



# FCC Test Report

## FCC Part 15.247 for DSSS systems/ CANADA RSS-210

for the  
SONY Corporation

Notebook PC

Model Number: VAIO-VGN TZ

FCC ID: AK8PCG4L2L

IC-ID: 409B-PCG4L2L

TEST REPORT #: SONYE\_016\_07001\_15.247A\_AK8PCG4L2L

DATE: 4/24/2007



FCC listed#  
101450

IC recognized  
#  
3925

**CETECOM Inc.**

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

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 and in compliance with the applicable criteria specified in Industry Canada rules RSS210.**

| Company          | Description | Model # |
|------------------|-------------|---------|
| SONY Corporation | Notebook PC |         |

**Technical responsibility for area of testing:**

4/25/2007 **EMC & Radio** Lothar Schmidt  
(Test Lab Manager)

**Date**                      **Section**                      **Name**                      **Signature**

**This report is prepared by:**

4/25/2007   **EMC & Radio**   **Pete Krebill**  
**(EMC Project Engineer)**

| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

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 SAR Assessment Report**

|                               |                                                        |
|-------------------------------|--------------------------------------------------------|
| Company Name:                 | CETECOM Inc.                                           |
| Department:                   | SAR                                                    |
| Address:                      | 411 Dixon Landing Road<br>Milpitas, CA 95035<br>U.S.A. |
| Telephone:                    | +1 (408) 586 6200                                      |
| Fax:                          | +1 (408) 586 6299                                      |
| Responsible Test Lab Manager: | Lothar Schmidt                                         |

### **2.2 Identification of the Client**

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Applicant's Name: | SONY Corporation                                 |
| Address:          | 1-7-1 Konan, Minato-ku,<br>Tokyo 108-0075, Japan |
| Contact Person:   | Michio Kobayashi                                 |
| Phone No.         | +81-263-72-5696                                  |
| Fax:              | +81-263-72-9755                                  |
| e-mail:           | Michio.Kobayashi@jp.sony.com                     |

### **2.3 Identification of the Manufacturer**

|                         |                                                        |
|-------------------------|--------------------------------------------------------|
| Manufacturer's Name:    | Sony EMCS Corporation                                  |
| Manufacturer's Address: | 5432 Toyoshima, Azumino-Shi, Nagano 399-<br>8282 Japan |

### **3 Equipment under Test (EUT)**

#### **3.1 Specification of the Equipment under Test**

|                             |                                      |
|-----------------------------|--------------------------------------|
| Product Type                | Notebook PC                          |
| Marketing Name:             | VAIO-VGN TZ                          |
| Model No:                   | PCG-4L2L                             |
| FCC-ID:                     | AK8PCG4L2L                           |
| IC-ID :                     | 409B-PCG4L2L                         |
| Frequency Range:            | 5745 MHz to 5825 MHz                 |
| Type(s) of Modulation:      | OFDM                                 |
| Antenna Type:               | PIFA                                 |
| Output Power <sup>1</sup> : | 20.54 dBm (0.113W) EIRP WLAN 802.11a |



#### **4 Subject Of Investigation**

All testing was performed on the product referred to in Section 3 as EUT.

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. The maximization of portable equipment is conducted in accordance with ANSI C63.4

## 5 Measurements

### 5.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)

#### 5.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)

| Frequency range | RF power output |
|-----------------|-----------------|
| 5725-5850 MHz   | 36dBm EIRP      |

\*limit is based upon antenna gain of less than or equal to 6dBi.

#### 5.1.2 EIRP a MODE:

| TEST CONDITIONS         |                         |                      | MAXIMUM PEAK OUTPUT POWER (dBm) |       |       |
|-------------------------|-------------------------|----------------------|---------------------------------|-------|-------|
| Frequency (MHz)         |                         |                      | 5745                            | 5785  | 5825  |
| Chain A                 | T <sub>nom</sub> (23)°C | V <sub>nom</sub> VDC | 19.16                           | 18.86 | 19.21 |
| Chain B                 | T <sub>nom</sub> (23)°C | V <sub>nom</sub> VDC | 18.18                           | 19.62 | 20.54 |
| Measurement uncertainty |                         |                      | ±0.5dBm                         |       |       |



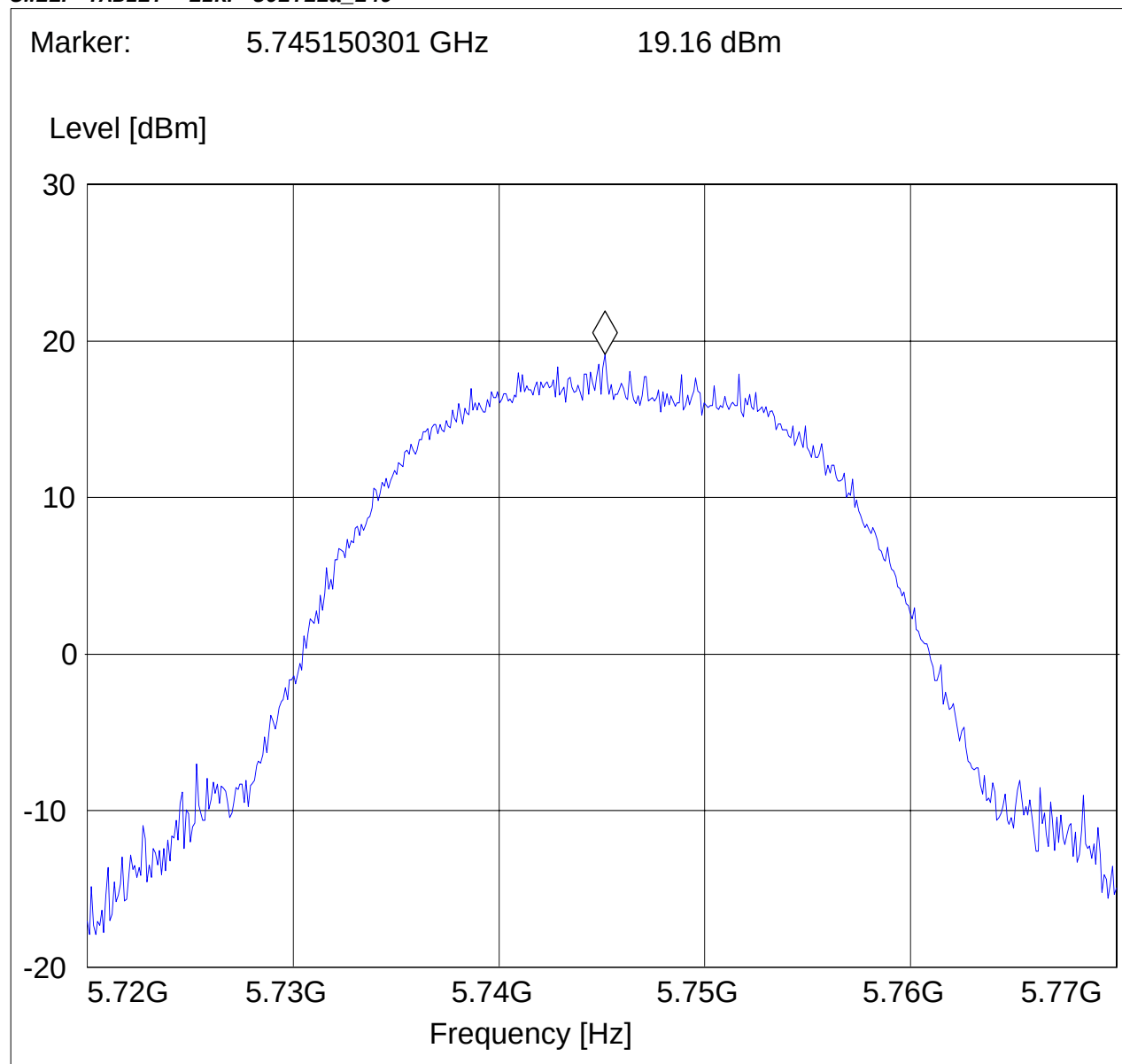
### EIRP a Mode (5745) Chain A

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: ES725  
Customer:: Sony  
Test Mode: 802.11a, ch 149  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Voltage:: AC adapter  
Comments:: Chain a

#### SWEEP TABLE: "EIRP 802.11a\_149"







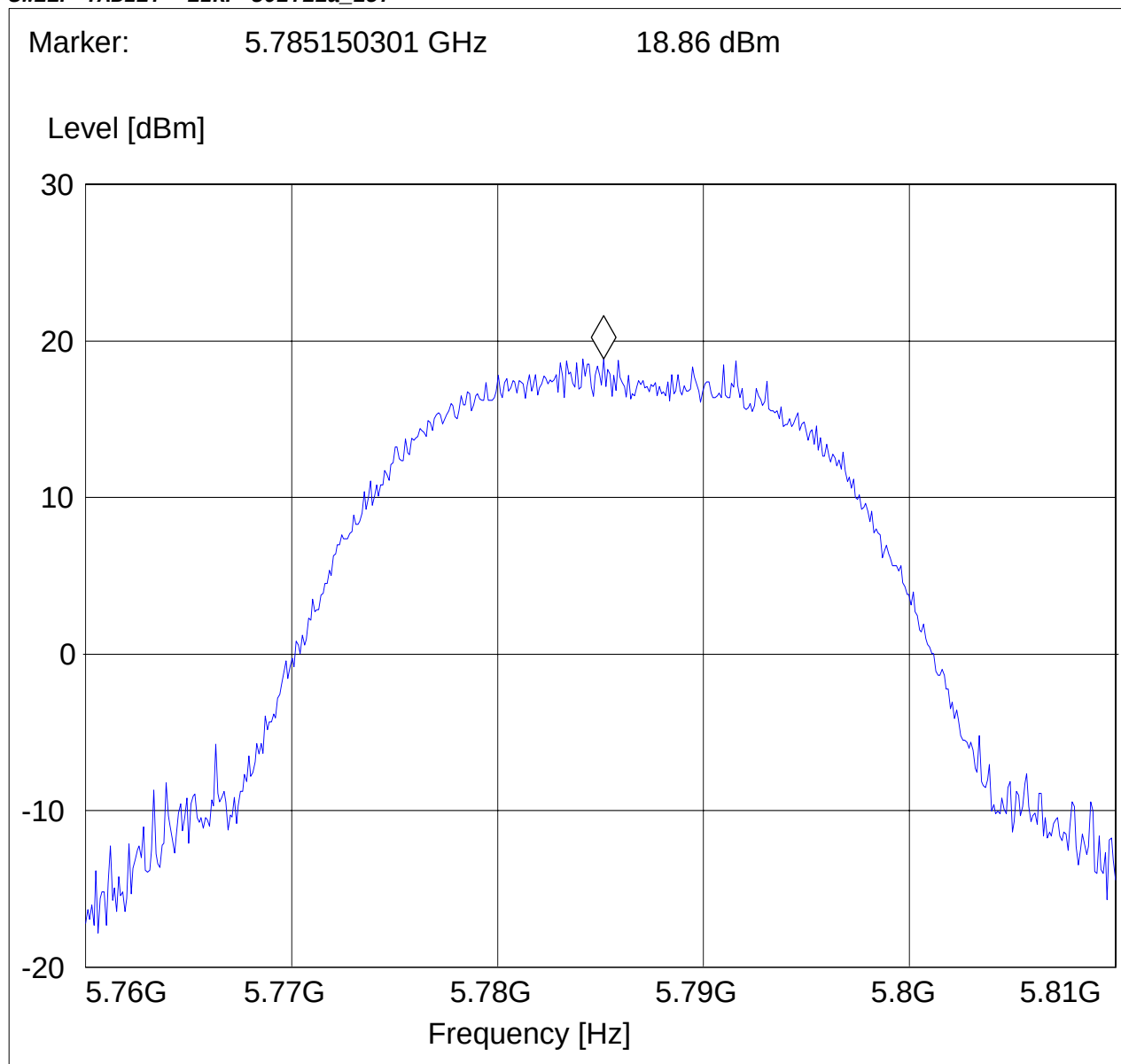
### EIRP a Mode (5785MHz) Chain A

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: ES725  
Customer:: Sony  
Test Mode: 802.11a, ch 157  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Voltage:: AC adapter  
Comments:: Chain A

