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Emissions
Test Report

EUT Name: Radio Module

Model No.: FWCS

CFR 47 Part 15.247 2011 and RSS 210: 2010

Prepared for:

Joseph E. Swanzy
Fluke Corporation.
6920 Seaway Blvd.
Everett, WA, USA 98062
Tel: (425)-446-5626

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane
Pleasanton, CA 94566
Tel: (925) 249-9123
Fax: (925) 249-9124
http://www.tuv.com/

Report/Issue Date: August 22, 2012
Report Number: 31261836.003

Statement of Compliance

Manufacturer:	Fluke Corporation. 6920 Seaway Blvd Alberta, Canada T2A 7X9
Requester / Applicant:	Joseph E. Swanzy
Name of Equipment:	Radio Module
Model No.	FWCS
Type of Equipment:	Intentional Radiator
Application of Regulations:	CFR 47 Part 15.247 2011 and RSS 210: 2010
Test Dates:	May 21 to June 22, 2012

Guidance Documents:

Emissions: ANSI C63.10-2009

Test Methods:

Emissions: ANSI C63.10-2009

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA. This report contains data that are not covered by A2LA accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Suresh Kondapalli	August 02, 2012	Conan Boyle	August 22, 2012
Test Engineer	Date	A2LA Signatory	Date

Testing Cert #3331.02 **US5254** **2932M-1**

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247 2011 and RSS 210: 2010 based on the results of testing performed on May 21 to June 22, 2012 on the Radio Module Model: FWCS manufactured by *Fluke Corporation.* This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4	Test Parameters (from Standard)	Result
2400 MHz to 2483.5 MHz Band			
Spurious Emission in Received Mode	CFR47 15.109, RSS-GEN Sect.7.2.3	Class B	**Complied**
Spurious Emission in Transmitted Mode	CFR47 15.209, RSS-GEN Sect.7.2.3	Class B	**Complied**
Restricted Bands of Operation	CFR47 15.205, RSS 210 Sect.2.6	Class B	**Complied**
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.7.2.2	Class B	**Complied**
Occupied Bandwidth	CFR47 15.247 (a2), RSS GEN Sect.4.4.1	≥ 500 kHz	**Complied**
Maximum Transmitted Power	CFR47 15.247 (b3), RSS 210 Sect. A.8.4	30 dBm	**Complied**
Peak Power Spectral Density	CFR47 15.247 (e), RSS 210 Sect. A.8.2	8 dBm/ 3 kHz.	**Complied**
Bandedge Measurement	CFR47 15.247 (d), RSS 210 Sect. A.8.5	20 dBr	**Complied**

Note: Since EUT is portable device where the end user will have the direct contact, RF Exposure/ SAR test requirements are evaluated separately

1.3.1 Measured values of key parameters

Test	Test Method ANSI C63.4	Measured value	Result
2400 MHz to 2483.5 MHz Band			
Maximum Transmitted Power	CFR47 15.247 (b3), RSS 210 Sect. A.8.4	1.79 dBm	Complied
Occupied Bandwidth	CFR47 15.247 (a2), RSS GEN Sect.4.4.1	2.74MHz	Complied
Peak Power Spectral Density	CFR47 15.247 (e), RSS 210 Sect. A.8.2	-12.00dBm	Complied
Spurious Emission in Transmitted Mode	CFR47 15.209, RSS-GEN Sect.7.2.3	49.65dBuV at 3 meters	Complied
Spurious Emission in Received Mode	CFR47 15.109, RSS-GEN Sect.7.2.3	15.34dBuV at 3 meters	Complied

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 2305 Mission College Blvd, Ste. 105, Santa Clara, CA 95054, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Pleasanton Registration No. US5254, Santa Clara Registration No. US5251). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

2.1.2 A2LA

TUV Rheinland of North America EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2005 (Pleasanton Testing Certificate #3331.02, Santa Clara Testing Certificate #3331.03). The Scope of Laboratory Accreditation includes emission and immunity testing. The accreditations are updated annually.

2.1.3 Industry Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M-1, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2009. The Santa Clara 10-meter Semi-Anechoic Chamber, Registration No. 2932D-1, has been accepted by Industry Canada to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2009.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 2305 Mission College Blvd, Ste. 105, Santa Clara, CA 95054, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0031

VCCI Registration No. for Santa Clara: A-0032

2.1.5 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland of North America EMC test results and test reports generated from facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 2305 Mission College Blvd, Ste. 105, Santa Clara, CA 95054, within the Scope of the Laboratory A2LA Accreditation, will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2009, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Testing Cert #3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2009, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.2.2 Immunity Test Facility

ESD, EFT, Surge, and PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty

	U_{lab}	U_{cispr}
Radiated Disturbance		
30 MHz – 40,000 MHz	3.2 dB	5.2 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.4 dB	3.6 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.5 dB

Measurement Uncertainty – Immunity Testing

The estimated combined standard uncertainty for ESD immunity measurements is ± 4.1%.
The estimated combined standard uncertainty for radiated immunity measurements is ± 2.7 dB.
The estimated combined standard uncertainty for conducted immunity measurements is ± 1.4 dB.
The estimated combined standard uncertainty for damped oscillatory wave immunity measurements is ± 8.8%.
The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 0.45%.

Measurement Uncertainty – Radio Testing

The estimated combined standard uncertainty for frequency error measurements is ± 3.88 Hz
The estimated combined standard uncertainty for carrier power measurements is ± 1.59 dB.
The estimated combined standard uncertainty for adjacent channel power measurements is ± 1.47 dB.
The estimated combined standard uncertainty for modulation frequency response measurements is ± 0.46 dB.
The estimated combined standard uncertainty for transmitter conducted emission measurements is ± 4.01 dB

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

The FWCS is Zigbee radio module used in Fluke Portable measuring devices.

The radio module will be used in future Fluke products to provide wireless communication between a central module radio device and satellite radio devices. The protocol used will be similar to Zigbee but tailored to meet Fluke proprietary requirements.

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with test standards. The EUT was programed to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

EUT was programed to operate at > 99% duty for the purpose of testing. This operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.4 Duty Cycle:

None

3.5 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.5.1 Results

The Radio Module has one internal antenna. The antenna is integral part of module PCB. EUT is compliant.

4 Emission Requirements – 2400 MHz to 2483.5 MHz Band

Testing was performed in accordance with CFR 47 Part 15.247: 2011 and RSS 210 Annex 8: 2010. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

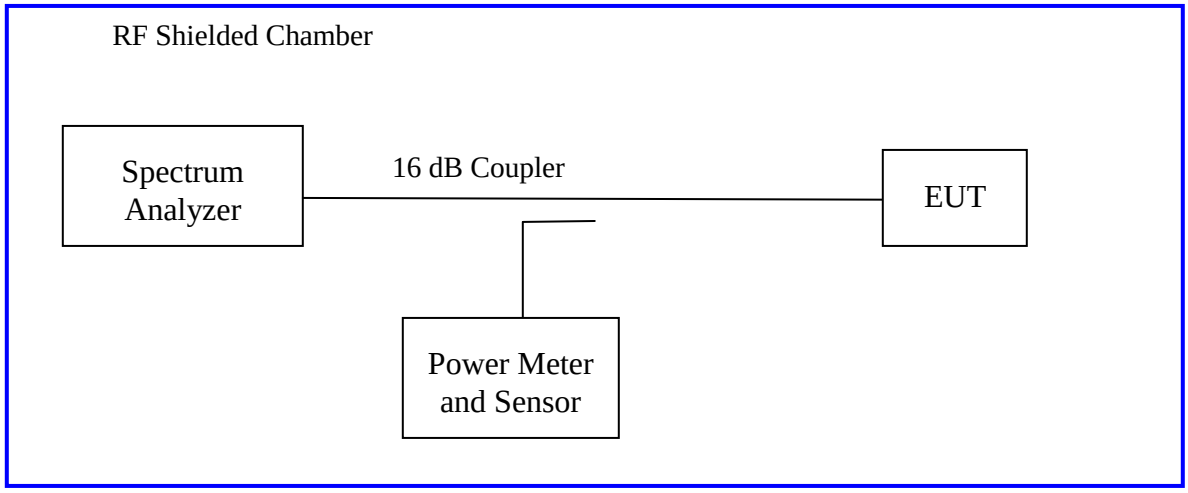
The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b3):2009 and RSS 210 A.8.4: 2010

The maximum transmitted power is +30 dBm or 1 Watt.

4.1.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.10:2009 Section 6.10.3.1. The measurement was performed with modulation per CFR47 Part 15.247 (b3):2011 and RSS 210 A.8.4. This test was conducted on 3 channels in each operating range. The worst mode result indicated below.

Test Setup:



Method #1 of "Measurement of Digital Transmission Systems Operating under Section 15.247"applies since the EUT continuously transmit; where T, Transmission Duration Pulse, is greater than analyzer sweep time.

4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 2: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature				
Antenna Type: Internal		**Power Setting:** See test plan		
Max. Antenna Gain: +3 dBi		**Duty Cycle:** 100%		
Ambient Temp.: 21 °C		**Relative Humidity:**39%		
802.15.4 Mode				
Operating Channel	**Limit [dBm]**	**[dBm]**	**Power [mWatts]**	**Margin [dB]**
2405MHz	+30.00	1.79	1.51	-28.21
2430MHz	+30.00	1.63	1.45	-28.37
2480MHz	+30.00	1.07	1.27	-28.93
Note: EUT has duty cycle EUT was modified to transmit continuously for test purpose. EUT normal data rate is 1Mbps. No duty was applied				

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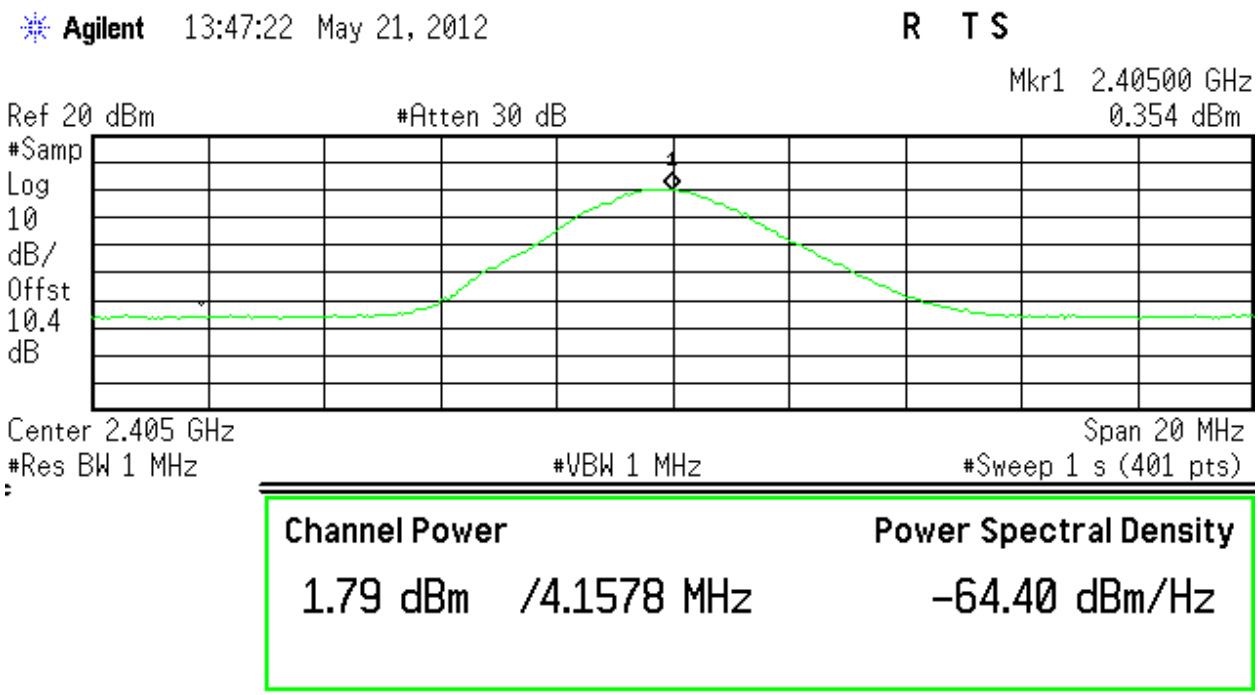


Figure 1: Maximum Transmitted Power, 2405 MHz

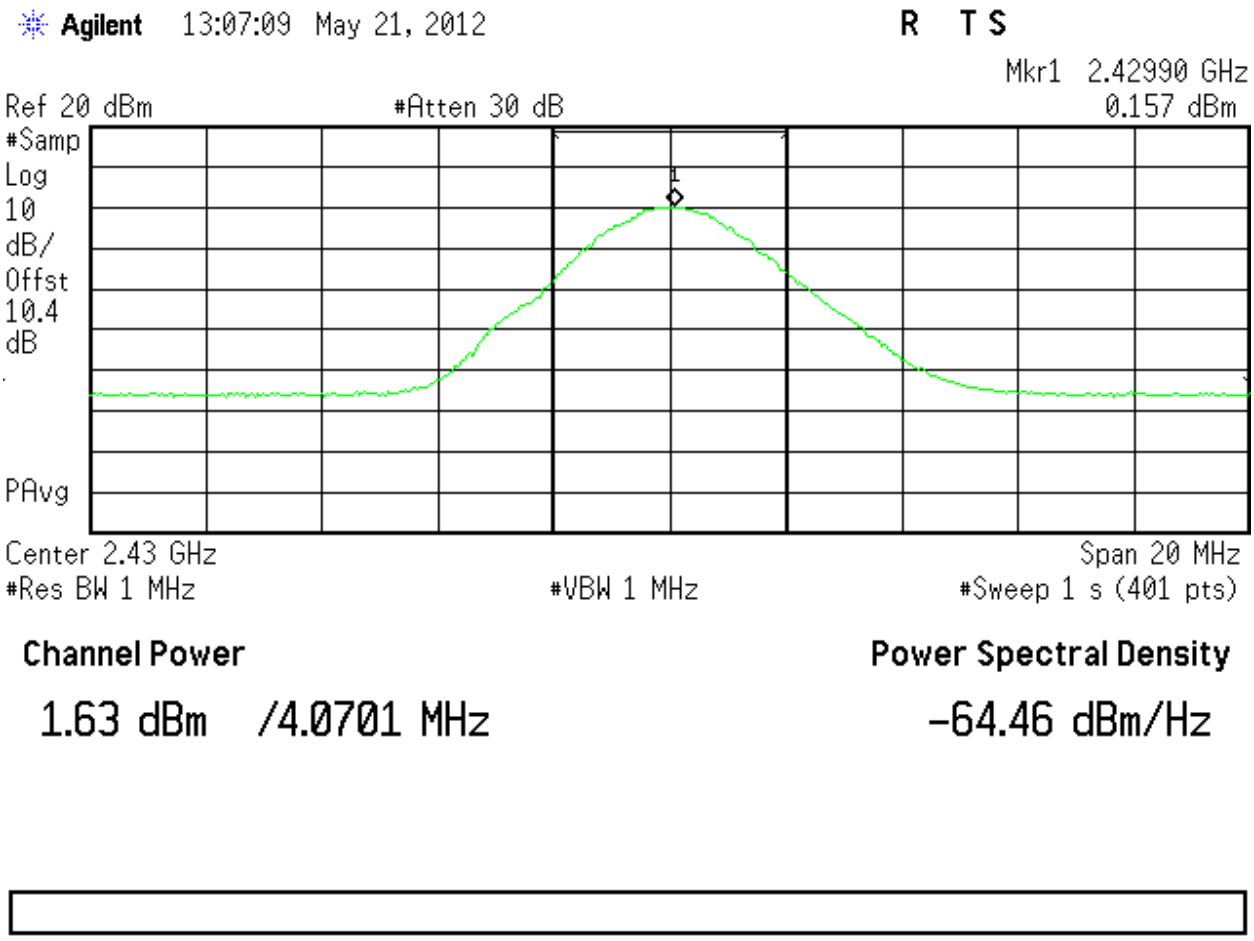


Figure 2: Maximum Transmitted Power, 2430 MHz

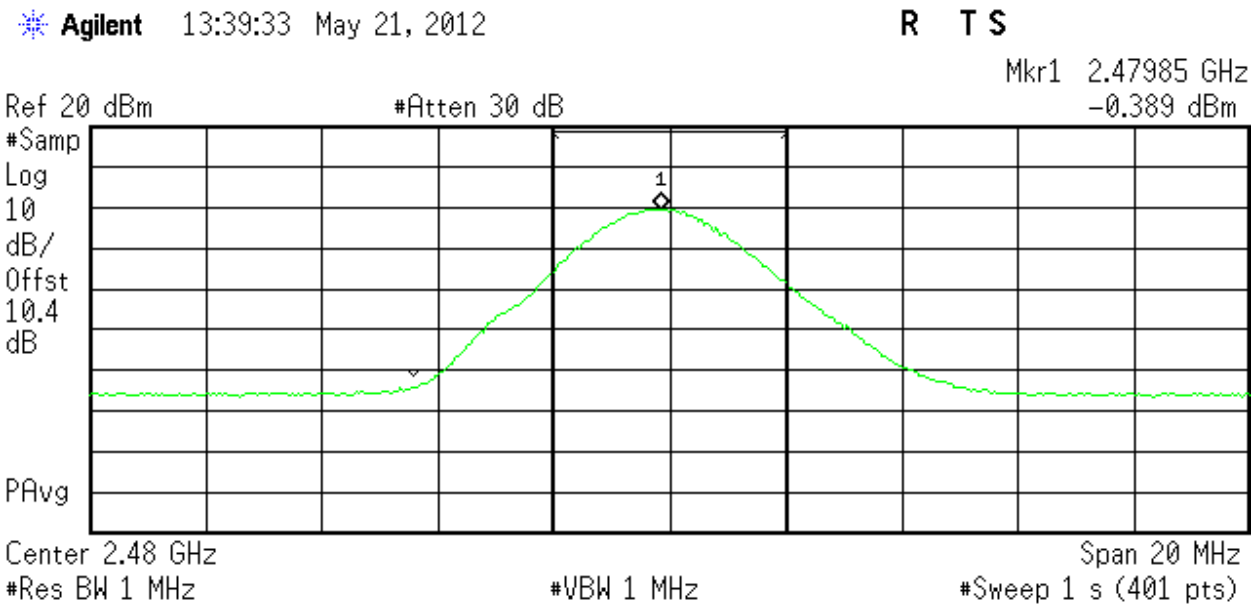


Figure 3: Maximum Transmitted Power, 2480 MHz, 1Mbps

4.2 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

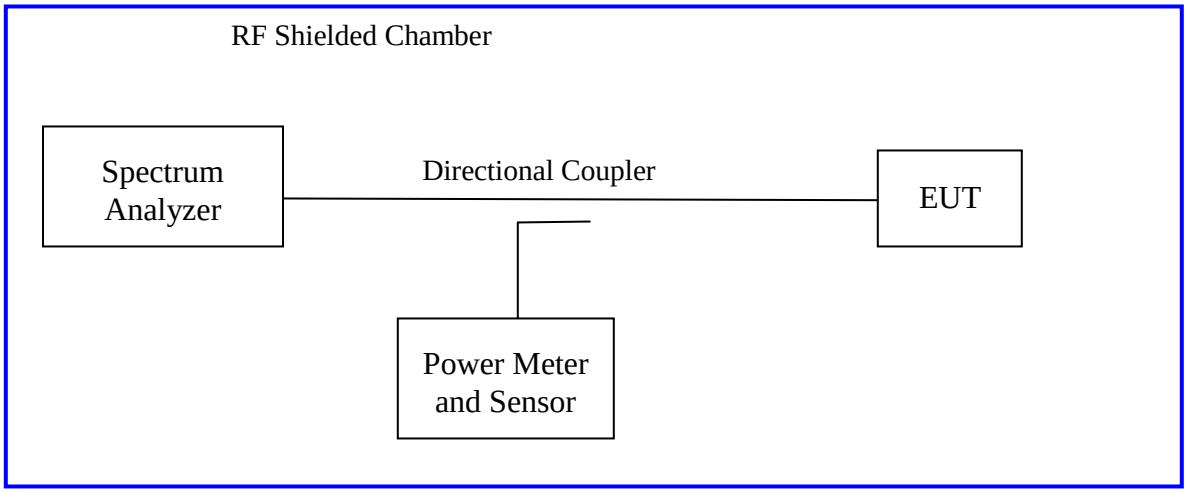
The 6 dB bandwidth is defined the bandwidth of 6 dBr from highest transmitted level of the fundamental frequency.

