TEST REPORT OF A 2.4/5 GHZ IEEE 802.11g/a WLAN CARDBUS CARD, BRAND GLOBESPANVIRATA, MODEL ISL39200C, IN CONFORMITY WITH 47 CFR PART 15 (2003-03-13).

FCC listed	: 90828
Industry Canada	: IC3501
VCCI registered	: R-1518, C-1598

TNO Electronic Products & Services (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@eps.tno.nl
Web: www.eps.tno.nl

MEASUREMENT/TECHNICAL REPORT

GlobespanVirata B.V.

Model : ISL39200C

FCC ID: RGS39200C

January 20, 2004

This report concerns:	Original grant/certification ~~Class 2 change~~ ~~Verification~~	
Equipment type:	Unlicensed U-NII Device	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	~~Yes~~	No
Report prepared by:	Name	: P.A.J.M. Robben, B.Sc.E.E.
	Company name	: TNO Electronic Products & Services (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@eps.tno.nl

The data taken for this test and report herein was done in accordance with 47 CFR Part 15 and the measurement procedures of ANSI C63.4-1992. TNO Electronic Products & Services (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: January 20, 2004 Signature:

P. de Beer
TNO Electronic Products & Services (EPS) B.V.

Description of test item

Test item	:	2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card
Manufacturer	:	GlobespanVirata B.V.
Brand	:	GlobespanVirata
Model	:	ISL39200C
Serial numbers	:	03290022
Revision	:	B3
Receipt number	:	1
Receipt date	:	August 18, 2003

Applicant information

Applicant's representative	:	Mr. D. Sariredjo
Company	:	GlobespanVirata B.V.
Address	:	Rembrandtlaan 1a
Postal code	:	3723 BG
City	:	Bilthoven
PO-box	:	343
Postal code	:	3720 AH
City	:	Bilthoven
Country	:	The Netherlands
Telephone number	:	+31 30 225 9742
Telefax number	:	+31 30 229 6061

Test(s) performed

Location	:	Niekerk
Test(s) started	:	August 18, 2003
Test(s) completed	:	January 20, 2004
Purpose of test(s)	:	Type approval / certification
Test specification(s)	:	47 CFR Part 15 (2003-03-13)
Test engineer	:	O.H. Hoekstra
		H.J. Pieters
		P.A.J.M. Robben, B.Sc.E.E.
Report written by	:	P.A.J.M. Robben, B.Sc.E.E.
Project leader	:	P.A.J.M. Robben, B.Sc.E.E.

This report is in conformity with NEN-EN-ISO/IEC 17025: 2000.
This report shall not be reproduced, except in full, without the written permission of TNO Electronic Products & Services (EPS) B.V.
The test results relate only to the item(s) tested.

Table of contents

1 General information. 6
1.1 Product description. 6
1.2 Related submittal(s) and/or Grant(s). 6
1.3 Tested system details. 6
1.4 Test methodology. 7
1.5 Test facility. 7
1.6 Product labeling. 7
1.7 System test configuration. 8
1.7.1 Justification. 8
1.7.2 EUT test software. 8
1.8 Special accessories. 8
1.9 Equipment modifications. 8
1.10 Configuration of the tested system. 8
1.11 Block diagram(s) of the EUT. 8
2 Radiated emission data. 9
2.1 Test results with EUT operating in receive mode on channel 36. 9
2.2 Test results with EUT operating in receive mode on channel 48. 10
2.3 Test results with EUT operating in receive mode on channel 52. 11
2.4 Test results with EUT operating in receive mode on channel 64. 12
2.5 Test results with EUT operating in transmit mode on channel 36. 13
2.6 Test results with EUT operating in transmit mode on channel 48. 14
2.7 Test results with EUT operating in transmit mode on channel 52. 15
2.8 Test results with EUT operating in transmit mode on channel 64. 16
3 Conducted emission data. 17
3.1 AC mains with EUT operating in transmit/receive mode. 17
4 Results of tests in conformity with 47 CFR Part 15, Subpart E. 18
4.1 Power limits. 18
4.1.1 Frequency band of 5.15 – 5.25 GHz. 18
4.1.2 Frequency band of 5.25 – 5.35 GHz. 19
4.1.3 Frequency band of 5.725 – 5.825 GHz. 20
4.2 Maximum peak conducted transmit output power. 21
4.3 Peak power spectral density. 22
4.4 Ratio of the peak excursion of the modulation envelope. 23
4.5 Peak emissions outside the frequency bands of operation. 24
4.5.1 Transmitters operating in the 5.15 – 5.25 GHz frequency band. 24
4.5.2 Transmitters operating in the 5.25 – 5.35 GHz frequency band. 24
4.5.3 Transmitters operating in the 5.725 – 5.825 GHz frequency band. 24
4.5.4 Unwanted emissions below 1 GHz. 24
4.5.5 Restricted bands of operation. 24
4.5.5.1 Emission in restricted bands nearest to the band 5.15 – 5.35 GHz 25
4.6 Automatic discontinuation of transmissions. 26
4.7 Transmitting antenna. 26
4.8 Indoor operations. 26
4.9 Radio frequency radiation exposure. 26
4.10 Frequency stability. 26

5 Plots of measurement data. 27
5.1 Emission bandwidth “B” MHz. 28
5.2 Peak conducted transmit output power. 44
5.3 Peak power spectral density. 60
5.4 Ratio of the peak excursion of the modulation envelope. 76
5.5 Emission in restricted bands nearest to the band of 5.15 – 5.35 GHz. 92
6 List of utilized test equipment. 96

1 General information.

1.1 Product description.

The 2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card, brand GlobespanVirata, model ISL39200C, is designed to operate in the 5 GHz unlicensed U-NII devices frequency band (5.15 GHz – 5.35 GHz), as specified by the Federal Communications Commission in the USA.

The 2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card, brand GlobespanVirata, model ISL39200C, utilizes Direct Sequence Spread Spectrum (DSSS) and OFDM modulation techniques.

The 2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card, brand GlobespanVirata, model ISL39200C, 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
2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card	ISL39200C	03290022	RGS39200C	None.
Hewlett Packard notebook computer	Omnibook 4150	FR01961844 4150 B	n.a. (DoC)	-Unshielded DC power cord to AC/DC adapter -Shielded parallel cable to printer -Shielded USB mouse cable to USB mouse
Hewlett Packard AC/DC power adapter 100-240 VAC/1.8 Amps to +19 VDC/3.16 Amps	HP F1454A	EOD0011090226	n.a. (DoC)	-Unshielded DC power cord to notebook computer -Unshielded power cord to AC mains
Hewlett-Packard Wheel Mouse	X05-41663	n.a.	n.a. (DoC)	-Shielded USB mouse cable to notebook computer
HP DeskJet 895Cxi	C6410A	ES8B42307H	n.a. (DoC)	-Unshielded DC power cord to AC/DC adapter -Shielded parallel cable to notebook computer
HP AC/DC power adapter 100-240 VAC/1 Amps to +18 VDC/1.1 Amps	C6409-60014	n.a.	n.a. (DoC)	-Unshielded DC power cord to printer -Unshielded power cord to AC mains

Table 1 - Tested system details overview.

1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (2003-03-13), sections 15.107, 15.207, 15.109, 15.209, 15.205 and Subpart E (Unlicensed National Information Infrastructure Devices).

The test methods, which have been used, are based on ANSI C63.4: 1992.

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 – 40 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 Niekerk, 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 23, 2000.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. 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 Cardbus slot of the host system by means of an "extender card" for the purpose of proving compliance with the applicable parts of 47 CFR Part 15 in case no additional shielding of the EUT is provided by the host system. 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: 1992.

Tests were performed at the operating frequencies channel 36 (5180 MHz), channel 48 (5240 MHz), channel 52 (5260 MHz) and channel 64 (5320 MHz). Further details may be found in table 2 below.

Channel	Operating frequencies (MHz)	Rated output power (mW)	Test performed
36	5180	48.9	***yes***
40	5200	48.9	no
44	5220	48.9	no
48	5240	48.9	***yes***
52	5260	47.9	***yes***
56	5280	47.9	no
60	5300	47.9	no
64	5320	47.9	***yes***

Table 2 - Specification of channels and rated maximum peak conducted transmit output power.

1.7.2 EUT test software.

The EUT could be enabled to transmit or receive continuously on channels 36 (5180 MHz), 48 (5240 MHz), 52 (5260 MHz) and 64 (5320 MHz) by means of test software, which was supplied by the manufacturer of the EUT. Furthermore, the utilized test software also enables various transmission bit-rate settings in the range of 6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s.

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/TCB.

2 Radiated emission data.

2.1 Test results with EUT operating in receive mode on channel 36.

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 36 (5180 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				
380.00	27.9	33.9	-	-	-	-	120	46.0	-	-
440.00	42.6	42.3	-	-	-	-	120	46.0	-	-
484.00	20.4	24.2	-	-	-	-	120	46.0	-	-
15540.00	-	-	n.t.	n.t.	40.1	40.0	1000	-	54.0	74.0
20720.00	-	-	n.t.	n.t.	45.5	43.8	1000	-	54.0	74.0

Table 3 - Test results with the EUT operating in receive mode on channel 36 (5180 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 : H.J. Pieters

Date : August 28, 2003

2.2 Test results with EUT operating in receive mode on channel 48.

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 48 (5240 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				
380.00	27.9	33.9	-	-	-	-	120	46.0	-	-
440.00	42.6	42.3	-	-	-	-	120	46.0	-	-
484.00	20.4	24.2	-	-	-	-	120	46.0	-	-
15720.00	-	-	n.t.	n.t.	39.2	39.1	1000	-	54.0	74.0
20960.00	-	-	n.t.	n.t.	46.8	44.0	1000	-	54.0	74.0

Table 4 - Test results with the EUT operating in receive mode on channel 48 (5240 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 : H.J. Pieters

Date : August 28, 2003

2.3 Test results with EUT operating in receive mode on channel 52.

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 52 (5260 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				
380.00	26.9	32.2	-	-	-	-	120	46.0	-	-
440.00	42.6	42.0	-	-	-	-	120	46.0	-	-
484.00	21.5	25.1	-	-	-	-	120	46.0	-	-
10520.00	-	-	n.t.	n.t.	34.8	<34.0	1000	-	54.0	74.0
15780.00	-	-	n.t.	n.t.	<39.0	<39.0	1000	-	54.0	74.0
21040.00	-	-	n.t.	n.t.	47.2	46.1	1000	-	54.0	74.0

Table 5 - Test results with the EUT operating in receive mode on channel 52 (5260 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 : H.J. Pieters

Date : August 28, 2003

2.4 Test results with EUT operating in receive mode on channel 64.

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 64 (5320 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				
380.00	26.9	32.2	-	-	-	-	120	46.0	-	-
440.00	42.6	42.0	-	-	-	-	120	46.0	-	-
484.00	21.5	25.1	-	-	-	-	120	46.0	-	-
10640.00	-	-	n.t.	n.t.	35.2	<34.0	1000	-	54.0	74.0
15960.00	-	-	n.t.	n.t.	39.2	39.2	1000	-	54.0	74.0
21280.00	-	-	n.t.	n.t.	47.4	<46.0	1000	-	54.0	74.0

Table 6 - Test results with the EUT operating in receive mode on channel 64 (5320 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 : H.J. Pieters

Date : August 28, 2003

2.5 Test results with EUT operating in transmit mode on channel 36.

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 36 (5180 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				
380.00	27.9	33.5	-	-	-	-	120	46.0	-	-
440.00	45.8	42.7	-	-	-	-	120	46.0	-	-
484.00	29.2	27.6	-	-	-	-	120	46.0	-	-
10360.00	-	-	n.t.	n.t.	45.2	47.1	1000	-	54.0	74.0
15540.00	-	-	43.3	41.3	55.5	59.8	1000	-	54.0	74.0
20720.00	-	-	n.t.	n.t.	48.9	<44.0	1000	-	54.0	74.0

Table 7 - Test results with the EUT operating in transmit mode on channel 36 (5180 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: Radiated emission tests have been performed with all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s) in transmit mode. The highest values measured of the spurious emission components are reported by means of table 7.

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 : H.J. Pieters

Date : August 28, 2003

2.6 Test results with EUT operating in transmit mode on channel 48.

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 48 (5240 MHz), are depicted in table 8.

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				
380.00	27.9	33.5	-	-	-	-	120	46.0	-	-
440.00	45.8	42.7	-	-	-	-	120	46.0	-	-
484.00	29.2	27.6	-	-	-	-	120	46.0	-	-
10480.00	-	-	n.t.	n.t.	51.1	53.6	1000	-	54.0	74.0
15720.00	-	-	47.5	47.2	64.8	62.9	1000	-	54.0	74.0
20960.00	-	-	n.t.	n.t.	47.3	42.8	1000	-	54.0	74.0

Table 8 - Test results with the EUT operating in transmit mode on channel 48 (5240 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: Radiated emission tests have been performed with all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s) in transmit mode. The highest values measured of the spurious emission components are reported by means of table 8.