#### SWEEP TABLE: "EIRP 802.11a\_157"





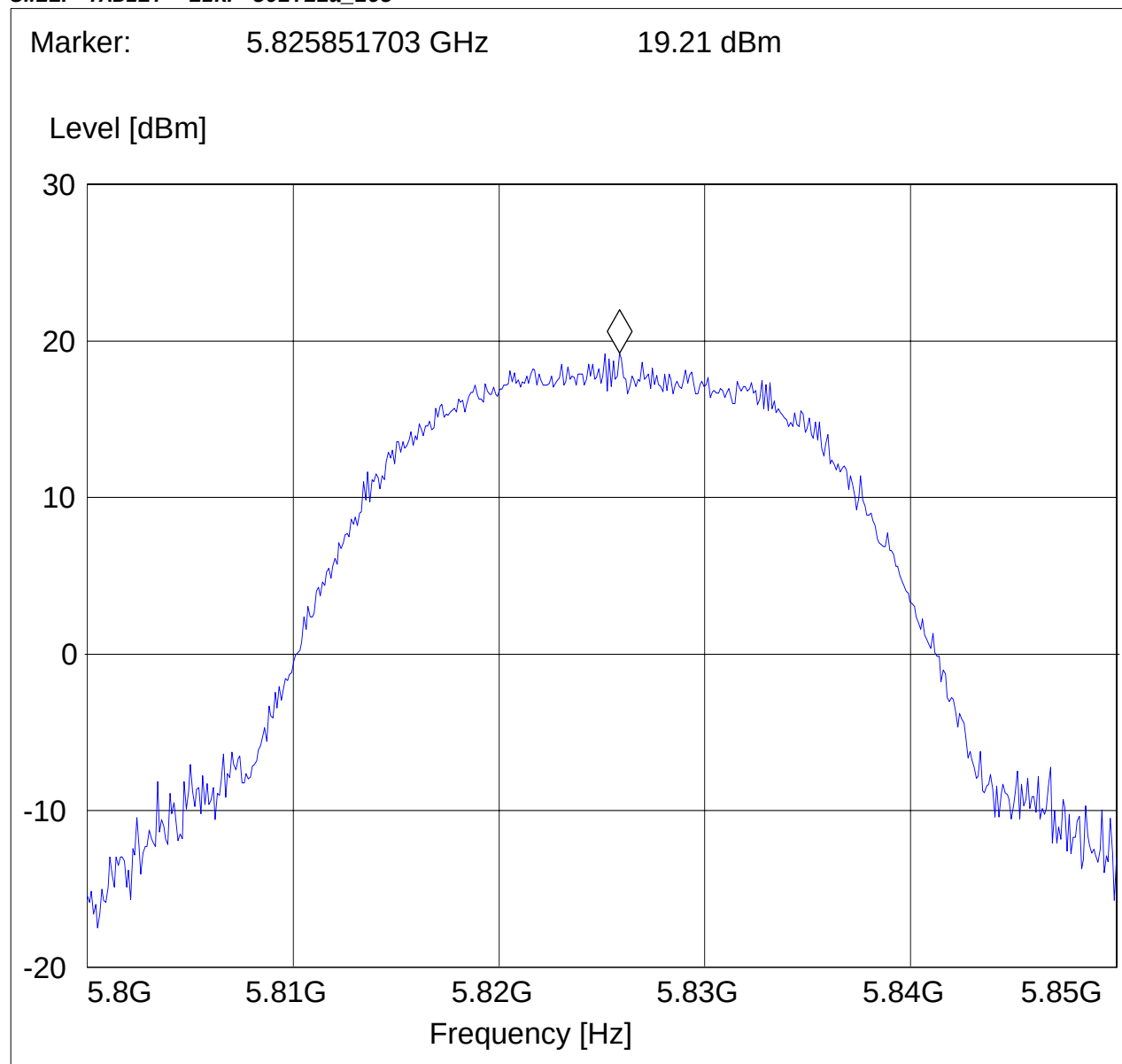
### EIRP a Mode (5825MHz) Chain A

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: ES725  
Customer:: Sony  
Test Mode: 802.11a, ch 165  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Voltage:: AC adapter  
Comments:: Chain A

**SWEEP TABLE: "EIRP 802.11a\_165"**





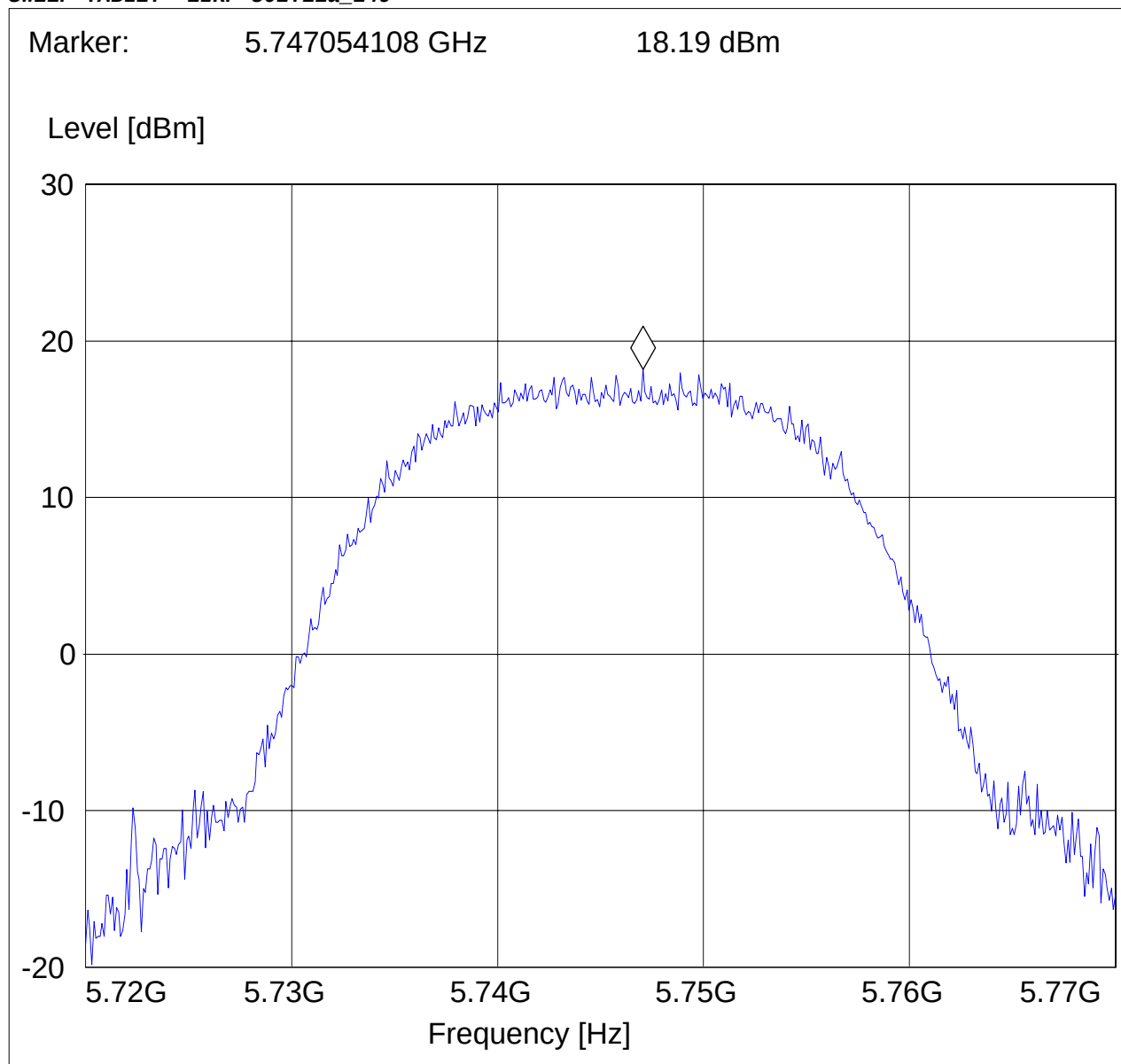
### EIRP a Mode (5745) Chain B

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: ES725  
Customer:: Sony  
Test Mode: 802.11a, ch 149  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Ed  
Voltage:: AC adapter  
Comments:: Chain B

#### SWEEP TABLE: "EIRP 802.11a\_149"





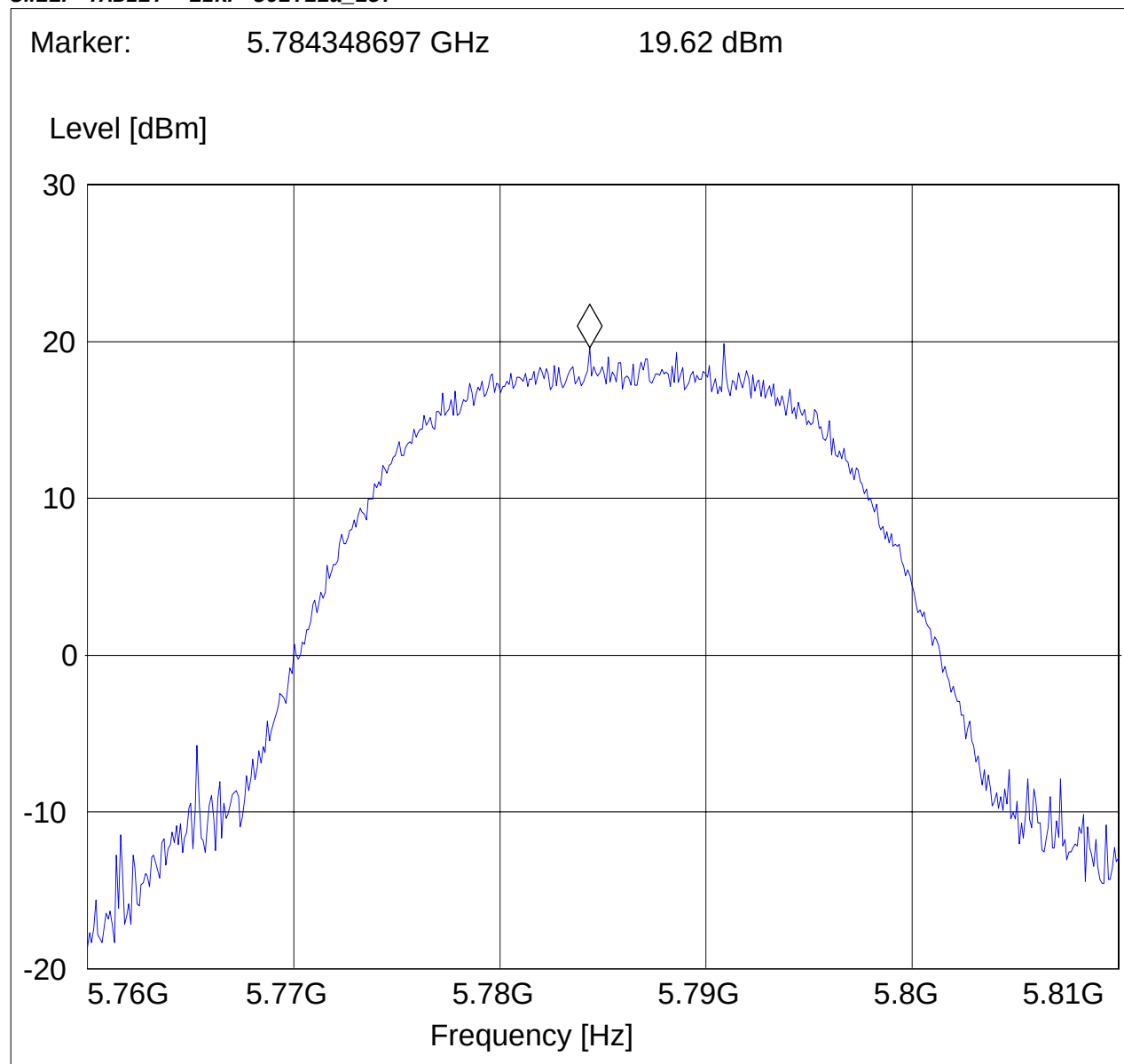
### EIRP a Mode (5785MHz) Chain B

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: ES725  
Customer:: Sony  
Test Mode: 802.11a, ch 157  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Ed  
Voltage:: AC adapter  
Comments:: Chain B

