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Job Number:	1001466364
Project Number:	12CA04129A
File Number:	MC16433
Date:	June 15, 2012
Model:	LLC7310

Electromagnetic Compatibility Test Report

For

Philips Lighting Electronics N. A.

Test Report Details

Tests Performed By:	**UL LLC** **333 Pfingsten Rd.** **Northbrook, IL 60062**
Tests Performed For:	**Philips Lighting Electronics N. A.** **10275 West Higgins Road** **Rosemont, IL 60018**
Applicant Contact: Phone: E-mail:	**Richard Haring** **(847) 390-5195** **richard.haring@philips.com**
Test Report Date:	**June 15, 2012**
Product Type:	**Street Light Control Switch with wireless communication**
Product standards	**FCC Part 15, Subpart C, 15.247**
Model Number:	**LLC7310**
Sample Serial Number:	**Prototype**
EUT Category:	**Digital / Wireless Device**
Testing Start Date:	**March 28, 2012**
Date Testing Complete:	**June 12, 2012**
Overall Results:	**Compliant**

UL LLC reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL LLC shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL LLC issued reports. 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.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

Report Directory

Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
None			

1.0 G E N E R A L - Product Description

1.1 Equipment Description

The Equipment Under Test (EUT) is a commercial street lamp controller with 900MHz transceiver.

1.2 Device Configuration During Test

1.2.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	Light Controller	Philips	LLC7310	Tested mounted on representative fixture
AE	Light Fixture	Philips	Generic	None

Note: **EUT** - Equipment Under Test, **AE** - Auxiliary/Associated Equipment, or **SIM** - Simulator (Not Subjected to Test)

1.2.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC	N	N	None

Note:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

1.2.3 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	120	-	-	60Hz	1	None
2	277	-	-	60Hz	1	None
3	5	-	-	DC	1	None

1.3 EUT Configurations

Mode #	Description
1	EUT was setup on top of typical light fixture 80cm above the ground plane.
2	Transmitter board removed from the main body of the EUT and connected to 5VDC supply for testing.

1.4 EUT Operation Modes

Mode #	Description
1	EUT set to transmit continuously on either low, middle or high channels
2	EUT set to receive on a channel
3	EUT with no transmitter (transmitter set to sleep mode, the IC is powered down via software)

1.5 Rational for EUT Configuration

Mode #	Description
1	The selected EUT configuration was chosen to maximize emissions

2.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL LLC in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

2.1 Deviations from standard test methods

None

2.2 Device Modifications Necessary for Compliance

None

2.3 Reference Standards

Standard Number	Standard Name	Standard Date
FCC Part 15, Subpart C, 15.247	Code of Federal Regulations, Part 15, Radio Frequency Devices	2012
RSS-210	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment	Issue 8
FCC KDB558074 DTS Meas Gudence DR01		

2.4 Results Summary

This product is considered Class A

Requirement – Test	Result (Compliant / Non-Compliant)*
Mains Terminal - Conducted Emissions	Compliant
Radiated Emissions – Receiver Mode	Compliant
Spurious Emissions (Antenna Conducted and Radiated)	Compliant
Band Edge Compliance	Compliant
6dB Bandwidth Measurement	Compliant
Maximum Peak Output Power	Compliant
Power Spectral Density	Compliant
99% Power Bandwidth	N/A – Data Only

Test Engineer:

Bartlomiej Mucha (Ext.41216)
Staff Engineer
International EMC Services
Conformity Assessment Services

Reviewer:

Michael Ferrer(Ext.41312)
Senior Project Engineer
International EMC Services
Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 EMISSIONS TEST RESULTS

The emissions tests were performed according to following regulations:

---------- United States ----------

Code of Federal Regulations Title 47	Part 15, Subpart C, Radio Frequency Devices

---------- Canada ----------

Spectrum Management and Telecommunications Radio Standards Specification	License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150

Measurement Uncertainty

Test	Uncertainty
Conducted Emissions	0.9dB
Radiated Emissions	3.1dB

Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.1 Test Conditions and Results – MAINS TERMINAL – CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN. The EUT was placed approximately 80cm above horizontal ground plane and 40cm from the vertical ground plane (+/- 10%).

Basic Standard	47 CFR Part 15.107, 15.207 RSS-Gen 7.2.4	
UL LPG	80-EM-S0026	
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains

Limits - Class A

Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	79	66
0.5-30	73	60

Supplementary information: EUT is not for residential use therefore it will never be connected to public utility. All emissions recorded are product of the SMPS used within the device and are not product of the transmitter. Data below shows the transmitter circuit in three modes – sleep mode, receive mode, and transmit mode. In all cases, including the sleep mode (radio chip and circuits unpowered) the device only complies with class A limits and the transmitter does not have effect on the emissions.

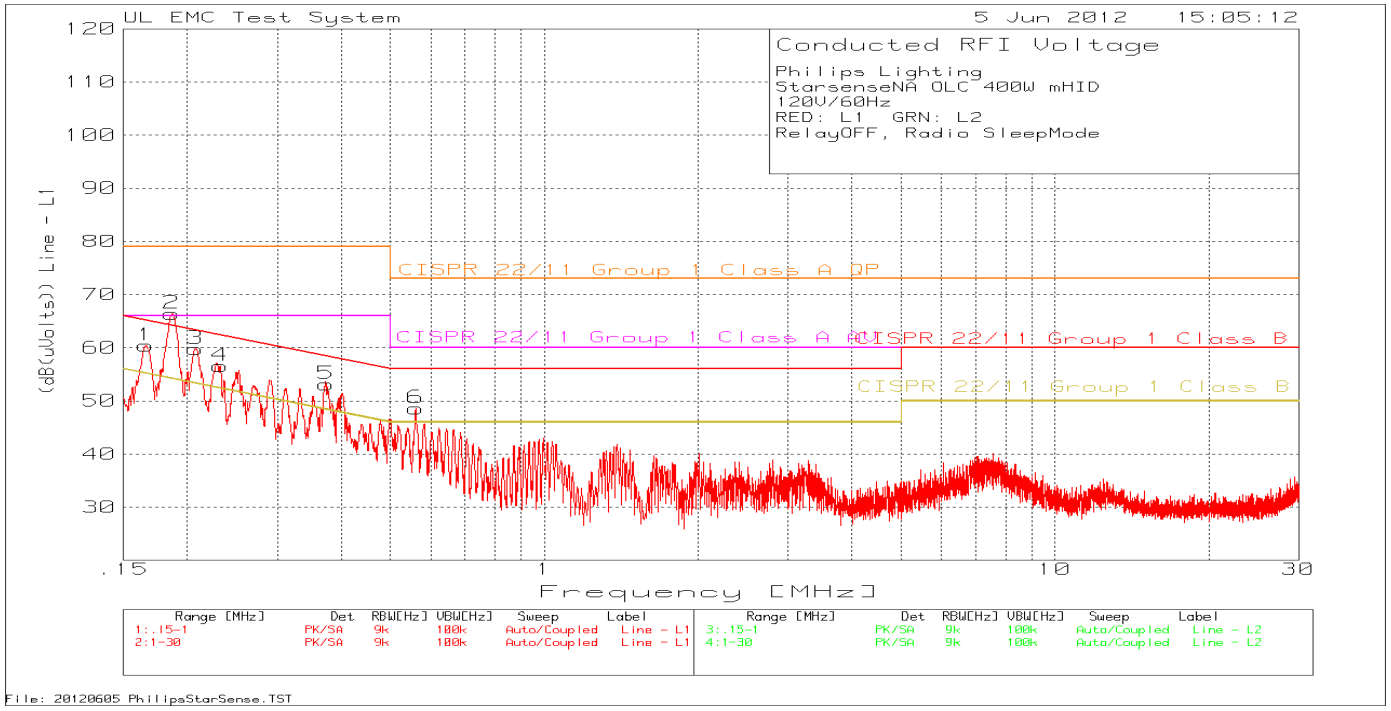
Table 1 Conducted Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1, 2, and 3
Supplementary information: None		

Table 2 Conducted Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	Dec 28 2011	Dec 31 2012
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
HighPass Filter	Solar Electronics	2803-150	885551	N/A	N/A
Attenuator	HP	8494B	2831A00838	N/A	N/A
LISN - L1	Solar	8602-50-TS-50-N	EMC4052	Jan 6 2012	Jan 6 2013
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	Jan 6 2012	Jan 6 2013
FILE USED FOR TESTING					
CISPR 22_11 w_ Dongle Line 1and2.TST					

Figure 1 Conducted Emissions Graph – Relay Off, Radio Sleep Mode



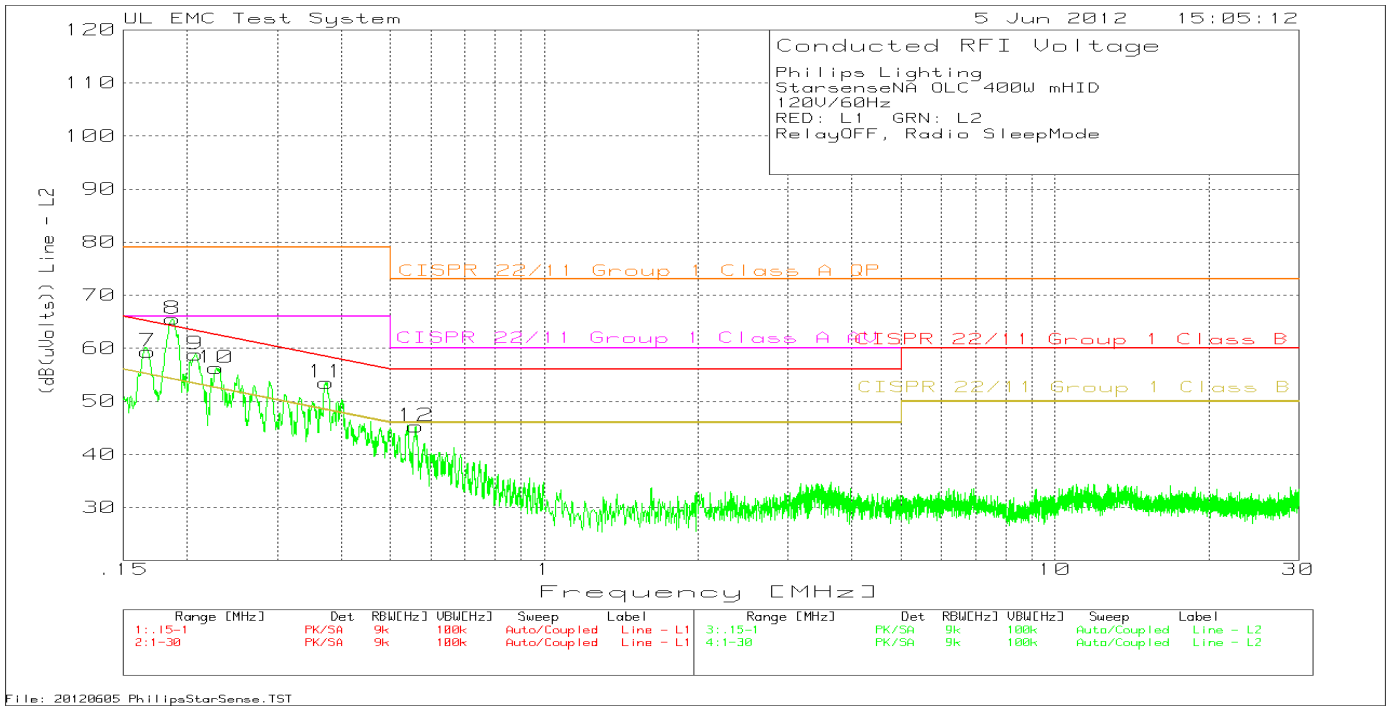


Table 3 Conducted Emissions Data Points – Relay Off, Radio Sleep Mode

Philips Lighting
StarsenseNA OLC 400W mHID
120V/60Hz
RED: L1 GRN: L2
RelayOFF, Radio SleepMode

No.	Test Frequency [MHz]	Meter Reading (dBuV)		Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line												
1	.16586	47.88	PK	.1	12.4	60.38	79	66	65.2	55.2	-	-
					Margin [dB]		-18.62	-5.62	-4.82	5.18	-	-
2	.18667	54.52	PK	.1	11.8	66.42	79	66	64.2	54.2	-	-
					Margin [dB]		-12.58	.42	2.22	12.22	-	-
3	.2079	48.31	PK	.1	11.4	59.81	79	66	63.3	53.3	-	-
					Margin [dB]		-19.19	-6.19	-3.49	6.51	-	-
4	.23183	45.24	PK	0	11.4	56.64	79	66	62.4	52.4	-	-
					Margin [dB]		-22.36	-9.36	-5.76	4.24	-	-
5	.37368	42.35	PK	0	10.8	53.15	79	66	58.4	48.4	-	-
					Margin [dB]		-25.85	-12.85	-5.25	4.75	-	-
6	.55999	38.03	PK	0	10.6	48.63	73	60	56	46	-	-
					Margin [dB]		-24.37	-11.37	-7.37	2.63	-	-
Netural												
7	.16756	46.92	PK	.1	12.4	59.42	79	66	65.1	55.1	-	-
					Margin [dB]		-19.58	-6.58	-5.68	4.32	-	-
8	.18709	53.65	PK	.1	11.8	65.55	79	66	64.2	54.2	-	-
					Margin [dB]		-13.45	-.45	1.35	11.35	-	-
9	.20805	47.26	PK	.1	11.5	58.86	79	66	63.3	53.3	-	-
					Margin [dB]		-20.14	-7.14	-4.44	5.56	-	-
10	.22801	44.76	PK	.1	11.4	56.26	79	66	62.5	52.5	-	-
					Margin [dB]		-22.74	-9.74	-6.24	3.76	-	-
11	.3751	42.78	PK	0	10.8	53.58	79	66	58.4	48.4	-	-
					Margin [dB]		-25.42	-12.42	-4.82	5.18	-	-
12	.55999	34.71	PK	0	10.6	45.31	73	60	56	46	-	-
					Margin [dB]		-27.69	-14.69	-10.69	-.69	-	-

StarsenseNA OLC 400W mHID
120V/60Hz
RED: L1 GRN: L2
RelayOFF, Radio SleepMode

Test Frequency [MHz]	Meter Reading (dBuV)		Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line											
.16616	45.88	QP	.1	12.4	58.38	79	66	65.15	55.15	-	-
				Margin [dB]:		-20.62	-7.62	-6.77	3.23	-	-
.18665	52.86	QP	.1	11.8	64.76	79	66	64.18	54.18	-	-
				Margin [dB]:		-14.24	-1.24	.58	10.58	-	-
.20741	47.74	QP	.1	11.4	59.24	79	66	63.31	53.31	-	-
				Margin [dB]:		-19.76	-6.76	-4.07	5.93	-	-
.22957	43.92	QP	.1	11.4	55.42	79	66	62.47	52.47	-	-
				Margin [dB]:		-23.58	-10.58	-7.05	2.95	-	-
.37363	38.75	QP	0	10.8	49.55	79	66	58.42	48.42	-	-
				Margin [dB]:		-29.45	-16.45	-8.87	1.13	-	-
.55965	33.05	QP	0	10.6	43.65	73	60	56	46	-	-
				Margin [dB]:		-29.35	-16.35	-12.35	-2.35	-	-
Neutral											
.16601	45.45	QP	.1	12.4	57.95	79	66	65.16	55.16	-	-
				Margin [dB]:		-21.05	-8.05	-7.21	2.79	-	-
.18657	52	QP	.1	11.8	63.9	79	66	64.19	54.19	-	-
				Margin [dB]:		-15.1	-2.1	-.29	9.71	-	-
.20731	46.51	QP	.1	11.5	58.11	79	66	63.31	53.31	-	-
				Margin [dB]:		-20.89	-7.89	-5.2	4.8	-	-
.22813	43.14	QP	.1	11.4	54.64	79	66	62.52	52.52	-	-
				Margin [dB]:		-24.36	-11.36	-7.88	2.12	-	-
.37378	38.71	QP	0	10.8	49.51	79	66	58.42	48.42	-	-
				Margin [dB]:		-29.49	-16.49	-8.91	1.09	-	-
.56007	29.35	QP	0	10.6	39.95	73	60	56	46	-	-
				Margin [dB]:		-33.05	-20.05	-16.05	-6.05	-	-

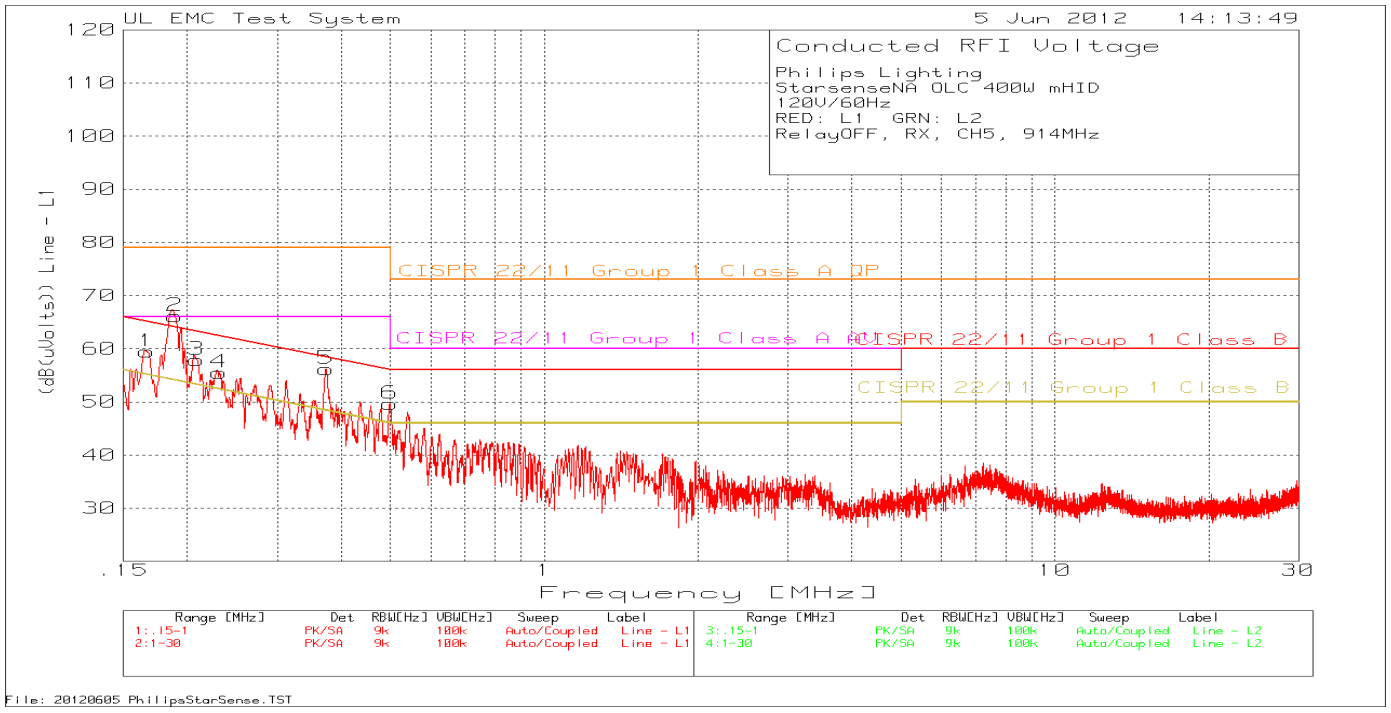
Test Frequency [MHz]	Meter Reading (dBuV)		Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line											
.16616	39.06	Av	.1	12.4	51.56	79	66	65.15	55.15	-	-
				Margin [dB]:		-27.44	-14.44	-13.59	-3.59	-	-
.18665	46.86	Av	.1	11.8	58.76	79	66	64.18	54.18	-	-
				Margin [dB]:		-20.24	-7.24	-5.42	4.58	-	-
.20741	41.85	Av	.1	11.4	53.35	79	66	63.31	53.31	-	-
				Margin [dB]:		-25.65	-12.65	-9.96	.04	-	-
.22957	38.44	Av	.1	11.4	49.94	79	66	62.47	52.47	-	-
				Margin [dB]:		-29.06	-16.06	-12.53	-2.53	-	-
.37363	24.89	Av	0	10.8	35.69	79	66	58.42	48.42	-	-
				Margin [dB]:		-43.31	-30.31	-22.73	-12.73	-	-
.55965	29.22	Av	0	10.6	39.82	73	60	56	46	-	-
				Margin [dB]:		-33.18	-20.18	-16.18	-6.18	-	-
Neutral											
.16601	38.06	Av	.1	12.4	50.56	79	66	65.16	55.16	-	-
				Margin [dB]:		-28.44	-15.44	-14.6	-4.6	-	-
.18657	45.41	Av	.1	11.8	57.31	79	66	64.19	54.19	-	-
				Margin [dB]:		-21.69	-8.69	-6.88	3.12	-	-
.20731	40.08	Av	.1	11.5	51.68	79	66	63.31	53.31	-	-
				Margin [dB]:		-27.32	-14.32	-11.63	-1.63	-	-
.22813	37.08	Av	.1	11.4	48.58	79	66	62.52	52.52	-	-
				Margin [dB]:		-30.42	-17.42	-13.94	-3.94	-	-
.37378	23.03	Av	0	10.8	33.83	79	66	58.42	48.42	-	-
				Margin [dB]:		-45.17	-32.17	-24.59	-14.59	-	-
.56007	21.88	Av	0	10.6	32.48	73	60	56	46	-	-
				Margin [dB]:		-40.52	-27.52	-23.52	-13.52	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

