



Test Report

FCC Part 15.247

Industry Canada RSS210

**DTS Devices Operating in range 2400-2483.5MHz and
5725–5850 MHz**

Model #: PP12S

**Broadcom Corporation
190 Mathilda Place
Sunnyvale, CA 94086**

**FCC ID: QDS-BRCM1031
IC ID: 4324A-BRCM1031**

**TEST REPORT #: EMC_BROAD_062_08002_15.247_BRCM1031
DATE: 2008-12-03**



**Bluetooth Qualification
Test Facility
(BQTF)**



**FCC listed:
A2LA
accredited**

**IC recognized #
3462B**

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Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

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1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations.

Company	Model #
Broadcom Corp.	PP12S

This report is reviewed by:

Lothar Schmidt
(Director Regulatory and
2008-12-03 EMC & Radio Antenna Services)

Date	Section	Name	Signature
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This report is prepared by:

Peter Mu
2008-12-03 EMC & Radio (EMC Project Engineer)

Date	Section	Name	Signature
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The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

2 Administrative Data**2.1 Identification of the Testing Laboratory Issuing the EMC Test Report**

Company Name:	CETECOM Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Lothar Schmidt
Responsible Project Leader:	Peter Mu
Date of test:	2008-10-30 to 2008-12-2

2.2 Identification of the Client

APPLICANT	
Applicant (Company Name)	Broadcom Corp.
Street Address	190 Mathilda Place
City/Zip Code	Sunnyvale, CA 94086
Country	U.S.A.
Contact Person	Dan Lawless
Telephone	408-922-5870
Fax	408-543-3399
e-mail	dlawless@broadcom.com

2.3 Identification of the Manufacturer

Same as applicant

3 Equipment under Test (EUT)**3.1 Specification of the Equipment under Test**

EUT	
Marketing Name of EUT (if not same as Model No.):	PP12S
Model No:	PP12S
FCC ID:	QDS-BRCM1031
IC ID:	4324A-BRCM1031

Frequency Range:	2400-2483.5MHz Channel 1, 6, 11 for 802.11b/g and 802.11n HT20 mode Channel 2, 6, 10 for 802.11n HT40 mode 5725-5850 MHz Channel 149, 157, 165 for 802.11a and 802.11n HT20 mode Channel 151, 159, 167 for 802.11n HT40 mode
Type(s) of Modulation:	OFDM
Antenna Type:	Amphenol IFA Antenna Peak Gain 2400-2483.5MHz: 2.38dBi. Peak Gain 5725-5850MHz: 1.64dBi. Yageo IFA Antenna Peak Gain 2400-2483.5MHz: 0.64dBi. Peak Gain 5725-5850MHz: 1.63dBi.
Max Output Power:	Sub-band 1, 2400-2483.5MHz 802.11b: Radiated: 24.38dBm (274mW) EIRP Conducted: 22.0dBm (159mW) Sub-band 1, 2400-2483.5MHz 802.11g: Radiated: 21.28dBm (134mW) EIRP Conducted: 18.9dBm (77.6mW) Sub-band 1, 2400-2483.5MHz 802.11n HT20: Radiated: 24.18dBm (262mW) EIRP Conducted: 21.8dBm (151.4mW)

	Sub-band 1, 2400-2483.5MHz 802.11n HT40: Radiated: 19.18dBm (82.8mW) EIRP Conducted: 16.8dBm (47.9mW) Sub-band 2, 5725-5850MHz 802.11a: Radiated: 18.34dBm (68.2mW) EIRP Conducted: 16.7dBm (46.8mW) Sub-band 2, 5725-5850MHz 802.11n HT20: Radiated: 21.44dBm (139mW) EIRP Conducted: 19.8dBm (95.5mW) Sub-band 2, 5725-5850MHz 802.11n HT40: Radiated: 21.5dBm (143mW) EIRP Conducted: 19.9dBm (97.7mW)
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3.2 Identification of the Equipment under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT Host Laptop	Dell	PP12S	AMG-E2-C1

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	Dell	FA65NE0-00	CN-0RX929-73245-87N-1806

4 Subject Of Investigation

All testing was performed on the product referred to in Section 3 as EUT. EUT operates in the band 2400-2483.5MHz in legacy 802.11b/g and 802.11n mode, and in 5725–5850 MHz in legacy 802.11a and 802.11n mode.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT operating under all operating modes as specified by Sony per requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations. The maximization of portable equipment is conducted in accordance with ANSI C63.4

There are two sets of antennae being implemented in the host platform with this module. They are differentiated by having the additional “bump” on top of the LCD screen.

There are two antenna manufacturers for each set of antennae, Yageo and Amphenol. Please reference the table below for a complete depiction of the antennae gains at different bands and in different modes of operation.

No	Antenna Manufacturer	Max Peak gain (2.4GHz)	Max Peak gain (5GHz)	Configuration
1	Amphenol	TX2 (-0.44) dBi(H)	TX2 1.644dBi(H)	Bump out TA mode
2	Amphenol	TX2 (-1.089)dBi(H)	TX2 (-0.083)dBi(H)	No Bump TA mode
3	Yageo	Main 0.39dBi(H)	Aux 1.52dBi(V)	Bump out TA mode
4	Yageo	Main (-0.85)dBi(V)	Aux 0.67dBi(V)	No Bump TA mode
5	Amphenol	Main 2.38dBi(H)	Main 1.37dBi(V)	Bump out PC mode
6	Amphenol	Main 2.38dBi(H)	Main 1.37dBi(V)	No Bump PC mode
7	Yageo	Main 0.64dBi(V)	Main (-0.27)dBi(V)	Bump out PC mode
8	Yageo	Main (-0.40)dBi(V)	Main 1.63dBi(V)	No Bump PC mode

Since the Amphenol “bump” antenna has the highest numeric gain in both 2.4GHz and 5GHz band, all tests are conducted with this antenna in the corresponding configuration where the highest gain is obtained.

That is, in 2.4GHz band the EUT is tested in Laptop PC configuration and in 5GHz band the EUT is tested in Tablet PC mode.

5 Radiated Measurements

5.1 Maximum Peak Output Power § 15.247 (b)(1) (Radiated)

5.1.1 Limits

FCC15.247 (b) (1): 4W (36dBm), with antenna gain < 6dBi.

RSS-210 A8.4 (4): 4W (36dBm)

5.1.2 Results:

EIRP is calculated as $EIRP = \text{Conducted Peak Power} + \text{Antenna Gain}$

EIRP 802.11 a/b/g Mode:

TEST CONDITIONS $T_{nom}(23)^{\circ}C$, $V_{nom}VDC$	Channel Frequency	EIRP (dBm)	EIRP (mW)	Verdict
Sub-band 1: 2400-2483.5MHz (802.11b)	2412	24.38	274.16	PASS
	2437	24.28	267.92	PASS
	2462	23.98	250.03	PASS
Sub-band 1: 2400-2483.5MHz (802.11g)	2412	21.28	134.28	PASS
	2437	21.18	131.22	PASS
	2462	19.18	82.79	PASS
Sub-band 2: 5725-5850MHz (802.11a)	5745	18.24	66.68	PASS
	5785	18.24	66.68	PASS
	5825	18.34	68.23	PASS

EIRP 802.11n HT20 MODE:

TEST CONDITIONS $T_{nom}(23)^{\circ}C$, $V_{nom}VDC$	Channel Frequency	EIRP (dBm)	EIRP (mW)	Verdict
Sub-band 1: 2400-2483.5MHz	2412	19.38	86.70	PASS
	2437	24.18	261.82	PASS
	2462	19.08	80.91	PASS
Sub-band 2: 5725-5850MHz	5745	21.44	139.32	PASS
	5785	21.04	127.06	PASS
	5825	21.24	133.05	PASS

EIRP 802.11n HT40 MODE:

TEST CONDITIONS $T_{nom}(23)^{\circ}C$, $V_{nom}VDC$	Channel Frequency	EIRP (dBm)	EIRP (mW)	Margin (mW)
Sub-band 1: 2400-2483.5MHz	2422	18.48	70.47	PASS
	2437	19.18	82.79	PASS
	2452	17.18	52.24	PASS
Sub-band 2: 5725-5850MHz	5755	21.54	142.56	PASS
	5795	21.34	136.14	PASS

5.2 Restricted Band Edge Compliance §15.247/15.205**5.2.1 Limits**

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

***PEAK LIMIT= 74dBuV/m**

***AVG. LIMIT= 54dBuV/m**

Notes:

1. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
2. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity.

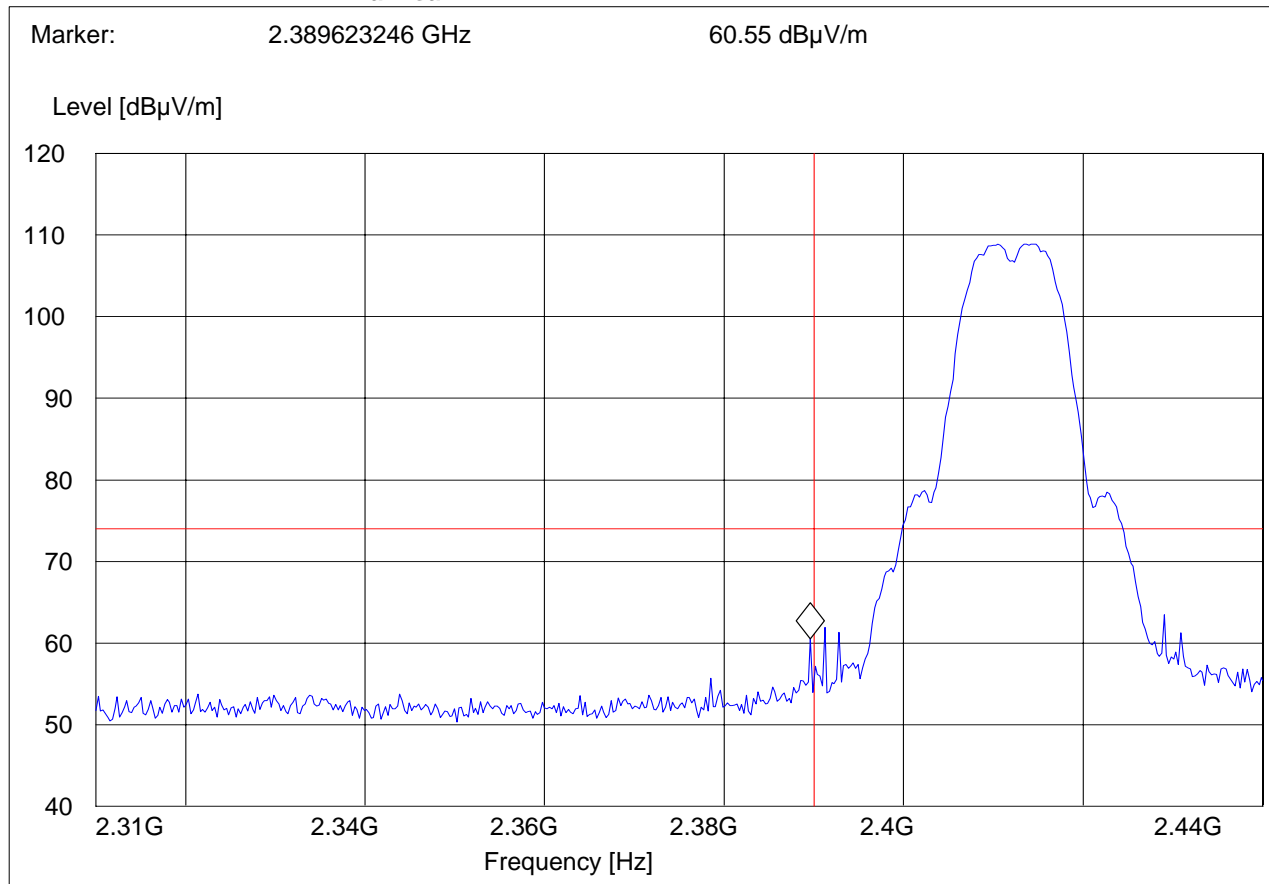
5.2.2 Sub-band 1 2400-2483.5MHz**Lower band edge PEAK****Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

EUT:

Customer:: Broadcom
Test Mode: 802.11b Ch.1
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC15.247 LBE_PK"

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert
		MaxPeak			



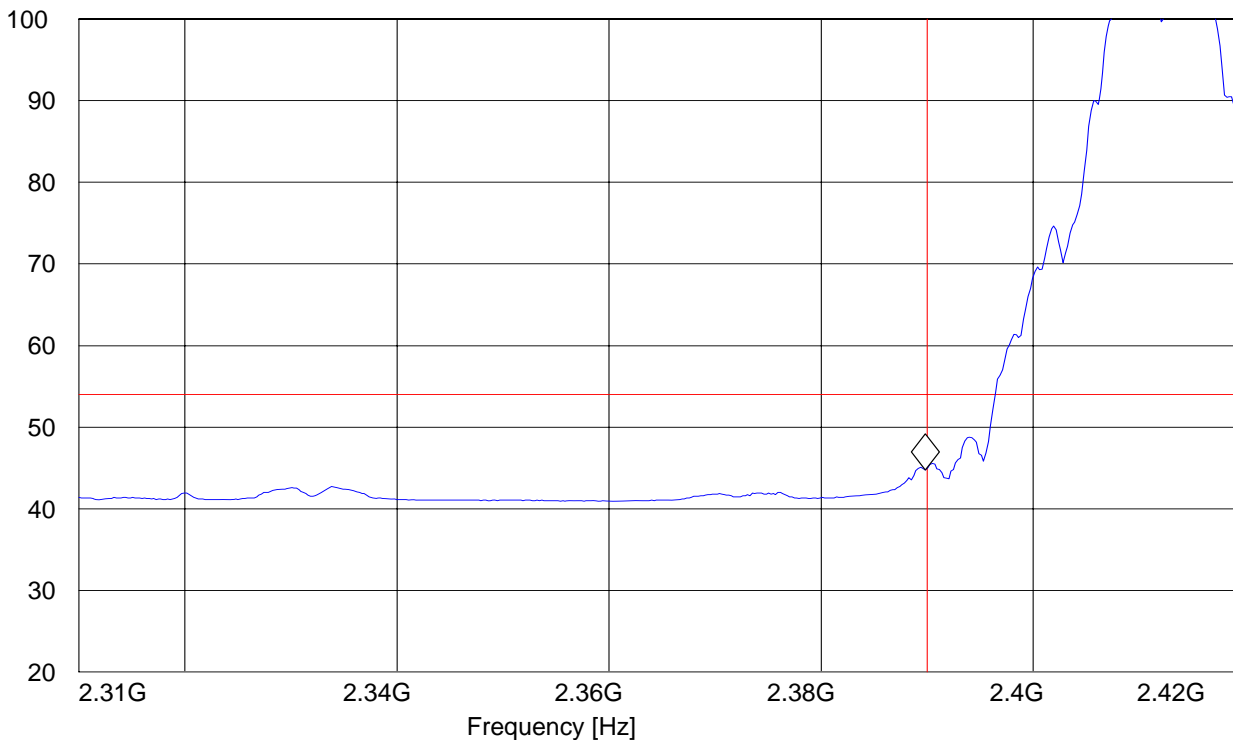
Lower band edge Average**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

