



# FCC Test Report

## FCC Part 22, 24

for the  
**Sierra Wireless**  
**850/900/1800/1900/2100 MHz Multiband Module**  
**FCC ID: N7NMC8775-L**  
Installed in  
**Model Number: Thinkpad T61 15.4-inch widescreen**

TEST REPORT #:CET10\_007\_07501\_FCC22\_24RADIATED\_rev1  
DATE: 4/17/2007



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 Ansoerge, 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 Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations.

Company	Description	Model #
Sierra Wireless	850/900/1800/1900/2100 MHz Multiband Module	MC8775

4/17/2007    EMC & Radio    **Pete Krebill  
(EMC Engineer)**

---

**Date                      Section                      Name Author                      Signature**

Technical responsibility for area of testing:

4/17/2007    EMC & Radio    **Peter Mu  
(Project Engineer)**

---

**Date                      Section                      Name Authorizing                      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 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:	Sierra Wireless
Address:	2290 Cosmos Ct. Carlsbad, CA, USA
Contact Person:	Ying Wang
Phone No.	604-232-1440
Fax:	604-231-1109
e-mail:	ywang@sierrawireless.com

### 2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as applicant
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### **3 Equipment under Test (EUT)**

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

Product Type	850/900/1800/1900/2100 MHz Multiband Module
Marketing Name:	Thinkpad T61 15.4-inch widescreen
Model No:	MC8775
FCC-ID:	N7NMC8775-L
Frequency Range:	824.2 MHz to 848.8 MHz & 1850.2 MHz to 1909.8 MHz
Type(s) of Modulation:	GPRS/EGRPS/WCDMA/WCDMA+HSDPA
Output Power:	850 MHz band ERP 24.42dBm (0.277W) @ 836.6 MHz 1900 MHz band EIRP 24.04dBm (0.254W) @ 1880 MHz

## **4 Subject of Investigation**

All testing was performed on the EUT listed in Section 3. The EUT was installed in a Lenovo Thinkpad T61 15.4-inch widescreen laptop PC.

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 Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations. The maximization of portable equipment is conducted in accordance with ANSI C63.4.

All data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

The device has GPRS/EGRPS/WCDMA/WCDMA+HSDPA operating modes. All of these modes use the same antenna. GPRS mode has the highest output power and highest emissions. The testing in this report shows emission results for GPRS mode.

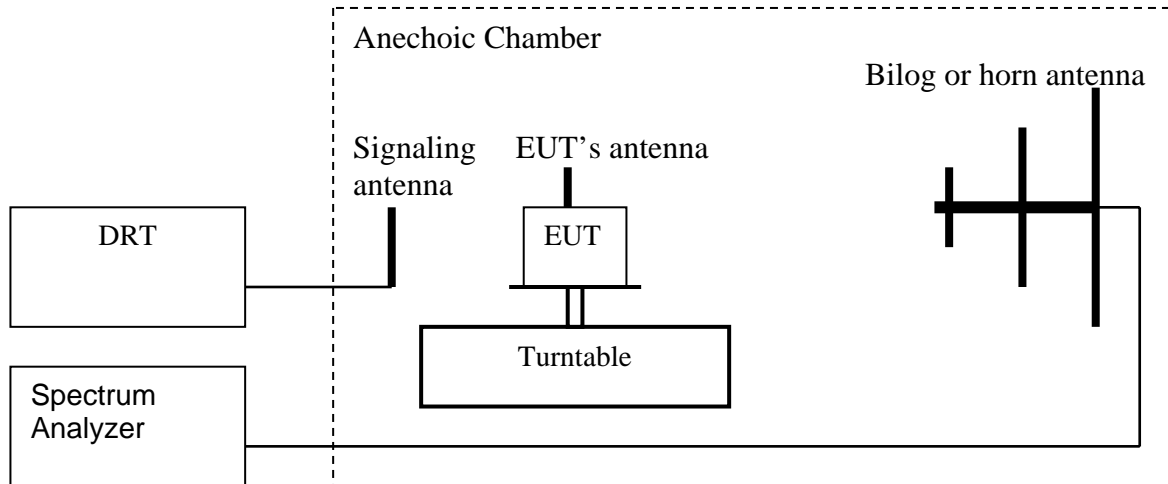
## 5 Measurements

### 5.1 RF Power Output

#### Radiated Output Power measurement procedure:

Based on TIA-603C 2004

#### 2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



Connect the equipment as shown in the above diagram with the EUT's antenna in a vertical orientation.

Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.

Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.

Rotate the EUT 360°. Record the peak level in dBm (**LVL**).

Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.

Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS**). **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).

Determine the ERP using the following equation:

$$\mathbf{ERP} \text{ (dBm)} = \mathbf{LVL} \text{ (dBm)} + \mathbf{LOSS} \text{ (dB)}$$

Determine the EIRP using the following equation:

$$\mathbf{EIRP} \text{ (dBm)} = \mathbf{ERP} \text{ (dBm)} + 2.14 \text{ (dB)}$$

Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band. **Spectrum analyzer settings = rbw=vbw=3MHz**

(**note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)

**ERP Results GPRS 850 MHz band:**

<b>Power Control Level</b>	<b>Burst Peak ERP</b>
5	≤38.45dBm (7W)

<b>Frequency (MHz)</b>	<b>Effective Radiated Power (dBm)</b>
	<b>GPRS</b>
824.2	23.72
836.6	24.42
848.8	24.36

**ERP Results EGPRS 850 MHz band:**

<b>Power Control Level</b>	<b>Burst Peak ERP</b>
5	≤38.45dBm (7W)

<b>Frequency (MHz)</b>	<b>Effective Radiated Power (dBm)</b>
	<b>EGPRS</b>
824.2	22.54
836.6	22.61
848.8	23.18

**ERP Results FDD5 band:**

	<b>Burst Peak ERP</b>
	≤38.45dBm (7W)

<b>Frequency (MHz)</b>	<b>Effective Radiated Power (dBm)</b>
	<b>WCDMA</b>
826.4	20.54
836.6	20.66
846.6	21.69

**ERP Results FDD5 HSDPA band:**

	<b>Burst Peak ERP</b>
	≤38.45dBm (7W)

<b>Frequency (MHz)</b>	<b>Effective Radiated Power (dBm)</b>
	<b>WCDMA + HSDPA</b>
826.4	20.34
836.6	20.54
846.6	21.69



**EIRP Results GPRS 1900 MHz band:**

<b>Power Control Level</b>	<b>Burst Peak EIRP</b>
0	≤33dBm (2W)

<b>Frequency (MHz)</b>	<b>Equivalent Isotropic Radiated Power (dBm)</b>
	<b>GPRS</b>
1850.2	23.91
1880.0	24.04
1909.8	24.00

**EIRP Results EGPRS 1900 MHz band:**

<b>Power Control Level</b>	<b>Burst Peak EIRP</b>
0	≤33dBm (2W)

<b>Frequency (MHz)</b>	<b>Equivalent Isotropic Radiated Power (dBm)</b>
	<b>EGPRS</b>
1850.2	21.39
1880.0	21.61
1909.8	21.75

**EIRP Results FDD2 band:**

	<b>Burst Peak EIRP</b>
	≤33dBm (2W)

<b>Frequency (MHz)</b>	<b>Equivalent Isotropic Radiated Power (dBm)</b>
	<b>WCDMA</b>
1852.4	23.33
1880.0	23.63
1907.6	23.8

**EIRP Results FDD2 HSDPA band:**

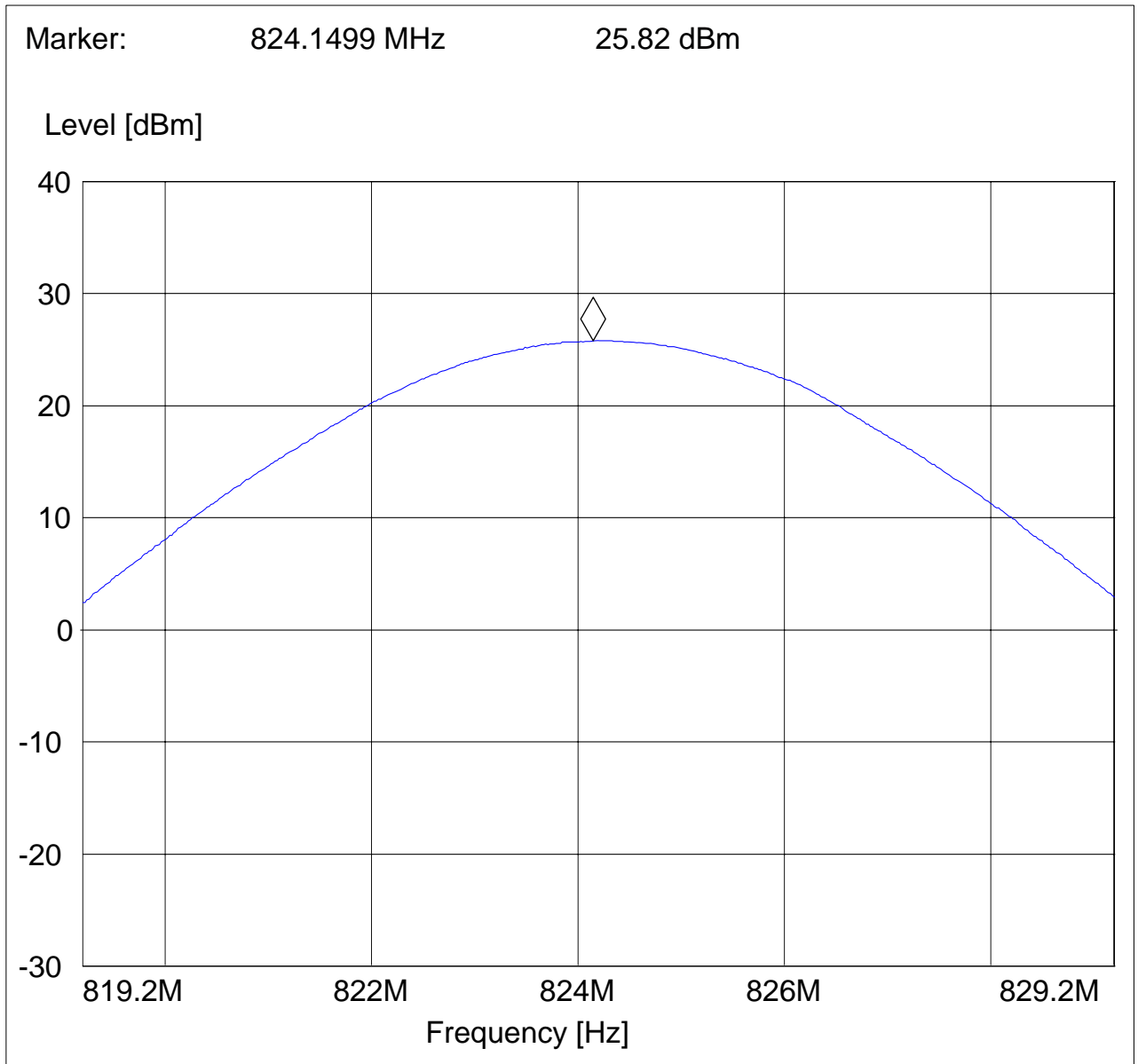
	<b>Burst Peak EIRP</b>
	≤33dBm (2W)

<b>Frequency (MHz)</b>	<b>Equivalent Isotropic Radiated Power (dBm)</b>
	<b>WCDMA + HSDPA</b>
1852.4	23.2
1880.0	23.44
1907.6	23.46



**EIRP (GSM 850) §22.913(a)**  
**CHANNEL 128 GPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3  
Customer: Lenovo  
Test Mode: GSM850  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed

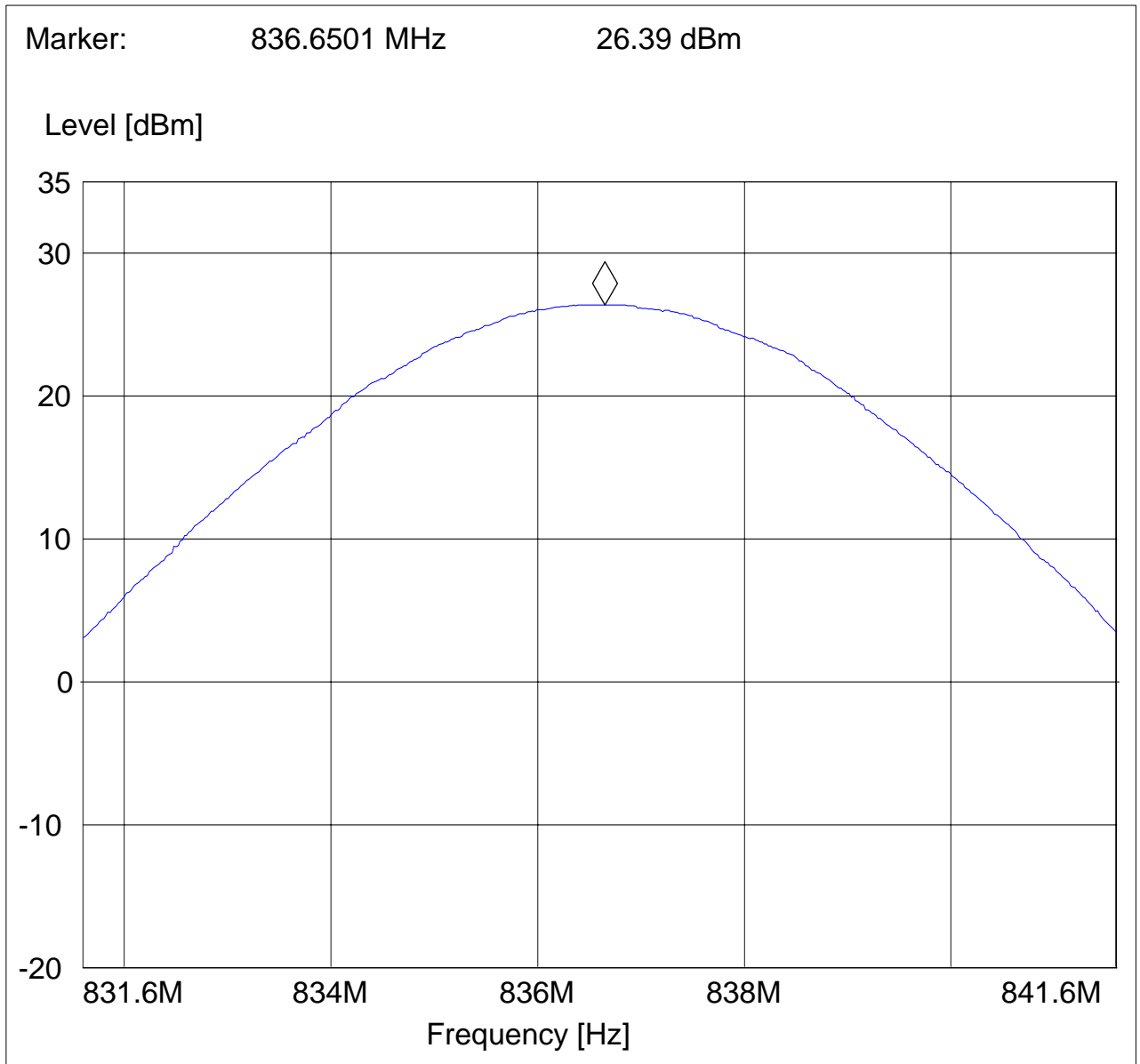
***SWEEP TABLE: "EIRP 850 CH 128 H"***





**EIRP (GSM 850) §22.913(a)**  
**CHANNEL 190 GPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3  
Customer: Lenovo  
Test Mode: GSM850  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed

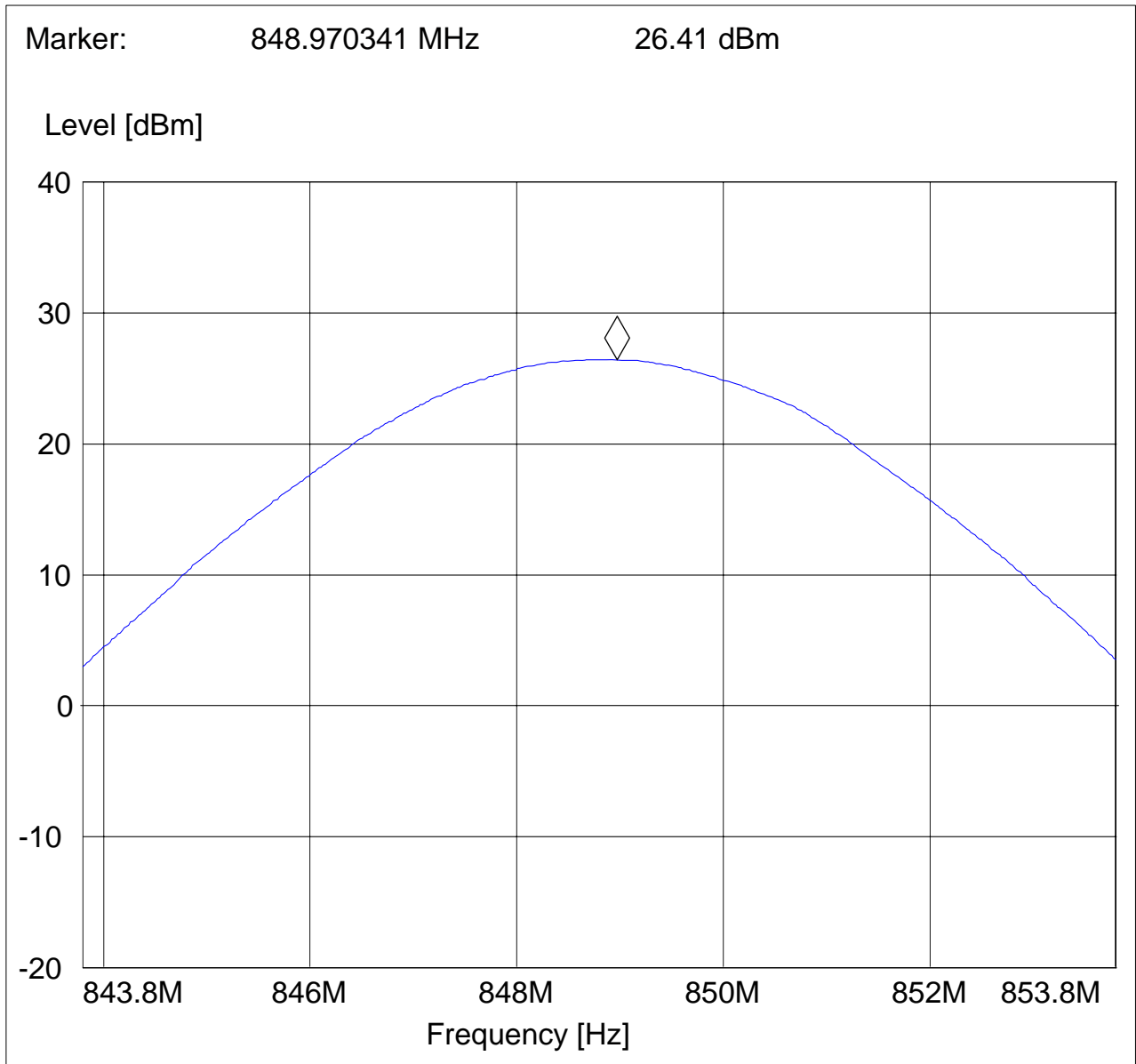
**SWEEP TABLE: "EIRP 850 CH 190 H"**





**EIRP (GSM 850) §22.913(a)**  
**CHANNEL 251 GPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3  
Customer: Lenovo  
Test Mode: GSM850  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed

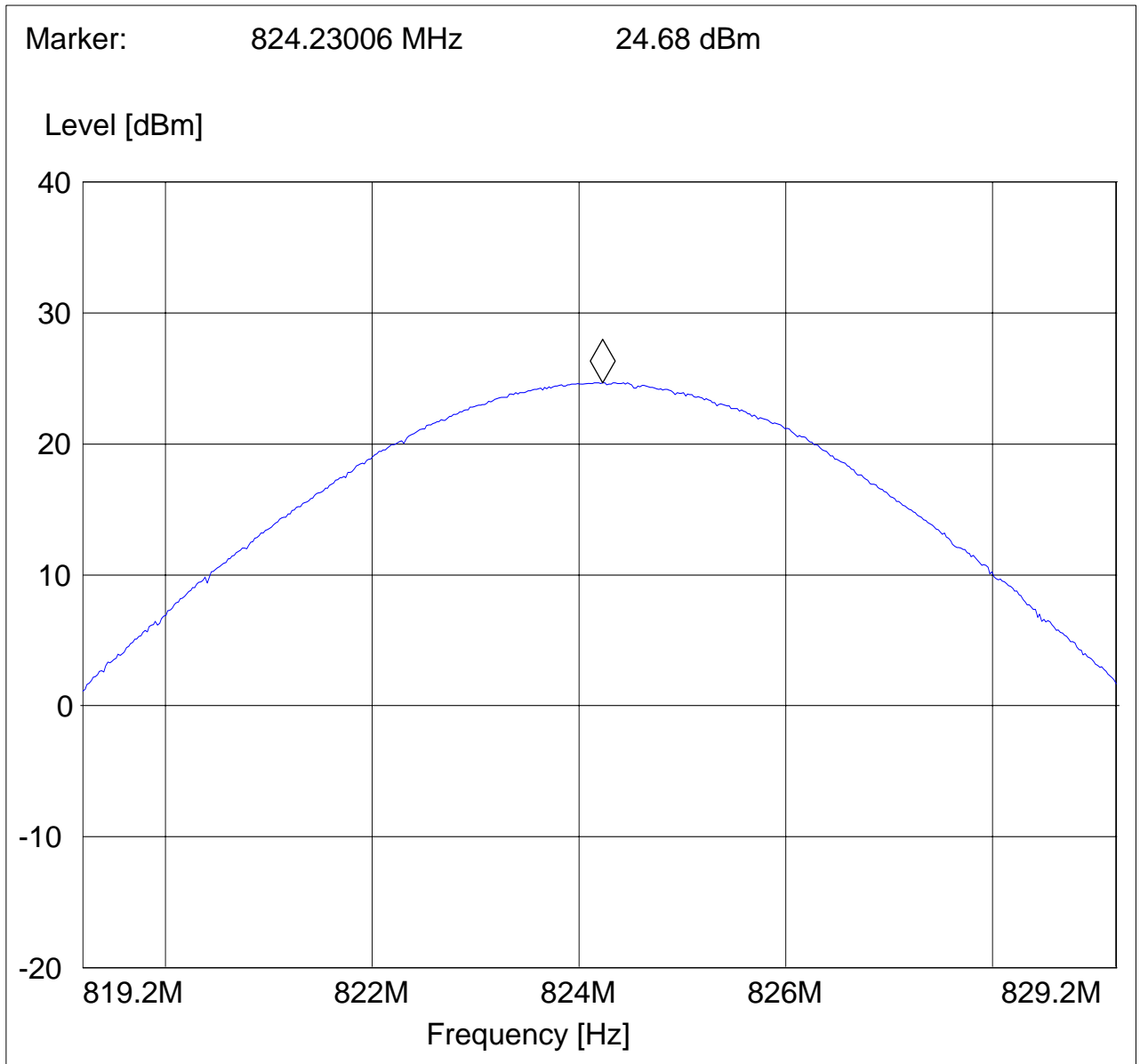
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**EIRP (GSM 850) §22.913(a)**  
**CHANNEL 128 EGPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: EDGE 850 ch 128  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

