SynapSense a Panduit Company

EMC TEST REPORT FOR

Subfloor EZ
Model: 1259

Tested To The Following Standards:

FCC Part 15 Subpart C Section 15.247

Report No.: 96902-11

Date of issue: August 3, 2015

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.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

SynapSense a Panduit Company
340 Palladio Pkwy, Suite 530
Folsom, CA 95630

Representative: Abraham Fechter
Customer Reference Number: 452570

REPORT PREPARED BY:

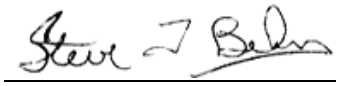
Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 96902

DATE OF EQUIPMENT RECEIPT: May 27, 2015
DATE(S) OF TESTING: June 1-4 & July 17, 2015

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.
5046 Sierra Pines Drive
Mariposa, CA 95338

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.02.00
EMITest Immunity	5.02.00

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure	Description	Modifications*	Results
15.247(a)(2)	Occupied Bandwidth	NA	Pass
15.247(b)(3)	Maximum Power Output	NA	Pass
15.247(d)	Field Strength of Radiated Spurious Emissions and Band Edge	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass

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)

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
Subfloor EZ	SynapSense a Panduit Company	1259	0715P0009

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

FCC PART 15 SUBPART C

15.247(a)(2) -6dB Occupied Bandwidth

Test Engineer: Eddie Mariscal
Test Date: 06/02/2015

Test Equipment					
Asset #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2015
03355	Cable	32022-2-29094-36TC	AstroLab	12/08/2014	12/08/2016
00327	Horn Antenna	3115	EMCO	03/18/2014	03/18/2016
03155	Preamp	83017A	HP	06/26/2013	06/26/2015
P01403	Cable	58758-23	Semflex	12/08/2014	12/08/2016
P05904	Cable	32022-2-29094K-144TC	AstroLab	12/08/2014	12/08/2016

Test Conditions / Setup

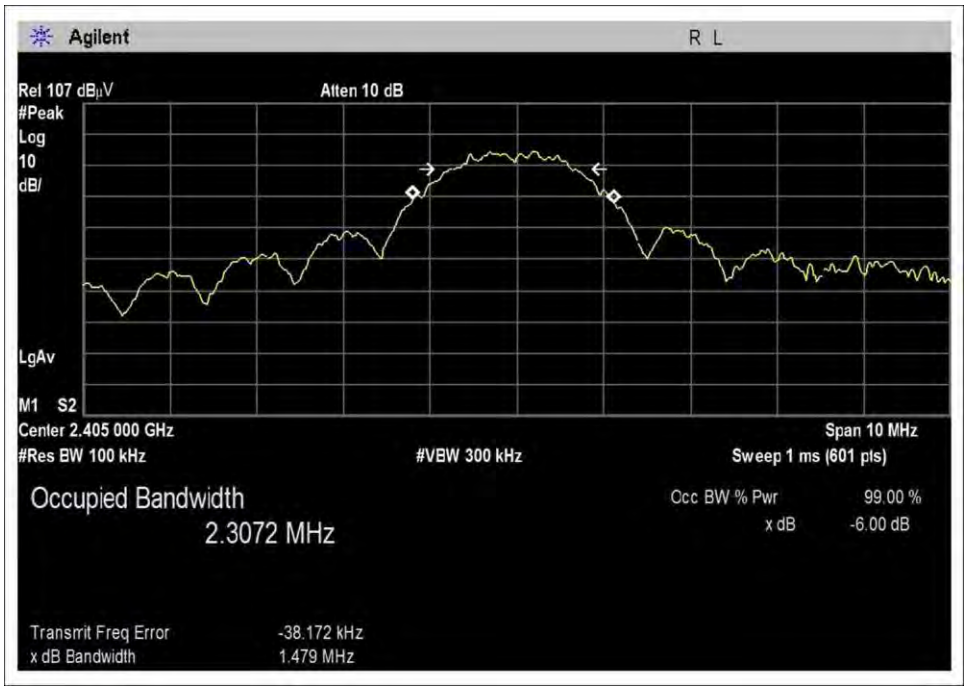
Test Conditions:
Temp: 18°C
Humidity: 45%
Pressure: 97.8kPa
Freq: 2405-2480MHz

The EUT uses a non-removable antenna, thus the data will be gathered through radiated measurements. The EUT operates with 2x AA Batteries and brand new batteries were installed at the time of test IAW 15.31(e). Three orthogonal axes were investigated. The data presented represents the worst case orientation. Testing was performed in accordance with KDB 558074 D01 v03r02 and ANSI C63.10 (2009).

