



FCC Test Report

FCC Part 22, 24 / RSS 132, 133

FOR:

Novatel Wireless

Model Number: **Novatel X950D ExpressCard Module**

FCC ID: NBZNRM-X950D

IC ID: 3229A-X950D

TEST REPORT #: EMC_NOVAT_036_07002_FCC22_24
DATE: 2007-8-10



Bluetooth™
Bluetooth
Qualification Test
Facility
(BQTF)



LAB CODE 20020328-00

FCC listed:
A2LA accredited

IC recognized #
3462B

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: +1 (408) 586 6200 ♦ Fax: +1 (408) 586 6299 ♦ E-mail: info@cetecomusa.com ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

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

© Copyright by CETECOM



Table of Contents

1 ASSESSMENT4

2 ADMINISTRATIVE DATA.....5

2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT.....5

2.2 IDENTIFICATION OF THE CLIENT5

2.3 IDENTIFICATION OF THE MANUFACTURER.....5

3 EQUIPMENT UNDER TEST (EUT).....6

3.1 SPECIFICATION OF THE EQUIPMENT UNDER TEST6

3.2 IDENTIFICATION OF THE EQUIPMENT UNDER TEST (EUT)6

3.3 IDENTIFICATION OF ACCESSORY EQUIPMENT6

4 SUBJECT OF INVESTIGATION.....7

5 MEASUREMENTS.....8

5.1 RF POWER OUTPUT8

5.1.1 *FCC 2.1046 Measurements required: RF power output.*.....8

5.1.2 *Limits:*8

5.1.2.1 *FCC 22.913 (a) Effective radiated power limits.*8

5.1.2.2 *FCC 24.232 (b)(c) Power limits.*8

5.1.3 *Conducted Output Power Measurement procedure:*.....8

5.1.4 *Conducted output power measurement results*9

5.1.5 *Radiated Output Power Measurement procedure:*.....11

5.1.6 *ERP Results 850 MHz band:*.....12

5.1.7 *EIRP Results 1900 MHz band:*.....12

5.2 OCCUPIED BANDWIDTH/EMISSION BANDWIDTH25

5.2.1 *FCC 2.1049 Measurements required: Occupied bandwidth.*.....25

5.2.2 *Occupied / emission bandwidth measurement procedure:*.....25

5.2.3 *Occupied / Emission bandwidth results 850 MHz band:*26

5.3 FREQUENCY STABILITY30

5.3.1 *Limit*30

5.3.2 *FREQUENCY STABILITY (GSM-850)*.....31

5.3.3 *FREQUENCY STABILITY (PCS-1900)*.....31

5.4 SPURIOUS EMISSIONS CONDUCTED.....32

5.4.1 *FCC 2.1051 Measurements required: Spurious emissions at antenna terminals.*32

5.4.2 *Limits:*32

5.4.2.1 *FCC 22.917 Emission limitations for cellular equipment.*32

5.4.2.2 *FCC 24.238 Emission limitations for Broadband PCS equipment.*32

5.4.3 *Conducted out of band emissions measurement procedure:*.....33

5.4.4 *Test Results: Conducted Emission:*34

5.4.5 *Test Results: Band Edge:*38

5.5 SPURIOUS EMISSIONS RADIATED46

5.5.1 *FCC 2.1053 Measurements required: Field strength of spurious radiation.*.....46

5.5.2 *Limits:*46

5.5.2.1 *FCC 22.917 Emission limitations for cellular equipment.*46

5.5.2.2 *FCC 24.238 Emission limitations for Broadband PCS equipment.*46

5.5.3 *Radiated out of band measurement procedure:*47



5.5.4	<i>Radiated out of band emissions results on EUT:</i>	49
5.5.4.1	Test Results (UMTS FDD5 HSDPA Only)	49
5.5.4.2	Test Results (UMTS FDD5 HSDPA + HSUPA)	61
5.5.4.3	Test Results (UMTS FDD2 HSDPA ONLY):	73
5.5.4.4	Test Results (UMTS FDD2 HSDPA + HSUPA):	83
5.5.5	<i>RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-132 & 133</i>	93
5.5.5.1	Test Results (UMTS FDD5 HSDPA Only)	94
5.5.5.2	Test Results (UMTS FDD5 HSDPA + HSUPA)	97
5.5.5.3	Test Results (UMTS FDD2 HSDPA Only)	100
5.5.5.4	Test Results (UMTS FDD2 HSDPA + HSUPA)	104
5.6	AC POWER LINE CONDUCTED EMISSIONS § 15.107/207	108
5.6.1	<i>Limits</i>	108
5.6.2	<i>Results (UMTS FDD5 HSDPA Only)</i>	109
5.6.3	<i>Results (UMTS FDD5 HSDPA + HSUPA)</i>	111
5.6.4	<i>Results (UMTS FDD2 HSDPA + HSUPA)</i>	113
5.6.5	<i>Results (UMTS FDD2 HSDPA + HSUPA)</i>	115
6	TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	117
7	REFERENCES	118
8	BLOCK DIAGRAMS	119



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 #
Novatel Wireless	ExpressCard GSM/UMTS module	X950D

Technical responsibility for area of testing:

Lothar Schmidt
 (Director Regulatory and
 Antenna Services)

2007-8-10 EMC & Radio

Date	Section	Name	Signature
------	---------	------	-----------

This report is prepared by:

Peter Mu
 (EMC Project Engineer)

2007-8-10 EMC & Radio

Date	Section	Name	Signature
------	---------	------	-----------

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

The test results of this test report relate exclusively to radiated measurement only. Radio module used in this product is an FCC approved module under FCC ID NBZNRM-X950D.



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:	Peter Mu
Date of test:	2007-5-30 to 2007-8-10

2.2 Identification of the Client

APPLICANT	
Applicant (Company Name)	Novatel Wireless
Street Address	9645 Scranton Rd., Suite 205
City/Zip Code	San Diego, California 92121
Country	U.S.A
Contact Person	Mohammad Toossi
Telephone	858 320 8810
Fax	858 812 3402
e-mail	mtoossi@nvtl.com

2.3 Identification of the Manufacturer

Same as above client.



3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name of EUT (if not same as Model No.)	Merlin X950D
Description	ExpressCard GSM/UMTS module
Model No.	X950D
FCC-ID	NBZNRM-X950D
IC-ID (Industry Canada)	3229A-X950D
Frequency Range:	826.4MHz – 846.6MHz for UMTS FDD5 1852.4MHz – 1907.6MHz for UMTS FDD2
Type(s) of Modulation:	QPSK
Antenna Type:	Integral antenna
Max. Output Power:	Conducted : 23.68dBm (0.223W) FDD2 HSDPA + HSUPA enabled. 22.88dBm (0.194W) FDD5 HSDPA +HSUPA enabled. Radiated: 22.65dBm (0.184W) FDD2 HSDPA + HSUPA 25.64dBm (0.366W) FDD5 HSDPA only Detailed measurements on page 9.

3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT	Novatel Wireless	X950D	001018-00-013611-0

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	Supporting Laptop	Lenovo	T60	2623P2U



4 Subject of Investigation

All testing was performed on the EUT listed in Section 3. The EUT was maximized in the X,Y, Z positions , all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz. The dual band antenna used has 2dBi only and is provided with a 3m cable.

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.

This EUT is a FCC approved module with FCC ID NBZNRM-X950D. This module is approved under HSDPA operating mode for UMTS FDD2 and FDD5 bands. Findings reported here support a Class II Permissive Change for the addition of HSUPA functionality and proof that the module complies with applicable FCC regulations. Specific effort was made to evaluate the difference between HSDPA and HSUPA mode.

For HSUPA signaling the base station simulator CMU200 is installed with Engineering Version firmware 4.50. Special thanks to R&S and their application engineers who supported us with this engineering version that is not yet officially available to the public.

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.

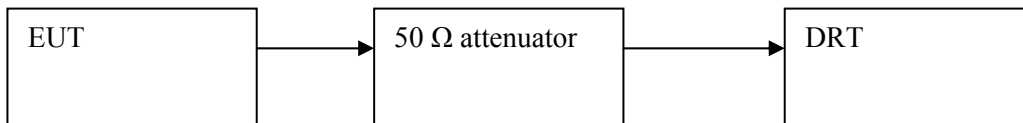
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(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 Conducted output power measurement results

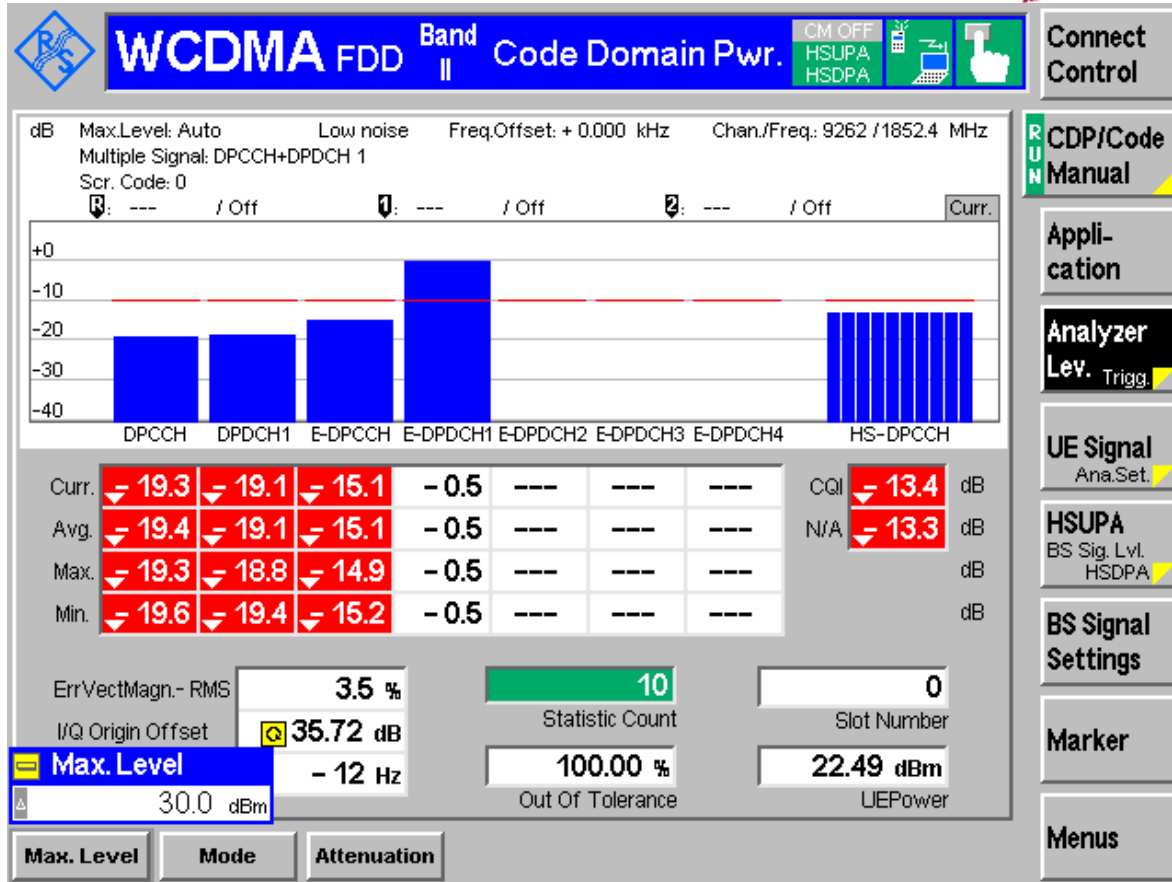
Conducted output power is measured in normal UMTS operating mode, HSDPA mode, and HSDPA + HSUPA mode in the low, mid, and high channels in each band. The results show that there are no major difference when HSUPA is operating.

Frequency	Channel	HSPA (dBm)		
		None	HSDPA	HSDPA + HSUPA
1852.4	9262	23.58	23.60	23.68
1880.0	9400	23.02	23.03	23.03
1907.5	9538	23.29	23.25	23.22
826.4	4132	22.50	22.51	22.54
835.0	4175	22.85	22.86	22.88
846.6	4233	22.69	22.70	22.70

Subtest	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM ⁽²⁾ (dB)	MPR (dB)	AG ⁽⁴⁾ Index	E-TFCI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs} / \beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$
 Note 2: CM = 1 for $\beta_c / \beta_d = 12/15, \beta_{hs} / \beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
 Note 3: For subset 1 the β_c / β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the references TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.
 Note 4: For subset 5 the β_c / β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the references TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.
 Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
 Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

The signal was measured using each setting in the table above. The measurements were all done using the CMU200. The slight differences in the range of 1/10 to 2/10 dB level out when measurement stabilizes over time using the maximum and average value.

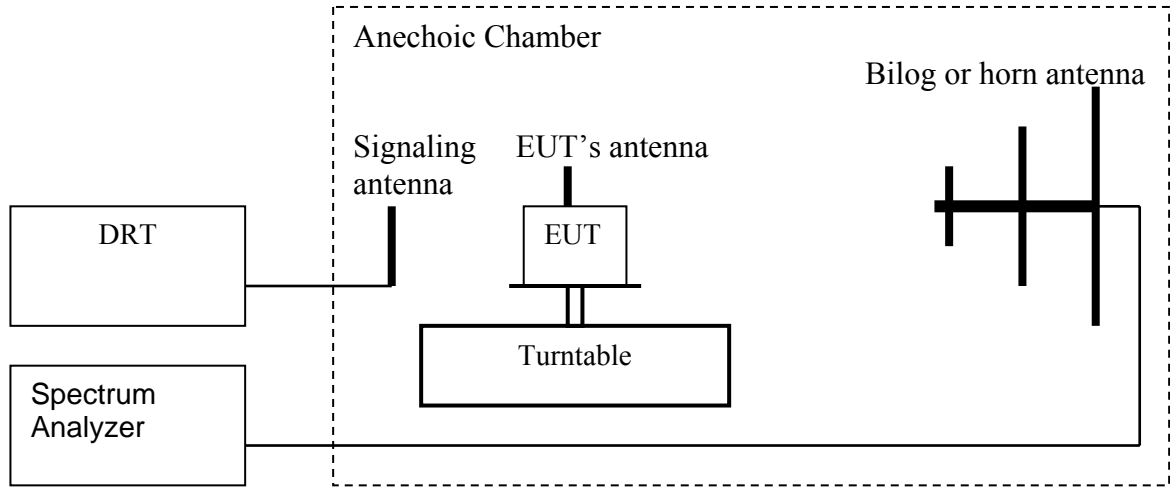


Screen shot of the CMU200 showing the CDP and the E- DPCCH and the E-DPDCH on. The settings showing the E-DPDCH at -.5 dB relative level.

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:
ERP (dBm) = LVL (dBm) + LOSS (dB)
 8. Determine the EIRP using the following equation:
EIRP (dBm) = ERP (dBm) + 2.14 (dB)
 9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band. **Spectrum analyzer settings = rbw=vbw=3MHz**
- (note: Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)



5.1.6 ERP Results 850 MHz band:

	Burst Peak ERP
	≤38.45dBm (7W)

Frequency (MHz)	Effective Radiated Power (dBm)	
	HSDPA Only	HSDPA + HSUPA
826.4	23.5	23.37
835.0	22.93	22.81
846.6	22.32	21.96

5.1.7 EIRP Results 1900 MHz band:

	Burst Peak EIRP
	≤33dBm (2W)

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)	
	HSDPA Only	HSDPA + HSUPA
1852.4	22.52	22.45
1880.0	22.32	22.65
1907.5	21.94	21.75

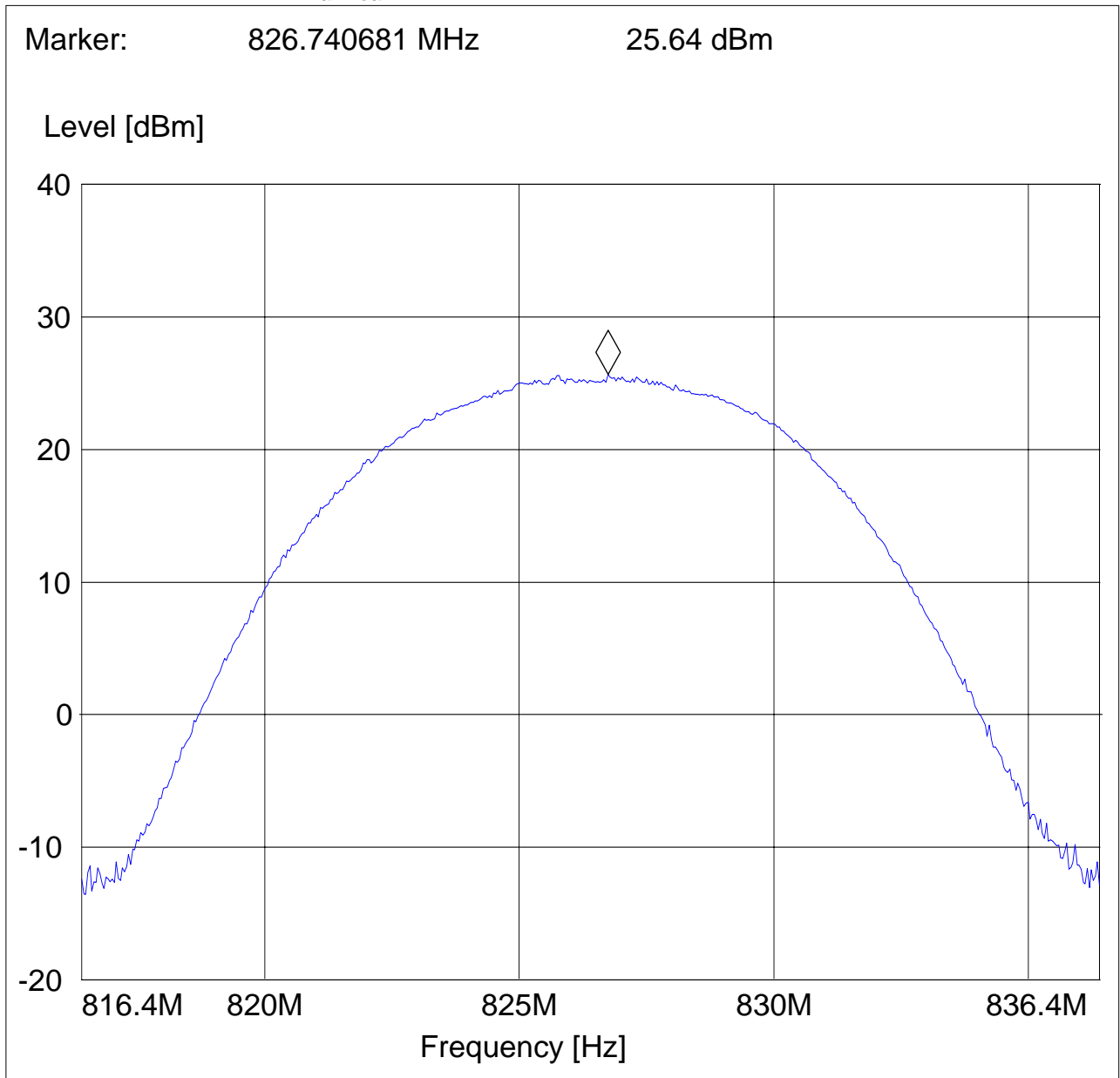


EIRP (UMTS FDD5) CHANNEL 4132, HSDPA Only §22.913(a)

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA

SWEEP TABLE: "EIRP 850 CH 4132H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
816.4 MHz	836.4 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM
		MaxPeak			



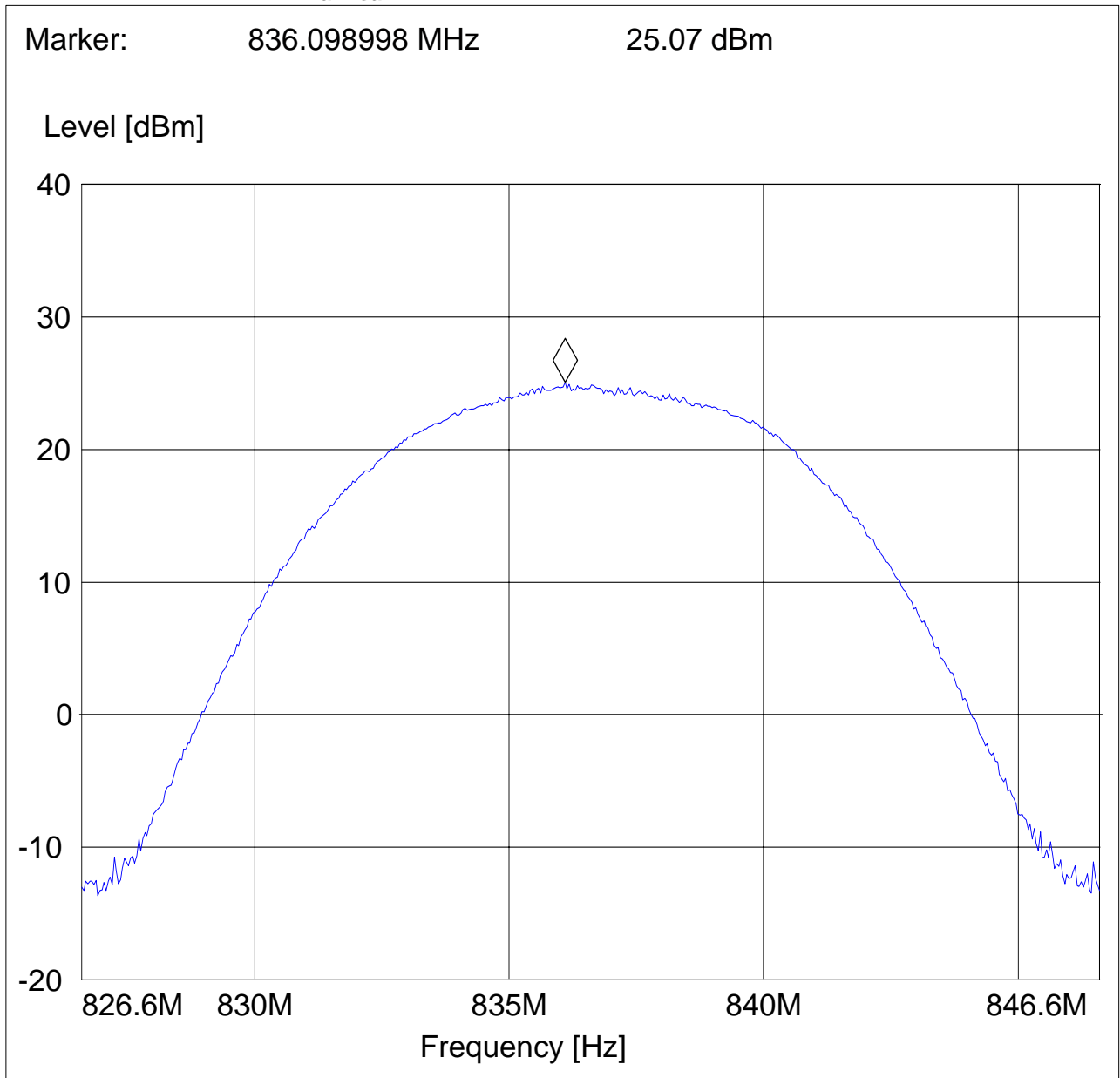


EIRP (UMTS FDD5) CHANNEL 4183, HSDPA Only §22.913(a)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "EIRP 850 CH 4183 H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
826.6 MHz	846.6 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM
		MaxPeak			



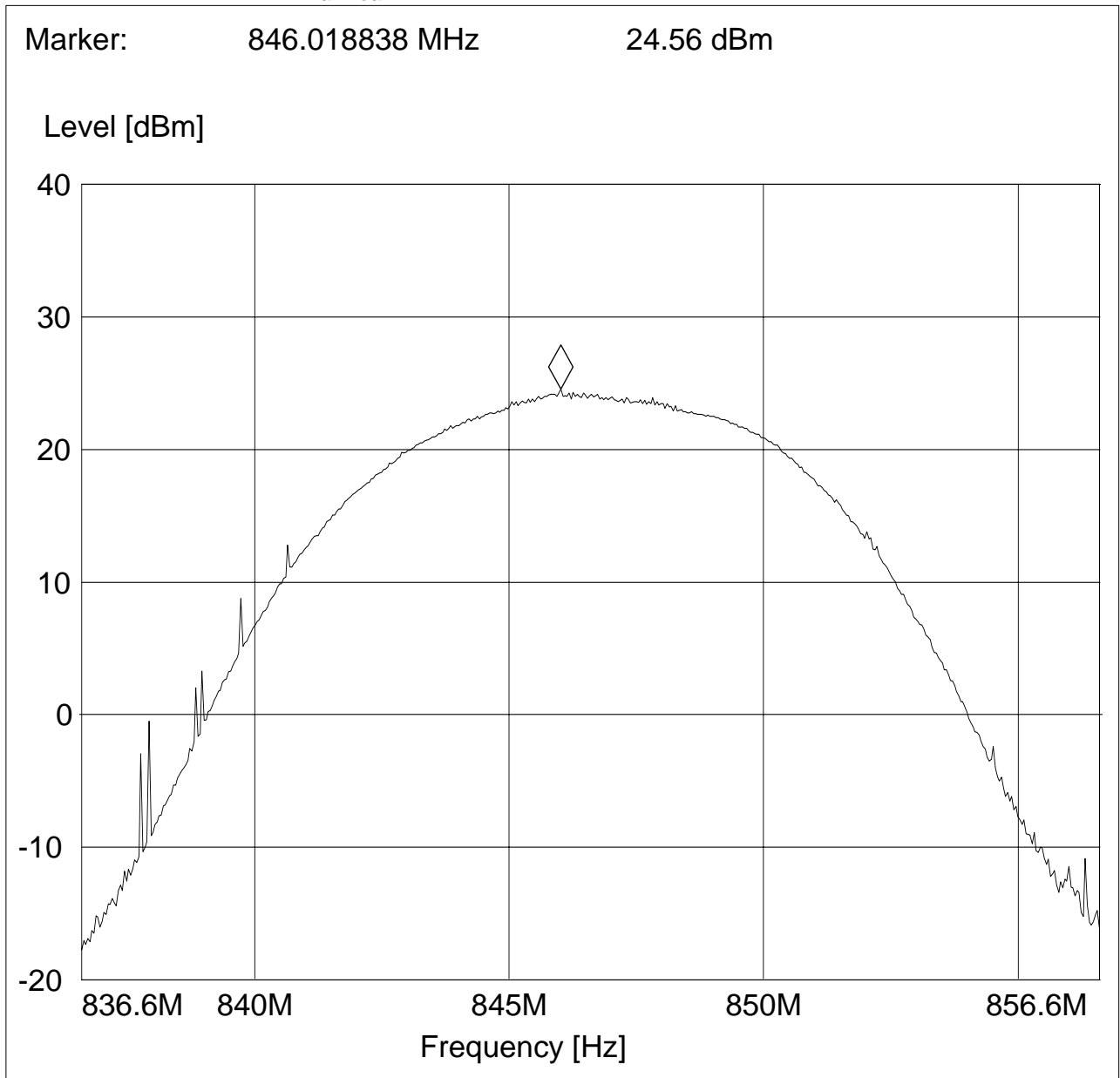


EIRP (UMTS FDD5) CHANNEL 4233, HSDPA Only §22.913(a)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "EIRP 850 CH 4233H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
836.6 MHz	856.6 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM



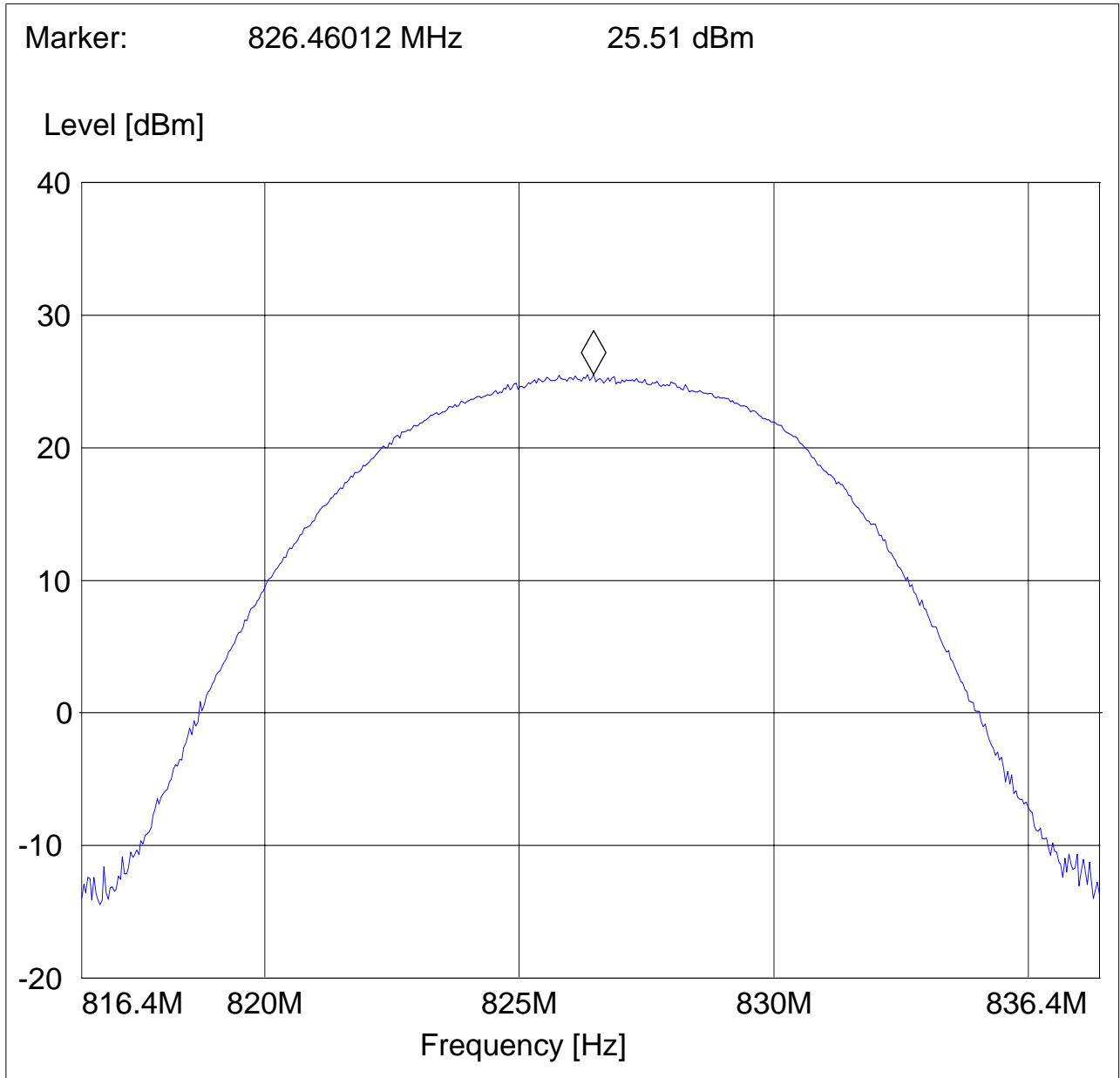


EIRP (UMTS FDD5) CHANNEL 4132, HSDPA+ HSUPA §22.913(a)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "EIRP 850 CH 4132H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
816.4 MHz	836.4 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM



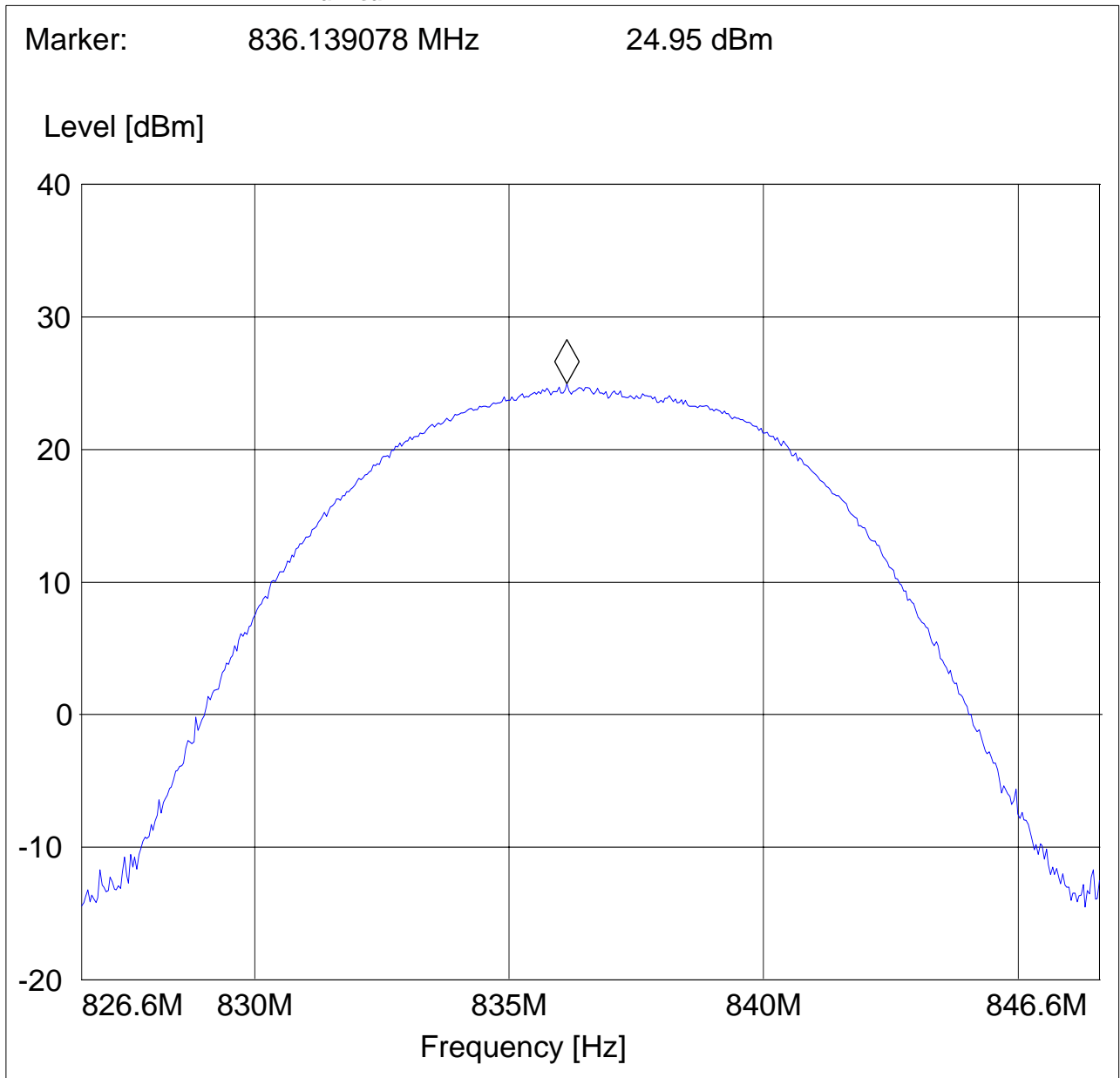


EIRP (UMTS FDD5) CHANNEL 4183, HSDPA+ HSUPA §22.913(a)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "EIRP 850 CH 4183 H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
826.6 MHz	846.6 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM
		MaxPeak			



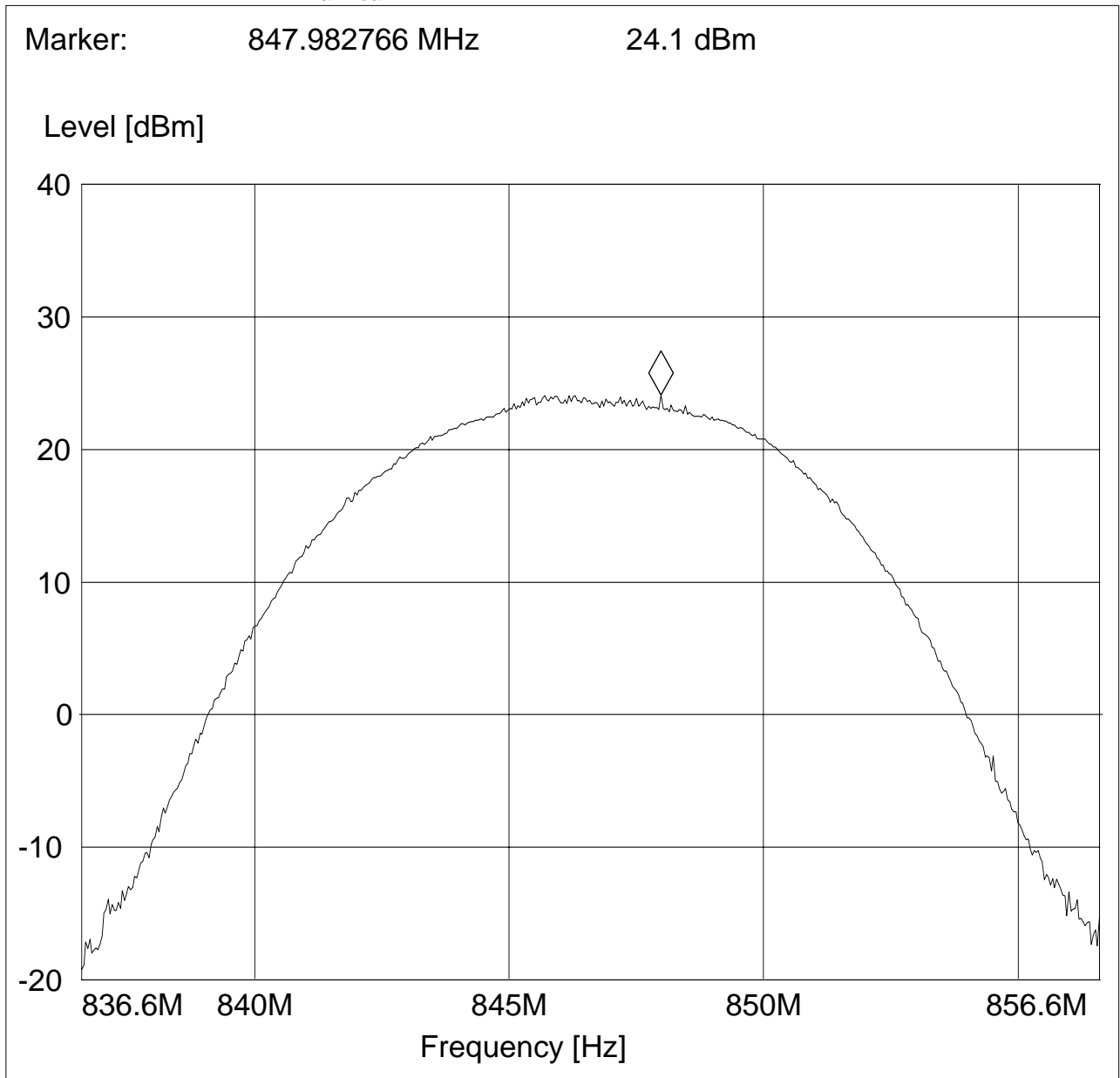


EIRP (UMTS FDD5) CHANNEL 4233, HSDPA+ HSUPA §22.913(a)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "EIRP 850 CH 4233H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
836.6 MHz	856.6 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM





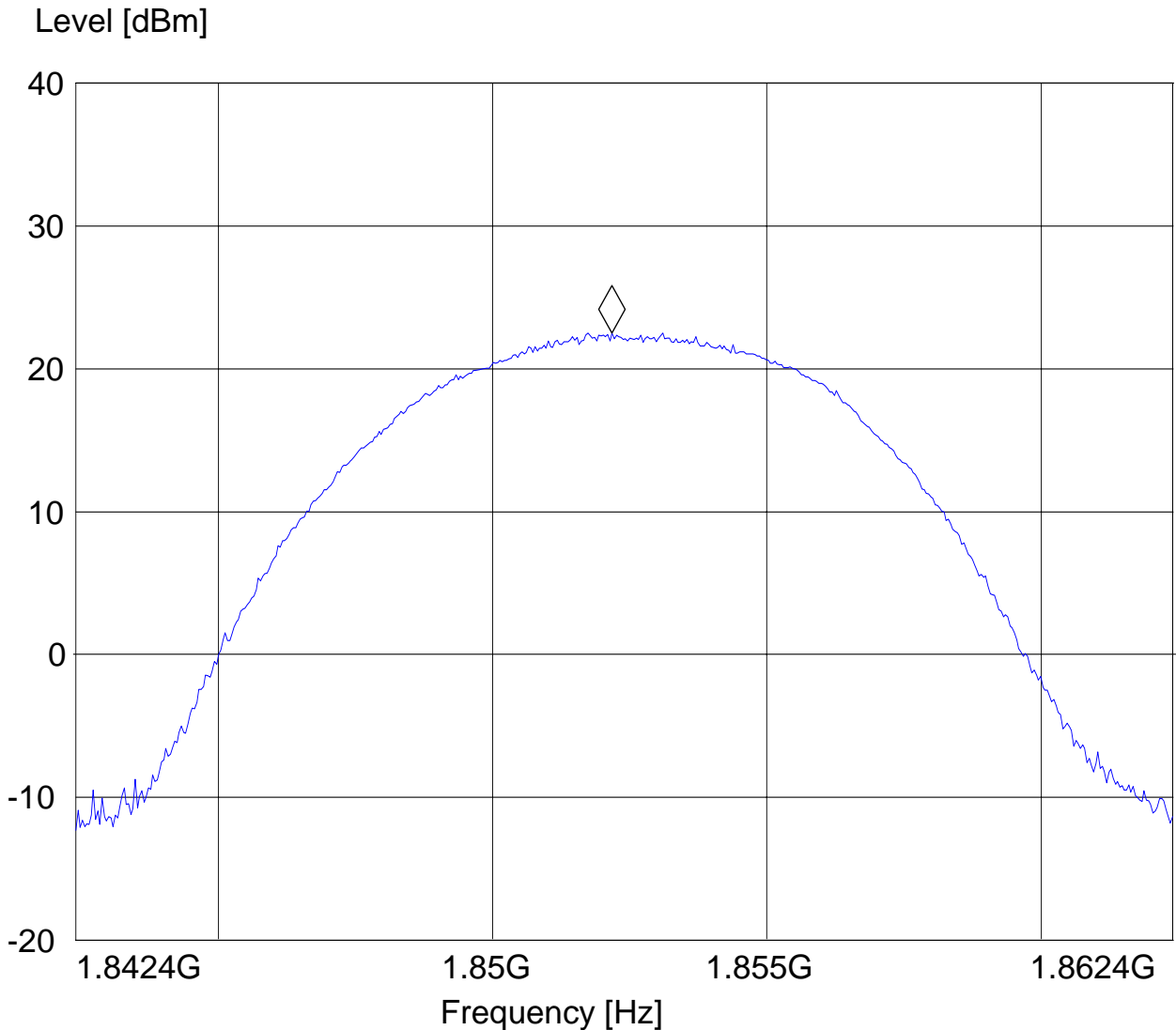
EIRP (UMTS FDD2) CHANNEL 9262, HSDPA Only §24.232(b)

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA

SWEEP TABLE: "EIRP 1900 CH 9262"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.8 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

Marker: 1.852179559 GHz 22.52 dBm



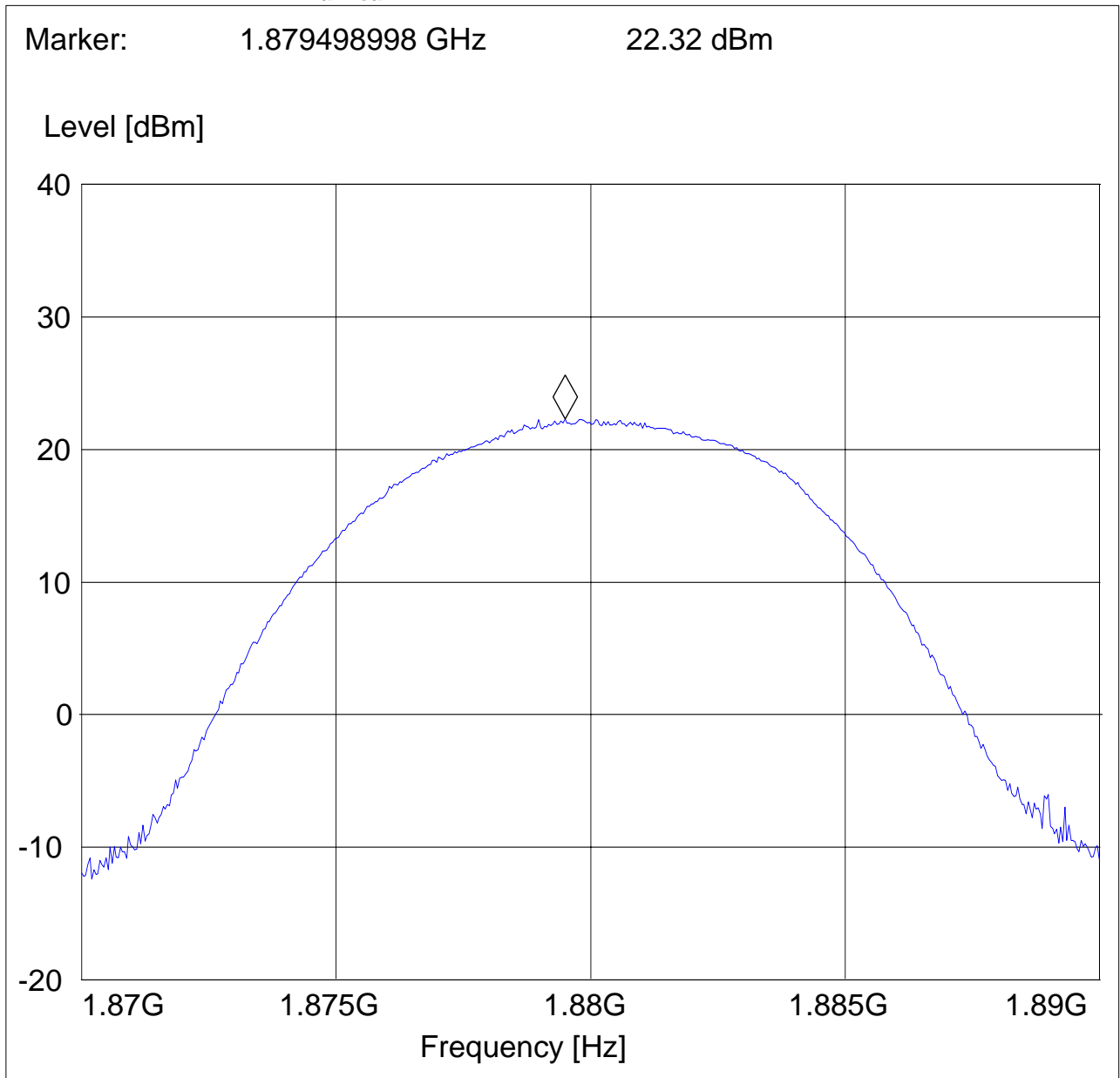


EIRP (UMTS FDD2) CHANNEL 9400, HSDPA Only §24.232(b)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "EIRP 1900 CH 9400"

Short Description:		EIRP PCS 1900 for channel-661			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM
		MaxPeak			