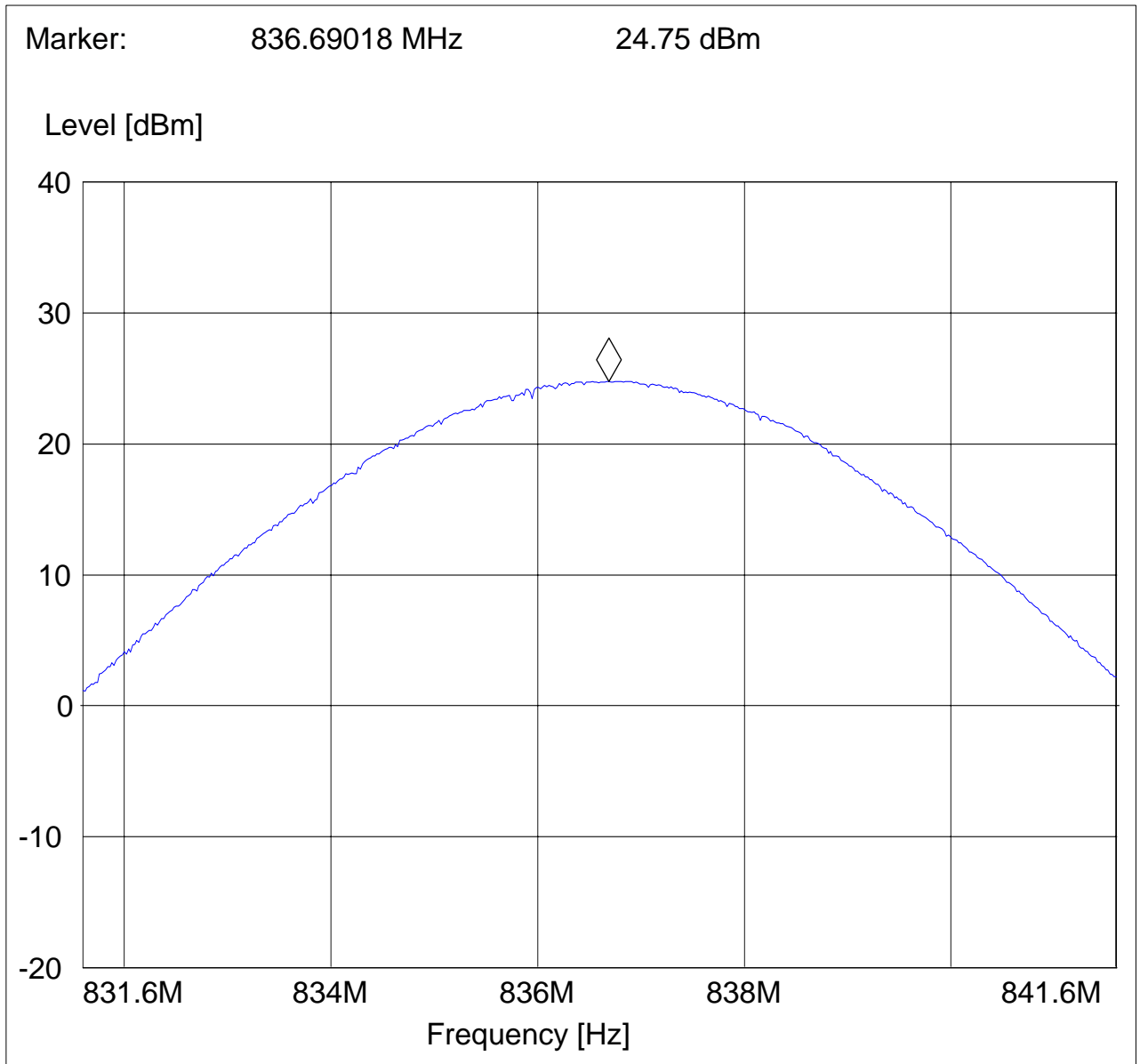
**SWEEP TABLE: "EIRP 850 CH 128 H"**





**EIRP (GSM 850) §22.913(a)**  
**CHANNEL 190 EGPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: EDGE 850 ch 190  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

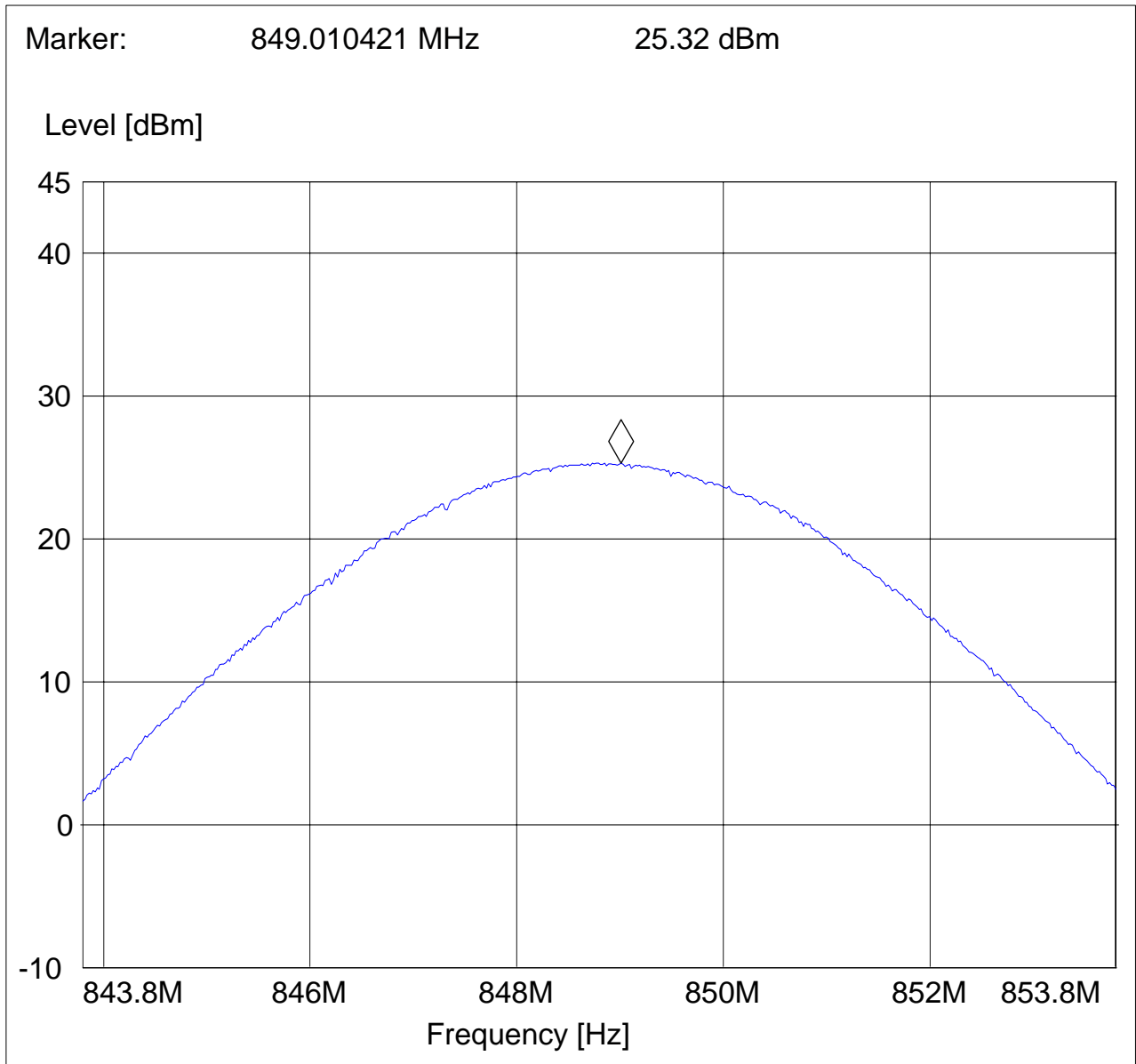
**SWEEP TABLE: "EIRP 850 CH 190 H"**





**EIRP (GSM 850) §22.913(a)**  
**CHANNEL 251 EGPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: EDGE 850 ch 251  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

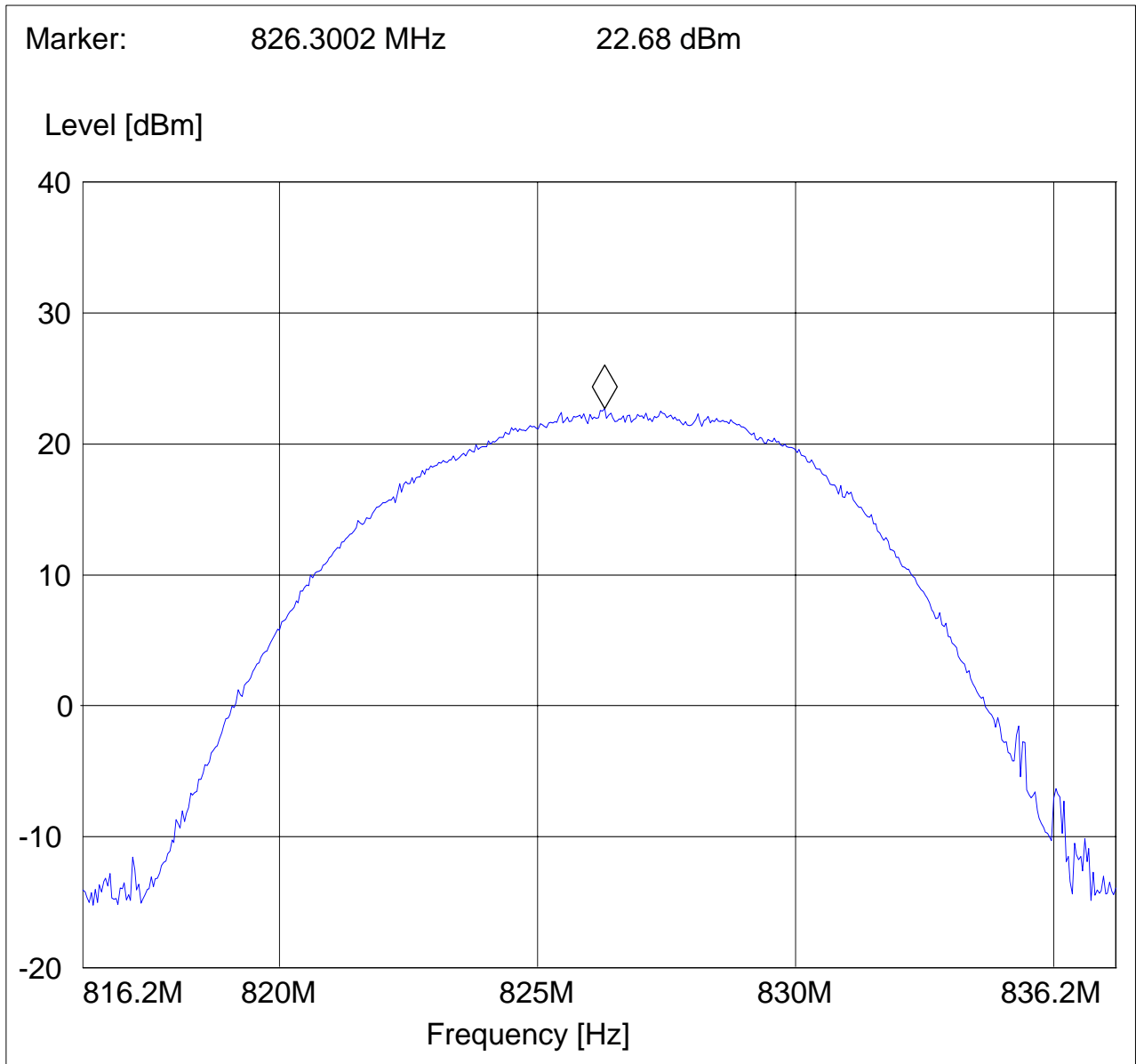
**SWEEP TABLE: "EIRP 850 CH 251 H"**





**EIRP FDD5 §22.913(a)**  
**CHANNEL 4132 WCDMA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 5 ch 4132 RMC 12.2k  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

**SWEEP TABLE: "EIRP WCDMA CH4132H"**

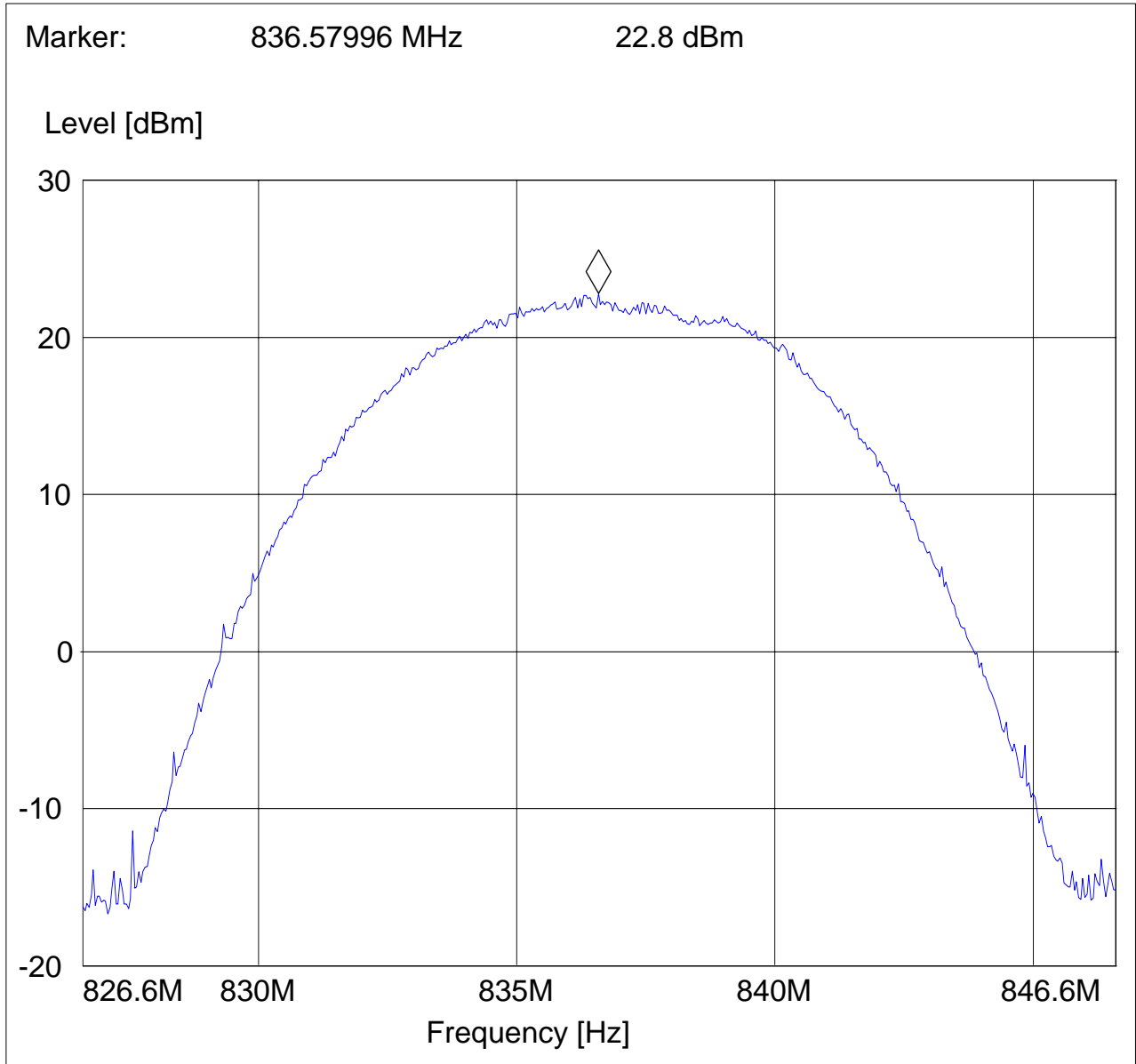






**EIRP FDD5 §22.913(a)**  
**CHANNEL 4183 WCDMA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 5 ch 4183 RMC 12.2k  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

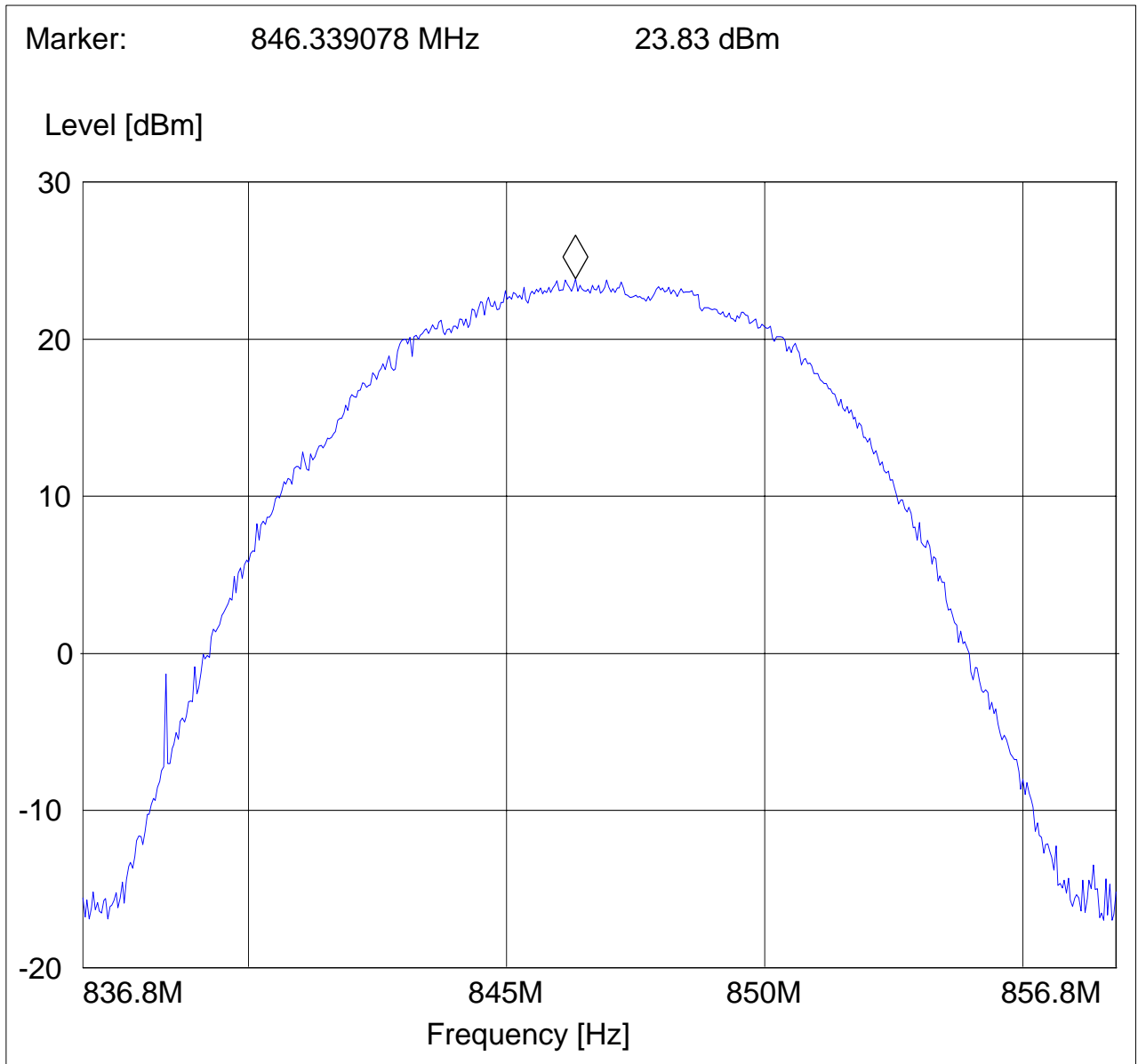
**SWEEP TABLE: "EIRP WCDMA CH4182H"**





**EIRP FDD5 §22.913(a)**  
**CHANNEL 4233 WCDMA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 5 ch 4233 RMC 12.2k  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

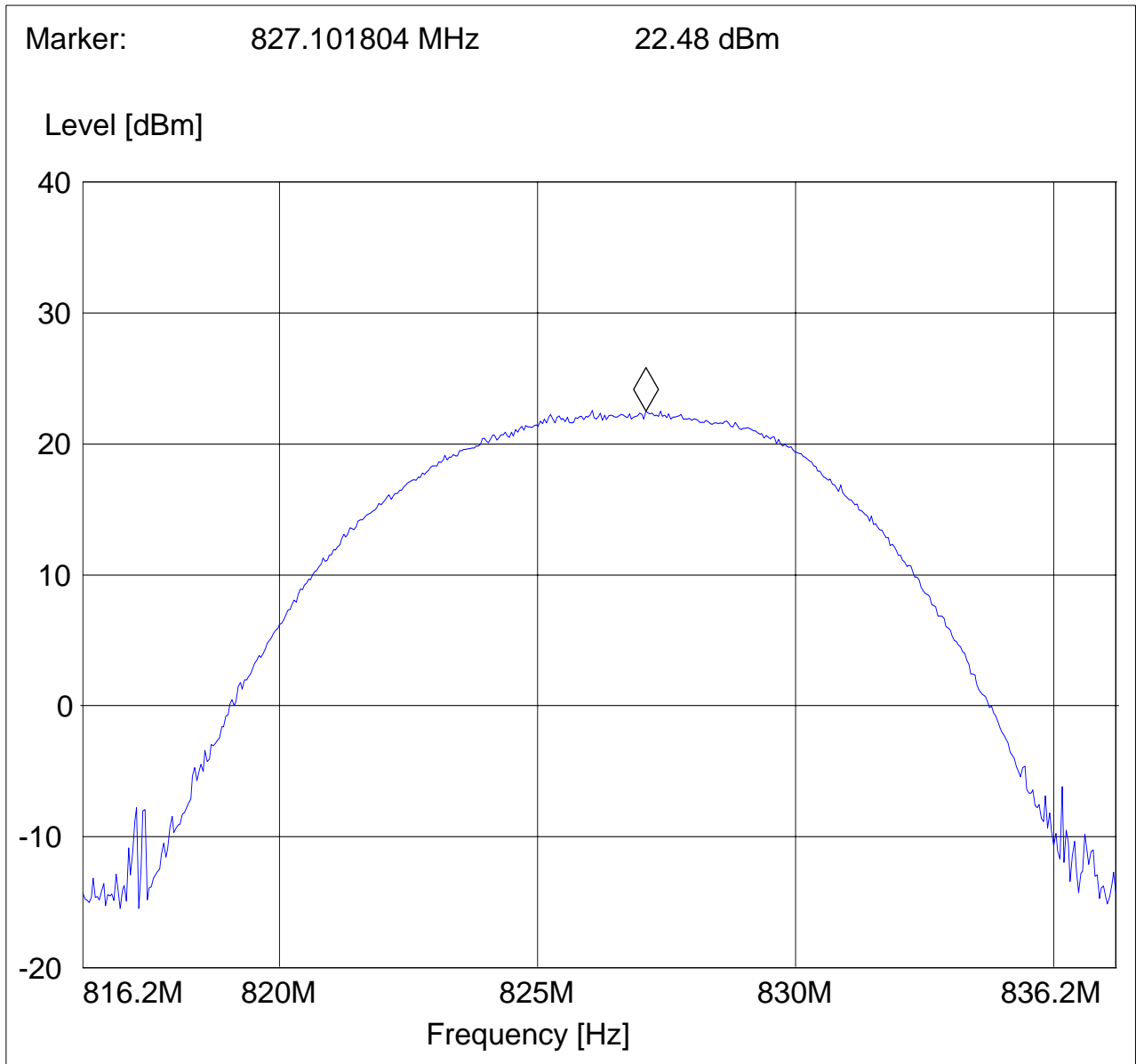
**SWEEP TABLE: "EIRP WCDMA CH4233H"**





**EIRP FDD5 §22.913(a)**  
**CHANNEL 4132 WCDMA+ HSDPA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 5 ch 4132 RMC 12.2k w/ HSDPA  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

