



FCC 47 CFR PART 15 SUBPART B

DECLARATION OF CONFORMITY TEST REPORT

FOR

BLUETOOTH TRANSCEIVER MODULE

MODEL NUMBER: BCM92070MD_LENO

REPORT NUMBER: 11U13947-5, Revision A

ISSUE DATE: AUGUST 29, 2011

**FCC ID: QDS-BRCM1046LE
IC: 4324A-BRCM1046**

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/05/11	Initial Issue	S. Leitner
A	08/29/11	Added FCC/IC IDs to the cover page	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
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EUT DESCRIPTION: BLUETOOTH TRANSCEIVER MODULE

MODEL: BCM92070MD_LEN

SERIAL NUMBER: V005

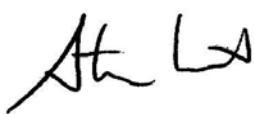
DATE TESTED: JULY 21 to 27, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART B	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. 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.

Approved & Released For UL CCS By:



STEVE LEITNER
ENGINEERING SUPERVISOR
UL CCS

Tested By:



DAVID GARCIA
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver module with Low Energy mode, manufactured by Broadcom.

GENERAL INFORMATION

Power Requirements	3.3 VDC
List of frequencies generated or used by the EUT	20 MHz

5.2. PRELIMINARY TEST CONFIGURATIONS

The following configurations were investigated during preliminary testing:

EUT Configuration	Description
Typical Configuration	EUT connected to an adapter board that is connected with a USB cable to a laptop PC with minimum configuration such as printer.

5.3. MODE(S) OF OPERATION

Mode	Description
EMC Test & TX	All I/O ports activated, scrolling "H" pattern on the laptop screen, TX on.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom Bluetooth Version 5.1.0.1400

The test utility software used during testing was Bluetool, ver. 1.4.6.7.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	HP	dv6000	CNF6463KP7	DoC
AC Adapter	HP	PPP009S	57BC30AU4Q709M	DoC
Adapter Board	Broadcom	BCM9USB3P3V	1416738	N/A
USB Printer	HP	7850	MY56K1304B	DoC
AC Adapter	HP	0957-2084	5715480604	DoC

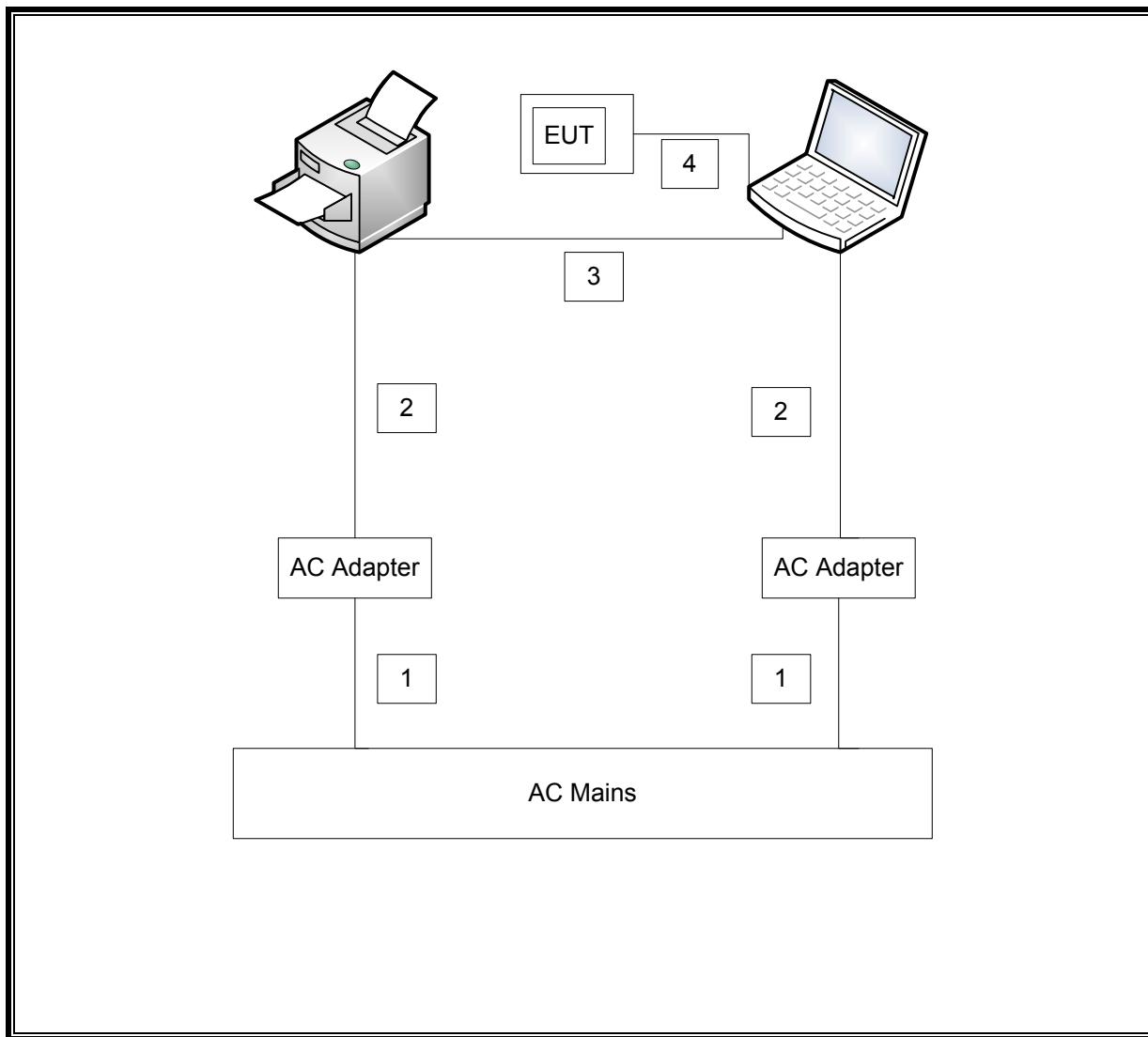
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Unshielded	1.5 m	Not available
2	DC	1	DC	Unshielded	1.5 m	Ferrite at laptop end
3	USB	1	USB	Shielded	2.0 m	Bundled
4	USB	1	USB	Shielded	1.5 m	Bundled