**SWEEP TABLE: "EIRP 802.11a\_157"**





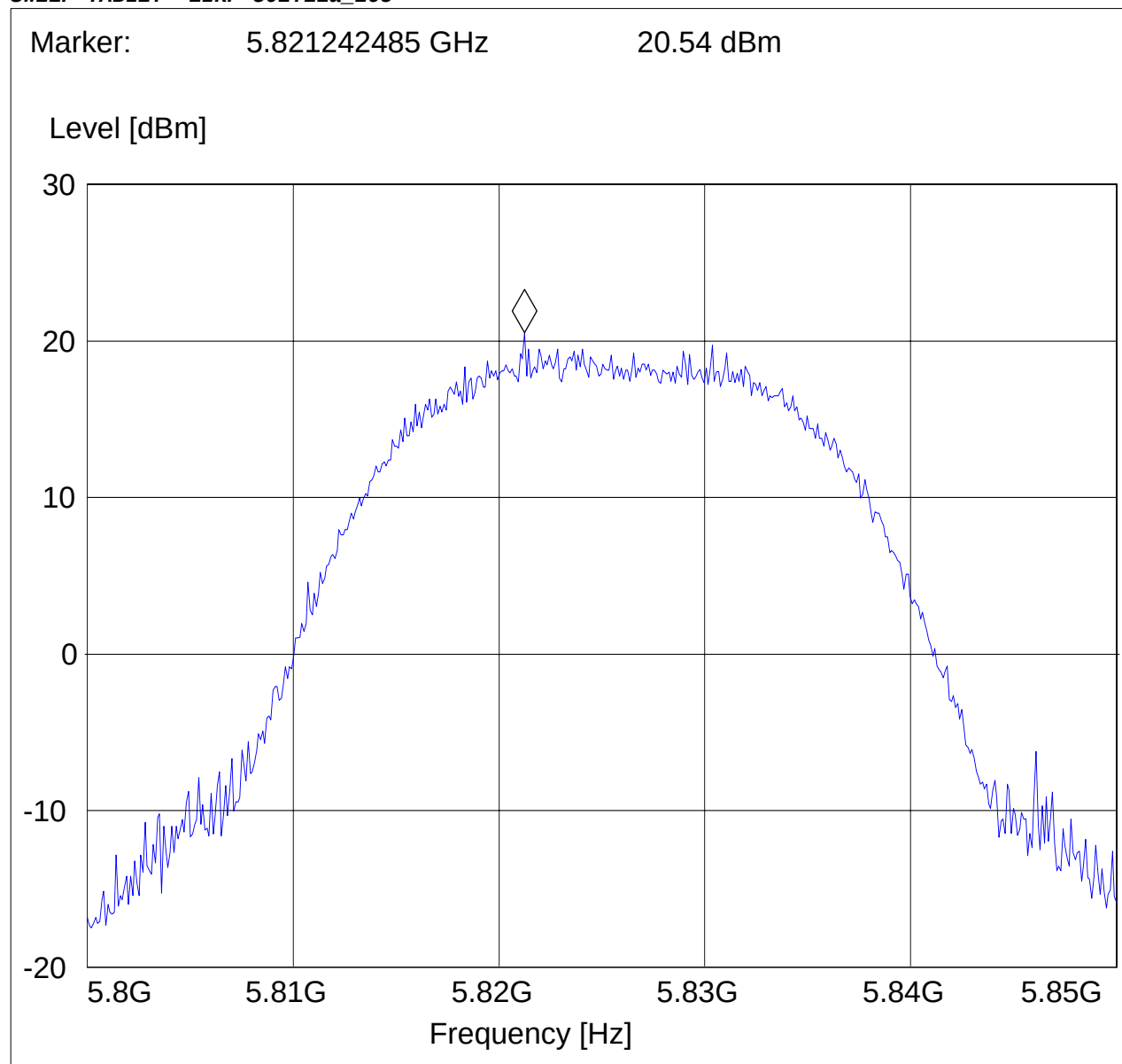
### EIRP a Mode (5825MHz) Chain B

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT:: ES725  
Customer:: Sony  
Test Mode: 802.11a, ch 165  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Ed  
Voltage:: AC adapter  
Comments:: Chain B

**SWEEP TABLE: "EIRP 802.11a\_165"**



## 5.2 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

### 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       |
| 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     | ( <sup>2</sup> ) |
| 13.36 - 13.41       |                       |                 |                  |

\*PEAK LIMIT= 74dBuV/m

\*AVG. LIMIT= 54dBuV/m

#### 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.

#### 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 |

## 5.2.2 RESULTS (a) MODE

30MHz – 1GHz Chain A

Antenna: vertical

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

Note: Peak reading vs. Quasi-peak limit

**CETECOM Inc.**

**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT:: ES725

Customer:: Sony

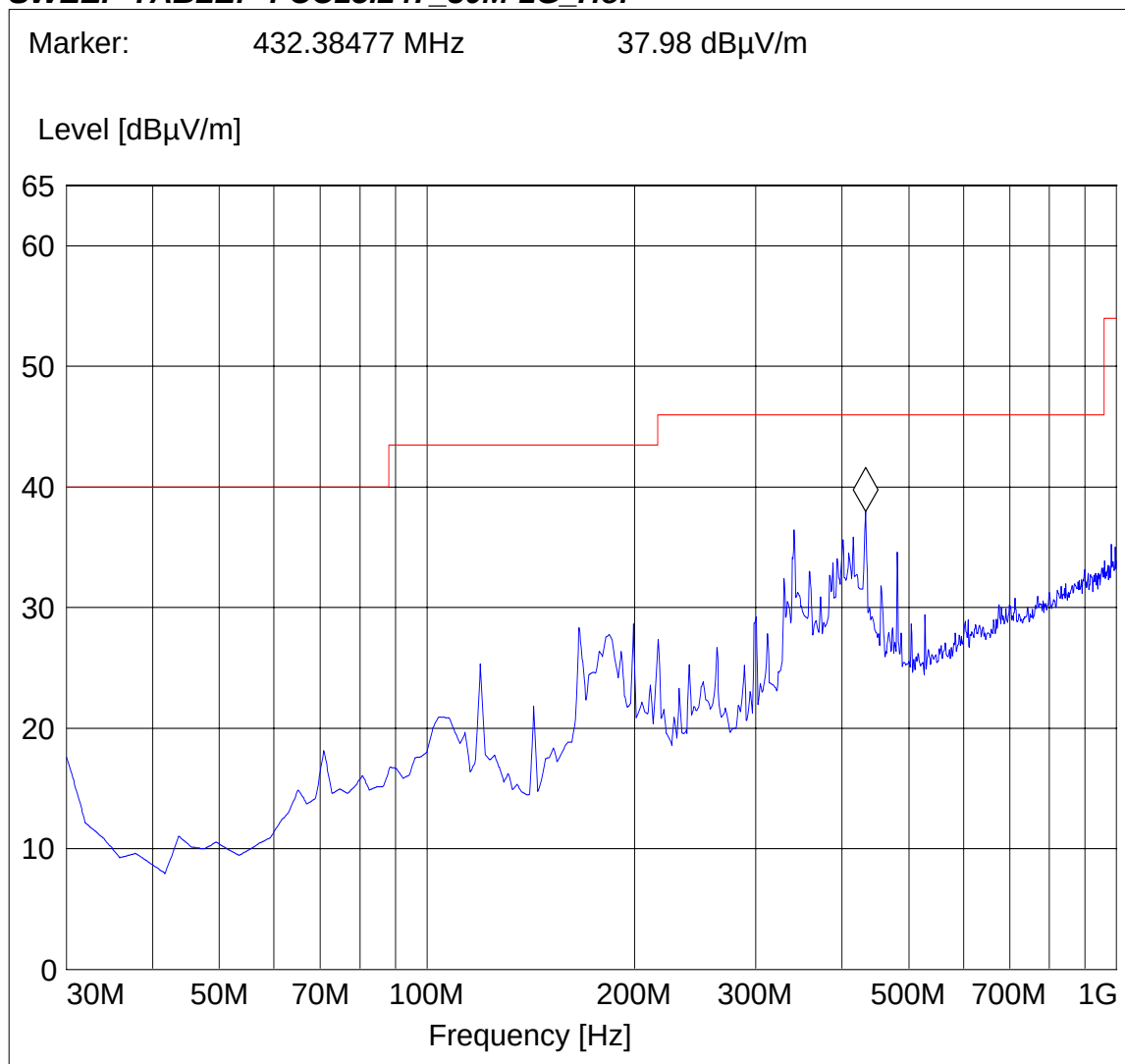
Test Mode: 802.11a, ch 149

ANT Orientation: H

EUT Orientation: H

Test Engineer: Ed

### **SWEEP TABLE: "FCC15.247\_30M-1G\_Hor"**





**1-18GHz (5745MHz) Chain A**

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

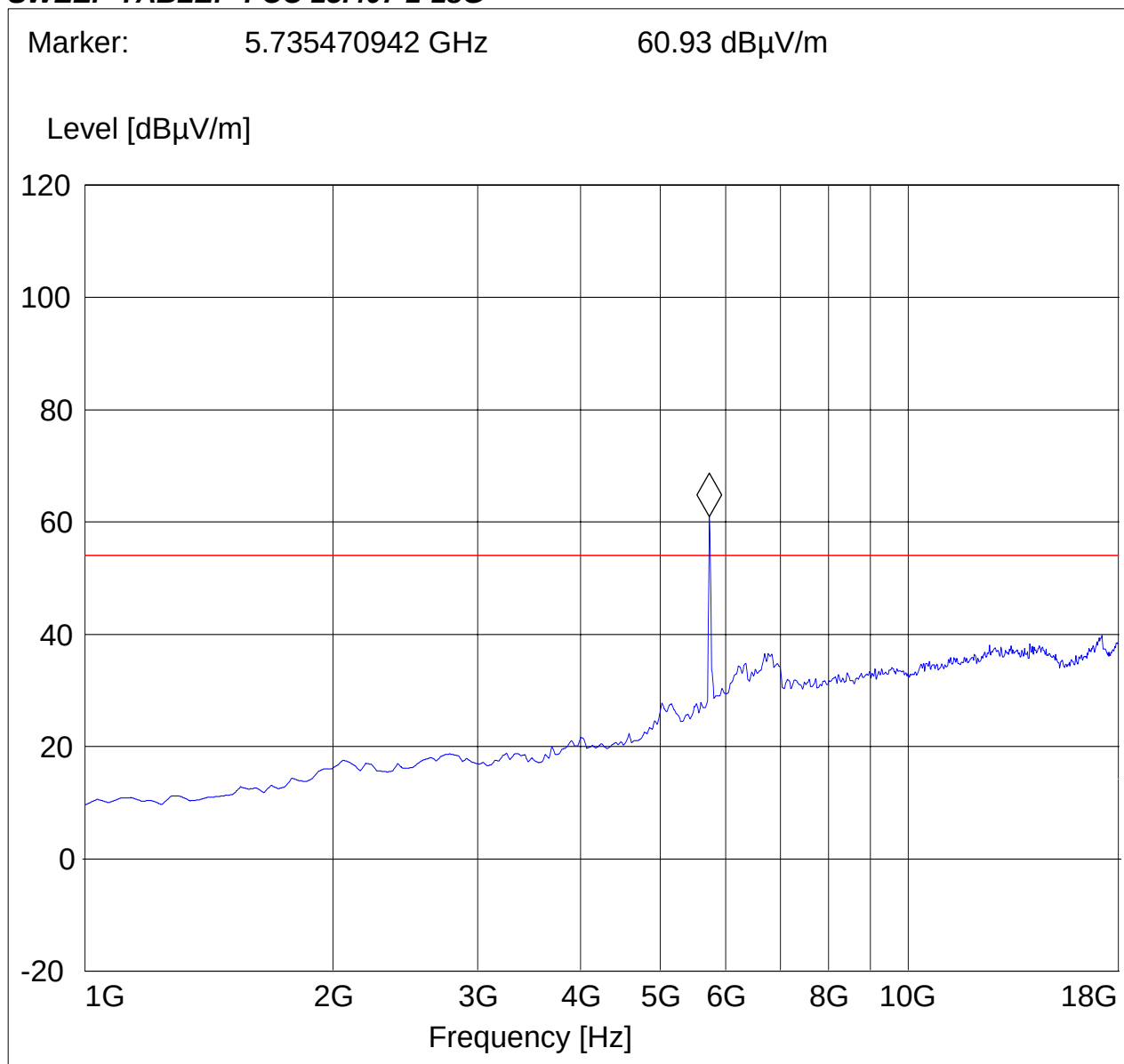
Test mode: 802.11a, Ch 149, chain A, 20Mhz bw