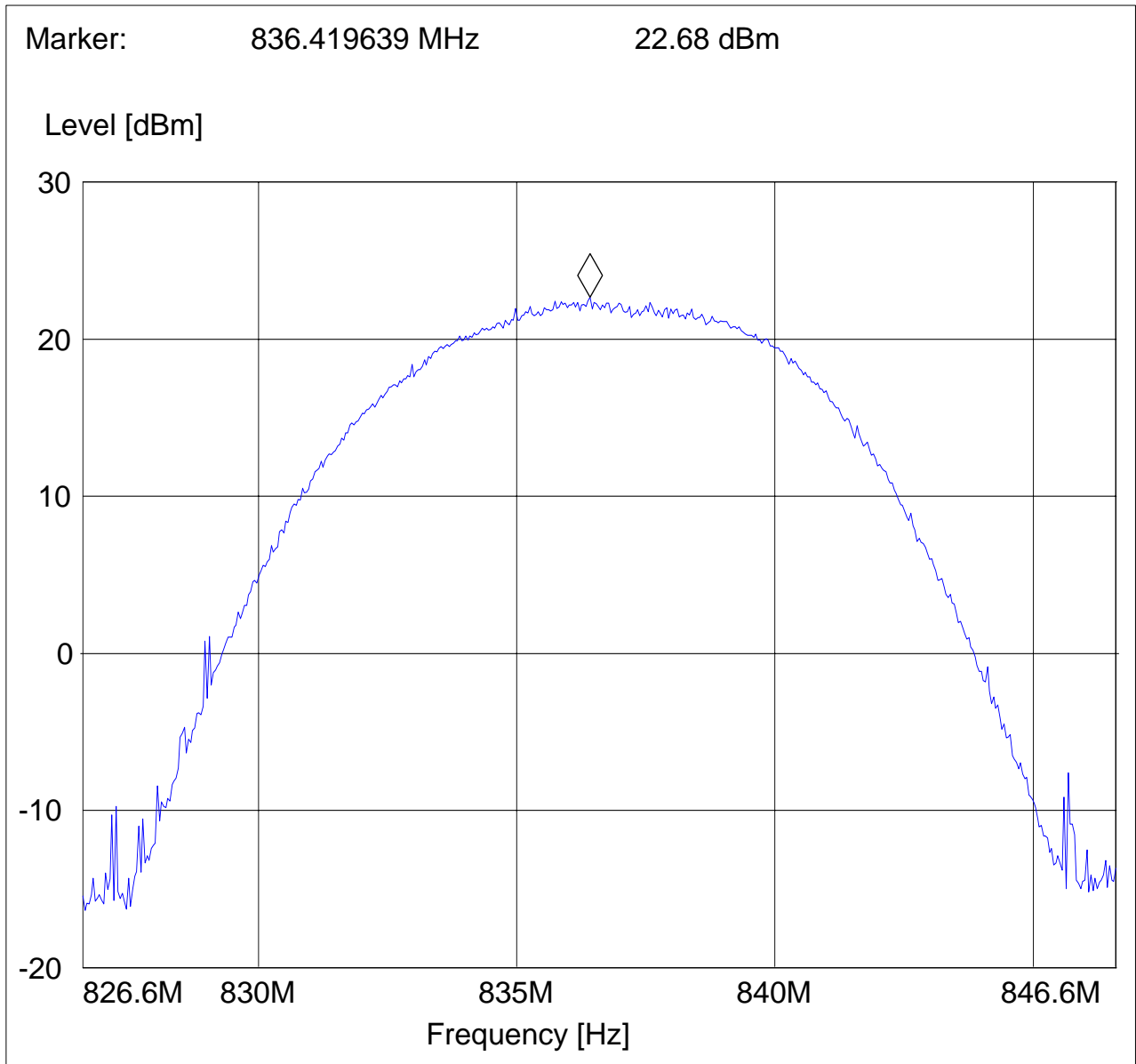
**SWEEP TABLE: "EIRP WCDMA CH4132H"**





**EIRP FDD5 §22.913(a)**  
**CHANNEL 4183 WCDMA+ HSDPA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 5 ch 4183 RMC 12.2k w/ HSDPA  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

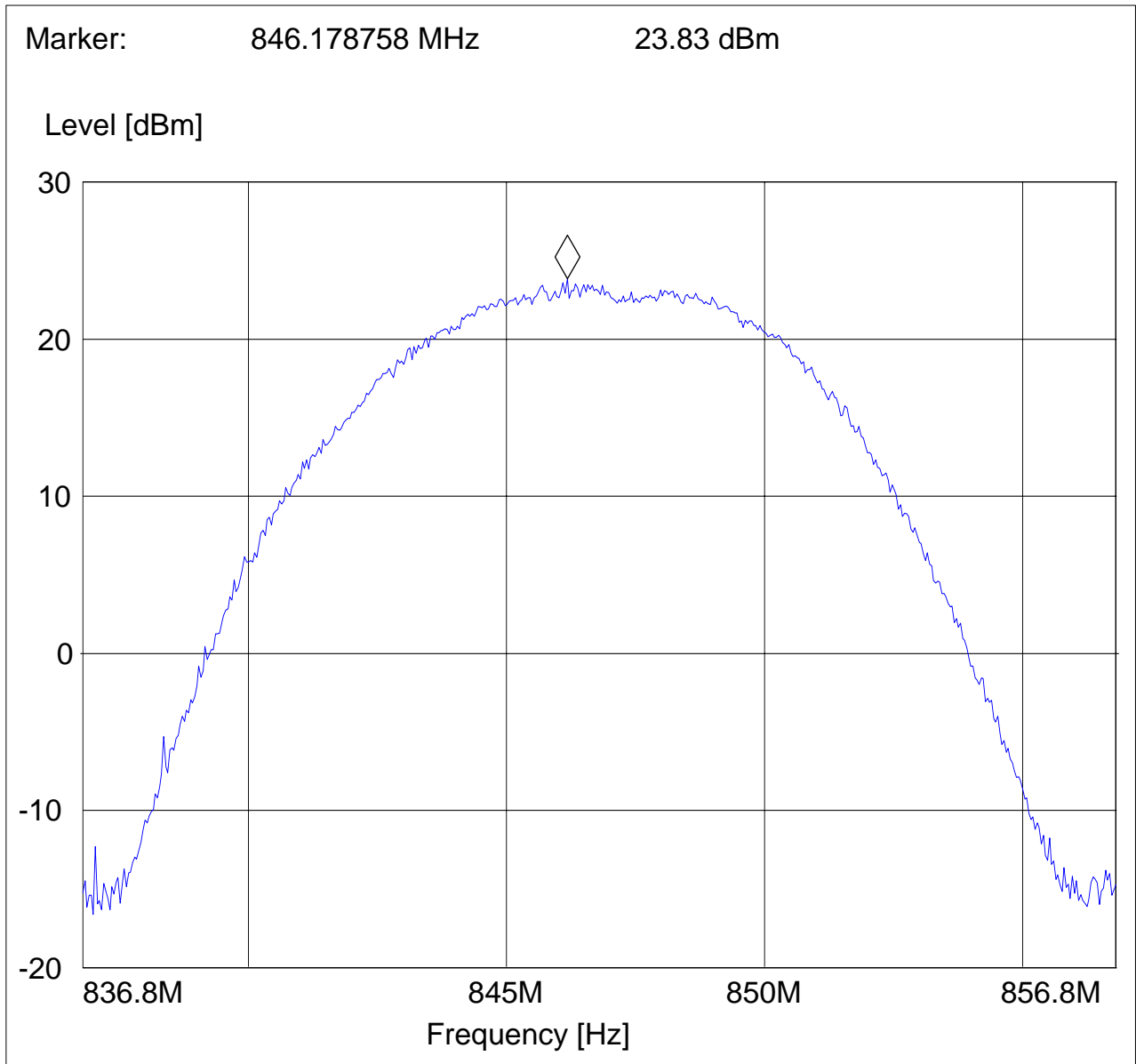
**SWEEP TABLE: "EIRP WCDMA CH4182H"**





**EIRP FDD5 §22.913(a)**  
**CHANNEL 4233 WCDMA + HSDPA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 5 ch 4233 RMC 12.2k w/ HSDPA  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

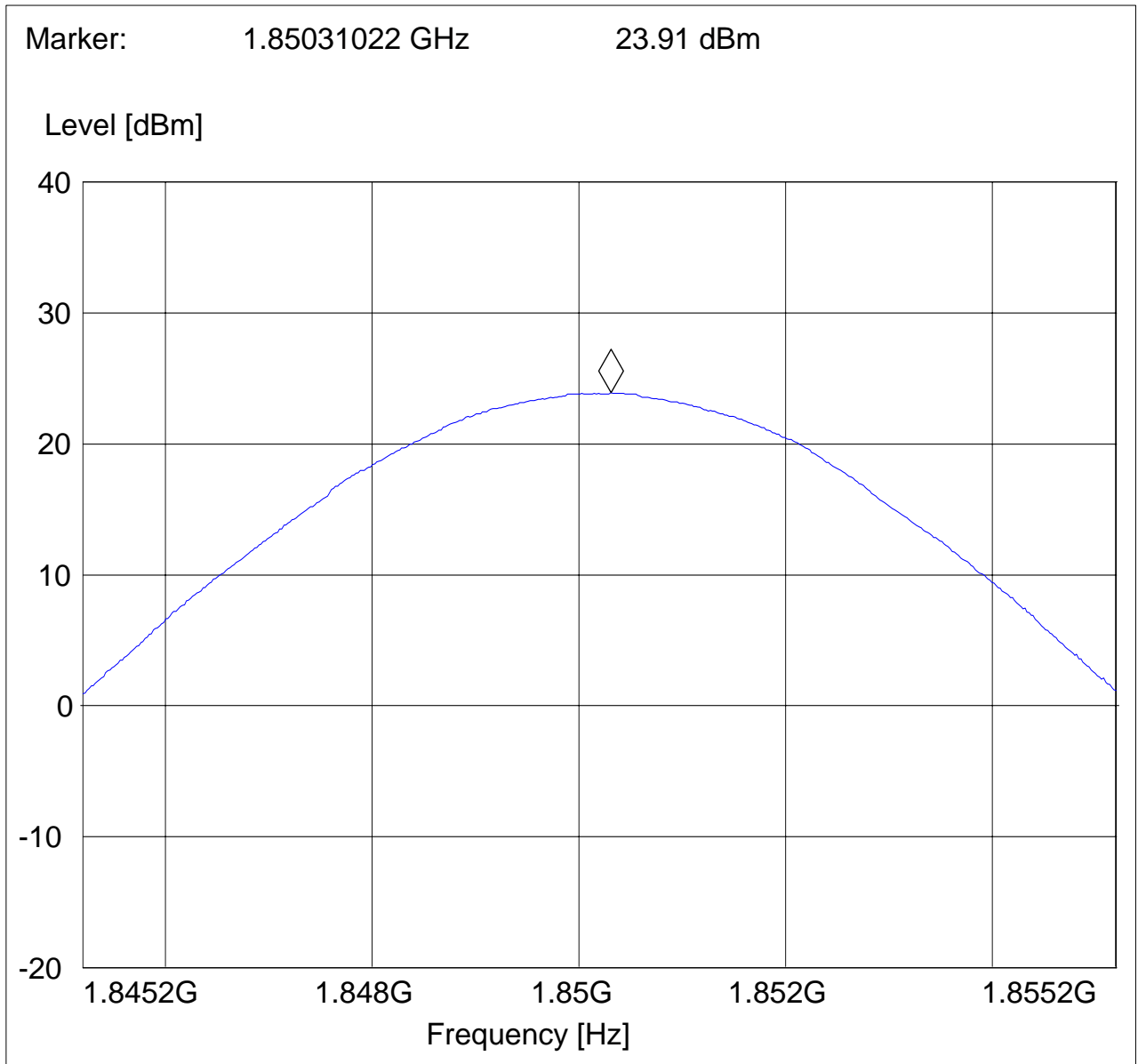
**SWEEP TABLE: "EIRP WCDMA CH4233H"**





**EIRP (PCS-1900) §24.232(b)**  
**CHANNEL 512 GPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3  
Customer: Lenovo  
Test Mode: GSM1900  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed

**SWEEP TABLE: "EIRP 1900 CH512"**

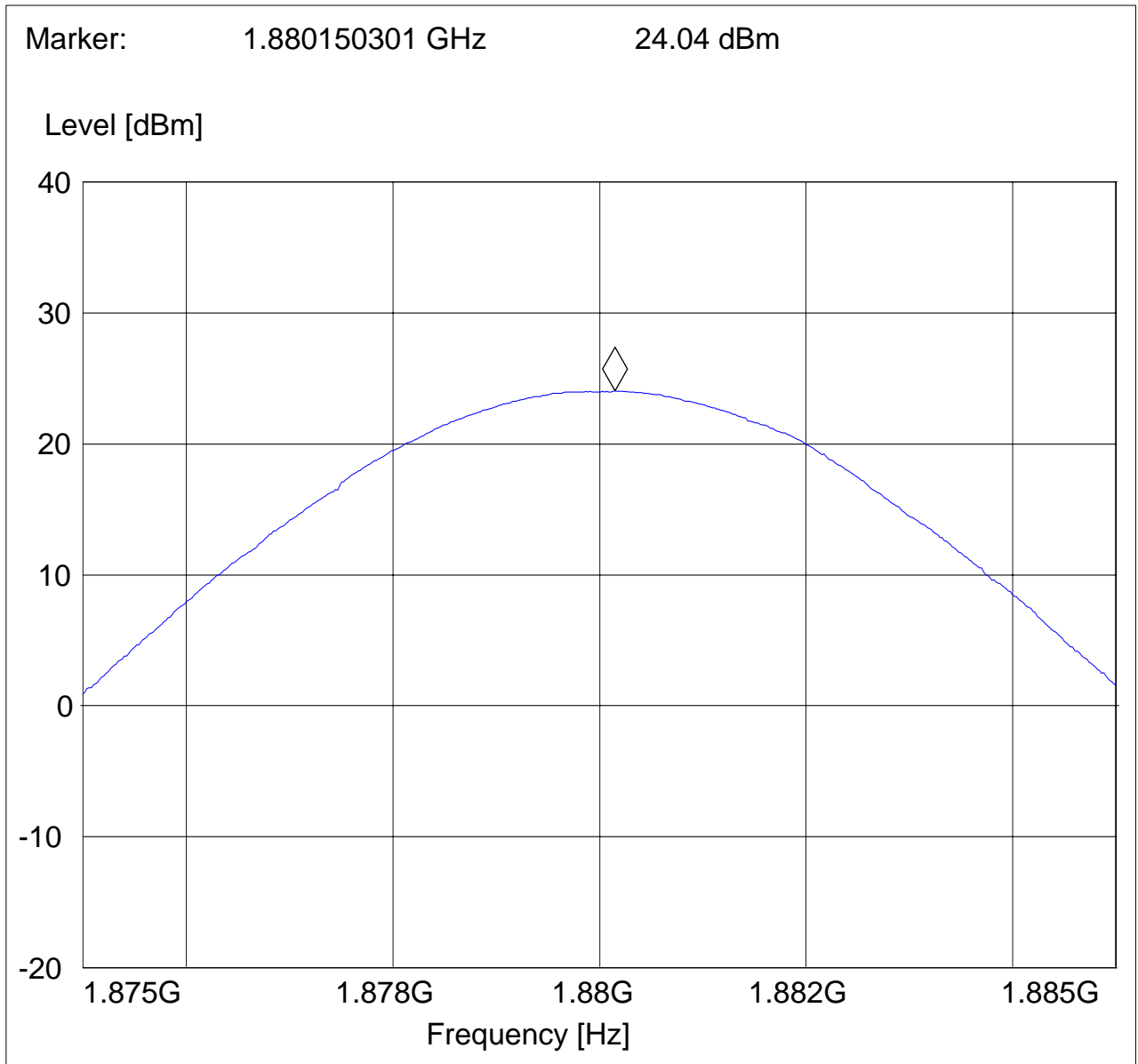




**EIRP (PCS-1900)**  
**CHANNEL 661 GPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3  
Customer: Lenovo  
Test Mode: GSM1900  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed

§24.232(b)

**SWEEP TABLE: "EIRP 1900 CH661"**



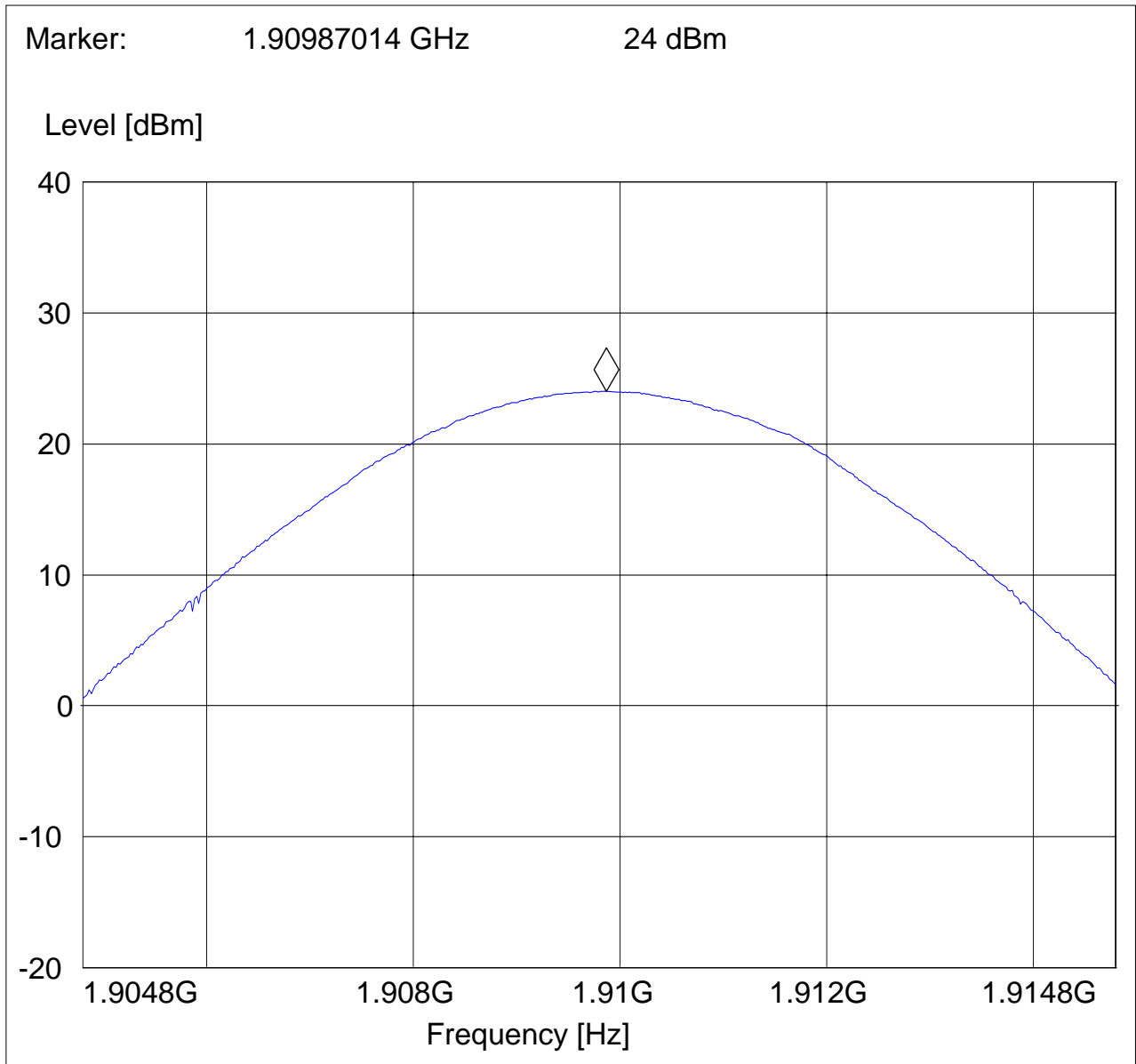
**EIRP (PCS-1900)  
CHANNEL 810 GPRS  
CETECOM Inc.**

§24.232(b)

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

EUT: C3  
Customer: Lenovo  
Test Mode: GSM1900  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed

**SWEEP TABLE: "EIRP 1900 CH810"**

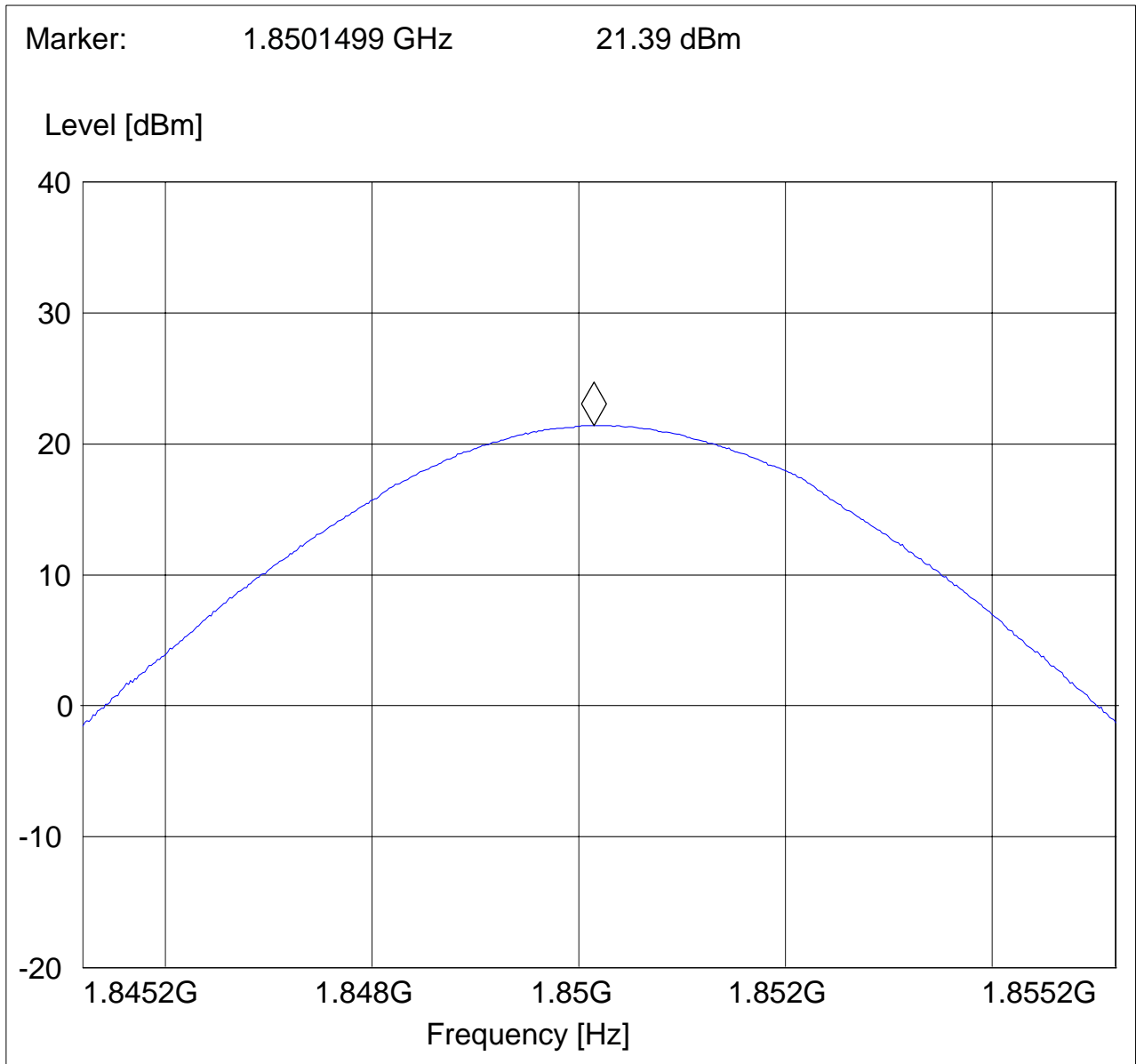






**EIRP (PCS-1900) §24.232(b)**  
**CHANNEL 512 EGPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: EDGE 1900 ch 512  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

