Permissive Class II Change FCC Test Report

FCC Part 15.247 & RSS-210, Issue 7 for Digital Transmission Systems

FOR:

802.11a/g Wireless LAN PCI-E Mini Card

MODEL #: BCM94311MCAG

Broadcom Corporation
190 Mathilda Place
Sunnyvale, CA 94086
U.S.A

FCC ID: QDS-BRCM1019

Test report no.: EMC_BROAD_038_07001_AG_DTS

ilac-MRA A2LA ACCREDITED Certificate # 2135.01

Bluetooth™ **Bluetooth Qualification Test Facility (BQTF)**

CTIA Authorized Test Lab LAB CODE 20020328-00

FCC listed# A2LA Certified

IC recognized # 3462B

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

Table of Contents

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. 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.

TEST REPORT PREPARED BY:
EMC Engineer: Juan Martinez

1.2 Testing laboratory

CETECOM Inc.
411 Dixon Landing Road, Milpitas, CA-95035, USA
Phone: +1 408 586 6200 Fax: +1 408 586 6299
E-mail: lothar.schmidt@cetecomusa.com
Internet: www.cetecom.com

1.1 Details of applicant

Name	:	**Broadcom Corporation**
Street	:	**190 Mathilda Place**
City / Zip Code	:	**Sunnyvale, California 94086**
Country	:	**USA**
Contact	:	**Daniel Lawless**
Telephone	:	**408 922 5870**
Tele-fax	:	**408 543 3399**
e-mail	:	**dlawless@broadcom.com**

1.2 Application details

Date of receipt test item	:	**07/30/2007**
Date of test	:	**07/31/2007**

1.3 Test item

Manufacturer	:	**Applicant**
Marketing Name	:	**802.11a/g Wireless LAN PCI-E Mini Card**
Model No.	:	**BCM94311MCAG**
Description	:	**802.11g Wireless LAN PCI-E Mini Card**
FCC-ID	:	**QDS-BRCM1019**

Additional information

Frequency	:	**2412MHz – 2462MHz and 5745 – 5825 MHz**
Type of modulation	:	**CCK/OFDM**
Number of channels	:	**11 (2412 – 2462 MHz), 5 (5745 – 5825 MHz)**
Antenna Type	:	**2.4GHz, Acon (Model: AMP6P-700000), Stamped metal sheet (2.6dBi)** **2.4GHz, Amphenol (Model: WT541-22-003), Stamped metal sheet (1.88 dBi)** **5GHz, Acon (Model: AMP6P-700000), Stamped metal sheet (0.7dBi)** **5GHz, Amphenol (Model: WT541-22-003), Stamped metal sheet (3.21 dBi)**
Output power	:	**802.11 (b) mode: 0.056 W EIRP @ 2412MHz** **802.11 (b) mode: 0.073 W EIRP @ 2437MHz** **802.11 (b) mode: 0.064 W EIRP @ 2462MHz** **802.11 (g) mode: 0.257 W EIRP @ 2412MHz** **802.11 (g) mode: 0.324 W EIRP @ 2437MHz** **802.11 (g) mode: 0.320 W EIRP @ 2462MHz** **802.11 (a) mode: 0.121 W EIRP @ 5745MHz** **802.11 (a) mode: 0.103 W EIRP @ 5785MHz** **802.11 (a) mode: 0.119 W EIRP @ 5825MHz**
Test standards:		**FCC Part 15 §15.247 & RSS-210, Issue 7**

1.4 Class II permissive change laptops to be added

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	Laptop	Dell	PP12S	UNIT 1

1.5 Identification of Accessory equipment

TYPE	MANF.	MODEL
AC ADAPTOR	Dell	DA65NS0-00

Subject Of Investigation

All testing were performed on the PP12S (Parker) laptop with the BCM94311MCAG pre-approved module. Measurements were performed on the Acon for 2.4GHz and Amphenol for 5GHz antenna. . Data, presented in this report, was collected for a Class II permissive change to add the laptop to the BCM94311MCAG (FCC ID: QDS-BRCM1019) module application.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and to Industry Canada RSS-210, Issue 7. The maximization of portable equipment is conducted in accordance with ANSI C63.4.

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (Only "passed" if all single measurements are "passed")	**Passed**

Technical responsibility for area of testing:

Date	Section	Name	Signature
07/31/2007	EMC & Radio	**Lothar Schmidt (Manager)**	Lothar Schmidt I am approving this document

Responsible for test report and project leader:

Date	Section	Name	Signature
07/31/2007	EMC & Radio	Juan Martinez **(Project Engineer)**	Juan Martinez I am the author of this document

2.2 Test report

TEST REPORT

Test report no.: EMC_BROAD_038_07001_AG_DTS

TEST REPORT REFERENCE

LIST OF MEASUREMENTS PAGE

2.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (b) (3) & RSS-210 (A8.4)(4) (RADIATED)

EIRP:

802.11b

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)°C	V_{nom}	17.45	18.65	18.06
Measurement uncertainty		±0.5dBm		

802.11g

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)°C	V_{nom}	24.1	25.11	25.06
Measurement uncertainty		±0.5dBm		

802.11a

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		5745	5785	5825
T_{nom}(23)°C	V_{nom}	20.84	20.14	20.77
Measurement uncertainty		±0.5dBm		

LIMIT **SUBCLAUSE § 15.247 (b) (3) & RSS-210 (A8.4)(4)**

Frequency range	RF power output
2400-2483.5 MHz	30dBm on Conducted
5725-5850 MHz	30dBm on Conducted

Notes:
1. For 802.11b, 802.11g, and 802.11a powers were set to transmit at the specified conducted average output power.
2. EIRP was measured with the device transmitting on both the auxiliary and the main antenna. The EIRP was highest when transmitting on the main antenna. EIRP values shown in this report are with the device transmitting on the main antenna.
3. Both vertical and horizontal were measured. Worst case polarization was horizontal for all modes.

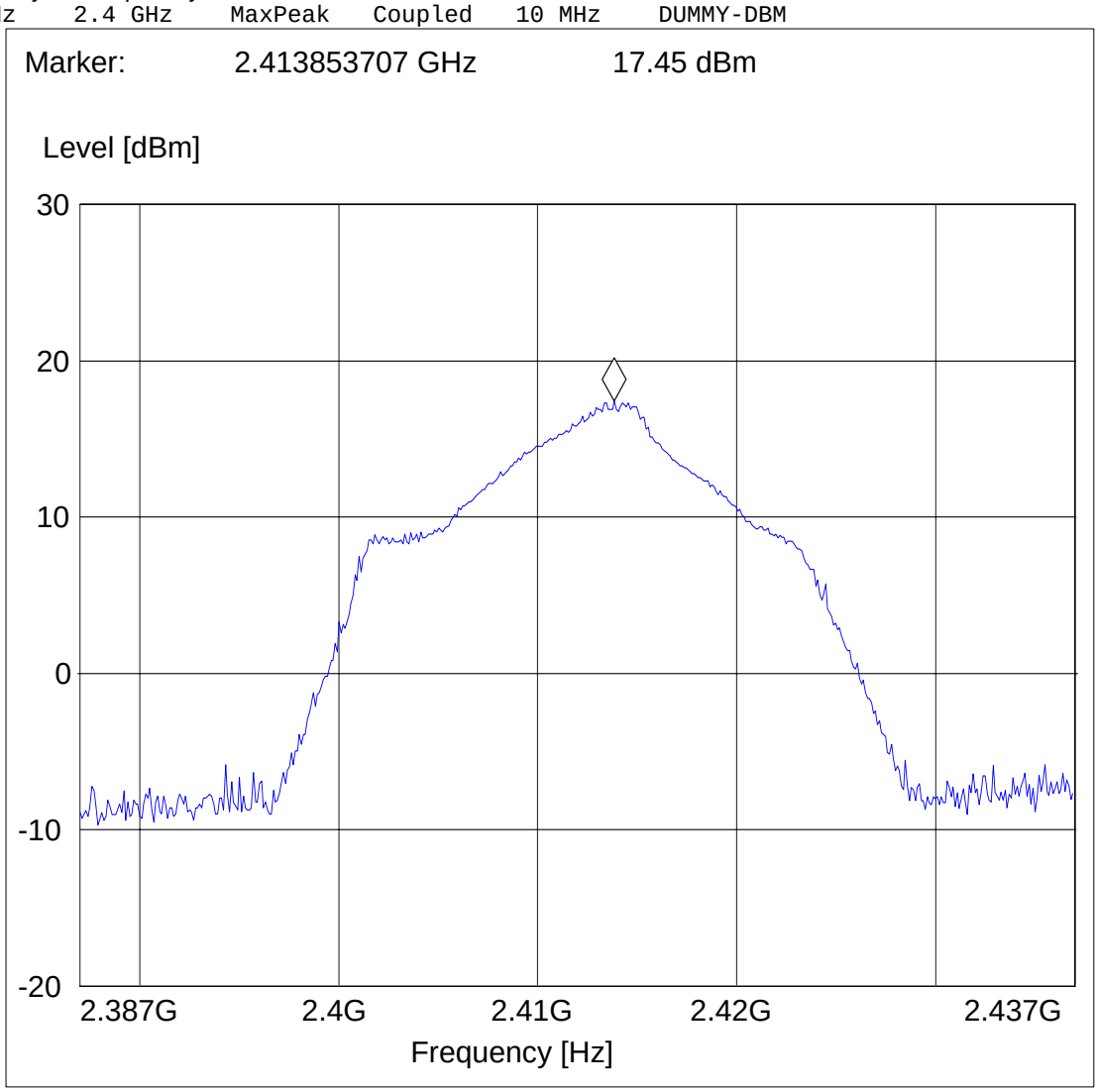
EIRP: 2412 MHz (802.11b)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, ch 1 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP RLAN CH1"

```
Short Description:            EIRP RLAN channel-2412 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
2.4 GHz    2.4 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



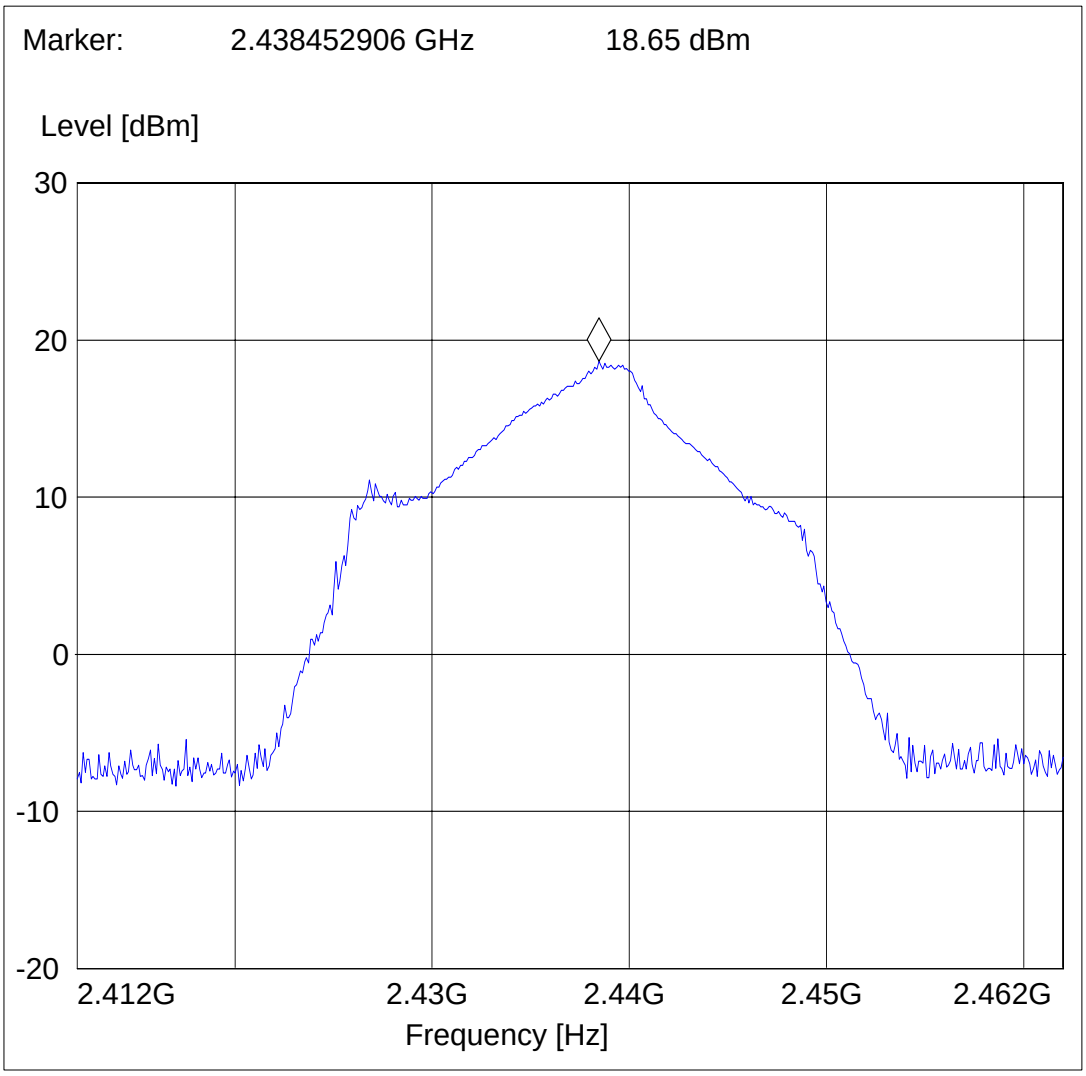
EIRP: 2437 MHz (802.11b)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, ch 6 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP RLAN CH6"

```
  Short Description:            EIRP RLAN channel-2437 MHz
  Start      Stop       Detector  Meas.     IF        Transducer
  Frequency  Frequency            Time      Bandw.
  2.4 GHz    2.5 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```


Marker: 2.438452906 GHz 18.65 dBm
Level [dBm]
30
20
10
0
-10
-20
2.412G
2.43G
2.44G
2.45G
2.462G
Frequency [Hz]

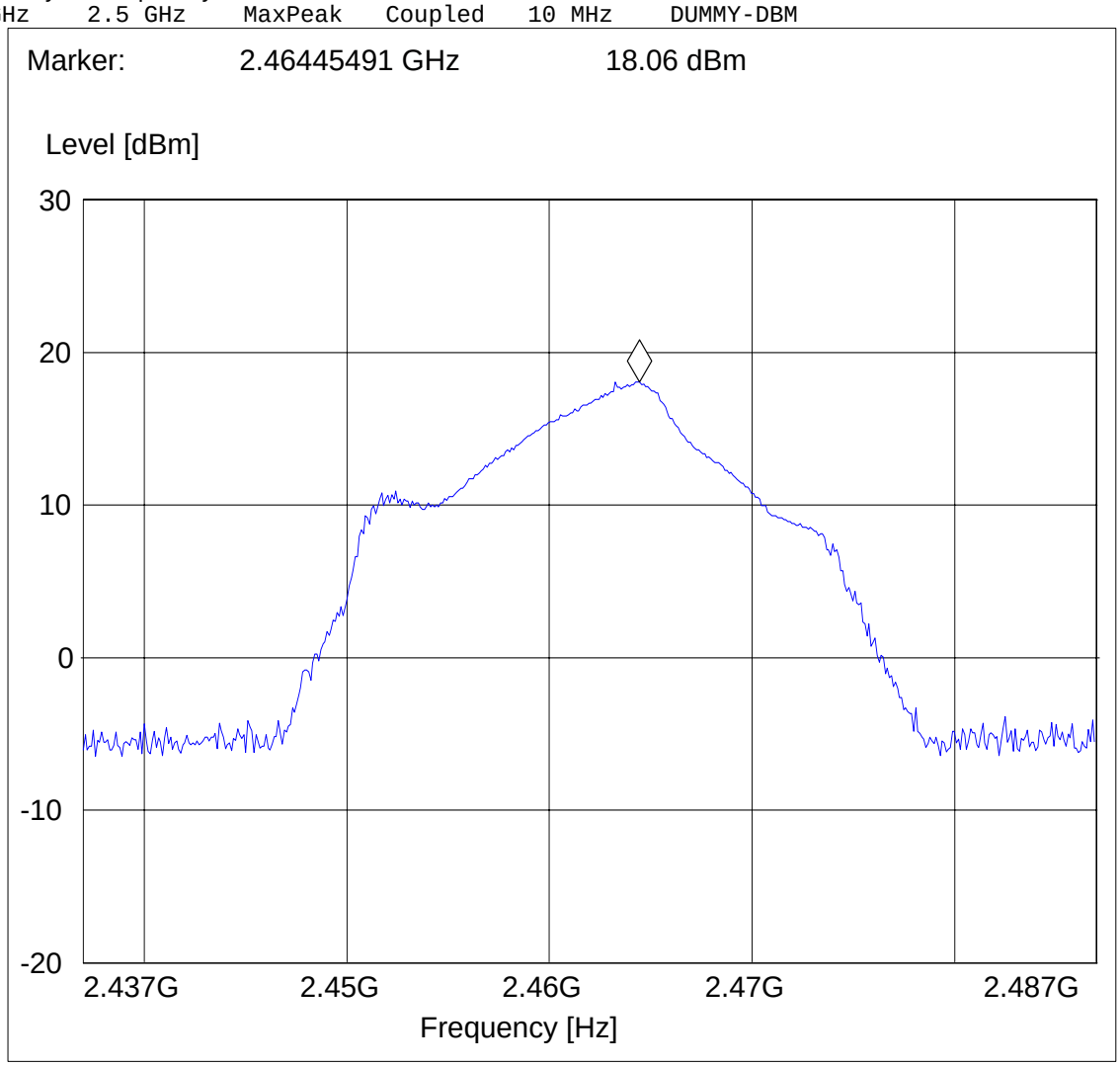
EIRP: 2462 MHz (802.11b)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, ch 11 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
```

SWEEP TABLE: "EIRP RLAN CH11"

```
Short Description:            EIRP RLAN channel-2462 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
2.4 GHz    2.5 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



