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Order Number: 10445301

Date: September 16, 2014
Rev.1 Date December 18, 2014
Model: LCN7330P

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: Rev.1 Date	**September 16, 2014** **December 18, 2014**
Product Type:	**Wireless Device**
Product standards	**FCC Part 15, Subpart C, 15.247, RSS-210, RSS-Gen**
Model Number:	**LCN7330P**
EUT Category:	**Industrial Control**
Testing Start Date:	**August 25, 2014**
Date Testing Complete:	**September 10, 2014**
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
2014-12-18	Rev.1 – Added references to newly released RSS-Gen Standard.	BM	MF

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 panel with 900MHz transceiver and external sawtooth filter.

1.2 Device Configuration During Test

1.2.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	Light Controller	Philips	LCN7330P	Tested mounted in representative configuration, metal enclosure.
AE	Control Panel	Philips	Generic	None
AE	Laptop computer	Dell	Generic	Used to control transceiver and as power source for transceiver.
Note: **EUT** – Equipment Under Test, **AE** – Auxiliary/Associated Equipment, or **SIM** – Simulator (Not Subjected to Test)				
* For antenna port measurements the module was tested while powered directly by external power supply with 5VDC. This was done to protect the spectrum analyzer from high voltages.				

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	Module is Powered by the host
2	USB	I/O & DC	N	Y	Connected to AE equipment

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	-	-	AC	1	Power applied to AE Equipment
2	5	-	-	DC	-	Supplied by AE equipment to EUT

1.3 EUT Configurations

Mode #	Description
1	Panel with transmitter installed was placed on 80cm support. Inside the panel the transceiver is installed on the din rail and laptop is connected to it via USB cable.
2	Transmitter part of the EUT was powered by laptop via 5VDC SUB connection (antenna port measurements).

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

1.5 Rational for EUT Configuration

Mode #	Description
1	Selected configuration was chosen as representative.

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	License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment	Issue 8
RSS-Gen	General Requirements for Compliance of Radio Apparatus	Issue 4
FCC KDB558074 D01 DTS Meas Guidance v03r02		

2.4 Results Summary

Requirement – Test	Result (Compliant / Non-Compliant)*
Mains Terminal - Conducted Emissions	Compliant
Radiated Emissions – Receiver Mode	Compliant
Spurious Emissions (Antenna Conducted and Radiated)	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
UL Verification Services

Reviewer:

Michael Ferrer(Ext.41312)
Program Manager
International EMC Services
UL Verification 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	Range	Equipment	Uncertainty k=2
Conducted Emissions	150k-30MHz	LISN	2.29dB
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB

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 8.8	
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 B (FCC 15.107(a) and 15.207)

Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 - 56	56 - 46
0.5-5.0	56	46
5.0-30	60	50

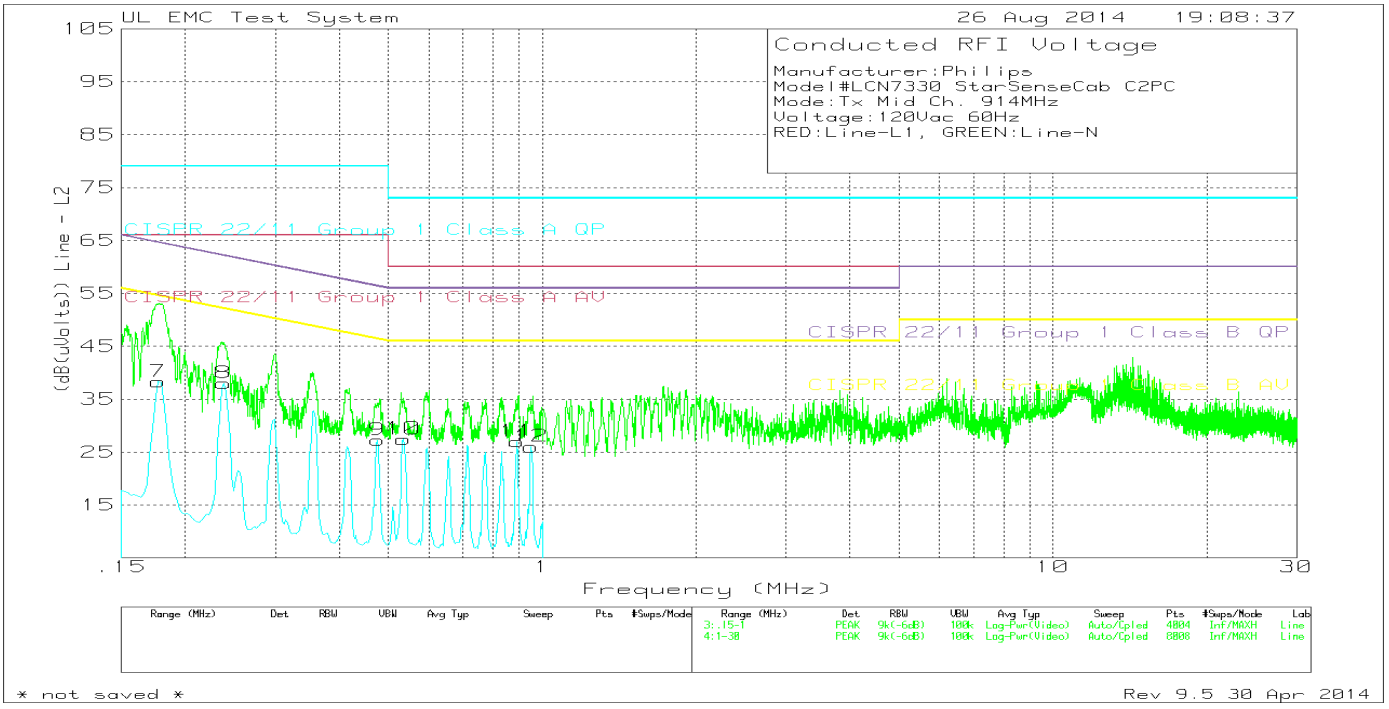
Supplementary information: None

Table 1 Conducted Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1

Supplementary information: None

Figure 1 Conducted Emissions Graph – Radio TX Mode



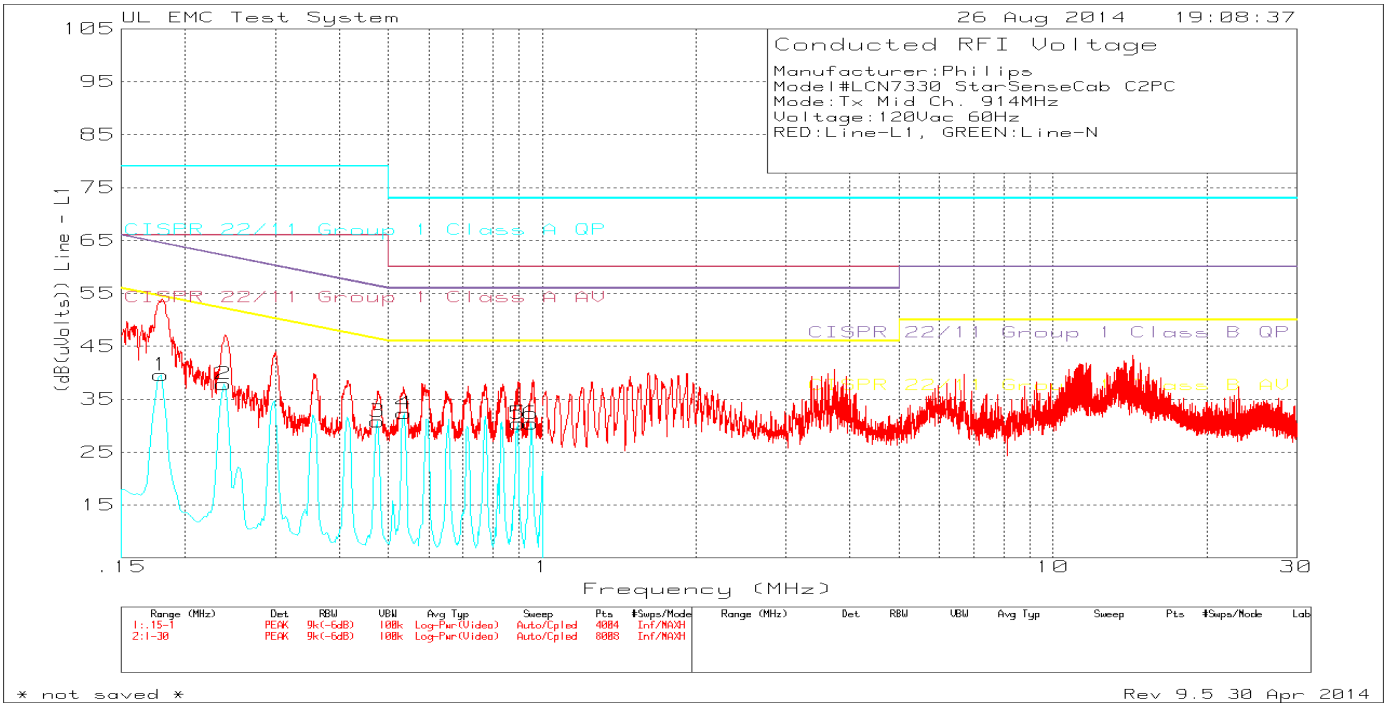


Table 2 Conducted Emissions Data Points – Radio TX Mode

Manufacturer:Philips										
Model#LCN7330 StarSenseCab C2PC										
Mode:Tx Mid Ch. 914MHz										
Voltage:120Vac 60Hz										
RED:Line-L1, GREEN:Line-N										
Trace Markers										
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Level dBuV	Limit CISPR 22 Class B QP dBuV	Margin (dB)	Limit CISPR 22 Class B AV dBuV	Margin (dB)
Line 1										
1	0.17925	27.25	Av	0.1	12.2	39.55	64.52	-24.97	54.52	-14.97
2	0.23775	26.44	Av	0.1	11.3	37.84	62.17	-24.33	52.17	-14.33
3	0.47625	19.97	Av	0.1	10.7	30.77	56.4	-25.63	46.4	-15.63
4	0.537	21.73	Av	0	10.6	32.33	56	-23.67	46	-13.67
5	0.897	19.68	Av	0.1	10.6	30.38	56	-25.62	46	-15.62
6	0.951	19.67	Av	0.1	10.6	30.37	56	-25.63	46	-15.63
Line 2										
7	0.177	25.83	Av	0.1	12.4	38.33	64.63	-26.3	54.63	-16.3
8	0.23775	26.62	Av	0.1	11.3	38.02	62.17	-24.15	52.17	-14.15
9	0.47625	16.49	Av	0.1	10.7	27.29	56.4	-29.11	46.4	-19.11
10	0.53475	16.74	Av	0.1	10.6	27.44	56	-28.56	46	-18.56
11	0.8925	16.3	Av	0.1	10.6	27	56	-29	46	-19
12	0.951	15.33	Av	0.1	10.6	26.03	56	-29.97	46	-19.97
Av - CISPR average detection										

4.2 Test Conditions and Results – RADIATED EMISSIONS Receiver Mode

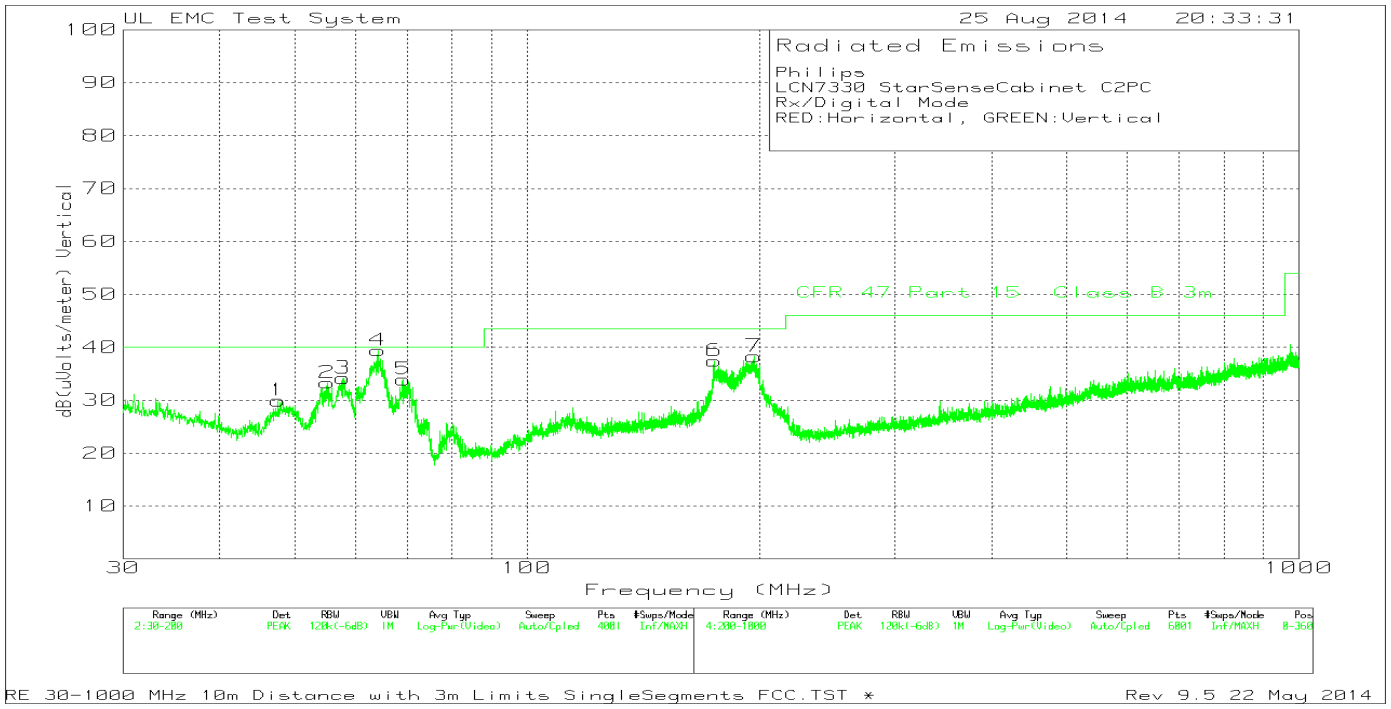
Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter or 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna 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 – 5GHz	3 meter
Limits – Class A		
Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30 - 88	49.54	NA
88 - 216	53.98	NA
216 - 960	56.90	NA
960 - 40000	60	60
Limits - Class B		
Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30 - 88	40	NA
88 - 216	43	NA
216 - 960	46.02	NA
960 - 40000	54	54
Supplementary information: None		