TEST SETUP

The EUT was attached to a jig board that was connected to the USB port of a host laptop computer during the tests. Test software exercised the radio card.

TEST SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01176	8/10/2010	8/10/2011
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	5/11/2011	5/11/2012
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	7/16/2011	7/16/2012
Antenna, Horn, 18 GHz	EMCO	3115	C00872	6/29/2011	6/29/2012
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	1/27/2011	1/27/2012
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	7/18/2011	7/18/2012
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	7/6/2011	7/6/2012
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/2010	11/10/2011
Peak Power Meter	Agilent / HP	E4416A	C00963	3/22/2011	3/22/2012
Peak Power Sensor	Agilent / HP	E9327A	C00964	4/13/2011	4/13/2012

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the EUT for the digital portion was 20 MHz; therefore the frequency range was investigated from 30 MHz to 1000 MHz.

LIMIT

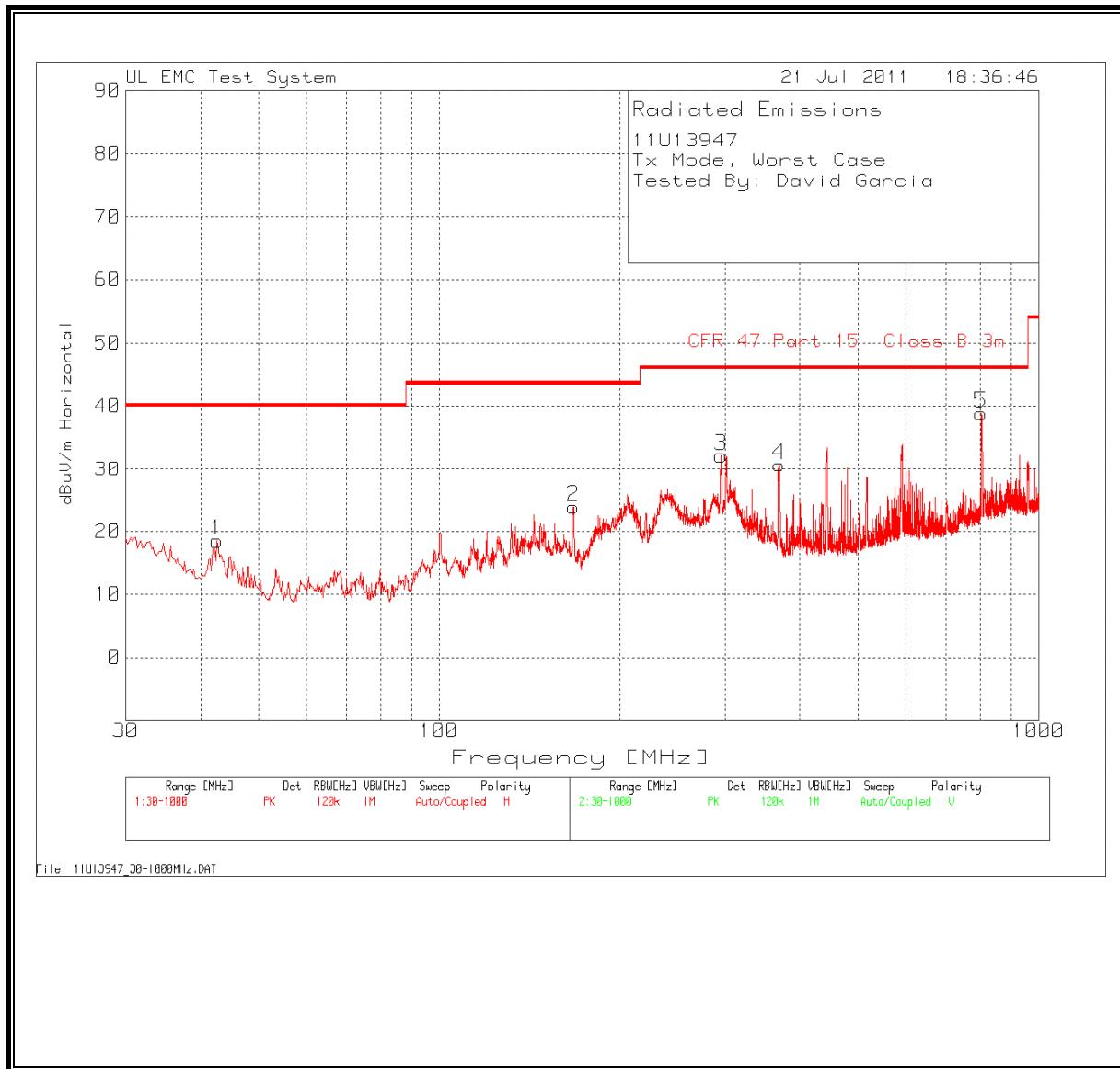
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dB μ V/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54

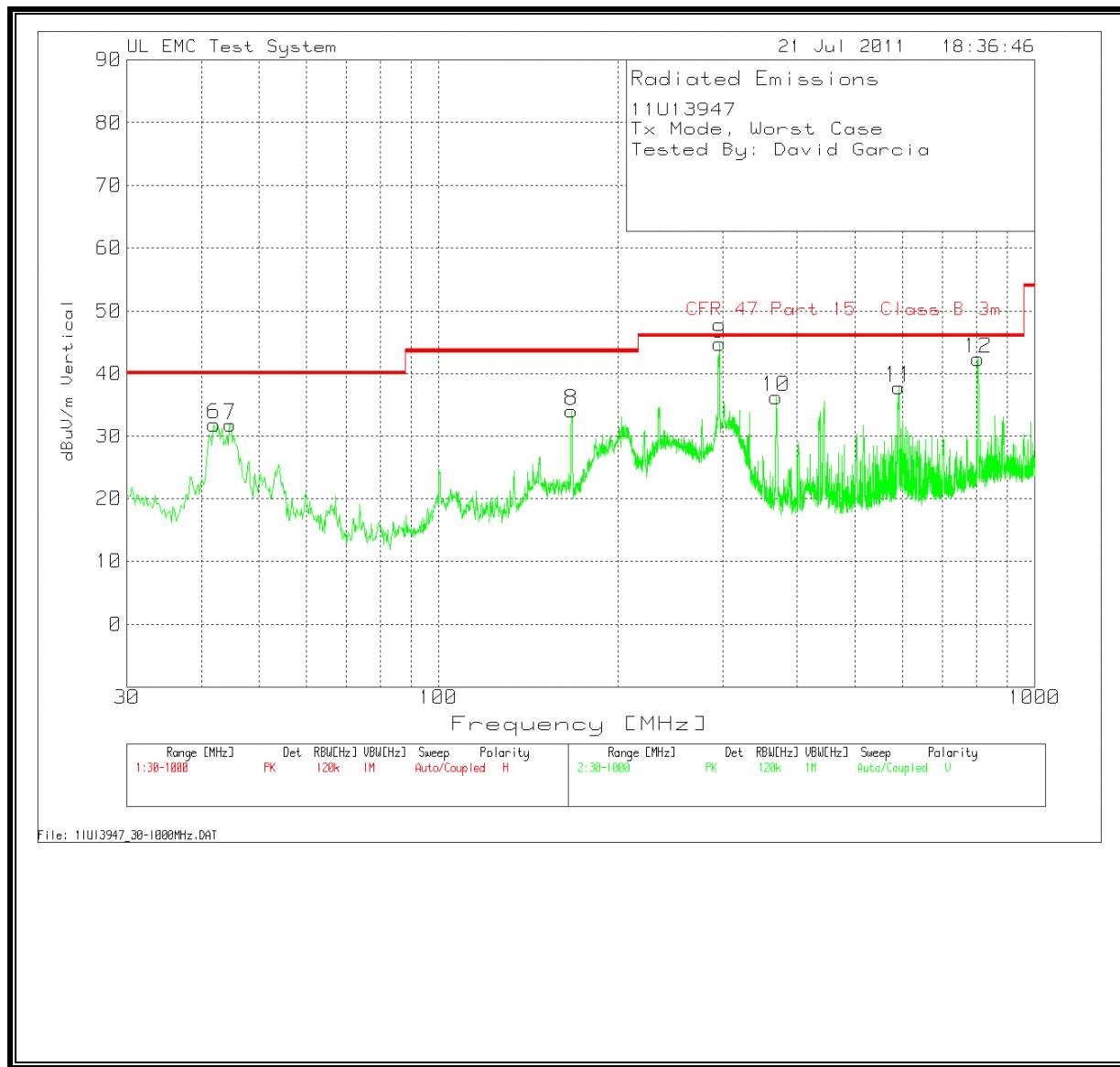
Note: The lower limit shall apply at the transition frequency.

