

Honeywell

FCC / ISED Test Report

For

SIXFLOOD

FCC ID: CFS8DLRF6C

IC ID: 573F-RF6CT

Report Completion Date: 2017-12-12

Prepared by and for:

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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/IC Test Report for Honeywell products. It demonstrates the data required to be analyzed to certify a product according to the requirements of the FCC & IC.

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	2017-12-12
A	M. Antola	A. Roussin	Updated below 30MHz emissions results	2017-12-12

Report Authorization

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Applicable Test Standards/Limits		
Test Standards/Limits	Result	Dates Tested
ANSI C63.10: 2013	Compliant	11/30/17-12/4/17
RSS-247, Issue 2	Compliant	11/30/17-12/4/17
RSS-GEN, Issue 4	Compliant	11/30/17-12/4/17
CFR 47 Pt 15 Subpart C, Section 15.209	Compliant	11/30/17-12/4/17
CFR 47 Pt 15 Subpart C, Section 15.247	Compliant	11/30/17-12/4/17

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 RF6 Flood Sensor is a battery powered 2.4 GHz IEEE 802.15.4-compliant transceiver, and is part of a wireless alarm system. It will have the ability to detect flood condition with a remote probe sensor and send the message to the control panel. The flood probe is wired directly to the device via the terminal block.

Worse-Case Configuration & Mode

Radiated emissions was performed with the EUT set to transmit at the channel with the highest output power as worst-case scenario. The EUT was tested in all three orthogonal planes in order to determine the worst-case emissions. It was determined that the X axis orientation (EUT lying flat) was the worst-case orientation. Therefore, all final radiated test was performed with the EUT in the X axis orientation.

The SIXFLOOD is tested as part of a Class 2 Permissive Change. As such, only radiated emission testing was performed as part of this test program. Additional testing required for certification was previously performed as part of the initial certification.

Test Sample Identification

Sample ID Number	Sample Serial Number	Date Received
MEL-378	Non-serialized production unit	10/27/17

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:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

[i.e.] $37 \text{ dBuV/m} = 30 \text{ dBuV} + 18.5 \text{ dB/m} + 0.5 \text{ dB} - 12 \text{ dB}$

- 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

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	8.9	68.0	1031	P	8.9

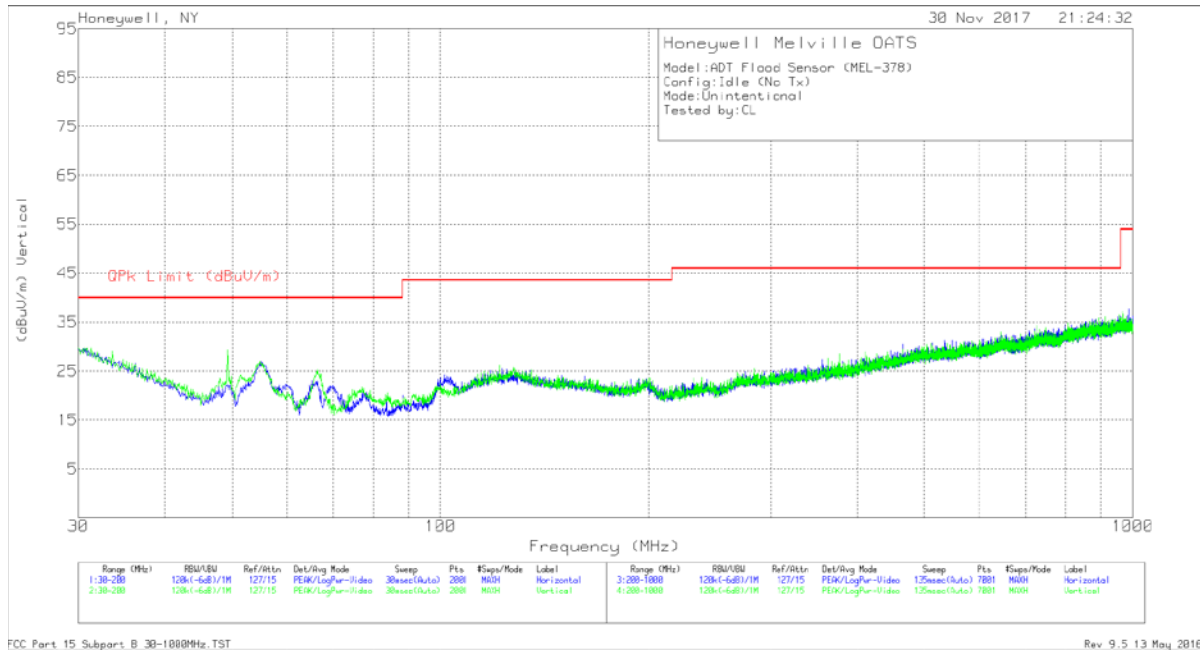
NOTE: For below 30MHz, pretesting showed that no emissions as a product of the EUT were detected within 20dB of the regulatory limit. Worse-case plot/data reported from 30MHz - 1GHz. Worse-case plots reported per antenna above 1GHz, however, all required numerical data is provided above 1GHz.

Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	04/10/2017	04/10/2018
Spectrum Analyzer	11545	103125	Rohde & Schwarz	FSW26	02/14/2017	02/14/2018
Loop Antenna	11535	121080	Com-Power	AL-130R	10/17/2017	10/18/2018
Bilog Antenna (30MHz-6GHz)	11534	A012816	Sunol	JB6	03/09/2017	03/09/2018
Horn Antenna (1-18GHz)	2973	3127	EMCO	RGA-60	02/03/2017	02/03/2018
Horn Antenna (18-40GHz)	11472	151	EMCO	EM-6963	02/06/2017	02/06/2018
Preamp (1-18GHz)	11539	160362	Amplical	AMP1G18-35	N/A	N/A
Preamp (18-40GHz)	11541	160911	Amplical	AMP18G40-35	N/A	N/A
Measurement Software	11543	Version 9.5	UL	UL EMC	N/A	N/A
Environmental Meter	11533	A070144	Extech Instruments	SD700	08/21/2017	08/21/2018
High Pass Filter	11552	G018	Micro-tronics	HPM50111-01	N/A	N/A

Test Results

Below 1GHz (Worse-case - Antenna 1, Low Channel)

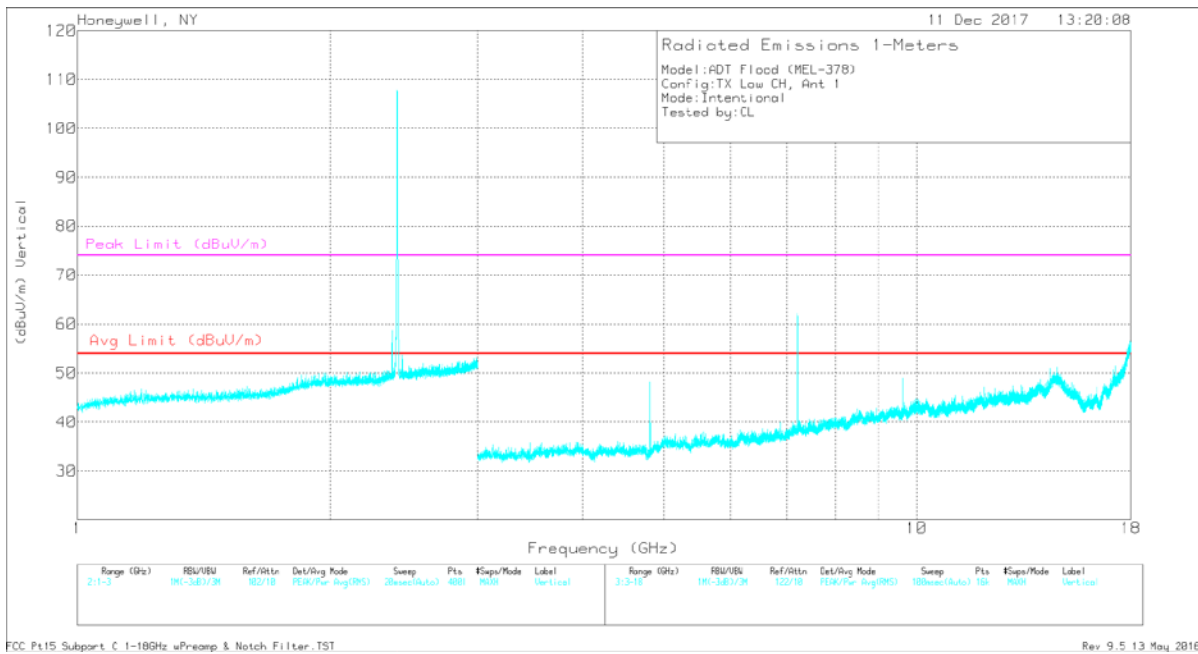
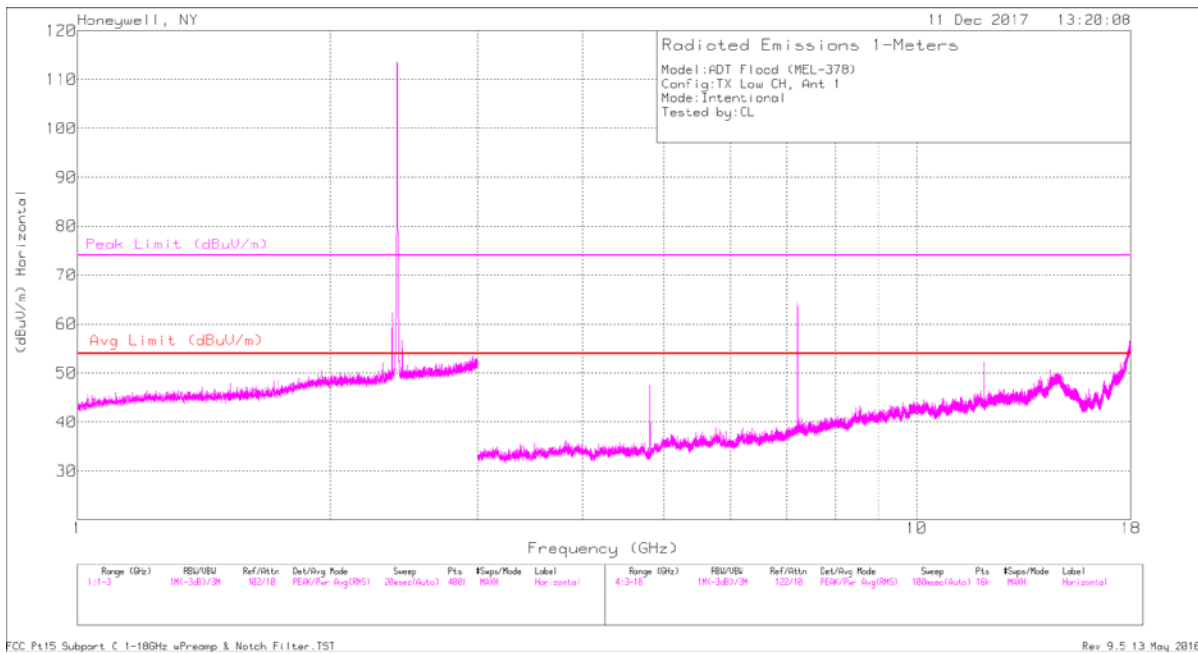


Frequency (MHz)	Meter Reading (dBuV)	Det	AF JB6 [dB/m]	Cable 1 [dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.8112	11.36	Qp	25.2	.9	37.46	40	-2.54	320	211	H
55.2229	16.53	Qp	11.9	1.1	29.53	40	-10.47	201	400	H
33.9673	10.11	Qp	23.1	.9	34.11	40	-5.89	231	123	V
49.0693	21.37	Qp	13	1.1	35.47	40	-4.53	304	349	V
959.2869	4.28	Qp	27.3	9.2	40.78	46.02	-5.24	103	106	H
961.2563	4.24	Qp	27.4	9.2	40.84	53.97	-13.13	317	143	V

