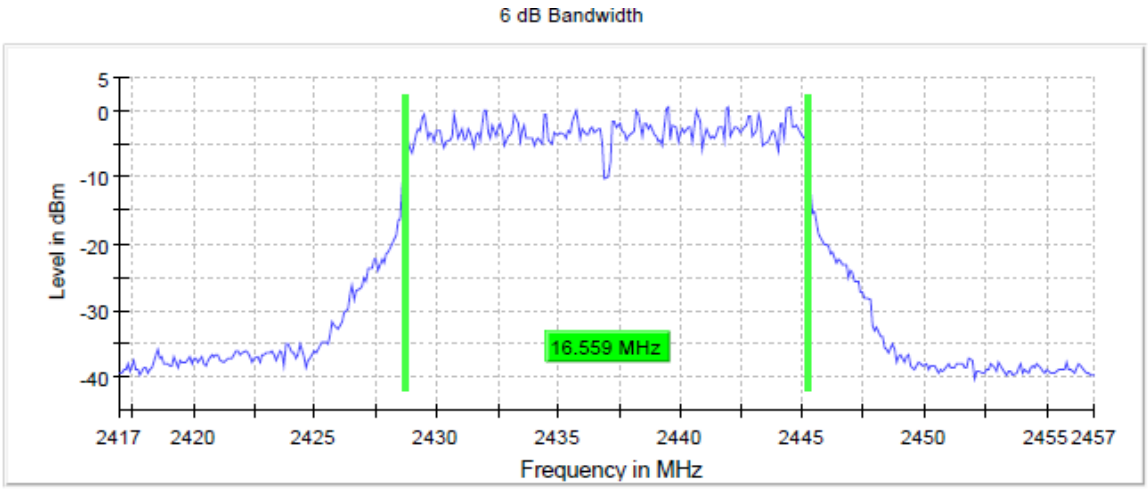
Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Minimum Limit (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
802.11b 5.5 Mbps	2412.000	8.478803	0.5	2407.710723	2416.189526
802.11g 54 Mbps	2412.000	16.458853	0.5	2403.720698	2420.179551
802.11n(HT20) MCS6	2412.000	17.955112	0.5	2403.022444	2420.977556
802.11b 5.5 Mbps	2437.000	8.478803	0.5	2432.710723	2441.189526
802.11g 54 Mbps	2437.000	16.558604	0.5	2428.720698	2445.279302
802.11n(HT20) MCS6	2437.000	17.855361	0.5	2428.022444	2445.877805
802.11b 5.5 Mbps	2462.000	8.179551	0.5	2457.810474	2465.990025
802.11g 54 Mbps	2462.000	16.558604	0.5	2453.720698	2470.279302
802.11n(HT20) MCS6	2462.000	17.855361	0.5	2453.022444	2470.877805

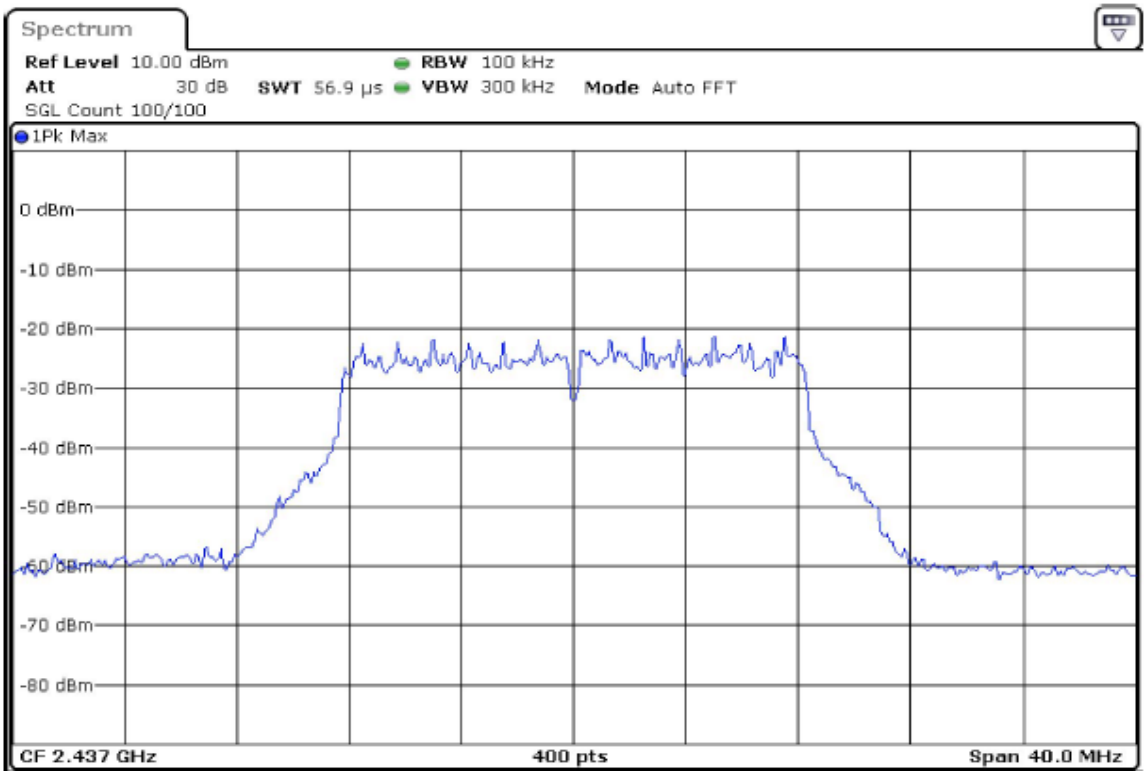
802.11b 5.5Mbps 2412MHz



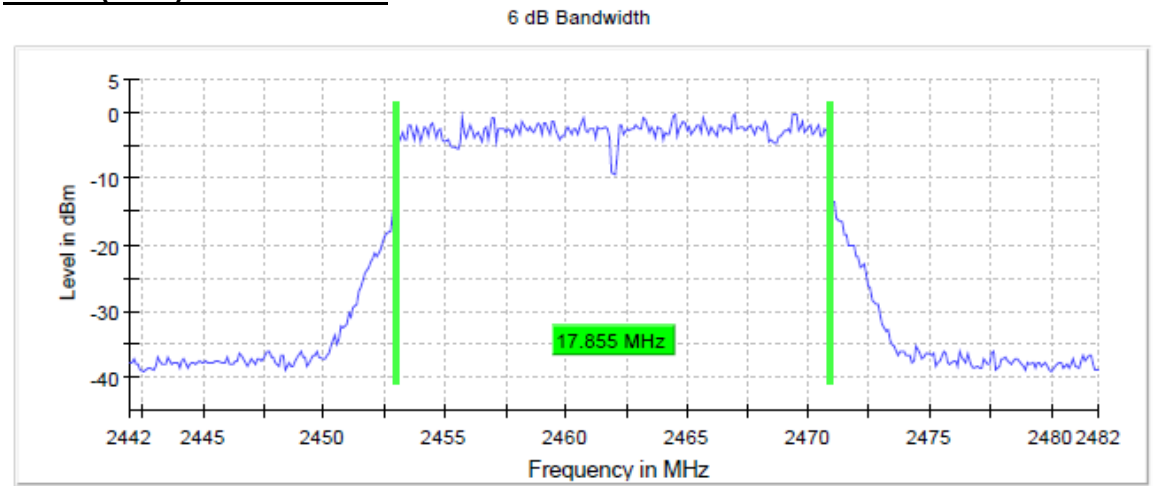


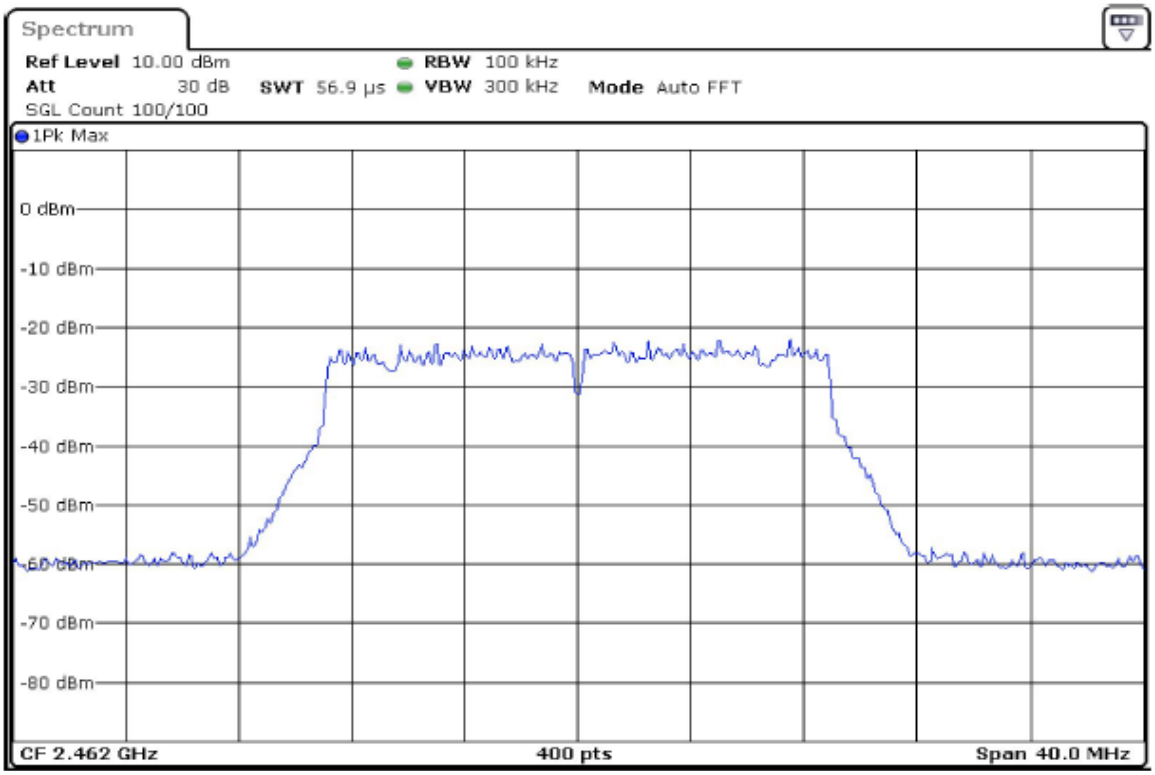
802.11g 54 Mbps 2437MHz





802.11n(HT20) MCS6 2462MHz





Conducted Band Edge

Test according to FCC KDB 558074 DTS Measurement Guidance v04 Section 11.

