TEST REPORT

Report Number: 102752932DEN-002
Project Number: G102752932

Report Issue Date: November 11, 2016

Product Designation: **Model: RC-04-MCT-WK**

Standards: **FCC Part 15 Subpart C (15.209)2016**
FCC Part 15 Subpart C (15.225)2016
IC RSS-210, Issue 9: 2016
IC RSS-GEN, Issue 4: 2014

Tested by:
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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded **the product tested complies with the requirements of the standard(s) indicated.** The results obtained in this test report pertain only to the item(s) tested.

1.1 Test Report Scope

1.2 Test Methodology

All measurements were performed according to the procedures in the following documents:

- ANSI C63.10: 2013 – ANSI Standard for Testing Unlicensed Wireless Devices

Radiated emissions tests were formed at an antenna-to-product distance of 3-meters.

1.3 Test Facility

Intertek Denver's testing facilities are located at 1795 Dogwood St. Suite 200 Louisville, CO 80027. The testing facility is ISO17025:2005 accredited by A2LA, our lab code is 2506.02, our VCCI registration numbers are. R-1643, C-1752 and T-1558, our FCC designation no. US1121 and our IC lab no. 2042N.

Testing contained in this test report may not be covered under the laboratories scope of accreditation. A note will be placed in the specific test section for testing not coved under the laboratories scope.

2 Test Summary

TEST SECTION	TESTS	FCC/IC REFERENCE	TEST DATE	RESULT
4	Radiated Unintentional Spurious Emissions	FCC 15.209/15.109 RSS-GEN: Sec. 7/8.9 RSS-210: sec. 2	10/17/2016-10/20/2016	PASS
5	Tx Voltage Variation	FCC 15.31	10/17/2016-10/20/2016	PASS
6	Tx Fundament and Harmonic Emissions	FCC 15.209/15.225 RSS-GEN 8.9 RSS-210: B.6	10/17/2016-10/20/2016	PASS
7	AC Conducted Emissions	FCC 15.207 RSS-GEN: 8.8	10/27/2016	PASS
8	Occupied Bandwidth Measurement	RSS-GEN: 6.6	10/17/2016-10/20/2016	PASS

General Notes:

1) The following product options were covered in this testing:
   - Power Over Ethernet (POE)
   - 12VDC

2) Product is RSS-210 Category 1 equipment.

Radio Notes:

1) FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

2) FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing the measurements within this report.

3) Near field correction was made to Radiated emissions from unlicensed wireless devices below 30MHz. refer to ANSIC63.10-2013, section 6.4.4 for detail.

Description of Product Under Test

Model:	RC-04-MCT-WK Pure IP MCT Reader-Controller Wall Mount Keypad (Backlit)
Type of EUT:	Reader Controller
Serial Number:	FCC Single Gang KP #1
FCC ID:	OCZRC-04SK
Industry Canada ID:	8431A-RC04S
Related Submittal(s) Grants:	NA
Company:	Isonas Inc
Customer:	Isonas Inc
Address:	4750 Walnut Street, Boulder, Colorado, USA, 80301
Phone:	970-324-0156
Fax:	N/A
e-mail:	MBetaM@gmail.com
Test Standards:	☒ 47 CFR, Part 15C:§15.225 ☒ RSS–210, Issue 8, 2010 ☒ RSS-Gen, Issue 3, 2010 ☒ Other 47 CFR, Part 15C:§15.209
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	10/17/2016
Test Work Started:	10/17/2016
Test Work Completed:	10/31/2016
Test Sample Conditions:	☐ Damaged ☐ Poor (Usable) ☒ Good

Product Description:	RFID Security Access Reader Controller
Transmitter Type:	RFID
Operating Frequency Range(s):	LF @ 125KHz HF @ 13.56MHz
Number of Channels:	1 in each band
Modulation:	ASK
Antenna(s) Info:	Loop antenna
Rated Power:	EIRP 3μW
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter power configuration:	☐ Internal battery ☒ External power source
Special Test Arrangement:	NA
Test Facility Accreditation:	A2LA (Certificate No. 2506.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.10-2013

2.1 Product Description - Detailed

Description of Equipment Under Test (provided by client)
RFID Security Access Reader Controller

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
POE	Class 4	N/A	N/A
12VDC	0.2A	N/A	N/A

Descriptions of EUT Exercising
☐ Standby/Idle Mode
☒ Continuous transmission, un-modulated carrier (CW)
☐ Continuous transmission, modulated carrier (CW) utilizing worst-case data rate
☐ Continuous Receive Mode

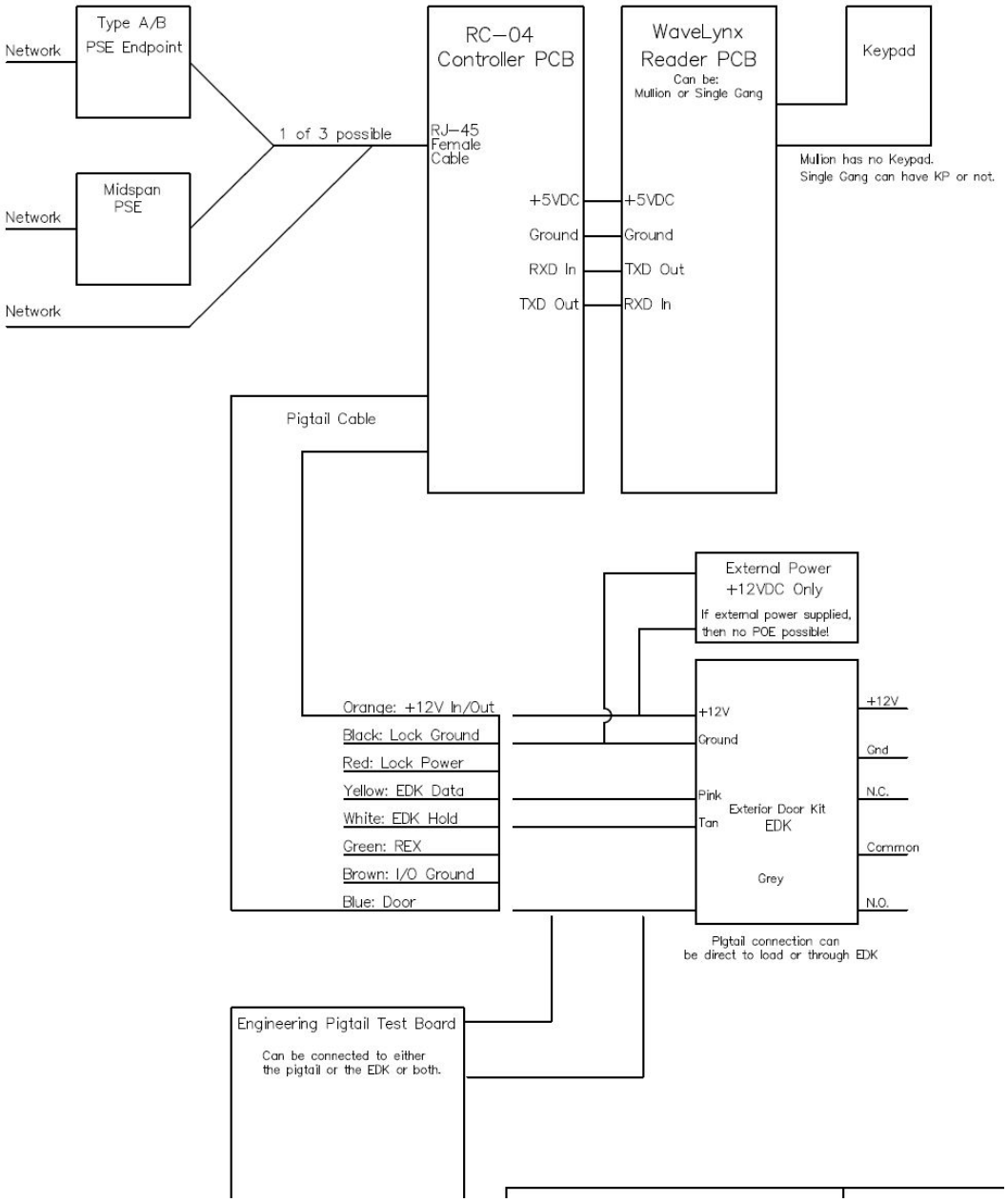
Note: The chosen mode of operation described above is dependent upon the specific test to be performed.

3 System setup including cable interconnection details, support equipment and simplified block diagram

3.1 Method:

Record the details of EUT cabling, document the support equipment, and show the interconnections in a block diagram.

3.2 EUT Block Diagram:



3.3 Antenna Specifications: NA integral loop antenna

3.4 Determination of RF Power supplied to antenna input for testing

3.5 Support Data:

ID	Description/ Function	Shield Type	Length	Connector	Connection	Ferrites
1	Network cable	None	6 feet	RJ-45	POE	None
2	Pigtail	None	6 feet	DC	DC	Yes

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Load Board	Isonas	Custom	EMC-1
Generic Laptop	Dell	EMC-1	EMC-1

Notes:

1) Add as needed

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

RC-04-PRX-WK Pure IP PRX Reader-Controller Wall Mount Keypad (Backlit) (125kHz, BLE)
RC-04-PRX-W Pure IP Prox Reader-Controller Wall Mount (125kHz, BLE)
RC-04-MCT-WK Pure IP MCT Reader-Controller Wall Mount Keypad (Backlit) (13.56MHz, 125kHz, BLE) – model tested
RC-04-MCT-W Pure IP MCT Reader-Controller Wall Mount (13.56MHz, 125kHz, BLE)

RC-04-MCT-W was not tested but does not add or remove any components, the plastic cover is replaced with one that does not have holes for the keypad and the keypad is removed.

RC-04-PRX-WK was not tested but does not add or remove any components, the 13.56MHz radio is turned off via software.

RC-04-PRX-W was not tested but does not add or remove any components, the 13.56MHz radio is turned off via software and the plastic cover is replaced with one that does not have holes for the keypad and the keypad is removed.

Photograph: Product Tested -

4 Radiated Unintentional & Spurious Emissions

4.1 Method:

Unless otherwise stated no deviations were made from FCC 15.209/ IC RSS-210.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

4.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
19936	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-1	6/22/2016	6/22/2017
18897	Magnetic loop	EMCO	6502	9205-2738	11/12/2015	11/12/2016
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	HP	5	3/31/2016	3/31/2017
DEN-073	EMI Receiver (10Hz – 26.5GHz)	RHODE & SCHWARZ	ESU 26	100265	12/19/2015	12/19/2016
CC1-E2	Radiated Cable	Teledyne	90-206-300; PN:F-130-S1S1-100; 90-206-072;	E2-A; 5026702 002; E2-C; E2-D	11/17/2015	11/17/2016
260	Humidity and Temp. Pen	Extech Instruments	445580	958123	07/21/2016	07/21/2017

4.3 Results:

The sample tested was found to comply.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)} = 39.8\ \mu V/m$

4.4 Test Data:

Test Report #:	**G102752932**	Test Area:	CC1 Radiated		Temperature:	23.9	°C
Test Method:	FCC 15.209/ IC RSS-210	Test Date:	10/17/2016 – 10/20/2016		Relative Humidity:	15.7	%
EUT Model #:	RC-04-MCT-WK	EUT Power:	POE, 12Vdc		Air Pressure:	835.7	kPa
EUT Serial #:	FCC Single Gang KP #1						
Manufacturer:	Isonas				Level Key		
EUT Description:	RFID Security Access Reader Controller				Pk – Peak		
Notes:					Qp – Quasi Peak		
					Av - Average		

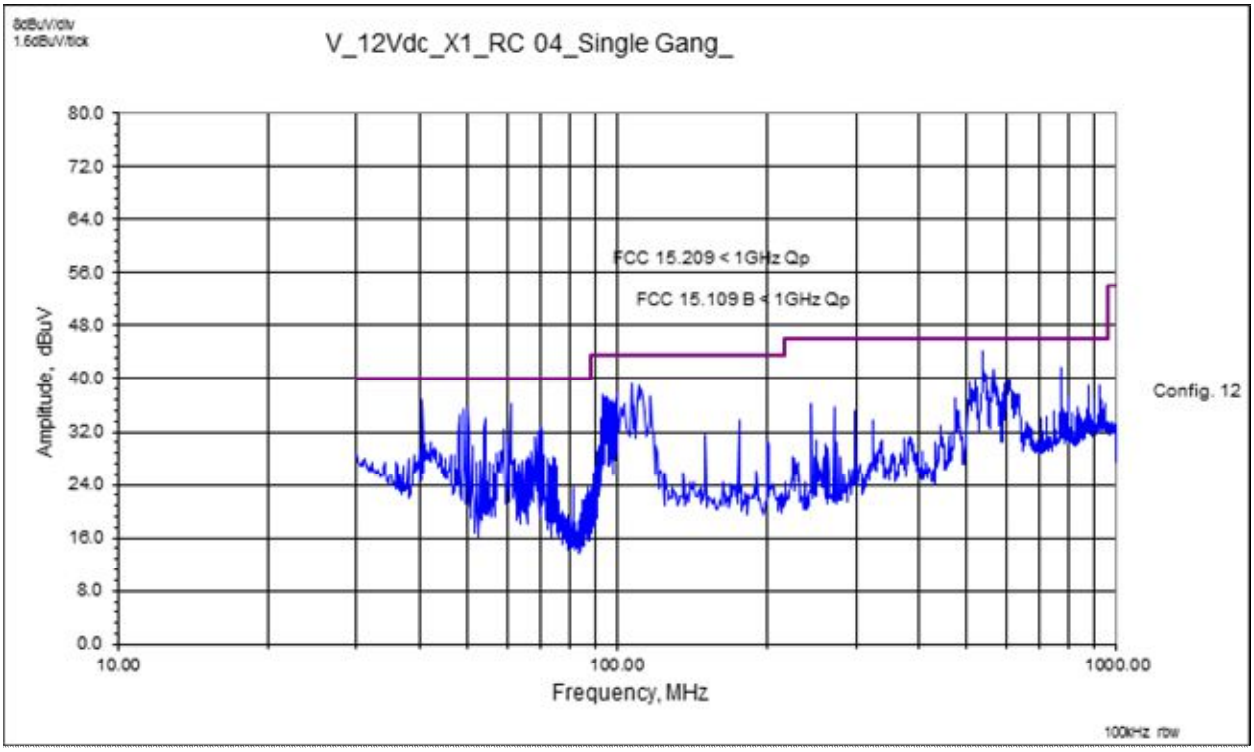
FREQ	LEVEL	DET	CABLE	ANT	PREAMP	ATTEN	FINAL	POL	HGT	AZ	DELTA1	Limit	RBW
MHz	dBuV	Qp Av Pk Rms	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	(V/H)	(m)	(DEG)	FCC 15.109 B &209 < 1GHz Qp	Limit	(MHz)
V_POE_X1_under loads_			RC 04_Single Gang_										
36.1090	37.66	**Qp**	0.54	22.71	28.17	0.00	32.74	V	1.00	146.3	- 7.26	(40.00)	0.120
51.1554	49.46	**Qp**	0.63	14.07	28.13	0.00	36.03	V	1.00	36.9	- 3.97	(40.00)	0.120
66.1555	48.71	**Qp**	0.74	13.90	28.08	0.00	35.27	V	1.00	0.0	- 4.73	(40.00)	0.120
74.5801	47.63	**Qp**	0.77	13.84	28.05	0.00	34.19	V	1.00	49.1	- 5.81	(40.00)	0.120
454.6699	44.54	**Qp**	1.91	22.99	28.12	0.00	41.32	V	1.00	20.5	- 4.70	(46.02)	0.120
520.5705	41.85	**Qp**	2.04	24.10	28.31	0.00	39.68	V	1.00	31.1	- 6.34	(46.02)	0.120
H_POE_X1_under loads_			RC 04_Single Gang_										
175.0048	35.67	**Qp**	1.20	17.60	27.55	0.00	26.92	H	1.36	247.9	- 16.60	(43.52)	0.120
200.0048	40.89	**Qp**	1.26	18.70	27.38	0.00	33.47	H	1.50	84.1	- 10.05	(43.52)	0.120
244.0802	47.37	**Qp**	1.40	17.70	27.13	0.00	39.34	H	1.50	234.6	- 6.68	(46.02)	0.120
271.1971	42.41	**Qp**	1.47	19.30	27.05	0.00	36.13	H	1.00	234.2	- 9.89	(46.02)	0.120
532.6971	41.50	**Qp**	2.07	24.20	28.34	0.00	39.44	H	1.32	123.6	- 6.59	(46.03)	0.120
775.0224	38.81	**Qp**	2.49	27.00	28.02	0.00	40.28	H	1.50	95.9	- 5.74	(46.02)	0.120
V_POE_X2_under loads_			RC 04_Single Gang_										
534.1346	42.34	**Qp**	2.08	24.20	28.34	0.00	40.28	V	1.00	145.5	- 5.74	(46.02)	0.120
H_POE_X2_under loads_			RC 04_Single Gang_										
534.1346	43.12	**Qp**	2.08	24.20	28.34	0.00	41.06	H	1.50	132.8	- 4.96	(46.02)	0.120
V_12Vdc_X2_			RC 04_Single Gang_										
40.6795	46.78	**Qp**	0.57	19.26	28.16	0.00	38.44	V	1.00	160.0	- 1.56	(40.00)	0.120
104.3000	45.62	**Qp**	0.91	17.56	27.93	0.00	36.16	V	1.00	184.5	- 7.36	(43.52)	0.120
116.5240	43.31	**Qp**	0.98	19.35	27.87	0.00	35.77	V	1.00	174.8	- 7.75	(43.52)	0.120
H_12Vdc_X2_			RC 04_Single Gang_										
515.2757	38.09	**Qp**	2.03	24.10	28.31	0.00	35.91	H	1.50	330.7	- 10.11	(46.02)	0.120
V_12Vdc_X1_			RC 04_Single Gang_										
40.6795	44.58	**Qp**	0.57	19.26	28.16	0.00	36.24	V	1.00	104.2	- 3.76	(40.00)	0.120
50.2292	45.14	**Qp**	0.62	14.25	28.13	0.00	31.89	V	1.00	359.9	- 8.11	(40.00)	0.120
61.0192	48.54	**Qp**	0.69	13.60	28.10	0.00	34.73	V	1.00	0.0	- 5.27	(40.00)	0.120
106.7051	45.93	**Qp**	0.93	18.04	27.92	0.00	36.98	V	1.00	162.1	- 6.54	(43.52)	0.120

