KE2 Connect

TEST REPORT FOR

Edge Manager
Model: 21596

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(DTS 2400-2483.5 MHz)

Report No.: 99529-5

Date of issue: October 30, 2017

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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 EMC 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.

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Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

KE2 Connect
12 Chamber Drive
Washington, MO 63090

Representative: Steve Roberts

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 99529

DATE OF EQUIPMENT RECEIPT: October 23, 2017
DATE(S) OF TESTING: October 23, 2017

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment 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	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147

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	NP
15.247(b)(3)	Output Power	NA	NP
15.247(e)	Power Spectral Density	NA	NP
15.247(d)	RF Conducted Emissions & Band Edge	NA	NP
15.247(d)	Radiated Emissions & Band Edge	NA	PASS
15.207	AC Conducted Emissions	NA	PASS

NA = Not Applicable
NP = CKC Laboratories was not contracted to perform test.

Modifications During Testing

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

Summary of Conditions
No modifications were made during testing.

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)

CKC Laboratories tested Device/Model: **Device: SmartEdge Portable Access Point, Model: KE2 Connect**

Since the time of testing, the manufacturer has chosen to update the device and model names to:
Device: Edge Manager, Model: 21596. Any difference between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested device/model.

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 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
5V DC Power Supply	CUI Inc	SW15-5-N-138	NA
Edge Manager	KE2 Connect	21596	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Lenovo	Thinkpad	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11b/g/n20/n40
Operating Frequency Range:	802.11b/g/n20 2412-2462MHz 802.11n40 2426-2452MHz
Modulation Type(s):	CCK,OFDM
Maximum Duty Cycle:	99%
Number of TX Chains:	2
Antenna Type(s) and Gain:	External 2dBi
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	5Vdc
Firmware / Software used for Test:	Atheros Radio test (ART2-GUI) version 2.3

FCC Part 15 Subpart C

15.247(d) Radiated Emissions & Band Edge

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	10/23/2017
Configuration:	1		

See data sheets for test setup and test equipment.

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112
Customer: **KE2 Connect**
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
Work Order #: **99529** Date: 10/23/2017
Test Type: **Radiated Scan** Time: 14:03:41
Tested By: E. Wong Sequence#: 4
Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT seeking PCII equipment authorization is placed on a Styrofoam block. Antennas set in vertical position as intended.

WAN, USB, RS485 are connected to section of cable.
LAN is connected to remote laptop for configuration of continuous transmit test mode.

Changes from original certification:
Depopulation of 5745-5825MHz radio.
Metal enclosure and two external antennae.
Antenna gain 2 dBi.

802.11 b/g/n20/
Freq 2412-2462MHz
802.11 n40
Freq 2422-2452MHz

Tx Freq
802.11 b/g/n20/

2412MHz, 2437MHz, 2462MHz

802.11 n40
2422MHz, 2437MHz, 2452MHz
Note: The software setting on support laptop is adjusted by 10MHz to set the measured center frequency.

Test software setting
Max TX power set: to match original testing.
802.11b : 18.0
802.11g: 15.0
802.11n20: 14.5
802.11n40: 14.5, 14.0
Gain set : not selected.

802.11b/g transmit one channel at a time, presented as 0 x 1, 0 x 2 .
802.11n20/ n20 transmit simultaneously

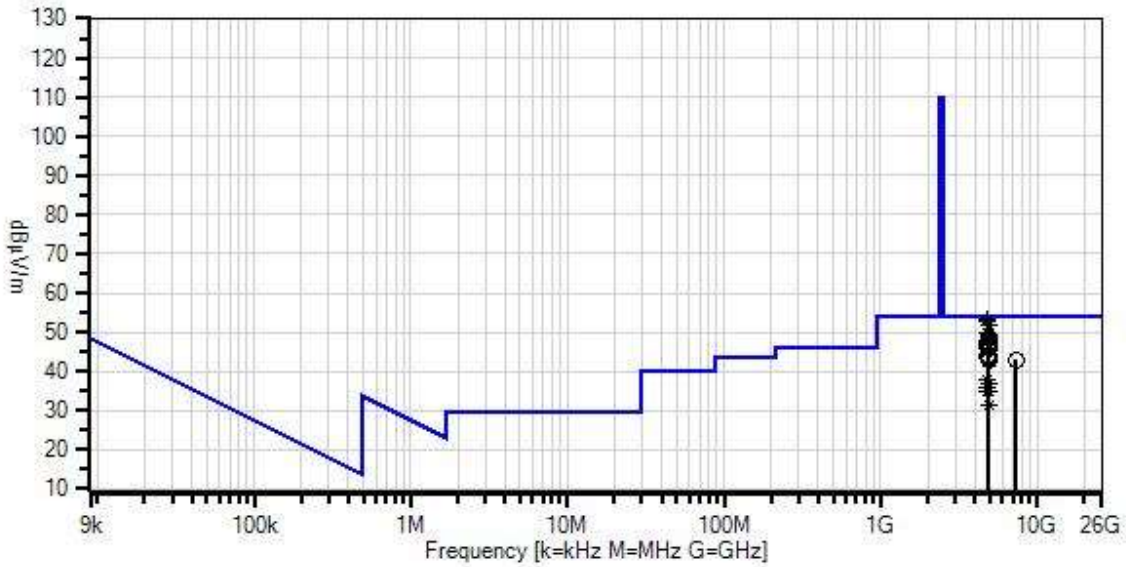
Frequency range of measurement = 1-18GHz base on preliminary test data.
1000 MHz-18000 MHz; RBW=1 MHz, VBW=1 MHz.
Test environment conditions: 24°C, 55 % Relative Humidity, 100kPa

Evaluation for PC II.
Site A
ANSI C63.10-2013

Emission profile of the EUT rotated along three orthogonal axis was investigated. Recorded data represent worse case emission, no Emission found beyond second harmonics.

All data rates / modulation types were evaluated during preliminary investigation. The test data represents worst case emissions for the investigated operational modes.

KE2 Connect WO#: 99529 Sequence#: 4 Date: 10/23/2017
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/1/2017	8/1/2018
T2	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T3	ANP06543	Cable	32022-29094K-29094K-24TC	11/30/2015	11/30/2017
T4	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T5	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T6	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/2/2017	6/2/2019

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	4823.983M Ave	54.2	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	53.1	54.0 802.11b_2437MHz _Tx18_0 x 1	-0.9	Vert
2	4823.983M Ave	54.1	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	53.0	54.0 802.11b_2437MHz _Tx18_0 x 1	-1.0	Horiz
3	4824.000M Ave	53.8	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	52.7	54.0 802.11b_2412MHz _Tx18_0 x 1	-1.3	Horiz
4	4824.000M Ave	53.7	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	52.6	54.0 802.11b_2412MHz _Tx18_0 x 1	-1.4	Vert
5	4923.900M Ave	52.5	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	51.6	54.0 802.11b_2462MHz _Tx18_0 x 1	-2.4	Vert
^	4923.900M	55.0	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	54.1	54.0 802.11b_2462MHz _Tx18_0 x 1	+0.1	Vert
7	4823.983M Ave	51.0	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	49.9	54.0 802.11b_2437MHz _Tx18_0 x 2	-4.1	Vert
8	4924.050M Ave	50.3	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	49.4	54.0 802.11b_2462MHz _Tx18_0 x 1	-4.6	Horiz
^	4924.050M	53.0	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	52.1	54.0 802.11b_2462MHz _Tx18_0 x 1	-1.9	Horiz
^	4924.050M	49.4	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	48.5	54.0 802.11b_2462MHz _Tx18_0 x 2	-5.5	Horiz
^	4924.000M	47.0	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	46.1	54.0 802.11g_2462MHz _Tx18_0 x 1	-7.9	Horiz

12	4902.500M	49.2	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	48.3	54.0	-5.7	Vert extra data _802.11N40_2452 MHz_ Tx target
13	4824.000M Ave	49.0	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	47.9	54.0	-6.1	Vert 802.11b_2412MHz _Tx18_0 x 2
^	4823.983M	56.2	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	55.1	54.0	+1.1	Vert 802.11b_2437MHz _Tx18_0 x 1
^	4824.000M	55.9	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	54.8	54.0	+0.8	Vert 802.11b_2412MHz _Tx18_0 x 1
^	4823.983M	53.3	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	52.2	54.0	-1.8	Vert 802.11b_2437MHz _Tx18_0 x 2
^	4824.000M	52.2	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	51.1	54.0	-2.9	Vert 802.11b_2412MHz _Tx18_0 x 2
18	4924.050M	48.4	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	47.5	54.0	-6.5	Vert 802.11b_2462MHz _Tx18_0 x 2
19	4824.000M Ave	48.5	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	47.4	54.0	-6.6	Horiz 802.11b_2412MHz _Tx18_0 x 2
20	4823.983M Ave	48.3	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	47.2	54.0	-6.8	Horiz 802.11b_2437MHz _Tx18_0 x 2
^	4823.983M	56.1	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	55.0	54.0	+1.0	Horiz 802.11b_2437MHz _Tx18_0 x 1
^	4824.000M	55.8	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	54.7	54.0	+0.7	Horiz 802.11b_2412MHz _Tx18_0 x 1
^	4824.000M	51.3	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	50.2	54.0	-3.8	Horiz 802.11b_2412MHz _Tx18_0 x 2
^	4823.983M	51.3	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	50.2	54.0	-3.8	Horiz 802.11b_2437MHz _Tx18_0 x 2
25	4872.625M	48.0	+0.0 +5.8	+29.7 +0.3	+0.8	-37.7	+0.0	46.9	54.0	-7.1	Horiz 802.11g_2473MHz _Tx18_0 x 1
26	4902.500M	47.4	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	46.5	54.0	-7.5	Horiz extra data _802.11N40_2452 MHz_ Tx target
27	4823.000M	47.5	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	46.4	54.0	-7.6	Vert 802.11n20_2412M Hz Tx:14.5

28	4873.330M	46.9	+0.0 +5.8	+29.7 +0.3	+0.8	-37.7	+0.0	45.8	54.0	-8.2	Vert 802.11n20_2437M Hz Tx:14.5
29	4822.300M	45.0	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	43.9	54.0	-10.1	Vert 802.11n40_2422M Hz Tx:14.5
30	4902.330M	44.7	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	43.8	54.0	-10.2	Vert 802.11n40_2452M Hz Tx:14.5
31	4874.620M	44.5	+0.0 +5.9	+29.7 +0.3	+0.8	-37.7	+0.0	43.5	54.0	-10.5	Horiz 802.11g_2473MHz _Tx18_0 x 2
32	4871.170M	44.0	+0.0 +5.8	+29.7 +0.3	+0.8	-37.7	+0.0	42.9	54.0	-11.1	Vert 802.11n40_2437M Hz Tx:14.5
33	7311.700M	38.8	+0.0 +7.5	+32.8 +0.2	+0.9	-37.3	+0.0	42.9	54.0	-11.1	Vert 802.11n20_2437M Hz Tx:14.5
34	4922.500M	43.6	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	42.7	54.0	-11.3	Horiz 802.11g_2462MHz _Tx18_0 x 2
35	4823.500M Ave	39.0	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	37.9	54.0	-16.1	Vert 802.11g_2412MHz _Tx18_0 x 1
36	4874.625M Ave	37.7	+0.0 +5.9	+29.7 +0.3	+0.8	-37.7	+0.0	36.7	54.0	-17.3	Vert 802.11g_2473MHz _Tx18_0 x 1
^	4874.625M	53.3	+0.0 +5.9	+29.7 +0.3	+0.8	-37.7	+0.0	52.3	54.0	-1.7	Vert 802.11g_2473MHz _Tx18_0 x 1
^	4874.620M	47.2	+0.0 +5.9	+29.7 +0.3	+0.8	-37.7	+0.0	46.2	54.0	-7.8	Vert 802.11g_2473MHz _Tx18_0 x 2
39	4823.500M Ave	37.1	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	36.0	54.0	-18.0	Horiz 802.11g_2412MHz _Tx18_0 x 1
^	4823.500M	50.8	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	49.7	54.0	-4.3	Horiz 802.11g_2412MHz _Tx18_0 x 1
^	4823.500M	47.8	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	46.7	54.0	-7.3	Horiz 802.11g_2412MHz _Tx18_0 x 2
42	4922.000M Ave	36.0	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	35.1	54.0	-18.9	Vert 802.11g_2462MHz _Tx18_0 x 1
^	4922.000M	51.1	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	50.2	54.0	-3.8	Vert 802.11g_2462MHz _Tx18_0 x 1
^	4922.000M	46.3	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	45.4	54.0	-8.6	Vert 802.11g_2462MHz _Tx18_0 x 2

