



EMC Test Report

*Application for Grant of Equipment Authorization
pursuant to*

FCC Part 15 Subpart C

Models: Wall Control Interface and Sensor Interface

FCC ID: WYXSDR10PA

APPLICANT: Adura Technologies
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San Francisco, CA 94105

TEST SITE(S): Elliott Laboratories
684 W. Maude Avenue
Sunnyvale, CA 94085

IC SITE REGISTRATION #: 2845A-1; 2845A-2

REPORT DATE: September 29, 2009

FINAL TEST DATES: April 1, April 2, April 3, April 15, April 30, July
16 and July 17, 2009

AUTHORIZED SIGNATORY:

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Testing Cert #2016-01

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REVISION HISTORY

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SCOPE

An electromagnetic emissions test has been performed on the Adura Technologies model Wall Control Interface and Sensor Interface, pursuant to the following rules:

FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003

FCC DTS Measurement Procedure KDB558074, March 2005

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

Full testing was performed on the Sensor Interface. The Wall Controller Interface uses the same radio board with the following changes: (a) minor changes to the AC power supply, (b) removal of the RF connector for the external antenna, and (c) minor change in the layout of the integral antenna. Limited testing was performed on the Wall Controller Interface to show that it is comparable to the Sensor Interface.

STATEMENT OF COMPLIANCE

The tested sample of Adura Technologies model Wall Control Interface and Sensor Interface complied with the requirements of the following regulations:

FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Adura Technologies model Wall Control Interface and Sensor Interface and therefore apply only to the tested sample. The sample was selected and prepared by Michael Corr of Adura Technologies.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY

The Sensor Interface was used for power, power spectral density and bandwidth measurements, since it was provided with an RF connector to allow for a conducted measurement.

Spurious emissions was performed on the Sensor Interface and the Wall Controller Interface.

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses DSSS techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	1.3 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	10.6 dBm (0.012 Watts) EIRP = 0.013 W ^{Note 1}	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-3.5 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	Emissions were below -30dBc limit	< -30dBc ^{Note 2}	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.7dBμV/m @ 7423.8MHz (-0.3dB)	15.207 in restricted bands, all others <-30dBc ^{Note 2}	Complies

Note 1: EIRP calculated using antenna gain of 2 dBi for the highest EIRP multi-point system.

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst) / RMS averaging over a time interval, as permitted under RSS 210 section A8.4(4).

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS**Sensor Interface**

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Device use a MMCX connector for the external antennas, but requires profession installation.	Refer to standard	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions 5Vdc	43.6dB μ V @ 0.364MHz (-5.0dB)	Refer to standard	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11	Refer to OET 65, FCC Part 1 and RSS 102	Complies

Wall Control Interface

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Device uses integral internal antenna	Refer to standard	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	25.1dB μ V @ 0.412MHz (-22.5dB)	Refer to standard	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11	Refer to OET 65, FCC Part 1 and RSS 102	Complies

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS**GENERAL**

The Adura Technologies model Wall Control Interface is part of a lightning control system. It uses 2.4GHz Zigbee radio system to communicate between a typical light switch and other devices in an industrial or commercial lightning system. It is intended to be installed with a low voltage wall switch. The electrical rating of the EUT is 120/277 VAC, 0.5 mA.

The sample was received on July 16, 2009 and tested on July 16 and July 17, 2009. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Adura Technologies	Wall Control Interface (WCI)	2.4GHz Wall Controller Interface	101	WYXSDR10PA

The Adura Technologies model Sensor Interface is part of a lightning control system. It uses 2.4GHz Zigbee radio system to communicate between lighting sensor devices and other lighting control devices in an industrial or commercial lightning system. It is intended to be mounted to an electrical junction box. The electrical rating of the EUT is 15-30VDC, 11 mA.

The sample was received on April 1, 2009 and tested on April 1, April 2, April 3, April 15 and April 30, 2009. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Adura Technologies	Sensor Interface(SI)	2.4GHz Sensor Interface	21	WYXSDR10PA

OTHER EUT DETAILS

Serial number coding follows this format. xx: Model SKU; ww: Week of Year of build; yy: Year of Build; rr: PCB Revision; b: BOM version; nnnnnnnn: 8-digit Serial Number (Decimal formatting)

ANTENNA SYSTEM

The Adura Technologies model Wall Control Interface has one antenna option, a printed inverted F-trace antenna. The antenna is a pcb trace antenna located on the WCI pcb.

The Adura Technologies model Sensor Interface has three antenna options. The primary antenna is a printed inverted F-trace antenna. The secondary antenna is either an external 1/2 wave whip antenna or 1/4 wave dome antenna.

The two external antennas connect to the Sensor Interface via a MMCX antenna connector and are to be installed by trained professionals, thereby meeting the requirements of FCC 15.203.

ENCLOSURE

The enclosures for Sensor Interface and Wall Control Interface are identical in size. They are primarily constructed of Plastic. They measure approximately 6.4 cm wide by 3.5 cm deep by 2.6 cm high.

Note, the EUTs were tested outside of their enclosures, as they would not effect the measurements.

MODIFICATIONS

No modifications were made to the EUTs during the time the product was at Elliott.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Sensor Interface

Company	Model	Description	Serial Number	FCC ID
WinBook	Winbook XL	Laptop*	-	-
Phihong	PSC15A-050S	5Vdc Power Supply	-	-
Phihong	PSC10A-120S	12Vdc Power Supply	-	-

* - Used to configure the EUT and then removed from the test site.

Wall Control Interface

Company	Model	Description	Serial Number	FCC ID
Adura Tech	None	Programmer Board	None	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Sensor Interface

Port	Connected To	Description	Cable(s) Shielded or Unshielded	Length(m)
Serial*	Laptop	DB9	Shielded	1.5
DC Power	AC/DC Power Supply	2Wire	Unshielded	1.0

* - Serial port is not available to the end user. Laptop was connected to configure the EUT for testing and then removed.

Wall Control Interface

Port	Connected To	Description	Cable(s) Shielded or Unshielded	Length(m)
Programmer Board DC	AC Adaptor	2Wire	Unshielded	2.0
Programmer Board DC	EUT	Muiltwire	Unshielded	0.5

EUT OPERATION

During emissions testing the EUT was configured to transmit continuously at full power on the selected channel.

TEST SITE**GENERAL INFORMATION**

Final test measurements were taken on April 1, April 2, April 3, April 15, April 30, July 16 and July 17, 2009 at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
SVOATS #1	90592	2845A-1	684 West Maude Ave, Sunnyvale CA 94085-3518
SVOATS #2	90593	2845A-2	

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception, on OATS sites, of predictable local TV, radio, and mobile communications traffic. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

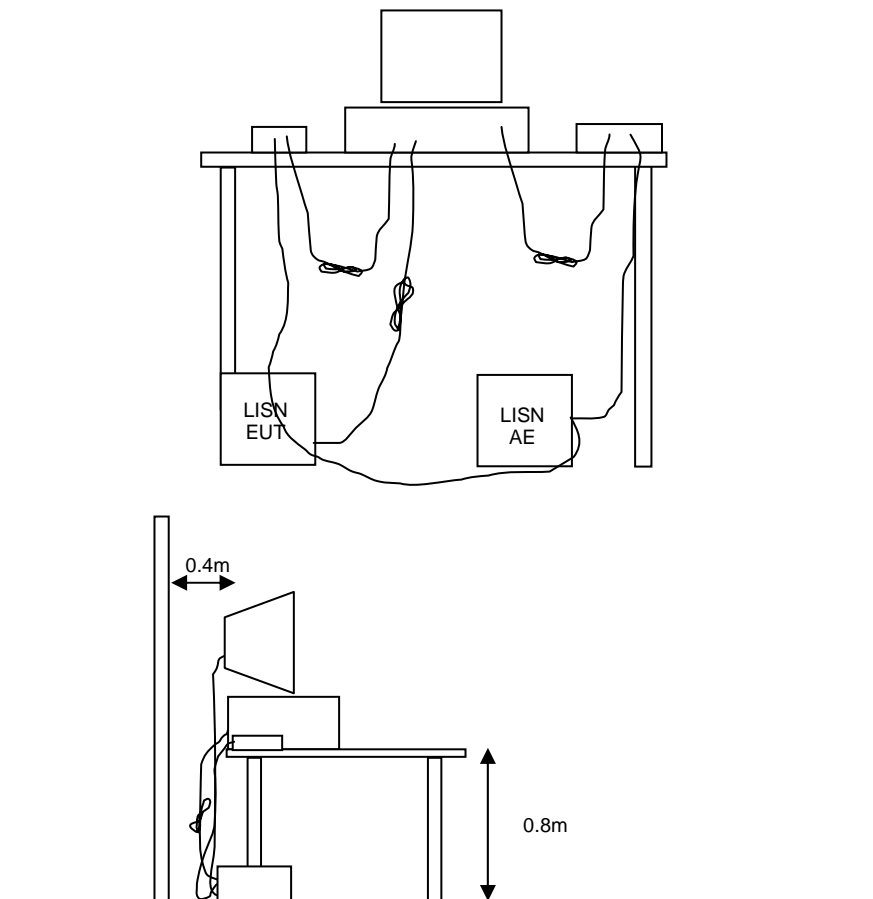
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.



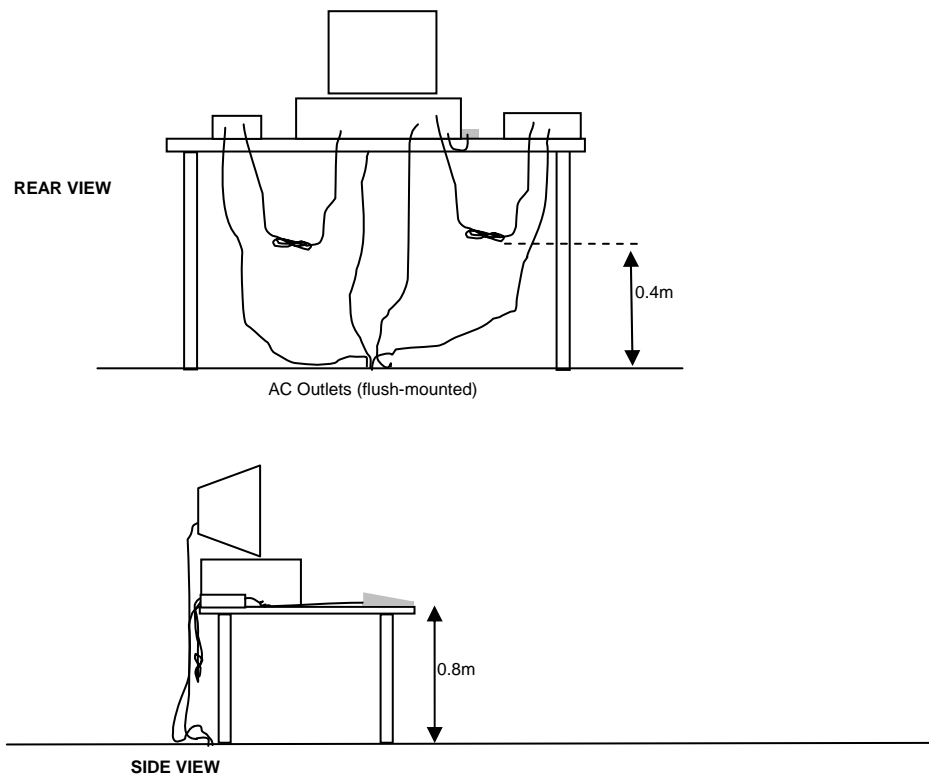
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

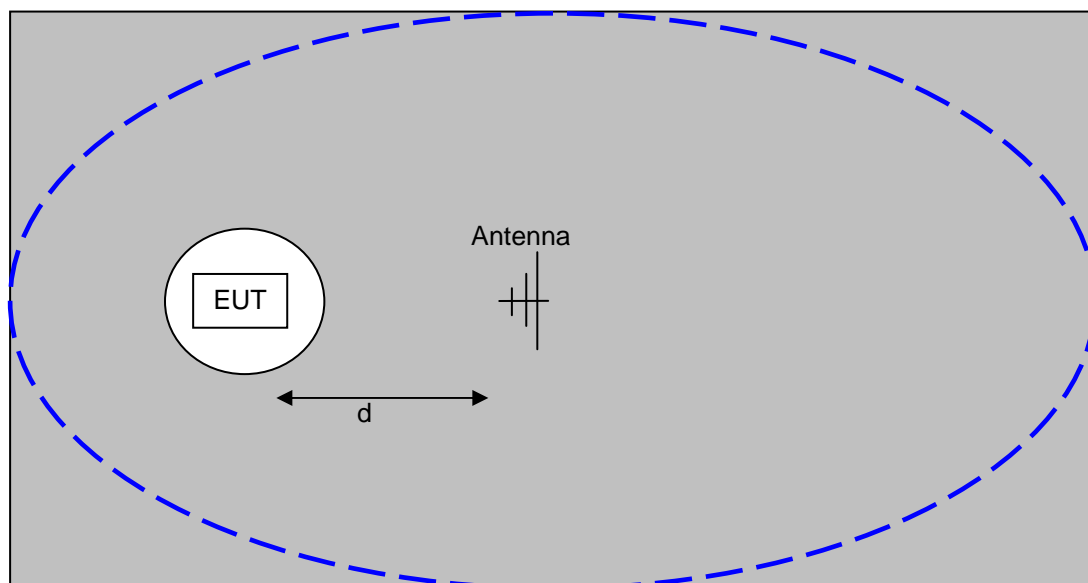
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

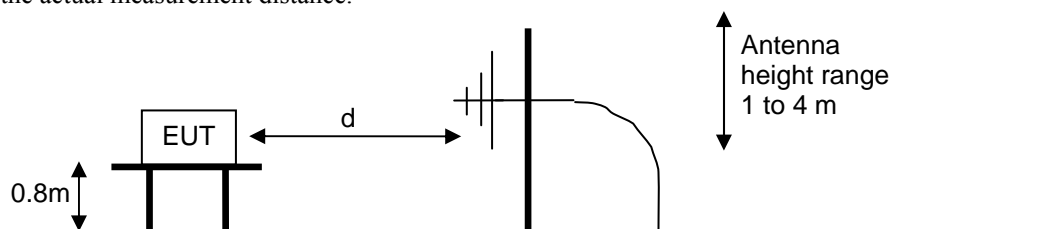
When testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.



Test Configuration for Radiated Field Strength Measurements
OATS- Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	2400/F _{KHz} @ 300m	67.6-20*log ₁₀ (F _{KHz}) @ 300m
0.490-1.705	24000/F _{KHz} @ 30m	87.6-20*log ₁₀ (F _{KHz}) @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit

¹ The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

(decibel form) as follows:

$$R_T - S = M$$

where:

R_T = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

Appendix A Test Equipment Calibration Data

3 Pages

Radio Antenna Port (Power and Spurious Emissions), 27-Mar-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-Jun-10

Radio Spurious Emissions, 01-Apr-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-Jun-10
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	05-Aug-09

Radiated Emissions, 30 - 1,000 MHz, 01-Apr-09**Engineer: Joseph Cadigal**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	19-Sep-09
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	13-Nov-09
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1404	24-Feb-10
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	29-May-09

Radio Antenna Port (Power and Spurious Emissions), 02-Apr-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-Jun-10

Radiated Emissions, 30 - 1,000 MHz, 03-Apr-09**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Rohde & Schwarz	Test Receiver, 20-1300 MHz	ESVP	273	16-Apr-09
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	19-Sep-09
EMCO	Log Periodic Antenna, 0.2-1 GHz	3146	1294	17-Sep-10

Conducted Emissions - AC Power Ports, 06-Apr-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Elliott Laboratories	LISN, FCC / CISPR	LISN-3, OATS	304	31-Jul-09
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	23-Feb-10
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	02-Oct-09

Conducted Emissions - AC Power Ports, 15-Apr-09**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Elliott Laboratories	LISN, FCC / CISPR	LISN-4, OATS	362	31-Jul-09
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	812	23-Feb-10
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz-26.5 GHz	8593EM	1141	29-Dec-09
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	1316	06-Nov-09

Radio Spurious Emissions, 30-Apr-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	15-Jul-10
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	05-Aug-09

Radiated Emissions, 30 - 26,500 MHz, 08-Sep-09**Engineer: John Caizzi**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	15-Jul-10
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	18-Sep-10

Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
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Radiated Emissions, 30 - 18,000 MHz, 16-Sep-09**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	15-Jul-10
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	18-Sep-10
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10

Conducted Emissions - AC Power Ports, 17-Jul-09**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Elliott Laboratories	LISN, FCC / CISPR	LISN-3, OATS	304	31-Jul-09
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	780	30-Dec-09
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	812	23-Feb-10
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	14-Apr-10

Radiated Emissions, 30 - 25,000 MHz, 17-Jul-09**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	15-Jul-10
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10

Radiated Emissions, 30 - 25000MHz, 22-Jul-09**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	15-Jul-10
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
Hewlett Packard	High Pass filter, 3.5 GHz (Red System)	P/N 84300-80038 (84125C)	1403	28-Aug-09

Appendix B Test Data

T74993 49 Pages

T76161 10 Pages



EMC Test Data

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
		Account Manager:	Deepa Shetty
Contact:	Michael Corr		-
Emissions Standard(s):	FCC Part 15.247, Subpart B	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Adura Technologies

Model

Sensor Interface(SI)

Date of Last Test: 9/16/2009

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 15-20 °C

Rel. Humidity: 30-45 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Frequency (MHz)	Channel	Power Setting	Antenna	Test Performed	Limit	Result / Margin
1a	2405	Low (ch 11)	16	Dome	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.6dBμV/m @ 2351.1MHz (-1.4dB)
			16	Dome	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	45.9dBμV/m @ 4809.1MHz (-8.1dB)
1b	2440	Center (ch 18)	16	Dome	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	46.5dBμV/m @ 4881.0MHz (-7.5dB)
1c	2475	High (ch 25)	19	Dome	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	45.2dBμV/m @ 2483.5MHz (-8.8dB)
			19	Dome	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	38.1dBμV/m @ 7423.7MHz (-15.9dB)
1d	2480	Higher (ch 26)	0	Dome	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	45.4dBμV/m @ 2483.5MHz (-8.6dB)
			0	Dome	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	37.4dBμV/m @ 7423.4MHz (-16.6dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26000 MHz.