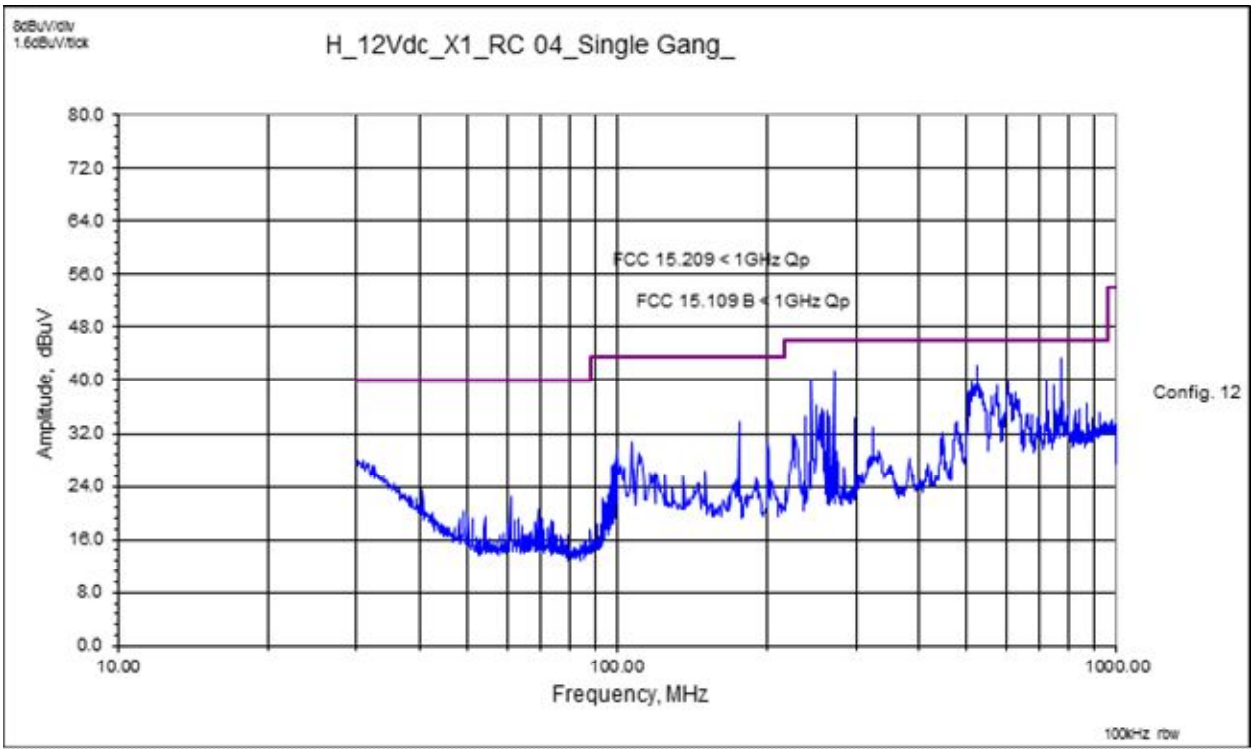
FREQ	LEVEL	DET	CABLE	ANT	PREAMP	ATTEN	FINAL	POL	HGT	AZ	DELTA1	Limit	RBW
MHz	dBuV	Qp Av Pk Rms	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	(V/H)	(m)	(DEG)	FCC 15.109 B &209 < 1GHz Qp	Limit	(MHz)
111.5257	42.52	**Qp**	0.94	18.75	27.90	0.00	34.31	V	1.00	128.4	- 9.21	(43.52)	0.120
539.6811	36.90	**Qp**	2.09	24.20	28.35	0.00	34.84	V	1.00	323.2	- 11.18	(46.02)	0.120
H_12Vdc_X1_			RC 04_Single Gang_										
106.6971	39.54	**Qp**	0.93	18.04	27.92	0.00	30.59	H	2.61	102.4	- 12.93	(43.52)	0.120
175.0048	40.28	**Qp**	1.20	17.60	27.55	0.00	31.53	H	1.50	270.2	- 11.99	(43.52)	0.120
244.0786	48.53	**Qp**	1.40	17.70	27.13	0.00	40.50	H	1.25	260.8	- 5.52	(46.02)	0.120
271.1971	48.49	**Qp**	1.47	19.30	27.05	0.00	42.21	H	1.35	81.0	- 3.81	(46.02)	0.120
525.0160	36.44	**Qp**	2.05	24.10	28.33	0.00	34.26	H	1.04	110.2	- 11.76	(46.02)	0.120
775.0224	41.83	**Qp**	2.49	27.00	28.02	0.00	43.30	H	1.23	267.5	- 2.72	(46.02)	0.120

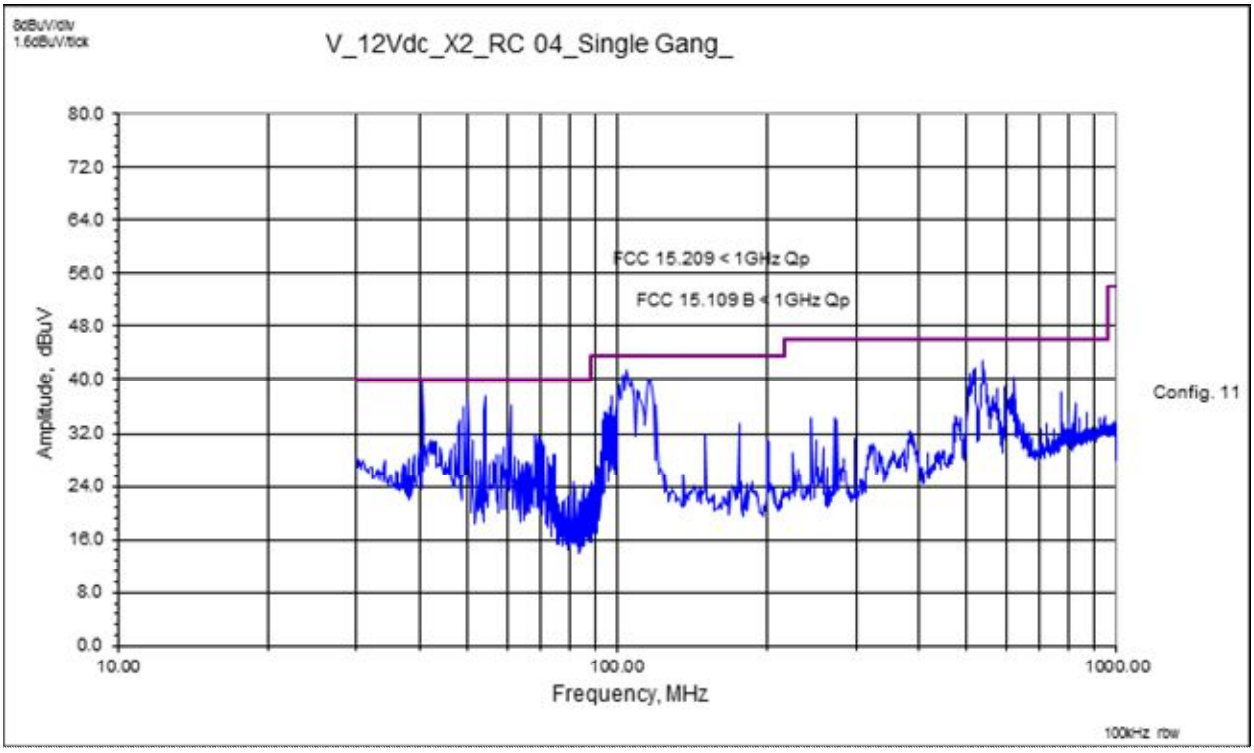
FREQ	LEVEL	DET	CABLE	ANT	PREAMP	ATTEN	FINAL	POL	HGT	AZ	DELTA1	Limit	RBW
MHz	dBuV	Qp Av Pk Rms	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	(V/H)	(m)	(DEG)	FCC 15.209 Qp	Limit	(MHz)
Parallel_loop_POE_Axis_1_RC-04 Single-Gang													
0.1288	- 53.55	**Qp**	0.04	10.27	0.00	0.00	- 43.24	V	1.00	0.0	- 68.64	(25.40)	0.0002
10.3517	- 14.60	**Qp**	0.28	10.61	0.00	0.00	- 3.72	V	1.00	0.0	- 33.26	(29.54)	0.009
14.4869	- 9.36	**Qp**	0.35	10.69	0.00	0.00	1.68	V	1.00	0.0	- 27.86	(29.54)	0.009
16.9234	- 15.46	**Qp**	0.38	10.58	0.00	0.00	- 4.50	V	1.00	0.0	- 34.04	(29.54)	0.009
Parallel_loop_POE_Axis_2_RC-04 Single-Gang													
0.1302	- 74.96	**Qp**	0.04	10.27	0.00	0.00	- 64.65	V	1.00	0.0	- 89.95	(25.30)	0.0002
0.2513	- 47.05	**Qp**	0.05	10.15	0.00	0.00	- 36.85	V	1.00	0.0	- 56.44	(19.59)	0.009
10.3520	- 15.57	**Qp**	0.28	10.61	0.00	0.00	- 4.69	V	1.00	0.0	- 34.23	(29.54)	0.009
14.8399	- 15.86	**Qp**	0.36	10.70	0.00	0.00	- 4.81	V	1.00	0.0	- 34.35	(29.54)	0.009
Perpendicular_loop_POE_Axis_1_RC-04 Single-Gang													
0.1304	- 55.07	**Qp**	0.04	10.27	0.00	0.00	- 44.76	V	1.00	0.0	- 70.05	(25.29)	0.0002
0.7288	- 23.34	**Qp**	0.07	10.20	0.00	0.00	- 13.07	V	1.00	0.0	- 43.41	(30.34)	0.009
10.0321	- 16.24	**Qp**	0.27	10.60	0.00	0.00	- 5.37	V	1.00	0.0	- 34.91	(29.54)	0.009
14.8044	- 12.02	**Qp**	0.36	10.70	0.00	0.00	- 0.97	V	1.00	0.0	- 30.51	(29.54)	0.009
Perpendicular_loop_POE_Axis_2_RC-04 Single-Gang													
0.1283	- 54.79	**Qp**	0.04	10.27	0.00	0.00	- 44.48	V	1.00	0.0	- 69.91	(25.43)	0.0002
0.9373	- 22.33	**Qp**	0.08	10.34	0.00	0.00	- 11.92	V	1.00	0.0	- 40.08	(28.16)	0.009
10.1605	- 15.75	**Qp**	0.27	10.60	0.00	0.00	- 4.88	V	1.00	0.0	- 34.42	(29.54)	0.009
14.4865	- 6.82	**Qp**	0.35	10.69	0.00	0.00	4.22	V	1.00	0.0	- 25.32	(29.54)	0.009
Parallel_loop_12VDC_Axis_1_RC-04 Single-Gang													
0.1297	- 54.14	**Qp**	0.04	10.27	0.00	0.00	- 43.83	V	1.00	0.0	- 69.16	(25.33)	0.0002
0.9425	- 22.33	**Qp**	0.08	10.34	0.00	0.00	- 11.90	V	1.00	0.0	- 40.02	(28.12)	0.009
10.0323	- 15.24	**Qp**	0.27	10.60	0.00	0.00	- 4.37	V	1.00	0.0	- 33.91	(29.54)	0.009
14.5426	- 10.48	**Qp**	0.35	10.69	0.00	0.00	0.56	V	1.00	0.0	- 28.98	(29.54)	0.009
Parallel_loop_12VDC_Axis_2_RC-04 Single-Gang													
0.1303	- 54.59	**Qp**	0.04	10.27	0.00	0.00	- 44.28	V	1.00	0.0	- 69.57	(25.29)	0.0002

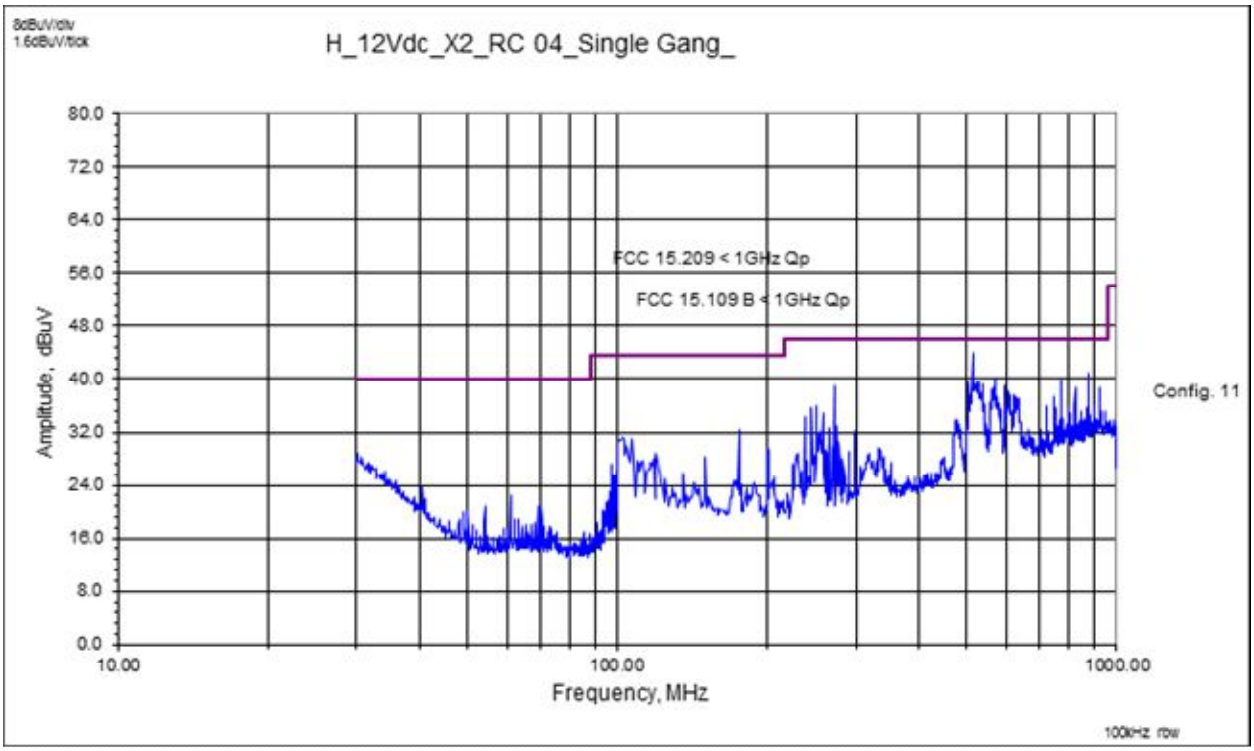
FREQ	LEVEL	DET	CABLE	ANT	PREAMP	ATTEN	FINAL	POL	HGT	AZ	DELTA1	Limit	RBW
MHz	dBuV	Qp Av Pk Rms	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	(V/H)	(m)	(DEG)	FCC 15.209 Qp	Limit	(MHz)
0.2511	- 27.59	**Qp**	0.05	10.15	0.00	0.00	- 17.40	V	1.00	0.0	- 36.99	(19.59)	0.009
10.1276	- 18.43	**Qp**	0.27	10.60	0.00	0.00	- 7.56	V	1.00	0.0	- 37.10	(29.54)	0.009
16.9373	- 15.50	**Qp**	0.38	10.58	0.00	0.00	- 4.54	V	1.00	0.0	- 34.08	(29.54)	0.009
Perpendicular_loop_12VDC_Axis_1_RC-04 Single-Gang													
0.1305	- 55.40	**Qp**	0.04	10.27	0.00	0.00	- 45.09	V	1.00	0.0	- 70.37	(25.28)	0.0002
0.2500	- 28.22	**Qp**	0.05	10.15	0.00	0.00	- 18.03	V	1.00	0.0	- 37.66	(19.63)	0.009
10.2239	- 12.54	**Qp**	0.27	10.60	0.00	0.00	- 1.66	V	1.00	0.0	- 31.20	(29.54)	0.009
14.8242	- 10.77	**Qp**	0.36	10.70	0.00	0.00	0.28	V	1.00	0.0	- 29.26	(29.54)	0.009
Perpendicular_loop_12VDC_Axis_2_RC-04 Single-Gang													
0.1303	- 55.60	**Qp**	0.04	10.27	0.00	0.00	- 45.29	V	1.00	0.0	- 70.58	(25.29)	0.0002
0.2496	- 28.54	**Qp**	0.04	10.15	0.00	0.00	- 18.35	V	1.00	0.0	- 38.00	(19.65)	0.009
10.2253	- 16.06	**Qp**	0.27	10.60	0.00	0.00	- 5.18	V	1.00	0.0	- 34.72	(29.54)	0.009
14.8440	- 15.91	**Qp**	0.36	10.70	0.00	0.00	- 4.86	V	1.00	0.0	- 34.40	(29.54)	0.009

