



FCC / ISED Test Report

For

ADTZWM

Report #: 50346-M2

FCC ID: CFS8DLWFZW

IC ID: 573F-WFZW

Report Completion Date: 2018-07-09

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	2018-06-29
A	M. Antola	A. Roussin	Updated 20dB BW section; updated equipment lists	2018-07-09

Report Authorization

Report Prepared By:



Michael Antola
Hardware Engineer
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 C63.10: 2013	Compliant	04/25/18 – 06/29/18
RSS-210, Issue 9, Annex B.10	Compliant	04/25/18 – 06/29/18
RSS-GEN, Issue 4	Compliant	04/25/18 – 06/29/18
CFR 47 Pt 15 Subpart C, Section 15.207/209	Compliant	04/25/18 – 06/29/18
CFR 47 Pt 15 Subpart C, Section 15.249	Compliant	04/25/18 – 06/29/18

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. Honeywell International is accredited by NVLAP, Laboratory Code 600110-0. The full scope of accreditation can be viewed at the NVLAP website.

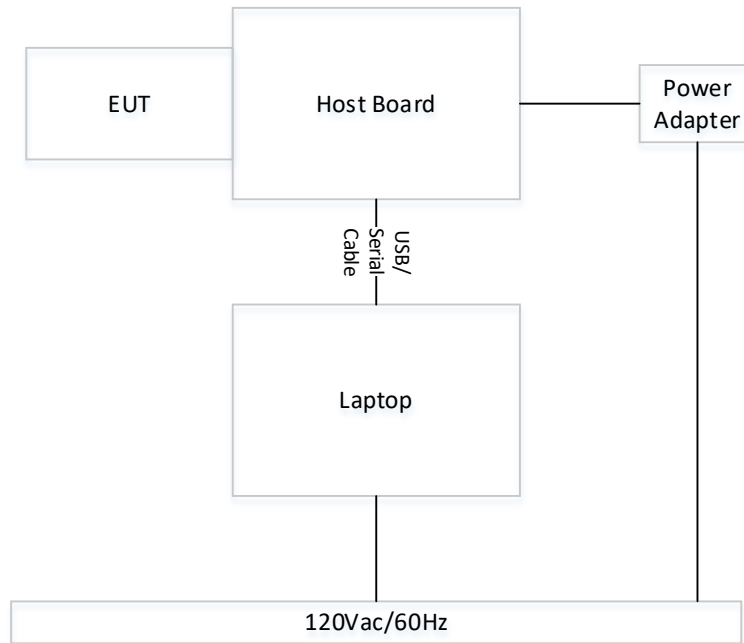
Test Item Description

The ADTZWM communication module is intended to provide compatible control panels with a Wi-Fi connection as well as connection with the and the ability to control Z-Wave device. The module connects directly to the control panel and is powered via the control panel's connection. Thus, this module will be certified for full modular approval.

The module utilizes discrete off-the-shelf Wi-Fi and Z-Wave chips incorporated onto the host board. The Z-Wave contains a single integral trace antenna, with a gain of 2.46dBi. This report covers the testing required for Z-Wave only, Wi-Fi testing will be cover as part of a separate report.

Worse-Case Configuration / Mode & Block Diagram

Radiated emissions was performed with the EUT set to transmit at the low/high channels with the highest output power as worst-case scenario. The EUT was investigated in all three orthogonal planes to determine the worst-case emissions. It was determined that the Y axis (lying flat) orientation was the worst-case orientation. Therefore, all final radiated test was performed with the EUT in the Y axis orientation. See setup photos for details.



Test Sample Identification

Sample ID Number	Sample Serial Number	Date Received
MEL-461	Non-serialized production unit	04/02/2018
MEL-462	Non-serialized production unit	04/02/2018
MEL-469	Non-serialized production unit	04/02/2018

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	99% Occupied Bandwidth	PASS
2	20 dB Emission Bandwidth	PASS
3	Radiated Emissions (Intentional)	PASS
4	Conducted Emissions (Mains)	PASS

20dB Emission 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 20 dB relative to the maximum level measured in the fundamental emission.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.249	None- For reporting only

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
MA	RF Lab	06/25/2018	22.6	37.2	1014	P

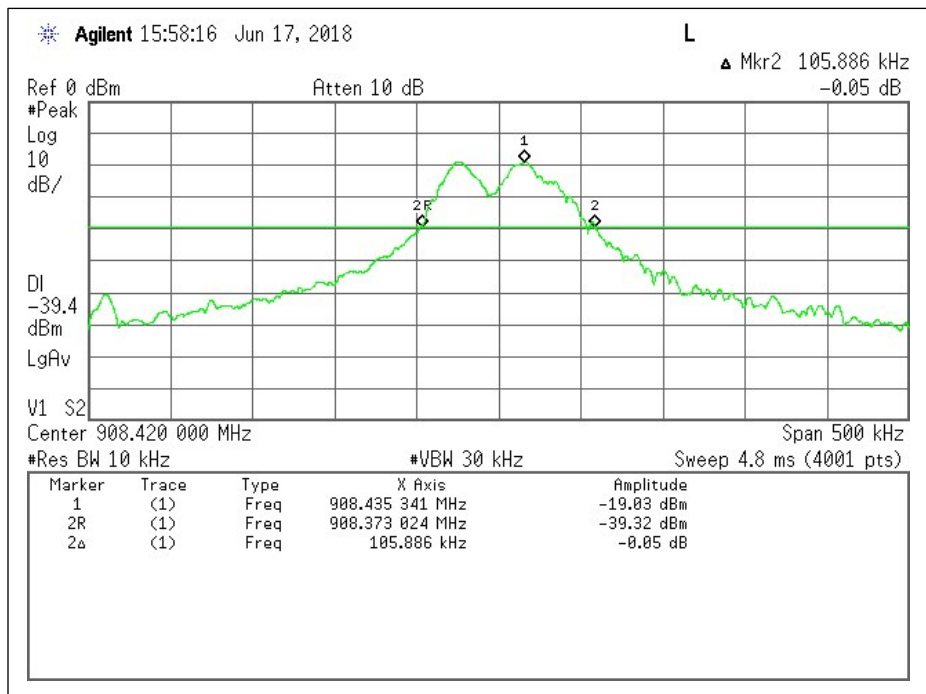
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	06/06/17	06/06/19
Attenuator	-	1624	Pasternack	PE7087-6	NA	NA
Environmental Meter	11533	A070144	Extech Instruments	SD700	08/21/17	08/21/20