Date of Test: 9/8/2009
Test Engineer: John Caizzi
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Run #1a: Low Channel 11 @ 2405 MHz with power setting of 16dBm

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

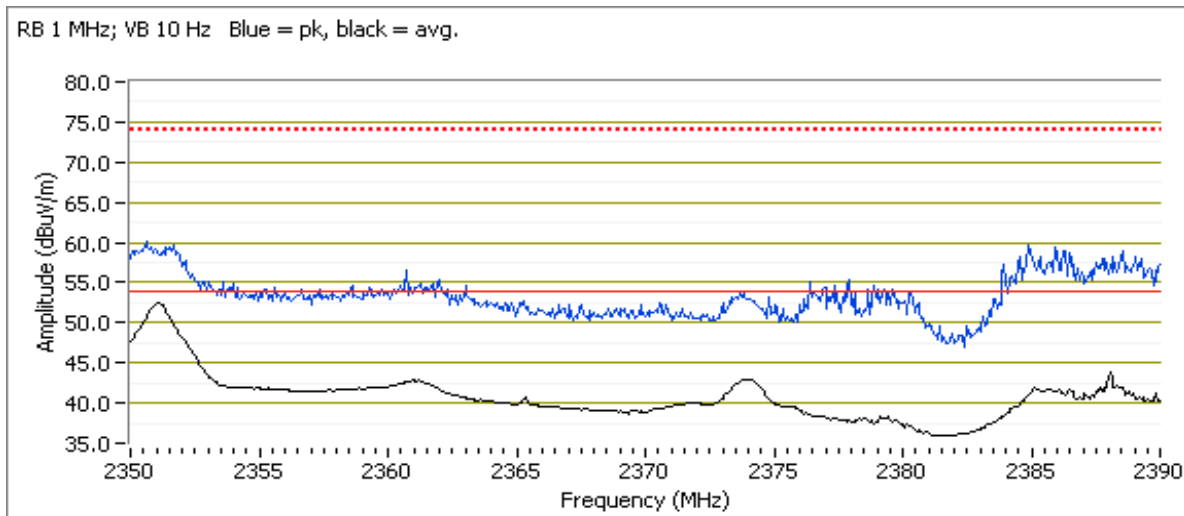
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2405.130	103.5	V	-	-	AVG	108	1.1	
2404.600	105.6	V	-	-	PK	108	1.1	
2405.120	94.1	H	-	-	AVG	149	1.0	
2404.630	97.4	H	-	-	PK	149	1.0	
2404.920	101.3	V	-	-	-	108	1.1	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW:	101.3 dB μ V/m
Limit for emissions outside of restricted bands:	71.3 dB μ V/m

Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2351.070	52.6	V	54.0	-1.4	AVG	108	1.08	
2351.000	58.8	V	74.0	-15.2	PK	108	1.08	



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4809.080	45.9	V	54.0	-8.1	AVG	351	1.40	
4809.100	44.5	H	54.0	-9.5	AVG	76	1.48	
7213.650	40.9	H	74.0	-33.1	AVG	139	1.40	
7213.700	41.0	V	74.0	-33.0	AVG	82	1.52	
9618.000	39.0	H	74.0	-35.0	AVG	192	2.24	
9618.100	40.9	V	74.0	-33.1	AVG	96	1.51	
4809.030	51.5	H	74.0	-22.5	PK	76	1.48	
4809.220	52.6	V	74.0	-21.4	PK	351	1.40	
7213.520	49.9	H	74.0	-24.1	PK	139	1.40	
7216.580	50.4	V	74.0	-23.6	PK	82	1.52	
9617.930	51.2	V	74.0	-22.8	PK	96	1.51	
9618.380	50.3	H	74.0	-23.7	PK	192	2.24	

Note 1: For all emissions, the tighter restricted band limit of 15.209 was used.

Run #1b: Center Channel 18 @ 2440 MHz with power setting of 16dBm

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4881.030	46.5	V	54.0	-7.5	AVG	352	1.42	
4881.050	44.2	H	54.0	-9.8	AVG	57	1.56	
7318.780	36.4	H	54.0	-17.6	AVG	110	1.00	
7318.800	36.2	V	54.0	-17.8	AVG	55	1.00	
4879.180	52.4	V	74.0	-21.6	PK	352	1.42	
4881.050	50.9	H	74.0	-23.1	PK	57	1.56	
7319.430	48.3	V	74.0	-25.7	PK	55	1.00	
7319.440	48.6	H	74.0	-25.4	PK	110	1.00	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Date of Test: 9/16/2009
Test Engineer: Mehran Birgani

Config. Used: 1
Test Location: SVOATS #2

Run #1c: High Channel 25 @ 2475 MHz with power setting of 19dBm

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2475.080	104.7	V	-	-	AVG	152	1.4	
2474.650	107.0	V	-	-	PK	152	1.4	
2475.120	96.1	H	-	-	AVG	66	1.0	
2474.530	98.0	H	-	-	PK	66	1.0	
2474.980	103.0	V	-	-	-	152	1.4	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW:

103.0 dB μ V/m

Limit for emissions outside of restricted bands:

73.0 dB μ V/m

Limit is -30dBc (UNII power measurement)

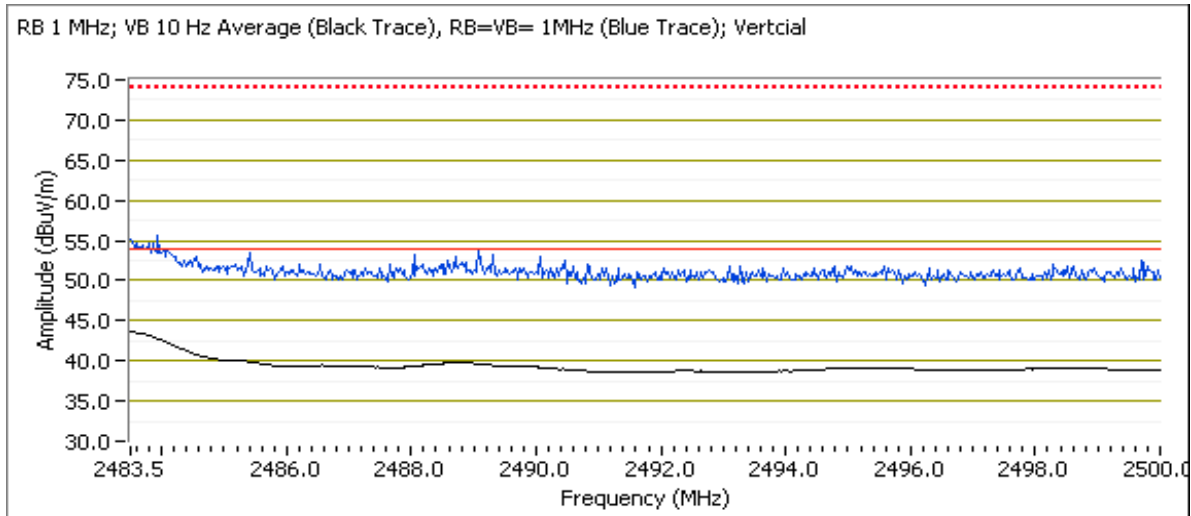
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	45.2	V	54.0	-8.8	AVG	152	1.4	
2483.580	54.4	V	74.0	-19.6	PK	152	1.4	

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4949.120	36.5	H	54.0	-17.5	AVG	207	1.5	
4949.130	35.6	V	54.0	-18.4	AVG	129	1.0	
7423.410	37.4	V	54.0	-16.6	AVG	55	1.0	
7423.670	38.1	H	54.0	-15.9	AVG	52	1.2	
4948.870	44.8	H	74.0	-29.2	PK	207	1.5	
4949.030	44.6	V	74.0	-29.4	PK	129	1.0	
7423.320	48.3	V	74.0	-25.7	PK	55	1.0	
7426.800	49.8	H	74.0	-24.2	PK	52	1.2	

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A



Date of Test: 9/16/2009
Test Engineer: Mehran Birgani

Config. Used: 1
Test Location: SVOATS #2

Run #1d: High Channel 26 @ 2480 MHz, Dome Antenna with power setting of 0dBm

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2480.050	78.4	V	-	-	AVG	152	1.4	
2479.580	80.9	V	-	-	PK	152	1.4	
2480.050	70.1	H	-	-	AVG	66	1.0	
2480.620	72.4	H	-	-	PK	66	1.0	
2479.880	75.9	V	-	-	-	152	1.4	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW: 75.9 dB μ V/m

Limit for emissions outside of restricted bands: 45.9 dB μ V/m Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

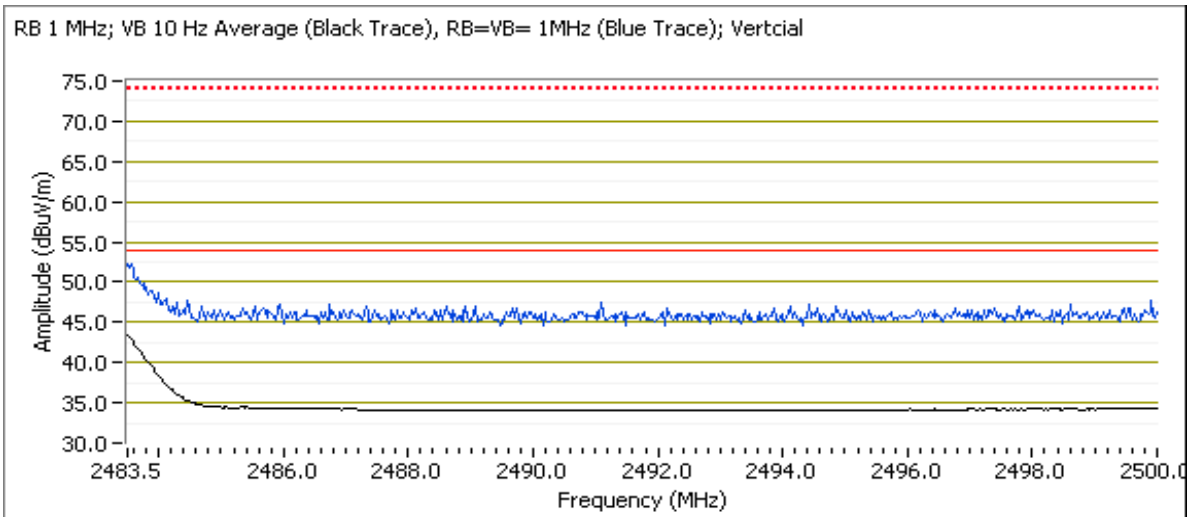
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	45.4	V	54.0	-8.6	AVG	152	1.4	
2483.500	51.5	V	74.0	-22.5	PK	152	1.4	

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4949.120	35.1	V	54.0	-18.9	AVG	129	1.0	
4959.540	29.9	H	54.0	-24.1	AVG	207	1.5	
7423.420	37.4	V	54.0	-16.6	AVG	55	1.0	
7438.540	37.1	H	54.0	-16.9	AVG	52	1.2	
4949.030	44.7	V	74.0	-29.3	PK	129	1.0	
4960.920	41.8	H	74.0	-32.2	PK	207	1.5	
7423.320	48.4	V	74.0	-25.8	PK	55	1.0	
7440.630	48.8	H	74.0	-25.2	PK	52	1.2	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 8-15 °C
Rel. Humidity: 50-100 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Frequency (MHz)	Channel	Power Setting	Antenna	Test Performed	Limit	Result / Margin
1a	2405	Low (ch 11)	16	Internal	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.9dBµV/m @ 2351.1MHz (-2.1dB)
			16	Internal	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	51.9dBµV/m @ 4809.2MHz (-2.1dB)
1b	2440	Center (ch 18)	16	Internal	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	50.8dBµV/m @ 4879.1MHz (-3.2dB)
1c	2475	High (ch 25)	19	Internal	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	50.7dBµV/m @ 2483.5MHz (-3.3dB)
			16	Internal	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	49.3dBµV/m @ 4949.1MHz (-4.7dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Note 1: Prescan showed the EUT with internal antenna in Up right oriantation has highest emission. No emissions from the radio was observed below 1GHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26000 MHz.

Date of Test: 4/1/2009
Test Engineer: Suhaila Khushzad
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Run #1a: Low Channel 11 @ 2405 MHz (EUT Up Right)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2405.130	106.3	V	-	-	AVG	306	1.0	RB 1 MHz; VB: 10 Hz
2405.700	108.0	V	-	-	PK	306	1.0	RB 1 MHz; VB: 1 MHz
2405.130	102.4	H	-	-	AVG	164	1.4	RB 1 MHz; VB: 10 Hz
2405.670	104.0	H	-	-	PK	164	1.4	RB 1 MHz; VB: 1 MHz
2405.400	104.3	V	-	-	PK	306	1.0	RB 100 kHz; VB: 100 kHz
2404.850	100.9	H	-	-	PK	164	1.4	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW: 104.3 dB μ V/m

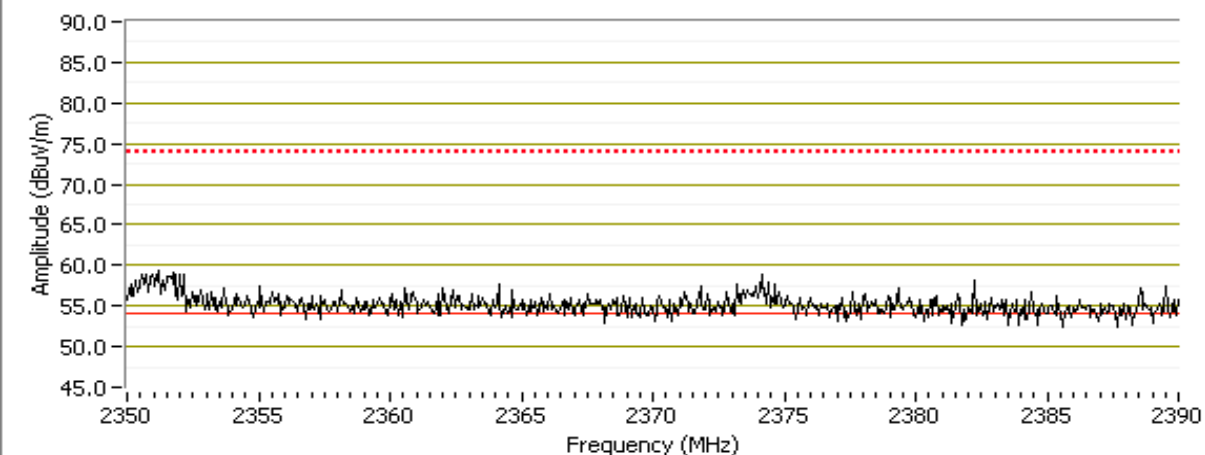
Limit for emissions outside of restricted bands: 74.3 dB μ V/m Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

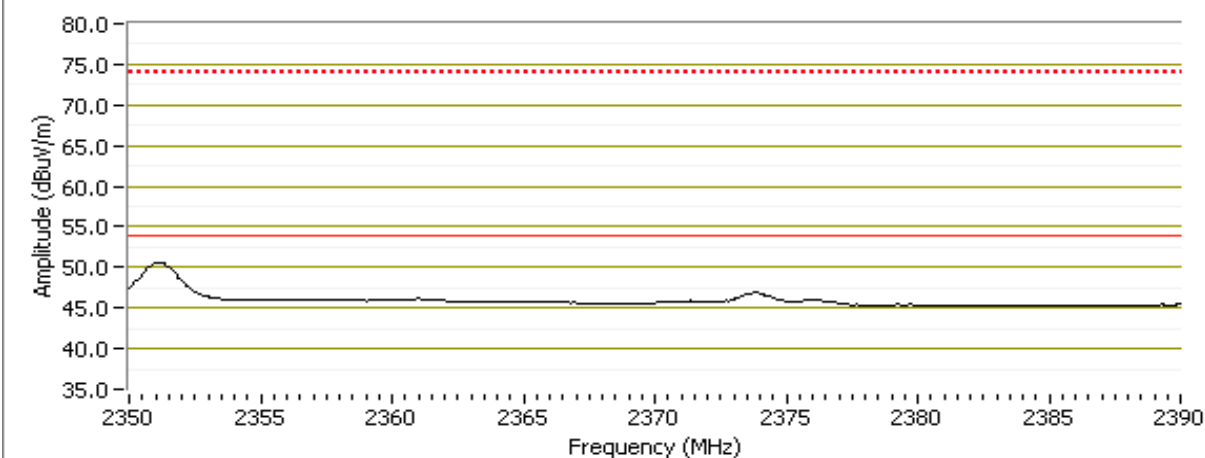
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2351.070	51.9	V	54.0	-2.1	AVG	306	1.0	RB 1 MHz; VB: 10 Hz
2351.000	48.8	H	54.0	-5.2	AVG	164	1.4	RB 1 MHz; VB: 10 Hz
2351.130	60.2	V	74.0	-13.8	PK	306	1.0	RB 1 MHz; VB: 1 MHz
2350.400	57.8	H	74.0	-16.2	PK	164	1.4	RB 1 MHz; VB: 1 MHz

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-V

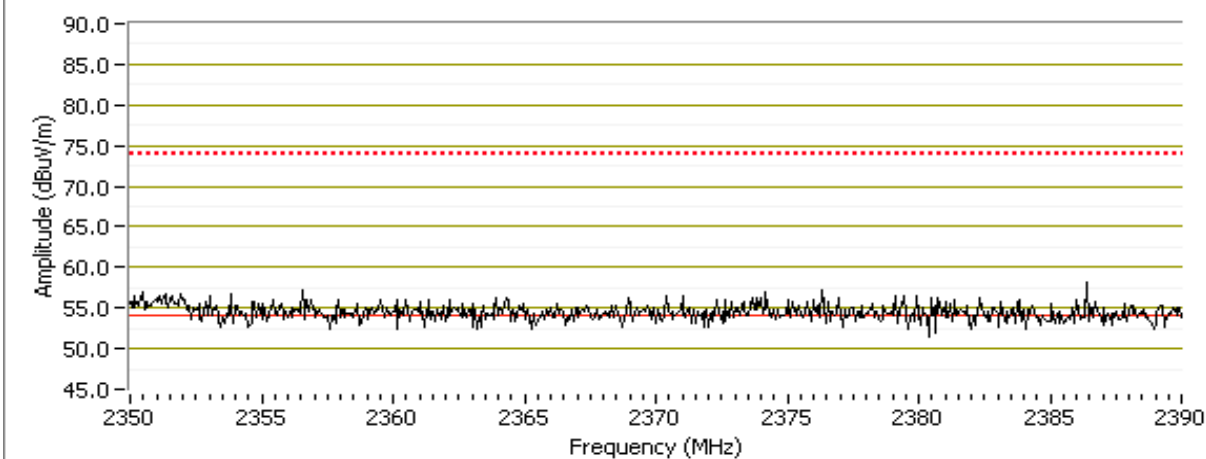


RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-V

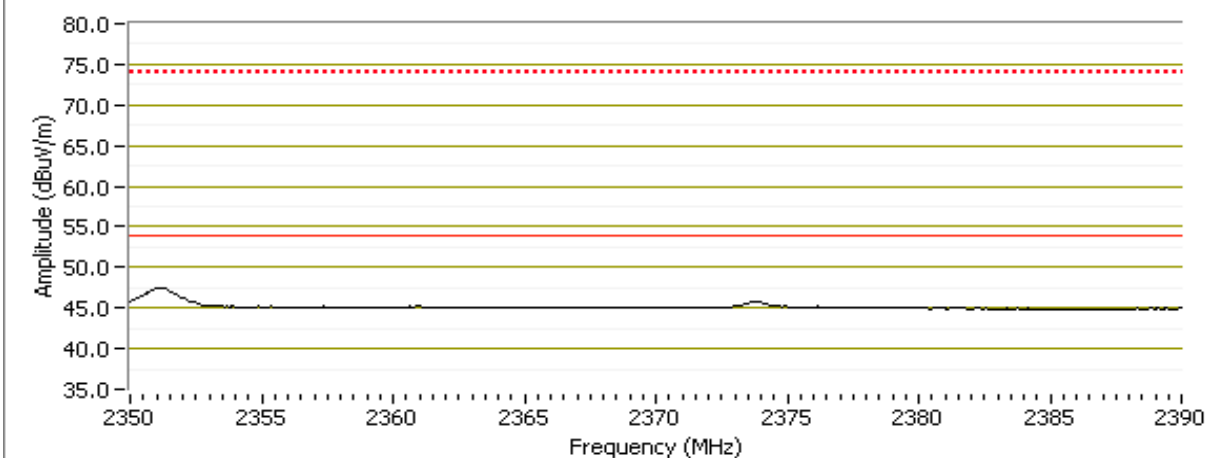


Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-H



RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-H



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4809.240	51.9	H	54.0	-2.1	AVG	163	1.7	RB 1 MHz; VB: 10 Hz
4809.210	50.3	V	54.0	-3.7	AVG	340	1.0	RB 1 MHz; VB: 10 Hz
4809.140	59.0	H	74.0	-15.0	PK	163	1.7	RB 1 MHz; VB: 1 MHz
4811.080	55.9	V	74.0	-18.1	PK	340	1.0	RB 1 MHz; VB: 1 MHz
7213.620	54.6	H	74.0	-19.4	PK	135	1.3	RB 1 MHz; VB: 1 MHz
7216.460	50.1	V	74.0	-23.9	PK	85	1.0	RB 1 MHz; VB: 1 MHz
9627.310	48.4	V	74.0	-25.6	PK	160	1.0	RB 1 MHz; VB: 1 MHz
7216.370	47.4	H	74.0	-26.6	AVG	135	1.3	RB 1 MHz; VB: 10 Hz
7213.710	41.0	V	74.0	-33.0	AVG	85	1.0	RB 1 MHz; VB: 10 Hz
9620.060	38.1	V	74.0	-35.9	AVG	160	1.0	RB 1 MHz; VB: 10 Hz