EUT:
Customer:: Broadcom
Test Mode: 802.11b Ch.1
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC15.247 LBE_AVG"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.3 GHz	2.4 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.389799599 GHz 44.78 dB μ V/m

Level [dB μ V/m]

High band edge PEAK**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

EUT:

Customer:: Broadcom

Test Mode: 802.11b Ch.11

ANT Orientation: H

EUT Orientation: H

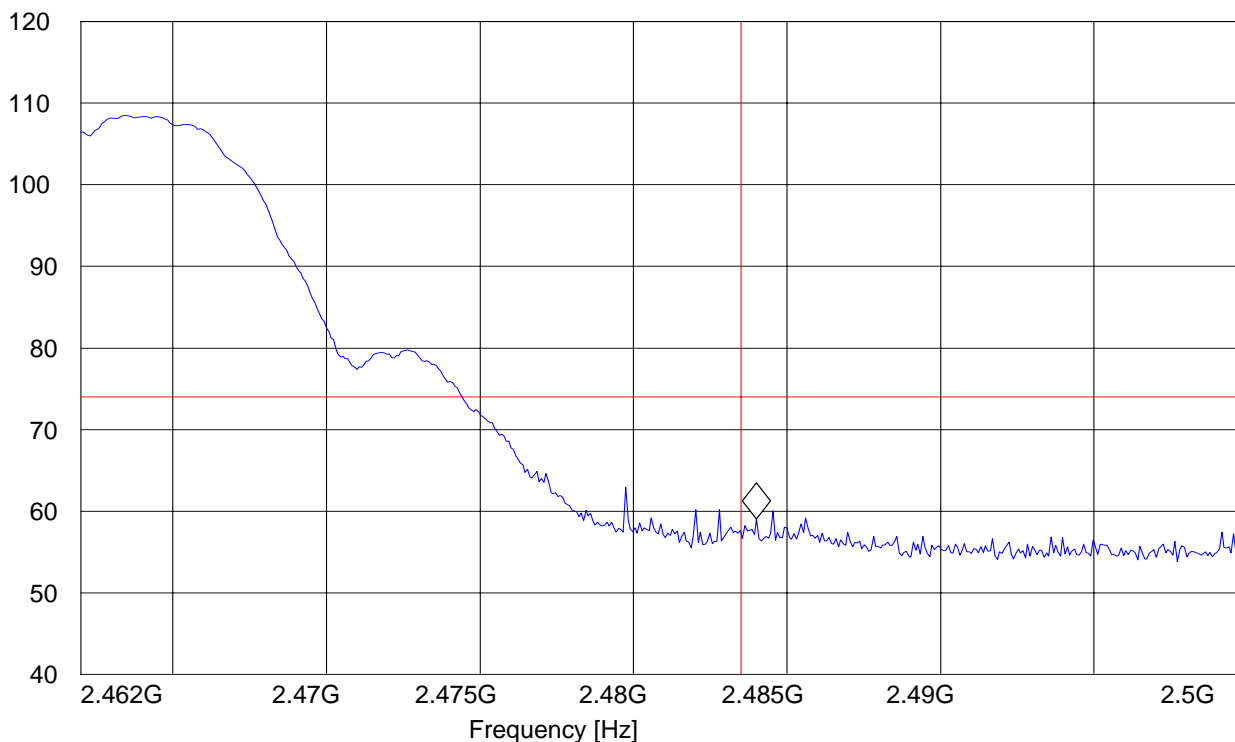
Test Engineer: Chris

Voltage: AC Adapter

Comments:

SWEEP TABLE: "FCC15.247 HBE_PK"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak MaxPeak	Coupled	1 MHz	#326horn_AF_vert

Marker: 2.484008016 GHz 59.02 dB μ V/mLevel [dB μ V/m]

High band edge Average**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

EUT:

Customer:: Broadcom

Test Mode: 802.11b Ch.11

ANT Orientation: H

EUT Orientation: H

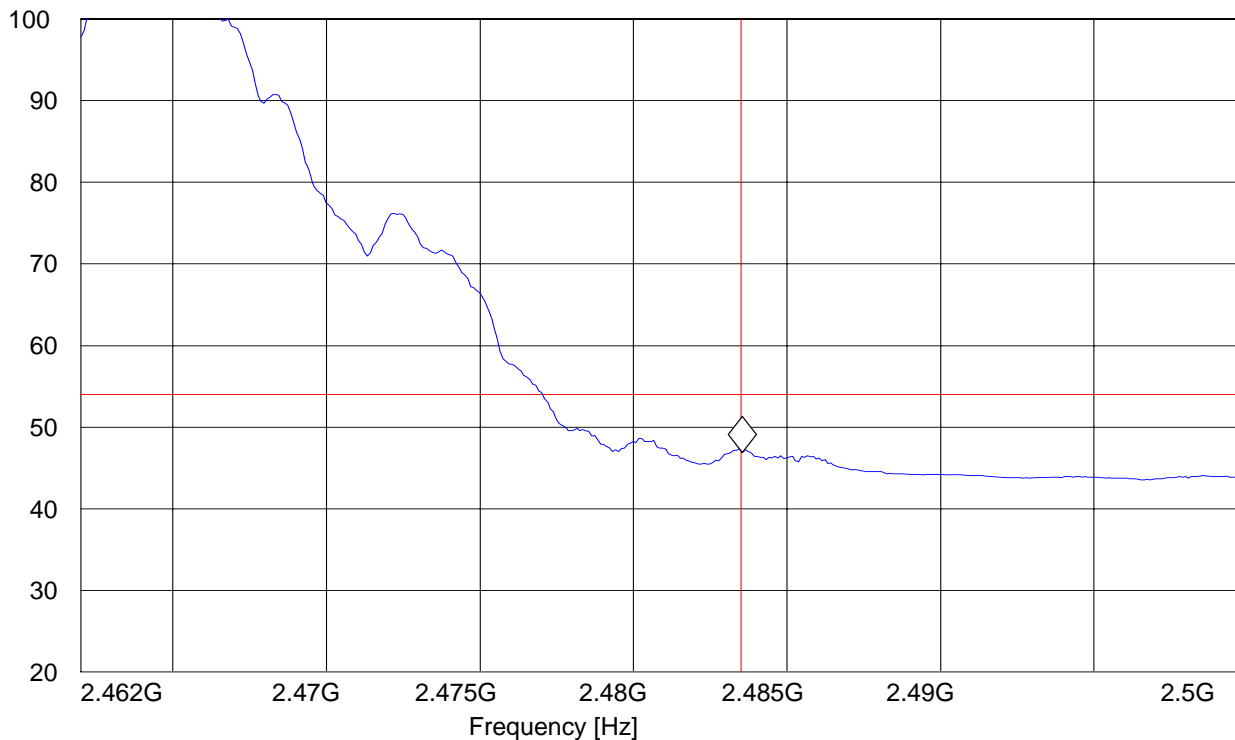
Test Engineer: Chris

Voltage: AC Adapter

Comments:

SWEEP TABLE: "FCC15.247 HBE_AVG"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
2.5 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.483547094 GHz 46.89 dB μ V/mLevel [dB μ V/m]

5.3 Transmitter Spurious Emission § 15.247/15.205/15.209

5.3.1 Limits

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

*PEAK LIMIT= 74dBuV/m

*AVG. LIMIT= 54dBuV/m

Notes:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.
2. All measurements are done in peak mode using an average limit , unless specified with the plots.
3. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
4. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity

Results for the radiated measurements below 30MHz according § 15.33

Frequency	Measured values	Remarks
9KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

5.3.2 RESULTS Sub-band 1 2400-2483.5MHz**30MHz – 1GHz, Antenna: Vertical**

Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

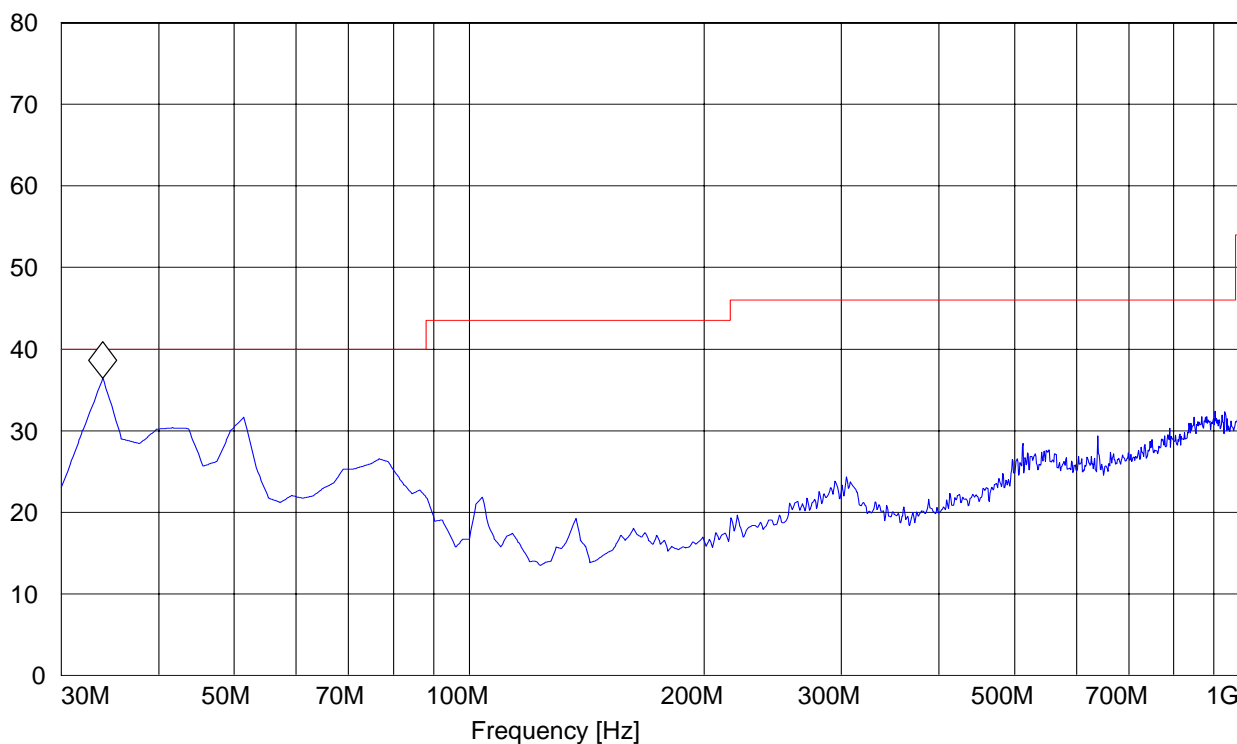
Customer:: Broadcom
Test Mode: 802.11b; CH.11
ANT Orientation: V
EUT Orientation: H; PC
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert

Marker: 33.887776 MHz 36.44 dB μ V/m

Level [dB μ V/m]



30MHz – 1GHz, Antenna: Horizontal

Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

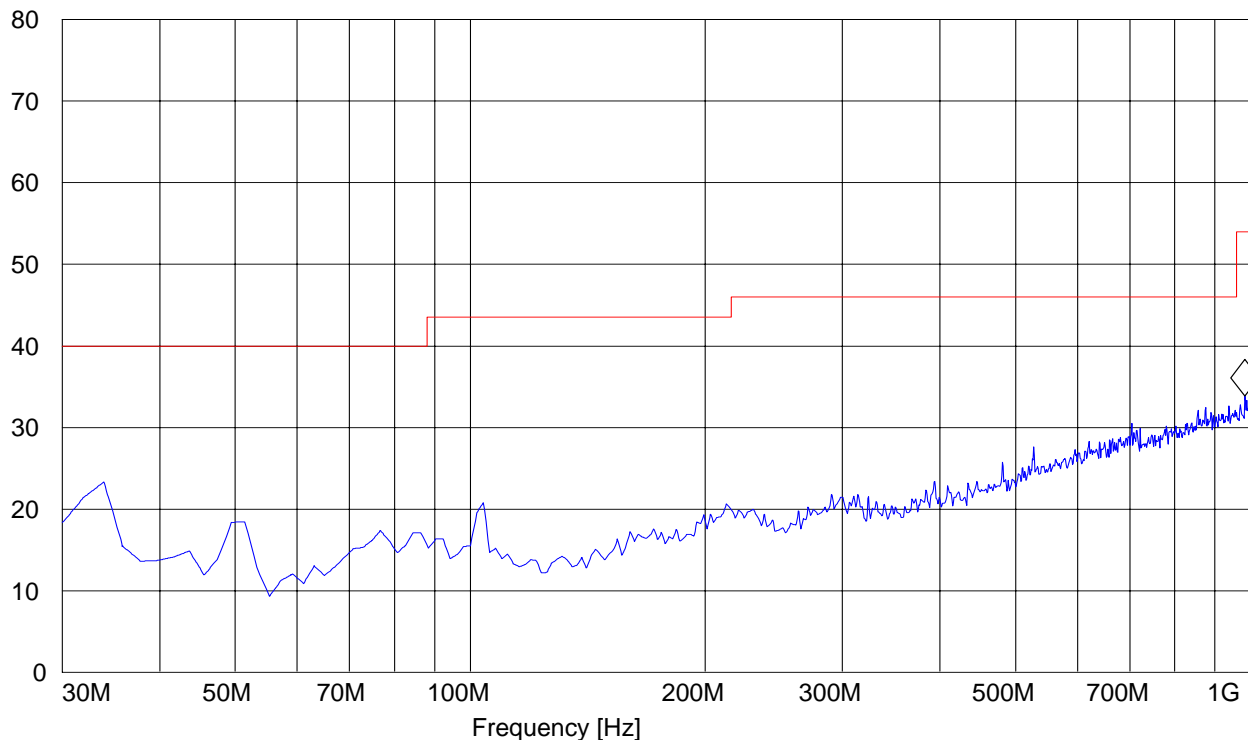
Customer:: Broadcom
Test Mode: 802.11b; CH.11
ANT Orientation: H
EUT Orientation: H; PC
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz

Marker: 982.50501 MHz 33.84 dB μ V/m

Level [dB μ V/m]



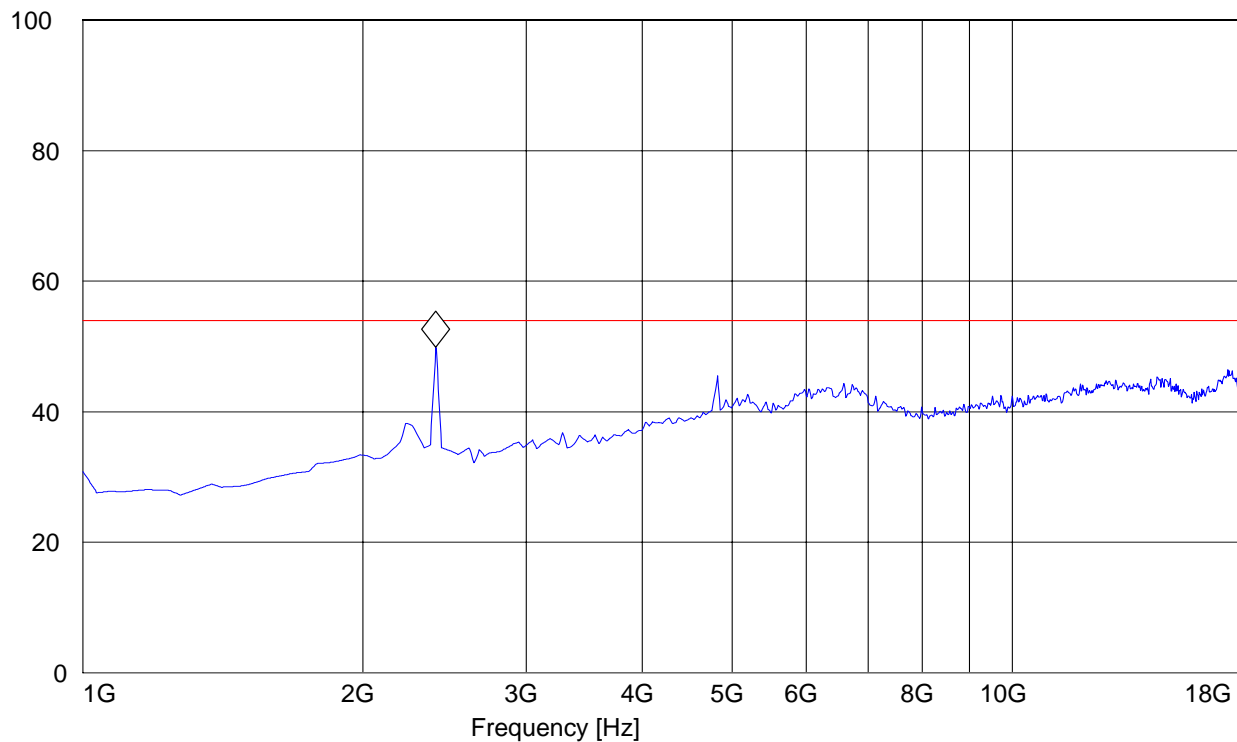
1-18GHz (2412MHz)**Note: Marked peak is the carrier freq.****Note: Peak Reading vs. Average limit**

Customer: Broadcom
Operation Mode: 802.11g; CH.1
ANT Orientation: : H
EUT Orientation:: H; tablet mode
Test Engineer: Chris
Voltage: AC
Comments:: With 2.4 GHz notch filter

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.396793587 GHz 49.91 dB μ V/m

Level [dB μ V/m]

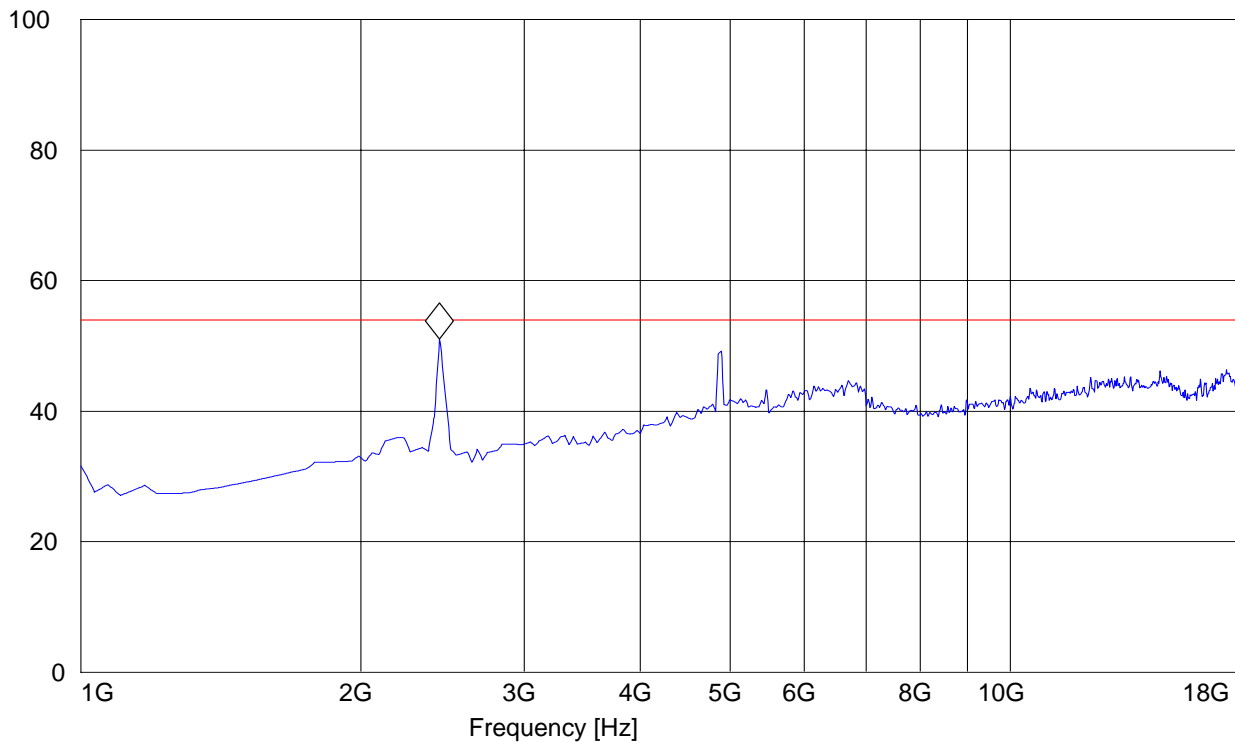
1-3GHz (2437MHz)**Note: Marked peak is the carrier freq.****Note: Peak Reading vs. Average limit**

Customer: Broadcom
Operation Mode: 802.11g; CH.6
ANT Orientation: : H
EUT Orientation:: H; PC mode
Test Engineer: Chris
Voltage: AC
Comments:: With 2.4 GHz notch filter

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.430861723 GHz 51.08 dB μ V/m

Level [dB μ V/m]

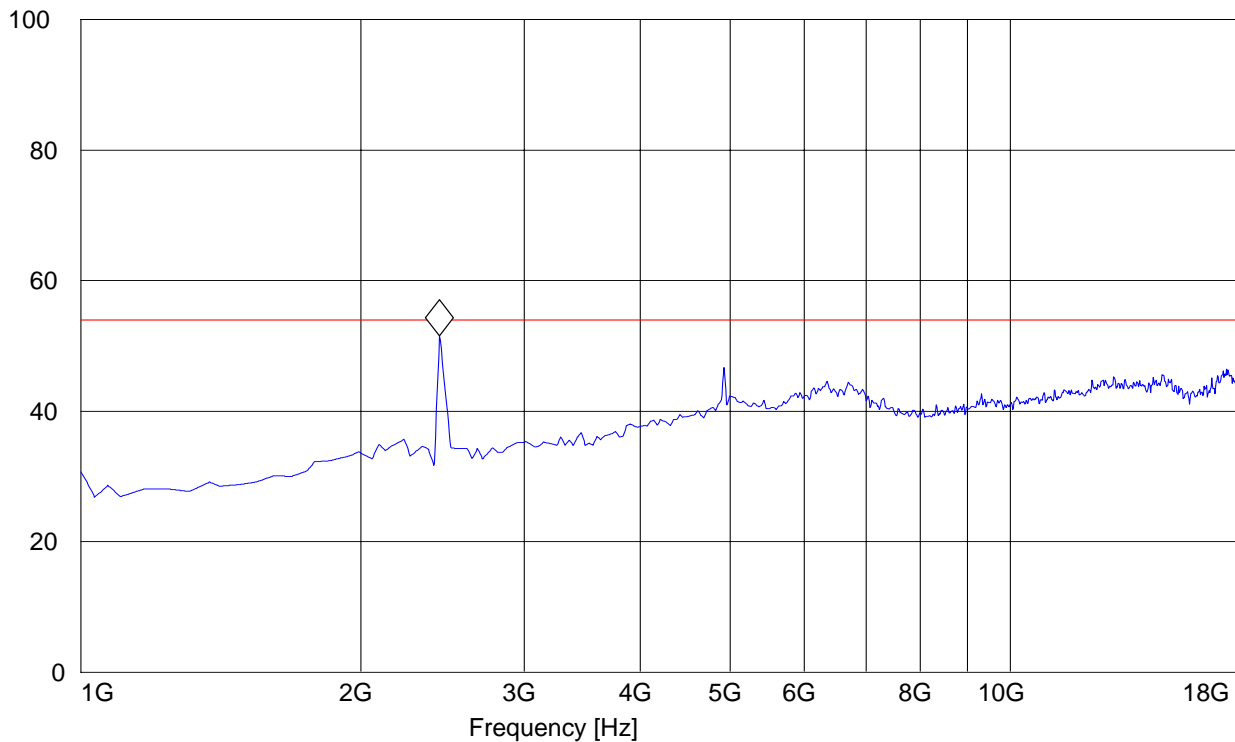
1-18GHz (2462MHz)**Note: Marked peak is the carrier freq.****Note: Peak Reading vs. Average limit**

Customer: Broadcom
Operation Mode: 802.11g; CH.11
ANT Orientation: : H
EUT Orientation:: H; PC mode
Test Engineer: Chris
Voltage: AC
Comments:: With 2.4 GHz notch filter

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 2.430861723 GHz 51.56 dB μ V/m

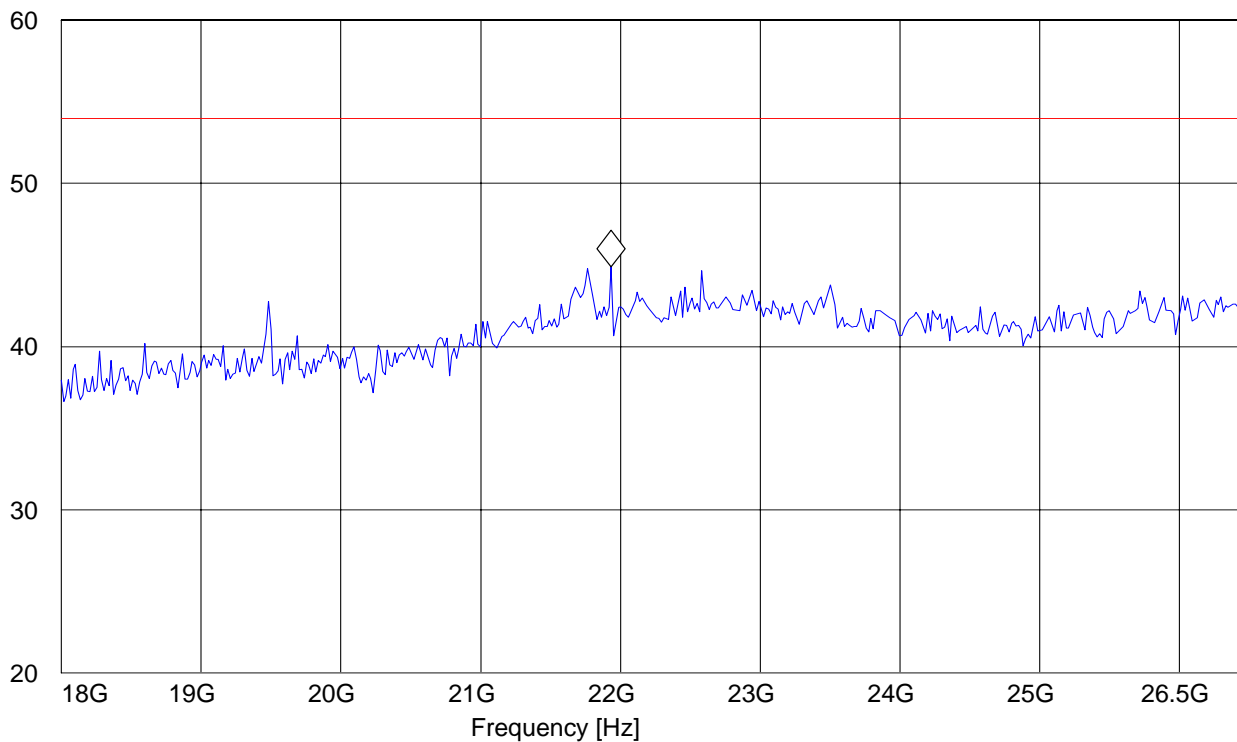
Level [dB μ V/m]

18-25GHz (2412MHz)**Note:** Peak Reading vs. Average limit

Customer:: Broadcom
Test Mode: 802.11g; CH.1
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak MaxPeak	Coupled	100 kHz	Horn # 3116_18-40G

