

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



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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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

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

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

Project Number: 96902

May 27, 2015

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.

A handwritten signature in black ink, reading "Steve Behm", is written over a horizontal line.

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 | Preamplifier | 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

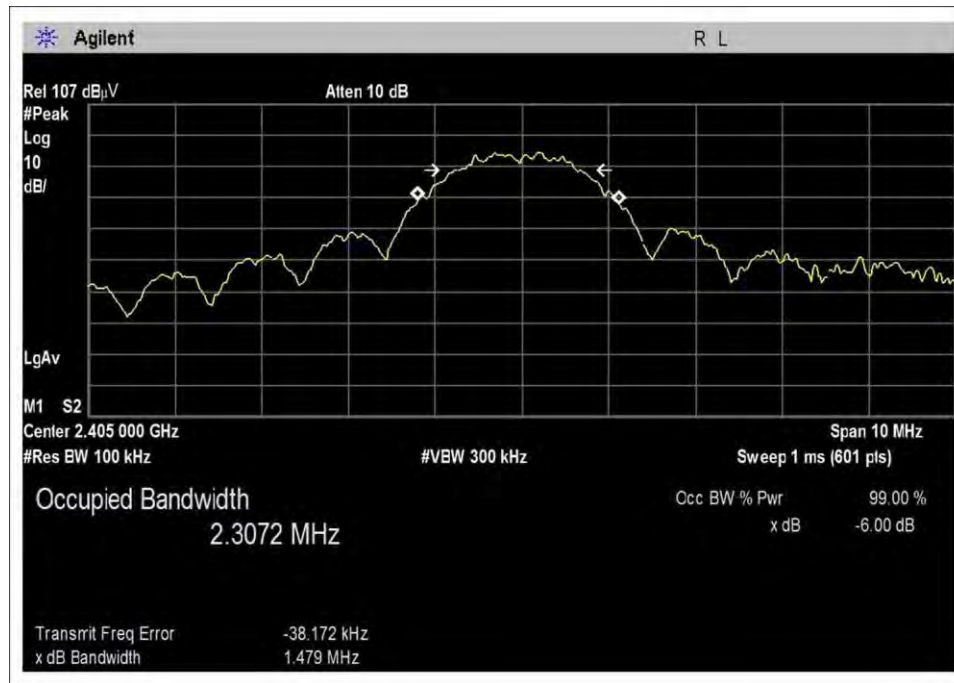
Freq: 2405-2480MHz

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).

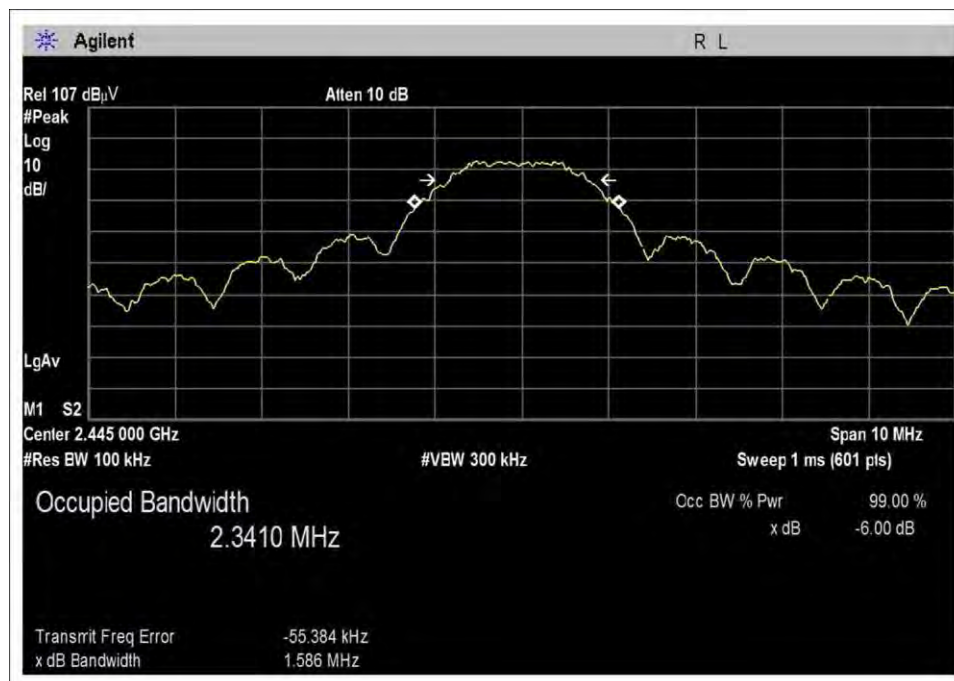
Note: The EUT was testing in configuration 1.