Note: Field strength values of radiated emissions at frequencies not listed in table 8 are more than 20 dB below the applicable limit.

Test engineer

Signature :

Name : H.J. Pieters

Date : August 28, 2003

2.7 Test results with EUT operating in transmit mode on channel 52.

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 52 (5260 MHz), are depicted in table 9.

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				
380.00	27.2	33.6	-	-	-	-	120	46.0	-	-
440.00	43.3	42.8	-	-	-	-	120	46.0	-	-
484.00	23.2	27.7	-	-	-	-	120	46.0	-	-
10520.00	-	-	n.t.	n.t.	45.7	50.0	1000	-	54.0	74.0
15780.00	-	-	50.9	45.1	65.4	65.0	1000	-	54.0	74.0
21040.00	-	-	n.t.	n.t.	48.0	<46.0	1000	-	54.0	74.0

Table 9 - Test results with the EUT operating in transmit mode on channel 52 (5260 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: Radiated emission tests have been performed with all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s) in transmit mode. The highest values measured of the spurious emission components are reported by means of table 9.

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

Test engineer

Signature :

Name : H.J. Pieters

Date : August 28, 2003

2.8 Test results with EUT operating in transmit mode on channel 64.

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 64 (5320 MHz), are depicted in table 10.

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				
380.00	27.2	33.6	-	-	-	-	120	46.0	-	-
440.00	43.3	42.8	-	-	-	-	120	46.0	-	-
484.00	23.2	27.7	-	-	-	-	120	46.0	-	-
10640.00	-	-	n.t.	n.t.	49.8	49.0	1000	-	54.0	74.0
15960.00	-	-	46.7	47.1	61.5	63.3	1000	-	54.0	74.0
21280.00	-	-	n.t.	n.t.	47.8	46.9	1000	-	54.0	74.0

Table 10 - Test results with the EUT operating in transmit mode on channel 64 (5320 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: Radiated emission tests have been performed with all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s) in transmit mode. The highest values measured of the spurious emission components are reported by means of table 10.

Note: Field strength values of radiated emissions at frequencies not listed in table 10 are more than 20 dB below the applicable limit.

Test engineer

Signature :

Name : H.J. Pieters

Date : August 28, 2003

3 Conducted emission data.

3.1 AC mains with EUT operating in transmit/receive mode.

The (worst-case) results of the conducted emission tests at the 110 Volts AC mains connection terminals of the notebook computer in which the EUT is built into, carried out in accordance with 47 CFR Part 15.107 and 47 CFR Part 15.207, with the EUT operating in transmit/receive mode on channels 36 (5180 MHz), 48 (5240 MHz), 52 (5260 MHz) and 64 (5320 MHz), while utilizing all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s), are depicted in table 11.

Frequency (MHz)	Measurement results dB(µV) Neutral		Measurement results dB(µV) Line 1		Limits dB(µV)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.19	56.0	48.2	55.0	47.7	64.0	54.0	-8.0	-5.8	-9.0	-6.3	PASS
0.26	50.4	45.0	51.0	45.0	61.4	51.4	-11.0	-6.4	-10.4	-6.4	PASS
0.32	44.6	40.5	46.5	41.7	59.7	49.7	-15.1	-9.2	-13.2	-8.0	PASS
0.38	47.0	43.2	46.3	43.0	58.3	48.3	-11.3	-5.1	-12.0	-5.3	PASS
0.45	40.9	40.2	40.6	41.1	56.9	46.9	-16.0	-6.7	-16.3	-5.8	PASS
0.58	40.2	39.6	40.2	40.9	56.0	46.0	-15.8	-6.4	-15.8	-5.1	PASS
0.65	39.5	39.6	39.7	40.4	56.0	46.0	-16.5	-6.4	-16.3	-5.6	PASS
1.56	39.4	40.0	39.9	39.8	56.0	46.0	-16.6	-6.0	-16.1	-6.2	PASS
3.11	33.9	32.1	34.0	29.6	56.0	46.0	-22.1	-13.9	-22.0	-16.4	PASS
8.70	35.7	32.7	35.7	33.1	60.0	50.0	-24.3	-17.3	-24.3	-16.9	PASS

Table 11 - Test results with the EUT operating in transmit/receive mode.

Note: Disturbance voltage values of conducted emissions at frequencies not listed in table 11 are more than 20 dB below the applicable limit.

Test engineer

Signature :

Name : Onno H. Hoekstra

Date : August 25, 2003

4 Results of tests in conformity with 47 CFR Part 15, Subpart E.

4.1 Power limits.

4.1.1 Frequency band of 5.15 – 5.25 GHz.

The results of tests on the EUT, carried out in accordance with 47 CFR Part 15.407 (a)(1) in order to determine the –26 dB emission bandwidth of the transmitter signal, are depicted in table 12.

The procedure, which was used for measuring the –26 dB emission bandwidth of the transmitter signal, is defined in FCC Public Notice DA 02-2138 (August 30, 2002), Appendix A, emission bandwidth "B" MHz.

The plots of the results of the –26 dB emission bandwidth measurements may be found in section 5.1 of this test report.

Transmission bit-rate (Mbit/s)	-26 dBm emission bandwidth (kHz)	
	Ch. 36 (5180 MHz)	Ch. 48 (5240 MHz)
9	24300	23700
18	21300	20400
36	20100	20250
54	19500	19350

Table 12 – The results of the –26 dB emission bandwidth measurements

From table 12 above it can be derived that the minimum –26 dB emission bandwidth is 19.35 MHz.

The peak transmit power limit, based on the –26 dB emission bandwidth, in the frequency band of 5.15 – 5.25 GHz can be calculated as follows:

4 dBm + 10 log B, where B is the –26 dB emission bandwidth in MHz;

4 dBm + 10 log 19.35 = 4 dBm + 12.9 = 16.9 dBm (48.9 mW).

In accordance with 47 CFR Part 15.407 (a)(1) the peak transmit power in the frequency band of 5.15 – 5.25 GHz shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the –26 dB emission bandwidth in MHz. It has been determined that the peak transmit power limit, based on the –26 dB emission bandwidth, in the frequency band of 5.15 – 5.25 GHz is 16.9 dBm (48.9 mW).

In accordance with 47 CFR Part 15.407 (a)(1) the peak transmit power limit, in the frequency band of 5.15 – 5.25 GHz, has been set to 16.9 dBm (48.9 mW).

Test engineer

Signature :

Name : Onno H. Hoekstra

Date : August 25, 2003

4.1.2 Frequency band of 5.25 – 5.35 GHz.

The results of tests on the EUT, carried out in accordance with 47 CFR Part 15.407 (a)(1) in order to determine the –26 dB emission bandwidth of the transmitter signal, are depicted in table 13.

The procedure, which was used for measuring the –26 dB emission bandwidth of the transmitter signal, is defined in FCC Public Notice DA 02-2138 (August 30, 2002), Appendix A, emission bandwidth "B" MHz.

The plots of the results of the –26 dB emission bandwidth measurements may be found in section 5.1 of this test report.

Transmission bit-rate (Mbit/s)	-26 dBm emission bandwidth (kHz)	
	Ch. 52 (5260 MHz)	Ch. 64 (5320 MHz)
9	24150	28800
18	21450	26700
36	20100	25350
54	19350	19500

Table 13 – The results of the –26 dB emission bandwidth measurements

From table 13 above it can be derived that the minimum –26 dB emission bandwidth is 19.35 MHz.

The peak transmit power limit, based on the –26 dB emission bandwidth, in the frequency band of 5.25 – 5.35 GHz can be calculated as follows:

11 dBm + 10 log B, where B is the –26 dB emission bandwidth in MHz;

11 dBm + 10 log 19.35 = 11 dBm + 12.9 = 23.9 dBm (245.5 mW).

In accordance with 47 CFR Part 15.407 (a)(2) the peak transmit power in the frequency band of 5.25 – 5.35 GHz shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the –26 dB emission bandwidth in MHz. It has been determined that the peak transmit power limit, based on the –26 dB emission bandwidth, in the frequency band of 5.25 – 5.35 GHz is 23.9 dBm (245.5 mW).

In accordance with 47 CFR Part 15.407 (a)(2) the peak transmit power limit, in the frequency band of 5.25 – 5.35 GHz, has been set to 23.9 dBm (245.5 mW).

Test engineer

Signature :

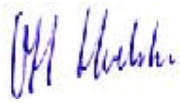
Name : P.A.J.M. Robben, B.Sc.E.E.

Date : January 20, 2004

4.1.3 Frequency band of 5.725 – 5.825 GHz.

47 CFR Part 15.407 (a)(3) is not applicable to the EUT.

Test engineer

Signature : 

Name : Onno H. Hoekstra

Date : August 25, 2003

4.2 Maximum peak conducted transmit output power.

The results of tests on the EUT, carried out in accordance with 47 CFR Part 15.407 (a)(4), are depicted in table 14. The maximum peak conducted transmit output power was measured directly at the (temporary) antenna connector.

The limits have been derived from 47 CFR Part 15.407 (a)(1) and 47 CFR Part 15.407 (a)(2), see also section 4.1 of this test report.

The procedure, which was used for measuring the maximum peak conducted transmit output power of the transmitter, is defined in FCC Public Notice DA 02-2138 (August 30, 2002), Appendix A, peak conducted transmit output power, test method #3.

The plots of the results of the maximum peak conducted transmit output power measurements may be found in section 5.2 of this test report.

Transmission bit-rate (Mbit/s)	Maximum peak transmit output power (conducted, mW)				Limit (conducted, mW) Antenna gain < 6 dBi	
	Ch. 36 (5180 MHz)	Ch. 48 (5240 MHz)	Ch. 52 (5260 MHz)	Ch. 64 (5320 MHz)	5150-5250 MHz	5250-5350 MHz
9	46.4	48.9	43.7	45.7	48.9	245.5
18	48.9	48.5	47.9	45.7	48.9	245.5
36	48.5	45.8	41.7	40.7	48.9	245.5
54	28.1	32.7	26.3	25.7	48.9	245.5

Table 14 - Maximum peak conducted transmit output power.

Note: During the measurements, the AC mains supply voltage of the notebook PC in which the EUT was built-in was varied between 85% and 115% of the nominal value. The maximum measured values are depicted in table 14. 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 transmit output power is required.

Test engineer

Signature :

Name : P.A.J.M. Robben, B.Sc.E.E.

Date : January 20, 2004

4.3 Peak power spectral density.

The results of the tests on the EUT, carried out in accordance with 47 CFR Part 15.407 (a)(5), are depicted in table 15. The peak power spectral density was measured directly at the (temporary) antenna connector. The limits have been derived from 47 CFR Part 15.407 (a)(1) and 47 CFR Part 15.407 (a)(2).

It has been determined that the –26 dB emission bandwidth of the EUT is 18.8 – 35.7 MHz (depending on the transmission bit-rate and operating frequency). Therefore, in accordance with 47 CFR Part 15.407 (a)(5), the measurements have been carried out over a bandwidth of 1 MHz.

The procedure, which was used for measuring the peak power spectral density, is defined in FCC Public Notice DA 02-2138 (August 30, 2002), Appendix A, peak power spectral density, test method #2.

The plots of the results of the peak power spectral density measurements may be found in section 5.3 of this test report.

Transmission bit-rate (Mbit/s)	Peak power spectral density in any 1 MHz band (conducted, dBm)				Limit (conducted, dBm)	
	Ch. 36 (5180 MHz)	Ch. 48 (5240 MHz)	Ch. 52 (5260 MHz)	Ch. 64 (5320 MHz)	5150-5250 MHz	5250-5350 MHz
9	2.8	2.7	3.0	2.9	4.0	11.0
18	3.3	3.0	3.1	3.0	4.0	11.0
36	2.7	2.1	1.9	2.1	4.0	11.0
54	0.5	1.1	0.1	0.2	4.0	11.0

Table 15 - Peak power spectral density (conducted).

Test engineer

Signature :

Name : P.A.J.M. Robben, B.Sc.E.E.

Date : January 20, 2004

4.4 Ratio of the peak excursion of the modulation envelope.

The results of the tests on the EUT, carried out in accordance with 47 CFR Part 15.407 (a)(6), are depicted in table 16.

The procedure, which was used for measuring the peak excursion of the modulation envelope, is defined in FCC Public Notice DA 02-2138 (August 30, 2002), Appendix A, peak excursion measurement. The second trace (trace "B") was created while using the settings as described in test method #3 for the peak conducted transmit output power test procedure (see section 4.2 of this test report).

The plots of the results of the peak excursion of the modulation envelope measurements may be found in section 5.4 of this test report. The upper trace is the result of the substraction of trace "B" from trace "A" with the 0 dBm line as the reference point.

Transmission bitrate (Mbit/s)	Ratio of the peak excursion of the modulation envelope (dB)				Limit (dB)
	Ch. 36 (5180 MHz)	Ch. 48 (5240 MHz)	Ch. 52 (5260 MHz)	Ch. 64 (5320 MHz)	
9	10.4	10.1	10.8	11.8	< 13.0
18	10.2	10.0	10.6	10.6	< 13.0
36	11.1	11.1	11.9	12.0	< 13.0
54	11.3	11.1	11.5	12.1	< 13.0

Table 16 – Ratio of the peak excursion of the modulation envelope.