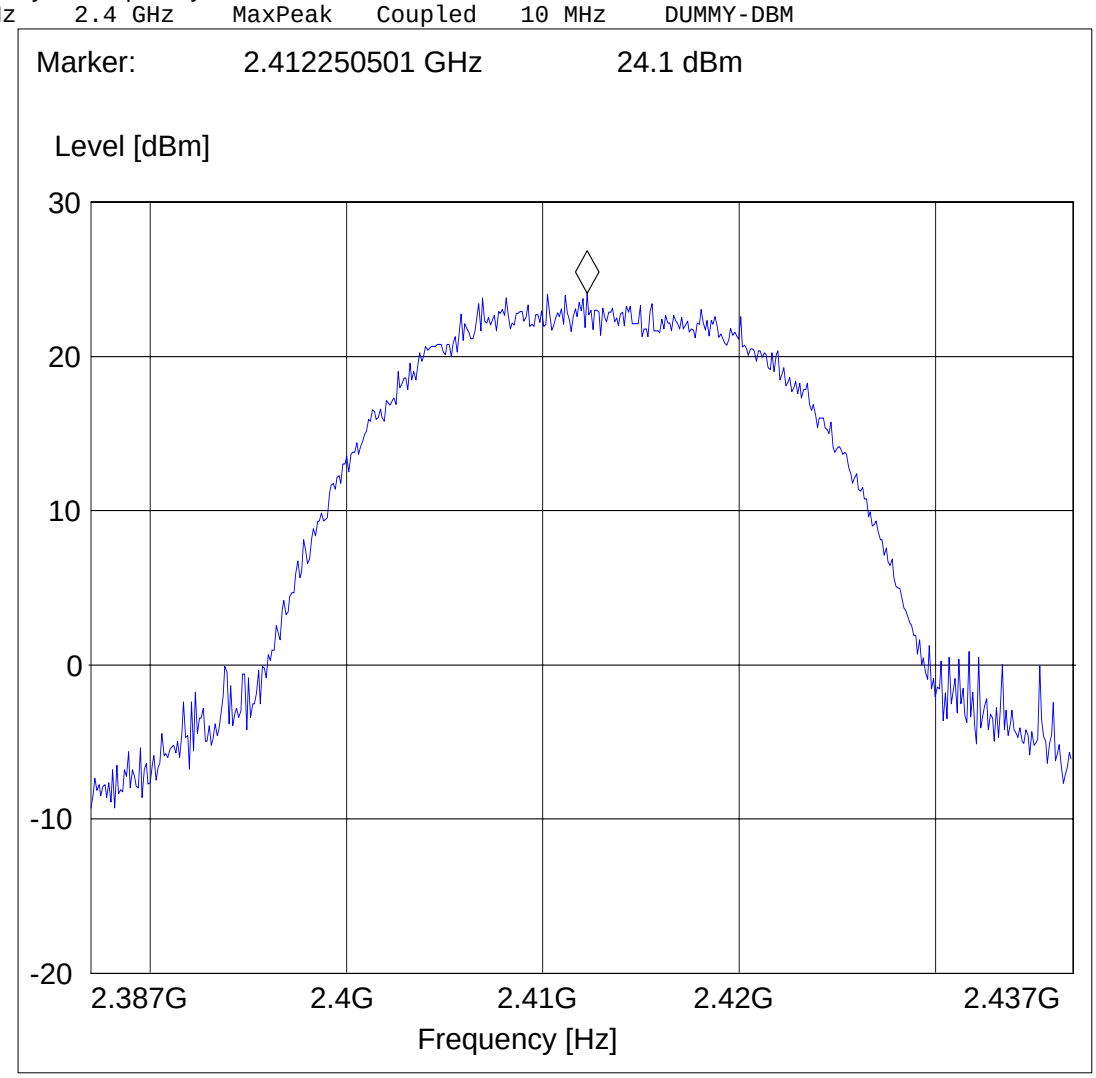
EIRP: 2412 MHz (802.11g)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 1 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP RLAN CH1"

```
Short Description:            EIRP RLAN channel-2412 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
2.4 GHz    2.4 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



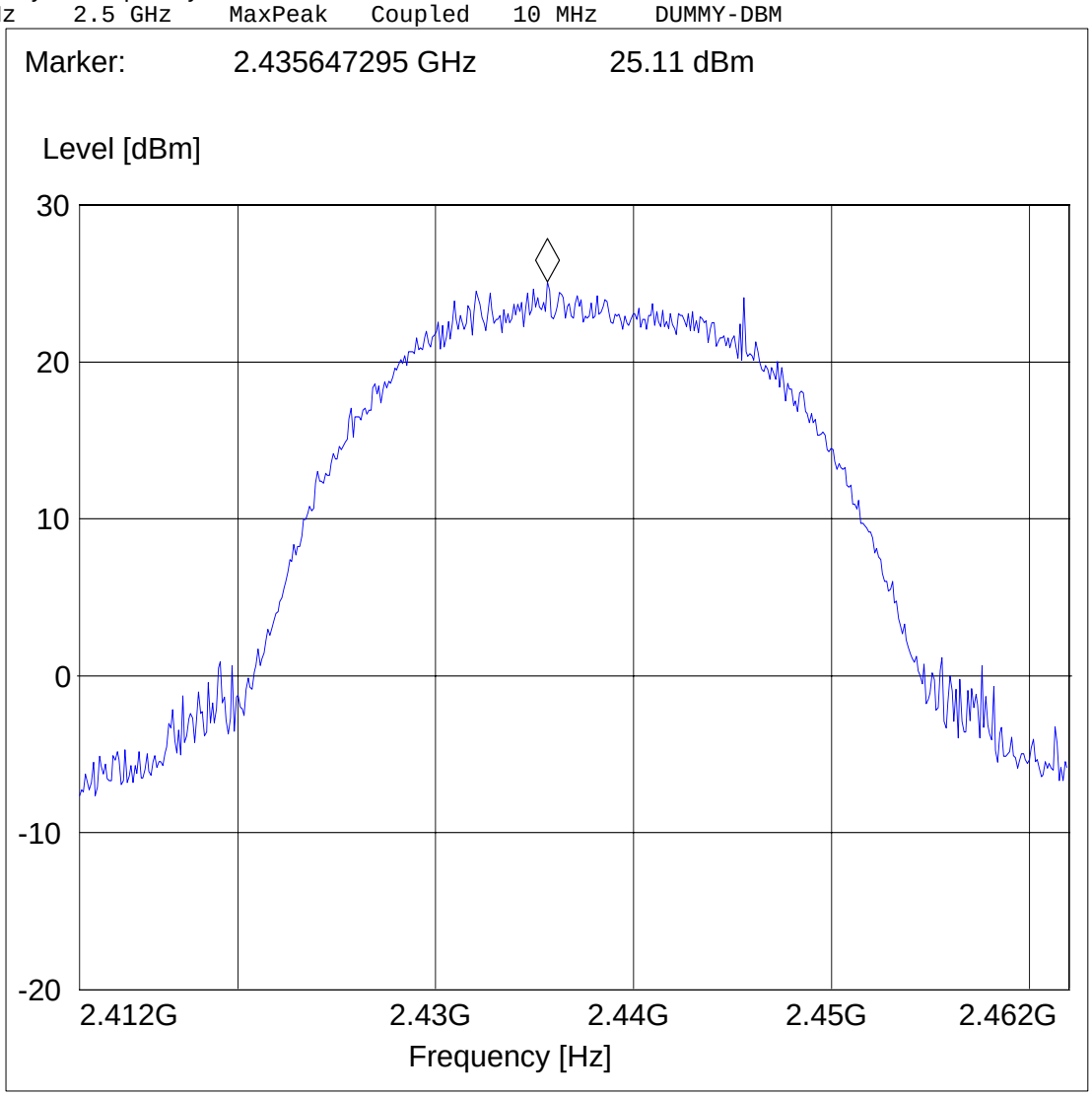
EIRP: 2437 MHz (802.11g)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 6 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP RLAN CH6"

```
Short Description:            EIRP RLAN channel-2437 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
2.4 GHz    2.5 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



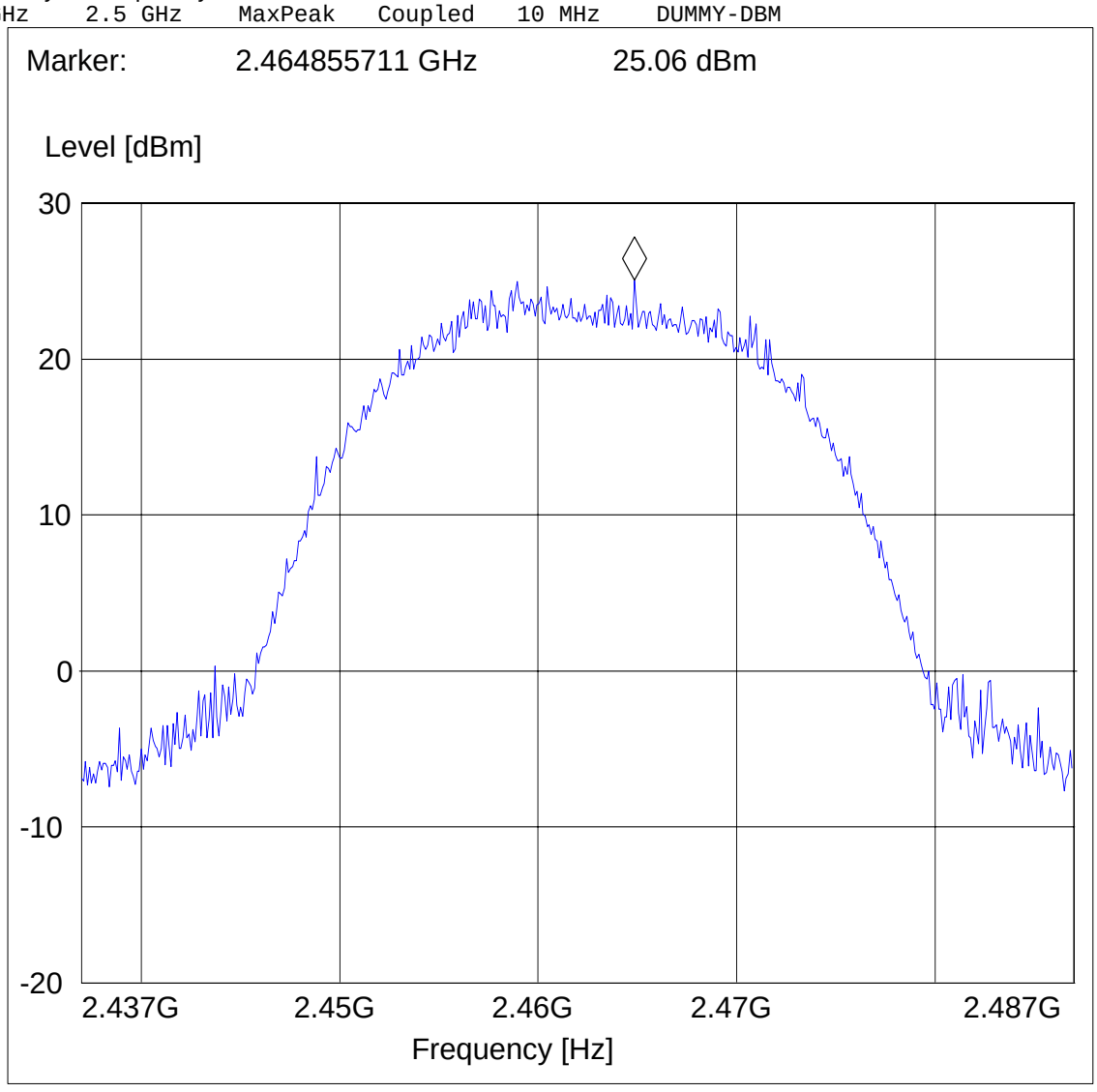
EIRP: 2462 MHz (802.11g)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 11
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP RLAN CH11"

```
Short Description:            EIRP RLAN channel-2462 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
2.4 GHz    2.5 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



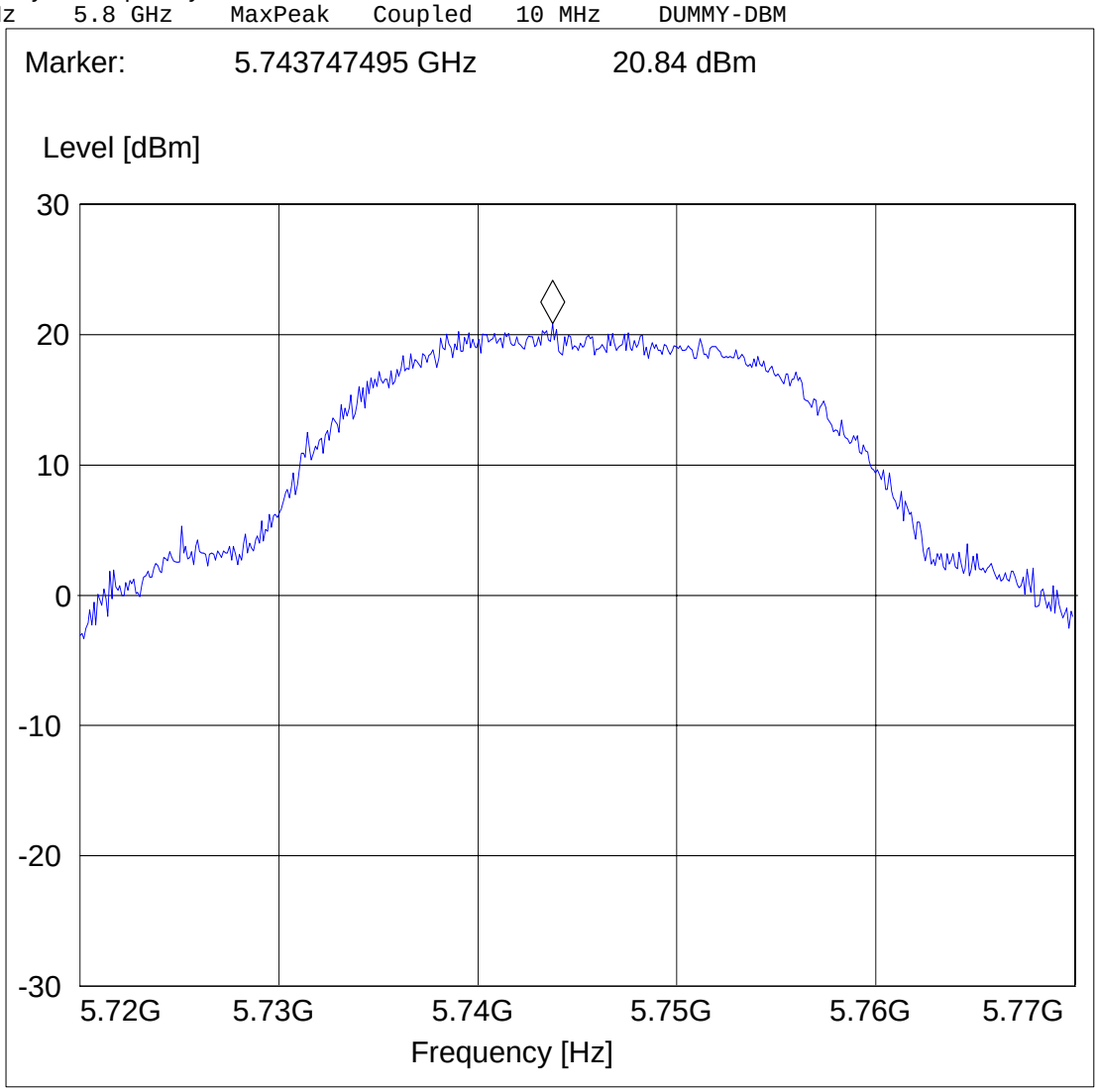
EIRP: 5745 MHz (802.11a)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11a, ch 149 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP 802.11a_149"

```
Short Description:            EIRP  channel-5260 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
5.7 GHz    5.8 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



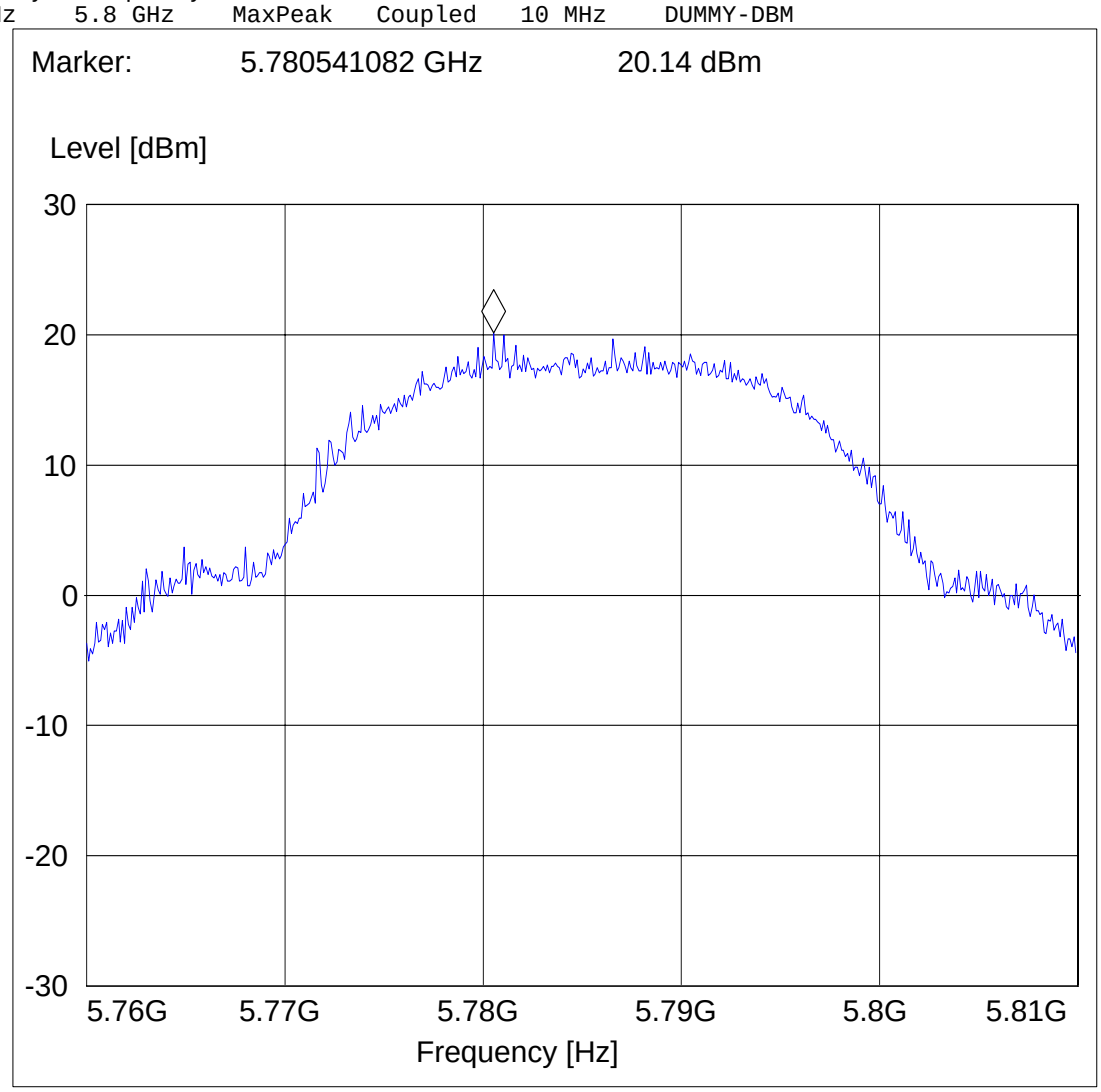
EIRP: 5785 MHz (802.11a)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11a, ch 157 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP 802.11a_157"

```
Short Description:            EIRP  channel-5260 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
5.8 GHz    5.8 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



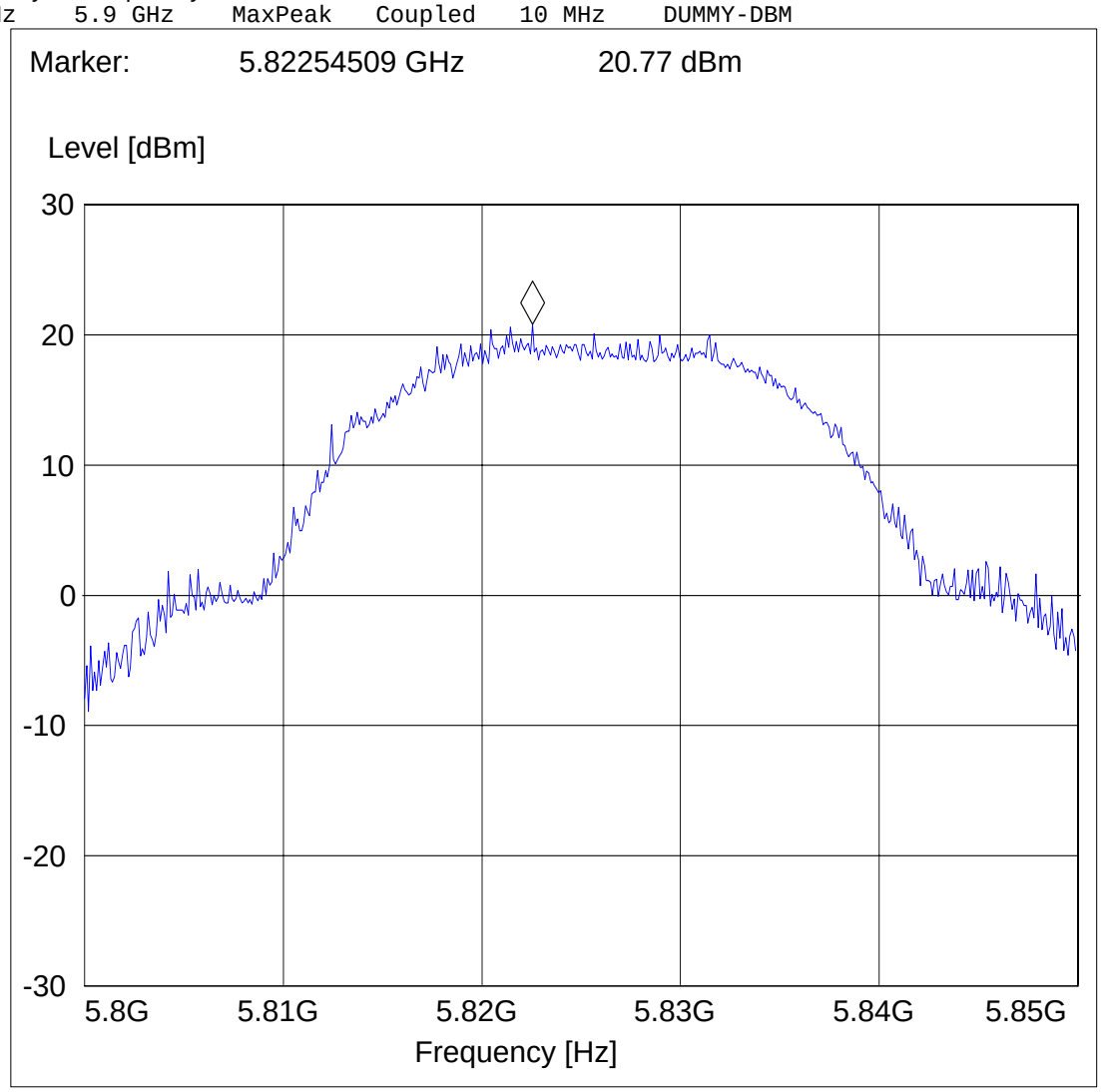
EIRP: 5825 MHz (802.11a)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11a, ch 165 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "EIRP 802.11a_165"