The bandwidth shall be at least 500 kHz per Section CFR47 15.247(a2) 2011and RSS Gen Sect. 4.4.1: 2010.

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth. The measurement was performed with modulation per CFR47 15.247(a2) 2011 and RSS Gen Sect. 4.4.1:2010. Initial investigation was performed at different data rates. The narrowest bandwidths of the operational mode were measured on 3 operating channels. The worst sample result indicated below.

Test Setup:



4.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 3: Occupied Bandwidth – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Internal		**Power Setting:** See test plan		
Max. Antenna Gain: + 3.0 dBi		**Signal State:** Modulated		
Ambient Temp.: 21 °C		**Relative Humidity:**33%		
Bandwidth (MHz) for 802.15.4				
Freq. (MHz)	**Limit (kHz)**	**99% BW(MHz)**	**6 dB BW (MHz)**	**Results**
2405	500	2.73	1.64	Pass
2430	500	2.74	1.64	Pass
2480	500	2.74	1.62	Pass

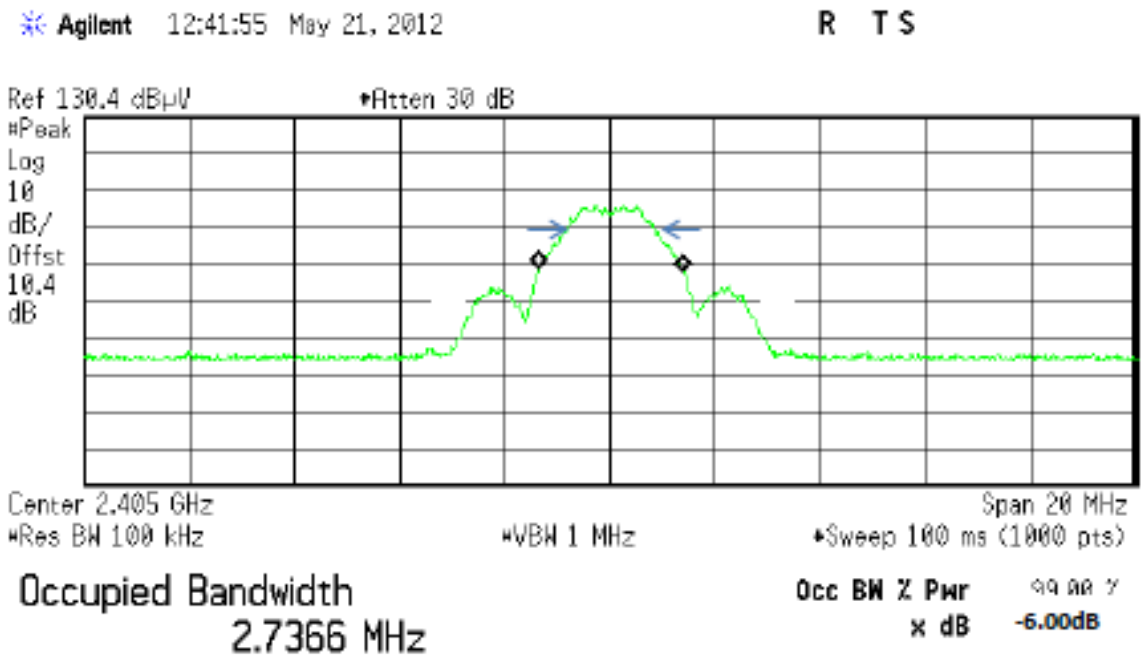


Figure 4: Occupied Bandwidth at Operating Channel 2405 MHz

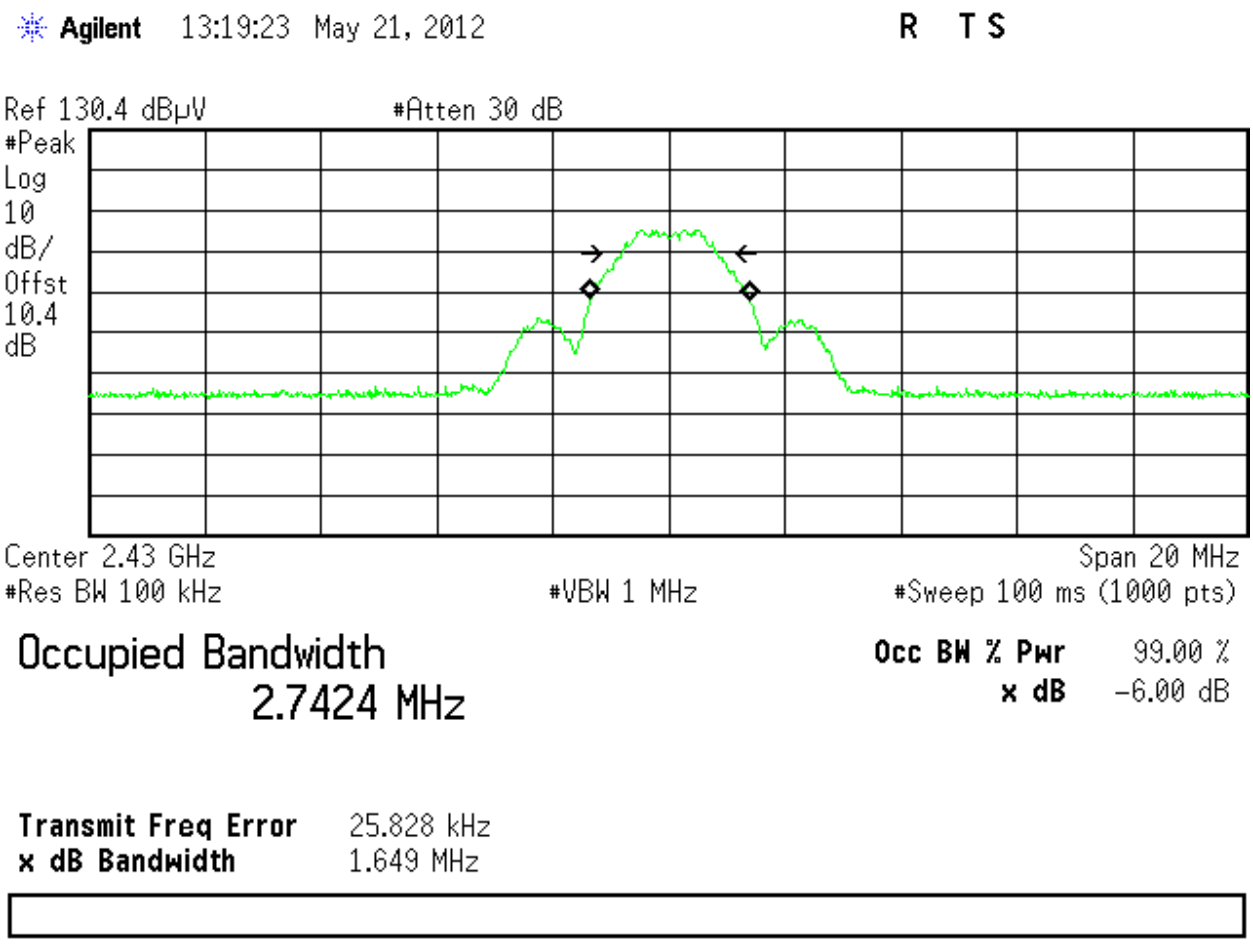


Figure 5: Occupied Bandwidth at Operating Channel 2430 MHz

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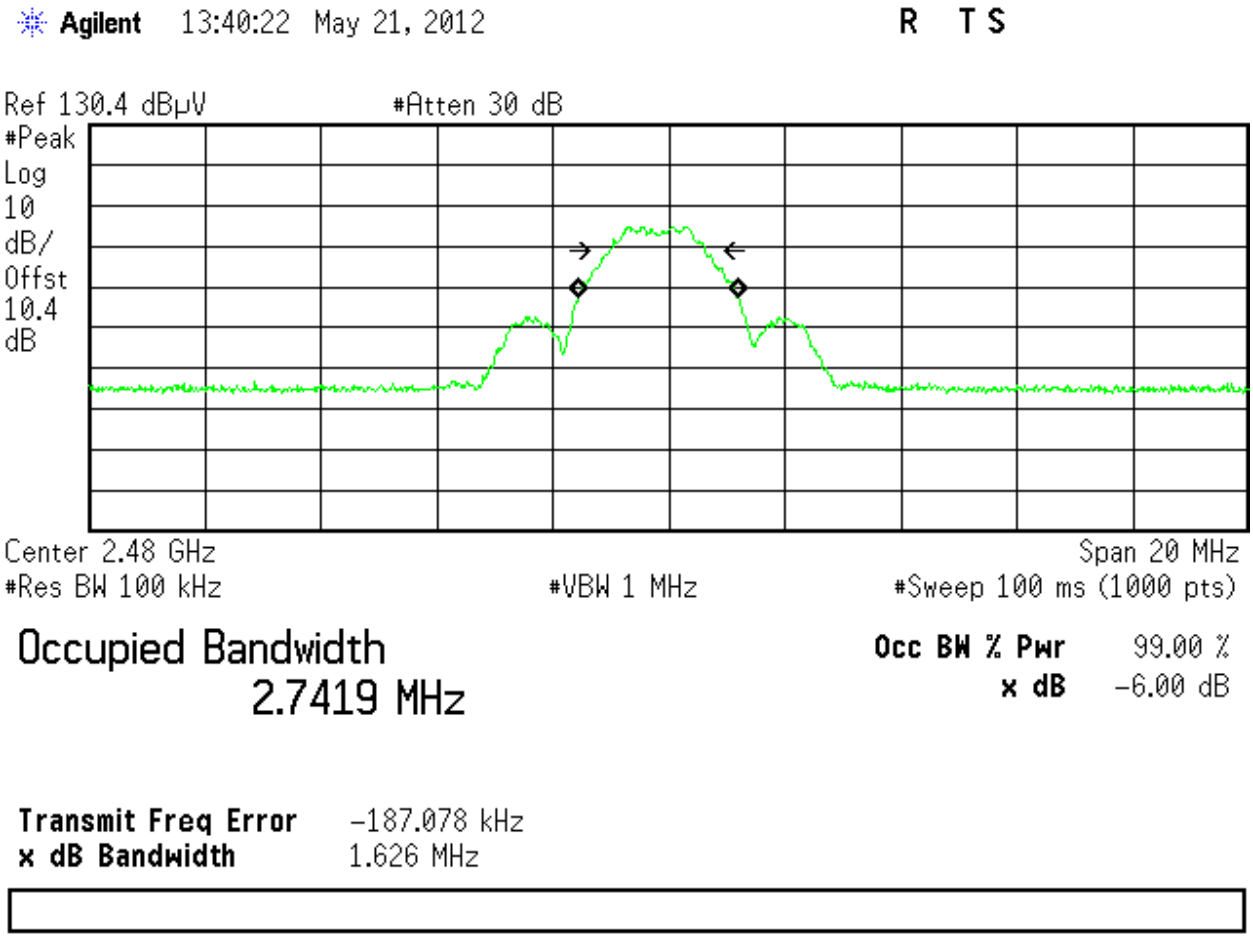


Figure 6: Occupied Bandwidth at Operating Channel 2480 MHz

4.3 Band-edge Requirements

The setup was identical to RF output power measurement. Intentional radiators operating under the alternative provisions to the general emission limits, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If the frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Any frequency outside the band of 2400 MHz to 2483.5 MHz, the power output level must be below 20 dB from the in-band transmitting signal; CFR 47 Part 15.215, 15.247(d) and RSS 210 A8.5

4.3.1 Results

The Out of band emission was performed on the conducted test Sample.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 4: Band-Edge Requirements – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Internal		**Power Setting:** See test plan		
Max. Antenna Gain: +3 dBi		**Signal State:** Modulated		
Ambient Temp.: 21 °C		**Relative Humidity:** 39%		
30dBr Band-Edge Results				
Operating Freq.	**Mode**	**Limit (dBm)**	**Measured Value (dBm)**	**Result**
2405 MHz	1Mbps	-34.90	-44.03	Pass
2430 MHz	1Mbps	-34.34	-44.75	Pass
2480 MHz	1Mbps	-35.22	-44.34	Pass
Note: The stated limits for 30 dBr are relative to each individual output per KDB 662911 Method.				

Note: All bandedge measurements were performed as indicated in the above table. Only worst case/ limited number of plots are placed in the report.

Table 5: Out of band Conducted Emission – Test Results

Operating Freq.	Mode	Result
2405 MHz	1Mbps	Pass
2430 MHz	1Mbps	Pass
2480 MHz	1Mbps	Pass
Note: All out of band emissions are at least 30 dB below their transmitting power levels.		

