



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: AK8PCG4L1L

IC-ID: 409B-PCG4L1L

TEST REPORT #: SONYE_016_07001_15.247n_AK8PCG4L1

DATE: 4/25/2007



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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TABLE OF CONTENTS

1	Assessment	3
	Technical responsibility for area of testing:	3
	EMC & Radio	3
2	Administrative Data	4
2.1	Identification of the Testing Laboratory Issuing the SAR Assessment Report	4
2.2	Identification of the Client	4
2.3	Identification of the Manufacturer	4
3	Equipment under Test (EUT)	5
3.1	Specification of the Equipment under Test	5
4	Subject Of Investigation	6
5	Measurements	7
5.1	MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)	7
5.1.1	LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)	7
5.1.2	EIRP a MODE:	7
5.2	TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209	12
5.2.1	LIMITS	12
5.2.2	RESULTS (a) MODE	13
5.3	RECEIVER SPURIOUS RADIATION § 15.209/RSS210	23
5.3.1	LIMITS	23
5.3.2	RESULTS	24
5.4	AC POWER LINE CONDUCTED EMISSIONS § 15.107/207	28
5.4.1	LIMITS	28
5.4.2	RESULTS	29
6	TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	30
6.1	BLOCK DIAGRAMS	31



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 Milpitas, CA 95035 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, 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- 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-4L1L
FCC-ID:	AK8PCG4L1L
IC-ID :	409B-PCG4L1L
Frequency Range:	5755 MHz to 5795 MHz
Type(s) of Modulation:	OFDM
Antenna Type:	PIFA
Output Power ¹ :	17.12 dBm (0.052W) EIRP WLAN 802.11n



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)			5755	5795
Chain A	T _{nom} (23)°C	V _{nom} VDC	13.62	14.62
Chain B	T _{nom} (23)°C	V _{nom} VDC	16.25	17.12
Measurement uncertainty			±0.5dBm	

EIRP a Mode (5755) Chain A

CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

EUT / Description: ES725

Manufacturer: Sony Electronics

Test mode: 802.11n, Ch 151, chain A, 40Mhz bw

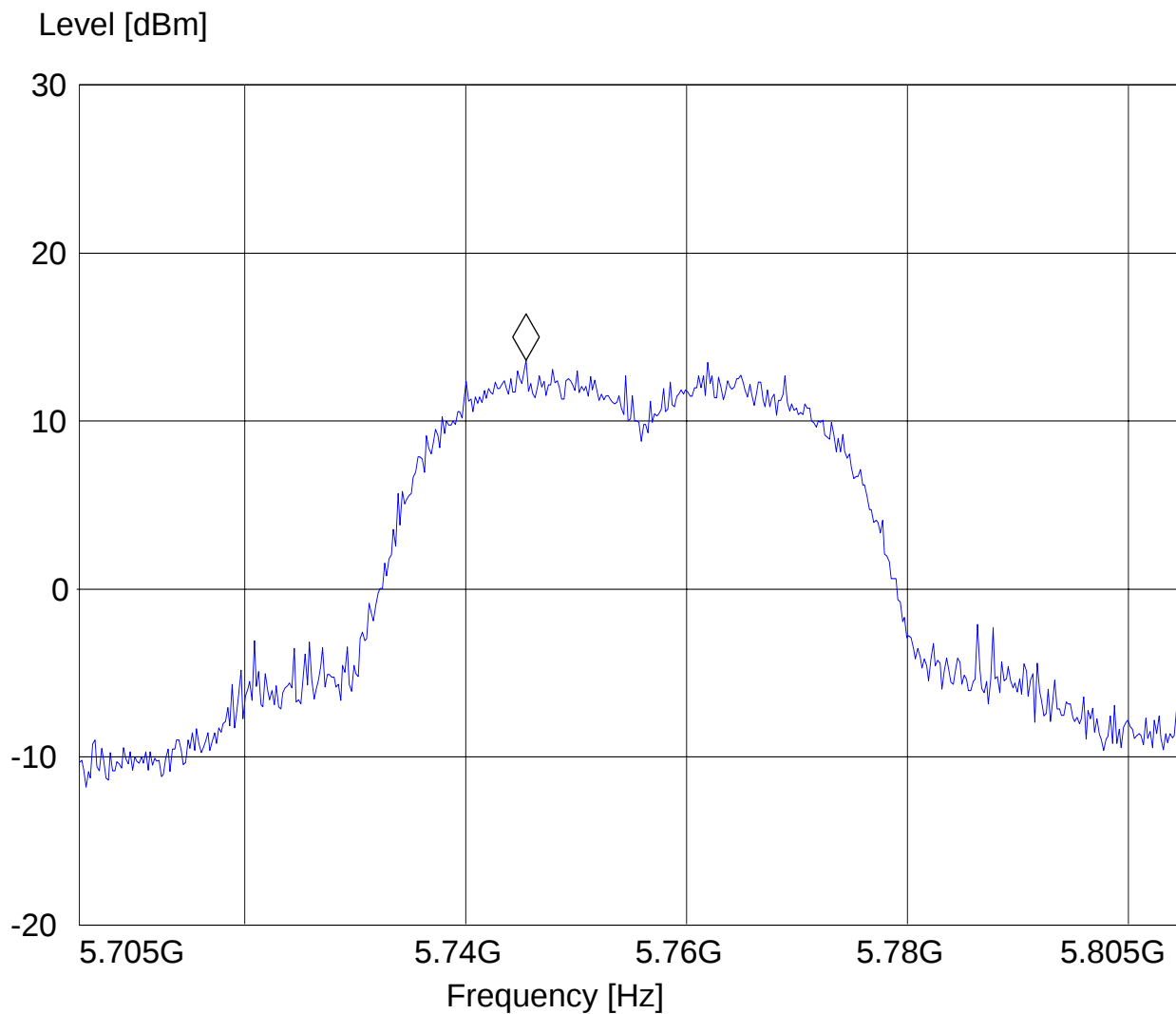
EUT: H

Antenna: H

Test Engineer: Ed

SWEEP TABLE: "EIRP 802.11n CH151"

Marker: 5.745480962 GHz 13.62 dBm



EIRP a Mode (5795MHz) Chain A

CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

EUT / Description: ES725

Manufacturer: Sony Electronics

Test mode: 802.11n, Ch 159, chain A, 40Mhz bw

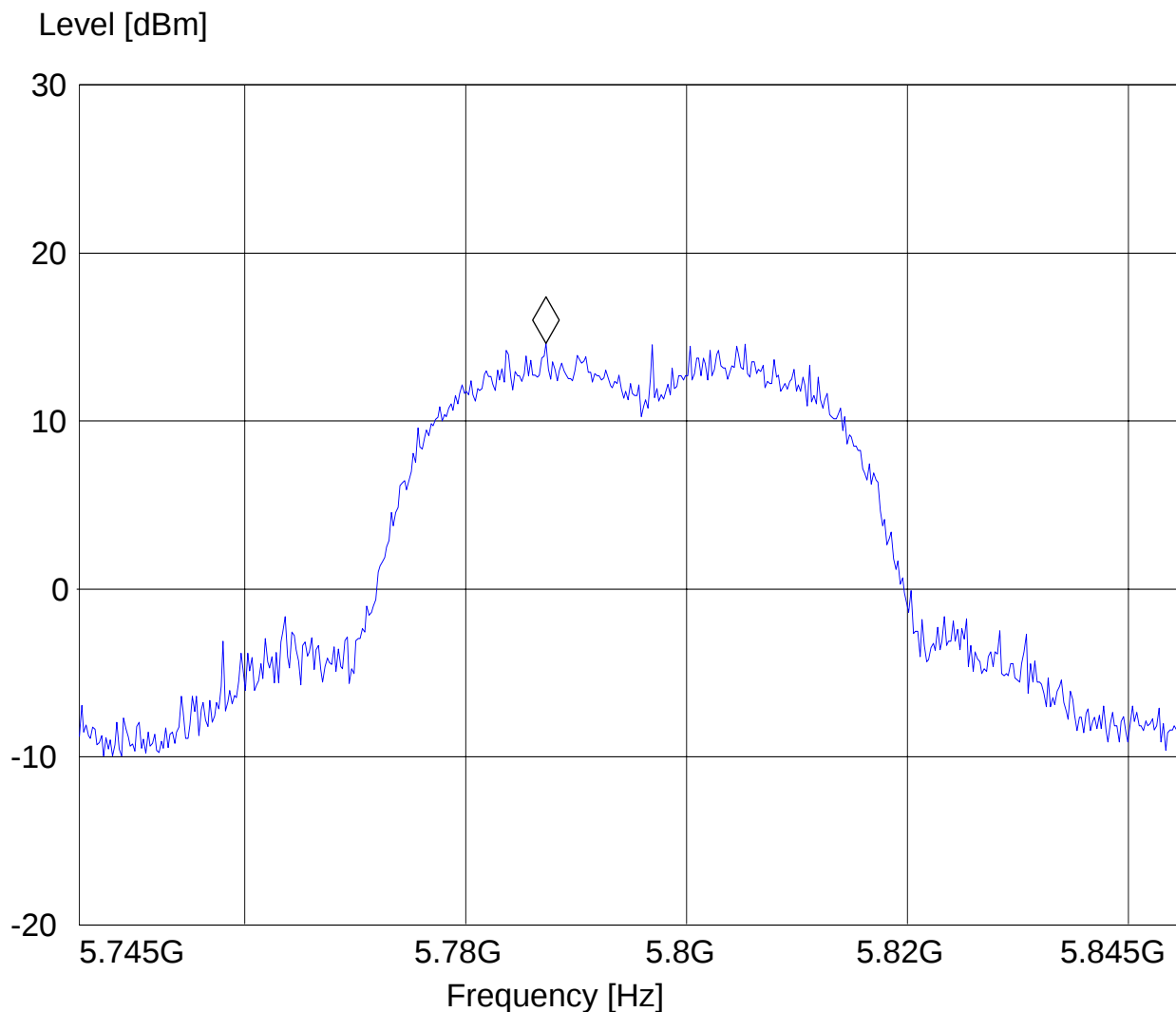
EUT: H

Antenna: H

Test Engineer: Ed

SWEEP TABLE: "EIRP 802.11n CH159"