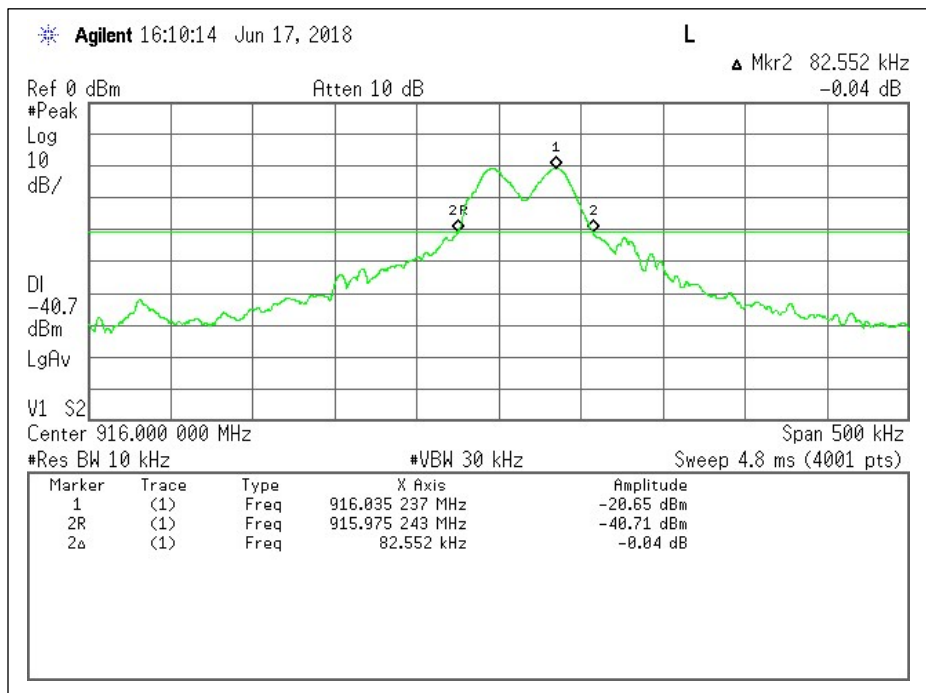
Test Results

Channel	Frequency (MHz)	20dB Bandwidth (in kHz)	Limit (kHz)	Margin (MHz)
Low	908.42	105.89	2271	-2.17
High	916	85.55	2290	-2.20

20dB Bandwidth



Low Channel - Plot



High Channel - Plot

99% Occupied 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)
MA	RF Lab	06/25/2018	22.6	37.2	1014	P

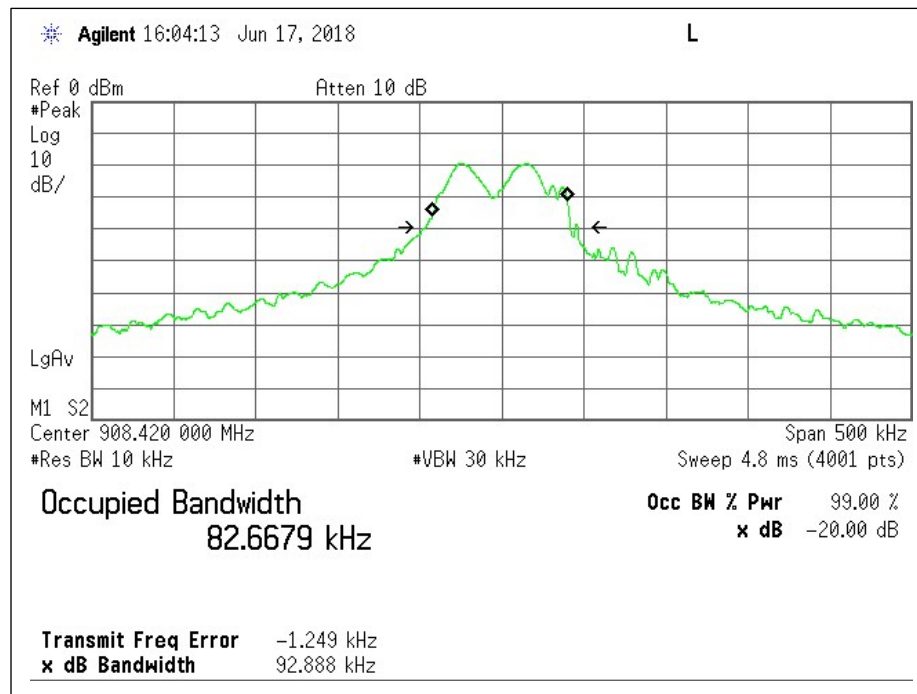
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	06/06/17	06/06/19
Attenuator	-	1624	Pasternack	PE7087-6	NA	NA
Environmental Meter	11533	A070144	Extech Instruments	SD700	08/21/17	08/21/20