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

802.11b 5.5Mbps 2412MHz

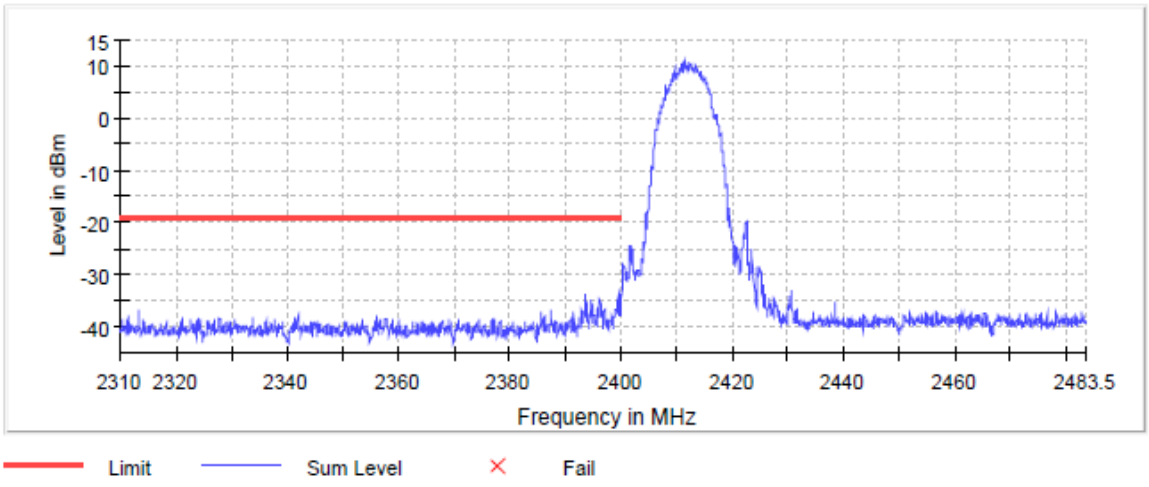
Band Edge Low

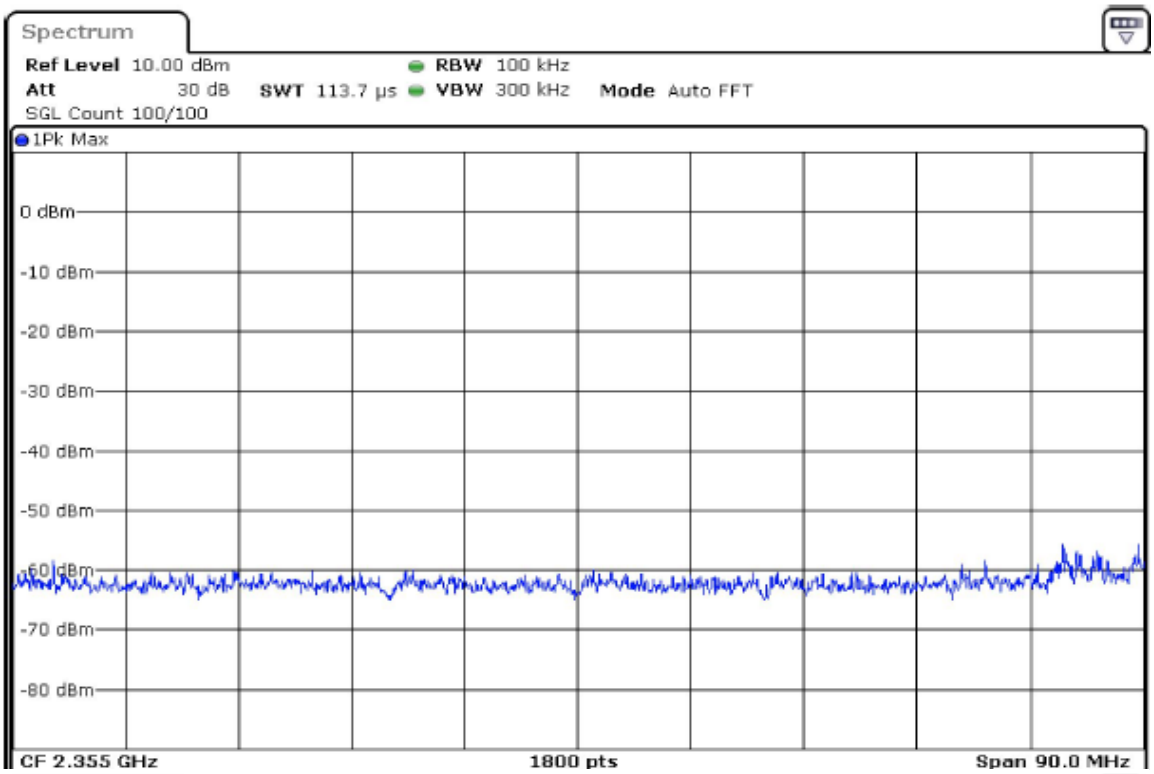
Inband Peak

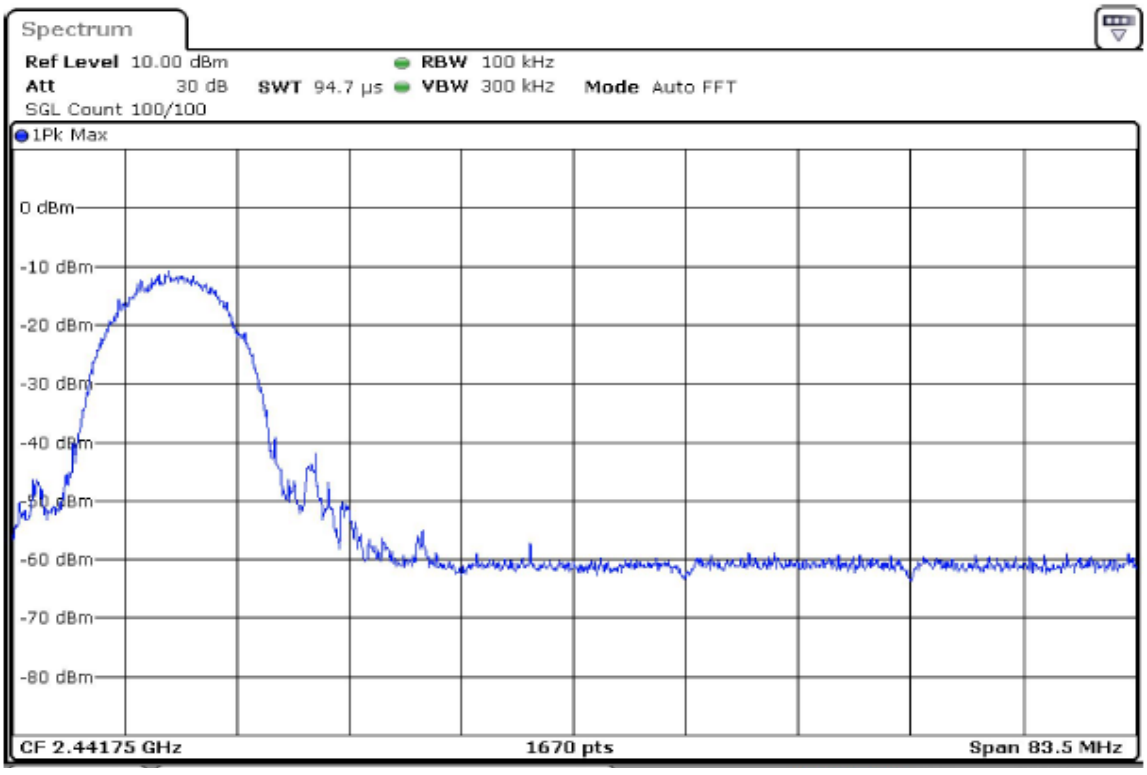
Frequency (MHz)	Level (dBm)
2411.618043	11.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.525264	-33.7	14.8	-19.0	PASS
2393.478623	-33.8	14.8	-19.0	PASS
2399.475292	-33.8	14.8	-19.0	PASS
2393.528595	-34.4	15.5	-19.0	PASS
2393.428651	-34.6	15.6	-19.0	PASS
2396.177124	-34.8	15.9	-19.0	PASS
2394.528040	-35.0	16.0	-19.0	PASS
2394.578012	-35.1	16.1	-19.0	PASS
2399.425319	-35.2	16.2	-19.0	PASS
2396.127152	-35.3	16.4	-19.0	PASS
2394.478068	-35.3	16.4	-19.0	PASS
2393.778456	-35.4	16.5	-19.0	PASS
2399.225430	-35.5	16.5	-19.0	PASS
2396.227096	-35.6	16.6	-19.0	PASS
2394.827873	-35.7	16.7	-19.0	PASS




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 113.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.355 GHz
1800 pts
Span 90.0 MHz


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz

802.11b 5.5Mbps 2462MHz

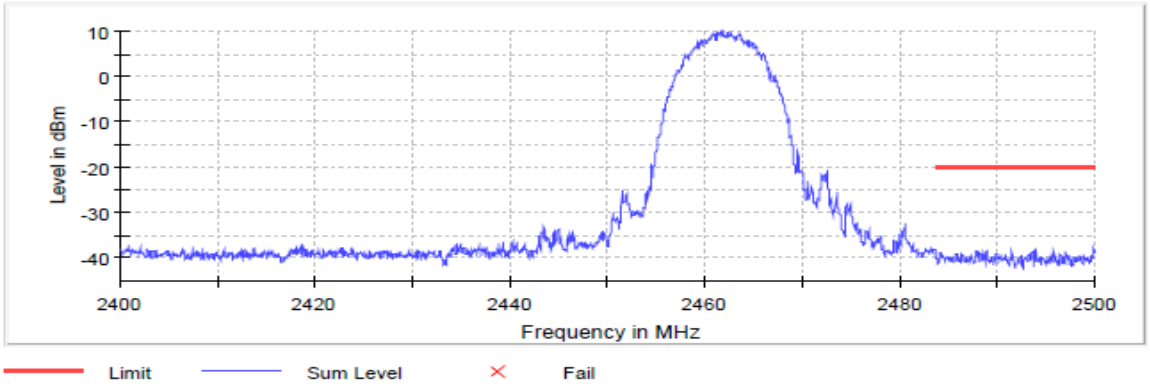
Band Edge High

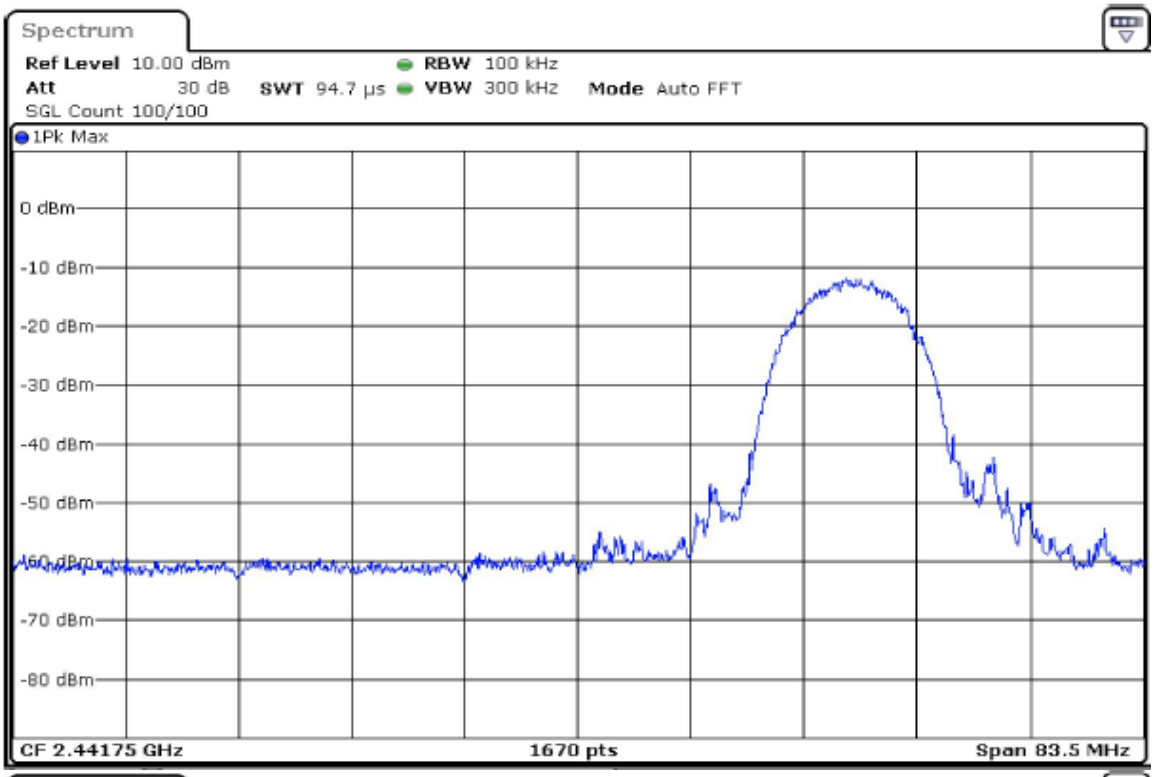
Inband Peak

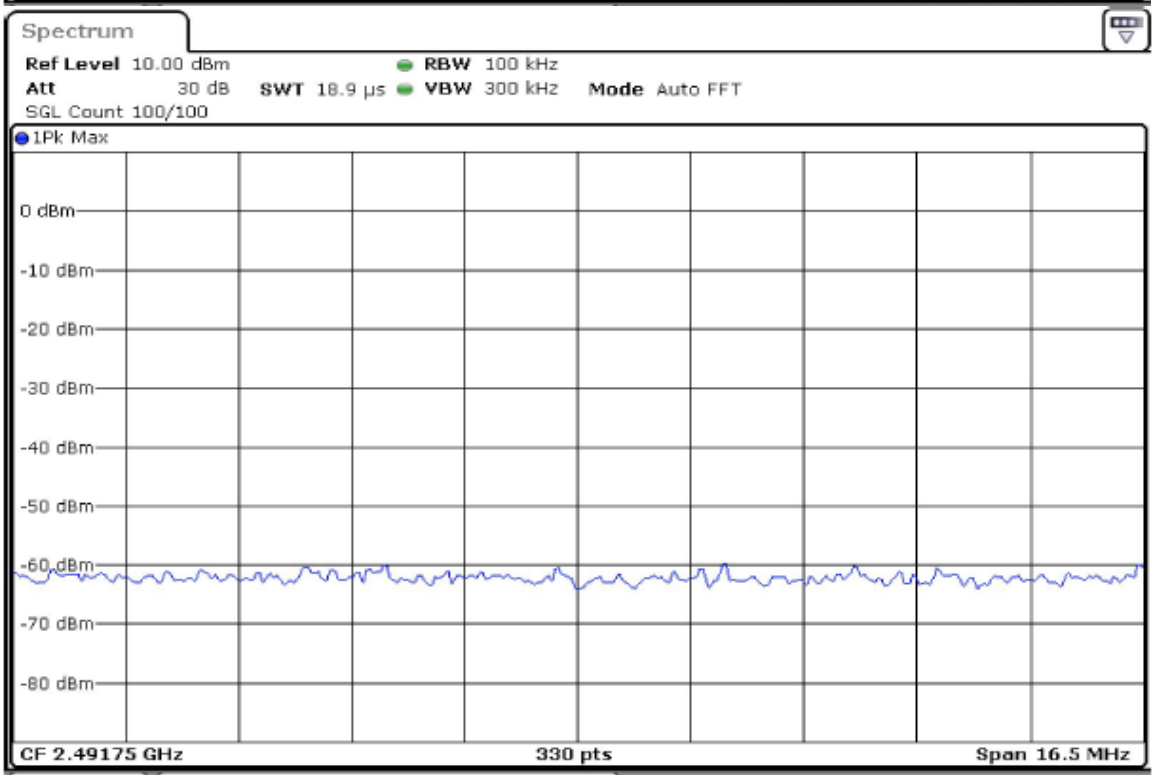
Frequency (MHz)	Level (dBm)
2461.538151	10.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2493.843656	-37.7	17.7	-20.0	PASS
2493.893505	-37.9	17.9	-20.0	PASS
2499.875378	-37.9	17.9	-20.0	PASS
2488.908610	-38.0	18.0	-20.0	PASS
2499.825529	-38.1	18.0	-20.0	PASS
2488.958459	-38.2	18.1	-20.0	PASS
2495.737915	-38.3	18.3	-20.0	PASS
2487.762085	-38.4	18.3	-20.0	PASS
2495.787764	-38.4	18.4	-20.0	PASS
2487.811934	-38.5	18.5	-20.0	PASS
2496.934290	-38.6	18.5	-20.0	PASS
2491.450906	-38.6	18.6	-20.0	PASS
2493.544562	-38.6	18.6	-20.0	PASS
2488.709215	-38.6	18.6	-20.0	PASS
2491.401057	-38.7	18.7	-20.0	PASS




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.49175 GHz
330 pts
Span 16.5 MHz