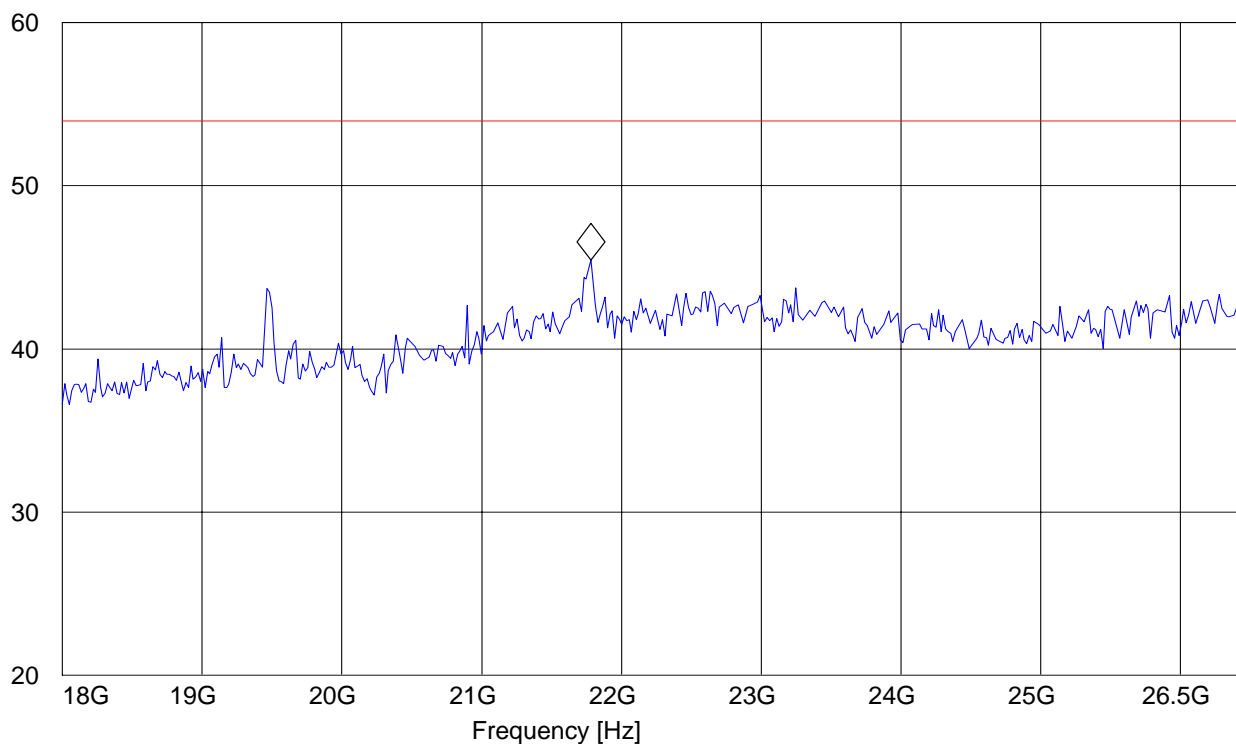
Marker: 21.934869739 GHz 44.87 dB μ V/mLevel [dB μ V/m]

18-25GHz (2437MHz)**Note: Peak Reading vs. Average limit**

Customer:: Broadcom
Test Mode: 802.11g; CH.6
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak MaxPeak	Coupled	100 kHz	Horn # 3116_18-40G

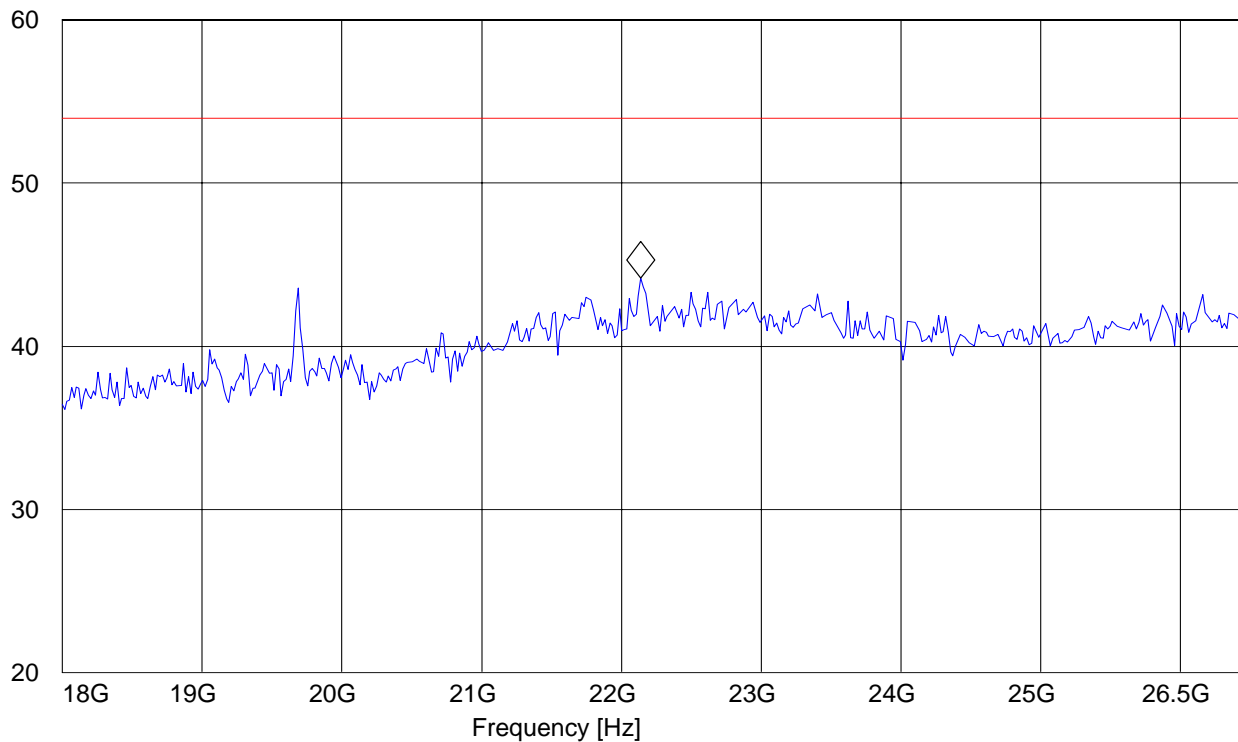
Marker: 21.781563126 GHz 45.46 dB μ V/mLevel [dB μ V/m]

18-25GHz (2462MHz)**Note: Peak Reading vs. Average limit**

Customer:: Broadcom
Test Mode: 802.11g; CH.11
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak MaxPeak	Coupled	100 kHz	Horn # 3116_18-40G

Marker: 22.139278557 GHz 44.19 dB μ V/mLevel [dB μ V/m]

5.3.3 RESULTS Sub-band 2, 5725–5850MHz

30MHz – 1GHz, Antenna: Vertical

Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

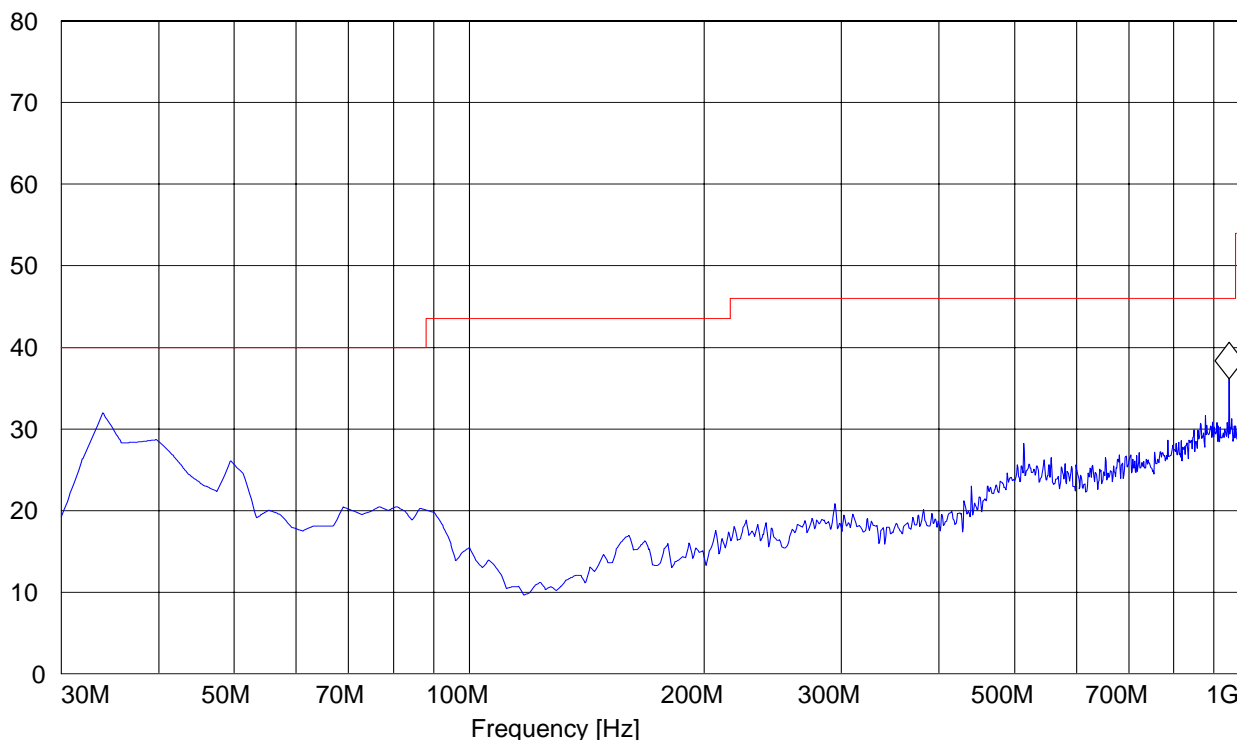
SWEEP TABLE: "FCC15.247_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert

Marker: 941.683367 MHz

36.13 dB μ V/m

Level [dB μ V/m]



30MHz – 1GHz, Antenna: Horizontal

Note: This plot is valid for low, mid, high channels (worst-case plot).

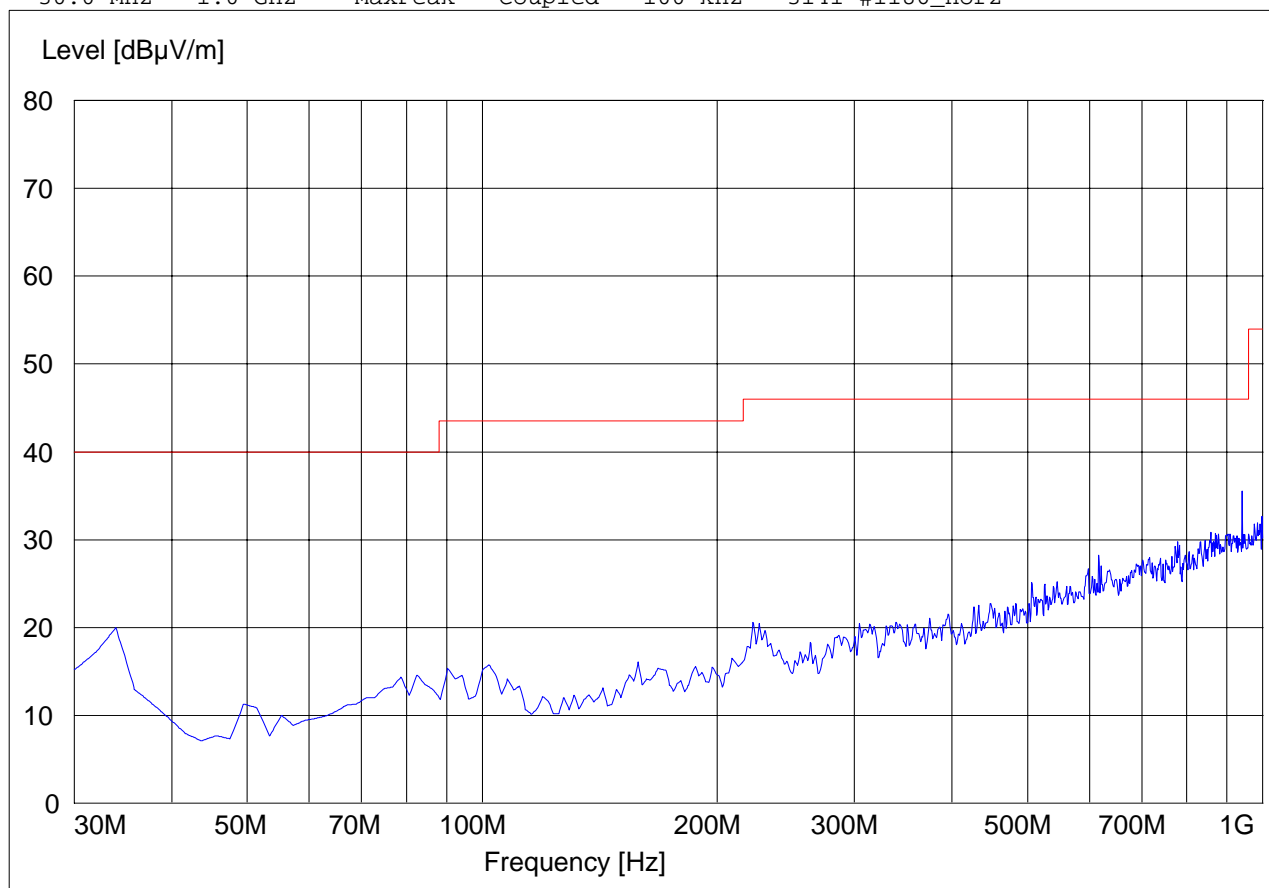
Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz



1-7GHz (5745MHz)

Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

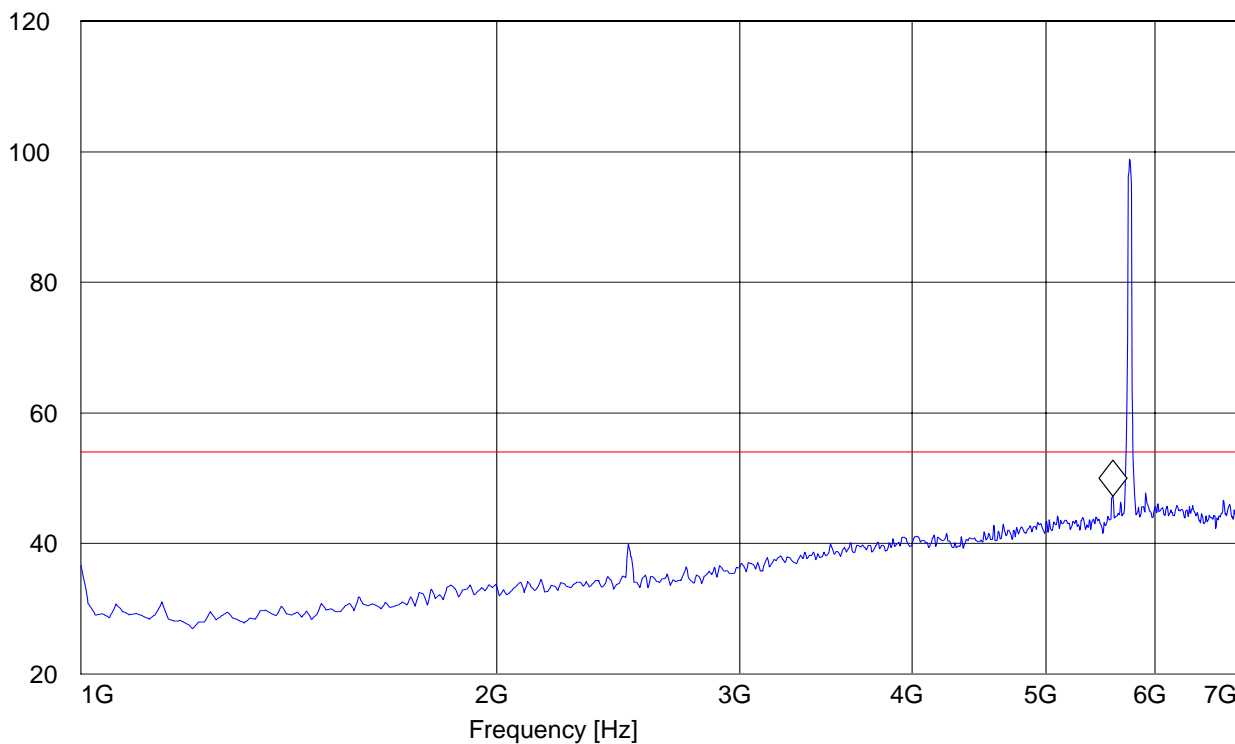
Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	7.0 GHz	MaxPeak	Coupled	1 MHz	#35114 Horn

Marker: 5.593186373 GHz 47.26 dB μ V/m

Level [dB μ V/m]



1-7GHz (5785MHz)

Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

Note: Worse case emission for all operating modes.

