Electromagnetic Compatibility Test Report

Tests Performed on a Dwyer

HART Transmitter Transciever, Model MH01

Radiometrics Document RP-7987

ACCREDITED
TESTING CERT #1495.01

Product Detail:

FCC ID: Z7KMRKW0515
IC: 9525A-MRKW0515
Equipment type: 2.4 GHz transmitter

Test Standards:

US CFR Title 47, Chapter I, FCC Part 15 Subpart C
FCC Part 15 CFR Title 47: 2014
Industry Canada RSS-247, Issue 1: 2015 as required for Category I Equipment

This report concerns: Original Grant for Certification
FCC Part 15.247

Tests Performed For:	*Test Facility:*
Dwyer Instruments, Inc. 102 Indiana Hwy. 212 Michigan City, IN 46360	**Radiometrics Midwest Corporation** 12 Devonwood Avenue Romeoville, IL 60446-1349 (815) 293-0772

Test Date(s): (Month-Day-Year)

Dec 22, 2014 to January 8, 2015

Document RP-7987 Revisions:

Rev.	Issue Date	Affected Sections	Revised By
0	October 5, 2015		
1	October 7, 2015	Cover, 2, 5, & 10.4	Joseph Strzelecki
2	October 20, 2015	Cover, 10.2, 10.9	Joseph Strzelecki
3	November 13, 2015	2, 10.9	Joseph Strzelecki

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1 ADMINISTRATIVE DATA

Equipment Under Test:	
A Dwyer, HART Transmitter Model: MH01 Serial Number: None This will be referred to as the EUT in this Report	
Date EUT Received at Radiometrics: (Month-Day-Year) Dec 22, 2014	*Test Date(s): (Month-Day-Year)* Dec 22, 2014 to January 8, 2015
Test Report Written By: Joseph Strzelecki Senior EMC Engineer	*Test Witnessed By:* Neal Syverson Dwyer
Radiometrics' Personnel Responsible for Test: Joseph Strzelecki 11/13/2015 Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	*Test Report Approved By* Chris W. Carlson Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a HART Transmitter, Model MH01, manufactured by Dwyer. The detailed test results are presented in a separate section. The following is a summary of the test results.

Spread Spectrum Transmitter Requirements

Environmental Phenomena	Frequency Range	FCC Section	RSS- Section	Test Result
RF AC Mains Conducted Emissions	0.15 - 30 MHz	15.207	GEN; 7.2.2	Pass
6 dB Bandwidth Test	2400 to 2483 MHz	15.247 a	247; 5.2 (1)	Pass
20 dB Bandwidth Test	2400 to 2483 MHz	15.247 a	GEN; 4.6.3	Pass
Peak Output Power	2400 to 2483 MHz	15.247 b	247; 5.4 (4)	Pass
Band-edge Compliance of RF Conducted Emissions	2400 to 2483 MHz	15.247 d	247; 5.5	Pass
Spurious Radiated Emissions	30 MHz to 25 GHz	15.247 d	247; 5.5	Pass
Power Spectral Density	2400 to 2483 MHz	15.247 e	247; 5.2 (2)	Pass

Note: The RSS-247 specification is not currently covered in Radiometrics' Scope of Accreditation. This is technically very similar to FCC, CFR 47 Part 15 which is on Radiometrics' scope.

2.1 RF Exposure Compliance Requirements

Since the power output is less than10 mW, the EUT meets the FCC requirement for RF exposure and it is exempt from RSS-102 SAR and RF exposure evaluations. There are no power level adjustments available to the end user. The detailed calculations for RF Exposure are presented in a separate document.

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a HART Transmitter, Model MH01, manufactured by Dwyer. The EUT was in good working condition during the tests, with no known defects.

3.1.1 FCC Section 15.203 & RSS-GEN Issue 4 Antenna Requirements

The EUT is professionally installed. It is not marketed to the general public for residential use. The module will be installed in a proximity sensor that is used in commercial and industrial applications. Dwyer will only sell the module in these types of products. Dwyer will not be selling the module as a stand-alone product. Therefore, it meets the 15.203 Requirements. The antenna is a half-wave monopole.

3.2 Related Submittals

Dwyer is not submitting any other products simultaneously for equipment authorization related to the EUT.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations.

The EUT was tested as a stand-alone device. Power was supplied at 115 VAC, 60 Hz single-phase to its external power supply.

The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	HART Transmitter	E	Dwyer	MH01	None

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

List of System Cables

QTY	Length (m)	Cable Description	Shielded?
1	1.8	DC Cord from power supply to module	No

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2015	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2009	2009	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2009	2009	American National Standard for Testing Unlicensed Wireless Devices
IC RSS-247 Issue 1	2015	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
IC RSS-Gen Issue 4	2014	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)

The test procedures used are in accordance with the Industry Canada RSS-GEN Issue 4 and ANSI document C63.10. Radiated testing was performed at an antenna to EUT distance of 3 meters.

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber. The floor has a 9' x 9' section of microwave absorber for testing above 1 GHz.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC 8727A-1.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification and the data contained herein was taken with calibrated test equipment. The results relate only to the EUT listed herein.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	07/01/14
AMP-20	Avantek	Pre-amplifier	SF8-0652	15221	8-18GHz	12 Mo	01/17/14
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	01/15/14
AMP-29	HP / Agilent	Amplifier	11975A	2304A00158	2-8 GHz	12 Mo.	01/09/15
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	12/01/14
ANT-44	ARA	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	12/10/13
ANT-48	RMC	Std Gain Horn	HW2020	1001	18-26 GHz	24 Mo.	08/08/13
ANT-53	EMCO	Loop Antenna	6507	1453	1 kHz-30 MHz	24 Mo	12/02/13
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	01/24/14
LSN-01	Electrometrics	50 uH LISN	FCC/VDE 50/2	1001	0.01-30MHz	24 Mo.	06/21/13
MXR-02	HP / Agilent	Harmonic Mixer	11970K	2332A00489	18-26.5GHz	12 Mo.	12/19/14
REC-08	HP / Agilent	Spectrum Analyzer	8566B	2648A13481 2209A01436	30Hz-22GHz	24 Mo.	11/21/13
REC-10	HP / Agilent	EMI Receiver	8546A	3842A00521 3704A00484	30Hz-6GHz	24 Mo.	01/13/14
REC-11	HP / Agilent	Spectrum Analyzer	E7405A	US39110103	9Hz-26.5GHz	12 Mo	06/17/14
REC-12	Agilent	Spectrum Analyzer	AT/N9030A-550;C	MY53310115	3Hz-50 GHz	12 Mo.	03/25/14
THM-02	Fluke	Temp/Humid Meter	971	93490471	N/A	24 Mo.	06/27/13

Note: All calibrated equipment is subject to periodic checks.

10 TEST SECTIONS

10.1 AC Conducted Emissions

The tests and limits are in accordance with FCC section 15.207 and RSS Gen Issue 4 section 7.2.2.

A computer-controlled analyzer was used to perform the conducted emissions measurements. The frequency range was divided into 500 subranges equally spaced on a logarithmic scale. The computer recorded the peak of each subrange. This data was then plotted on a semi-log graph generated by the computer. Adjusting the positions of the cables and orientation of the test system then maximizes the highest emissions.

Mains Conducted emission measurements were performed using a 50 Ohm/50 uH Line Impedance Stabilization Network (LISN) as the pick-up device. Measurements were repeated on both leads within the power cord. If the EUT power cord exceeded 80 cm in length, the excess length of the power cord was made into a 30 to 40 cm bundle near the center of the cord. The LISN was placed on the floor at the base of the test platform and electrically bonded to the ground plane.