Note 1:

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1b: Center Channel 18 @ 2440 MHz (EUT Up Right)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4879.130	50.8	V	54.0	-3.2	AVG	337	1.0	RB 1 MHz; VB: 10 Hz
4879.240	50.8	H	54.0	-3.2	AVG	166	1.9	RB 1 MHz; VB: 10 Hz
7321.420	44.8	H	54.0	-9.2	AVG	121	1.3	RB 1 MHz; VB: 10 Hz
7321.520	40.9	V	54.0	-13.1	AVG	272	1.0	RB 1 MHz; VB: 10 Hz
4880.970	56.5	V	74.0	-17.5	PK	337	1.0	RB 1 MHz; VB: 1 MHz
4881.140	56.3	H	74.0	-17.7	PK	166	1.9	RB 1 MHz; VB: 1 MHz
7321.680	53.9	H	74.0	-20.1	PK	121	1.3	RB 1 MHz; VB: 1 MHz
9758.230	50.6	V	74.0	-23.4	PK	163	1.0	RB 1 MHz; VB: 1 MHz
7318.670	50.2	V	74.0	-23.8	PK	272	1.0	RB 1 MHz; VB: 1 MHz
9760.090	38.2	V	74.0	-35.8	AVG	163	1.0	RB 1 MHz; VB: 10 Hz

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1c: High Channel 25 @ 2475 MHz (EUT Up Right)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2475.140	109.6	V	-	-	AVG	298	1.3	RB 1 MHz; VB: 10 Hz
2474.570	111.9	V	-	-	PK	298	1.3	RB 1 MHz; VB: 1 MHz
2475.090	102.3	H	-	-	AVG	295	1.8	RB 1 MHz; VB: 10 Hz
2474.660	104.4	H	-	-	PK	295	1.8	RB 1 MHz; VB: 1 MHz
2474.830	100.6	H	-	-	PK	295	1.8	RB 100 kHz; VB: 100 kHz
2475.210	107.4	V	-	-	PK	298	1.3	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW:	107.4 dB μ V/m
Limit for emissions outside of restricted bands:	77.4 dB μ V/m

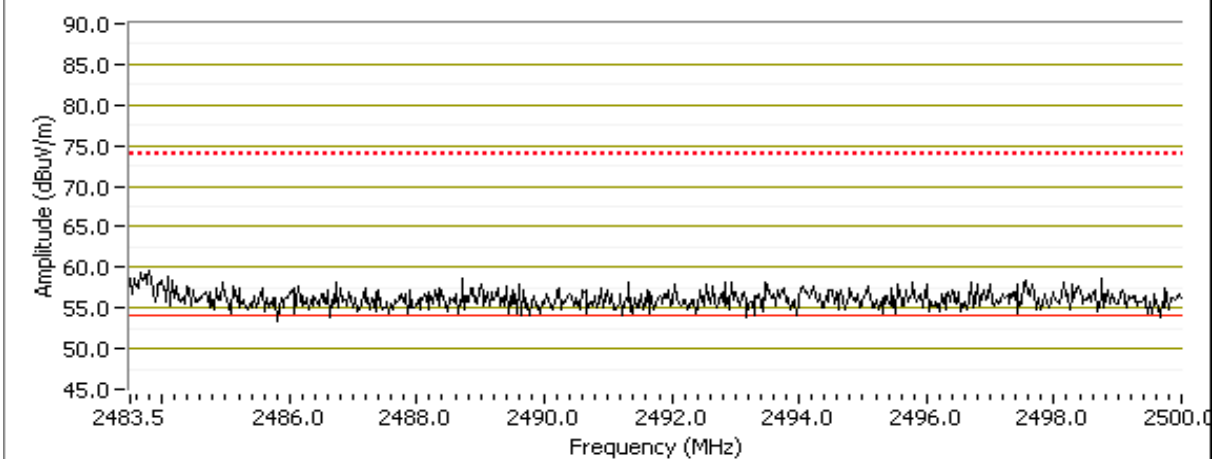
Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

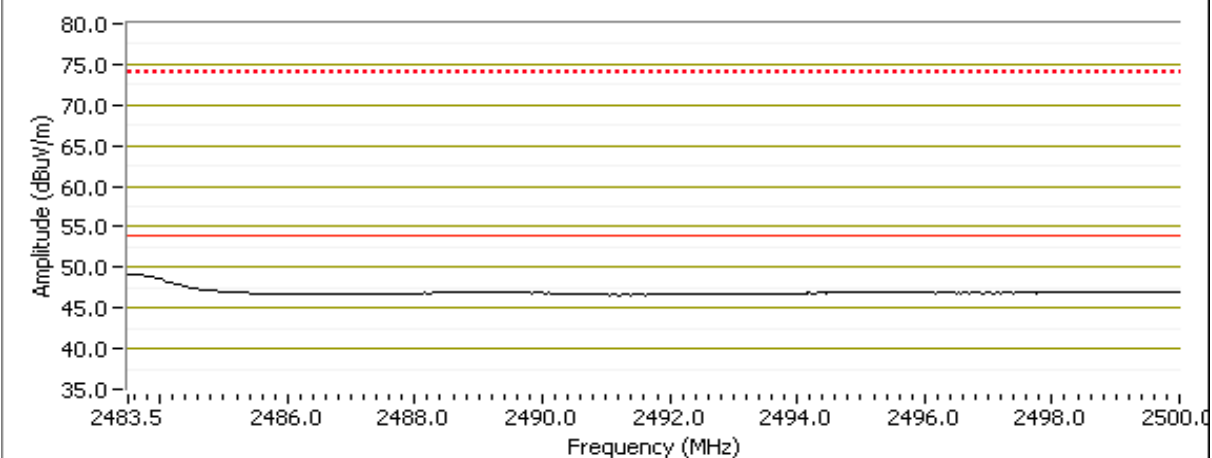
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	50.7	V	54.0	-3.3	AVG	298	1.3	RB 1 MHz; VB: 10 Hz
2483.500	47.9	H	54.0	-6.1	AVG	295	1.8	RB 1 MHz; VB: 10 Hz
2483.750	60.1	V	74.0	-13.9	PK	298	1.3	RB 1 MHz; VB: 1 MHz
2497.960	59.1	H	74.0	-14.9	PK	295	1.8	RB 1 MHz; VB: 1 MHz

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2483.5 MHz, Peak-V

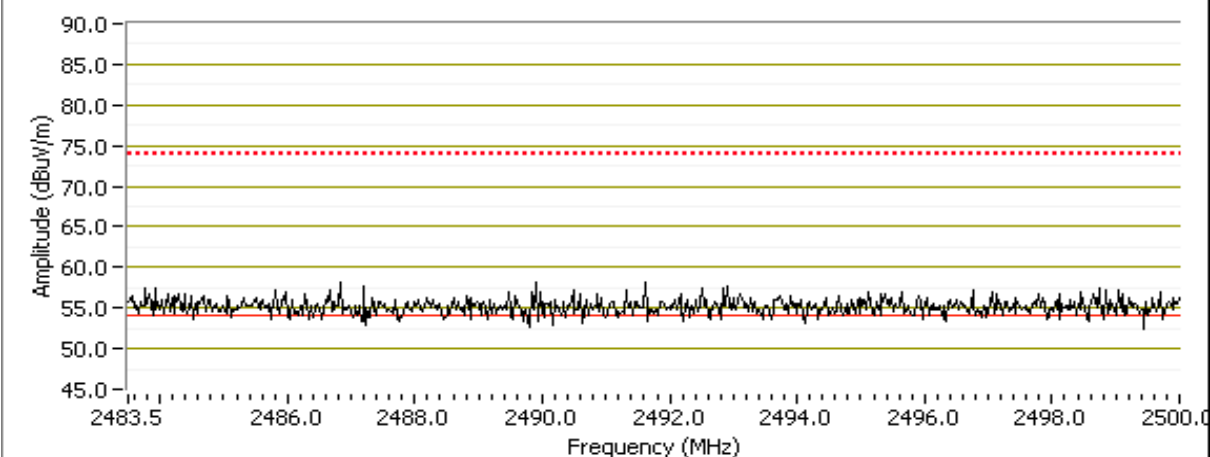


RB 1 MHz; VB 10 Hz BE @ 2483.5 MHz, Avg-V

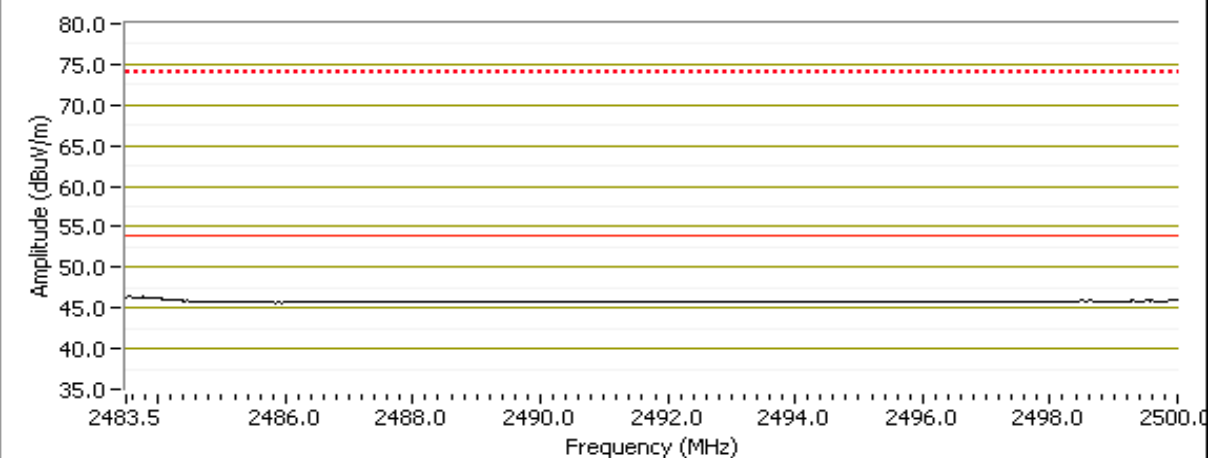


Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2483.5 MHz, Peak-H



RB 1 MHz; VB 10 Hz BE @ 2483.5 MHz, Avg-H



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4949.110	49.3	H	54.0	-4.7	AVG	163	1.4	RB 1 MHz; VB: 10 Hz pwr16
7426.380	44.4	H	54.0	-9.6	AVG	123	1.3	RB 1 MHz; VB: 10 Hz pwr16
4950.980	54.8	H	74.0	-19.2	PK	163	1.4	RB 1 MHz; VB: 1 MHz pwr16
7423.650	53.2	H	74.0	-20.8	PK	123	1.3	RB 1 MHz; VB: 1 MHz pwr16
9897.810	49.9	H	74.0	-24.1	PK	223	1.1	RB 1 MHz; VB: 1 MHz pwr16
9898.230	39.7	H	74.0	-34.3	AVG	223	1.1	RB 1 MHz; VB: 10 Hz pwr16

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 8-15 °C

Rel. Humidity: 50-100 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Frequency (MHz)	Channel	Power Setting	Antenna	Test Performed	Limit	Result / Margin
1a	2405	Low (ch 11)	13	Whip(Omni)	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.1dBµV/m @ 2351.1MHz (-1.9dB)
			13	Whip(omni)	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.1dBµV/m @ 4809.3MHz (-6.9dB)
1b	2440	Center (ch 18)	16	Whip(Omni)	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	48.5dBµV/m @ 4879.2MHz (-5.5dB)
1c	2475	High (ch 25)	19	Whip(Omni)	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	50.2dBµV/m @ 2483.5MHz (-3.8dB)
			19	Whip(Omni)	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	53.7dBµV/m @ 7423.8MHz (-0.3dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Note 1: Prescan showed the EUT with external antenna on side oriantation has highest emission. No emissions below 1GHz related to the radio were observed.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26000 MHz.

Date of Test: 4/1/2009
Test Engineer: Suhaila Khushzad
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Run #1a: Low Channel 11 @ 2405 MHz (EUT on Side)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2405.050	103.1	V	-	-	AVG	211	1.0	RB 1 MHz; VB: 10 Hz
2404.600	105.3	V	-	-	PK	211	1.0	RB 1 MHz; VB: 1 MHz
2405.100	92.3	H	-	-	AVG	346	1.8	RB 1 MHz; VB: 10 Hz
2404.600	94.2	H	-	-	PK	346	1.8	RB 1 MHz; VB: 1 MHz
2404.830	90.3	H	-	-	PK	346	1.8	RB 100 kHz; VB: 100 kHz
2405.220	101.2	V	-	-	PK	211	1.0	RB 100 kHz; VB: 100 kHz

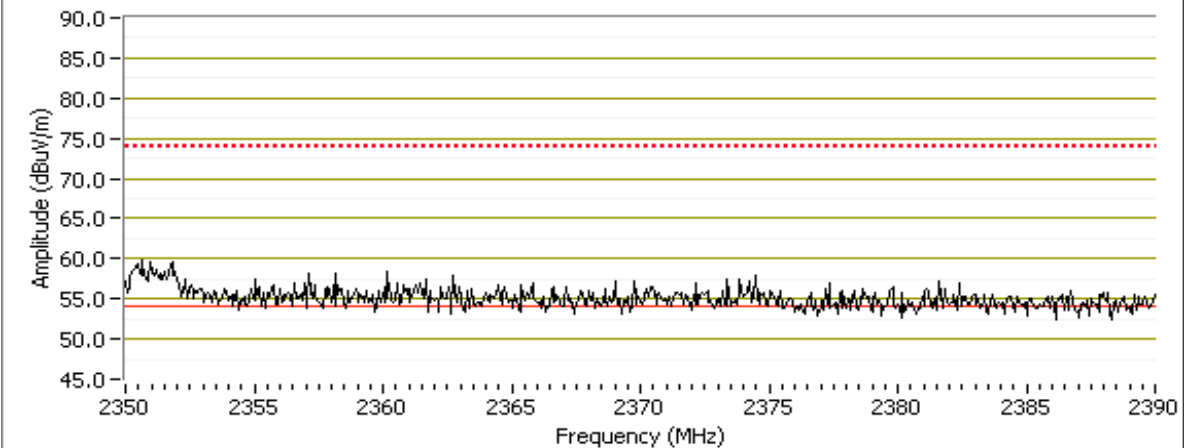
Fundamental emission level @ 3m in 100kHz RBW:	101.2 dB μ V/m	Limit is -30dBc (UNII power measurement)
Limit for emissions outside of restricted bands:	71.2 dB μ V/m	

Band Edge Signal Field Strength

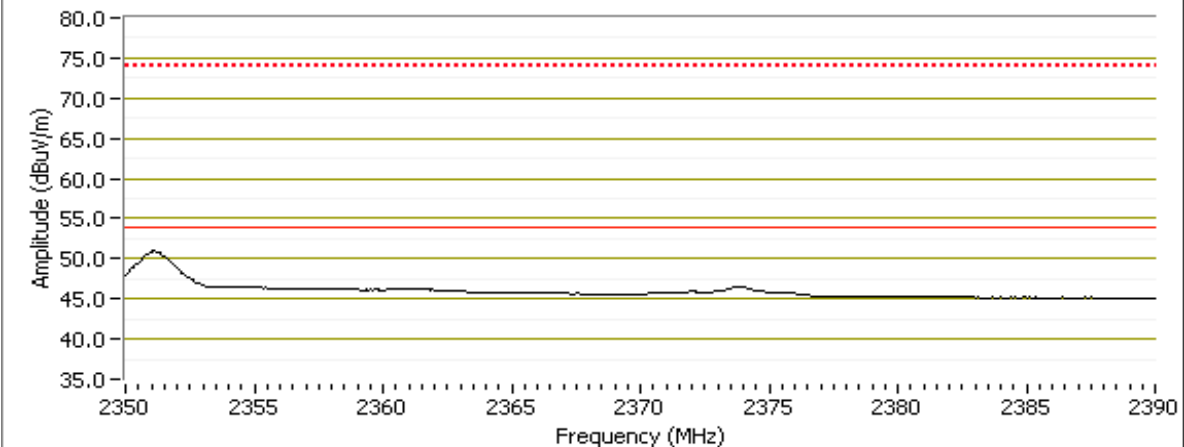
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2351.070	52.1	V	54.0	-1.9	AVG	211	1.0	RB 1 MHz; VB: 10 Hz pwr13
2351.330	46.3	H	54.0	-7.7	AVG	346	1.8	RB 1 MHz; VB: 10 Hz pwr13
2350.730	61.6	V	74.0	-12.4	PK	211	1.0	RB 1 MHz; VB: 1 MHz pwr13
2352.000	57.3	H	74.0	-16.7	PK	346	1.8	RB 1 MHz; VB: 1 MHz pwr13