PK - Peak detector
QP - Quasi-Peak detector
Av - average detection

LIMIT 1: CISPR 22/11 Group 1 Class A QP
LIMIT 2: CISPR 22/11 Group 1 Class A AV
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

Figure 2 Conducted Emissions Graph – Relay Off, Radio RX mode, Ch5



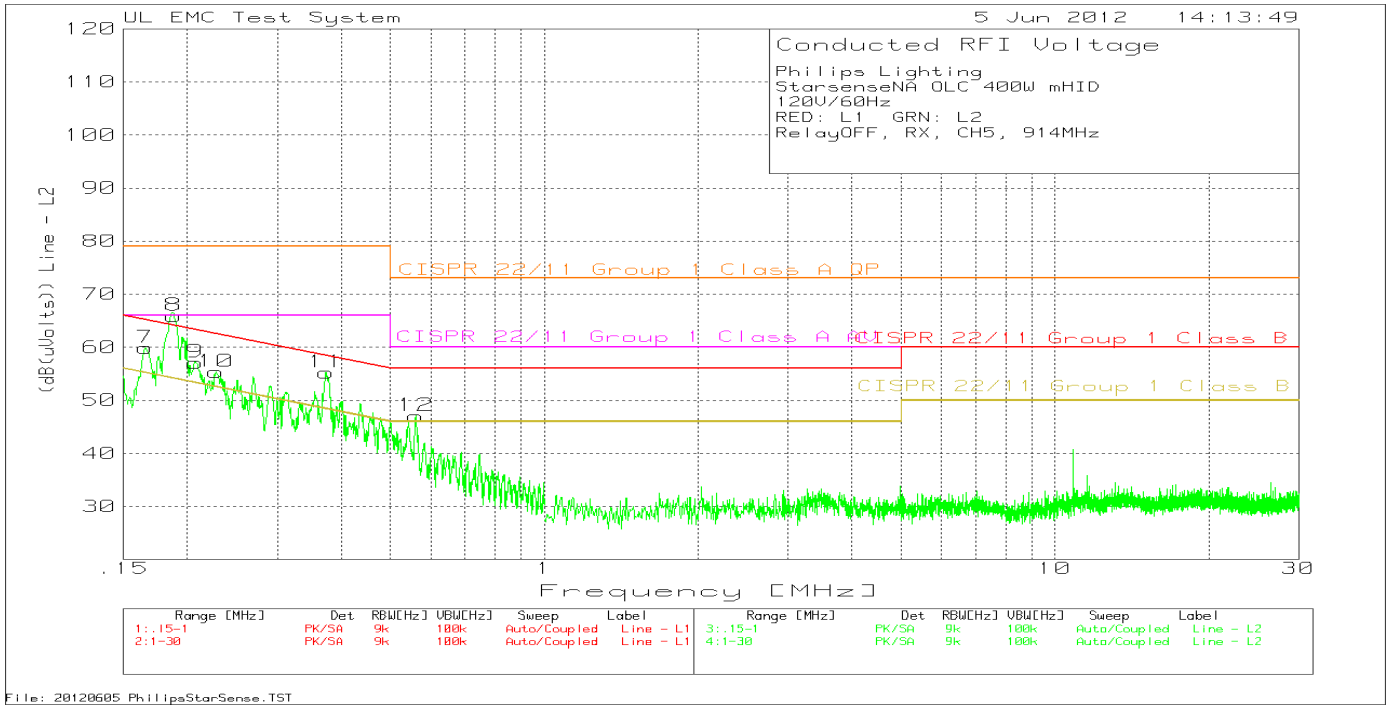


Table 4 Conducted Emissions Data Points – Relay Off, Radio RX mode, Ch5

Philips Lighting
StarsenseNA OLC 400W mHID
120V/60Hz
RED: L1 GRN: L2
RelayOFF, RX, CH5, 914MHz

No.	Test Frequency [MHz]	Meter Reading (dBuV)		Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line 1												
1	.16671	46.96	PK	.1	12.4	59.46	79	66	65.1	55.1	-	-
					Margin [dB]		-19.54	-6.54	-5.64	4.36	-	-
2	.18936	54.41	PK	.1	11.7	66.21	79	66	64.1	54.1	-	-
					Margin [dB]		-12.79	.21	2.11	12.11	-	-
3	.20889	46.38	PK	.1	11.4	57.88	79	66	63.2	53.2	-	-
					Margin [dB]		-21.12	-8.12	-5.32	4.68	-	-
4	.23112	44.17	PK	0	11.4	55.57	79	66	62.4	52.4	-	-
					Margin [dB]		-23.43	-10.43	-6.83	3.17	-	-
5	.37368	45.35	PK	0	10.8	56.15	79	66	58.4	48.4	-	-
					Margin [dB]		-22.85	-9.85	-2.25	7.75	-	-
6	.49855	38.88	PK	.1	10.7	49.68	79	66	56	46	-	-
					Margin [dB]		-29.32	-16.32	-6.32	3.68	-	-
Neutral												
7	.16557	47.26	PK	.1	12.5	59.86	79	66	65.2	55.2	-	-
					Margin [dB]		-19.14	-6.14	-5.34	4.66	-	-
8	.18851	54.02	PK	.1	11.8	65.92	79	66	64.1	54.1	-	-
					Margin [dB]		-13.08	-.08	1.82	11.82	-	-
9	.20805	45.48	PK	.1	11.5	57.08	79	66	63.3	53.3	-	-
					Margin [dB]		-21.92	-8.92	-6.22	3.78	-	-
10	.22758	43.83	PK	.1	11.4	55.33	79	66	62.5	52.5	-	-
					Margin [dB]		-23.67	-10.67	-7.17	2.83	-	-
11	.37368	44.41	PK	0	10.8	55.21	79	66	58.4	48.4	-	-
					Margin [dB]		-23.79	-10.79	-3.19	6.81	-	-
12	.55999	36.46	PK	0	10.6	47.06	73	60	56	46	-	-
					Margin [dB]		-25.94	-12.94	-8.94	1.06	-	-

Philips Lighting
StarsenseNA OLC 400W mHID
120V/60Hz
RED: L1 GRN: L2
RelayOFF, RX, CH5, 914MHz

Test Frequency [MHz]	Meter Reading (dBuV)	Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line - L1 .15 - 1MHz										
.16651	45.04 QP	.1	12.4	57.54	79	66	65.13	55.13	-	-
			Margin [dB]:		-21.46	-8.46	-7.59	2.41	-	-
.18714	53.88 QP	.1	11.8	65.78	79	66	64.16	54.16	-	-
			Margin [dB]:		-13.22	-.22	1.62	11.62	-	-
.20776	46.07 QP	.1	11.4	57.57	79	66	63.29	53.29	-	-
			Margin [dB]:		-21.43	-8.43	-5.72	4.28	-	-
.22892	41.87 QP	.1	11.4	53.37	79	66	62.49	52.49	-	-
			Margin [dB]:		-25.63	-12.63	-9.12	.88	-	-
.37358	40.45 QP	0	10.8	51.25	79	66	58.42	48.42	-	-
			Margin [dB]:		-27.75	-14.75	-7.17	2.83	-	-
.49799	34.66 QP	0	10.7	45.36	79	66	56.03	46.03	-	-
			Margin [dB]:		-33.64	-20.64	-10.67	-.67	-	-
Line - L2 .15 - 1MHz										
.16641	44.5 QP	.1	12.4	57	79	66	65.14	55.14	-	-
			Margin [dB]:		-22	-9	-8.14	1.86	-	-
.18701	52.82 QP	.1	11.8	64.72	79	66	64.17	54.17	-	-
			Margin [dB]:		-14.28	-1.28	.55	10.55	-	-
.20746	44.93 QP	.1	11.5	56.53	79	66	63.31	53.31	-	-
			Margin [dB]:		-22.47	-9.47	-6.78	3.22	-	-
.22815	40.77 QP	.1	11.4	52.27	79	66	62.52	52.52	-	-
			Margin [dB]:		-26.73	-13.73	-10.25	-.25	-	-
.37354	40.07 QP	0	10.8	50.87	79	66	58.42	48.42	-	-
			Margin [dB]:		-28.13	-15.13	-7.55	2.45	-	-
.56039	30.11 QP	0	10.6	40.71	73	60	56	46	-	-
			Margin [dB]:		-32.29	-19.29	-15.29	-5.29	-	-

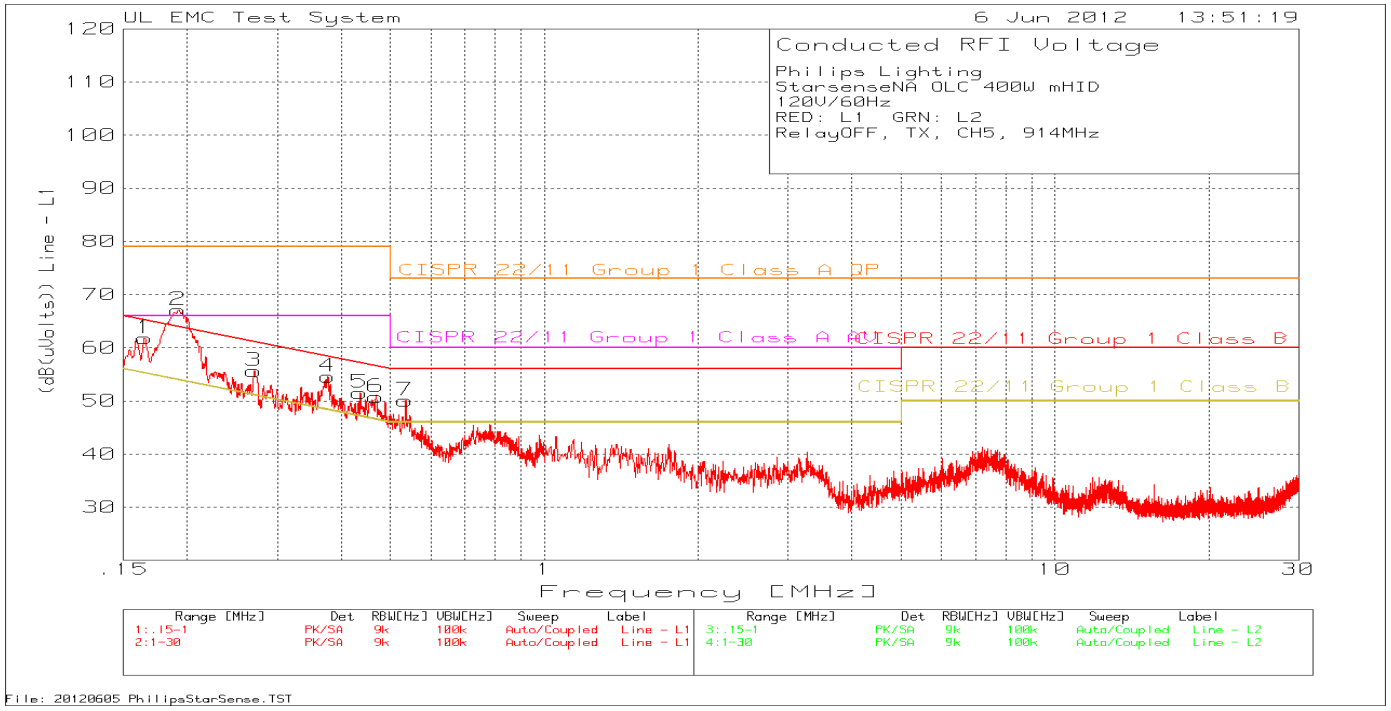
Test Frequency [MHz]	Meter Reading (dBuV)	Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line 1										
.16651	37.39 Av	.1	12.4	49.89	79	66	65.13	55.13	-	-
			Margin [dB]:		-29.11	-16.11	-15.24	-5.24	-	-
.18714	47.98 Av	.1	11.8	59.88	79	66	64.16	54.16	-	-
			Margin [dB]:		-19.12	-6.12	-4.28	5.72	-	-
.20776	39.94 Av	.1	11.4	51.44	79	66	63.29	53.29	-	-
			Margin [dB]:		-27.56	-14.56	-11.85	-1.85	-	-
.22892	35.68 Av	.1	11.4	47.18	79	66	62.49	52.49	-	-
			Margin [dB]:		-31.82	-18.82	-15.31	-5.31	-	-
.37358	24.91 Av	0	10.8	35.71	79	66	58.42	48.42	-	-
			Margin [dB]:		-43.29	-30.29	-22.71	-12.71	-	-
.49799	29.14 Av	0	10.7	39.84	79	66	56.03	46.03	-	-
			Margin [dB]:		-39.16	-26.16	-16.19	-6.19	-	-
Neutral										
.16641	36.28 Av	.1	12.4	48.78	79	66	65.14	55.14	-	-
			Margin [dB]:		-30.22	-17.22	-16.36	-6.36	-	-
.18701	46.35 Av	.1	11.8	58.25	79	66	64.17	54.17	-	-
			Margin [dB]:		-20.75	-7.75	-5.92	4.08	-	-
.20746	38.26 Av	.1	11.5	49.86	79	66	63.31	53.31	-	-
			Margin [dB]:		-29.14	-16.14	-13.45	-3.45	-	-
.22815	33.89 Av	.1	11.4	45.39	79	66	62.52	52.52	-	-
			Margin [dB]:		-33.61	-20.61	-17.13	-7.13	-	-
.37354	22.76 Av	0	10.8	33.56	79	66	58.42	48.42	-	-
			Margin [dB]:		-45.44	-32.44	-24.86	-14.86	-	-
.56039	22.21 Av	0	10.6	32.81	73	60	56	46	-	-
			Margin [dB]:		-40.19	-27.19	-23.19	-13.19	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

PK - Peak detector
QP - Quasi-Peak detector
Av - average detection

LIMIT 1: CISPR 22/11 Group 1 Class A QP
LIMIT 2: CISPR 22/11 Group 1 Class A AV
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

Figure 3 Conducted Emissions Graph – Relay Off, Radio TX mode, Ch5



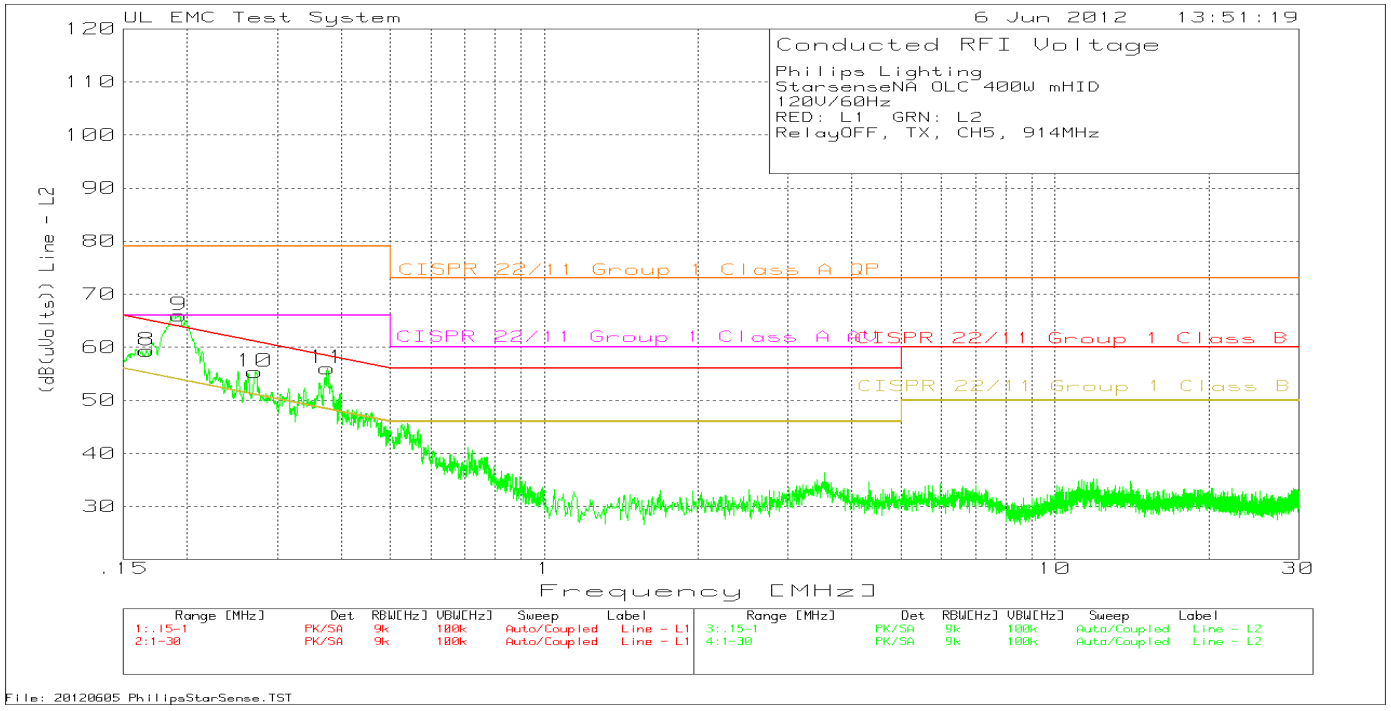


Table 5 Conducted Emissions Data Points – Relay Off, Radio TX mode, Ch5

Philips Lighting
StarsenseNA OLC 400W mHID
120V/60Hz
RED: L1 GRN: L2
RelayOFF, TX, CH5, 914MHz

