



FCC / ISED Test Report

For

SiXHEAT

FCC ID: CFS8DL6HEAT

IC ID: 573F-6HEAT

Report Completion Date: 2017-12-28

Prepared by and for:

Honeywell International Inc.

2 Corporate Center Dr.

Suite 100 PO Box 9040

Melville, NY 11747



Testing

NVLAP Lab Code: 600110

Document Introduction

Honeywell tested the above equipment in accordance with the requirements set forth in the listed standards. All indications of Pass/Fail in the report are opinions expressed by Honeywell based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

This document is a record of the FCC/ISED Test Report for Honeywell products. It demonstrates the data required to be analyzed to certify a product according to the requirements of the FCC & ISED.

The results in the report reflect only the model of the items under test unless noted otherwise. This document may not be altered or revised in any way unless done so by Honeywell and all revisions are duly noted in the revisions section. Any alterations of this document not carried out by Honeywell will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Test Report Revision History				
Revision	Prepared By	Reviewed By	Revision Detail	Release Date
---	M. Antola	A. Roussin	Original Release	2017-12-21
A	A. Roussin	--	Updated Test Item Description section	2017-12-21
B	A. Roussin	--	Updated Table of Contents	2017-12-22
C	M. Antola	--	Updated Radiated Bandedge plots	2017-12-28

Report Authorization

Report Prepared By:



Michael Antola
Hardware Engineer II
HBT RF & EMC Design
Honeywell International Inc.

Reviewed & Approved By:



Andrew Roussin
Hardware Engineer II
HBT RF & EMC Design
Honeywell International Inc.

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Applicable Test Standards/Limits

Test Standards/Limits	Result	Dates Tested
ANSI C63.4: 2014	Compliant	12/8/17-12/20/17
ANSI C63.10: 2013	Compliant	12/8/17-12/20/17
ICES-003, Issue 6	Compliant	12/8/17-12/20/17
RSS-247, Issue 2, Section 5	Compliant	12/8/17-12/20/17
RSS-GEN, Issue 4	Compliant	12/8/17-12/20/17
CFR 47 Pt 15 Subpart B, Section 15.109	Compliant	12/8/17-12/20/17
CFR 47 Pt 15 Subpart C, Section 15.209	Compliant	12/8/17-12/20/17
CFR 47 Pt 15 Subpart C, Section 15.247	Compliant	12/8/17-12/20/17

Deviations from Test Methods

#	Deviation Description
-	None

Facilities and Accreditation

The test site and measurement facility used to collect data are located at 2 Corporate Center Dr., Melville, NY 11747, USA. Honeywell International is accredited by NVLAP, Laboratory Code 600110-0. The full scope of accreditation can be viewed at the NVLAP website.

Test Item Description

The SiXHEAT Sensor is a 2.4 GHz IEEE 802.15.4-compliant transceiver. It operates on battery power only, and is not designed to connect to the AC Mains. It is part of a wireless alarm system. It will have the ability to:

1. Rate-of-Rise Detection – When the temperature ramps up at a rate of 15°F (8°C) or more per minute the SiXHEAT will signal an alarm to the control panel.
2. Fixed Temperature Detection – When the ambient temperature rises above 135°F (57°C) SiXHEAT will signal an alarm to the control panel.

It contains two integrated antennas. Each has a gain of 2.0 dBi. The firmware version at the time of test is 2.0.5.

The EUT is a digital transmission system operating in the 2400-2483.5MHz band, thus the device is evaluated against Section 15.247 of CFR 47 Part 15 Subpart C and Section 5 of RSS-247, Issue 2.

Worse-Case Configuration & Mode

Final radiated test was performed with the EUT set to transmit at the low, middle, and high channels. The EUT was tested in the two potential orthogonal planes in order to determine the worst-case emissions. It was determined that the Y axis (standing upright) orientation was the worst-case orientation. Therefore, all final radiated test was performed with the EUT in the Y axis (standing upright).

Test Sample Identification

Sample ID Number	Sample Serial Number	Date Received
MEL-406	Non-serialized production unit	12/7/2017
MEL-407	Non-serialized production unit	12/7/2017

Calibration & Measurement Uncertainty

- Measuring Instrument Calibration – The measuring equipment utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer’s recommendations and is traceable to recognized national standards.
- Sample Calculation – Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

[i.e.] 37 dBuV/m = 30 dBuV + 18.5 dB/m + 0.5 dB – 12 dB

- Uncertainty - Figures are valid to a confidence level of 95%.

Test	Standard Uncertainty
Radiated Emissions (30-200MHz Horizontal)	+/- 5.05 dB
Radiated Emissions (30-200MHz Vertical)	+/- 5.28 dB
Radiated Emissions (200-1000MHz Horizontal)	+/- 10.21 dB
Radiated Emissions (200-1000MHz Vertical)	+/- 10.36 dB
Radiated Emissions (Above 1GHz)	+/- 9.70 dB
Conducted Emissions (150kHz-30MHz)	+/- 4.36 dB

Opinions / Interpretations

None

Test Summary

All tests described below are required, unless otherwise noted. Notes should be described in detail in the "Additional notes" section.

#	Test Description	Status
1	99% Bandwidth	PASS
2	6 dB Occupied Bandwidth	PASS
3	Maximum Conducted Output Power	PASS
4	Maximum Power Spectral Density	PASS
5	Band Edge / Conducted Spurious Emissions	PASS
6	Radiated Emissions (Intentional)	PASS
7	Radiated Emissions (Unintentional)	PASS

6dB Occupied Bandwidth (DTS Bandwidth)

Test Description

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Refer to KDB 558074 D01 DTS Meas Guidance v04.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (a)(2) RSS-247 Section 5.2 (a)	$\geq 500\text{kHz}$

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL	RF Lab	12/8/2017	25	7.8	1013	P

Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	6/6/2017	6/6/2019
Environmental Meter	11533	A070144	Extech Instruments	SD700	4/24/2017	4/24/2018

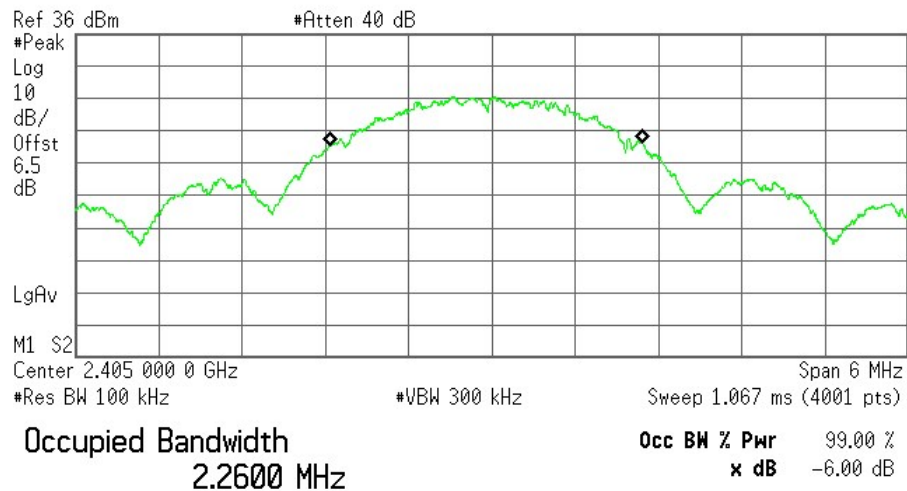
Test Results

Channel	Frequency (GHz)	6dB Bandwidth (in MHz)	
		Antenna 1	Antenna 2
Low	2.405	1.375	1.425
Mid	2.445	1.546	1.516
High	2.475	1.590	1.469

6dB Bandwidth

Agilent 19:04:01 Nov 30, 2017

L

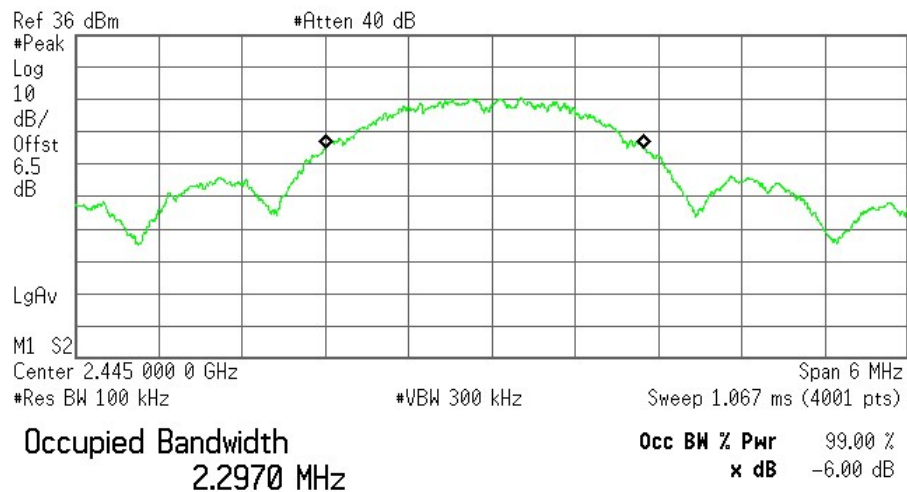


Transmit Freq Error -38.528 kHz
x dB Bandwidth 1.375 MHz

Antenna 1 Low Channel - Plot

Agilent 18:50:09 Nov 30, 2017

L

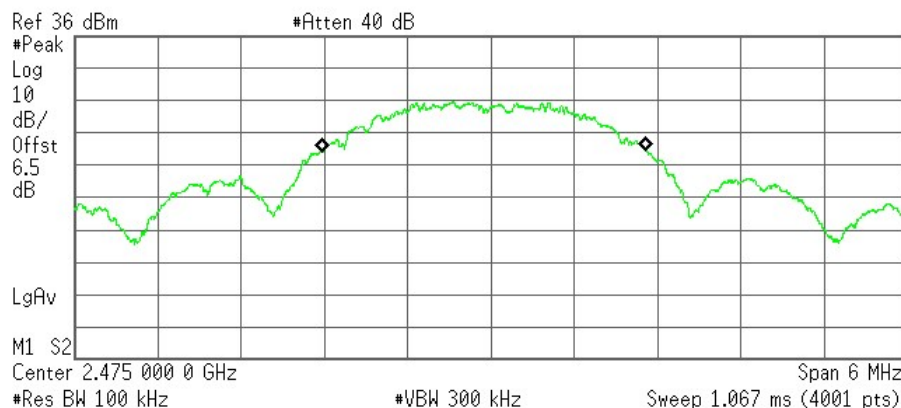


Transmit Freq Error -46.276 kHz
x dB Bandwidth 1.546 MHz

Antenna 1 Mid Channel - Plot

Agilent 19:02:32 Nov 30, 2017

L



Occupied Bandwidth
2.3453 MHz

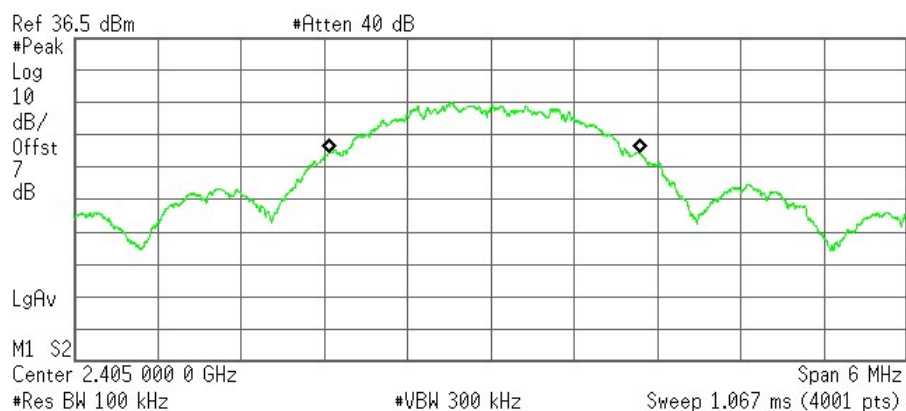
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -51.735 kHz
x dB Bandwidth 1.590 MHz

Antenna 1 High Channel - Plot

Agilent 19:15:47 Nov 30, 2017

L



Occupied Bandwidth
2.2509 MHz

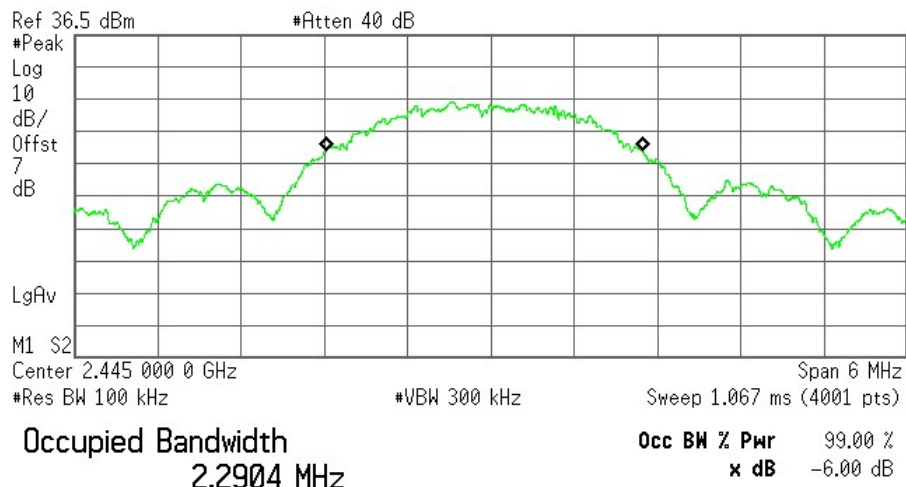
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -47.584 kHz
x dB Bandwidth 1.425 MHz

Antenna 2 Low Channel - Plot

Agilent 19:10:57 Nov 30, 2017

L

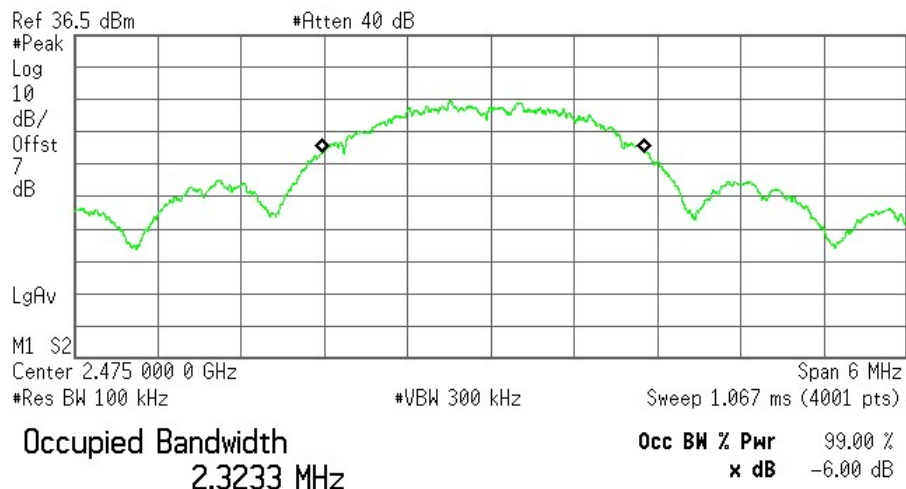


Transmit Freq Error -45.489 kHz
x dB Bandwidth 1.516 MHz

Antenna 2 Mid Channel - Plot

Agilent 19:12:07 Nov 30, 2017

L



Transmit Freq Error -51.359 kHz
x dB Bandwidth 1.469 MHz

Antenna 2 High Channel - Plot

99% Bandwidth

Test Description

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

Test Criteria

Reference	Limit
RSS-GEN, Section 6.6	N/A

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL	RF Lab	12/8/2017	25	7.8	1013	P

Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	6/6/2017	6/6/2019
Environmental Meter	11533	A070144	Extech Instruments	SD700	4/24/2017	4/24/2018

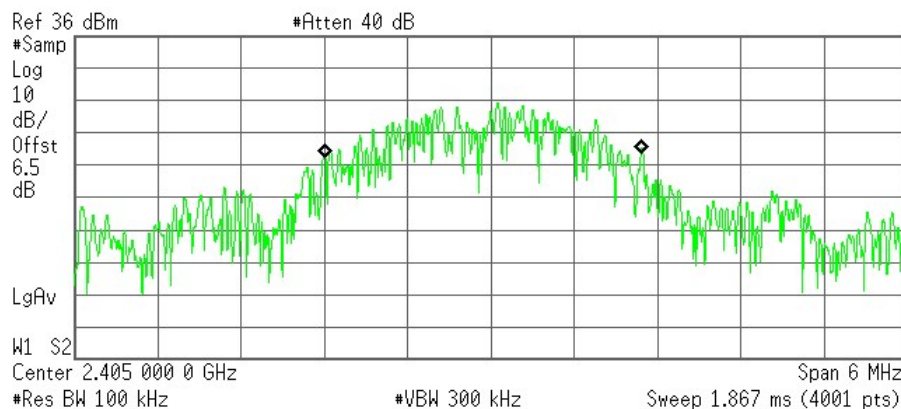
Test Results

Channel	Frequency (GHz)	99% Bandwidth (in MHz)	
		Antenna 1	Antenna 2
Low	2.405	2.2294	2.2316
Mid	2.445	2.2589	2.2505
High	2.475	2.2573	2.2632

99% Bandwidth

Agilent 19:05:24 Nov 30, 2017

L

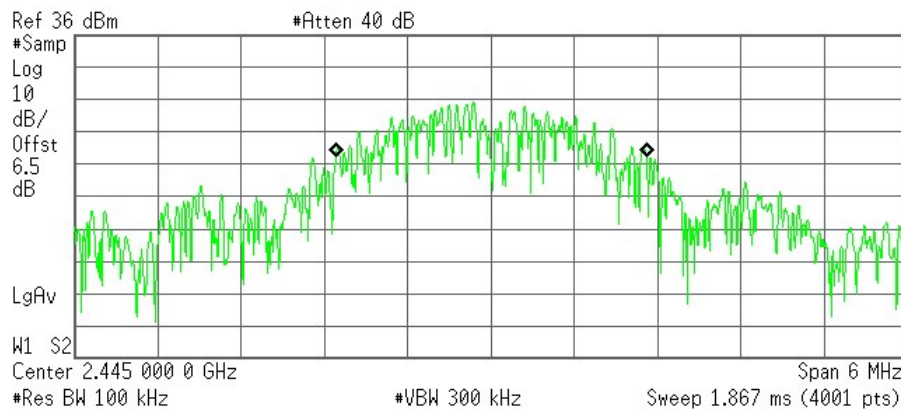


Transmit Freq Error -41.442 kHz
x dB Bandwidth 1.303 MHz*

Antenna 1 Low Channel - Plot

Agilent 19:00:02 Nov 30, 2017

L

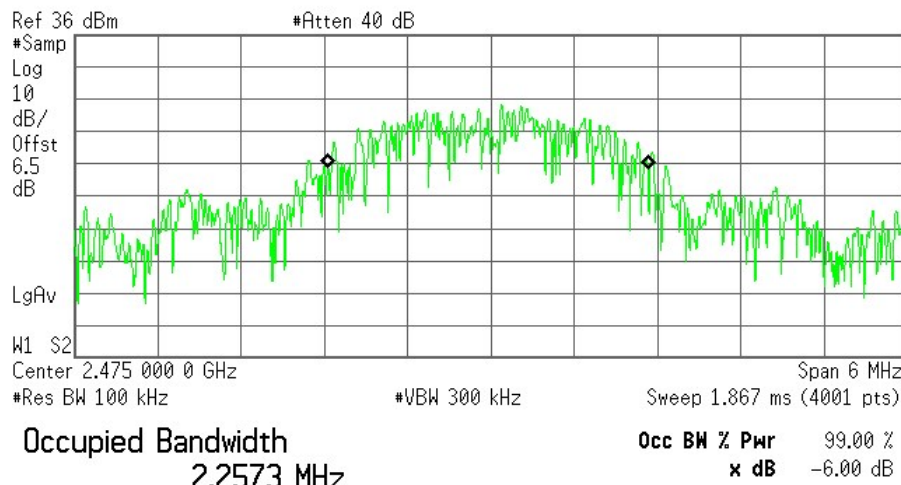


Transmit Freq Error -36.762 kHz
x dB Bandwidth 1.397 MHz*

Antenna 1 Mid Channel - Plot

Agilent 19:01:25 Nov 30, 2017

L

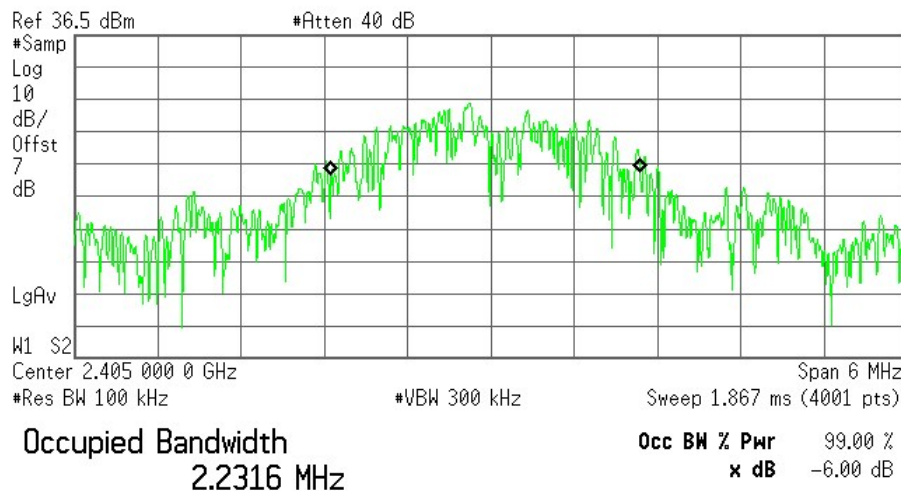


Transmit Freq Error -43.875 kHz
x dB Bandwidth 1.468 MHz*

Antenna 1 High Channel – Plot

Agilent 19:09:10 Nov 30, 2017

L

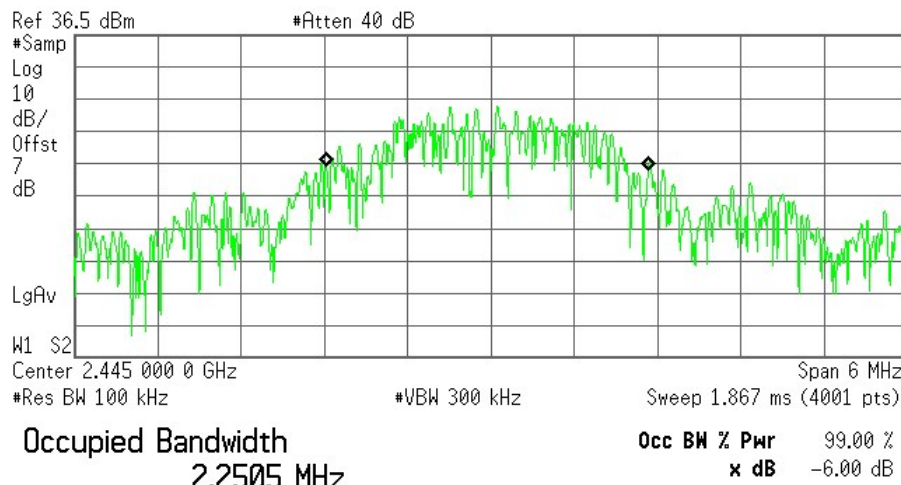


Transmit Freq Error -40.492 kHz
x dB Bandwidth 1.274 MHz*

Antenna 2 Low Channel - Plot

Agilent 19:10:07 Nov 30, 2017

L

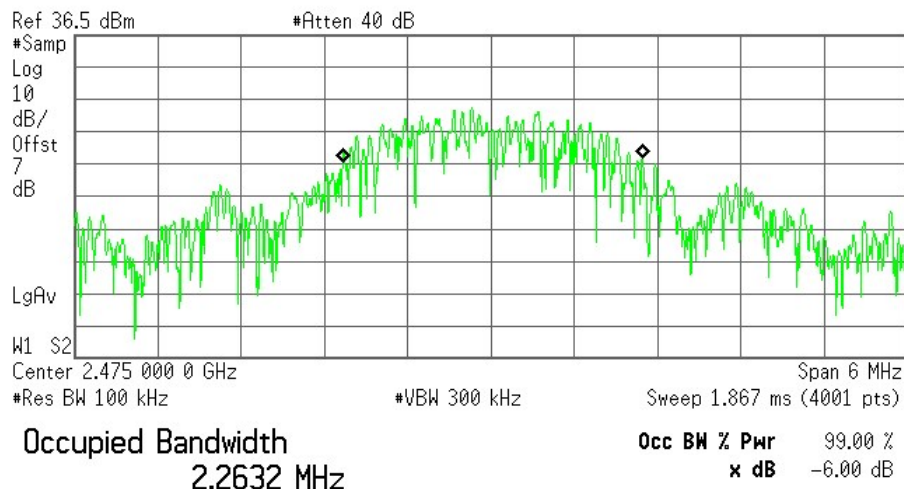


Transmit Freq Error -44.861 kHz
x dB Bandwidth 1.395 MHz*

Antenna 2 Mid Channel - Plot

Agilent 19:13:11 Nov 30, 2017

L



Transmit Freq Error -40.237 kHz
x dB Bandwidth 1.451 MHz*

Antenna 2 High Channel - Plot

Maximum Conducted Output Power

Test Description

For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz and 5725-5850MHz bands, the conducted output power limit (specified below) is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Method AVGSA-1 per C63.10 and KDB 558074 was utilized for this test program.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (b)(3) RSS-247 Section 5.4 (d)	1W (30dBm)