Marker: 5.787284569 GHz 14.62 dBm





EIRP a Mode (5755) Chain B

CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

EUT / Description: ES725

Manufacturer: Sony Electronics

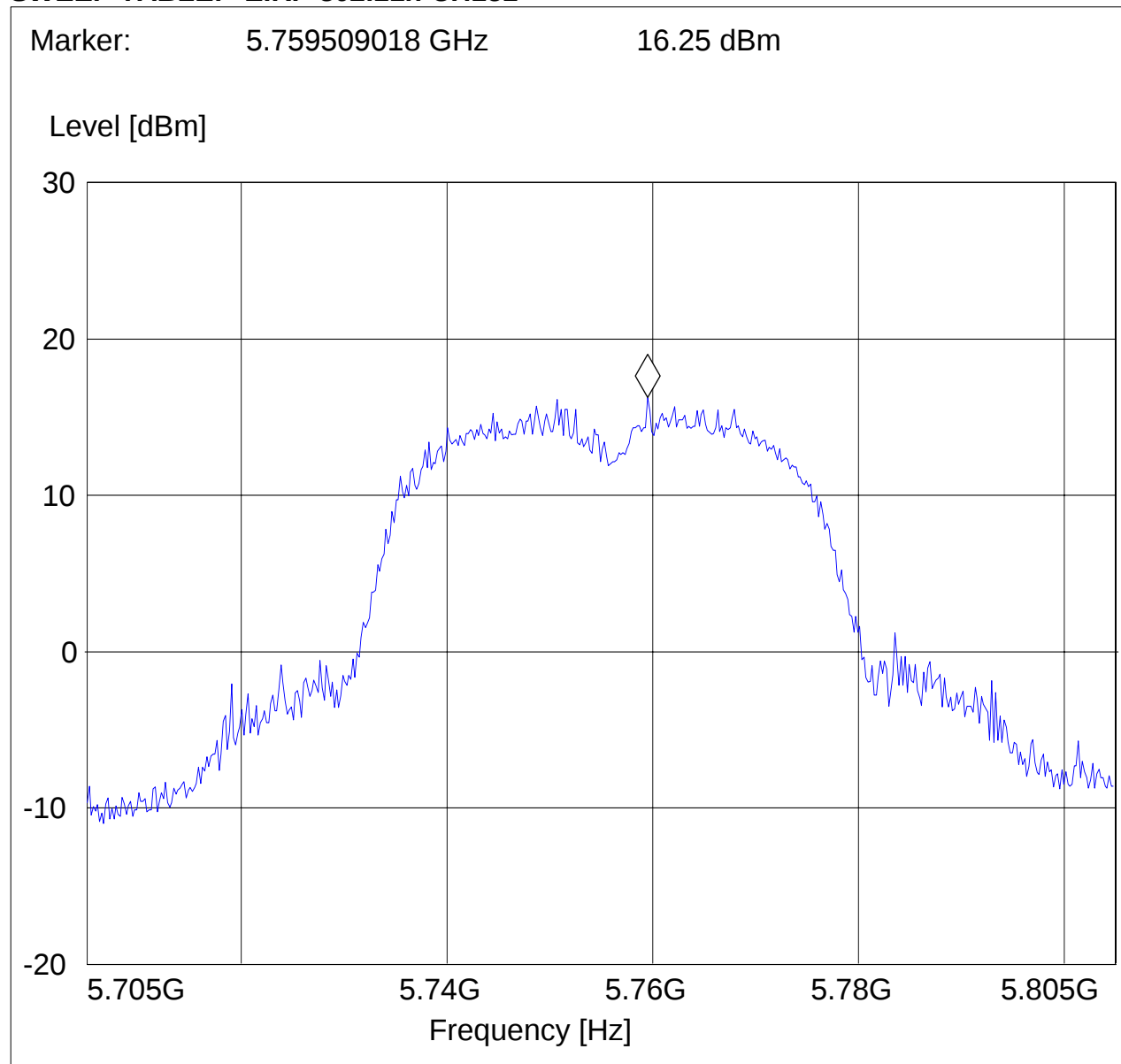
Test mode: 802.11n, Ch 151, chain B, 40Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

SWEEP TABLE: "EIRP 802.11n CH151"





EIRP a Mode (5795MHz) Chain B

CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

EUT / Description: ES725

Manufacturer: Sony Electronics

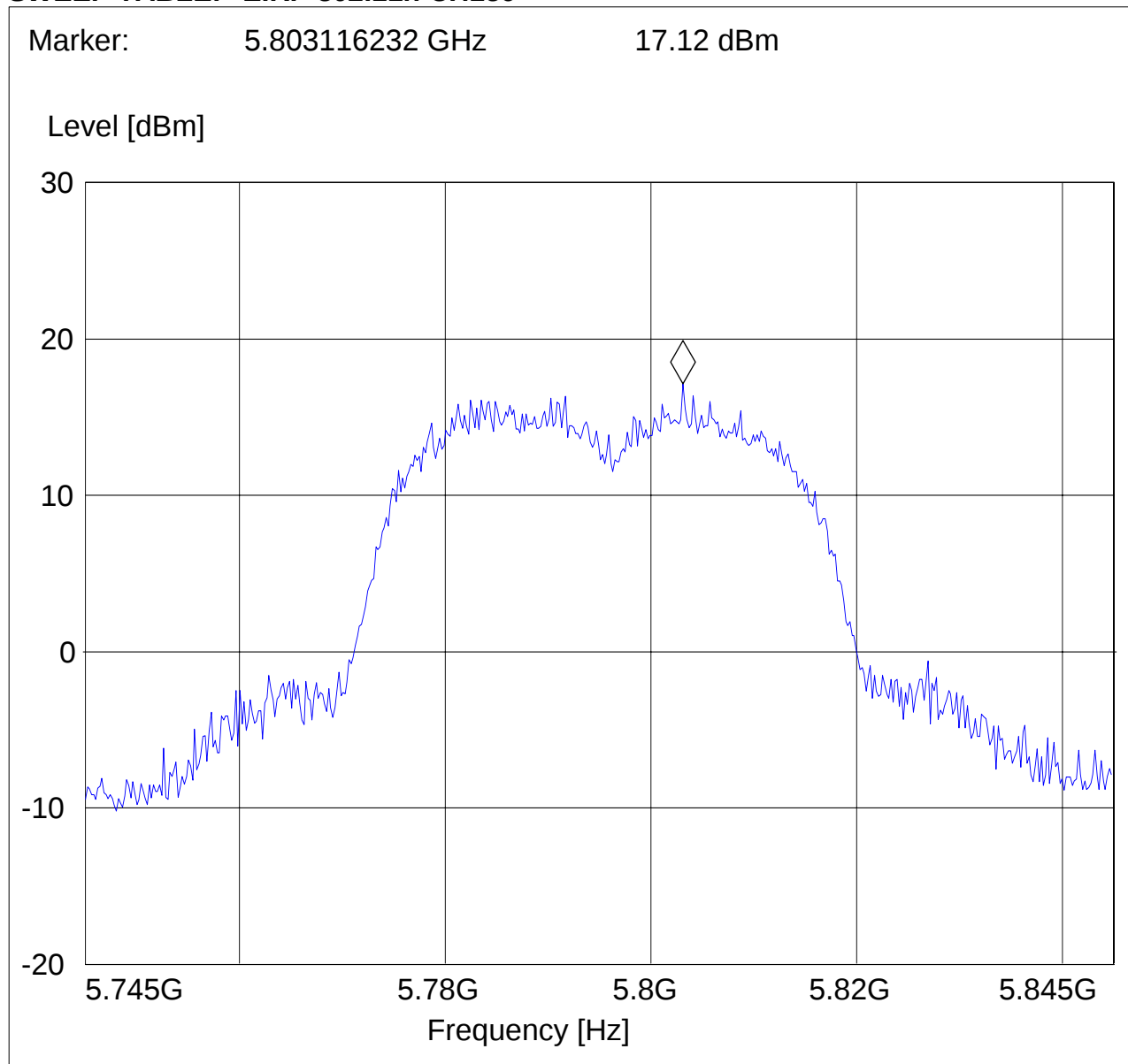
Test mode: 802.11n, Ch 159, chain B, 40Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

SWEEP TABLE: "EIRP 802.11n CH159"



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	(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 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