Test engineer

Signature :

Name : P.A.J.M. Robben, B.Sc.E.E.

Date : January 20, 2004

4.5 Peak emissions outside the frequency bands of operation.

4.5.1 Transmitters operating in the 5.15 – 5.25 GHz frequency band.

In accordance with 47 CFR Part 15.407 (b)(1) all emissions outside of the 5.15 – 5.35 GHz frequency band shall not exceed an EIRP of –27 dBm/MHz. The results of these measurements may be found in section 2 of this test report.

4.5.2 Transmitters operating in the 5.25 – 5.35 GHz frequency band.

In accordance with 47 CFR Part 15.407 (b)(2) all emissions outside of the 5.15 – 5.35 GHz frequency band shall not exceed an EIRP of –27 dBm/MHz. The results of these measurements may be found in section 2 of this test report.

4.5.3 Transmitters operating in the 5.725 – 5.825 GHz frequency band.

Not applicable.

4.5.4 Unwanted emissions below 1 GHz.

In accordance with 47 CFR Part 15.407 (b)(5) all unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 47 CFR Part 15.209. The results of these measurements may be found in section 2 of this test report.

Any U-NII device using an AC power line are required to comply with the conducted limits set forth in 47 CFR Part 15.207. The results of these measurements may be found in section 3 of this test report.

4.5.5 Restricted bands of operation.

In accordance with 47 CFR Part 15.407 (b)(6), intentional radiators need to comply with the provisions of 47 CFR Part 15.205. The results of these measurements may be found in section 2 of this test report.

4.5.5.1 Emission in restricted bands nearest to the band 5.15 – 5.35 GHz

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 5.15 – 5.35 MHz and with the EUT operating in transmit mode, are depicted in table 17.

The plots of the measurement results may be found in section 5.5 of this test report.

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)
5141.88	-	45.6	59.4	1000	-	54.0	74.0
5150.00	-	43.9	55.4	1000	-	54.0	74.0
5350.00	-	44.3	55.5	1000	-	54.0	74.0
5356.05	-	43.6	58.8	1000	-	54.0	74.0

Table 17 - Test results with the EUT operating in transmit mode.

Note: Conducted emission tests have been performed with all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s) in transmit mode. The highest values measured of the spurious emission components are reported by means of table 17.

Note: Field strength values of conducted emissions at frequencies not listed in table 17 are more than 20 dB below the applicable limit.

Test engineer

Signature :

Name : P.A.J.M. Robben, B.Sc.E.E.

Date : January 20, 2004

4.6 Automatic discontinuation of transmissions.

The EUT shall automatically discontinue transmission in case of either absence of information to transmit or operational failure.

In accordance with 47 CFR Part 15.407 (c) applicants shall include in their application of how this requirement is met.

4.7 Transmitting antenna.

In accordance with 47 CFR Part 15.407 (d) any U-NII device that operates in the 5.15 – 5.25 GHz frequency band shall use a transmitting antenna that is an integral part of the device.

The EUT incorporates an integral antenna.

4.8 Indoor operations.

In accordance with 47 CFR Part 15.407 (e) U-NII devices operating in 5.15 – 5.25 GHz frequency band are restricted to indoor operations only.

The applicant has declared that the EUT is intended for indoor operations only.

4.9 Radio frequency radiation exposure.

In accordance with 47 CFR Part 15.407 (f) U-NII devices are subject to the radio frequency radiation exposure requirements specified in 47 CFR Part 1.1307 (b), 47 CFR Part 2.1091 and 47 CFR Part 2.1093, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment.

In accordance with 47 CFR Part 15.407 (f) applicants shall include in their application of how this requirement is met.

4.10 Frequency stability.

In accordance with 47 CFR Part 15.407 (g) the frequency stability of U-NII devices must be such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

The results of tests on the EUT, carried out in order to determine the frequency stability under extreme temperature conditions combined with variations in the DC supply voltage, are depicted in table 18.

Test conditions		Frequency (MHz)		
		Channel 36 (5180 MHz)	Channel 52 (5260 MHz)	Channel 64 (5320 MHz)
T = +21 °C	V = +3.3 VDC	5180.0240	5260.0248	5320.0253
T = 0 °C	V = +3.1 VDC	5180.0293	5260.0293	5320.0298
	V = +3.5 VDC	5180.0293	5260.0293	5320.0298
T = +35 °C	V = +3.1 VDC	5180.0250	5260.0255	5320.0258
	V = +3.5 VDC	5180.0250	5260.0255	5320.0258

Table 18 – Frequency stability

Test engineer

Signature : Name : Onno H. Hoekstra Date : August 25, 2003

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.

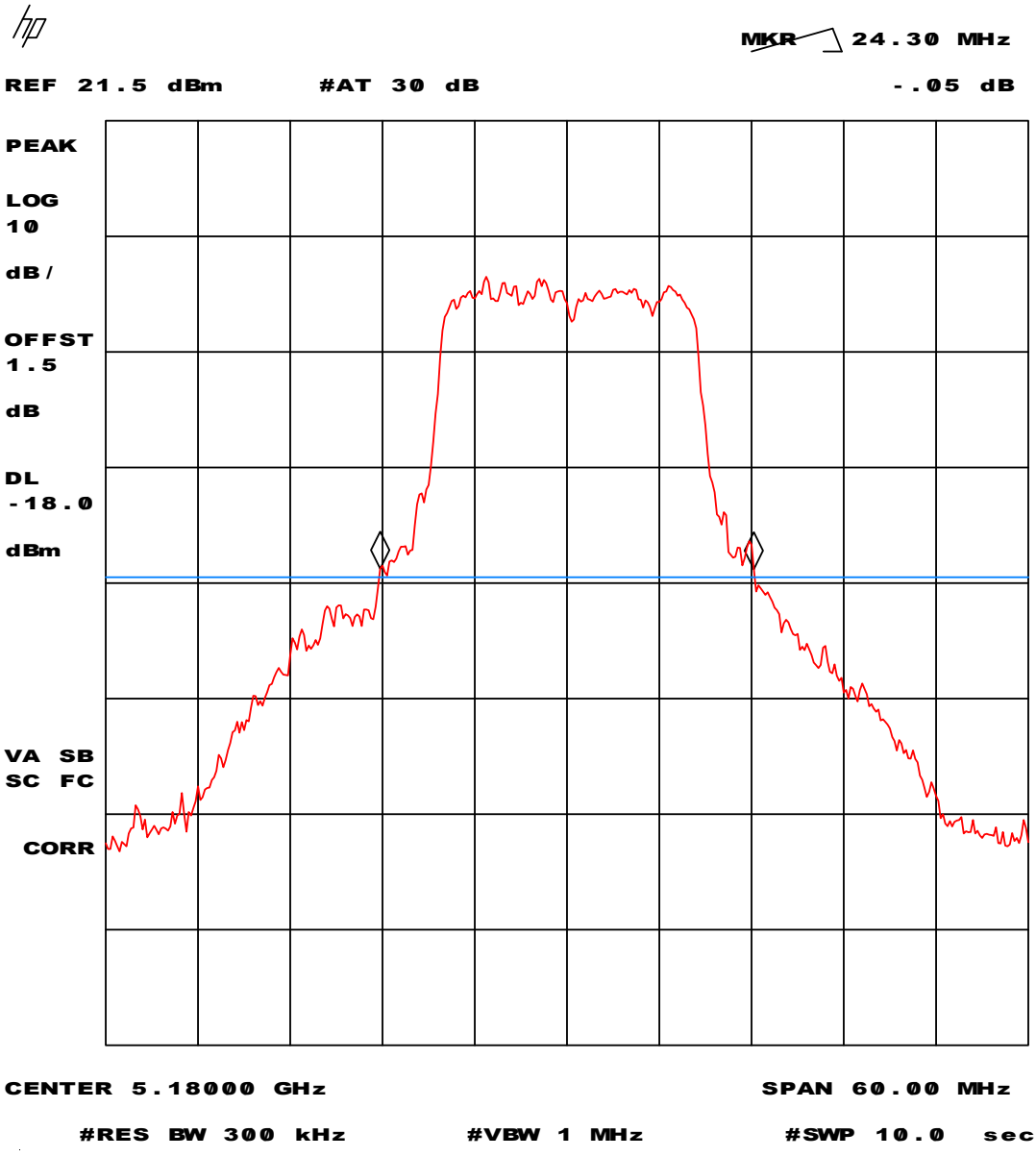
Test engineer

Signature :

