CETECOM™

FCC Test Report

FCC Part 15.247 for DSSS systems/ CANADA RSS-210

FOR:

Notebook PC

MODEL #: PCG-4J3L

SONY CORPORATION
6-7-35, KITASHINAGAWA, SHINAGAWA-KU
TOKYO 141-0001
JAPAN

FCC ID: AK8PCG4J3L
IC ID: 409B-PCG4J3L

TEST REPORT #: SONYE_008_06002_15.247A
DATE: 07/11/2006

ilac-MRA ACCREDITED Certificate # 2135.01

Deutscher Akkreditierungs Rat DAR
TTI-P-G 081/94-A0
Accredited according to
ISO/IEC 17025

Bluetooth™
Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Testing Laboratory

FCC listed# 101450

IC recognized # 3925

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

Company	Description	Model #
SONY CORPORATION	**Notebook PC**	**PCG-4J3L**

Michael Grings
Project Leader

Lothar Schmidt
Test Lab Manager

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:	**Michael Grings**
Date of test:	**6/20/2006 to 6/23/2006**

2.2 Identification of the Client

Applicant's Name:	**SONY Corporation**
Street Address:	**6-7-35, Kitashinagawa, Shinagawa-ku,**
City/Zip Code	**Tokyo 141-0001**
Country	**Japan**
Contact Person:	**Katsunori Tsusui**
Phone No.	**81-263-72-5696**
Fax:	**81-263-72-9755**
e-mail:	**Katsunori.tsusui@jp.sony.com**

2.3 Identification of the Manufacturer

Manufacturer's Name:	**Sony EMCS Corporation**
Manufacturers Address:	**5432 Toyoshima, Toyoshima -machi, Minamiiazumi-gun**
City/Zip Code	**Nagano 399-8282,**
Country	**Japan**

3 Equipment under Test (EUT)

3.1 Identification of the Equipment under Test

Marketing Name:	**VAIO-VGN-TX**
Description:	**Notebook PC**
Model No:	**PCG-4J3L**
FCC ID:	**AK8PCG4J3L**
IC ID:	**409B-PCG4J3L**
Frequency Range:	**5725-5850MHz**
*Type(s) of Modulation:	**OFDM**
Number of Channels:	**17**
Antenna Type:	**λ/monopole (Inverted F Antenna)**
Output Power:	**a mode: 0.222 W EIRP @ 5825 MHz**

***This report contains data for FCC15.247 "a" mode. For all "b" and "g" mode data please see report SONYE_008_06002_15.247BG and for FCC15.407 "a" mode data please see report SONYE_008_06002_15.407A.**

3.2 Identification of Accessory equipment

TYPE	MANUFACTURER.	MODEL
AC ADAPTER	SONY	VGP-AC16V8

4 Subject Of Investigation

All testing was performed on the PCG-4J3L referred to as EUT. The EUT carries a pre-certified WLAN module with FCC ID# PD9WM3945ABG. This test report contains full radiated testing as per FCC15.247 on the EUT with the pre-certified WLAN module. All conducted measurements are covered under *test report# INTEL-05901F*

During the testing process the EUT was tested in a mode with 1Mbps data rate which yielded the worst case results. All testing was performed on aux antenna which yielded the highest gain, all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

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 Industry Canada rules RSS210.

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
T_{nom}(23)°C	V_{nom}VDC	22.87	23.32	23.46
Measurement uncertainty		±0.5dBm		

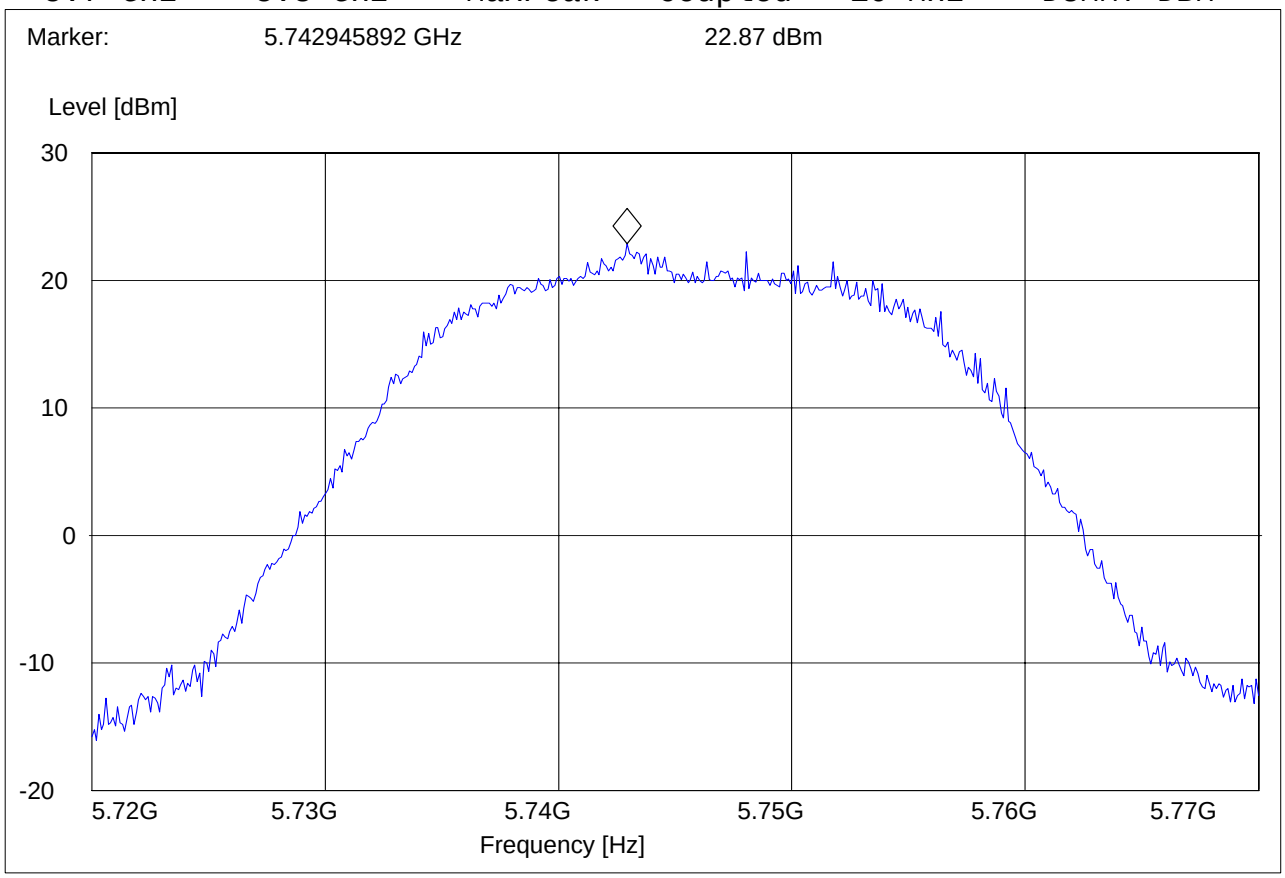
EIRP a Mode (5745)

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

EUT / Description: Vaio laptop "F" series unit #2 ESN: 5B101BC3
Customer: Sony Electronics
Operating Mode: WLAN, TX 5745MHz
Antenna: V
EUT: V
Test Engineer: ED
Voltage: AC
Sweep: EIRP 802.11a_149

SWEEP TABLE: "EIRP 802.11a_149"

