

Honeywell

FCC / ISED Test Report

For

GRIP Defender Panel

Report #: 50346-D3

FCC ID: CFS8DL-GRIPDF

IC ID: 573F-GRIPDF

Report Completion Date: 2018-10-25

Prepared by and for:

Ademco Inc.

2 Corporate Center Dr.

Suite 100 PO Box 9040

Melville, NY 11747



Testing

NVLAP Lab Code: 600110

Document Introduction

Ademco Inc. 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 Ademco Inc. 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 Ademco Inc. 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 Ademco Inc. and all revisions are duly noted in the revisions section. Any alterations of this document not carried out by Ademco Inc. 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	2018-10-19
A	M. Antola	A. Roussin	Updated radiated spurious data; added clarification to equipment list	2018-10-25

Report Authorization

Report Prepared By:



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

Reviewed & Approved By:



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

Contents

Applicable Test Standards/Limits.....5
Deviations from Test Methods5
Facilities and Accreditation5
Test Item Description5
Worse-Case Configuration & Mode.....6
Calibration & Measurement Uncertainty.....7
Opinions / Interpretations7
Test Summary.....8
 On Time and Duty Cycle.....9
 Radiated Emissions (Intentional)11
 Conducted Emissions (Mains).....25
END OF REPORT.....27

Applicable Test Standards/Limits		
Test Standards/Limits	Result	Dates Tested
ANSI C63.10: 2013	Compliant	09/25/2018 – 10/25/2018
RSS-247, Issue 2, Section 5	Compliant	09/25/2018 – 10/25/2018
RSS-GEN, Issue 4	Compliant	09/25/2018 – 10/25/2018
CFR 47 Pt 15 Subpart C, Section 15.207/209	Compliant	09/25/2018 – 10/25/2018
CFR 47 Pt 15 Subpart C, Section 15.247	Compliant	09/25/2018 – 10/25/2018

Deviations from Test Methods	
#	Deviation Description
0	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. Ademco Inc. is accredited by NVLAP, Laboratory Code 600110-0. The full scope of accreditation can be viewed at the NVLAP website.

Test Item Description
<p>The Global Residential Intrusion Platform (GRIP) Defender solution consists of a panel with a push-button interface and small LED screen display. The panel consists of a main PCB board that contains components (Display, camera, microphones, speaker) to support features such as video and audio, interfaces to external devices/sensors (sensors, devices, and cameras) and wireless communicators. The EUT is AC powered with a battery back-up.</p> <p>There are three (3) on-board radios - Bluetooth (LE), RF6 and Wiselink. Plug-in modules can support Wi-Fi, Z-Wave and cellular communications. This report will cover the Bluetooth (LE) portion of the EUT only. This report contains only radiated (spurious emissions, Bandedge, etc.) and conducted emissions (mains) data. Conducted antenna port data is being leveraged from a previous certification (FCC ID: CFS8DL-GRIPAIO7, IC: 573F-GRIPAIO7) based on similarities. See test report exhibit titled “AIO 7-INCH EXHIBIT 5-1A FCC_ISED Test Report BLE” for specific data.</p> <p>The Bluetooth LE circuitry contains a single integral PCB antenna with a gain of 6dBi.</p>

Worse-Case Configuration & Mode

Radiated emissions was performed with the EUT set to transmit at the low/mid/high channels with the highest output power as worst-case scenario. The EUT has a typical installation orientation of vertical (i.e. wall-mounted or standing upright on desktop). Therefore, all final radiated test was performed with the EUT in the vertical orientation. See setup photos for details. The AC powered configuration proved to be the worse-case configuration and was tested as such.

Test Sample Identification

Sample ID Number	Sample Serial Number	Date Received
MEL-549	Non-serialized production unit	09/14/2018
MEL-550	Non-serialized production unit	09/14/2018

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	Radiated Emissions (Intentional)	PASS
2	Conducted Emissions (Mains)	PASS

On Time and Duty Cycle

Test Description

Refer to KDB 558074 Zero-Span Analyzer Method.

Test Criteria

Reference	Limit
KDB 558074, Section 6	None, for reporting only

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL	RF Lab	05/11/2018	22.6	37.2	1014	P

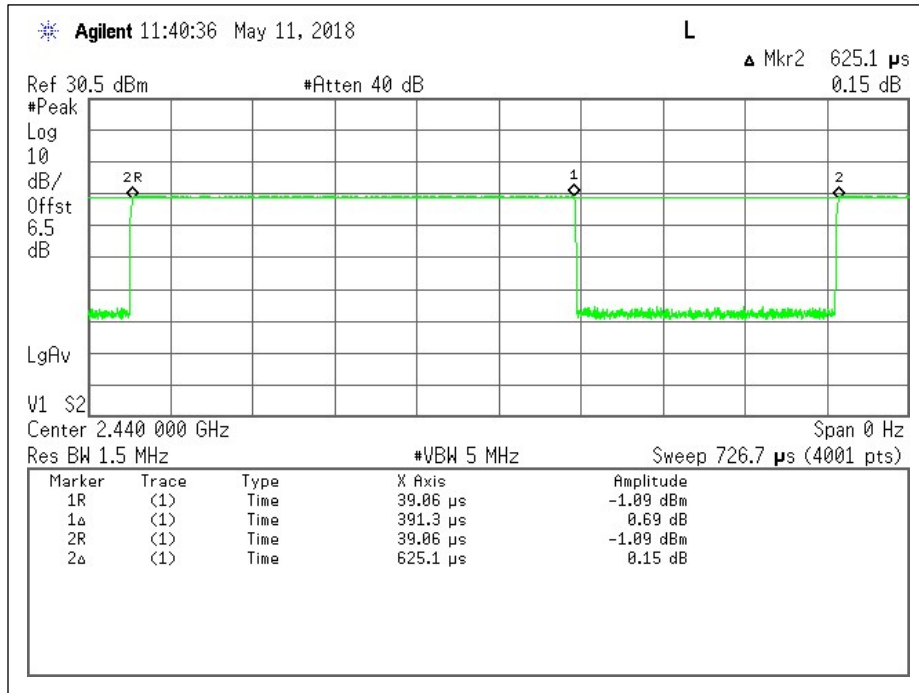
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	06/06/17	06/06/19

Test Results

On Time (usec)	Period (usec)	Duty Cycle	Duty Cycle (%)	Correction Factor [10log(1/D)]
391.3	625.1	0.626	62.6	2.03

Duty Cycle 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	09/25/18-10/19/18	23.3	52	1018	P

NOTE: Below 30MHz, pretesting showed that no emissions as a product of the EUT were detected within 20dB of the regulatory limit. Worse-case plot/data reported from 30MHz - 1GHz and above 18GHz. Prescans performed in an anechoic chamber, final measurements performed on an OATS.

Since Wiselink/RF6/Bluetooth radios can transmit simultaneously, additional spurious scans are provided with all radios on and transmitting in their worse-case state.