```
Short Description:            EIRP  channel-5260 MHz
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
5.8 GHz    5.9 GHz    MaxPeak   Coupled   10 MHz    DUMMY-DBM
```



2.2 BAND EDGE COMPLIANCE (802.11b) §15.247 (d) & RSS-210(A8.5)

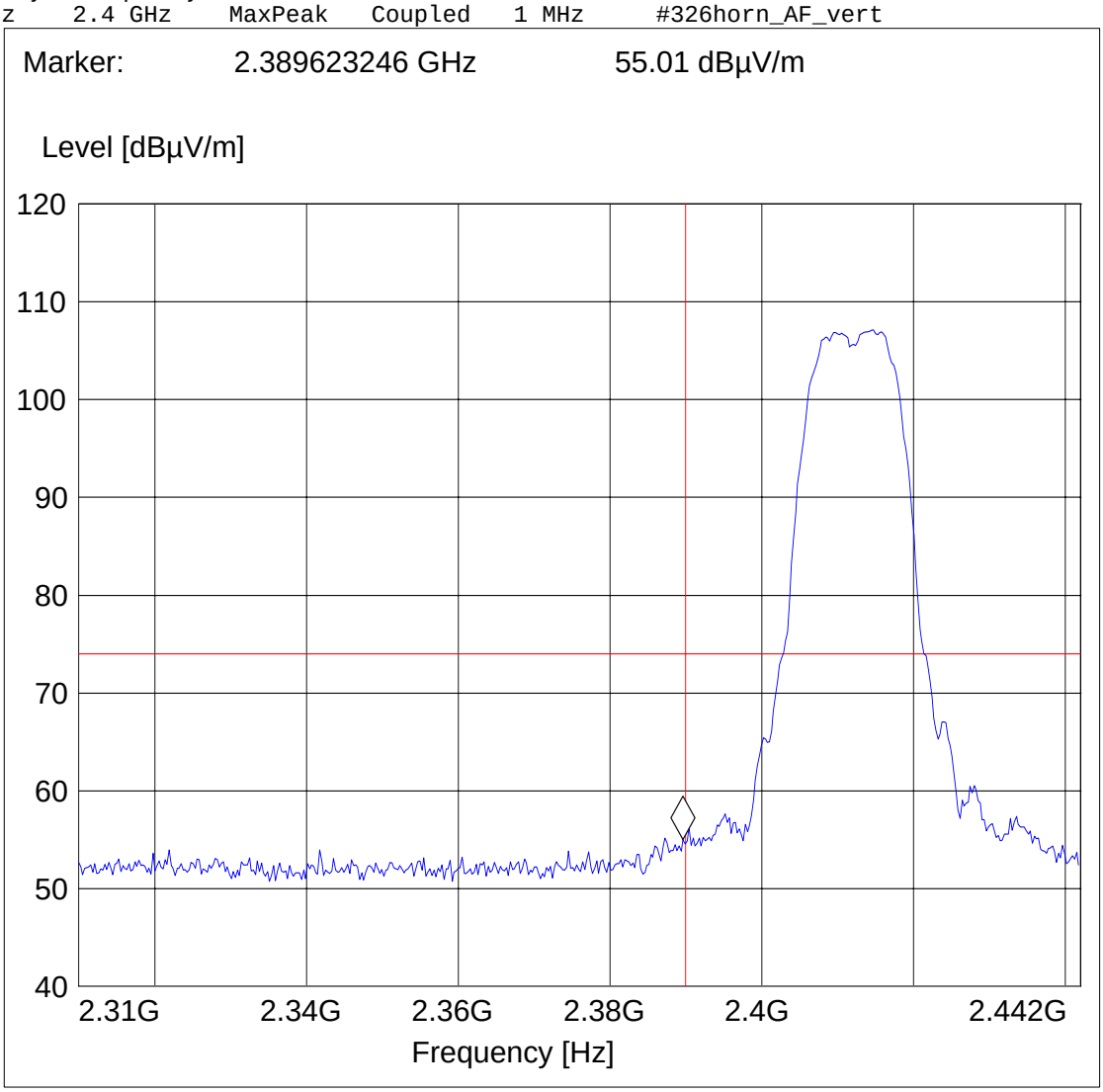
802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, Ch. 1 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Juan
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "FCC15.247 LBE_PK"

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



BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

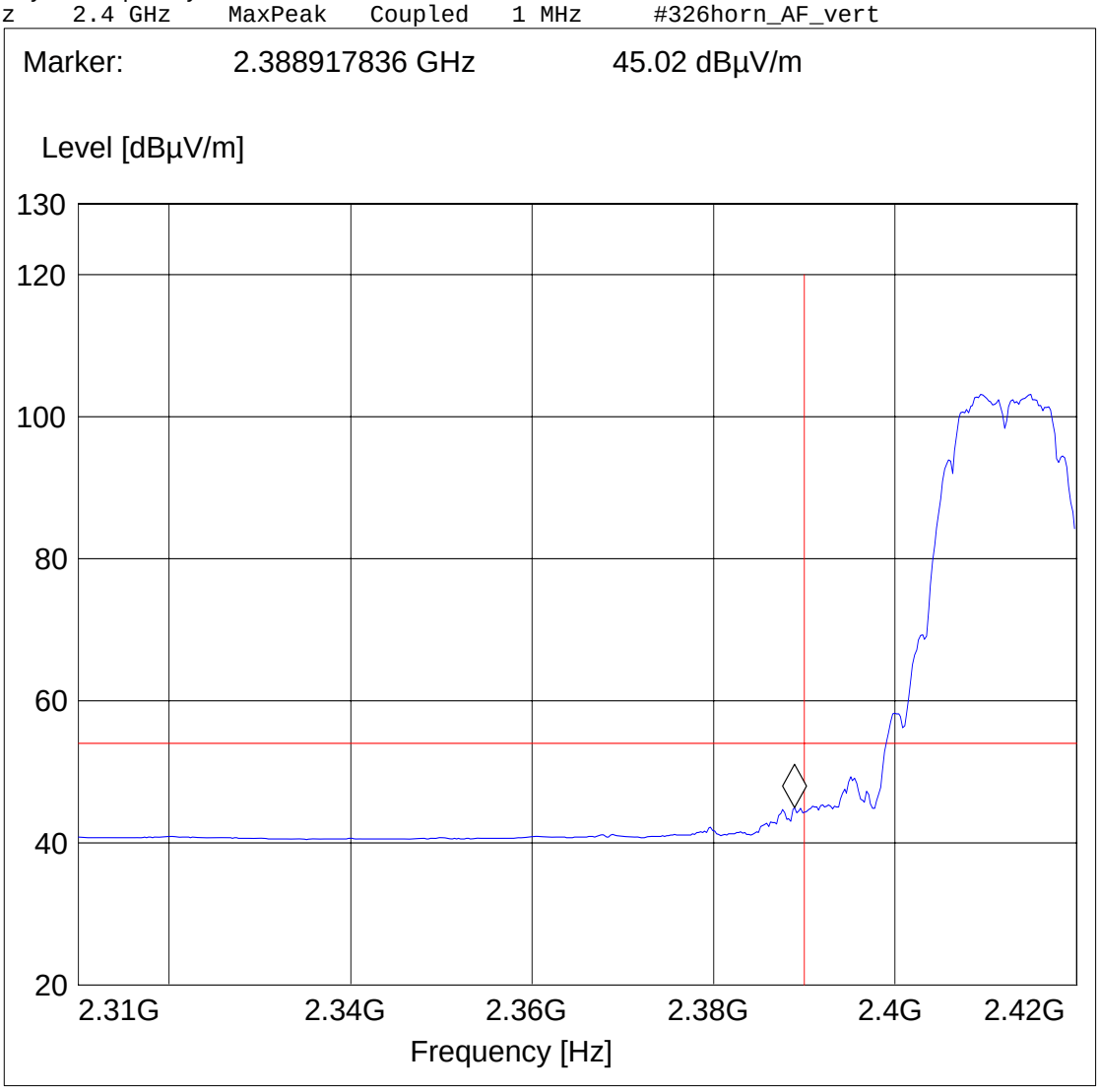
802.11b Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, Ch. 1 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Juan
Power Supply:    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



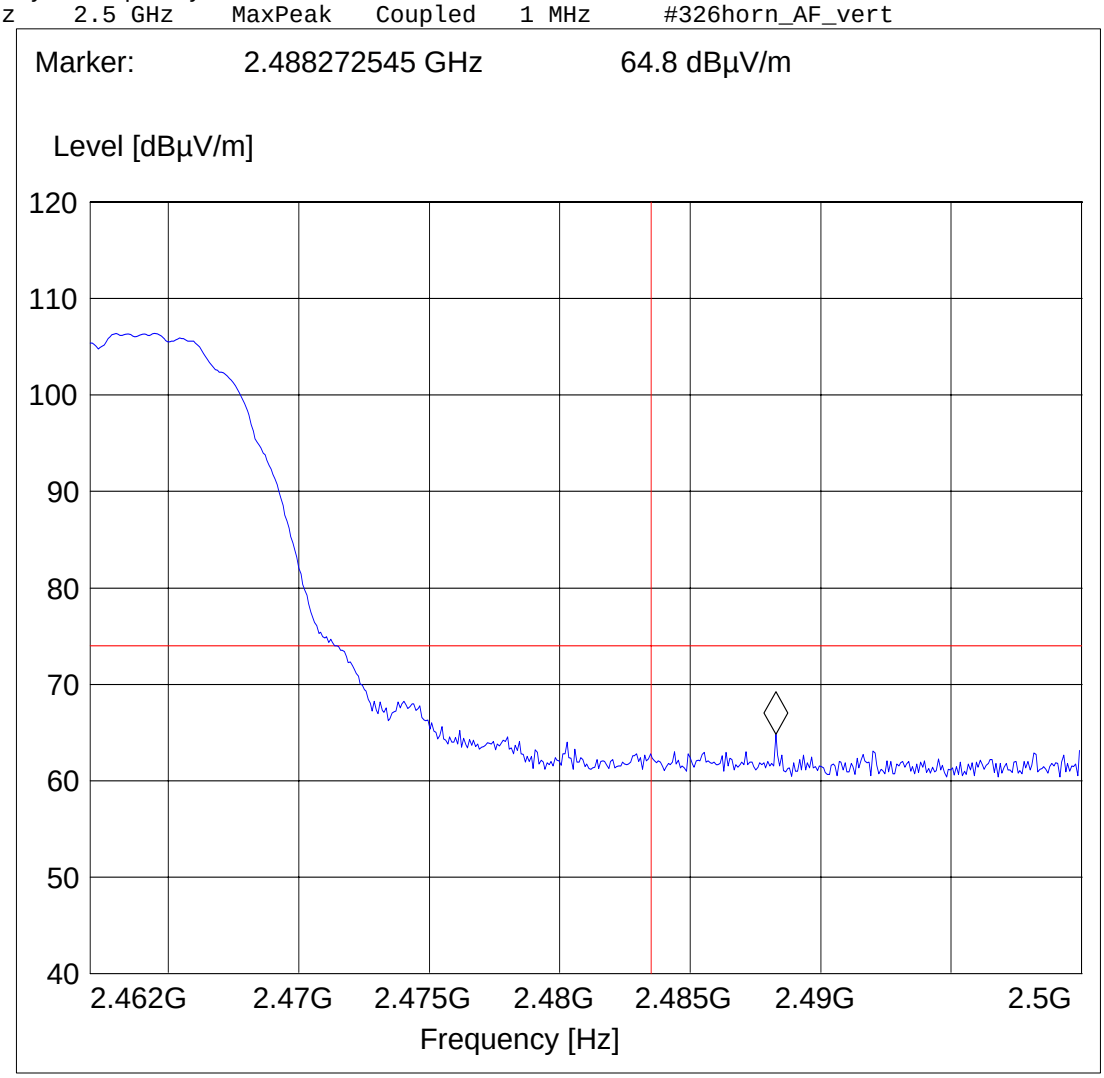
BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

802.11b High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, Ch. 11 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Juan
Power Supply:    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	Coupled	1 MHz	#326horn_AF_vert



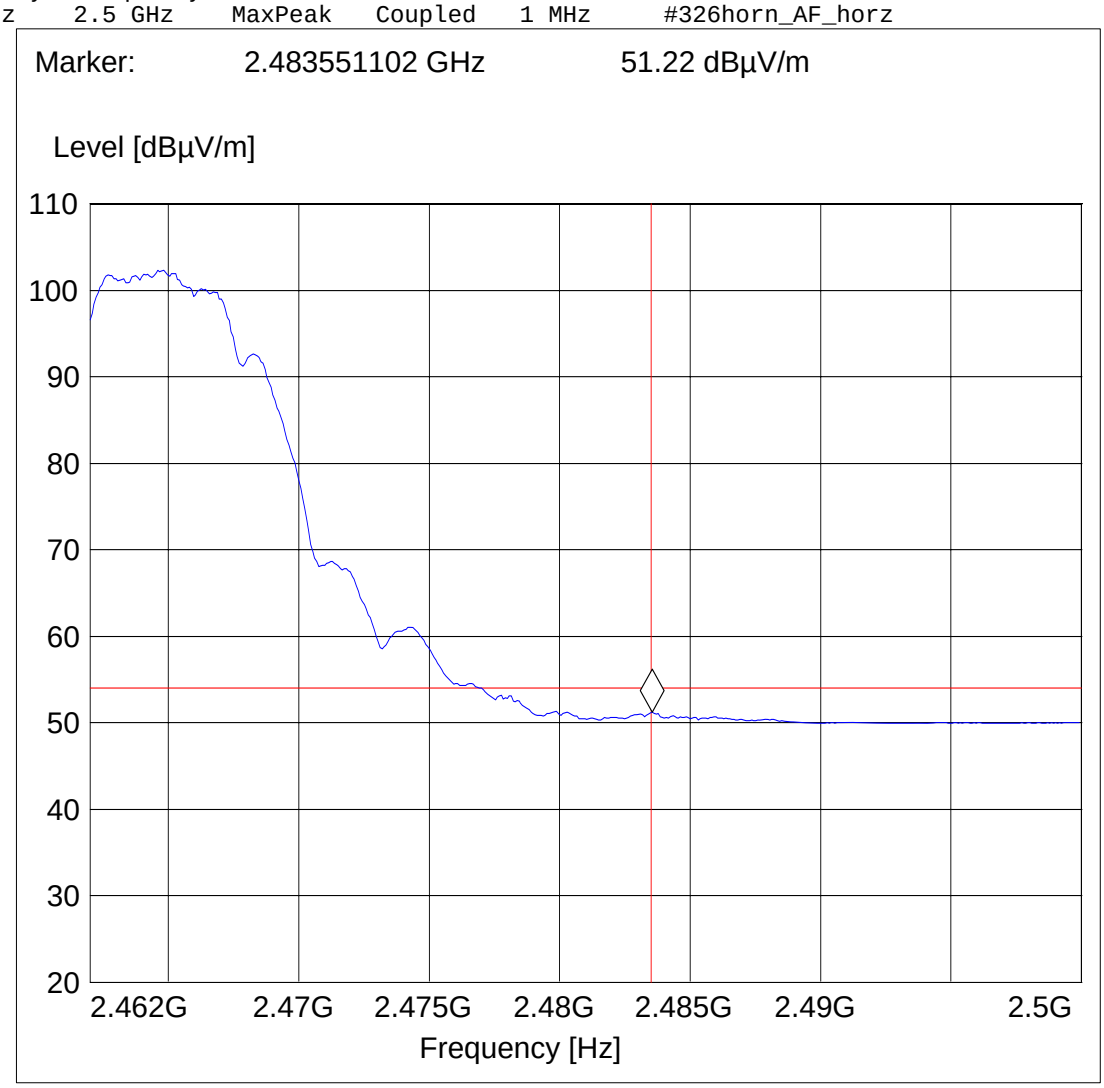
BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

802.11b High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, Ch. 11 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Juan
Power Supply:    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



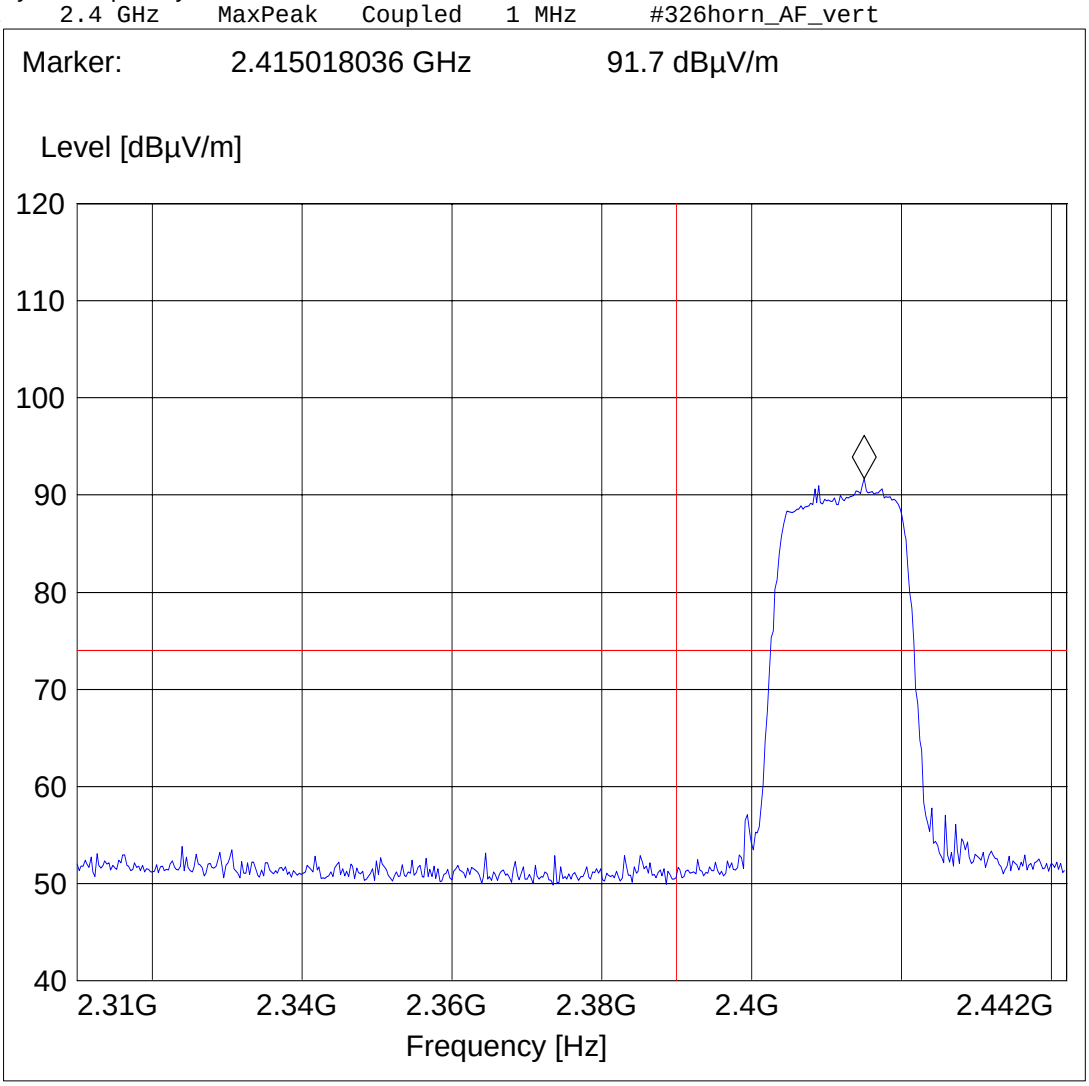
2.3 BAND EDGE COMPLIANCE (802.11g) §15.247 (d) & RSS-210(A8.5)

802.11g Low frequency section (spurious in the restricted band 2310 – 2390 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 1 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    AC Adapter
Comments:
```

SWEEP TABLE: "FCC15.247 LBE_PK"

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



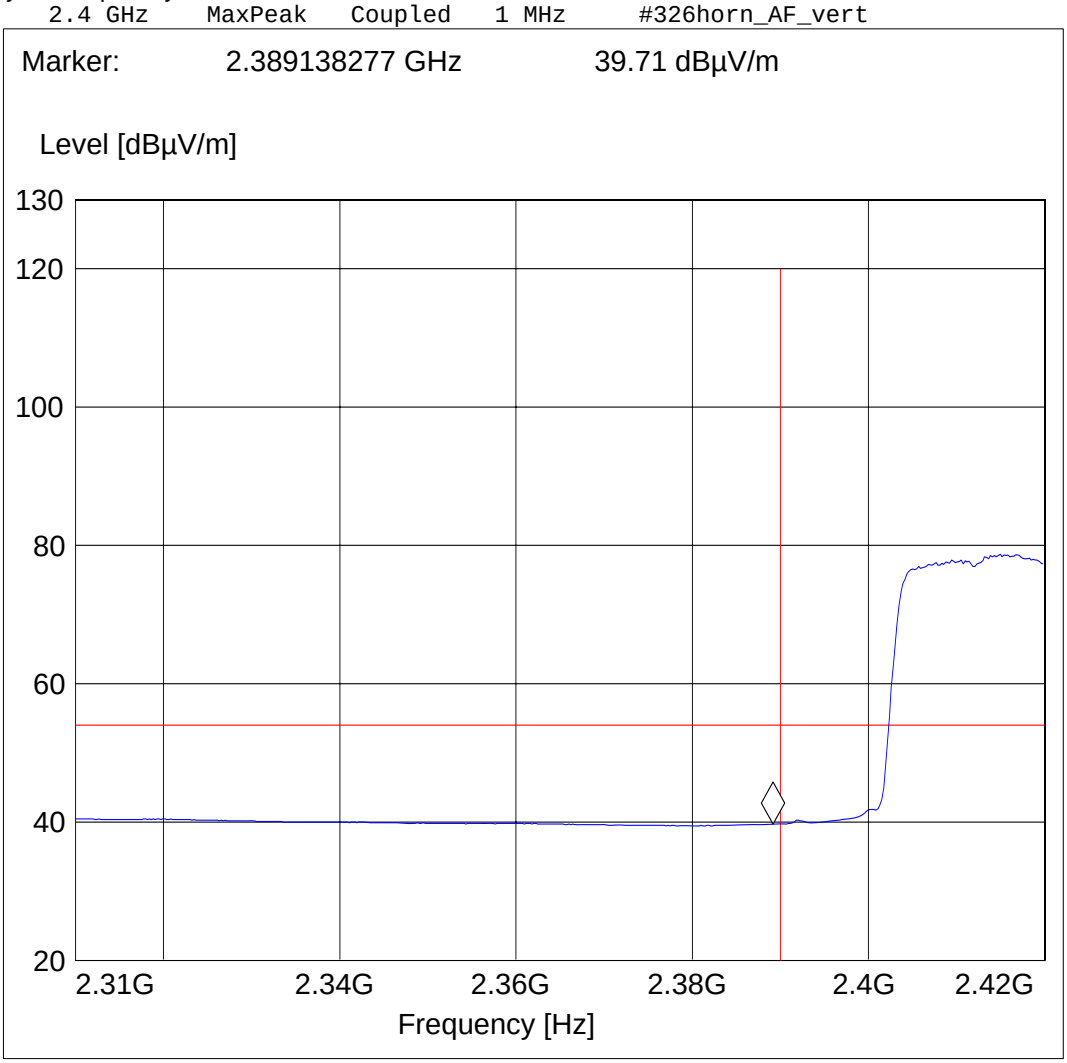
BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