Name : Onno H. Hoekstra

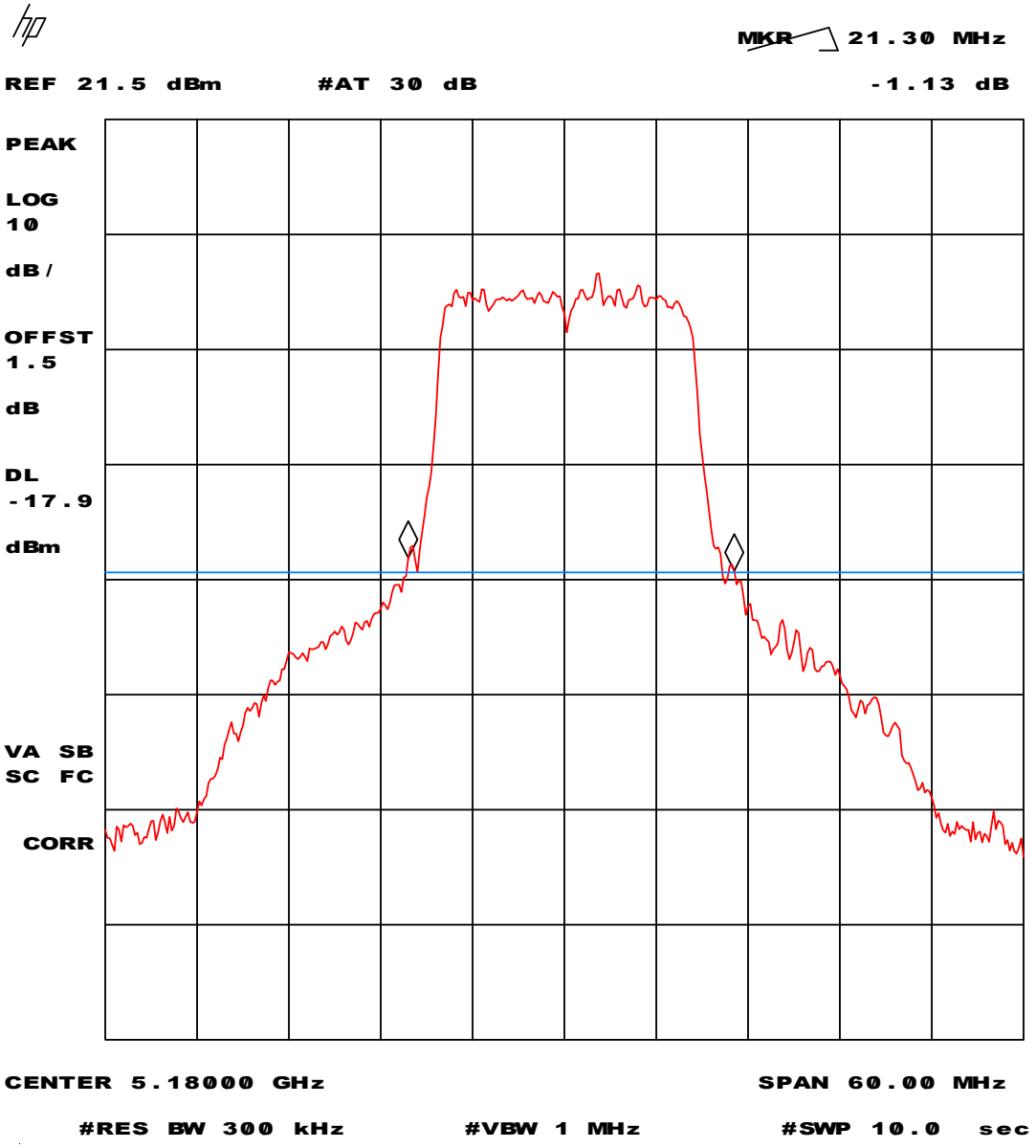
Date : August 25, 2003

5.1 Emission bandwidth "B" MHz.



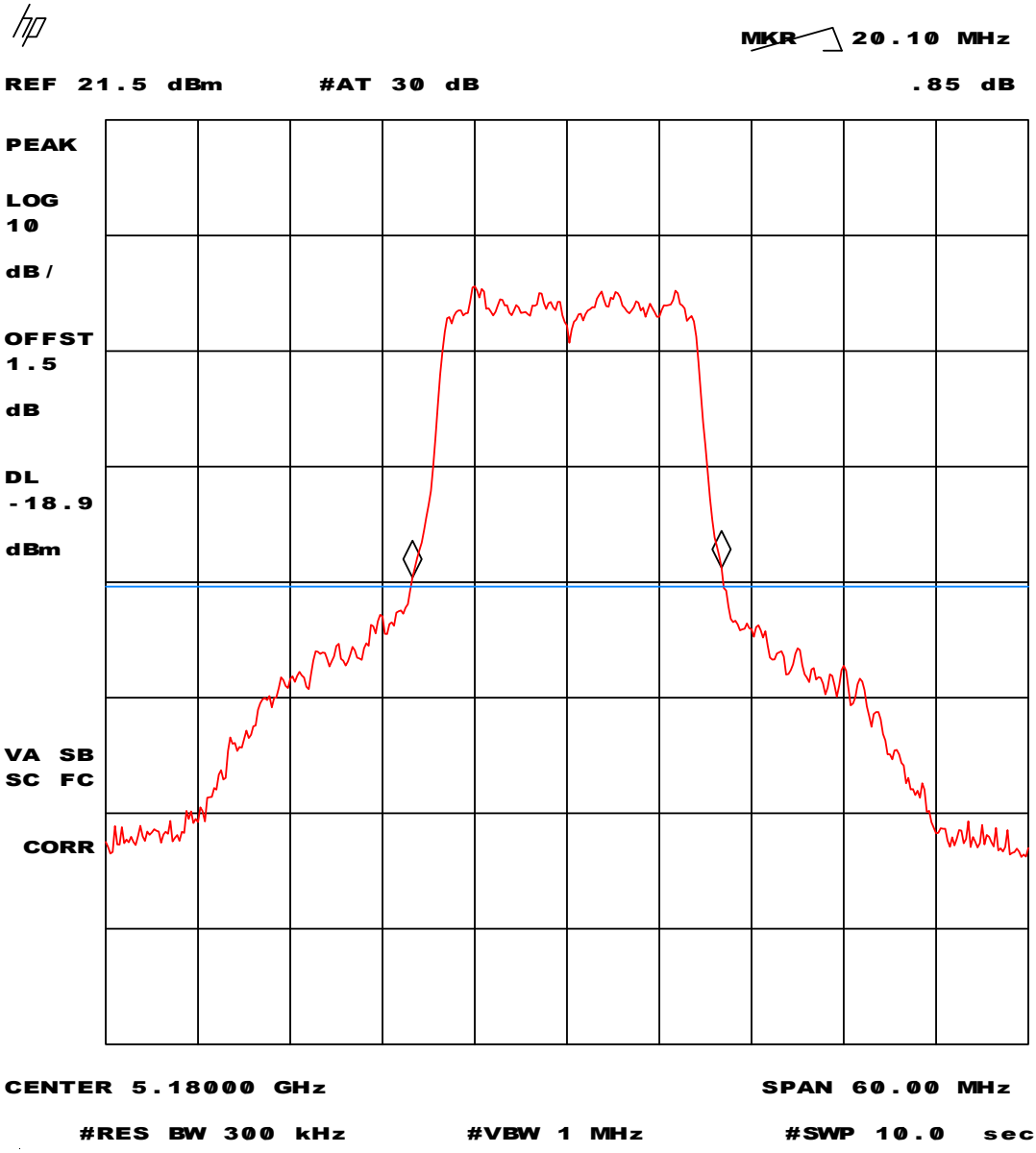
Plot 1 – Emission bandwidth (conducted, -26 dB).

Plot 1 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



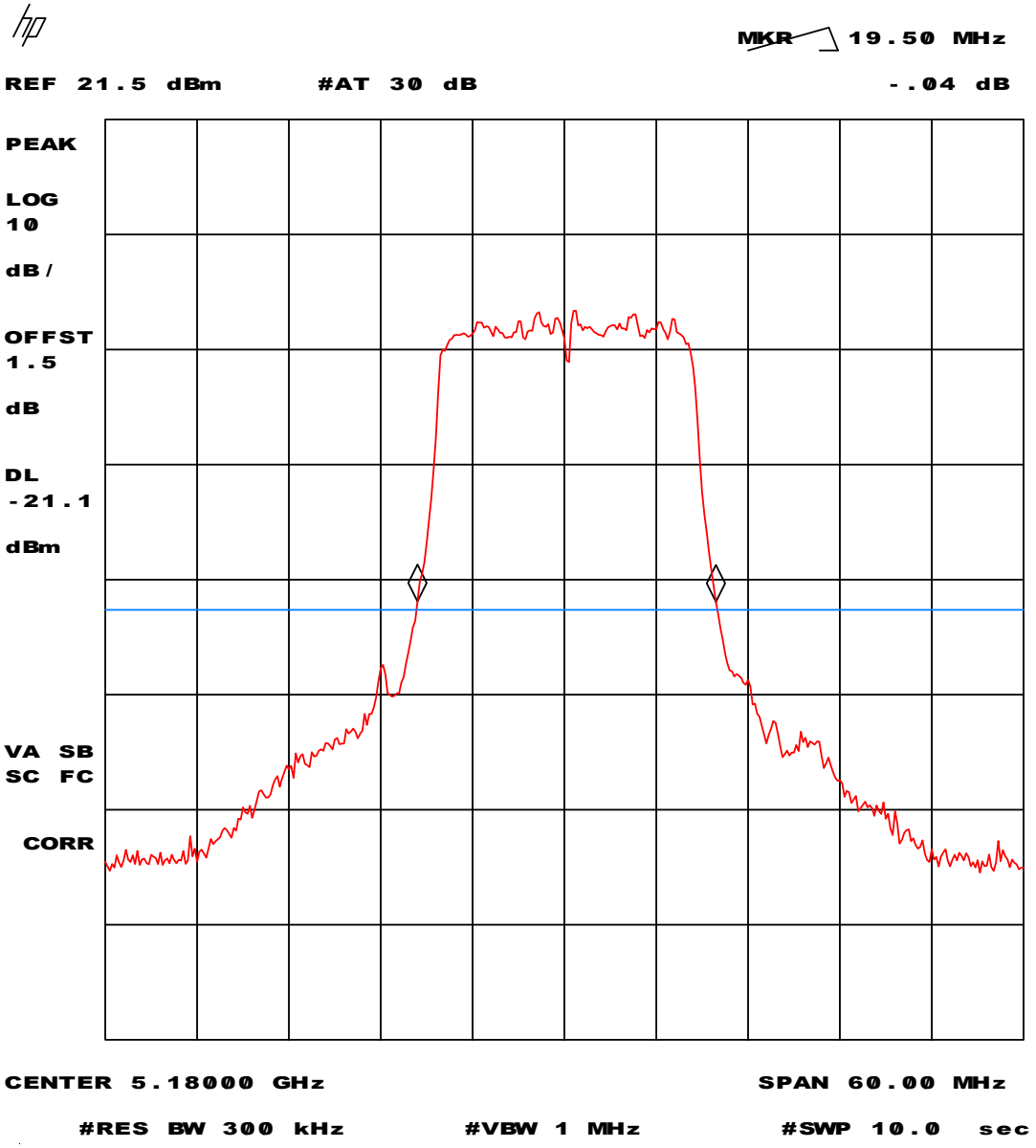
Plot 2 – Emission bandwidth (conducted, -26 dB).

Plot 2 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



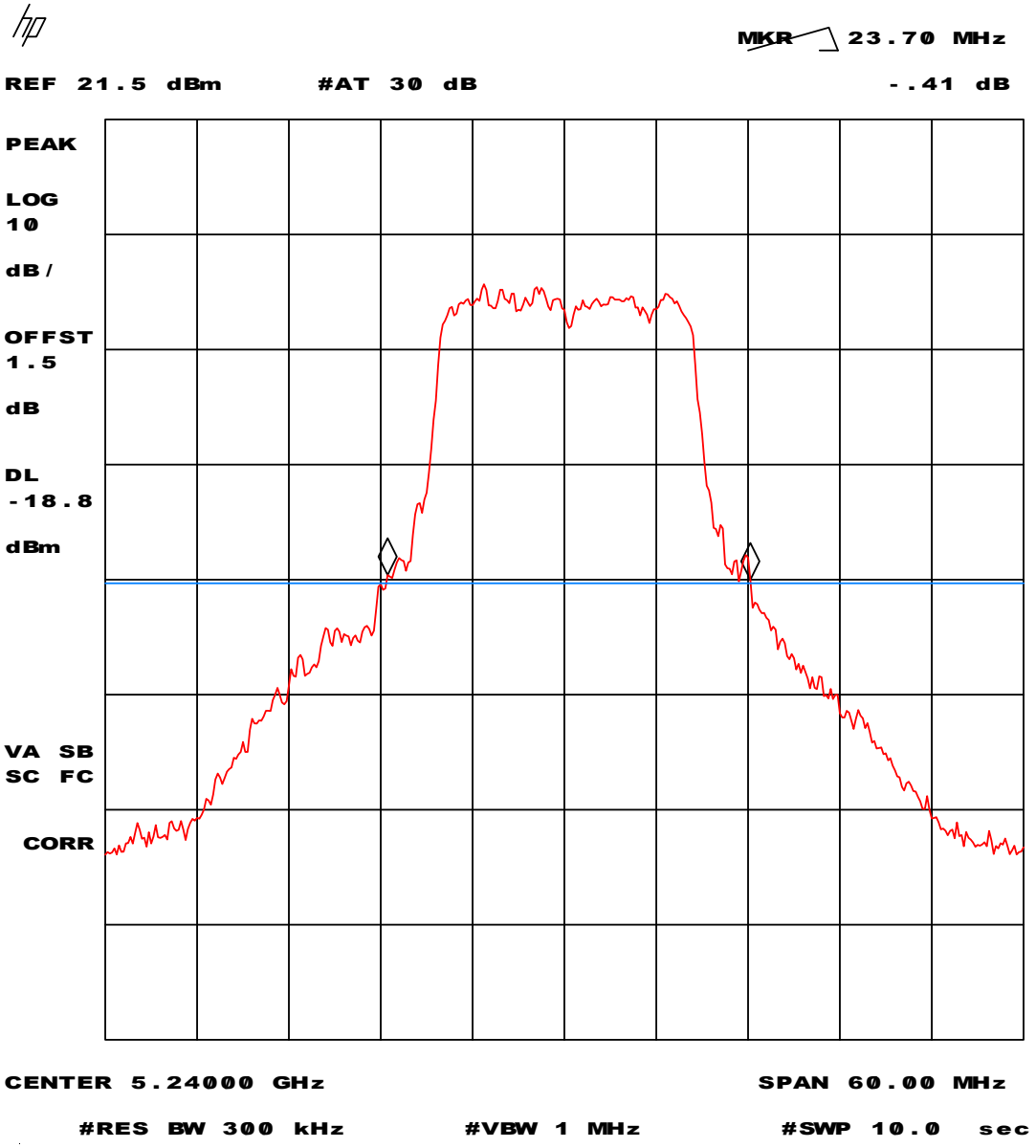
Plot 3 – Emission bandwidth (conducted, -26 dB).

Plot 3 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



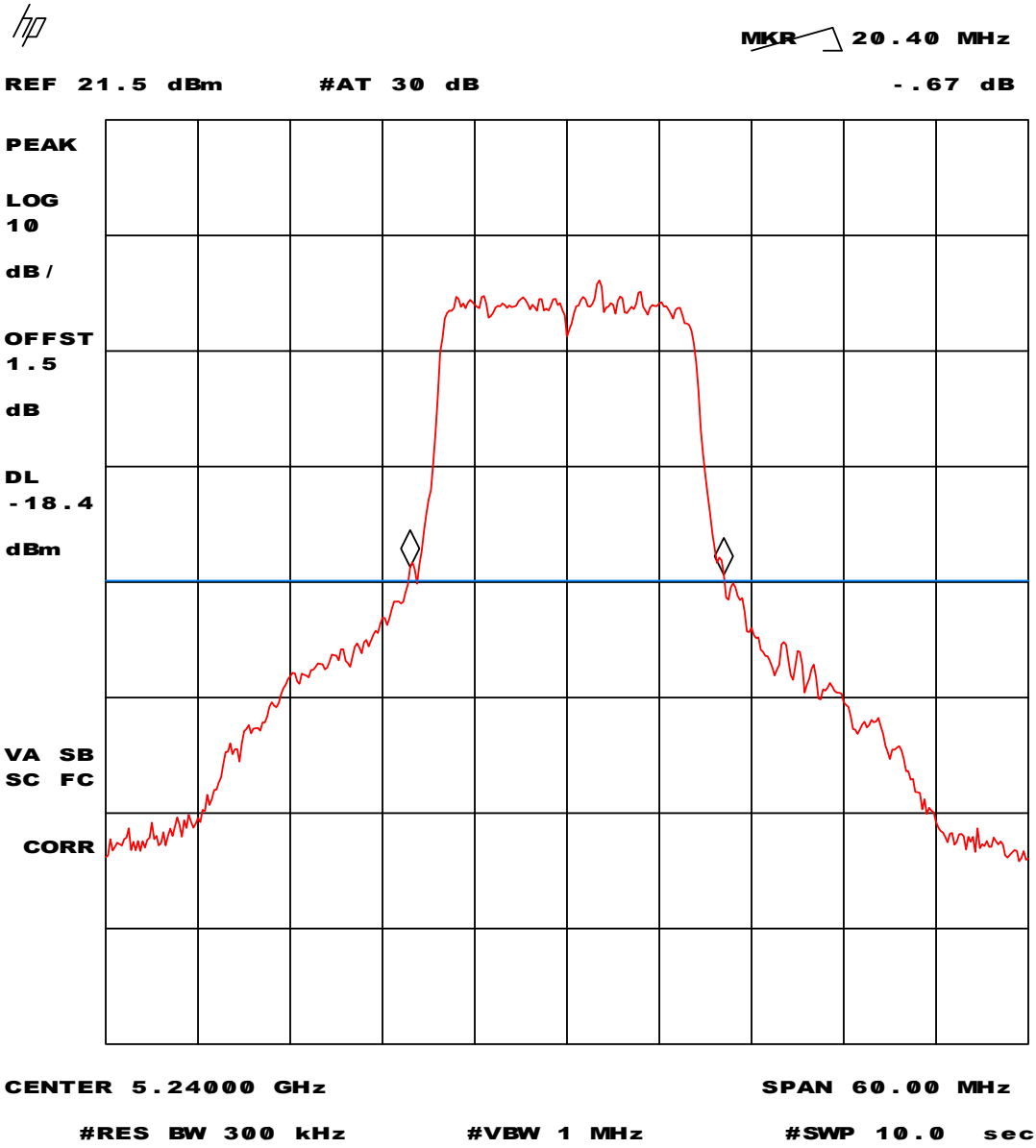
Plot 4 – Emission bandwidth (conducted, -26 dB).