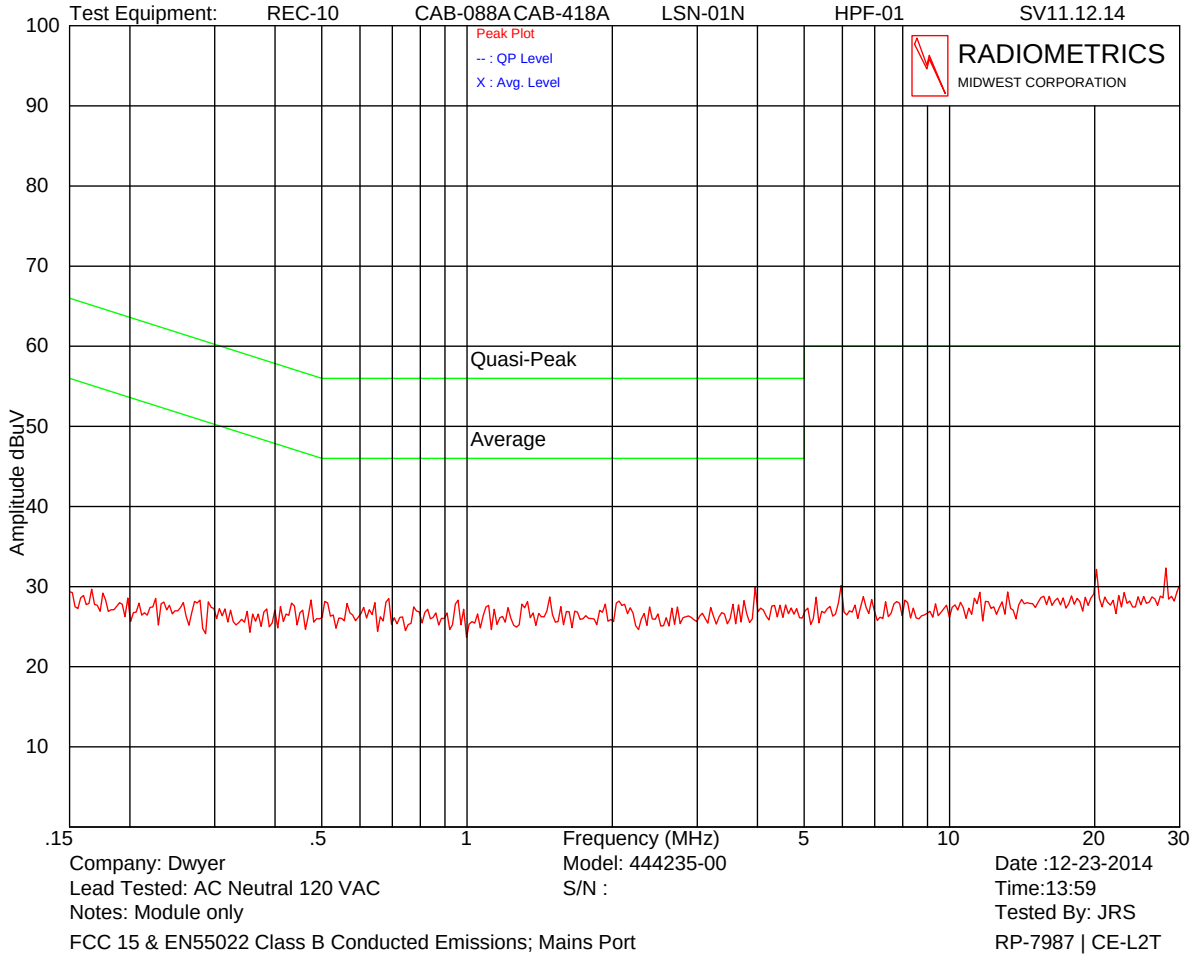
FCC Limits of Conducted Emissions at the AC Mains Ports

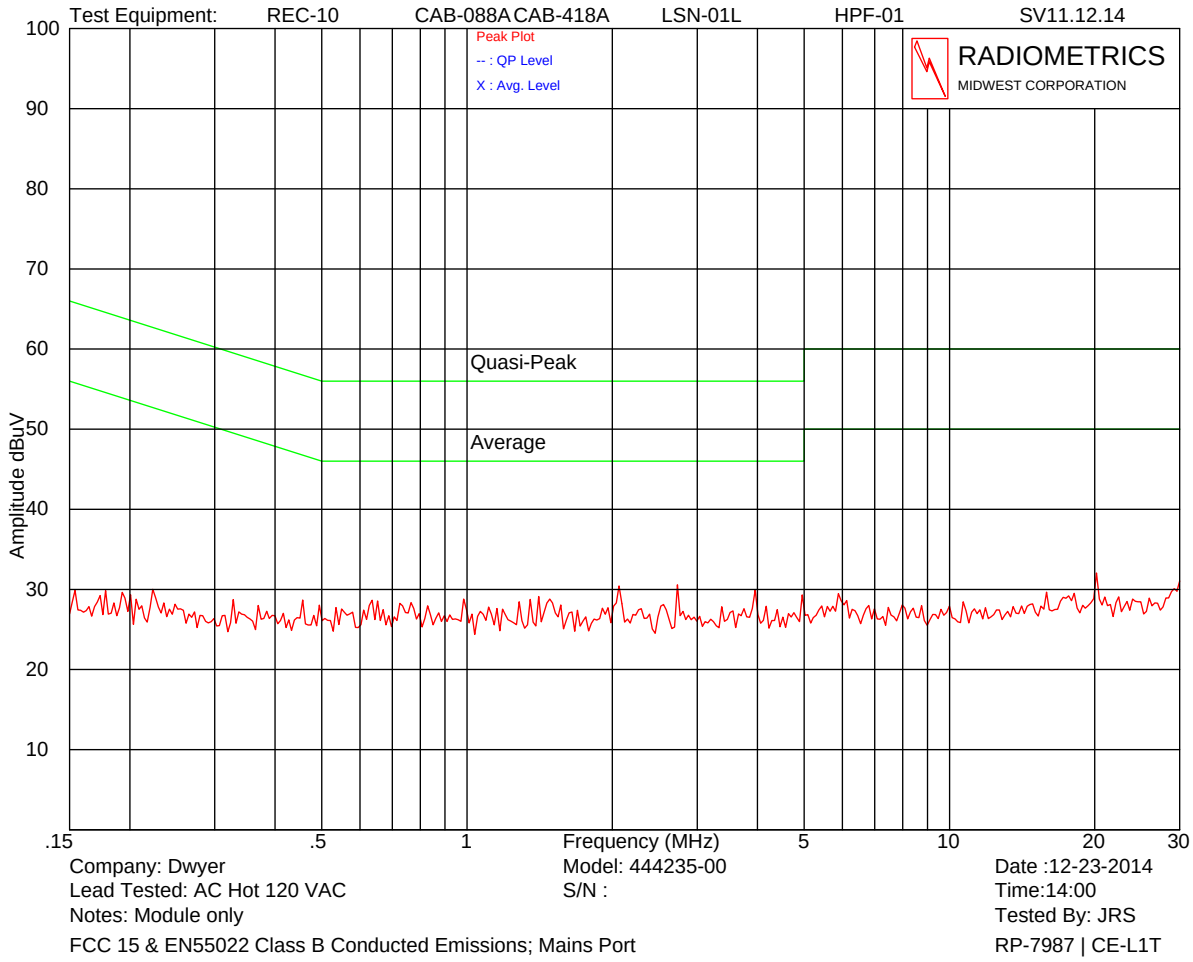
Frequency Range (MHz)	Class B Limits (dBuV)	
	Quasi-Peak	Average
0.150 - 0.50*	66 - 56	56 - 46
0.5 – 5.0	56	46
5.0 - 30	60	50
* The limit decreases linearly with the logarithm of the frequency in this range.		

The initial step in collecting conducted data is a peak detector scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the power cord, after testing all modes of operation.

Testing of the Dwyer, Model MH01, HART Transmitter

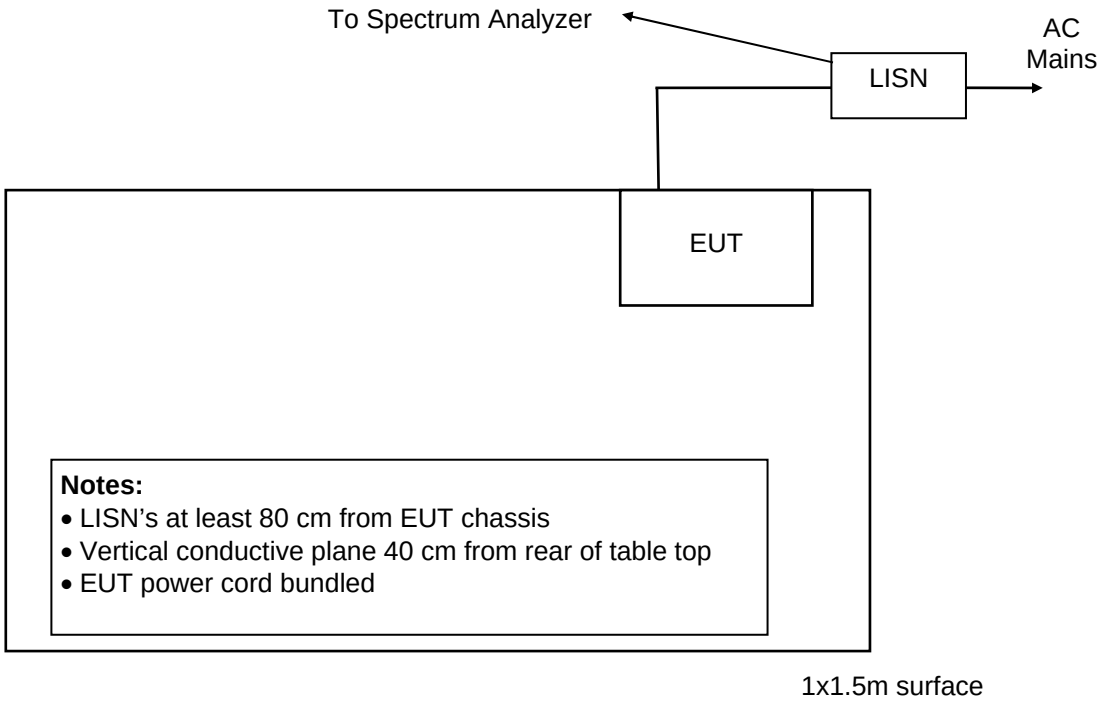
Test Date : Dec. 23, 2014
The Amplitude is the final corrected value with cable and LISN Loss.