802.11g Low frequency section (spurious in the restricted band 2310 – 2390 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 1 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    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



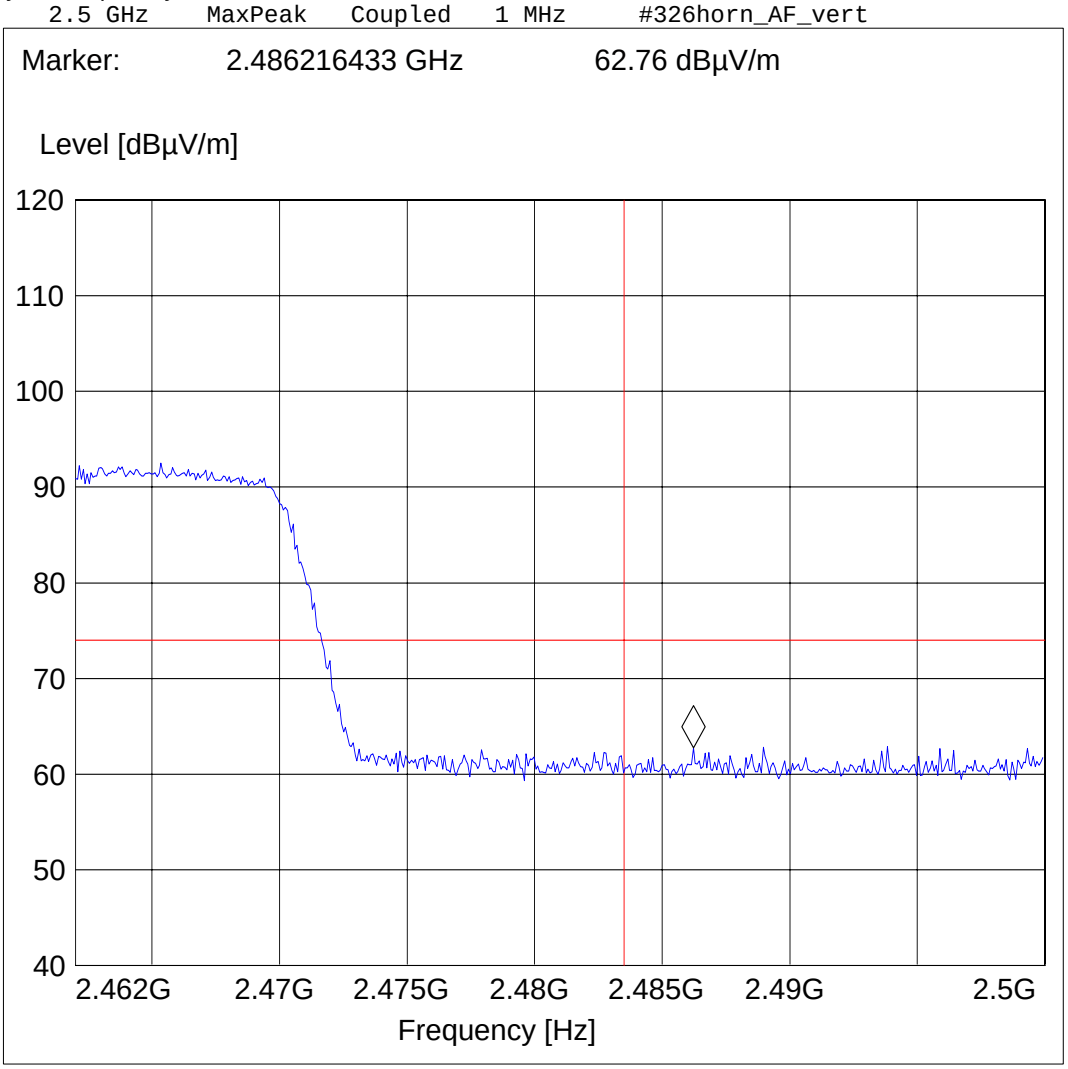
BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

802.11g High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 11 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    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	Coupled	1 MHz	#326horn_AF_vert



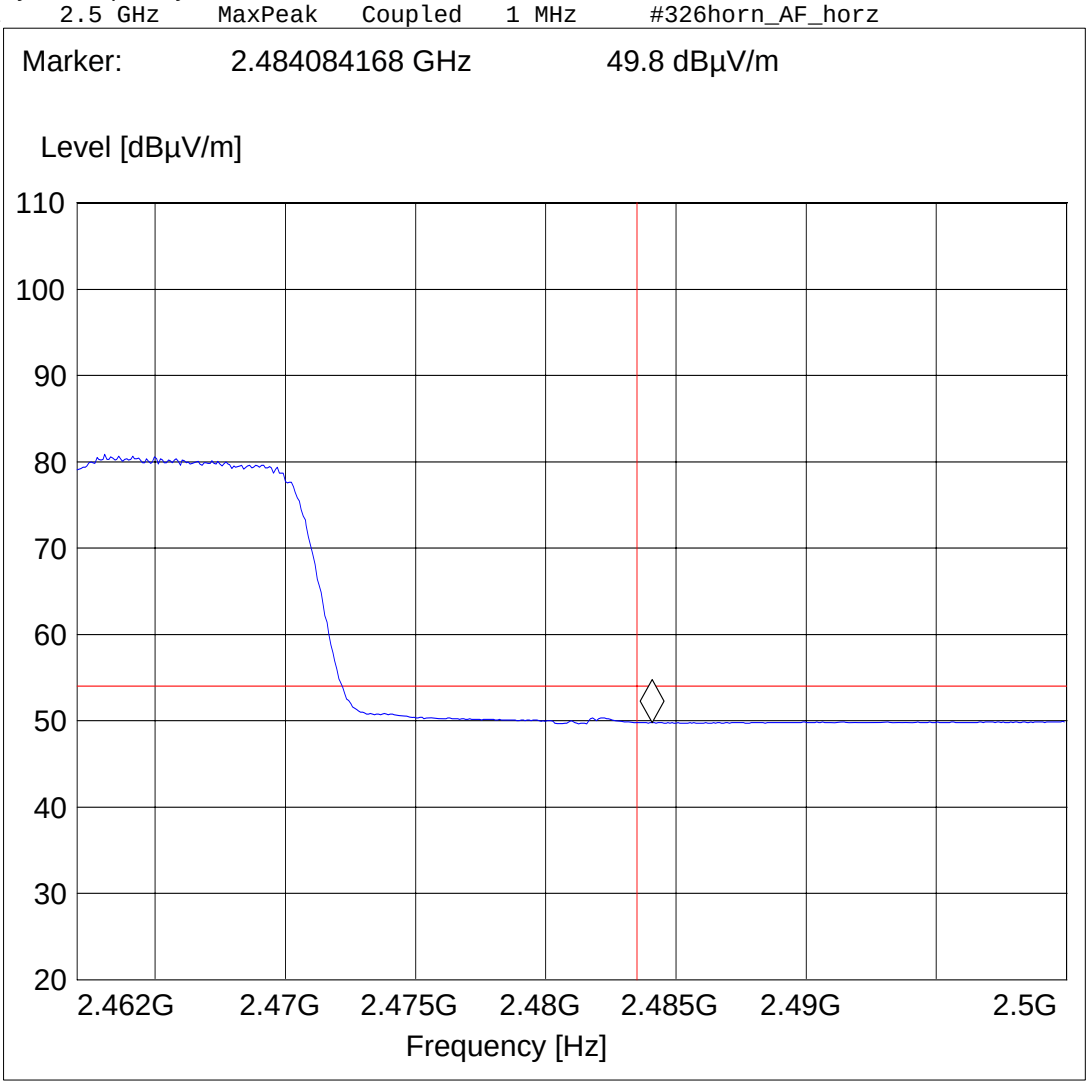
BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

802.11g High frequency section (spurious in the restricted band 2483.5 – 2500 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 11 (Main Antenna)
ANT Orientation: H
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    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

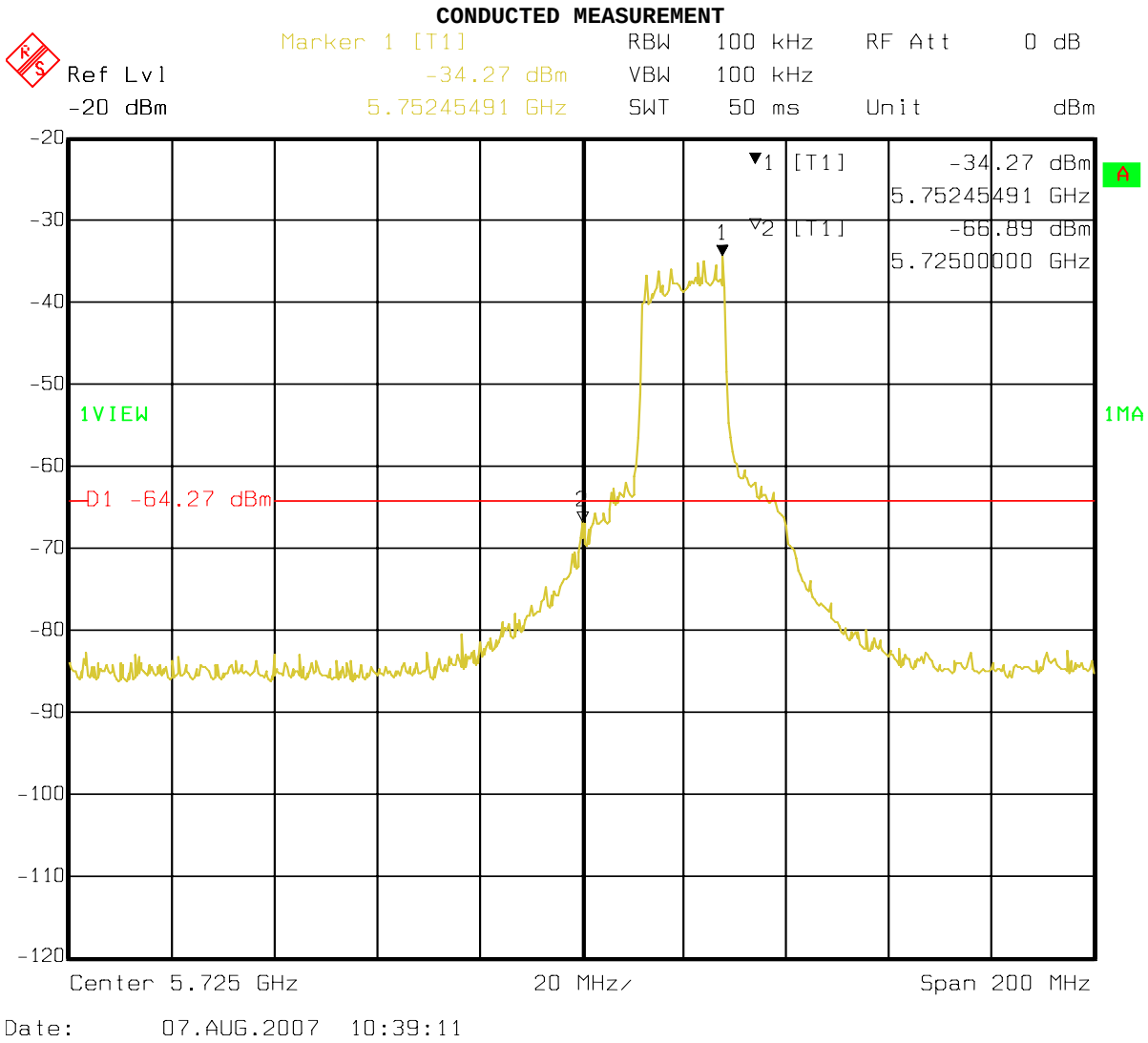


2.4 BAND EDGE COMPLIANCE (802.11a) §15.247 (d) & RSS-210(A8.5)

802.11a Low frequency section (spurious in the restricted band 5725 – 5850 MHz)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT: Dell PP12S with BCM94311MCAG
Customer: Broadcom
Test Mode: 802.11a, ch 149 (Main Antenna)
Test Engineer: Juan
Power Supply: AC Adapter
Comments:

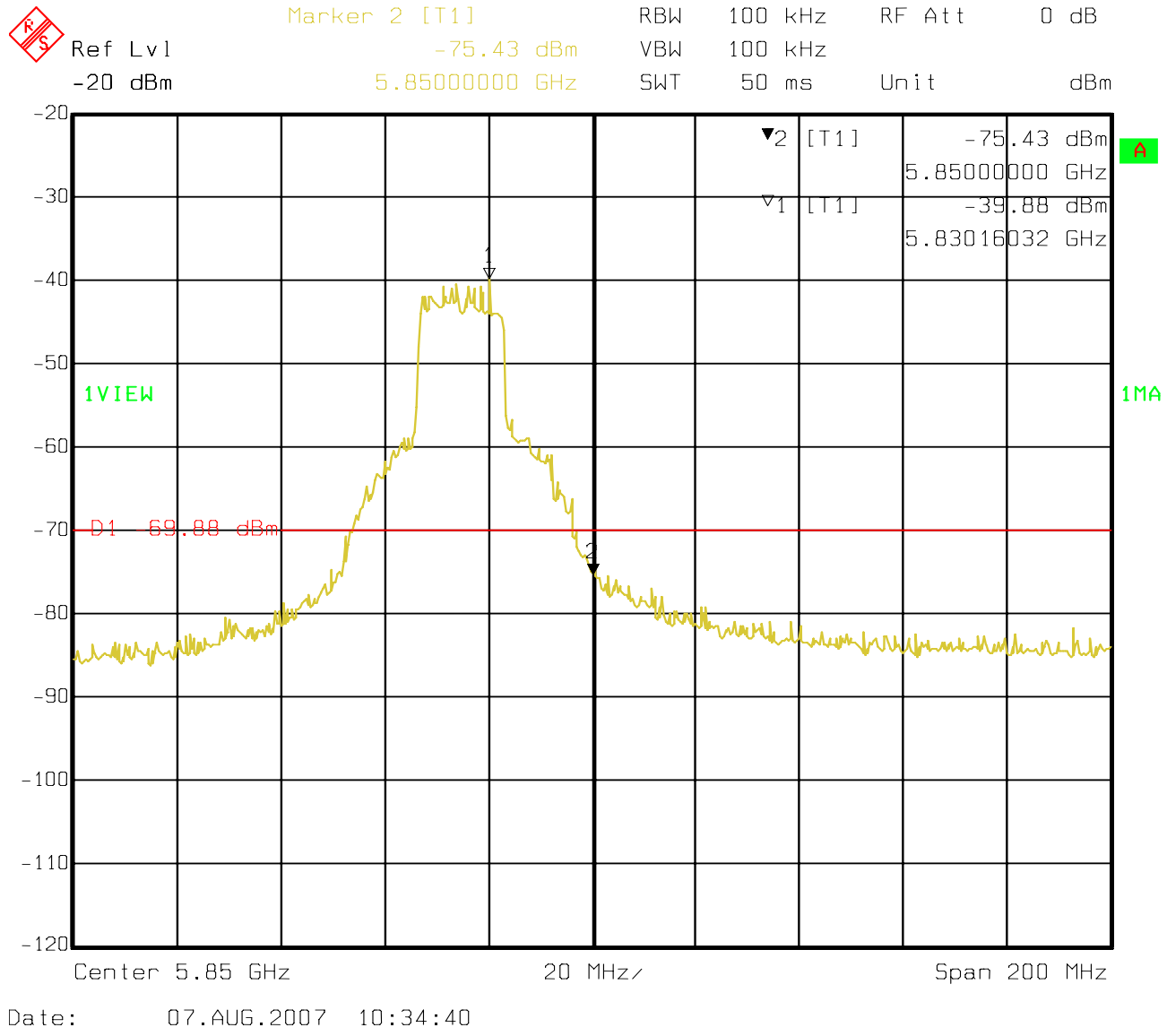


BAND EDGE COMPLIANCE §15.247 (d) & RSS-210(A8.5)

802.11a High frequency section (spurious in the restricted band 5825 – 5850 MHz)
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT: Dell PP12S with BCM94311MCAG
Customer: Broadcom
Test Mode: 802.11a, ch 165 (Main Antenna)
Test Engineer: Juan
Power Supply: AC Adapter
Comments:

CONDUCTED MEASUREMENT



2.5 EMISSION LIMITATIONS §15.247 (d) & RSS-210(A8.5)

Transmitter (Radiated)

LIMITS

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions, which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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 26.5 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in peak mode unless specified with the plots.

3. Emissions were measured with the device in 802.11b mode, 802.11g mode, and 802.11a mode.

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

2.6 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11b

§15.247 (d) & RSS-210(A8.5):

Transmit at Lowest channel Frequency 2412MHz (802.11b)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

Transmit at Middle channel Frequency 2437MHz (802.11b)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

Transmit at Highest channel Frequency 2462MHz (802.11b)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (2412MHz): 30MHz – 1GHz

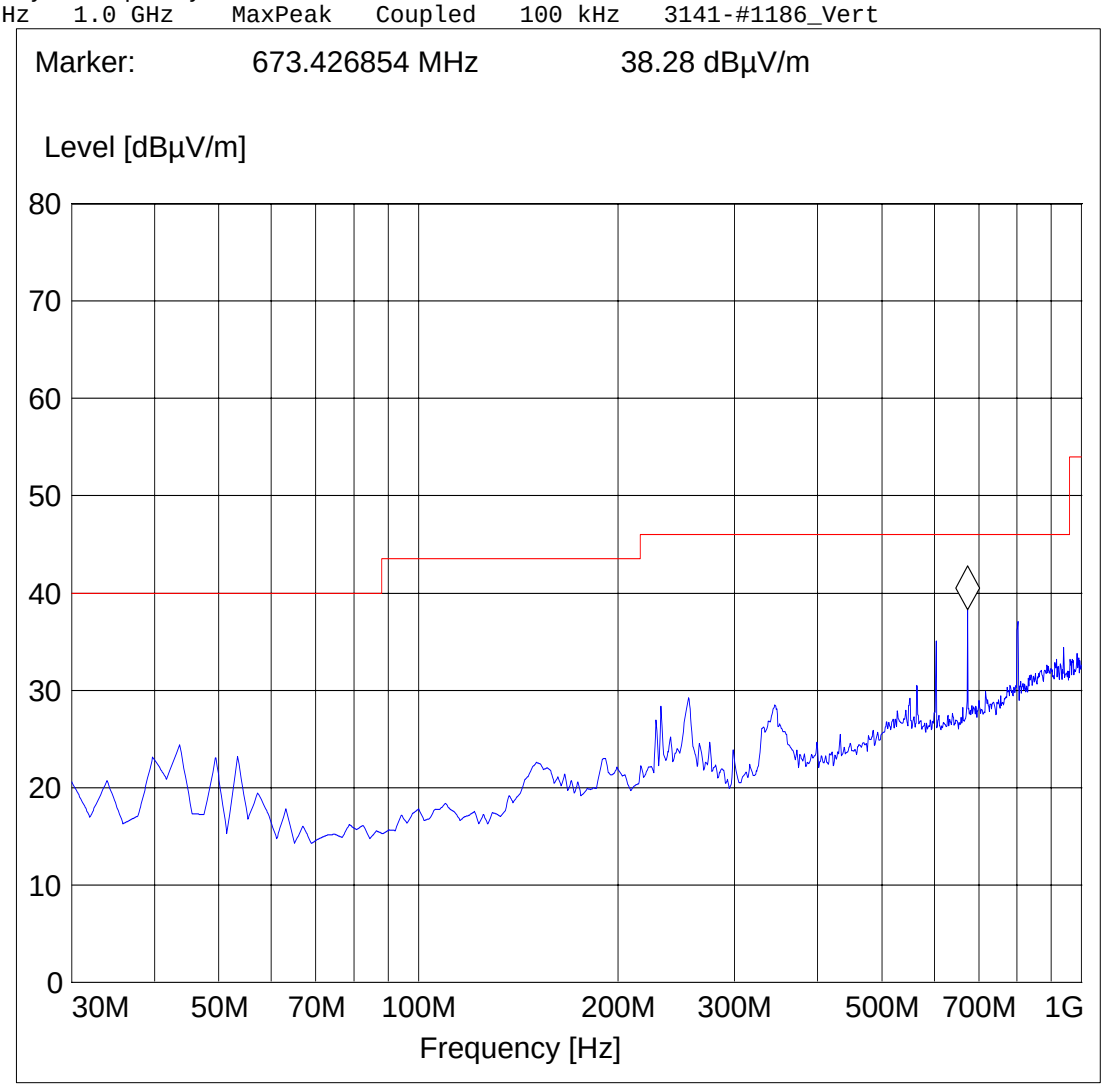
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, ch 1 (Main Antenna)
ANT Orientation: V
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (2412MHz): 30MHz – 1GHz