Plot 4 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



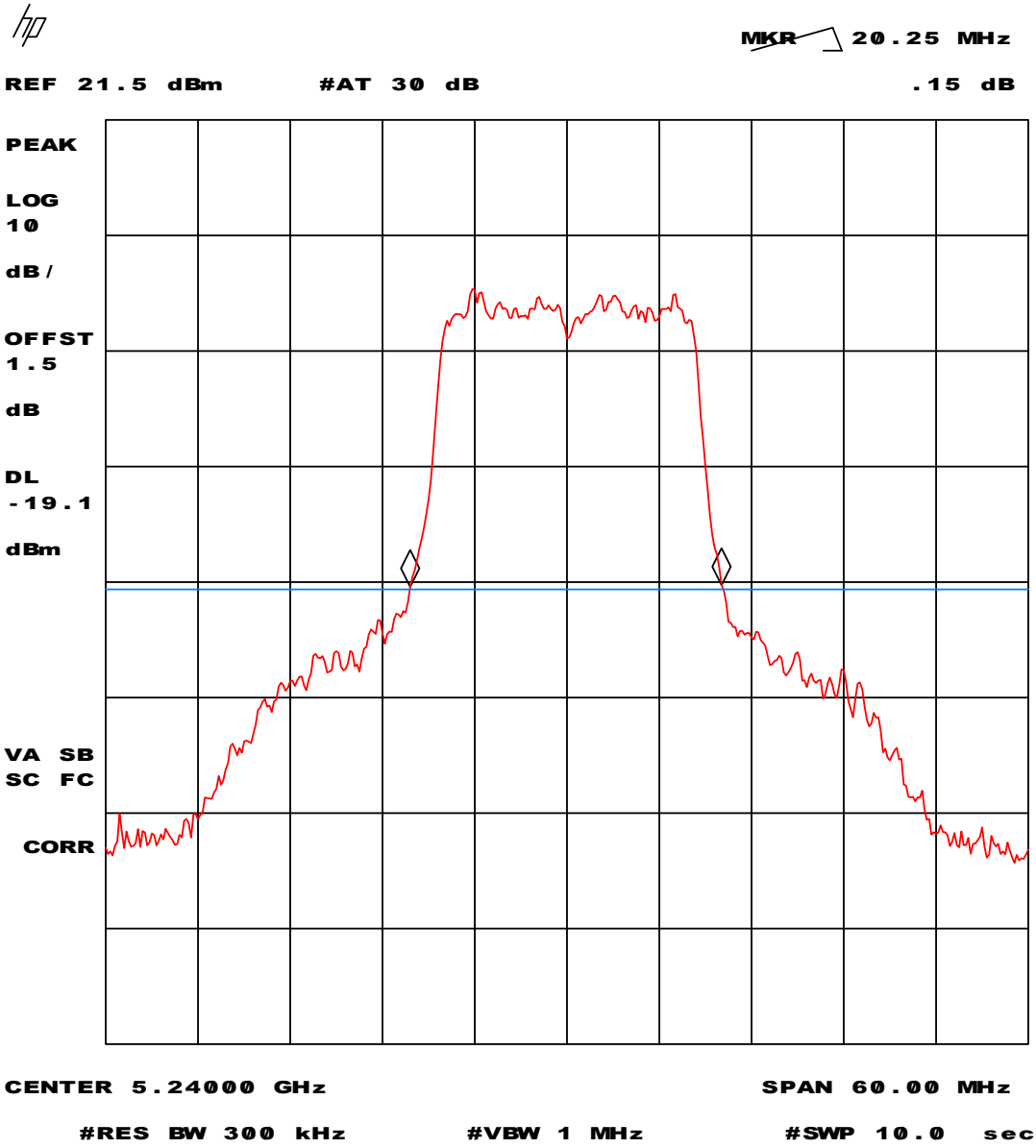
Plot 5 – Emission bandwidth (conducted, -26 dB).

Plot 5 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



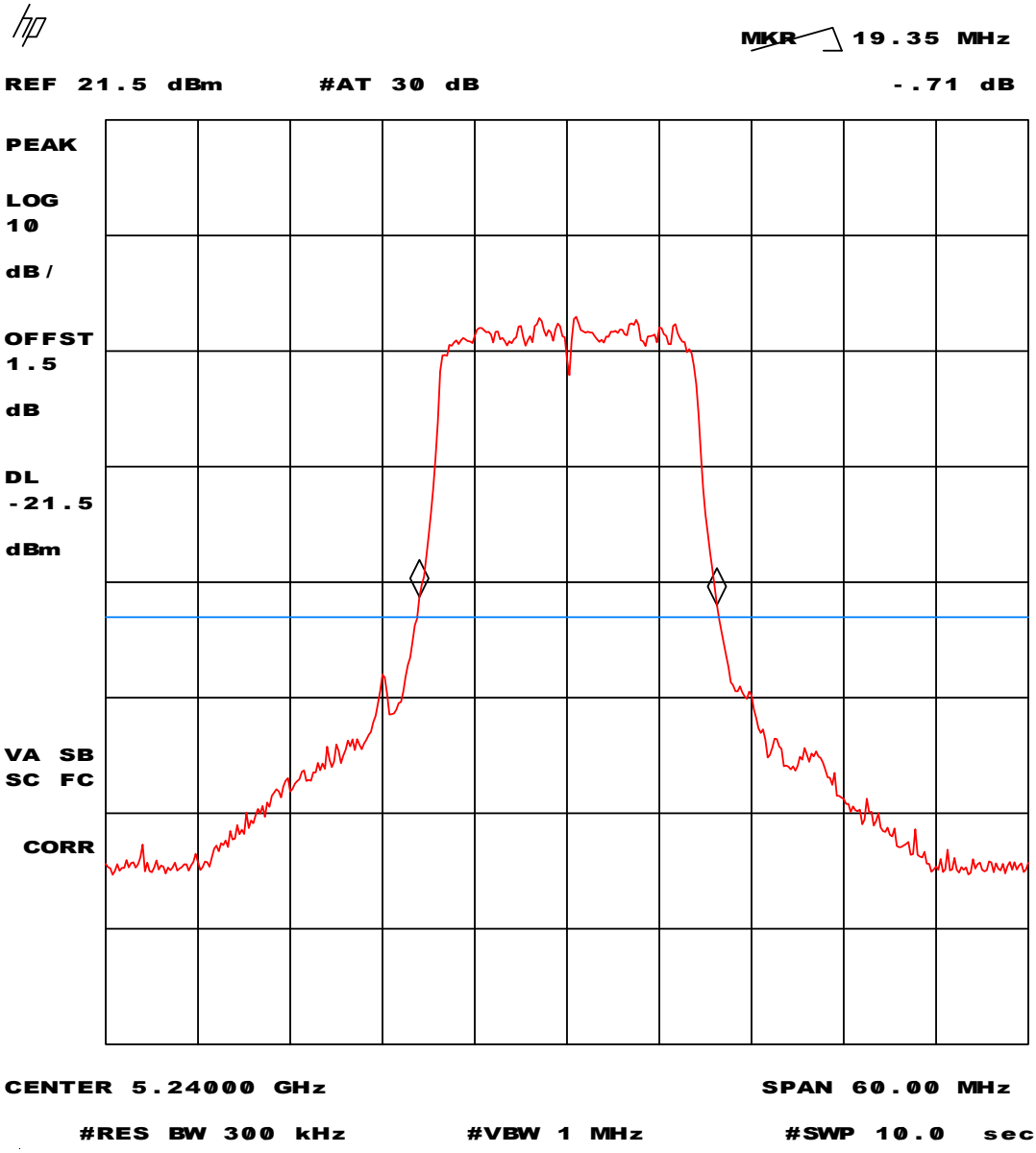
Plot 6 – Emission bandwidth (conducted, -26 dB).

Plot 6 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



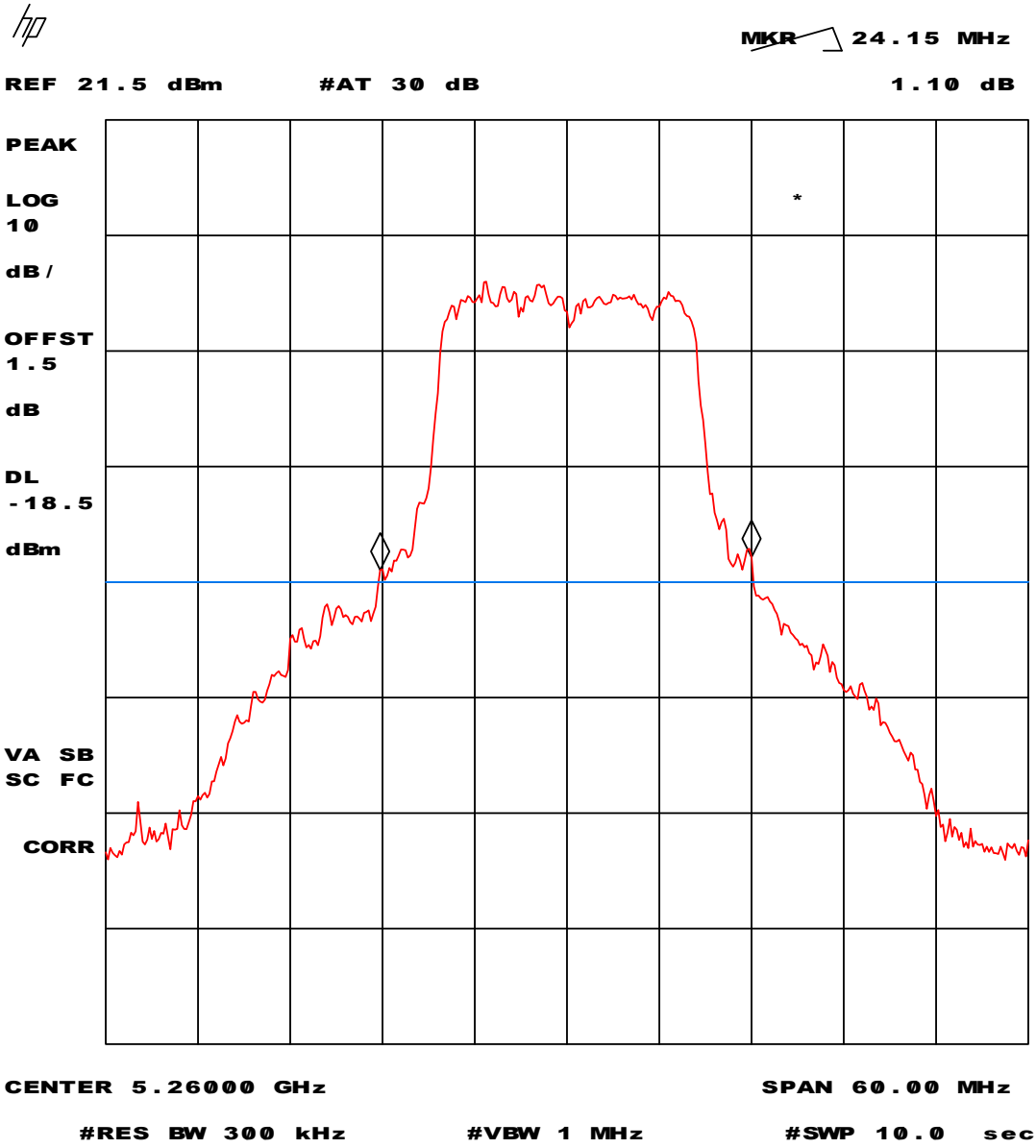
Plot 7 – Emission bandwidth (conducted, -26 dB).