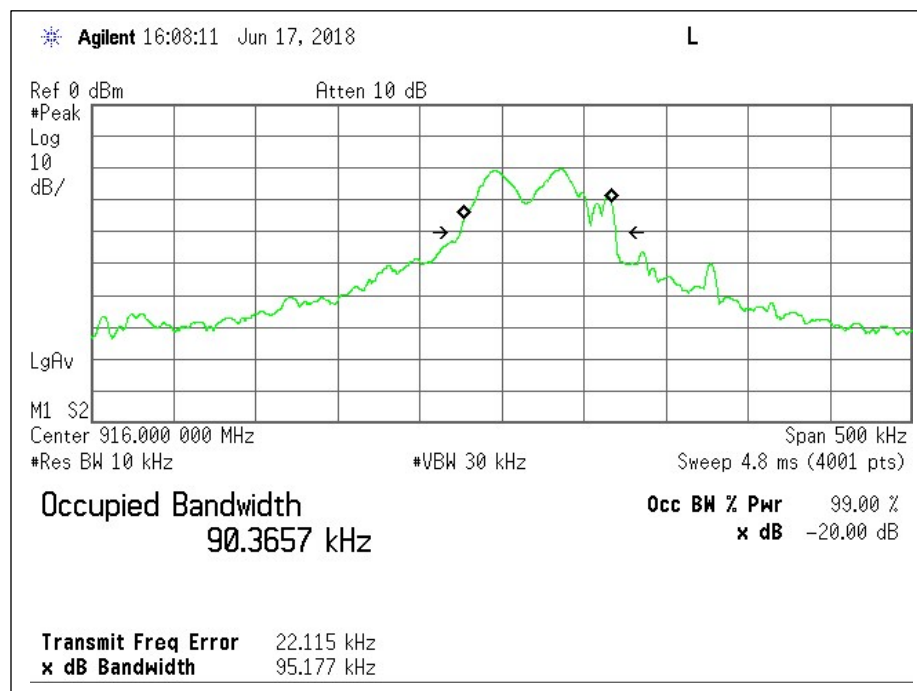
Test Results

Channel	Frequency (MHz)	99% Bandwidth (in kHz)
Low	908.42	82.6679
High	916	90.3657

99% Occupied Bandwidth



Low Channel - Plot



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 10 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		
CFR 47 Subpart C, 15.249 RSS-210, Annex B	Fundamental Frequency	Field strength of fundamental (uV/m)	Field strength of harmonics (uV/m)
	902-928MHz	50	500
	2400-2483.5MHz	50	500
	5725-5875MHz	50	500
	24.0-24.25GHz	250	2500

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
CL/JB	RF Chamber/OATS	05/15/18-06/28/18	28.3	54	1002	P

NOTE: Below 30MHz, pretesting showed that no emissions as a product of the EUT were detected within 20dB of the regulatory limit. Prescans performed in an anechoic chamber, final measurements performed on an OATS.

Since both Wi-Fi and Z-Wave radio can transmit simultaneously, additional spurious scans are provided with both radios on and transmitting in their worse-case state.

