Venstar, Inc.

REVISED TEST REPORT FOR 104502-9

Data Concentrator with Wifi, Subgig, BLE, Model: DC500
Power Supply, Model: MKA-482400500

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(DTS 2400-2483.5 MHz)

Report No.: 104502-9A

Date of issue: March 21, 2022

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.01

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:	REPORT PREPARED BY:
Venstar, Inc. 9250 Owensmouth Avenue Chatsworth, CA 91311	Lisa Bevington CKC Laboratories, Inc. 5046 Sierra Pines Drive Mariposa, CA 95338
Representative: Alex Garashin	Project Number: 104502
DATE OF EQUIPMENT RECEIPT:	January 5, 2021
DATE(S) OF TESTING:	January 5, 6, 12 and 13, 2021

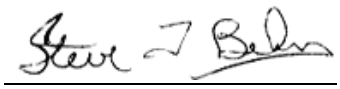
Revision History

Original: Testing of Data Concentrator with Wifi, Subgig, BLE, DC500, Power Supply, MKA-482400500 to FCC Part 15 Subpart C Section(s), 15.207 & 15.247, (DTS 2400-2483.5 MHz).

Revision A: Update Firmware / Software used for Test in the General Product Information section.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	A-0136

*CKC's list of NIST designated countries can be found at: https://standards.gov/cabs/designations.html

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	Mod 1	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
Mod 1: Copper tape was added to LCD display cable to suppress radiated emission below 1GHz.
See appendix A for Modification Photo.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
Data Concentrator with WiFi, Subgig, and BLE	Venstar, Inc.	DC500	07
Power Supply	NA	MKA-482400500	NA

Support Equipment:

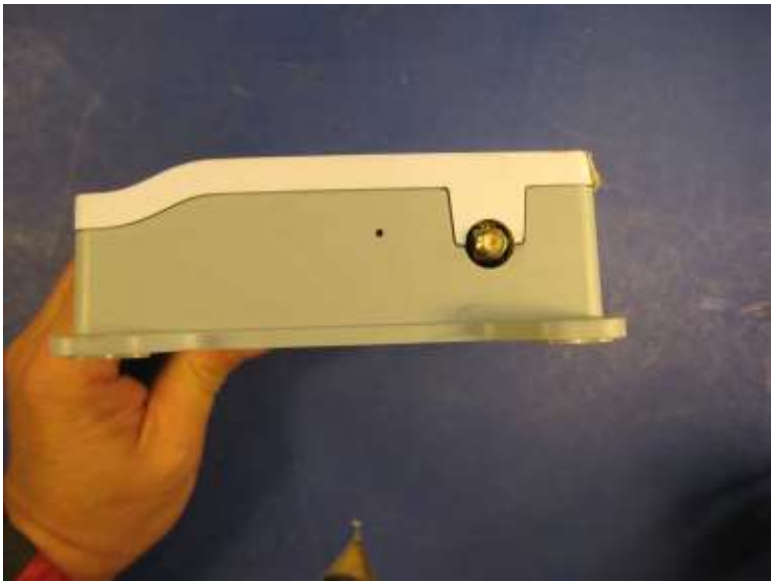
Device	Manufacturer	Model #	S/N
None			

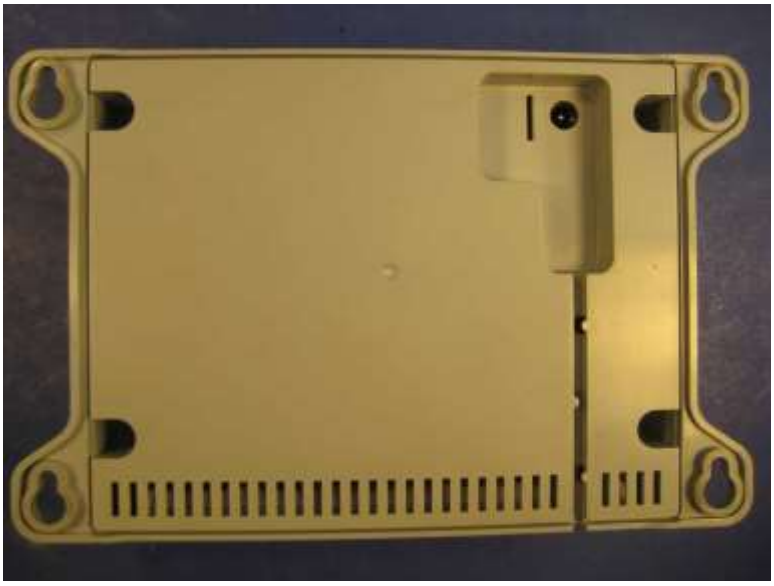
General Product Information:

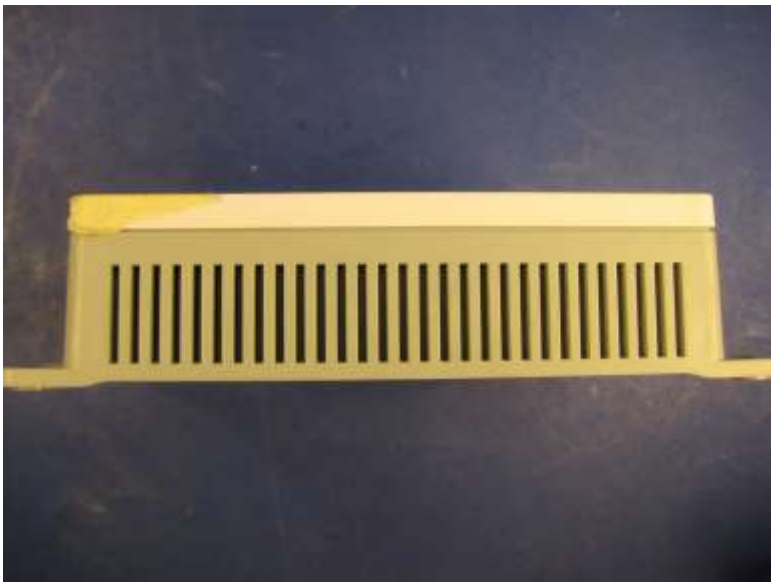
Product Information	Stand-Alone Equipment
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11b/g/n20
Operating Frequency Range:	2412-2462MHz
Modulation Type(s):	802.11b: DBPSK, 1.0 Mbps 802.11g: BPSK, 6.0 Mbps 802.11n20: BPSK 6.5 Mbps
Maximum Duty Cycle:	94%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Chip Antenna , 2 dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	110Vac (output: 24Vac)
Firmware / Software used for Test:	Test mode Firmware 1.0.4

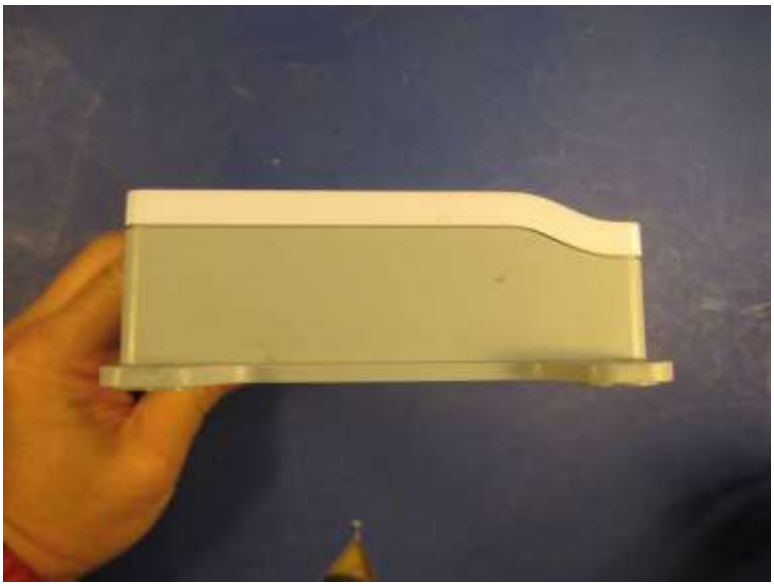
EUT and Accessory Photo(s)

Power Supply

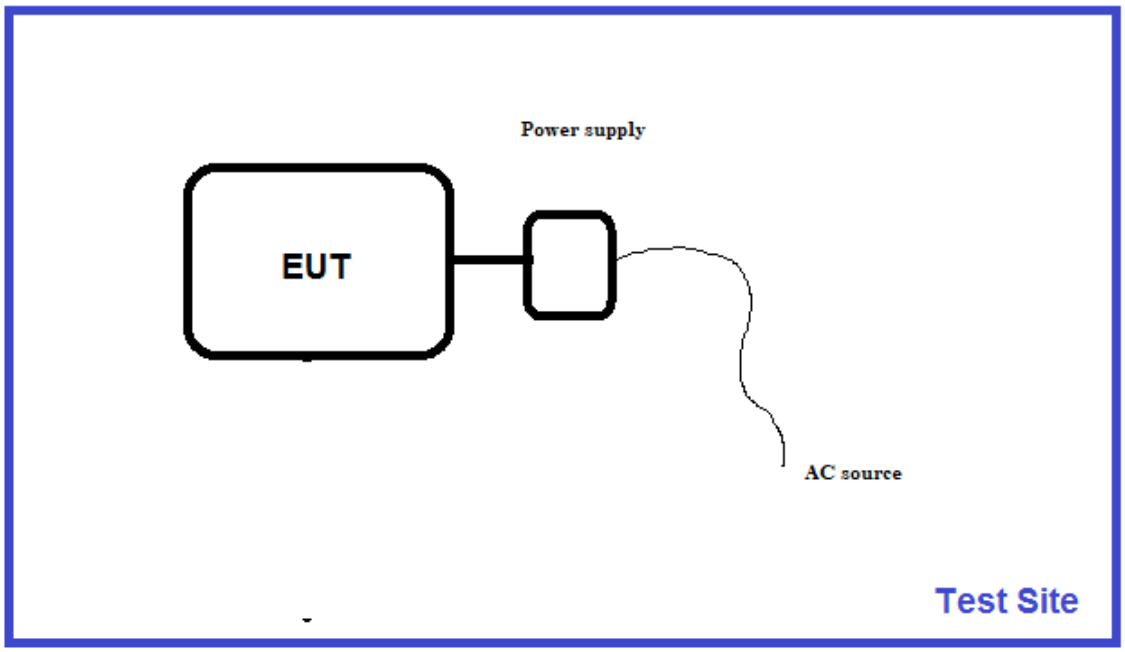








Test Setup Block Diagram



FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

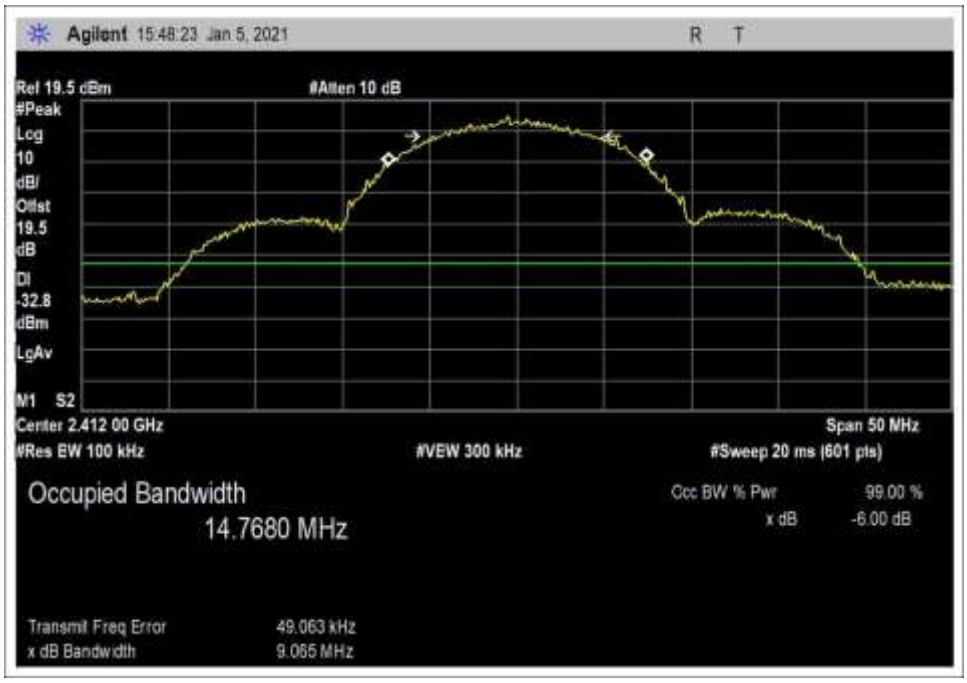
Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	1/5/2021
Configuration:	2		
Test Setup:	The EUT is placed on test bench, conducted measurement made at RF2 connector. Firmware power setting: 802.11b: 20 dBm 802.11g: 17dBm 802.11n20: 17dBm		

Environmental Conditions			
Temperature (ºC)	19.2	Relative Humidity (%):	52

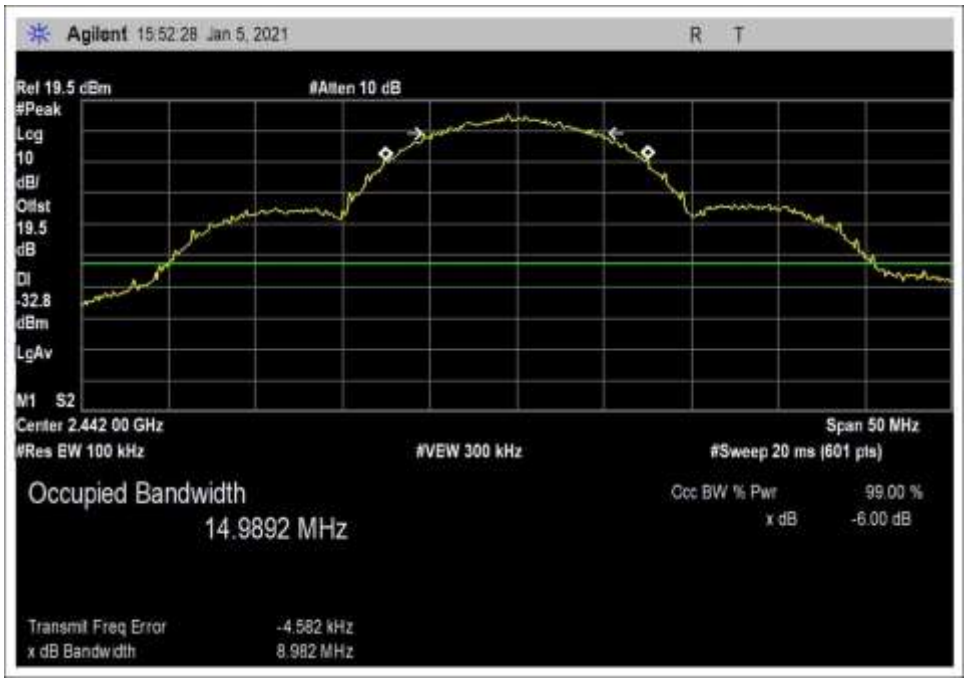
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02869	Spectrum Analyzer	Agilent	E4440A	8/3/2020	8/3/2021
03431	Attenuator	Aeroflex/Weinschel	89-20-21	12/20/2019	12/20/2021
07246	Cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2412	1	802.11b	9065	≥500	Pass
2442	1	802.11b	8982	≥500	Pass
2462	1	802.11b	9844	≥500	Pass
2412	1	802.11g	15473	≥500	Pass
2442	1	802.11g	15729	≥500	Pass
2462	1	802.11g	15477	≥500	Pass
2412	1	802.11n20	16682	≥500	Pass
2442	1	802.11n20	16095	≥500	Pass
2462	1	802.11n20	15247	≥500	Pass

Plot(s)