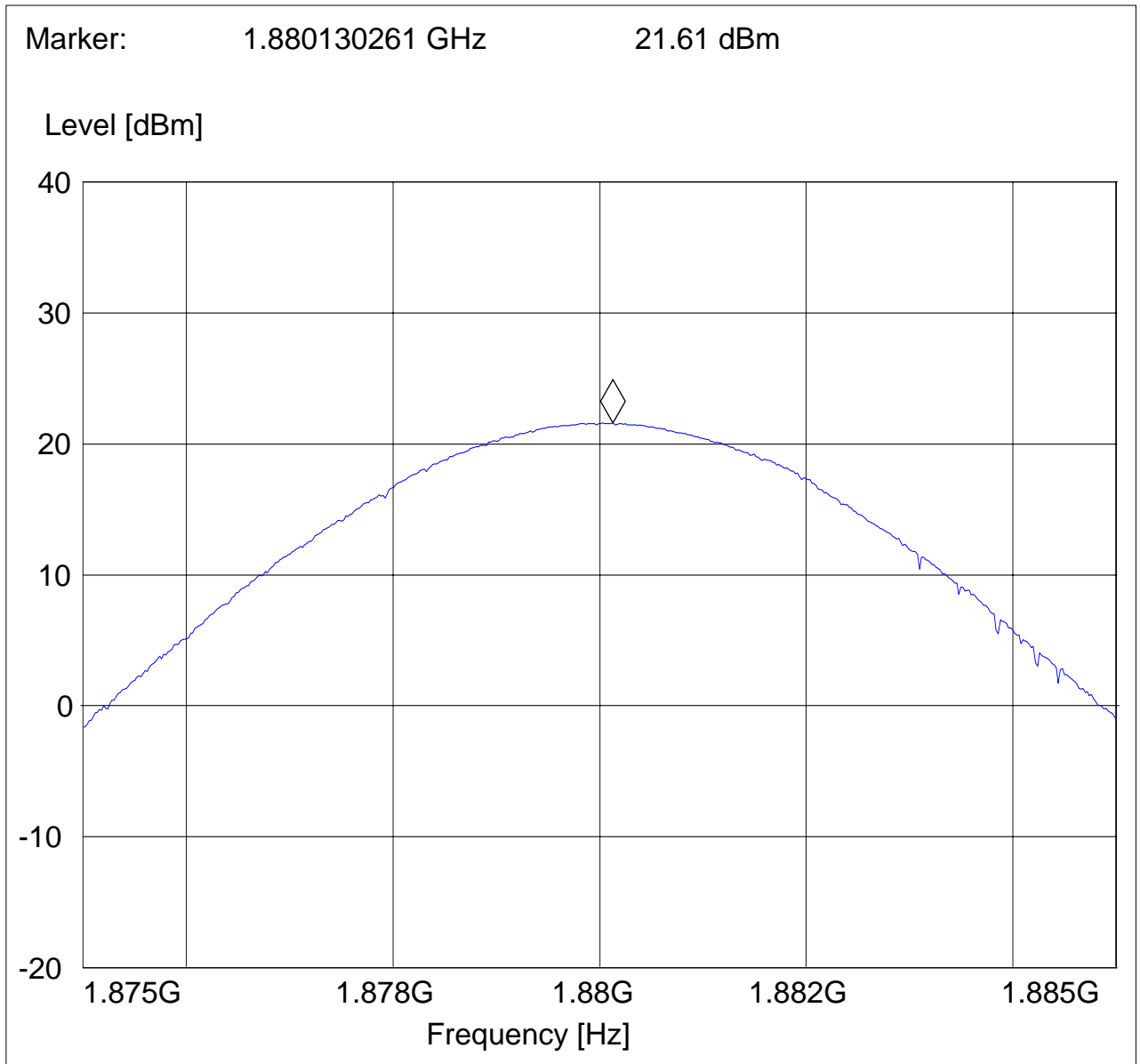
**SWEEP TABLE: "EIRP 1900 CH512"**





**EIRP (PCS-1900) §24.232(b)**  
**CHANNEL 661 EGPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: EDGE 1900 ch 661  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

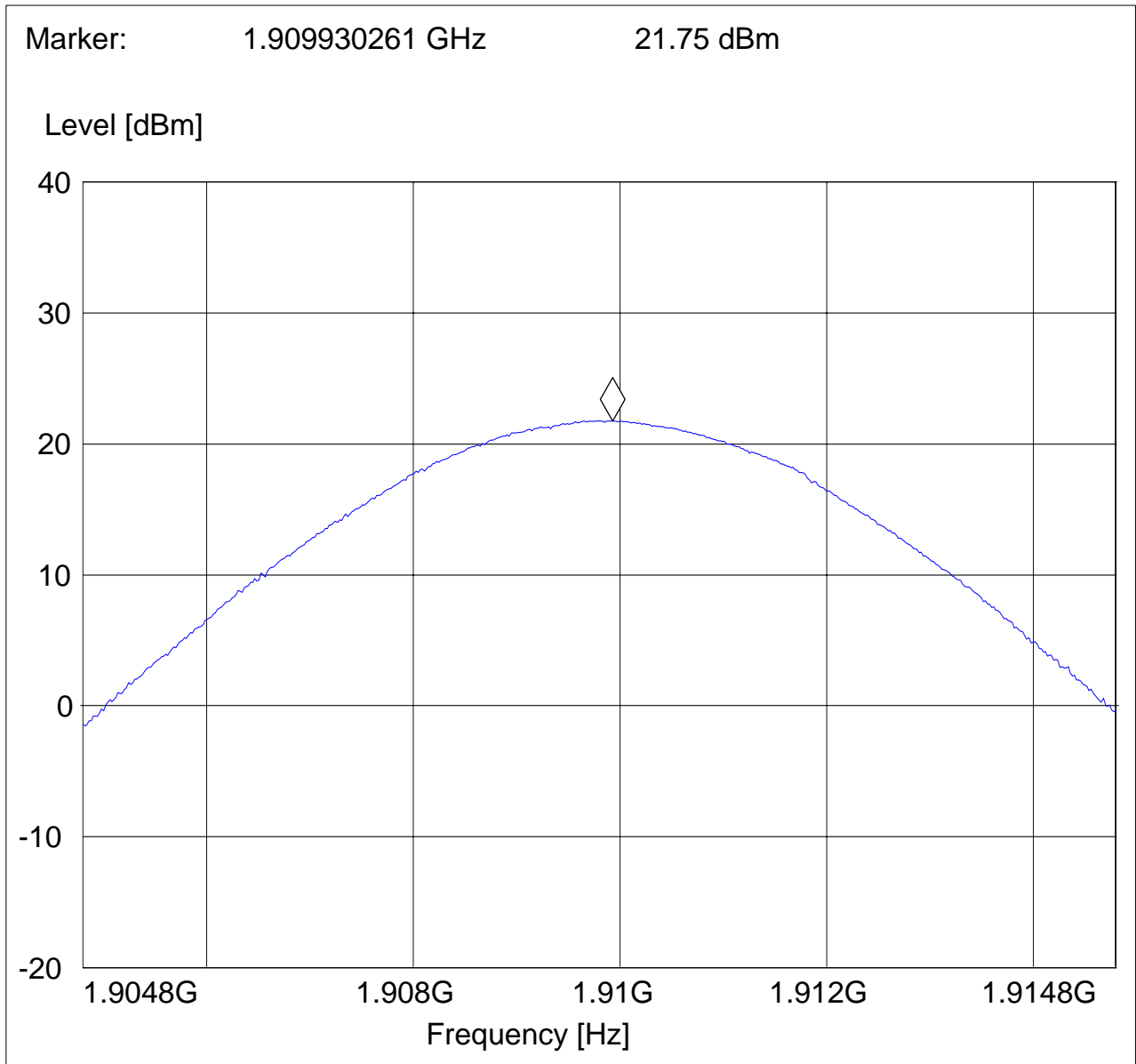
**SWEEP TABLE: "EIRP 1900 CH661"**





**EIRP (PCS-1900) §24.232(b)**  
**CHANNEL 810 EGPRS**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: EDGE 1900 ch 810  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

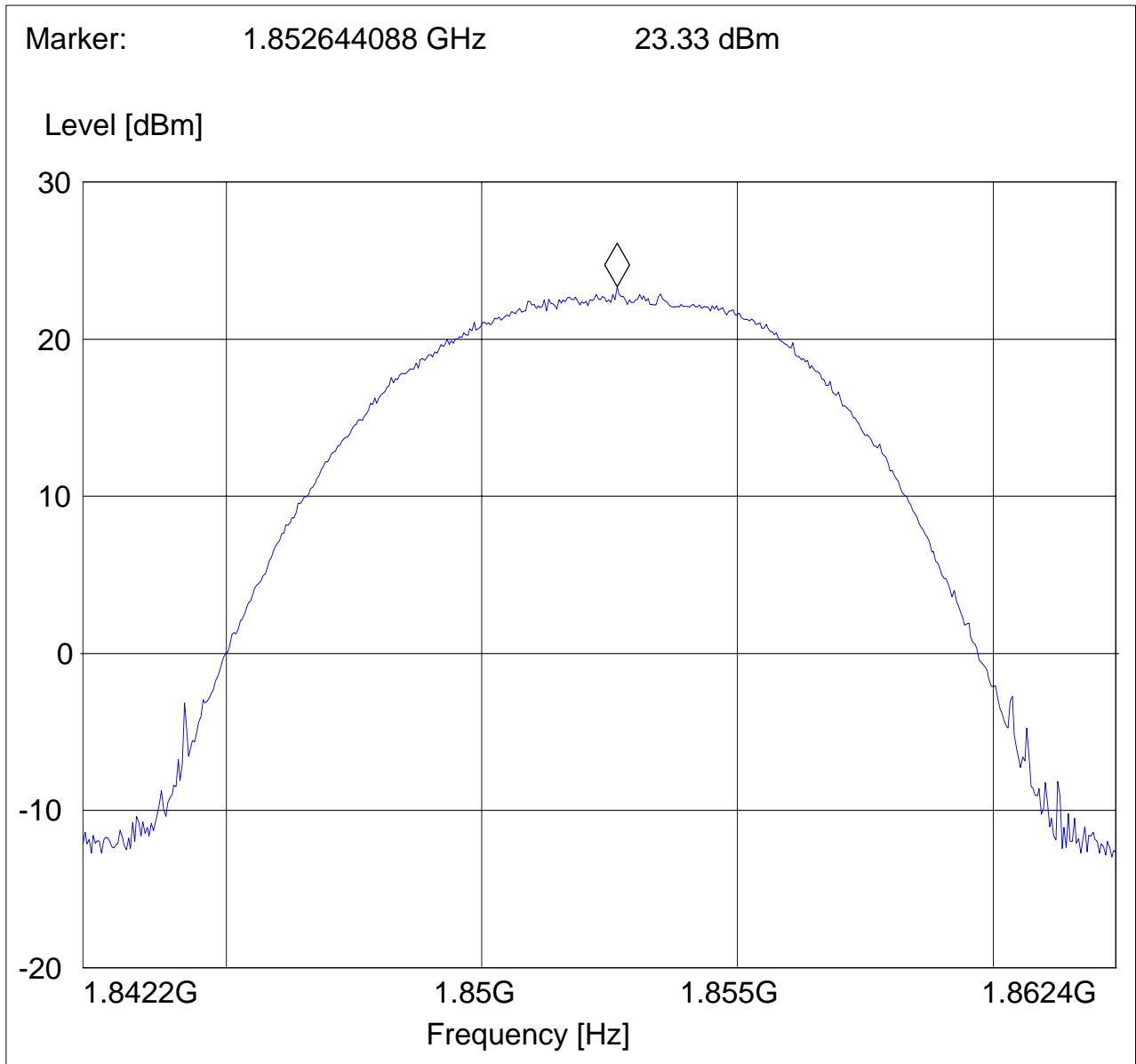
**SWEEP TABLE: "EIRP 1900 CH810"**





**EIRP FDD2 §24.232(b)**  
**CHANNEL 9262 WCDMA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 2 ch 9262 RMC 12.2k  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

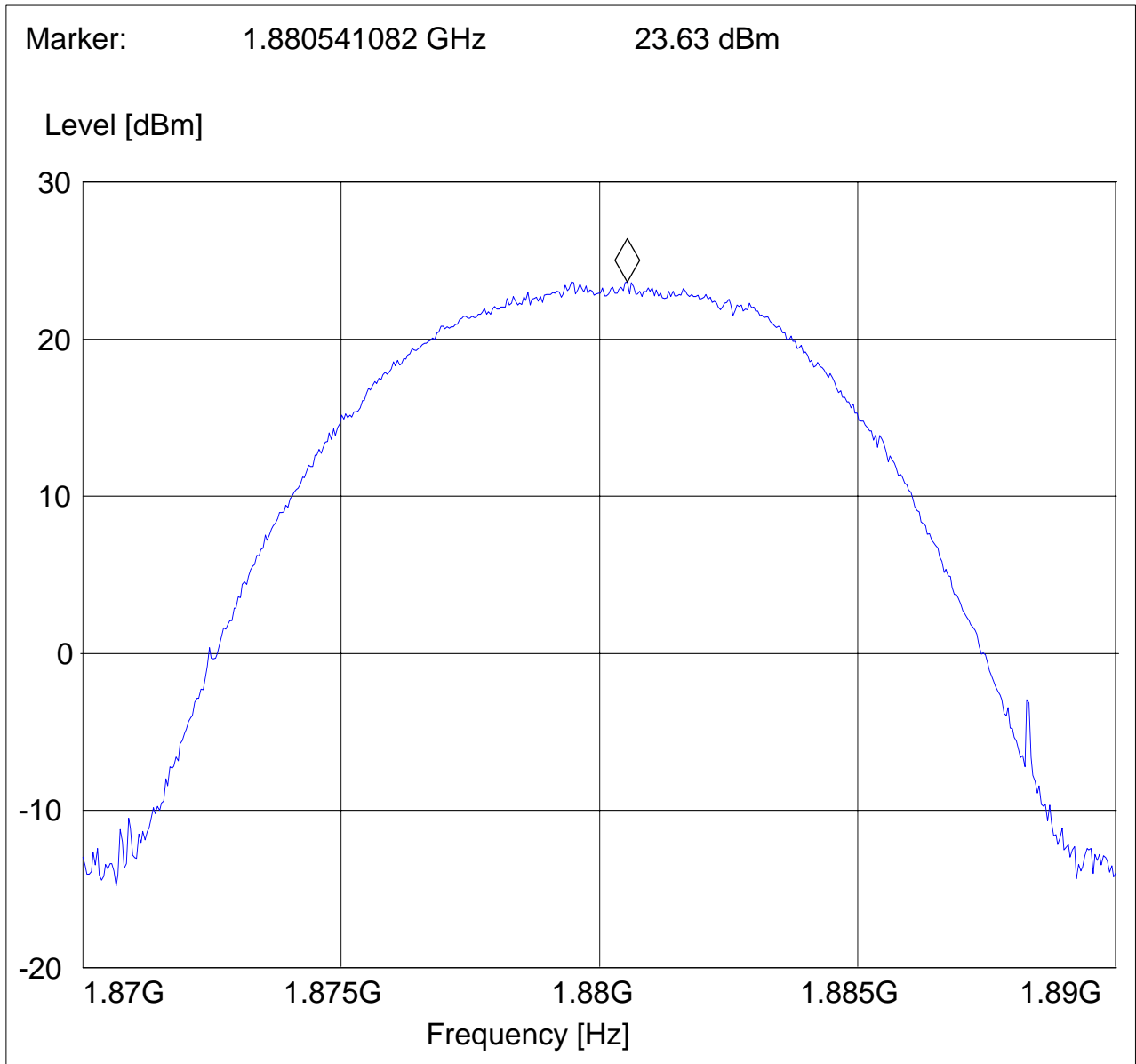
**SWEEP TABLE: "EIRP WCDMA CH9262"**





**EIRP FDD2 §24.232(b)**  
**CHANNEL 9400 WCDMA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 2 ch 9400 RMC 12.2k  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

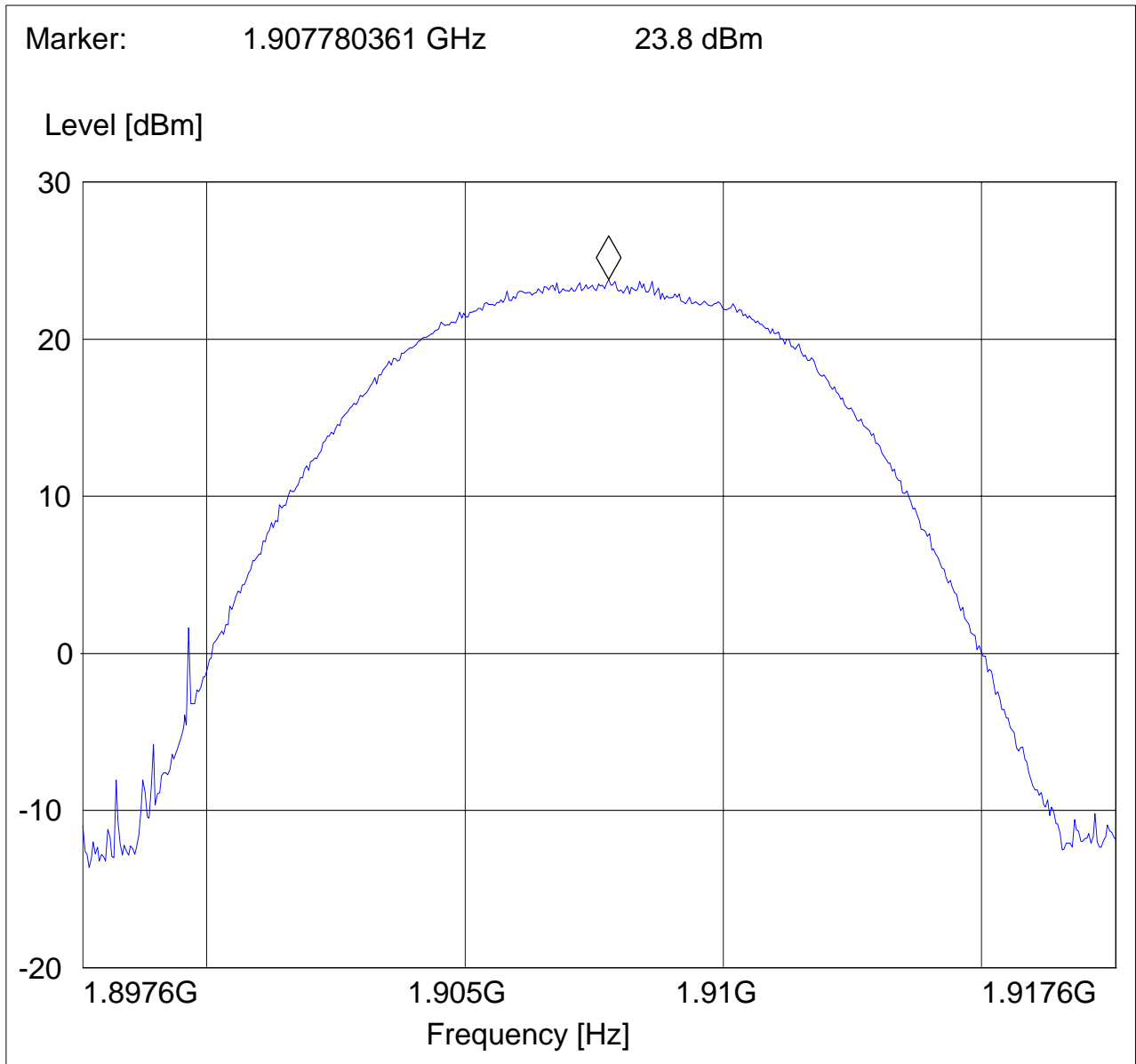
**SWEEP TABLE: "EIRP WCDMA CH9400"**





**EIRP FDD2 §24.232(b)**  
**CHANNEL 9538 WCDMA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 2 ch 9538 RMC 12.2k  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

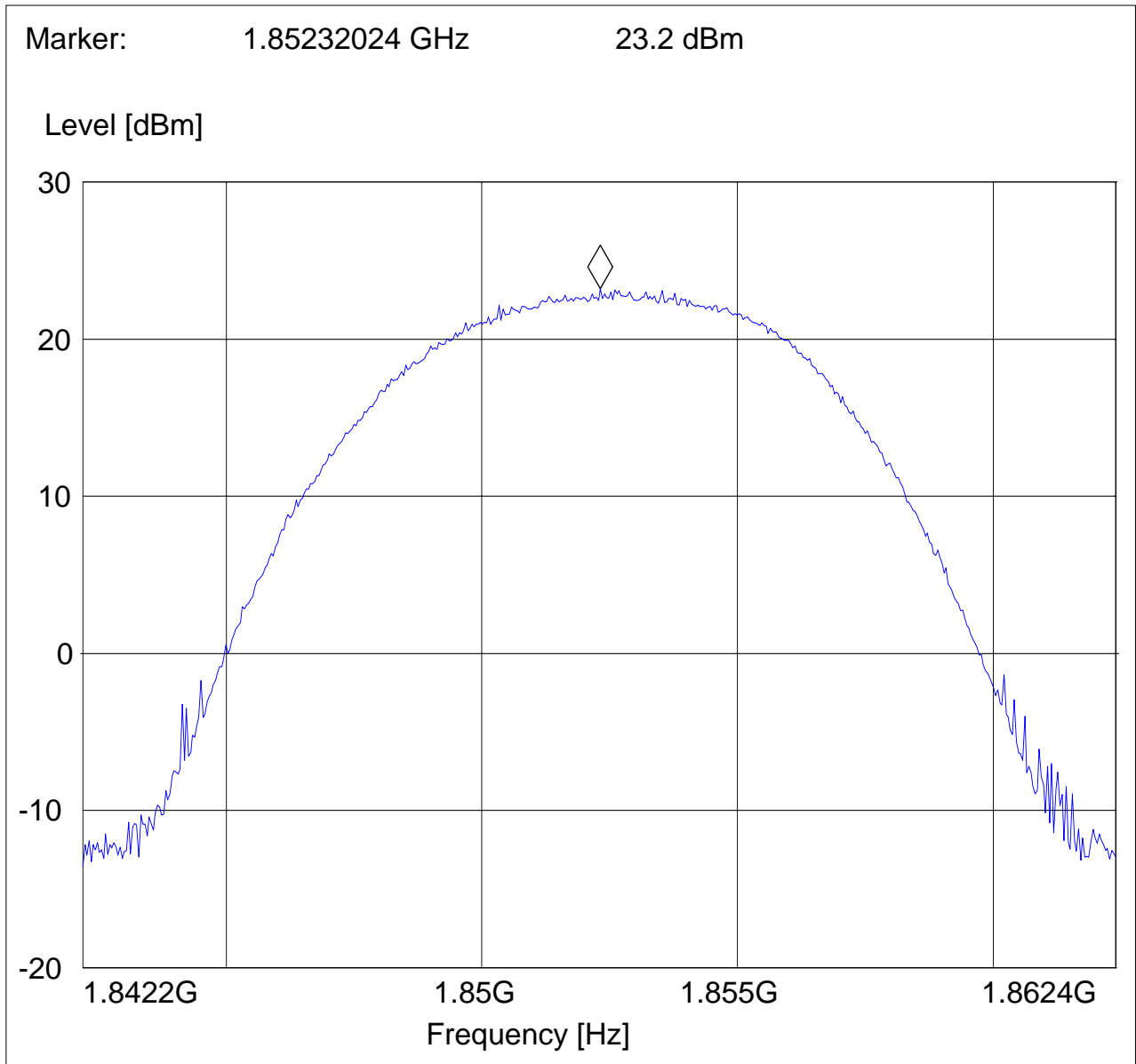
**SWEEP TABLE: "EIRP WCDMA CH9538"**





**EIRP FDD2 §24.232(b)**  
**CHANNEL 9162 WCDMA+ HSDPA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 2 ch 9262 RMC 12.2k w/ HSDPA  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

