



# FCC Test Report

## FCC Part 22, 24 / RSS 132,133

**FOR:**

**GPS/GSM Locator**

**MODEL #: Trimble Navigation  
TrimTrac-ProE, with Control Module**

**Trimble Navigation  
935 Stewart Dr.  
Sunnyvale, CA 94085  
USA**

**FCC ID: JUPTRIMTRACE  
IC-ID: 1756A-TRMTRACE**

**TEST REPORT #: EMC\_TRIMB\_022\_07001\_FCC22\_24  
DATE: 2007-08-07**



**FCC listed:  
A2LA accredited  
IC recognized #  
3462B**

**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 Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS132 and RSS133.

Company	Description	Model #
Trimble Navigation	GPS/GSM Locator	TrimTrac-ProE, with Control Module

Technical responsibility for area of testing:

Lothar Schmidt  
 (Director Regulatory and  
 Antenna Services)

2007-08-07 EMC & Radio

<b>Date</b>	<b>Section</b>	<b>Name</b>	<b>Signature</b>
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This report is prepared by:

Satya Radhakrishna  
 (EMC Project Engineer)

2007-08-07 EMC & Radio

<b>Date</b>	<b>Section</b>	<b>Name</b>	<b>Signature</b>
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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:	<b>CETECOM Inc.</b>
Department:	<b>EMC</b>
Address:	<b>411 Dixon Landing Road Milpitas, CA 95035 U.S.A.</b>
Telephone:	<b>+1 (408) 586 6200</b>
Fax:	<b>+1 (408) 586 6299</b>
Responsible Test Lab Manager:	<b>Lothar Schmidt</b>
Responsible Project Leader:	<b>Satya Radhakrishna</b>
Date of test:	<b>2007-06-21 to 2006-06-22</b>

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

Applicant's Name:	<b>Trimble Navigation</b>
Street Address:	<b>935 Stewart Dr.</b>
City/Zip Code	<b>Sunnyvale, CA 94085</b>
Country	<b>USA</b>
Contact Person:	<b>Keith Endow</b>
Phone No.	<b>408-481-8116</b>
Fax:	<b>408-481-8011</b>
e-mail:	<b>Keith_endow@trimble.com</b>

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

Manufacturer's Name:	<b>Trimble Navigation Limited</b>
Manufacturers Address:	<b>935 Steward Dr.</b>
City/Zip Code	<b>Sunnyvale, CA 94085</b>
Country	<b>USA</b>



### 3 Equipment under Test (EUT)

#### 3.1 Specification of the Equipment under Test

Marketing Name:	TrimTrac-ProE, with Control Module
Description:	GPS/GSM Locator
Model No:	TrimTrac-ProE, with Control Module
Antenna Type:	GSM
Type(s) of Modulation:	GPS: BPSK/CDMA, GSM/GPRS: GMSK
Band/Mode:	<input checked="" type="checkbox"/> GSM850 <input checked="" type="checkbox"/> PCS1900 <input type="checkbox"/> UMTS
Type:	<input type="checkbox"/> SPEECH <input checked="" type="checkbox"/> DATA <input type="checkbox"/> SPEECH & DATA
Equipment Classification: (CLASS)	<input type="checkbox"/> FIXED <input checked="" type="checkbox"/> VEHICULAR <input checked="" type="checkbox"/> PORTABLE <input type="checkbox"/> MODULE
Equipment Classification: (POWER(AC MAINS))	<input type="checkbox"/> 230VAC (GROUND) <input type="checkbox"/> 230VAC (NO GROUND) <input checked="" type="checkbox"/> 12VDC <input type="checkbox"/> 24VDC <input checked="" type="checkbox"/> OTHER : 6VDC BATTERY PACK

#### 3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	GPS/GSM Locator	Trimble Navigation	TrimTrac-ProE	01127600000409

#### 3.3 Identification of Accessory Equipment (AE)

AE #	TYPE	MANF.	MODEL
1	Control Module	Trimble Navigation	60210-00
2	Battery Pack	Trimble Navigation	54207-00

## **4 Subject of Investigation**

All testing was performed on the EUT listed in Section 3. The EUT was maximized in the X, Y, Z positions, all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

The EUT carries a pre-certified GPRS module with FCC ID# MIVGSM0308. This test report contains full radiated testing as per FCC 22/24 on the EUT with the pre-certified GPRS module. All conducted measurements are covered under test report # W7005-1\_Enfora\_FCC Test Report\_Rev3.pdf

There are two versions of the EUT available. The first version has a control module. It provides power connection to the car battery and collects data via a sensor. The second version is powered by a battery pack and enables usage as a portable configuration. The EUT with the control module was found to be the worst case configuration and all tests were performed with this configuration.

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 and Industry Canada rules RSS132 and RSS133.

## 5 Measurements

### 5.1 RF Power Output

#### 5.1.1 FCC 2.1046 Measurements required: RF power output.

Power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on circuit elements as specified. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

#### 5.1.2 Limits:

##### 5.1.2.1 FCC 22.913 (a) Effective radiated power limits.

The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts.

##### 5.1.2.2 FCC 24.232 (b)(c) Power limits.

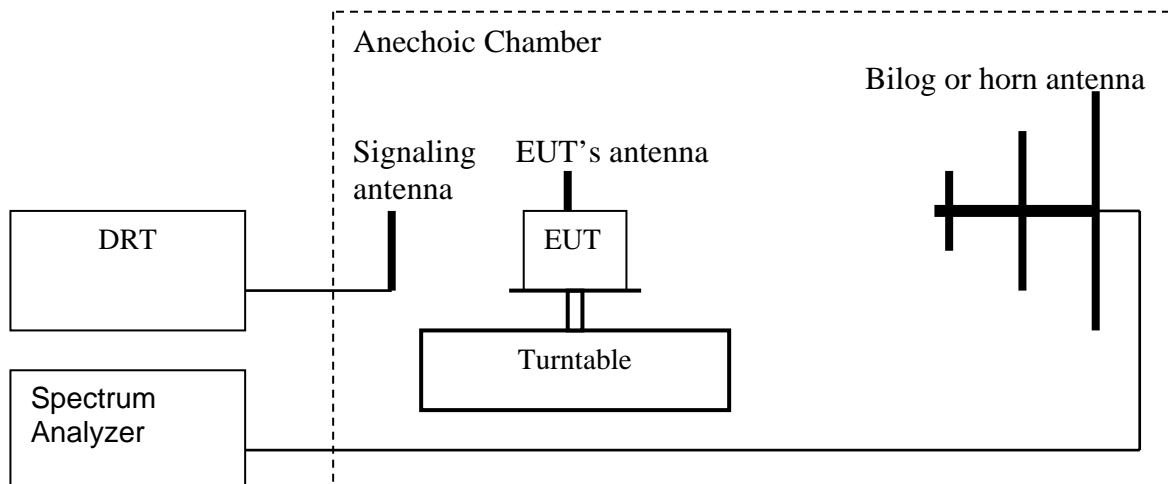
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement over the full bandwidth of the channel.

#### 5.1.3 Radiated Output Power Measurement procedure:

Based on TIA-603C 2004

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



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



2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
  3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
  4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
  5. 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.
  6. 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).
  7. Determine the ERP using the following equation:  
**ERP (dBm) = LVL (dBm) + LOSS (dB)**
  8. Determine the EIRP using the following equation:  
**EIRP (dBm) = ERP (dBm) + 2.14 (dB)**
  9. 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.)





**5.1.4 ERP Results 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	28.9
836.6	29.34
848.8	29.39

**5.1.5 EIRP Results 1900 MHz band:**

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

<b>Frequency (MHz)</b>	<b>Effective Isotropic Radiated Power (dBm)</b>
	<b>GPRS</b>
1850.2	27.97
1880.0	29.15
1909.8	29.28



**EIRP (GSM 850)  
 CHANNEL 128 GPRS**

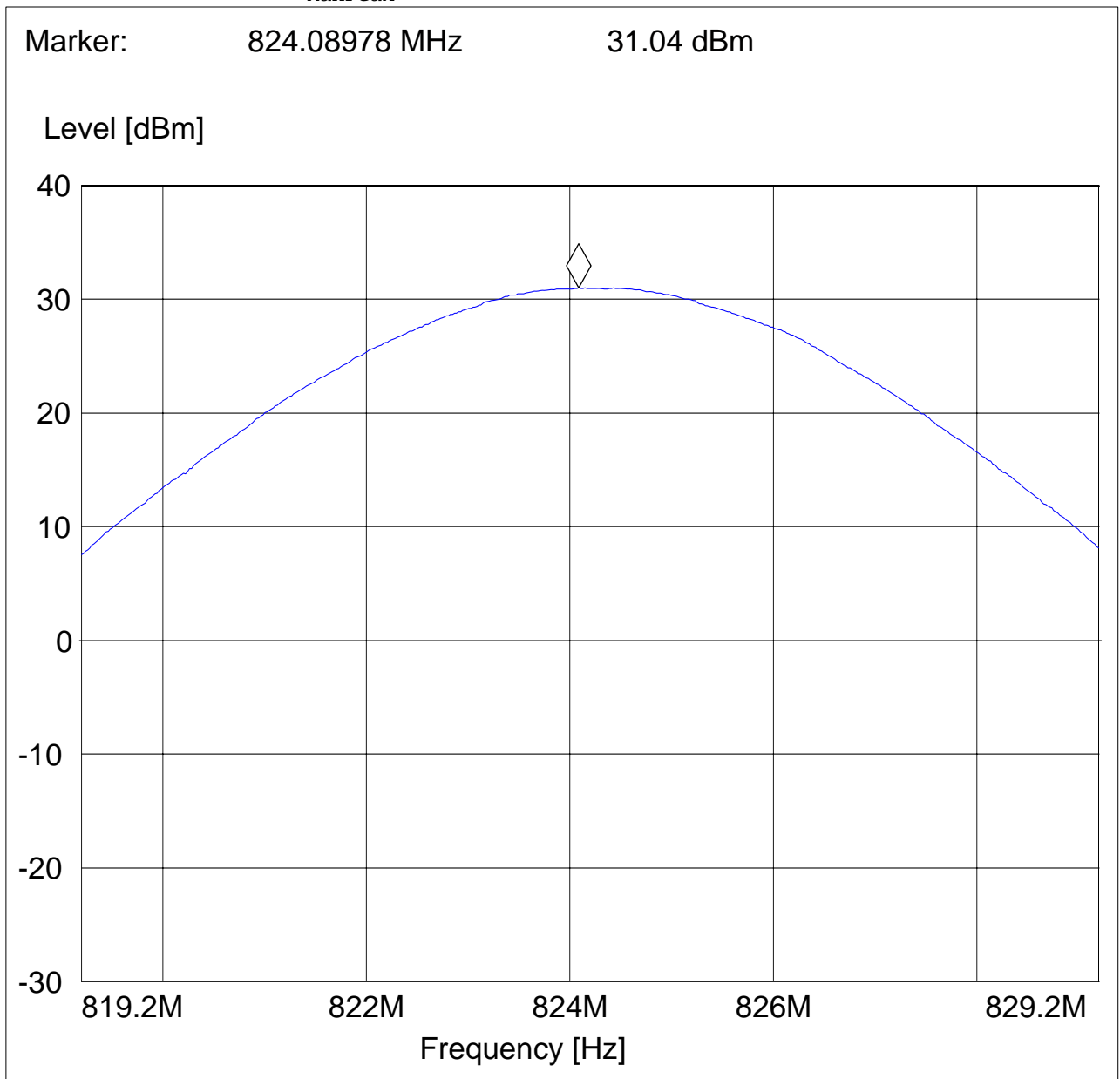
§22.913(a)

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

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM850, ch128  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
819.2 MHz	829.2 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM
		MaxPeak			





**EIRP (GSM 850)  
 CHANNEL 190 GPRS**

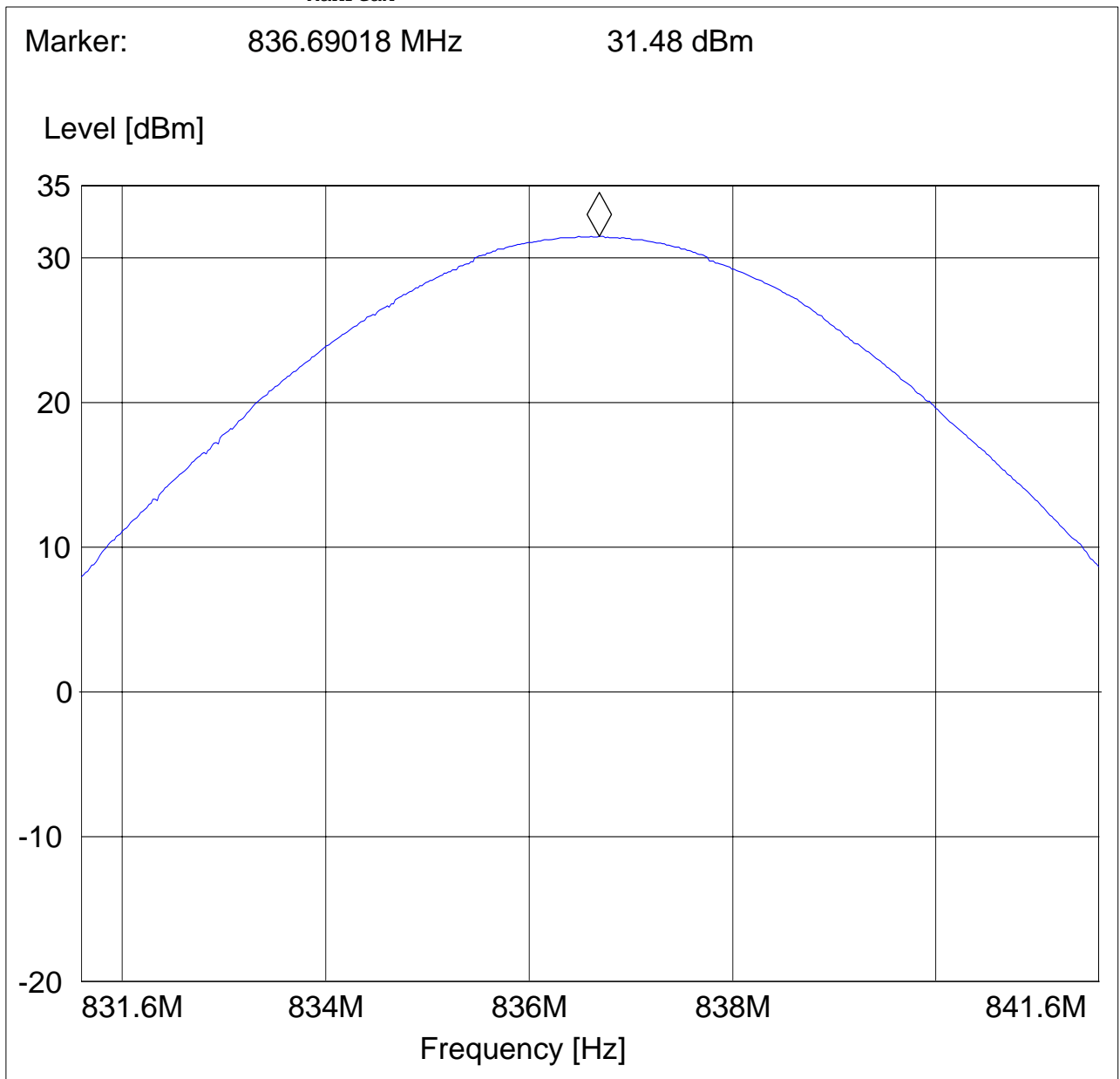
§22.913(a)

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

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM850, ch190  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
831.6 MHz	841.6 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM
		MaxPeak			