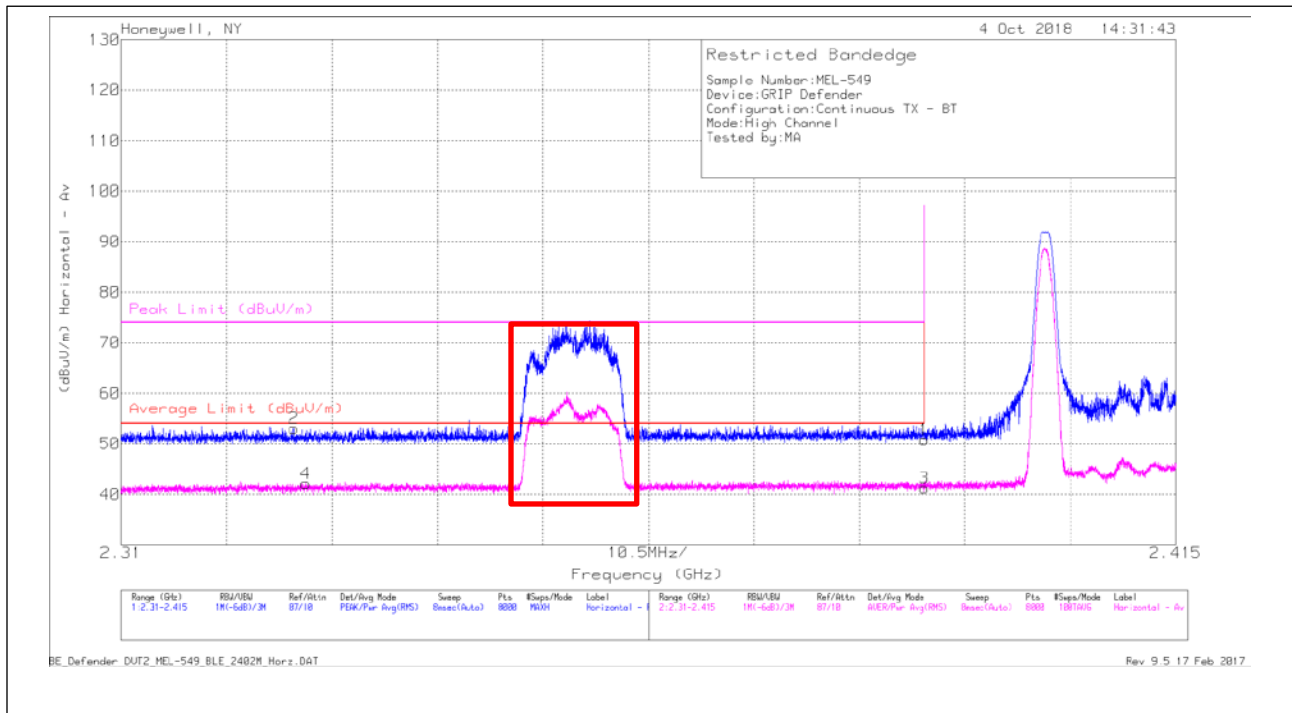
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
RF Chamber						
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	04/11/18	04/11/19
Loop Antenna (9kHz-30MHz)	11535	121080	Com-Power	AL-130R	10/17/17	10/17/18
Bilog Antenna (30MHz-5GHz)	11311	A022406	Sunol	JB5	02/01/18	02/01/19
Horn Antenna (1-18GHz)	2319	2317	EMCO	3115	01/10/18	01/10/19
Horn Antenna (18-40GHz)	11472	151	EMCO	EM-6963	02/14/18	02/14/19
Preamp (10-4200MHz)	11537	1603006	Mini Circuits	TVA-11-422	N/A	N/A
Preamp (1-18GHz)	11557	18040034	Com-Power	PAM-118A	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	11533	A070144	Extech Instruments	SD700	08/21/17	08/21/20
OATS						
Spectrum Analyzer	11545	103125	Rohde & Schwarz	FSW26	02/21/18	02/21/19
Bilog Antenna (30MHz-6GHz)	11534	A012816	Sunol	JB6	03/27/18	03/27/19
Horn Antenna (1-18GHz)	2973	3127	EMCO	RGA-60	01/22/18	01/22/19
Horn Antenna (18-40GHz)	11472	151	EMCO	EM-6963	02/14/18	02/14/19
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	08/21/17	08/21/20

All testing performed using equipment that remained within the calibration cycle at the time of testing.

Test Results

Restricted Band Edge



Low Channel Horizontal - Plot

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	16.5	Pk	28.5	.7	2.6	2.5	-	50.8	74	-23.2	152	135	H
2	* 2.327	19.38	Pk	28	.7	2.5	2.5	-	53.08	74	-20.92	152	135	H
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.39	6.96	RMS	28.5	.7	2.6	2.5	2.03	43.29	54	-10.71	152	135	H
4	* 2.328	8.41	RMS	28	.7	2.5	2.5	2.03	44.14	54	-9.86	152	135	H

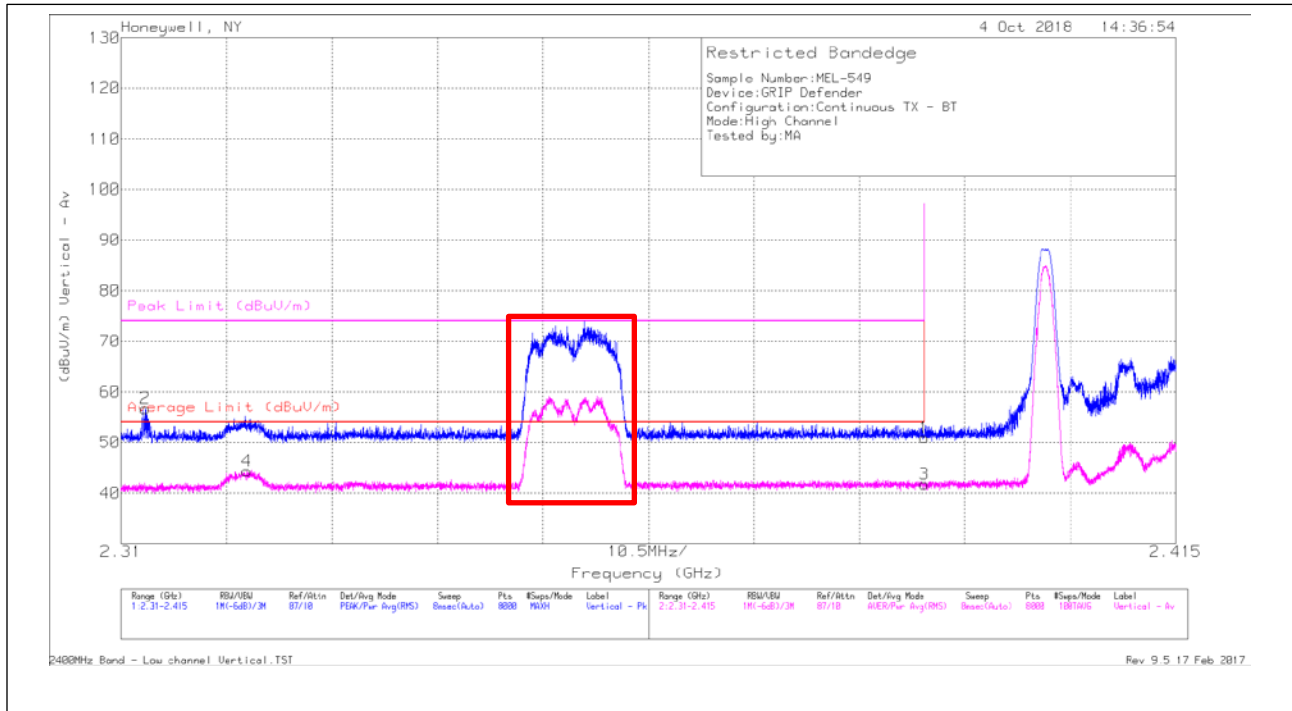
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

NOTE: Emissions highlighted in the plot above is OATS ambient and not a product of the transmitter.