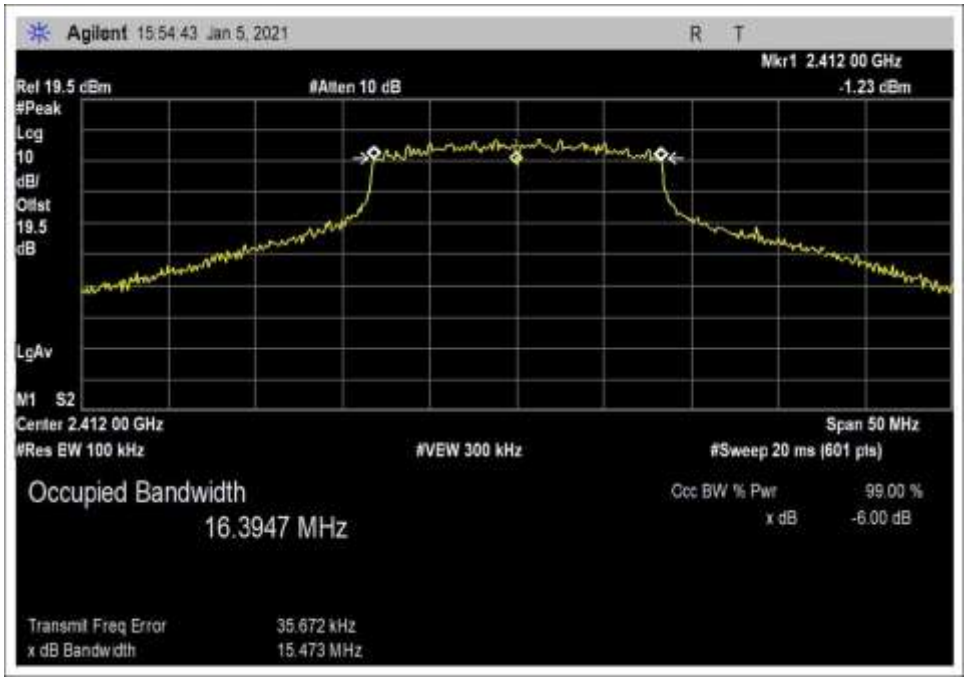


-6dB_BW_802.11b_Low Channel, 20dBm

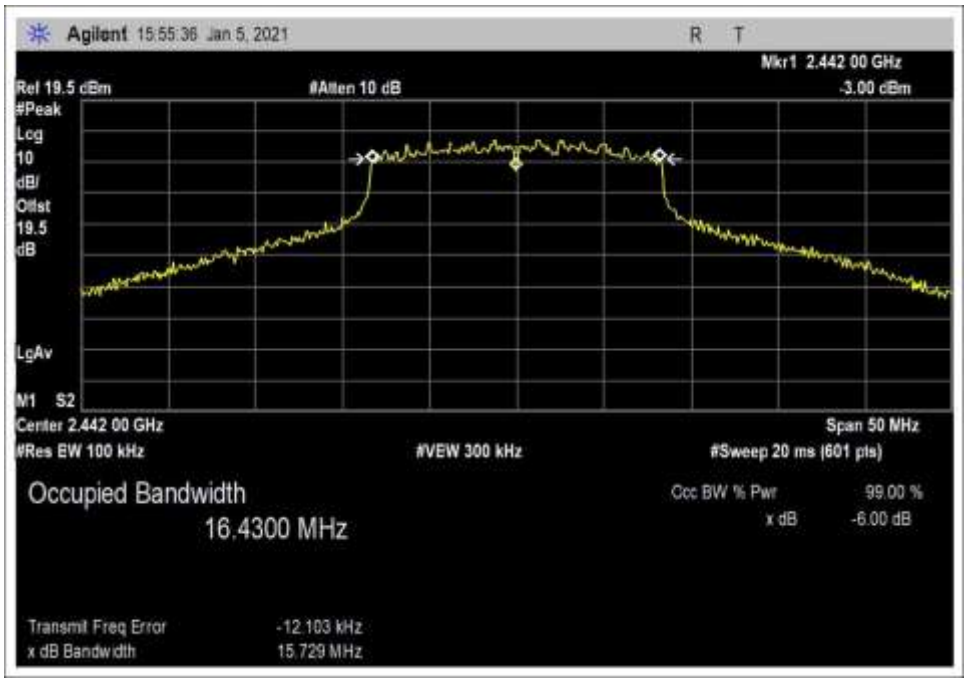


-6dB_BW_802.11b_Middle Channel_20dBm

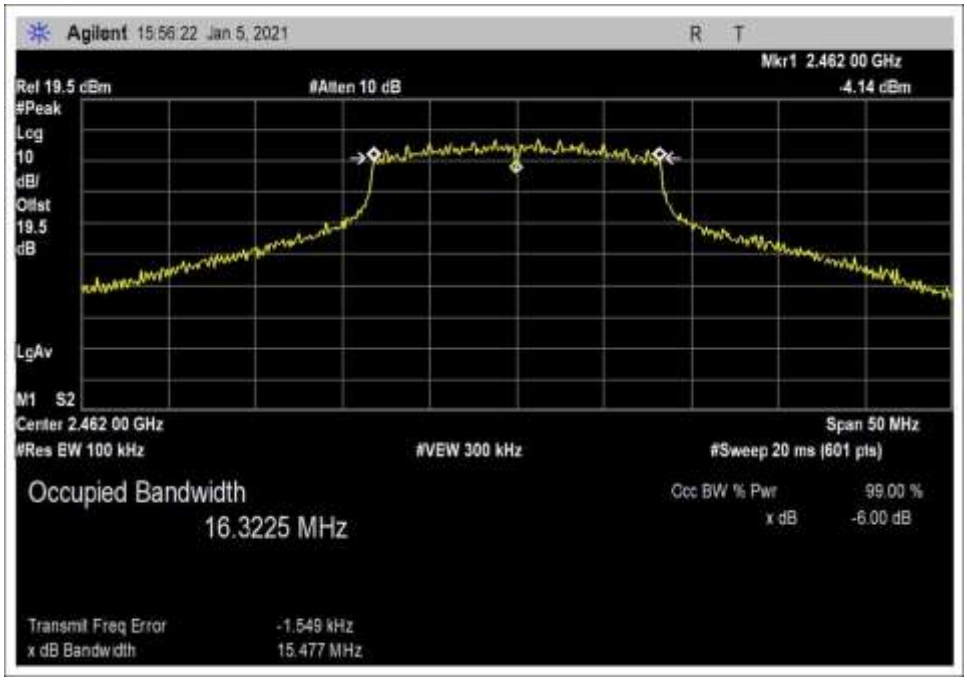
-6dB_BW_802.11b_High Channel_20dBm



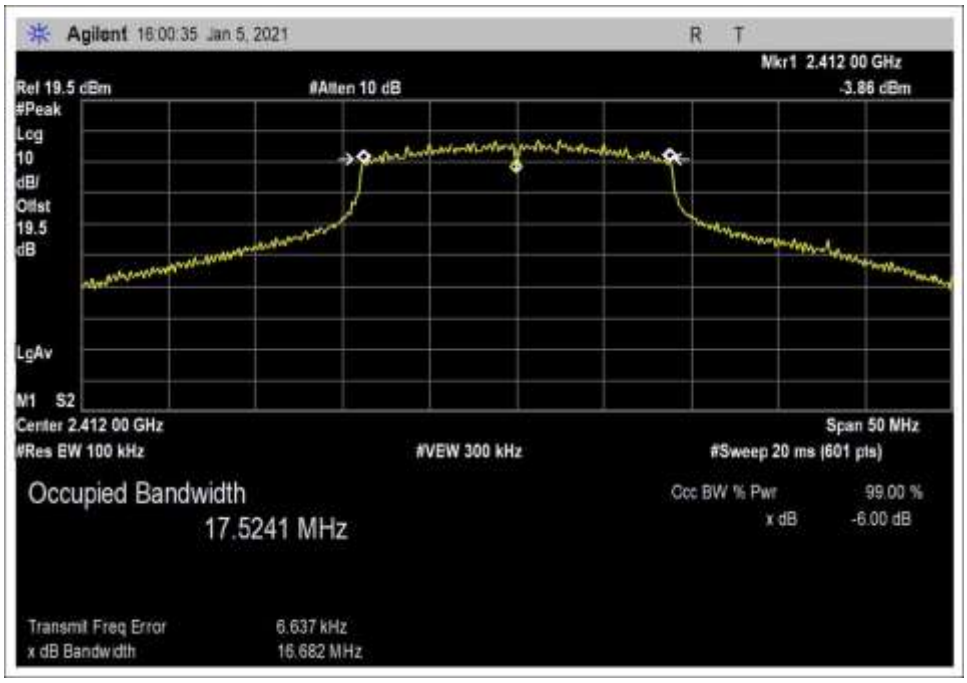
-6dB_BW_802.11g_Low Channel_17dBm



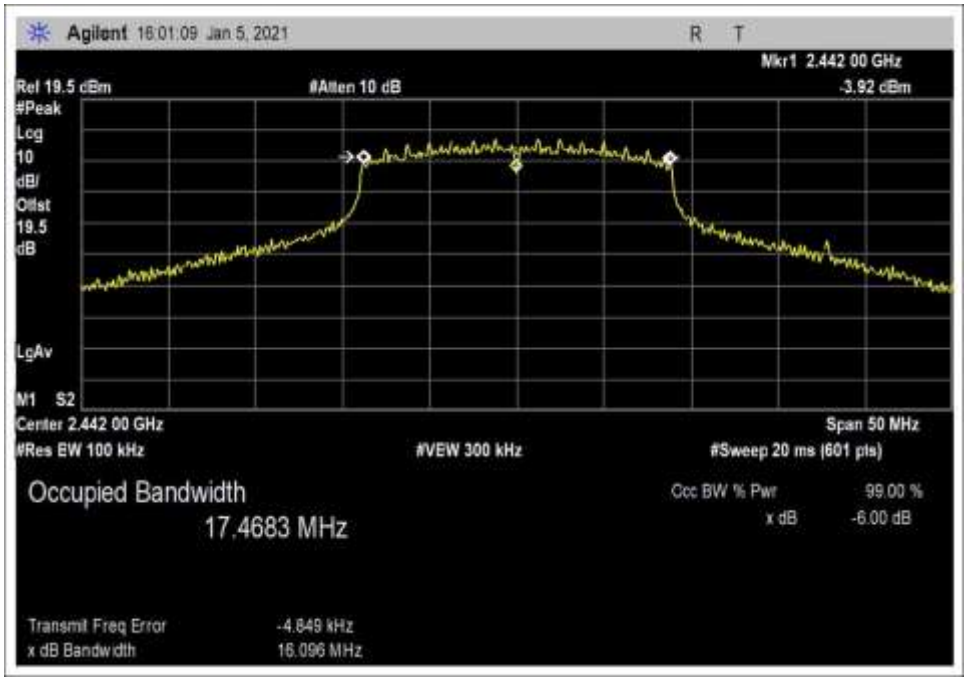
-6dB_BW_802.11g_Middle Channel_17dBm



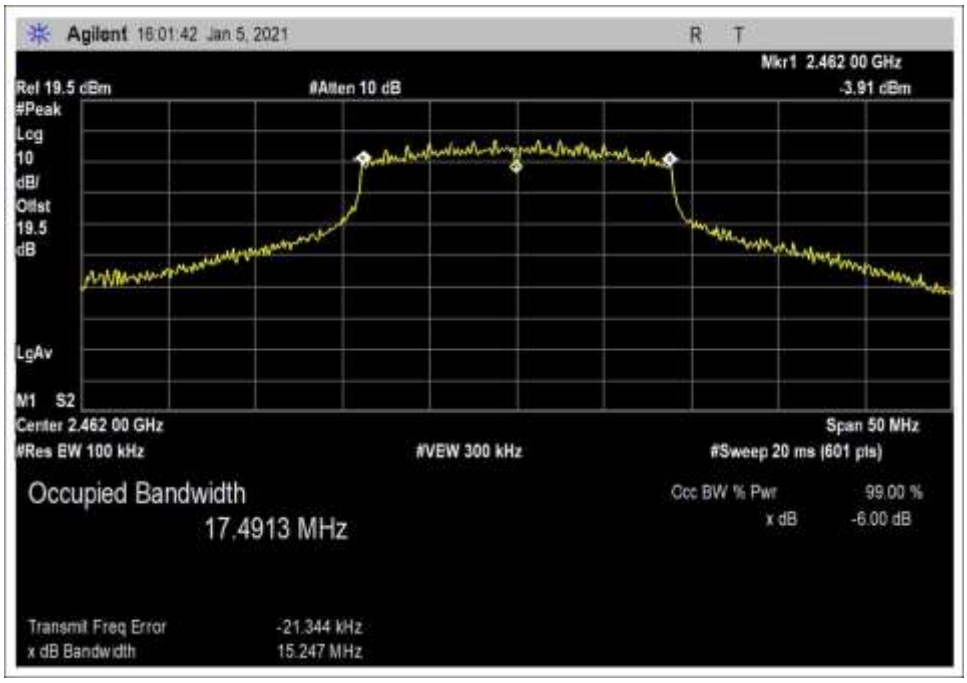
-6dB_BW_802.11g_High Channel_17dBm



-6dB_BW_802.11n_Low Channel_17dBm

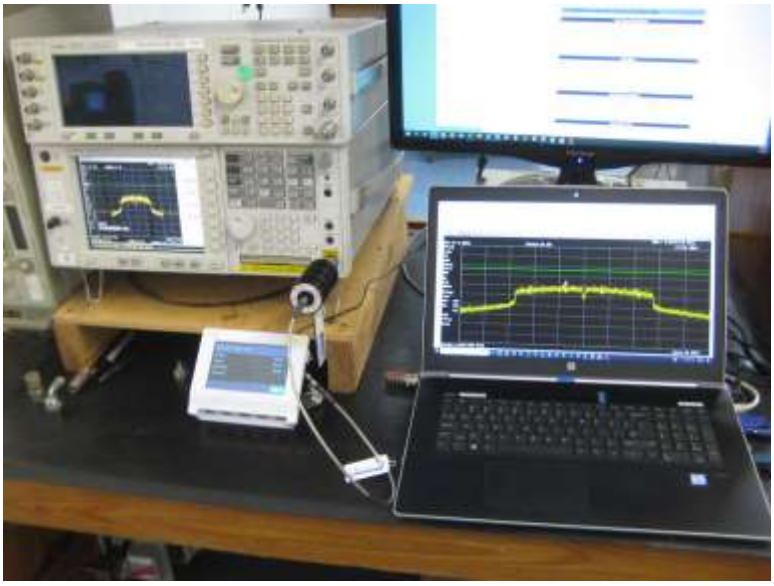


-6dB_BW_802.11n_Middle Channel_17dBm



-6dB_BW_802.11n_High Channel_17dBm

Test Setup Photo(s)



15.247(b)(3) Output Power

Test Setup / Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong/Don Nguyen
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	1/13/2021
Configuration:	2		
Test Setup:	The EUT is placed on test bench, conducted measurement made at RF2 connector. Firmware power setting: 802.11b: 19dBm 802.11g: 17dBm 802.11n20 :17dBm		

Environmental Conditions			
Temperature (ºC)	19.2	Relative Humidity (%):	52

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02869	Spectrum Analyzer	Agilent	E4440A	8/3/2020	8/3/2021
03431	Attenuator	Aeroflex/Weinschel	89-20-21	12/20/2019	12/20/2021
07246	cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022
07164	multimeter	Fluke	8845A/G	7/30/2019	7/30/2021

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation / Ant Port**	**$V_{Minimum}$ (dBm)**	**$V_{Nominal}$ (dBm)**	**$V_{Maximum}$ (dBm)**	**Max Deviation from $V_{Nominal}$ (dB)**
2412	802.11b	20.64	20.64	20.64	0
2442	802.11b	20.68	20.68	20.68	0
2462	802.11b	20.44	20.44	20.44	0
2412	802.11g	16.3	16.3	16.3	0
2442	802.11g	16.3	16.3	16.3	0
2462	802.11g	16.3	16.3	16.3	0
2412	802.11n20	16.0	16.0	16.0	0
2442	802.11n20	16.2	16.2	16.2	0
2462	802.11n20	16.2	16.2	16.2	0

Test performed using operational mode with the highest output power, representing worst case.

Parameter Definitions:

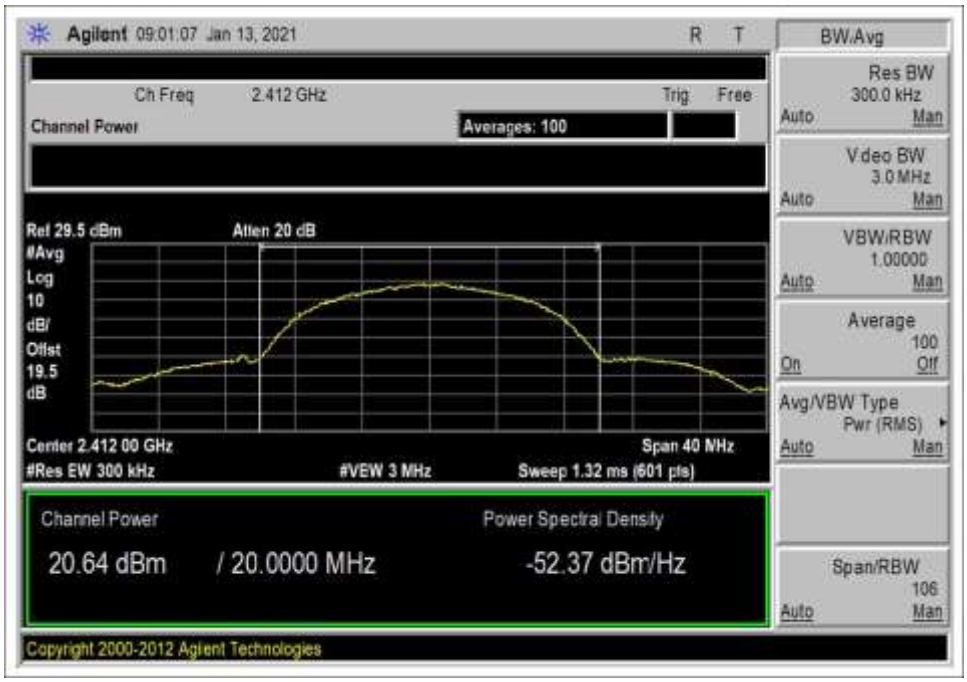
Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	110
$V_{Minimum}$:	93.5
$V_{Maximum}$:	126.5

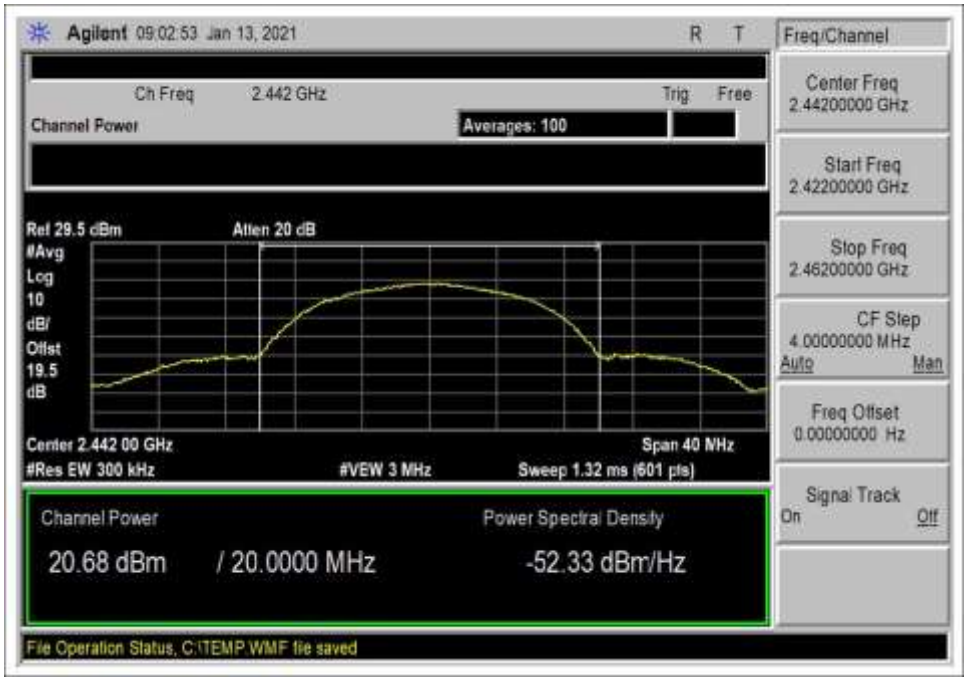
Test performed at AC main of the transformer to be sold with the product.

Test Data Summary - RF Conducted Measurement					
Measurement Option: AVGSA-1					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2412	802.11b	Chip Antenna +2dBi	20.64	≤ 30	Pass
2442	802.11b	Chip Antenna +2dBi	20.68	≤ 30	Pass
2462	802.11b	Chip Antenna +2dBi	20.44	≤ 30	Pass
2412	802.11g	Chip Antenna +2dBi	16.3	≤ 30	Pass
2442	802.11g	Chip Antenna +2dBi	16.3	≤ 30	Pass
2462	802.11g	Chip Antenna +2dBi	16.3	≤ 30	Pass
2412	802.11n20	Chip Antenna +2dBi	16.0	≤ 30	Pass
2442	802.11n20	Chip Antenna +2dBi	16.2	≤ 30	Pass
2462	802.11n20	Chip Antenna +2dBi	16.2	≤ 30	Pass