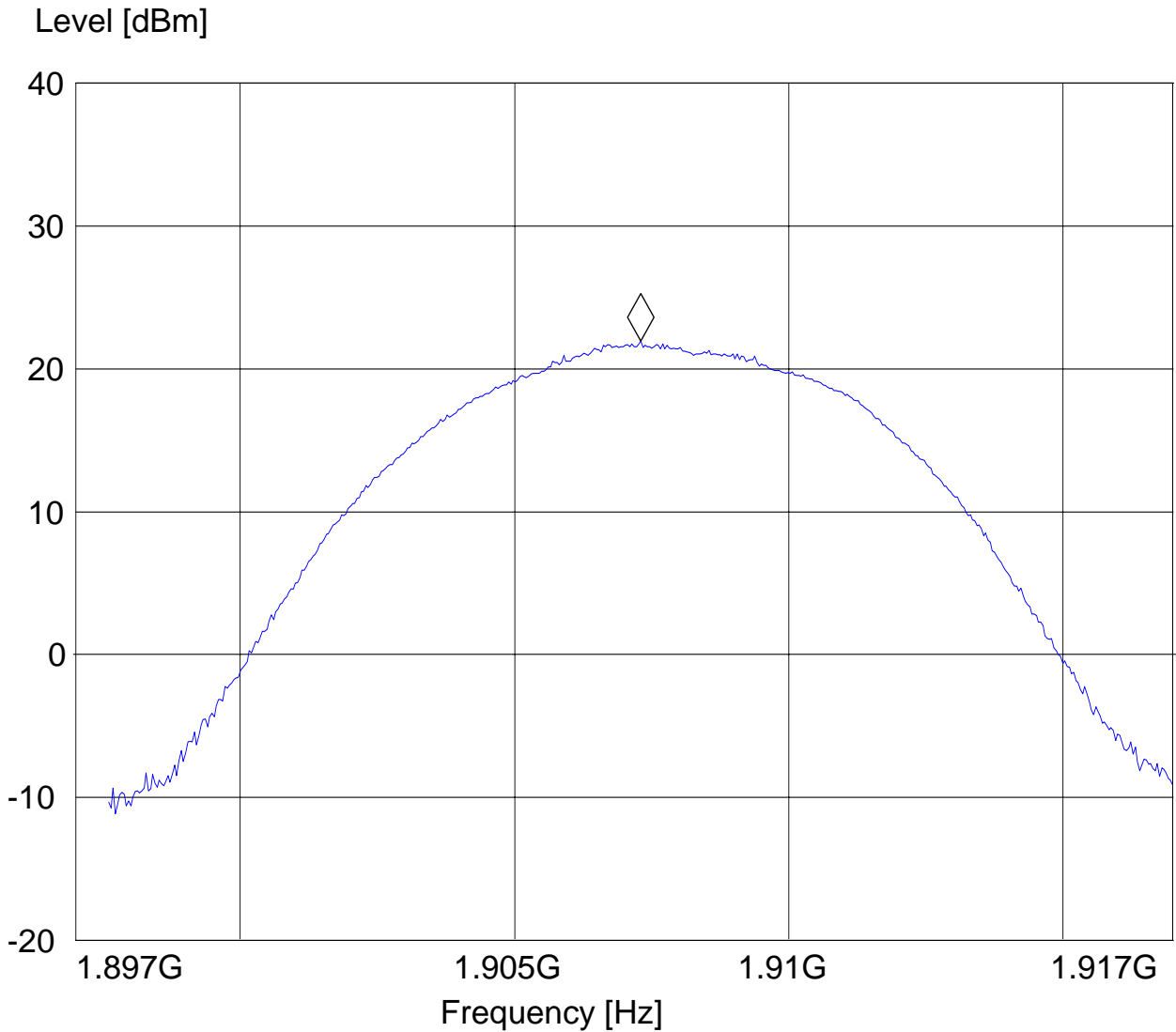
EIRP (UMTS FDD2) CHANNEL 9538, HSDPA Only §24.232(b)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "EIRP 1900 CH 9538"

Short Description:		EIRP PCS 1900 for channel-810			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

Marker: 1.907299399 GHz 21.94 dBm





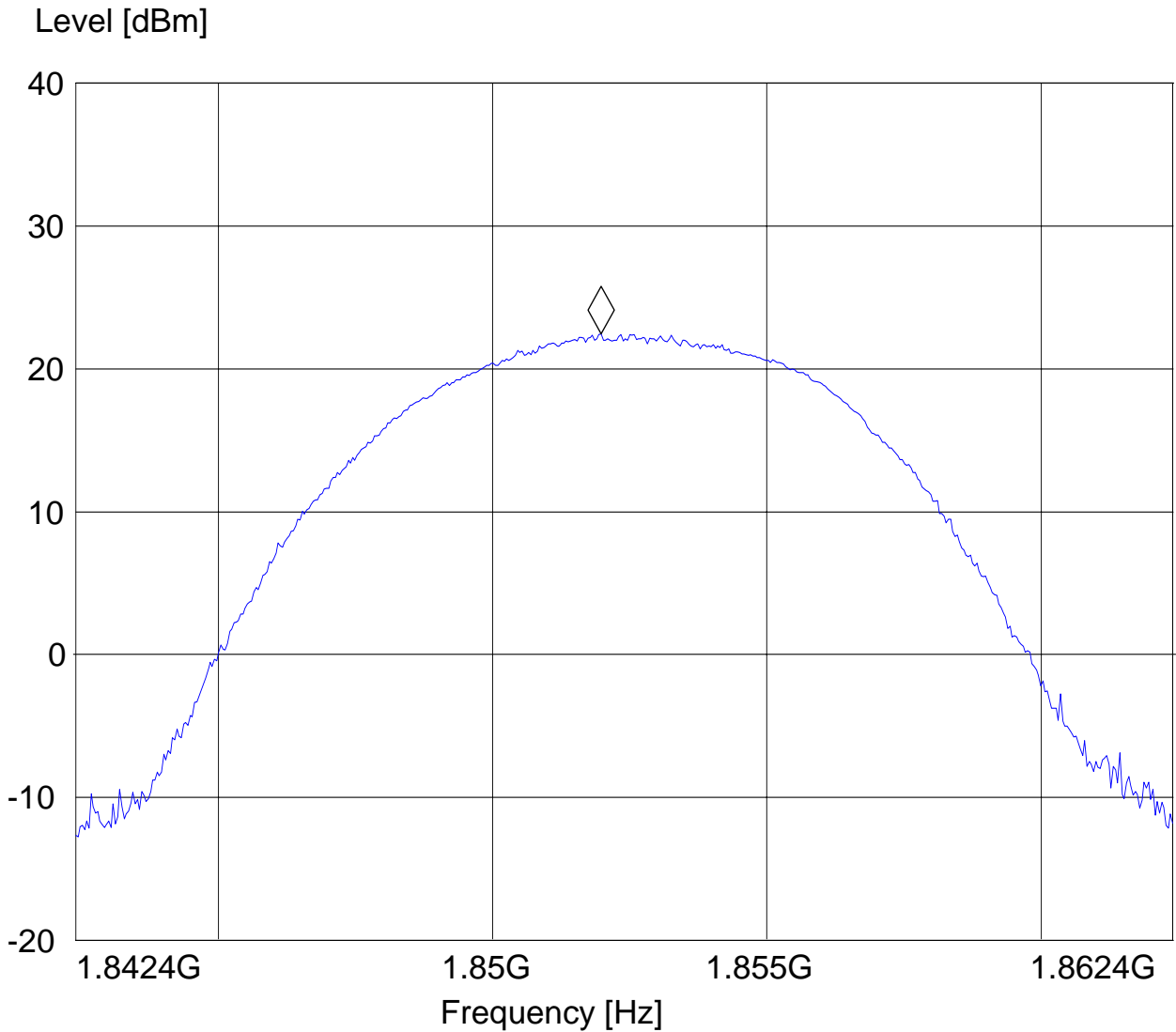
EIRP (UMTS FDD2) CHANNEL 9262, HSDPA + HSUPA §24.232(b)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "EIRP 1900 CH 9262"

Short Description:		EIRP PCS 1900 for channel-512			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.8 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

Marker: 1.851979158 GHz 22.45 dBm



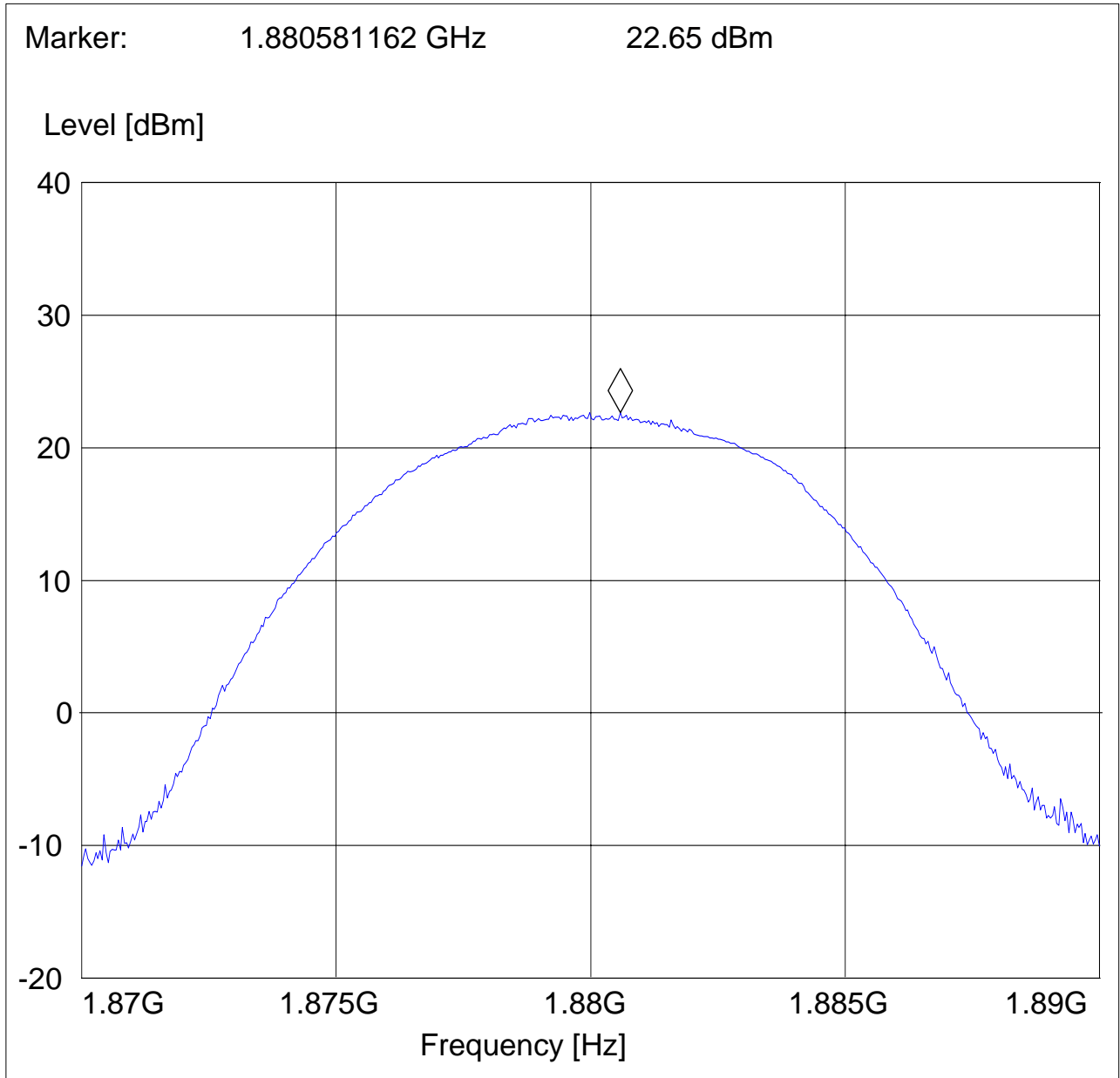


EIRP (UMTS FDD2) CHANNEL 9400, HSDPA + HSUPA §24.232(b)

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "EIRP 1900 CH 9400"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

Short Description: EIRP PCS 1900 for channel-661
MaxPeak





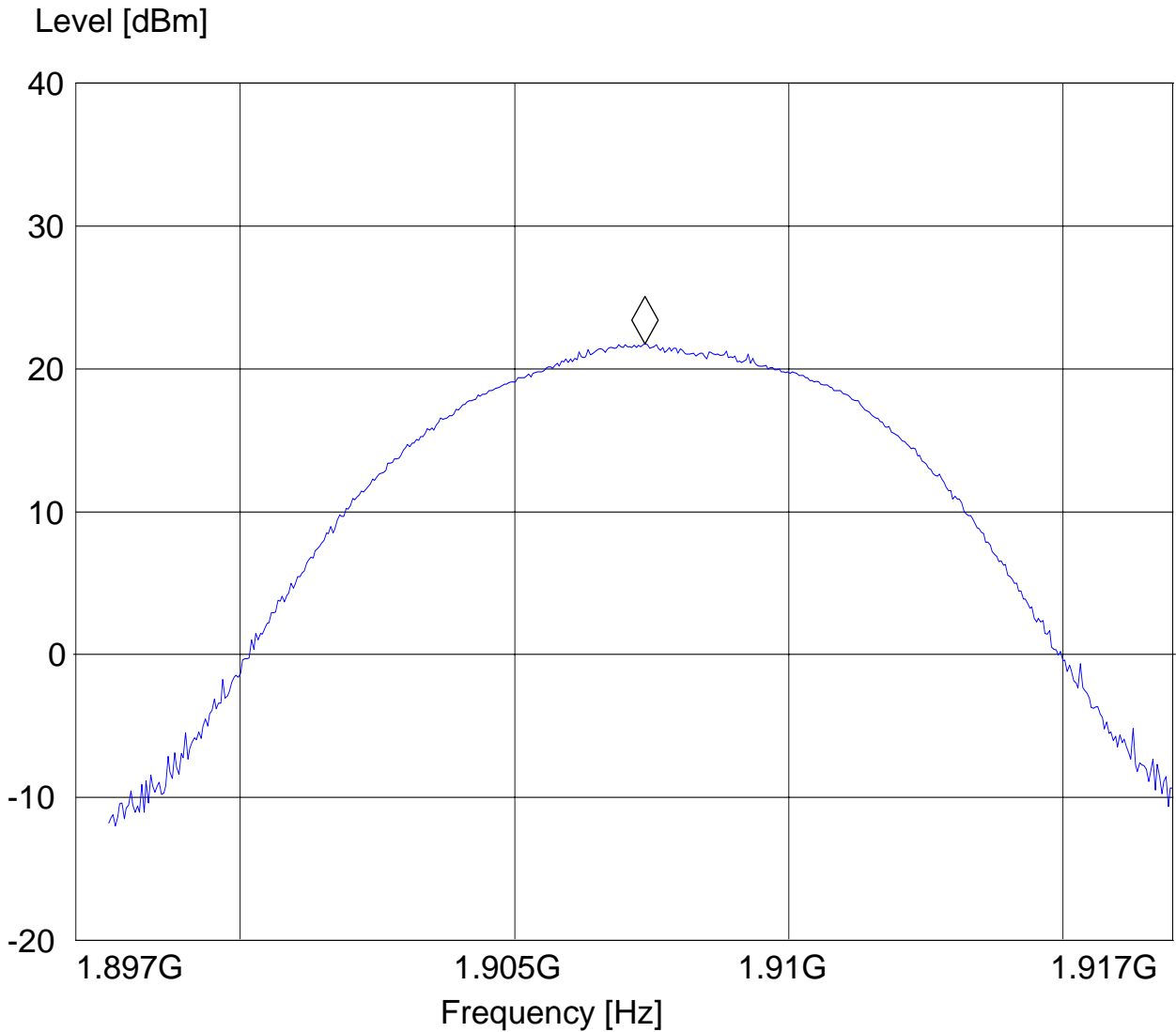
EIRP (UMTS FDD2) CHANNEL 9538, HSDPA + HSUPA §24.232(b)

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

SWEEP TABLE: "EIRP 1900 CH 9538"

Short Description:		EIRP PCS 1900 for channel-810			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

Marker: 1.907379559 GHz 21.75 dBm



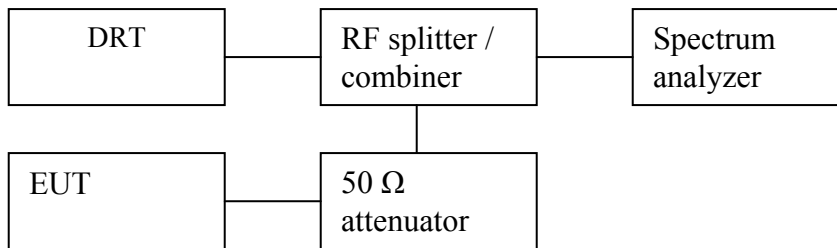
5.2 Occupied Bandwidth/Emission Bandwidth

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:



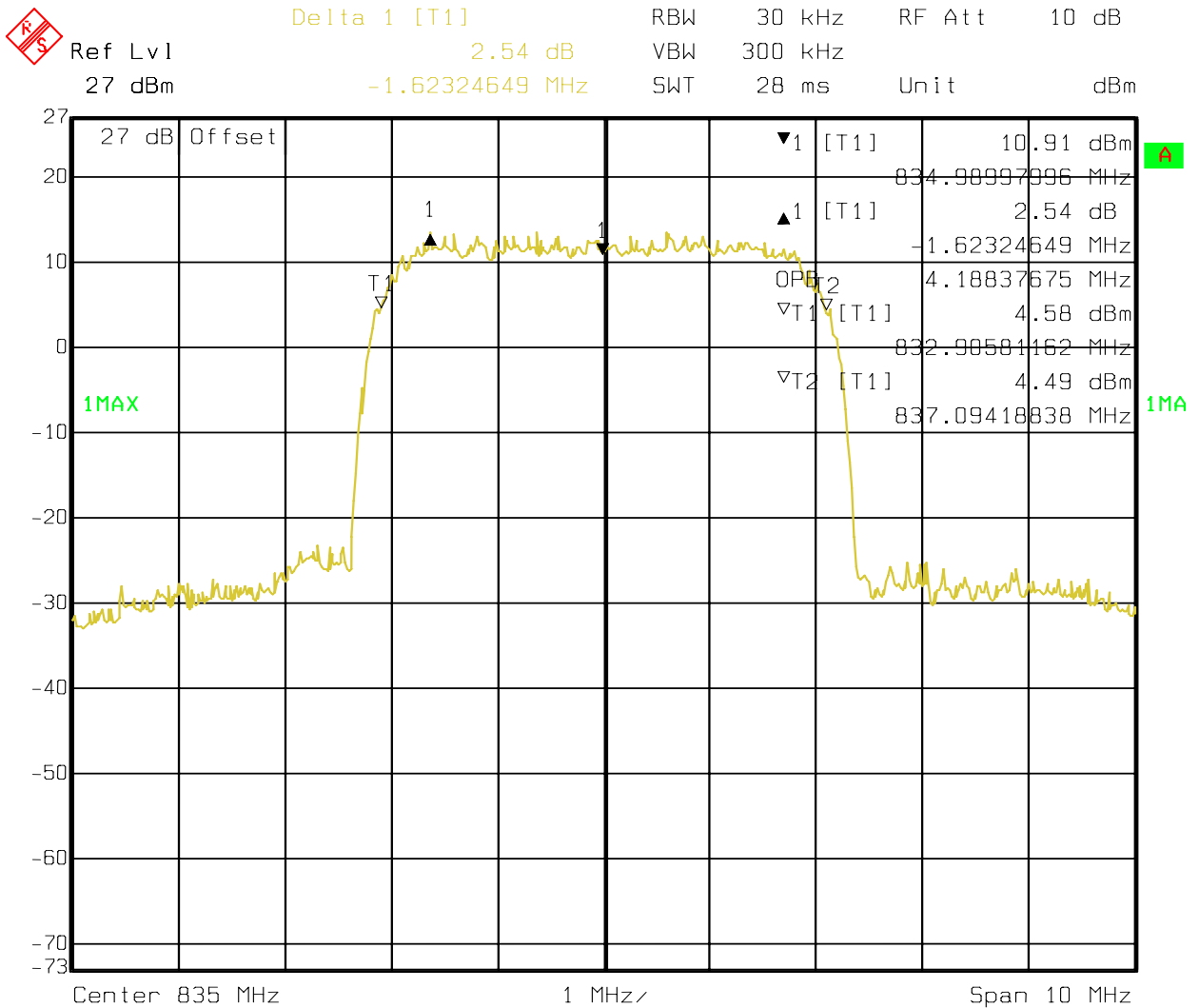
1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure the 99% (-20 dB) occupied bandwidth. Record the value.
4. Set the spectrum 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:

Occupied bandwidth is measured on the middle channel in both FDD2 and FDD5 band in both HSDPA and HSDPA + HSUPA operating mode. Measurement results show that there is no change to the signal envelop when HSUPA is switched on.

FDD5 HSDPA Only



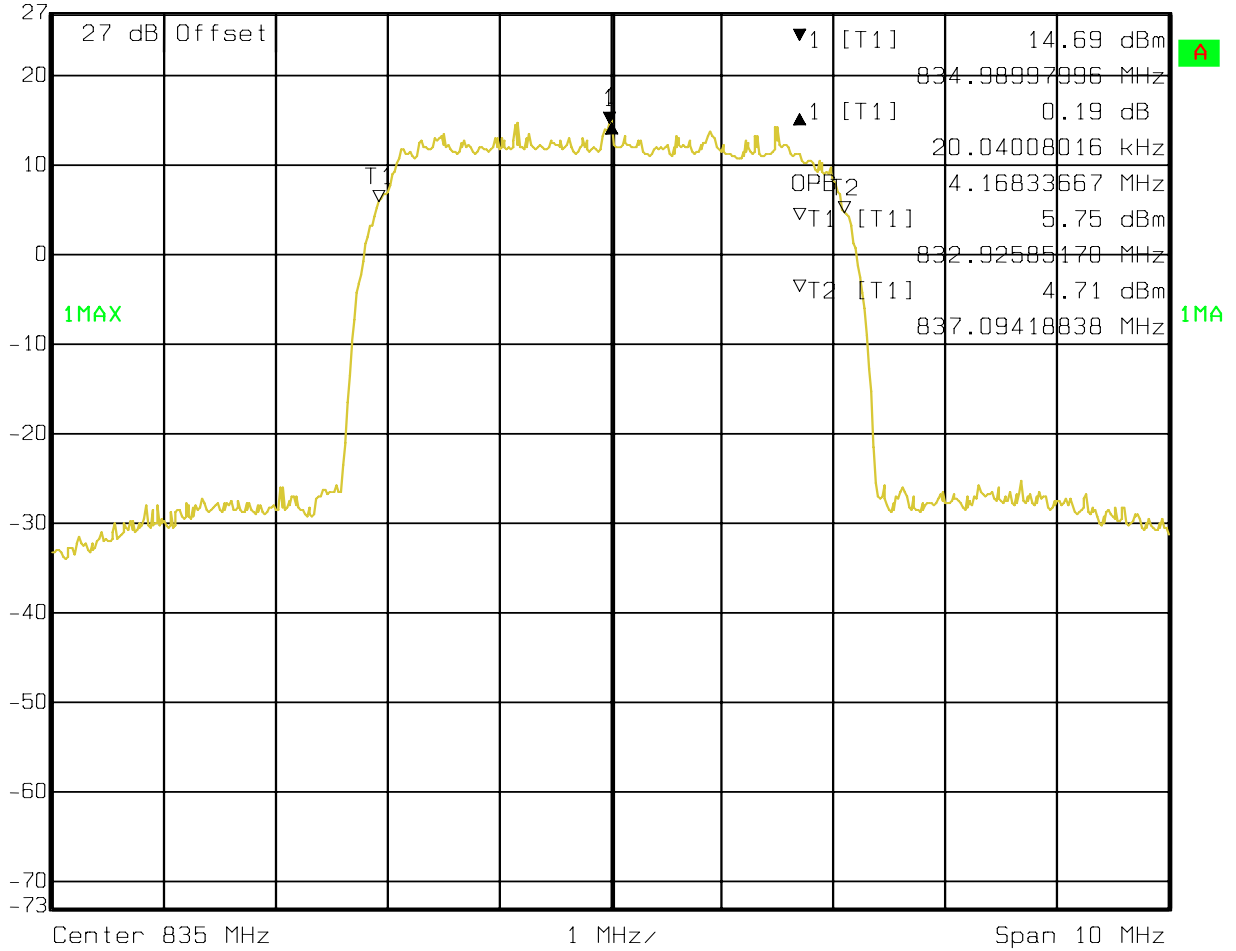
Date: 02.AUG.2007 14:00:46



FDD5 HSDPA + HSUPA



Delta 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 0.19 dB VBW 300 kHz
 27 dBm 20.04008016 kHz SWT 28 ms Unit dBm



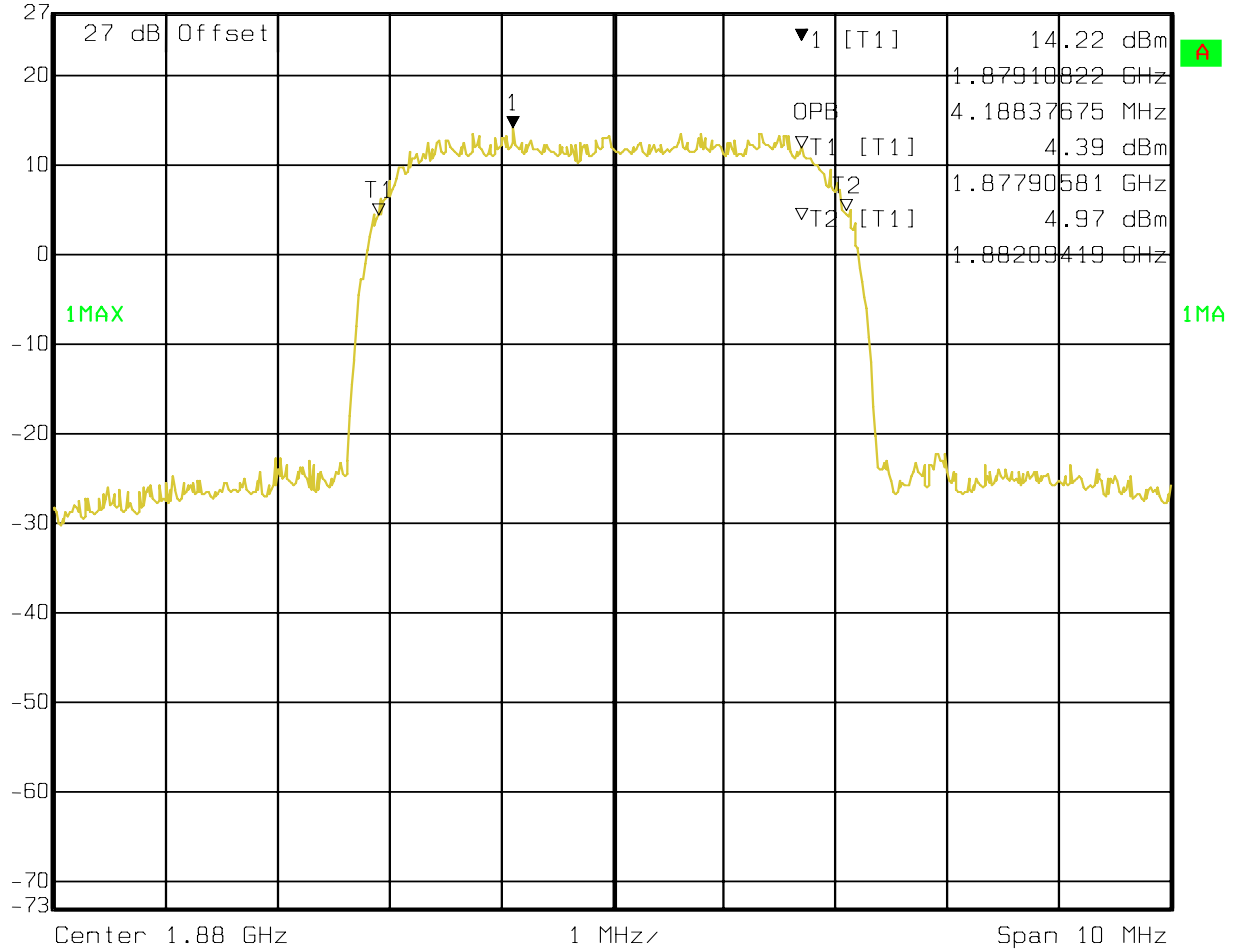
Date: 02.AUG.2007 13:56:50



FDD2 HSDPA Only



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 14.22 dBm VBW 300 kHz
 27 dBm 1.87910822 GHz SWT 28 ms Unit dBm



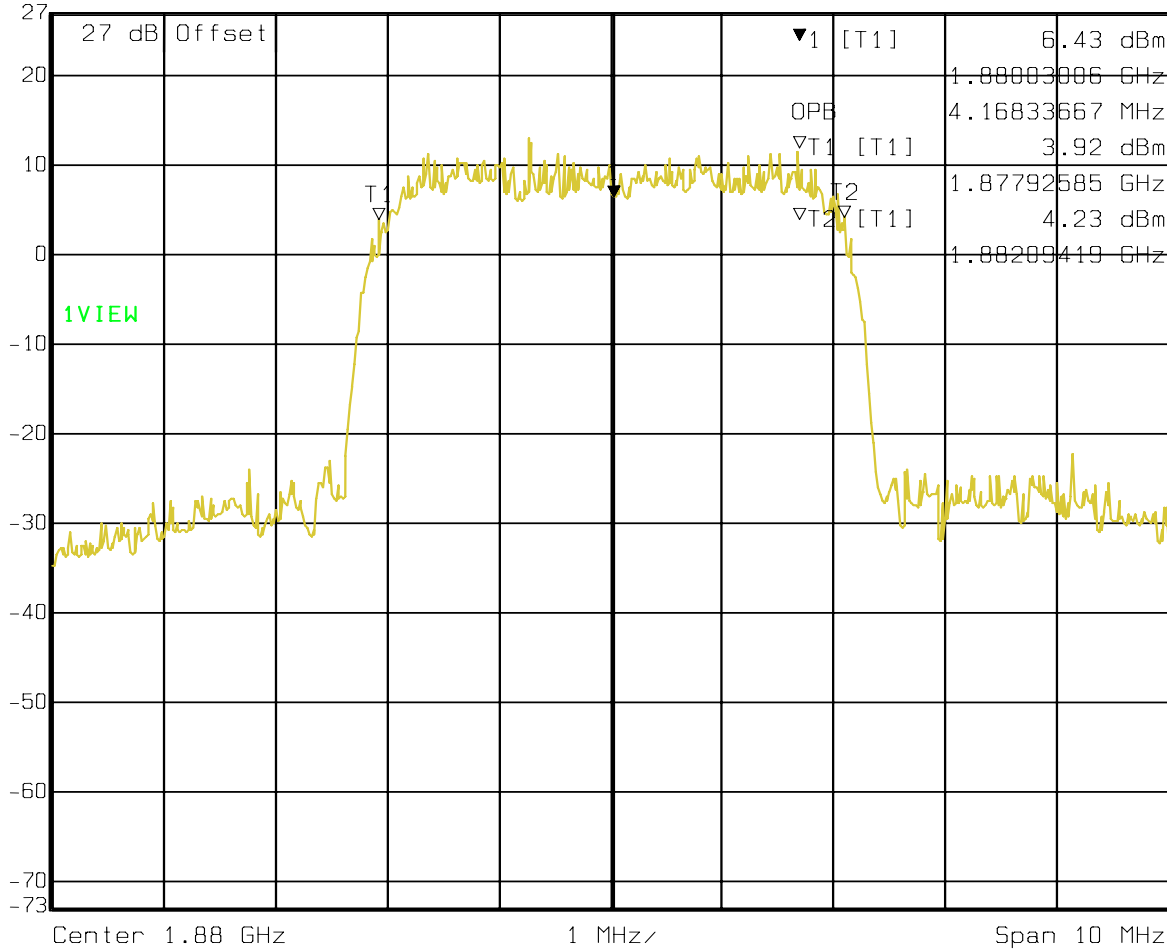
Date: 02.AUG.2007 14:04:09



FDD5 HSDPA + HSUPA



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
Ref Lvl 6.43 dBm VBW 300 kHz
27 dBm 1.88003006 GHz SWT 28 ms Unit dBm



Date: 02.AUG.2007 14:08:25

5.3 Frequency Stability

5.3.1 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 $+50\text{ C}$. 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 0.1 Volt 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 $+50\text{ C}$.
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 $+50\text{ C}$ 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 $\pm 0.5\text{ C}$ 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.

5.3.2 FREQUENCY STABILITY (GSM-850)

This EUT is a FCC approved module with FCC ID NBZNRM-X950D. This module is approved under HSDPA operating mode for UMTS FDD2 and FDD5 bands. Findings reported here proofs that with the addition of HSUPA operation the module complies with applicable FCC regulations.

5.3.3 FREQUENCY STABILITY (PCS-1900)

This EUT is a FCC approved module with FCC ID NBZNRM-X950D. This module is approved under HSDPA operating mode for UMTS FDD2 and FDD5 bands. Findings reported here proofs that with the addition of HSUPA operation the module complies with applicable FCC regulations.

5.4 Spurious Emissions Conducted

5.4.1 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.

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.

5.4.2.2 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.

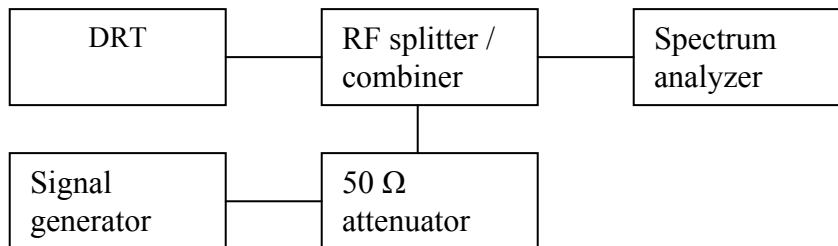
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

5.4.3 Conducted out of band emissions measurement procedure:

Based on TIA-603C 2004

2.2.13 Unwanted Emissions: Conducted Spurious

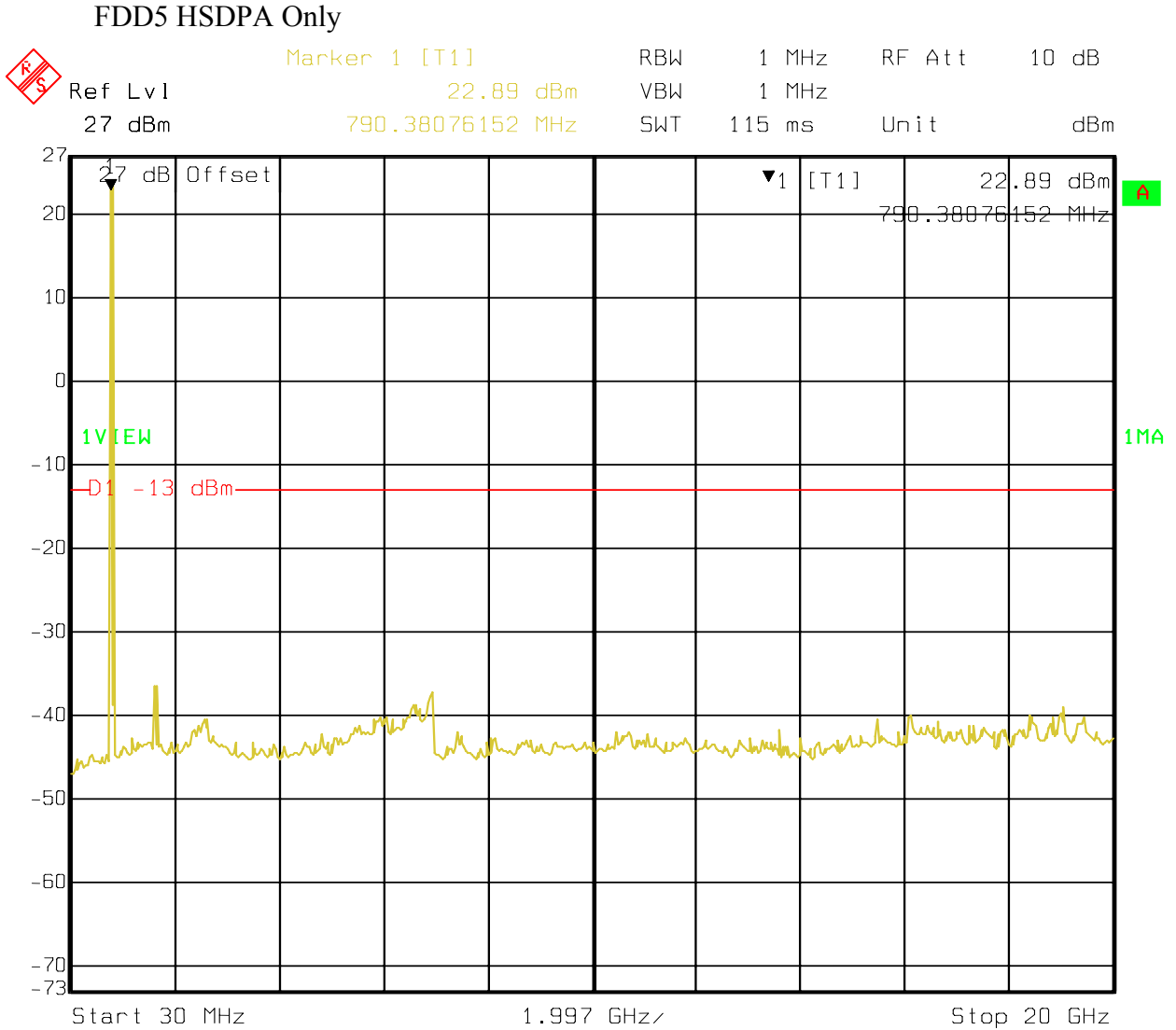


1. Connect the equipment as shown in the above diagram.
 2. Set the spectrum analyzer to measure peak hold with the required settings.
 3. Set the signal generator to a known output power and record the path loss in dB (**LOSS**) for frequencies up to the tenth harmonic of the EUT's carrier frequency. **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.)



5.4.4 Test Results: Conducted Emission:

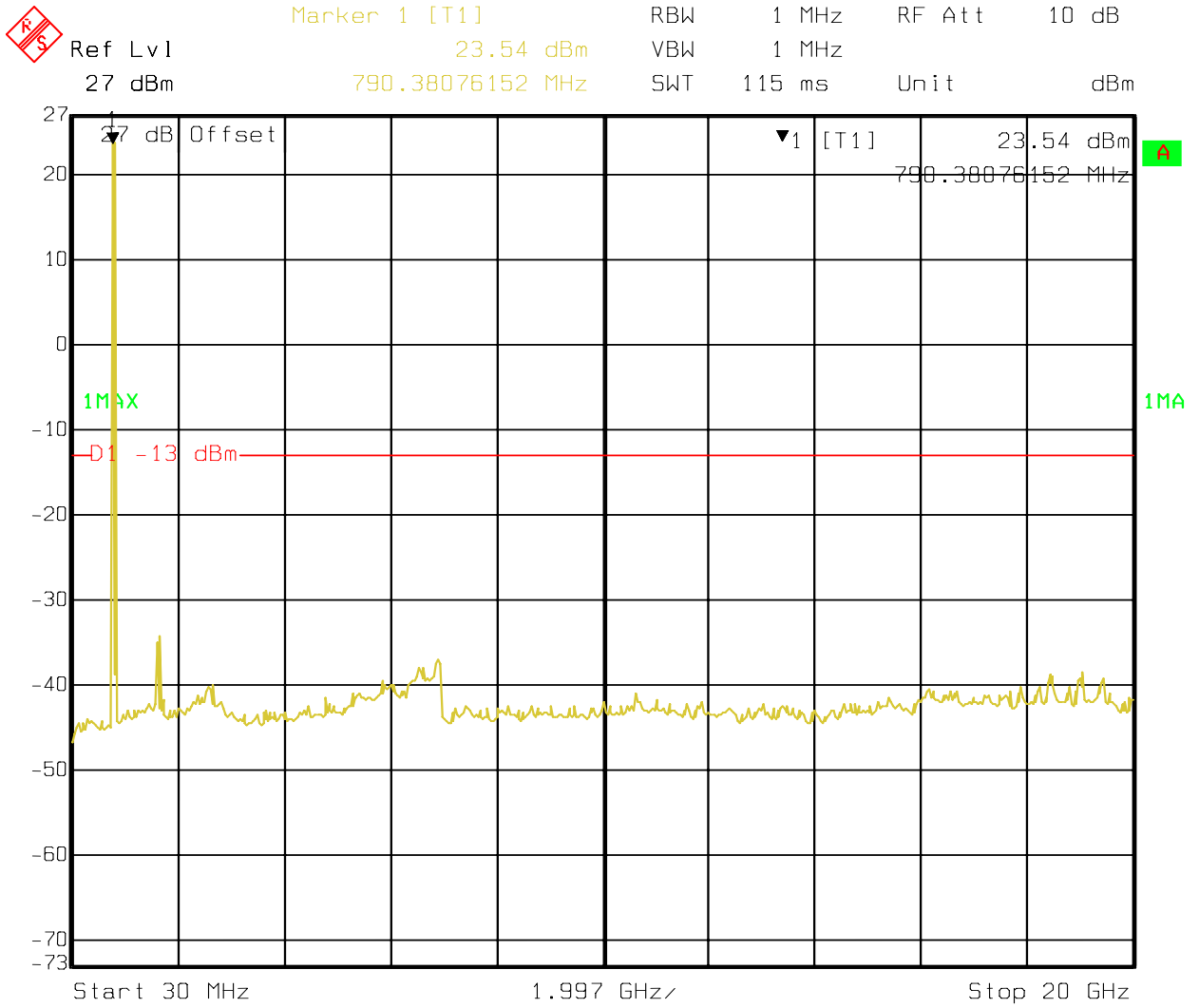
Measurements are made on the middle channel in both FDD2 and FDD5 band in both HSDPA and HSDPA + HSUPA operating mode. Results show that there is no change to the emission signature when HSUPA is switched on.



Date: 02.AUG.2007 12:36:25



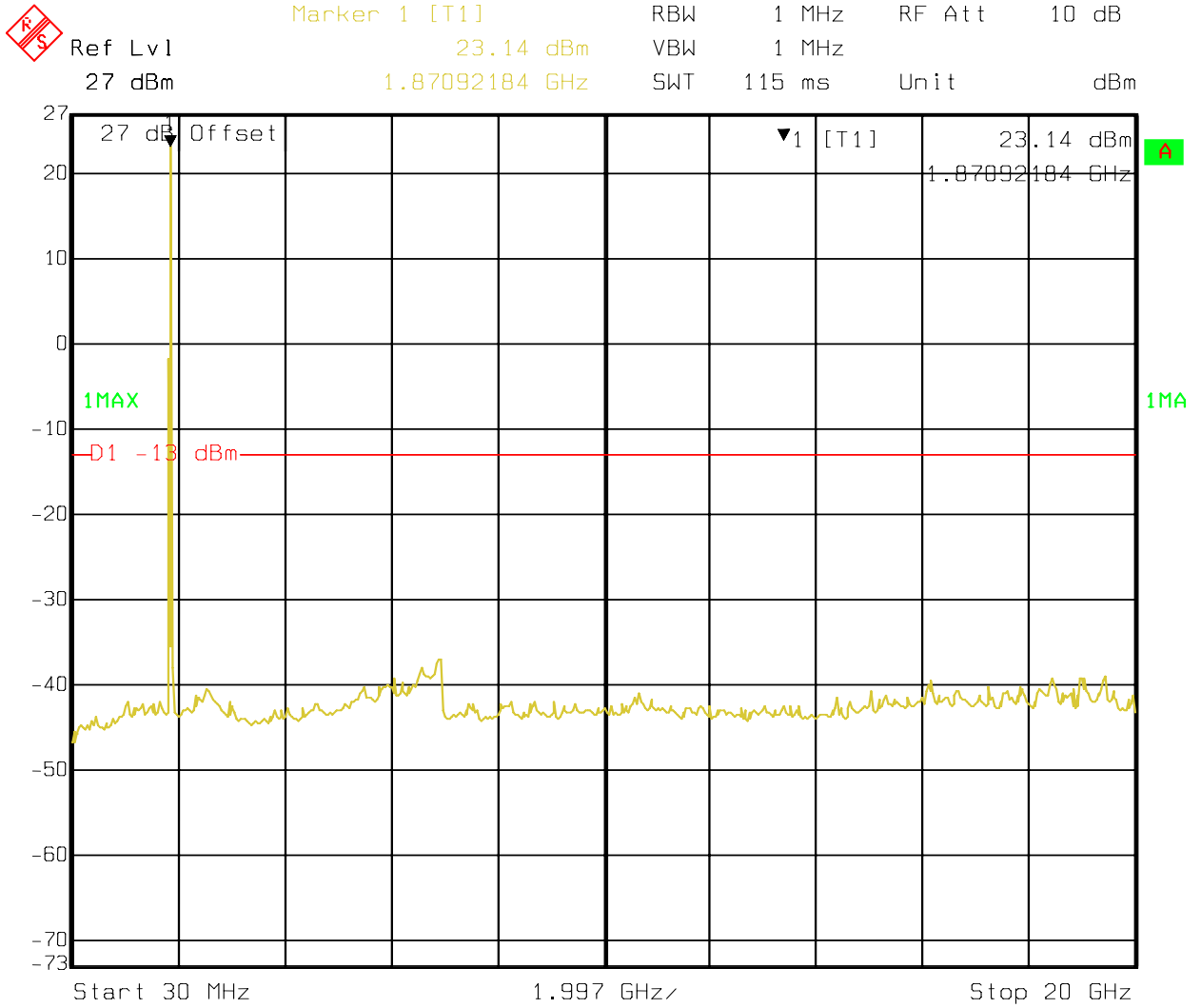
FDD5 HSDPA + HSUPA



Date: 02.AUG.2007 12:35:35



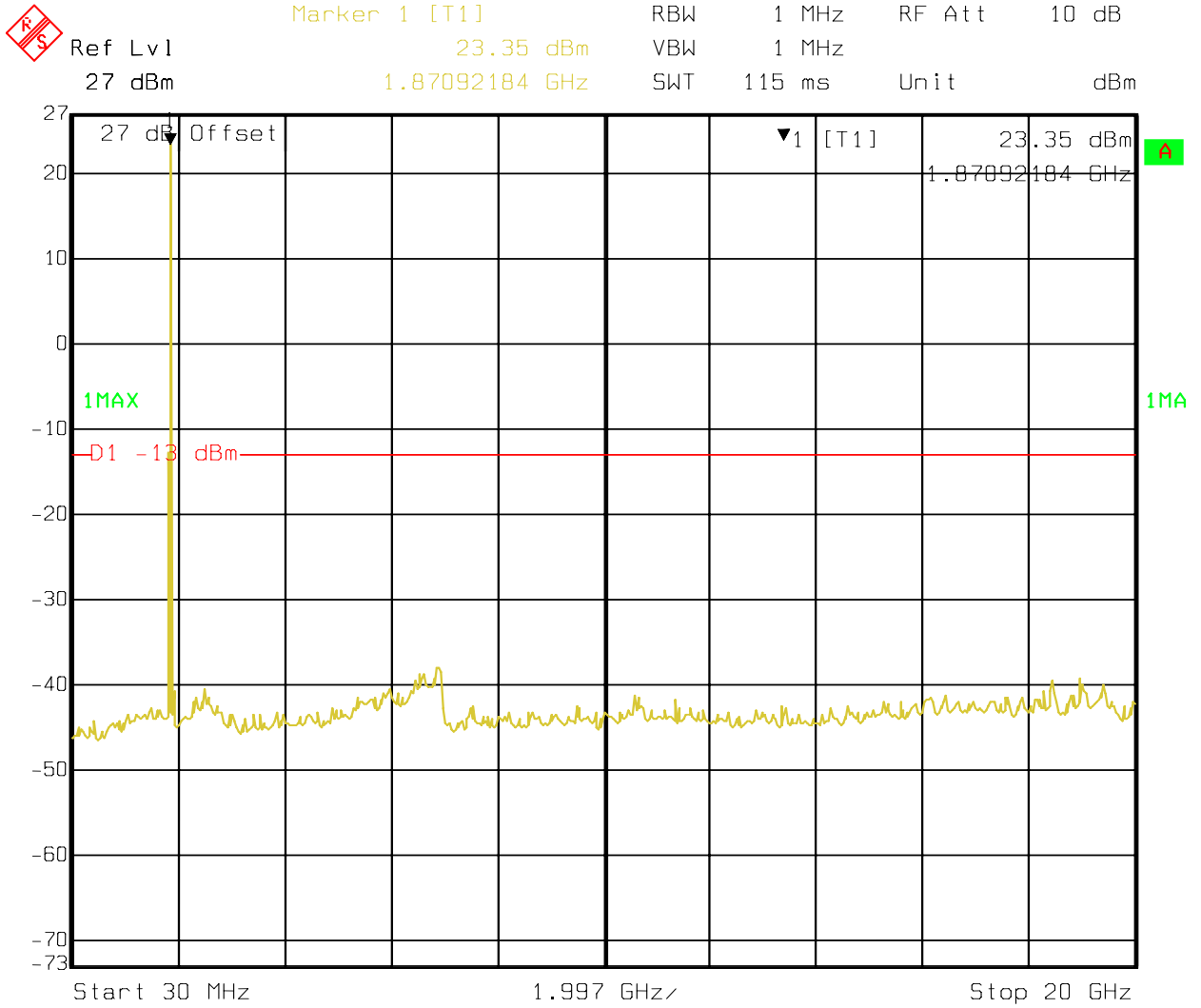
FDD2 HSDPA Only



Date: 02.AUG.2007 12:33:01



FDD2 HSDPA + HSUPA



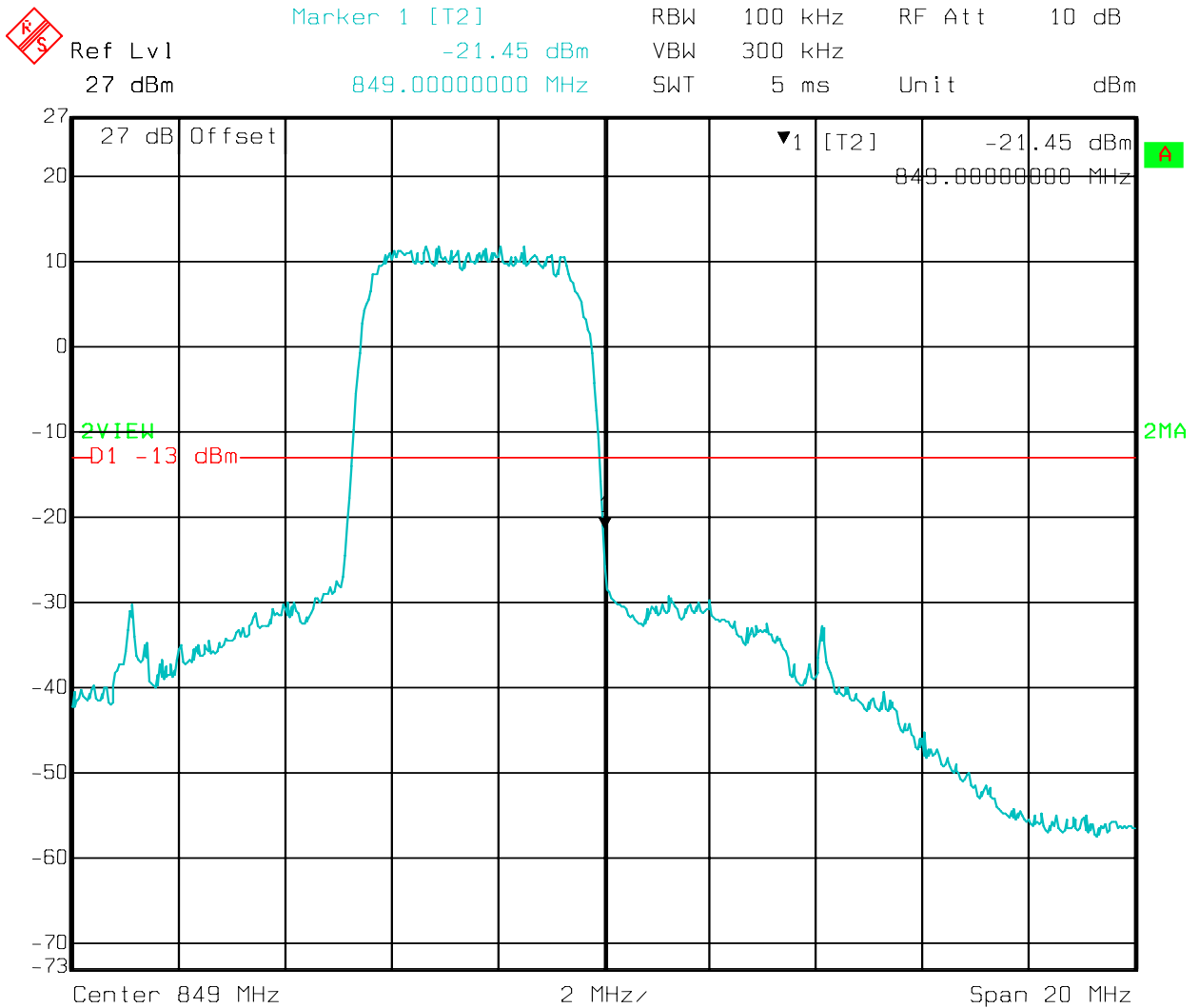
Date: 02.AUG.2007 12:33:36



5.4.5 Test Results: Band Edge:

Measurements are made in both FDD2 and FDD5 bands in both HSDPA and HSDPA + HSUPA operating modes. Results show no measurable change.