Low Channel Horizontal - Data



Low Channel Vertical - Plot

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	16.61	Pk	28.5	.7	2.6	2.5	-	50.91	74	-23.09	358	248	V
2	* 2.312	23.12	Pk	27.9	.7	2.5	2.5	-	56.72	74	-17.28	358	248	V
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.39	7.51	RMS	28.5	.7	2.6	2.5	2.03	43.84	54	-10.16	358	248	V
4	* 2.323	10.64	RMS	28	.7	2.5	2.5	2.03	46.37	54	-7.63	358	248	V

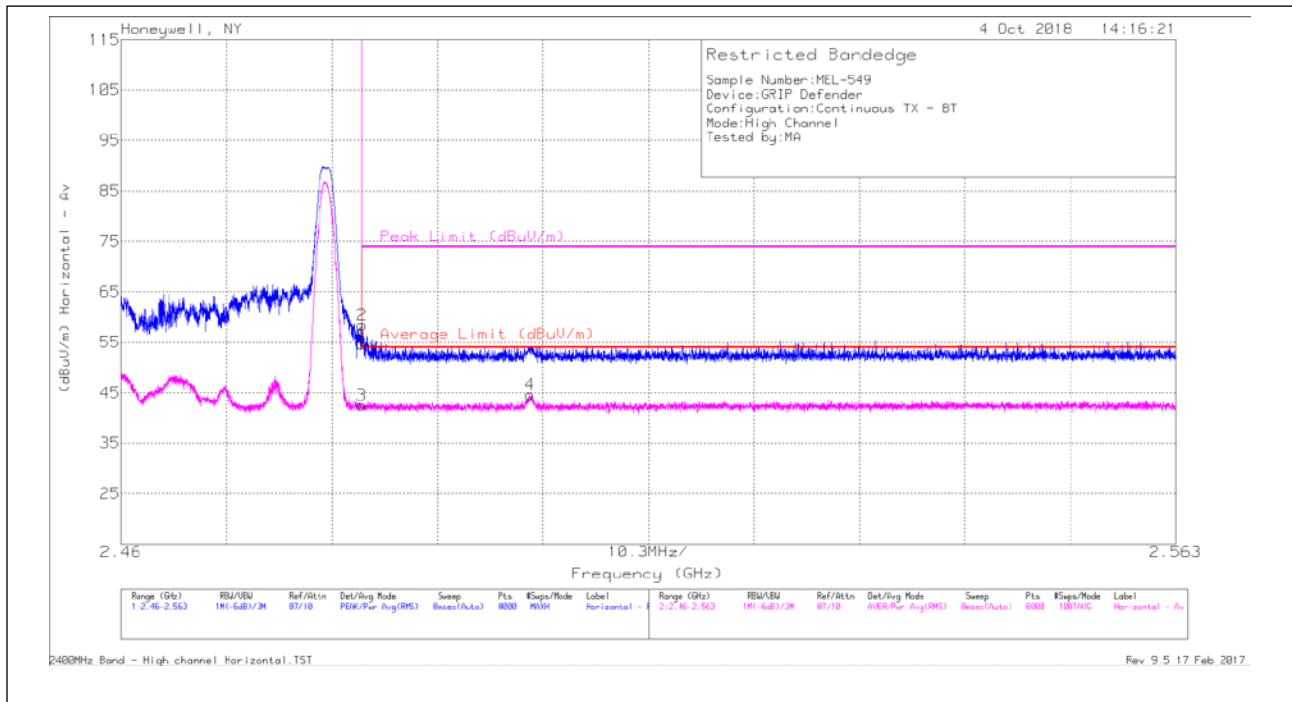
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

NOTE: Emissions highlighted in the plot above is OATS ambient and not a product of the transmitter.

Low Channel Vertical - Data

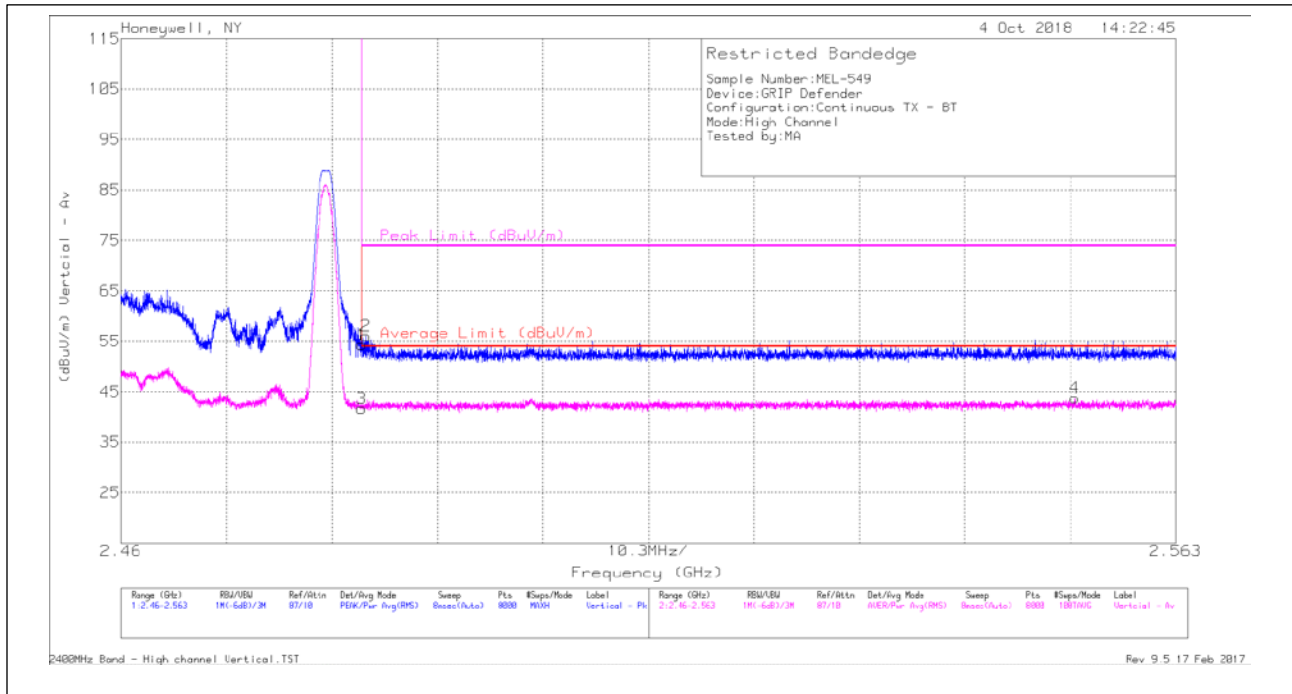


High Channel Horizontal – Plot

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	20.14	Pk	28.7	.7	2.6	2.6	-	54.74	74	-19.26	208	157	H
2	* 2.484	23.83	Pk	28.7	.7	2.6	2.6	-	58.43	74	-15.57	208	157	H
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.484	7.94	RMS	28.7	.7	2.6	2.6	2.03	44.57	54	-9.43	208	157	H
4	* 2.5	9.88	RMS	28.7	.7	2.7	2.6	2.03	46.61	54	-7.39	208	157	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

High Channel Horizontal - Data



High Channel Vertical – Plot

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	19.72	Pk	28.7	.7	2.6	2.6	-	54.32	74	-19.68	38	164	V
2	* 2.484	21.51	Pk	28.7	.7	2.6	2.6	-	56.11	74	-17.89	38	164	V
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.484	7.01	RMS	28.7	.7	2.6	2.6	2.03	43.64	54	-10.36	38	164	V
4	2.553	8.76	RMS	29	.7	2.7	2.6	2.03	45.79	54	-8.21	38	164	V