No.	Test Frequency [MHz]	Meter Reading (dBuV)		Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line - L1												
1	.16515	49.33	PK	.1	12.4	61.83	79	66	65.2	55.2	-	-
					Margin [dB]		-17.17	-4.17	-3.37	6.63	-	-
2	.19219	55.44	PK	.1	11.6	67.14	79	66	63.9	53.9	-	-
					Margin [dB]		-11.86	1.14	3.24	13.24	-	-
3	.27062	44.52	PK	0	11.1	55.62	79	66	61.1	51.1	-	-
					Margin [dB]		-23.38	-10.38	-5.48	4.52	-	-
4	.37708	43.84	PK	0	10.8	54.64	79	66	58.3	48.3	-	-
					Margin [dB]		-24.36	-11.36	-3.66	6.34	-	-
5	.43612	40.89	PK	0	10.7	51.59	79	66	57.1	47.1	-	-
					Margin [dB]		-27.41	-14.41	-5.51	4.49	-	-
6	.4691	40.09	PK	0	10.7	50.79	79	66	56.5	46.5	-	-
					Margin [dB]		-28.21	-15.21	-5.71	4.29	-	-
7	.53536	39.48	PK	0	10.6	50.08	73	60	56	46	-	-
					Margin [dB]		-22.92	-9.92	-5.92	4.08	-	-
Line - L2												
8	.16642	46.92	PK	.1	12.4	59.42	79	66	65.1	55.1	-	-
					Margin [dB]		-19.58	-6.58	-5.68	4.32	-	-
9	.19276	54.37	PK	.1	11.6	66.07	79	66	63.9	53.9	-	-
					Margin [dB]		-12.93	.07	2.17	12.17	-	-
10	.27175	44.24	PK	.1	11.1	55.44	79	66	61.1	51.1	-	-
					Margin [dB]		-23.56	-10.56	-5.66	4.34	-	-
11	.37609	45.25	PK	0	10.8	56.05	79	66	58.4	48.4	-	-
					Margin [dB]		-22.95	-9.95	-2.35	7.65	-	-

LIMIT 1: CISPR 22/11 Group 1 Class A QP
LIMIT 2: CISPR 22/11 Group 1 Class A AV
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

PK - Peak detector

Philips Lighting
StarsenseNA OLC 400W mHID
120V/60Hz
RED: L1 GRN: L2
RelayOFF, TX, CH5, 914MHz

Test Frequency [MHz]	Meter Reading (dBuV)	Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line - L1										
.16624	43.57 QP	.1	12.4	56.07	79	66	65.15	55.15	-	-
			Margin [dB]:		-22.93	-9.93	-9.08	.92	-	-
.18994	52.97 QP	.1	11.7	64.77	79	66	64.04	54.04	-	-
			Margin [dB]:		-14.23	-1.23	.73	10.73	-	-
.26975	38.31 QP	0	11.1	49.41	79	66	61.13	51.13	-	-
			Margin [dB]:		-29.59	-16.59	-11.72	-1.72	-	-
.37568	39.13 QP	0	10.8	49.93	79	66	58.37	48.37	-	-
			Margin [dB]:		-29.07	-16.07	-8.44	1.56	-	-
.43709	34.48 QP	0	10.7	45.18	79	66	57.12	47.12	-	-
			Margin [dB]:		-33.82	-20.82	-11.94	-1.94	-	-
.46769	33.07 QP	0	10.7	43.77	79	66	56.55	46.55	-	-
			Margin [dB]:		-35.23	-22.23	-12.78	-2.78	-	-
.53628	31.29 QP	0	10.6	41.89	73	60	56	46	-	-
			Margin [dB]:		-31.11	-18.11	-14.11	-4.11	-	-
Line - L2										
.1676	43.27 QP	.1	12.4	55.77	79	66	65.08	55.08	-	-
			Margin [dB]:		-23.23	-10.23	-9.31	.69	-	-
.19084	51.59 QP	.1	11.7	63.39	79	66	64	54	-	-
			Margin [dB]:		-15.61	-2.61	-.61	9.39	-	-
.27144	37.98 QP	.1	11.1	49.18	79	66	61.07	51.07	-	-
			Margin [dB]:		-29.82	-16.82	-11.89	-1.89	-	-
.37541	38.2 QP	0	10.8	49	79	66	58.38	48.38	-	-
			Margin [dB]:		-30	-17	-9.38	.62	-	-

Test Frequency [MHz]	Meter Reading (dBuV)	Transducer Factor [dB]	Gain/Loss Factor [dB]	Level (dB(uVolts))	Limit:1	2	3	4	5	6
Line - L1										
.16624	33.93 Av	.1	12.4	46.43	79	66	65.15	55.15	-	-
			Margin [dB]:		-32.57	-19.57	-18.72	-8.72	-	-
.18994	44.61 Av	.1	11.7	56.41	79	66	64.04	54.04	-	-
			Margin [dB]:		-22.59	-9.59	-7.63	2.37	-	-
.26975	25.81 Av	0	11.1	36.91	79	66	61.13	51.13	-	-
			Margin [dB]:		-42.09	-29.09	-24.22	-14.22	-	-
.37568	25.62 Av	0	10.8	36.42	79	66	58.37	48.37	-	-
			Margin [dB]:		-42.58	-29.58	-21.95	-11.95	-	-
.43709	27.19 Av	0	10.7	37.89	79	66	57.12	47.12	-	-
			Margin [dB]:		-41.11	-28.11	-19.23	-9.23	-	-
.46769	24.17 Av	0	10.7	34.87	79	66	56.55	46.55	-	-
			Margin [dB]:		-44.13	-31.13	-21.68	-11.68	-	-
.53628	23.93 Av	0	10.6	34.53	73	60	56	46	-	-
			Margin [dB]:		-38.47	-25.47	-21.47	-11.47	-	-
Line - L2										
.1676	32.98 Av	.1	12.4	45.48	79	66	65.08	55.08	-	-
			Margin [dB]:		-33.52	-20.52	-19.6	-9.6	-	-
.19084	42.65 Av	.1	11.7	54.45	79	66	64	54	-	-
			Margin [dB]:		-24.55	-11.55	-9.55	.45	-	-
.27144	24.28 Av	.1	11.1	35.48	79	66	61.07	51.07	-	-
			Margin [dB]:		-43.52	-30.52	-25.59	-15.59	-	-
.37541	22.71 Av	0	10.8	33.51	79	66	58.38	48.38	-	-
			Margin [dB]:		-45.49	-32.49	-24.87	-14.87	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

LIMIT 1: CISPR 22/11 Group 1 Class A QP
LIMIT 2: CISPR 22/11 Group 1 Class A AV
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

PK - Peak detector
QP - Quasi-Peak detector
Av - Average detector

4.2 Test Conditions and Results – RADIATED EMISSIONS Receiver Mode

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter or 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	FCC Part 15, Subpart B		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 13GHz	(10 meter or 3 meter)	

Limits - Class A

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30-88	39.08	NA
88-216	43.52	NA
216-960	46.44	NA
960-1000	49.54	NA
Above 1GHz	NA	60 (at 3-meter)

Limits - Class B

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30-88	29.54	NA
88-216	33.06	NA
216-960	35.56	NA
960-1000	43.52	NA
Above 1GHz	NA	54 (at 3-meter)

Supplementary information: EUT is considered class A device with unlicensed transmitter. There are no emissions related to transmitter/receiver recorded in the frequency range. Below 1GHz all emissions are product of the main EUT SMPS. Above 1GHz there were no emissions.

Table 6 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	2
Supplementary information: None		

Table 7 Radiated Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20111228	20121231
Bicon Antenna	Chase	VBA6106A	EMC4078	20120117	20130131
Log-P Antenna	Chase	UPA6109	EMC4313	20110929	20120629
Spectrum Analyzer	Rhode & Schwarz	FSEK	EMC4182	20111227	20121231
Antenna Array	UL	BOMS	EMC4276	20111227	20121231

Figure 4 Radiated Emissions Graph 30MHz – 1GHz, Relay Off, RX Mode, Ch5

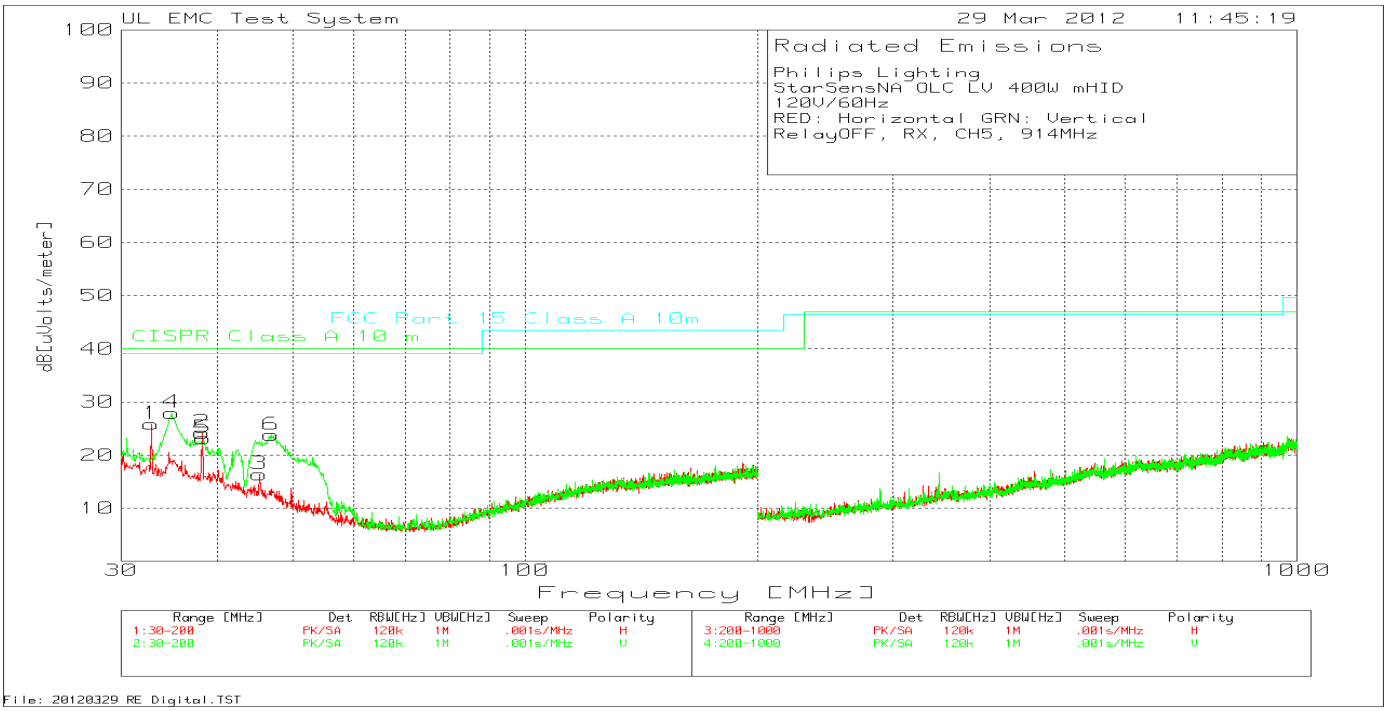


Table 8 Radiated Emissions Data Points 30MHz – 1GHz, Relay Off, RX Mode, Ch5

Philips Lighting
StarSensNA OLC LV 400W mHID
120V/60Hz
RED: Horizontal GRN: Vertical
RelayOFF, RX, CH5, 914MHz

Test Frequency	Meter Reading	Detector	Antenna Factor dB	Path Loss/Gain Factor dB	Level dBuV/m	CISPR Class A 10 m	Margin	FCC Part 15 Class A 10m	Margin	Height [cm]	Polarity
32.8036	38.38	PK	16.9	-29.4	25.88	40	-14.12	39.1	-13.22	400	Horz
38.1559	38.69	PK	14.8	-29.3	24.19	40	-15.81	39.1	-14.91	400	Horz
45.2924	33.78	PK	12	-29.4	16.38	40	-23.62	39.1	-22.72	400	Horz
34.8426	41.26	PK	16.1	-29.4	27.96	40	-12.04	39.1	-11.14	99	Vert
38.3258	37.92	PK	14.7	-29.4	23.22	40	-16.78	39.1	-15.88	99	Vert
46.9065	41.77	PK	11.3	-29.3	23.77	40	-16.23	39.1	-15.33	99	Vert

PK - Peak detector

Figure 5 Radiated Emissions Graph 30MHz – 1GHz, Relay On, RX Mode, Ch5

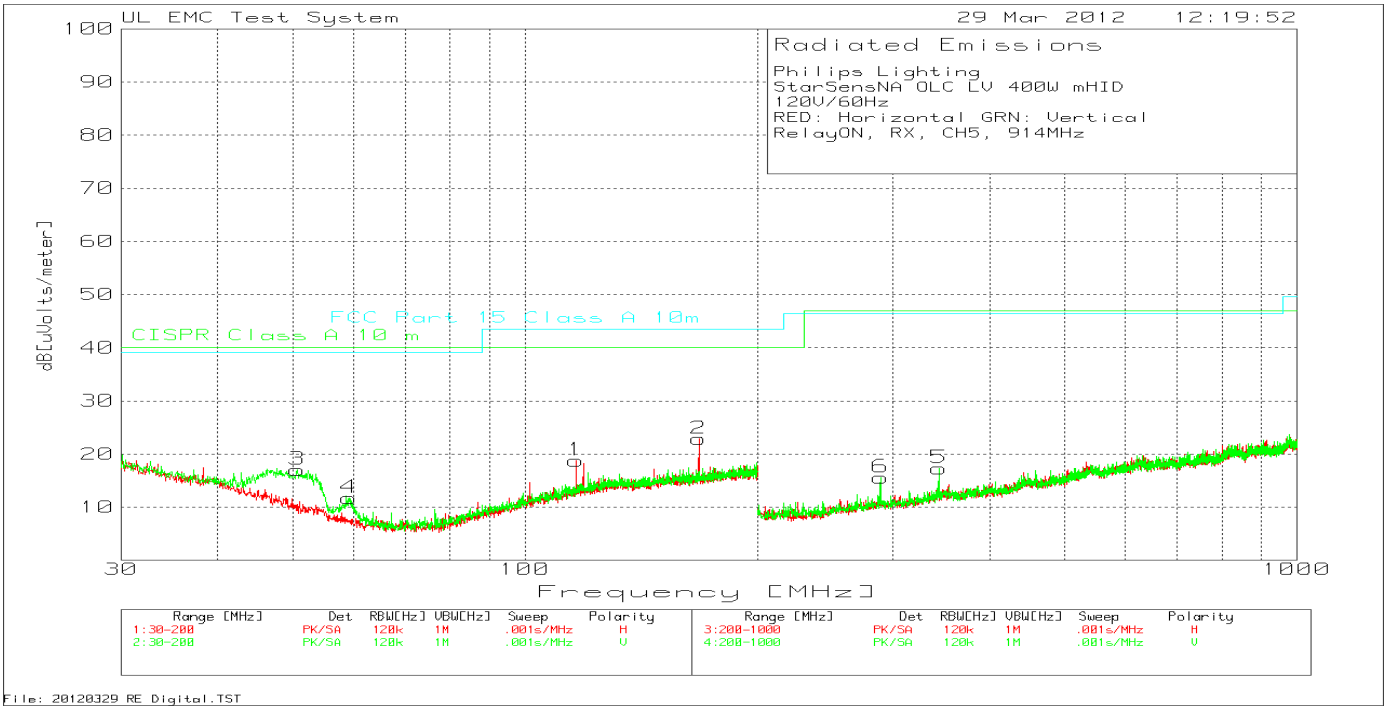


Table 9 Radiated Emissions Data Points 30MHz – 1GHz, Relay On, RX Mode, Ch5

Philips Lighting
StarSensNA OLC LV 400W mHID
120V/60Hz
RED: Horizontal GRN: Vertical
RelayON, RX, CH5, 914MHz

Test Frequency	Meter Reading	Detector	Antenna Factor dB	Path Loss/Gain Factor dB	Level dBuV/m	CISPR Class A 10 m	Margin	FCC Part 15 Class A 10m	Margin	Height [cm]	Polarity
116.5717	35.32	PK	12.9	-29.4	18.82	40	-21.18	43.5	-24.68	399	Horz
167.971	36.74	PK	15.3	-29.2	22.84	40	-17.16	43.5	-20.66	399	Horz
50.6447	36.63	PK	9.7	-29.3	17.03	40	-22.97	39.1	-22.07	99	Vert
59.1404	34.15	PK	7	-29.4	11.75	40	-28.25	39.1	-27.35	249	Vert
343.6376	35.47	PK	14.5	-32.6	17.37	47	-29.63	46.4	-29.03	99	Vert
288.7408	35.6	PK	12.9	-32.9	15.6	47	-31.4	46.4	-30.8	99	Vert

PK - Peak detector

4.3 Test Conditions and Results – SPURIOUS EMISSIONS (Antenna Conducted and Radiated)

Test Description	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section15.205(c)).

Basic Standard	47 CFR Part 15.247(d) RSS-210, A8.5 RSS-Gen 7.2.5

	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	10 meter distance and / or antenna port
Fully configured sample scanned over the following frequency range	1GHz – 10GHz	3 meter distance and / or antenna port

Limits (Antenna Conducted)

All emissions must be 20dB below the level of the fundamental frequency.

Limits (Radiated – Restricted Bands Only)

Frequency (MHz)	Limit (dBµV/m)		
	Quasi-Peak	Average	
	General Emissions	Fundamental	Spurious
30 – 88	29.54	-	-
88 – 216	33.06	-	-
216-960	35.56	-	-
960-1000	43.52	-	-
1,000-25,000	-	-	54

Supplementary information: The device is designed to operate between 120V to 277V AC. Because of the possibility of high leakage current onto the antenna port all antenna port measurements were conducted with the transmitter board removed from the main board. The transmitter board was powered with 5VDC supply (regulated voltage provided by main board). As confirmation that input voltage to the main board does not change the power level of the fundamental frequency the fundamental frequency filed strength was measured. The data shows very small differences between the field strength readings. In addition all emissions other than the fundamental in frequency range from 30MHz to 1GHz are product of the main EUT and not the transmit / receive board.

Table 10 SPURIOUS EMISSIONS EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	1
Supplementary information: None		

Table 11 SPURIOUS CONDUCTED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E7405A	19695	20120201	20120228
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	*N/A	N/A
* Cable and attenuator ware characterized at the time of testing					

Table 12 SPURIOUS RADIATED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	20111228	20121231
Bicon Antenna	Chase	VBA6106A	EMC4078	20120117	20130131
Log-P Antenna	Chase	UPA6109	EMC4313	20110929	20120629
Spectrum Analyzer	Rhode & Schwartz	FSEK	EMC4182	20111227	20121231
Antenna Array	UL	BOMS	EMC4276	20111227	20121231

Table 13 Fundamental Field Strength Measurements at various input voltages (for reference only).