Antenna: Horizontal

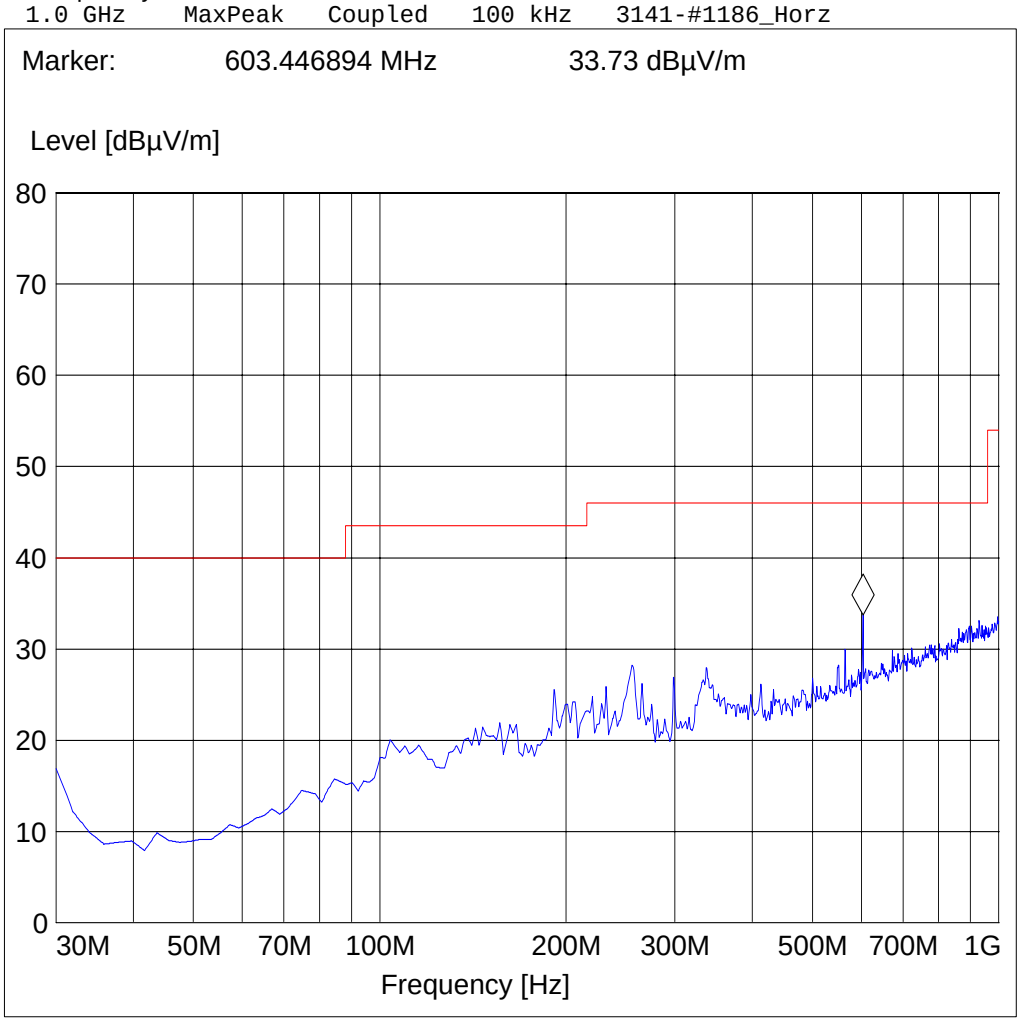
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              Dell PP12S with BCM94311MCAG
Customer:         Broadcom
Test Mode:        802.11b, ch 1 (Main Antenna)
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Ed
Power Supply:     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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (2412MHz): 1GHz – 18GHz

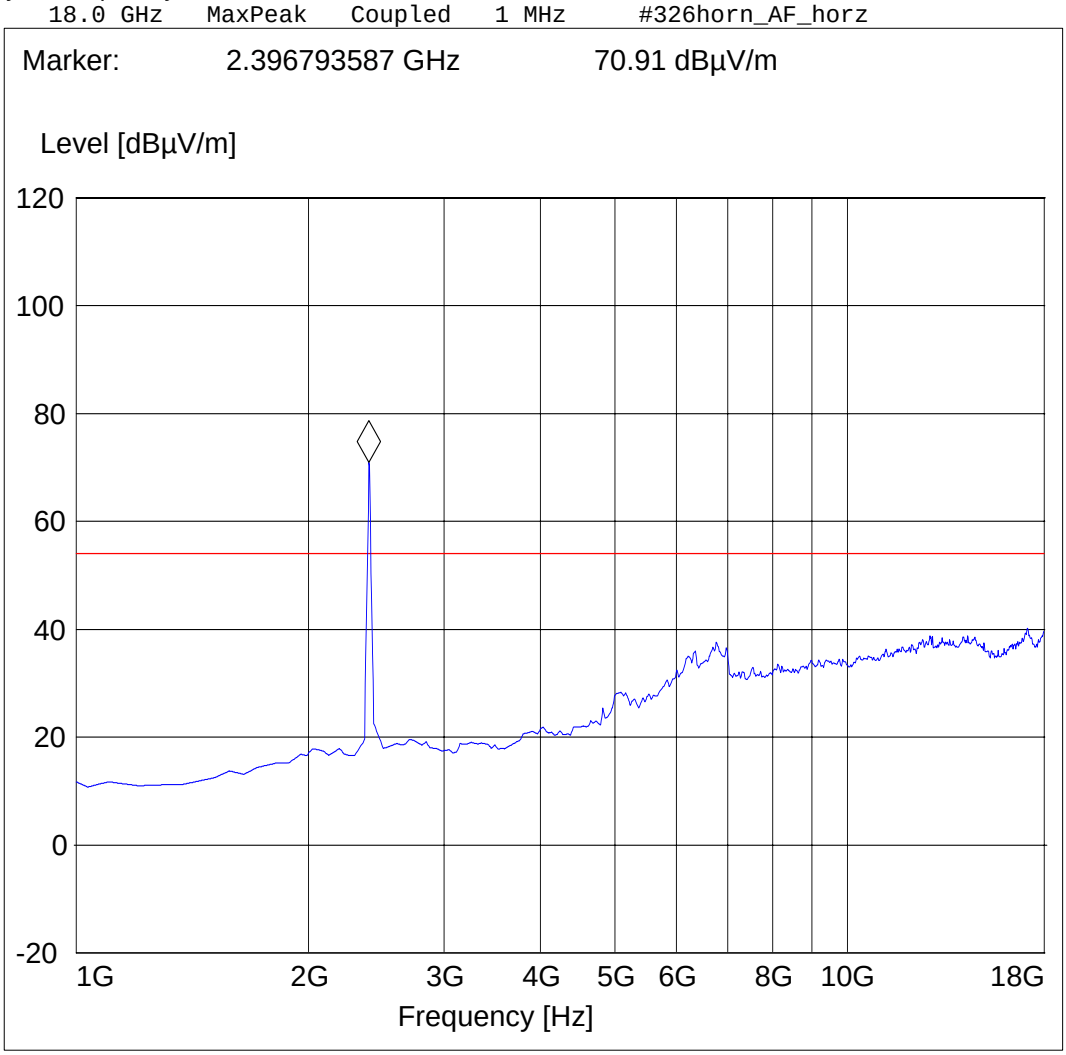
Note: Peak above the limit line is the carrier freq.

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11b, ch 1 (Main Antenna)
ANT Orientation: V
EUT Orientation: H
Test Engineer:   Juan
Voltage:         AC Adapter
Comments:        Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

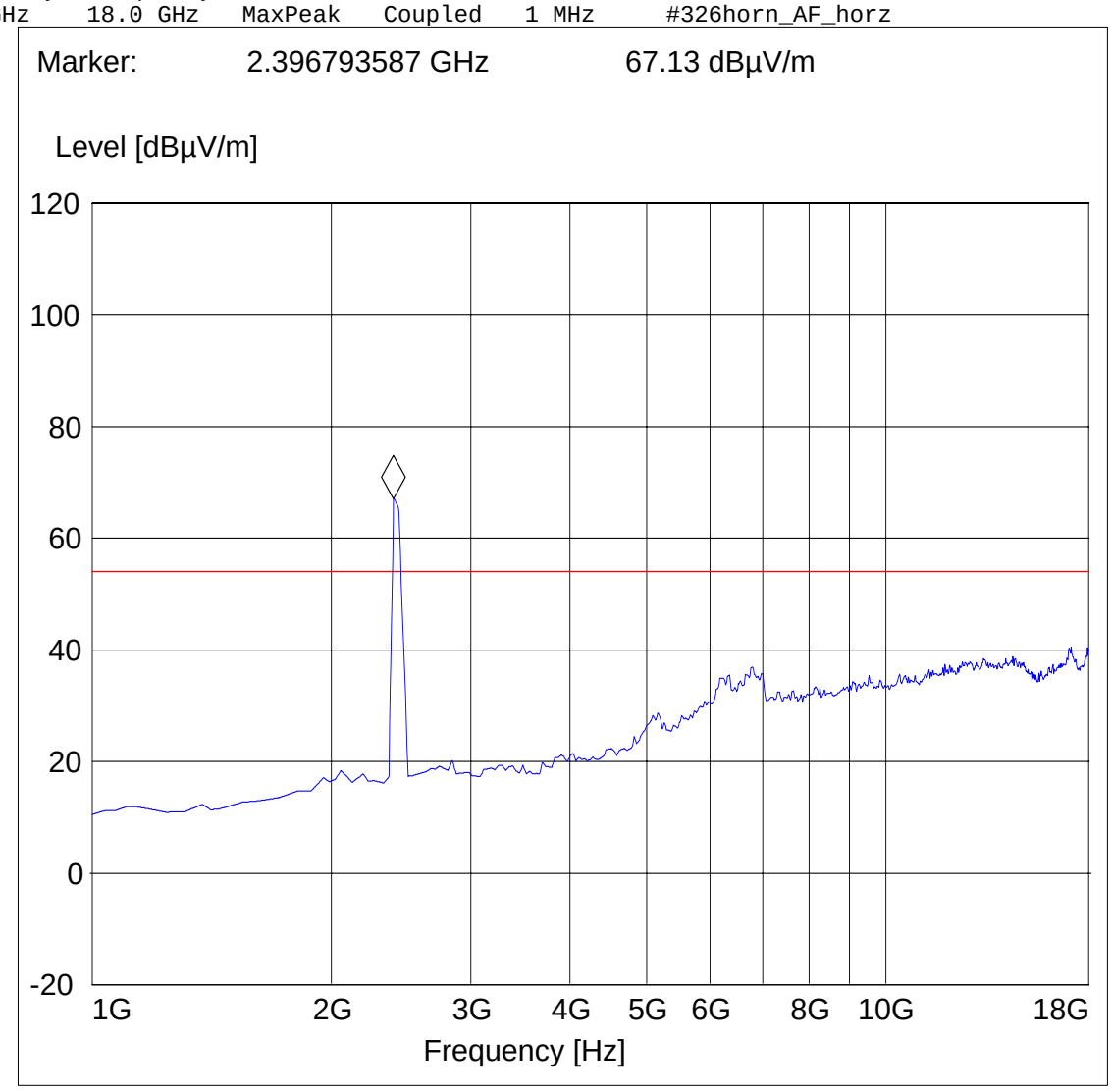
Lowest Channel (2412MHz): 1GHz – 18GHz

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11b, Ch. 1 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Juan
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

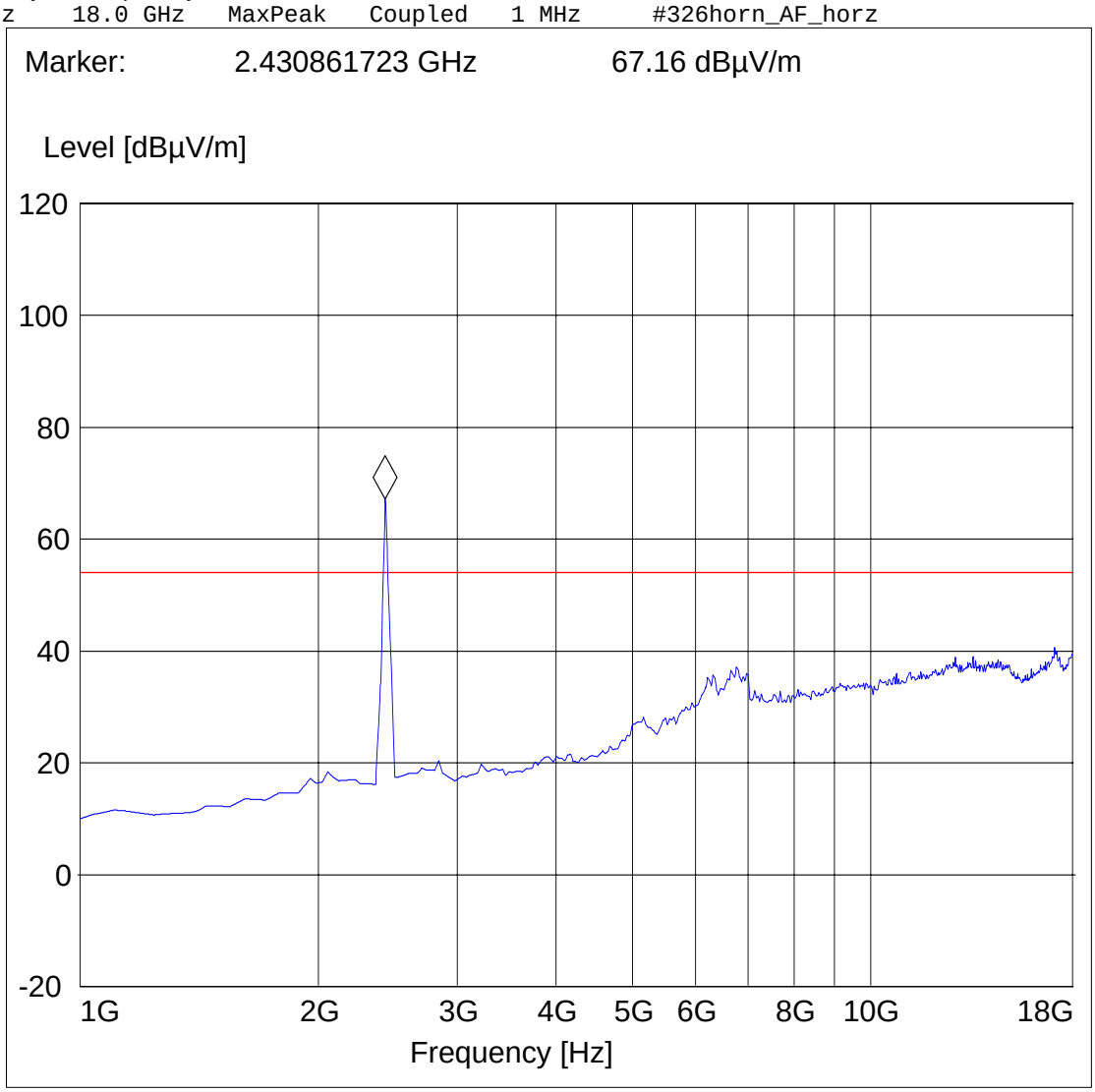
Mid Channel (2437MHz): 1GHz – 18GHz

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11b, Ch. 6 (Main Antenna)
ANT Orientation:   V
EUT Orientation:   H
Test Engineer:     Juan
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

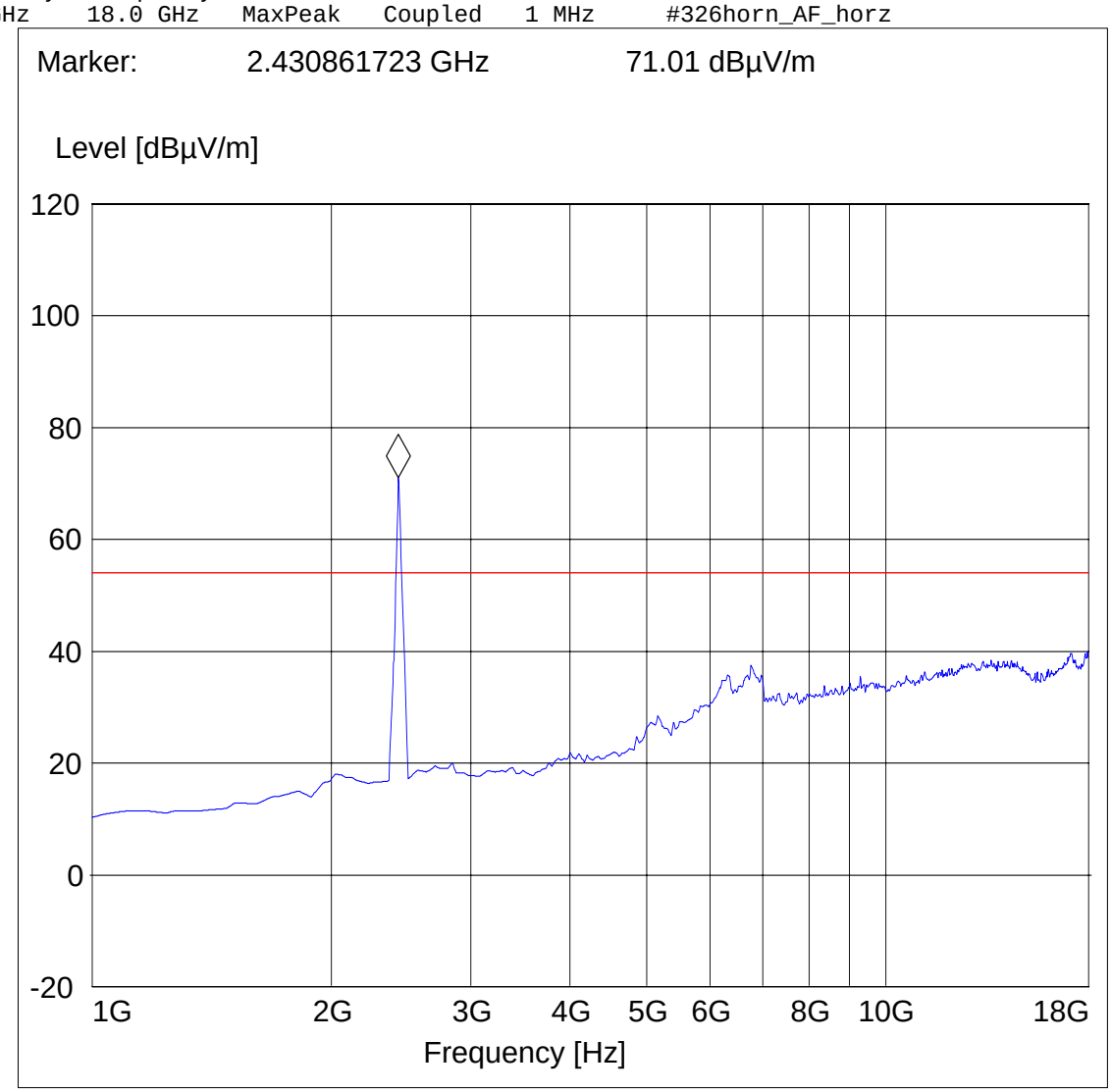
Mid Channel (2437MHz): 1GHz – 18GHz

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11b, Ch. 6 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Juan
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

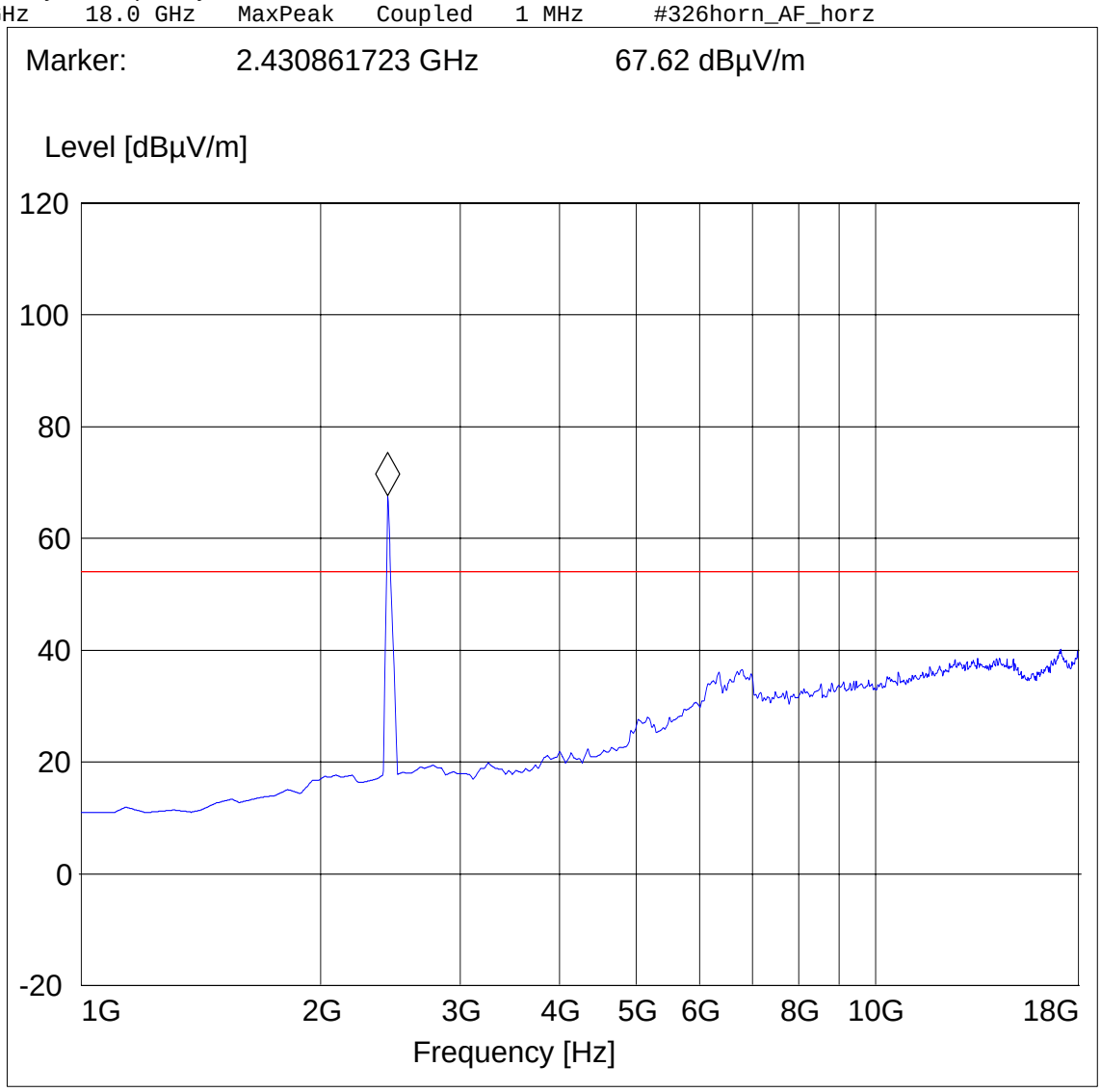
Highest Channel (2462MHz): 1GHz – 18GHz

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11b, Ch. 11 (Main Antenna)
ANT Orientation:   V
EUT Orientation:   H
Test Engineer:     Juan
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