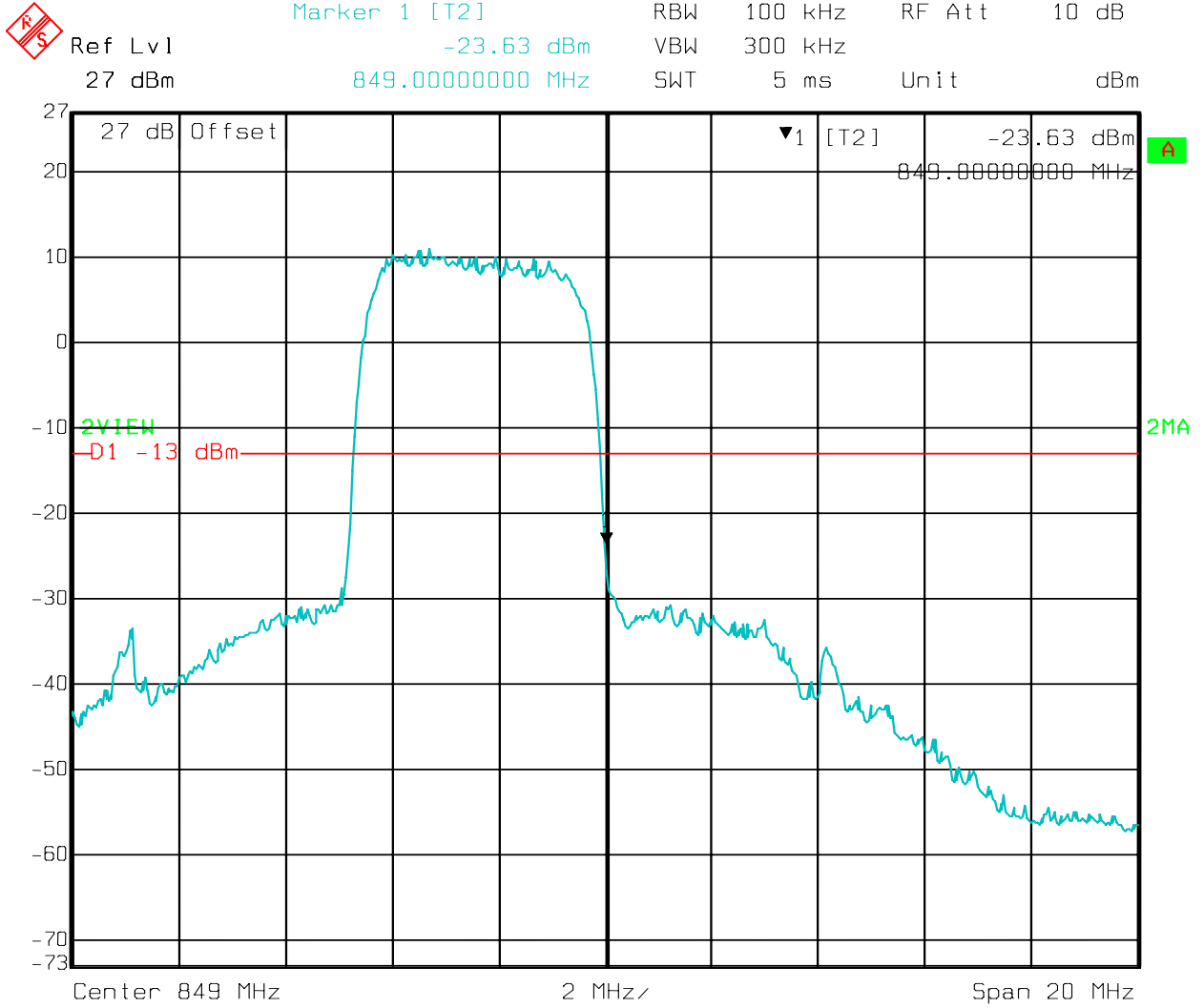
FDD5 HSDPA Only



Date: 02.AUG.2007 16:11:18



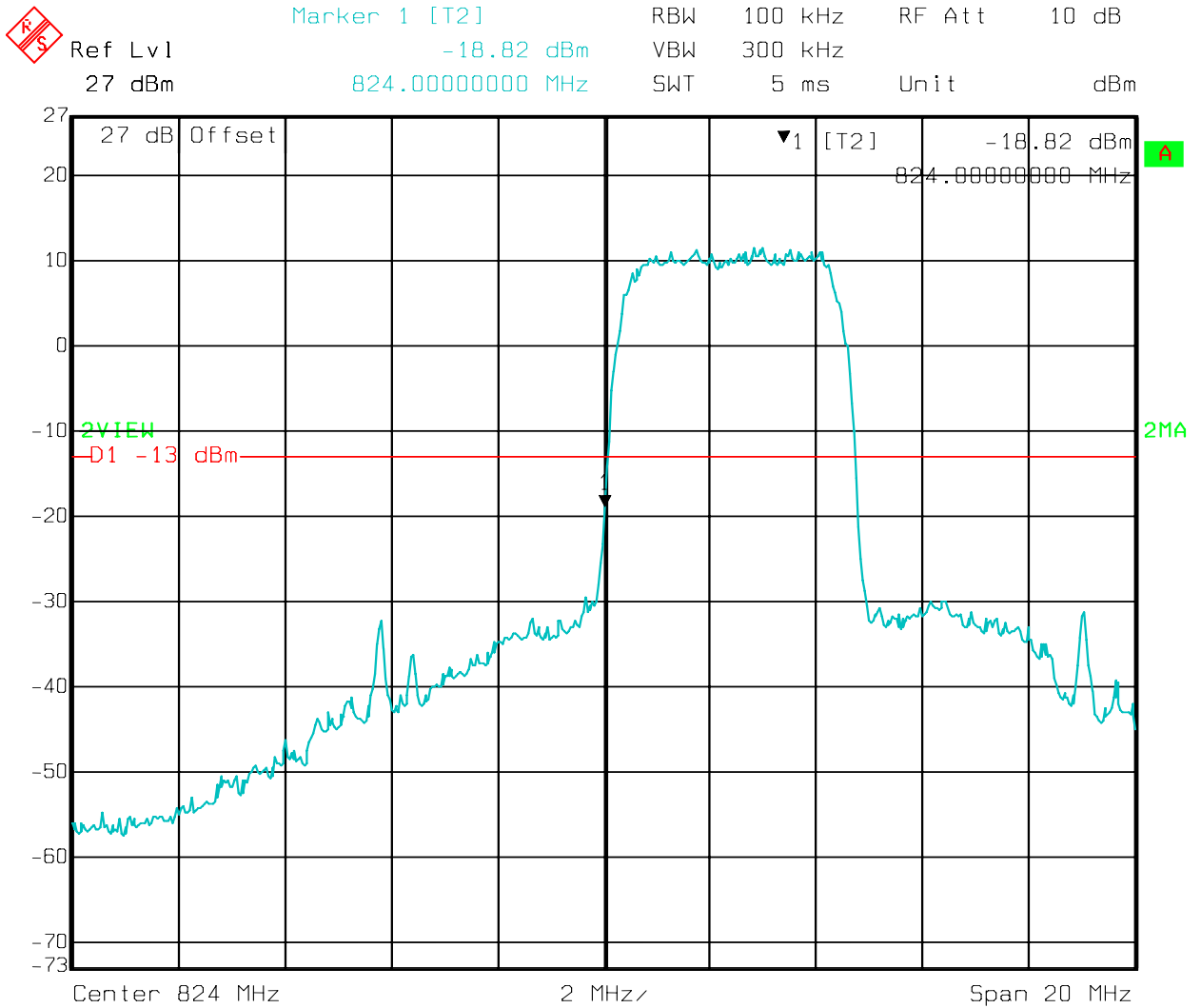
FDD5 HSDPA + HSUPA



Date: 02.AUG.2007 16:14:07



FDD5 HSDPA Only



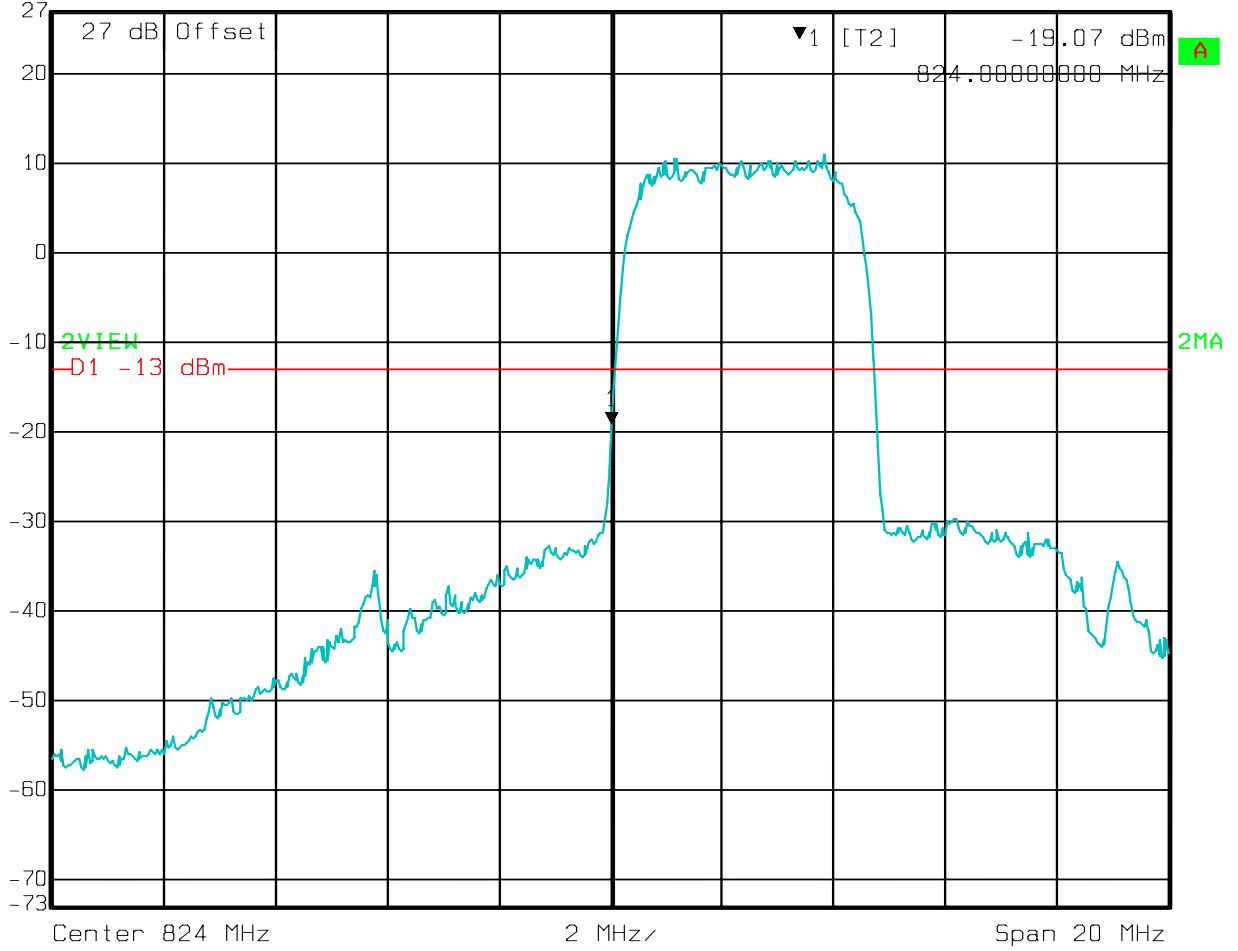
Date: 02.AUG.2007 16:07:50



FDD5 HSDPA + HSUPA



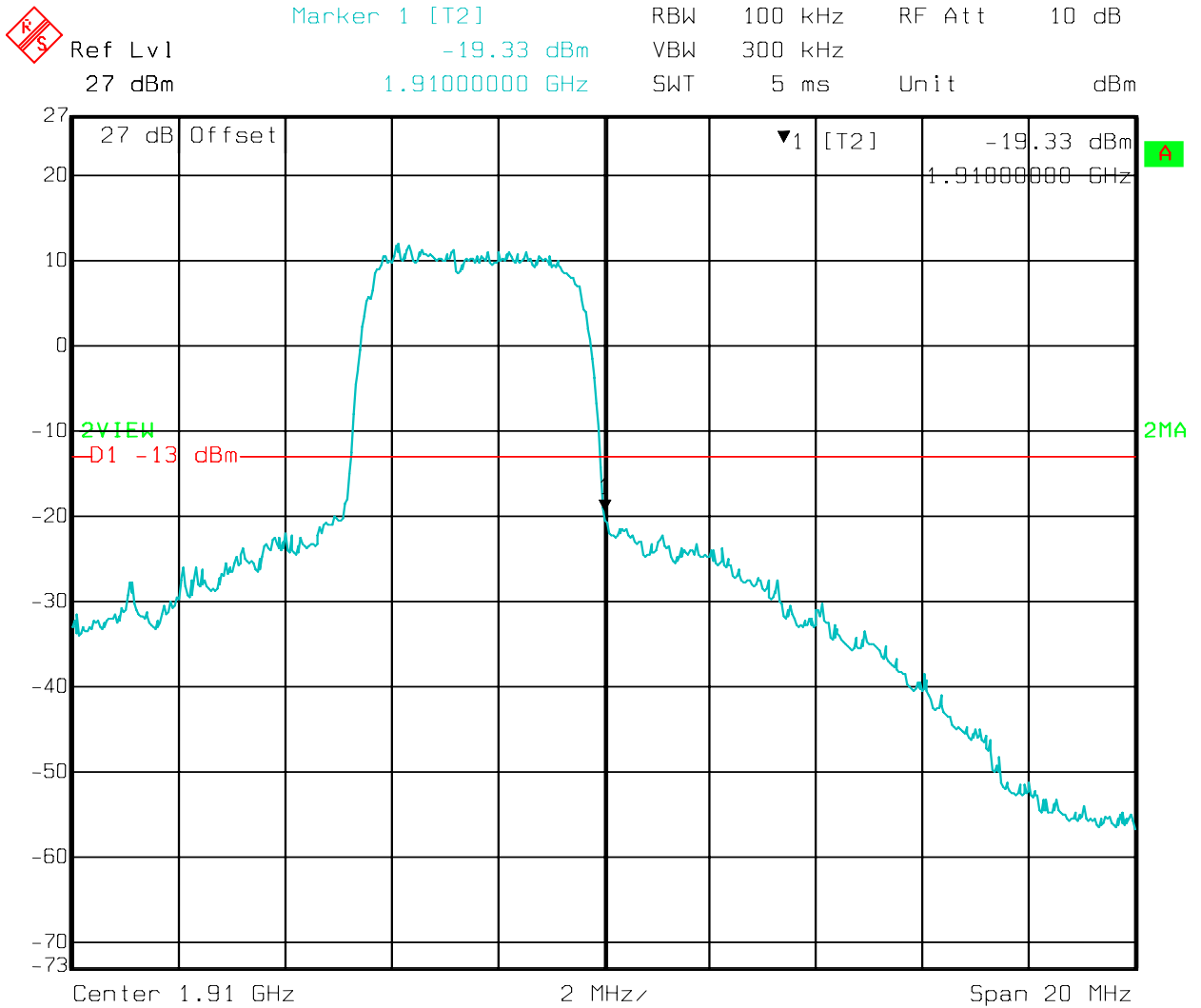
Ref Lvl 27 dBm
Marker 1 [T2] -19.07 dBm
824.00000000 MHz
RBW 100 kHz RF Att 10 dB
VBW 300 kHz
SWT 5 ms Unit dBm



Date: 02.AUG.2007 16:06:20



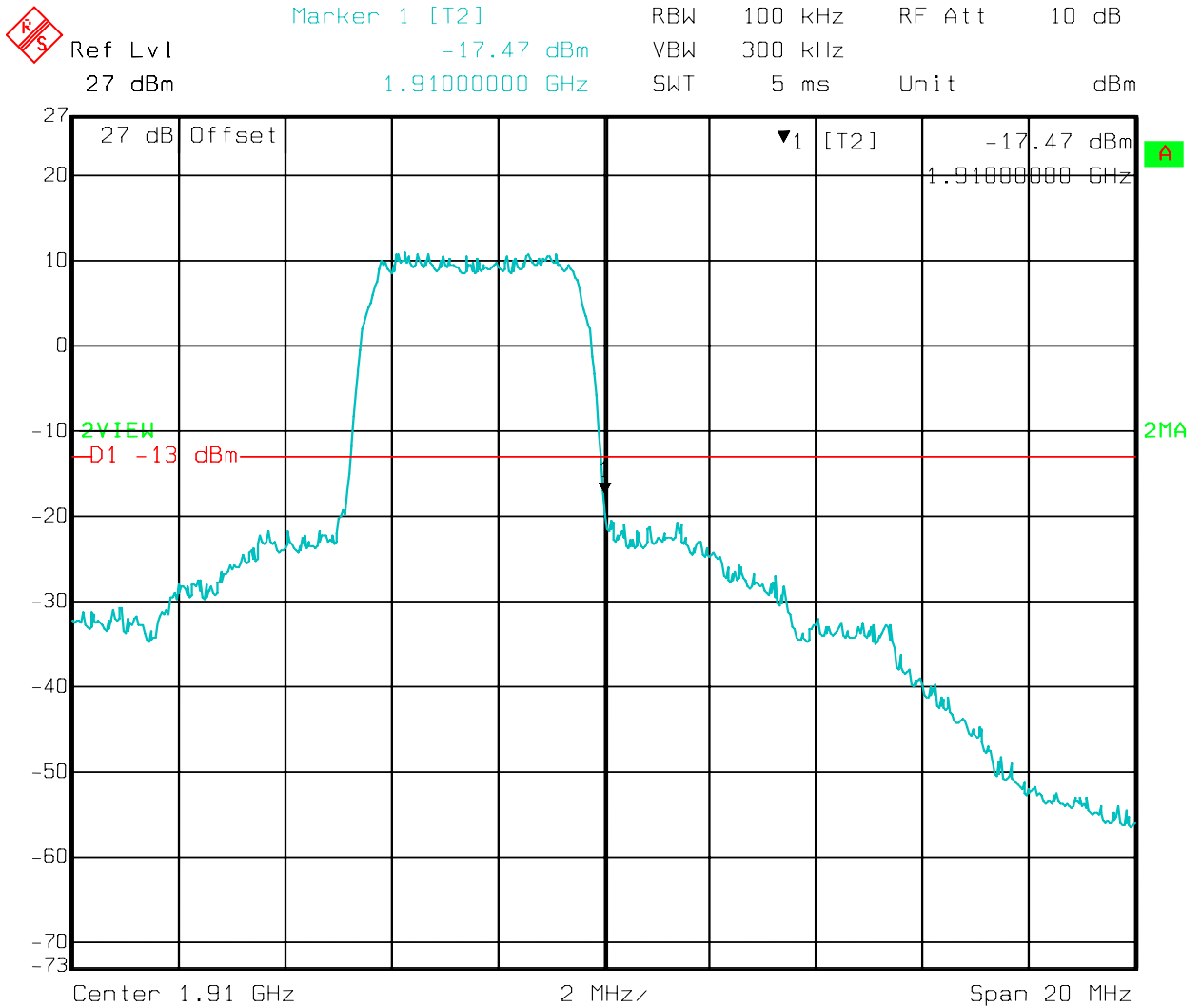
FDD2 HSDPA Only



Date: 02.AUG.2007 16:24:29



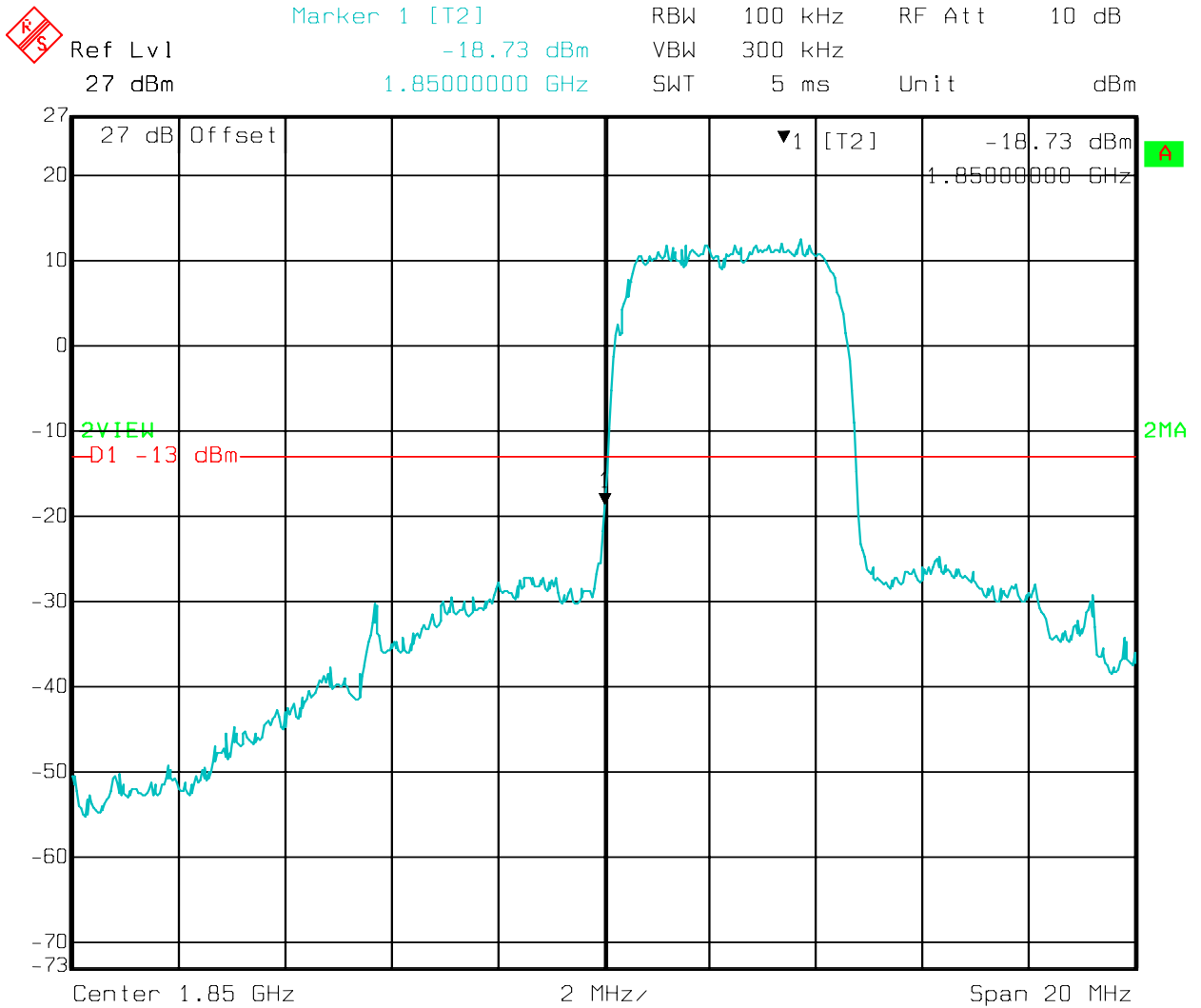
FDD2 HSDPA + HSUPA



Date: 02.AUG.2007 16:25:51



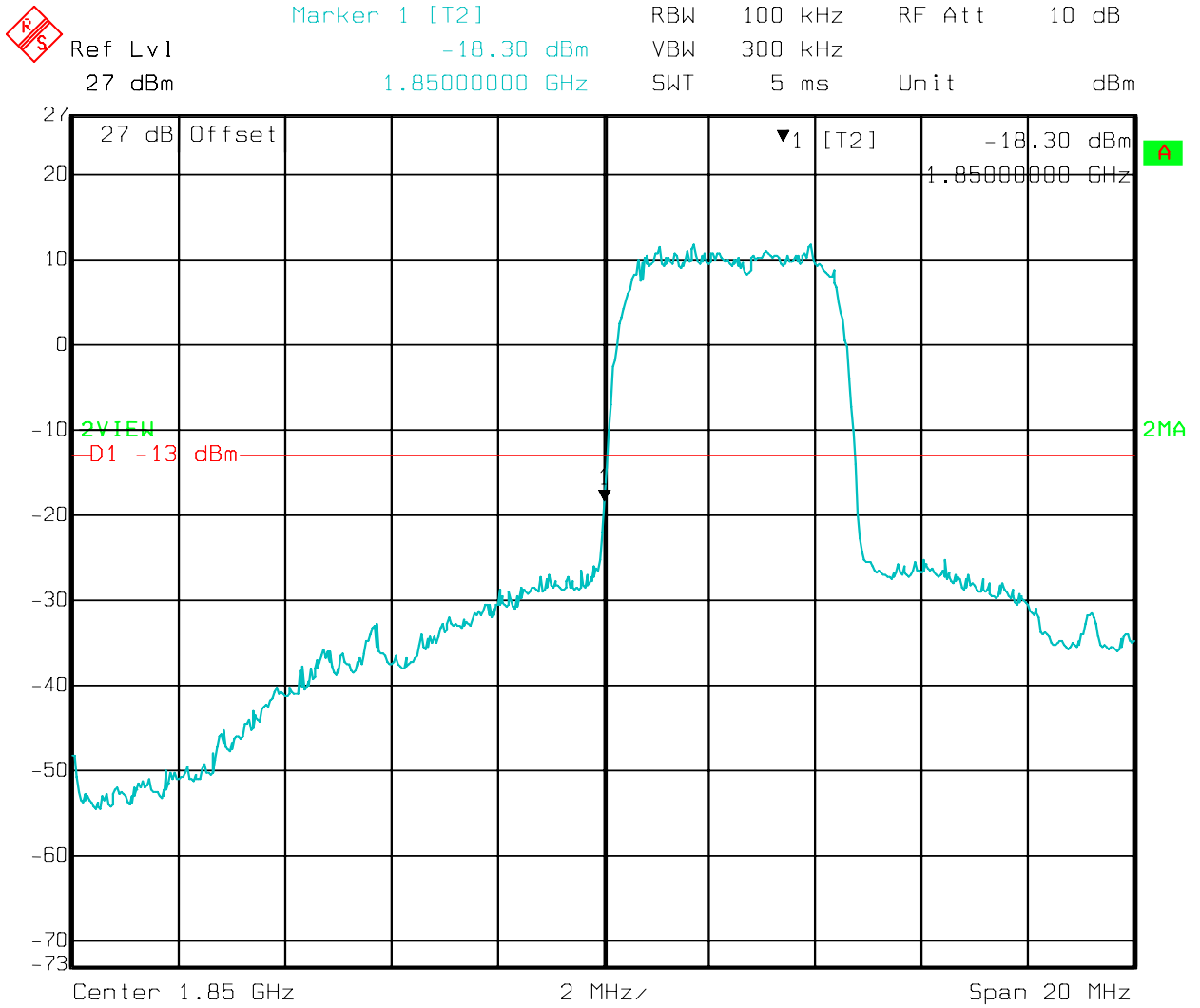
FDD2 HSDPA Only



Date: 02.AUG.2007 16:22:54



FDD2 HSDPA + HSUPA



Date: 02.AUG.2007 16:21:20

5.5 Spurious Emissions Radiated

5.5.1 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.

5.5.2 Limits:

5.5.2.1 **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.

5.5.2.2 **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.

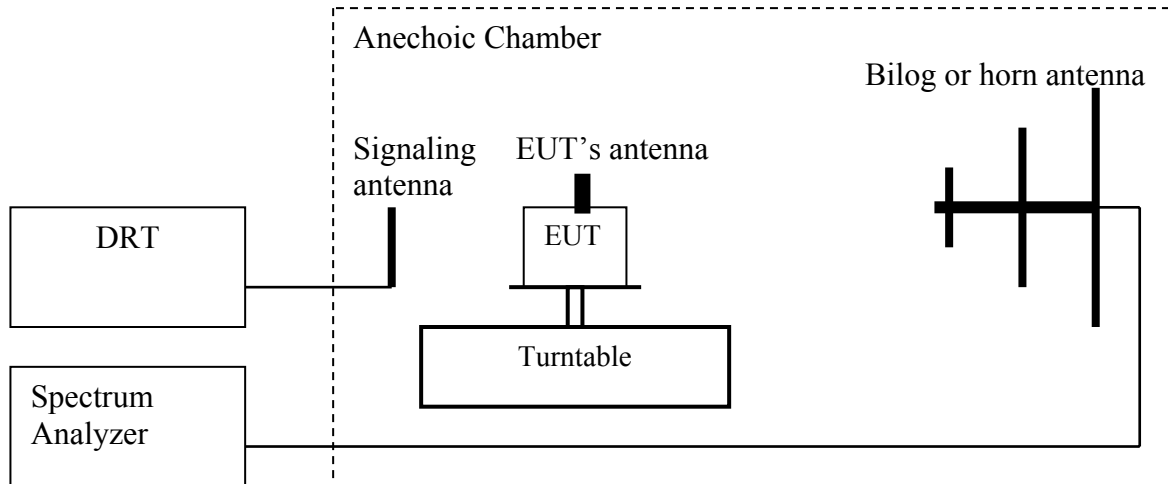
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

5.5.3 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). $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$.
7. Determine the level of spurious emissions using the following equation:
Spurious (dBm) = LVL (dBm) + LOSS (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:
Spurious (dBm) = LVL (dBm) + LOSS (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

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

Spectrum analyzer settings:

Res B/W: 1 MHz

Vid B/W: 1 MHz

Measurement Survey:

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the FDD2 and FDD5 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 FDD2 and FDD5 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.



5.5.4 Radiated out of band emissions results on EUT:

5.5.4.1 Test Results (UMTS FDD5 HSDPA Only)

Harmonics	Tx ch-4132 Freq. (MHz)	Level(dBm)	Tx ch-4183 Freq. (MHz)	Level(dBm)	Tx ch-4233 Freq. (MHz)	Level(dBm)
2	1652.8	NF	1673.2	NF	1693.2	NF
3	2479.2	NF	2509.8	NF	2539.8	NF
4	3305.6	NF	3346.4	NF	3386.4	NF
5	4132	NF	4183	NF	4233	NF
6	4958.4	NF	5019.6	NF	5079.6	NF
7	5784.8	NF	5856.2	NF	5926.2	NF
8	6611.2	NF	6692.8	NF	6772.8	NF
9	7437.6	NF	7529.4	NF	7619.4	NF
10	8264	NF	8366	NF	8466	NF



RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only) TX: 30MHz - 1GHz
Spurious emission limit -13dBm
Antenna: vertical

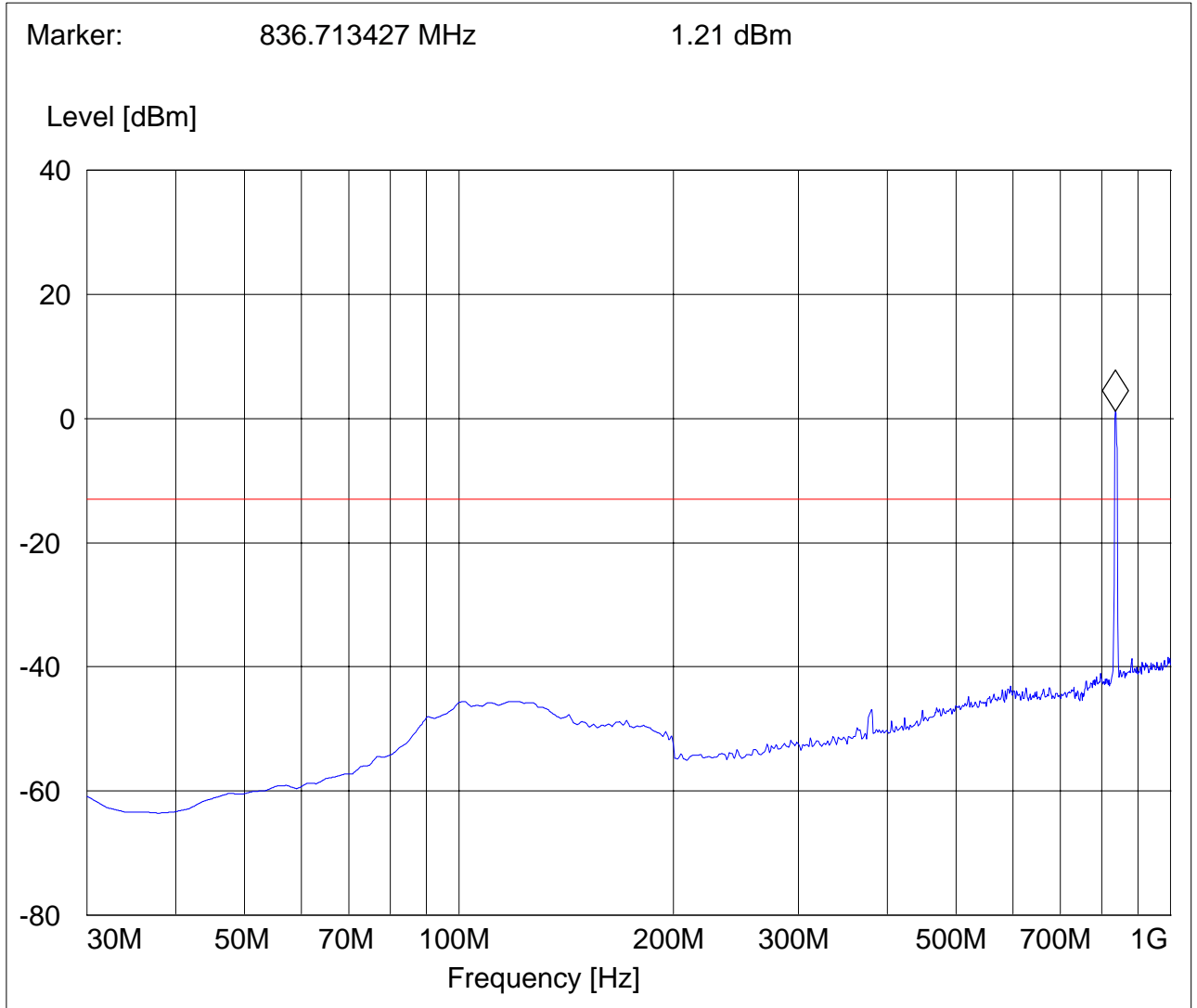
Note:

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

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA Only

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

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





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only) TX: 30MHz - 1GHz
Spurious emission limit -13dBm
Antenna: Horizontal

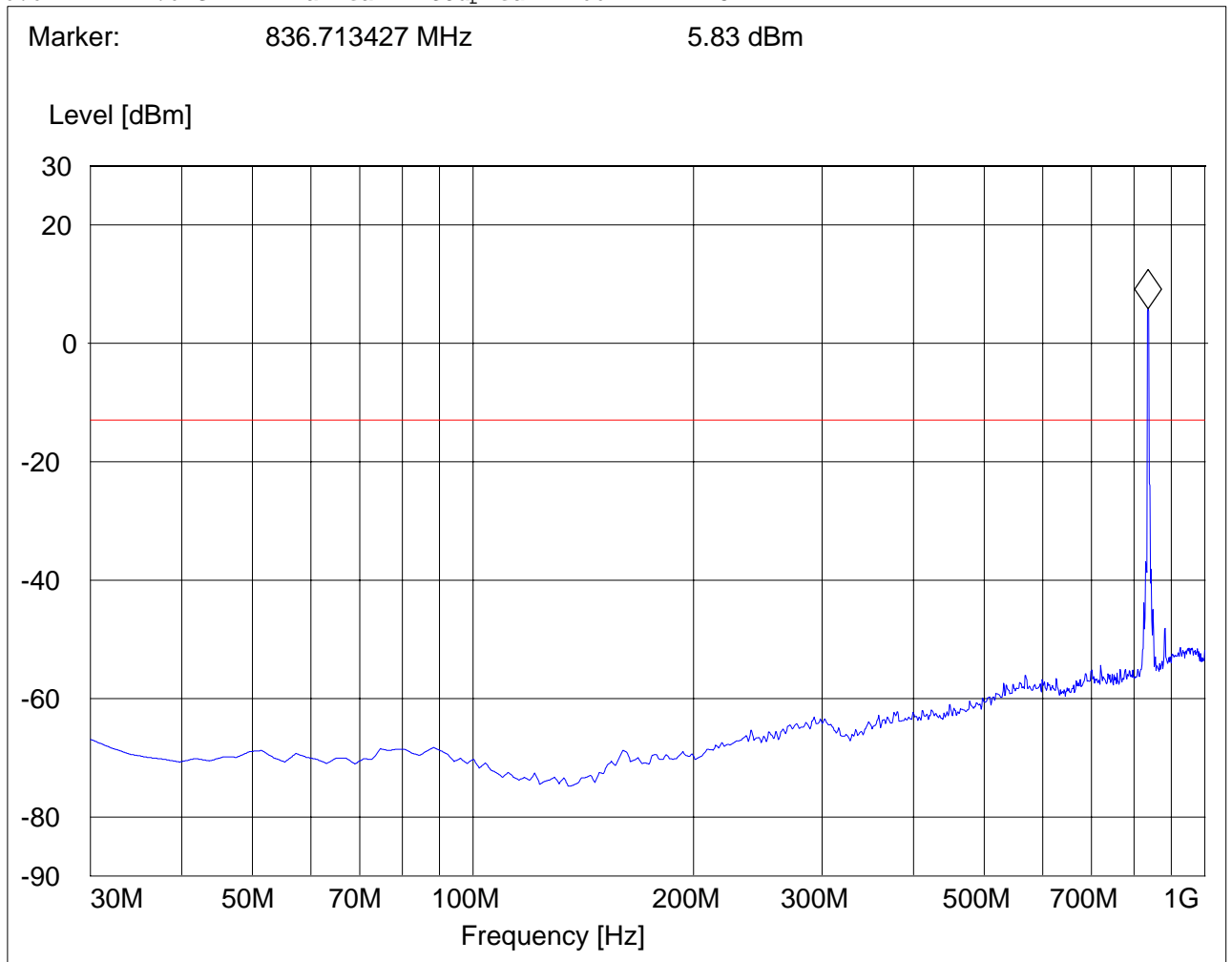
Note:

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

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA Only

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

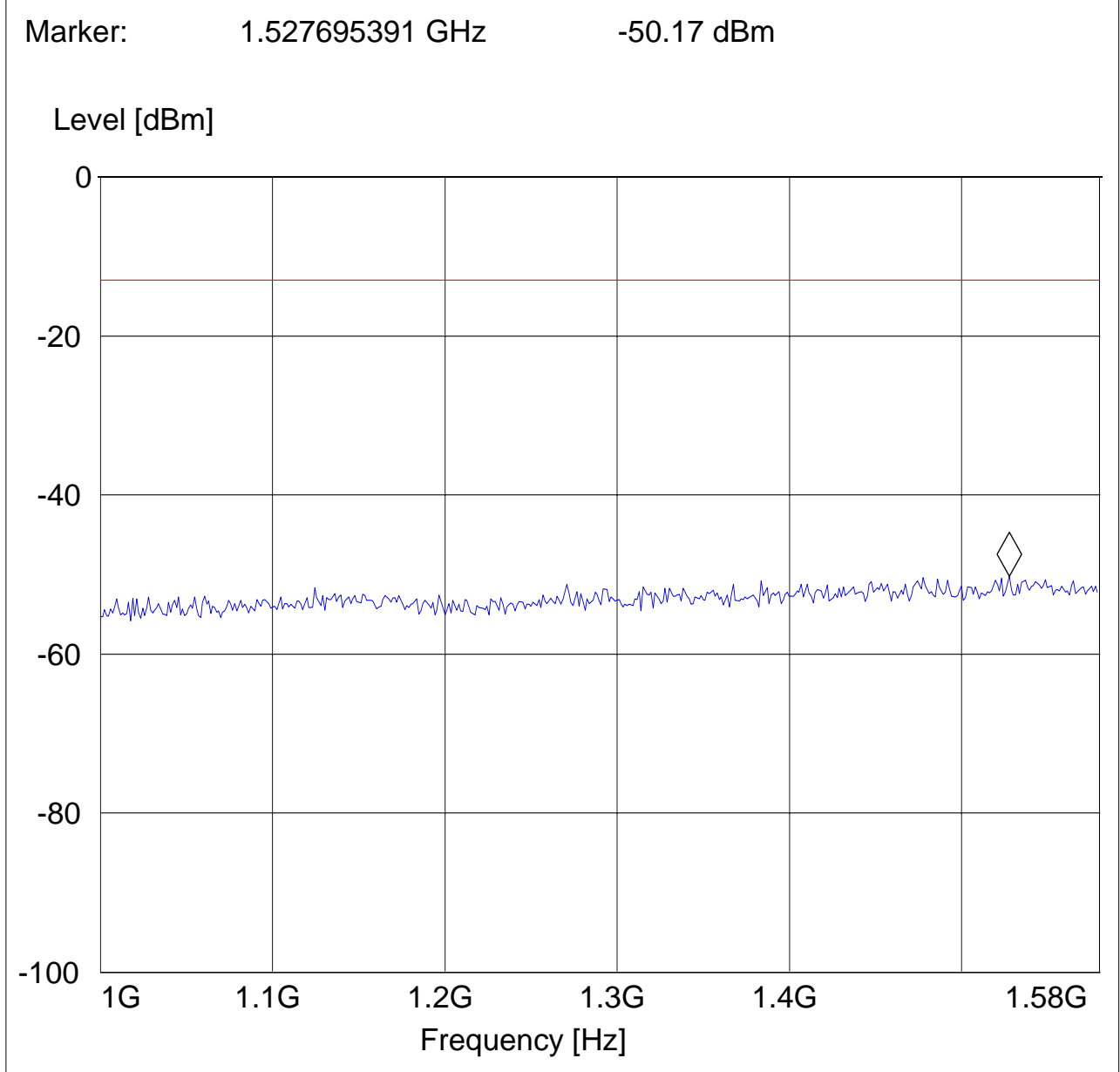
Tx @ 826.4MHz: 1GHz - 1.58GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 1.527695391 GHz -50.17 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