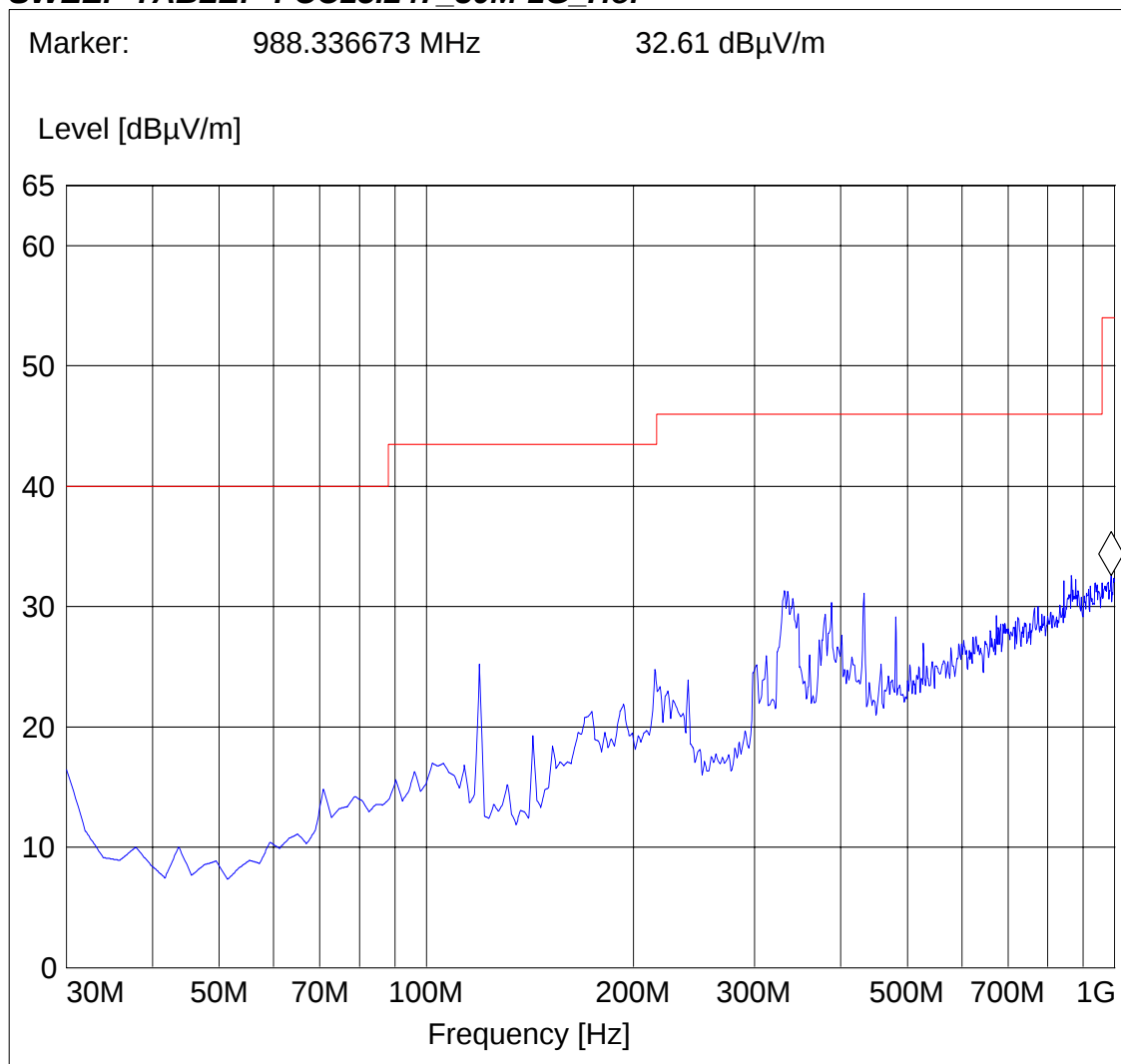
Test Mode: 802.11n, Ch 159, RX

ANT Orientation: H

EUT Orientation: H

Test Engineer: PETER MU

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





1-18GHz (5755MHz) 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

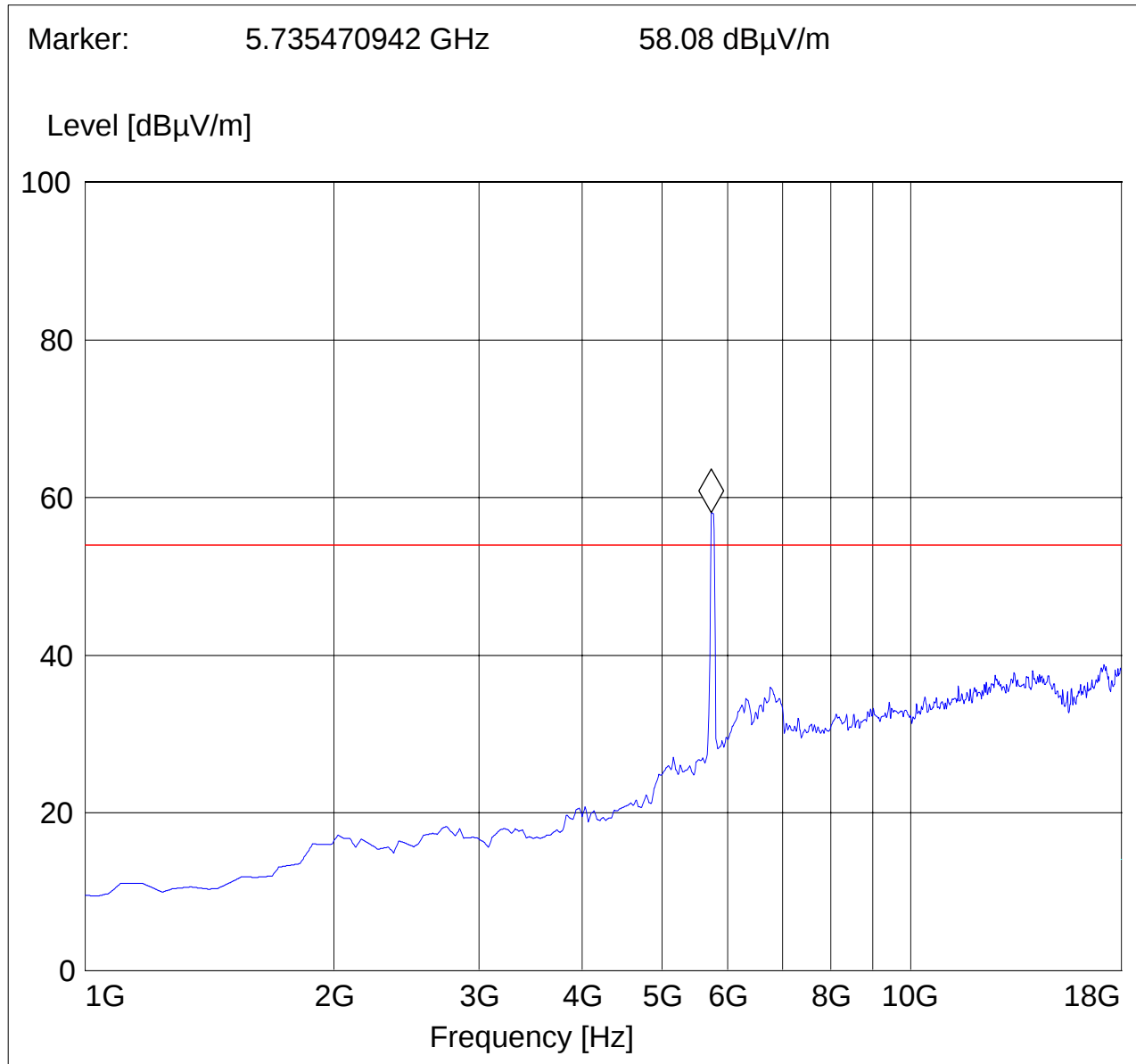
Test mode: 802.11n, Ch 151, chain A, 40Mhz bw

EUT: H

Antenna: H

Test Engineer: Ed

SWEEP TABLE: "FCC 15.407 1-18G"





1-18GHz (5795MHz) 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

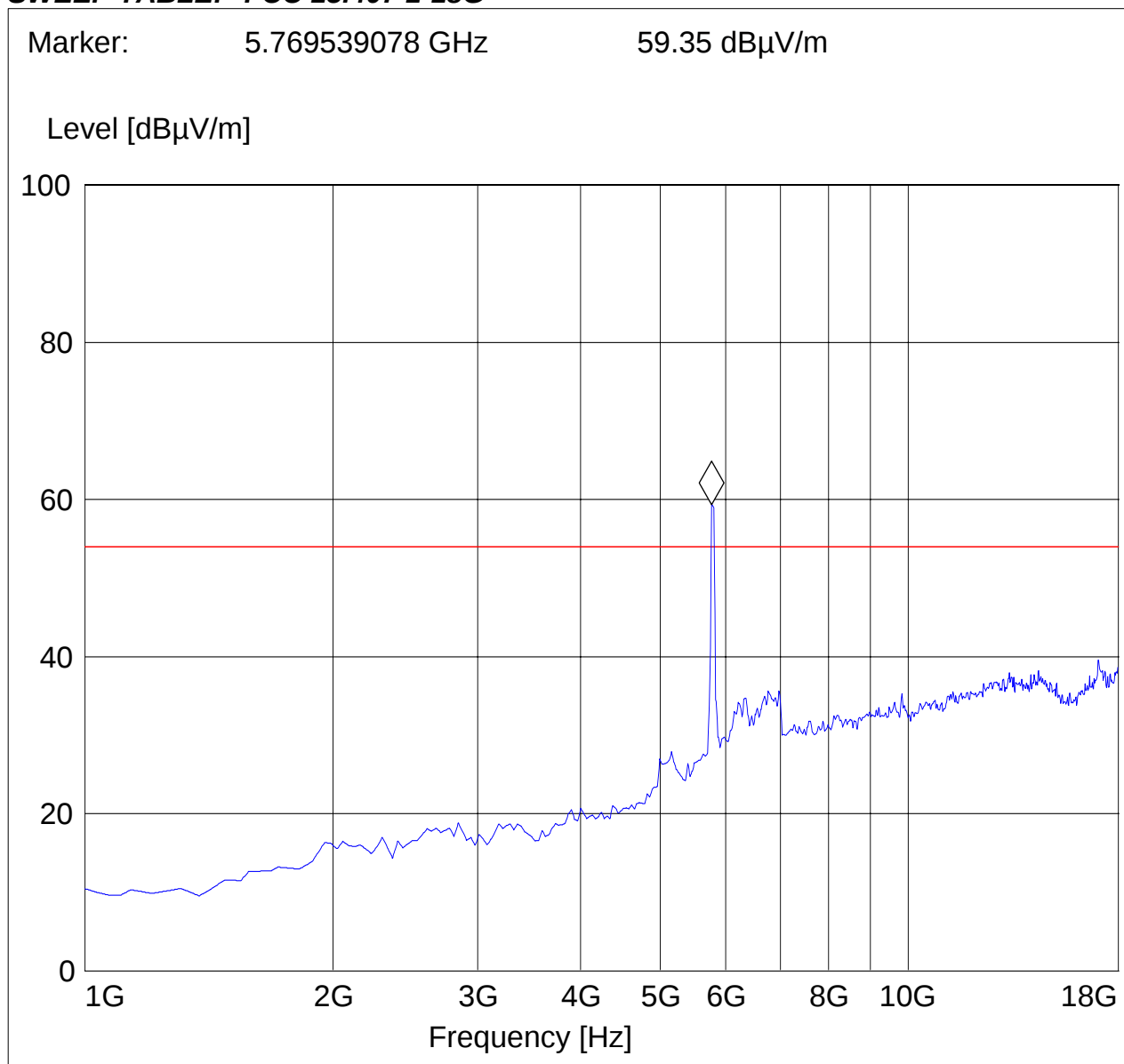
Test mode: 802.11n, Ch 159, chain A, 40Mhz bw

EUT: H

Antenna: H

Test Engineer: Ed

SWEEP TABLE: "FCC 15.407 1-18G"





