



TEST DATA REPORT

Test Data Number: 102569433MIN-008

Project Number: G102569433

Testing performed on the
5883H-AT

to

47 CFR Part 15. 231:2015 / RSS-210, Issue 8, Amendment 1
Spurious Radiated Emissions

For

Honeywell International Inc.

Test Performed by:
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Test Authorized by:
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Date of issue: July 15, 2016

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1.0 GENERAL DESCRIPTION

Model:	5883H-AT, with Power Supply by MG Electronics, model: MGT12500RTS
Type of EUT:	Wireless Transceiver
Sample ID:	MEL-068 and MEL-069
Company:	Honeywell International Inc.
Customer:	Mr. Andrew Roussin
Address:	2 Corporate Center Drive Melville, NY 11747 USA
Phone:	(516) 577-5935
e-mail:	AndrewRoussin@Honeywell.com
Date Sample Submitted:	May 16, 2016
Test Work Started:	May 16, 2016
Test Work Completed:	July 12, 2016
Test Sample Conditions:	☐ Damaged ☐ Poor (Usable) ☒ Good



1.1 Product Description; Test Facility

Product Description:	RF Transceiver
Operating Frequency	344.94 MHz
Test Facility Accreditation:	A2LA (Certificate No. 1427.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.10-2013

1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

- ☐ - Standby
- ☐ - Continuous
- ☒ - Continuous un-modulated
- ☐ - Test program (customer specific)
- ☐ -

Operating modes of the EUT:

No.	Description
1	Unit MEL-068 was setup to transmitting with Antenna 1
2	Unit MEL-069 was setup to transmitting with Antenna 2

Cables:

No.	Type	Length	Designation	Note
1	2 wires, unshielded	1.6 m	AC Power	

Support equipment/Services:

No.	Item	Description
	None	

General notes: None

1.3 Measurement uncertainty

The expanded uncertainty ($k = 2$) for radiated emissions from 30 to 1000 MHz has been determined to be: ± 4 dB at 10m and ± 5.4 dB at 3m

The expanded uncertainty ($k = 2$) for conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 2.6 dB

1.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude in dB(μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(m^{-1})

AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(μ V) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(μ V/m).

$$RA = 48.1 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

$$FS = RA + AF + CF - AG$$

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

$$FS = 41.1 \text{ dB}(\mu\text{V}/\text{m})$$

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST SPECIFICATION	TEST PARAMETERS	RESULT
15.231(b) / RSS-210 A1.1.2	Transmitter field strength of emissions	Pass
15.207/RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	Pass

Note: Selection of tests above is per client request.



3.0 TEST CONDITIONS AND RESULTS

3.1 Transmitter field strength of emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Frequency range of measurements: 30MHz-4000MHz

Test result: Pass

Max. Emissions margin at fundamental: 0.8 dB below the limits

Max. Margin of harmonics and spurious emissions: 10.4 dB below the limits

Notes: Limits in Restricted Band of Operation (FCC Part 15.205) are according to FCC Part 15.209. Limits outside of the Restricted Band of Operation (FCC Part 15.205) are according to FCC Part 15.231(a).
Tables 3.1.1 and 3.1.3 show peak value of emissions.
Tables 3.1.2 and 3.1.4 show average value of emissions.
Graphs 3.1.1 to 3.1.4 show peak of emissions; limits to FCC Part 15.209 are shown for reference.

Date:	May 16 – July 12, 2016	Result: Pass
Tested by:	Simon Khazon	
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Test Point:	Enclosure with antenna	
Operation mode:	See page 5	
Environmental Conditions:	24°C; 46%(RH); 96.5kPa	
Equipment Verification:	☒	
Note:	MEL-068, Peak Value	

Table 3.1.1

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB
	Polarity	Hts(cm)							
Emissions at Fundamental Frequency									
344.94	V	100	15.3	1.5	0.0	71.5	88.3	97.3	-8.9
344.90	H	100	15.3	1.5	0.0	75.4	92.2	97.3	-5.0
Spurious and Harmonics Emissions									
355.70	V	100	15.6	1.5	0.0	27.7	44.9	77.3	-32.4
355.70	H	100	15.6	1.5	0.0	28.4	45.6	77.3	-31.7
689.87	V	100	20.0	2.0	0.0	33.9	55.9	77.3	-21.3
689.87	H	137	20.0	2.0	0.0	40.6	62.6	77.3	-14.6
1034.83	V	100	22.8	2.8	43.0	69.6	52.2	74.0	-21.8
1379.70	V	190	25.1	3.3	43.5	73.9	58.8	74.0	-15.2
1724.46	V	171	26.9	3.9	43.5	71.0	58.3	77.3	-19.0

Date:	May 16 – July 12, 2016	Result: Pass
Tested by:	Simon Khazon	
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Test Point:	Enclosure with antenna	
Operation mode:	See page 5	
Environmental Conditions:	24°C; 46%(RH); 96.5kPa	
Equipment Verification:	☒	
Note:	MEL-068, Average Value	

Table 3.1.2

Frequency MHz	Antenna Polarity	Ant. CF Hts(cm) dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Average C.F. (dB)	Total @ 3m after C.F. dBμV/m	Limit dBμV/m	Margin dB
Emissions at Fundamental Frequency										
344.94	V	100	15.3	1.5	0.0	71.5	88.3	15.74	72.6	77.3 -4.7
344.90	H	100	15.3	1.5	0.0	75.4	92.2	15.74	76.5	77.3 -0.8
Spurious and Harmonics Emissions										
355.70	V	100	15.6	1.5	0.0	27.7	44.9	15.74	29.1	57.3 -28.1
355.70	H	100	15.6	1.5	0.0	28.4	45.6	15.74	29.8	57.3 -27.4
689.87	V	100	20.0	2.0	0.0	33.9	55.9	15.74	40.2	57.3 -17.1
689.87	H	137	20.0	2.0	0.0	40.6	62.6	15.74	46.9	57.3 -10.4
1034.83	V	100	22.8	2.8	43.5	69.6	51.7	15.74	36.0	54.0 -18.0
1379.70	V	190	25.1	3.3	43.5	73.9	58.8	15.74	43.1	54.0 -10.9
1724.46	V	171	26.9	3.9	43.4	71.0	58.4	15.74	42.7	57.3 -14.6