EUT: H

Antenna: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 15.407 1-18G"**







**1-18GHz (5785MHz) Chain A**

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

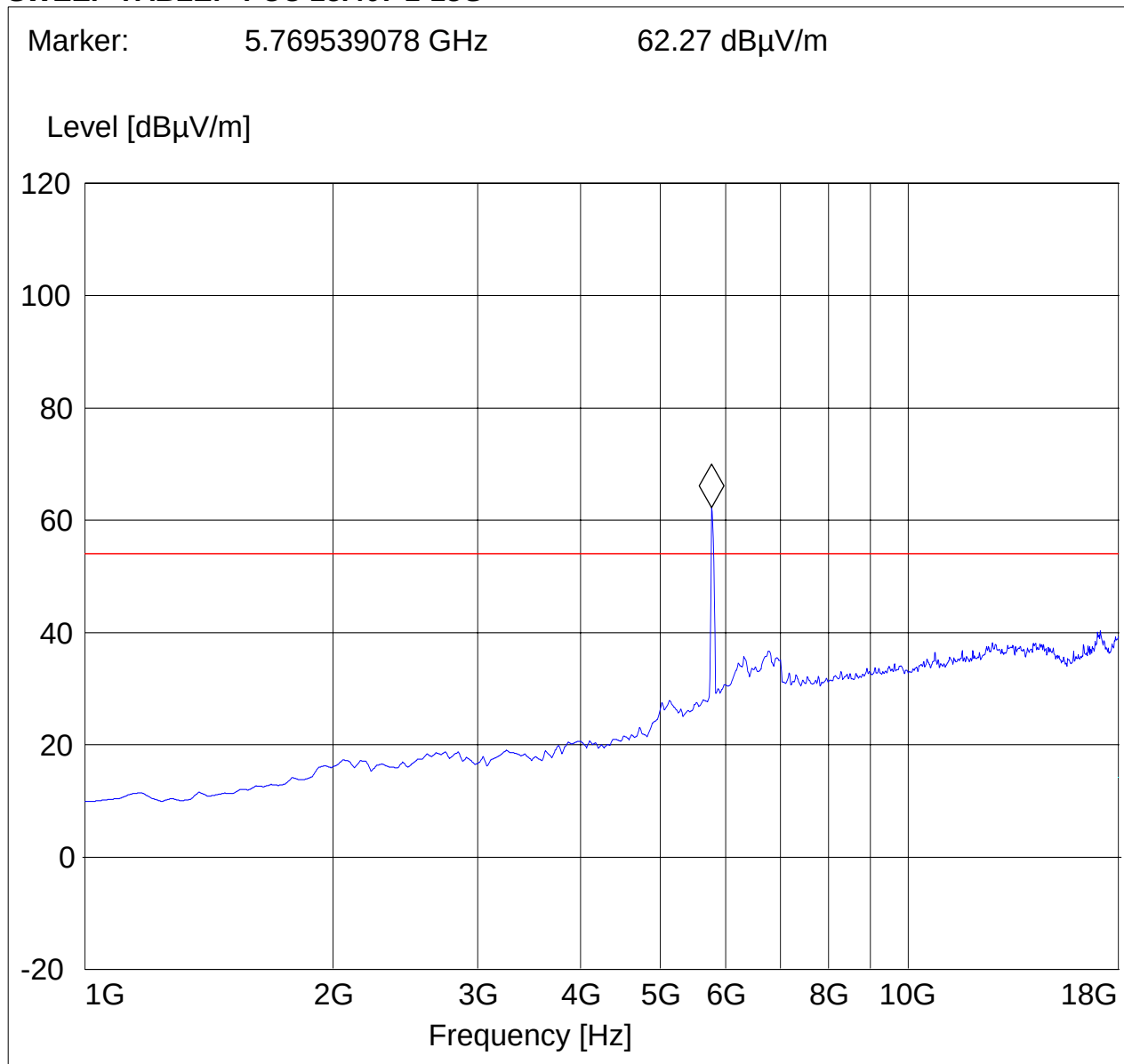
Test mode: 802.11a, Ch 157, chain A, 20Mhz bw

EUT: H

Antenna: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 15.407 1-18G"**





**1-18GHz (5825MHz) Chain A**

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

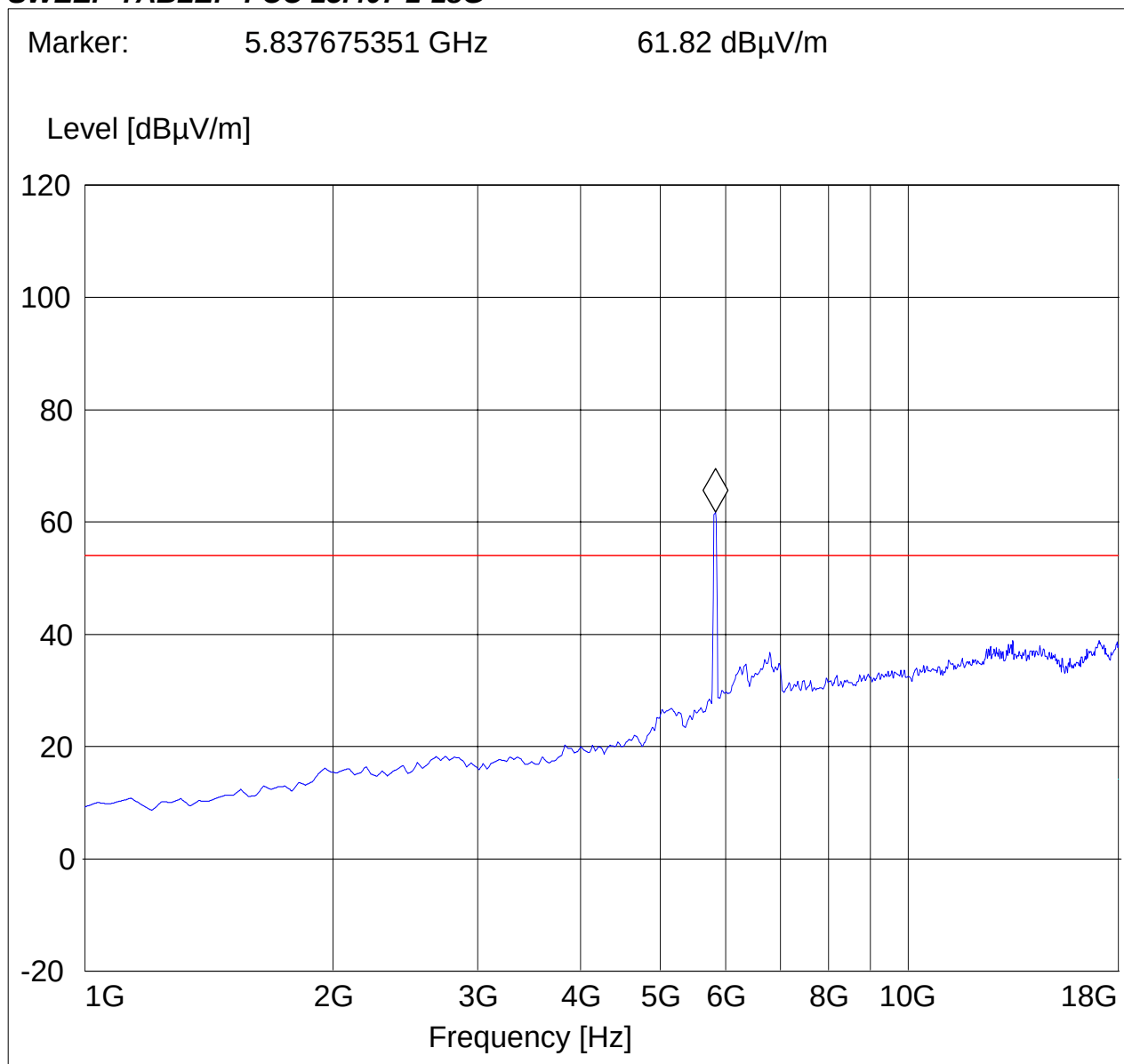
Test mode: 802.11a, Ch 165, chain A, 20Mhz bw