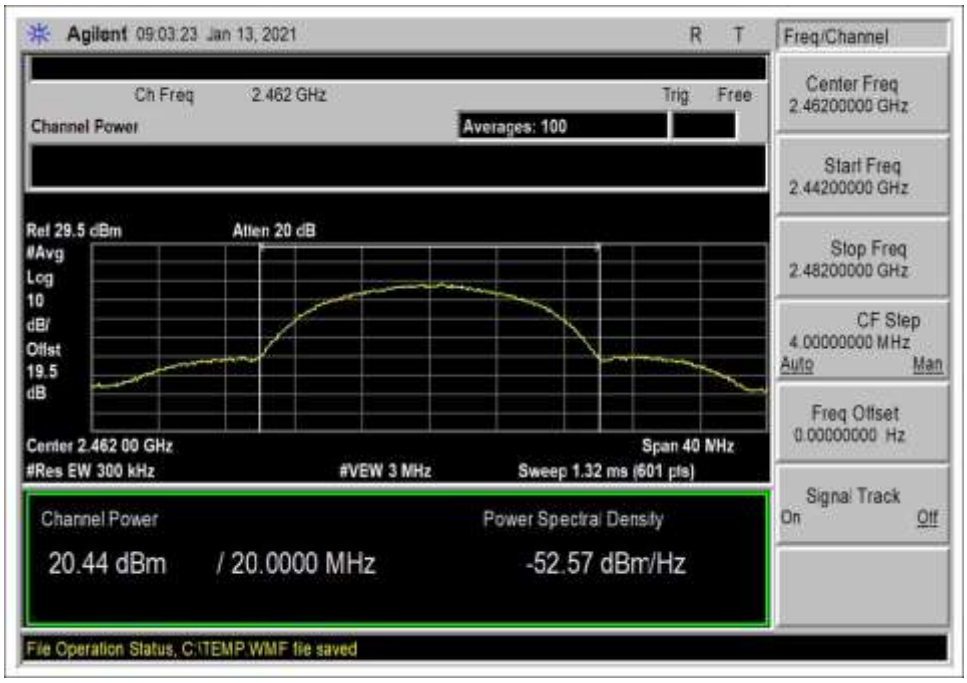
Plots



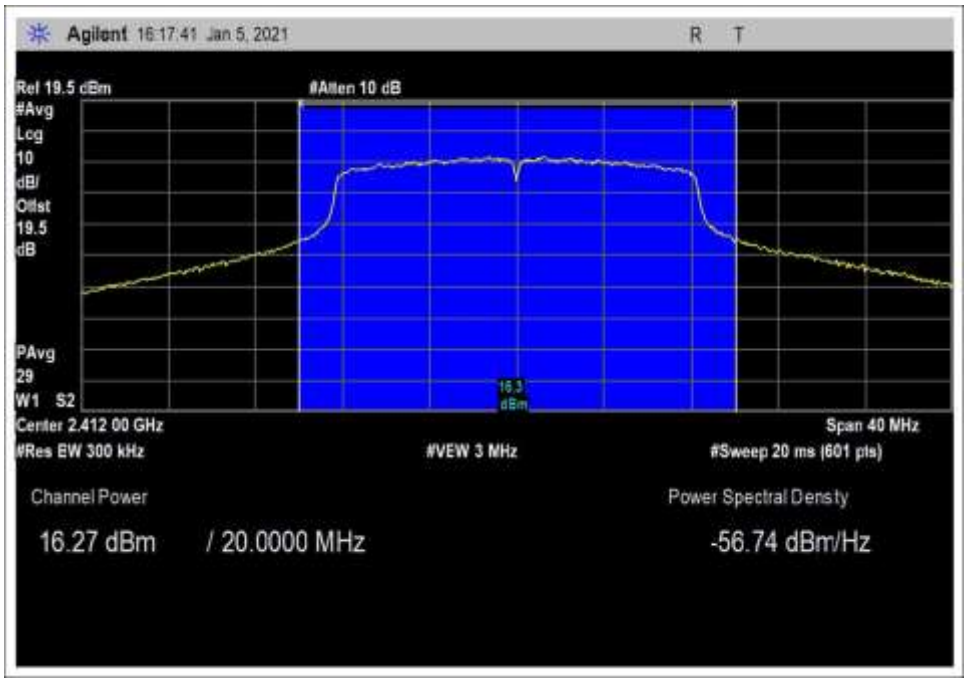
power_802.11b_Low Channel_19dBm



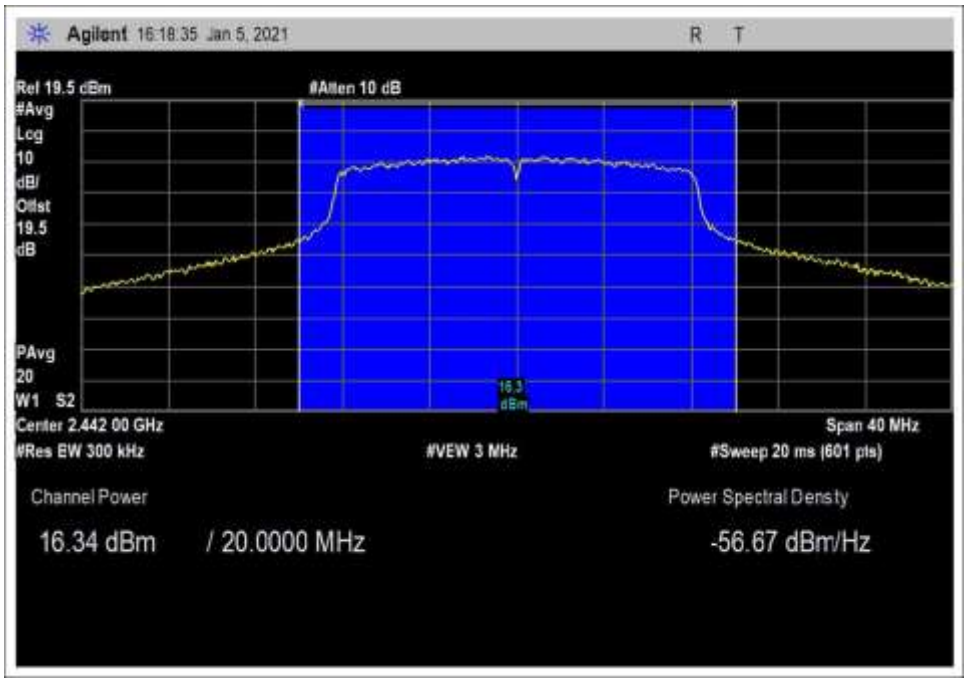
power_802.11b_Middle Channel_19dBm



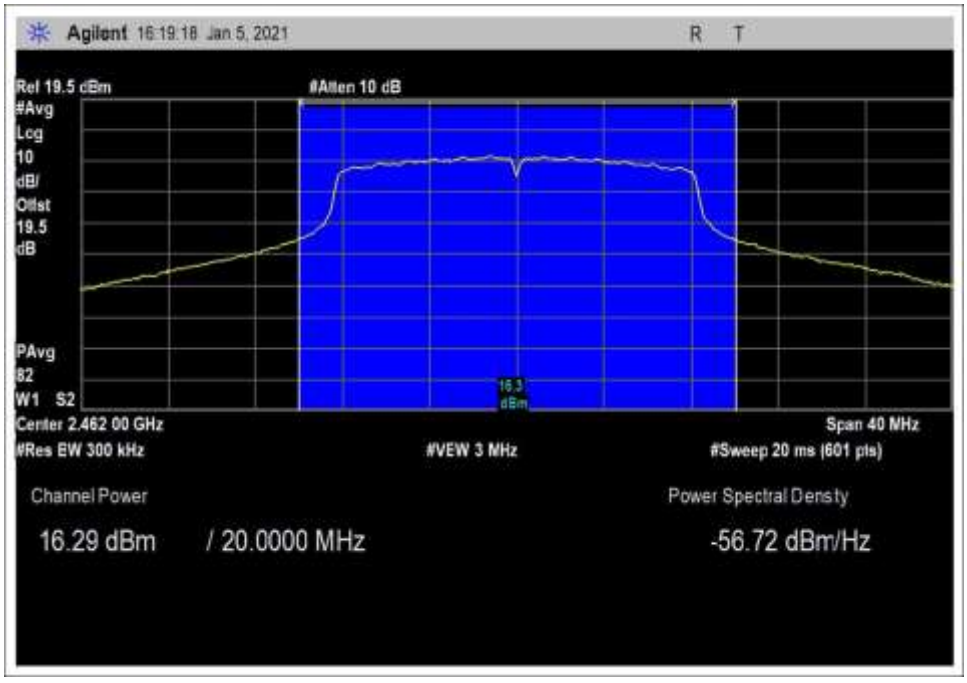
power_802.11b_High Channel_19dBm



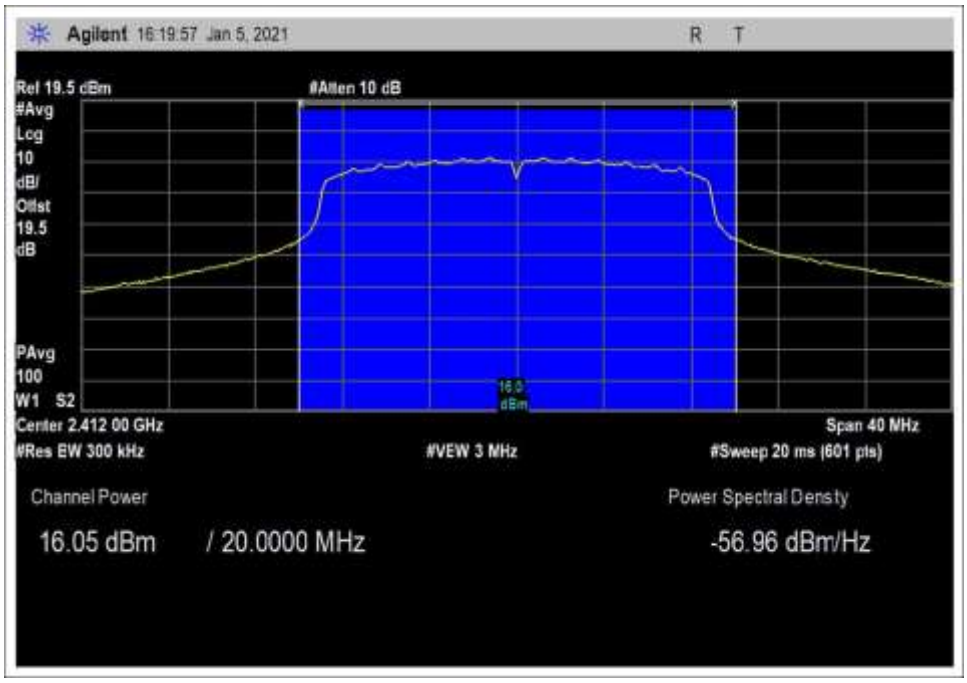
power_802.11g_Low Channel_17dBm



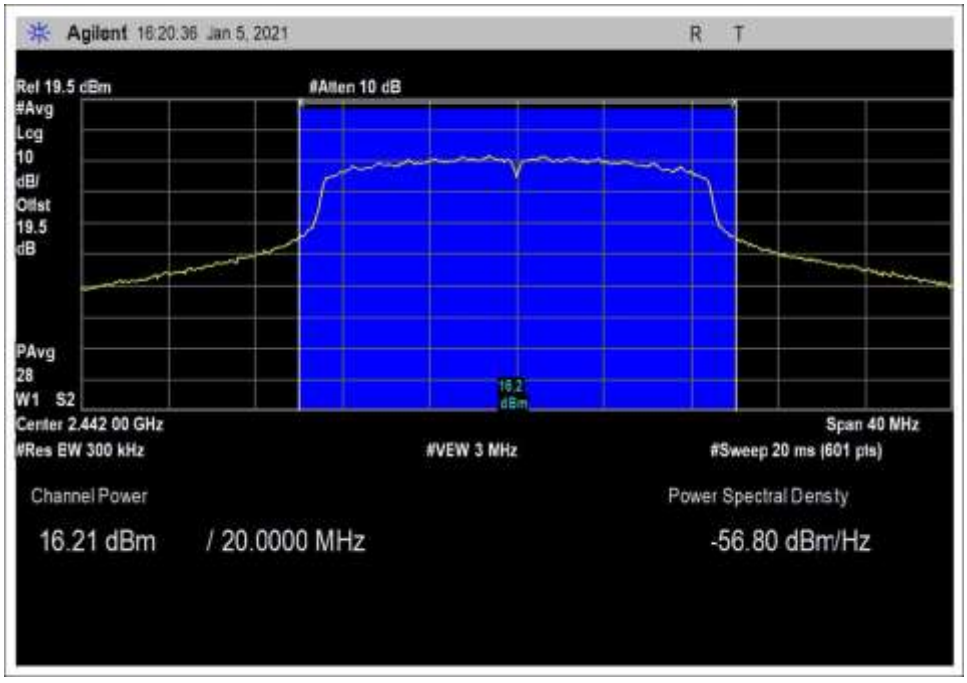
power_802.11g_Middle Channel_17dBm



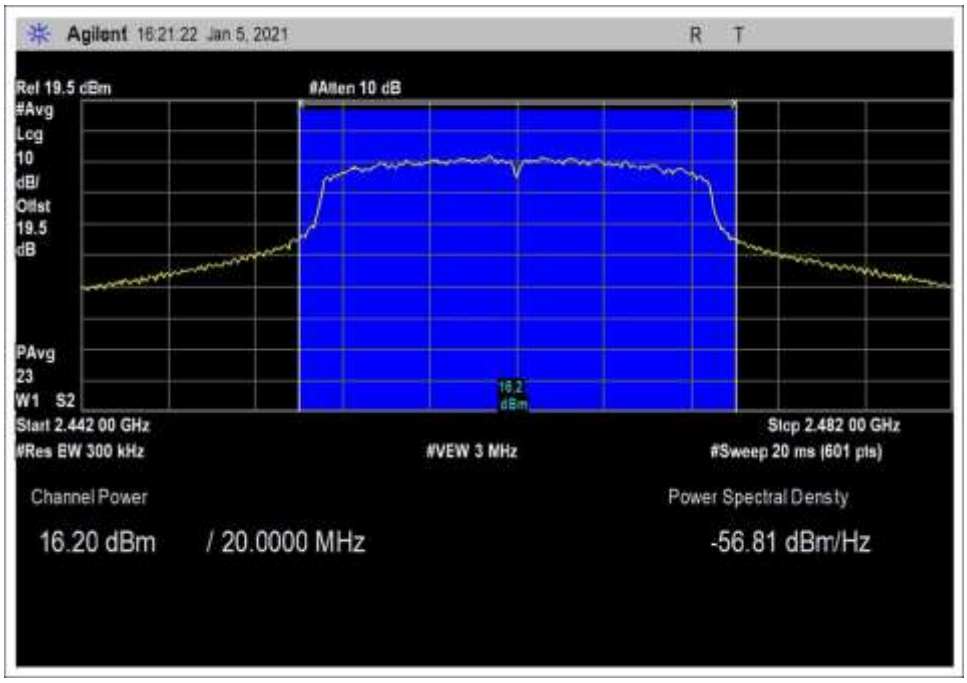
power_802.11g_High Channel_17dBm



power_802.11n_Low Channel_17dBm

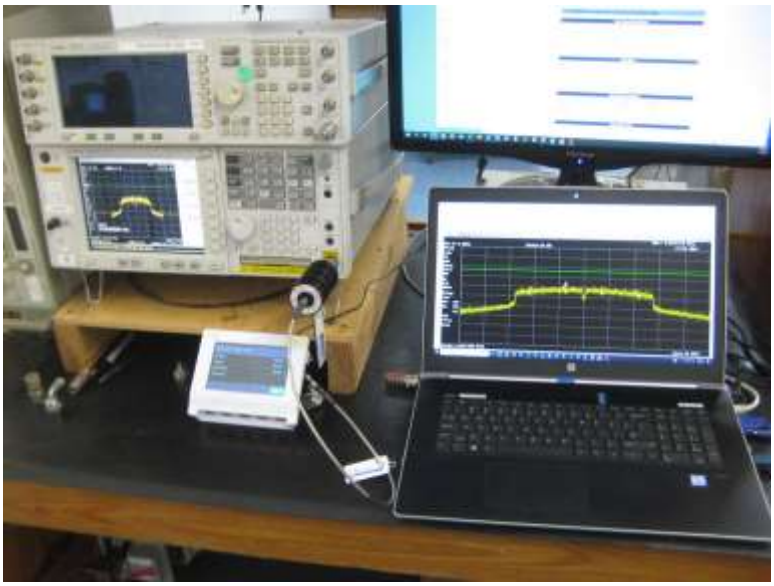


power_802.11n_Middle Channel_17dBm



power_802.11n_High Channel_17dBm

Test Setup / Conditions / Data



15.247(e) Power Spectral Density

Test Setup / Conditions / Data			
Test Location:	Brea Lab A	Test Engineer:	E. Wong/Don Nguyen
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	1/13/2021
Configuration:	2		
Test Setup:	The EUT is placed on test bench, conducted measurement made at RF2 connector. Firmware power setting: 802.11b: 19dBm 802.11g: 17dBm 802.11n20 :17dBm		

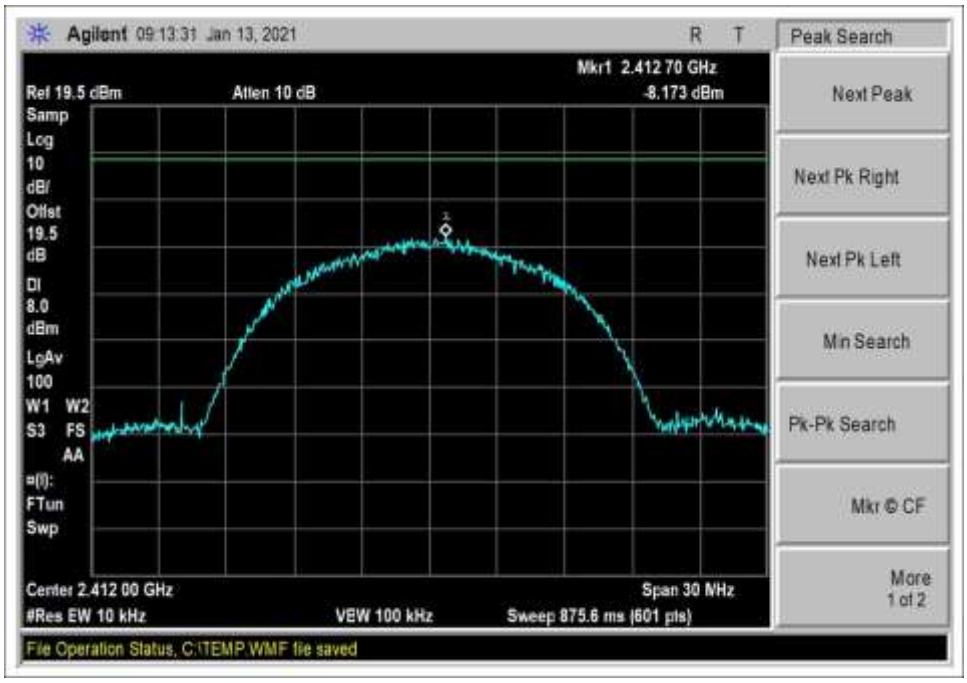
Environmental Conditions			
Temperature (ºC)	22	Relative Humidity (%):	48

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03431	Attenuator	Aeroflex/Weinschel	89-20-21	12/20/2019	12/20/2021
07246	cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022

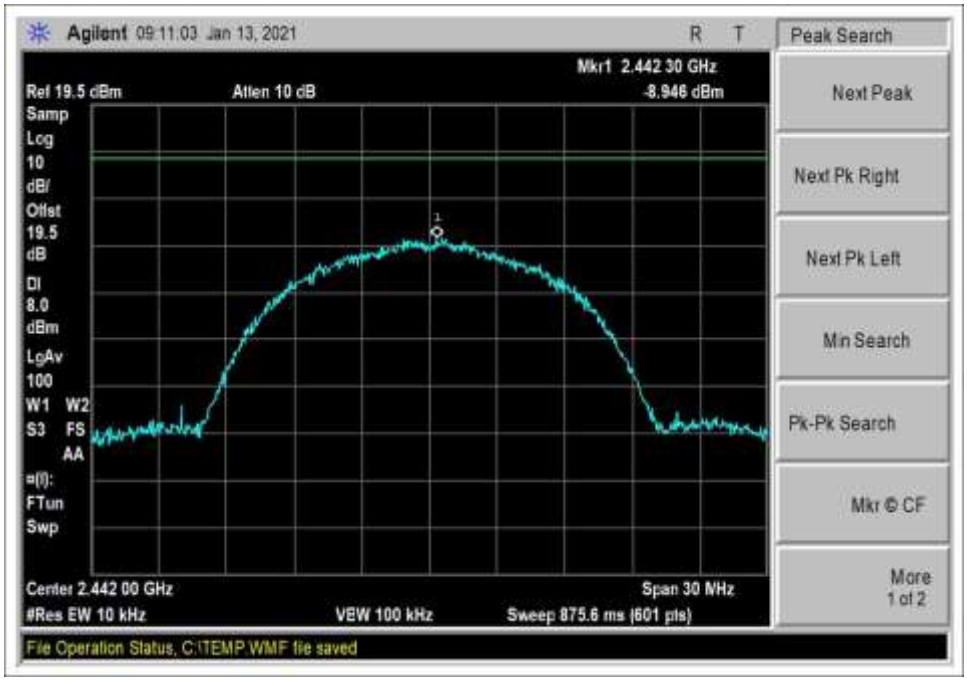
PSD Test Data Summary - RF Conducted Measurement				
Measurement Method: AVGPSD-1				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
2412	802.11b	-8.2	≤8	Pass
2442	802.11b	-8.9	≤8	Pass
2462	802.11b	-8.6	≤8	Pass
2412	802.11g	-4.2	≤8	Pass
2442	802.11g	-4.7	≤8	Pass
2462	802.11g	-10.5	≤8	Pass
2412	802.11n20	-8.7	≤8	Pass
2442	802.11n20	-9.1	≤8	Pass
2462	802.11n20	-8.9	≤8	Pass

Measurement made at RBW=10kHz.