Plot 7 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



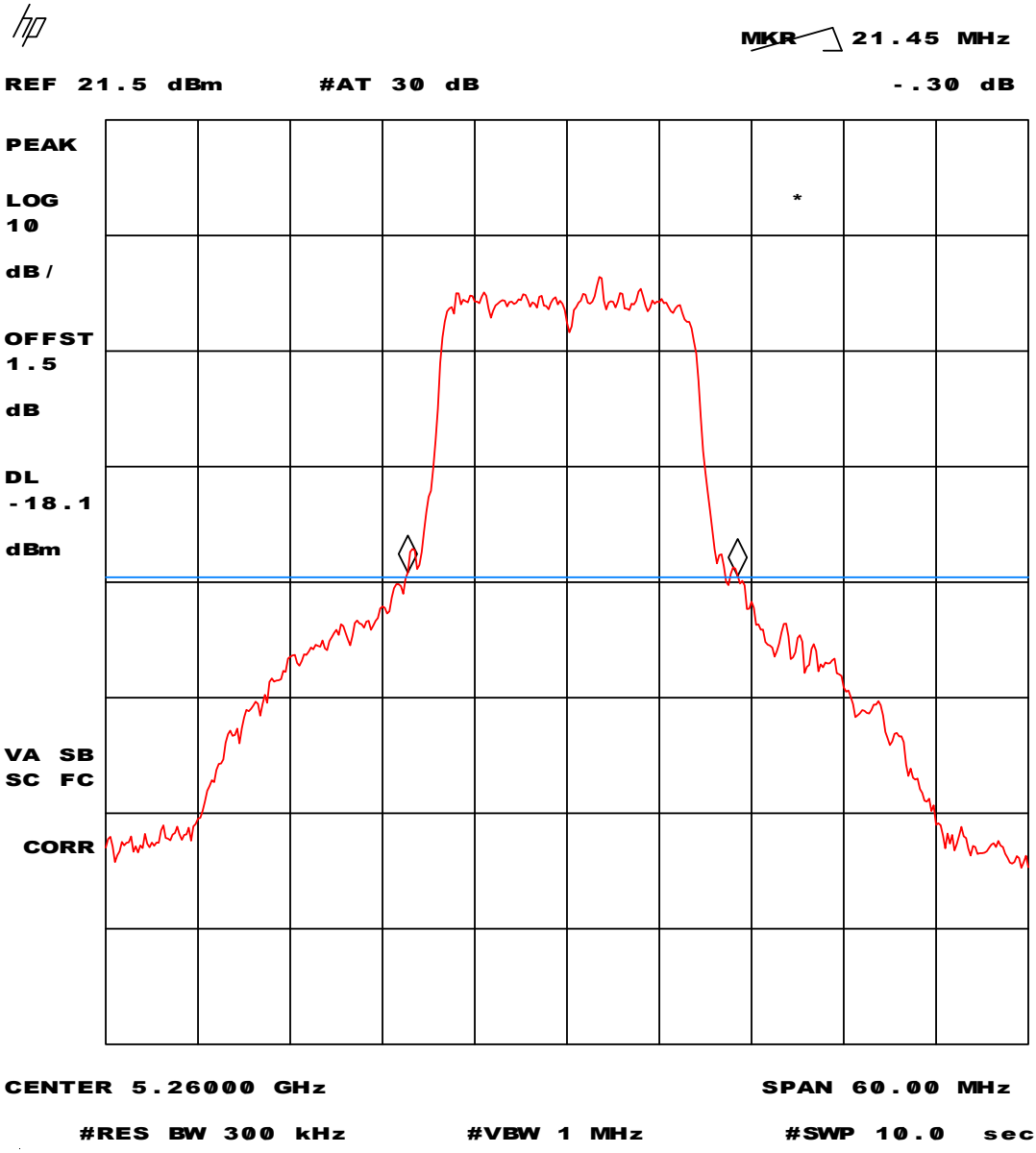
Plot 8 – Emission bandwidth (conducted, -26 dB).

Plot 8 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



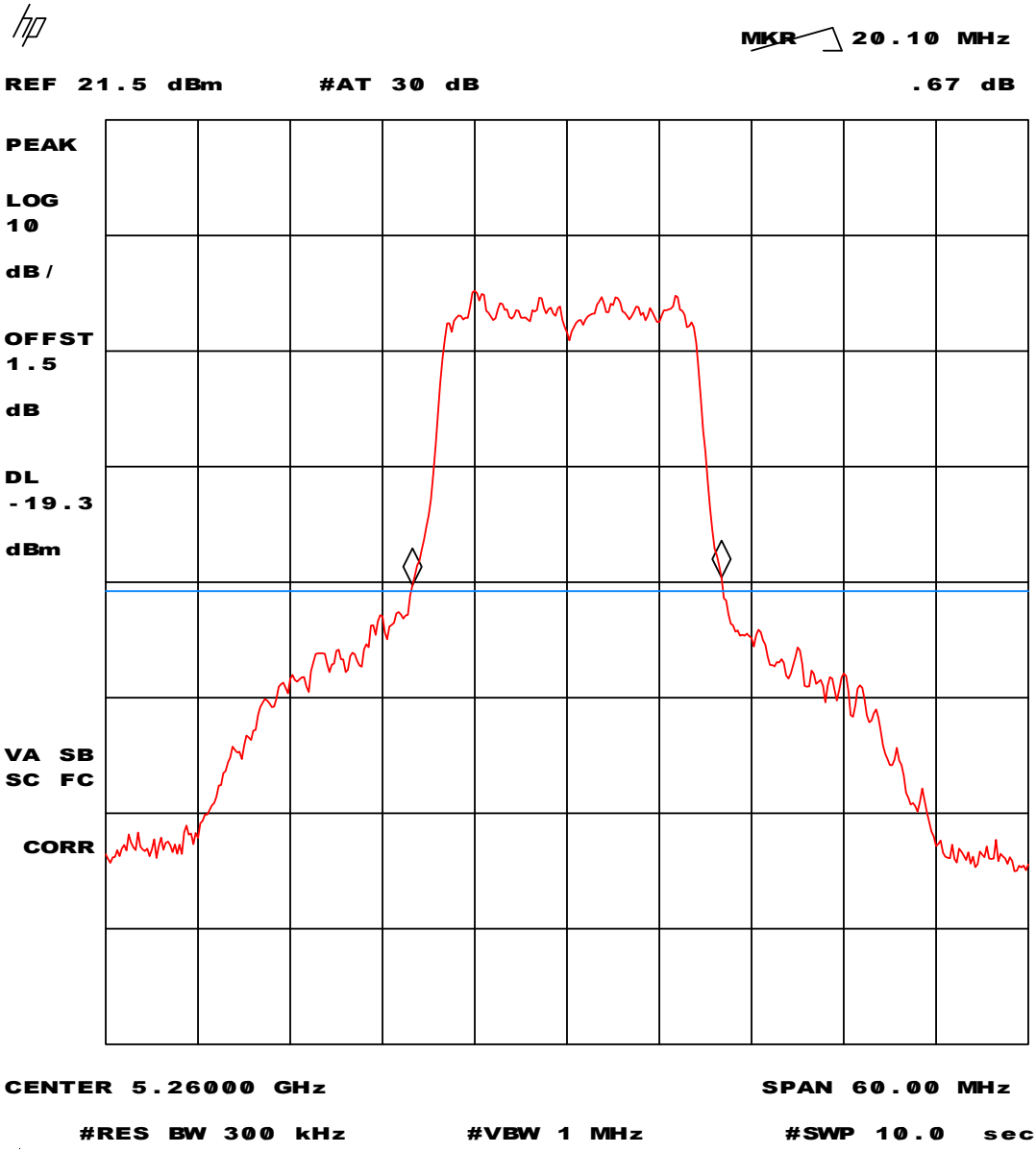
Plot 9 – Emission bandwidth (conducted, -26 dB).

Plot 9 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



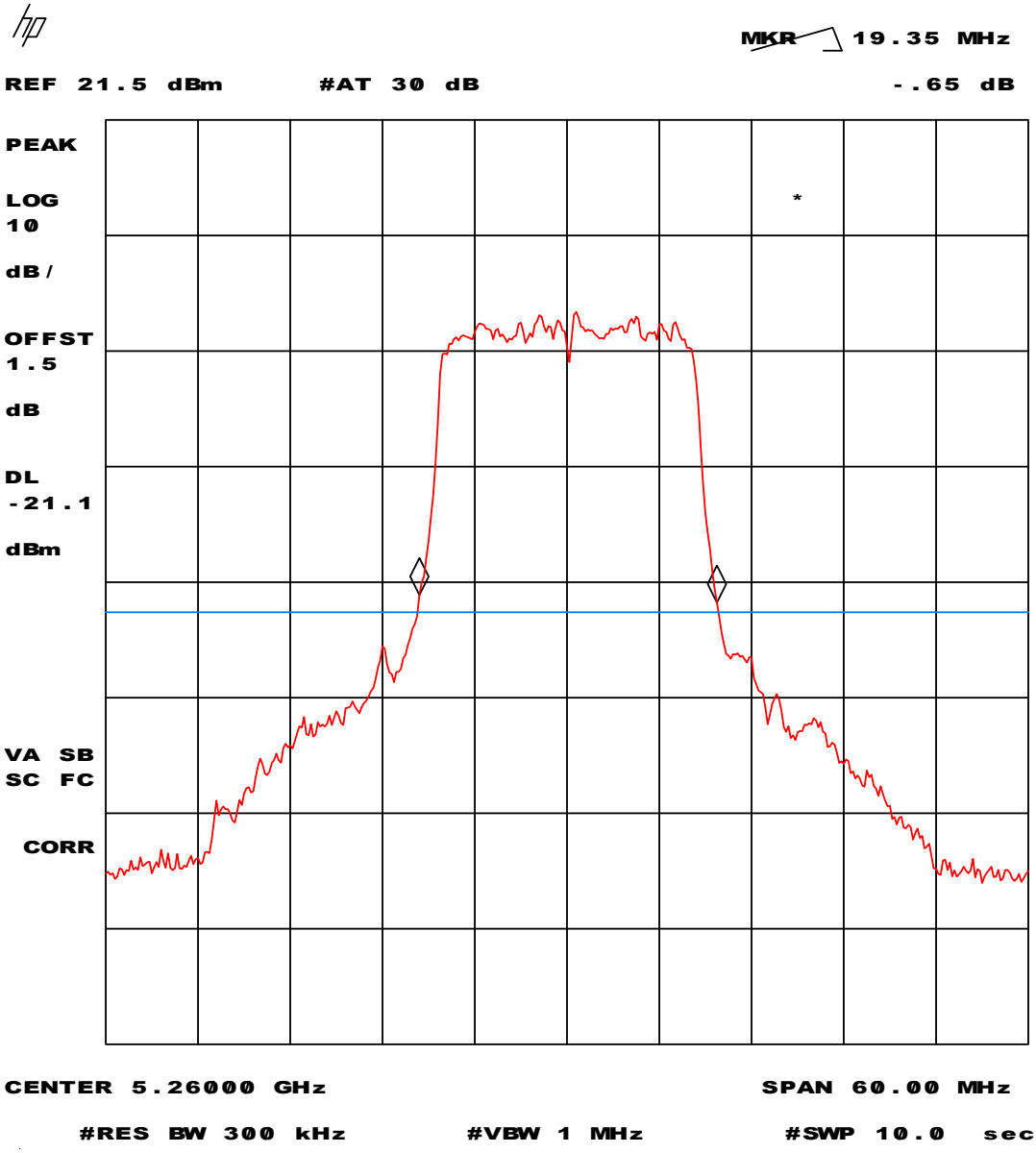
Plot 10 – Emission bandwidth (conducted, -26 dB).