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



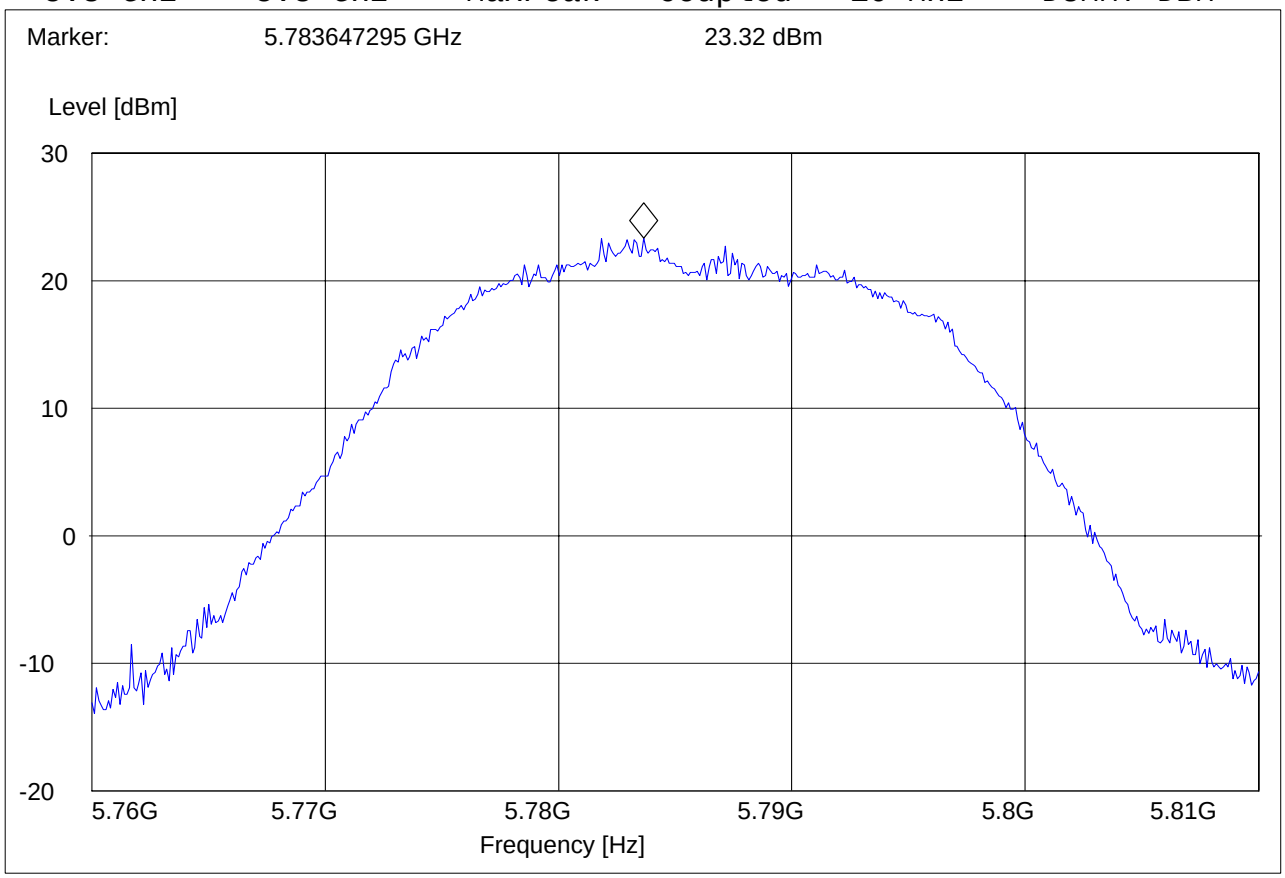
EIRP a Mode (5785MHz)

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

```
EUT / Description: Vaio laptop "F" series  unit #2  ESN: 5B101BC3
Customer:          Sony Electronics
Operating Mode:    WLAN, TX 5785MHz
Antenna:           V
EUT:               V
Test Engineer:     ED
Voltage:           AC
Sweep:             EIRP 802.11a_157
```

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
```



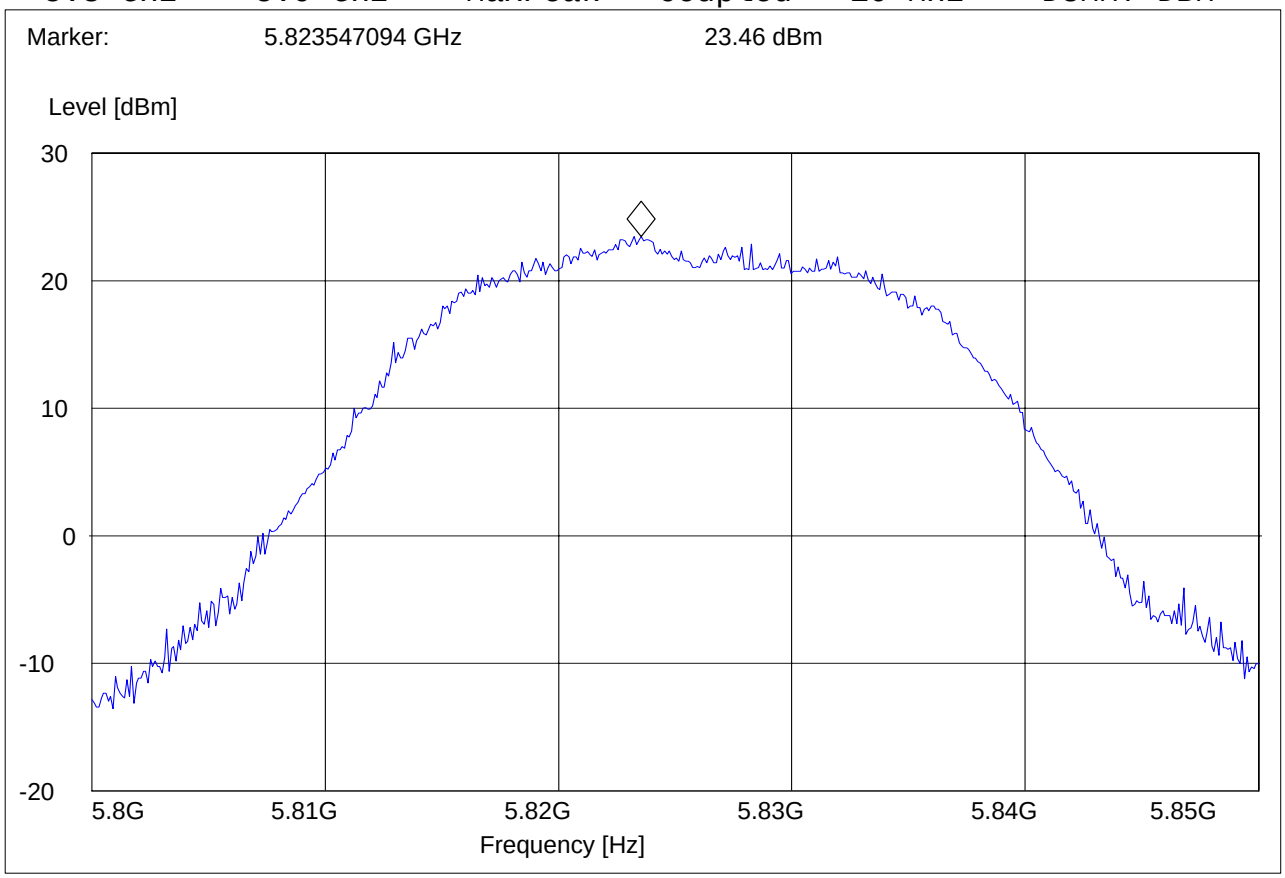
EIRP a Mode (5825MHz)

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

```
EUT / Description: Vaio laptop "F" series  unit #2  ESN: 5B101BC3
Customer:          Sony Electronics
Operating Mode:    WLAN, TX 5825MHz    230 DEGREES ROTATION
Antenna:           V
EUT:               V
Test Engineer:     ED
Voltage:           AC
Sweep:             EIRP 802.11a_165
```

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
```



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
[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**