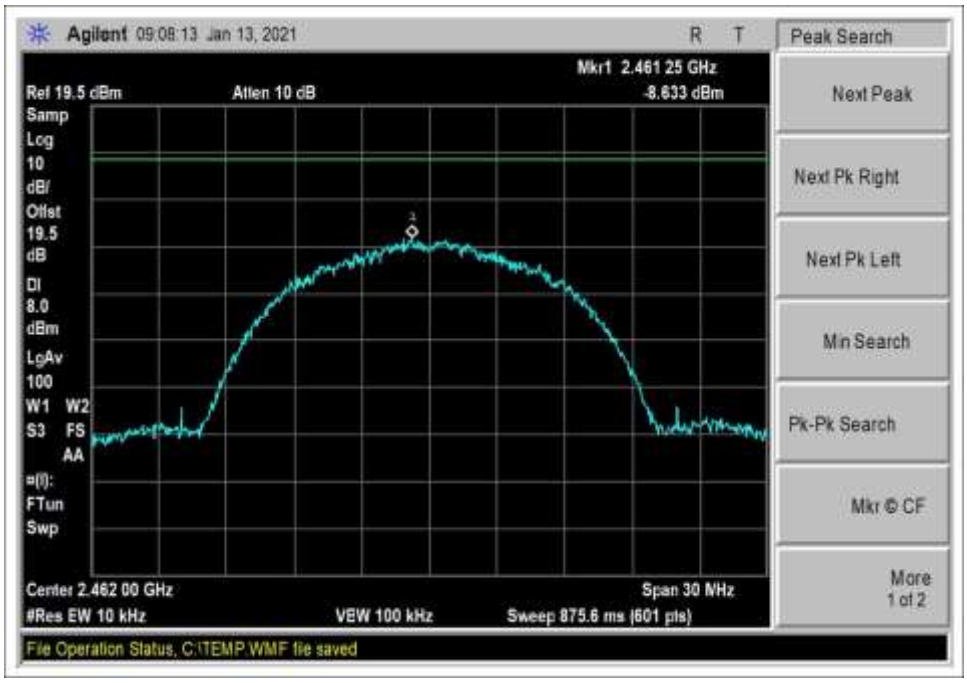
Plots



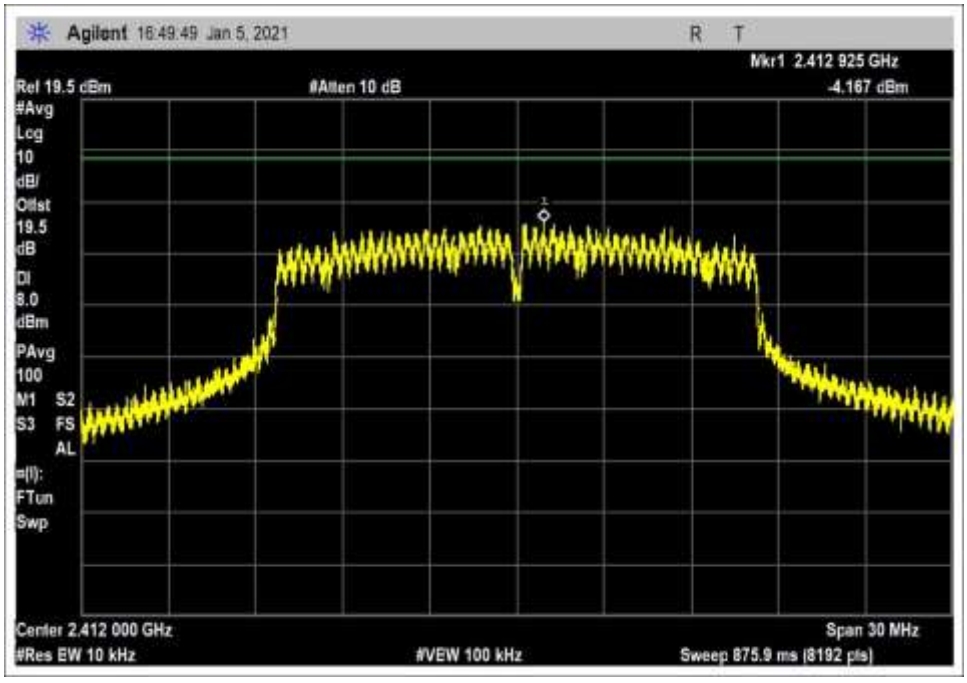
PSD_802.11b_Low Channel_19dBm



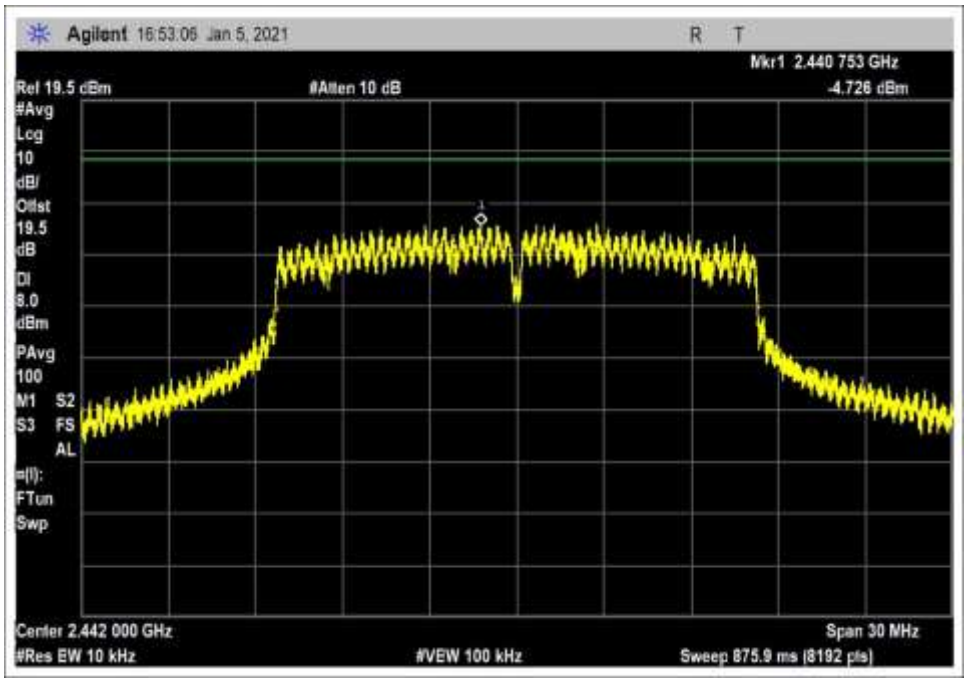
PSD_802.11b_Middle Channel_19dBm



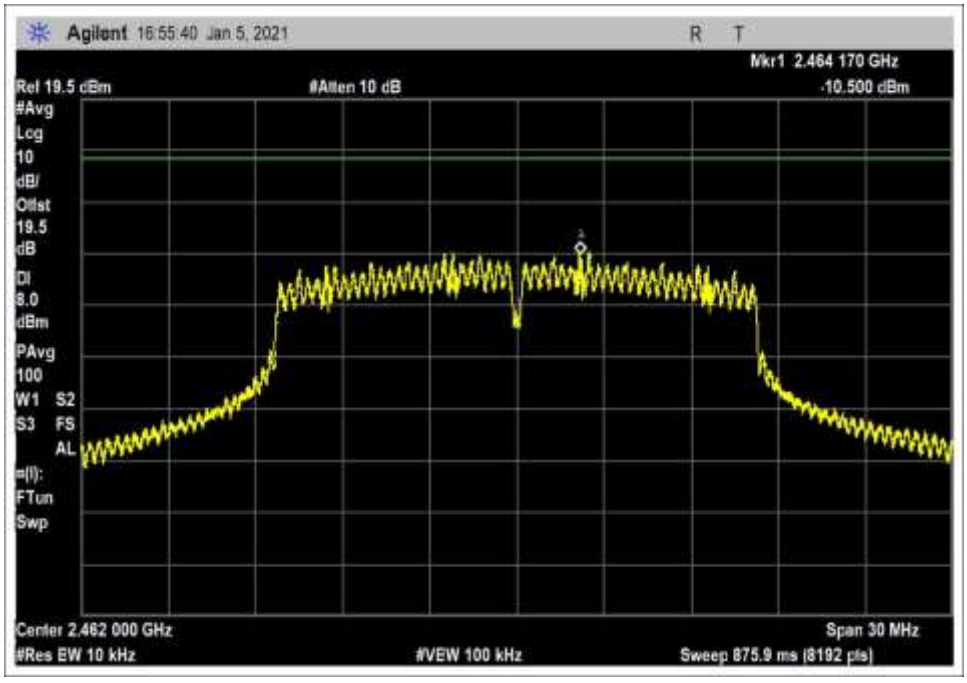
PSD_802.11b_High Channel_19dBm



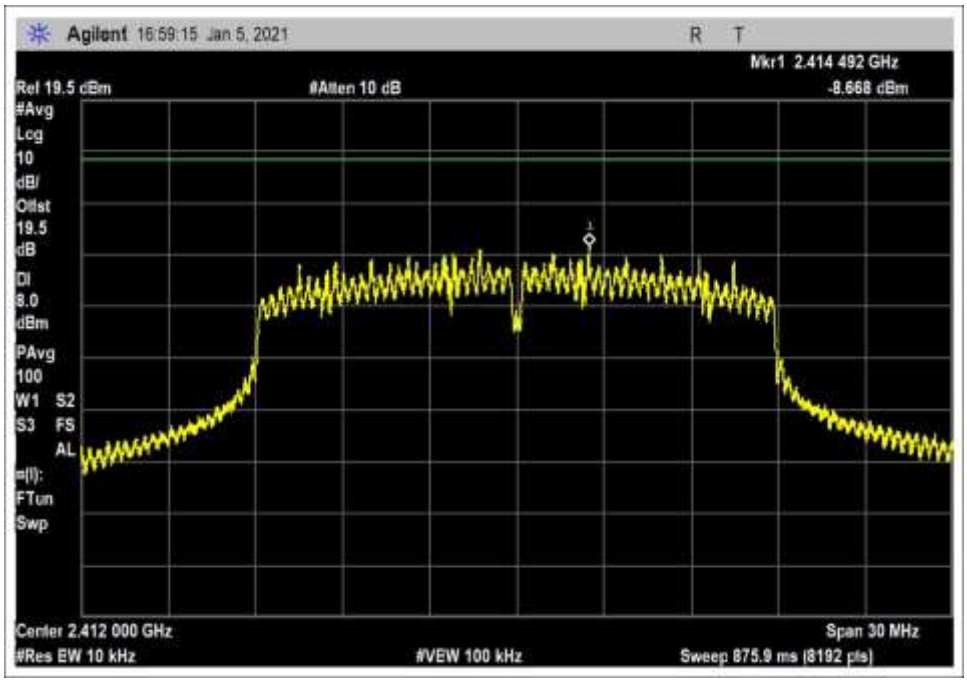
PSD_802.11g_Low Channel_17dBm



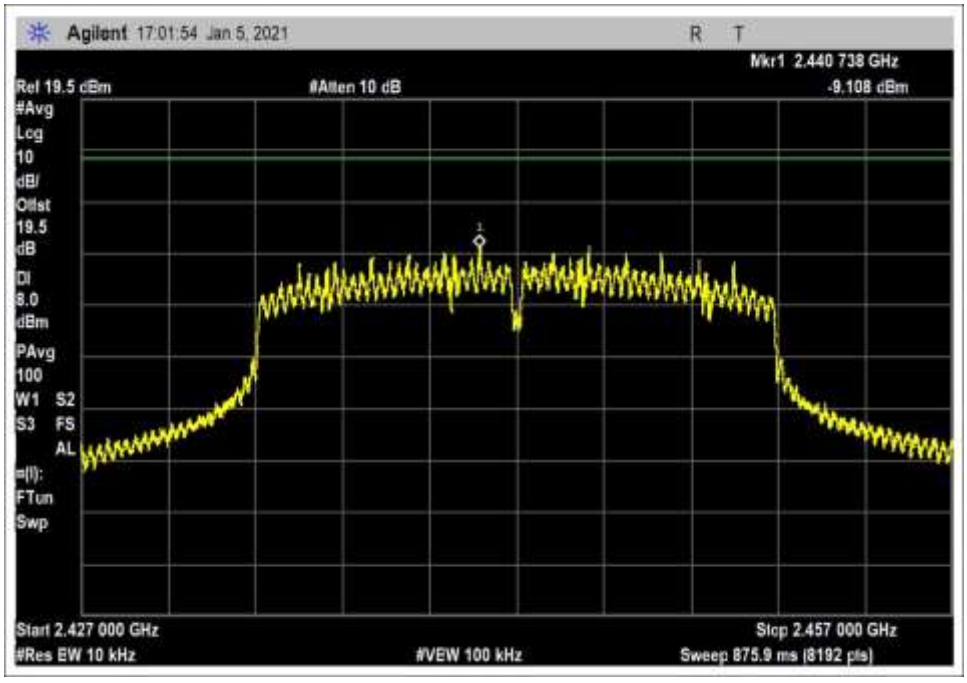
PSD_802.11g_Middle Channel_17dBm



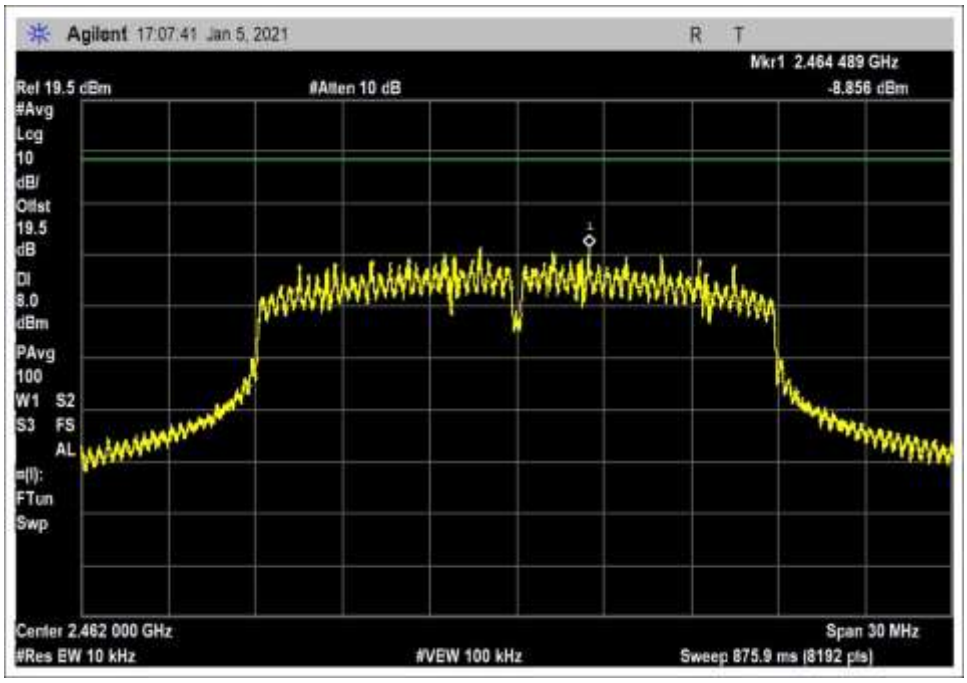
PSD_802.11g_High Channel_17dBm



PSD_802.11n_Low Channel_17dBm

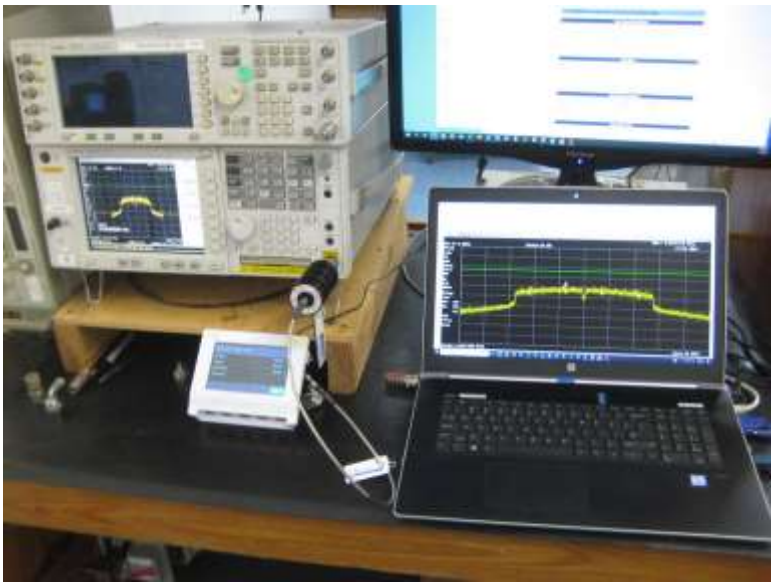


PSD_802.11n_Middle Channel_17dBm



PSD_802.11n_High Channel_17dBm

Test Setup / Conditions / Data



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112		
Customer:	**Venstar, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**104502**	Date:	1/6/2021
Test Type:	**Conducted Emissions**	Time:	12:21:32
Tested By:	E. Wong	Sequence#:	2
Software:	EMITest 5.03.19		24Vac

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

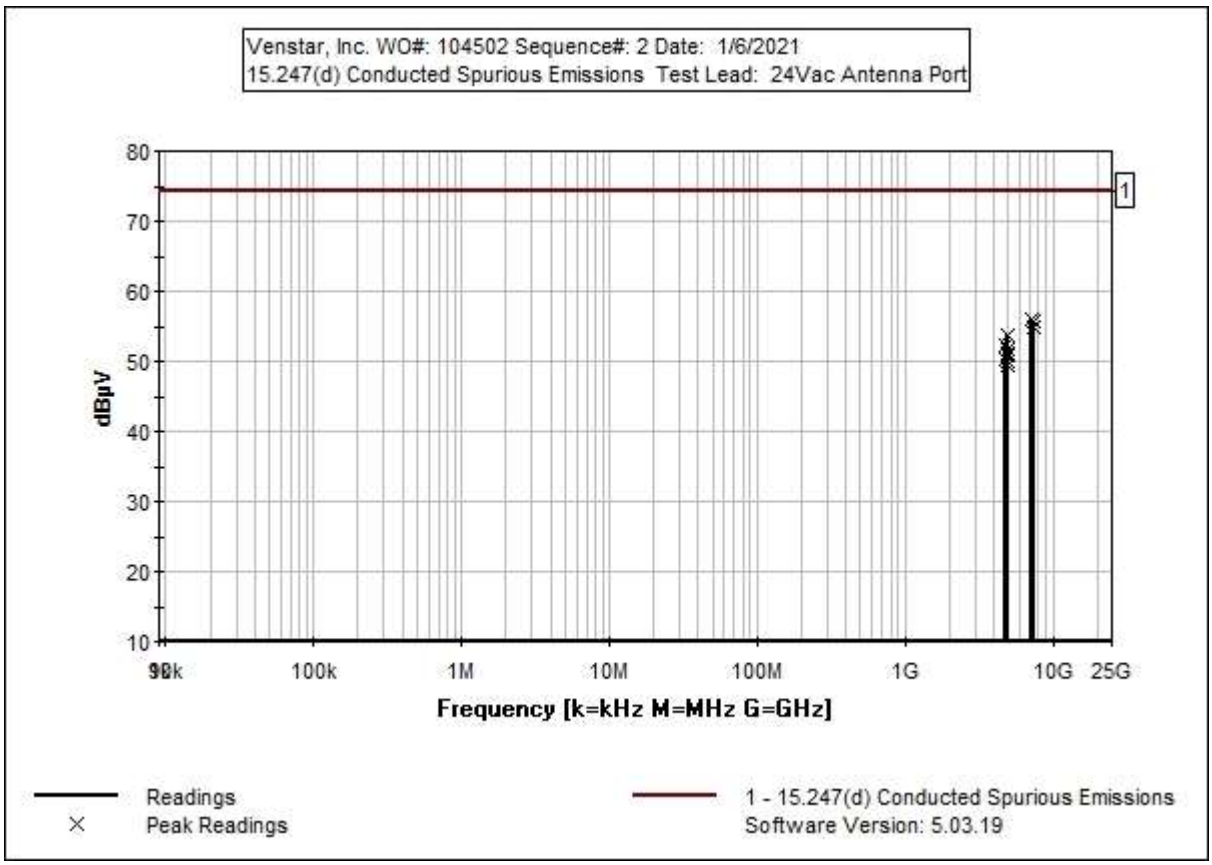
The EUT is placed on the table, RF measurement performed at the antenna port.
Software setting:
Set Mode: Transmit

Power setting:
802.11b: 20dBm
802.11g: 17dBm
802.11n20: 17dBm

Modulation: 802.11b, 802.11g, 802.11n20

Frequency: 2412, 2442, 2462MHz

Frequency of measurement: 9kHz-25GHz
RBW=100kHz, VBW=300kHz



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/3/2020	8/3/2021
T1	ANP07246	Cable	32022-29094K-29094K-24TC	5/29/2020	5/29/2022
T2	AN03431	Attenuator	89-20-21	12/20/2019	12/20/2021

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

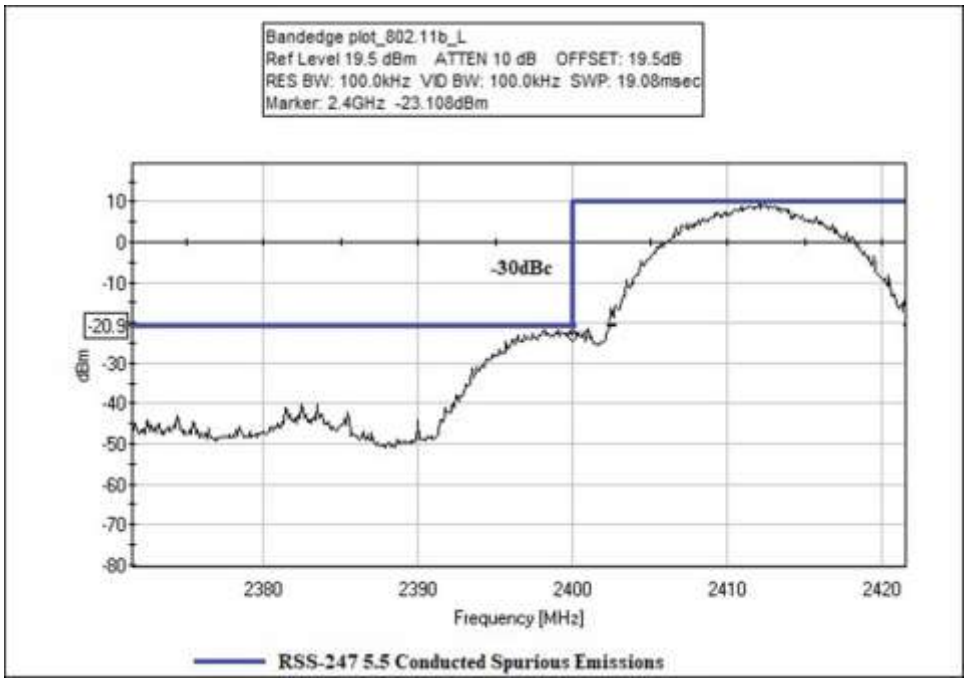
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist. Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	4826.700M	32.1	+0.7	+19.4			+0.0	52.2	74.2 802.11n	-22.0	Anten
2	4884.700M	31.9	+0.6	+19.3			+0.0	51.8	74.2 802.11n	-22.4	Anten
3	4929.300M	31.0	+0.6	+19.3			+0.0	50.9	74.2 802.11g	-23.3	Anten
4	4826.700M	30.3	+0.7	+19.4			+0.0	50.4	74.2 802.11g	-23.8	Anten
5	4882.700M	30.2	+0.6	+19.3			+0.0	50.1	74.2 802.11g	-24.1	Anten
6	4922.700M	29.4	+0.6	+19.3			+0.0	49.3	74.2 802.11n	-24.9	Anten
7	7237.000M	36.1	+0.8	+19.2			+0.0	56.1	86.1 802.11b	-30.0	Anten
8	7384.000M	35.5	+0.9	+19.3			+0.0	55.7	86.1 802.11b	-30.4	Anten
9	7325.000M	35.0	+0.8	+19.2			+0.0	55.0	86.1 802.11b	-31.1	Anten
10	4883.300M	33.9	+0.6	+19.3			+0.0	53.8	86.1 802.11b	-32.3	Anten
11	4922.700M	31.2	+0.6	+19.3			+0.0	51.1	86.1 802.11b	-35.0	Anten