Fundamental Field Strength Measurements at 120V60Hz					
Test Frequency MHz	Meter Reading dBuV/m	Detector	Atenna Factor dB	Path Loss/Gain dB	Level dBuV/m
913.892808	92.02	QP	22.8	-31.7	83.12
913.892808	93.79	PK	22.8	-31.7	84.89
913.892808	100.14	QP	22.8	-31.7	91.24
913.892808	101.89	PK	22.8	-31.7	92.99
906.073718	94	QP	23.1	-31.7	85.4
906.073718	95.24	PK	23.1	-31.7	86.64
906.073718	101.07	QP	23.1	-31.7	92.47
906.073718	102.31	PK	23.1	-31.7	93.71
924.139423	92.78	QP	22.7	-31.7	83.78
924.139423	93.95	PK	22.7	-31.7	84.95
924.137821	98.87	QP	22.7	-31.7	89.87
924.137821	100.04	PK	22.7	-31.7	91.04

Fundamental Filed Strength Measurements at 277V60Hz					
Test Frequency MHz	Meter Reading dBuV/m	Detector	Atenna Factor dB	Path Loss/Gain dB	Level dBuV/m
914.129641	92.57	QP	22.8	-31.7	83.67
914.129641	94.04	PK	22.8	-31.7	85.14
914.129641	99.99	QP	22.8	-31.7	91.09
914.129641	101.44	PK	22.8	-31.7	92.54
905.900641	93.07	QP	23.1	-31.7	84.47
905.900641	94.87	PK	23.1	-31.7	86.27
905.900641	100	QP	23.1	-31.7	91.4
905.900641	101.8	PK	23.1	-31.7	93.2
923.884615	92.32	QP	22.7	-31.7	83.32
923.884615	93.87	PK	22.7	-31.7	84.87
923.884615	99.37	QP	22.7	-31.7	90.37
923.884615	100.94	PK	22.7	-31.7	91.94

PK - Peak detector
QP - Quasi-Peak detector

Figure 6 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode, Low Channel.

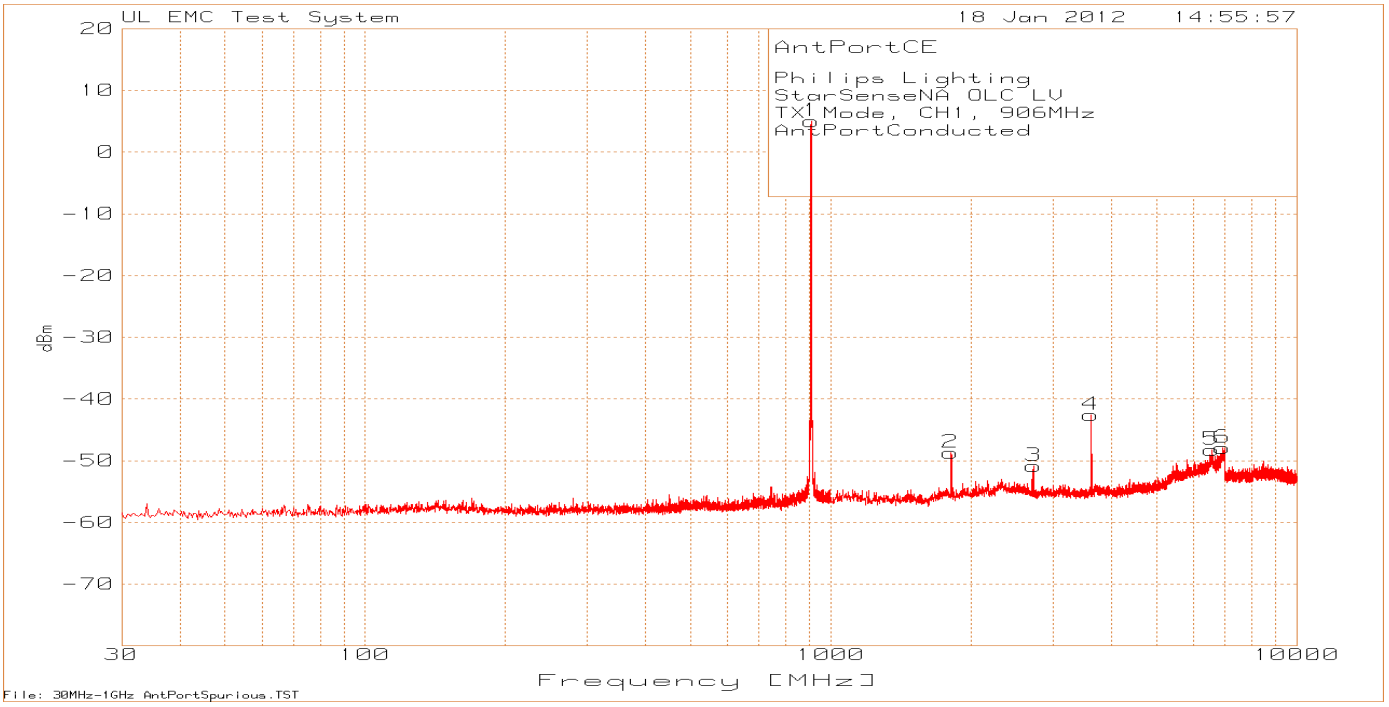


Table 14 Antenna Port Conducted Spurious Emissions 30MHz - 10GHz, Low Channel

Test Frequency	Meter Reading	Detector	dBuV to dBm [dB]	25MHz-10GHz CF dB.TXT [dB]	Level dBm
906.2989	101.33	PK	-107	10.7	5.03
1810.18	47.36	PK	-107	10.9	-48.74
2718.382	45.04	PK	-107	11.1	-50.86
3624.583	53.06	PK	-107	11.4	-42.54
6555.234	46.85	PK	-107	11.9	-48.25
6943.321	47.06	PK	-107	12	-47.94

PK - Peak detector

Figure 7 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode Middle Channel.

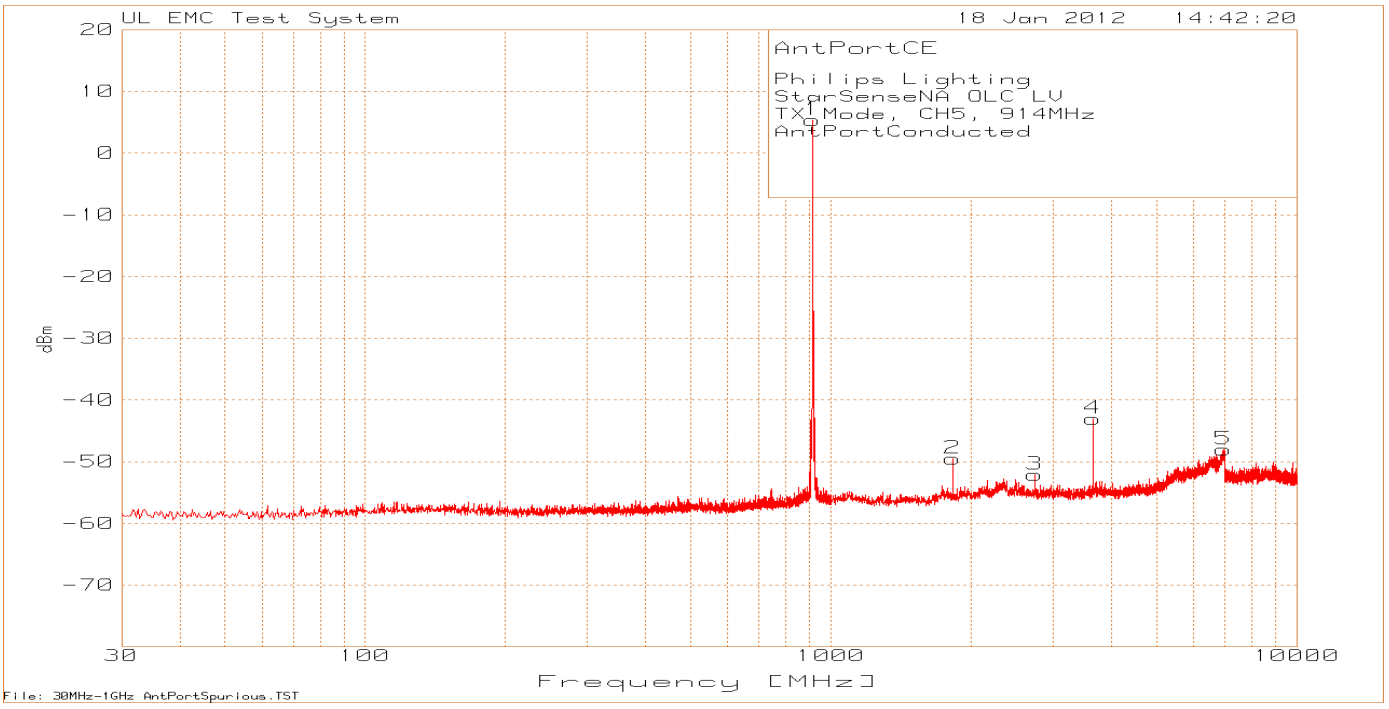


Table 15 Antenna Port Conducted Spurious Emissions 30MHz - 10GHz, Middle Channel

Test Frequency	Meter Reading	Detector	dBuV to dBm [dB]	25MHz-10GHz CF dB.TXT [dB]	Level dBm
913.7839	101.69	PK	-107	10.7	5.39
1826.184	46.65	PK	-107	10.9	-49.45
2742.387	43.71	PK	-107	11.2	-52.09
3656.59	52.7	PK	-107	11.3	-43
6983.33	46.95	PK	-107	12	-48.05

PK - Peak detector

Figure 8 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode High Channel.

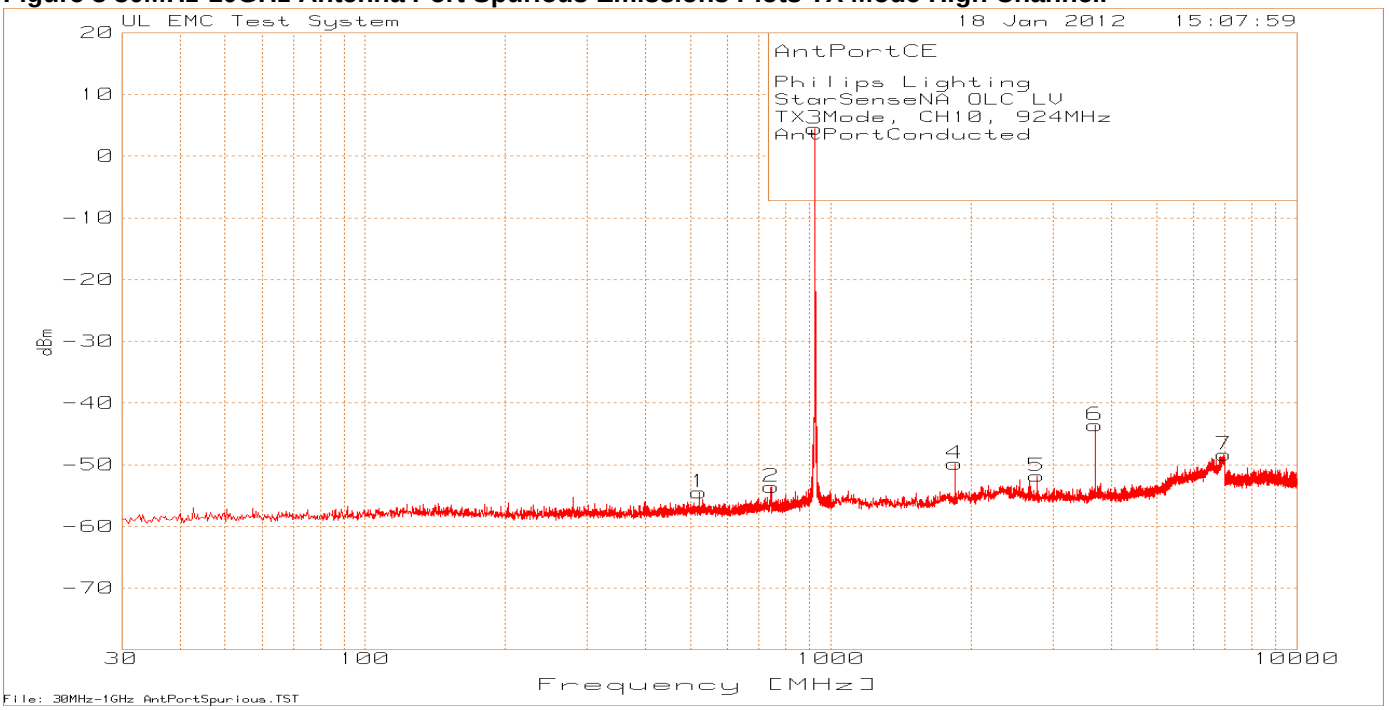


Table 16 Antenna Port Conducted Spurious Emissions 30MHz - 10GHz, High Channel

Test Frequency	Meter Reading	Detector	dBuV to dBm [dB]	25MHz-10GHz CF dB.TXT [dB]	Level dBm
520.9603	42.01	PK	-107	10.5	-54.49
743.8468	42.86	PK	-107	10.6	-53.54
924.3184	100.79	PK	-107	10.7	4.49
1846.188	46.3	PK	-107	10.9	-49.8
2770.393	44.09	PK	-107	11.1	-51.81
3696.599	52.06	PK	-107	11.3	-43.64
6987.331	46.62	PK	-107	12	-48.38

PK - Peak detector

Figure 9 Radiated Spurious Emissions below 1GHz, Low Channel

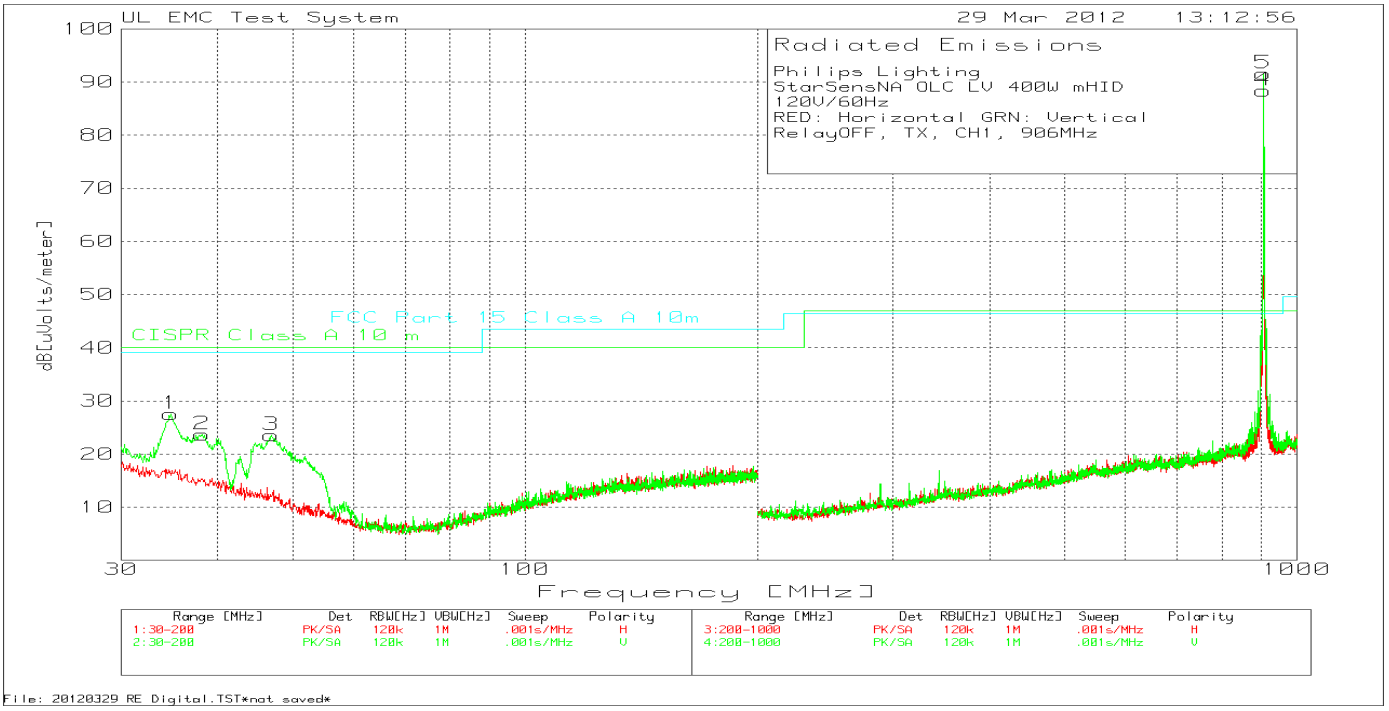


Figure 10 Radiated Spurious Emissions above 1GHz, Low Channel

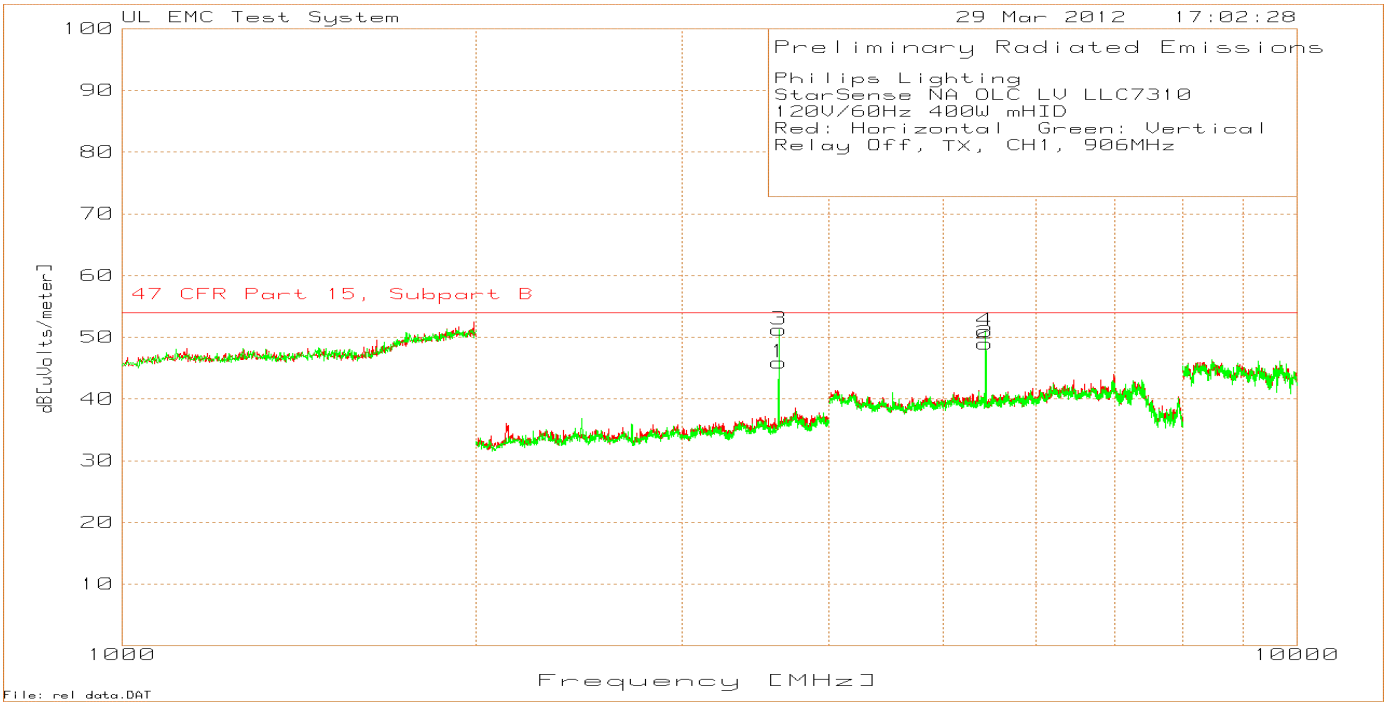


Table 17 Radiated Spurious Emissions below 1GHz, Low Channel

Philips Lighting
StarSensNA OLC LV 400W mHID
120V/60Hz
RED: Horizontal GRN: Vertical
RelayOFF, TX, CH1, 906MHz

