



**TEST REPORT OF A 2.4 GHZ IEEE 802.15 ZIGBEE
FIRE CONTROL AND INDICATING APPARATUS,
BRAND NOFIQ, MODEL N20-BASE_HUB, IN
CONFORMITY WITH 47 CFR PART 15 (OCTOBER 7,
2007).**

FCC listed : 90828
Industry Canada : 2932G-1
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

TÜV Rheinland EPS B.V.
P.O. Box 15
9822 ZG Niekerk (NL)
Smidshornerweg 18
9822 TL Niekerk (NL)

Telephone: +31 594 505005
Telefax: +31 594 504804

E-mail: info@tuv-eps.com
Web: www.tuv-eps.com

MEASUREMENT/TECHNICAL REPORT

NOFIQ systems B.V.

Model : N20-BASE_HUB

FCC ID: W6O-102020A

June 23, 2008

This report concerns: Original grant/certification Class 2 change Verification			
Equipment type: 2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus			
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ? Yes No n.a.			
Report prepared by:	Name	: O.H. Hoekstra	
	Company name	: TÜV Rheinland EPS B.V.	
	Address	: Smidshornerweg 18	
	Postal code/city	: 9822 ZG Niekerk	
	Mailing address	: P.O. Box 15	
	Postal code/city	: 9822 TL Niekerk	
	Country	: The Netherlands	
	Telephone number	: + 31 594 505 005	
	Telefax number	: + 31 594 504 804	
	E-mail	: info@tuv-eps.com	

The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (October 7, 2007) and the measurement procedures of ANSI C63.4-2003. TÜV Rheinland EPS B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: June 23, 2008

Signature:



H.J. Pieters
Project Manager TÜV Rheinland EPS B.V.

Description of test item

Test item : 2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus
Manufacturer : NOFIQ systems B.V.
Brand mark : NOFIQ
Model : N20-BASE_HUB
Serial number(s) : -
Receipt number : 1
Receipt date : May 30, 2008

Applicant information

Applicant's representative : Mr. G.M. de Groot
Company : NOFIQ systems B.V.
Address : Nijverheidsweg 16
Postal code : 9403 VN
City : Assen
PO-Box : 510
Postal code : 9400 AM
City : Assen
Country : The Netherlands
Telephone number : +31 (0)592 404201
Telefax number : +31 (0)592 404282


Test(s) performed

Location : Niekerk
Test(s) started : May 30, 2008
Test(s) completed : June 23, 2008
Purpose of test(s) : Type approval / certification
Test specification(s) : 47 CFR Part 15 (October 7, 2007)

Test engineer : O.H. Hoekstra

Report written by : O.H. Hoekstra

Project leader : H.J. Pieters



This report is in conformity with NEN-EN-ISO/IEC 17025: 2005

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The test results relate only to the item(s) tested.

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1 General information

1.1 Product description

The 2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus, brand NOFIQ, model N20-BASE_HUB, is designed to operate in the 2.4 GHz ISM frequency band, channels 11 to 26 (2405 MHz to 2480 MHz).

The 2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus, brand NOFIQ, model N20-BASE_HUB, incorporates an integral antenna.

1.2 Related submittal(s) and/or Grant(s)

Not applicable.

1.3 Tested system details

Details and an overview of the system and all its components, as it has been tested, can be found in table 1 below. FCC ID's are stated in this overview where applicable. The EUT is listed in the first row of this table 1.

Description	Model number	Serial number	FCC ID	Cable descriptions
2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus	N20-BASE_HUB	2206472024	W6O-102020A	-Shielded DC and Data connection
Alarm Management Station	N20-BASE	1207041002	-	-Mains cord -Shielded DC and Data connection to EUT

Table 1 - Tested system details overview.

1.4 Test methodology

The test methodology used is based on the requirements of 47 CFR Part 15 (October 7, 2007), sections 15.107, 15.207, 15.109, 15.209, 15.205 and 15.247.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters. Below 30 MHz the radiated emission tests were carried out at measurement distances of 3 and 10 meters. The test results regarding the radiated emission tests on frequencies below 30 MHz have been extrapolated in order to determine the field strength of the measured values at measurement distances of 30 and 300 meters (as required by 47 CFR Part 15).

The bandwidth of the receiver is switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

Radiated emission tests in the frequency range of 1 GHz – 26.5 GHz were performed with appropriate pre-amplifiers, antennas and a spectrum analyzer. At frequencies on which radiated emissions were found the level at the input of the pre-amplifier was reproduced by means of a RF signal generator. The output level of the signal generator was then increased with the antenna factor in order to obtain the actual field strength value for each individual frequency on which radiated emissions were found.

1.5 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TNO Electronic Products & Services (EPS) B.V., located in Nieuwerkerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 7, 2007.

The description of the test facilities has been filed under registration number 90828 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

1.6 Product labeling

In accordance with 47 CFR Part 15.19 (a)(3) the following text shall be placed on a label, which is attached to the EUT:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

In accordance with 47 CFR Part 2.925 (a)(1), the FCC ID shall be placed on a label, which is attached to the EUT.

For further details about the labeling requirements (size, legibility, etc.) as set by the Federal Communications Commission see 47 CFR Part 15.19 (a)(3), 47 CFR Part 15.19 (b)(2), 47 CFR Part 15.19 (b)(4), 47 CFR Part 2.925 and 47 CFR Part 2.926.

1.7 System test configuration

1.7.1 Justification

The EUT was connected to the AC/DC adapter. The EUT was tested while using the integral antenna of the EUT.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

Tests were performed at the lowest operating frequency (channel 11: 2405 MHz), the operating frequency in the middle of the specified frequency band (channel 18: 2440 MHz) and the highest operating frequency (channel 26: 2480 MHz).

1.7.2 EUT test software

The EUT could be enabled to transmit or receive continuously on channels 11 (2405 MHz), 18 (2440 MHz) and 26 (2480 MHz) by means of test software, which was supplied by the manufacturer of the EUT.

The test software enabled operation of the device with a duty-cycle of 100% in continuous transmit mode with a modulated carrier.

1.8 Special accessories

No special accessories are used and/or needed to achieve compliance with the appropriate sections of 47 CFR Part 15.

1.9 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the appropriate sections of 47 CFR Part 15.

1.10 Configuration of the tested system

Not applicable. See table 1 in section 1.3 of this test report.

1.11 Block diagram(s) of the EUT

The block diagram is available as part of the documentation which is to be submitted to the FCC.

2 Radiated emission data

2.1 Test results with EUT operating in receive mode on channel 11

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15.109 and 47 CFR Part 15.209 with the EUT operating in receive mode on channel 11 (2405 MHz), are depicted in table 2.

Frequency (MHz)	Test results quasi peak (dB μ V/m)		Test results average (dB μ V/m)		Test results peak (dB μ V/m)		Resolution bandwidth (kHz)	Quasi peak limits (dB μ V/m)	Average limits (dB μ V/m)	Peak limits (dB μ V/m)
	V	H	V	H	V	H				
4810	-	-	n.t.	n.t.	43.7	45.0	1000	-	54.0	74.0
4810 - 26500	-	-	n.t.	n.t.	<34.0	<34.0	1000	-	54.0	74.0

Table 2 - Test results with the EUT operating in receive mode on channel 1 (2405 MHz).

Note: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note: Field strength values of radiated emissions at frequencies not listed in table 2 are more than 20 dB below the applicable limit.

Test engineer

Signature :



Name : O.H. Hoekstra

Date : June 23, 2008

2.2 Test results with EUT operating in receive mode on channel 18

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15.109 and 47 CFR Part 15.209 with the EUT operating in receive mode on channel 18 (2440 MHz), are depicted in table 3.

Frequency (MHz)	Test results quasi peak (dBµV/m)		Test results average (dBµV/m)		Test results peak (dBµV/m)		Resolution bandwidth (kHz)	Quasi peak limits (dBµV/m)	Average limits (dBµV/m)	Peak limits (dBµV/m)
	V	H	V	H	V	H				
4880	-	-	n.t.	n.t.	44.7	43.6	1000	-	54.0	74.0
4880 - 26500	-	-	n.t.	n.t.	<34.0	<34.0	1000	-	54.0	74.0

Table 3 - Test results with the EUT operating in receive mode on channel 18 (2440 MHz).

Note: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note: Field strength values of radiated emissions at frequencies not listed in table 3 are more than 20 dB below the applicable limit.

Test engineer

Signature :



Name : O.H. Hoekstra

Date : June 23, 2008

2.3 Test results with EUT operating in receive mode on channel 26

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15.109 and 47 CFR Part 15.209 with the EUT operating in receive mode on channel 26 (2462 MHz), are depicted in table 4.

Frequency (MHz)	Test results quasi peak (dBµV/m)		Test results average (dBµV/m)		Test results peak (dBµV/m)		Resolution bandwidth (kHz)	Quasi peak limits (dBµV/m)	Average limits (dBµV/m)	Peak limits (dBµV/m)
	V	H	V	H	V	H				
4960	-	-	n.t.	n.t.	44.0	44.7	1000	-	54.0	74.0
4960 - 26500	-	-	n.t.	n.t.	<34.0	<34.0	1000	-	54.0	74.0

Table 4 - Test results with the EUT operating in receive mode on channel 26 (2480 MHz).

Note: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note: Field strength values of radiated emissions at frequencies not listed in table 4 are more than 20 dB below the applicable limit.