Table 3 Radiated Emissions EUT Configuration Settings

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

Figure 2 Radiated Emissions Graph Below 1GHz, RX Mode



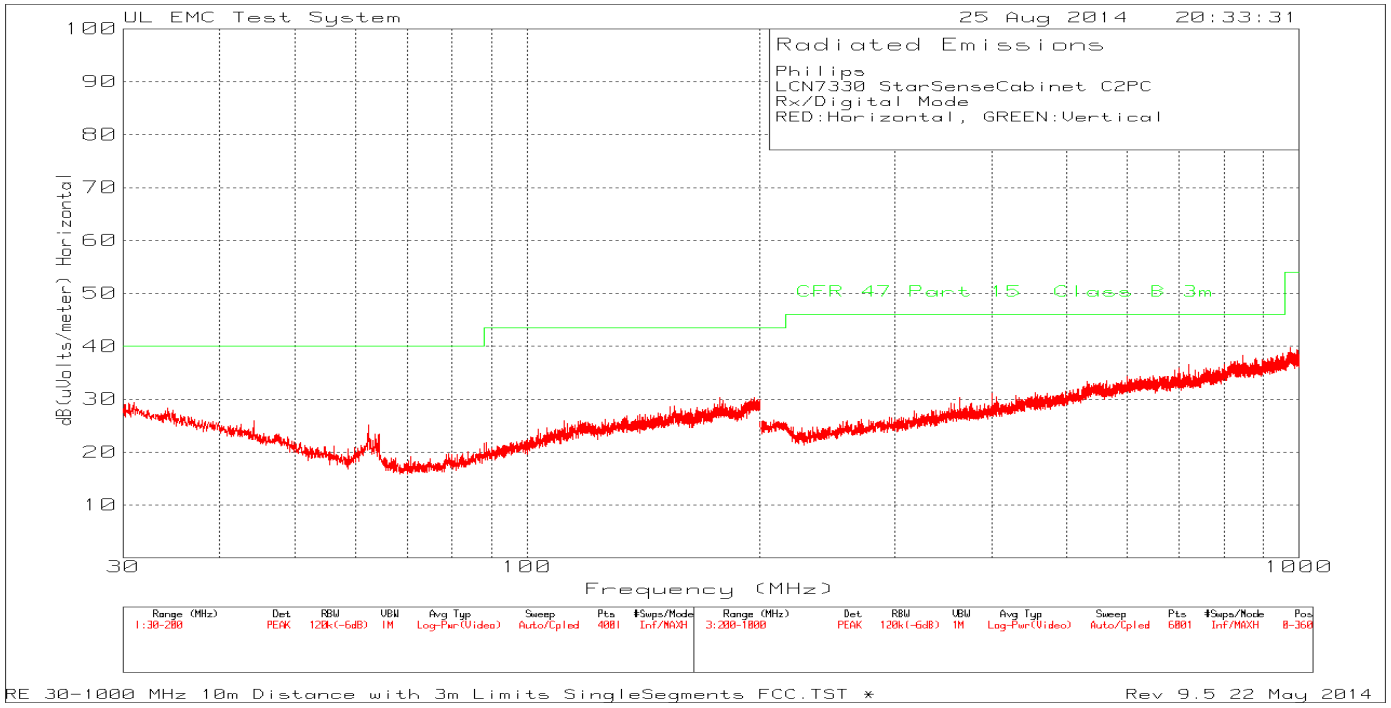
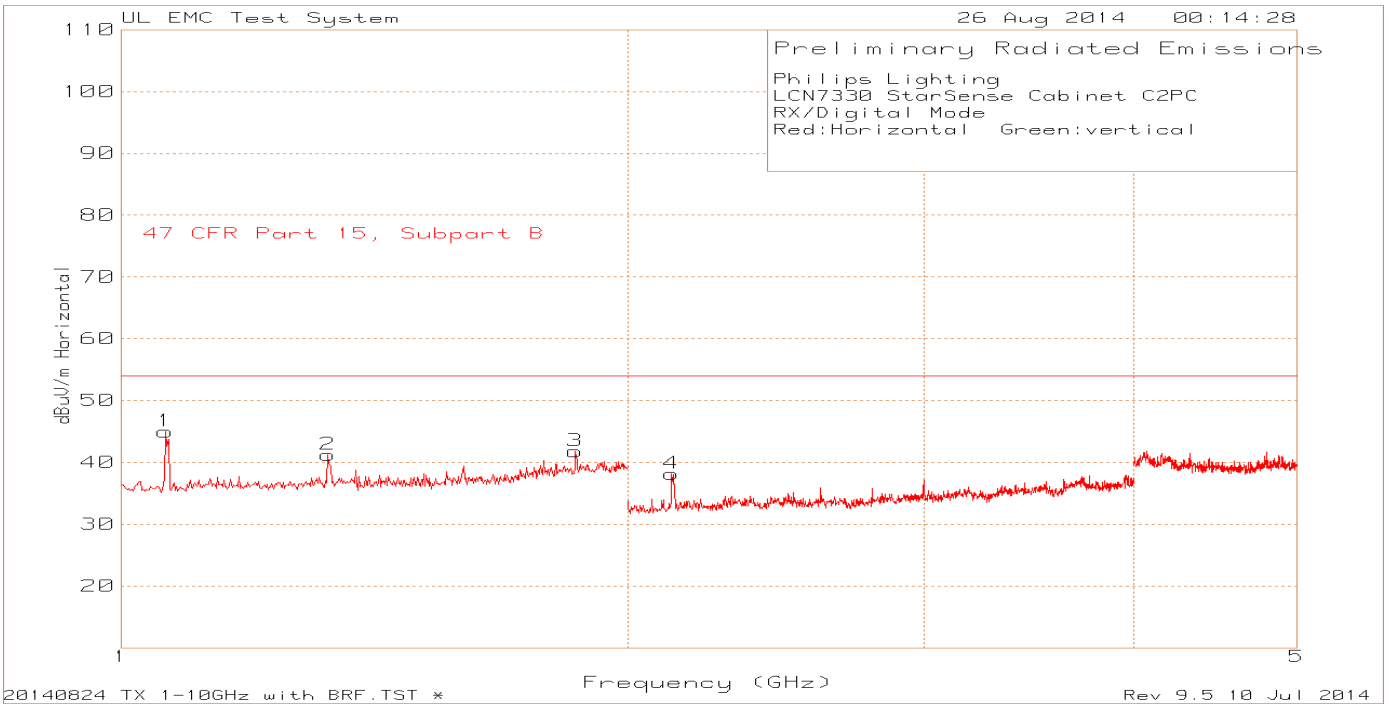


Table 4 Radiated Emissions Data Below 1GHz, RX Mode

Philips												
LCN7330 StarSenseCabinet C2PC												
Rx/Digital Mode												
RED:Horizontal, GREEN:Vertical												
Trace Markers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	47.595	38.34	PK	11.2	-30.1	10.5	29.94	40	-10.06	0-360	99	V
2	55.16	44.72	PK	8.2	-30.1	10.5	33.32	40	-6.68	0-360	99	V
3	57.795	46.36	PK	7.4	-30.1	10.5	34.16	40	-5.84	0-360	249	V
4	64.17	52.62	PK	6.3	-30	10.5	39.42	40	-0.58	0-360	249	V
5	69.185	47.25	PK	6.2	-30	10.5	33.95	40	-6.05	0-360	400	V
6	175.01	40.74	PK	15.5	-29.3	10.5	37.44	43.52	-6.08	0-360	99	V
7	197.0675	40.56	PK	16	-28.8	10.5	38.26	43.52	-5.26	0-360	99	V
PK - Peak detector												
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	57.919	41.49	QP	7.3	-30.1	10.5	29.19	40	-10.81	232	262	V
	68.9212	39.63	QP	6.2	-30	10.5	26.33	40	-13.67	329	242	V
	63.8652	44.16	QP	6.3	-30	10.5	30.96	40	-9.04	264	249	V
	197.035	37.55	QP	16	-28.8	10.5	35.25	43.52	-8.27	172	100	V
QP - Quasi-Peak detector												

Figure 3 Radiated Emissions Graph Above 1GHz, RX Mode



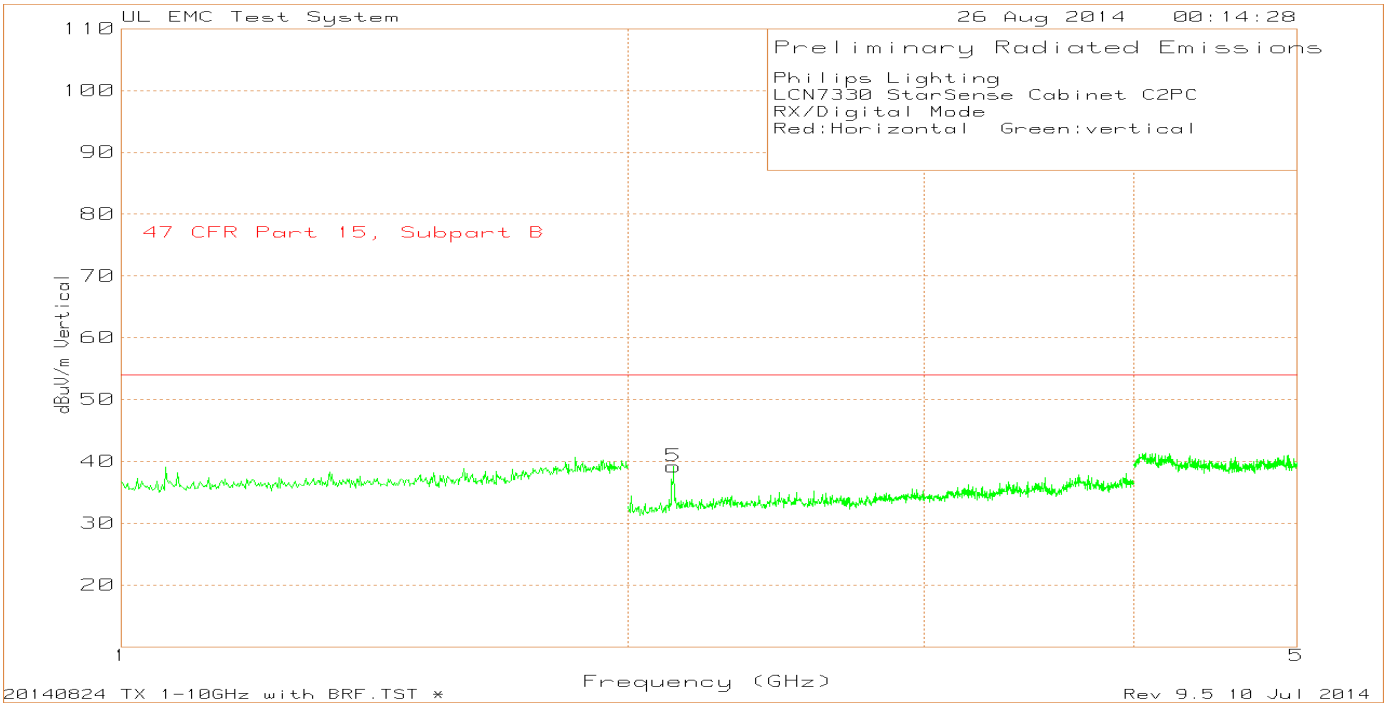


Table 5 Radiated Emissions Data Above 1GHz, RX Mode

Philips Lighting												
LCN7330 StarSense Cabinet C2PC												
RX/Digital Mode												
Red:Horizontal Green:vertical												
Trace Markers												
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	900MHz BRF Factor dB	Path Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	* 1.0621	76	PK	24.5	0.5	-56.01	44.99	54	-9.01	0-360	150	H
2	* 1.3267	70.84	PK	25.2	0.3	-55.11	41.23	54	-12.77	0-360	100	H
3	1.8617	67.49	PK	27.3	0.4	-53.37	41.82	54	-12.18	0-360	150	H
4	2.1241	68.86	PK	21.5	0	-52.19	38.17	54	-15.83	0-360	150	H
5	2.1301	69.83	PK	21.5	0	-52.13	39.2	54	-14.8	0-360	150	V
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band												
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	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	10 meter distance and / or antenna port
	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	40.0	-	-
88 – 216	43.52	-	-
216 - 960	46.02	-	-
960 - 1000	54	-	-
1,000-25,000	-	-	54

Supplementary information: Radiated Spurious Emissions levels (below) were extrapolated to 3m distance.

Table 6 SPURIOUS EMISSIONS EUT Configuration Settings

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

Figure 4 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode, Low, Middle, High Channels.

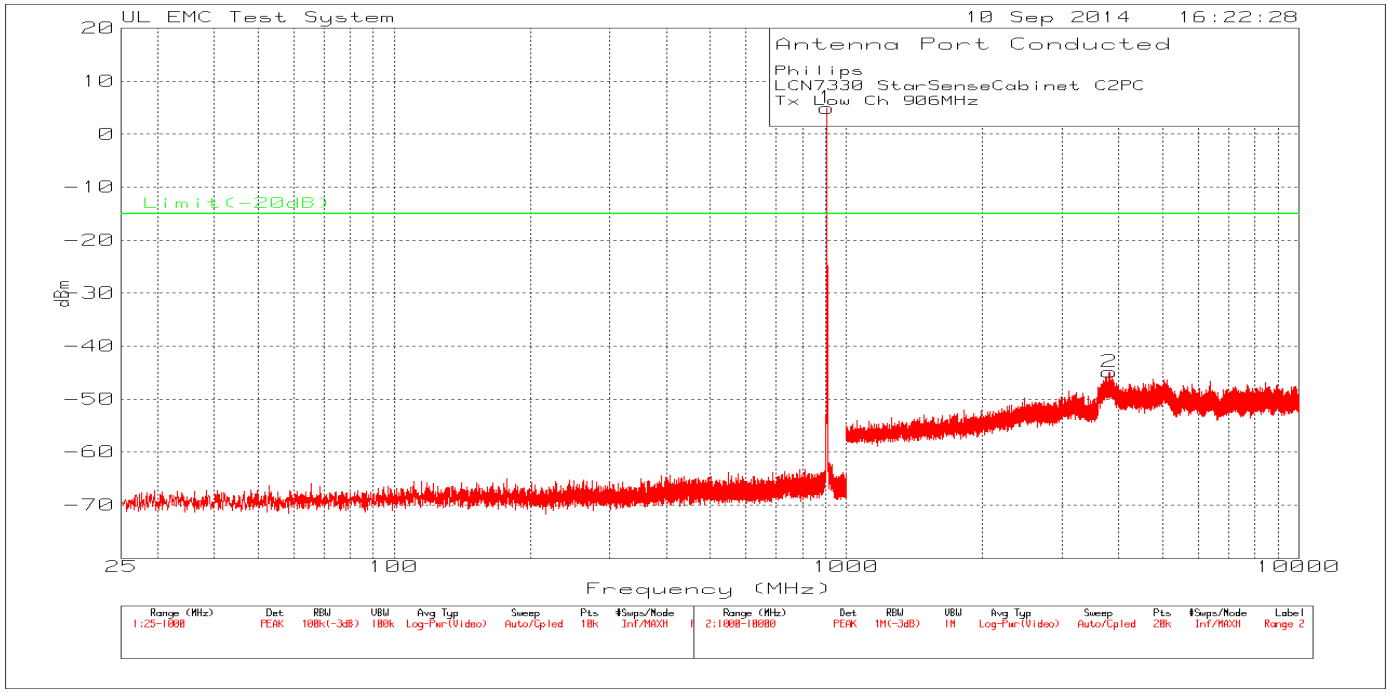


Figure 5 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode, Low, Middle, High Channels.

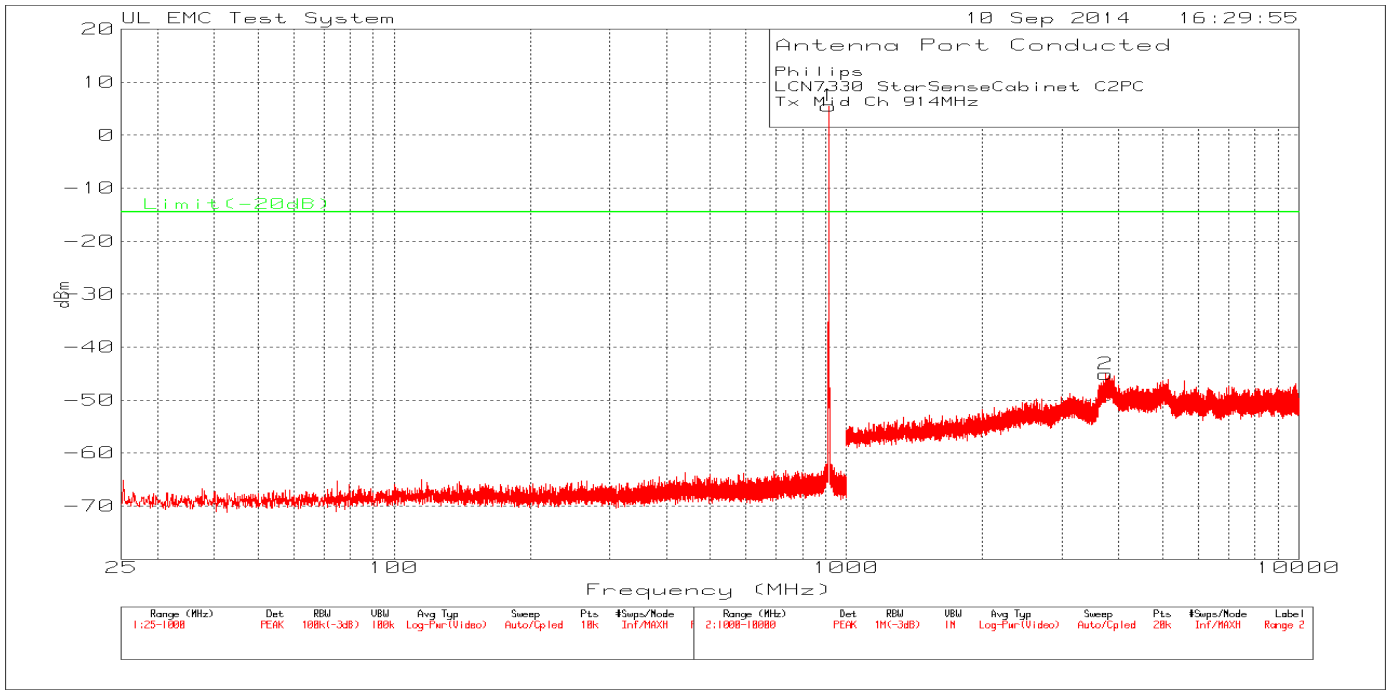


Figure 6 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode, Low, Middle, High Channels.