802.11g 54 Mbps 2412MHz

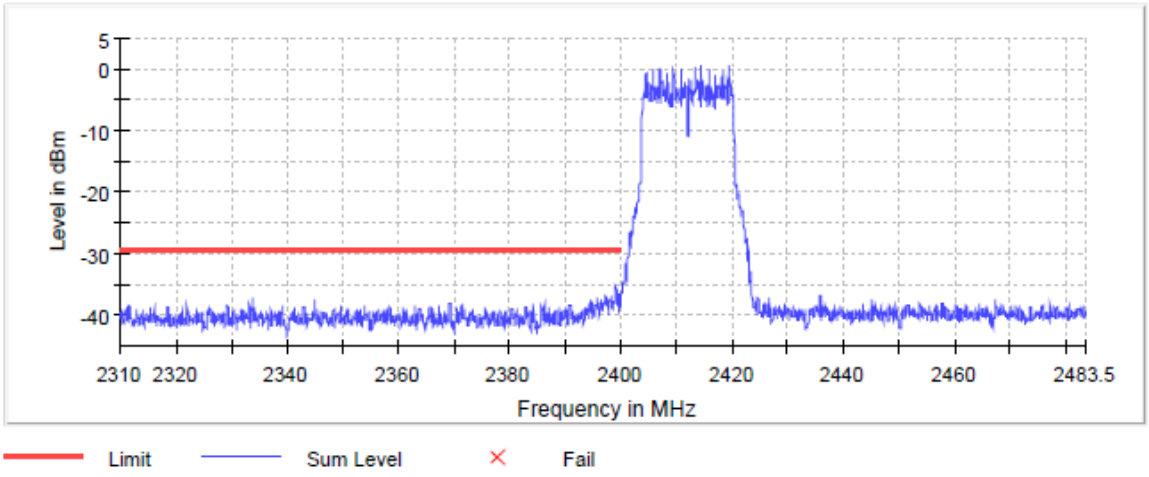
Band Edge Low

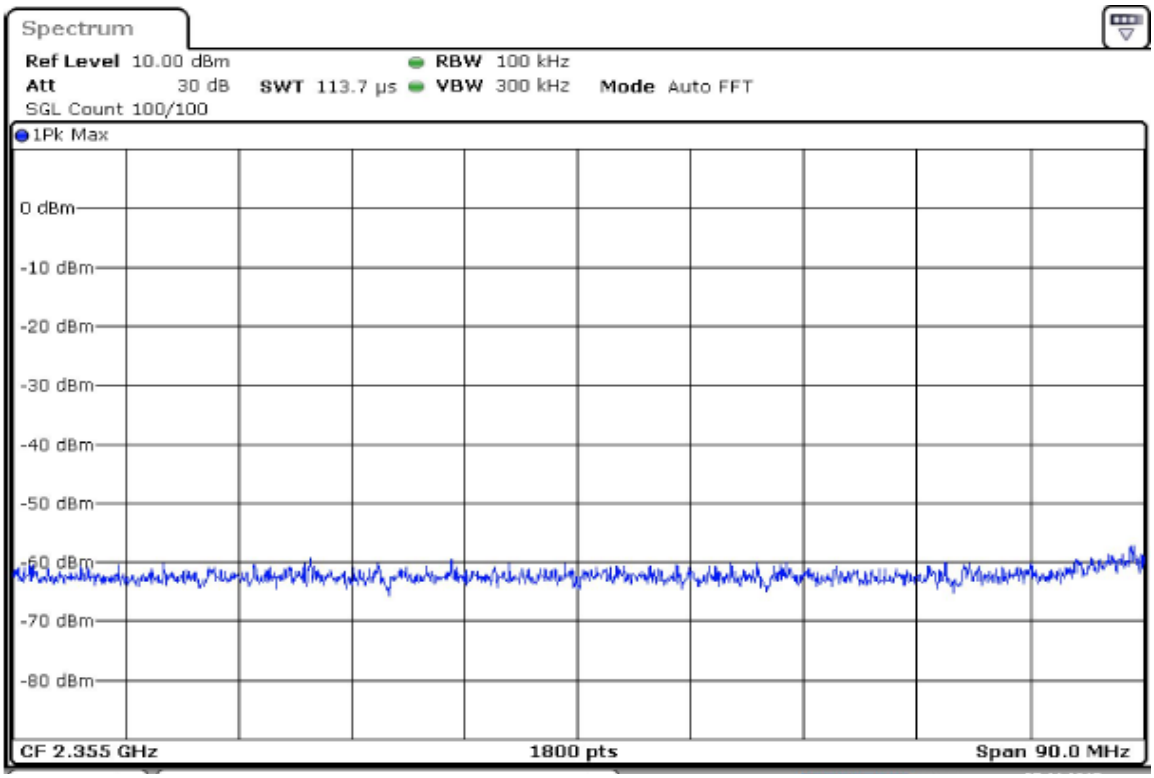
ınband Peak

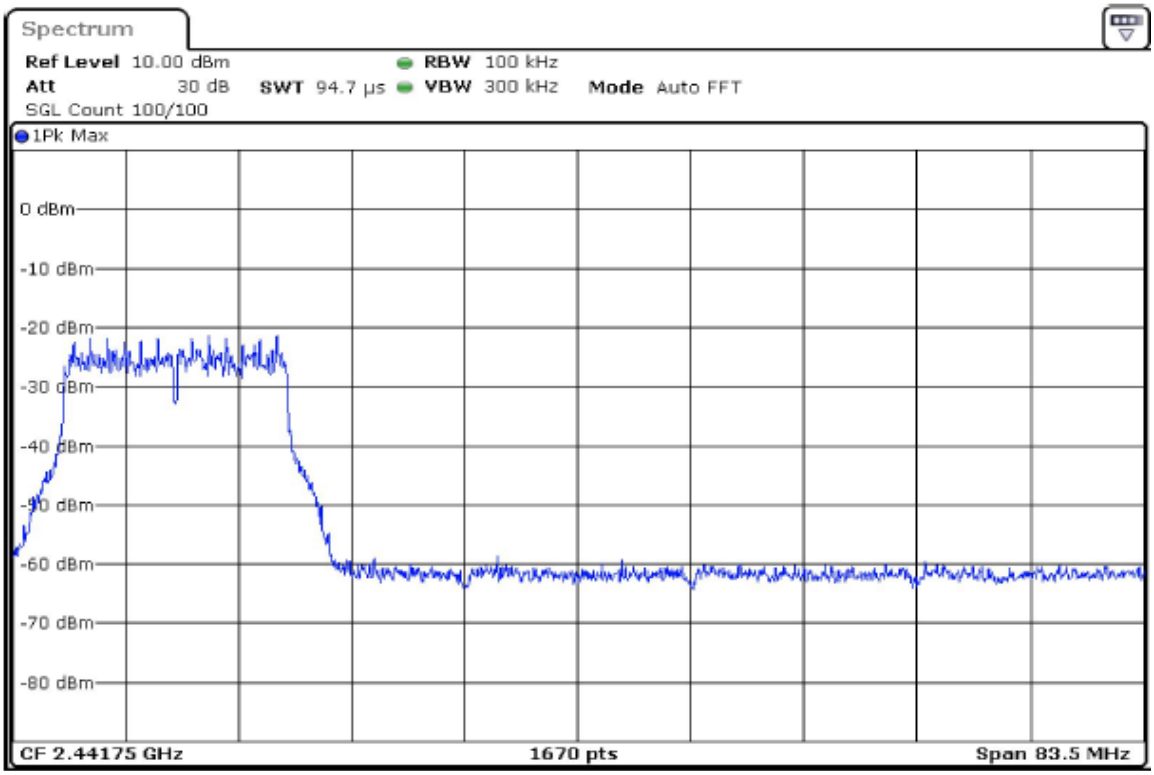
Frequency (MHz)	Level (dBm)
2414.516308	0.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.075514	-35.4	6.0	-29.4	PASS
2398.875625	-35.5	6.1	-29.4	PASS
2398.825652	-35.6	6.3	-29.4	PASS
2399.125486	-36.0	6.6	-29.4	PASS
2398.925597	-36.2	6.8	-29.4	PASS
2399.025541	-36.2	6.8	-29.4	PASS
2399.175458	-36.4	7.0	-29.4	PASS
2399.725153	-36.7	7.3	-29.4	PASS
2398.176013	-36.8	7.4	-29.4	PASS
2397.026652	-36.8	7.4	-29.4	PASS
2397.076624	-36.8	7.5	-29.4	PASS
2397.276513	-36.9	7.5	-29.4	PASS
2399.775125	-36.9	7.5	-29.4	PASS
2398.225986	-36.9	7.6	-29.4	PASS
2399.225430	-37.0	7.7	-29.4	PASS




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 113.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.355 GHz
1800 pts
Span 90.0 MHz


