FCC Test Report

FCC Part 22, 24

for

Sage Co., Ltd.

Telemeter system for automobile with Quad-band module – Motorola G24 E

Model Number: H913E

FCC ID: VRBH913E

IC-ID: NA

TEST REPORT #:EMC_CET10_010_07503_FCC22-24 .
DATE: November 01, 2007

ilac-MRA A2LA ACCREDITED Certificate # 2135.01

Bluetooth™ **Bluetooth Qualification Test Facility (BQTF)**

CTIA Authorized Test Lab LAB CODE 20020328-00

FCC listed
A2LA accredited

IC recognized # 3462B

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Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

Table of Contents

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 #
Sage Co., Ltd.	**Telemeter system for automobile with Quad-band module – Motorola G24 E**	**H913E**

Technical responsibility for area of testing:

November 01, 2007	**EMC & Radio**	**Juan Martinez (EMC Project Engineer)**	Juan Martinez I am approving this document
Date	**Section**	**Name**	**Signature**

Project Leader:

November 01, 2007	**EMC & Radio**	**Val Tankov (EMC Project Engineer)**	Ivaylo Tankov I am the author of this document
Date	**Section**	**Name**	**Signature**

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the SAR Assessment 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

2.2 Identification of the Client

Applicant's Name:	Sage Co., Ltd.
Address:	7F Bentendori Naka-ku 4-59 Yokohama city / 231-0007, Japan
Contact Person:	Masaki Mori
Phone No.	+81-45-650-6840
Fax:	+81-45-650-6841
e-mail:	m-mori@jsage.co.jp

2.3 Identification of the Manufacturer

Manufacturer's Name:	Sage Co., Ltd.
Manufacturer's Address:	7F Bentendori Naka-ku4-59,Yokohama city/231 0007 Japan

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Product Type	**Telemeter system for automobile with Quad-band module – Motorola G24 E**
Marketing Name:	H913E
Model No:	H913E
Hardware Revision :	**1.0**
Software Revision :	**1.0**
FCC-ID:	VRBH913E
IC-ID :	NA
Frequency Range:	824.2MHz – 848.8MHz for GSM850
Number of Channels	**124 for GSM-850; 299 for PCS-1900**
Type(s) of Modulation:	GMSK, 8PSK
Antenna Type:	Patch Antenna
Output Power:	**ERP 30.24dBm (1.056W) @ 848.8MHz** **EIRP 28.26dBm (0.669 W) @1880MHz**

3.2 Identification of Accessory equipment

AE #	TYPE	MANUFACTURE	MODEL	SERIAL #
1	Car Battery	EXIDETech.	720	NA

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 objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations. The maximization of portable equipment is conducted in accordance with ANSI C63.4.

4 Measurements

4.1 RF Power Output

4.1.1 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.

4.1.2 Limits:

4.1.2.1 FCC 22.913 (a) Effective radiated power limits.

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

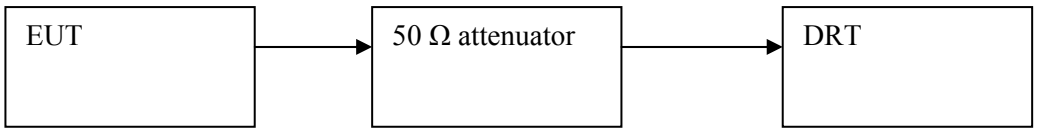
4.1.2.2 FCC 24.232 (b)(c) Power limits.

(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.

4.1.3 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.

4.1.4 Results 850 MHz band (conducted):

Frequency (MHz)	Conducted Output Power (dBm)	
	GSM/GPRS	EDGE
824.2	Please refer to Test Report: MOTRAD_FCC.16719 _rev1	Please refer to Test Report: MOTRAD_FCC.17052 _rev1
836.6		
848.8		

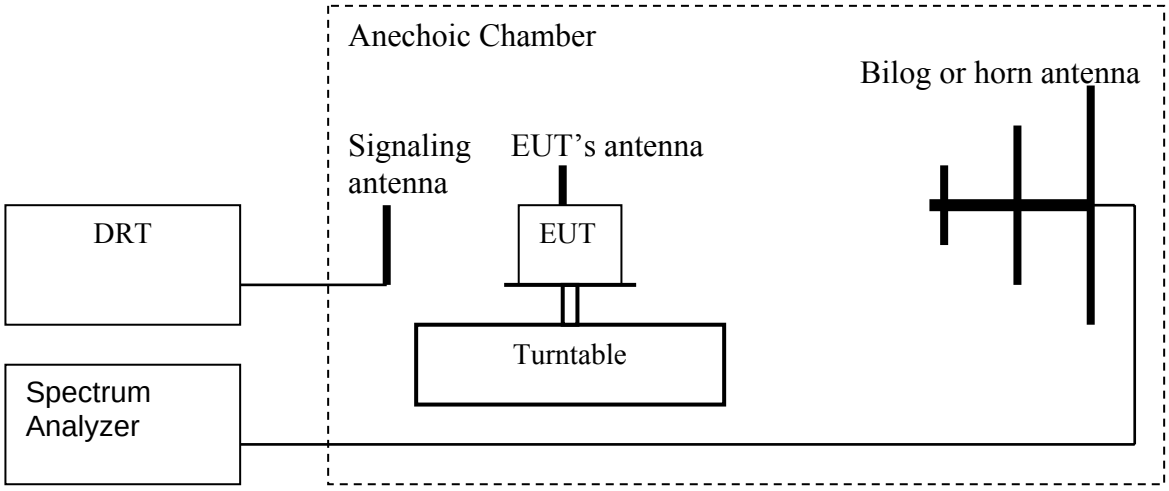
4.1.5 Results 1900 MHz band (conducted):

Frequency (MHz)	Conducted Output Power (dBm)	
	GSM/GPRS	EDGE
1850.2	Please refer to Test Report: MOTRAD_FCC.16719 _rev1	Please refer to Test Report: MOTRAD_FCC.17052 _rev1
1880.0		
1909.8		

4.1.6 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.)

4.1.7 ERP Results 850 MHz band:

Power Control Level	Burst Peak ERP
5	≤38.45dBm (7W)

Frequency (MHz)	Effective Radiated Power (dBm)	
	GPRS	EDGE
824.2	29.43	29.27
836.6	29.11	28.89
848.8	30.24	30.22

Note 1: The results are taken from the OTA measurements for the device. Measurements were obtained in EIRP and converted EIRP to ERP by subtracting 2.14dB from EIRP.

4.1.8 EIRP Results 1900 MHz band:

Power Control Level	Burst Peak EIRP
0	≤33dBm (2W)

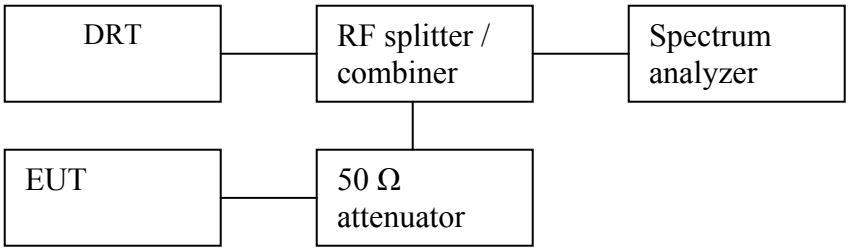
Frequency (MHz)	Effective Isotropic Radiated Power (dBm)	
	GPRS	EDGE
1850.2	25.79	22.71
1880.0	28.26	24.14
1909.8	27.06	23.32

4.2 Occupied Bandwidth/Emission Bandwidth

4.2.1 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.

4.2.2 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.

4.2.3 Occupied / Emission bandwidth results 850 MHz band:

Frequency (MHz)	Occupied B/W -20 dB (KHz)	Emission B/W -26 dB (KHz)
	GPRS	GPRS
824.2	Please refer to Test Report: MOTRAD_FCC.16719_rev1	Please refer to Test Report: MOTRAD_FCC.16719_rev1
836.6		
848.8		

4.2.4 Occupied / Emission bandwidth results 1900 MHz band:

Frequency (MHz)	Occupied B/W -20 dB (KHz)	Emission B/W -26 dB (KHz)
	GPRS	GPRS
1850.2	Please refer to Test Report: MOTRAD_FCC.16719_rev1	Please refer to Test Report: MOTRAD_FCC.16719_rev1
1880.0		
1909.8		

4.3 Frequency Stability

4.3.1 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 3.2VDC 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 & 4183 for FDD5 & 661 for PCS-1900&9400 for FDD2), 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 0.1Volt 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 & 4183 for FDD5 & 661 for PCS-1900&9400 for FDD2), 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.

4.3.2 FREQUENCY STABILITY (GSM-850)

Channel No. : 190 at 836.6 MHz

§2.1055 AFC FREQ ERROR VS. VOLTAGE

NOTE: Freq. Error (ppm) = Freq. Error (Hz) / 836.6

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

FREQUENCY STABILITY (PCS-1900)

Channel No. : 661 at 1880 MHz

§2.1055 / §24.235 AFC FREQ ERROR vs. VOLTAGE

NOTE: Freq. Error (ppm) = Freq. Error (Hz) / 1880

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

4.4 Spurious Emissions Conducted

4.4.1 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.

4.4.2 Limits:

4.4.2.1 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.

4.4.2.2 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.

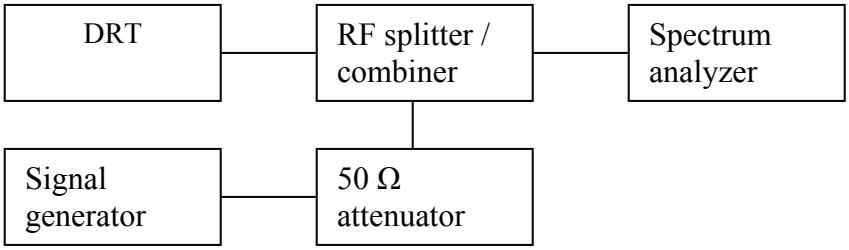
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution

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.

4.4.3 Conducted out of band emissions measurement procedure:

Based on TIA-603C 2004

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.)

4.4.4 Band Edge Results GSM-850

GSM-850 Lower Band Edge
CHANNEL 128

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

GSM-850 Higher Band Edge
CHANNEL 251

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

4.4.5 Conducted Spurious Results GSM-850

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

4.4.6 Band Edge Results PCS-1900

PCS-1900 Lower Band Edge
CHANNEL 512

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

PCS-1900 Higher Band Edge
CHANNEL 810

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

4.4.7 Conducted Spurious Results PCS-1900

Please refer to Test Report: MOTRAD_FCC.16719_rev1 and MOTRAD_FCC.17052_rev1

4.5 Transmitter Spurious Emissions Radiated

4.5.1 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.

4.5.2 Limits:

4.5.2.1 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.

4.5.2.2 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.

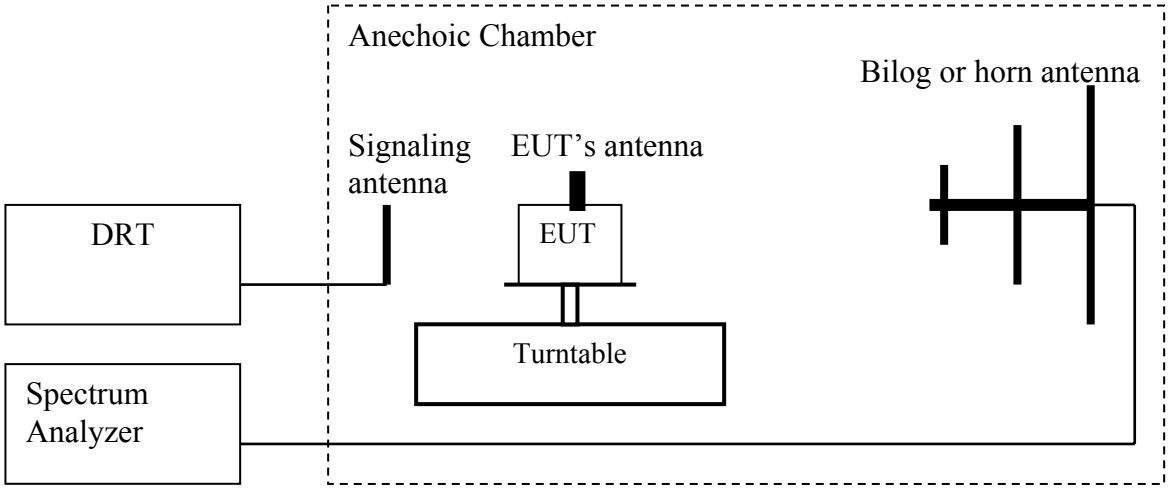
(b) Measurement procedure. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the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

4.5.3 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.