Judgment: Passed by at least 10 dB

Figure 1. Conducted Emissions Test Setup

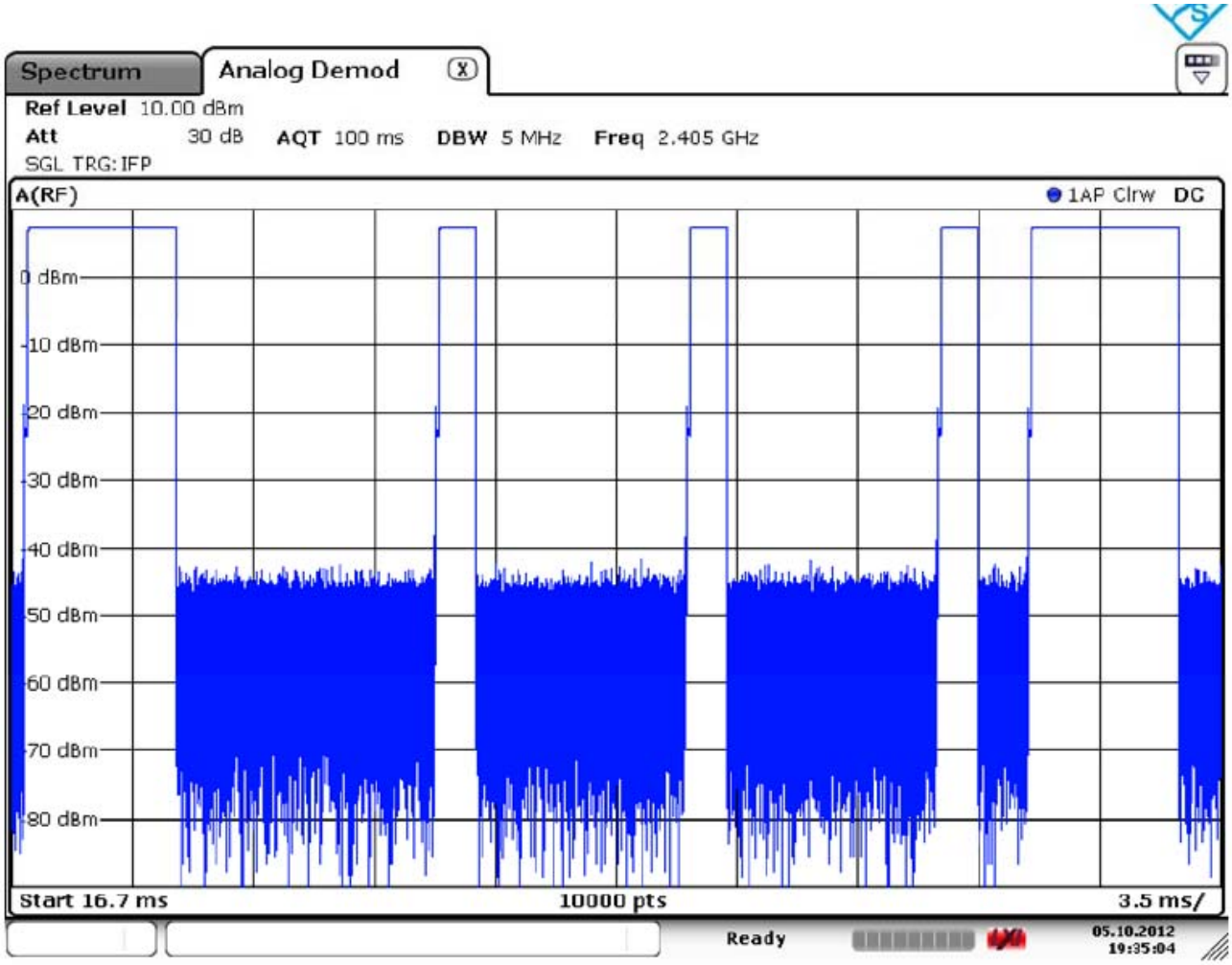


10.2 Duty Cycle

As required by FCC section 15.35 and RSS-GEN section 4.5, the Peak to Average correction factor was calculated. Please refer to the document "MH01 Duty Cycle Description" for the full description.

The maximum total on time for any 100 mSec time period is 27.24 mSec. The peak to average factor is 20*Log(42.8/100) = 11.3 dB

Figure 2. Duty Cycle Plot



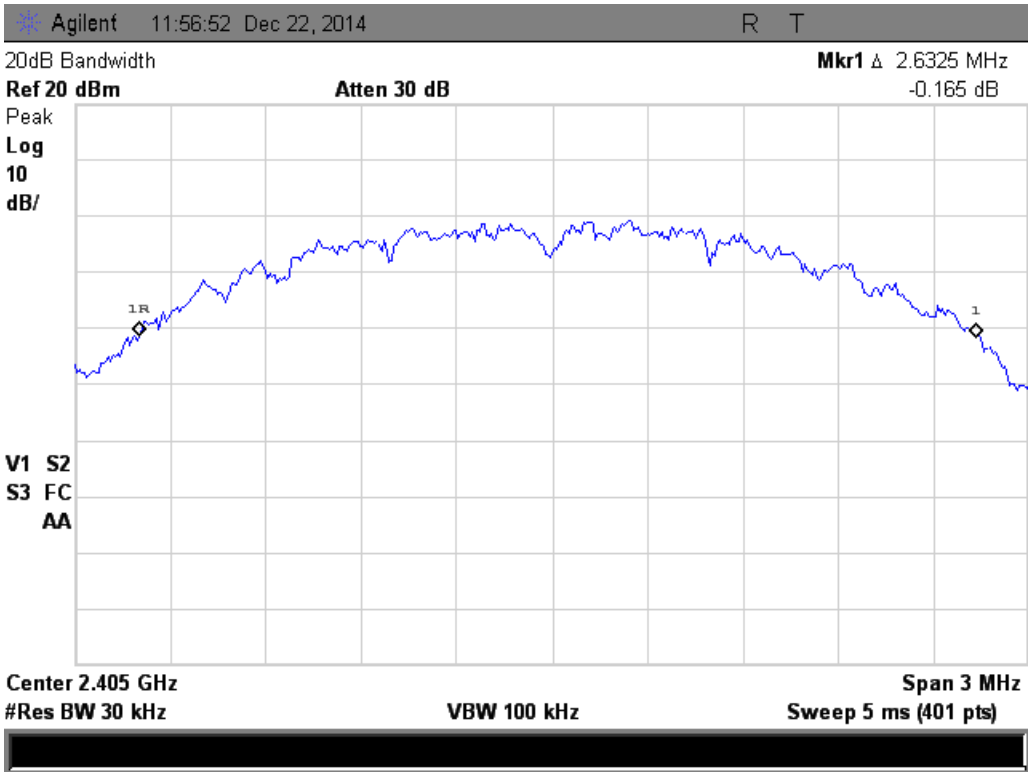
10.3 Occupied Bandwidth

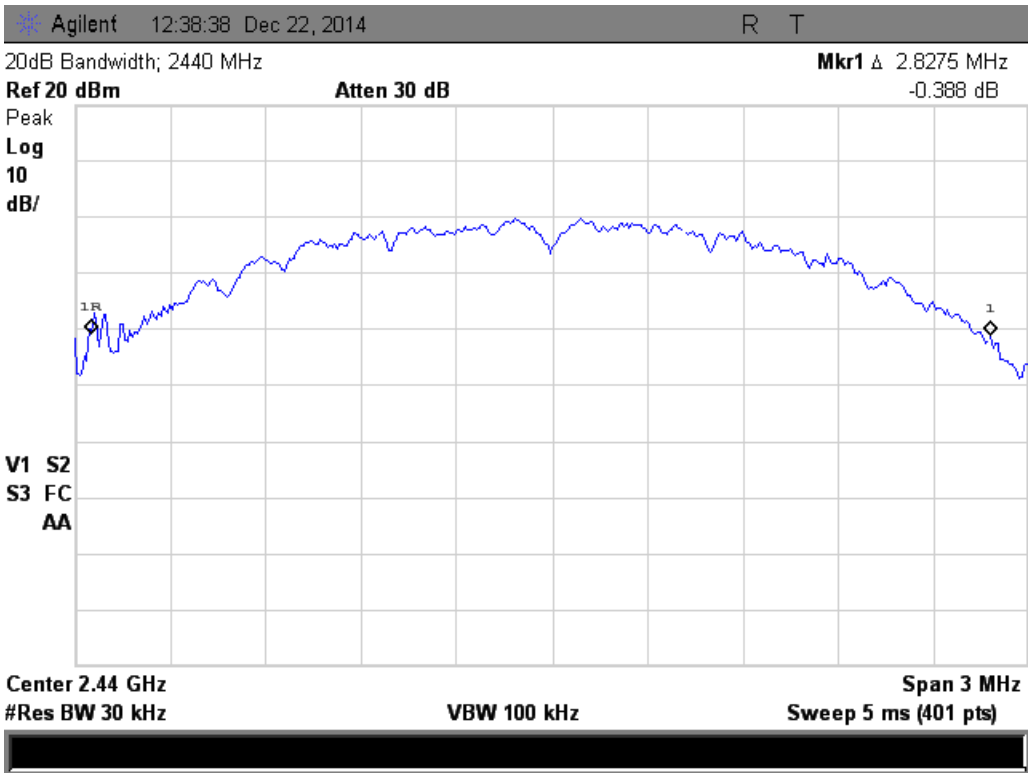
The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