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

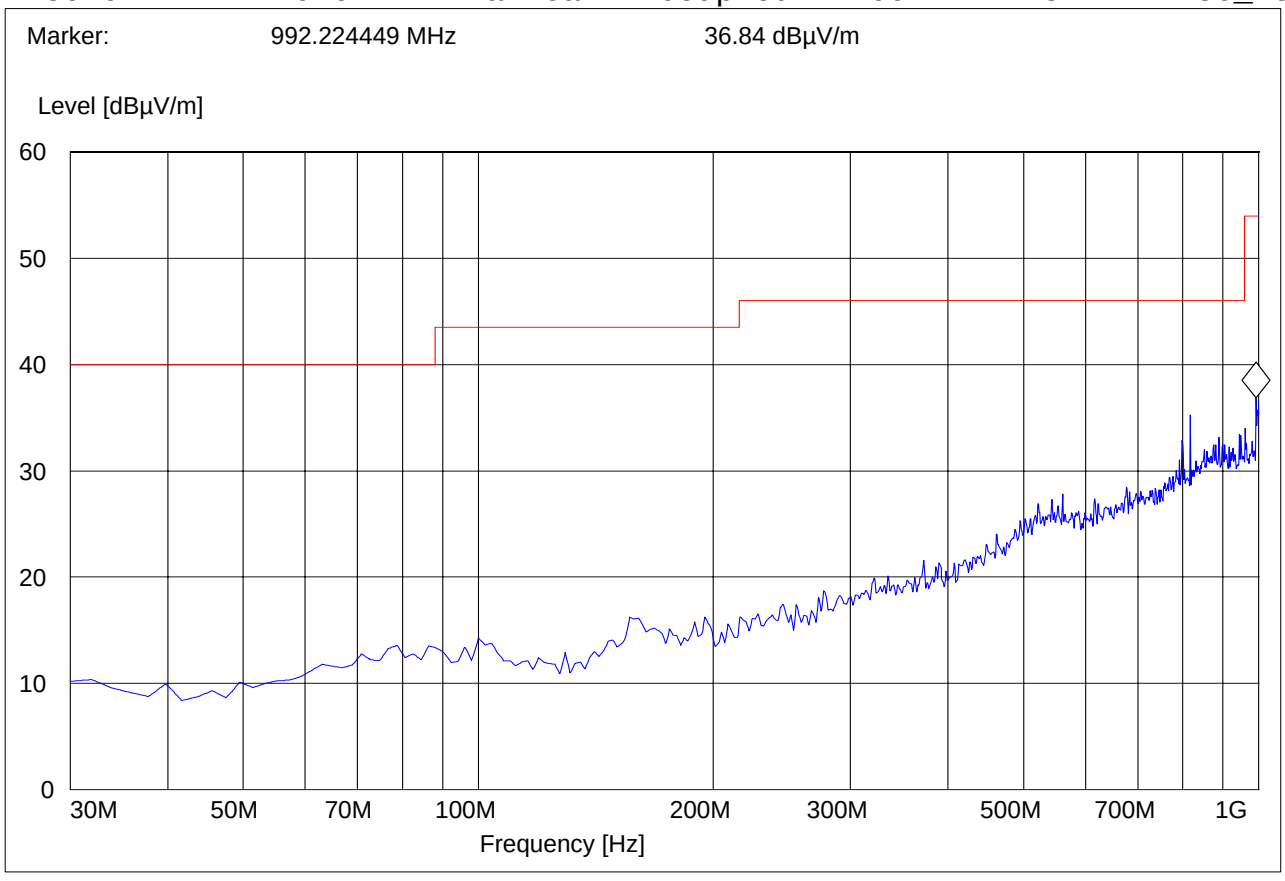
30MHz – 1GHz
Antenna: vertical
Note: This plot is valid for low, mid, high channels as well as for polarizations (worst-case plot)
Note: Peak reading vs. Quasi-peak limit

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

```
EUT / Description: Vaio laptop "F" series  unit #2  ESN: 5B101BC3
Customer:          Sony Electronics
Operating Mode:    WLAN, TX 5745MHz    230 DEGREES ROTATION
Antenna:           V
EUT:               V
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC15.247_30M-1G_VER
```

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

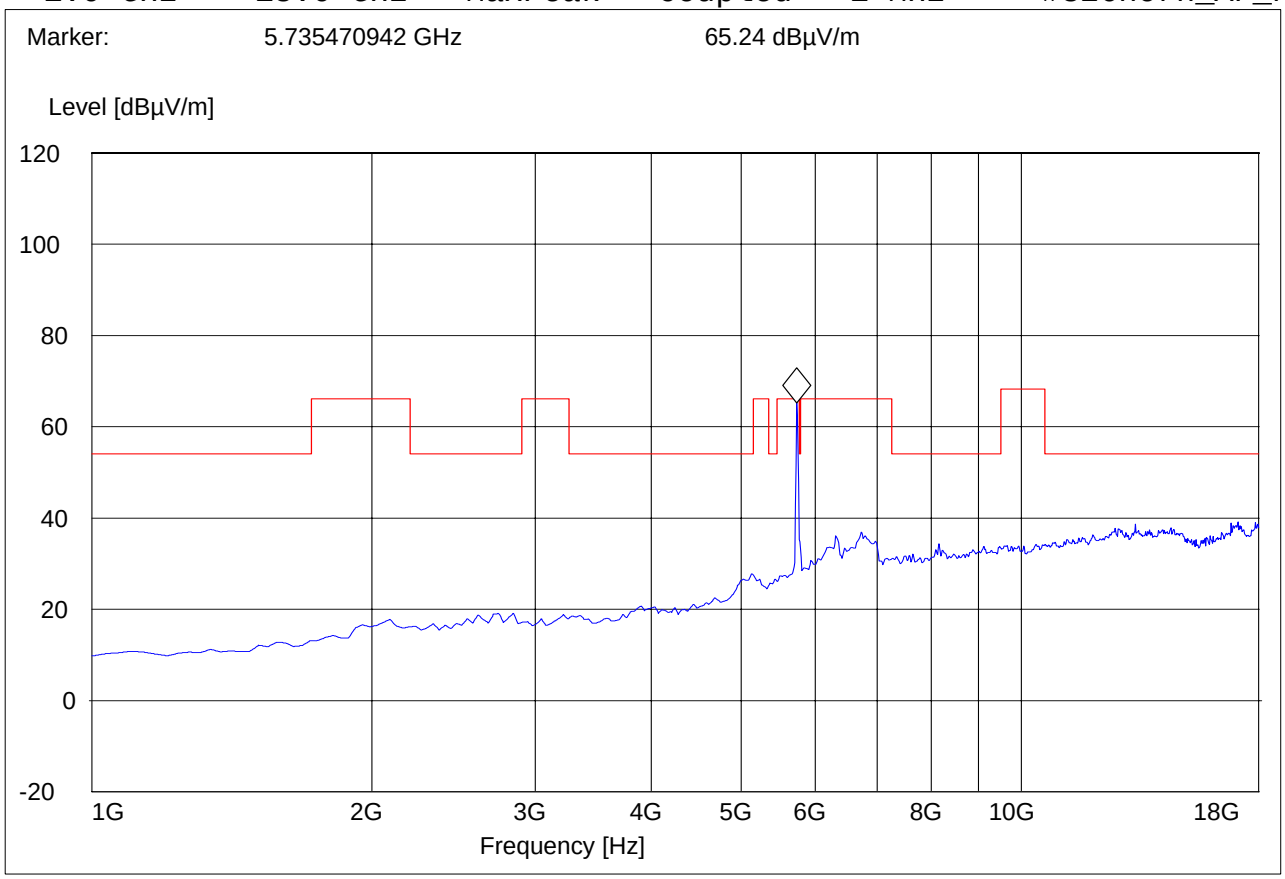


1-18GHz (5745MHz)
Note: The peaks above the limit line is the carrier freq.
Note: Peak Reading vs. Average limit