Date:	May 16 – July 12, 2016	Result: Pass
Tested by:	Simon Khazon	
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Test Point:	Enclosure with antenna	
Operation mode:	See page 5	
Environmental Conditions:	24°C; 46%(RH); 96.5kPa	
Equipment Verification:	☒	
Note:	MEL-069, peak Value	

Table 3.1.3

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB
	Polarity	Hts(cm)							
Emissions at Fundamental Frequency									
344.94	V	146	15.3	1.5	0.0	75.2	92.0	97.3	-5.2
344.90	H	324	15.3	1.5	0.0	69.7	86.5	97.3	-10.7
Spurious and Harmonics Emissions									
355.71	V	100	15.6	1.5	0.0	25.6	42.8	77.3	-34.5
355.71	H	100	15.6	1.5	0.0	26.7	43.9	77.3	-33.4
689.89	V	100	20.0	2.0	0.0	29.9	51.9	77.3	-25.3
689.87	H	142	20.0	2.0	0.0	36.2	58.2	77.3	-19.0
1034.83	V	370	22.8	2.8	43.0	68.4	51.0	74.0	-23.0
1379.70	V	131	25.1	3.3	43.5	59.3	44.2	74.0	-29.8
1724.46	V	171	26.9	3.9	43.5	58.0	45.3	77.3	-32.0

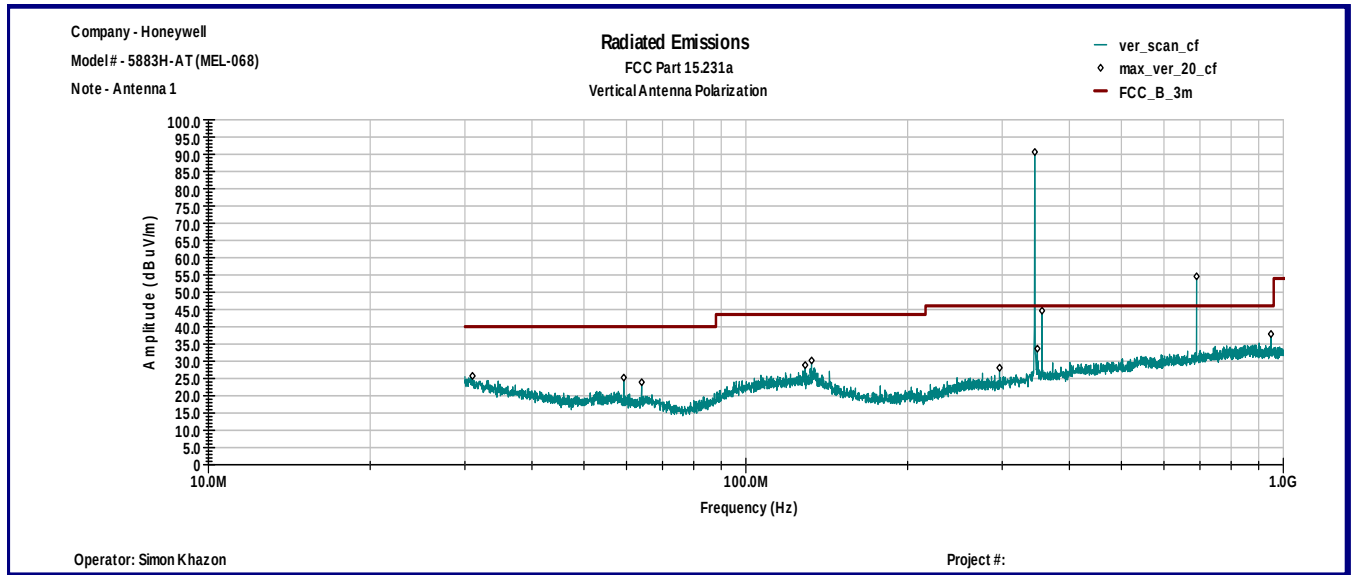
Date:	May 16 – July 12, 2016	Result: Pass
Tested by:	Simon Khazon	
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Test Point:	Enclosure with antenna	
Operation mode:	See page 5	
Environmental Conditions:	24°C; 46%(RH); 96.5kPa	
Equipment Verification:	☒	
Note:	MEL-069, Average Value	