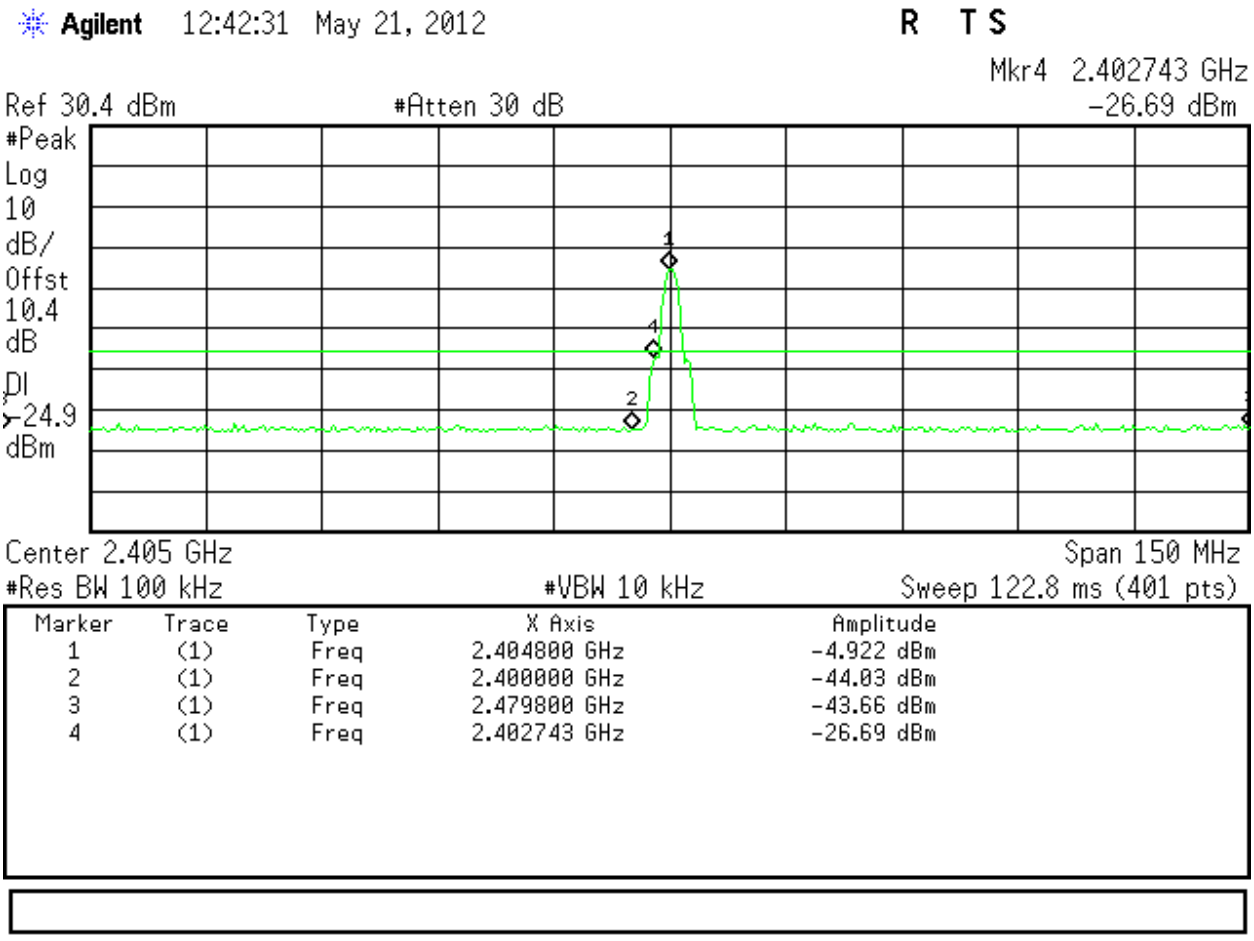


Figure 7: Band-edge Requirement at Operating Channel 2405 MHz,

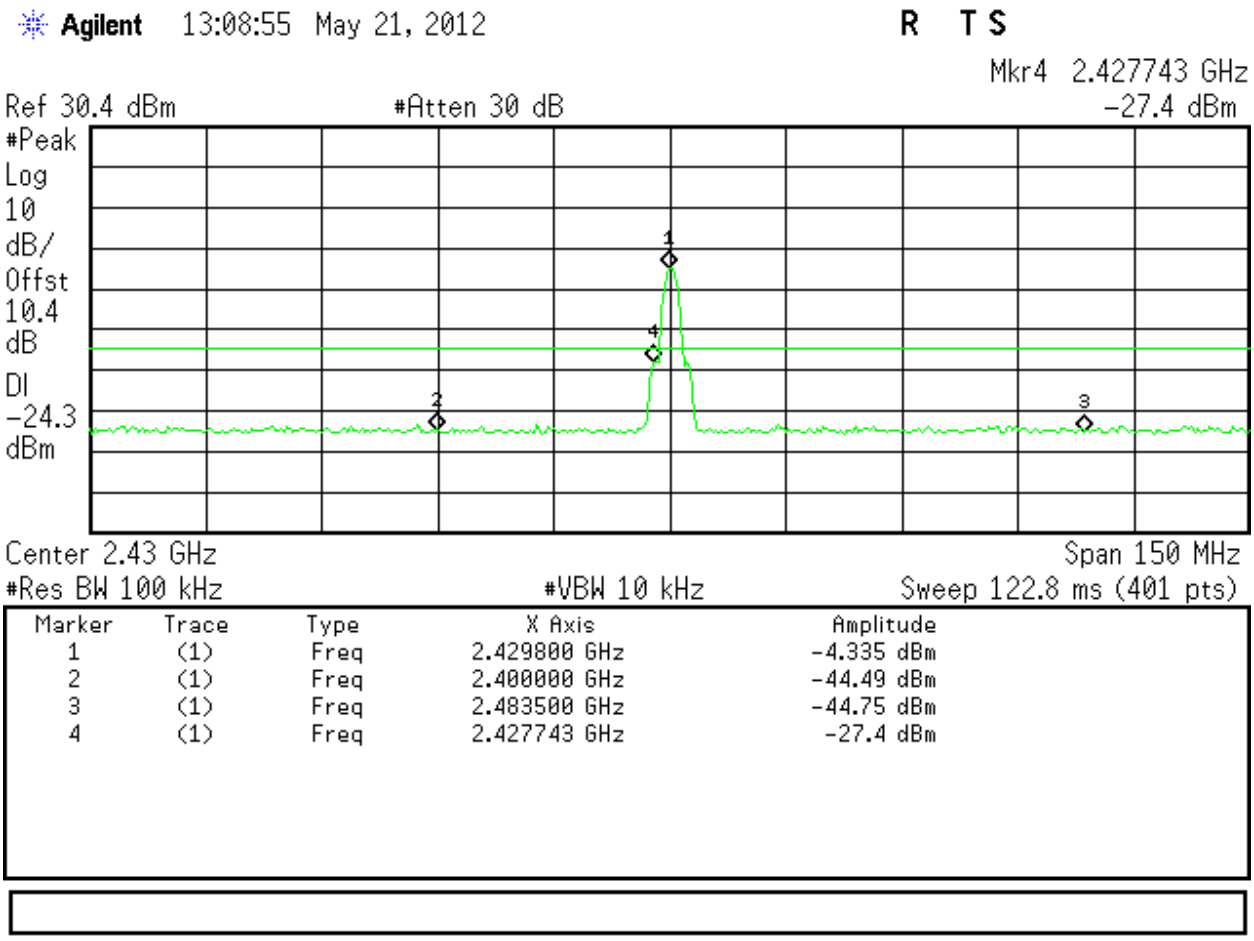


Figure 8: Band-edge Requirement at Operating Channel 2430 MHz

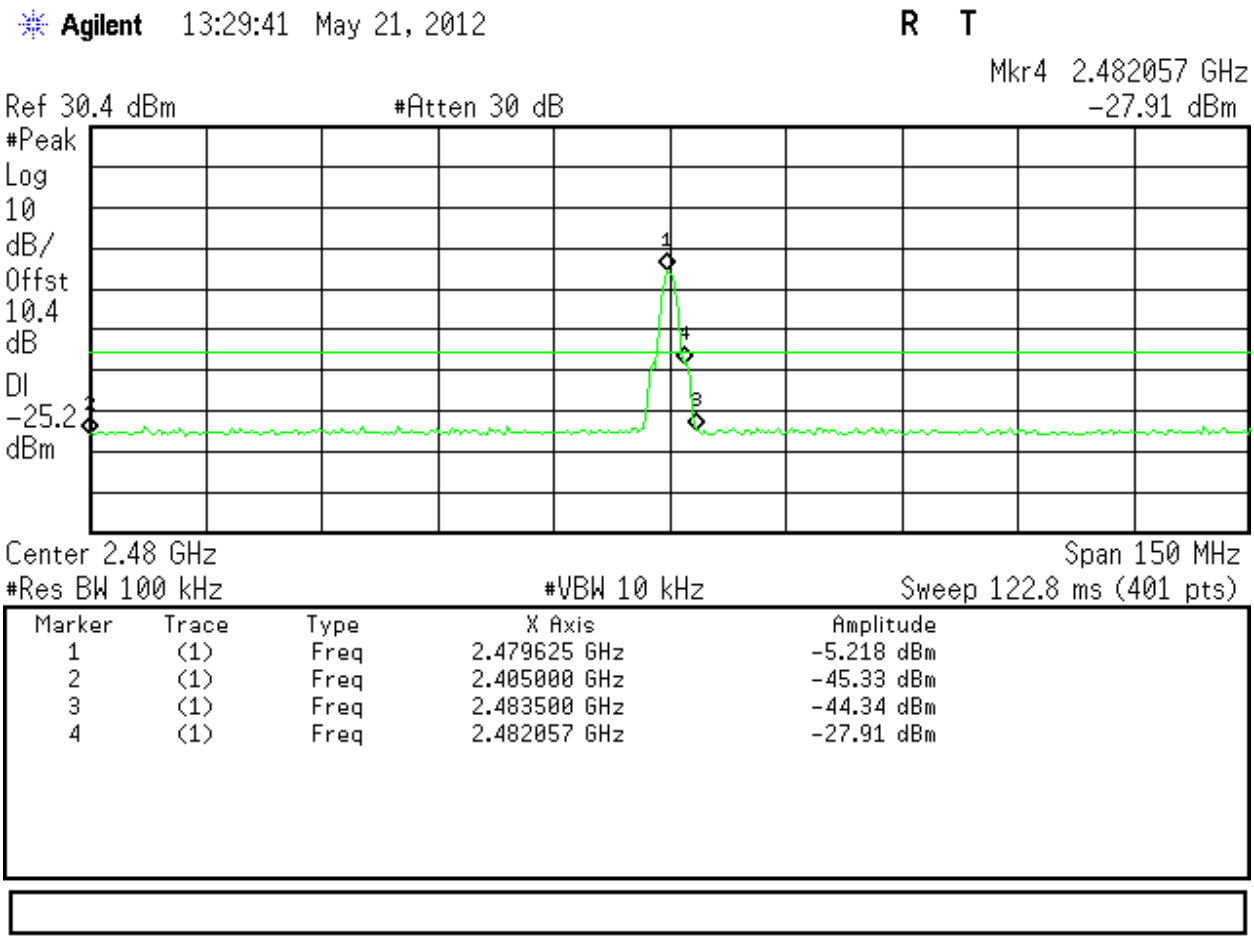


Figure 9: Band-edge Requirement at Operating Channel 2480 MHz

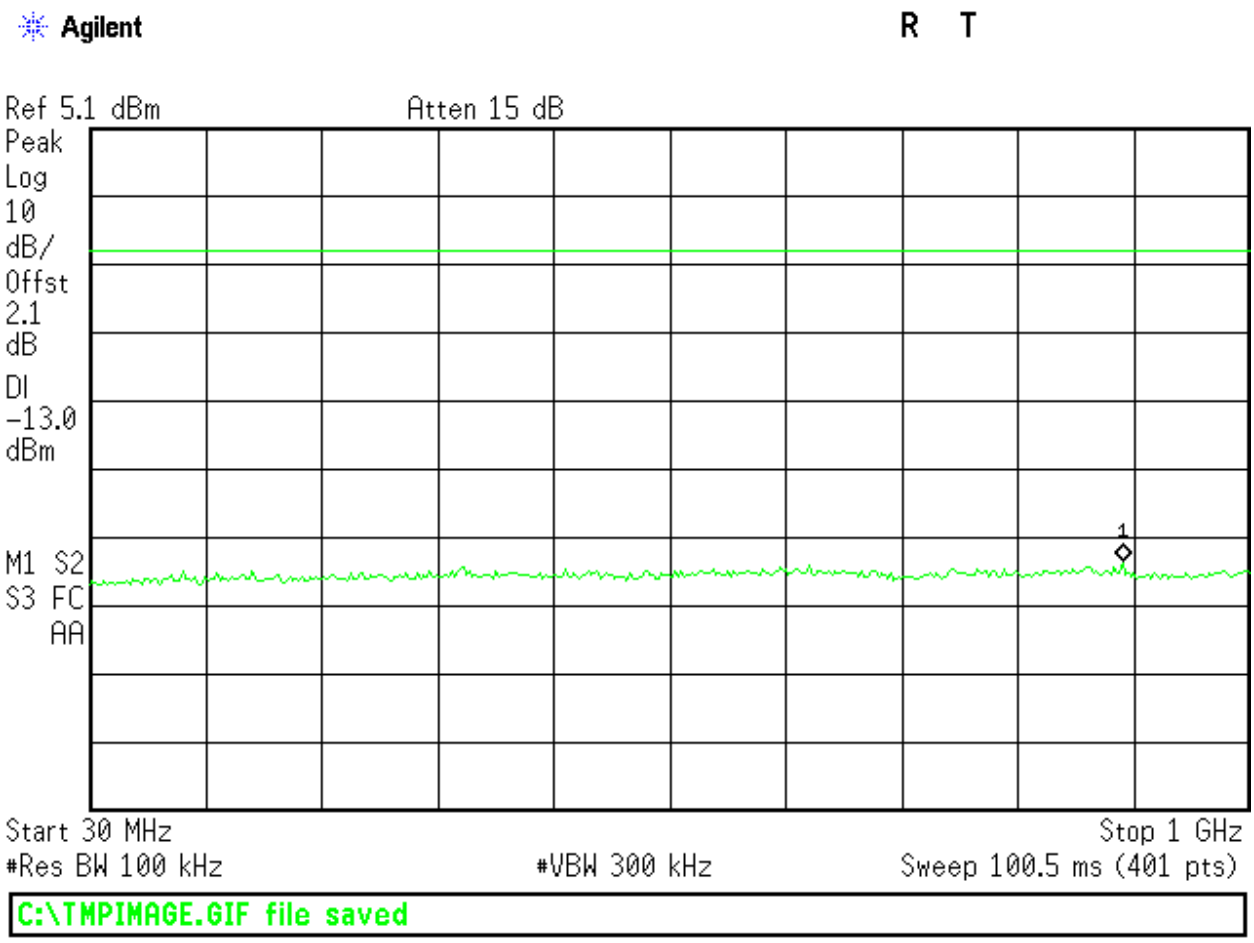


Figure 10: Out of band emissions at Operating Channel 2405 MHz – Plot 1

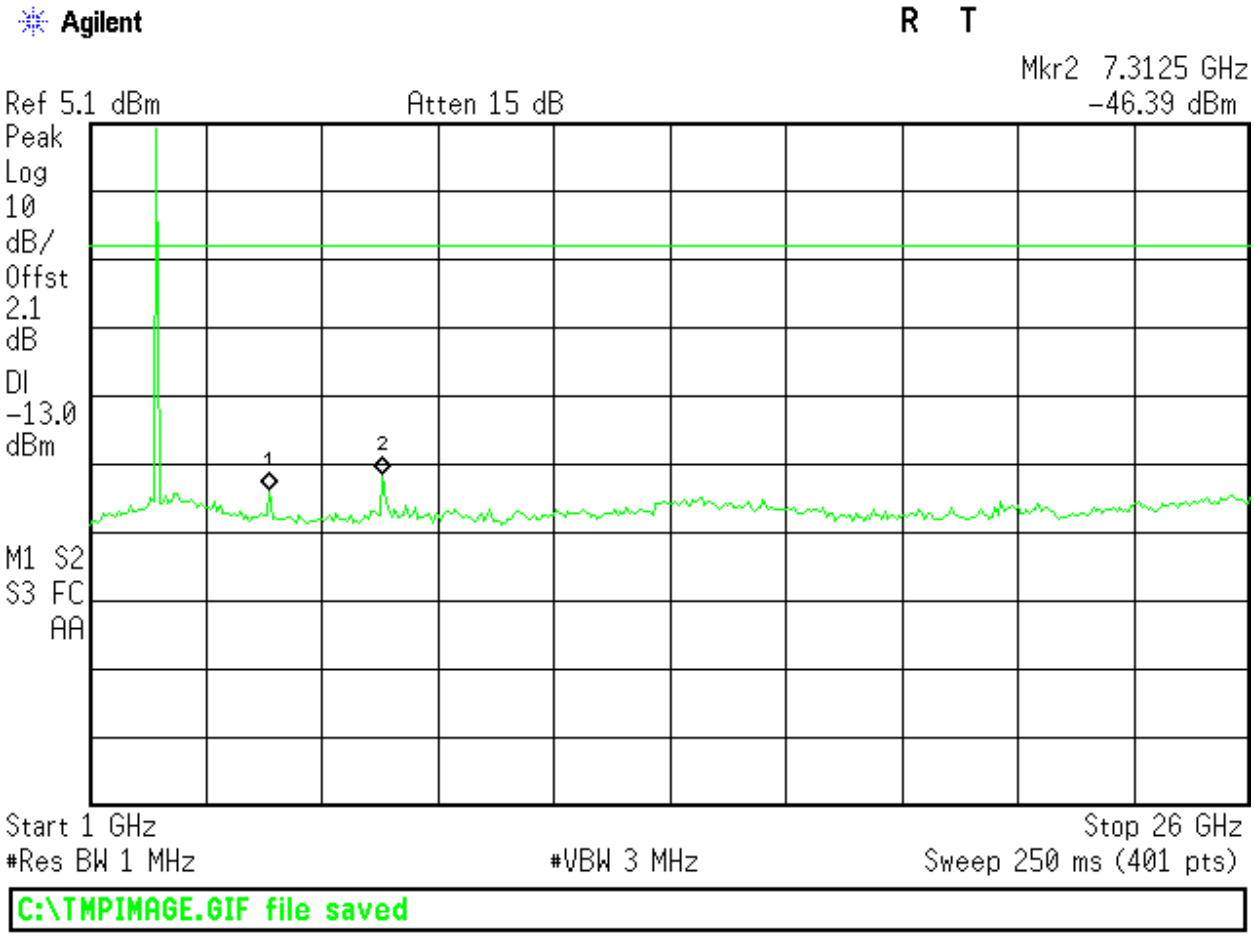


Figure 11: Out of band emissions at Operating Channel 2405 MHz - Plot 2

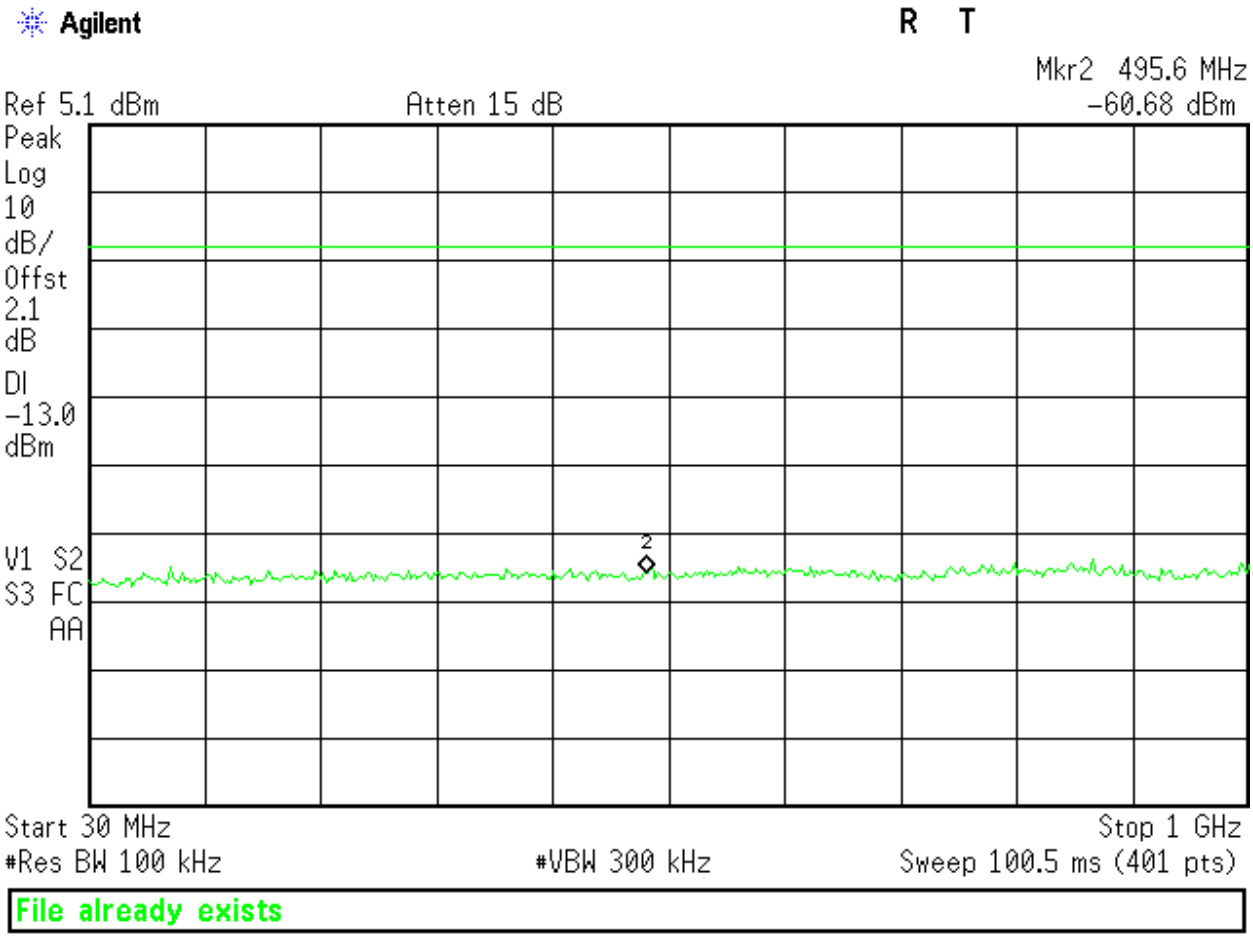


Figure 12: Out of band emissions at Operating Channel 2430 MHz - Plot 1

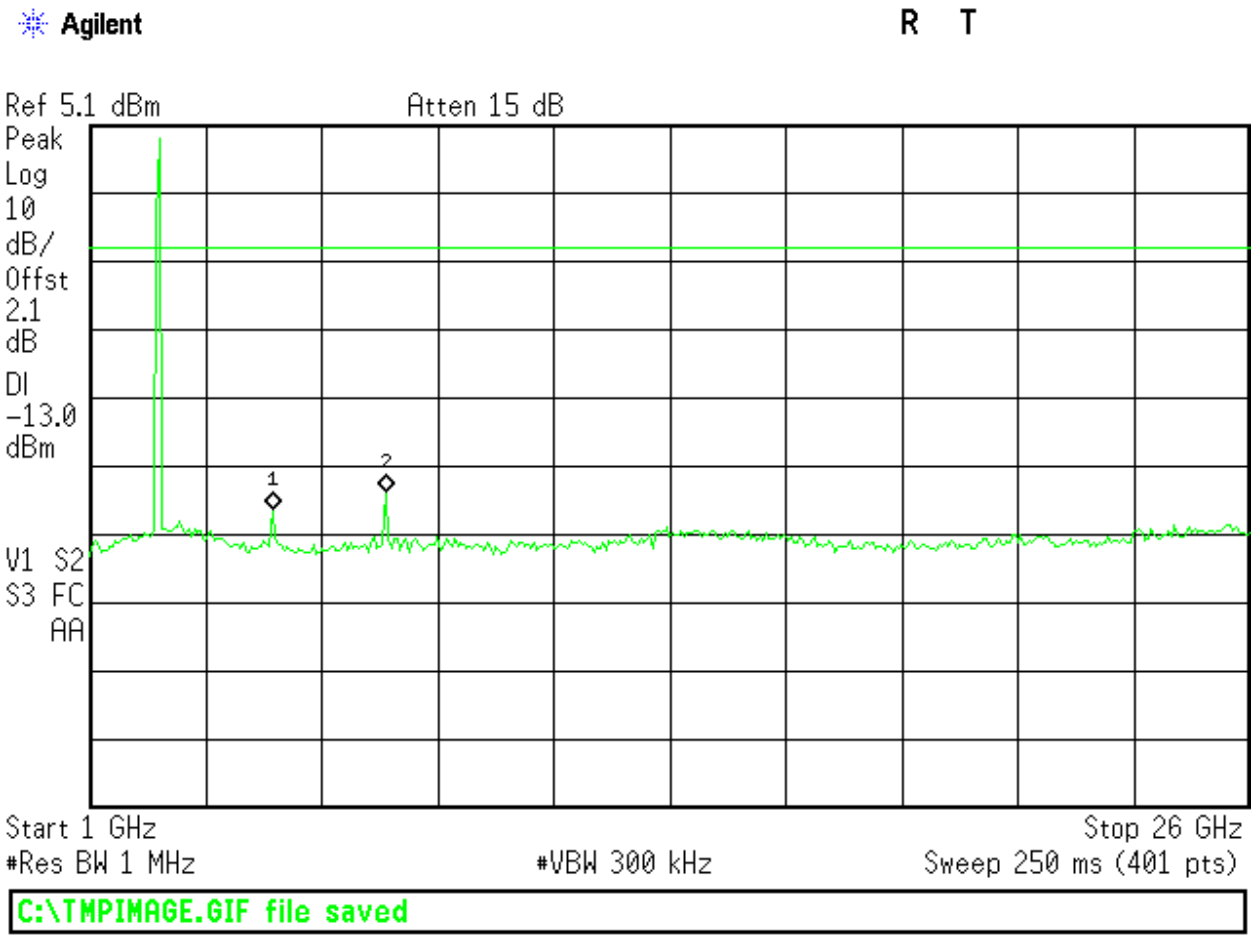


Figure 13: Out of band emissions at Operating Channel 2430 MHz - Plot 2

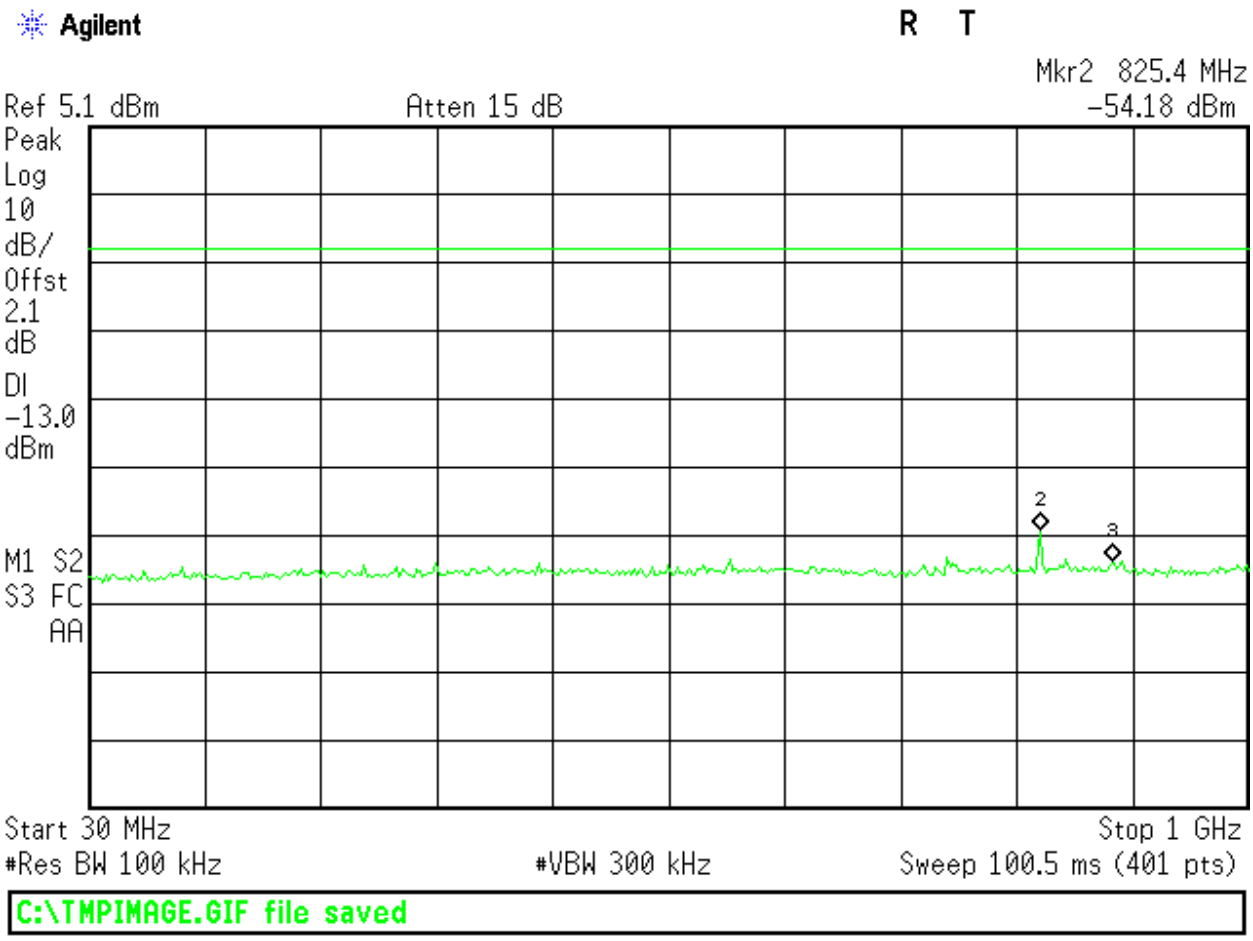


Figure 14: Out of band emissions at Operating Channel 2480 MHz - Plot 1

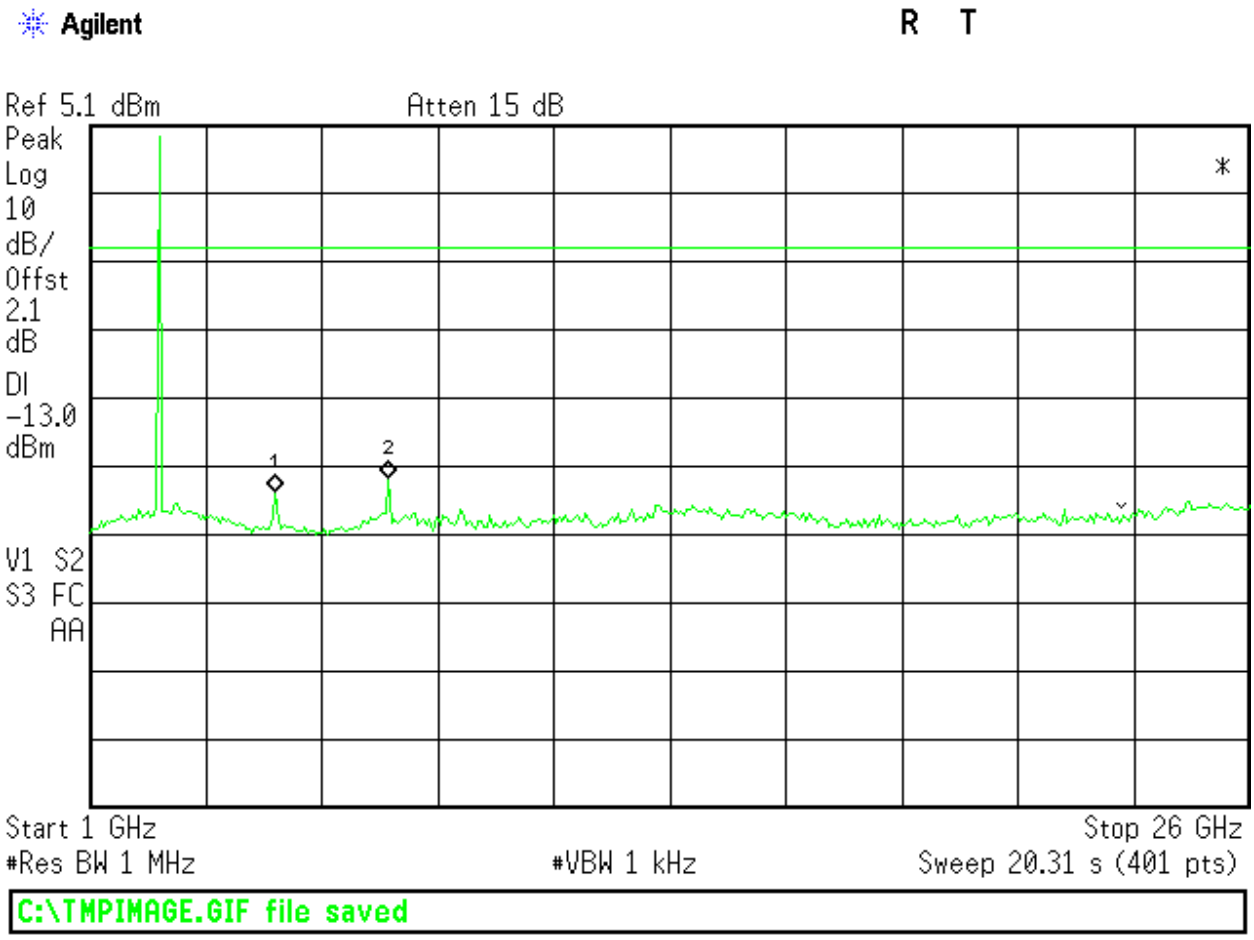


Figure 15: Out of band emissions at Operating Channel 2480 MHz - Plot 2