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
MA	RF Lab	12/13/2017	23.8	6.6	996	P

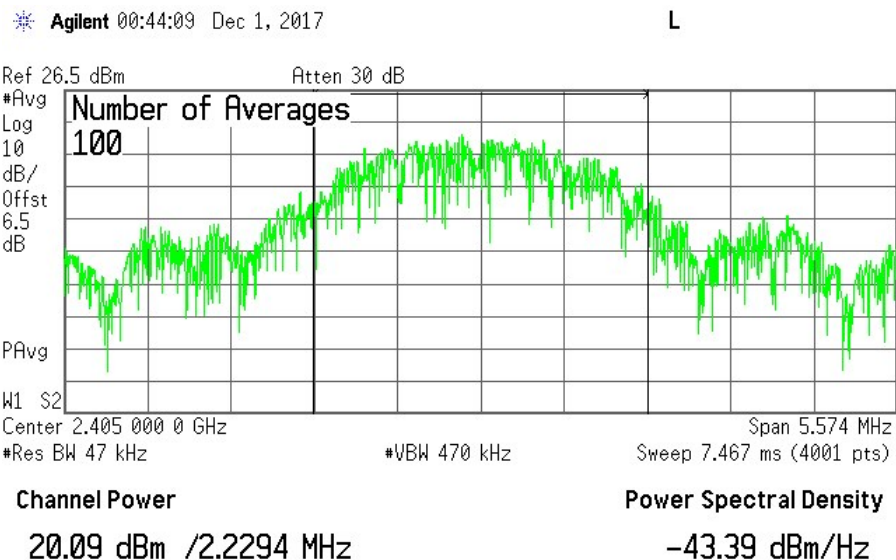
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	6/6/2017	6/6/2019
Environmental Meter	11533	A070144	Extech Instruments	SD700	4/24/2017	4/24/2018

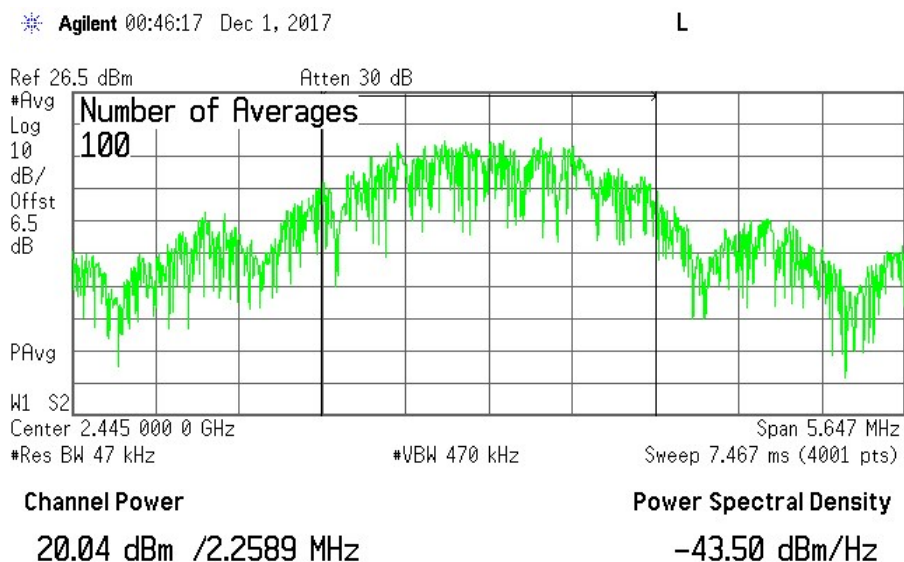
Test Results

Channel	Frequency (GHz)	Tx Channel BW Power (dBm)	
		Antenna 1	Antenna 2
Low	2.405	20.09	19.54
Mid	2.445	20.04	19.23
High	2.475	19.80	19.16

Output Power



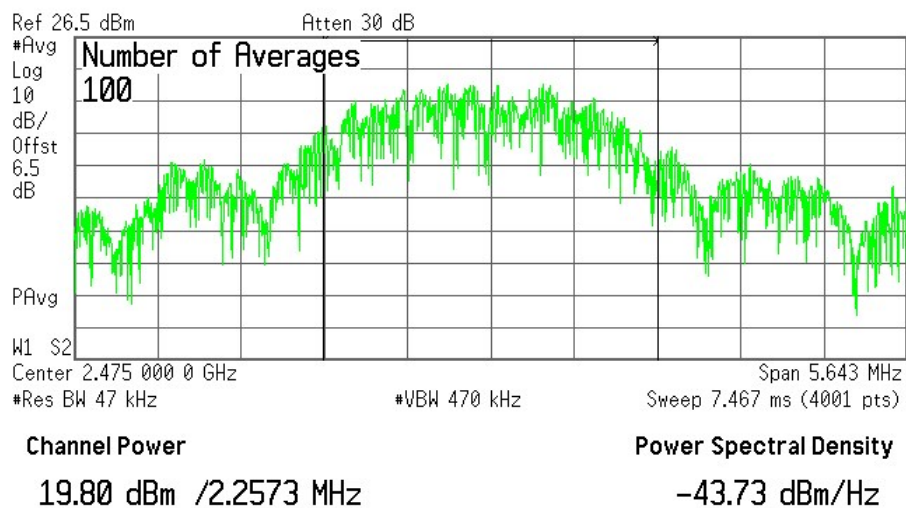
Antenna 1 Low Channel - Plot



Antenna 1 Mid Channel - Plot

Agilent 00:47:19 Dec 1, 2017

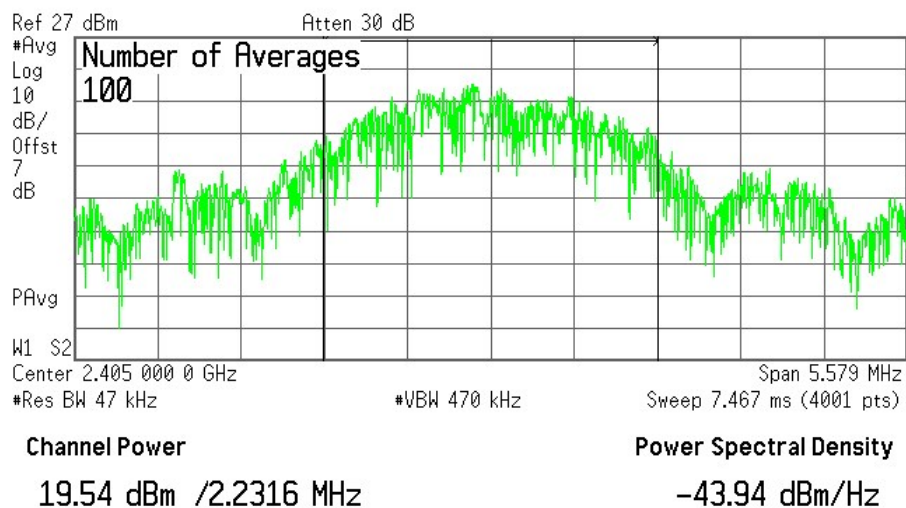
L



Antenna 1 High Channel – Plot

Agilent 00:49:19 Dec 1, 2017

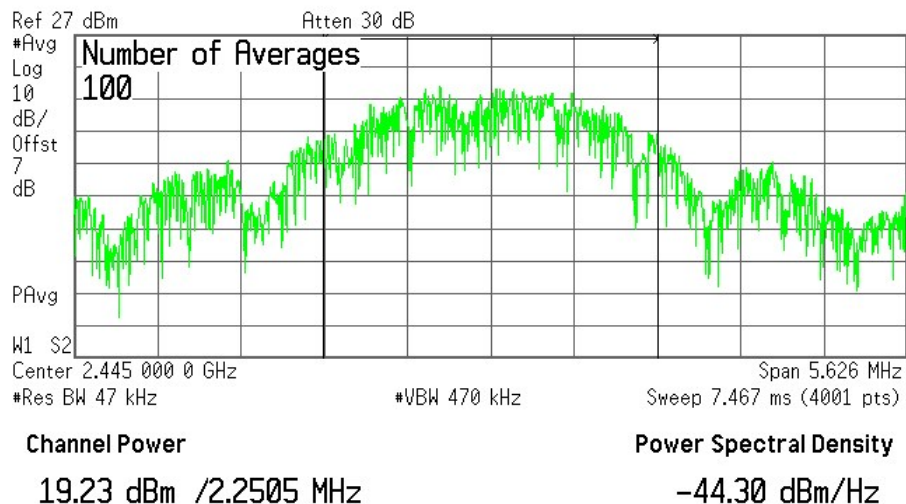
L



Antenna 2 Low Channel - Plot

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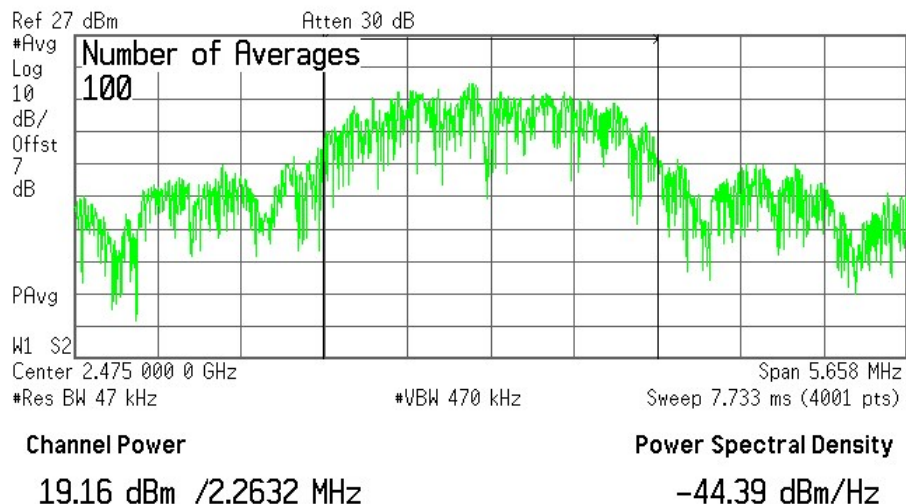
L



Antenna 2 Mid Channel - Plot

Agilent 00:50:55 Dec 1, 2017

L



Antenna 2 High Channel - Plot

Maximum Power Spectral Density

Test Description

The DTS rules specify a conducted PSD limit within the *DTS bandwidth* during any time interval of continuous transmission. Such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. Therefore, if maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used.

Method AVGPSD-1 per C63.10 and KDB 558074 was utilized for this test program.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (e) RSS-247 Section 5.2 (b)	< 8 dBm in any 3 kHz Band

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
MA	RF Lab	12/13/2017	23.8	6.6	996	P

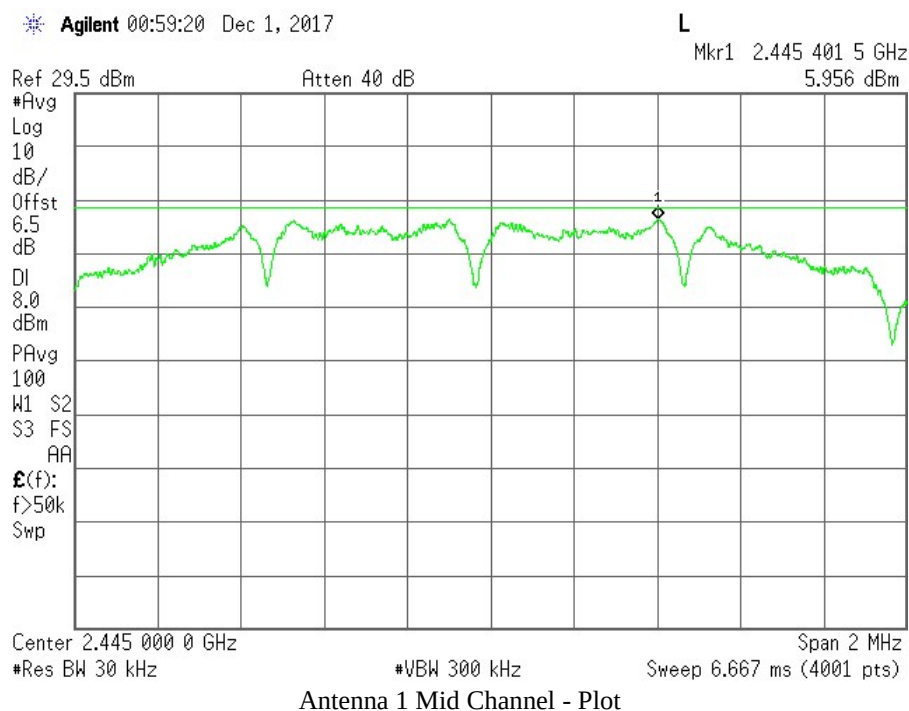
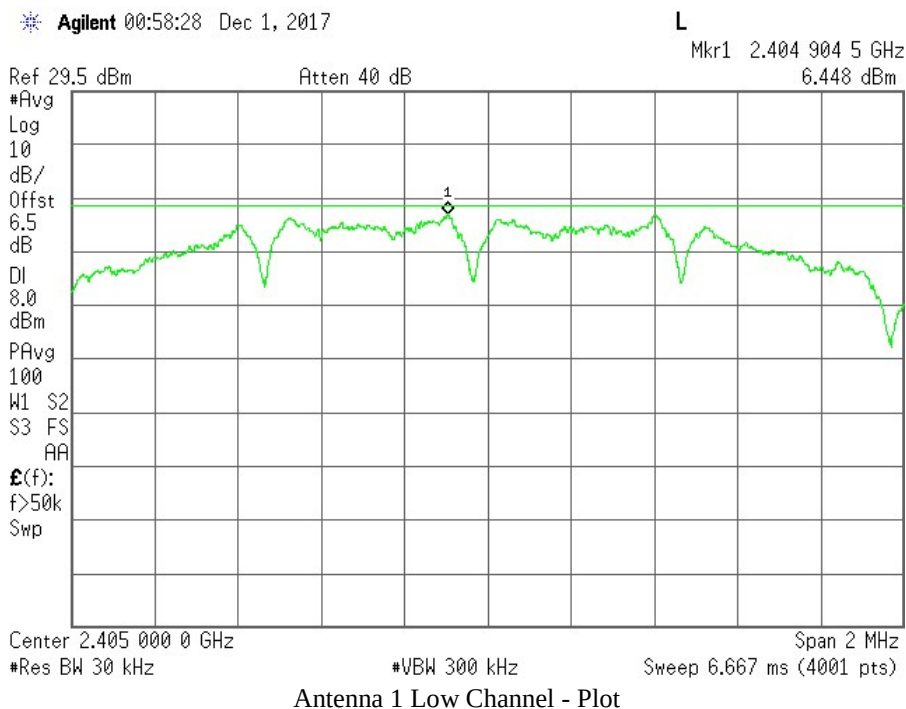
Equipment List

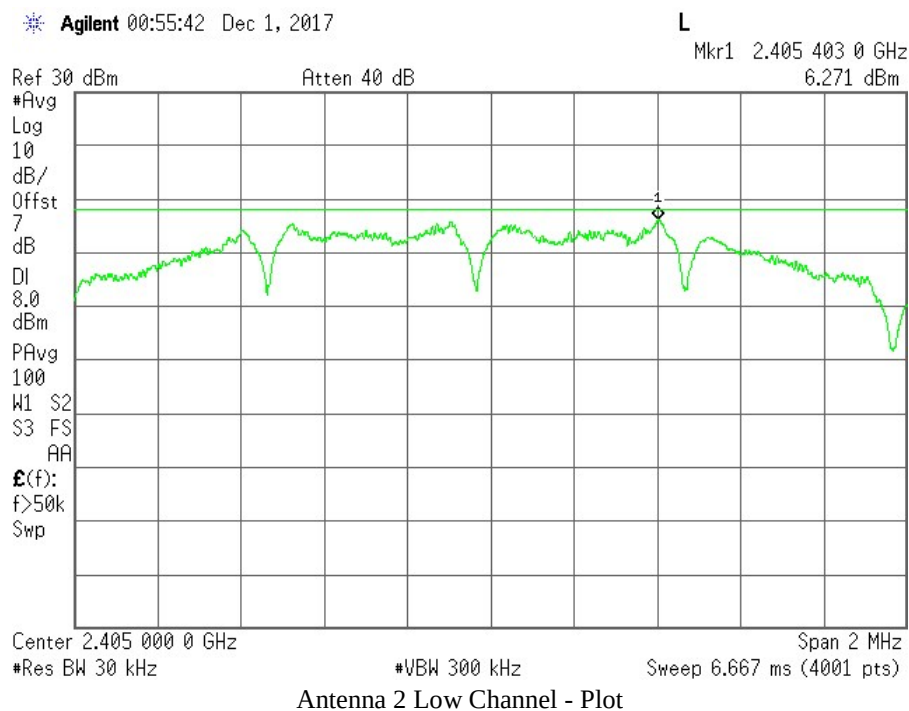
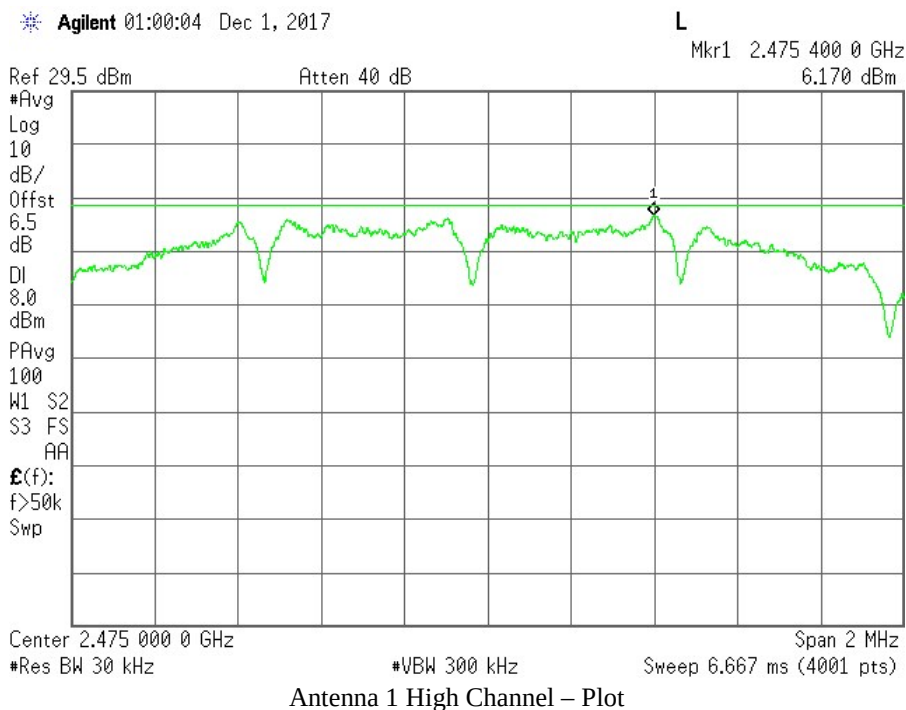
Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	6/6/2017	6/6/2019
Environmental Meter	11533	A070144	Extech Instruments	SD700	4/24/2017	4/24/2018

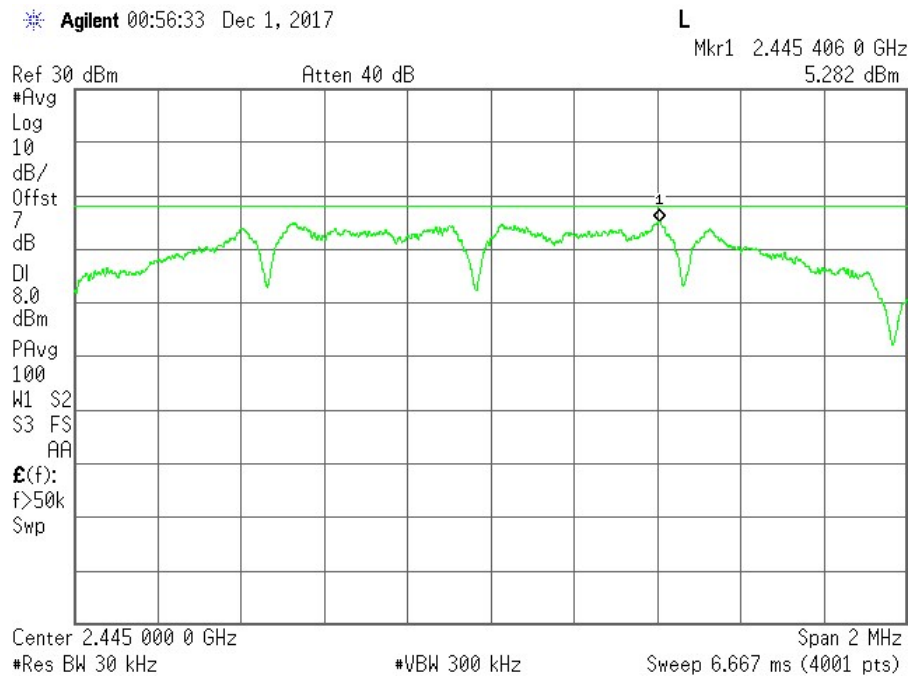
Test Results

Channel	Frequency (GHz)	Max Power (dBm)	
		Antenna 1	Antenna 2
Low	2.405	6.45	6.27
Mid	2.445	5.96	5.28
High	2.475	6.17	5.67