Table 3.1.4

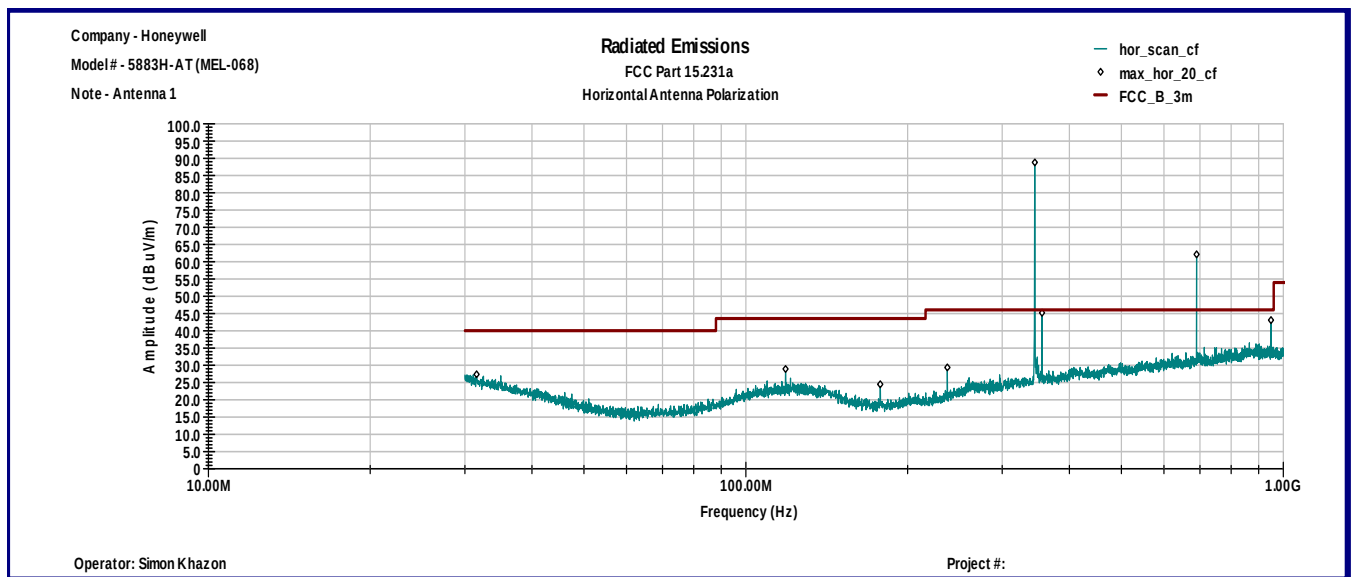
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Average C.F. (dB)	Total @ 3m after C.F. dBμV/m	Limit dBμV/m	Margin dB
			Emissions at Fundamental Frequency								
344.94	V	146	15.3	1.5	0.0	75.2	92.0	15.74	76.3	77.3	-1.0
344.90	H	324	15.3	1.5	0.0	69.7	86.5	15.74	70.8	77.3	-6.5
			Spurious and Harmonics Emissions								
355.71	V	100	15.6	1.5	0.0	25.6	42.8	15.74	27.0	57.3	-30.2
355.71	H	100	15.6	1.5	0.0	26.7	43.9	15.74	28.1	57.3	-29.1
689.89	V	100	20.0	2.0	0.0	29.9	51.9	15.74	36.2	57.3	-21.1
689.87	H	142	20.0	2.0	0.0	36.2	58.2	15.74	42.5	57.3	-14.8
1034.83	V	370	22.8	2.8	43.5	68.4	50.5	15.74	34.8	54.0	-19.2
1379.70	V	131	25.1	3.3	43.5	59.3	44.2	15.74	28.5	54.0	-25.5
1724.46	V	171	26.9	3.9	43.4	58.0	45.4	15.74	29.7	57.3	-27.6