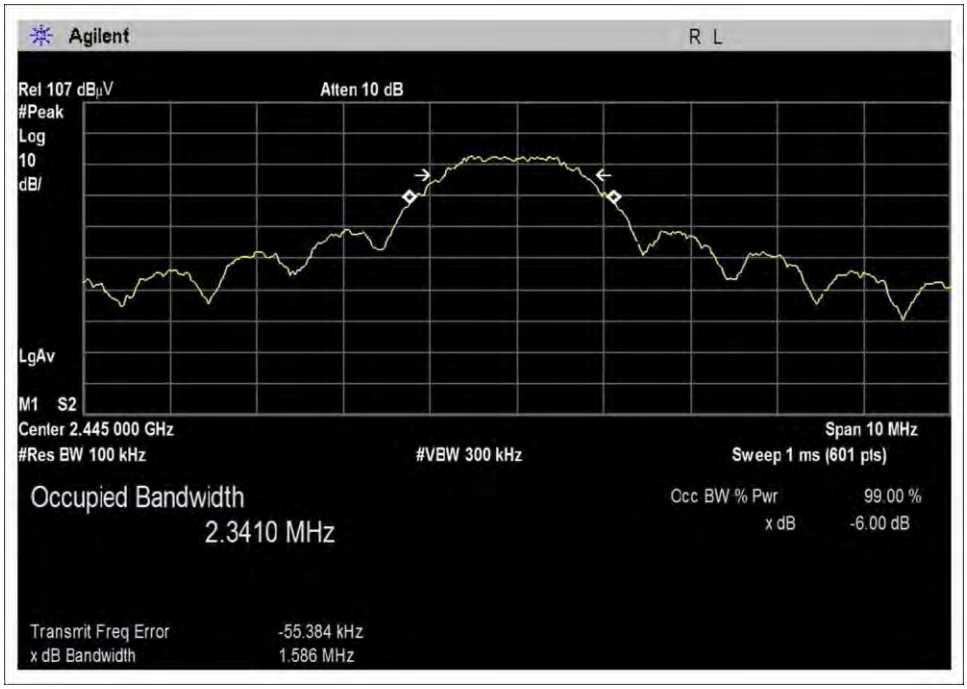
Note: The EUT was testing in configuration 1.

Frequency (MHz)	6dB Bandwidth (MHz)
2405	**1.479**
2445	**1.586**
2480	**1.577**

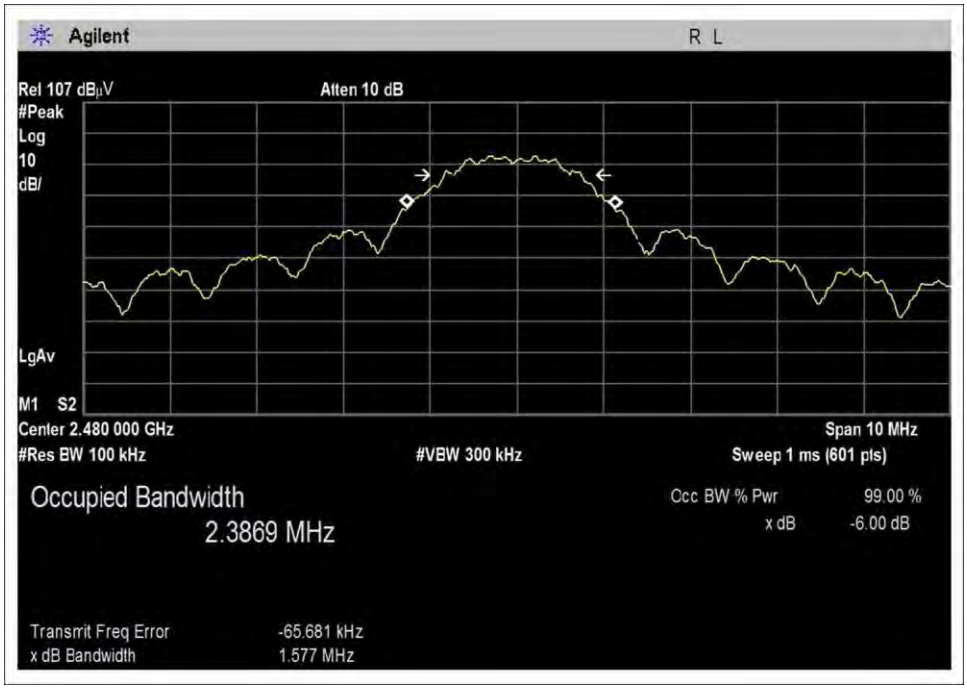
Test Data



Low



Middle



High

Test Setup Photo

15.247(b)(3) Maximum Power Output

Test Engineer: Eddie Mariscal
Test Date: 06/02/2015

Test Equipment

Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2015
03355	Cable	32022-2-29094-36TC	AstroLab	12/08/2014	12/08/2016
00327	Horn Antenna	3115	EMCO	03/18/2014	03/18/2016
03155	Preamp	83017A	HP	06/26/2016	06/26/2015
P01403	Cable	58758-23	Semflex	12/08/2014	12/08/2016
P05904	Cable	32022-2-29094K-144TC	AstroLab	12/08/2014	12/08/2016

Test Conditions / Setup

Test Conditions:
Temp: 18°C
Humidity: 35%
Pressure: 97.8kPa
Freq: 2402-2480MHz

The EUT uses a non-removable antenna, thus the data will be gathered through radiated measurements. The EUT operates with 2x AA Batteries and brand new batteries were installed at the time of test IAW 15.31(e). Three orthogonal axes were investigated. The data presented represents the worst case orientation. Testing was performed in accordance with KDB 558074 D01 v03r02 and ANSI C63.10 (2009).

Note: The EUT was tested in configuration 1.