45	4823.500M Ave	35.9	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	34.8	54.0	-19.2	Vert 802.11g_2412MHz _Tx18_0 x 2
^	4823.500M	53.7	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	52.6	54.0	-1.4	Vert 802.11g_2412MHz _Tx18_0 x 1
^	4823.500M	50.6	+0.0 +5.8	+29.6 +0.3	+0.8	-37.6	+0.0	49.5	54.0	-4.5	Vert 802.11g_2412MHz _Tx18_0 x 2
48	4921.333M Ave	32.5	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	31.6	54.0	-22.4	Vert 802.11n20_2462MHz Tx:14.5
^	4921.333M	47.3	+0.0 +5.9	+29.8 +0.3	+0.8	-37.7	+0.0	46.4	54.0	-7.6	Vert 802.11n20_2462MHz Tx:14.5

Band Edge

Band Edge Summary					
Chain1 0X1					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	802.11b	External 2dBi	38.5 Av	<54	Pass
2400.0	802.11b	External 2dBi	65.3	<77.2	Pass
2483.5	802.11b	External 2dBi	44.9	< 54	Pass
Chain2 0X2					
2390.0	802.11b	External 2dBi	48.7	<54	Pass
2400.0	802.11b	External 2dBi	64.6	< 77.8	Pass
2483.5	802.11b	External 2dBi	43.8 Av	< 54	Pass
Chain 1 0X1					
2390.0	802.11g	External 2dBi	45.3 av	<54	Pass
2400.0	802.11g	External 2dBi	57.8	< 59.7	Pass
2483.5	802.11g	External 2dBi	41.6 av	< 54	Pass
Chain2 0X2					
2390.0	802.11g	External 2dBi	41.2 av	<54	Pass
2400.0	802.11g	External 2dBi	55.7	< 58.4	Pass
2483.5	802.11g	External 2dBi	43.0 av	< 54	Pass
Chan1 &2					
2390.0	802.11n20	External 2dBi	45.6 av	<54	Pass
2400.0	802.11n20	External 2dBi	57.0	<69.2	Pass
2483.5	802.11n20	External 2dBi	42.2av	< 54	Pass
Chan1 &2					
2390.0	802.11n40	External 2dBi	53.7	<54	Pass
2400.0	802.11n40	External 2dBi	57.9	<58	Pass
2483.5	802.11n40	External 2dBi	53.2av *	< 54	Pass

*tx power =14.0

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**KE2 Connect**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions_non resticted band -30dBc**		
Work Order #:	**99529**	Date:	10/23/2017
Test Type:	**Radiated Scan**	Time:	19:53:29
Tested By:	E. Wong	Sequence#:	5
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT seeking PCII equipment authorization is placed on a Styrofoam block. Antennas set in vertical position as intended.

WAN, USB, RS485 are connected to section of cable.
LAN is connected to remote laptop for configuration of continuous transmit test mode.

Changes from original certification:
Depopulation of 5745-5825MHz radio.
Metal enclosure and two external antennae.
Antenna gain 2 dBi.

802.11 b/g/n20/
Freq 2412-2462MHz
802.11 n40
Freq 2422-2452MHz

Tx Freq
802.11 b/g/n20/
2412MHz, 2437MHz, 2462MHz

802.11 n40
2422MHz, 2437MHz, 2452MHz
Note: The software setting on support laptop is adjusted by 10MHz to set the measured center frequency.

Test software setting
Max TX power set: to match original testing.
802.11b: 18.0
802.11g: 15
802.11n20: 14.5
802.11n40: 14.5, 14.0
Gain set: not selected.

802.11b/g transmit one channel at a time, presented as 0 x 1, 0 x 2 .
802.11n20/ n20 transmit simultaneously

Frequency range of measurement = Fundamental
2000 MHz-3000 MHz; RBW=1 MHz, VBW=1 MHz.
Test environment conditions: 24°C, 55 % Relative Humidity, 100kPa

Evaluation for PC II.
Site A
ANSI C63.10-2013

Emission profile of the EUT rotated along three orthogonal axis was investigated. Recorded data represent worse case emission, no Emission found beyond second harmonics.
All data rates / modulation types were evaluated during preliminary investigation. The test data represents worst case emissions for the investigated operational modes.

This data sheet is for worst case bandedge at 2400 MHz, -30dBc in 100kHz.bandwidth

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/1/2017	8/1/2018
T2	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T3	ANP06543	Cable	32022-29094K-29094K-24TC	11/30/2015	11/30/2017
T4	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T5	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2400.000M	66.4	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	57.9	58.0 bandedge lo 802.11n40_tx14.5_ both ant	-0.1	Vert
2	2400.000M	66.2	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	57.7	58.4 bandedge low 802.11g_Tx15_0x2	-0.7	Vert
3	2400.000M	66.3	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	57.8	59.7 bandedge_low_802. 11g_Tx15_0x1	-1.9	Vert
4	2400.000M	73.8	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	65.3	77.2 bandedge low_802.11b_Tx18 _ 0 X 1	-11.9	Vert
5	2400.000M	65.5	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	57.0	69.2 bandedge low 802.11n20_tx14.5_ both ant	-12.2	Vert
6	2400.000M	73.1	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	64.6	77.8 bandedge low_802.11b_Tx18 _ 0 X 2	-13.2	Vert

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**KE2 Connect**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99529**	Date:	10/23/2017
Test Type:	**Radiated Scan**	Time:	19:53:29
Tested By:	E. Wong	Sequence#:	5
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT seeking PCII equipment authorization is placed on a Styrofoam block. Antennas set in vertical position as intended.

WAN, USB, RS485 are connected to section of cable.
LAN is connected to remote laptop for configuration of continuous transmit test mode.

Changes from original certification:
Depopulation of 5745-5825MHz radio.
Metal enclosure and two external antennae.
Antenna gain 2 dBi.

802.11 b/g/n20/
Freq 2412-2462MHz
802.11 n40
Freq 2422-2452MHz

Tx Freq
802.11 b/g/n20/
2412MHz, 2437MHz, 2462MHz

802.11 n40
2422MHz, 2437MHz, 2452MHz
Note: The software setting on support laptop is adjusted by 10MHz to set the measured center frequency.

Test software setting
Max TX power set : to match original testing.
802.11b: 18.0
802.11g: 15
802.11n20: 14.5
802.11n40: 14.5, 14.0
Gain set: not selected.

802.11b/g transmit one channel at a time, presented as 0 x 1, 0 x 2 .
802.11n20/ n20 transmit simultaneously

Frequency range of measurement = Fundamental
2000 MHz-3000 MHz; RBW=1 MHz, VBW=1 MHz.

Test environment conditions: 24°C, 55 % Relative Humidity, 100kPa

Evaluation for PC II.
Site A
ANSI C63.10-2013

Emission profile of the EUT rotated along three orthogonal axis was investigated. Recorded data represent worse case emission, no Emission found beyond second harmonics.

All data rates / modulation types were evaluated during preliminary investigation. The test data represents worst case emissions for the investigated operational modes.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/1/2017	8/1/2018
T2	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T3	ANP06543	Cable	32022-29094K-29094K-24TC	11/30/2015	11/30/2017
T4	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T5	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018

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

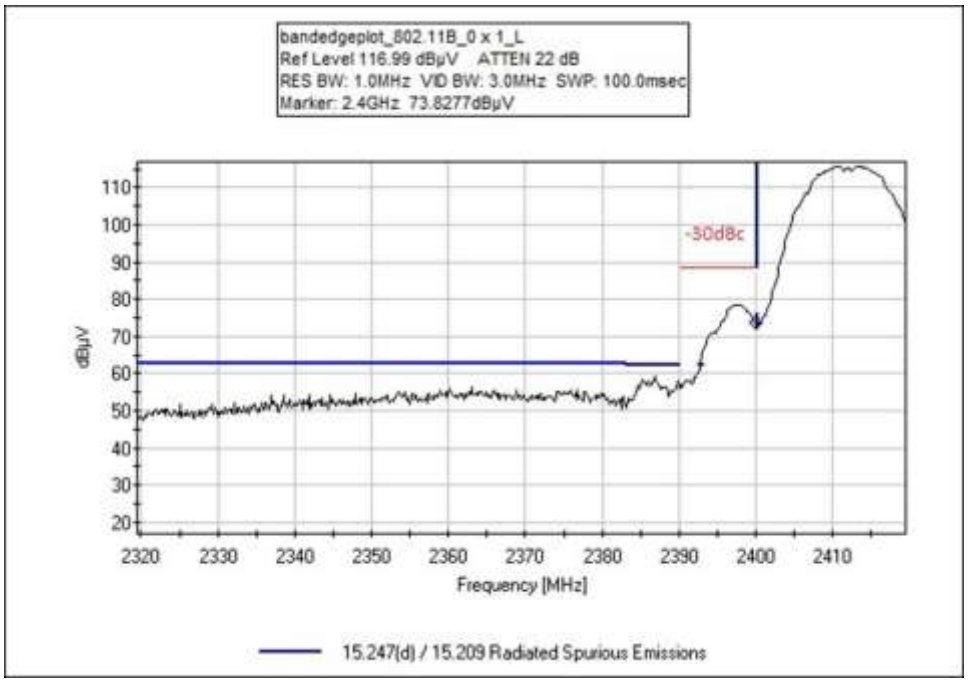
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2390.000M Ave	62.2	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	53.7	54.0 bandedge lo 802.11n40_tx14.5_ both ant	-0.3	Vert
2	2484.000M Ave	61.5	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	53.2	54.0 bandedge hi 802.11n40_tx14.0_ both ant	-0.8	Vert
^	2484.000M	77.9	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	69.6	54.0 bandedge hi 802.11n40_tx14.0_ both ant	+15.6	Vert
4	2390.000M Ave	54.1	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	45.6	54.0 bandedge low 802.11n20_tx14.5_ both ant	-8.4	Vert
5	2390.000M Ave	53.8	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	45.3	54.0 bandedge_low_802. 11g_Tx15_0X1	-8.7	Vert
6	2483.500M Ave	53.2	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	44.9	54.0 bandedge hi 802.11b_Tx18_0X1	-9.1	Vert
7	2655.000M	52.7	+0.0 +4.1	+25.7	+0.6	-38.2	+0.0	44.9	54.0 bandedge Hi 802.11g_tx15_0x1_ revb	-9.1	Vert

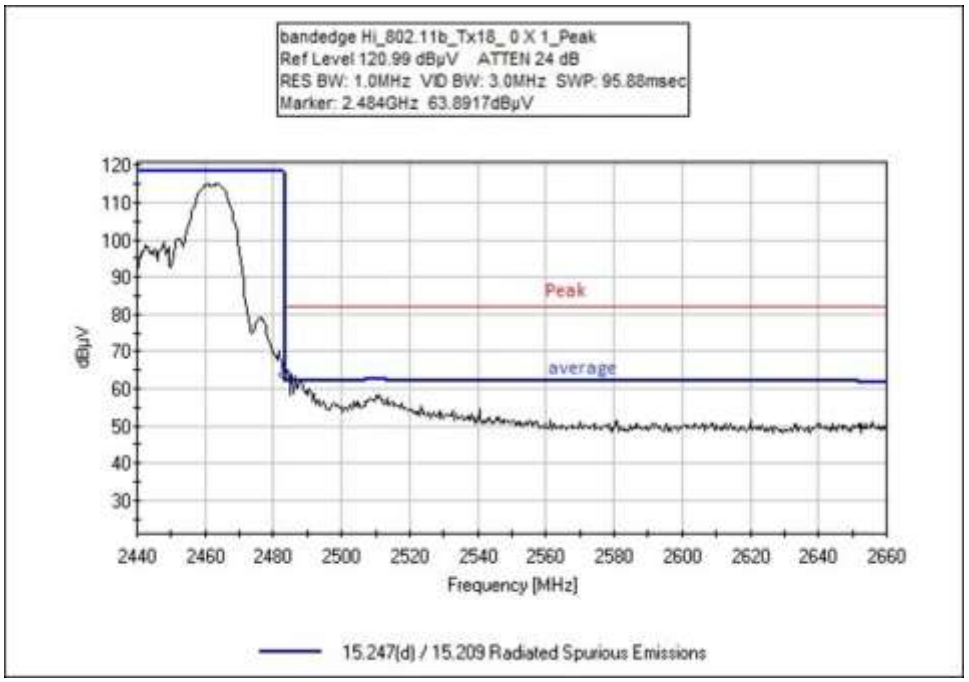
8	2655.000M	52.5	+0.0 +4.1	+25.7	+0.6	-38.2	+0.0	44.7	54.0	-9.3	Vert bandedge hi 802.11n20_tx14.5_ both ant
9	2655.000M	52.4	+0.0 +4.1	+25.7	+0.6	-38.2	+0.0	44.6	54.0	-9.4	Vert bandedge Hi_802.11g_tx15_0 x2
10	2483.500M Ave	52.1	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	43.8	54.0	-10.2	Vert bandedge hi_802.11b_Tx18_ 0 X 2
11	2655.000M	51.1	+0.0 +4.1	+25.7	+0.6	-38.2	+0.0	43.3	54.0	-10.7	Vert bandedge hi 802.11b_Tx18_0X1
12	2483.500M Ave	51.3	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	43.0	54.0	-11.0	Vert bandedge Hi_802.11g_tx15_0 x2
13	2390.000M Ave	51.3	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	42.8	54.0	-11.2	Vert bandedge low 802.11g_Tx15_0x2
14	2483.500M Ave	50.5	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	42.2	54.0	-11.8	Vert bandedge hi 802.11n20_tx14.5_ both ant
15	2483.500M Ave	49.9	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	41.6	54.0	-12.4	Vert bandedge Hi 802.11g_tx15_0x1_ revb
^	2483.500M	72.9	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	64.6	54.0	+10.6	Vert bandedge Hi_802.11g_tx15_0 x2
^	2483.500M	72.1	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	63.8	54.0	+9.8	Vert bandedge Hi 802.11g_tx15_0x1_ revb
^	2483.500M	66.3	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	58.0	54.0	+4.0	Vert bandedge hi 802.11n20_tx14.5_ both ant
^	2483.500M	60.4	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	52.1	54.0	-1.9	Vert bandedge hi 802.11b_Tx18_0X1
^	2483.500M	58.8	+0.0 +4.0	+25.1	+0.6	-38.0	+0.0	50.5	54.0	-3.5	Vert bandedge hi_802.11b_Tx18_ 0 X 2