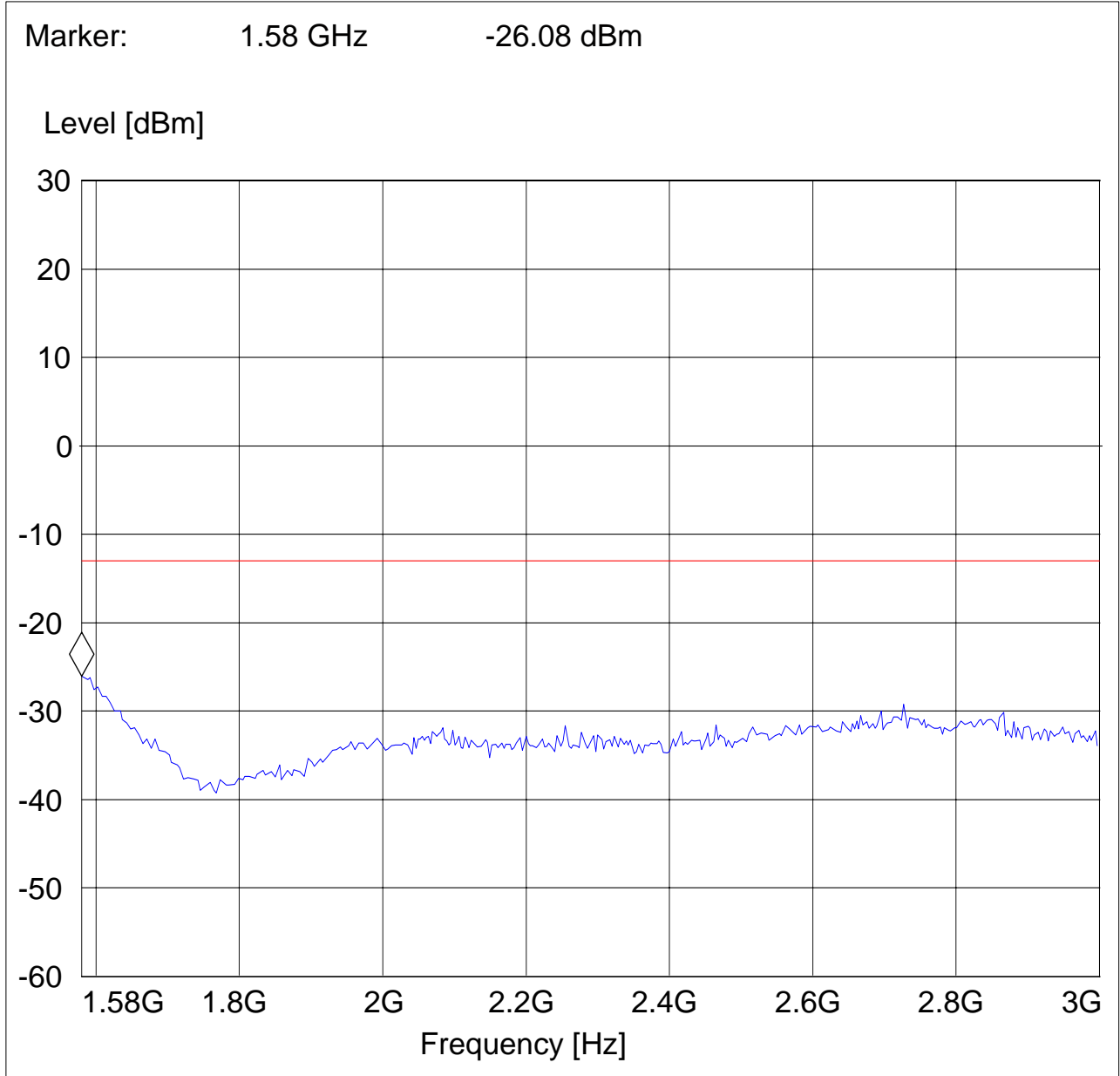
Tx @ 826.4MHz: 1.58GHz – 3GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 1.58 GHz -26.08 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

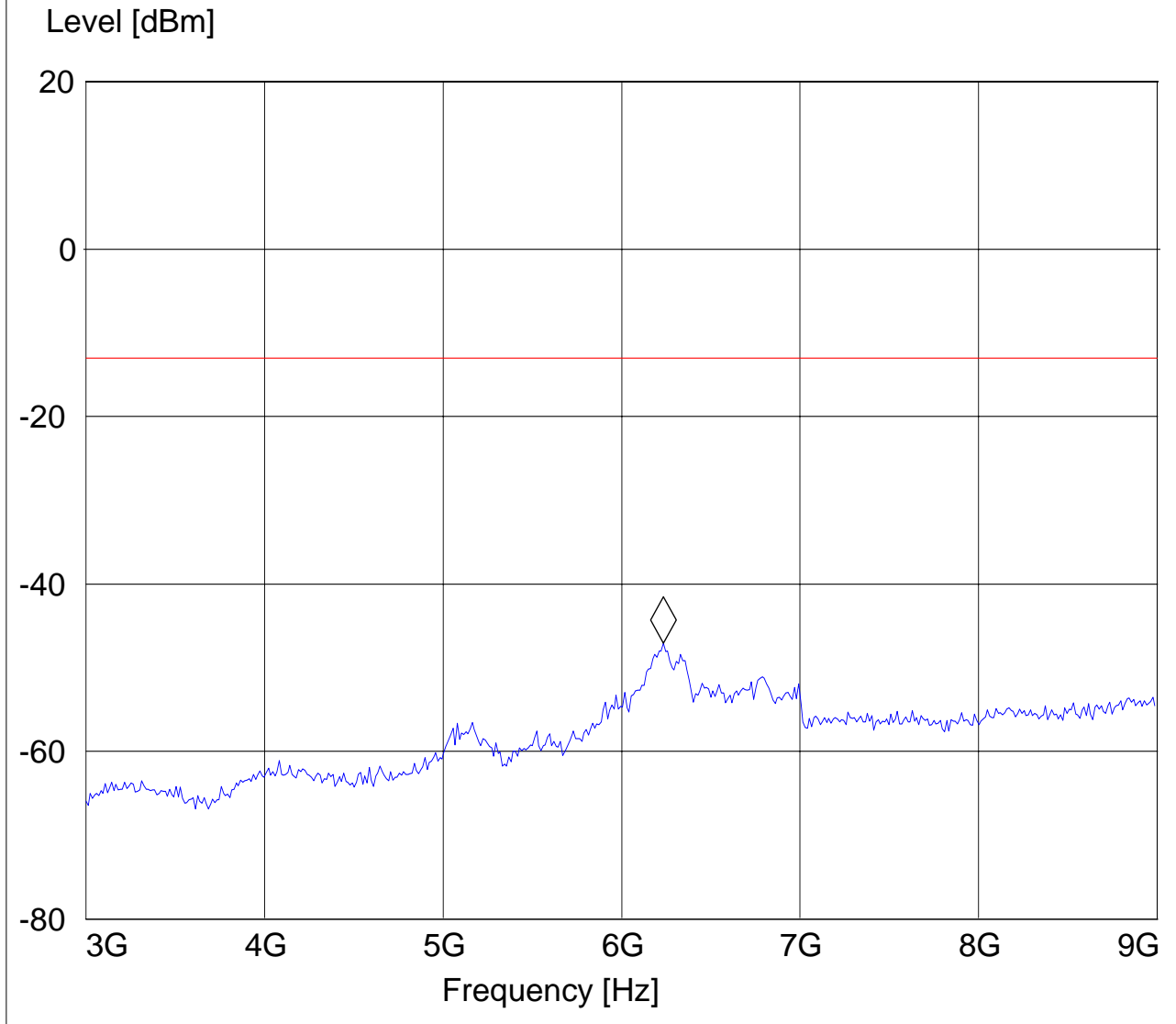
Tx @ 826.4MHz: 3GHz – 9GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 6.234468938 GHz -47.05 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

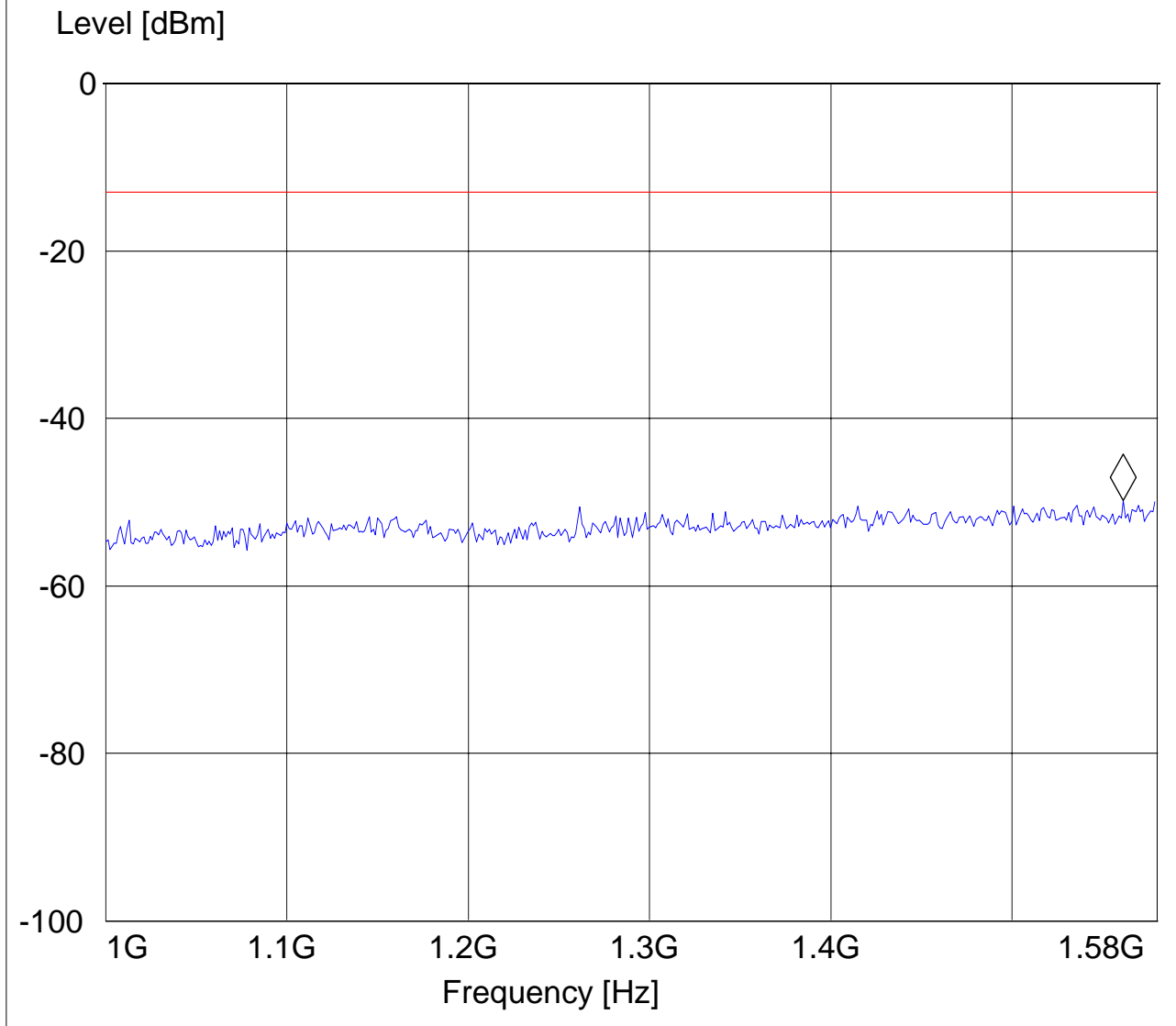
Tx @ 836.6MHz: 1GHz - 1.58GHz

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA Only

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

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

Marker: 1.561402806 GHz -49.75 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

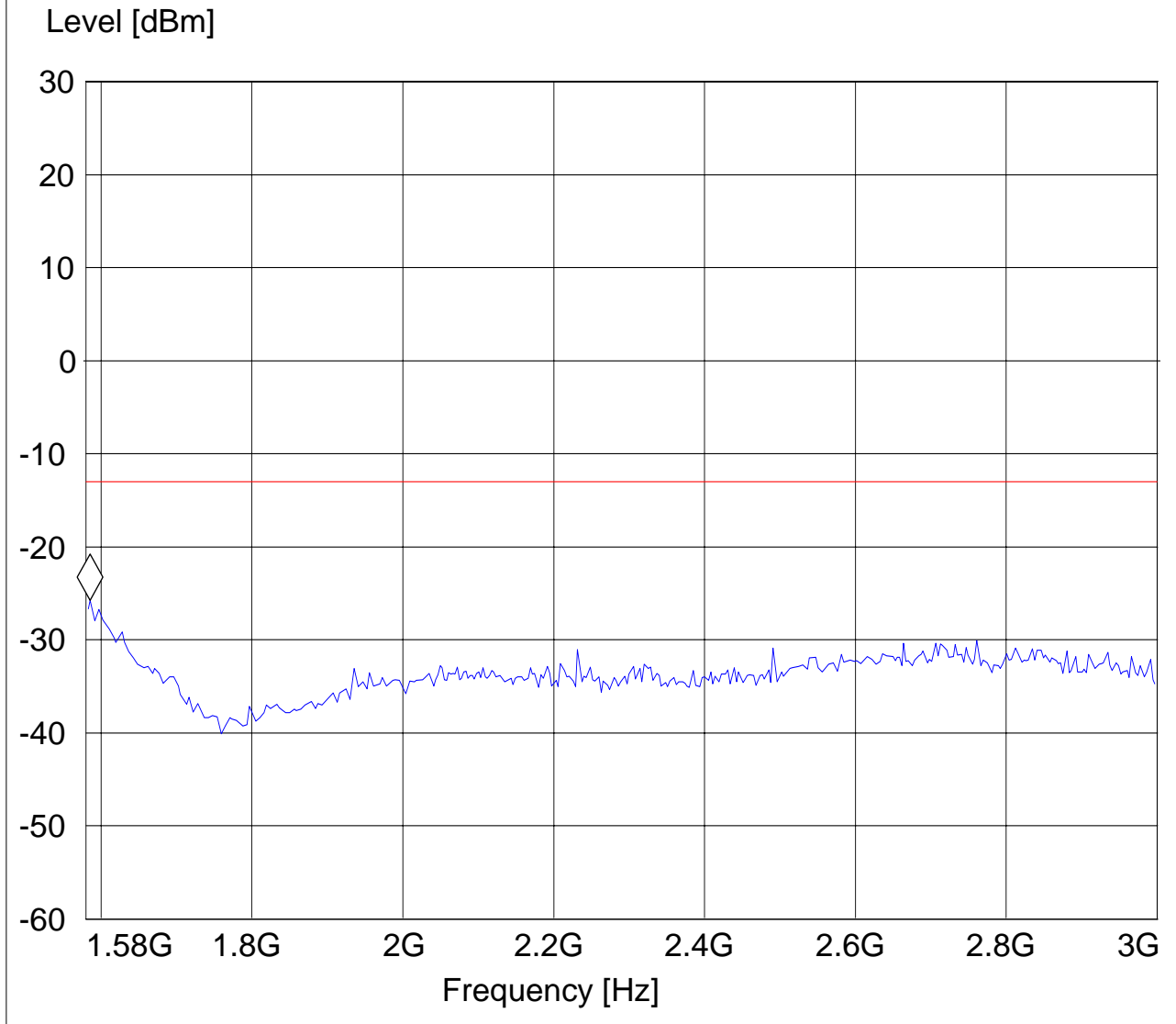
Tx @ 836.6MHz: 1.58GHz – 3GHz

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA Only

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

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

Marker: 1.585691383 GHz -25.75 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

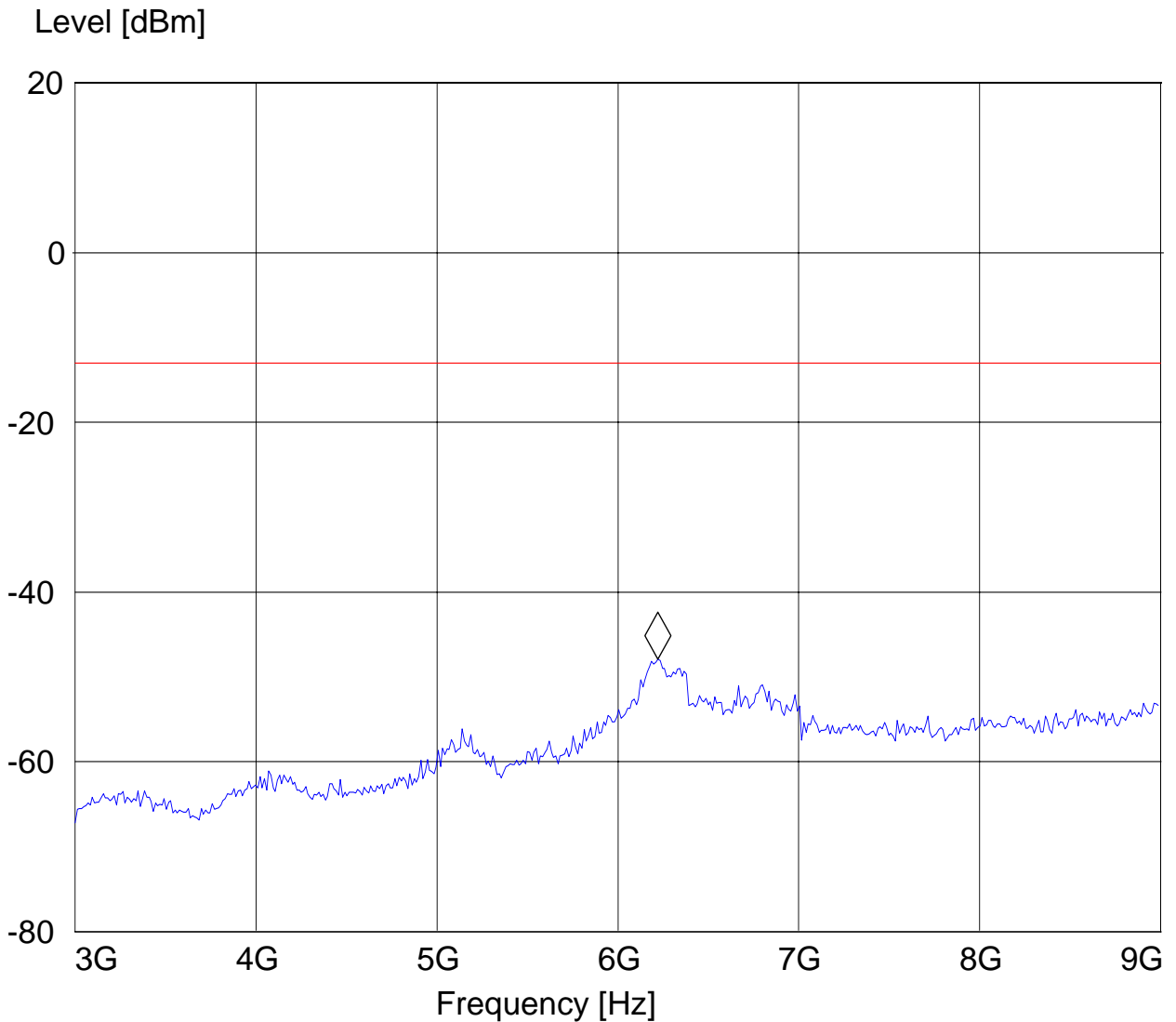
Tx @ 836.6MHz: 3GHz – 9GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA Only

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

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

Marker: 6.22244489 GHz -47.92 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

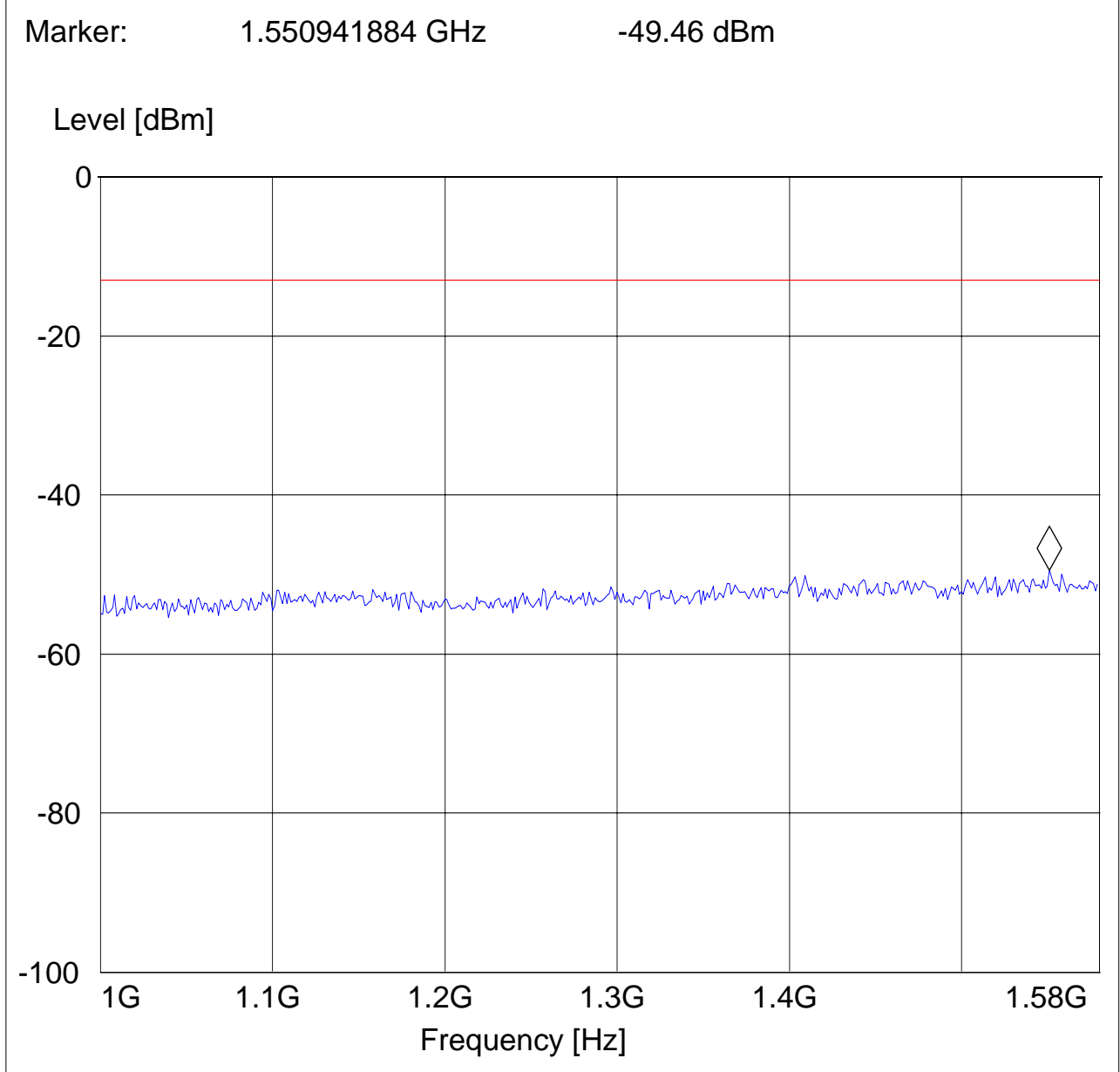
Tx @ 846.6MHz: 1GHz - 1.58GHz

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA

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

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

Marker: 1.550941884 GHz -49.46 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

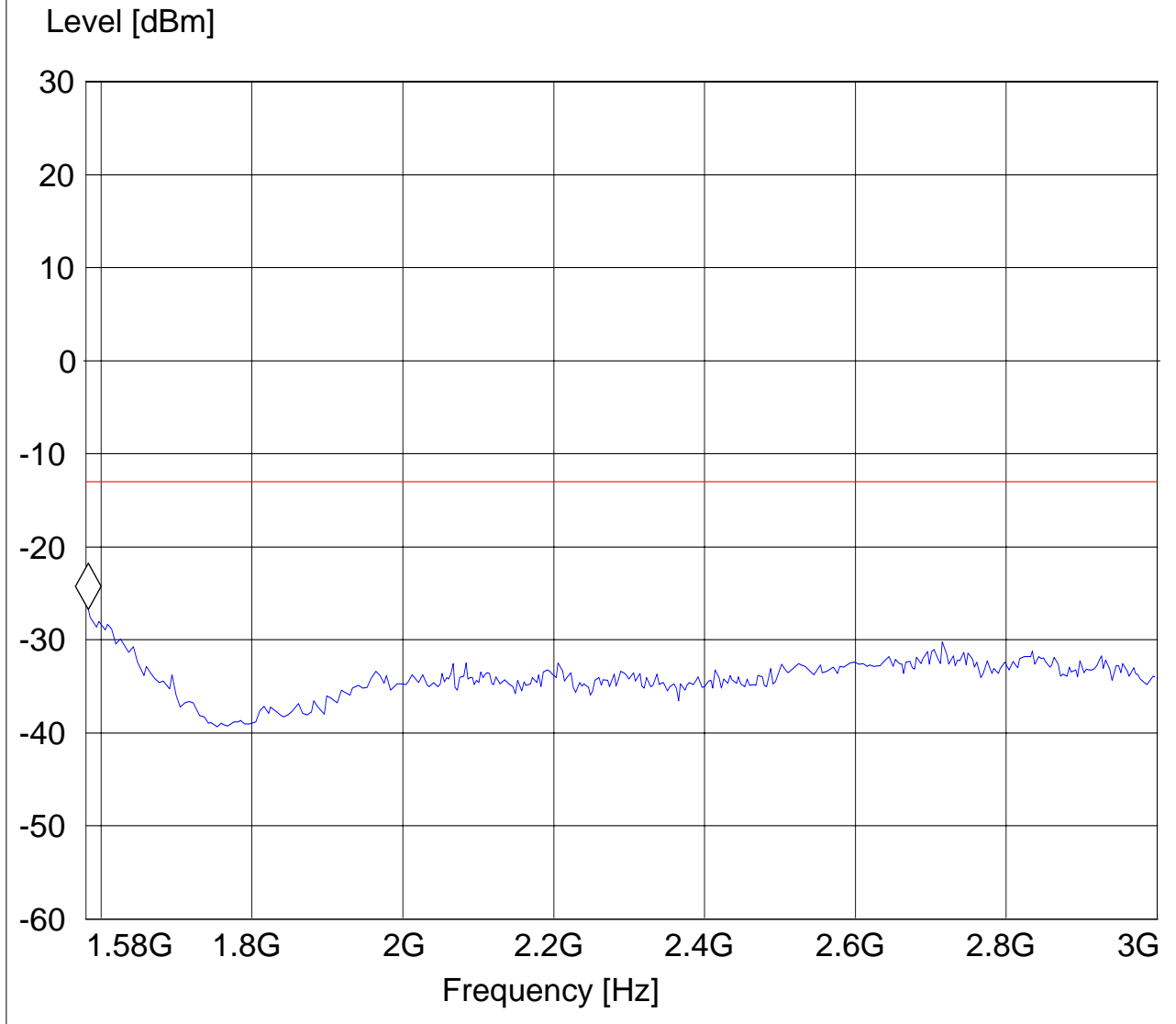
Tx @ 846.6MHz: 1.58GHz – 3GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 1.582845691 GHz -26.7 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA Only)

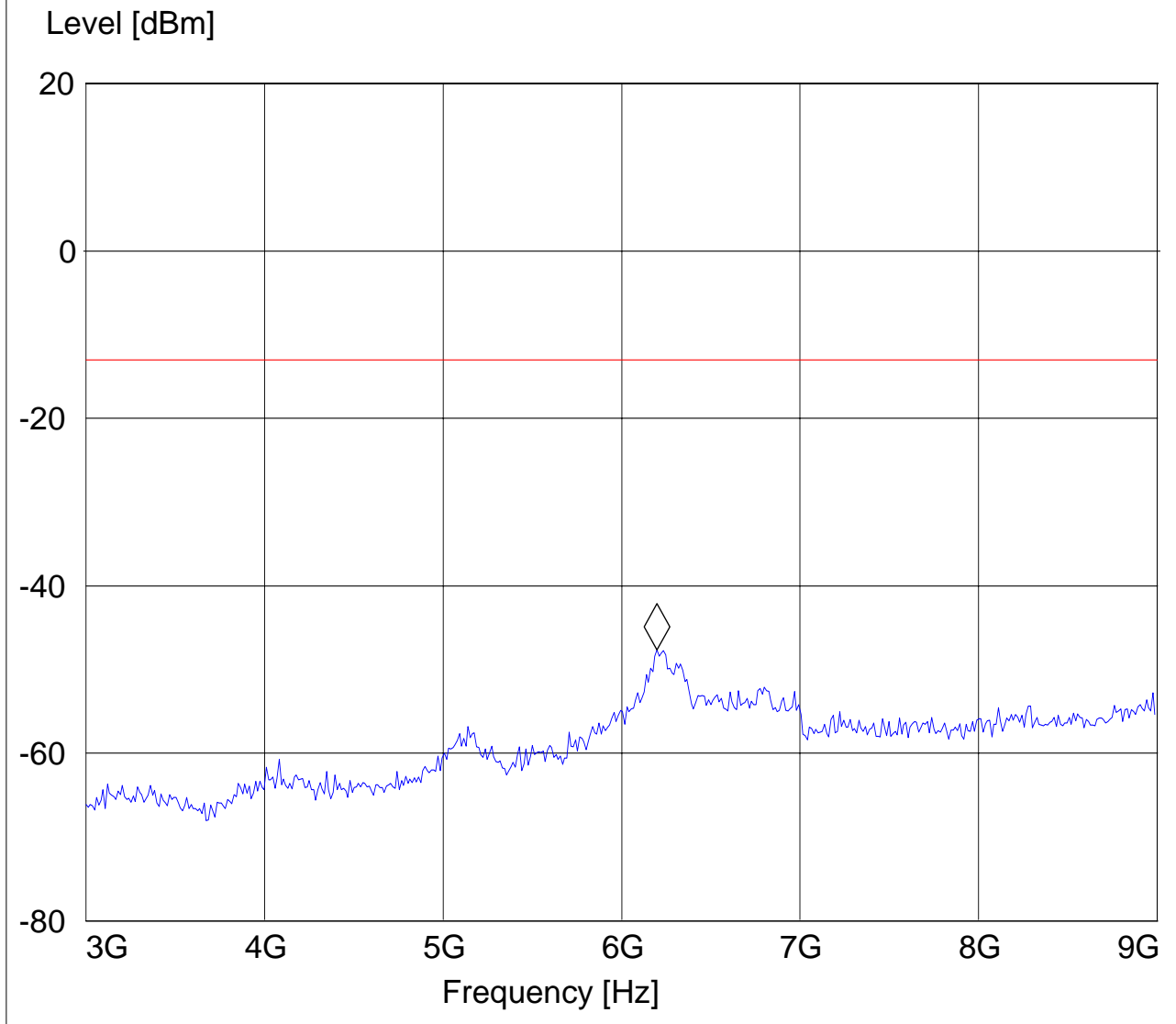
Tx @ 846.6MHz: 3GHz – 9GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 6.198396794 GHz -47.63 dBm





5.5.4.2 Test Results (UMTS FDD5 HSDPA + HSUPA)

Harmonics	Tx ch-4132 Freq. (MHz)	Level(dBm)	Tx ch-4183 Freq. (MHz)	Level(dBm)	Tx ch-4233 Freq. (MHz)	Level(dBm)
2	1652.8	NF	1673.2	NF	1693.2	NF
3	2479.2	NF	2509.8	NF	2539.8	NF
4	3305.6	NF	3346.4	NF	3386.4	NF
5	4132	NF	4183	NF	4233	NF
6	4958.4	NF	5019.6	NF	5079.6	NF
7	5784.8	NF	5856.2	NF	5926.2	NF
8	6611.2	NF	6692.8	NF	6772.8	NF
9	7437.6	NF	7529.4	NF	7619.4	NF
10	8264	NF	8366	NF	8466	NF



RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA) TX: 30MHz - 1GHz
Spurious emission limit -13dBm
Antenna: vertical

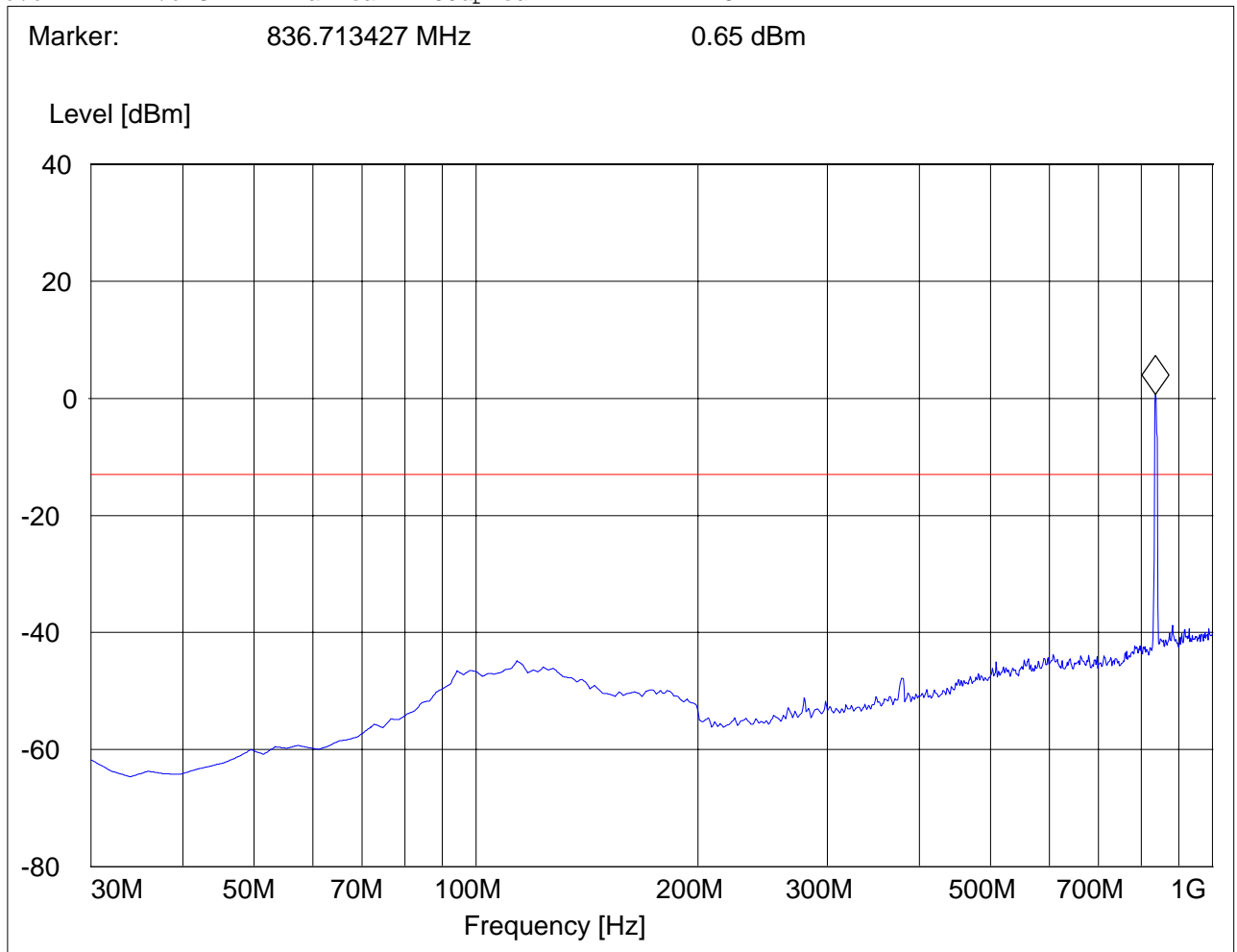
Note:

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

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: V
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

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

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





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA) TX: 30MHz - 1GHz
Spurious emission limit -13dBm
Antenna: Horizontal

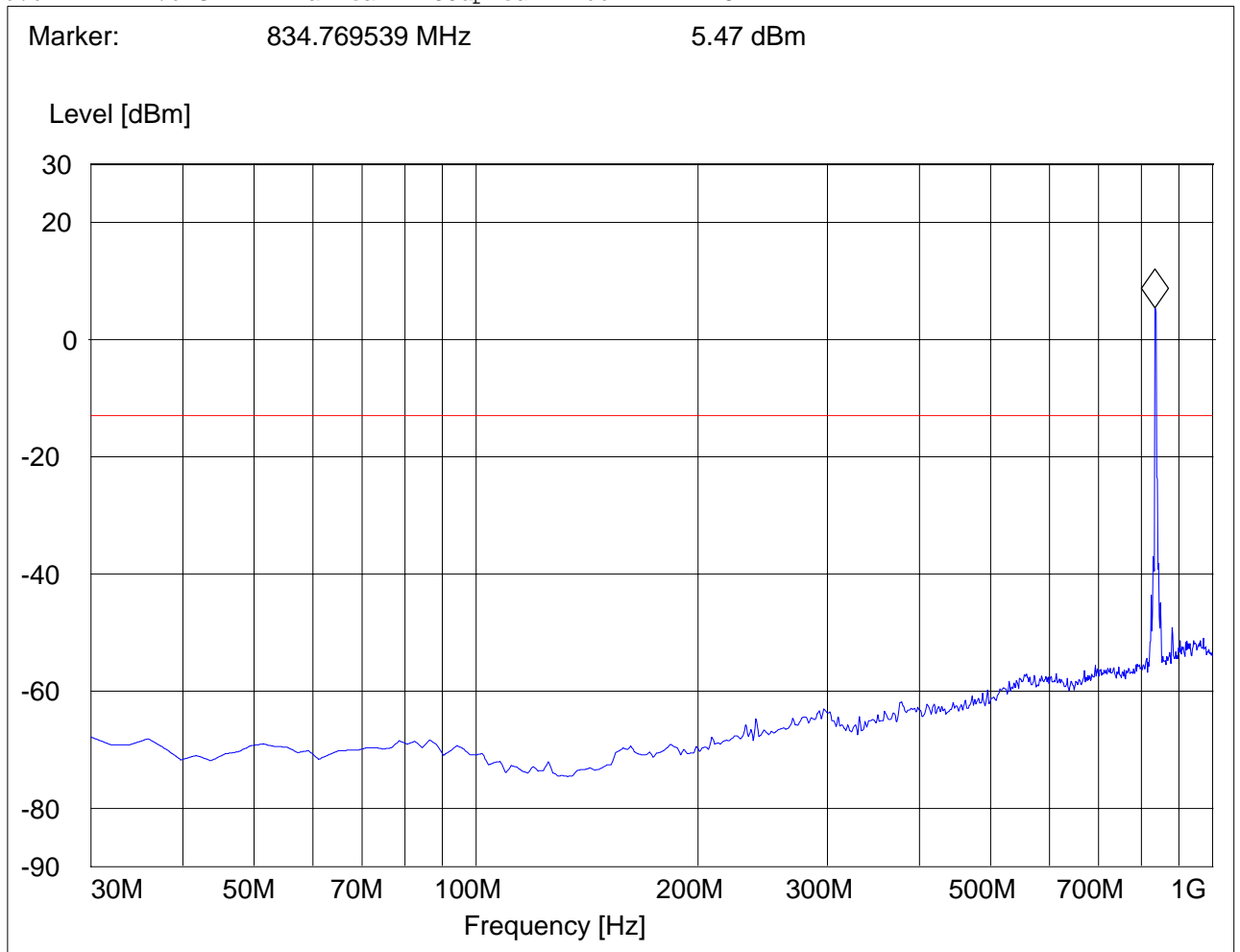
Note:

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

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

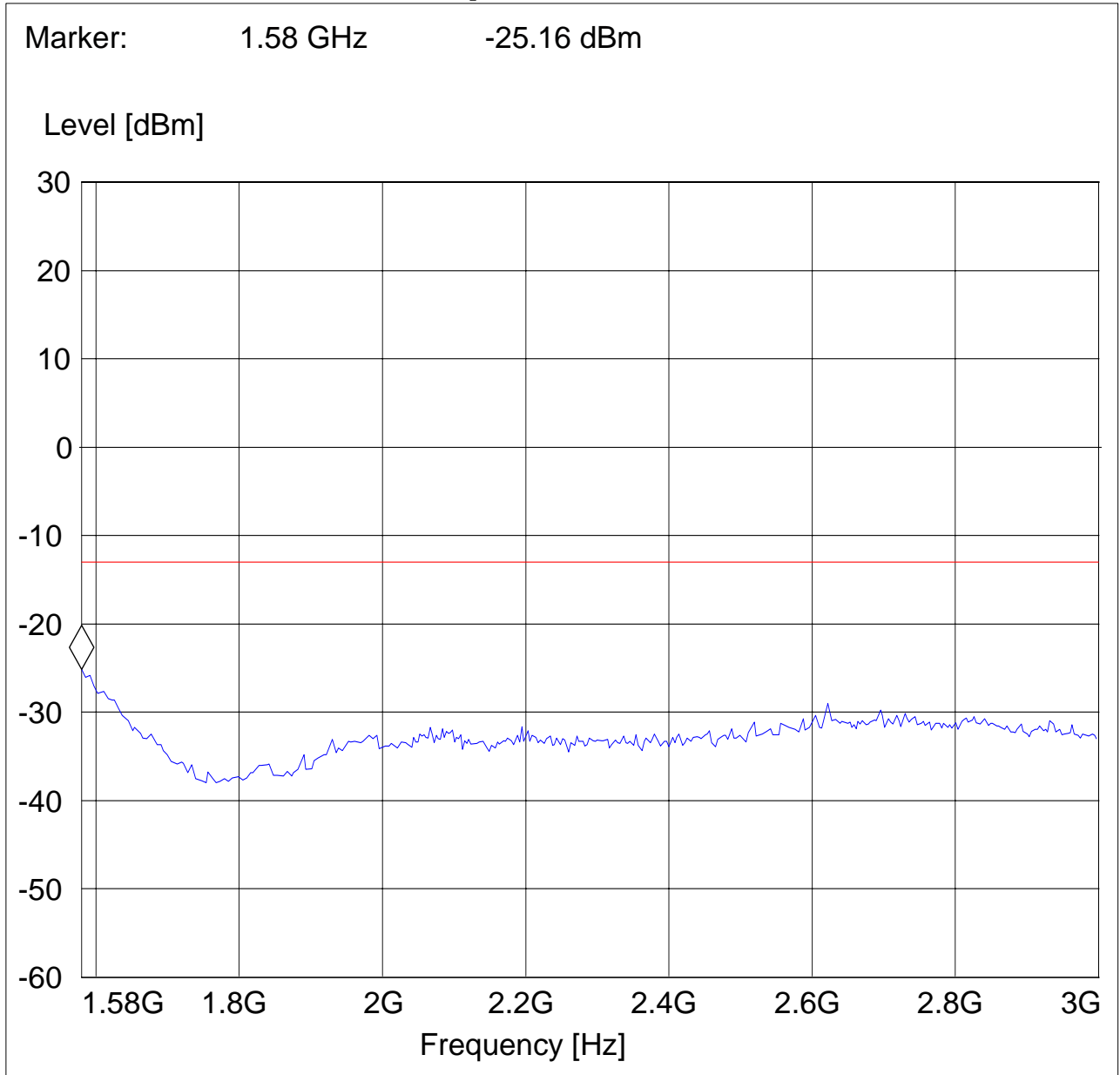
Tx @ 826.4MHz: 1GHz - 1.58GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

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

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

Marker: 1.58 GHz -25.16 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

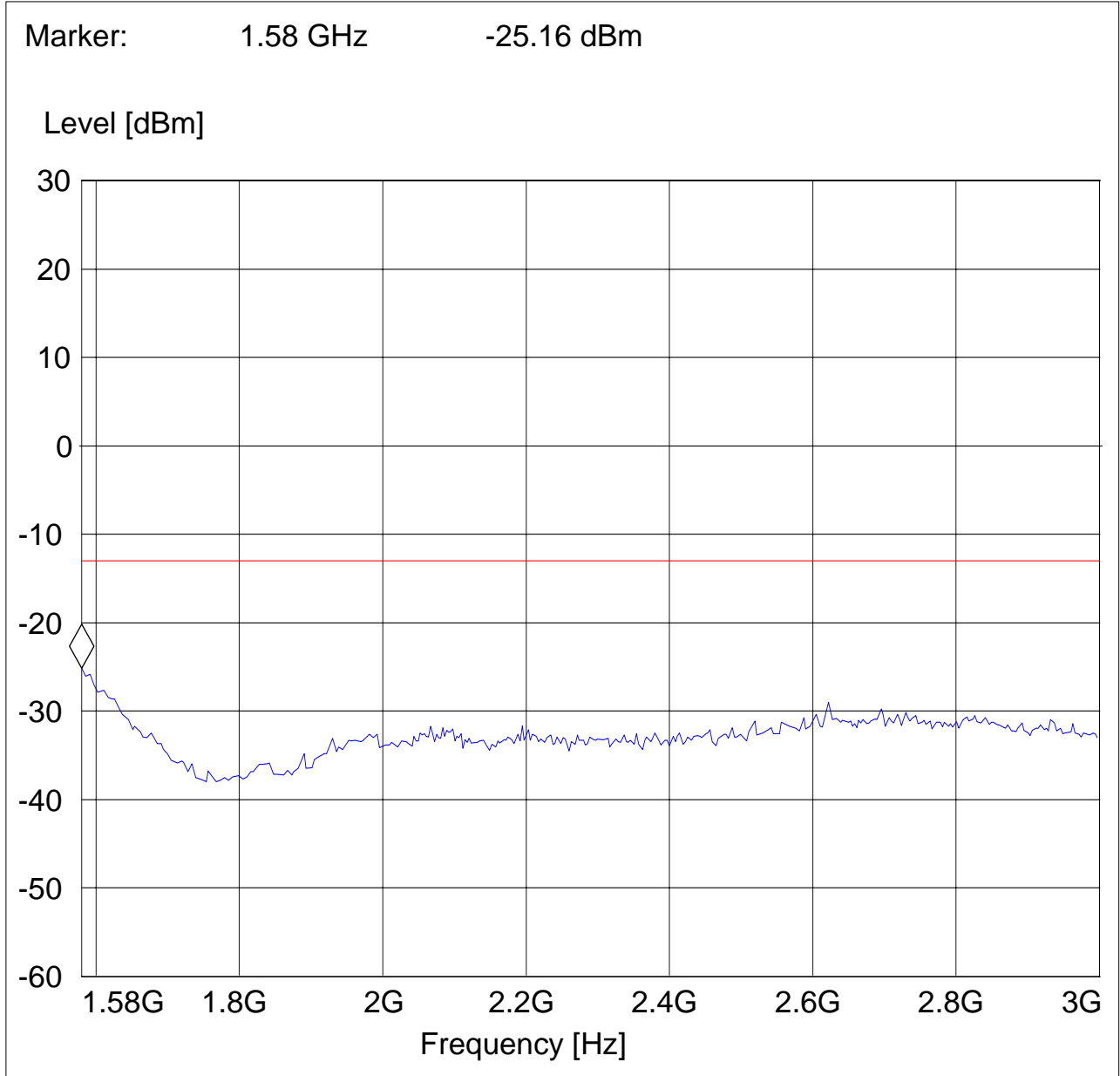
Tx @ 826.4MHz: 1.58GHz – 3GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