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

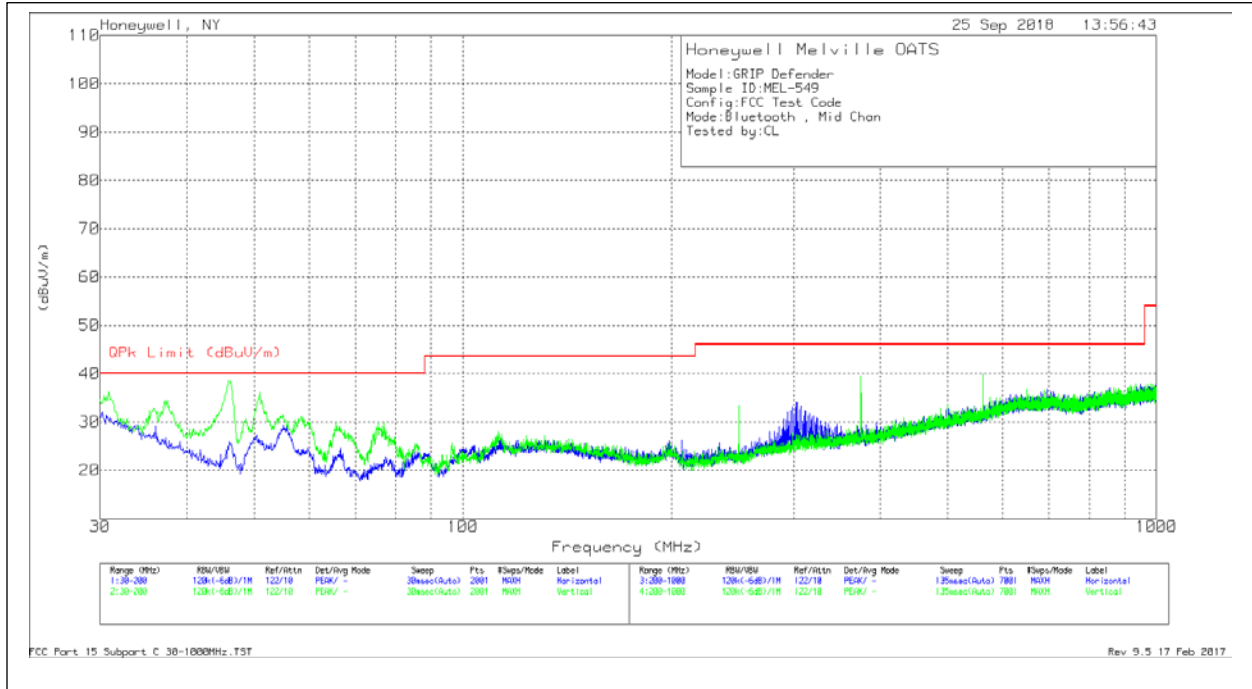
Pk - Peak detector

RMS - RMS detection

High Channel Vertical - Data

Spurious Emissions

Below 1GHz (Worse-case)



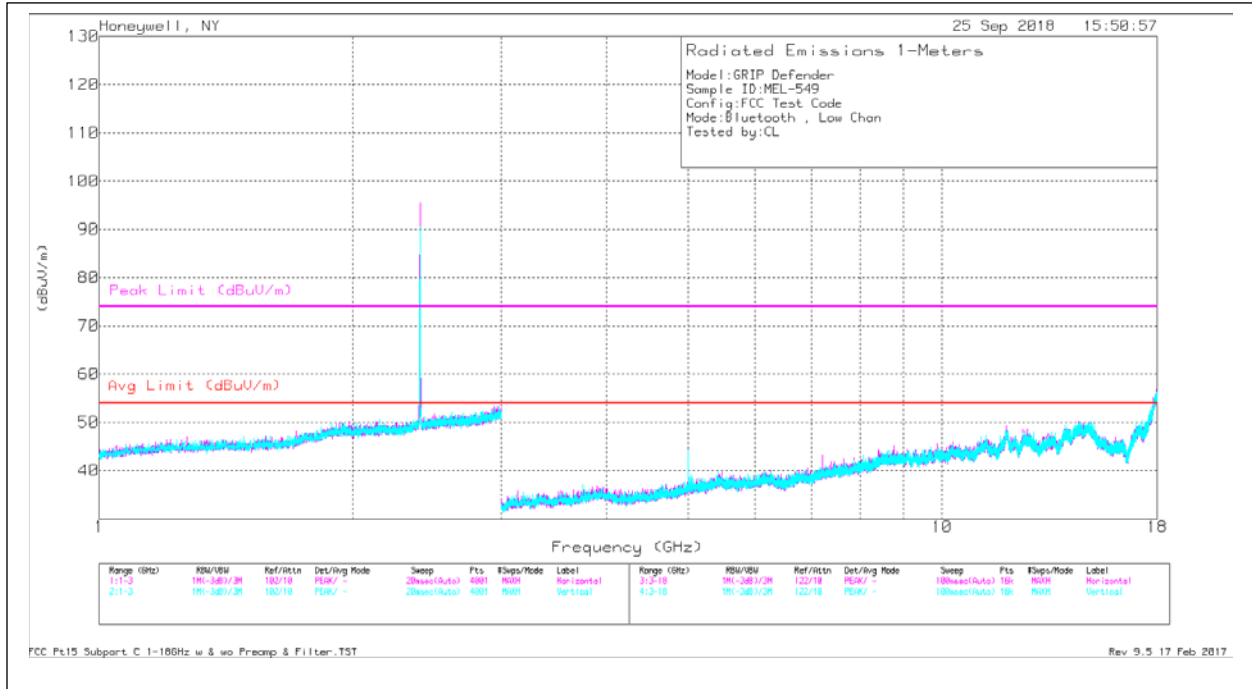
High Channel - Plot

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
30.2301	10.99	Qp	24.7	.9	36.59	40	-3.41	171	291	H
54.8945	15.73	Qp	12.1	1.1	28.93	40	-11.07	111	398	H
37.3786	10.54	Qp	19.6	1	31.14	40	-8.86	192	281	V
46.4195	16.98	Qp	14.2	1	32.18	40	-7.82	186	322	V
302.9044	4.91	Qp	18	3.3	26.21	46.02	-19.81	190	307	H
374.2846	4.37	Qp	19.1	3.8	27.27	46.02	-18.75	131	198	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Qp - Quasi-Peak detector

High Channel - Data

1-18GHz



Low Channel - Plot

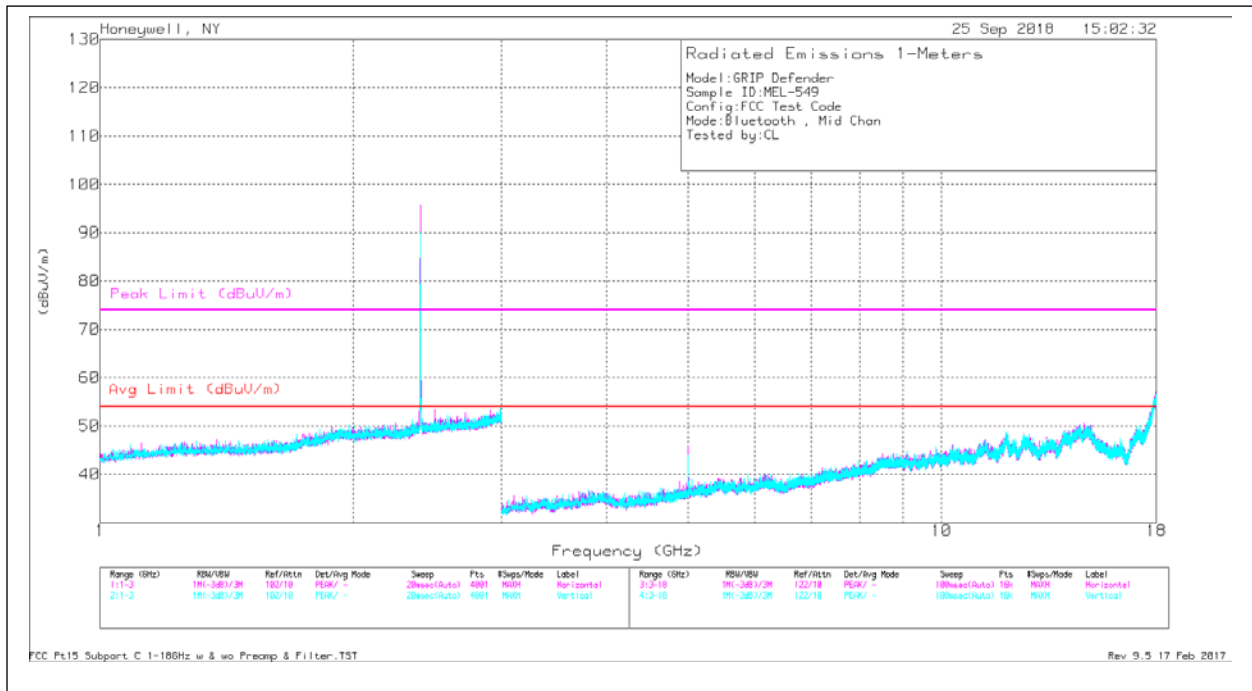
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX2 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.967	43.89	PK2	30.1	-42.3	2.9	2.8	-	37.39	-	-	74	-36.61	123	193	H
2.967	33.1	MAv1	30.1	-42.3	2.9	2.8	2.03	28.63	54	-25.37	-	-	123	193	H
* 5	48.52	PK2	33.3	-41.6	3.8	3.7	-	47.72	-	-	74	-26.28	89	184	H
* 5	44.3	MAv1	33.3	-41.6	3.8	3.7	2.03	45.53	54	-8.47	-	-	89	184	H
* 11.92	35.31	PK2	39.5	-37.4	6.9	5.8	-	50.11	-	-	74	-23.89	272	302	H
* 11.921	24.53	MAv1	39.5	-37.4	6.9	5.8	2.03	41.36	54	-12.64	-	-	272	302	H
* 18	38.95	PK2	47.9	-38.4	7.7	7.3	-	63.45	-	-	74	-10.55	174	106	H
* 18	24.64	MAv1	47.9	-38.4	7.7	7.3	2.03	51.17	54	-2.83	-	-	174	106	H
2.948	42.89	PK2	29.9	-42.1	2.9	2.8	-	36.39	-	-	74	-37.61	244	141	V
2.948	33.56	MAv1	29.9	-42.1	2.9	2.8	2.03	29.09	54	-24.91	-	-	244	141	V
* 5	48.44	PK2	33.3	-41.6	3.8	3.7	-	47.64	-	-	74	-26.36	341	268	V
* 5	44.78	MAv1	33.3	-41.6	3.8	3.7	2.03	46.01	54	-7.99	-	-	341	268	V
14.583	36.6	PK2	42.5	-36.9	6.9	6.4	-	55.5	-	-	74	-18.5	316	191	V
14.583	27.56	MAv1	42.5	-36.9	6.9	6.4	2.03	48.49	54	-5.51	-	-	316	191	V
* 17.998	38.92	PK2	47.9	-38.4	7.7	7.3	-	63.42	-	-	74	-10.58	242	220	V
* 17.997	24.72	MAv1	47.9	-38.4	7.7	7.3	2.03	51.25	54	-2.75	-	-	242	220	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