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
34.7576	40.85	PK	16.1	-29.4	27.55	29.54	-1.99	101	Vert
38.1559	38.2	PK	14.8	-29.3	23.7	29.54	-5.84	101	Vert
46.9065	41.53	PK	11.3	-29.3	23.53	29.54	-6.01	101	Vert
906.1959	97	PK	23.1	-31.7	88.4	-	-	99	Horz
905.9294	100.23	PK	23.1	-31.7	91.63	-	-	199	Vert

PK - Peak detector

Table 18 Radiated Spurious Emissions above 1GHz, Low Channel

Philips Lighting
StarSense NA OLC LV LLC7310
120V/60Hz 400W mHID
Red: Horizontal Green: Vertical
Relay Off, TX, CH1, 906MHz

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
3625.626	73.68	PK	23.3	-51.07	45.91	54	-8.09	100	Horz
5435.624	71.63	PK	28	-50.6	49.03	54	-4.97	100	Horz
3625.626	78.98	PK	23.3	-51.07	51.21	54	-2.79	100	Vert
5435.624	73.58	PK	28	-50.6	50.98	54	-3.02	150	Vert

Maximized Peak and Average readings

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
5435.7325	73.1	PK	28	-50.59	50.51	74	-23.49	49	100	Horz
5435.9489	64.01	LnAv	28	-50.59	41.42	54	-12.58	49	100	Horz
3624.1283	80.39	PK	23.3	-51.12	52.57	74	-21.43	97	111	Vert
3624.0621	78.49	LnAv	23.3	-51.12	50.67	54	-3.33	97	111	Vert
5435.9469	71.99	PK	28	-50.59	49.4	74	-24.6	128	100	Vert
5436.013	63.01	LnAv	28	-50.59	40.42	54	-13.58	128	100	Vert

PK - Peak detector
LnAv - Linear Average detector

Figure 11 Radiated Spurious Emissions below 1GHz, Middle Channel

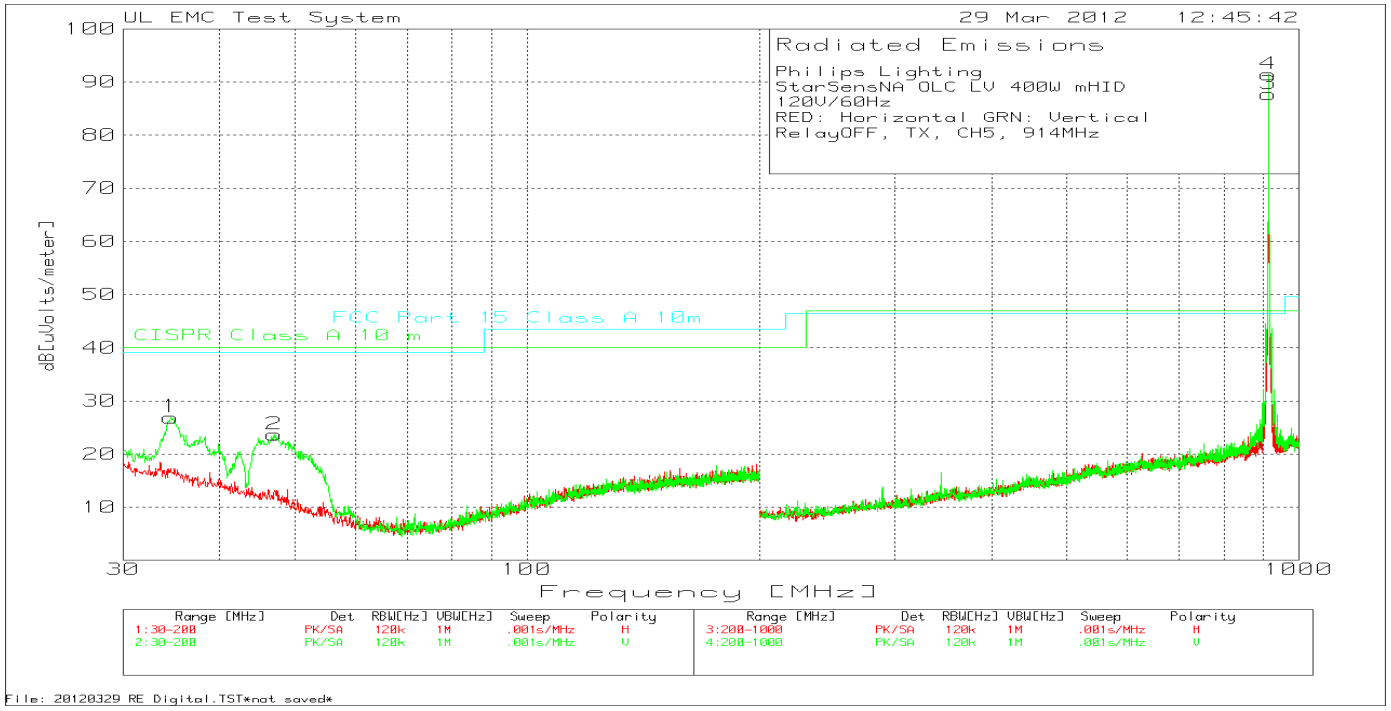


Figure 12 Radiated Spurious Emissions above 1GHz, Middle Channel

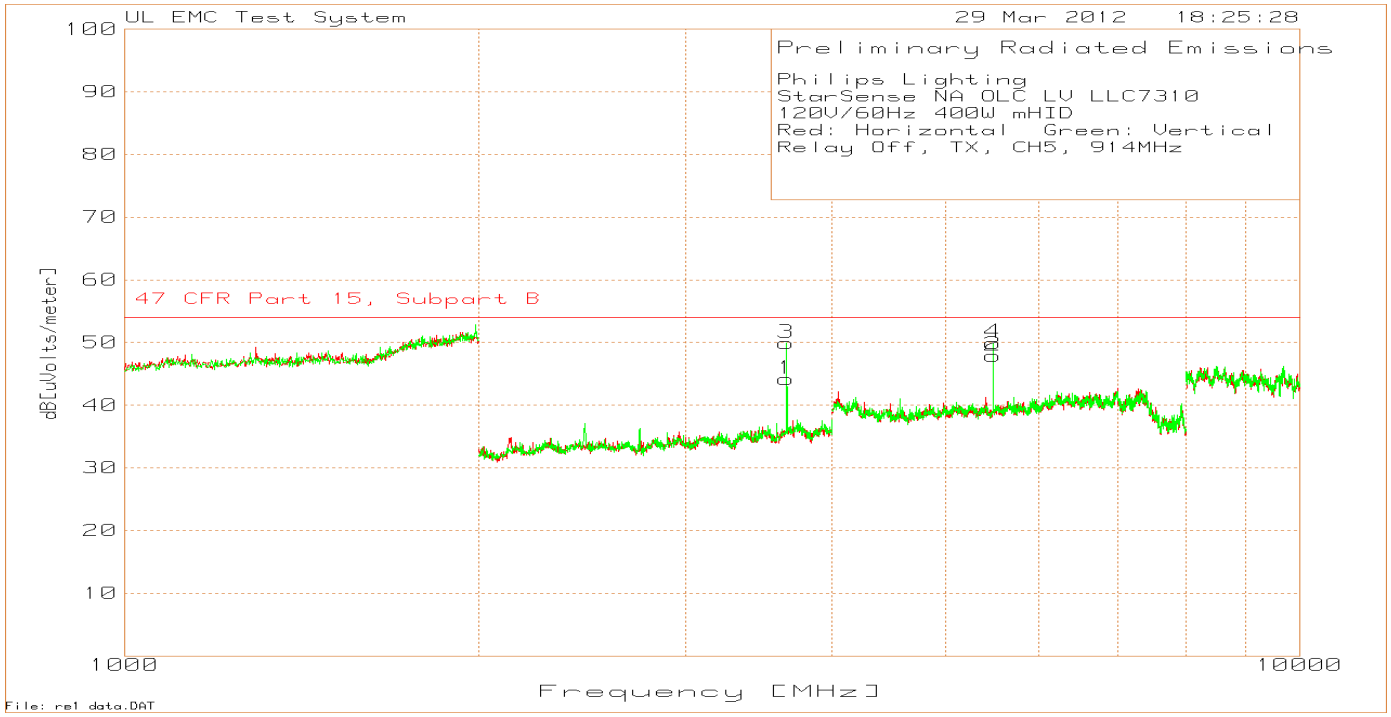


Table 19 Radiated Spurious Emissions below 1GHz, Middle Channel

Philips Lighting
StarSensNA OLC LV 400W mHID
120V/60Hz
RED: Horizontal GRN: Vertical
RelayOFF, TX, CH5, 914MHz

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
34.5027	40.05	PK	16.2	-29.4	26.85	29.54	-2.69	101	Vert
47.0765	41.64	PK	11.3	-29.3	23.64	29.54	-5.9	101	Vert
914.1905	96.78	PK	22.8	-31.8	87.78	-	-	99	Horz
914.1905	100.41	PK	22.8	-31.8	91.41	-	-	199	Vert

PK - Peak detector

Table 20 Radiated Spurious Emissions above 1GHz, Middle Channel

Philips Lighting
StarSense NA OLC LV LLC7310
120V/60Hz 400W mHID
Red: Horizontal Green: Vertical
Relay Off, TX, CH5, 914MHz

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
3657.658	71.31	PK	23.4	-50.5	44.21	54	-9.79	100	Horz
5483.656	70.38	PK	28.1	-50.52	47.96	54	-6.04	100	Horz
3657.658	77.03	PK	23.4	-50.5	49.93	54	-4.07	101	Vert
5483.656	72.4	PK	28.1	-50.52	49.98	54	-4.02	150	Vert

Maximized Peak and Average measurements

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
3656.1533	79.29	PK	23.4	-50.5	52.19	74	-21.81	99	110	Vert
3656.0571	77.29	LnAv	23.4	-50.51	50.18	54	-3.82	99	110	Vert
5483.9148	73.39	PK	28.1	-50.52	50.97	74	-23.03	9	150	Vert
5483.987	65.46	LnAv	28.1	-50.52	43.04	54	-10.96	9	150	Vert

PK - Peak detector
LnAv - Linear Average detector

Figure 13 Radiated Spurious Emissions below 1GHz, High Channel

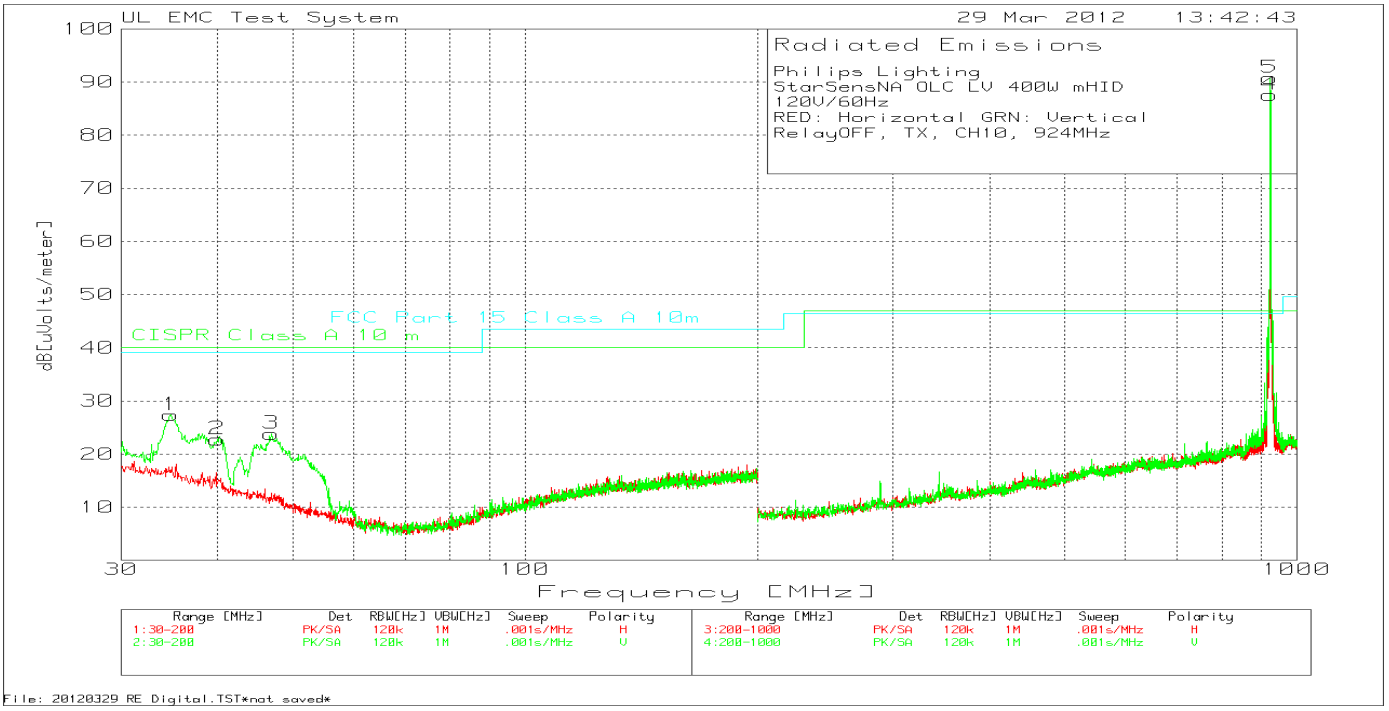


Figure 14 Radiated Spurious Emissions above 1GHz, High Channel

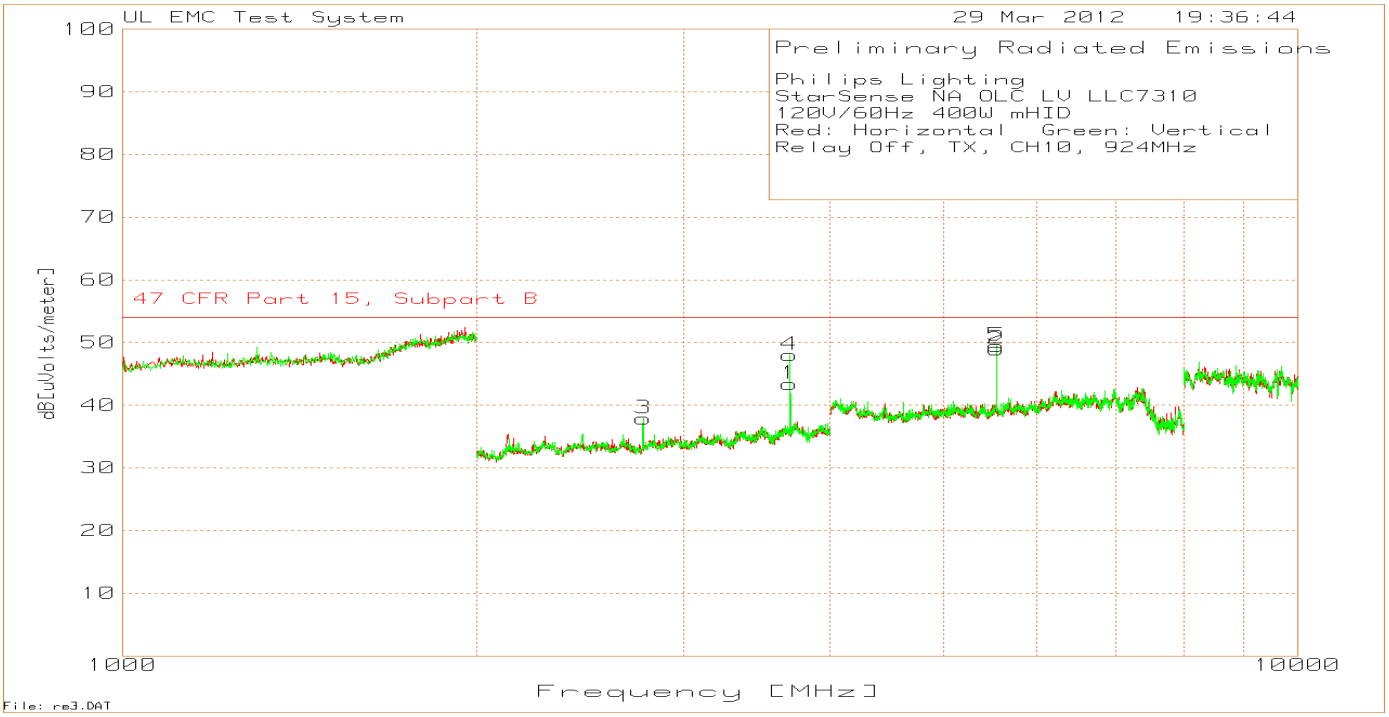


Table 21 Radiated Spurious Emissions below 1GHz, High Channel

Philips Lighting
StarSensNA OLC LV 400W mHID
120V/60Hz
RED: Horizontal GRN: Vertical
RelayOFF, TX, CH10, 924MHz

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
34.7576	40.65	PK	16.1	-29.4	27.35	29.54	-2.19	101	Vert
39.94	37.96	PK	14.1	-29.3	22.76	29.54	-6.78	101	Vert
46.9915	41.83	PK	11.3	-29.3	23.83	29.54	-5.71	101	Vert
924.0506	96.59	PK	22.7	-31.7	87.59	-	-	99	Horz
924.0506	99.75	PK	22.7	-31.7	90.75	-	-	199	Vert

PK - Peak detector

Table 22 Radiated Spurious Emissions above 1GHz, High Channel

Philips Lighting
StarSense NA OLC LV LLC7310
120V/60Hz 400W mHID
Red: Horizontal Green: Vertical
Relay Off, TX, CH10, 924MHz

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
3697.698	70.65	PK	23.5	-50.78	43.37	54	-10.63	99	Horz
5545.03	71.13	PK	28.3	-50.45	48.98	54	-5.02	100	Horz
2772.773	67.63	PK	22.2	-51.94	37.89	54	-16.11	101	Vert
3697.698	75.27	PK	23.5	-50.78	47.99	54	-6.01	101	Vert
5545.03	71.59	PK	28.3	-50.45	49.44	54	-4.56	150	Vert

Maximized Peak and Average Measurements

Test Frequency	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss/Gain dB	Level dBuV/m	Limit dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
5543.9509	72.84	PK	28.3	-50.42	50.72	74	-23.28	47	100	Horz
5544.1433	64.55	LnAv	28.3	-50.43	42.42	54	-11.58	47	100	Horz
3695.9409	77.63	PK	23.5	-50.76	50.37	74	-23.63	101	109	Vert
3696.0671	75.3	LnAv	23.5	-50.76	48.04	54	-5.96	101	109	Vert
5543.9409	72.82	PK	28.3	-50.42	50.7	74	-23.3	291	148	Vert
5544.1032	64.63	LnAv	28.3	-50.43	42.5	54	-11.5	291	148	Vert

PK - Peak detector
LnAv - Linear Average detector

4.4 Test Conditions and Results – BAND EDGE COMPLIANCE

Test Description	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section15.205(c)).