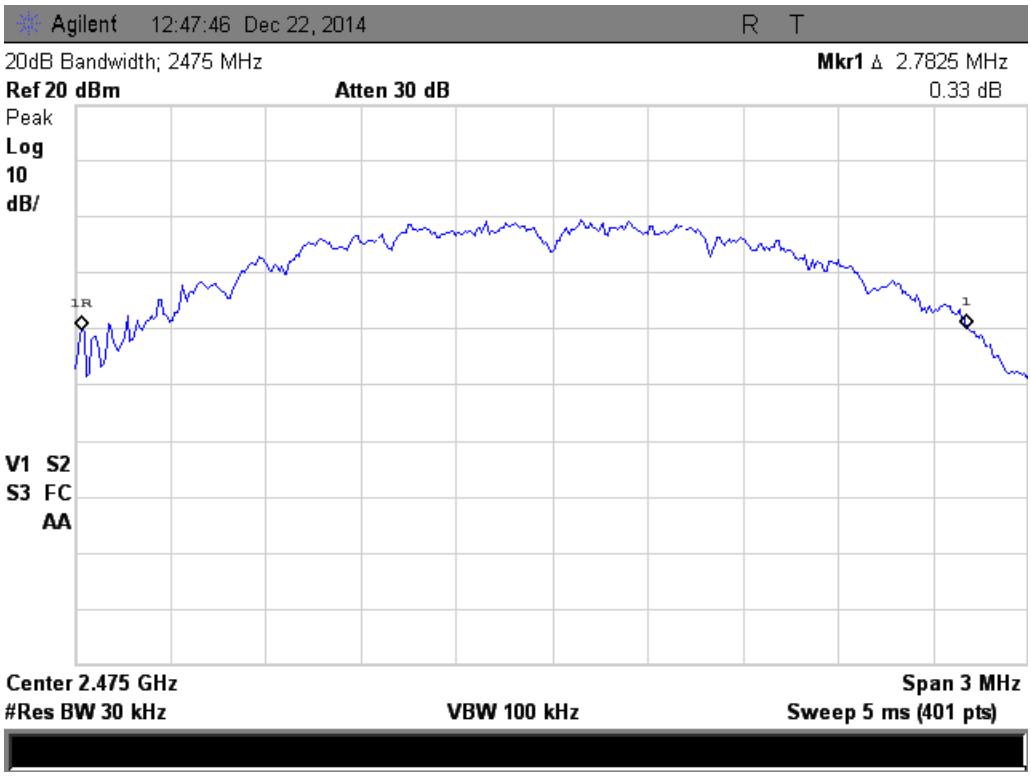
The marker-to-peak function was set to the peak of the emission. Then the marker-delta function was used to measure 6 or 20 dB down one side of the emission. The marker-delta function was reset and then moved to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the bandwidth of the emission.

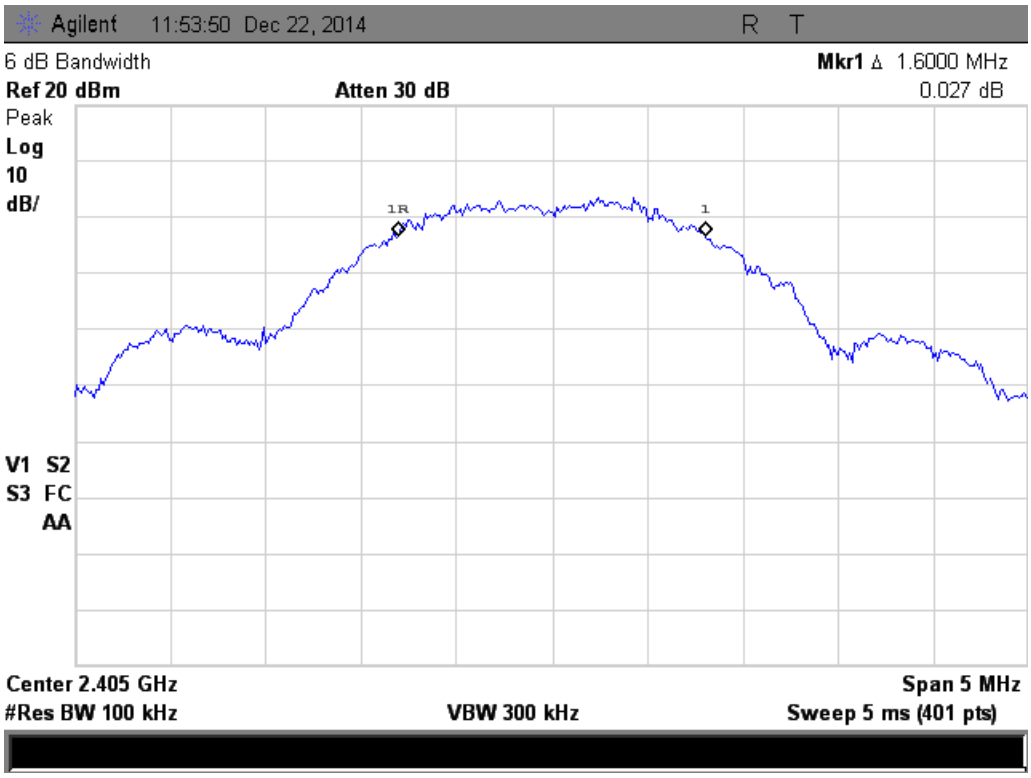
Channel MHz	20 dB EBW MHz	6 dB EBW MHz
2405	2.6325	1.6000
2440	2.8275	1.6125
2475	2.7825	1.6875