Low Channel - Data



Mid Channel - Plot

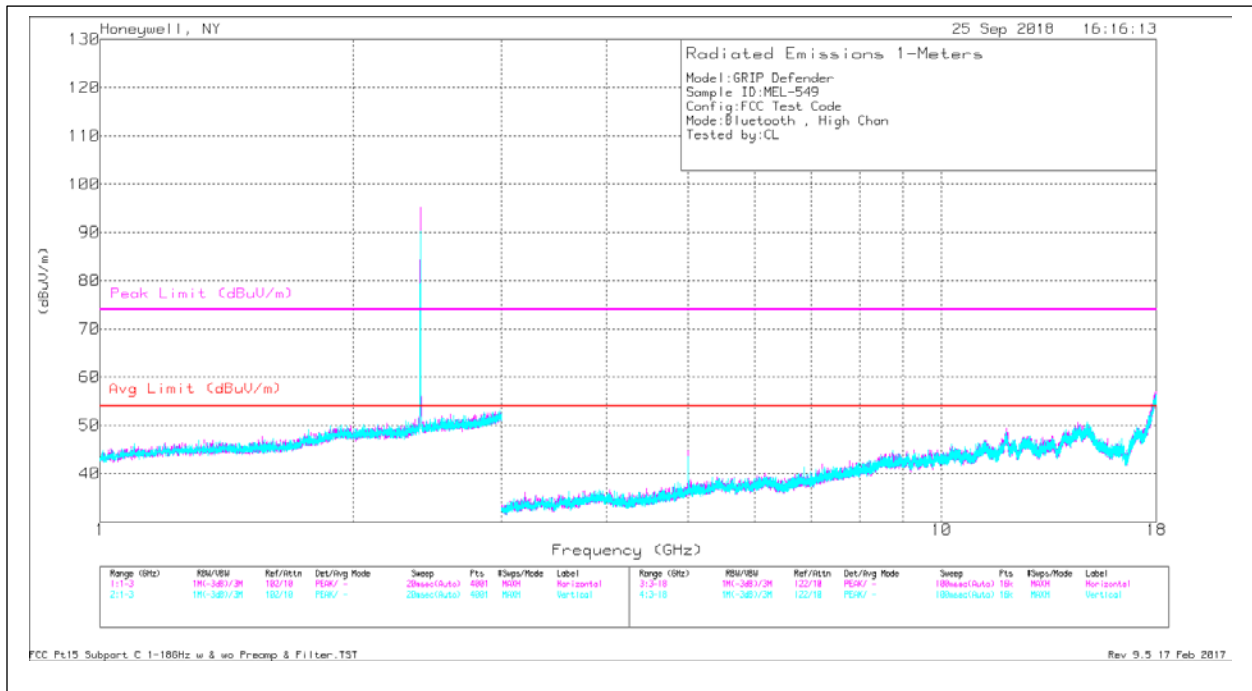
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX2 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 5	48.84	PK2	33.3	-41.6	3.8	3.7	-	48.04	-	-	74	-25.96	105	164	H
* 5	43.16	MAv1	33.3	-41.6	3.8	3.7	2.03	44.39	54	-9.61	-	-	105	164	H
* 12.199	38.28	PK2	39.2	-37.2	6.4	6	-	52.68	-	-	74	-21.32	52	302	H
* 12.204	26.86	MAv1	39.2	-37.2	6.4	6	2.03	43.29	54	-10.71	-	-	52	302	H
* 17.998	36.78	PK2	47.9	-37.8	7.7	7.3	-	61.88	-	-	74	-12.12	256	333	H
* 17.999	24.29	MAv1	47.9	-37.8	7.7	7.3	2.03	51.42	54	-2.58	-	-	256	333	H
* 5	49.36	PK2	33.3	-41.6	3.8	3.7	-	48.56	-	-	74	-25.44	348	196	V
* 5	44.05	MAv1	33.3	-41.6	3.8	3.7	2.03	45.28	54	-8.72	-	-	348	196	V
* 12.199	38.54	PK2	39.2	-37.2	6.4	6	-	52.94	-	-	74	-21.06	271	169	V
* 12.203	27.08	MAv1	39.2	-37.2	6.4	6	2.03	43.51	54	-10.49	-	-	271	169	V
* 18	38.91	PK2	47.9	-37.8	7.7	7.3	-	64.01	-	-	74	-9.99	345	339	V
* 17.999	25.57	MAv1	47.9	-37.8	7.7	7.3	2.03	52.7	54	-1.3	-	-	345	339	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

Mid Channel - Data



High Channel - Plot

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX2 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 5	48.29	PK2	33.3	-41.6	3.8	3.7	-	47.49	-	-	74	-26.51	111	176	H
* 5	42.89	MAv1	33.3	-41.6	3.8	3.7	2.03	44.12	54	-9.88	-	-	111	176	H
* 12.003	38.05	PK2	39.4	-37.3	6.6	5.7	-	52.45	-	-	74	-21.55	136	238	H
* 12.003	26.38	MAv1	39.4	-37.3	6.6	5.7	2.03	42.81	54	-11.19	-	-	136	238	H
* 17.997	38.69	PK2	47.9	-37.8	7.7	7.3	-	63.79	-	-	74	-10.21	343	234	H
* 17.998	25.61	MAv1	47.9	-37.8	7.7	7.3	2.03	52.74	54	-1.26	-	-	343	234	H
* 5	49.86	PK2	33.3	-41.6	3.8	3.7	-	49.06	-	-	74	-24.94	335	259	V
* 5	45.02	MAv1	33.3	-41.6	3.8	3.7	2.03	46.25	54	-7.75	-	-	335	259	V
* 11.997	38.19	PK2	39.4	-37.3	6.6	5.7	-	52.59	-	-	74	-21.41	247	256	V
* 12.001	26.33	MAv1	39.4	-37.3	6.6	5.7	2.03	42.76	54	-11.24	-	-	247	256	V
* 17.998	39.11	PK2	47.9	-37.8	7.7	7.3	-	64.21	-	-	74	-9.79	2	148	V
* 17.999	25.59	MAv1	47.9	-37.8	7.7	7.3	2.03	52.72	54	-1.28	-	-	2	148	V