4.4 Peak Power Spectral Density

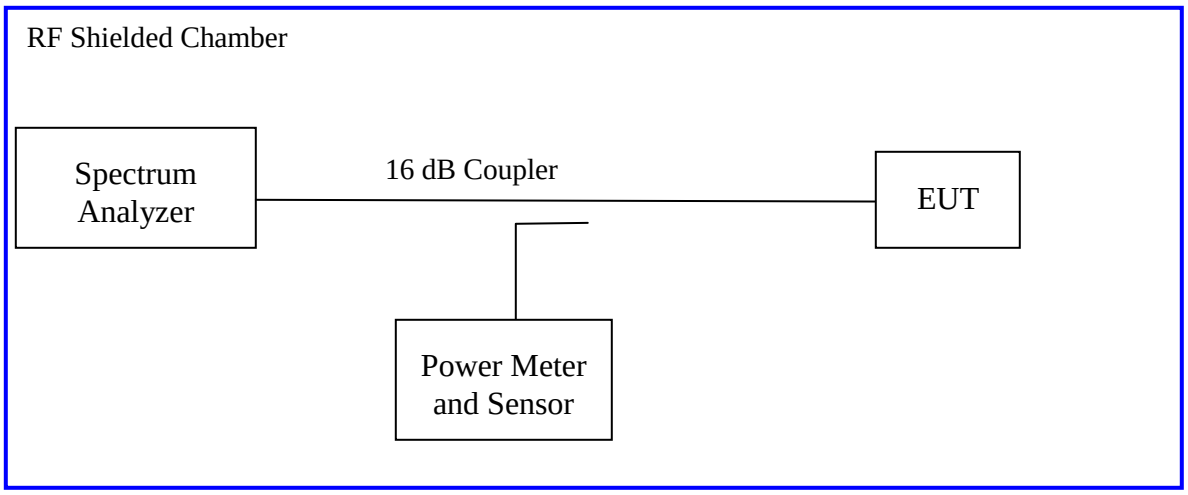
According to the CFR47 Part 15.247 (e) and RSS 210 (A8.2), the spectral power density output of the antenna port shall be less than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.4.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10:2009 Section 6.11.2

The measurement was performed with modulation per CFR47 Part 15.247 (e) and RSS 210 (A8.2). This test was conducted on 3 channels in each mode. The worst sample result indicated below.

Test Setup:



4.4.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 6: Peak Power Spectral Density – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: *Internal*		**Power Setting:** See test plan		
Max. Antenna Gain: 3.0dBi		**Signal State:** Modulated		
Ambient Temp.: 21 °C		**Relative Humidity:**39%		
Peak Power Spectral Density				
Freq. (MHz)	**Mode**	**Max. PPSD [dBm]**	**Limit [dBm]**	**Margin [dB]**
2405	1Mbps	-12.00	8.00	-20.00
2430	1Mbps	-12.07	8.00	-20.07
2480	1Mbps	-12.64	8.00	-20.64