**EIRP (GSM 850)  
 CHANNEL 251 GPRS**

§22.913(a)

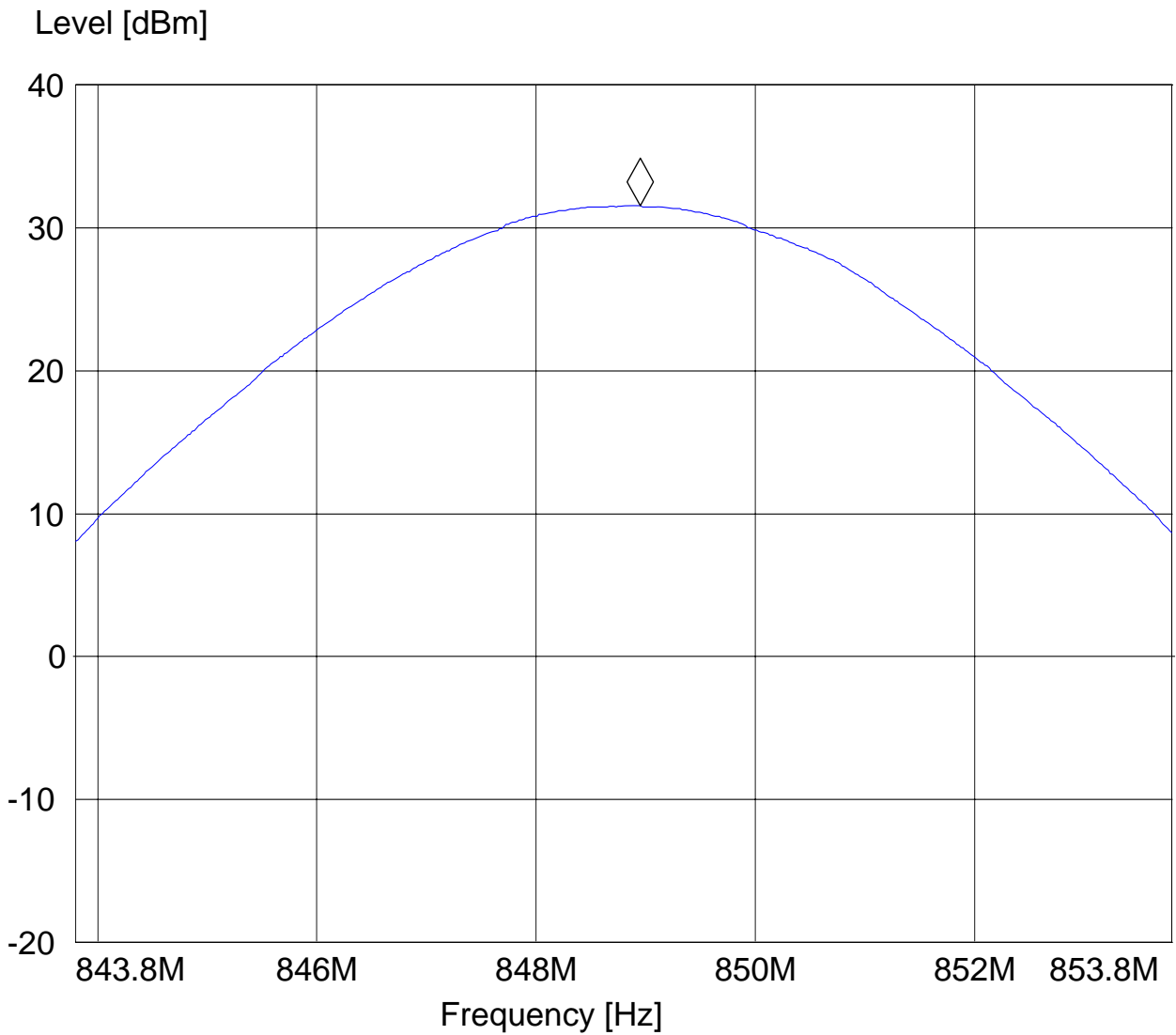
**CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM850, ch251  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
843.8 MHz	853.8 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM

Marker: 848.950301 MHz 31.53 dBm





§24.232(b)

**EIRP (PCS-1900)**

**CHANNEL 512 GPRS**

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

EUT: Trimtrac pro E + Control module

Customer: Trimble Navigation

Test Mode: GSM1900, ch 512

ANT Orientation: H

EUT Orientation: H

Test Engineer: Ed

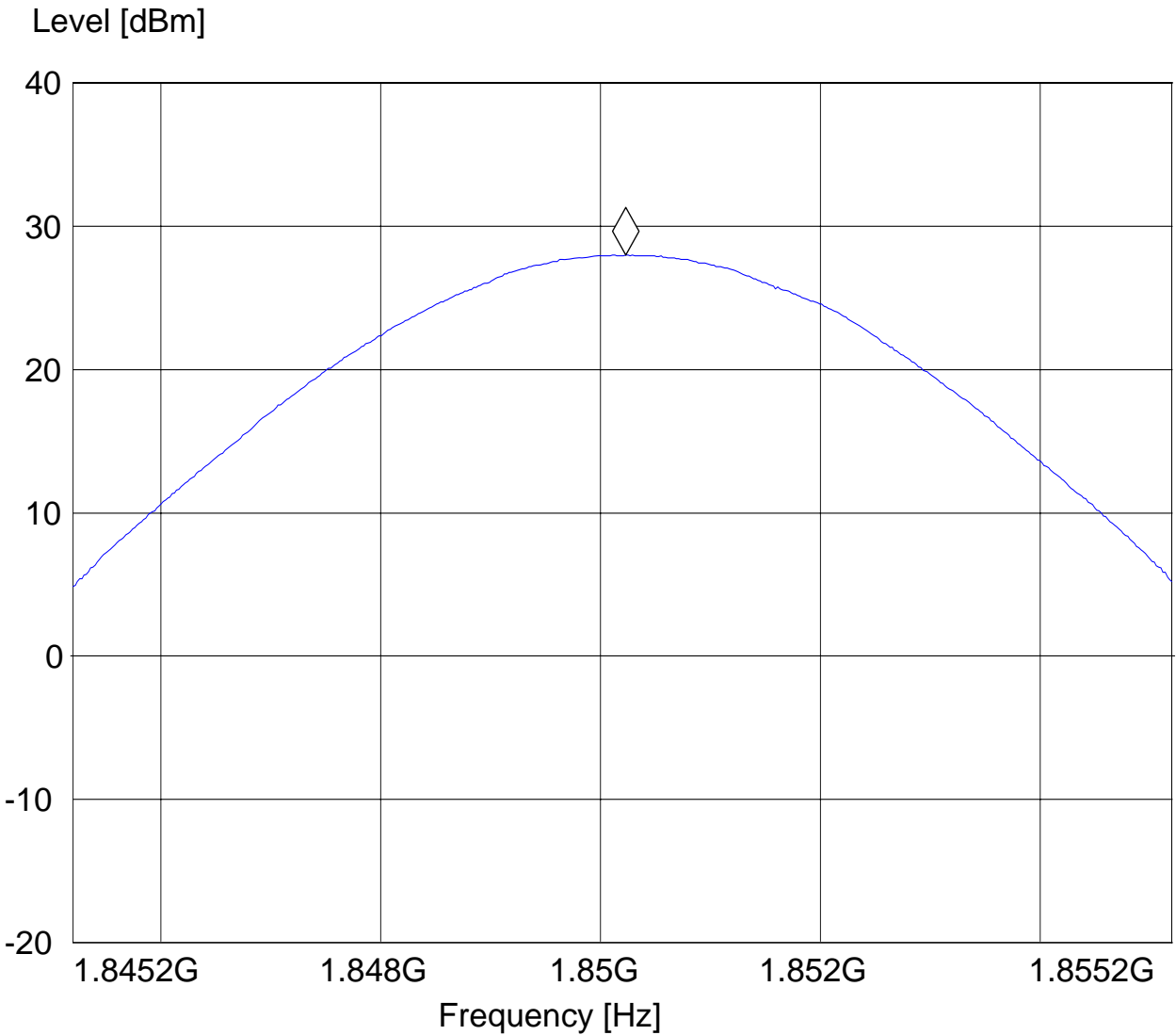
Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.8 GHz	1.9 GHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM

Short Description: EIRP PCS 1900 for channel-512

Marker: 1.85023006 GHz 27.97 dBm





**EIRP (PCS-1900)  
CHANNEL 661 GPRS**

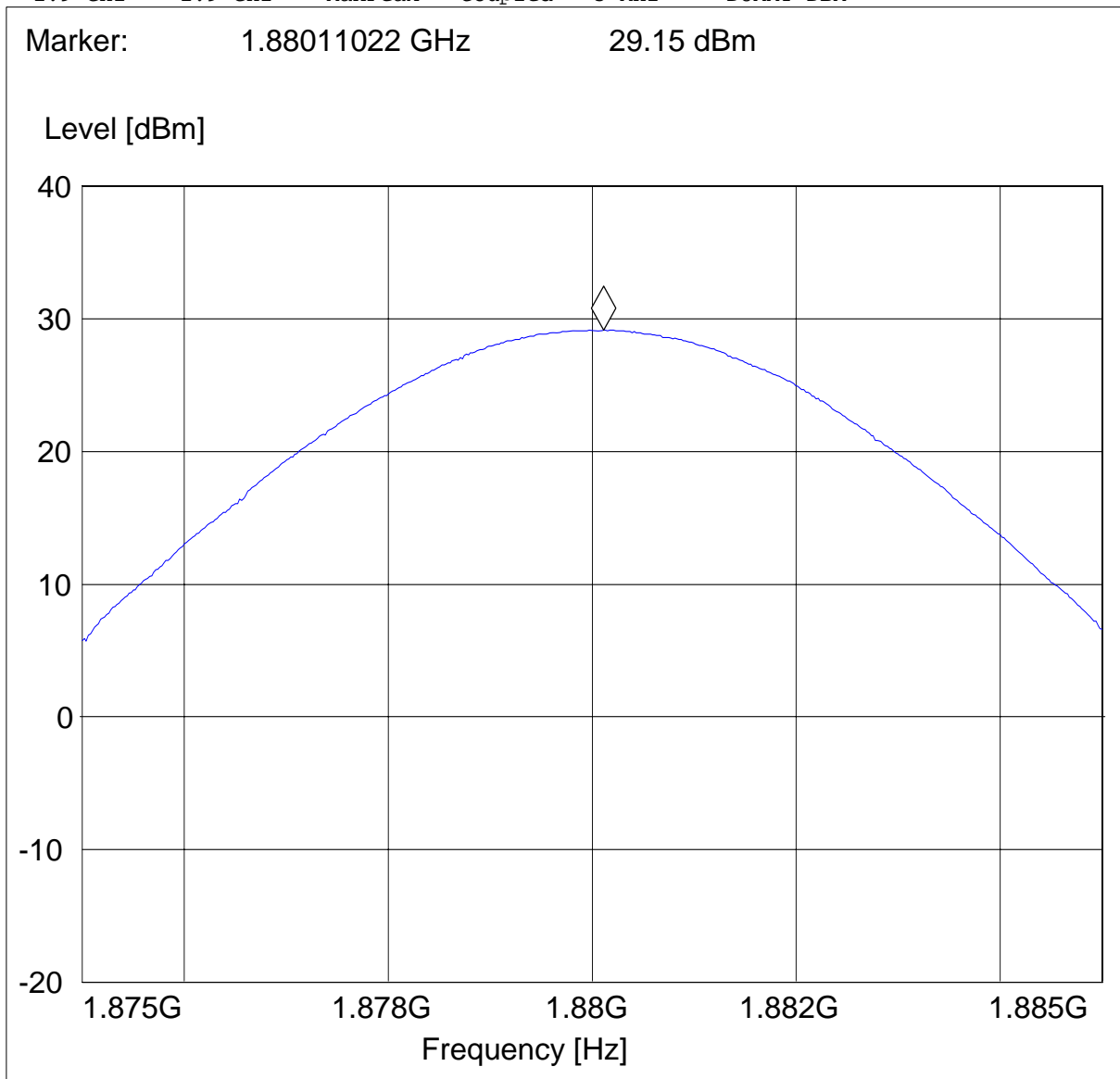
§24.232(b)

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, ch 661  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM



**EIRP (PCS-1900)  
CHANNEL 810 GPRS**

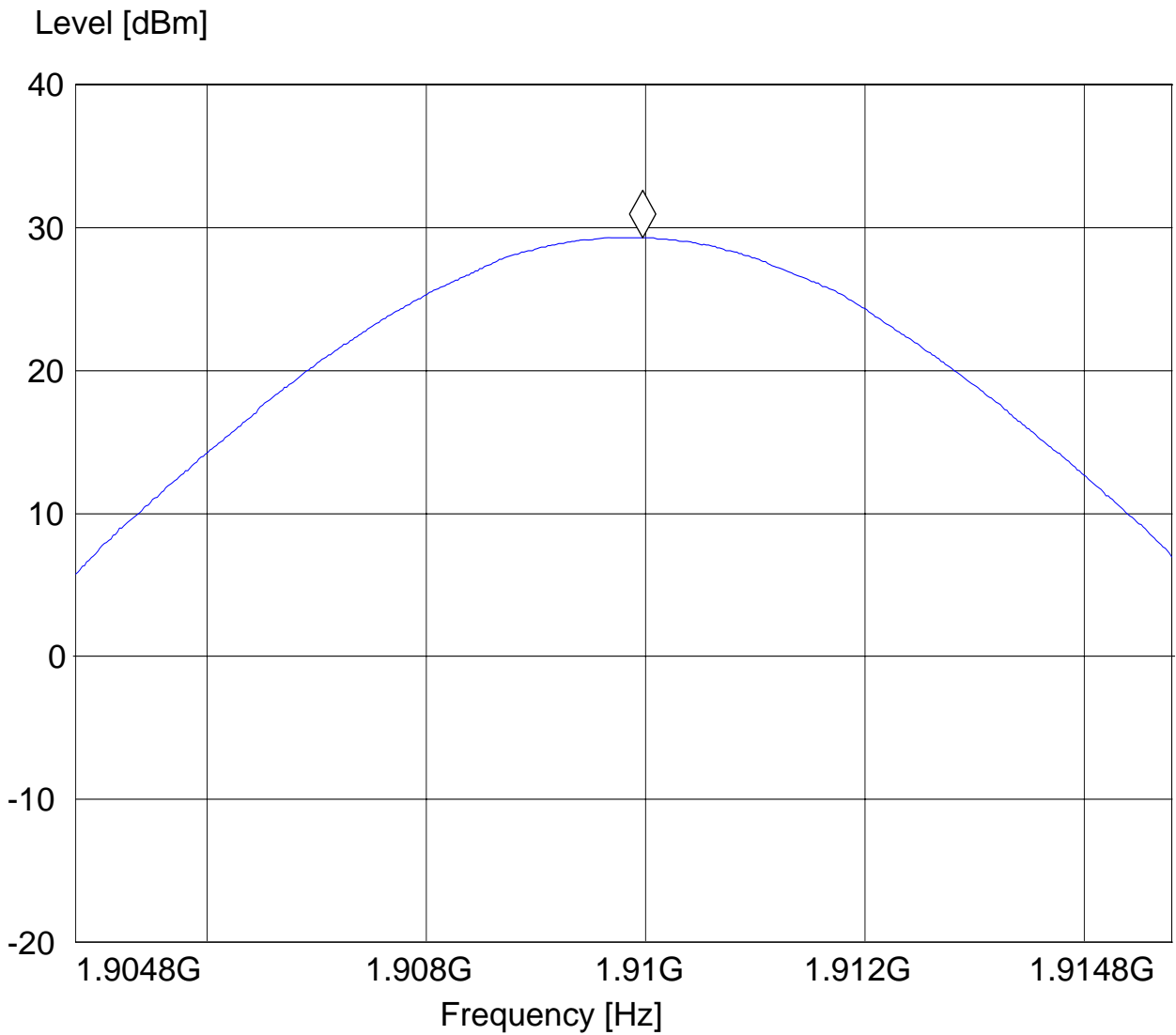
**CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, ch 810  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

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

Short Description:		EIRP PCS 1900 for channel-810			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.9 GHz	1.9 GHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM

Marker: 1.909970341 GHz 29.28 dBm





## 5.2 Spurious Emissions Radiated

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

- (a) 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.