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

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

Marker: 1.58 GHz -25.16 dBm





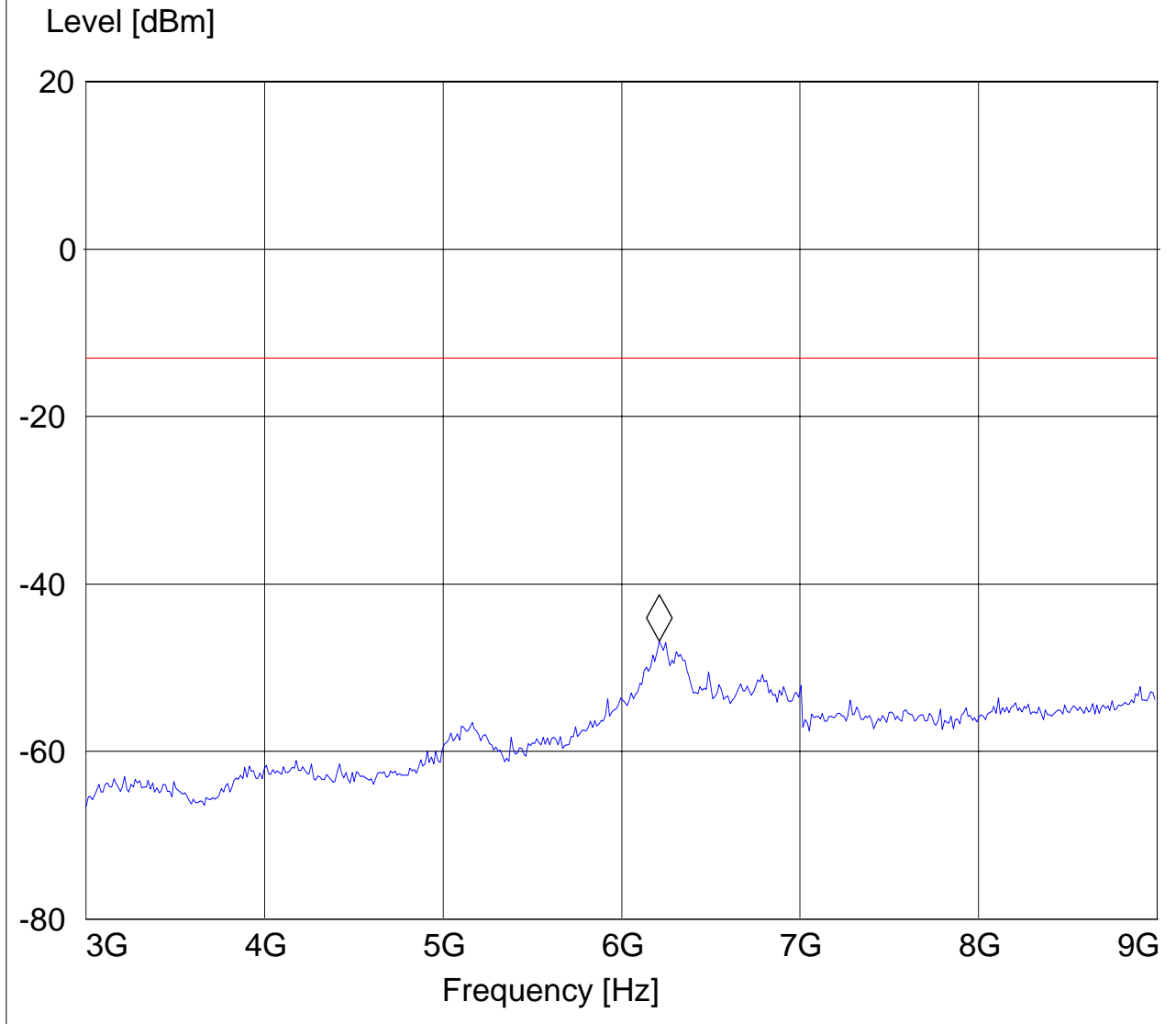
RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

Tx @ 826.4MHz: 3GHz – 9GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "FCC 22Spuri 3-9G"

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

Marker: 6.210420842 GHz -46.79 dBm





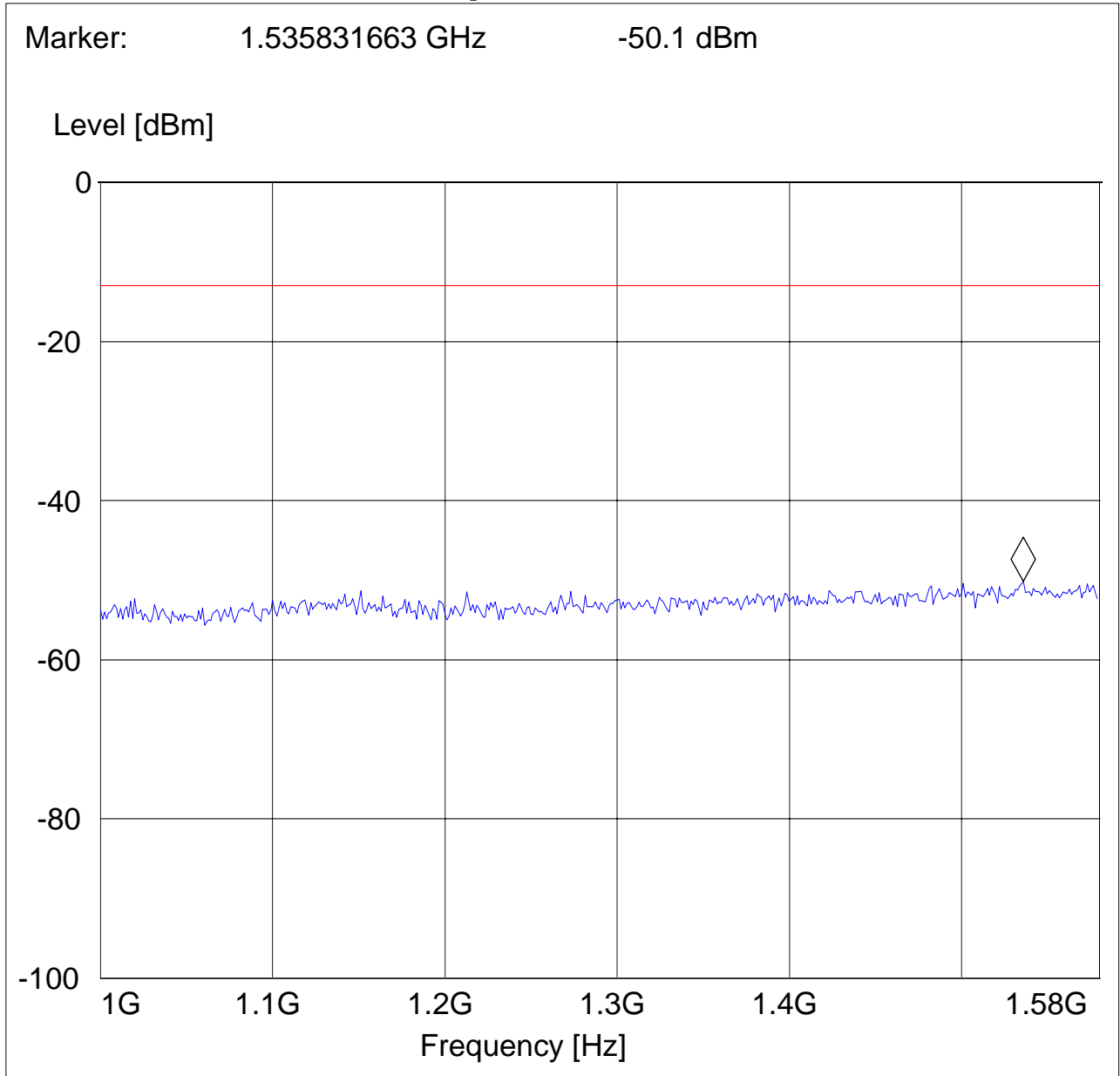
RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

Tx @ 836.6MHz: 1GHz - 1.58GHz

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

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

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





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

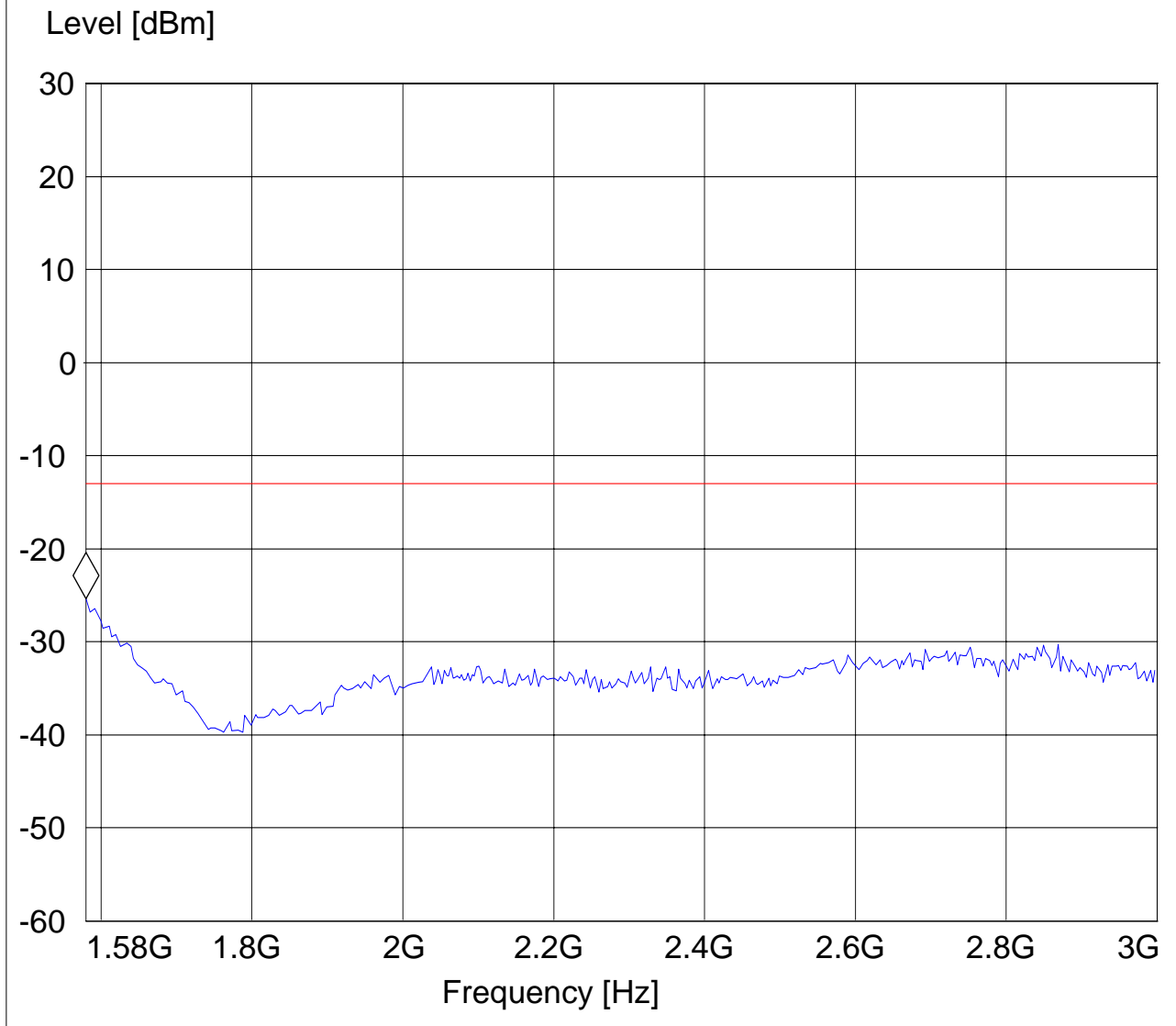
Tx @ 836.6MHz: 1.58GHz – 3GHz

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

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

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

Marker: 1.58 GHz -25.34 dBm





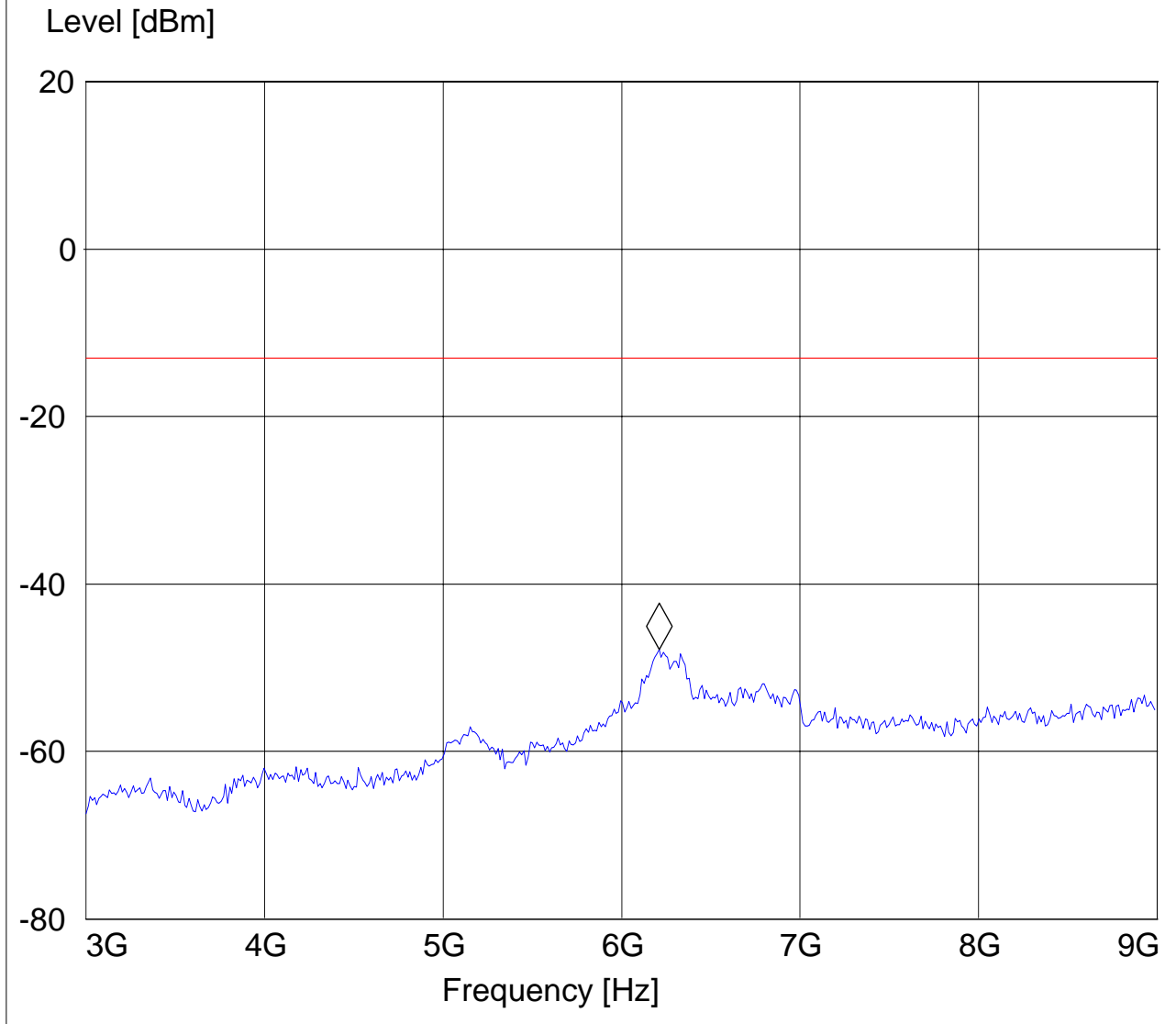
RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

Tx @ 836.6MHz: 3GHz – 9GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "FCC 22Spuri 3-9G"

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

Marker: 6.210420842 GHz -47.85 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

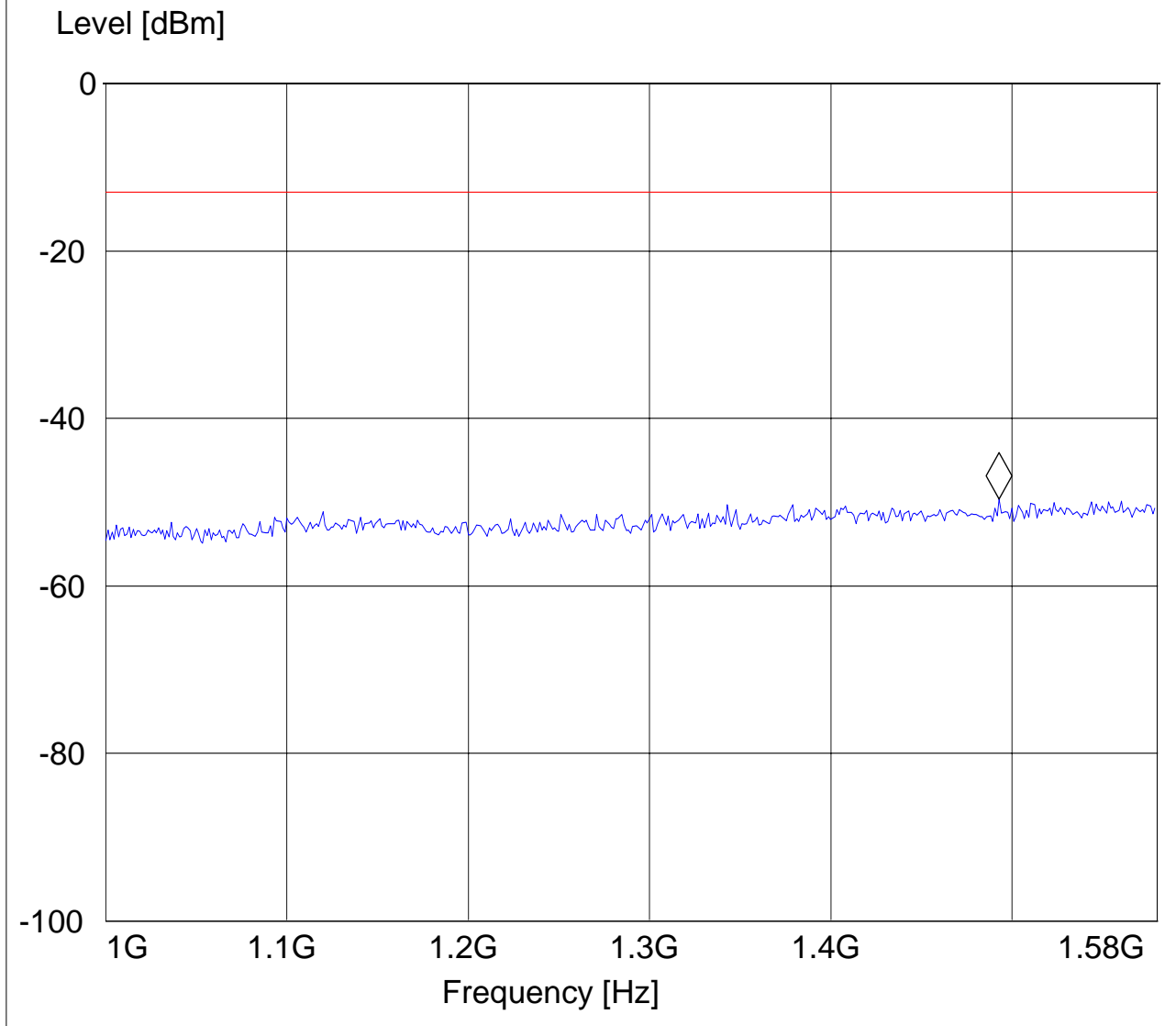
Tx @ 846.6MHz: 1GHz - 1.58GHz

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD V
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

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

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

Marker: 1.492825651 GHz -49.6 dBm





RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

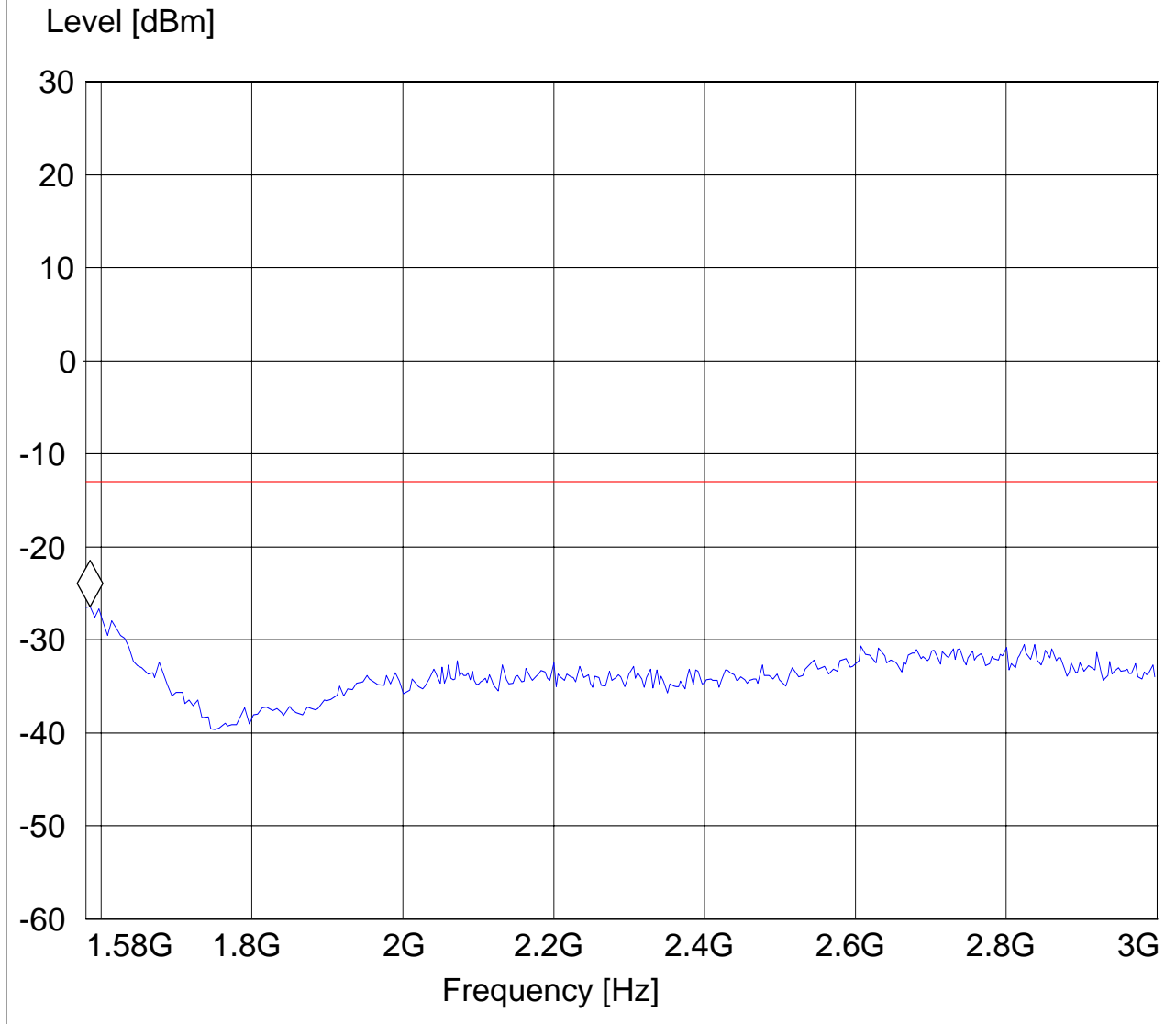
Tx @ 846.6MHz: 1.58GHz – 3GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

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

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

Marker: 1.585691383 GHz -26.4 dBm





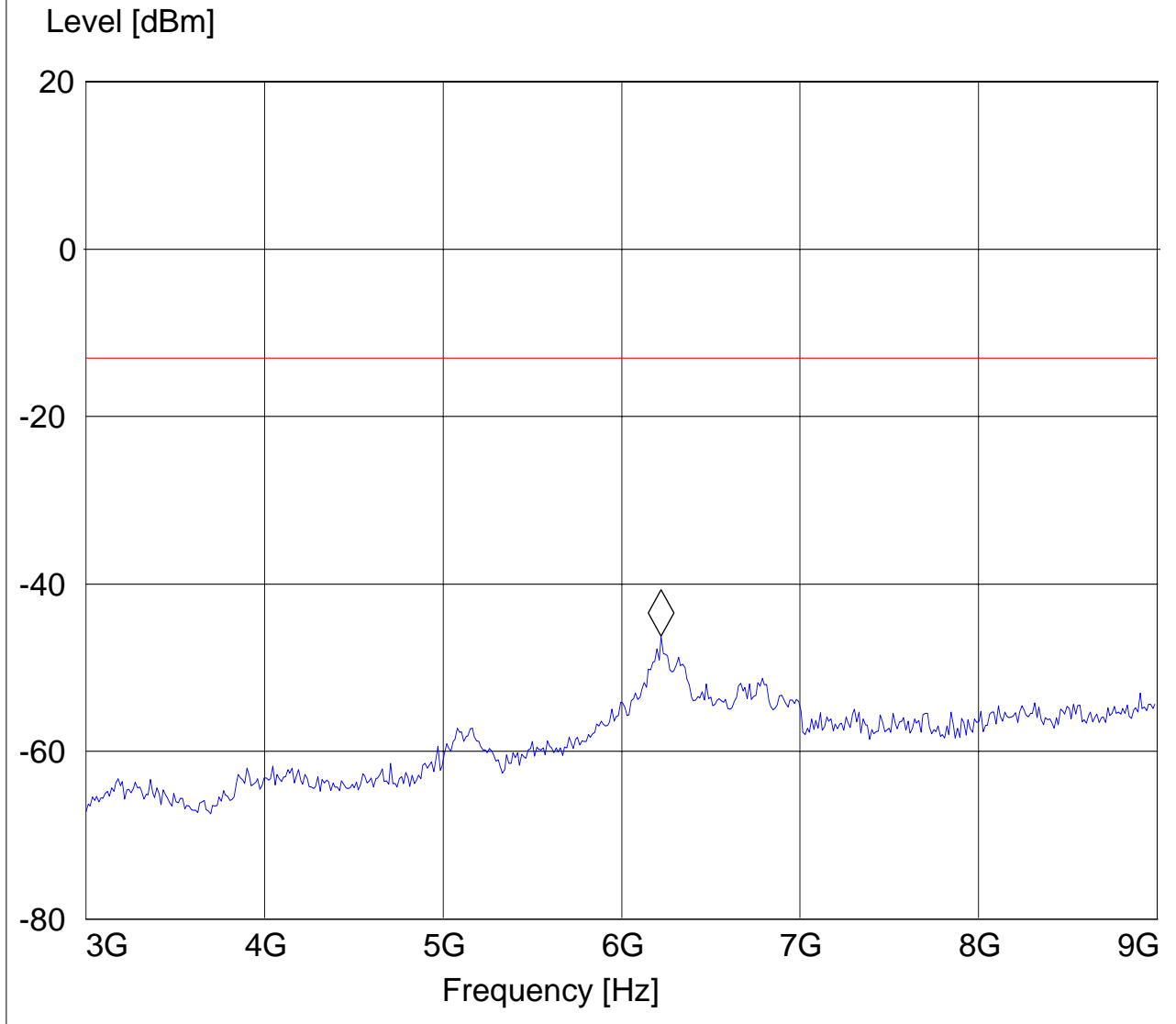
RADIATED SPURIOUS EMISSIONS (UMTS FDD5 HSDPA + HSUPA)

Tx @ 846.6MHz: 3GHz – 9GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "FCC 22Spuri 3-9G"

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

Marker: 6.22244489 GHz -46.21 dBm





5.5.4.3 Test Results (UMTS FDD2 HSDPA ONLY):

Harmonics	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
2	3704.8	NF	3760	NF	3815.2	NF
3	5557.2	NF	5640	NF	5722.8	NF
4	7409.6	NF	7520	NF	7630.4	NF
5	9262	NF	9400	NF	9538	NF
6	11114.4	NF	11280	NF	11445.6	NF
7	12966.8	NF	13160	NF	13353.2	NF
8	14819.2	NF	15040	NF	15260.8	NF
9	16671.6	NF	16920	NF	17168.4	NF
10	18524	NF	18800	NF	19076	NF



RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY) TX: 30MHz - 1GHz

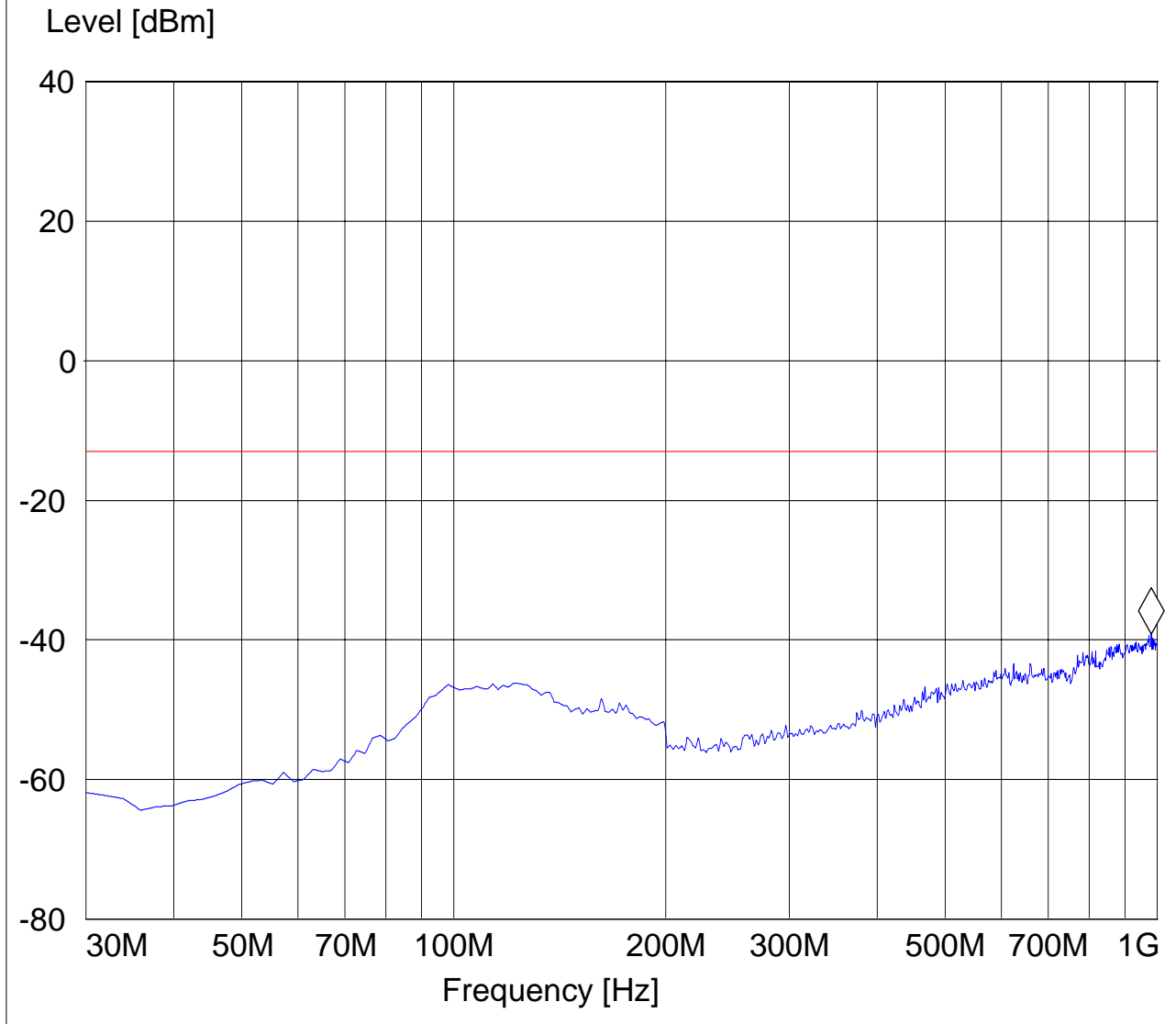
Antenna: Vertical

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 980.561122 MHz -39.19 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY) TX: 30MHz - 1GHz

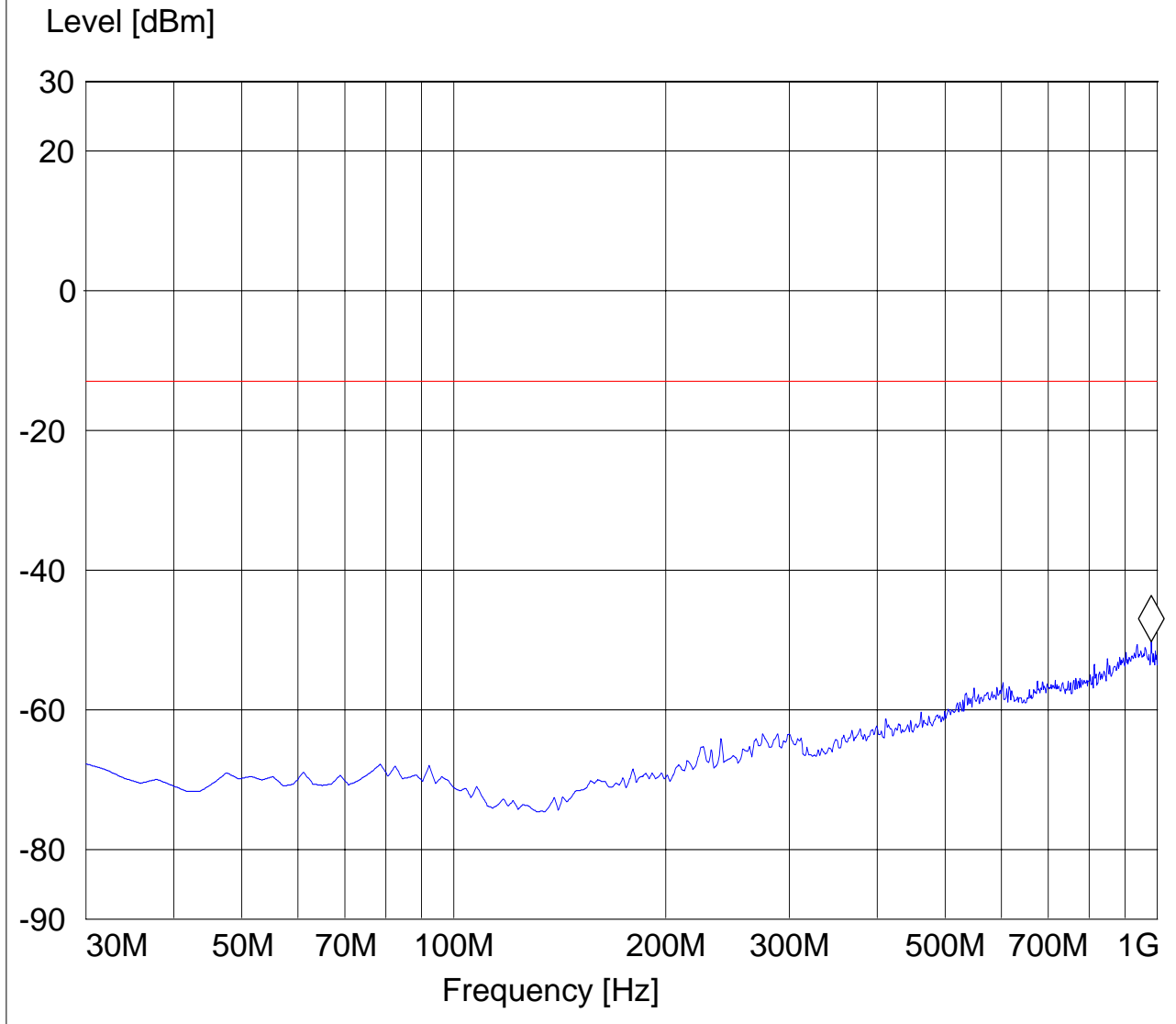
Antenna: Horizontal

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM

Marker: 980.561122 MHz -50.29 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY)

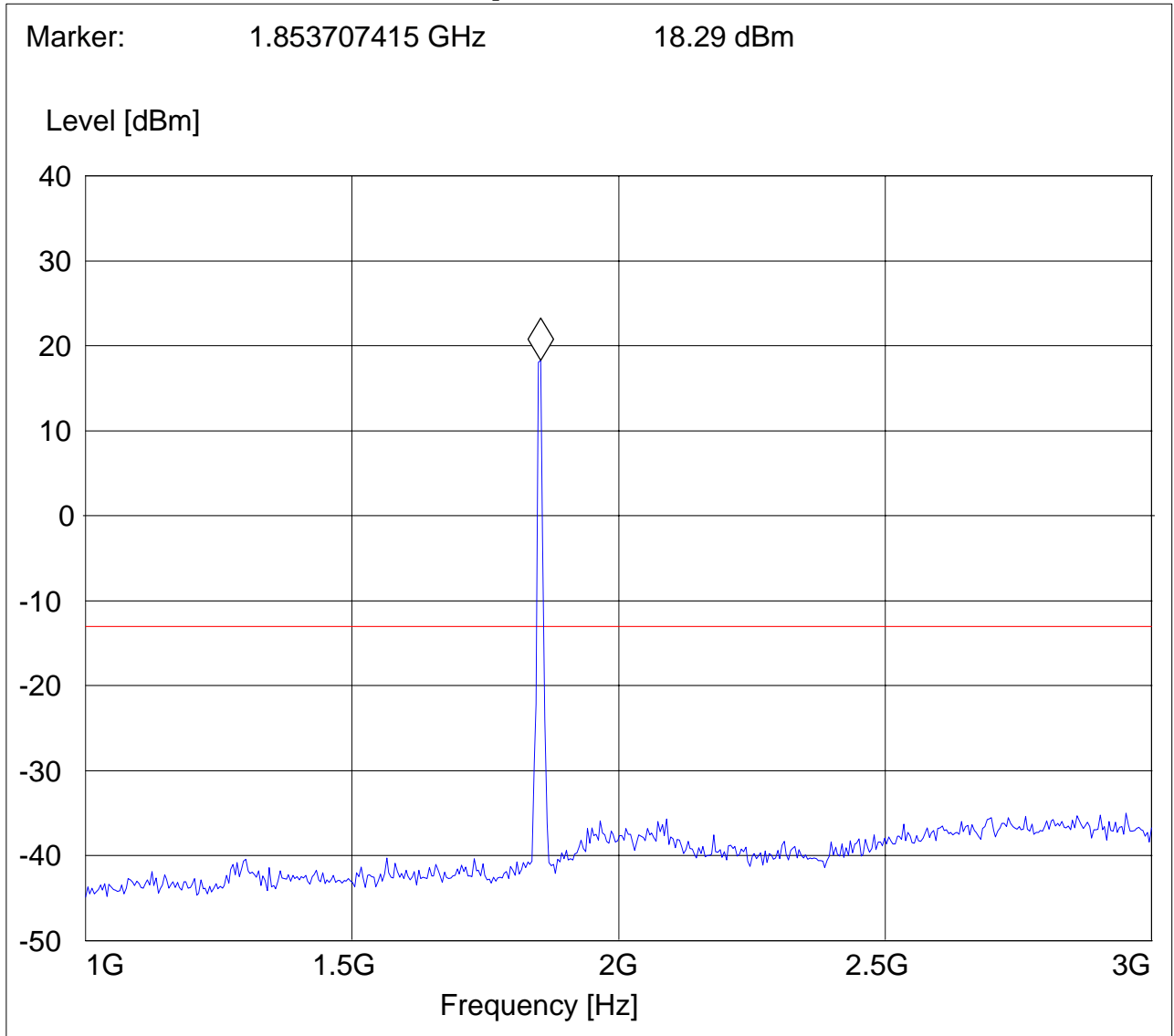
Tx @ 1852.4MHz: 1GHz – 3GHz

Note: The peak above the limit line is the carrier freq. at ch-9262.

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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





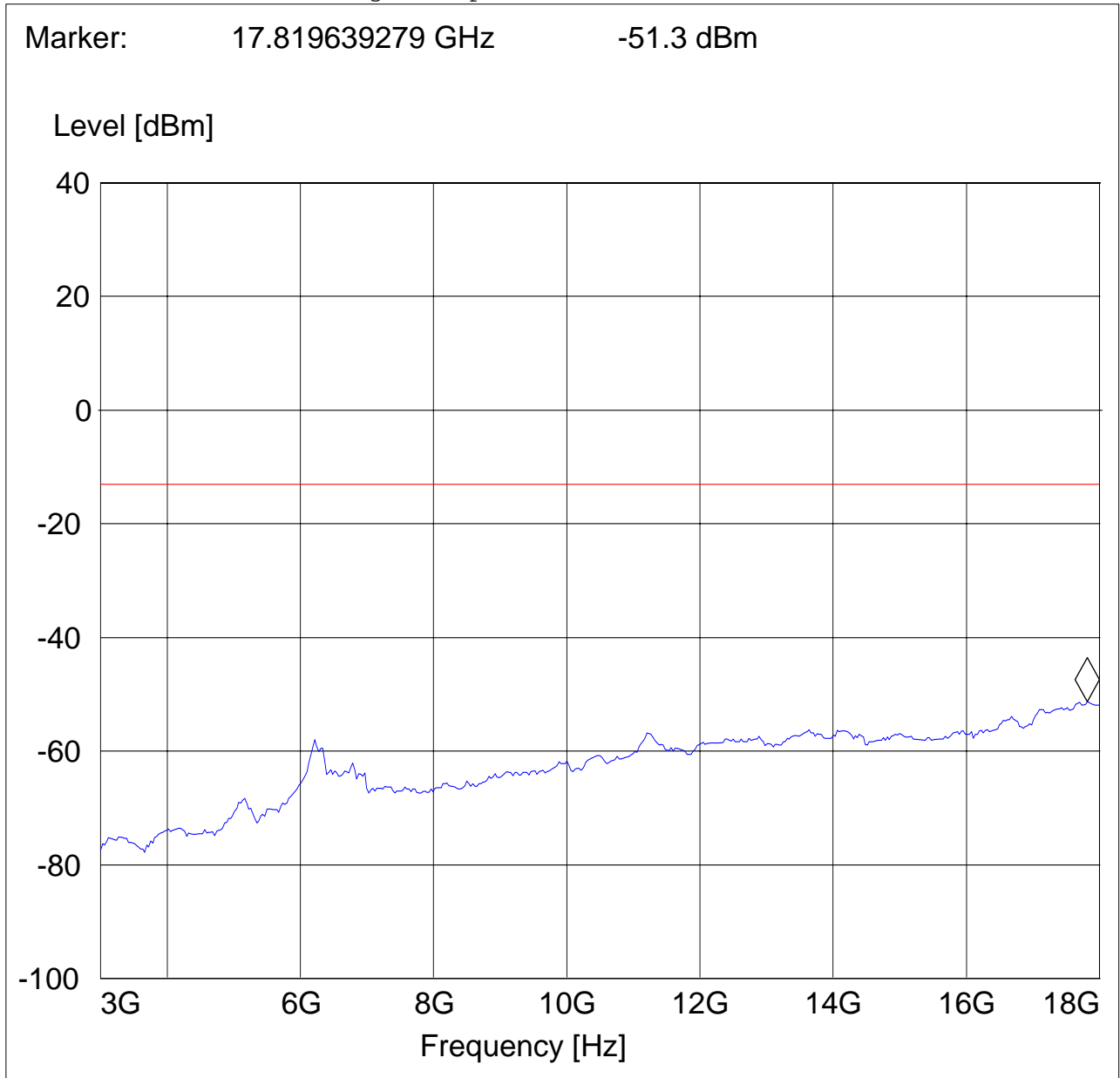
RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY)

Tx @ 1852.4MHz: 3GHz – 18GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA
SWEEP TABLE: "FCC 24Spuri 3-18G"

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

Marker: 17.819639279 GHz -51.3 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY)

Tx @ 1880.0MHz: 1GHz – 3GHz

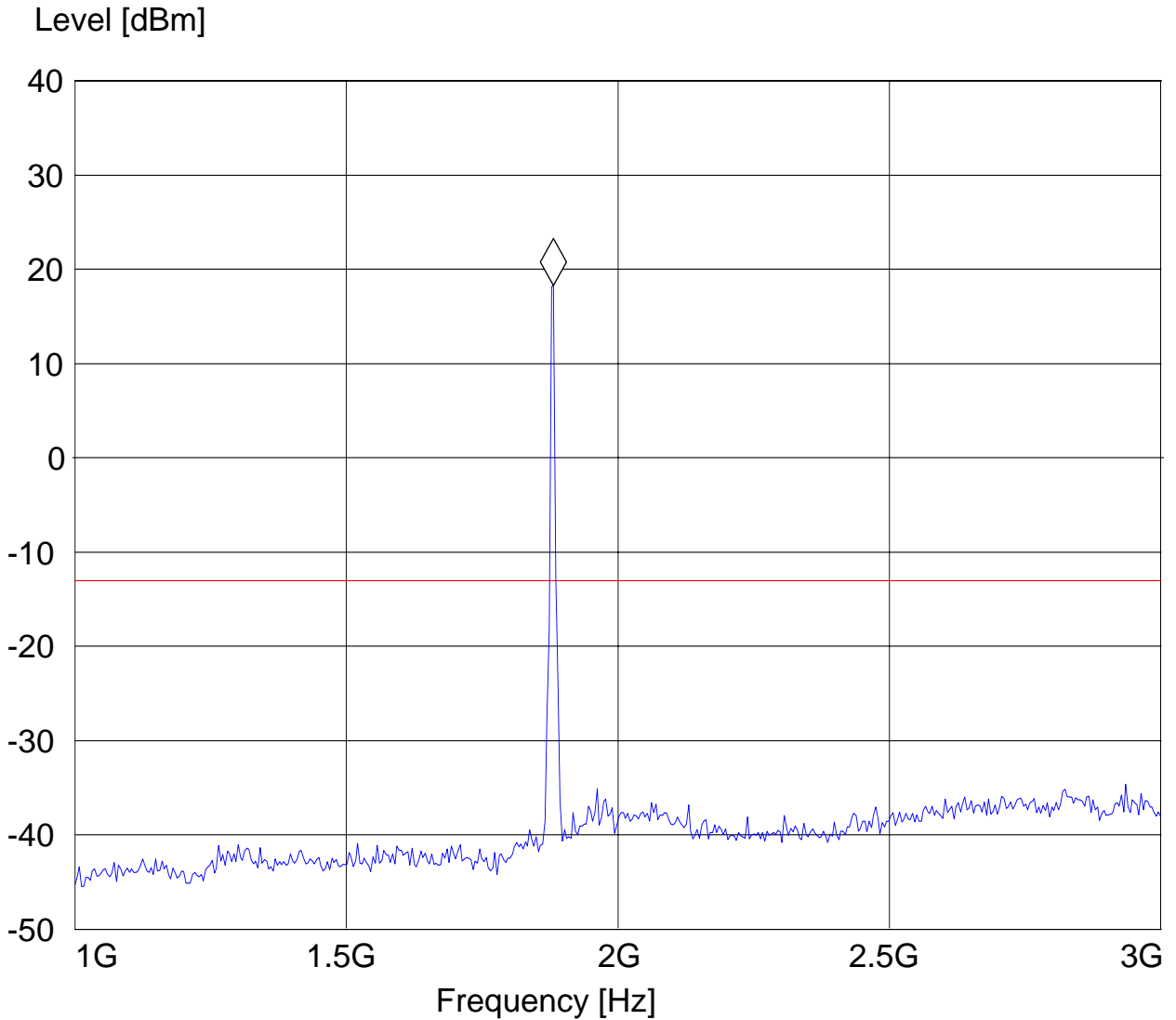
Note: The peak above the limit line is the carrier freq. at ch-9400

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 1.881763527 GHz 18.29 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY)