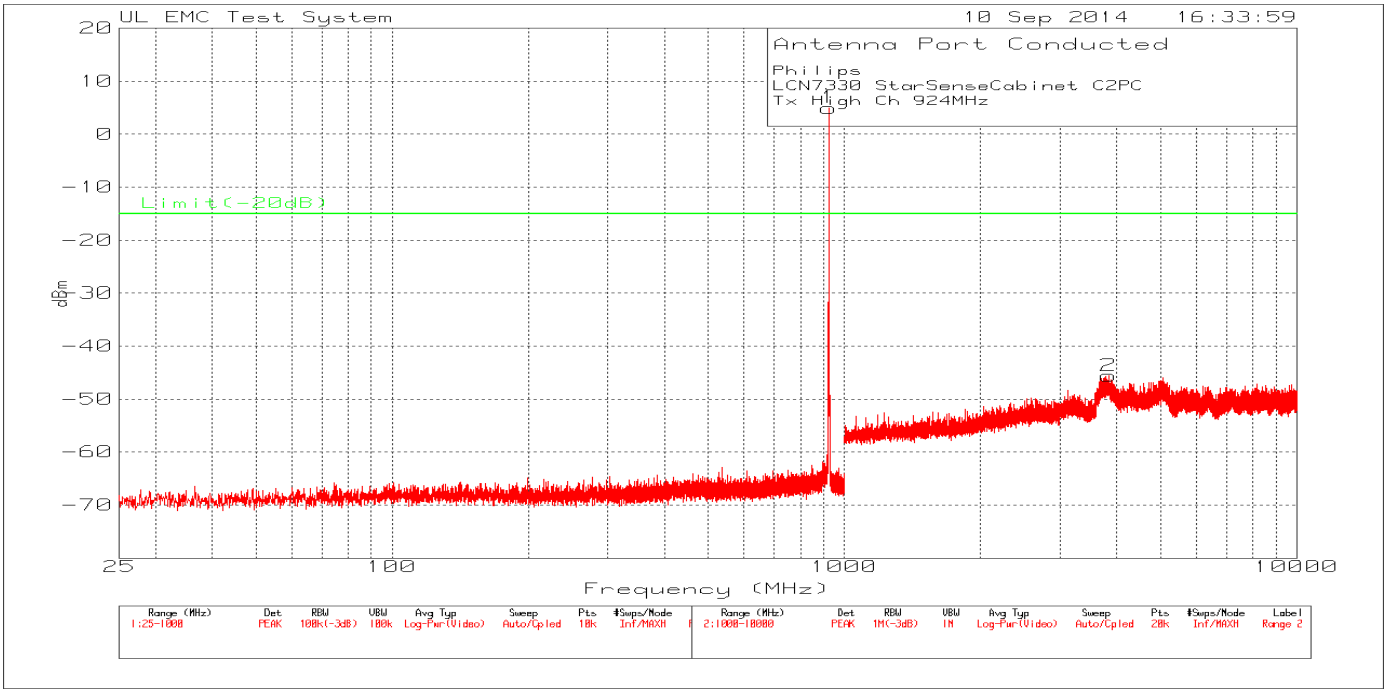


Table 7 Antenna Port Conducted Spurious Emissions 30MHz - 10GHz, Low, Middle, High Channels

Philips								
LCN7330 StarSenseCabinet C2PC								
Tx Low Ch 906MHz								
Trace Markers								
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	dBuV to dBm	Path Factor dB	Level dBm	Limit	Margin (dB)
Low Channel								
1	906.01	101.75	PK	-107	10.2	4.95	30	-25.05
2	* 3817	51.32	PK	-107	10.8	-44.88	-15	-29.83
Middle Channel								
1	914.2	102.3	PK	-107	10.2	5.5	30	-24.5
2	* 3742.3	51.12	PK	-107	10.8	-45.08	-15	-30.58
High Channel								
1	924.0475	101.75	PK	-107	10.2	4.95	30	-25.05
2	* 3840.85	50.64	PK	-107	10.8	-45.56	-15	-30.51
PK - Peak detector								

* All spurious emissions are 20dB or more under the level of the fundamental.

Figure 7 Antenna Port Bandedge Spurious Emissions Plots TX Mode, Low, Middle, High Channels.

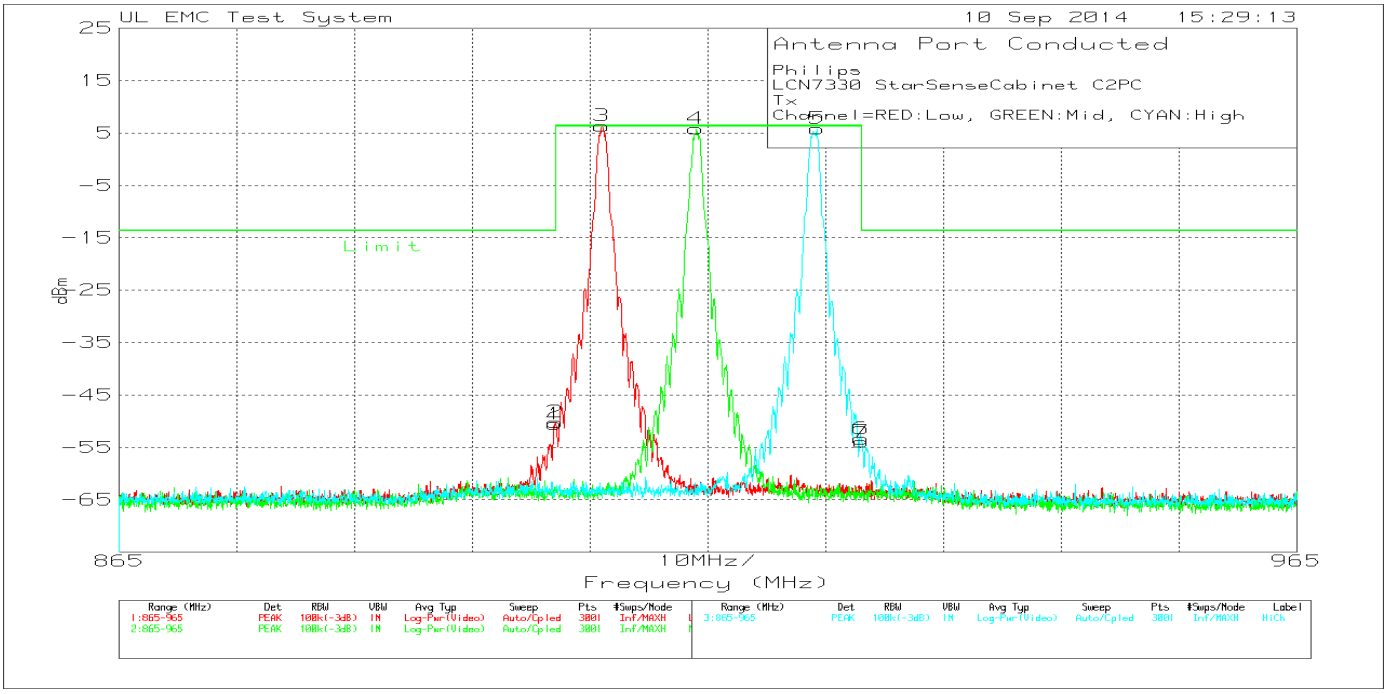
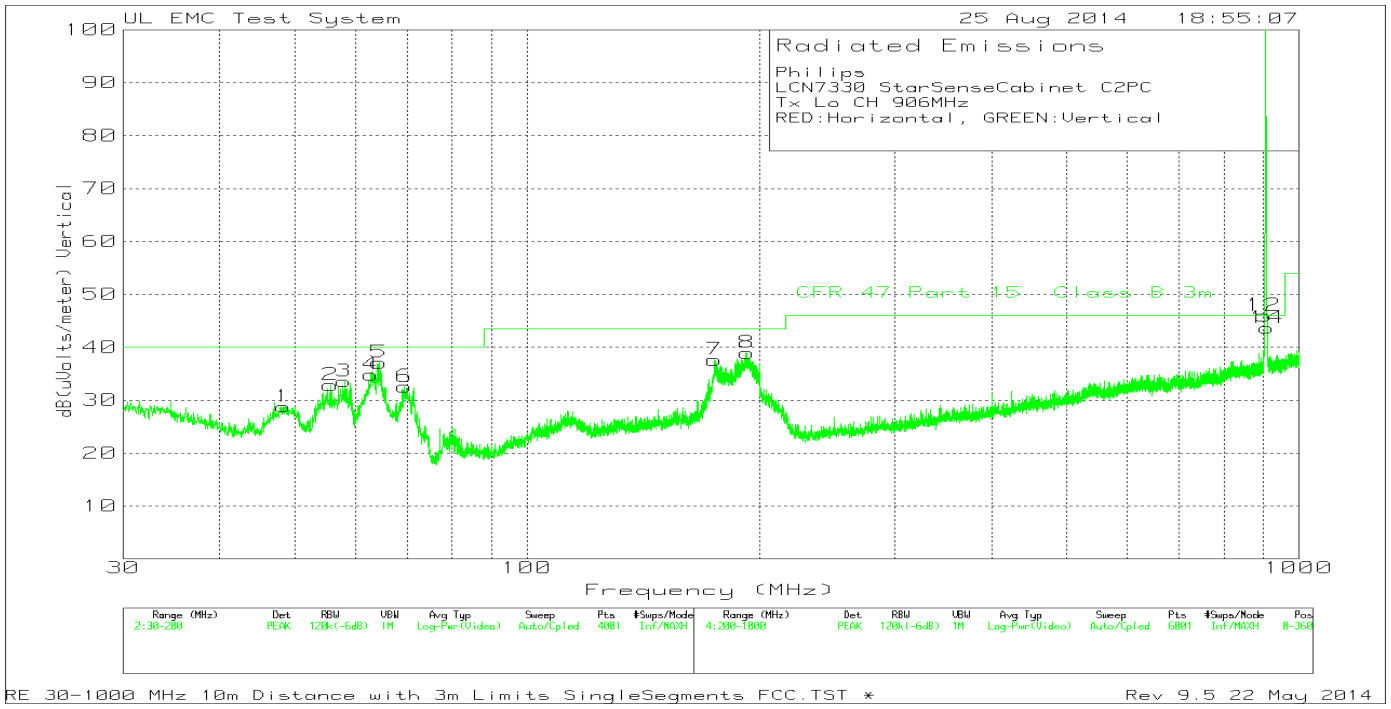


Table 8 Antenna Port Band-edge Spurious Emissions, Low, Middle, High Channels

Philips							
LCN7330 StarSenseCabinet C2PC							
Tx							
Channel=RED:Low, GREEN:Mid, CYAN:High							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	Limit	Margin (dB)
Low Channel							
1	901.9996	-60.75	PK	10.2	-50.55	-13.6	-36.92
2	902.033	-60.4	PK	10.2	-50.2	30	-80.2
3	905.9663	-3.87	PK	10.2	6.33	30	-23.67
Middle Channel							
4	913.9662	-4.39	PK	10.2	5.81	30	-24.19
High Channel							
5	924.2661	-4.37	PK	10.2	5.83	30	-24.17
6	927.9994	-63.55	PK	10.2	-53.35	30	-83.35
7	928.0327	-64.15	PK	10.2	-53.95	-13.6	-40.32
PK - Peak detector							

Figure 8 Radiated Spurious Emissions below 1GHz, Low Channel



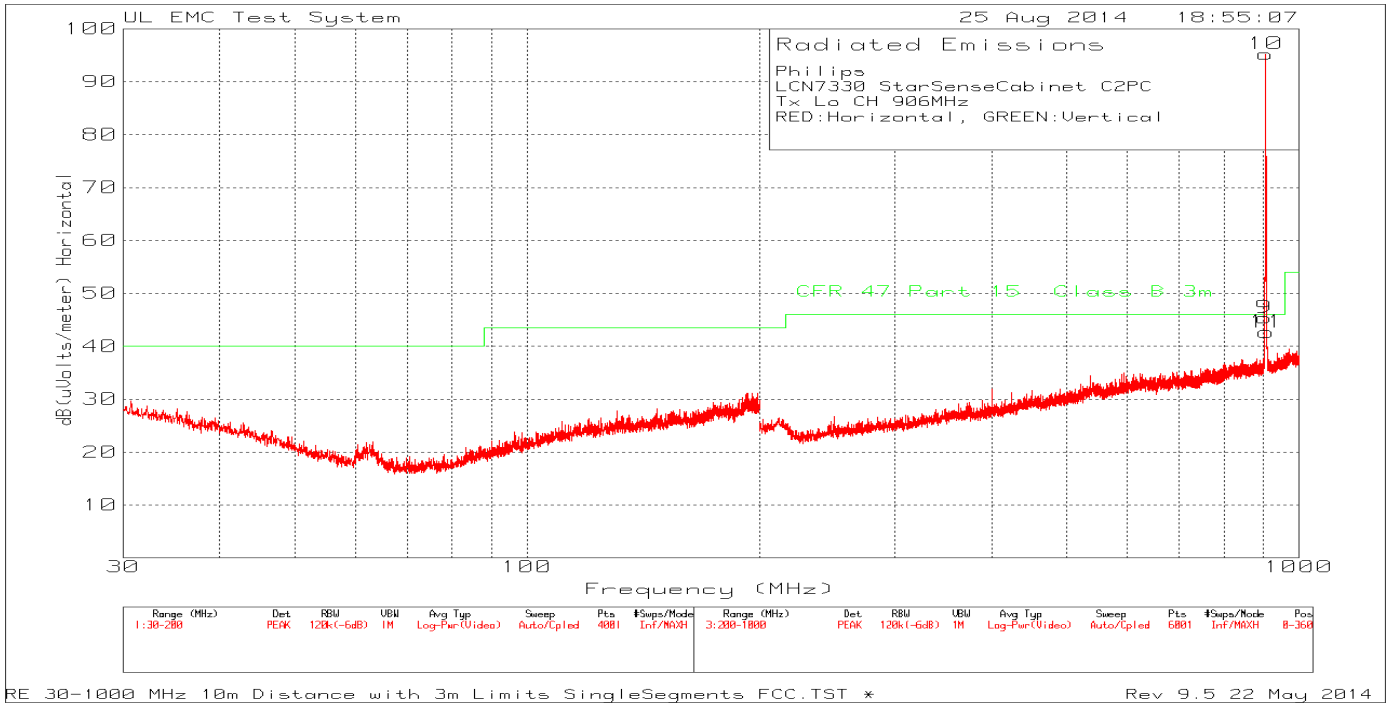
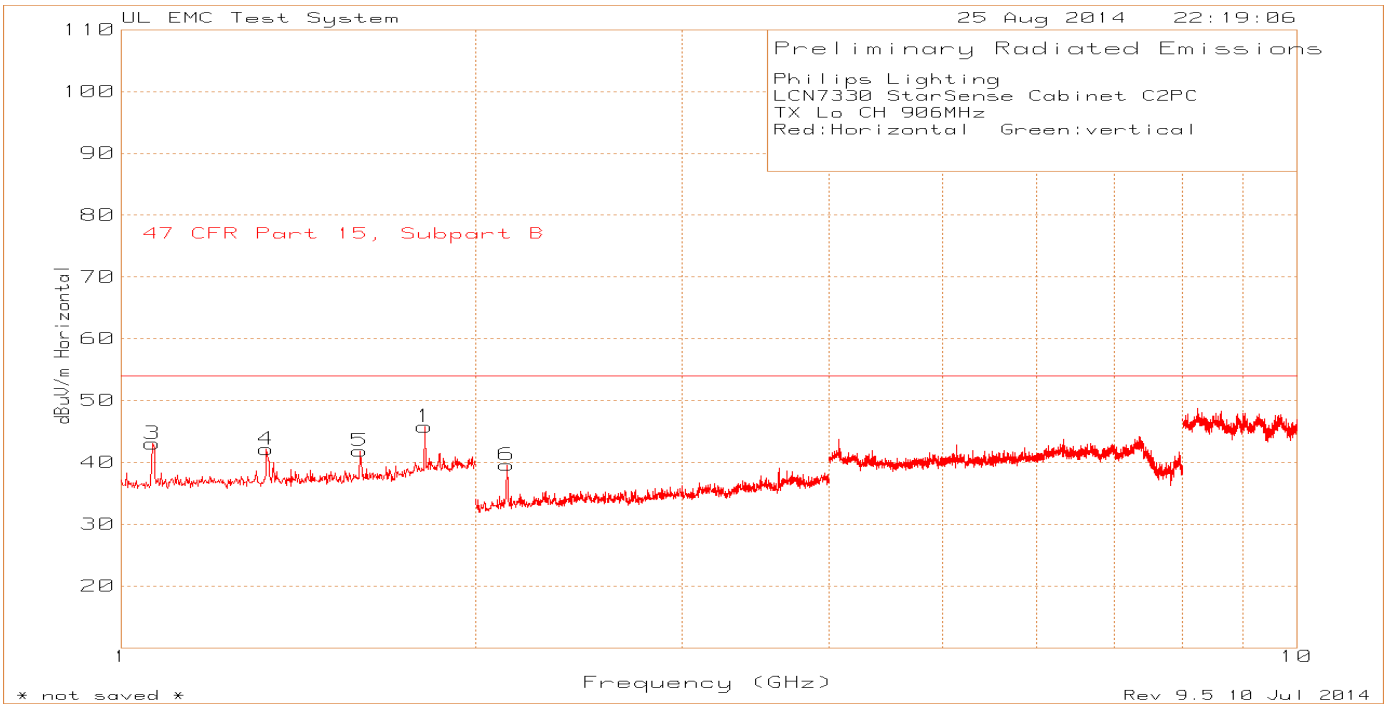


Table 9 Radiated Spurious Emissions below 1GHz, Low Channel

Philips												
LCN7330 StarSenseCabinet C2PC												
Tx Lo CH 906MHz												
RED:Horizontal, GREEN:Vertical												
Trace Markers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	48.36	37.51	PK	10.9	-30.1	10.5	28.81	-	-	0-360	99	V
2	55.67	44.45	PK	8	-30.1	10.5	32.85	-	-	0-360	99	V
3	57.965	45.88	PK	7.3	-30.1	10.5	33.58	-	-	0-360	249	V
4	62.81	47.86	PK	6.5	-30	10.5	34.86	-	-	0-360	249	V
5	64.34	50.32	PK	6.3	-30	10.5	37.12	-	-	0-360	249	V
6	69.3975	45.76	PK	6.2	-29.9	10.5	32.56	-	-	0-360	249	V
7	175.01	40.97	PK	15.5	-29.3	10.5	37.67	-	-	0-360	99	V
8	192.86	41.36	PK	16	-28.9	10.5	38.96	-	-	0-360	99	V
9	903.0649	36.6	PK	23	-24.7	10.5	45.4	-	-	0-360	199	H
10	905.9982	86.51	PK	23.1	-24.9	10.5	95.21	-	-	0-360	199	H
11	908.7982	33.65	PK	23.3	-24.8	10.5	42.65	-	-	0-360	199	H
12	901.8649	37.27	PK	22.9	-24.7	10.5	45.97	-	-	0-360	99	V
13	905.8649	94.8	PK	23.1	-24.9	10.5	103.5	-	-	0-360	99	V
14	909.8649	34.57	PK	23.3	-24.7	10.5	43.67	-	-	0-360	399	V
PK - Peak detector												
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	62.8906	41.9	QP	6.5	-30	10.5	28.9	-	-	286	340	V
	64.3566	43.89	QP	6.3	-30	10.5	30.69	-	-	251	249	V
	175.0291	39.65	QP	15.5	-29.3	10.5	36.35	-	-	160	100	V
	192.896	37.44	QP	16	-28.9	10.5	35.04	-	-	188	100	V
QP - Quasi-Peak detector												