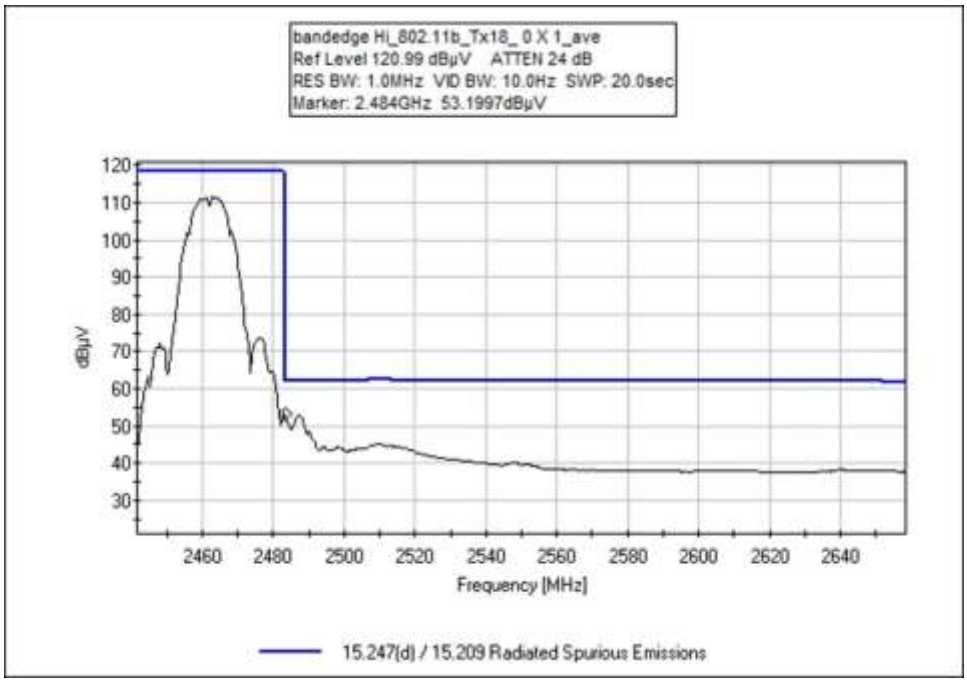
21	2390.000M Ave	49.7	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	41.2	54.0	-12.8	Vert bandedge Low 802.11g_tx15_0x2 _revb
22	2655.000M	48.8	+0.0 +4.1	+25.7	+0.6	-38.2	+0.0	41.0	54.0	-13.0	Vert bandedge hi 802.11n40_tx14.5_ both ant
23	2655.000M	48.6	+0.0 +4.1	+25.7	+0.6	-38.2	+0.0	40.8	54.0	-13.2	Vert bandedge hi_802.11b_Tx18_ 0 X 2
24	2390.000M Ave	47.0	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	38.5	54.0	-15.5	Vert bandedge low_802.11b_Tx18 _ 0 X 1
^	2390.000M	77.8	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	69.3	54.0	+15.3	Vert bandedge lo 802.11n40_tx14.5_ both ant
^	2390.000M	74.6	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	66.1	54.0	+12.1	Vert bandedge_low_802. 11g_Tx15_0X1
^	2390.000M	74.1	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	65.6	54.0	+11.6	Vert bandedge low 802.11n20_tx14.5_ both ant
^	2390.000M	72.4	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	63.9	54.0	+9.9	Vert bandedge low 802.11g_Tx15_0x2
^	2390.000M	69.1	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	60.6	54.0	+6.6	Vert bandedge Low 802.11g_tx15_0x2 _revb
^	2390.000M	58.9	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	50.4	54.0	-3.6	Vert bandedge low_802.11b_Tx18 _ 0 X 1
^	2390.000M	57.2	+0.0 +4.0	+25.0	+0.6	-38.1	+0.0	48.7	54.0	-5.3	Vert bandedge low_802.11b_Tx18 _ 0 X 2

Band Edge Plots

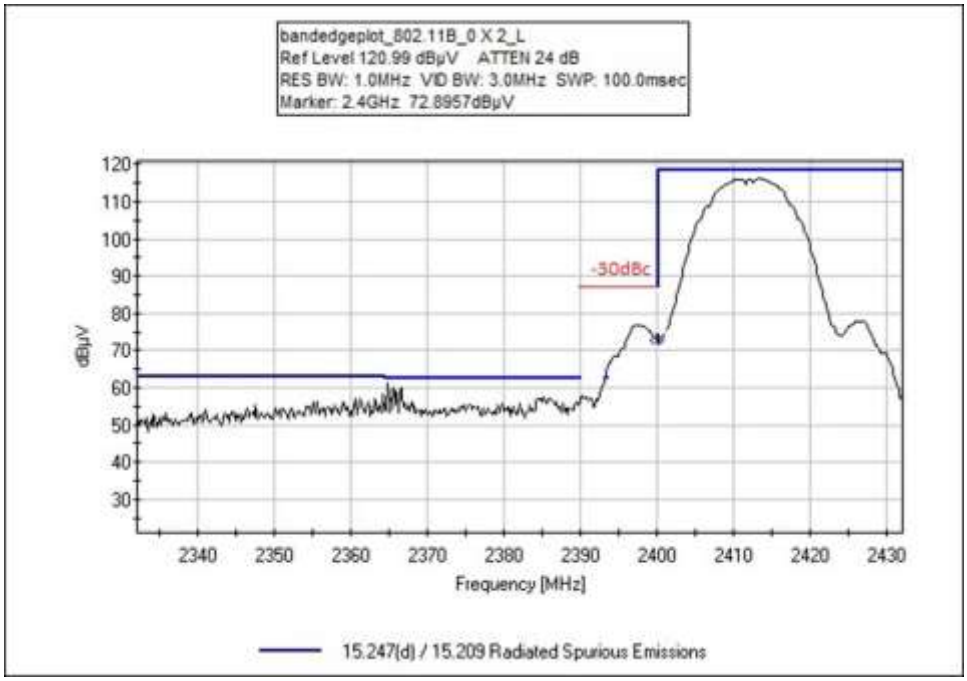
802.11b, 0x1

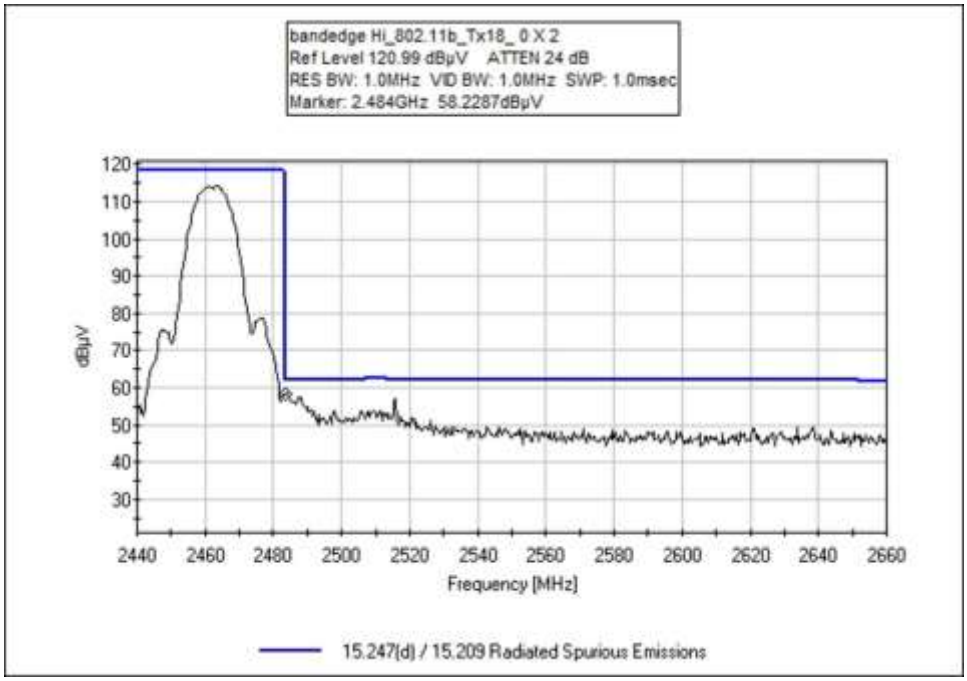




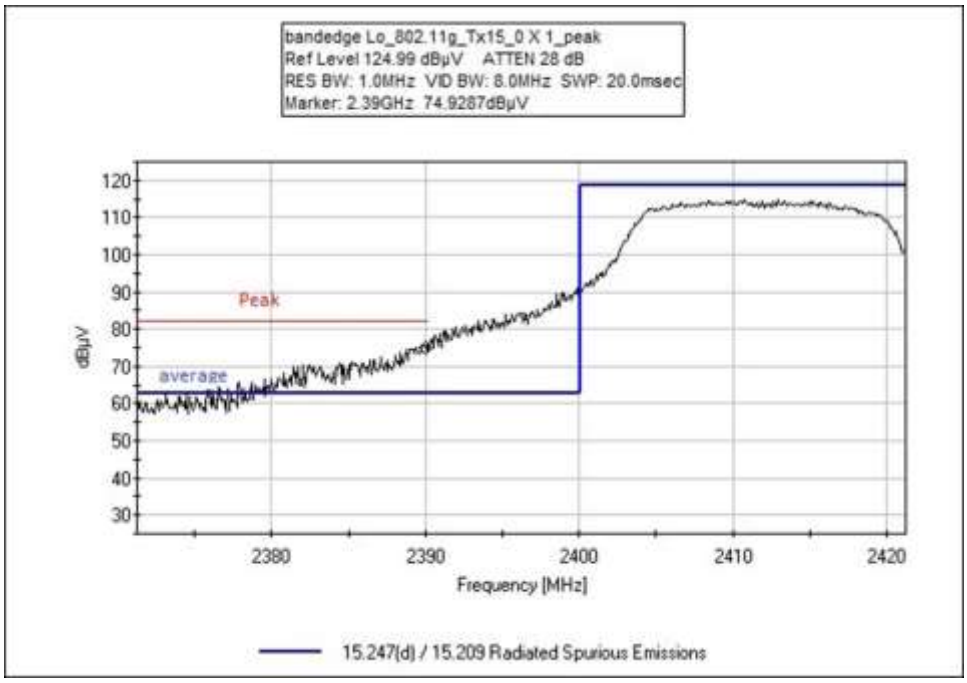

bandedge Hi_802.11b_Tx18_ 0 X 1_ave
Ref Level 120.99 dBµV ATTEN 24 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 20.0sec
Marker: 2.484GHz 53.1997dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
2460
2480
2500
2520
2540
2560
2580
2600
2620
2640
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