EUT: H

Antenna: H

Test Engineer: Ed

***SWEEP TABLE: "FCC 15.407 1-18G"***





**18-26.5GHz (5745MHz) Chain A**

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

**Note: Peak Reading vs. Average limit ,**

**CETECOM Inc.**

**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT:: ES725

Customer:: Sony

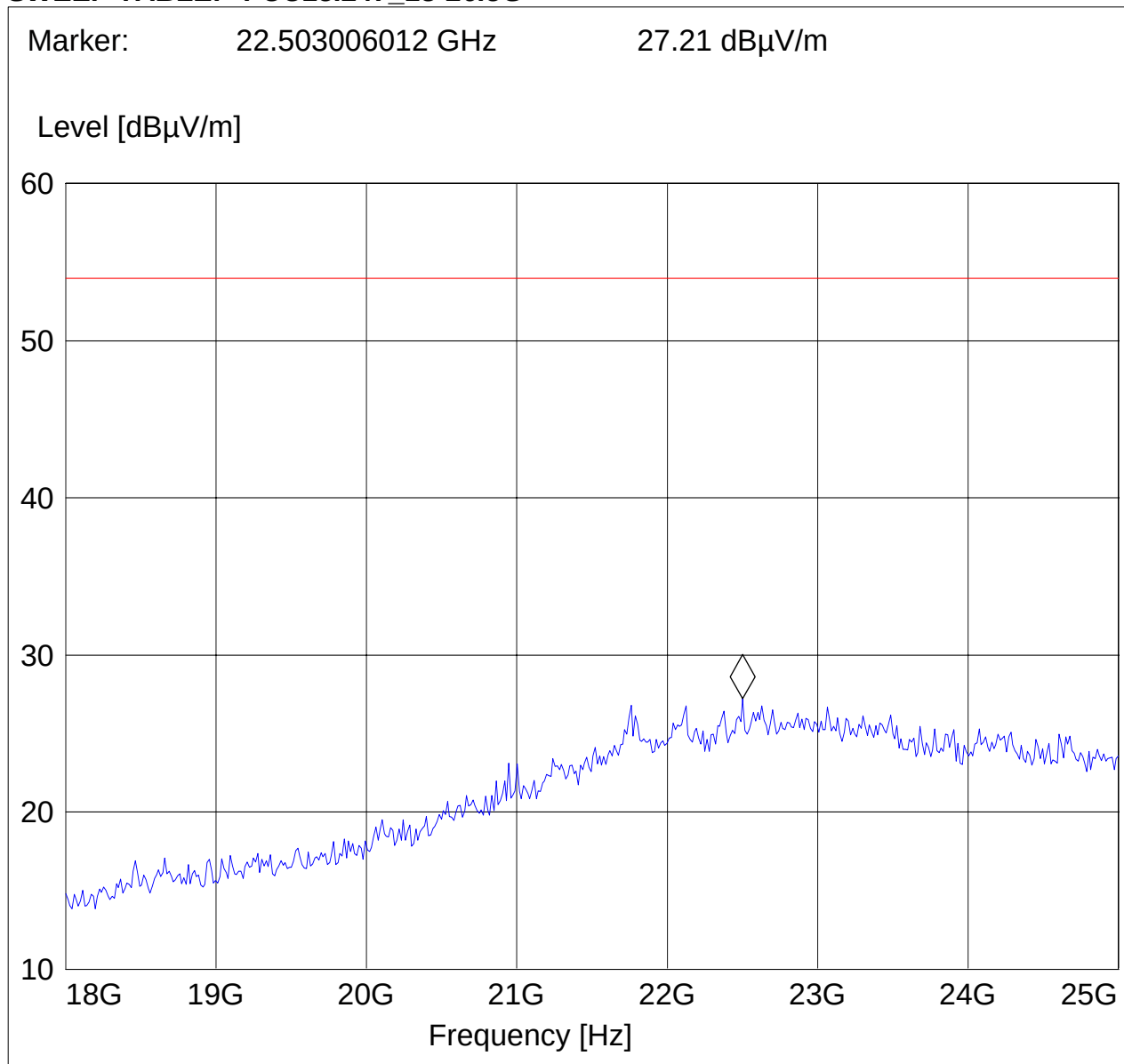
Test Mode: 802.11a, ch 149

ANT Orientation: H

EUT Orientation: H

Test Engineer: Ed

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





**26-40GHz Chain A**

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

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

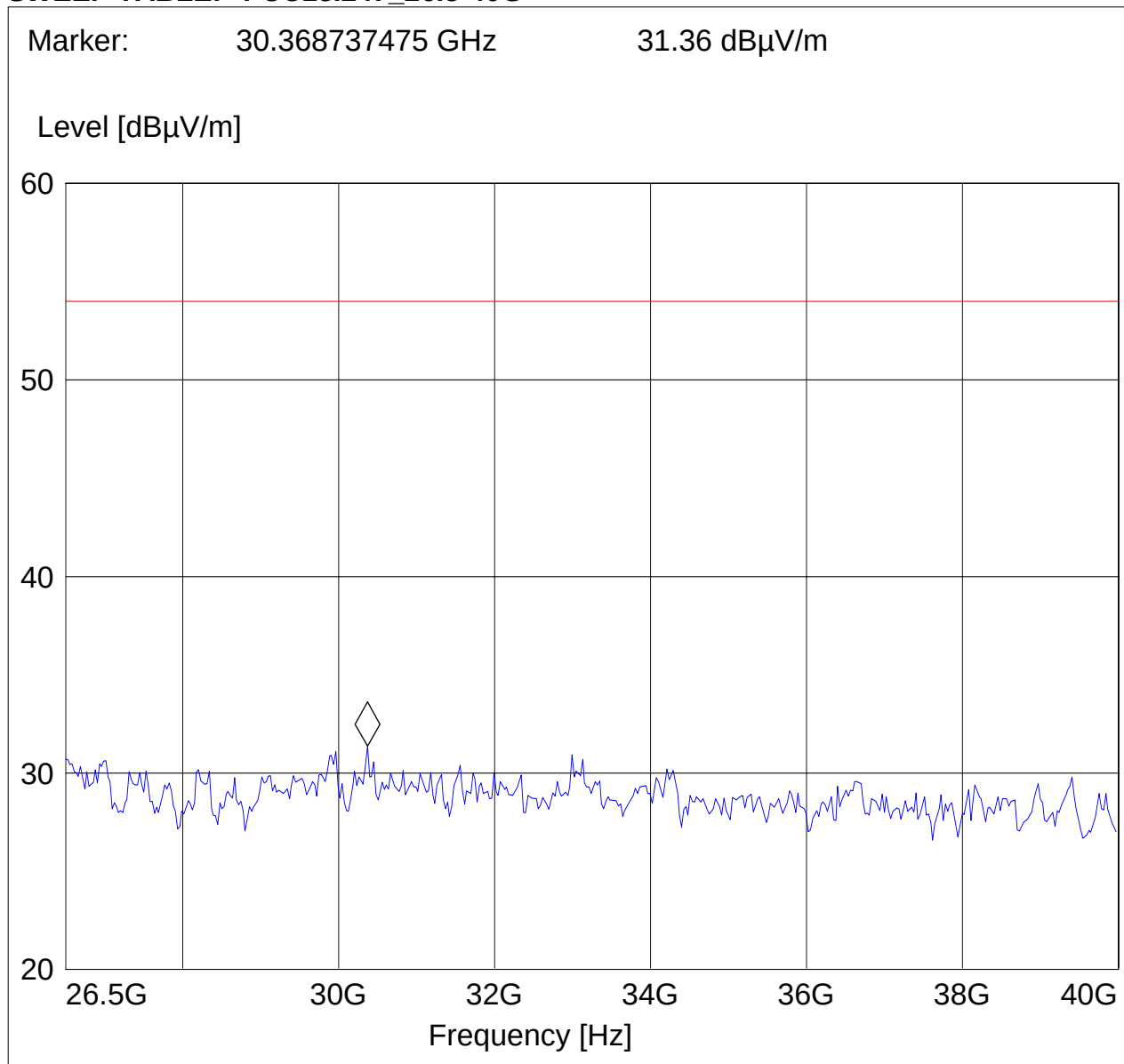
Test mode: 802.11a, Ch 157, chain A

EUT: H

Antenna: H

Test Engineer: Peter Mu

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



**30MHz – 1GHz Chain B**

**Antenna: vertical**

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

**Note: Peak reading vs. Quasi-peak limit**

**CETECOM Inc.**

**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT:: ES725

Customer:: Sony

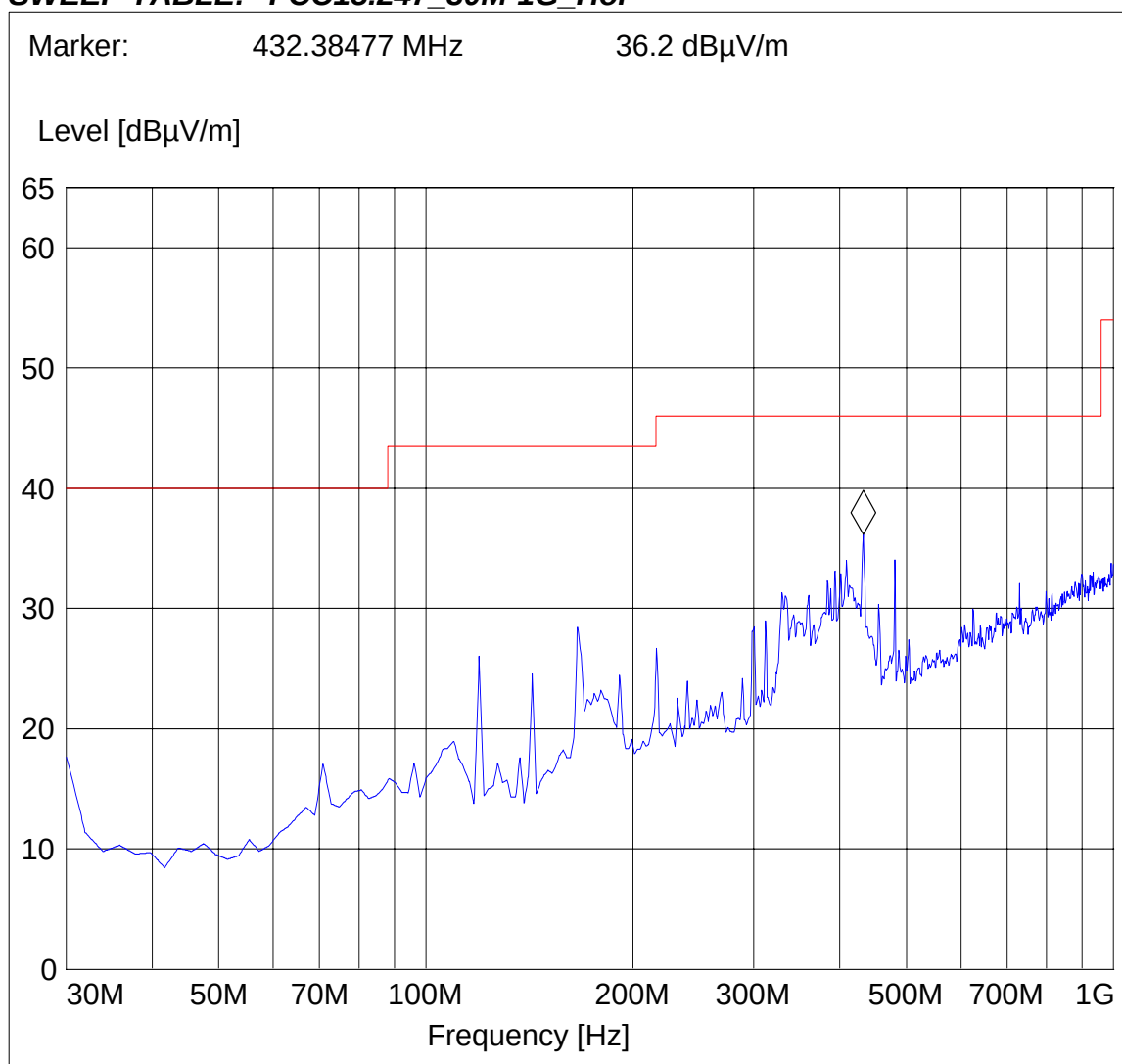
Test Mode: 802.11a, ch 149

ANT Orientation: H

EUT Orientation: H

Test Engineer: Ed

***SWEEP TABLE: "FCC15.247\_30M-1G\_Hor"***





**1-18GHz (5745MHz) Chain B**

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

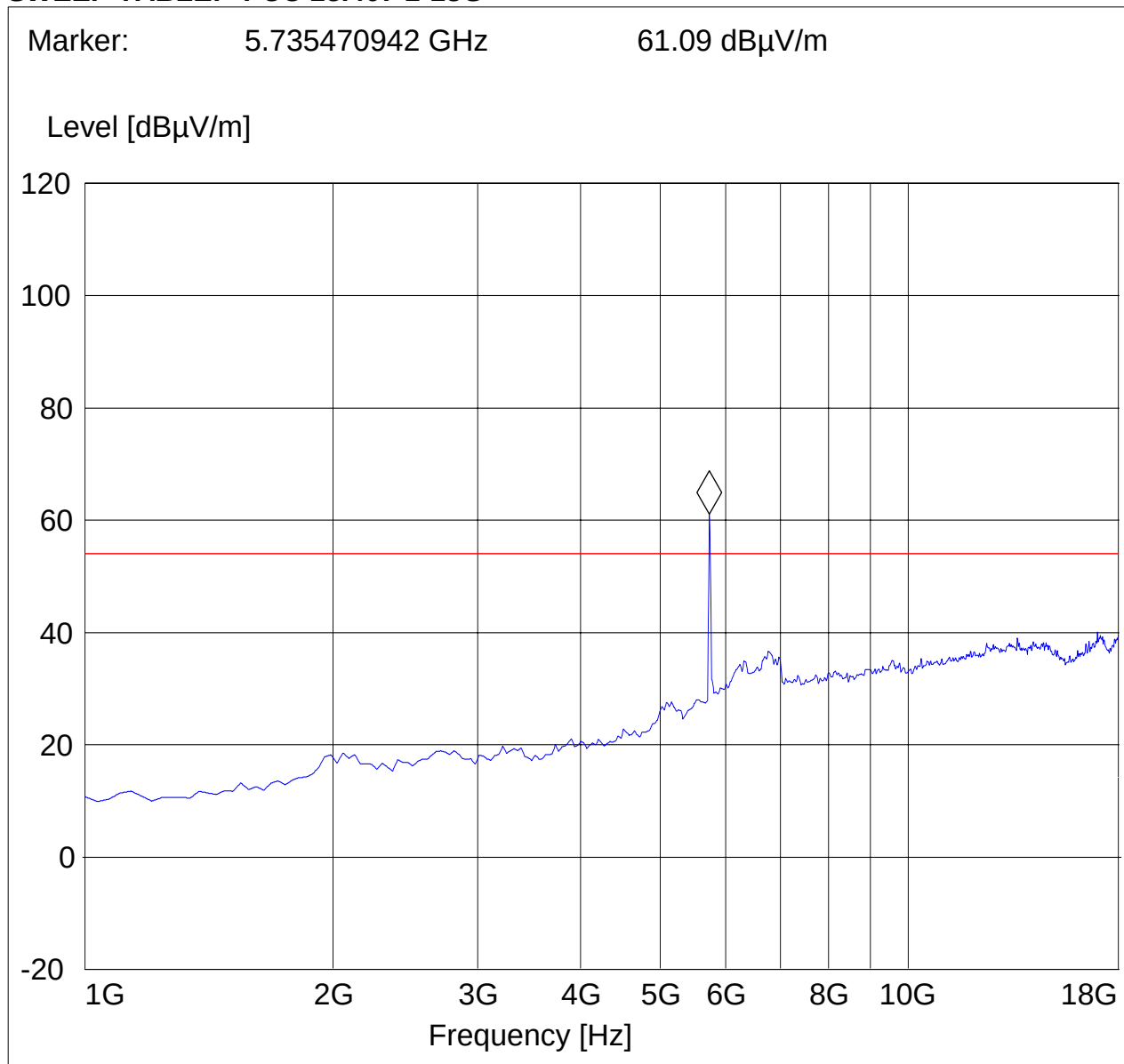
Test mode: 802.11a, Ch 149, chain B, 20Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

***SWEEP TABLE: "FCC 15.407 1-18G"***





**1-18GHz (5785MHz) Chain B**

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

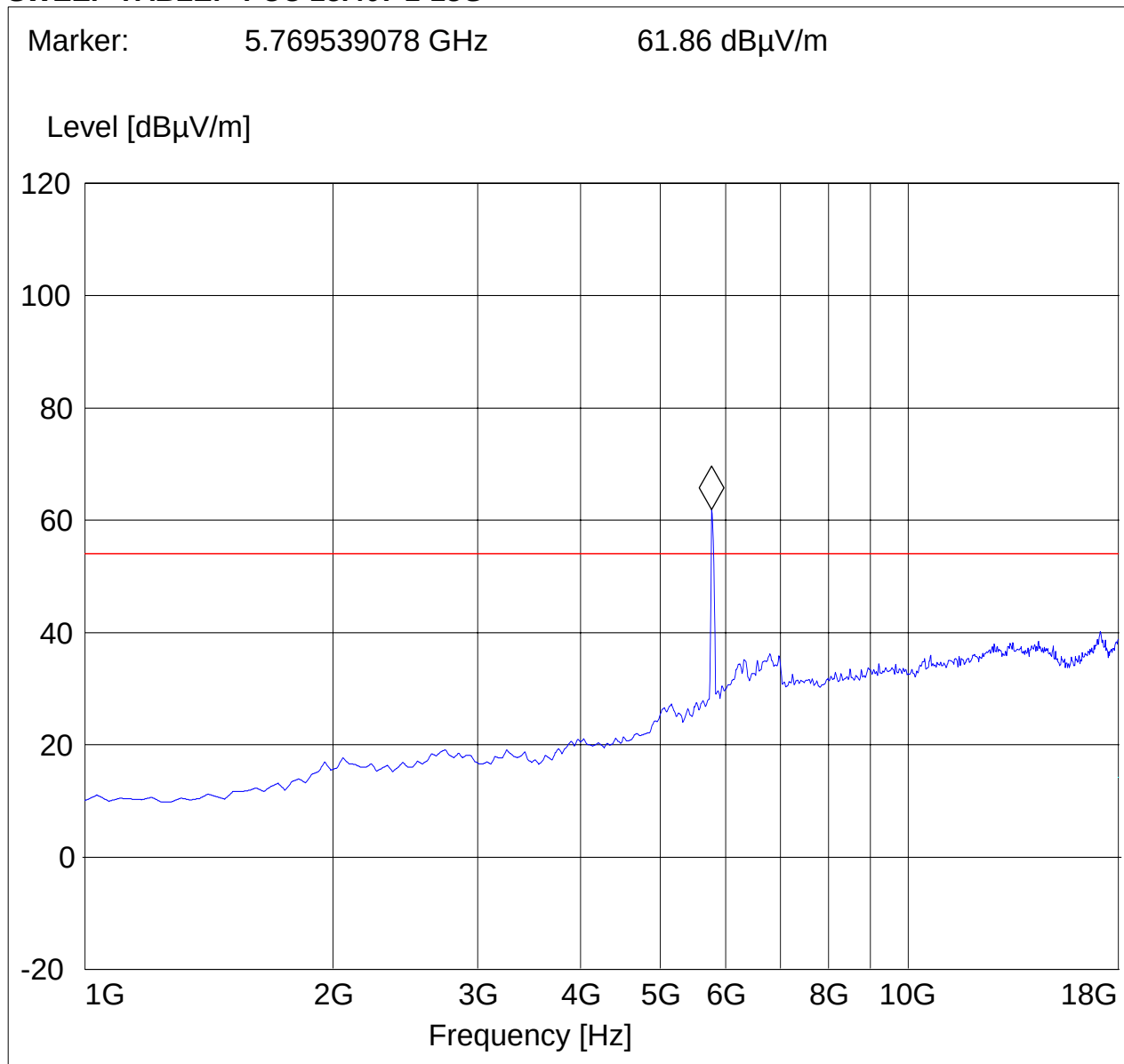
Test mode: 802.11a, Ch 157, chain B, 20Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