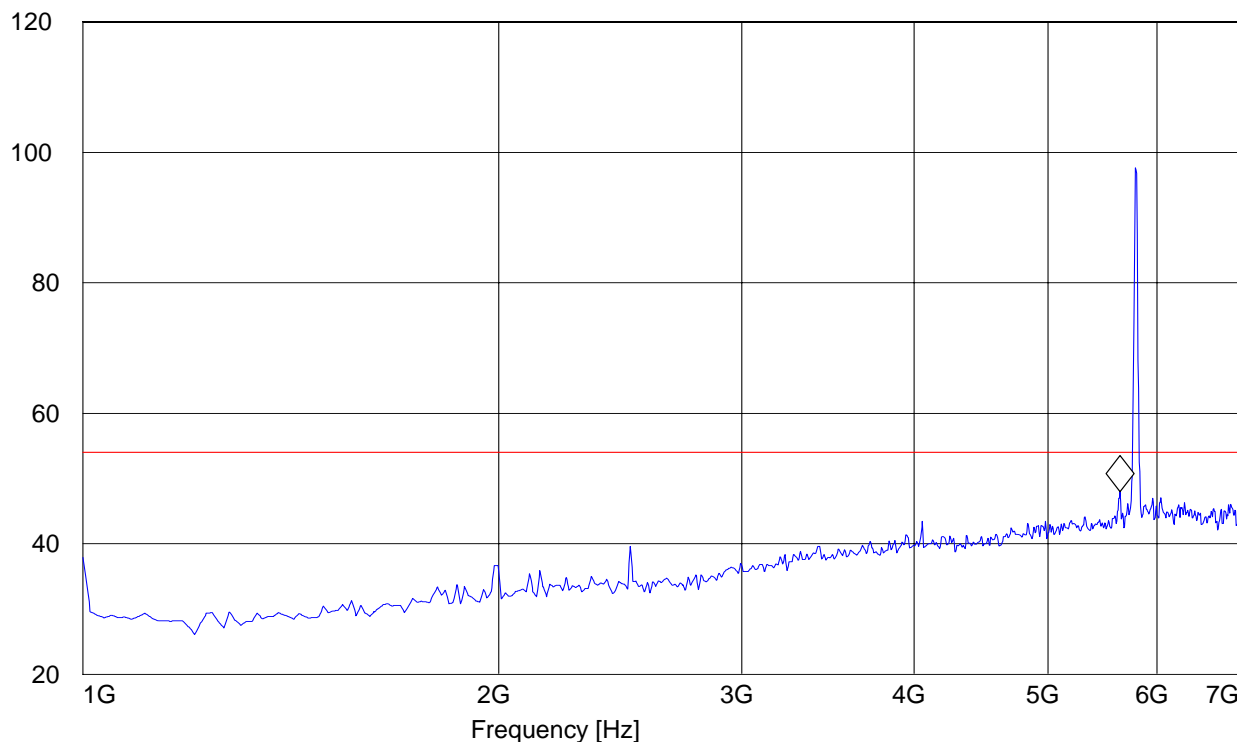
Note: Worse case emission for both Laptop and Table configuration.

Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	7.0 GHz	MaxPeak	Coupled	1 MHz	#35114 Horn

Marker: 5.641282565 GHz

47.98 dB μ V/mLevel [dB μ V/m]

1-7GHz (5825MHz)

Note: The peak above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

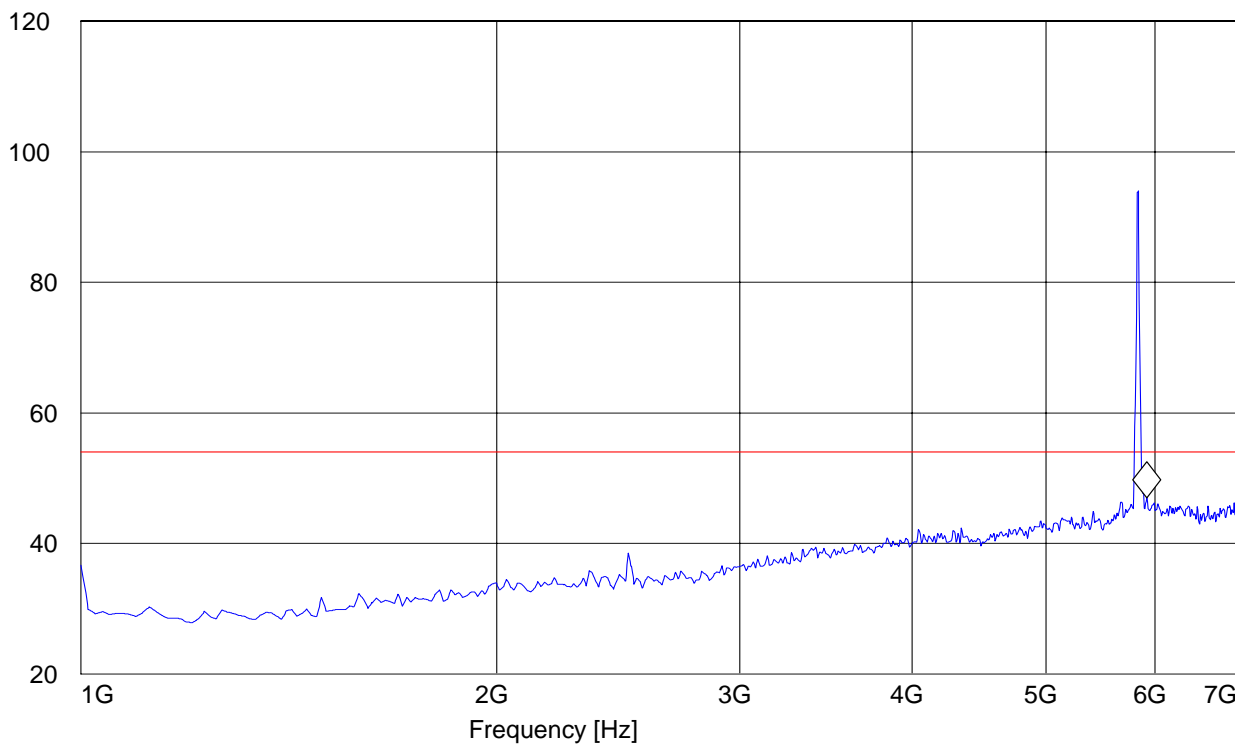
Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	7.0 GHz	MaxPeak	Coupled	1 MHz	#35114 Horn

Marker: 5.917835671 GHz 46.99 dB μ V/m

Level [dB μ V/m]



7-18GHz

Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Peak Reading vs. Average limit

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

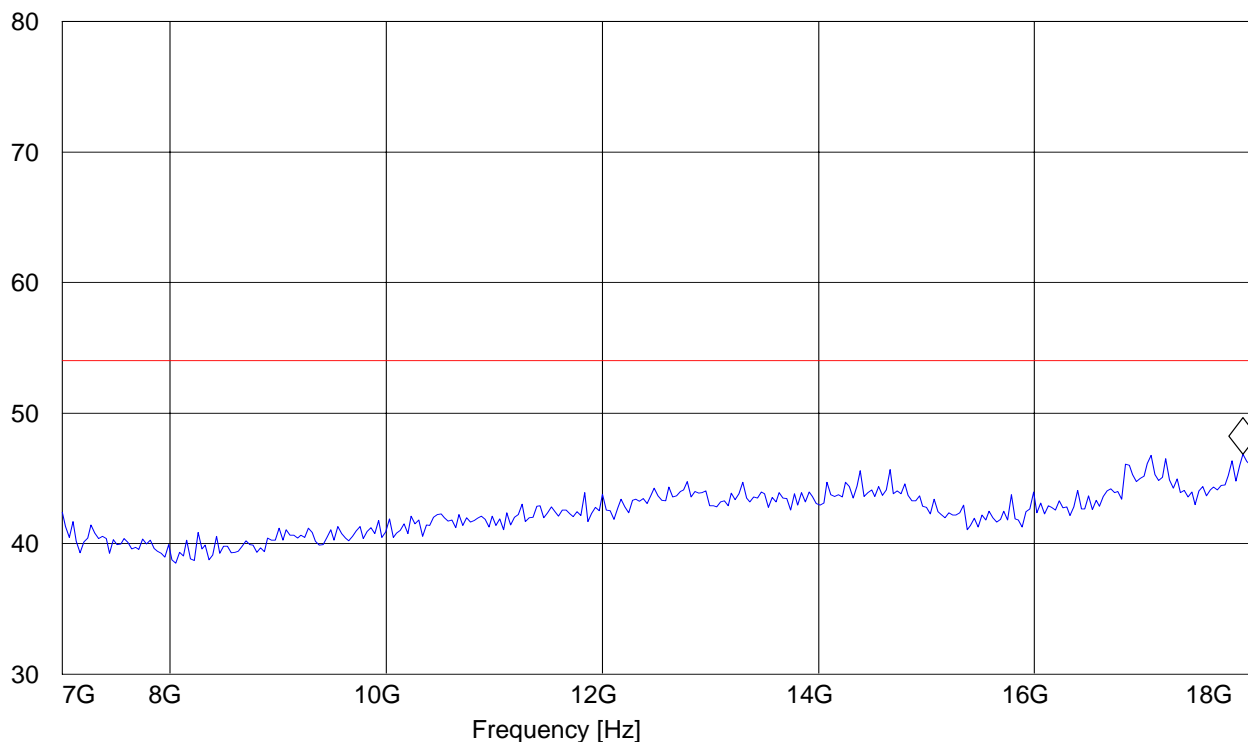
Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC 15.407 7-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	1.0 s	1 MHz	#326horn_AF_horz

Marker: 17.931863727 GHz 46.86 dBμV/m

Level [dBμV/m]



18-26.5GHz

Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Peak Reading vs. Average limit

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

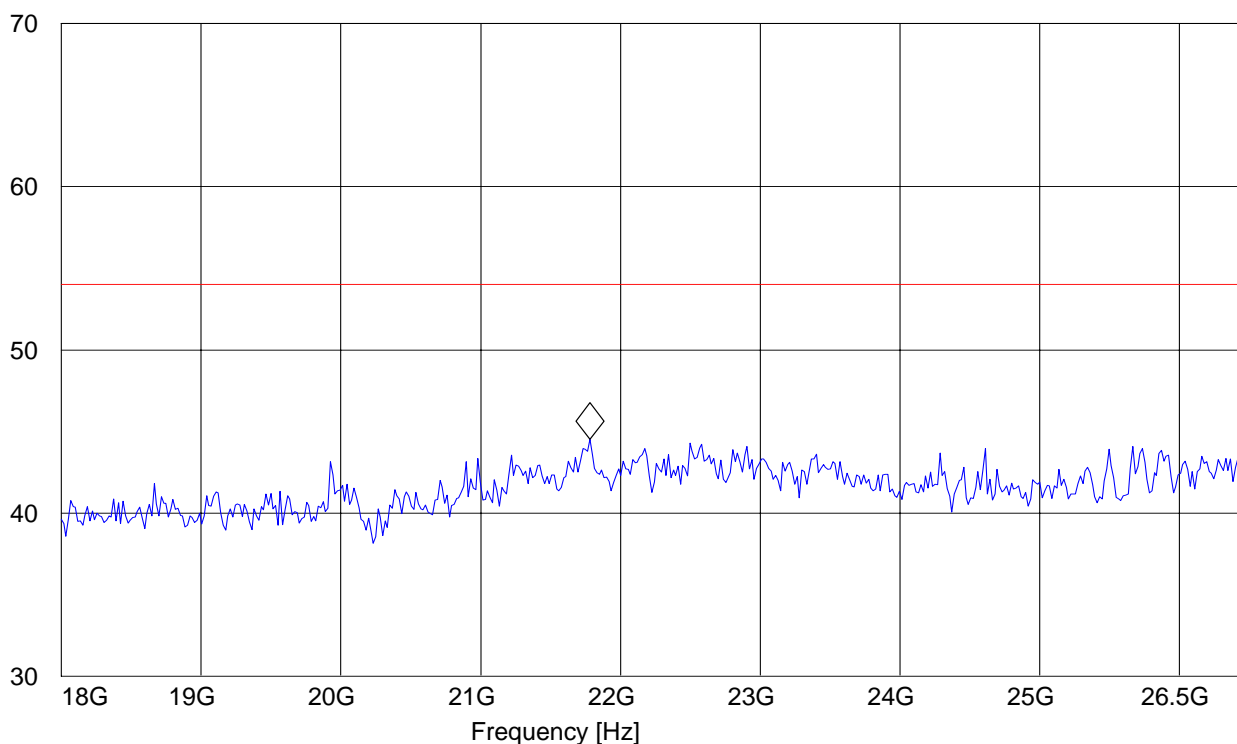
Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC 15.407 18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	Horn # 3116_18-40G

Marker: 21.781563126 GHz 44.53 dB μ V/m

Level [dB μ V/m]



26.5-40GHz

Note: This plot is valid for low, mid, high channels (worst-case plot).