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz

802.11g 54 Mbps 2462MHz

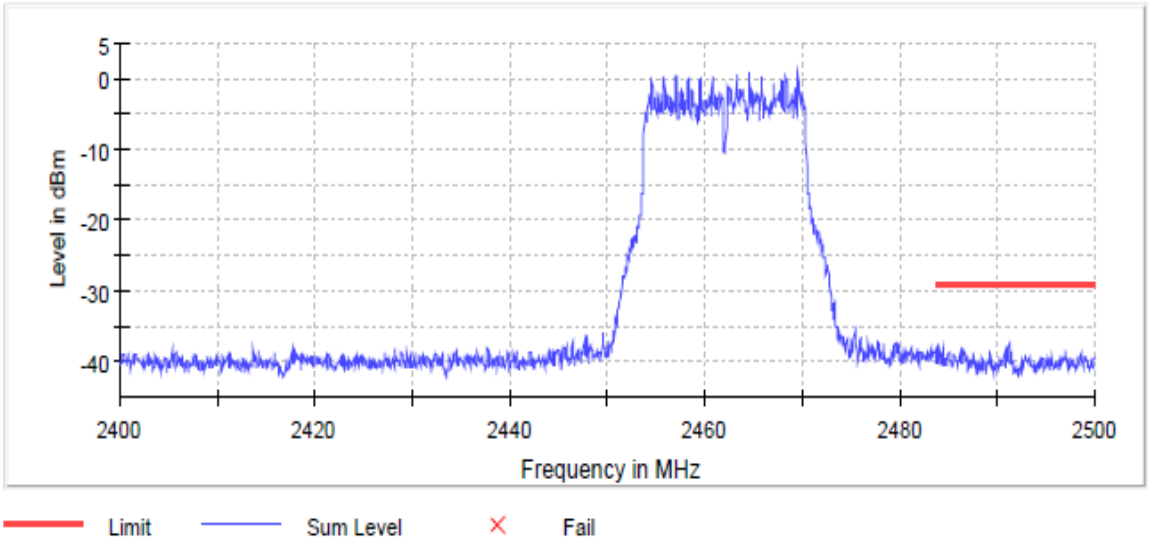
Band Edge High

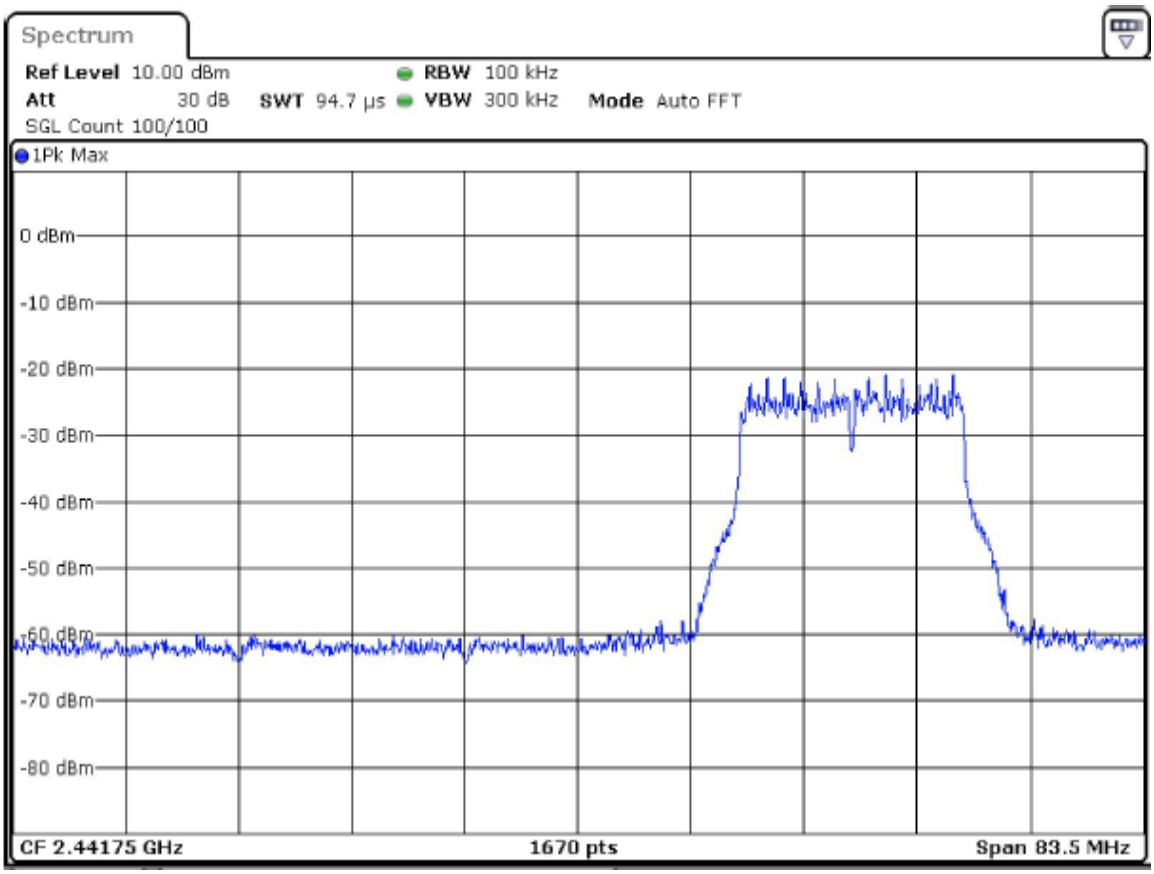
Inband Peak

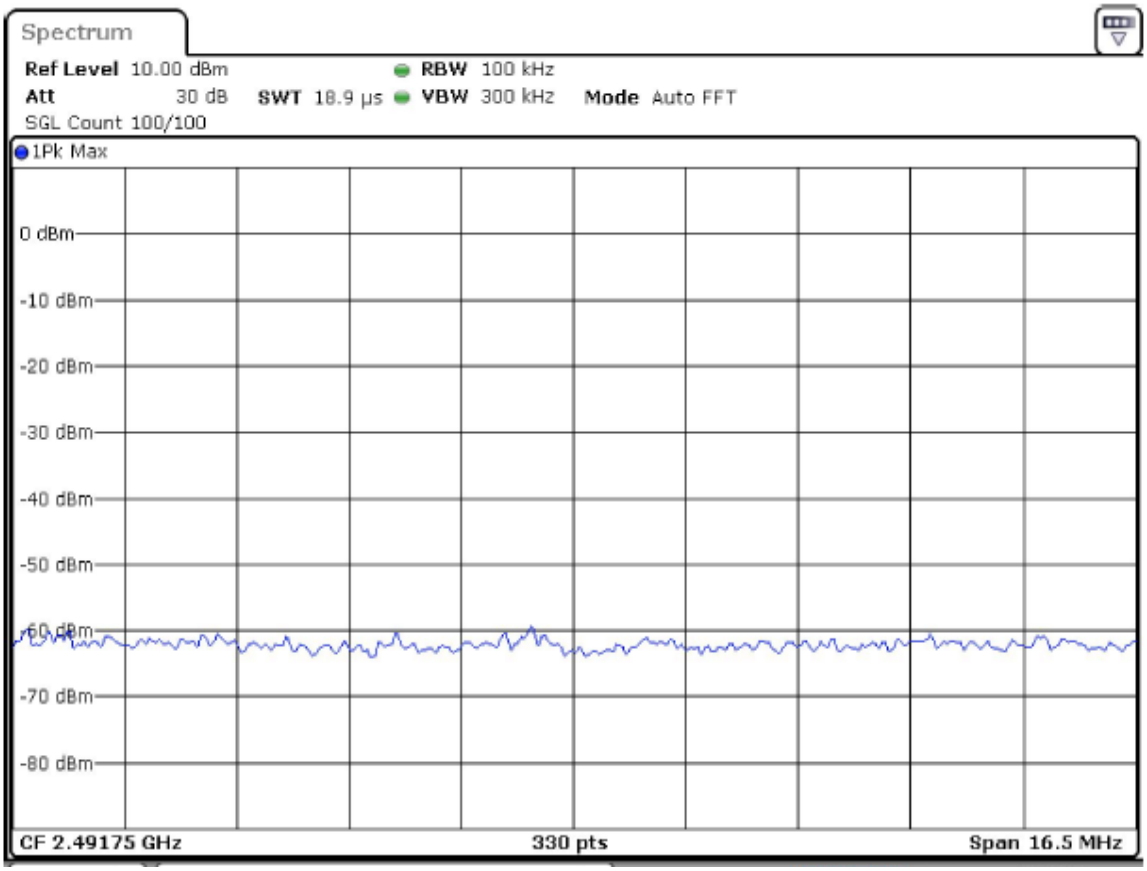
Frequency (MHz)	Level (dBm)
2464.486385	1.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2491.101964	-37.4	8.5	-28.9	PASS
2491.151813	-37.7	8.8	-28.9	PASS
2483.724320	-37.8	8.8	-28.9	PASS
2483.774169	-38.1	9.2	-28.9	PASS
2484.322508	-38.3	9.3	-28.9	PASS
2491.052115	-38.3	9.3	-28.9	PASS
2484.073263	-38.3	9.4	-28.9	PASS
2484.372356	-38.3	9.4	-28.9	PASS
2490.703172	-38.4	9.4	-28.9	PASS
2489.157855	-38.4	9.4	-28.9	PASS
2496.934290	-38.4	9.5	-28.9	PASS
2489.108006	-38.4	9.5	-28.9	PASS
2484.023414	-38.5	9.5	-28.9	PASS
2483.674471	-38.5	9.6	-28.9	PASS
2486.515861	-38.5	9.6	-28.9	PASS




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz



802.11n(HT20) MCS6 2412MHz

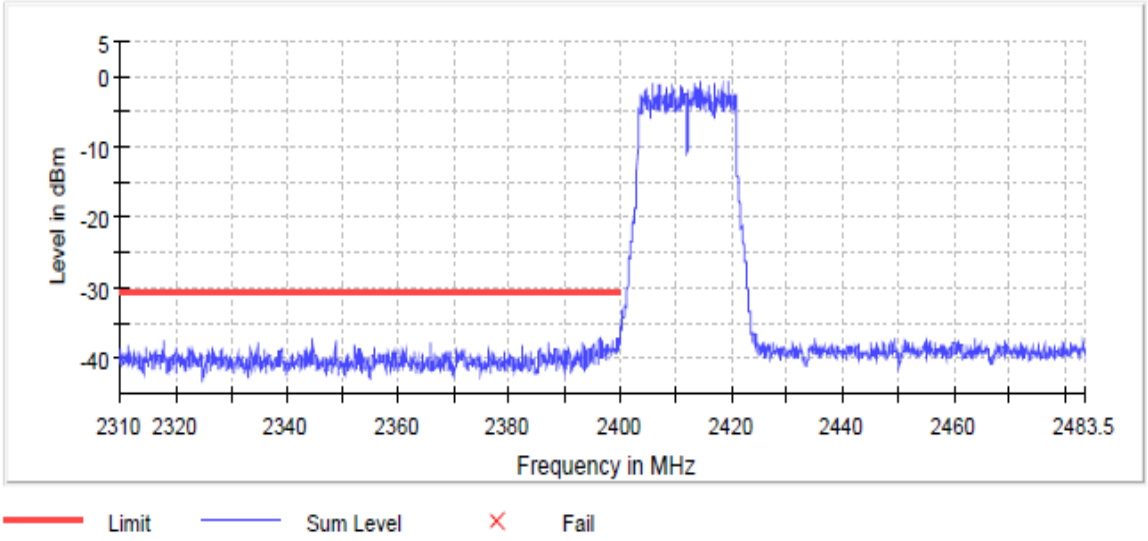
Band Edge Low

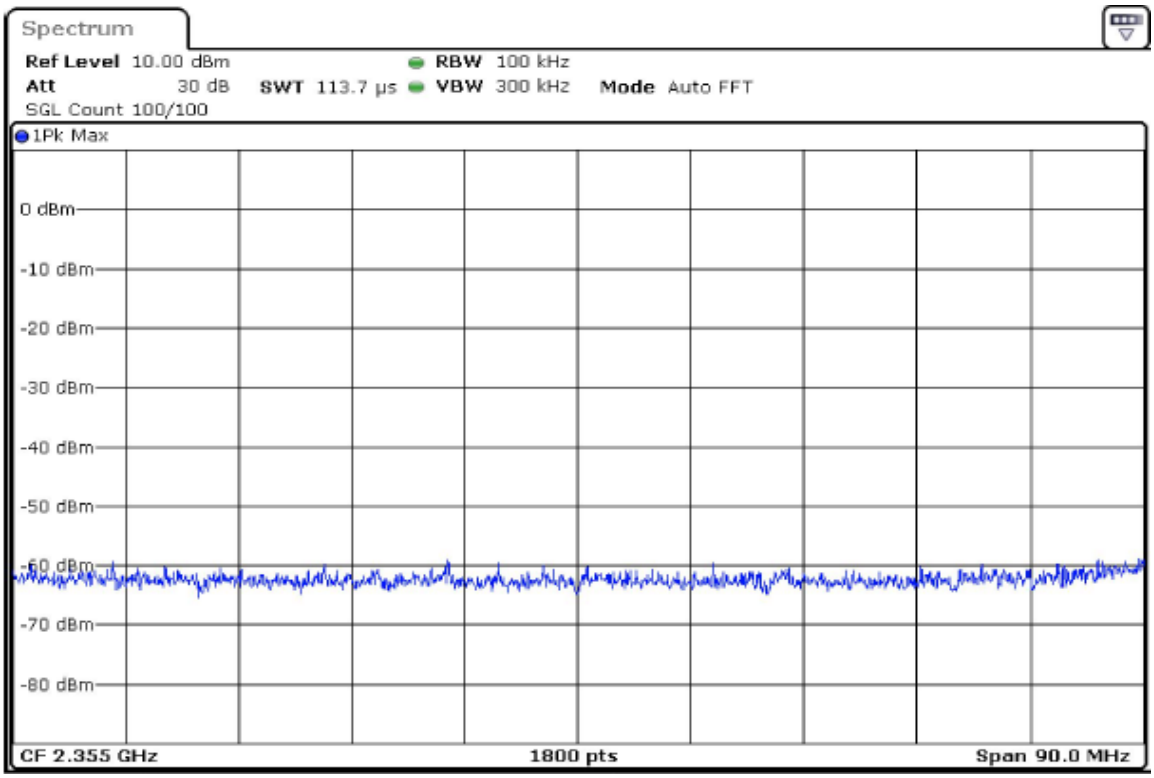
Inband Peak

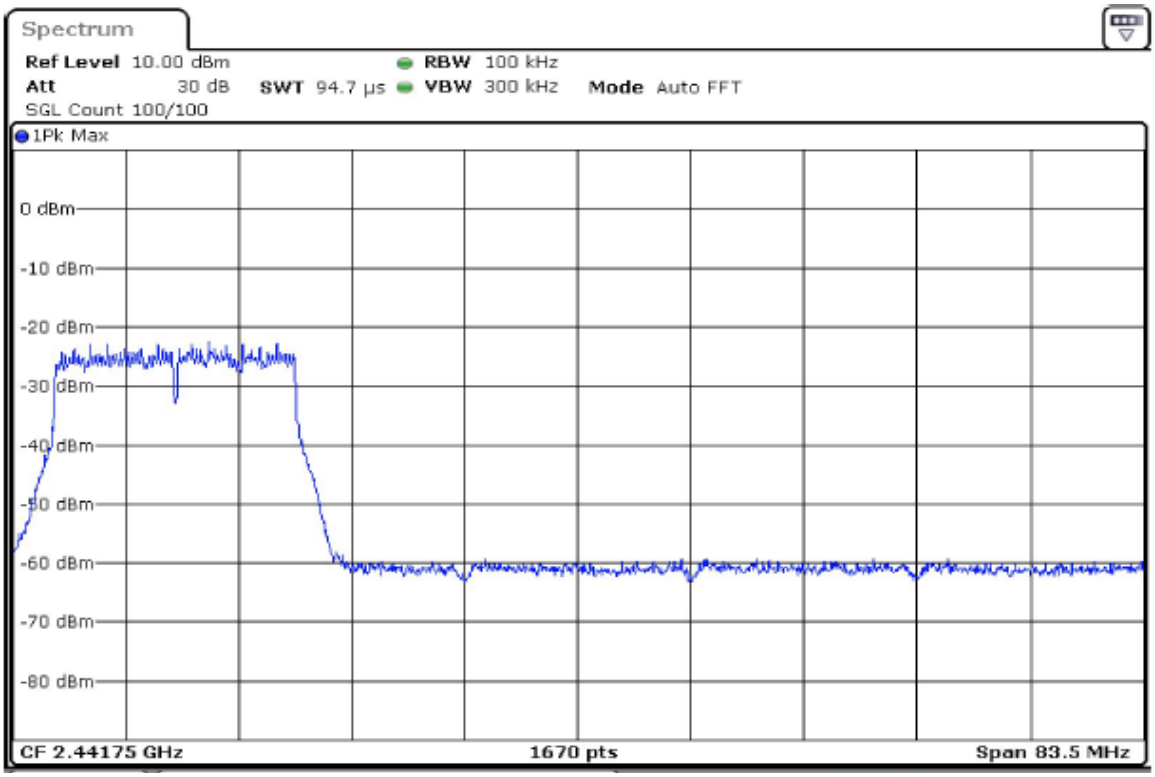
Frequency (MHz)	Level (dBm)
2414.516308	-0.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.475292	-37.0	6.4	-30.6	PASS
2396.227096	-37.1	6.5	-30.6	PASS
2344.655747	-37.1	6.5	-30.6	PASS
2399.725153	-37.2	6.6	-30.6	PASS
2399.925042	-37.3	6.7	-30.6	PASS
2399.425319	-37.3	6.7	-30.6	PASS
2399.525264	-37.4	6.8	-30.6	PASS
2396.177124	-37.5	6.9	-30.6	PASS
2317.970572	-37.5	6.9	-30.6	PASS
2398.425875	-37.5	6.9	-30.6	PASS
2318.020544	-37.5	6.9	-30.6	PASS
2396.676846	-37.5	6.9	-30.6	PASS
2399.775125	-37.5	6.9	-30.6	PASS
2348.703498	-37.6	7.0	-30.6	PASS
2398.475847	-37.6	7.0	-30.6	PASS




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 113.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.355 GHz
1800 pts
Span 90.0 MHz