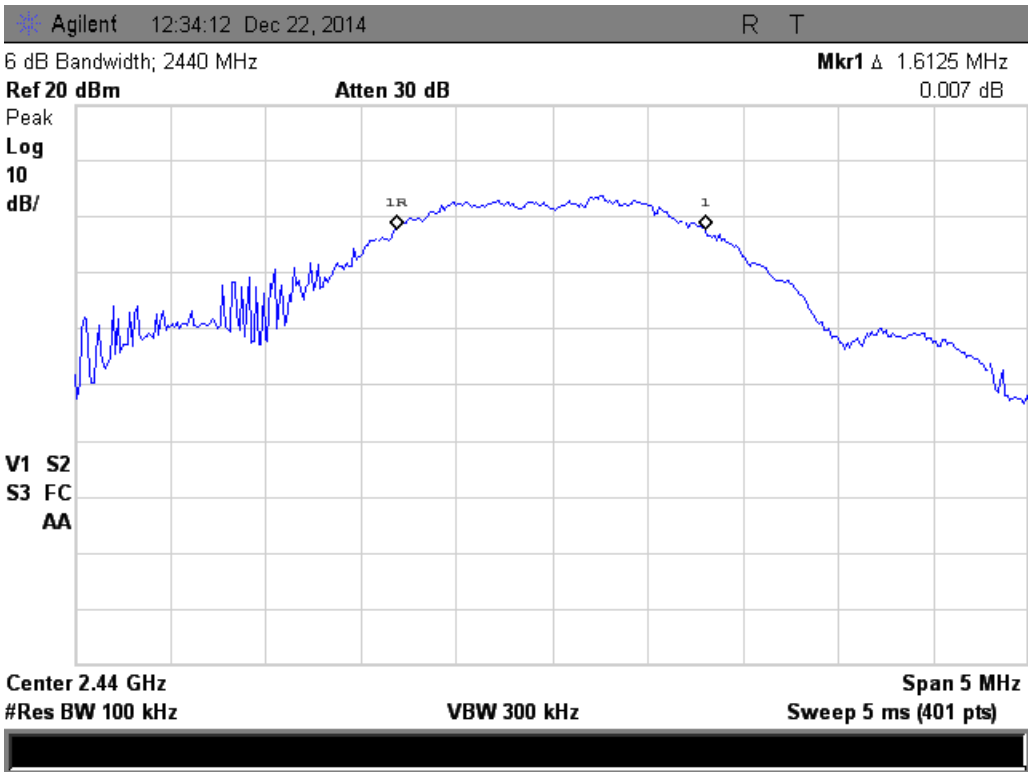
Figure 3. Occupied Bandwidth Plots

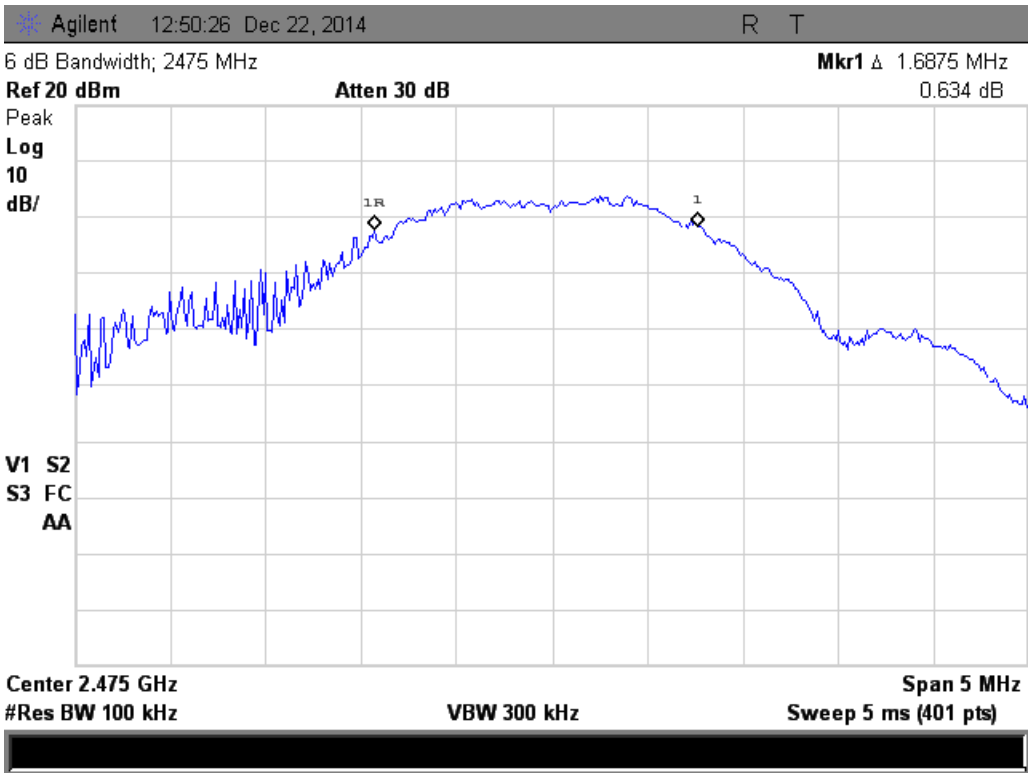





Agilent 12:47:46 Dec 22, 2014
R T
20dB Bandwidth; 2475 MHz
Mkr1 Δ 2.7825 MHz
Ref 20 dBm
Atten 30 dB
0.33 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 FC
AA
Center 2.475 GHz
Span 3 MHz
#Res BW 30 kHz
VBW 100 kHz
Sweep 5 ms (401 pts)


Agilent 11:53:50 Dec 22, 2014
R T
6 dB Bandwidth
Mkr1 Δ 1.6000 MHz
Ref 20 dBm
Atten 30 dB
0.027 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 FC
AA
Center 2.405 GHz
Span 5 MHz
#Res BW 100 kHz
VBW 300 kHz
Sweep 5 ms (401 pts)





Judgment: Pass; 6 dB bandwidth greater than 500 kHz.

10.4 Peak Output Power

The EUT antenna port was connected to the Spectrum analyzer Via a low loss coaxial cable.

The power output test method from ANSI C63.10 section 6.10.2.1 c) was used for this test. The spectrum analyzer was set to the following settings:

Span = 10 MHz; RBW = 5 MHz; VBW = 3 MHz
Detector function = peak; Trace = max hold

The trace was allowed to stabilize. The marker-to-peak function was used to measure the peak of the emission. The indicated level is the peak output power. The BW correction factor is 10*Log(BW). Note 30 dBm = 1 watt. Since the gain of the antenna is always less than 6 dB, the limit is not reduced.

Tested by: Joseph Strzelecki
Test Date: December 22, 2014

Conducted Peak power

Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Total Power (dBm)		Limit (dBm)
			dBm	Watts	
2405	6.5	0.4	6.9	0.0049	30.0
2440	6.4	0.4	6.8	0.0048	30.0
2475	6.2	0.4	6.6	0.0046	30.0

Overall Test result: Pass by 23.1 dB

Peak Radiated Power from section 10.8.2 herein

Freq MHz	Peak dBuV/m	Meas Dist	EUT Watts	EUT dBm	Limit dBm
2405	103.9	3	0.0074	8.7	30
2440	100.6	3	0.0034	5.4	30
2475	101.5	3	0.0043	6.3	30

The Radiated peak power is 7.4 mW. This value is used for RF exposure.

10.5 Power Spectral Density

The PSD test method from ANSI C63.10 section 6.11.2.3 was used for this test. The spectrum analyzer was set to the following settings:

Span = 500 kHz; RBW = 3 kHz; VBW = 10 kHz; Detector function = Peak
Tested by: Joseph Strzelecki
Test Date: December 22, 2014

Frequency (MHz)	Reading dBm	Cable Loss (dB)	3 kHz Spectral Density (dBm)	Limit (dBm)
2405	-5.8	0.4	-5.4	8.0
2440	-6.0	0.4	-5.6	8.0
2475	-6.1	0.4	-5.7	8.0

Judgment: Passed by 13.4 dB

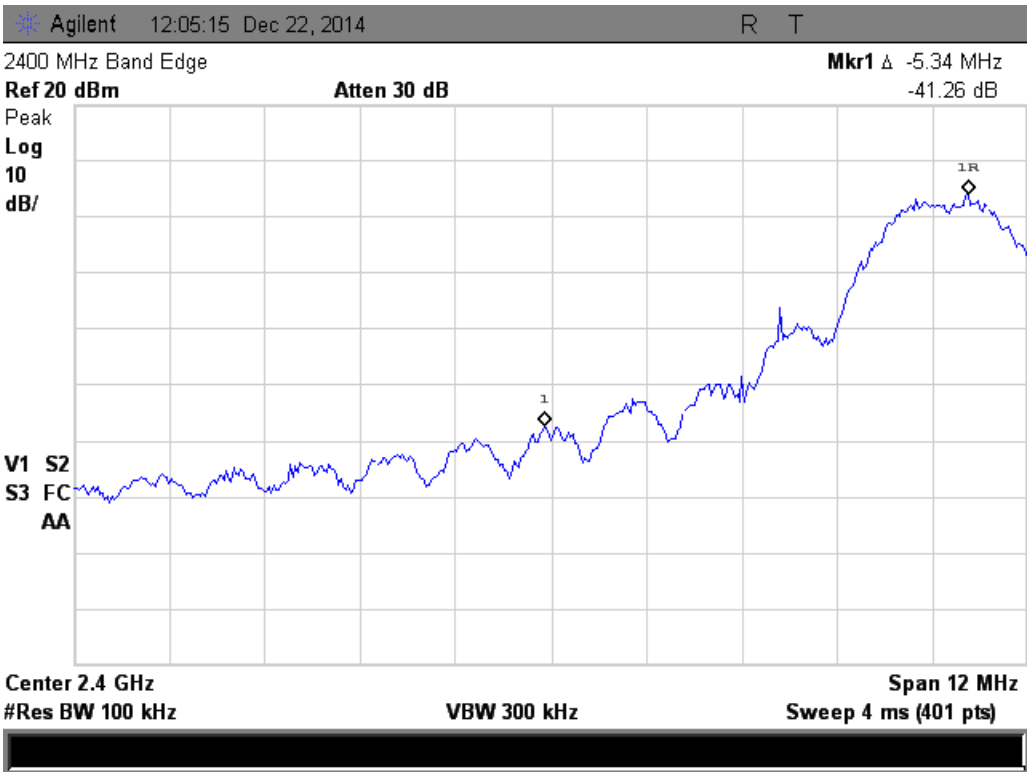
10.6 Band-edge Compliance of RF Conducted Emissions

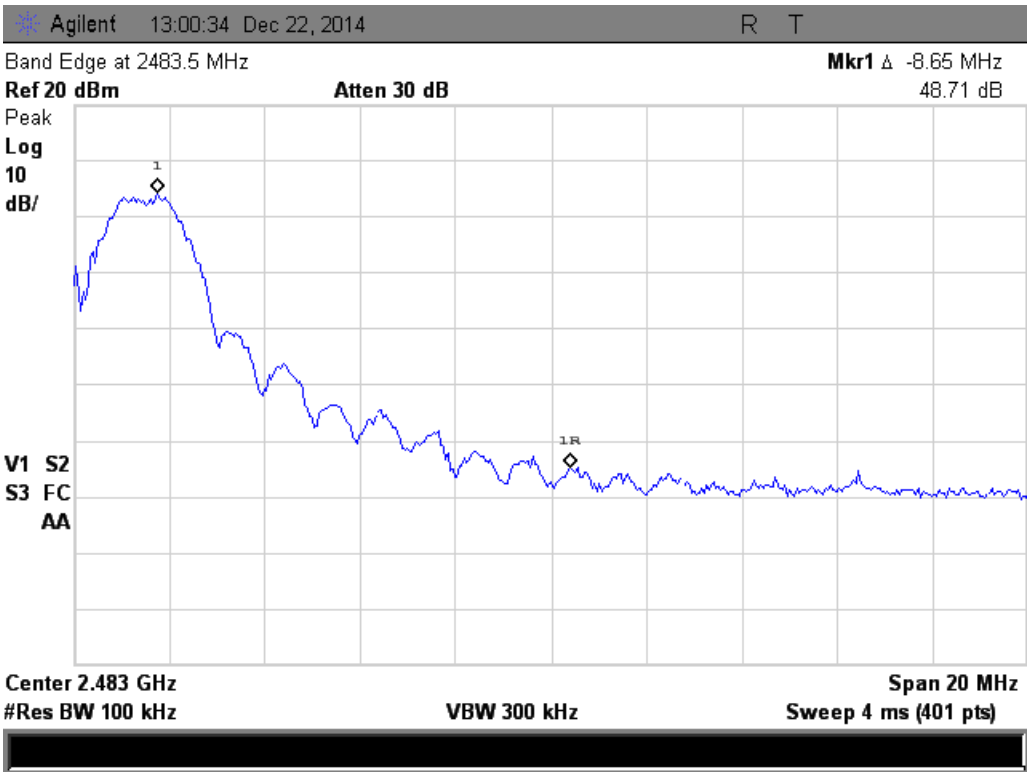
The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation at the band-edge, with the EUT set to the lowest frequency. The trace was allowed to stabilize.