Note: Peak Reading vs. Average limit

Note: Worse case emission for all operating modes.

Note: Worse case emission for both Laptop and Table configuration.

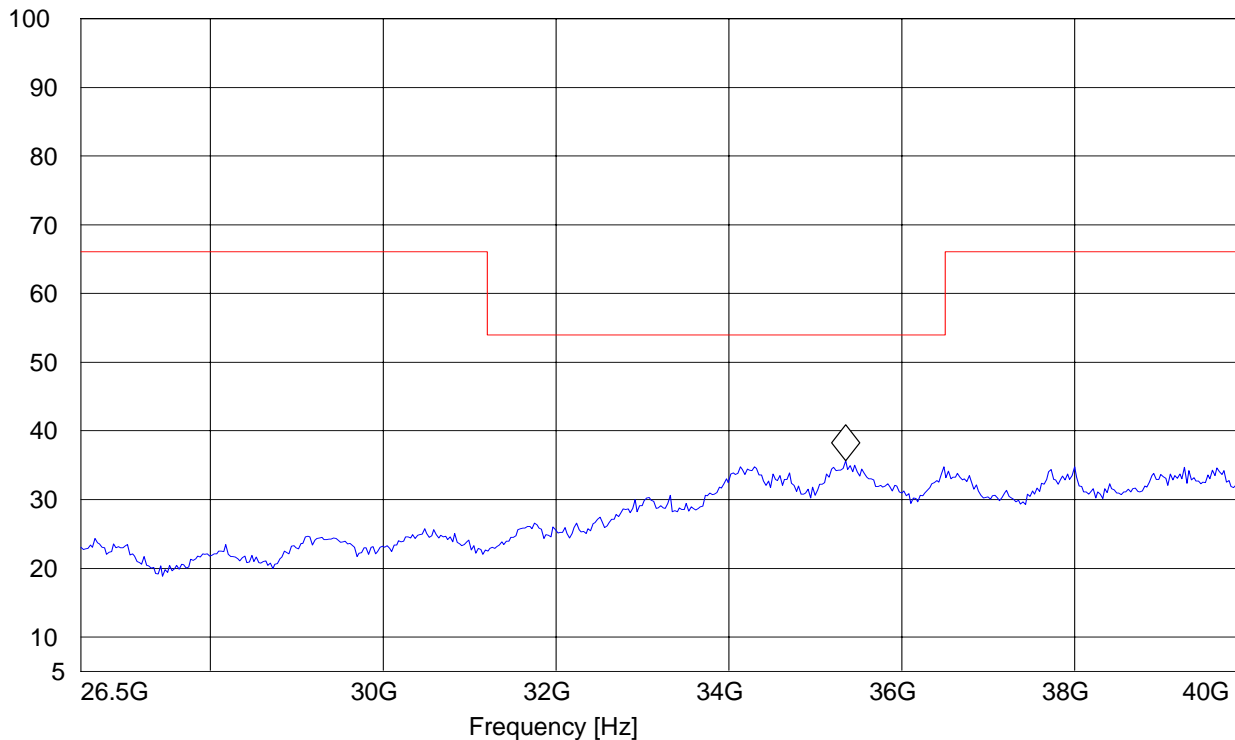
Customer:: Broadcom
Test Mode: 802.11a
ANT Orientation: H
EUT Orientation: H; Tablet
Test Engineer: Chris
Voltage: AC Adapter
Comments:

SWEEP TABLE: "FCC 15.407 26.5-40G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
26.5 GHz	40.0 GHz	MaxPeak	Coupled	1 MHz	Horn # 3116_18-40G

Marker: 35.346693387 GHz 35.63 dBμV/m

Level [dBμV/m]



5.4 Receiver Spurious Emission § 15.209/RSS210**5.4.1 Limits**

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.
2. All measurements are done in peak mode using an average limit unless specified with the plots.
3. There are no measurable emissions up to 18GHz in Rx mode.
4. Receiver spurious emissions reported here are the worse case emissions for all receiver modes and between two receiving chains.

5.4.2 RESULTS

30MHz – 1GHz, Antenna: Vertical

Note: This plot is valid for low, mid, high channels (worst-case plot).

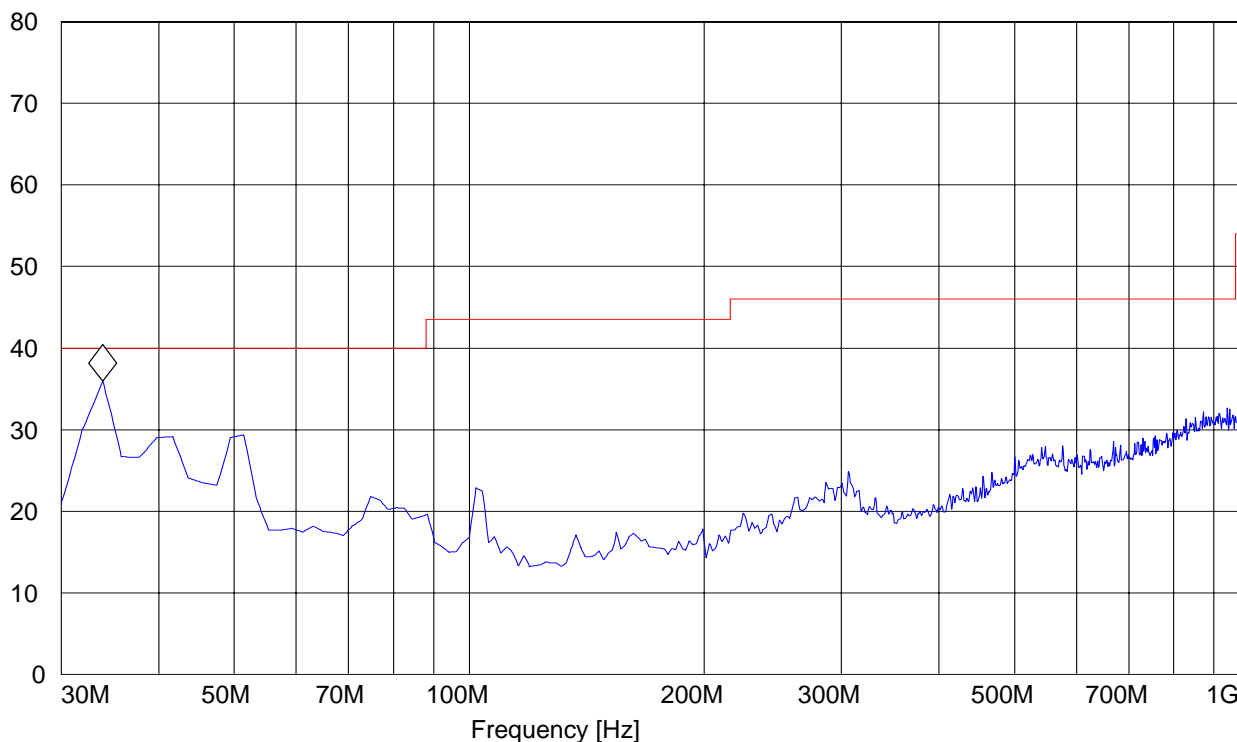
Customer:: Broadcom
Test Mode: Rx
ANT Orientation: V
EUT Orientation: H; tablet
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Ver"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert

Marker: 33.887776 MHz 35.96 dB μ V/m

Level [dB μ V/m]



30MHz – 1GHz, Antenna: Horizontal

Note: This plot is valid for low, mid, high channels (worst-case plot).

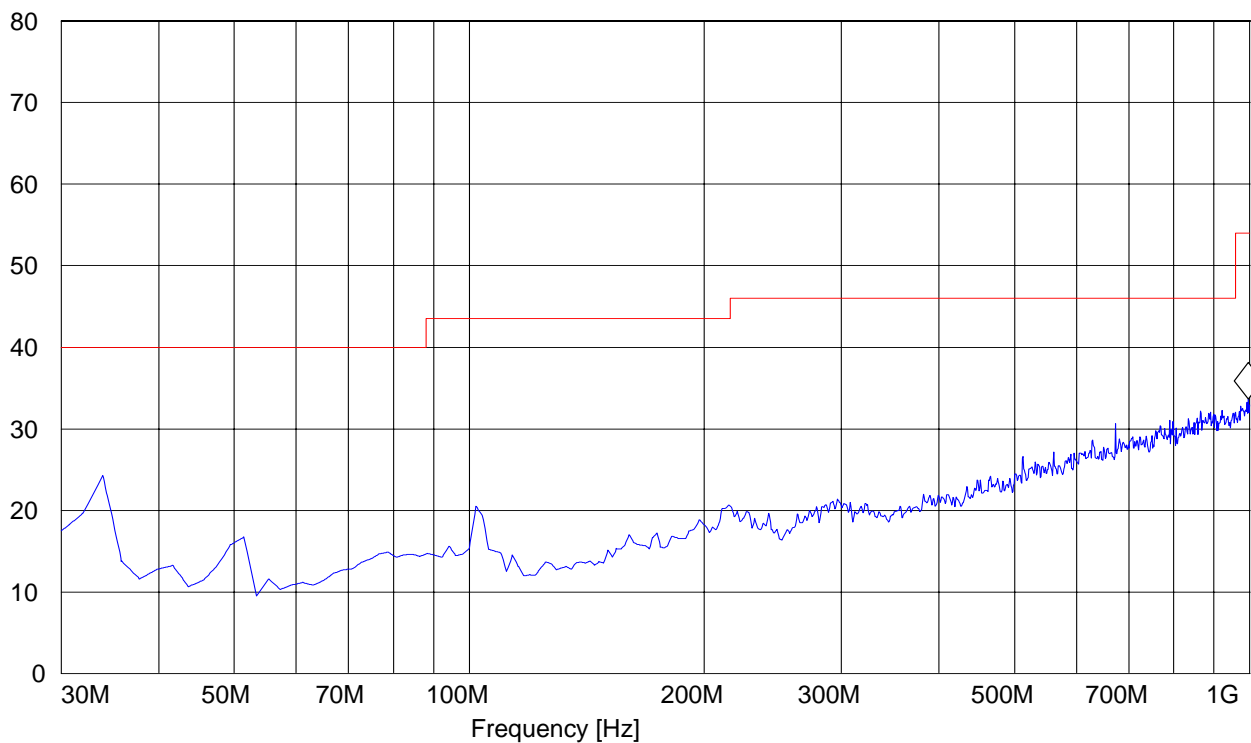
Customer:: Broadcom
Test Mode: Rx
ANT Orientation: H
EUT Orientation: H; tablet
Test Engineer: Chris
Voltage: AC
Comments:

SWEEP TABLE: "FCC15.247_30M-1G_Hor"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz

Marker: 996.112224 MHz 33.68 dB μ V/m

Level [dB μ V/m]



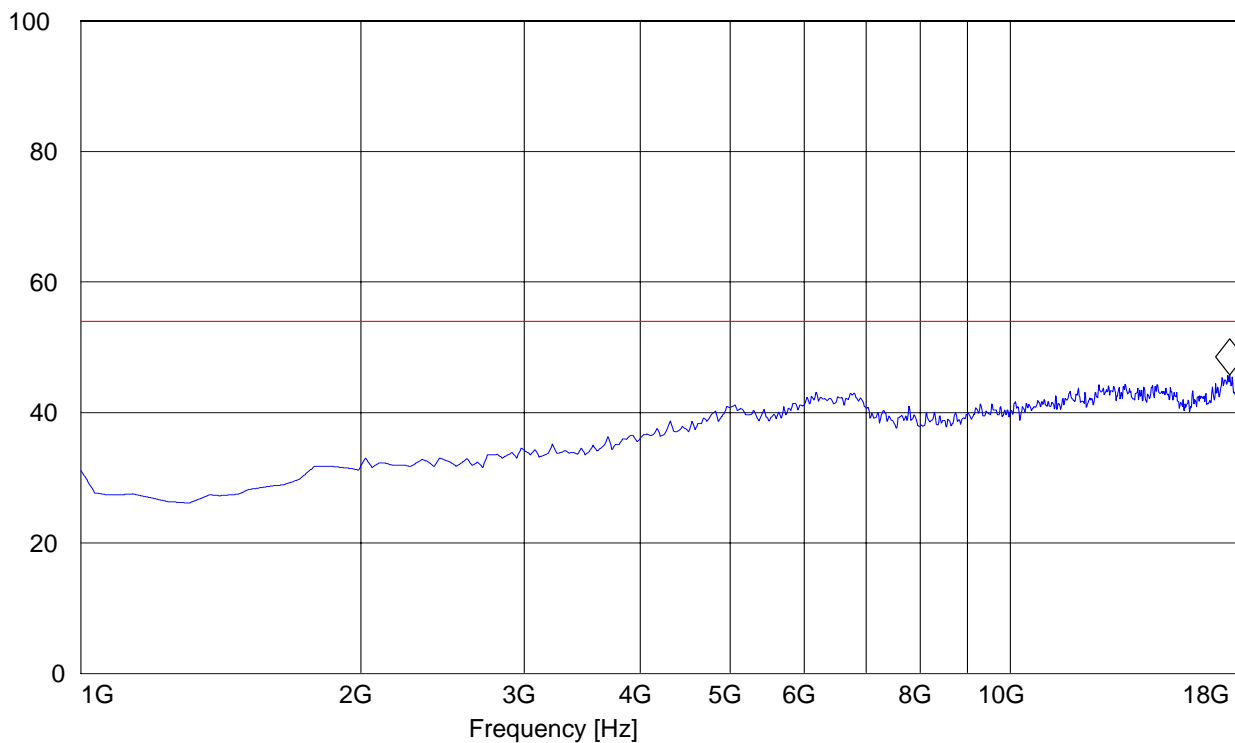
1-18GHz**Note: Peak Reading vs. Average limit**