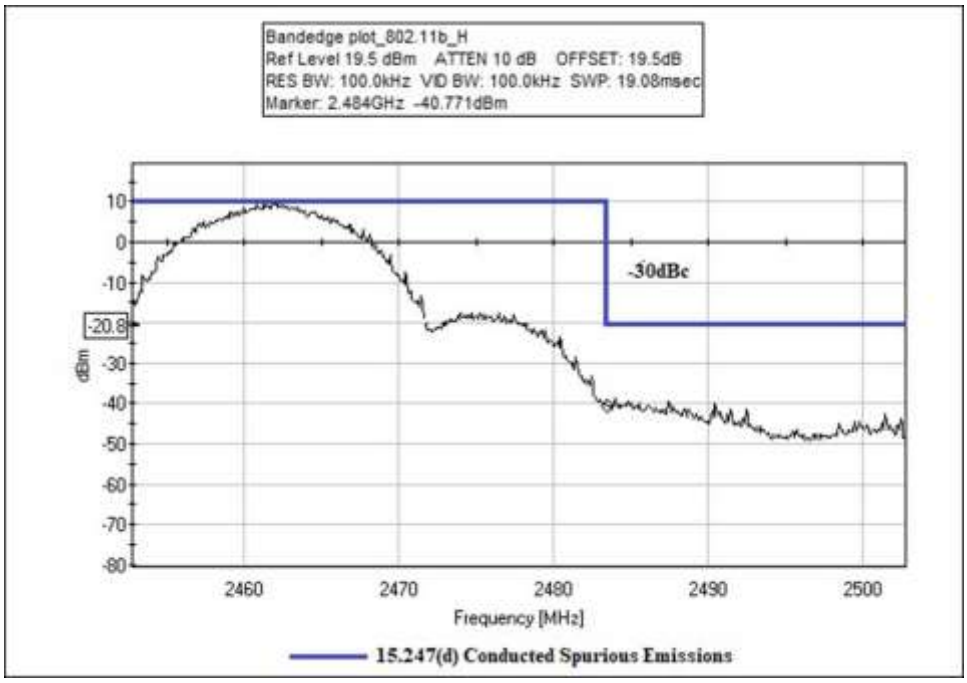
Band Edge

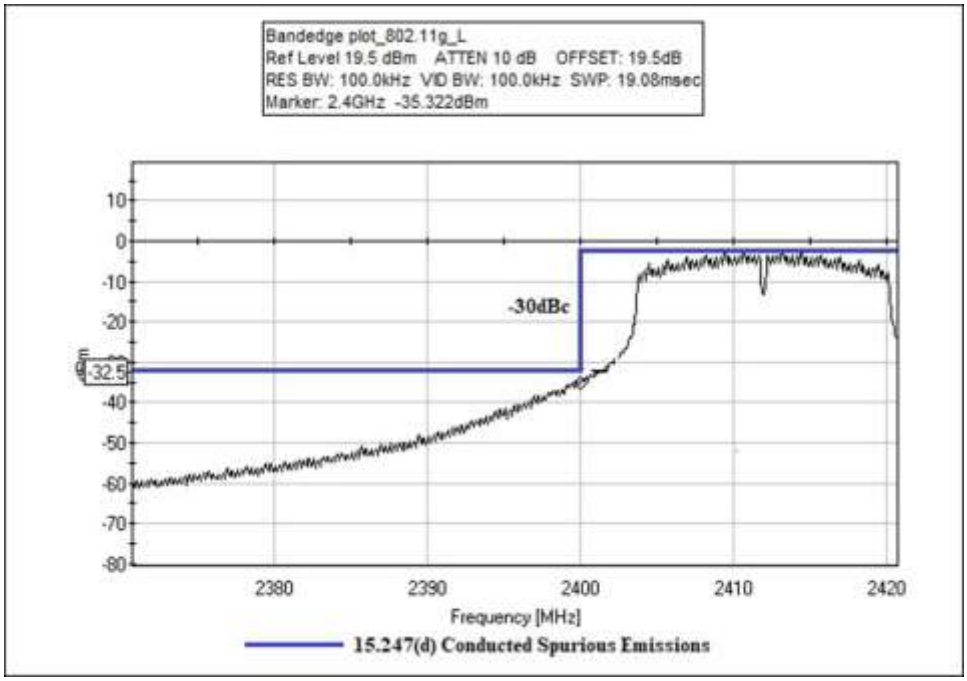
Band Edge Summary				
Limit applied: Max Power/100kHz - 30dB (When average power limit is applied).				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2400.0	802.11b	-23.1	< -20.9	Pass
2483.5	802.11b	-40.8	<-20.8	Pass
2400.0	802.11g	-35.1	<-32.5	Pass
2483.5	802.11g	-47.4	<-32.5	Pass
2400.0	802.11n	-35.9	< -32.4	Pass
2483.5	802.11n	-47.3	< -32.8	Pass

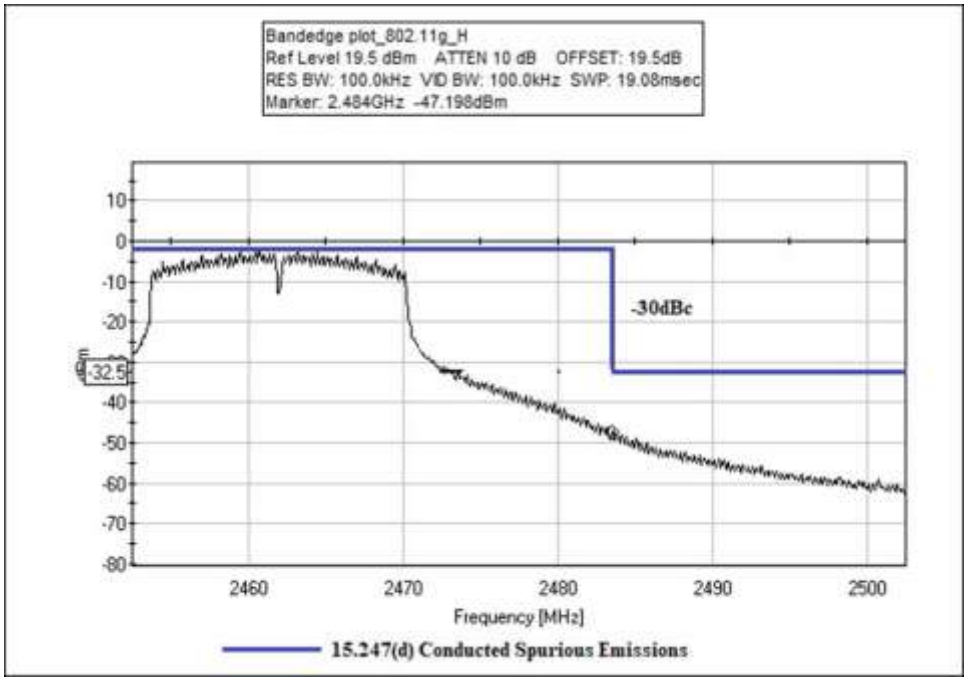
Power setting:
802.11b: 20dBm (worse case, reduced to 19dBm for radiated spur emission)
802.11g: 17dBm
802.11n: 17dBm

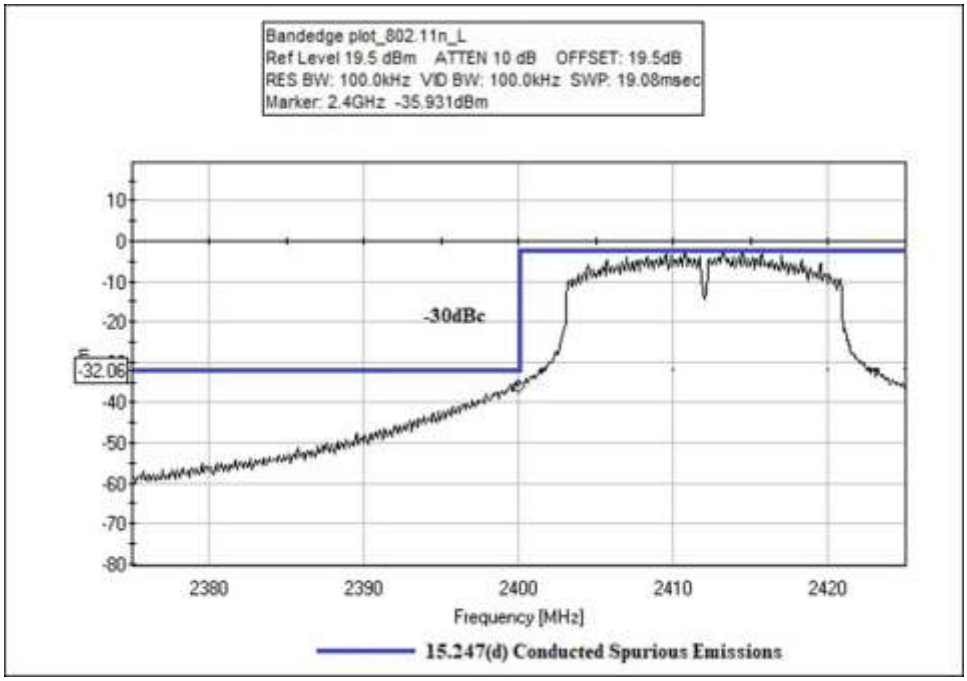
Band Edge Plots

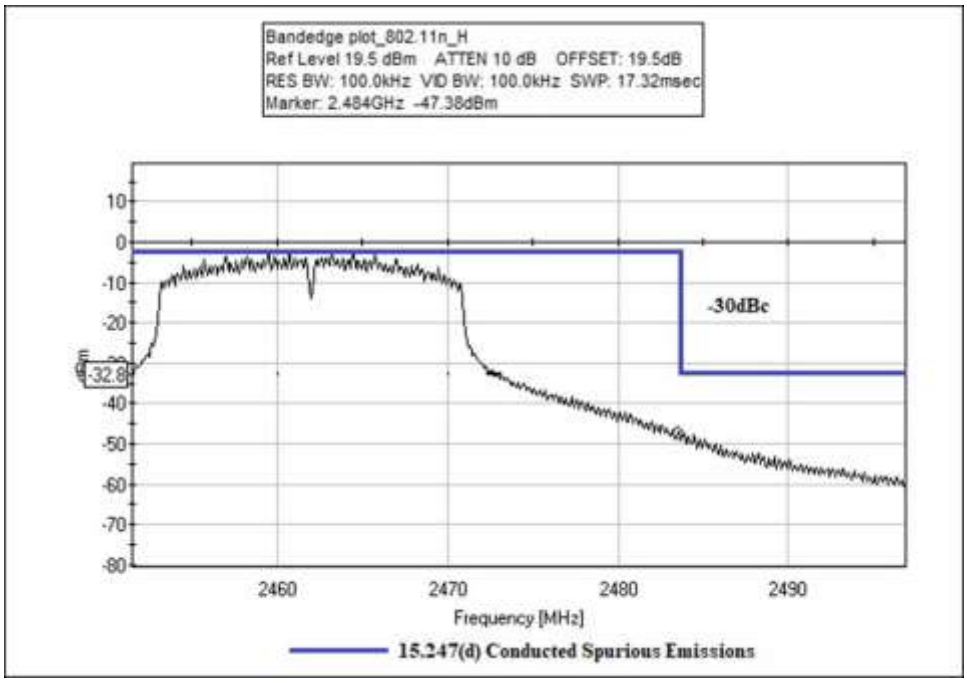



Bandedge plot_802.11b_H
Ref Level 19.5 dBm ATTEN 10 dB OFFSET: 19.5dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 19.08msec
Marker: 2.484GHz -40.771dBm
-30dBc
-20.8
dBm
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

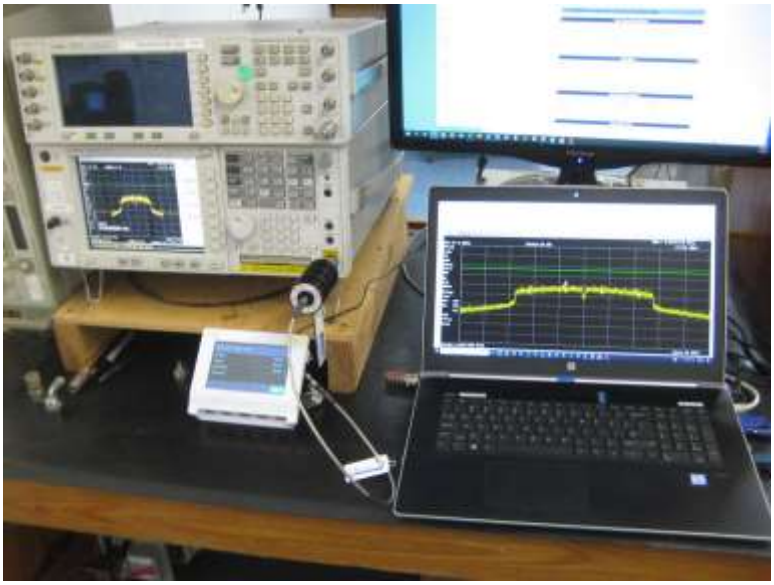

Bandedge plot_802.11g_L
Ref Level 19.5 dBm ATTEN 10 dB OFFSET: 19.5dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 19.08msec
Marker: 2.4GHz -35.322dBm
-30dBc
-32.5
dBm
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge plot_802.11g_H
Ref Level 19.5 dBm ATTEN 10 dB OFFSET: 19.5dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 19.08msec
Marker: 2.484GHz -47.198dBm
10
0
-10
-20
-30dBc
dBm
-32.5
-40
-50
-60
-70
-80
2460
2470
2480
2490
2500
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge plot_802.11n_L
Ref Level 19.5 dBm ATTEN 10 dB OFFSET: 19.5dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 19.08msec
Marker: 2.4GHz -35.931dBm
10
0
-10
-20
-30dBc
dBm
-32.06
-40
-50
-60
-70
-80
2380
2390
2400
2410
2420
Frequency [MHz]
15.247(d) Conducted Spurious Emissions



Test Setup Photo(s)



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112		
Customer:	**Venstar, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**104502**	Date:	1/12/2021
Test Type:	**Radiated Scan**	Time:	14:19:06
Tested By:	E. Wong	Sequence#:	3
Software:	EMITest 5.03.19		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The EUT is placed on the Styrofoam platform, set in intended orientation. 5 UTP are connected to the Ethernet port.
Software setting:
Set Mode: Transmit

Power setting:
802.11b: 19dBm
802.11g: 17dBm
802.11n20: 17dBm

Modulation: 802.11b, 802.11g, 802.11n20

Frequency: 2412, 2442, 2462MHz

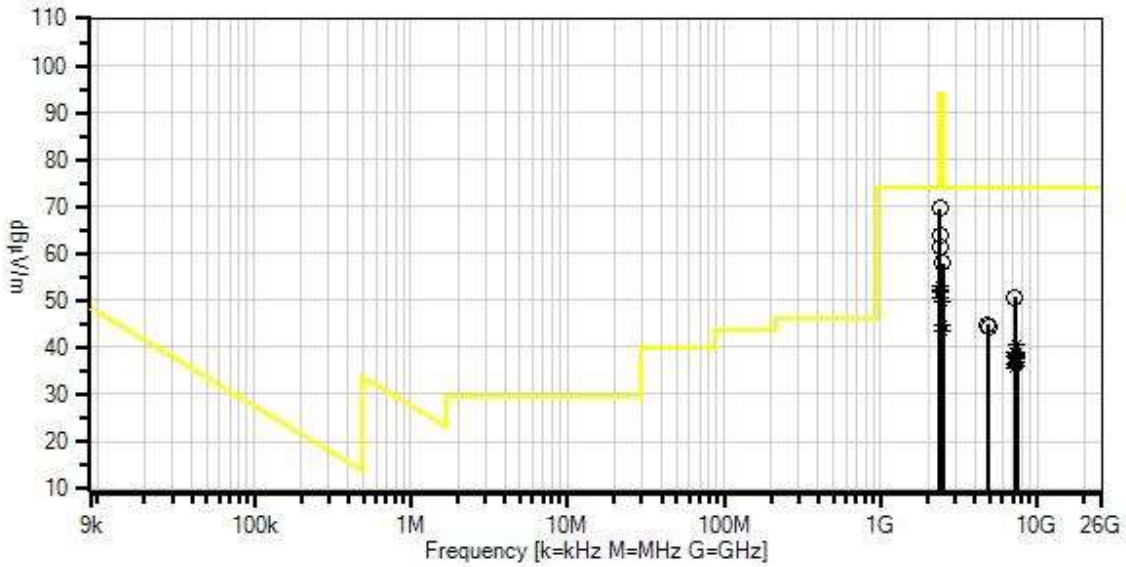
Frequency range of measurement = 9 kHz- 25 GHz.
9kH -150 kHz; RBW=200 Hz, VBW=200 Hz;150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz;30 MHz-1000 MHz; RBW=120 kHz, VBW=120 kHz,1000 MHz-25000 MHz; RBW=1MHz, VBW=1MHz.

Test environment conditions:
Temperature: 19°C
Relative Humidity: 38%
Atmospheric Pressure: 100kPa

Upright and lay flat orientation investigation, date represent worst case (up right)
Site D
ANSI C63.10-2013

Modification 1 was in place during testing.