Basic Standard	47 CFR Part 15.247(d) RSS-210, A8.5	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	902MHz – 928MHz	Antenna Conducted

Limits	
Measurement Type	
Conducted	Antenna Conducted – 20dB below the fundamental
Radiated	Must meet the restricted band limit adjacent to the bandedge.
Supplementary information: Radiated Tests are not conducted since there is no restricted bands close to the fundamental frequency range.	

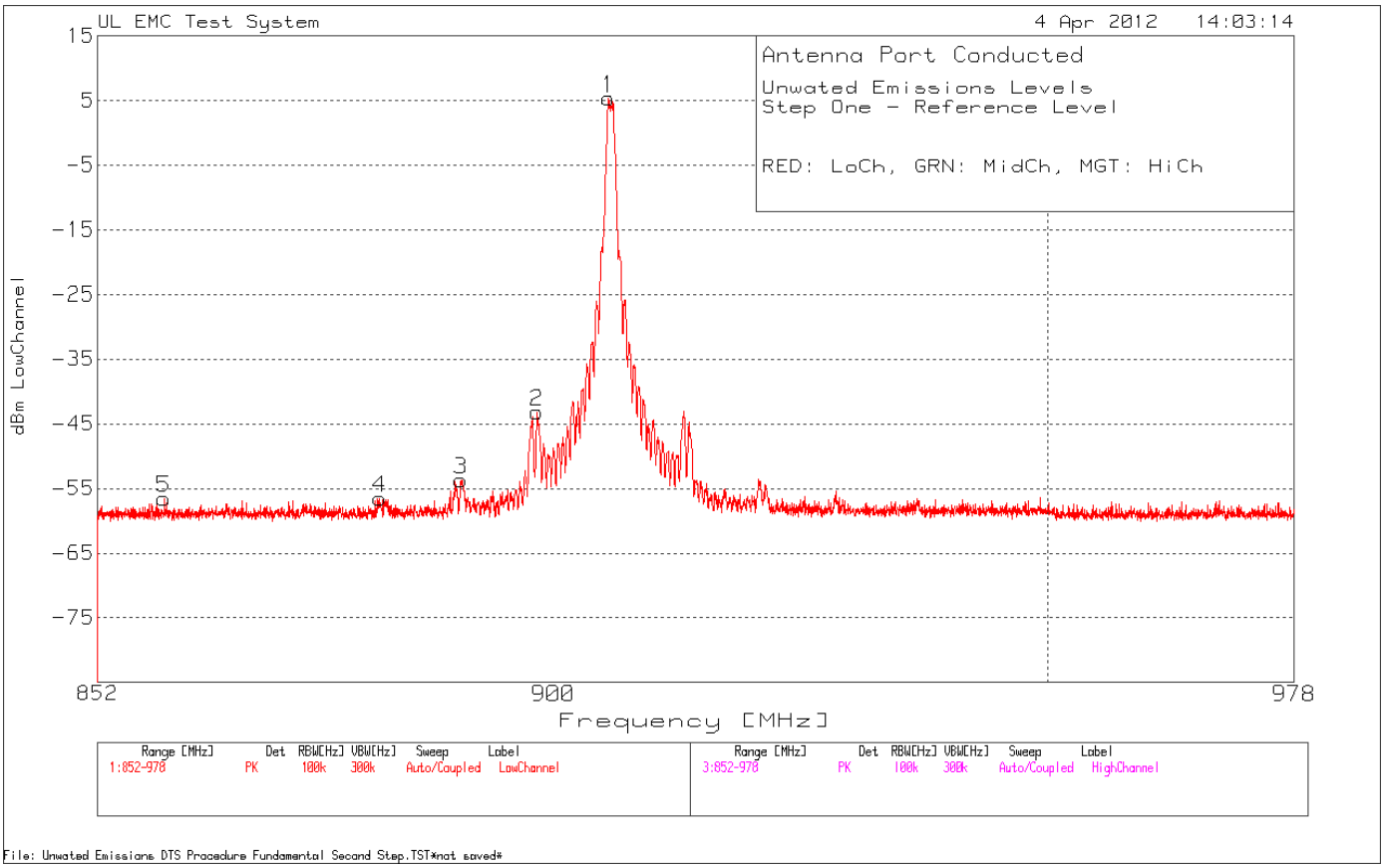
Table 23 Band Edge Compliance EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
3	2	1
Supplementary information: None		

Table 24 Bandedge CONDUCTED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E7405A	19695	20120201	20120228
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	*N/A	N/A
* Cable and attenuator ware characterized at the time of testing					

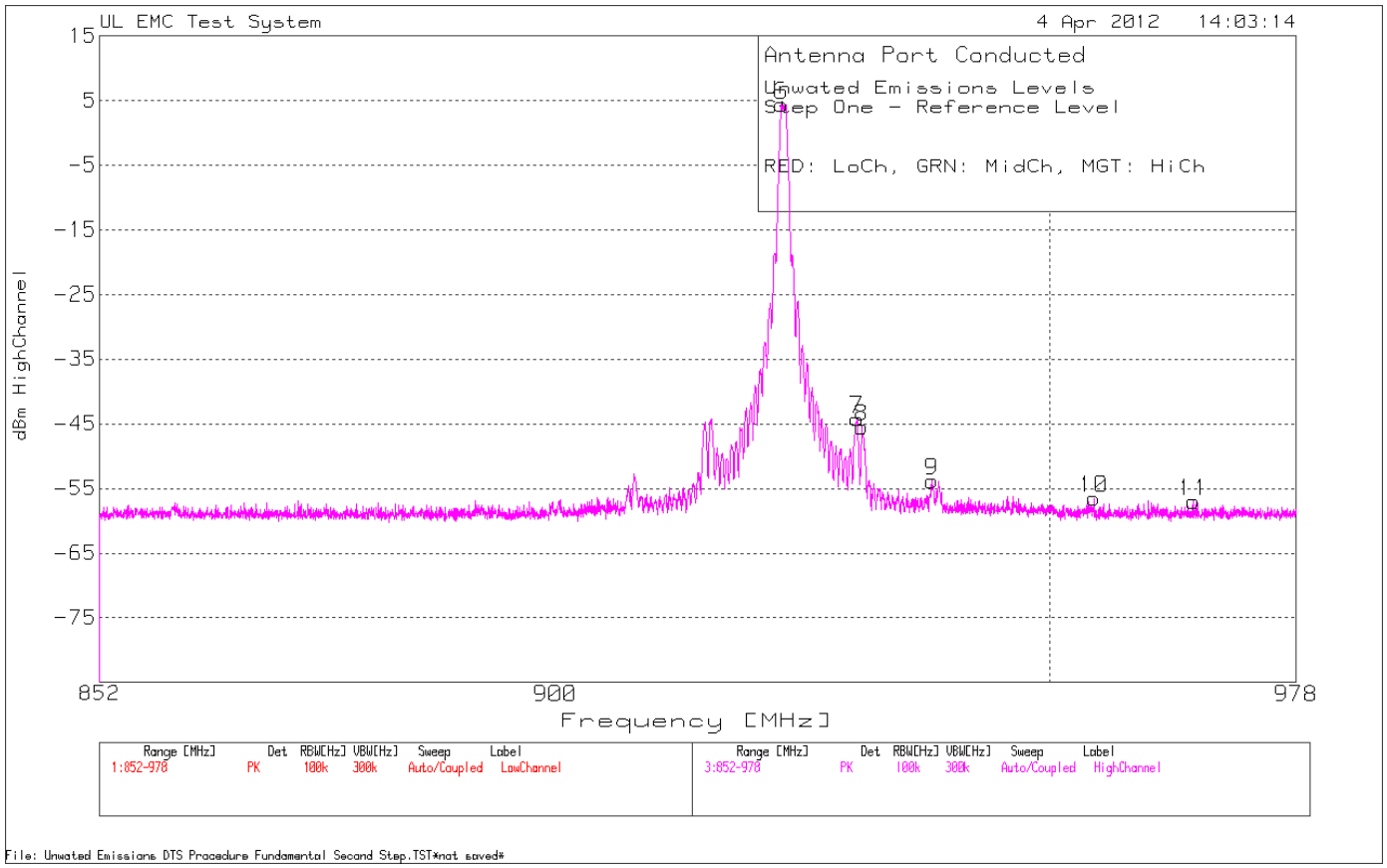
Figure 15 Antenna Conducted Band Edge Compliance Graph – Low Channel



Marker #	Test Frequency	Meter Reading	Detector	30MHz-10GHz White cable with 0 [dB]	dBuV to dBm [dB]	dBm
1	905.7755	102.12	PK	10.2	-107	5.32
2	898.2639	53.63	PK	10.2	-107	-43.17
3	890.2494	43.11	PK	10.2	-107	-53.69
4	881.6692	40.29	PK	10.2	-107	-56.51
5	858.9773	40.26	PK	10.2	-107	-56.54

PK - Peak detector

Figure 16 Antenna Conducted Band Edge Compliance Graph – High Channel



Marker #	Test Frequency	Meter Reading	Detector	30MHz-10GHz White cable with 0 [dB]	dBuV to dBm [dB]	dBm
6	923.7531	101	PK	10.3	-107	4.3
7	931.7361	52.45	PK	10.3	-107	-44.25
8	932.2704	51.26	PK	10.3	-107	-45.44
9	939.6248	42.9	PK	10.3	-107	-53.8
10	956.6909	40.19	PK	10.3	-107	-56.51
11	967.1883	39.72	PK	10.3	-107	-56.98

PK - Peak detector

4.5 Test Conditions and Results – 6dB BANDWIDTH

Test Description	Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Basic Standard	47 CFR Part 15.247(a)(2) RSS-210, A8.2(a)

Table 25 6dB Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
3	2	1
Supplementary information: None		

Table 26 6dB Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E7405A	19695	20120201	20120228
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	*N/A	N/A
* Cable and attenuator ware characterized at the time of testing					

Table 27 6dB Bandwidth Results

Mode	Channel	6dB Bandwidth
TX	Low	825.000
	Middle	768.750
	High	790.000

Figure 17 6dB Bandwidth Graphs – Low Channel

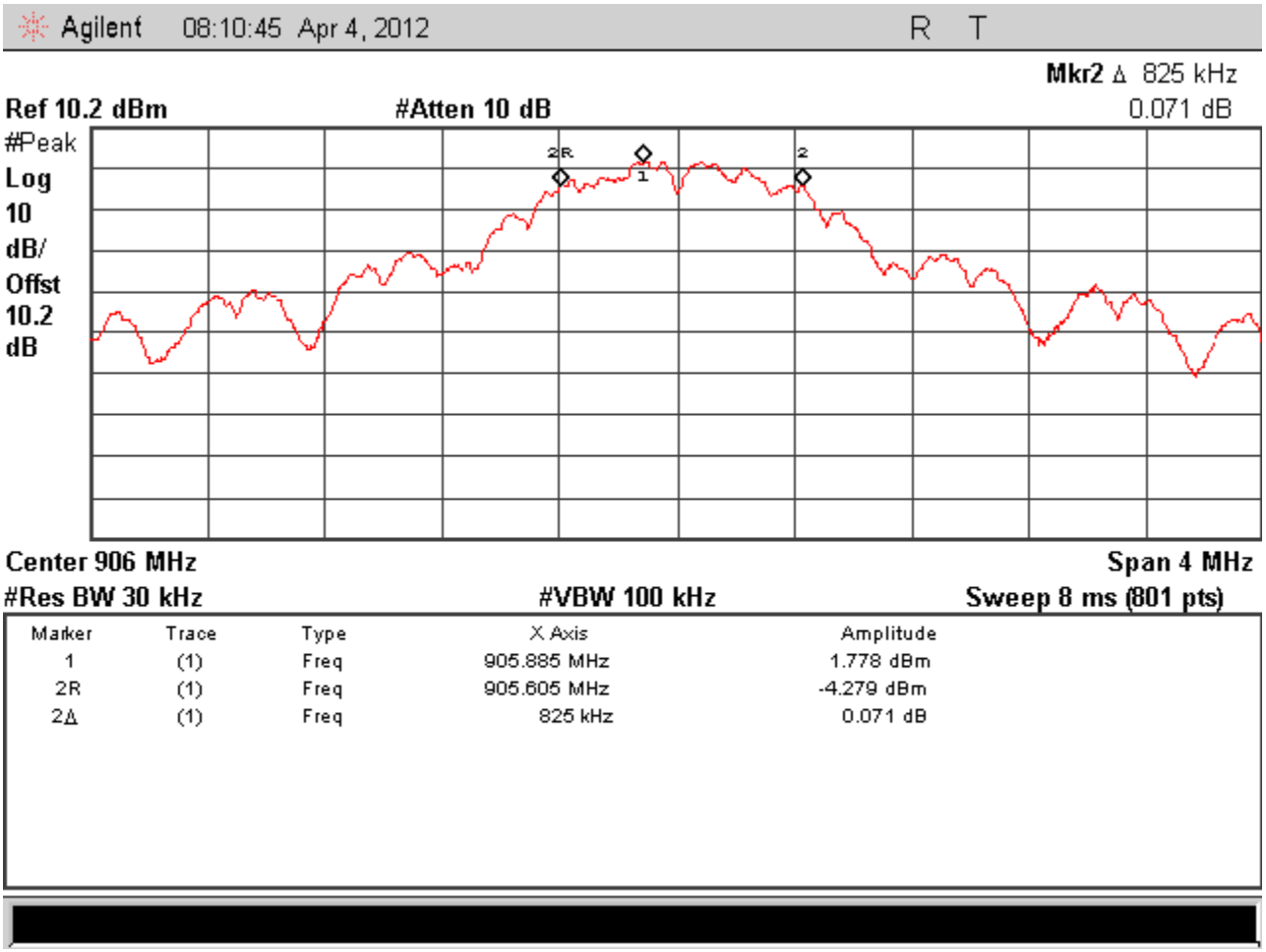


Figure 18 6dB Bandwidth Graphs – Middle Channel

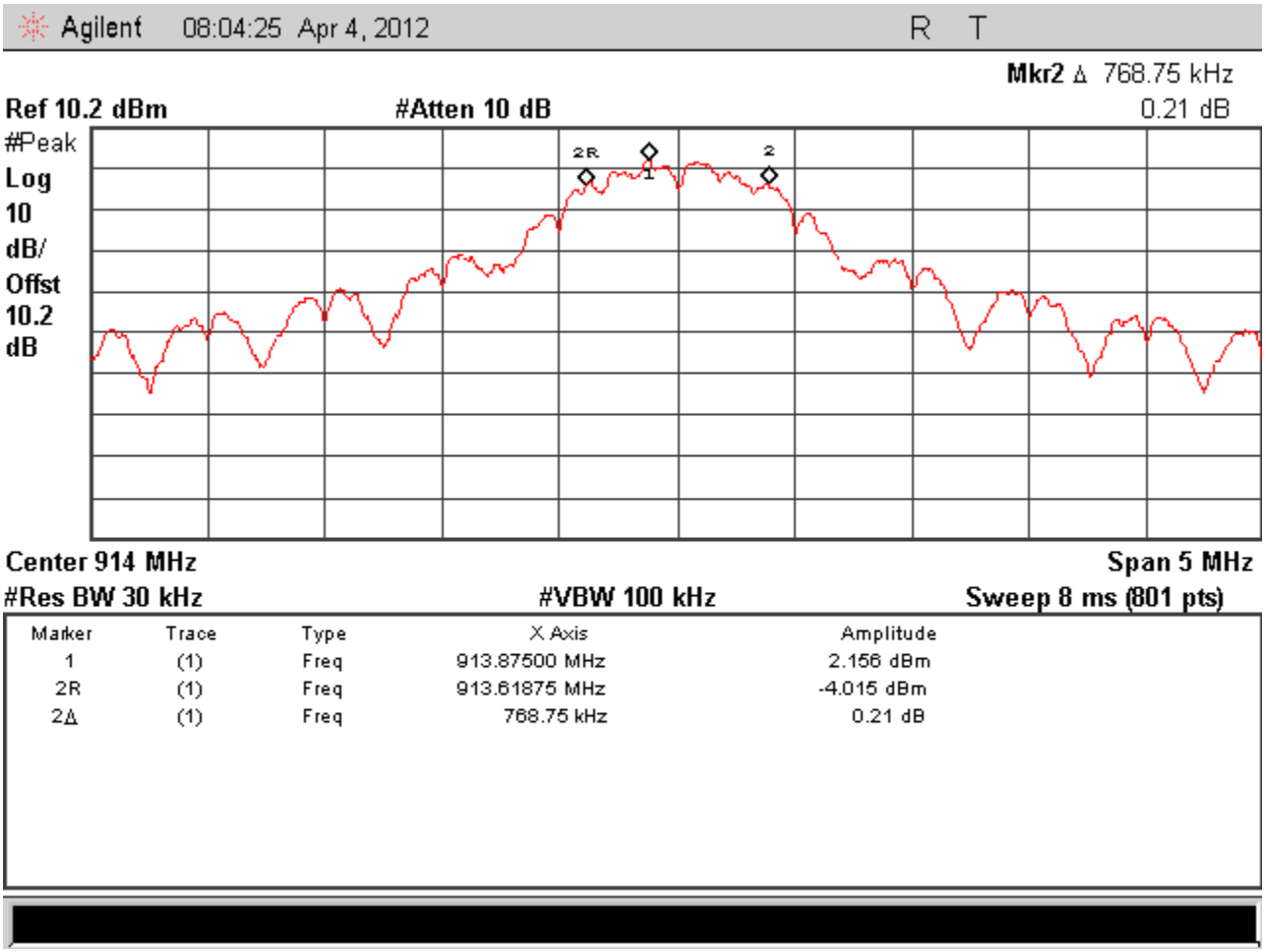
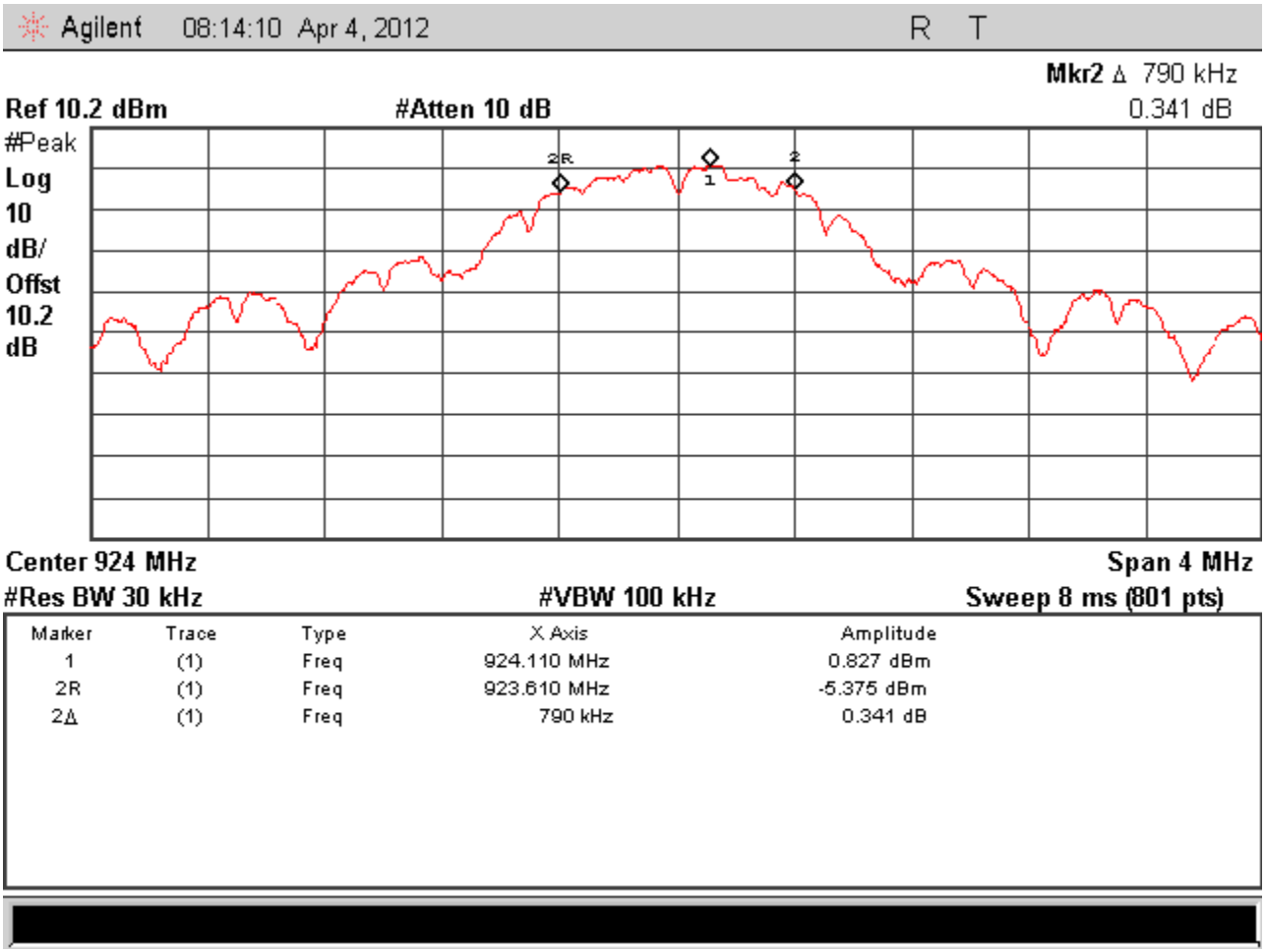