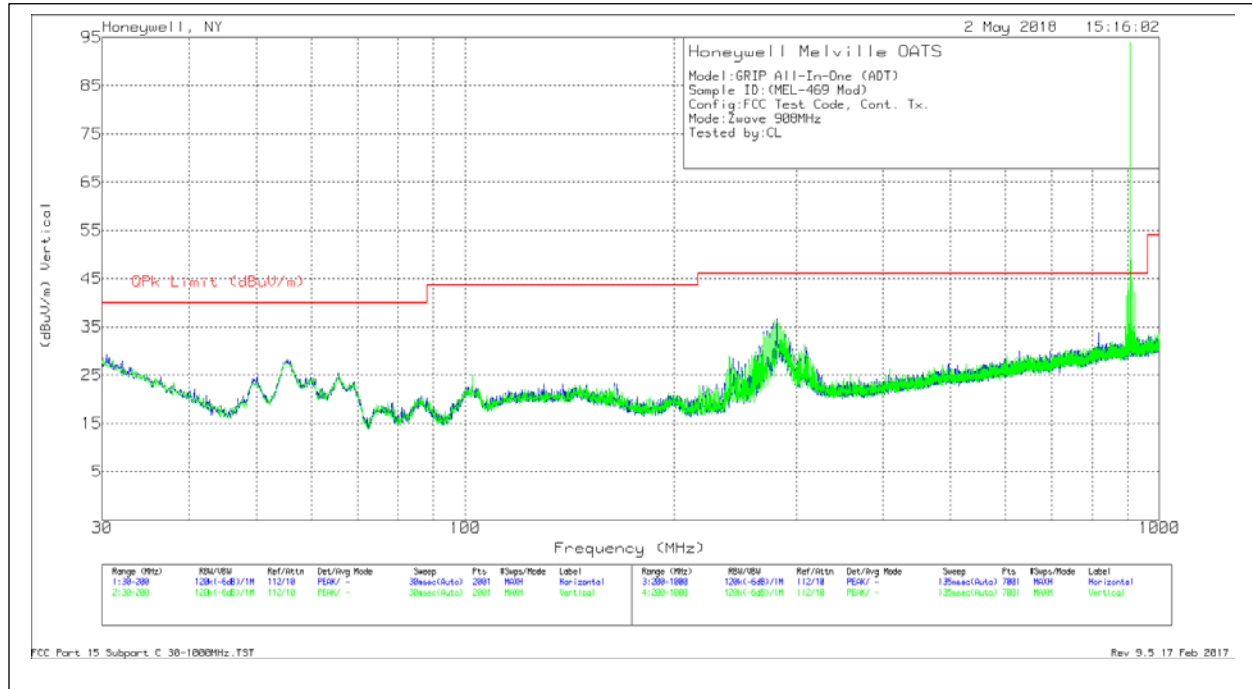
Equipment List

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	10/17/18	10/17/19
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
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
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
RF Cable	-	-	Mini-Circuits	RDE#2	N/A	N/A
RF Cable	-	-	Insulated Wire	SMA#8	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
Preamp (800MHz-21GHz)	11538	233701631	Mini Circuits	ZVA-213-S+	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
RF Cable	-	-	Pasternack	RDE#1	N/A	N/A
RF Cable	-	-	MegaPhase	EMC2-S1S1-360	N/A	N/A
Environmental Meter	11533	A070144	Extech Instruments	SD700	08/21/17	08/21/20

Test Results

Spurious Emissions

Below 1GHz



Low Channel - Plot

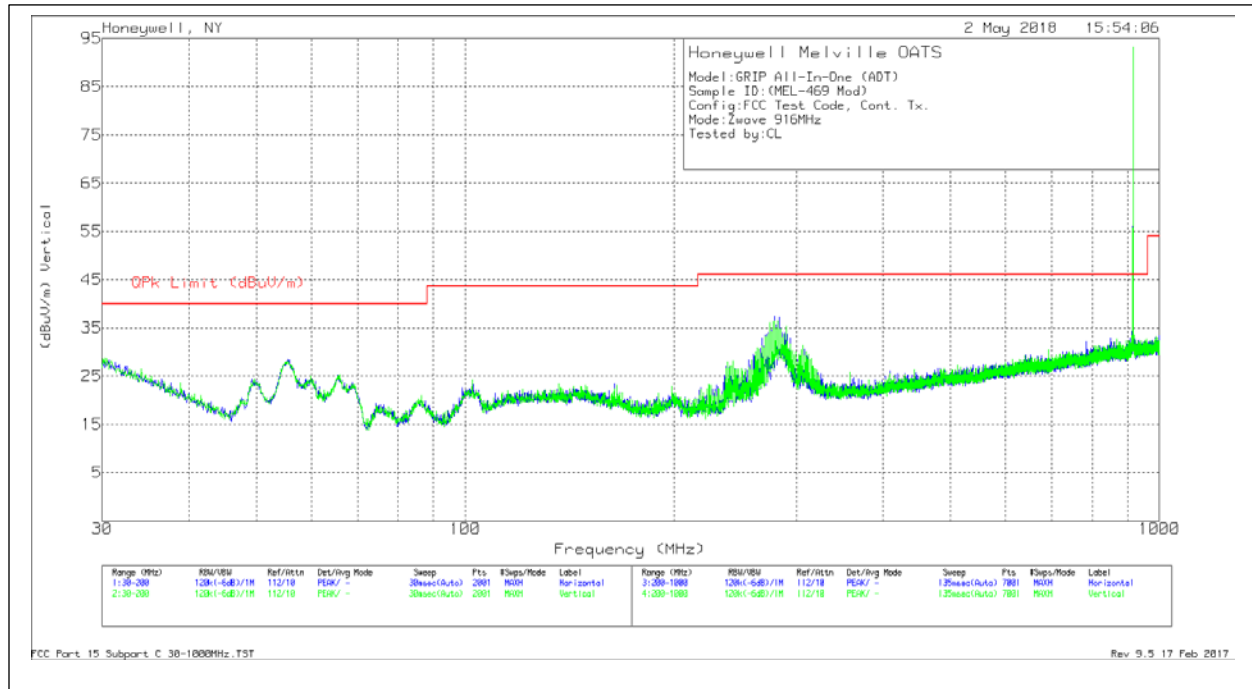
Frequency (MHz)	Meter Reading (dBuV)	Det	AF_JB6 [dB/m]	Cable 1 [dB]	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.3296	10.85	Qp	24.6	.9	36.35	40	-3.65	169	293	H
55.536	14.89	Qp	12	1.1	27.99	40	-12.01	227	364	H
30.2018	11.03	Qp	24.7	.9	36.63	40	-3.37	218	351	V
54.8694	19.14	Qp	12.1	1.1	32.34	40	-7.66	37	196	V
* 281.1903	4.55	Qp	17.6	3	25.15	46.02	-20.87	62	310	H
* 282.0764	4.94	Qp	17.6	3	25.54	46.02	-20.48	50	321	V
908.1465	35.88	Pk	27.3	8.3	71.48	94	-22.52	296	102	H
908.1415	30.12	Pk	27.3	8.3	65.72	94	-28.28	159	105	V