### 5.2.2 Limits:

#### 5.2.2.1 **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.

#### 5.2.2.2 **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.

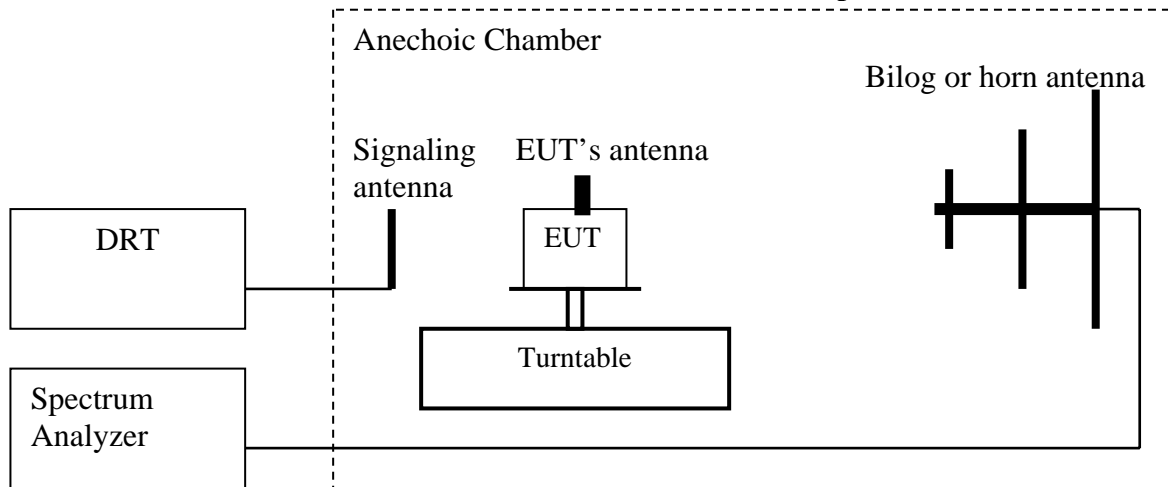
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

### 5.2.3 Radiated out of band measurement procedure:

#### Based on TIA-603C 2004 2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. 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.
5. 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.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (LOSS).  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .
7. Determine the level of spurious emissions using the following equation:  
**Spurious (dBm) = LVL (dBm) + LOSS (dB):**
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:  
**Spurious (dBm) = LVL (dBm) + LOSS (dB):**

10. 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.



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

**5.2.4.1 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)

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

TX: 30MHz - 1GHz Spurious emission limit -13dBm

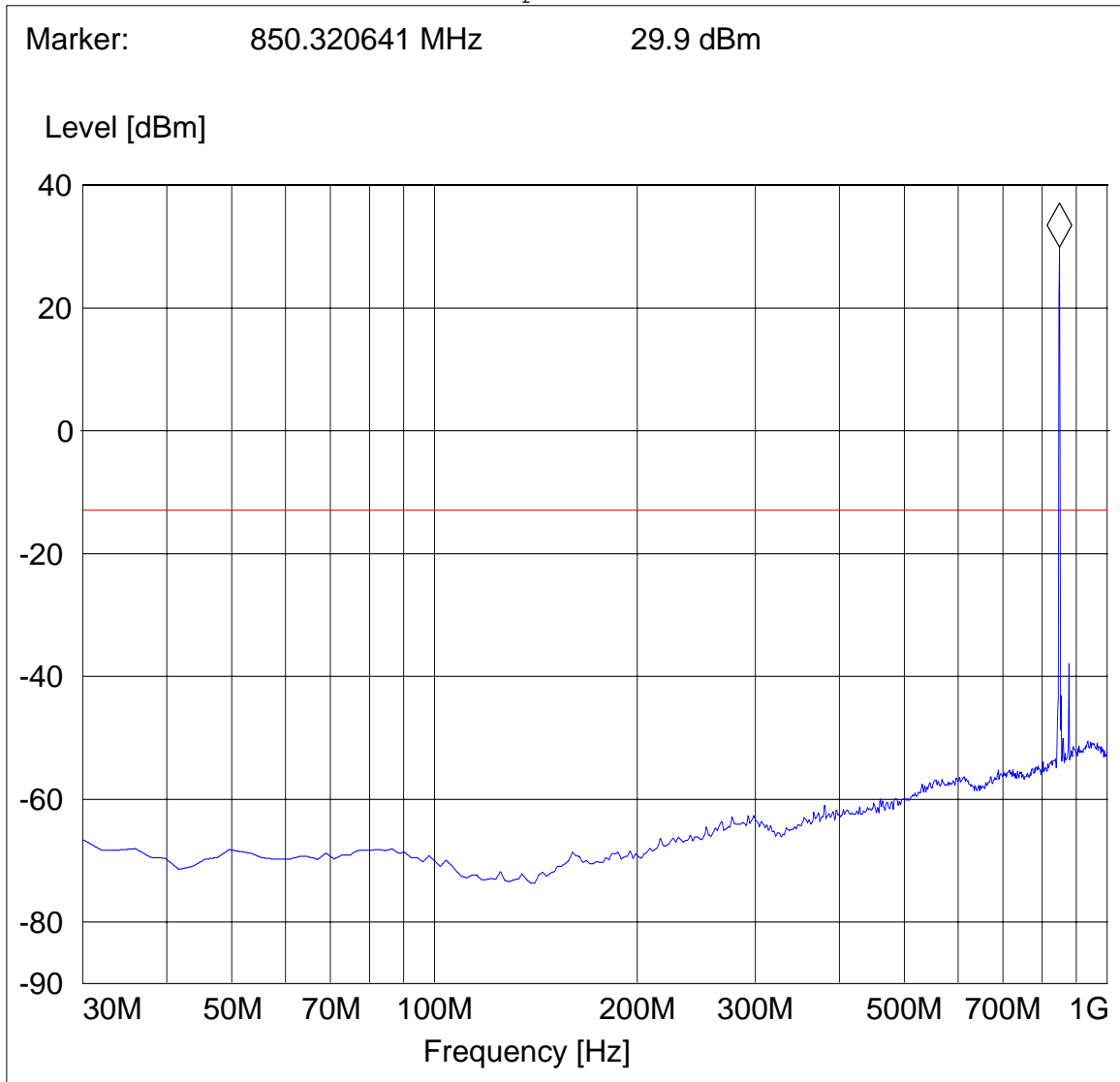
Antenna: vertical Note: 1. The peak above the limit line is the carrier freq.

2. This plot is valid for low, mid & high channels (worst-case plot)

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM850, ch251  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





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

**Tx @ 824.2MHz: 1GHz – 1.58GHz**

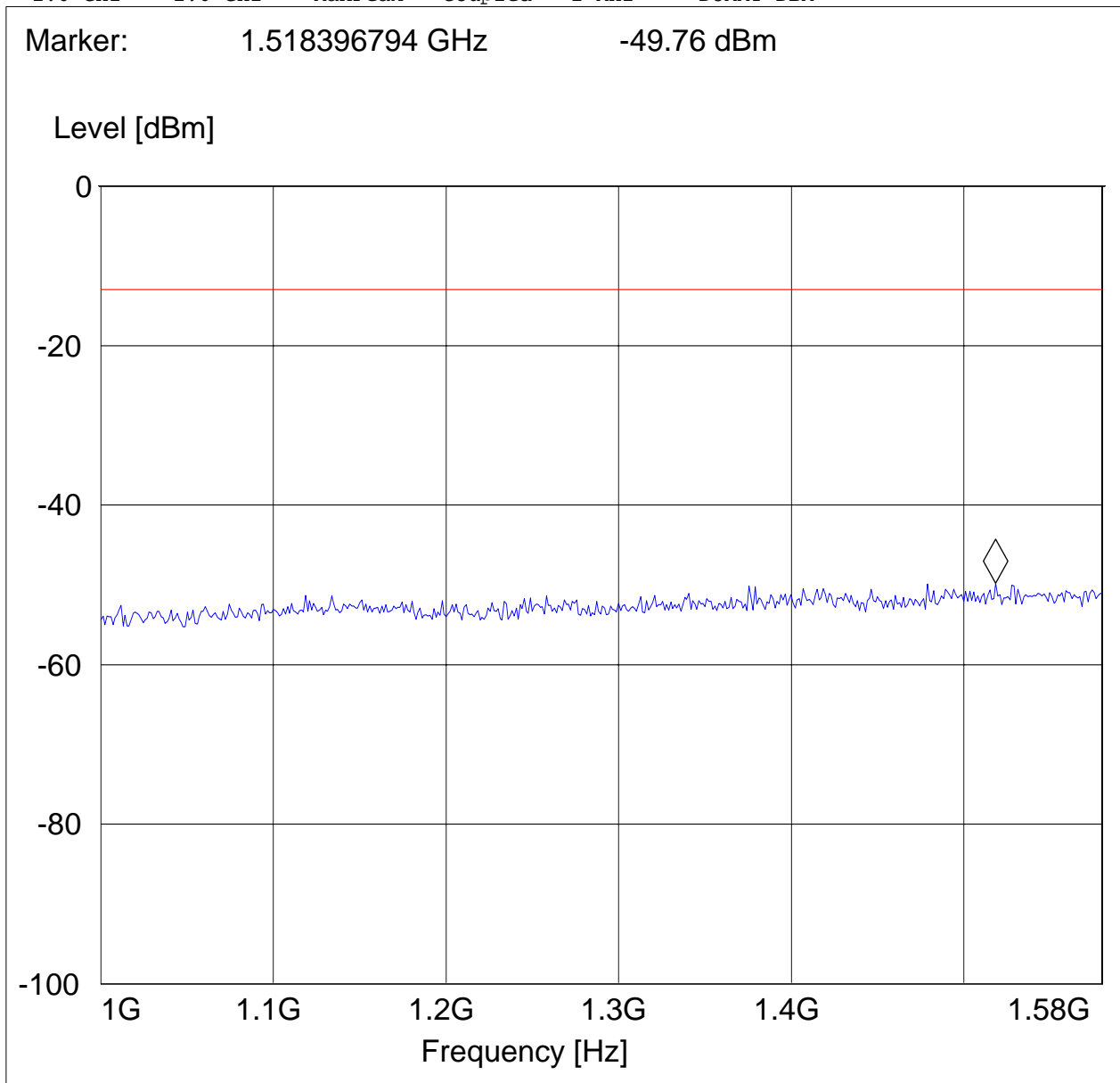
Spurious emission limit -13dBm

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

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM850, ch 128  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





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

**Tx @ 824.2MHz: 1.58GHz – 9GHz**

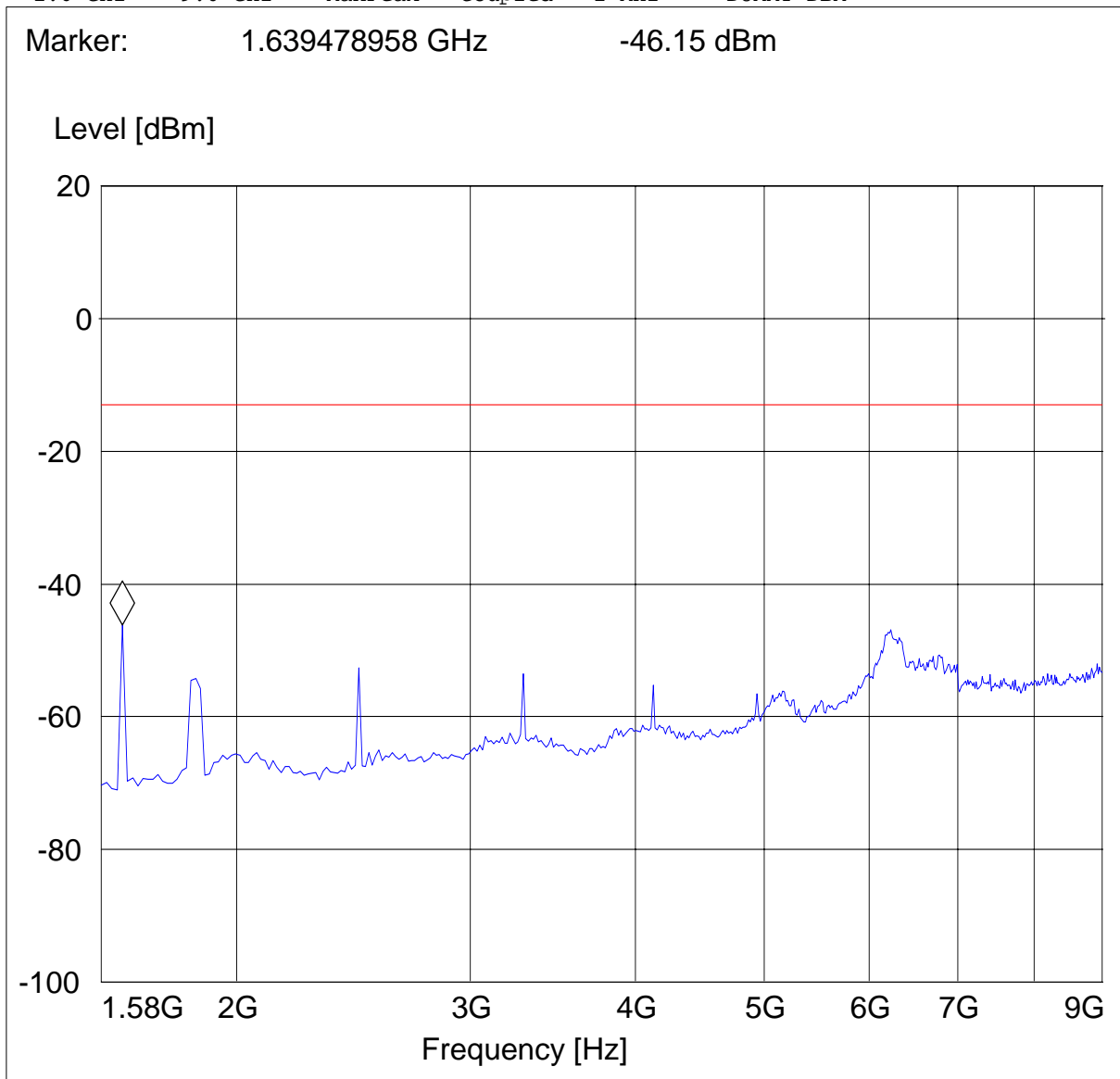
Spurious emission limit -13dBm

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM850, ch190  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