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

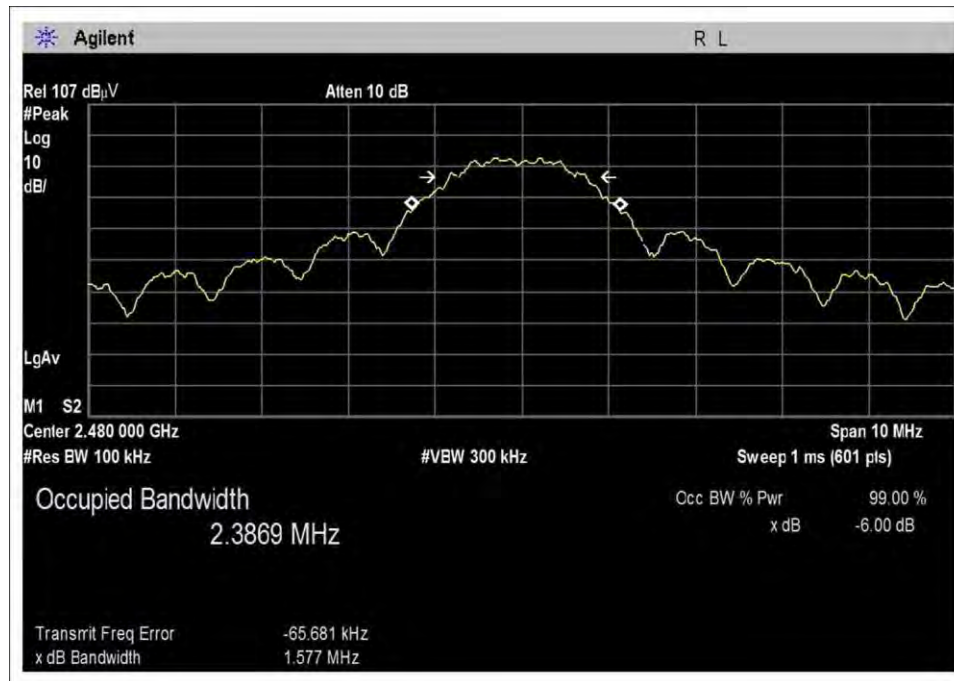
Test Data



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 | Preamplifier | 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:

$$P = (E \cdot d)^2 / (30 \cdot G)$$

E = Field strength of the measurement converted to V/M

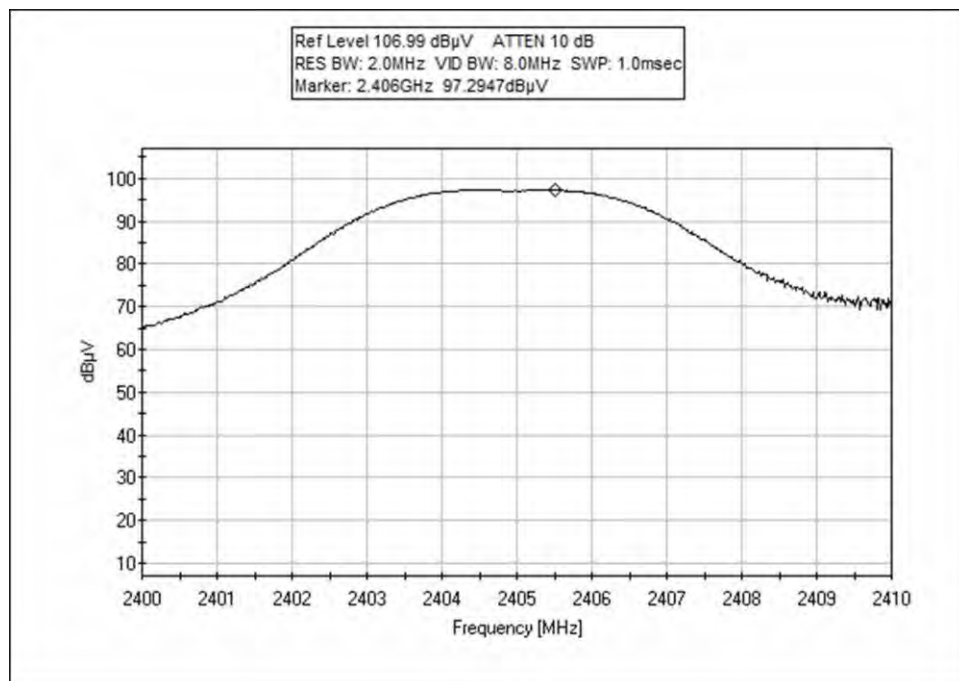
d = Measurement distance in meters

G = Numerical gain of the EUT's antenna relative to an isotropic radiator.

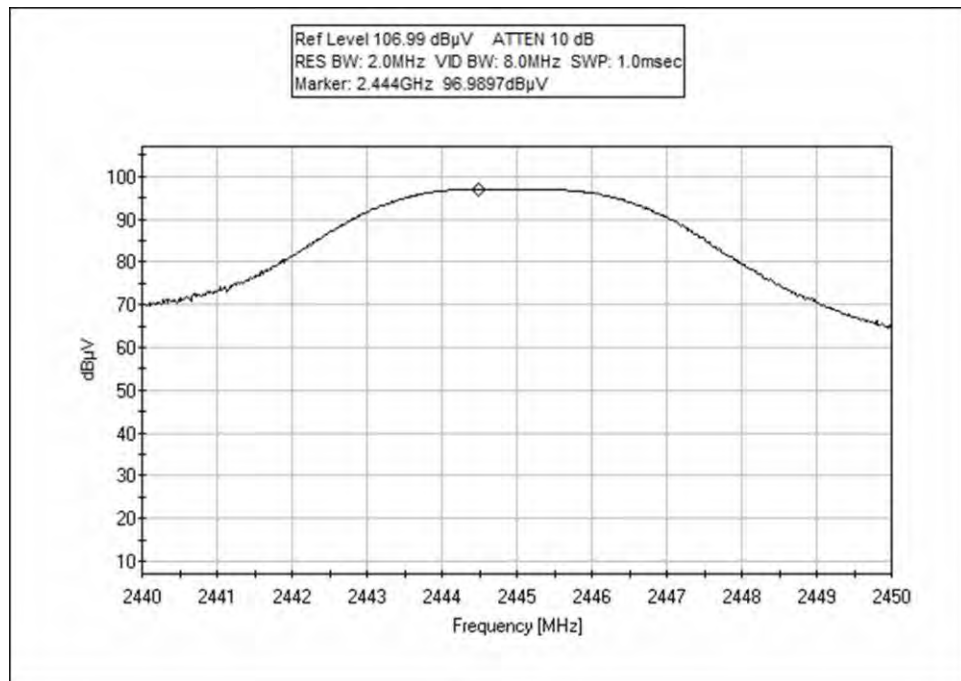
P = The power in watts for which we are solving