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

Pk - Peak detector

Qp - Quasi-Peak detector

Low Channel - Data



High Channel - Plot

Frequency (MHz)	Meter Reading (dBuV)	Det	AF_JB6 [dB/m]	Cable 1 [dB]	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.8771	10.9	Qp	24.2	.9	36	40	-4	146	280	H
55.5194	14.91	Qp	12	1.1	28.01	40	-11.99	64	390	H
30.2427	10.97	Qp	24.7	.9	36.57	40	-3.43	265	309	V
55.0252	19.2	Qp	12.1	1.1	32.4	40	-7.6	41	204	V
* 283.7238	4.3	Qp	17.6	3.1	25	46.02	-21.02	206	275	H
* 279.7007	6.69	Qp	17.6	3	27.29	46.02	-18.73	38	182	V
915.785	37.3	Pk	27.4	8.3	73	94	-21	290	103	H
915.75	29.27	Pk	27.4	8.3	64.97	94	-29.03	157	167	V

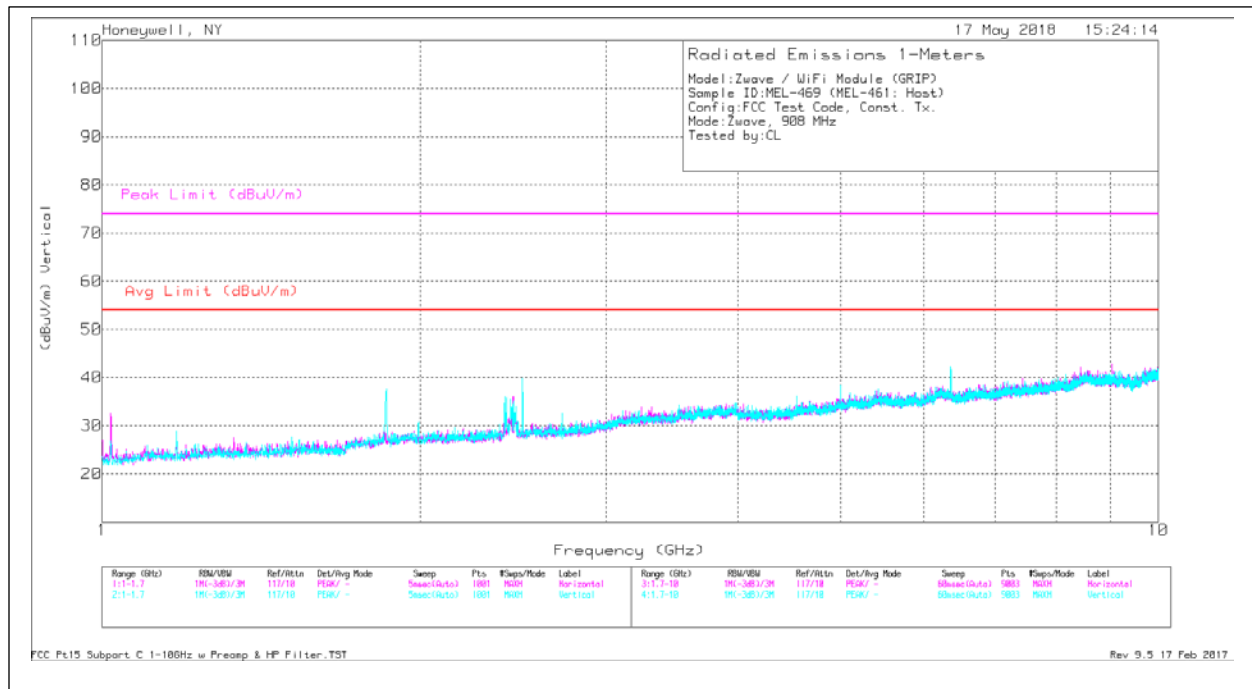
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