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

SWEEP TABLE: "FCC 15.407 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

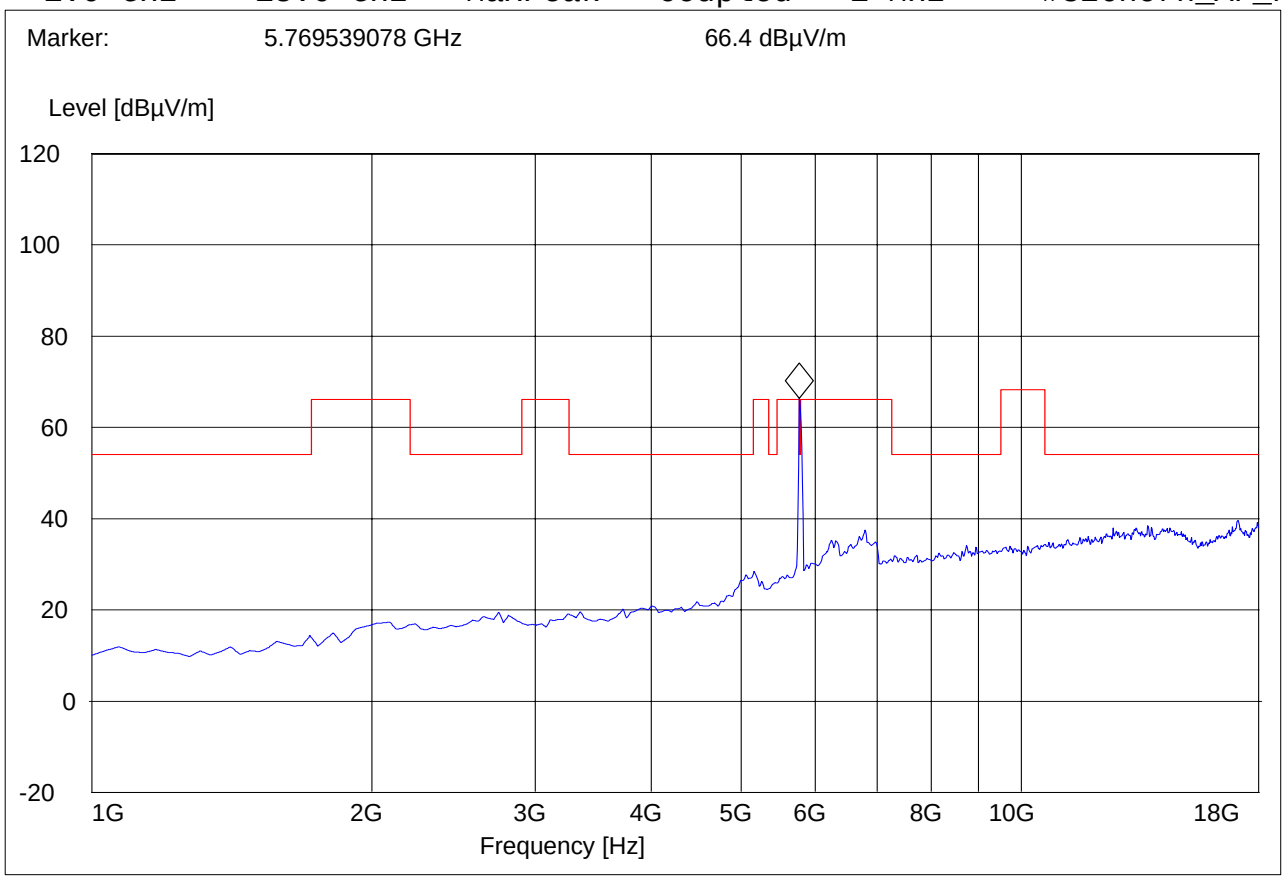


1-18GHz (5785MHz)
Note: The peaks above the limit line is the carrier freq.
Note: Peak Reading vs. Average limit

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

SWEEP TABLE: "FCC 15.407 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

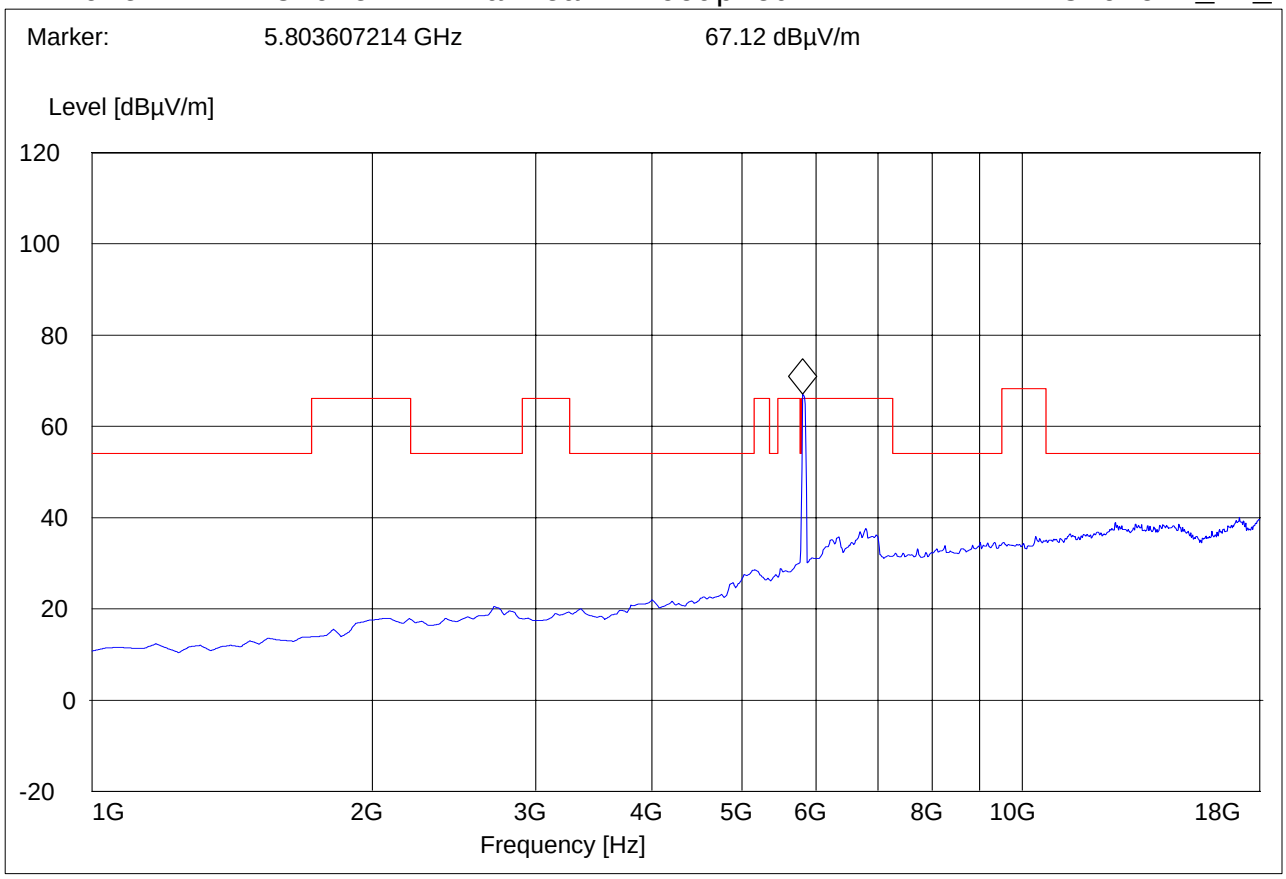


1-18GHz (5825MHz)
Note: The peaks above the limit line is the carrier freq.
Note: Peak Reading vs. Average limit

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

SWEEP TABLE: "FCC 15.407 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



18-26.5GHz (5745MHz)

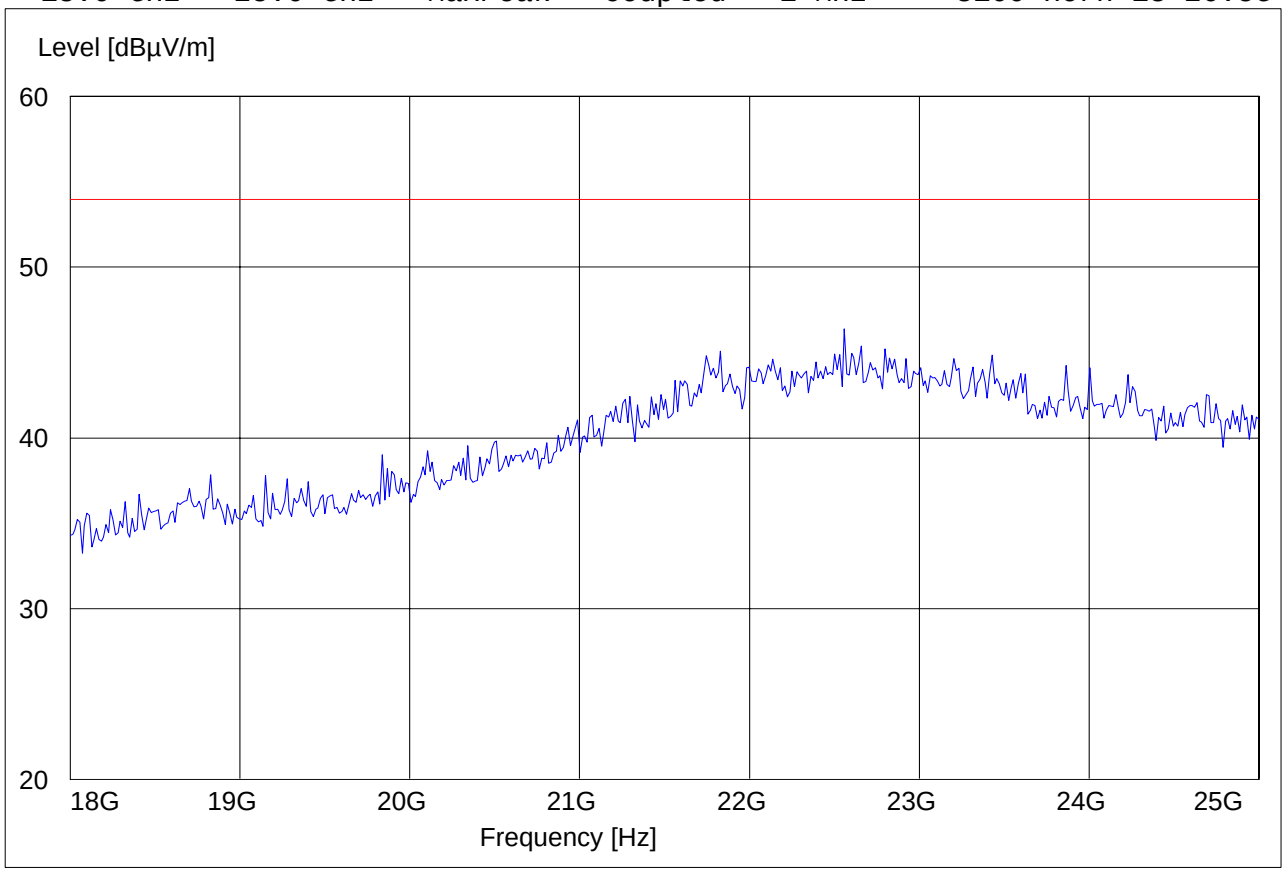
Note: This plot is valid for low, mid, high channels (worst-case plot)
Note: Peak Reading vs. Average limit ,