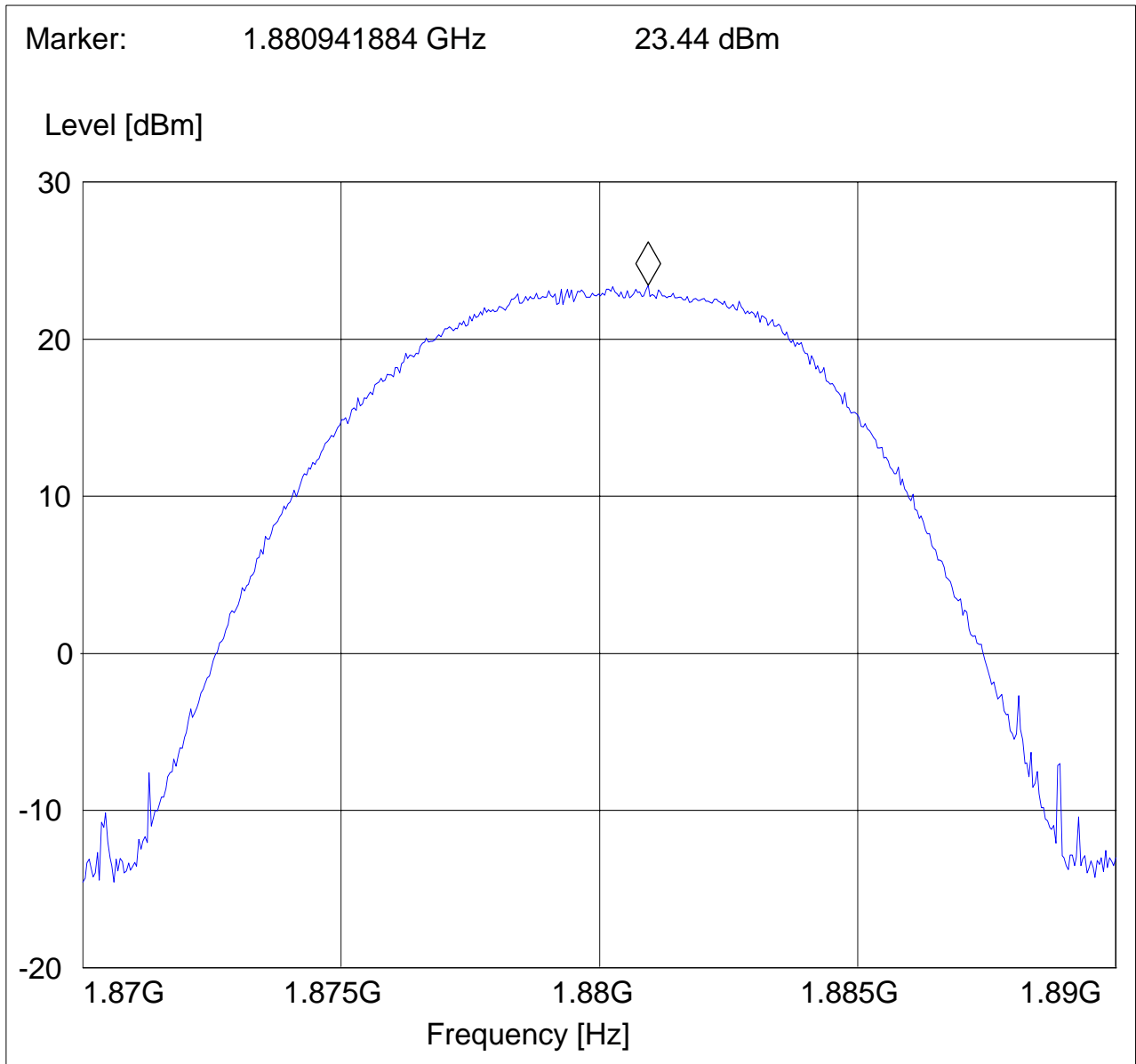
**SWEEP TABLE: "EIRP WCDMA CH9262"**





**EIRP FDD2 §24.232(b)**  
**CHANNEL 9400 WCDMA+ HSDPA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 2 ch 9400 RMC 12.2k w/ HSDPA  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

**SWEEP TABLE: "EIRP WCDMA CH9400"**

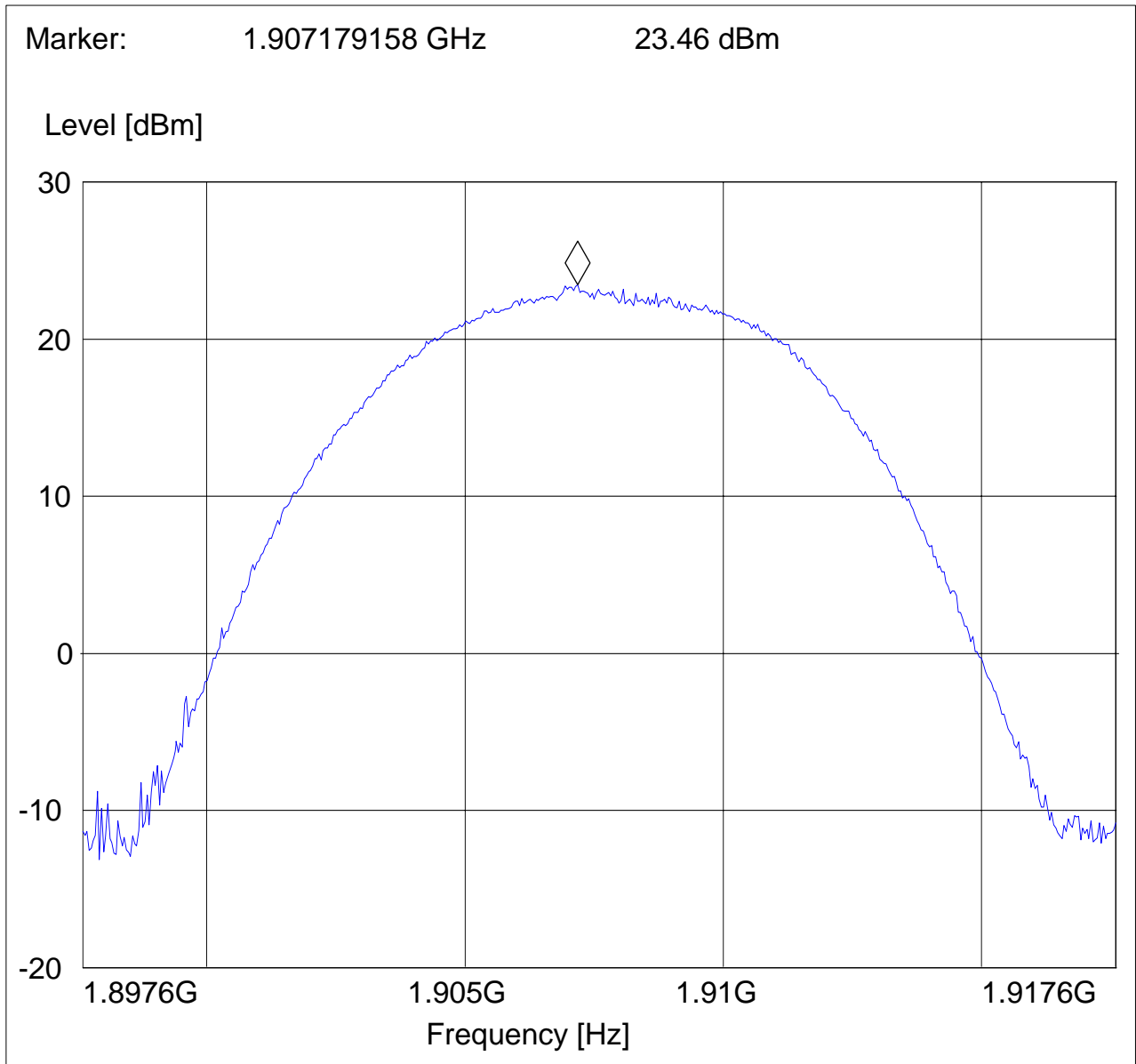






**EIRP FDD2 §24.232(b)**  
**CHANNEL 9538 WCDMA + HSDPA**  
**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**  
EUT: C3 w/ MC8775  
Customer: Lenovo  
Test Mode: FDD 2 ch 9538 RMC 12.2k w/ HSDPA  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Pete k

**SWEEP TABLE: "EIRP WCDMA CH9538"**



## 5.2 Spurious Emissions Radiated

### **FCC 2.1053 Measurements required: Field strength of spurious radiation.**

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

### **Limits:**

#### **FCC 22.917 Emission limitations for cellular equipment.**

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

#### **FCC 24.238 Emission limitations for Broadband PCS equipment.**

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

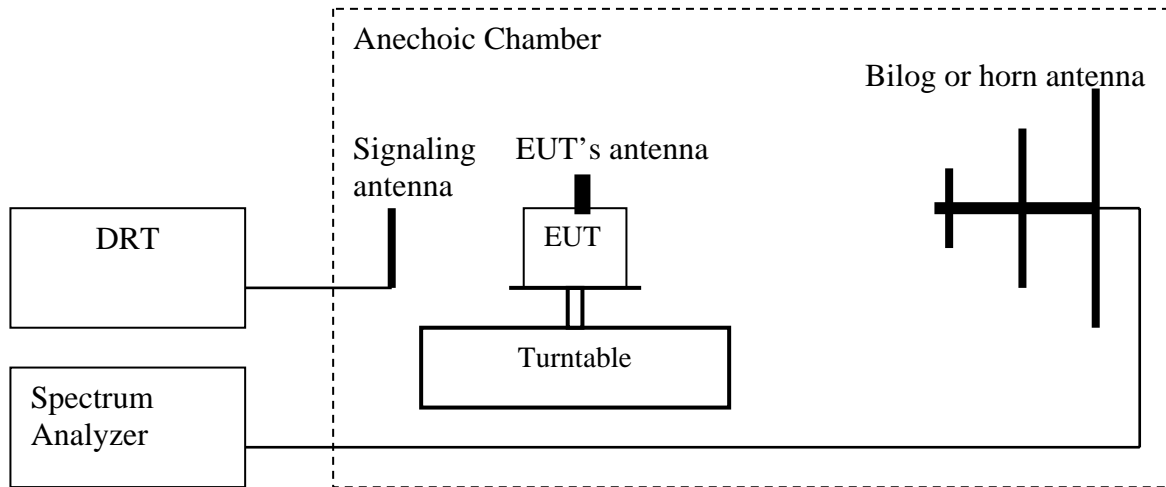
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted

in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**Radiated out of band measurement procedure:**

**Based on TIA-603C 2004**

**2.2.12 Unwanted emissions: Radiated Spurious**



Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.

Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.

Set the spectrum analyzer to measure peak hold with the required settings.

Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (LVL) up to the tenth harmonic of the carrier frequency.

Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.

Connect the antenna to a signal generator with known output power and record the path loss in dB (LOSS).  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .

Determine the level of spurious emissions using the following equation:

$$\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}:$$

Repeat steps 4, 5 and 6 with all antennas vertically polarized.

Determine the level of spurious emissions using the following equation:

$$\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}:$$

Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

(**note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

**Spectrum analyzer settings:**

Res B/W: 1 MHz

Vid B/W: 1 MHz

**Measurement Survey:**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 & PCS-1900 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

**Radiated out of band emissions results on EUT:**

**RESULTS OF RADIATED TESTS GSM-850:**

Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	1648.4	NF	1673.2	NF	1697.6	NF
3	2472.6	NF	2509.8	NF	2546.4	NF
4	3296.8	NF	3346.4	NF	3395.2	NF
5	4121	NF	4183	NF	4244	NF
6	4945.2	NF	5019.6	NF	5092.8	NF
7	5769.4	NF	5856.2	NF	5941.6	NF
8	6593.6	NF	6692.8	NF	6790.4	NF
9	7417.8	NF	7529.4	NF	7639.2	NF
10	8242	NF	8366	NF	8488	NF
NF = NOISE FLOOR						



**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**TX: 30MHz - 1GHz**

Spurious emission limit -13dBm

**Antenna: vertical**

**Note:**

- 1. The peak above the limit line is the carrier freq.
- 2. This plot is valid for low, mid & high channels (worst-case plot)

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

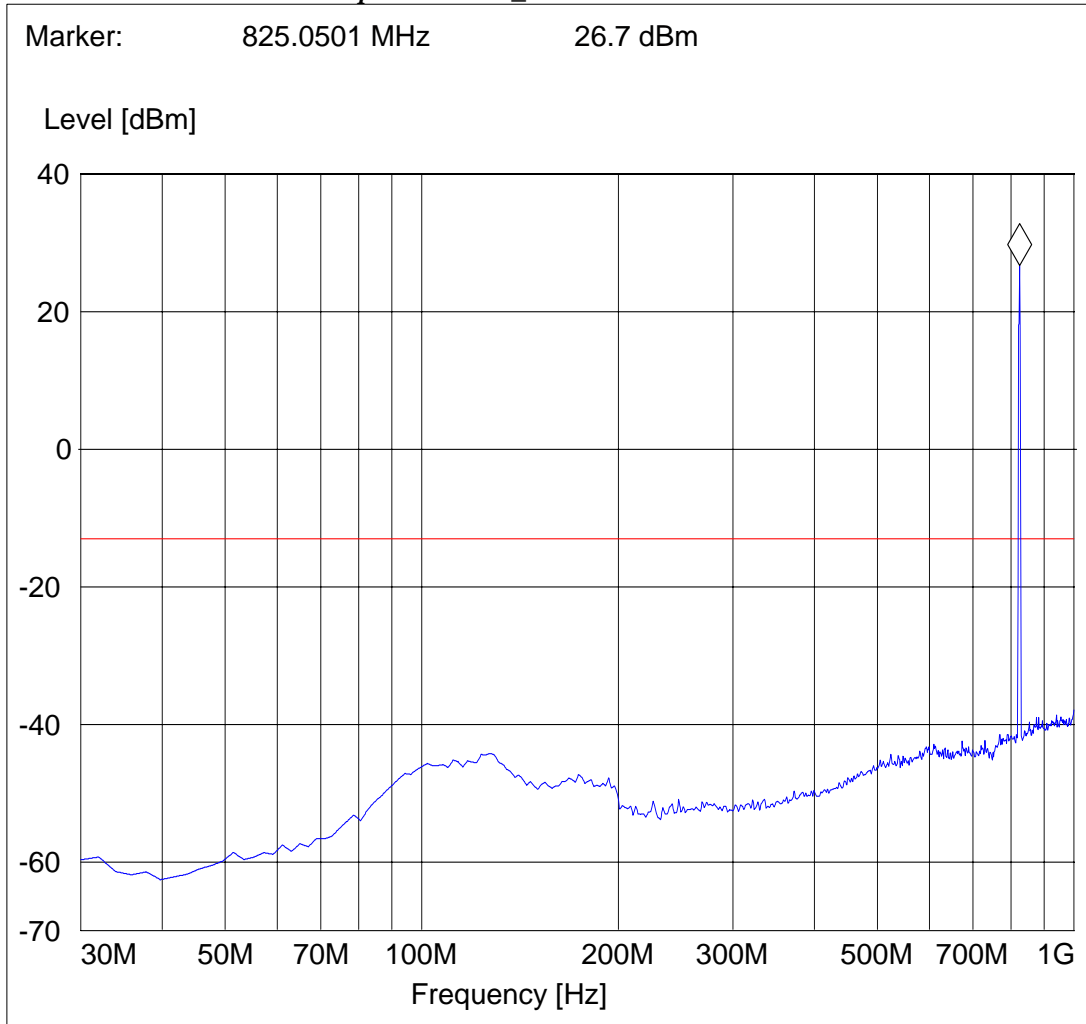
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24 Spur 30M-1G\_V"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 824.2MHz: 1GHz – 1.58GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

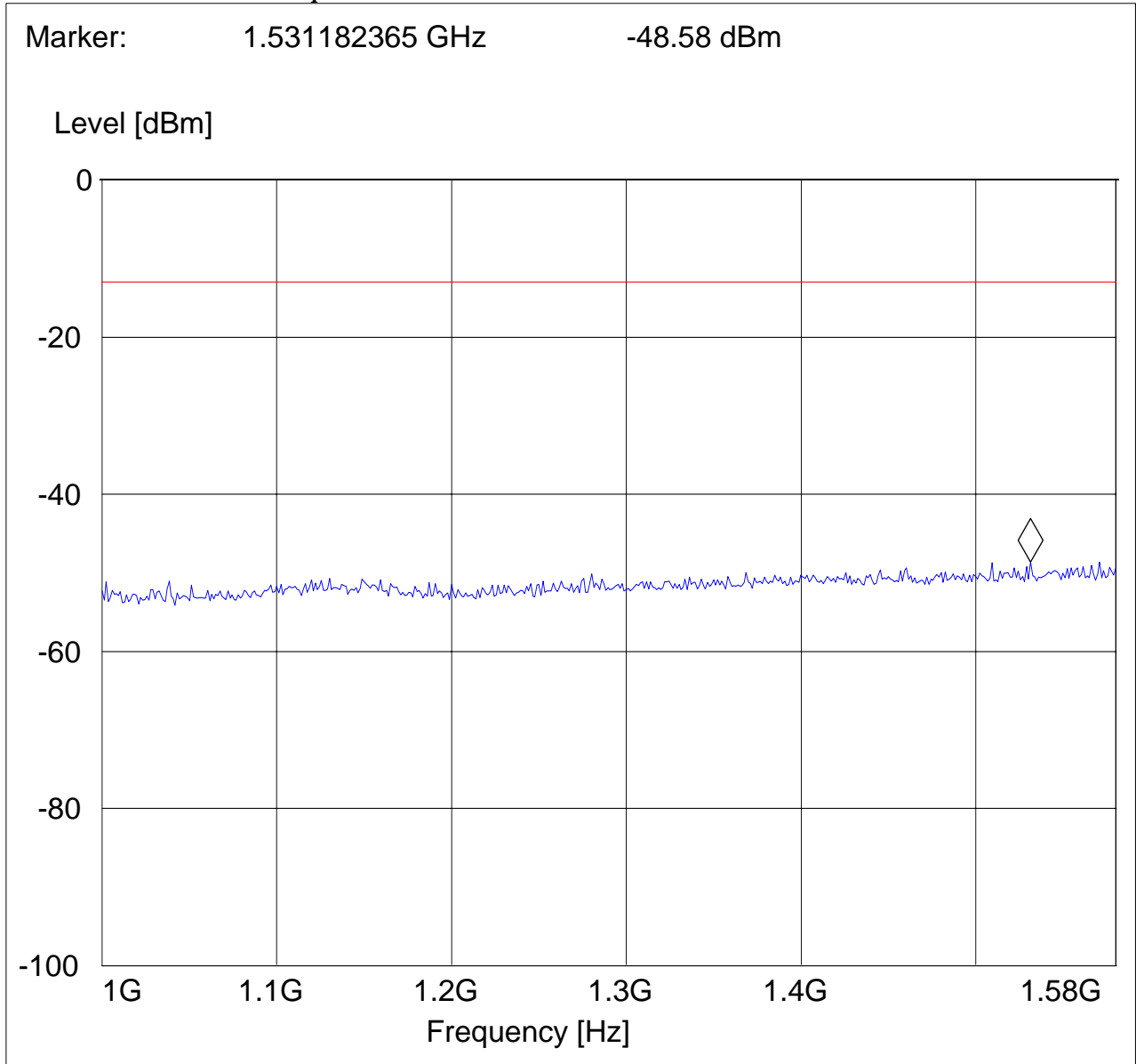
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 1-1.58G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 824.2MHz: 1.58GHz – 3GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

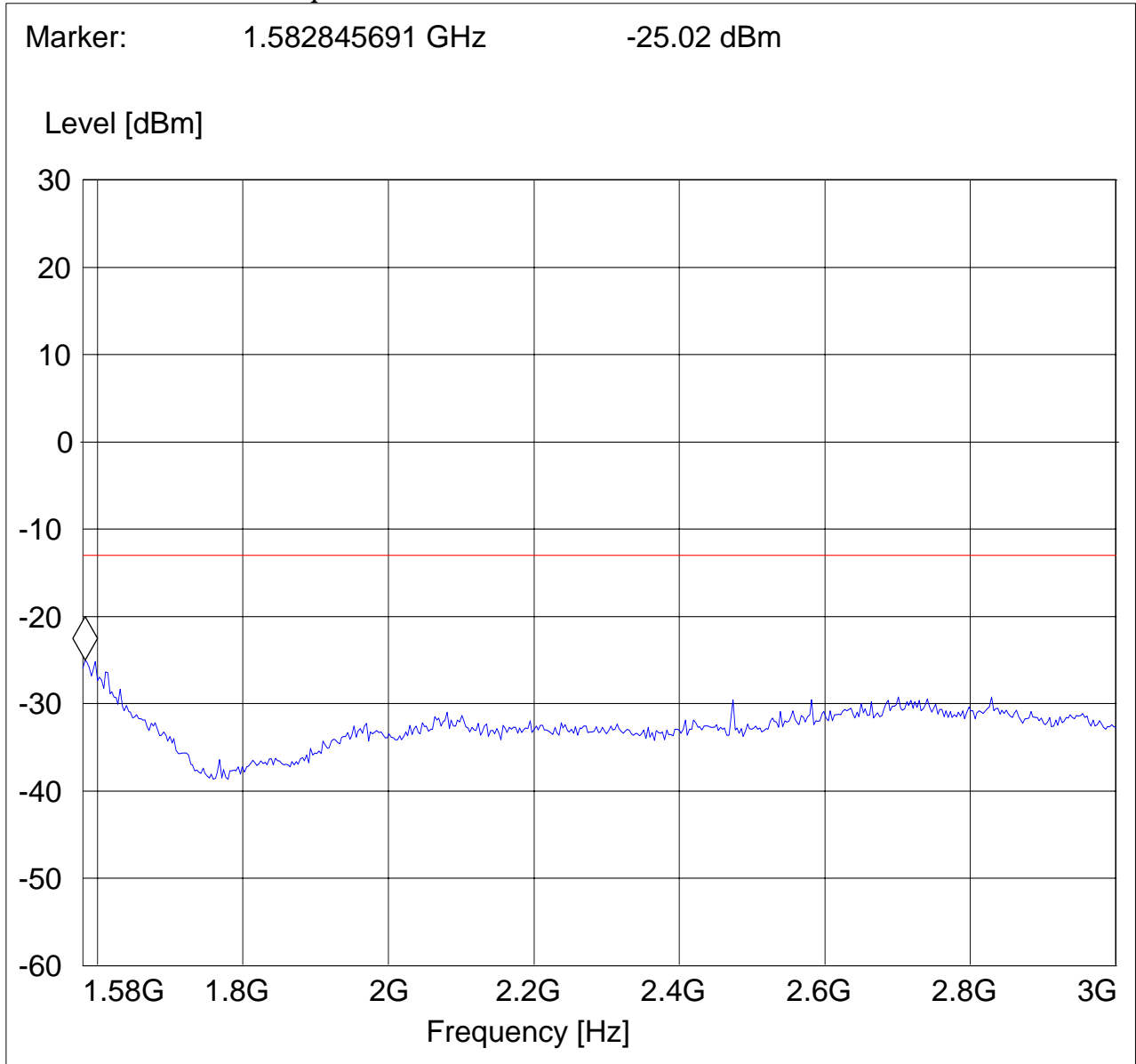
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 1.58-3G"**