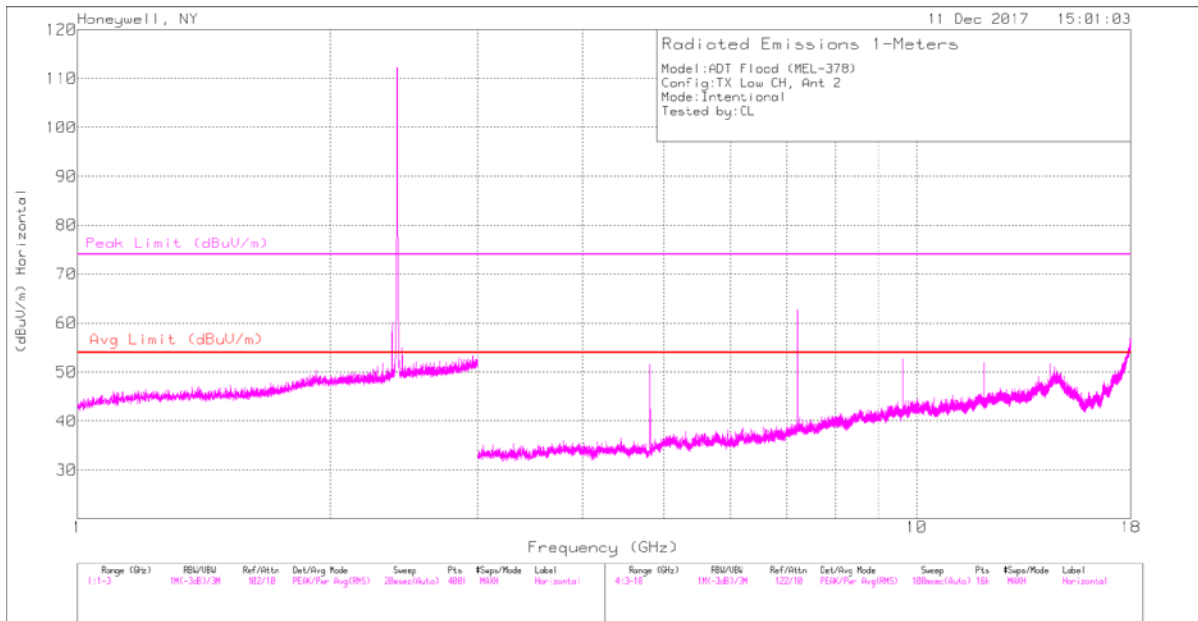
Qp - Quasi-Peak detector

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

Above 1GHz - Plots

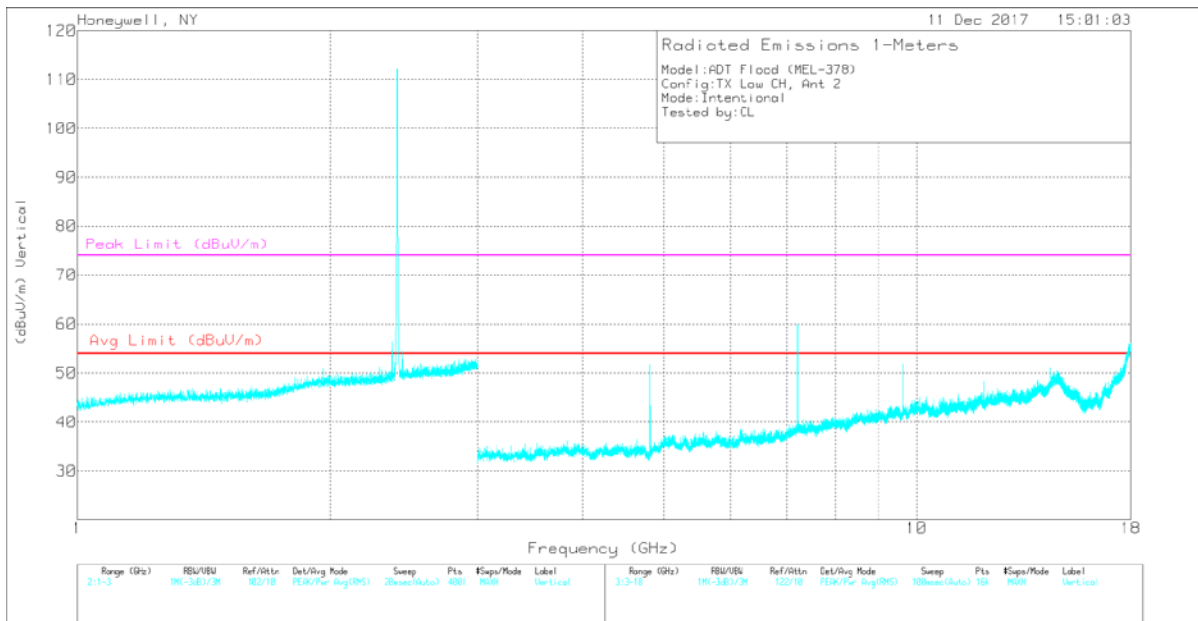


Low Channel Antenna 1- Plot



FCC Pt15 Subpart C 1-18GHz w and w/o Preamp & Notch Filter.TST

Rev. 9.5.13 May 2016.



