



# FCC Test Report

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

FOR:

GPS/GSM Locator

MODEL #: TrimTrac 1.5

TRIMBLE NAVIGATION LTD.,  
935 STEWART DR.  
P.O BOX 3642  
SUNNYVALE, CA 94088-3642  
USA

FCC ID: JUPTRIMTRACB  
IC ID: 1756A-TRMTRACB

TEST REPORT #: EMC\_TRIMB\_009\_06002\_TrimTrac\_FCC22\_24  
DATE: 6/07/06



FCC listed#  
101450

IC recognized #  
3925

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## 1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Parts 2, 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 LTD	GPS/GSM Locator	TrimTrac 1.5

A handwritten signature in black ink that reads "Michael Grings".

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2006-06-07

Michael Grings  
Deputy Test Lab Manager

The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Lothar Schmidt
Responsible Project Leader:	Pete Krebill
Date of test:	05/03/06 - 06/07/06

### 2.2 Identification of the Client

Applicant's Name:	Trimble Navigation
Street Address:	935 Stewart DR.
City/Zip Code	Sunnyvale, CA 94085
Countr	USA
Contact Person:	Yahsing Yuan
Phone No.	408-481-8263
Fax:	408-481-2011
e-mail:	Yahsing.yuan@trimble.com

### 2.3 Identification of the Manufacturer

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

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

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

Marketing Name:	TrimTrac 1.5
Description:	GPS/GSM Locator
Model No:	TrimTrac1.5
FCC ID:	JUPTRIMTRACB
IC ID:	1756A-TRMTRACB
Frequency Range:	824.2 MHz – 848.8 MHz 1850.2 MHz – 1909.8 MHz
Type(s) of Modulation:	GMSK
Number of Channels:	124 for 850 band 298 for 1900 band
Antenna Type:	INTERNAL
Output Power:	34.16 dBm ERP for 850 band 32.43 dBm EIRP for 1900 band



#### **4 Subject of Investigation**

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.

The Trimble TrimTrac 1.5 incorporates a pre approved GSM module therefore this report only contains results fro radiated measurements. For the conducted results refer to the module report.

## 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.

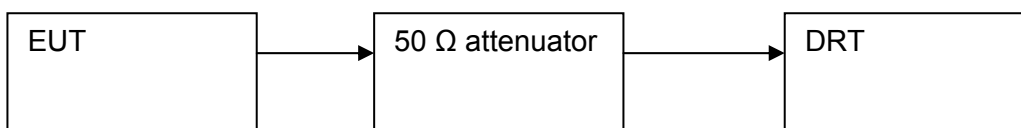
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(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 Conducted Output Power Measurement procedure:

Based on TIA-603C 2004

##### 2.2.1 Conducted Carrier Output Power Rating



1. Connect the equipment as shown in the above diagram. A Digital Radiocommunication Tester (DRT) is used to enable the EUT to transmit and to measure the output power.
2. Adjust the settings of the DRT to set the EUT to its maximum power at the required channel.
3. Record the output power level measured by the DRT.
4. Correct the measured level for all losses in the RF path.
5. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.



**5.1.4 Results Conducted Output Power:**

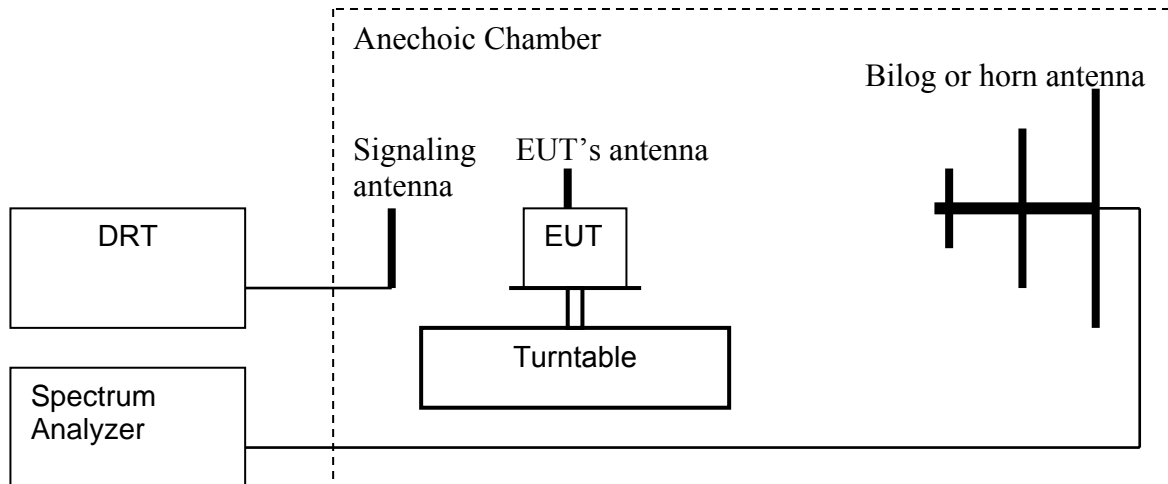
<b>Frequency (MHz)</b>	<b>Conducted Output Power (dBm) (850MHz)</b>
<b>824.2</b>	<b>33.75</b>
<b>836.6</b>	<b>34.04</b>
<b>848.8</b>	<b>33.96</b>

<b>Frequency (MHz)</b>	<b>Conducted Output Power (dBm) (1900MHz)</b>
<b>1850.2</b>	<b>30.31</b>
<b>1880.0</b>	<b>30.31</b>
<b>1909.8</b>	<b>30.29</b>

### 5.1.5 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:  

$$\mathbf{ERP} \text{ (dBm)} = \mathbf{LVL} \text{ (dBm)} + \mathbf{LOSS} \text{ (dB)}$$
8. Determine the EIRP using the following equation:  

$$\mathbf{EIRP} \text{ (dBm)} = \mathbf{ERP} \text{ (dBm)} + 2.15 \text{ (dB)}$$
9. 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, 7 and 8 above are performed with test software.)

#### Spectrum analyzer settings:

Res B/W: 3 MHz

Vid B/W: 3 MHz

**5.1.6 ERP Results 850 MHz band:**

Frequency (MHz)	Effective Radiated Power (dBm)
824.2	33.42
836.6	33.97
848.8	34.16

**5.1.7 EIRP Results 1900 MHz band:**

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)
1850.2	31.58
1880.0	31.33
1909.8	32.43

Note: EIRP was measured in antenna lab. No plots are made.

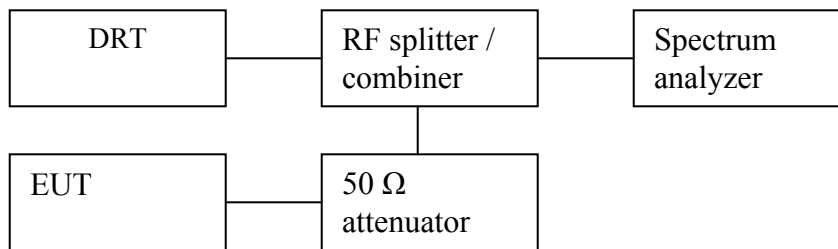
## 5.2 Occupied Bandwidth/Emission Bandwidth

### 5.2.1 FCC 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable.

(h) Transmitters employing digital modulation techniques-when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated.

### 5.2.2 Occupied / emission bandwidth measurement procedure:



1. Connect the equipment as shown in the above diagram.
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 the 99% (-20 dB) occupied bandwidth. Record the value.
4. Set the spectrum analyzer to measure the 99.5% (-26 dB) emission bandwidth. Record the value.
5. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

**5.2.3 Occupied / Emission bandwidth results 850 MHz band:**

<b>Frequency (MHz)</b>	<b>Occupied B/W -20 dB (KHz)</b>	<b>Emission B/W -26 dB (KHz)</b>
<b>824.2</b>	<b>282.6</b>	<b>314.6</b>
<b>836.6</b>	<b>284.6</b>	<b>316.6</b>
<b>848.8</b>	<b>280.1</b>	<b>314.6</b>

**5.2.4 Occupied / Emission bandwidth results 1900 MHz band:**

<b>Frequency (MHz)</b>	<b>Occupied B/W -20 dB (KHz)</b>	<b>Emission B/W -26 dB (KHz)</b>
<b>1850.2</b>	<b>280.6</b>	<b>316.6</b>
<b>1880.0</b>	<b>292.6</b>	<b>316.6</b>
<b>1909.8</b>	<b>292.6</b>	<b>316.6</b>



**-20dB (GSM 850)  
CHANNEL 128**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

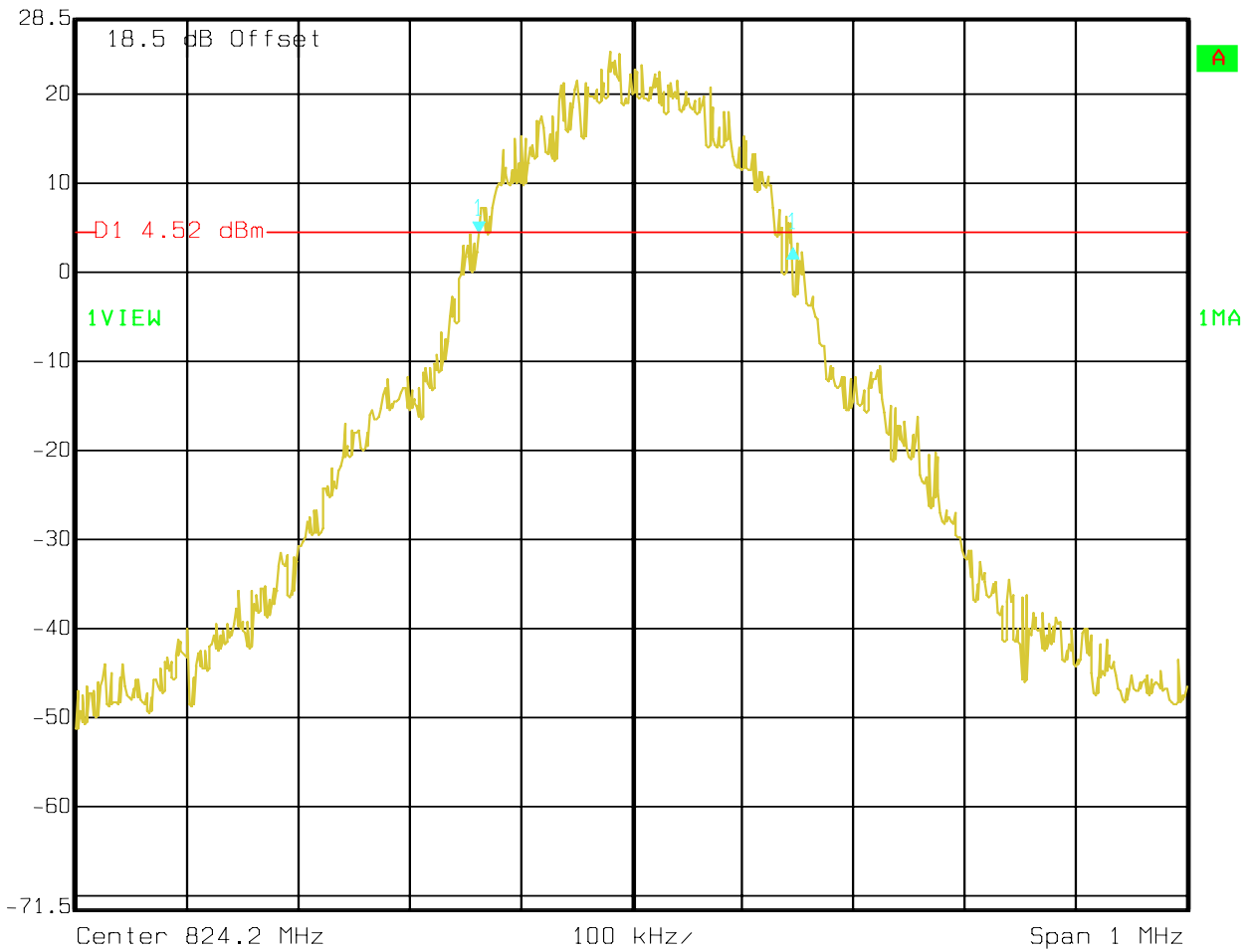
Ref Lvl -1.48 dB

VBW 3 kHz

28.5 dBm 282.56513026 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 12:18:49



**-20dB (GSM 850)  
CHANNEL 190**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

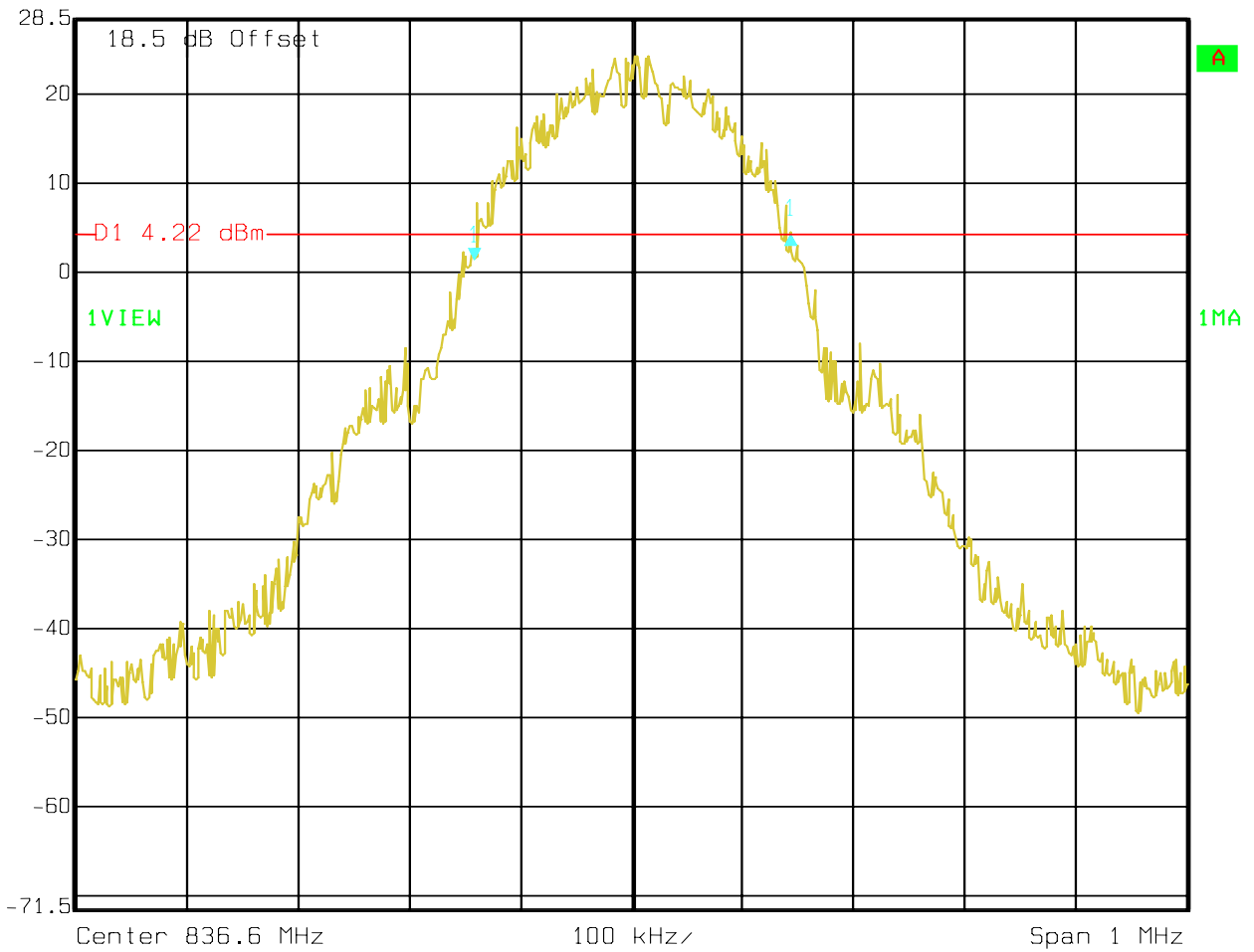
Ref Lvl 3.04 dB

VBW 3 kHz

28.5 dBm 284.56913828 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 12:20:15



**-20dB (GSM 850)  
CHANNEL 251**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

Ref Lvl

2.27 dB

VBW 3 kHz

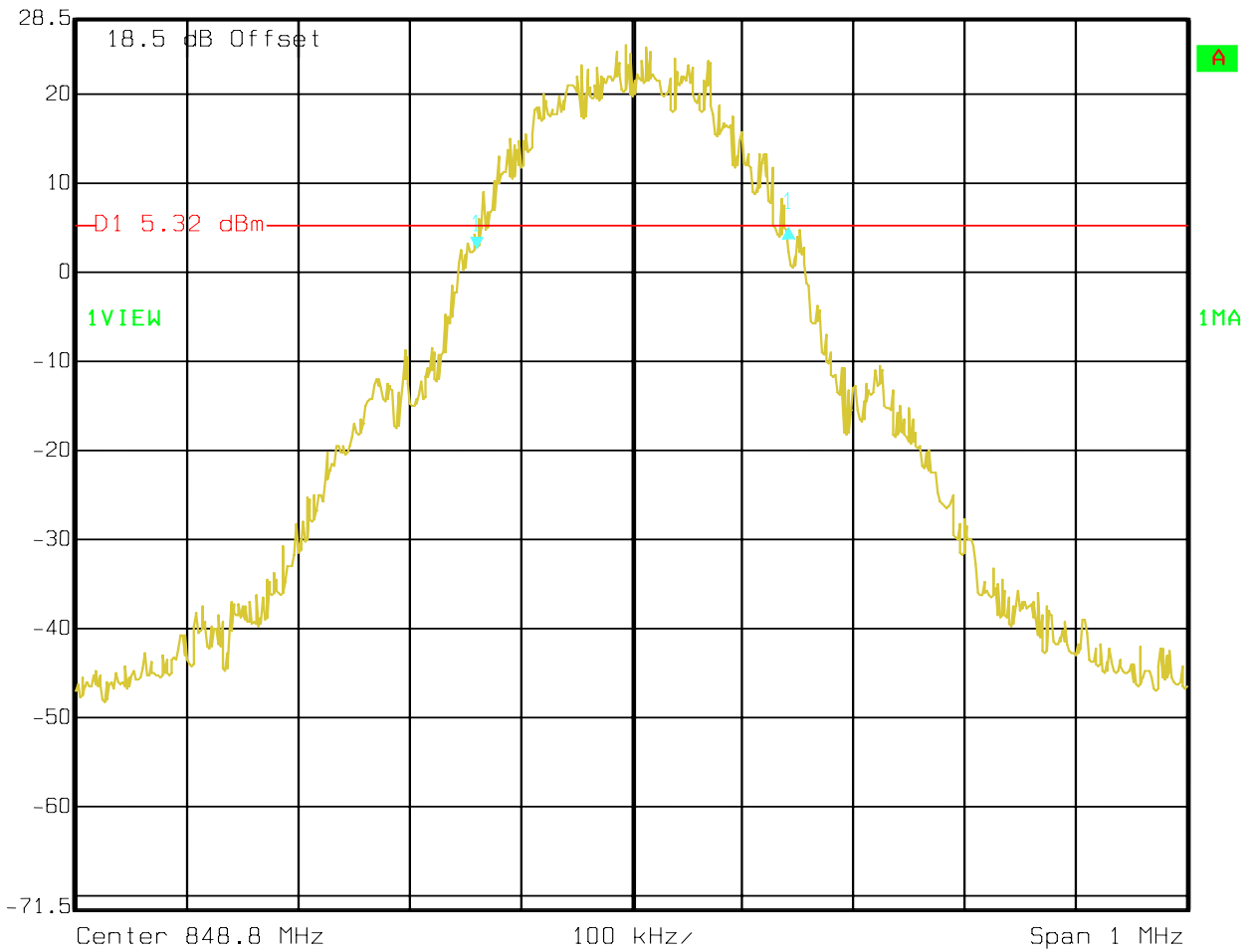
28.5 dBm

280.56112224 kHz

SWT 280 ms

Unit

dBm



Date: 07.JUN.2006 12:23:19





**-26dB (GSM 850)  
CHANNEL 128**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

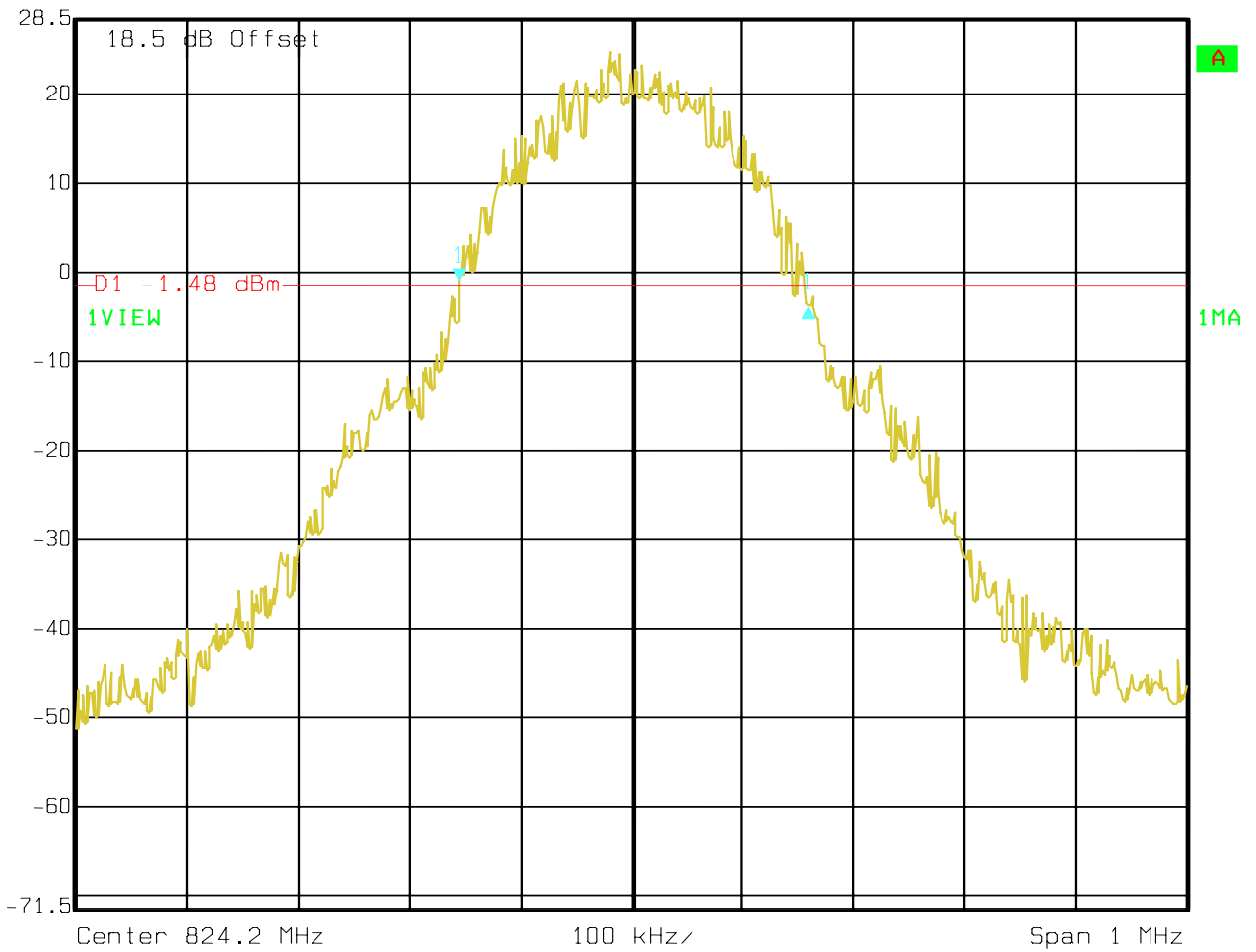
Ref Lvl -3.10 dB

VBW 3 kHz

28.5 dBm 314.62925852 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 12:19:21