4.5.4 Radiated out of band emissions results on EUT:

4.5.4.1 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						

4.5.4.2 RADIATED SPURIOUS EMISSIONS (GSM-850)

TX: 30MHz - 1GHz

Spurious emission limit –13dBm

Note:

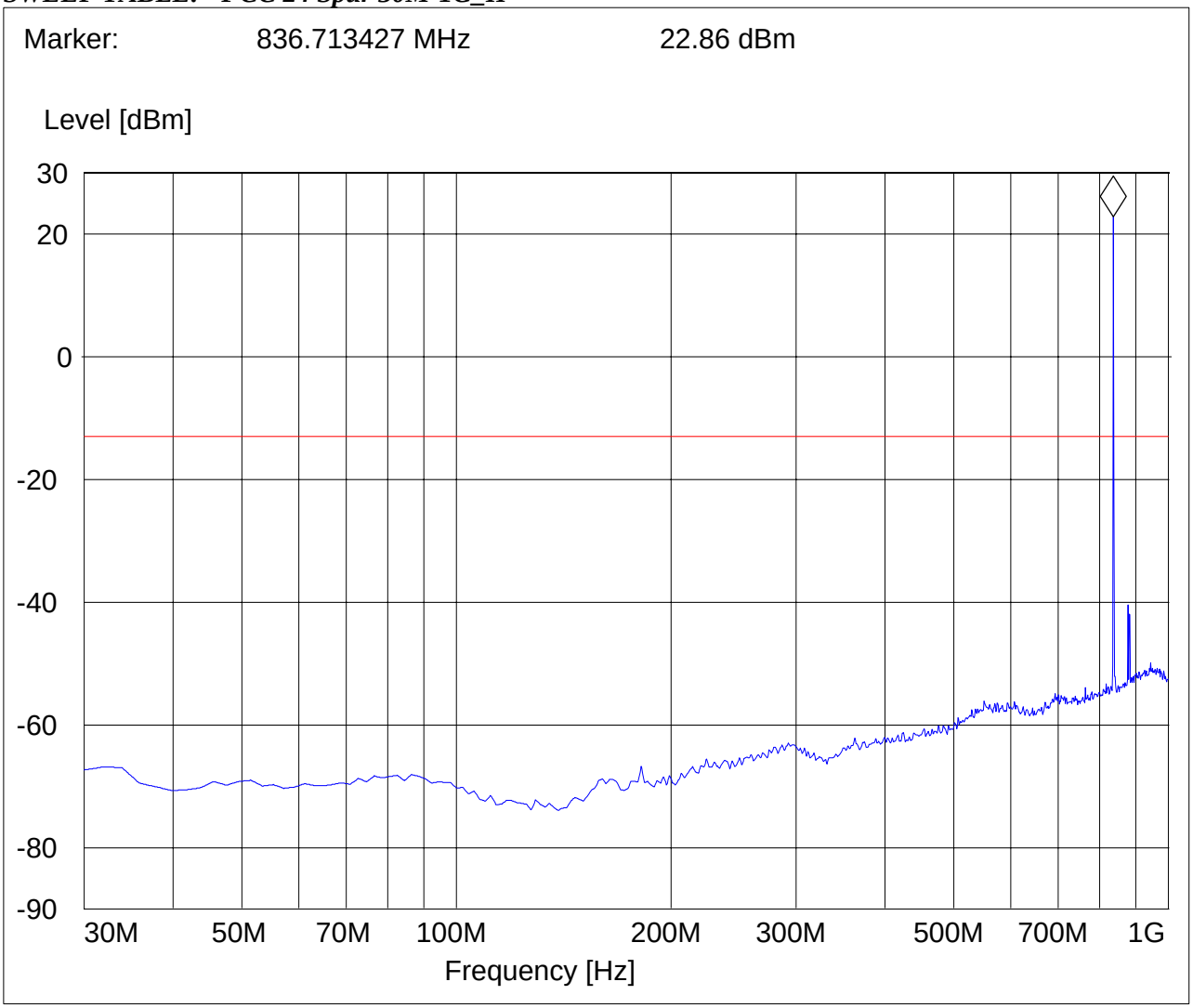
1.The peak above the limit line is the carrier freq.

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

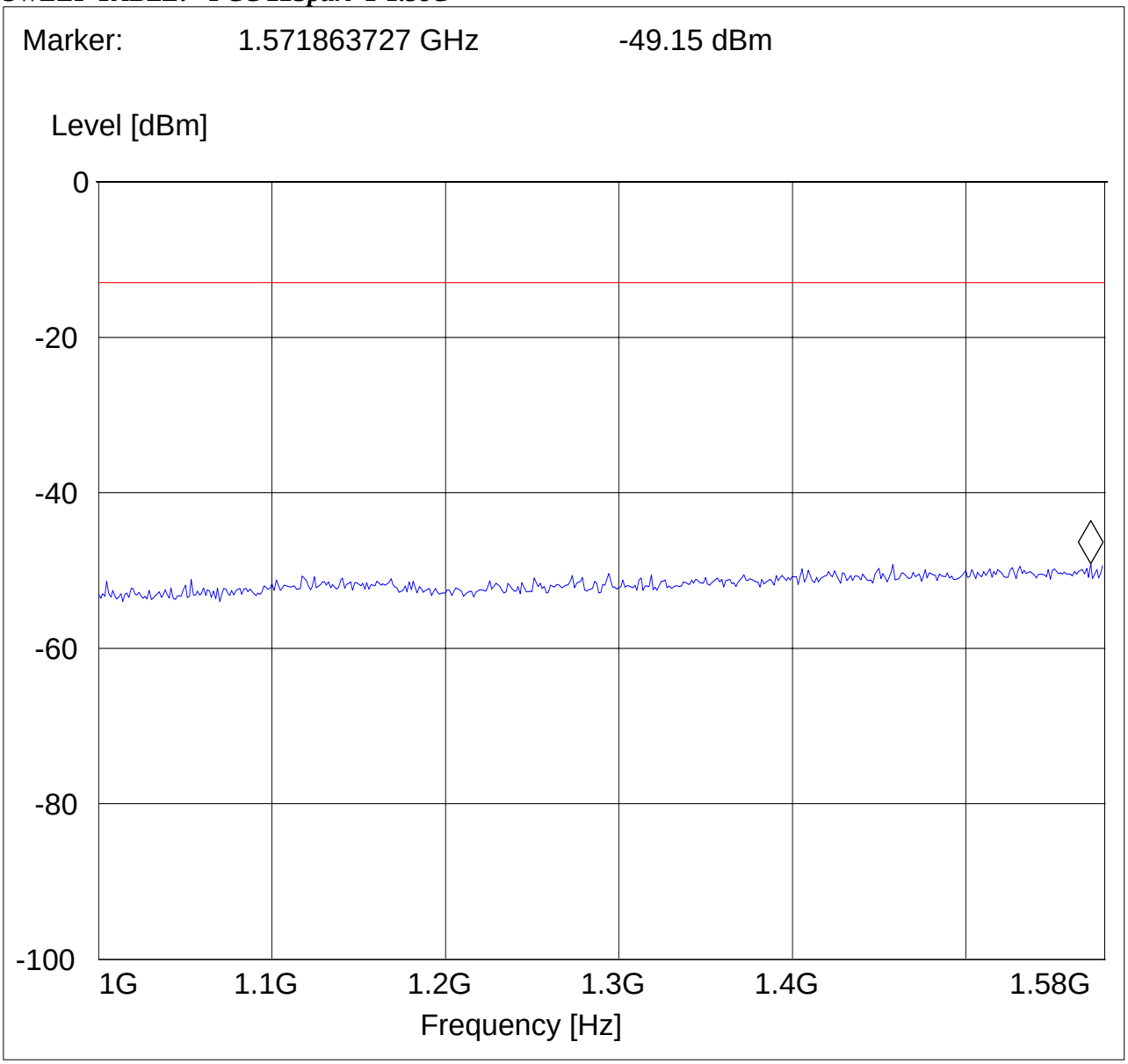
411 Dixon Landing Road, Milpitas CA 95035, USA

EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH190
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
Comments: Marker placed on uplink

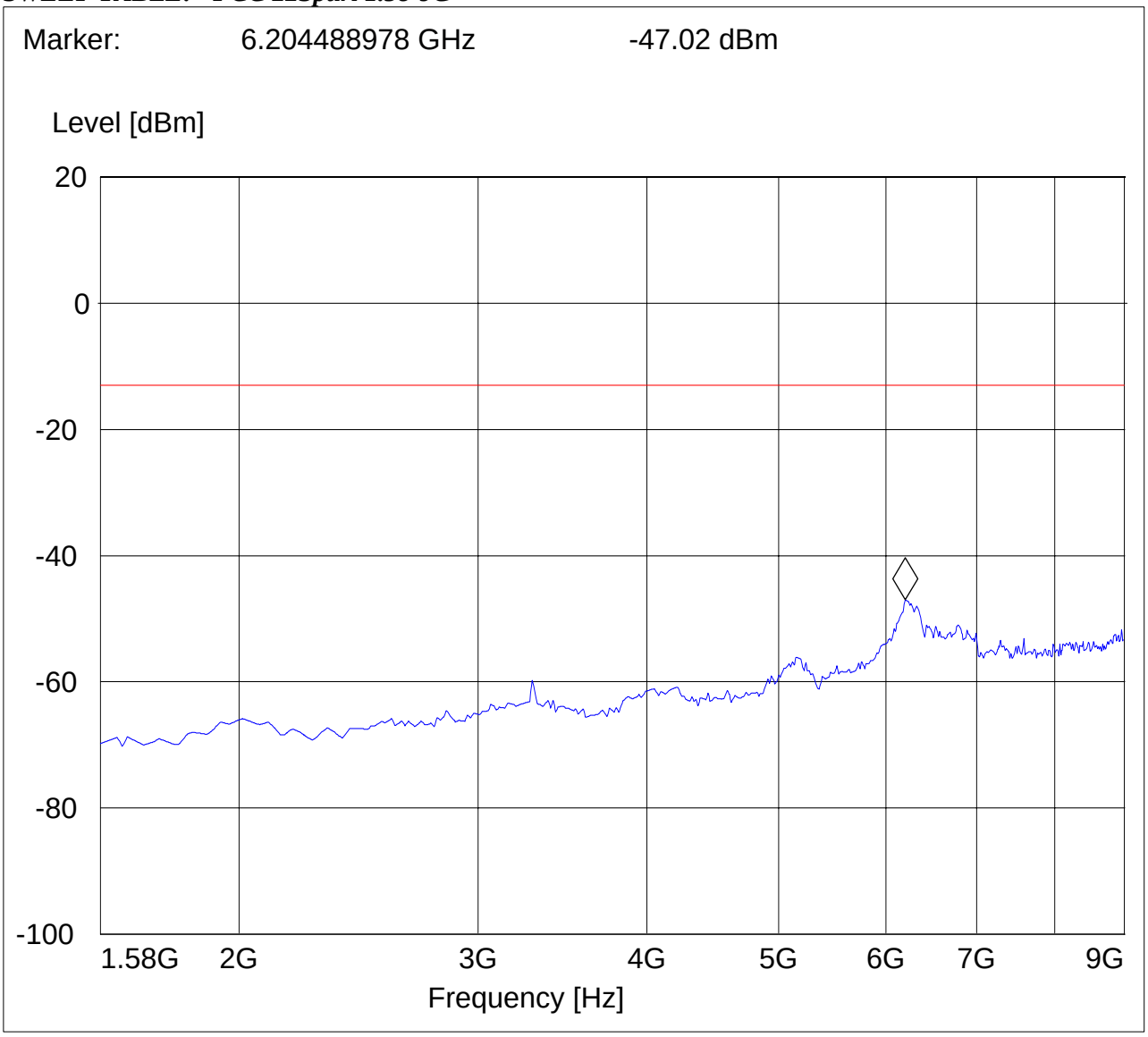
SWEEP TABLE: "FCC 24 Spur 30M-1G_H"