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

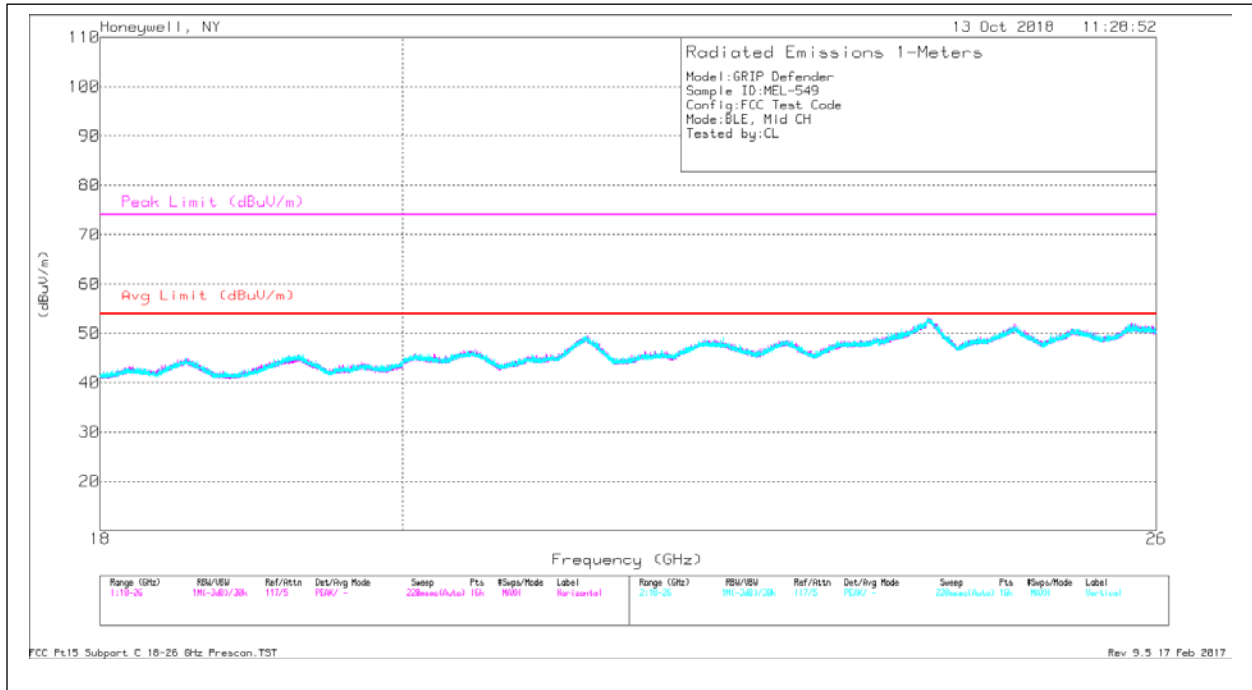
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

High Channel - Data

18-26GHz

Note: No emissions detected above the system noise floor



Mid Channel - Plot

Frequency (GHz)	Meter Reading (dBuV)	Det	AF EM-6963 [dB/m]	Preamp [dB]	SMA7 [dB]	SMA5 [dB]	Dist Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 19.274	28.65	PK2	44.1	-34.5	7.9	8	-9.5	44.65	-	-	74	-29.35	0	100	H
* 19.276	20.91	MAv1	44.1	-34.5	7.9	8	-9.5	36.91	54	-17.09	-	-	0	100	H
* 21.319	33.99	PK2	44.5	-31.9	8.3	8.1	-9.5	53.49	-	-	74	-20.51	0	100	H
* 21.319	20.79	MAv1	44.5	-31.9	8.3	8.1	-9.5	40.29	54	-13.71	-	-	0	100	H
* 21.318	31.03	PK2	44.5	-31.9	8.3	8.1	-9.5	50.53	-	-	74	-23.47	193	166	H
* 21.318	20.71	MAv1	44.5	-31.9	8.3	8.1	-9.5	40.21	54	-13.79	-	-	193	166	H
24.027	30.98	PK2	46.4	-30.4	8.9	8.4	-9.5	54.78	-	-	74	-19.22	140	354	H
24.026	20.24	MAv1	46.4	-30.4	8.9	8.4	-9.5	44.04	54	-9.96	-	-	140	354	H
* 19.29	31	PK2	44.2	-34.3	7.9	8	-9.5	47.3	-	-	74	-26.7	277	321	V
* 19.29	21.1	MAv1	44.2	-34.3	7.9	8	-9.5	37.4	54	-16.6	-	-	277	321	V
* 21.323	31.14	PK2	44.5	-32	8.3	8.1	-9.5	50.54	-	-	74	-23.46	139	366	V
* 21.324	20.5	MAv1	44.5	-32	8.3	8.1	-9.5	39.9	54	-14.1	-	-	139	366	V
24.018	30.41	PK2	46.4	-30.3	8.9	8.4	-9.5	54.31	-	-	74	-19.69	272	380	V
24.019	20.61	MAv1	46.4	-30.3	8.9	8.4	-9.5	44.51	54	-9.49	-	-	272	380	V

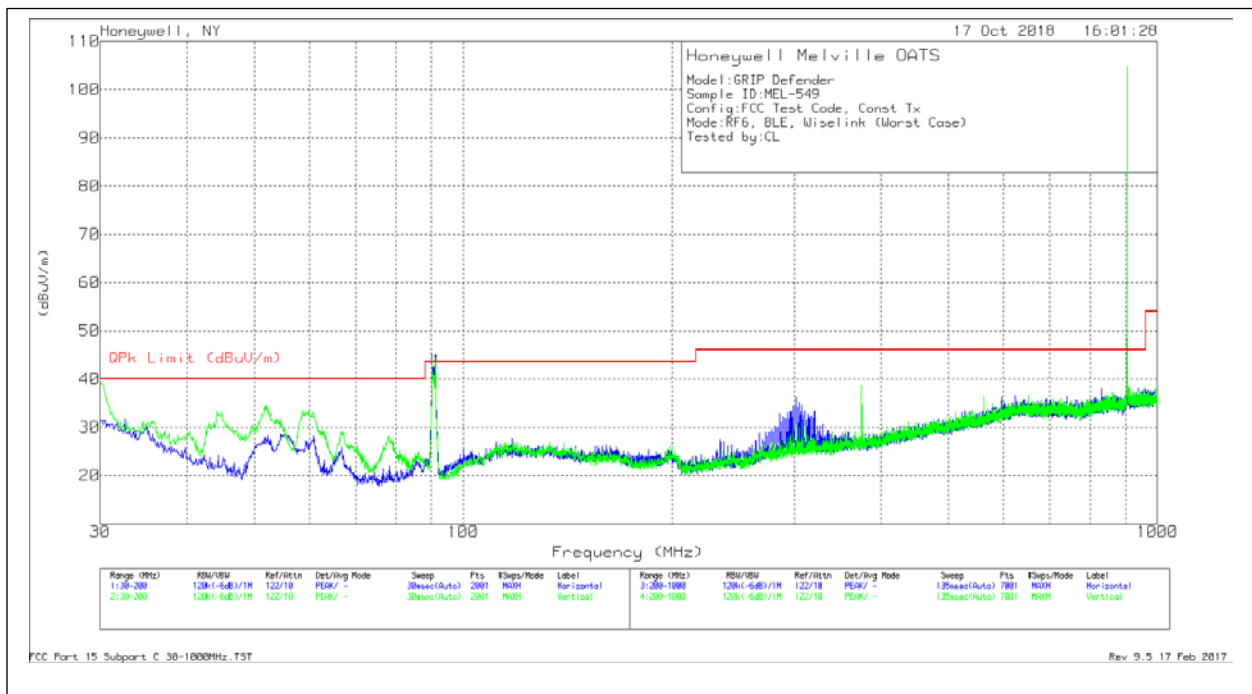
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 MAv1 - KDB558074 Option 1 Maximum RMS Average