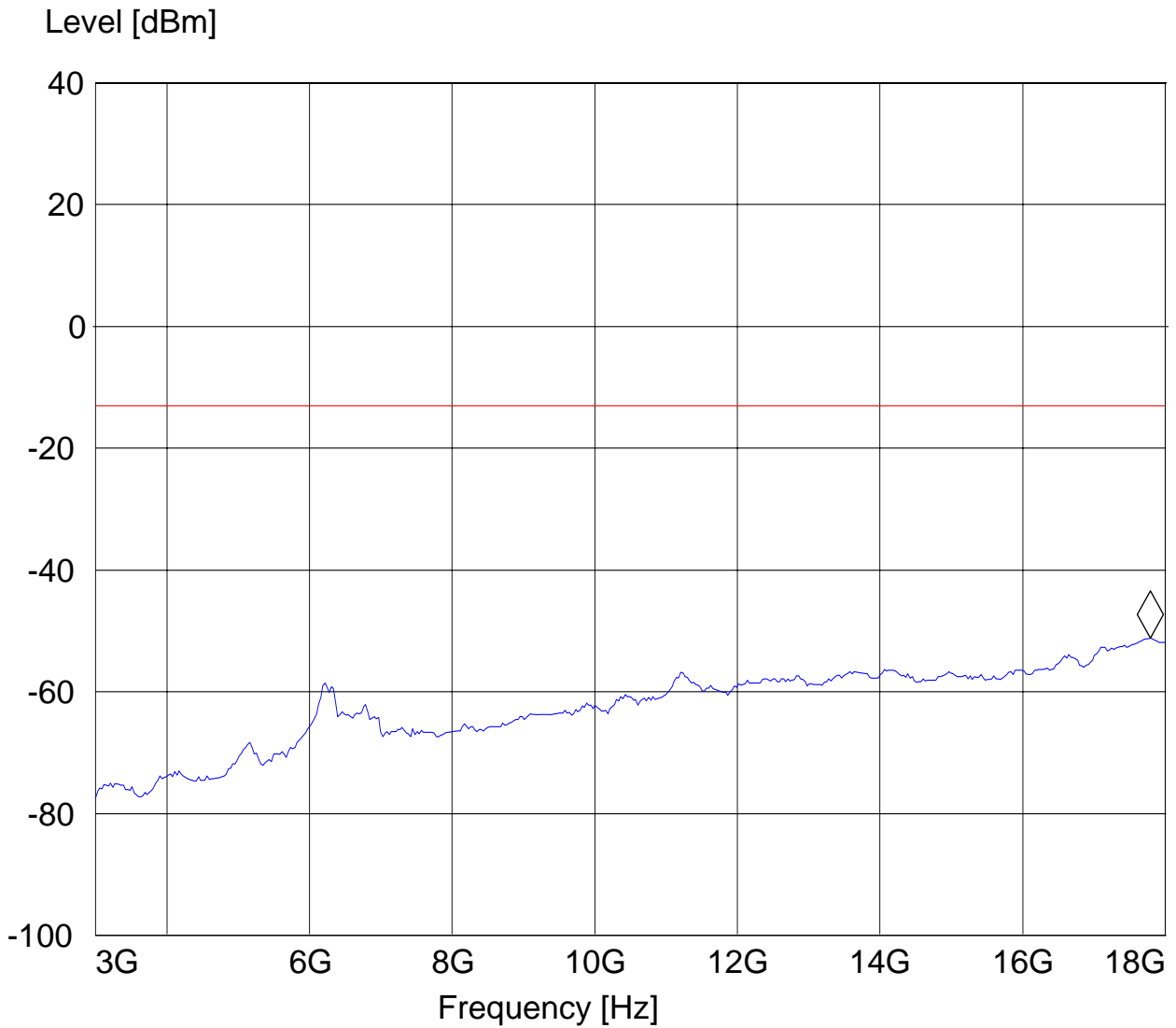
Tx @ 1880.0MHz: 3GHz – 18GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 17.789579158 GHz -51.19 dBm





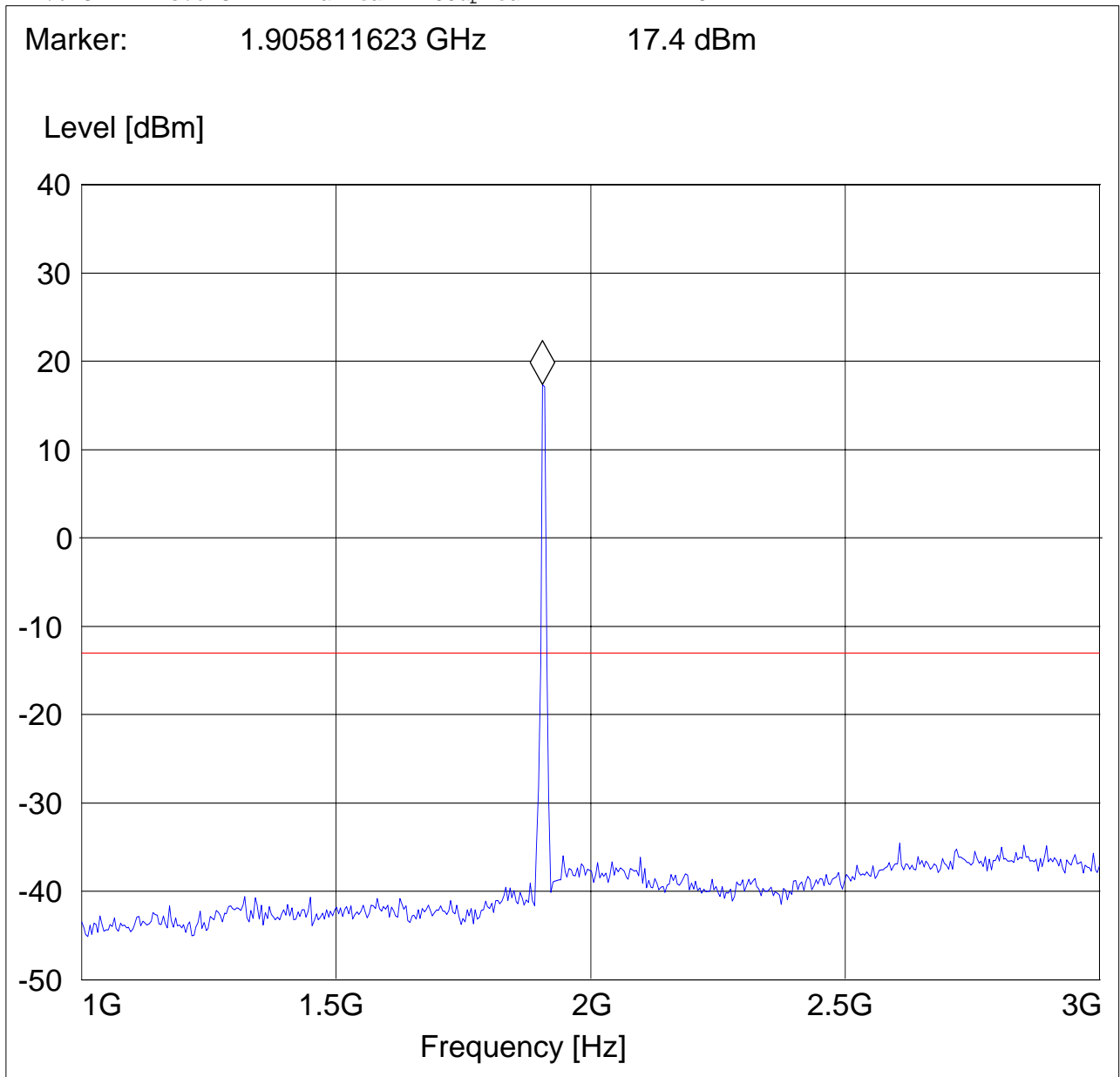
RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY)

Tx @ 1907.6MHz: 1GHz – 3GHz

Note: The peak above the limit line is the carrier freq. at ch-9538

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA
SWEEP TABLE: "FCC 24Spuri 1-3G"

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





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY)

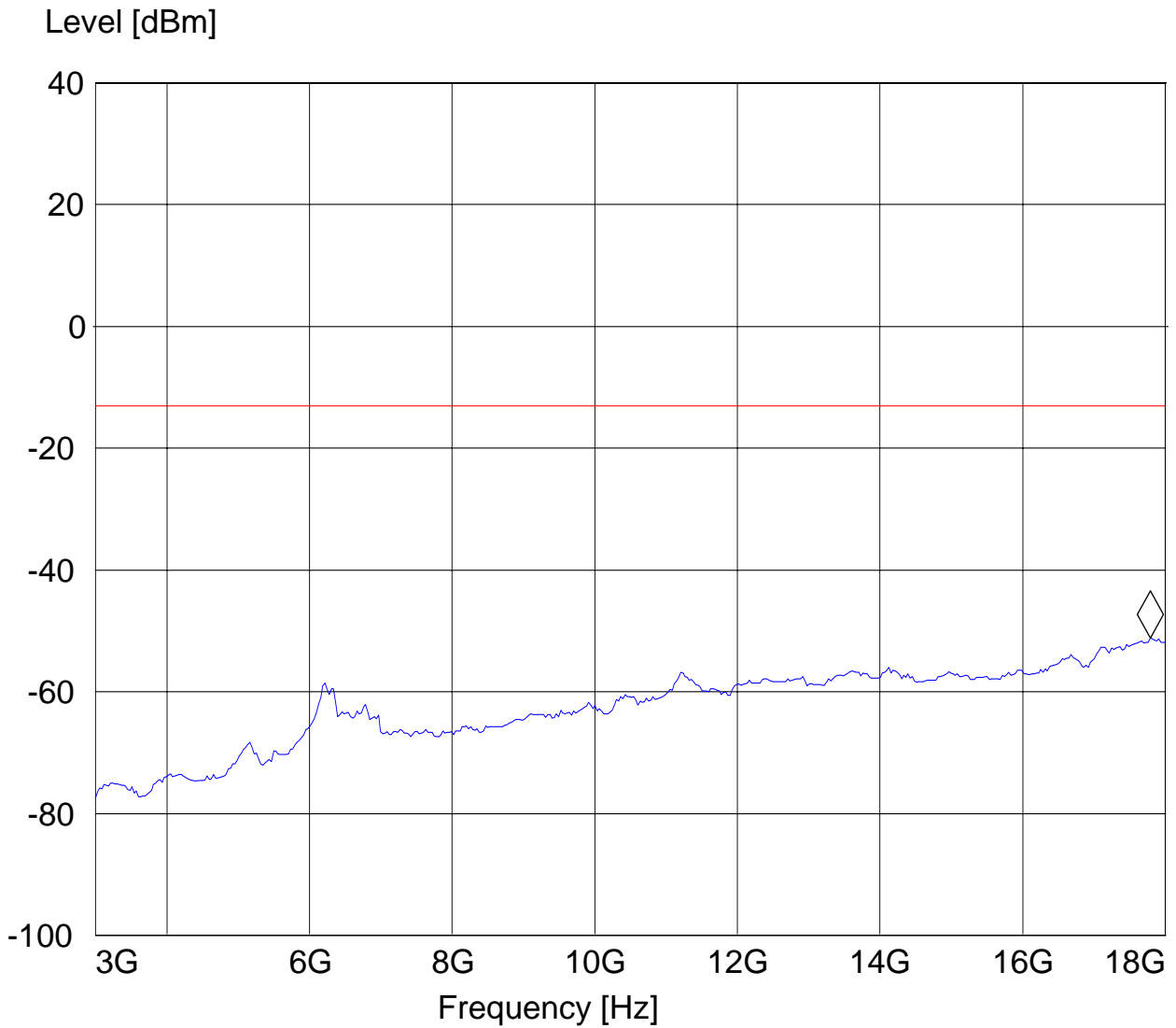
Tx @ 1907.6MHz: 3GHz – 18GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 17.789579158 GHz -51.19 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA ONLY) 18GHz – 19.1GHz

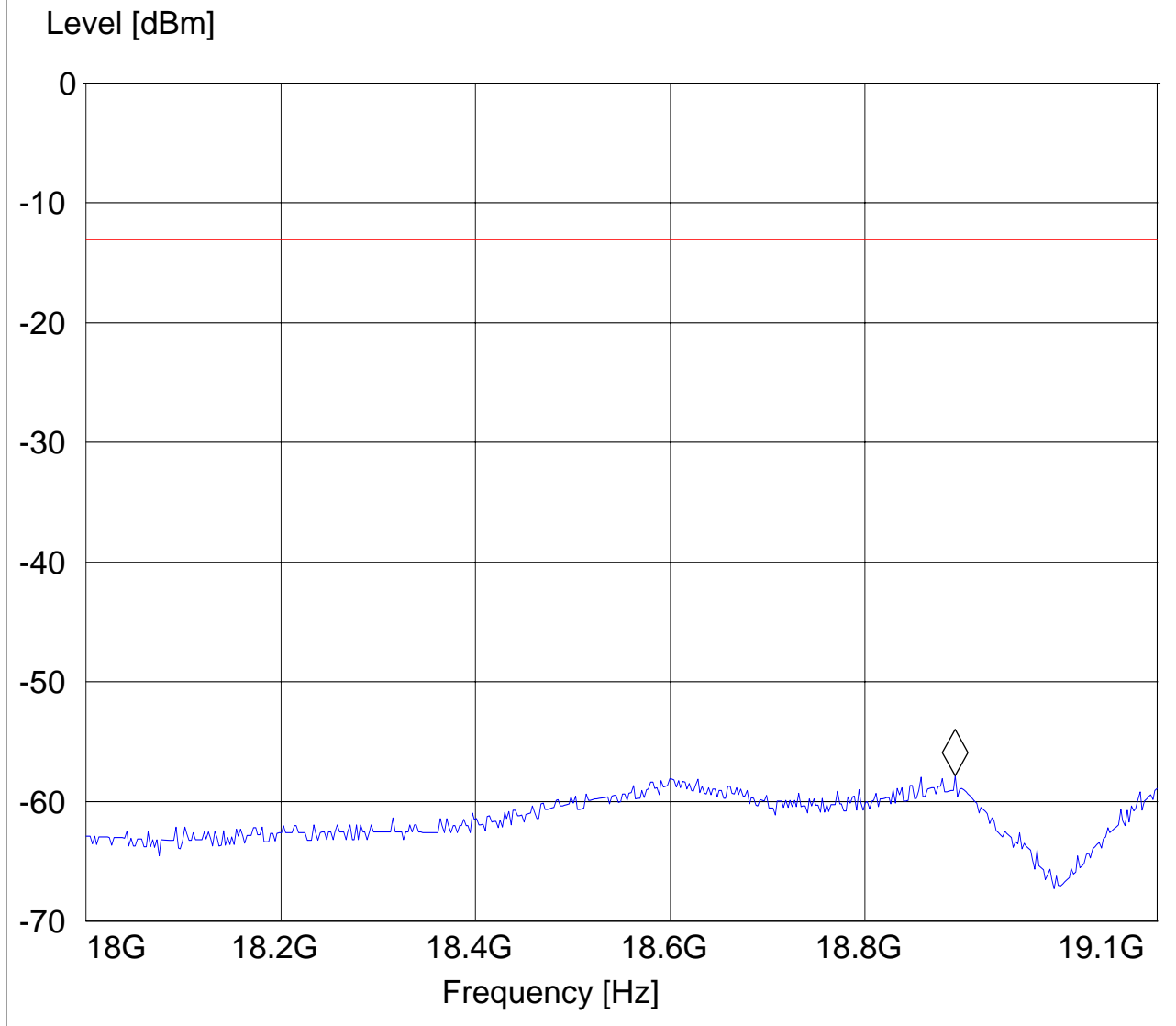
Note: This plot is valid for low, mid & high channels (worst-case plot)

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	19.1 GHz	Average	Coupled	1 MHz	DUMMY-DBM

Marker: 18.892785571 GHz -57.87 dBm





5.5.4.4 Test Results (UMTS FDD2 HSDPA + HSUPA):

Harmonics	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
2	3704.8	NF	3760	NF	3815.2	NF
3	5557.2	NF	5640	NF	5722.8	NF
4	7409.6	NF	7520	NF	7630.4	NF
5	9262	NF	9400	NF	9538	NF
6	11114.4	NF	11280	NF	11445.6	NF
7	12966.8	NF	13160	NF	13353.2	NF
8	14819.2	NF	15040	NF	15260.8	NF
9	16671.6	NF	16920	NF	17168.4	NF
10	18524	NF	18800	NF	19076	NF



RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

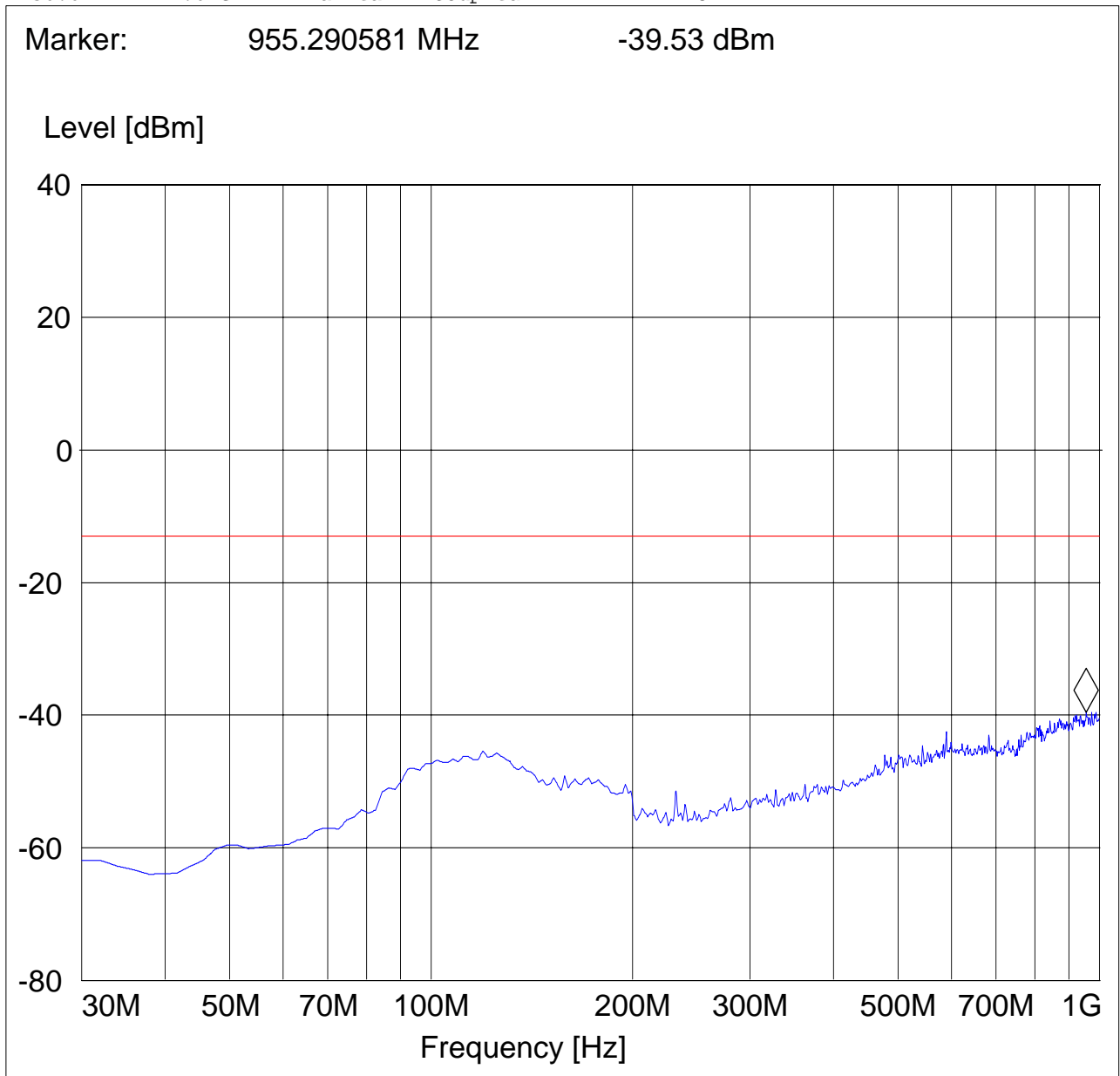
TX: 30MHz - 1GHz

Antenna: Vertical

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

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

Marker: 955.290581 MHz -39.53 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

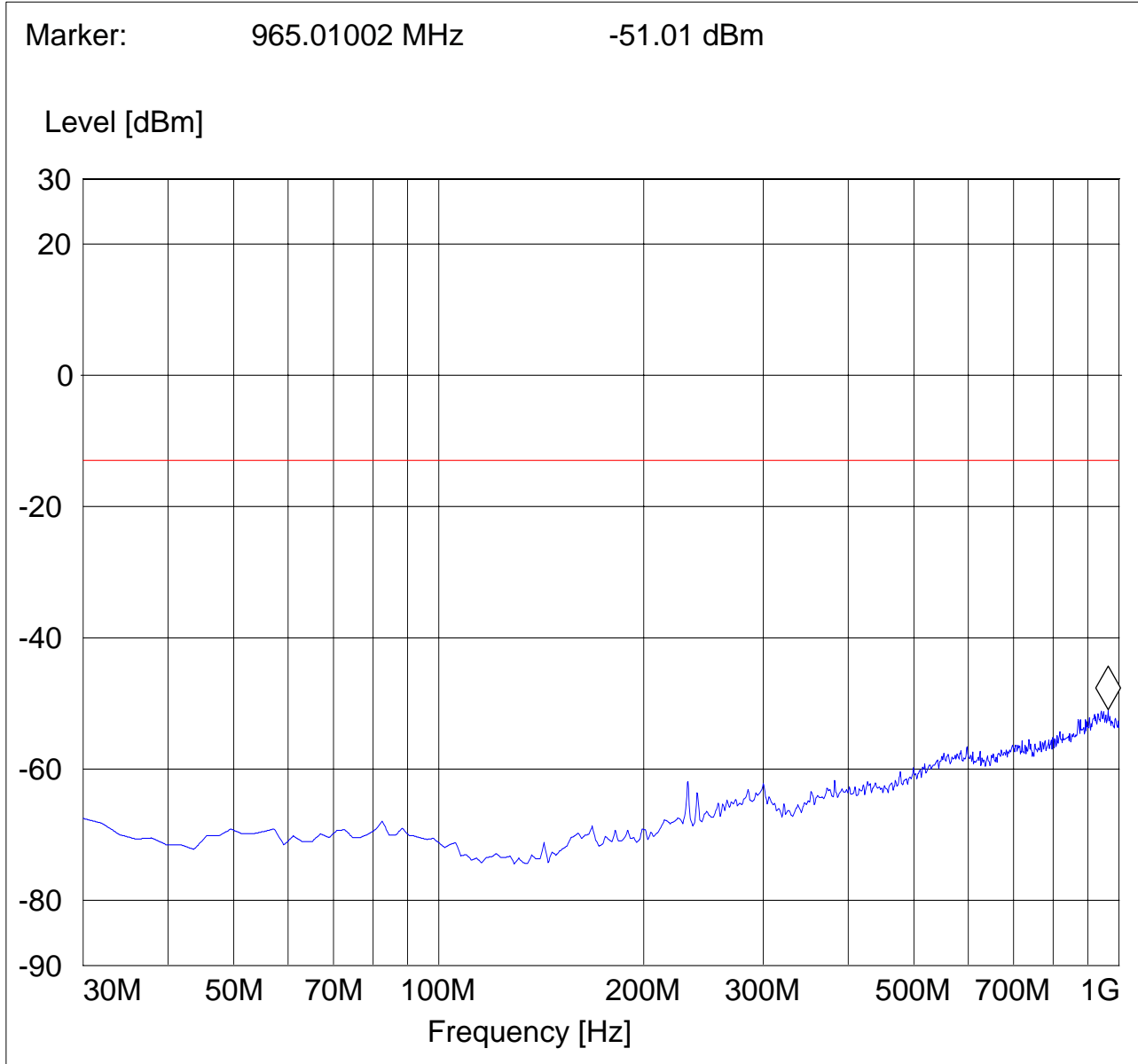
TX: 30MHz - 1GHz

Antenna: Horizontal

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

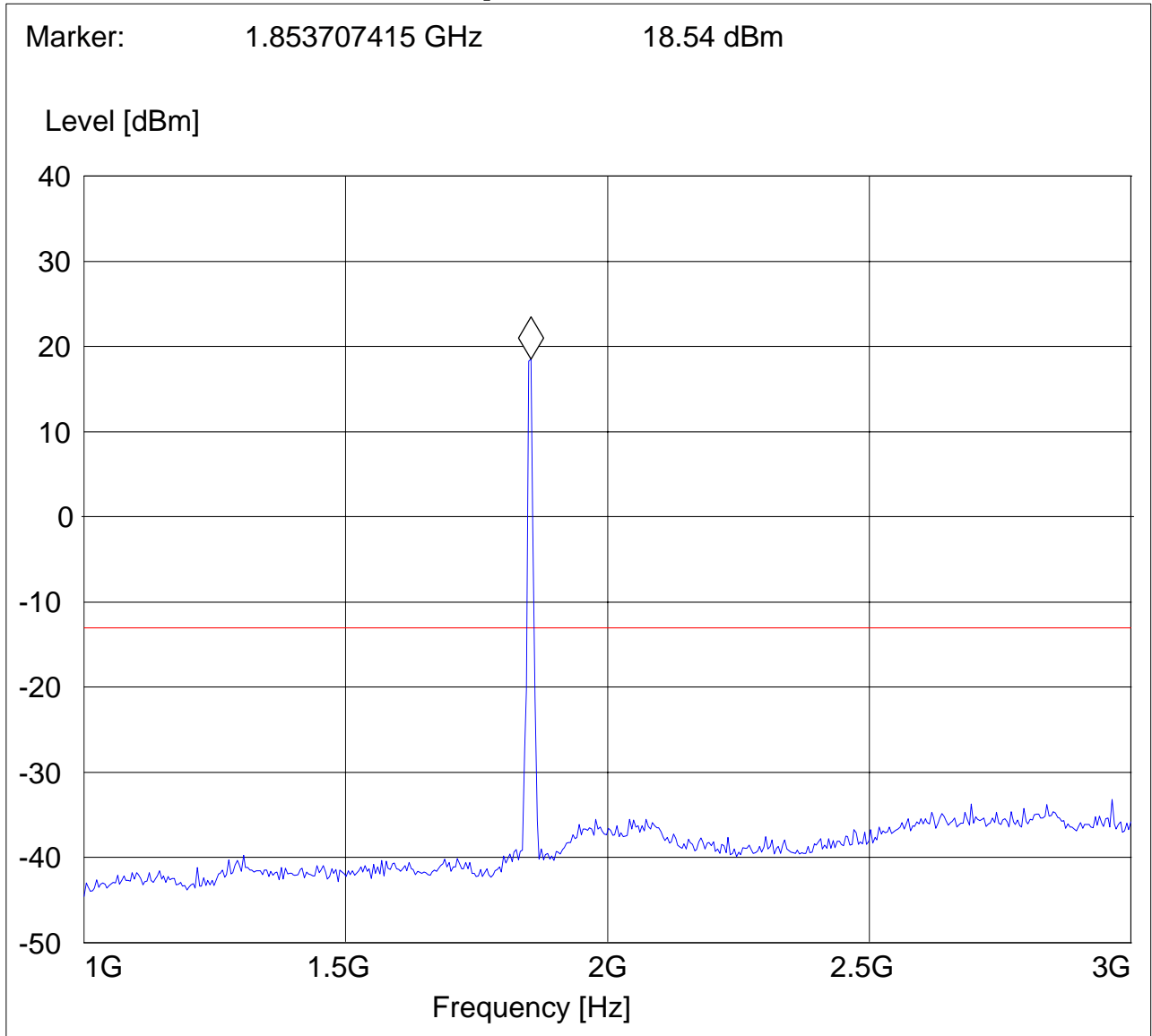
Tx @ 1852.4MHz: 1GHz – 3GHz

Note: The peak above the limit line is the carrier freq. at ch-9262.

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

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

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





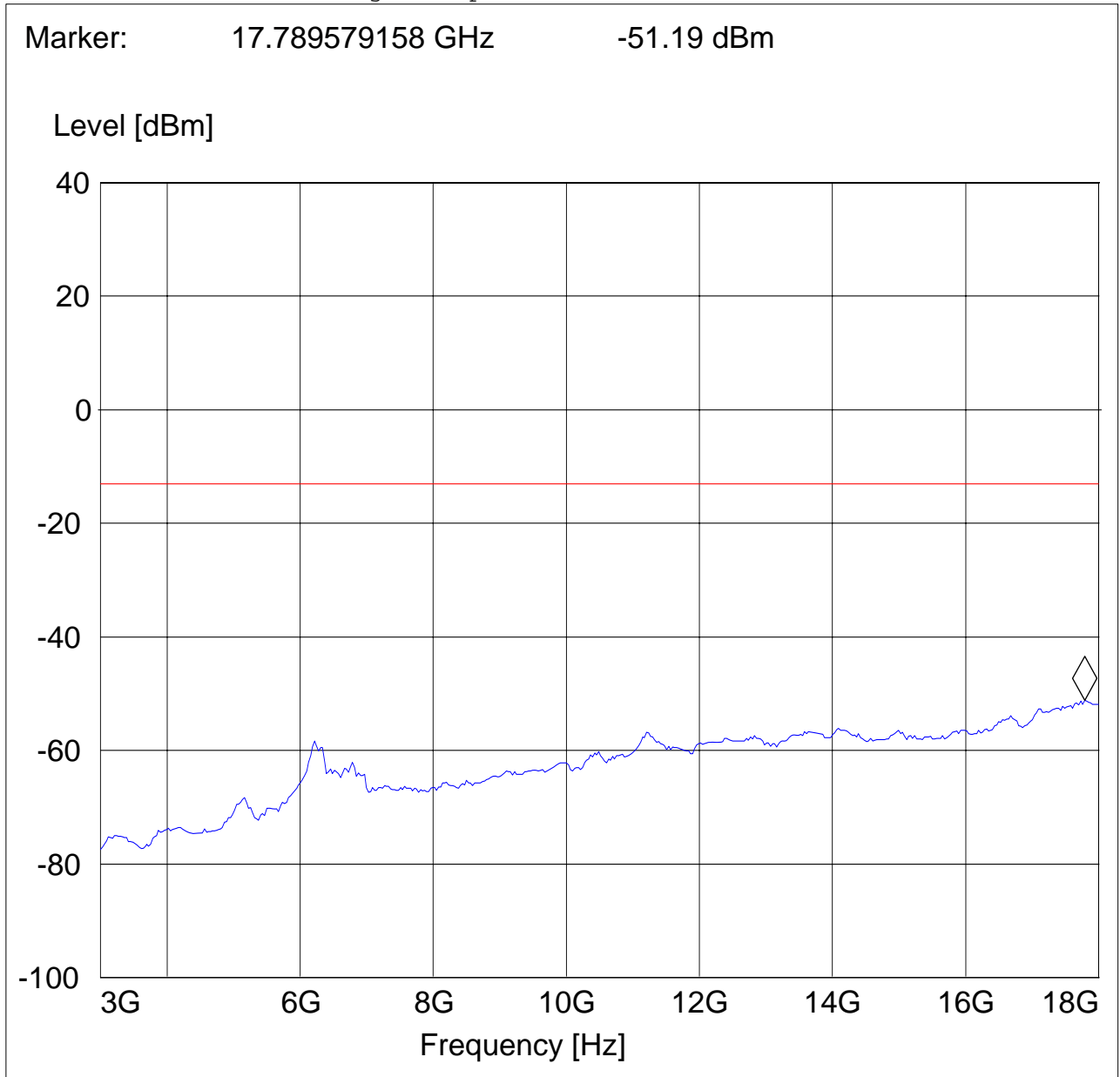
RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

Tx @ 1852.4MHz: 3GHz – 18GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "FCC 24Spuri 3-18G"

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

Marker: 17.789579158 GHz -51.19 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

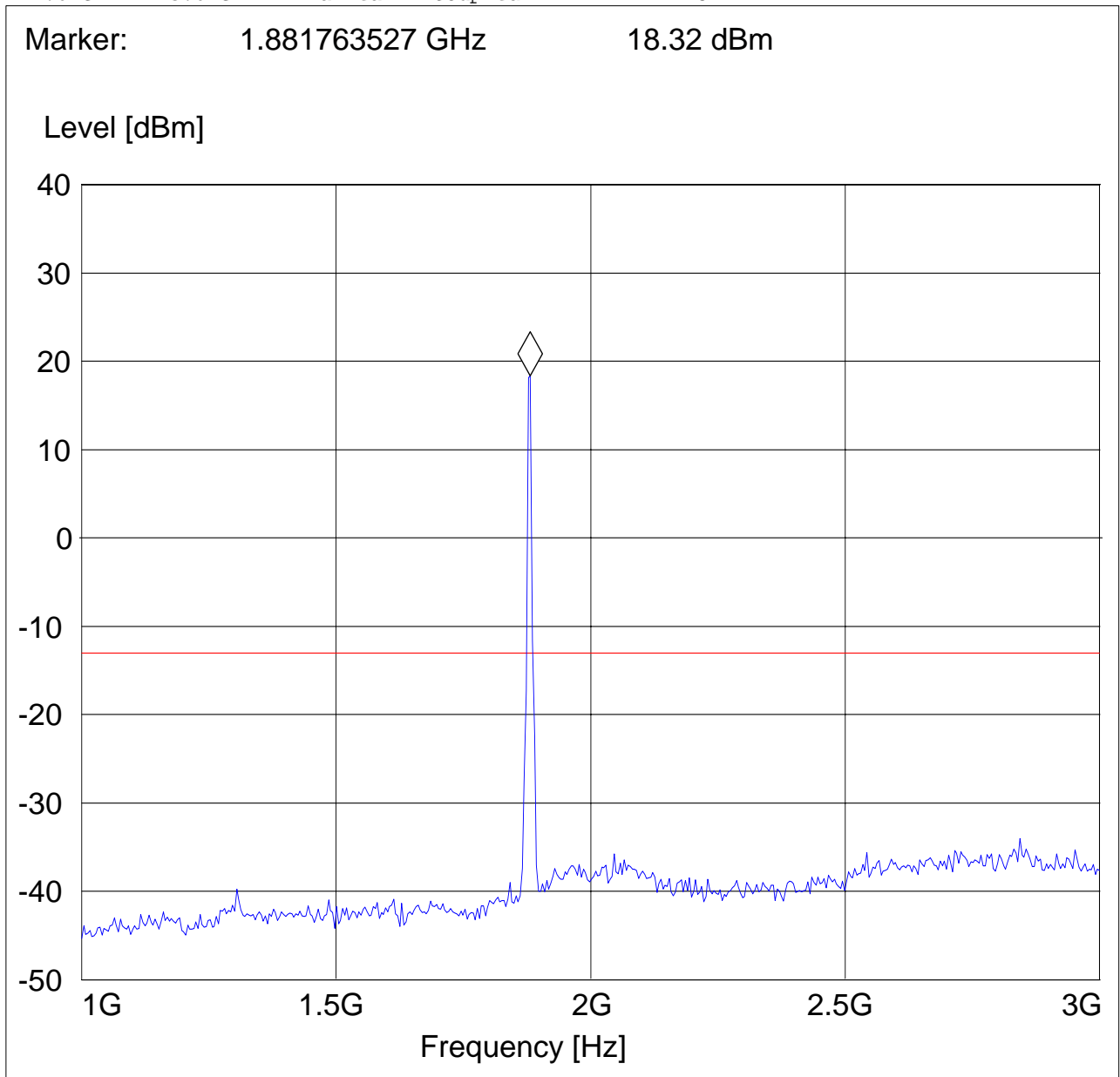
Tx @ 1880.0MHz: 1GHz – 3GHz

Note: The peak above the limit line is the carrier freq. at ch-9400

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA
SWEEP TABLE: "FCC 24Spuri 1-3G"

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

Marker: 1.881763527 GHz 18.32 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

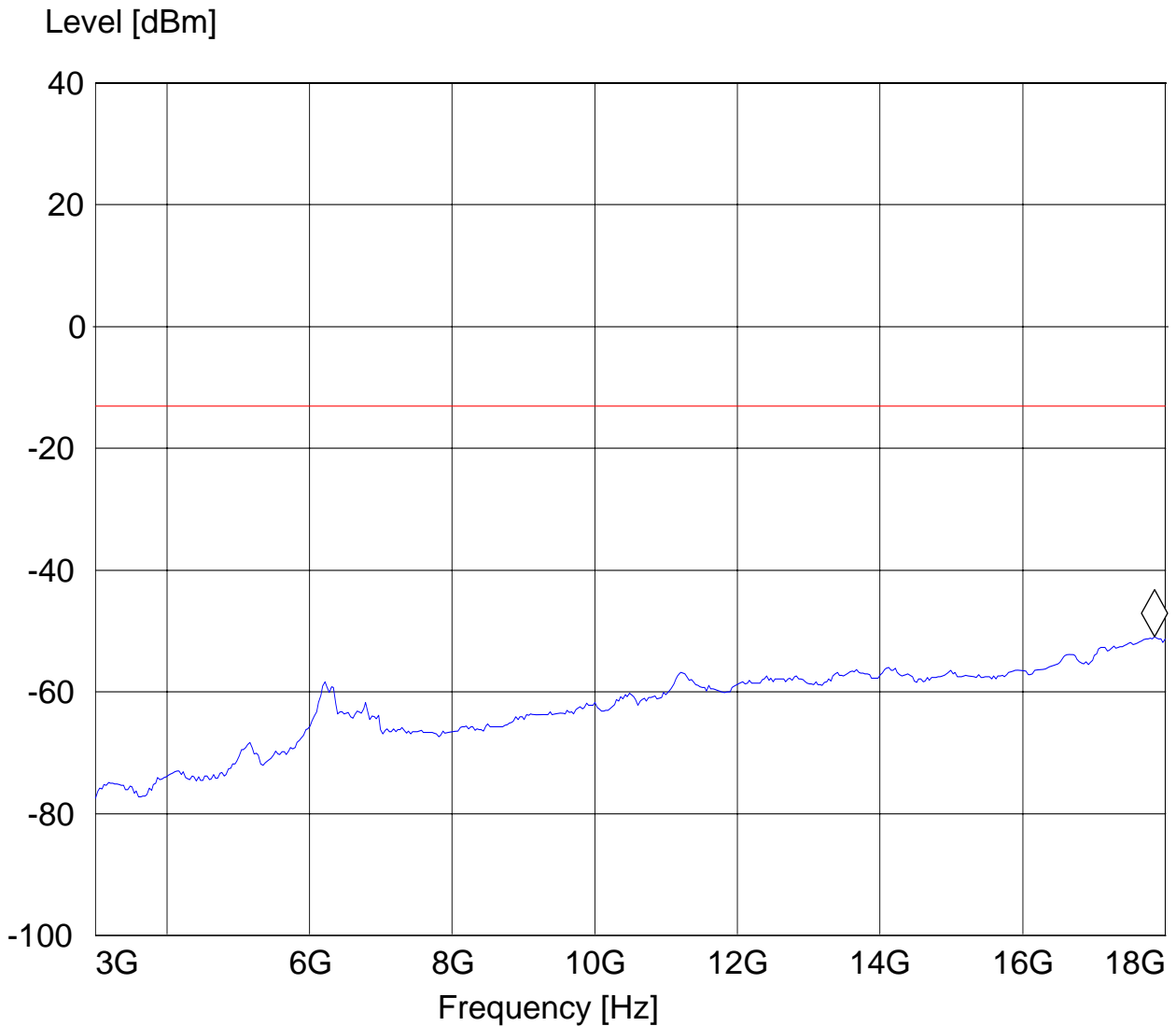
Tx @ 1880.0MHz: 3GHz – 18GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

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

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

Marker: 17.849699399 GHz -50.94 dBm





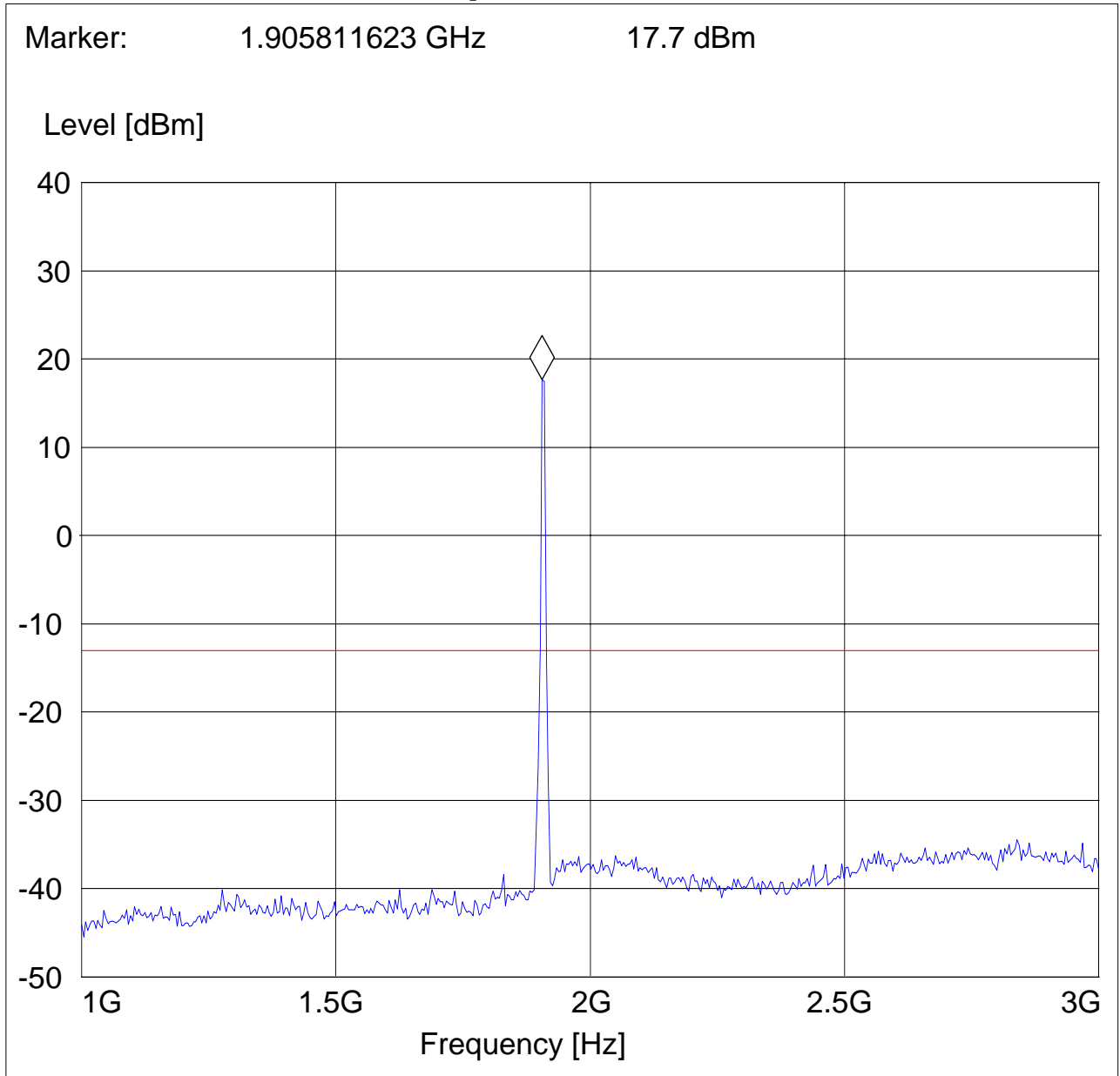
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)
Tx @ 1907.6MHz: 1GHz – 3GHz**

Note: The peak above the limit line is the carrier freq. at ch-9538

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

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

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





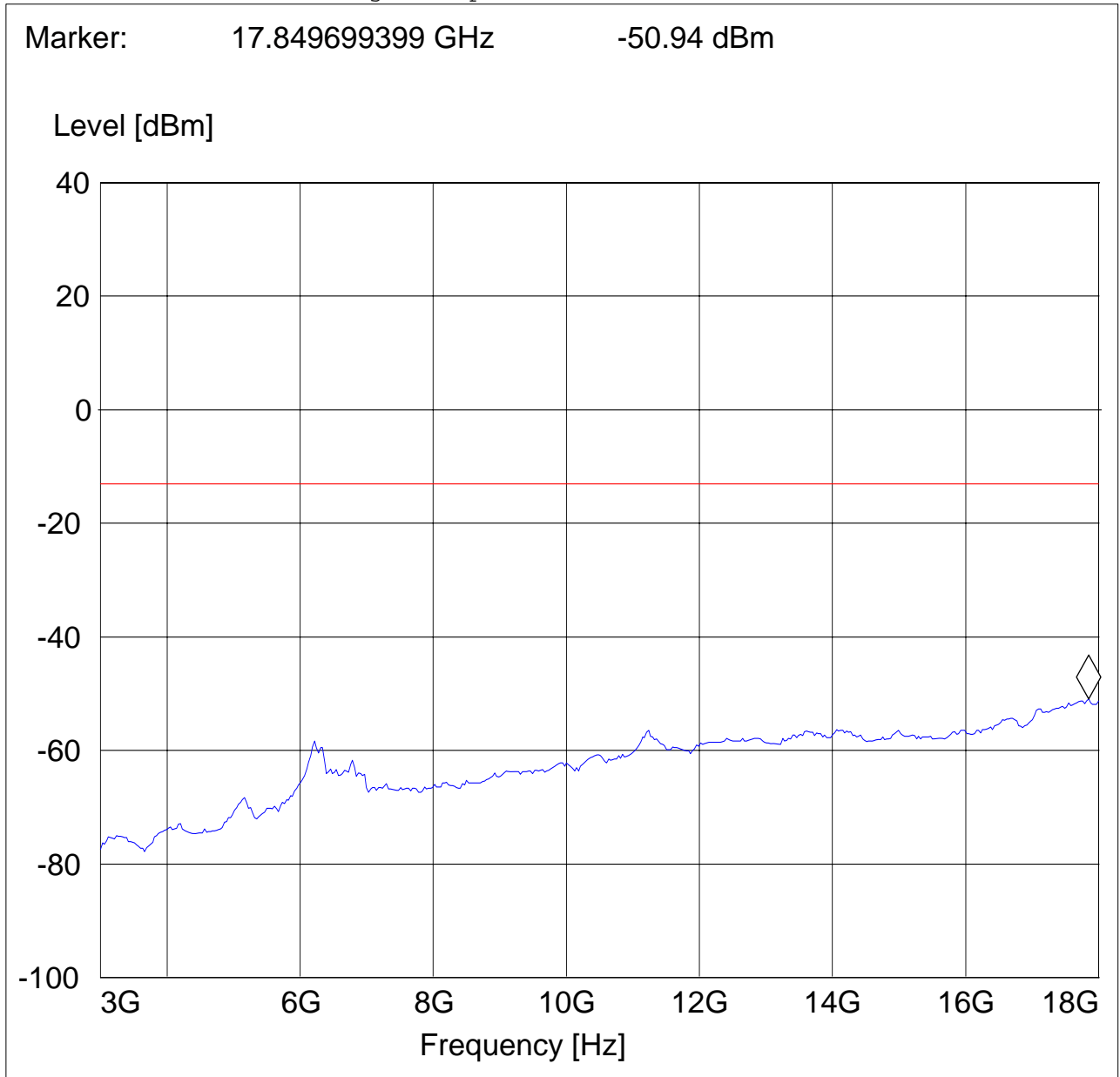
RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA)

Tx @ 1907.6MHz: 3GHz – 18GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "FCC 24Spuri 3-18G"

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

Marker: 17.849699399 GHz -50.94 dBm





RADIATED SPURIOUS EMISSIONS(UMTS FDD2 HSDPA + HSUPA) 18GHz – 19.1GHz

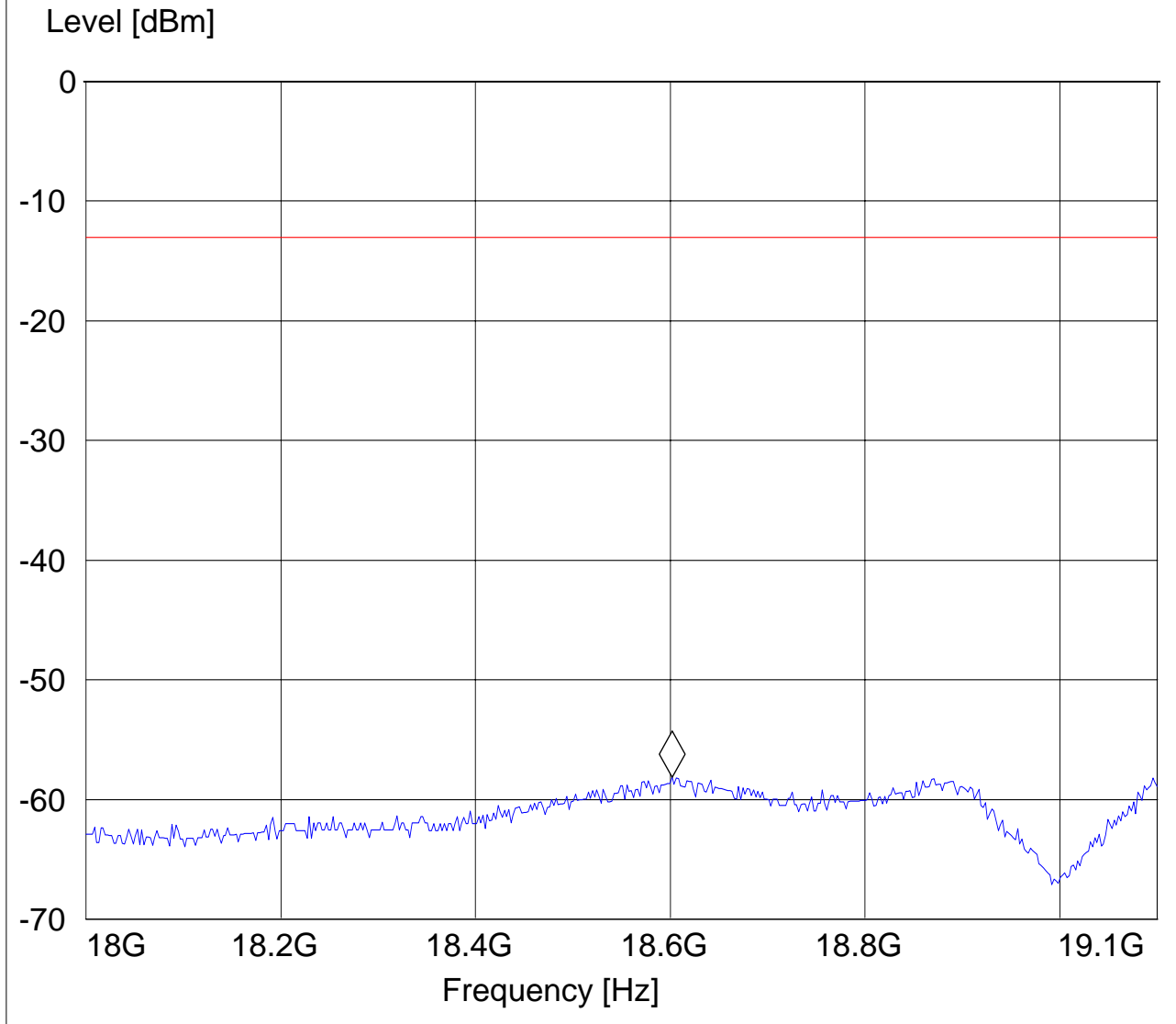
Note: This plot is valid for low, mid & high channels (worst-case plot)