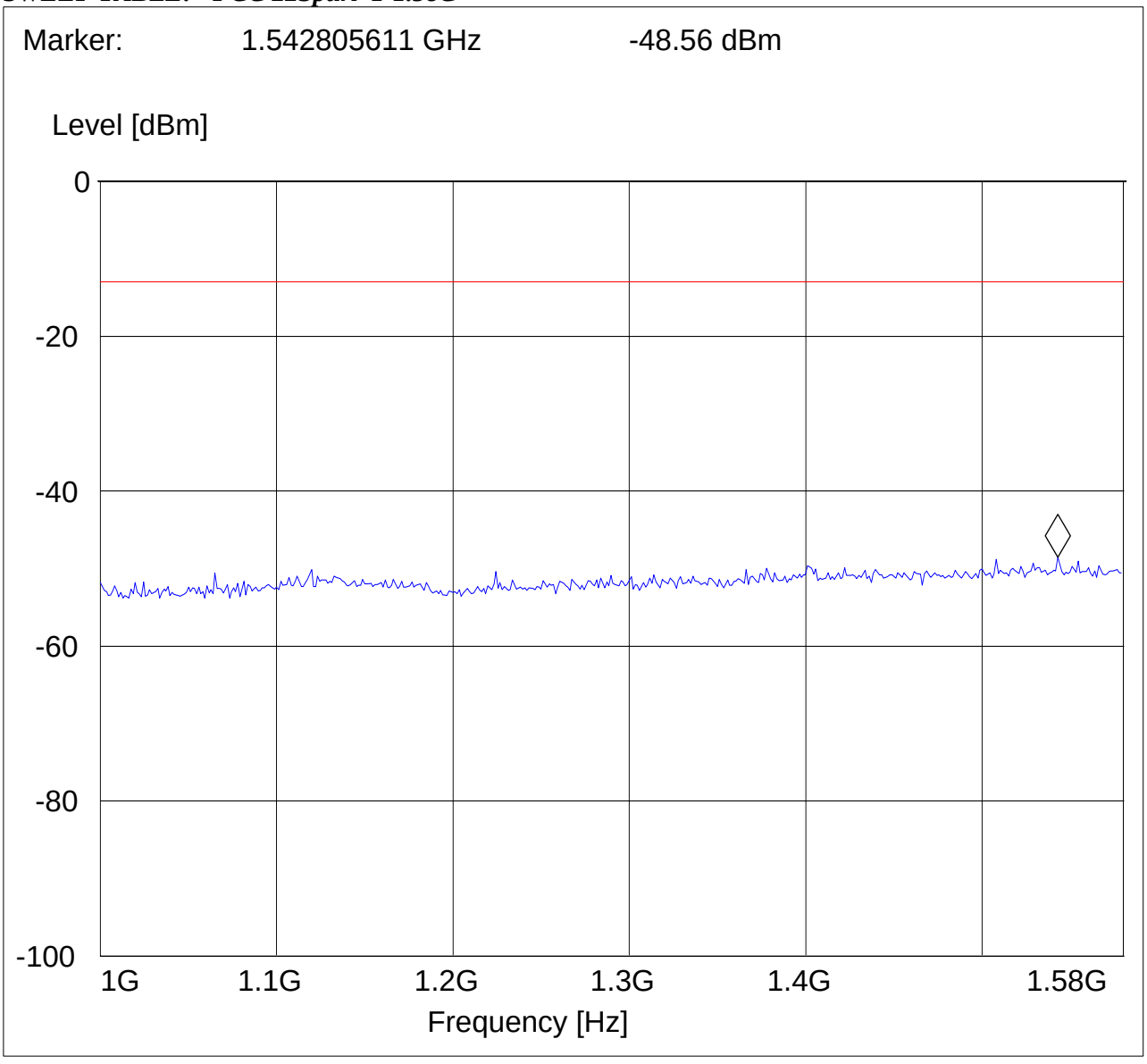
RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 824.2MHz: 1GHz – 1.58GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850 CH.128
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 22Spuri 1-1.58G"



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 824.2MHz: 1.58GHz – 9GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850 CH.128
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 22Spuri 1.58-9G"



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 836.6MHz: 1GHz – 1.58GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH190
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 22Spuri 1-1.58G"

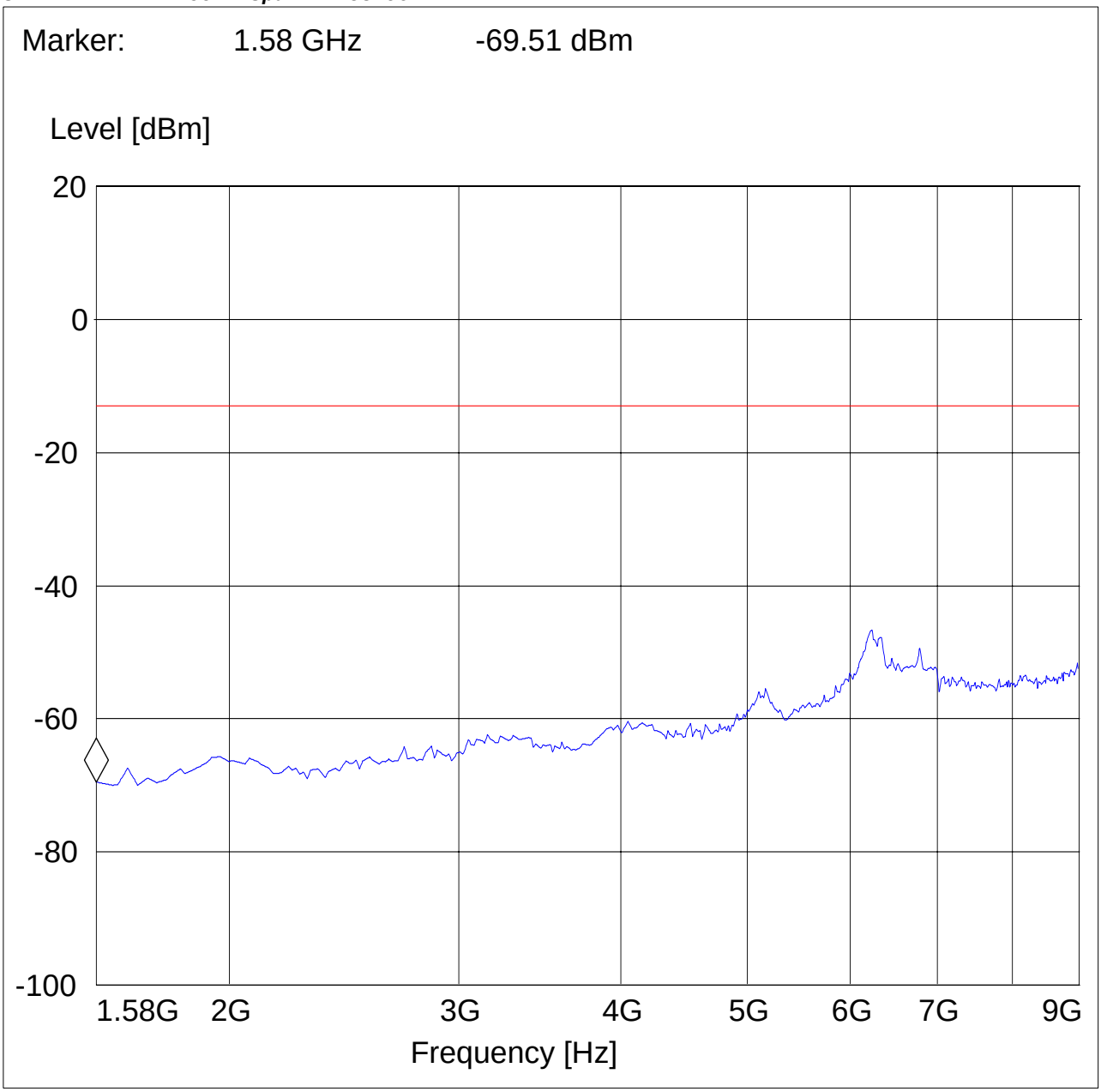


RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 836.6MHz: 1.58GHz – 9GHz
Spurious emission limit –13dBm