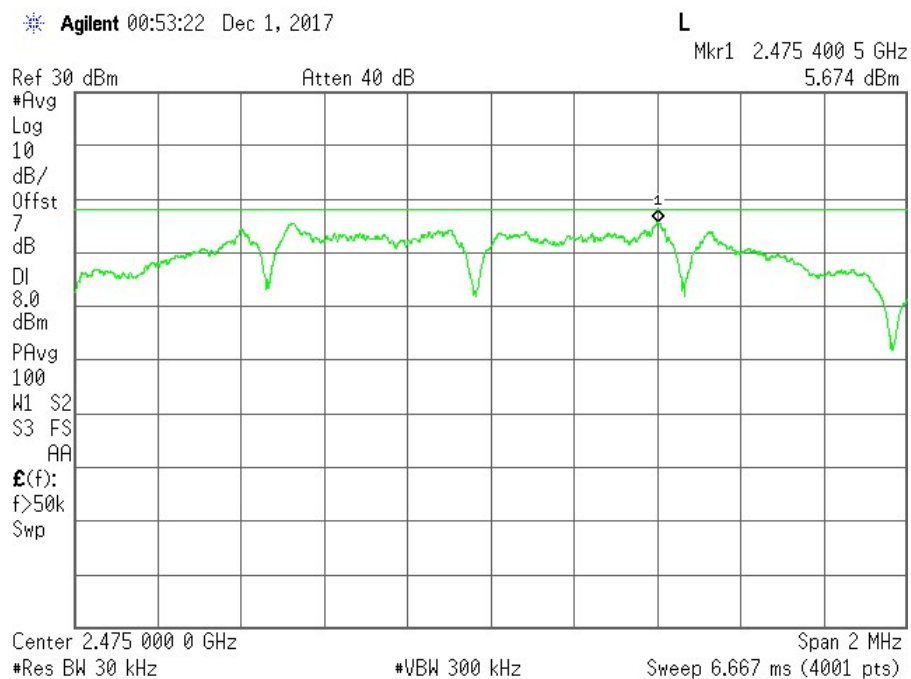
PSD







Antenna 2 Mid Channel - Plot



Antenna 2 High Channel - Plot

Authorized Band Edge / Conducted Spurious Emissions

Test Description

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (d) RSS-247, Section 5.5	20 or 30dB Below the Fundamental

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL	RF Lab	12/8/2017	25	7.8	1013	P

Equipment List

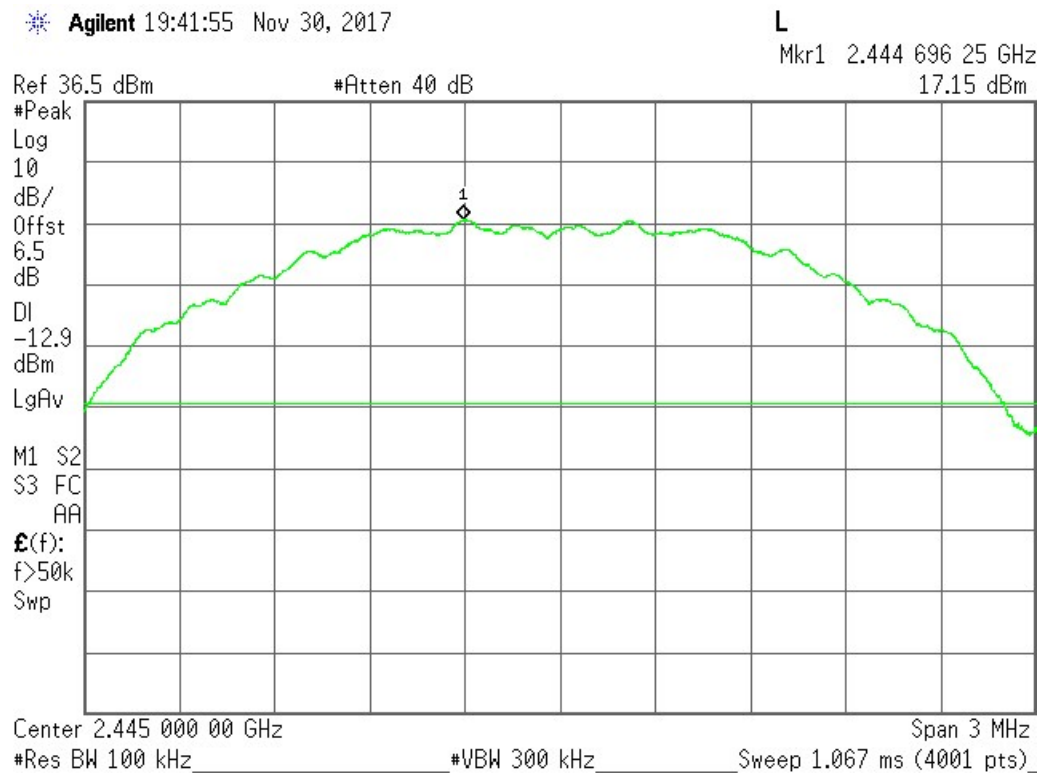
Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	6/6/2017	6/6/2019
Environmental Meter	11533	A070144	Extech Instruments	SD700	4/24/2017	4/24/2018

Test Results

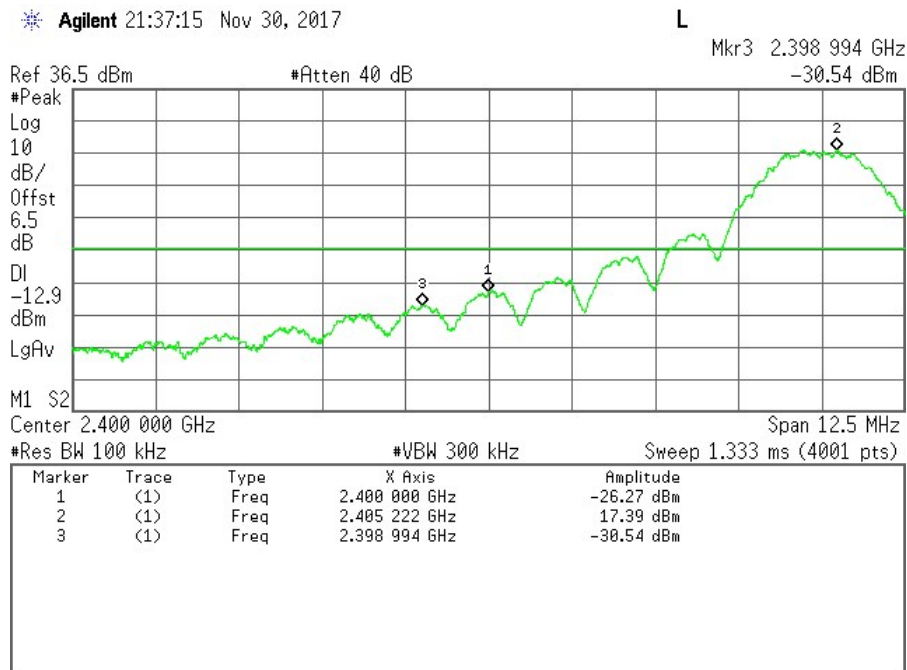
Authorized Band Edge			
Channel	Frequency (GHz)	N dB Down at Band edge (dBc)	
		Antenna 1	Antenna 2
Low	2.405	-43.66	-44.44
High	2.475	-60.56	-60.36

Conducted Spurious			
Channel	Frequency (GHz)	Highest Spurious Emission (dBm)	
		Antenna 1	Antenna 2
Low	2.405	-45.41	-44.29
Mid	2.445	-44.01	-43.49
High	2.475	-41.24	-44.24

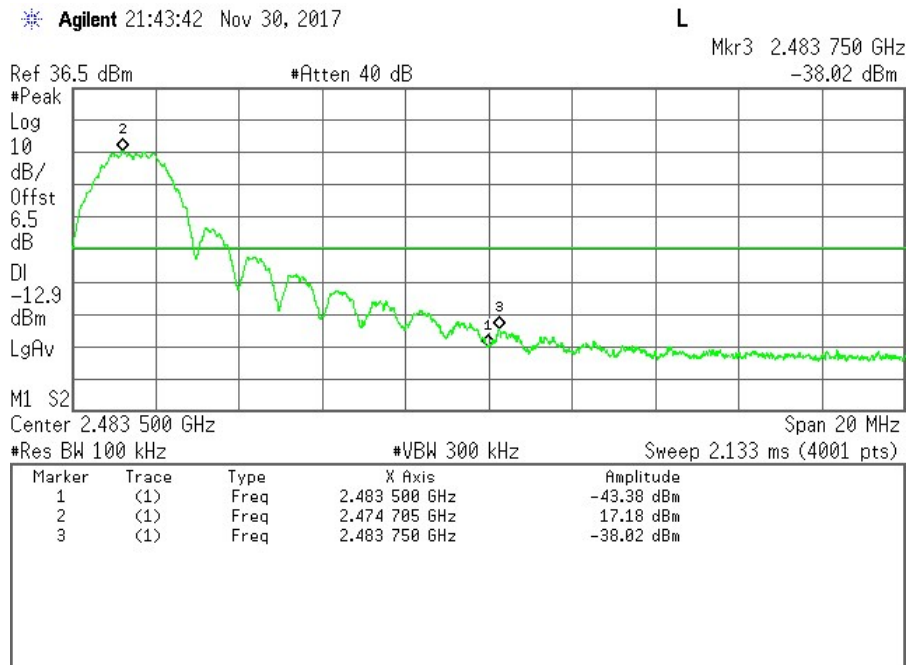
Band Edge



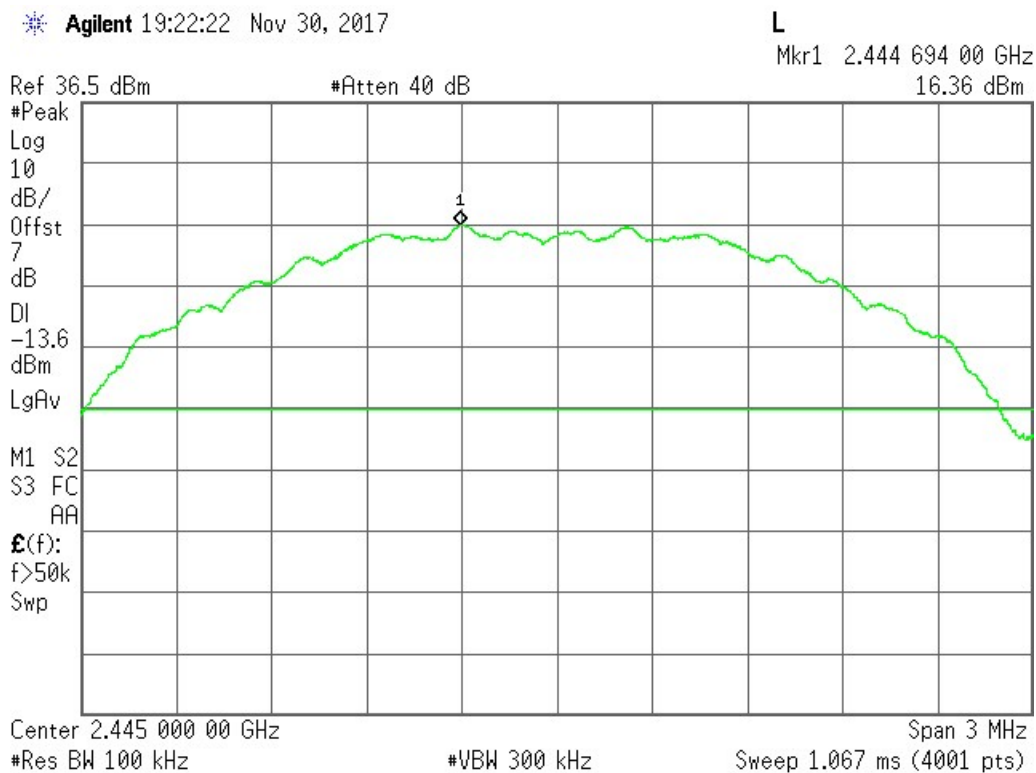
Antenna 1 Mid (Reference) Channel - Plot



