TEST REPORT

Report Number: 103087756MIN-001
Project Number: G103087756

Testing performed on the
PV35

to
47 CFR FCC, Part 15.225:2017
RSS- 210, Issue 9, 2016
RSS-Gen, Issue 4, 2014
47 CFR FCC, Part 15:2017, §15.107 and §15.109, Class A / ICES-003, Issue 6:2016

For
Gemalto Cogent, Inc.

Test Performed by:	Test Authorized by:
Intertek Testing Services NA, Inc.	Gemalto, Inc.
7250 Hudson Blvd., Suite 100	6, rue de la Verrerie - CS20001
Oakdale, MN 55128 USA	92197 Meudon Cedex France

Prepared by: Richard Blonigen

Reviewed by: Norman Shpilsher

Date of issue: June 2, 2017

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1.0 GENERAL DESCRIPTION

Model:	PV35
Type of EUT:	Kiosk RFID reader
Serial Number:	N/A
Related Submittal(s) Grants:	None
Company:	Gemalto, Inc.
Customer:	Sonya Gambrel-Lenarz
Address:	6, rue de la Verrerie - CS20001 92197 Meudon Cedex France
Phone:	(512) 215-7306
e-mail:	Sonya.gambrel-lenarz@gemalto.com
Test Standards:	☒ 47 CFR FCC, Part 15:2017, §15.225 ☒ RSS–210, Issue 9, 2016 ☒ RSS-Gen, Issue 4, 2014 ☒ 47 CFR FCC, Part 15:2017, §15.107 and §15.109, Class A, test method: ANSI C63.4-2014 ☒ ICES-003, Issue 6:2016
Type of radio:	☐ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	April 25, 2017
Test Work Started:	April 25, 2017
Test Work Completed:	May 19, 2017
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good

1.1 Product Description; Test Facility

Product Description:	RFID reader
Operating Frequency	13.56MHz
Modulation:	Double-sideband amplitude modulation
Emission Designator:	10K3A1D
Antenna(s) Info:	Internal Antenna
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter Power Configuration:	☒ External power source ☒ 100 – 240VAC ☒ 50 / 60Hz
Special Test Arrangement:	N/A
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	The EUT was continuously transmitting during testing

Cables:

No.	Type	Length	Designation	Note
1	Unshielded	<3m	USB	

Support equipment/Services:

No.	Item	Description
1	Laptop	Local PC

1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ **Normal**

Temperature: 15-35°C

Humidity: 30-60%

Atmospheric pressure: 86-106kPa

☒ **Extreme**

Temperature: -20 to +50°C

Primary Supply Voltage: ± 15%

1.4 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 radiated emissions above 1GHz has been determined to be: ±6.4 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

1.5 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(µV/m)
RA = Receiver Amplitude in dB(µV)
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(µV) 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(µV/m).

RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/m)

General notes: None

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
15.225(a)(b)(c) / RSS-210 A2.6(a)(b)(c)	Field strength within the band of operation	Pass
15.225(d) / RSS-210 A2.6(d)	Out of band emissions	Pass
15.215(c) / RSS- Gen 4.6.1	Bandwidth of the emission	Pass
15.225(e) / RSS-210 A2.6	Frequency tolerance	Pass
15.207/RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	Pass
15.109/ICES-003	Receiver/digital device radiated emissions	Pass
15.107/ ICES-003	Digital device conducted emissions	Pass

3.0 TEST CONDITIONS AND RESULTS

3.1 Field strength within the band of operation

Test location: ☒ OATS ☐ Anechoic Chamber ☐ Other

Test distance: ☒ 10 meters ☐ 3 meters

Test result: **Pass**

Max. Emissions margin within the band of operation: 13.0dB below the limits

Notes: Field strength within the band of operation measurements were performed in the Open Area Test Site at 10m measurement distance (see Table 3.1.1)

Date:	April 27, 2017	**Result: Pass**
Tested by:	Richard Blonigen	
Standard:	FCC 15.225(a)(b)(c) / RSS-210 A2.6(a)(b)(c)	
Test Point:	Enclosure with antenna	
Operation mode:	See page 5	
Environmental Conditions:	21°C; 35%(RH); 98kPa	
Equipment Verification:	☒	
Note:	None	

Table 3.1.1

Frequency	Ant. Orientation	Peak Reading dBµV	Ant.Factor dB1/m	Total at 10m dBµV/m	Limit dBµV/m	Margin dB
12.600 MHz	Front	-1.1	34.7	33.6	59.6	-26.0
13.110 MHz	Front	-0.6	34.7	34.1	59.6	-25.5
13.410 MHz	Front	5.7	34.7	40.4	59.6	-19.2
13.553 MHz	Front	21.9	34.7	56.6	69.6	-13.0
13.560 MHz	Front	31.0	34.7	65.7	103.1	-37.4
13.567 MHz	Front	20.9	34.7	55.6	69.6	-14.0
13.710 MHz	Front	5.6	34.7	40.3	59.6	-19.3
14.010 MHz	Front	-0.6	34.7	34.1	59.6	-25.5
14.500 MHz	Front	-1.2	34.7	33.5	59.6	-26.1
12.600 MHz	Side	-1.6	34.7	33.1	59.6	-26.5
13.110 MHz	Side	-0.7	34.7	34.0	59.6	-25.6
13.410 MHz	Side	3.4	34.7	38.1	59.6	-21.5
13.553 MHz	Side	21.0	34.7	55.7	69.6	-13.9
13.560 MHz	Side	30.6	34.7	65.3	103.1	-37.8
13.567 MHz	Side	20.4	34.7	55.1	69.6	-14.5
13.710 MHz	Side	5.2	34.7	39.9	59.6	-19.7
14.010 MHz	Side	-0.9	34.7	33.8	59.6	-25.8
14.500 MHz	Side	-1.3	34.5	33.2	59.6	-26.4

3.2 Field strength outside of the band of operation

Test location: ☒ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☒ 10 meters ☒ 3 meters

Frequency range of measurements: 0.15MHz-1000MHz

Test result: **Pass**

Max. margin of spurious emissions: 3.8 dB below the limits

Notes: The Emissions pre-test in frequency range from 150kHz to 30MHz was performed in the Anechoic chamber at 3m measurement distance (see Graphs 3.2.1);
Final measurements were performed in the Open Area Test Site at 10m measurement distance: no emissions above the ambient were detected.