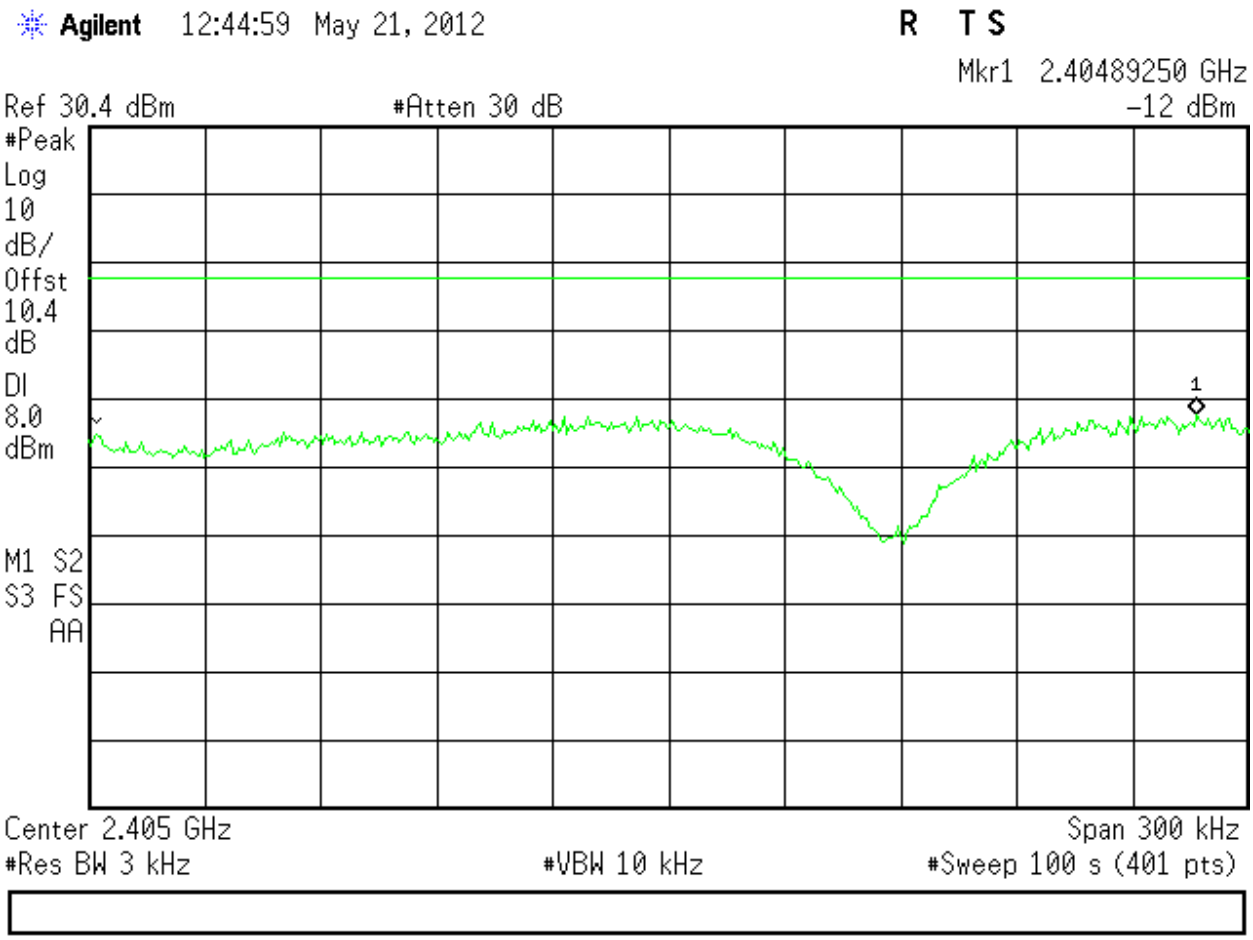


Figure 16: Peak Power Spectral Density for Operating Channel 2405MHz

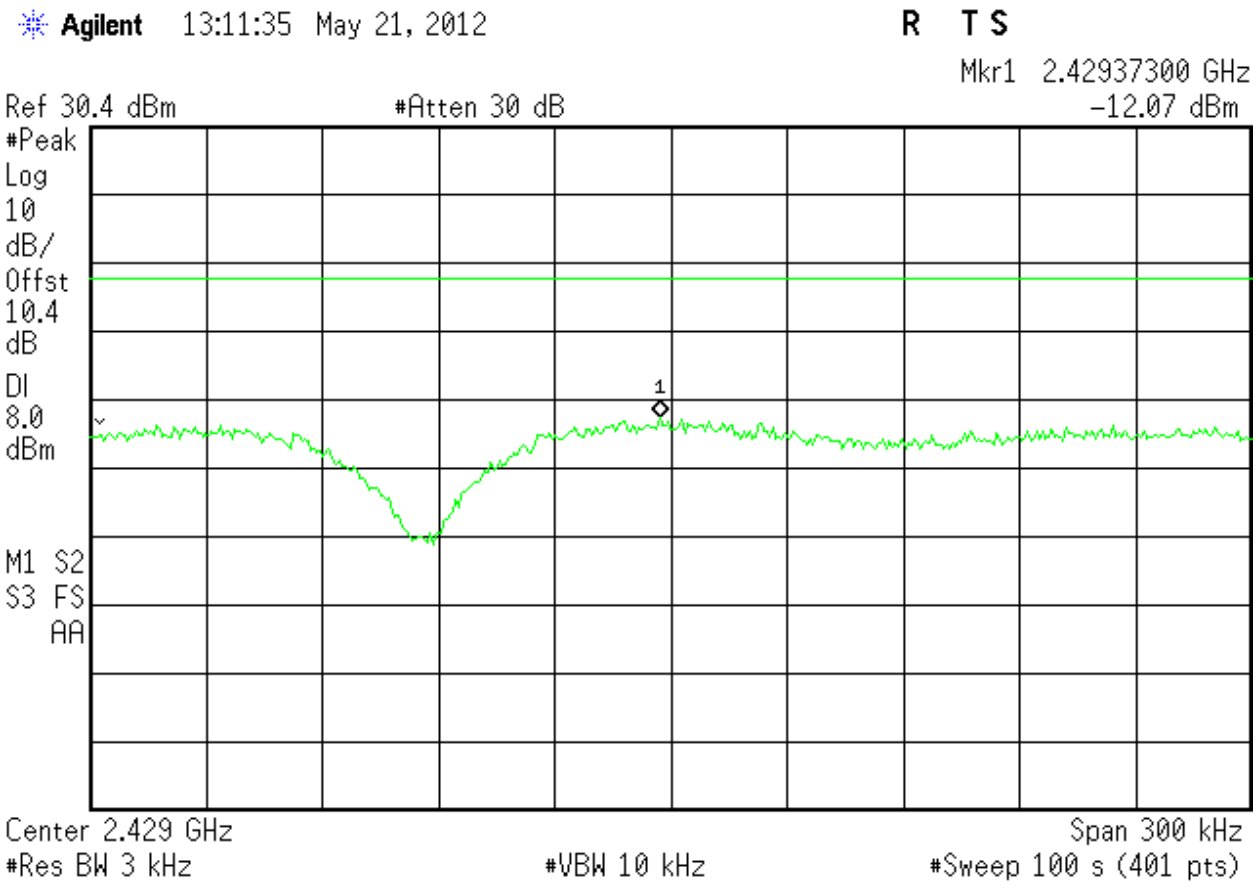


Figure 17: Peak Power Spectral Density for Operating Channel 2430MHz

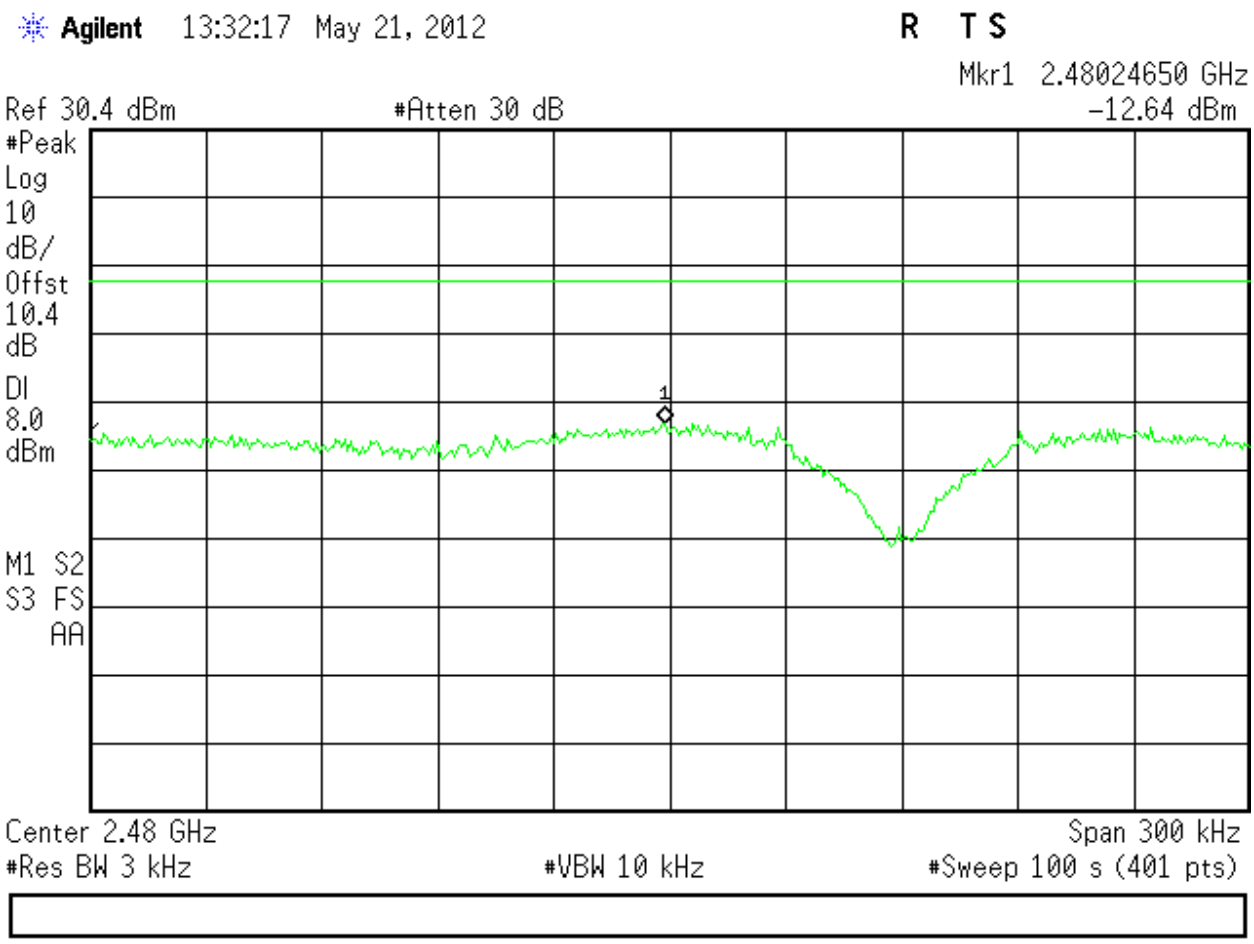


Figure 18: Peak Power Spectral Density for Operating Channel 2480MHz

4.5 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS 210 Sect. A.8.5

4.5.1 Test Methodology

4.5.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

4.5.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

The final scans performed on the worst axis, Y-Axis, for three operating channels;

2405MHz, 2430MHz, and 2480MHz at 1Mbit/s

4.5.1.3 Deviations

None.

4.5.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2011 and RSS 210 A1.1.2 2010.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

All harmonics and spurious emission which are outside of the restricted band shall be 20 dB below the in-band emission.

4.5.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and Test Plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 7: Transmit Spurious Emission at Band-Edge Requirements

Test Conditions: Radiated Measurement, at 3 meters								
Antenna Type: Internal				**Power Setting:** See test plan				
Max. Antenna Gain: + 3dBi				**Signal State:** Modulated at 99%				
Ambient Temp.: 22 °C				**Relative Humidity:**34%				
Band-Edge Results								
Operating Channel MHz	**Polarity**	**Peak Field Strength Measured dBuV**	**Peak Limit dBuV**	**Margin dB**	**Avg Field Strength Measured dBuV**	**Avg Limit dBuV**	**Margin dB**	**Result**
2405	H	37.25	74.0	-36.75	24.15	54.00	-29.85	Pass
2405	V	35.76	74.0	-38.24	22.26	54.00	-31.74	Pass
2480	H	50.49	74.0	-23.55	42.91	54.00	-11.09	Pass
2480	V	54.26	74.0	-19.75	46.34	54.00	-7.66	Pass

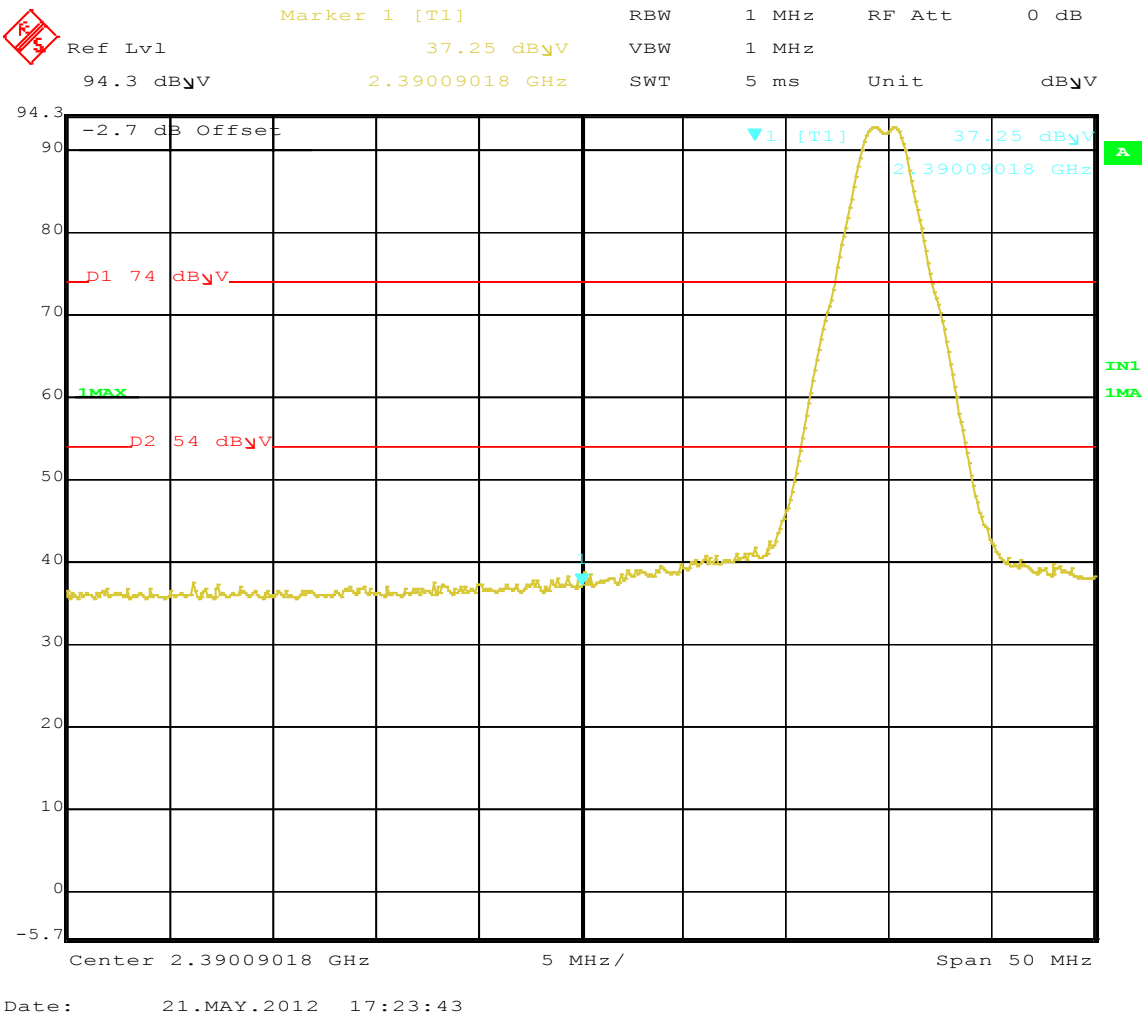


Figure 19: Radiated Emission at the Edge for Channel 2405MHz at 1Mbps – Horizontal (Peak)

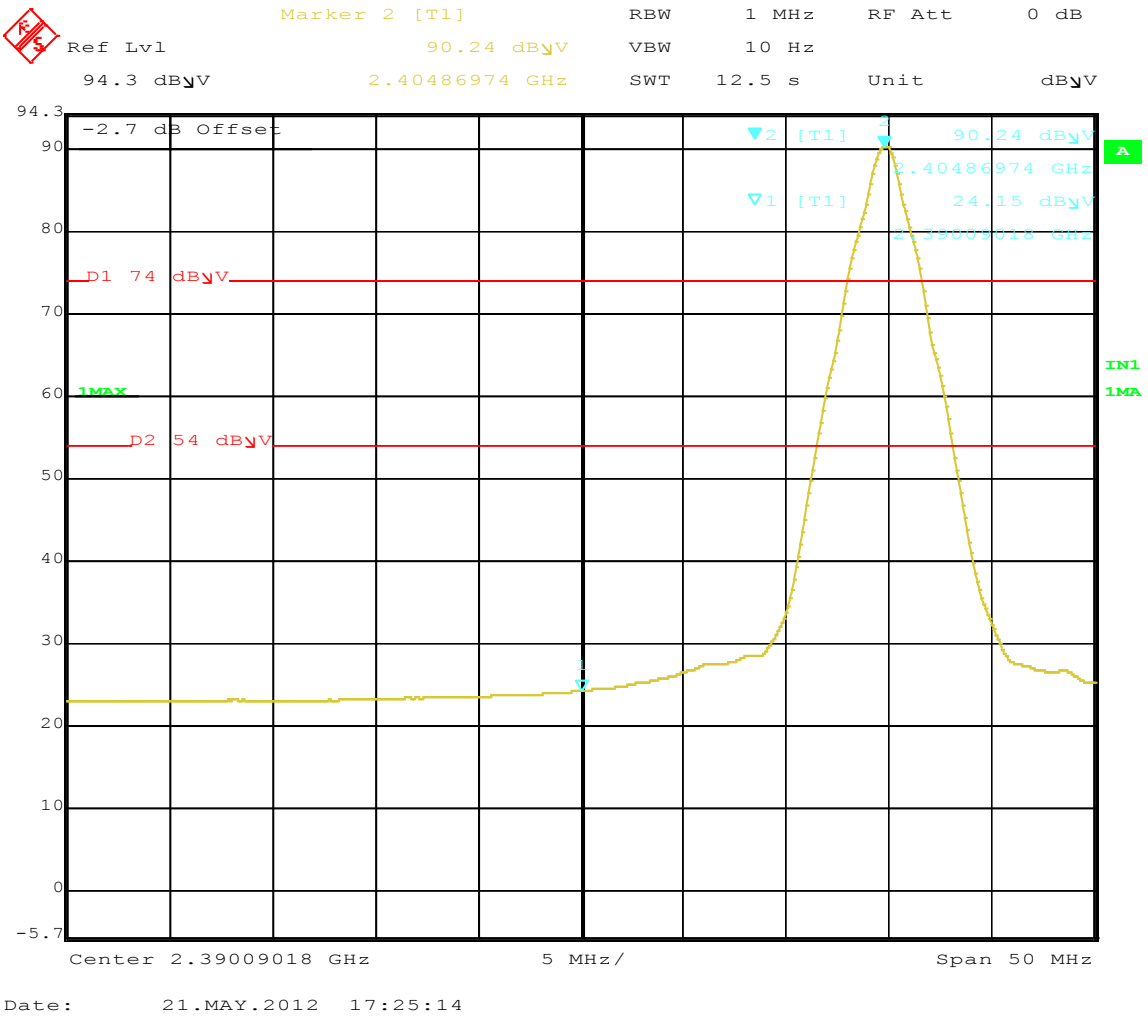


Figure 20: Radiated Emission at the Edge for Channel 2405MHz at 1Mbps – Horizontal (Avg)

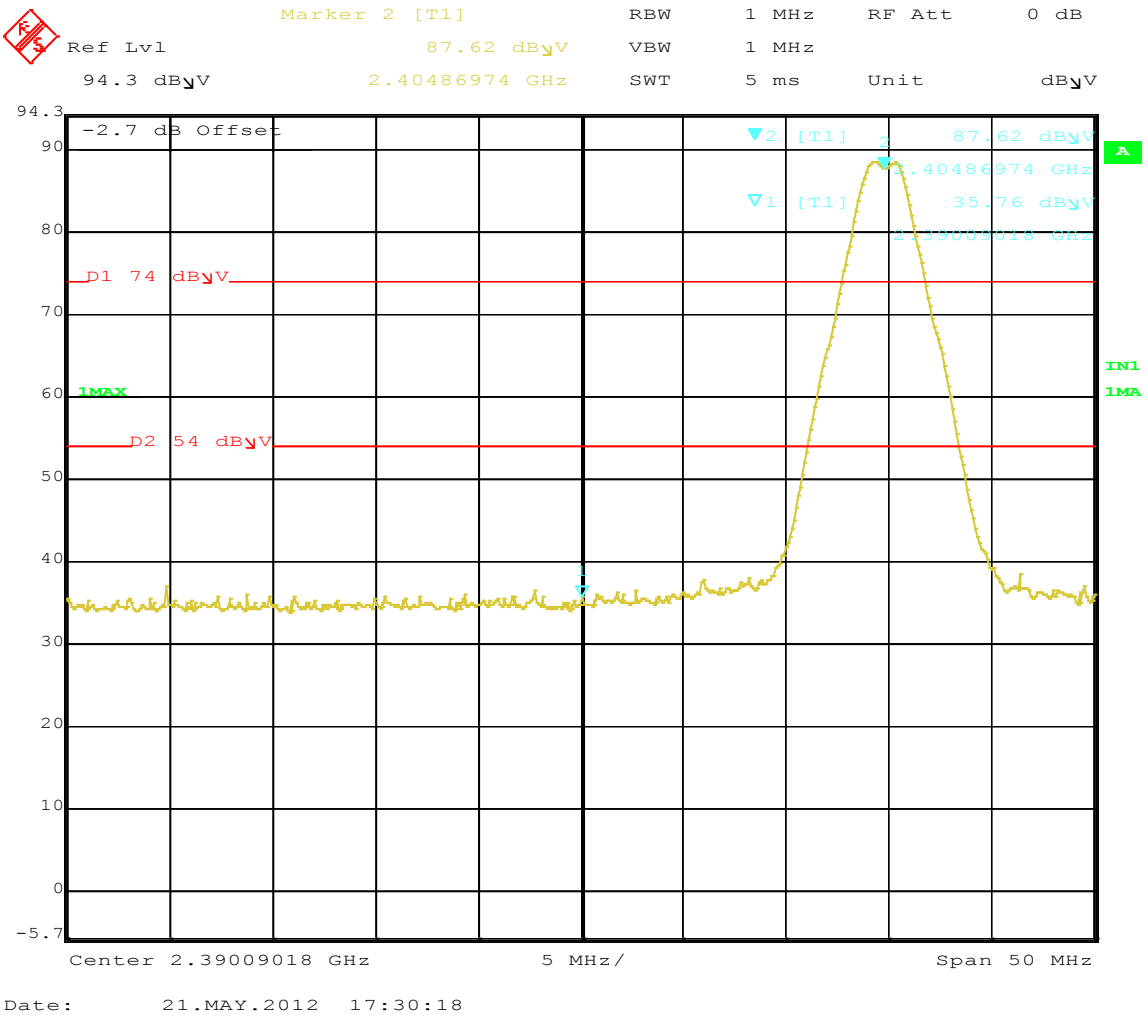


Figure 21: Radiated Emission at the Edge for Channel 2405MHz at 1Mbps – Vertical (Pk)

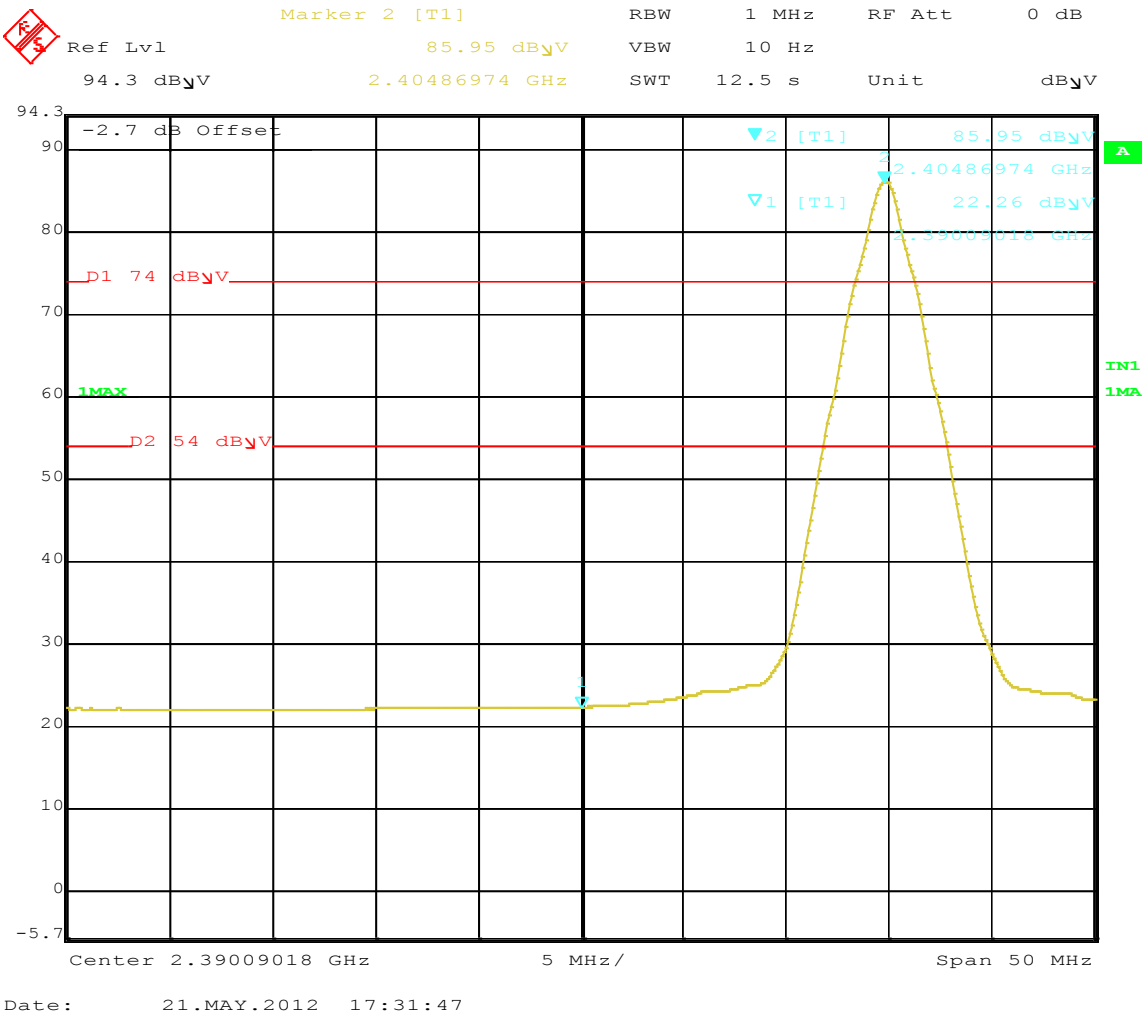


Figure 22: Radiated Emission at the Edge for Channel 2405MHz at 1Mbps – Vertical (avg)