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

EUT / Description: Vaio laptop "F" series unit #2 ESN: 5B101BC3
Customer: Sony Electronics
Operating Mode: WLAN, RX 5745MHz TABLE 185°
Antenna: V
EUT: V
Test Engineer: PETER
Voltage: AC ADAPTOR
Sweep: FCC15.247_18-26.5G

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	25.0 GHz	MaxPeak	Coupled	1 MHz	3160 Horn 18-26.5G



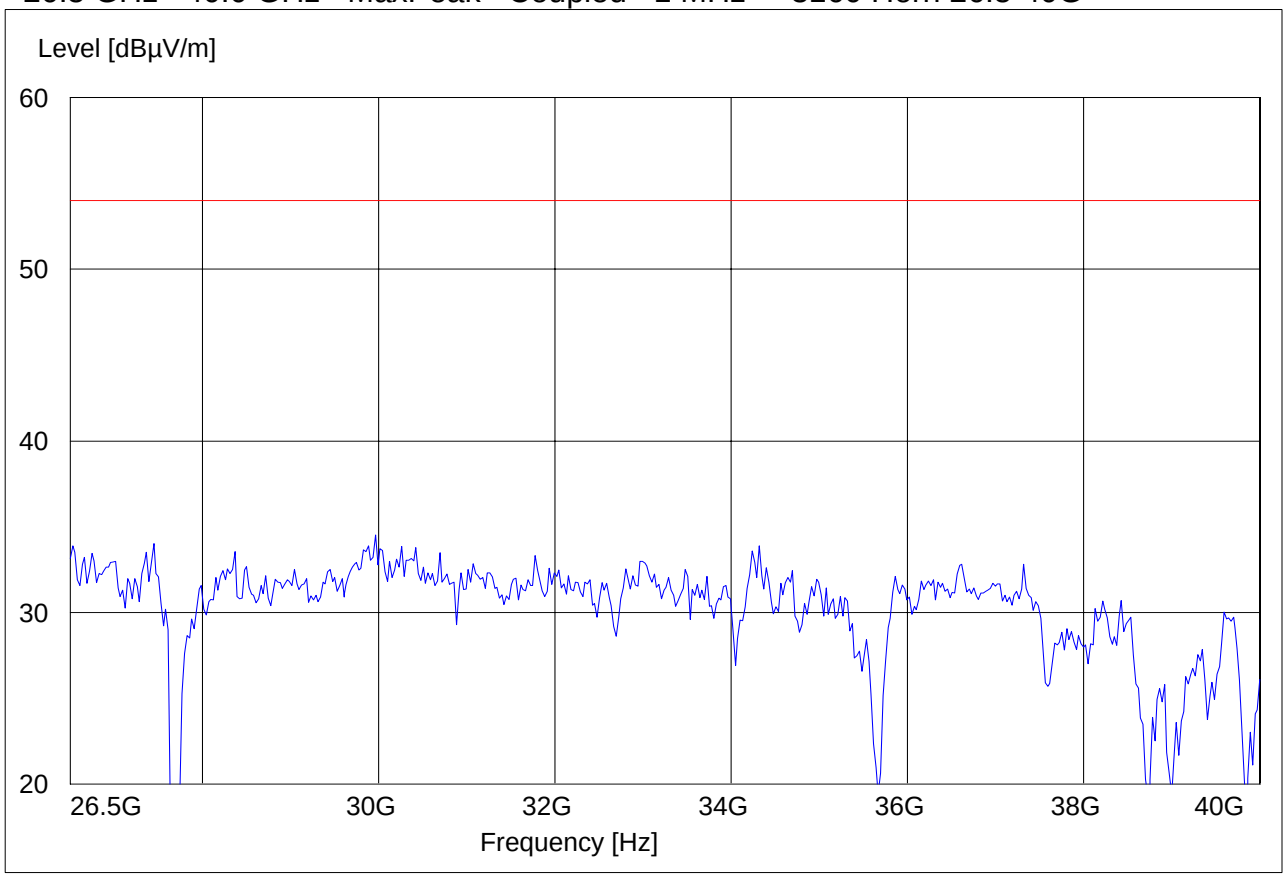
26-40GHz
Note: This plot is valid for low, mid, high channels (worst-case plot)
Note: Peak Reading vs. Average limit ,

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

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

Short Description: Bluetooth 18 - 26 GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
26.5 GHz	40.0 GHz	MaxPeak	Coupled	1 MHz	3160 Horn 26.5-40G



5.3 RECEIVER SPURIOUS RADIATION § 15.209/RSS210

5.3.1 LIMITS

Frequency (MHz)	Field strength (µV/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

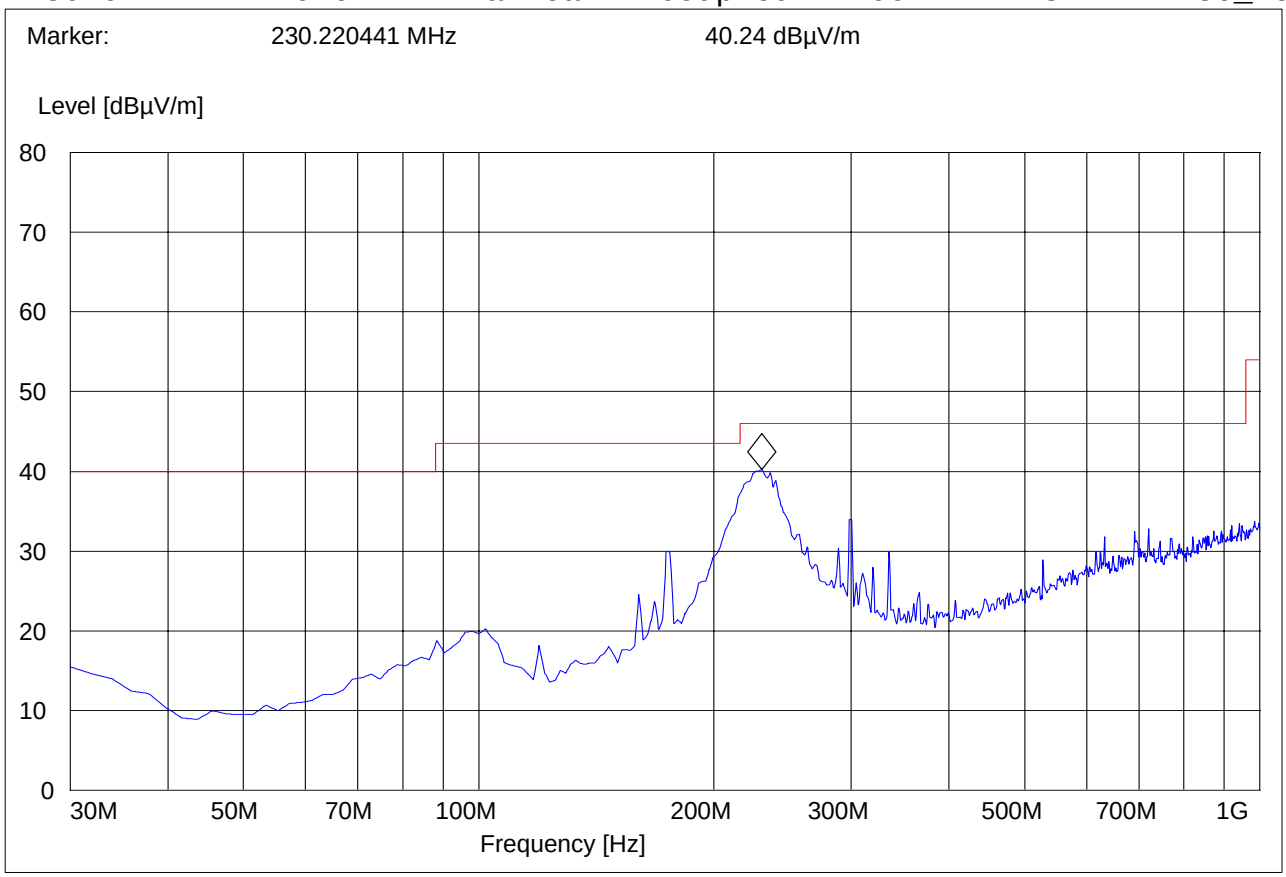
30MHz – 1GHz
Antenna: horizontal
Note: Peak Reading vs. Quasi-peak limit