High Channel - Data

1-10GHz



Low Channel - Plot

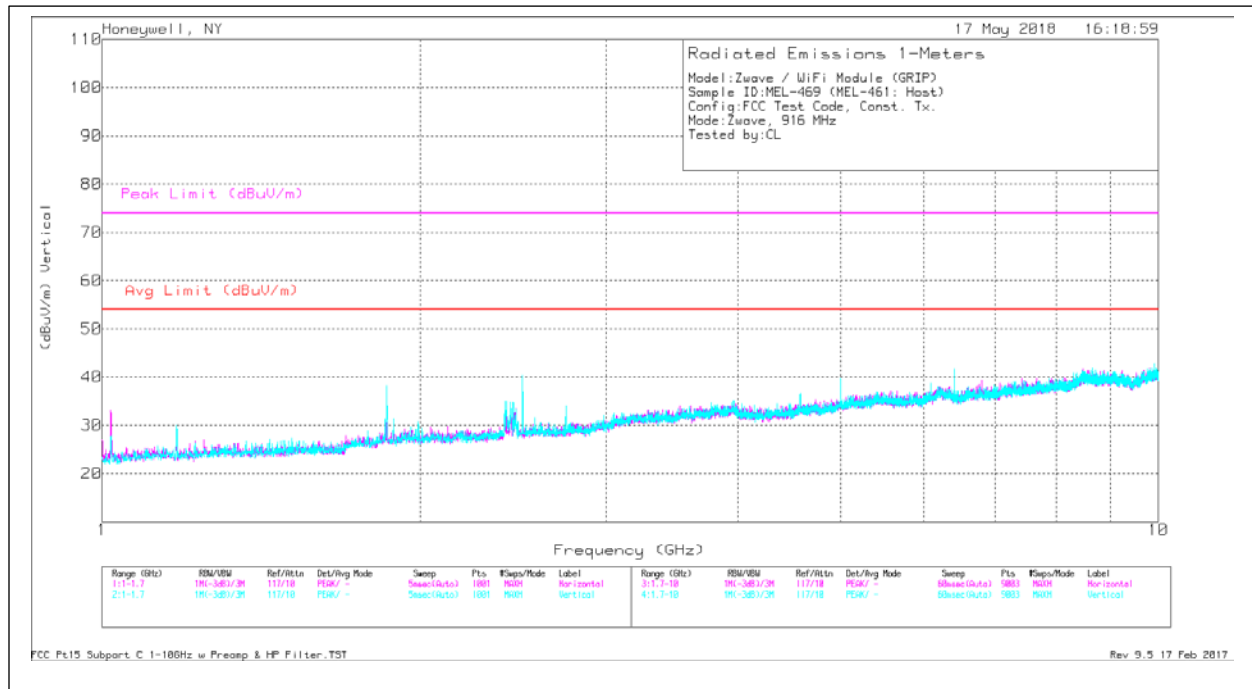
Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX1 [dB]	SMA7 [dB]	SMA5 [dB]	HPF [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.021	41.06	PK2	24.4	-40.2	1.7	1.6	-	28.56	-	-	74	-45.44	242	107	H
* 1.021	31.87	MAV1	24.4	-40.2	1.7	1.6	-	19.37	54	-34.63	-	-	242	107	H
* 9.04	38.62	PK2	37.7	-39.4	5.4	5	.1	47.42	-	-	74	-26.58	33	322	H
* 9.044	27.12	MAV1	37.7	-39.4	5.4	5	.1	35.92	54	-18.08	-	-	33	322	H
1.859	73.11	PK2	27.4	-42.4	2.3	2.2	.4	63.01	-	-	74	-10.99	132	315	V
1.861	37.68	MAV1	27.5	-42.4	2.3	2.2	.4	27.68	54	-26.32	-	-	132	315	V
2.5	52.26	PK2	28.7	-43.3	2.7	2.6	.3	43.26	-	-	74	-30.74	338	128	V
2.5	49.09	MAV1	28.7	-43.3	2.7	2.6	.3	40.09	54	-13.91	-	-	338	128	V
* 2.724	45.08	PK2	29	-43.6	2.8	2.7	.2	36.18	-	-	74	-37.82	15	155	V
* 2.722	33.56	MAV1	29	-43.6	2.8	2.7	.2	24.66	54	-29.34	-	-	15	155	V
6.361	40.76	PK2	34.8	-39.8	4.2	4.2	1.1	45.26	-	-	74	-28.74	180	205	V
6.36	28.96	MAV1	34.8	-39.8	4.2	4.2	1.1	33.46	54	-20.54	-	-	180	205	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



High Channel - Plot

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	SWBOX1 [dB]	SMA7 [dB]	SMA5 [dB]	HPF [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.019	46.1	PK2	24.4	-40.2	1.7	1.6	-	33.6	-	-	74	-40.4	343	367	H
* 1.019	33.15	MAv1	24.4	-40.2	1.7	1.6	-	20.65	54	-33.35	-	-	343	367	H
2.5	53.97	PK2	28.7	-43.3	2.7	2.6	.3	44.97	-	-	74	-29.03	0	118	H
2.5	51.14	MAv1	28.7	-43.3	2.7	2.6	.3	42.14	54	-11.86	-	-	0	118	H
1.857	76.53	PK2	27.4	-42.4	2.3	2.2	.5	66.53	-	-	74	-7.47	357	358	V
1.859	47.36	MAv1	27.5	-42.4	2.3	2.2	.4	37.36	54	-16.64	-	-	357	358	V
2.5	50.22	PK2	28.7	-43.3	2.7	2.6	.3	41.22	-	-	74	-32.78	28	277	V
2.5	46.23	MAv1	28.7	-43.3	2.7	2.6	.3	37.23	54	-16.77	-	-	28	277	V
6.415	40.57	PK2	34.7	-39.8	4.3	4.2	1.2	45.17	-	-	74	-28.83	29	301	V
6.416	29.25	MAv1	34.7	-39.8	4.3	4.2	1.2	33.85	54	-20.15	-	-	29	301	V
* 5	47.94	PK2	33.3	-41.1	3.8	3.7	.2	47.84	-	-	74	-26.16	359	105	V
* 5	42.51	MAv1	33.3	-41.1	3.8	3.7	.2	42.41	54	-11.59	-	-	359	105	V