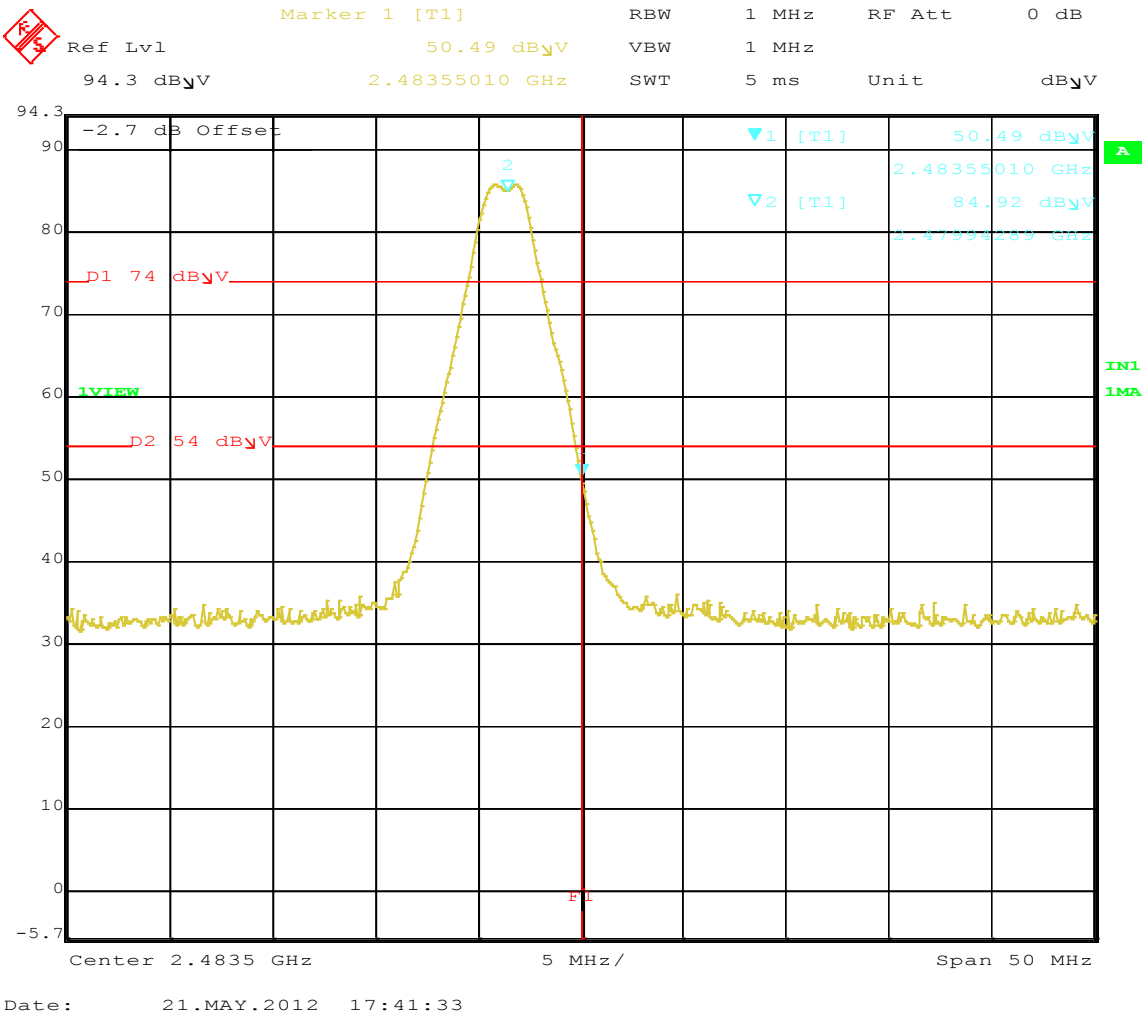


Figure 23: Radiated Emission at the Edge for Channel 2480MHz at 1Mbps – Horizontal (Pk)

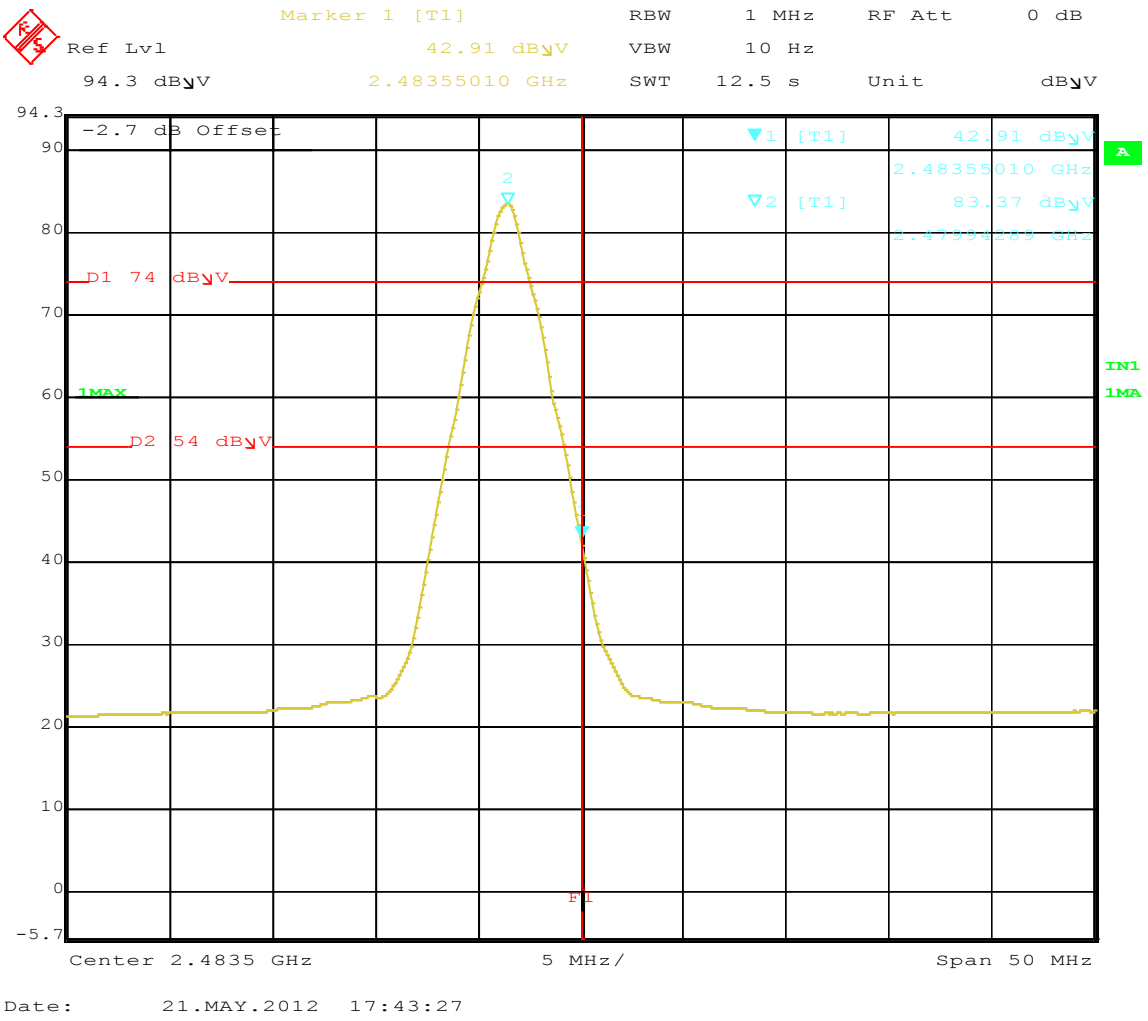


Figure 24: Radiated Emission at the Edge for Channel 2480MHz at 1Mbps – Horizontal (Avg)

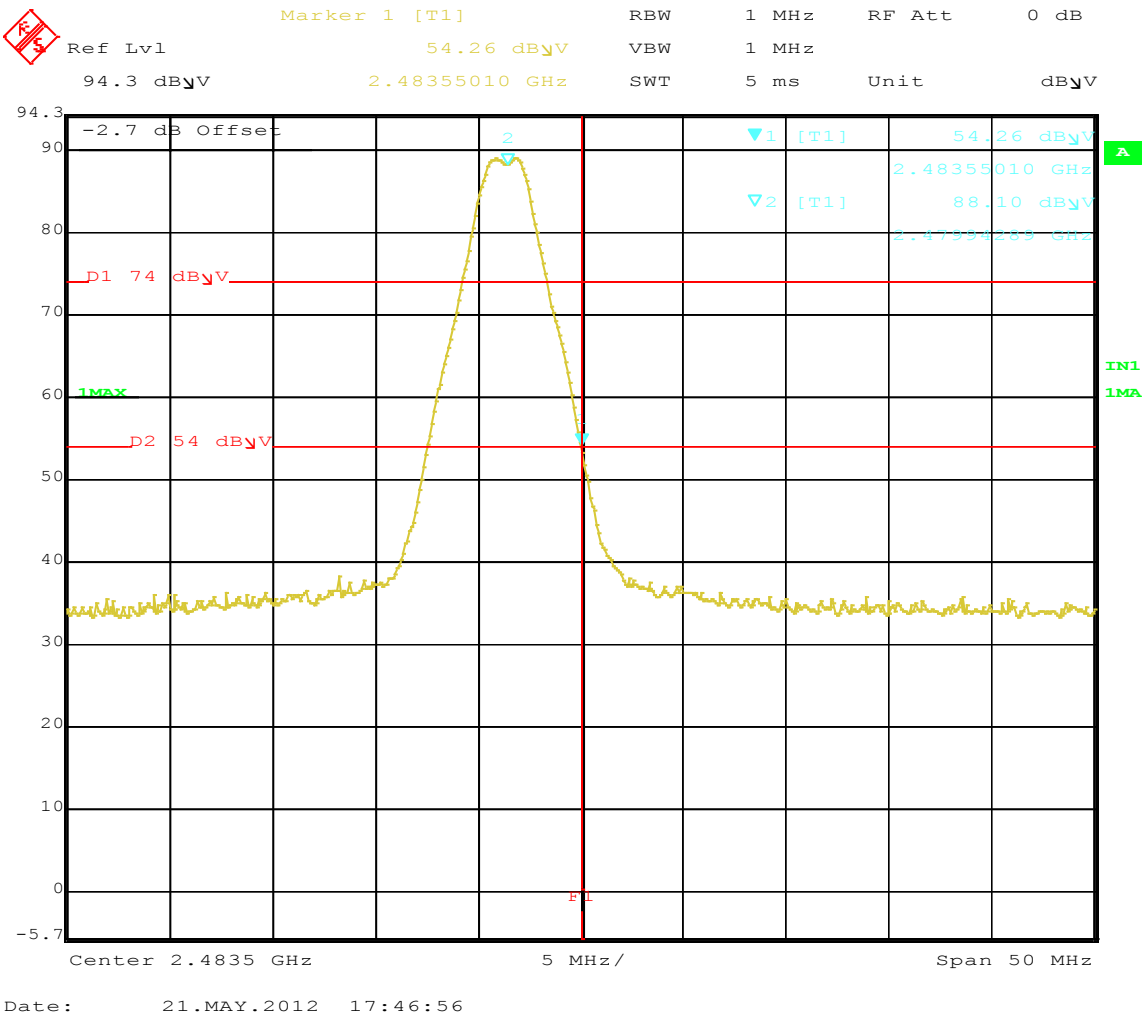


Figure 25: Radiated Emission at the Edge for Channel 2480MHz at 1Mbps – Vertical (Pk)

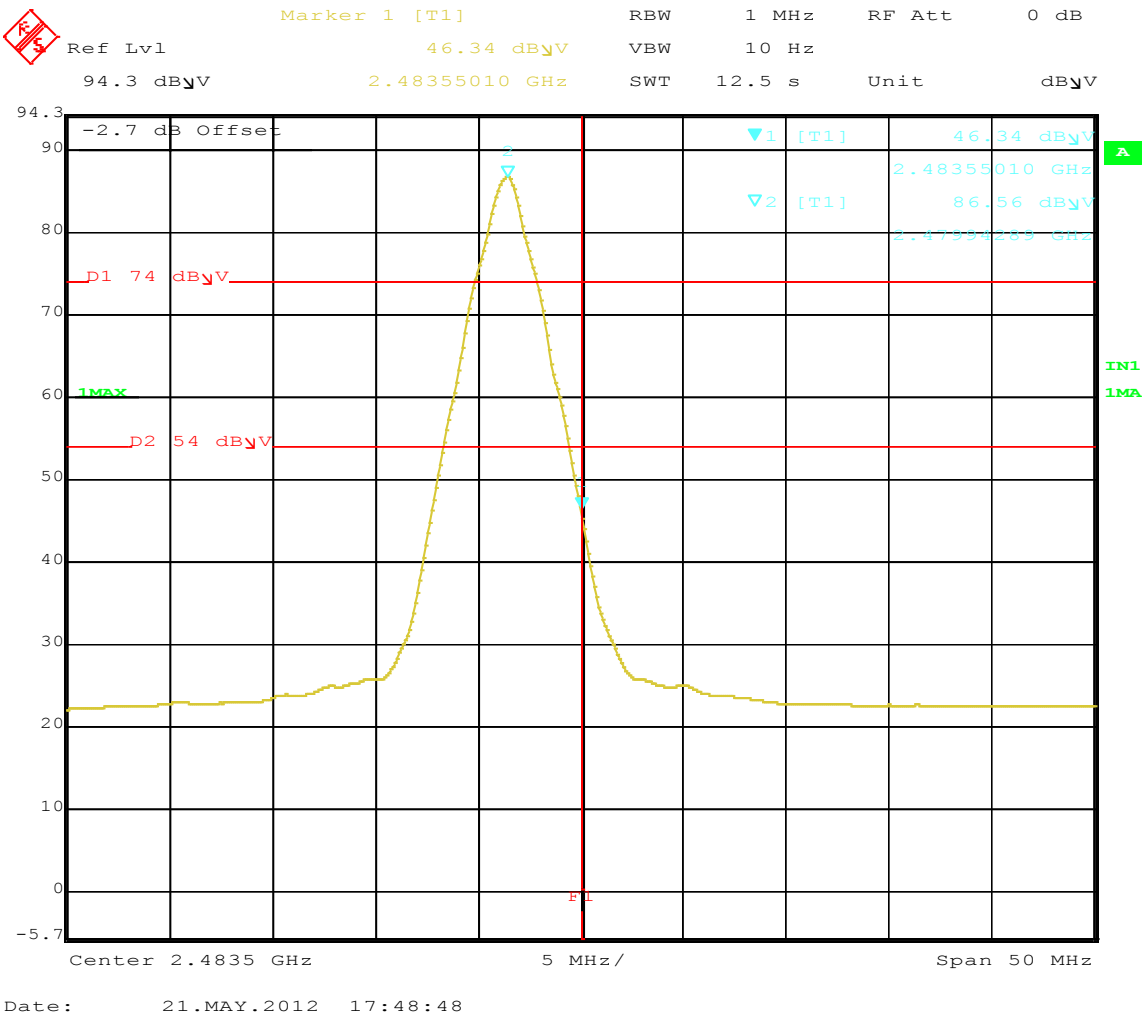


Figure 26: Radiated Emission at the Edge for Channel 2405MHz at 1Mbps – Vertical (Avg)

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EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Comfit.	Y-Axis	**Line AC / Freq**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Emission Freq MHz	E Field Pk dBuV	E-Field Ave dBuV	Spec Limit dBuV	Spec Margin dB	Table Pos deg	ANT Pos cm	ANT Pola	Type
Transmitted Data at 2405MHz								
4810.03	45.30	38.26	53.98	-15.72	28	128	H	Harmonic
4810.06	51.17	45.48	53.98	-8.50	343	124	V	Harmonic
7213.74	60.99	49.65	53.98	-4.33	442	129	V	Harmonic

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: Worst case was observed on Y-axis, 1Mbps. No duty cycle reduction was applied. Only worst case results are reported here.

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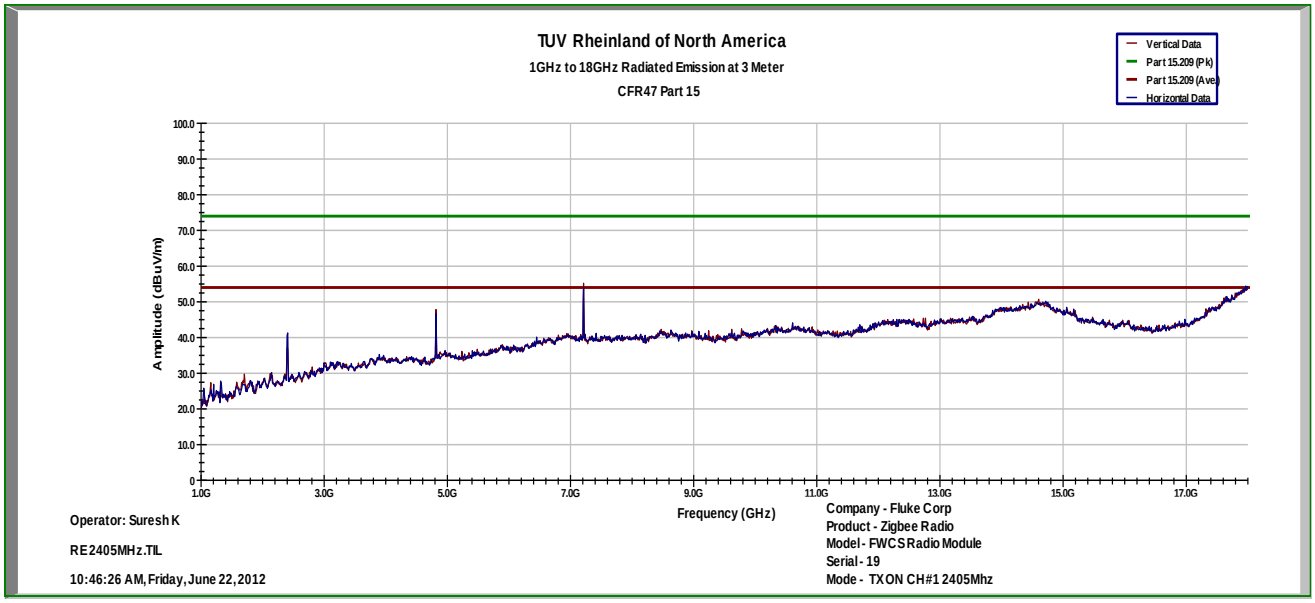
EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Config.	Y-Axis,	**Line AC**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1MHz / 3MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Above 1GHz Plots for Transmit Mode at 2405MHz, 1Mbit/s



Notes: All Emissions 18 to 26 Ghz were at least 20dB below the limt
1GHz – 25 GHz Setting: RBW = 1MHz/ VBW = 3MHz

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EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Comfit.	Y-Axis, at 1 Mbps	**Line AC / Freq**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Emission Freq MHz	E Field Pk dBuV	E-Field Ave dBuV	Spec Limit dBuV	Spec Margin dB	Table Pos deg	ANT Pos cm	ANT Pola	Type
Transmitted Data at 2430MHz								
1330.71	36.32	16.79	53.98	-37.19	95	100	V	Spurious
4859.67	51.09	46.47	53.98	-7.51	382	147	V	Harmonic
7290.66	53.50	42.91	53.98	-11.07	95	127	V	Harmonic
9786.84	46.06	31.88	53.98	-22.1	482	100	V	Harmonic

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: Worst case was observed on Y-axis, 1Mbps. No duty cycle reduction was applied. Only worst case results are reported here. All Emissions in 18 to 26 Ghz were at least 20dB below the limt.