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

EUT / Description: Vaio laptop "F" series unit #2 ESN: 5B101BC3
Customer: Sony Electronics
Operating Mode: WLAN, RX 5180MHz TABLE 280°, ANNT 100CM, NO absorbers
Antenna: H
EUT: V
Test Engineer: PETER
Voltage: AC ADAPTOR
Sweep: CANADA RE_30M-1G_HOR

SWEEP TABLE: "CANADA RE_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



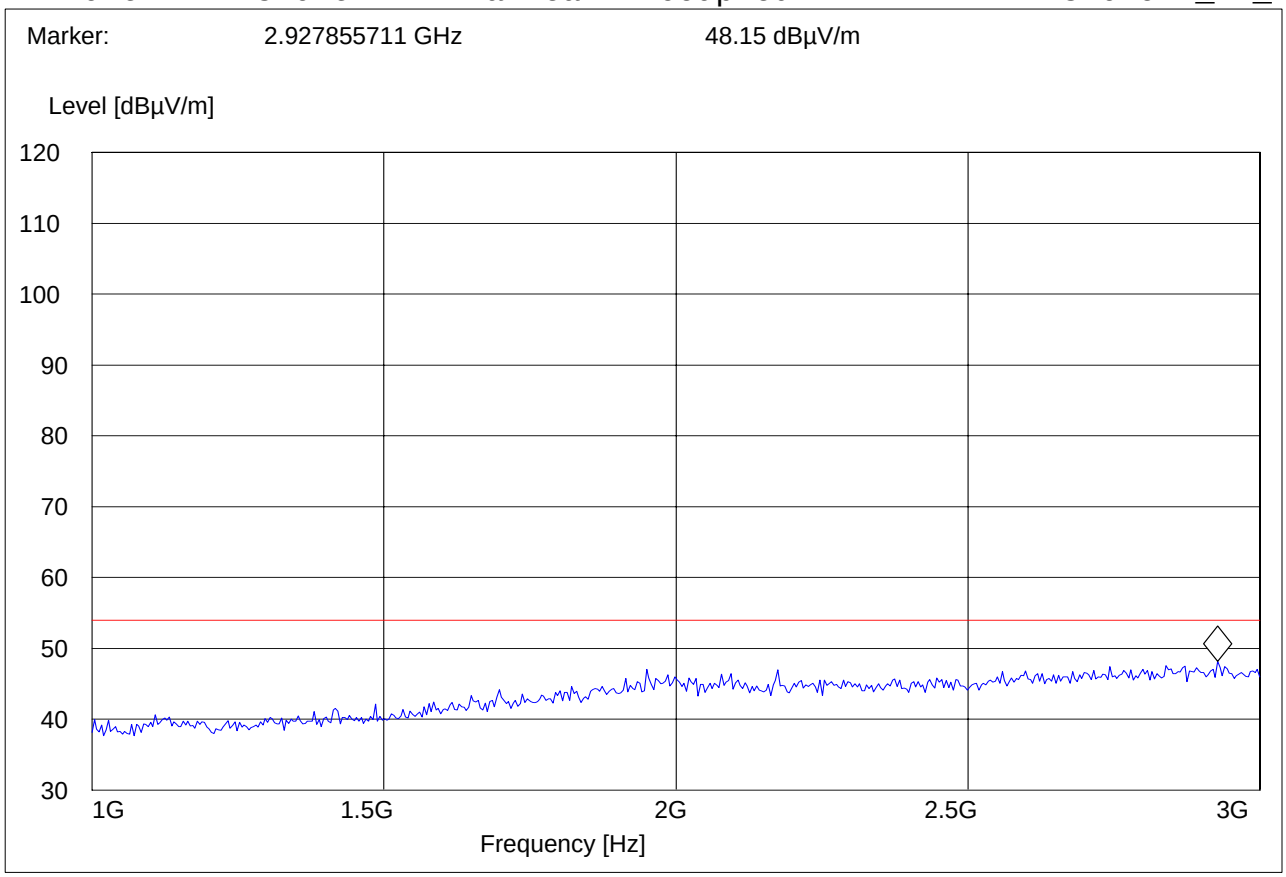
1-3GHz
Note: Peak Reading vs. Average limit

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

EUT / Description: Vaio laptop "F" series unit #2 ESN: 5B101BC3
Customer: Sony Electronics
Operating Mode: WLAN, RX 5180MHz
Antenna: V
EUT: V
Test Engineer: ED
Voltage: AC
Sweep: CANADA RE_1-3G

SWEEP TABLE: "CANADA RE_1-3G"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_vert



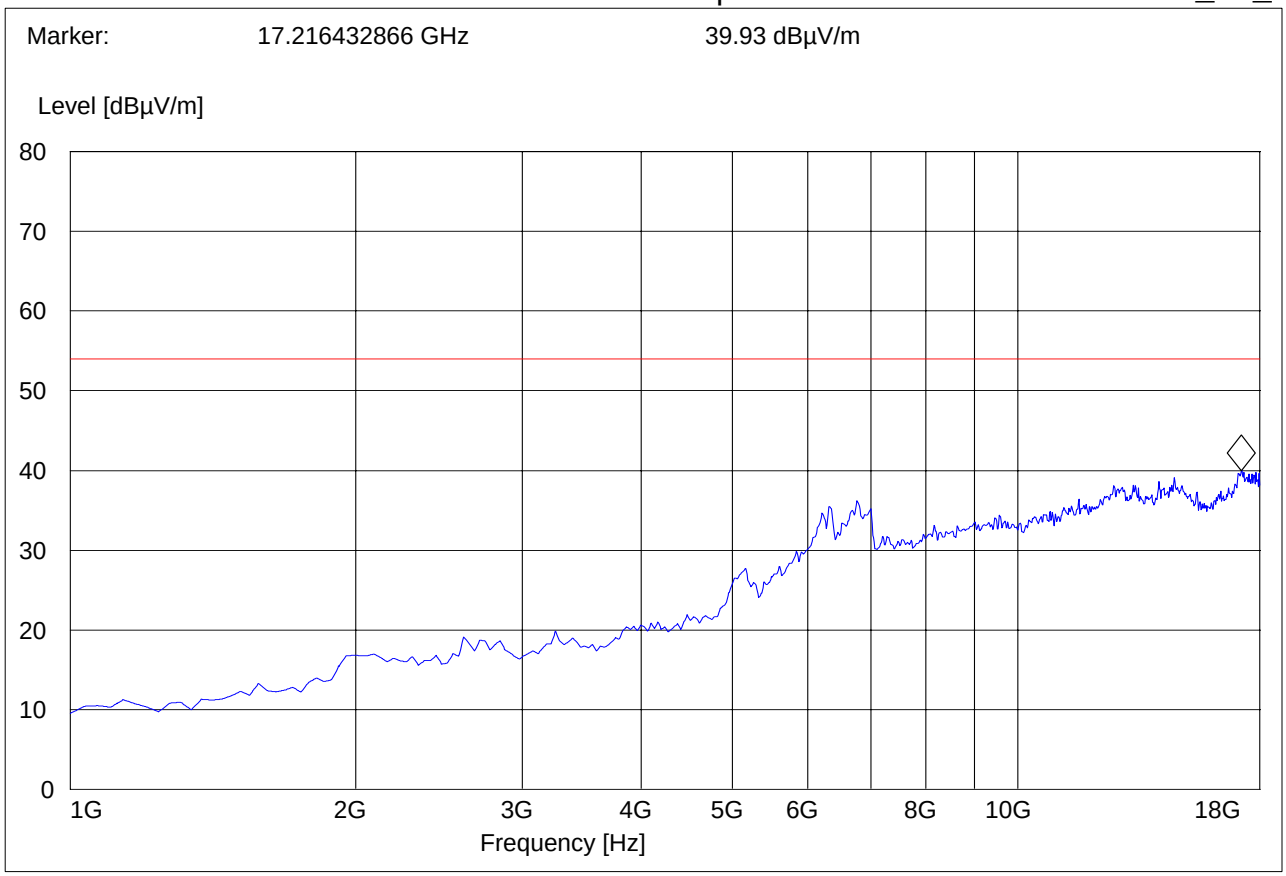
3-18GHz
Note: Peak Reading vs. Average limit