**-26dB (GSM 850)  
CHANNEL 190**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

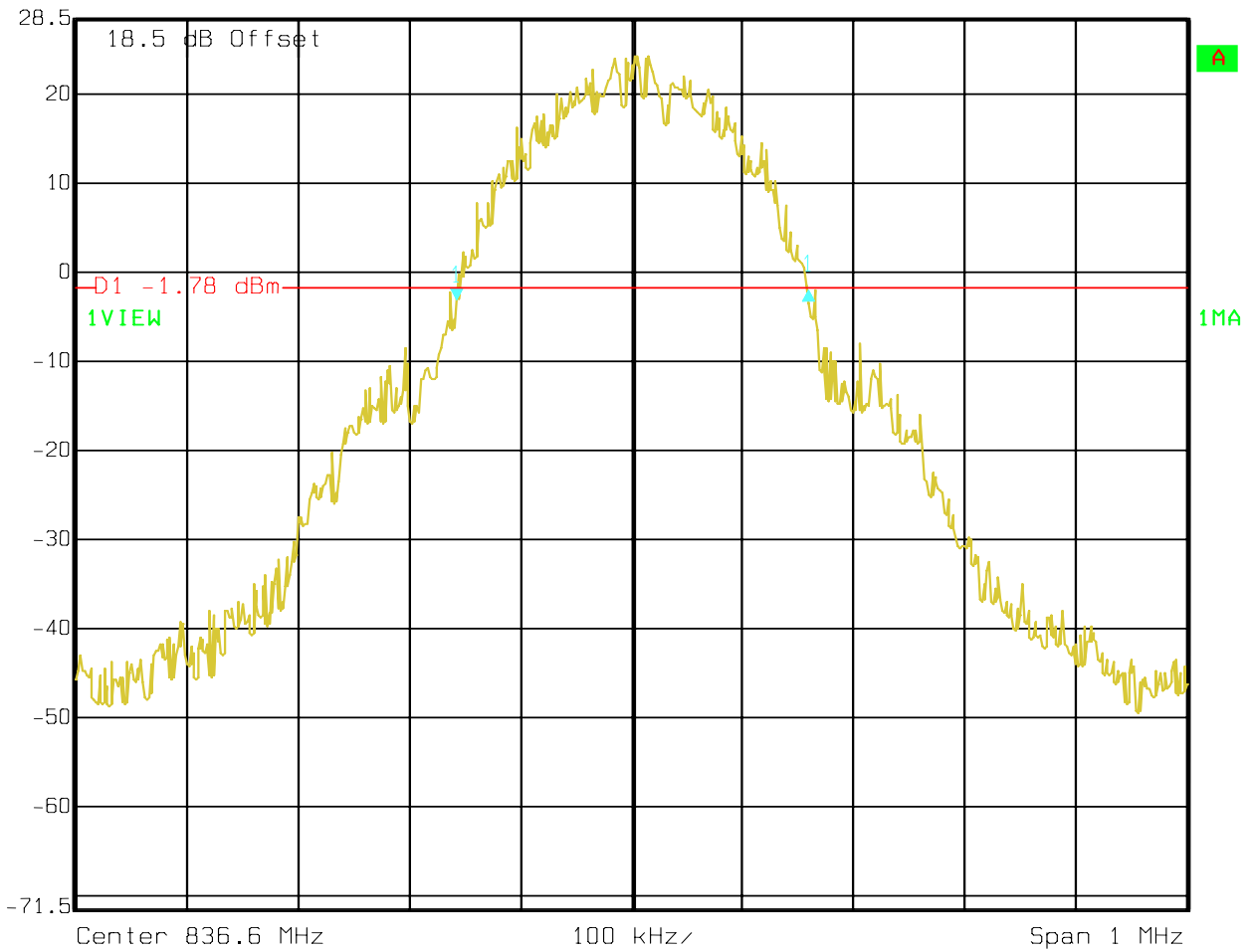
Ref Lvl 1.12 dB

VBW 3 kHz

28.5 dBm 316.63326653 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 12:20:58



**-26dB (GSM 850)  
CHANNEL 251**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

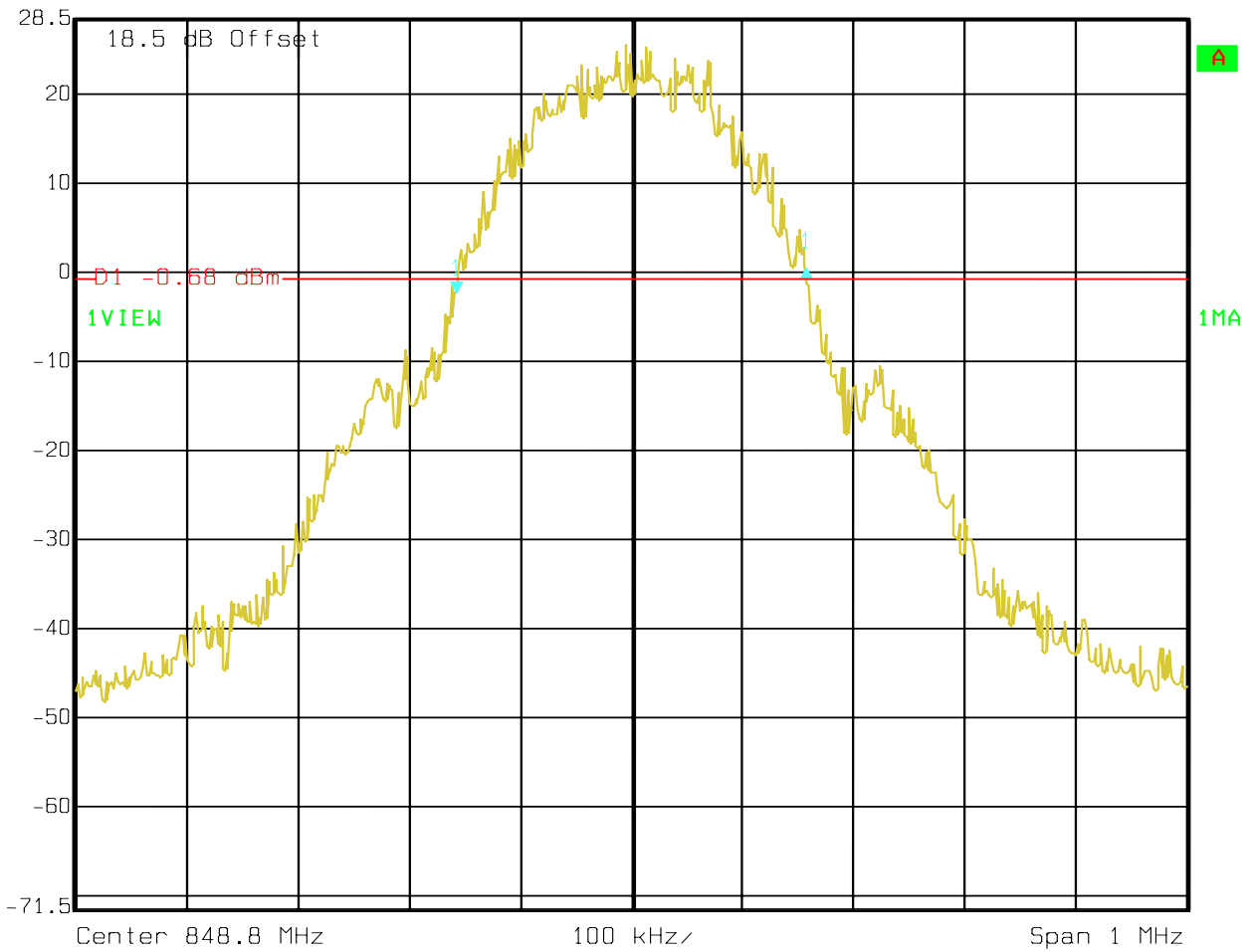
Ref Lvl 3.06 dB

VBW 3 kHz

28.5 dBm 314.62925852 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 12:23:58



**-20dB (PCS-1900)  
CHANNEL 512**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

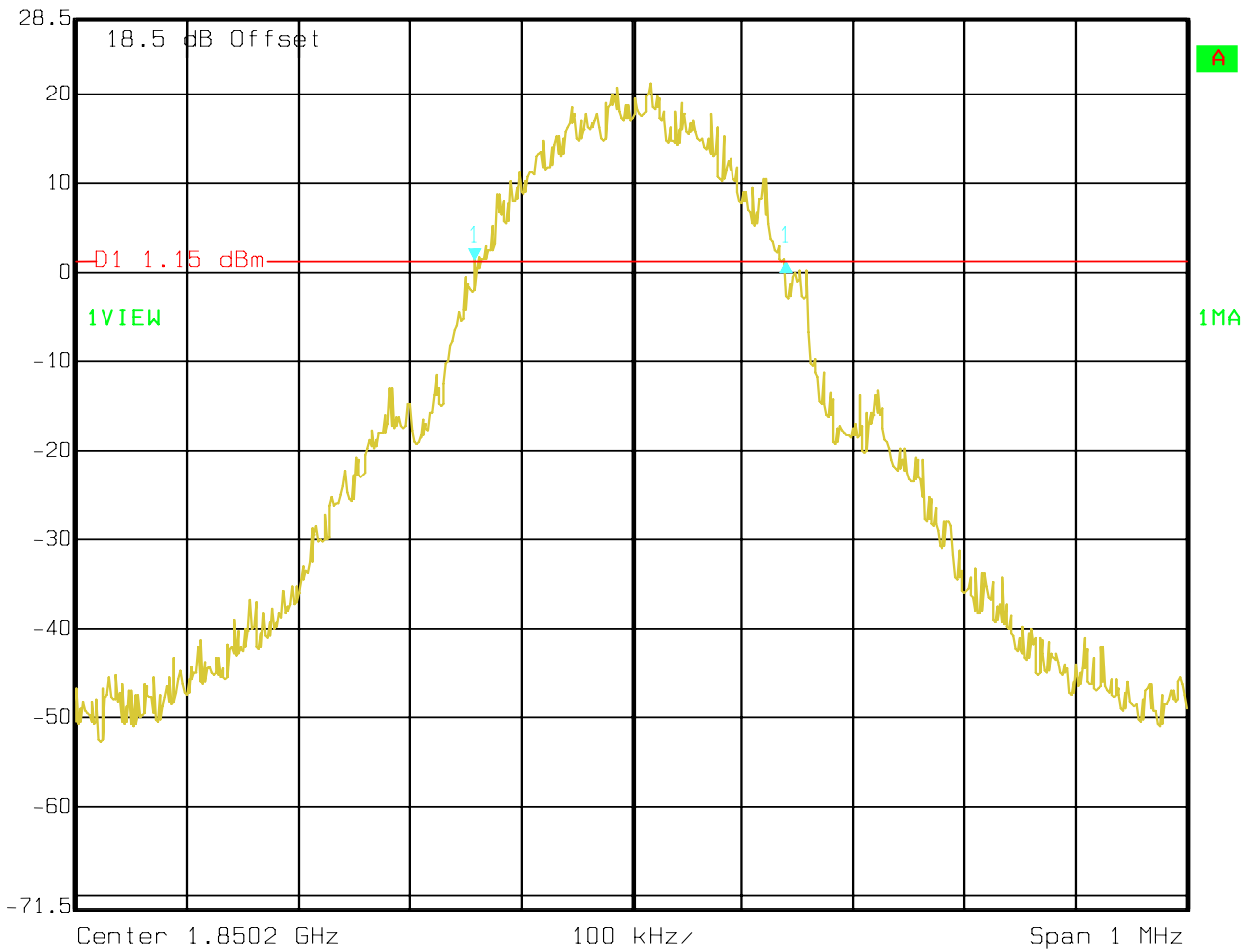
Ref Lvl 0.00 dB

VBW 3 kHz

28.5 dBm 280.56112224 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 11:48:22



**-20dB (PCS-1900)  
CHANNEL 661**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

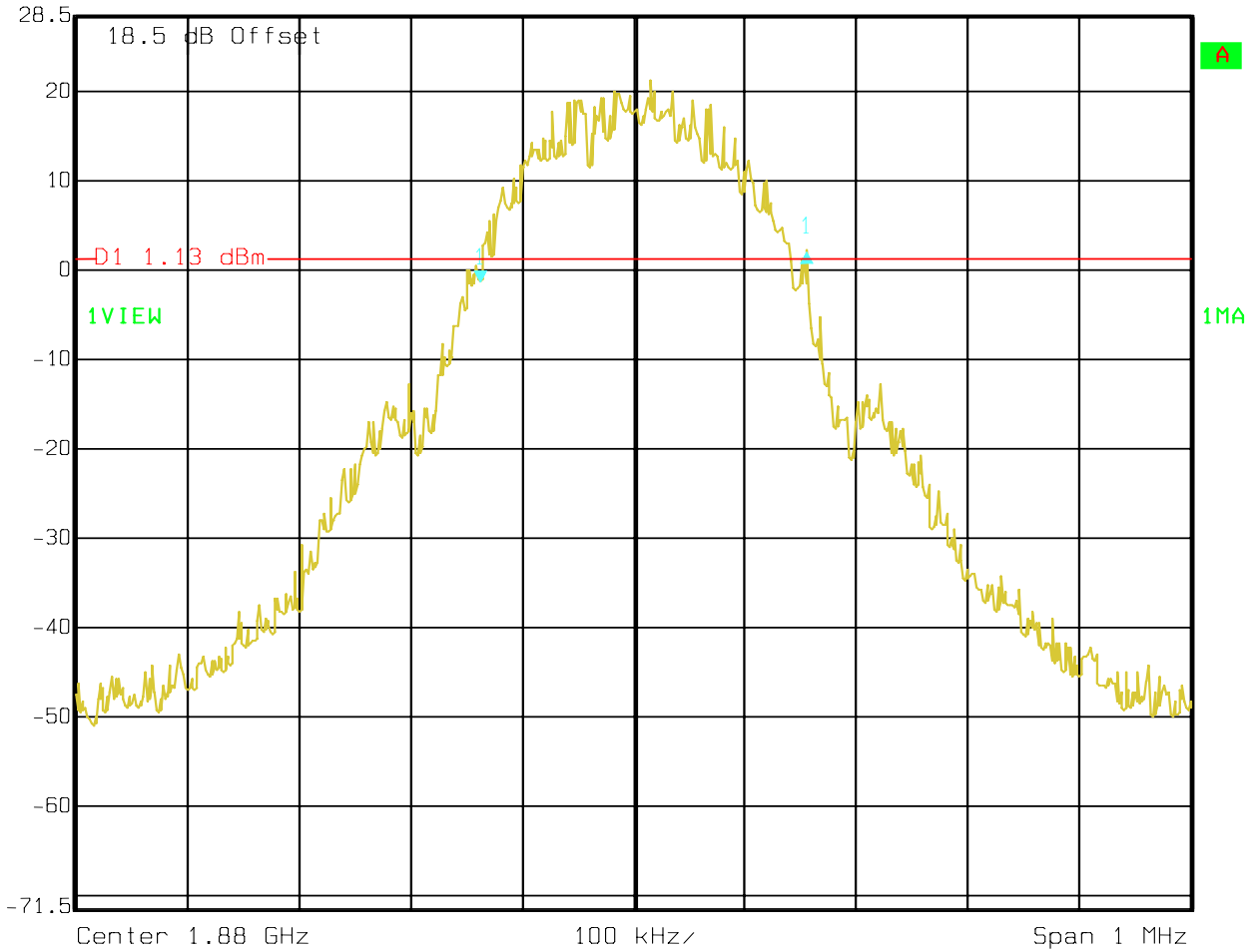
Ref Lvl 3.39 dB

VBW 3 kHz

28.5 dBm 292.58517034 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 11:50:02



**-20dB (PCS-1900)  
CHANNEL 810**



Delta 1 [T1]

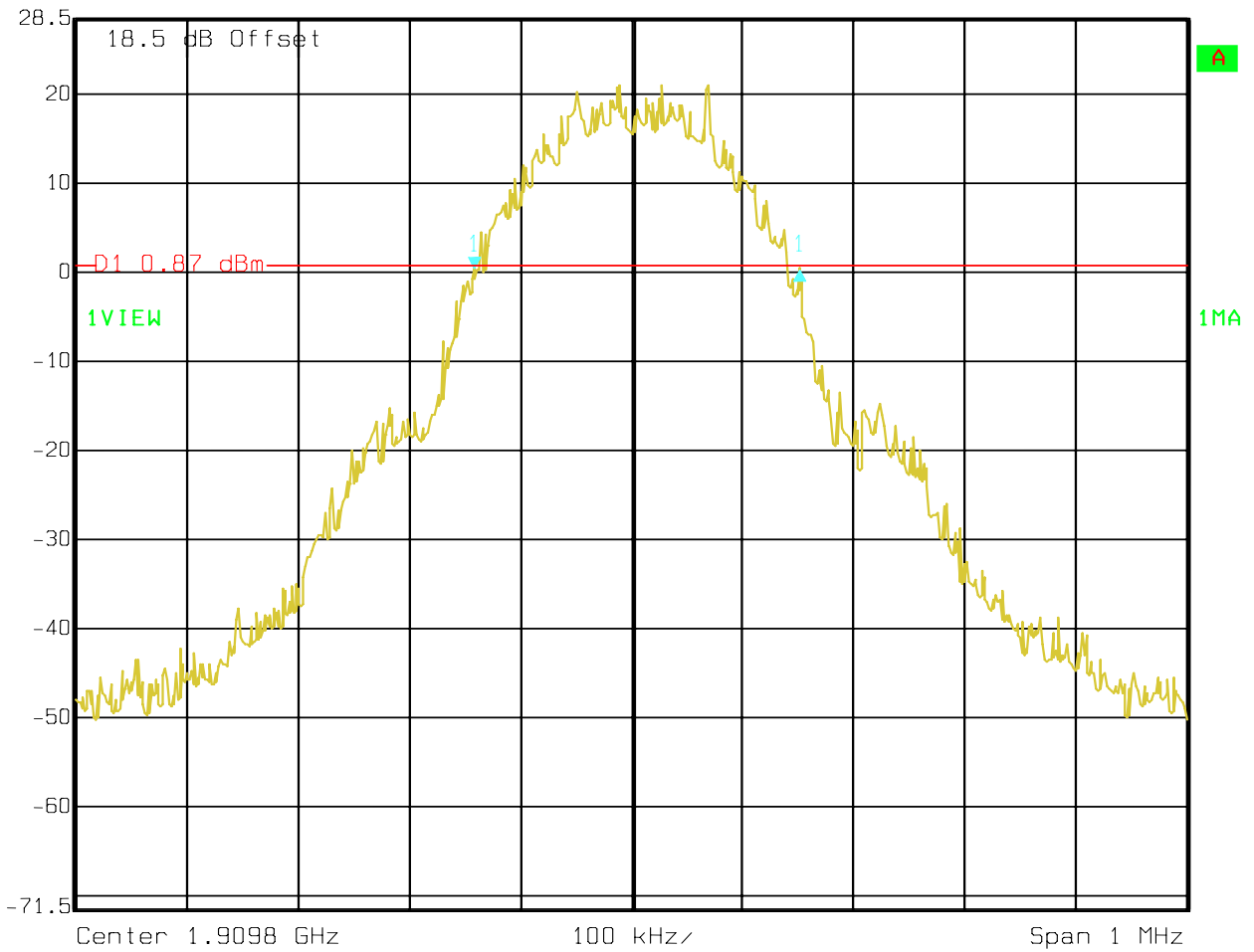
RBW 3 kHz RF Att 40 dB

Ref Lvl 0.00 dB

VBW 3 kHz

28.5 dBm 292.58517034 kHz

SWT 280 ms Unit dBm



Date: 07.JUN.2006 11:52:04



**-26dB (PCS-1900)  
CHANNEL 512**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

Ref Lvl 28.5 dBm

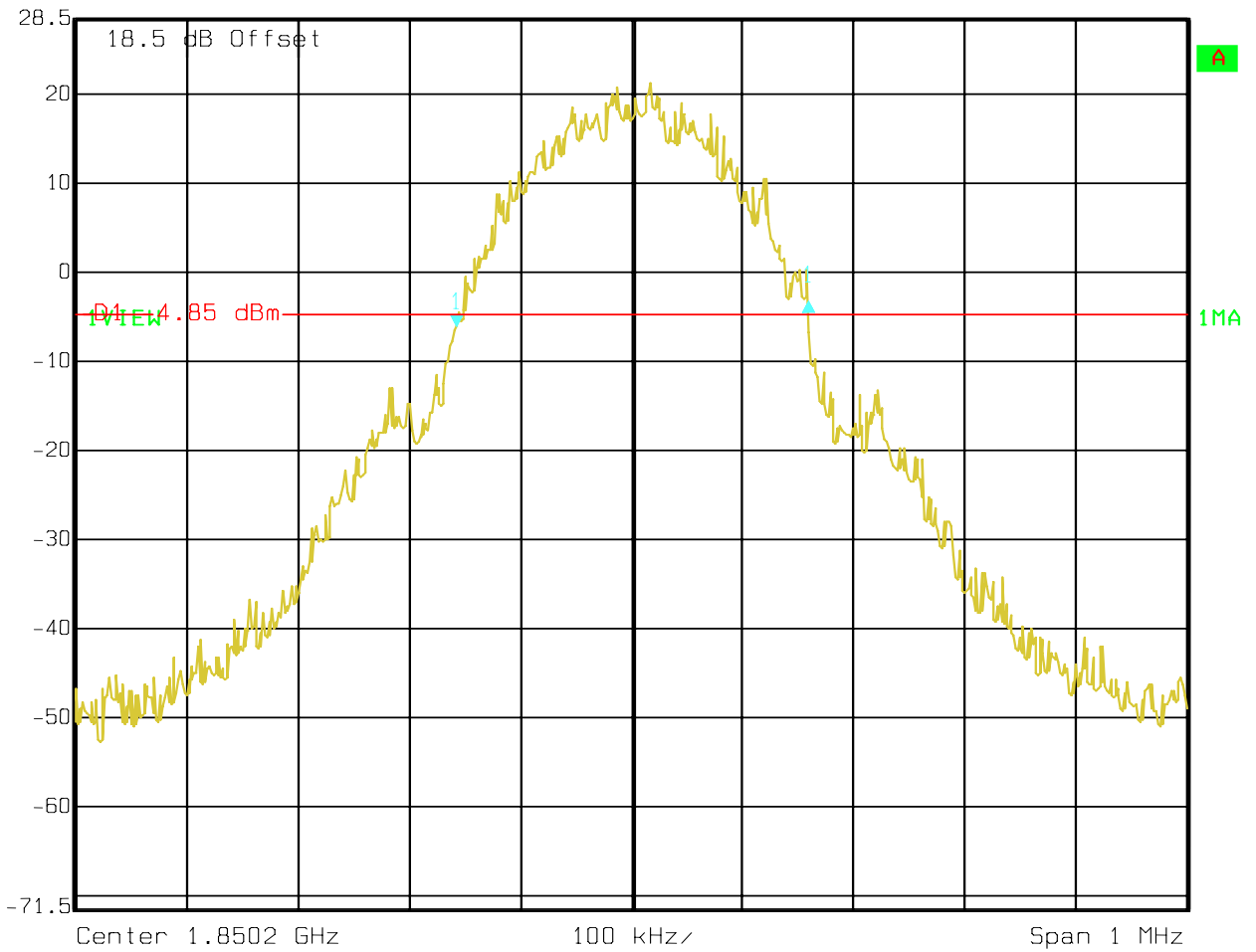
2.96 dB

VBW 3 kHz

316.63326653 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 11:48:54



**-26dB (PCS-1900)  
CHANNEL 661**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

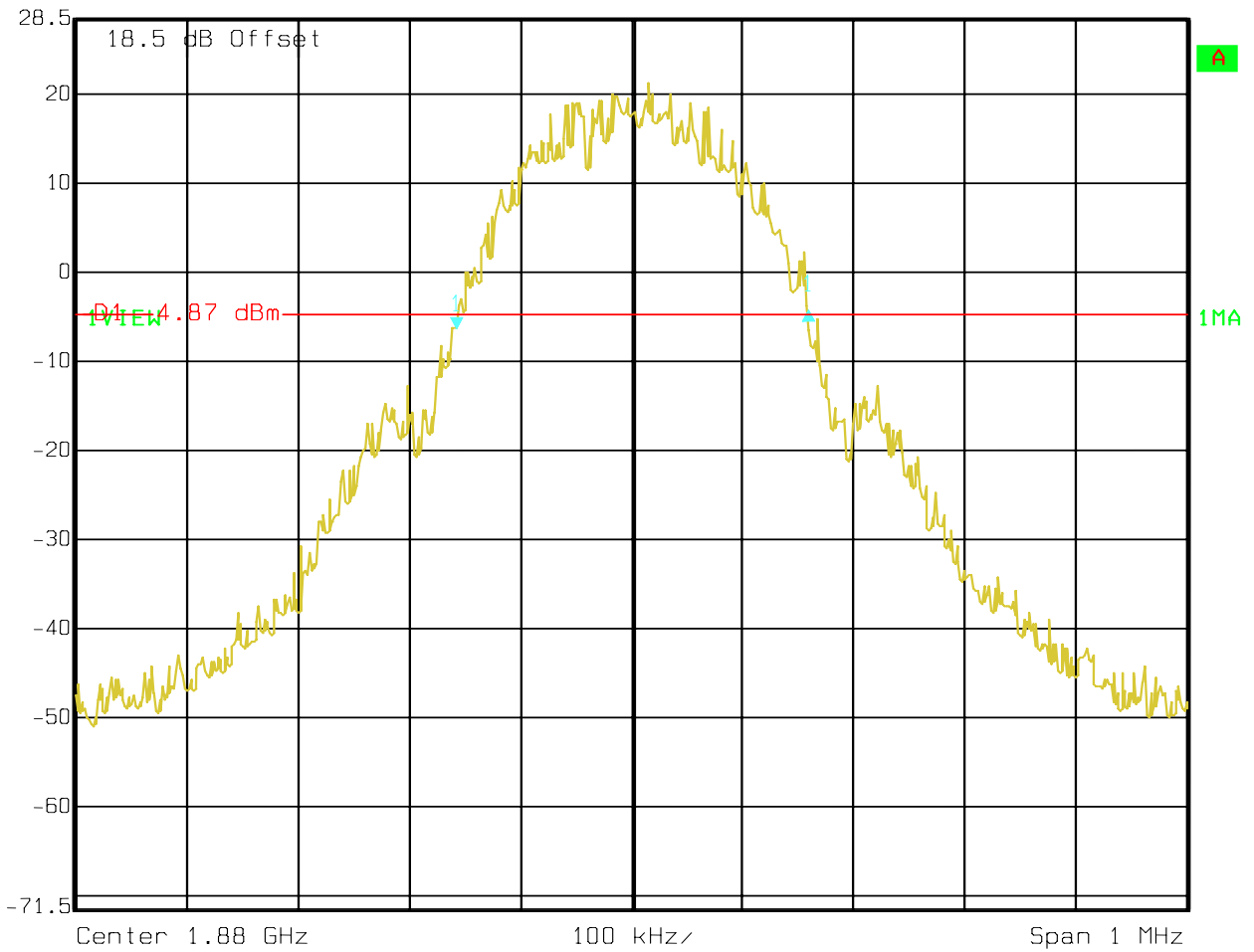
Ref Lvl 2.36 dB

VBW 3 kHz

28.5 dBm 316.63326653 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 11:50:36