Test engineer

Signature :



Name : O.H. Hoekstra

Date : June 23, 2008

2.4 Test results with EUT operating in transmit mode on channel 11

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15.109, 47 CFR Part 15.209 and 47 CFR Part 15.205 (restricted bands of operation) with the EUT operating in transmit mode on channel 11 (2405 MHz), are depicted in table 5.


Frequency (MHz)	Test results quasi peak (dBµV/m)		Test results average (dBµV/m)		Test results peak (dBµV/m)		Resolution bandwidth (kHz)	Quasi peak limits (dBµV/m)	Average limits (dBµV/m)	Peak limits (dBµV/m)
	V	H	V	H	V	H				
4810	-	-	n.t.	n.t.	43.9	44.3	1000	-	54.0	74.0
4810 - 26500	-	-	n.t.	n.t.	<34.0	<34.0	1000	-	54.0	74.0

Table 5 - Test results with the EUT operating in transmit mode on channel 11 (2405 MHz).

Note: Above 1 GHz, most measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, most spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note: Field strength values of radiated emissions at frequencies not listed in table 5 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : June 23, 2008

2.5 Test results with EUT operating in transmit mode on channel 18

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15.109, 47 CFR Part 15.209 and 47 CFR Part 15.205 (restricted bands of operation) with the EUT operating in transmit mode on channel 18 (2440 MHz), are depicted in table 6.


Frequency (MHz)	Test results quasi peak (dBµV/m)		Test results average (dBµV/m)		Test results peak (dBµV/m)		Resolution bandwidth (kHz)	Quasi peak limits (dBµV/m)	Average limits (dBµV/m)	Peak limits (dBµV/m)
	V	H	V	H	V	H				
4880	-	-	n.t.	n.t.	44.8	45.1	1000	-	54.0	74.0
4880 - 26500	-	-	n.t.	n.t.	<34.0	<34.0	1000	-	54.0	74.0

Table 6 - Test results with the EUT operating in transmit mode on channel 18 (2440 MHz).

Note: Above 1 GHz, most measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, most spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note: Field strength values of radiated emissions at frequencies not listed in table 6 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : June 23, 2008

2.6 Test results with EUT operating in transmit mode on channel 26

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15.109, 47 CFR Part 15.209 and 47 CFR Part 15.205 (restricted bands of operation) with the EUT operating in transmit mode on channel 26 (2480 MHz), are depicted in table 7.


Frequency (MHz)	Test results quasi peak (dBµV/m)		Test results average (dBµV/m)		Test results peak (dBµV/m)		Resolution bandwidth (kHz)	Quasi peak limits (dBµV/m)	Average limits (dBµV/m)	Peak limits (dBµV/m)
	V	H	V	H	V	H				
4960	-	-	n.t.	n.t.	45.6	44.2	1000	-	54.0	74.0
4960 - 26500	-	-	n.t.	n.t.	<34.0	<34.0	1000	-	54.0	74.0

Table 7 - Test results with the EUT operating in transmit mode on channel 26 (2480 MHz).

Note: Above 1 GHz, most measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, most spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note: Field strength values of radiated emissions at frequencies not listed in table 7 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : June 23, 2008

3 Conducted emission data

3.1 AC mains with EUT operating in transmit and receive mode


The (worst-case) results of the conducted emission tests at the 110 Volts AC mains connection terminals of the AC/DC power adapter of the EUT, carried out in accordance with 47 CFR Part 15.107 and 47 CFR Part 15.207 with the EUT operating in transmit and receive mode on channels 11 (2405 MHz), 18 (2440 MHz) and 26 (2480 MHz), are depicted in table 8.

Frequency (MHz)	Measured levels				Limits	
	Line		Neutral		QP	AV
	QP (dBμV)	AV (dBμV)	QP (dBμV)	AV (dBμV)		
0.15 - 0.5	< 30.0	< 15.0	< 30.0	< 15.0	66.0-56.0	66.0-56.0
0.5 - 5.0	< 30.0	< 15.0	< 30.0	< 15.0	56.0	56.0
5.0 - 30.0	< 30.0	< 15.0	< 30.0	< 15.0	60.0	60.0

Table 8 - Test results with the EUT operating in transmit and receive mode.

Note: Disturbance voltage values of conducted emissions at frequencies not listed in table 8 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : June 23, 2008

3.2 Emission in restricted bands nearest to the band 2400 - 2483.5 MHz


The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15.205 (restricted bands of operation, with the emphasis on the emission in restricted bands nearest to the band 2400-2483.5 MHz) with the EUT operating in transmit mode, are depicted in table 9. The plots of the measurement results may be found in section 5.1 of this test report.

Frequency (MHz)	Test results quasi peak (dB μ V/m)	Test results average (dB μ V/m)	Test results peak (dB μ V/m)	Resolution bandwidth (kHz)	Quasi peak limits (dB μ V/m)	Average limits (dB μ V/m)	Peak limits (dB μ V/m)
2389.4	-	27.6	40.9	1000	-	54.0	74.0
2483.5	-	52.1	61.8	1000	-	54.0	74.0

Table 9 - Test results with the EUT operating in transmit mode.

Note: Field strength values of conducted emissions at frequencies not listed in table 9 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : June 23, 2008

4 Test results of measurements in conformity with 47 CFR Part 15.247

4.1 Minimum 6 dB bandwidth


The results of tests on the EUT, carried out in accordance with 47 CFR Part 15.247 (a)(2), are depicted in table 10.

The plots of the measurement results may be found in section 5.2 of this test report.

Minimum 6 dB bandwidth (kHz)			Limit (kHz)
Channel 11 (2405 MHz)	Channel 18 (2440 MHz)	Channel 26 (2480 MHz)	
1600	1580	1600	>500

Table 10 - Minimum 6 dB bandwidth.

Test engineer

Signature : 

Name : Onno H. Hoekstra

Date : June 23, 2008

4.2 Maximum peak output power

The results of tests on the EUT, carried out in accordance with 47 CFR Part 15.247 (b)(3), are depicted in table 11. The maximum peak output power (conducted) was measured directly at the antenna connector.

Maximum peak output power (conducted, dBm)			Limit (dBm)
Channel 11 (2405 MHz)	Channel 18 (2440 MHz)	Channel 26 (2480 MHz)	Antenna gain < 6 dBi
-6.3	-4.8	-5.4	30.0

Table 11 - Maximum peak output power (conducted).

Note: During the measurements, the AC mains supply voltage of the AC/DC adapter to which the EUT is connected in was varied between 85% and 115% of the nominal value. The maximum measured values are depicted in table 11. No differences in measurement results, due to the AC mains voltage variations between 85% and 115% from the nominal value, have been observed. As the antenna gain does not exceed 6 dBi, no reduction of the maximum peak output power is required.

Test engineer

Signature

: 

Name : Onno H. Hoekstra

Date : June 23, 2008

4.3 Conducted emission data outside restricted bands

The results of tests on the EUT, carried out in accordance with 47 CFR Part 15.247 (c), are depicted in table 12.

Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band.

The plots of the measurement results may be found in section 5.3 of this test report.

Frequency (MHz)	Level below working channel (dB)	Limit of level below working channel (dB)
2400	-36.7	< -20.0
2483 - 10000	< -46.0	< -20.0
10000 - 26500	< -40.0	< -20.0
other frequencies	< -40.0	< -20.0

Table 12 - Conducted emission data outside restricted bands.

Note: Worst case measurement values for transmissions on channel 11 (2405 MHz), channel 18 (2440 MHz) and channel 26 (2480 MHz) combinations.

Test engineer

Signature :



Name : Onno H. Hoekstra

Date : June 23, 2008

4.4 Peak power spectral density


The results of the tests on the EUT, carried out in accordance with 47 CFR Part 15.247 (d), are depicted in table 13.

The plots of the measurement results may be found in section 5.4 of this test report.

Peak power spectral density (conducted) in any 3 kHz band (dBm)			Limit (dBm)
Channel 11 (2405 MHz)	Channel 18 (2440 MHz)	Channel 26 (2480 MHz)	
-21.2	-20.6	-21.9	<8.0

Table 13 - Peak power spectral density.

Test engineer

Signature : 

Name : Onno H. Hoekstra

Date : June 23, 2008

5 Plots of measurement data

For reference purposes and visualization of spectrum analyzer settings during the measurements, a selection of plots of measurement data is included in this test report.