**SWEEP TABLE: "FCC 22Spuri 1.58-9G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





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

**Tx @ 836.6MHz: 1GHz – 1.58GHz**

Spurious emission limit -13dBm

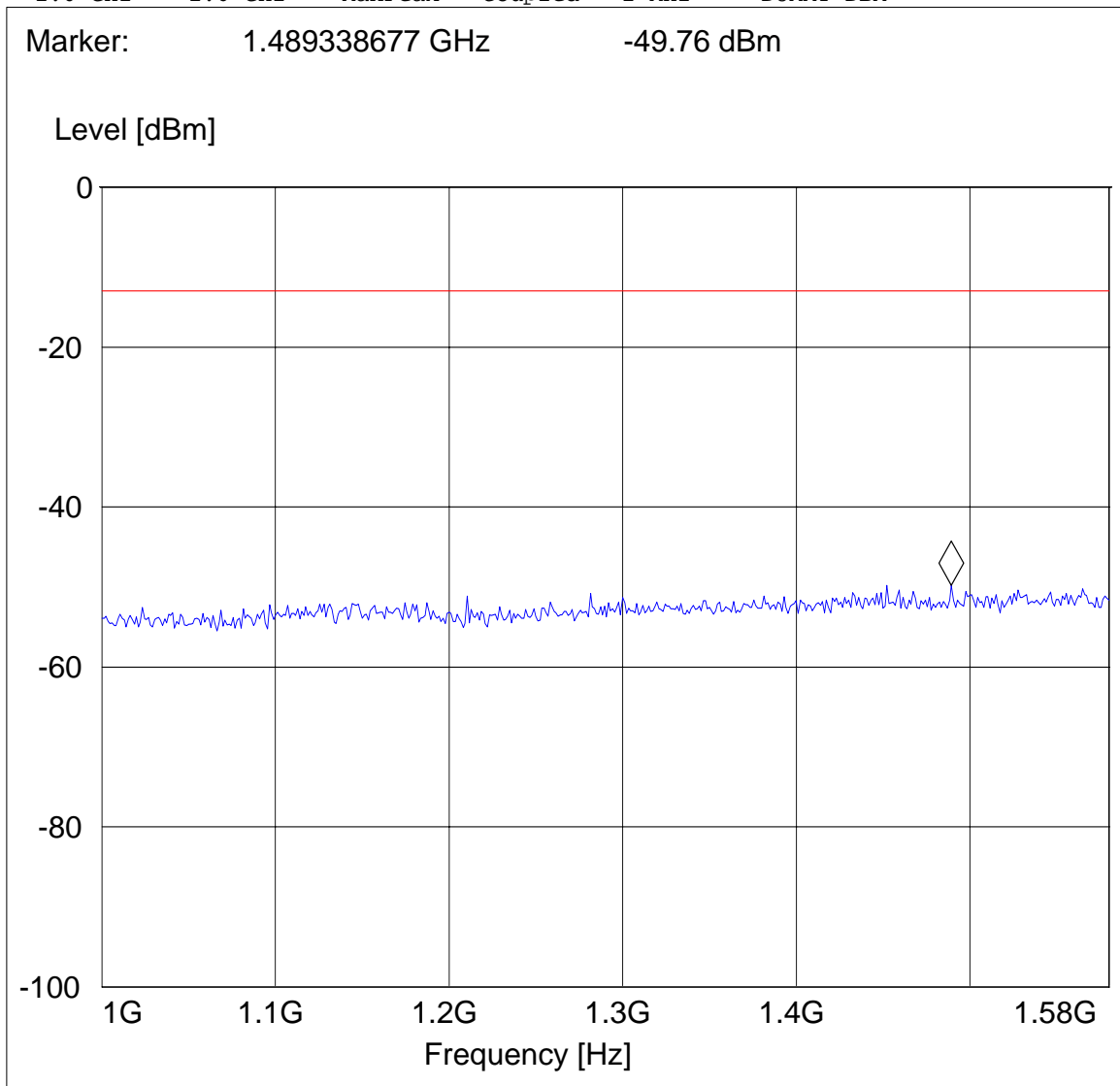
**CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM850, ch 190  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.489338677 GHz -49.76 dBm





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

**Tx @ 836.6MHz: 1.58GHz – 9GHz**

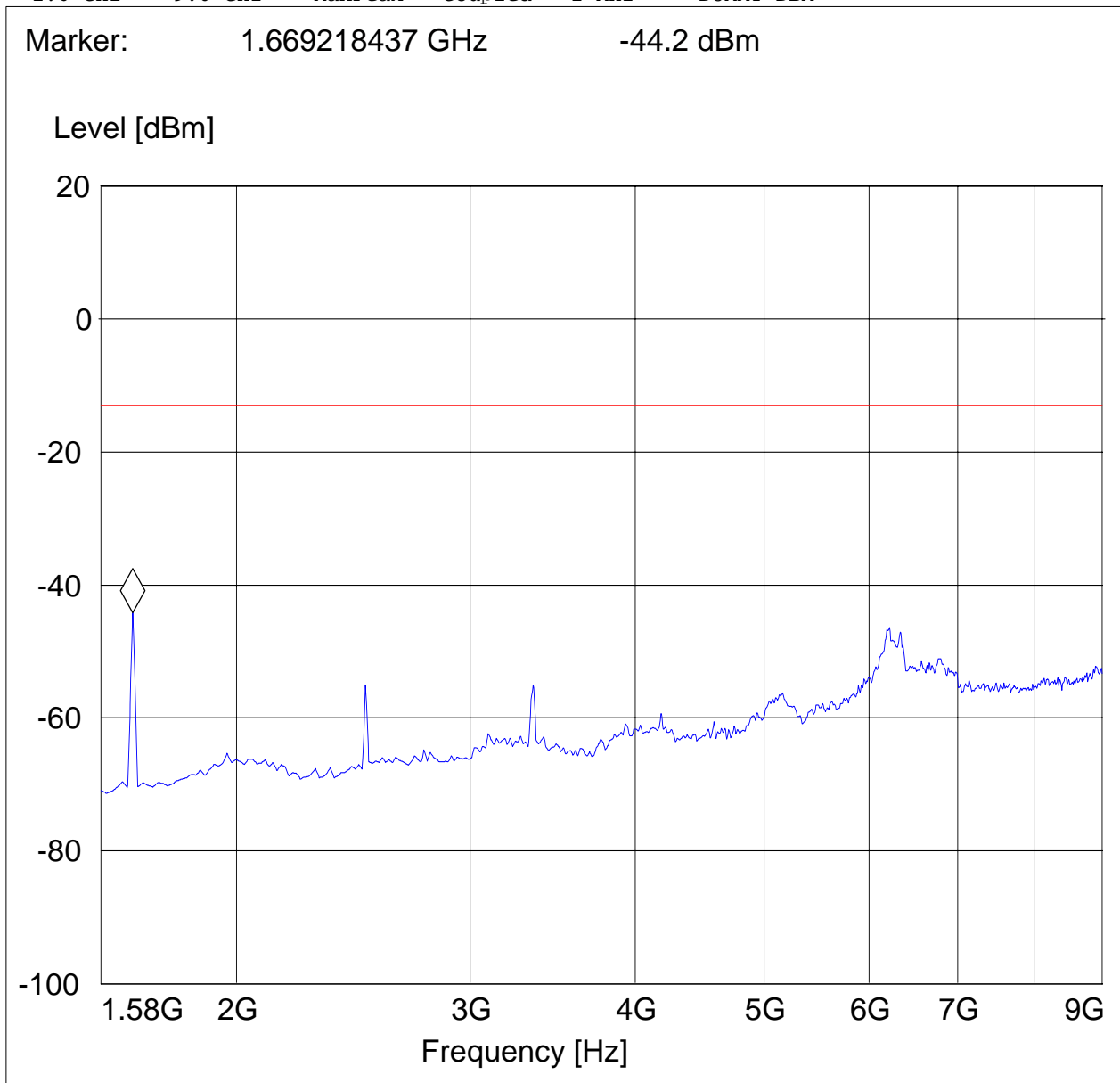
Spurious emission limit -13dBm

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM850, ch 190  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

**SWEEP TABLE: "FCC 22Spuri 1.58-9G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM







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

**Tx @ 848.8MHz: 1GHz – 1.58GHz**

Spurious emission limit -13dBm

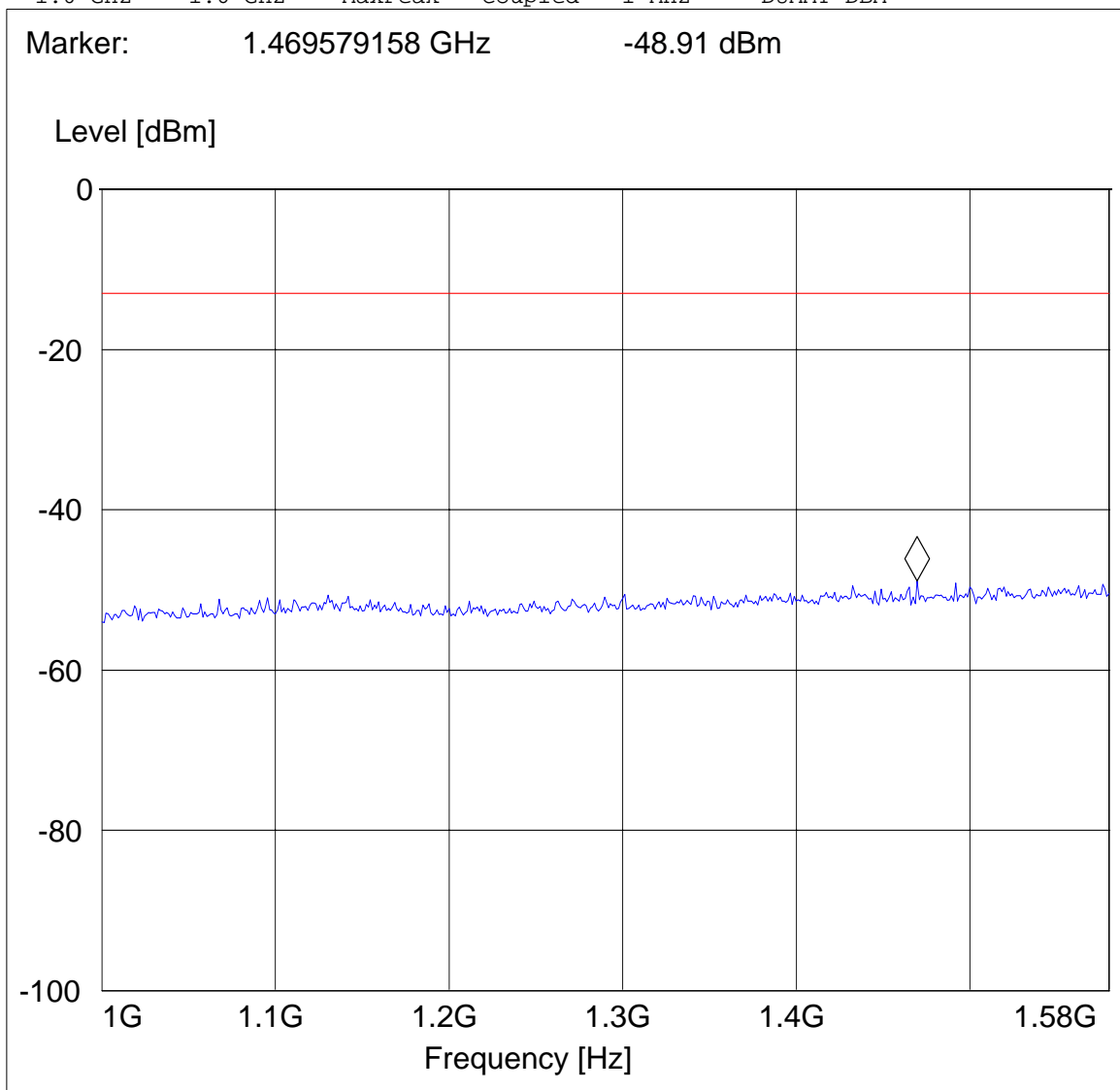
**CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navagation  
 Test Mode: GSM850, ch251  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.469579158 GHz -48.91 dBm





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

**Tx @ 848.8MHz: 1.58GHz – 9GHz**

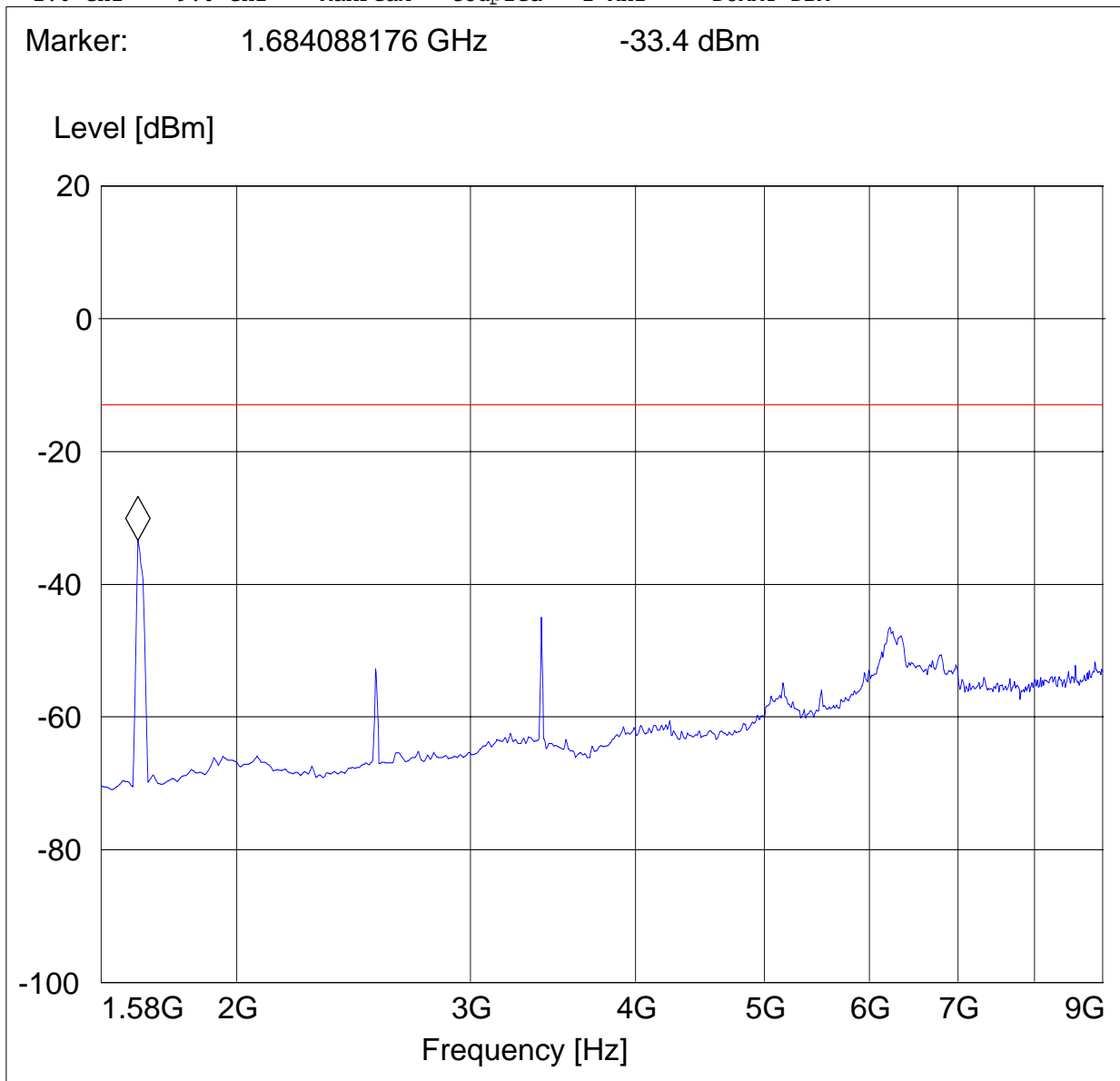
Spurious emission limit -13dBm

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM850, ch 251  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