The Emissions test in frequency range from 30MHz to 1GHz was performed in the Anechoic chamber at 3m measurement distance (see Table 3.2.1 and Graphs 3.2.2).
Emissions are not related to the Transmitter operation were excluded from the Table, see Section 3.6.

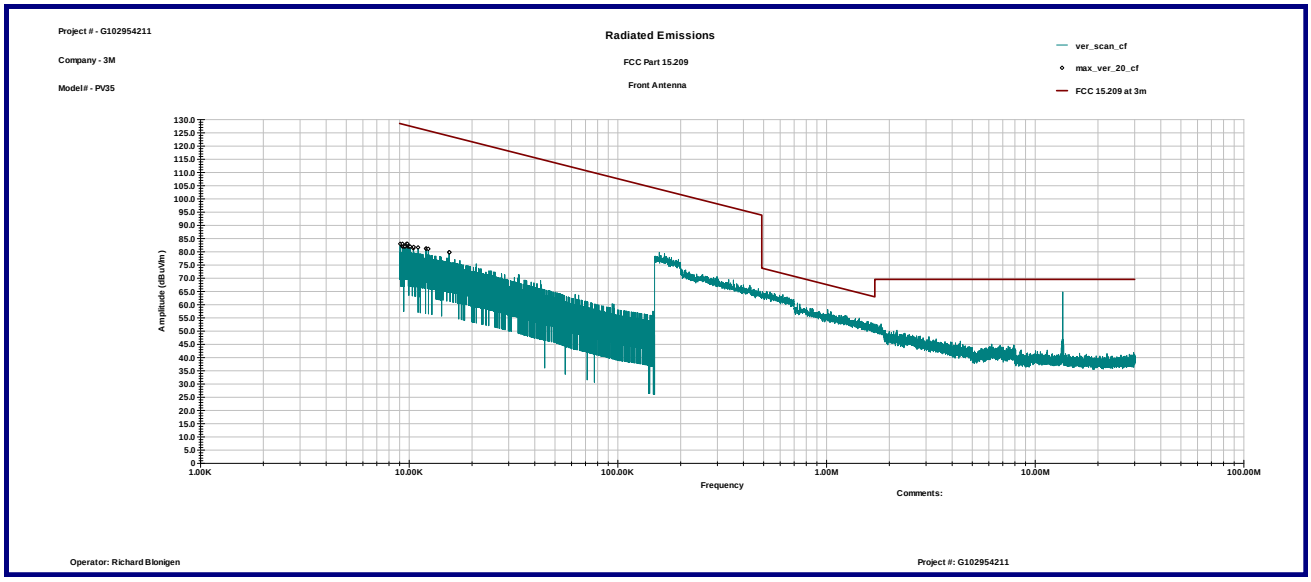
Date:	April 27, 2017	**Result: Pass**
Tested by:	Uri Spector	
Standard:	FCC 15.225(d) / RSS-210 A2.6(d)	
Test Point:	Enclosure with antenna	
Operation mode:	See page 5	
Environmental Conditions:	21°C; 34%(RH); 98kPa	
Equipment Verification:	☒	
Note:	Frequency Range: 30-1000MHz	

Table 3.2.1

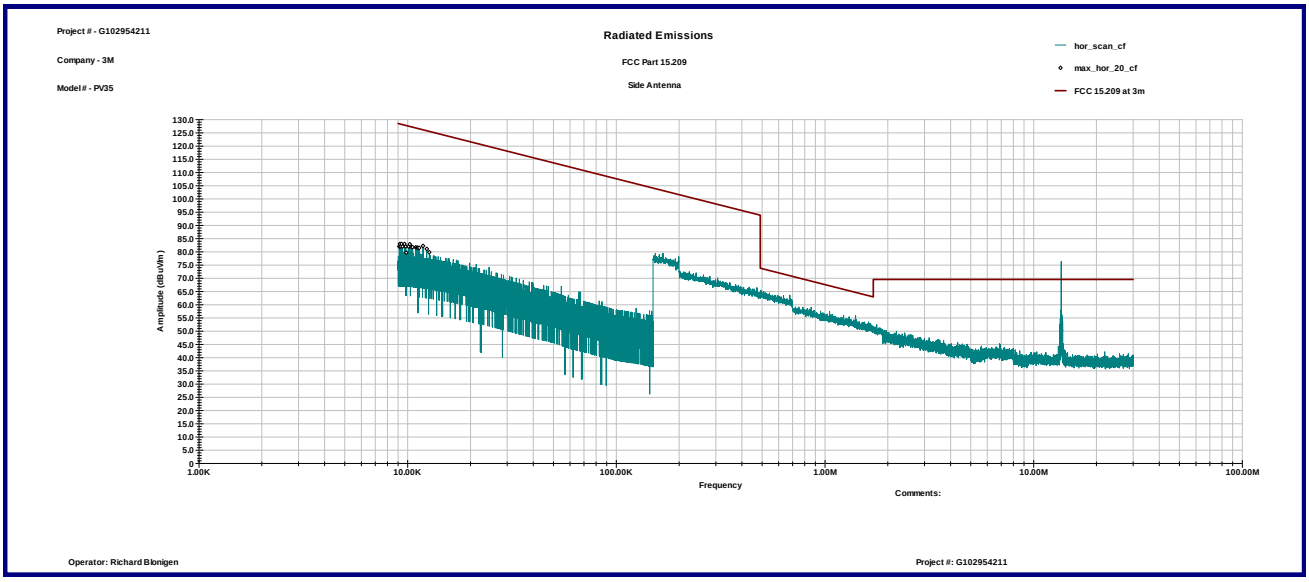
Frequency	Ant. Polarity	Peak Reading dBµV	Total C.F. dB1/m	Total at 3m dBµV/m	Limit dBµV/m	Margin dB
40.668 MHz	V	16.8	15.4	32.2	40.0	-7.8
135.64 MHz	V	22.6	17.1	39.7	43.5	-3.8
162.74 MHz	V	16.0	15.3	31.3	43.5	-12.3
135.64 MHz	H	15.4	16.3	31.7	43.5	-11.8
162.74 MHz	H	15.7	14.6	30.3	43.5	-13.2