**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 824.2MHz: 3GHz – 9GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

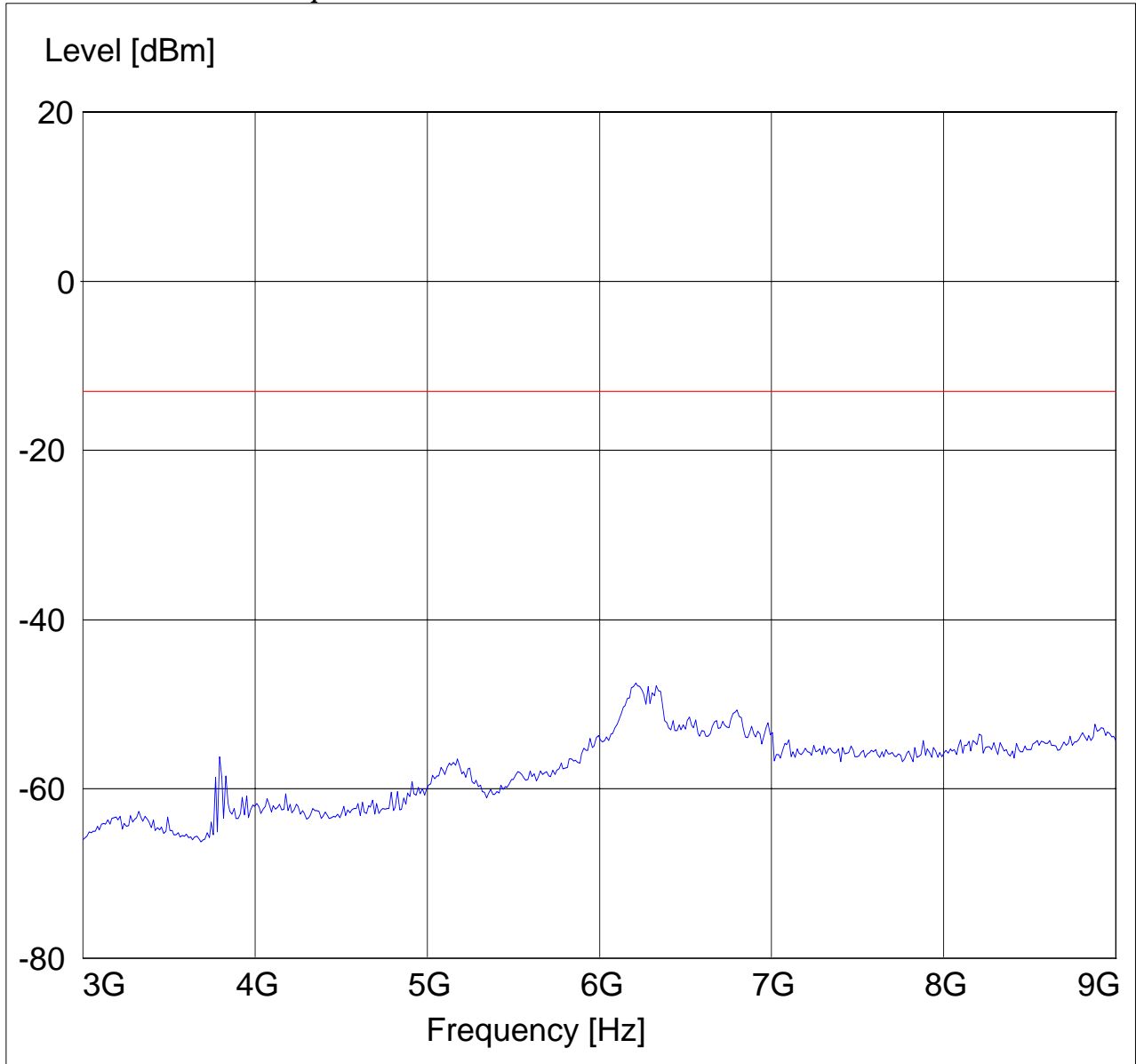
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 3-9G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 836.6MHz: 1GHz – 1.58GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

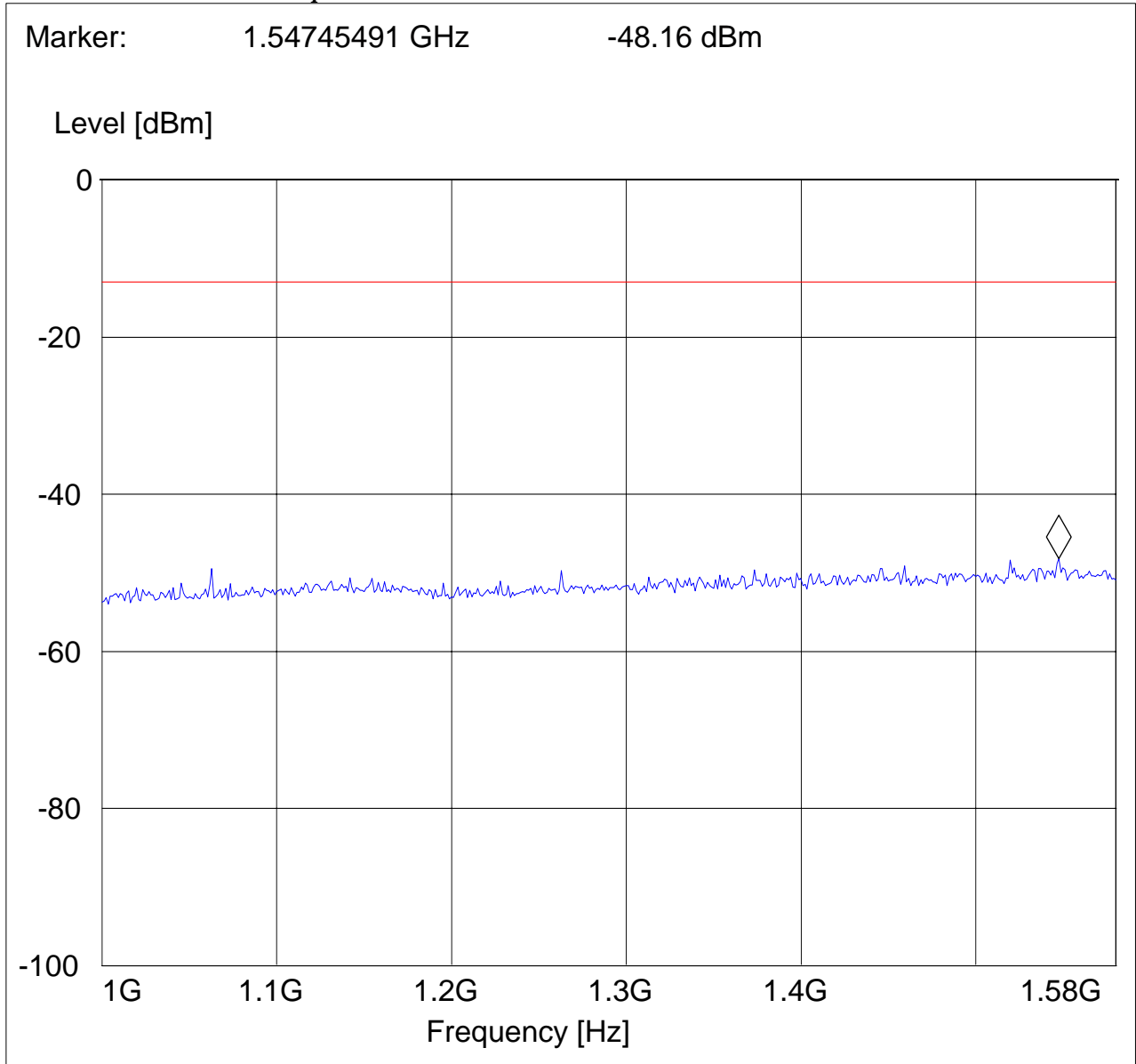
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 1-1.58G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 836.6MHz: 1.58GHz – 3GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

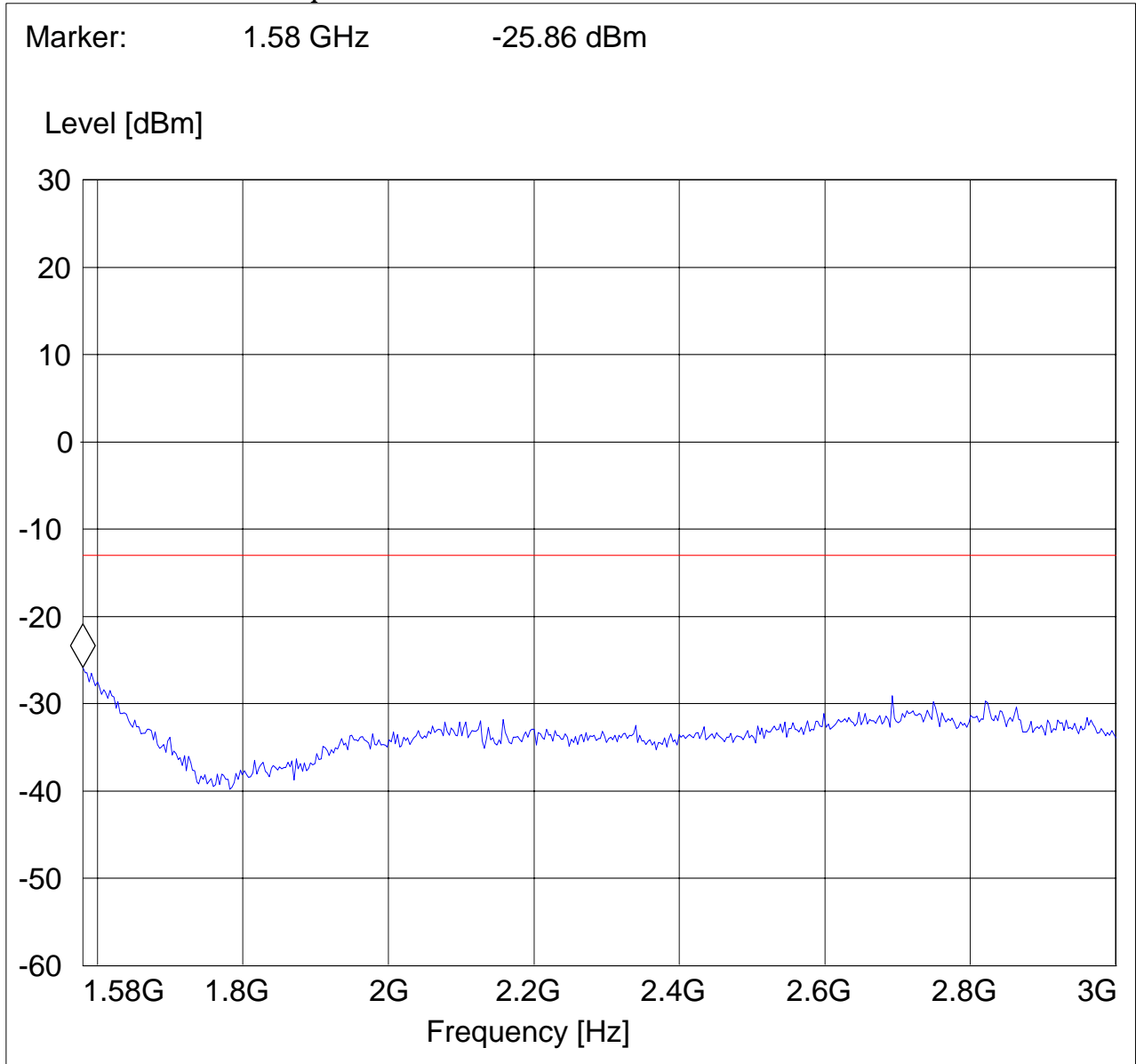
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 1.58-3G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 836.6MHz: 3GHz – 9GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

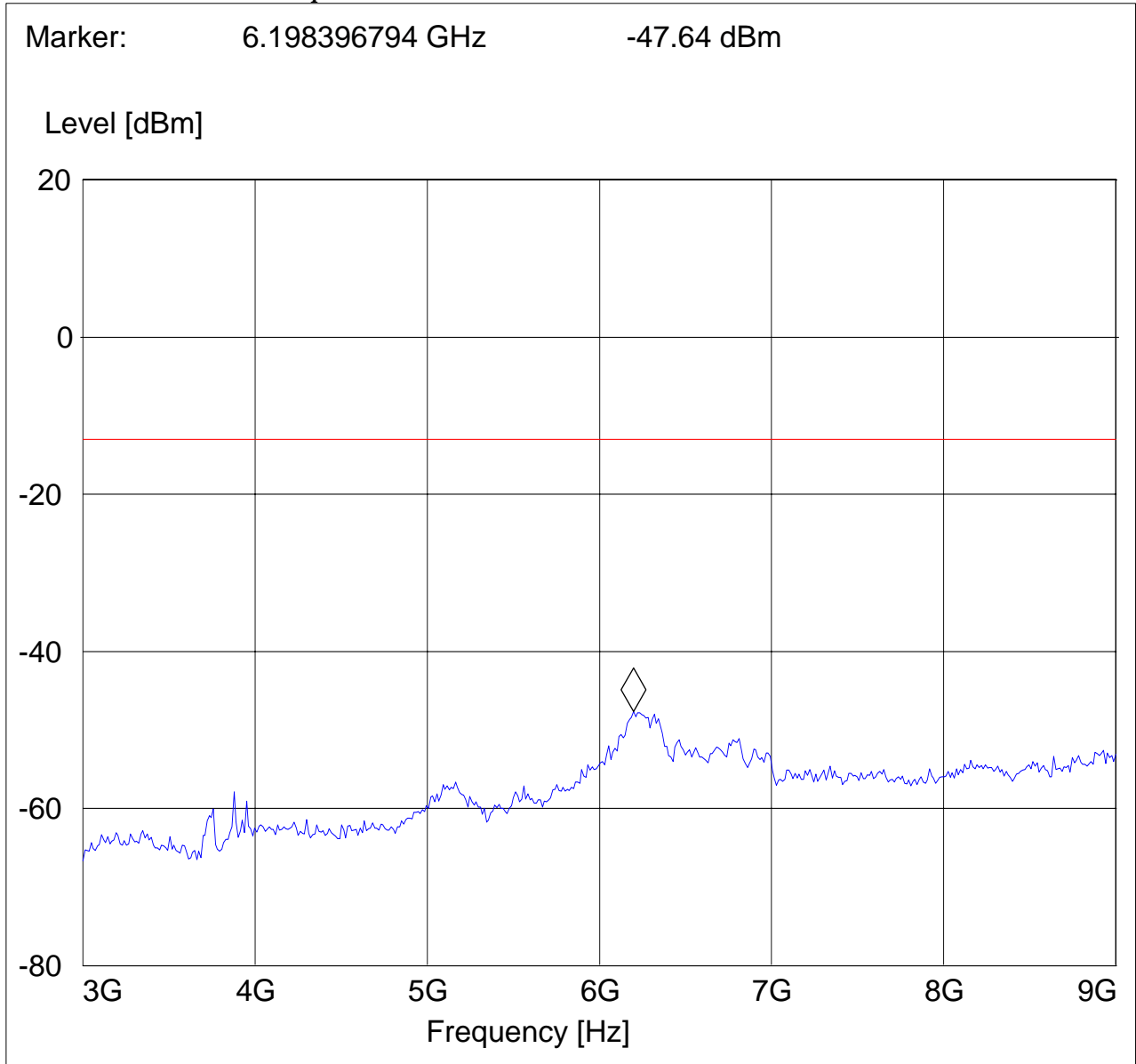
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 3-9G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 848.8MHz: 1GHz – 1.58GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

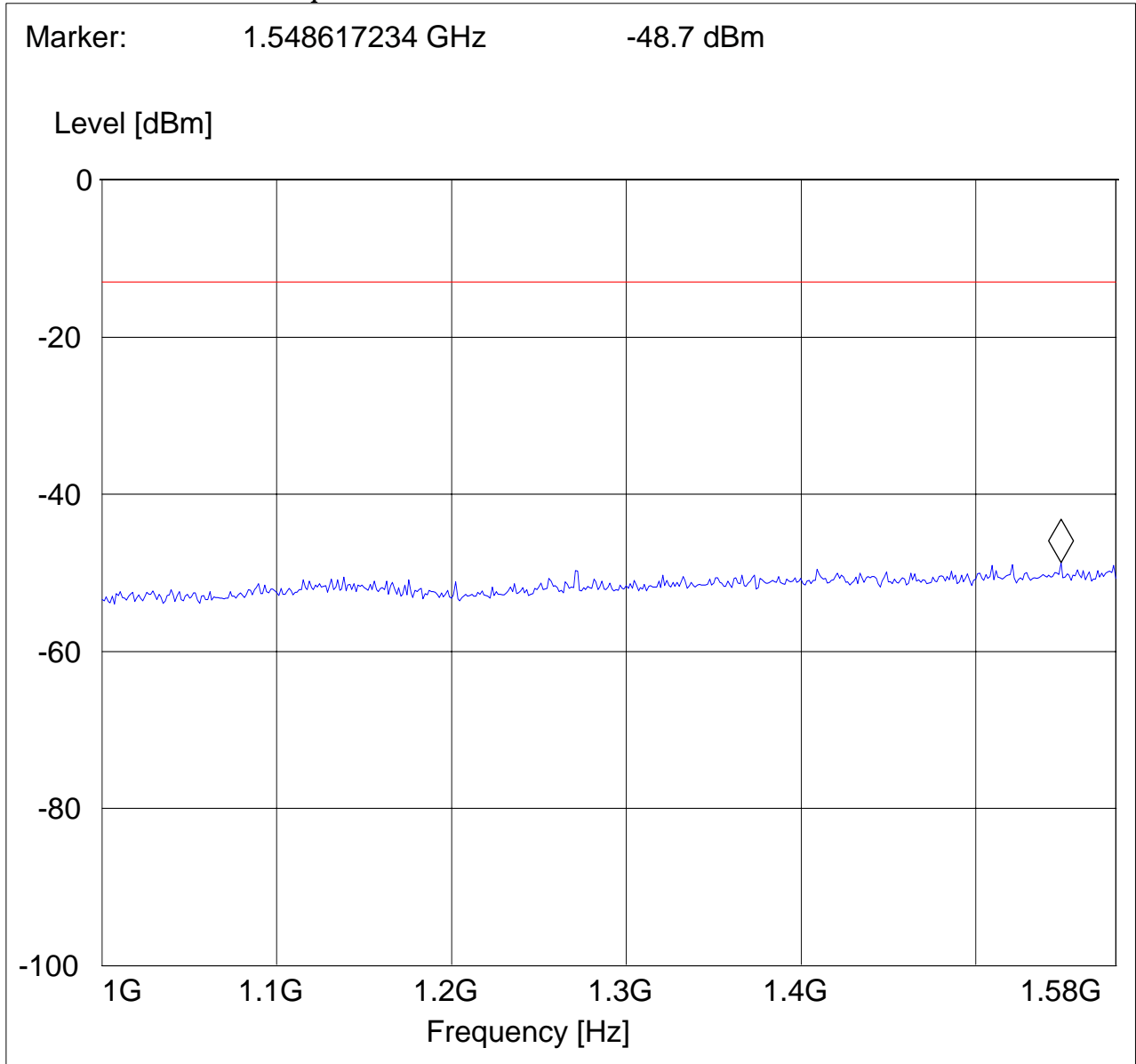
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 1-1.58G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 848.8MHz: 1.58GHz – 3GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

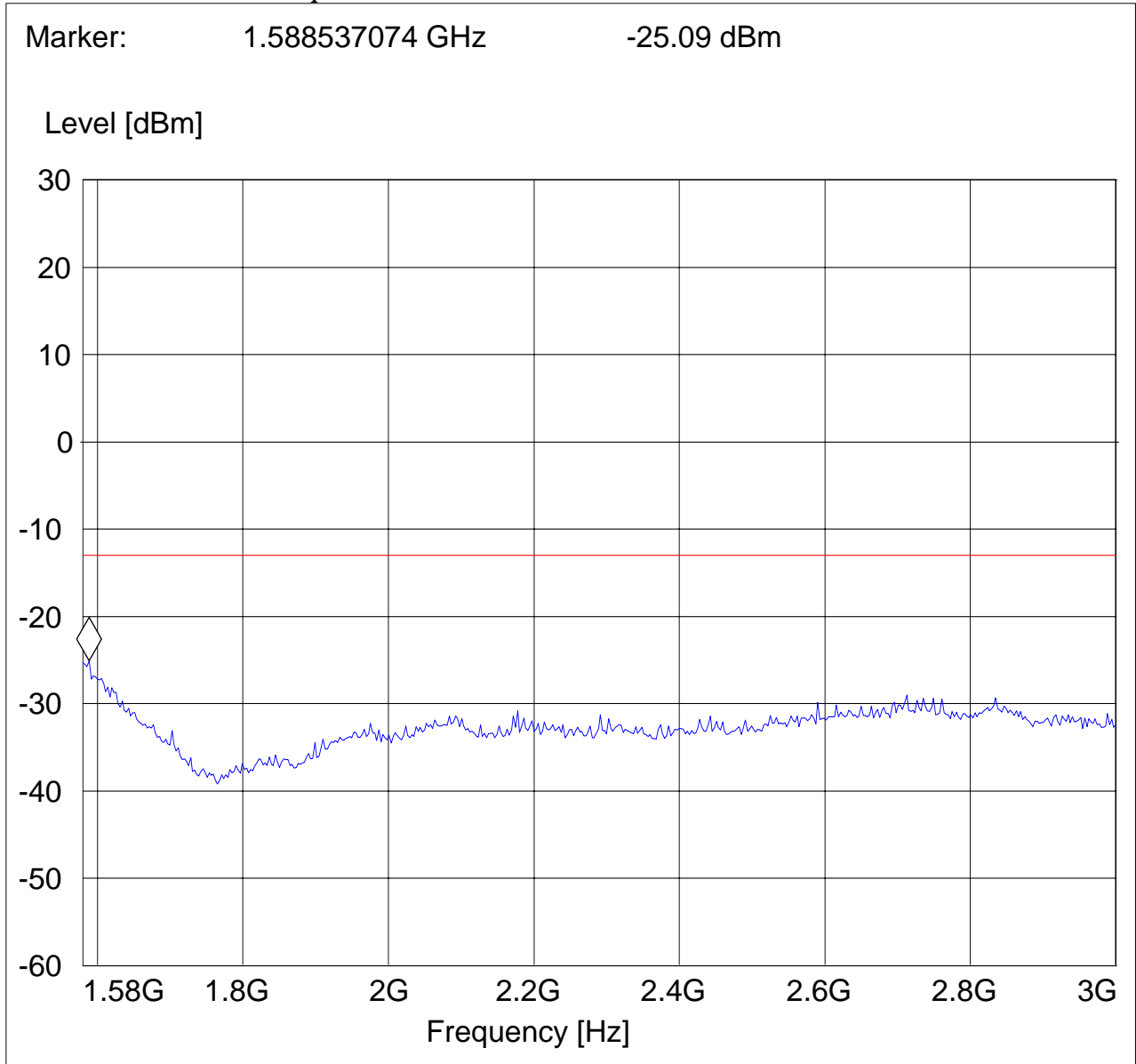
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 1.58-3G"**