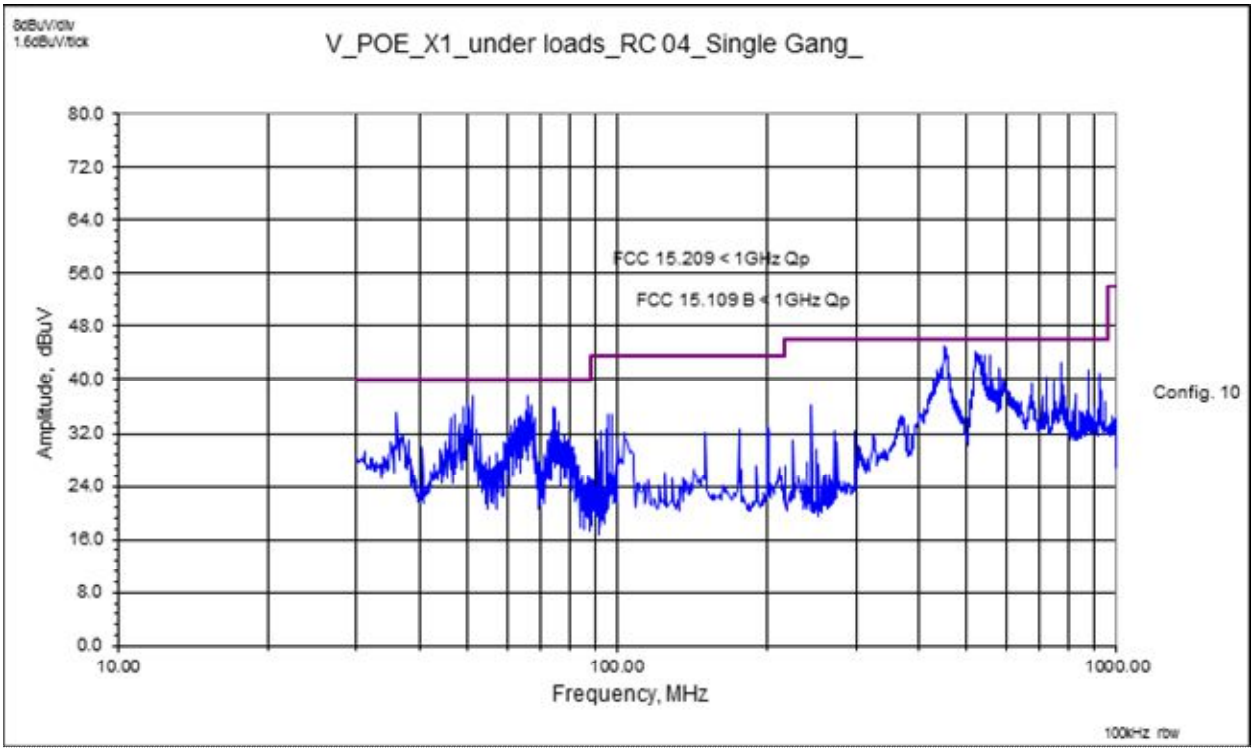
4.5 Plots:

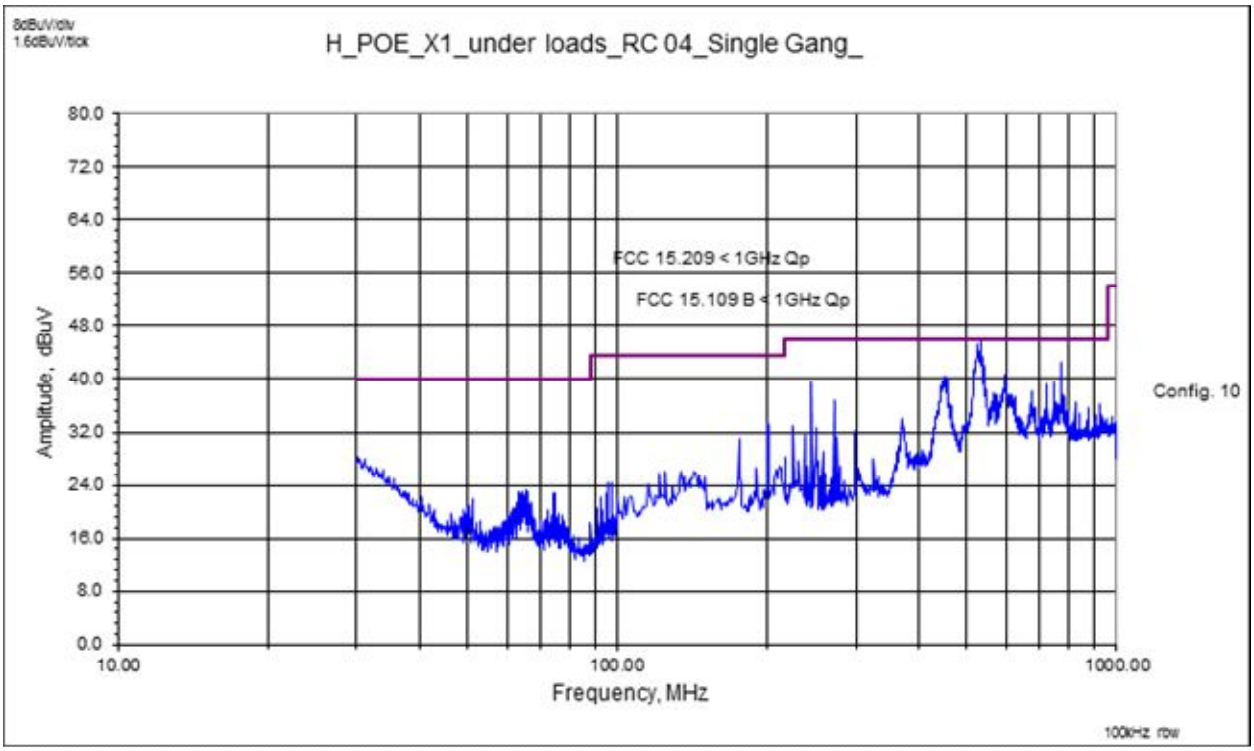

8dBuV/div
1.6dBuV/tick
V_12Vdc_X1_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 12
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

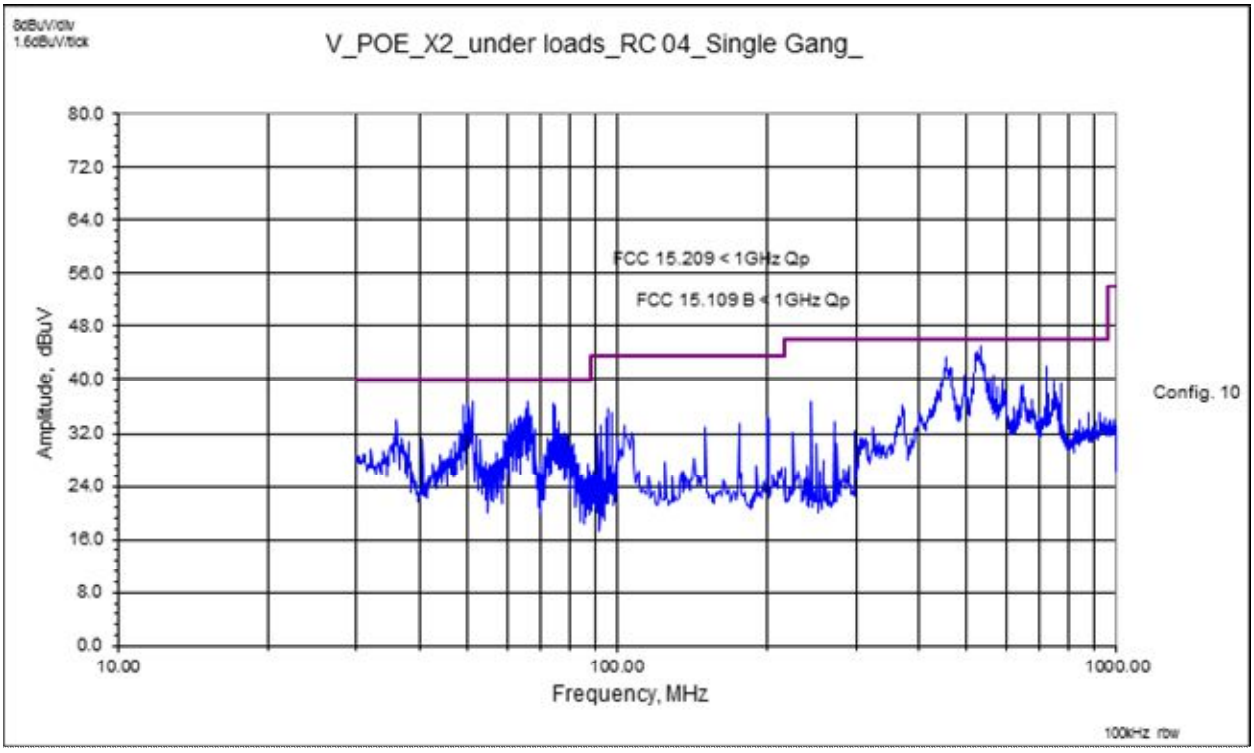

8dBuV/div
1.6dBuV/tick
H_12Vdc_X1_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 12
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

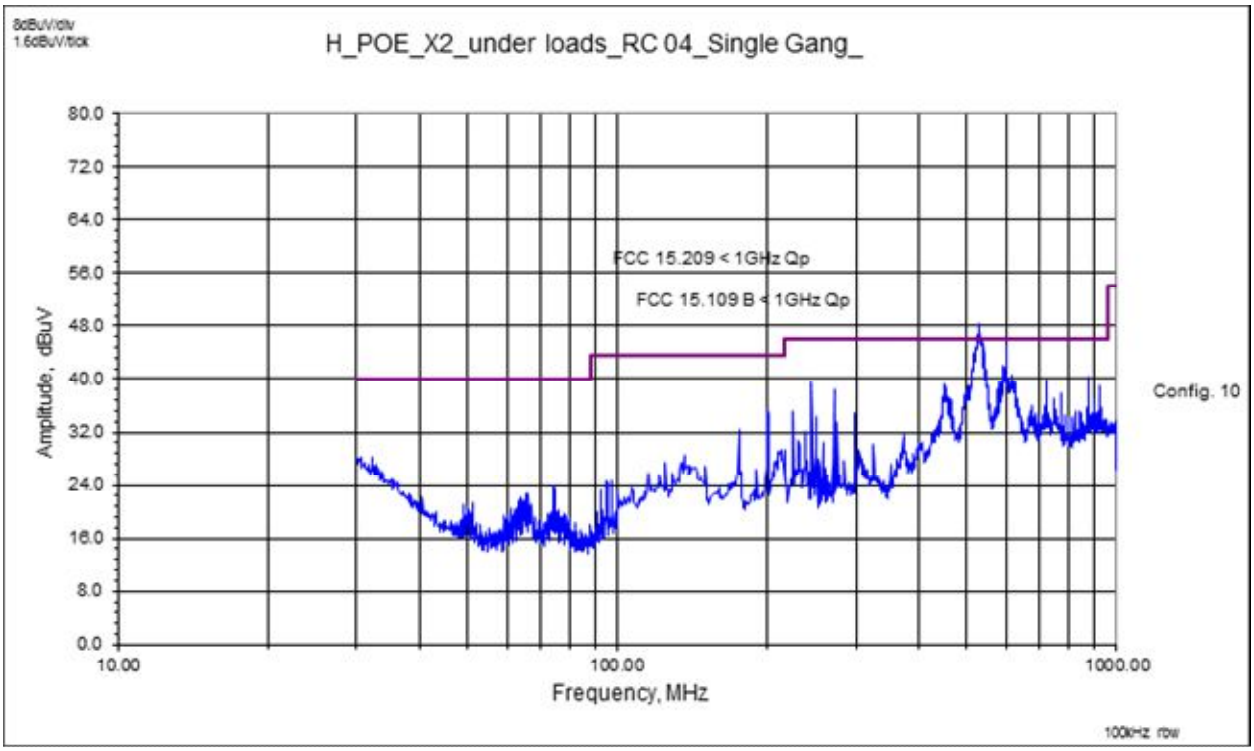

8dBuV/div
1.6dBuV/tick
V_12Vdc_X2_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 11
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

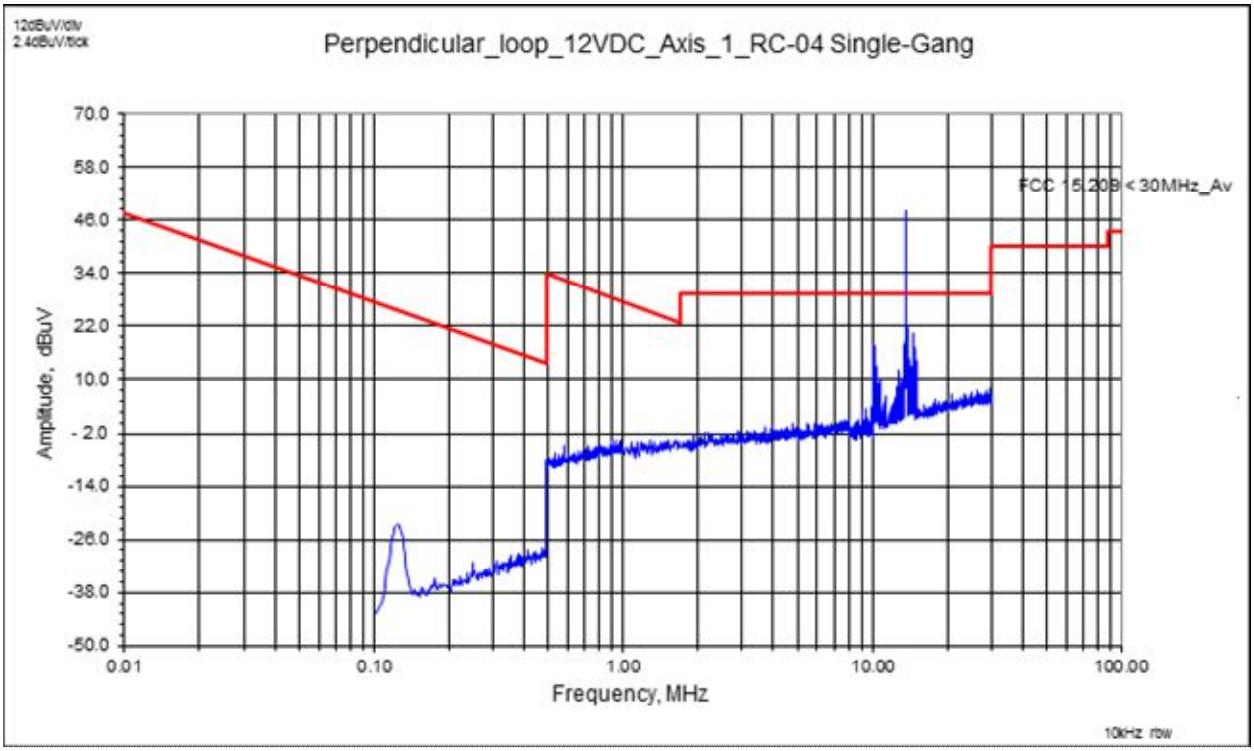

8dBuV/div
1.6dBuV/tick
H_12Vdc_X2_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 11
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