Test engineer

Signature

:



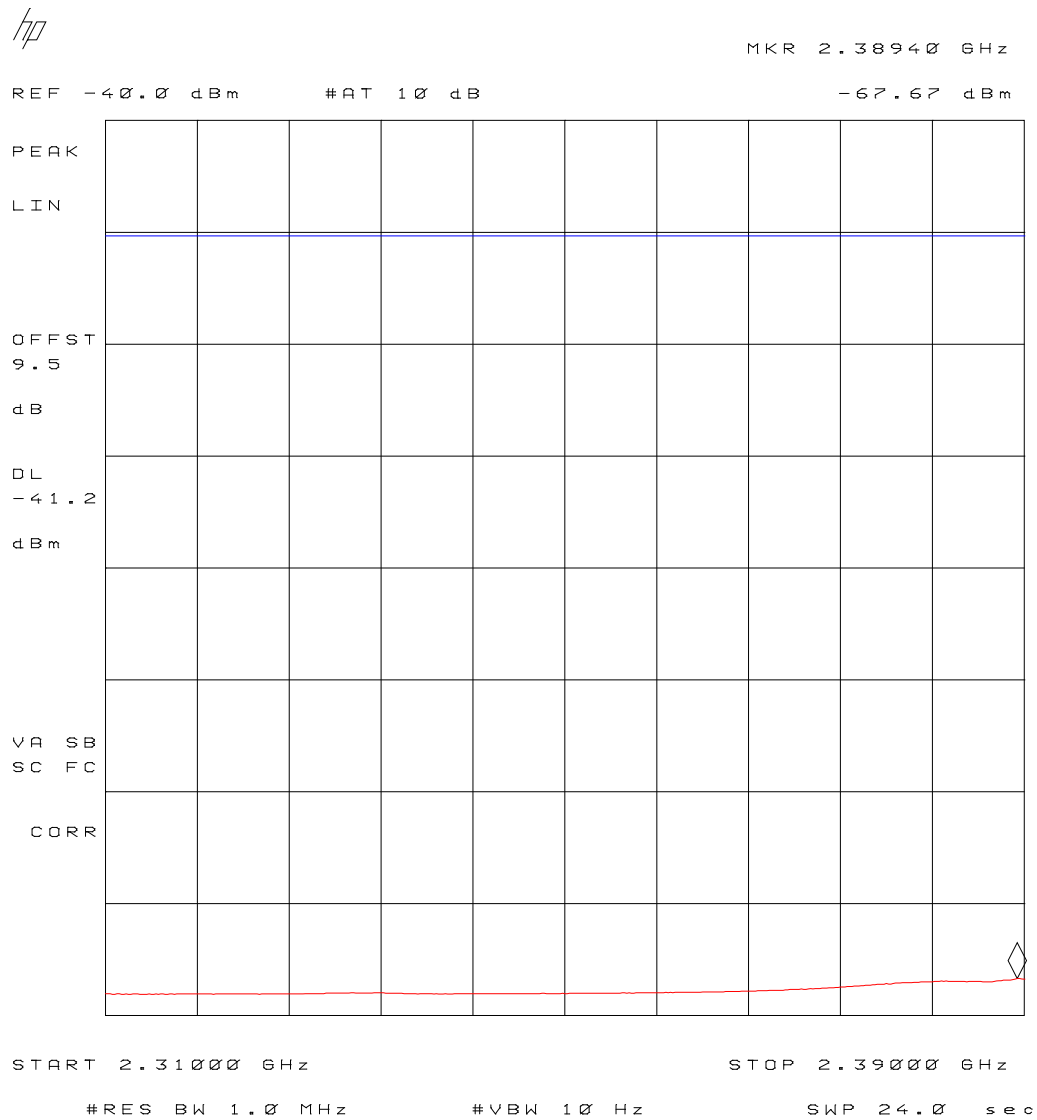
Name

: Onno H. Hoekstra

Date

: June 23, 2008

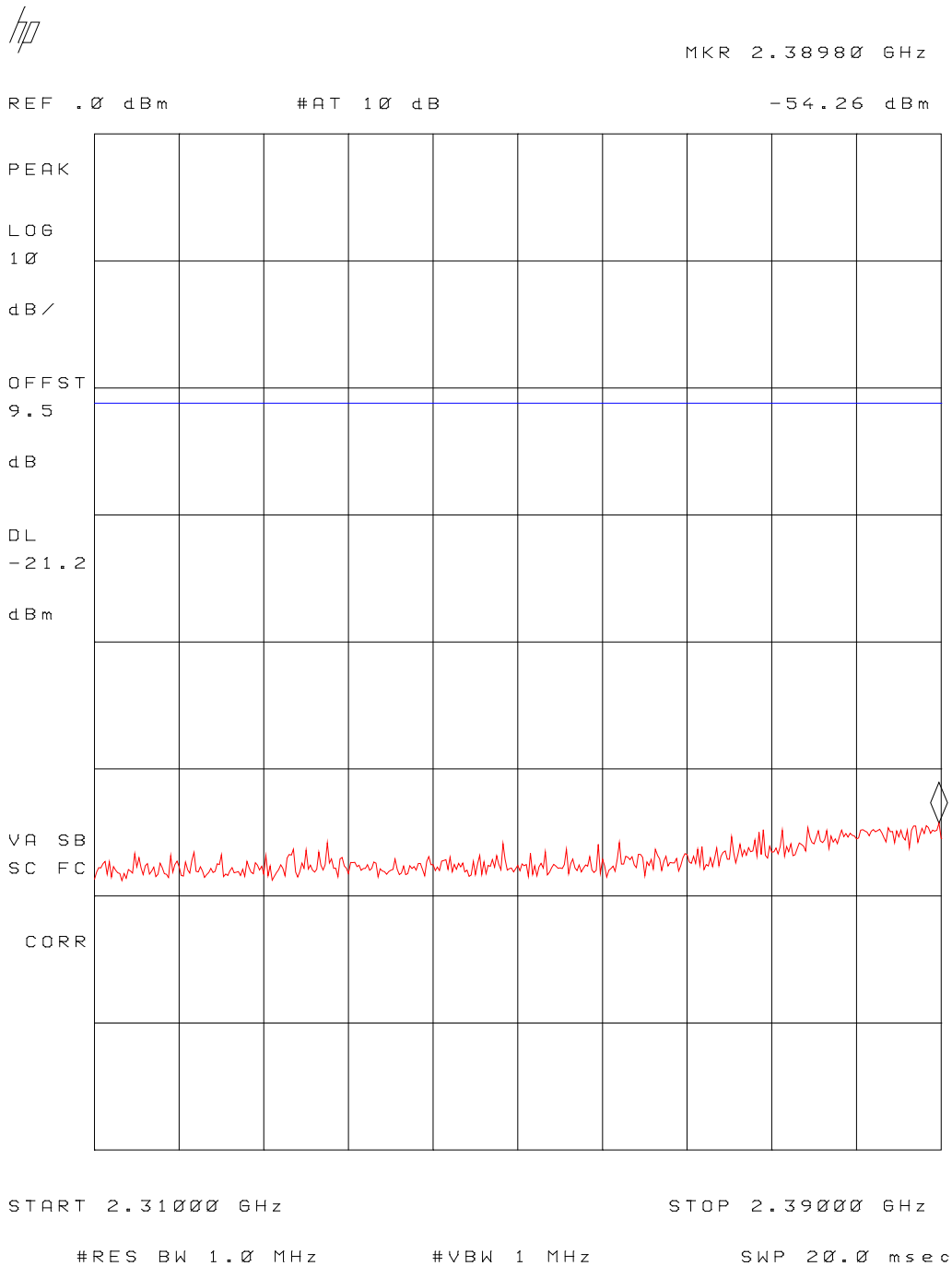
5.1 Emission in restricted bands nearest to the band 2400 - 2483.5 MHz



Plot 1 - Average measurement values in restricted band 2310 - 2390 MHz.

Average measurement values in restricted band. Radiated measurement.

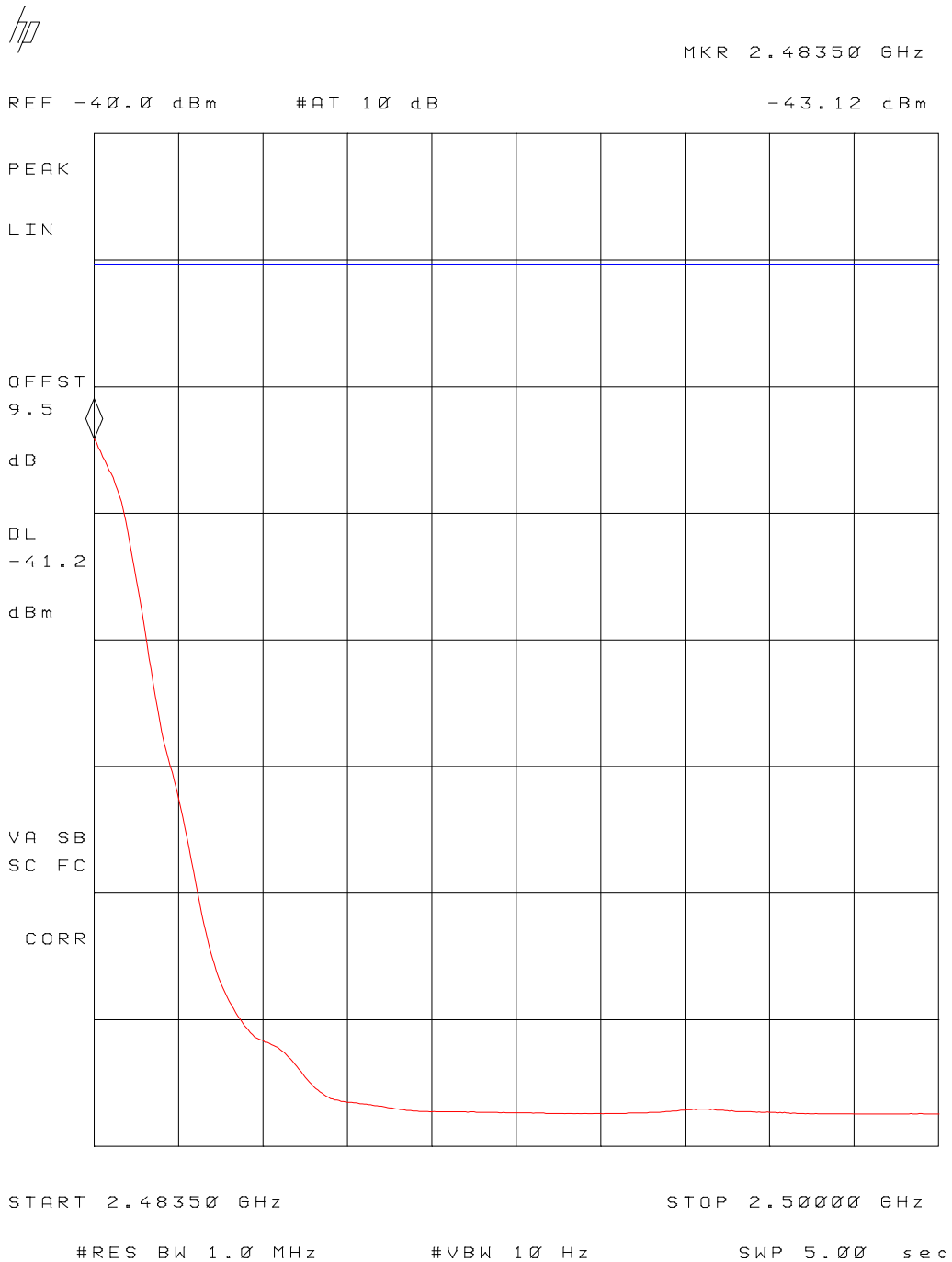
Note: 54 dBμV/m :: -41.2 dBm display line setting.