EUT: X950U
 Customer: Novatel
 Test Mode: WCDMA FDD II
 ANT Orientation: H
 EUT Orientation: H
 Test Engineer: Ed
 Power Supply: AC Adapter
 Comments: HSDPA + HSUPA

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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	19.1 GHz	Average	Coupled	1 MHz	DUMMY-DBM

Marker: 18.601803607 GHz -58.14 dBm





5.5.5 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



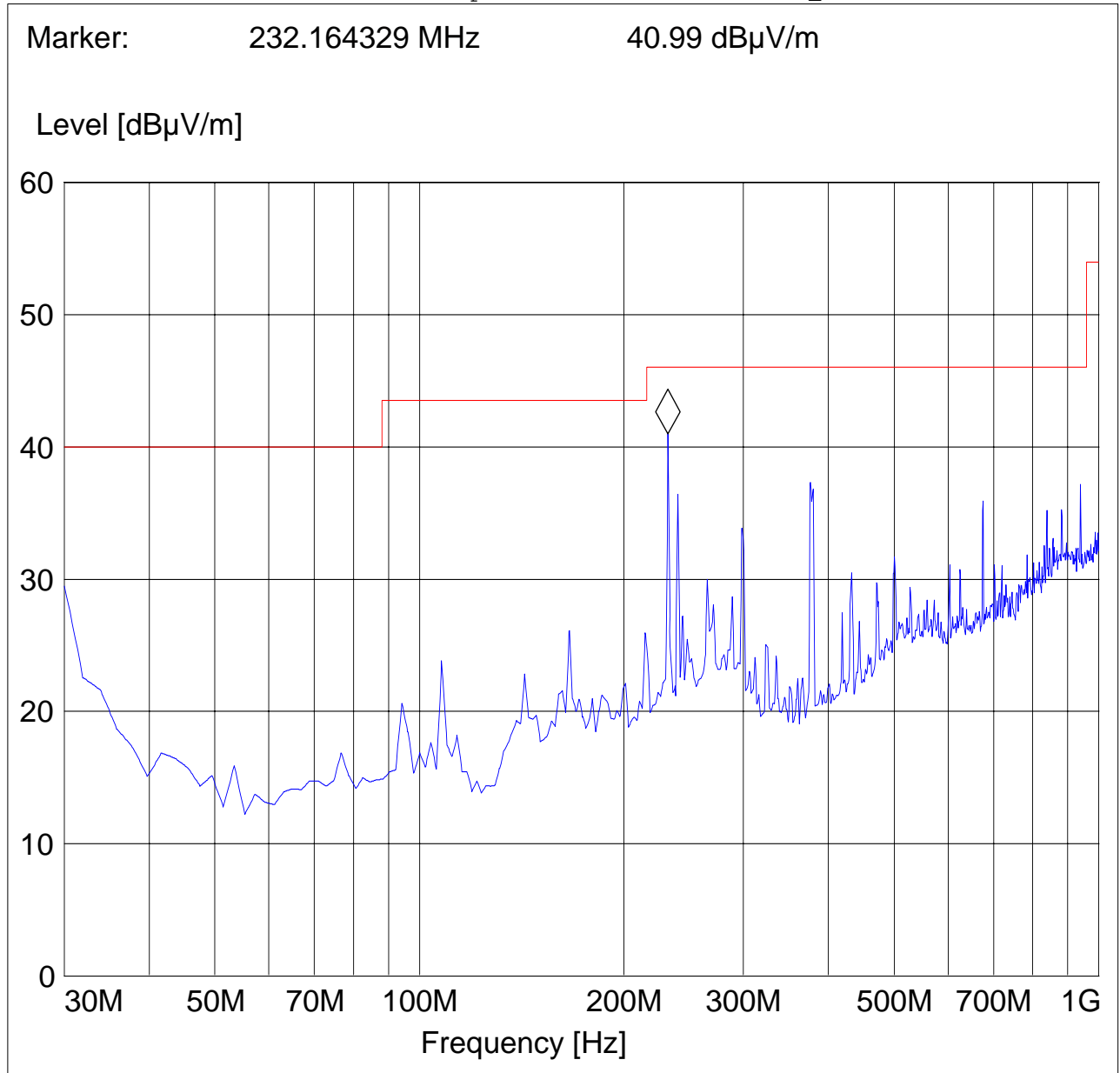
5.5.5.1 Test Results (UMTS FDD5 HSDPA Only)

RX 30M – 1GHz, antenna Vertical

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "CANADA RE_30M-1G_Ver"

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



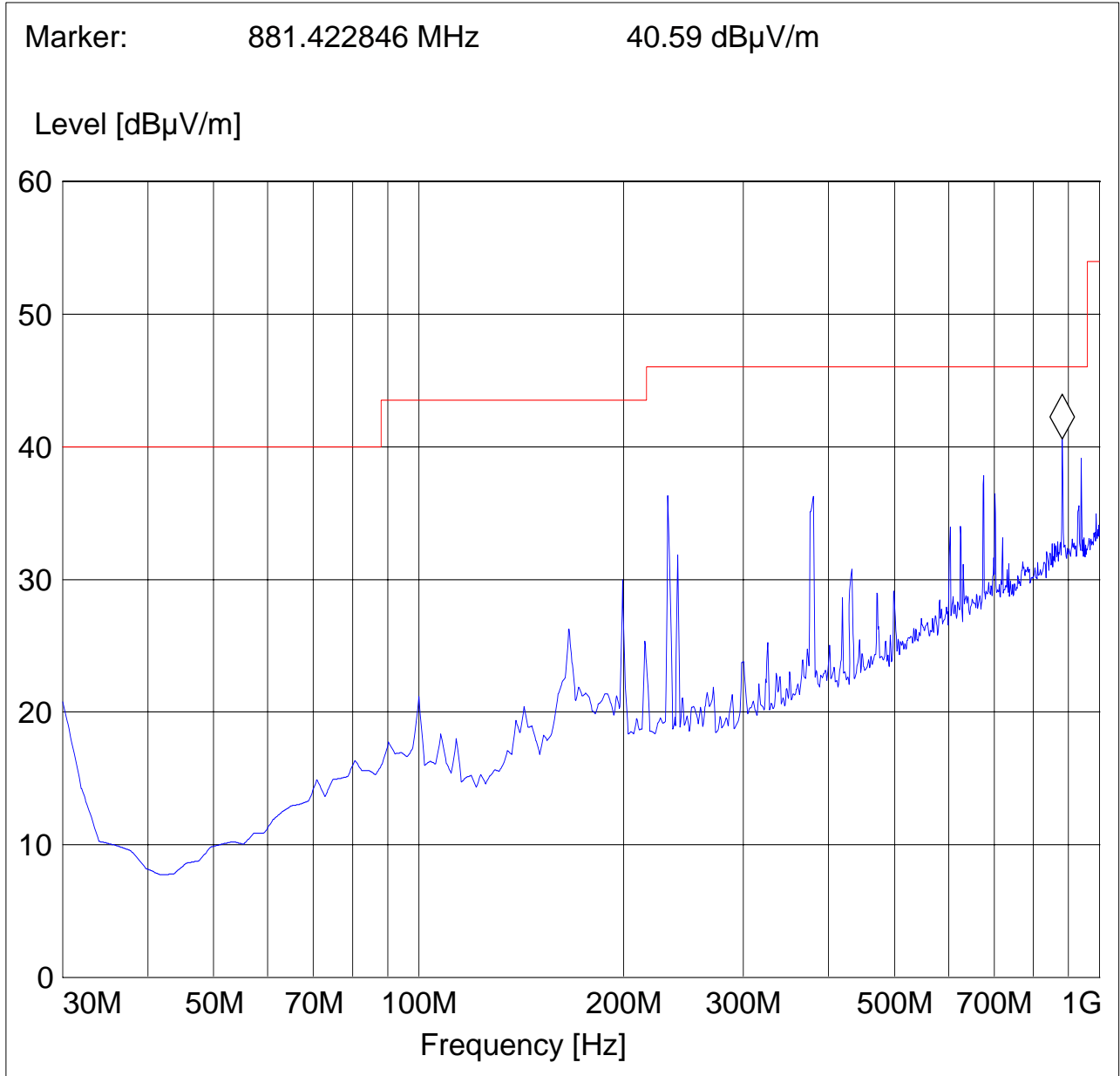


(UMTS FDD5 HSDPA Only) RX 30M – 1GHz, antenna Horizontal

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "CANDA RE_30M-1G_Hor"

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





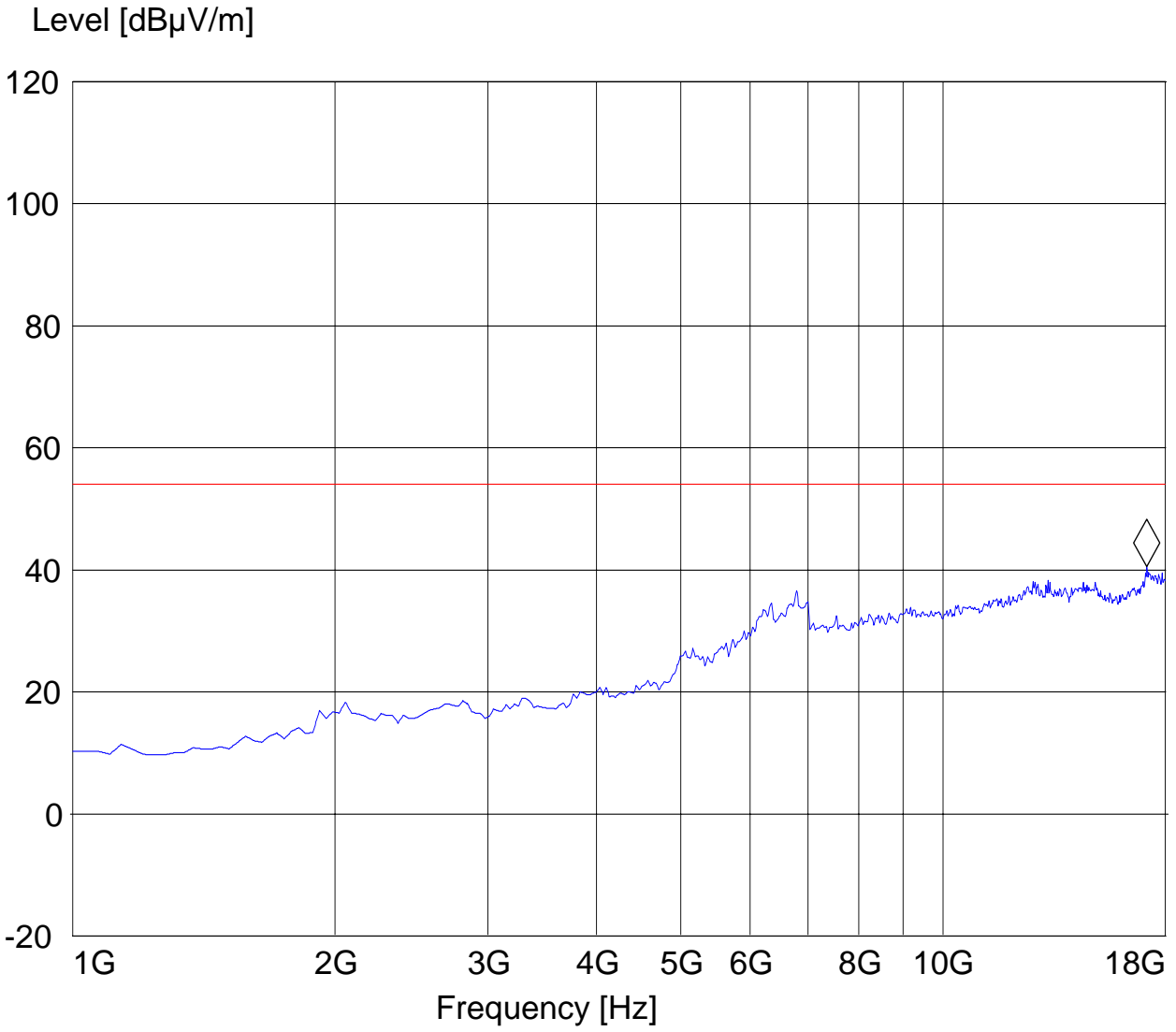
(UMTS FDD5 HSDPA Only) RX 1-18GHz

EUT / Description: X950U
Manufacturer: Novatel
Test mode: WCDMA FDD V
ANT Orientation: : H
EUT Orientation:: H
Test Engineer: Ed
Voltage: AC Adapter
Comments:: HSDPA

SWEEP TABLE: "CANADA RE_1-18G"

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

Marker: 17.148296593 GHz 40.55 dBµV/m





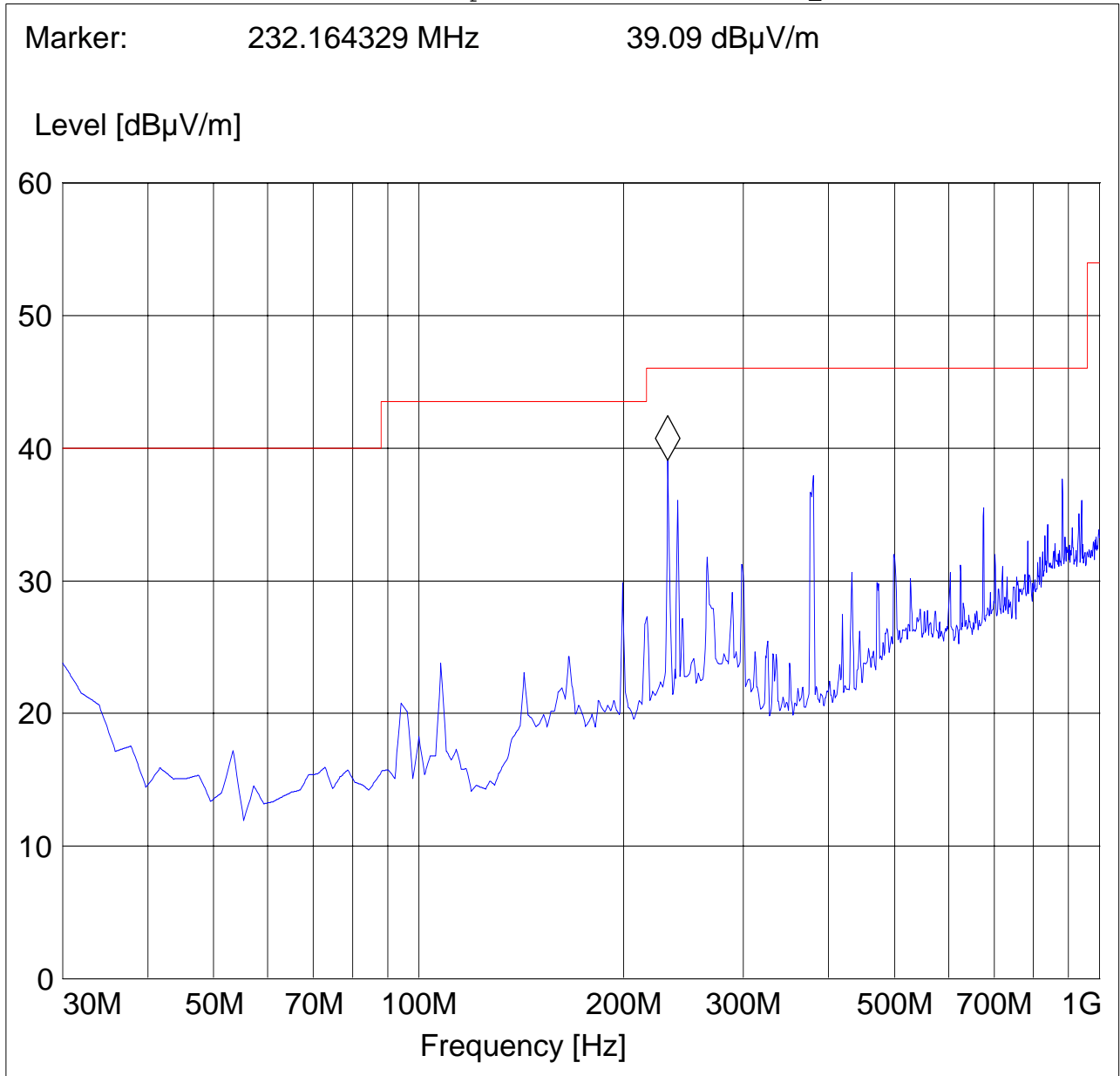
5.5.5.2 Test Results (UMTS FDD5 HSDPA + HSUPA)

RX 30M – 1GHz, antenna Vertical

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "CANADA RE_30M-1G_Ver"

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





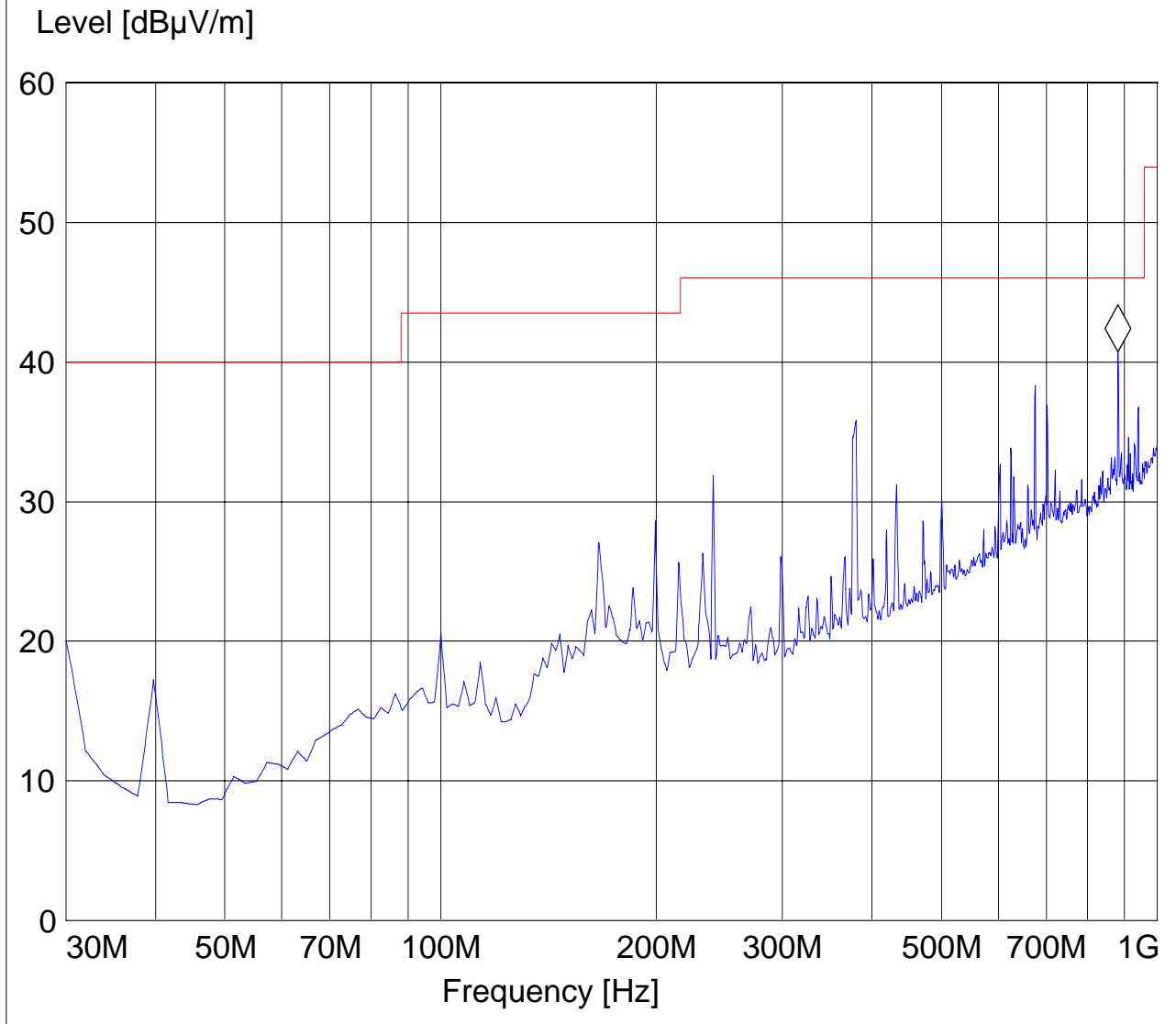
(UMTS FDD5 HSDPA + HSUPA) RX 30M – 1GHz, antenna Horizontal

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD V
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "CANDA RE_30M-1G_Hor"

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

Marker: 881.422846 MHz 40.76 dBµV/m





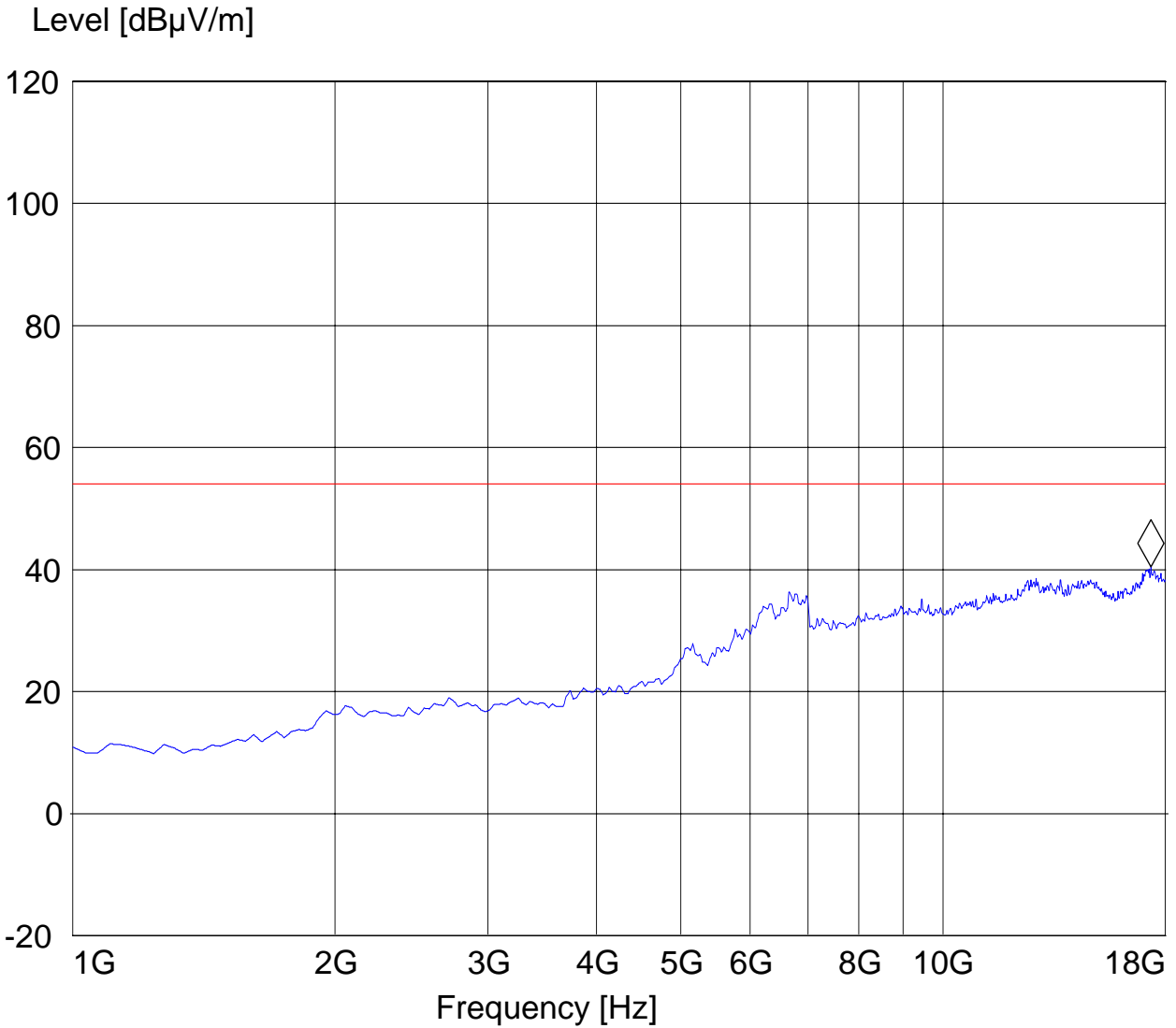
(UMTS FDD5 HSDPA + HSPUA) RX 1-18GHz

EUT / Description: X950U
Manufacturer: Novatel
Test mode: WCDMA FDD V
ANT Orientation: : H
EUT Orientation:: H
Test Engineer: Ed
Voltage: AC Adapter
Comments:: HSDPA + HSUPA

SWEEP TABLE: "CANADA RE_1-18G"

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

Marker: 17.318637275 GHz 40.48 dBµV/m





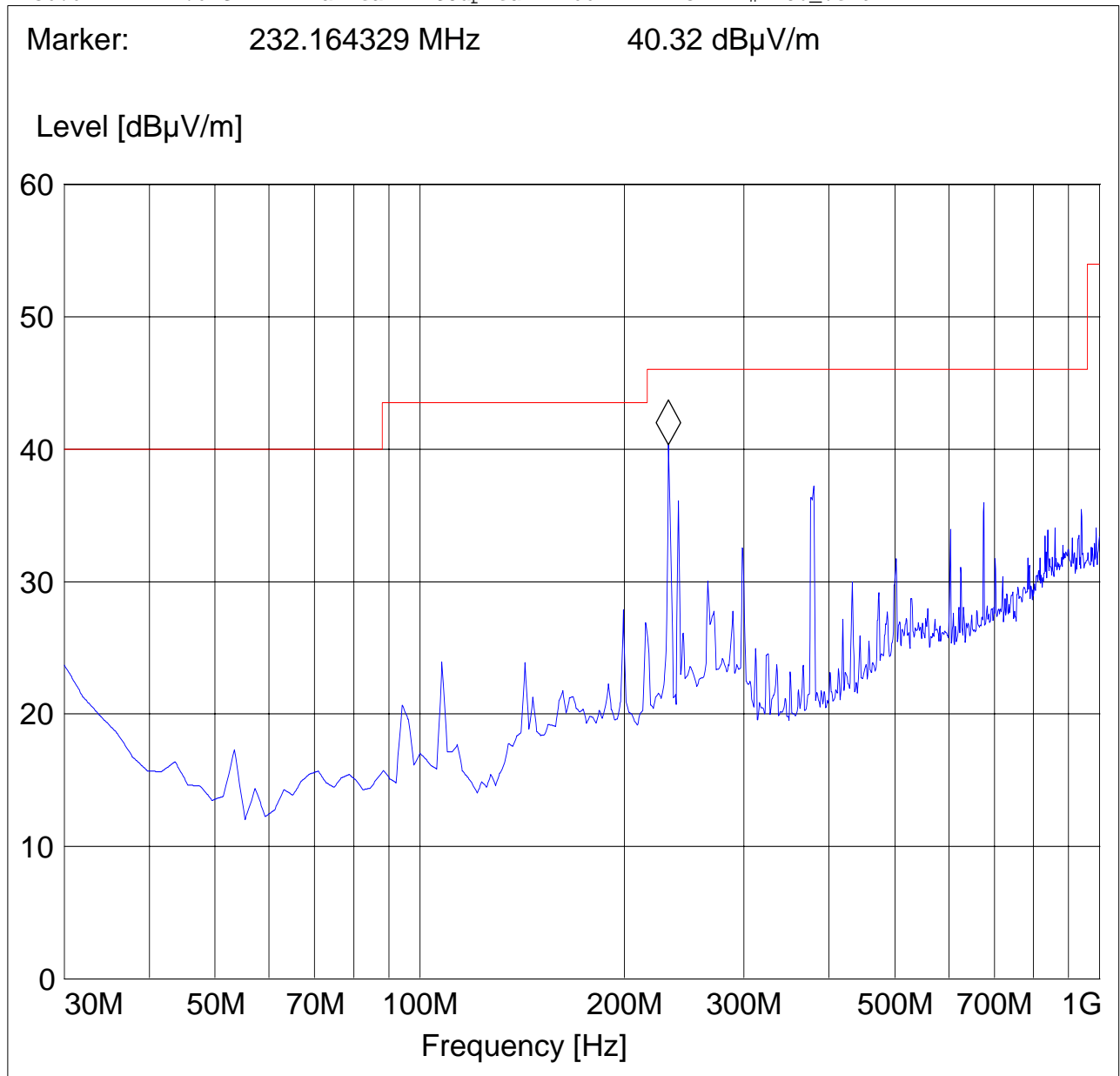
5.5.5.3 Test Results (UMTS FDD2 HSDPA Only)

RX 30M – 1GHz, antenna Vertical

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "CANADA RE_30M-1G_Ver"

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



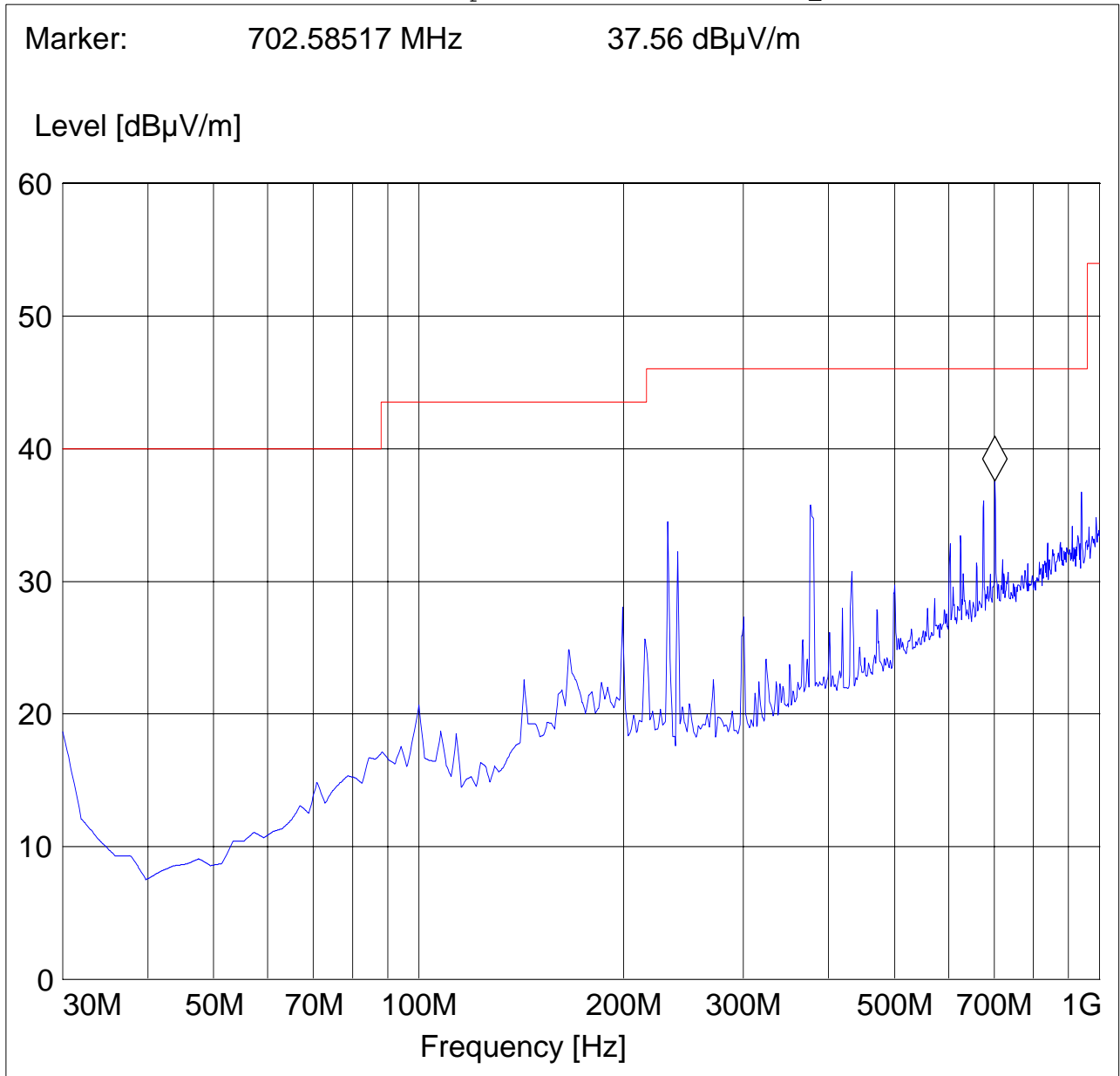


(UMTS FDD2 HSDPA Only) RX 30M – 1GHz, antenna Horizontal

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "CANDA RE_30M-1G_Hor"

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



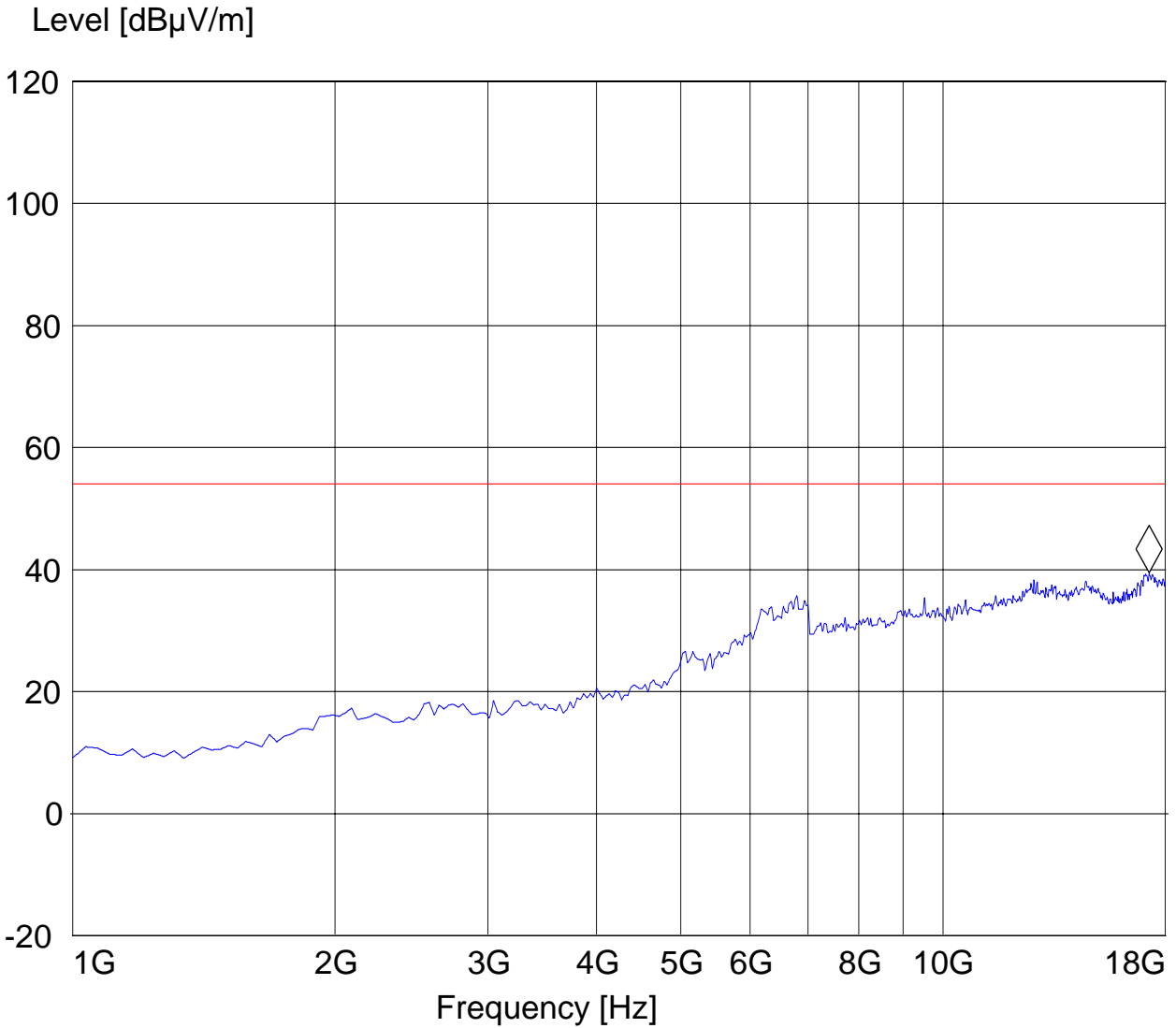


(UMTS FDD2 HSDPA Only) RX 1-18GHz

EUT / Description: X950U
Manufacturer: Novatel
Test mode: WCDMA FDD II
ANT Orientation: : H
EUT Orientation:: H
Test Engineer: Ed
Voltage: AC Adapter
Comments:: HSDPA
SWEEP TABLE: "CANADA RE_1-18G"

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

Marker: 17.250501002 GHz 39.55 dBµV/m



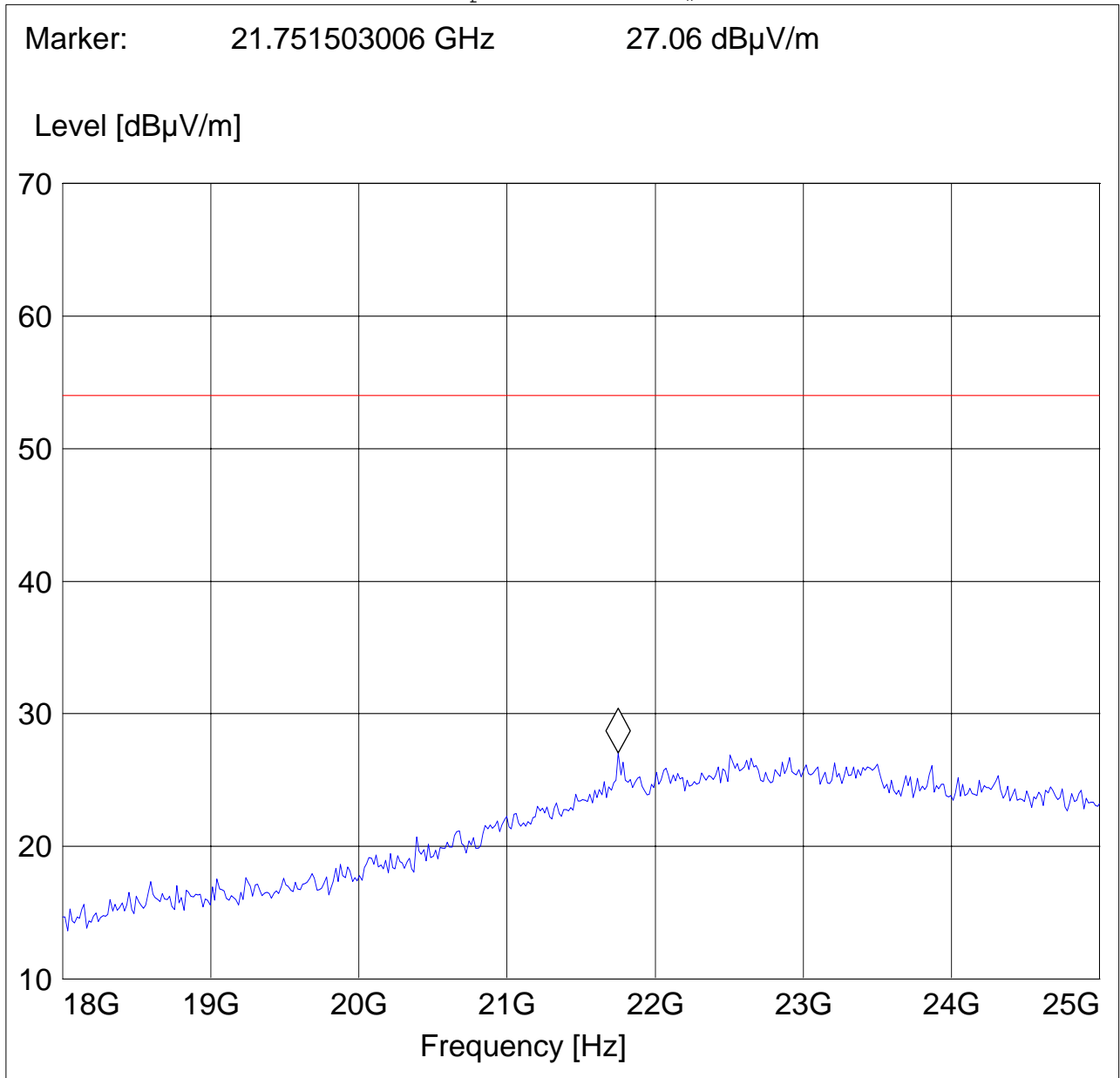


(UMTS FDD2 HSDPA Only) RX 18-19GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA

SWEEP TABLE: "CANADA RE_18-26.5G"

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





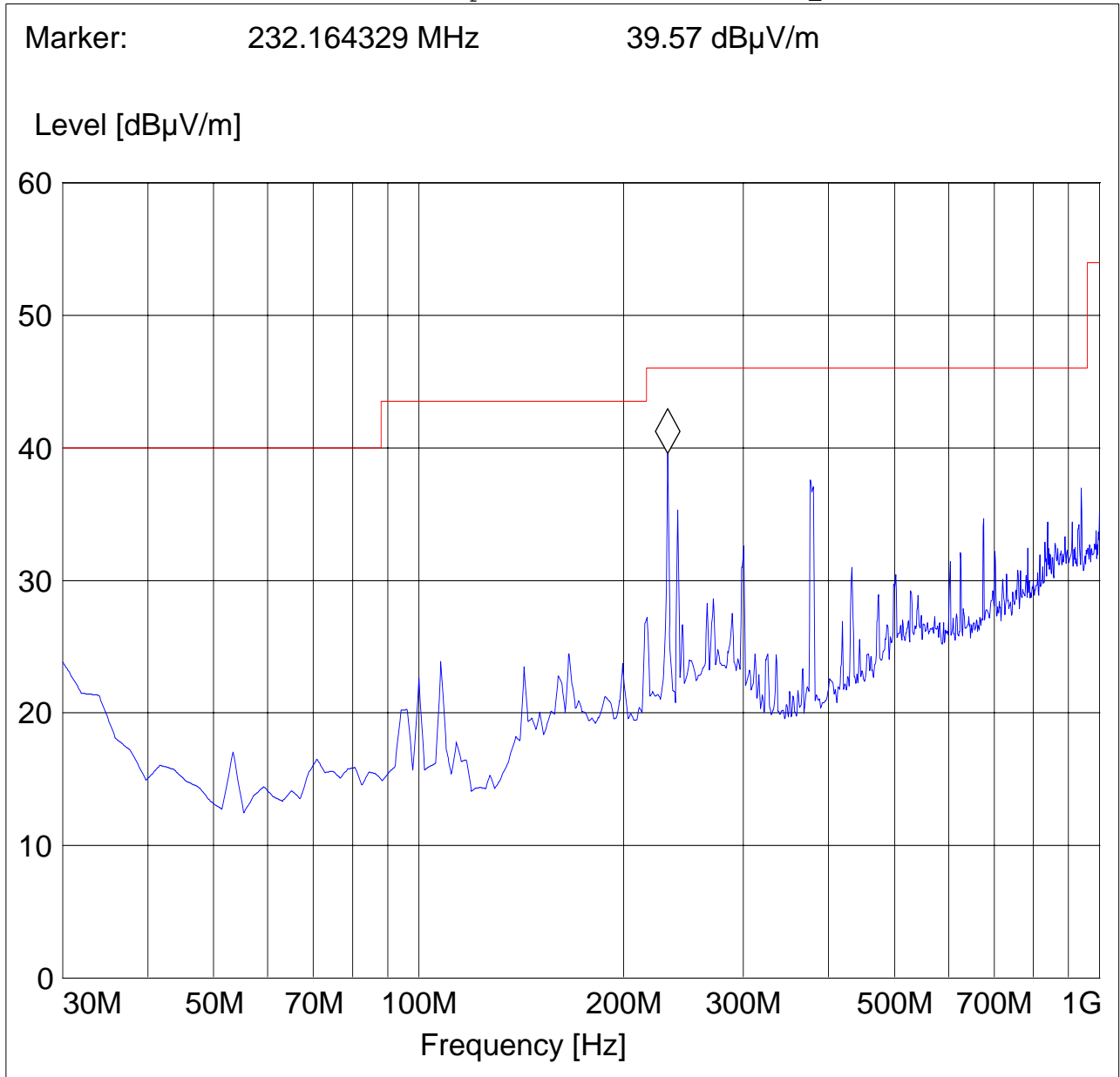
5.5.5.4 Test Results (UMTS FDD2 HSDPA + HSUPA)

RX 30M – 1GHz, antenna Vertical

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: V
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "CANADA RE_30M-1G_Ver"