Figure 9 Radiated Spurious Emissions above 1GHz, Low Channel



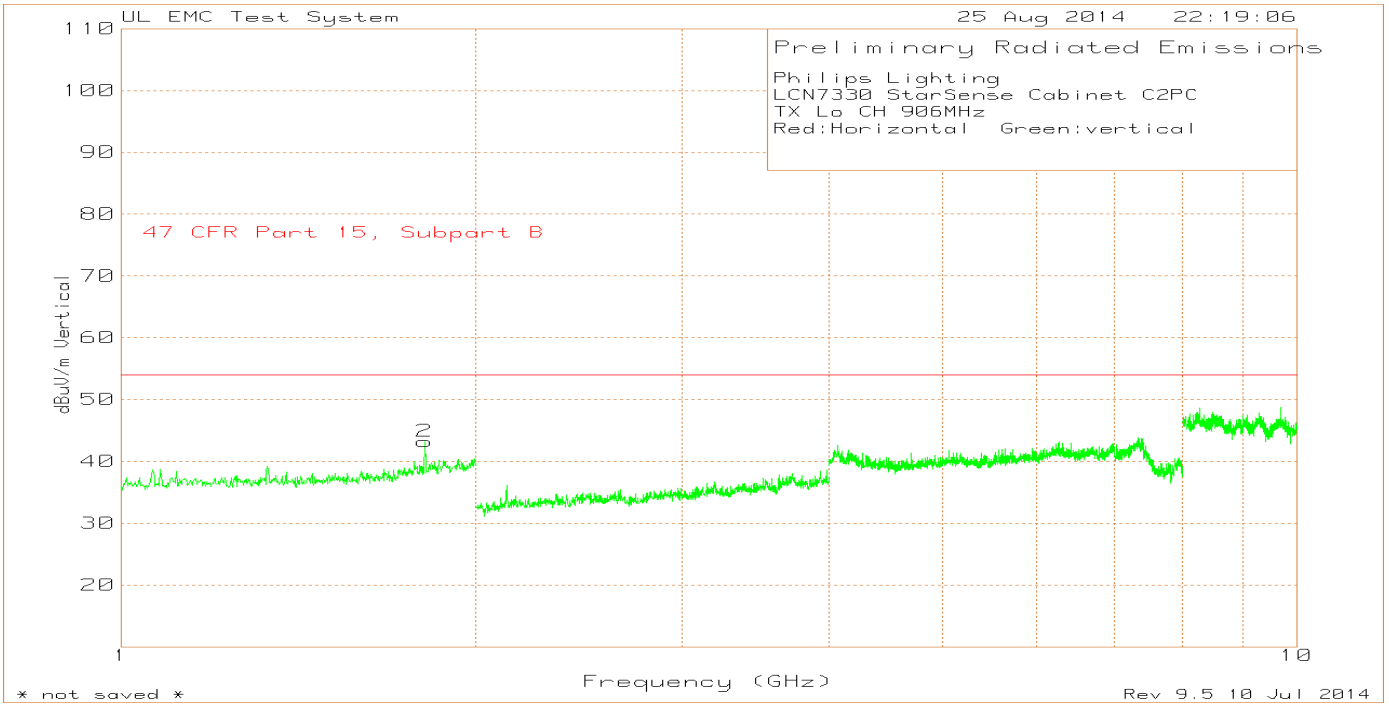
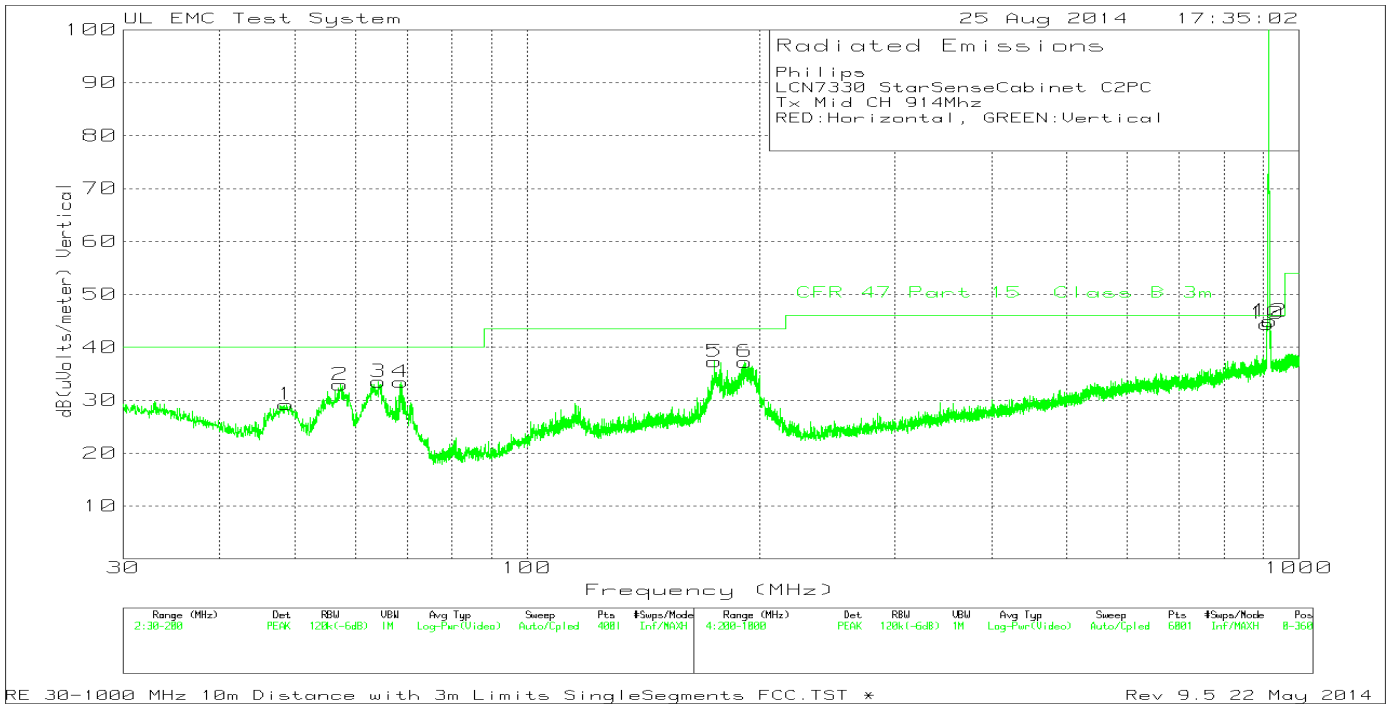


Table 10 Radiated Spurious Emissions above 1GHz, Low Channel

Philips Lighting												
LCN7330 StarSense Cabinet C2PC												
TX Lo CH 906MHz												
Red:Horizontal Green:vertical												
Trace Markers												
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	900MHz BRF Factor dB	Path Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.8116	71.9	PK	27	0.4	-53.53	45.77	54	-8.23	0-360	99	H
3	* 1.0621	74.04	PK	24.5	0.5	-56.01	43.03	54	-10.97	0-360	150	H
4	* 1.3287	71.73	PK	25.2	0.3	-55.11	42.12	54	-11.88	0-360	150	H
5	* 1.5952	69.9	PK	25.5	0.4	-53.95	41.85	54	-12.15	0-360	99	H
6	2.1281	70.25	PK	21.5	0	-52.16	39.59	54	-14.41	0-360	99	H
2	1.8116	69.35	PK	27	0.4	-53.53	43.22	54	-10.78	0-360	150	V
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band												
PK - Peak detector												

Figure 10 Radiated Spurious Emissions below 1GHz, Middle Channel



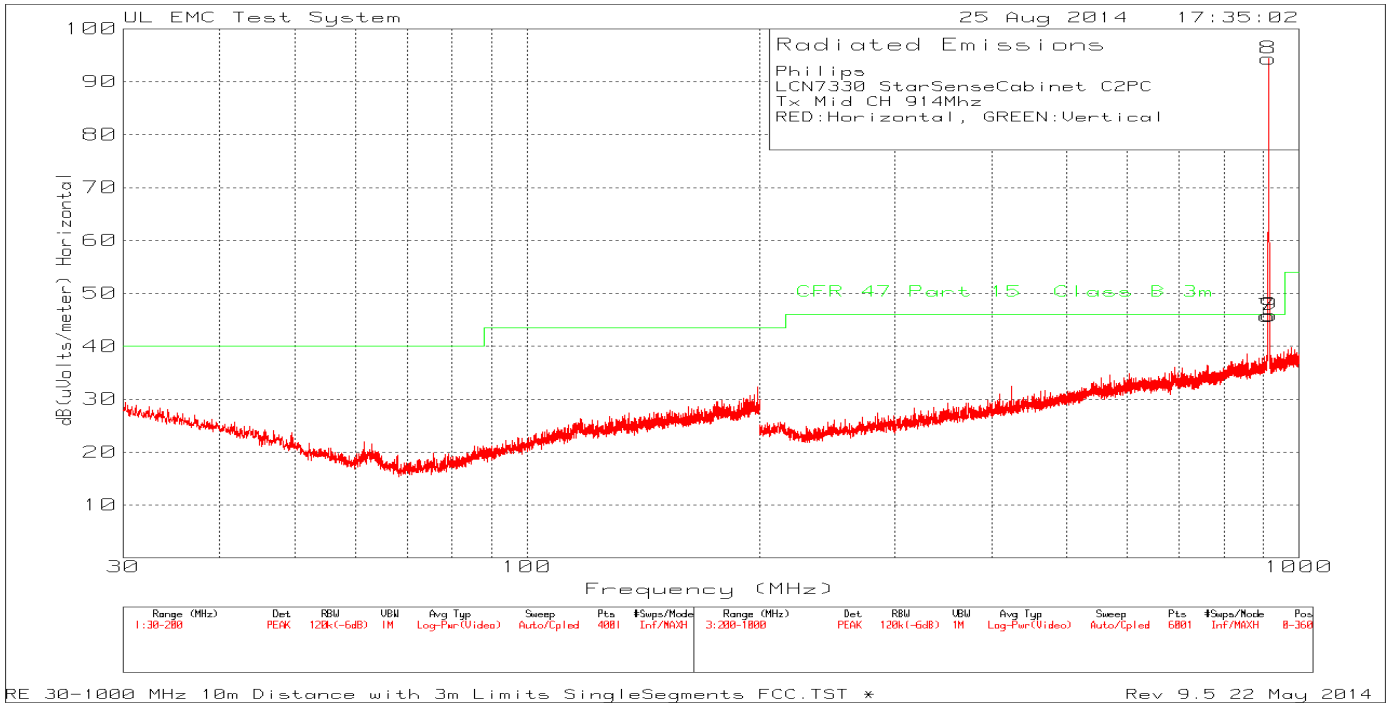
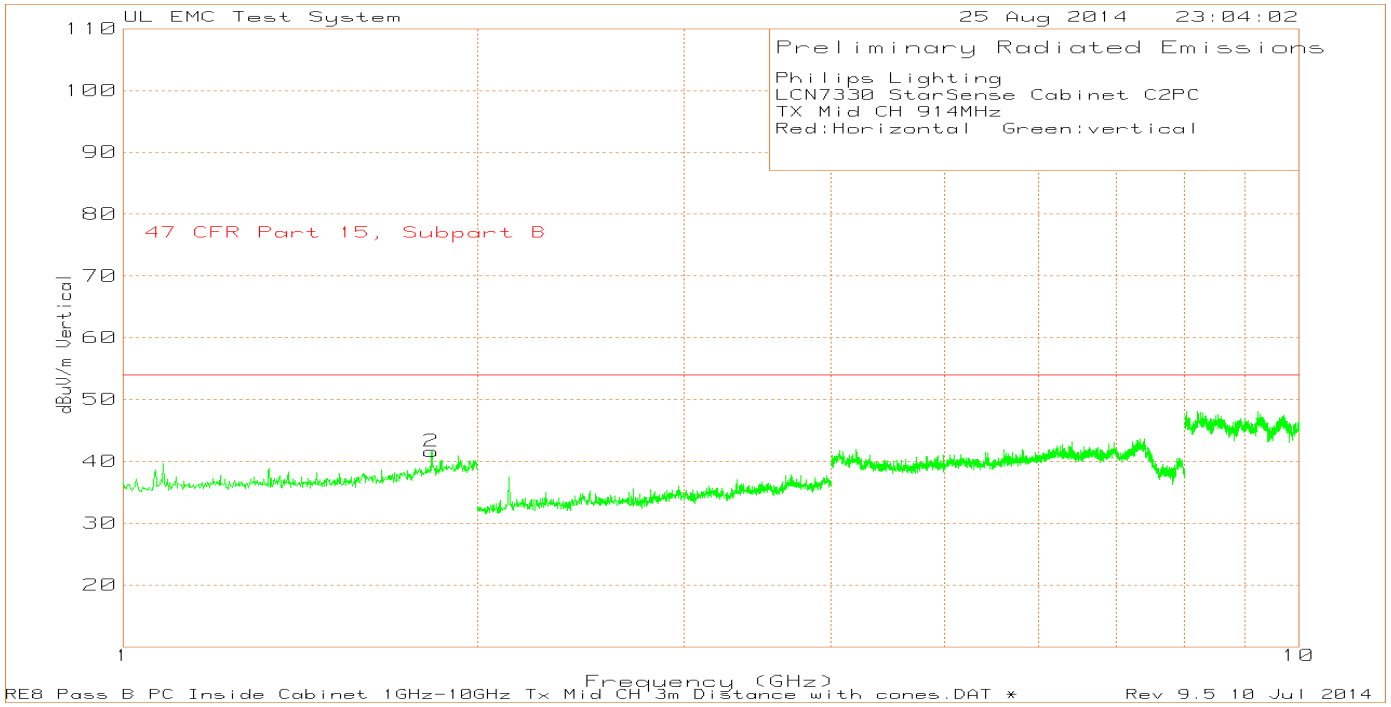


Table 11 Radiated Spurious Emissions below 1GHz, Middle Channel

Philips												
LCN7330 StarSenseCabinet C2PC												
Tx Mid CH 914Mhz												
RED:Horizontal, GREEN:Vertical												
Trace Markers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	48.785	38.1	PK	10.7	-30.1	10.5	29.2	-	-	0-360	99	V
2	57.285	44.93	PK	7.6	-30.1	10.5	32.93	-	-	0-360	249	V
3	64.2125	46.69	PK	6.3	-30	10.5	33.49	-	-	0-360	249	V
4	68.6325	46.73	PK	6.2	-30	10.5	33.43	-	-	0-360	249	V
5	175.01	40.62	PK	15.5	-29.3	10.5	37.32	-	-	0-360	99	V
6	191.585	39.67	PK	16	-28.9	10.5	37.27	-	-	0-360	99	V
7	911.0649	36.63	PK	23.3	-24.7	10.5	45.73	-	-	0-360	99	H
8	914.1315	85.37	PK	23.1	-24.6	10.5	94.37	-	-	0-360	199	H
9	916.9315	37.1	PK	23	-24.7	10.5	45.9	-	-	0-360	199	H
10	909.8649	35.34	PK	23.3	-24.7	10.5	44.44	-	-	0-360	99	V
11	913.9982	95.07	PK	23.1	-24.6	10.5	104.07	-	-	0-360	99	V
12	917.8649	36.2	PK	23	-24.8	10.5	44.9	-	-	0-360	99	V
PK - Peak detector												