Graph 3.1.1

Vertical antenna polarization

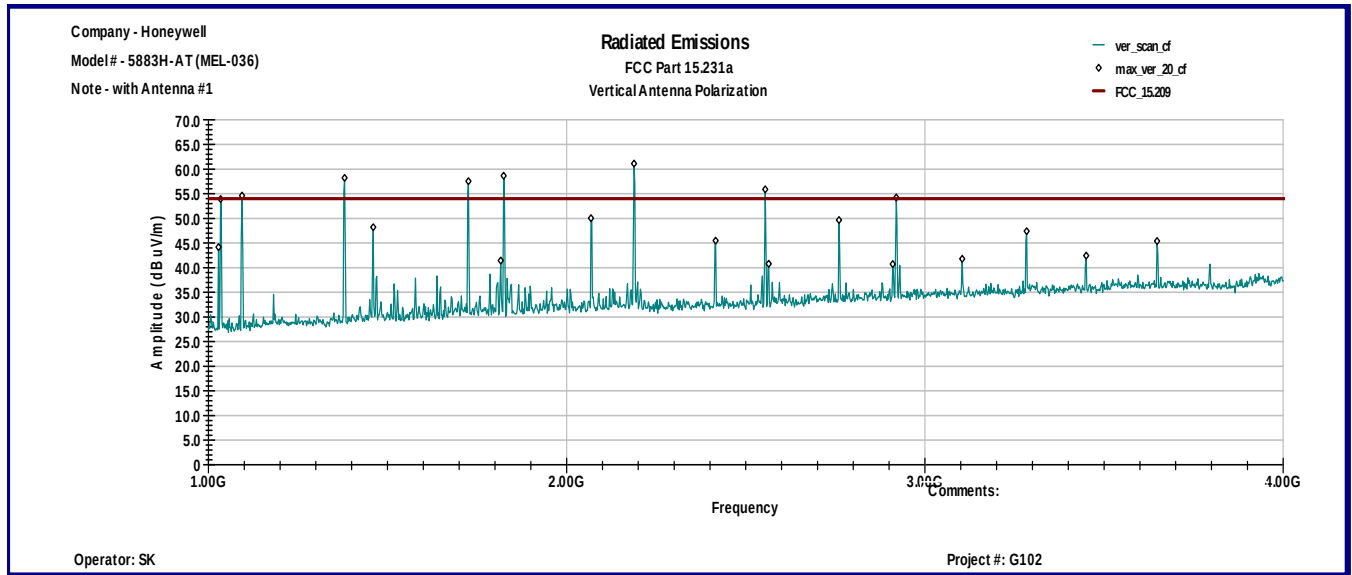


Horizontal antenna polarization

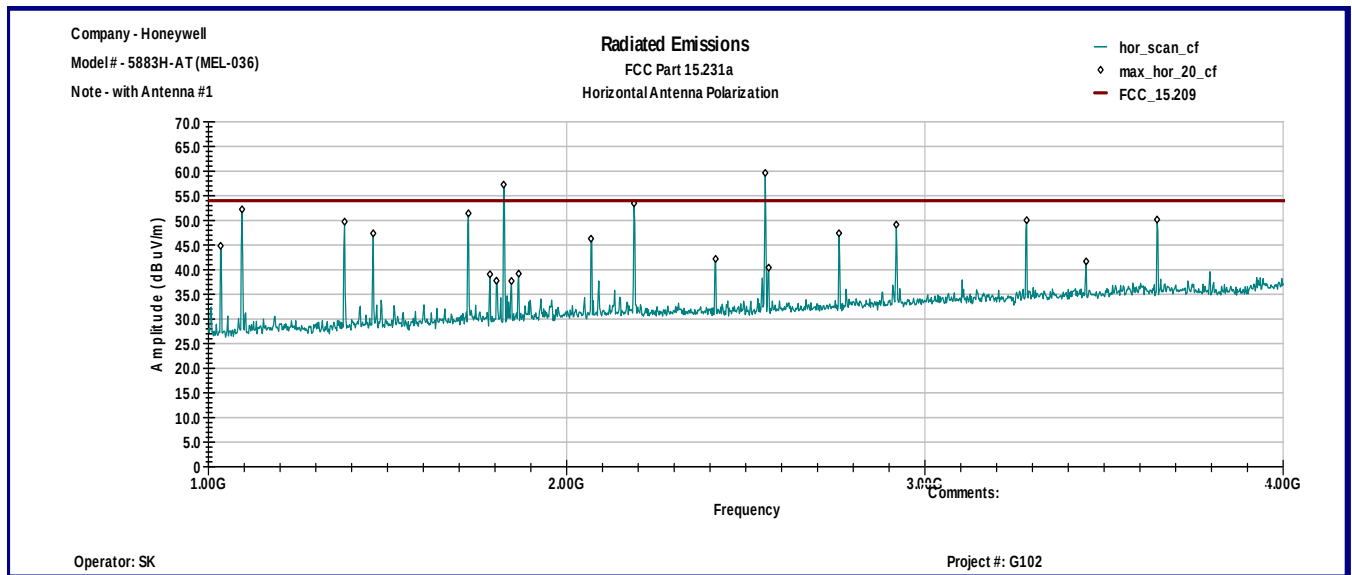


Graph 3.1.2

Vertical antenna polarization

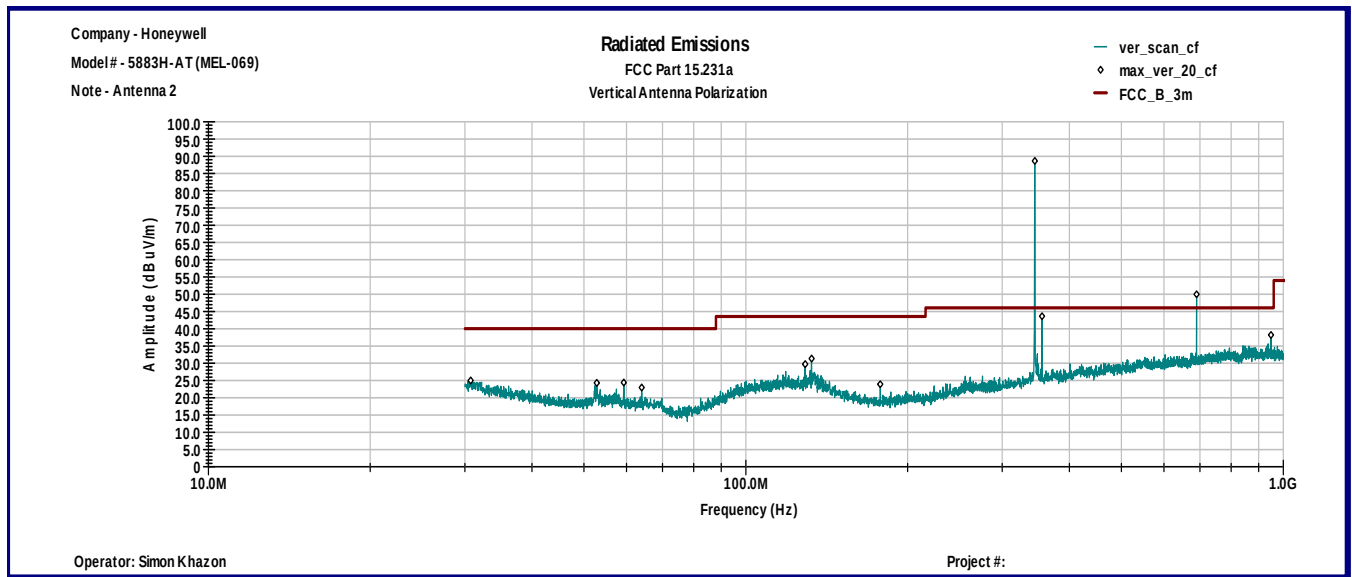


Horizontal antenna polarization

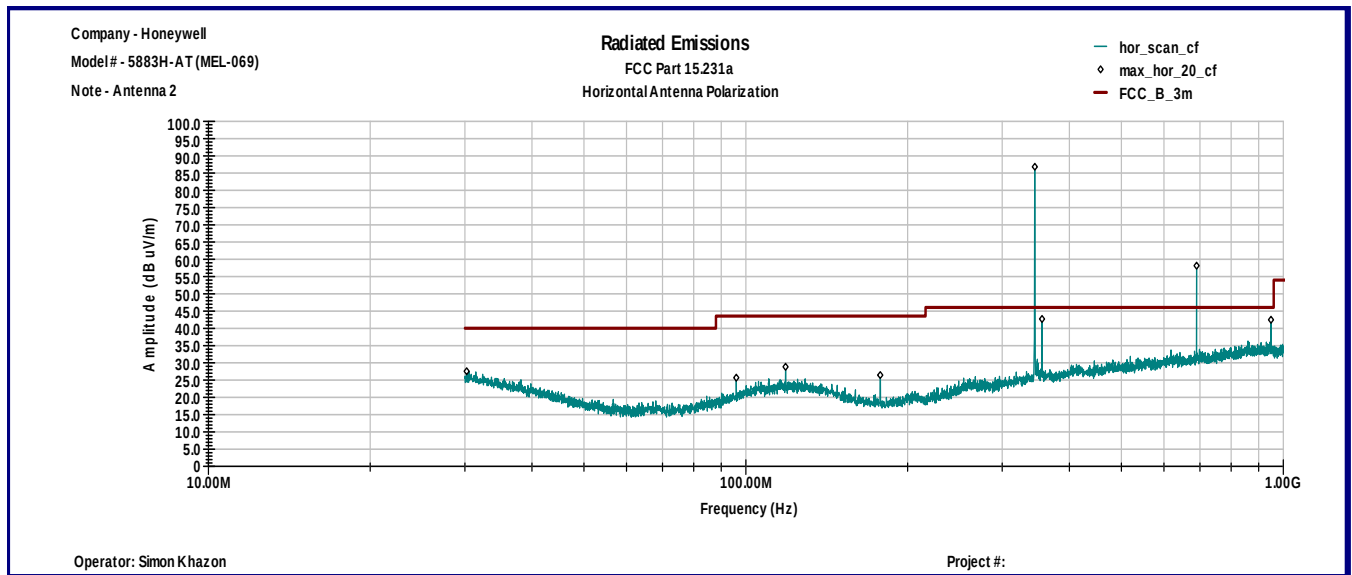


Graph 3.1.3

Vertical antenna polarization

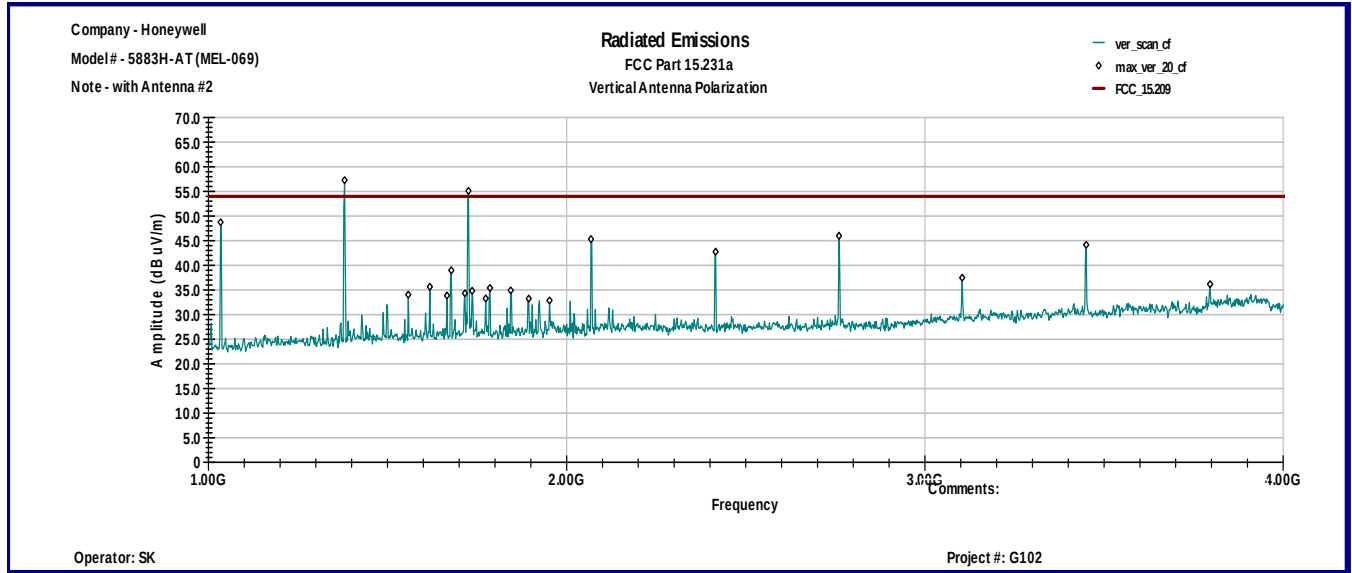


Horizontal antenna polarization

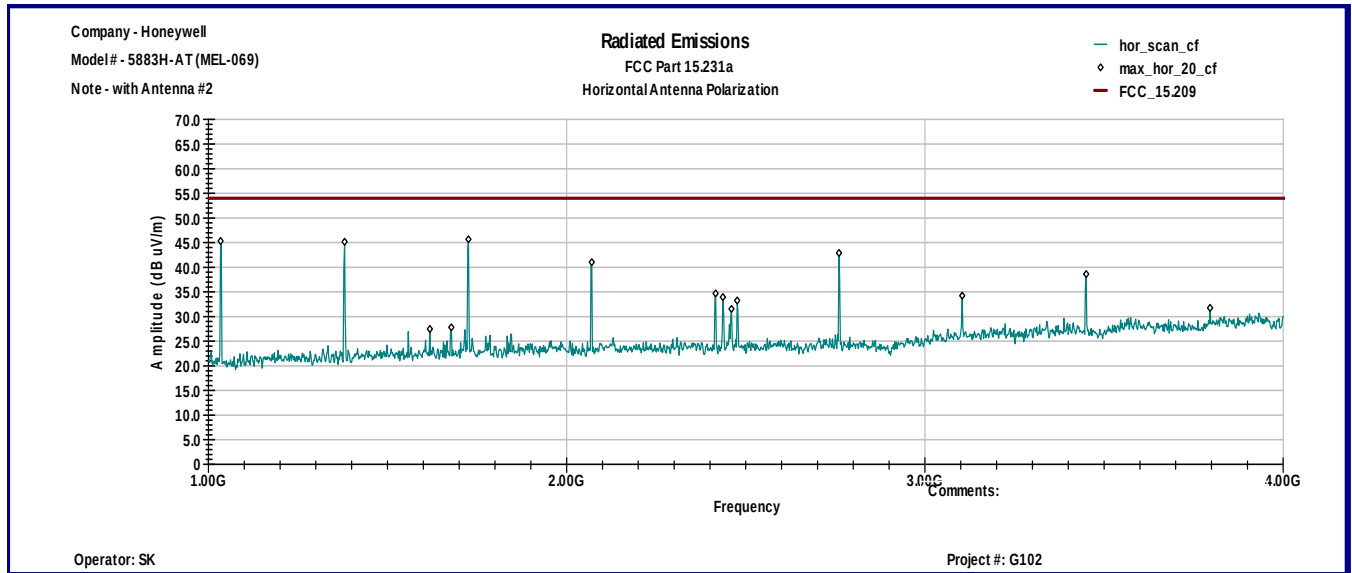


Graph 3.1.4

Vertical antenna polarization



Horizontal antenna polarization





3.1.1 Average correction factor calculation