| 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 |

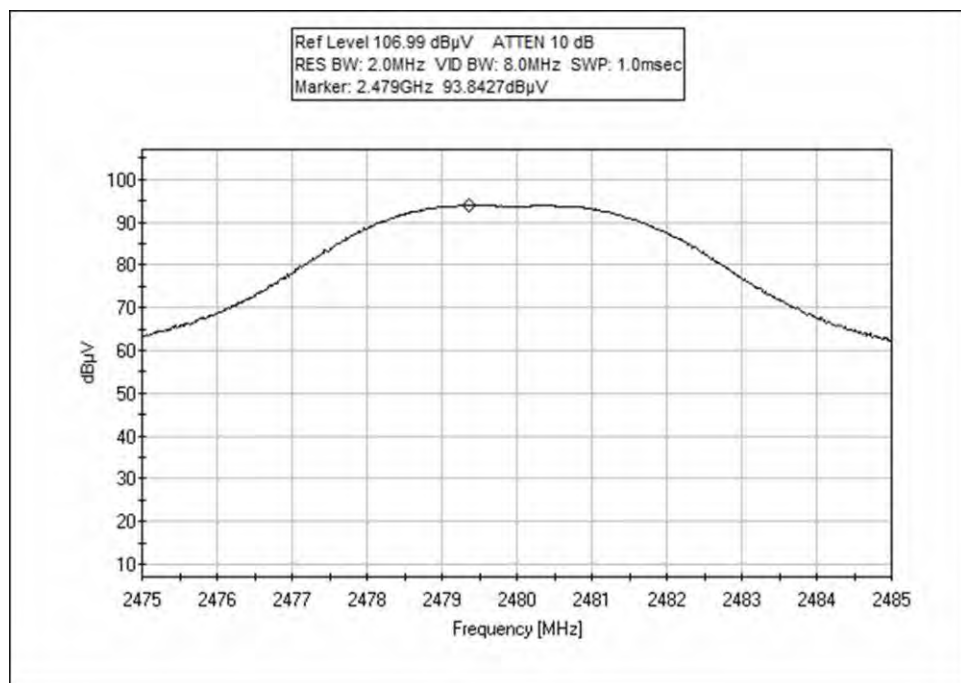
Test Data



Low



Middle



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

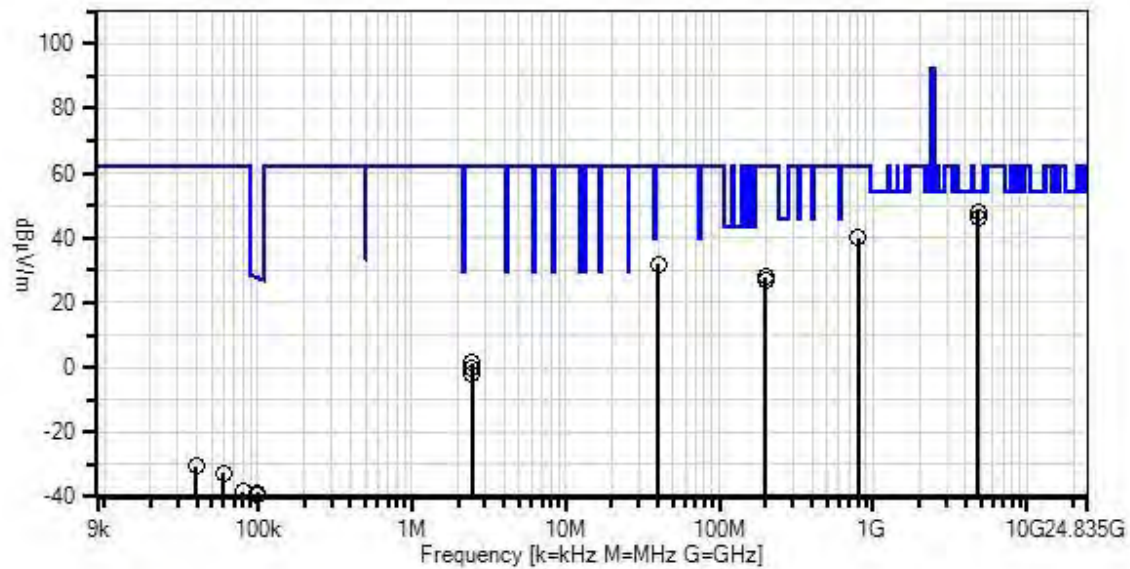
Compliance with the band edges was verified. The marker-delta method was utilized IAW ANSI C63.10 (2009).

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



— Readings
× QP Readings
▼ Ambient
○ Peak Readings
* Average Readings
Software Version: 5.02.00

1 - 15.247 Radiated Spurious Emissions

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:

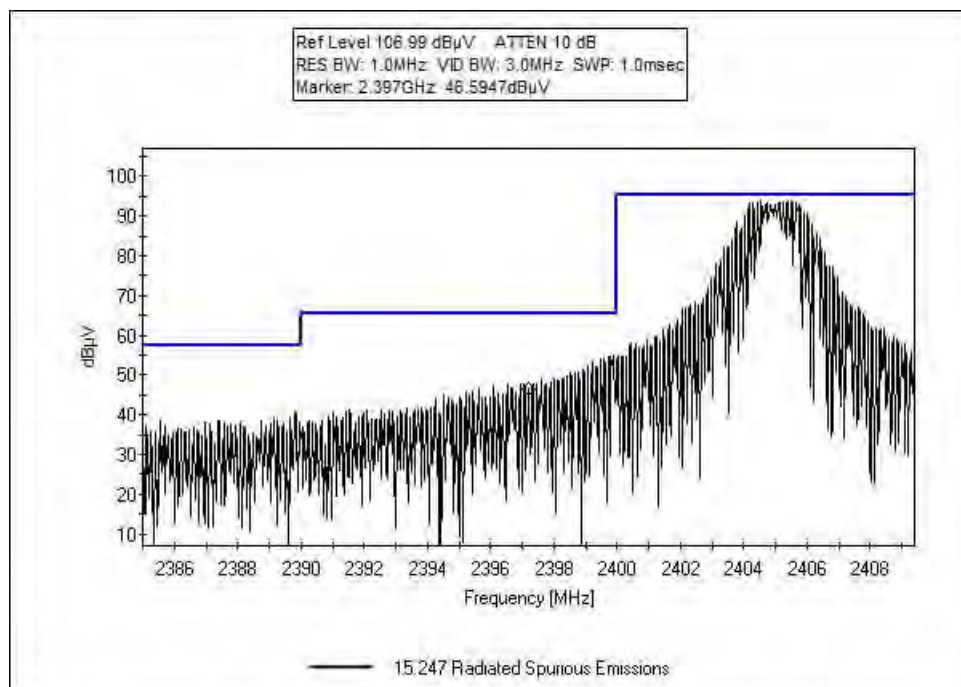
Reading listed by margin.

Test Distance: 3 Meters

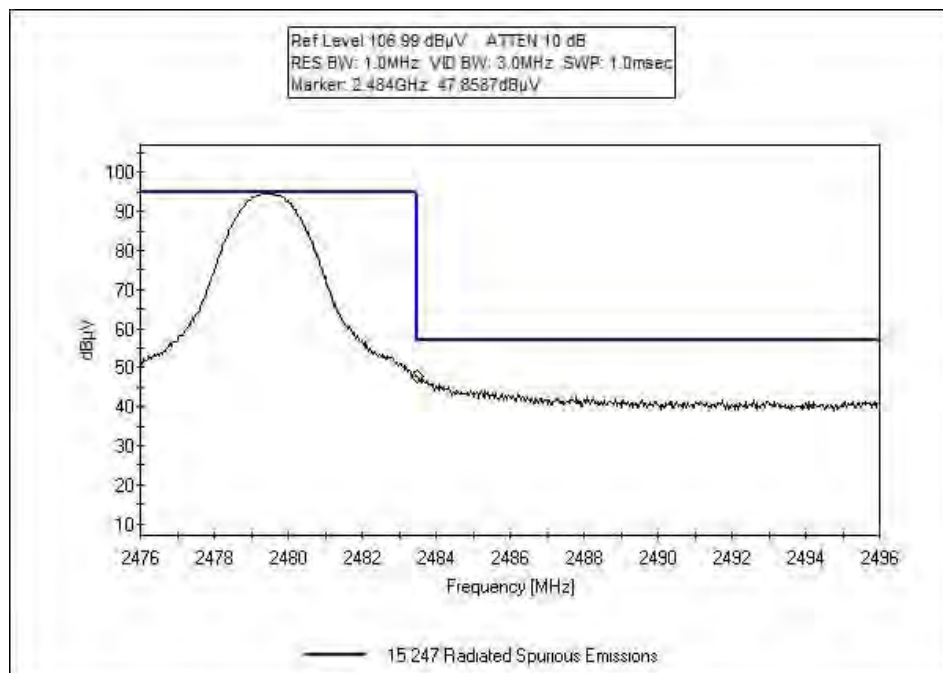
| # | Freq | Rdng | T1 | T2 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|-----------|------|-------|-------|-------|------|-------|--------|--------|--------|-------|
| | | | T5 | T6 | T7 | T8 | | | | | |
| | MHz | dBμV | T9 | T10 | T11 | | Table | dBμV/m | dBμV/m | dB | Ant |
| 1 | 4808.720M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

| | | | | | | | | | | | |
|----|----------|------|----------------------|----------------------|-----------------------|----------------------|-------|-------|------|--------|-------|
| 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 +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 +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 +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 +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 +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 +0.0 | -80.0 | -38.4 | 62.0 | -100.4 | Paral |