**-26dB (PCS-1900)  
CHANNEL 810**



Delta 1 [T1]

RBW 3 kHz RF Att 40 dB

Ref Lvl 28.5 dBm

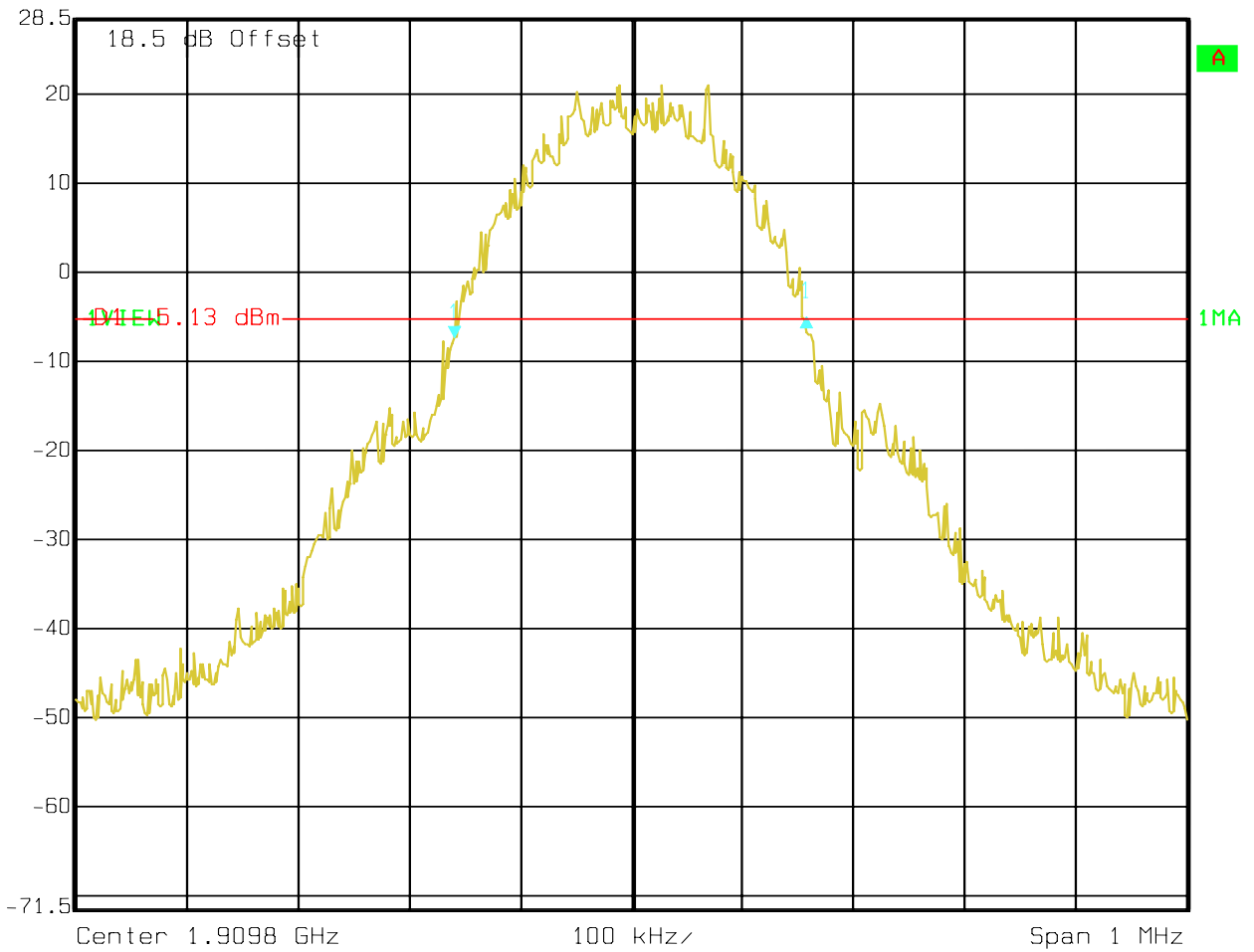
2.62 dB

VBW 3 kHz

316.63326653 kHz

SWT 280 ms

Unit dBm



Date: 07.JUN.2006 11:52:41

### 5.3 Spurious Emissions Conducted

#### 5.3.1 FCC 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in FCC 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

#### 5.3.2 Limits:

##### 5.3.2.1 **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.

##### 5.3.2.2 **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.

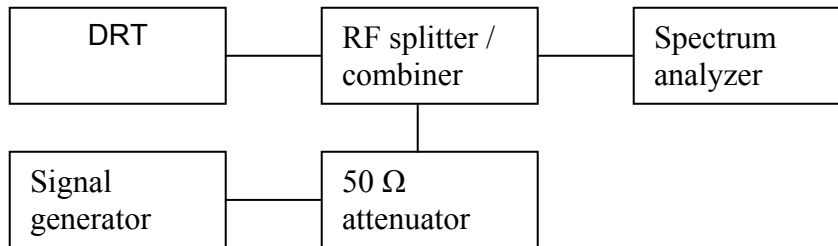
(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

(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.

**5.3.3 Conducted out of band emissions measurement procedure:**  
**Based on TIA-603B November 2002**

**2.2.13 Unwanted Emissions: Conducted Spurious**



1. Connect the equipment as shown in the above diagram.
2. Set the spectrum analyzer to measure peak hold with the required settings.
3. Set the signal generator to a known output power and record the path loss in dB (**LOSS**) for frequencies up to the tenth harmonic of the EUT's carrier frequency. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
4. Replace the signal generator with the EUT.
5. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
6. Set the spectrum analyzer to measure peak hold with the required settings. Offset the spectrum analyzer reference level by the path loss measured above.
7. Measure and record all spurious emissions up to the tenth harmonic of the carrier frequency.
8. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
9. If necessary steps 6 and 7 may be performed with the spectrum analyzer set to average detector.

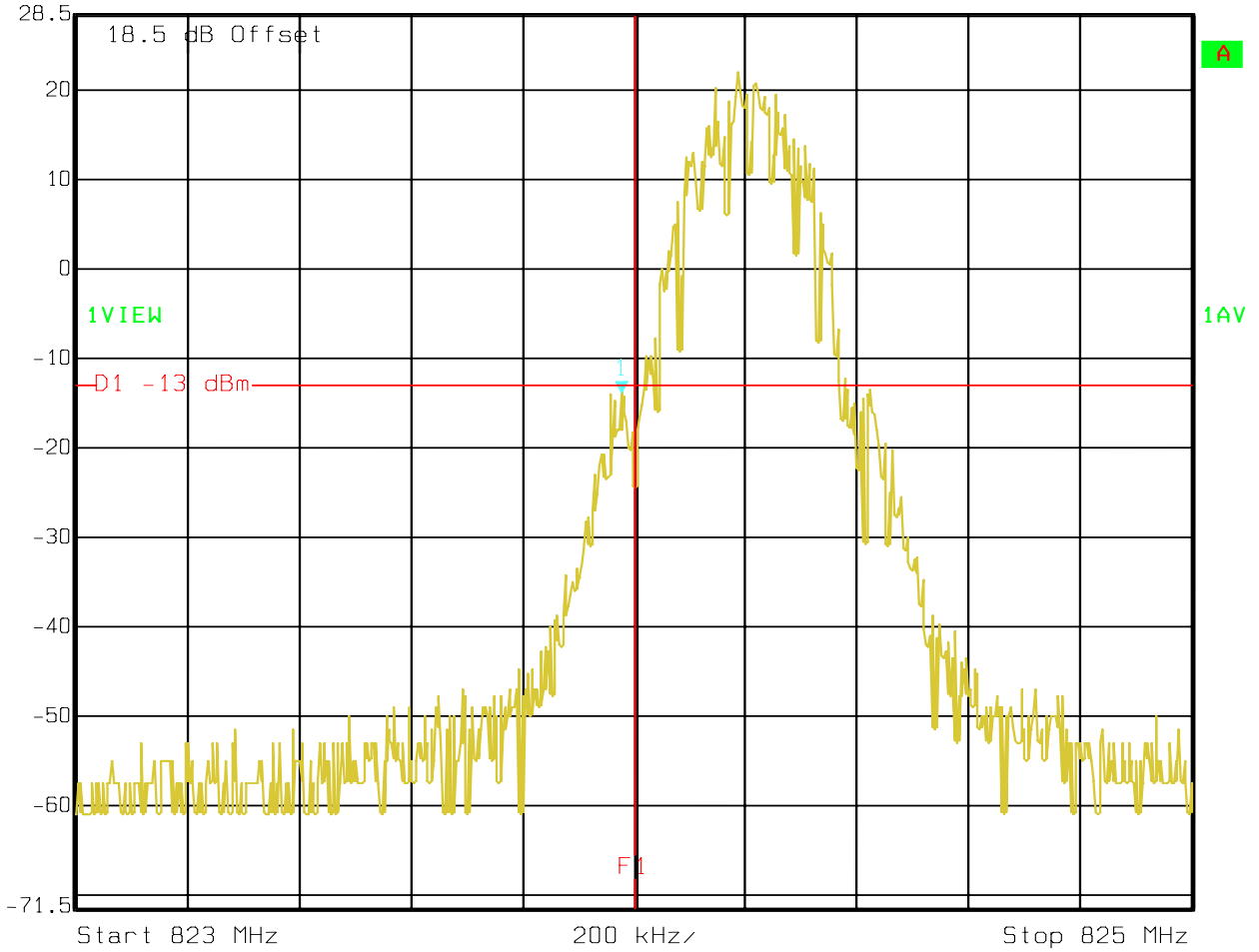
**(note:** Step 3 above is performed prior to testing and **LOSS** is recorded by test software. Steps 2, 6, and 7 above are performed with test software.)



### 5.3.4 Bandedge Results GSM 850

(Channel 128)

	Marker 1 [T1]	RBW	5 kHz	RF Att	40 dB
	Ref Lvl	-13.98 dBm	VBW	5 kHz	
	28.5 dBm	823.97795591 MHz	SWT	200 ms	Unit dBm



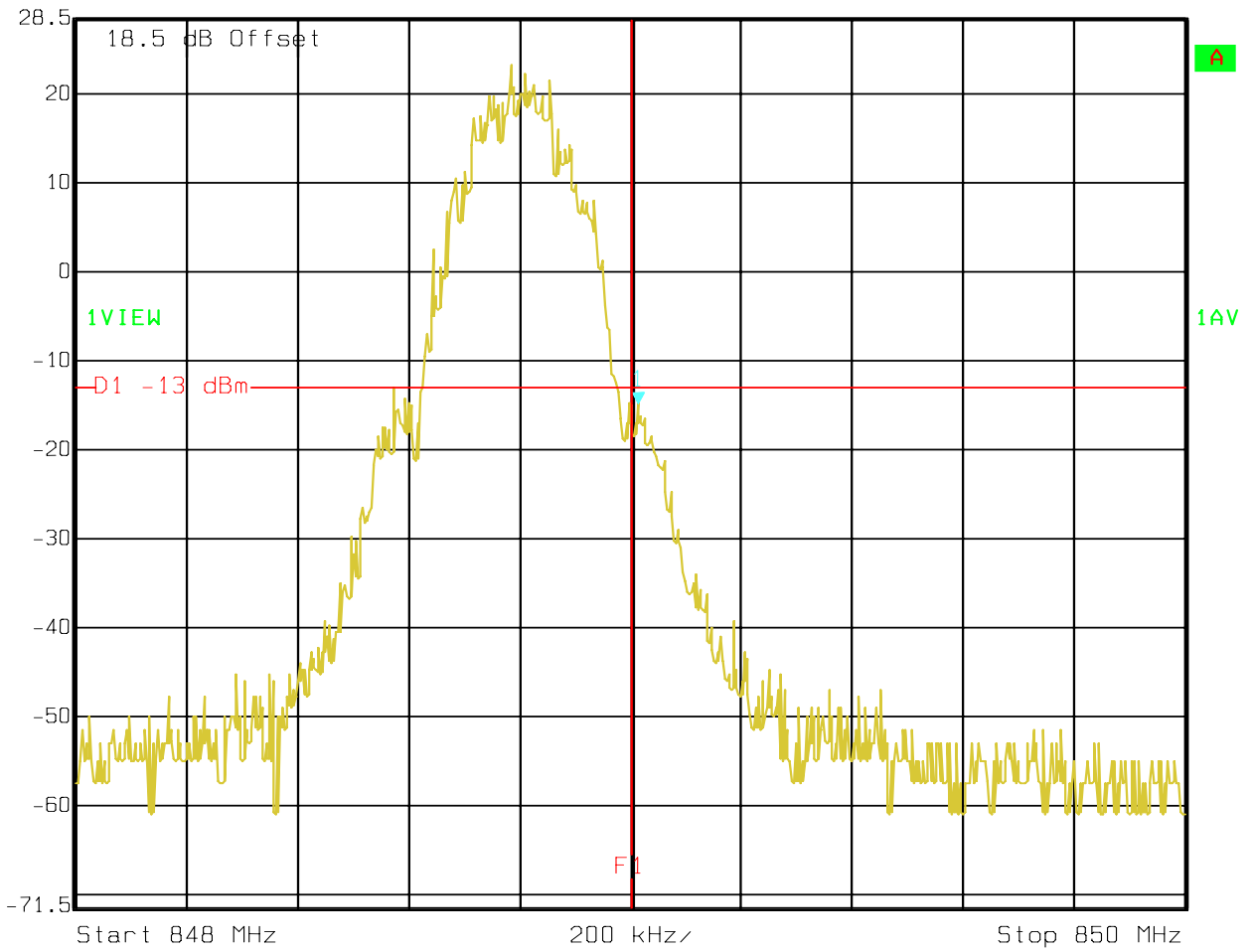
Date: 07.JUN.2006 12:26:15



(Channel 251)



Marker 1 [T1] RBW 5 kHz RF Att 40 dB  
Ref Lvl -14.85 dBm VBW 5 kHz  
28.5 dBm 849.01543086 MHz SWT 200 ms Unit dBm



Date: 07.JUN.2006 12:25:07



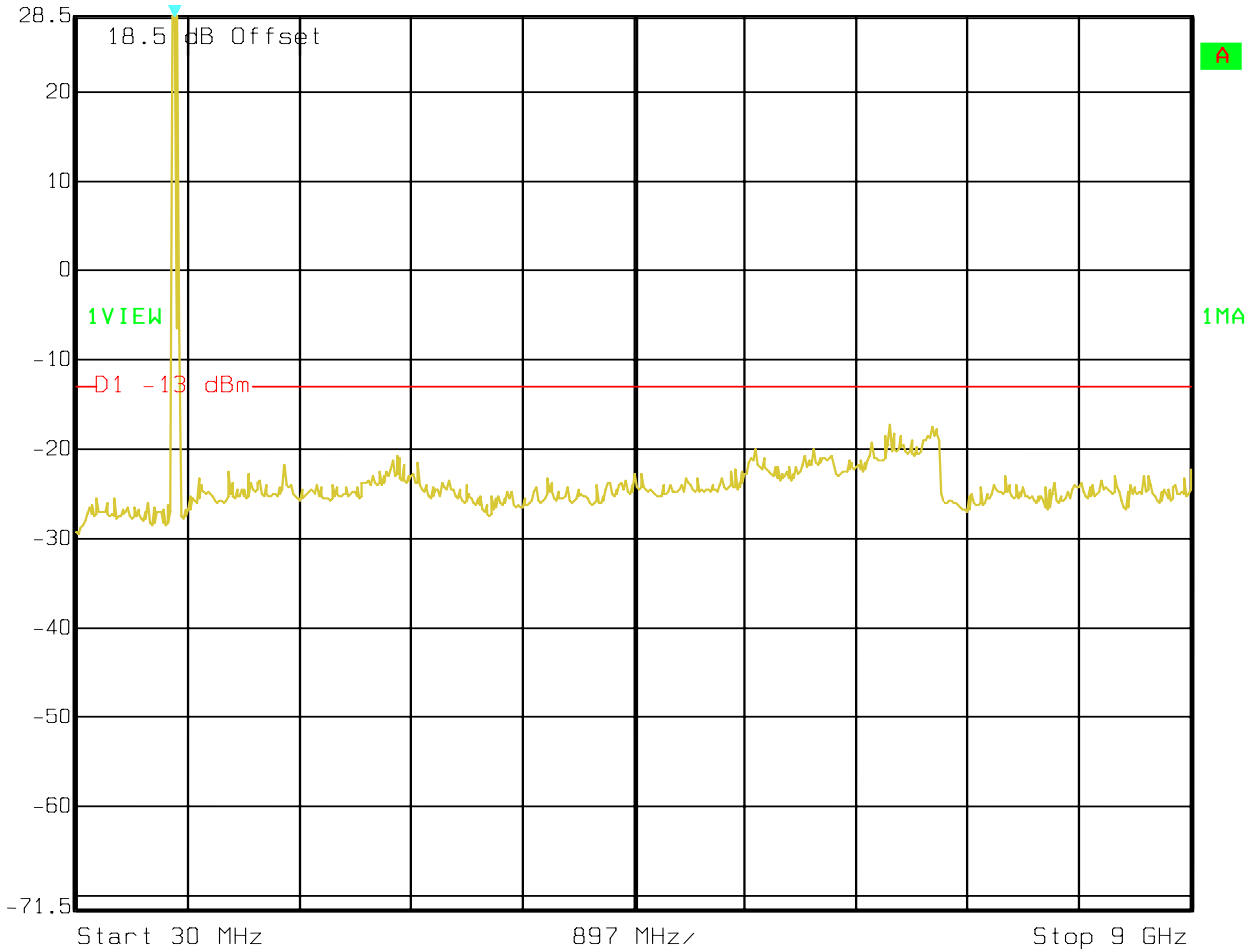
### 5.3.5 Conducted Spurious Results GSM 850

CHANNEL 128

30 MHz – 9 GHz

Note: The peak above the limit line is the carrier freq. at ch-128

	Ref Lvl	33.58 dBm	RBW	1 MHz	RF Att	40 dB
	28.5 dBm	824.20000000 MHz	VBW	1 MHz		
			SWT	52 ms	Unit	dBm



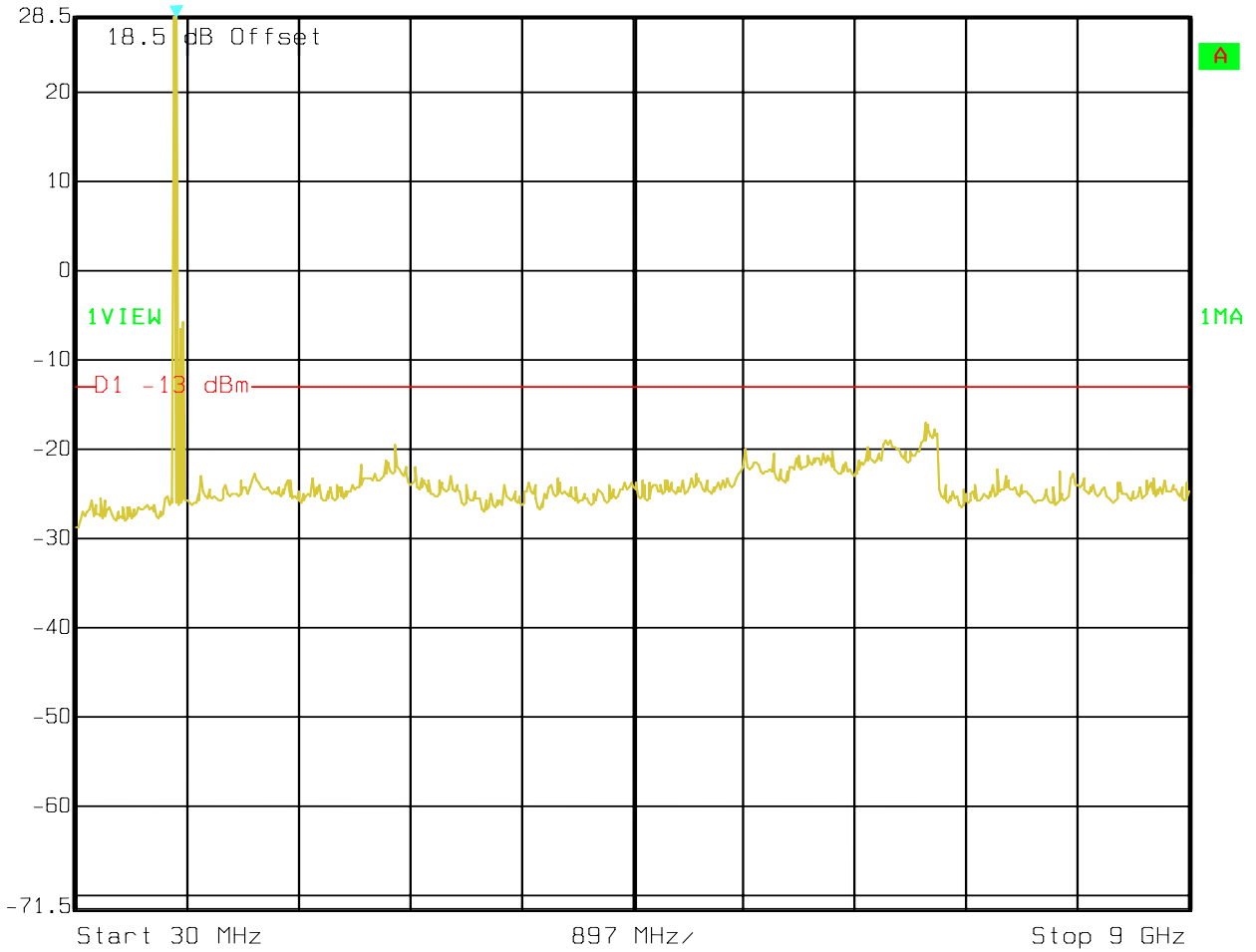
Date: 07.JUN.2006 12:17:35



**CHANNEL 190**  
**30MHz – 9GHz**

**Note: The peak above the limit line is the carrier freq. at ch-190**

	Ref Lvl	32.45 dBm	RBW	1 MHz	RF Att	40 dB
	28.5 dBm	836.6000000 MHz	VBW	1 MHz	SWT	52 ms
			Unit			dBm



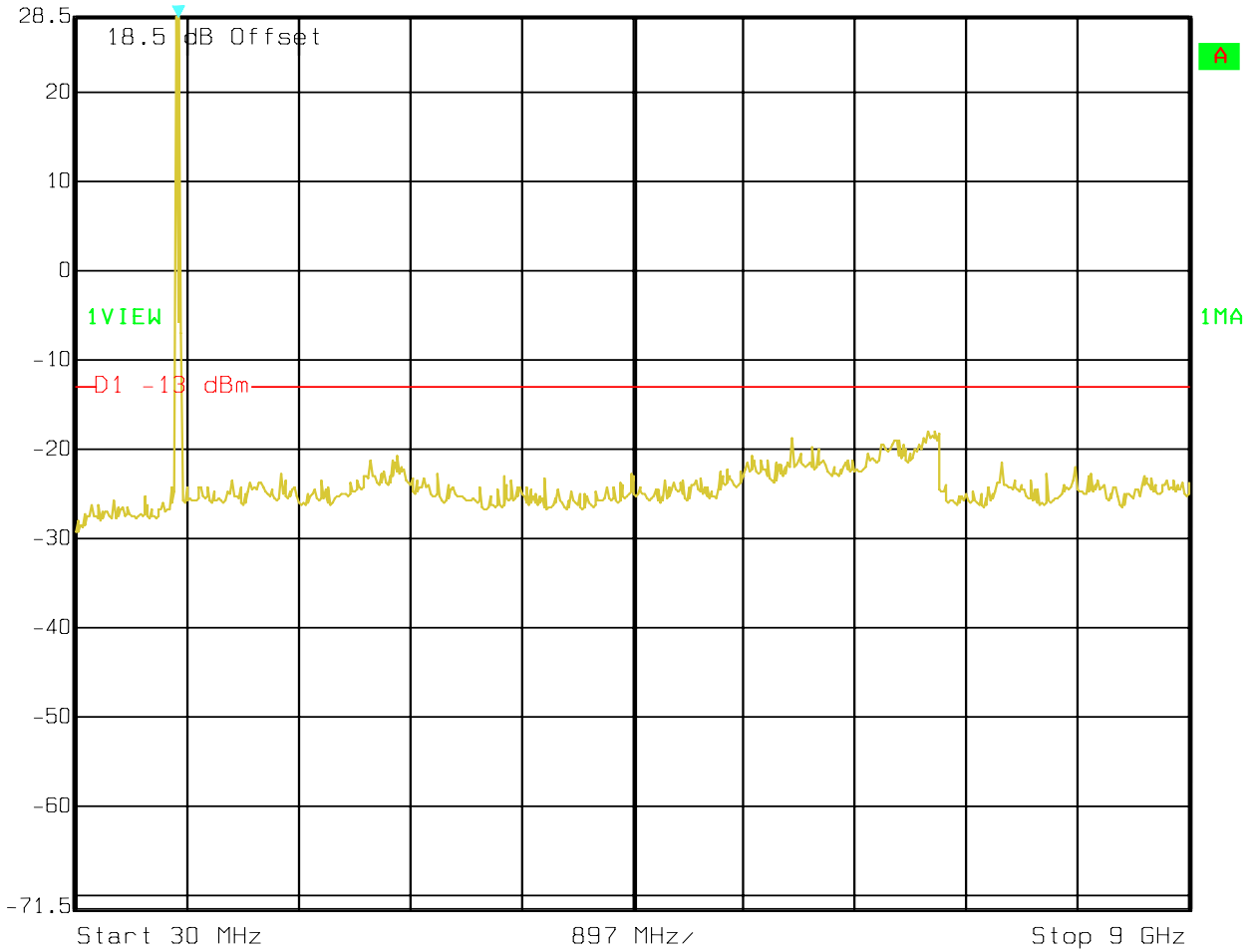
Date: 07.JUN.2006 12:17:06



**CHANNEL 251**  
**30MHz – 9GHz**

**Note: The peak above the limit line is the carrier freq. at ch-251**

	Ref Lvl	33.23 dBm	RBW	1 MHz	RF Att	40 dB
	28.5 dBm	848.8000000 MHz	VBW	1 MHz	SWT	52 ms
			Unit			dBm