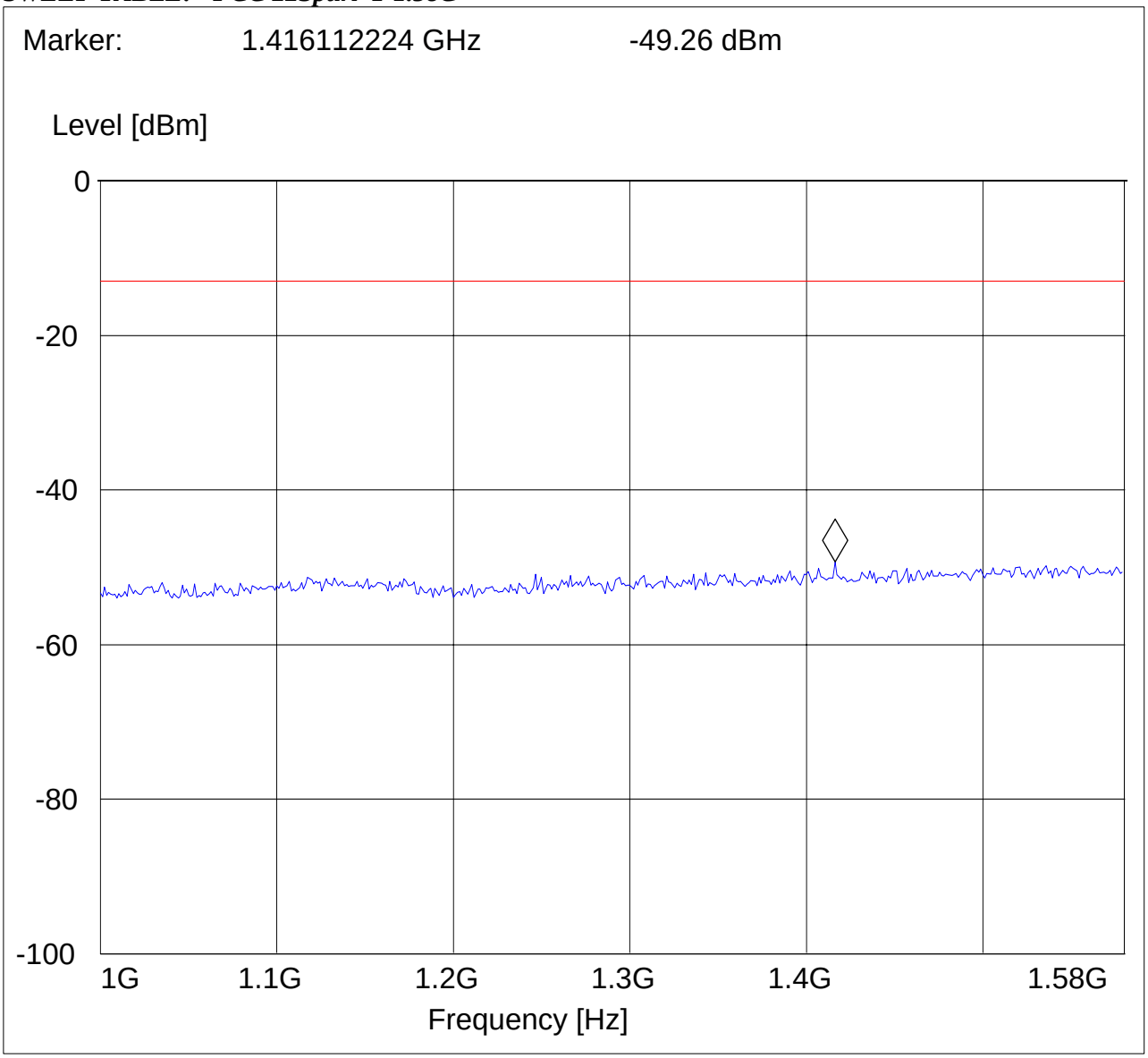
411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              04FG10b
Customer:         DOCOMO
Test Mode:        GSM850 CH.190
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          DC CAR BATTERY 12v
```

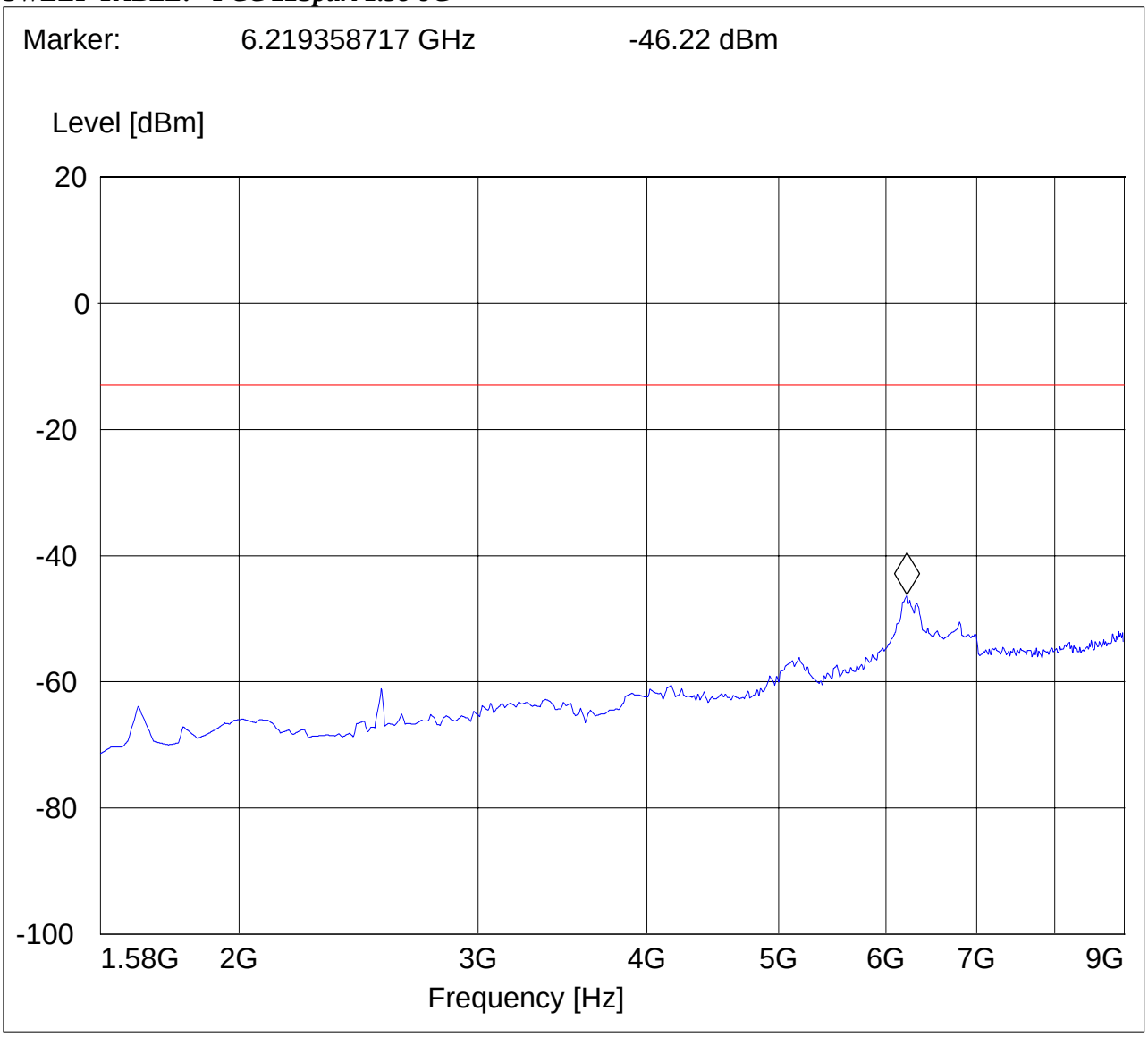
SWEEP TABLE: "FCC 22Spuri 1.58-9G"



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 848.8MHz: 1GHz – 1.58GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH251
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 22Spuri 1-1.58G"



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 848.8MHz: 1.58GHz – 9GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH251
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 22Spuri 1.58-9G"

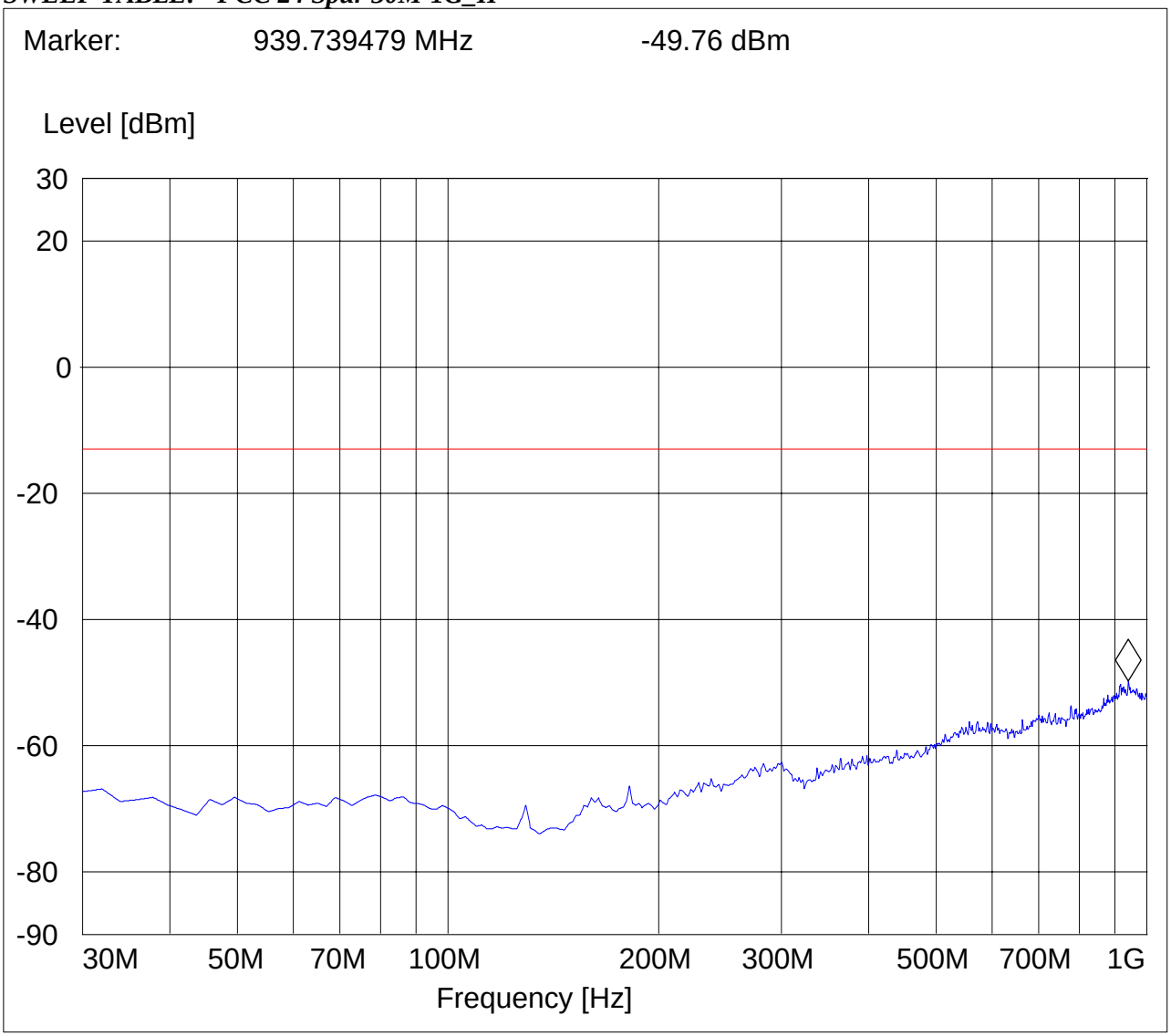


4.5.4.3 RESULTS OF RADIATED TESTS PCS-1900:

Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
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						

4.5.4.4 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)
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM1900 CH.661
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 24 Spur 30M-1G_H"

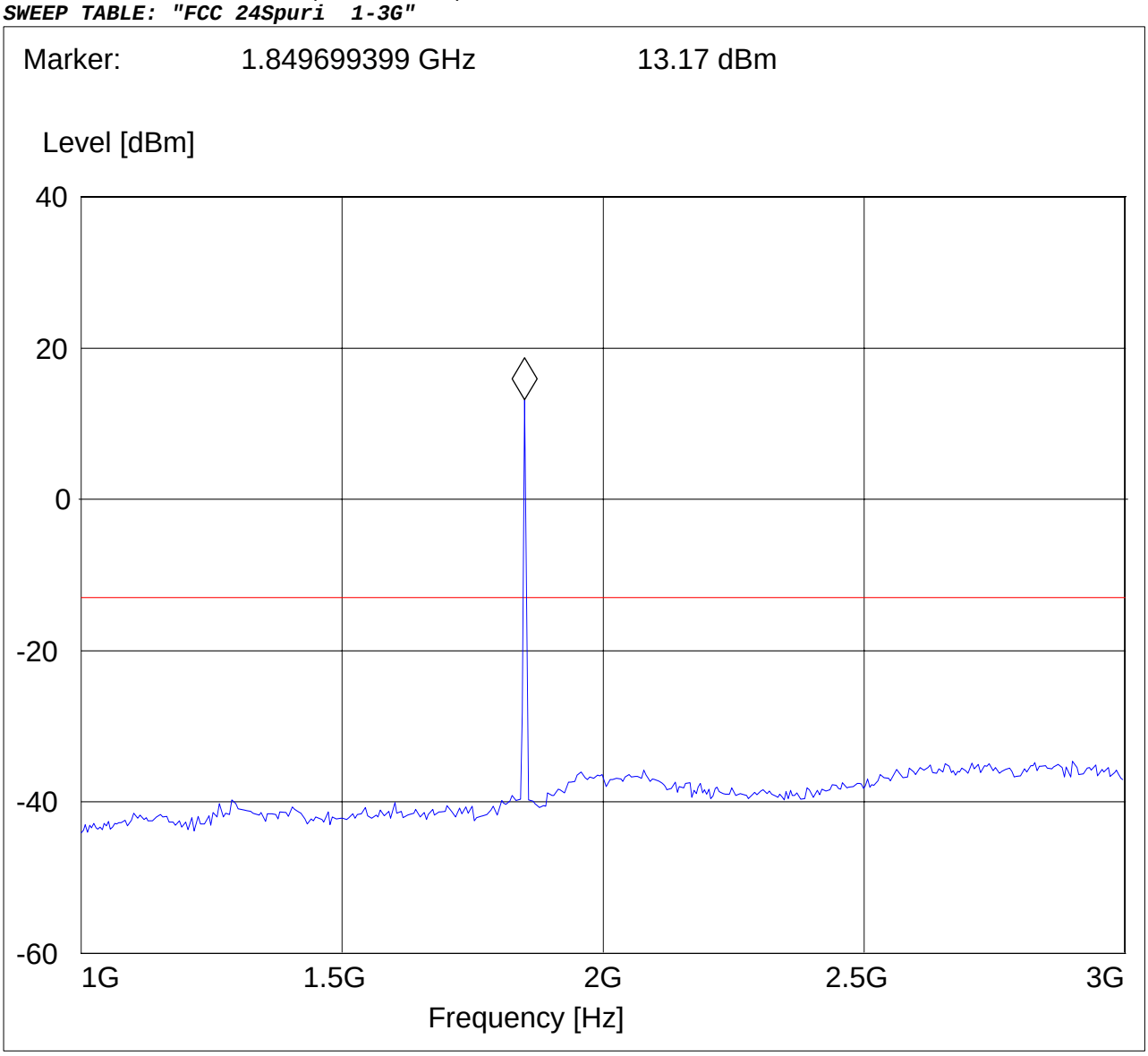


RADIATED SPURIOUS EMISSIONS (PCS 1900)
Tx @ 1850.2MHz: 1GHz – 3GHz
Spurious emission limit –13dBm
Note: The peak above the limit line is the carrier freq. at ch-512.

411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              04FG10b
Customer:         DOCOMO
Test Mode:        GSM1900 CH.512
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          DC CAR BATTERY 12v
Comments:         Marker placed on uplink
```

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

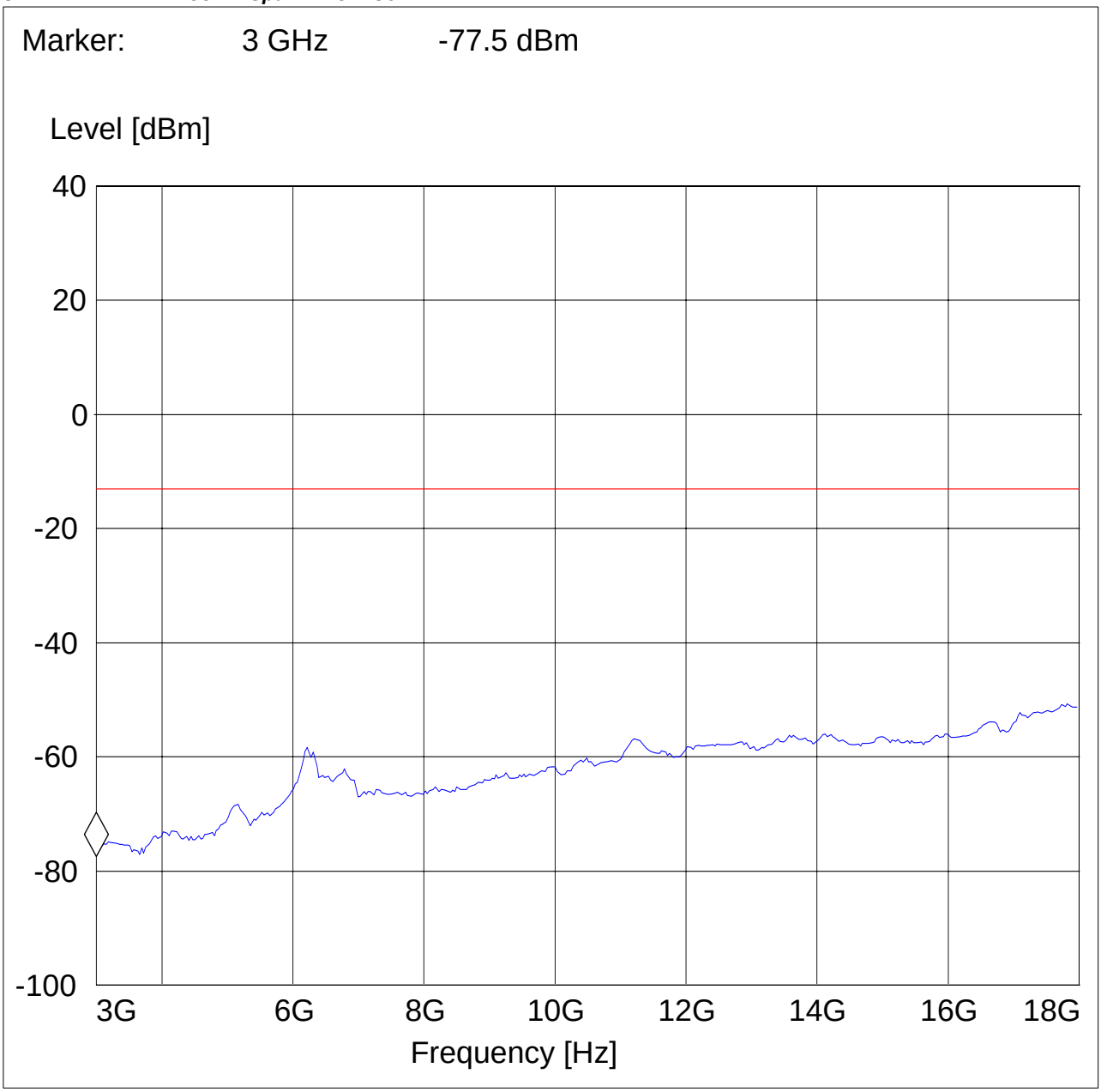


RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1850.2MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