**RADIATED SPURIOUS EMISSIONS (GSM-850)**

**Tx @ 848.8MHz: 3GHz – 9GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

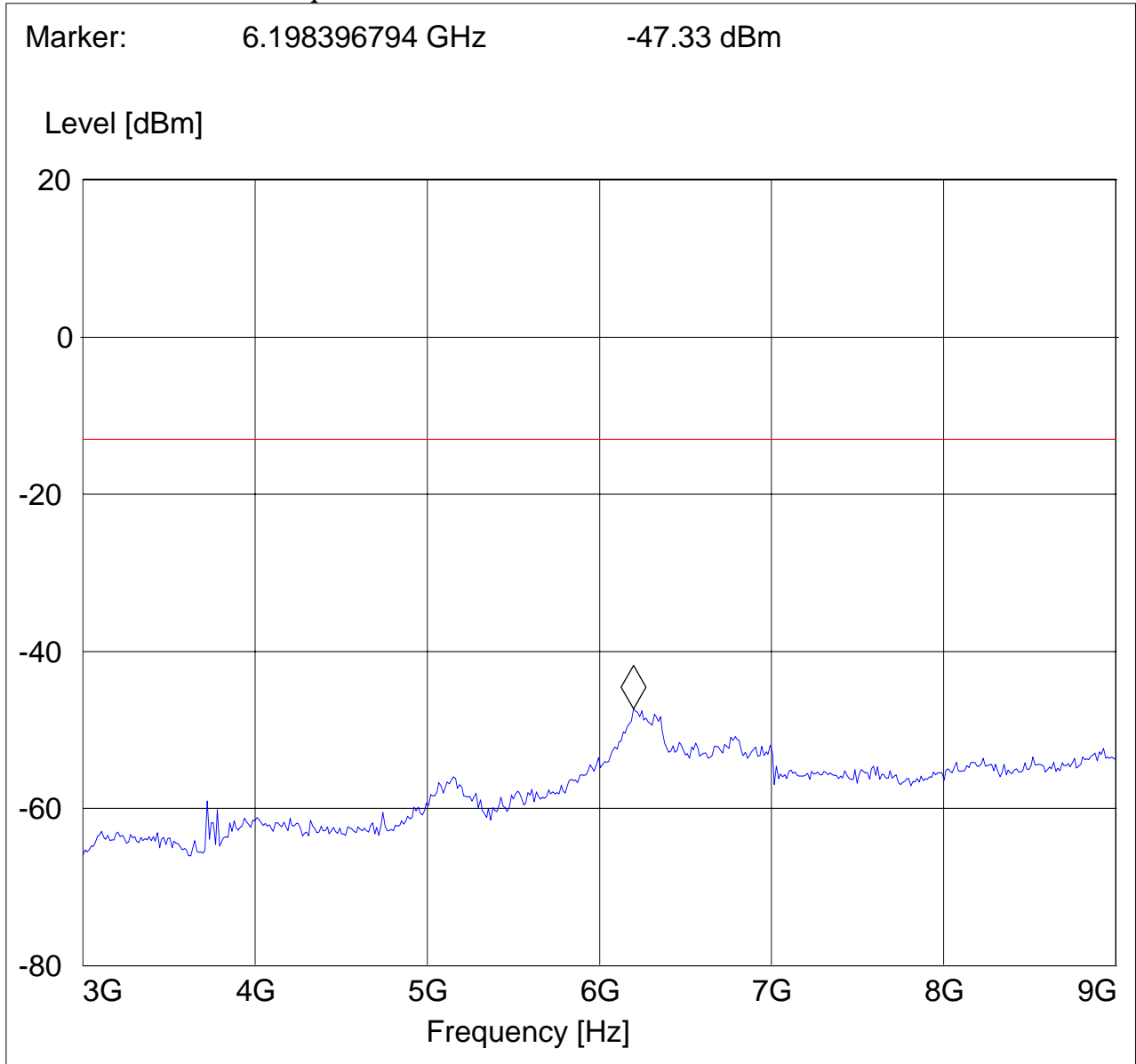
Test Mode: GSM850

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 22Spuri 3-9G"**





**RESULTS OF RADIATED TESTS PCS-1900:**

<b>Harmonic</b>	<b>Tx ch-512 Freq.(MHz)</b>	<b>Level (dBm)</b>	<b>Tx ch-661 Freq. (MHz)</b>	<b>Level (dBm)</b>	<b>Tx ch-810 Freq. (MHz)</b>	<b>Level (dBm)</b>
<b>2</b>	<b>3700.4</b>	NF	<b>3760</b>	NF	<b>3819.6</b>	NF
<b>3</b>	<b>5550.6</b>	NF	<b>5640</b>	NF	<b>5729.4</b>	NF
<b>4</b>	<b>7400.8</b>	NF	<b>7520</b>	NF	<b>7639.2</b>	NF
<b>5</b>	<b>9251</b>	NF	<b>9400</b>	NF	<b>9549</b>	NF
<b>6</b>	<b>11101.2</b>	NF	<b>11280</b>	NF	<b>11458.8</b>	NF
<b>7</b>	<b>12951.4</b>	NF	<b>13160</b>	NF	<b>13368.6</b>	NF
<b>8</b>	<b>14801.6</b>	NF	<b>15040</b>	NF	<b>15278.4</b>	NF
<b>9</b>	<b>16651.8</b>	NF	<b>16920</b>	NF	<b>17188.2</b>	NF
<b>10</b>	<b>18502</b>	NF	<b>18800</b>	NF	<b>19098</b>	NF

NF = NOISE FLOOR





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**TX: 30MHz - 1GHz**

Spurious emission limit -13dBm

**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: C3

Customer: Lenovo

Test Mode: GSM1900

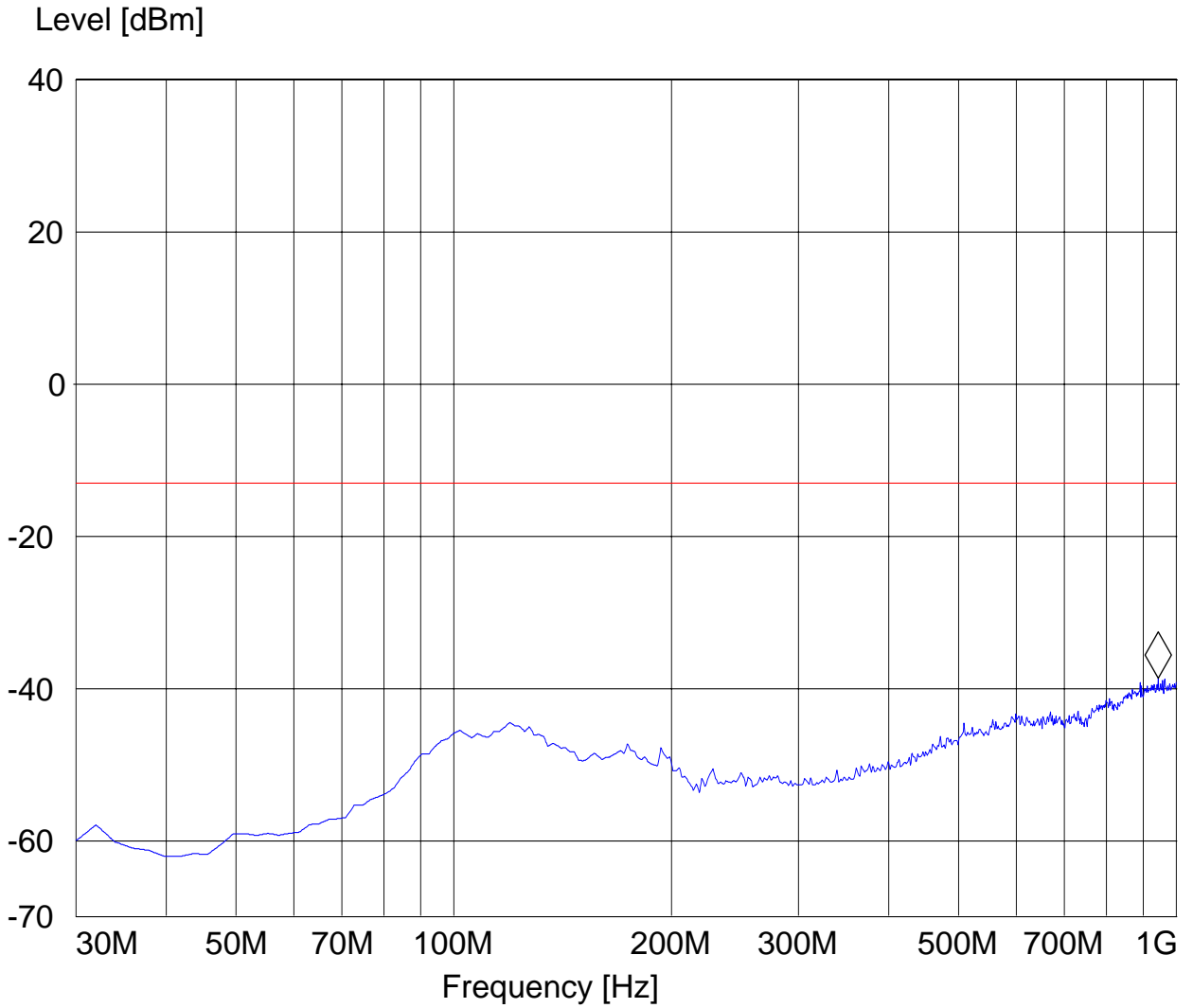
ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

***SWEEP TABLE: "FCC 24 Spur 30M-1G\_V"***

Marker: 943.627255 MHz -38.63 dBm





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1850.2MHz: 1GHz – 3GHz**

Spurious emission limit -13dBm

**Note: The peak above the limit line is the carrier freq. at ch-512.**

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

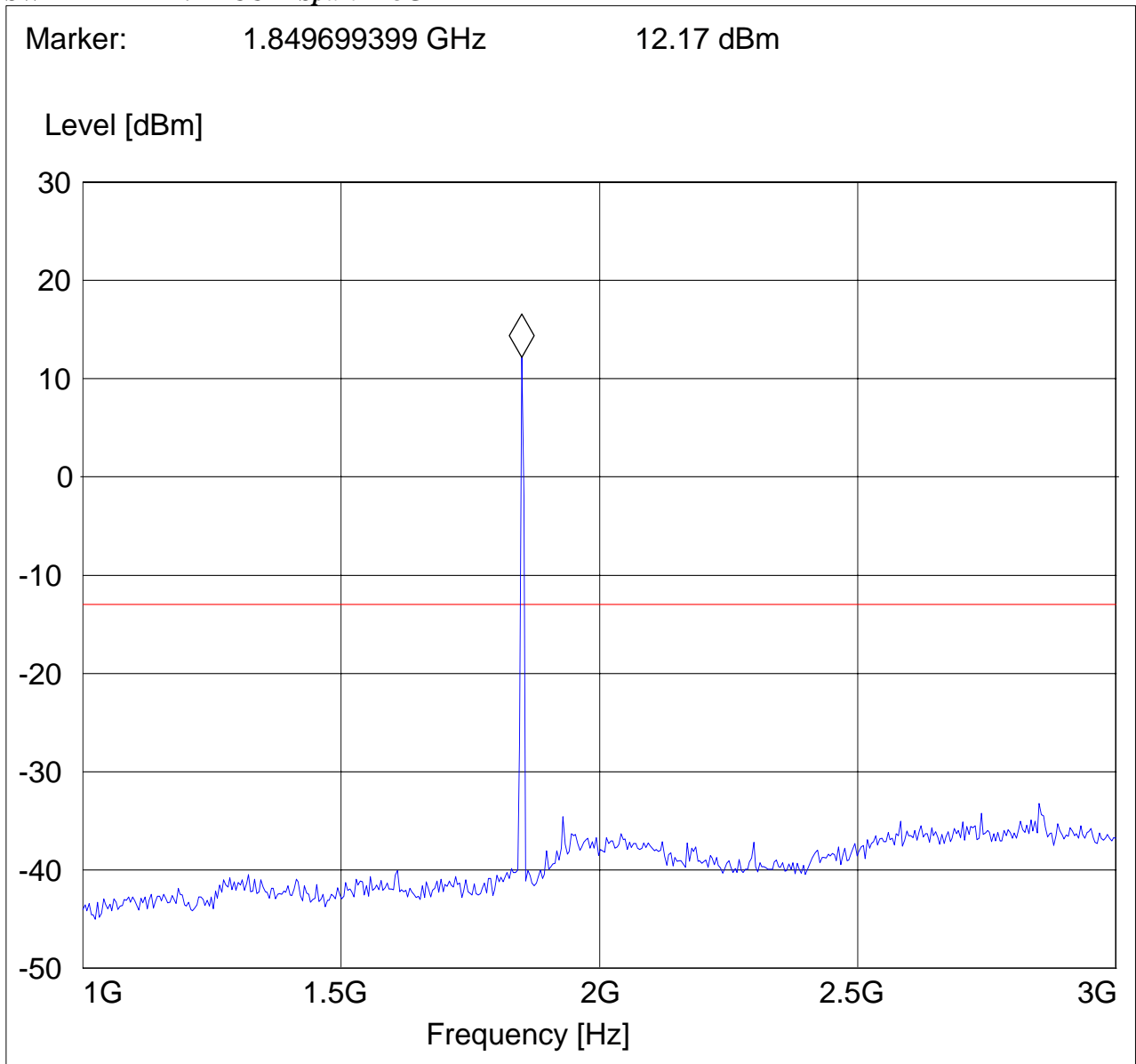
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24Spuri 1-3G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1850.2MHz: 3GHz – 18GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

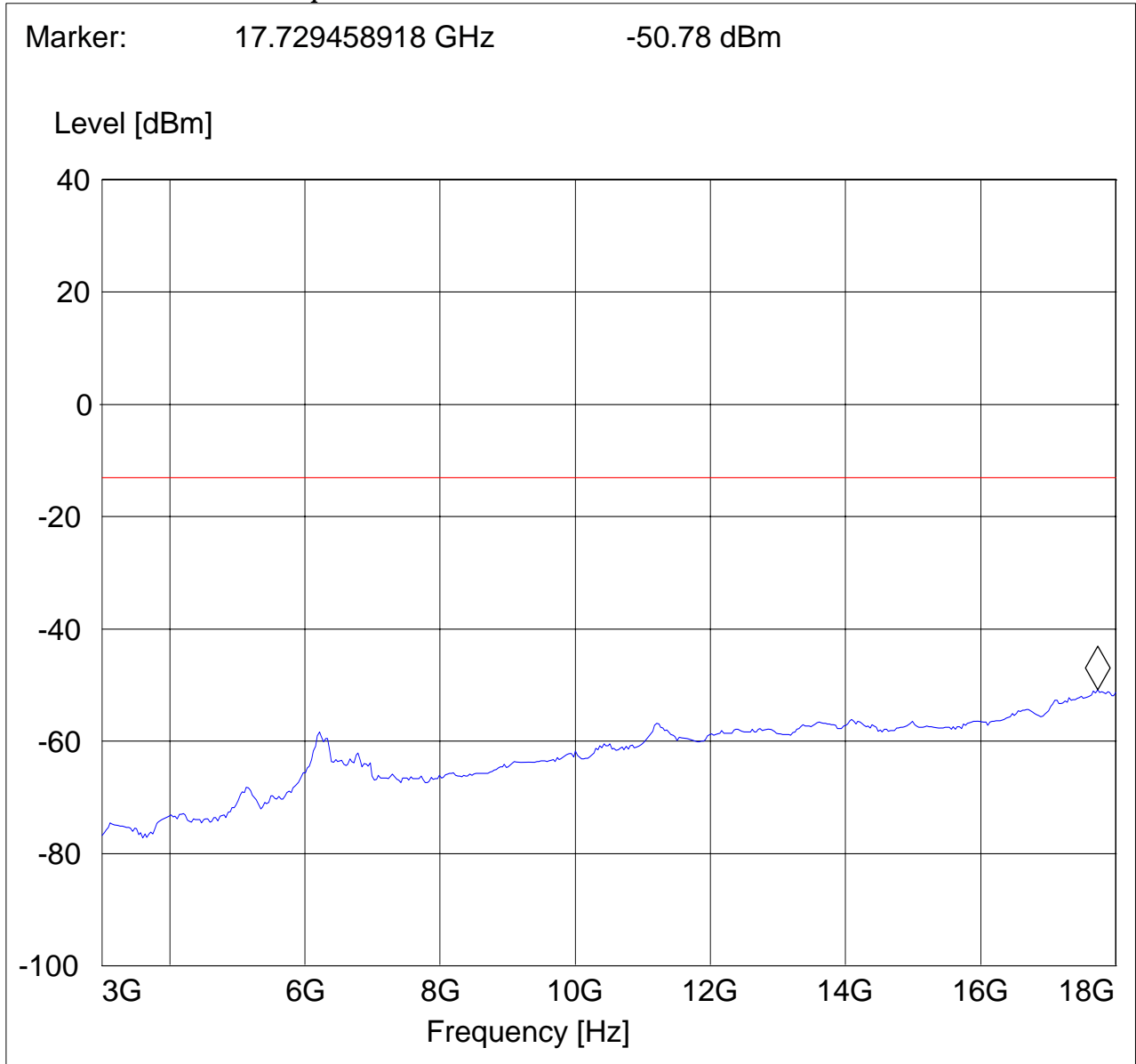
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24Spuri 3-18G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1850.2MHz: 18GHz – 19GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

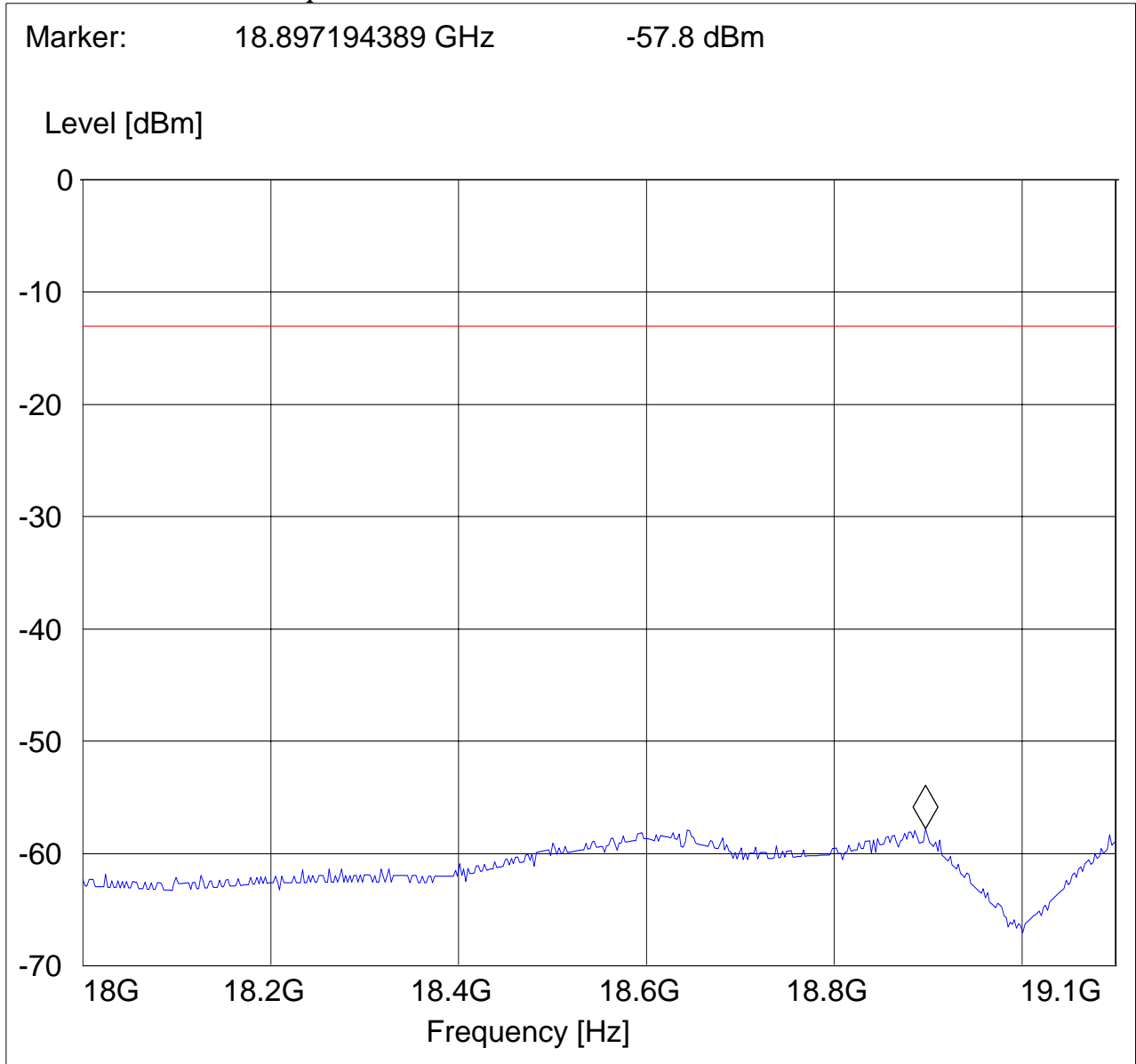
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24spuri 18-19.1G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1880.0MHz: 1GHz – 3GHz**