Mid Channel - Data

Simultaneous Transmission

Configuration (Worse-case):

RF6 – Antenna 1, Low Channel
 Wiselink – Low Channel
 Bluetooth (LE) – Mid Channel



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
32.55	-7.71	Qp	23	.9	16.19	40	-23.81	36	302	H
55.6485	11.44	Qp	12	1.1	24.54	40	-15.46	74	372	H
*90.1812	36.98	Qp	12	1.5	50.48	43.52	6.96	289	372	H
**90.18	35.62	Qp	12	1.5	49.12	43.52	5.6	136	383	H
30.085	-2	Qp	24.8	.8	25.4	40	-14.6	161	314	V
52.0704	20.44	Qp	12.2	1.1	33.74	40	-6.26	55	389	V
*90.18	37.42	Qp	12	1.5	50.92	43.52	7.4	42	121	V
**90.18	34.61	Qp	12	1.5	48.11	43.52	4.59	144	119	V
374.9719	-8.77	Qp	19.1	3.8	14.13	46.02	-31.89	159	111	H
375.0164	-3.63	Qp	19.1	3.8	19.27	46.02	-26.75	199	326	V

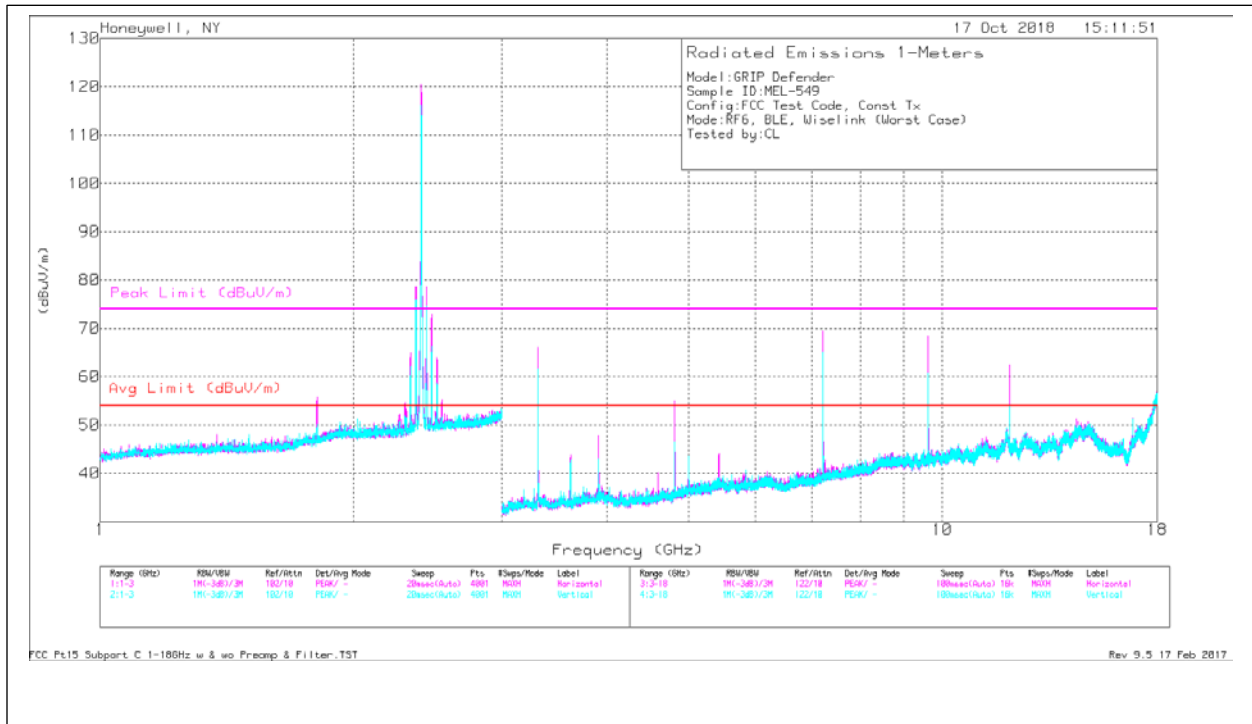
Qp - Quasi-Peak detector

*-EUT on

**-EUT off

30-1000MHz – Plot / Data

Note: 90MHz is a known RF6 transient emission. When measured on the OATS, this frequency additionally falls within the FM band. Measurements were made with the EUT on and off to show that this is an ambient emission.



1-18GHz – Plot

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX3 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.809	28.6	PK2	26.8	.3	2.3	2.2	-	60.2	-	-	74	-13.8	1	358	H
* 2.33	32.3	Pk	28.1	.7	2.6	2.5	-	66.2	-	-	74	-7.8	226	204	H
* 2.33	27.36	Av	28.1	.7	2.6	2.5	-23.4	37.86	54	-16.14	-	-	226	204	H
* 2.33	28.34	PK2	28.1	.7	2.6	2.5	-	62.24	-	-	74	-11.76	193	108	V
* 2.33	22.15	Av	28.1	.7	2.6	2.5	-23.4	32.65	54	-21.35	-	-	193	108	V

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX2 [dB]	SMA7 [dB]	SMA5 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.309	67.04	PK2	31.4	-41.8	3	3	-	62.64	-	-	74	-11.36	347	342	H
7.216	62.48	PK2	36.2	-39.5	4.7	4.5	-	68.38	-	-	74	-5.62	267	215	H
9.618	62.78	PK2	38	-39	5.6	5.2	-	72.58	-	-	74	-1.42	221	118	H
3.31	62.82	PK2	31.4	-41.8	3	3	-	58.42	-	-	74	-15.58	194	188	V
7.213	52.35	PK2	36.2	-39.5	4.7	4.5	-	58.25	-	-	74	-15.75	270	117	V
9.618	59.89	PK2	38	-39	5.6	5.2	-	69.69	-	-	74	-4.31	241	303	V
16.838	40.98	PK2	39.6	-38.1	7.5	7.1	-	57.08	-	-	74	-16.92	251	208	V
* 3.618	51.59	PK2	31.8	-41.5	3.2	3.1	-	48.19	-	-	74	-25.81	171	239	H
* 3.618	46.2	MAv1	31.8	-41.5	3.2	3.1	-	42.8	54	-11.2	-	-	171	239	H
* 3.904	50.3	PK2	32.9	-40.8	3.4	3.2	-	49	-	-	74	-25	130	185	H
* 3.905	42.46	MAv1	32.9	-40.8	3.4	3.2	-	41.16	54	-12.84	-	-	130	185	H
* 4.595	42.46	PK2	32.7	-41.1	3.6	3.5	-	41.16	-	-	74	-32.84	172	115	H
* 4.595	30.64	MAv1	32.7	-41.1	3.6	3.5	-	29.34	54	-24.66	-	-	172	115	H
* 4.811	51.85	PK2	33.1	-41.2	3.7	3.7	-	51.15	-	-	74	-22.85	251	167	H
* 4.809	51.85	Av	33.1	-41.2	3.7	3.7	-23.4	27.75	54	-26.25	-	-	251	167	H
* 5	47.7	PK2	33.3	-41.6	3.8	3.7	-	46.9	-	-	74	-27.1	98	177	H
* 5	41.35	MAv1	33.3	-41.6	3.8	3.7	-	40.55	54	-13.45	-	-	98	177	H
* 5.426	46.61	PK2	34.4	-41.2	4	3.9	-	47.71	-	-	74	-26.29	155	215	H
* 5.426	39.42	MAv1	34.4	-41.2	4	3.9	-	40.52	54	-13.48	-	-	155	215	H
* 12.022	45.45	PK2	39.4	-37.3	6.5	5.6	-	59.65	-	-	74	-14.35	218	126	H
* 12.022	37.23	MAv1	39.4	-37.3	6.5	5.6	-	51.43	54	-2.57	-	-	218	126	H
* 17.997	38.69	PK2	47.9	-37.8	7.7	7.3	-	63.79	-	-	74	-10.21	343	234	H
* 17.998	25.61	MAv1	47.9	-37.8	7.7	7.3	-	50.71	54	-3.29	-	-	343	234	H
* 3.618	50.32	PK2	31.8	-41.5	3.2	3.1	-	46.92	-	-	74	-27.08	173	171	V
* 3.618	44.93	MAv1	31.8	-41.5	3.2	3.1	-	41.53	54	-12.47	-	-	173	171	V
* 3.906	45.58	PK2	32.9	-40.8	3.4	3.2	-	44.28	-	-	74	-29.72	284	154	V
* 3.906	34.48	MAv1	32.9	-40.8	3.4	3.2	-	33.18	54	-20.82	-	-	284	154	V
* 4.809	67.94	PK2	33.1	-41.2	3.7	3.7	-	67.24	-	-	74	-6.76	9	171	V
* 4.809	67.94	Av	33.1	-41.2	3.7	3.7	-23.4	43.84	54	-10.16	-	-	9	171	V
* 5	49.85	PK2	33.3	-41.6	3.8	3.7	-	49.05	-	-	74	-24.95	353	181	V
* 5	45.12	MAv1	33.3	-41.6	3.8	3.7	-	44.32	54	-9.68	-	-	353	181	V
* 12.027	45.92	PK2	39.4	-37.3	6.5	5.6	-	60.12	-	-	74	-13.88	326	141	V
* 12.022	38.24	MAv1	39.4	-37.3	6.5	5.6	-	52.44	54	-1.56	-	-	326	141	V
* 17.998	39.11	PK2	47.9	-37.8	7.7	7.3	-	64.21	-	-	74	-9.79	2	148	V
* 17.999	25.59	MAv1	47.9	-37.8	7.7	7.3	-	50.69	54	-3.31	-	-	2	148	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak Detector
 Av - KDB558074 Method: PK + DC Corr (Duty Cycle Correction Factor)
 MAv1 - KDB558074 Option 1 Maximum RMS Average