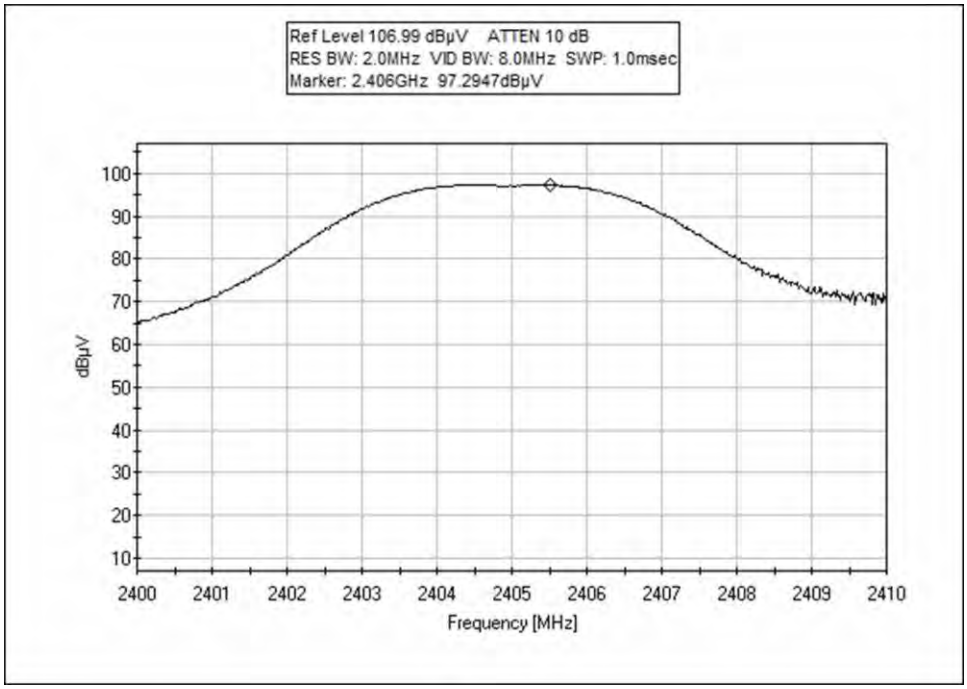
Antenna Gain: 3.3dBi
Measurement Distance: 3m

Plots do not have corrections applied. See correction factors in table below. The conducted power was calculated with the following formula:

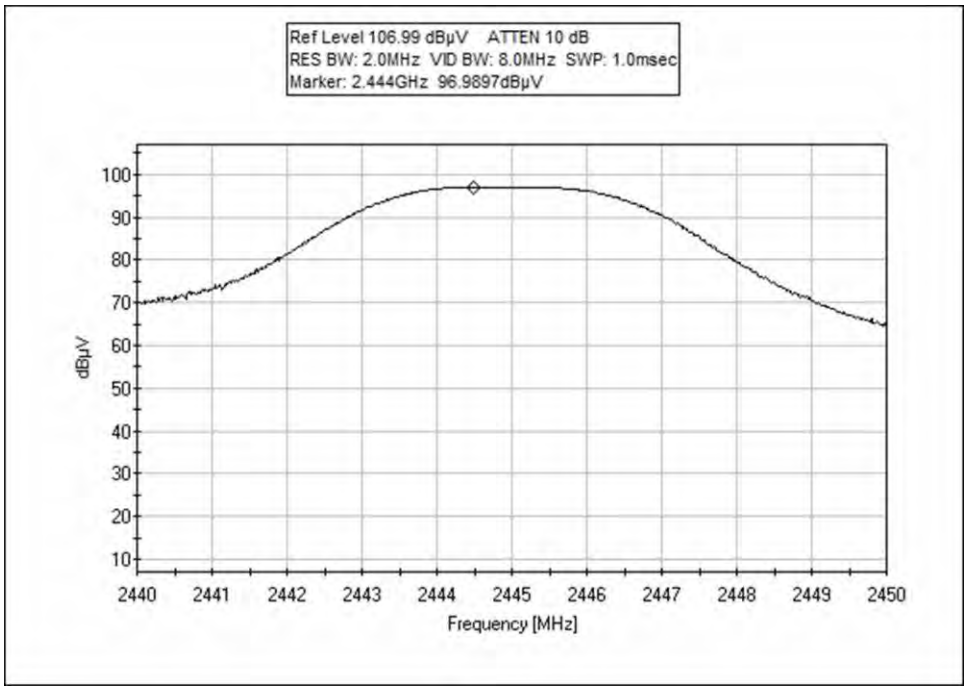
P = (E*d)^2 / (30 * G)
E = Field strength of the measurement converted to V/M
d = Measurement distance in meters
G = Numerical gain of the EUT's antenna relative to an isotropic radiator.
P = The power in watts for which we are solving

Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cables and preamp (dB)	Corrected Reading (dBuV)	Conducted Power (mW)	Limit (mW)
2405	97.30	-2.5	94.80	0.424	1000
2445	96.99	-2.5	94.49	0.395	1000
2480	93.84	-2.5	91.34	0.191	1000