18-26.5GHz 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

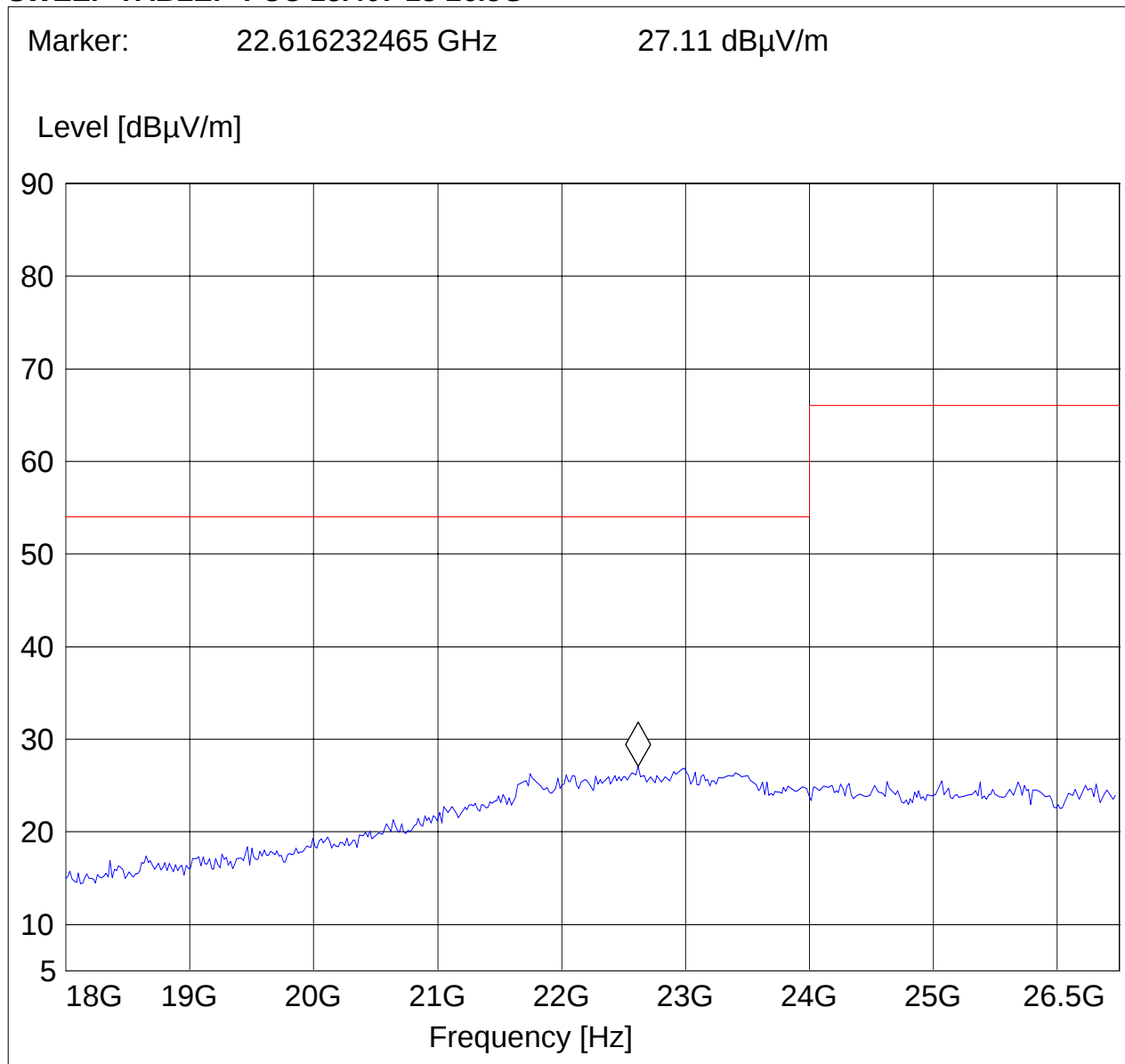
Test Mode: 802.11n, Ch 151, Chain A, 40 Mhz bw

ANT Orientation: H

EUT Orientation: H

Test Engineer: PETER MU

SWEEP TABLE: "FCC 15.407 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

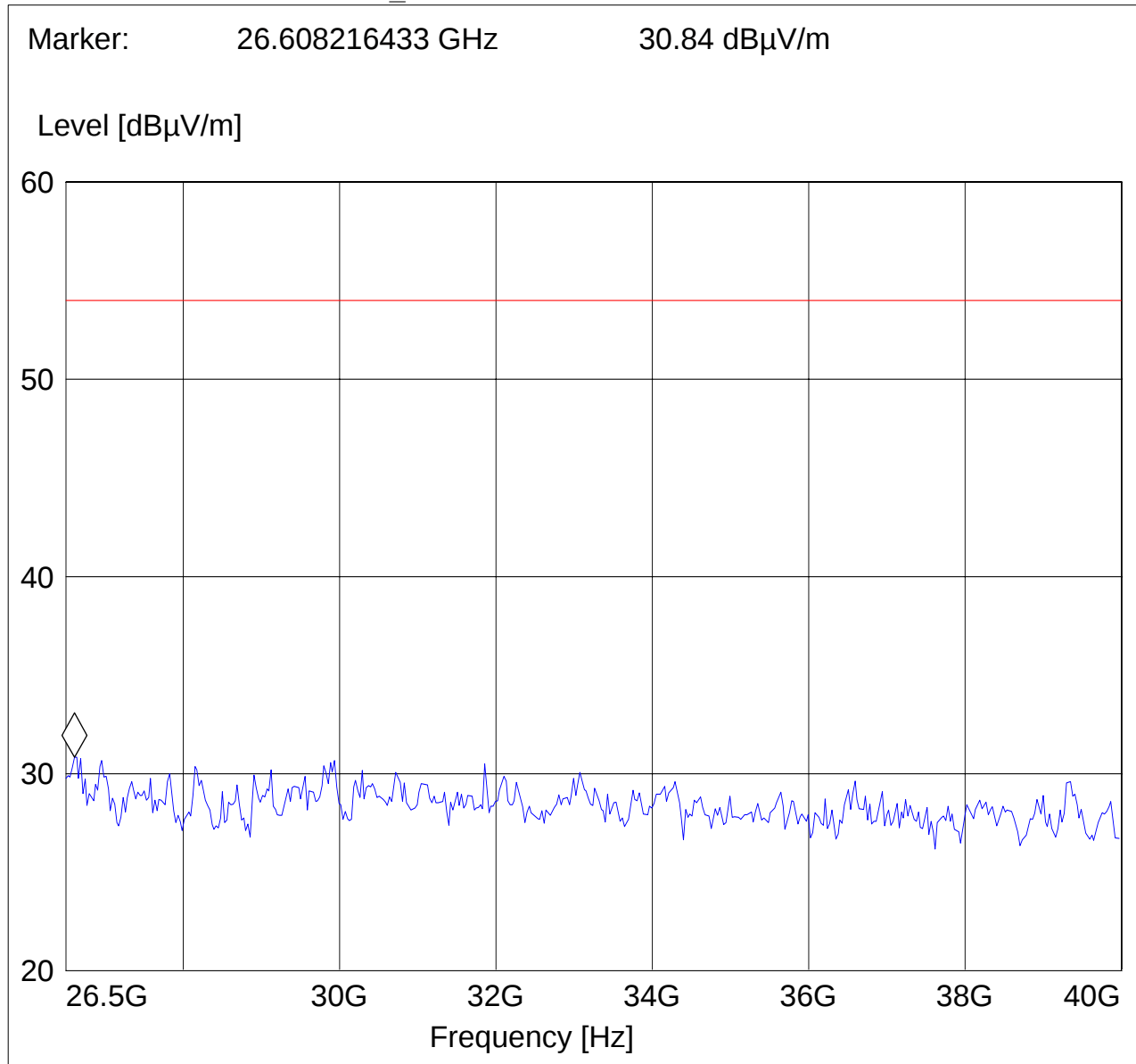
Test mode: 802.11n, Ch 151, 40MB BW, chain A

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

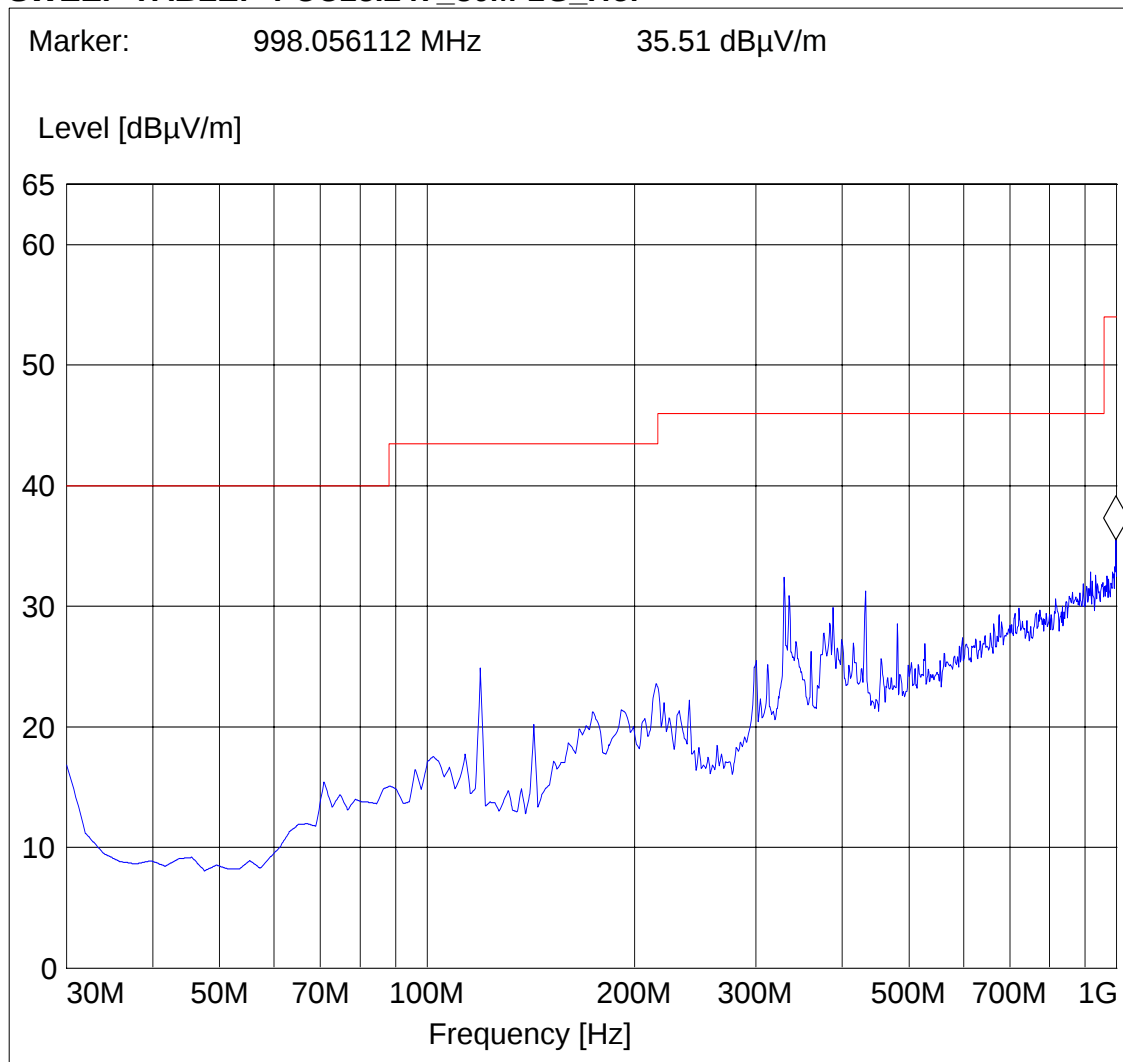
Test Mode: 802.11n, Ch 151, CHAIN B 40MB BW