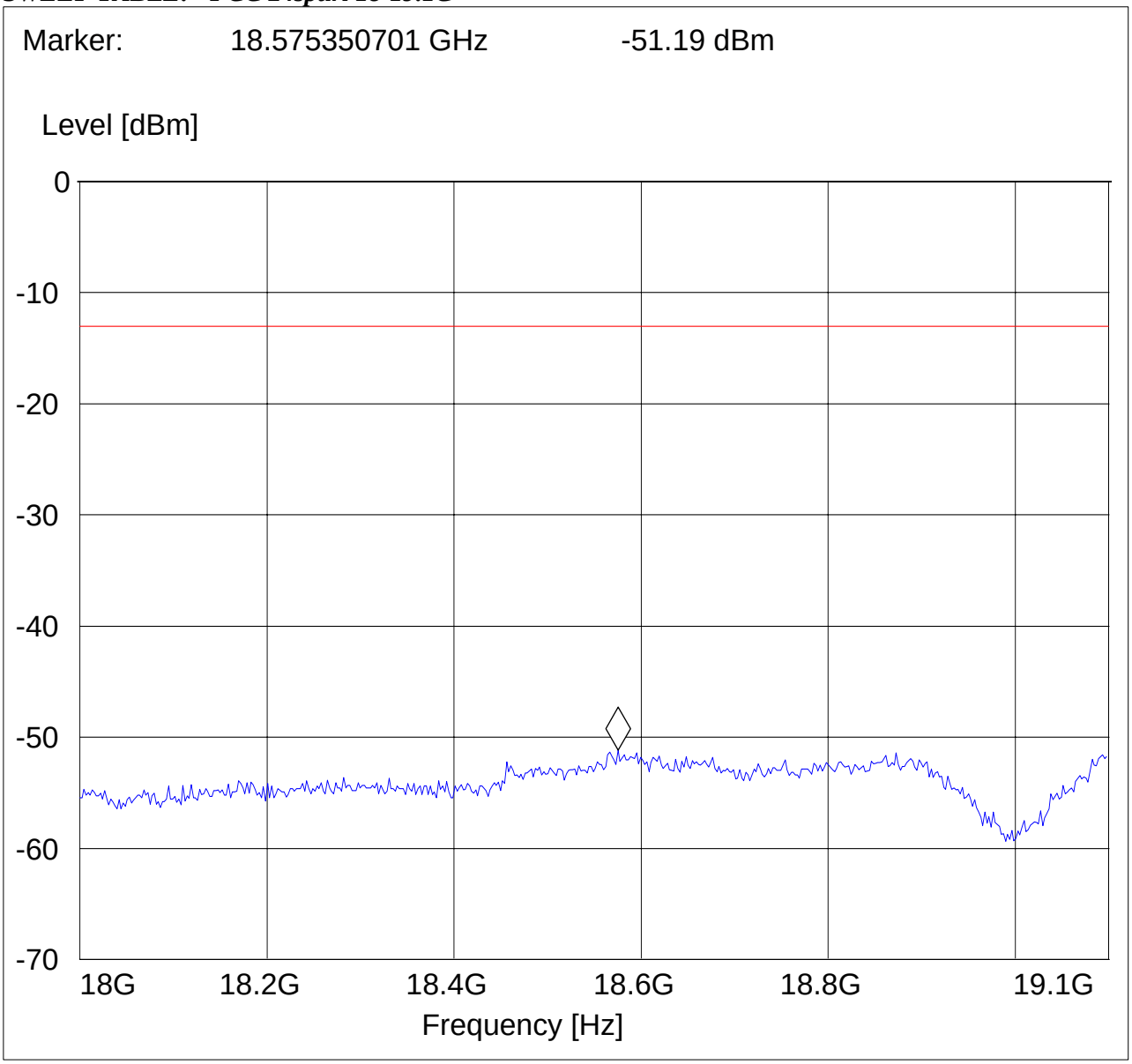
411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              04FG10b
Customer:         DOCOMO
Test Mode:        GSM1900 CH.512
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          DC CAR BATTERY 12v
```

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



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1850.2MHz: 18GHz – 19GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM1900 CH.512
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 24spuri 18-19.1G"

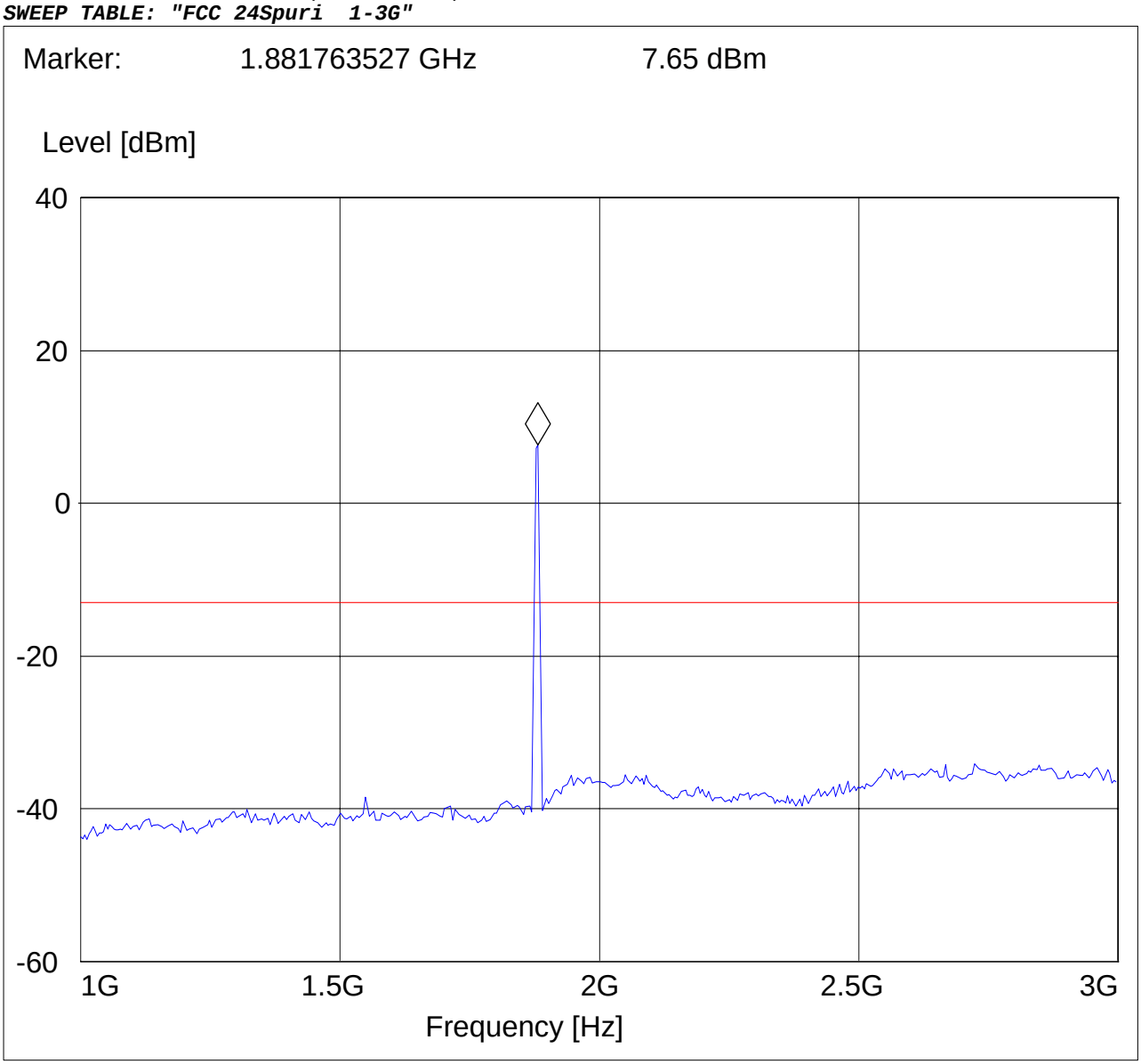


RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 1GHz – 3GHz
Spurious emission limit –13dBm
Note: The peak above/close to the limit line is the carrier freq. at ch-661.

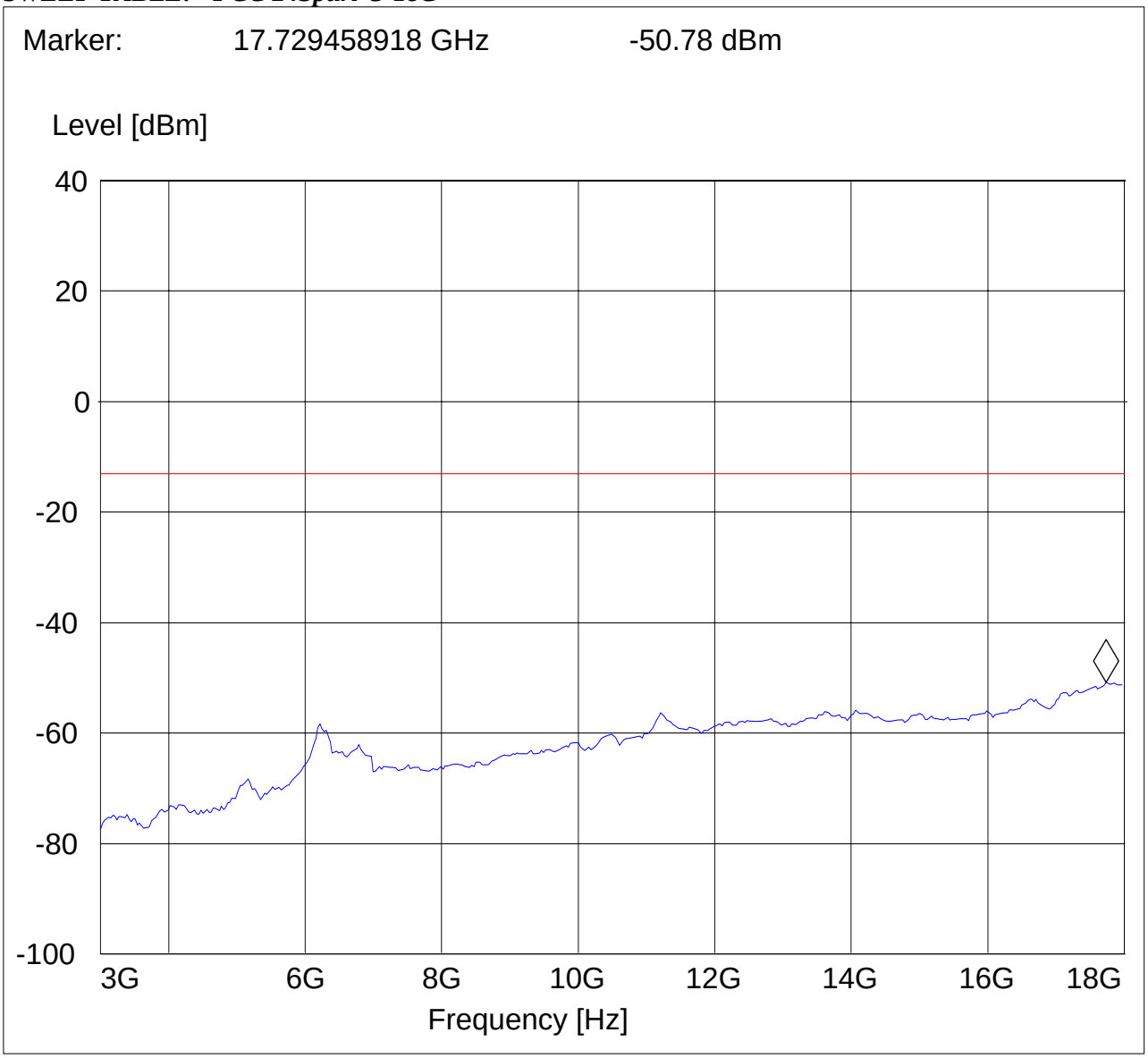
411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              04FG10b
Customer:         DOCOMO
Test Mode:        GSM1900 CH.661
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          DC CAR BATTERY 12v
Comments:         Marker placed on uplink
```