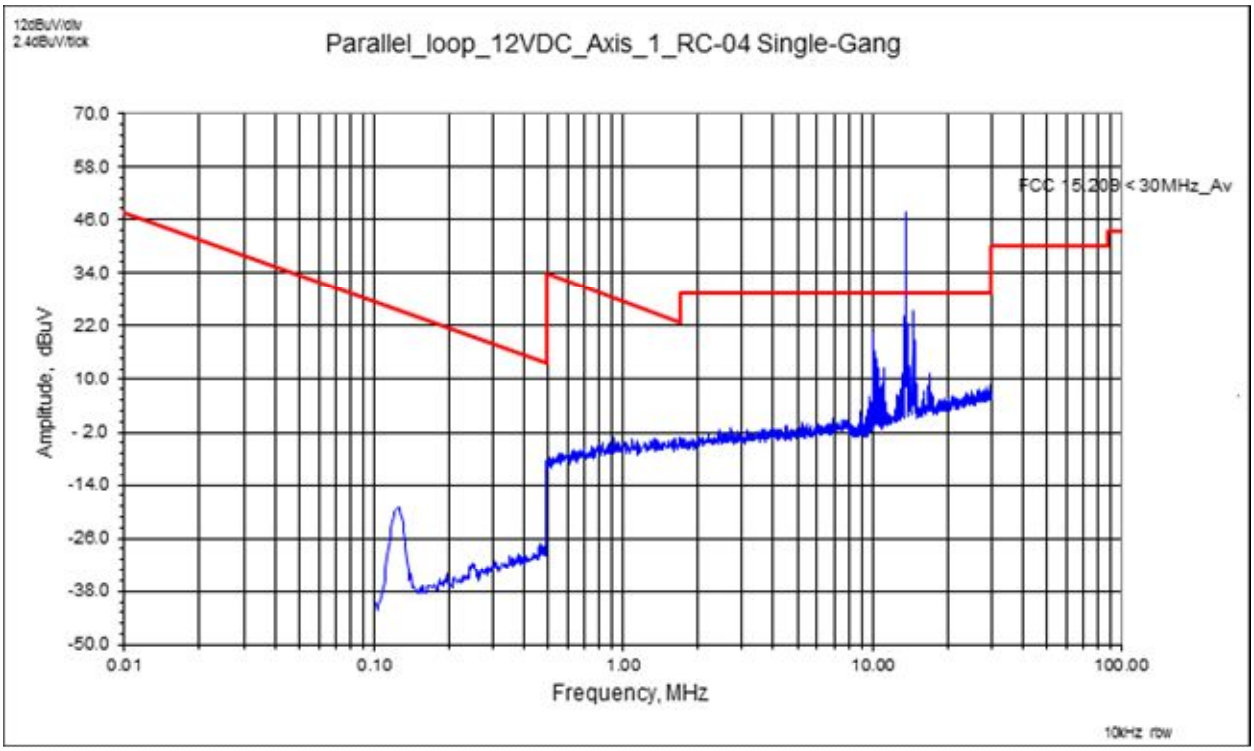

8dBuV/div
1.6dBuV/tick
V_POE_X1_under loads_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 10
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

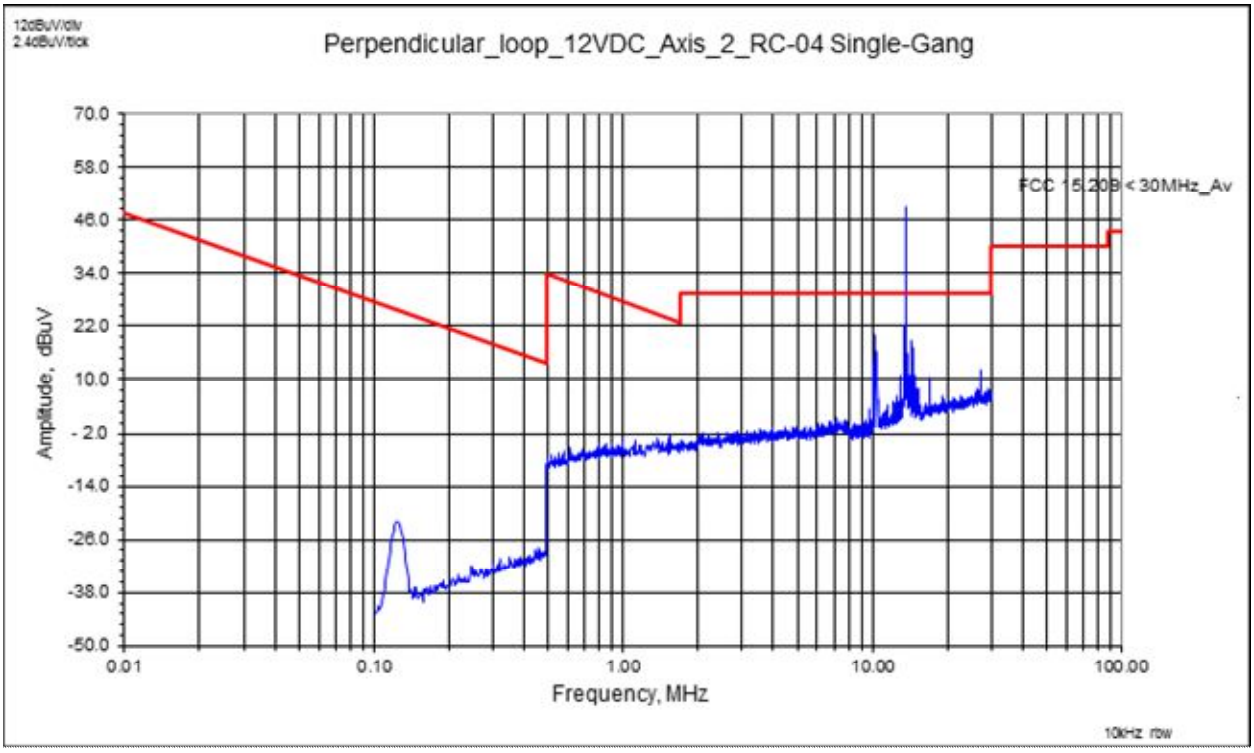

8dBuV/div
1.6dBuV/tick
H_POE_X1_under loads_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 10
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

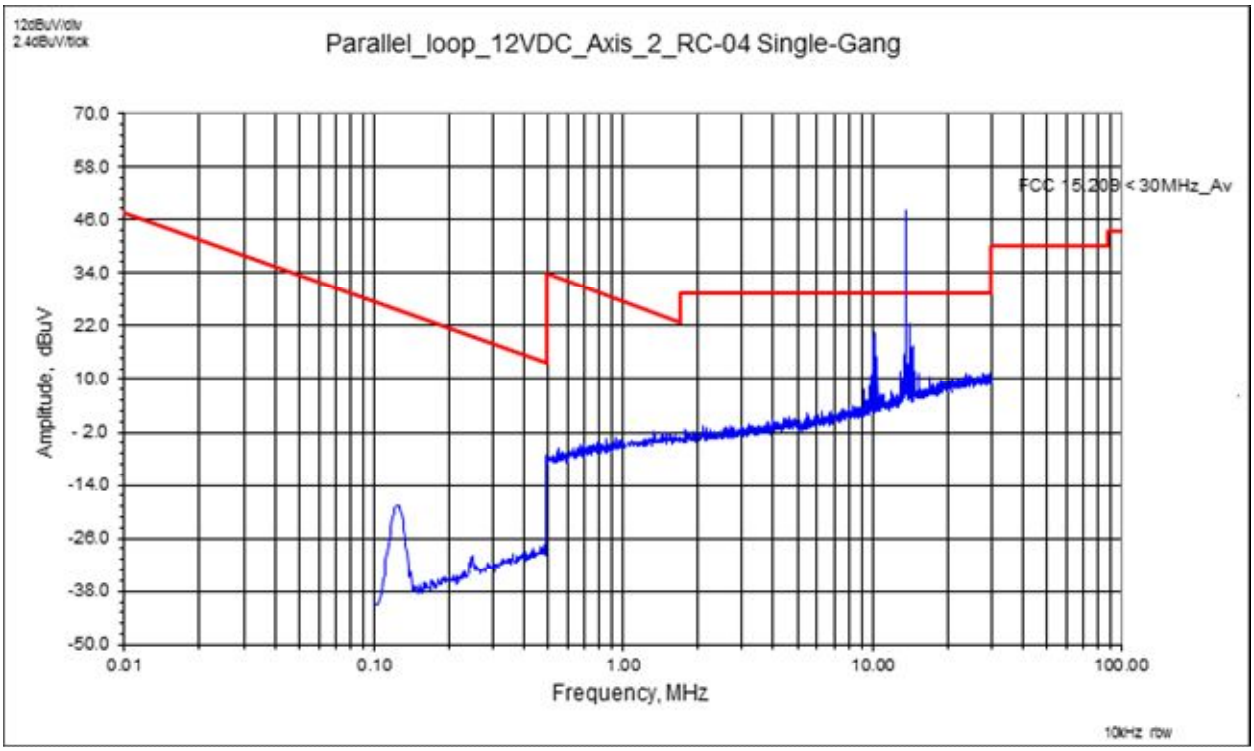

8dBuV/div
1.6dBuV/tick
V_POE_X2_under loads_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 10
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

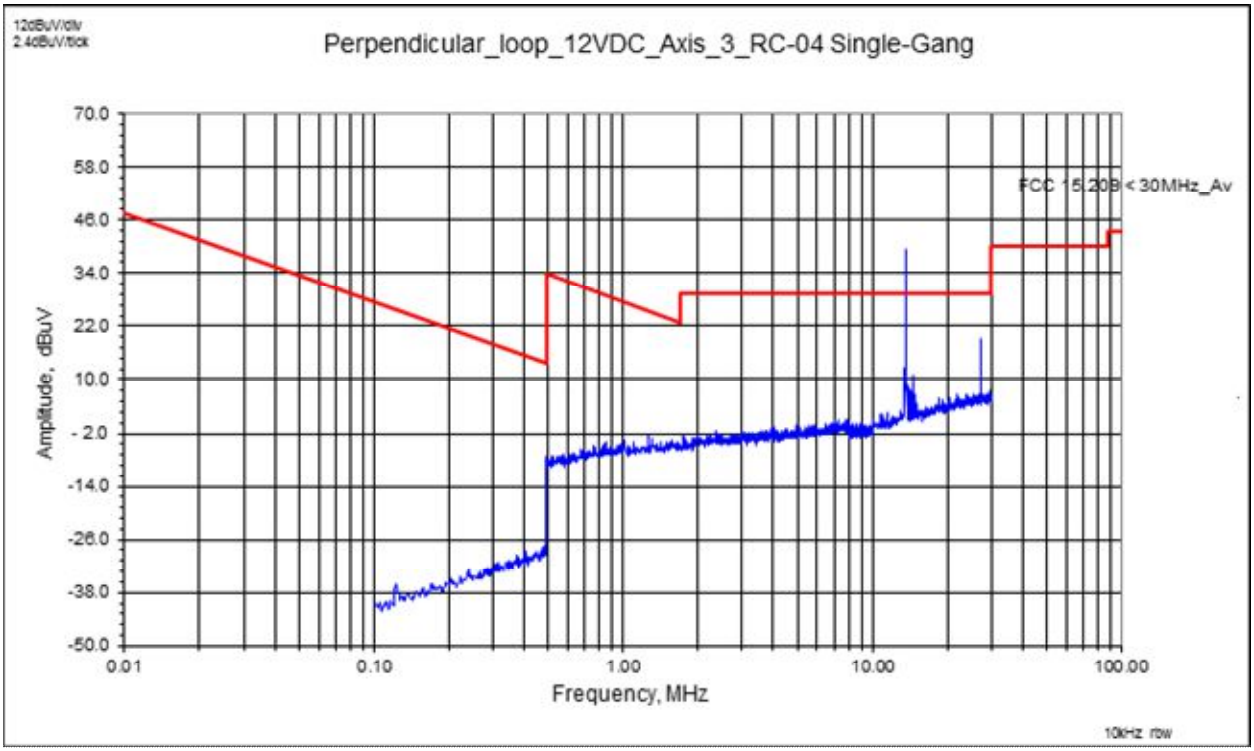

8dBuV/div
1.6dBuV/tick
H_POE_X2_under loads_RC 04_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
FCC 15.209 < 1GHz Qp
FCC 15.109 B < 1GHz Qp
Config. 10
10.00
100.00
1000.00
Frequency, MHz
100kHz rbw

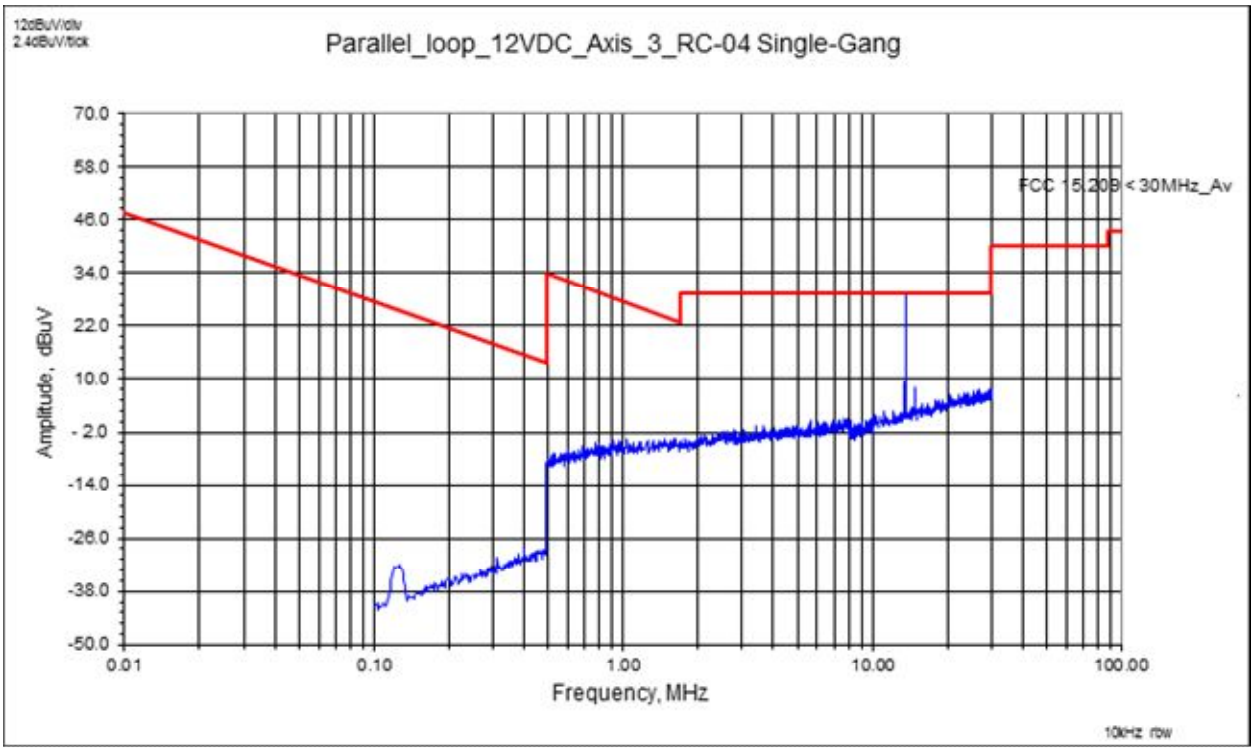

120dBuV/div
2.4dBuV/tick
Perpendicular_loop_12VDC_Axis_1_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

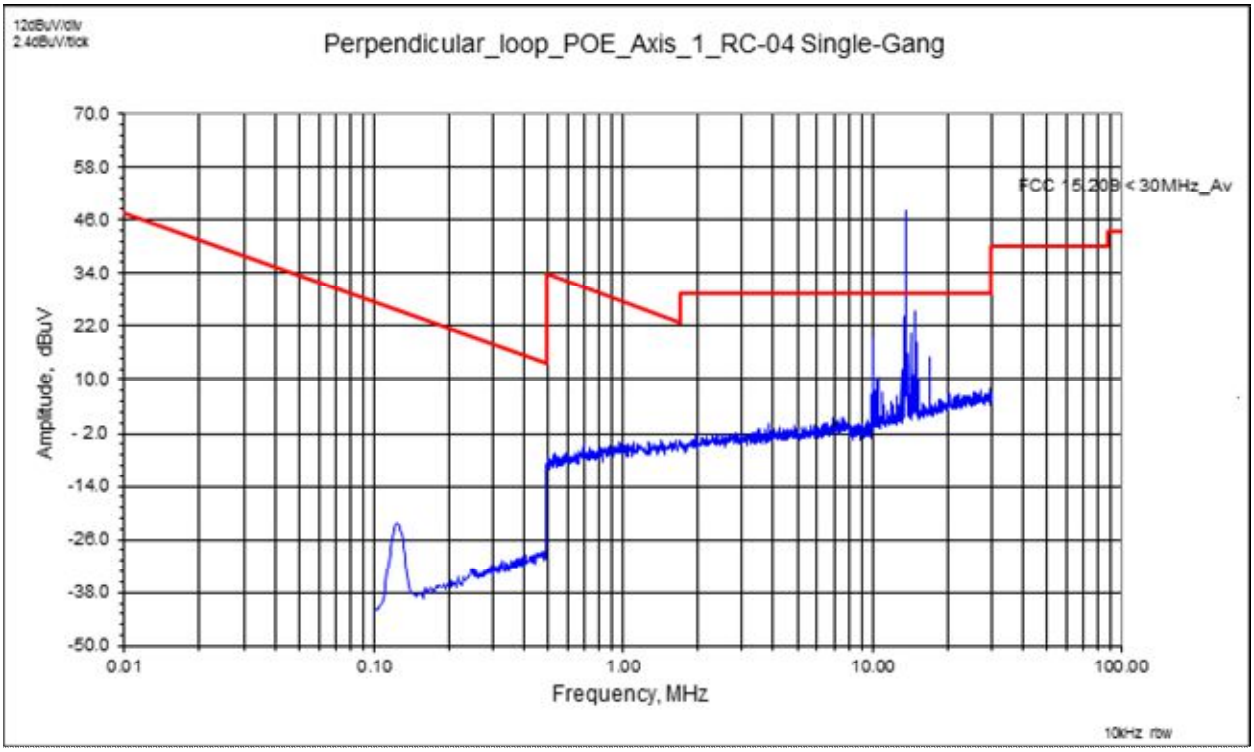

120dBuV/div
2.4dBuV/tick
Parallel_loop_12VDC_Axis_1_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