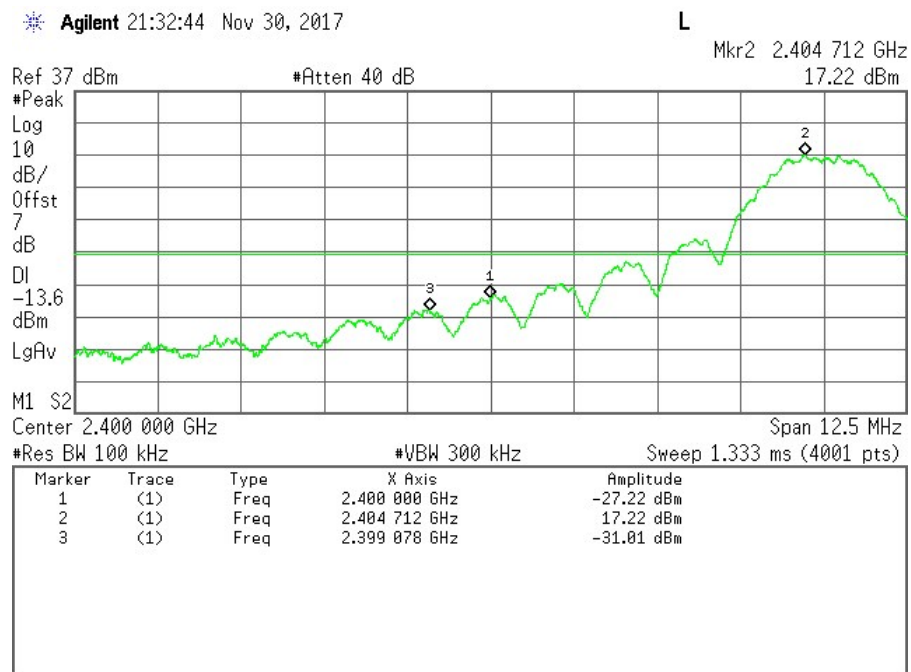
Antenna 1 Low Channel - Plot



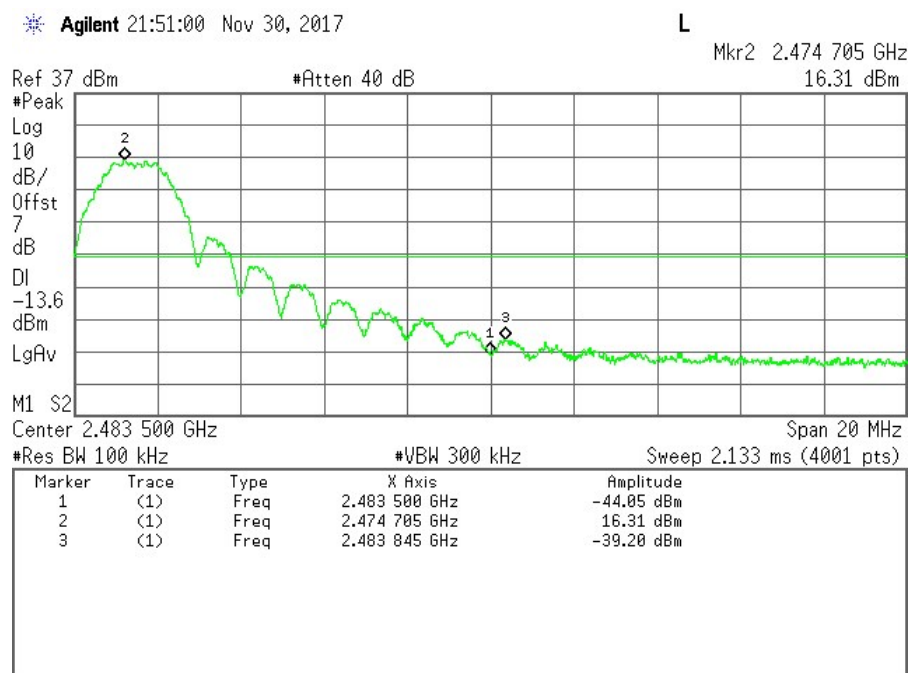
Antenna 1 High Channel - Plot



Antenna 2 Mid (Reference) Channel - Plot

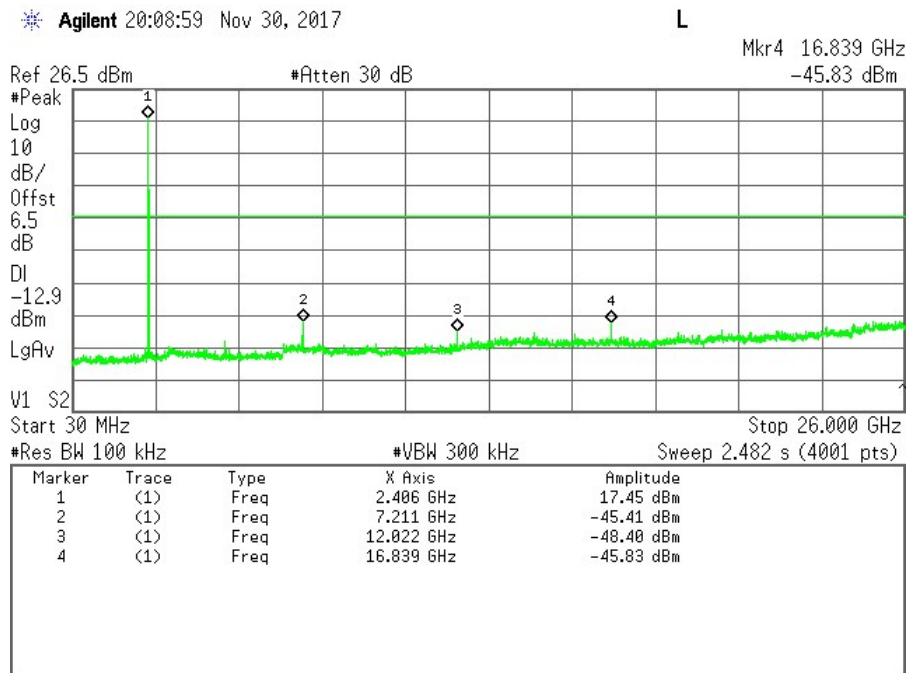


Antenna 2 Low Channel - Plot

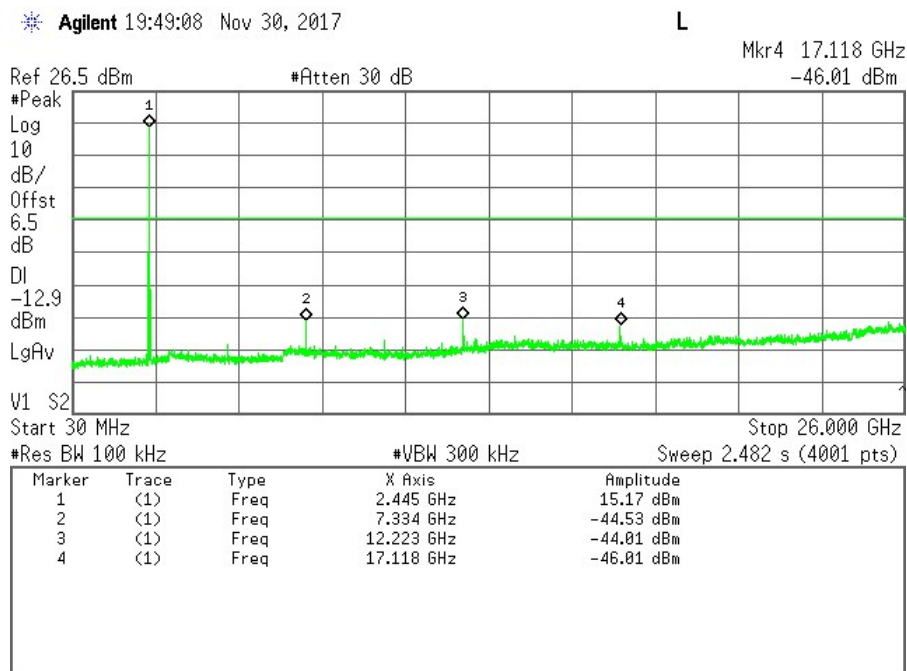


Antenna 2 High Channel - Plot

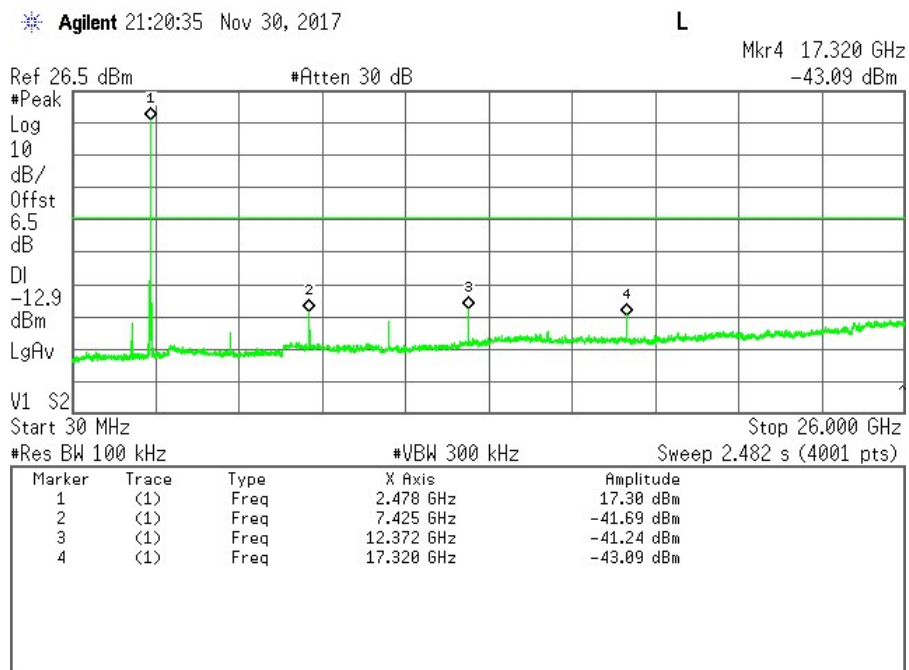
Conducted Spurious



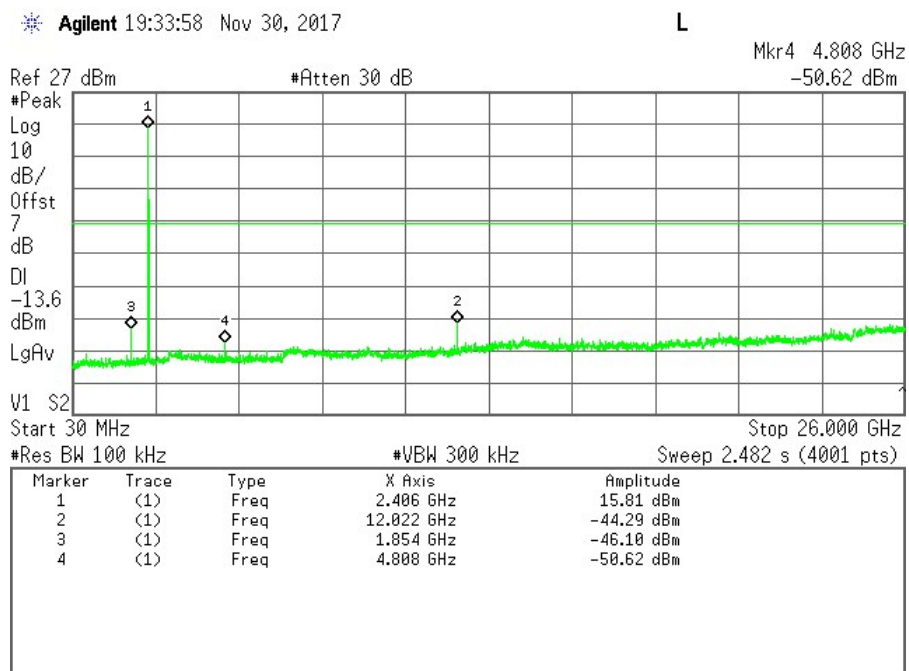
Antenna 1 Low Channel - Plot



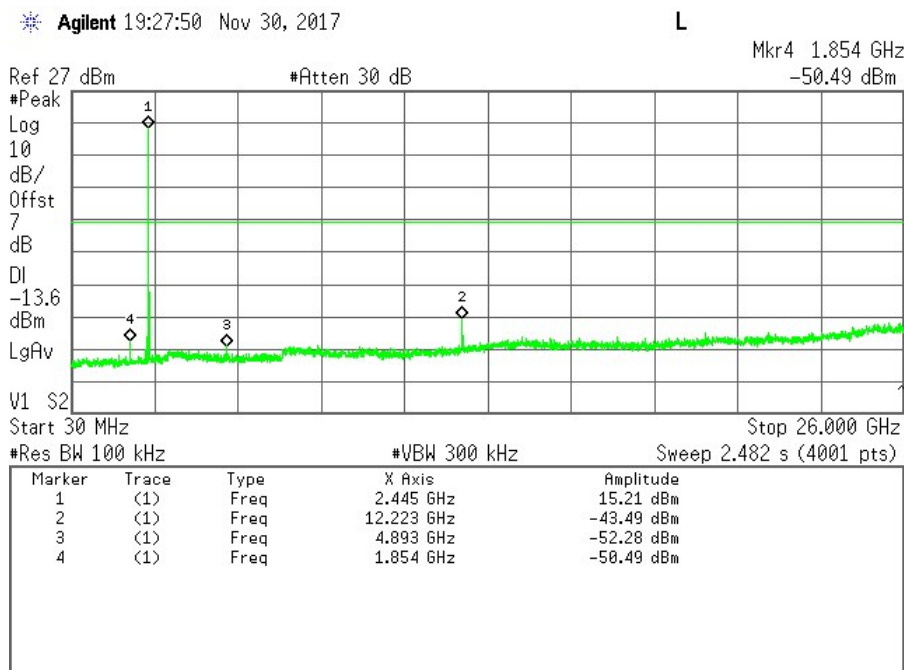
Antenna 1 Mid Channel - Plot



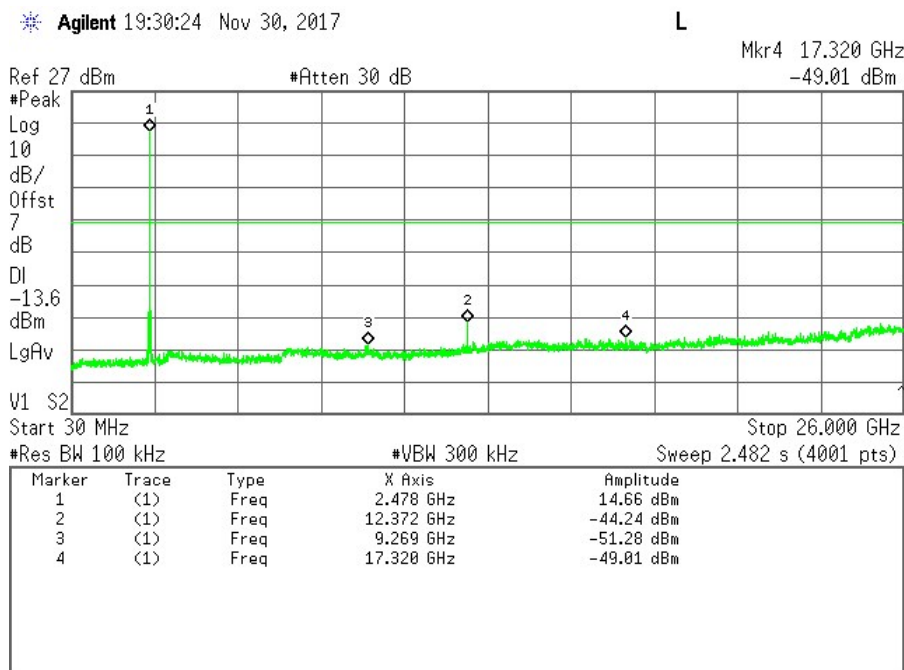
Antenna 1 High Channel – Plot



Antenna 2 Low Channel - Plot



Antenna 2 Mid Channel - Plot



Antenna 2 High Channel - Plot

Radiated Emissions (Intentional)

Test Description

Intentional Radiator Radiated Emissions are a test of the emissions, and harmonics on the EUT. The EUT is positioned to get the maximum emissions after a series of prescan measurements.

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1 GHz measurements and 1.5 m above the ground plane for above 1 GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Test Criteria

Reference	Limit		
	Frequency Range (MHz)	Field Strength Limit (uV/m)	Measurement distance (meters)
CFR 47 Subpart C, 15.205 CFR 47 Subpart C, 15.209 RSS-GEN	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

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL/JB	RF Chamber/OATS	12/12/17-12/20/17	3.9	75.0	1018	P

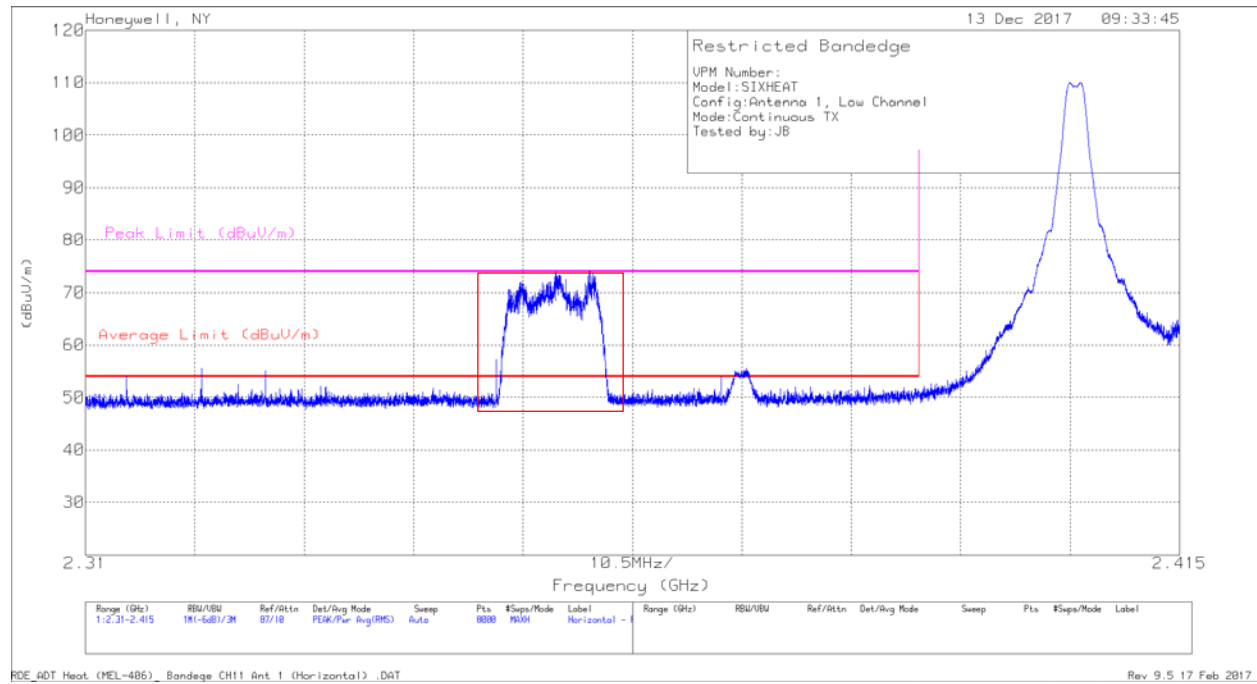
NOTE: Investigative testing was performed below 30MHz. No emissions were detected from the EUT that were within 20dB of the limit.

Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
RF Chamber						
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	4/10/2017	4/10/2018
Loop Antenna (9kHz-30MHz)	11535	121080	Com-Power	AL-130R	10/17/2017	10/17/2018
Bilog Antenna (30MHz-5GHz)	11311	A022406	Sunol	JB5	1/30/2017	1/30/2018
Horn Antenna (1-18GHz)	2319	2317	EMCO	3115	2/3/2017	2/3/2018
Horn Antenna (18-40GHz)	11472	151	EMCO	EM-6963	2/6/2017	2/6/2018
Preamp (10-4200MHz)	11537	1603006	Mini Circuits	TVA-11-422	N/A	N/A
Preamp (1-18GHz)	11539	160362	Amplical	AMP1G18-35	N/A	N/A
Preamp (18-40GHz)	11541	160911	Amplical	AMP18G40-35	N/A	N/A
Band Reject Filter	11553	G041	Micro-tronics	BRM50702-01	N/A	N/A
Measurement Software	11543	Version 9.5	UL	UL EMC	N/A	N/A
Environmental Meter	11548	A.078188	Extech Instruments	SD700	4/24/2017	4/24/2018
OATS						
Spectrum Analyzer	11545	103125	Rohde & Schwarz	FSW26	2/14/2017	2/14/2018
Bilog Antenna (30MHz-6GHz)	11534	A012816	Sunol	JB6	3/9/2017	3/9/2018
Horn Antenna (1-18GHz)	2973	3127	EMCO	RGA-60	2/3/2017	2/3/2018
Horn Antenna (18-40GHz)	11472	151	EMCO	EM-6963	2/6/2017	2/6/2018
Preamp (800MHz-21GHz)	11538	233701631	Mini Circuits	ZVA-213-S+	N/A	N/A
Preamp (18-40GHz)	11541	160911	Amplical	AMP18G40-35	N/A	N/A
High Pass Filter	11552	G018	Micro-tronics	HPM50111-01	N/A	N/A
Measurement Software	11543	Version 9.5	UL	UL EMC	N/A	N/A
Environmental Meter	11533	A070144	Extech Instruments	SD700	8/21/2017	8/21/2020

Test Results

Restricted Band Edge



Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBuV/m)	Corrected Pk Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.39	17.84	Pk	28.5	2.6	1.3	-23.1	27.14	50.24	54	-26.86	74	-23.76	15	112	H
* 2.373	22.98	Pk	28.4	2.6	1.3	-23.1	32.18	55.28	54	-21.82	74	-18.72	15	112	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

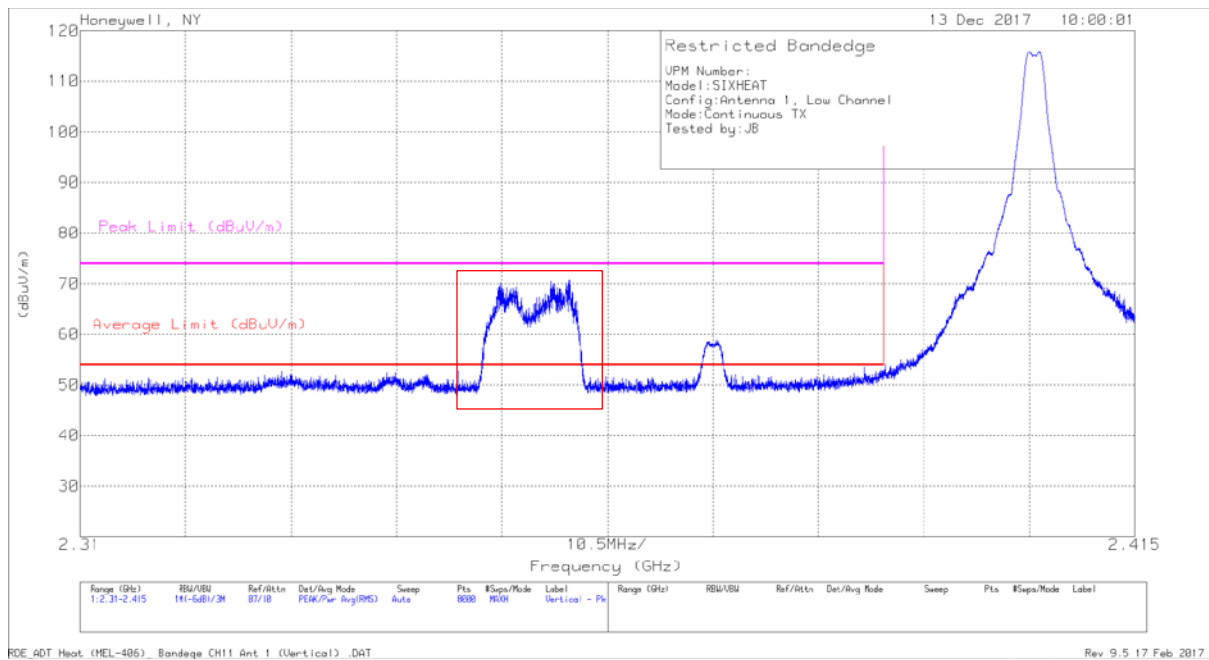
Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

NOTE: Emissions highlighted between ~ 2348-2360MHz have been determined to be OATS ambient and not a product of the EUT.

Antenna 1 Low Channel – Horizontal



Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBuV/m)	Corrected Pk Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.39	19.5	Pk	28.5	2.6	1.3	-23.1	28.8	51.9	54	-25.2	74	-22.1	15	112	H
* 2.373	26.47	Pk	28.4	2.6	1.3	-23.1	35.67	58.77	54	-18.33	74	-15.23	15	112	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

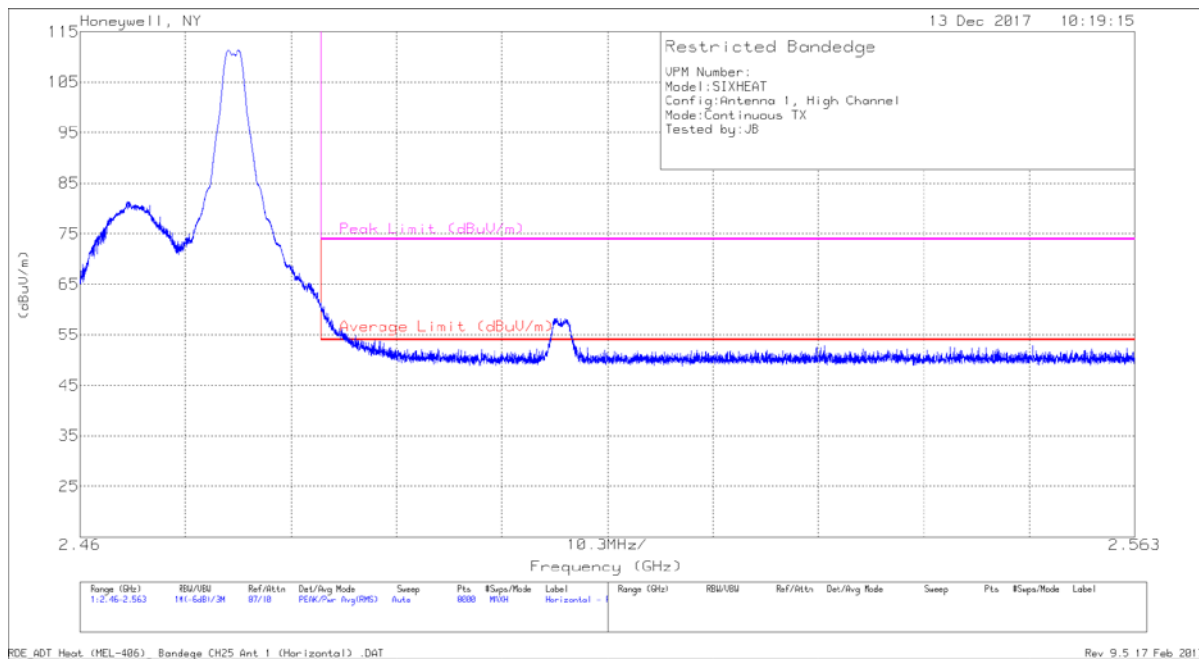
Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

NOTE: Emissions highlighted between ~ 2348-2360MHz have been determined to be OATS ambient and not a product of the EUT.

Antenna 1 Low Channel - Vertical



Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBuV/m)	Corrected Pk Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.484	27.88	Pk	28.7	2.6	1.4	-23.1	37.48	60.58	54	-16.52	74	-13.42	12	106	H
2.507	24.86	Pk	28.8	2.7	1.4	-23.1	34.66	57.76	54	-19.34	74	-16.24	12	106	H

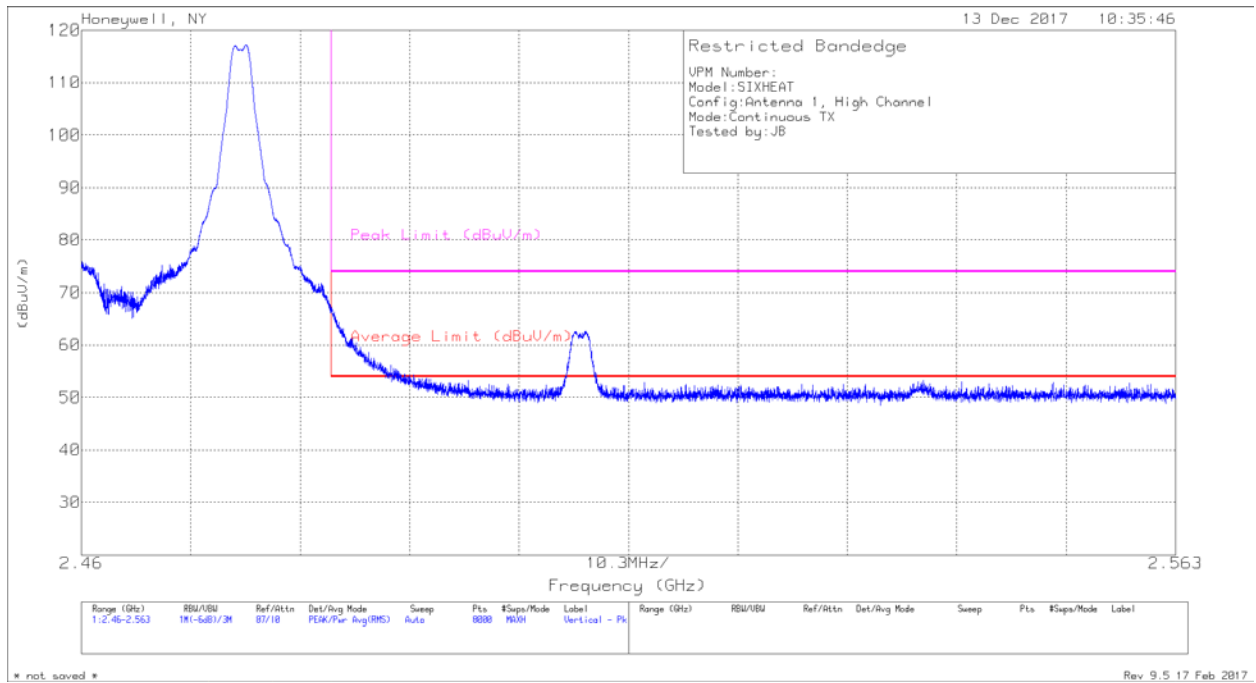
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 1 High Channel - Horizontal



Frequency (GHz)	Meter Reading (dBUV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBUV/m)	Corrected Pk Reading (dBUV/m)	Average Limit (dBUV/m)	Margin (dB)	Peak Limit (dBUV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.484	34.54	Pk	28.7	2.6	1.4	-23.1	44.14	67.24	54	-9.86	74	-6.76	88	117	V
2.507	29.2	Pk	28.8	2.7	1.4	-23.1	39	62.1	54	-15	74	-11.9	88	117	V

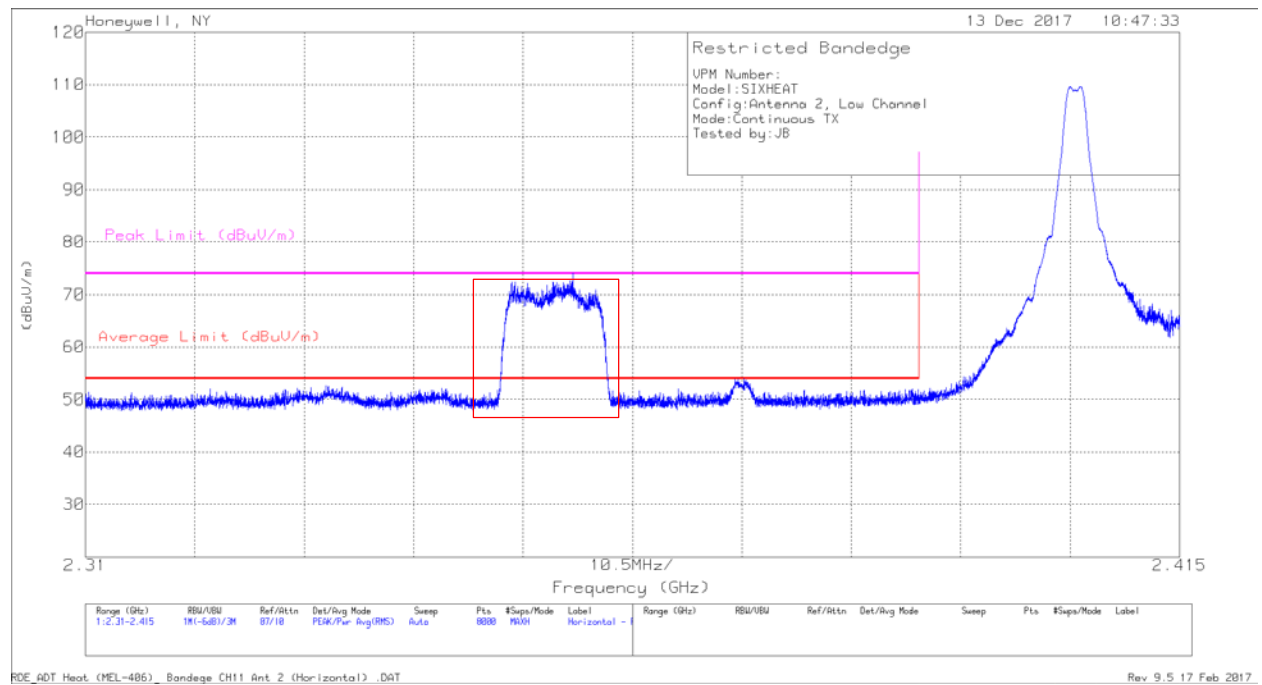
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 1 High Channel - Vertical



Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBuV/m)	Corrected Pk Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.39	17.62	Pk	28.5	2.6	1.3	-23.1	26.92	50.02	54	-27.08	74	-23.98	88	117	V
* 2.373	20.71	Pk	28.4	2.6	1.3	-23.1	29.91	53.01	54	-24.09	74	-20.99	88	117	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

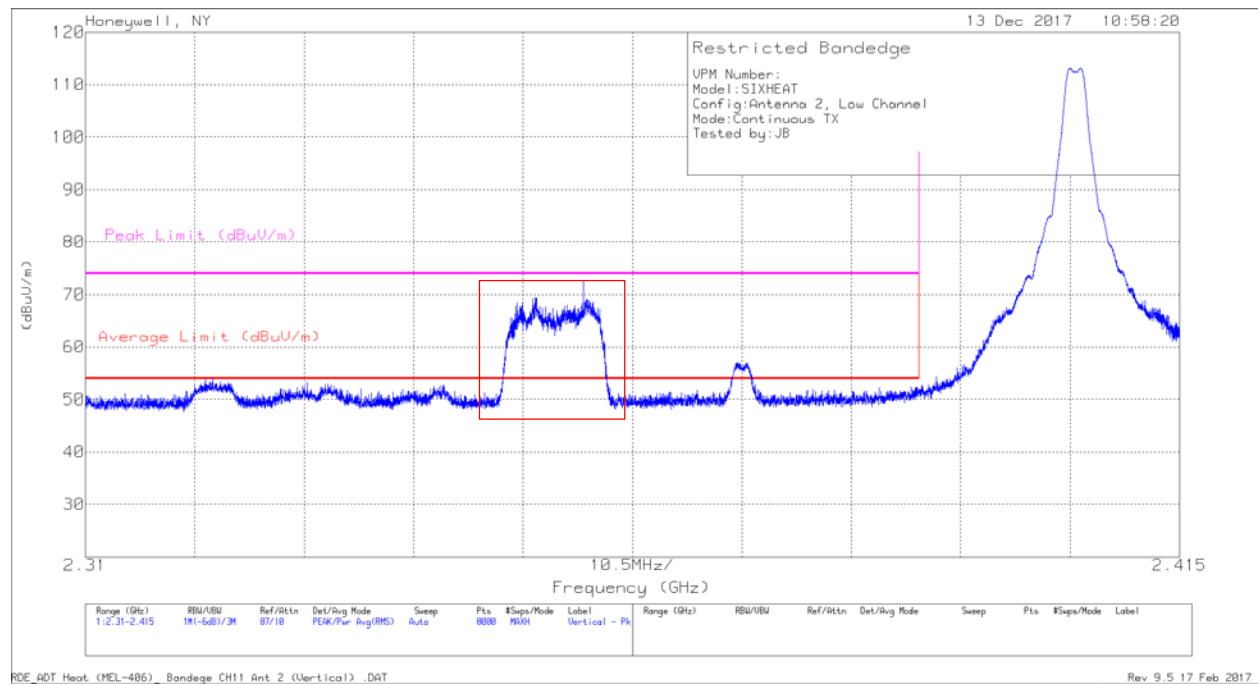
Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

NOTE: Emissions highlighted between ~ 2348-2360MHz have been determined to be OATS ambient and not a product of the EUT.