Venstar, Inc. WO#: 104502 Sequence#: 3 Date: 1/12/2021
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.19

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03643	Spectrum Analyzer	E4440A	5/20/2020	5/20/2022
T2	AN01646	Horn Antenna	3115	3/17/2020	3/17/2022
T3	ANP07656	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00787	Preamp	83017A	5/31/2019	5/31/2021
T5	ANP07138	Cable	ANDL1-PNMNM-60	3/4/2019	3/4/2021
T6	ANP04382	Cable	LDF-50	5/15/2020	5/15/2022
T7	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	5/13/2019	5/13/2021
	AN00010	Preamp	8447D	1/2/2020	1/2/2022
	AN01994	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
	ANP05283	Attenuator	ATT-0218-06-NNN-02	3/26/2020	3/26/2022
	ANP05569	Cable-Amplitude +15C to +45C (dB)	RG-214/U	12/14/2020	12/14/2022
	ANP06978	Cable	Sucoflex 104A	3/26/2020	3/26/2022
	AN03470	Spectrum Analyzer	E4440A	5/2/2019	5/2/2021
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022
	AN03367	Horn Antenna	62-GH-62-25.	8/1/2019	8/1/2021
	AN01413	Horn Antenna	84125-80008	10/19/2020	10/19/2022

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist.	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2390.000M Ave	54.3	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	52.9	54.0 bandedge_802.11g_ L	-1.1	Horiz
2	2400.000M	65.2	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	63.8	65.0 bandedge_802.11g_ L_100kHz_-30dBc	-1.2	Horiz
3	2390.000M Ave	53.7	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	52.3	54.0 bandedge_802.11n_ L	-1.7	Horiz
4	2390.000M Ave	53.2	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	51.8	54.0 bandedge_802.11b_ L	-2.2	Horiz
^	2390.000M	73.7	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	72.3	74.0 bandedge_802.11n_ L	-1.7	Horiz
^	2390.000M	72.8	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	71.4	74.0 bandedge_802.11g _L	-2.6	Horiz
^	2390.000M	66.4	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	65.0	74.0 bandedge_802.11b_ L	-9.0	Horiz
8	2400.000M	62.8	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	61.4	64.0 bandedge_802.11n_ L_ 100kHz_-30dBc	-2.6	Horiz
9	7235.500M	34.7	+0.0 +7.5	+36.7 +11.0	+0.8 +0.2	-40.3	+0.0	50.6	54.0 802.11b	-3.4	Horiz
10	2384.500M Ave	51.9	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	50.5	54.0 bandedge_802.11b_ L	-3.5	Horiz
^	2384.580M	67.6	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	66.2	74.0 bandedge_802.11b_ L	-7.8	Horiz
12	2483.500M Ave	51.2	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	49.8	54.0 bandedge_802.11g_ H	-4.2	Horiz
13	2400.000M	70.9	+0.0 +4.0	+28.3 +5.6	+0.5 +0.0	-39.8	+0.0	69.5	76.4 bandedge_802.11b_ L_100kHz -30dBc	-6.9	Horiz
14	4824.000M	36.0	+0.0 +5.8	+33.6 +8.5	+0.7 +0.3	-40.0	+0.0	44.9	54.0 802.11b	-9.1	Vert
15	2487.920M Ave	46.2	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	44.8	54.0 bandedge_802.11b_ H	-9.2	Horiz
16	4924.000M	35.1	+0.0 +5.9	+33.8 +8.6	+0.7 +0.3	-39.9	+0.0	44.5	54.0 802.11b	-9.5	Vert
17	4924.000M	35.1	+0.0 +5.9	+33.8 +8.6	+0.7 +0.3	-39.9	+0.0	44.5	54.0 802.11b	-9.5	Horiz

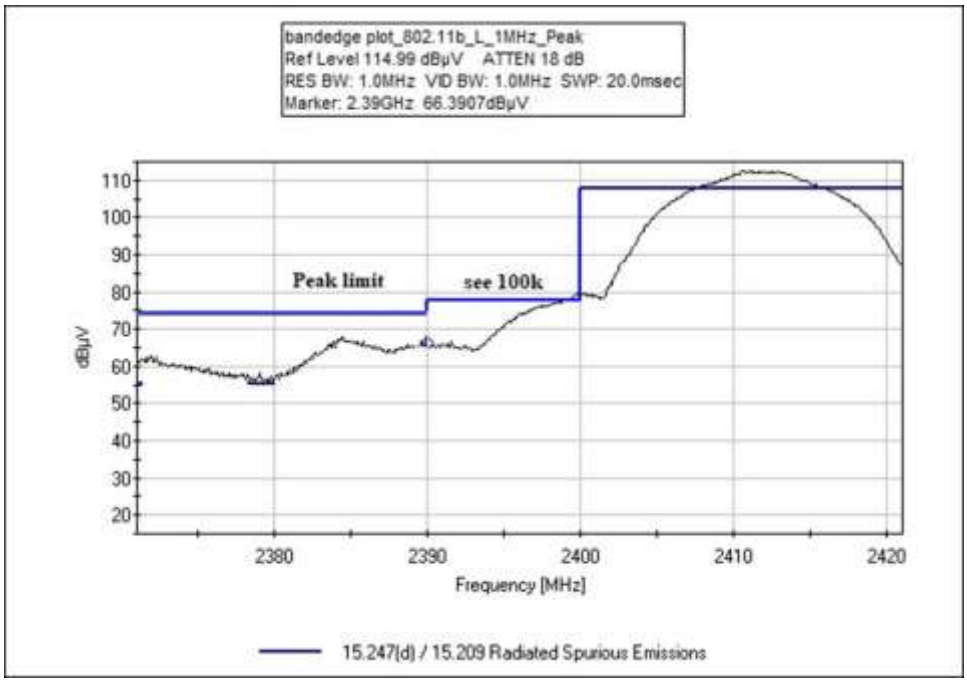
18	2483.500M Ave	45.0	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	43.6	54.0 bandedge_802.11b_H	-10.4	Horiz
^	2483.500M	72.1	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	70.7	74.0 bandedge_802.11g_H	-3.3	Horiz
^	2483.500M	70.4	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	69.0	74.0 bandedge_802.11n H	-5.0	Horiz
^	2483.500M	50.3	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	48.9	54.0 bandedge_802.11n_H	-5.1	Horiz
^	2483.500M	57.4	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	56.0	74.0 bandedge_802.11b_H	-18.0	Horiz
23	7386.000M Ave	23.9	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	40.4	54.0 802.11b	-13.6	Horiz
24	7386.000M Ave	22.6	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	39.1	54.0 802.11n	-14.9	Horiz
25	7236.000M Ave	23.1	+0.0 +7.5	+36.7 +11.0	+0.8 +0.2	-40.3	+0.0	39.0	54.0 802.11n	-15.0	Vert
^	7236.000M	34.5	+0.0 +7.5	+36.7 +11.0	+0.8 +0.2	-40.3	+0.0	50.4	54.0 802.11n	-3.6	Vert
27	7386.000M Ave	22.3	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	38.8	54.0 802.11g	-15.2	Horiz
^	7386.000M	36.7	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	53.2	54.0 802.11b	-0.8	Horiz
^	7386.000M	34.9	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	51.4	54.0 802.11g	-2.6	Horiz
^	7386.000M	34.4	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	50.9	54.0 802.11n	-3.1	Horiz
31	7326.000M Ave	22.3	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	38.6	54.0 802.11n	-15.4	Vert
32	7326.000M Ave	22.3	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	38.6	54.0 802.11b	-15.4	Horiz
33	7326.000M Ave	22.2	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	38.5	54.0 802.11n	-15.5	Horiz
34	7236.117M Ave	22.3	+0.0 +7.5	+36.7 +11.0	+0.8 +0.2	-40.3	+0.0	38.2	54.0 802.11g	-15.8	Horiz
35	2489.330M	59.3	+0.0 +4.1	+28.2 +5.7	+0.5 +0.0	-39.9	+0.0	57.9	74.0 bandedge_802.11b_H	-16.1	Horiz
36	7386.000M Ave	21.4	+0.0 +7.6	+37.1 +11.2	+0.8 +0.2	-40.4	+0.0	37.9	54.0 802.11b	-16.1	Vert
37	7326.050M Ave	21.5	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	37.8	54.0 802.11g	-16.2	Vert
^	7326.000M	33.5	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	49.8	54.0 802.11n	-4.2	Vert
^	7326.050M	33.4	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	49.7	54.0 802.11g	-4.3	Vert
^	7326.000M	32.4	+0.0 +7.5	+37.0 +11.1	+0.8 +0.2	-40.3	+0.0	48.7	54.0 802.11b	-5.3	Vert

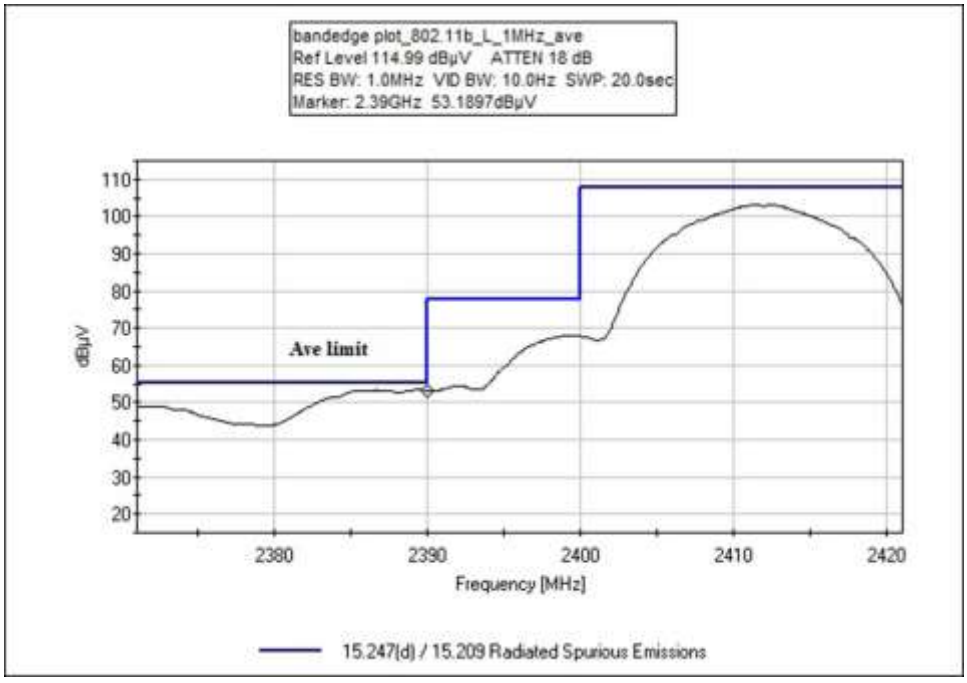
41	7386.000M	20.4	+0.0	+37.1	+0.8	-40.4	+0.0	36.9	54.0	-17.1	Vert
	Ave		+7.6	+11.2	+0.2				802.11g		
^	7386.000M	34.6	+0.0	+37.1	+0.8	-40.4	+0.0	51.1	54.0	-2.9	Vert
			+7.6	+11.2	+0.2				802.11g		
^	7386.000M	33.9	+0.0	+37.1	+0.8	-40.4	+0.0	50.4	54.0	-3.6	Vert
			+7.6	+11.2	+0.2				802.11b		
44	7236.083M	20.5	+0.0	+36.7	+0.8	-40.3	+0.0	36.4	54.0	-17.6	Horiz
	Ave		+7.5	+11.0	+0.2				802.11b		
^	7236.117M	34.5	+0.0	+36.7	+0.8	-40.3	+0.0	50.4	54.0	-3.6	Horiz
			+7.5	+11.0	+0.2				802.11g		
46	7326.000M	19.7	+0.0	+37.0	+0.8	-40.3	+0.0	36.0	54.0	-18.0	Horiz
	Ave		+7.5	+11.1	+0.2				802.11g		
^	7326.000M	35.8	+0.0	+37.0	+0.8	-40.3	+0.0	52.1	54.0	-1.9	Horiz
			+7.5	+11.1	+0.2				802.11b		
^	7326.000M	34.1	+0.0	+37.0	+0.8	-40.3	+0.0	50.4	54.0	-3.6	Horiz
			+7.5	+11.1	+0.2				802.11n		
^	7326.000M	33.3	+0.0	+37.0	+0.8	-40.3	+0.0	49.6	54.0	-4.4	Horiz
			+7.5	+11.1	+0.2				802.11g		
50	7236.667M	19.6	+0.0	+36.7	+0.8	-40.3	+0.0	35.5	54.0	-18.5	Vert
	Ave		+7.5	+11.0	+0.2				802.11g		
^	7236.667M	33.6	+0.0	+36.7	+0.8	-40.3	+0.0	49.5	54.0	-4.5	Vert
			+7.5	+11.0	+0.2				802.11g		
52	7236.000M	19.5	+0.0	+36.7	+0.8	-40.3	+0.0	35.4	54.0	-18.6	Horiz
	Ave		+7.5	+11.0	+0.2				802.11n		
^	7236.000M	32.0	+0.0	+36.7	+0.8	-40.3	+0.0	47.9	54.0	-6.1	Horiz
			+7.5	+11.0	+0.2				802.11n		

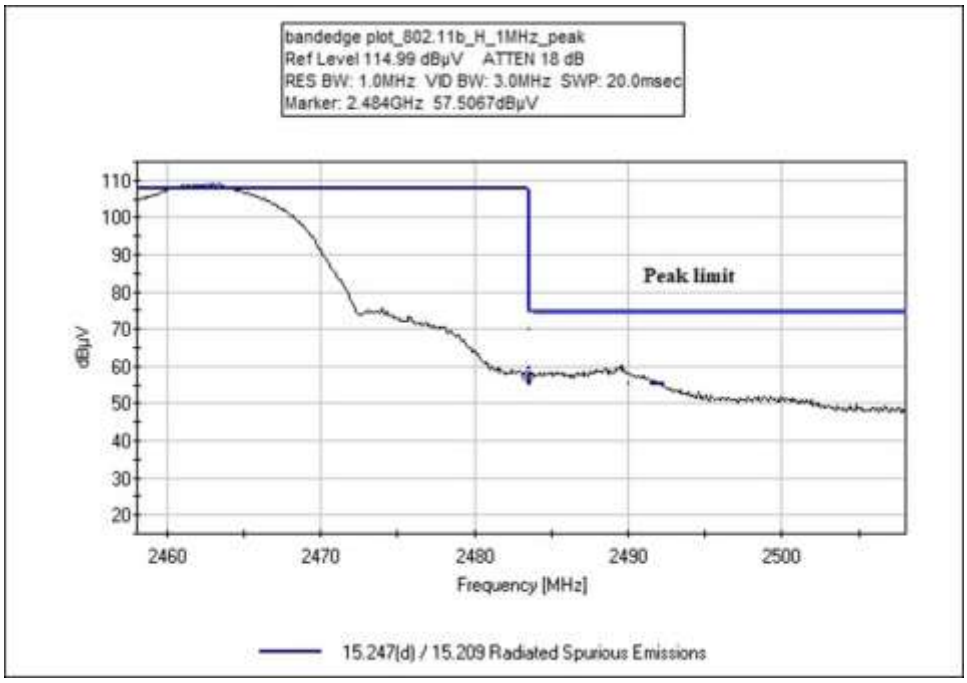
Band Edge

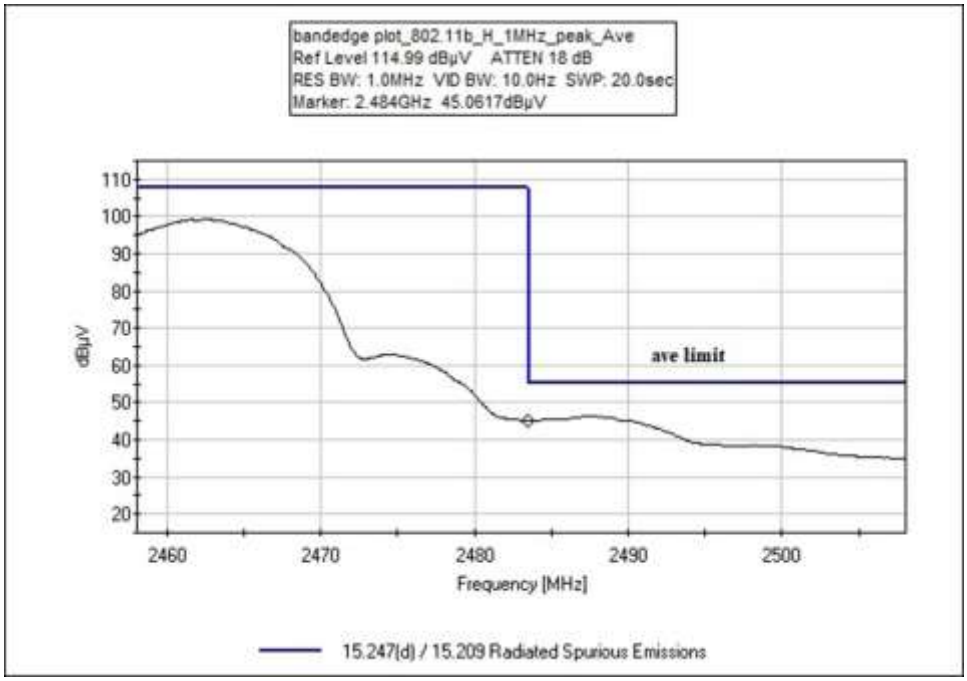
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	802.11b	Chip Antenna +2dBi	51.8	<54	Pass
2400.0	802.11b	Chip Antenna +2dBi	69.5	<76.4	Pass
2483.5	802.11g	Chip Antenna +2dBi	43.6	<54	Pass
2390.0	802.11g	Chip Antenna +2dBi	52.9	<54	Pass
2400.0	802.11n	Chip Antenna +2dBi	63.8	<65	Pass
2483.5	802.11n	Chip Antenna +2dBi	49.8	<54	Pass
2390.0	802.11b	Chip Antenna +2dBi	52.3	<54	Pass
2400.0	802.11b	Chip Antenna +2dBi	61.4	<64	Pass
2483.5	802.11g	Chip Antenna +2dBi	48.9	<54	Pass