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

```
EUT / Description: Vaio laptop "F" series  unit #2  ESN: 5B101BC3
Customer:          Sony Electronics
Operating Mode:    WLAN, RX 5180MHz
Antenna:           V
EUT:               V
Test Engineer:     ED
Voltage:           AC
Sweep:             CANADA RE_3-18G
```

SWEEP TABLE: "CANADA RE_3-18G"

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



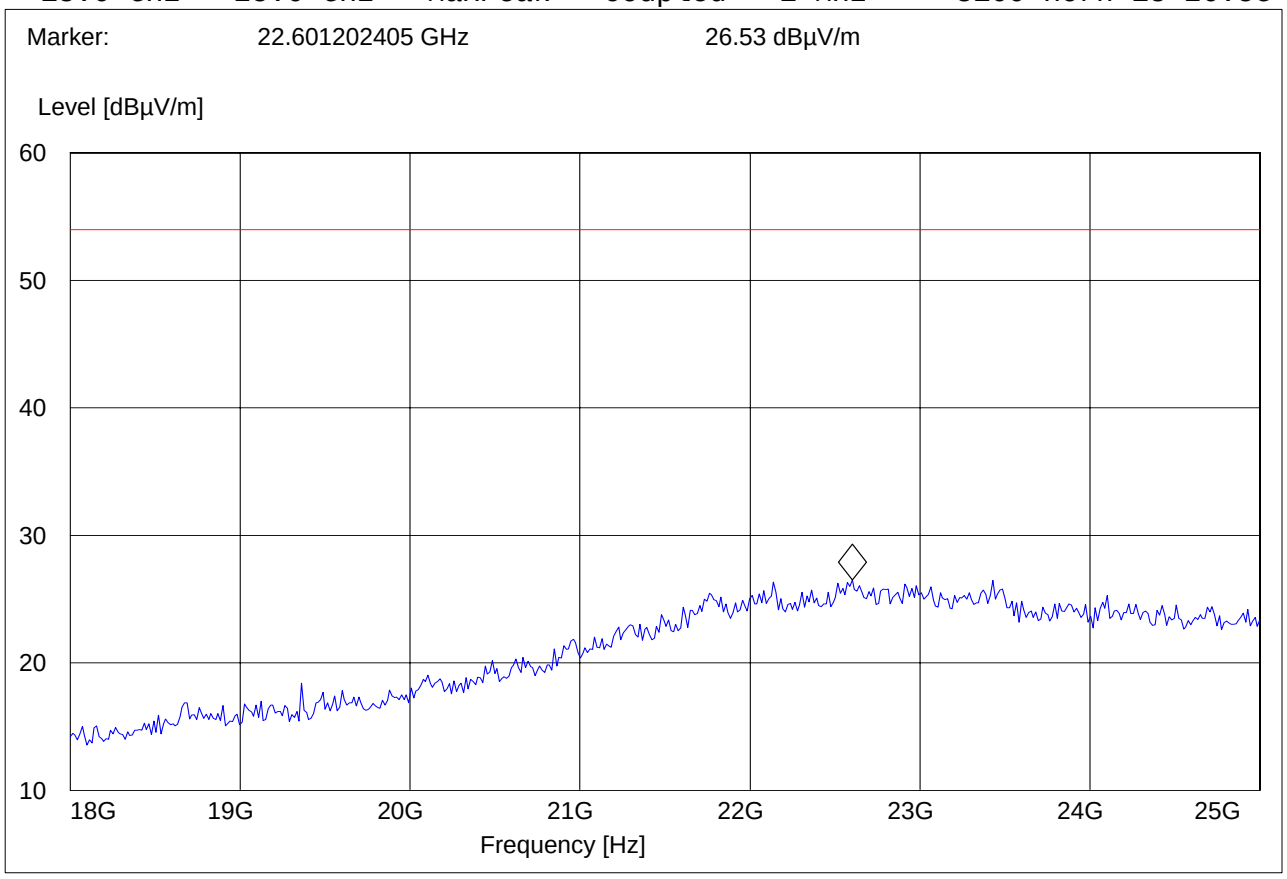
18-26.5GHz
Note: Peak Reading vs. Average limit

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

```
EUT / Description: Vaio laptop "F" series  unit #2  ESN: 5B101BC3
Customer:          Sony Electronics
Operating Mode:    WLAN, TX 5260MHz
Antenna:           V
EUT:               V
Test Engineer:     ED
Voltage:           AC
Sweep:             FCC15.247_18-26.5G
```

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	25.0 GHz	MaxPeak	Coupled	1 MHz	3160 Horn 18-26.5G



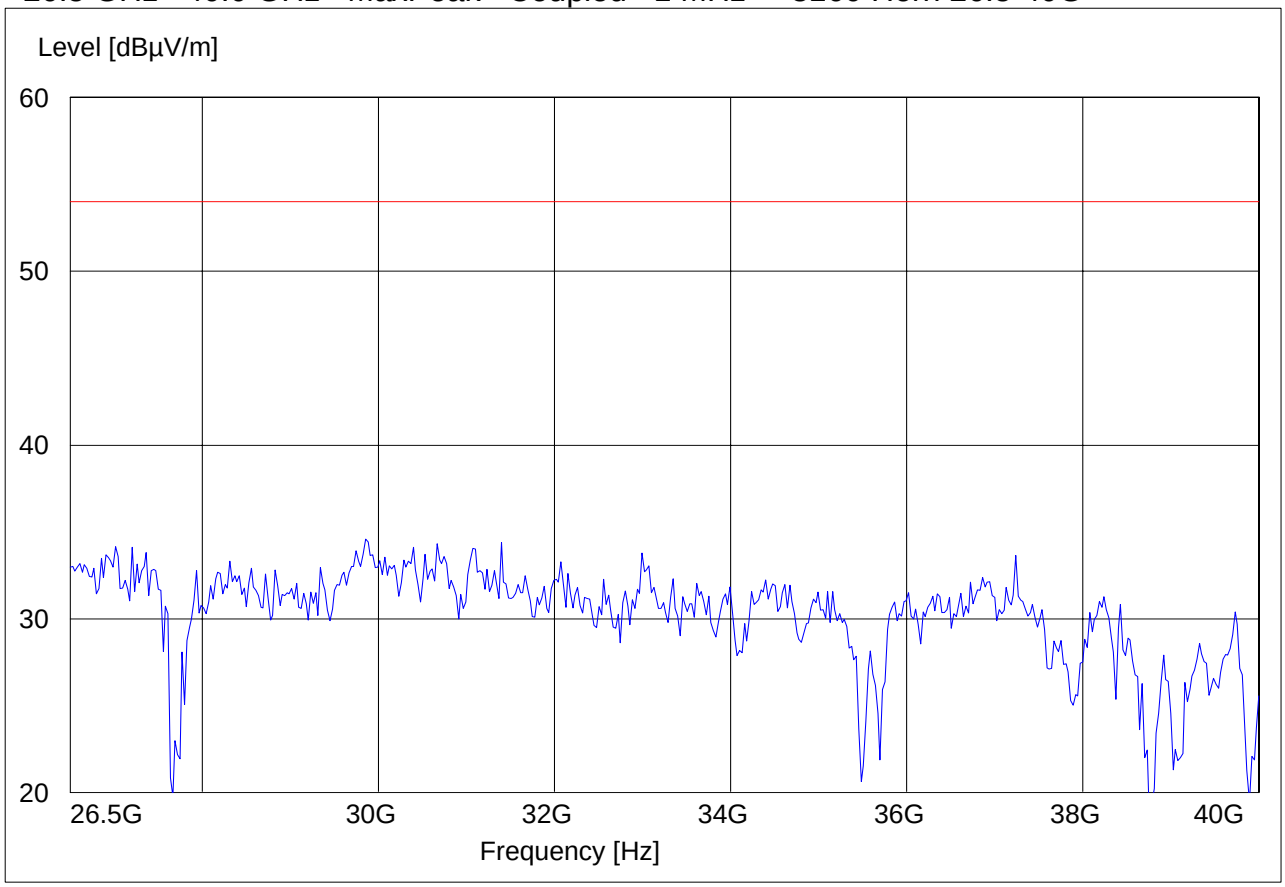
26.5-40GHz
Note: Peak Reading vs. Average limit