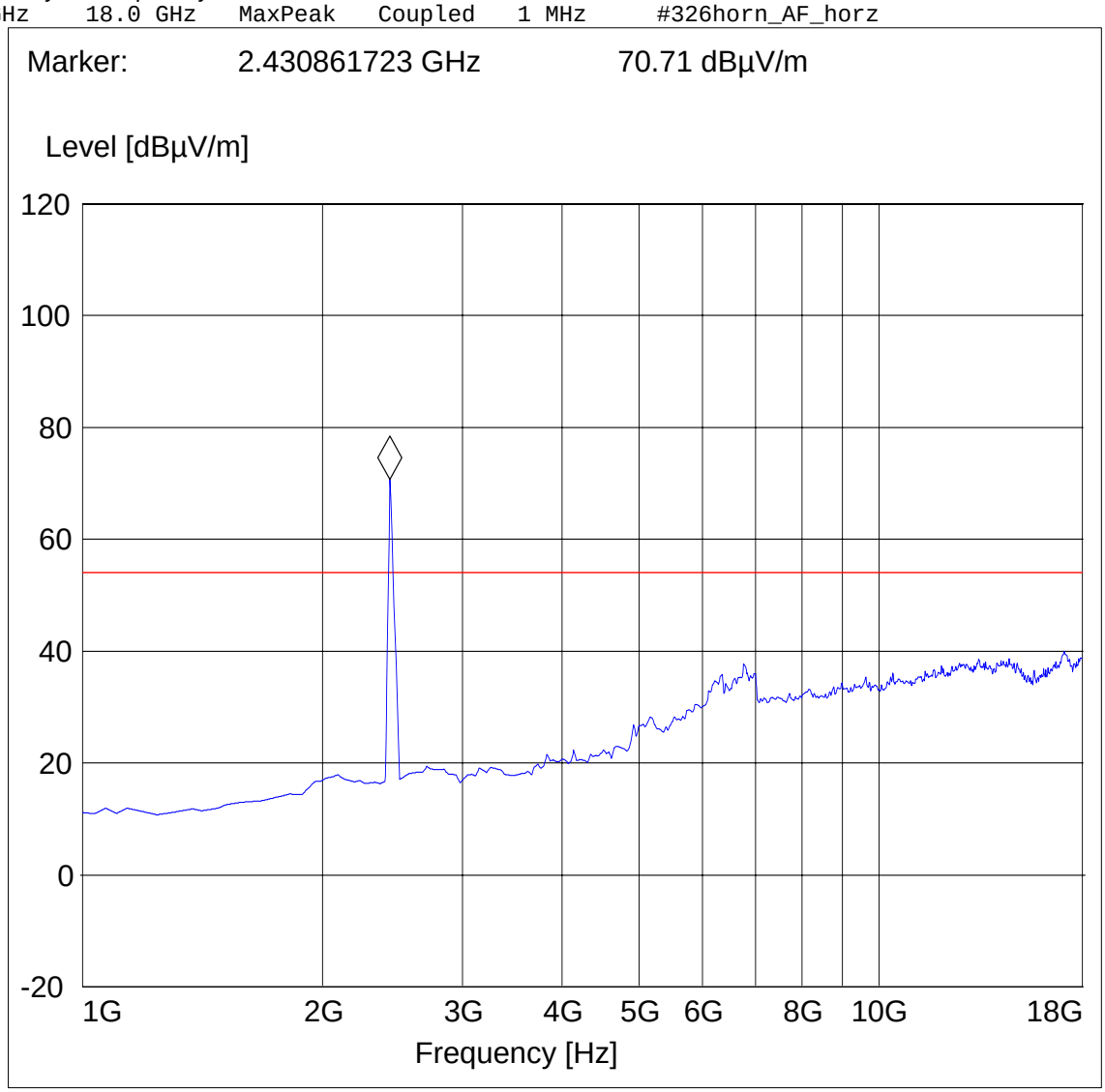
Highest Channel (2462MHz): 1GHz – 18GHz

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11b, Ch. 11 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Juan
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

18GHz – 26.5GHz for low, middle, and high channels

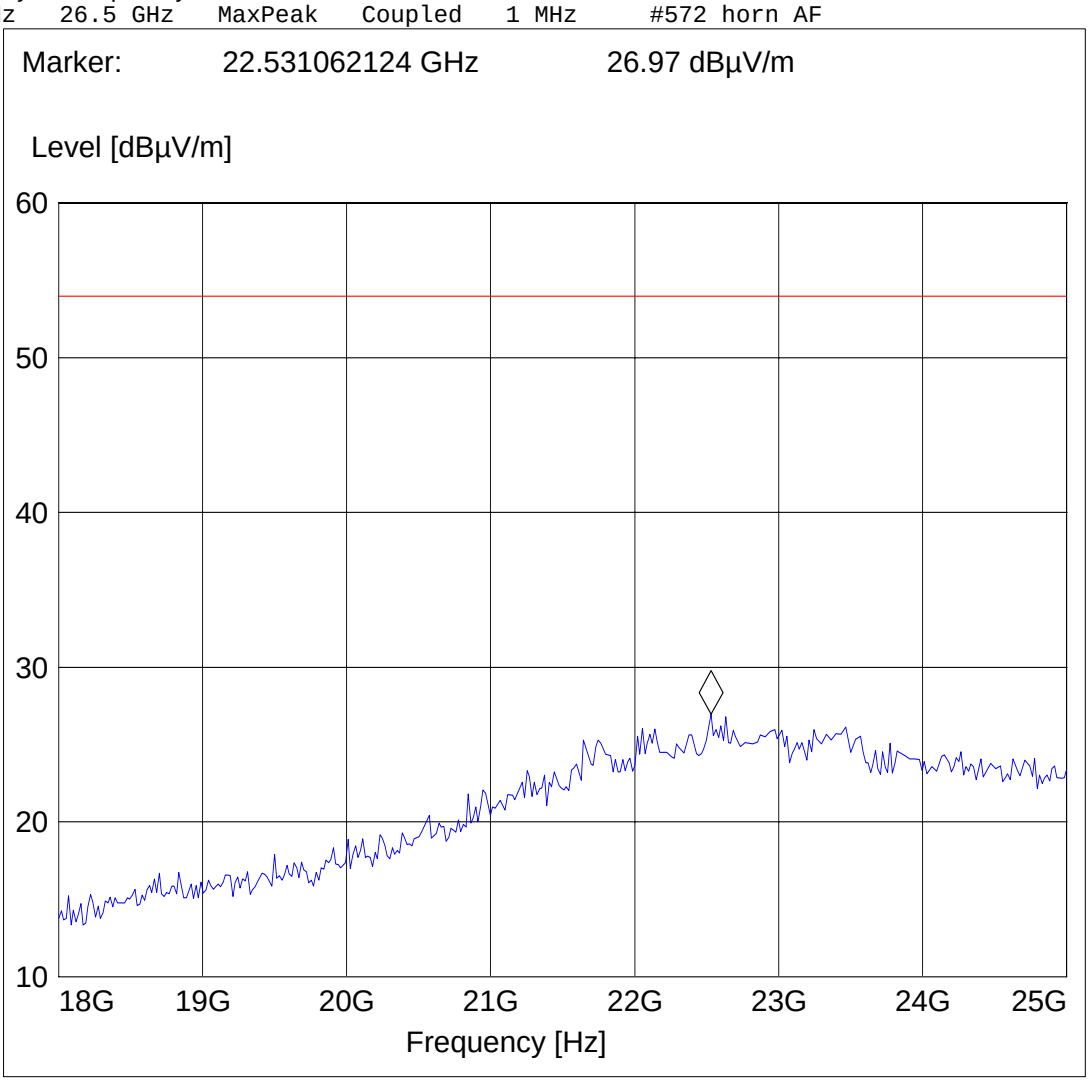
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test Mode:         802.11b, Measurement for low, middle, and high channels
ANT Orientation:   V
EUT Orientation:   H
Test Engineer:     Juan
Power Supply:      AC Adapter
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	Coupled	1 MHz	#572 horn AF



2.7 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11g

§15.247 (d) & RSS-210(A8.5):

Transmit at Lowest channel Frequency 2412MHz (802.11g)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

Transmit at Middle channel Frequency 2437MHz (802.11g)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

Transmit at Highest channel Frequency 2462MHz (802.11g)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (2412MHz): 30MHz – 1GHz

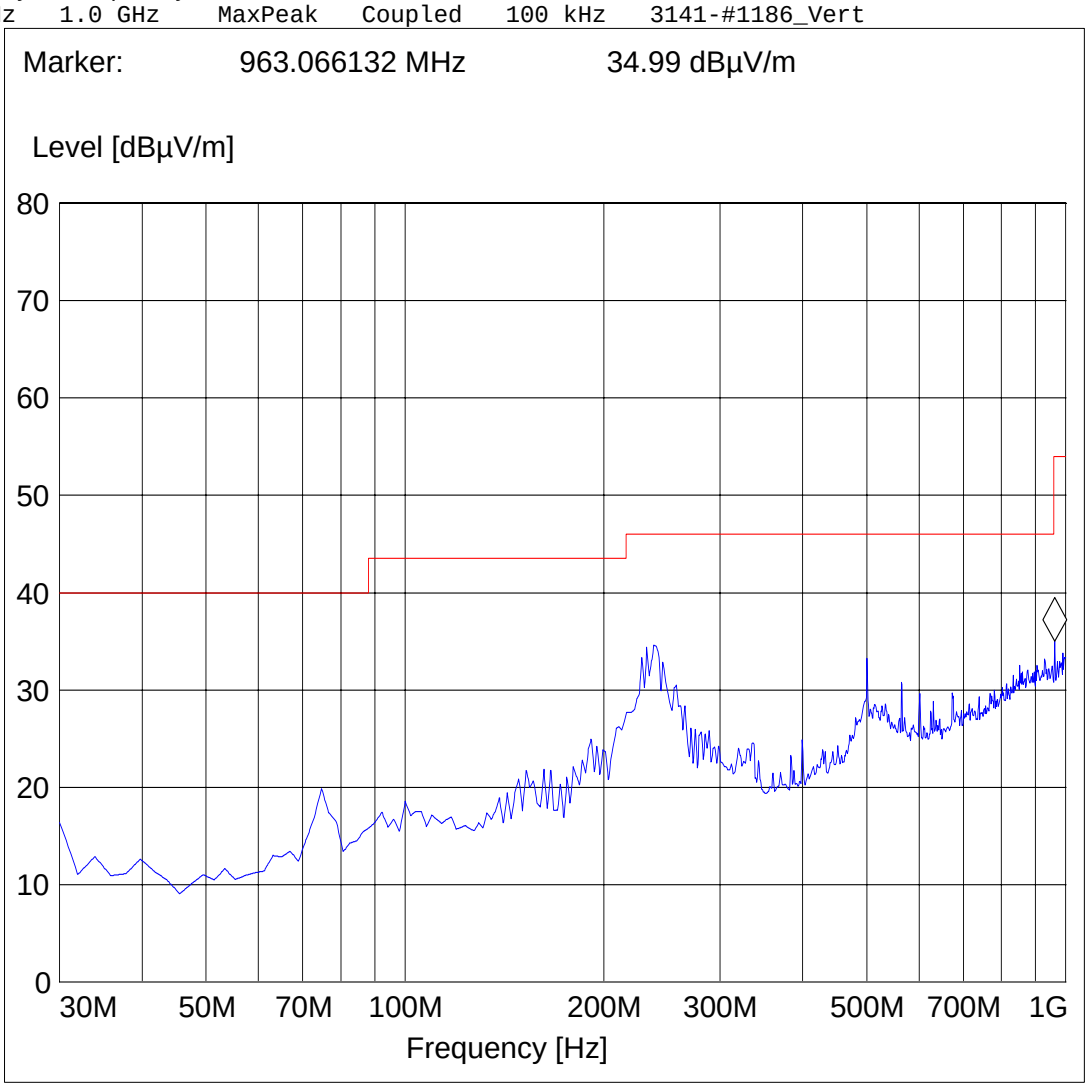
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:             Dell PP12S with BCM94311MCAG
Customer:        Broadcom
Test Mode:       802.11g, ch 1 (Main Antenna)
ANT Orientation: V
EUT Orientation: H
Test Engineer:   Ed
Power Supply:    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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (2412MHz): 30MHz – 1GHz

Antenna: Horizontal

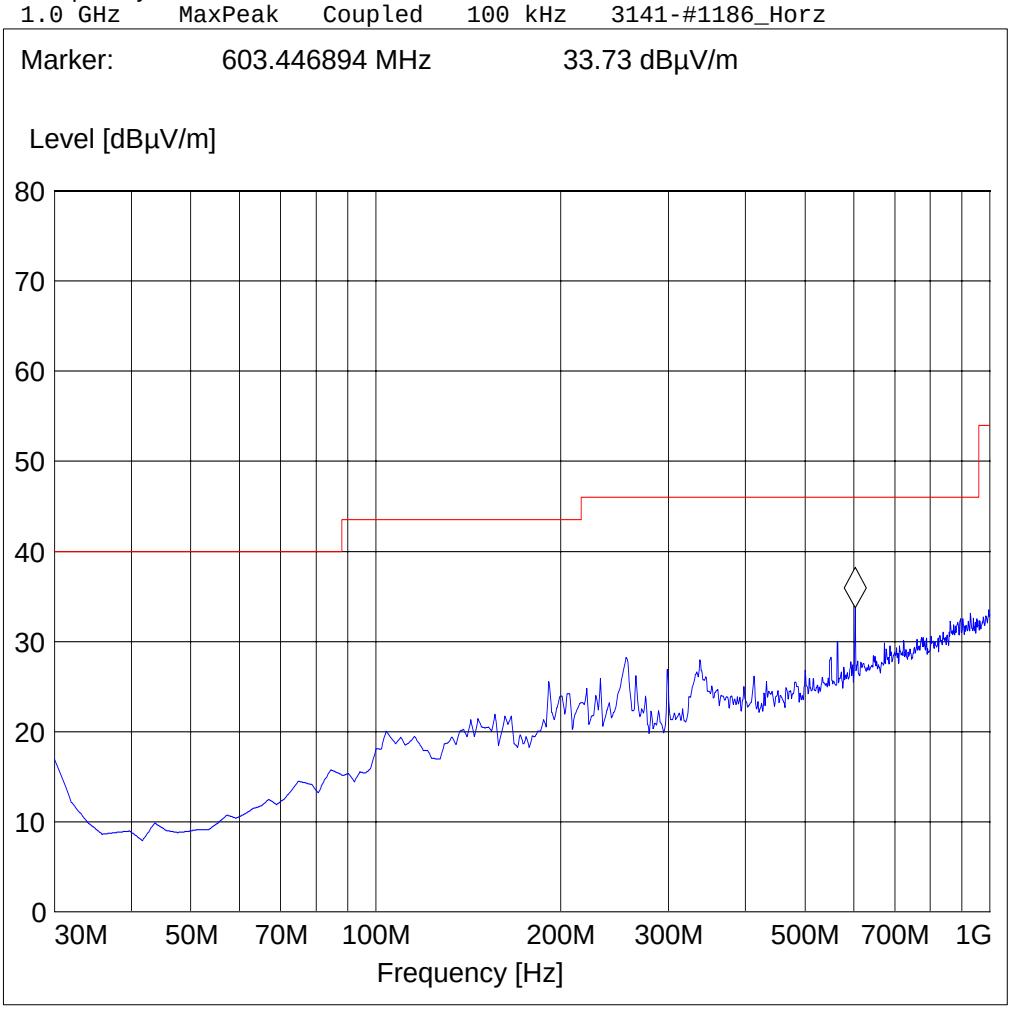
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              Dell PP12S with BCM94311MCAG
Customer:         Broadcom
Test Mode:        802.11g, ch 1 (Main Antenna)
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Ed
Power Supply:     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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (2412MHz): 1GHz – 18GHz

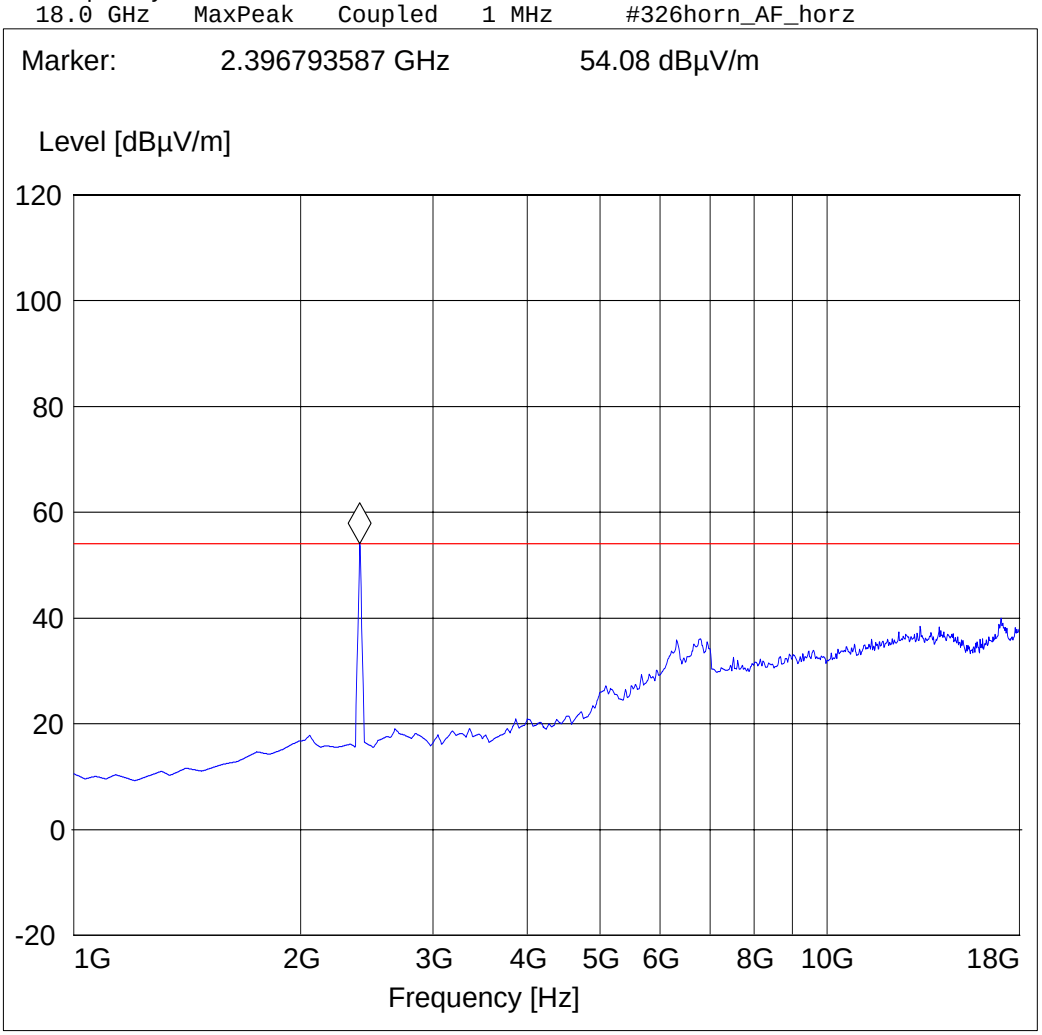
Note: No significant harmonic emissions detected either in Vertical or Horizontal

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11g, Ch. 1 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Mid Channel (2437MHz): 1GHz – 18GHz