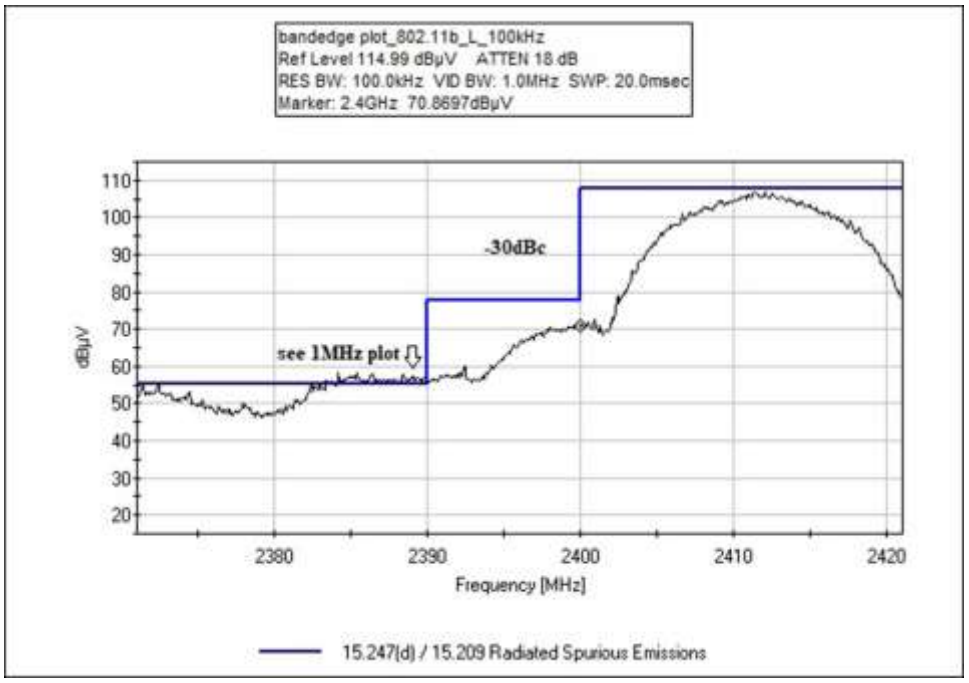
Band Edge Plots

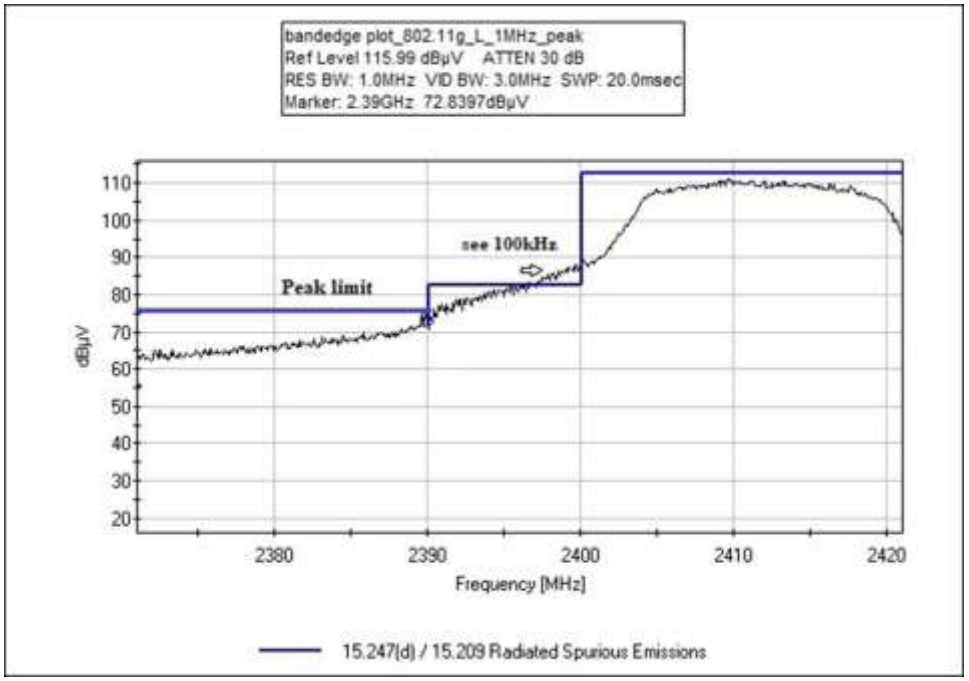


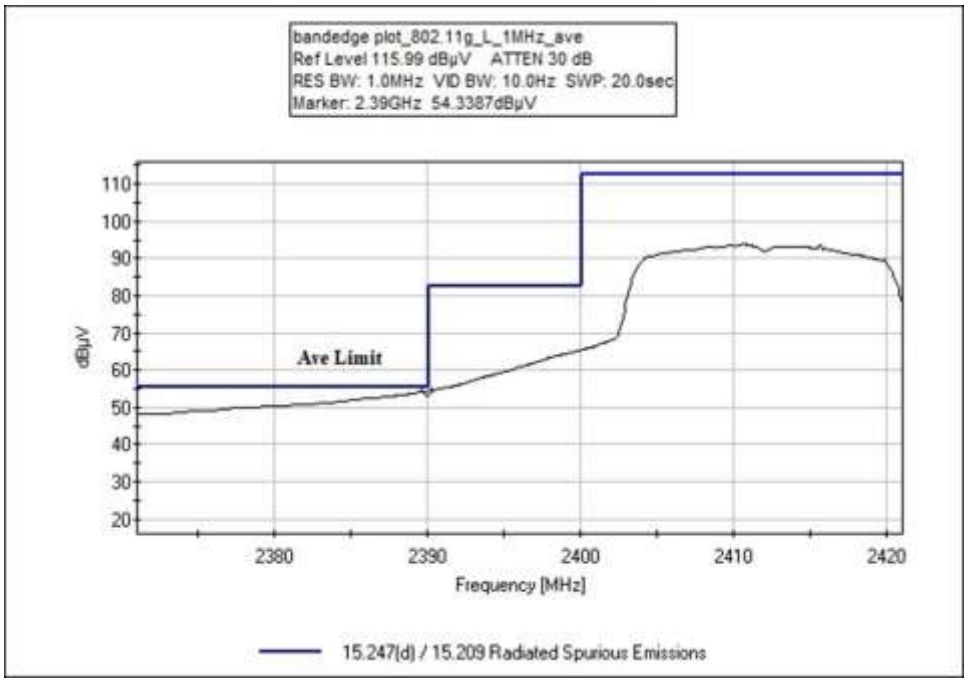


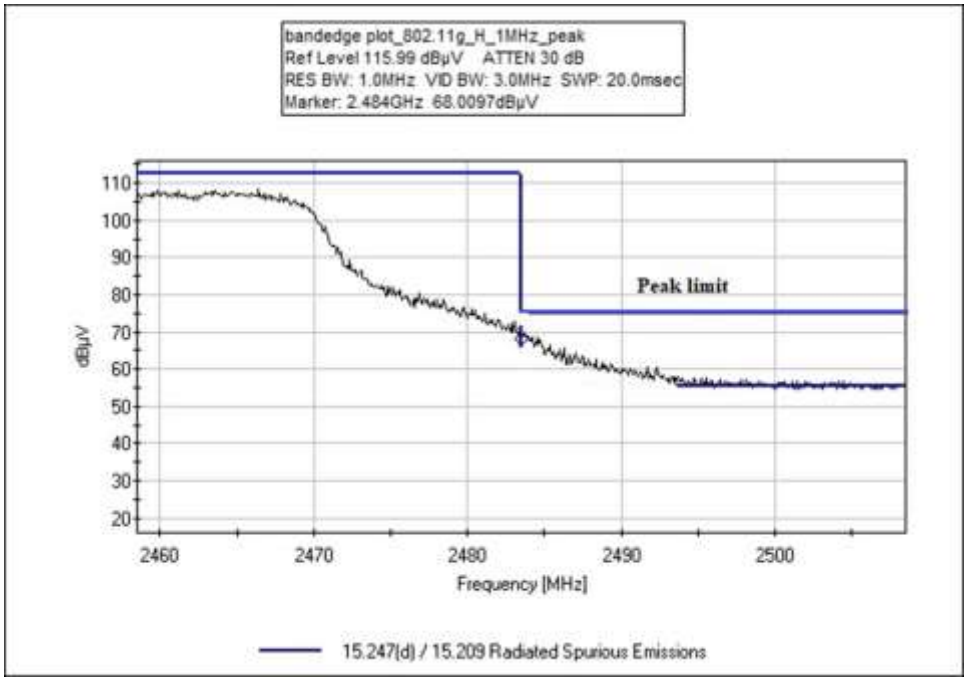

bandedge plot_802.11b_H_1MHz_peak
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 57.5067dBµV
Peak limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

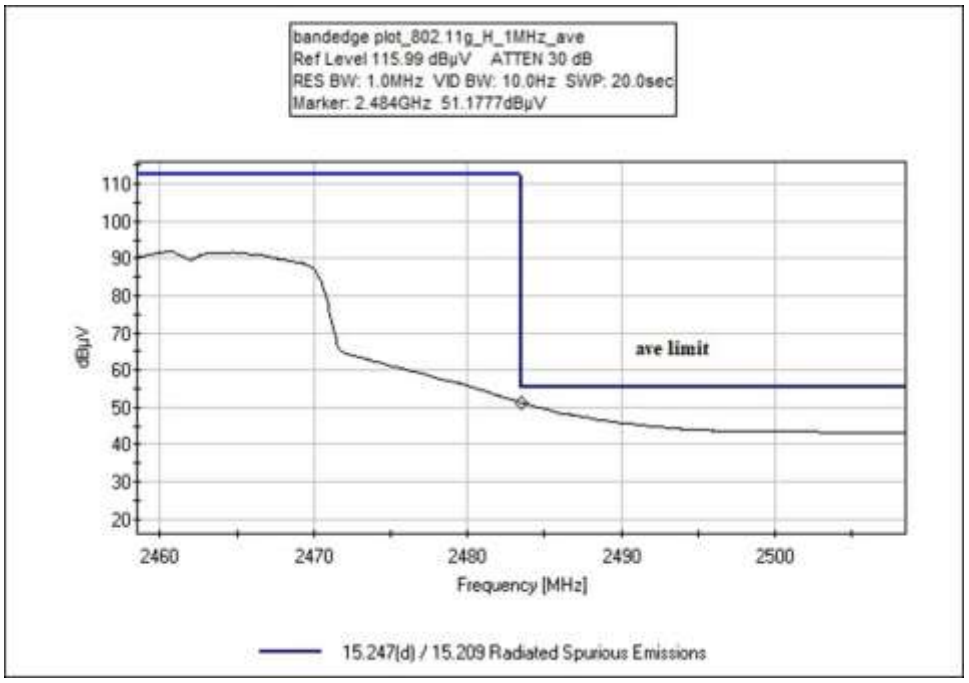

bandedge plot_802.11b_H_1MHz_peak_Ave
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 20.0sec
Marker: 2.484GHz 45.0617dBµV
ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

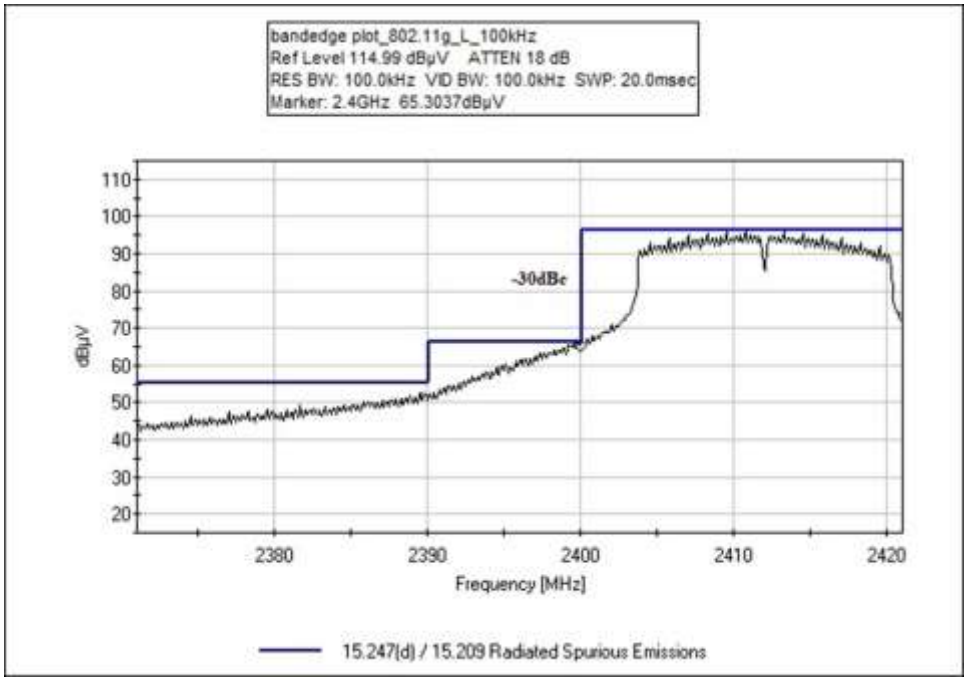

bandedge plot_802.11b_L_100kHz
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.4GHz 70.8697dBµV
-30dBc
see 1MHz plot
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge plot_802.11g_L_1MHz_peak
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 72.8397dBµV
see 100kHz
Peak limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

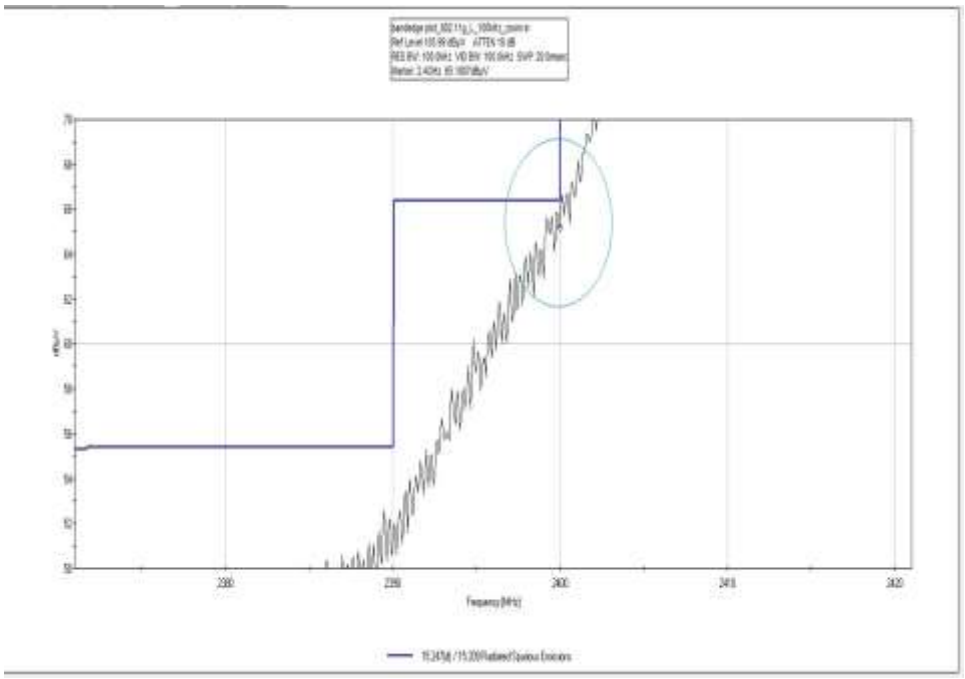

bandedge plot_802.11g_L_1MHz_ave
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 20.0sec
Marker: 2.39GHz 54.3387dBµV
Ave Limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

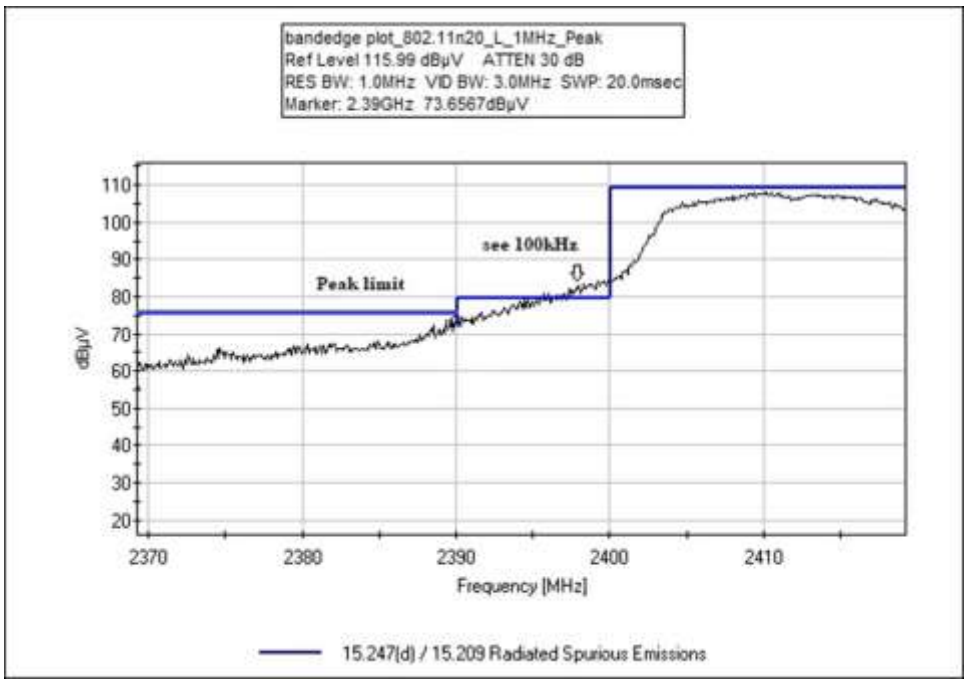

bandedge plot_802.11g_H_1MHz_peak
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 68.0097dBµV
Peak limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions



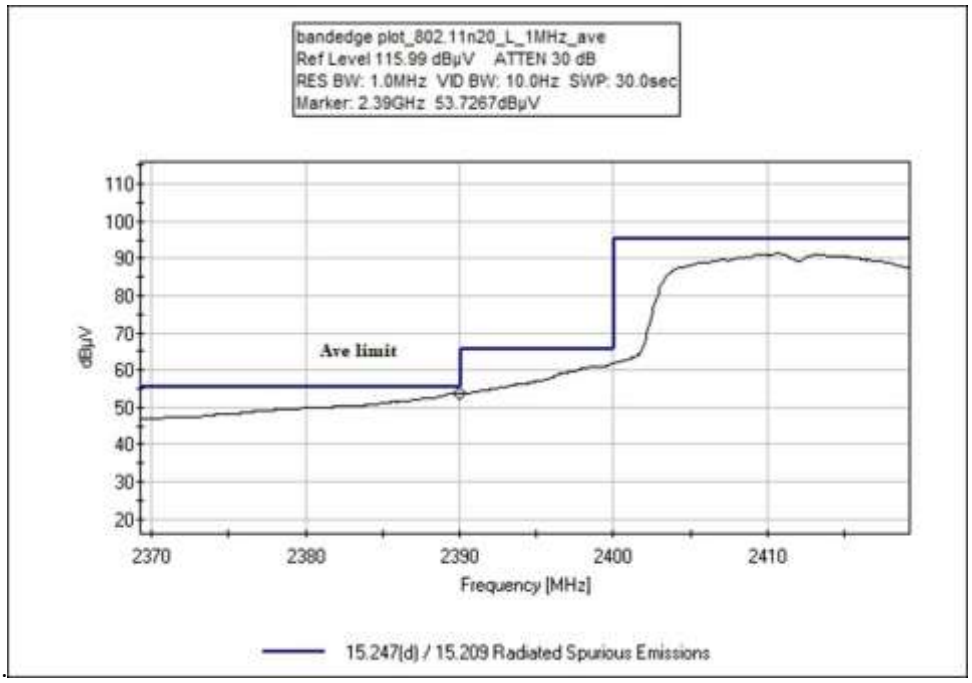


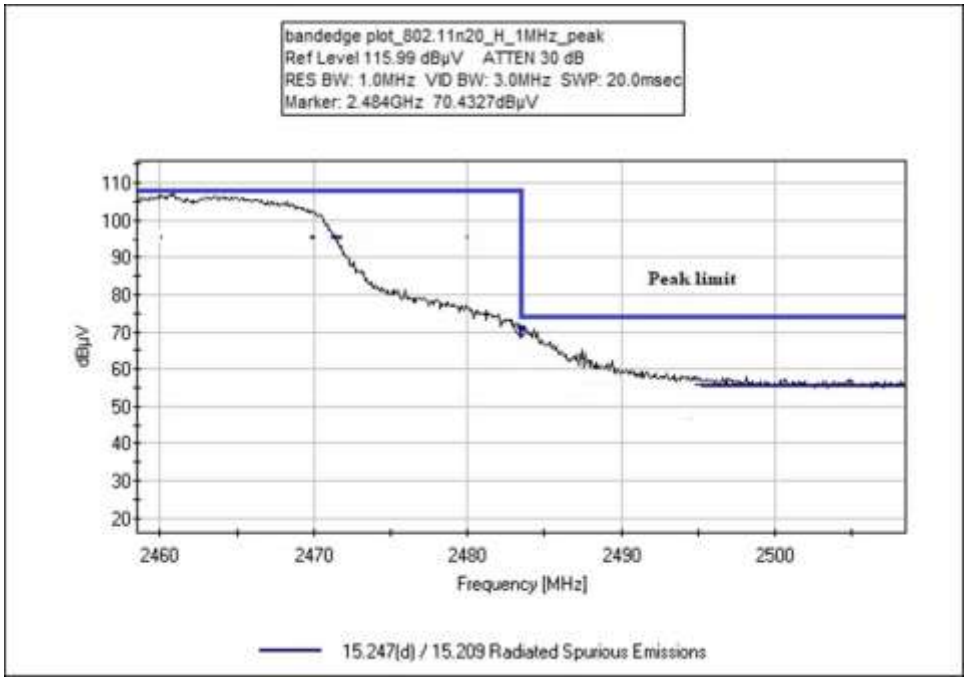
*See next page

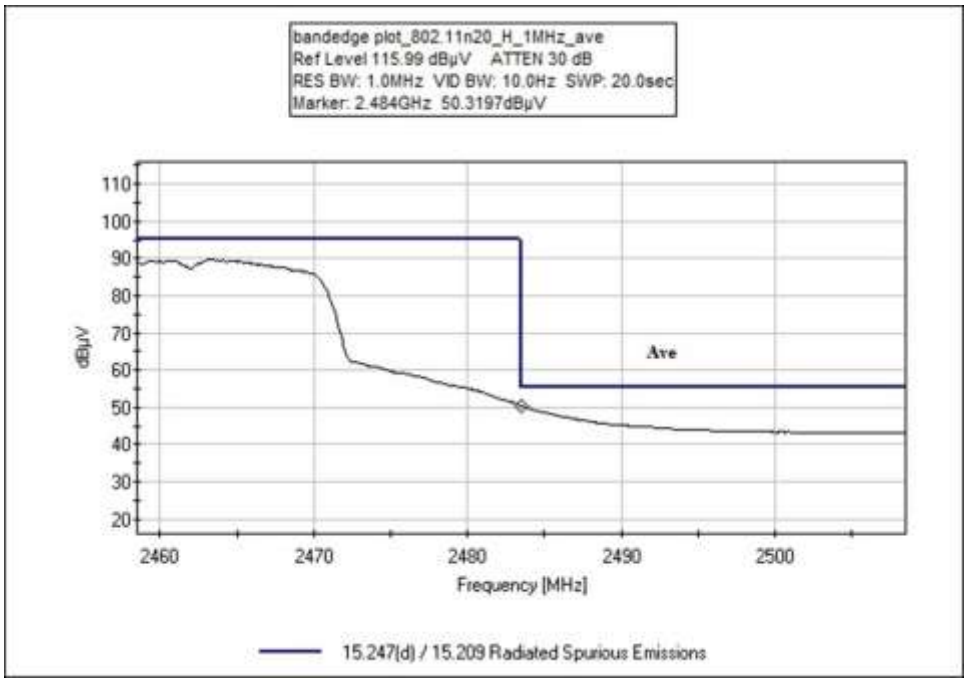


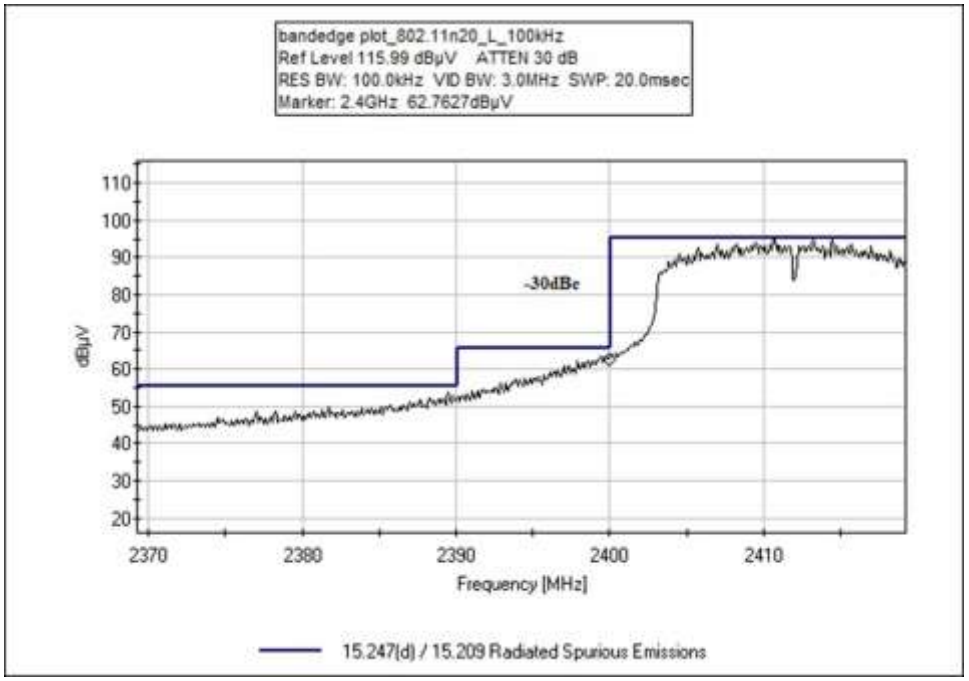

bandedge plot_802.11n20_L_1MHz_Peak
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 73.6567dBµV
see 100kHz
Peak limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