Graph 3.2.1

Front antenna orientation

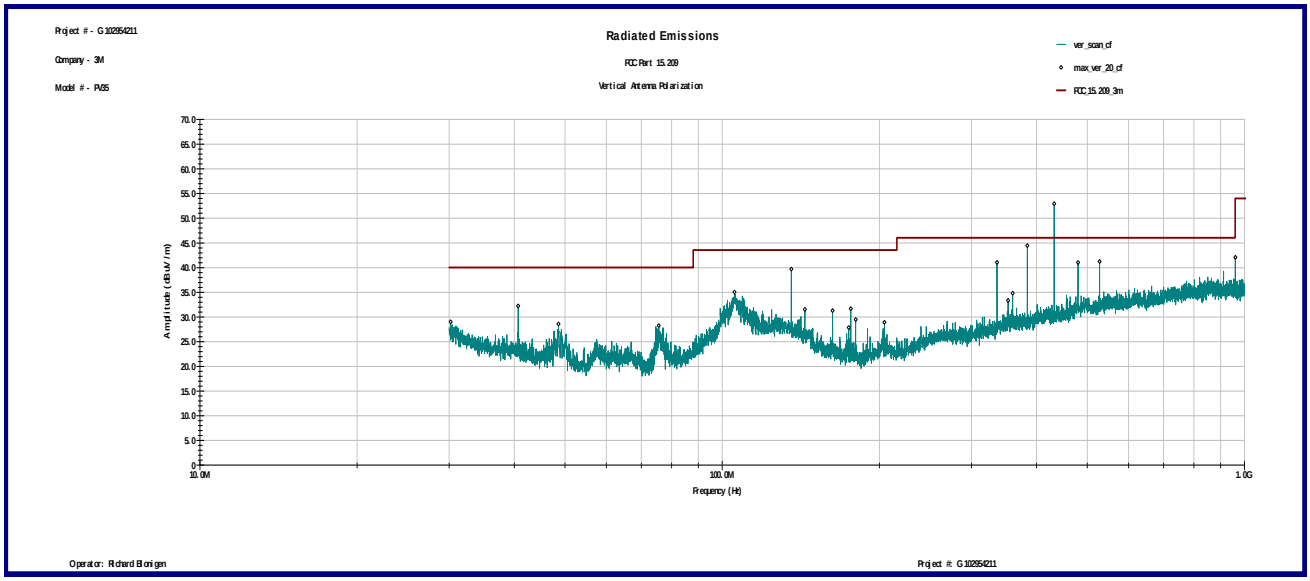


Side antenna orientation

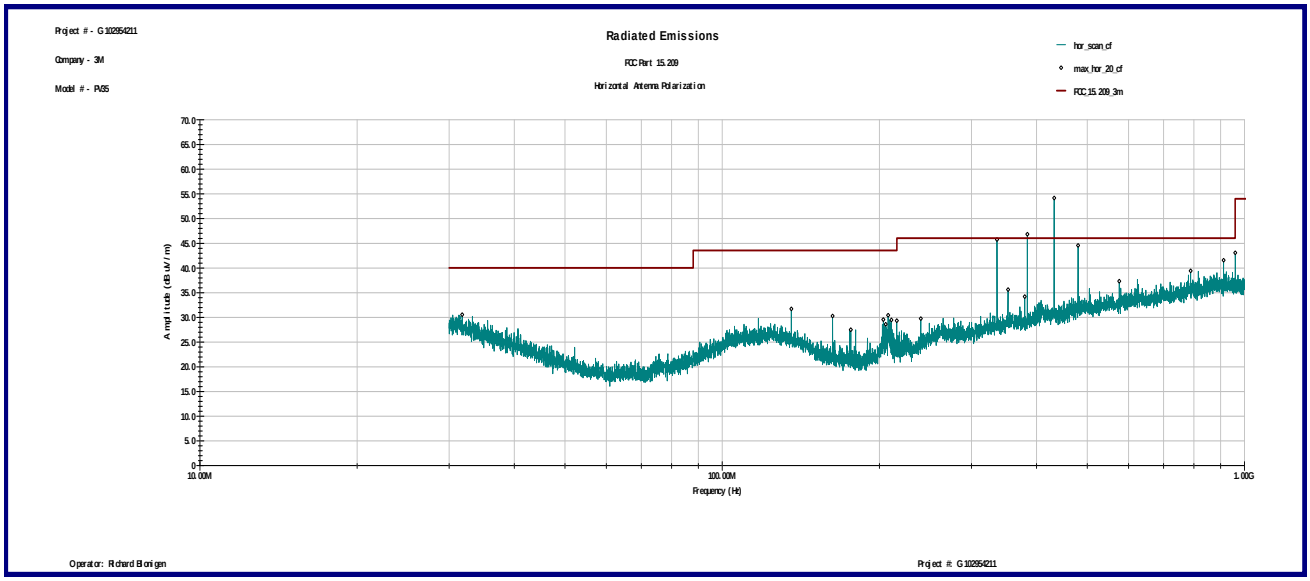


Graph 3.2.2

Vertical antenna polarization



Horizontal antenna polarization



3.3 Frequency Tolerance

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test date: April 27, 2017 & May 3, 2017

Tested by: Richard Blonigen & Uri Spector

Test result: **Pass**

Test Parameter		Measured Deviation (Hz)	Maximum Allowed Deviation (Hz)	Margin
Temperature °C	Voltage V			
-20	120	94	1356	**Pass**
-10		43	1356	**Pass**
0		17.7	1356	**Pass**
10		6.5	1356	**Pass**
20		0	1356	**Pass**
30		27.3	1356	**Pass**
40		30.5	1356	**Pass**
50		89.7	1356	**Pass**
20	102	0	1356	**Pass**
	108	0	1356	**Pass**
	114	0	1356	**Pass**
	120	0	1356	**Pass**
	126	1	1356	**Pass**
	132	1	1356	**Pass**
	138	1	1356	**Pass**