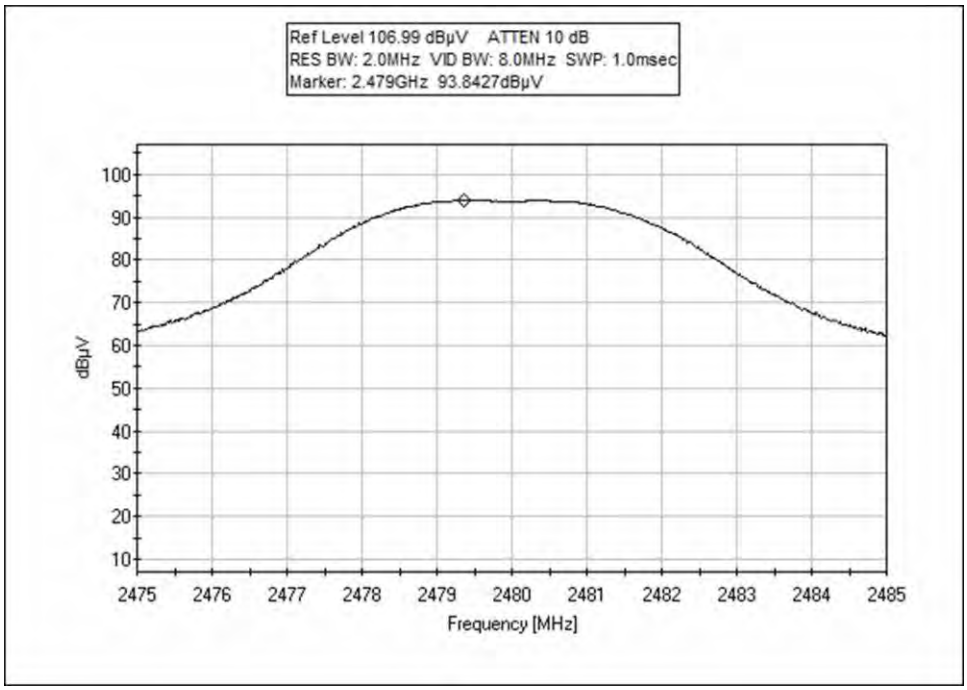
Test Data



Low

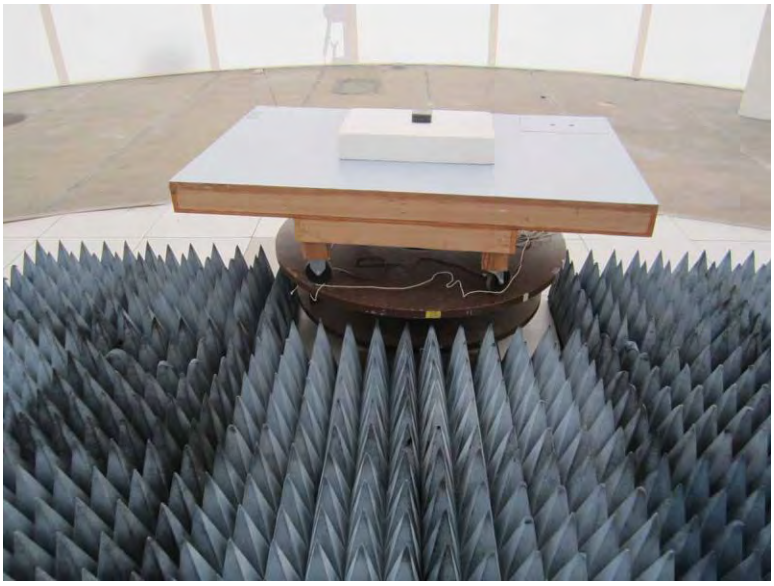

Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 2.0MHz VID BW: 8.0MHz SWP: 1.0msec
Marker: 2.444GHz 96.9897dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2440
2441
2442
2443
2444
2445
2446
2447
2448
2449
2450
Frequency [MHz]

Middle


Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 2.0MHz VID BW: 8.0MHz SWP: 1.0msec
Marker: 2.479GHz 93.8427dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2475
2476
2477
2478
2479
2480
2481
2482
2483
2484
2485
Frequency [MHz]

High

Test Setup Photo(s)



Test Setup

X-Axis

Y-Axis

Z-Axis

15.247(d) Field Strength of Radiated Spurious Emissions and Band Edge

Test Data

Test Location:	CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240		
Customer:	**SynapSense a Panduit Company**		
Specification:	**15.247 Radiated Spurious Emissions**		
Work Order #:	**96902**	Date:	6/4/2015
Test Type:	**Maximized Emissions**	Time:	13:23:29
Tested By:	Eddie Mariscal	Sequence#:	1
Software:	EMITest 5.02.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

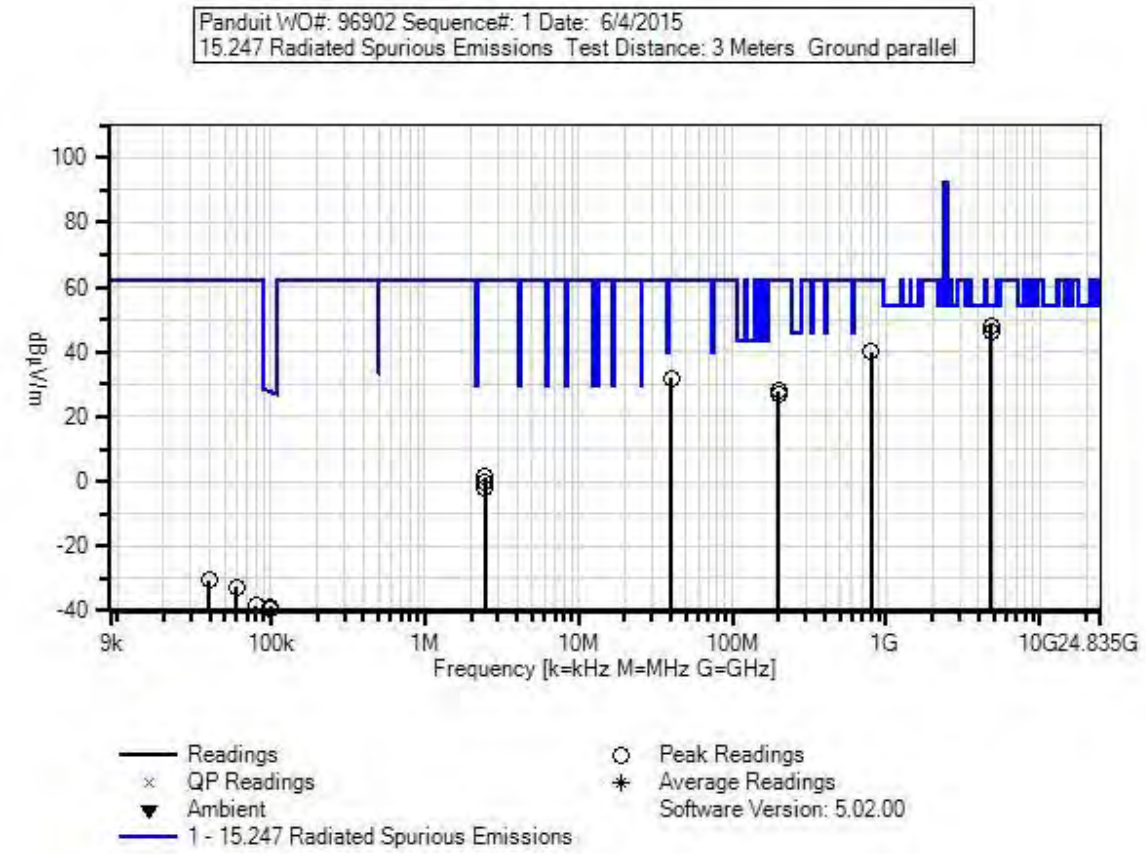
The EUT is configured to continuously transmit with modulation enabled. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation. Testing was performed IAW ANSI 63.10 (2009).