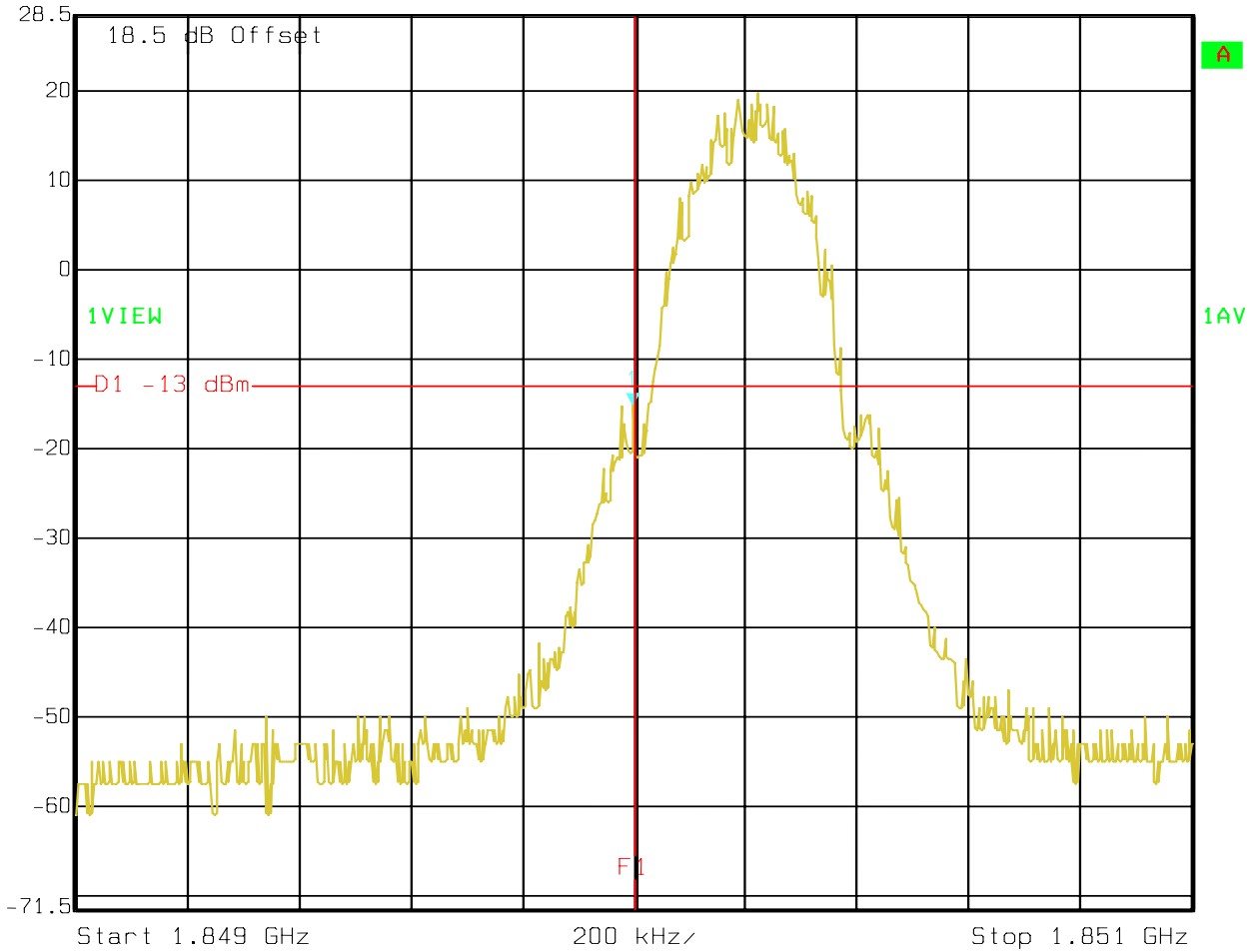
Date: 07.JUN.2006 12:15:47



### 5.3.6 Bandedge Results PCS-1900

#### PCS-1900 (Channel 512)

 Ref Lvl 28.5 dBm      Marker 1 [T1] 1.84999800 GHz      RBW 5 kHz      RF Att 40 dB  
-15.07 dBm      VBW 5 kHz  
SWT 200 ms      Unit dBm



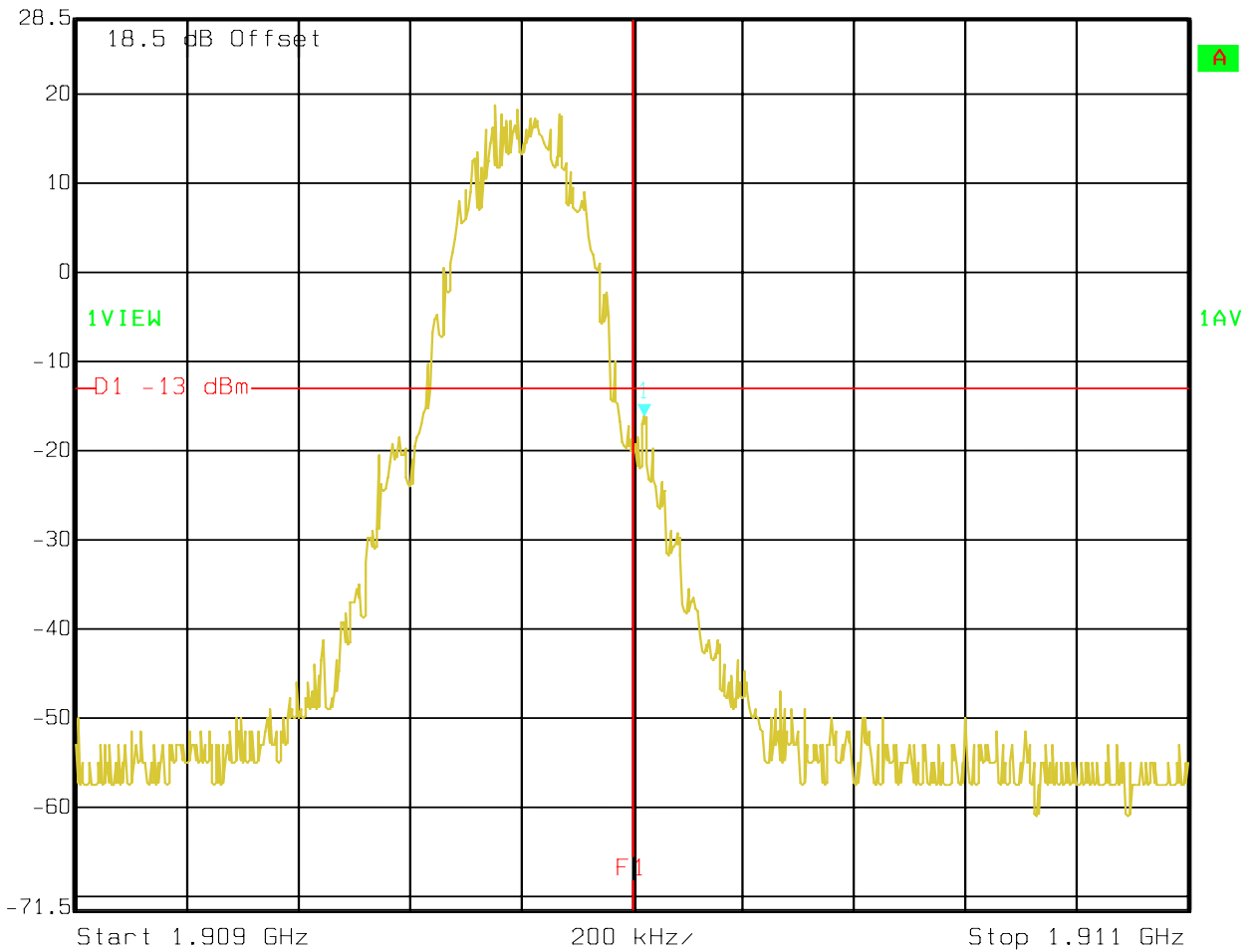
Date: 07.JUN.2006 12:05:44



### PCS-1900 (Channel 810)



Marker 1 [T1] RBW 5 kHz RF Att 40 dB  
Ref Lvl -16.09 dBm VBW 5 kHz  
28.5 dBm 1.91002204 GHz SWT 200 ms Unit dBm



Date: 07.JUN.2006 12:06:45



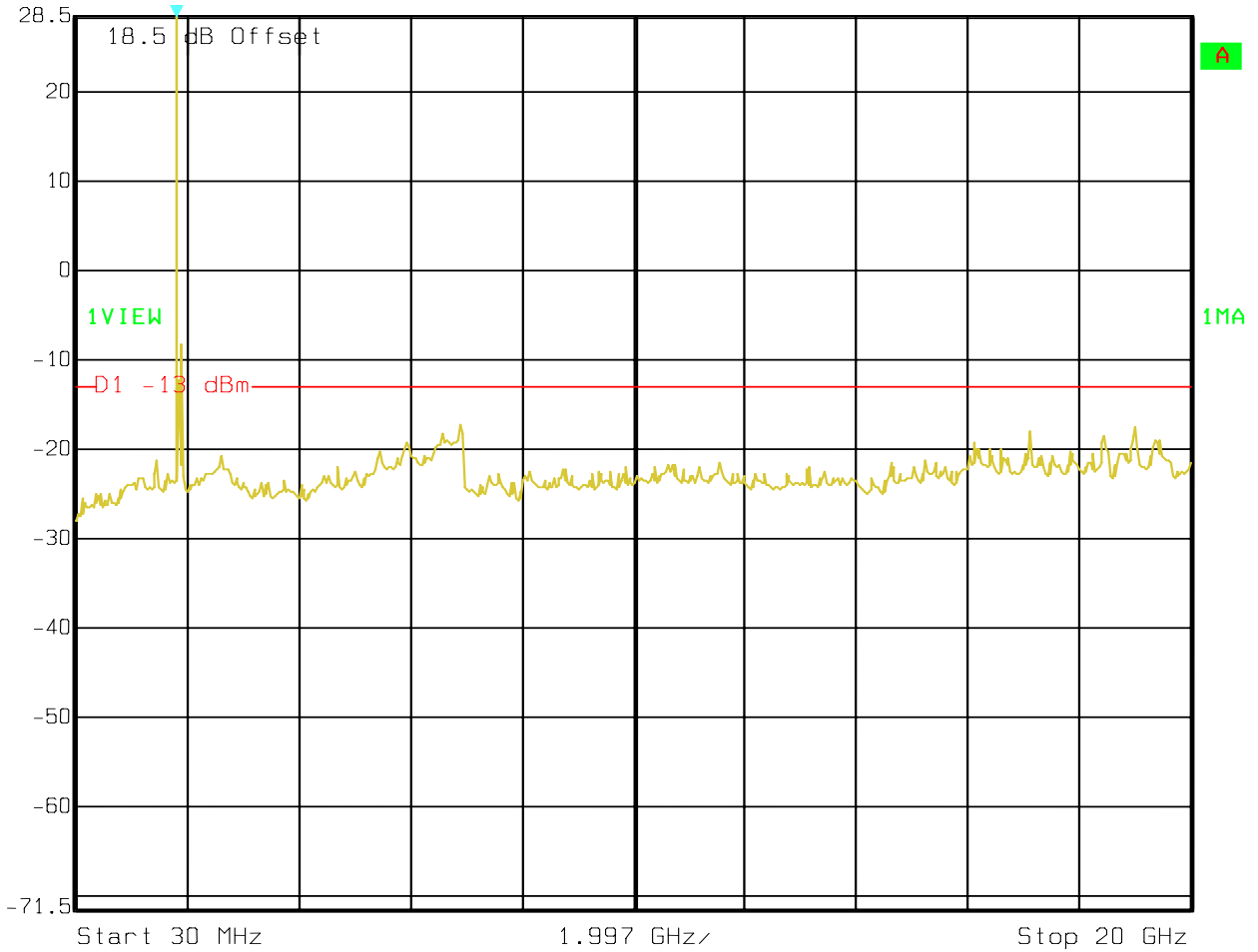
### 5.3.7 Conducted Spurious Results PCS-1900

#### CHANNEL 512 (PCS-1900)

30MHz – 20GHz

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

	Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
	28.5 dBm	30.35 dBm	VBW	1 MHz		
		1.85020000 GHz	SWT	115 ms	Unit	dBm



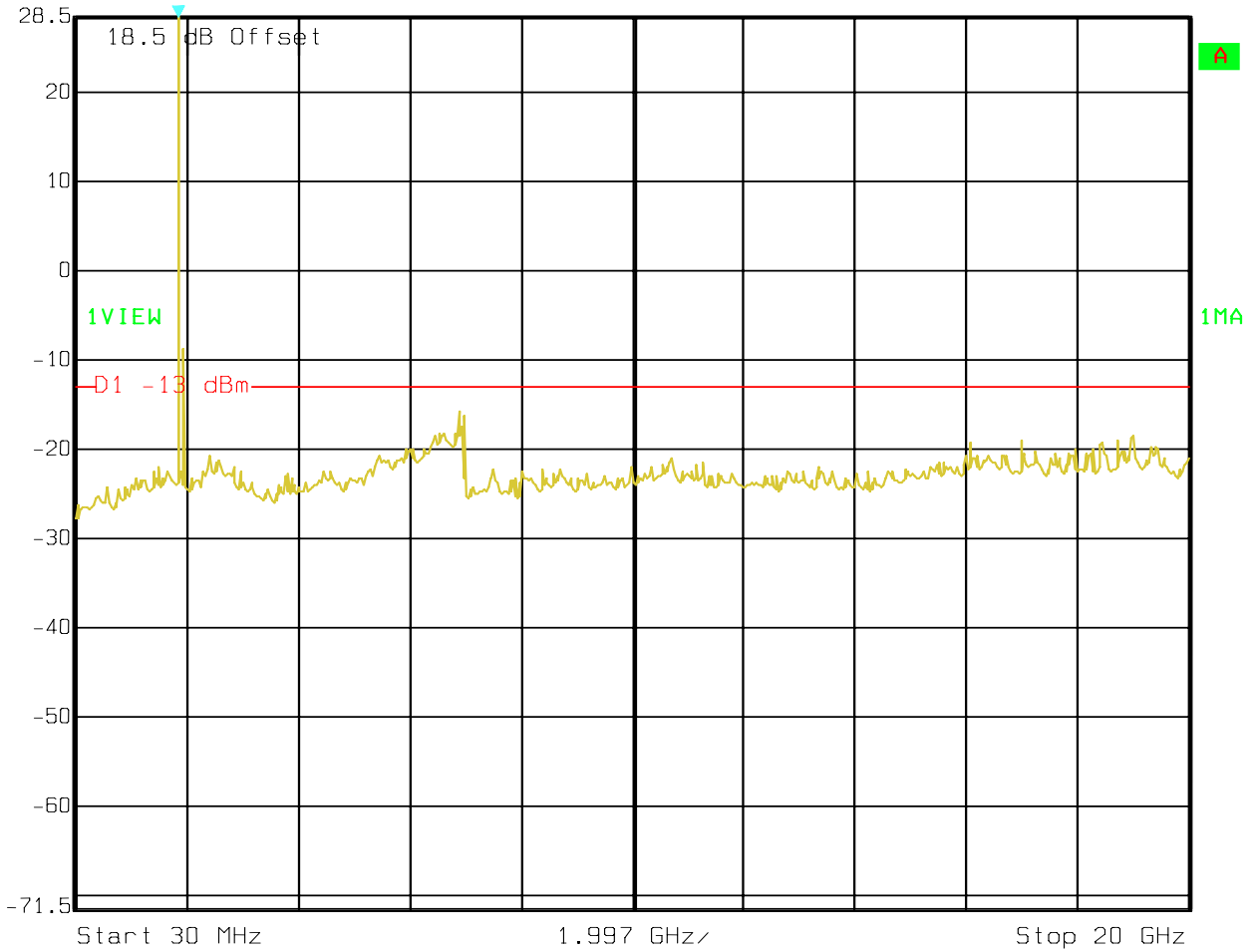
Date: 07.JUN.2006 11:46:51



**CHANNEL 661 (PCS-1900)**  
**30MHz – 20GHz**

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

	Ref Lvl	30.06 dBm	RBW	1 MHz	RF Att	40 dB
	28.5 dBm	1.88000000 GHz	VBW	1 MHz	SWT	115 ms
			Unit			dBm



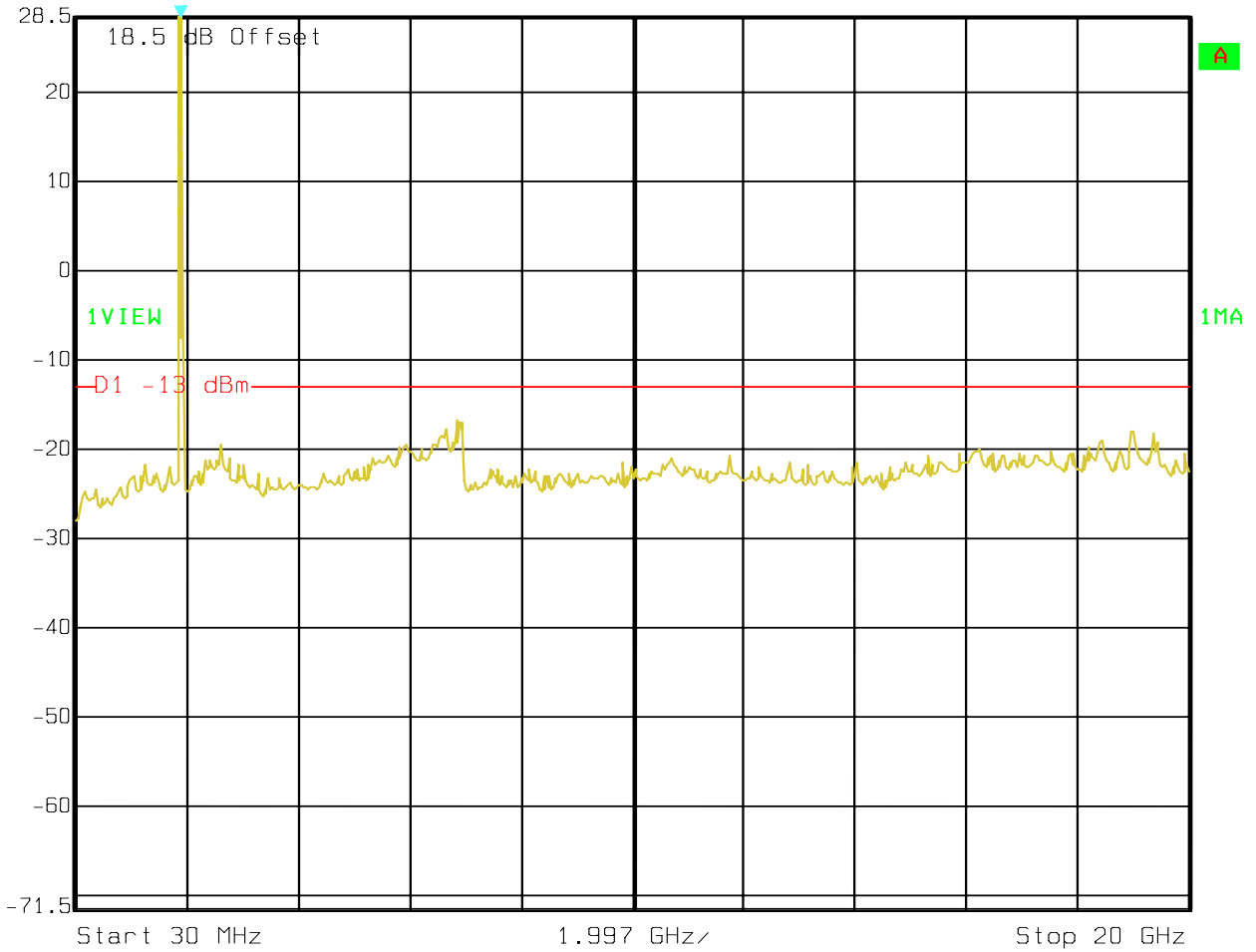
Date: 07.JUN.2006 11:46:26



**CHANNEL 810 (PCS-1900)**  
**30MHz – 20GHz**

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

	Ref Lvl	30.30 dBm	RBW	1 MHz	RF Att	40 dB
	28.5 dBm	1.90980000 GHz	VBW	1 MHz	SWT	115 ms
			Unit			dBm



Date: 07.JUN.2006 11:46:00

## 5.4 Spurious Emissions Radiated

### 5.4.1 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.

### 5.4.2 Limits:

#### 5.4.2.1 **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.

#### **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

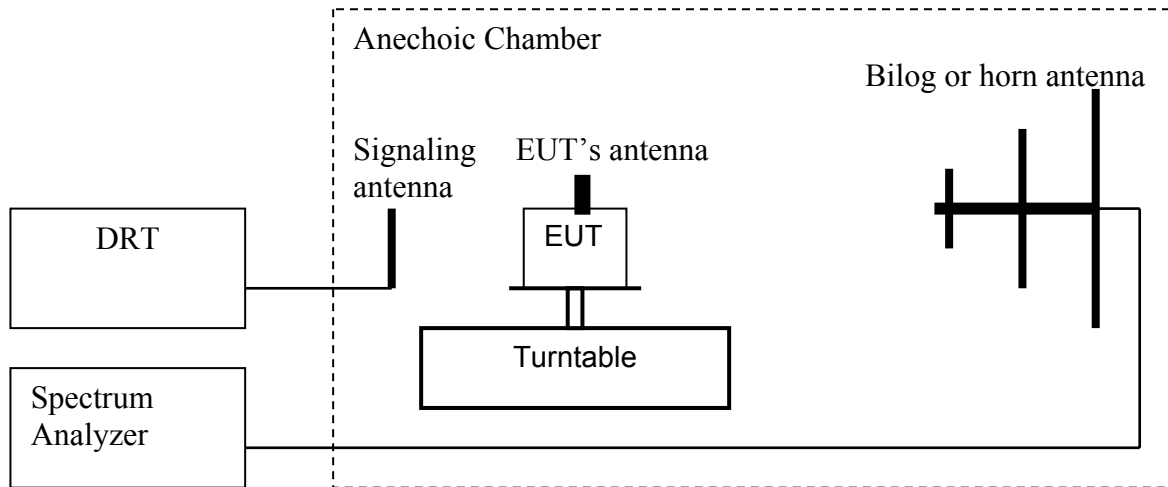


measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at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

### 5.4.3 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** = Generator Output Power (dBm) – 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.