An Average correction factor is calculated by client in value of -15.74dB (see calculations below).

The data output is phase encoded Manchester which has inherent 50% duty cycle. The transmitted data rate is 3.676 kBs +/-0.05%, i.e. each bit is 272uS duration typical and 272.13uS max. The worst case data format consists of 120 bits, The duration of each word is 32.655 mSec max. Each word is transmitted 6 times at each transmission event, the words are separated (start to start) by 105mSec max.

Total max transmission time at each transmission = $(6-1)*105\text{mSec} + 32.655\text{ mSec max} = 557.655\text{mSec}$.

The duty cycle over a 100mSec measuring period is as follows:

Duty Cycle = Actual RF transmission ON time / 100mSec (interval)

Actual transmission ON time = 120 bits X 50% X 272.13uSec = 16.33mSec

Therefore Duty cycle = 16.33 / 100 mSec = .1633 = 16.33%

Duty Cycle in dB (correction factor) = $20*\log(.1633) = -15.74\text{ dB}$



3.2 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 3.5 dB below the limits

Notes: None

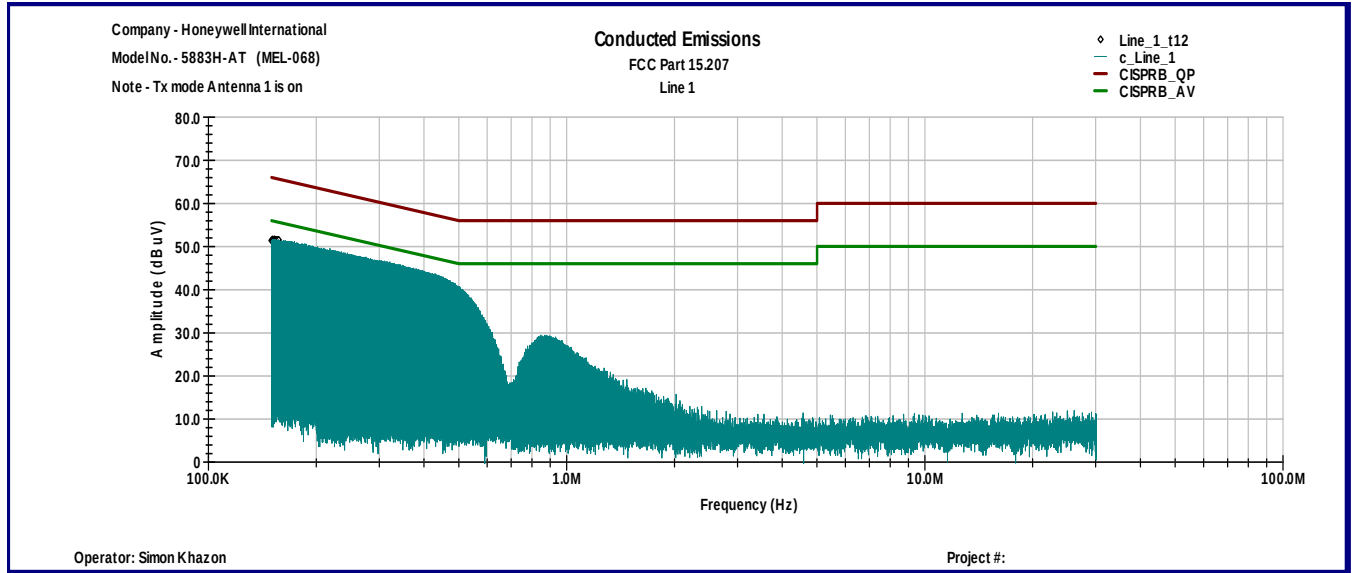
Date:	July 12, 2016	Result: Pass
Tested by:	Simon Khazon	
Standard:	FCC 15.207	
Test Point:	Power Line	
Operation mode:	See page 5	
Environmental Conditions:	25°C; 46%(RH); 96.2kPa	
Equipment Verification:	☒	
Note:	MEL-068	