Figure 19 6dB Bandwidth Graphs – High Channel



4.6 Test Conditions and Results – MAXIMUM PEAK OUTPUT POWER

Test Description	For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.	
Basic Standard	47 CFR Part 15.247(b)(3) RSS-210, A8.4(4)	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	902MHz – 928MHz	Antenna Conducted
Limits		
Frequency (MHz)	Limit mW	
	Peak	
902 - 928	1,000	
Supplementary information: None		

Table 28 Maximum Peak Output Power EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
3	3	1
Supplementary information: None		

Table 29 Maximum Peak Output Power Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E7405A	19695	20120201	20120228
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	*N/A	N/A
* Cable and attenuator ware characterized at the time of testing					

Table 30 Maximum Peak Output Power Results

Channel	Limit (dBm)	Power dBm	Power W
Low Channel	30	6.834	0.004824
Middle Channel	30	6.633	0.004606
High Channel	30	6.356	0.004321

Figure 20 Maximum Peak Output Power Graphs – Low Channel

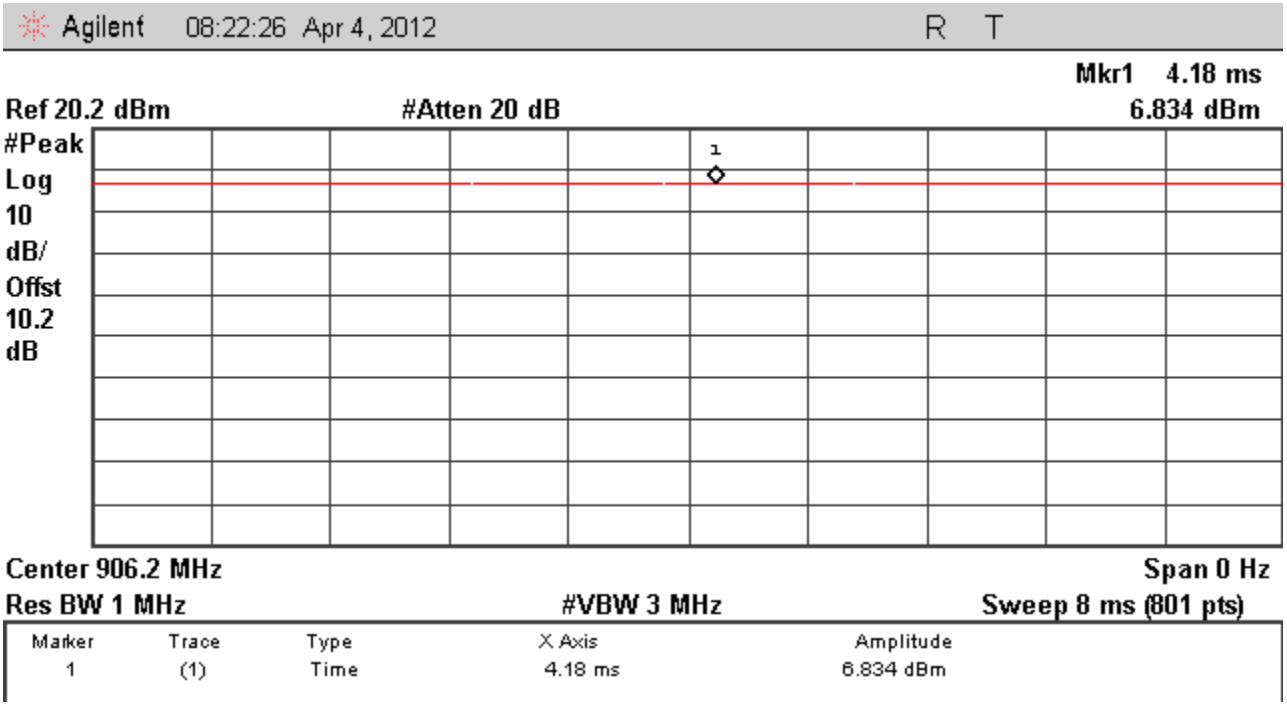


Figure 21 Maximum Peak Output Power Graphs – Mid Channel

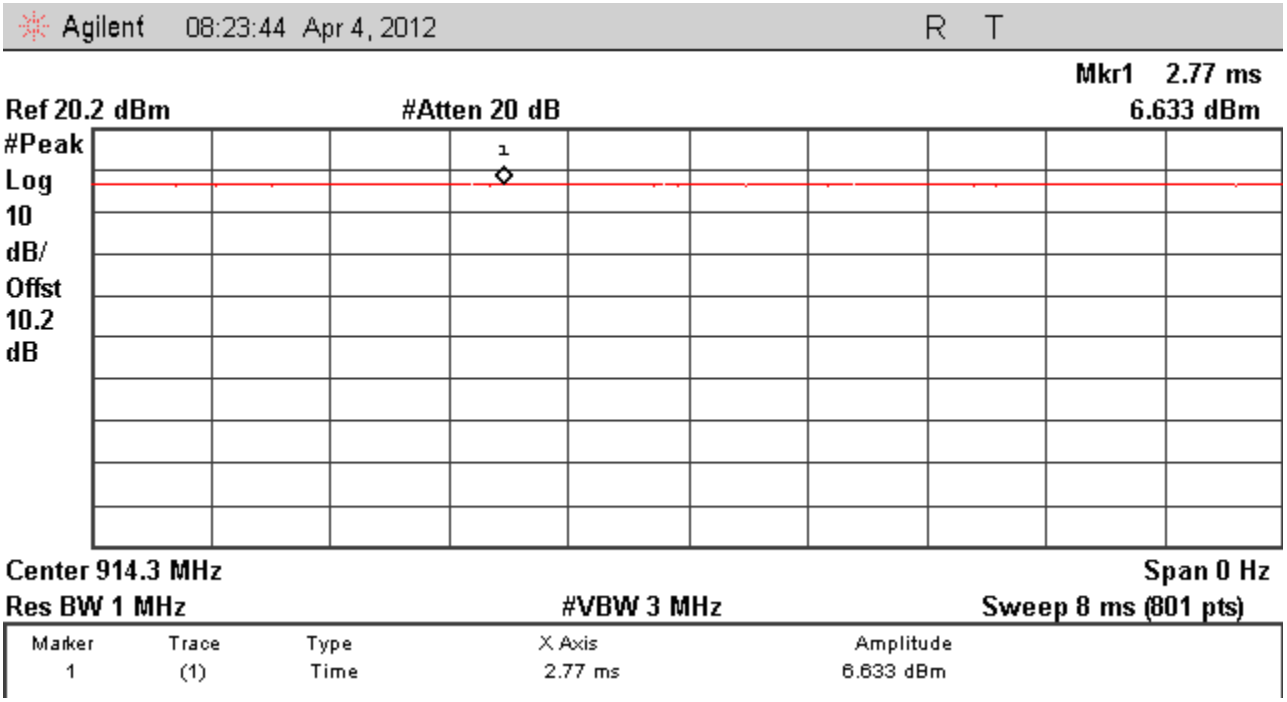
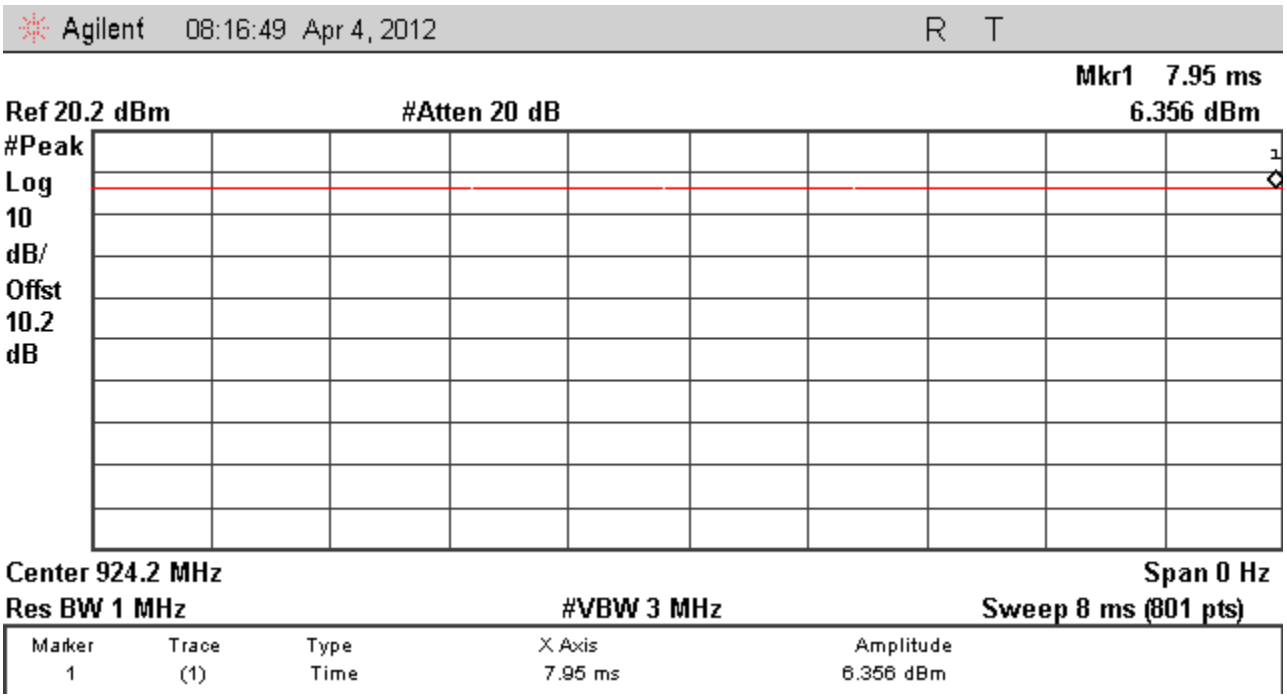


Figure 22 Maximum Peak Output Power Graphs – High Channel



4.7 Test Conditions and Results – POWER SPECTRAL DENSITY

Test Description	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	
Basic Standard	47 CFR Part 15.247(e) RSS-210, A8.2(b)	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	902MHz – 928MHz	Antenna Conducted
Limits		
Frequency (MHz)	Limit mW	
	Peak	
902 - 928	8dBm (0.00631mW)	
Supplementary information: Per "558074 D01 DTS Meas Gudence DR01", Option 1, PSD was measured with 100kHz RBW and -15.2dB correction factor was applied in **Table 33** below.		

Table 31 Power Spectral Density EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
3	2	1
Supplementary information: None		

Table 32 Power Spectral Density Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E7405A	19695	20120201	20120228
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	*N/A	N/A
* Cable and attenuator ware characterized at the time of testing					

Table 33 Power Spectral Density Power Results

Channel	**Limit (dBm)**	**Power Density dBm**
Low Channel	8	-10.462
Middle Channel	8	-10.061
High Channel	8	-10.354