Tested by: Joseph Strzelecki
Test Date: December 22, 2014

Channel	Reading at Band Edge		Minimum Allowed
	Freq. (MHz)	Delta (dB)	dB
2405 Lower Band edge	2400	41.3	20
2475 Upper Band edge	2483.5	48.7	20

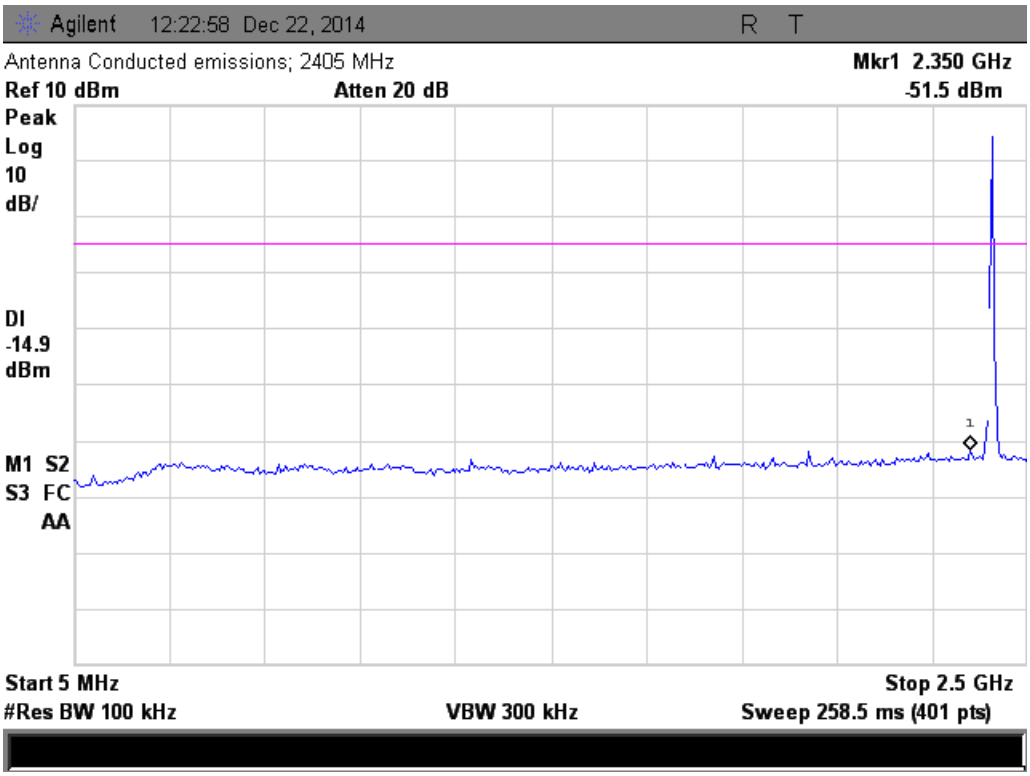
Judgment: Passed by 21.3 dB



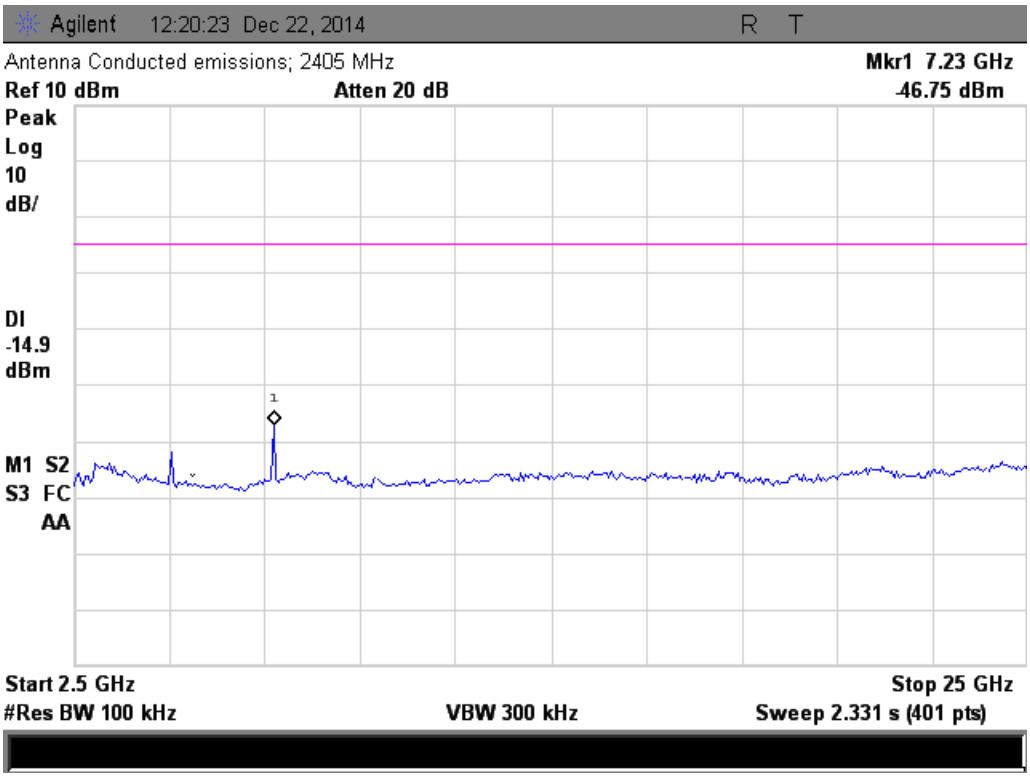


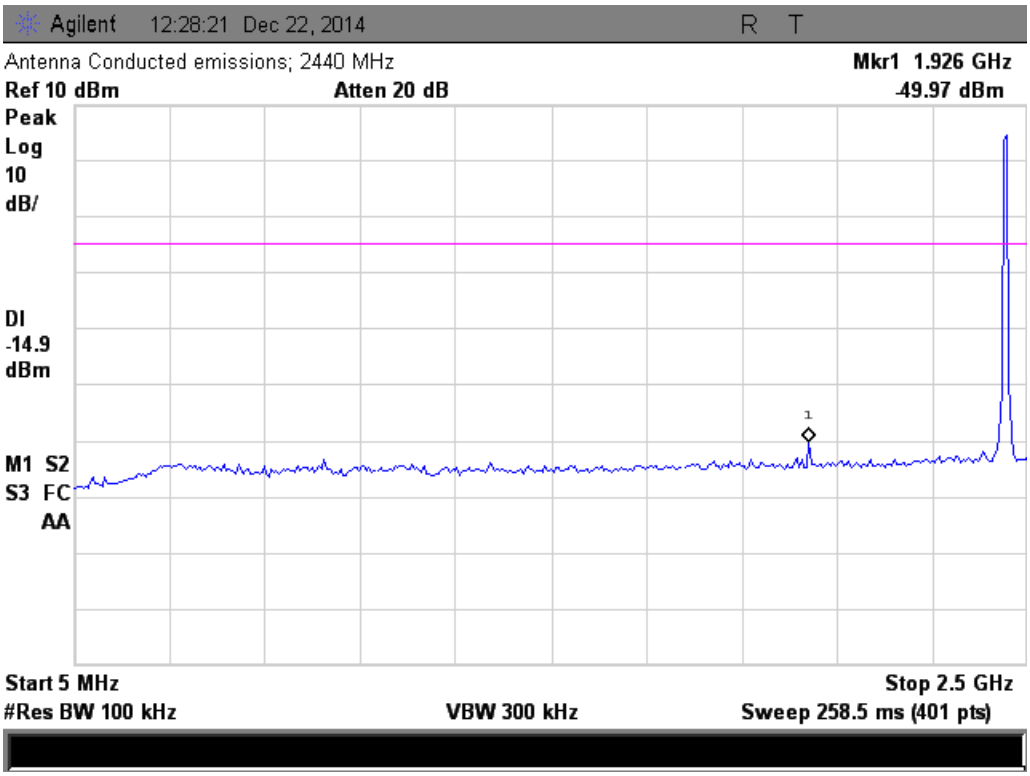
10.7 Spurious RF Conducted Emissions at Antenna Port

The spectrum analyzer was set to the MAX HOLD mode to record all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. The trace was allowed to stabilize. The first two plots were made while stepping through three frequencies (Low middle and high). Each frequency was on for 30 seconds.



The fundamental signal on the right does not need to meet the limit.