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

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

Short Description: Bluetooth 18 - 26 GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
26.5 GHz	40.0 GHz	MaxPeak	Coupled	1 MHz	3160 Horn 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 (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

5.4.2 RESULTS

LISN

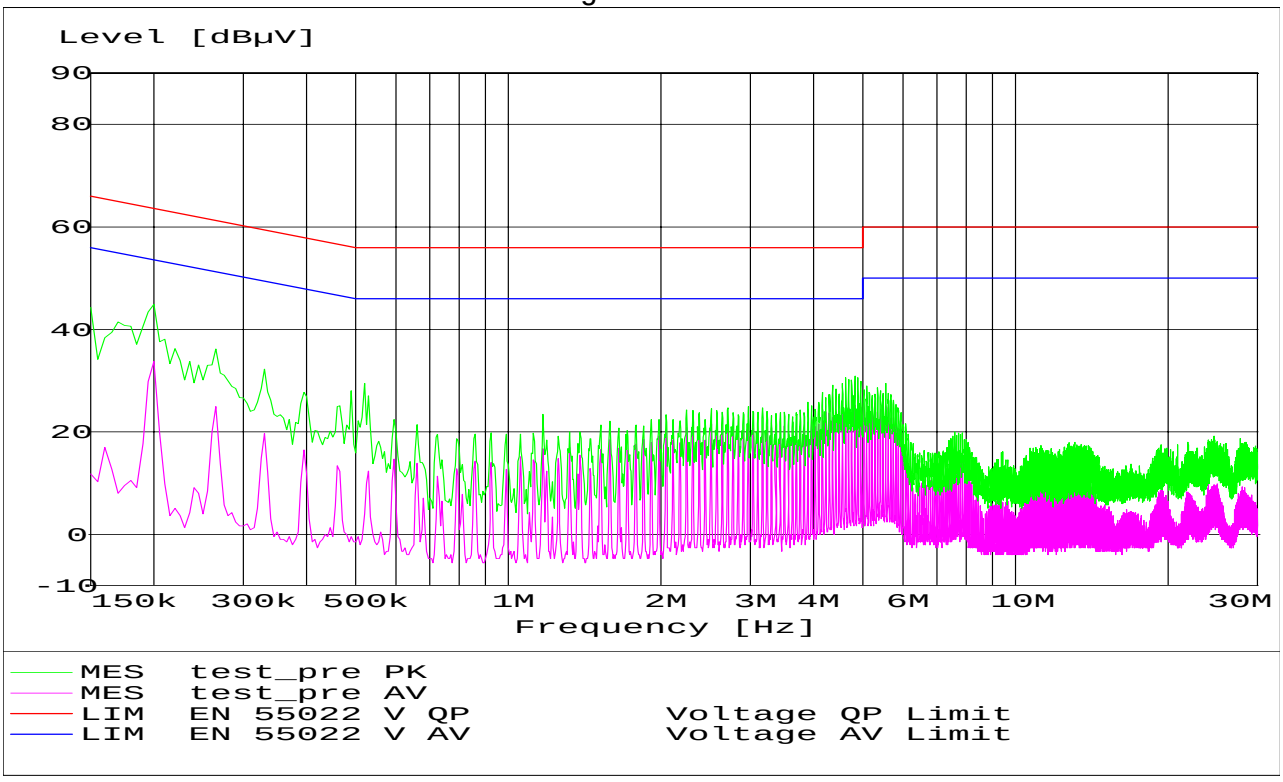
CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA

EUT / Description: Vaio laptop "F" series unit #1 ESN: 5B101BA6
Manufacturer: Sony Electronics
Test Engineer: Ed
Phase: L & N
Comment: EN55022
AC/DC adapter at 110V

SWEEP TABLE: "EN 55022 Voltage"

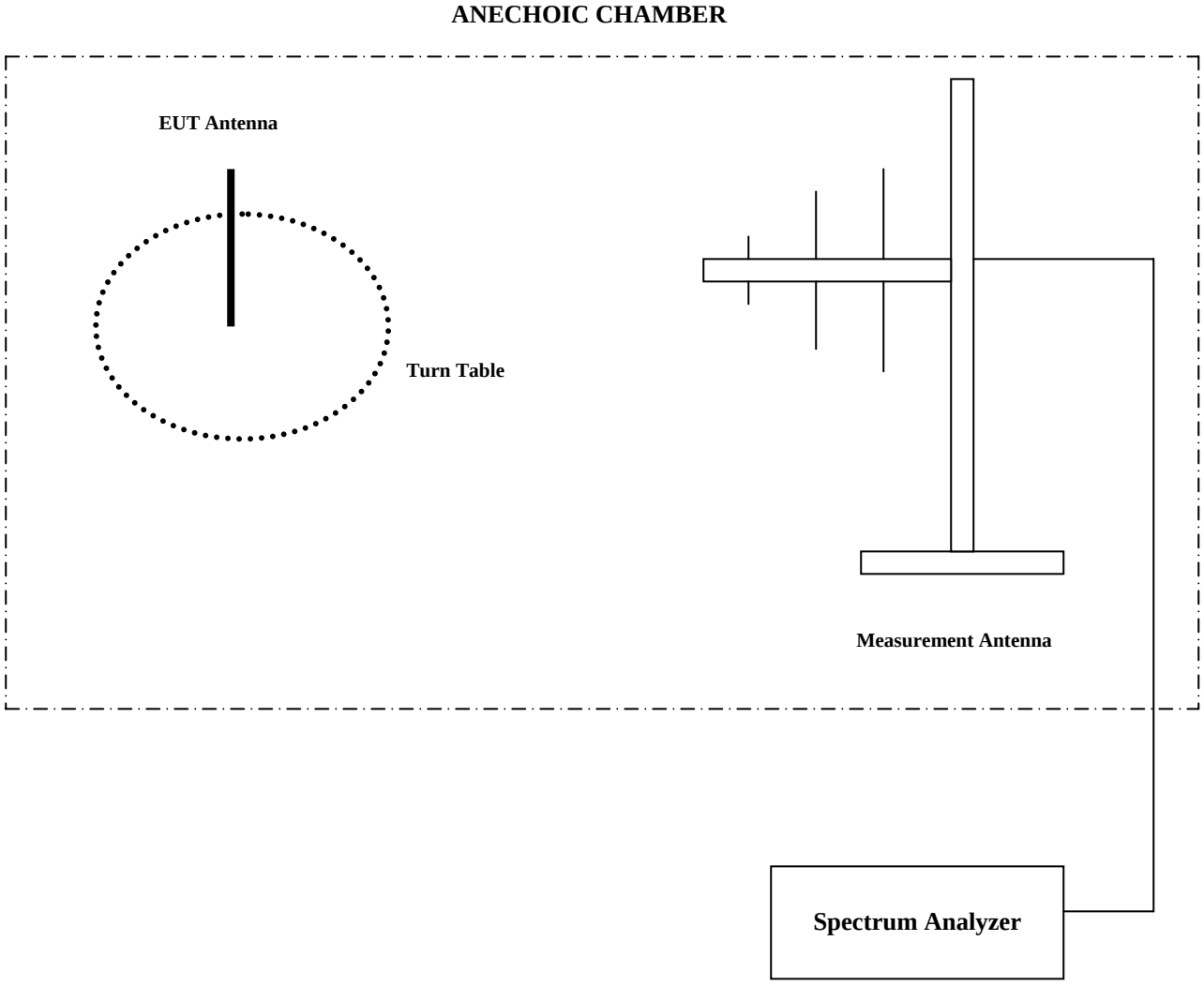
Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak Average	Coupled	9 kHz	None



5.5 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

5.6 BLOCK DIAGRAMS

Radiated Testing