***SWEEP TABLE: "FCC 15.407 1-18G"***





**1-18GHz (5825MHz) Chain B**

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

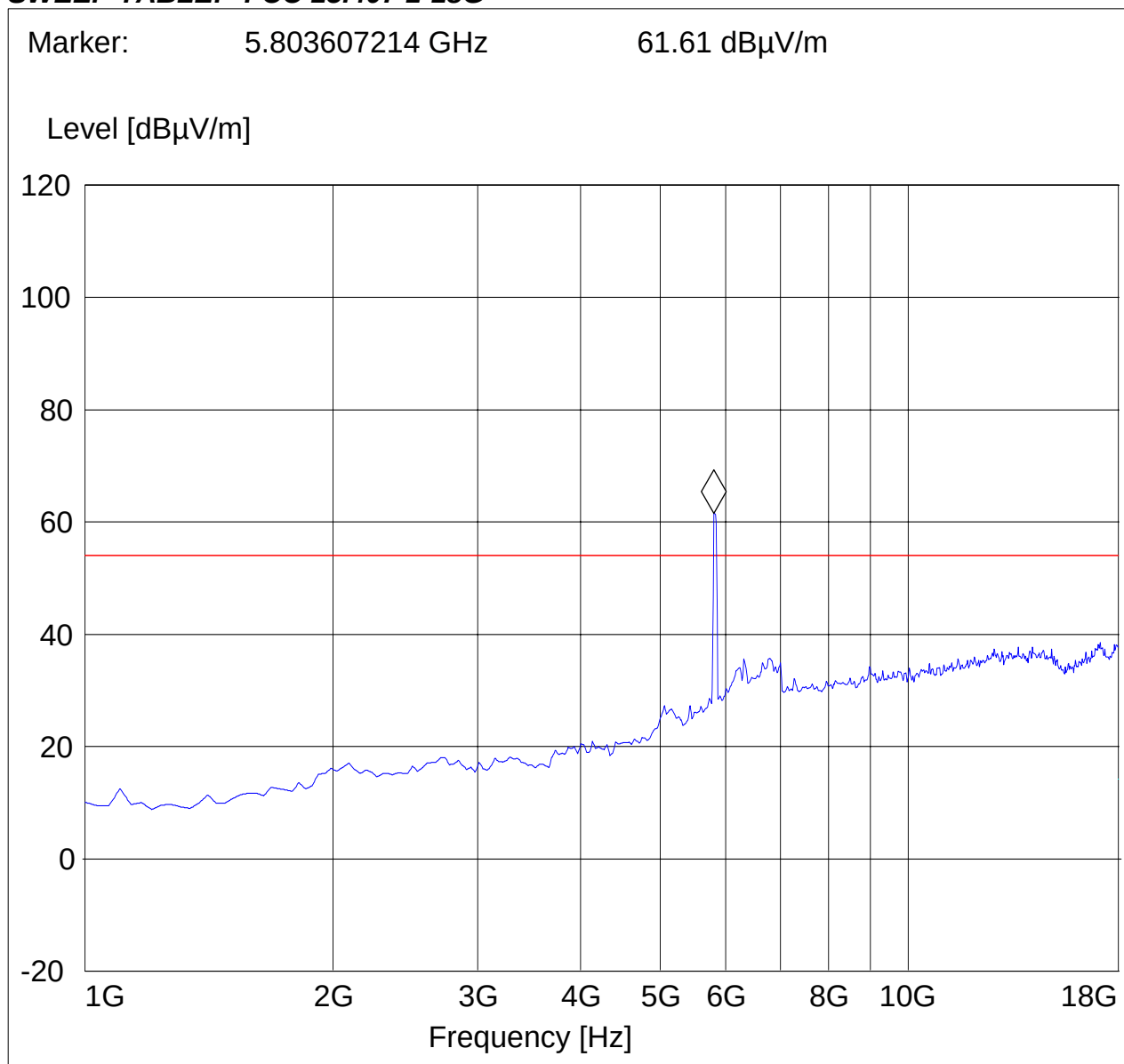
Test mode: 802.11a, Ch 165, chain B, 20Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