RESULTS

RADIATED EMISSIONS 30 TO 1000 MHz - HORIZONTAL



RADIATED EMISSIONS 30 TO 1000 MHz - VERTICAL



HORIZONTAL AND VERTICAL SUMMARY DATA

Project Number:	11U13947										
Model Number:	BCM920702MD_REF14L										
Test Date:	7/21/2011										
Test Engineer:	David Garcia										
Mode:	Tx Mode, Worst Case										

Test Frequency MHz	Meter Reading	Detector	Cable [dB]	3m T15 PreAmp [dB]	3m T185 Bilog [dB]	dBuV/m	CFR 47 Part 15 Class B 3m Limit	Margin	Height [cm]	Polarity
42.5999	33.5	PK	0.7	-28.2	12.5	18.5	40	-21.5	251	Horz
167.4361	38.68	PK	1.3	-27.8	11.7	23.88	43.5	-19.62	251	Horz
295.1799	44.33	PK	1.8	-27.3	13.3	32.13	46	-13.87	176	Horz
369.2286	41.85	PK	2	-27.7	14.5	30.65	46	-15.35	251	Horz
802.472	43.07	PK	2.9	-28	20.9	38.87	46	-7.13	101	Horz
42.0184	46.72	PK	0.7	-28.2	12.7	31.92	40	-8.08	99	Vert
44.7322	47.55	PK	0.7	-28.2	11.8	31.85	40	-8.15	99	Vert
167.2422	48.8	PK	1.3	-27.8	11.8	34.1	43.5	-9.4	99	Vert
295.9552	56.87	PK	1.8	-27.3	13.4	44.77	46	-1.23	99	Vert
368.6471	47.5	PK	2	-27.7	14.5	36.3	46	-9.7	251	Vert
591.9564	45.42	PK	2.5	-28.4	18.3	37.82	46	-8.18	99	Vert
804.7982	46.61	PK	2.9	-28	20.9	42.41	46	-3.59	99	Vert

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Notes:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

RESULTS

6 WORST EMISSIONS

Project Number:	11U13947					
Model Number:	BCM920702MD_REF14L					
Test Date:	7/21/2011					
Test Engineer:	David Garcia					
Mode:	Tx Mode, Worst Case					

Line-L1 .15 - 30MHz

Test Frequency	Meter Reading	Detector	CFR 47 15.207 QP Limit	Margin	CFR 47 15.207 Avg Limit	Margin
0.204	46.52	PK	63.4	-16.88	53.4	-6.88
0.3435	40.03	PK	59.1	-19.07	49.1	-9.07
13.3575	39.84	PK	60	-20.16	50	-10.16
19.8825	38.97	PK	60	-21.03	50	-11.03