Band Edge

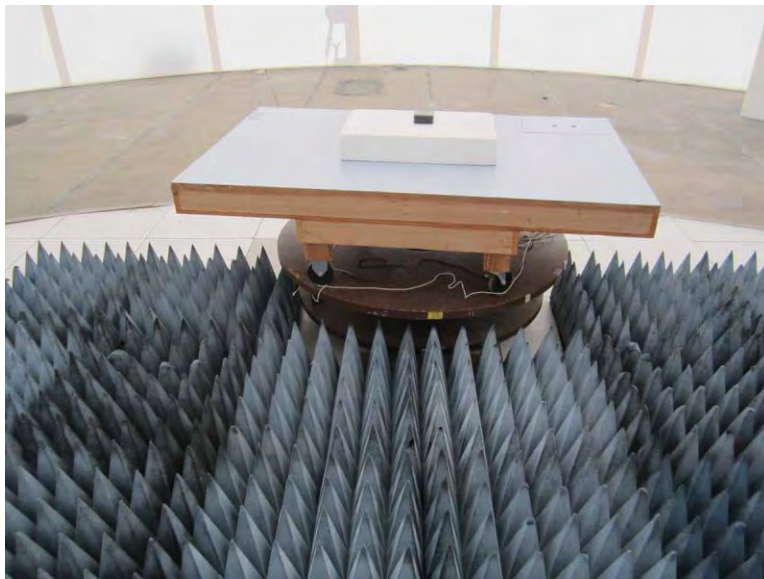


Low



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 | Preamplifier | 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:

$$P = (E \cdot d)^2 / (30 \cdot G)$$

E = Field strength of the measurement converted to V/M

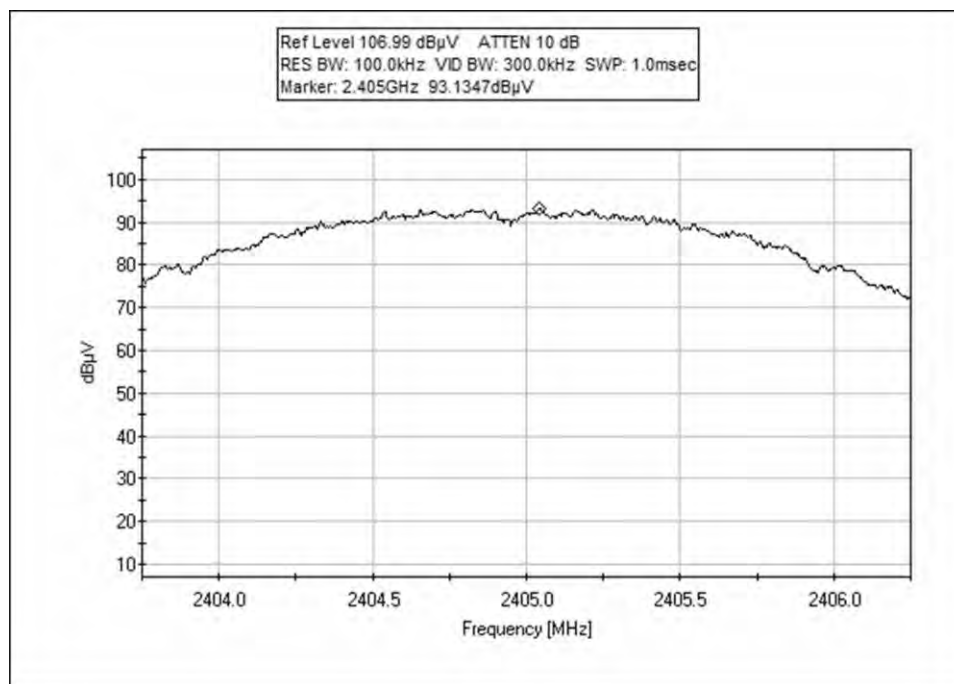
d = Measurement distance in meters

G = Numerical gain of the EUT's antenna relative to an isotropic radiator.