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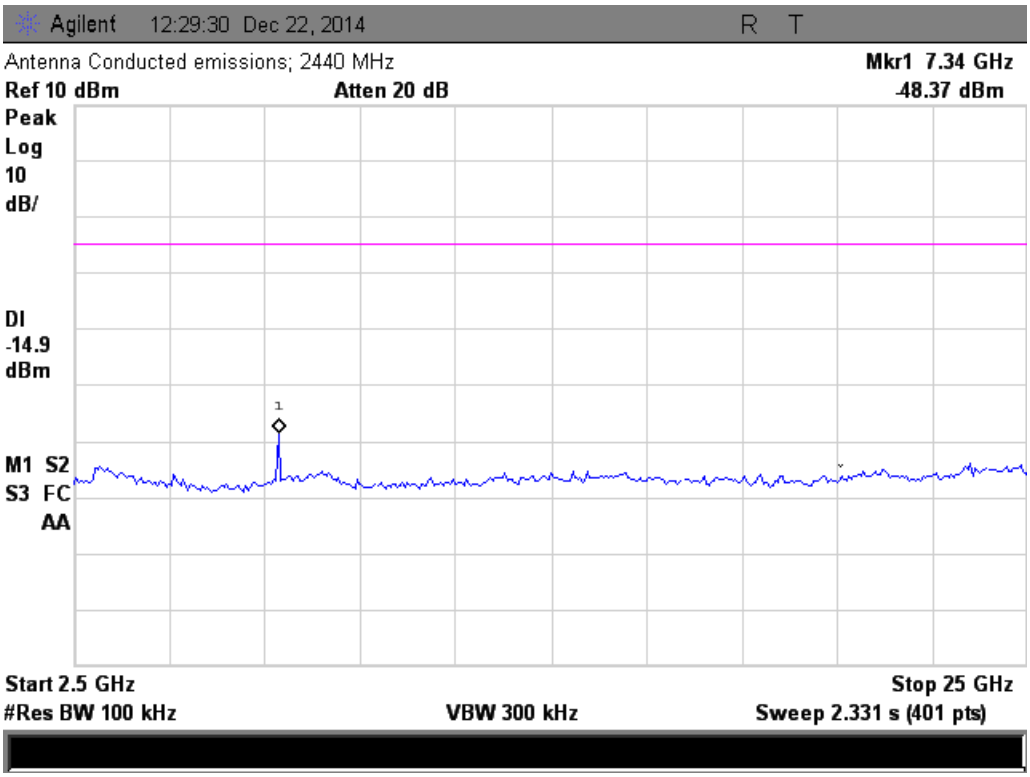
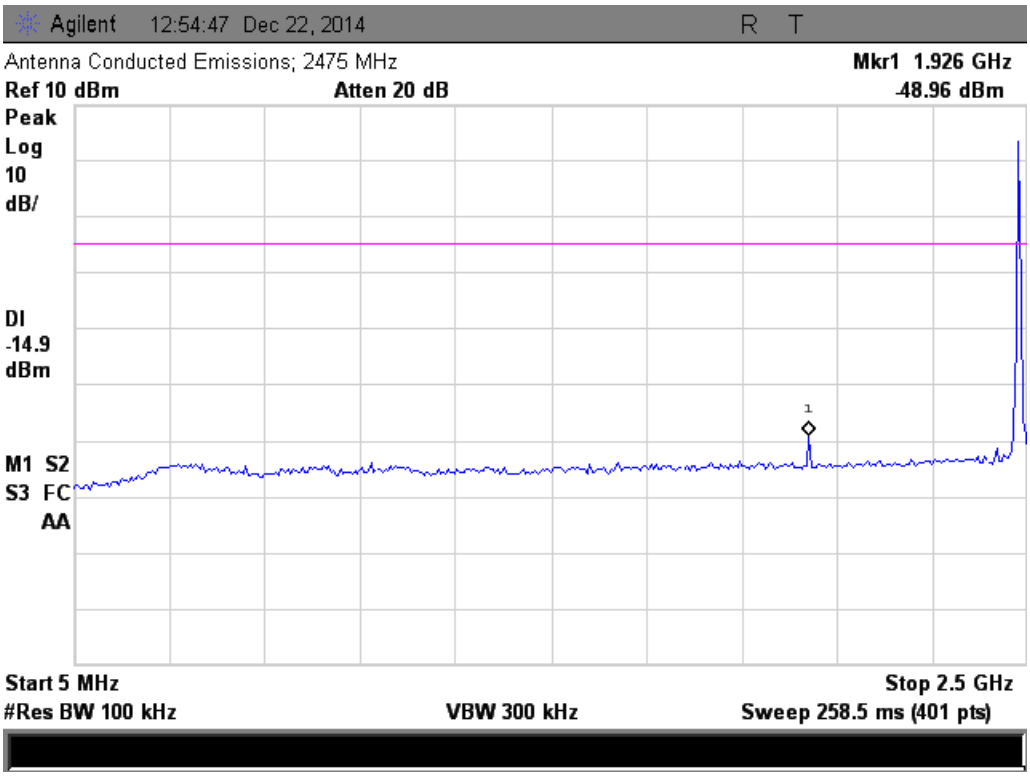
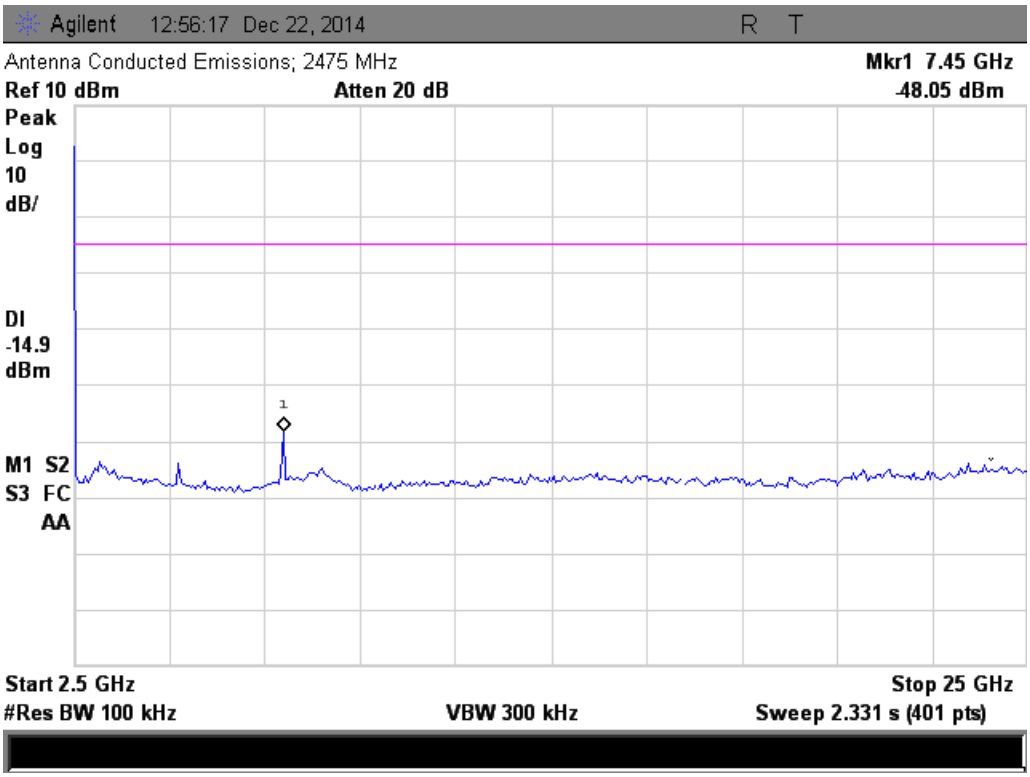




The fundamental signal on the right does not need to meet the limit.



The fundamental signal on the left does not need to meet the limit.

Judgement: Pass by at least 10 dB

10.8 Spurious Radiated Emissions (Restricted Band)

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu spectrum analyzer was used. For tests from 1 to 25 GHz, an HP 8566 spectrum analyzer was used. For tests from 1 to 10 GHz, a high pass filter was used to reduce the fundamental emission. A harmonic mixer was used from 18 to 25 GHz. Figure 4 herein lists the details of the test equipment used during radiated emissions tests.

The was device was rotated through three orthogonal axis as per 13.1.4.1 of ANSI C63.4 during the radiated tests.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 25000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