Notes: None

3.4 Bandwidth of Emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

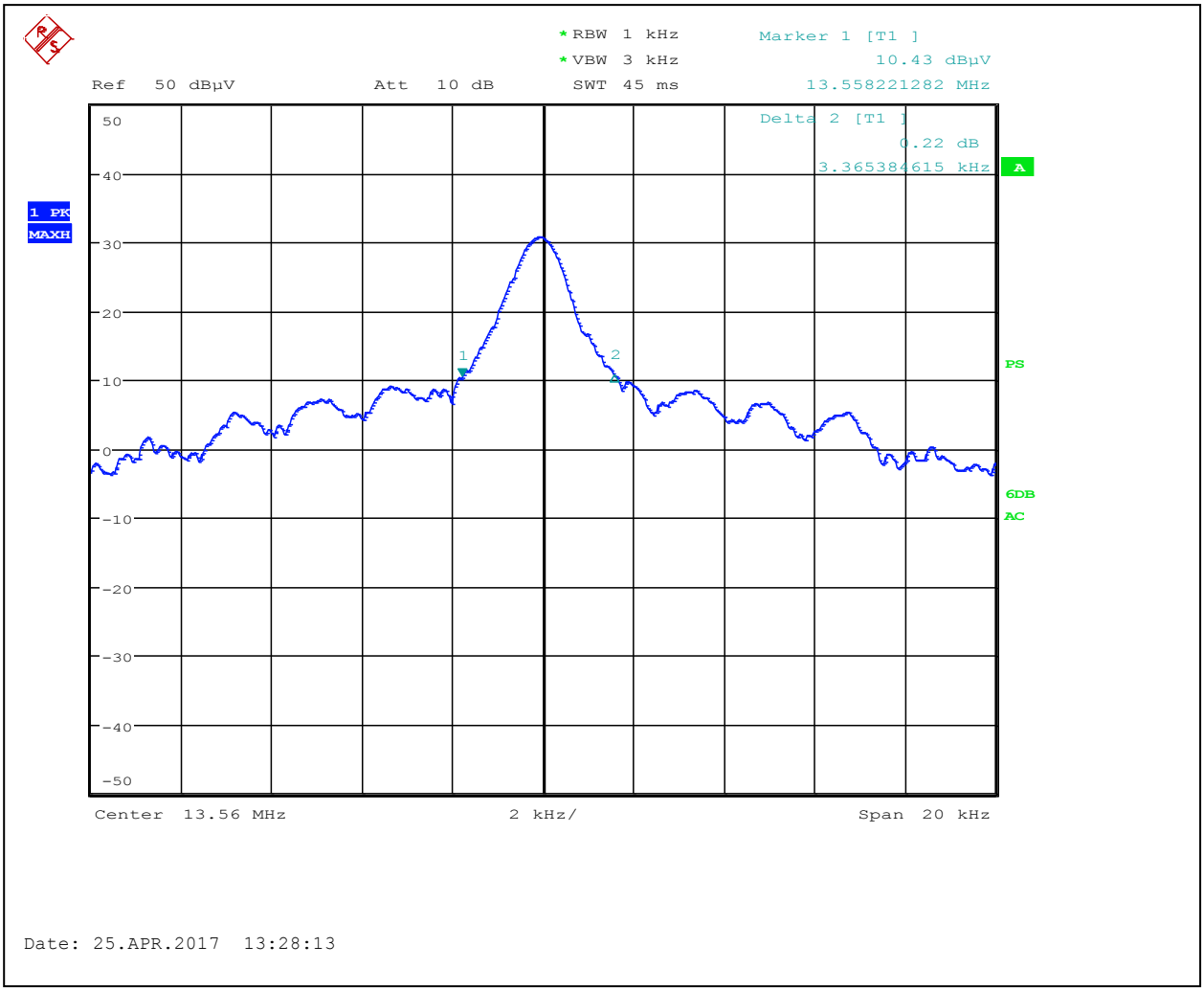
Test result: **Pass**

Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
13.56	3.365	10.28

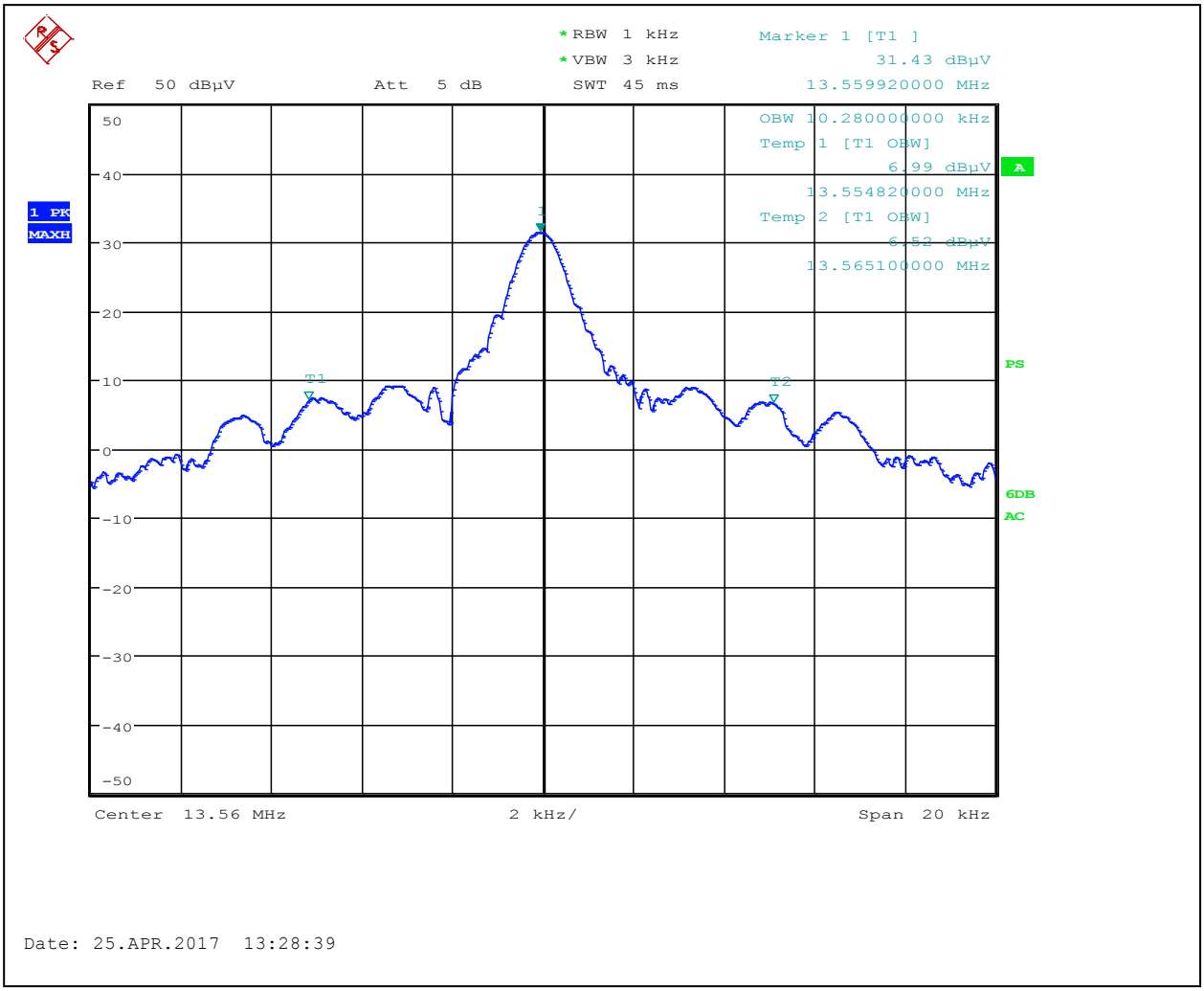
Graphs 3-4-1 and 3-4-2 are show bandwidth of emissions