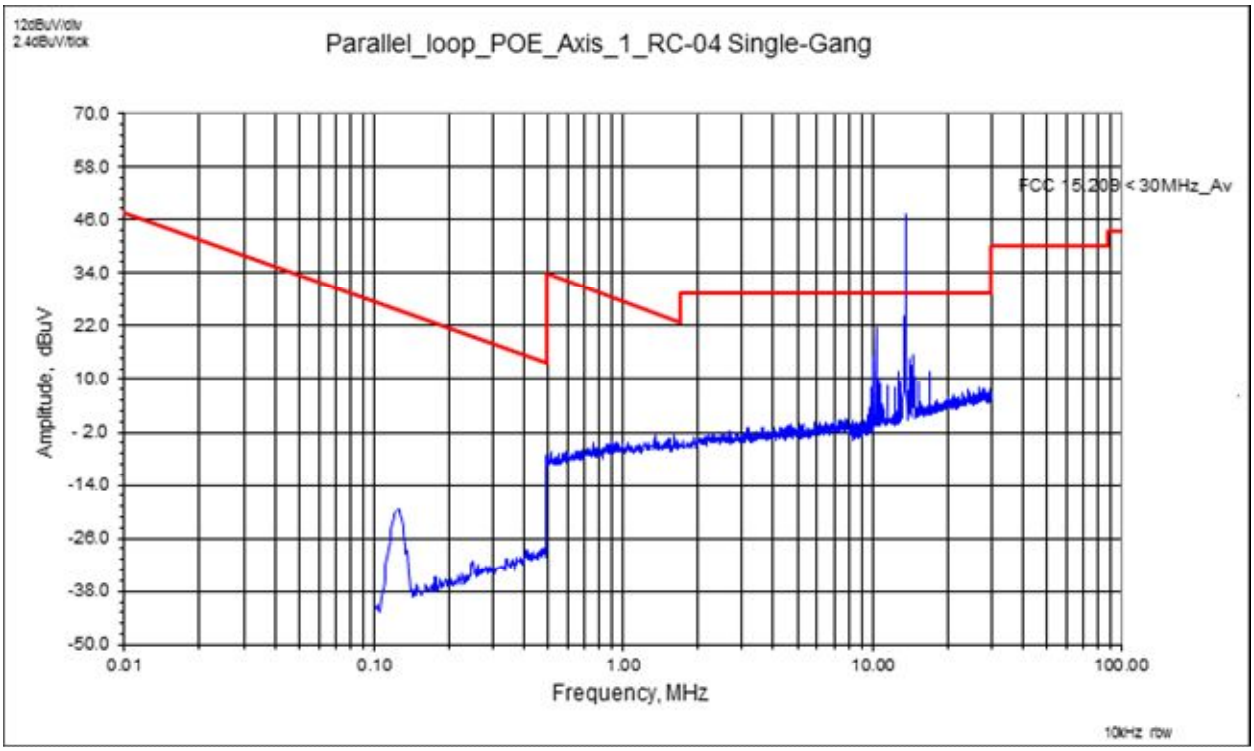

120dBuV/div
2.4dBuV/tick
Perpendicular_loop_12VDC_Axis_2_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

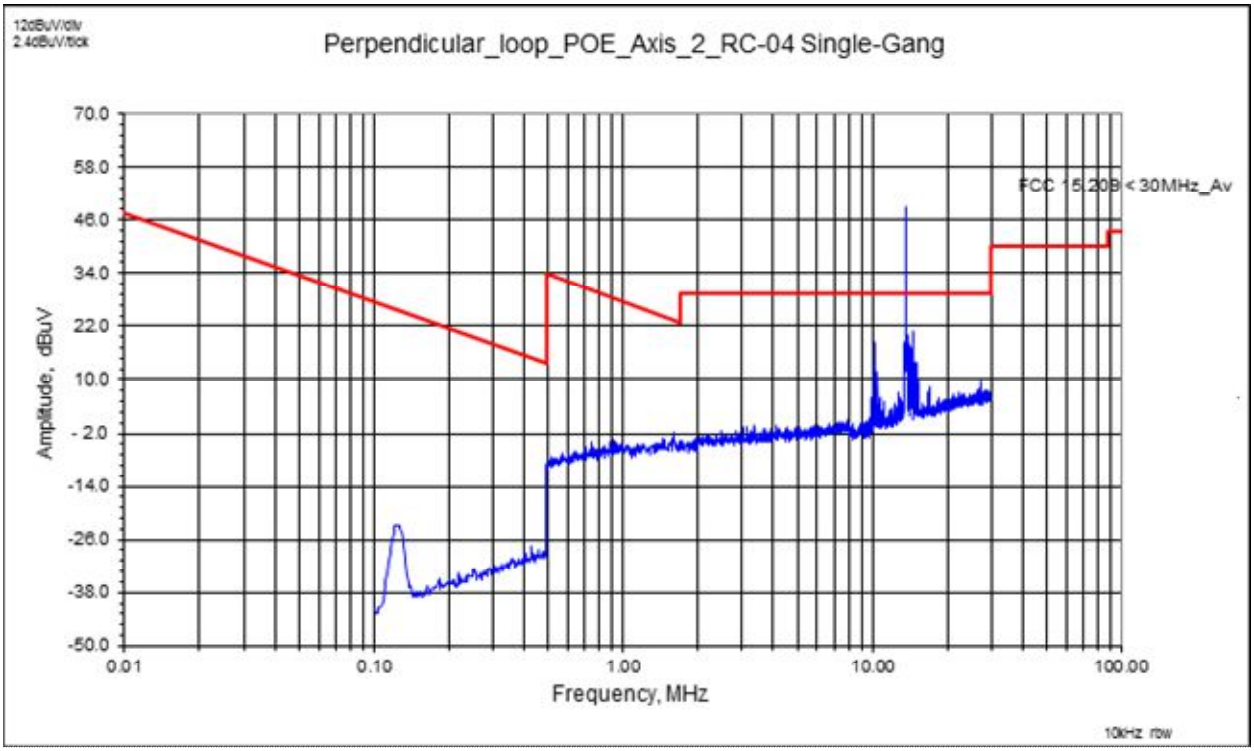

120dBuV/div
2.4dBuV/tick
Parallel_loop_12VDC_Axis_2_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

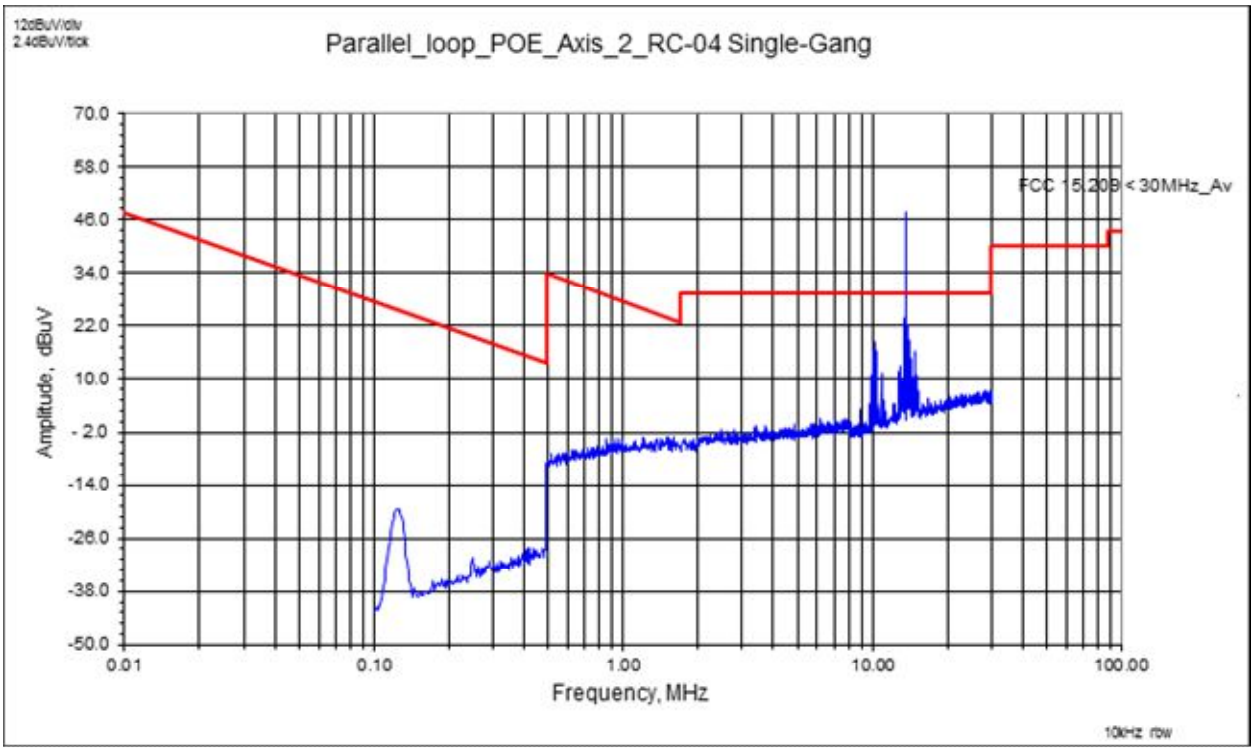

120dBuV/div
2.4dBuV/tick
Perpendicular_loop_12VDC_Axis_3_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

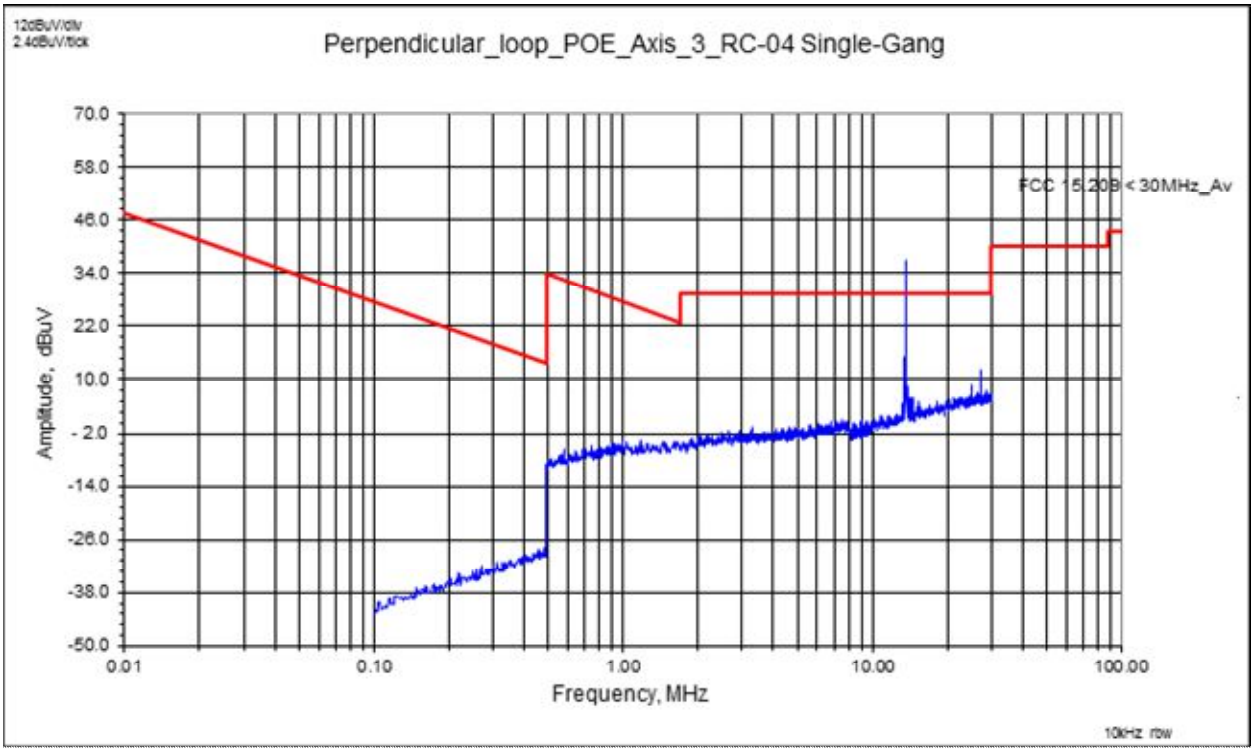

120dBuV/div
2.4dBuV/tick
Parallel_loop_12VDC_Axis_3_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

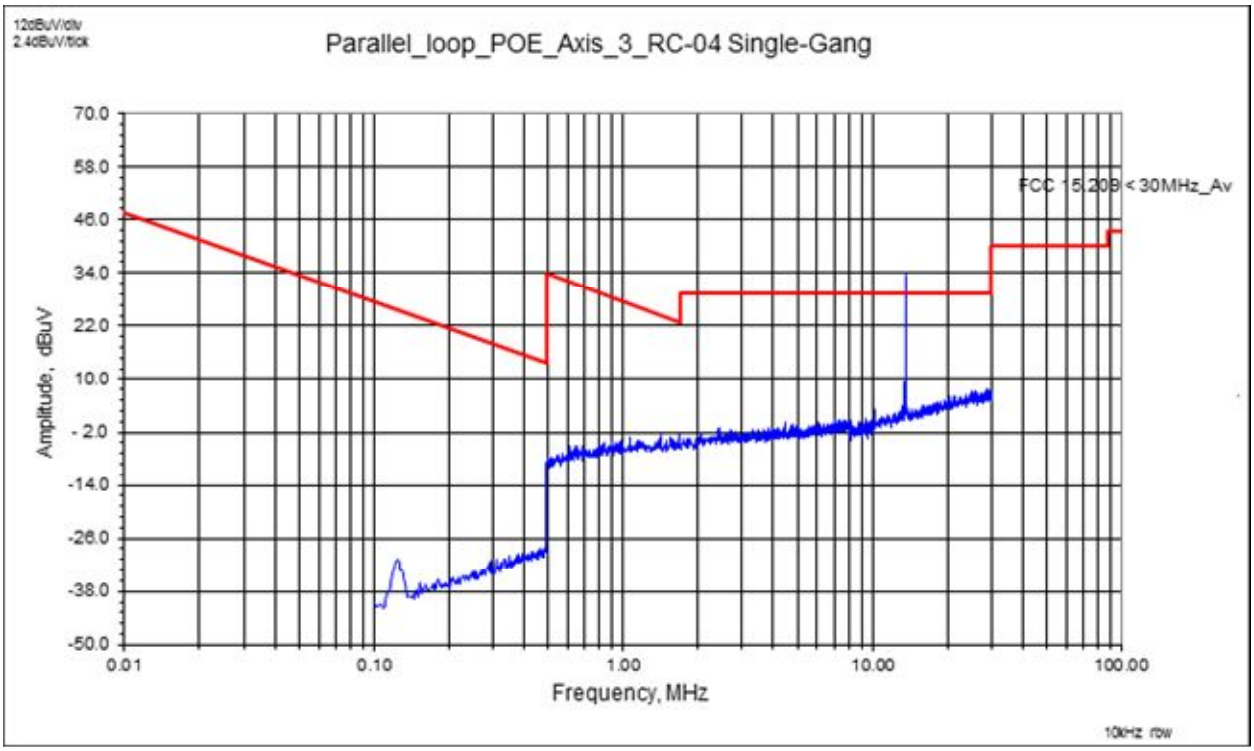

120dBuV/div
2.4dBuV/tick
Perpendicular_loop_POE_Axis_1_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw


120dBuV/div
2.4dBuV/tick
Parallel_loop_POE_Axis_1_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw


120dBuV/div
2.4dBuV/tick
Perpendicular_loop_POE_Axis_2_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw


120dBuV/div
2.4dBuV/tick
Parallel_loop_POE_Axis_2_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw


120dBuV/div
2.4dBuV/tick
Perpendicular_loop_POE_Axis_3_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw


120dBuV/div
2.4dBuV/tick
Parallel_loop_POE_Axis_3_RC-04 Single-Gang
FCC 15.209 < 30MHz_Av
Amplitude, dBuV
70.0
58.0
46.0
34.0
22.0
10.0
- 2.0
-14.0
-26.0
-38.0
-50.0
0.01
0.10
1.00
10.00
100.00
Frequency, MHz
10kHz rbw

5 Tx Voltage Variation – FCC 15.31

5.1 Method

Unless otherwise stated no deviations were made from FCC 15.31.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

5.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
19936	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-1	6/22/2016	6/22/2017
18897	Magnetic loop	EMCO	6502	9205-2738	11/12/2015	11/12/2016
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	HP	5	3/31/2016	3/31/2017
DEN-073	EMI Receiver (10Hz – 26.5GHz)	RHODE & SCHWARZ	ESU 26	100265	12/19/2015	12/19/2016
CC1-E2	Radiated Cable	Teledyne	90-206-300; PN:F-130-S1S1-100; 90-206-072;	E2-A; 5026702 002; E2-C; E2-D	11/17/2015	11/17/2016
260	Humidity and Temp. Pen	Extech Instruments	445580	958123	07/21/2016	07/21/2017

5.3 Test Results:

The sample tested was found to Comply.