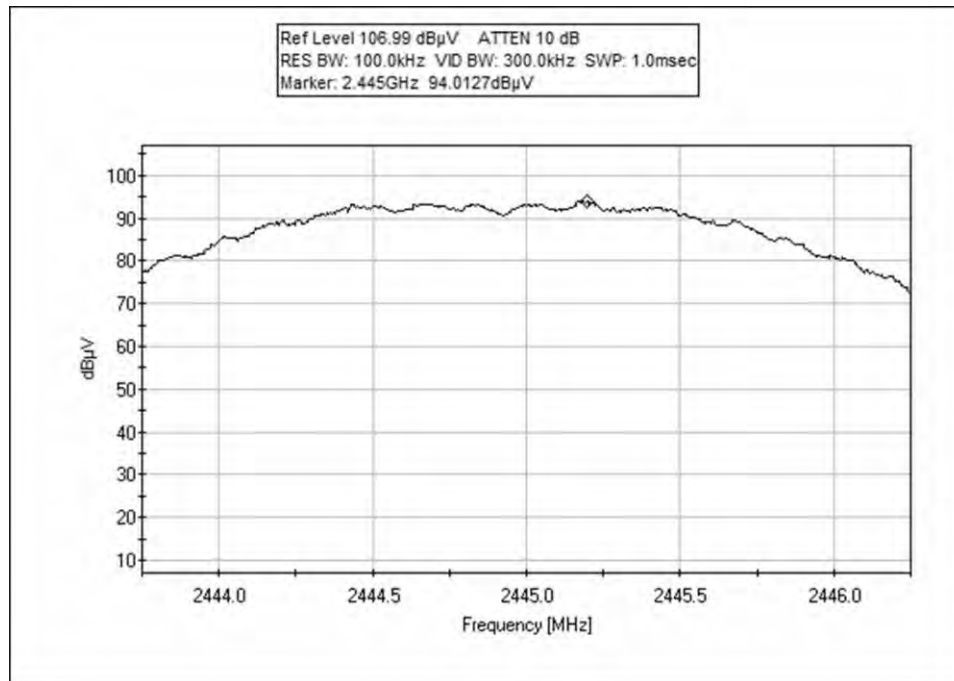
P = The power in watts for which we are solving

| 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 |

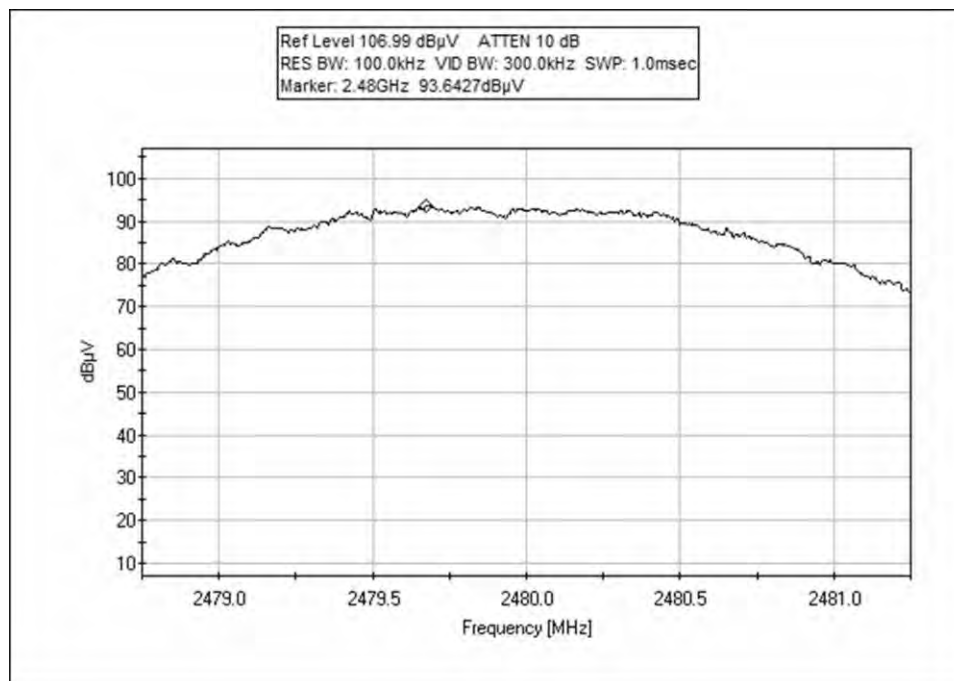
Test Data



Low



Middle



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 dB μ V/m, the spectrum analyzer reading in dB μ V 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.