Figure 11 Radiated Spurious Emissions above 1GHz, Middle Channel



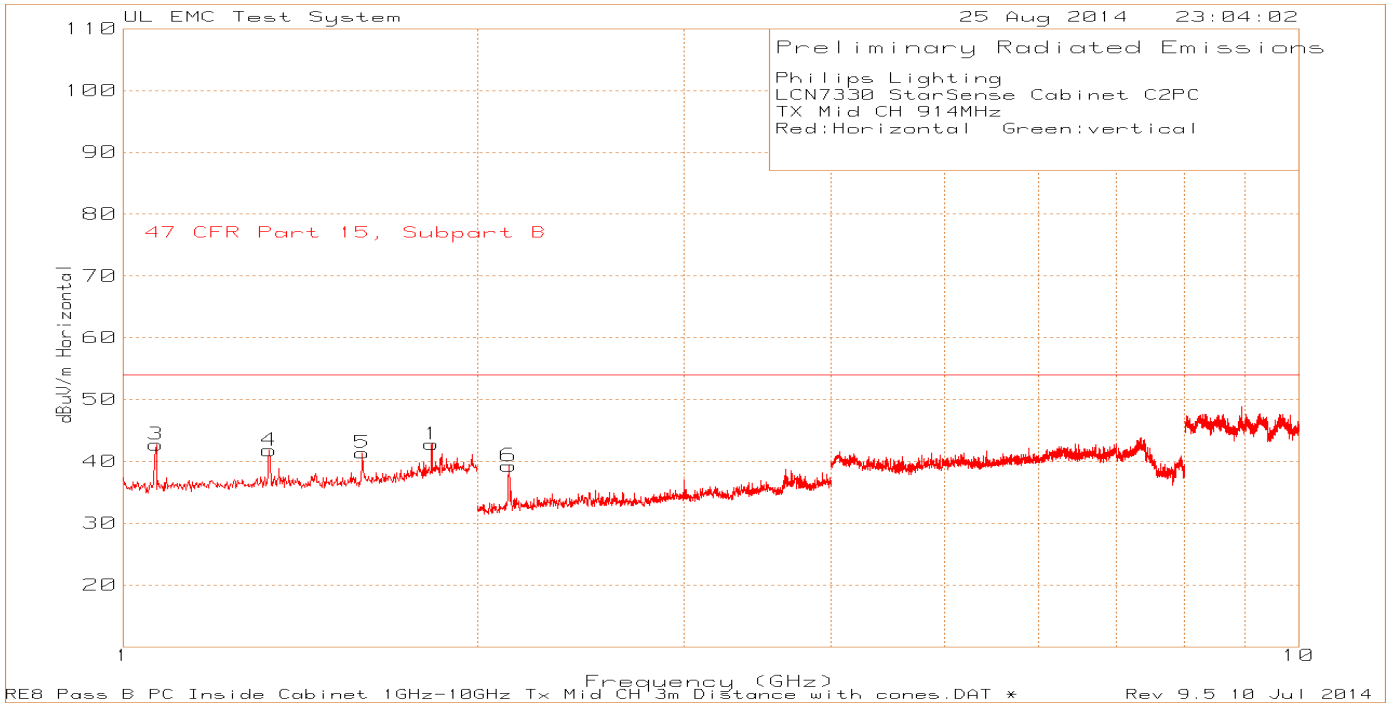
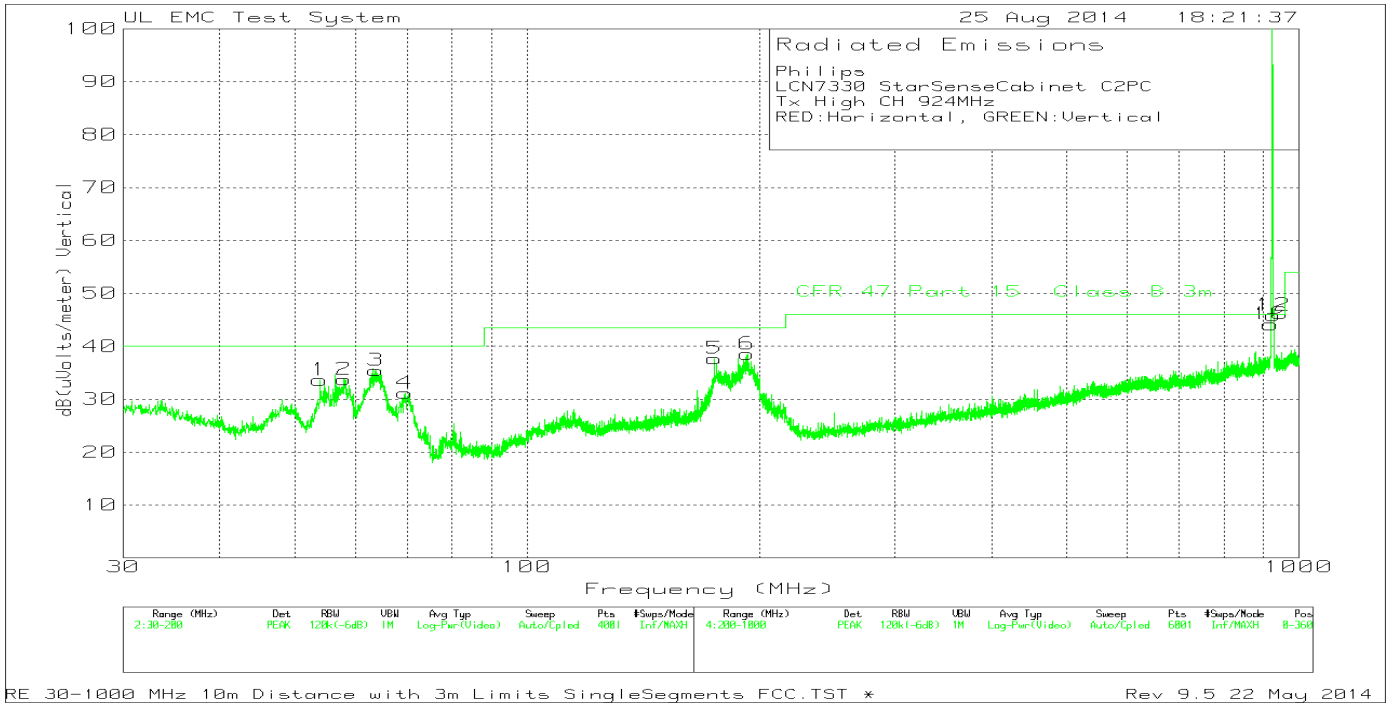


Table 12 Radiated Spurious Emissions above 1GHz, Middle Channel

Philips Lighting												
LCN7330 StarSense Cabinet C2PC												
TX Mid CH 914MHz												
Red:Horizontal Green:vertical												
Trace Markers												
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	900MHz BRF Factor dB	Path Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.8297	68.8	PK	27.1	0.4	-53.52	42.78	54	-11.22	0-360	100	H
3	* 1.0661	73.61	PK	24.6	0.5	-55.98	42.73	54	-11.27	0-360	150	H
4	* 1.3307	71.39	PK	25.2	0.3	-55.12	41.77	54	-12.23	0-360	100	H
5	* 1.5972	69.43	PK	25.5	0.4	-53.95	41.38	54	-12.62	0-360	100	H
6	2.1281	69.92	PK	21.5	0	-52.16	39.26	54	-14.74	0-360	99	H
2	1.8287	67.64	PK	27.1	0.4	-53.53	41.61	54	-12.39	0-360	100	V
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band												
PK - Peak detector												

Figure 12 Radiated Spurious Emissions below 1GHz, High Channel



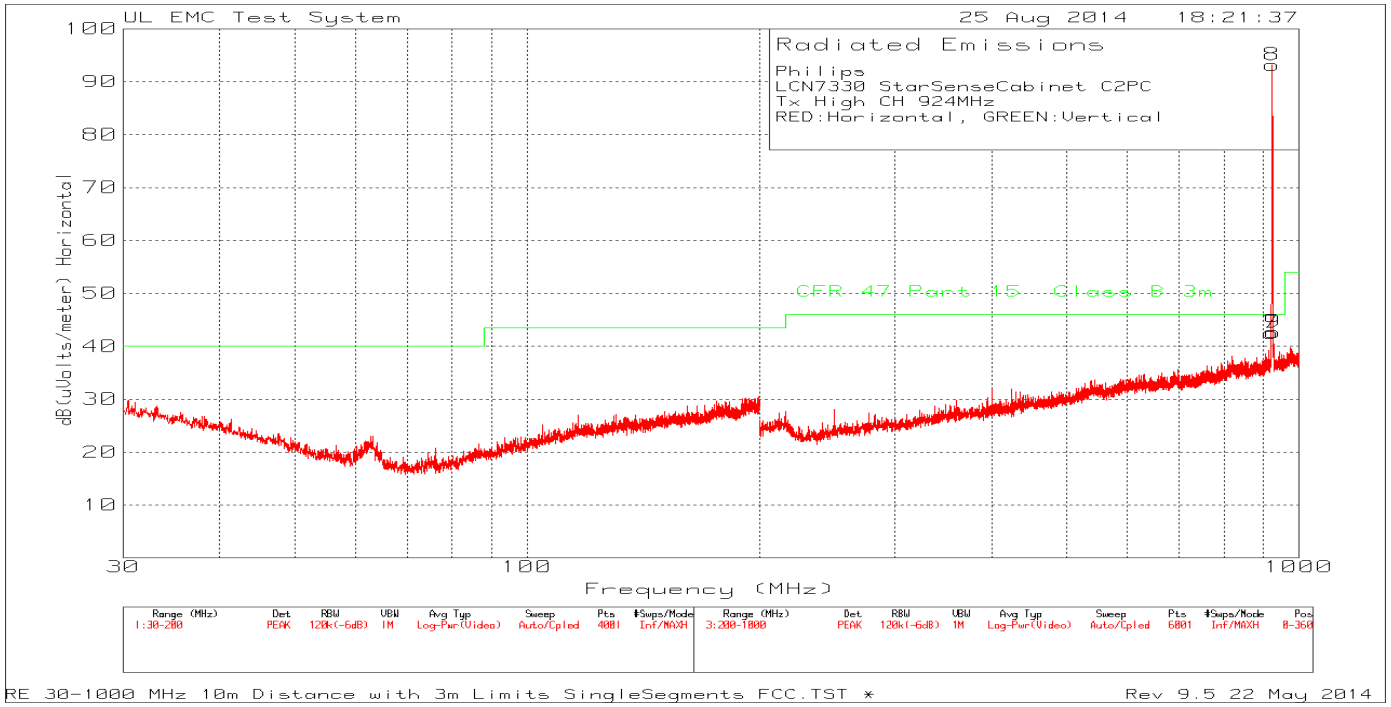
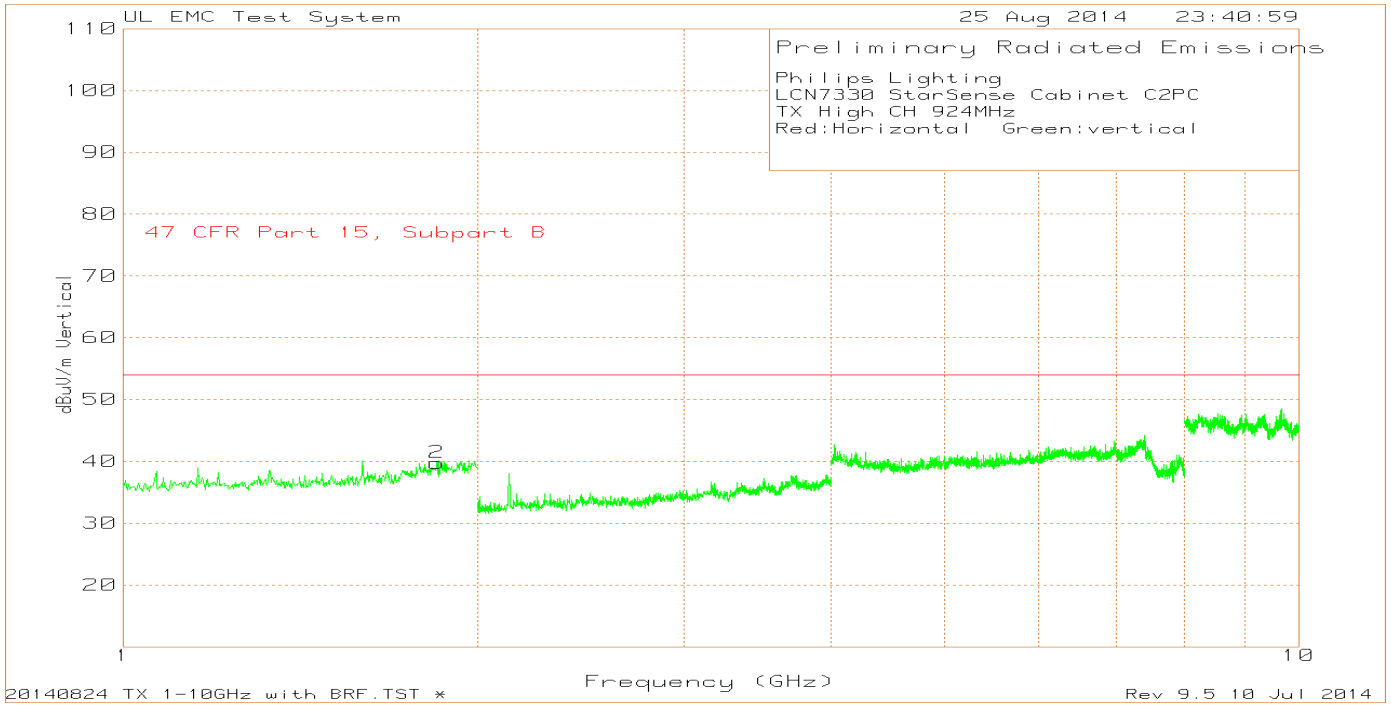


Table 13 Radiated Spurious Emissions below 1GHz, High Channel

Philips												
LCN7330 StarSenseCabinet C2PC												
Tx High CH 924MHz												
RED:Horizontal, GREEN:Vertical												
Trace Markers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	53.9275	44.52	PK	8.6	-30	10.5	33.62	-	-	0-360	249	V
2	57.9225	46.03	PK	7.3	-30.1	10.5	33.73	-	-	0-360	249	V
3	63.7025	48.53	PK	6.4	-30	10.5	35.43	-	-	0-360	249	V
4	69.4825	44.39	PK	6.2	-29.9	10.5	31.19	-	-	0-360	249	V
5	175.01	40.98	PK	15.5	-29.3	10.5	37.68	-	-	0-360	99	V
6	192.945	40.93	PK	16	-28.9	10.5	38.53	-	-	0-360	99	V
7	921.3315	34.08	PK	22.9	-24.9	10.5	42.58	-	-	0-360	199	H
8	924.1315	84.54	PK	22.8	-24.7	10.5	93.14	-	-	0-360	199	H
9	926.7982	33.76	PK	22.9	-24.5	10.5	42.66	-	-	0-360	199	H
10	920.2649	35.67	PK	22.9	-24.9	10.5	44.17	-	-	0-360	399	V
11	924.3982	93.8	PK	22.8	-24.7	10.5	102.4	-	-	0-360	99	V
12	927.7315	36.75	PK	23	-24.4	10.5	45.85	-	-	0-360	399	V
PK - Peak detector												
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	63.9279	41.69	QP	6.3	-30	10.5	28.49	-	-	2	245	V
	175.0645	37.04	QP	15.5	-29.3	10.5	33.74	-	-	156	101	V
	192.949	38.14	QP	16	-28.9	10.5	35.74	-	-	185	102	V
QP - Quasi-Peak detector												

Figure 13 Radiated Spurious Emissions above 1GHz, High Channel



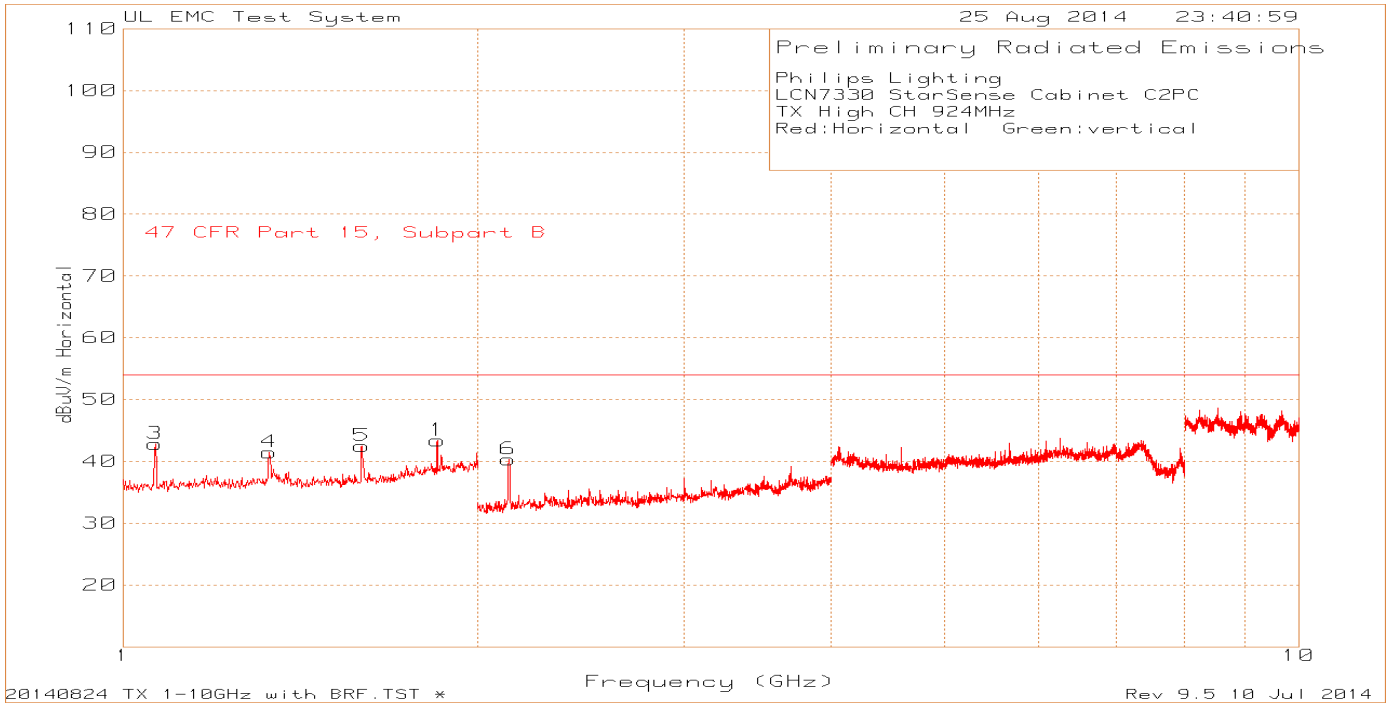


Table 14 Radiated Spurious Emissions above 1GHz, High Channel

Philips Lighting												
LCN7330 StarSense Cabinet C2PC												
TX High CH 924MHz												
Red:Horizontal Green:vertical												
Trace Markers												
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	900MHz BRF Factor dB	Path Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.8497	68.98	PK	27.3	0.5	-53.42	43.36	54	-10.64	0-360	100	H
3	* 1.0641	73.75	PK	24.6	0.5	-56	42.85	54	-11.15	0-360	150	H
4	* 1.3307	71.11	PK	25.2	0.3	-55.12	41.49	54	-12.51	0-360	150	H
5	* 1.5952	70.56	PK	25.5	0.4	-53.95	42.51	54	-11.49	0-360	100	H
6	2.1261	71	PK	21.5	0	-52.18	40.32	54	-13.68	0-360	150	H
2	1.8477	65.52	PK	27.2	0.5	-53.44	39.78	54	-14.22	0-360	150	V
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band												
PK - Peak detector												