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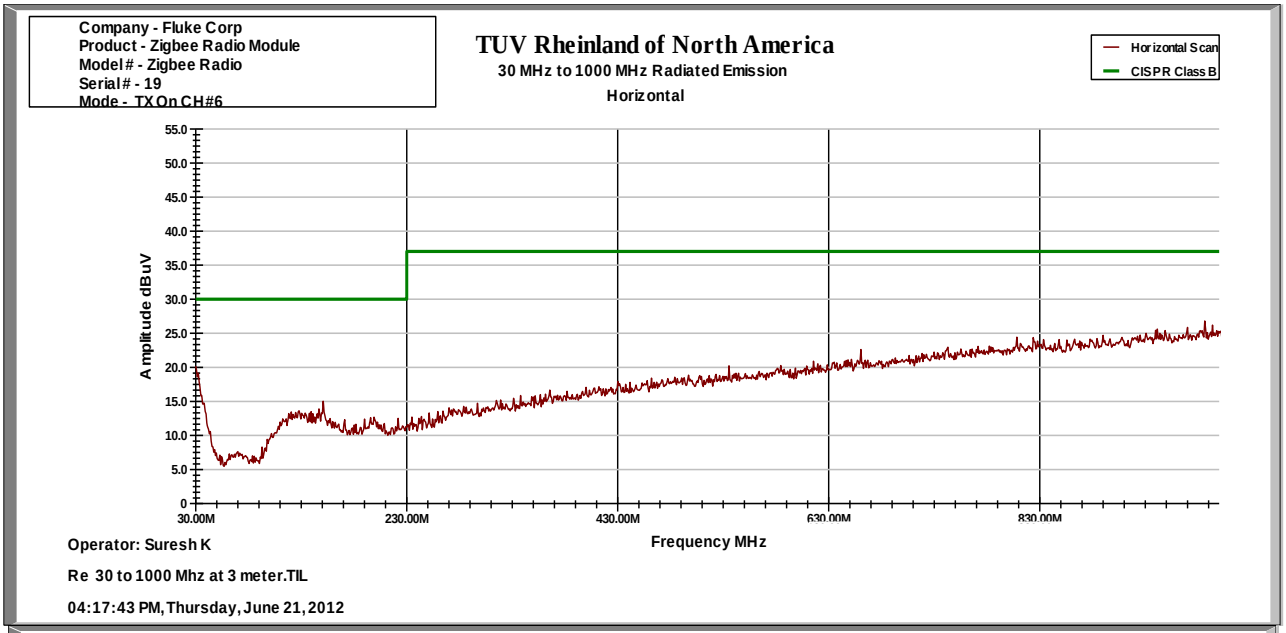
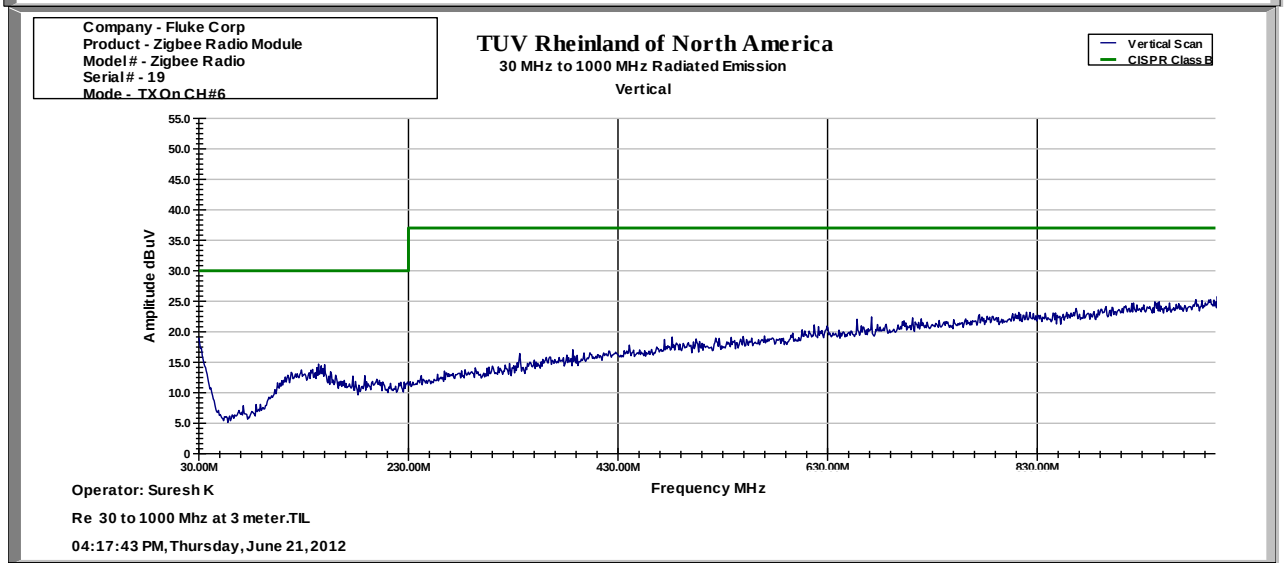
EUT Name	Radio Module	**Date**	June 22, 2011
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 1Mbps	**Line AC**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1MHz / 3MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Above 1GHz Plots for Transmit Mode at 2430MHz 1Mbit/s





All emissions were atleast 20 below limit for all channels 30 MHz to 1000MHz. OnlyCH#6 Results are here

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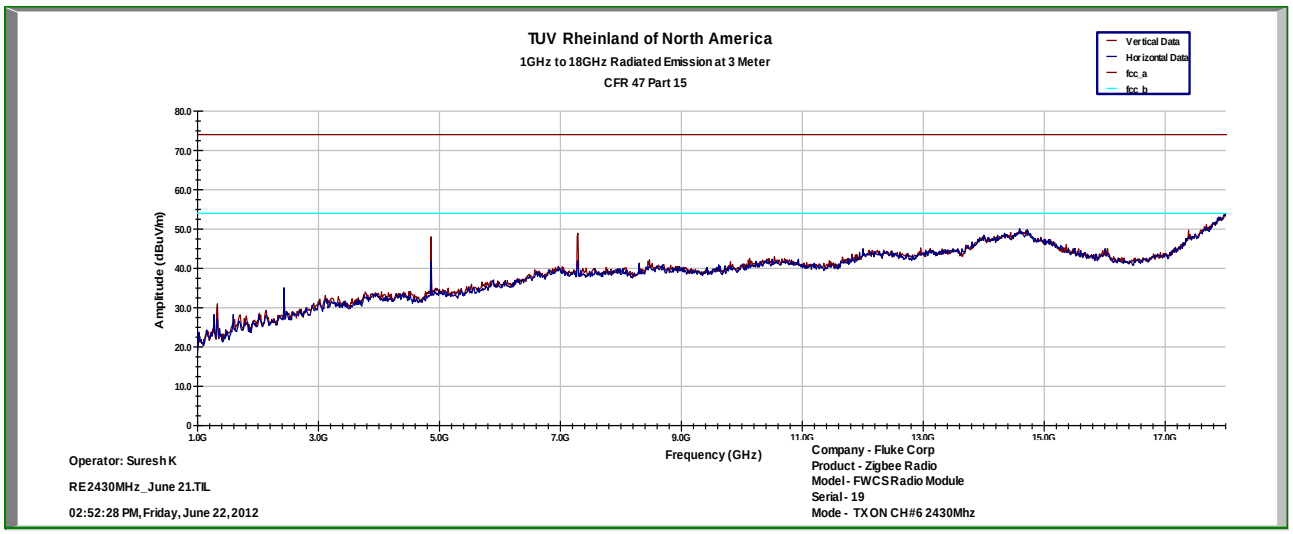
EUT Name	Radio Module	**Date**	June 22, 2011
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 1Mbps	**Line AC**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1MHz / 3MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Above 1GHz Plots for Transmit Mode at 2430MHz, 1Mbit/s



Notes: All Emissions 18 to 26 Ghz were at least 20dB below the limt
1GHz – 25 GHz Setting: RBW = 1MHz/ VBW = 3MHz

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EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Comfit.	Y-Axis, at 1Mbps	**Line AC / Freq**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Emission Freq MHz	E Field Pk dBuV	E-Field Ave dBuV	Spec Limit dBuV	Spec Margin dB	Table Pos deg	ANT Pos cm	ANT Pola	Type
Transmitted Data at 2480MHz								
4959.61	52.54	48.07	53.98	-5.91	23	102	V	Harmonic
4960.06	46.99	40.23	53.98	-13.75	23	97	H	Harmonic
7440.57	56.55	46.01	53.98	-7.97	90	125	V	Harmonic
9921.23	43.85	31.82	53.98	-22.16	336	100	V	Harmonic

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: Worst case was observed on Y-axis, 1Mbps. No duty cycle reduction was applied. Only worst case results are reported here.

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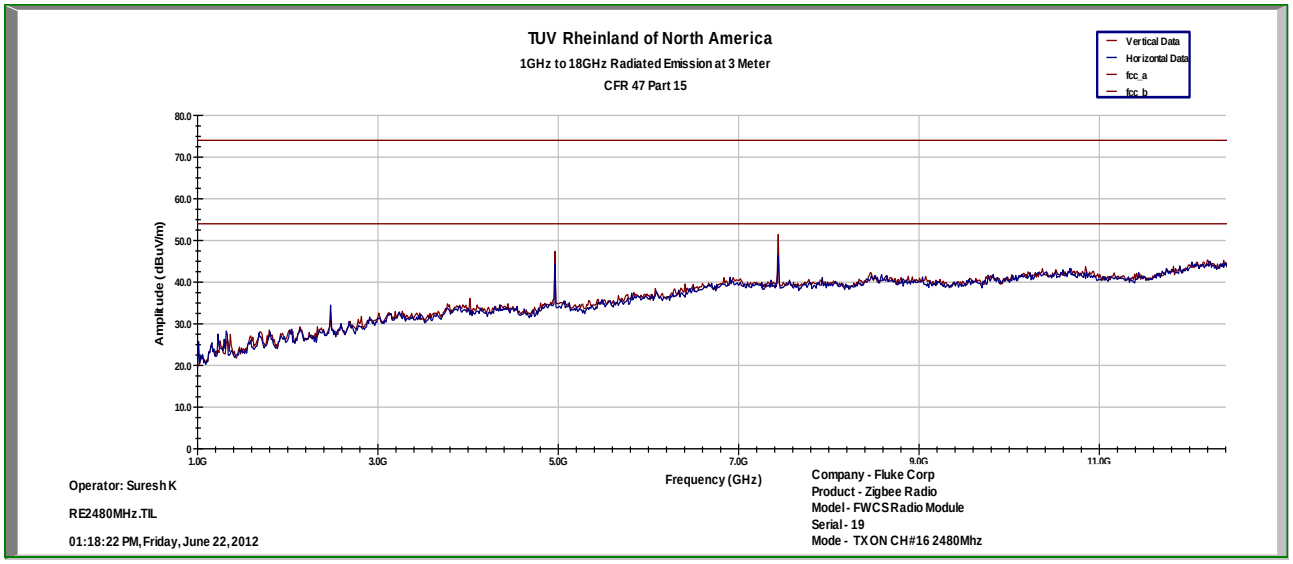
EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	23°C / 40%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 1Mbps	**Line AC**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1MHz / 3MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Above 1GHz Plots for Transmit Mode at 2480MHz, 1Mbit/s



Notes: All Emissions 18 to 26 Ghz were at least 20dB below the limt
1GHz – 25 GHz Setting: RBW = 1MHz/ VBW = 3MHz

4.5.4 Sample Calculation

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = FIM - AMP + CBL + ACF

Where: FIM = Field Intensity Meter (dBμV)
AMP = Amplifier Gain (dB)
CBL = Cable Loss (dB)
ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

4.6 Receiver Spurious Emissions

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

The spurious emissions of the receiver shall not exceed the values in CFR47 Part 15.109 and RSS GEN Sect 6.1.

4.6.1 Test Methodology

4.6.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

4.6.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

4.6.1.3 Deviations

None.

4.6.2 Receiver Spurious Emission Limit

The spurious emissions of the receiver shall not exceed the values in CFR47 Part 15.109: 2011 and RSS GEN Sect 6.1 2010.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

4.6.3 Test Results

The final measurement data indicates the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

4.6.3.1 Final Data

The data recorded in this section contains the final results under the worst-case conditions and without any modifications or special accessories implemented as the manufacturer intends.

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EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	23°C / 39%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Comfit.	Y-Axis, Receive Mode	**Line AC / Freq**	9V DC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Suresh Kondapalli

Emission Freq MHz	E Field Pk dBuV	E-Field Ave dBuV	Spec Limit dBuV	Spec Margin dB	Table Pos deg	ANT Pos cm	ANT Pola	Type
Receive Mode								
1231.06	27.32	14.56	53.98	-39.42	123	167	V	Spurious
1278.72	30.38	15.34	53.98	-38.64	-22	167	V	Spurious
1350.03	32.6	14.20	53.98	-39.78	60	166	V	Spurious

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

All other emissions atleast 20db below the margin

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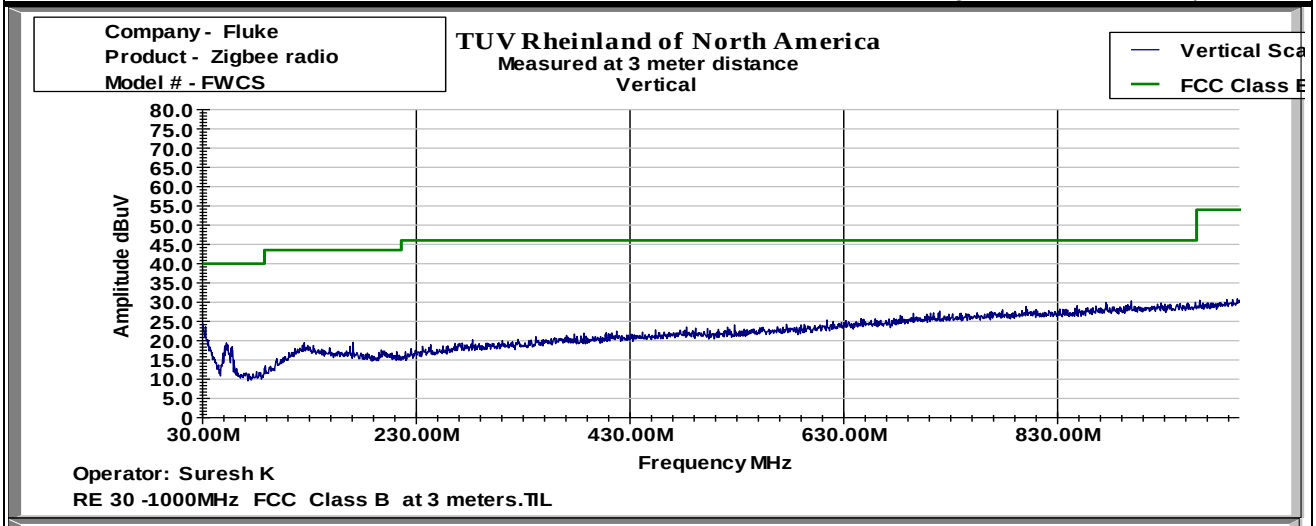
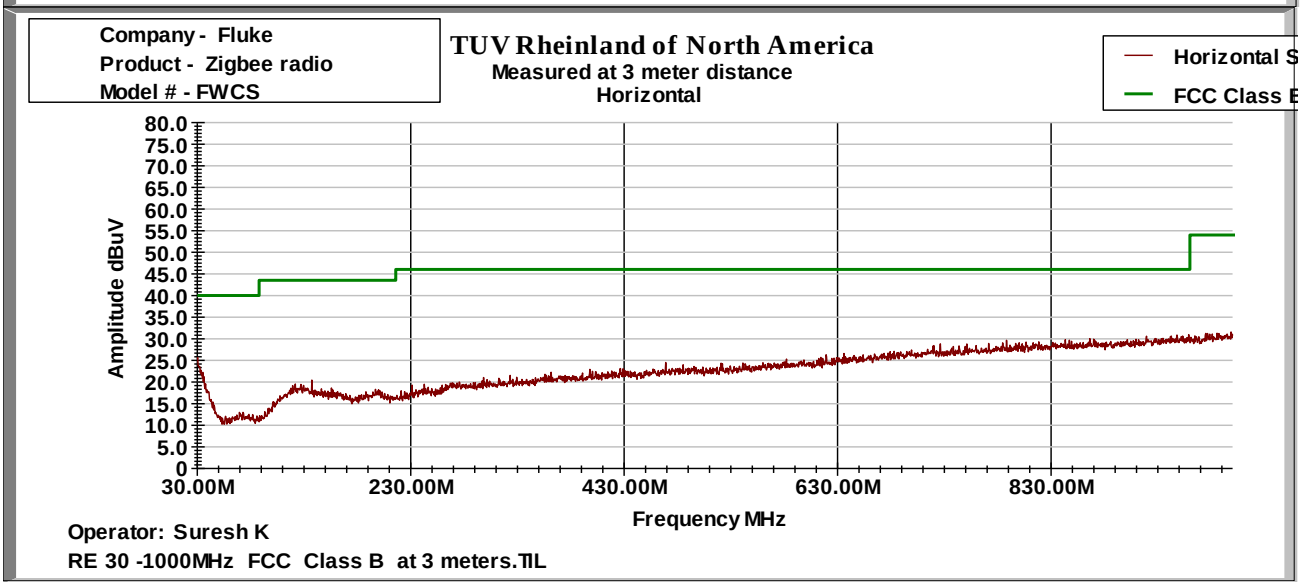
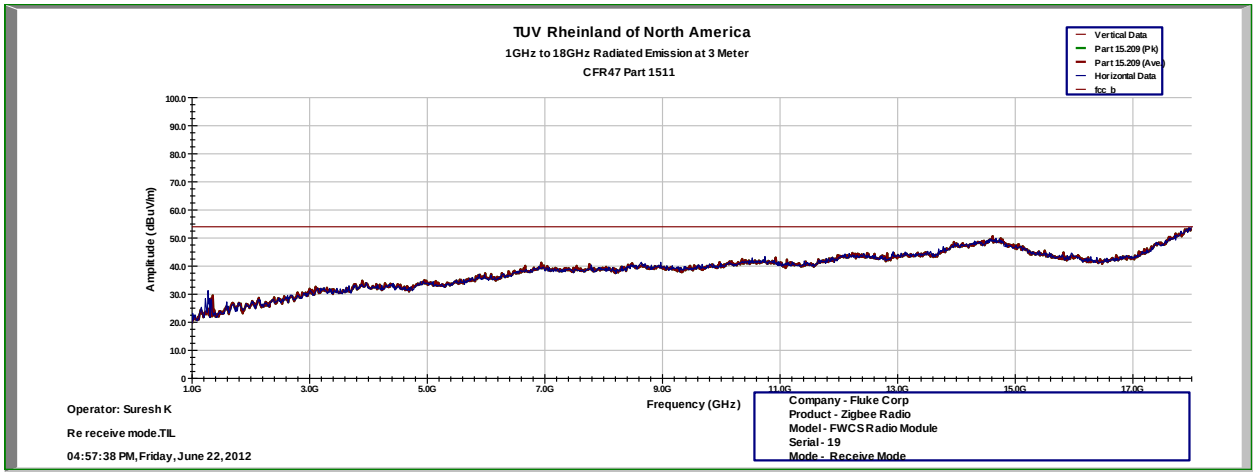
EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	22°C / 40%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, RX at Ch6	**Line AC / Freq**	9V DC
Standard	CFR47 Part 15.109, Class A	**RBW / VBW**	See Note
Dist/Ant Used	3m / JB3 & EMCO3115	**Performed by**	Suresh Kondapalli





SOP 1 Radiated Emissions		Tracking #	31261836.00 Page 3 of 3
EUT Name	Radio Module	**Date**	June 22, 2012
EUT Model	FWCS	**Temp / Hum in**	22°C / 40%rh
EUT Serial	19	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, RX at Ch6	**Line AC**	9V DC
Standard	CFR47 Part 15.109, Class A	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Suresh Kondapali

Above 1GHz Plot for Receive Mode



Notes: All emission above 18GHz are at least 20dB below the limit

4.6.4 Sample Calculation

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = FIM - AMP + CBL + ACF

Where: FIM = Field Intensity Meter (dBμV)
AMP = Amplifier Gain (dB)
CBL = Cable Loss (dB)
ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

4.7 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4-2009. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207: 2011 and RSS 210: 2010.