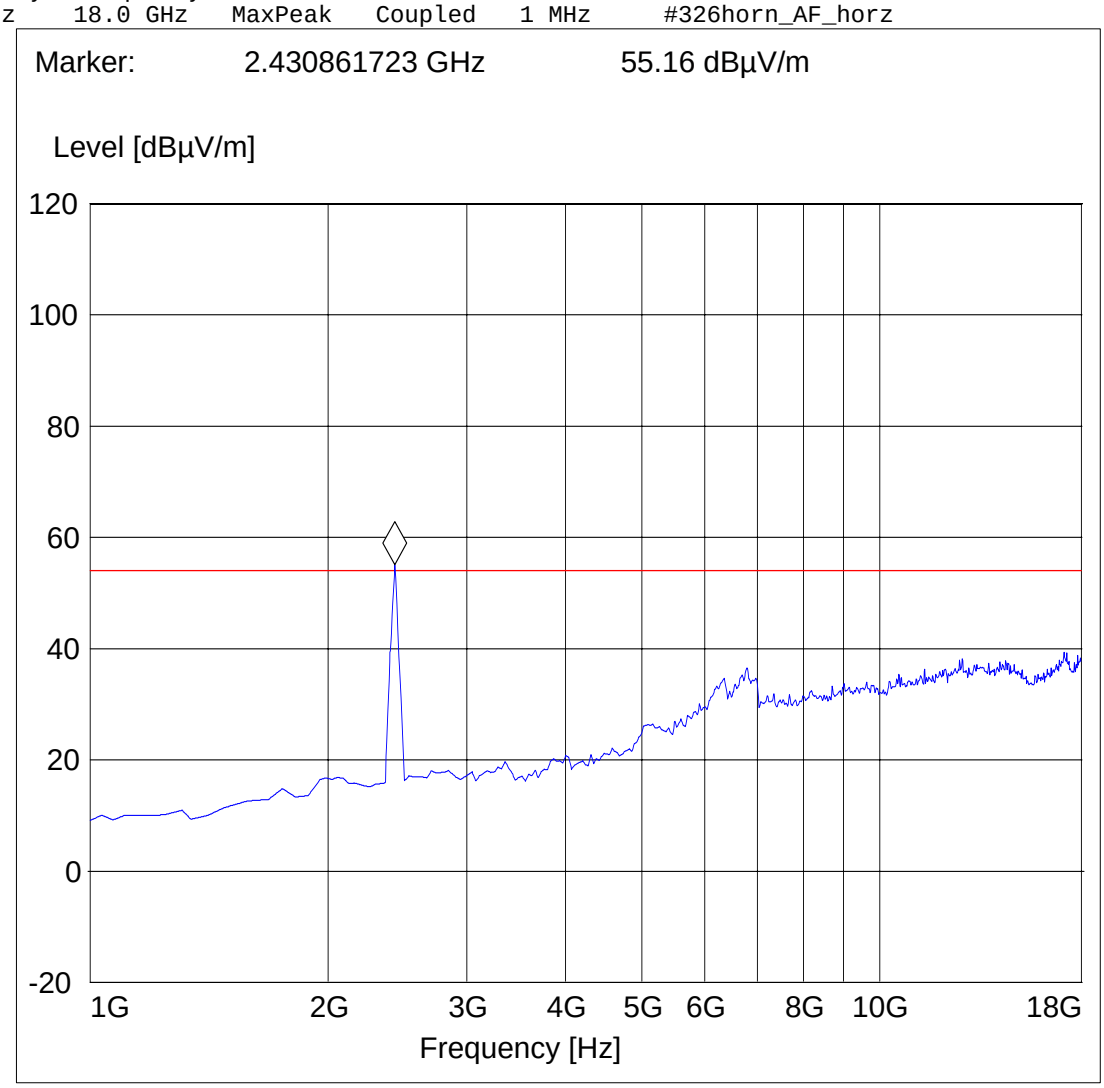
Note: No significant harmonic emissions detected either in Vertical or Horizontal

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11g, Ch. 6 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Highest Channel (2462MHz): 1GHz – 18GHz

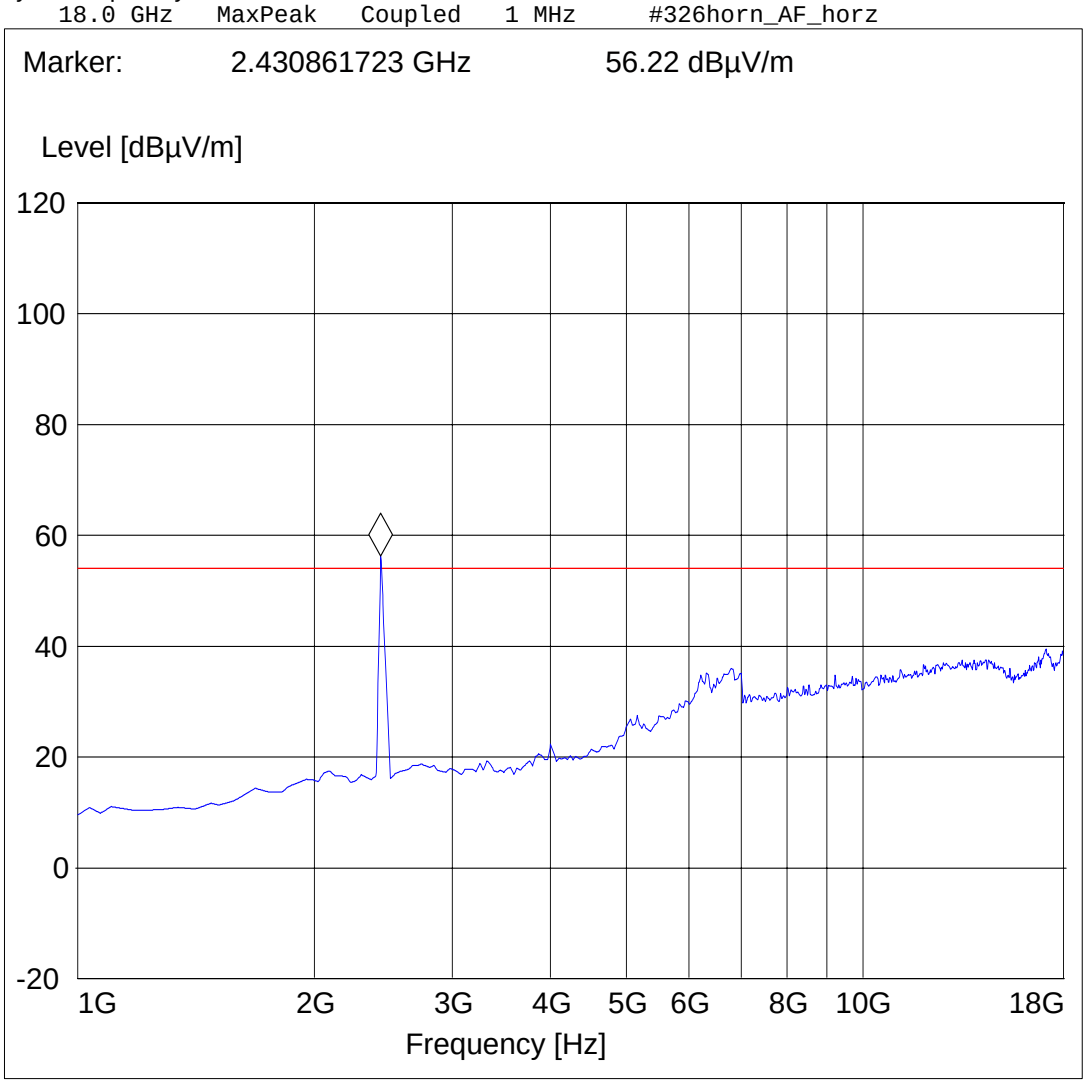
Note: No significant harmonic emissions detected either in Vertical or Horizontal

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11g, Ch. 11 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
Comments:          Marker on fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

18GHz – 26.5GHz for low, middle, and high channels

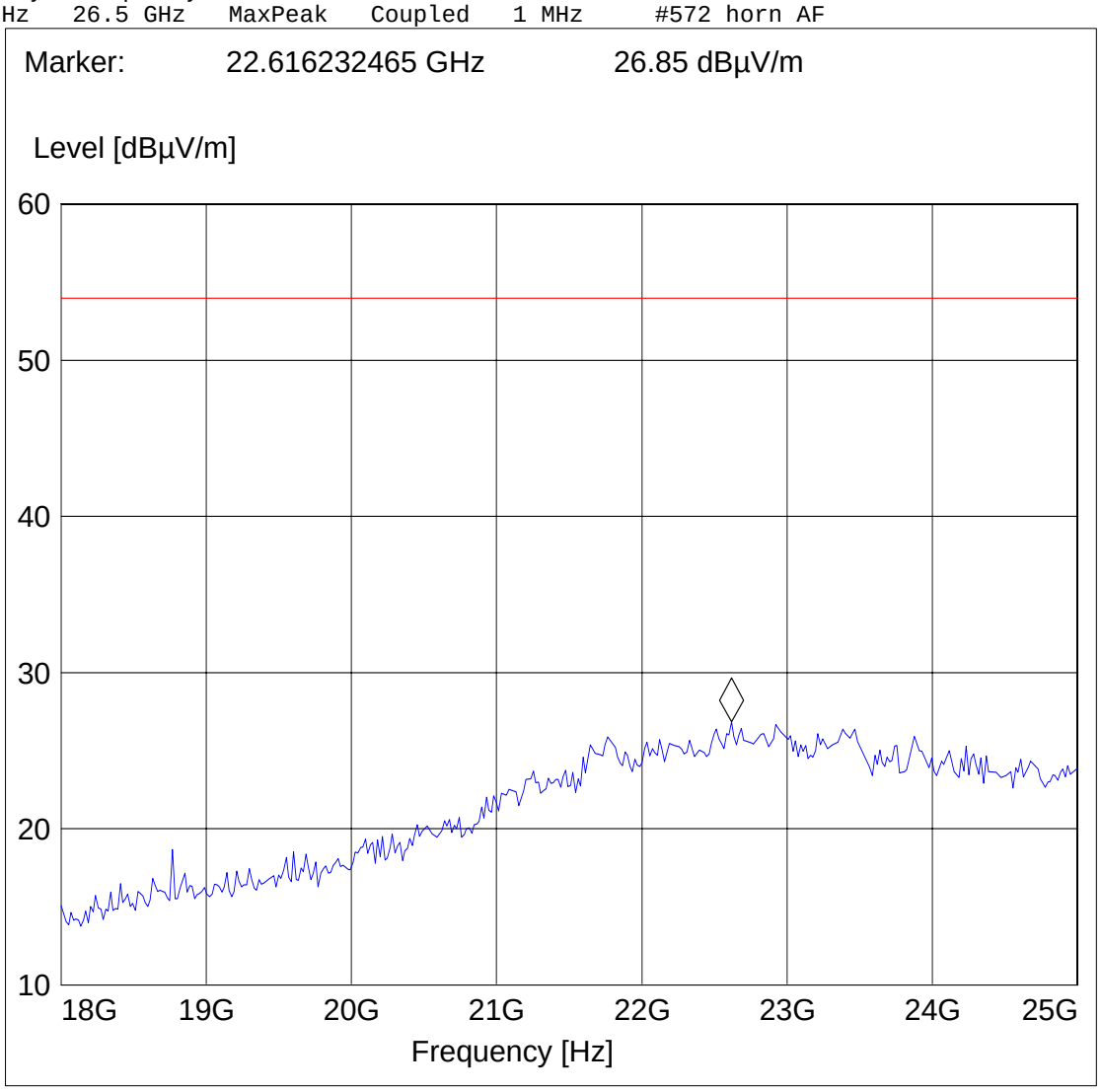
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test Mode:         802.11g, Measurement for low, middle, and high channels
ANT Orientation:   V
EUT Orientation:   H
Test Engineer:     Juan
Power Supply:      AC Adapter
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	Coupled	1 MHz	#572 horn AF



2.8 EMISSION LIMITATIONS - Radiated (Transmitter), 802.11a

§15.247 (d) & RSS-210(A8.5):

Transmit at Lowest channel Frequency 5745MHz (802.11a)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

Transmit at Middle channel Frequency 5785MHz (802.11a)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

Transmit at Highest channel Frequency 5825MHz (802.11a)			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
SEE PLOTS			

EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (5745MHz): 30MHz – 1GHz

Antenna: Vertical

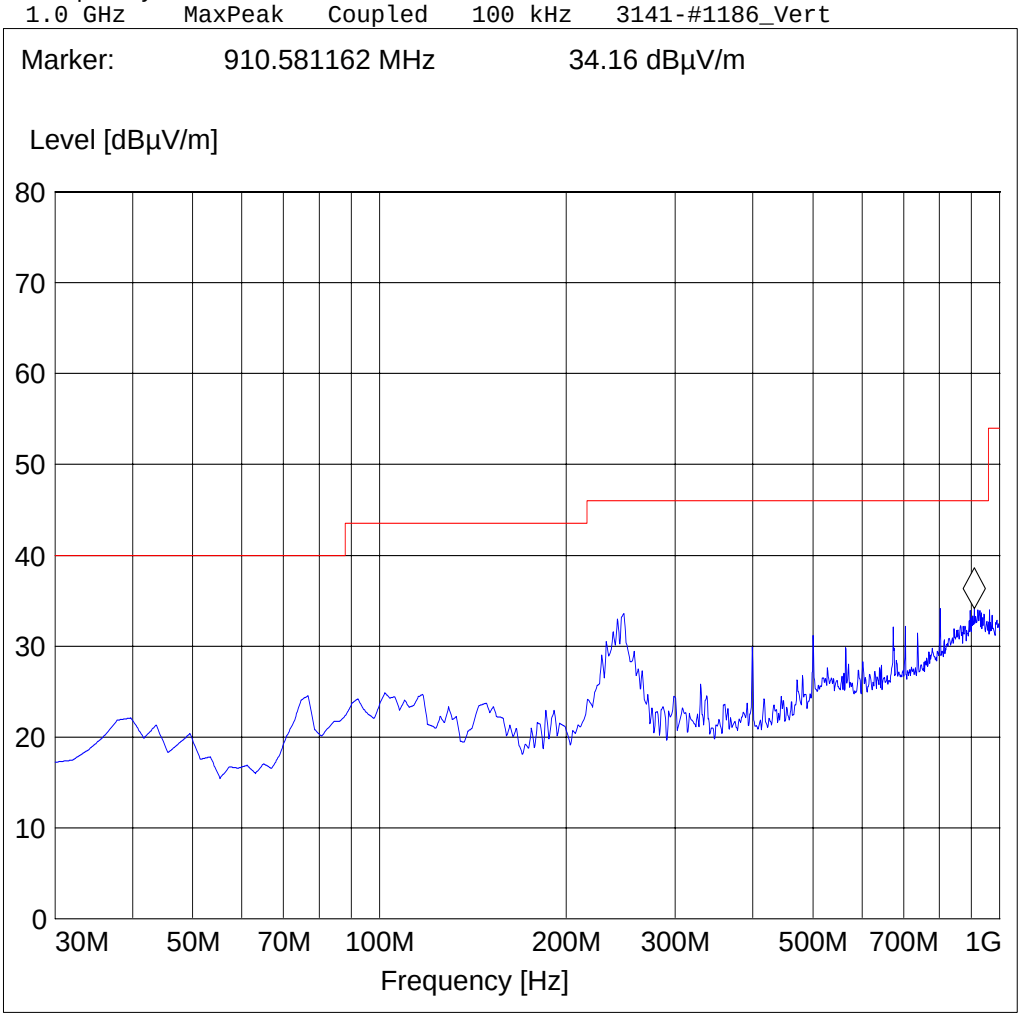
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              Dell PP12S with BCM94311MCAG
Customer:         Broadcom
Test Mode:        802.11a, ch 149 (Main Antenna
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Ed
Power Supply:     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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (5745MHz): 30MHz – 1GHz

Antenna: Horizontal

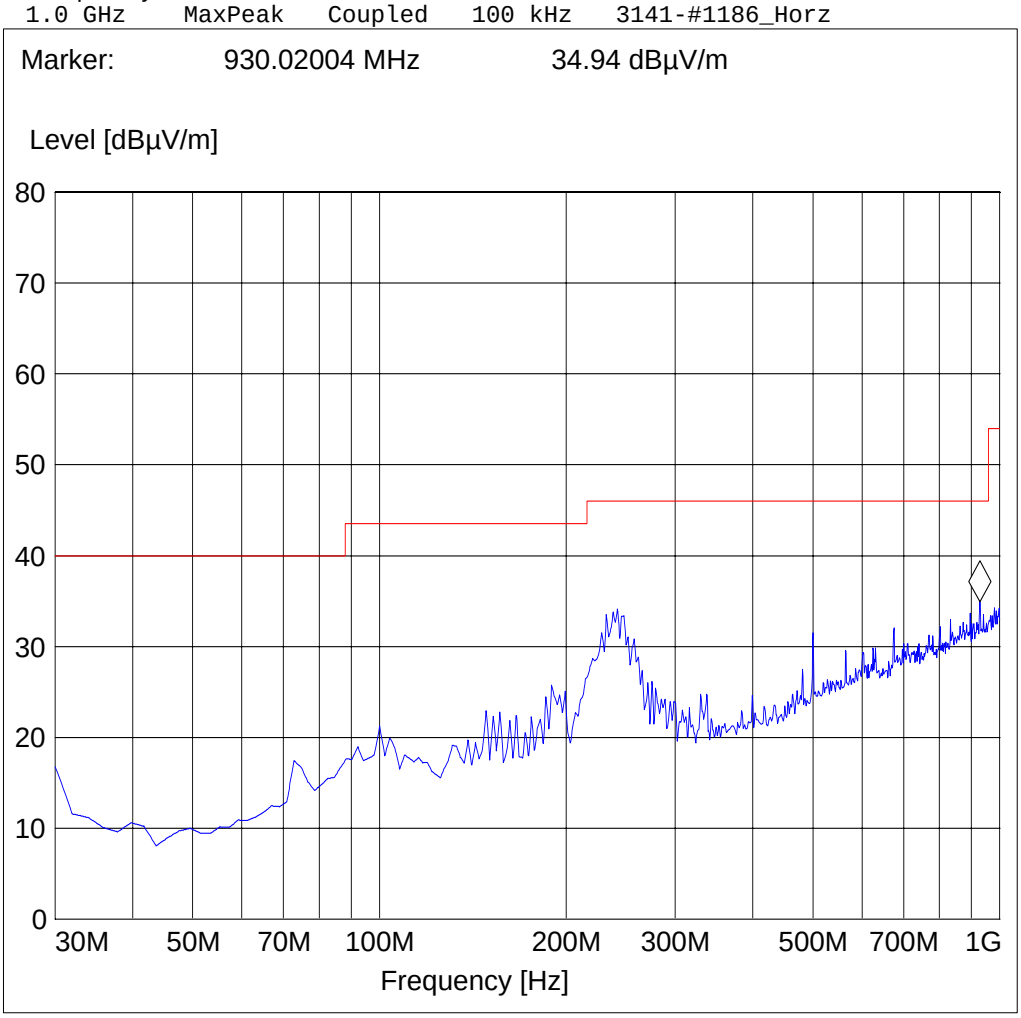
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              Dell PP12S with BCM94311MCAG
Customer:         Broadcom
Test Mode:        802.11a, ch 149 (Main Antenna)
ANT Orientation:  H
EUT Orientation:  H
Test Engineer:    Ed
Power Supply:     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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Lowest Channel (5745MHz): 1GHz – 18GHz

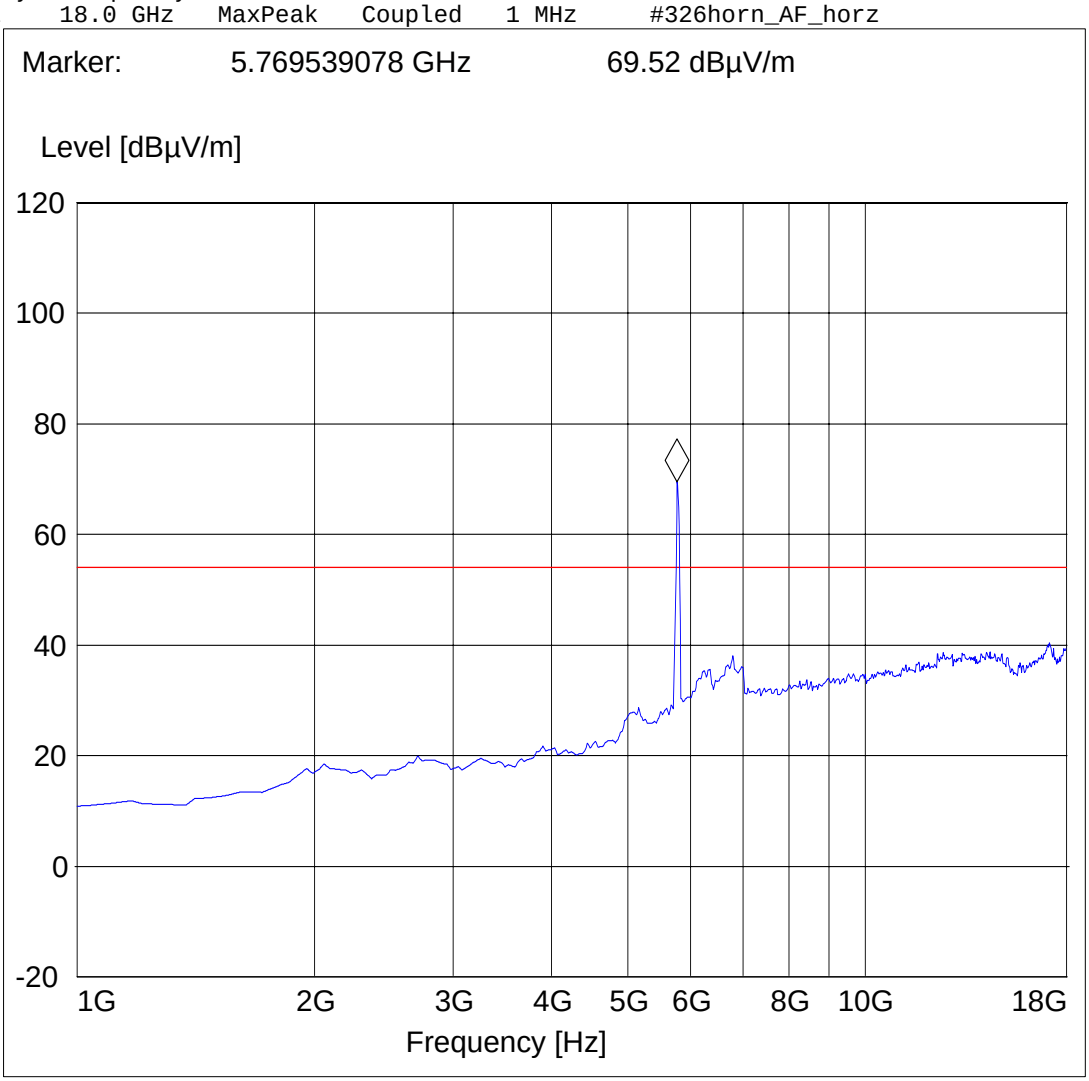
Note: No significant harmonic emissions detected either in Vertical or Horizontal