Antenna 2 Low Channel - Horizontal



Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBuV/m)	Corrected Pk Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.39	19.32	Pk	28.5	2.6	1.3	-23.1	28.62	51.72	54	-25.38	74	-22.28	88	117	V
* 2.373	24.67	Pk	28.4	2.6	1.3	-23.1	33.87	56.97	54	-20.13	74	-17.03	88	117	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

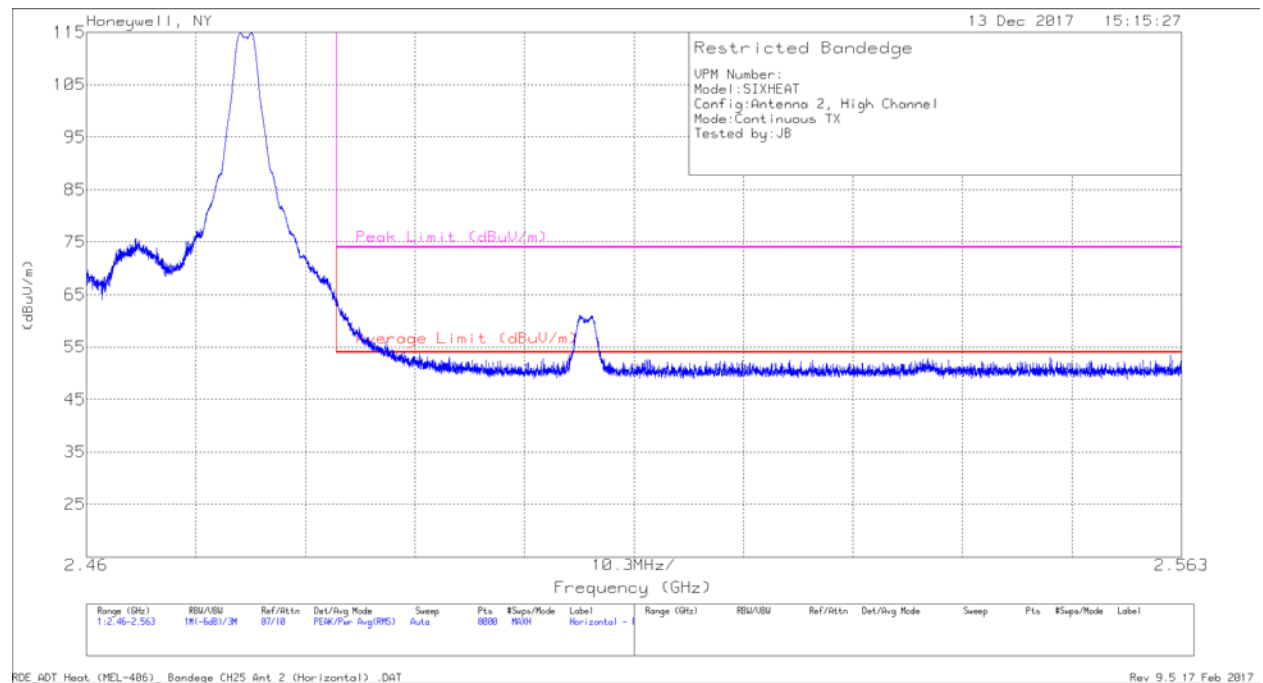
Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

NOTE: Emissions highlighted between ~ 2348-2360MHz have been determined to be OATS ambient and not a product of the EUT.

Antenna 2 Low Channel - Vertical



Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SMA7 [dB]	SMA6 [dB]	DCF [dB]	Corrected Av Reading (dBuV/m)	Corrected Pk Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.484	31.05	Pk	28.7	2.6	1.4	-23.1	40.65	63.75	54	-13.35	74	-10.25	88	117	H
2.507	27.81	Pk	28.8	2.7	1.4	-23.1	37.61	60.71	54	-16.39	74	-13.29	88	117	H

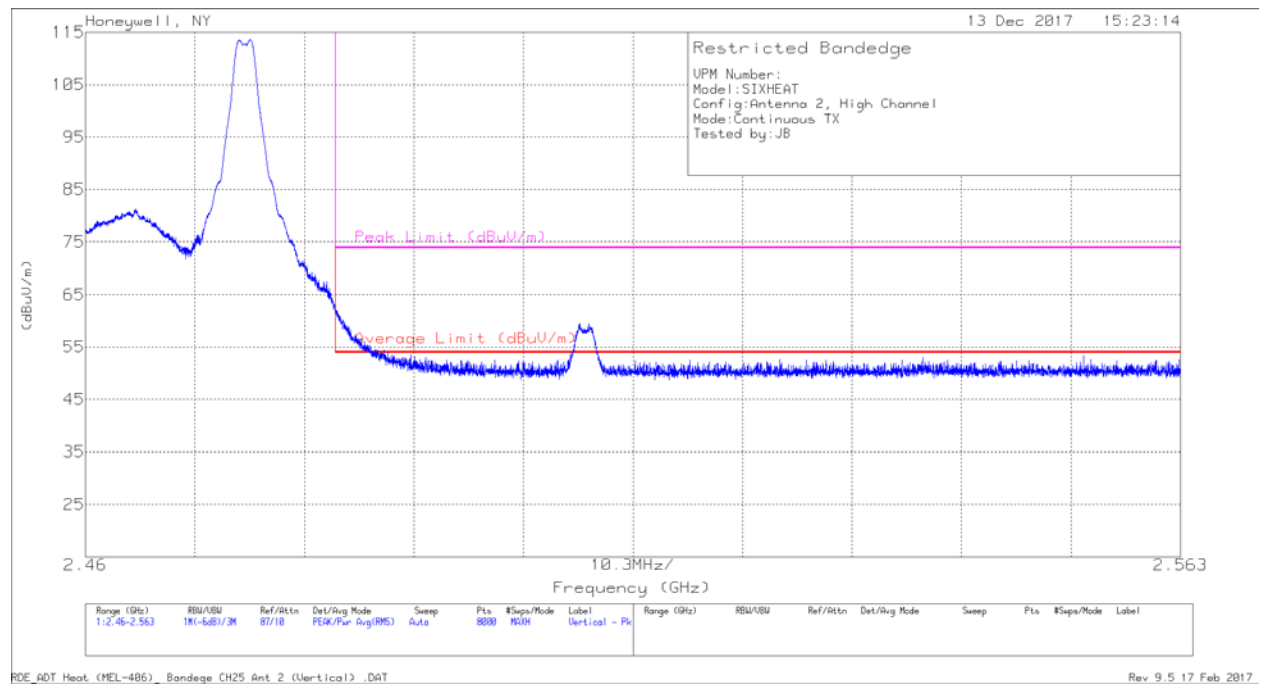
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 2 High Channel - Horizontal



* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

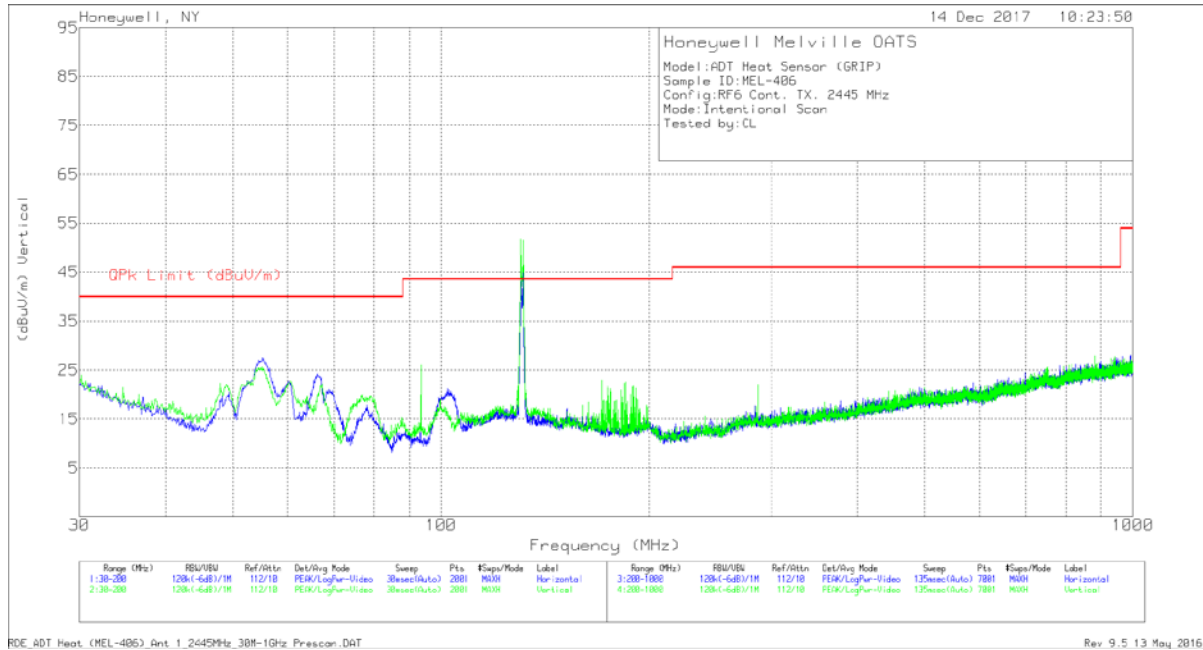
Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 2 High Channel - Vertical

Spurious Emissions

30MHz - 1GHz

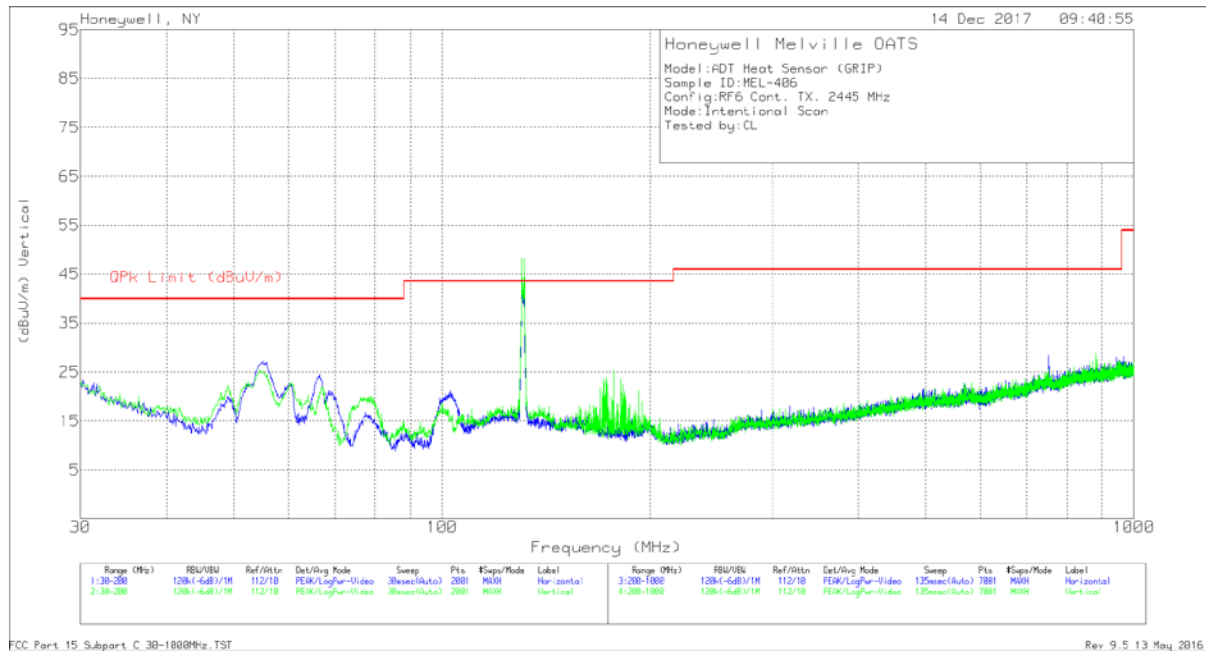


Frequency (MHz)	Meter Reading (dBuV)	Det	AF JB6 [dB/m]	Cable 1 [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
54.8886	15.19	Qp	11.9	1.1	28.19	40	-11.81	81	385	H
65.4231	16.99	Qp	12.1	1.2	30.29	40	-9.71	13	391	H
130.2385	5.6	Qp	17.7	1.8	25.1	43.52	-18.42	195	235	H
55.3315	19.06	Qp	11.9	1.1	32.06	40	-7.94	36	140	V
93.6331	14.42	Qp	12.6	1.5	28.52	43.52	-15	238	114	V
130.2918	6.14	Qp	17.7	1.8	25.64	43.52	-17.88	158	105	V

Qp - Quasi-Peak detector

Antenna 1 Worse-case

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS



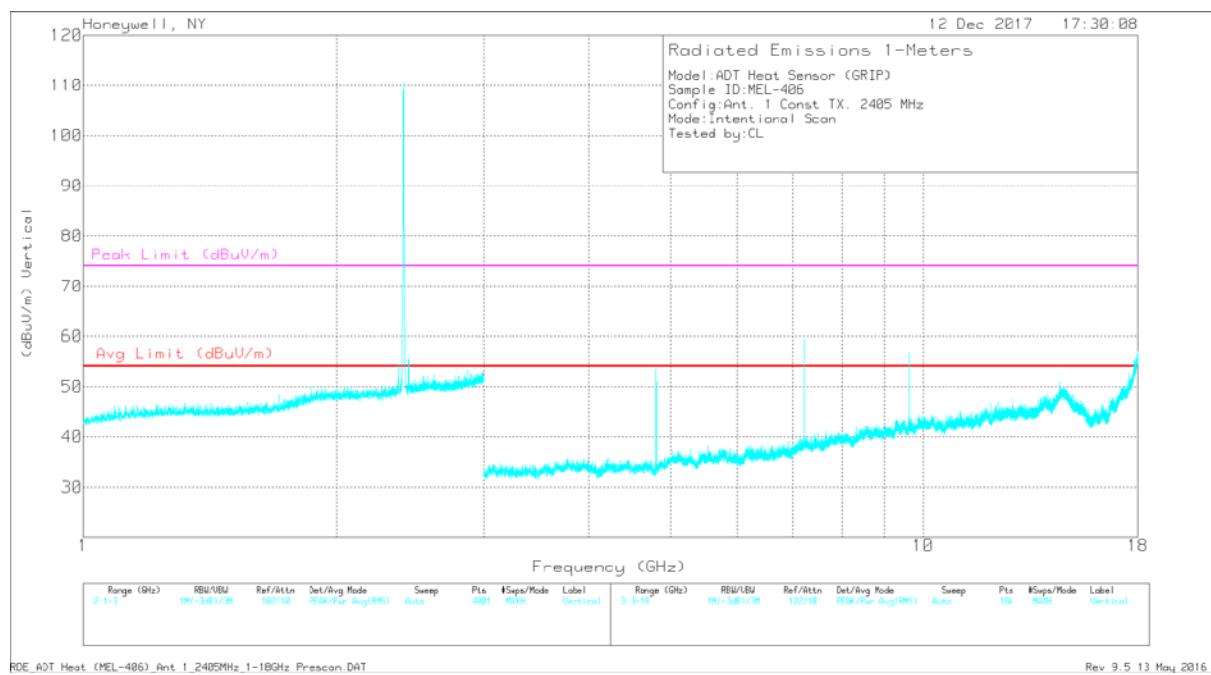
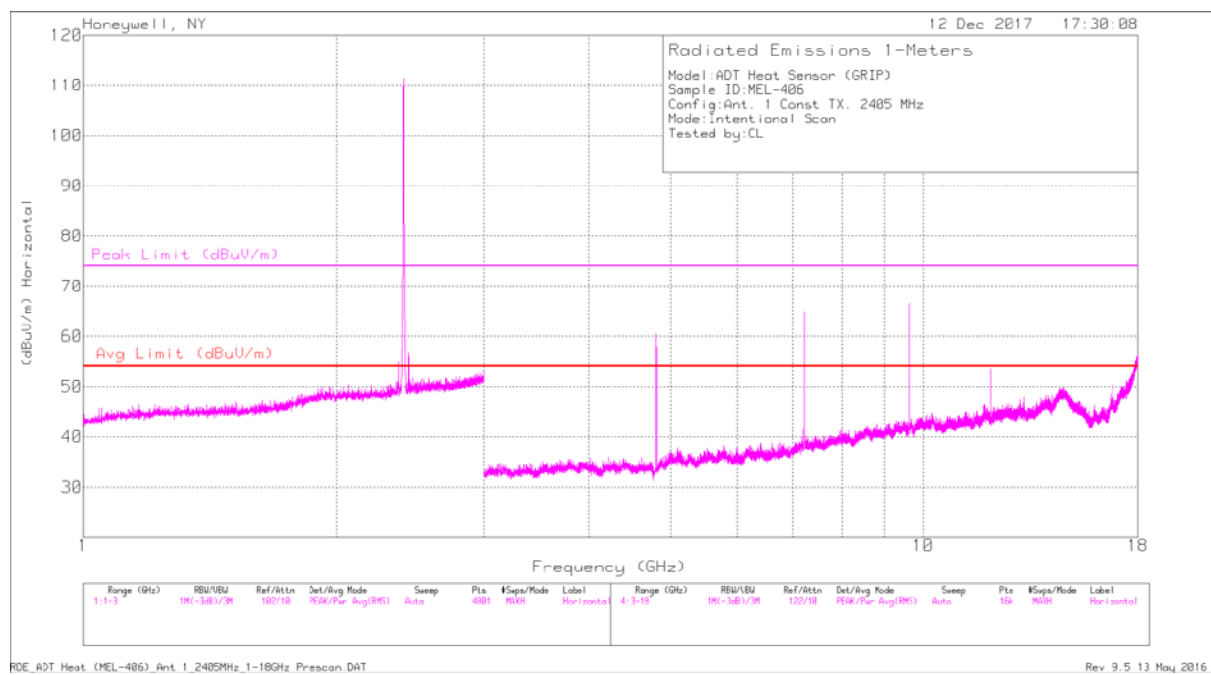
Frequency (MHz)	Meter Reading (dBuV)	Det	AF JB6 [dB/m]	Cable 1 [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
55.5662	15.67	Qp	11.9	1.1	28.67	40	-11.33	99	340	H
67.1739	14.08	Qp	12.2	1.3	27.58	40	-12.42	257	323	H
130.3765	5.43	Qp	17.7	1.8	24.93	43.52	-18.59	312	239	H
54.3075	20.75	Qp	12	1.1	33.85	40	-6.15	126	148	V
129.9369	5.91	Qp	17.7	1.8	25.41	43.52	-18.11	201	331	V
176.6884	18.9	Qp	15.8	2.1	36.8	43.52	-6.72	120	102	V