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz

802.11n(HT20) MCS6 2462MHz

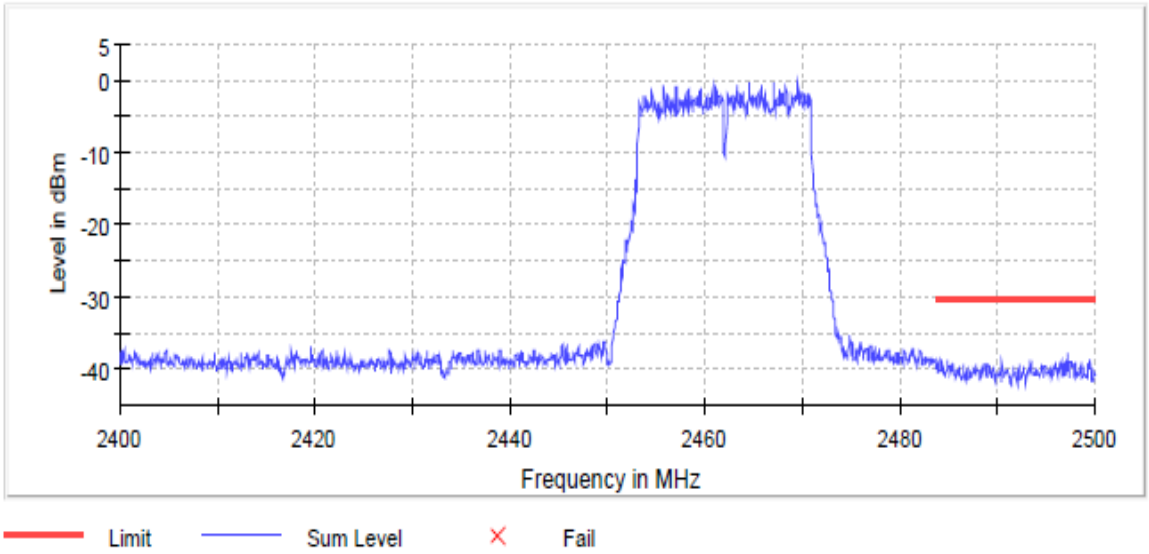
Band Edge High

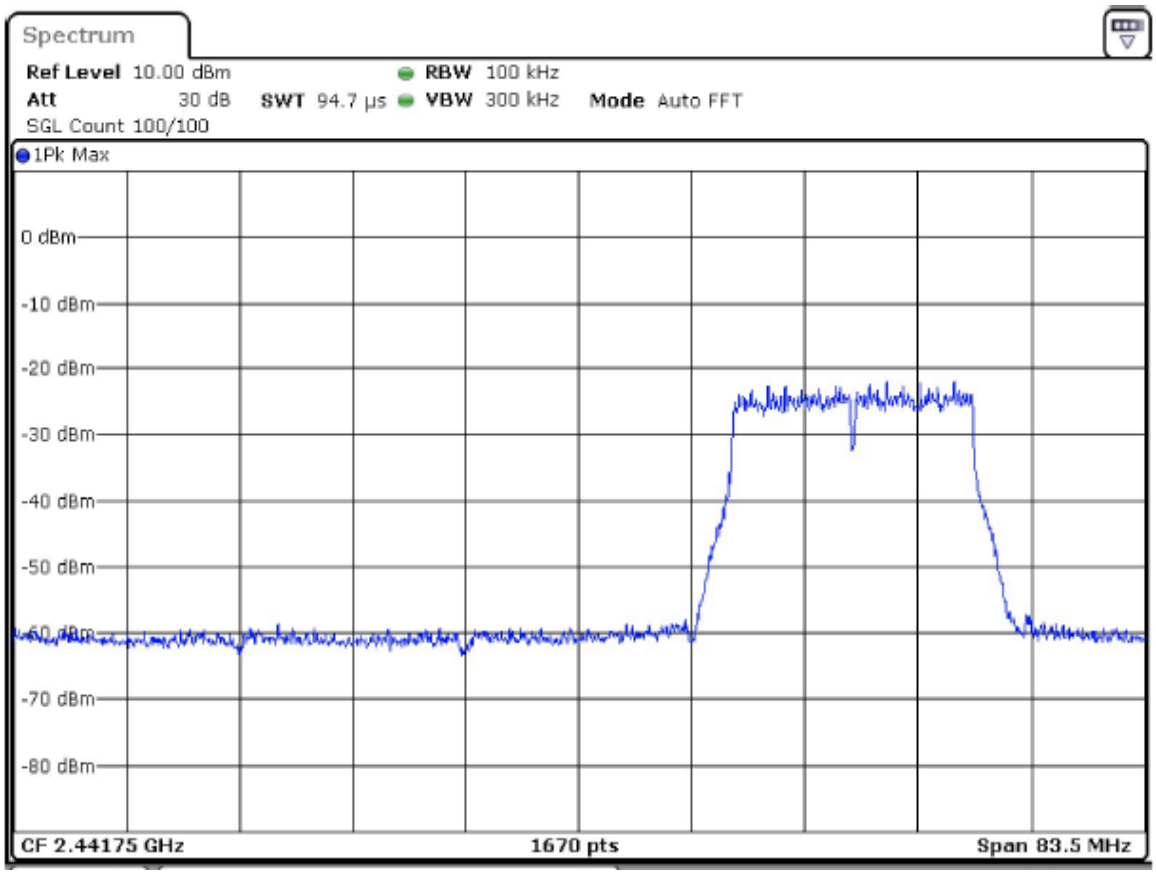
Inband Peak

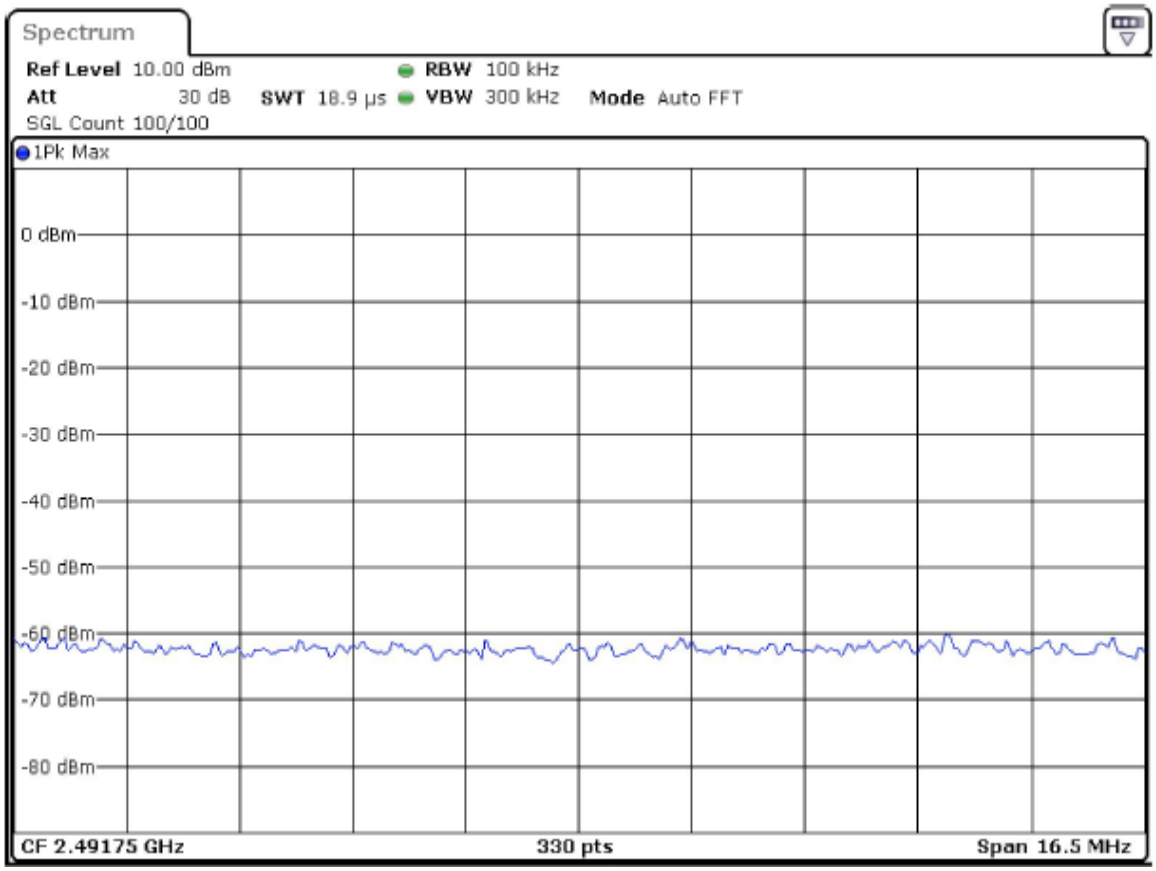
Frequency (MHz)	Level (dBm)
2464.486385	-0.2

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2497.083837	-37.9	7.7	-30.2	PASS
2497.033988	-38.4	8.2	-30.2	PASS
2483.524924	-38.6	8.5	-30.2	PASS
2493.195619	-38.7	8.5	-30.2	PASS
2483.973565	-38.7	8.5	-30.2	PASS
2484.272659	-38.8	8.6	-30.2	PASS
2483.923716	-38.8	8.6	-30.2	PASS
2499.476586	-38.8	8.6	-30.2	PASS
2484.222810	-38.8	8.7	-30.2	PASS
2484.820997	-38.9	8.7	-30.2	PASS
2499.426737	-38.9	8.7	-30.2	PASS
2497.133686	-38.9	8.8	-30.2	PASS
2493.245468	-38.9	8.8	-30.2	PASS
2484.771148	-39.0	8.8	-30.2	PASS
2496.435801	-39.0	8.9	-30.2	PASS




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz



Conducted Spurious Emissions

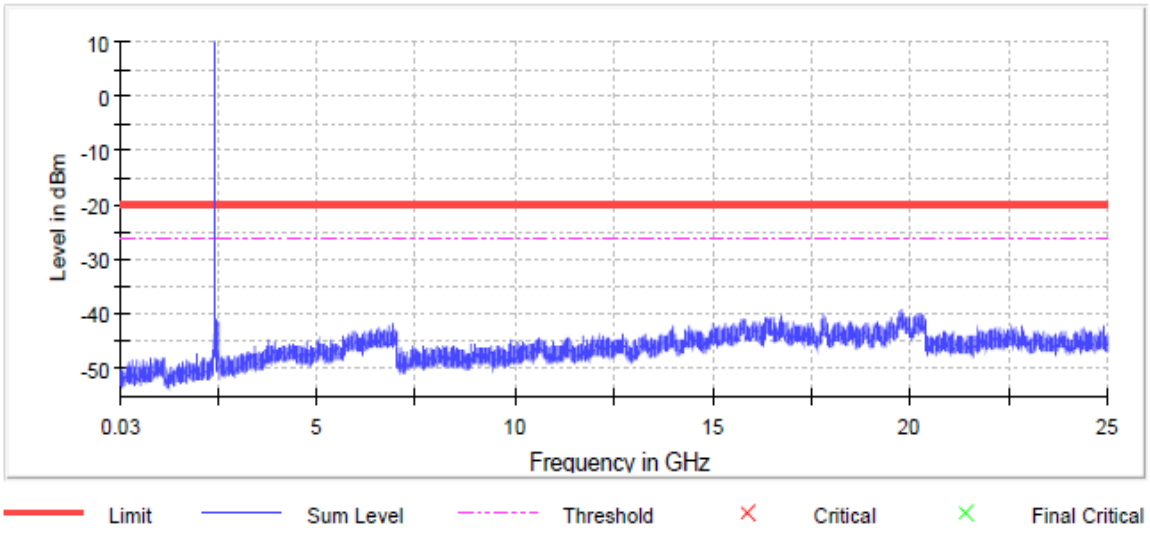
Test according to FCC KDB 558074 DTS Measurement Guidance v04 Section 11.

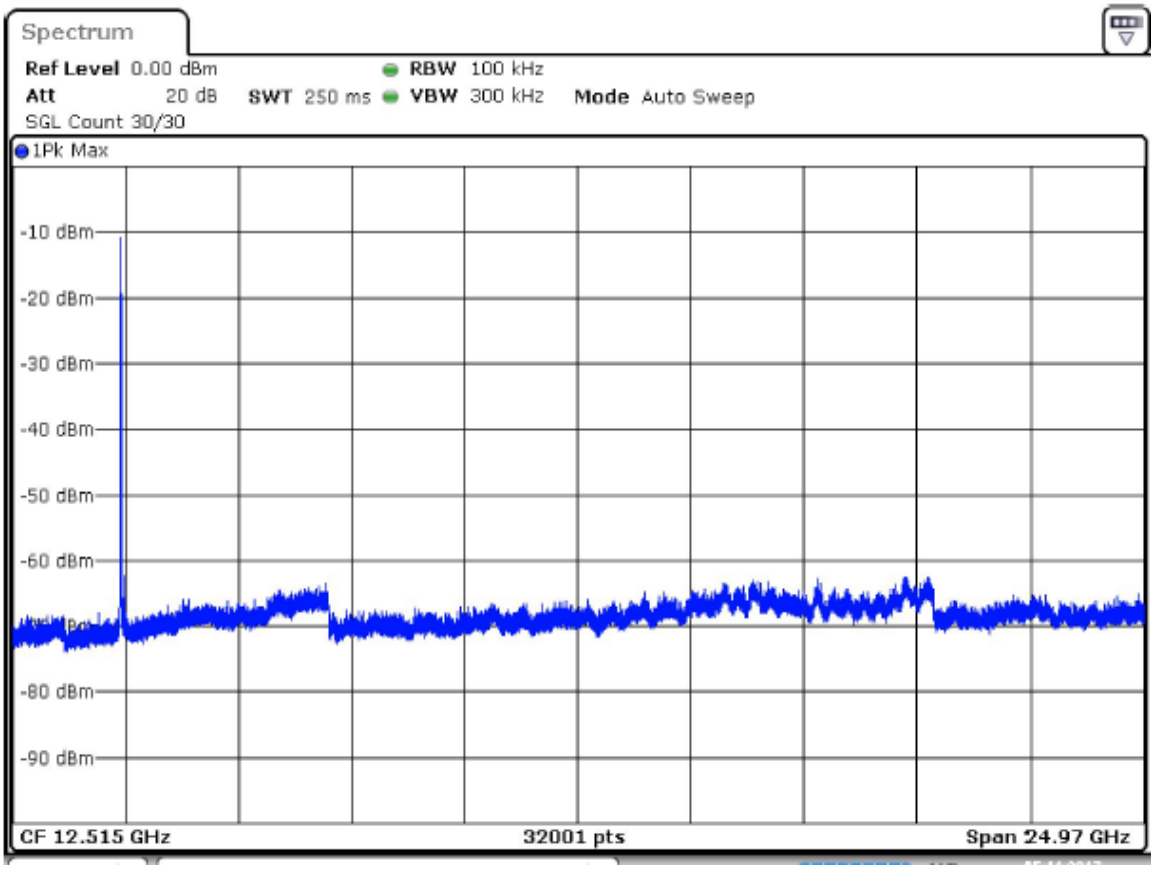
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB

802.11b 5.5 Mbps 2412MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2396.149772	-35.8	15.7	-20.0
2394.589244	-36.3	16.3	-20.0
2393.028717	-37.0	17.0	-20.0
2393.808981	-37.3	17.3	-20.0
2399.270827	-37.4	17.4	-20.0
19764.820480	-39.2	19.2	-20.0
19725.807293	-39.3	19.3	-20.0
19785.107337	-39.3	19.3	-20.0
20288.377445	-39.7	19.7	-20.0
2395.369508	-39.7	19.7	-20.0
2398.490563	-39.8	19.8	-20.0
19778.865227	-39.8	19.8	-20.0
19760.919161	-39.8	19.8	-20.0
20257.947160	-39.9	19.8	-20.0
17828.205893	-39.9	19.9	-20.0

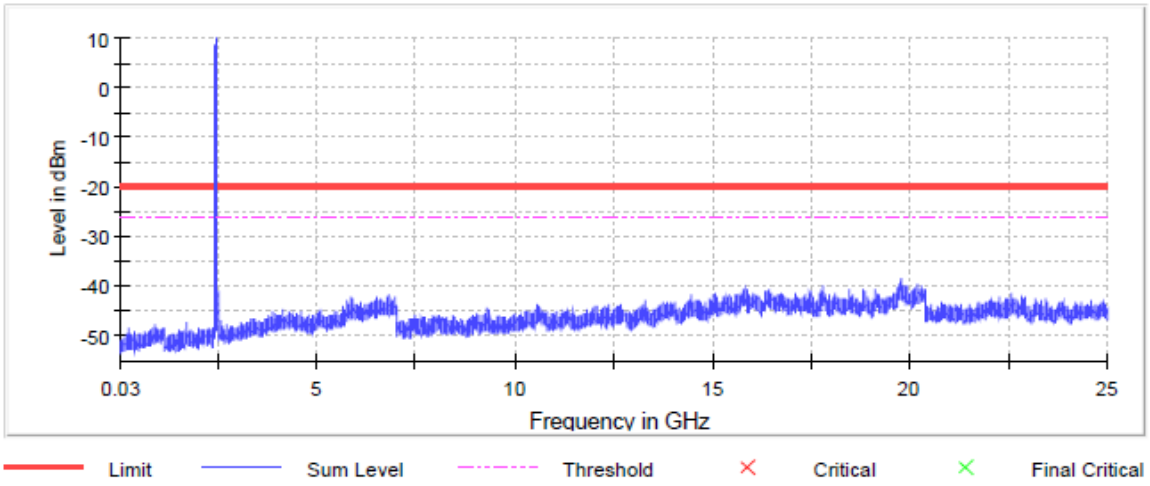


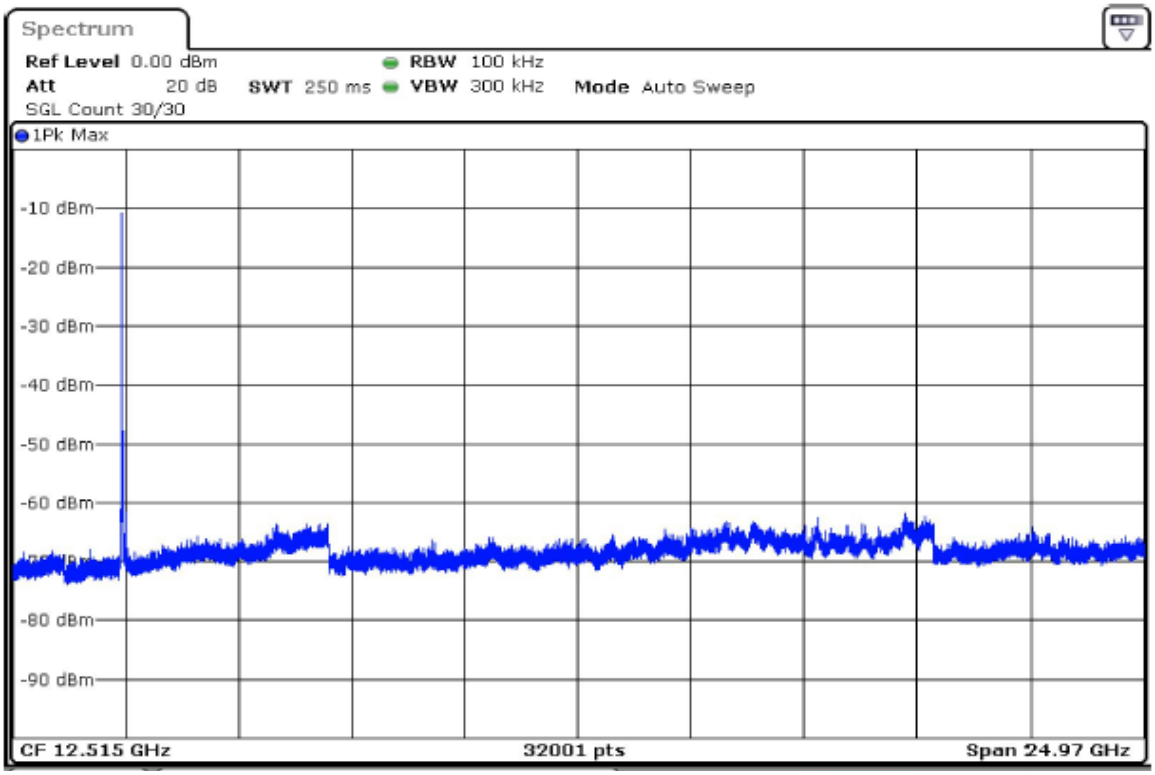


802.11b 5.5 Mbps 2437MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19758.578370	-38.6	18.5	-20.0
19768.721799	-39.2	19.2	-20.0
19720.345447	-39.6	19.5	-20.0
20196.306325	-39.6	19.6	-20.0
19739.852040	-39.7	19.7	-20.0
17821.183520	-39.8	19.7	-20.0
19763.259953	-39.8	19.8	-20.0
19774.183645	-39.8	19.8	-20.0
19875.617930	-39.9	19.9	-20.0
19948.962721	-39.9	19.9	-20.0
19806.954722	-39.9	19.9	-20.0
19789.788919	-40.0	19.9	-20.0
19820.999469	-40.0	20.0	-20.0
20192.405006	-40.0	20.0	-20.0
19751.555997	-40.0	20.0	-20.0

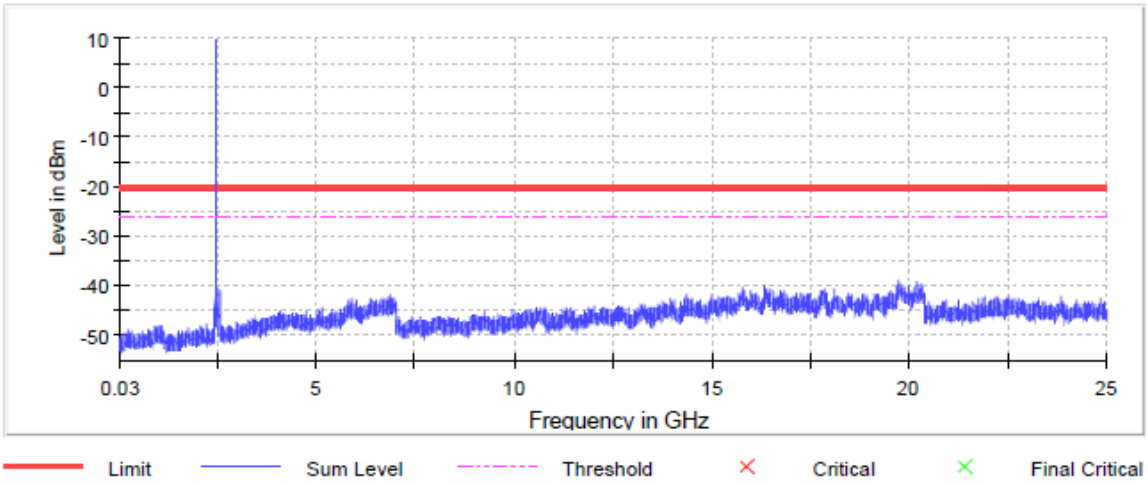

10
0
-10
-20
-30
-40
-50
Level in dBm
0.03
5
10
15
20
25
Frequency in GHz
Limit
Sum Level
Threshold
Critical
Final Critical

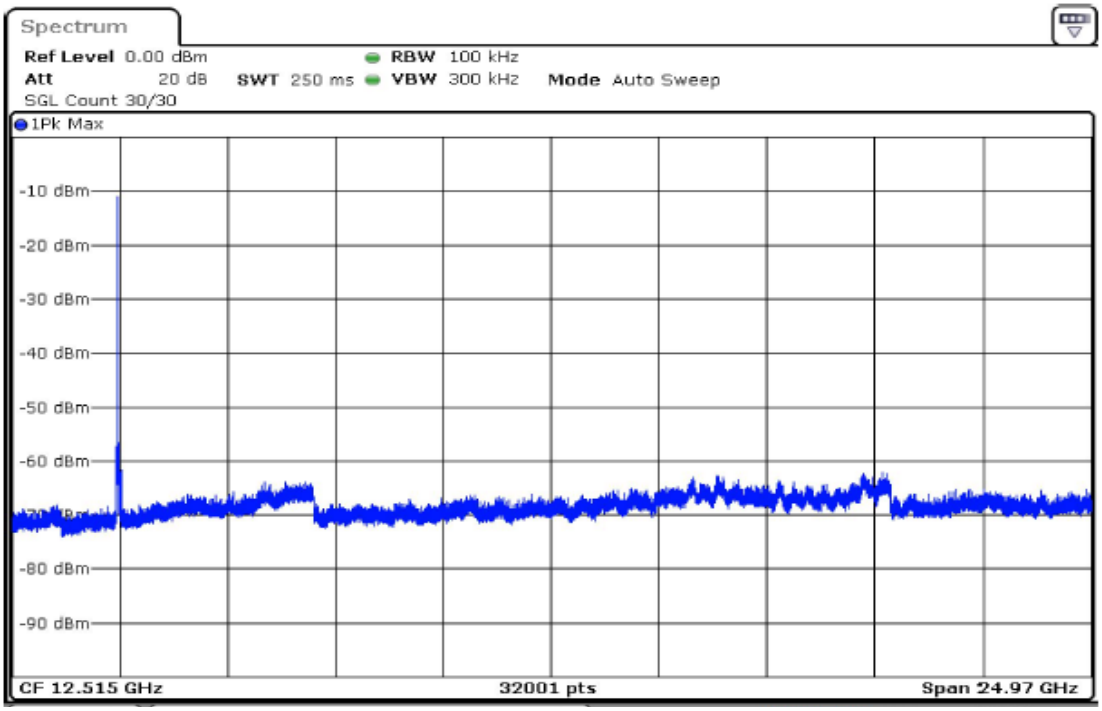

Spectrum
Ref Level 0.00 dBm
RBW 100 kHz
Att 20 dB
SWT 250 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
-90 dBm
CF 12.515 GHz
32001 pts
Span 24.97 GHz

802.11b 5.5Mbps 2462MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19743.753359	-38.8	18.6	-20.2
20196.306325	-39.2	19.0	-20.2
19735.950722	-39.3	19.1	-20.2
20274.332698	-39.3	19.1	-20.2
19778.865227	-39.5	19.3	-20.2
20189.283951	-39.5	19.3	-20.2
19779.645491	-39.5	19.3	-20.2
20199.427380	-39.5	19.3	-20.2
20290.718236	-39.6	19.3	-20.2
20278.234017	-39.6	19.4	-20.2
19787.448128	-39.7	19.4	-20.2
19964.567996	-39.7	19.5	-20.2
19757.017843	-39.8	19.5	-20.2
19723.466502	-39.8	19.6	-20.2
19767.161271	-39.8	19.6	-20.2