4.7.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50μH / 50Ω LISNs.

Testing is either performed inLab 5. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

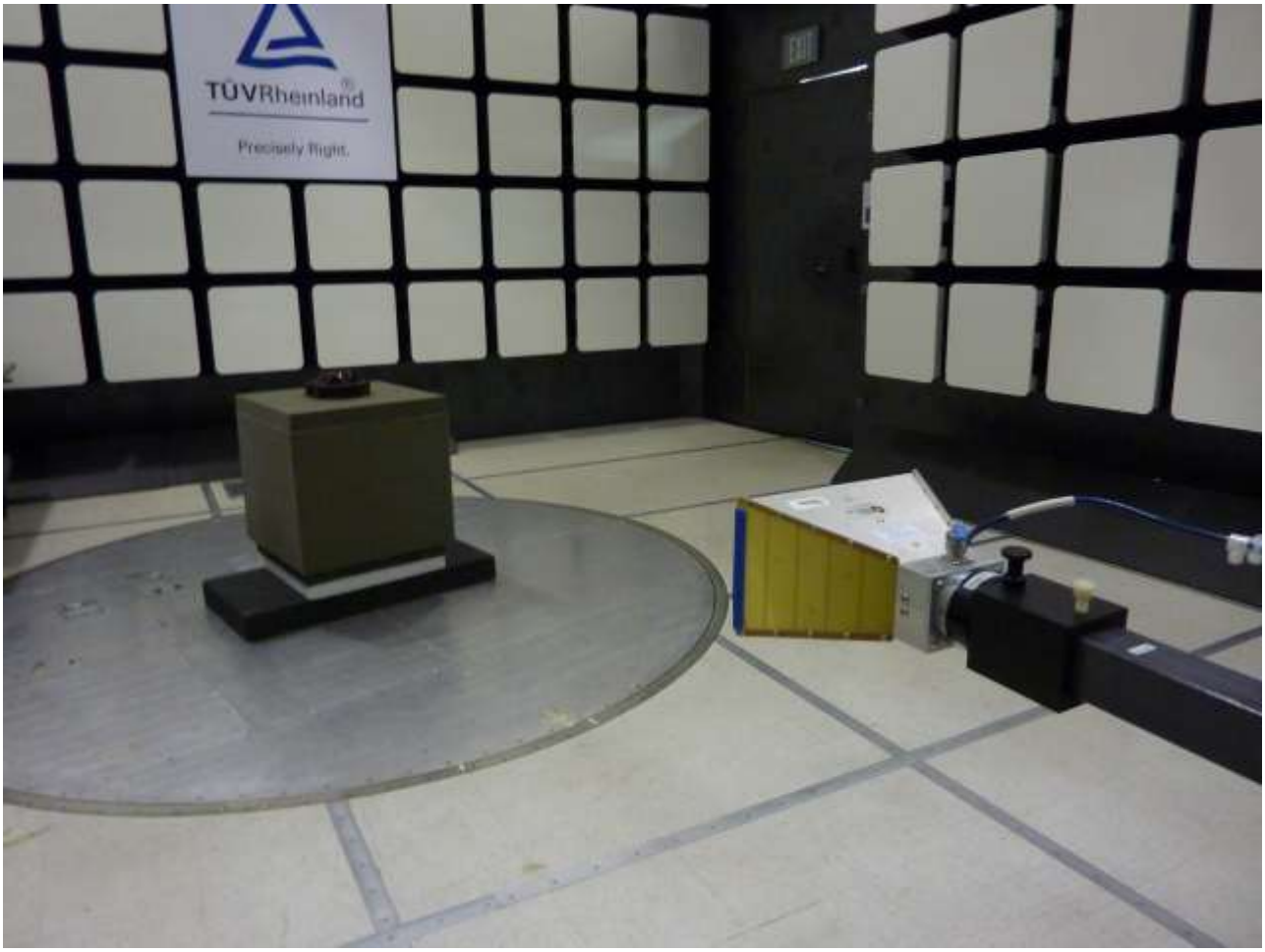
4.7.1.1 Deviations

There were no deviations from this test methodology.

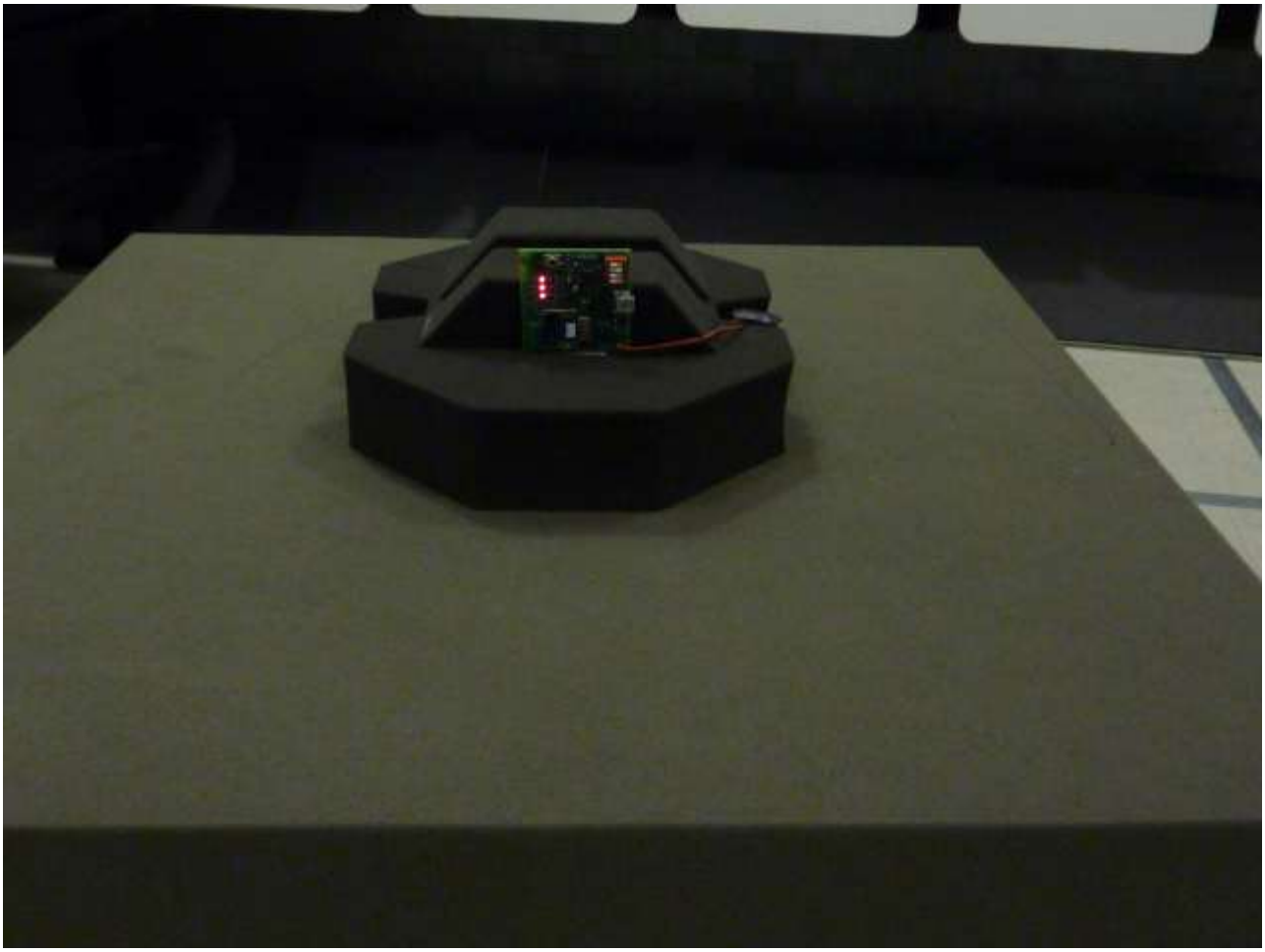
4.7.2 Test Results

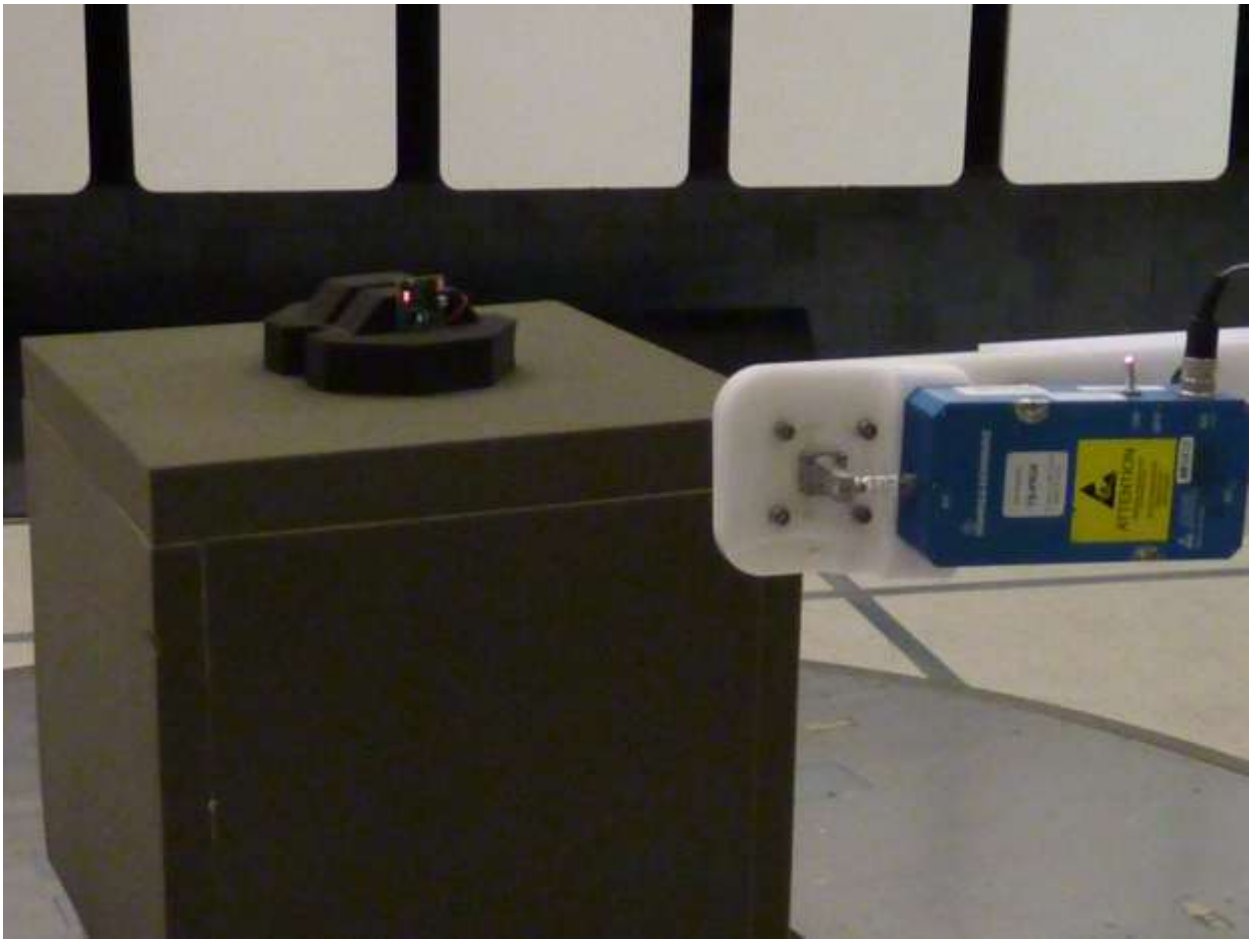
Test is Not applicable. EUT is powered from Host device and Host device is alkaline battery operated.

4.7.3 Test Setup Photos




TÜVRheinland




ATTENTION

5 Test Equipment Use List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal dd/mm/yy	Next Cal dd/mm/yy
Bilog Antenna	Sunol Science	JB3	A061907	5/15/2012	05/15/2014
Horn Antenna	Sunol Scienece	DRH-118	A040806	9/29/2010	9/29/2012
Antenna (18-26GHz)	CMT	RA42-K-F-4B-C	020131-004	1/17/2012	1/17/2013
EMI Receiver	Hewlett Packard	8546A	3807A00445	1/17/2012	1/17/2013
Preselector	Hewlett Packard	85460A	3704A00407	1/17/2012	1/17/2013
Amplifier	Hewlett Packard	8447D	2944A07996	1/16/2012	1/16/2013
Spectrum Analyzer	Rhode&Schwarz	ESIB	832427/002	1/17/2012	1/17/2013
Amplifier	Rhode&Schwarz	TS-PR18	3545.7008.03	9/29/2010	9/29/2012
Amplifier	Rhode&Schwarz	TS-PR26	100011	1/16/2012	1/16/2013
Signal Generator	Anritsu	MG3694A	42803	1/17/2012	1/17/2013
Notch Filter	Micro-Tronics	BRM50702	37	1/17/2012	1/17/2013
Notch Filter	Micro-Tronics	BRC50705	9	1/17/2012	1/17/2013
High Pass Filter (8.5 GHz)	Micro-Tronics	HPM50107	4	1/17/2012	1/17/2013
Digital Multimeter	Fluke	177	92780314	1/18/2012	1/18/2013
LISN	Com-Power	LI-215	24548	1/19/2012	1/19/2013
Signal Generator	Anritsu	MG3694A	42803	1/17/2012	1/17/2013
Spectrum Analyzer	Agilent	E4407B	SG43330468	10/05/2011	10/05/2012

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 8: Customer Information

Company Name	Fluke Corporation.
Address	6920 Seaway Blvd
City, State, Zip	Everett, WA 98203
Country	USA
Phone	425 446-5626
Fax	None

Table 9: Technical Contact Information

Name	Joseph E. Swanzy
E-mail	swanzy@fluke.com
Phone	425 446-5626
Fax	None

6.3 Equipment Under Test (EUT)

Table 10: EUT Specifications

EUT Specification	
Dimensions	25mm x 19mm x 2.5mm
Power	EUT is Battery Operated Input Voltage: 3.3V DC (9V DC at input of test jig) Input Current: 50mA
Environment	Portable
Operating Temperature Range:	-10 to +50 degrees C
Multiple Feeds:	☐ Yes and how many ☒ No
Hardware Version	None
Part Number	None
RF Software Version	None
Radio Module 802.15.4 -radio module	
Operating Mode	EUT Operates on 802.15.4 Zigbee protocol
Transmitter Frequency Band	2.400GHz to 2.4835 GHz
Max. Rated Power Output	See Channel Planning Table.
Power Setting @ Operating Channel	See Channel Planning Table.
Antenna Type	Internal Antenna 3.0dBi
Modulation Type	☐ AM ☐ FM ☒ DSSS ☐ OFDM ☒Other describe: OQPSK
Data Rate	250Kbps to 1Mbps EUT Operates on 802.15.4 Zigbee protocol
TX/RX Chain (s)	1
Directional Gain Type	☒ Uncorrelated ☒ No Beam-Forming ☐ Other describe:
Type of Equipment	☐ Table Top ☐Wall-mount ☐ Floor standing cabinet ☒Other *Portable*

Table 11: EUT Channel Power Specifications

No.	Frequency (MHz)	802.15.4 Radio Module
1	2405	4.5dBm
2	2430	4.5dBm
3	2480	4.5dBm
Note: 1. The power levels shown here are with 100% duty cycle. Duty cycle factor for a comparison with limits. 2. This report is only documented for frequency ranges, 2400-2483.5 MHz		

Table 12: Interface Specifications: None

Table 13: Supported Equipment : None

Table 14: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.247
Radio Module	19	Internal antenna	TX Emission, RX Emission,
	20	SMA Connector (This was setup by BW Technologies for test purposes only)	RF Power Output, Out of Band Emission, Peak Power Spectral Density, Occupied Bandwidth

Table 15: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Photo (X-Axis)	Setup Photo (Y-Axis)	Setup Photo (Z-Axis)
Radio Module	Internal	* Transmit * Receive	 Flat on table	 EUT set on wall laying on longer side.	 EUT vertical
Note: Pre-scans were performed in 3 orthogonal axes and **Y-Axis was worst case.**					

Table 16: Final Test Mode for 2400 MHz to 2483.5 MHz Band

Test	802.15.4
Occupied Bandwidth	2405, 2430, 2480 MHz @ 1Mbps
Output Power	2405, 2430, 2480 MHz @ 1Mbps
Peak Power Spectral Density	2405, 2430, 2480 MHz @ 1Mbps
Out-of-Band (-20 dBr)	2405, 2430, 2480 MHz @ 11Mbps
Band-Edge (Radiated)	2405, 2430, 2480 MHz @ 1Mbps
Transmitted Spurious Emission	2405, 2430, 2480 MHz @ 1Mbps
Received Spurious Emission	2430 MHz
AC Conducted Emission	Test Not Applicable

6.4 Test Specifications

Testing requirements

Table 17: Test Specifications

Emissions and Immunity	
Standard	Requirement
CFR 47 Part 15.247: 2011	All
RSS 210 Issue 8, 2010	All

7 Revision History

Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	08/22/2012	Original Document	SK
1	09/06/2012	Revised to add revision history, changed protocol 8011.b to 802.15.4 (Zigbee) protocol	SK

Note: Latest revision report will replace all previous reports.

END OF REPORT