Plot 2 - Peak measurement values in restricted band 2310 - 2390 MHz.

Peak measurement values in restricted band. Radiated measurement.

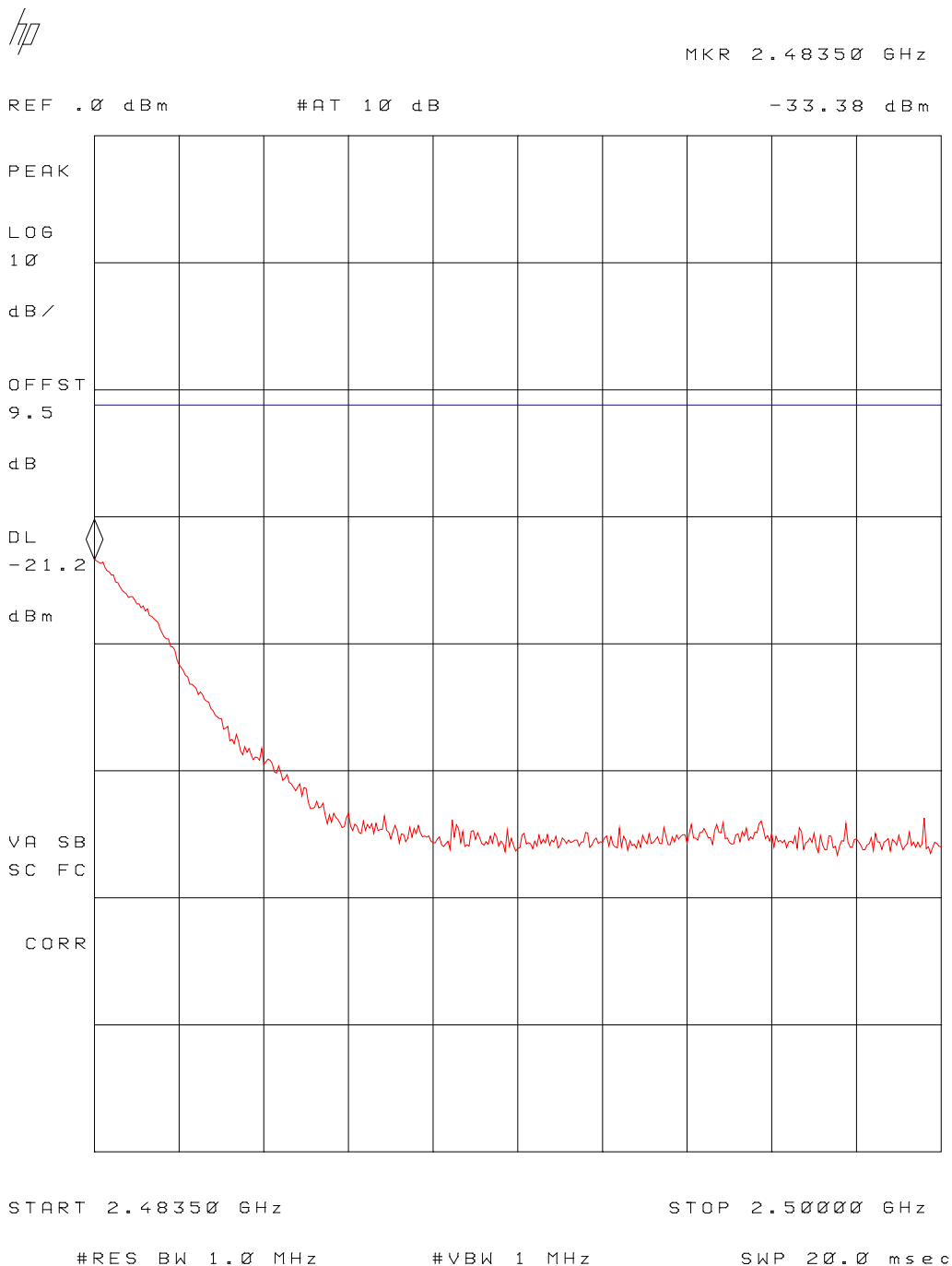
Note: 74 dBμV/m :: -21.2 dBm display line setting.



Plot 3 - Average measurement values in restricted band 2483.5 - 2500 MHz.

Average measurement values in restricted band. Radiated measurement.

Note: 54 dBμV/m :: -41.2 dBm display line setting.

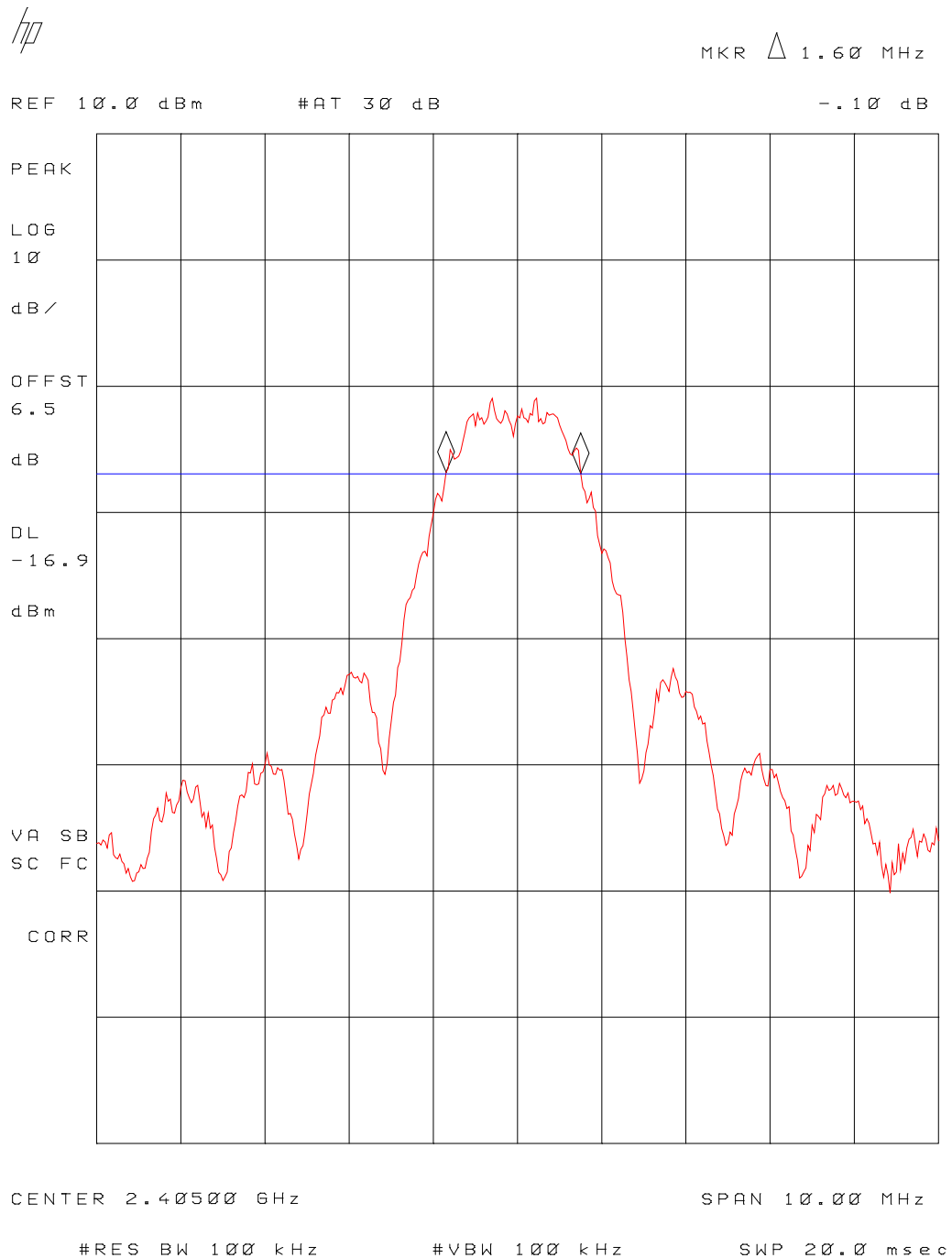


Plot 4 - Peak measurement values in restricted band 2483.5 - 2500 MHz.

Peak measurement values in restricted band. Radiated measurement.

Note: 74 dBμV/m :: -21.2 dBm display line setting.