4.4 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 15 6dB Bandwidth Configuration Settings

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

Table 16 6dB Bandwidth Results

Mode	Channel	6dB Bandwidth
TX	Low	834.1
	Middle	806.2
	High	833.0

Figure 14 6dB Bandwidth Graphs – Low Channel

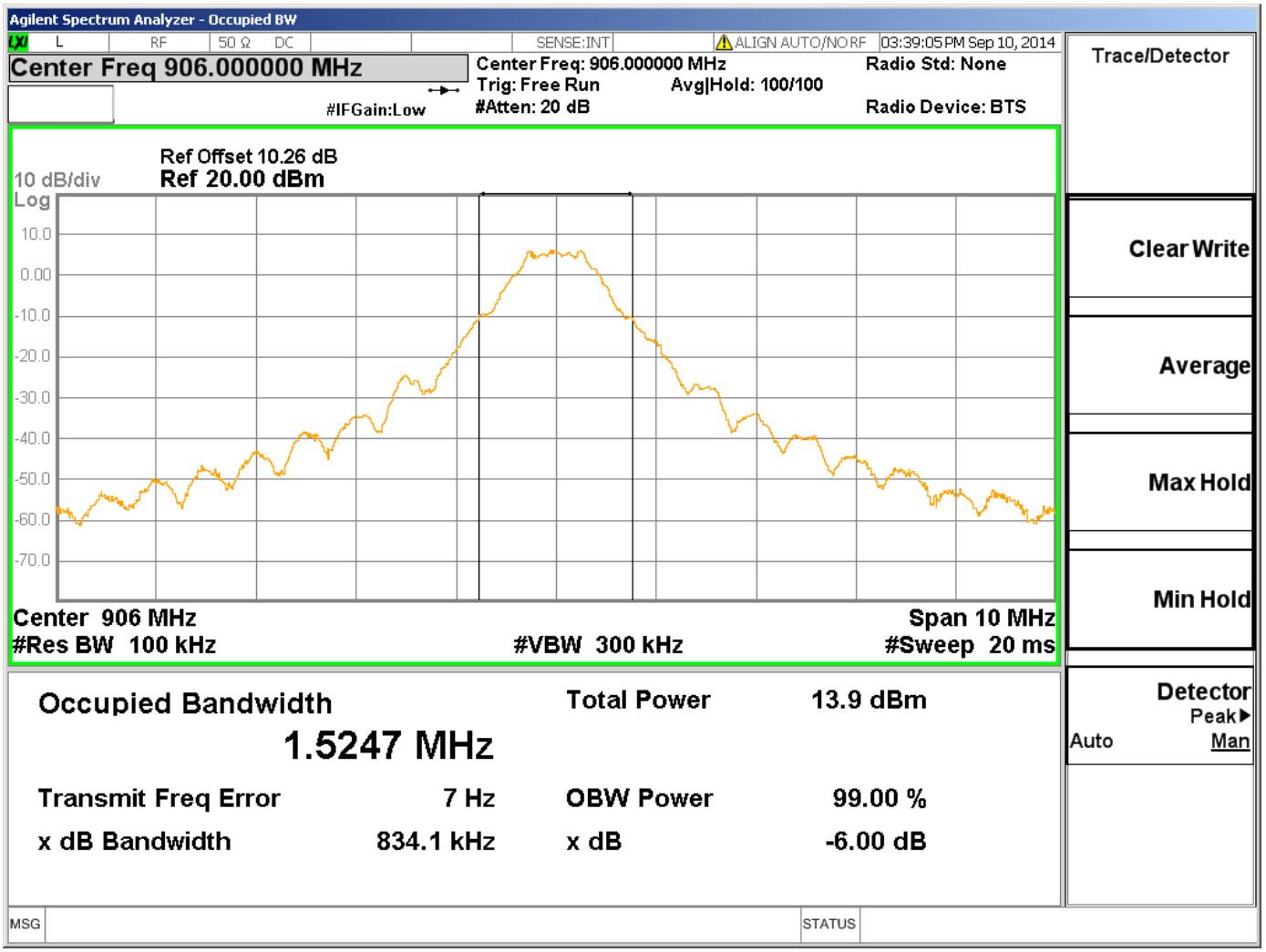


Figure 15 6dB Bandwidth Graphs – Middle Channel

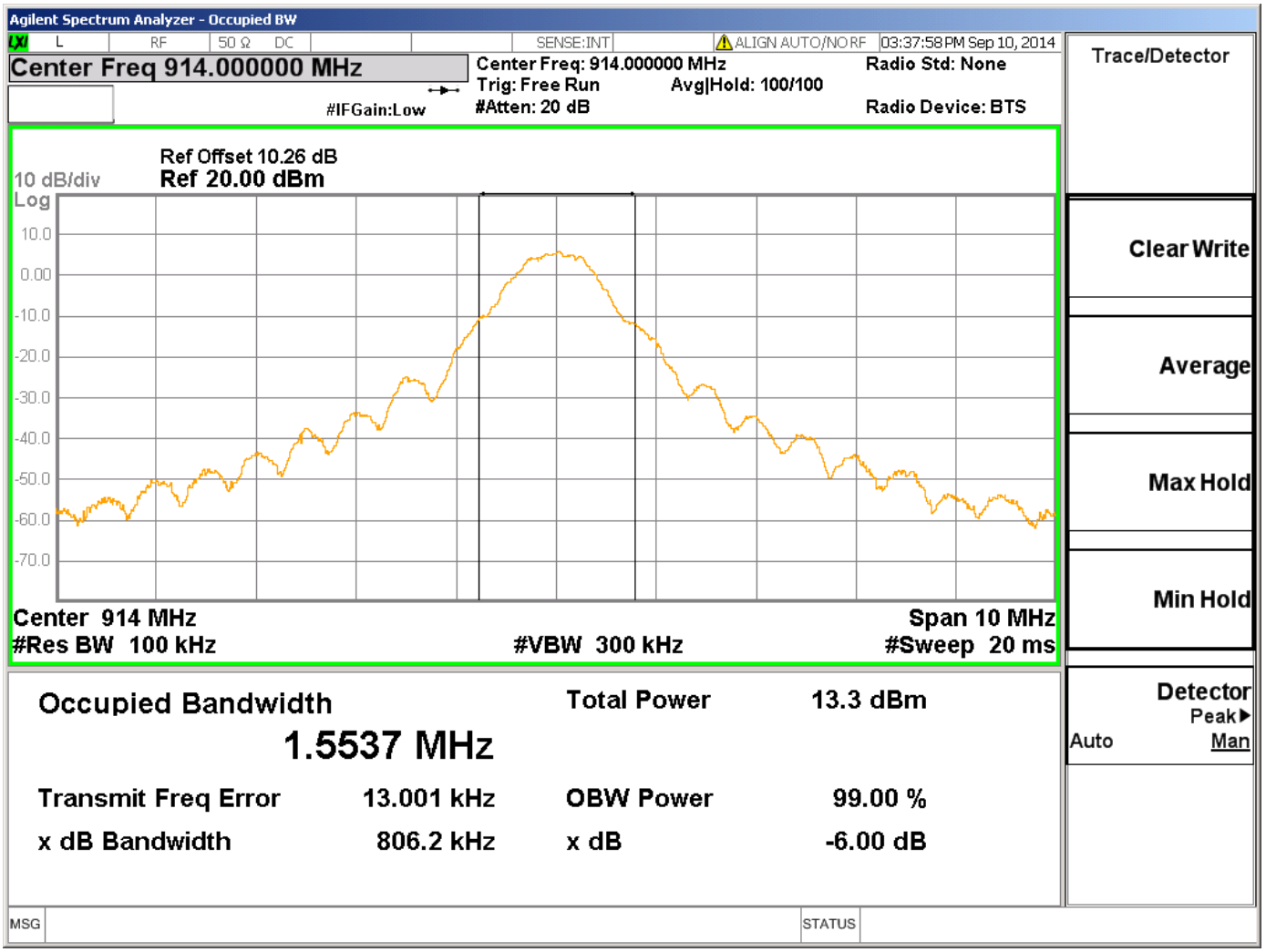
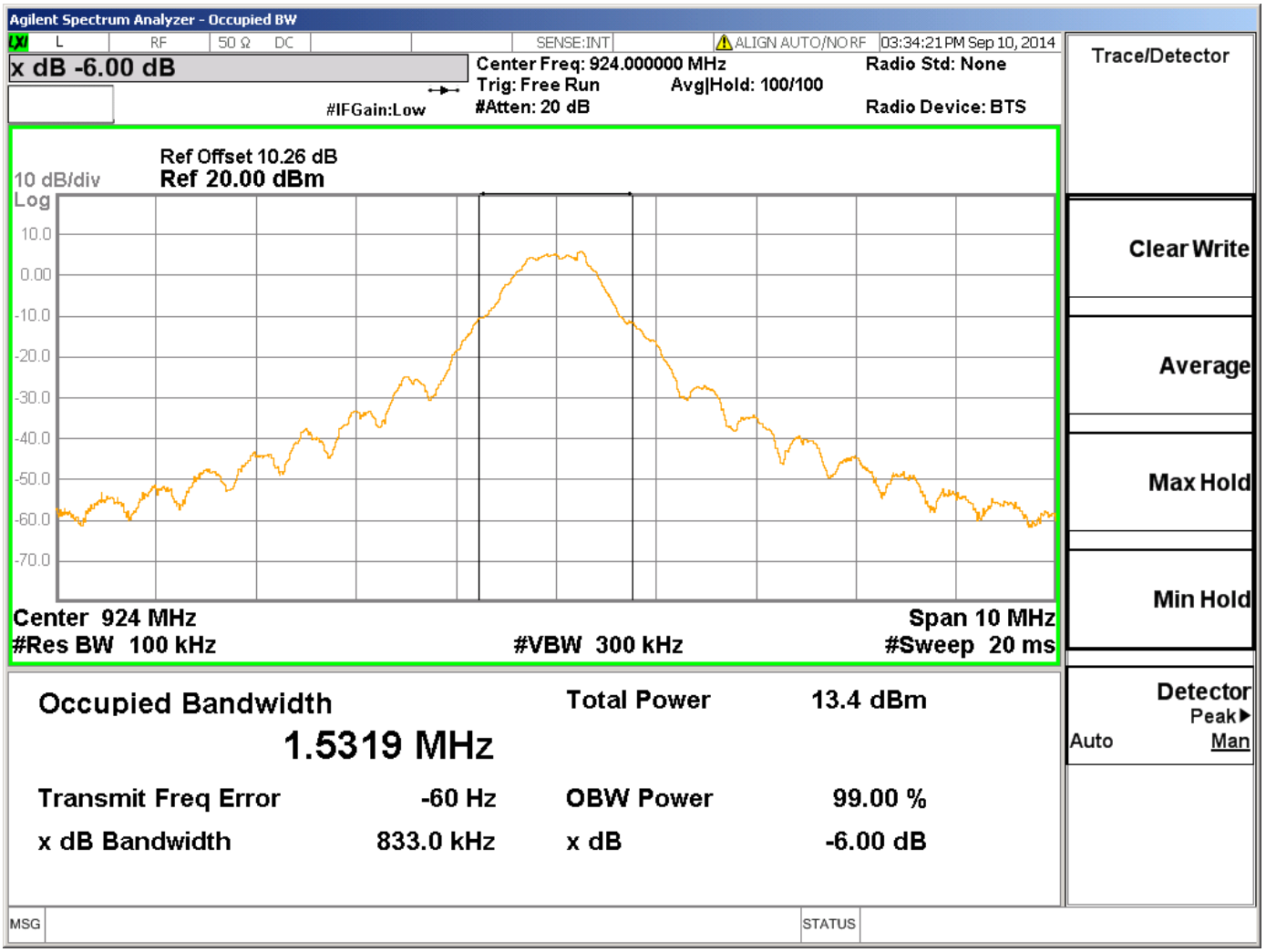


Figure 16 6dB Bandwidth Graphs – High Channel



4.5 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 17 Maximum Peak Output Power EUT Configuration Settings

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

Table 18 Maximum Peak Output Power Results

Channel	Limit (dBm)	Power dBm	Power W
Low Channel	30	8.172	0.006564
Middle Channel	30	7.963	0.006256
High Channel	30	7.894	0.006157