### 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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 251, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22, marked peak is TX frequency of EUT

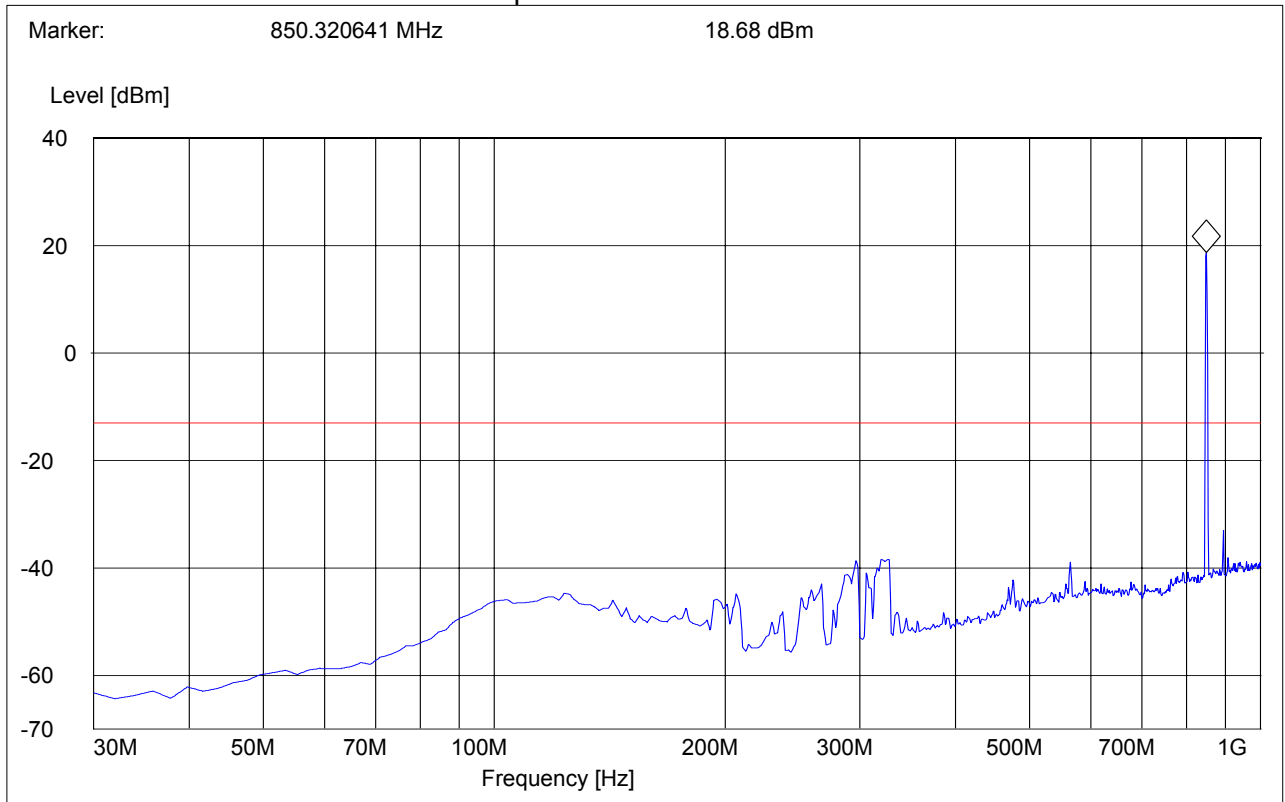
**SWEEP TABLE: "FCC 24 Spur 30M-1G\_V"**

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 (GSM-850)**

**Tx @ 824.2MHz: 1GHz – 1.58GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 128, PCL: 5

Antenna: H

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

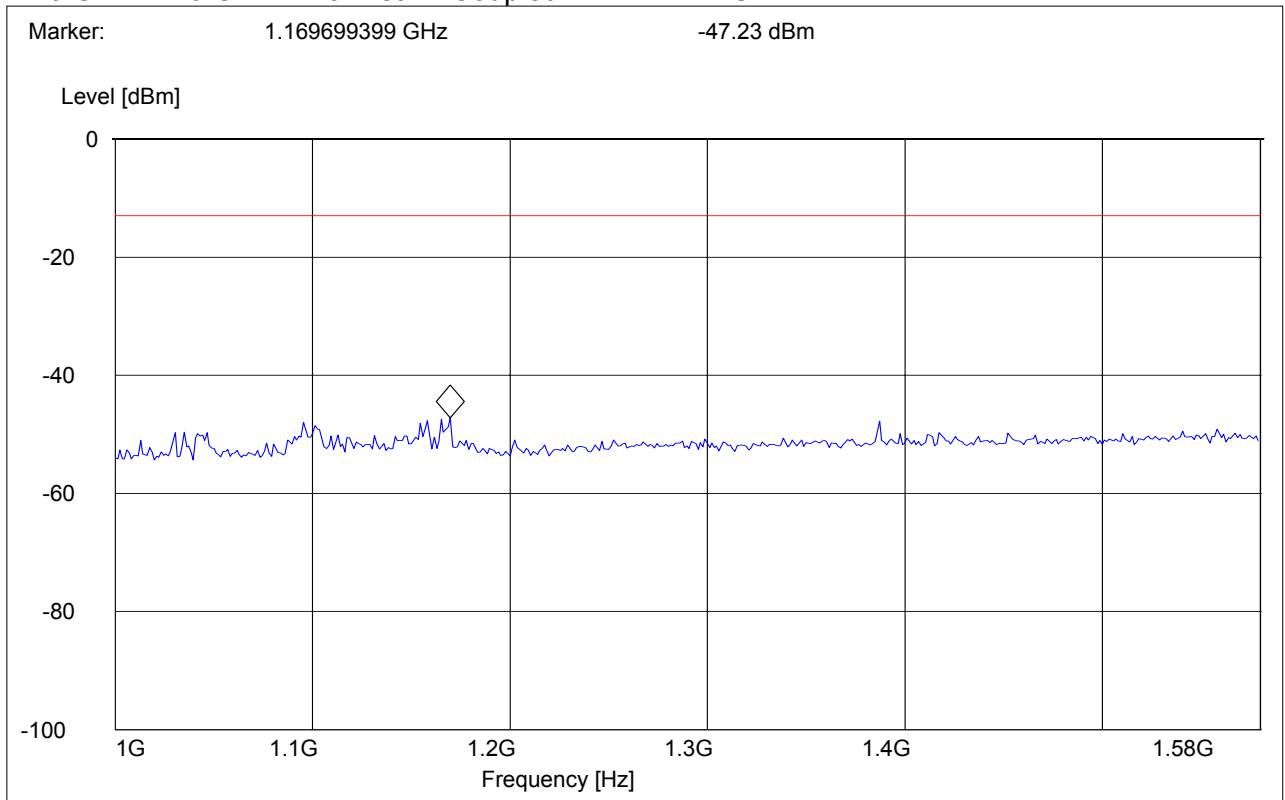
**SWEEP TABLE: "FCC 22Spuri 1-1.58G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.0 GHz 1.6 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 128, PCL: 5

Antenna: H

EUT: V

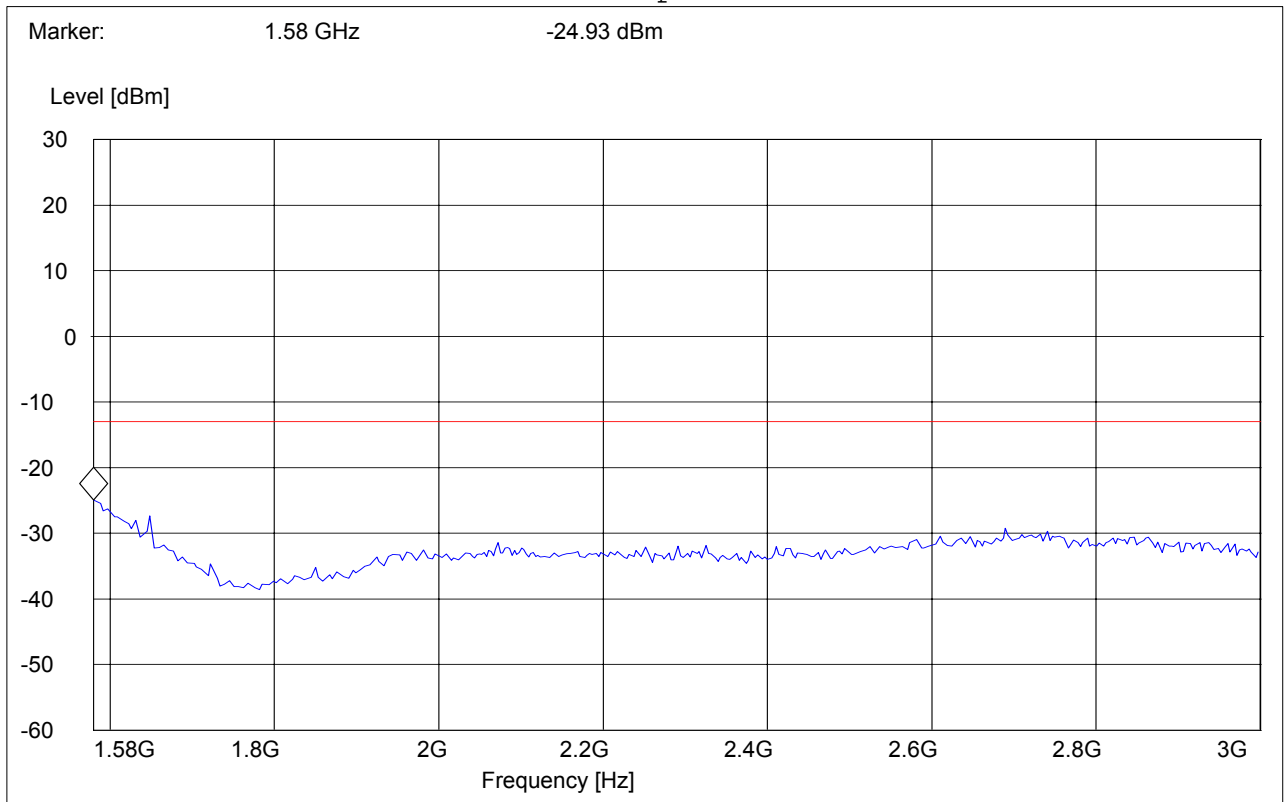
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

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

Short Description:		FCC 24 1GHz-8GHz			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.6 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 128, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

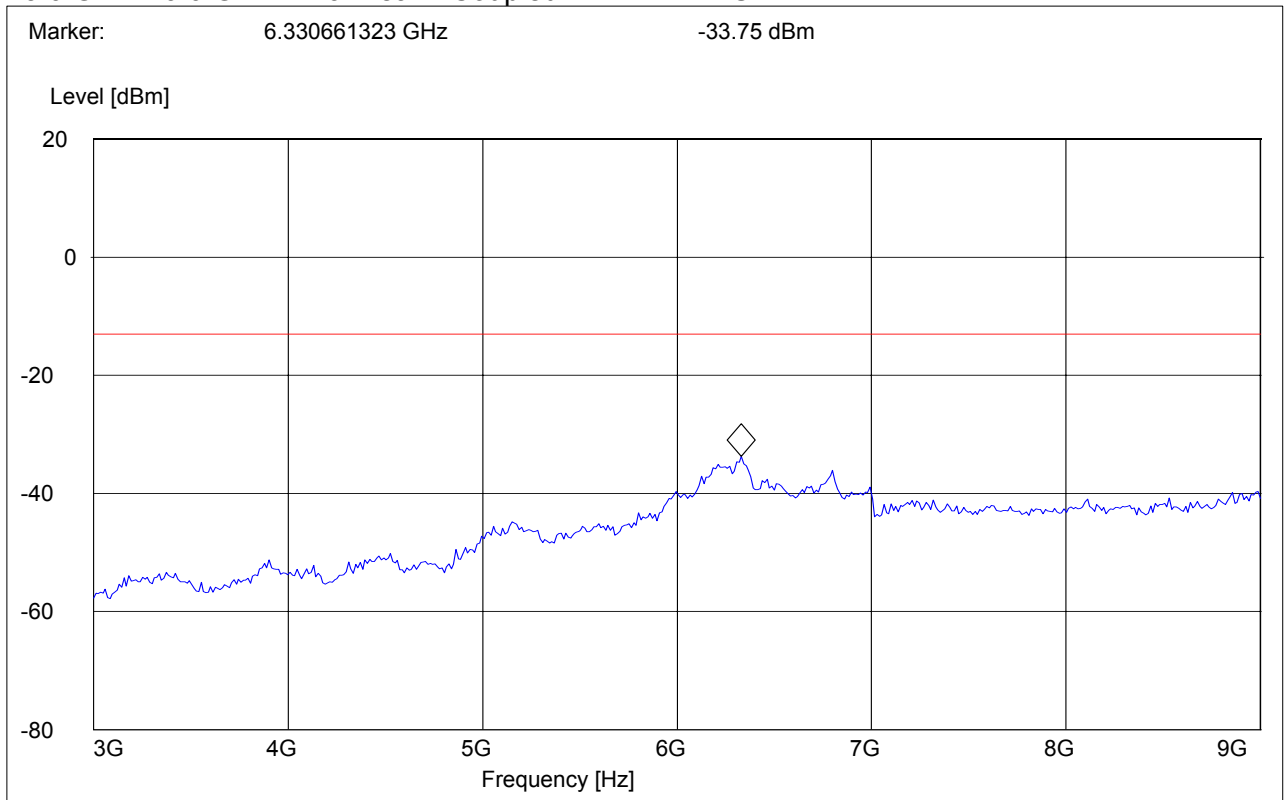
**SWEEP TABLE: "FCC 22Spuri 3-9G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

3.0 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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 190, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

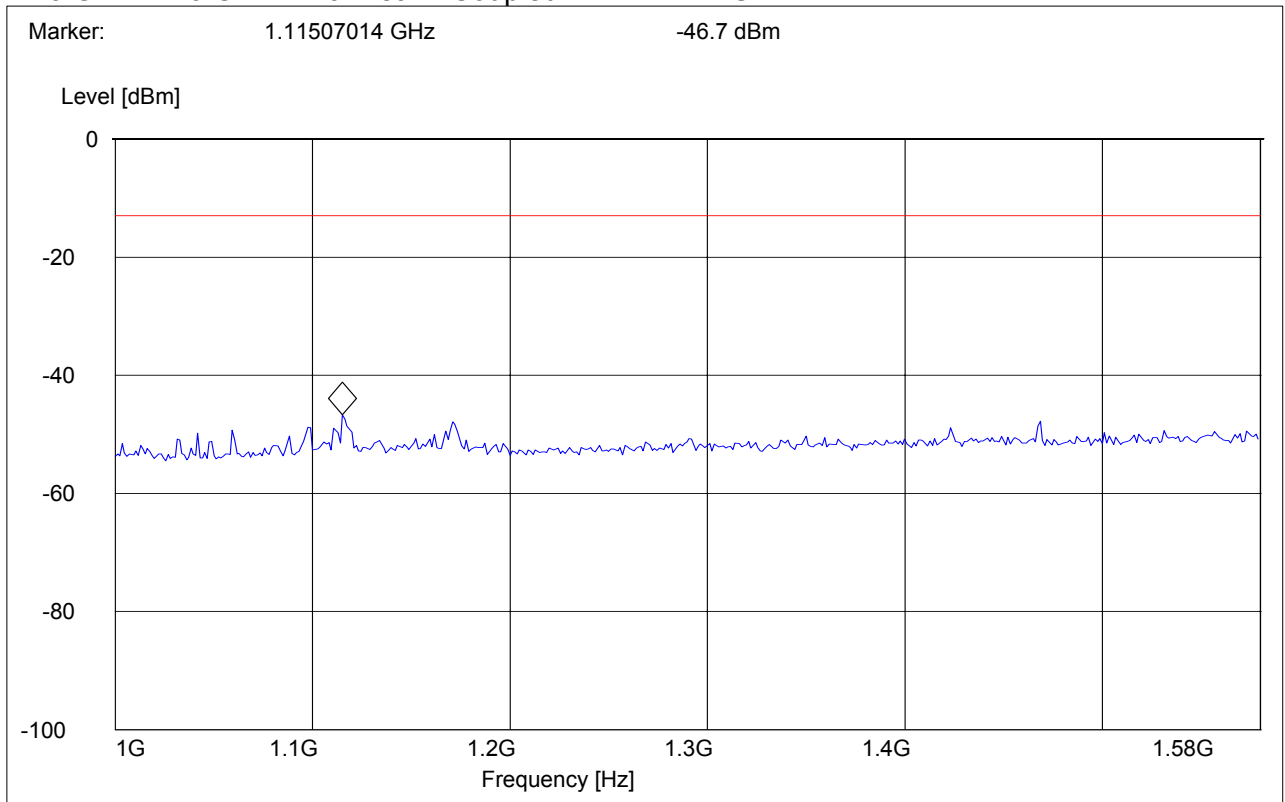
**SWEEP TABLE: "FCC 22Spuri 1-1.58G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.0 GHz 1.6 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 190, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

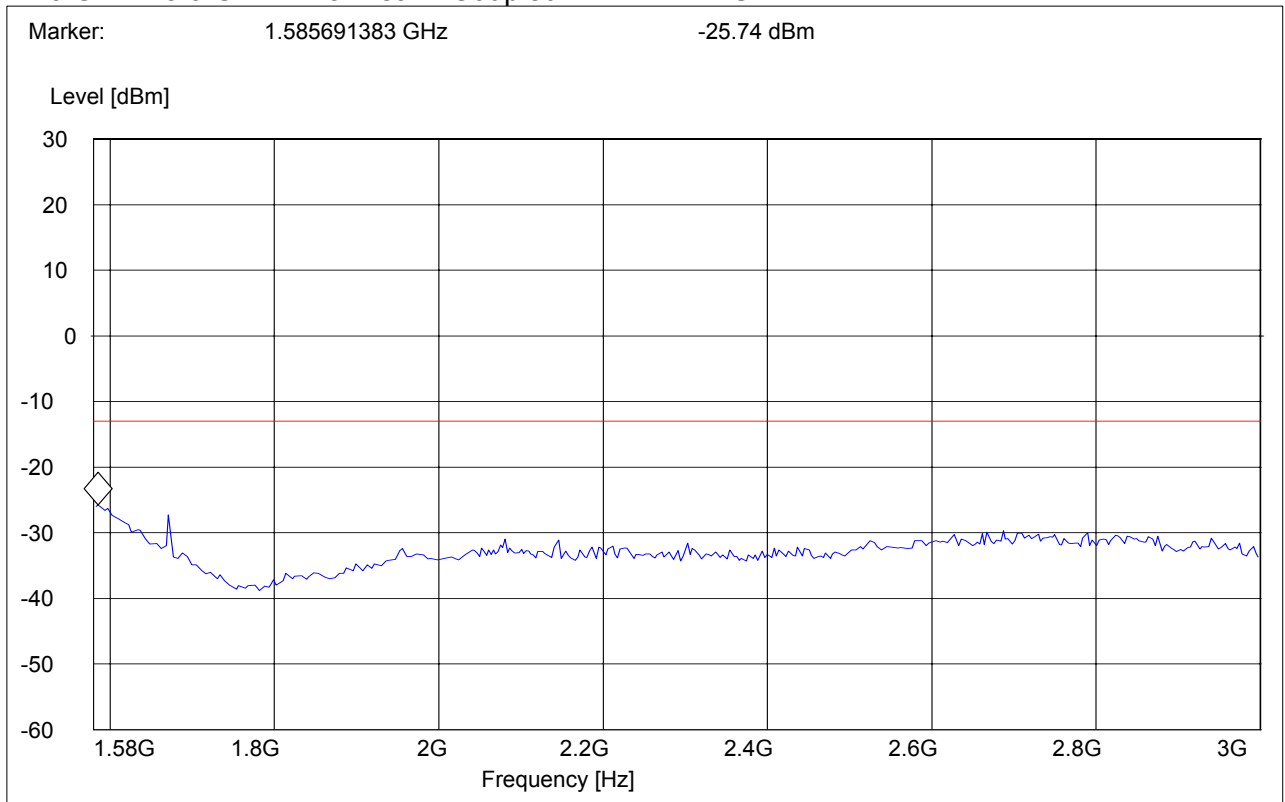
**SWEEP TABLE: "FCC 22Spuri 1.58-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.6 GHz 3.0 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 190, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

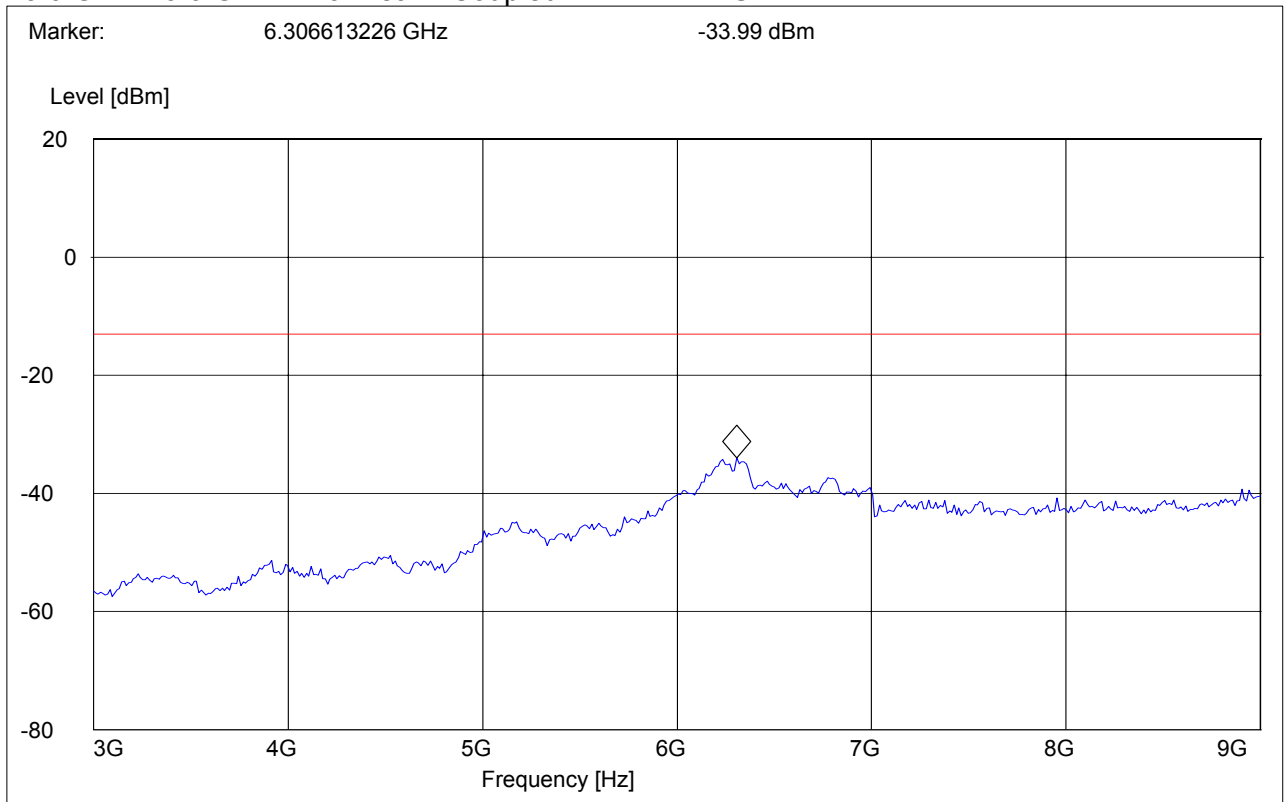
**SWEEP TABLE: "FCC 22Spuri 3-9G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

3.0 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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 251, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

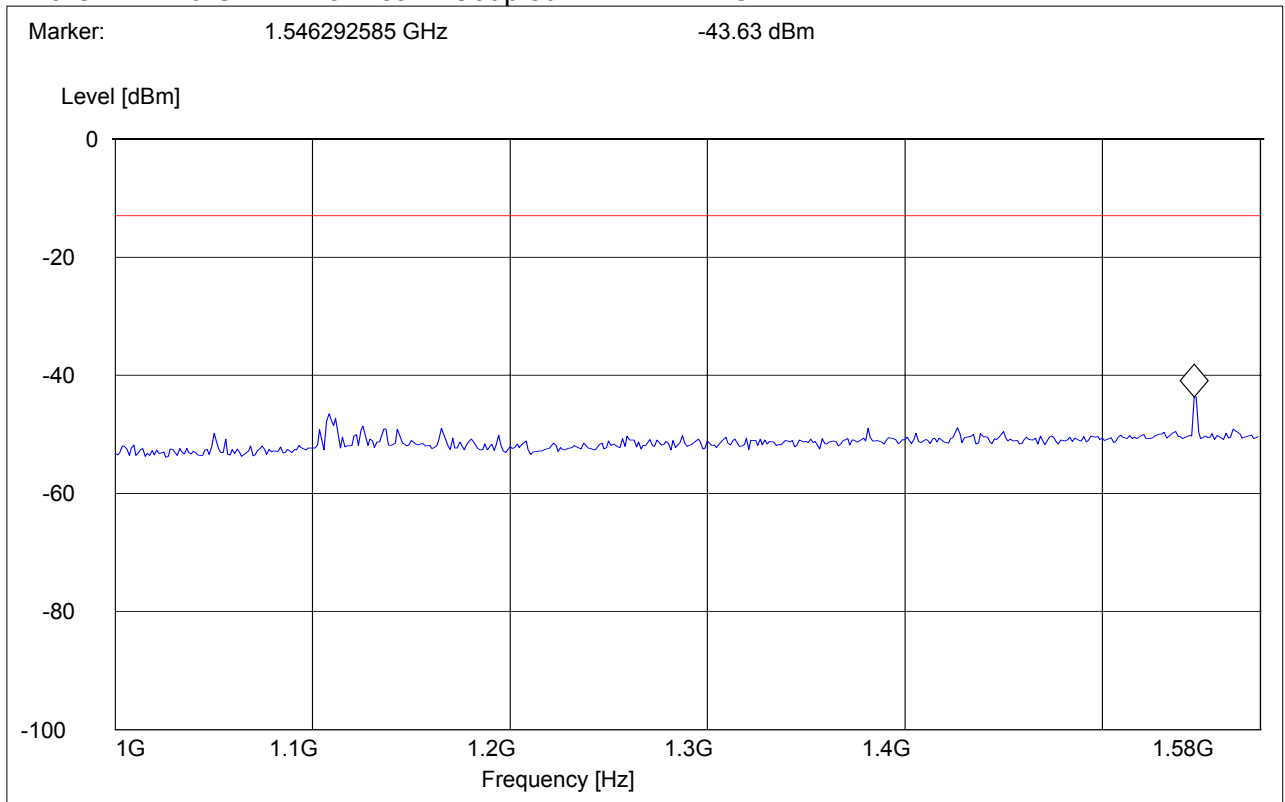
**SWEEP TABLE: "FCC 22Spuri 1-1.58G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.0 GHz 1.6 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 251, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