802.


bandedge plot_802.11n20_L_1MHz_ave
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 30.0sec
Marker: 2.39GHz 53.7267dBµV
dBµV
Ave limit
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

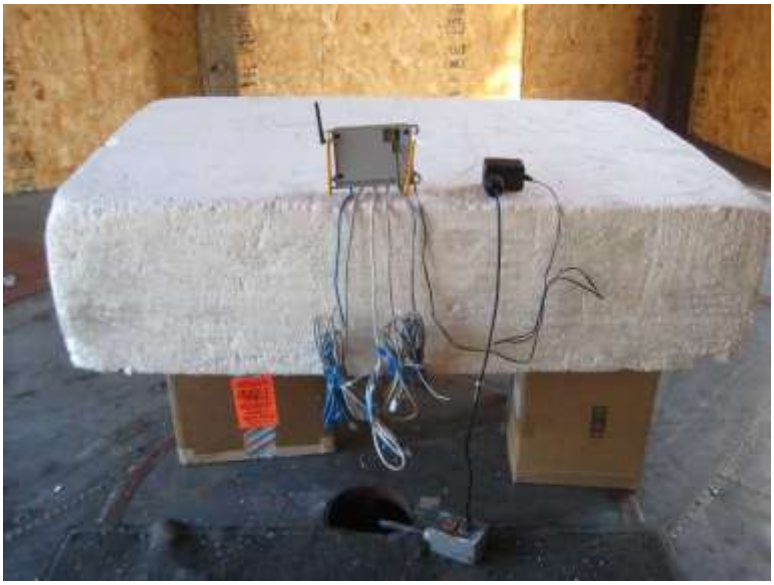

bandedge plot_802.11n20_H_1MHz_peak
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 70.4327dBµV
dBµV
Peak limit
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge plot_802.11n20_H_1MHz_ave
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 20.0sec
Marker: 2.484GHz 50.3197dBµV
dBµV
Ave
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge plot_802.11n20_L_100kHz
Ref Level 115.99 dBµV ATTEN 30 dB
RES BW: 100.0kHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.4GHz 62.7627dBµV
dBµV
-30dBc
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup Photo(s)

Below 1GHz



Below 1GHz

Above 1GHz

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112		
Customer:	**Venstar, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**104502**	Date:	1/6/2021
Test Type:	**Conducted Emissions**	Time:	16:29:55
Tested By:	E. Wong	Sequence#:	7
Software:	EMITest 5.03.19		110/60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

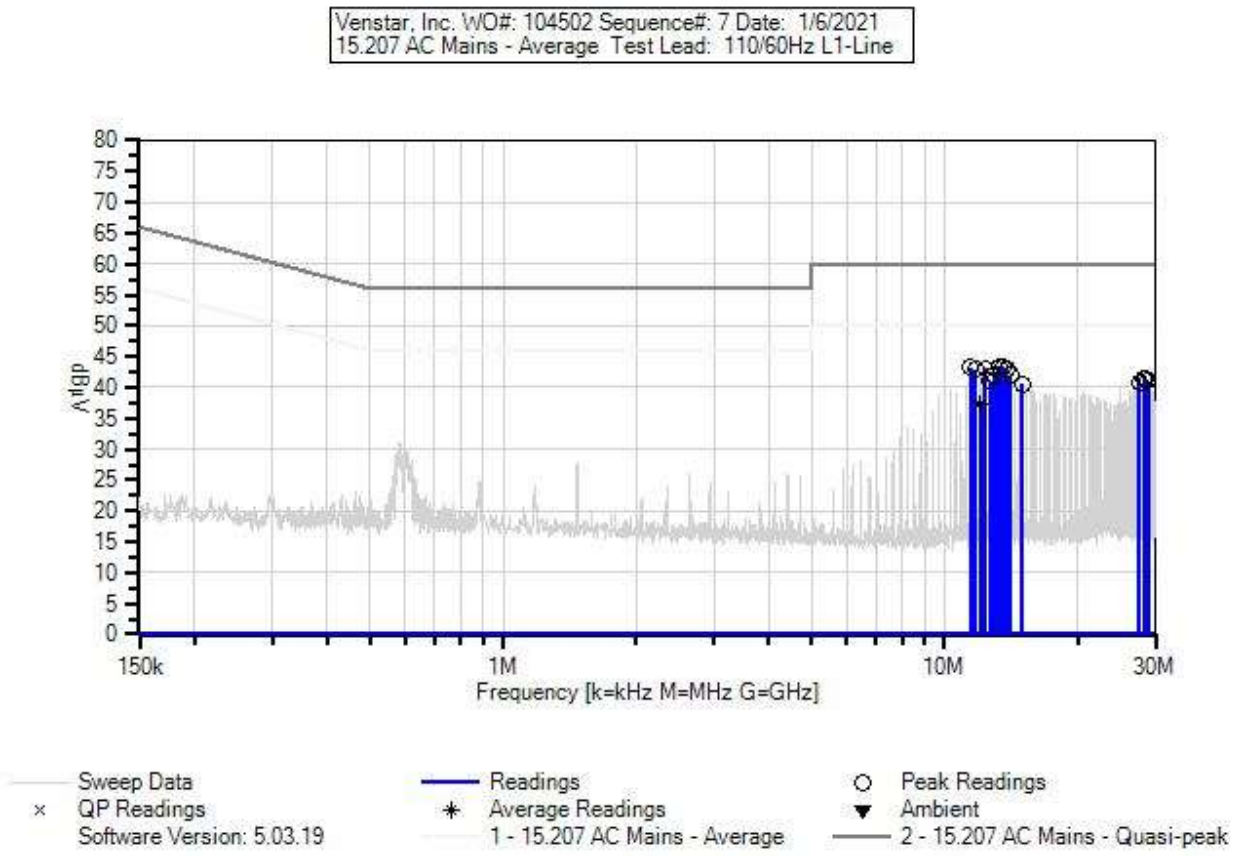
Test Conditions / Notes:

The EUT is placed on the table, 5 Ethernet cables are connected to the Ethernet ports.
Software setting:
Set Mode: Transmit
Power setting: 20dBm
Modulation: DBPSK (802.11b) worst case

Frequency: 2442MHz

Frequency range of measurement = 150kHz- 30MHz.
150 kHz-30 MHz; RBW=9 kHz, VBW=30kHz
ANSI C63.10-2013

Test environment conditions:
Temperature: 27°C
Relative Humidity: 29%
Atmospheric Pressure: 100kPa



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/3/2020	8/3/2021
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
T4	ANP07738	Cable-Line L1(dB)	90cm-extcord	12/9/2020	12/9/2022
	ANP07738	Cable-Neutral L2(dB)	90cm-extcord	12/9/2020	12/9/2022
T5	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021

Measurement Data: Reading listed by margin. Test Lead: L1-Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist.	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	13.238M	36.4	+5.8 +0.1	+0.3	+0.2	+0.6	+0.0	43.4	50.0	-6.6	L1-Li
2	13.526M	36.4	+5.8 +0.1	+0.3	+0.2	+0.6	+0.0	43.4	50.0	-6.6	L1-Li
3	11.472M	36.3	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	43.2	50.0	-6.8	L1-Li
4	12.355M	36.2	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	43.1	50.0	-6.9	L1-Li
5	13.824M	36.1	+5.8 +0.1	+0.3	+0.2	+0.6	+0.0	43.1	50.0	-6.9	L1-Li
6	11.761M	36.0	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	42.9	50.0	-7.1	L1-Li
7	12.941M	35.1	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	42.0	50.0	-8.0	L1-Li
8	14.121M	34.9	+5.8 +0.1	+0.3	+0.2	+0.6	+0.0	41.9	50.0	-8.1	L1-Li
9	28.239M	33.9	+5.8 +0.2	+0.5	+0.2	+0.9	+0.0	41.5	50.0	-8.5	L1-Li
10	28.534M	33.8	+5.8 +0.2	+0.5	+0.2	+0.9	+0.0	41.4	50.0	-8.6	L1-Li
11	12.652M	34.1	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	41.0	50.0	-9.0	L1-Li
12	28.828M	33.4	+5.8 +0.2	+0.5	+0.2	+0.9	+0.0	41.0	50.0	-9.0	L1-Li
13	27.650M	33.1	+5.8 +0.2	+0.5	+0.2	+0.9	+0.0	40.7	50.0	-9.3	L1-Li
14	15.004M	33.5	+5.8 +0.1	+0.3	+0.2	+0.7	+0.0	40.6	50.0	-9.4	L1-Li
15	12.062M Ave	30.4	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	37.3	50.0	-12.7	L1-Li
^	12.062M	37.5	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	44.4	50.0	-5.6	L1-Li
^	12.058M	37.4	+5.8 +0.1	+0.3	+0.2	+0.5	+0.0	44.3	50.0	-5.7	L1-Li

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112		
Customer:	**Venstar, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**104502**	Date:	1/6/2021
Test Type:	**Conducted Emissions**	Time:	4:30:33 PM
Tested By:	E. Wong	Sequence#:	8
Software:	EMITest 5.03.19		110/60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

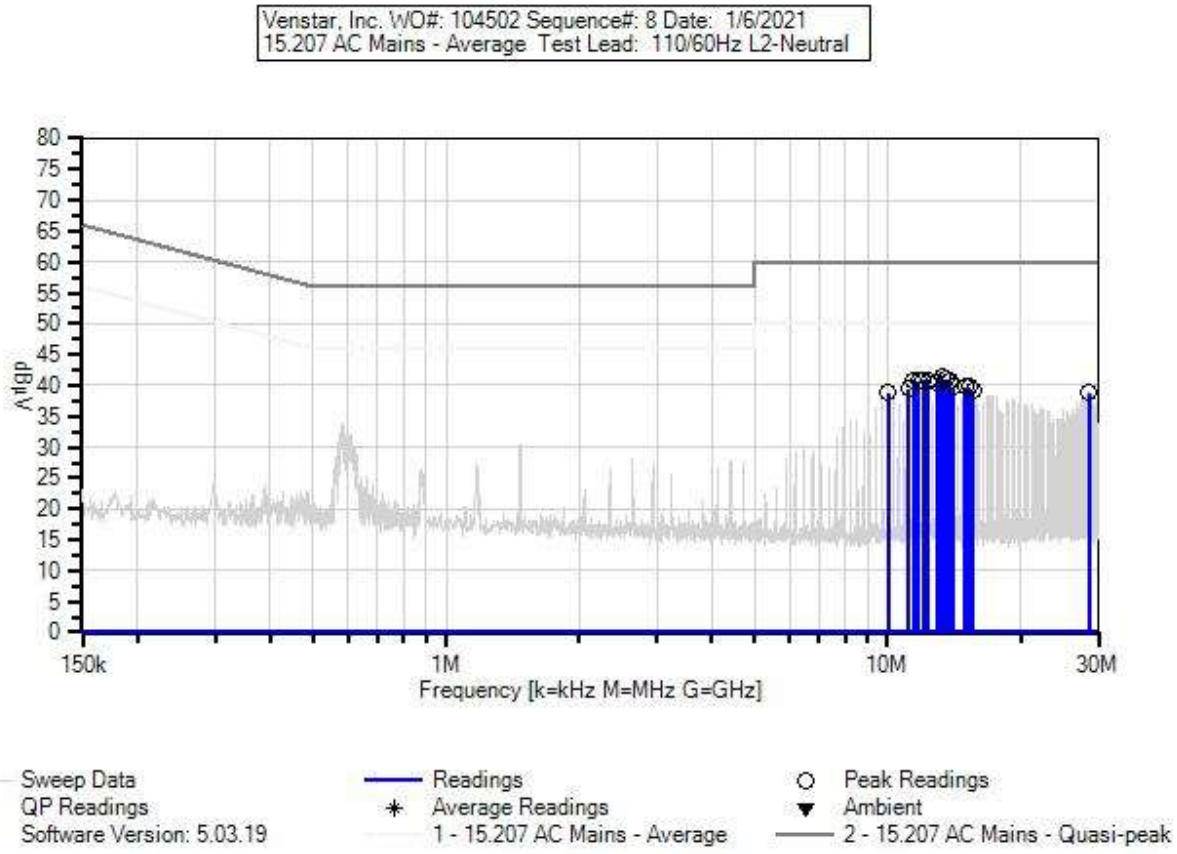
Test Conditions / Notes:

The EUT is placed on the table, 5 Ethernet cables are connected to the Ethernet ports.
Software setting:
Set Mode: Transmit
Power setting: 20dBm
Modulation: DBPSK (802.11b) worst case

Frequency: 2442MHz

Frequency range of measurement = 150kHz- 30MHz.
150 kHz-30 MHz; RBW=9 kHz, VBW=30kHz
ANSI C63.10-2013

Test environment conditions:
Temperature: 27°C
Relative Humidity: 29%
Atmospheric Pressure: 100kPa



Test Equipment:

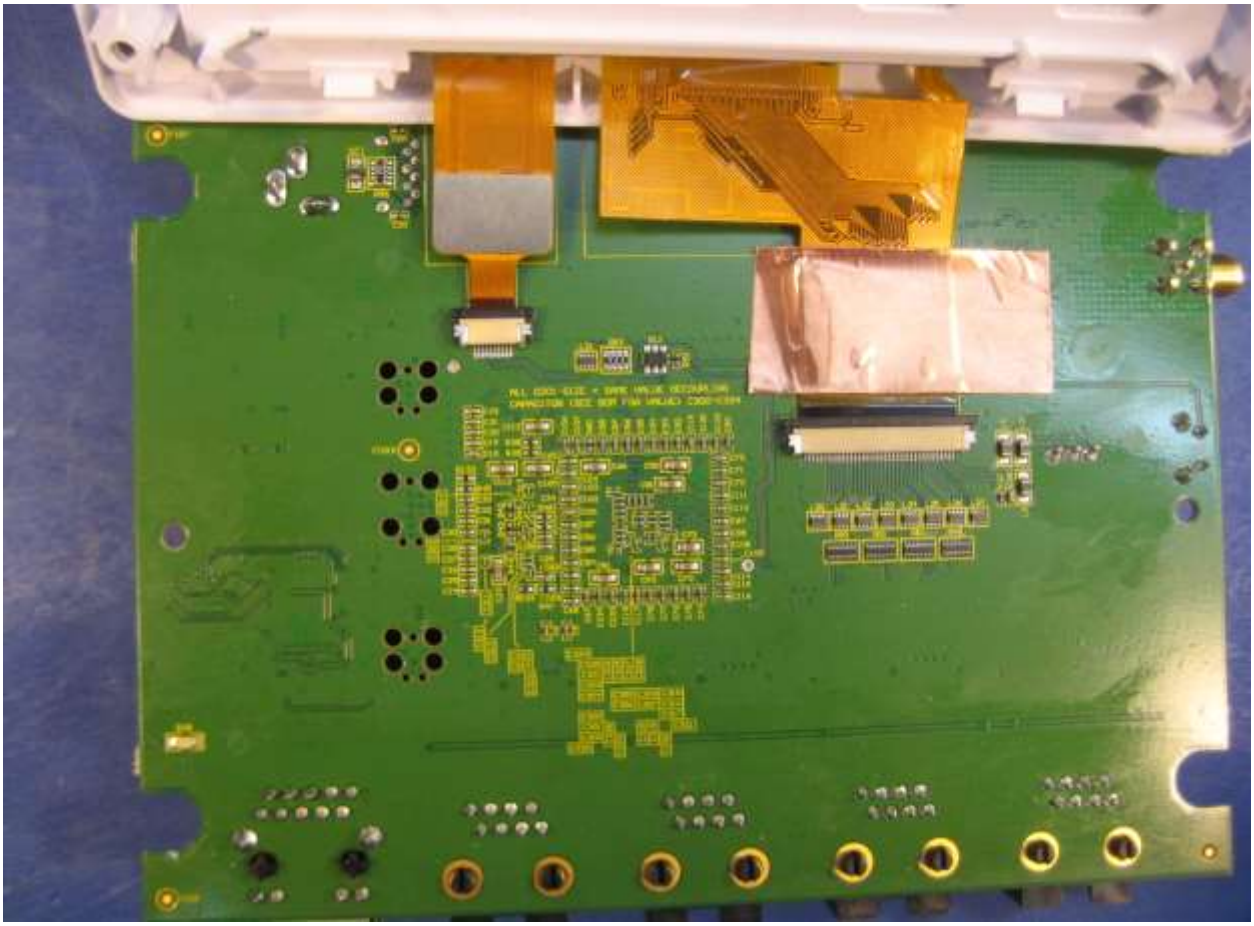
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/3/2020	8/3/2021
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
	ANP07738	Cable-Line L1(dB)	90cm-extcord	12/9/2020	12/9/2022
T4	ANP07738	Cable-Neutral L2(dB)	90cm-extcord	12/9/2020	12/9/2022
	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
T5	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021

Measurement Data: Reading listed by margin. Test Lead: L2-Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist.	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	13.238M	34.4	+5.8 +0.2	+0.3	+0.2	+0.5	+0.0	41.4	50.0	-8.6	L2-Ne
2	13.526M	34.1	+5.8 +0.2	+0.3	+0.2	+0.5	+0.0	41.1	50.0	-8.9	L2-Ne
3	11.472M	33.9	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	40.8	50.0	-9.2	L2-Ne
4	12.058M	33.9	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	40.8	50.0	-9.2	L2-Ne
5	12.355M	33.9	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	40.8	50.0	-9.2	L2-Ne
6	11.770M	33.8	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	40.7	50.0	-9.3	L2-Ne
7	13.824M	33.7	+5.8 +0.2	+0.3	+0.2	+0.5	+0.0	40.7	50.0	-9.3	L2-Ne
8	12.941M	33.6	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	40.5	50.0	-9.5	L2-Ne
9	14.121M	32.8	+5.8 +0.2	+0.3	+0.2	+0.5	+0.0	39.8	50.0	-10.2	L2-Ne
10	15.004M	32.6	+5.8 +0.2	+0.3	+0.2	+0.6	+0.0	39.7	50.0	-10.3	L2-Ne
11	15.301M	32.6	+5.8 +0.2	+0.3	+0.2	+0.6	+0.0	39.7	50.0	-10.3	L2-Ne
12	11.175M	32.6	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	39.5	50.0	-10.5	L2-Ne
13	15.589M	32.1	+5.8 +0.2	+0.3	+0.2	+0.6	+0.0	39.2	50.0	-10.8	L2-Ne
14	10.004M	31.9	+5.8 +0.2	+0.3	+0.2	+0.4	+0.0	38.8	50.0	-11.2	L2-Ne
15	28.534M	31.1	+5.8 +0.3	+0.5	+0.2	+0.9	+0.0	38.8	50.0	-11.2	L2-Ne

Test Setup Photo(s)

Appendix A: Modification



Mod 1 =Copper tape added to LCD display ribbon cable to suppress radiated emission below 1 GHz.

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.