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

PK2 - KDB558074 Method: Maximum Peak

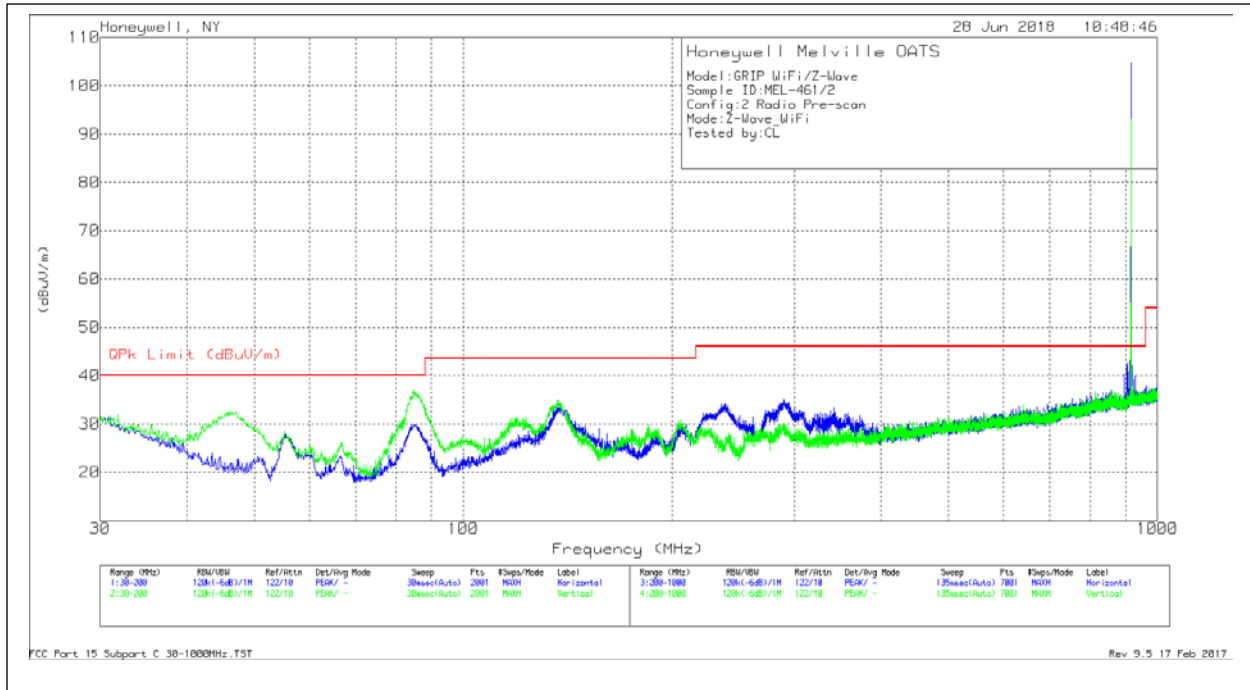
MAv1 - KDB558074 Option 1 Maximum RMS Average

High Channel – Data

Simultaneous Transmission

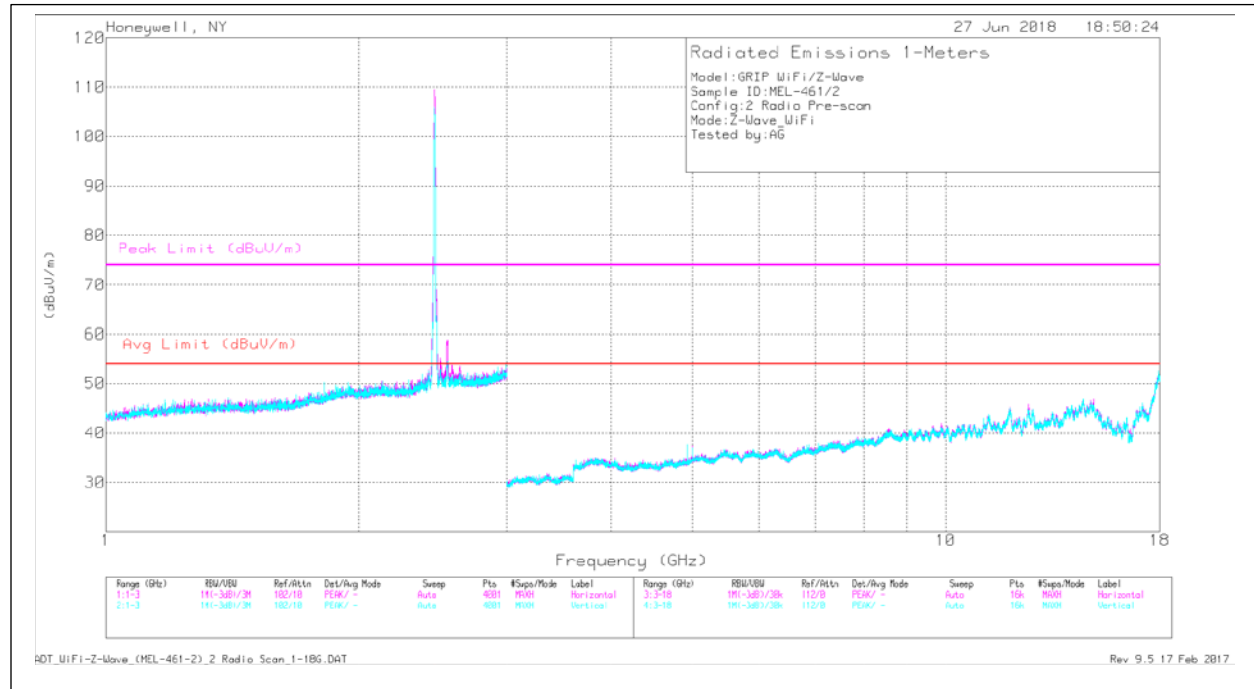
Configuration (Worse-case):