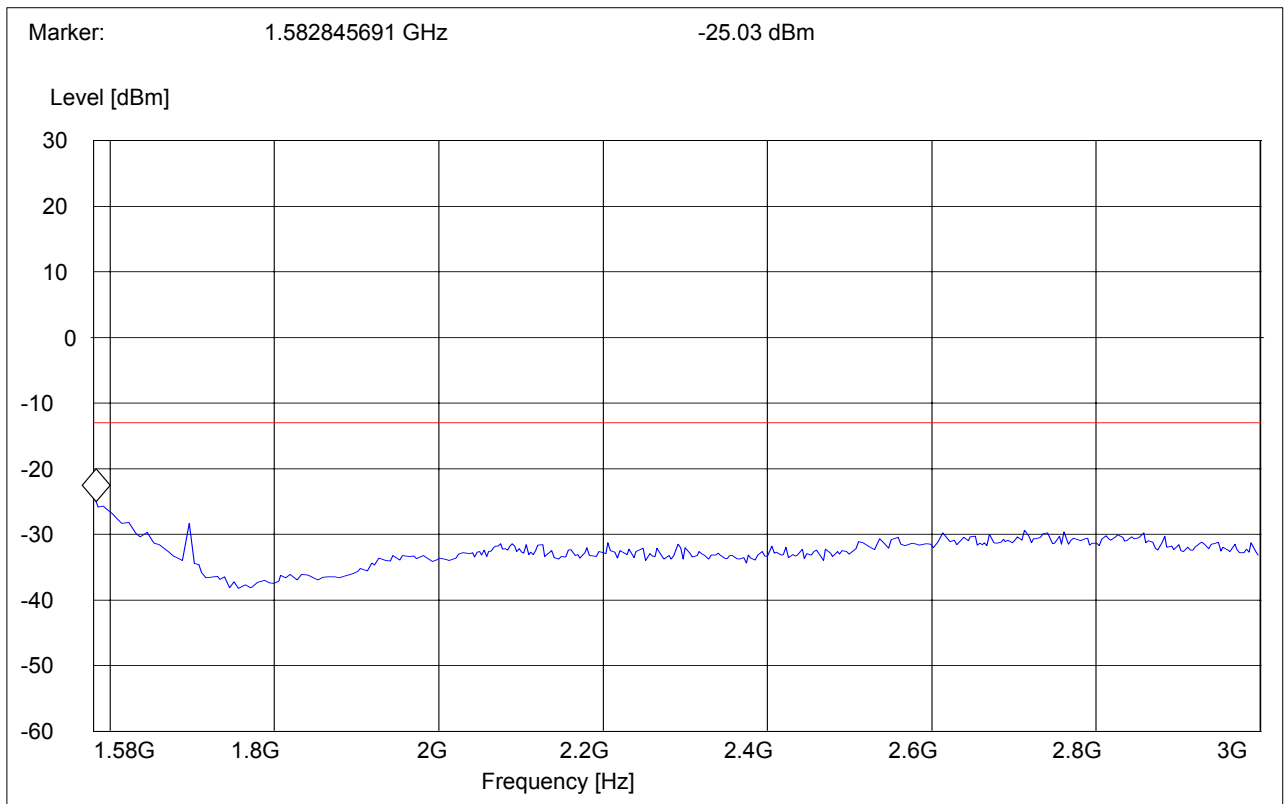
**SWEEP TABLE: "FCC 22Spuri 1.58-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.6 GHz 3.0 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, TCH: 251, PCL: 5

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

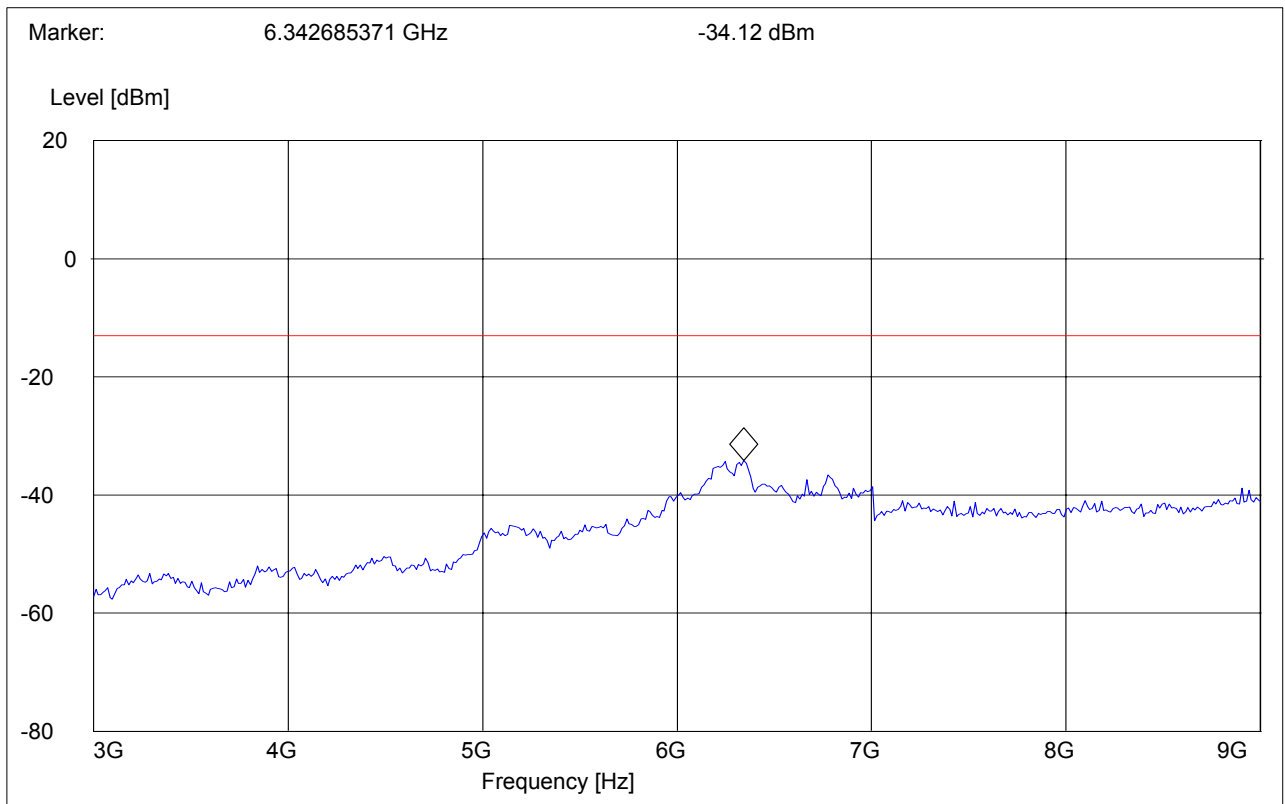
**SWEEP TABLE: "FCC 22Spuri 3-9G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

3.0 GHz 9.0 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





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

**IDLE: 30MHz - 1GHz**

Spurious emission limit -13dBm

**Antenna: vertical**

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, idle

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22, marked peak is TX frequency of EUT

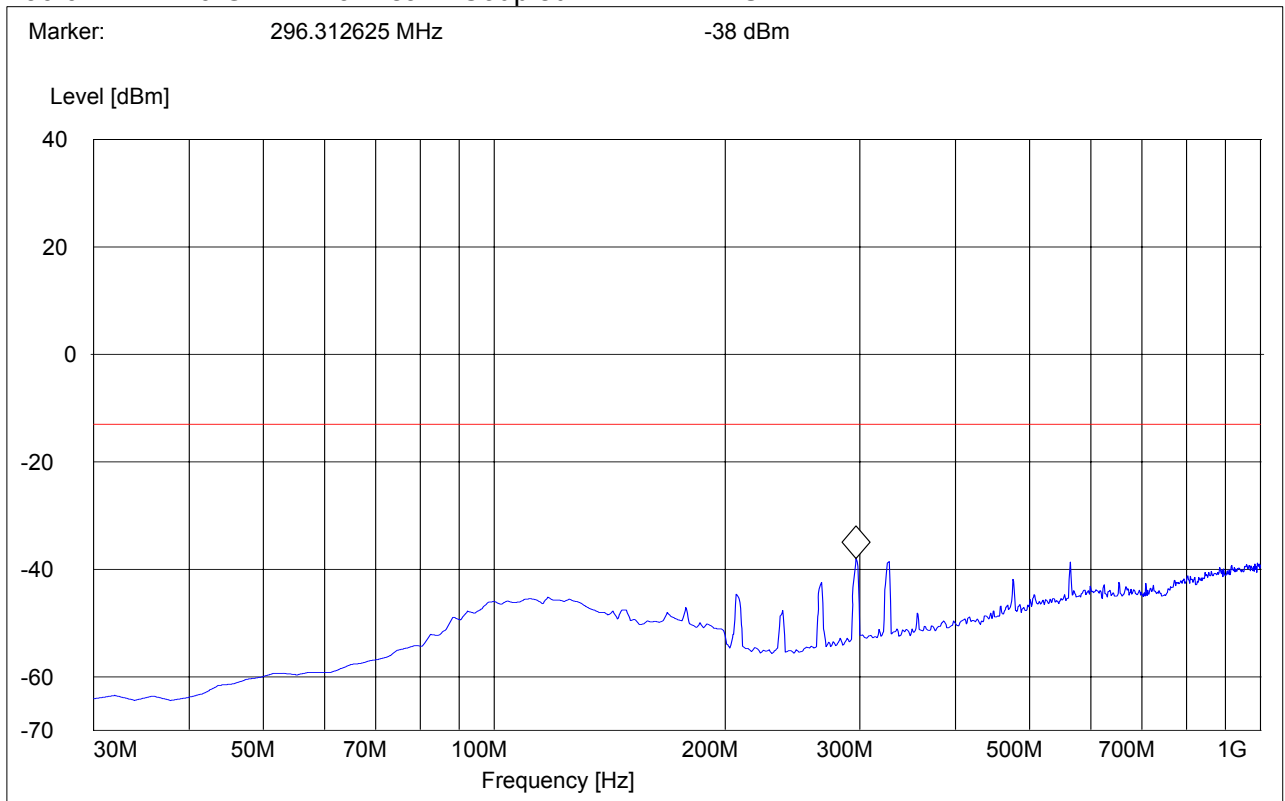
**SWEEP TABLE: "FCC 24 Spur 30M-1G\_V"**

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 (GSM-850)**

**IDLE: 1GHz – 3GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, idle

Antenna: v

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

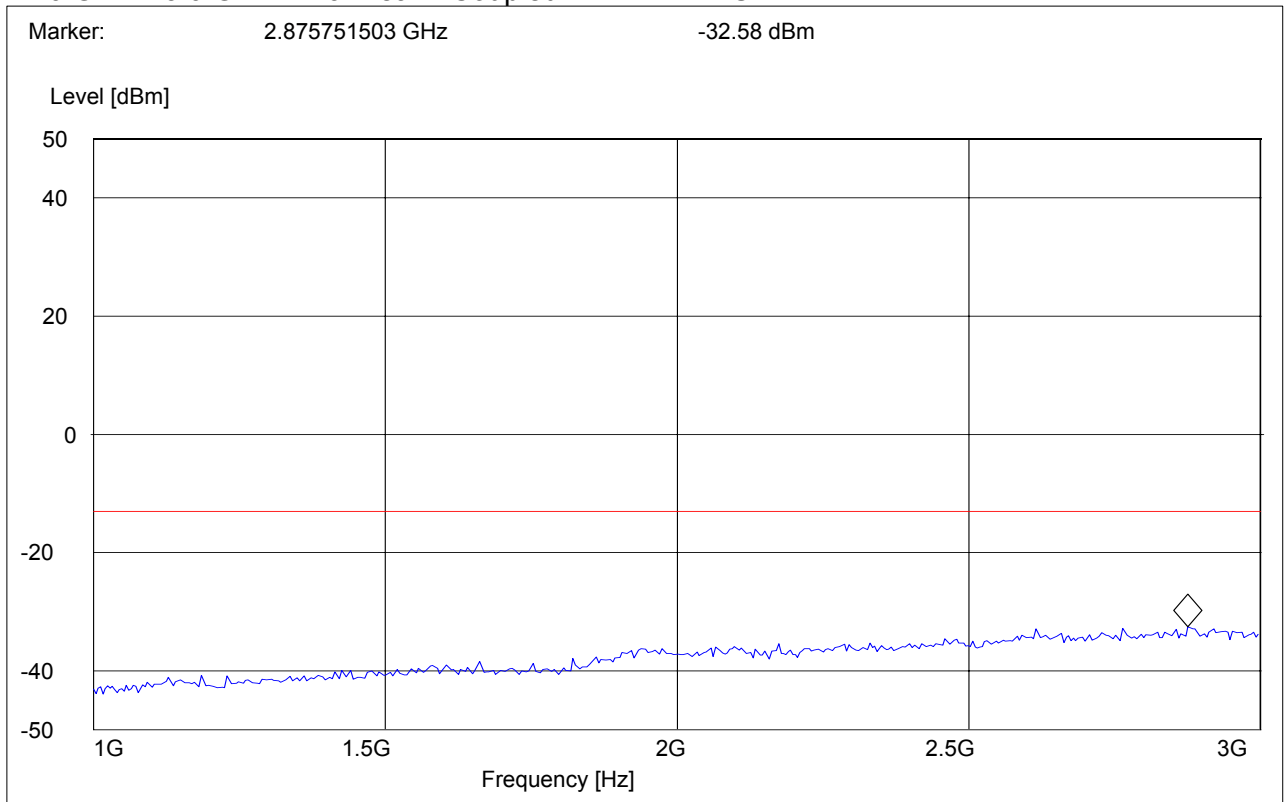
**SWEEP TABLE: "FCC 24Spuri 1-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.0 GHz 3.0 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





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

**IDLE: 3GHz – 9GHz**

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 850, idle

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 22

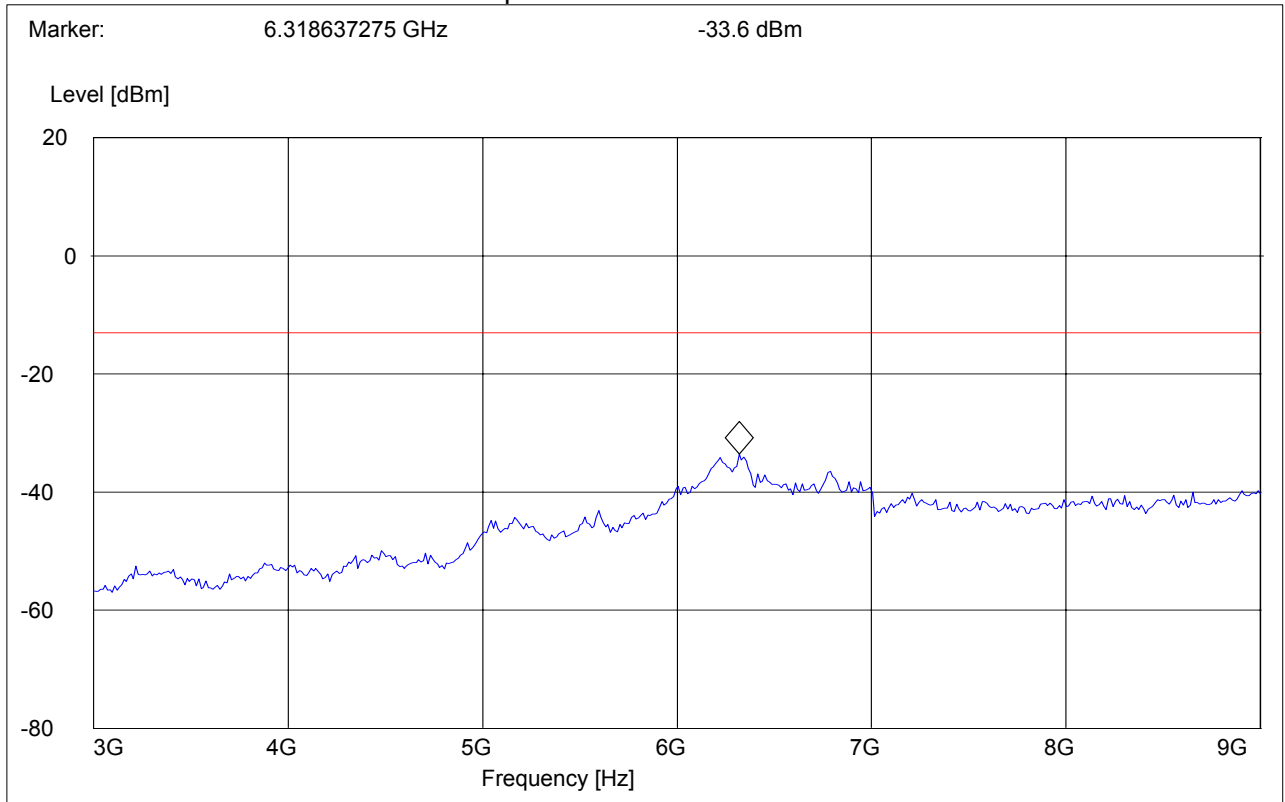
**SWEEP TABLE: "FCC 22Spuri 3-9G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

3.0 GHz 9.0 GHz MaxPeak Coupled 1 MHz DUMMY-DBM



**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH: 512, PCL: 0

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

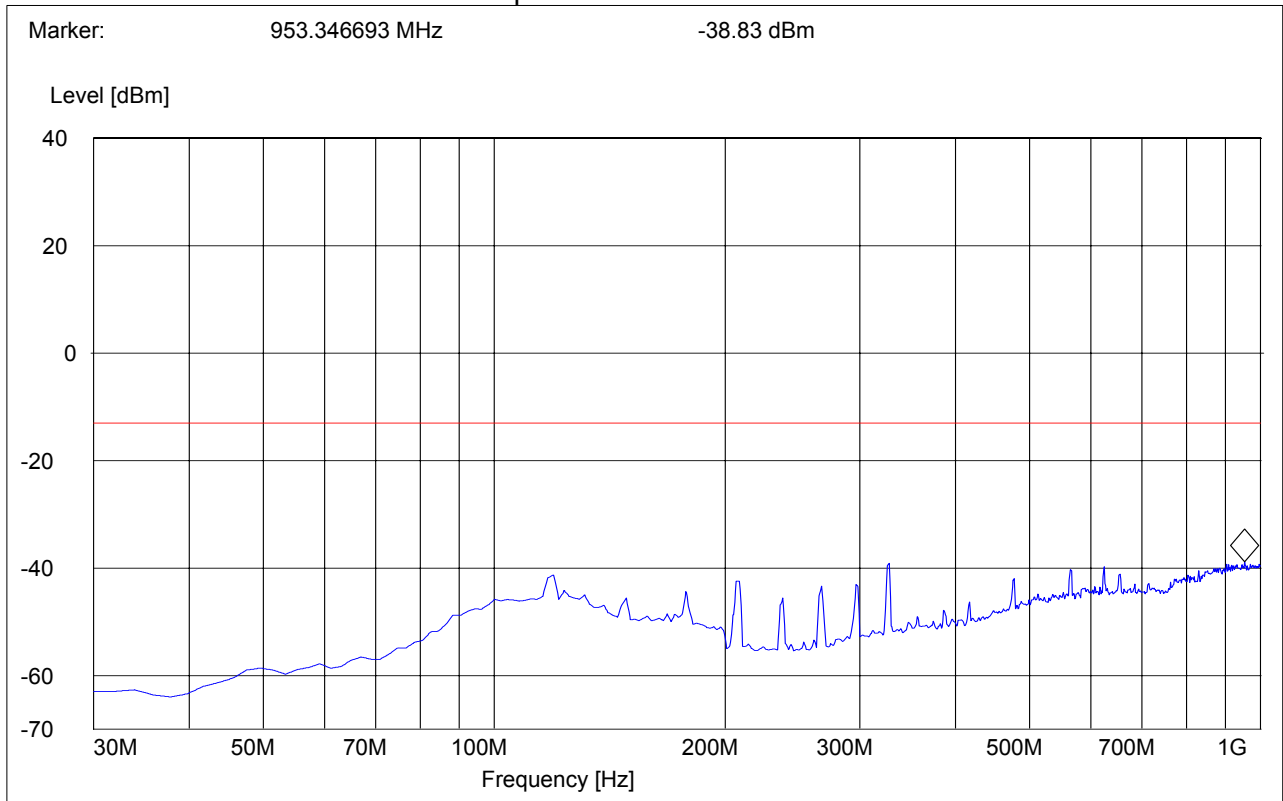
**SWEEP TABLE: "FCC 24 Spur 30M-1G\_V"**

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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH 512, PCL: 0

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

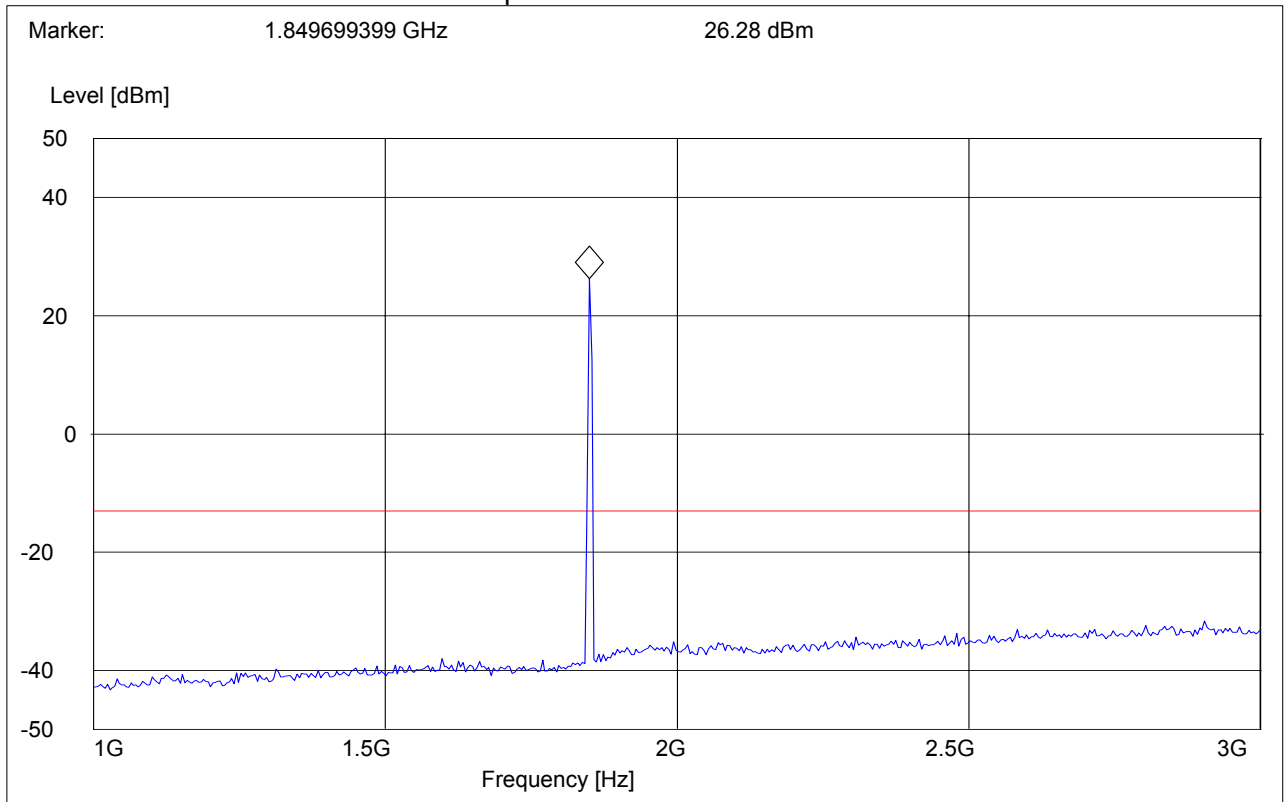
**SWEEP TABLE: "FCC 24Spuri 1-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH: 512, PCL: 5