Plot 10 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



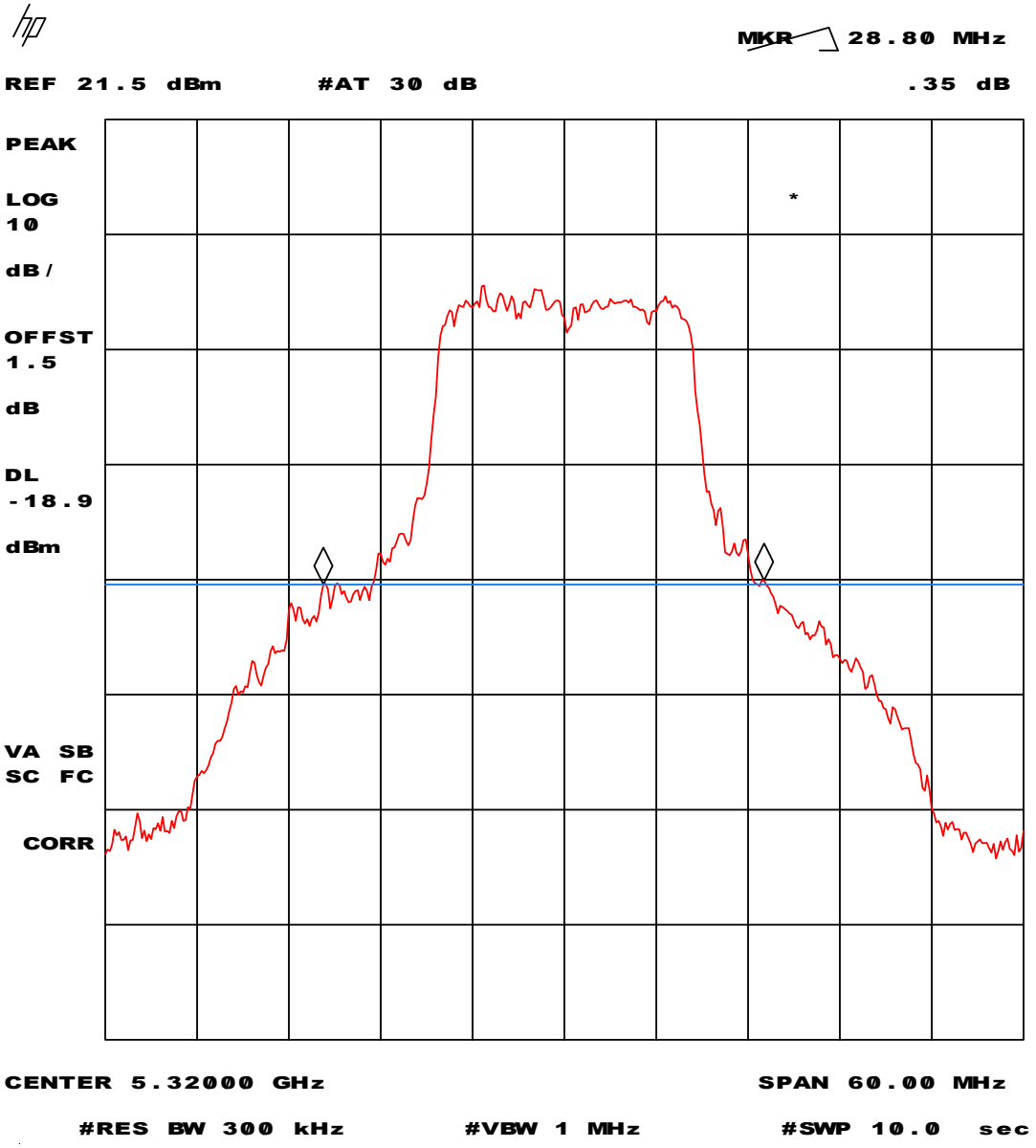
Plot 11 – Emission bandwidth (conducted, -26 dB).

Plot 11 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



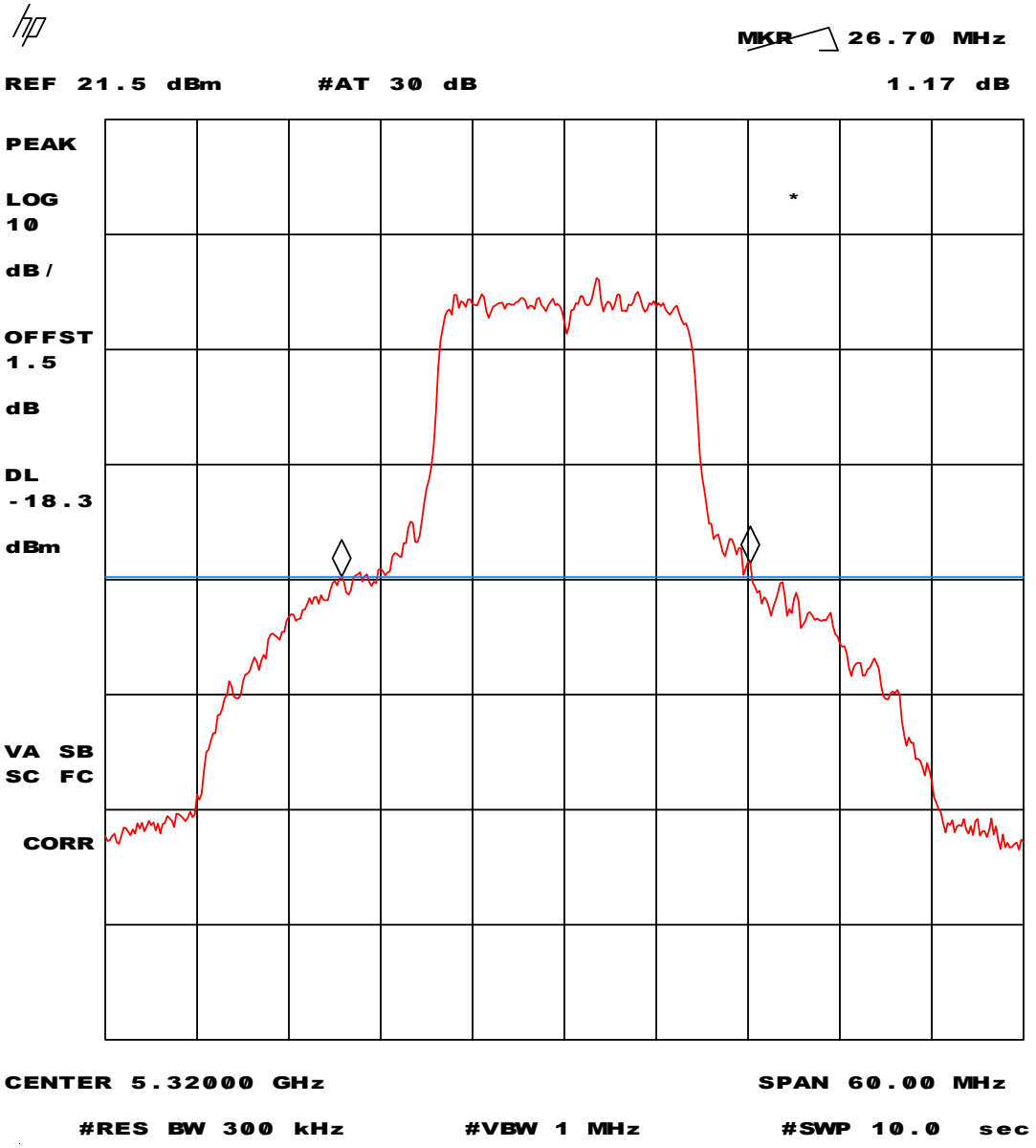
Plot 12 – Emission bandwidth (conducted, -26 dB).

Plot 12 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



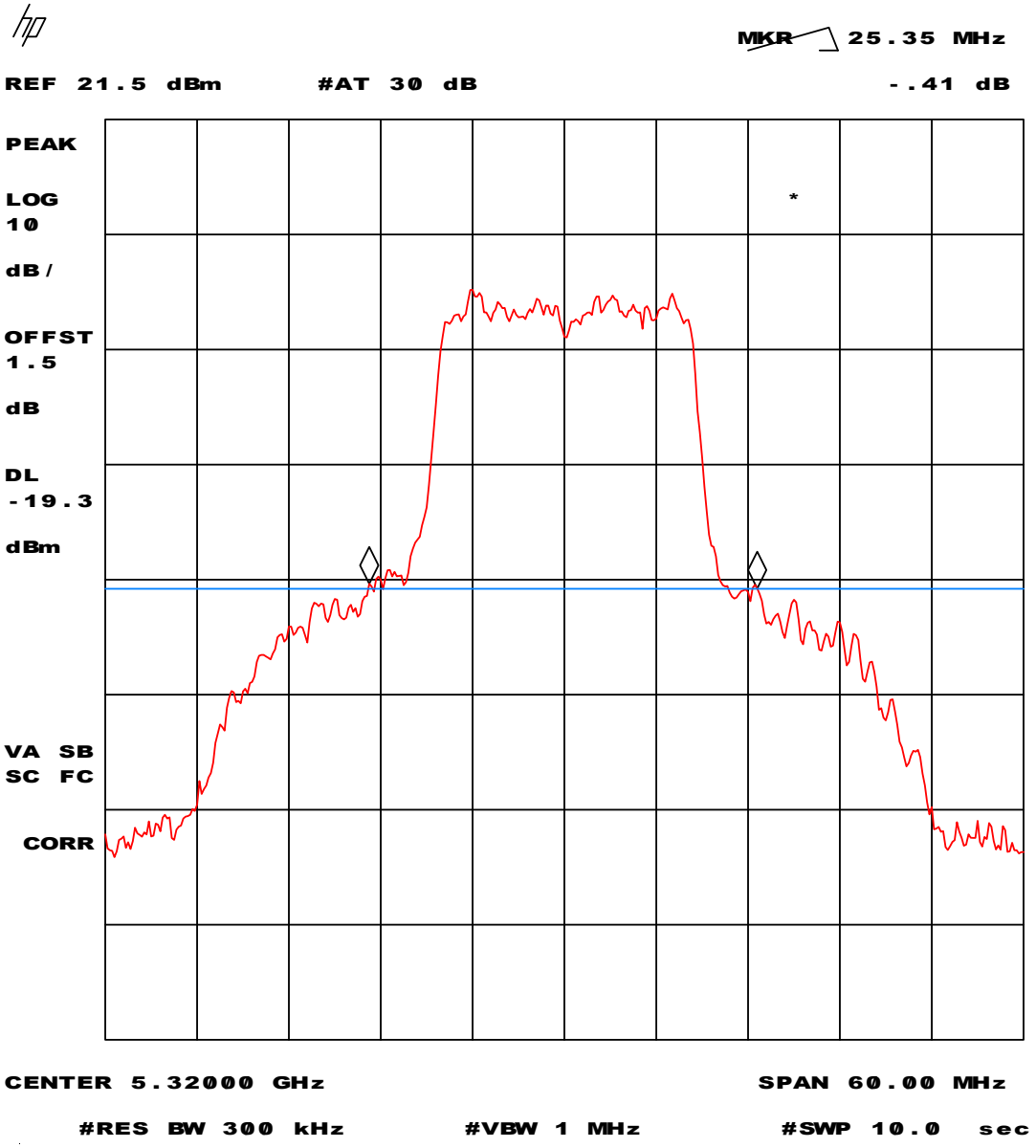
Plot 13 – Emission bandwidth (conducted, -26 dB).

Plot 13 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



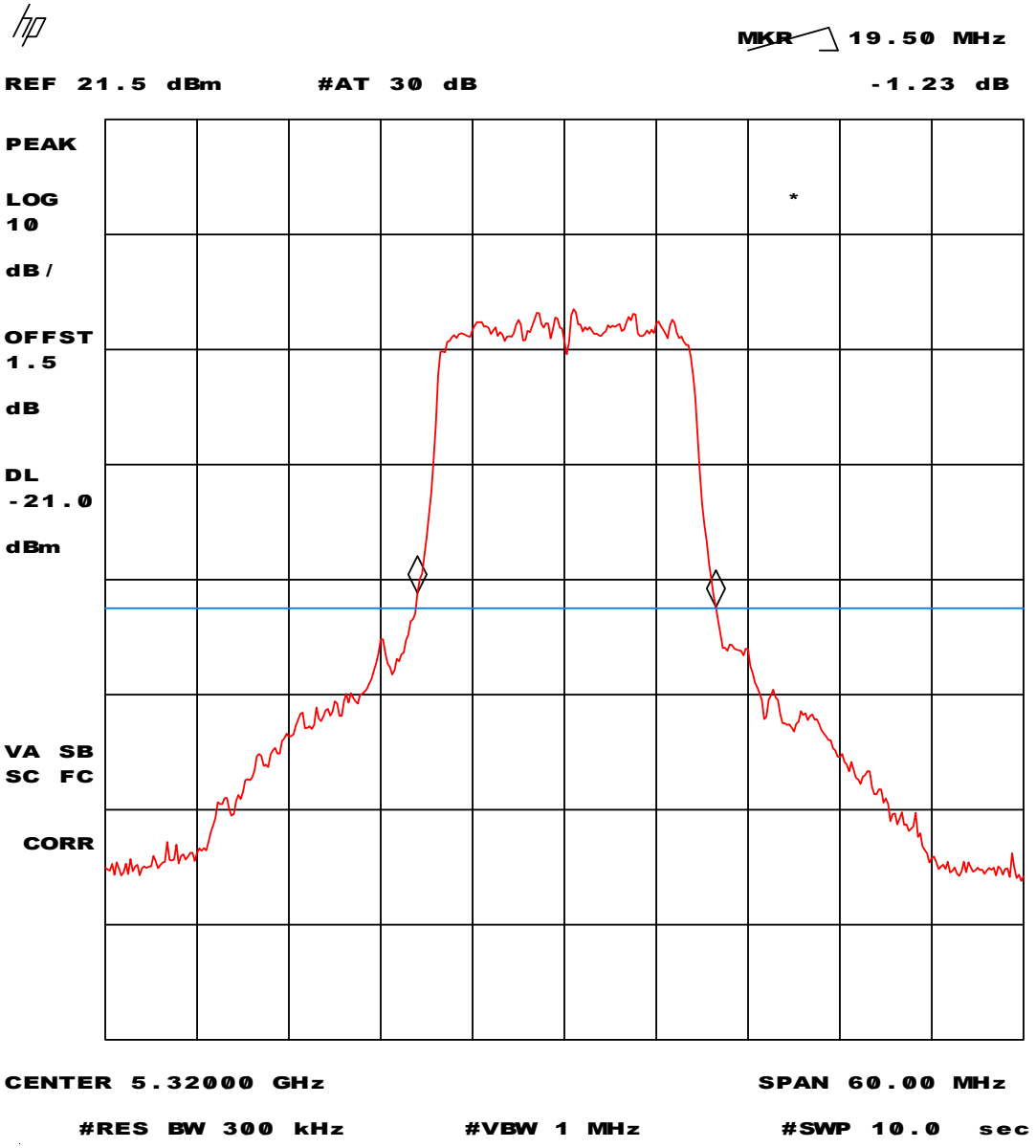
Plot 14 – Emission bandwidth (conducted, -26 dB).