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11a, ch 149 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
Comments:          Mark is on Fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Mid Channel (5785MHz): 1GHz – 18GHz

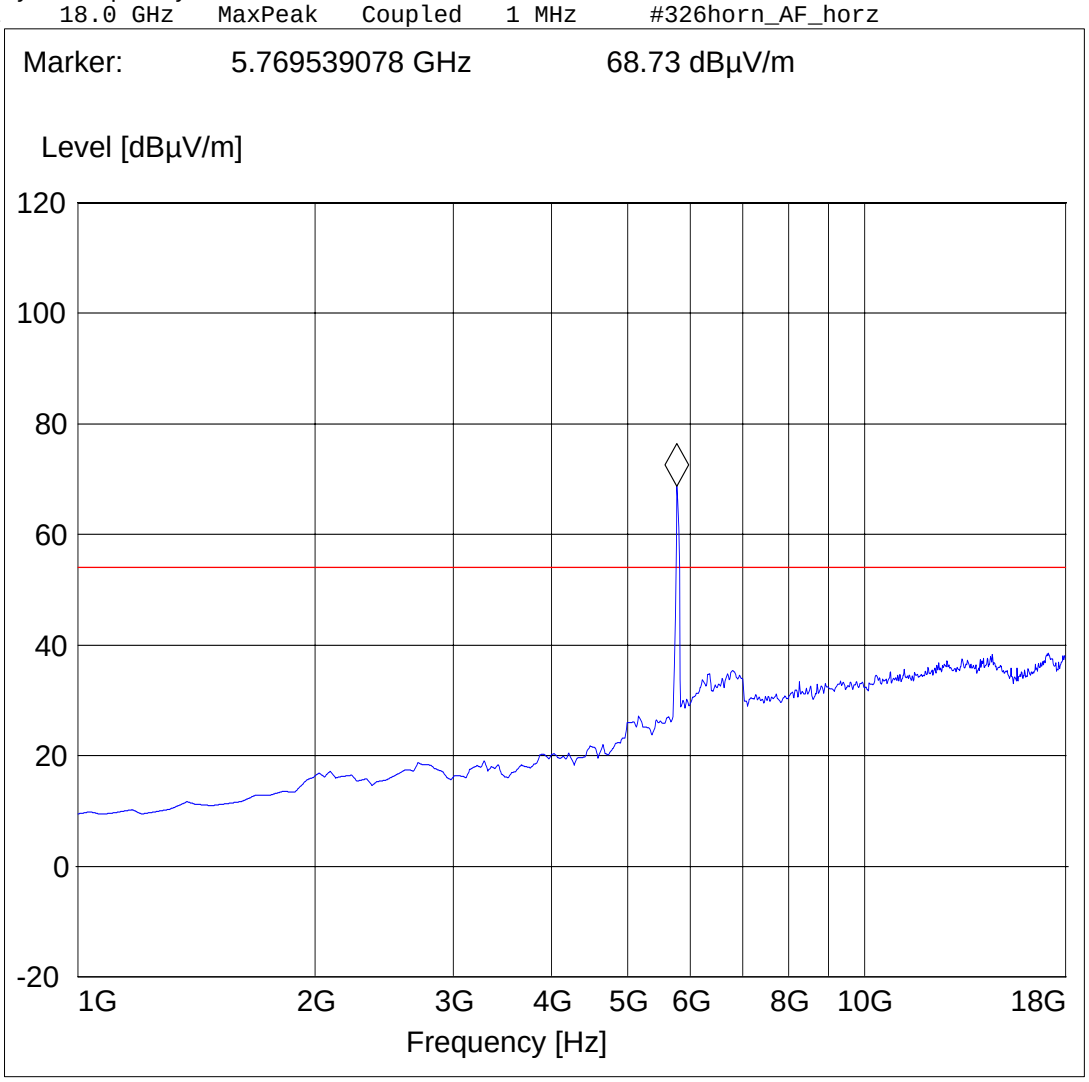
Note: No significant harmonic emissions detected either in Vertical or Horizontal

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11a, ch 157 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
Comments:          Mark is on Fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

Highest Channel (5825MHz): 1GHz – 18GHz

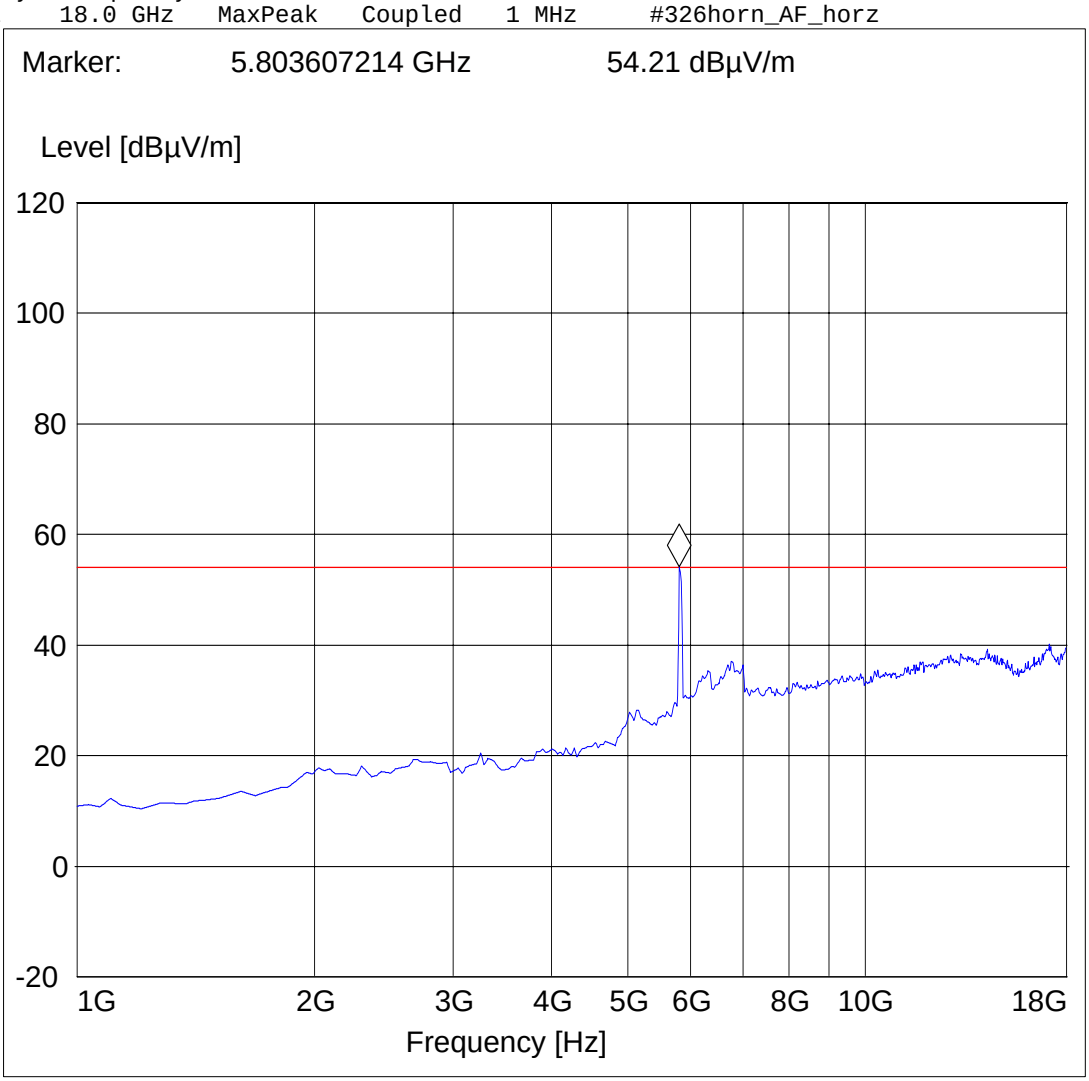
Note: No significant harmonic emissions detected either in Vertical or Horizontal

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11a, ch 165 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
Comments:          Mark is on Fundamental signal
```

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



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

18GHz – 26.5GHz for low, middle, and high channels

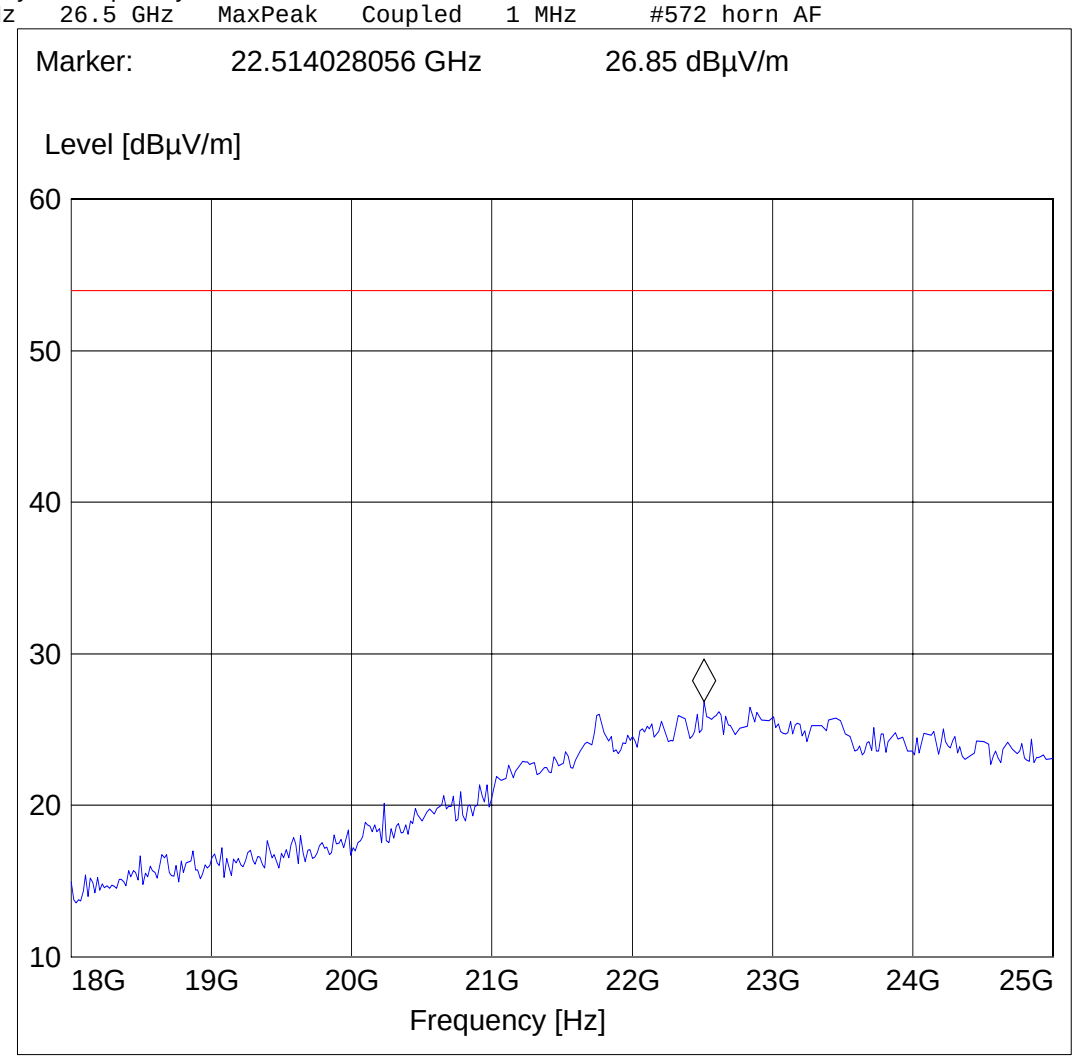
Note: This plot is valid for low, mid, high channels (worst-case plot)

CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT / Description: Dell PP12S with BCM94311MCAG
Manufacturer:      Broadcom
Test mode:         802.11a, ch 157 (Main Antenna)
ANT Orientation:   H
EUT Orientation:   H
Test Engineer:     Ed
Voltage:           AC Adapter
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	Coupled	1 MHz	#572 horn AF



EMISSION LIMITATIONS - Radiated (Transmitter) §15.247 (d) & RSS-210(A8.5)

26-40GHz for low, middle and high channels.

Note: Since no harmonic emissions were detected 20-dB of the limit for scans 18 – 26GHz it was determine that no emissions will be detected from 26 – 40 GHz, so no scans were captured.

3 AC POWER LINE CONDUCTED EMISSIONS § 15.207 & RSS-GEN (7.2.2)

LIMITS
Technical specification: 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 µH/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.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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

OPERATING MODE
Conducted AC emissions testing were performed with 110 VAC @ 60 Hz with the EUT in the mode that produced the highest power.

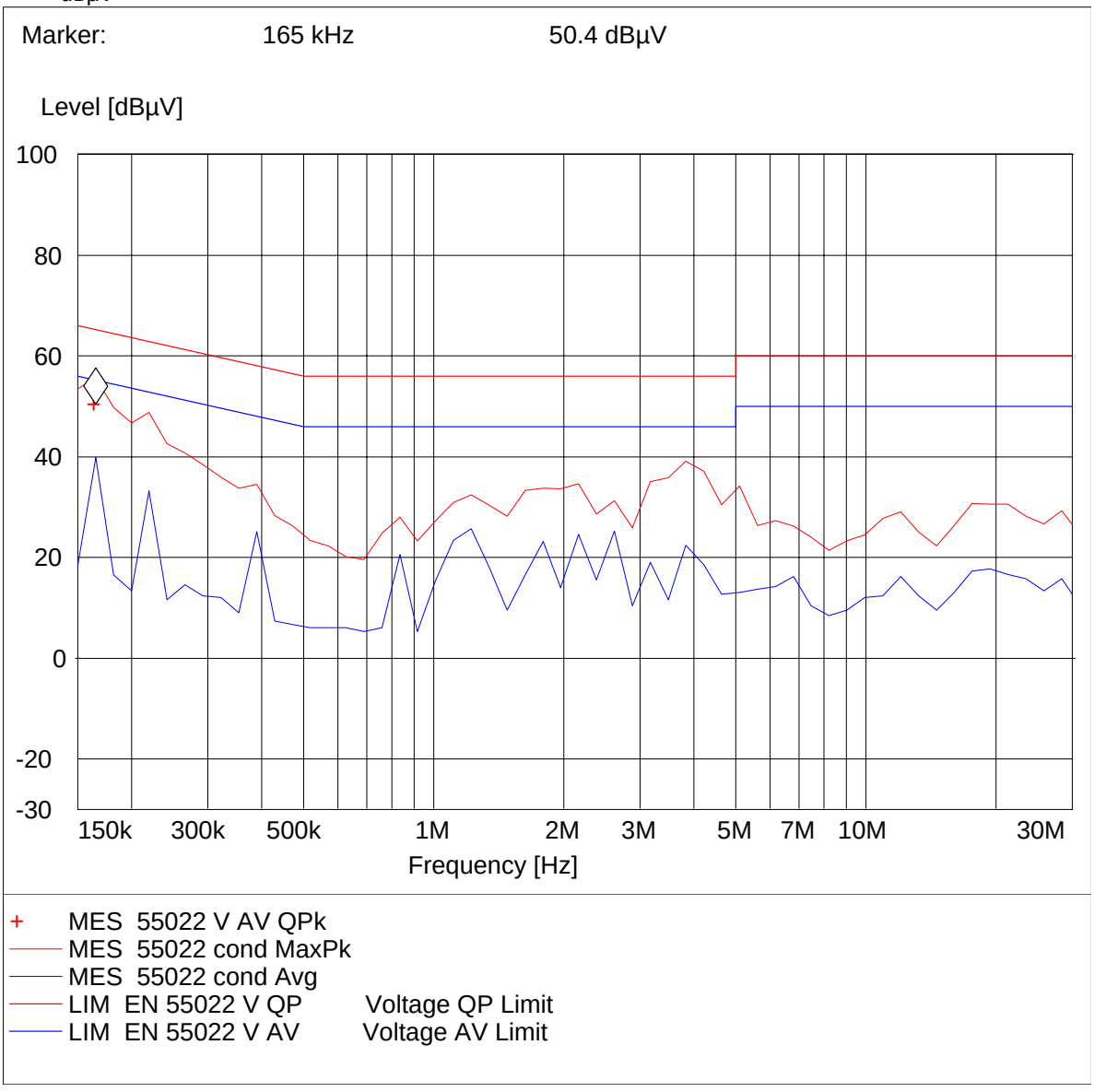
Voltage Mains Test (Line)

CETECOM Inc. Milpitas, USA

```
EUT:                 Dell PP12S with BCM94311MCG
Manufacturer:        Broadcom
Operating Condition: Tx Mode
ANT Orientation::    CONDUCTED
EUT Orientation::    H
Test Engineer:       Juan M.
Power Supply:        AC Adaptor
Comments:            120V,60Hz (Line)
```

SWEEP TABLE: "55022 cond"

```
Short Description:           EN 55022 for 150KHz-30MHz
Unit:     dBµV
```

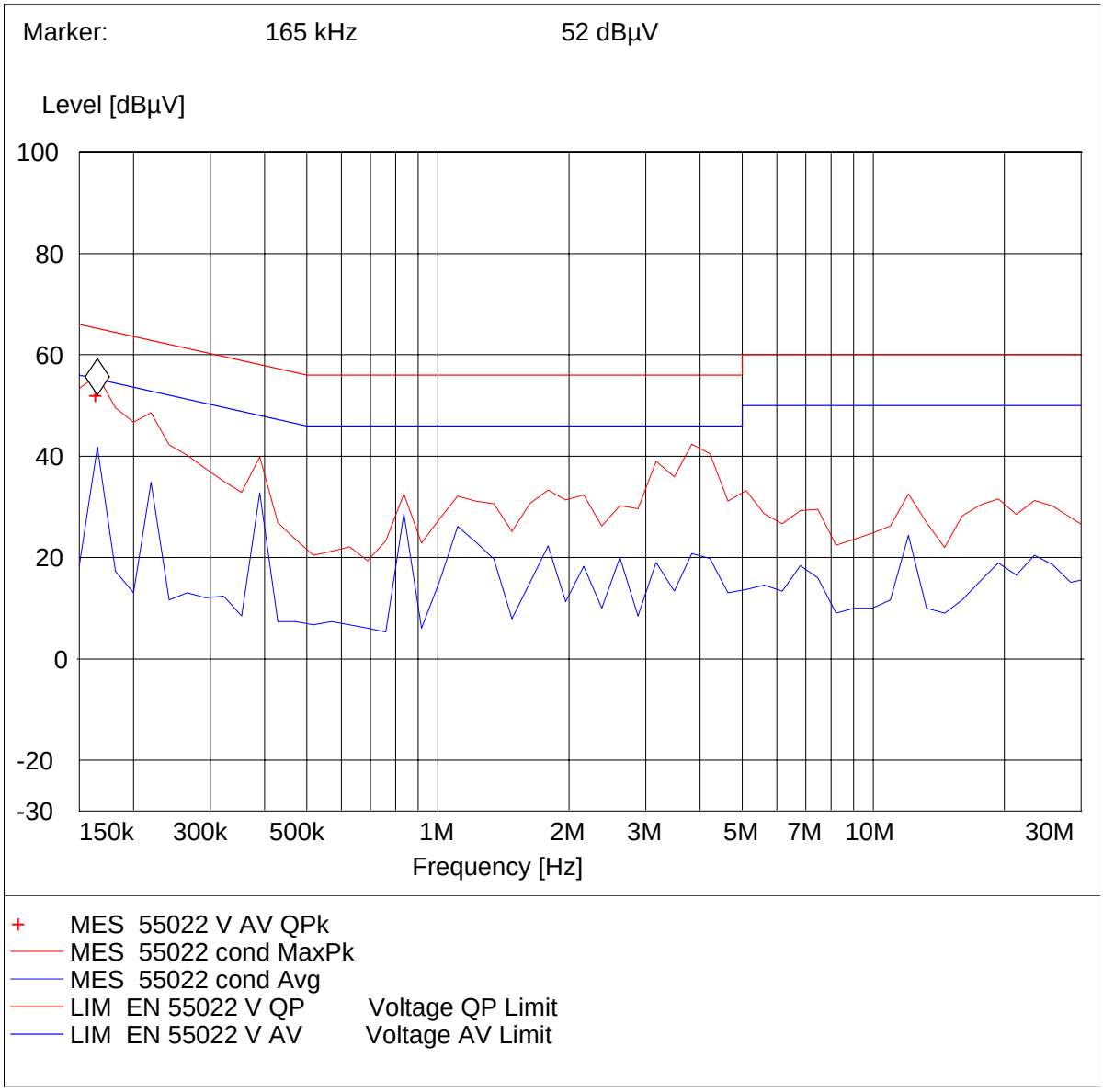


Voltage Mains Test (Neutral)

```
EUT:                 Dell PP12S with BCM94311MCG
Manufacturer:        Broadcom
Operating Condition: Tx Mode
ANT Orientation::    CONDUCTED
EUT Orientation::    H
Test Engineer::      Juan M.
Power Supply: :      AC Adaptor
Comments:  :         120V,60Hz (Neutral)
```

SWEEP TABLE: "55022 cond"

```
Short Description:           EN 55022 for 150KHz-30MHz
Unit:     dBµV
```



4 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 2008	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2008	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2008	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2008	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
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2008	1 year

5 BLOCK DIAGRAMS

Radiated Testing