Table 3.2.1

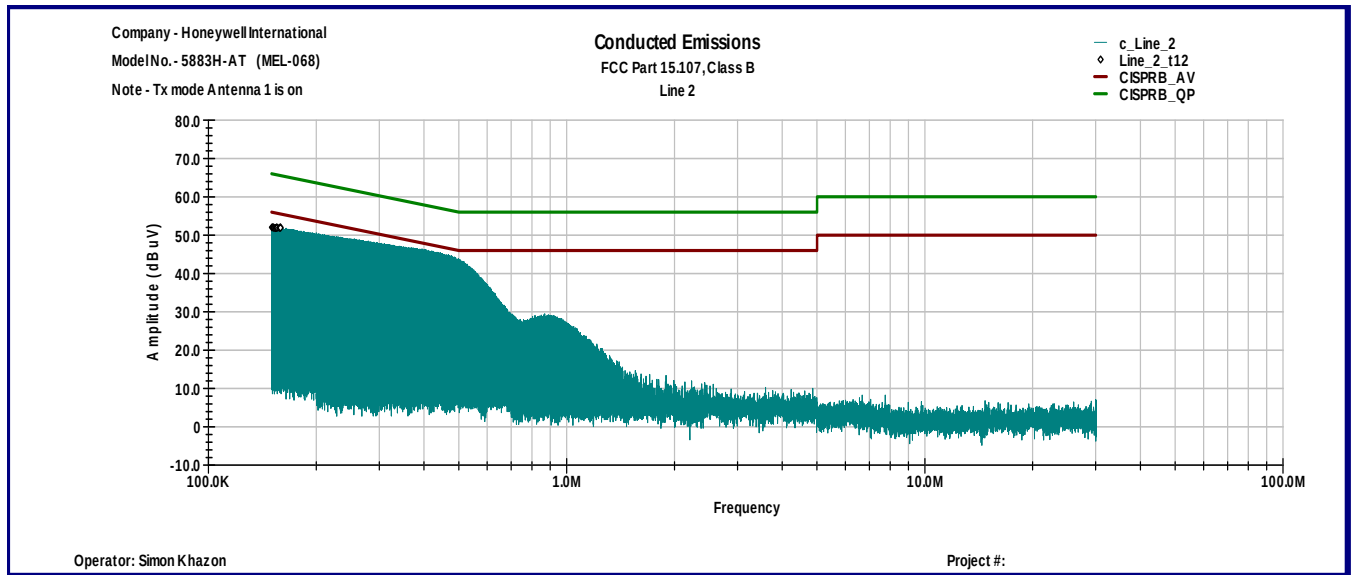
Line 1					
Frequency	Peak dBμV	QP Limit dBμV	AVG Limit dBμV	QP Margin dB	AVG Margin dB
150.04 KHz	51.4	66.0	56.0	-14.6	-4.6
150.93 KHz	51.6	66.0	56.0	-14.3	-4.3
152.21 KHz	51.5	65.9	55.9	-14.3	-4.3
152.76 KHz	51.6	65.9	55.9	-14.2	-4.2
153.5 KHz	51.6	65.8	55.8	-14.2	-4.2
154.04 KHz	51.5	65.8	55.8	-14.3	-4.3
154.58 KHz	51.4	65.8	55.8	-14.3	-4.3
154.82 KHz	51.4	65.7	55.7	-14.3	-4.3
155.32 KHz	51.5	65.7	55.7	-14.3	-4.3
156.1 KHz	51.4	65.7	55.7	-14.2	-4.2
156.64 KHz	51.5	65.6	55.6	-14.2	-4.2
157.19 KHz	51.5	65.6	55.6	-14.1	-4.1
Line 2					
Frequency	Peak dBμV	QP Limit dBμV	AVG Limit dBμV	QP Margin dB	AVG Margin dB
150.43 KHz	52.0	66.0	56.0	-14.0	-4.0
151.2 KHz	52.0	65.9	55.9	-13.9	-3.9
151.75 KHz	52.0	65.9	55.9	-13.9	-3.9
152.29 KHz	51.9	65.9	55.9	-14.0	-4.0
153.57 KHz	51.8	65.8	55.8	-14.0	-4.0
153.81 KHz	51.9	65.8	55.8	-13.9	-3.9
154.89 KHz	52.0	65.7	55.7	-13.8	-3.8
155.09 KHz	51.9	65.7	55.7	-13.8	-3.8
155.63 KHz	52.0	65.7	55.7	-13.7	-3.7
157.69 KHz	51.9	65.6	55.6	-13.7	-3.7
158.78 KHz	52.0	65.5	55.5	-13.5	-3.5
158.97 KHz	51.9	65.5	55.5	-13.6	-3.6

Graph 3.2.1

Line 1



Line 2



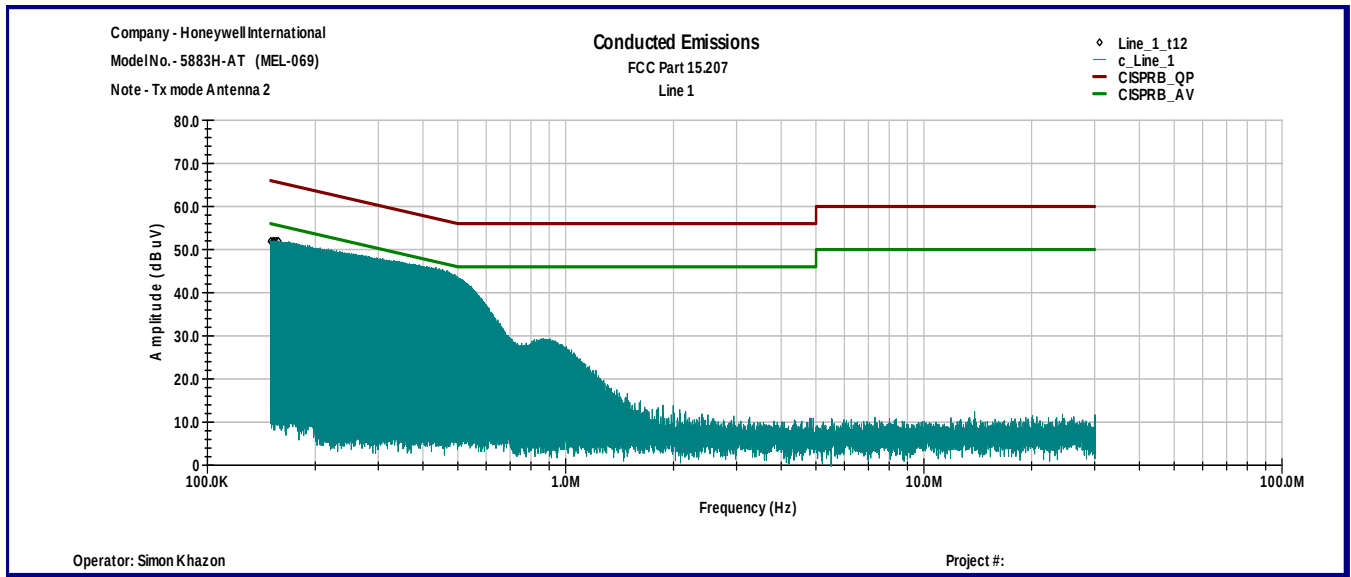
Date:	July 12, 2016	Result: Pass
Tested by:	Simon Khazon	
Standard:	FCC 15.207	
Test Point:	Power Line	
Operation mode:	See page 5	
Environmental Conditions:	25°C; 46%(RH); 96.2kPa	
Equipment Verification:	☒	
Note:	MEL-069	