Notes: The bandwidth of emissions is contained within the frequency band of operation

Graph 3.4.1


* RBW 1 kHz
* VBW 3 kHz
SWT 45 ms
Marker 1 [T1]
10.43 dBµV
13.558221282 MHz
Delta 2 [T1]
0.22 dB
3.365384615 kHz
Ref 50 dBµV
Att 10 dB
1 PK
MAXH
A
PS
6DB
AC
50
40
30
20
10
0
-10
-20
-30
-40
-50
Center 13.56 MHz
2 kHz/
Span 20 kHz
Date: 25.APR.2017 13:28:13

Graph 3.4.2


* RBW 1 kHz
* VBW 3 kHz
Ref 50 dBµV
Att 5 dB
SWT 45 ms
Marker 1 [T1]
31.43 dBµV
13.559920000 MHz
OBW 10.280000000 kHz
Temp 1 [T1 OBW]
6.99 dBµV
13.554820000 MHz
Temp 2 [T1 OBW]
6.52 dBµV
13.565100000 MHz
1 PK
MAXH
A
PS
6DB
AC
T1
T2
50
40
30
20
10
0
-10
-20
-30
-40
-50
Center 13.56 MHz
2 kHz/
Span 20 kHz
Date: 25.APR.2017 13:28:39

3.5 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 5.9 dB below the limits

Notes:

1. During testing the EUT antenna was terminated with 50ohm terminator.
2. Testing was performed at the local PC AC port.

Date:	May 19, 2017	**Result: Pass**
Tested by:	Uri Spector	
Standard:	FCC Part 15.207	
Test Point:	Power Line	
Operation mode:	See page 5	
Environmental Conditions:	21°C; 36%(RH); 98kPa	
Equipment Verification:	☒	
Note:	None	

Table 3.5.1

Line 1

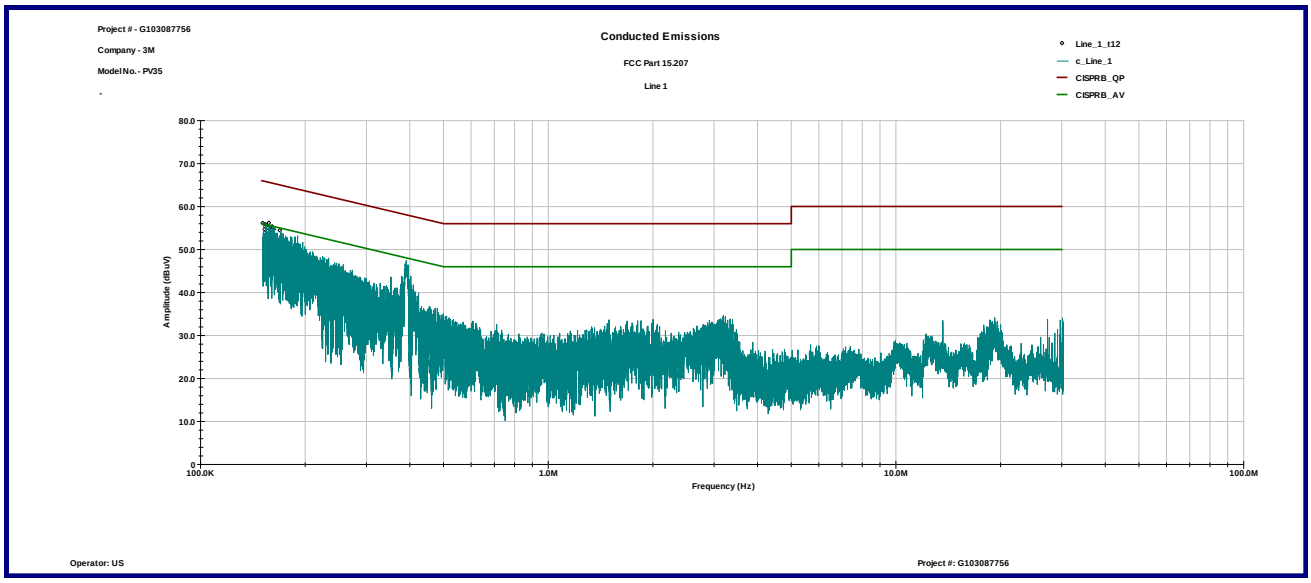
Frequency MHz	QP dBµV	AVG dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.157	48.2	40.0	0.1	65.6	55.6	-17.3	-15.5
0.388	44.1	42.1	0.1	58.1	48.1	-13.9	-5.9
3.169	29.9	19.1	0.4	56.0	46.0	-25.7	-26.5
5.960	21.0	12.0	0.6	60.0	50.0	-38.4	-37.4
19.100	28.2	21.7	1.1	60.0	50.0	-30.7	-27.2
29.930	27.5	20.1	1.3	60.0	50.0	-31.2	-28.6