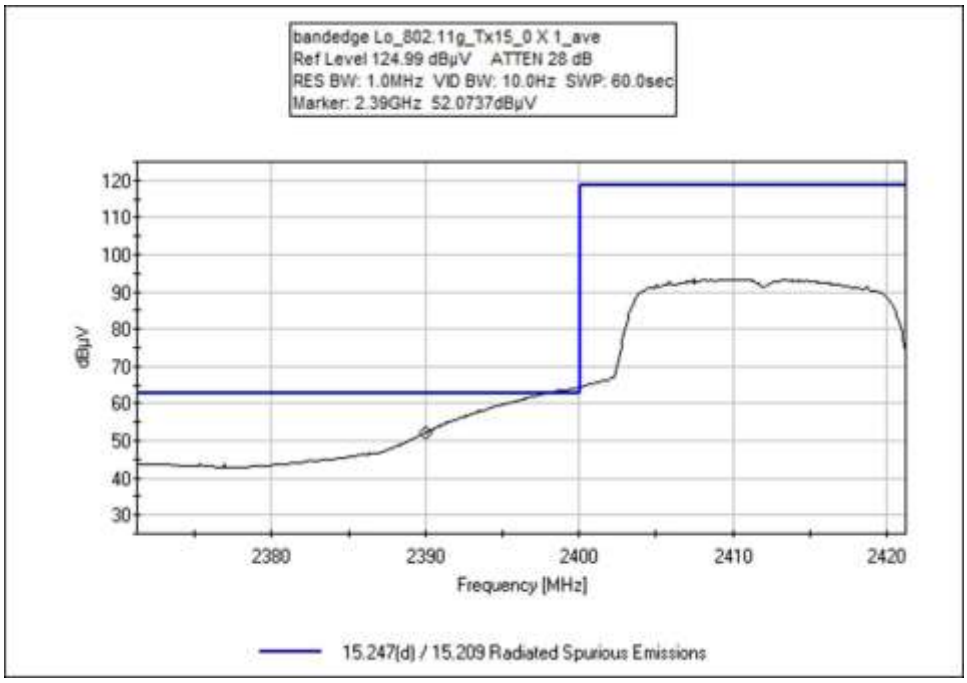
802.11b, 0x2

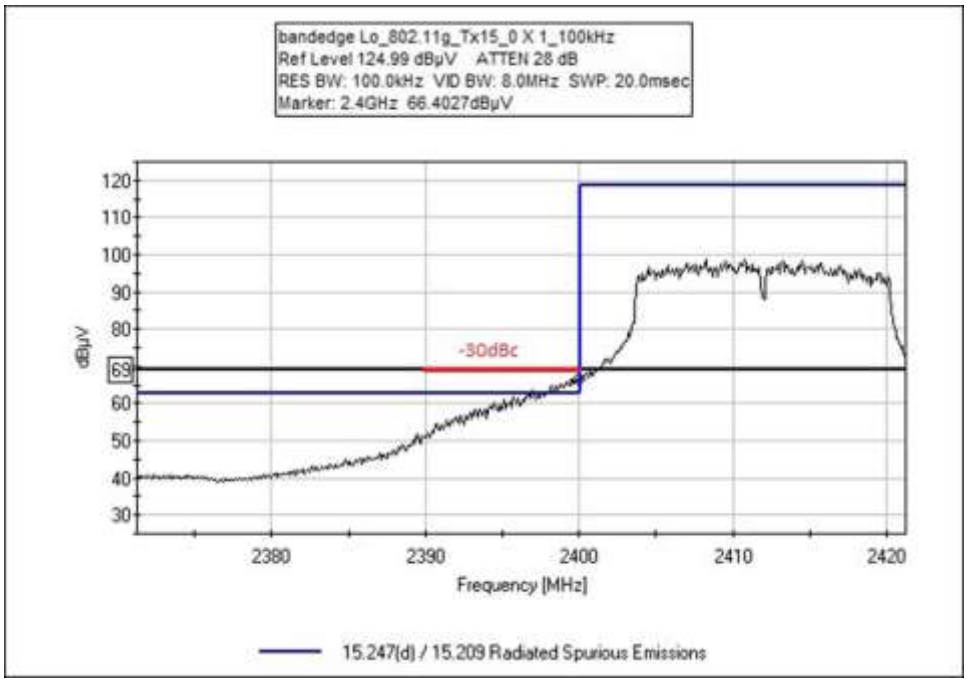

bandedgeplot_802.11B_0 X 2_L
Ref Level 120.99 dBµV ATTEN 24 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 100.0msec
Marker: 2.4GHz 72.8957dBµV
-30dBc
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

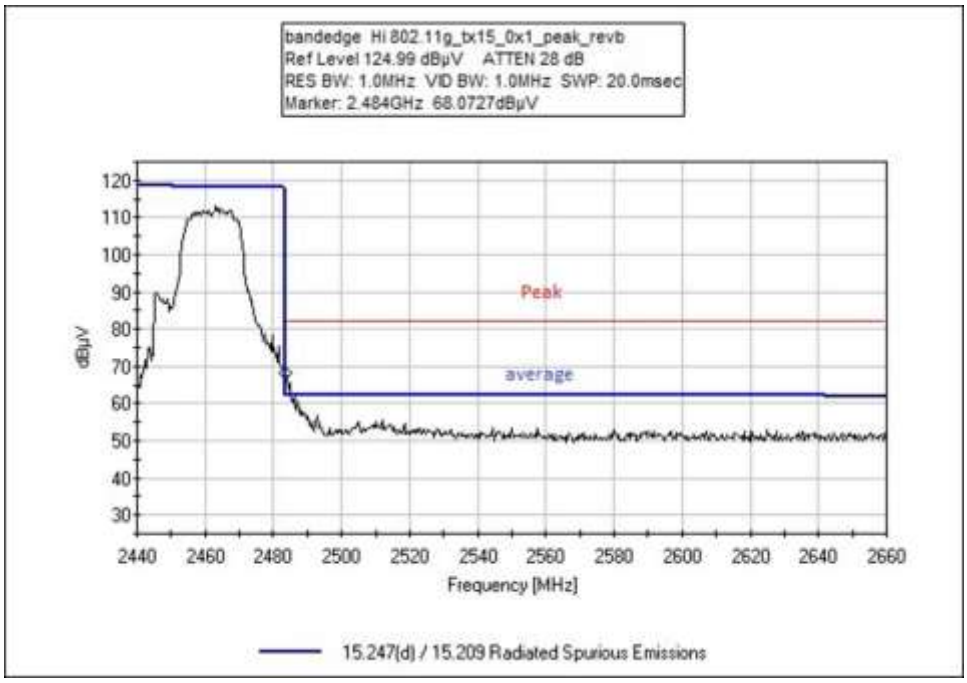

bandedge Hi_802.11b_Tx18_ 0 X 2
Ref Level 120.99 dBµV ATTEN 24 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 1.0msec
Marker: 2.484GHz 58.2287dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

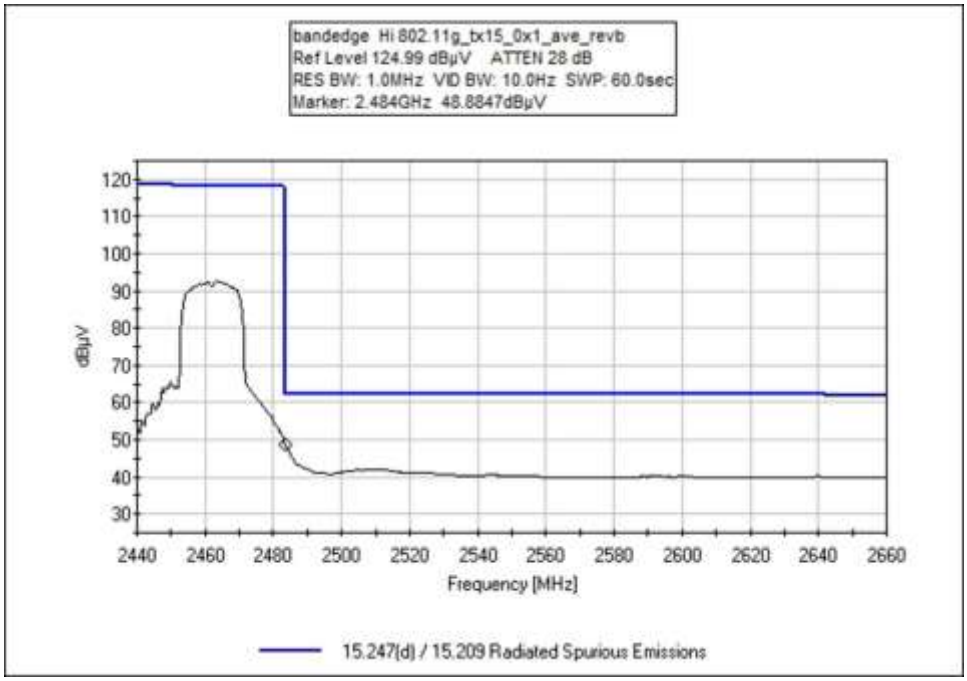
802.11g, 0X1


bandedge Lo_802.11g_Tx15_0 X 1_peak
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 8.0MHz SWP: 20.0msec
Marker: 2.39GHz 74.9287dBµV
Peak
average
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

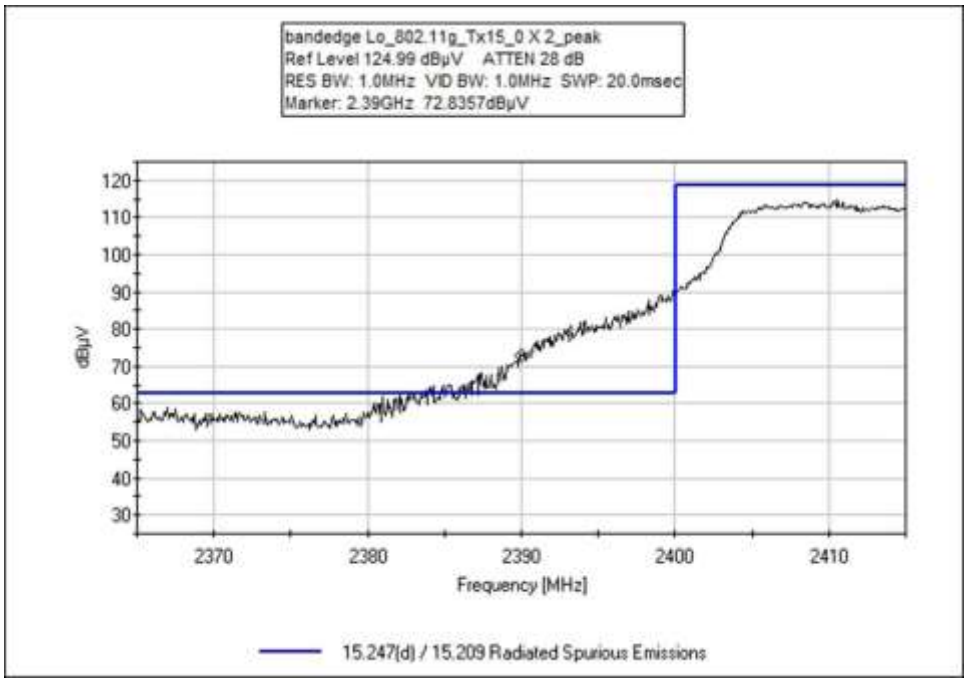

bandedge Lo_802.11g_Tx15_0 X 1_ave
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.39GHz 52.0737dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

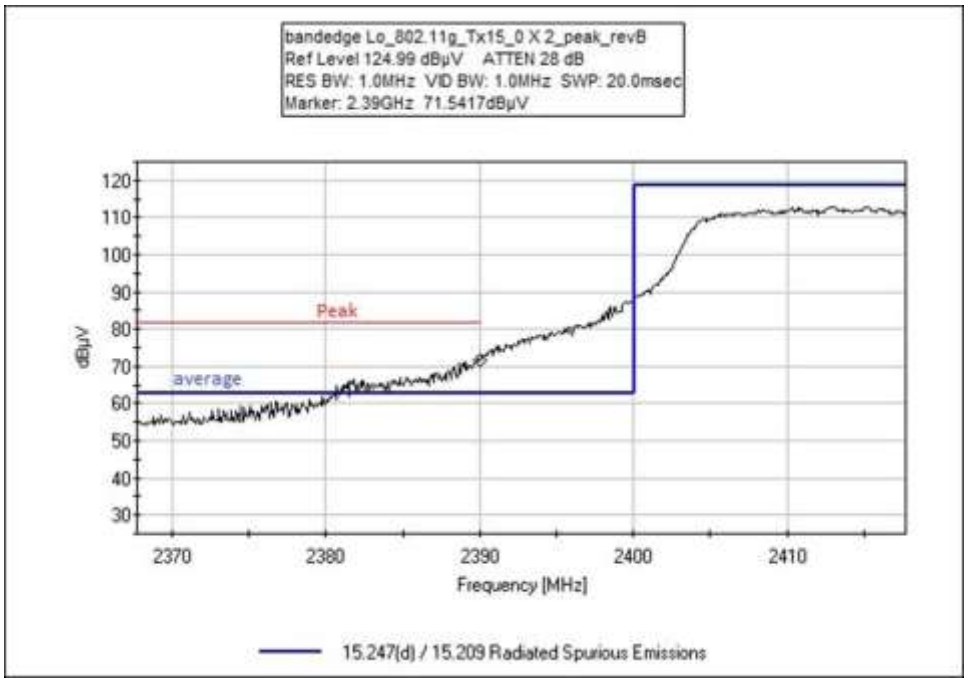

bandedge Lo_802.11g_Tx15_0 X 1_100kHz
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 20.0msec
Marker: 2.4GHz 66.4027dBµV
120
110
100
90
80
69
60
50
40
30
dBµV
-30dBc
2380
2390
2400
2410
2420
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