Figure 23 Power Spectral Density Graphs – Low Channel

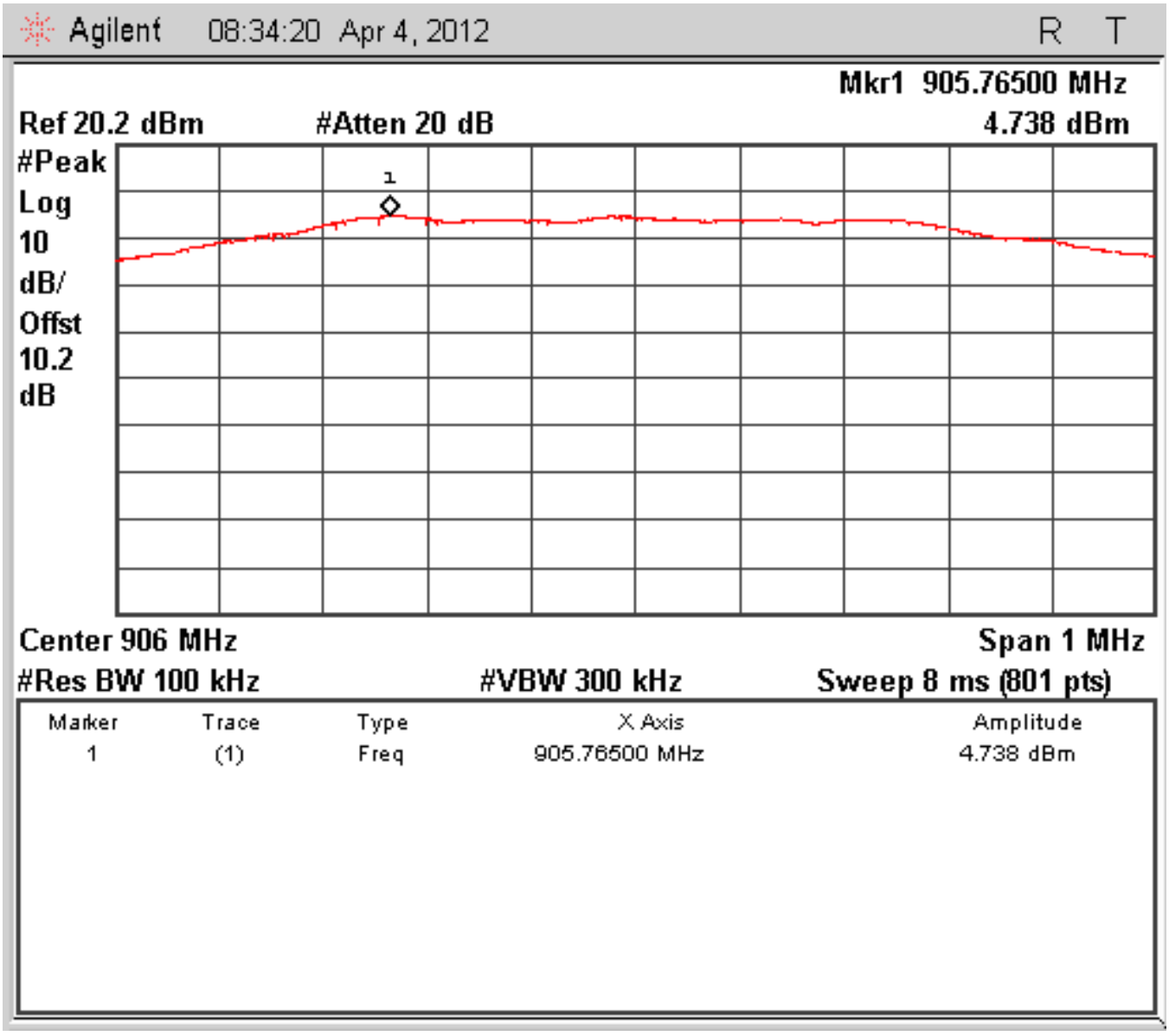


Figure 24 Power Spectral Density Graphs – Middle Channel

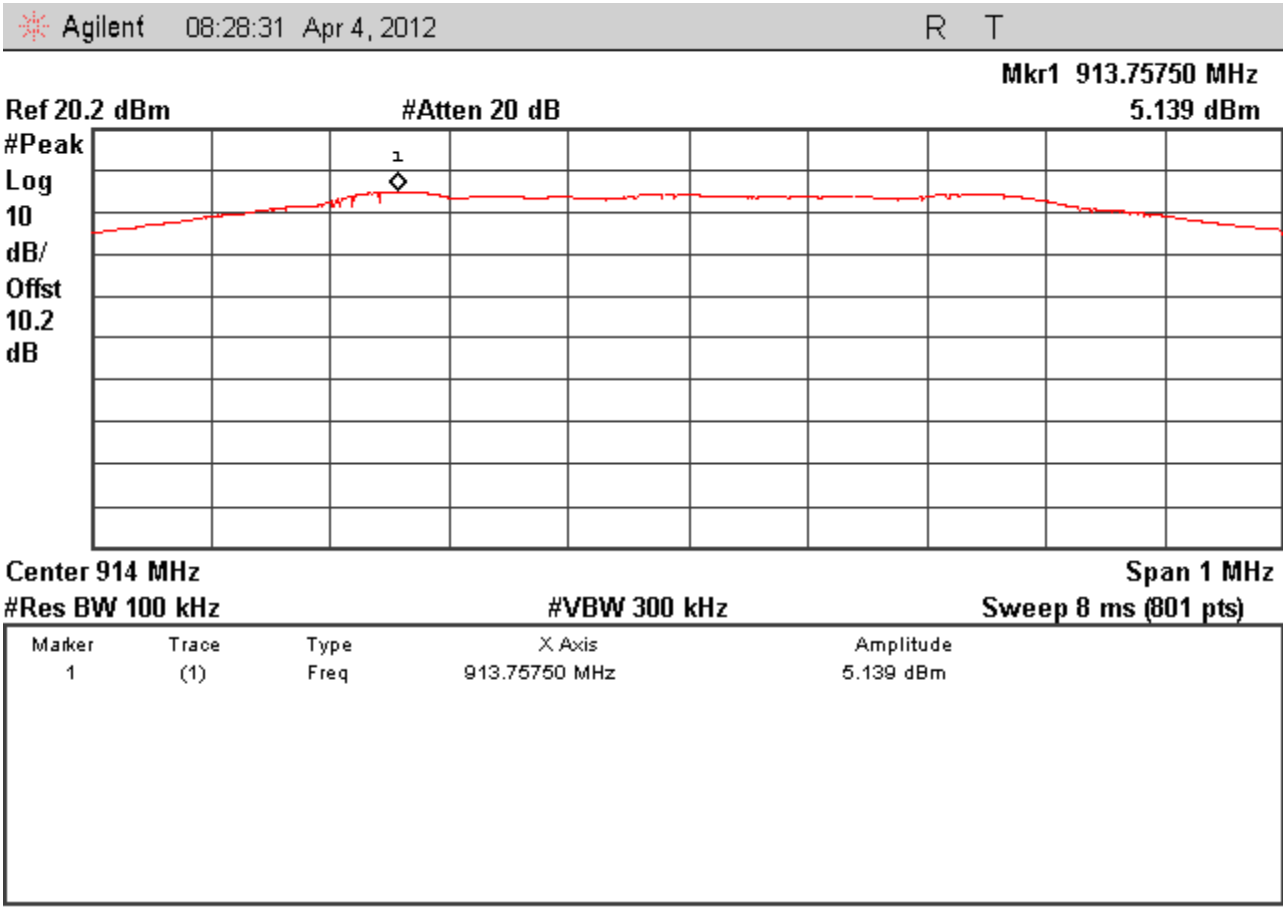
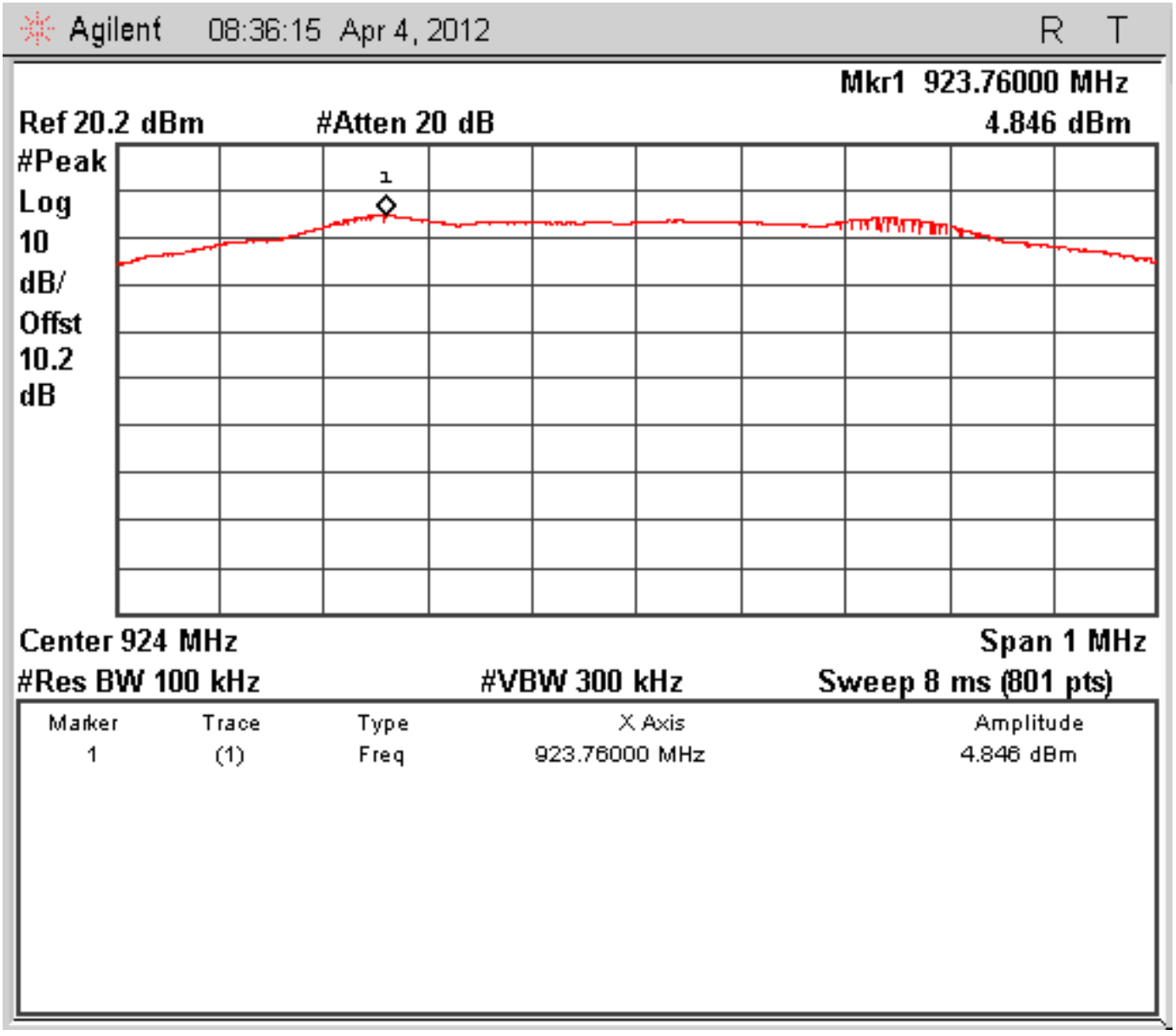


Figure 25 Power Spectral Density Graphs – High Channel



4.8 Test Conditions and Results – 99% Power BANDWIDTH

Test Description	When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
Basic Standard	RSS-Gen, 4.6.1

Table 34 99% Power Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Table 35 99% Power Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20111228	20121231
Near Filed Probe	Generic	-	-	-	-

Table 36 99% Power Bandwidth Results

Mode	Channel	99% Power Bandwidth
TX	Low	1.245 MHz
	Middle	1.230 MHz
	High	1.225 MHz

Figure 26 99% Power Bandwidth Graphs – Low Channel

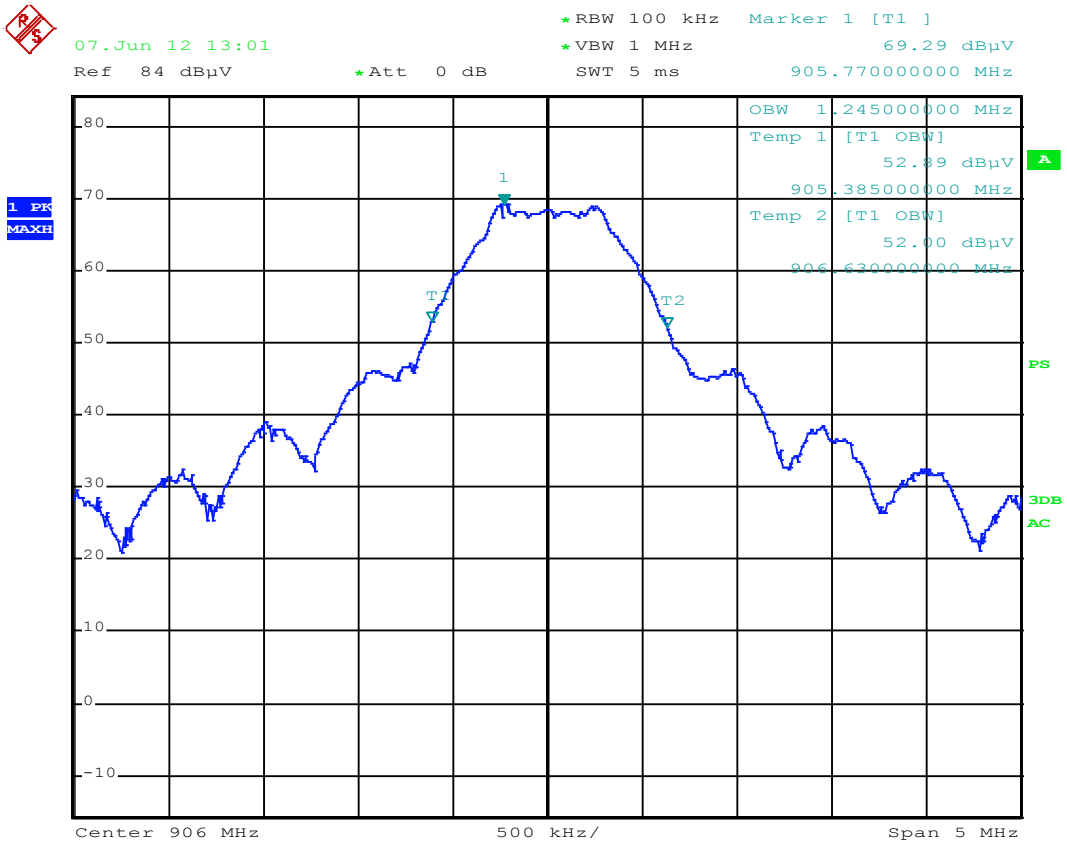


Figure 27 99% Power Bandwidth Graphs – Middle Channel

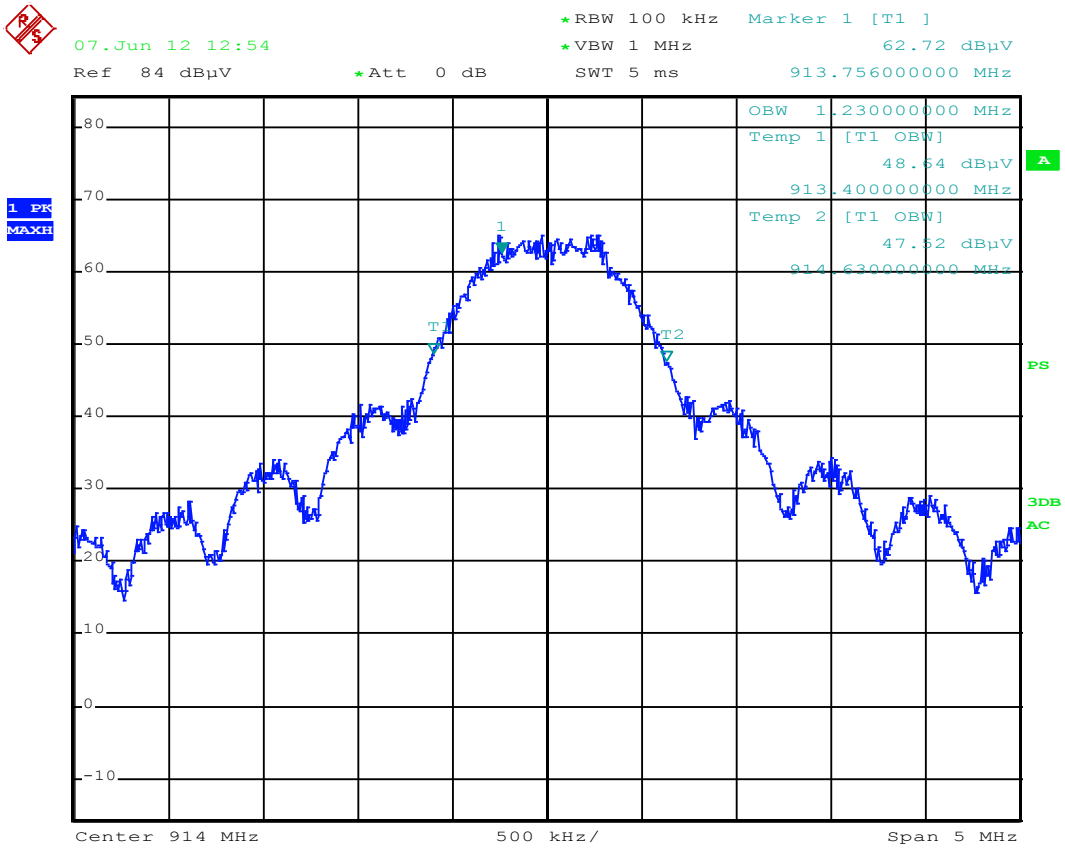
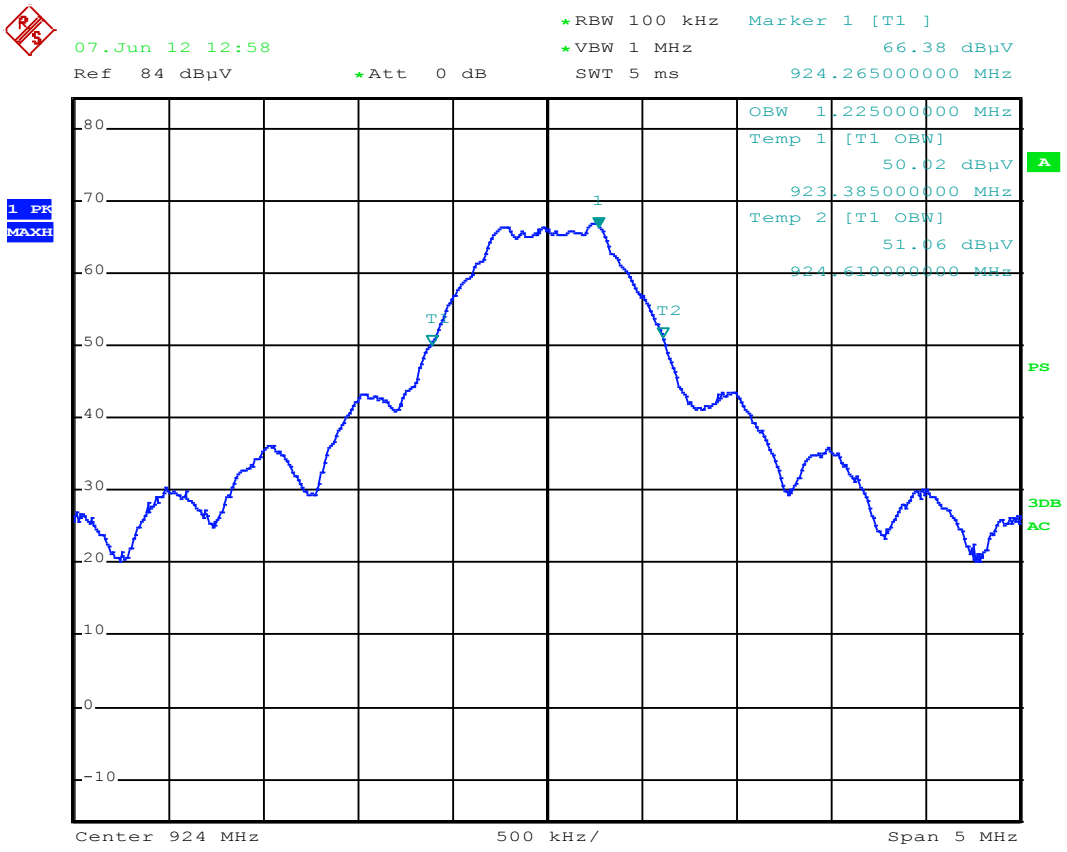


Figure 28 99% Power Bandwidth Graphs – High Channel



Appendix A

Test Setup Photos

Figure 29 – Antenna Port Conducted Emissions

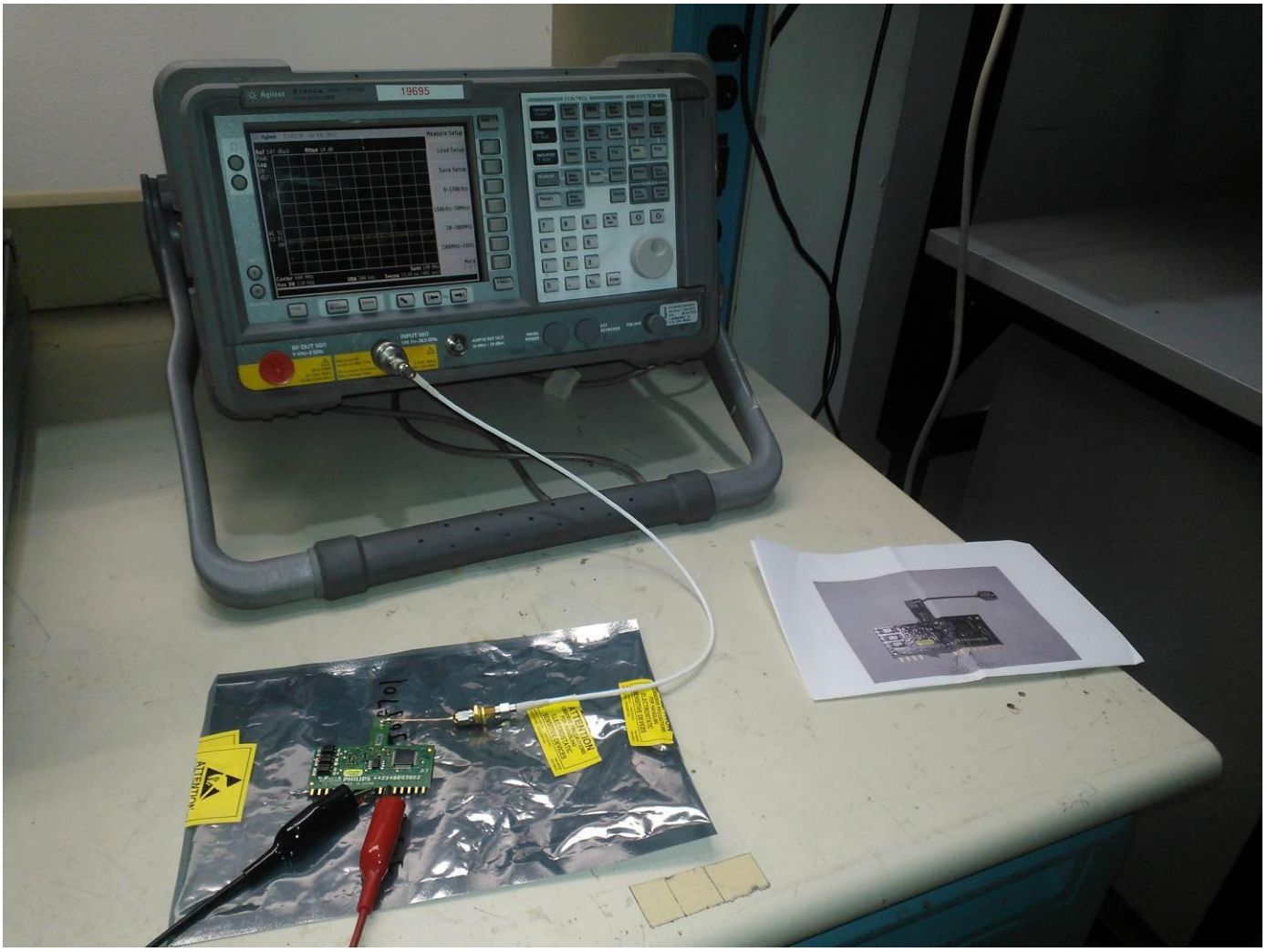


Figure 30 – Radiated Emissions

Figure 31 – Line Conducted Emissions

Appendix B

Accreditations and Authorizations

NVLAP Lab code: 100414-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see http://ts.nist.gov/standards/scopes/1004140.htm

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91044).

Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2180

VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: Radiated Emissions R-621, Conducted Emissions C-642.

ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).

NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.
NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).
NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6