Line 2

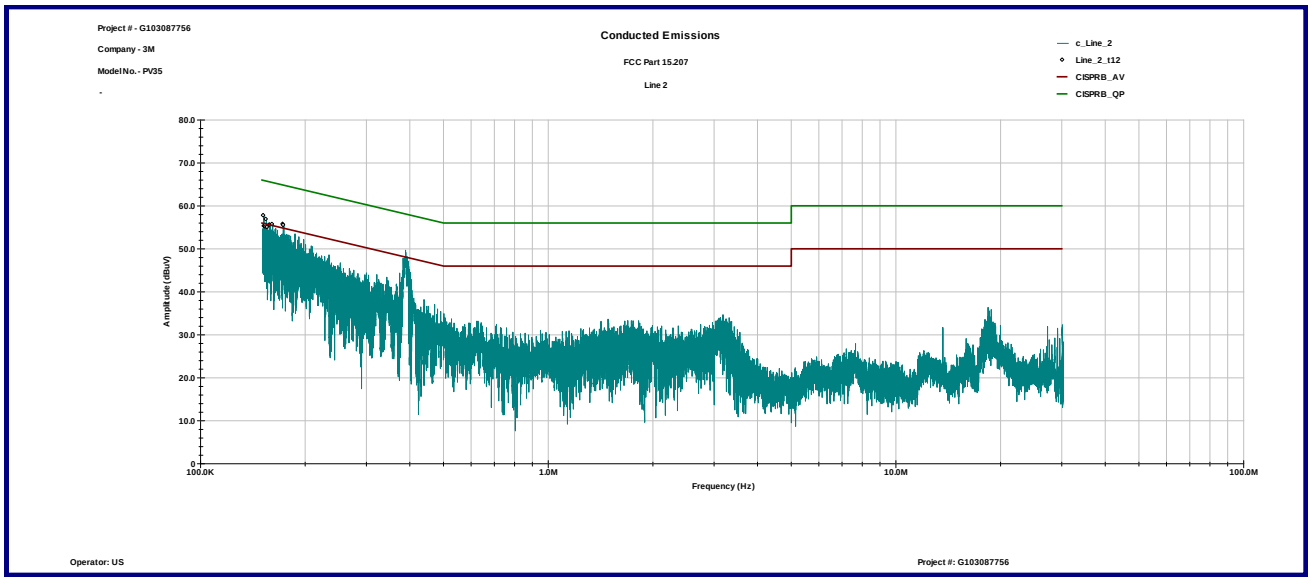
Frequency MHz	QP dBµV	AVG dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.151	49.1	40.5	0.1	65.9	55.9	-16.8	-15.4
0.172	47.0	37.0	0.1	64.9	54.9	-17.8	-17.8
0.390	46.0	41.9	0.1	58.1	48.1	-11.9	-6.0
3.210	29.9	20.5	0.4	56.0	46.0	-25.7	-25.1
18.290	29.3	22.9	1.0	60.0	50.0	-29.7	-26.1
27.100	17.9	12.4	1.3	60.0	50.0	-40.8	-36.3

Graph 3.5.1

Line 1



Line 2



3.6 Receiver/digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-1000MHz

Max. Emissions margin: 2.4 dB below the limits

Notes:

None

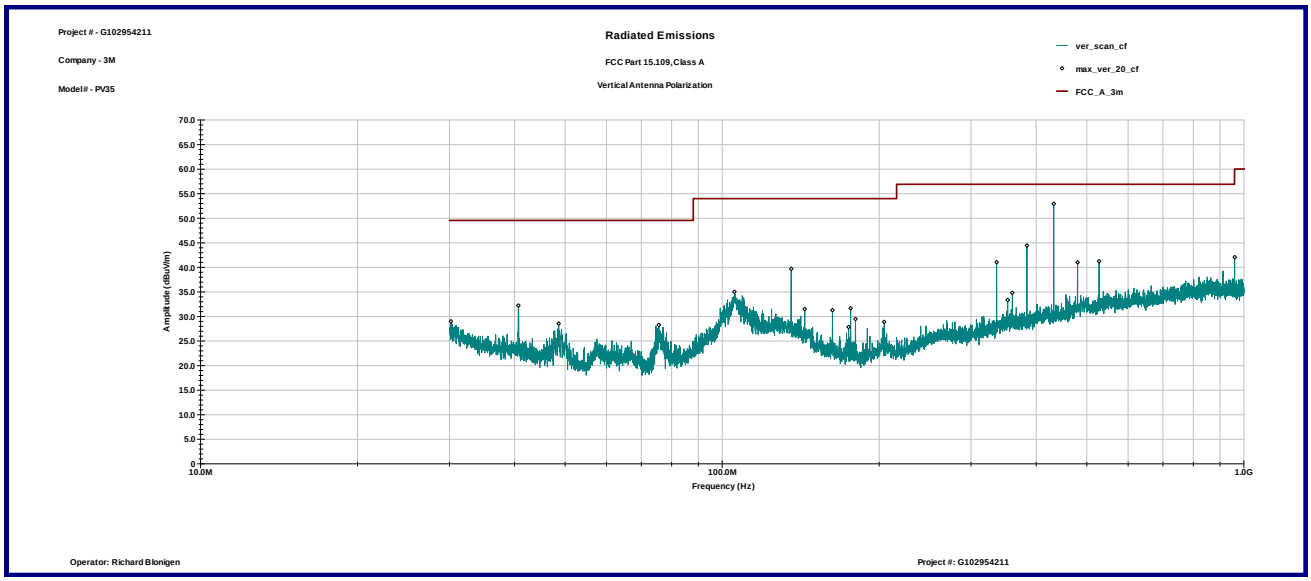
Date:	May 19, 2017	**Result: Pass**
Tested by:	Uri Spector	
Standard:	FCC Part 15.109, Class A	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	20°C; 39%(RH); 98kPa	
Equipment Verification:	☒	
Note:	None	