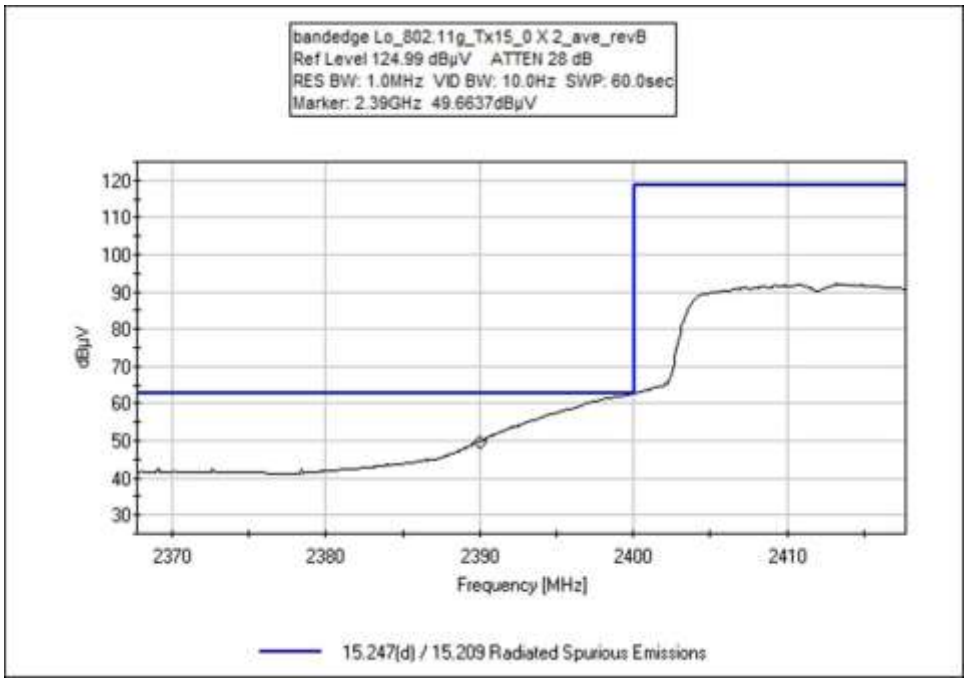

bandedge Hi 802.11g_tx15_0x1_peak_revb
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 68.0727dBµV
Peak
average
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

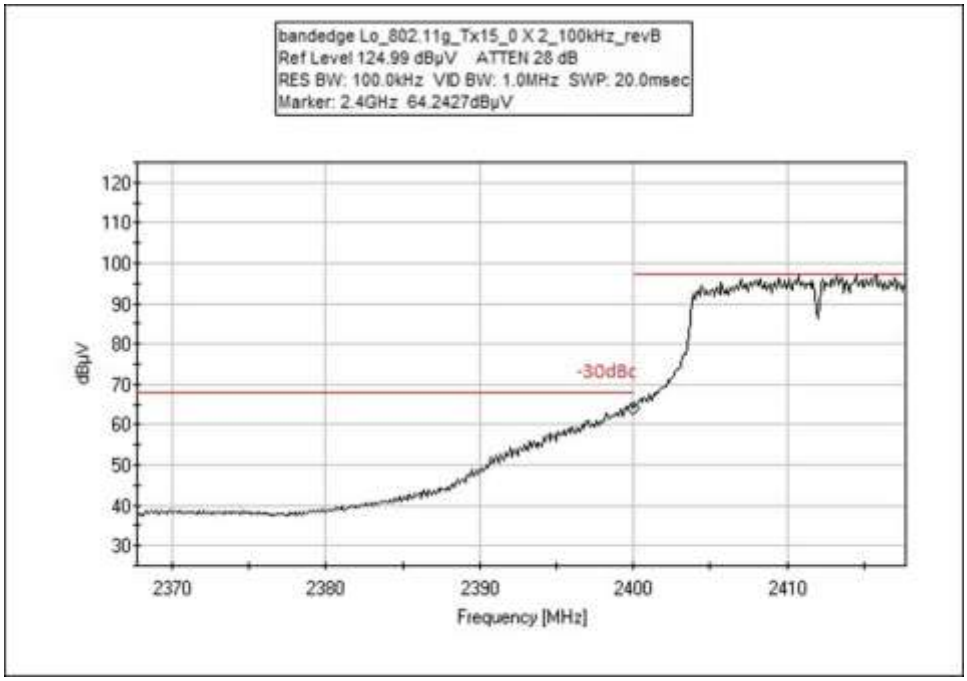

bandedge Hi 802.11g_tx15_0x1_ave_revb
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.484GHz 48.8847dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

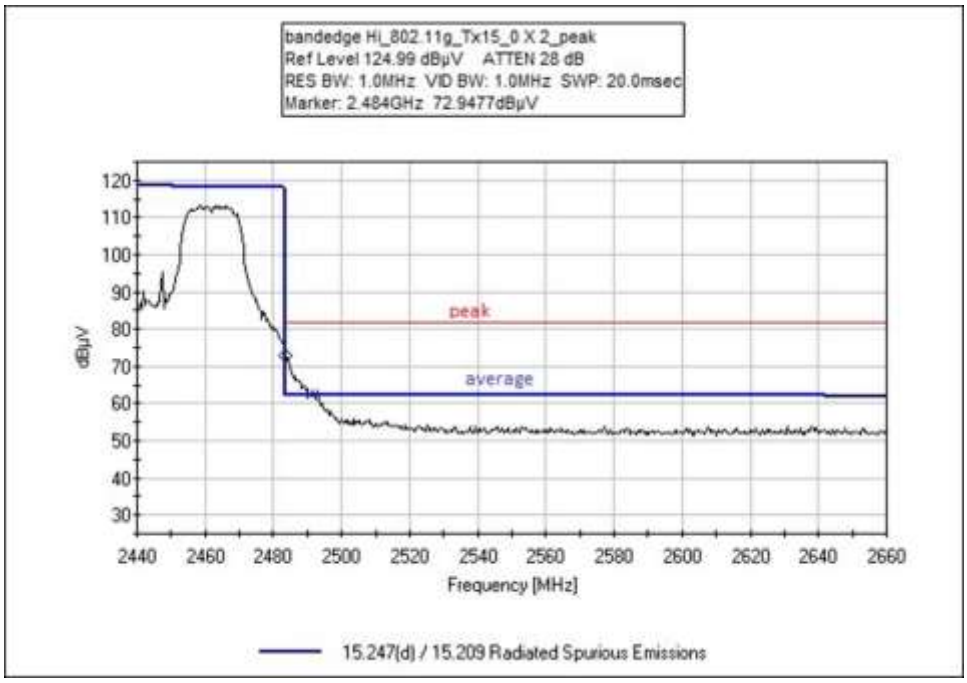
802.11g, 0X2

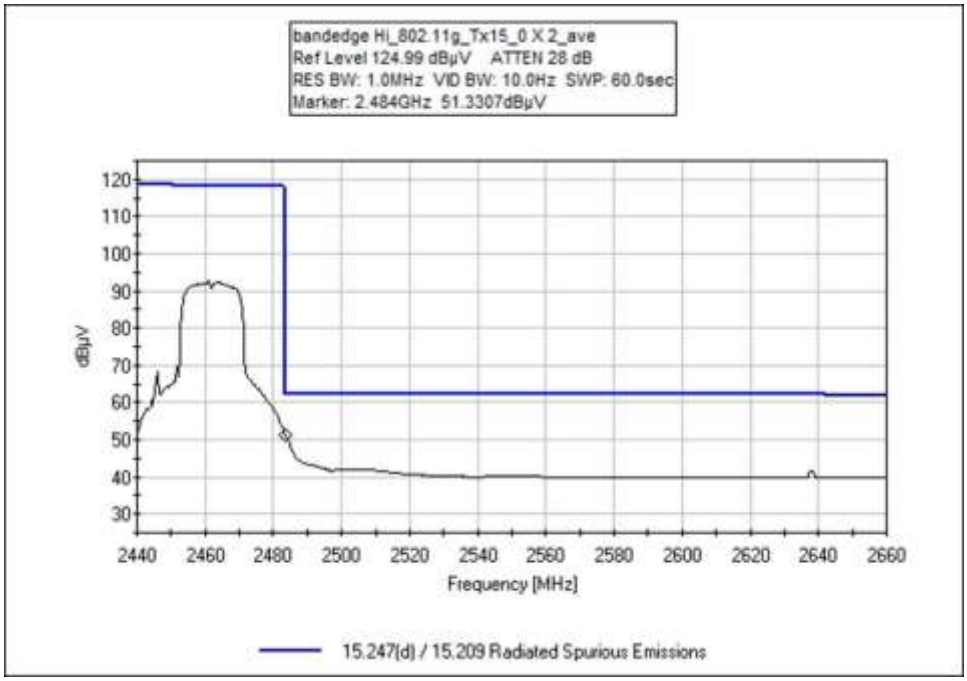

bandedge Lo_802.11g_Tx15_0 X 2_peak
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.39GHz 72.8357dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2370
2380
2390
2400
2410
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge Lo_802.11g_Tx15_0 X 2_peak_revB
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.39GHz 71.5417dBµV
dBµV
Peak
average
120
110
100
90
80
70
60
50
40
30
2370
2380
2390
2400
2410
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

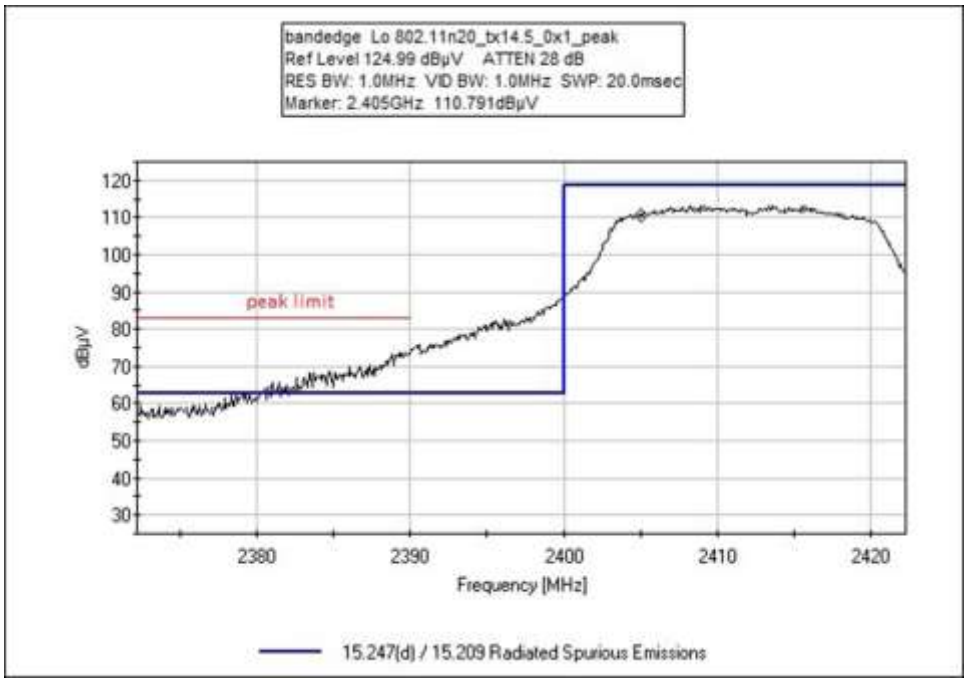

bandedge Lo_802.11g_Tx15_0 X 2_ave_revB
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.39GHz 49.6637dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

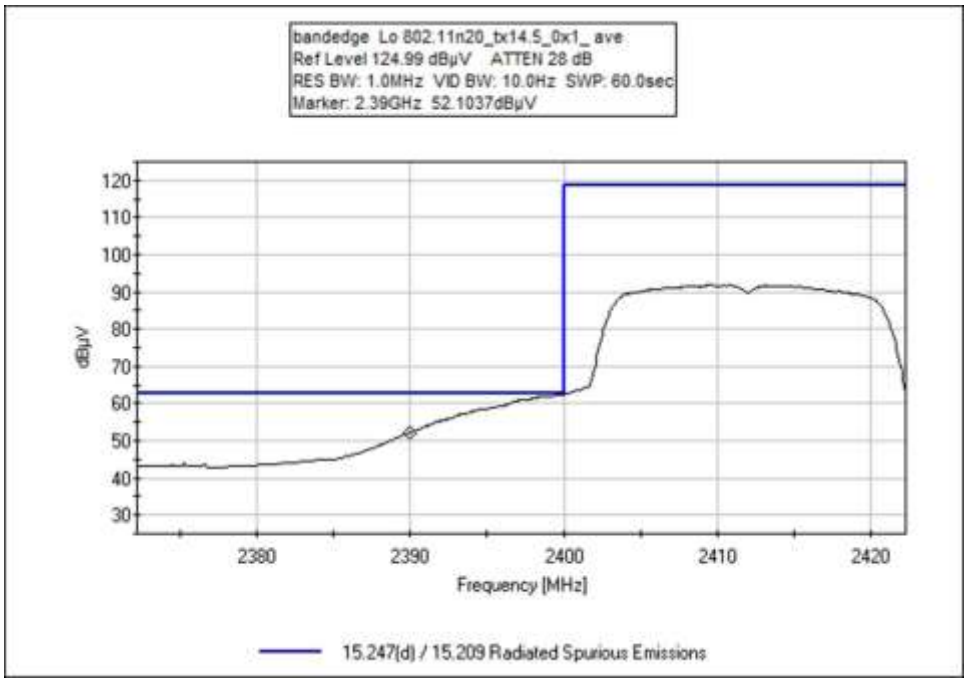

bandedge Lo_802.11g_Tx15_0 X 2_100kHz_revB
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.4GHz 64.2427dBµV
-30dBc
dBµV
Frequency [MHz]