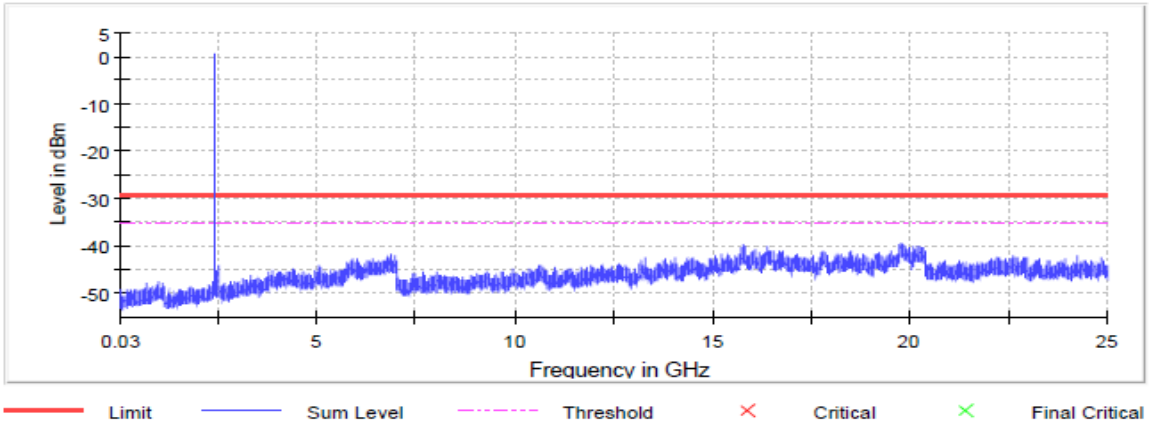


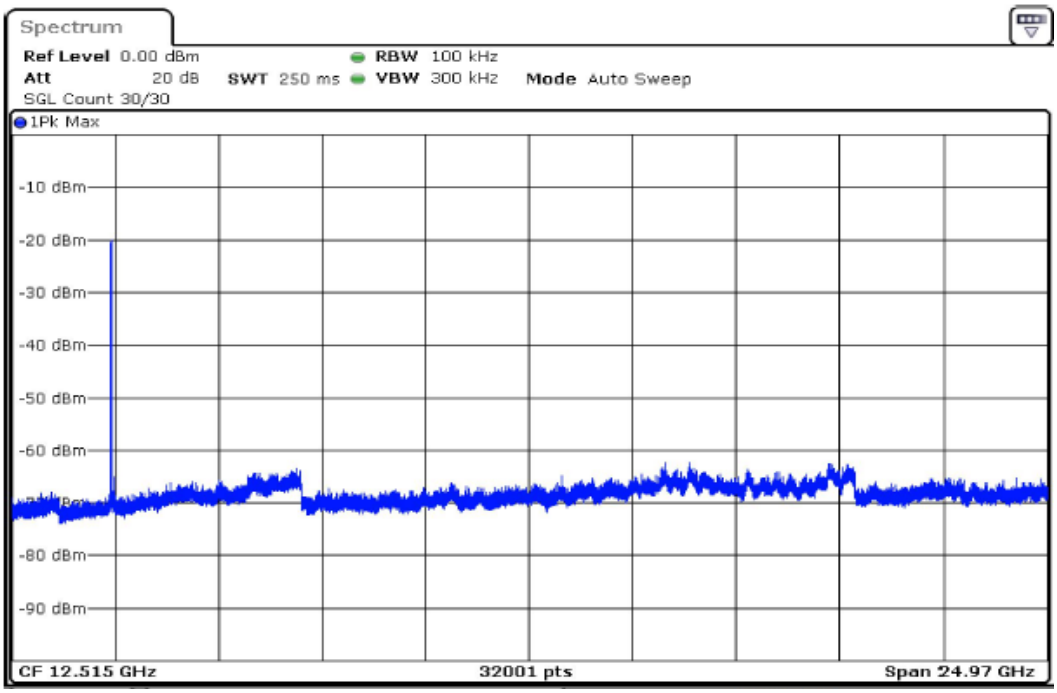


802.11g 54 Mbps 2412MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2398.490563	-37.6	8.2	-29.3
2399.270827	-38.1	8.8	-29.3
2397.710299	-39.0	9.6	-29.3
2396.930036	-39.2	9.9	-29.3
19767.161271	-39.3	9.9	-29.3
19798.371821	-39.4	10.0	-29.3
19785.887601	-39.5	10.1	-29.3
19840.506062	-39.6	10.3	-29.3
15796.399131	-39.7	10.4	-29.3
19784.327073	-39.7	10.4	-29.3
19837.385007	-39.8	10.4	-29.3
19747.654678	-39.8	10.5	-29.3
19760.138898	-39.8	10.5	-29.3
19781.206018	-39.9	10.5	-29.3
16401.103525	-39.9	10.5	-29.3

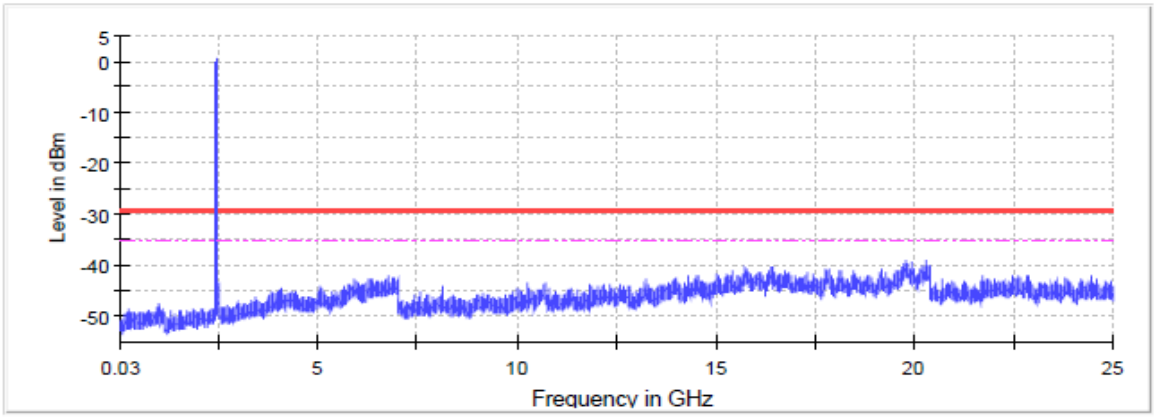


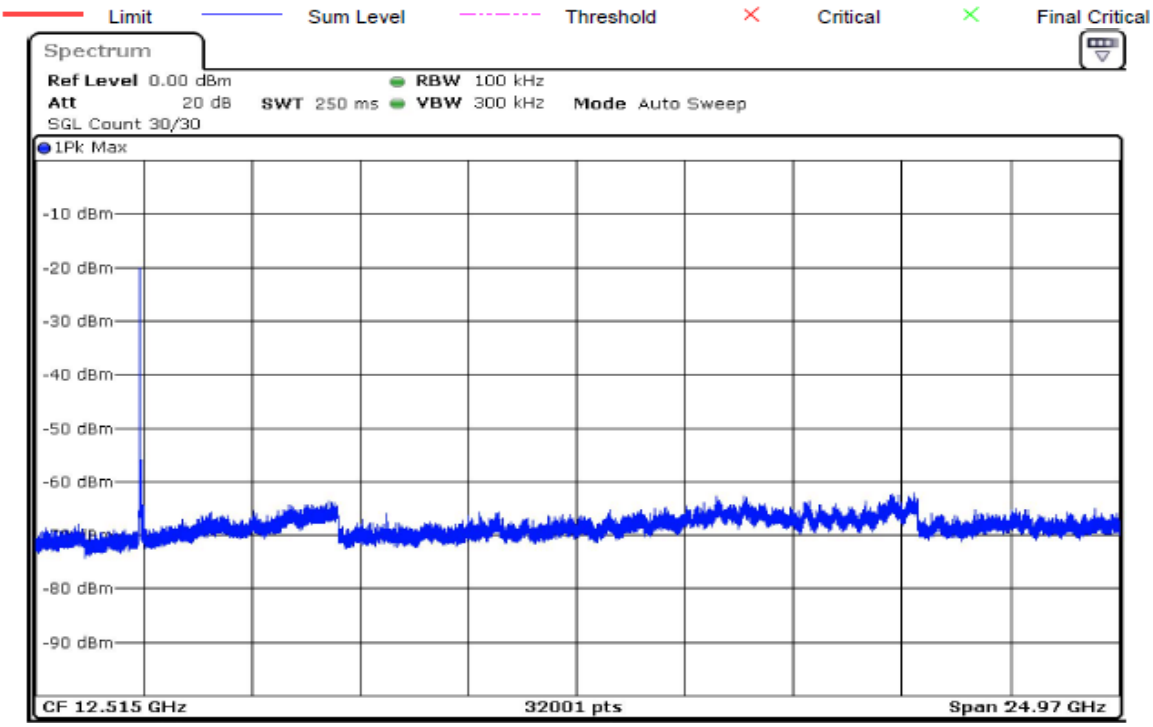


802.11g 54 Mbps 2437MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
20284.476126	-39.0	9.6	-29.3
19760.138898	-39.1	9.8	-29.3
19782.766546	-39.1	9.8	-29.3
19934.137710	-39.2	9.8	-29.3
19761.699425	-39.4	10.1	-29.3
19765.600744	-39.5	10.2	-29.3
19835.044216	-39.7	10.3	-29.3
19754.677051	-39.8	10.4	-29.3
19806.174458	-39.8	10.5	-29.3
19746.094150	-39.9	10.6	-29.3
20319.587995	-39.9	10.6	-29.3
19799.932348	-40.0	10.6	-29.3
20176.019468	-40.0	10.6	-29.3
19743.753359	-40.0	10.7	-29.3
19768.721799	-40.0	10.7	-29.3

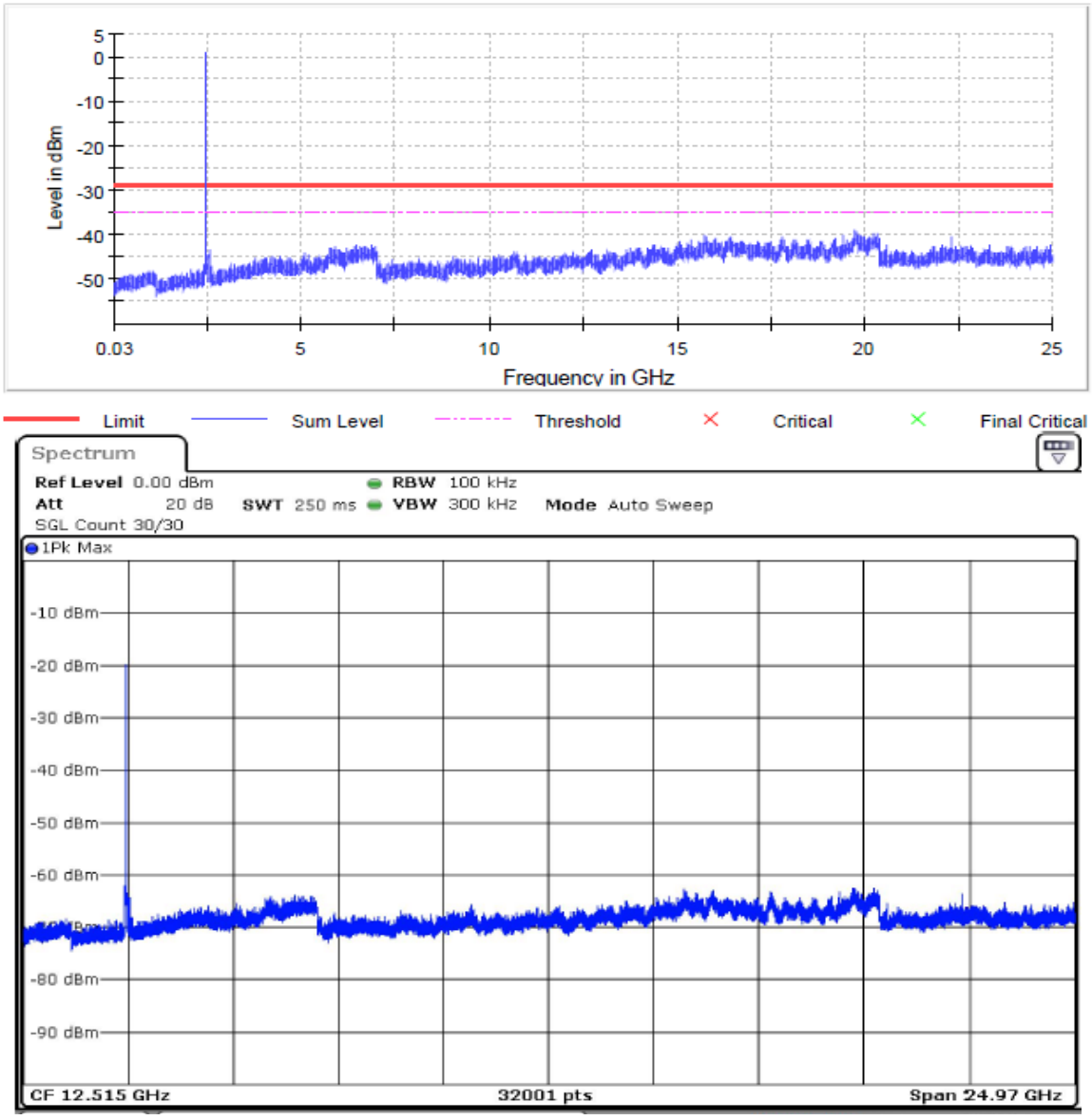




802.11g 54 Mbps 2462MHz

Pre Measurements

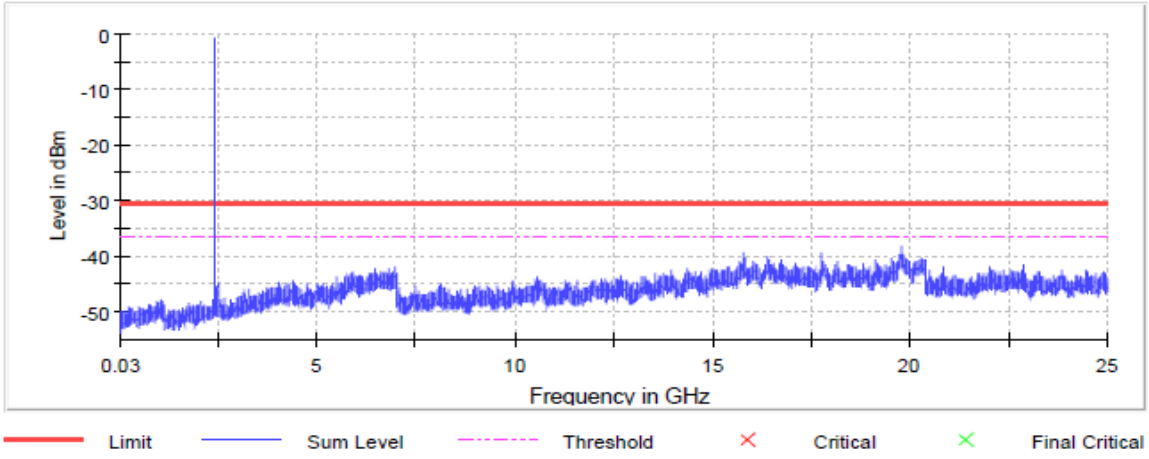
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19749.215205	-39.1	10.1	-29.1
19770.282326	-39.2	10.1	-29.1
19800.712612	-39.5	10.4	-29.1
19757.017843	-39.7	10.6	-29.1
19779.645491	-39.7	10.6	-29.1
19782.766546	-39.7	10.7	-29.1
20358.601181	-39.8	10.7	-29.1
20247.023467	-39.8	10.7	-29.1
19765.600744	-39.8	10.8	-29.1
19767.161271	-39.9	10.8	-29.1
19864.694238	-40.0	10.9	-29.1
19756.237579	-40.0	10.9	-29.1
19794.470502	-40.0	10.9	-29.1
19741.412568	-40.0	10.9	-29.1
19806.954722	-40.0	11.0	-29.1