Figure 17 Maximum Peak Output Power Graphs – Low Channel

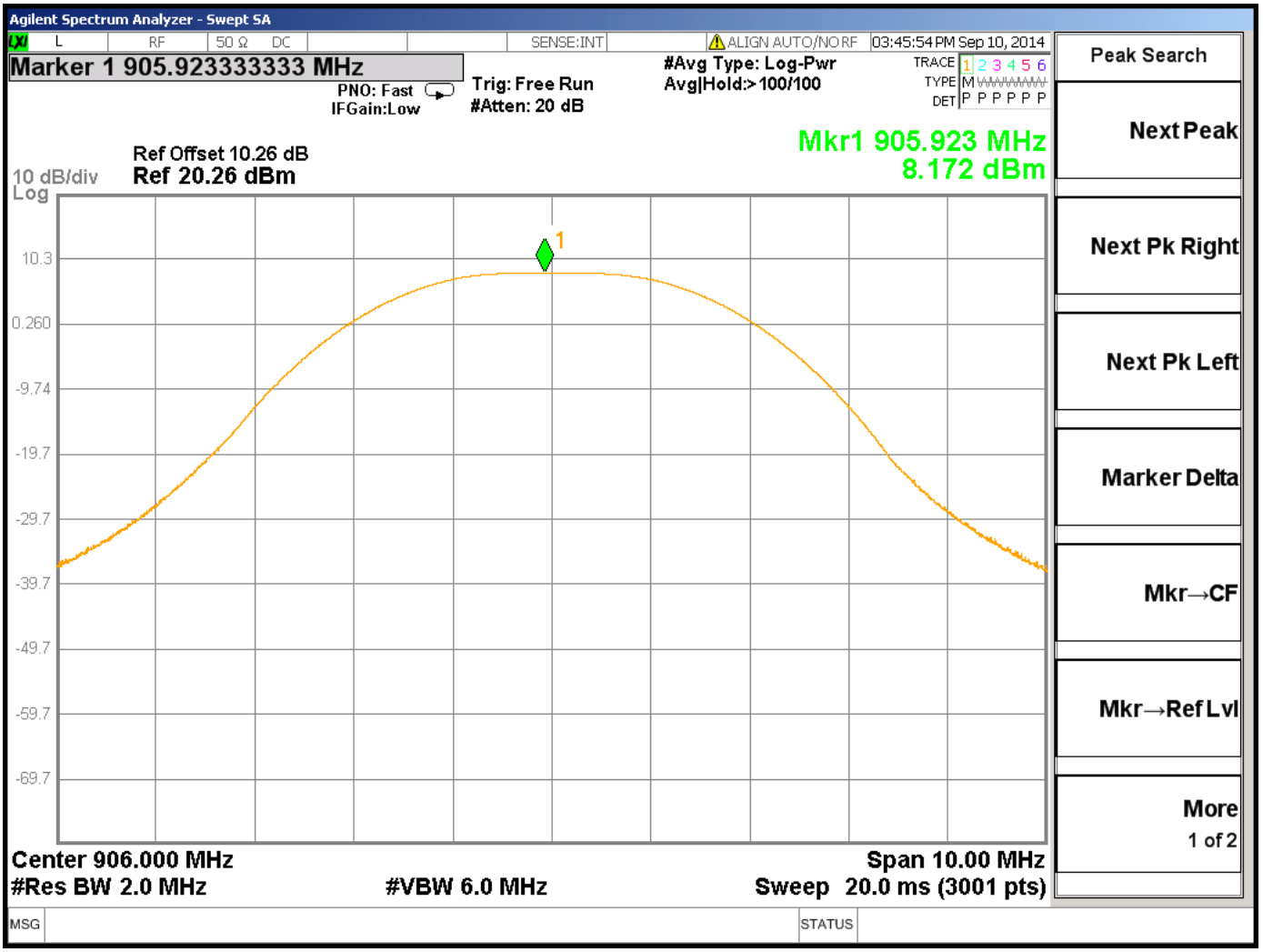


Figure 18 Maximum Peak Output Power Graphs – Mid Channel

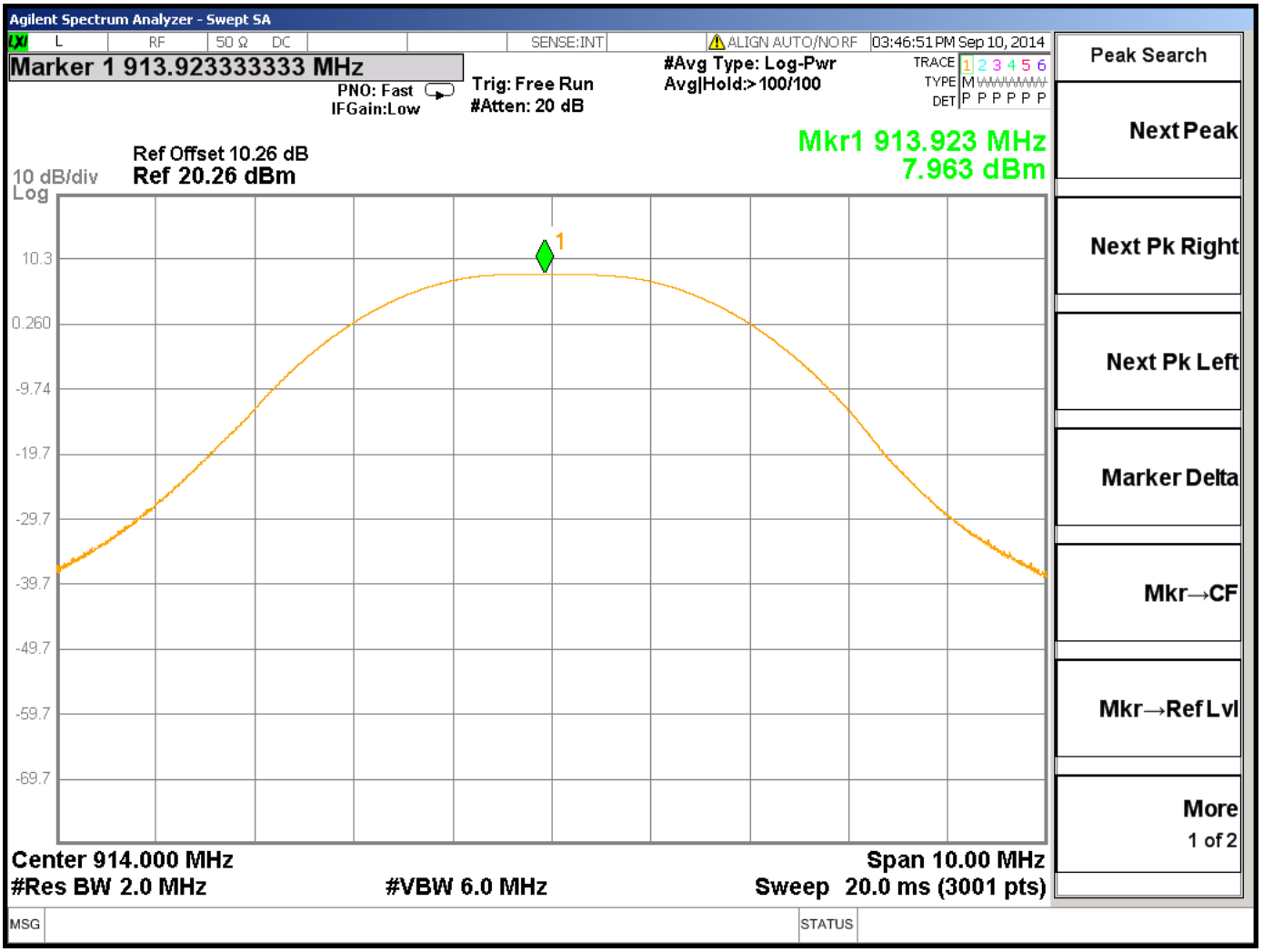
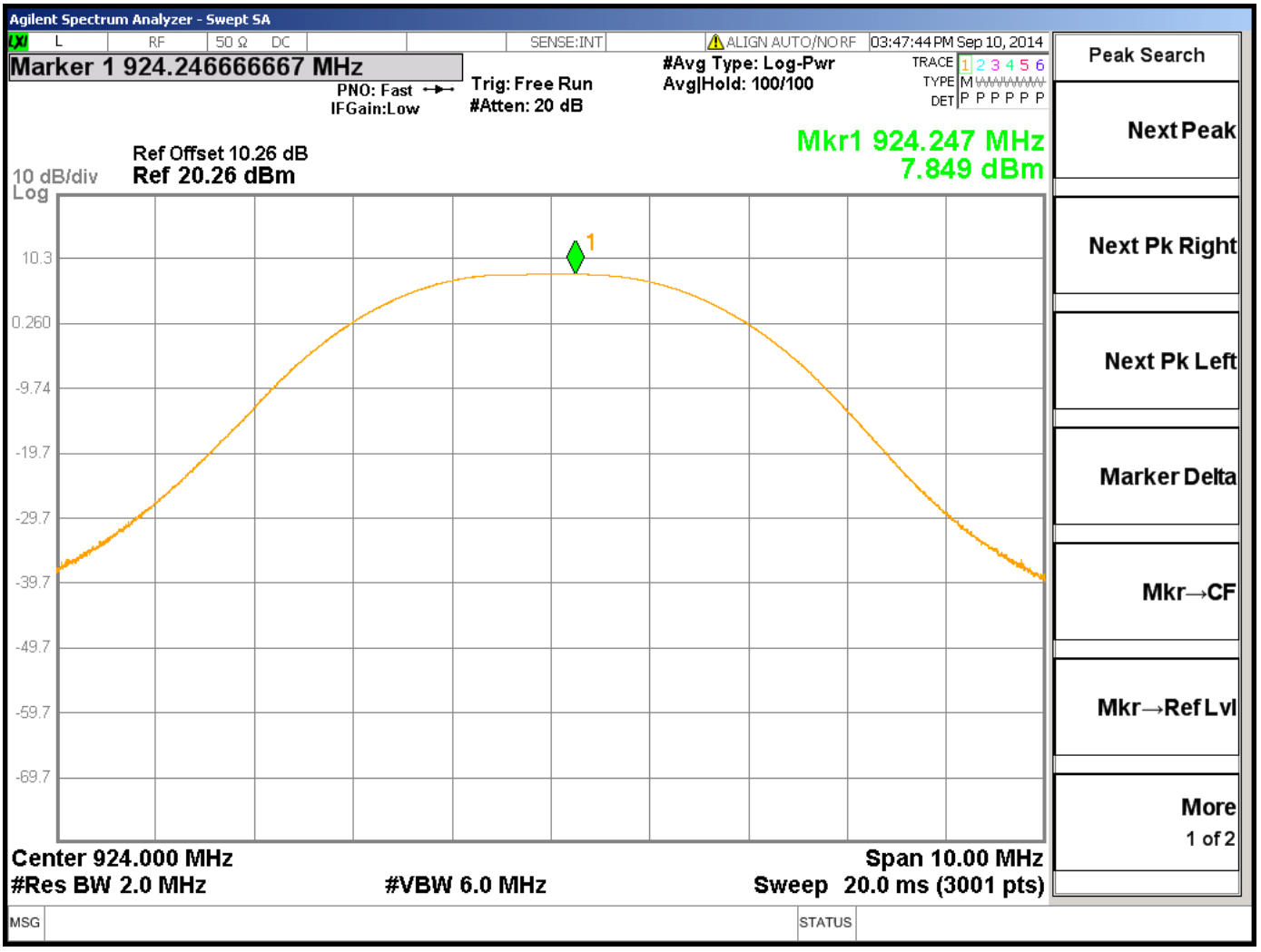


Figure 19 Maximum Peak Output Power Graphs – High Channel



4.6 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: None		

Table 19 Power Spectral Density EUT Configuration Settings

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

Table 20 Power Spectral Density Power Results

Channel	Limit (dBm)	Power Density dBm
Low Channel	8	3.764
Middle Channel	8	3.006
High Channel	8	3.262

Figure 20 Power Spectral Density Graphs – Low Channel

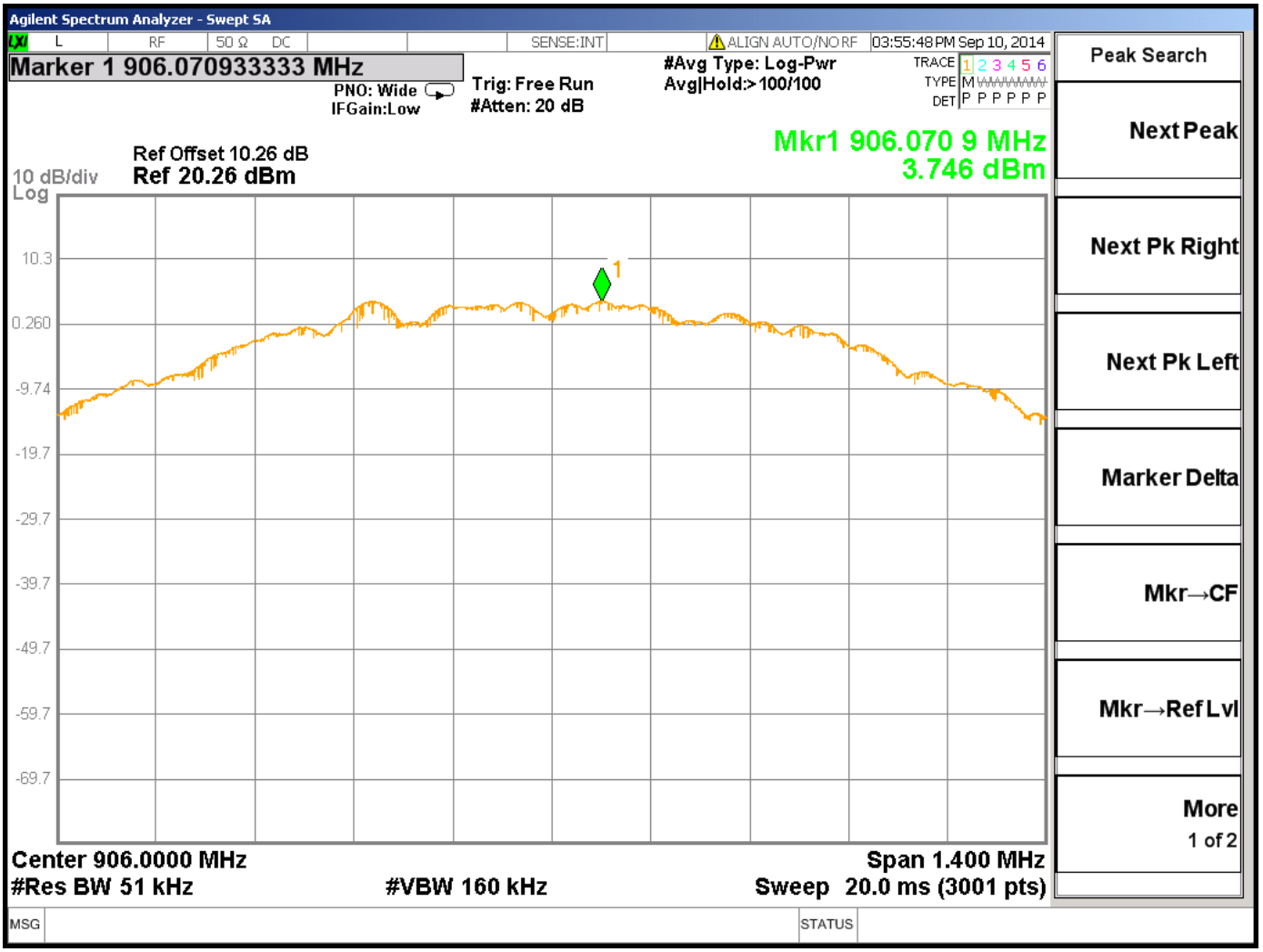


Figure 21 Power Spectral Density Graphs – Middle Channel

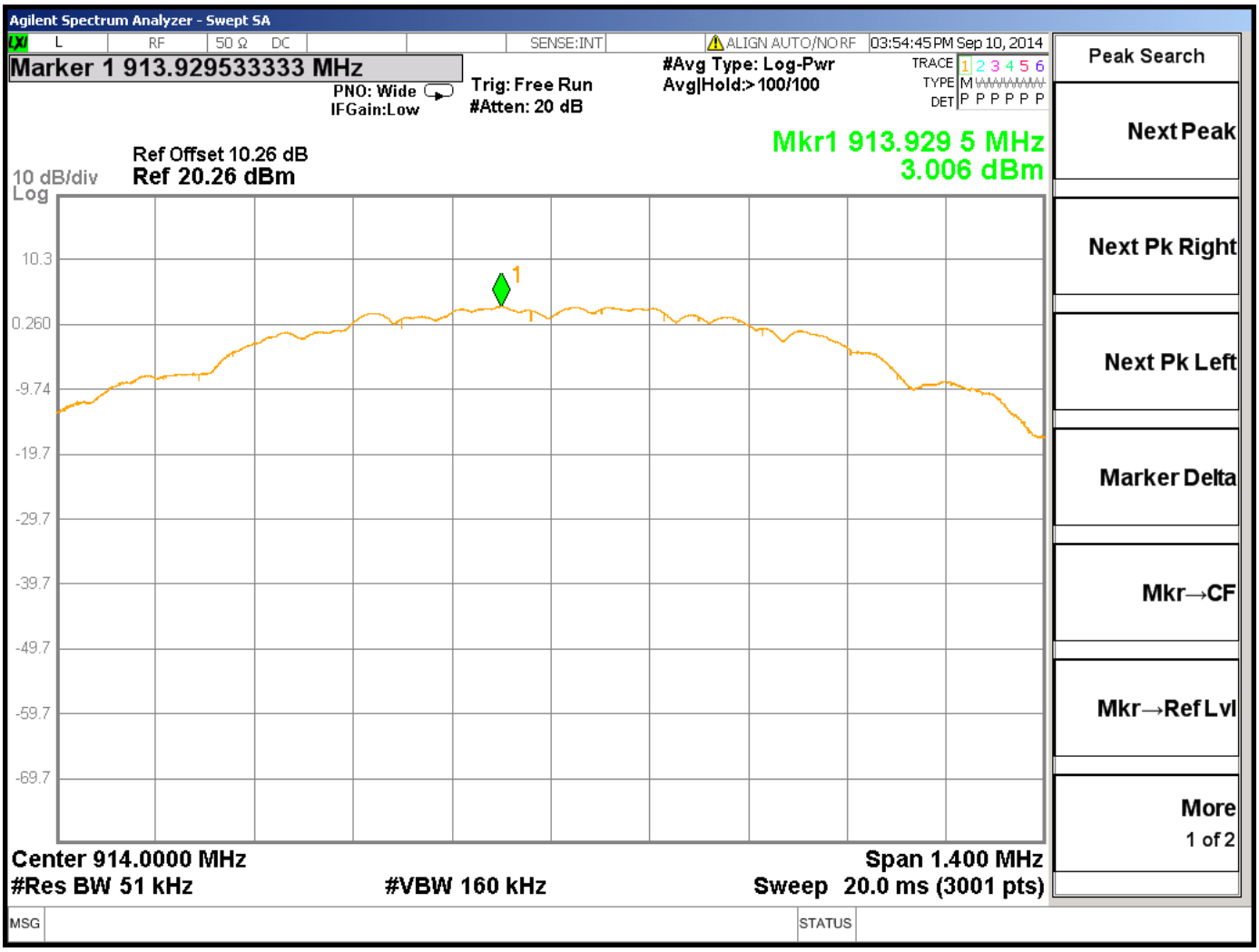
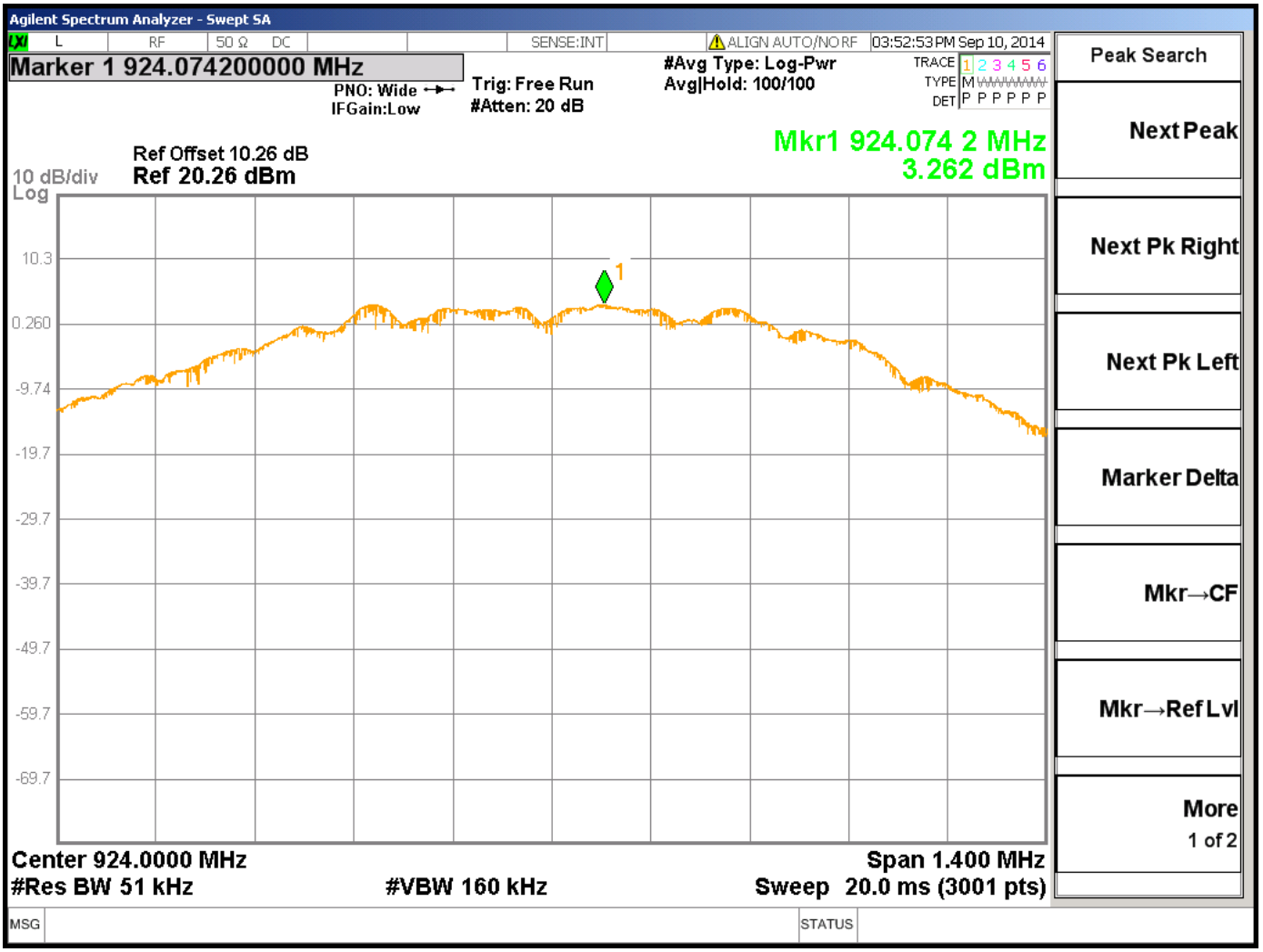