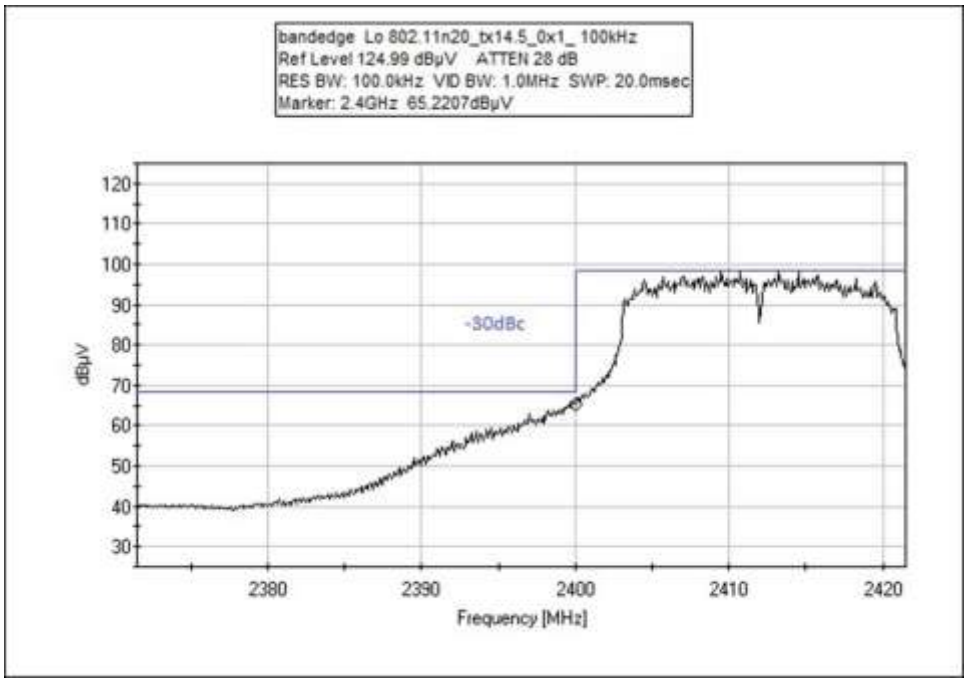

bandedge Hi_802.11g_Tx15_0 X 2_peak
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 72.9477dBµV
peak
average
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

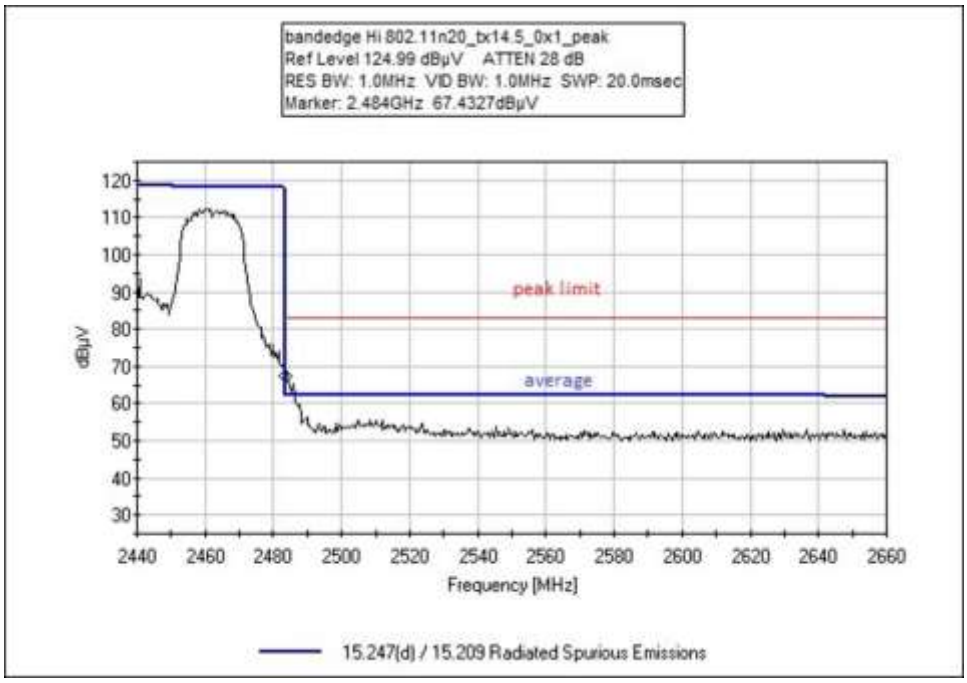

bandedge Hi_802.11g_Tx15_0 X 2_ave
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.484GHz 51.3307dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

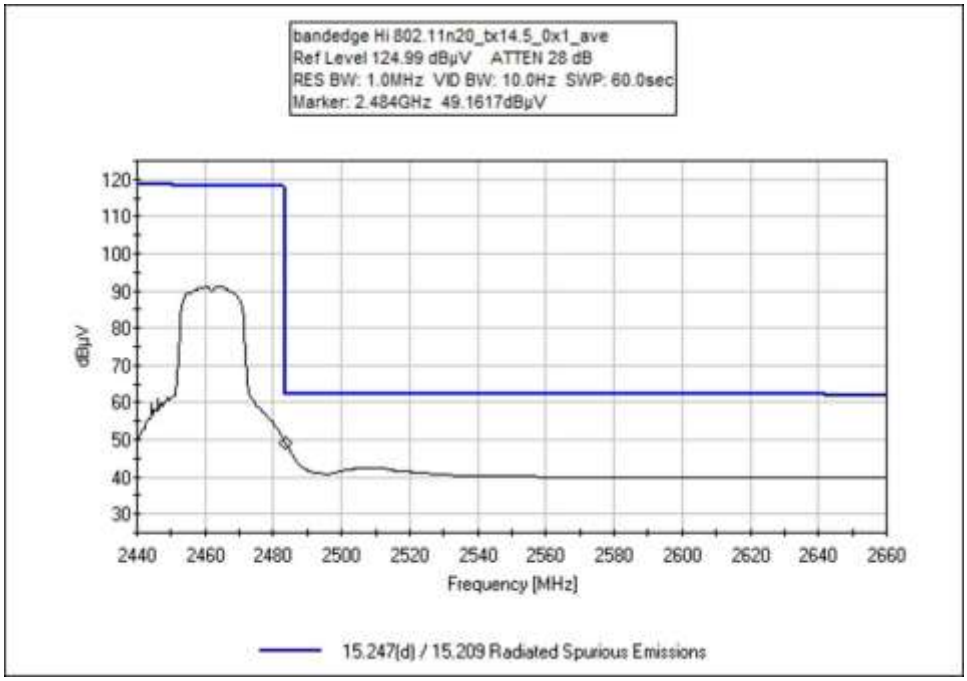
802.11n20


bandedge Lo 802.11n20_tx14.5_0x1_peak
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.405GHz 110.791dBµV
peak limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

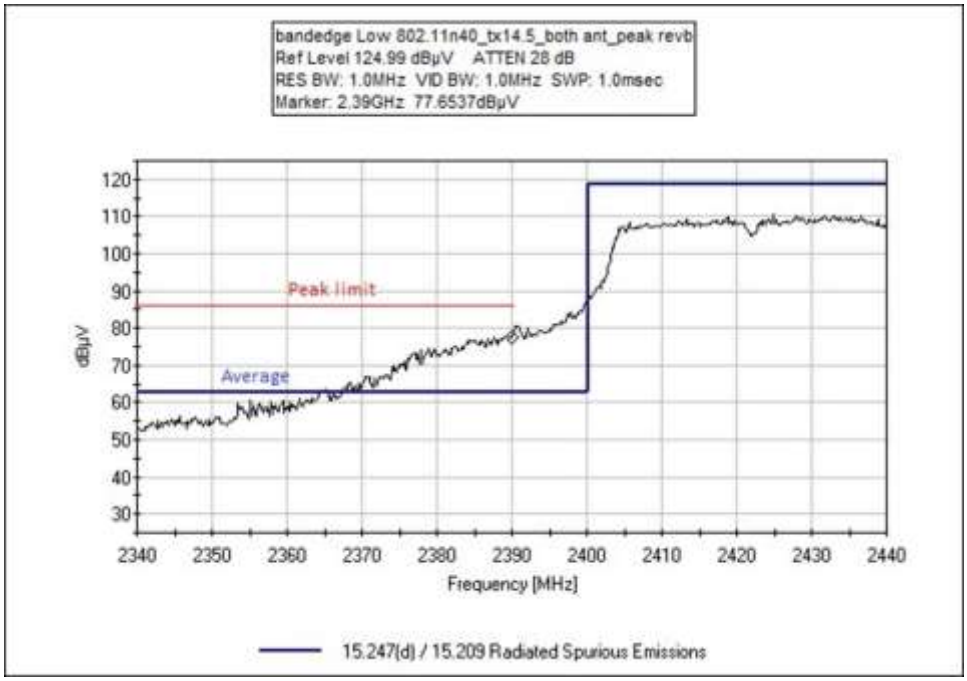

bandedge Lo 802.11n20_tx14.5_0x1_ ave
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.39GHz 52.1037dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

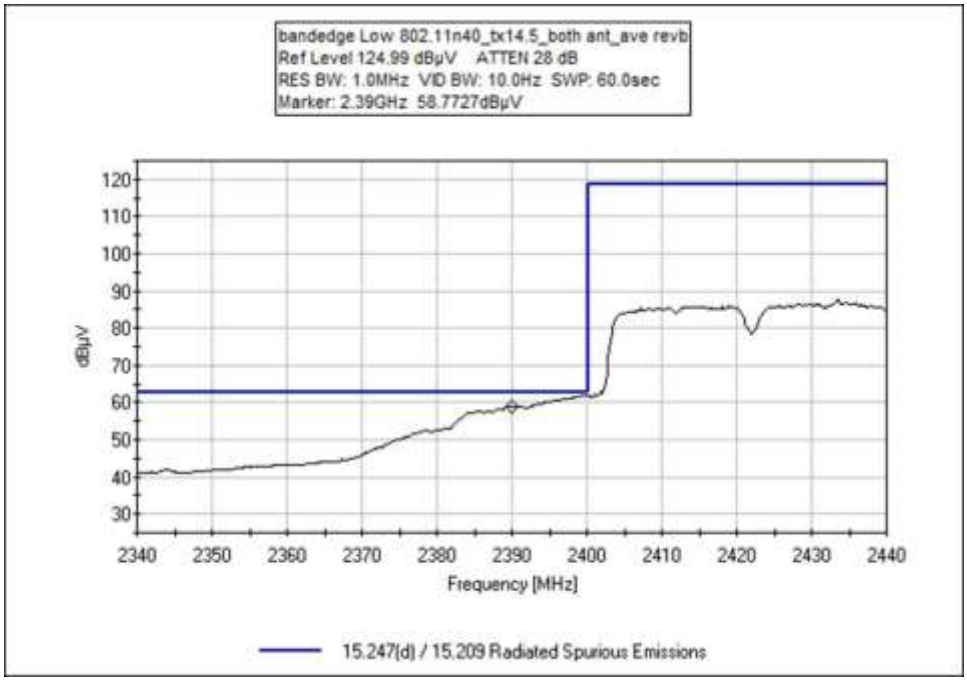

bandedge Lo 802.11n20_tx14.5_0x1_ 100kHz
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.4GHz 65.2207dBµV
-30dBc
dBµV
120
110
100
90
80
70
60
50
40
30
2380
2390
2400
2410
2420
Frequency [MHz]