**SWEEP TABLE: "FCC 15.407 1-18G"**







**18-26.5GHz (5745MHz) Chain B**

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

**Note: Peak Reading vs. Average limit ,**

**CETECOM Inc.**

**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT:: ES725

Customer:: Sony

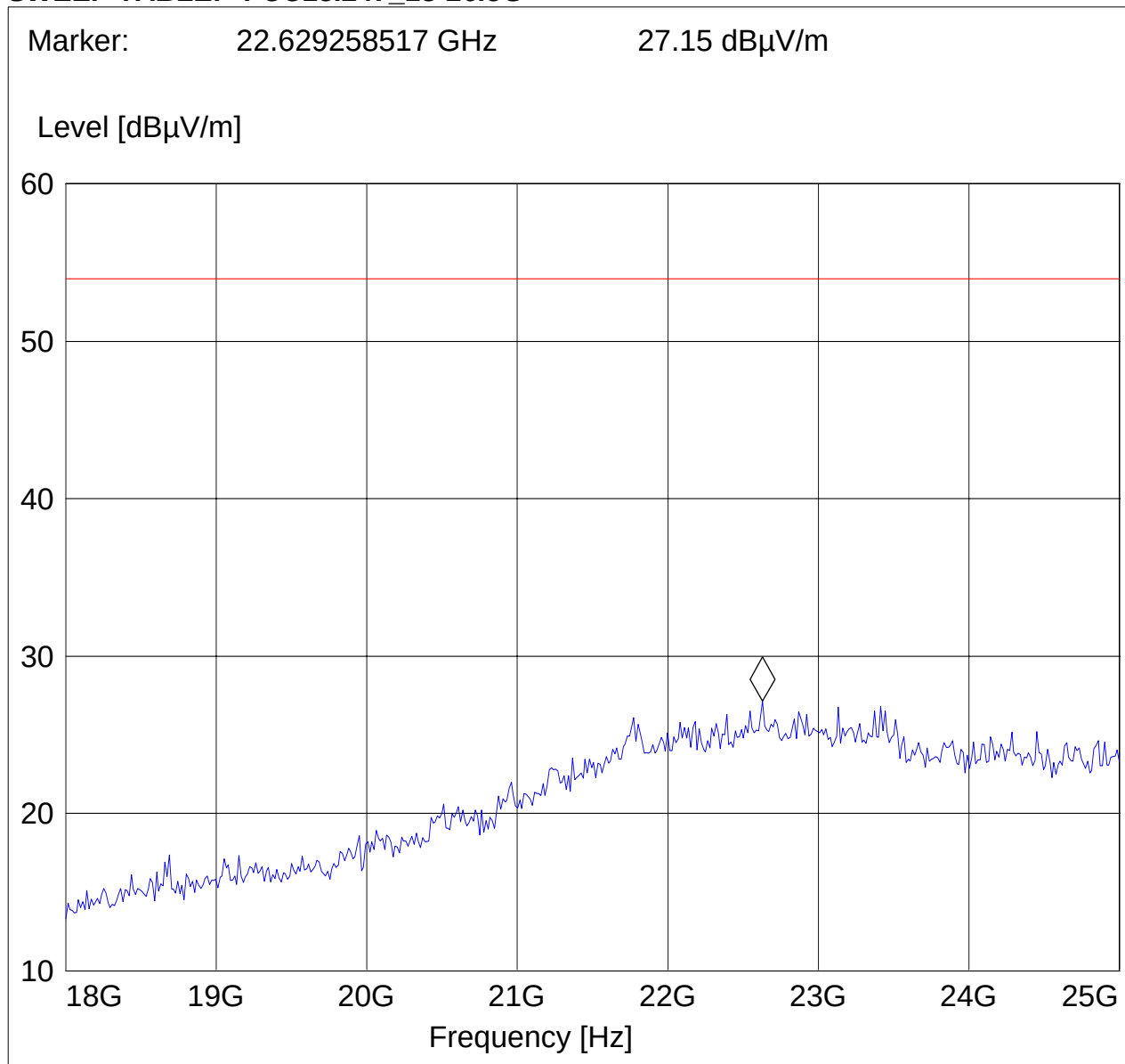
Test Mode: 802.11a CH 149

ANT Orientation: V

EUT Orientation: H

Test Engineer: Satya R

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





**26-40GHz Chain B**

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

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

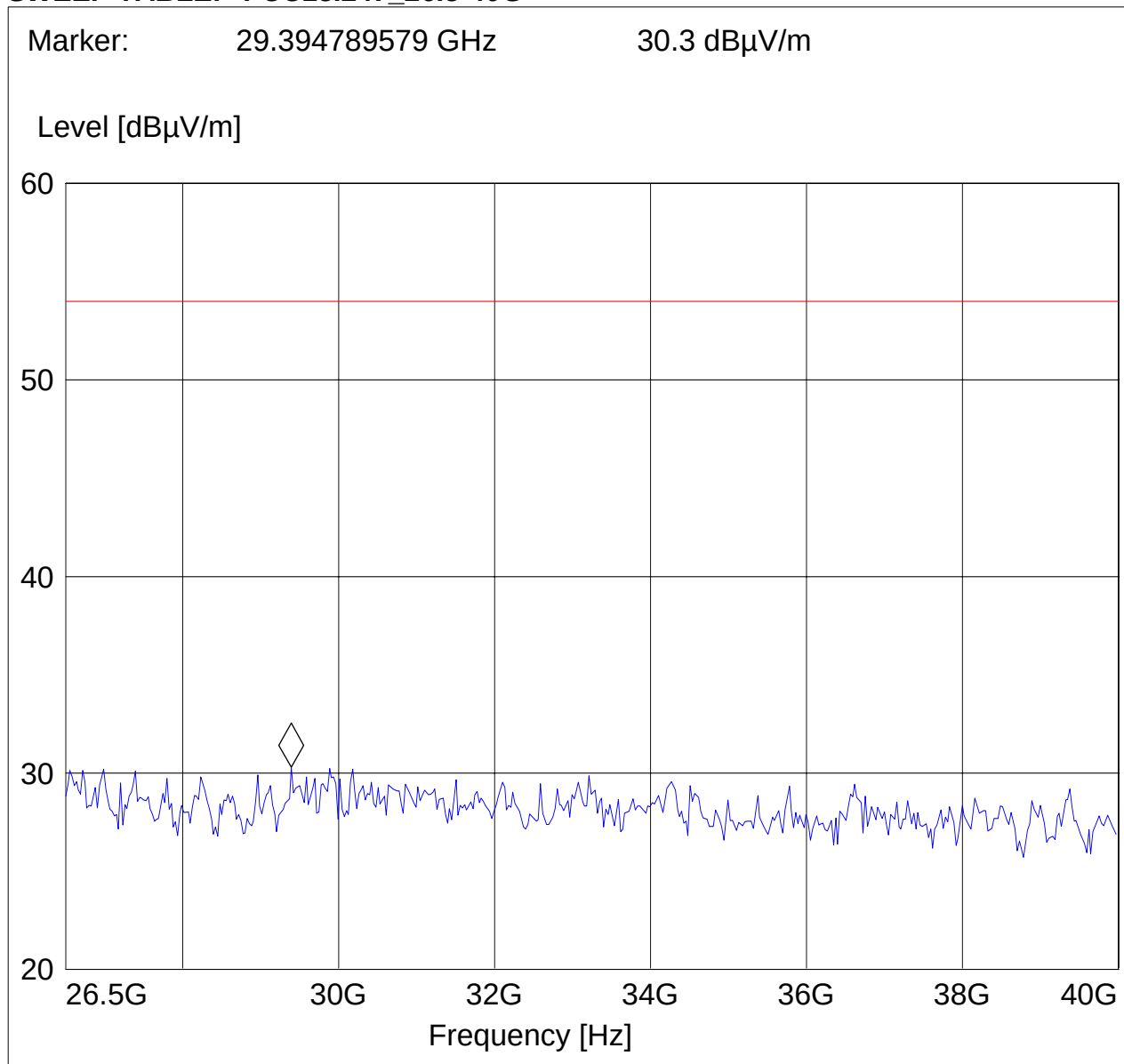
Test mode: 802.11a, Ch 157, chain B

EUT: H

Antenna: H

Test Engineer: Peter Mu

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



### 5.3 RECEIVER SPURIOUS RADIATION § 15.209/RSS210

#### 5.3.1 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.

### 5.3.2 RESULTS

30MHz – 1GHz

**Note: This plot is valid for horizontal and vertical polarities (worst-case plot).**

**Note: Peak Reading vs. Quasi-peak limit**

**CETECOM Inc.**

**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: ES725

Customer: Sony

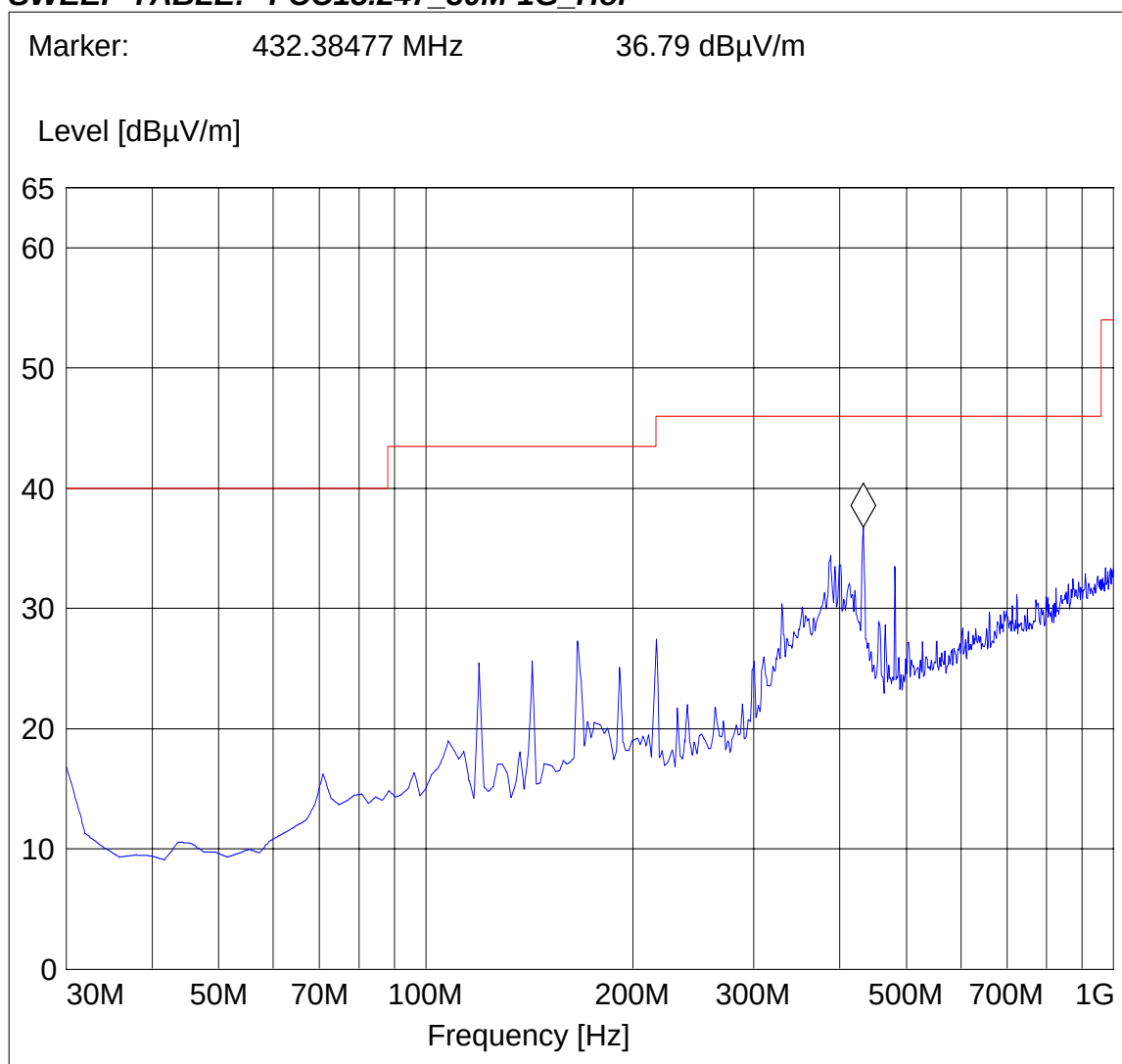
Test Mode: 802.11a receive mode

ANT Orientation: H

EUT Orientation: H

Test Engineer: Satya R

#### ***SWEEP TABLE: "FCC15.247\_30M-1G\_Hor"***





**1-18GHz**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

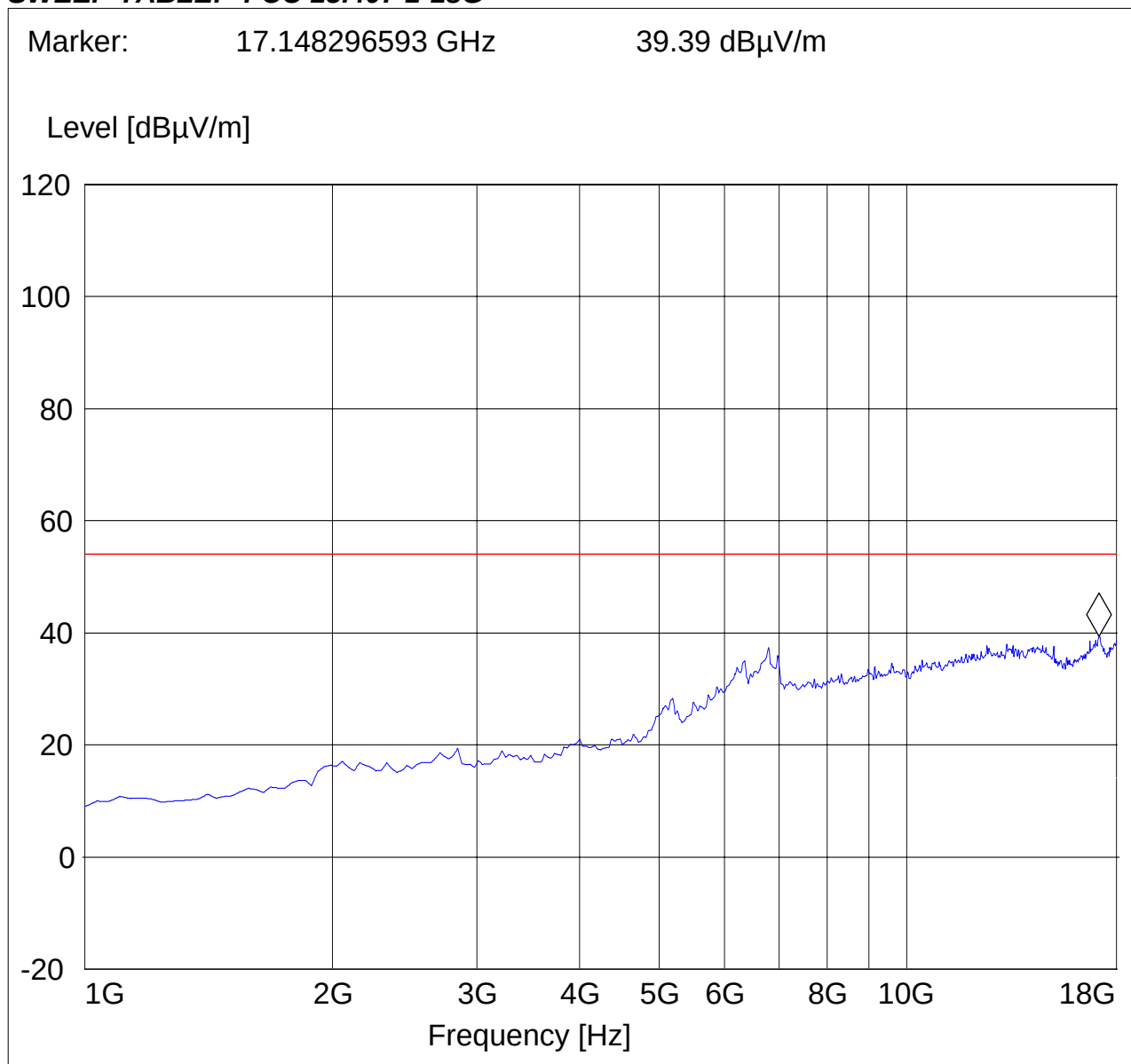
Test mode: 802.11a, Ch 157, chain AB, RX Mode

EUT: H

Antenna: V

Test Engineer: Ed

**SWEEP TABLE: "FCC 15.407 1-18G"**





18-26.5GHz

Note: Peak Reading vs. Average limit

**CETECOM Inc.**

**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: ES725

Manufacturer: Sony Electronics

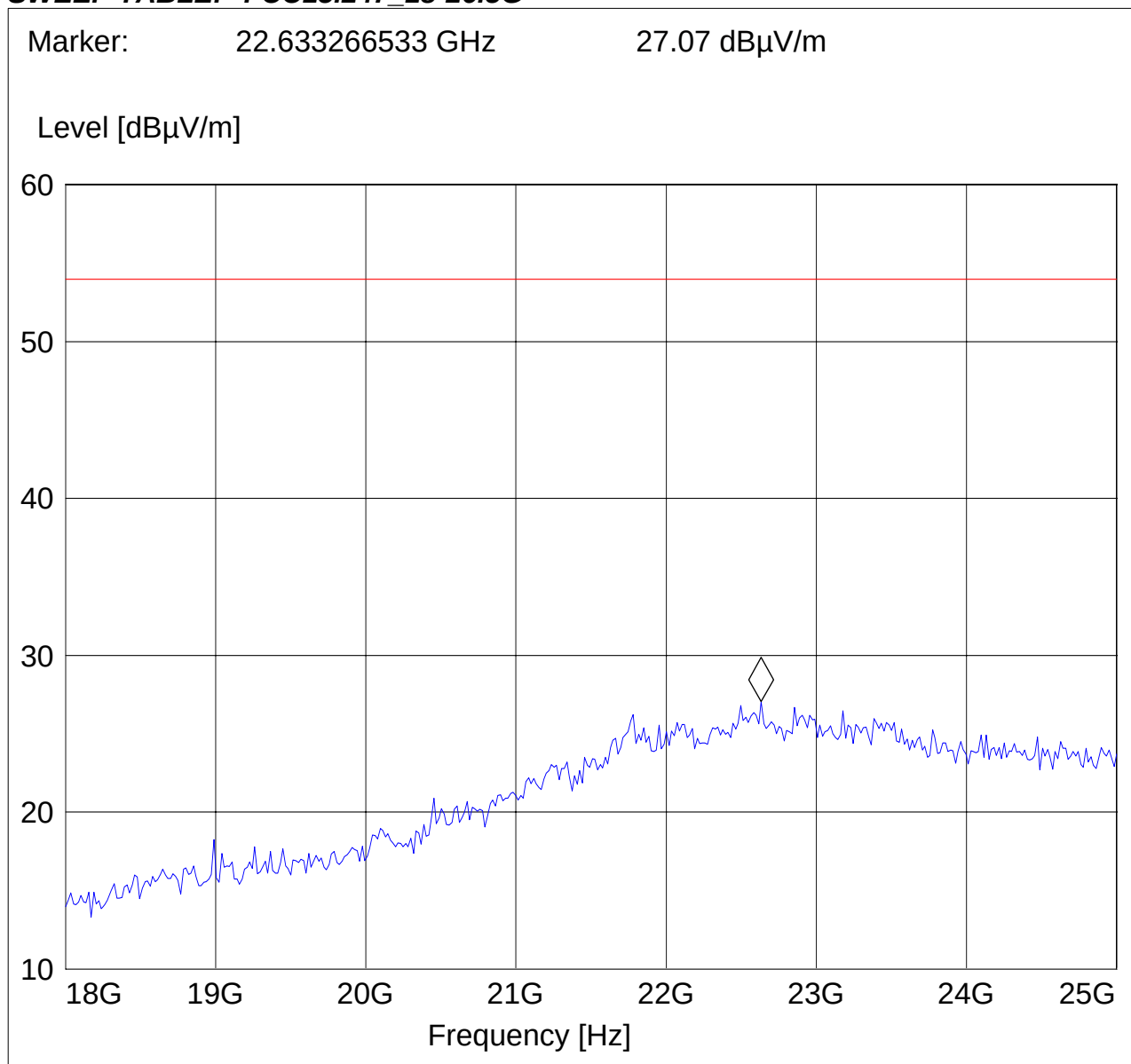
Test mode: 802.11a, Ch 157, chain AB, RX Mode