5.4 Test Data:

Tx Voltage Variation

Test Report #:	**G102752932**	Test Area:	CC1 Radiated		Temperature:	23.9	°C
Test Method:	FCC 15.209/ IC RSS-210	Test Date:	10/17/2016 – 10/20/2016		Relative Humidity:	15.7	%
EUT Model #:	RC-04-MCT-WK	EUT Power:	POE, 12Vdc		Air Pressure:	835.7	kPa
EUT Serial #:	FCC Single Gang KP #1						
Manufacturer:	Isonas				Level Key		
EUT Description:	RFID Security Access Reader Controller				Pk – Peak		
Notes:					Qp – Quasi Peak		
					Av - Average		

FREQ	LEVEL	DET	CABLE	ANT	PREAMP	ATTEN	FINAL	POL	HGT	AZ	DELTA1	DELTA2	RBW
MHz	dBuV	Qp Av Pk Rms	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	(V/H)	(m)	(DEG)	NA	NA	(MHz)
Nominal 12Vdc													
0.1247	43.81	**Pk**	0.04	10.28	0.00	0.00	54.13	H	1.00	247.4	NA	NA	0.0002
13.5599	50.92	**Pk**	0.33	10.67	0.00	0.00	61.92	H	1.00	247.4	NA	NA	0.009
85% : 10.2 V													
13.5599	51.32	**Pk**	0.33	10.67	0.00	0.00	62.32	H	1.00	247.4	NA	NA	0.009
0.1247	43.91	**Pk**	0.04	10.28	0.00	0.00	54.23	H	1.00	247.4	NA	NA	0.0002
115%: 13.8 V													
13.5599	49.61	**Pk**	0.33	10.67	0.00	0.00	60.61	H	1.00	247.4	NA	NA	0.009
0.1247	43.94	**Pk**	0.04	10.28	0.00	0.00	54.26	H	1.00	247.4	NA	NA	0.0002

6 Radiated Tx Intentional Emissions – Fundamental

6.1 Method:

Unless otherwise stated no deviations were made from FCC 15.209/ IC RSS-210.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
19936	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-1	6/22/2016	6/22/2017
18897	Magnetic loop	EMCO	6502	9205-2738	11/12/2015	11/12/2016
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	HP	5	3/31/2016	3/31/2017
DEN-073	EMI Receiver (10Hz – 26.5GHz)	RHODE & SCHWARZ	ESU 26	100265	12/19/2015	12/19/2016
CC1-E2	Radiated Cable	Teledyne	90-206-300; PN:F-130-S1S1-100; 90-206-072;	E2-A; 5026702 002; E2-C; E2-D	11/17/2015	11/17/2016
260	Humidity and Temp. Pen	Extech Instruments	445580	958123	07/21/2016	07/21/2017

6.3 Test Results:

The sample tested was found to Comply

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

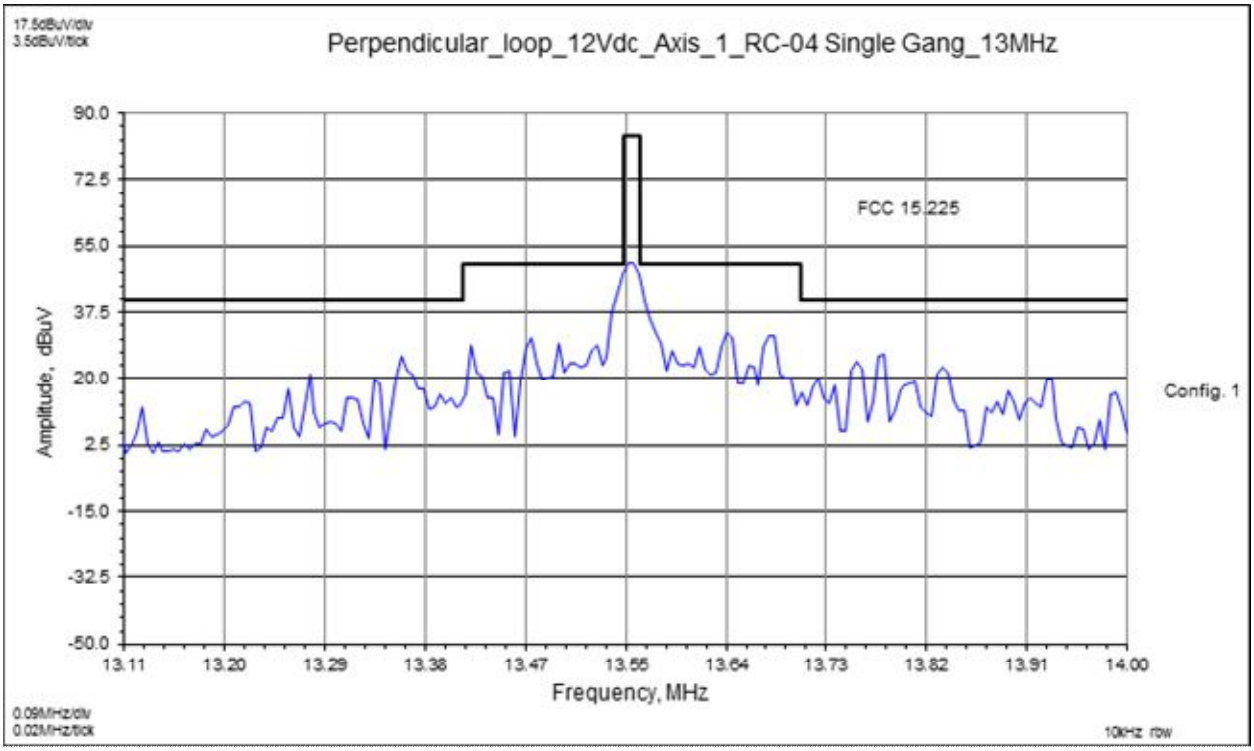
To convert from dBμV to μV or mV the following was used:

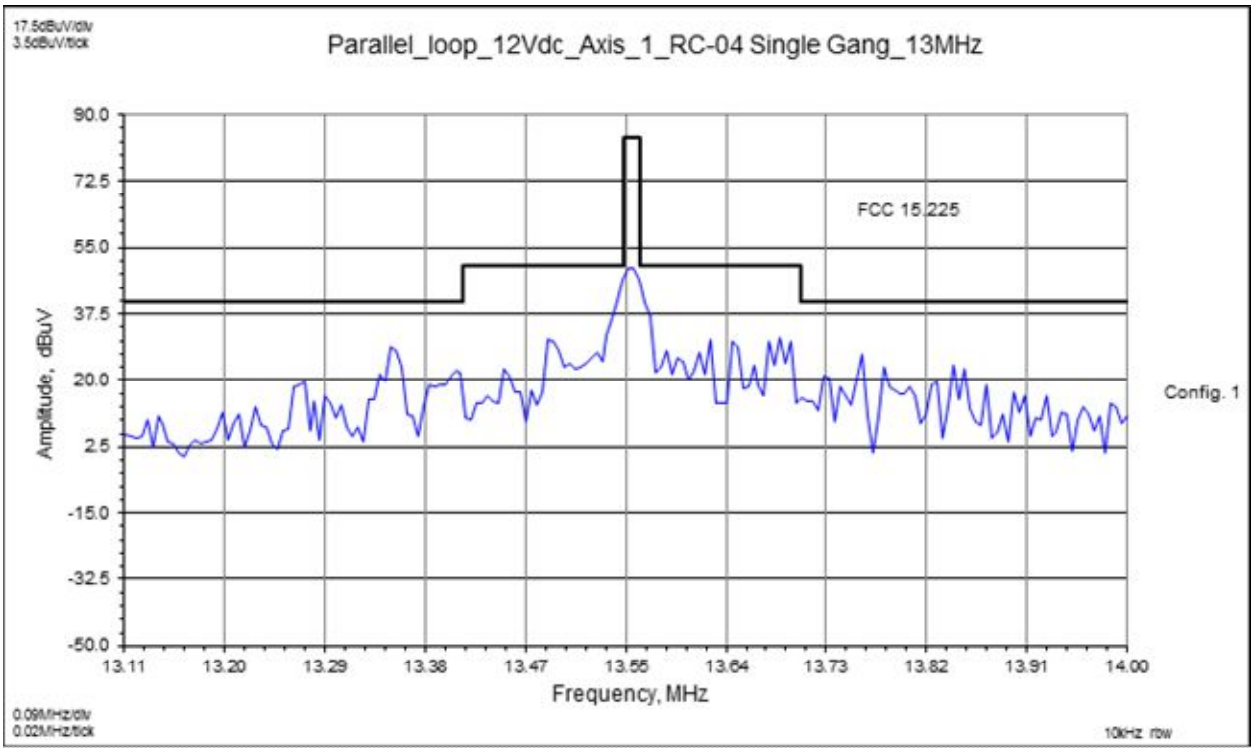
$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

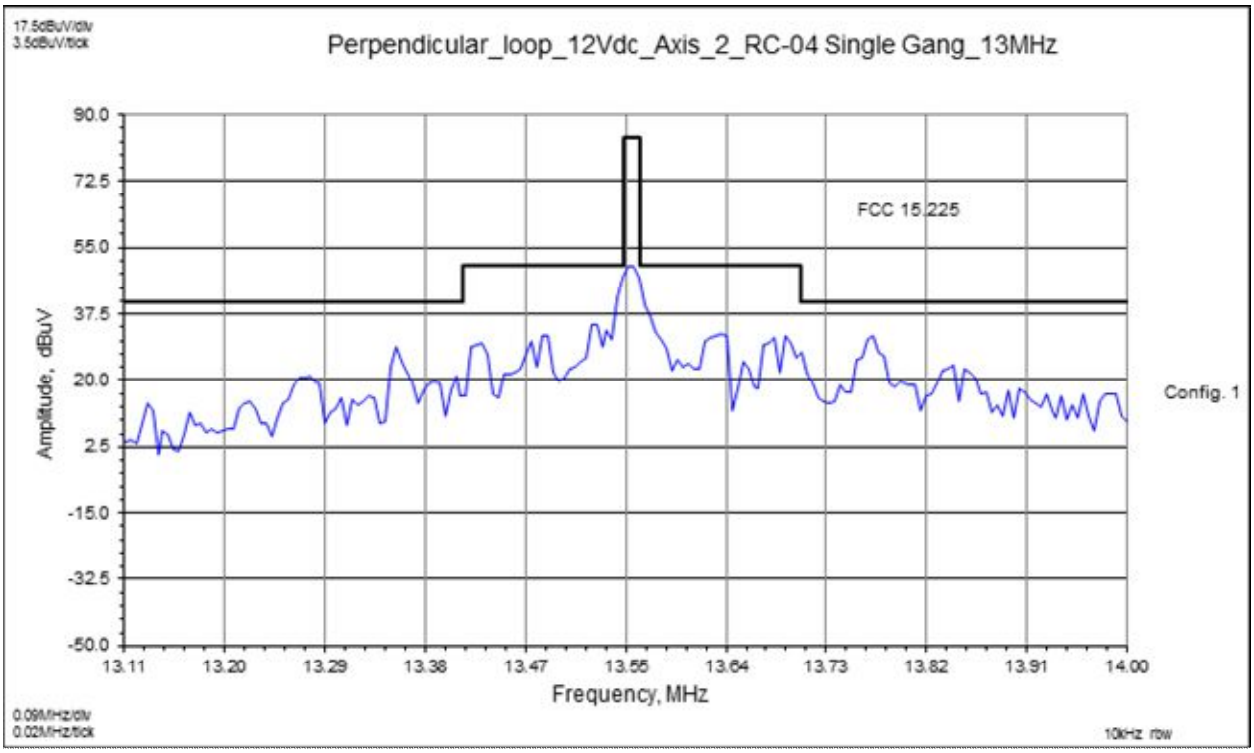
Example:

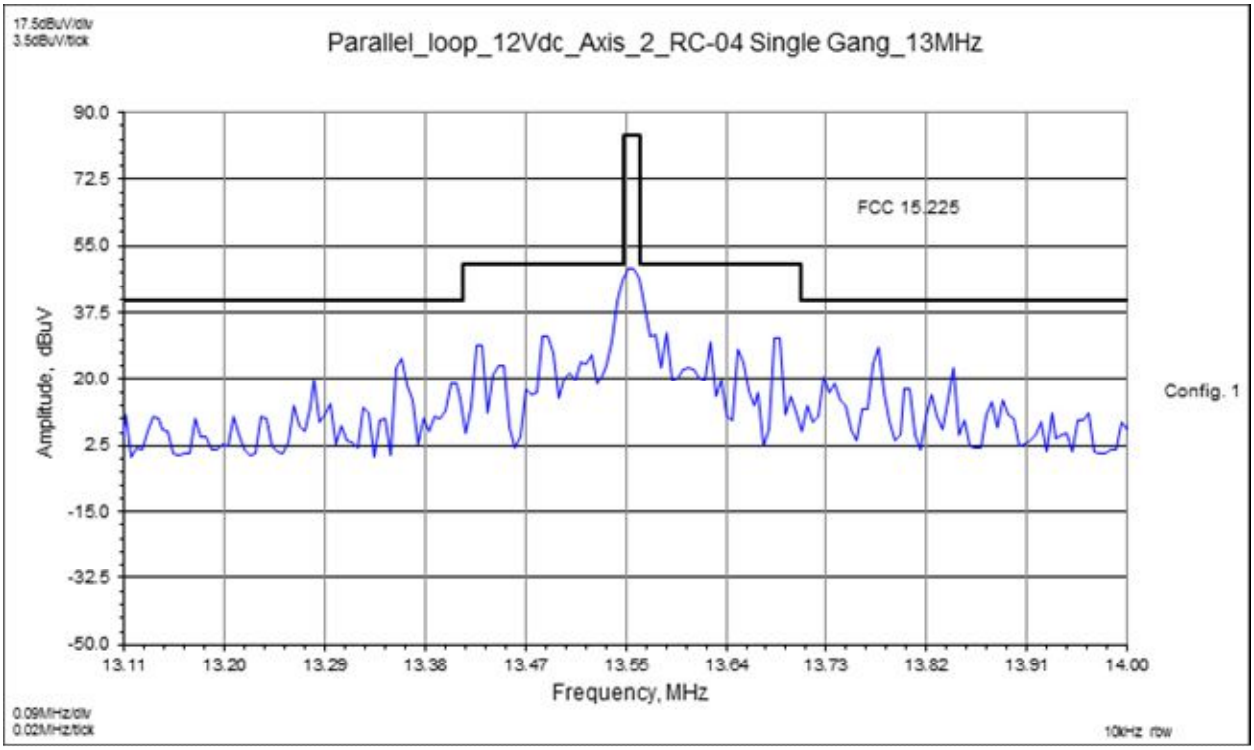
FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)} = 39.8\ \mu V/m$

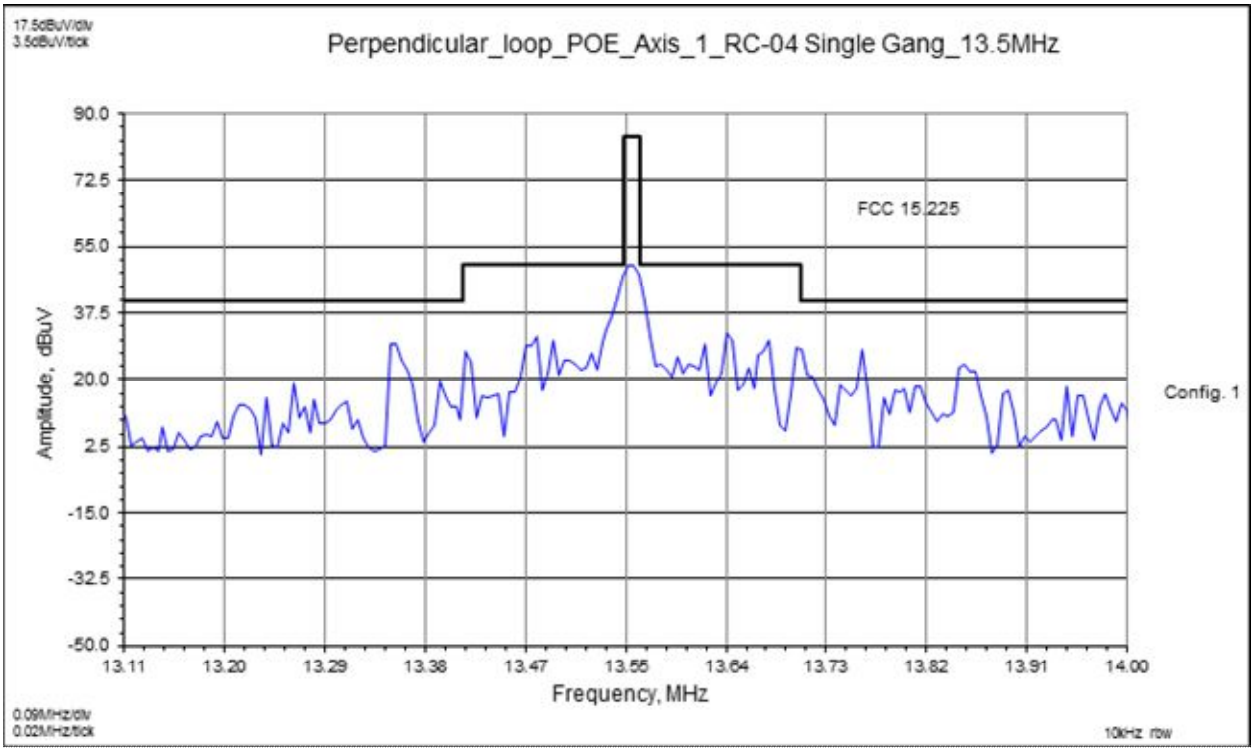
Plots:

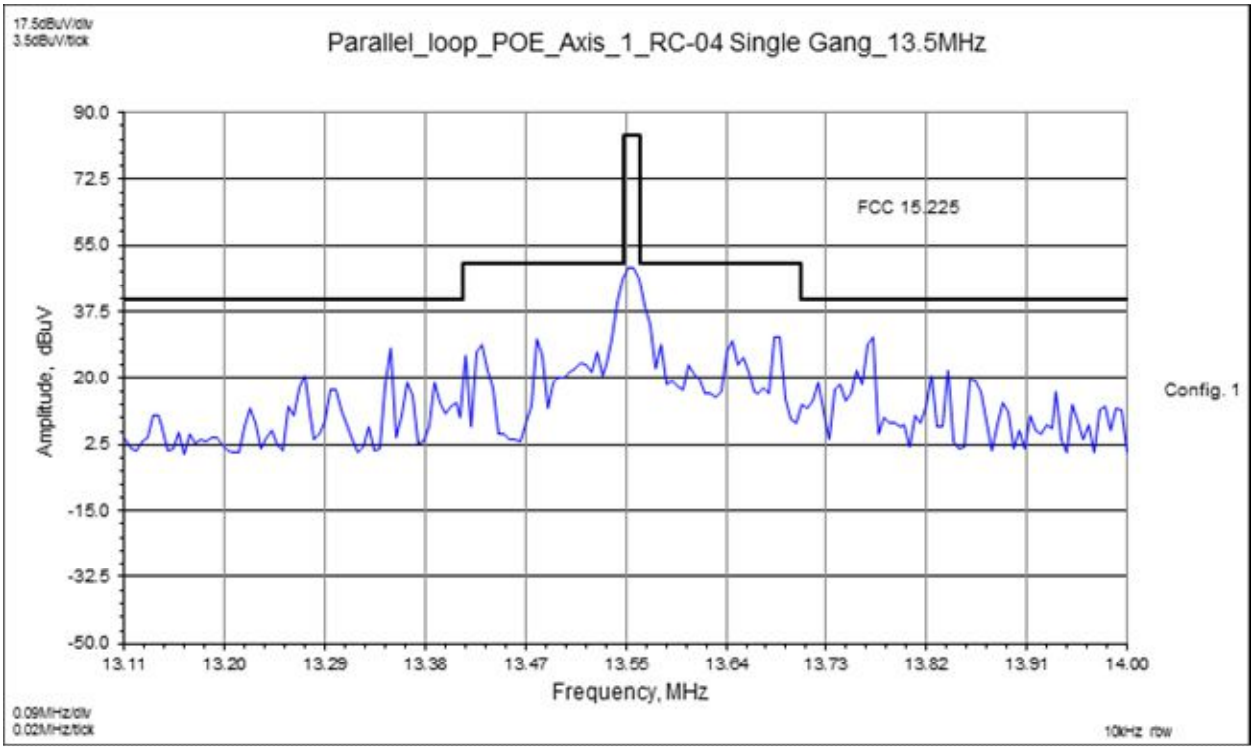

17.5dBuV/div
3.5dBuV/tick
Perpendicular_loop_12Vdc_Axis_1_RC-04 Single Gang_13MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw

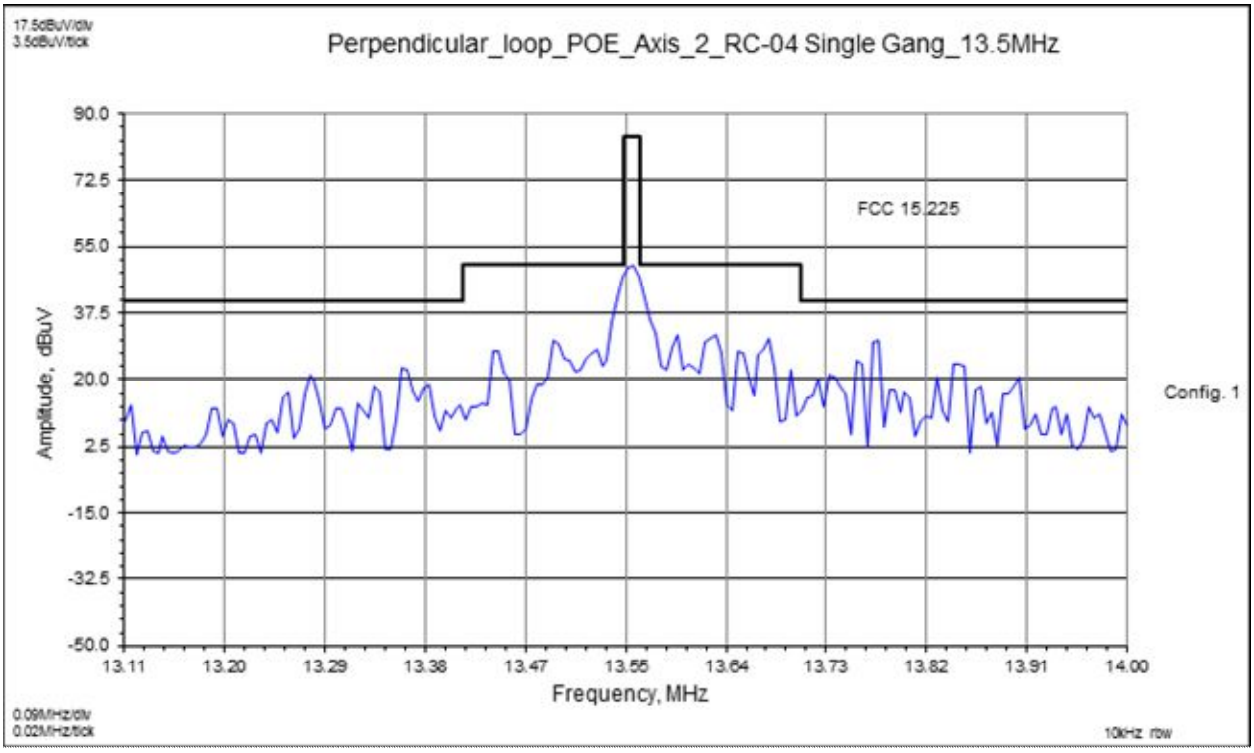

17.5dBuV/div
3.5dBuV/tick
Parallel_loop_12Vdc_Axis_1_RC-04 Single Gang_13MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw

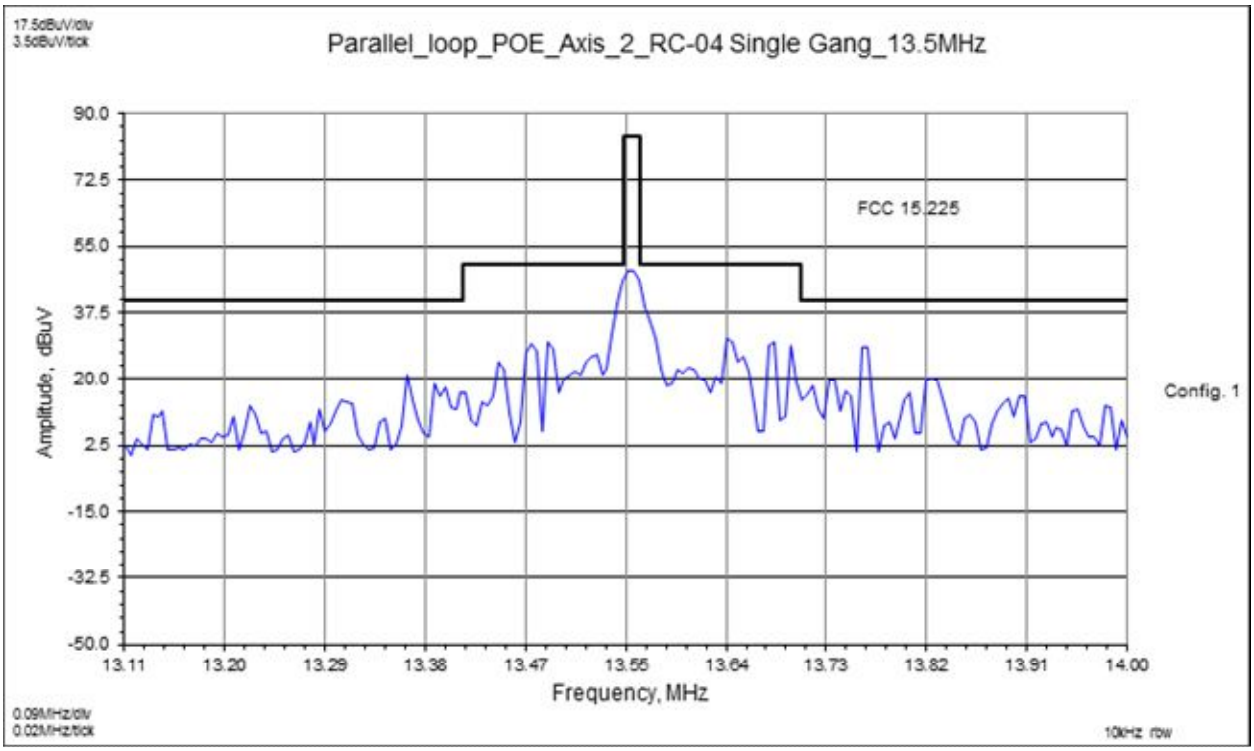

17.5dBuV/div
3.5dBuV/tick
Perpendicular_loop_12Vdc_Axis_2_RC-04 Single Gang_13MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw


17.5dBuV/div
3.5dBuV/tick
Parallel_loop_12Vdc_Axis_2_RC-04 Single Gang_13MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw


17.5dBuV/div
3.5dBuV/tick
Perpendicular_loop_POE_Axis_1_RC-04 Single Gang_13.5MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw


17.5dBuV/div
3.5dBuV/tick
Parallel_loop_POE_Axis_1_RC-04 Single Gang_13.5MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw


17.5dBuV/div
3.5dBuV/tick
Perpendicular_loop_POE_Axis_2_RC-04 Single Gang_13.5MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw


17.5dBuV/div
3.5dBuV/tick
Parallel_loop_POE_Axis_2_RC-04 Single Gang_13.5MHz
90.0
72.5
55.0
37.5
20.0
2.5
-15.0
-32.5
-50.0
Amplitude, dBuV
FCC 15.225
Config. 1
13.11
13.20
13.29
13.38
13.47
13.55
13.64
13.73
13.82
13.91
14.00
Frequency, MHz
0.09MHz/div
0.02MHz/tick
10kHz rbw

Radiated Electromagnetic Emissions

Test Report #:	**G102752932**	Test Area:	CC1 Radiated		Temperature:	23.9	°C
Test Method:	FCC 15.209/ IC RSS-210	Test Date:	10/17/2016 – 10/20/2016		Relative Humidity:	15.7	%
EUT Model #:	RC-04-MCT-WK	EUT Power:	POE, 12Vdc		Air Pressure:	835.7	kPa
EUT Serial #:	FCC Single Gang KP #1						
Manufacturer:	Isonas				Level Key		
EUT Description:	RFID Security Access Reader Controller				Pk – Peak		
Notes:					Qp – Quasi Peak		
					Av - Average		

FREQ	LEVEL	DET	CABLE	ANT	PREAMP	ATTEN	FINAL	POL	HGT	AZ	DELTA1	DELTA2	RBW
MHz	dBuV	Qp Av Pk Rms	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	(V/H)	(m)	(DEG)		Limit	(MHz)
Parallel_loop_POE_Axis_1_RC-04 Single Gang_													
0.125	-48.76	**Qp**	0.04	10.27	0	0	-38.45	H	1	359.9	-64.07	25.62	0.0002
13.5601	36.68	**Qp**	0.33	10.67	0	0	47.68	H	1	359.9	-36.32	84	0.009
Perpendicular_loop_POE_Axis_1_RC-04 Single Gang_													
0.125	-44.86	**Qp**	0.04	10.27	0	0	-34.55	H	1	117.9	-60.17	25.62	0.0002
13.5601	37.76	**Qp**	0.33	10.67	0	0	48.76	H	1	272.7	-35.24	84	0.009
Perpendicular_loop_POE_Axis_2_RC-04 Single Gang_													
0.125	-44.66	**Qp**	0.04	10.27	0	0	-34.35	H	1	273	-59.97	25.62	0.0002
13.5577	36.23	**Qp**	0.33	10.67	0	0	47.23	H	1	279.5	-36.77	84	0.009
Parallel_loop_POE_Axis_2_RC-04 Single Gang_													
0.125	-47.37	**Qp**	0.04	10.27	0	0	-37.06	H	1	149.5	-62.68	25.62	0.0002
13.5577	35.34	**Qp**	0.33	10.67	0	0	46.34	H	1	0	-37.66	84	0.009
Parallel_loop_12Vdc_Axis_1_RC-04 Single Gang_													
0.125	-48.55	**Qp**	0.04	10.27	0	0	-38.24	H	1	176.9	-63.86	25.62	0.0002
13.5601	37.15	**Qp**	0.33	10.67	0	0	48.15	H	1	166	-35.85	84	0.009
Perpendicular_loop_12Vdc_Axis_1_RC-04 Single Gang_													
0.125	-52.51	**Qp**	0.04	10.27	0	0	-42.2	H	1	119.5	-67.82	25.62	0.0002
13.5601	38.02	**Qp**	0.33	10.67	0	0	49.02	H	1	281.8	-34.98	84	0.009
Perpendicular_loop_12Vdc_Axis_2_RC-04 Single Gang_													
0.125	-48.39	**Qp**	0.04	10.27	0	0	-38.08	H	1	144.4	-63.7	25.62	0.0002
13.5599	37.57	**Qp**	0.33	10.67	0	0	48.57	H	1	278.4	-35.43	84	0.009
Parallel_loop_12Vdc_Axis_2_RC-04 Single Gang_													
0.125	-50.61	**Qp**	0.04	10.27	0	0	-40.3	H	1	18.6	-65.92	25.62	0.0002
13.5599	37.02	**Qp**	0.33	10.67	0	0	48.02	H	1	155.2	-35.98	84	0.009

7 AC Mains Conducted Emissions - Transmitter

7.1 Method

Unless otherwise stated no deviations were made from FCC Part 15.207.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
18914	Single Phase LISN	EMCO	3816/NM	9408-1003	3/17/2016	3/17/2017
18729	Transient Limiter	Hewlett-Packard	11947A	3107A01975	5/11/2016	5/11/2017
DEN-073	EMI Receiver (10Hz – 26.5GHz)	RHODE & SCHWARZ	ESU 26	100265	12/19/2015	12/19/2016
CC1-001	50 Ohm Cable	Pasternak Enterprise	RG-223/U	N/A	5/23/2016	5/23/2017
260	Humidity and Temp. Pen	Extech Instruments	445580	958123	07/21/2016	07/21/2017

7.3 Test Requirement/ Specification:

The product must pass the AC Conducted average and quasi-peak Class B Limits defined in FCC Part 15.207. The product is operated with all radios enabled and active.