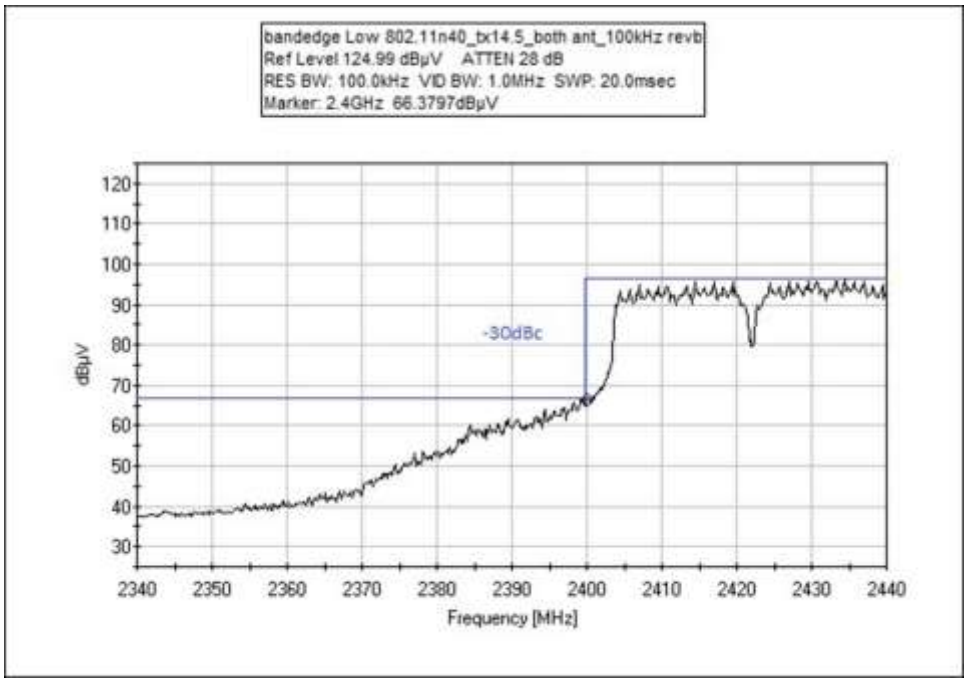

bandedge Hi 802.11n20_tx14.5_0x1_peak
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 67.4327dBµV
peak limit
average
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

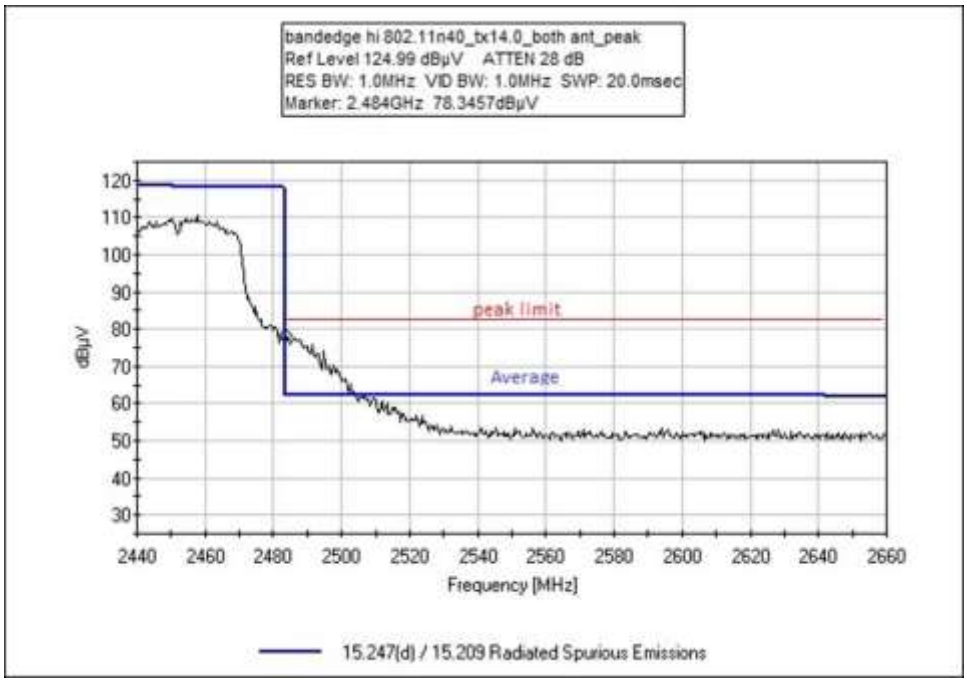

bandedge Hi 802.11n20_tx14.5_0x1_ave
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.484GHz 49.1617dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

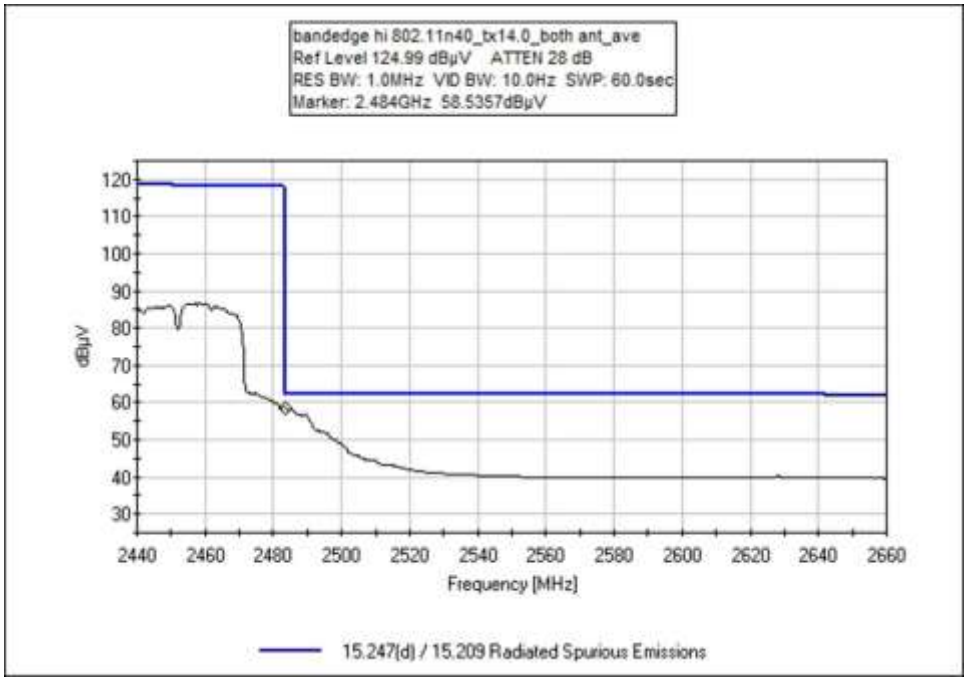
802.11n40


bandedge Low 802.11n40_tx14.5_both ant_peak revb
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 1.0msec
Marker: 2.39GHz 77.6537dBµV
Peak limit
Average
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge Low 802.11n40_tx14.5_both ant_ave revb
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.39GHz 58.7727dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge Low 802.11n40_bx14.5_both ant_100kHz revb
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.4GHz 66.3797dBµV
-30dBc
dBµV
120
110
100
90
80
70
60
50
40
30
2340
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
Frequency [MHz]


bandedge hi 802.11n40_tx14.0_both ant_peak
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 78.3457dBµV
peak limit
Average
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge hi 802.11n40_tx14.0_both ant_ave
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 60.0sec
Marker: 2.484GHz 58.5357dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

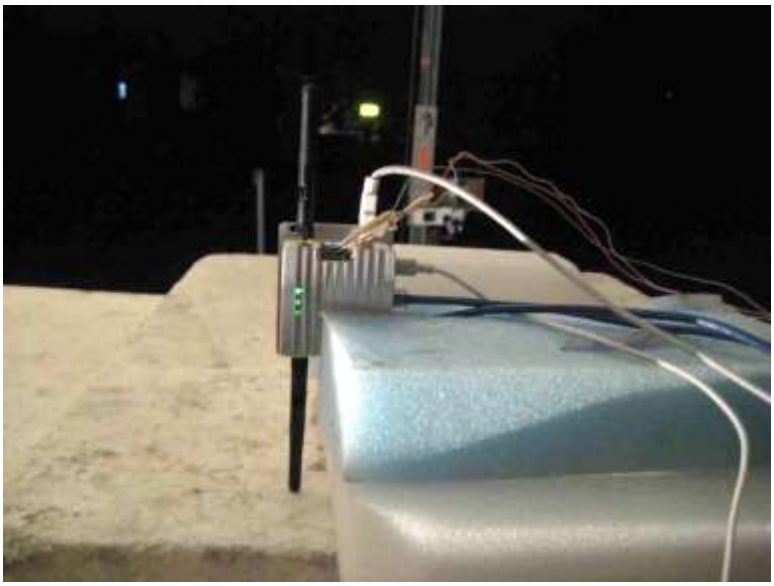
Test Setup Photo(s)

Below 1GHz

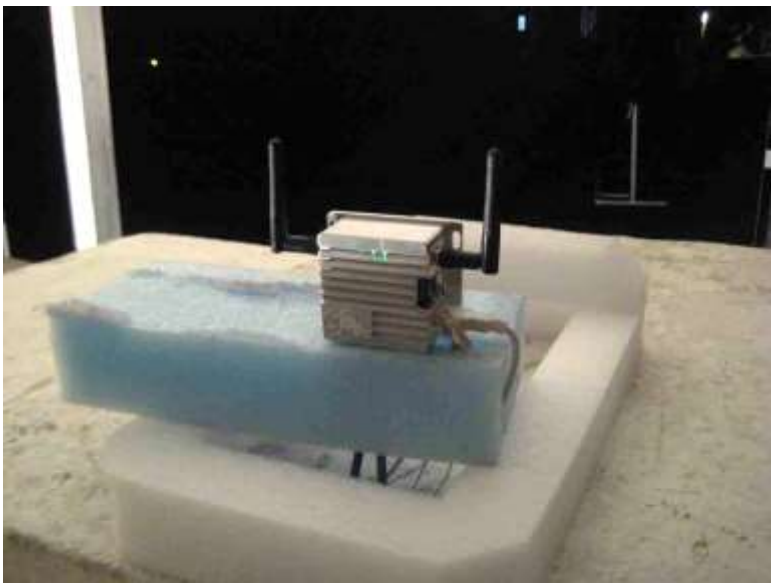
Below 1GHz

Above 1GHz

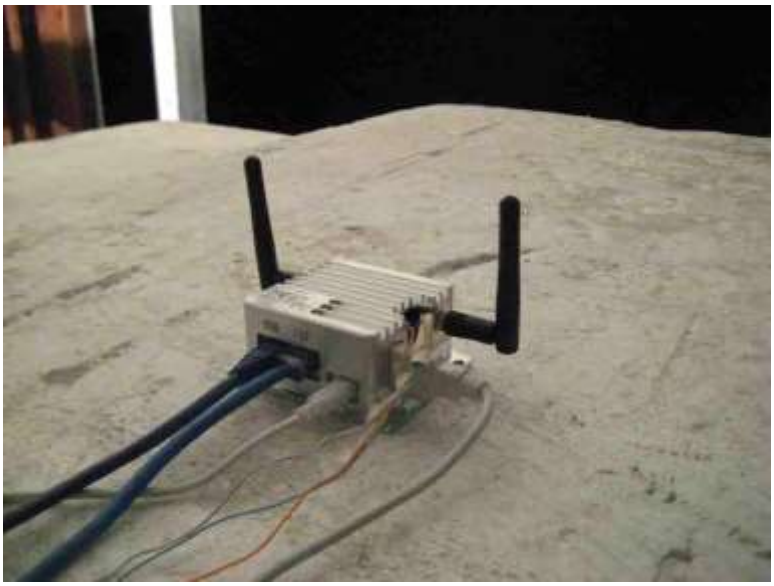
Above 1GHz



Orientation 1



Orientation 2



Orientation 3

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**KE2 Connect**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**99529**	Date:	10/23/2017
Test Type:	**Conducted Emissions**	Time:	20:53:03
Tested By:	E. Wong	Sequence#:	6
Software:	EMITest 5.03.11		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT seeking PCII equipment authorization is placed on a Styrofoam block. Antennas set in vertical position as intended.
WAN, USB, RS485 are connected to section of cable. LAN is connected to remote laptop for configuration of continuous transmit test mode.