ANT Orientation: H

EUT Orientation: H

Test Engineer: PETER MU

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



1-18GHz (5755MHz) 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

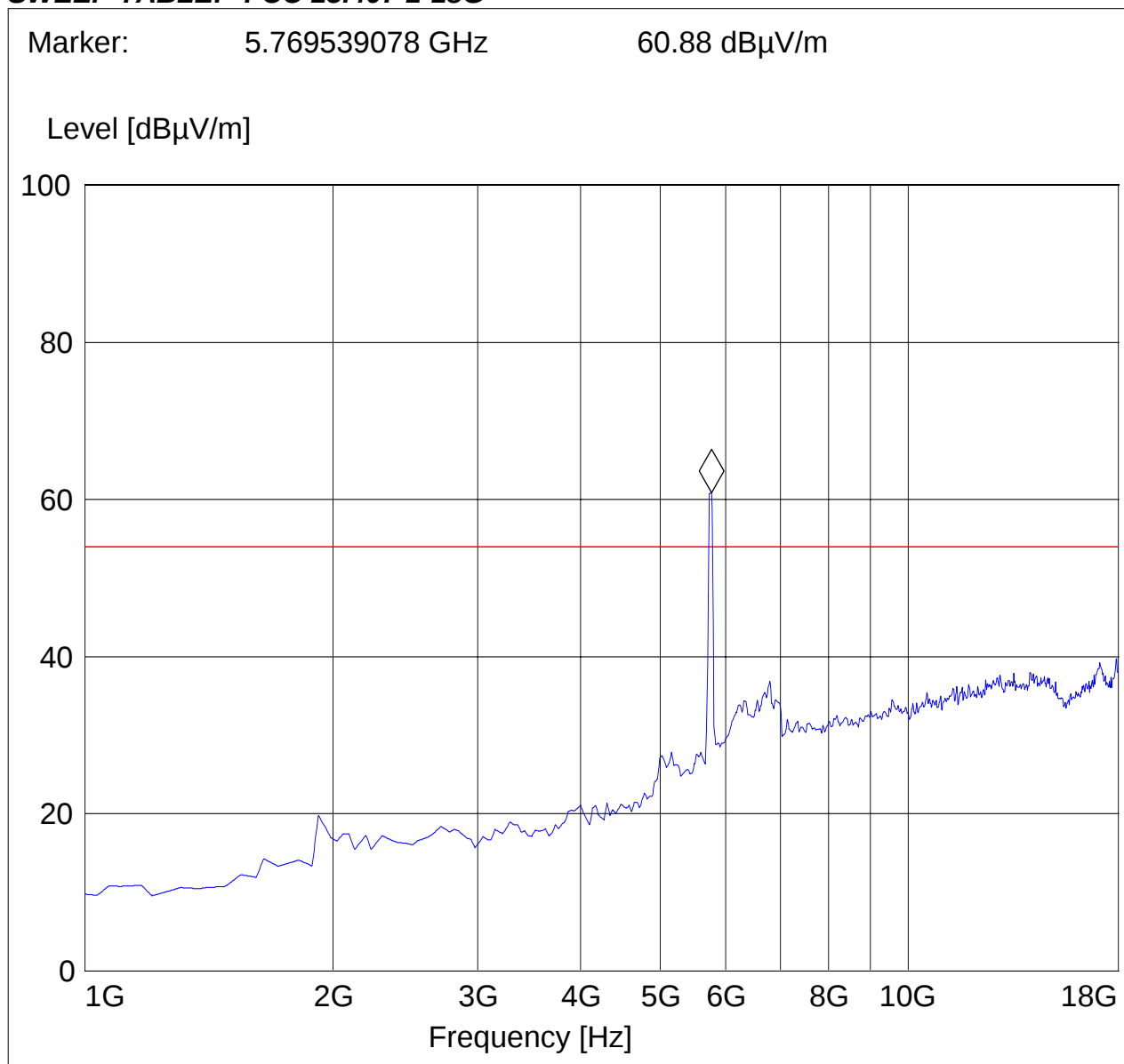
Test mode: 802.11n, Ch 151, chain B, 40Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

SWEEP TABLE: "FCC 15.407 1-18G"





1-18GHz (5795MHz) 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

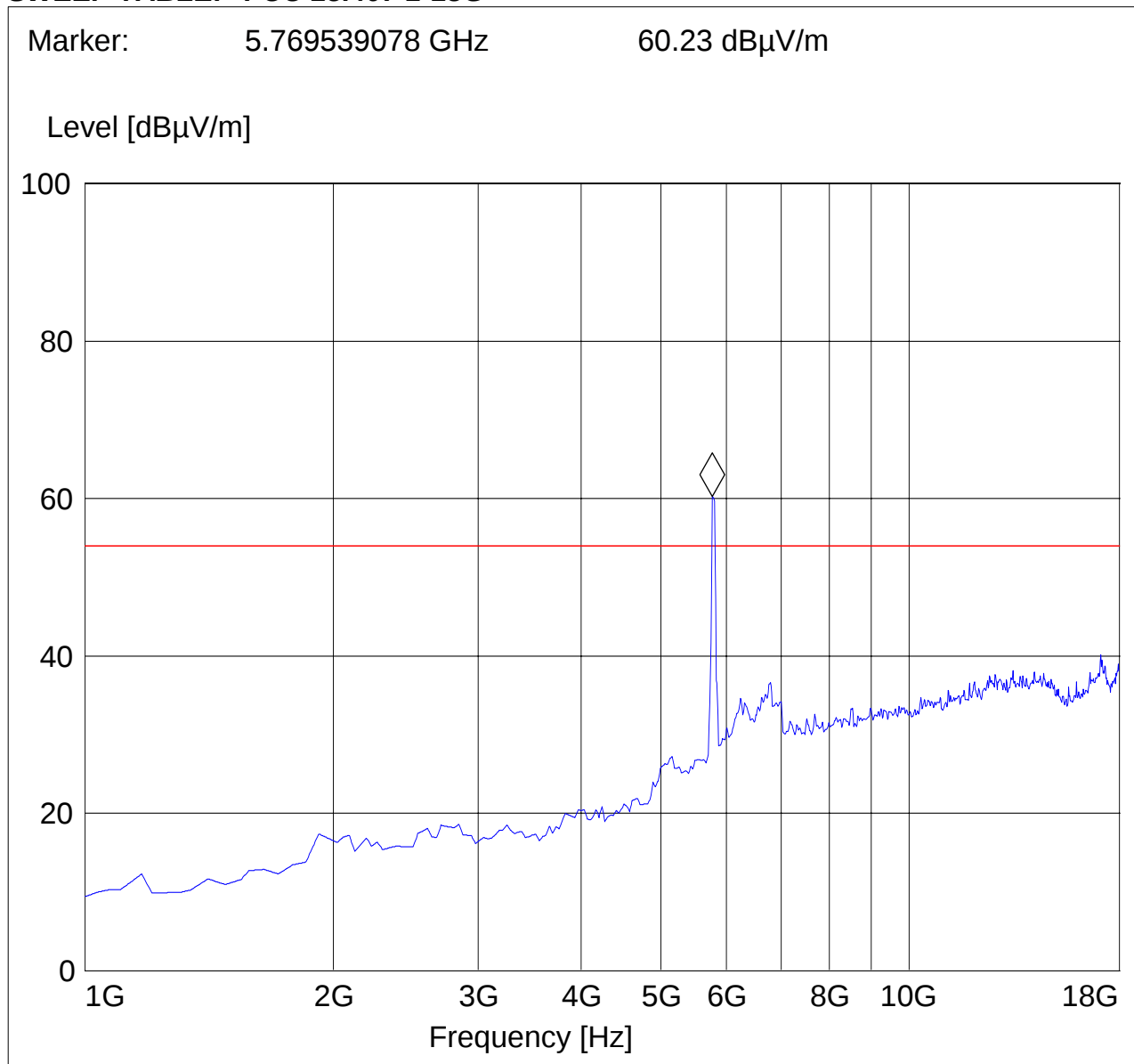
Test mode: 802.11n, Ch 159, chain B, 40Mhz bw

EUT: H

Antenna: V

Test Engineer: Ed

SWEEP TABLE: "FCC 15.407 1-18G"