5.2 Minimum 6 dB bandwidth



Plot 5 - Minimum 6 dB bandwidth at a transmission on channel 11 (2405 MHz).

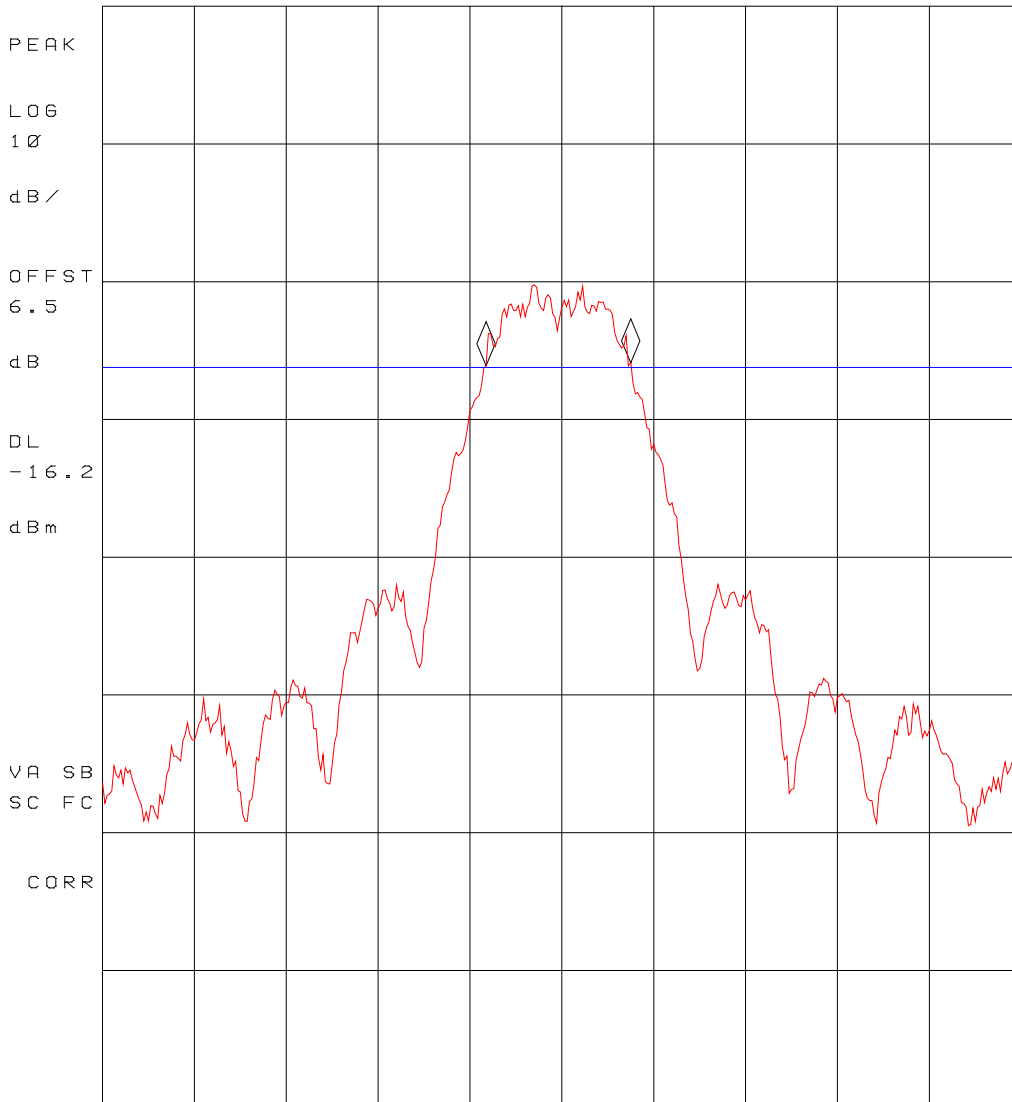
hp

MKR Δ 1.58 MHz

REF 10.0 dBm

#AT 30 dB

.21 dB



CENTER 2.44000 GHz

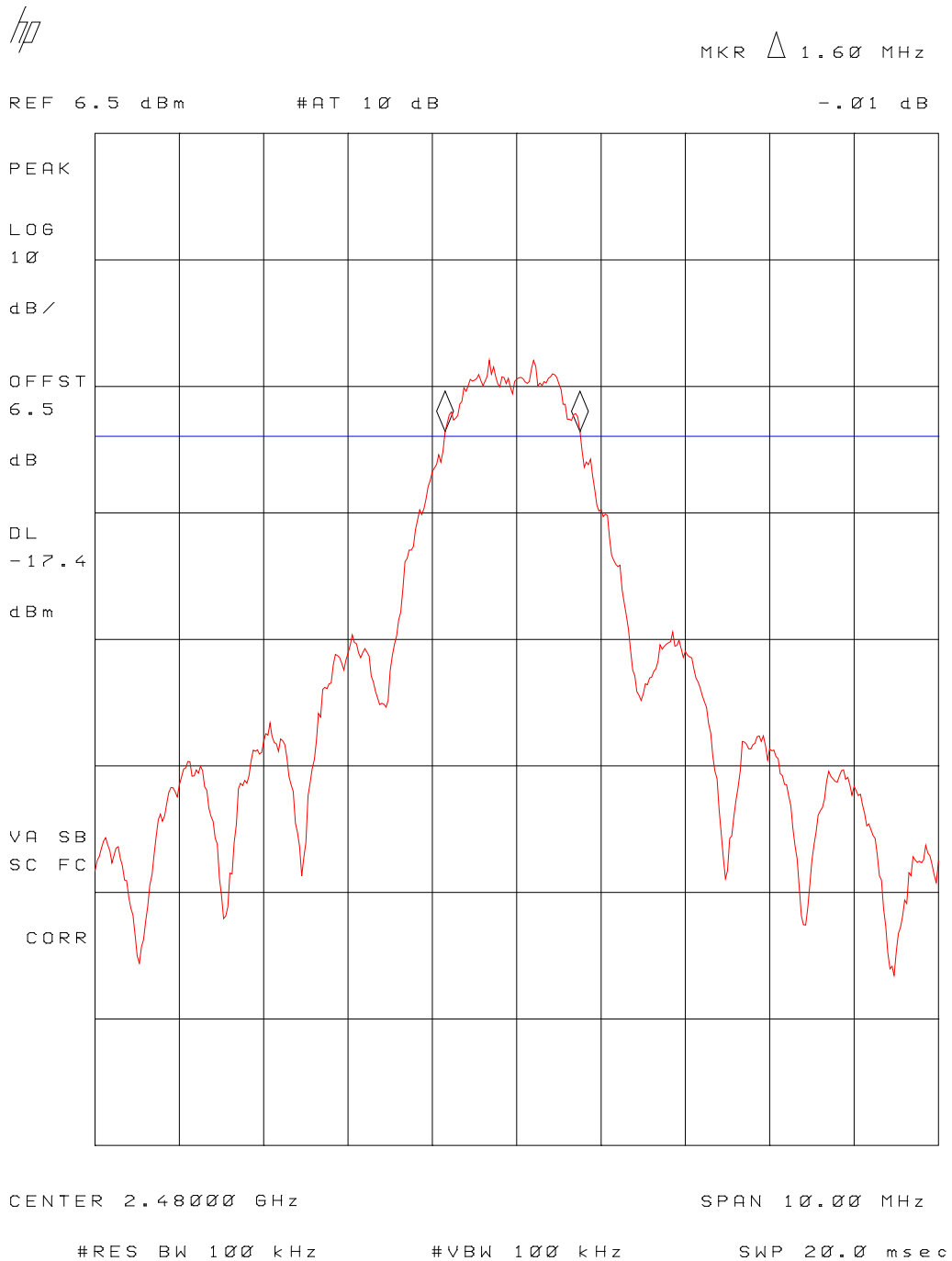
SPAN 10.00 MHz

#RES BW 100 kHz

#VBW 100 kHz

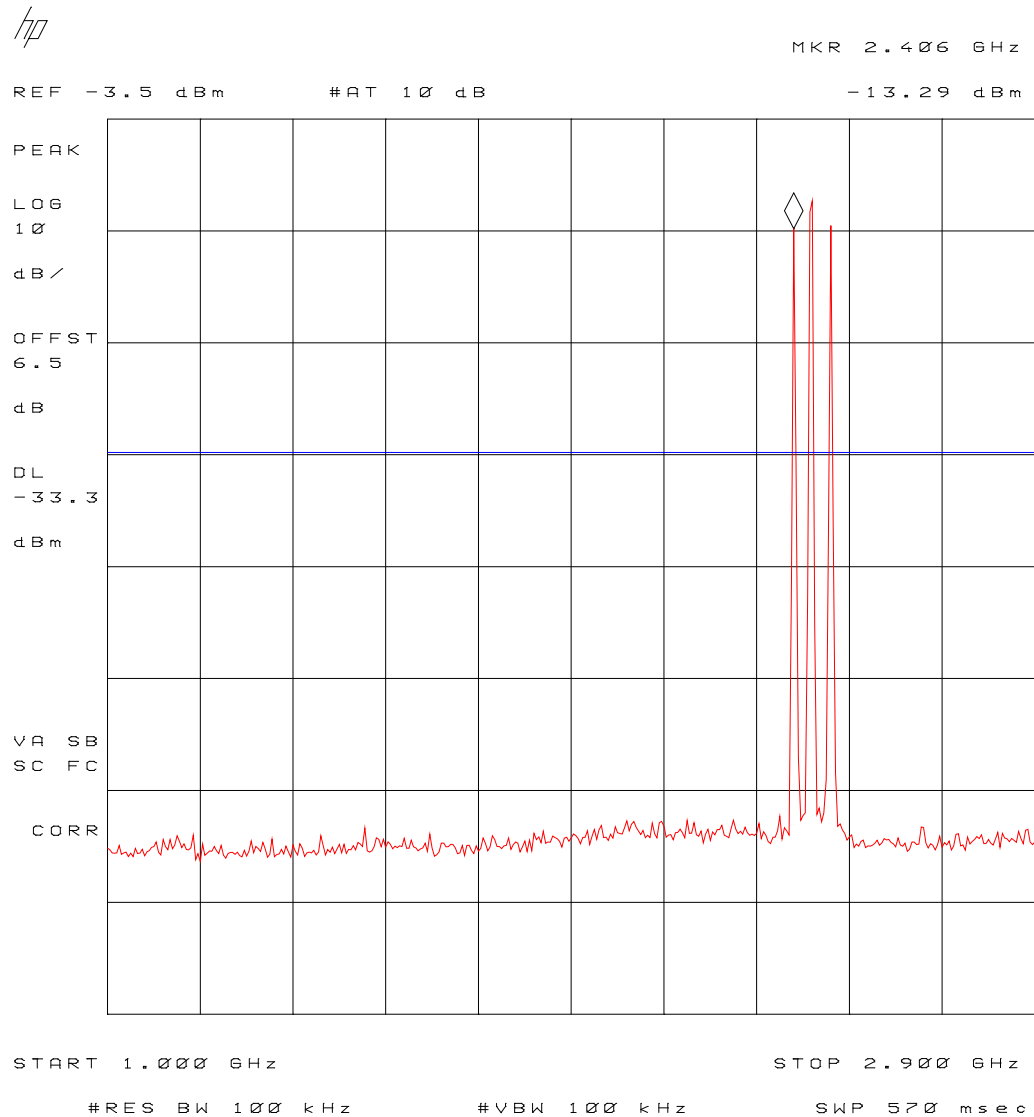