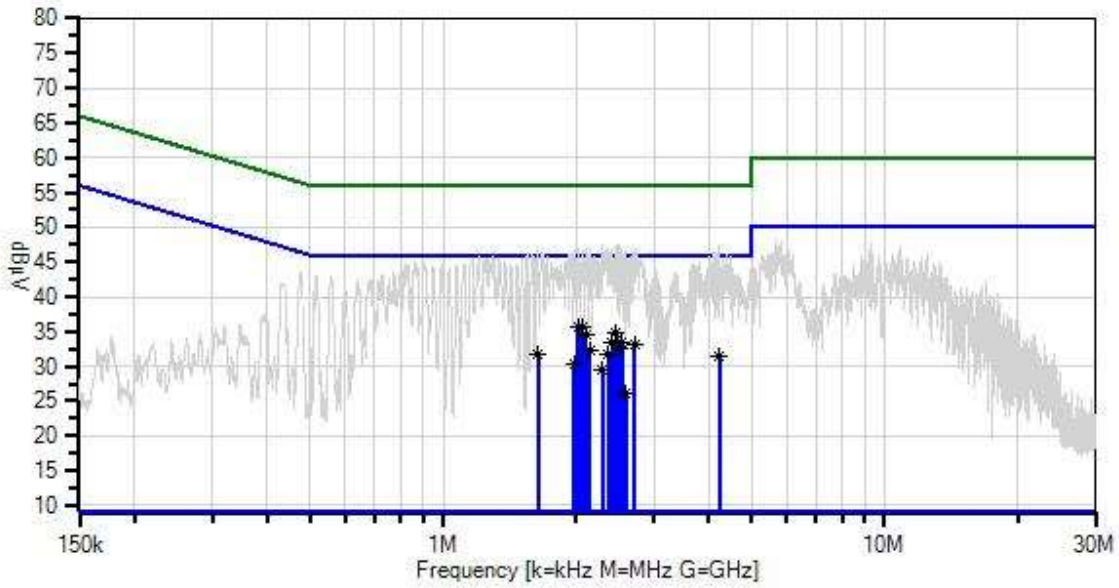
Changes from original certification:
Depopulation of 5745-5825MHz radio.
Metal enclosure and two external antenna.
Antenna gain 2 dBi.

802.11 b/g/n20/
Freq 2412-2462MHz
802.11 n40
Freq 2422-2452MHz

Tx Freq
802.22b
2437MHz

Test software setting
Max TX power set: to match original testing.
802.11b: 18.0
Gain set: not selected.
Test environment conditions: 24°C, 55 % Relative Humidity, 100kPa
Evaluation for PC II.
Site A
ANSI C63.10-2013

KE2 Connect WO#: 99529 Sequence#: 6 Date: 10/23/2017
15.207 AC Mains - Average Test Lead: 110V 60Hz L1-Line



Sweep Data
× QP Readings
Software Version: 5.03.11
Readings
Average Readings
1 - 15.207 AC Mains - Average
Peak Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/1/2017	8/1/2018
T1	ANC00079	Attenuator		2/3/2017	2/3/2019
T2	ANP04358	Cable	RG142	3/14/2016	3/14/2018
T3	AN02343	High Pass Filter	HE9615-150K-50-720B	1/25/2017	1/25/2019
T4	AN00969A	50uH LISN-Line 1 (L1)	3816/2NM	3/14/2017	3/14/2019
	AN00969A	50uH LISN-Line2 (L2)	3816/2NM	3/14/2017	3/14/2019

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2.025M Ave	25.7	+9.8	+0.1	+0.1	+0.0	+0.0	35.7	46.0	-10.3	L1-Li
^	2.025M	36.9	+9.8	+0.1	+0.1	+0.0	+0.0	46.9	46.0	+0.9	L1-Li
3	2.068M Ave	25.6	+9.8	+0.1	+0.1	+0.0	+0.0	35.6	46.0	-10.4	L1-Li
^	2.068M	36.7	+9.8	+0.1	+0.1	+0.0	+0.0	46.7	46.0	+0.7	L1-Li
5	2.459M Ave	24.6	+9.8	+0.2	+0.1	+0.0	+0.0	34.7	46.0	-11.3	L1-Li
^	2.459M	37.1	+9.8	+0.2	+0.1	+0.0	+0.0	47.2	46.0	+1.2	L1-Li
7	2.110M Ave	24.5	+9.8	+0.1	+0.1	+0.0	+0.0	34.5	46.0	-11.5	L1-Li
^	2.110M	36.9	+9.8	+0.1	+0.1	+0.0	+0.0	46.9	46.0	+0.9	L1-Li
9	2.417M Ave	23.4	+9.8	+0.2	+0.1	+0.0	+0.0	33.5	46.0	-12.5	L1-Li
^	2.417M	37.0	+9.8	+0.2	+0.1	+0.0	+0.0	47.1	46.0	+1.1	L1-Li
11	2.544M Ave	23.4	+9.8	+0.2	+0.1	+0.0	+0.0	33.5	46.0	-12.5	L1-Li
^	2.544M	36.9	+9.8	+0.2	+0.1	+0.0	+0.0	47.0	46.0	+1.0	L1-Li
13	2.714M Ave	22.9	+9.8	+0.2	+0.1	+0.0	+0.0	33.0	46.0	-13.0	L1-Li
^	2.714M	36.8	+9.8	+0.2	+0.1	+0.0	+0.0	46.9	46.0	+0.9	L1-Li
15	2.497M Ave	22.4	+9.8	+0.2	+0.1	+0.0	+0.0	32.5	46.0	-13.5	L1-Li
^	2.497M	37.4	+9.8	+0.2	+0.1	+0.0	+0.0	47.5	46.0	+1.5	L1-Li
17	2.153M Ave	22.4	+9.8	+0.1	+0.1	+0.0	+0.0	32.4	46.0	-13.6	L1-Li

^	2.153M	37.0	+9.8	+0.1	+0.1	+0.0	+0.0	47.0	46.0	+1.0	L1-Li
19	2.370M Ave	21.7	+9.8	+0.2	+0.1	+0.0	+0.0	31.8	46.0	-14.2	L1-Li
^	2.370M	36.9	+9.8	+0.2	+0.1	+0.0	+0.0	47.0	46.0	+1.0	L1-Li
21	1.638M Ave	21.7	+9.8	+0.1	+0.1	+0.0	+0.0	31.7	46.0	-14.3	L1-Li
^	1.638M	36.7	+9.8	+0.1	+0.1	+0.0	+0.0	46.7	46.0	+0.7	L1-Li
23	4.216M Ave	21.2	+9.8	+0.2	+0.1	+0.1	+0.0	31.4	46.0	-14.6	L1-Li
^	4.216M	37.2	+9.8	+0.2	+0.1	+0.1	+0.0	47.4	46.0	+1.4	L1-Li
25	1.979M Ave	20.3	+9.8	+0.1	+0.1	+0.0	+0.0	30.3	46.0	-15.7	L1-Li
^	1.979M	36.6	+9.8	+0.1	+0.1	+0.0	+0.0	46.6	46.0	+0.6	L1-Li
27	2.298M Ave	19.4	+9.8	+0.2	+0.1	+0.0	+0.0	29.5	46.0	-16.5	L1-Li
^	2.298M	37.4	+9.8	+0.2	+0.1	+0.0	+0.0	47.5	46.0	+1.5	L1-Li
29	2.595M Ave	15.9	+9.8	+0.2	+0.1	+0.0	+0.0	26.0	46.0	-20.0	L1-Li
^	2.595M	36.6	+9.8	+0.2	+0.1	+0.0	+0.0	46.7	46.0	+0.7	L1-Li

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**KE2 Connect**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**99529**	Date:	10/23/2017
Test Type:	**Conducted Emissions**	Time:	20:56:01
Tested By:	E. Wong	Sequence#:	7
Software:	EMITest 5.03.11		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT seeking PCII equipment authorization is place on a Styrofoam block. Antennas set in vertical position as intended.

WAN, USB, RS485 are connected to section of cable.
LAN is connected to remote laptop for configuration of continuous transmit test mode.

Changes from original certification:
Depopulation of 5745-5825MHz radio.
Metal enclosure and two external antennae.
Antenna gain 2 dBi.

802.11 b/g/n20/
Freq 2412-2462MHz
802.11 n40
Freq 2422-2452MHz

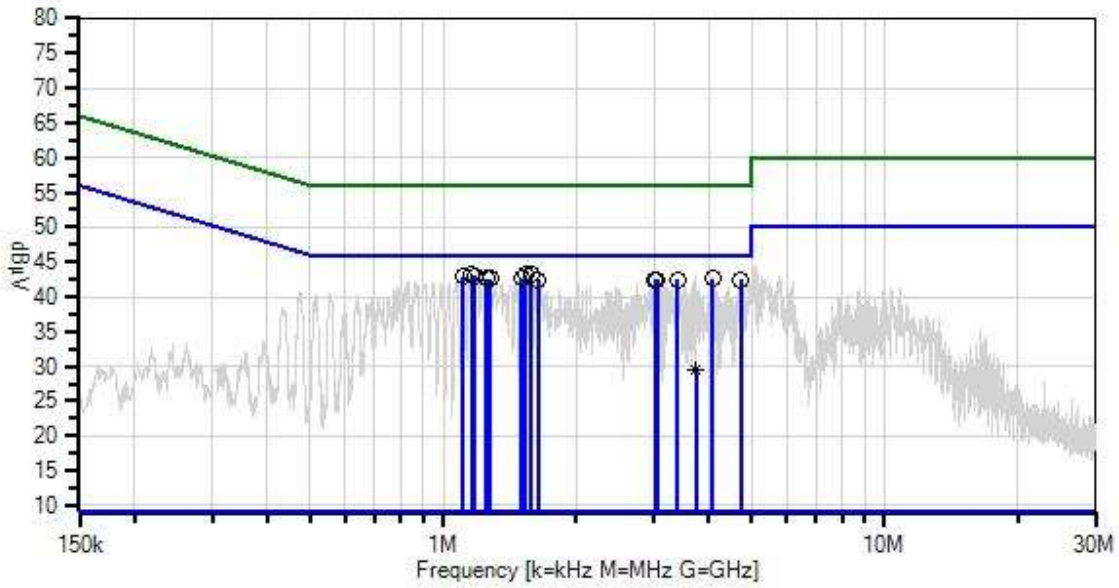
Tx Freq
802.22b
2437MHz

Test software setting
Max TX power set: to match original testing.
802.11b: 18.0
Gain set: not selected.

Test environment conditions: 24°C, 55 % Relative Humidity, 100kPa

Evaluation for PC II.
Site A
ANSI C63.10-2013

KE2 Connect WO#: 99529 Sequence#: 7 Date: 10/23/2017
15.207 AC Mains - Average Test Lead: 110V 60Hz L2-Neutral



Sweep Data
× QP Readings
Software Version: 5.03.11
Readings
Average Readings
1 - 15.207 AC Mains - Average
Peak Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/1/2017	8/1/2018
T1	ANC00079	Attenuator		2/3/2017	2/3/2019
T2	ANP04358	Cable	RG142	3/14/2016	3/14/2018
T3	AN02343	High Pass Filter	HE9615-150K-50-720B	1/25/2017	1/25/2019
	AN00969A	50uH LISN-Line 1 (L1)	3816/2NM	3/14/2017	3/14/2019
T4	AN00969A	50uH LISN-Line2 (L2)	3816/2NM	3/14/2017	3/14/2019

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1.536M	33.2	+9.8	+0.1	+0.1	+0.0	+0.0	43.2	46.0	-2.8	L2-Ne
2	1.162M	33.1	+9.8	+0.1	+0.1	+0.0	+0.0	43.1	46.0	-2.9	L2-Ne
3	1.587M	33.1	+9.8	+0.1	+0.1	+0.0	+0.0	43.1	46.0	-2.9	L2-Ne
4	1.179M	33.0	+9.8	+0.1	+0.1	+0.0	+0.0	43.0	46.0	-3.0	L2-Ne
5	1.107M	32.9	+9.8	+0.1	+0.1	+0.0	+0.0	42.9	46.0	-3.1	L2-Ne
6	1.507M	32.6	+9.8	+0.1	+0.1	+0.0	+0.0	42.6	46.0	-3.4	L2-Ne
7	4.084M	32.4	+9.8	+0.2	+0.1	+0.1	+0.0	42.6	46.0	-3.4	L2-Ne
8	1.251M	32.6	+9.8	+0.1	+0.1	+0.0	+0.0	42.6	46.0	-3.4	L2-Ne
9	1.277M	32.6	+9.8	+0.1	+0.1	+0.0	+0.0	42.6	46.0	-3.4	L2-Ne
10	3.016M	32.3	+9.8	+0.2	+0.1	+0.1	+0.0	42.5	46.0	-3.5	L2-Ne
11	1.638M	32.5	+9.8	+0.1	+0.1	+0.0	+0.0	42.5	46.0	-3.5	L2-Ne
12	3.399M	32.3	+9.8	+0.2	+0.1	+0.1	+0.0	42.5	46.0	-3.5	L2-Ne
13	3.059M	32.3	+9.8	+0.2	+0.1	+0.1	+0.0	42.5	46.0	-3.5	L2-Ne
14	4.730M	32.2	+9.8	+0.2	+0.1	+0.1	+0.0	42.4	46.0	-3.6	L2-Ne
15	3.739M Ave	19.3	+9.8	+0.2	+0.1	+0.1	+0.0	29.5	46.0	-16.5	L2-Ne
^	3.739M	33.1	+9.8	+0.2	+0.1	+0.1	+0.0	43.3	46.0	-2.7	L2-Ne

Test Setup Photo(s)

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.