Customer: Broadcom
Operation Mode: Rx
ANT Orientation: : H
EUT Orientation:: H; tablet mode
Test Engineer: Chris
Voltage: AC
Comments::

SWEEP TABLE: "FCC15.247_1-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 17.216432866 GHz 45.73 dB μ V/m

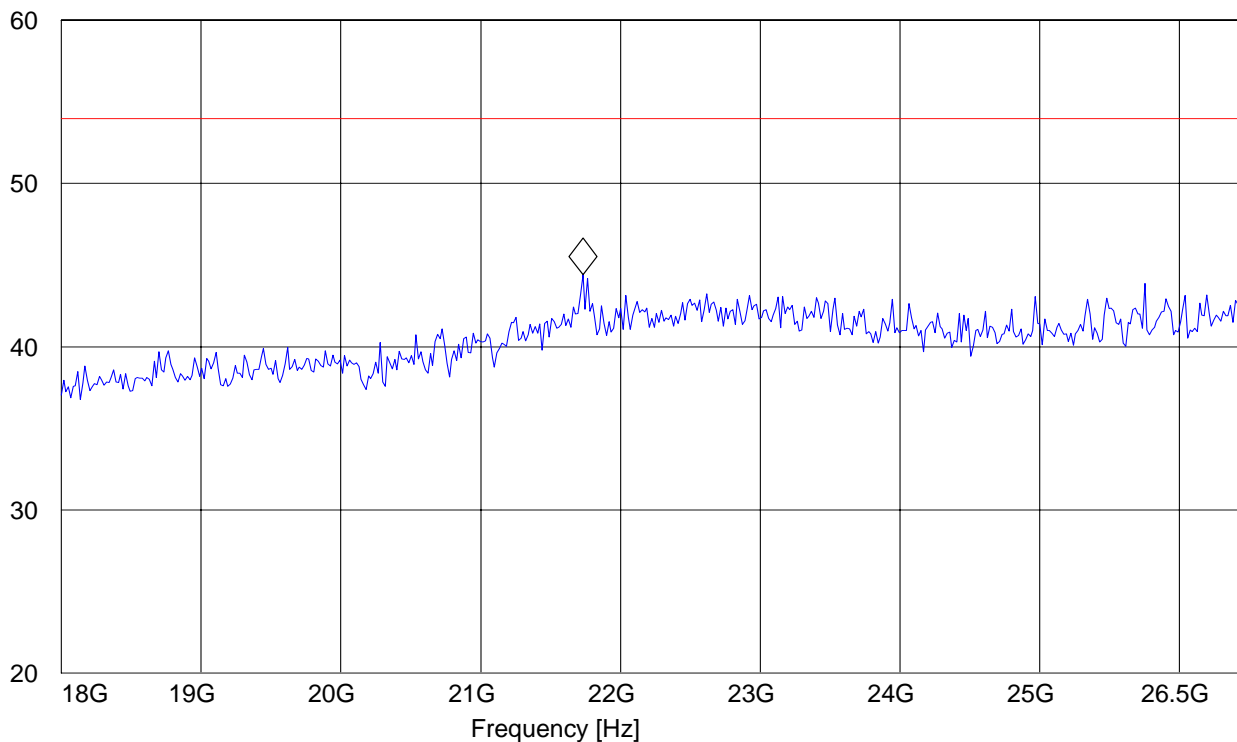
Level [dB μ V/m]

18-26.5GHz**Note: Peak Reading vs. Average limit**

Customer: Broadcom
Operation Mode: Rx
ANT Orientation: : H
EUT Orientation:: H; tablet mode
Test Engineer: Chris
Voltage: AC
Comments::

SWEEP TABLE: "FCC15.247_18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.5 GHz	MaxPeak MaxPeak	Coupled	100 kHz	Horn # 3116_18-40G

Marker: 21.730460922 GHz 44.4 dB μ V/mLevel [dB μ V/m]

26.5-40GHz**Note: Peak Reading vs. Average limit**

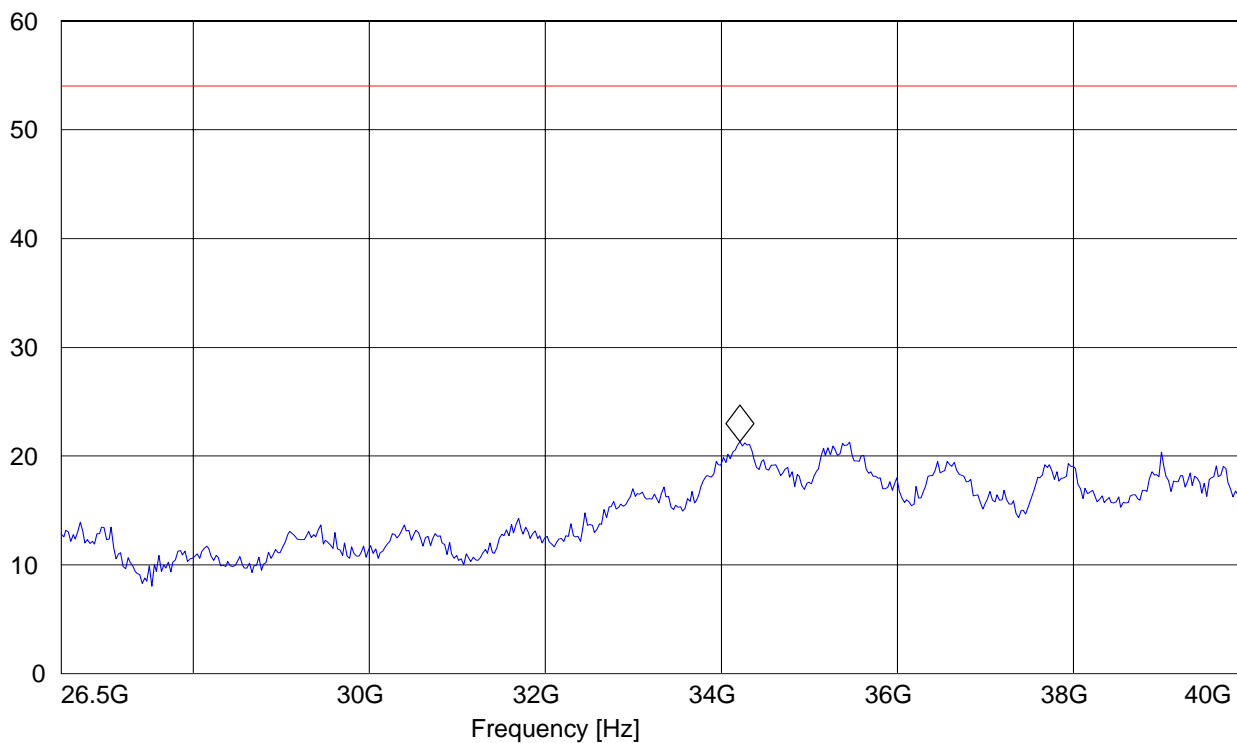
Customer: Broadcom
Operation Mode: Rx
ANT Orientation: : H
EUT Orientation:: H; tablet mode
Test Engineer: Chris
Voltage: AC
Comments::

SWEEP TABLE: "FCC15.247_26.5-40G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
26.5 GHz	40.0 GHz	MaxPeak	Coupled	1 MHz	Horn # 3116_18-40G

Marker: 34.210420842 GHz 21.31 dBμV/m

Level [dBμV/m]



6 Conducted Measurements

6.1 6dB bandwidth and 99% bandwidth.

6.1.1 Limit

FCC15.247(a)(2) 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.

RSS210 A8.2 (a): The minimum 6 dB bandwidth shall be at least 500 kHz.

6.1.2 Measurement Result:

Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.

6.2 Conducted Power Measurement

6.2.1 Limit

FCC15.247 (b)(3): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt

RSS210 A8.4(4): For systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.

6.2.2 Results

Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.

6.3 Power Spectral Density

6.3.1 Limit

FCC 15.247 (e) 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.

6.3.2 Results

Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.

6.4 Conducted Spurious Emission

6.4.1 Limit

§15.247(d) & RSS-210 (A8.5): -30dBc

6.4.2 Results:

Test Not conducted. The EUT integrates an FCC approved module. All conducted measurements are referenced from the original report for the module.

6.5 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207**6.5.1 LIMITS****Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)**

§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 boundary between the frequency ranges.

Limit

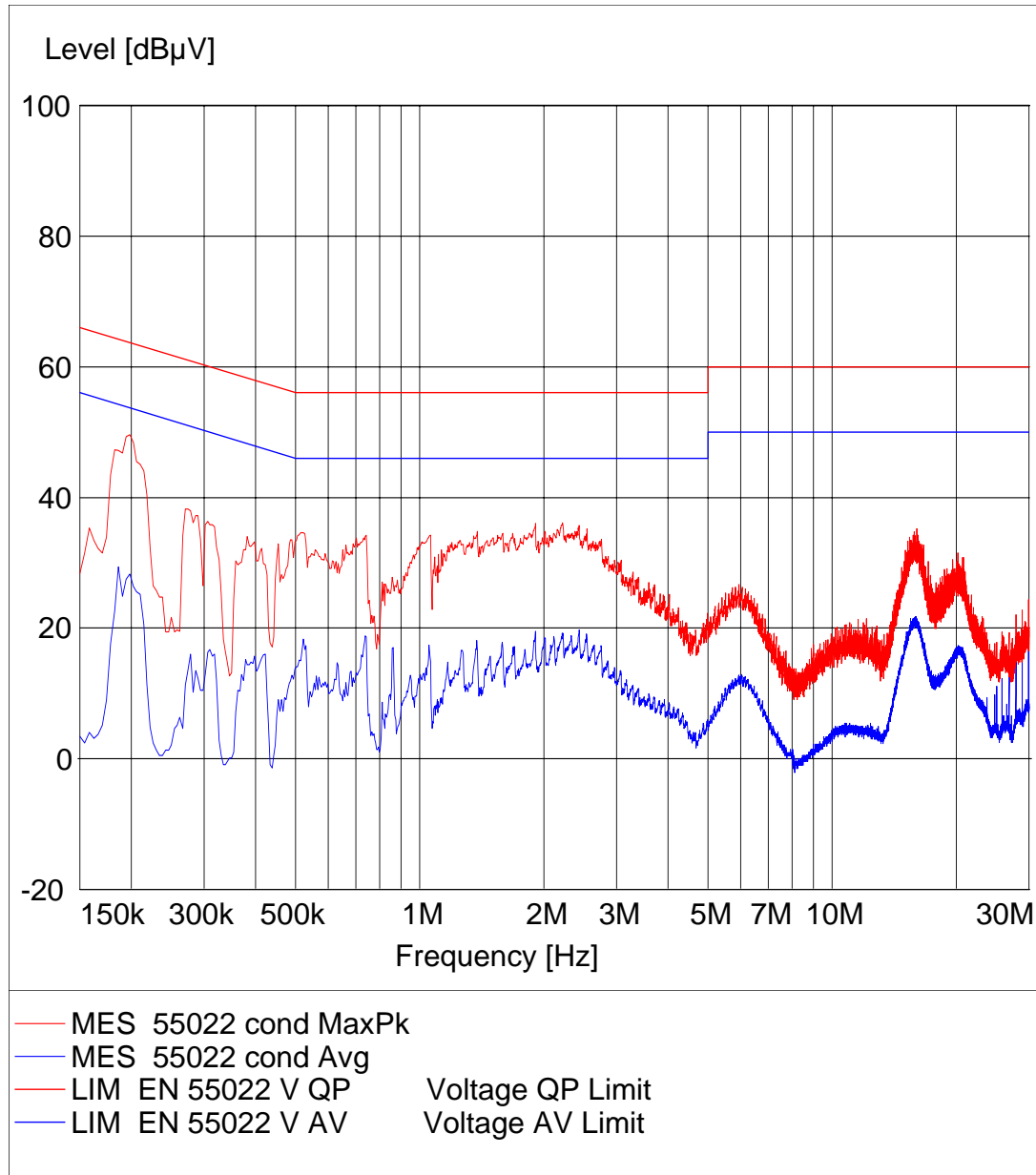
Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

ANALYZER SETTINGS: RBW = 10KHz**VBW = 10KHz**

Note: AC Line Conducted Emission reported here are the worse cases among all operating modes.

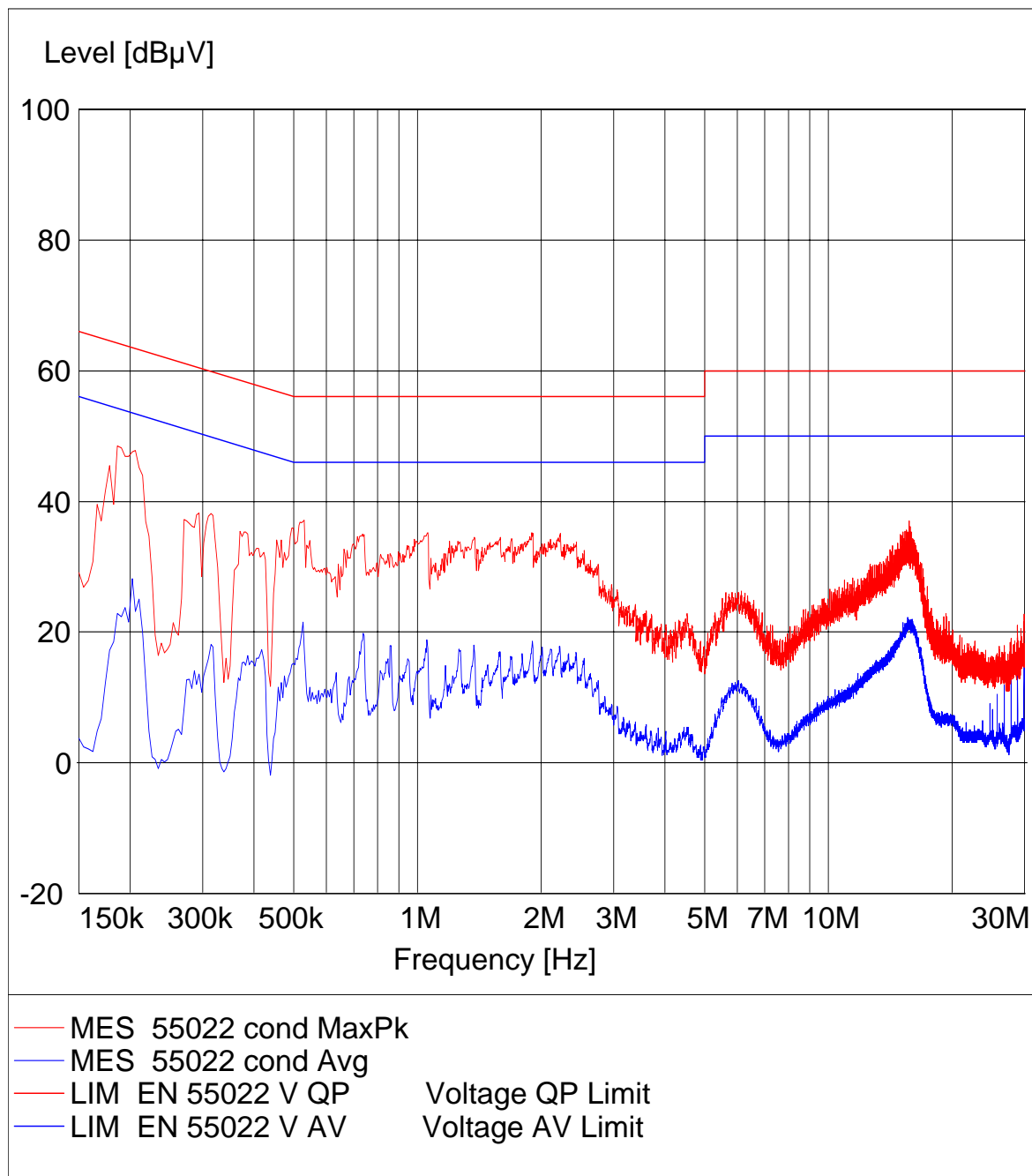
6.5.2 RESULTS Tx mode, Line**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