FCC Pt15 Subpart C 1-18GHz w and w/o Preamp & Notch Filter.TST

Rev. 9.5.13 May 2016.

Low Channel Antenna 2- Plot

Above 1GHz – Antenna 1 Data

SIXFLOOD SENSOR DATA COMPARISON (ANTENNA 1)

LOW CHANNEL

Freq. (MHz):	ORIGINAL Peak Reading (duV/m):	ORIGINAL Avg Corr. Reading (duV/m):	NEW Peak Reading (duV/m):	NEW Avg Corr. Reading (duV/m):	Peak Reading DELTA (dB):	Avg Reading DELTA (dB):	FCC / IC Limit @ 3M (duV/m):	FCC / IC Limit DELTA (dB):
4810	57.19	34.06	55.48	32.35	-1.7	-1.7	54.0	-21.6
7215	72.93	49.80	66.83	43.70	-6.1	-6.1	54.0	-10.3
9620	47.26	24.13	56.74	33.61	9.5	9.5	54.0	-20.4
12025	71.74	48.61	58.6	35.47	-13.1	-13.1	54.0	-18.5
14430	64.73	41.60	64.05	40.92	-0.7	-0.7	54.0	-13.1
16835	64.43	41.30	63.99	40.86	-0.4	-0.4	54.0	-13.1
19240	53.71	30.58	54.38	31.25	0.7	0.7	54.0	-22.7
21645	57.45	34.32	58.47	35.34	1.0	1.0	54.0	-18.7
24050	60.73	37.60	61.13	38.00	0.4	0.4	54.0	-16.0

MID CHANNEL

Freq. (MHz):	ORIGINAL Peak Reading (duV/m):	ORIGINAL Avg Corr. Reading (duV/m):	NEW Peak Reading (duV/m):	NEW Avg Corr. Reading (duV/m):	Peak Reading DELTA (dB):	Avg Reading DELTA (dB):	FCC / IC Limit @ 3M (duV/m):	FCC / IC Limit DELTA (dB):
4890	57.72	34.59	57.72	34.59	0.0	0.0	54.0	-19.4
7335	68.13	45.00	53.41	30.28	-14.7	-14.7	54.0	-23.7
9780	52.65	29.52	54.4	31.27	1.8	1.8	54.0	-22.7
12225	61.66	38.53	59.98	36.85	-1.7	-1.7	54.0	-17.1
14670	63.99	40.86	63.95	40.82	0.0	0.0	54.0	-13.2
17115	66.01	42.88	66.19	43.06	0.2	0.2	54.0	-10.9
19560	55.58	32.45	56.72	33.59	1.1	1.1	54.0	-20.4
22005	57.13	34.00	58.46	35.33	1.3	1.3	54.0	-18.7
24450	61.36	38.23	61.69	38.56	0.3	0.3	54.0	-15.4

HIGH CHANNEL

Freq. (MHz):	ORIGINAL Peak Reading (duV/m):	ORIGINAL Avg Corr. Reading (duV/m):	NEW Peak Reading (duV/m):	NEW Avg Corr. Reading (duV/m):	Peak Reading DELTA (dB):	Avg Reading DELTA (dB):	FCC / IC Limit @ 3M (duV/m):	FCC / IC Limit DELTA (dB):
4950	57.78	34.65	57.41	34.28	-0.4	-0.4	54.0	-19.7
7425	51.18	28.05	52.97	29.84	1.8	1.8	54.0	-24.2
9900	55.02	31.89	55.75	32.62	0.7	0.7	54.0	-21.4
12375	58.05	34.92	58.96	35.83	0.9	0.9	54.0	-18.2
14850	62.97	39.84	63.15	40.02	0.2	0.2	54.0	-14.0
17325	68.68	45.55	68.81	45.68	0.1	0.1	54.0	-8.3
19800	54.49	31.36	56.09	32.96	1.6	1.6	54.0	-21.0
22275	58.62	35.49	58.28	35.15	-0.3	-0.3	54.0	-18.8
24750	64.46	41.33	64.13	41.00	-0.3	-0.3	54.0	-13.0