Qp - Quasi-Peak detector

Antenna 2 Worse-case

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

1 - 18GHz



Antenna 1 Low Channel - Plot

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

LOW CHANNEL														
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]		Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.809	46.58	PK2	33	-26.8	3.7	1.6	.6		58.68	74	-15.32	304	266	H
7.213	43.03	PK2	36.2	-26.2	4.7	2	.8		60.53	74	-13.47	103	275	H
9.622	40.63	PK2	37.8	-26.1	5.6	2.5	.5		60.93	74	-13.07	49	255	H
16.833	37.45	PK2	40.3	-25.3	7.4	3.4	1.1		64.35	74	-9.65	96	170	H
* 12.024	35.24	PK2	39.4	-25.8	6.5	2.8	-.6		57.54	74	-16.46	62	293	H
* 4.811	49.43	PK2	33	-26.8	3.7	1.6	.6		61.53	74	-12.47	197	259	V
7.217	46.33	PK2	36.3	-26.2	4.7	2	.8		63.93	74	-10.07	241	217	V
9.622	42.41	PK2	37.8	-26.1	5.6	2.5	.5		62.71	74	-11.29	117	193	V
* 12.026	35.12	PK2	39.4	-25.8	6.5	2.8	-.6		57.42	74	-16.58	122	366	V
16.837	36.95	PK2	40.3	-25.3	7.5	3.4	1.1		63.95	74	-10.05	156	149	V
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]	DCF [dB]	Corrected Reading (dBuV/m)	Av Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.809	46.58	Av	33	-26.8	3.7	1.6	.6	-23.13	35.55	54	-18.45	304	266	H
7.213	43.03	Av	36.3	-26.2	4.7	2	.8	-23.13	37.5	54	-16.5	103	275	H
9.622	40.63	Av	37.8	-26.1	5.6	2.5	.5	-23.13	37.8	54	-16.2	49	255	H
16.833	37.45	Av	40.2	-25.3	7.4	3.4	1.1	-23.13	41.12	54	-12.88	96	170	H
* 12.024	35.24	Av	39.4	-25.8	6.5	2.8	-.7	-23.13	34.31	54	-19.69	62	293	H
* 4.811	49.43	Av	33	-26.8	3.7	1.6	.6	-23.13	38.4	54	-15.6	197	259	V
7.217	46.33	Av	36.3	-26.2	4.7	2	.8	-23.13	40.8	54	-13.2	241	217	V
9.622	42.41	Av	37.8	-26.1	5.6	2.5	.5	-23.13	39.58	54	-14.42	117	193	V
* 12.026	35.12	Av	39.4	-25.8	6.5	2.8	-.6	-23.13	34.29	54	-19.71	122	366	V
16.837	36.95	Av	40.2	-25.3	7.4	3.4	1.1	-23.13	40.62	54	-13.38	156	149	V

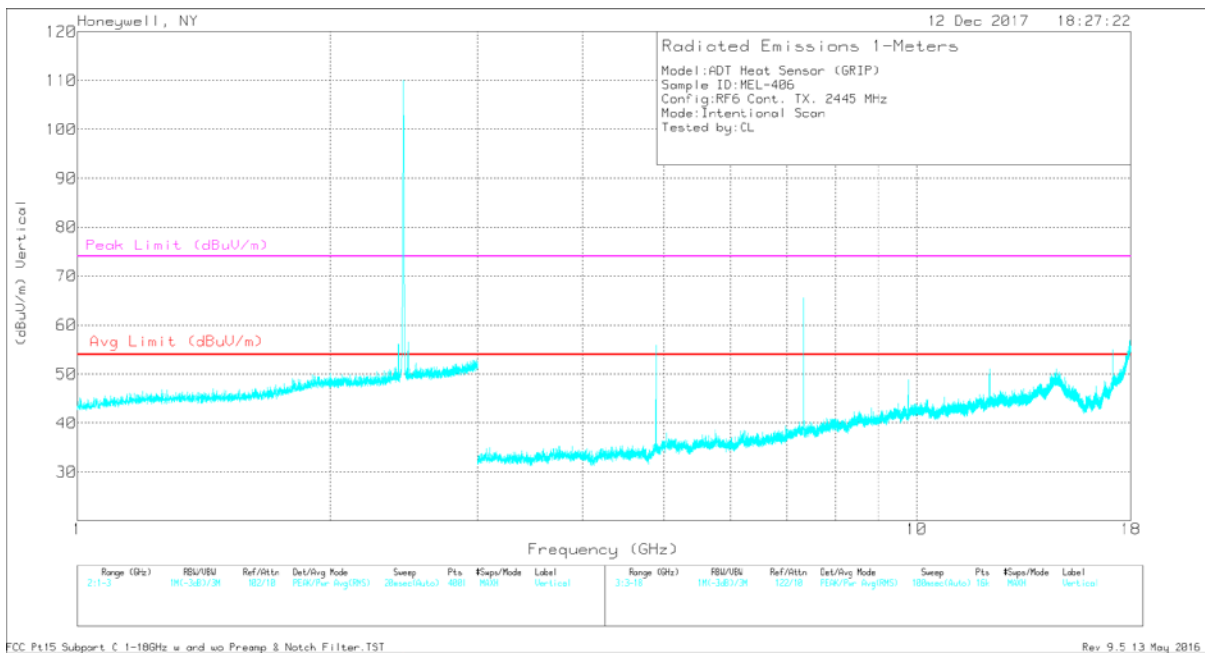
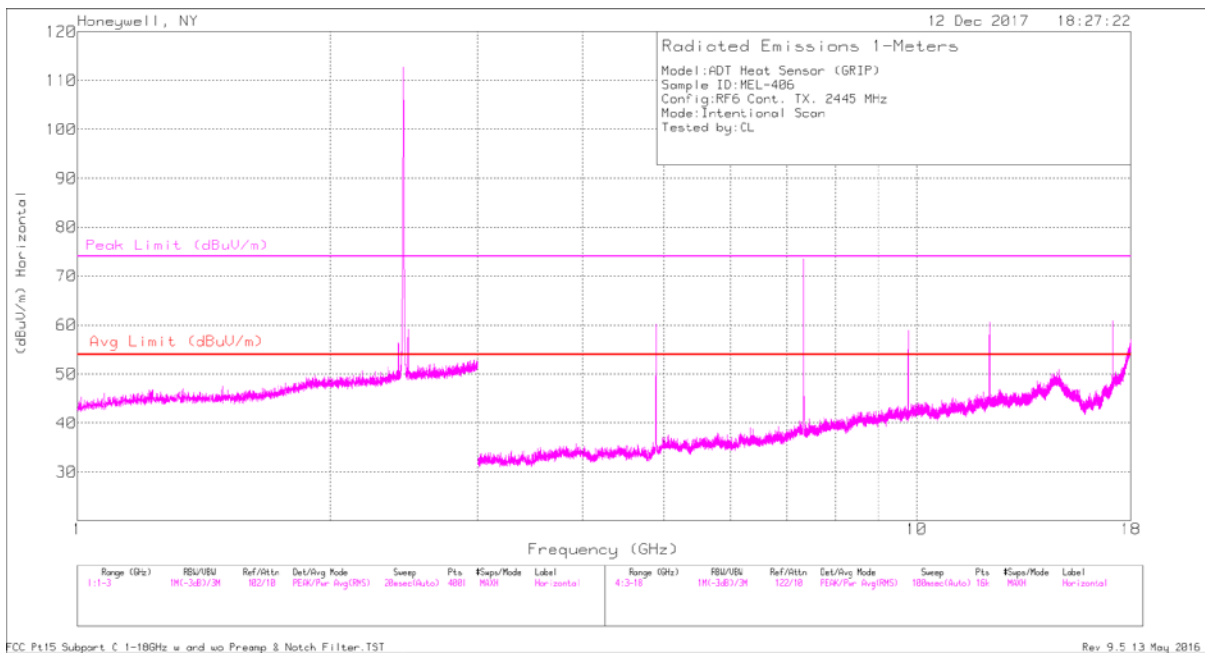
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 1 Low Channel - Data



Antenna 1 Mid Channel - Plot

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

MID CHANNEL														
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]		Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.889	46.61	PK2	33.2	-26.9	3.7	1.6	.6		58.81	74	-15.19	149	363	H
* 7.336	51.99	PK2	36.7	-26.2	4.6	2	.6		69.69	74	-4.31	282	326	H
9.782	38.67	PK2	38.1	-26.2	5.5	2.4	.5		58.97	74	-15.03	83	354	H
* 12.227	40.74	PK2	38.9	-25.6	6.5	3.5	.5		64.54	74	-9.46	138	371	H
17.111	37.65	PK2	42.2	-25.3	7.5	3.2	1.3		66.55	74	-7.45	120	352	H
* 4.889	46.22	PK2	33.2	-26.9	3.7	1.6	.6		58.42	74	-15.58	195	252	V
* 7.336	53.89	PK2	36.7	-26.2	4.6	2	.6		71.59	74	-2.41	153	164	V
* 12.227	43.31	PK2	38.9	-25.6	6.5	3.5	.5		67.11	74	-6.89	188	159	V
17.112	37.69	PK2	42.2	-25.3	7.5	3.2	1.3		66.59	74	-7.41	62	260	V
9.782	43.06	PK2	38.1	-26.2	5.5	2.4	.5		63.36	74	-10.64	206	258	V
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]	DCF [dB]	Corrected Reading (dBuV/m)	Av Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.889	46.61	Av	33.2	-26.9	3.7	1.6	.6	-23.13	35.68	54	-18.32	149	363	H
* 7.336	51.99	Av	36.7	-26.2	4.6	2	.6	-23.13	46.56	54	-7.44	282	326	H
9.782	38.67	Av	38.1	-26.2	5.5	2.4	.5	-23.13	35.84	54	-18.16	83	354	H
* 12.227	40.74	Av	38.9	-25.6	6.5	3.5	.5	-23.13	41.41	54	-12.59	138	371	H
17.111	37.65	Av	42.2	-25.3	7.5	3.2	1.3	-23.13	43.42	54	-10.58	120	352	H
* 4.889	46.22	Av	33.2	-26.9	3.7	1.6	.6	-23.13	35.29	54	-18.71	195	252	V
* 7.336	53.89	Av	36.7	-26.2	4.6	2	.6	-23.13	48.46	54	-5.54	153	164	V
* 12.227	43.31	Av	38.9	-25.6	6.5	3.5	.5	-23.13	43.98	54	-10.02	188	159	V
17.112	37.69	Av	42.2	-25.3	7.5	3.2	1.3	-23.13	43.46	54	-10.54	62	260	V
9.782	43.06	Av	38.1	-26.2	5.5	2.4	.5	-23.13	40.23	54	-13.77	206	258	V

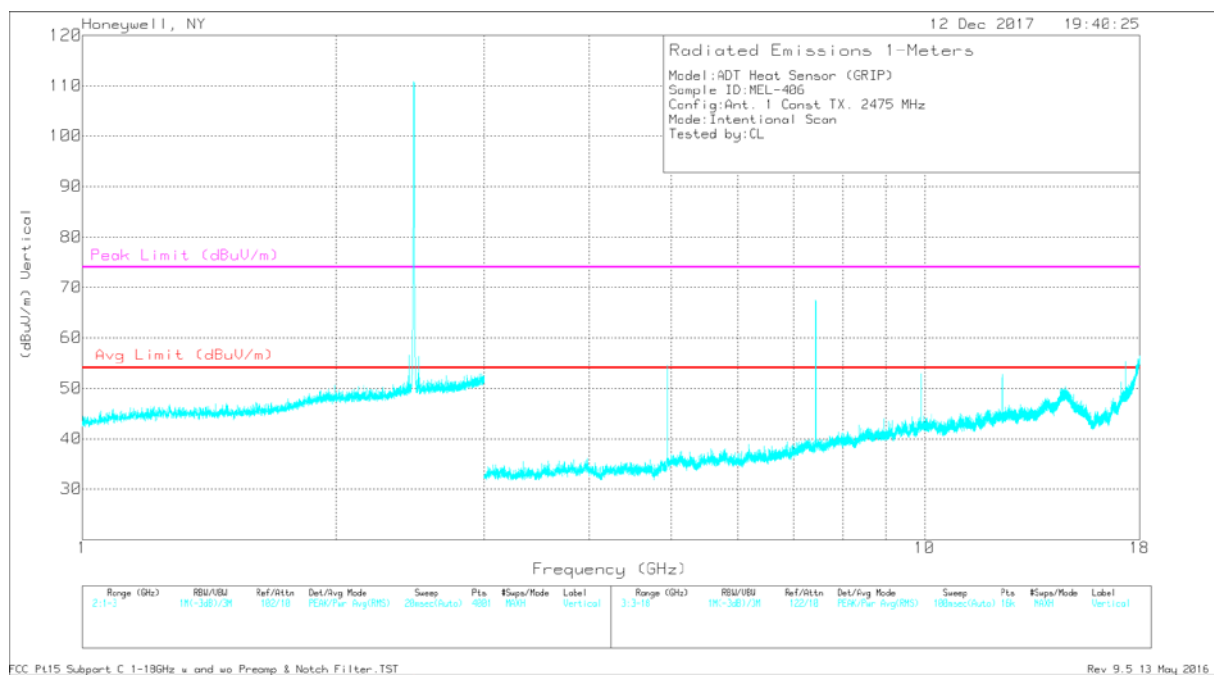
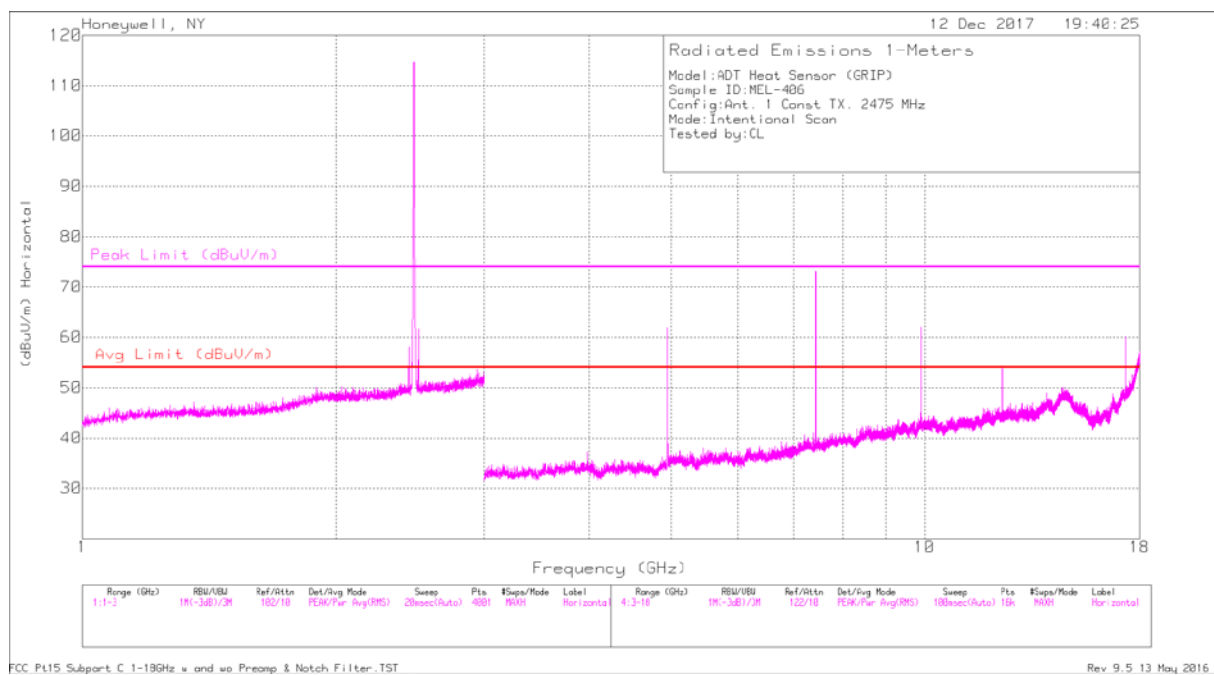
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 1 Mid Channel - Data



Antenna 1 High Channel - Plot

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

HIGH CHANNEL														
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]		Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.951	44.32	PK2	33.3	-26.7	3.8	1.6	.6		56.92	74	-17.08	173	228	H
* 7.426	53.06	PK2	36.8	-26.2	4.7	2	.5		70.86	74	-3.14	302	216	H
9.898	43.88	PK2	38.4	-26.1	5.5	2.5	.5		64.68	74	-9.32	203	187	H
* 12.377	44.27	PK2	38.7	-25.7	6.5	3.8	-3		67.27	74	-6.73	58	191	H
17.321	37.78	PK2	43.8	-25	7.5	3.3	1.1		68.48	74	-5.52	251	211	H
* 4.949	44.42	PK2	33.3	-26.7	3.8	1.6	.6		57.02	74	-16.98	169	222	V
* 7.426	55.56	PK2	36.8	-26.2	4.7	2	.5		73.36	74	-.64	239	300	V
9.902	45.61	PK2	38.4	-26.1	5.5	2.5	.5		66.41	74	-7.59	188	159	V
* 12.377	44.03	PK2	38.7	-25.7	6.5	3.8	-3		67.03	74	-6.97	194	165	V
17.321	37.63	PK2	43.8	-25	7.5	3.3	1.1		68.33	74	-5.67	165	321	V
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]	DCF [dB]	Corrected Reading (dBuV/m)	Av Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.951	44.32	Av	33.3	-26.7	3.8	1.6	.6	-23.13	33.79	54	-20.21	173	228	H
* 7.426	53.06	Av	36.8	-26.2	4.7	2	.5	-23.13	47.73	54	-6.27	302	216	H
9.898	43.88	Av	38.4	-26.1	5.5	2.5	.5	-23.13	41.55	54	-12.45	203	187	H
* 12.377	44.27	Av	38.7	-25.7	6.5	3.8	-3	-23.13	44.14	54	-9.86	58	191	H
17.321	37.78	Av	43.8	-25	7.5	3.3	1.1	-23.13	45.35	54	-8.65	251	211	H
* 4.949	44.42	Av	33.3	-26.7	3.8	1.6	.6	-23.13	33.89	54	-20.11	169	222	V
* 7.426	55.56	Av	36.8	-26.2	4.7	2	.5	-23.13	50.23	54	-3.77	239	300	V
9.902	45.61	Av	38.4	-26.1	5.5	2.5	.5	-23.13	43.28	54	-10.72	188	159	V
* 12.377	44.03	Av	38.7	-25.7	6.5	3.8	-3	-23.13	43.9	54	-10.1	194	165	V
17.321	37.63	Av	43.8	-25	7.5	3.3	1.1	-23.13	45.2	54	-8.8	165	321	V

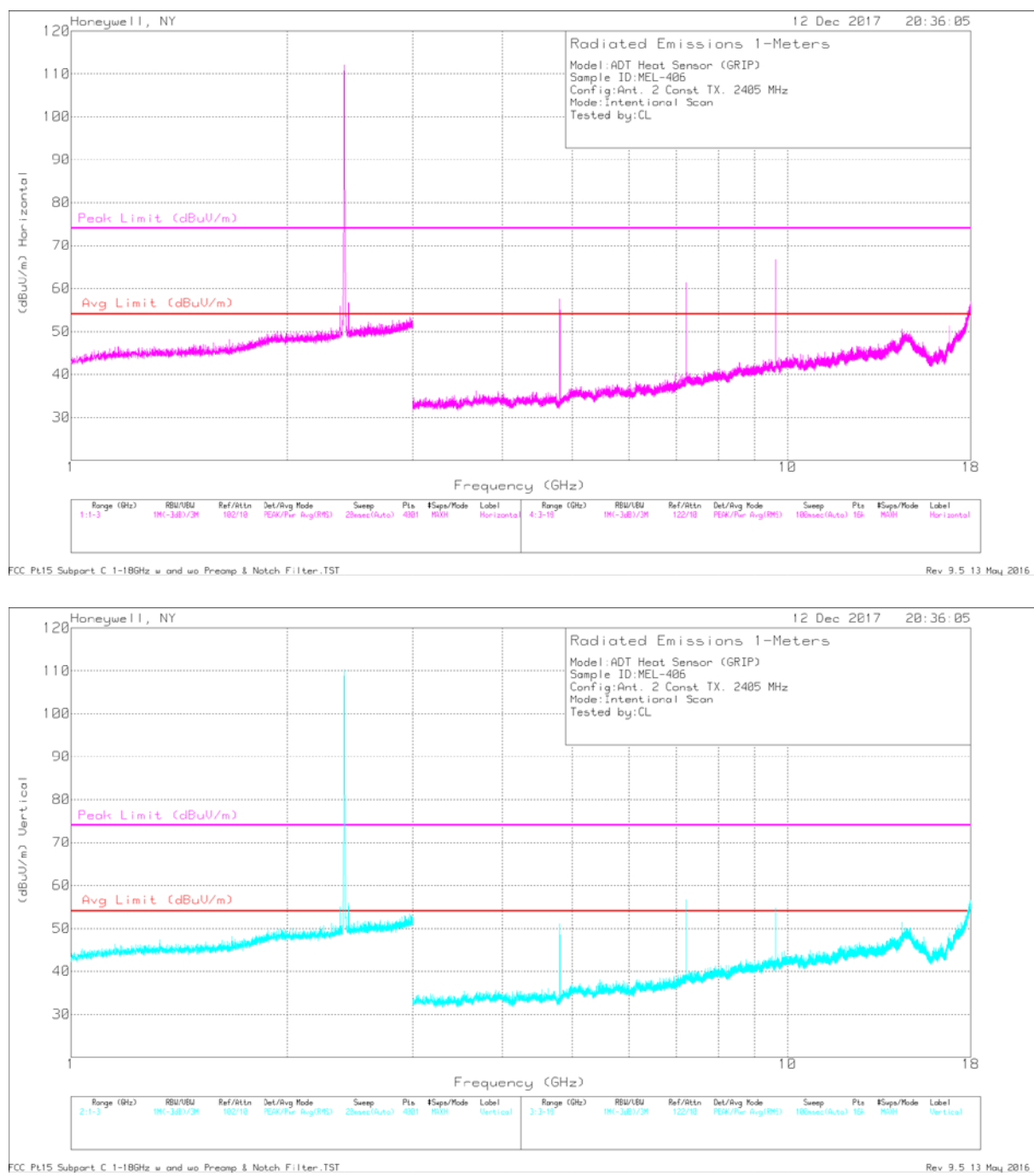
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 1 High Channel - Data



Antenna 2 Low Channel - Plot

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

LOW CHANNEL														
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]		Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.811	46.3	PK2	33	-26.8	3.7	1.6	.6		58.4	74	-15.6	145	357	H
7.217	41.53	PK2	36.3	-26.2	4.7	2	.8		59.13	74	-14.87	292	308	H
9.622	41.43	PK2	37.8	-26.1	5.6	2.5	.5		61.73	74	-12.27	271	340	H
16.833	36.55	PK2	40.2	-25.3	7.4	3.4	1.1		63.35	74	-10.65	146	172	H
* 4.811	47.02	PK2	33	-26.8	3.7	1.6	.6		59.12	74	-14.88	204	320	V
7.216	44.1	PK2	36.3	-26.2	4.7	2	.8		61.7	74	-12.3	235	185	V
9.622	44.33	PK2	37.8	-26.1	5.6	2.5	.5		64.63	74	-9.37	187	136	V
16.835	37.53	PK2	40.3	-25.3	7.4	3.4	1.1		64.43	74	-9.57	229	151	V
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]	DCF [dB]	Corrected Reading (dBuV/m)	Av Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.811	46.3	Av	33	-26.8	3.7	1.6	.6	-23.13	35.27	54	-18.73	145	357	H
7.217	41.53	Av	36.3	-26.2	4.7	2	.8	-23.13	36	54	-18	292	308	H
9.622	41.43	Av	37.8	-26.1	5.6	2.5	.5	-23.13	38.6	54	-15.4	271	340	H
16.833	36.55	Av	40.2	-25.3	7.4	3.4	1.1	-23.13	40.22	54	-13.78	146	172	H
* 4.811	47.02	Av	33	-26.8	3.7	1.6	.6	-23.13	35.99	54	-18.01	204	320	V
7.216	44.1	Av	36.3	-26.2	4.7	2	.8	-23.13	38.57	54	-15.43	235	185	V
9.622	44.33	Av	37.8	-26.1	5.6	2.5	.5	-23.13	41.5	54	-12.5	187	136	V
16.835	37.53	Av	40.3	-25.3	7.4	3.4	1.1	-23.13	41.3	54	-12.7	229	151	V