SWP 20.0 msec

Plot 6 - Minimum 6 dB bandwidth at a transmission on channel 18 (2440 MHz).



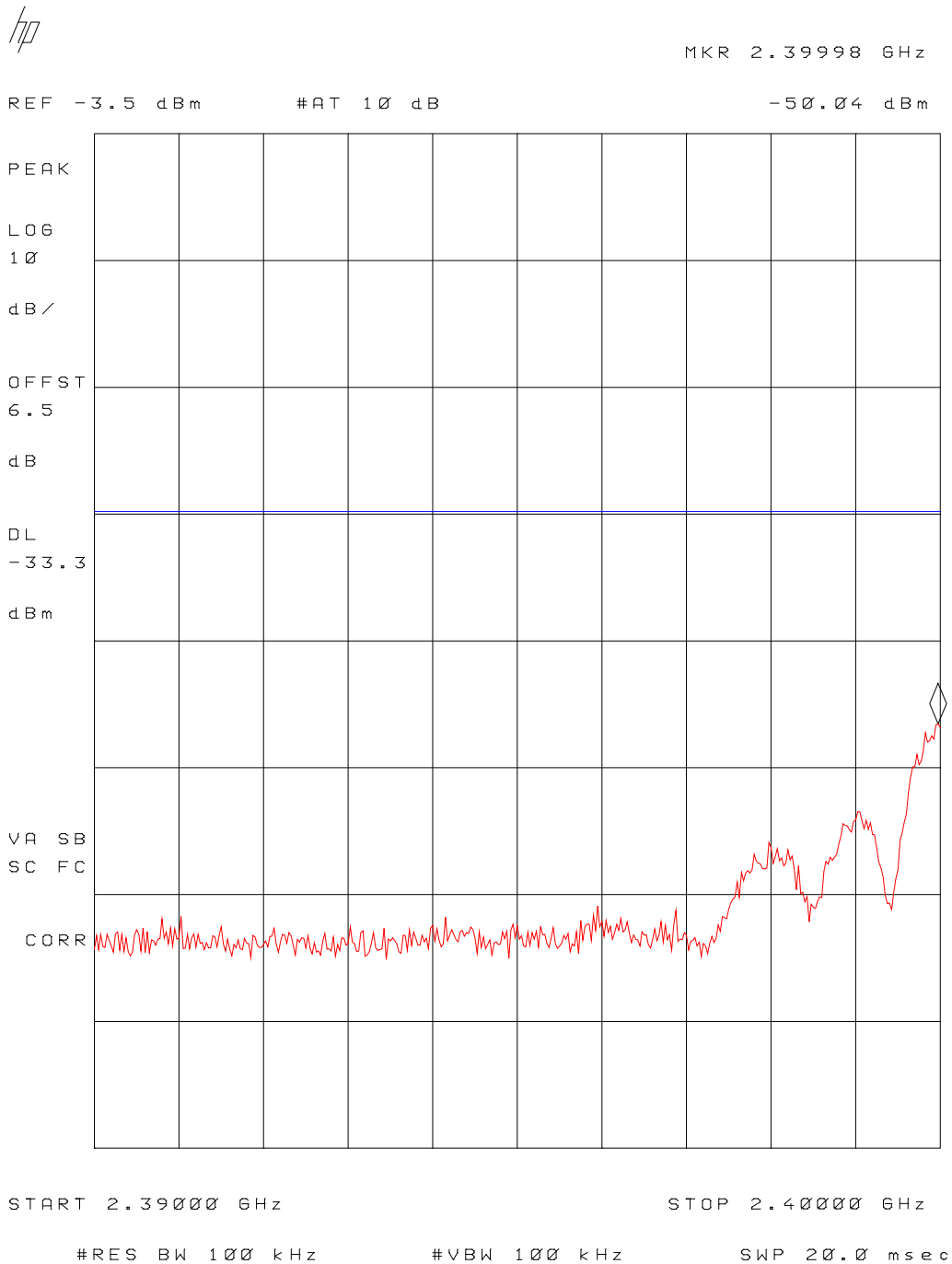
Plot 7 - Minimum 6 dB bandwidth at a transmission on channel 26 (2480 MHz).

5.3 Conducted emission data outside restricted bands



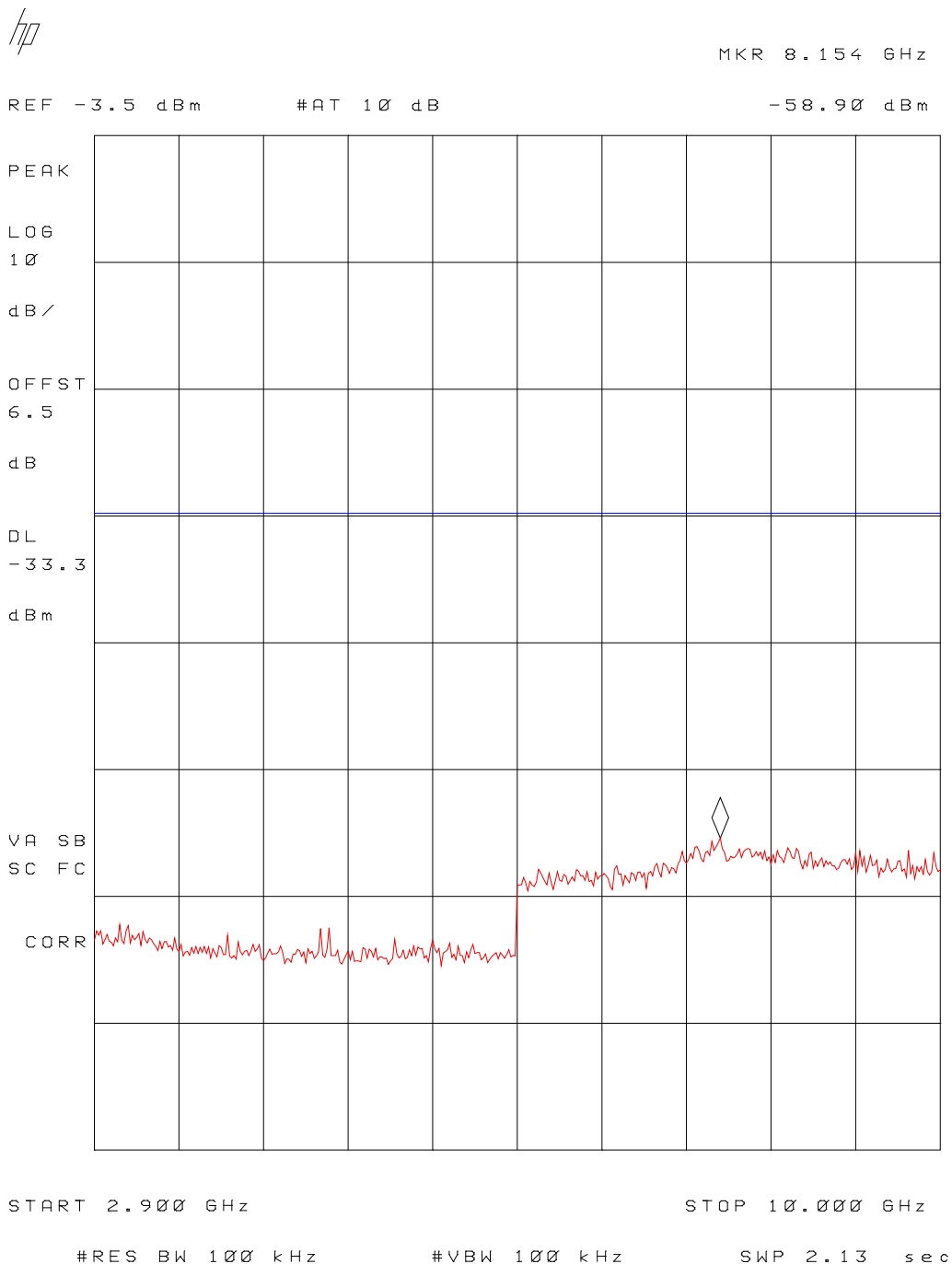
Plot 8 - Conducted emission outside restricted bands.

Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band. Display line :: -20 dB limit line.



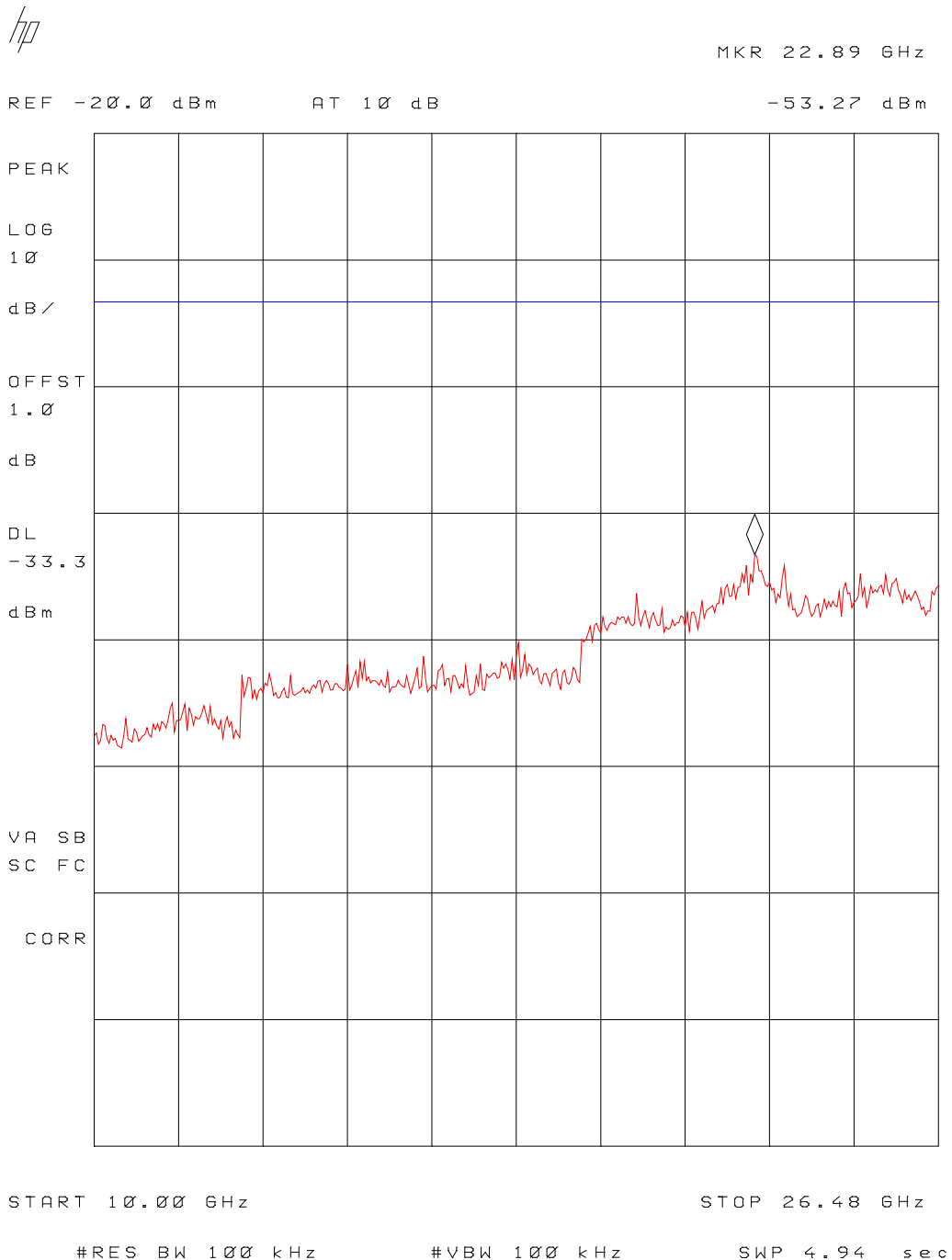
Plot 9 - Conducted emission outside restricted bands.

Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band. Display line :: -20 dB limit line.



Plot 10 - Conducted emission outside restricted band.

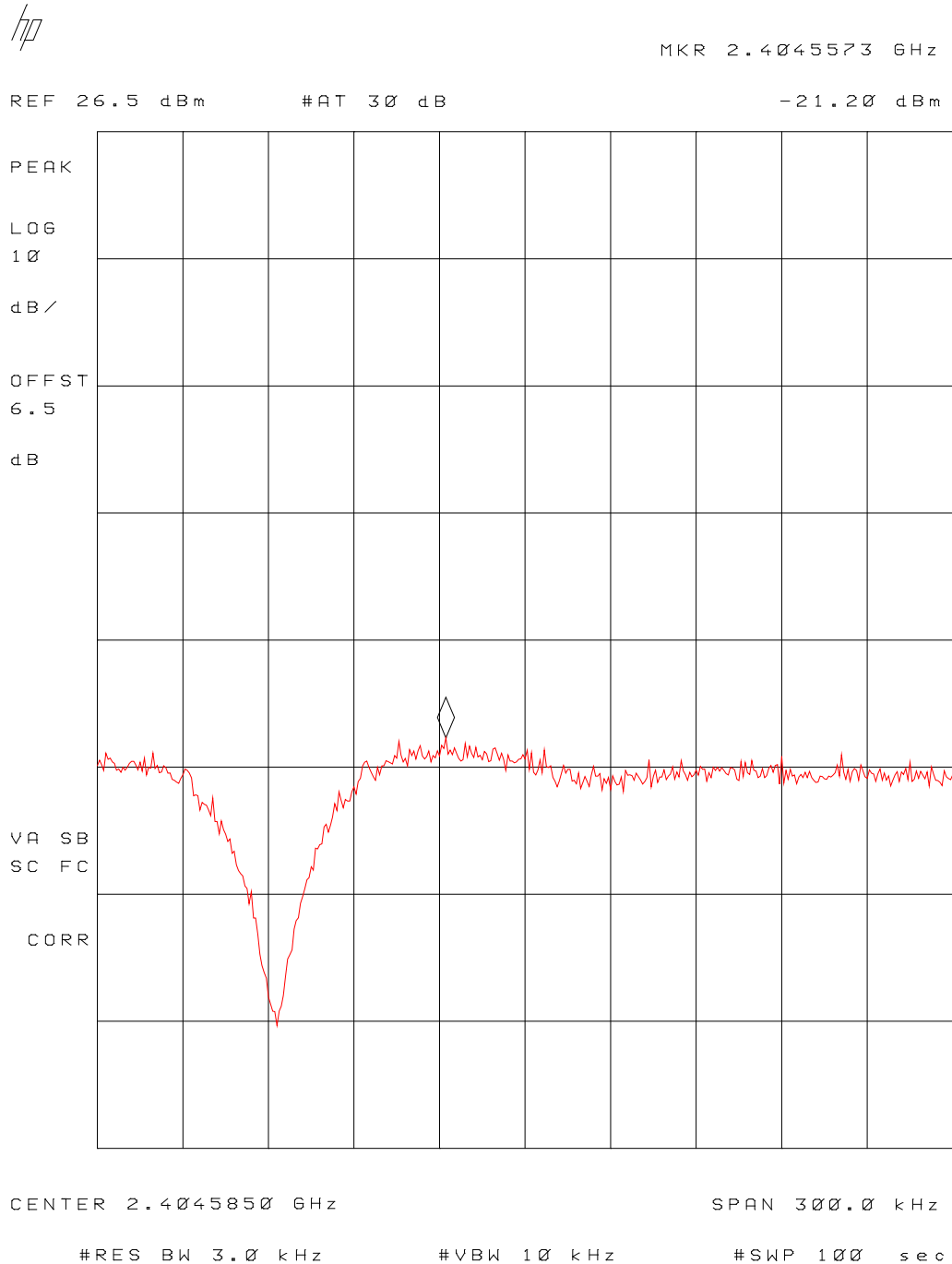
Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band. Display line :: -20 dB limit line.



Plot 11 - Conducted emission outside restricted band.