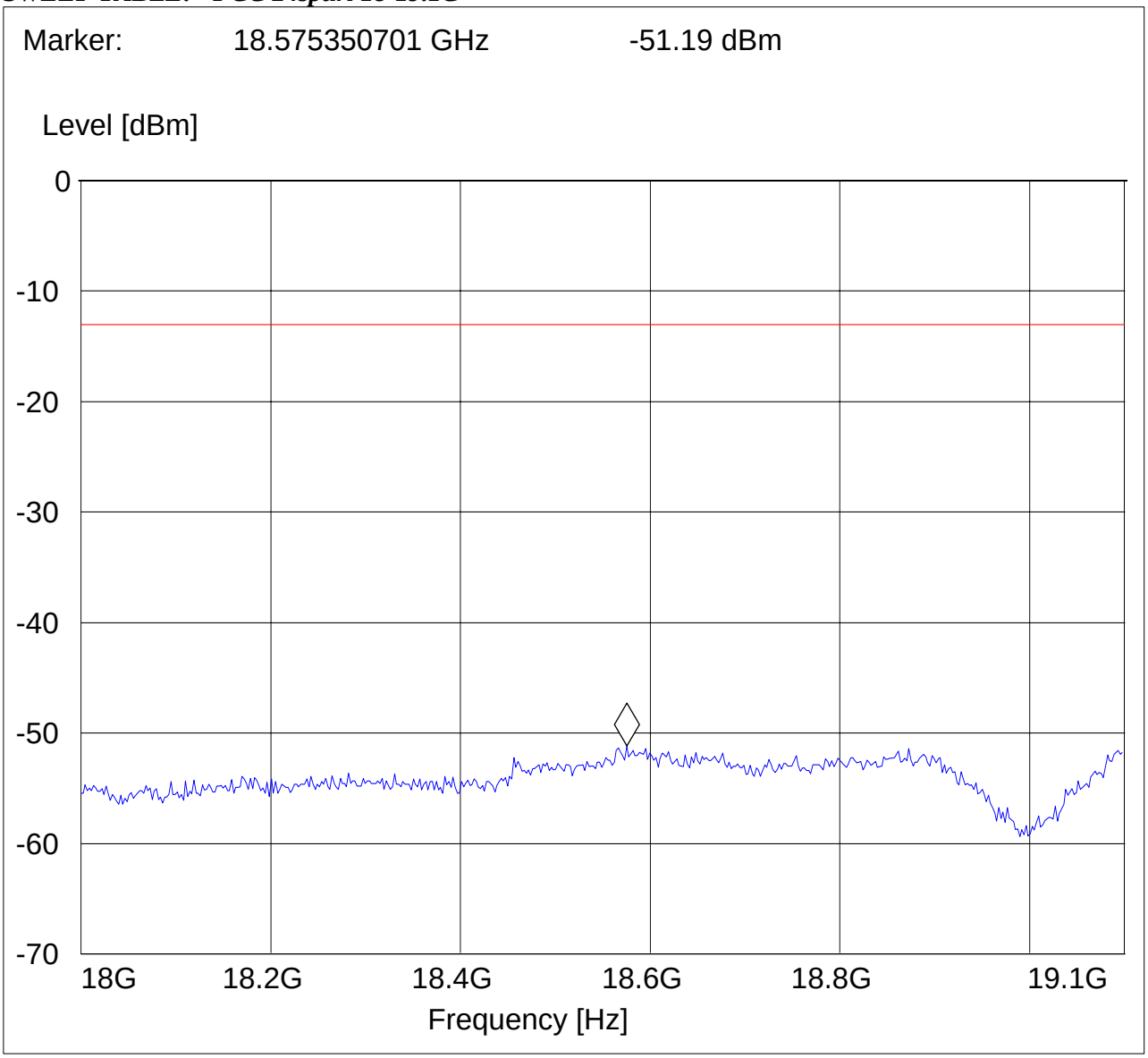
SWEEP TABLE: "FCC 24Spuri 1-3G"



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 3GHz – 18GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM1900 CH.661
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 24Spuri 3-18G"



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 18GHz – 19GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM1900 CH.512
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 24spuri 18-19.1G"

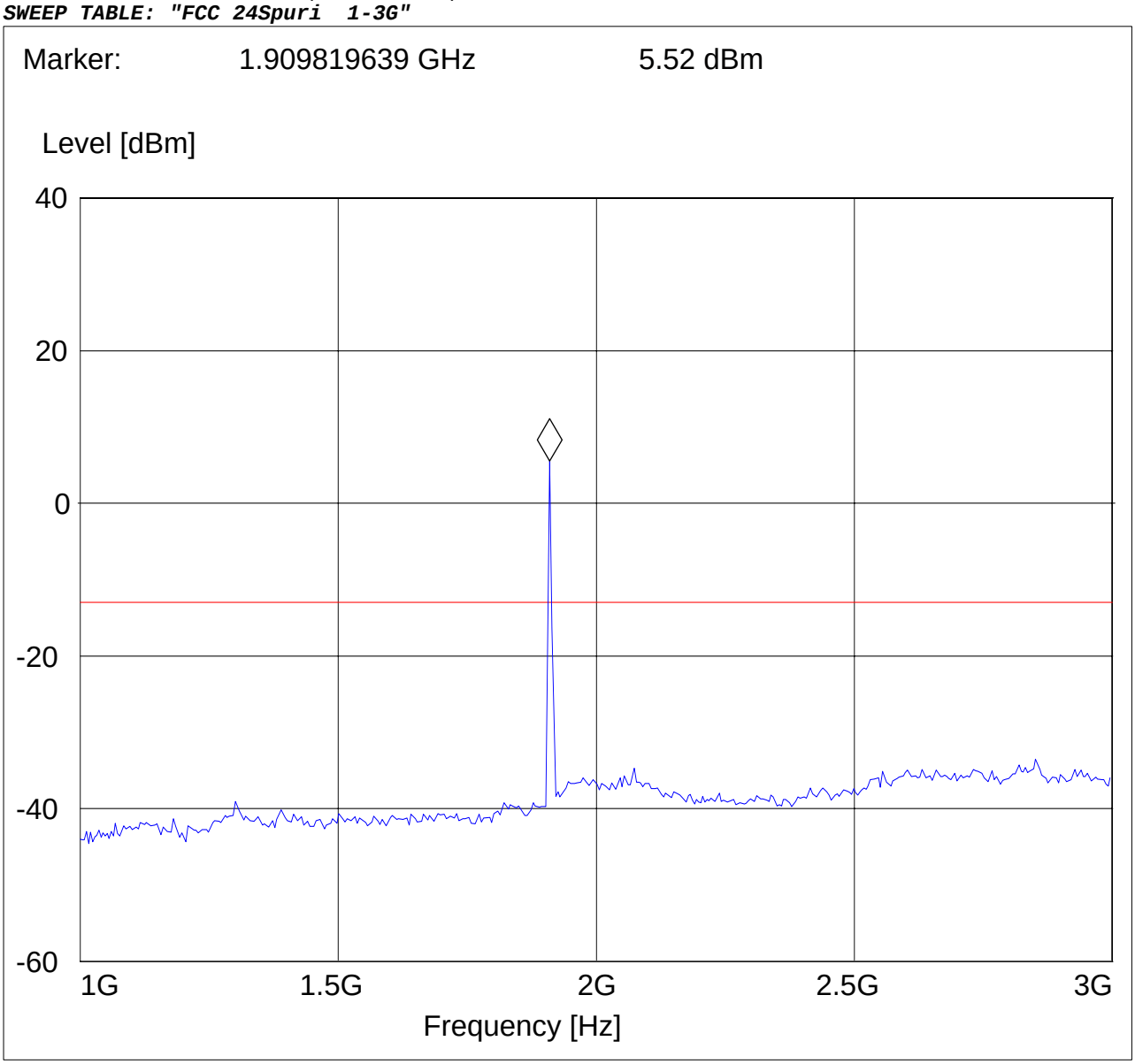


RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz: 1GHz – 3GHz
Spurious emission limit –13dBm
Note: The peak above the limit line is the carrier freq. at ch-810.

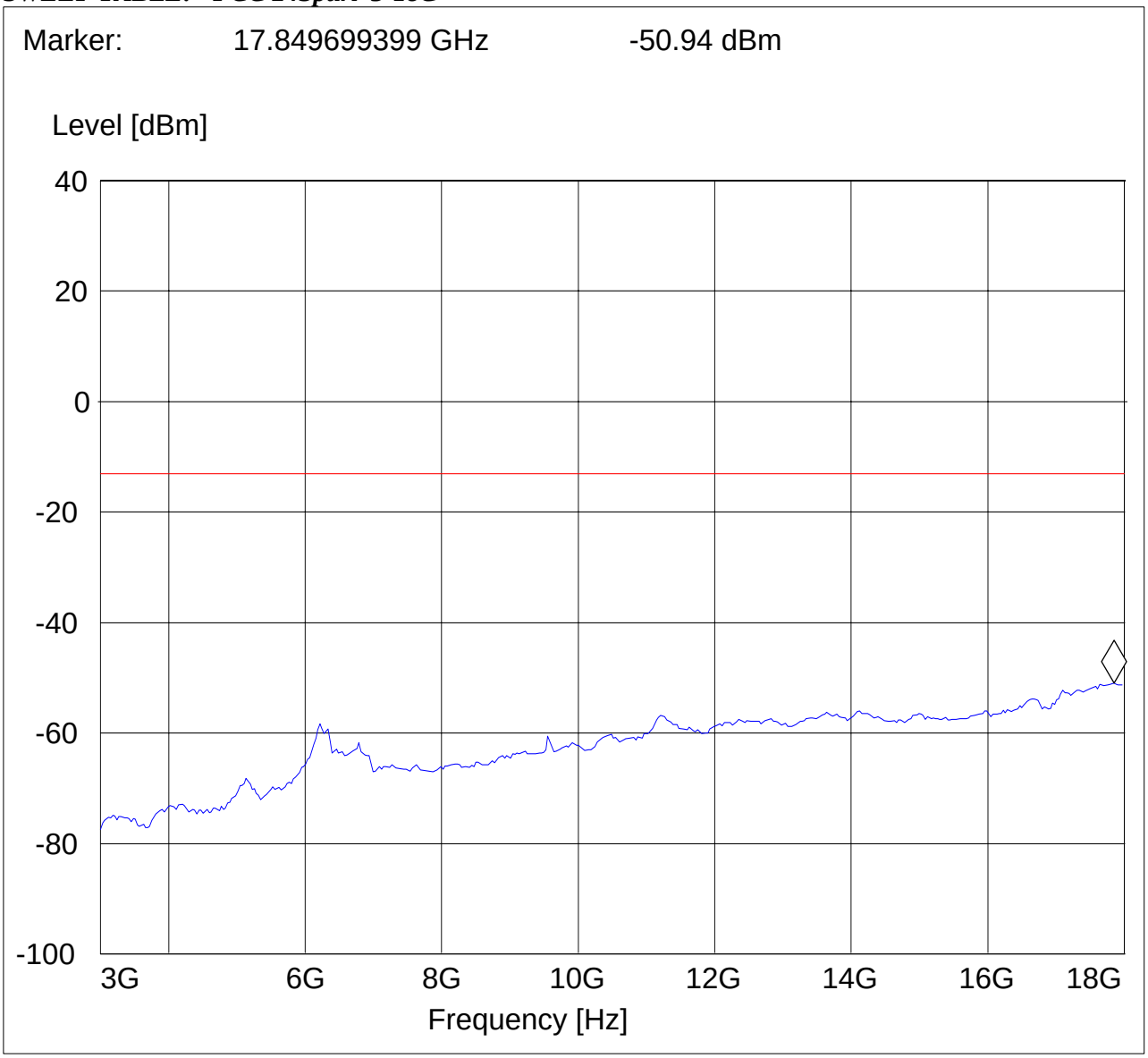
411 Dixon Landing Road, Milpitas CA 95035, USA

```
EUT:              04FG10b
Customer:         DOCOMO
Test Mode:        GSM1900 CH.810
ANT Orientation:  V
EUT Orientation:  H
Test Engineer:    Chris
Voltage:          DC CAR BATTERY 12v
Comments:         Marker placed on uplink
```