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-V

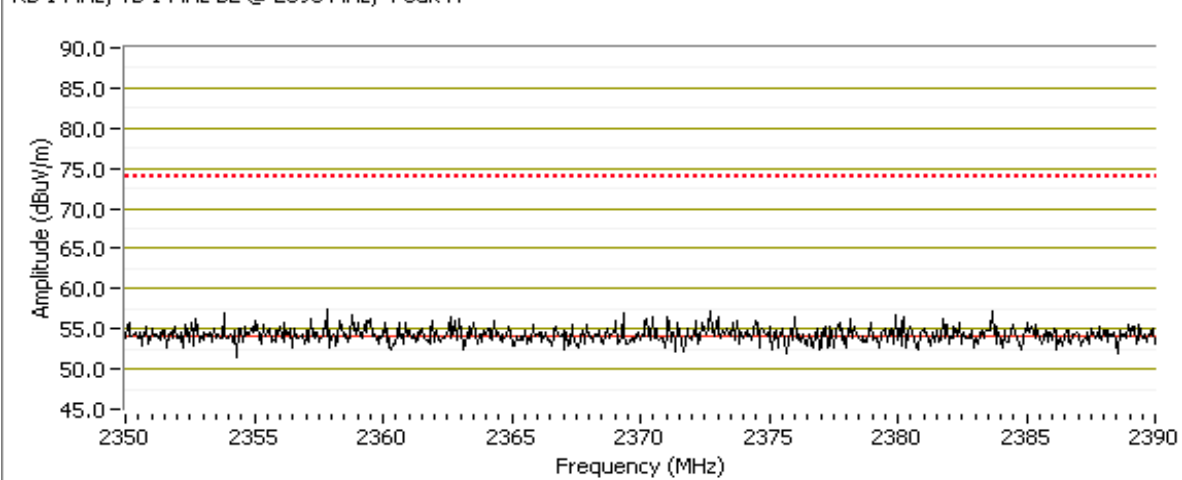


RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-V

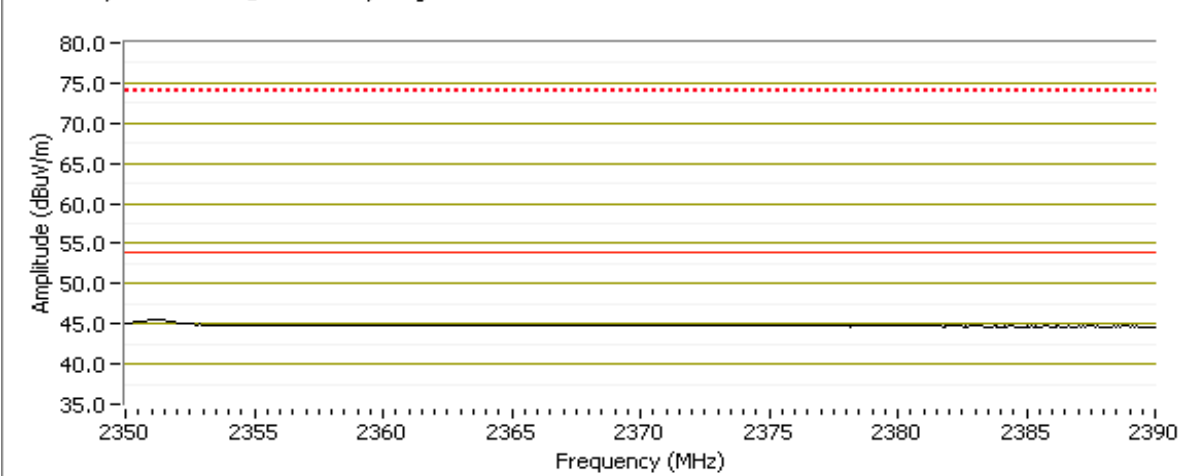


Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-H



RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-H



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4809.270	47.1	V	54.0	-6.9	AVG	80	1.0	RB 1 MHz; VB: 10 Hz
4809.270	40.5	H	54.0	-13.5	AVG	91	1.3	RB 1 MHz; VB: 10 Hz
7216.470	39.2	H	54.0	-14.8	AVG	105	1.4	RB 1 MHz; VB: 10 Hz
9610.630	38.4	V	54.0	-15.6	AVG	142	1.0	RB 1 MHz; VB: 10 Hz
7213.580	36.8	V	54.0	-17.2	AVG	67	1.0	RB 1 MHz; VB: 10 Hz
4809.180	53.1	V	74.0	-20.9	PK	80	1.0	RB 1 MHz; VB: 1 MHz
7216.400	49.8	H	74.0	-24.2	PK	105	1.4	RB 1 MHz; VB: 1 MHz
9613.600	49.6	V	74.0	-24.4	PK	142	1.0	RB 1 MHz; VB: 1 MHz
4809.150	49.2	H	74.0	-24.8	PK	91	1.3	RB 1 MHz; VB: 1 MHz
7213.440	47.8	V	74.0	-26.2	PK	67	1.0	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1b: Center Channel 18 @ 2440 MHz (EUT on Side)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4879.240	48.5	V	54.0	-5.5	AVG	73	1.0	RB 1 MHz; VB: 10 Hz pwr16
4879.270	45.6	H	54.0	-8.4	AVG	86	1.5	RB 1 MHz; VB: 10 Hz pwr16
7321.460	44.4	H	54.0	-9.6	AVG	277	1.5	RB 1 MHz; VB: 10 Hz pwr16
7318.830	41.1	V	54.0	-12.9	AVG	101	1.0	RB 1 MHz; VB: 10 Hz pwr16
4879.560	54.3	V	74.0	-19.7	PK	73	1.0	RB 1 MHz; VB: 1 MHz pwr16
7321.900	53.5	H	74.0	-20.5	PK	277	1.5	RB 1 MHz; VB: 1 MHz pwr16
4879.150	52.1	H	74.0	-21.9	PK	86	1.5	RB 1 MHz; VB: 1 MHz pwr16
7318.800	51.1	V	74.0	-22.9	PK	101	1.0	RB 1 MHz; VB: 1 MHz pwr16
9757.250	49.3	V	74.0	-24.7	PK	269	1.4	RB 1 MHz; VB: 1 MHz pwr16
9758.100	38.7	V	74.0	-35.3	AVG	269	1.4	RB 1 MHz; VB: 10 Hz pwr16

Note 1:

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1c: High Channel 25 @ 2475 MHz (EUT on Side)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2475.090	109.4	V	-	-	AVG	354	1.3	RB 1 MHz; VB: 10 Hz
2474.580	111.8	V	-	-	PK	354	1.3	RB 1 MHz; VB: 1 MHz
2475.200	99.4	H	-	-	AVG	360	1.8	RB 1 MHz; VB: 10 Hz
2474.580	101.7	H	-	-	PK	360	1.8	RB 1 MHz; VB: 1 MHz
2474.810	98.0	H	-	-	PK	360	1.8	RB 100 kHz; VB: 100 kHz
2475.360	107.6	V	-	-	PK	354	1.3	RB 100 kHz; VB: 100 kHz

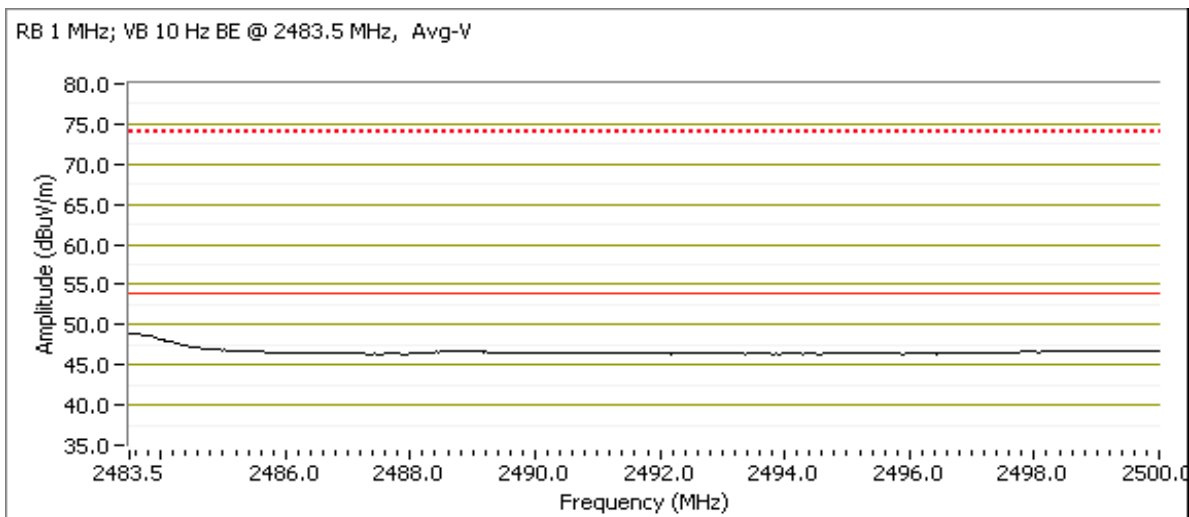
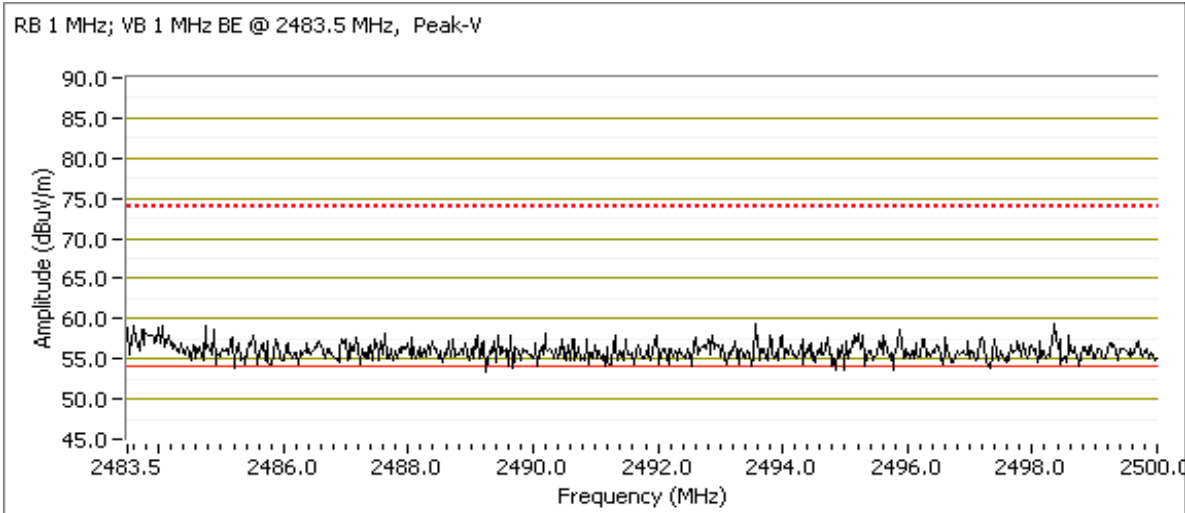
Fundamental emission level @ 3m in 100kHz RBW: 107.6 dB μ V/m

Limit for emissions outside of restricted bands: 77.6 dB μ V/m Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

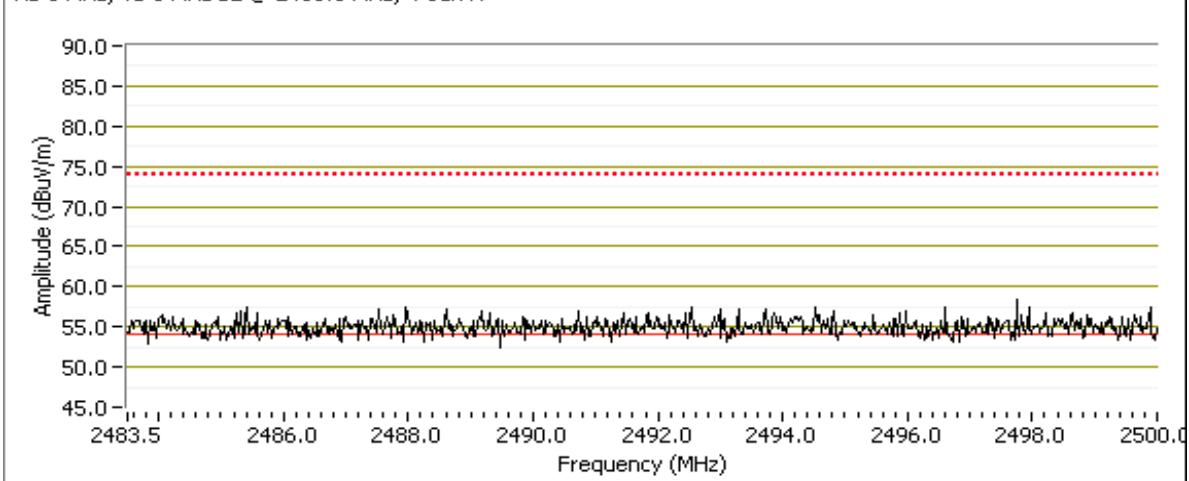
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	50.2	V	54.0	-3.8	AVG	354	1.3	RB 1 MHz; VB: 10 Hz
2483.500	47.1	H	54.0	-6.9	AVG	360	1.8	RB 1 MHz; VB: 10 Hz
2484.300	59.4	V	74.0	-14.6	PK	354	1.3	RB 1 MHz; VB: 1 MHz
2491.200	58.9	H	74.0	-15.1	PK	360	1.8	RB 1 MHz; VB: 1 MHz

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

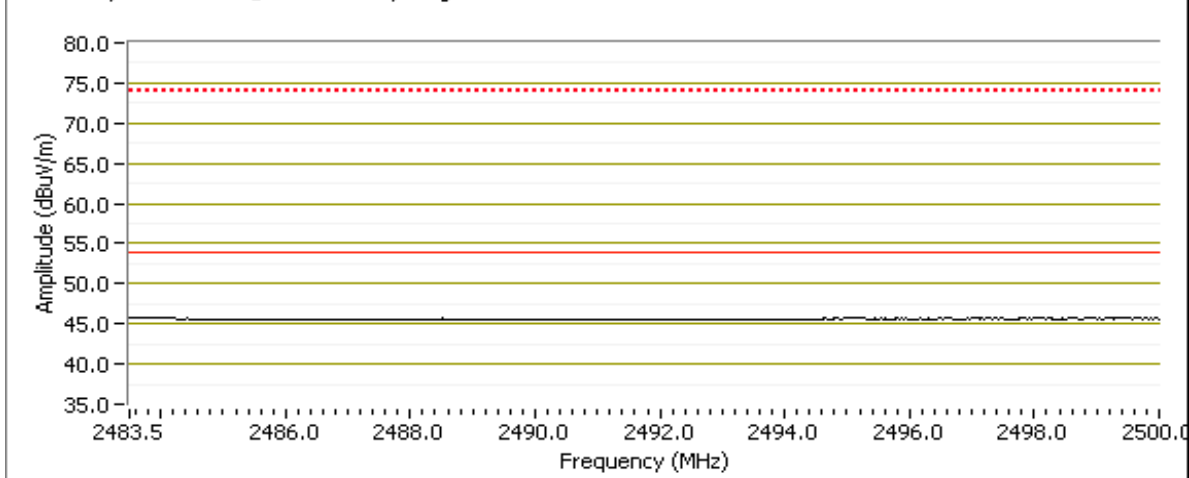


Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2483.5 MHz, Peak-H



RB 1 MHz; VB 10 Hz BE @ 2483.5 MHz, Avg-H



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
7423.790	53.7	H	54.0	-0.3	AVG	91	1.5	RB 1 MHz; VB: 10 Hz
4949.210	50.9	V	54.0	-3.1	AVG	64	1.1	RB 1 MHz; VB: 10 Hz
7423.710	49.6	V	54.0	-4.4	AVG	89	1.6	RB 1 MHz; VB: 10 Hz
4949.240	47.2	H	54.0	-6.8	AVG	76	1.2	RB 1 MHz; VB: 10 Hz
7426.630	60.7	H	74.0	-13.3	PK	91	1.5	RB 1 MHz; VB: 1 MHz
7423.620	57.3	V	74.0	-16.7	PK	89	1.6	RB 1 MHz; VB: 1 MHz
4949.110	56.7	V	74.0	-17.3	PK	64	1.1	RB 1 MHz; VB: 1 MHz
9902.280	55.8	V	74.0	-18.2	PK	14	1.4	RB 1 MHz; VB: 1 MHz
9902.150	55.2	H	74.0	-18.8	PK	0	1.2	RB 1 MHz; VB: 1 MHz
4949.300	53.5	H	74.0	-20.5	PK	76	1.2	RB 1 MHz; VB: 1 MHz
9898.160	47.8	V	74.0	-26.2	AVG	14	1.4	RB 1 MHz; VB: 10 Hz
9898.260	47.2	H	74.0	-26.8	AVG	0	1.2	RB 1 MHz; VB: 10 Hz

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 8-15 °C

Rel. Humidity: 50-100 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Frequency (MHz)	Channel	Power Setting	Antenna	Test Performed	Limit	Result / Margin
1a	2480	High (ch 26)	0	Internal	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	50.8dBµV/m @ 2483.5MHz (-3.2dB)
			0	Internal	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	40.0dBµV/m @ 4960.1MHz (-14.0dB)
2a	2480	High (ch 26)	0	External Omni	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.1dBµV/m @ 2483.5MHz (-1.9dB)
			0	External Omni	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	42.6dBµV/m @ 4960.1MHz (-11.4dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26000 MHz.

Date of Test: 4/30/2009
Test Engineer: Suhaila Khushzad
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Run #1a: High Channel 26 @ 2480 MHz, Internal Antenna,(EUT Up Right)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2480.120	82.3	V	-	-	AVG	360	1.0	RB 1 MHz; VB: 10 Hz
2479.610	84.9	V	-	-	PK	360	1.0	RB 1 MHz; VB: 1 MHz
2480.110	78.6	H	-	-	AVG	187	1.4	RB 1 MHz; VB: 10 Hz
2479.610	81.4	H	-	-	PK	187	1.4	RB 1 MHz; VB: 1 MHz
2479.890	76.7	H	-	-	PK	187	1.4	RB 100 kHz; VB: 100 kHz
2480.330	79.5	V	-	-	PK	360	1.0	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW: 79.5 dB μ V/m

Limit for emissions outside of restricted bands: 49.5 dB μ V/m Limit is -30dBc (UNII power measurement)