7.4 Test Procedure:

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at all frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.
The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.
The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

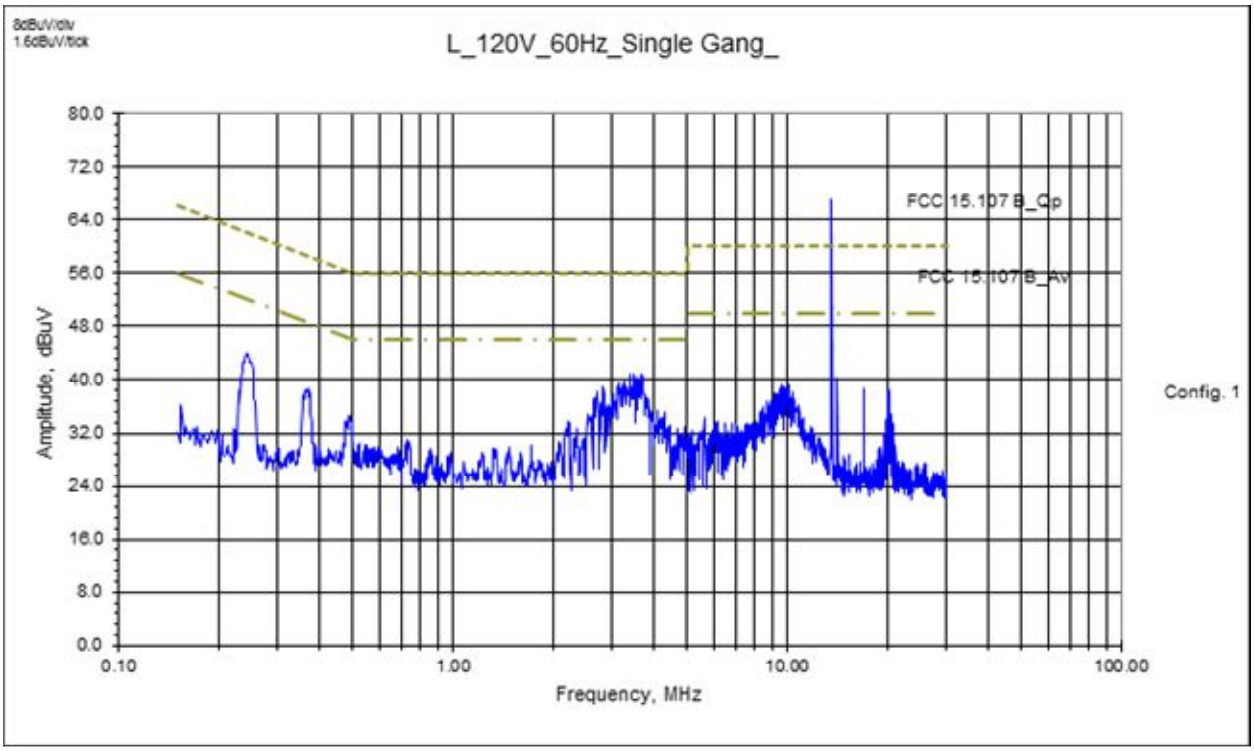
Equipment setup for conducted disturbance tests followed the guidelines of:

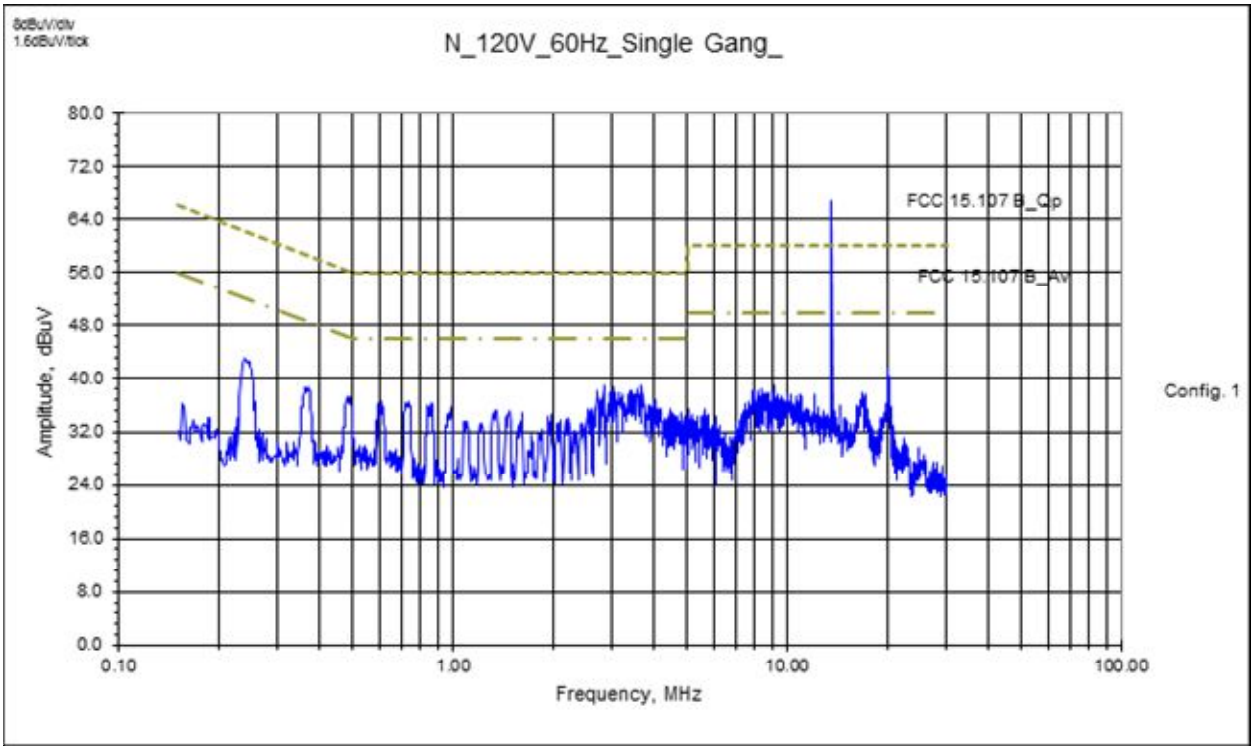
- ANSI C63.10: 2009, Section 6.2.

7.5 Test Results:

The sample tested was found to Comply.

7.6 Plots:


8dBuV/div
1.6dBuV/tick
L_120V_60Hz_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
0.10
1.00
10.00
100.00
Frequency, MHz
FCC 15.107 B_Qp
FCC 15.107 B_Av
Config. 1


8dBuV/div
1.6dBuV/tick
N_120V_60Hz_Single Gang_
80.0
72.0
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
Amplitude, dBuV
0.10
1.00
10.00
100.00
Frequency, MHz
FCC 15.107 B_Qp
FCC 15.107 B_Av
Config. 1

7.7 Test Data: AC Mains Conducted Emissions – Transmitter

Tx AC Conducted Electromagnetic Emissions

Test Report #:	G102752932	Test Area:	CC1 Conducted		Temperature:	24.3	C
Test Method:	FCC 15.207	Test Date:	10/27/2016		Relative Humidity:	18.2	%
EUT Model #:	RC-04-MCT-WK	EUT Power:	120V/60Hz (POE power supply)		Air Pressure:	838.5	kPa
EUT Serial #:	FCC Single Gang KP #1						
Manufacturer:	Isonas				Level Key		
EUT Description:	RFID Security Access Reader Controller				Pk - Peak	Nb - Narrow Band	
Notes:					Qp - QuasiPeak	Bb - Broad Band	
					Av - Average		

FREQ	LEVEL	DET	CABLE	LISN	PREAMP	ATTEN	FINAL	TEST POINT			DELTA1	DELTA2	RBW
MHz	dBuV	Qp Av Pk	+ [dB]	+ [dB/m]	- [dB]	+ [dB]	= [dBuV]	Other - N - L1 - L2 - L3			FCC 15.107 B_Qp	FCC 15.107 B_Av	(MHz)
L_120V_60Hz_			Single Gang_										
0.244	31.42	**Qp**	0.05	0.03	0.00	9.94	41.45		Line 1		- 20.50	NA	0.009
0.361	24.75	**Qp**	0.07	0.03	0.00	9.95	34.80		Line 1		- 23.90	NA	0.009
0.491	20.21	**Qp**	0.07	0.03	0.00	9.95	30.26		Line 1		- 25.90	NA	0.009
3.690	26.23	**Qp**	0.22	0.06	0.00	9.96	36.47		Line 1		- 19.53	NA	0.009
9.650	20.90	**Qp**	0.37	0.21	0.00	9.98	31.46		Line 1		- 28.54	NA	0.009
20.220	27.10	**Qp**	0.54	0.49	0.00	10.01	38.14		Line 1		- 21.86	NA	0.009
0.244	20.16	**Av**	0.05	0.03	0.00	9.94	30.19		Line 1		NA	- 21.76	0.009
0.361	17.39	**Av**	0.07	0.03	0.00	9.95	27.44		Line 1		NA	- 21.26	0.009
0.491	16.25	**Av**	0.07	0.03	0.00	9.95	26.30		Line 1		NA	- 19.86	0.009
3.690	14.40	**Av**	0.22	0.06	0.00	9.96	24.64		Line 1		NA	- 21.36	0.009
9.650	10.71	**Av**	0.37	0.21	0.00	9.98	21.27		Line 1		NA	- 28.73	0.009
20.220	26.46	**Av**	0.54	0.49	0.00	10.01	37.50		Line 1		NA	- 12.50	0.009
N_120V_60Hz_			Single Gang_										
0.241	29.85	**Qp**	0.05	0.03	0.00	9.94	39.88		Neutral		- 22.18	NA	0.009
0.368	26.23	**Qp**	0.07	0.03	0.00	9.95	36.28		Neutral		- 22.26	NA	0.009
0.491	24.32	**Qp**	0.07	0.03	0.00	9.95	34.37		Neutral		- 21.79	NA	0.009
0.858	23.14	**Qp**	0.09	0.04	0.00	9.97	33.24		Neutral		- 22.76	NA	0.009
2.996	23.61	**Qp**	0.19	0.06	0.00	9.96	33.82		Neutral		- 22.18	NA	0.009
19.931	27.89	**Qp**	0.54	0.48	0.00	10.01	38.92		Neutral		- 21.08	NA	0.009
0.241	23.96	**Av**	0.05	0.03	0.00	9.94	33.99		Neutral		NA	- 18.07	0.009
0.368	21.98	**Av**	0.07	0.03	0.00	9.95	32.03		Neutral		NA	- 16.51	0.009
0.491	20.74	**Av**	0.07	0.03	0.00	9.95	30.79		Neutral		NA	- 15.37	0.009
0.858	18.39	**Av**	0.09	0.04	0.00	9.97	28.49		Neutral		NA	- 17.51	0.009
2.996	8.36	**Av**	0.19	0.06	0.00	9.96	18.57		Neutral		NA	- 27.43	0.009
19.931	25.58	**Av**	0.54	0.48	0.00	10.01	36.61		Neutral		NA	- 13.39	0.009

8 Occupied Bandwidth (OBW) – RSS-GEN, Section 6.6

8.1 Method

Unless otherwise stated no deviations were made from RSS-GEN:2014, Section 6.6.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

8.2 Test Equipment Used:

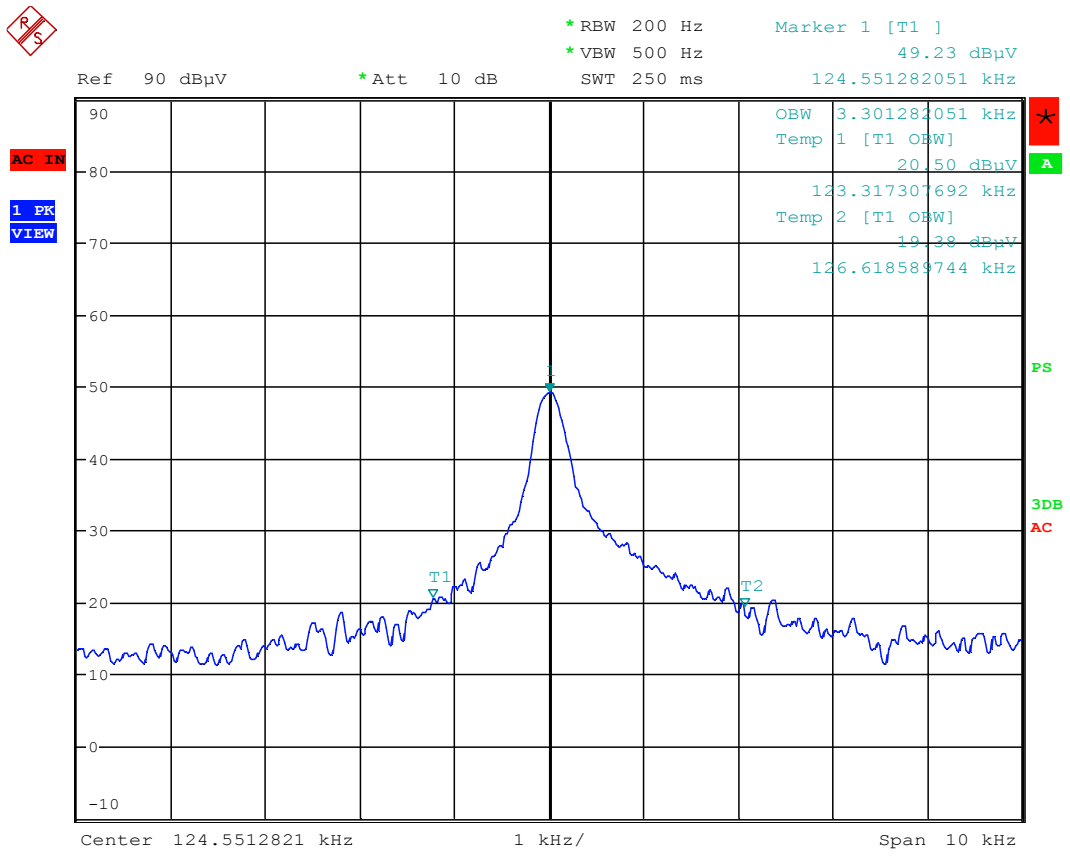
Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
19936	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-1	6/22/2016	6/22/2017
18897	Magnetic loop	EMCO	6502	9205-2738	11/12/2015	11/12/2016
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	HP	5	3/31/2016	3/31/2017
DEN-073	EMI Receiver (10Hz – 26.5GHz)	RHODE & SCHWARZ	ESU 26	100265	12/19/2015	12/19/2016
CC1-E2	Radiated Cable	Teledyne	90-206-300; PN:F-130-S1S1-100; 90-206-072;	E2-A; 5026702 002; E2-C; E2-D	11/17/2015	11/17/2016
260	Humidity and Temp. Pen	Extech Instruments	445580	958123	07/21/2016	07/21/2017

8.3 Results:

The product tested was found to comply.

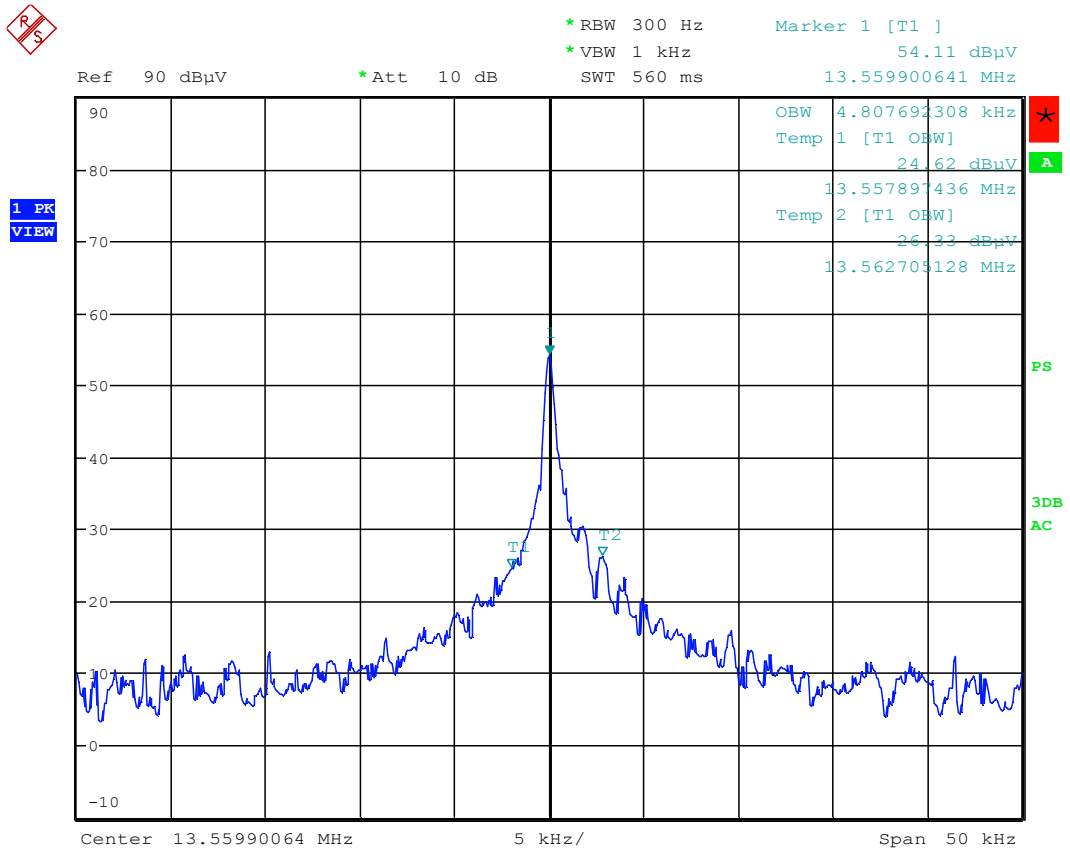
8.4 Final Plots:

Occupied Bandwidth - (RSS-GEN, Section 6.6) – 125kHz Tx



Date: 19.OCT.2016 15:32:59

Occupied Bandwidth - (RSS-GEN, Section 6.6) – 13.56MHz Tx



Date: 19.OCT.2016 15:35:04

Notes: Measured OBW for the Tx 125 kHz: 3.3kHz
Measured OBW for the Tx 13MHz: 4.8kHz

9 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty ±	Notes
Radiated emissions, 10kHz to 30 MHz	3.4 dB	
Radiated emissions, 30 to 200 MHz HP	2.2 dB	
Radiated emissions, 30 to 200 MHz VP	3.8 dB	
Radiated emissions, 200 to 1000 MHz HP	2.8 dB	
Radiated emissions, 200 to 1000 MHz VP	2.7 dB	
Radiated emissions, 1 to 18 GHz	5.2 dB	
Conducted port emissions 10kHz to 1000 MHz	1.0 dB	
Conducted port emissions 1 – 26.5 GHz	1.6 dB	
AC mains Conducted emissions, 9kHz to 30 MHz	3.14 dB	

10 Revision History

Revision Level	Date	Report Number	Notes
0	11/11/2016	102752932DEN-002	Original Issue