Above 1GHz – Antenna 2 Data

SiXFLOOD SENSOR DATA COMPARISON (ANTENNA 2)

LOW CHANNEL

Freq. (MHz):	ORIGINAL Peak Reading (duV/m):	ORIGINAL Avg Corr. Reading (duV/m):	NEW Peak Reading (duV/m):	NEW Avg Corr. Reading (duV/m):	Peak Reading DELTA (dB):	Avg Reading DELTA (dB):	FCC / IC Limit @ 3M (duV/m):	FCC / IC Limit DELTA (dB):
4810	59.98	36.85	59.97	36.84	0.0	0.0	54.0	-17.2
7215	66.31	43.18	65.63	42.50	-0.7	-0.7	54.0	-11.5
9620	54.76	31.63	59.13	36.00	4.4	4.4	54.0	-18.0
12025	61.48	38.35	57.9	34.77	-3.6	-3.6	54.0	-19.2
14430	64.32	41.19	64.59	41.46	0.3	0.3	54.0	-12.5
16835	63.80	40.67	64.03	40.90	0.2	0.2	54.0	-13.1
19240	53.08	29.95	54.91	31.78	1.8	1.8	54.0	-22.2
21645	57.76	34.63	58.24	35.11	0.5	0.5	54.0	-18.9
24050	61.60	38.47	61.15	38.02	-0.5	-0.5	54.0	-16.0

MID CHANNEL

Freq. (MHz):	ORIGINAL Peak Reading (duV/m):	ORIGINAL Avg Corr. Reading (duV/m):	NEW Peak Reading (duV/m):	NEW Avg Corr. Reading (duV/m):	Peak Reading DELTA (dB):	Avg Reading DELTA (dB):	FCC / IC Limit @ 3M (duV/m):	FCC / IC Limit DELTA (dB):
4890	57.42	34.29	55.1	31.97	-2.3	-2.3	54.0	-22.0
7335	61.24	38.11	58.4	35.27	-2.8	-2.8	54.0	-18.7
9780	54.32	31.19	58.25	35.12	3.9	3.9	54.0	-18.9
12225	58.08	34.95	59.08	35.95	1.0	1.0	54.0	-18.0
14670	63.30	40.17	63.63	40.50	0.3	0.3	54.0	-13.5
17115	66.16	43.03	66.32	43.19	0.2	0.2	54.0	-10.8
19560	55.22	32.09	55.65	32.52	0.4	0.4	54.0	-21.5
22005	57.29	34.16	58.51	35.38	1.2	1.2	54.0	-18.6
24450	61.79	38.66	61.29	38.16	-0.5	-0.5	54.0	-15.8

HIGH CHANNEL

Freq. (MHz):	ORIGINAL Peak Reading (duV/m):	ORIGINAL Avg Corr. Reading (duV/m):	NEW Peak Reading (duV/m):	NEW Avg Corr. Reading (duV/m):	Peak Reading DELTA (dB):	Avg Reading DELTA (dB):	FCC / IC Limit @ 3M (duV/m):	FCC / IC Limit DELTA (dB):
4950	59.87	36.74	55.29	32.16	-4.6	-4.6	54.0	-21.8
7425	55.80	32.67	56.49	33.36	0.7	0.7	54.0	-20.6
9900	55.25	32.12	55.04	31.91	-0.2	-0.2	54.0	-22.1
12375	59.07	35.94	59.58	36.45	0.5	0.5	54.0	-17.5
14850	63.32	40.19	63.48	40.35	0.2	0.2	54.0	-13.6
17325	68.74	45.61	68.29	45.16	-0.4	-0.4	54.0	-8.8
19800	55.10	31.97	55.11	31.98	0.0	0.0	54.0	-22.0
22275	57.90	34.77	58.7	35.57	0.8	0.8	54.0	-18.4
24750	63.96	40.83	63.79	40.66	-0.2	-0.2	54.0	-13.3

END OF REPORT