Wi-Fi – Antenna 2, 802.11b Mode, High Channel
Z-Wave – High Channel



30-1000MHz – Plot

Note: No additional emissions generated by simultaneous transmission



1-18GHz – Plot

Note: No additional emissions generated by simultaneous transmission

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 CFR 47 Subpart B, 15.107 ICES-003	0.15-0.5	66 to 56	56 to 46
	0.5-5	56	46
	5-30	60	50

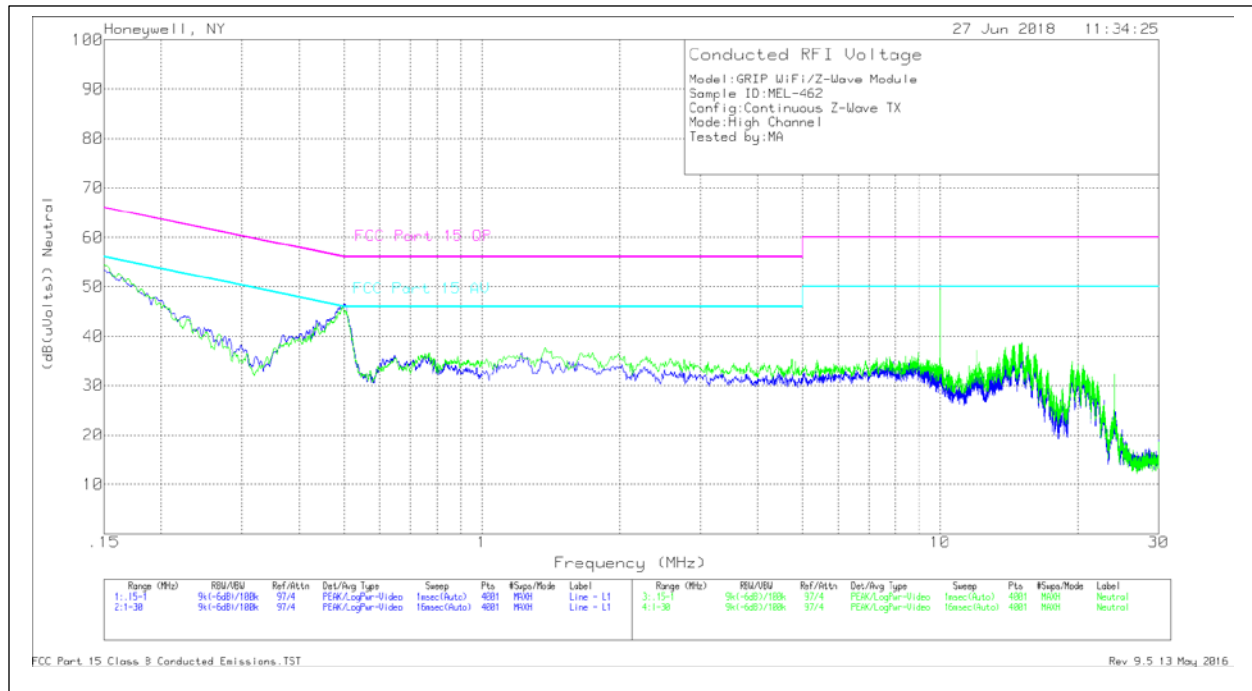
Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
MA	RF Lab	06/27/2018	20.7	54.3	1005	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
RF Cable	-	-	Pasternack	CDE#1	N/A	N/A
Environmental Meter	11533	A078144	Extech Instruments	SD700	08/21/2017	08/21/2020

Test Results (Worse-case)



Line: L1

Frequency (MHz)	Meter Reading (dBuV)	Det	LISN1 L1 [dB]	CDE Cable [dB]	Corrected Reading (dB(uVolts))	FCC Part 15 QP	Margin (dB)	FCC Part 15 AV	Margin (dB)
.15426	42.41	Pk	10.6	-.1	52.91	65.77	-12.86	55.77	-2.86
.43904	32.16	Pk	10	.1	42.26	57.08	-14.82	47.08	-4.82
.49549	35.91	Pk	10	0	45.91	56.08	-10.17	46.08	-.17
.4942	26.02	Av	10	0	36.02	56.1	-20.08	46.1	-10.08
.7595	24.89	Pk	9.9	0	34.79	56	-21.21	46	-11.21
1.22475	26.63	Pk	9.9	0	36.53	56	-19.47	46	-9.47
9.99725	38.83	Pk	10	.2	49.03	60	-10.97	50	-.97

Line: Neutral

Frequency (MHz)	Meter Reading (dBuV)	Det	LISN1 L2 [dB]	CDE Cable [dB]	Corrected Reading (dB(uVolts))	FCC Part 15 QP	Margin (dB)	FCC Part 15 AV	Margin (dB)
.15181	43.68	Pk	10.6	0	54.28	65.9	-11.62	55.9	-1.62
.43712	32.39	Pk	10	0	42.39	57.12	-14.73	47.12	-4.73
.49613	36.07	Pk	10	0	46.07	56.06	-9.99	46.06	.01
.49773	24.3	Av	10	0	34.3	56.04	-21.74	46.04	-11.74
1.37338	27.72	Pk	9.9	0	37.62	56	-18.38	46	-8.38
1.74675	26.66	Pk	9.9	0	36.56	56	-19.44	46	-9.44
9.99725	39.25	Pk	10	.2	49.45	60	-10.55	50	-.55

Pk - Peak detector

Av - Average detector

END OF REPORT