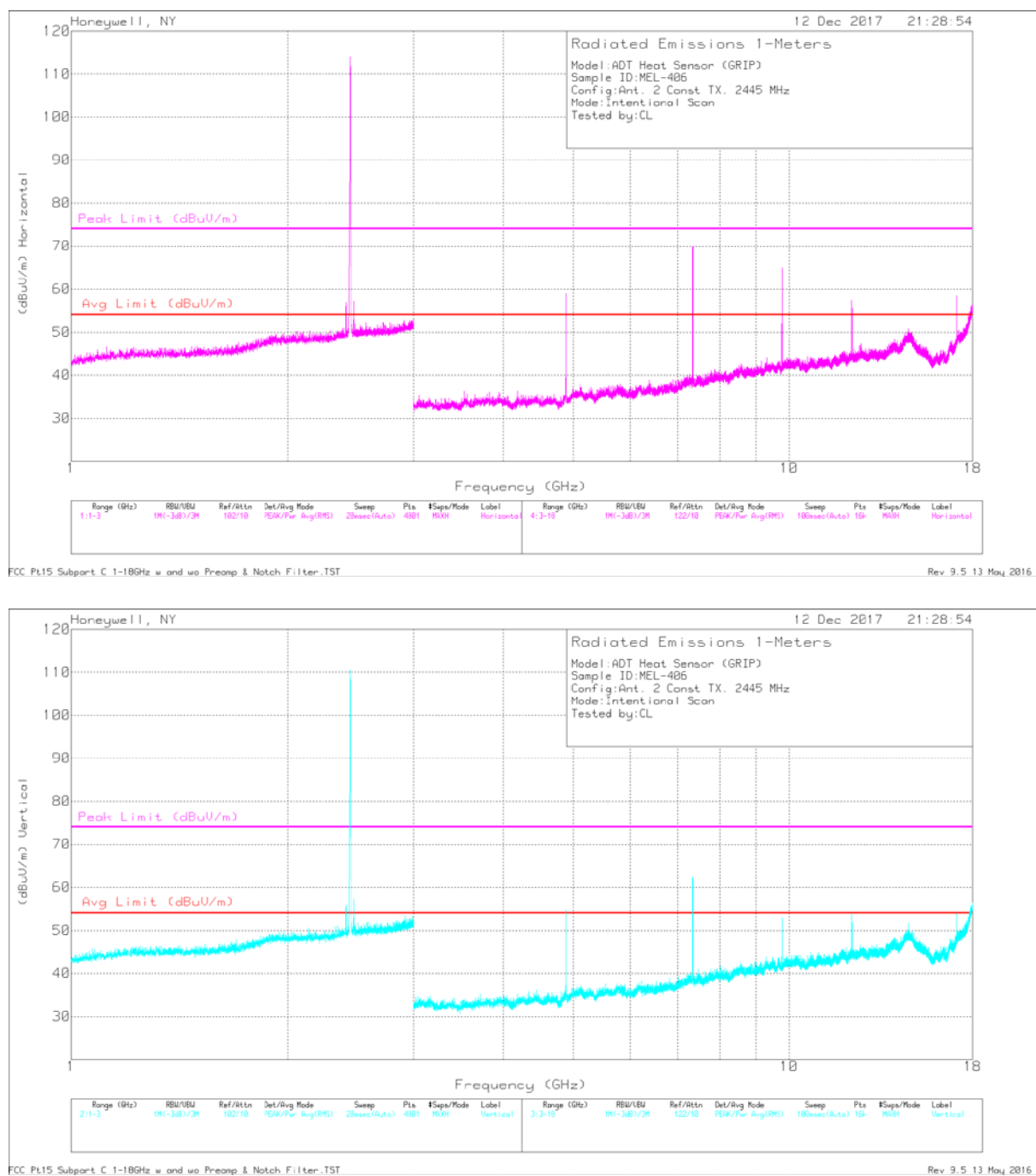
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 2 Low Channel - Data



Antenna 2 Mid Channel - Plot

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

MID CHANNEL														
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]		Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.891	45.88	PK2	33.2	-26.9	3.7	1.6	.6		58.08	74	-15.92	152	365	H
* 7.336	49.36	PK2	36.7	-26.2	4.6	2	.6		67.06	74	-6.94	276	329	H
9.782	36.58	PK2	38.1	-26.2	5.5	2.4	.5		56.88	74	-17.12	162	273	H
* 12.227	35.93	PK2	38.9	-25.6	6.5	3.5	.5		59.73	74	-14.27	162	273	H
17.118	37.31	PK2	42.3	-25.3	7.5	3.2	1.4		66.41	74	-7.59	89	355	H
* 4.891	45.84	PK2	33.2	-26.9	3.7	1.6	.6		58.04	74	-15.96	197	253	V
* 7.336	50.22	PK2	36.7	-26.2	4.6	2	.6		67.92	74	-6.08	155	164	V
9.782	40.74	PK2	38.1	-26.2	5.5	2.4	.5		61.04	74	-12.96	186	161	V
* 12.227	39.37	PK2	38.9	-25.6	6.5	3.5	.5		63.17	74	-10.83	217	175	V
17.111	37.15	PK2	42.2	-25.3	7.5	3.2	1.3		66.05	74	-7.95	264	360	V
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]	DCF [dB]	Corrected Reading (dBuV/m)	Av Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.891	45.88	Av	33.2	-26.9	3.7	1.6	.6	-23.13	34.95	54	-19.05	152	365	H
* 7.336	49.36	Av	36.7	-26.2	4.6	2	.6	-23.13	43.93	54	-10.07	276	329	H
9.782	36.58	Av	38.1	-26.2	5.5	2.4	.5	-23.13	33.75	54	-20.25	162	273	H
* 12.227	35.93	Av	38.9	-25.6	6.5	3.5	.5	-23.13	36.6	54	-17.4	162	273	H
17.118	37.31	Av	42.3	-25.3	7.5	3.2	1.4	-23.13	43.28	54	-10.72	89	355	H
* 4.891	45.84	Av	33.2	-26.9	3.7	1.6	.6	-23.13	34.91	54	-19.09	197	253	V
* 7.336	50.22	Av	36.7	-26.2	4.6	2	.6	-23.13	44.79	54	-9.21	155	164	V
9.782	40.74	Av	38.1	-26.2	5.5	2.4	.5	-23.13	37.91	54	-16.09	186	161	V
* 12.227	39.37	Av	38.9	-25.6	6.5	3.5	.5	-23.13	40.04	54	-13.96	217	175	V
17.111	37.15	Av	42.2	-25.3	7.5	3.2	1.3	-23.13	42.92	54	-11.08	264	360	V

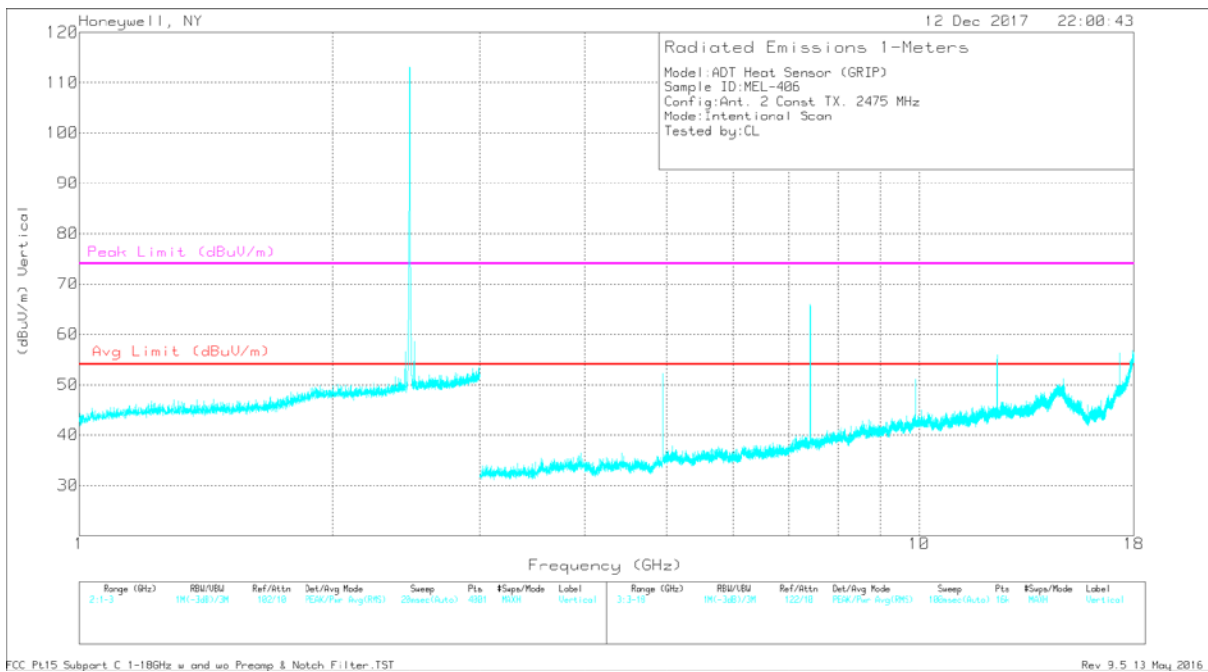
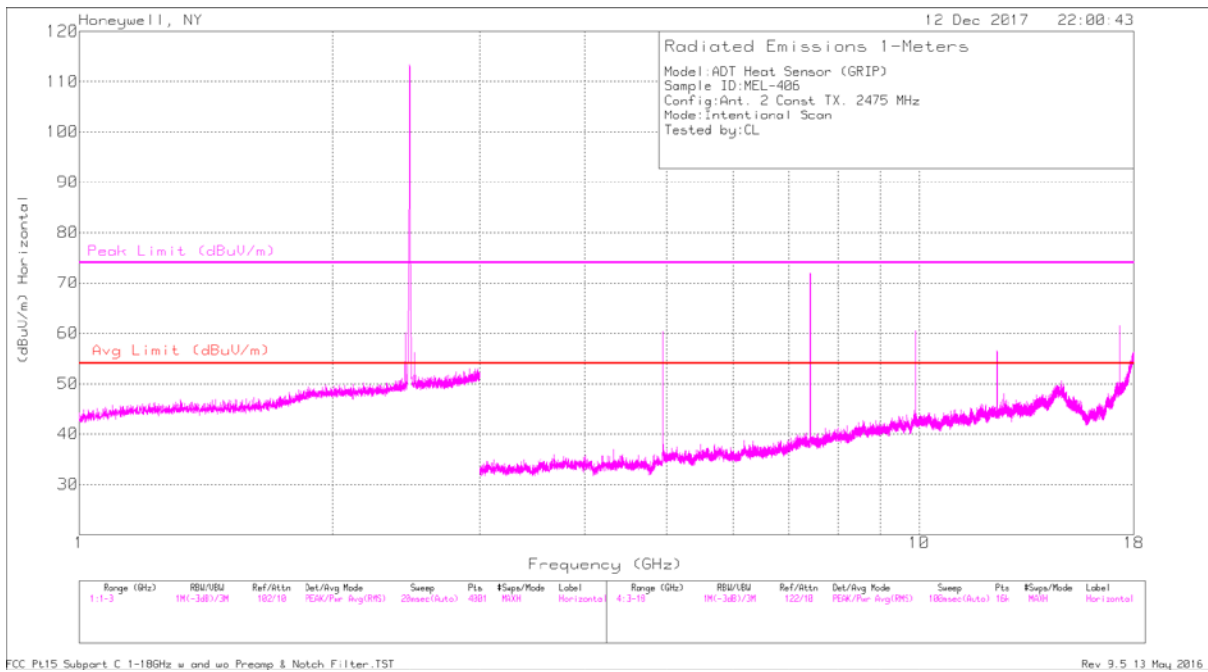
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 2 Mid Channel - Data



Antenna 2 High Channel - Plot

NOTE: Prescans performed in an RF chamber, final measurements performed on an OATS

HIGH CHANNEL															
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]		HPF [dB]		Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.951	43.91	PK2	33.3	-26.7	3.8	1.6		.6		56.51	74	-17.49	154	182	H
* 7.427	51.17	PK2	36.8	-26.2	4.7	2		.5		68.97	74	-5.03	120	192	H
9.902	39.24	PK2	38.4	-26.1	5.5	2.5		.5		60.04	74	-13.96	196	188	H
* 12.377	42.29	PK2	38.7	-25.7	6.5	3.8		-.3		65.29	74	-8.71	57	203	H
17.323	37.91	PK2	43.8	-25	7.5	3.3		1.1		68.61	74	-5.39	76	400	H
* 4.949	45.33	PK2	33.3	-26.7	3.8	1.6		.6		57.93	74	-16.07	172	261	V
* 7.426	55.08	PK2	36.8	-26.2	4.7	2		.5		72.88	74	-1.12	199	150	V
9.902	39.69	PK2	38.4	-26.1	5.5	2.5		.5		60.49	74	-13.51	225	164	V
* 12.377	41.89	PK2	38.7	-25.7	6.5	3.8		-.3		64.89	74	-9.11	201	139	V
17.321	37.72	PK2	43.8	-25	7.5	3.3		1.1		68.42	74	-5.58	215	189	V
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	HPF [dB]	DCF [dB]	Corrected Reading (dBuV/m)	Av Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity	
* 4.951	43.91	Av	33.3	-26.7	3.8	1.6	.6	-23.13	33.38	54	-20.62	154	182	H	
* 7.427	51.17	Av	36.8	-26.2	4.7	2	.5	-23.13	45.84	54	-8.16	120	192	H	
9.902	39.24	Av	38.4	-26.1	5.5	2.5	.5	-23.13	36.91	54	-17.09	196	188	H	
* 12.377	42.29	Av	38.7	-25.7	6.5	3.8	-.3	-23.13	42.16	54	-11.84	57	203	H	
17.323	37.91	Av	43.8	-25	7.5	3.3	1.1	-23.13	45.48	54	-8.52	76	400	H	
* 4.949	45.33	Av	33.3	-26.7	3.8	1.6	.6	-23.13	34.8	54	-19.2	172	261	V	
* 7.426	55.08	Av	36.8	-26.2	4.7	2	.5	-23.13	49.75	54	-4.25	199	150	V	
9.902	39.69	Av	38.4	-26.1	5.5	2.5	.5	-23.13	37.36	54	-16.64	225	164	V	
* 12.377	41.89	Av	38.7	-25.7	6.5	3.8	-.3	-23.13	41.76	54	-12.24	201	139	V	
17.321	37.72	Av	43.8	-25	7.5	3.3	1.1	-23.13	45.29	54	-8.71	215	189	V	

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

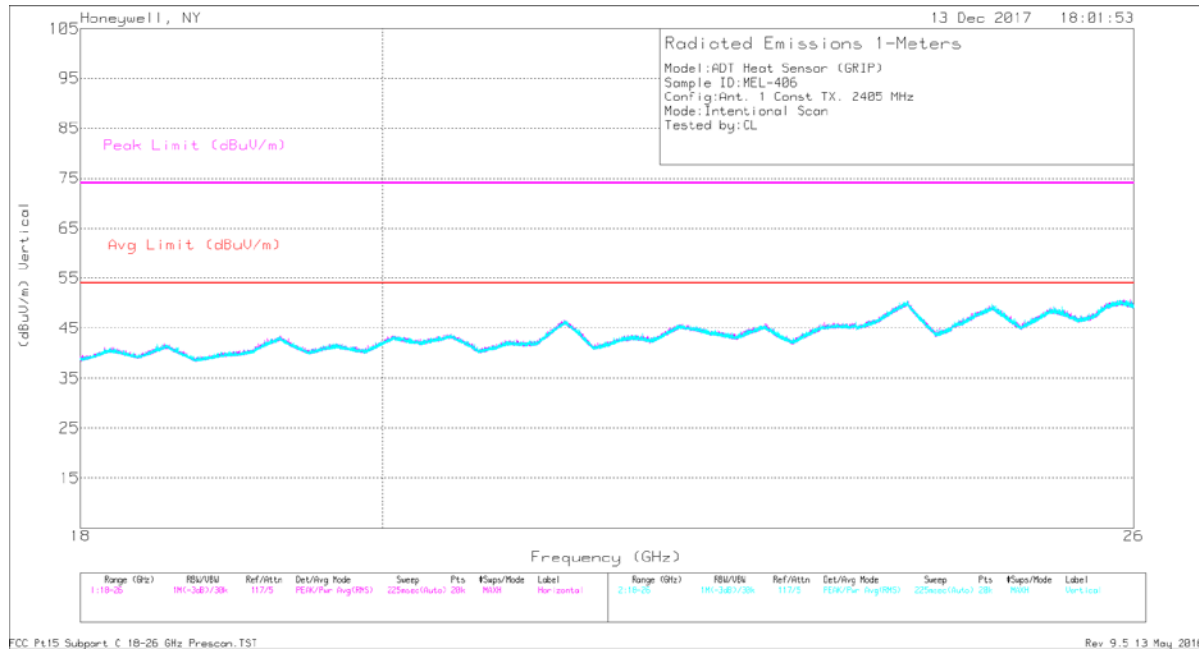
PK2 - KDB558074 Method: Maximum Peak

Av - Maximum Peak + DCF (Duty Cycle Correction Factor)

Duty Cycle = 6.976%, thus DCF = $20\log(0.06976) = -23.13$

Antenna 2 High Channel – Data

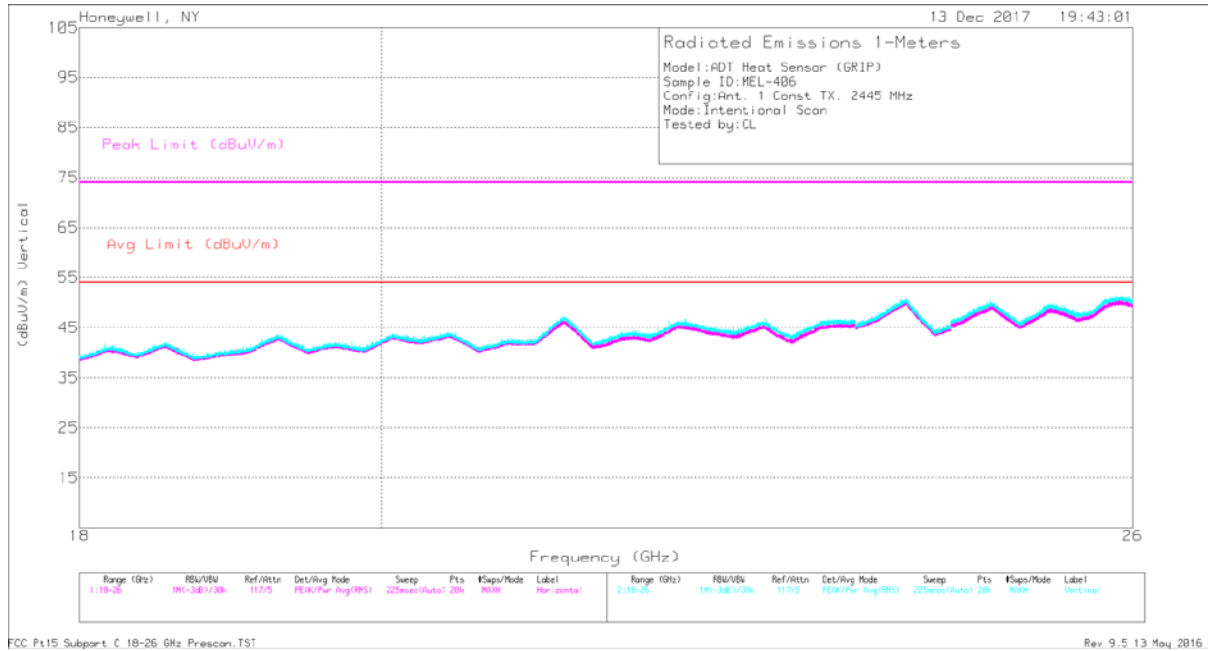
18 - 26GHz



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn ACF [dB]	SMA 5 [dB]	18-26G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19.277	34.69	Pk	44.3	8	-34.4	-9.5	43.09	54	-10.91	74	-30.91	0-360	98	H
2	* 21.325	35.13	Pk	44.9	8.1	-32.1	-9.5	46.53	54	-7.47	74	-27.47	0-360	98	H
3	24.022	35.23	Pk	46.3	8.4	-30.3	-9.5	50.13	54	-3.87	74	-23.87	0-360	98	H
4	* 20.092	34.67	Pk	44.2	8.3	-34.2	-9.5	43.47	54	-10.53	74	-30.53	0-360	98	V
5	* 21.332	35.1	Pk	44.9	8.1	-32.2	-9.5	46.4	54	-7.6	74	-27.6	0-360	98	V
6	24.022	35.58	Pk	46.3	8.4	-30.3	-9.5	50.48	54	-3.52	74	-23.52	0-360	98	V

Antenna 1 Low Channel

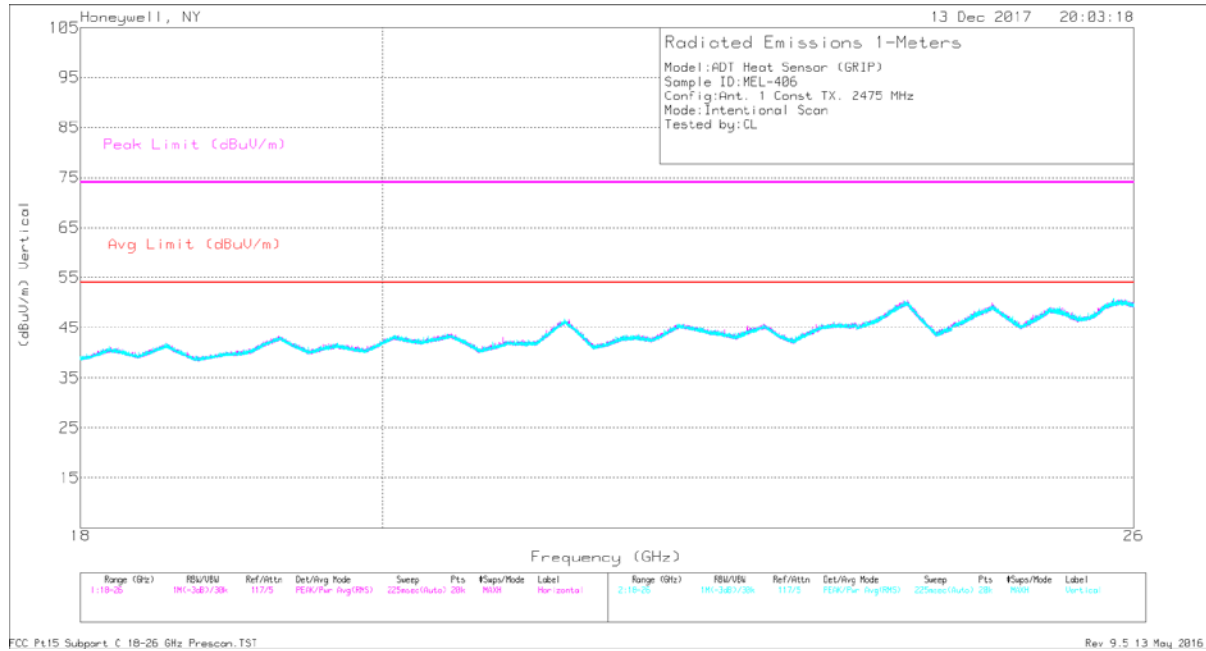
NOTE: No emissions as a product of the EUT detected above the system noise floor