**SWEEP TABLE: "FCC 22Spuri 1.58-9G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





**5.2.4.2 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>
2	3700.4	NF	3760	NF	3819.6	NF
3	5550.6	NF	5640	NF	5729.4	NF
4	7400.8	NF	7520	NF	7639.2	NF
5	9251	NF	9400	NF	9549	NF
6	11101.2	NF	11280	NF	11458.8	NF
7	12951.4	NF	13160	NF	13368.6	NF
8	14801.6	NF	15040	NF	15278.4	NF
9	16651.8	NF	16920	NF	17188.2	NF
10	18502	NF	18800	NF	19098	NF
NF = NOISE FLOOR						



**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**TX: 30MHz - 1GHz**

Spurious emission limit -13dBm

**Antenna: vertical**

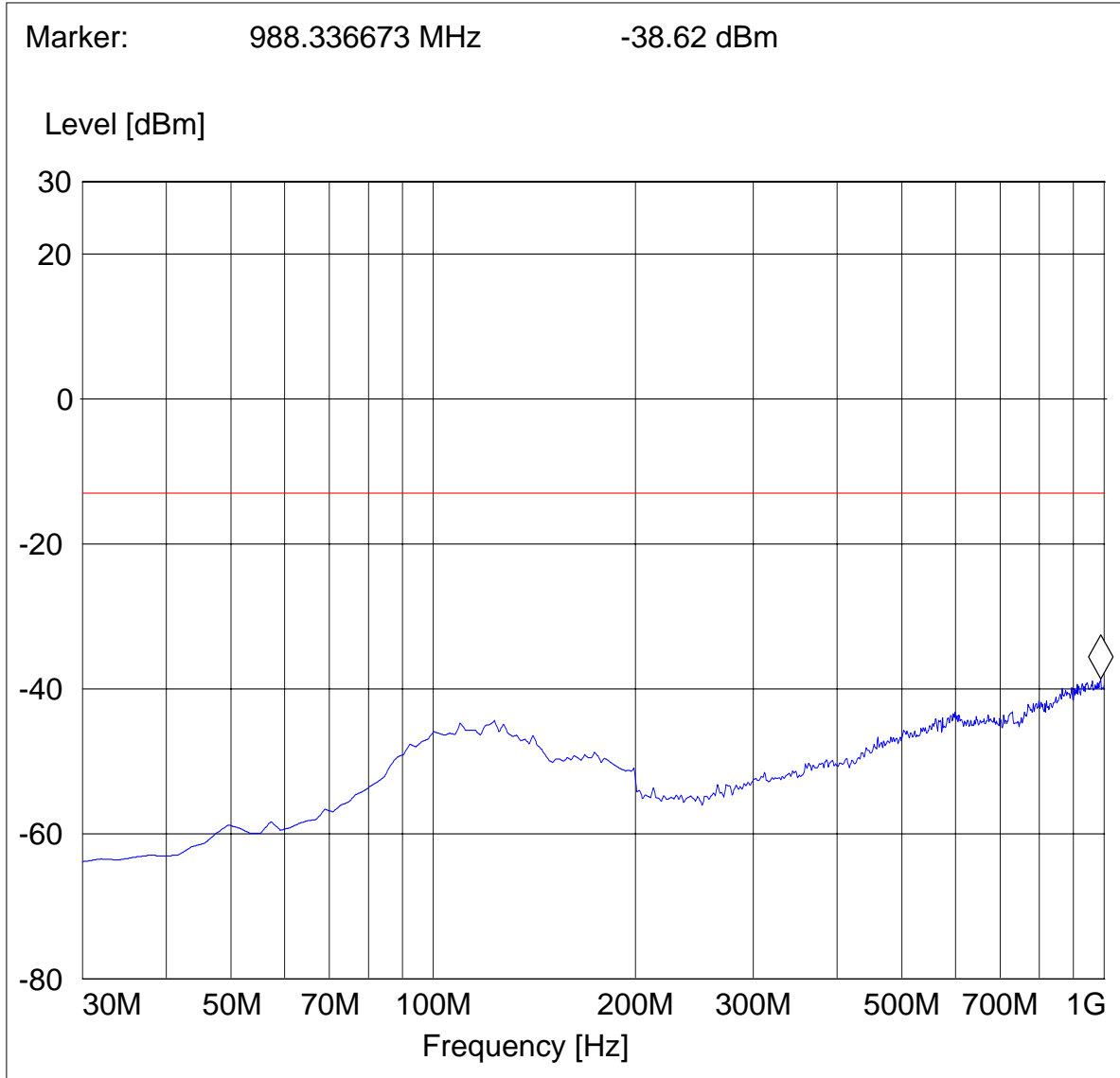
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, ch 661  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

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

Short Description:		FCC 24 30MHz-1GHz			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-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: Trimtrac pro E + Control module

Customer: Trimble Navigation

Test Mode: GSM1900, ch 512

ANT Orientation: H

EUT Orientation: H

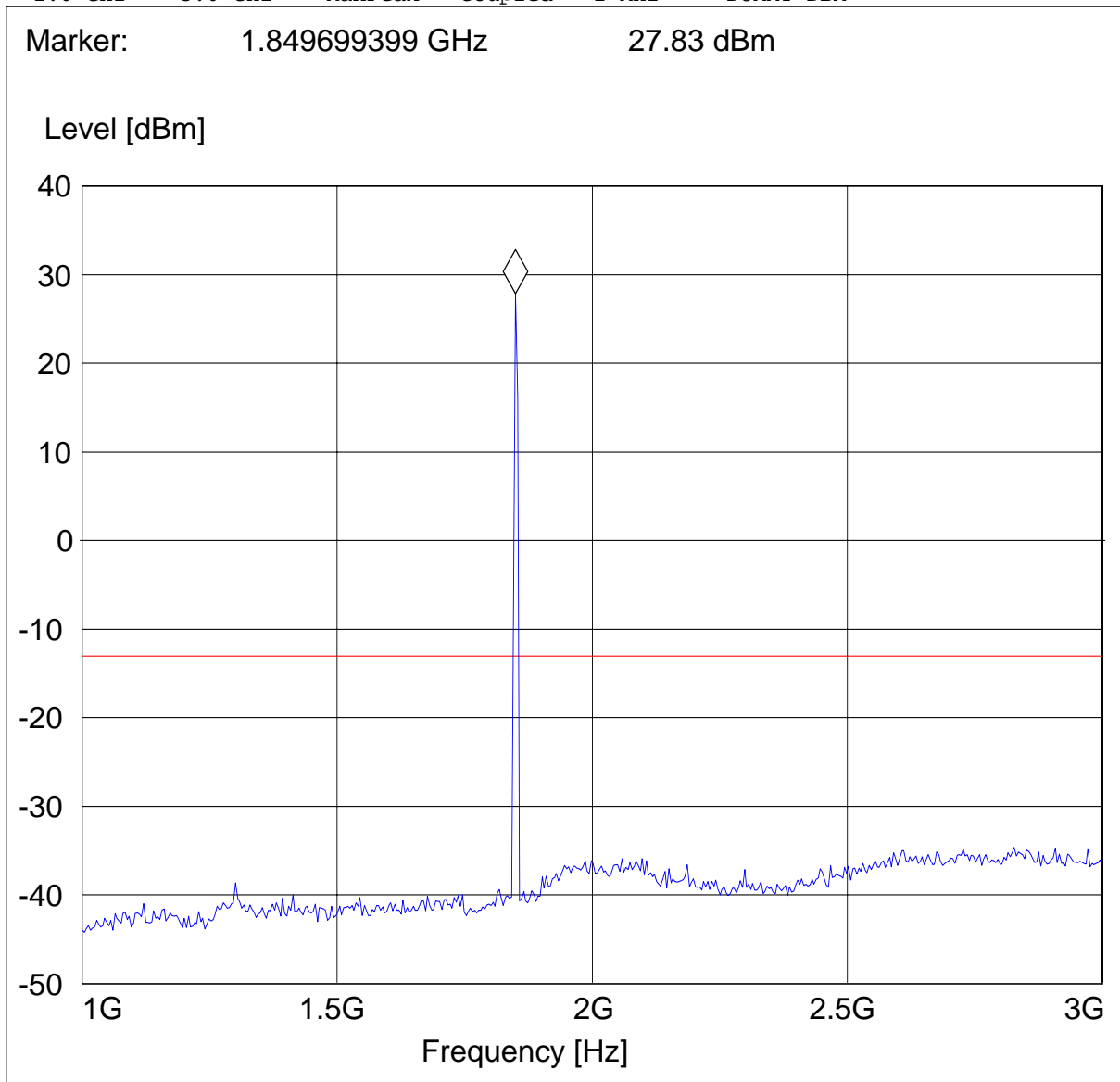
Test Engineer: Ed

Power Supply: 12VDC Battery

Comments: marker is on uplink sig.

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





**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: Trimtrac pro E + Control module

Customer: Trimble Navigation

Test Mode: GSM1900, ch 512

ANT Orientation: H

EUT Orientation: H

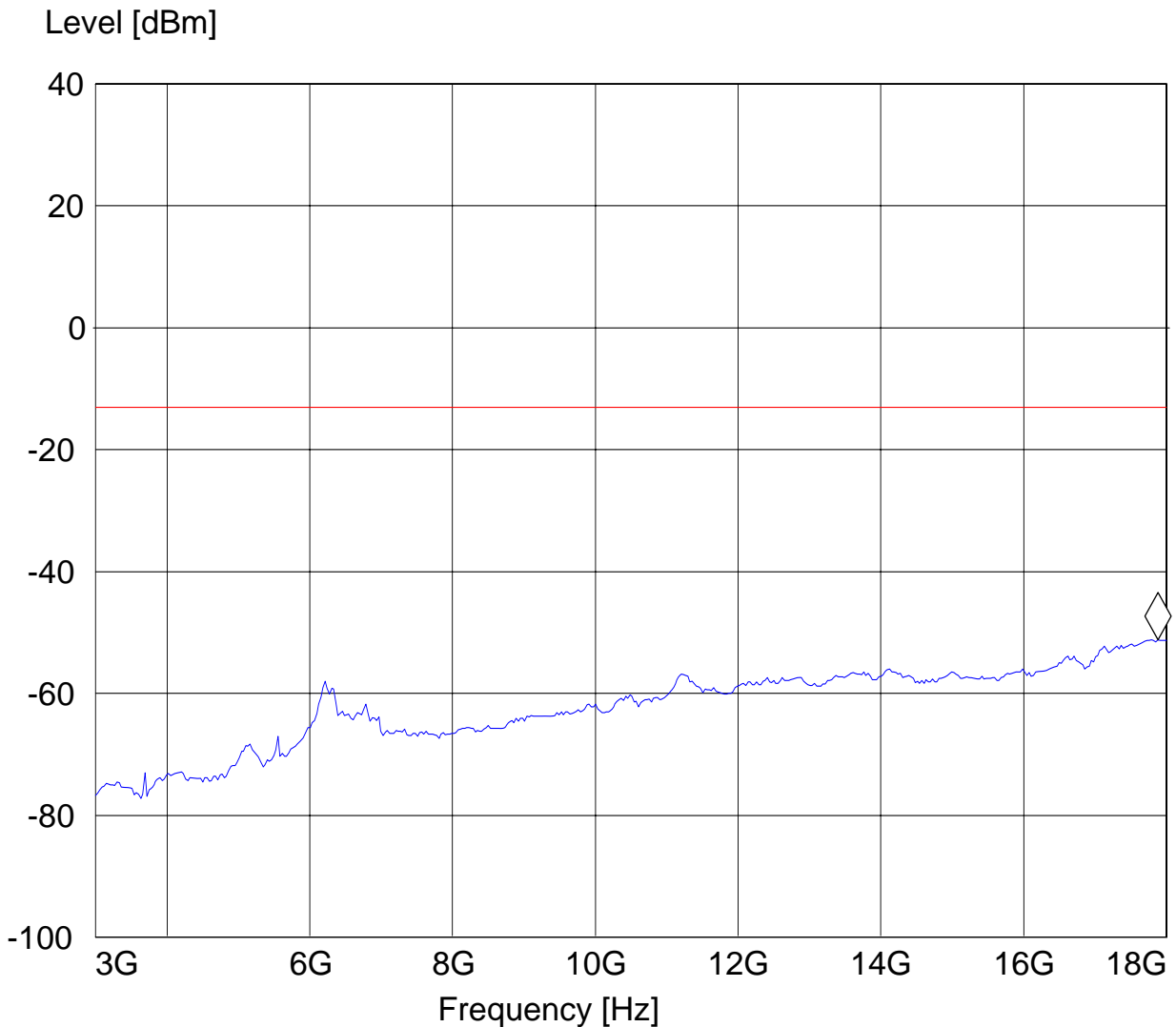
Test Engineer: Ed

Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 17.879759519 GHz -51.14 dBm





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1880.0MHz: 1GHz – 3GHz**

Spurious emission limit -13dBm

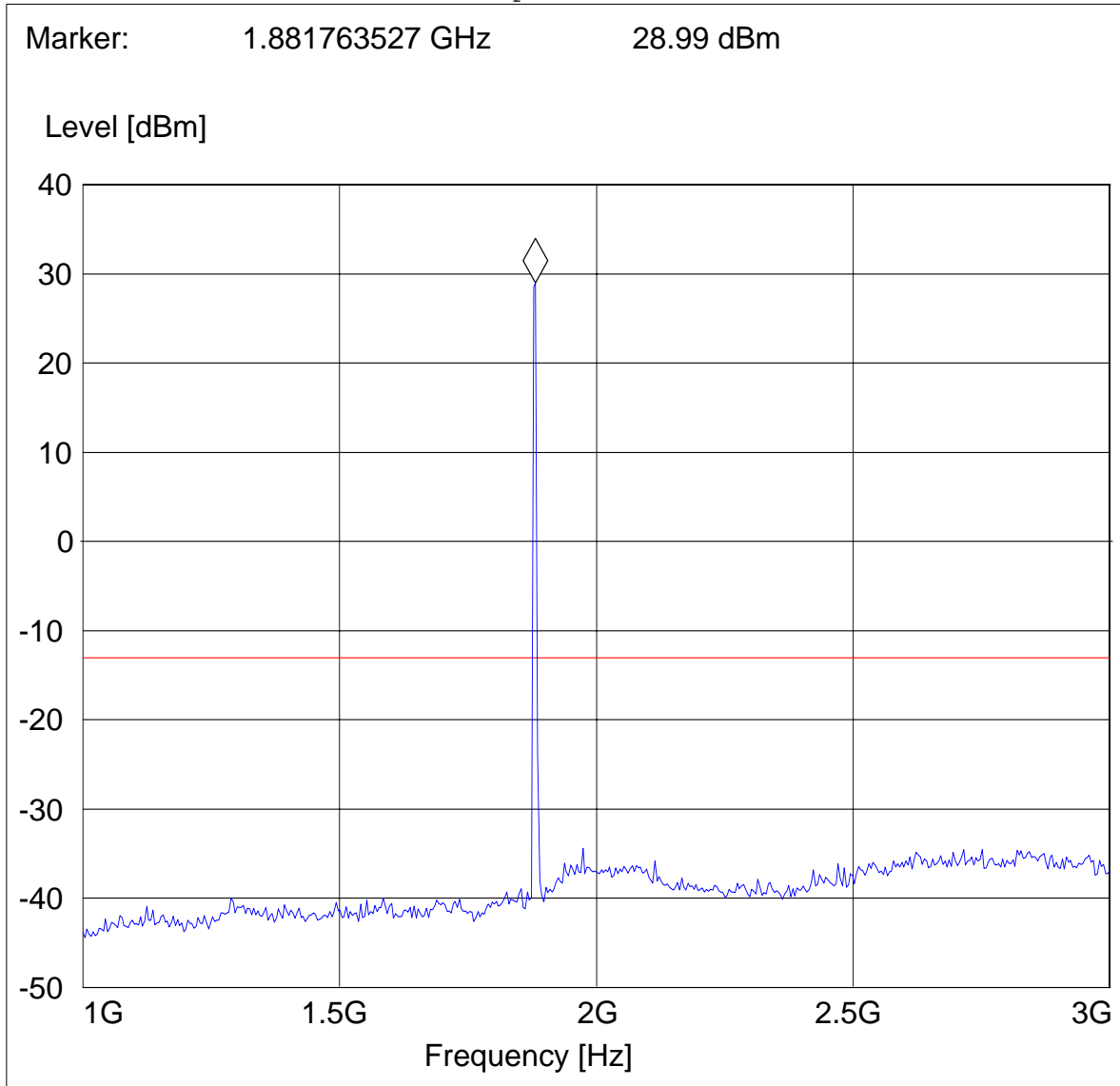
**Note: The peak above/close to the limit line is the carrier freq. at ch-661.**

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, ch 661  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery  
Comments: marker is on uplink sig.