Antenna: V

EUT: V

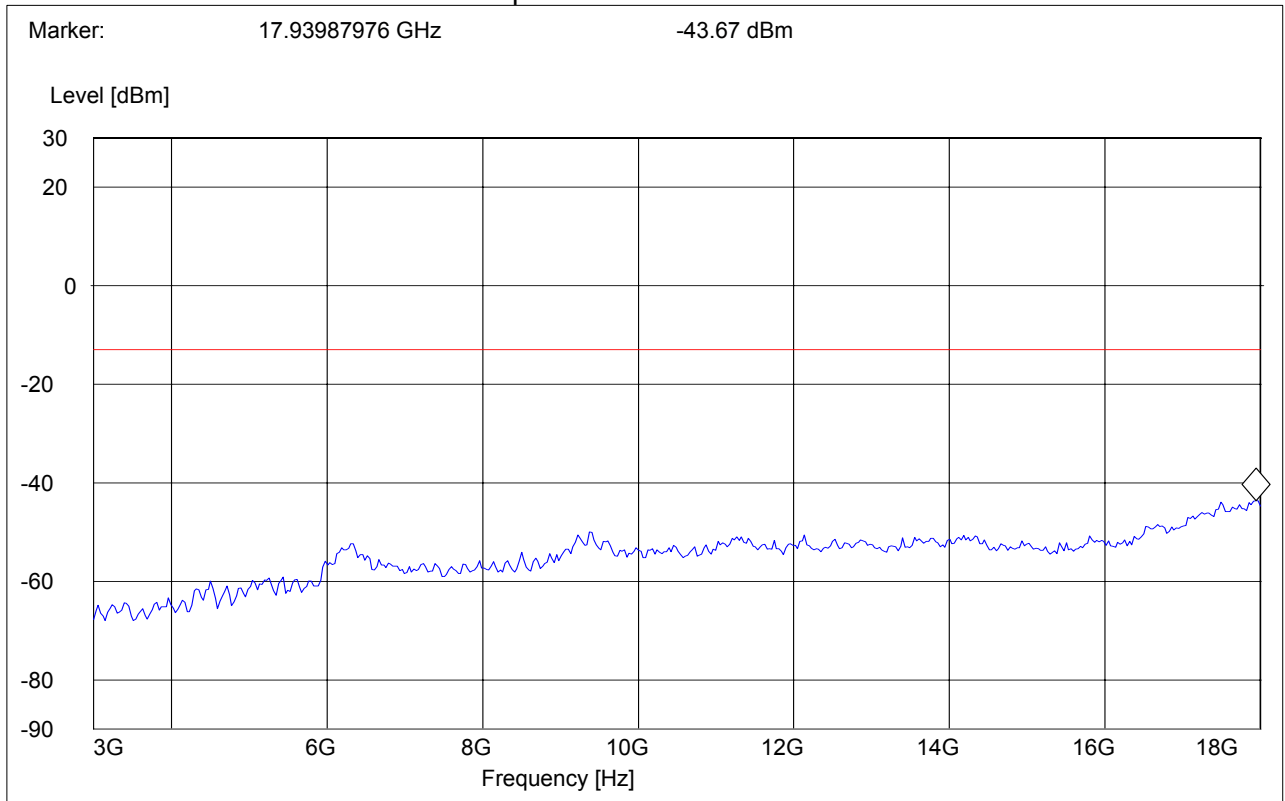
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

**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)**

**Tx @ 1880.0MHz: 1GHz – 3GHz**

Spurious emission limit -13dBm

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

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH 661, PCL: 0

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

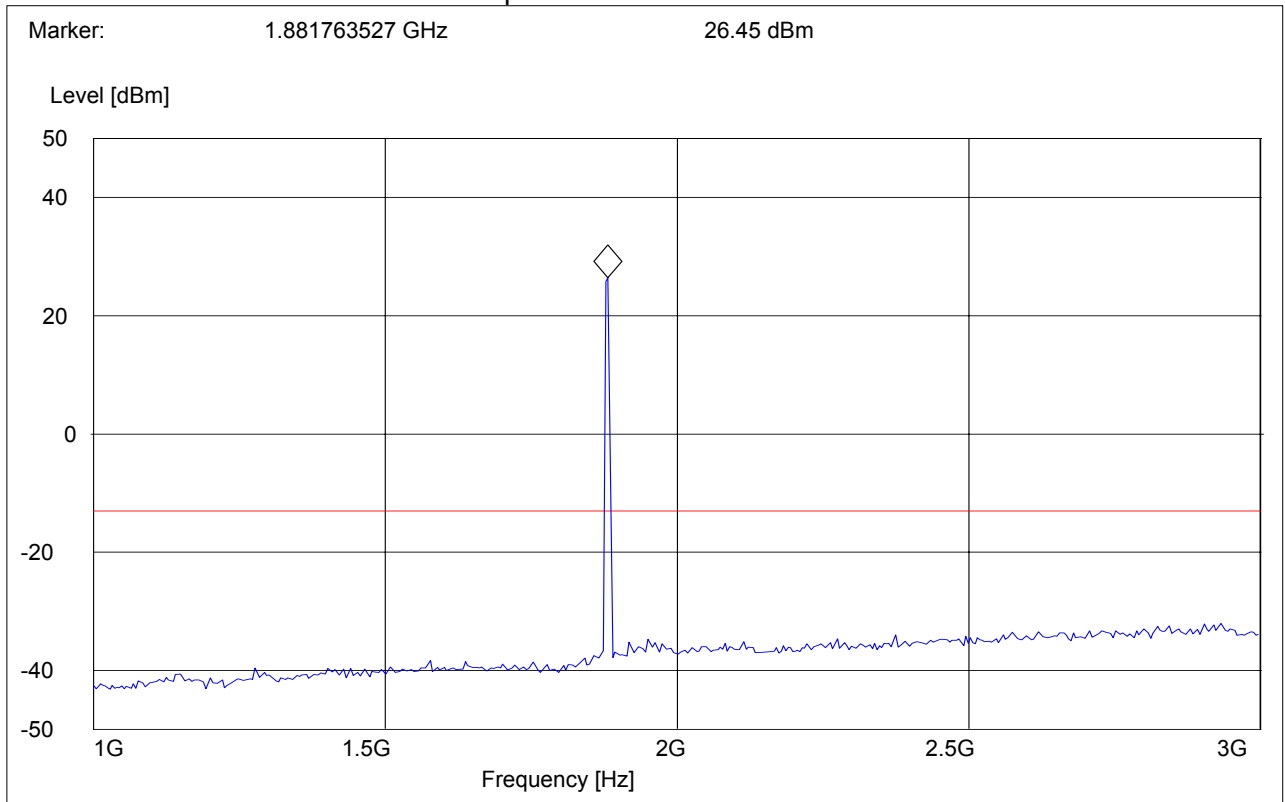
**SWEEP TABLE: "FCC 24Spuri 1-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH: 661, PCL: 5

Antenna: V

EUT: V

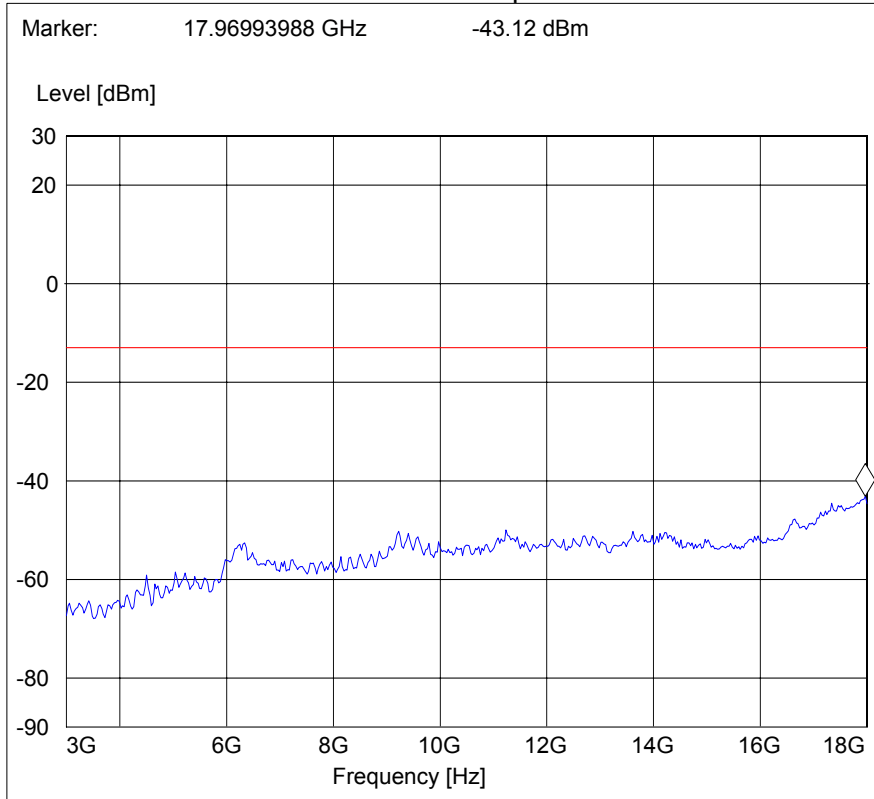
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

**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)**

**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH 810, PCL: 0

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

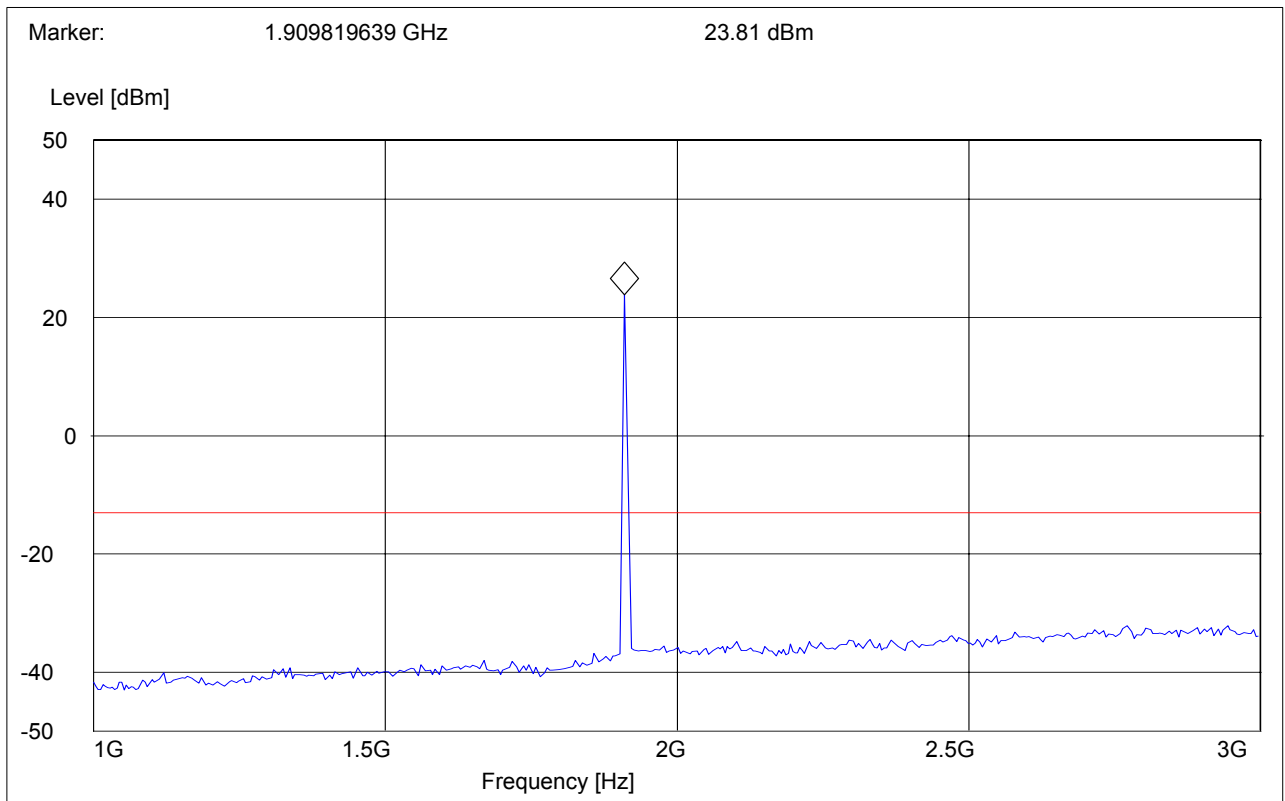
**SWEEP TABLE: "FCC 24Spuri 1-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH: 810, PCL: 5

Antenna: V

EUT: V

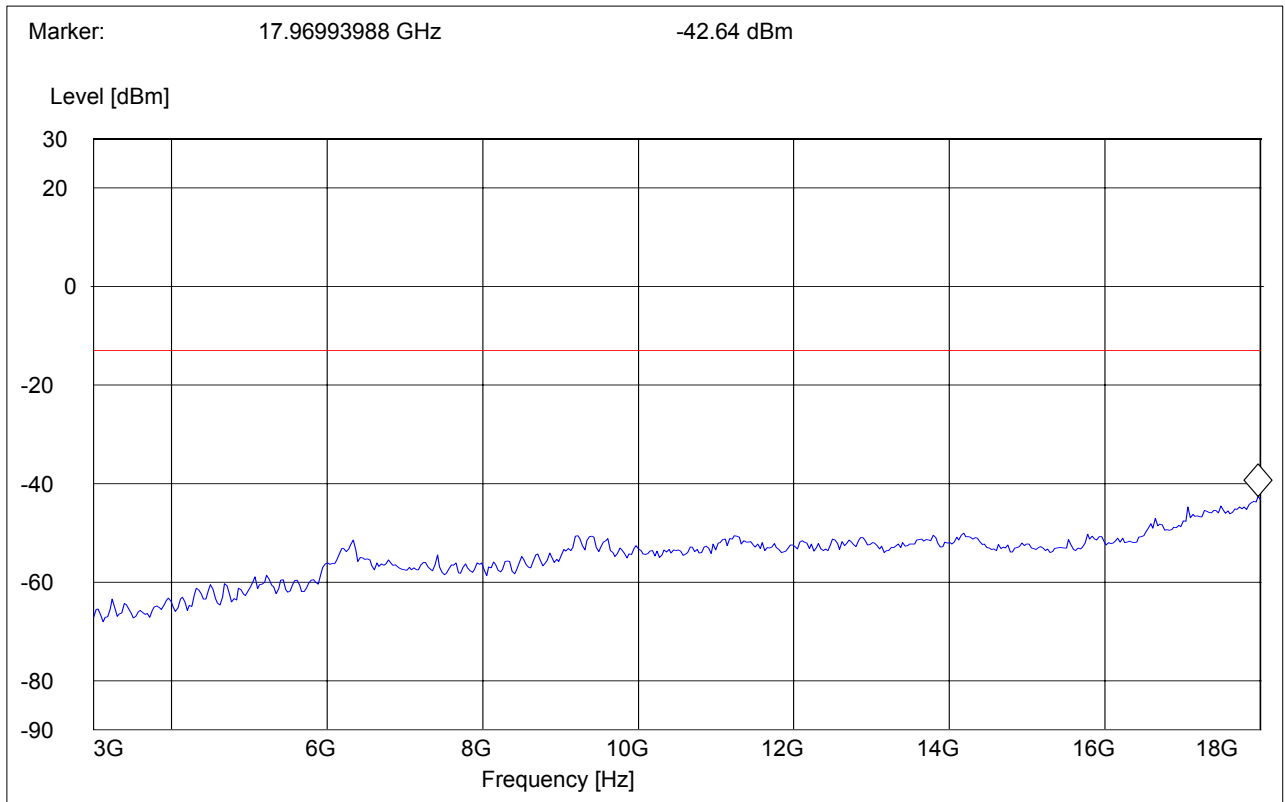
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, CH: 512, PCL: 5

Antenna: H

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

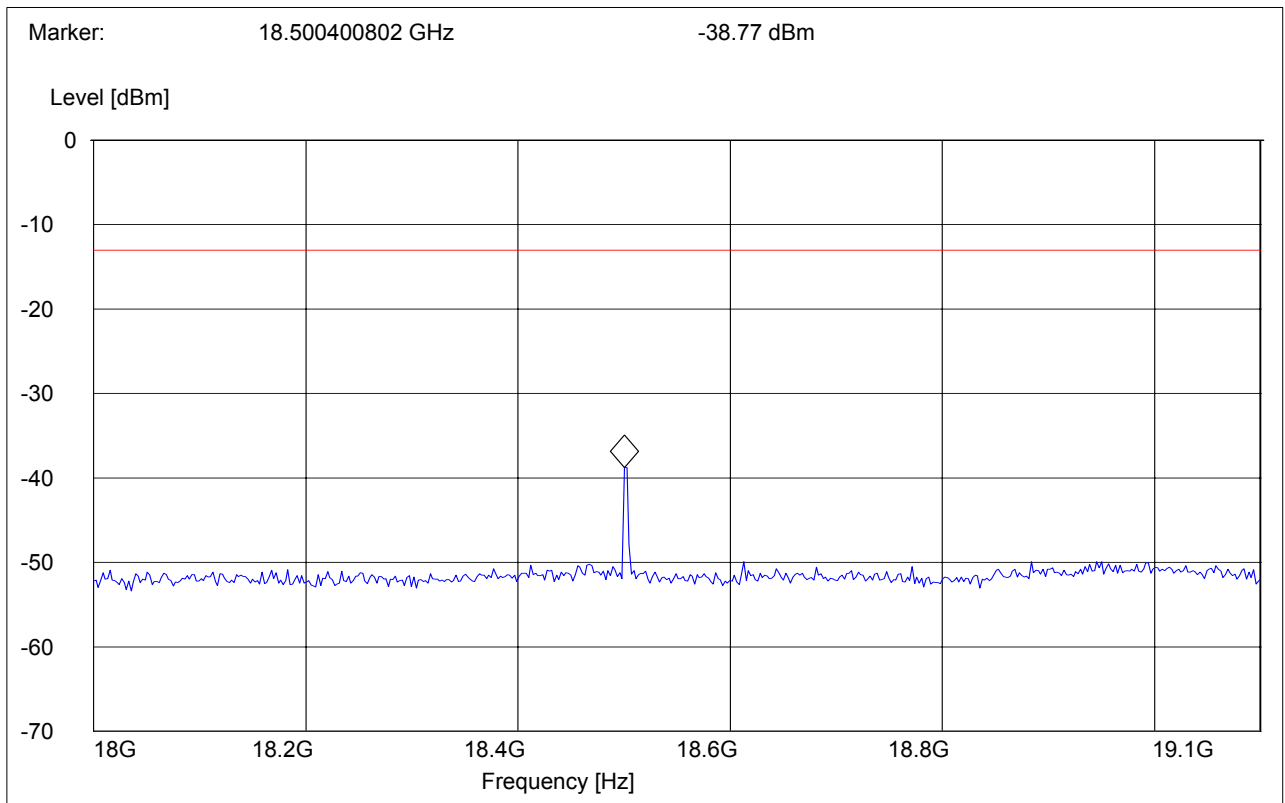
**SWEEP TABLE: "FCC 24spuri 18-19.1G"**

Short Description: FCC 24 18GHz-19.1GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

18.0 GHz 19.1 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**RADIATED SPURIOUS EMISSIONS (IDLE MODE)**

**EUT in Idle Mode: 30MHz – 1GHz**

Spurious emission limit -13dBm

**Antenna: vertical**

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, IDLE, PCL: 0

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

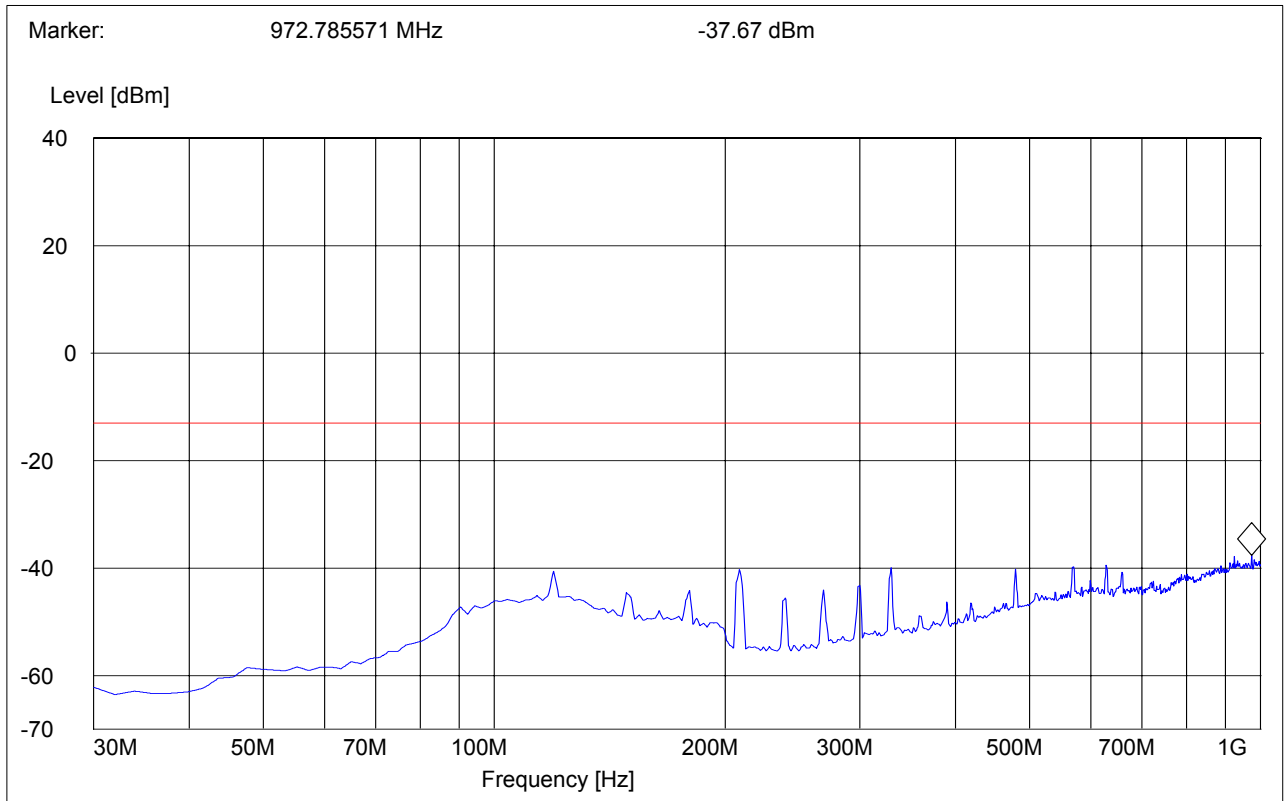
**SWEEP TABLE: "FCC 24 Spur 30M-1G\_V"**

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 (IDLE MODE)**

**EUT in Idle Mode: 1GHz – 3GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, IDLE, PCL: 0

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

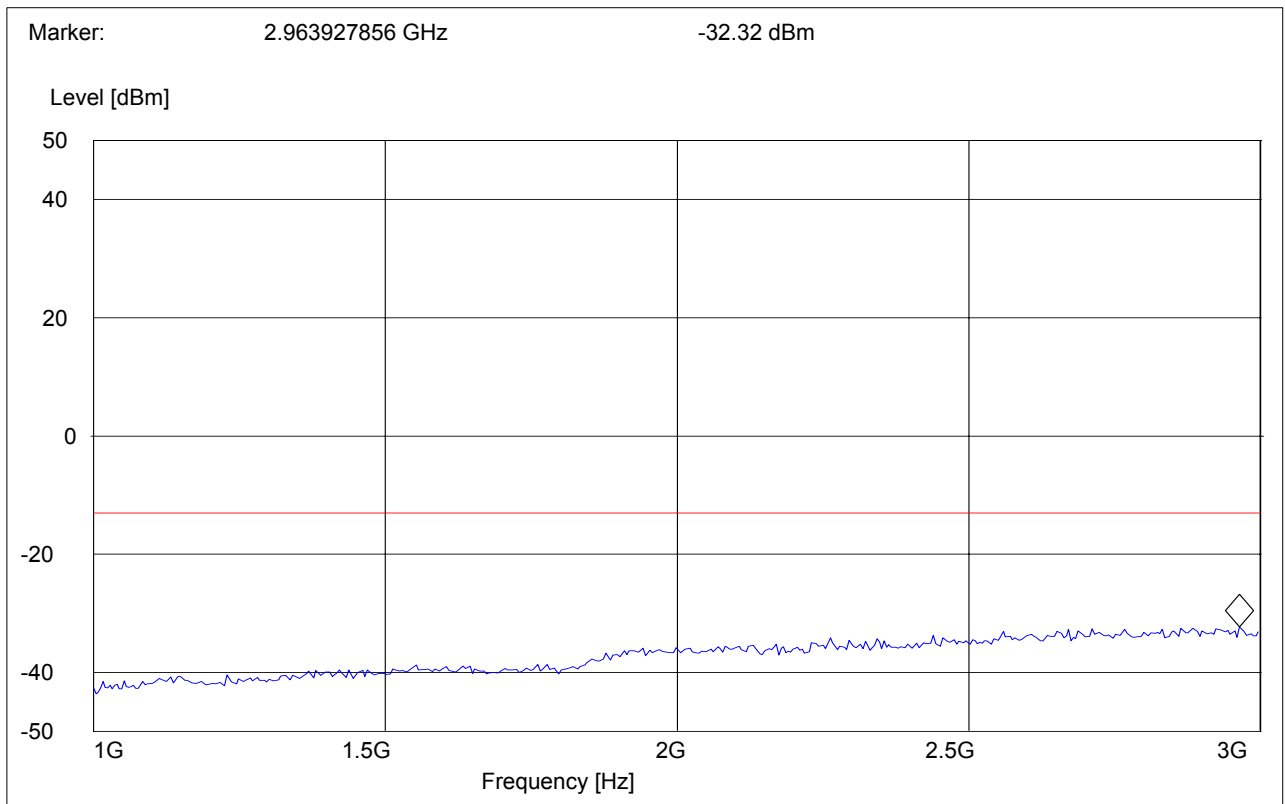
**SWEEP TABLE: "FCC 24Spuri 1-3G"**

Short Description: FCC 24 1GHz-8GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.0 GHz 3.0 GHz MaxPeak Coupled 1 MHz DUMMY-DBM