Table 3.6.1

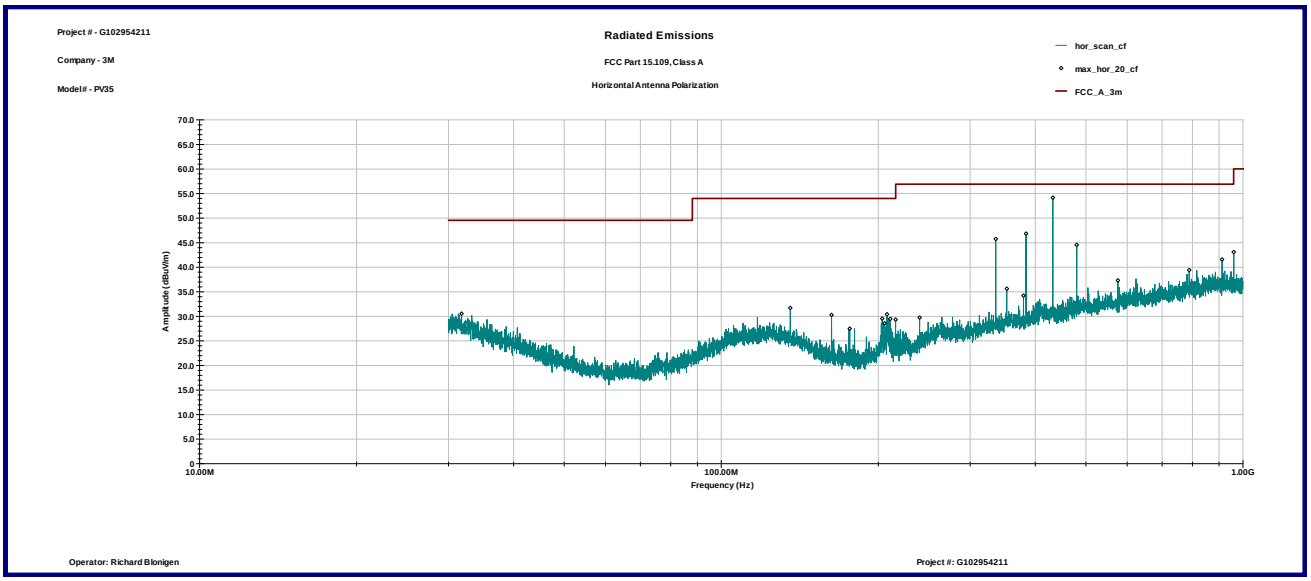
Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	QP Reading	Total @ 3m	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dBµV/m	dB	
162.72	V	100	13.6	1.0	0.0	22.9	37.4	54.0	-16.5	
215.98	V	100	13.5	1.1	0.0	28.3	43.0	54.0	-11.0	
431.96	V	119	19.8	1.7	0.0	31.0	52.5	56.9	-4.4	
335.97	H	100	18.0	1.5	0.0	24.5	44.0	56.9	-12.9	
431.96	H	195	19.8	1.7	0.0	33.0	54.5	56.9	-2.4	
479.87	H	198	20.6	1.8	0.0	19.4	41.8	56.9	-15.1	

Graph 3.6.1

Vertical antenna polarization



Horizontal antenna polarization



3.7 Digital device conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 19.9 dB below the limits

Notes:
1. During testing the EUT antenna was terminated with 50ohm terminator.
2. Testing was performed on the local PC AC port.

Date:	May 19, 2017	**Result: Pass**
Tested by:	Uri Spector	
Standard:	FCC Part 15.107, Class A	
Test Point:	Line 1 and Line 2	
Operation mode:	See page 5	
Environmental Conditions:	20°C; 38%(RH); 98kPa	
Equipment Verification:	☒	
Note:	None	

Table 3.7.1

Line 1

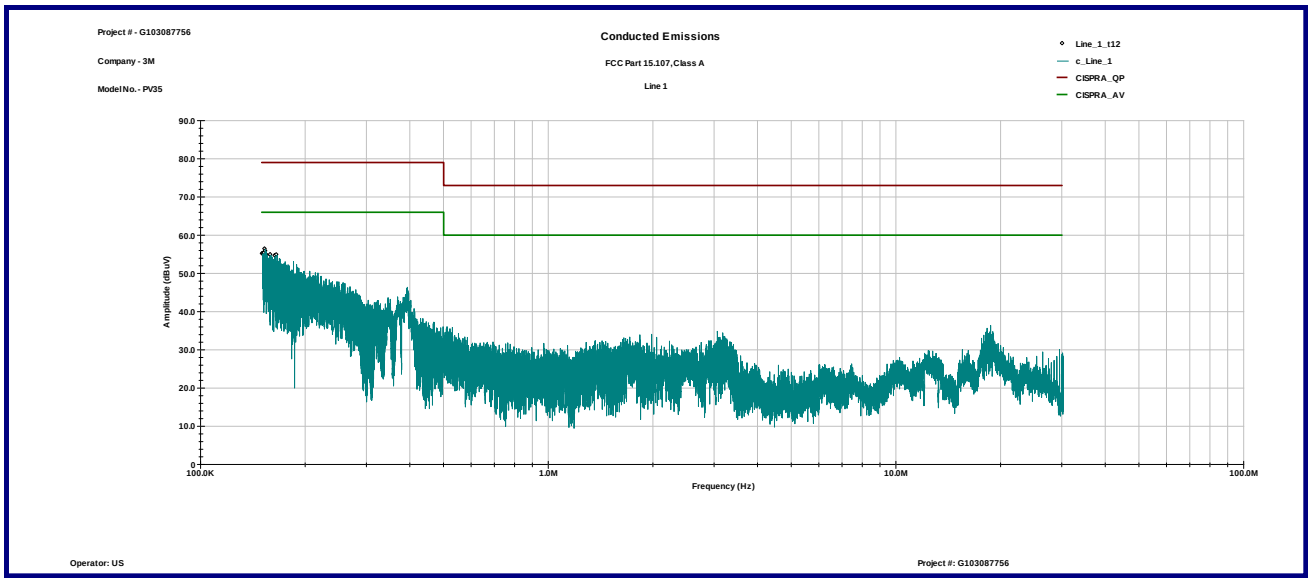
Frequency MHz	QP dBµV	AVG dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.151	47.3	37.3	0.1	79.0	66.0	-31.6	-28.6
0.389	47.2	46.0	0.1	79.0	66.0	-31.7	-19.9
3.157	30.2	19.1	0.4	73.0	60.0	-42.4	-40.5
12.300	19.9	13.9	0.8	73.0	60.0	-52.3	-45.3
18.590	28.8	22.3	1.0	73.0	60.0	-43.2	-36.7
29.900	18.8	13.2	1.3	73.0	60.0	-52.9	-45.5