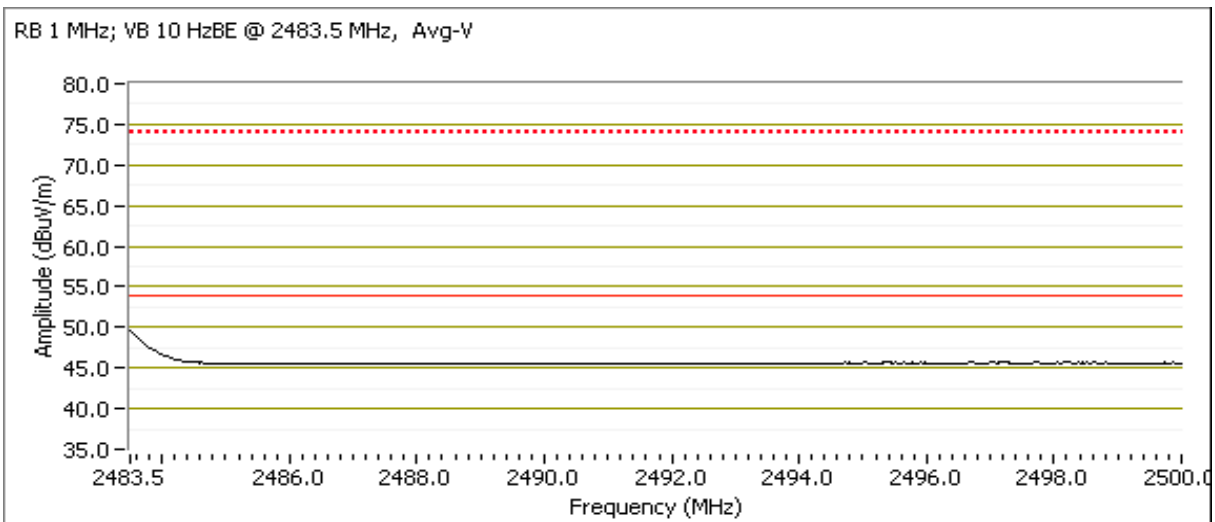
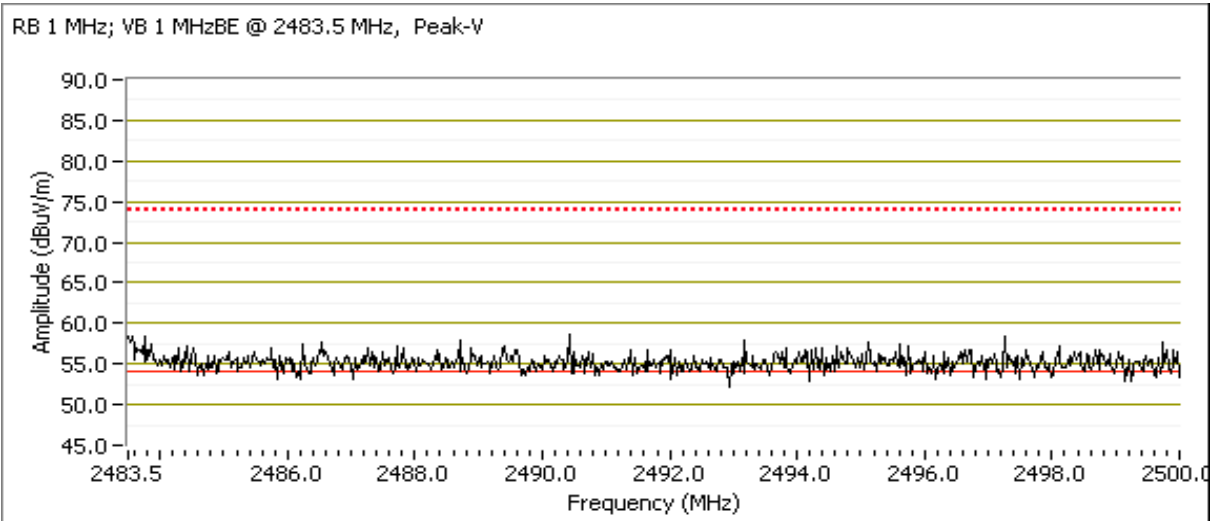
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	50.8	V	54.0	-3.2	AVG	360	1.0	RB 1 MHz; VB: 10 Hz
2483.500	49.0	H	54.0	-5.0	AVG	187	1.4	RB 1 MHz; VB: 10 Hz
2483.500	58.1	V	74.0	-15.9	PK	360	1.0	RB 1 MHz; VB: 1 MHz
2483.530	58.1	H	74.0	-15.9	PK	187	1.4	RB 1 MHz; VB: 1 MHz

Other Spurious Emissions

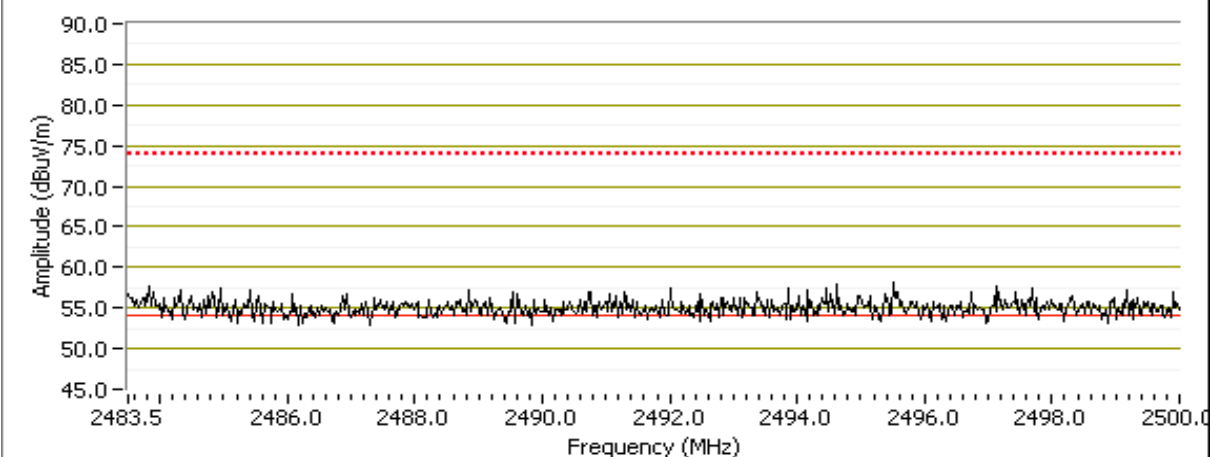
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4960.120	40.0	H	54.0	-14.0	AVG	49	1.3	RB 1 MHz; VB: 10 Hz
4960.080	38.0	V	54.0	-16.0	AVG	153	1.0	RB 1 MHz; VB: 10 Hz
4959.910	46.0	H	74.0	-28.0	PK	49	1.3	RB 1 MHz; VB: 1 MHz
4959.960	45.7	V	74.0	-28.3	PK	153	1.0	RB 1 MHz; VB: 1 MHz

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

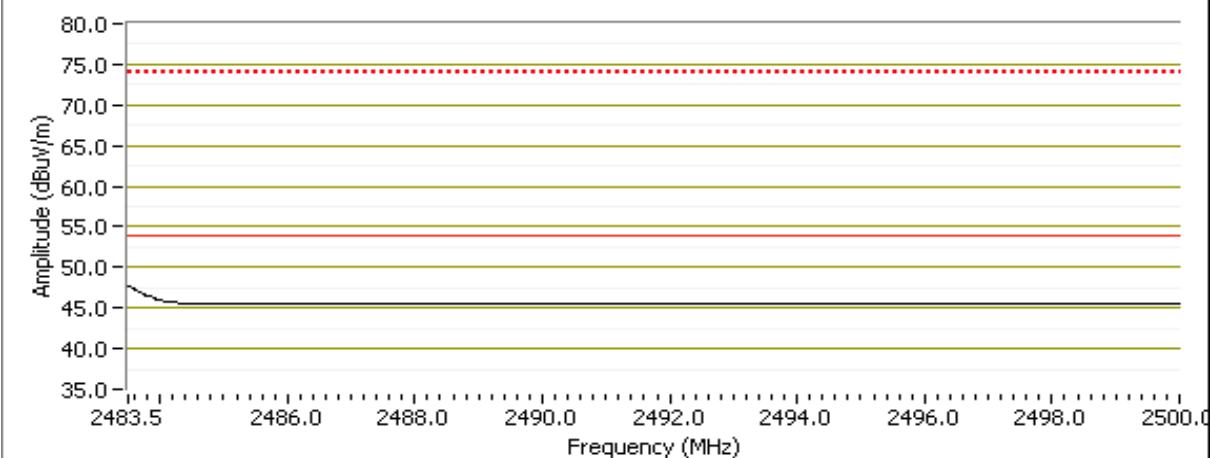


Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A

RB 1 MHz; VB 1 MHzBE @ 2483.5 MHz, Peak-H



RB 1 MHz; VB 10 HzBE @ 2483.5 MHz, Avg-H



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #2a: High Channel 26 @ 2480 MHz, External Omni Antenna,(EUT On Side)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2480.120	84.9	V	-	-	AVG	351	1.2	RB 1 MHz; VB: 10 Hz
2479.680	87.4	V	-	-	PK	351	1.2	RB 1 MHz; VB: 1 MHz
2480.130	74.6	H	-	-	AVG	32	1.6	RB 1 MHz; VB: 10 Hz
2479.590	77.5	H	-	-	PK	32	1.6	RB 1 MHz; VB: 1 MHz
2480.600	72.5	H	-	-	PK	32	1.6	RB 100 kHz; VB: 100 kHz
2479.590	82.3	V	-	-	PK	351	1.2	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW:	82.3 dBμV/m
Limit for emissions outside of restricted bands:	52.3 dBμV/m

Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

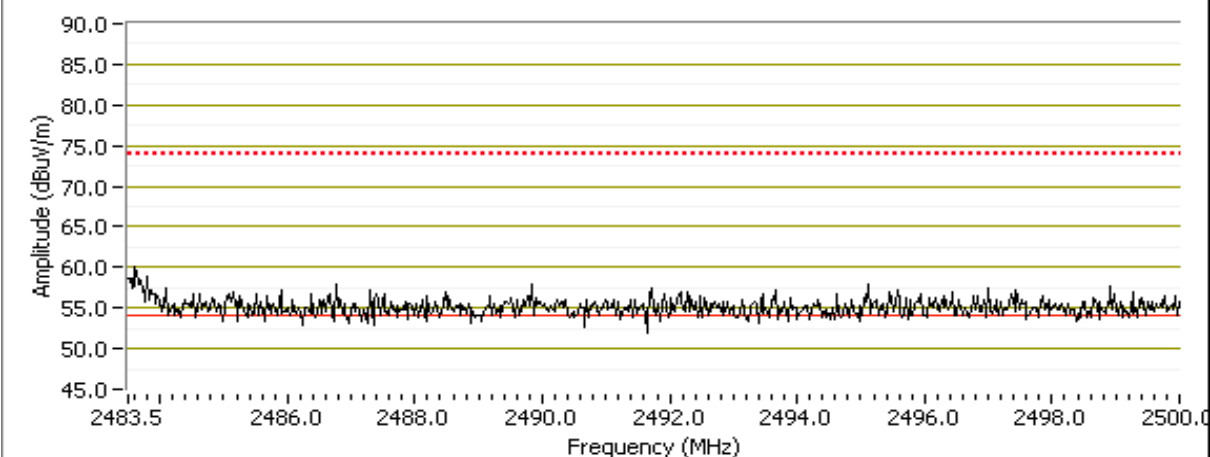
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	52.1	V	54.0	-1.9	AVG	351	1.2	RB 1 MHz; VB: 10 Hz
2483.500	47.9	H	54.0	-6.1	AVG	32	1.6	RB 1 MHz; VB: 10 Hz
2483.500	59.5	V	74.0	-14.5	PK	351	1.2	RB 1 MHz; VB: 1 MHz
2492.740	58.9	H	74.0	-15.1	PK	32	1.6	RB 1 MHz; VB: 1 MHz

Other Spurious Emissions

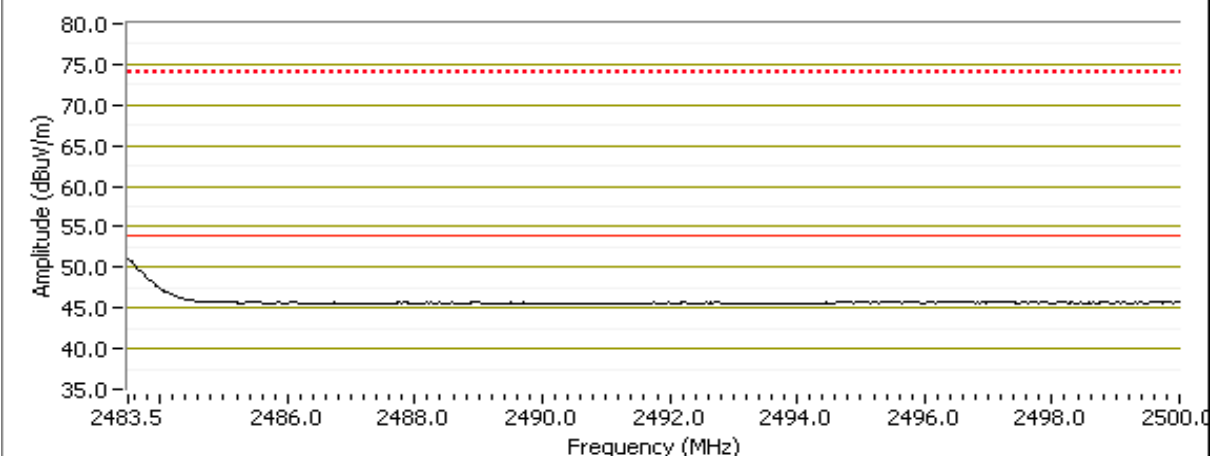
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4960.080	42.6	V	54.0	-11.4	AVG	327	1.0	MHz; VB: 10 Hz
4960.040	37.3	H	54.0	-16.7	AVG	232	1.4	MHz; VB: 10 Hz
4959.900	47.7	V	74.0	-26.3	PK	327	1.0	MHz; VB: 1 MHz
4959.900	47.7	V	74.0	-26.3	PK	327	1.0	MHz; VB: 1 MHz
4959.990	45.6	H	74.0	-28.4	PK	232	1.4	MHz; VB: 1 MHz

Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A

RB 1 MHz; VB 1 MHzBE @ 2483.5 MHz, Peak-V

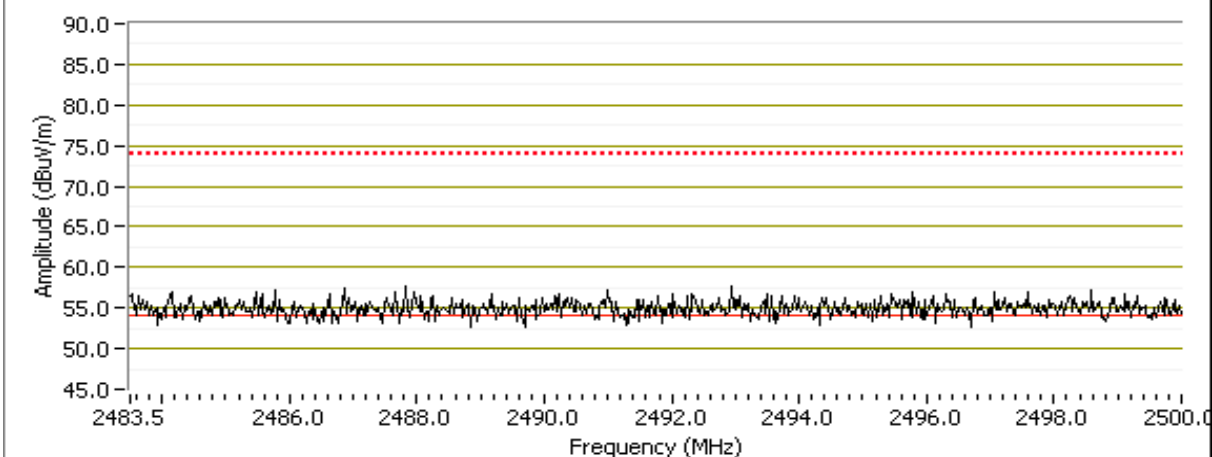


RB 1 MHz; VB 10 HzBE @ 2483.5 MHz, Avg-V

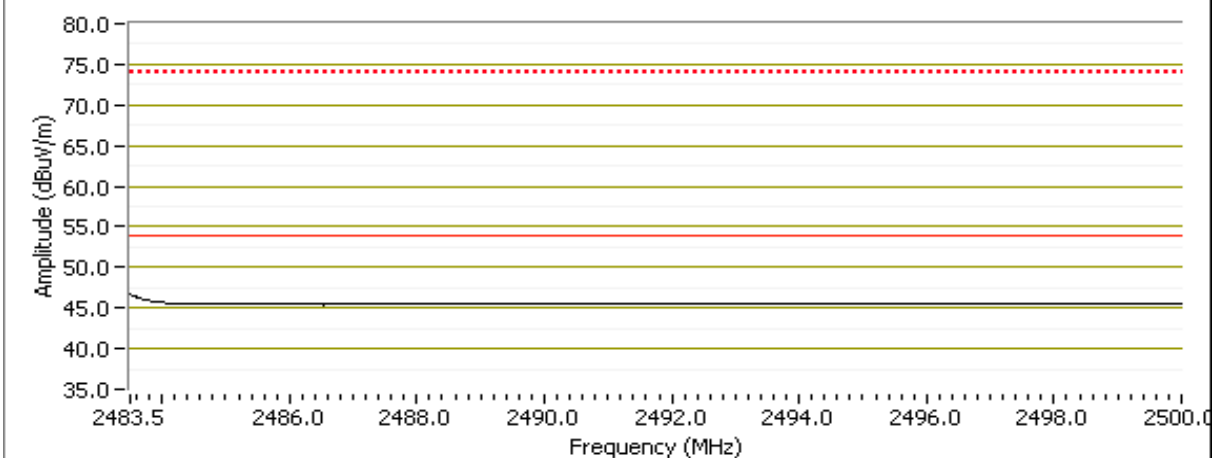


Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RB 1 MHz; VB 1 MHzBE @ 2483.5 MHz, Peak-H



RB 1 MHz; VB 10 HzBE @ 2483.5 MHz, Avg-H



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/2/2009
Test Engineer: Suhaila Khushzad
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
Host Unit Voltage 120V/60Hz

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 13 °C
Rel. Humidity: 66 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	16	-	Output Power	15.247(b)	Pass	11.7 dBm
2	19	-	Power spectral Density (PSD)	15.247(d)	Pass	-3.5 dBm/3kHz
3	16	-	Minimum 6dB Bandwidth	15.247(a)	Pass	1.3 MHz
3	16	-	99% Bandwidth	RSS GEN	-	4.0 MHz
4	16	-	Spurious emissions	15.247(b)	Pass	Emissions were below -30dBc limit

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

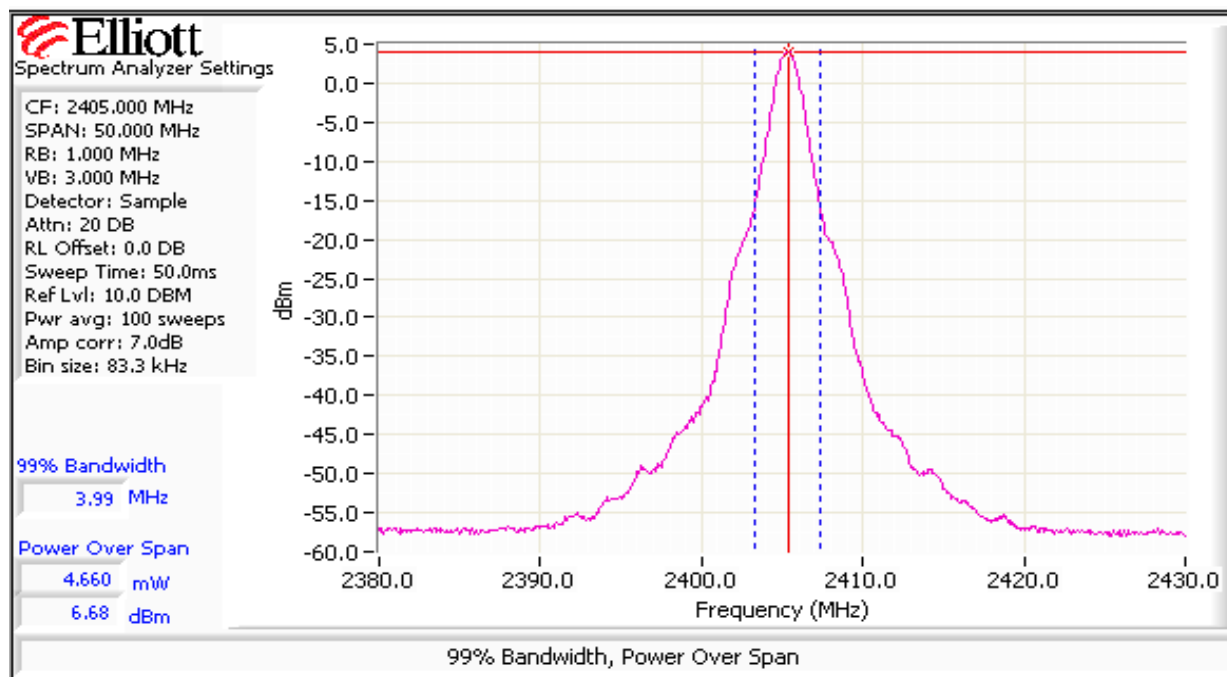
No deviations were made from the requirements of the standard.

Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

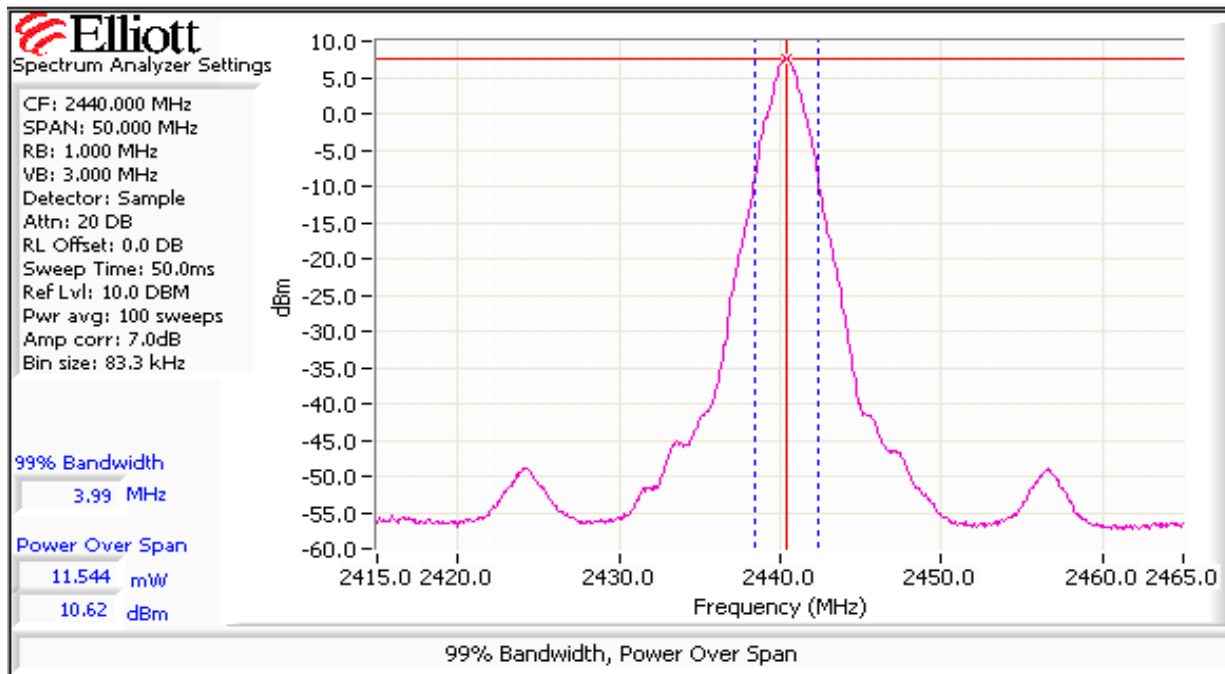
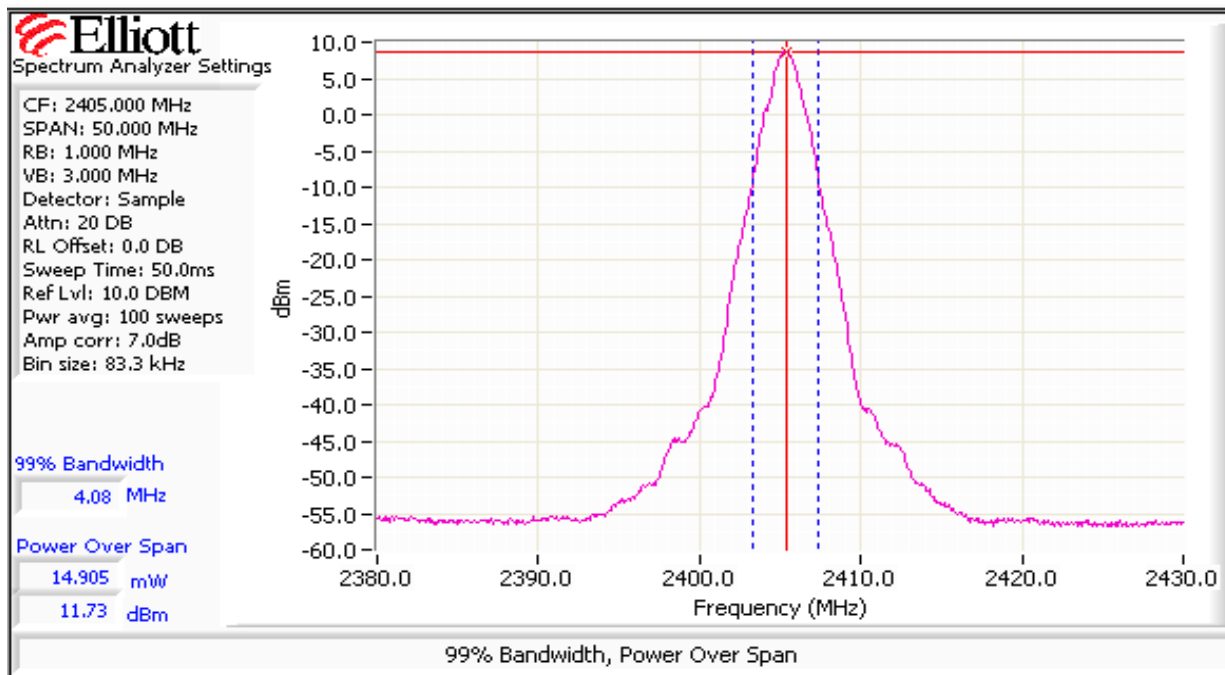
Run #1: Output Power

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP ^{Note 2}		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
13	2405	6.7	4.7	2.0	Pass	8.7	0.007		
16	2440	10.6	11.5	2.0	Pass	12.6	0.018		
0	2480	-12.8	0.1	2.0	Pass	-10.8	0.000		

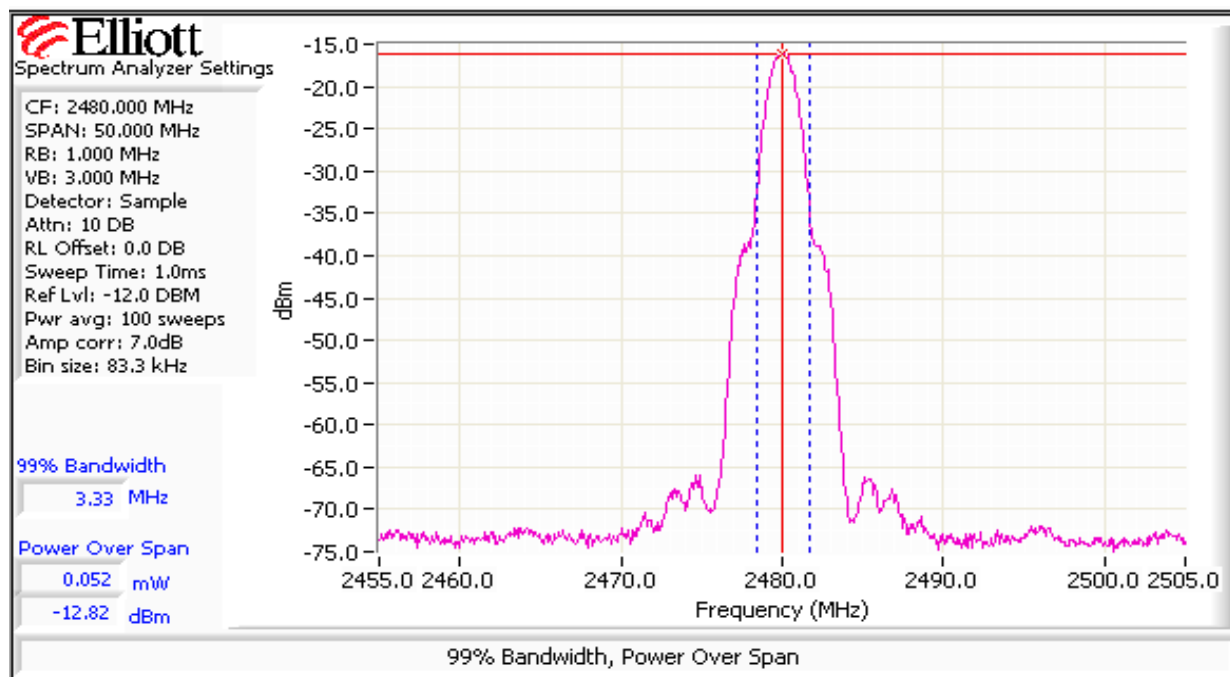
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration
Note 2:	Power setting - the software power setting used during testing, included for reference only.



Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A



Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A

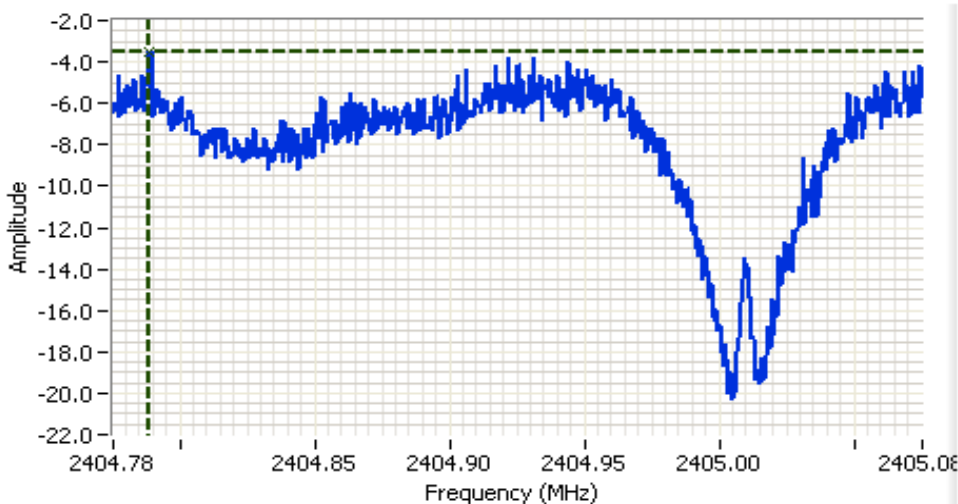


Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/3kHz) ^{Note 1}		
16	2405	-3.5	8.0	Pass
16	2440	-4.8	8.0	Pass
0	2480	-27.8	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.
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Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A



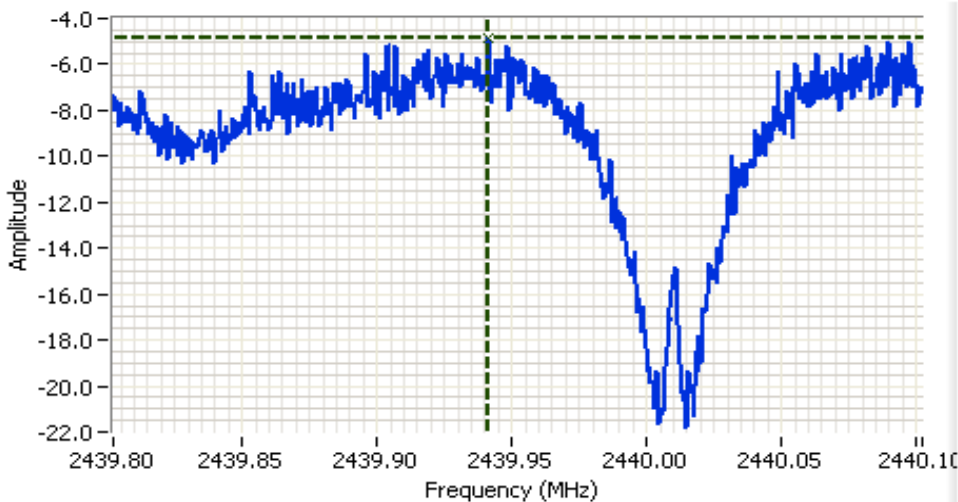
Analyzer Settings

HP8564E
 CF: 2404.925 MHz
 SPAN: 300 kHz
 RB 3.00 kHz
 VB 10.00 kHz
 Detector POS
 Att 20
 RL Offset 7.00
 Sweep Time 100.0s
 Ref Lvl: 17.00DBM

Comments

PSD: -3.5dBm/3kHz
 Channel @ 2405 MHz

Cursor 1 2404.7888 -3.50
 0.0000 0.00



Analyzer Settings

HP8564E
 CF: 2439.952 MHz
 SPAN: 300 kHz
 RB 3.00 kHz
 VB 10.00 kHz
 Detector POS
 Att 20
 RL Offset 7.00
 Sweep Time 100.0s
 Ref Lvl: 17.00DBM

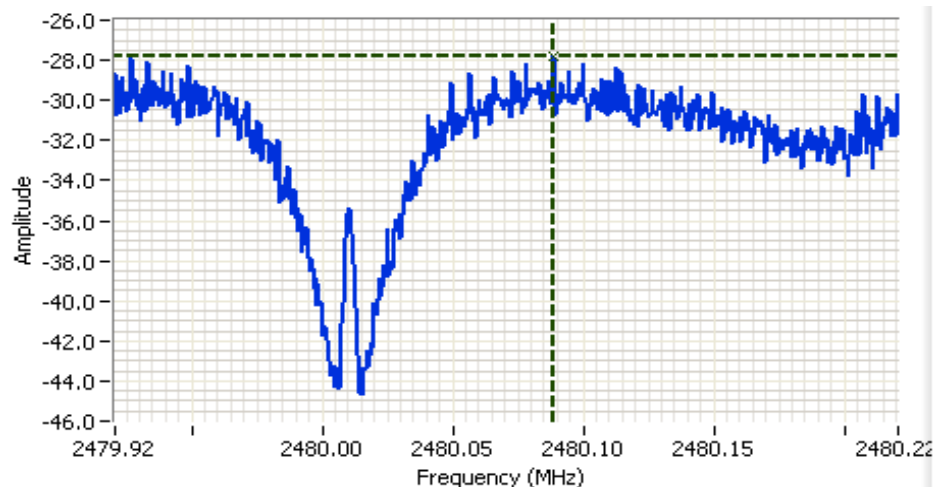
Comments

PSD: -4.83dBm/3kHz
 Channel @ 2440 MHz

Cursor 1 2439.9411 -4.83
 0.0000 0.00



Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2480.071 MHz
 SPAN: 300 kHz
 RB: 3.00 kHz
 VB: 10.0 kHz
 Detector: POS
 Attn: 10 DB
 RL Offset: 7.0 DB
 Sweep Time: 100.0s
 Ref Lvl: -14.0 DBM

Comments

PSD: -27.8 dBm/3kHz
 Channel @ 2480 MHz

Cursor 1	2480.0887	-27.84		
	0.0000	0.00		

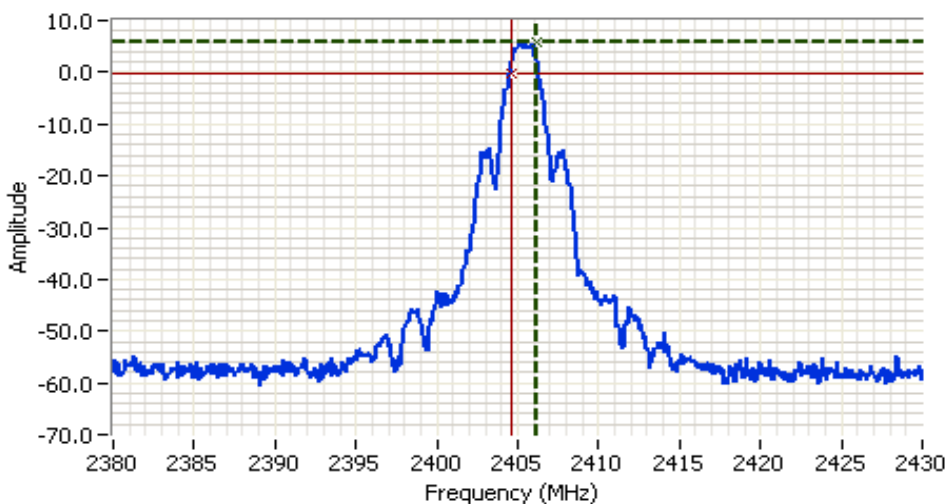


Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz)	
			6dB	99%
16	2405	100kHz	1.58	4.0
16	2440	100kHz	1.66	4.0
0	2480	100kHz	1.33	3.3

Note 1: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB

Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A



Analyzer Settings

HP8564E
 CF: 2405.000 MHz
 SPAN:50.000 MHz
 RB 100 kHz
 VB 100 kHz
 Detector Sample
 Att 20
 RL Offset 7.00
 Sweep Time 50.0ms
 Ref Lvl:17.00DBM

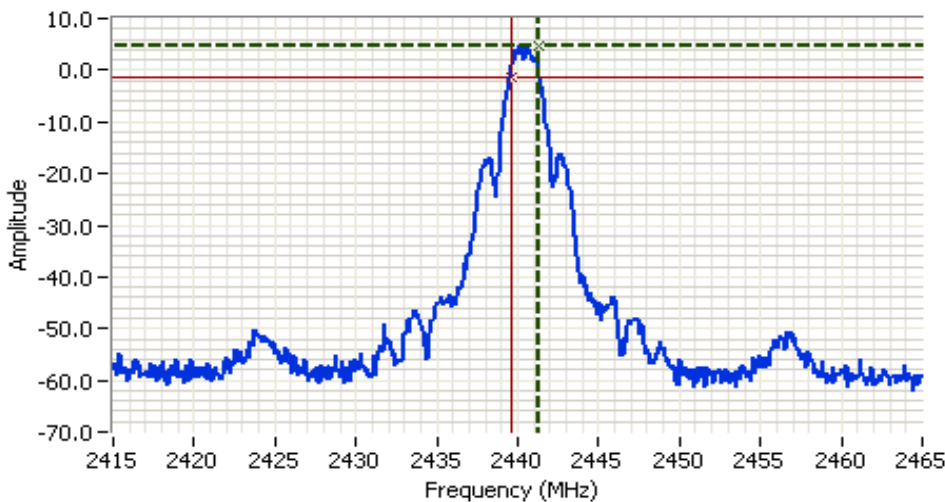
Comments

6dB BW: 1.583 MHz
 Channel @ 2405 MHz

Cursor 1 2406.1667 5.83
 Cursor 2 2404.5833 -0.17

Delta Freq. 1.583

Delta Amplitude 6.00



Analyzer Settings

HP8564E
 CF: 2440.000 MHz
 SPAN:50.000 MHz
 RB 100 kHz
 VB 100 kHz
 Detector Sample
 Att 20
 RL Offset 7.00
 Sweep Time 50.0ms
 Ref Lvl:17.00DBM