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**Tx @ 1880.0MHz: 3GHz – 18GHz**

Spurious emission limit -13dBm

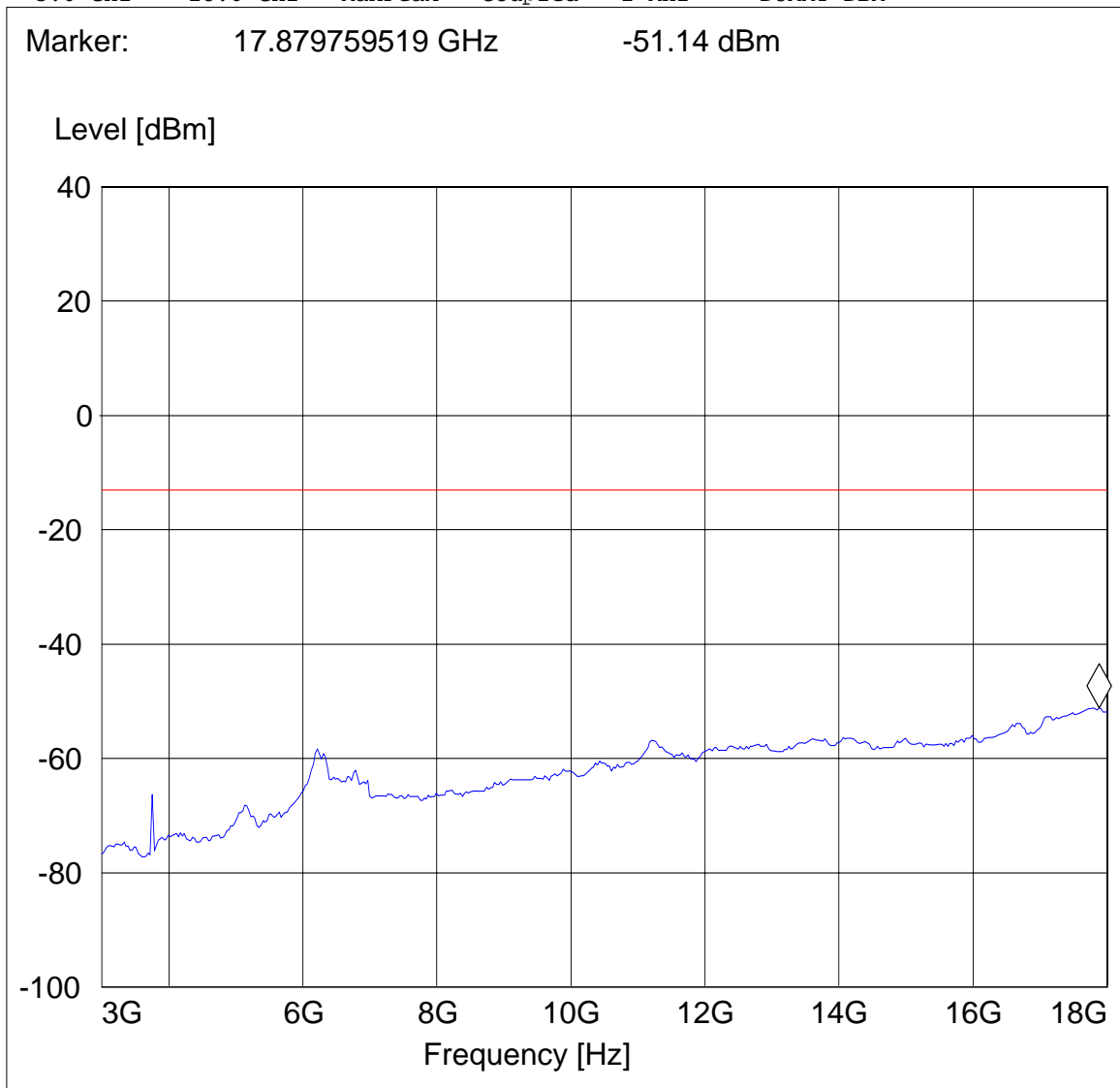
**CETECOM Inc., 411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM1900, ch 661  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 17.879759519 GHz -51.14 dBm







**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: Trimtrac pro E + Control module

Customer: Trimble Navigation

Test Mode: GSM1900, ch 810

ANT Orientation: H

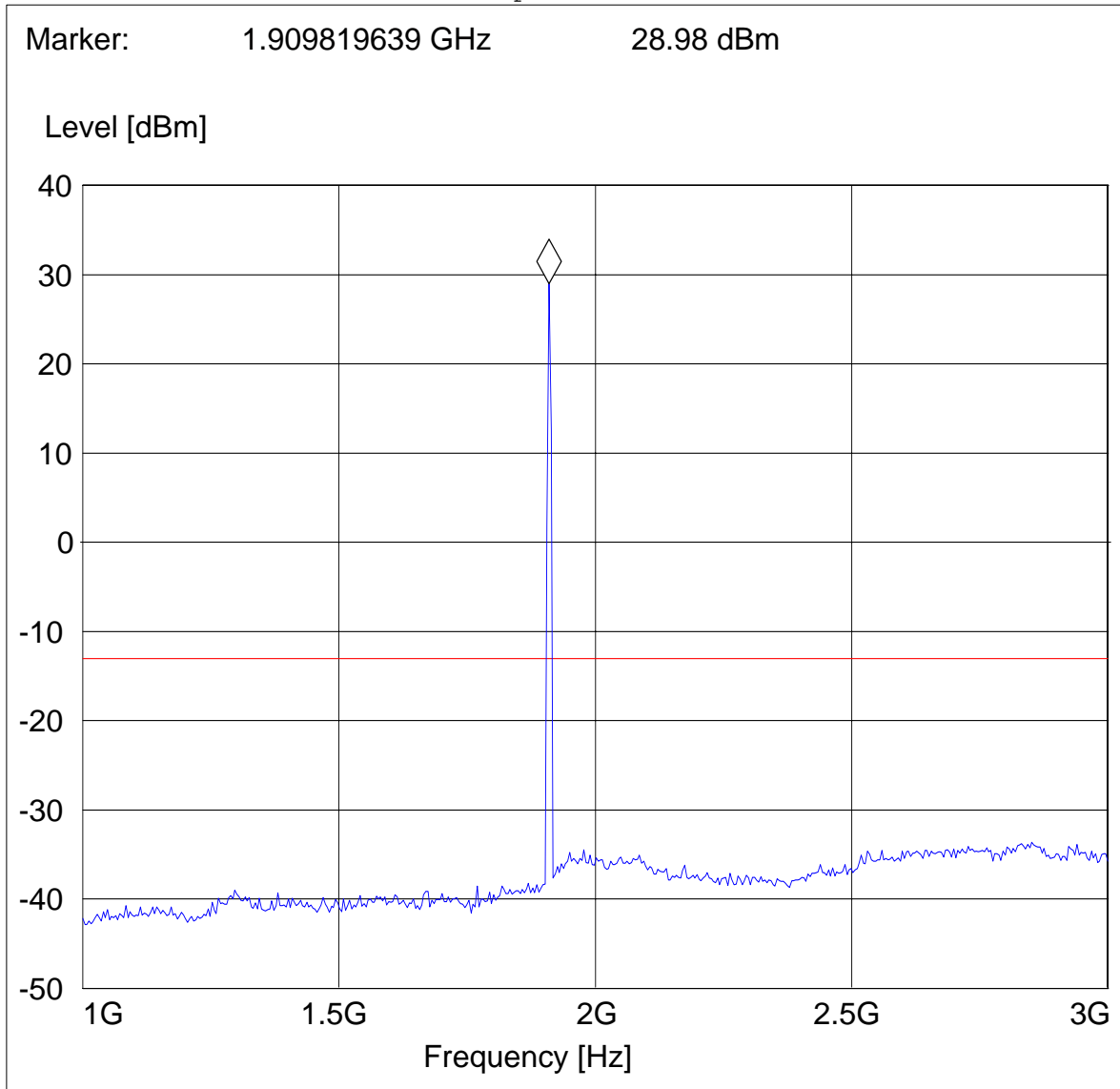
EUT Orientation: H

Test Engineer: Ed

Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





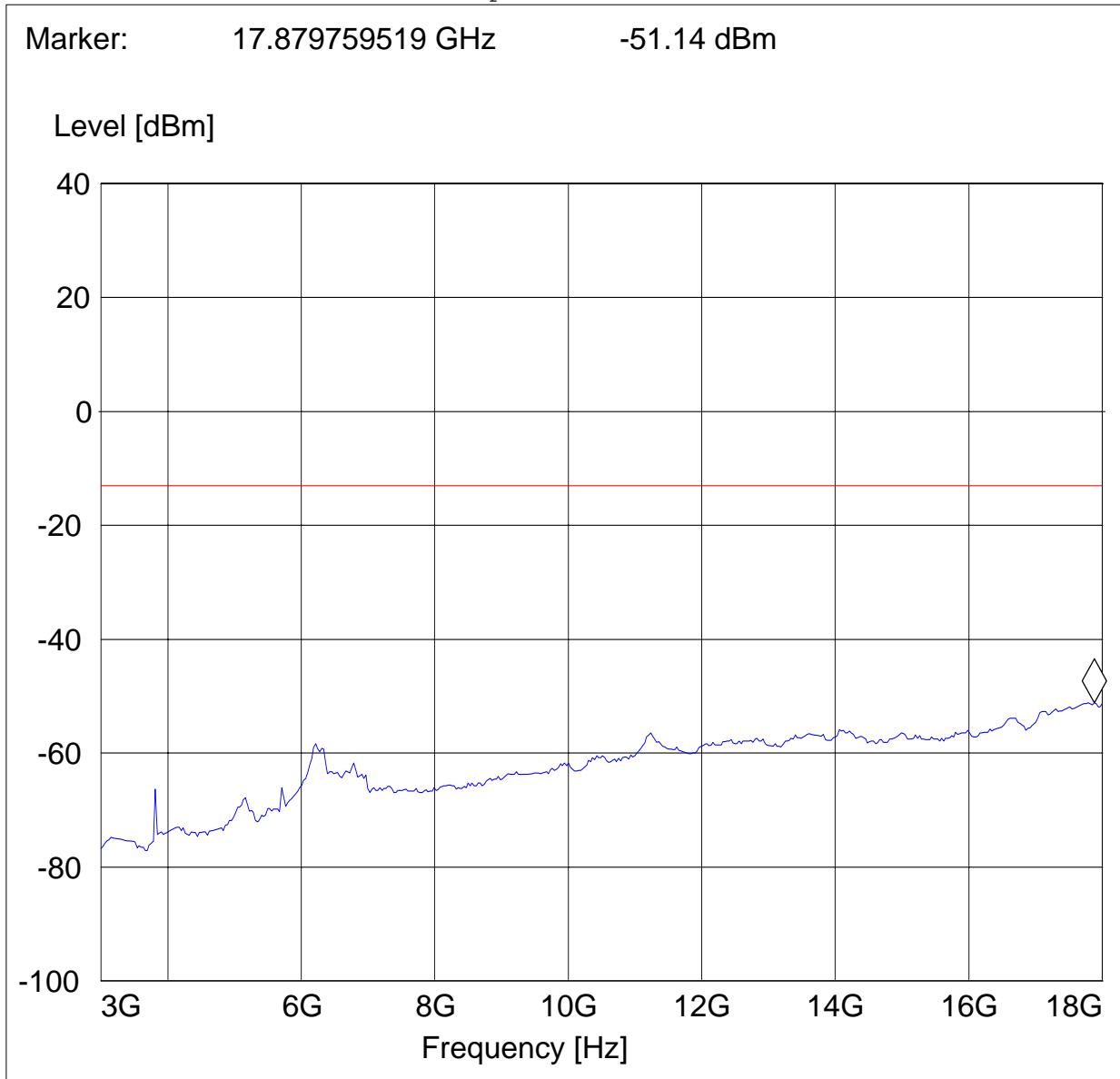
**RADIATED SPURIOUS EMISSIONS(PCS 1900)**  
**Tx @ 1909.8MHz: 3GHz – 18GHz**  
Spurious emission limit -13dBm

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, ch 810  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





**RADIATED SPURIOUS EMISSIONS(PCS 1900)**

**18GHz – 19.1GHz**

Spurious emission limit -13dBm

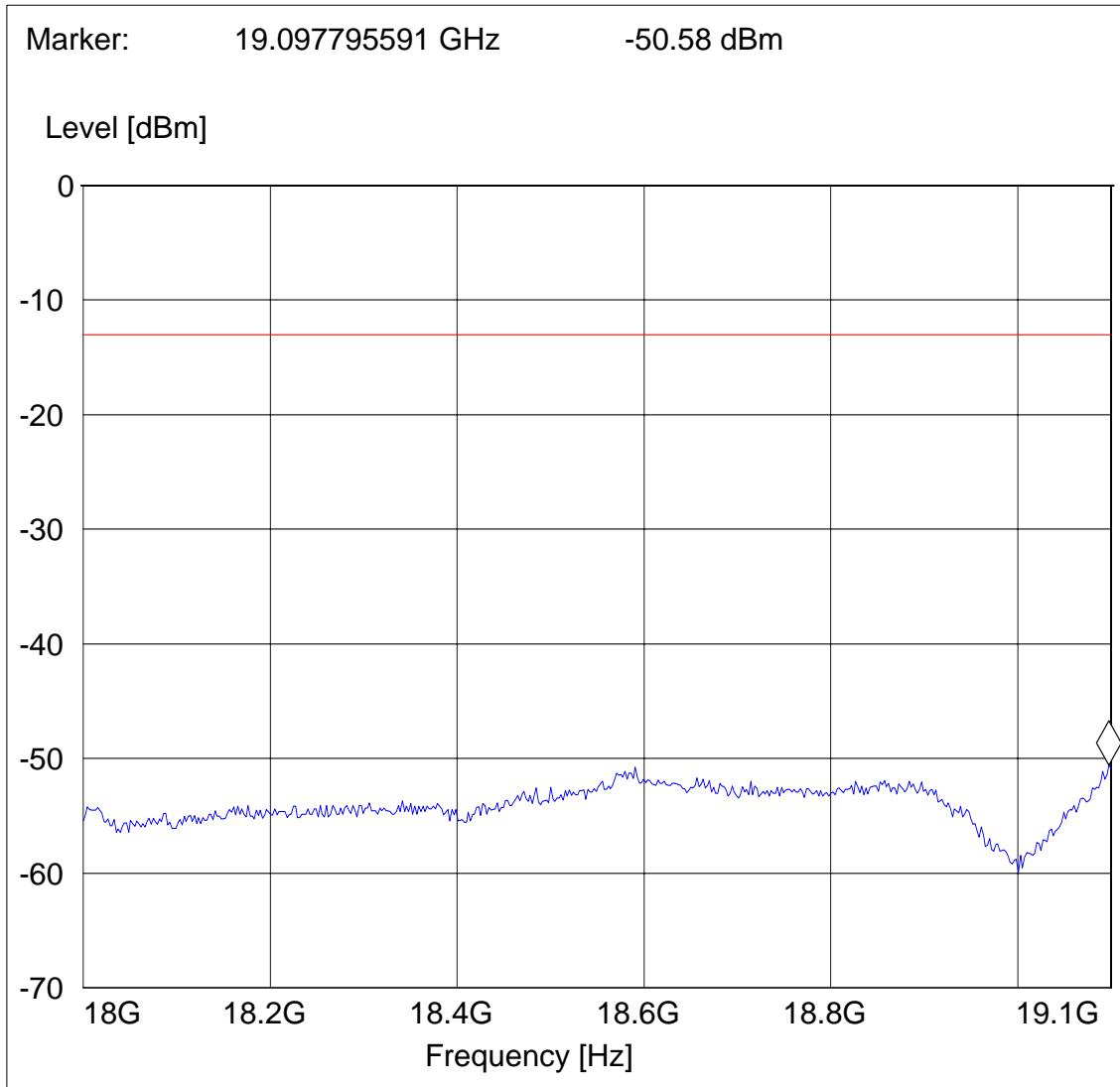
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, ch 810  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

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

Start	Stop	Detector	Meas.	IF	Transducer
18.0 GHz	19.1 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





**5.3 RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-132 & 133**

**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 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the noise level.