10.8.1 Radiated Emissions Field Strength Sample Calculation

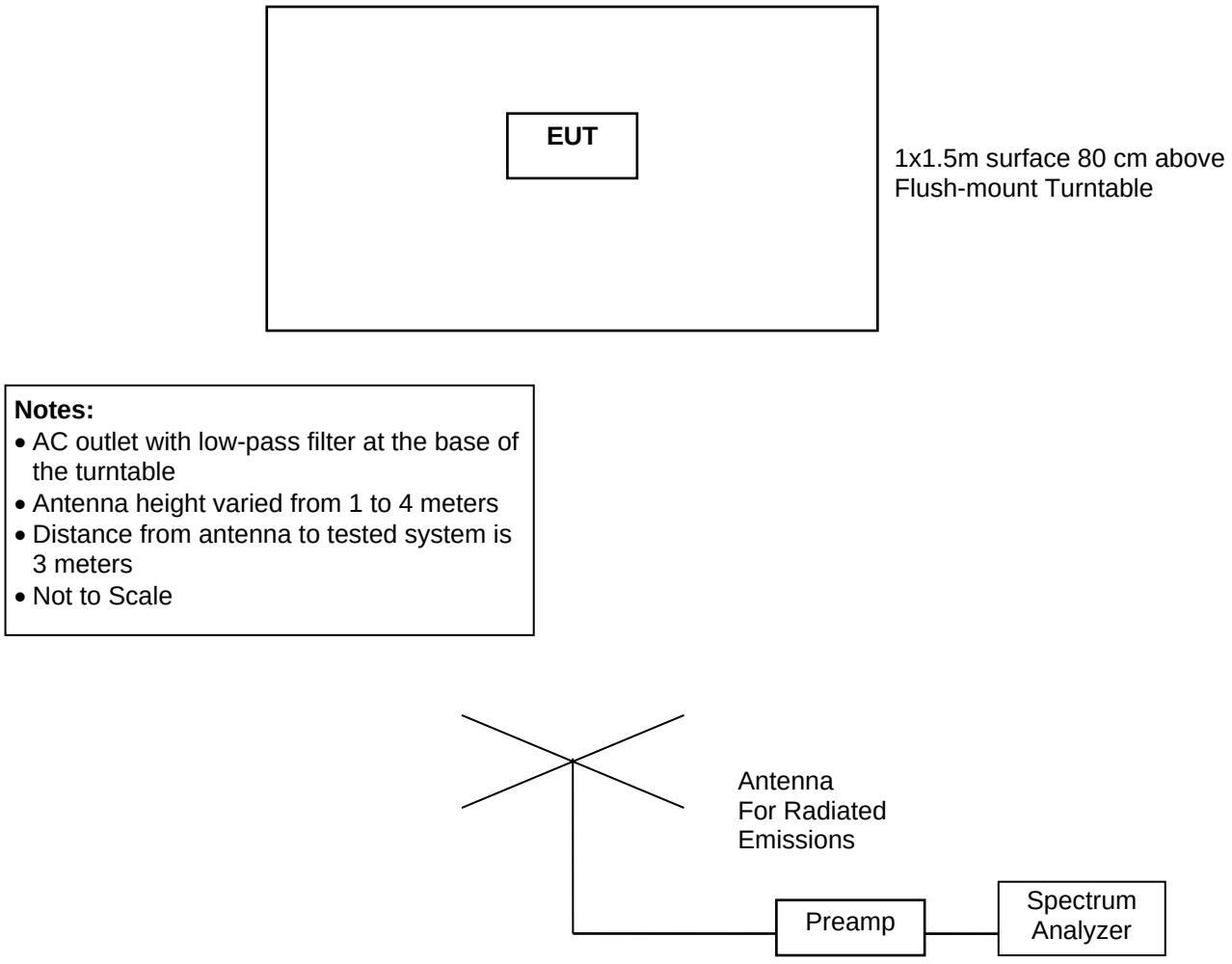
The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + CF - AG

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain
PKA = Peak to Average Factor (This is zero for non-average measurements)

The Peak to average factor is used when average measurements are required. It is calculated by the highest duty cycle in percent over any 100mS transmission. The factor in dB is 20 * Log(Duty cycle/100).

Figure 4. Drawing of Radiated Emissions Setup



10.8.2 Spurious Radiated Emissions Test Results

The following spectrum analyzer settings were used.

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
Sweep = auto; Detector function = peak; Trace = max hold

Testing of the Dwyer, Model MH01, HART Transmitter

Manufacturer	Dwyer	Specification	FCC Part 15 Subpart C & RSS-247
Model	MH01	Test Date	Dec 22, 2014
Serial Number	None	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; BC = Biconical (ANT-3); LP = Log-Periodic (ANT-6); HN = Horn (ANT-13) P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain – Duty Cycle Factor + HP Filter Loss		

Radiated Emissions that are not fundamental or harmonics

Freq. MHz	Meter Reading dBuV	Dect.	Ant. Pol.	Ant Factor	Cable & Amp Factors	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB
30.0	30.5	P	H	16.9	-28.3	0.0	19.1	40.0	20.9
47.6	41.2	P	H	14.8	-28.2	0.0	27.8	40.0	12.2
67.4	37.2	P	H	8.3	-28.0	0.0	17.5	40.0	22.5
154.3	41.0	P	H	10.0	-27.6	0.0	23.4	43.5	20.1
207.1	43.1	P	H	10.6	-27.4	0.0	26.3	43.5	17.2
264.4	31.3	P	H	12.9	-27.5	0.0	16.7	46.0	29.3
287.5	35.0	P	H	12.9	-27.3	0.0	20.6	46.0	25.4
331.9	35.5	P	H	14.4	-27.3	0.0	22.6	46.0	23.4
345.6	33.1	P	H	15.4	-27.3	0.0	21.2	46.0	24.8
356.9	34.5	P	H	15.8	-27.4	0.0	22.9	46.0	23.1
576.3	30.4	P	H	20.4	-26.5	0.0	24.3	46.0	21.7
607.5	31.4	P	H	20.5	-26.2	0.0	25.7	46.0	20.3
1302.5	39.4	P	H	25.6	-26.9	0.0	38.1	54.0	15.9
1332.5	39.9	P	H	25.6	-26.9	0.0	38.6	54.0	15.4
2332.5	34.7	P	H	28.0	-26.2	0.0	36.5	54.0	17.5
30.0	35.5	Q	V	16.9	-28.3	0.0	24.1	40.0	15.9
31.1	37.9	Q	V	16.9	-28.3	0.0	26.5	40.0	13.5
47.6	39.1	P	V	14.8	-28.2	0.0	25.7	40.0	14.3
54.2	39.7	P	V	12.7	-28.1	0.0	24.3	40.0	15.7
67.4	42.2	P	V	8.3	-28.0	0.0	22.5	40.0	17.5
98.2	37.5	P	V	8.9	-27.8	0.0	18.6	43.5	24.9
152.6	39.4	P	V	10.0	-27.7	0.0	21.7	43.5	21.8
207.6	33.1	P	V	10.6	-27.4	0.0	16.3	43.5	27.2
271.9	34.0	P	V	13.1	-27.4	0.0	19.7	46.0	26.3
343.1	32.4	P	V	15.2	-27.3	0.0	20.3	46.0	25.7
345.6	30.5	P	V	15.4	-27.3	0.0	18.6	46.0	27.4
461.9	31.1	P	V	16.7	-27.0	0.0	20.8	46.0	25.2
562.5	31.0	P	V	19.4	-26.8	0.0	23.6	46.0	22.4
880.0	31.7	P	V	21.6	-25.5	0.0	27.8	46.0	18.2
1812.5	36.3	P	V	27.0	-26.4	0.0	36.9	54.0	17.1
1980.0	36.2	P	V	27.6	-26.5	0.0	37.3	54.0	16.7
2237.5	29.6	P	V	27.5	-26.0	0.0	31.1	54.0	22.9

Judgment: Passed by at least 10 dB

Intentional Radiator emissions (Fundamental, Band edge and Harmonics)

		Spectrum Analyzer Readings									EUT	Peak	Ave	Peak	Ave	Margin
hrm	Tx	Peak			Ave	Peak			Ave	Corr.	Emission	Tot. FS		Limit		Under
		Vertical Polarization				Horizontal Polarization					Freq					
#	Freq	X	Y	Z	Max	X	Y	Z	Max	Fact.	MHz	dBuV/m		dBuV/m		Limit
1	2405	99.2	99.2	101.3	90.0	96.5	96.6	96.6	85.3	2.6	2405.0	103.9	92.6	125	105	12.4
BE	2405	47.6	47.6	49.7	38.4	44.9	45.0	45.0	33.7	2.6	2390.0	52.3	41.0	74	54	13.0
2	2405	51.1	51.1	52.2	40.9	47.0	47.3	49.5	38.2	10.1	4810.0	62.3	51.0	74	54	3.0
3	2405	42.2	42.1	42.1	30.9	41.5	41.7	41.8	30.5	11.5	7215.0	53.7	42.4	74	54	11.6
4	2405	35.0	35.0	39.0	27.7	35.0	35.0	35.0	23.7	12.8	9620.0	51.8	40.5	74	54	13.5
1	2440	96.8	96.9	97.5	86.2	95.1	94.8	95.0	83.8	3.1	2440.0	100.6	89.3	125	105	15.7
2	2440	48.0	48.2	49.3	38.0	46.5	45.2	46.7	35.4	10.0	4880.0	59.3	48.0	74	54	6.0
3	2440	42.1	41.8	41.7	30.8	41.2	41.0	41.5	30.2	12.0	7320.0	54.1	42.8	74	54	11.2
4	2440	35.0	35.0	38.0	26.7	35.0	35.0	35.0	23.7	13.1	9760.0	51.1	39.8	74	54	14.2
1	2475	97.9	97.4	98.1	86.8	97.0	97.2	96.6	85.9	3.4	2475.0	101.5	90.2	125	105	14.8
BE	2475	49.2	48.7	49.4	38.1	48.3	48.5	47.9	37.2	3.4	2483.5	52.8	41.5	74	54	12.5
2	2475	51.2	49.5	50.6	39.9	49.4	48.1	47.7	38.1	9.5	4950.0	60.7	49.4	74	54	4.6
3	2475	42.5	42.0	42.2	31.2	41.7	41.4	42.2	30.9	12.4	7425.0	54.9	43.6	74	54	10.4
4	2475	35.0	35.0	39.5	28.2	35.0	35.0	35.0	23.7	13.1	9900.0	52.6	41.3	74	54	12.7
Column numbers (see below for explanations)																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Column #1. hrm = Harmonic; BE = Band Edge emissions
Column #2. Frequency of Transmitter.
Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
Column #6. Average Reading based on peak reading reduced by the Duty cylce correction
Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
Column #10. Average Reading based on peak reading reduced by the Duty cylce correction
Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
Column #12. Frequency of Tested Emission
Column #13. Highest peak field strength at listed frequency.
Column #14. Highest Average field strength at listed frequency.
Column #15. Peak Limit.
Column #16. Average Limit.
Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.

Judgment: Passed by 3 dB
No other emissions were detected from 1 to 25 GHz.