Frequency Range of Interest: 0.009-24835MHz
0.009 - 0.15MHz: RBW = 200Hz; VBW > RBW
0.15 - 30MHz: RBW = 9kHz; VBW > RBW
30 - 1000MHz: RBW = 120kHz; VBW > RBW
1 - 24.835GHz: RBW = 1MHz; VBW > RBW

Compliance with the band edges was verified. The marker-delta method was utilized IAW ANSI C63.10 (2009).

Environmental Conditions:
Temperature = 19°C
Relative Humidity = 40%
Atmospheric Pressure = 97.8kPa

NOTE
No EUT emissions within 6dB of the limit were found in the band 30-1000MHz. Noise floor readings were taken for reference.


Panduit WO#: 96902 Sequence#: 1 Date: 6/4/2015
15.247 Radiated Spurious Emissions Test Distance: 3 Meters Ground parallel
100
80
60
40
20
0
-20
-40
dBµV/m
9k
100k
1M
10M
100M
1G
10G24.835G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.02.00

Test Equipment:

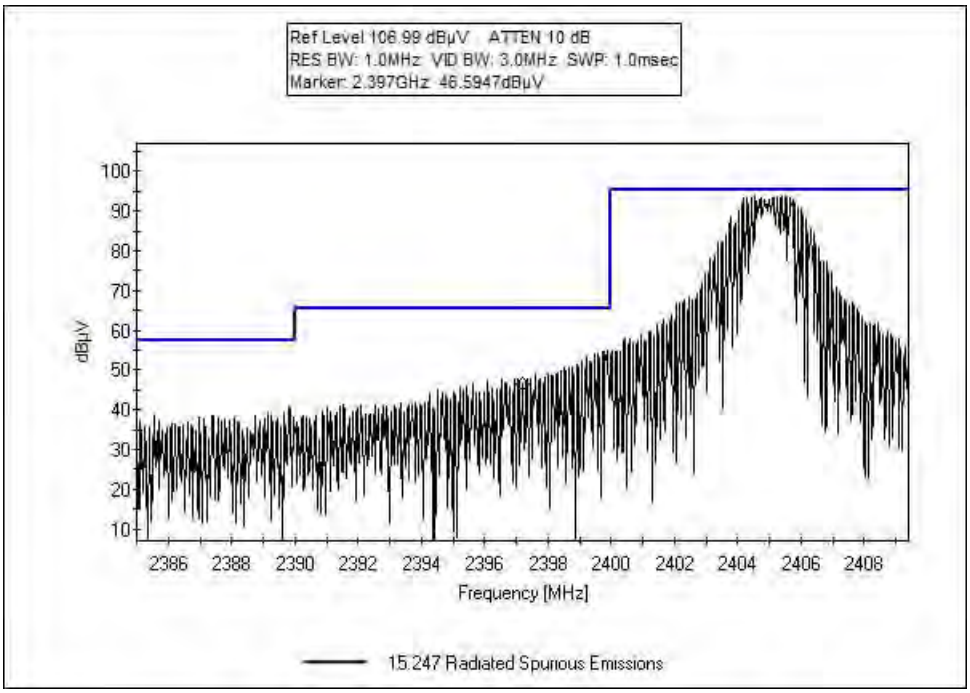
ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00327	Horn Antenna	3115	3/18/2014	3/18/2016
T2	AN03355	Cable	32026-2-29094K-48TC	12/8/2014	12/8/2016
T3	AN03155	Preamp	83017A	6/26/2013	6/26/2015
T4	ANP01403	Cable	58758-23	12/8/2014	12/8/2016
T5	ANP05904	Cable	32022-2-29094K-144TC	12/8/2014	12/8/2016
T6	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T7	AN01991	Biconilog Antenna	CBL6111C	3/7/2014	3/7/2016
T8	ANP05922	Cable	RG/214	9/5/2014	9/5/2016
T9	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016
T10	AN00449	Preamp-Bottom Amp (dB)	8447F	4/7/2014	4/7/2016
T11	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016