18-26.5GHz 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

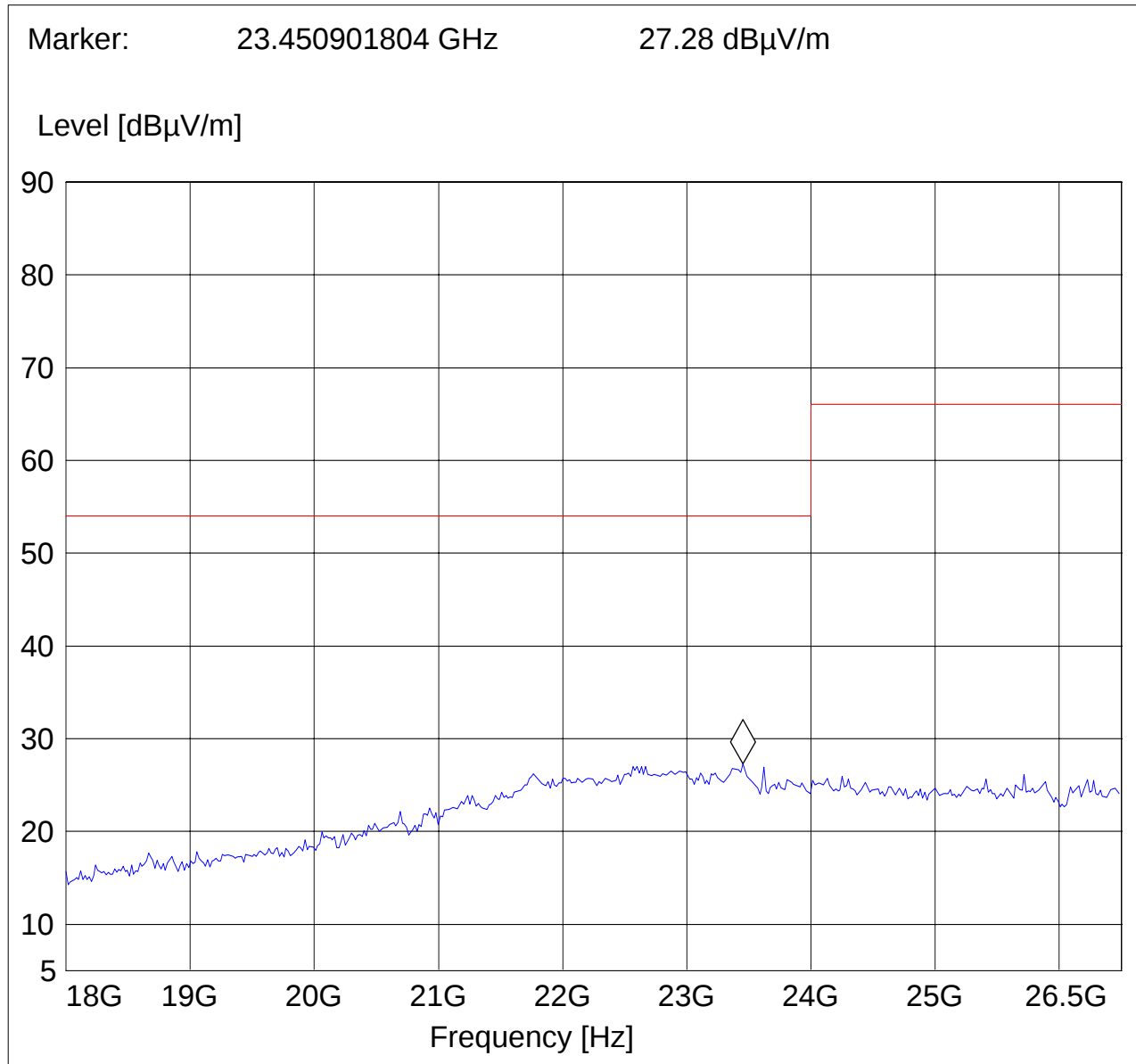
Test Mode: 802.11n, Ch 151, Chain B, 40 Mhz bw

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

SWEEP TABLE: "FCC 15.407 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

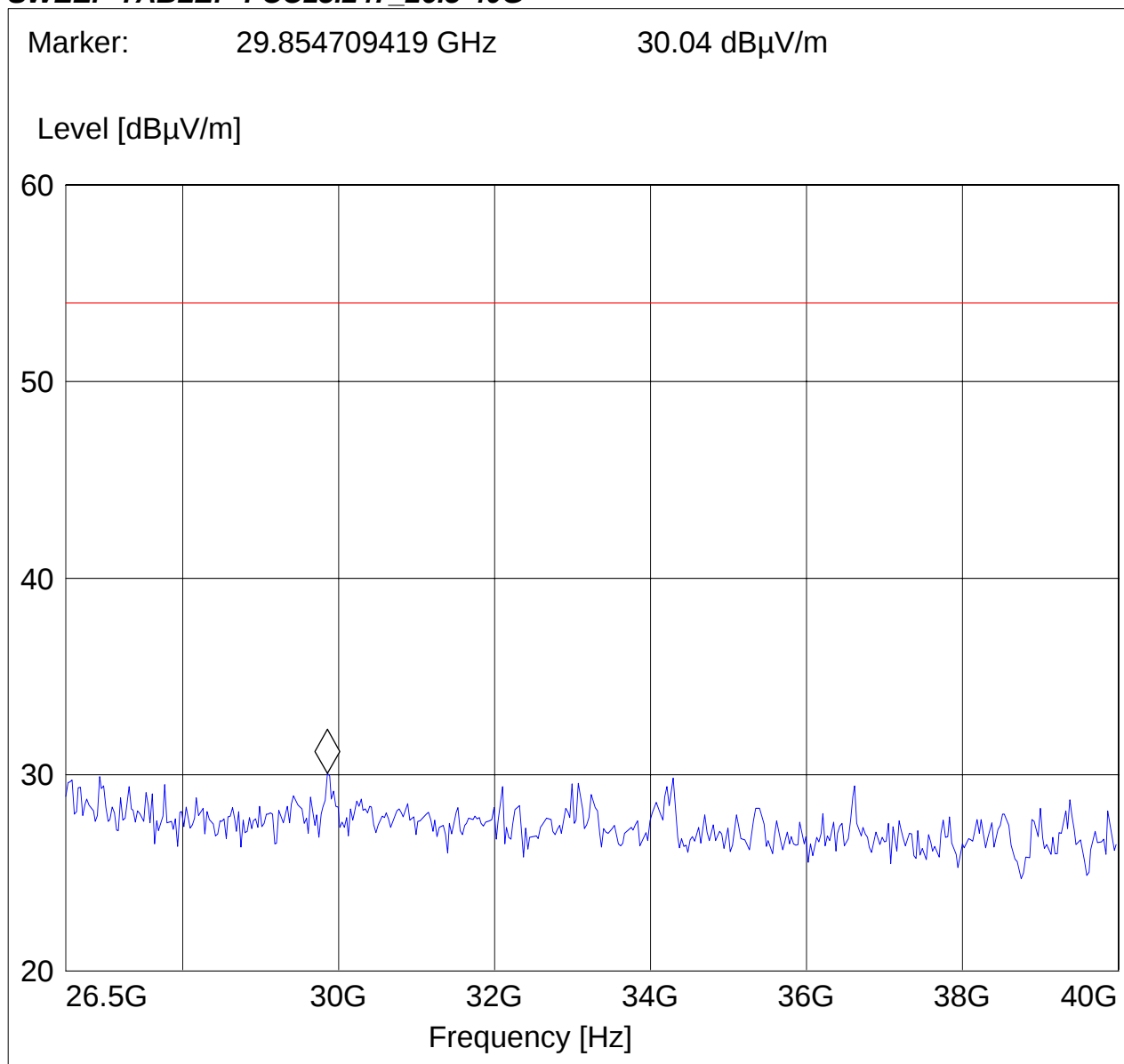
Test mode: 802.11n, Ch 159, 40MB BW, chain B

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

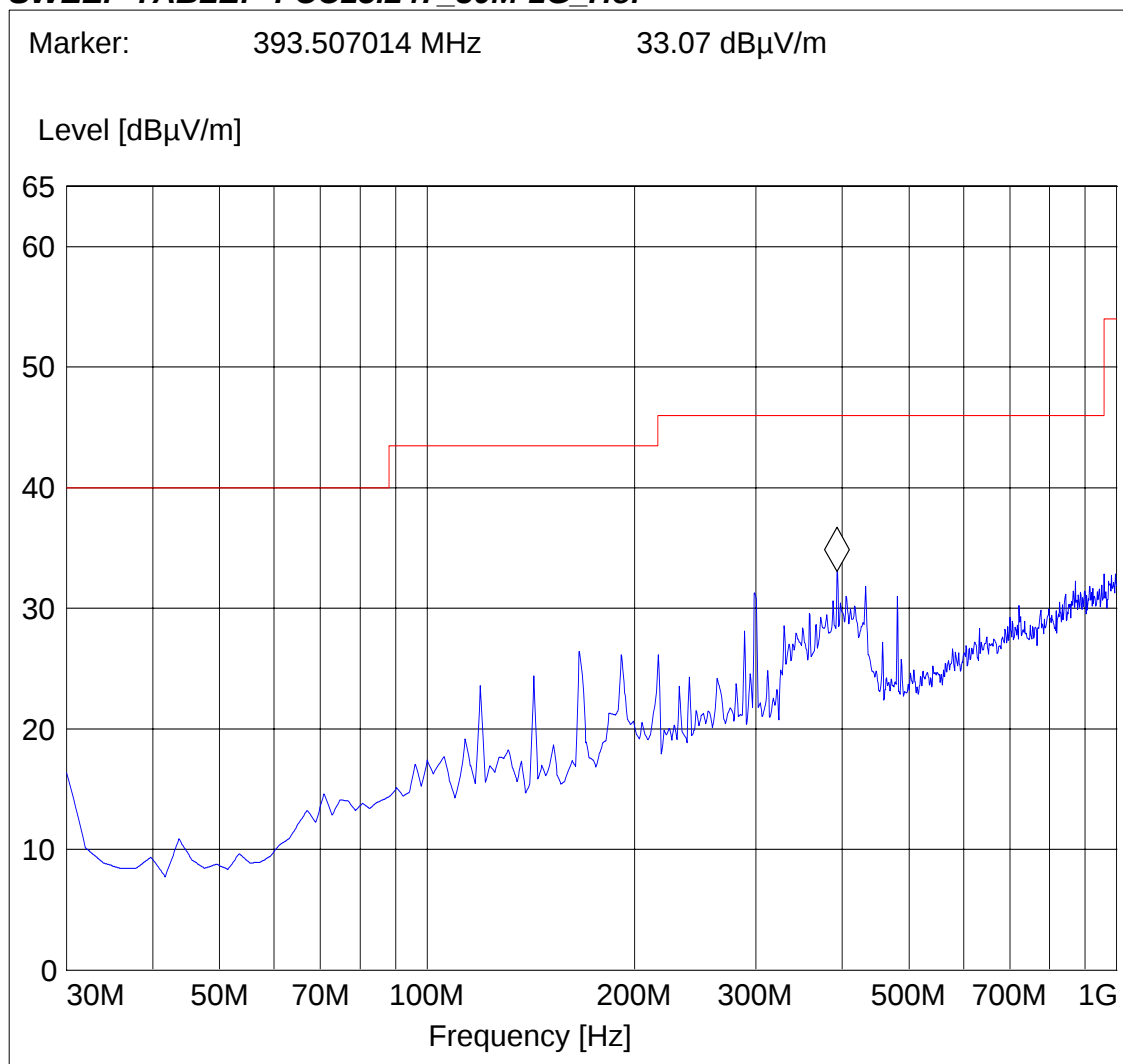
Test Mode: 802.11n, Ch 151, CHAIN B 40MB BW