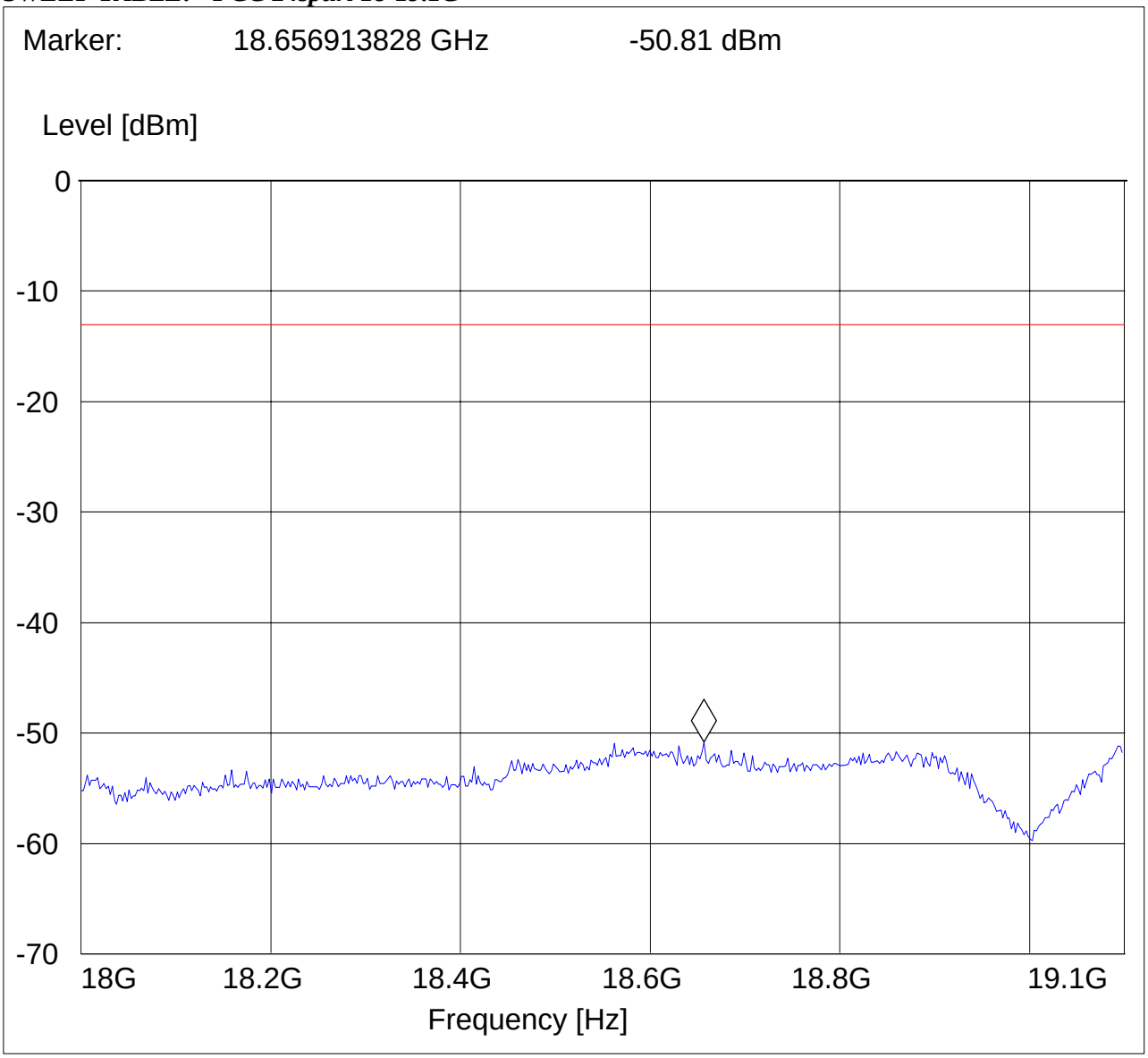
SWEEP TABLE: "FCC 24Spuri 1-3G"



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz: 3GHz – 18GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM1900 CH.810
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 24Spuri 3-18G"



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz : 18GHz – 19.1GHz
Spurious emission limit –13dBm
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM1900 CH.810
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "FCC 24spuri 18-19.1G"



4.6 Receiver Spurious Emissions Radiated

4.6.1 Limits:

4.6.1.1 FCC §15.109 & RSS-129 (10) Emission limitations for cellular equipment.

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

EUT in Idle mode & hooked up with any available ancillary equipment (Limit: FCC-15.109 Class B) Per FCC section 15.31(m) receiver has to be tested on the low, middle, and high channel.
Per RSS-129 (10) states that receiver emissions are to be performed at the middle channel up to the 3rd harmonic of the LO.

4.6.1.2 IC § RSS-133 (4.5) & (6.7) Emission limitations for Broadband PCS equipment.

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

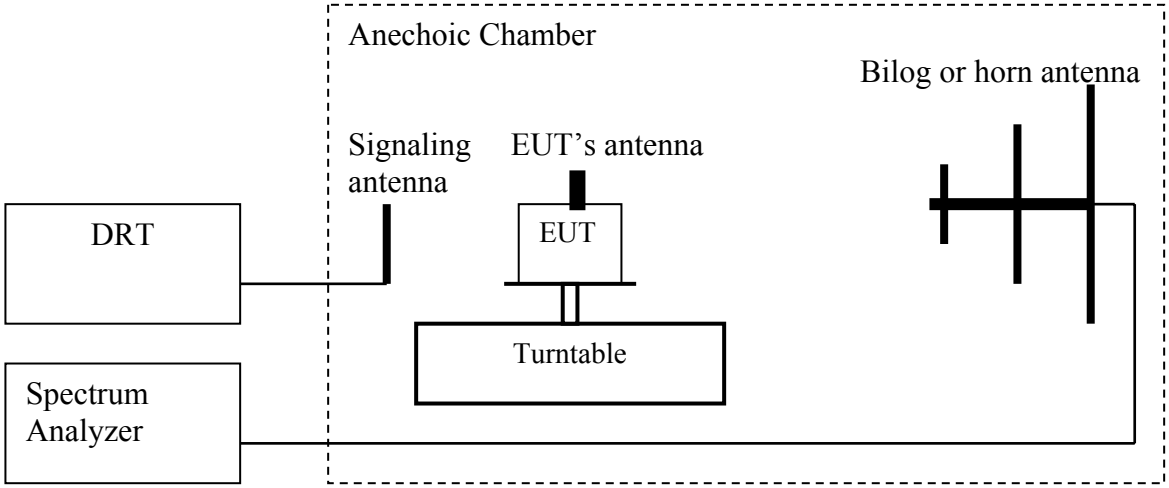
EUT in Idle mode & hooked up with any available ancillary equipment (Limit: FCC-15.109 Class B) Per FCC section 15.31(m) receiver has to be tested on the low, middle, and high channel.
Per RSS-129 (10) states that receiver emissions are to be performed at the middle channel up to the 3rd harmonic of the LO.

Note: Per 15.111 Receivers that operate or tune between 30 to 960 MHz must show compliance to section 15.109 limits. All other receivers operating below 30 MHz or above 960 MHz are exempt from testing. No such exclusion exists in the RSS standards, so all receivers are to be tested.

4.6.2 Radiated receiver measurement procedure:

Based on ANSI63.4: 2004

2.2.12 Unwanted emissions: Radiated Spurious



11. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
12. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
13. Set the spectrum analyzer to measure peak hold with the required settings.
14. 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.
15. 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.
16. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
17. Determine the level of spurious emissions using the following equation: **Spurious** (dBuV/m) = **LVL** (dBuV) + **LOSS** (dB/m):
18. 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:
Below 1GHz: RBW=VBW=100 kHz, Detector: QP
Above 1GHz: RBW=VBW= 1MHz, Detector: Peak

Measurement Survey:

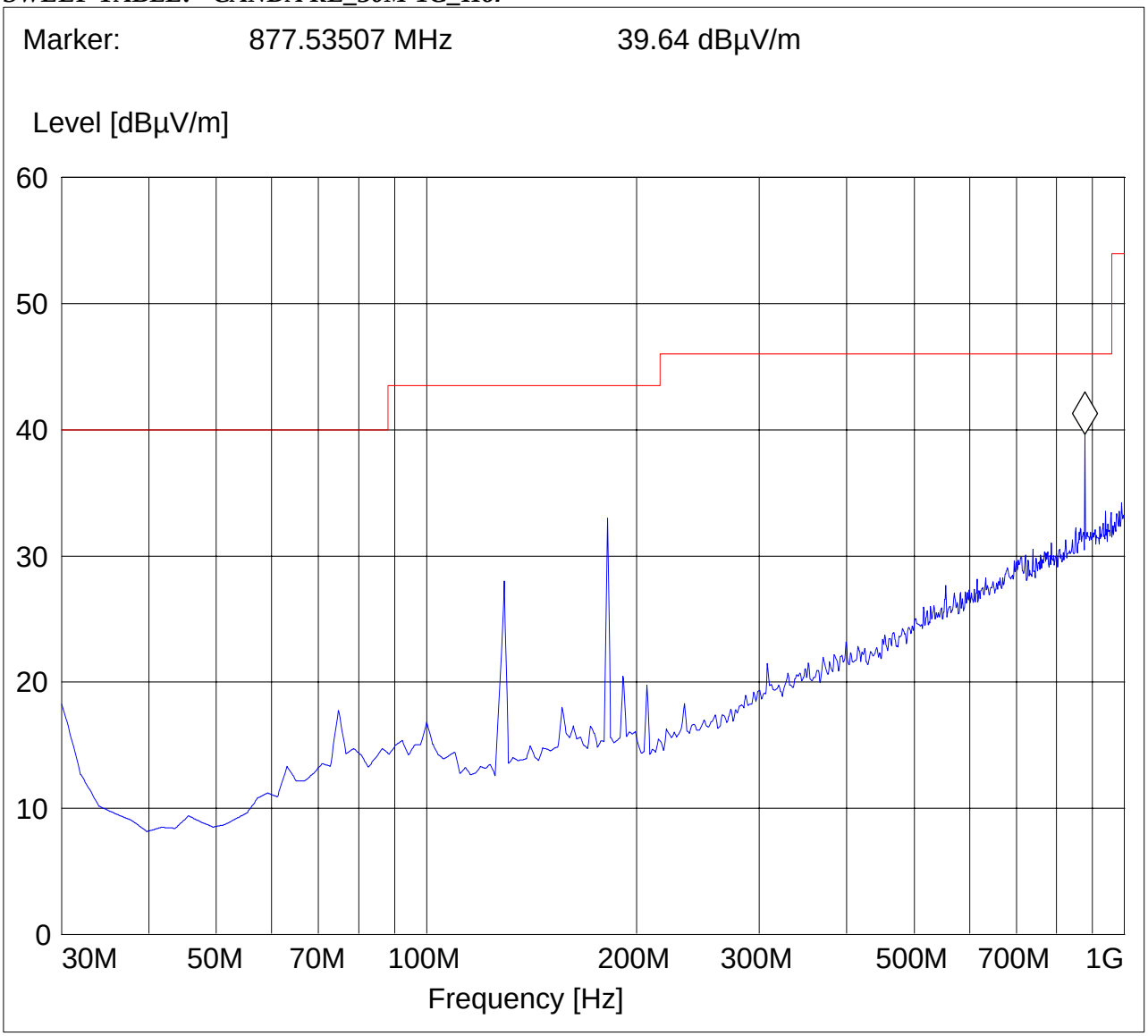
For FCC receiver radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850. For Industry Canada receiver radiated emissions measurements were made only at the middle carrier frequencies of the PCS-1900 bands. The equipment must still, however, meet 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.