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

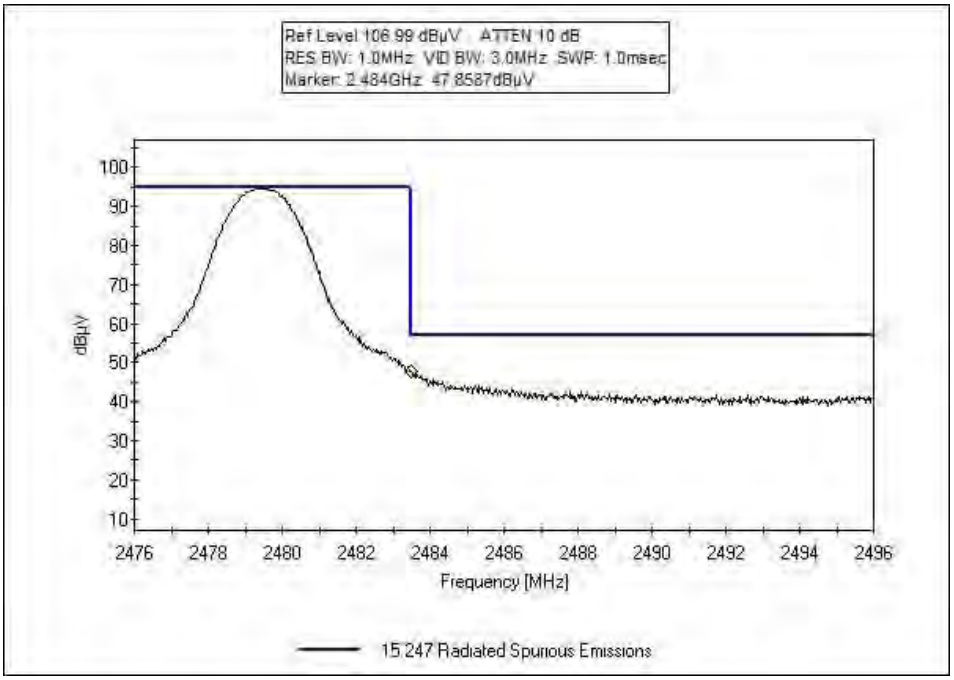
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	4808.720M	43.1	+30.0 +3.4 +0.0	+1.2 +0.0 +0.0	-33.0 +0.0 +0.0	+3.4 +0.0	+0.0	48.1	54.0	-5.9	Vert
2	4808.820M	41.3	+30.0 +3.4 +0.0	+1.2 +0.0 +0.0	-33.0 +0.0 +0.0	+3.4 +0.0	+0.0	46.3	54.0	-7.7	Horiz
3	800.000M	34.1	+0.0 +0.0 +6.6	+0.0 +0.0 -22.9	+0.0 +21.9 +0.0	+0.0 +0.2	+0.0	39.9	62.0	-22.1	Vert
4	40.000M	38.6	+0.0 +0.0 +1.3	+0.0 +0.0 -22.3	+0.0 +14.1 +0.0	+0.0 +0.0	+0.0	31.7	62.0	-30.3	Vert
5	200.000M	38.2	+0.0 +0.0 +3.0	+0.0 +0.0 -22.4	+0.0 +9.1 +0.0	+0.0 +0.1	+0.0	28.0	62.0	-34.0	Vert
6	200.000M	36.8	+0.0 +0.0 +3.0	+0.0 +0.0 -22.4	+0.0 +9.1 +0.0	+0.0 +0.1	+0.0	26.6	62.0	-35.4	Horiz
7	2.469M	31.1	+0.0 +0.0 +0.3	+0.0 +0.0 +0.0	+0.0 +0.0 +10.1	+0.0 +0.0	-40.0	1.5	62.0	-60.5	Groun
8	2.469M	29.6	+0.0 +0.0 +0.3	+0.0 +0.0 +0.0	+0.0 +0.0 +10.1	+0.0 +0.0	-40.0	0.0	62.0	-62.0	Perpe
9	2.472M	27.3	+0.0 +0.0 +0.3	+0.0 +0.0 +0.0	+0.0 +0.0 +10.1	+0.0 +0.0	-40.0	-2.3	62.0	-64.3	Paral

10	99.995k	30.7	+0.0 +0.0 +0.1	+0.0 +0.0 +0.0	+0.0 +0.0 +10.7	+0.0 +0.0	-80.0	-38.5	27.6	-66.1	Paral
11	100.010k	30.4	+0.0 +0.0 +0.1	+0.0 +0.0 +0.0	+0.0 +0.0 +10.7	+0.0 +0.0	-80.0	-38.8	27.6	-66.4	Perpe
12	100.010k	29.6	+0.0 +0.0 +0.1	+0.0 +0.0 +0.0	+0.0 +0.0 +10.7	+0.0 +0.0	-80.0	-39.6	27.6	-67.2	Groun
13	39.745k	37.8	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +11.7	+0.0 +0.0	-80.0	-30.5	62.0	-92.5	Paral
14	59.830k	36.5	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +10.9	+0.0 +0.0	-80.0	-32.6	62.0	-94.6	Paral
15	79.745k	30.6	+0.0 +0.0 +0.1	+0.0 +0.0 +0.0	+0.0 +0.0 +10.9	+0.0 +0.0	-80.0	-38.4	62.0	-100.4	Paral

Band Edge

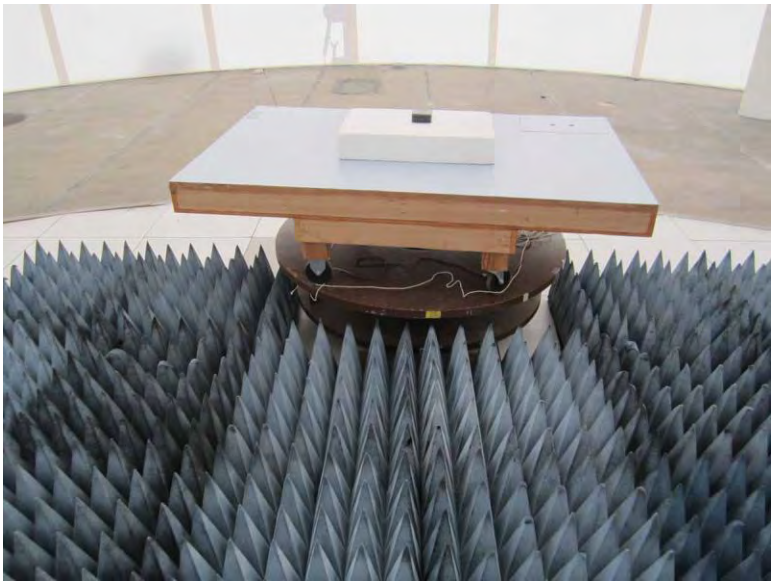


Low



High

Test Setup Photo(s)