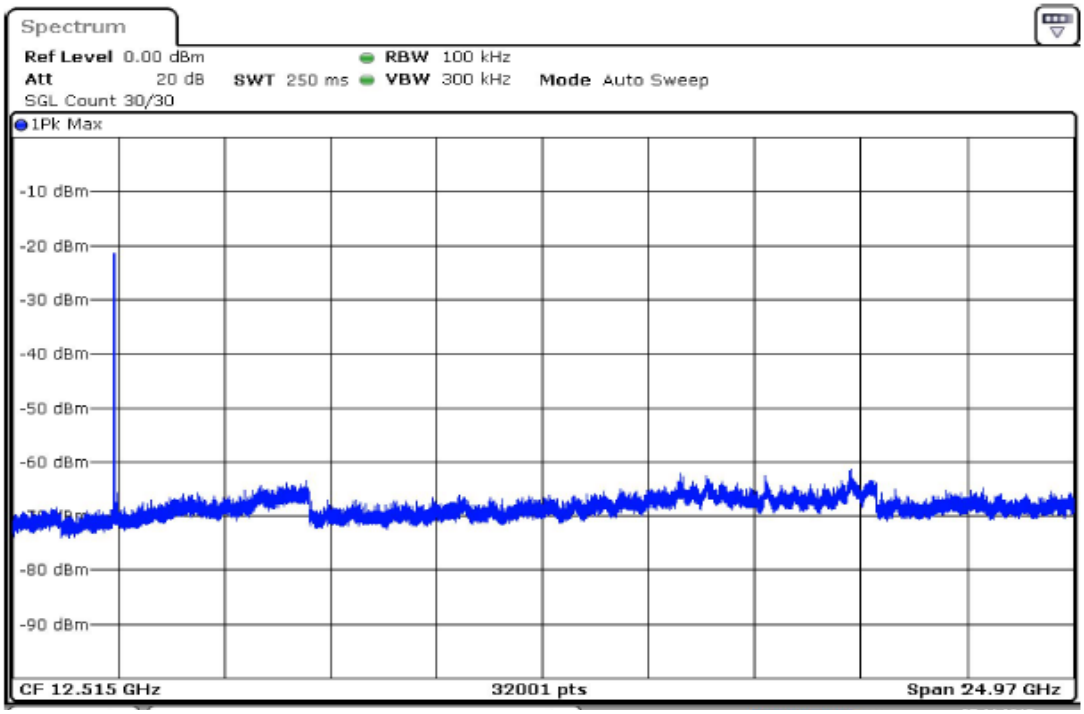

Level in dBm
5
0
-10
-20
-30
-40
-50
0.03
5
10
15
20
25
Frequency in GHz
Limit
Sum Level
Threshold
Critical
Final Critical
Spectrum
Ref Level 0.00 dBm
RBW 100 kHz
Att 20 dB
SWT 250 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
-90 dBm
CF 12.515 GHz
32001 pts
Span 24.97 GHz

802.11n(HT20) MCS6 2412MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19768.721799	-38.1	7.5	-30.6
19764.820480	-38.3	7.8	-30.6
19769.502062	-38.9	8.3	-30.6
19784.327073	-38.9	8.4	-30.6
15761.287263	-39.3	8.7	-30.6
17772.026905	-39.4	8.9	-30.6
19793.690238	-39.5	8.9	-30.6
19746.094150	-39.6	9.1	-30.6
19824.120524	-39.7	9.2	-30.6
19779.645491	-39.7	9.2	-30.6
19798.371821	-39.8	9.2	-30.6
19758.578370	-39.8	9.3	-30.6
19739.071777	-39.9	9.3	-30.6
19810.075777	-39.9	9.4	-30.6
16370.673239	-39.9	9.4	-30.6

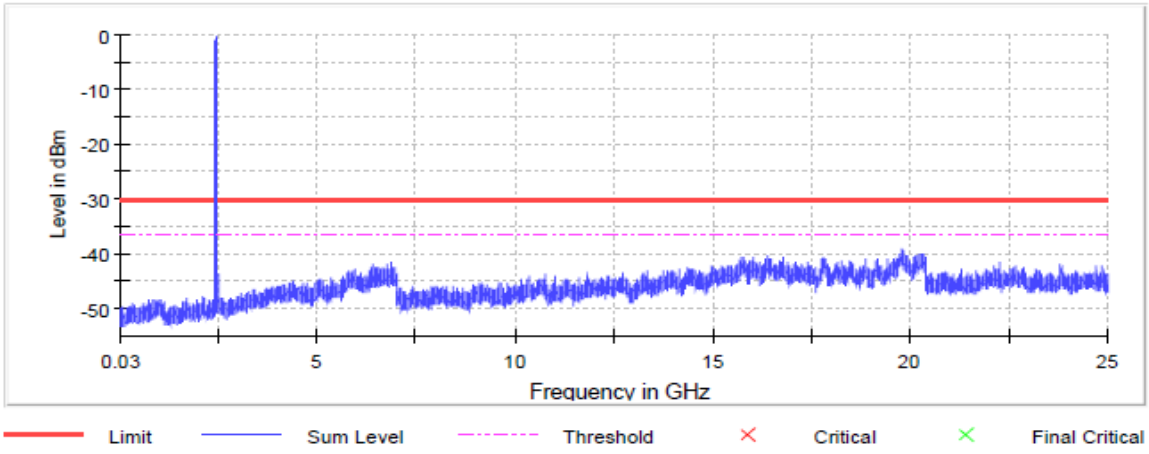


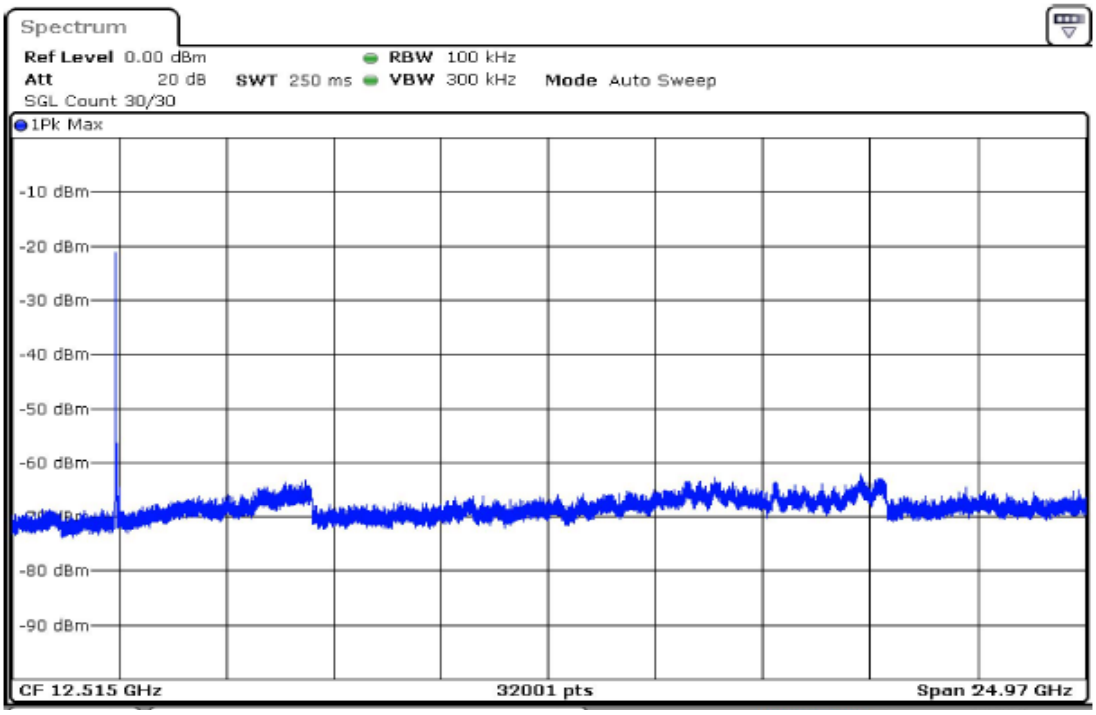


802.11n(HT20) MCS6 2437MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19782.766546	-39.0	8.6	-30.4
19808.515249	-39.4	9.0	-30.4
19789.788919	-39.5	9.1	-30.4
19806.174458	-39.6	9.1	-30.4
19842.846853	-39.8	9.4	-30.4
19810.075777	-39.8	9.4	-30.4
19847.528436	-39.8	9.4	-30.4
19769.502062	-39.9	9.5	-30.4
19753.896788	-39.9	9.5	-30.4
19781.206018	-40.0	9.5	-30.4
20300.861665	-40.0	9.5	-30.4
19749.215205	-40.0	9.6	-30.4
19739.071777	-40.1	9.7	-30.4
20316.466940	-40.1	9.7	-30.4
19770.282326	-40.1	9.7	-30.4

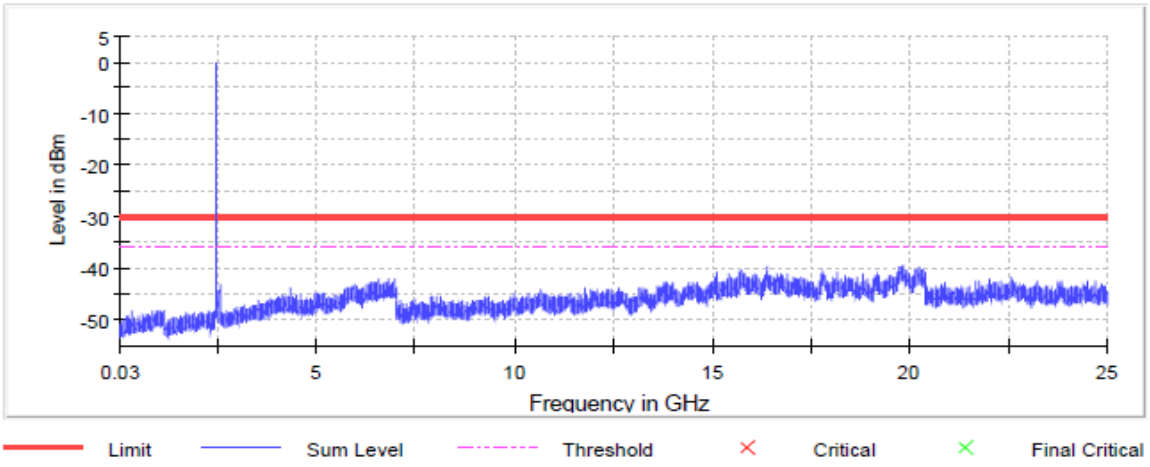

0
-10
-20
-30
-40
-50
Level in dBm
0.03
5
10
15
20
25
Frequency in GHz
Limit
Sum Level
Threshold
Critical
Final Critical

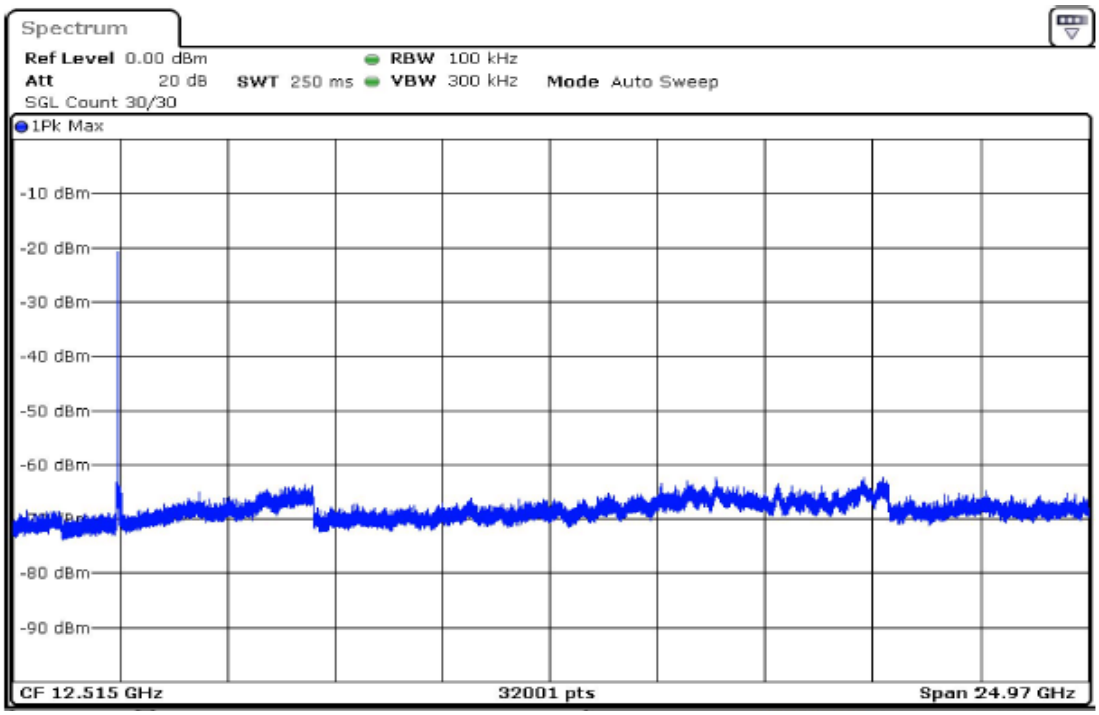

Spectrum
Ref Level 0.00 dBm
RBW 100 kHz
Att 20 dB
SWT 250 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
-90 dBm
CF 12.515 GHz
32001 pts
Span 24.97 GHz

802.11n(HT20) MCS6 2462MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19824.900787	-39.2	9.3	-30.0
20247.023467	-39.5	9.6	-30.0
19746.094150	-39.5	9.6	-30.0
19763.259953	-39.6	9.6	-30.0
19737.511249	-39.7	9.7	-30.0
19821.779733	-39.8	9.8	-30.0
19751.555997	-39.8	9.8	-30.0
16371.453503	-39.8	9.8	-30.0
19778.865227	-39.8	9.8	-30.0
19776.524436	-39.9	9.9	-30.0
20340.655115	-39.9	10.0	-30.0
19774.183645	-39.9	10.0	-30.0
19743.753359	-40.0	10.0	-30.0
19813.196831	-40.0	10.0	-30.0
19759.358634	-40.0	10.1	-30.0




Spectrum
Ref Level 0.00 dBm
RBW 100 kHz
Att 20 dB
SWT 250 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
-90 dBm
CF 12.515 GHz
32001 pts
Span 24.97 GHz