4.6.2.1 RESULTS OF RADIATED TESTS GSM-850:

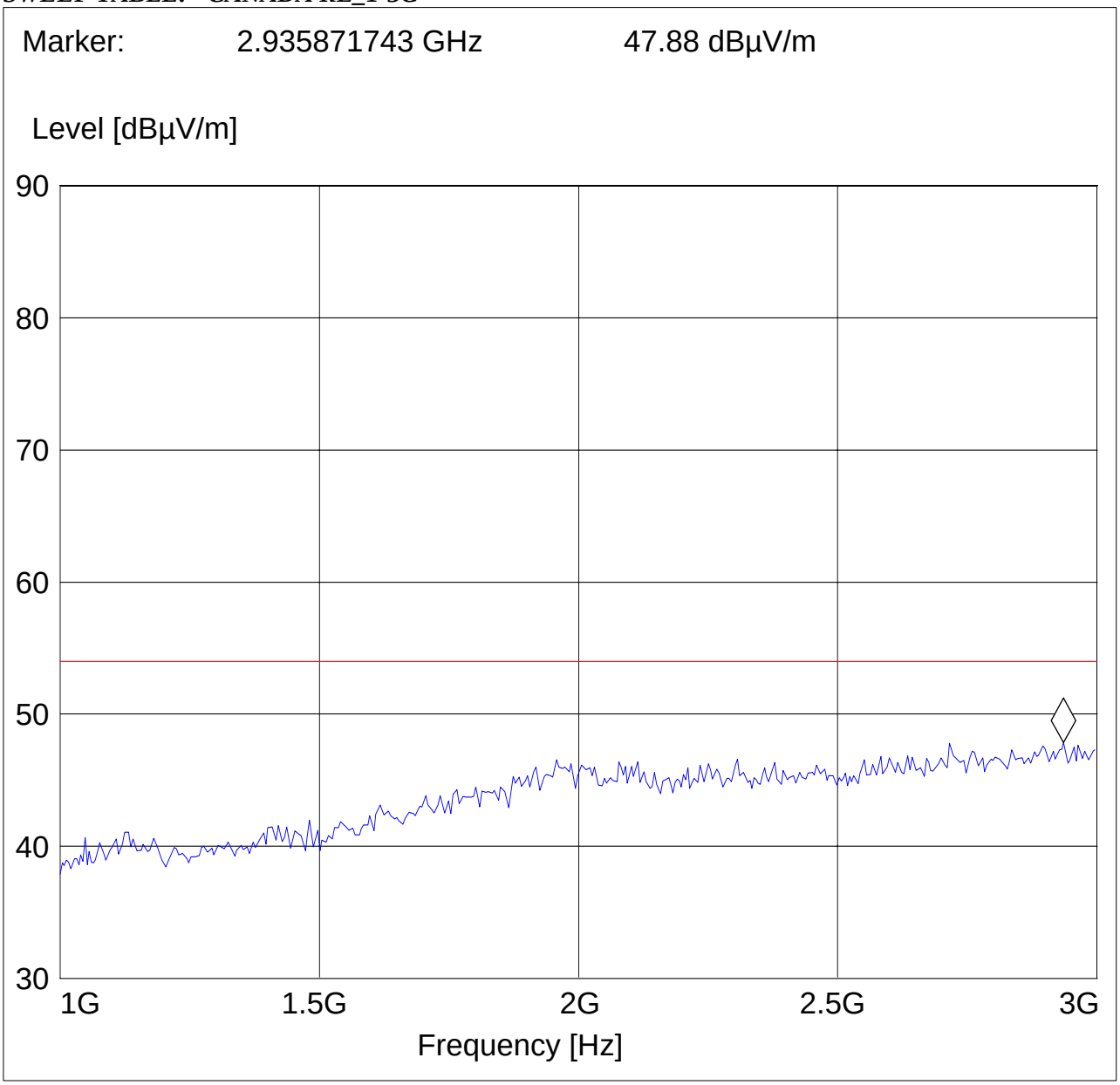
Harmonics	Tx ch-8 Freq. (MHz)	Level (dBuV/m)	Tx ch-383 Freq. (MHz)	Level (dBuV/m)	Tx ch-758 Freq. (MHz)	Level (dBuV/m)
1	**825.25**	NF	**836.5**	41	**847.75**	NF
2	**1648.4**	NF	**1673.2**	NF	**1697.6**	NF
3	**2472.6**	NF	**2509.8**	NF	**2546.4**	NF
4	**3296.8**	NF	**3346.4**	NF	**3395.2**	NF
5	**4121**	NF	**4183**	NF	**4244**	NF
NF = NOISE FLOOR						

4.6.2.2 RADIATED SPURIOUS EMISSIONS (GSM-850)

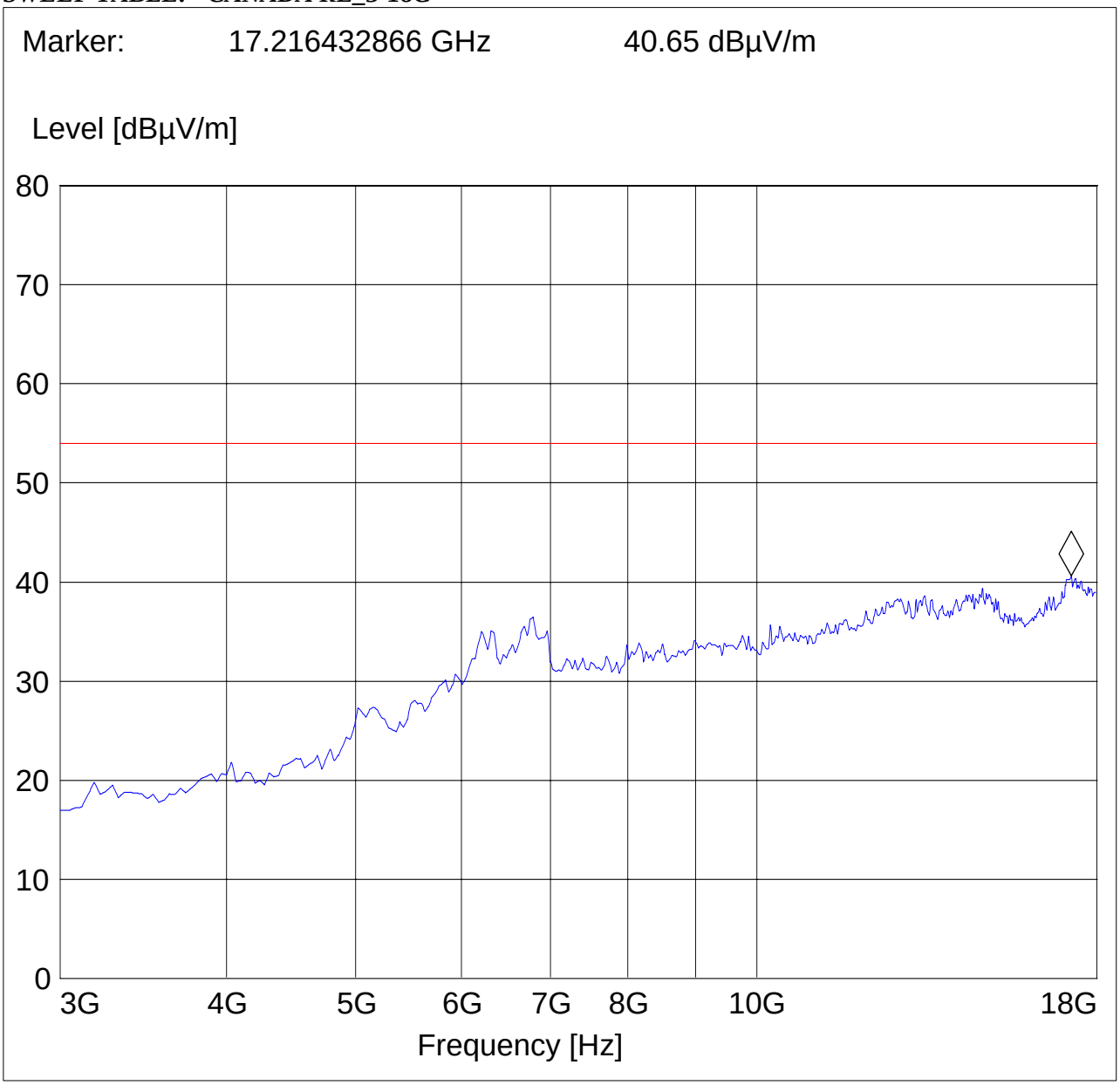
RX: 30MHz - 1GHz
Note: This plot is valid for low, mid & high channels (worst-case plot)
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH251, IDLE
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "CANDA RE_30M-1G_Hor"



RADIATED SPURIOUS EMISSIONS (GSM-850)
Rx Mode: 1 – 3 GHz (This applies to low, middle, and high, worst case plot)
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH128, IDLE
ANT Orientation: V
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "CANADA RE_1-3G"



RADIATED SPURIOUS EMISSIONS (GSM-850)
Rx Mode: 3 – 9 Ghz (This applies to low, middle, and high, worst case plot)
411 Dixon Landing Road, Milpitas CA 95035, USA
EUT: 04FG10b
Customer: DOCOMO
Test Mode: GSM850, CH251, IDLE
ANT Orientation: H
EUT Orientation: H
Test Engineer: Chris
Voltage: DC CAR BATTERY 12v
SWEEP TABLE: "CANADA RE_3-18G"



5 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

Asset #	Description	Manufacturer	Model / Type	Serial #	Maintenance	Cal Due Date
E1	Anechoic Chamber	Euroshield	3 meter	NA	In house	NA
E2	Turn Table	EMCO/ETS	2088	NA	In house	NA
E4	EMI Receiver/Analyzer	Rhode & Schwarz	ESIB 40	100107/040	by cal.	31-May-08
E5	Biconilog Antenna Type 2	A.H.Systems	SAS-200/521	253	by cal.	30-Jul-08
E22	Pre Amplifier	Miteq	JS4-00102600	340125	in house	31-May-08
E23	Pre Amplifier	Miteq	AFS4-00101	800-55-LN	-	-
E25	Notch Filter-1	Weinschel	System Integrated	NA	NA	NA
E26	Notch Filter-2	Weinschel	System Integrated	NA	NA	NA
E27	Notch Filter-3	Weinschel	System Integrated	NA	NA	NA
E32	High Pass Filter-1	Weinschel	System Integrated	NA	-	-
E33	High Pass Filter-2	Weinschel	System Integrated	NA	-	-
E34	DC Power Supply	Hewlett Packard	E3610A	KR83023316	in house	NA
E86	System Control Interface Unit	Rhode & Schwarz	SCIU	338802/003	NA	NA
E88	CCTV monitoring system	Lindgreen-Rayproof	Fibre optic remote	NA	NA	NA
E104	Digital Radio Comm. Tester	Rhode & Schwarz	CMU 200	101821	by cal.	20-May-08
E107	GSM Indoor Antenna	Kathrein	IBP5-900/1940		in house	NA
E124	MAPS Position Controller	ETS-Lindgren	2092	0004-1510	in house	NA
E134	Horn Antenna	EMCO	3115	35114	N/A	10-Apr-08
E135	Horn Antenna	EMCO	3115	35111	N/A	10-Apr-08
E136	EMC Software	Rhode & Schwarz	ESK1	N/A	N/A	N/A
E137	EMC Software	Rhode & Schwarz	EMSK1	N/A	N/A	N/A
E147	Digital Radio Comm. Tester	Rhode & Schwarz	CMU 200 #2	109879	by cal.	May-08

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.

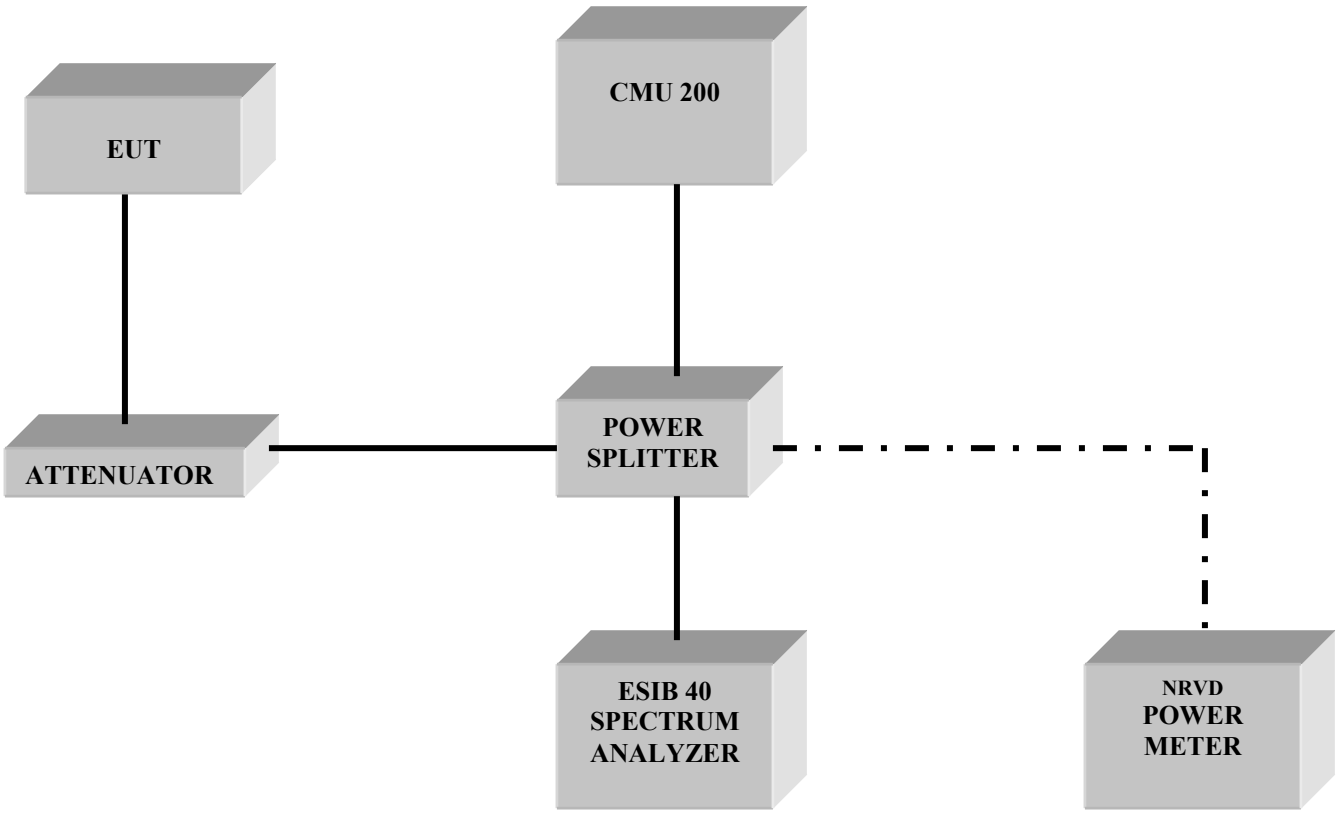
FCC Report and order 02-229 September 24, 2002.

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

Conducted Testing



Radiated Testing