Duty Cycle (RF6) = 6.75%, thus DC Corr = 20log(0.0675) = -23.4dB

2.33GHz & 4.81GHz were found to be products of the RF6 transmitter, thus Average measurement was derived by applying a duty cycle correction factor to the Peak measurement.

1-18GHz – Data

Conducted Emissions (Mains)

Test Description

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10 / C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorder for both NEUTRAL and HOT lines.

Test Criteria

Reference	Limit (dBuV)		
	Frequency Range (MHz)	Quasi-Peak	Average
CFR 47 Subpart C, 15.207 RSS-GEN	0.15-0.5	66 to 56	56 to 46
CFR 47 Subpart B, 15.107 ICES-003	0.5-5	56	46
	5-30	60	50

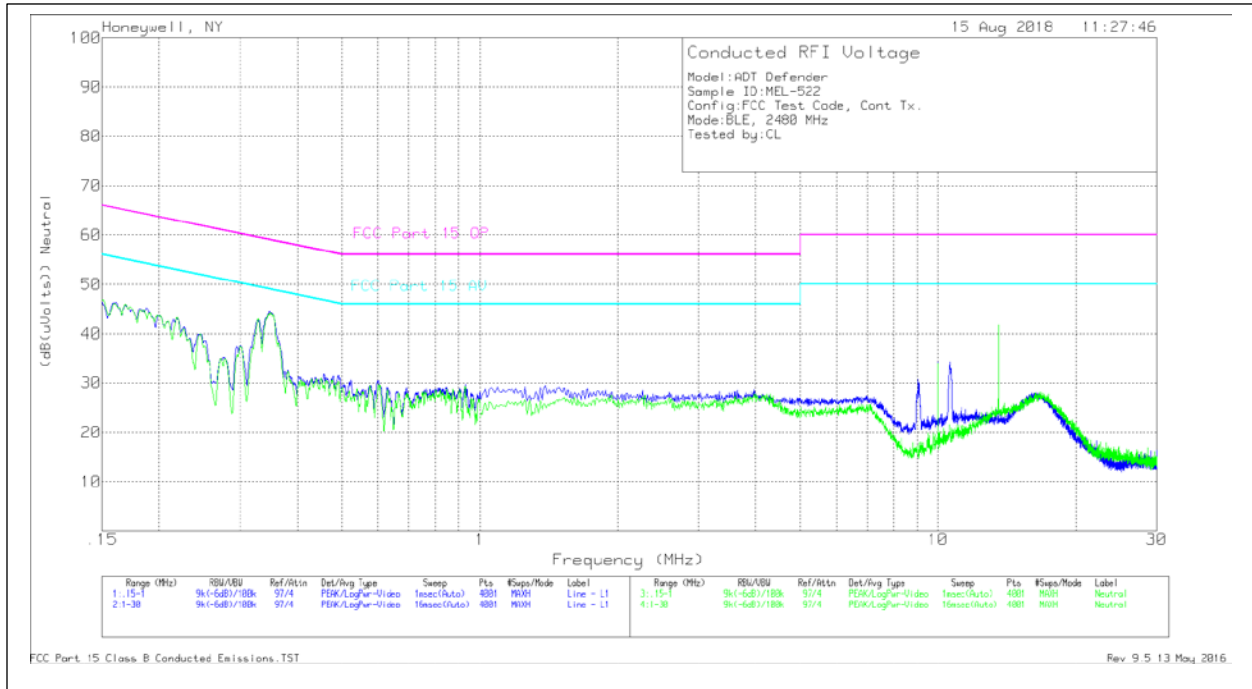
Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL	RF Lab	08/15/18	22.6	70.6	1004	P

Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11556	MY49430802	Keysight	N9030A (PXA)	12/19/2017	12/19/2018
LISN	11527	241259	Com-Power	LIN-120A	01/10/2018	01/10/2019
Measurement Software	11543	Version 9.5	UL	UL EMC	N/A	N/A
Environmental Meter	11533	A078144	Extech Instruments	SD700	08/21/2017	08/21/2020

Test Results (Worse-case)



High Channel – Plot

Line - L1									
Frequency (MHz)	Meter Reading (dBuV)	Det	Gain/Loss [dB] LISN1	CDE Cable #1	Corrected Reading (dB(uVolts))	FCC Part 15 QP	Margin (dB)	FCC Part 15 AV	Margin (dB)
.16065	35.79	Pk	10.5	0	46.29	65.43	-19.14	55.43	-9.14
.35214	34.18	Pk	10	0	44.18	58.91	-14.73	48.91	-4.73
.93096	19.8	Pk	9.9	0	29.7	56	-26.3	46	-16.3
9.0475	20.47	Pk	10	.2	30.67	60	-29.33	50	-19.33
9.99725	24.09	Pk	10	.2	34.29	60	-25.71	50	-15.71
10.60625	24.1	Pk	10	.2	34.3	60	-25.7	50	-15.7

Line - Neutral									
Frequency (MHz)	Meter Reading (dBuV)	Det	Gain/Loss [dB] LISN1	CDE Cable #1	Corrected Reading (dB(uVolts))	FCC Part 15 QP	Margin (dB)	FCC Part 15 AV	Margin (dB)
.15969	35.55	Pk	10.6	0	46.15	65.48	-19.33	55.48	-9.33
.35011	34.05	Pk	10.1	0	44.15	58.96	-14.81	48.96	-4.81
.60103	19.72	Pk	10	0	29.72	56	-26.28	46	-16.28
9.99725	23.77	Pk	10	.2	33.97	60	-26.03	50	-16.03
13.557	31.47	Pk	10.1	.2	41.77	60	-18.23	50	-8.23
16.71075	17.78	Pk	10.2	.2	28.18	60	-31.82	50	-21.82

Pk - Peak detector

High Channel – Data

END OF REPORT