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn ACF [dB]	SMA 5 [dB]	18-26G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19.271	34.4	Pk	44.3	8	-34.5	-9.5	42.7	54	-11.3	74	-31.3	0-360	98	H
2	* 21.328	34.89	Pk	44.9	8.1	-32.1	-9.5	46.29	54	-7.71	74	-27.71	0-360	98	H
3	24.003	35.67	Pk	46.3	8.4	-30.5	-9.5	50.37	54	-3.63	74	-23.63	0-360	98	H
4	* 20.081	35.07	Pk	44.2	8.3	-34.2	-9.5	43.87	54	-10.13	74	-30.13	0-360	98	H
5	* 21.346	35.63	Pk	44.9	8.1	-32.5	-9.5	46.63	54	-7.37	74	-27.37	0-360	98	H
6	24.058	35.34	Pk	46.3	8.4	-31.2	-9.5	49.34	54	-4.66	74	-24.66	0-360	98	H

Antenna 1 Mid Channel

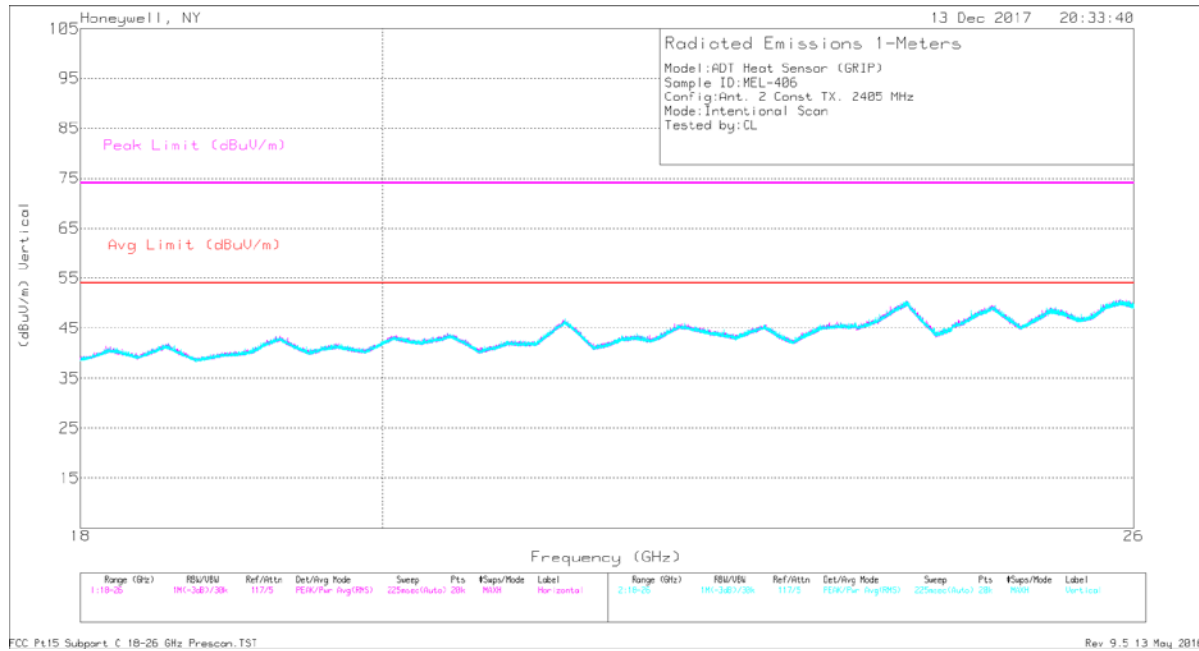
NOTE: No emissions as a product of the EUT detected above the system noise floor



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn ACF [dB]	SMA 5 [dB]	18-26G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19.29	34.75	Pk	44.3	8	-34.3	-9.5	43.25	54	-10.75	74	-30.75	0-360	98	H
2	* 21.319	34.99	Pk	44.9	8.1	-31.9	-9.5	46.59	54	-7.41	74	-27.41	0-360	98	H
3	24.021	35.48	Pk	46.3	8.4	-30.3	-9.5	50.38	54	-3.62	74	-23.62	0-360	98	H
4	* 19.303	34.56	Pk	44.3	8	-34.3	-9.5	43.06	54	-10.94	74	-30.94	0-360	98	H
5	* 21.331	35.03	Pk	44.9	8.1	-32.2	-9.5	46.33	54	-7.67	74	-27.67	0-360	98	H
6	24.005	35.44	Pk	46.3	8.4	-30.5	-9.5	50.14	54	-3.86	74	-23.86	0-360	98	H

Antenna 1 High Channel

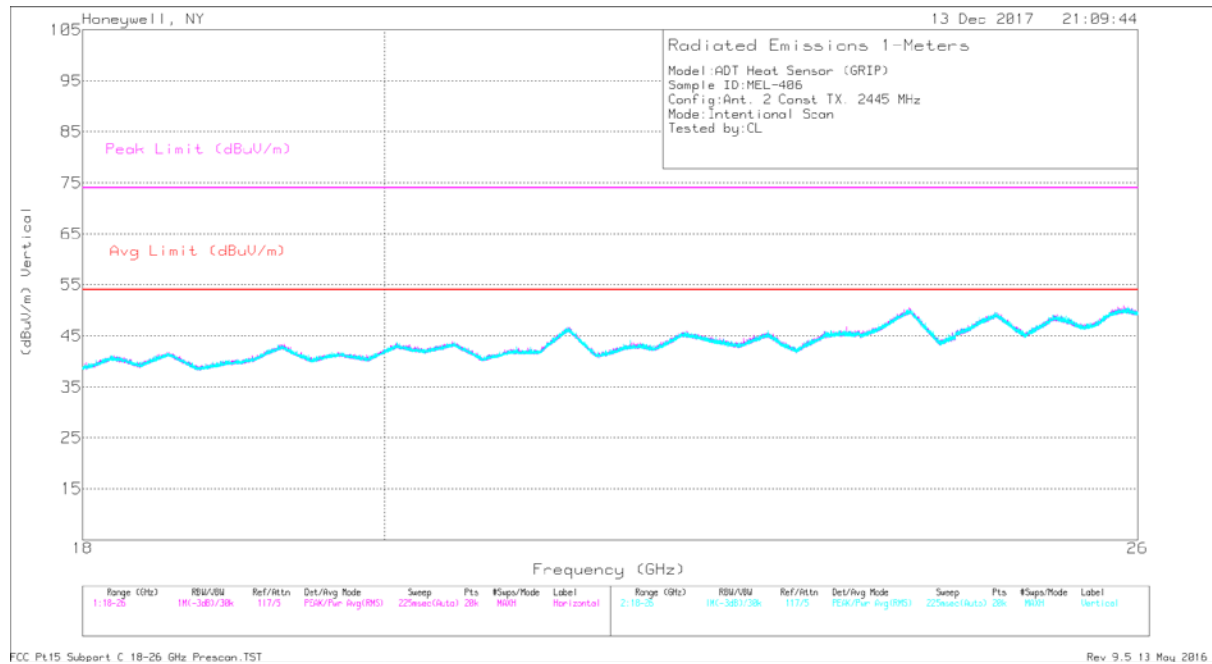
NOTE: No emissions as a product of the EUT detected above the system noise floor



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn ACF [dB]	SMA 5 [dB]	18-26G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19.293	34.69	Pk	44.3	8	-34.3	-9.5	43.19	54	-10.81	74	-30.81	0-360	98	H
2	* 21.32	35.44	Pk	44.9	8.1	-32	-9.5	46.94	54	-7.06	74	-27.06	0-360	98	H
3	24.013	35.66	Pk	46.3	8.4	-30.4	-9.5	50.46	54	-3.54	74	-23.54	0-360	98	H
4	* 19.368	34.71	Pk	44.3	7.9	-35.2	-9.5	42.21	54	-11.79	74	-31.79	0-360	98	H
5	* 21.326	34.89	Pk	44.9	8.1	-32.1	-9.5	46.29	54	-7.71	74	-27.71	0-360	98	H
6	24.053	35.29	Pk	46.3	8.4	-31.1	-9.5	49.39	54	-4.61	74	-24.61	0-360	98	H

Antenna 2 Low Channel

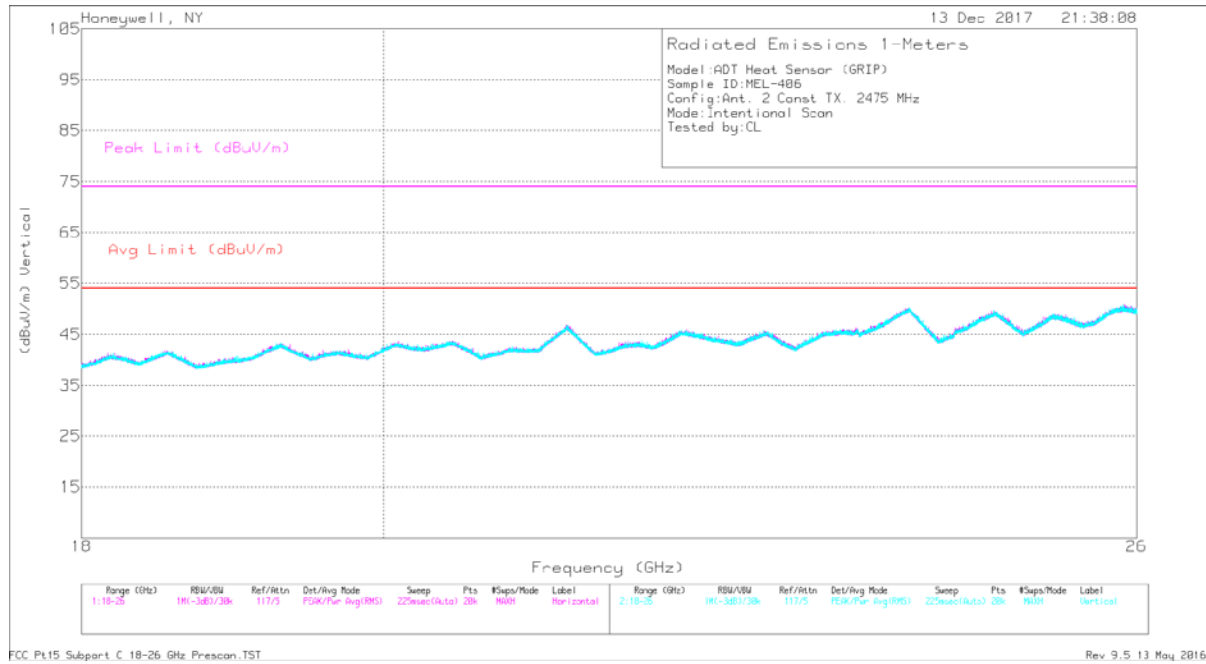
NOTE: No emissions as a product of the EUT detected above the system noise floor



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn ACF [dB]	SMA 5 [dB]	18-26G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19.299	34.69	Pk	44.3	8	-34.2	-9.5	43.29	54	-10.71	74	-30.71	0-360	98	H
2	* 21.325	35.23	Pk	44.9	8.1	-32.1	-9.5	46.63	54	-7.37	74	-27.37	0-360	98	H
3	* 23.993	35.22	Pk	46.3	8.4	-30.6	-9.5	49.82	54	-4.18	74	-24.18	0-360	98	H
4	* 19.329	34.8	Pk	44.3	7.9	-34.7	-9.5	42.8	54	-11.2	74	-31.2	0-360	98	H
5	* 21.341	34.92	Pk	44.9	8.1	-32.4	-9.5	46.02	54	-7.98	74	-27.98	0-360	98	H
6	24.02	35.2	Pk	46.3	8.4	-30.3	-9.5	50.1	54	-3.9	74	-23.9	0-360	98	H

Antenna 2 Mid Channel

NOTE: No emissions as a product of the EUT detected above the system noise floor



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn ACF [dB]	SMA 5 [dB]	18-26G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19.298	34.66	Pk	44.3	8	-34.2	-9.5	43.26	54	-10.74	74	-30.74	0-360	98	H
2	* 21.328	35.19	Pk	44.9	8.1	-32.1	-9.5	46.59	54	-7.41	74	-27.41	0-360	98	H
3	24.018	35.26	Pk	46.3	8.4	-30.3	-9.5	50.16	54	-3.84	74	-23.84	0-360	98	H
4	* 19.305	34.64	Pk	44.3	8	-34.3	-9.5	43.14	54	-10.86	74	-30.86	0-360	98	H
5	* 21.328	35.14	Pk	44.9	8.1	-32.1	-9.5	46.54	54	-7.46	74	-27.46	0-360	98	H
6	24.019	35.43	Pk	46.3	8.4	-30.3	-9.5	50.33	54	-3.67	74	-23.67	0-360	98	H

Antenna 2 High Channel

NOTE: No emissions as a product of the EUT detected above the system noise floor

Radiated Emissions (Unintentional)

Test Description

The Radiated Emissions (Unintentional) measurement is a test of the whole EUT during normal operation. It is a Radiated Emissions measurement performed from 30 MHz to 5x the highest operating frequency of the device. Prescans are done in a 3 meter anechoic chamber, while final measurements are made on the OATS. The EUT is positioned on a turntable in the manner for which the device will be normally used, with all peripherals connected in idle, with all cables typically used with the EUT dressed appropriately.

Test Criteria

Reference	Limit		
CFR 47 Subpart B, 15.109 ICES-003	Frequency Range	Field Strength Limit (uV/m) at 3M	Field Strength Limit (dBuV/m) at 3M
	30-88	100	40
	88-216	150	43.5
	216-960	200	46
	Above 960	500	54

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL/JB	RF Chamber/OATS	12/12/17-12/20/17	3.9	75.0	1018	P

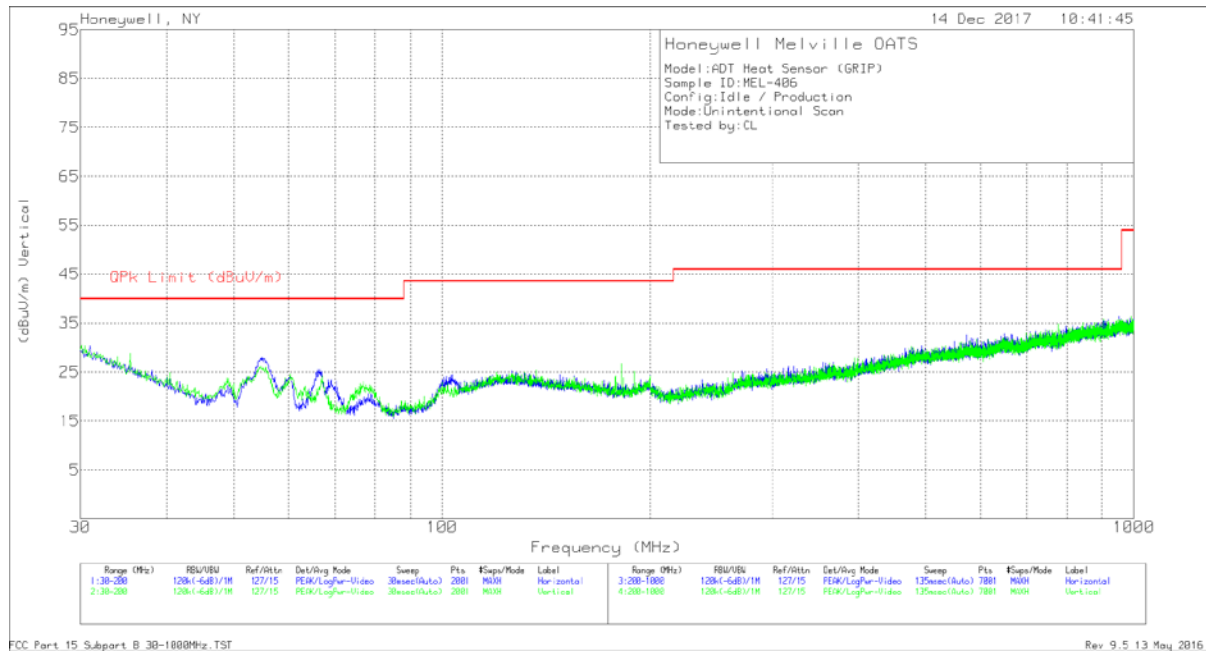
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
RF Chamber						
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	4/10/2017	4/10/2018
Bilog Antenna (30MHz-5GHz)	11311	A022406	Sunol	JB5	1/30/2017	1/30/2018
Horn Antenna (1-18GHz)	2319	2317	EMCO	3115	2/3/2017	2/3/2018
Preamp (10-4200MHz)	11537	1603006	Mini Circuits	TVA-11-422	N/A	N/A
Preamp (1-18GHz)	11539	160362	Amplical	AMP1G18-35	N/A	N/A
Measurement Software	11543	Version 9.5	UL	UL EMC	N/A	N/A
Environmental Meter	11548	A.078188	Extech Instruments	SD700	4/24/2017	4/24/2018
OATS						
Spectrum Analyzer	11545	103125	Rohde & Schwarz	FSW26	2/14/2017	2/14/2018
Bilog Antenna (30MHz-6GHz)	11534	A012816	Sunol	JB6	3/9/2017	3/9/2018
Horn Antenna (1-18GHz)	2973	3127	EMCO	RGA-60	2/3/2017	2/3/2018

Preamp (800MHz-21GHz)	11538	233701631	Mini Circuits	ZVA-213-S+	N/A	N/A
Measurement Software	11543	Version 9.5	UL	UL EMC	N/A	N/A
Environmental Meter	11533	A070144	Extech Instruments	SD700	8/21/2017	8/21/2020

Test Results

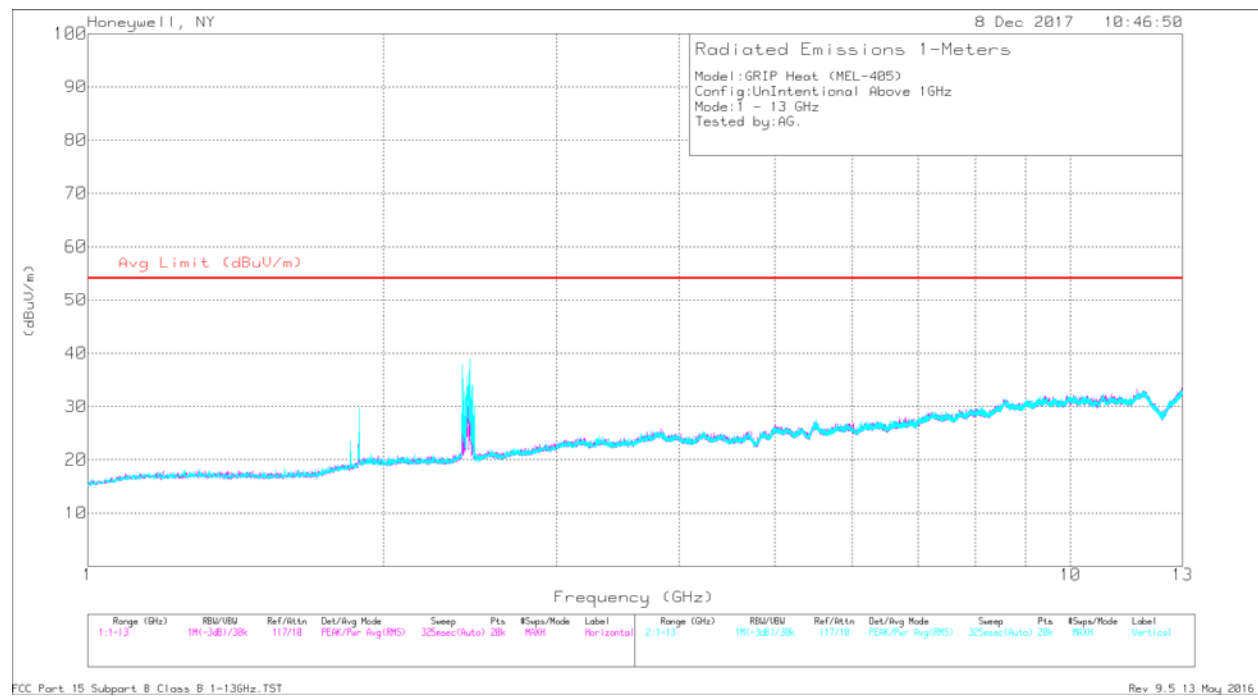
Below 1GHz



Frequency (MHz)	Meter Reading (dBuV)	Det	AF JB6 [dB/m]	Cable 1 [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
31.3188	10.96	Qp	24.8	.9	36.66	40	-3.34	117	216	H
54.8866	15.53	Qp	11.9	1.1	28.53	40	-11.47	256	399	H
30.6289	11.22	Qp	25.3	.9	37.42	40	-2.58	88	269	V
55.1203	19.05	Qp	11.9	1.1	32.05	40	-7.95	45	198	V
955.6214	4.24	Qp	27.3	9.2	40.74	46.02	-5.28	231	379	H
964.8738	4.17	Qp	27.5	9.2	40.87	53.97	-13.1	279	196	V

Qp - Quasi-Peak detector

Above 1GHz



Marker	Frequency (GHz)	Meter Reading (dBUV)	Det	3115 Antenna [dB/m]	SMA5	Above1G Preamp [dB]	Distance Corr Factor [dB]	Corrected Reading (dBUV/m)	Pk Limit (dBUV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.889	46.27	Pk	27.7	2.2	-40.8	-9.5	25.87	74	-48.13	0-360	119	H
2	2.405	51.65	Pk	28.6	2.5	-41.4	-9.5	31.85	74	-42.15	0-360	119	H
3	2.45	54.86	Pk	28.6	2.5	-41.5	-9.5	34.96	74	-39.04	0-360	119	H
4	1.89	50.18	Pk	27.7	2.2	-40.8	-9.5	29.78	74	-44.22	0-360	119	V
5	2.405	57.68	Pk	28.6	2.5	-41.4	-9.5	37.88	74	-36.12	0-360	119	V
6	2.45	58.83	Pk	28.6	2.5	-41.5	-9.5	38.93	74	-35.07	0-360	119	V

Frequency (GHz)	Meter Reading (dBUV)	Det	AF [dB/m]	Preamp [dB]	SMA7 [dB]	SMA6 [dB]	Corrected Reading (dBUV/m)	Avg Limit (dBUV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.889	35.19	Av	27.8	-26.8	2.3	1.1	39.59	54	-14.41	86	324	H
2.405	31.91	Av	28.6	-27	2.6	1.1	37.21	54	-16.79	349	389	H
2.45	42.43	Av	28.6	-27	2.6	1.1	47.73	54	-6.27	282	354	H
1.889	40.51	Av	27.8	-26.8	2.3	1.1	44.91	54	-9.09	281	133	V
2.404	34.28	Av	28.6	-27	2.6	1.1	39.58	54	-14.42	115	384	V
2.449	41.5	Av	28.6	-27	2.6	1.1	46.8	54	-7.2	194	371	V

Pk - Peak detector
Av - Average detection

END OF REPORT