ANT Orientation: H

EUT Orientation: H

Test Engineer: PETER MU

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: 802.11n, Ch 159, chain B, 40Mhz bw RX

EUT: H

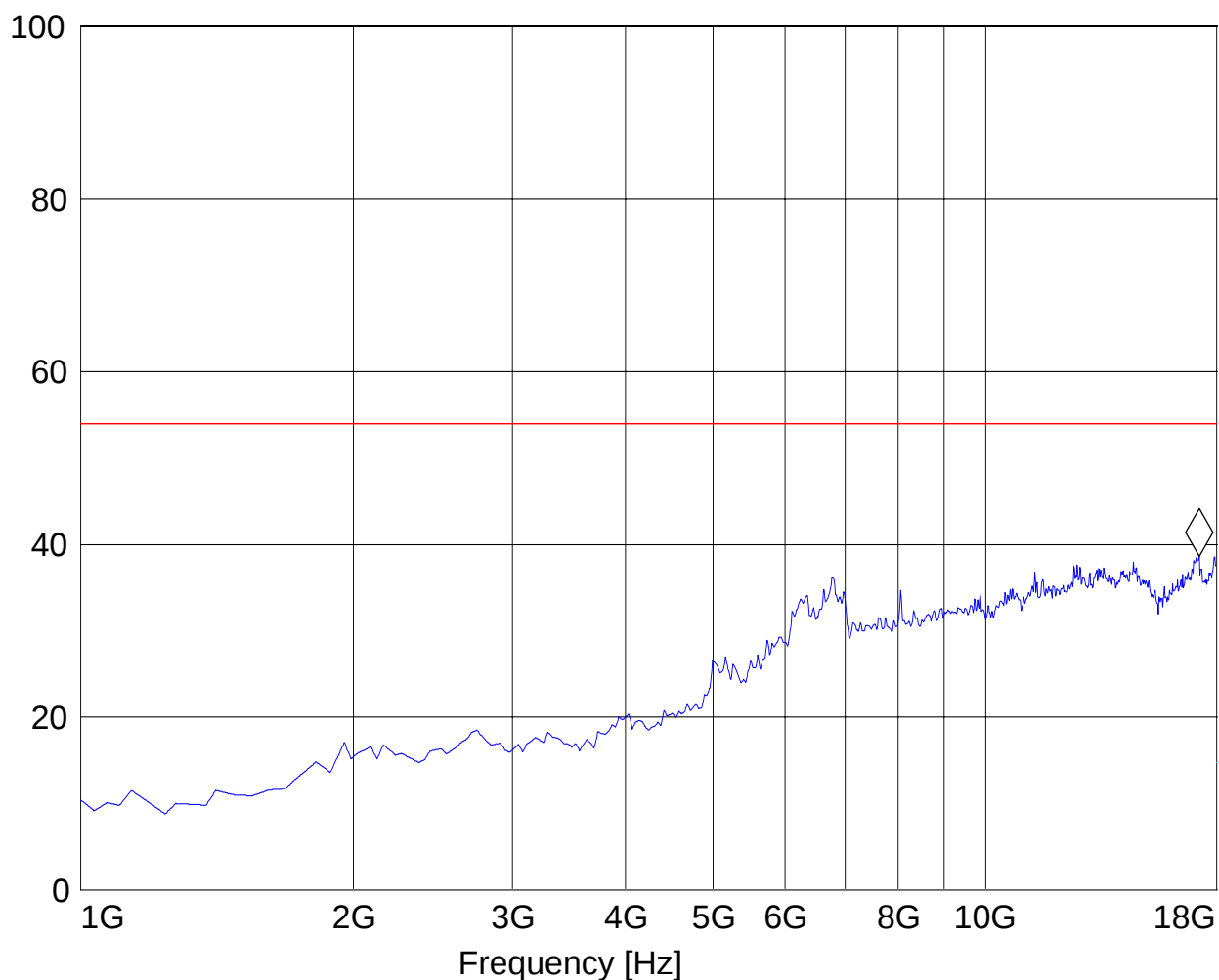
Antenna: H

Test Engineer: PETER MU

SWEEP TABLE: "FCC 15.407 1-18G"

Marker: 17.216432866 GHz 38.62 dB μ V/m

Level [dB μ V/m]





18-26.5GHz

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road, Milpitas CA 95035, USA

EUT: ES725

Customer: Sony

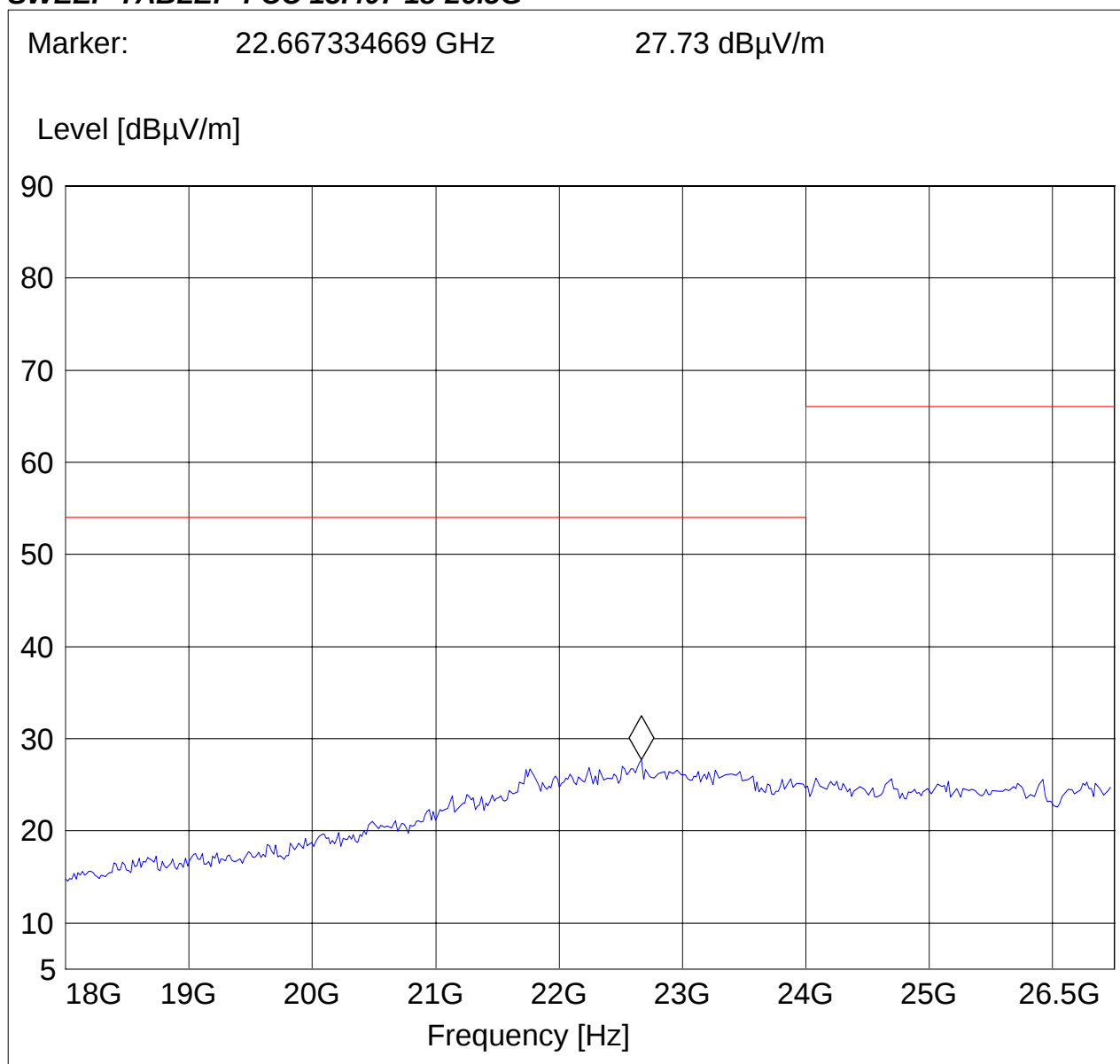
Test Mode: 802.11n, Ch 159, RX

ANT Orientation: H

EUT Orientation: H

Test Engineer: PETER MU

SWEEP TABLE: "FCC 15.407 18-26.5G"