**Limits**

**SUBCLAUSE § RSS-133**

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



**5.3.1 Receiver Spurious on EUT 850 MHz**

**EUT in Idle Mode: 30MHz – 1GHz      Antenna: horizontal**

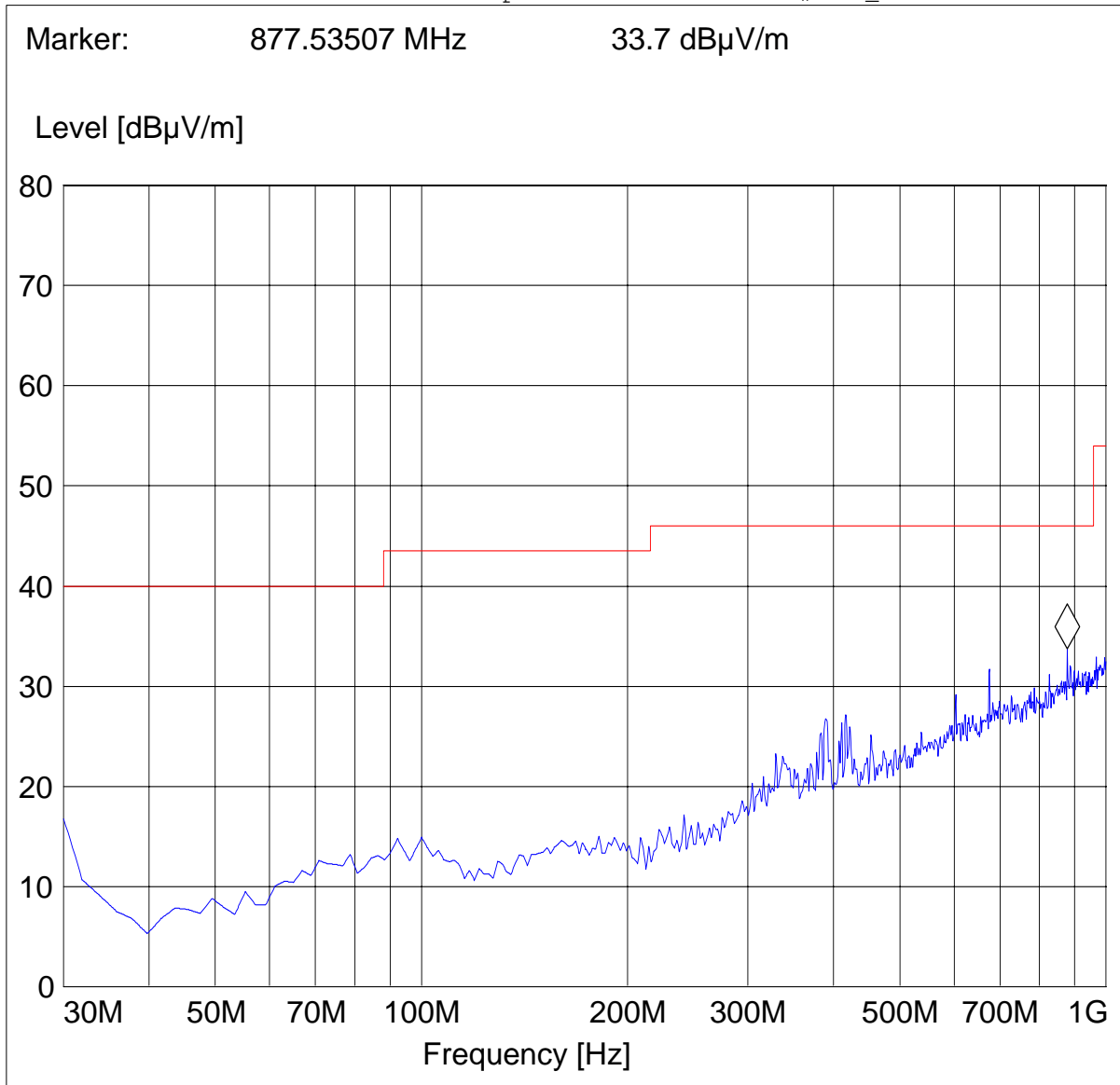
**Note: Peak Reading Vs. Quasi-Peak Limit.**

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM850, receive mode  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

**SWEEP TABLE: "CANADA RE\_30M-1G\_Hor"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz





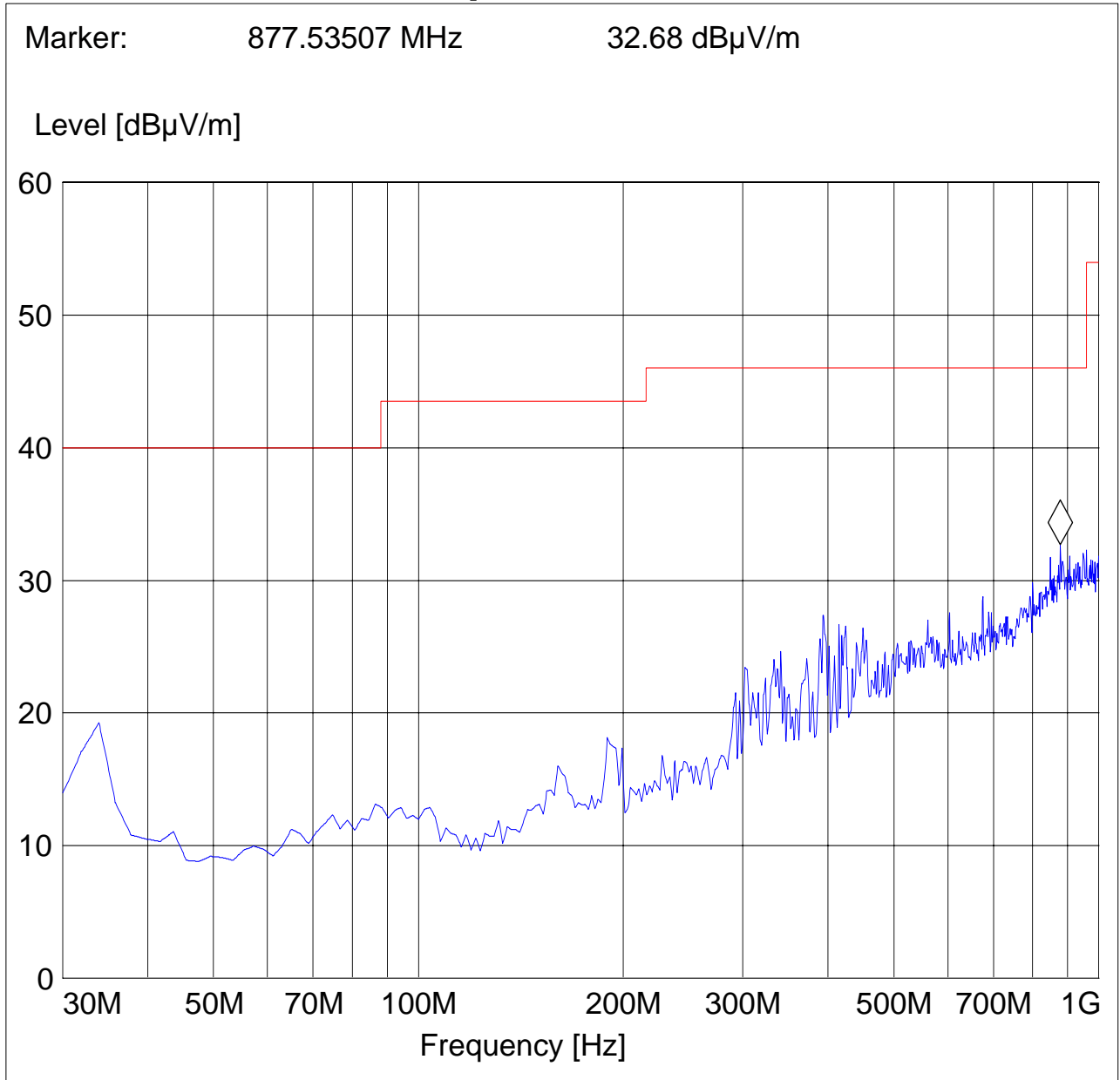
**EUT in Idle Mode: 30MHz – 1GHz**                      **Antenna: Vertical**  
**Note: Peak Reading Vs. Quasi-Peak Limit.**

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM850, receive mode  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

**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





**EUT in Idle Mode: 1GHz – 18GHz**

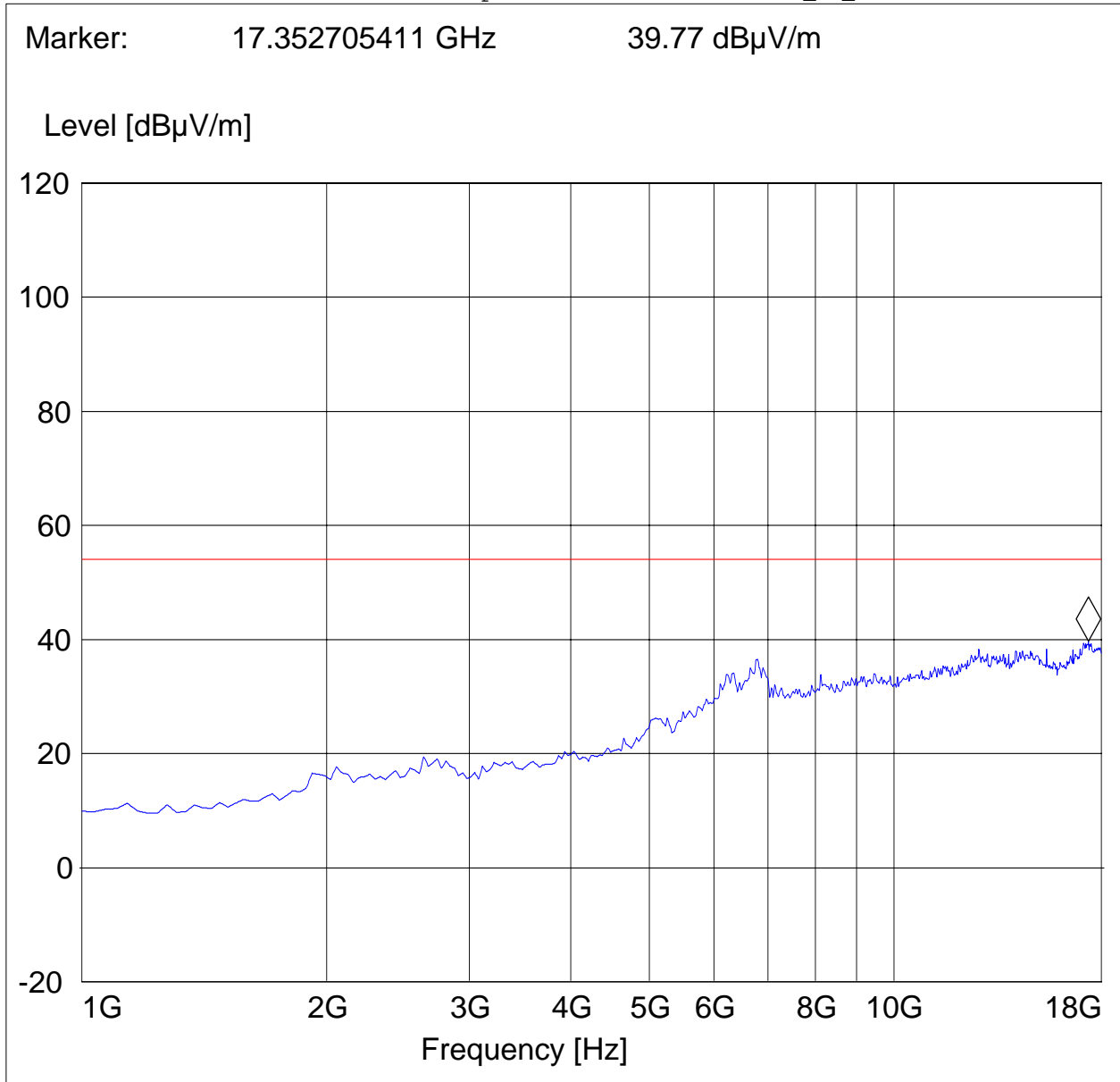
**Note: Peak Reading Vs. Average Limit.**

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

EUT / Description: Trimtrac pro E + Control module  
Manufacturer: Trimble Navigation  
Test mode: GSM850, receive mode  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Voltage: 12VDC Battery