Spurious emission limit –13dBm

**Note: The peak above/close to the limit line is the carrier freq. at ch-661.**

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

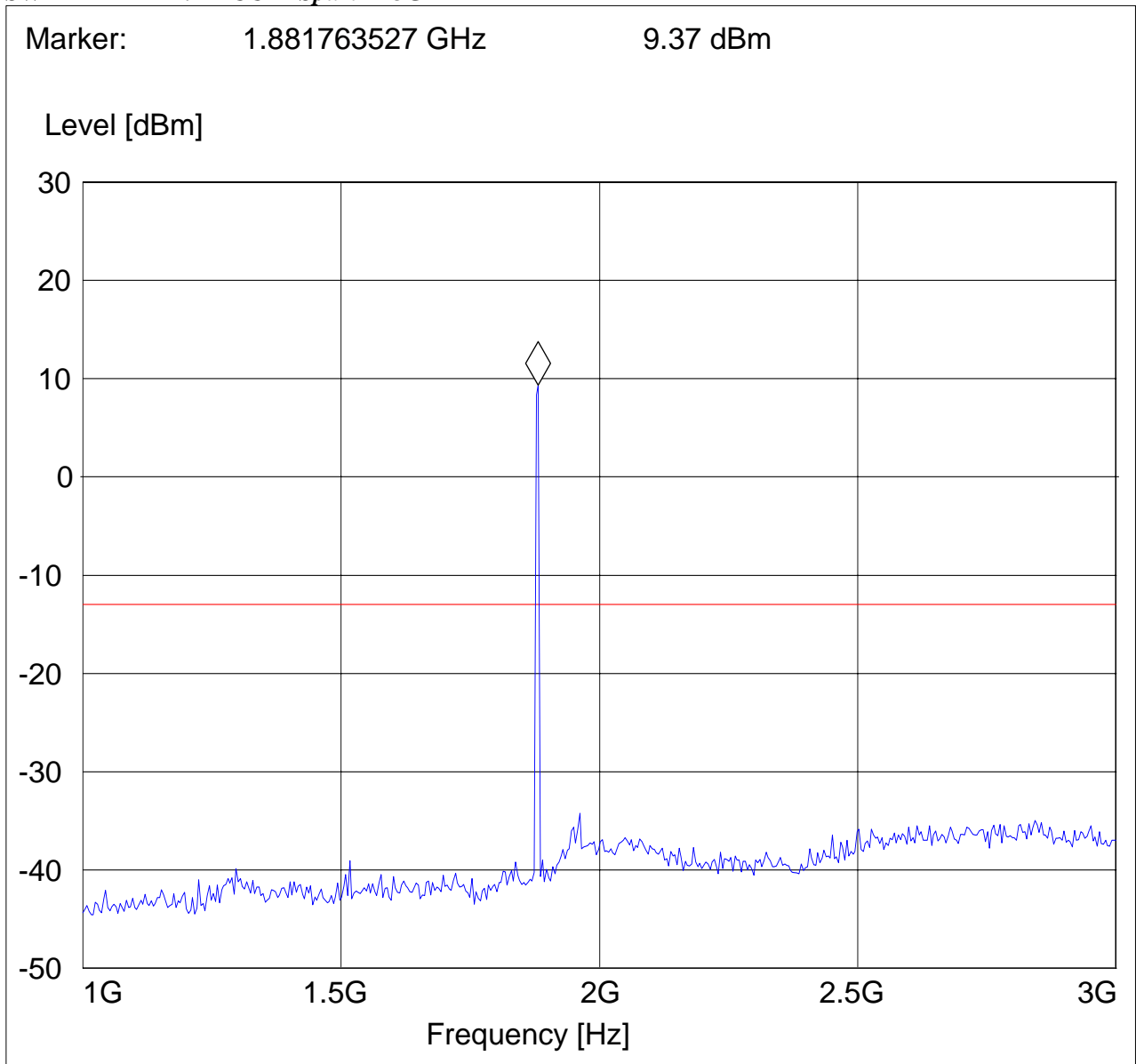
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24Spuri 1-3G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1880.0MHz: 3GHz – 18GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

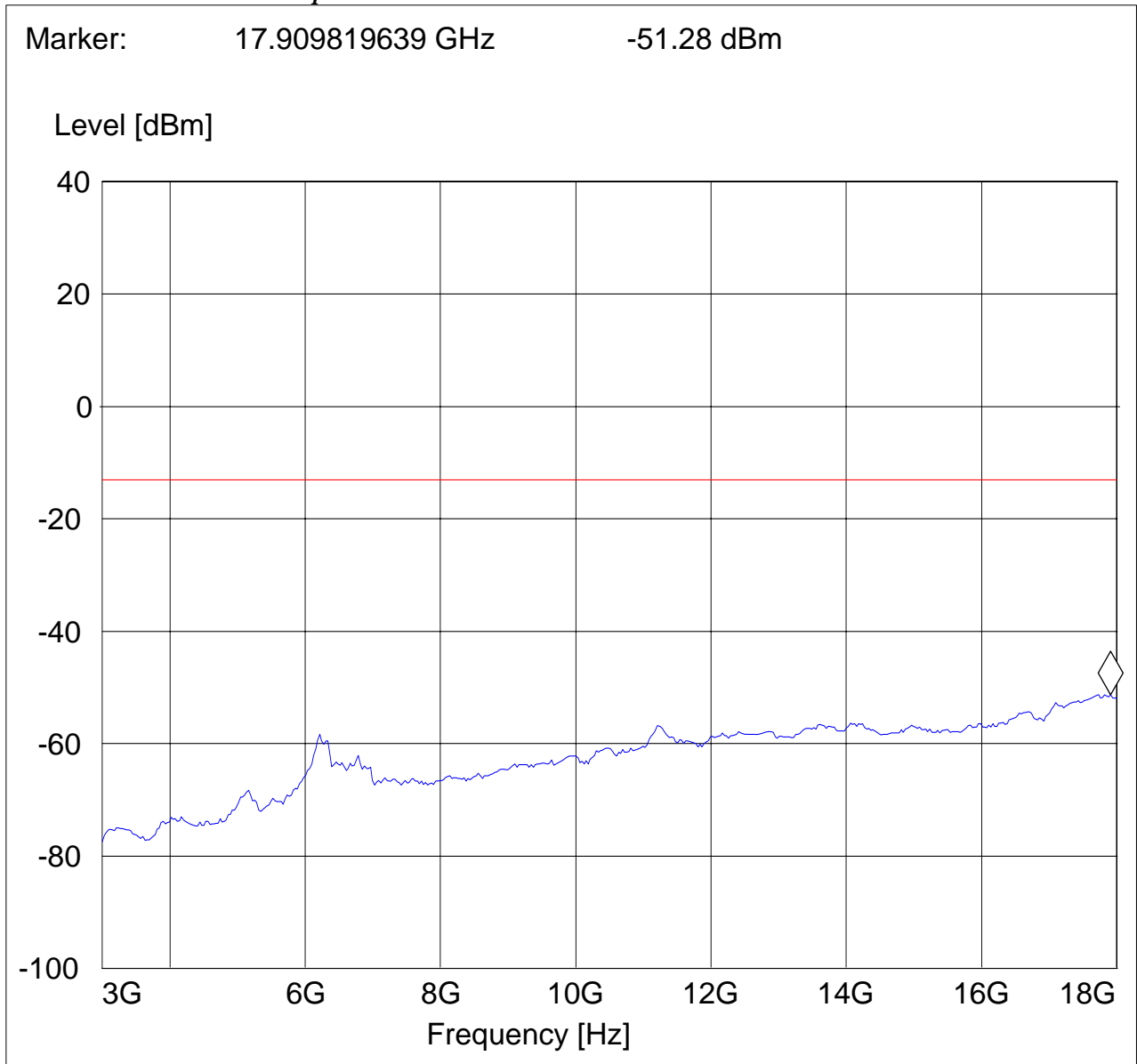
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24Spuri 3-18G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1880.0MHz: 18GHz – 19GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

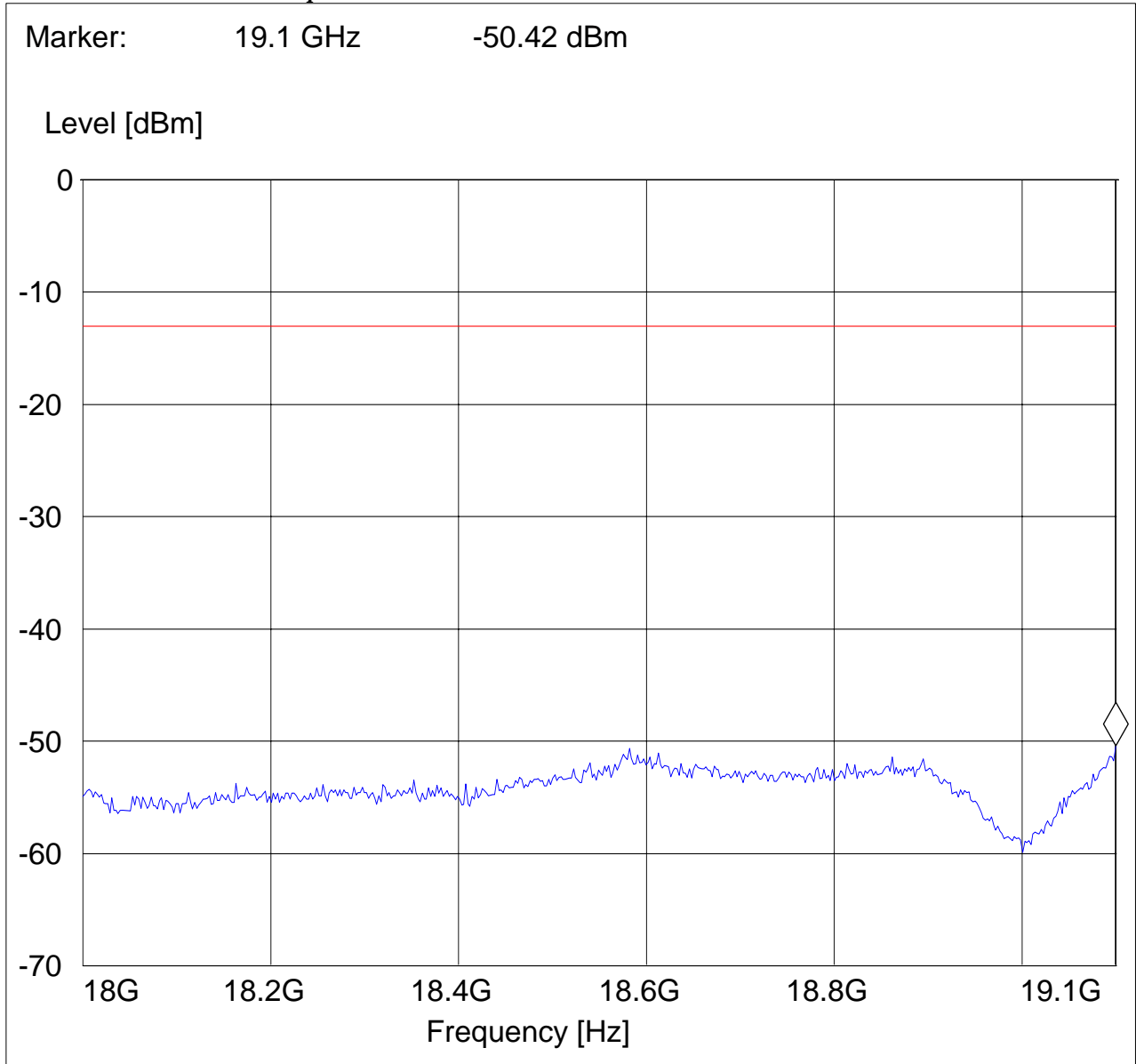
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24spuri 18-19.1G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1909.8MHz: 1GHz – 3GHz**

Spurious emission limit –13dBm

**Note: The peak above the limit line is the carrier freq. at ch-810.**

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

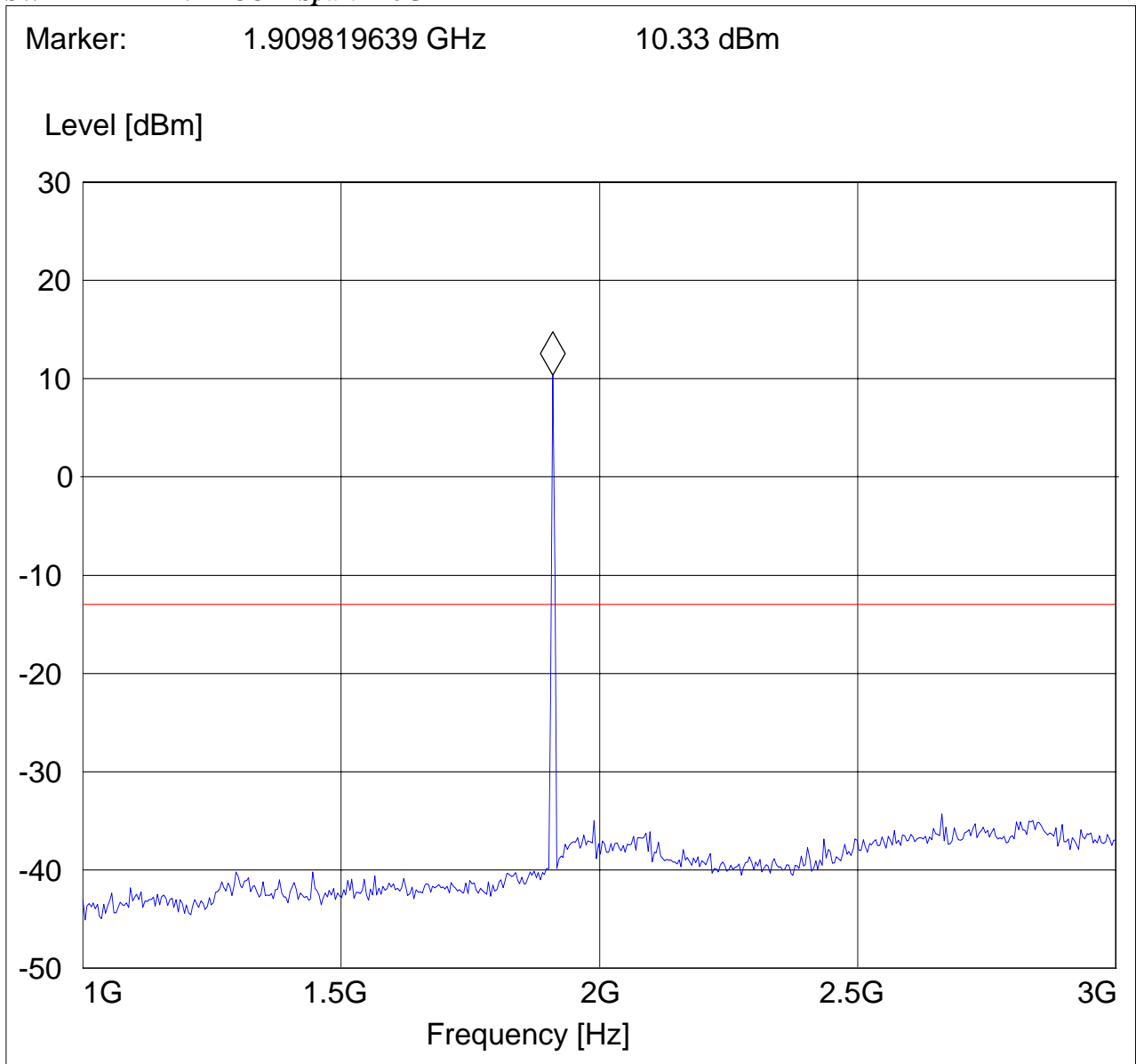
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24Spuri 1-3G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1909.8MHz: 3GHz – 18GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

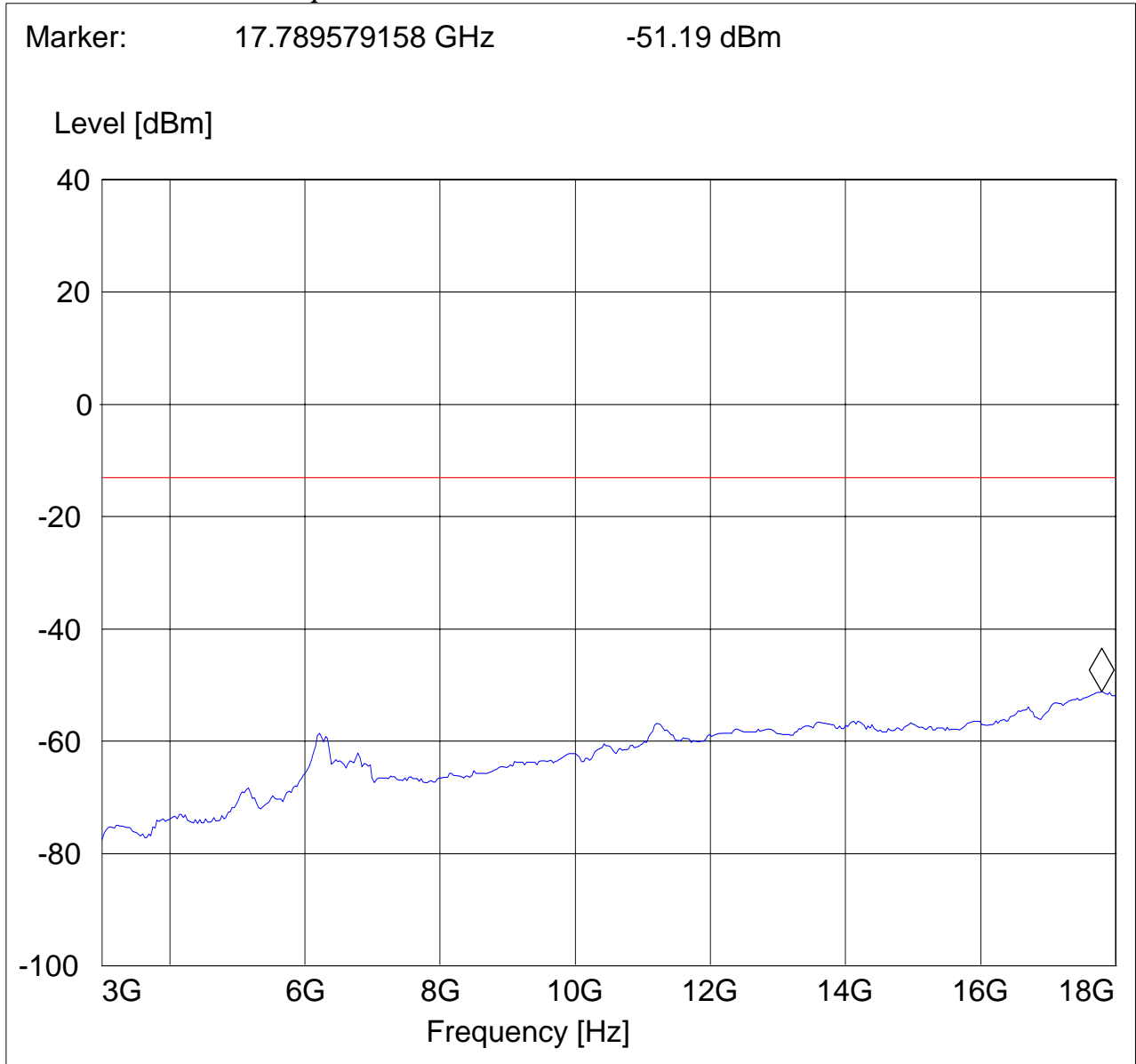
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24Spuri 3-18G"**





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1909.8MHz : 18GHz – 19.1GHz**

Spurious emission limit –13dBm

**CETECOM Inc.**

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

EUT: C3

Customer: Lenovo

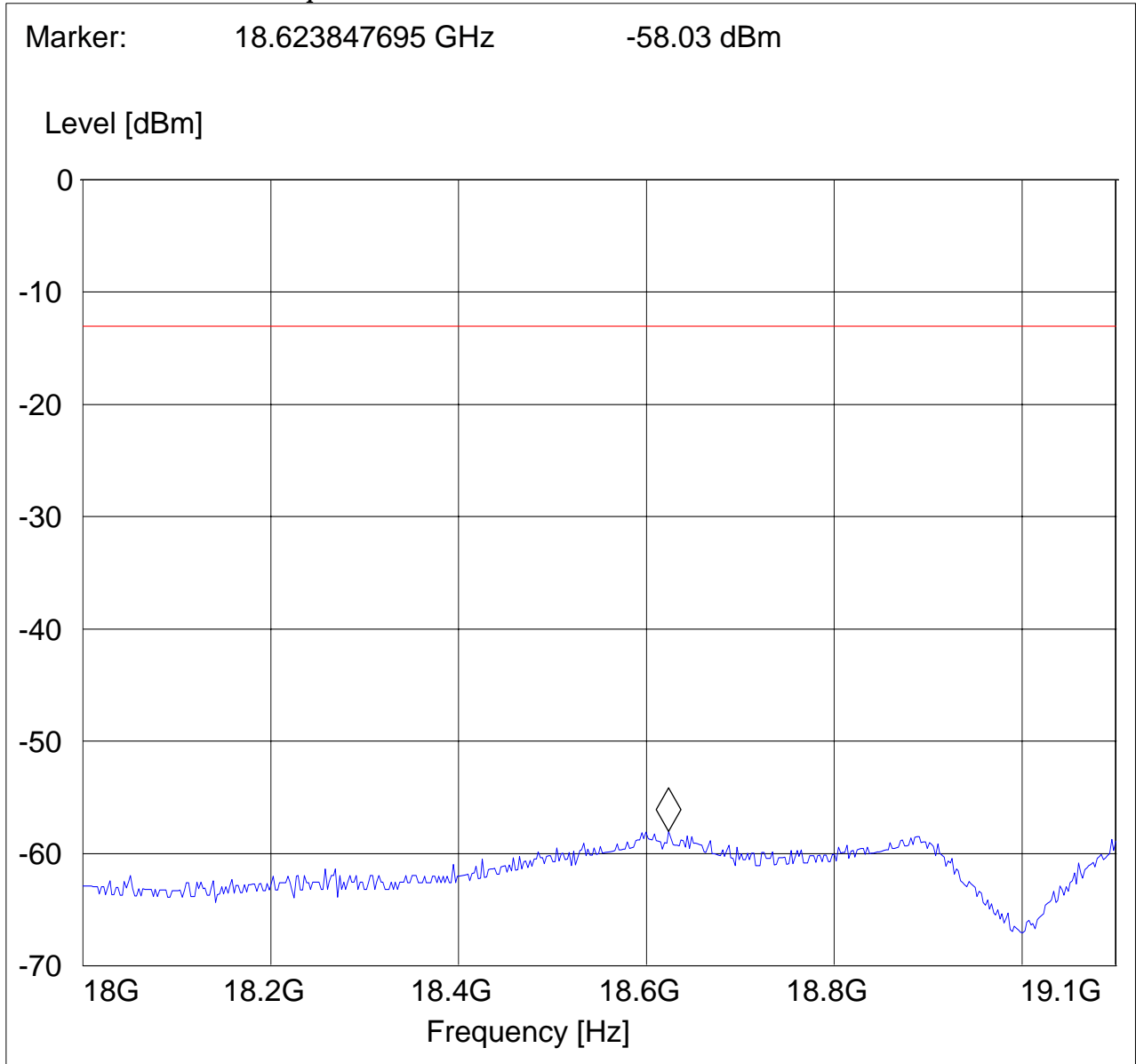
Test Mode: GSM1900

ANT Orientation: V

EUT Orientation: H

Test Engineer: Ed

**SWEEP TABLE: "FCC 24spuri 18-19.1G"**



## 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

## **7 References**

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION, PART 2--FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS October 1, 2001.

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION, PART 22 PUBLIC MOBILE SERVICES October 1, 1998.

FCC Report and order 02-229 September 24, 2002.

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION, PART 24 PERSONAL COMMUNICATIONS SERVICES October 1, 1998.

ANSI / TIA-603-C-2004 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard November 7, 2002.

## 8 BLOCK DIAGRAMS

### Radiated Testing

#### ANECHOIC CHAMBER