Line-L2 .15 - 30MHz

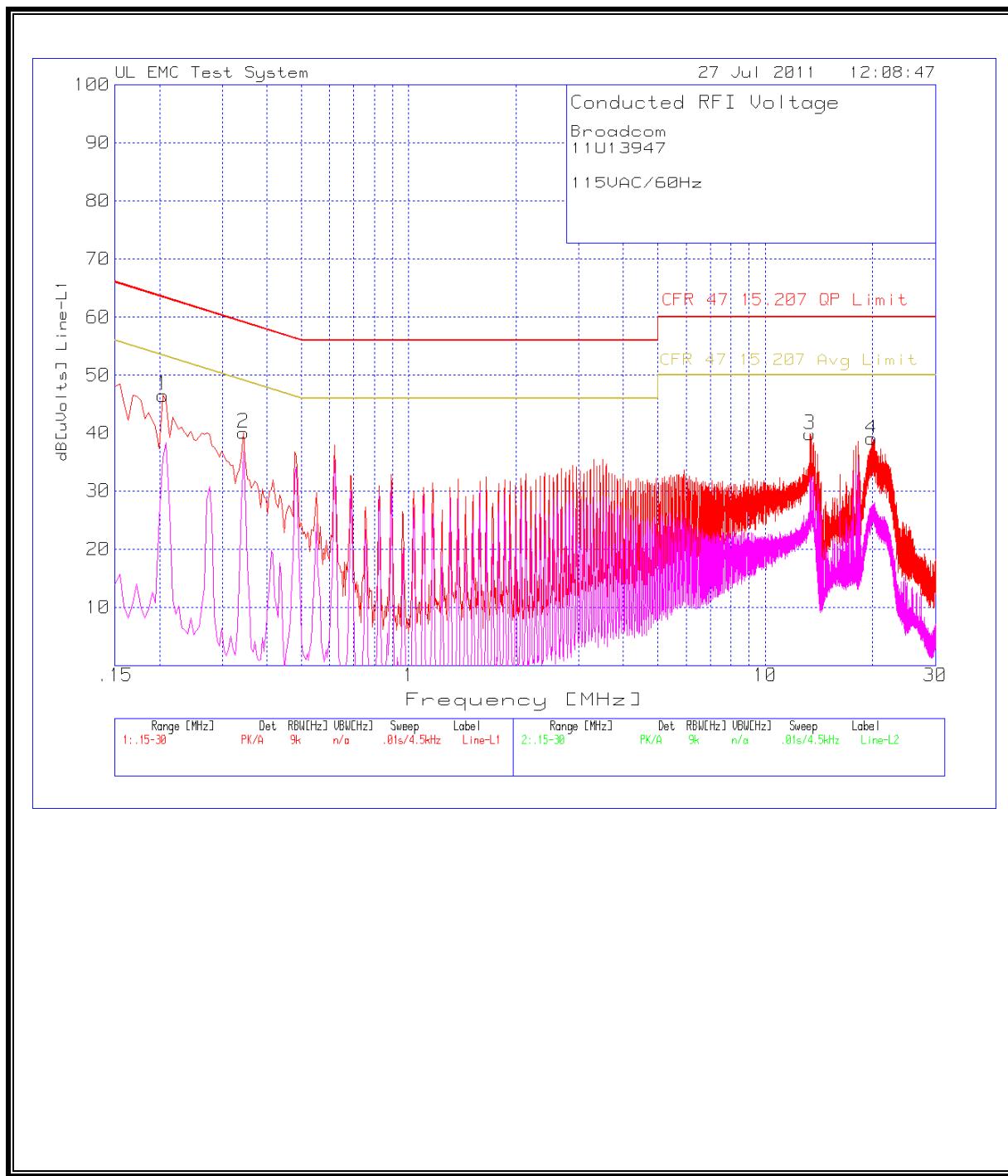
Test Frequency	Meter Reading	Detector	CFR 47 15.207 QP Limit	Margin	CFR 47 15.207 Avg Limit	Margin
0.204	48.38	PK	63.4	-15.02	53.4	-5.02
0.618	38.63	PK	56	-17.37	46	-7.37
13.479	39.81	PK	60	-20.19	50	-10.19
18.2445	40.15	PK	60	-19.85	50	-9.85

PK - Peak detector

QP - Quasi-Peak detector

Av - Average detector

LINE 1 RESULTS



LINE 2 RESULTS