26.5-40GHz

Note: Peak Reading vs. Average limit

CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

EUT: ES725

Customer: Sony

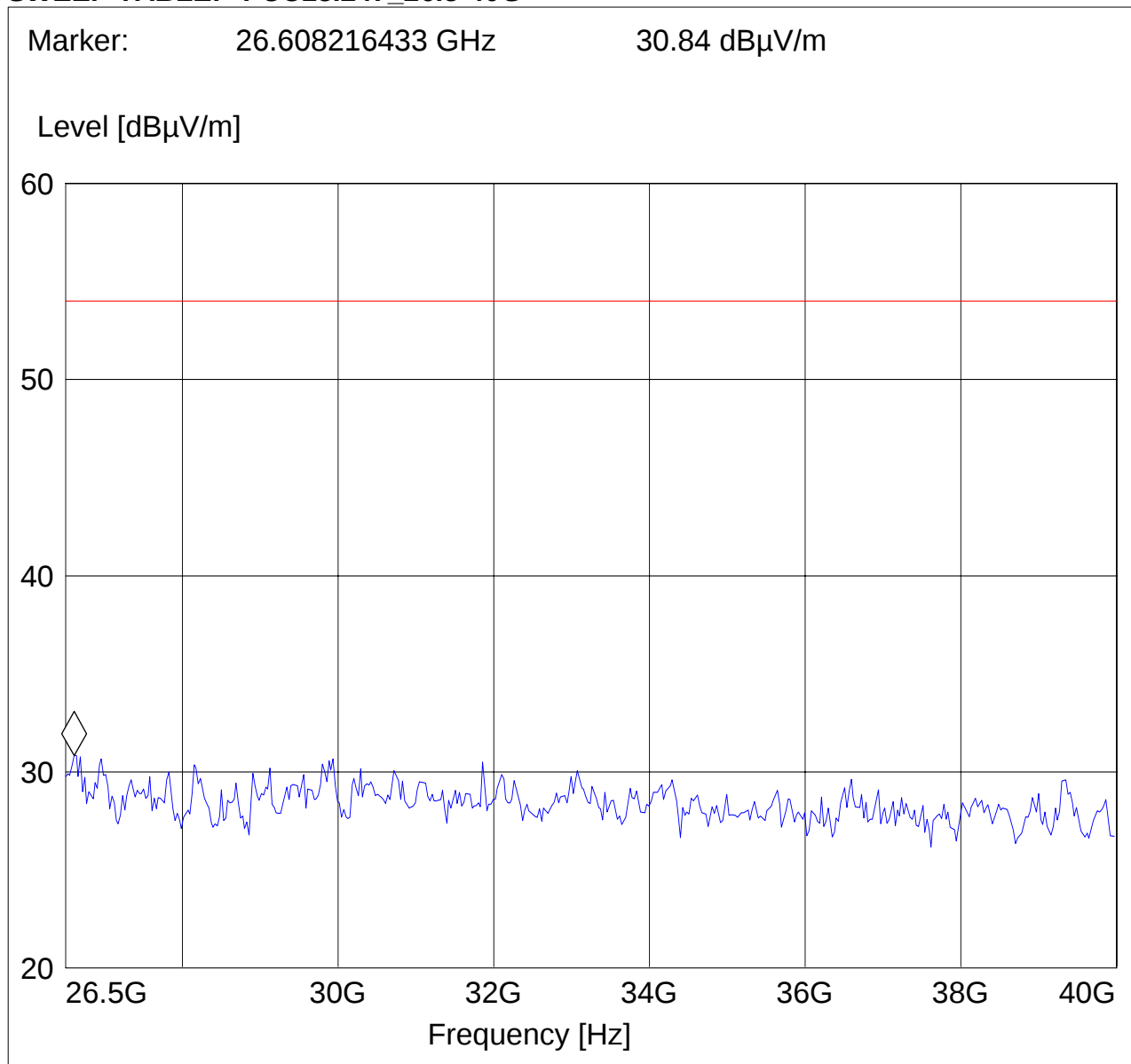
Test Mode: 802.11n, Ch 159, RX

ANT Orientation: H

EUT Orientation: 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

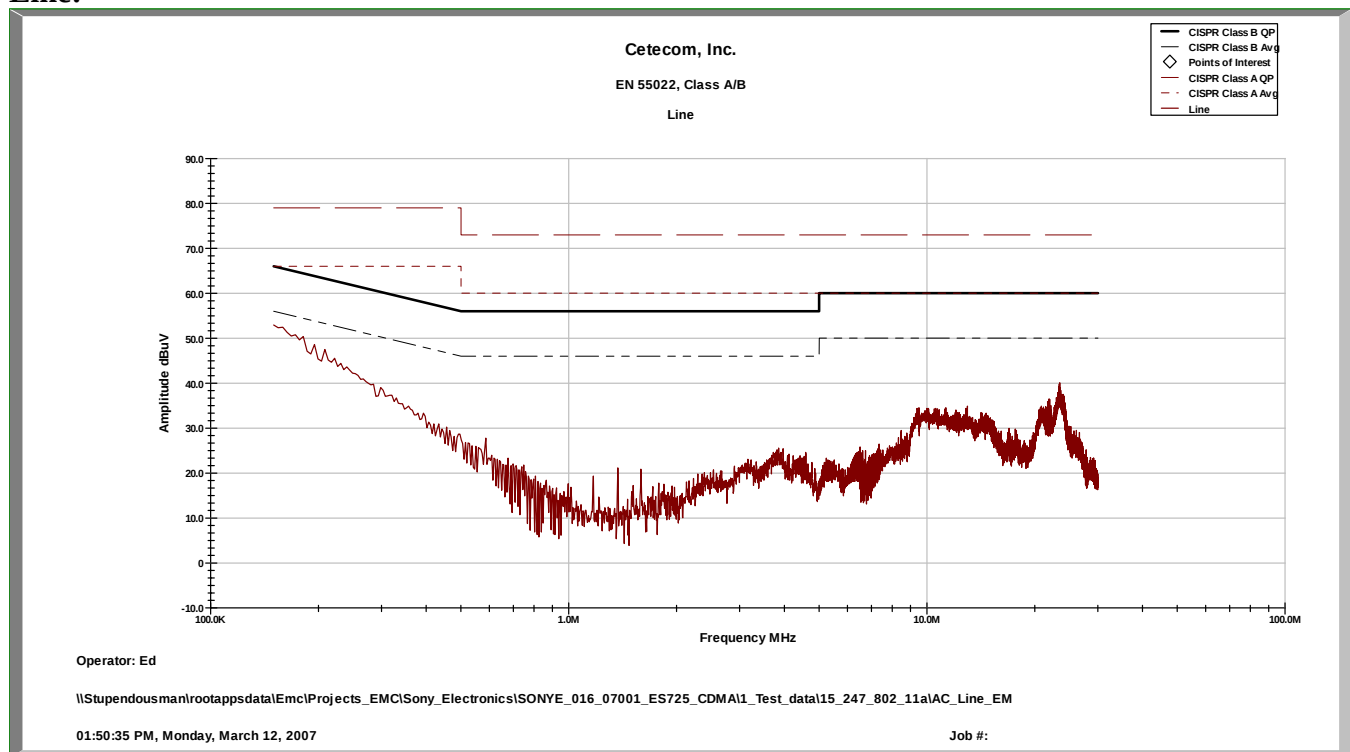
Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

ANALYZER SETTINGS: RBW = 10KHz

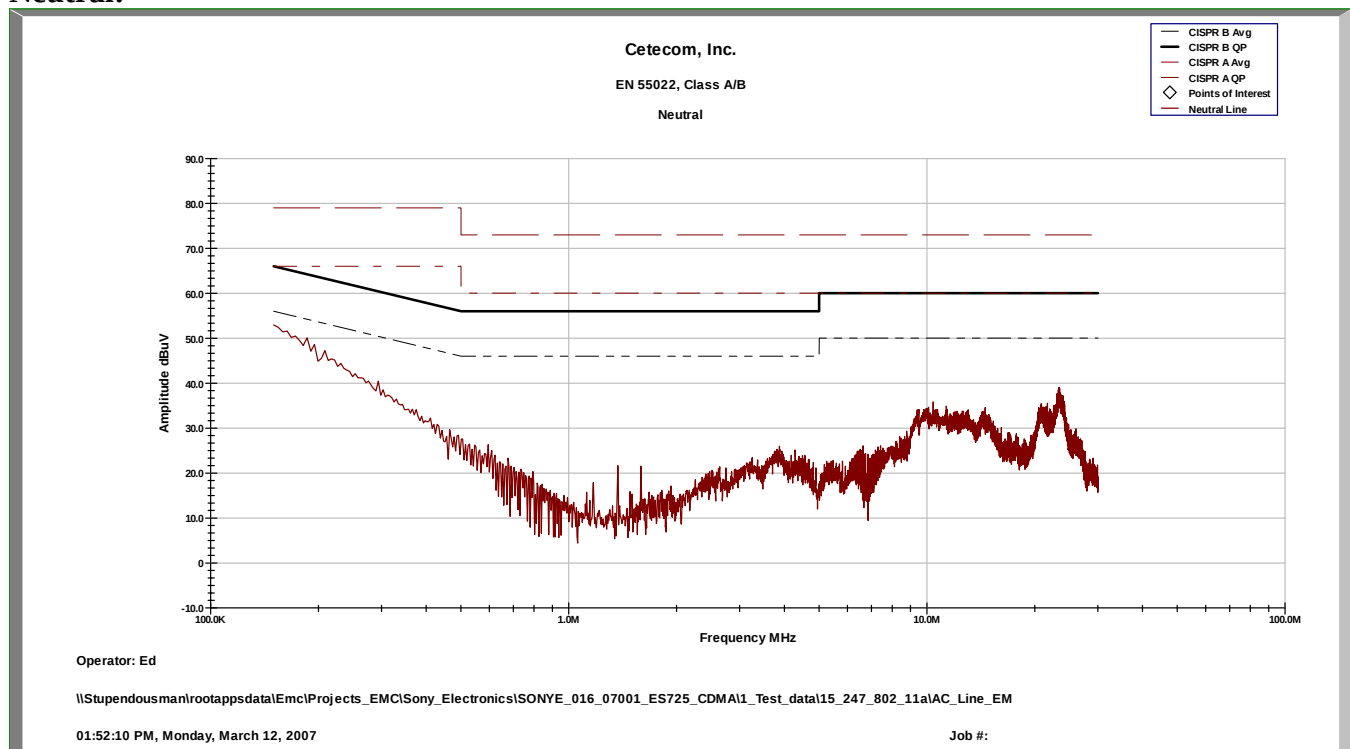
VBW = 10KHz

5.4.2 RESULTS

Line:



Neutral:





6 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

6.1 BLOCK DIAGRAMS

Radiated Testing