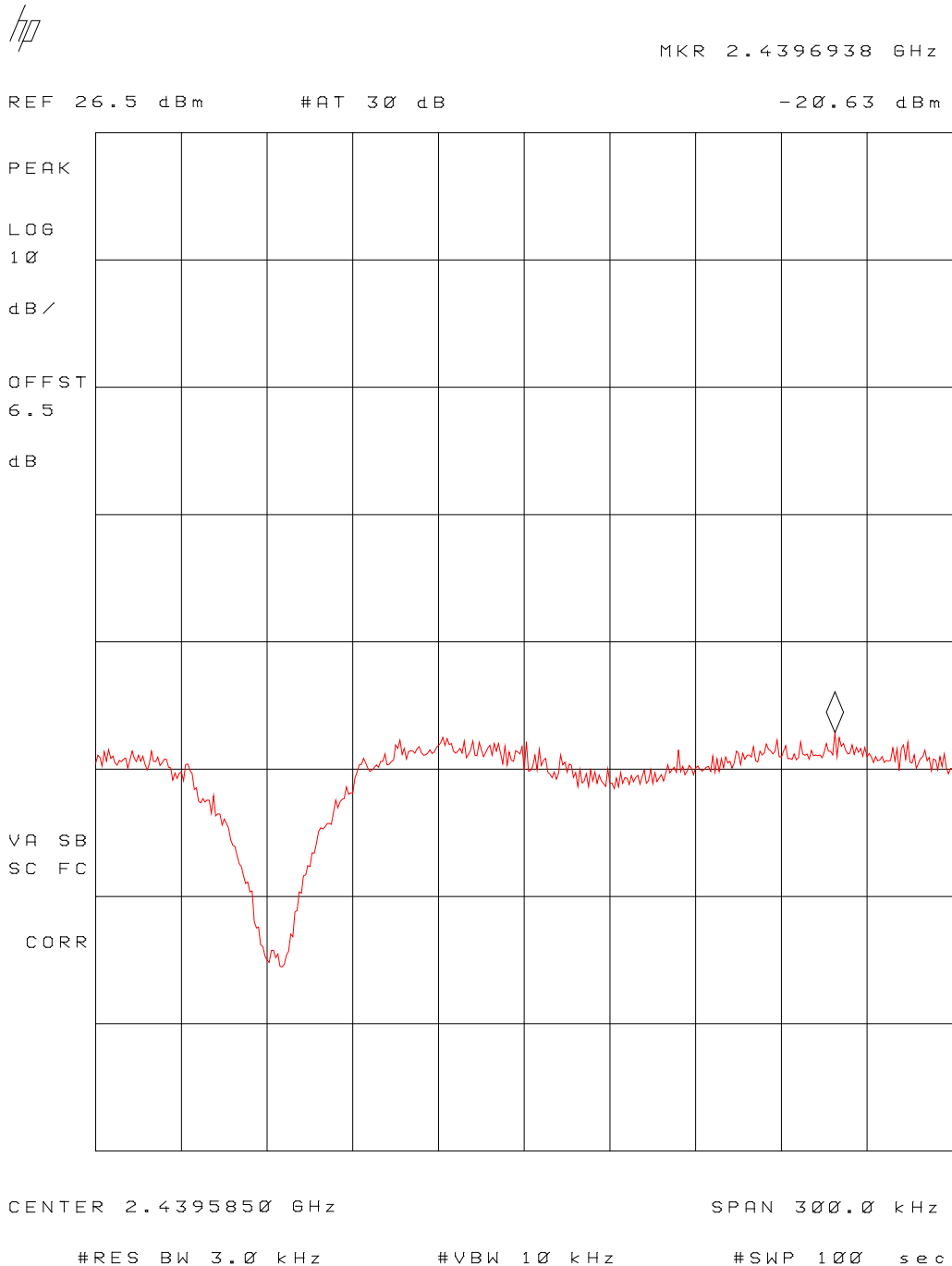
Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band. Display line :: -20 dB limit line. Corrected (offset) for cable losses.

5.4 Peak power spectral density



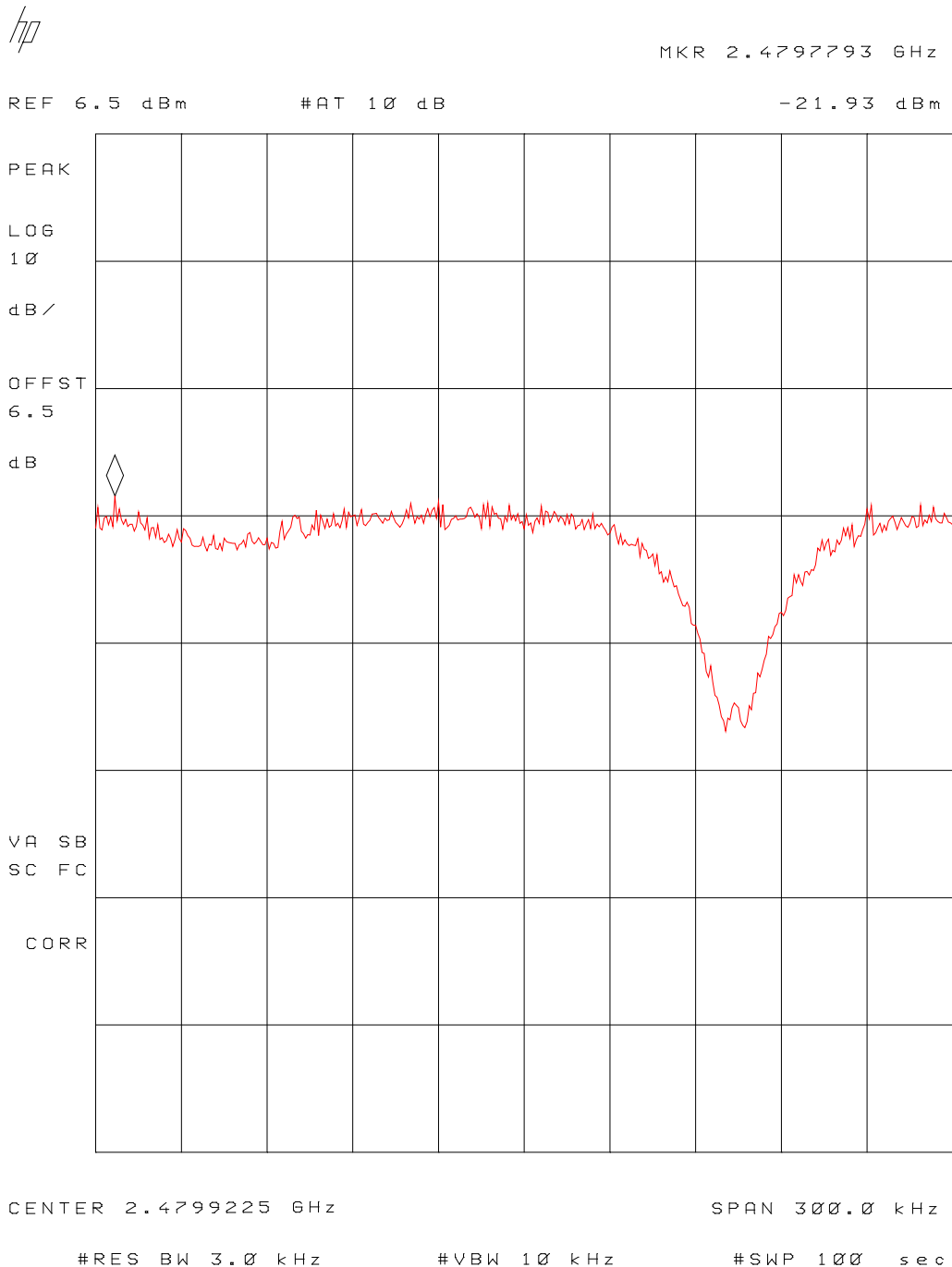
Plot 12 - Peak power spectral density (conducted) from the intentional radiator in any 3 kHz band.

Peak power spectral density (conducted) in a 3 kHz bandwidth at a transmission on channel 11 (2405 MHz).
Corrected (offset) for cable losses.



Plot 13 - Peak power spectral density (conducted) from the intentional radiator in any 3 kHz band.

Peak power spectral density (conducted) in a 3 kHz bandwidth at a transmission on channel 18 (2440 MHz).
Corrected (offset) for cable losses.



Plot 14 - Peak power spectral density (conducted) from the intentional radiator in any 3 kHz band.

Peak power spectral density (conducted) in a 3 kHz bandwidth at a transmission on channel 18 (2440 MHz).
Corrected (offset) for cable losses.

6 List of utilized test equipment

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12482	Loop antenna	EMCO	6507	05/2008	05/2009
12483	Guidehorn 1-18 GHz	EMCO	3115	04/2008	04/2009
12488	Guidehorn 18-26.5 GHz	EMCO	RA42-K-F-4B-C	04/2008	04/2009
12507	LISN	R&S	ESH2-Z5	01/2008	01/2010
12640	Temperature chamber	Heraeus	VEM03/500	01/2008	01/2009
13664	Spectrum analyzer	HP	8593E	09/2007	09/2008
14450	2.4 GHz bandreject filter	BSC	XN-1783	NA	NA
15275	Spectrum analyzer	HP	8594E	10/2007	10/2008
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2008	02/2009
15667	Measuring receiver	R&S	ESCS 30	04/2008	04/2009
99076	Bandpass filter 4-10 GHz	Reactel	7AS-7G-6G-511	NA	NA
99161	Variac 110Vac	RFT	LTS001	NA	NA
99136	Bandpass filter 10-26 GHz	Reactel	9HS-10G/26.5G-S11	NA	NA
99318	Digital multimeter	HP	34401A	10/2007	10/2008
99538	Spectrum analyzer	R&S	FSP40	05/2008	05/2009
99576	Peak power meter	Agilent	N1911A	09/2007	09/2008
99577	Sensor for power meter	Agilent	N1921A	09/2007	09/2008
99580	Open Area testsite	Comtest	NA	09/2006	09/2009
99596	Preamplifier 0.5 - 18 GHz	Miteq	AMF-5D-005180-28-13p	11/2007	11/2008
99609	Antenna mast 1-4 mtr	EMCS	AP-4702C	NA	NA

NA= Not Applicable