EUT: H

Antenna: V

Test Engineer: Ed

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





**26.5-40GHz**

**Note: Peak Reading vs. Average limit**

**CETECOM Inc.**

**411 Dixon Landing Road; Milpitas, CA 95035**

EUT / Description: ES725

Manufacturer: Sony Electronics

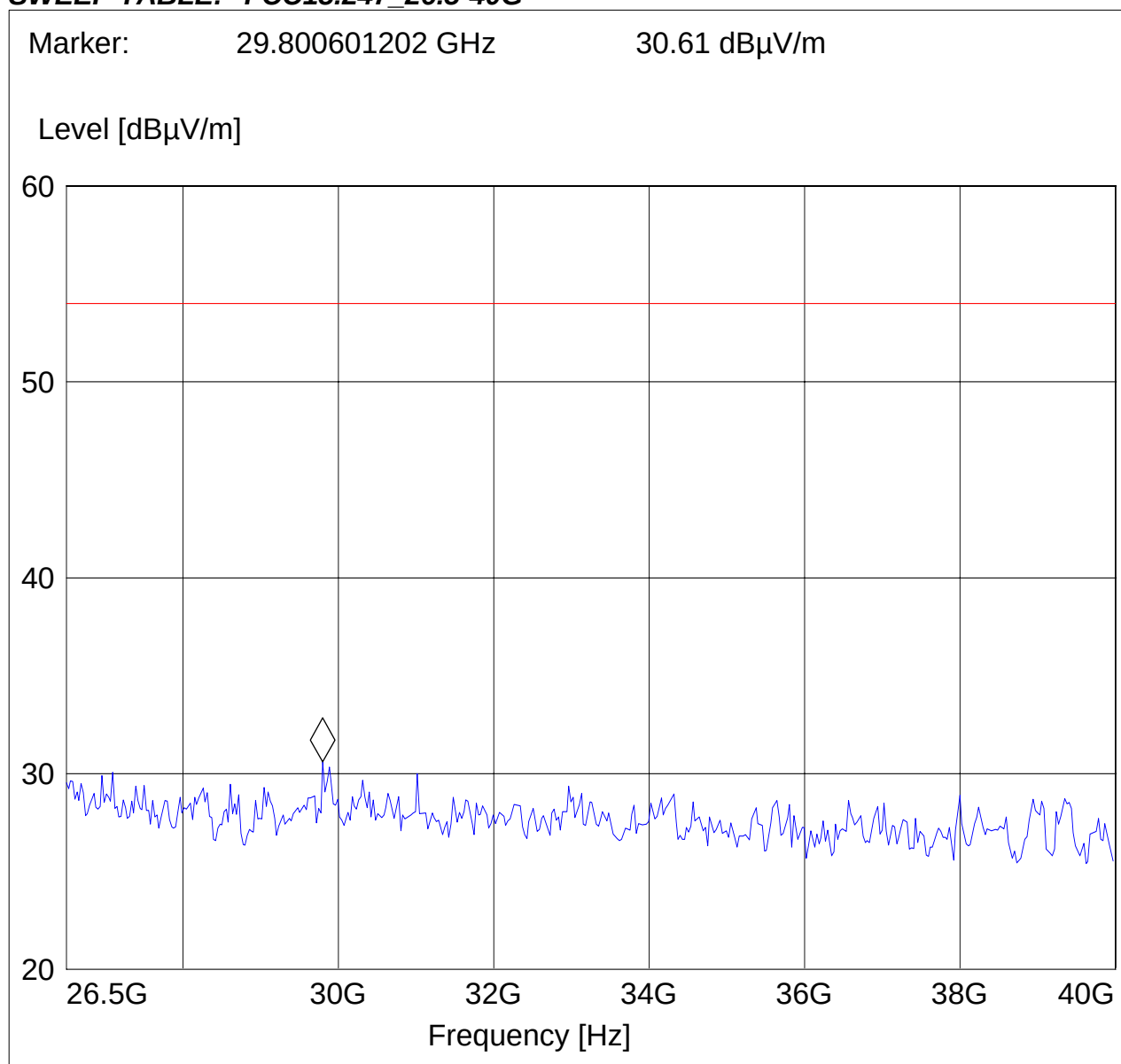
Test mode: 802.11a, Ch 157, RX

EUT: H

Antenna: H

Test Engineer: Peter Mu

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



#### 5.4 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207

##### 5.4.1 LIMITS

Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

##### Limit

| Frequency of Emission (MHz)                 | Conducted Limit (dB $\mu$ 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 |                              |           |

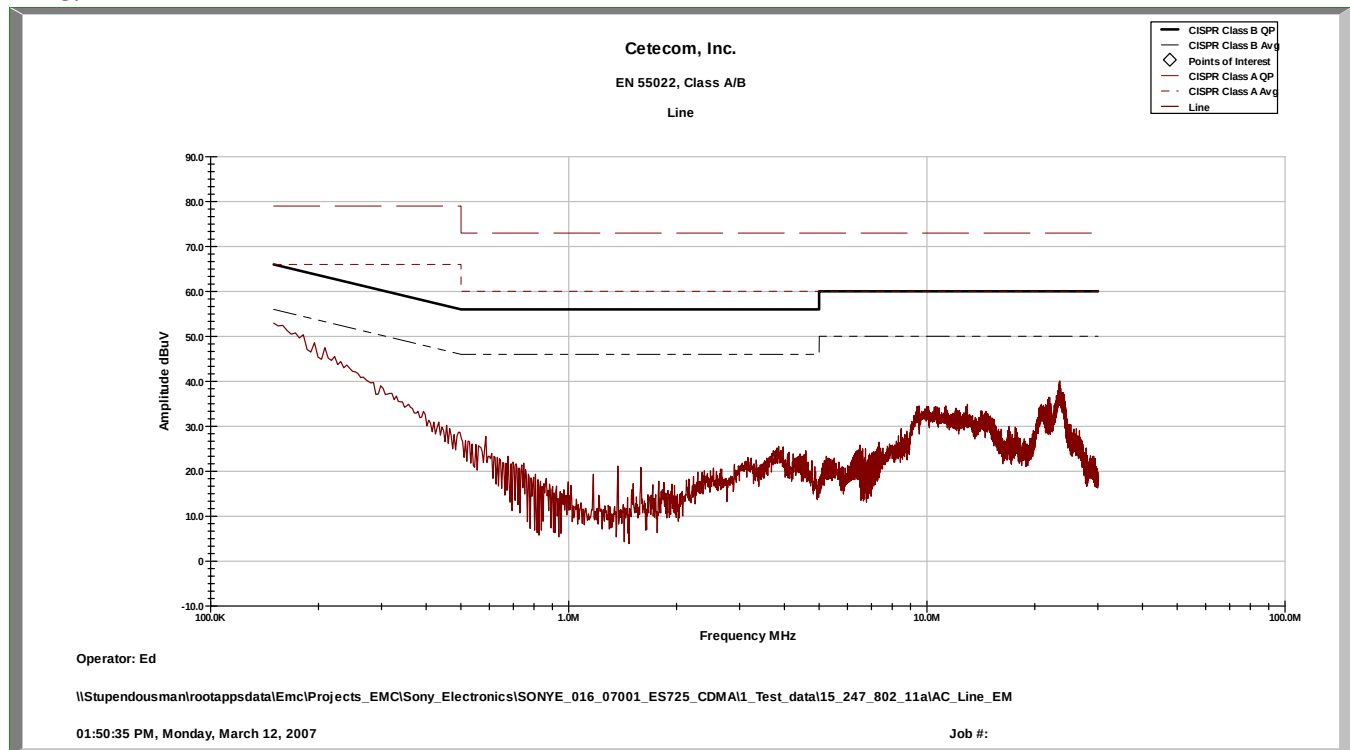
ANALYZER SETTINGS: RBW = 10KHz

VBW = 10KHz

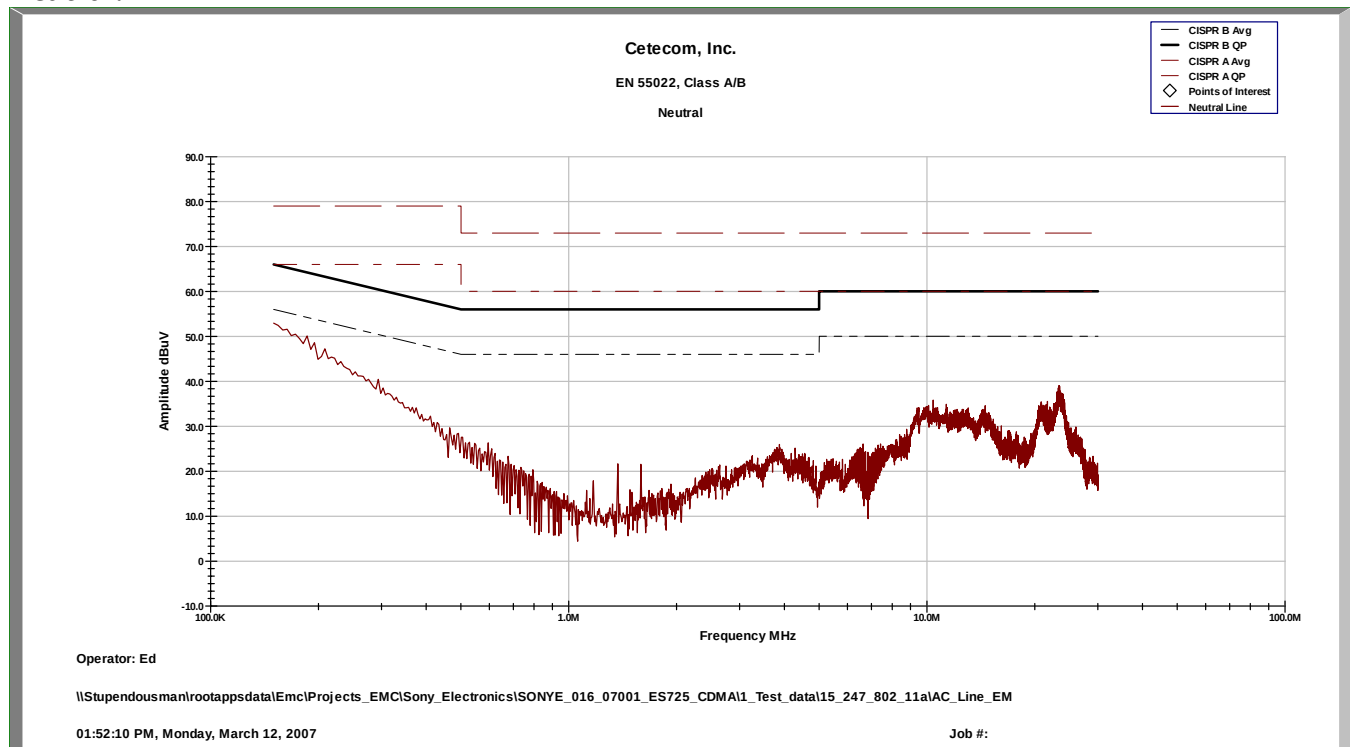


## 5.4.2 Results

### Line:



### Neutral:





**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 2007    | 1 year   |
| 02 | Spectrum Analyzer            | FSEM 30      | Rohde & Schwarz | 100017       | August 2007 | 1 year   |
| 03 | Signal Generator             | SMY02        | Rohde & Schwarz | 836878/011   | May 2007    | 1 year   |
| 04 | Power-Meter                  | NRVD         | Rohde & Schwarz | 0857.8008.02 | May 2007    | 1 year   |
| 05 | Biconilog Antenna            | 3141         | EMCO            | 0005-1186    | June 2007   | 1 year   |
| 06 | Horn Antenna (1-18GHz)       | SAS-200/571  | AH Systems      | 325          | June 2007   | 1 year   |
| 07 | Horn Antenna (18-26.5GHz)    | 3160-09      | EMCO            | 1240         | June 2007   | 1 year   |
| 08 | Power Splitter               | 11667B       | Hewlett Packard | 645348       | n/a         | n/a      |
| 09 | Climatic Chamber             | VT4004       | Voltsch         | G1115        | May 2007    | 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 2007    | 1 year   |
| 13 | Power Sensor                 | URV5-Z2      | Rohde & Schwarz | DE30807      | May 2007    | 1 year   |
| 14 | Digital Radio Comm. Tester   | CMD-55       | Rohde & Schwarz | 847958/008   | May 2007    | 1 year   |
| 15 | Universal Radio Comm. Tester | CMU 200      | Rohde & Schwarz | 832221/06    | May 2007    | 1 year   |
| 16 | LISN                         | ESH3-Z5      | Rohde & Schwarz | 836679/003   | May 2007    | 1 year   |
| 17 | Loop Antenna                 | 6512         | EMCO            | 00049838     | July 2007   | 2 years  |

## 5.5 BLOCK DIAGRAMS

### Radiated Testing

#### ANECHOIC CHAMBER