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

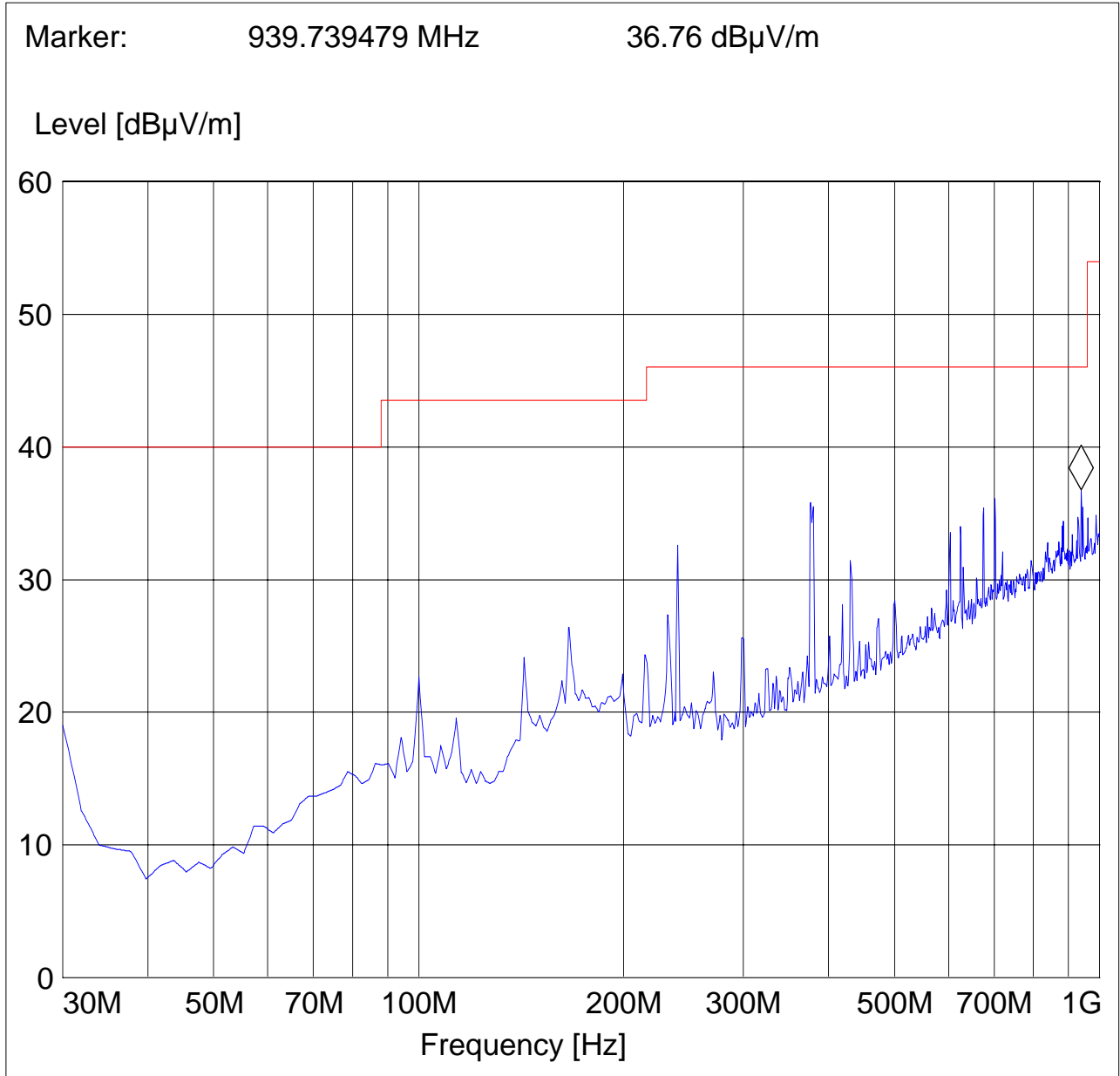




(UMTS FDD2 HSDPA + HSUPA) RX 30M – 1GHz, antenna Horizontal

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA
SWEEP TABLE: "CANDA RE_30M-1G_Hor"

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



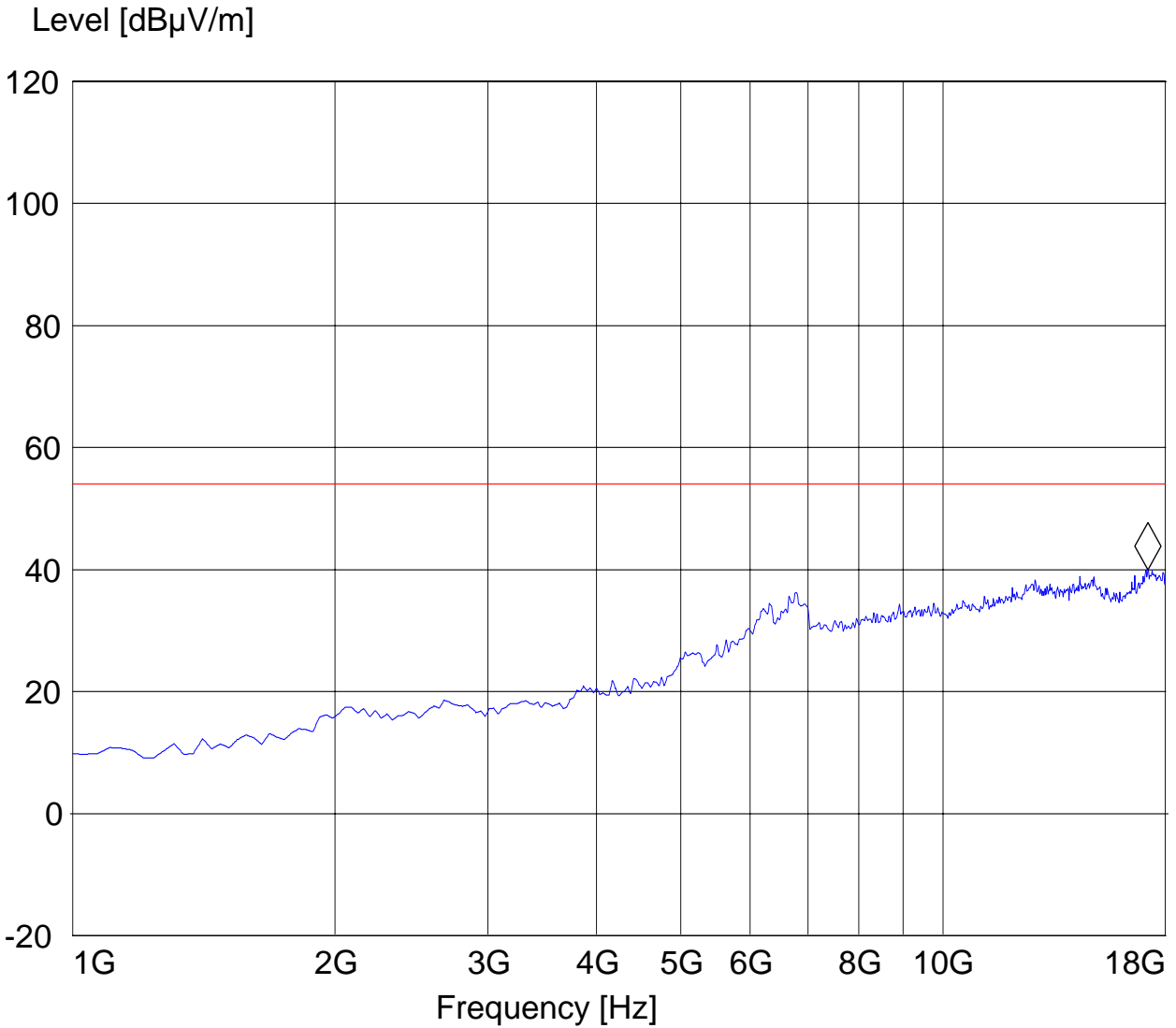


(UMTS FDD2 HSDPA + HSUPA) RX 1-18GHz

EUT / Description: X950U
Manufacturer: Novatel
Test mode: WCDMA FDD II
ANT Orientation: : H
EUT Orientation:: H
Test Engineer: Ed
Voltage: AC Adapter
Comments:: HSDPA + HSUPA
SWEEP TABLE: "CANADA RE_1-18G"

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

Marker: 17.182364729 GHz 39.94 dBµV/m



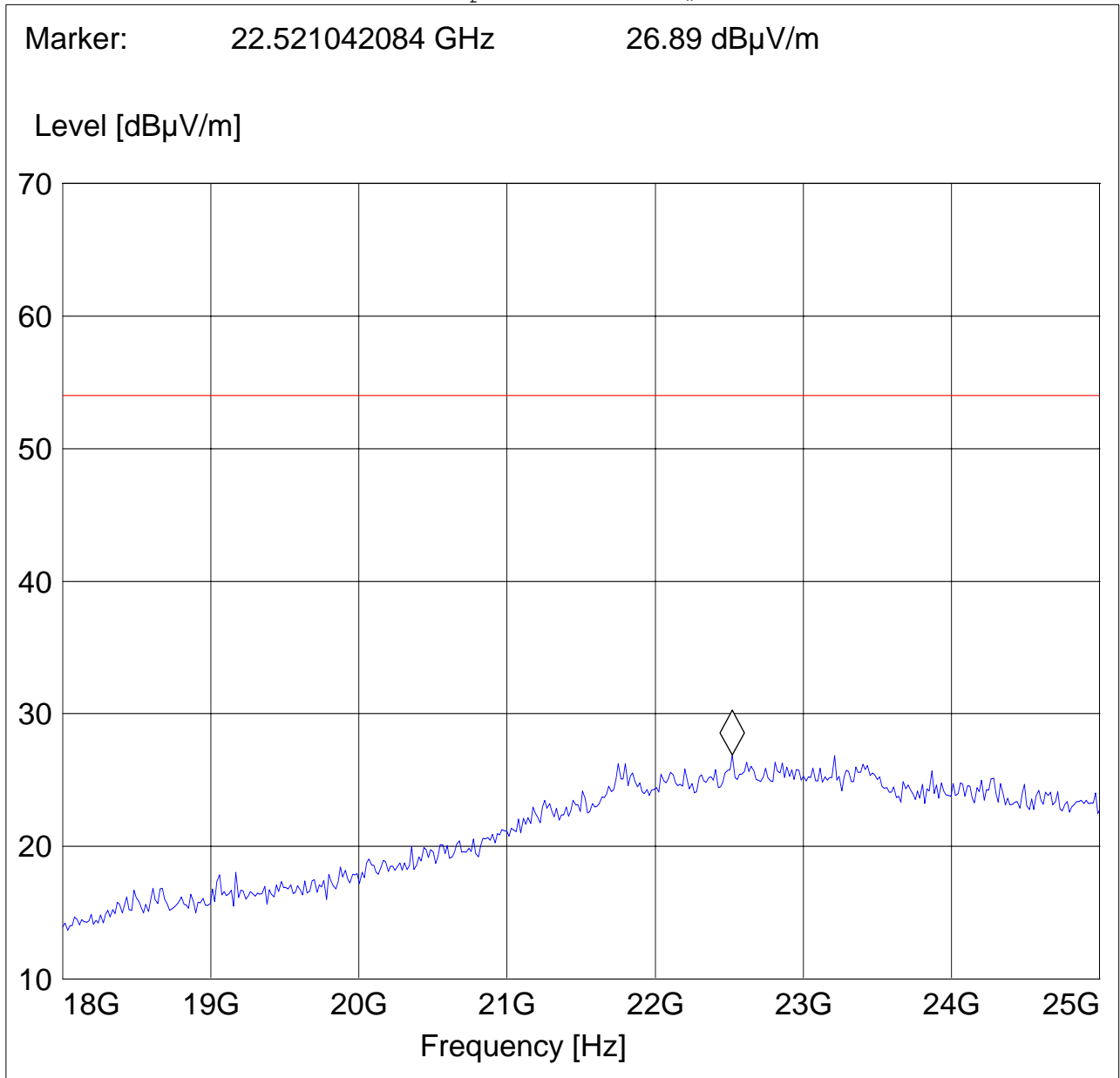


(UMTS FDD2 HSDPA + HSUPA) RX 18-19GHz

EUT: X950U
Customer: Novatel
Test Mode: WCDMA FDD II
ANT Orientation: H
EUT Orientation: H
Test Engineer: Ed
Power Supply: AC Adapter
Comments: HSDPA + HSUPA

SWEEP TABLE: "CANADA RE_18-26.5G"

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





5.6 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207

5.6.1 Limits

Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with logarithm of the frequency

ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz



5.6.2 Results (UMTS FDD5 HSPDA Only)

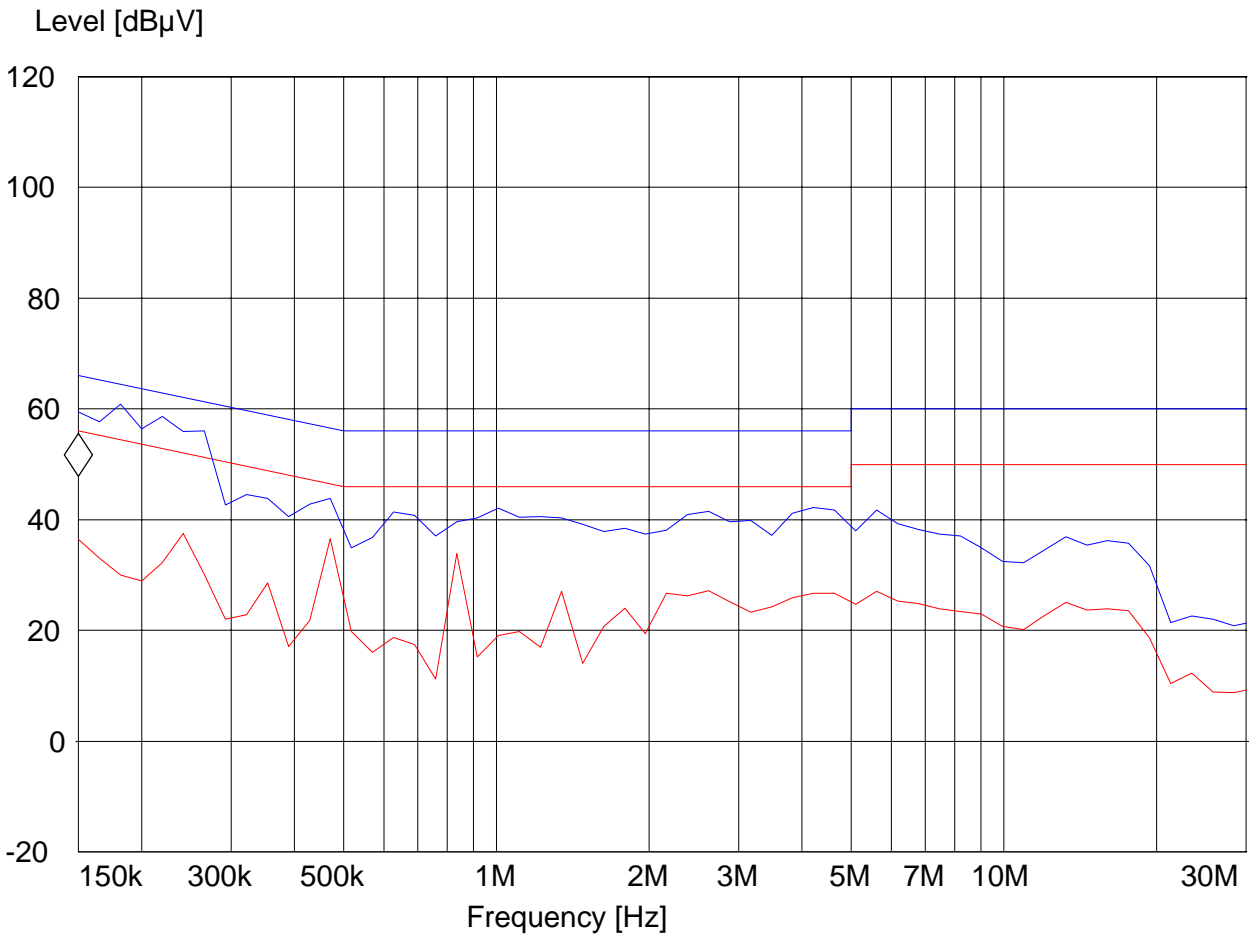
Line:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, LINE, HSDPA, WCDMA FDD5
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 3:23:56PM

SWEEP TABLE: "55022 cond"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None
Short Description: EN 55022 for 150KHz-30MHz					
Average					

Marker: 150 kHz 47.8 dBµV N



— MES 55022 cond MaxPk
 — MES 55022 cond Avg
 — LIM EN 55022 V AV Voltage AV Limit
 — LIM EN 55022 V QP Voltage QP Limit

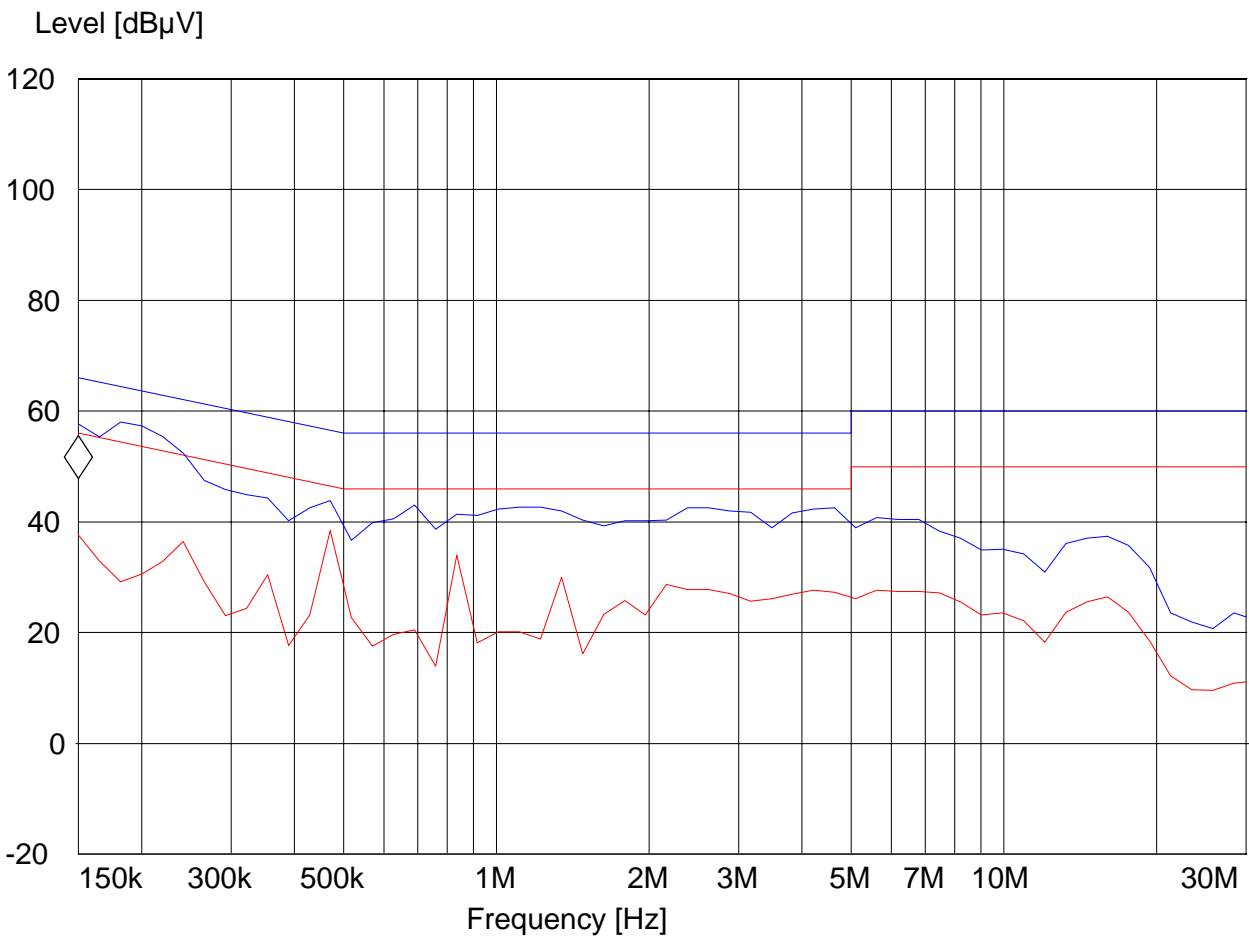


Neutral:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, Neutral, HSDPA, WCDMA FDD5
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 3:30:38PM
SWEEP TABLE: "55022 cond"

Short Description:		EN 55022 for 150KHz-30MHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak Average	Coupled	10 kHz	None

Marker: 150 kHz 47.8 dBµV N



- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V AV Voltage AV Limit
- LIM EN 55022 V QP Voltage QP Limit



5.6.3 Results (UMTS FDD5 HSPDA + HSUPA)

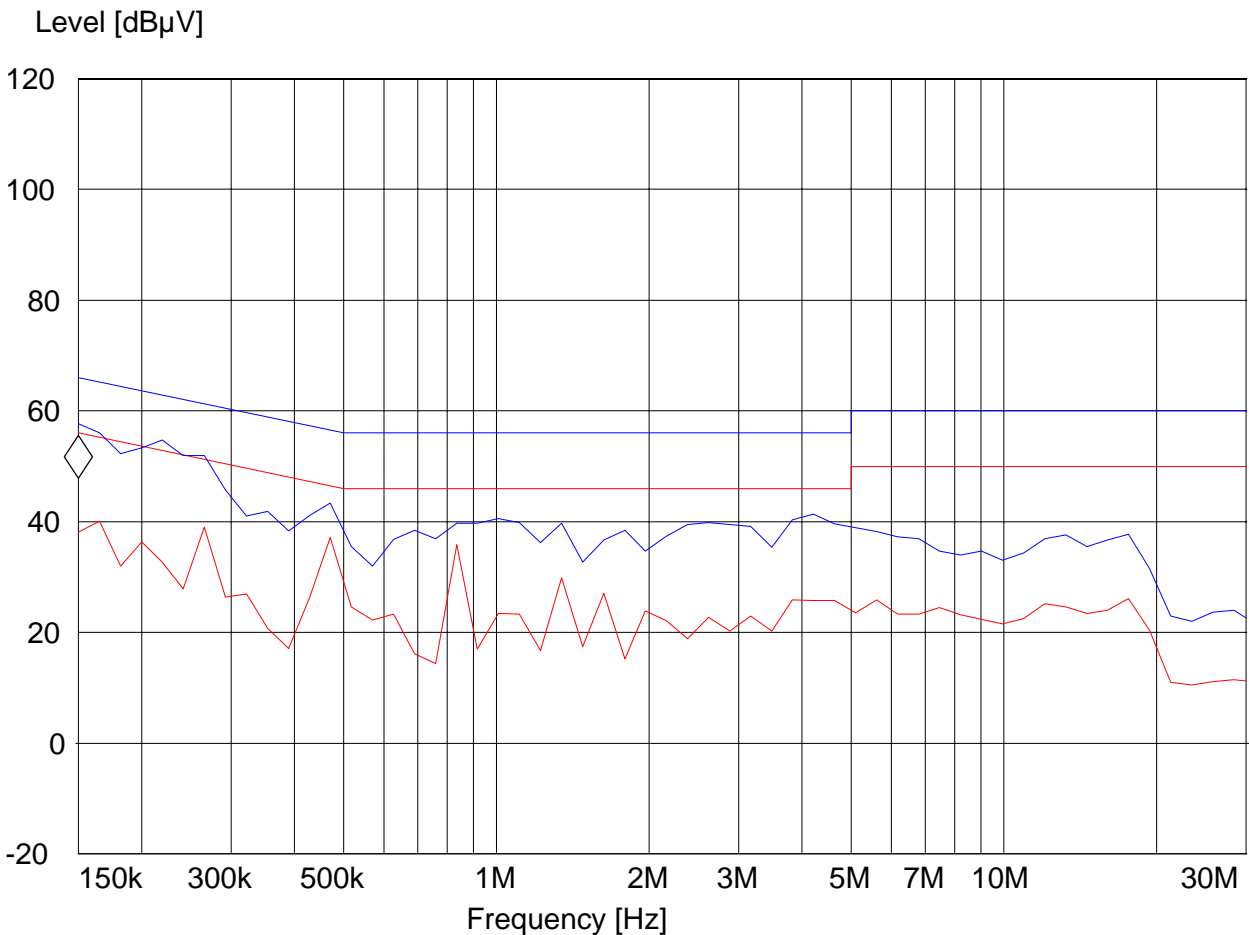
Line:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, Line, HSDPA + HSUPA, WCDMA FDD5
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 3:48:09PM

SWEEP TABLE: "55022 cond"

Short Description:		EN 55022 for 150KHz-30MHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None
Average					

Marker: 150 kHz 47.8 dBµV N



- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V AV Voltage AV Limit
- LIM EN 55022 V QP Voltage QP Limit



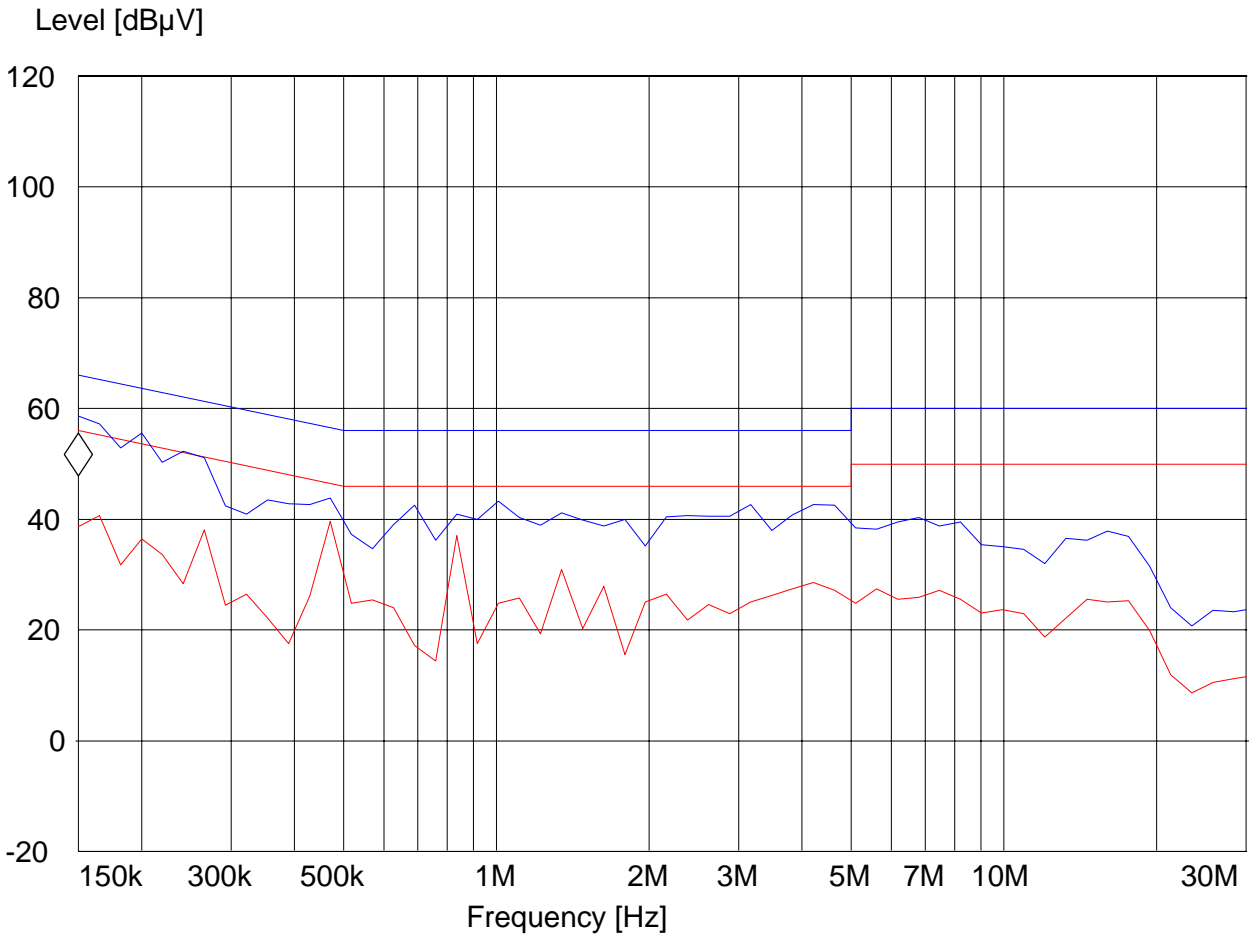
Neutral:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, neutral, HSDPA + HSUPA, WCDMA FDD5
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 3:34:44PM

SWEEP TABLE: "55022 cond"

Short Description:		EN 55022 for 150KHz-30MHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak Average	Coupled	10 kHz	None

Marker: 150 kHz 47.8 dBµV N



- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V AV Voltage AV Limit
- LIM EN 55022 V QP Voltage QP Limit



5.6.4 Results (UMTS FDD2 HSDPA + HSUPA)

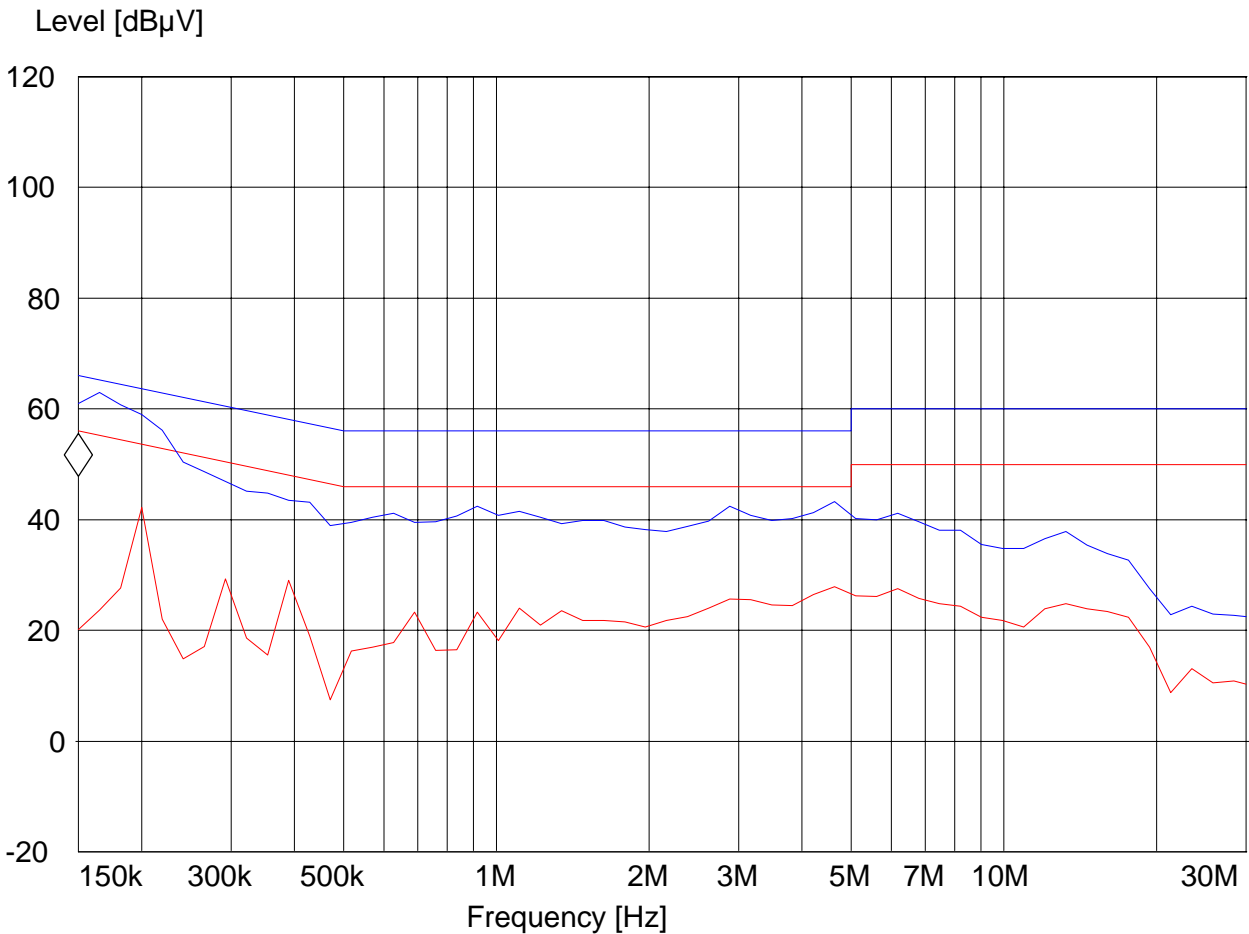
Line:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, line, HSDPA, WCDMA FDD2
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 4:13:19PM

SWEEP TABLE: "55022 cond"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None
Short Description: EN 55022 for 150KHz-30MHz					
Average					

Marker: 150 kHz 47.8 dBµV N



— MES 55022 cond MaxPk
 — MES 55022 cond Avg
 — LIM EN 55022 V AV Voltage AV Limit
 — LIM EN 55022 V QP Voltage QP Limit



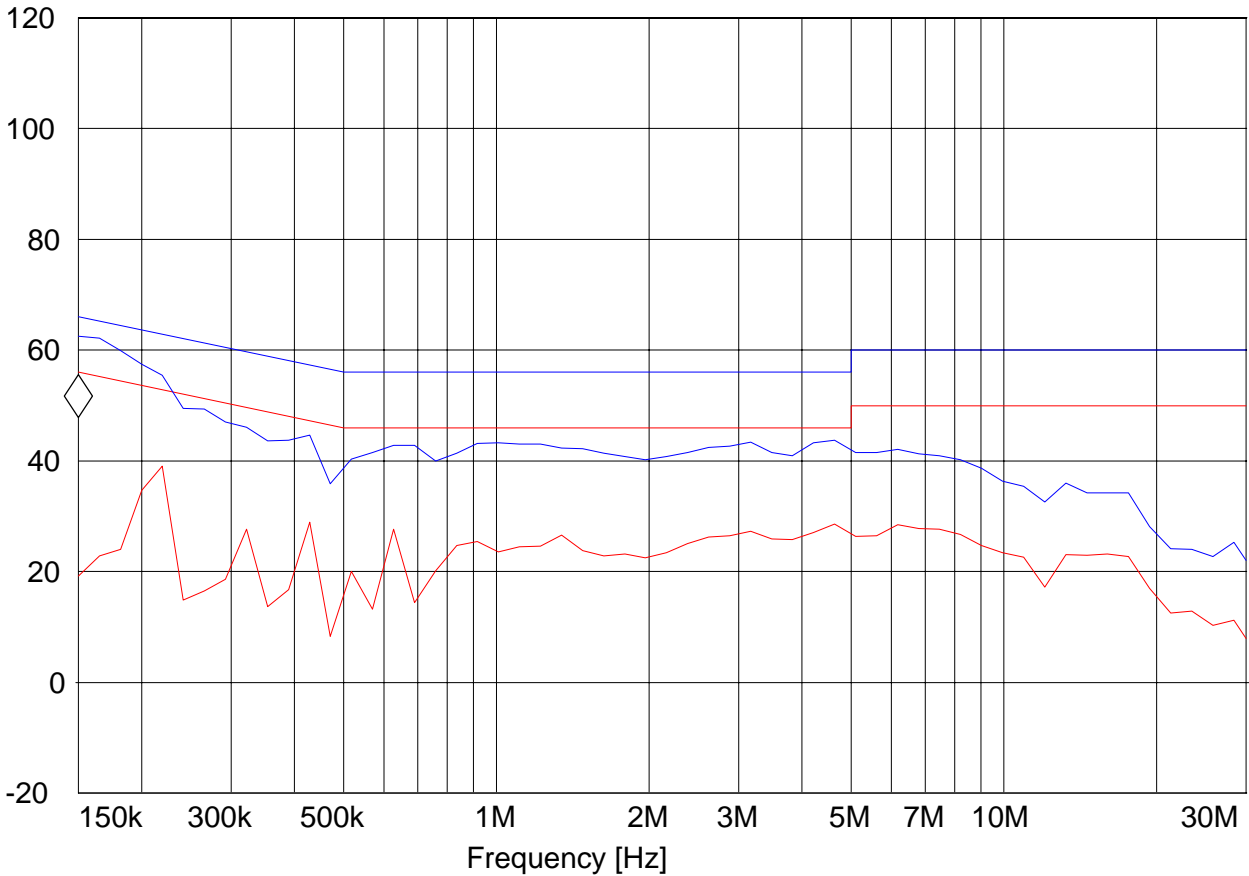
Neutral:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, neutral, HSDPA, WCDMA FDD2
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 4:17:02PM
SWEEP TABLE: "55022 cond"

Short Description:		EN 55022 for 150KHz-30MHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak Average	Coupled	10 kHz	None

Marker: 150 kHz 47.8 dBµV N

Level [dBµV]



— MES 55022 cond MaxPk
 — MES 55022 cond Avg
 — LIM EN 55022 V AV Voltage AV Limit
 — LIM EN 55022 V QP Voltage QP Limit



5.6.5 Results (UMTS FDD2 HSDPA + HSUPA)

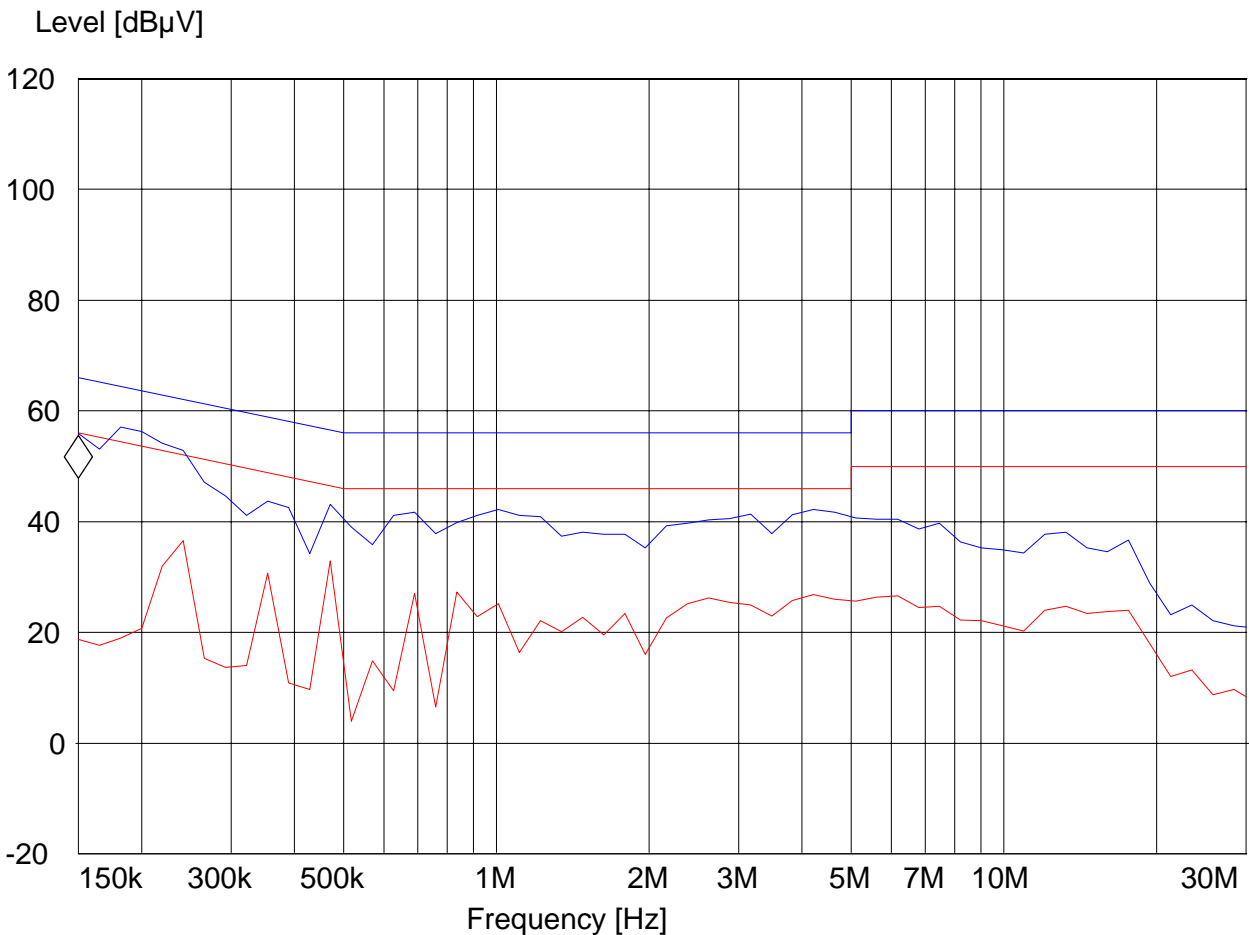
Line:

EUT: X950U
 Manufacturer: Novatel
 Operating Condition: 115V, line, HSDPA + HSUPA, WCDMA FDD2
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 4:23:08PM

SWEEP TABLE: "55022 cond"

Short Description:		EN 55022 for 150KHz-30MHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None
Average					

Marker: 150 kHz 47.8 dBµV N



- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V AV Voltage AV Limit
- LIM EN 55022 V QP Voltage QP Limit

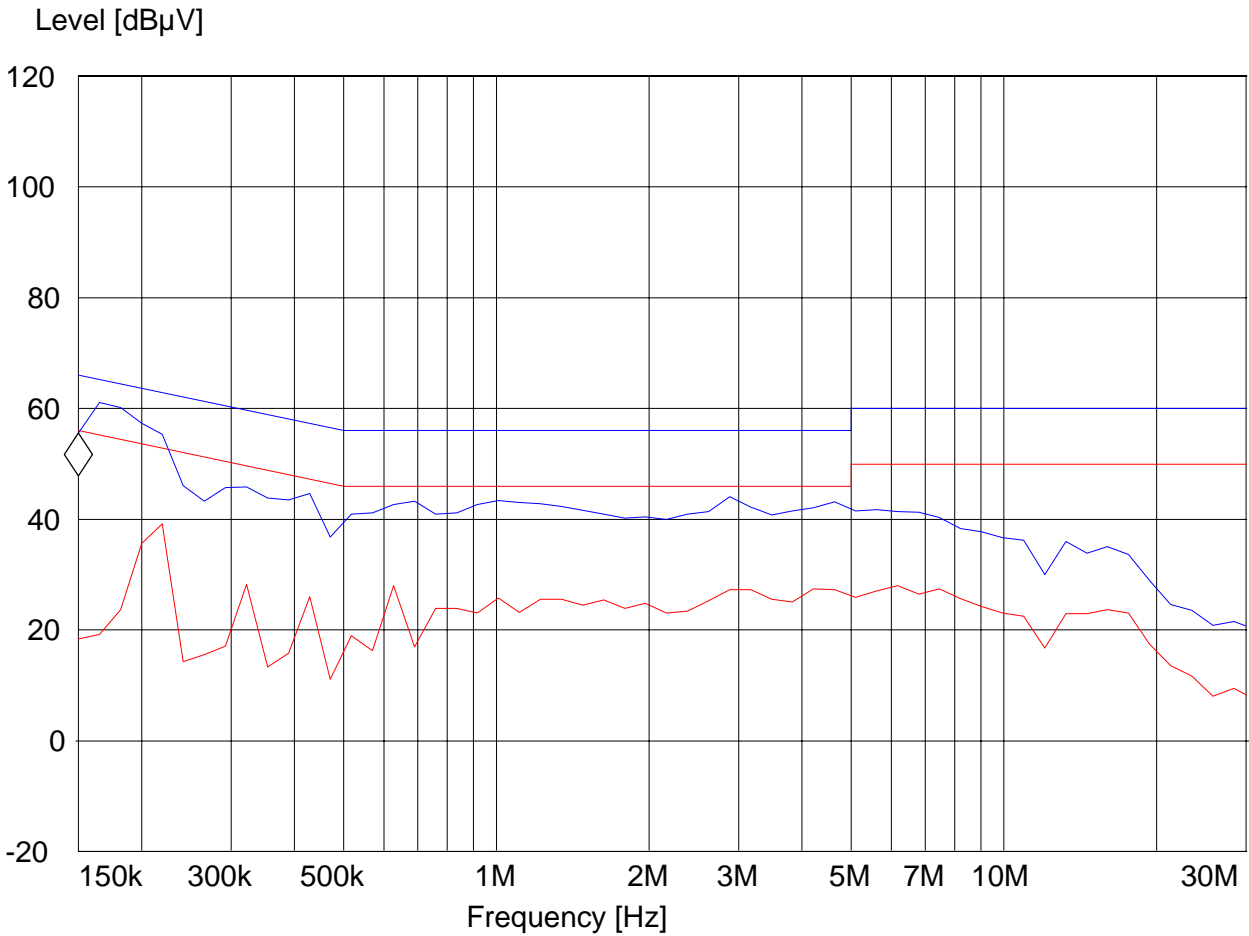


Neutral:

EUT: X959U
 Manufacturer: Novatel
 Operating Condition: 115V, neutral, HSDPA + HSUPA, WCDMA FDD2
 Test Site: Cetecom Inc.
 Operator: Ed
 Comment: AC Adapter
 Start of Test: 8/9/2007 / 4:19:56PM
SWEEP TABLE: "55022 cond"

Short Description:		EN 55022 for 150KHz-30MHz			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None
Average					

Marker: 150 kHz 47.8 dBµV N



- MES 55022 cond MaxPk
- MES 55022 cond Avg
- LIM EN 55022 V AV Voltage AV Limit
- LIM EN 55022 V QP Voltage QP Limit



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 2008	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2008	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2008	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2008	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2008	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2008	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2008	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2008	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2008	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2008	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2008	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2008	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2008	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2008	2 years

For HSUPA signaling the CMU200 is loaded with firmware version 4.5 Engineering Version.

7 References

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

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

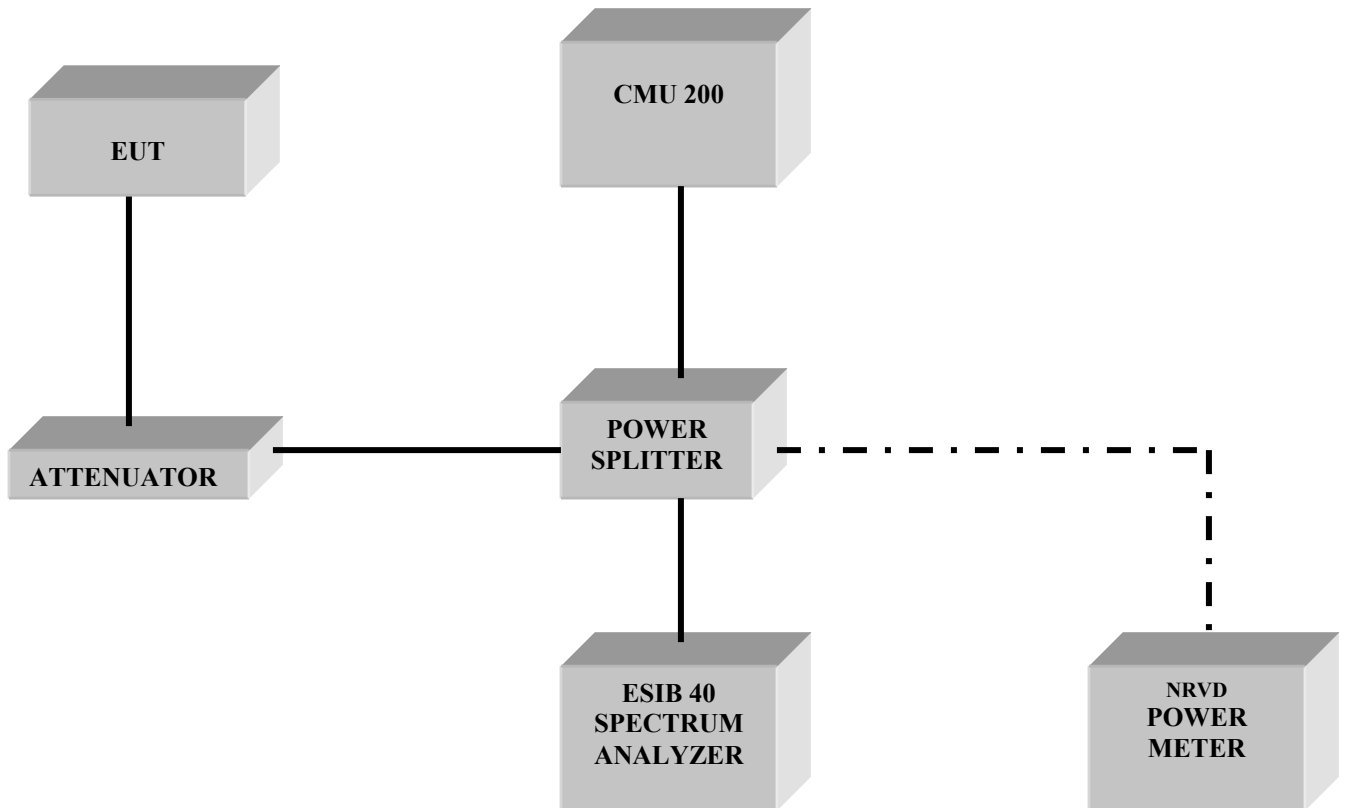
FCC Report and order 02-229 September 24, 2002.

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

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

8 BLOCK DIAGRAMS

Conducted Testing



Radiated Testing

ANECHOIC CHAMBER