15. 247(e) Power Spectral Density

Test Equipment					
Asset #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2015
03355	Cable	32022-2-29094-36TC	AstroLab	12/08/2014	12/08/2016
00327	Horn Antenna	3115	EMCO	03/18/2014	03/18/2016
03155	Preamp	83017A	HP	06/26/2013	06/26/2015
P01403	Cable	58758-23	Semflex	12/08/2014	12/08/2016
P05904	Cable	32022-2-29094K-144TC	AstroLab	12/08/2014	12/08/2016

Test Conditions / Setup

Engineer Name: Eddie Mariscal

Test Conditions:
Temp: 18°C
Humidity: 45%
Pressure: 97.8kPa
Freq: 2405-2480MHz

The EUT uses a non-removable antenna, thus the data will be gathered through radiated measurements. The EUT operates with 2x AA Batteries and brand new batteries were installed at the time of test IAW 15.31(e). Three orthogonal axes were investigated. The data presented represents the worst case orientation. Testing was performed in accordance with KDB 558074 D01 v03r02 and ANSI C63.10 (2009).

Note: The EUT was tested in configuration 1.

Section 10.2 allows for resolution bandwidth of 3kHz > RBW > 100kHz. A RBW of 100kHz was used.

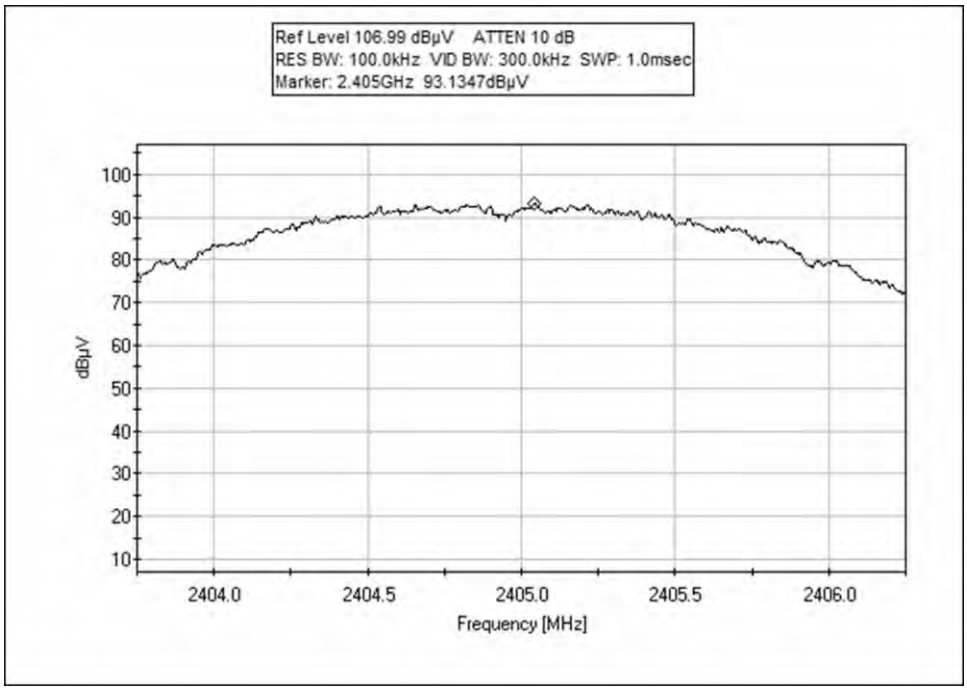
Antenna Gain: 3.3dBi
Measurement Distance: 3m

Plots do not have corrections applied. See correction factors in table below. The conducted power was calculated with the following formula:

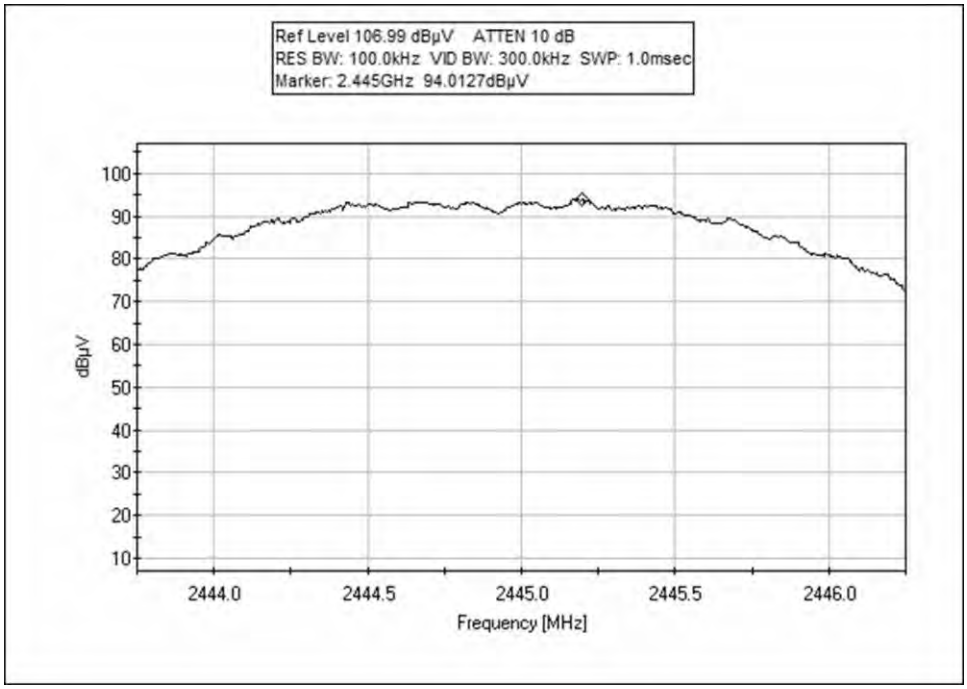
P = (E*d)^2 / (30 * G)
E = Field strength of the measurement converted to V/M
d = Measurement distance in meters
G = Numerical gain of the EUT's antenna relative to an isotropic radiator.
P = The power in watts for which we are solving

Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cables and preamp (dB)	Corrected Reading (dBuV)	Power Spectral Density (dBm/100kHz)	Limit (dBm/3kHz)
2405	93.14	-2.5	90.64	-5.39	8.00
2445	94.01	-2.5	91.51	-4.52	8.00
2480	93.64	-2.5	91.14	-4.89	8.00

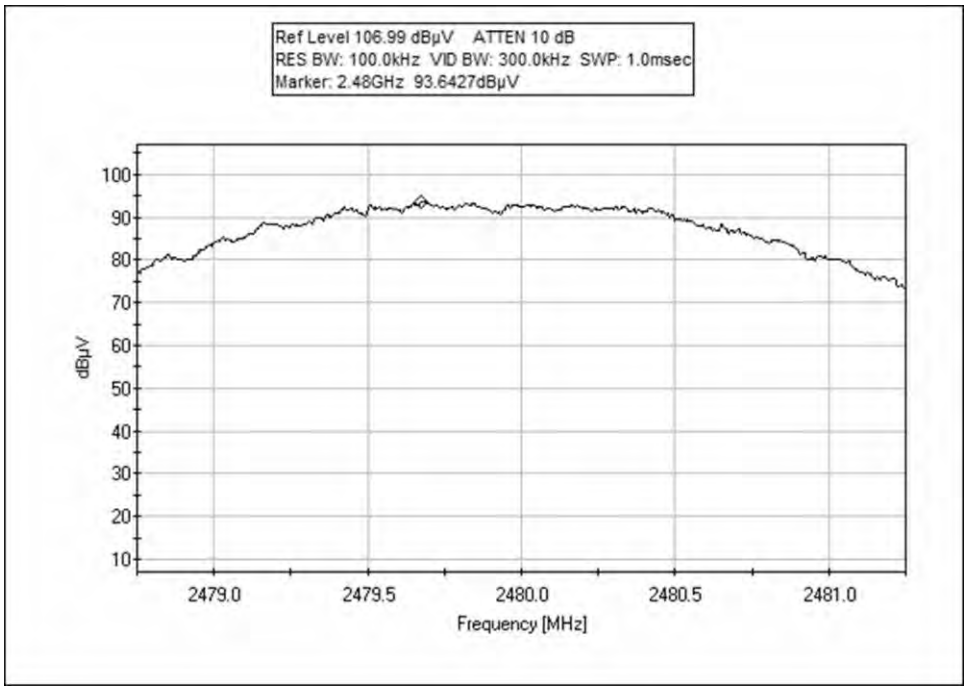
Test Data



Low

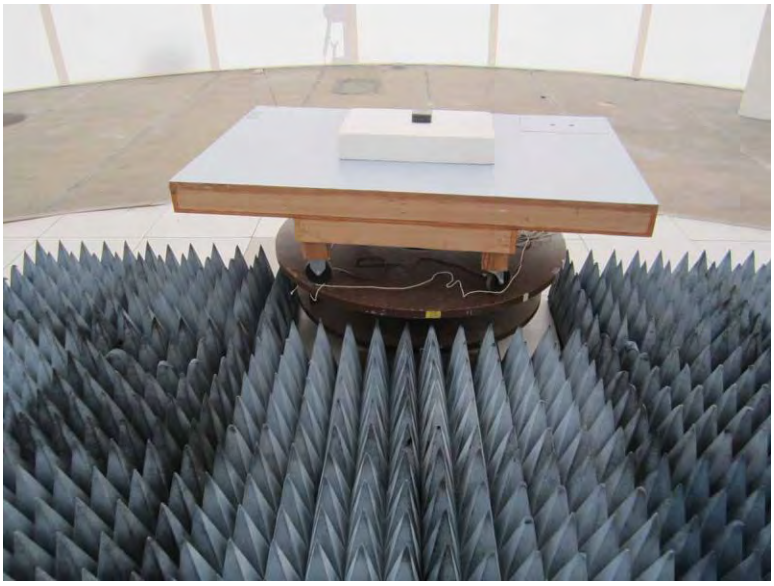

Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 2.445GHz 94.0127dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2444.0
2444.5
2445.0
2445.5
2446.0
Frequency [MHz]

Middle


Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 2.48GHz 93.6427dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2479.0
2479.5
2480.0
2480.5
2481.0
Frequency [MHz]

High

Test Setup Photo



SUPPLEMENTAL INFORMATION

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.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	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 carrot ("^") 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.