Table 3.2.2

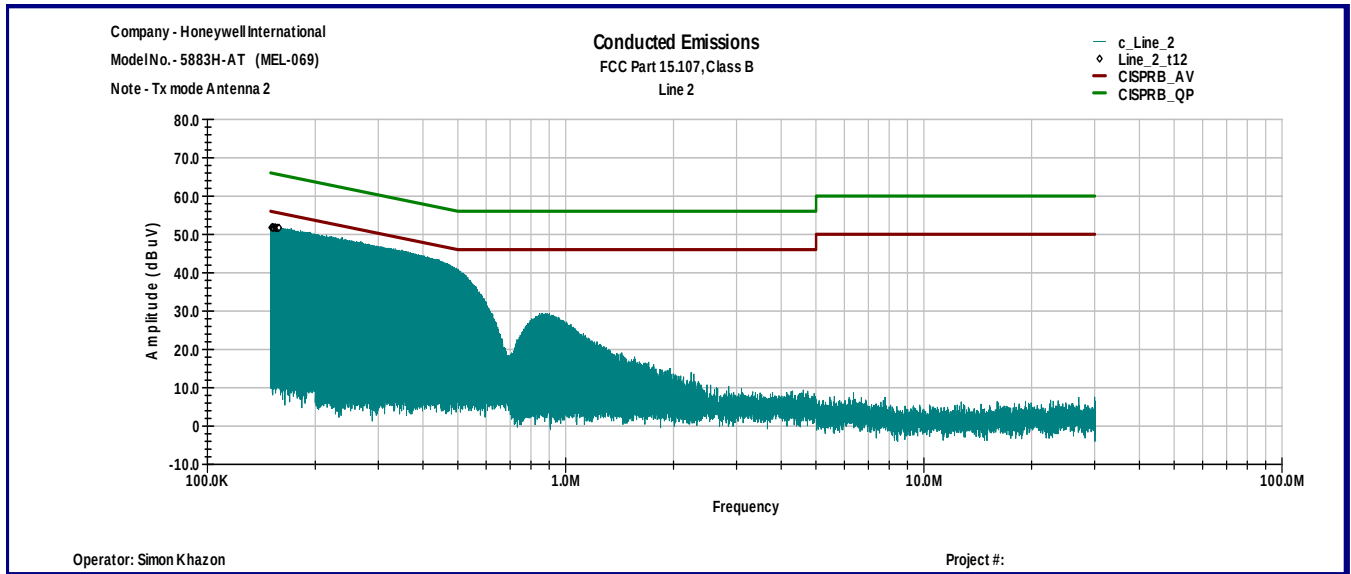
Line 1					
Frequency	Peak dBμV	QP Limit dBμV	AVG Limit dBμV	QP Margin dB	AVG Margin dB
150.27 KHz	51.9	66.0	56.0	-14.1	-4.1
150.47 KHz	52.0	66.0	56.0	-14.0	-4.0
152.64 KHz	51.9	65.9	55.9	-13.9	-3.9
152.84 KHz	52.0	65.8	55.8	-13.8	-3.8
153.07 KHz	51.9	65.8	55.8	-13.9	-3.9
153.73 KHz	51.9	65.8	55.8	-13.9	-3.9
154.16 KHz	52.0	65.8	55.8	-13.8	-3.8
155.24 KHz	51.9	65.7	55.7	-13.8	-3.8
155.67 KHz	51.9	65.7	55.7	-13.8	-3.8
155.9 KHz	51.9	65.7	55.7	-13.8	-3.8
156.76 KHz	52.0	65.6	55.6	-13.6	-3.6
157.85 KHz	52.0	65.6	55.6	-13.6	-3.6
Line 2					
Frequency	Peak dBμV	QP Limit dBμV	AVG Limit dBμV	QP Margin dB	AVG Margin dB
150.85 KHz	51.8	66.0	56.0	-14.2	-4.2
151.94 KHz	51.9	65.9	55.9	-14.0	-4.0
152.14 KHz	51.9	65.9	55.9	-14.0	-4.0
152.64 KHz	51.8	65.9	55.9	-14.0	-4.0
152.8 KHz	51.6	65.9	55.9	-14.2	-4.2
154.54 KHz	51.9	65.8	55.8	-13.9	-3.9
154.74 KHz	51.8	65.7	55.7	-14.0	-4.0
155.24 KHz	51.6	65.7	55.7	-14.1	-4.1
155.83 KHz	51.6	65.7	55.7	-14.1	-4.1
156.56 KHz	51.7	65.6	55.6	-13.9	-3.9
157.34 KHz	51.7	65.6	55.6	-13.9	-3.9
158.43 KHz	51.7	65.6	55.6	-13.8	-3.8

Graph 3.2.2

Line 1



Line 2



4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	FSP 40	100024	12559	01/20/2017	☒
Spectrum Analyzer	R & S	ESU	100398	25283	02/11/2017	☒
Bicono-Log Antenna	Teseq	CBL6112D	32859	25289	09/24/2016	☒
Horn Antenna	EMCO	3115	6579	15580	08/04/2016	☒
LISN	COM-Power	Li-215A	191971	172316	05/27/2017	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1402232	172081	11/19/2016	☒
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	☒



Test Setup Photos