Manufacturer: Broadcom
Test Mode: 802.11g; Ch.6
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC
Comments: : Line



6.5.3 RESULTS Tx mode, Neutral**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

Manufacturer: Broadcom
Test Mode: 802.11g; Ch.6
ANT Orientation:: N/A
EUT Orientation:: H
Test Engineer:: Chris
Power Supply: : AC
Comments: : Neutral



6.5.4 RESULTS Rx mode, Line**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

Manufacturer: Broadcom

Test Mode: RX

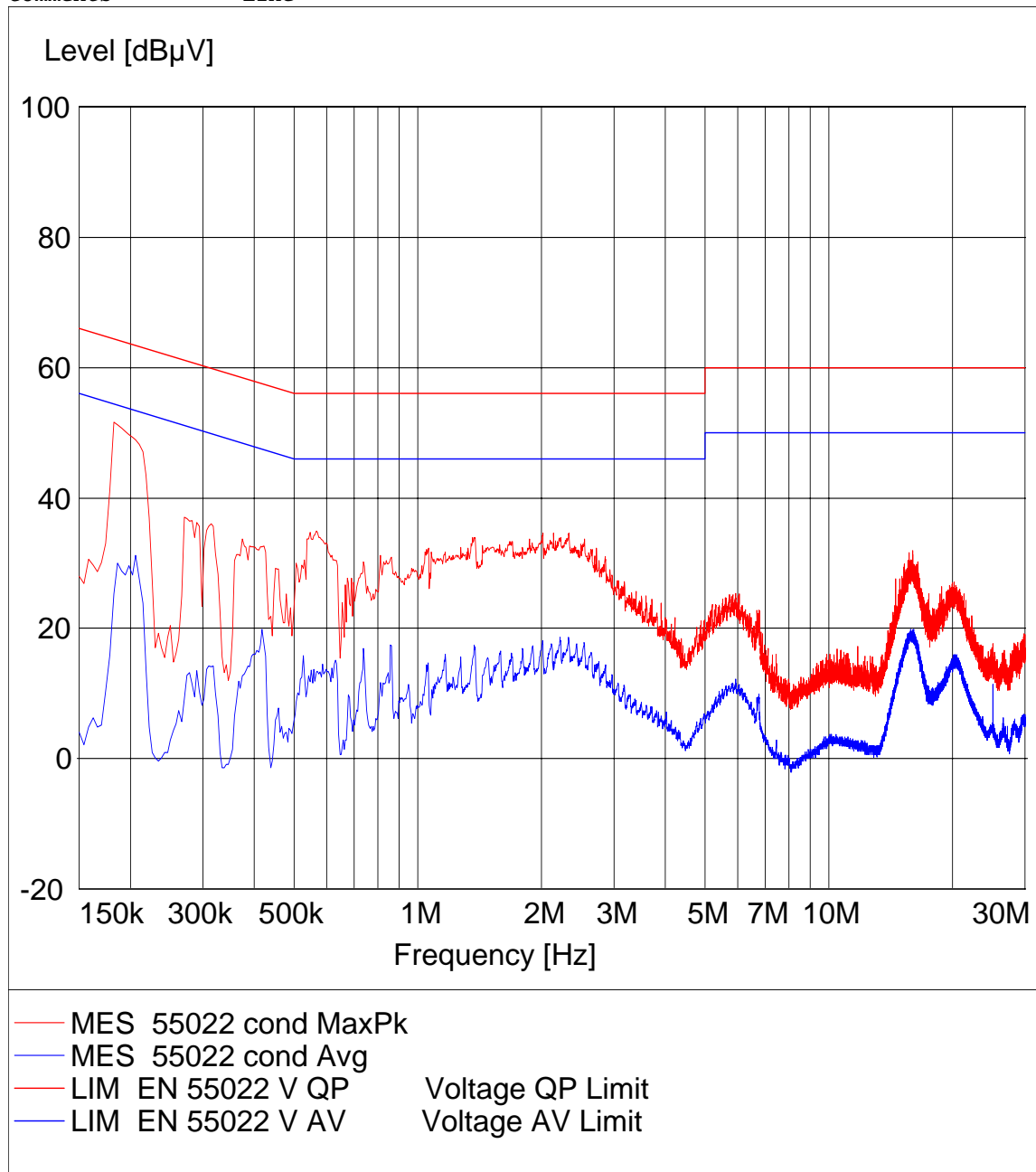
ANT Orientation:: N/A

EUT Orientation:: H

Test Engineer:: Chris

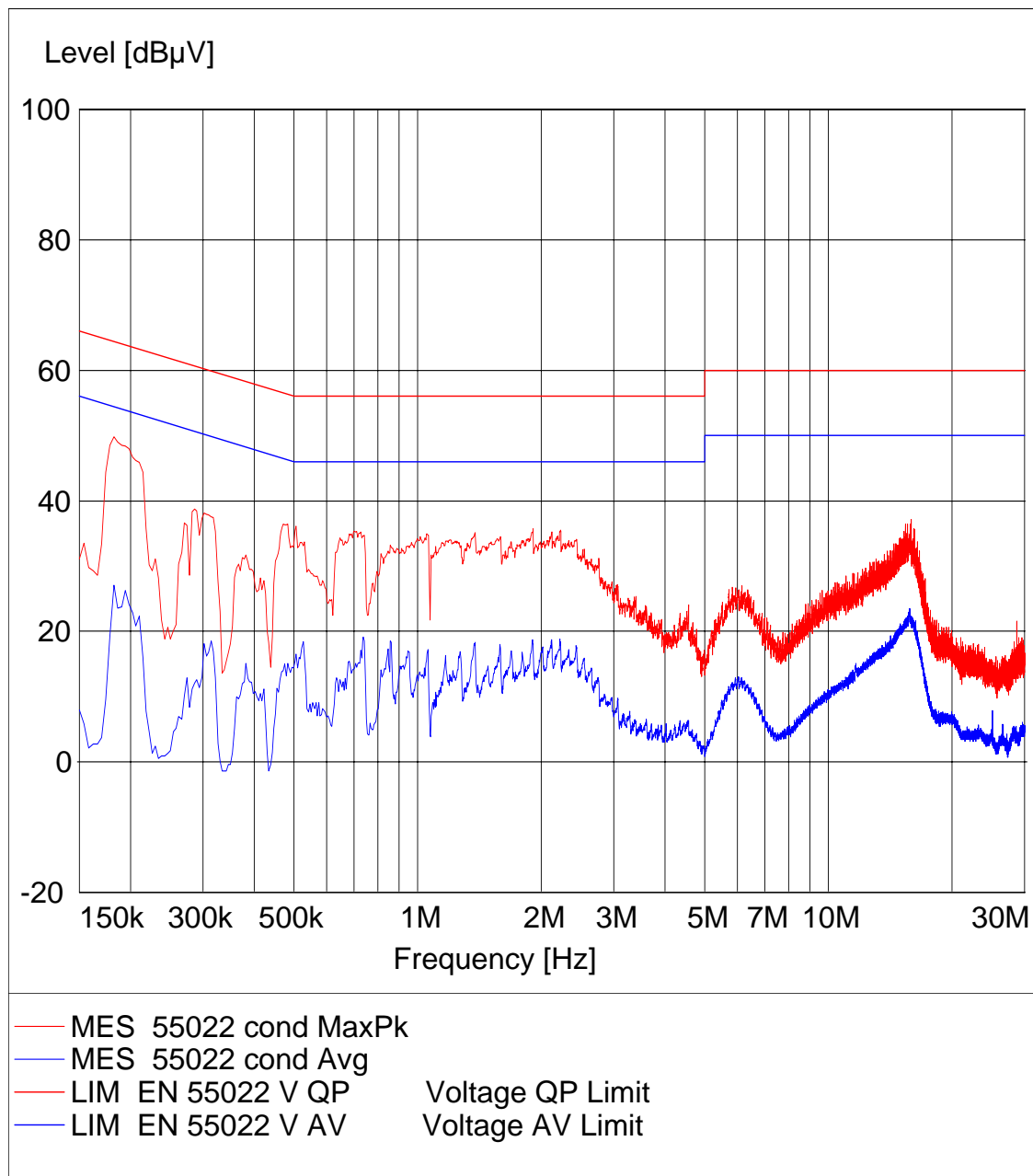
Power Supply: : AC

Comments: : Line



6.5.5 RESULTS Rx mode, Neutral**Note: Worse case emission for all operating modes.****Note: Worse case emission for both Laptop and Table configuration.**

Manufacturer: Broadcom
Test Mode: RX
ANT Orientation:: N/A
EUT Orientation:: H; tablet
Test Engineer:: Chris
Power Supply: : AC
Comments: : Neutral



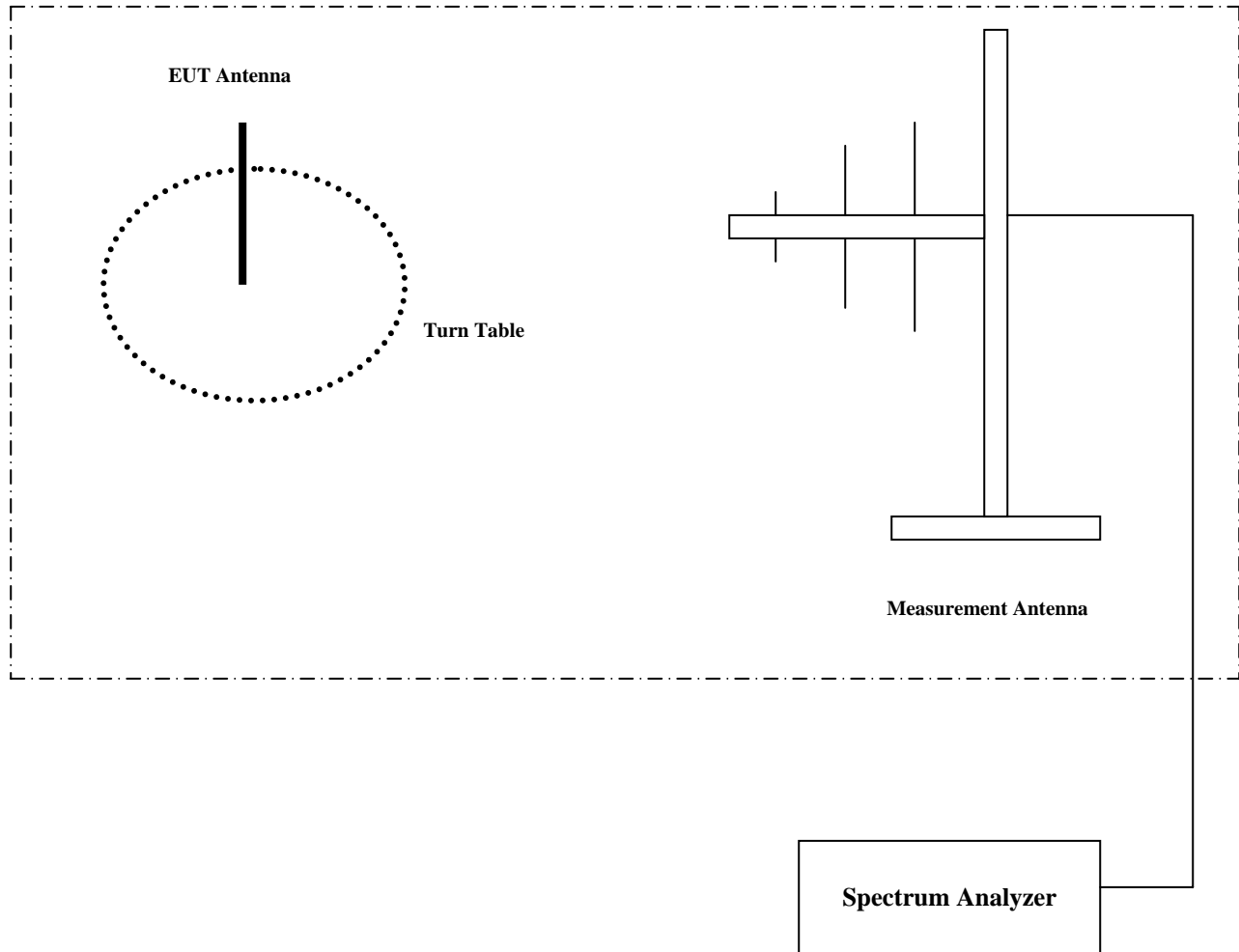
7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2009	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2009	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2009	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2009	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2009	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2009	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2009	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2009	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2009	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2009	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2009	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2009	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2009	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2009	2 years

8 BLOCK DIAGRAMS

Radiated Testing

ANECHOIC CHAMBER



Test Report #: **EMC_BROAD_062_08002_15.247_BRCM1030**



Date of Report: **2008-12-03**

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9 Revision History

2008-12-03: First Issue