**SWEEP TABLE: "CANADA RE\_1-18G"**

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





### 5.3.2 Receiver Spurious on EUT 1900 MHz

#### RECEIVER RADIATED EMISSIONS

EUT in Idle Mode: 30MHz – 1GHz

Antenna: vertical

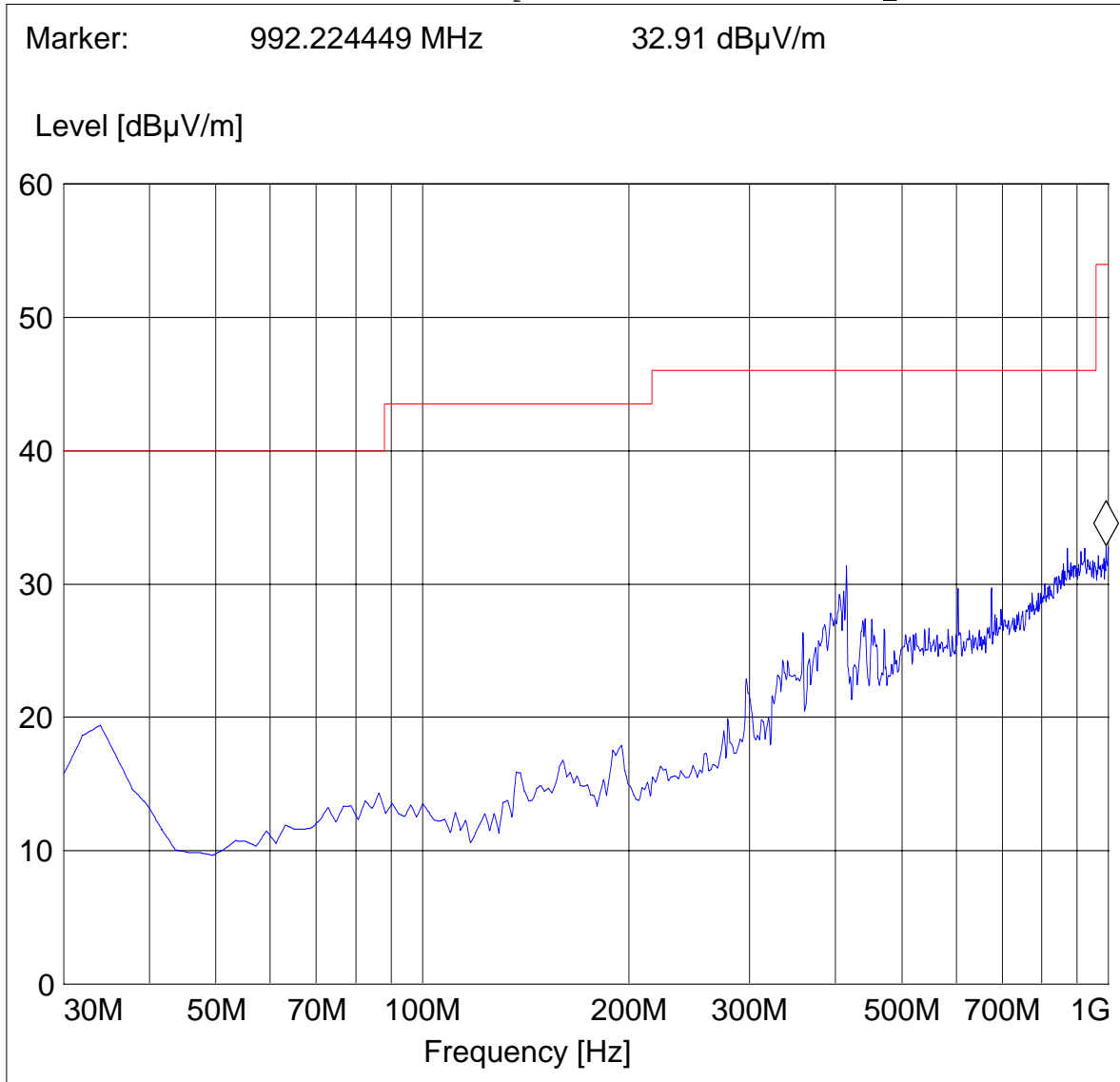
Note: Peak Reading Vs. Quasi-Peak Limit.

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, receive mode  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery

**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







EUT in Idle Mode: 30MHz – 1GHz

Antenna: Horizontal

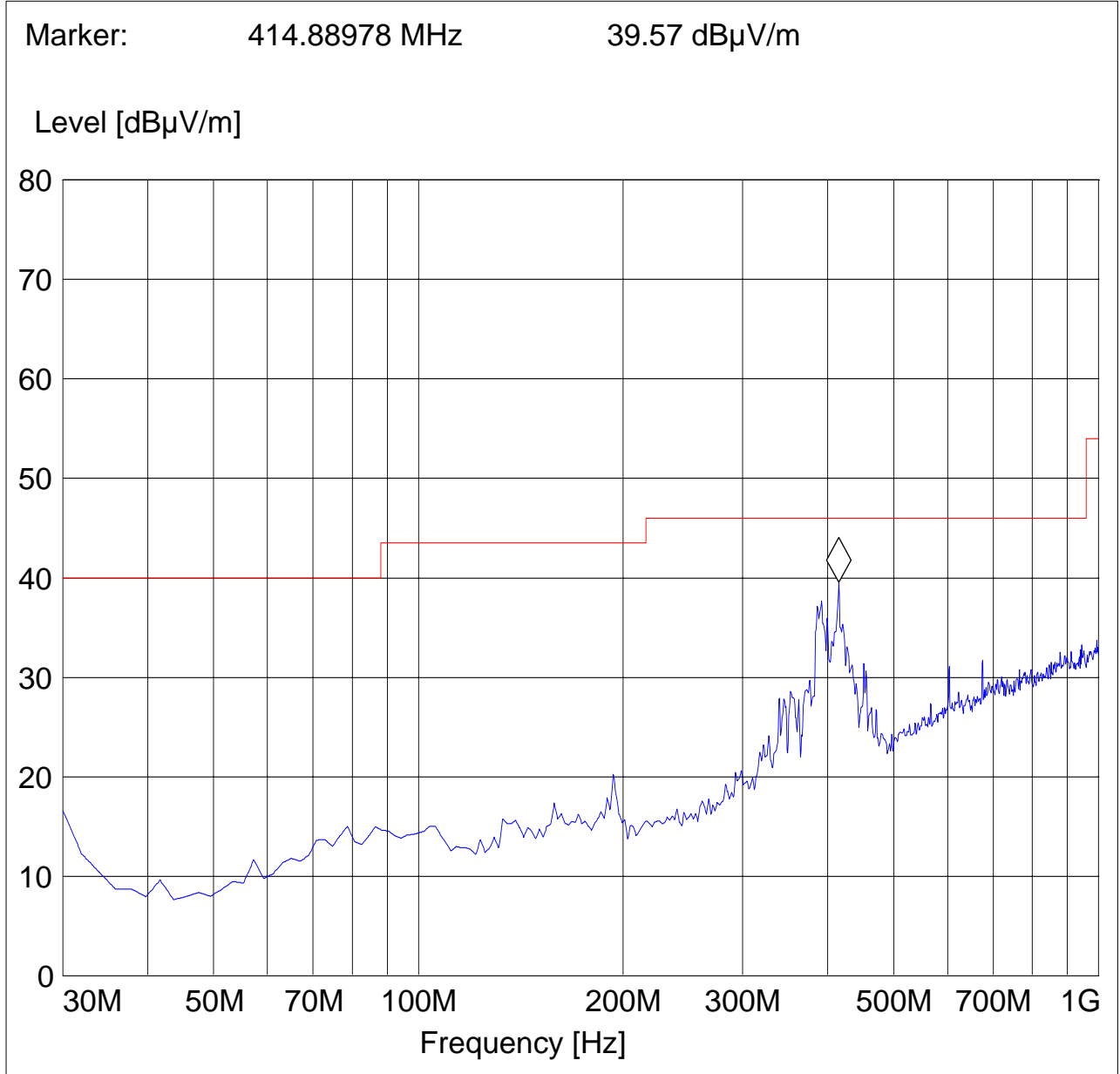
Note: Peak Reading Vs. Quasi-Peak Limit.

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

EUT: Trimtrac pro E + Control module  
Customer: Trimble Navigation  
Test Mode: GSM1900, receive mode  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Ed  
Power Supply: 12VDC Battery  
SWEEP TABLE: "CANDA RE\_30M-1G\_Horz"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz

Marker: 414.88978 MHz 39.57 dBμV/m





**EUT in Idle Mode: 1GHz – 18GHz**

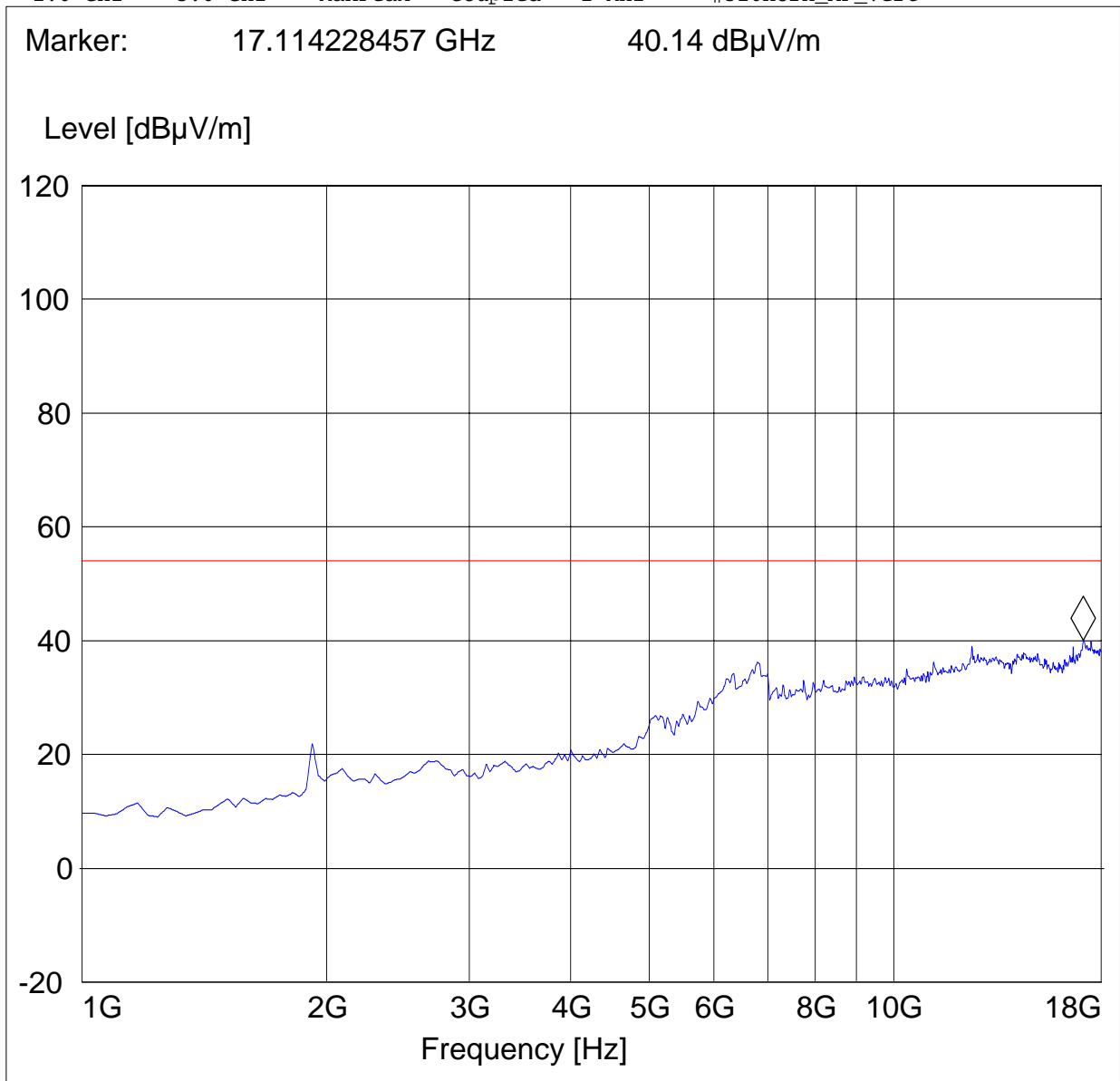
**Note: Peak Reading Vs. Average Limit.**

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

EUT / Description: Trimtrac pro E + Control module  
 Manufacturer: Trimble Navigation  
 Test mode: GSM1900, receive mode  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Voltage: 12VDC Battery

**SWEEP TABLE: "CANADA RE\_1-18G"**

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





**RECEIVER RADIATED EMISSIONS**

**EUT in Idle Mode: 18GHz – 26.5GHz**

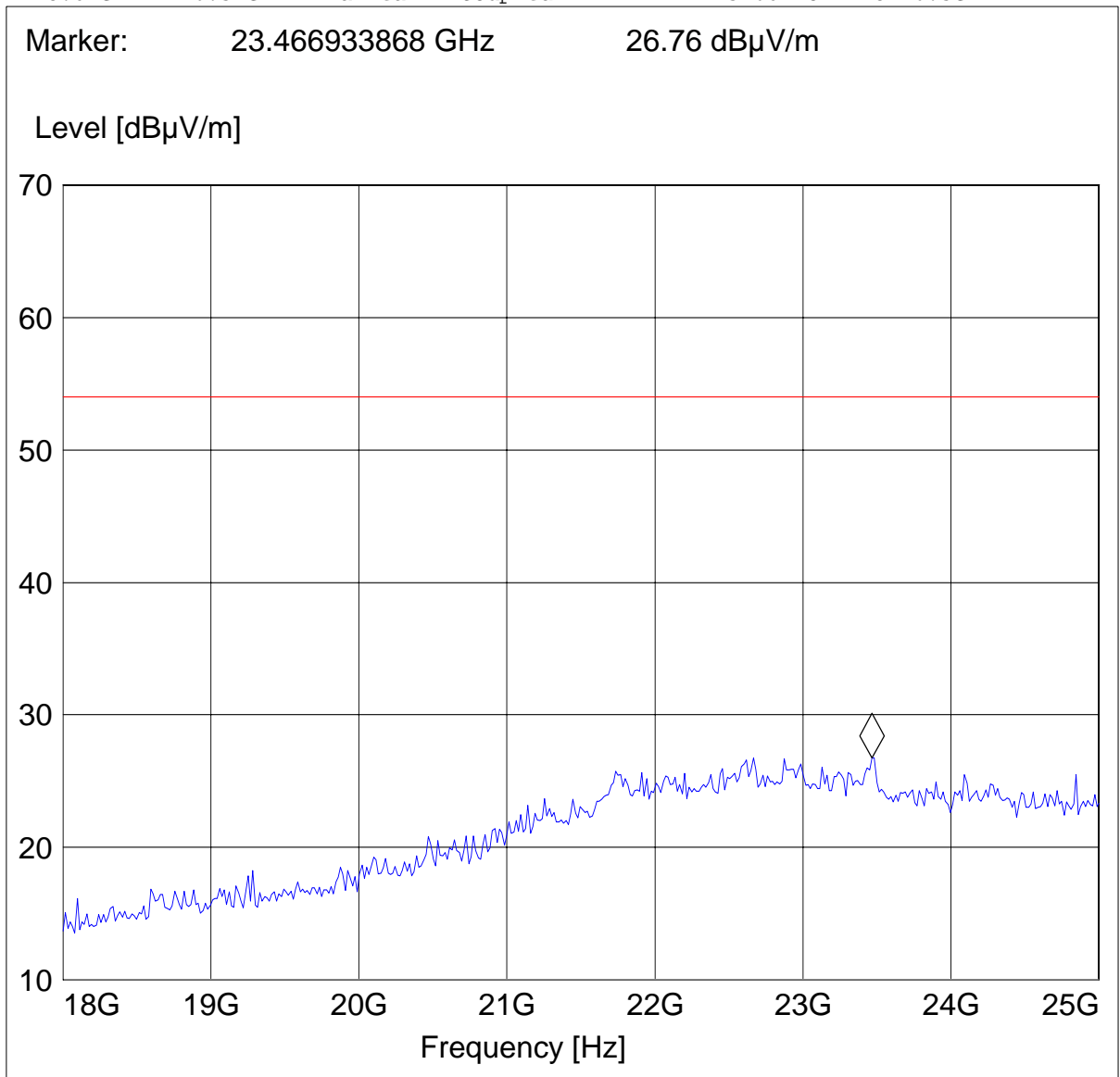
**Note: Peak Reading Vs. Average Limit.**

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

EUT: Trimtrac pro E + Control module  
 Customer: Trimble Navigation  
 Test Mode: GSM1900, receive mode  
 ANT Orientation: H  
 EUT Orientation: H  
 Test Engineer: Ed  
 Power Supply: 12VDC Battery

**SWEEP TABLE: "CANADA RE\_18-26.5G"**

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





## TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2008	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2008	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2008	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2008	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2008	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2008	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2008	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2008	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2008	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2008	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2008	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2008	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2008	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2008	2 years

## **6 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.

## 7 BLOCK DIAGRAMS

### Radiated Testing

#### ANECHOIC CHAMBER