Comments

6dB BW: 1.667 MHz
 Channel @ 2440 MHz

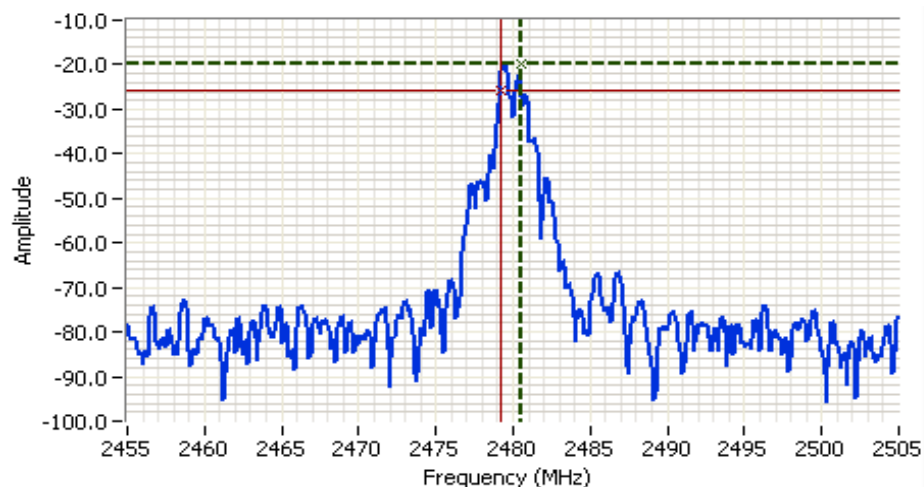
Cursor 1 2441.2500 4.67
 Cursor 2 2439.5833 -1.33

Delta Freq. 1.667

Delta Amplitude 6.00



Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2480.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 100 kHz
 Detector: POS
 Attn: 10 DB
 RL Offset: 7.0 DB
 Sweep Time: 1.0ms
 Ref Lvl: -14.0 DBM

Comments

6dB BW: 1.33 MHz
 Channel @ 2480 MHz

Cursor 1	2480.5000	-19.62	
Cursor 2	2479.1667	-25.62	

Delta Freq. 1.333

Delta Amplitude 6.00

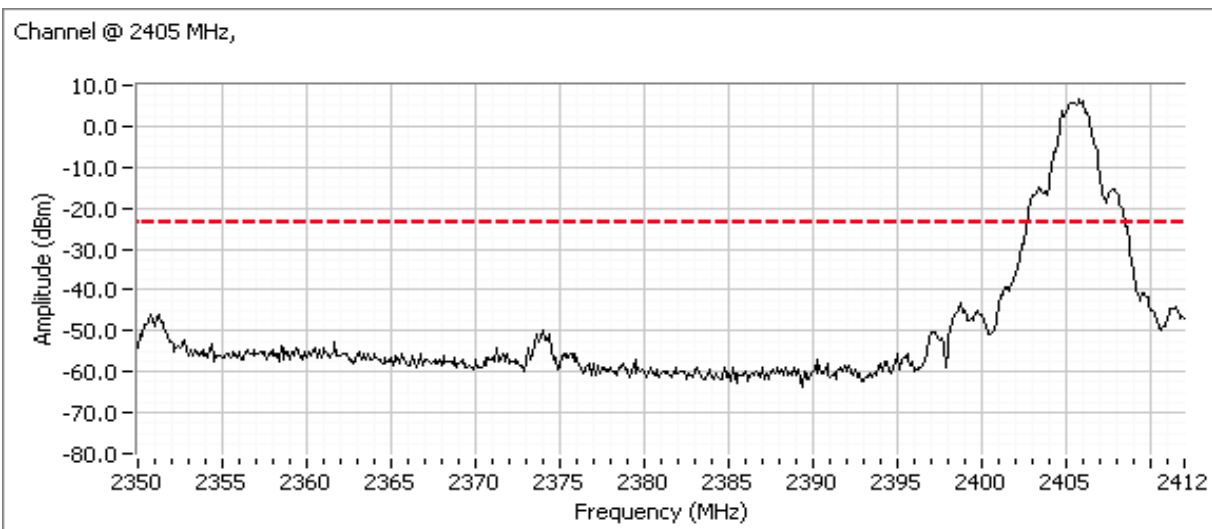
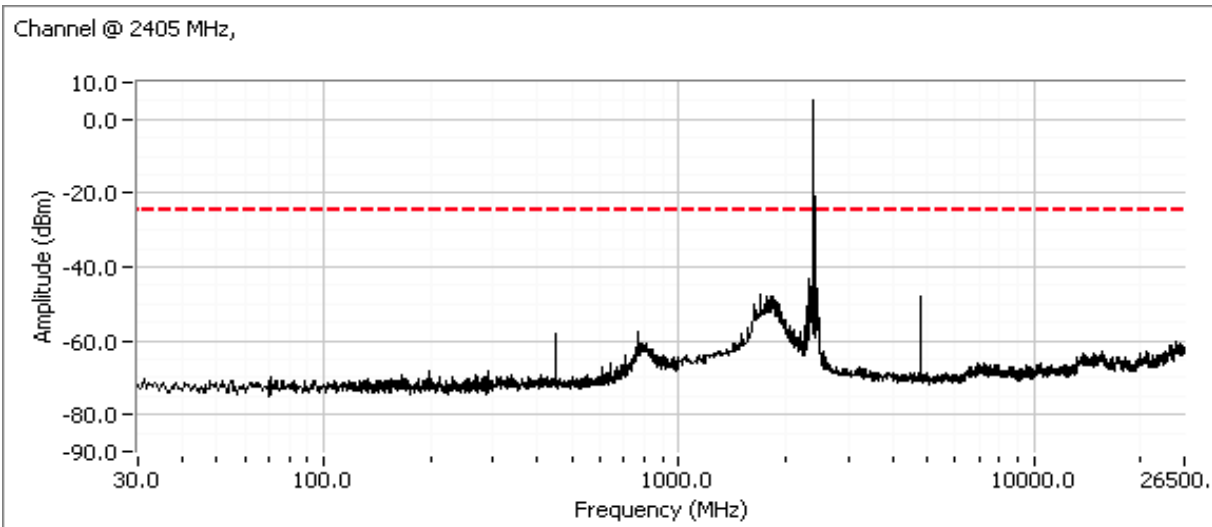


Run #4: Out of Band Spurious Emissions

Frequency (MHz)	Limit	Result
2405	-30dBc	Pass
2440	-30dBc	Pass
2480	-30dBc	Pass

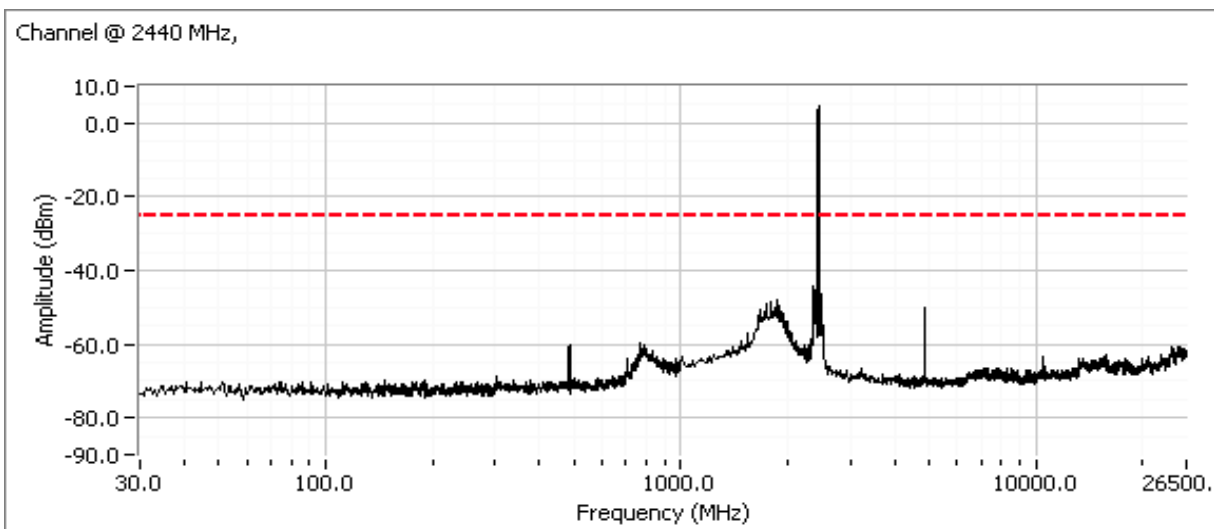
Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A

Plots for low channel, power setting(s) = 16

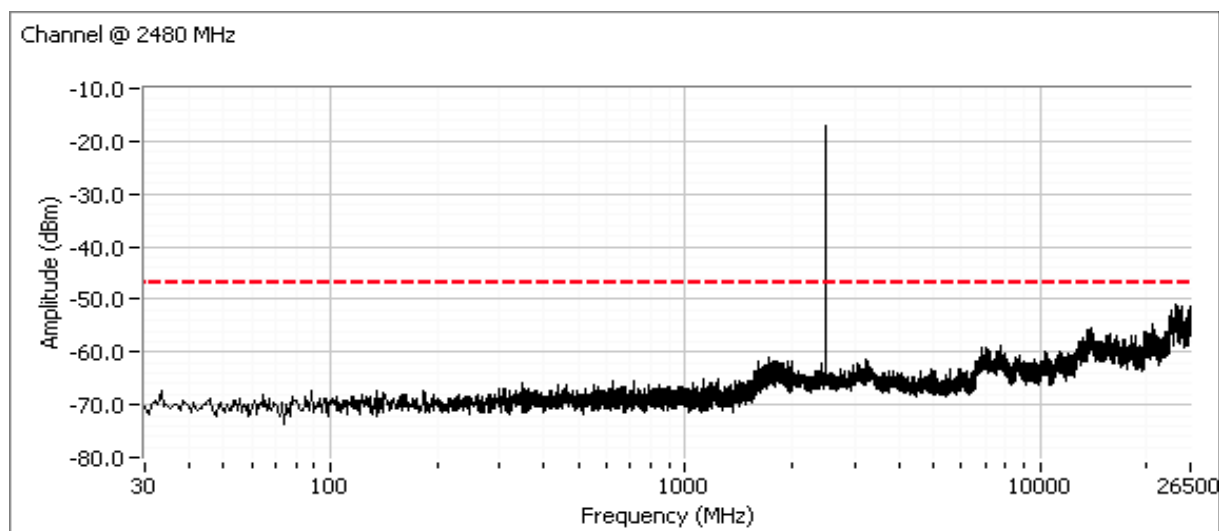


Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: N/A

Plots for center channel, power setting(s) = 16



Plots for high channel, power setting(s) = 0



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	B

Conducted Emissions - Power Ports

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/15/2009 18:03
Test Engineer: Rafael Varelas
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 14 °C
Rel. Humidity: 52 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1 (5Vdc)	CE, AC Power, 120V/60Hz	EN55022 Class B	Pass	43.6dBμV @ 0.364MHz (-5.0dB)
2 (12Vdc)	CE, AC Power, 120V/60Hz	EN55022 Class B	Pass	39.6dBμV @ 1.170MHz (-6.4dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

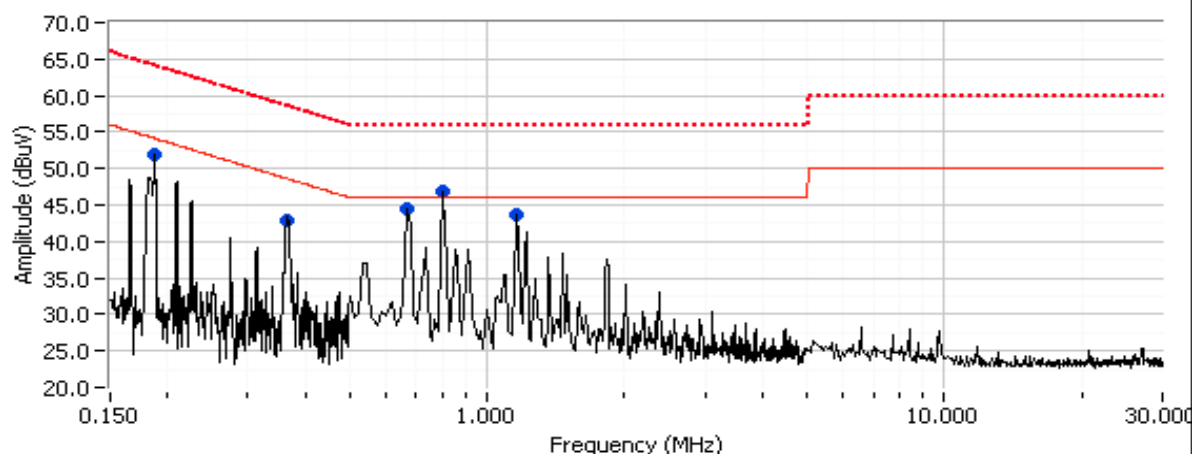
No deviations were made from the requirements of the standard.

Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: B

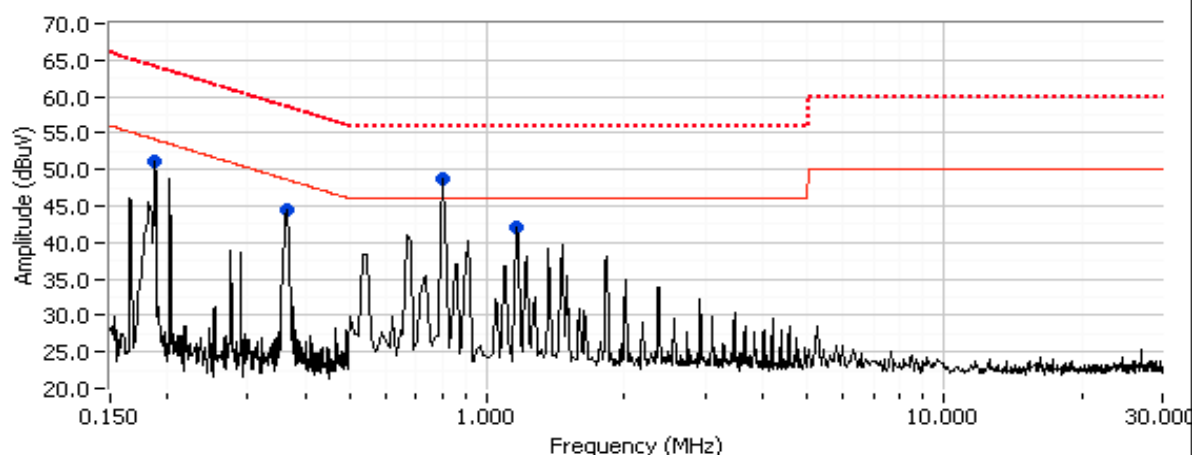
Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Phihong Power Supply 5Vdc

0.15 - 30MHz, 120V/60Hz, Line



0.15 - 30MHz, 120V/60Hz, Neutral



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	B

Run #1: Continued

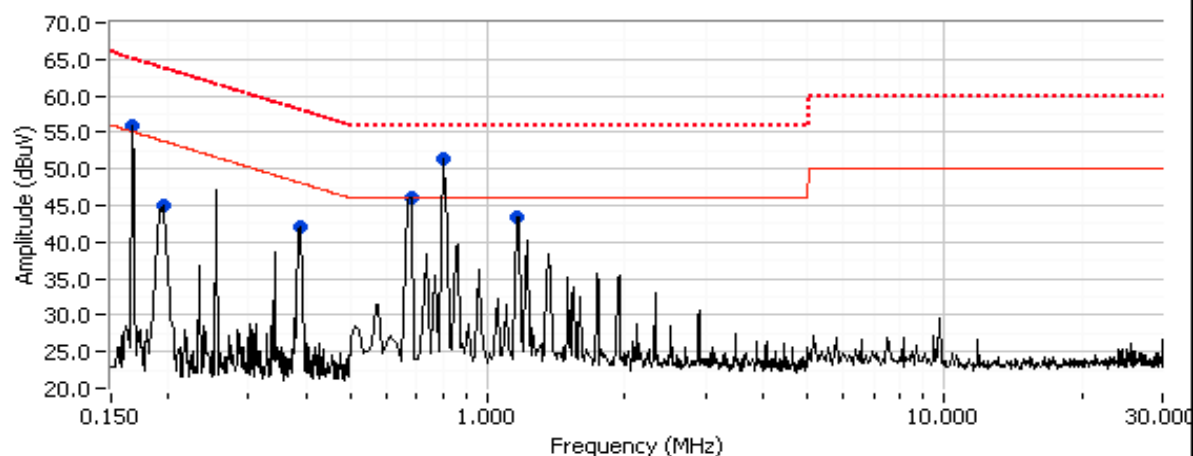
Frequency MHz	Level dB μ V	AC Line	EN55022 B		Detector QP/Ave	Comments
			Limit	Margin		
0.364	43.6	Neutral	48.6	-5.0	AVG	
0.366	42.0	Line 1	48.6	-6.6	AVG	
1.171	39.0	Line 1	46.0	-7.0	AVG	
1.170	38.4	Neutral	46.0	-7.6	AVG	
0.185	41.5	Neutral	54.3	-12.8	AVG	
1.171	40.5	Line 1	56.0	-15.5	QP	
1.170	40.3	Neutral	56.0	-15.7	QP	
0.364	42.7	Neutral	58.6	-15.9	QP	
0.185	37.3	Line 1	54.3	-17.0	AVG	
0.366	41.1	Line 1	58.6	-17.5	QP	
0.185	46.6	Neutral	64.3	-17.7	QP	
0.185	46.4	Line 1	64.3	-17.9	QP	
0.810	46.8	Neutral	-	-	PK	Ambient
0.811	46.9	Line 1	-	-	Peak	Ambient
0.681	44.5	Line 1	-	-	Peak	Ambient

Client: Adura Technologies	Job Number: J73245
Model: Sensor Interface(SI)	T-Log Number: T74993
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: B

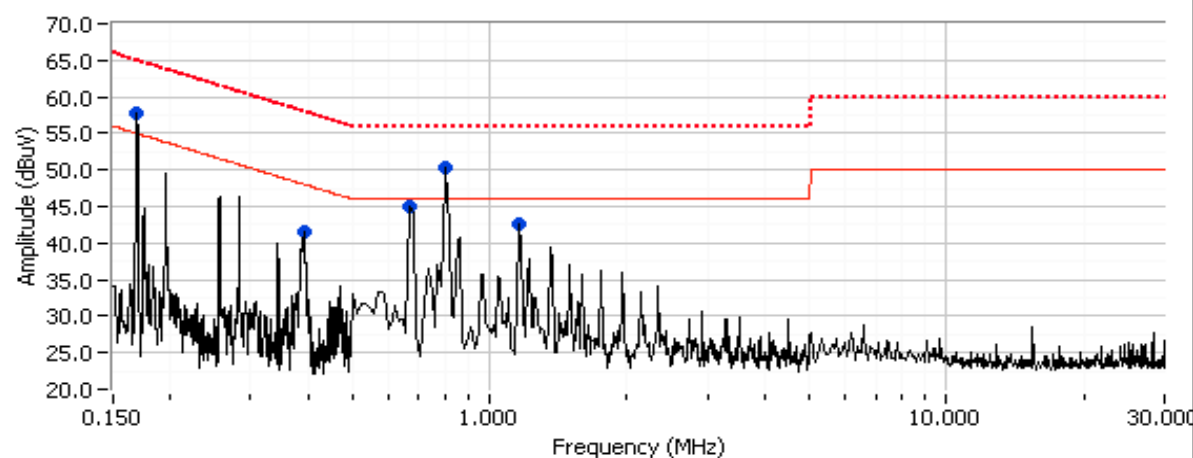
Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Phihong Power Supply 12Vdc

0.15 - 30MHz, 120V/60Hz, Line



0.15 - 30MHz, 120V/60Hz, Neutral



Client:	Adura Technologies	Job Number:	J73245
Model:	Sensor Interface(SI)	T-Log Number:	T74993
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	B

Run #2: Continued

Frequency MHz	Level dB μ V	AC Line	EN55022 B		Detector QP/Ave	Comments
			Limit	Margin		
1.170	39.6	Line 1	46.0	-6.4	AVG	
1.171	39.6	Neutral	46.0	-6.4	AVG	
0.388	40.4	Line 1	48.1	-7.7	AVG	
0.391	39.6	Neutral	48.1	-8.5	AVG	
0.193	44.1	Line 1	53.9	-9.8	AVG	
0.167	53.4	Line 1	65.1	-11.7	QP	
0.169	53.2	Neutral	65.0	-11.8	QP	
1.171	41.6	Neutral	56.0	-14.4	QP	
1.170	41.3	Line 1	56.0	-14.7	QP	
0.193	48.3	Line 1	63.9	-15.6	QP	
0.388	39.5	Line 1	58.1	-18.6	QP	
0.391	38.6	Neutral	58.1	-19.5	QP	
0.167	19.6	Line 1	55.1	-35.5	AVG	
0.169	19.1	Neutral	55.0	-35.9	AVG	
0.681	46.1	Line 1	-	-	Peak	Ambient
0.809	51.4	Line 1	-	-	Peak	Ambient
0.680	45.0	Neutral	-	-	Peak	Ambient
0.810	50.4	Neutral	-	-	Peak	Ambient



EMC Test Data

Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
		Account Manager:	Deepa Shetty
Contact:	Michael Corr		-
Emissions Standard(s):	FCC Part 15.247, Subpart B	Class:	A
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Adura Technologies

Model

Wall Control Interface (WCI)

Date of Last Test: 7/22/2009

Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/17/2009
Test Engineer: Mehran Birgani/Rafael Varelas
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20-26 °C
Rel. Humidity: 30-40 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Frequency (MHz)	Channel	Power Setting	Antenna	Test Performed	Limit	Result / Margin
1a	2405	Low (ch 11)	16	Internal	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.3dBμV/m @ 2350.9MHz (-1.7dB)
			16	Internal	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	35.8dBμV/m @ 4810.0MHz (-18.2dB)
1b	2440	Center (ch 18)	16	Internal	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	35.5dBμV/m @ 4880.0MHz (-18.5dB)
1c	2475	High (ch 25)	19	Internal	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.2dBμV/m @ 2483.5MHz (-1.8dB)
			16	Internal	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	35.9dBμV/m @ 4950.0MHz (-18.1dB)
1d	2480	High (ch 26)	0	Internal	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	48.7dBμV/m @ 2483.5MHz (-5.3dB)
			0	Internal	Radiated Emissions 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	38.9dBμV/m @ 4960.0MHz (-15.1dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Note 1: Prescan showed the EUT with internal antenna in Upright orientation has highest emission.

Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26000 MHz.

Run #1a: Low Channel 11 @ 2405 MHz (EUT Upright with Power Setting: 16dBm)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2404.990	104.6	V	-	-	AVG	226	1.3	
2404.500	106.8	V	-	-	PK	226	1.3	
2404.950	103.8	H	-	-	AVG	163	1.0	
2404.520	105.9	H	-	-	PK	163	1.0	
2405.270	102.7	V	-	-	-	226	1.3	RB 100 kHz; VB: 100 kHz

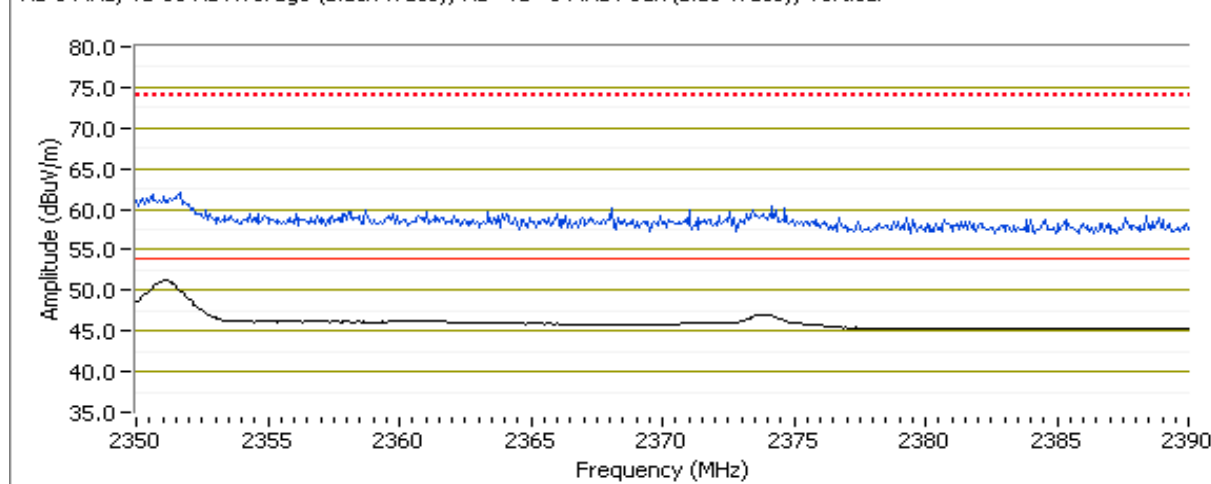
Fundamental emission level @ 3m in 100kHz RBW: 102.7 dB μ V/m

Limit for emissions outside of restricted bands: 72.7 dB μ V/m Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2350.930	52.3	V	54.0	-1.7	AVG	226	1.3	
2351.200	60.9	V	74.0	-13.1	PK	226	1.3	

RB 1 MHz; VB 10 Hz Average (Black Trace), RB=VB=1 MHz Peak (Blue Trace), Vertical



Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions (Power Setting: 16dBm)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4809.920	35.5	V	54.0	-18.5	AVG	306	1.0	
4809.980	35.8	H	54.0	-18.2	AVG	224	1.5	
4809.730	45.3	V	74.0	-28.7	PK	306	1.0	
4811.200	44.8	H	74.0	-29.2	PK	224	1.5	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Run #1b: Center Channel 18 @ 2440 MHz (EUT Upright with Power Setting: 16dBm)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4879.980	33.5	H	54.0	-20.5	AVG	171	1.5	
4880.020	35.5	V	54.0	-18.5	AVG	324	2.1	
4879.980	43.7	H	74.0	-30.3	PK	171	1.5	
4880.060	44.5	V	74.0	-29.5	PK	324	2.1	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Run #1c: High Channel 25 @ 2475 MHz (EUT Upright with Power Setting: 19dBm)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

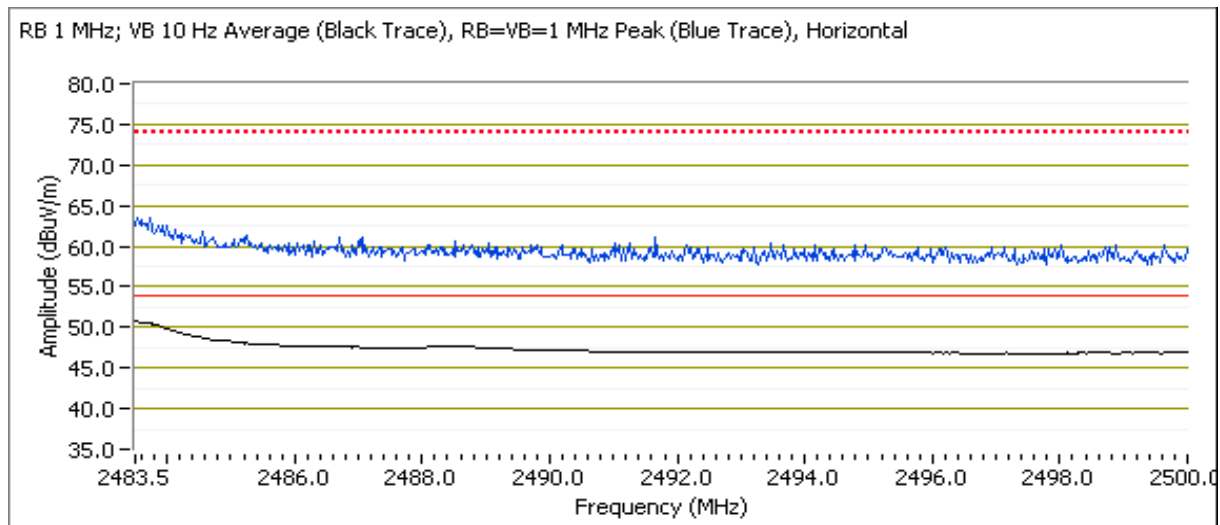
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2474.990	109.3	H	-	-	AVG	199	2.0	
2474.520	111.7	H	-	-	PK	199	2.0	
2474.940	103.7	V	-	-	AVG	72	1.0	
2474.500	105.9	V	-	-	PK	72	1.0	
2475.250	108.1	H	-	-	-	199	2.0	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW:	108.1 dB μ V/m
Limit for emissions outside of restricted bands:	78.1 dB μ V/m

Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	52.2	H	54.0	-1.8	AVG	199	2.0	
2483.830	62.0	H	74.0	-12.0	PK	199	2.0	



Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A

Other Spurious Emissions (Power Setting: 16dBm)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4950.040	35.9	V	54.0	-18.1	AVG	191	1.0	
4950.050	35.8	H	54.0	-18.2	AVG	237	1.6	
4950.000	44.5	V	74.0	-29.5	PK	191	1.0	
4950.130	44.1	H	74.0	-29.9	PK	237	1.6	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Run #1d: High Channel 26 @ 2480 MHz (EUT Upright with Power Setting: 0dBm)

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2479.970	81.4	V	-	-	AVG	180	1.1	
2479.540	83.9	V	-	-	PK	180	1.1	
2479.720	79.4	V	-	-	PK	180	1.1	RB 100 kHz; VB: 100 kHz
2480.030	79.2	H	-	-	AVG	229	1.2	
2480.540	81.6	H	-	-	PK	229	1.2	
2479.910	77.2	H	-	-	PK	229	1.2	RB 100 kHz; VB: 100 kHz

Fundamental emission level @ 3m in 100kHz RBW: 79.4 dBμV/m

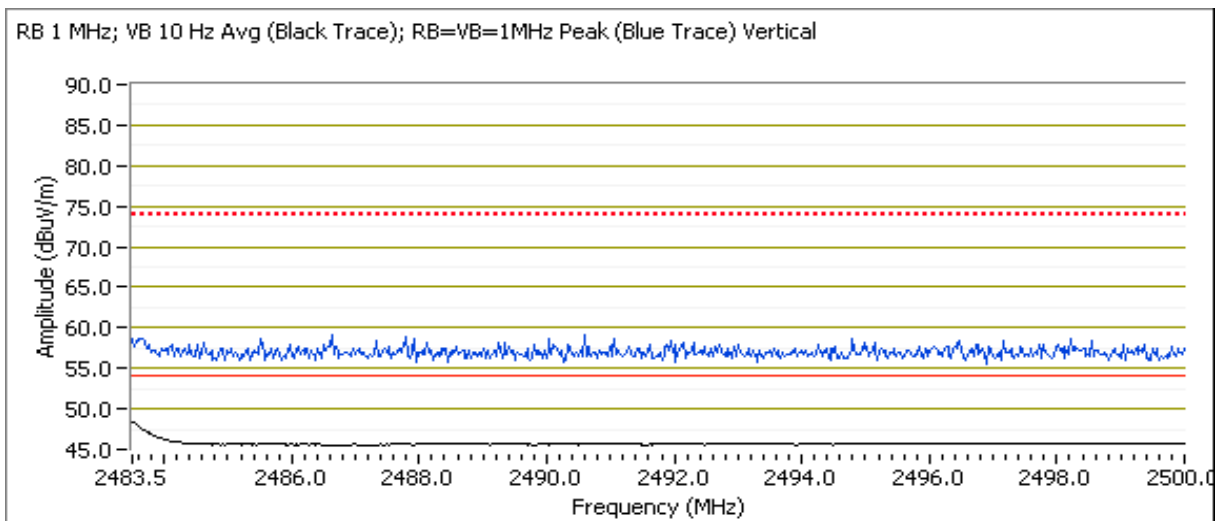
Limit for emissions outside of restricted bands: 49.4 dBμV/m

Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	48.7	V	54.0	-5.3	Avg	180	1.1	
2483.890	59.0	V	74.0	-15.0	PK	180	1.1	
2483.500	48.1	H	54.0	-5.9	Avg	229	1.2	
2483.520	58.6	H	74.0	-15.4	PK	229	1.2	

Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	N/A



Other Spurious Emissions (Power Setting: 0dBm)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4960.020	38.9	V	54.0	-15.1	AVG	166	1.0	MHz; VB: 10 Hz
4959.970	45.8	V	74.0	-28.2	PK	166	1.0	MHz; VB: 1 MHz
4960.060	35.3	H	54.0	-18.7	AVG	177	1.4	MHz; VB: 10 Hz
4959.960	43.8	H	74.0	-30.2	PK	177	1.4	MHz; VB: 1 MHz

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	A

Conducted Emissions - Power Ports

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/17/2009
 Test Engineer: Mehran Birgani
 Test Location: SVOATS #2

Config. Used: 1
 Config Change: Noone
 Host Unit Voltage 120V/60Hz

General Test Configuration

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 26 °C
 Rel. Humidity: 30 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	EN 55022 Class B	Pass	25.1dBμV @ 0.412MHz (-22.5dB)

Modifications Made During Testing

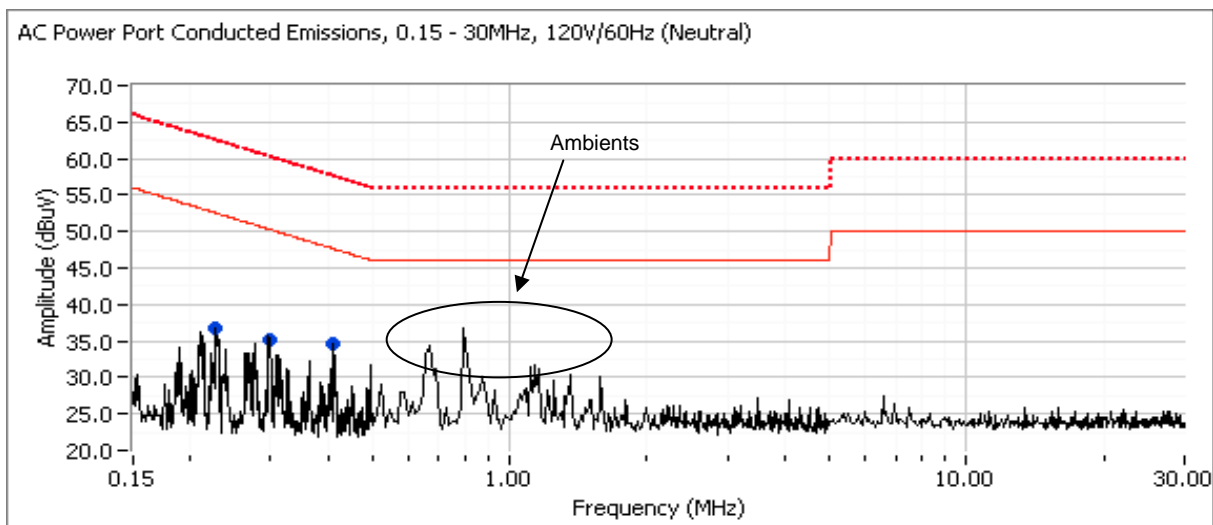
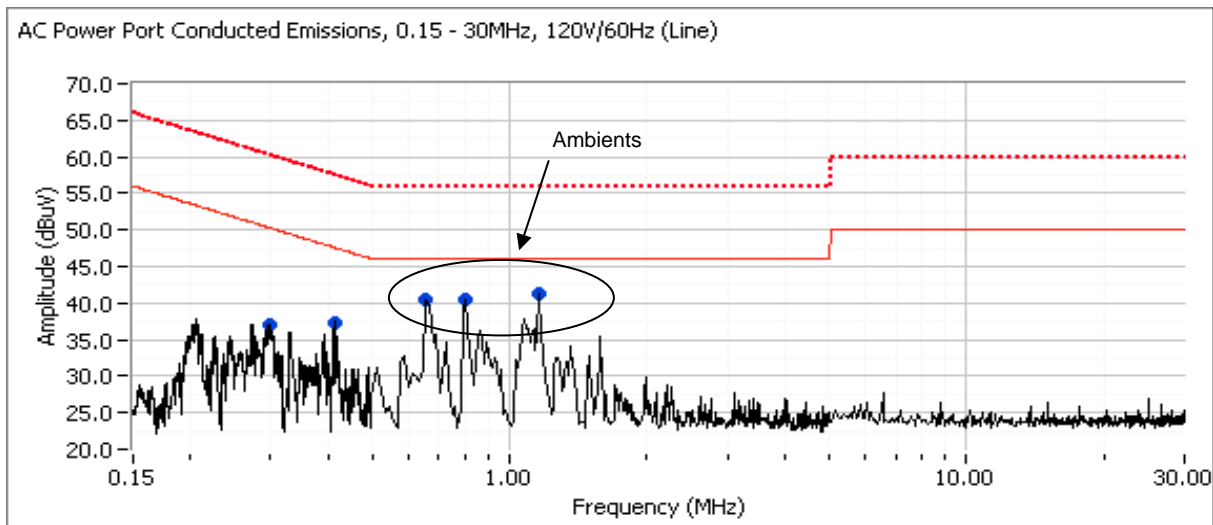
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Acura Technologies	Job Number: J73247
Model: Wall Control Interface (WCI)	T-Log Number: T76161
Contact: Michael Corr	Account Manager: Deepa Shetty
Standard: FCC Part 15.247, Subpart B	Class: A

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz



Client:	Adura Technologies	Job Number:	J73247
Model:	Wall Control Interface (WCI)	T-Log Number:	T76161
Contact:	Michael Corr	Account Manager:	Deepa Shetty
Standard:	FCC Part 15.247, Subpart B	Class:	A

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Frequency MHz	Level dB μ V	AC Line	EN 55022 Class B Limit	Margin	Detector QP/Ave	Comments
0.205	24.4	Line	53.4	-29.0	AVG	
0.228	16.0	Neutral	52.5	-36.5	AVG	
0.298	16.0	Neutral	50.3	-34.3	AVG	
0.299	22.7	Line	50.3	-27.6	AVG	
0.412	25.1	Line	47.6	-22.5	AVG	
0.413	14.7	Neutral	47.6	-32.9	AVG	
0.205	35.7	Line	63.4	-27.7	QP	
0.228	30.1	Neutral	62.5	-32.4	QP	
0.298	30.7	Neutral	60.3	-29.6	QP	
0.299	34.5	Line	60.3	-25.8	QP	
0.412	35.0	Line	57.6	-22.6	QP	
0.413	26.3	Neutral	57.6	-31.3	QP	

Appendix C Photographs of Test Configurations

Uploaded as a separate exhibit

Appendix D Proposed FCC ID Label & Label Location

Uploaded as a separate exhibit

Appendix E Detailed Photographs

Uploaded as a separate exhibit

Appendix F Operator's Manual

Uploaded as a separate exhibit

Appendix G Block Diagram

Uploaded as a separate exhibit

Appendix H Schematic Diagrams

Uploaded as a separate exhibit

Appendix I Theory of Operation

Uploaded as a separate exhibit

Appendix J Advertising Literature

Uploaded as a separate exhibit

Appendix K RF Exposure Information

Uploaded as a separate exhibit