Line 2

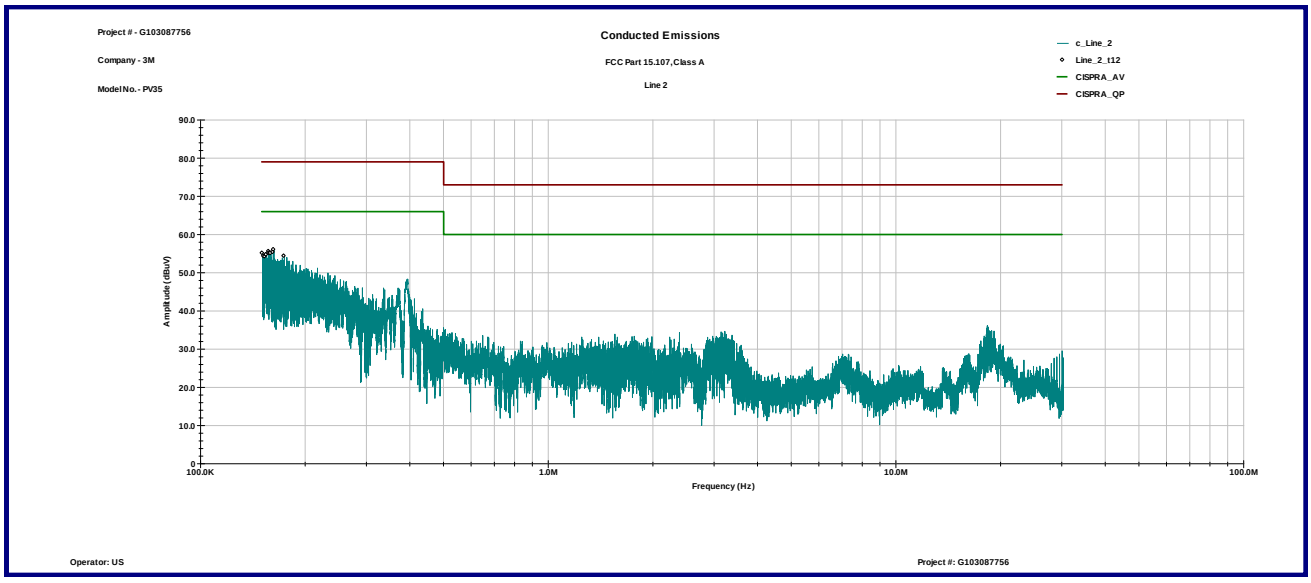
Frequency MHz	QP dBµV	AVG dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.161	47.3	36.2	0.1	79.0	66.0	-31.6	-29.7
0.390	44.7	42.3	0.1	79.0	66.0	-34.2	-23.6
3.200	29.4	18.9	0.4	73.0	60.0	-43.2	-40.7
7.250	21.5	13.5	0.6	73.0	60.0	-50.9	-45.9
18.200	33.0	23.7	1.0	73.0	60.0	-39.0	-35.3
29.900	20.2	16.1	1.3	73.0	60.0	-51.5	-42.6

Graph 3.7.1

Line 1



Line 2



3.8 SAR Test Exclusion Calculation

RF Exposure requirements are described in FCC KDB 447498 D01 v05r02, Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

Annex C of this document set SAR Test Exclusions for devices operated in frequency range below 100MHz, which are based on the power at the EUT output RF power according to the Table below

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

The EUT Output Power (W) can be calculated using the formula:

$P = (E \times d)^2/30G$, where

E – field strength in V/m,
D – field strength measurement distance in m,
G – numerical value of antenna gain.

The EUT Output Power can be calculated based on technical characterization and operation of the EUT.

Per the client information the Typical Tx Current 60mA into 50 Ohm load (40-60% duty cycle)

The power calculation is $P = 0.06A^2 \times 50\ Ohm = 0.18W = 180mW$

The Minimum SAR Test Exclusion Threshold power for frequency range 10-50MHz per the Table above is 308mW.
The EUT calculated power of 180mW is below the is Minimum SAR Test Exclusion Threshold power of 308mW, and also below the Minimum Exemption Limits for SAR Routine Evaluation of RSS-102 (section 2.5) is 345mW.

Therefore, the transmitter is exempt from SAR testing.

4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	LAST CAL DATE	CAL DUE	USED
Spectrum Analyzer	R & S	FSP 40	100024	12559	01/26/2017	01/26/2018	☐
Spectrum Analyzer	R & S	ESU	100398	25283	03/21/2017	03/21/2018	☒
Spectrum Analyzer	R & S	ESCI	100358	12909	10/31/2016	10/31/2017	☒
Bicono-Log Antenna	Teseq	CBL6112D	32859	25289	05/18/2017	05/18/2018	☒
Bicono-Log Antenna	Schaffner-Teseq	CBL6112B	2468	9734	02/09/2017	02/09/2018	☒
Horn Antenna	EMCO	3115	9507-4513	9936	07/12/2016	07/12/2017	☐
Loop Antenna	ETS	6512	00060486	19942	01/03/2017	01/03/2018	☒
LISN	COM-Power	Li-215A	191970	172315	06/13/2016	06/13/2017	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	12/01/2016	12/01/2017	☐
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	VBU	☒

5.0 Revision History

REVISION LEVEL	DATE	REPORT NUMBER	PREPARED	REVIEWED	NOTES
0	6-2-2017	103087756MIN-001	RB	NS	Original Issue
1	8-29-2017	103087756MIN-001	RB	US	Change contact and added FCC to 47 CFR on title page and page 3
2	09-01-2017	103087756MIN-001	US	NS	Section 3.2 was modified to reflect correct limits