Figure 22 Power Spectral Density Graphs – High Channel



4.7 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, 6.6

Table 21 99% Power Bandwidth Configuration Settings

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

Table 22 99% Power Bandwidth Results

Mode	Channel	99% Power Bandwidth MHz
TX	Low	1.5163
	Middle	1.5412
	High	1.5237

Figure 23 99% Power Bandwidth Graphs – Low Channel

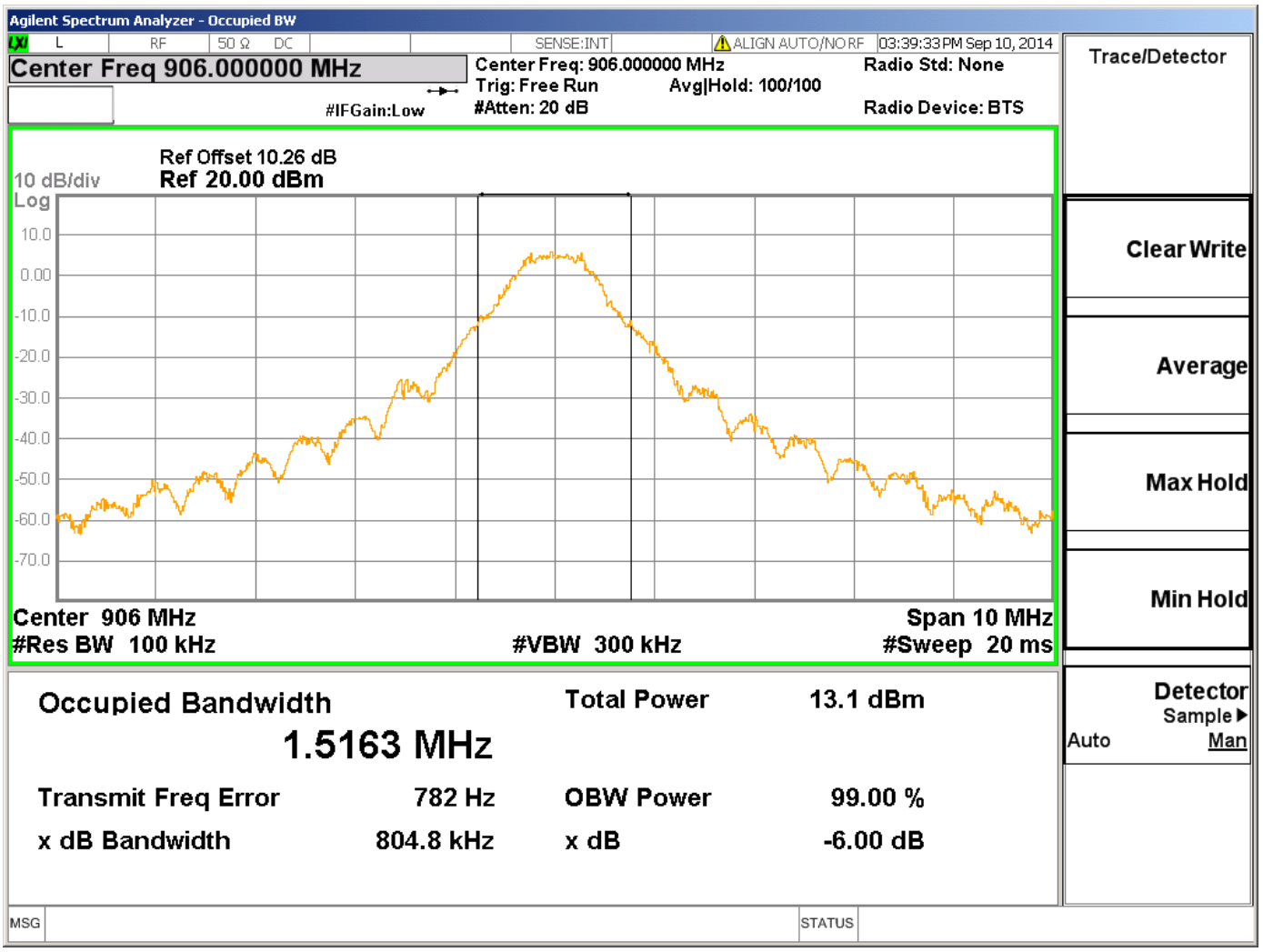


Figure 24 99% Power Bandwidth Graphs – Middle Channel

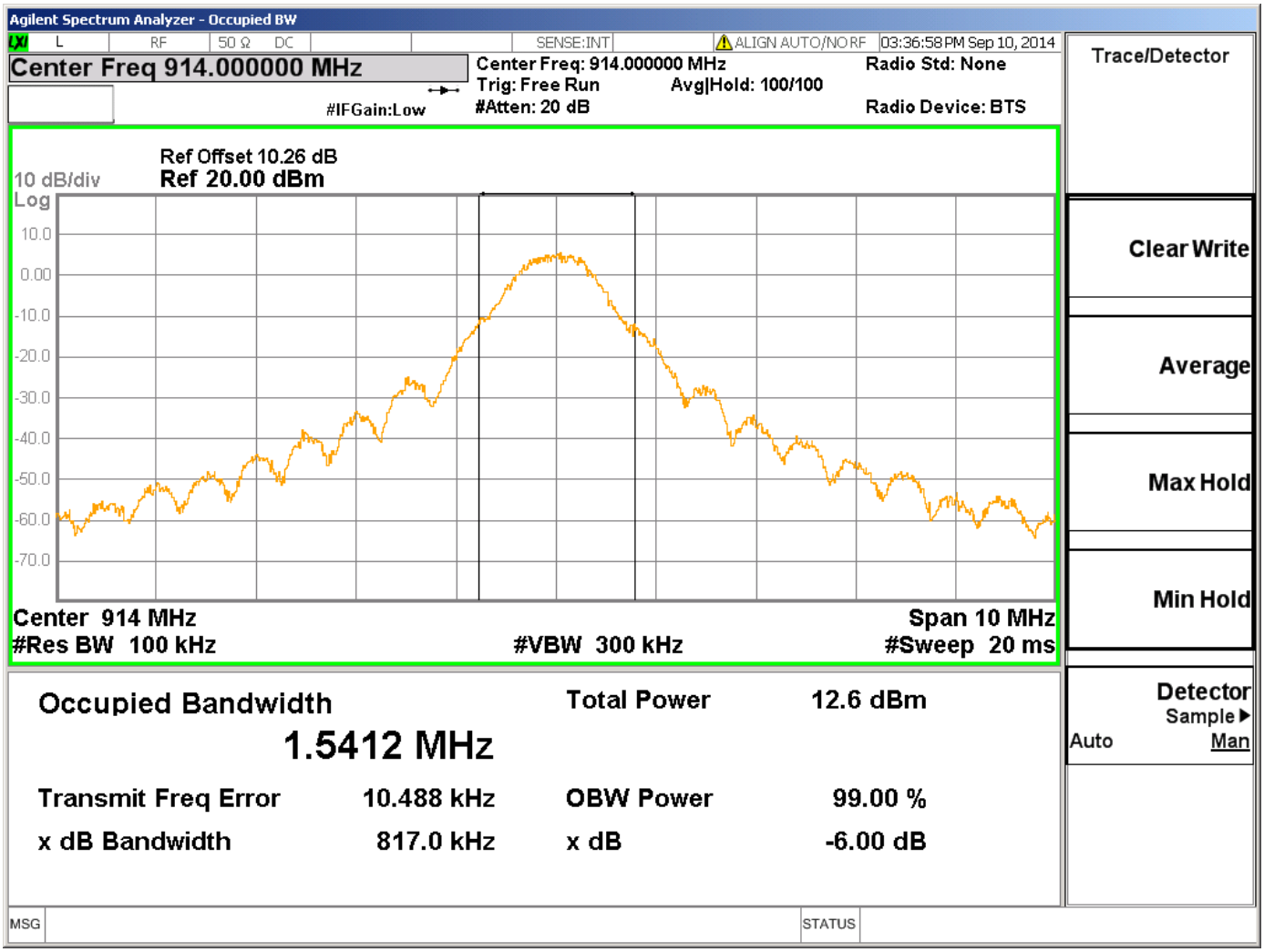
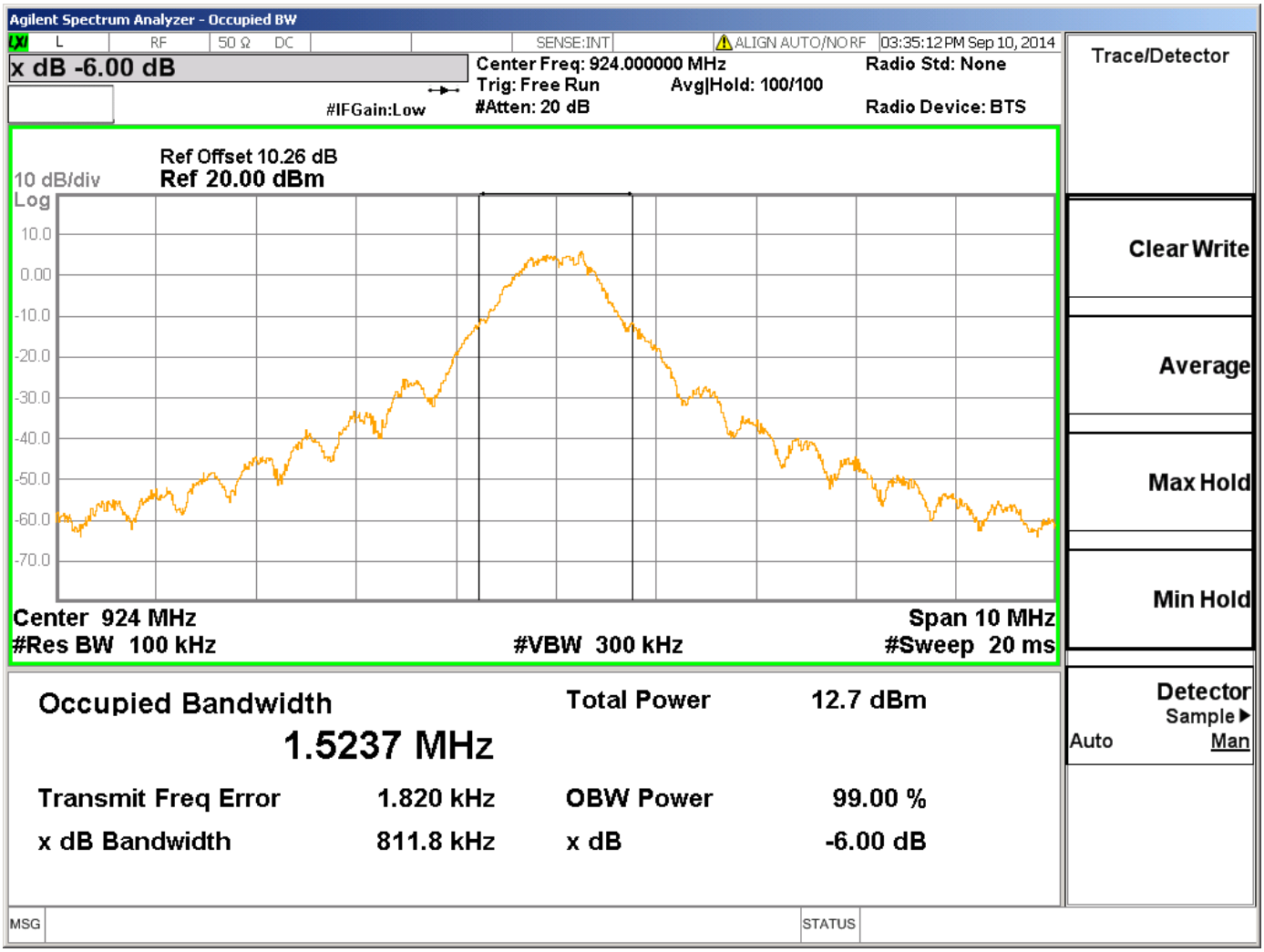


Figure 25 99% Power Bandwidth Graphs – High Channel



Appendix A

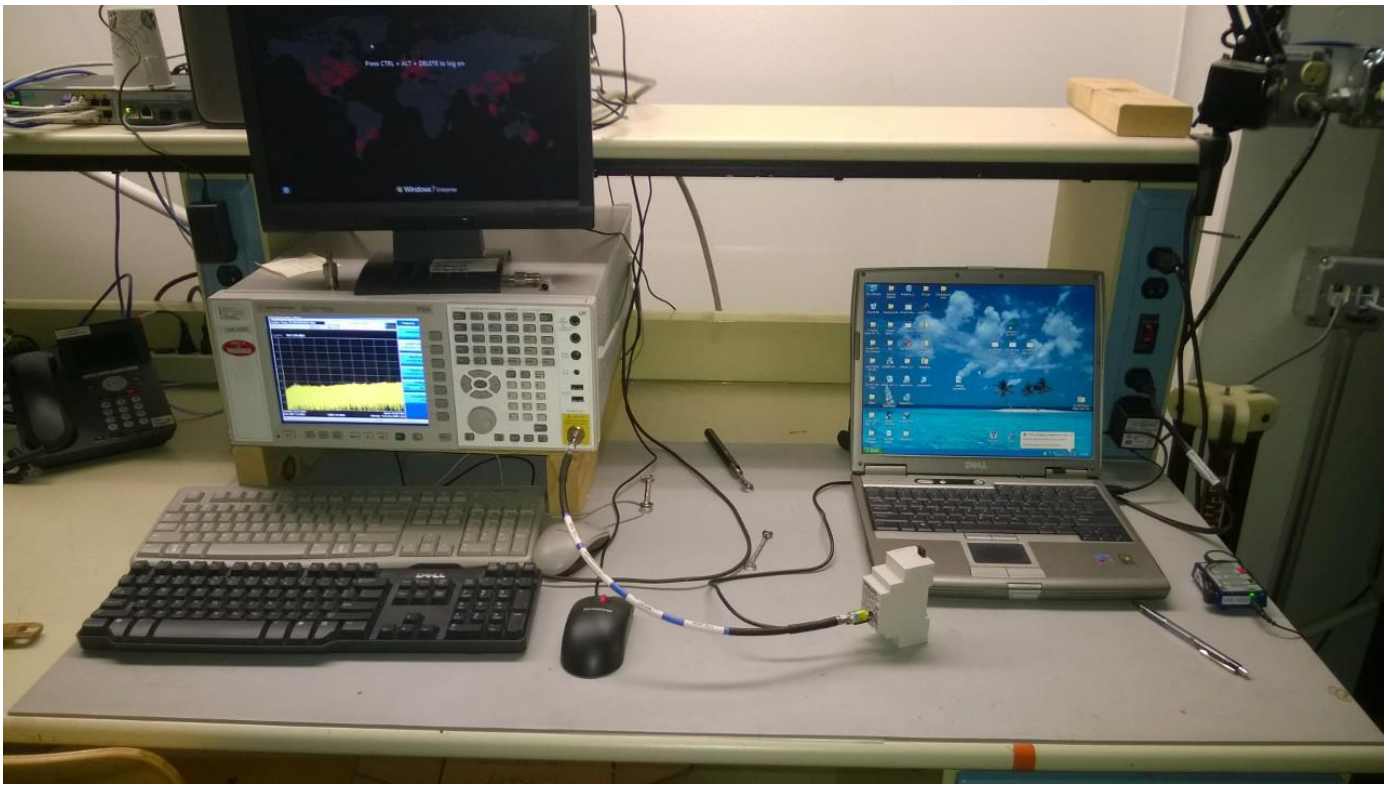
Test Setup Photos

Figure 26 – Radiated Emissions

Figure 27 – View inside the cabinet

Figure 28 – Line Conducted Emissions

Figure 29 – Antenna Port Measurements



Appendix B

Test Equipment List

Table 23 Antenna Port Measurements Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	N9030A	EMC4360	20131221	20141221
Attenuator w/ Cable	Mini Circuits	-	-	*N/A	N/A
* Cable and attenuator ware characterized at the time of testing					

Table 24 Line conducted Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	Dec 30, 2013	Dec 30, 2014
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 15, 2014	Jan 16, 2015
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	Jan 15, 2014	Jan 16, 2015

Table 25 Radiated Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20131227	20141231
Bicon Antenna	Electro-Metrics	EM6912A	EMC4070	20130806	20140830
Log-P Antenna	Chase	UPA6109	EMC4313	20131003	20141003
Spectrum Analyzer	Rhode & Schwarz	FSEK	EMC4182	20131226	20141231
Antenna Array	UL	BOMS	EMC4276	20130912	20140930

Appendix C

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