**RADIATED SPURIOUS EMISSIONS (IDLE MODE)**

**EUT in Idle Mode: 3GHz – 18GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, idle

Antenna: V

EUT: V

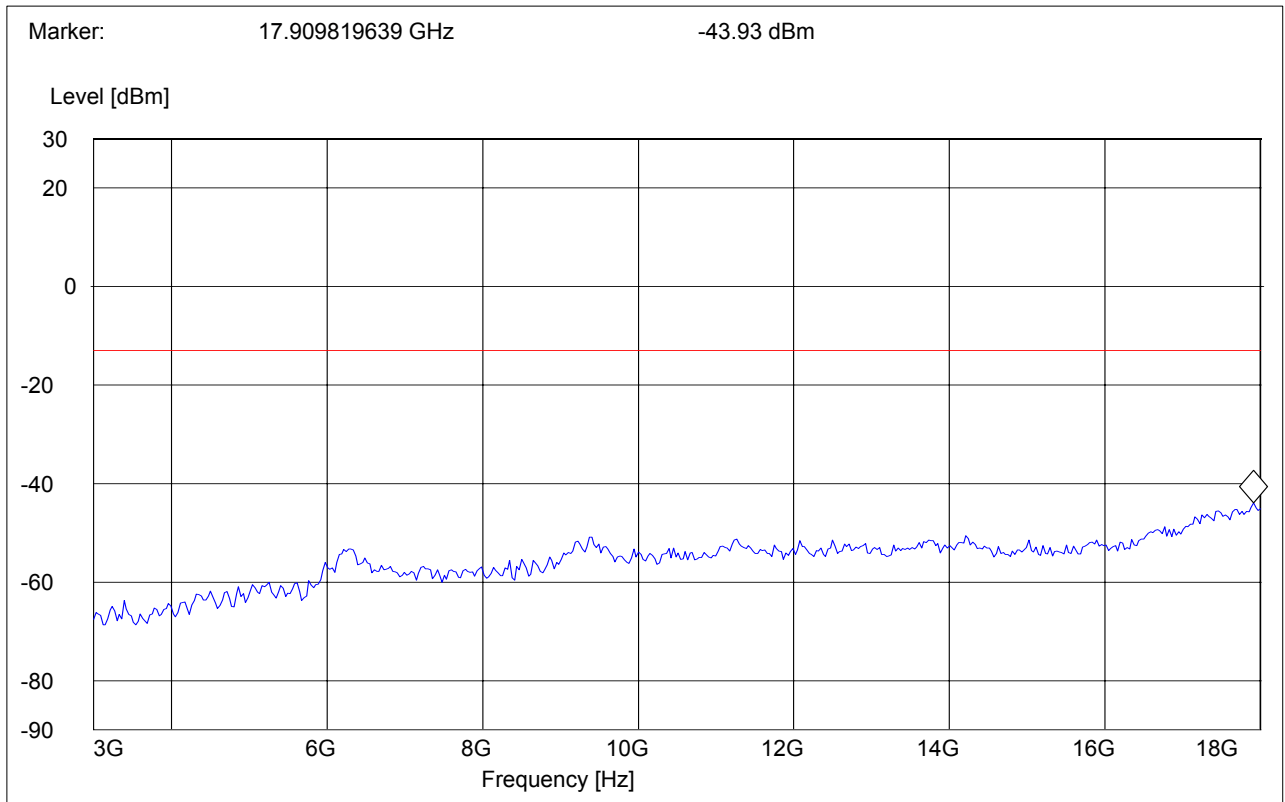
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

**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 (IDLE MODE)**

**EUT in Idle Mode: 18GHz – 19.1GHz**

Spurious emission limit -13dBm

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, idle

Antenna: H

EUT: V

Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

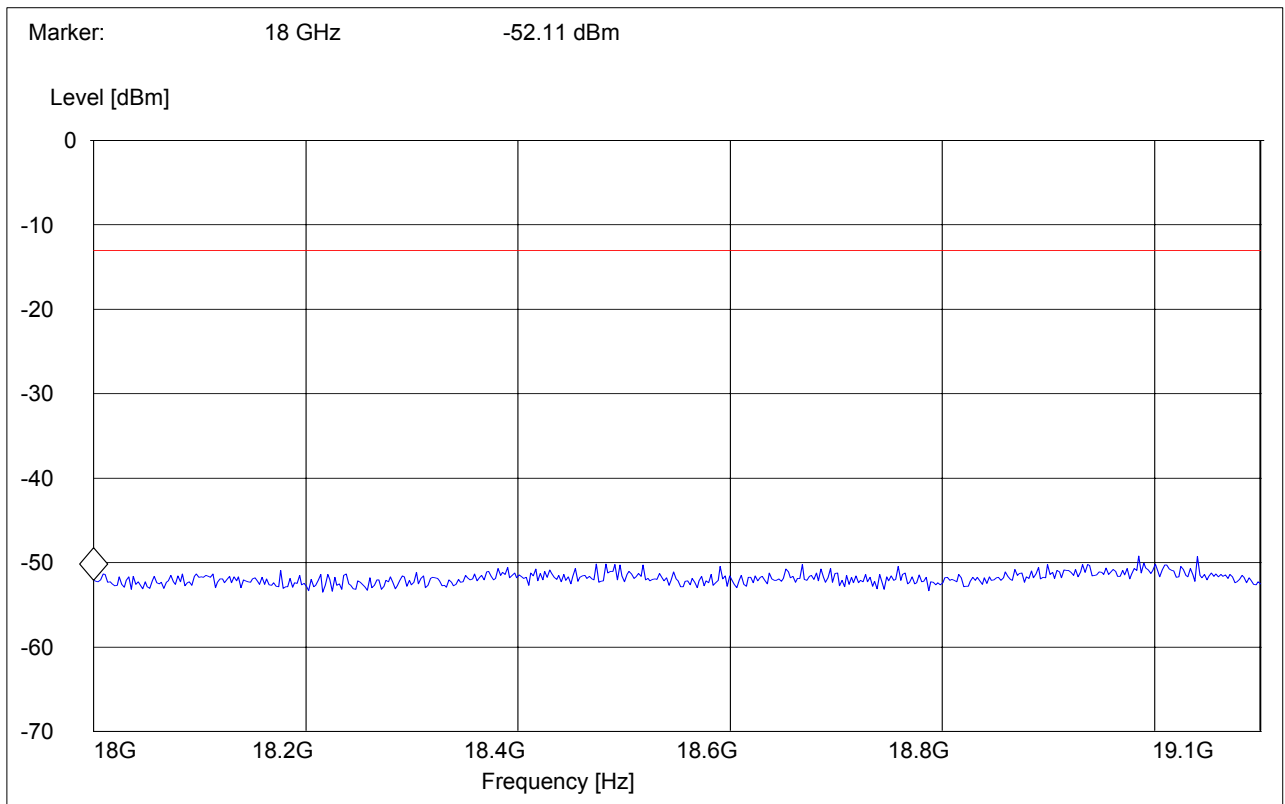
**SWEEP TABLE: "FCC 24spuri 18-19.1G"**

Short Description: FCC 24 18GHz-19.1GHz

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

18.0 GHz 19.1 GHz MaxPeak Coupled 1 MHz DUMMY-DBM



**5.5 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 ( $\mu\text{V}/\text{m}$ )	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



**5.5.1 Receiver Spurious on EUT**

**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 / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, idle

Antenna: V

EUT: V

Test operator: Willmes

Voltage: DC 5 V, dummy battery with external electronics

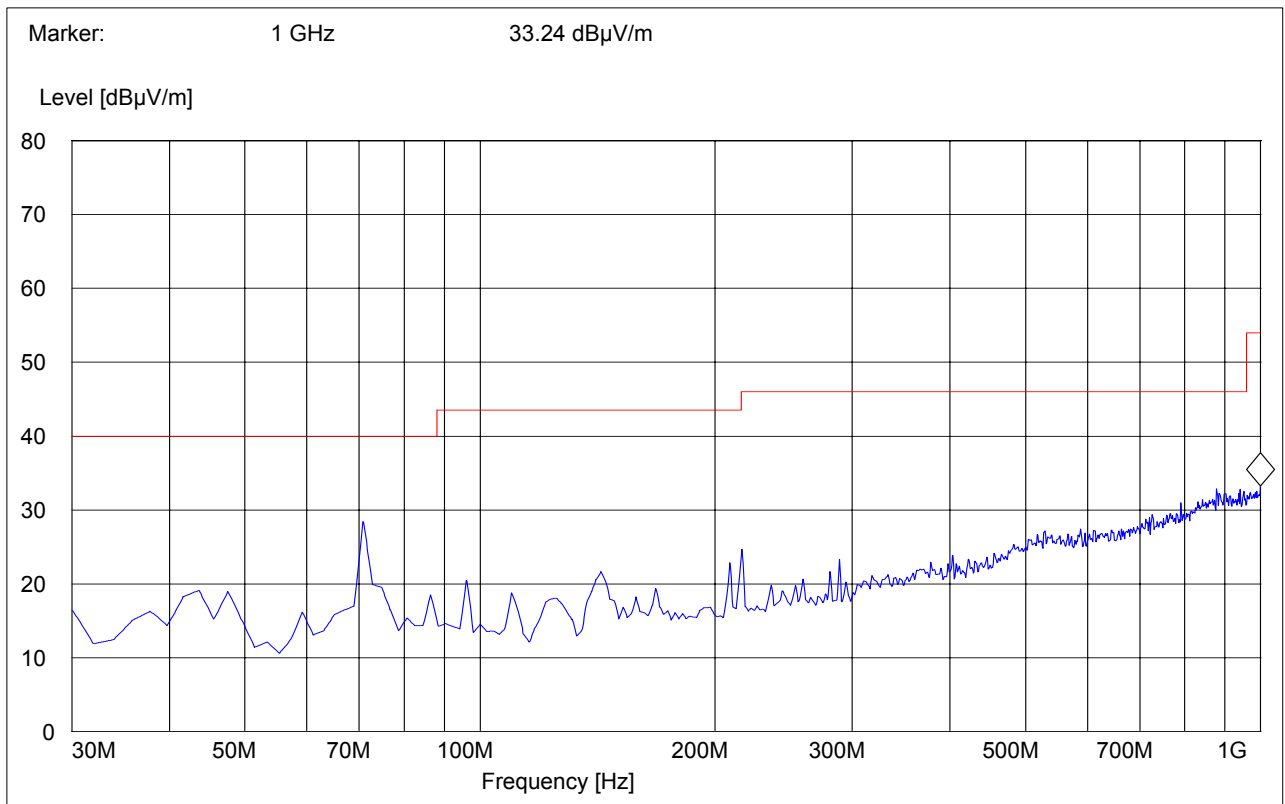
Sweep: FCC 24

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

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

30.0 MHz 1.0 GHz MaxPeak Coupled 100 kHz 3141-#1186\_Vert





**RECEIVER RADIATED EMISSIONS**  
**RECEIVER RADIATED EMISSIONS**  
**EUT in Idle Mode: 1GHz – 3GHz**  
**Note: Peak Reading Vs. Average Limit.**

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, idle

Antenna: V

EUT: V

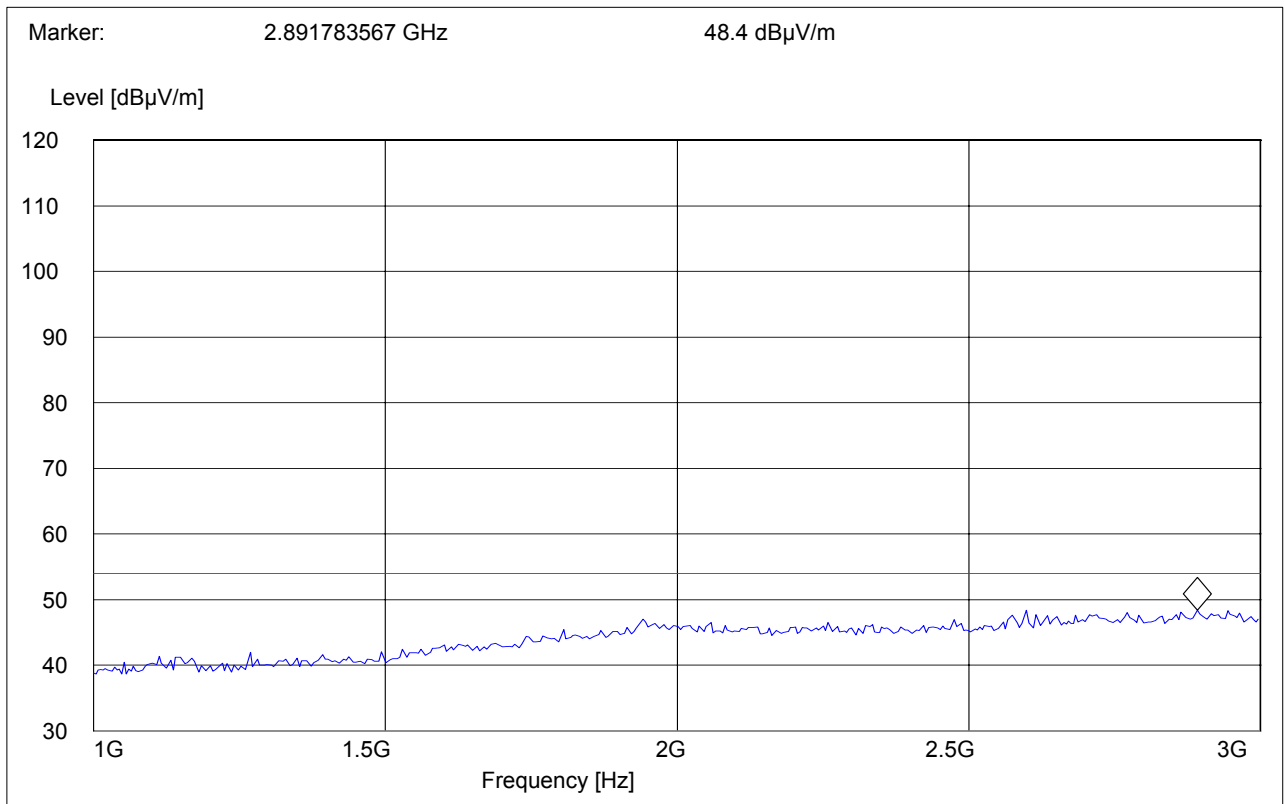
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

**SWEEP TABLE: "CANADA RE\_1-3G"**

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





**RECEIVER RADIATED EMISSIONS**

**EUT in Idle Mode: 3GHz – 18GHz**

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

**CETECOM Inc.**

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

EUT / Description: A31a

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, idle

Antenna: V

EUT: V

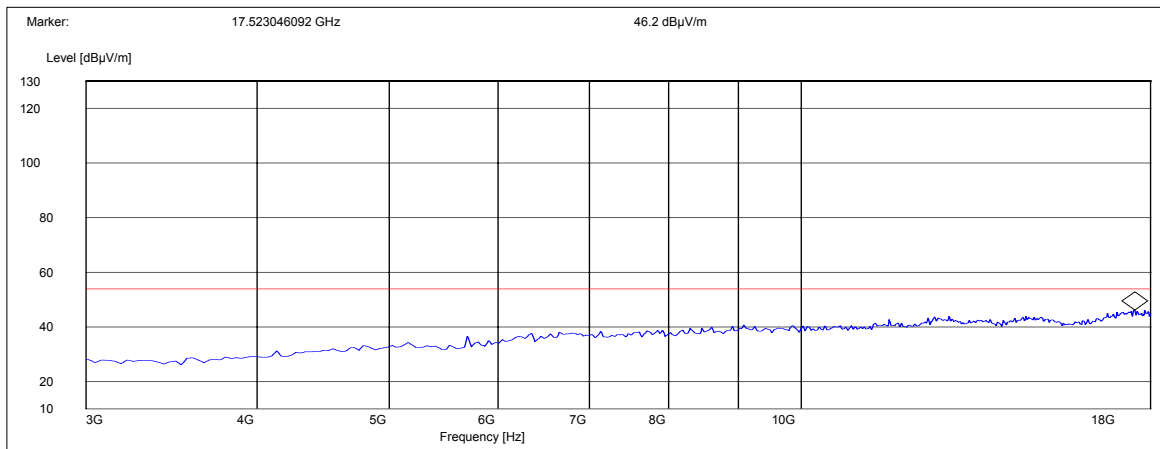
Test operator: Willmes

Voltage: DC 5 V

Sweep: FCC 24

**SWEEP TABLE: "CANADA RE\_3-18G"**

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





**RECEIVER RADIATED EMISSIONS**

**EUT in Idle Mode: 18GHz – 19.1GHz**

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

**CETECOM Inc.**

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

EUT / Description: TrimTrac-1.5 (04DQ00a) , C01, SN: 30129356

Customer: Trimble Navigation Ltd

Operating Mode: GSM 1900, idle

Antenna: V

EUT: V

Test operator: willmes

Voltage: DC 5 V

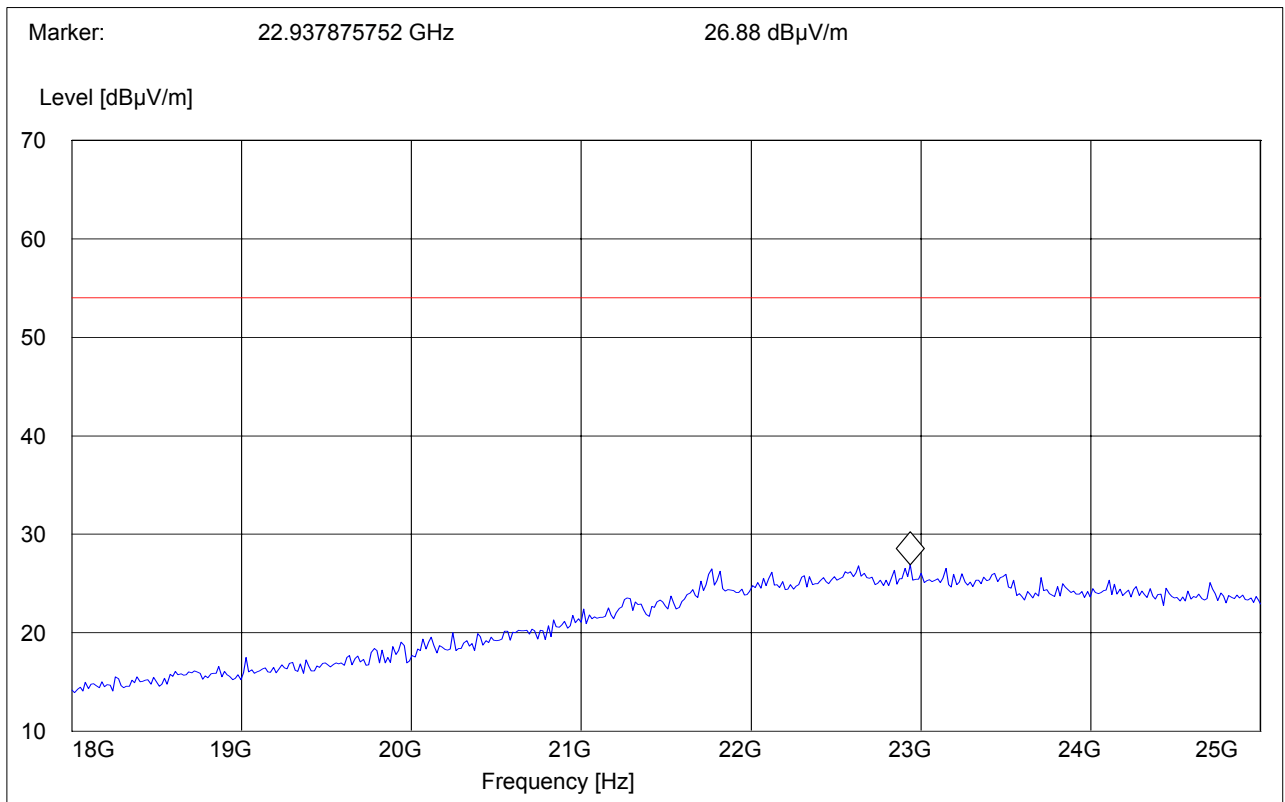
Sweep: FCC 24

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

Start	Stop	Detector	Meas.	IF	Transducer
18.0 GHz	26.0 GHz	MaxPeak	Coupled	1 MHz	#572 horn AF

Frequency Frequency Time Bandw.

18.0 GHz 26.0 GHz MaxPeak Coupled 1 MHz #572 horn AF





## 5.6 Frequency Stability

### 5.6.1 Limit

#### **For Hand carried battery powered equipment:**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.6VDC and 4.5VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -2.7% and +21.62%. For the purposes of measuring frequency stability these voltage limits are to be used.

#### **Method of Measurement:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU 200 UNIVERSAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30 C.
3. With the EUT, powered via nominal voltage, connected to the CMU 200 and in a simulated call on mid channel (190 for GSM 850 & 661 for PCS-1900), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10 C increments from -30 C to +50 C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1V increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50 C.
7. With the EUT, powered via nominal voltage, connected to the CMU 200 and in a simulated call on mid channel (190 for GSM 850 & 661 for PCS-1900), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50 C to -30 C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

#### **For equipment powered by primary supply voltage:**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

For this EUT section 2.1055(d)(1) applies. This requires to vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

### 5.6.2 FREQUENCY STABILITY (GSM-850)

AFC FREQ ERROR vs. VOLTAGE (Channel 190 / 836.6 MHz)

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
10.2	7	0.008
13.8	7	0.008

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	7	0.008
-20	7	0.008
-10	5	0.006
0	5	0.006
+10	5	0.006
+20	7	0.008
+30	10	0.012
+40	12	0.014
+50	12	0.014

### 5.6.3 FREQUENCY STABILITY (PCS-1900)

AFC FREQ ERROR vs. VOLTAGE ( Channel 661 / 1880 MHz)

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
10.2	7	0.004
13.8	7	0.004

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	7	0.004
-20	7	0.004
-10	5	0.003
0	5	0.003
+10	7	0.004
+20	7	0.004
+30	10	0.005
+40	12	0.006
+50	12	0.006

## 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 2006	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2006	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2006	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2006	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2006	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2006	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2006	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2006	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 2006	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2006	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2006	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2006	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2006	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.

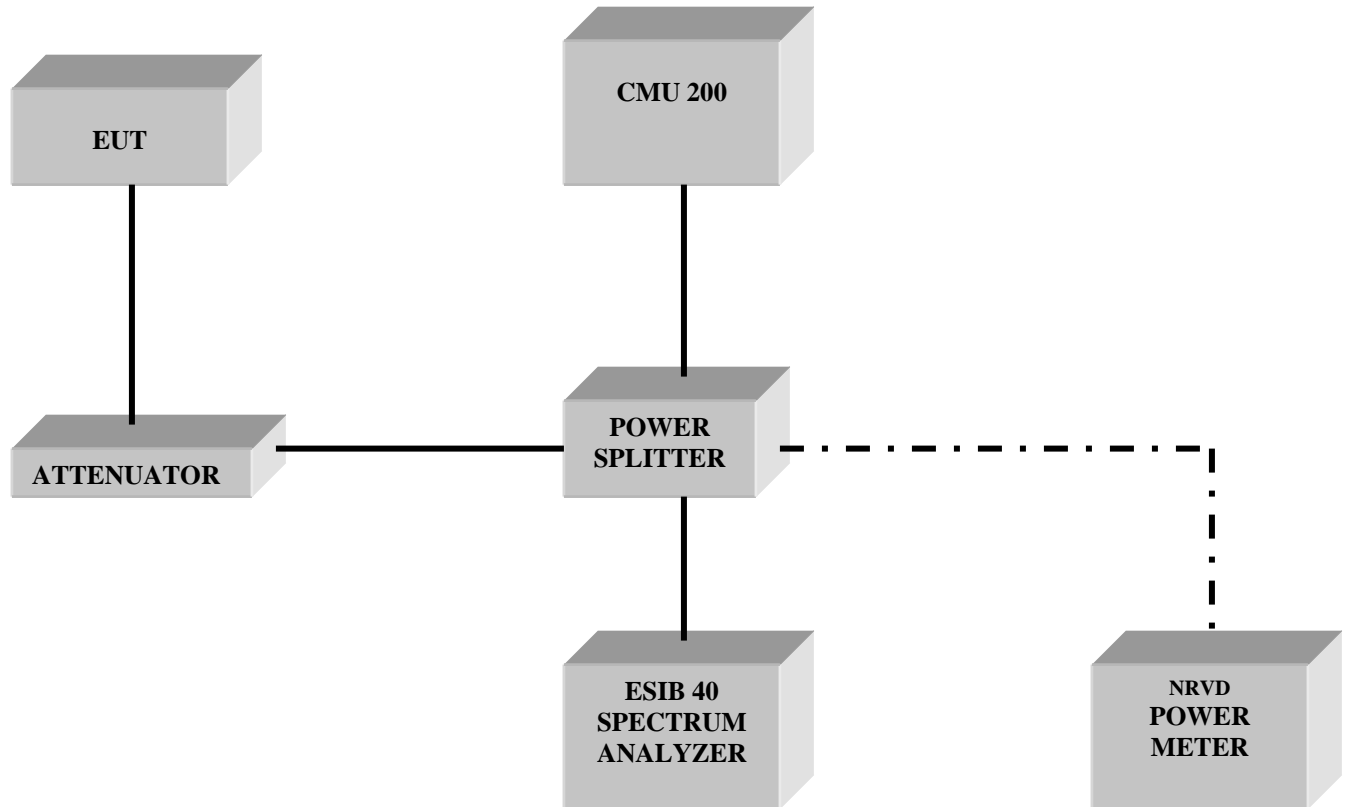
FCC Report and order 02-229 September 24, 2002.

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

### Conducted Testing



### Radiated Testing

#### ANECHOIC CHAMBER