Plot 14 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



Plot 15 – Emission bandwidth (conducted, -26 dB).

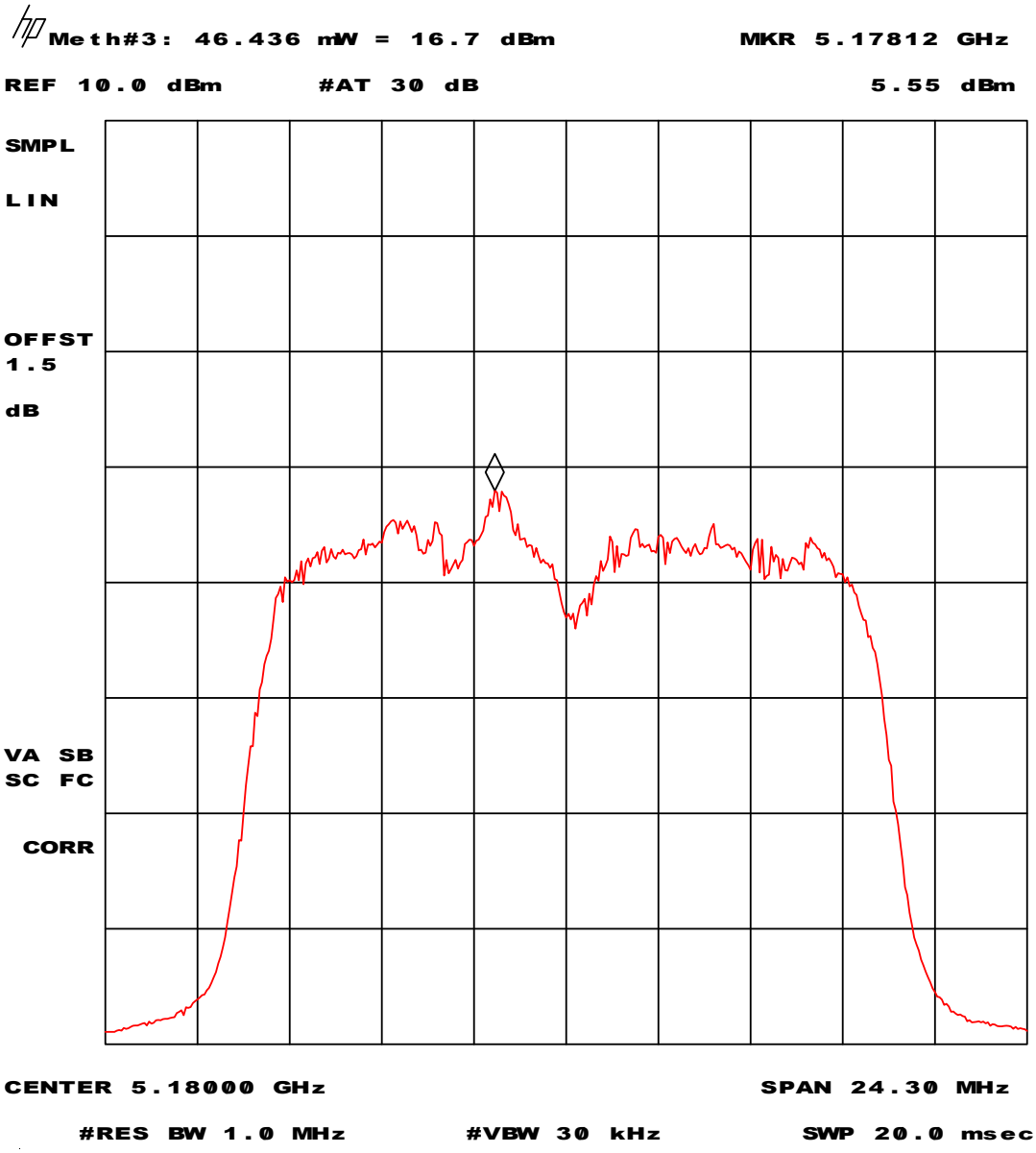
Plot 15 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



Plot 16 – Emission bandwidth (conducted, -26 dB).

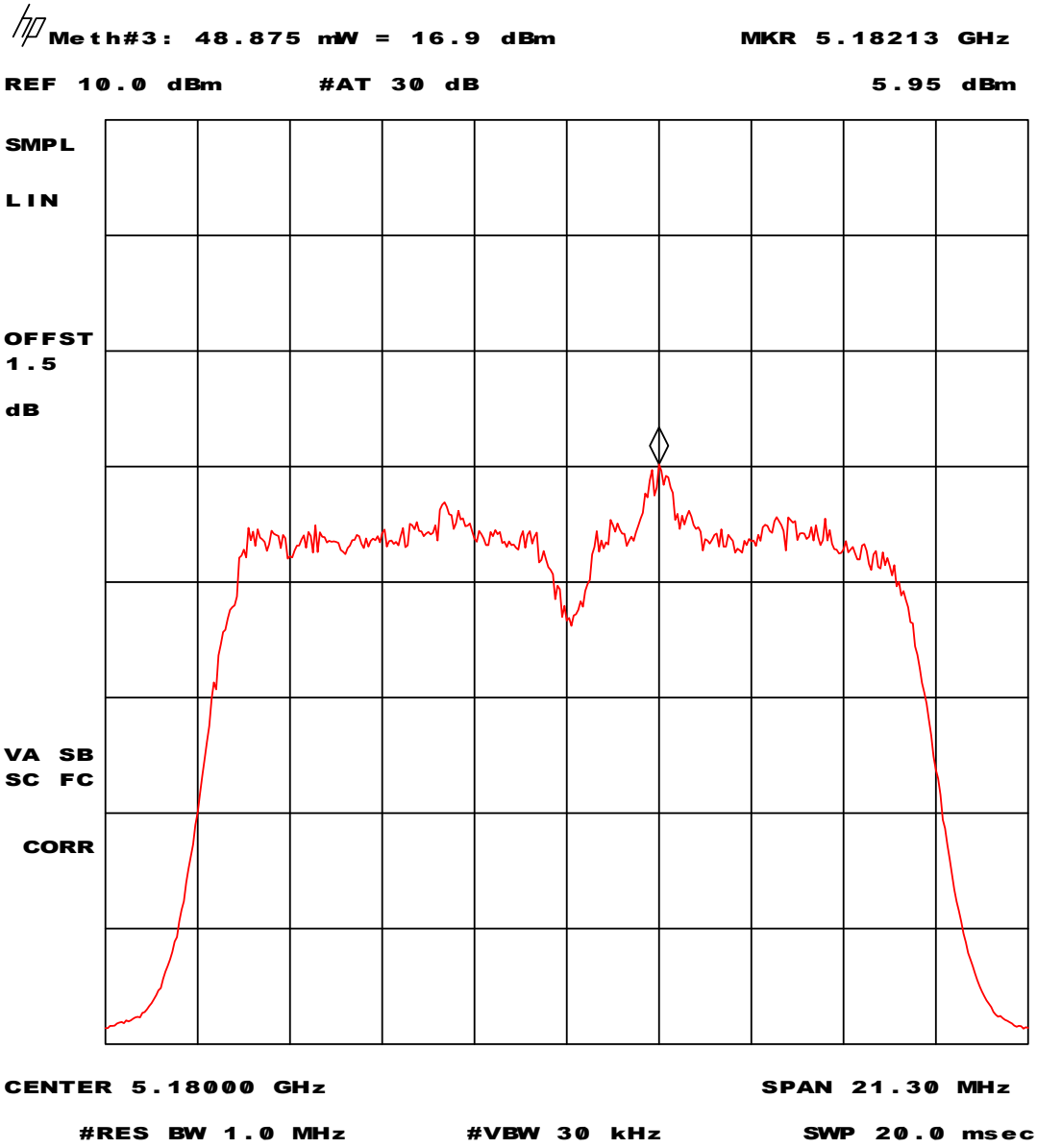
Plot 16 depicts the emission bandwidth (conducted, -26 dB) with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.

5.2 Peak conducted transmit output power.



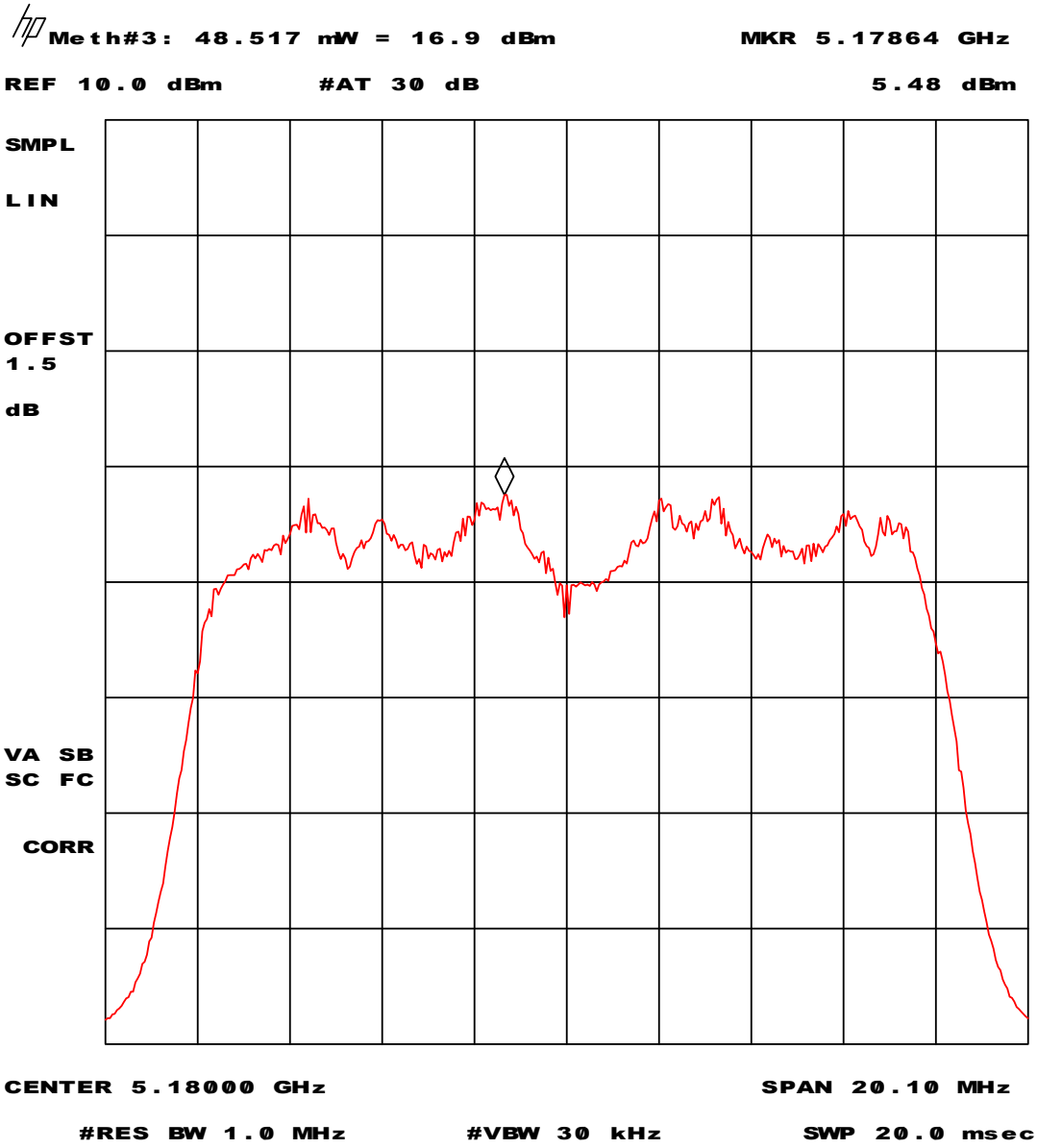
Plot 17 – Peak conducted transmit output power.

Plot 17 depicts the peak conducted transmit output power with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



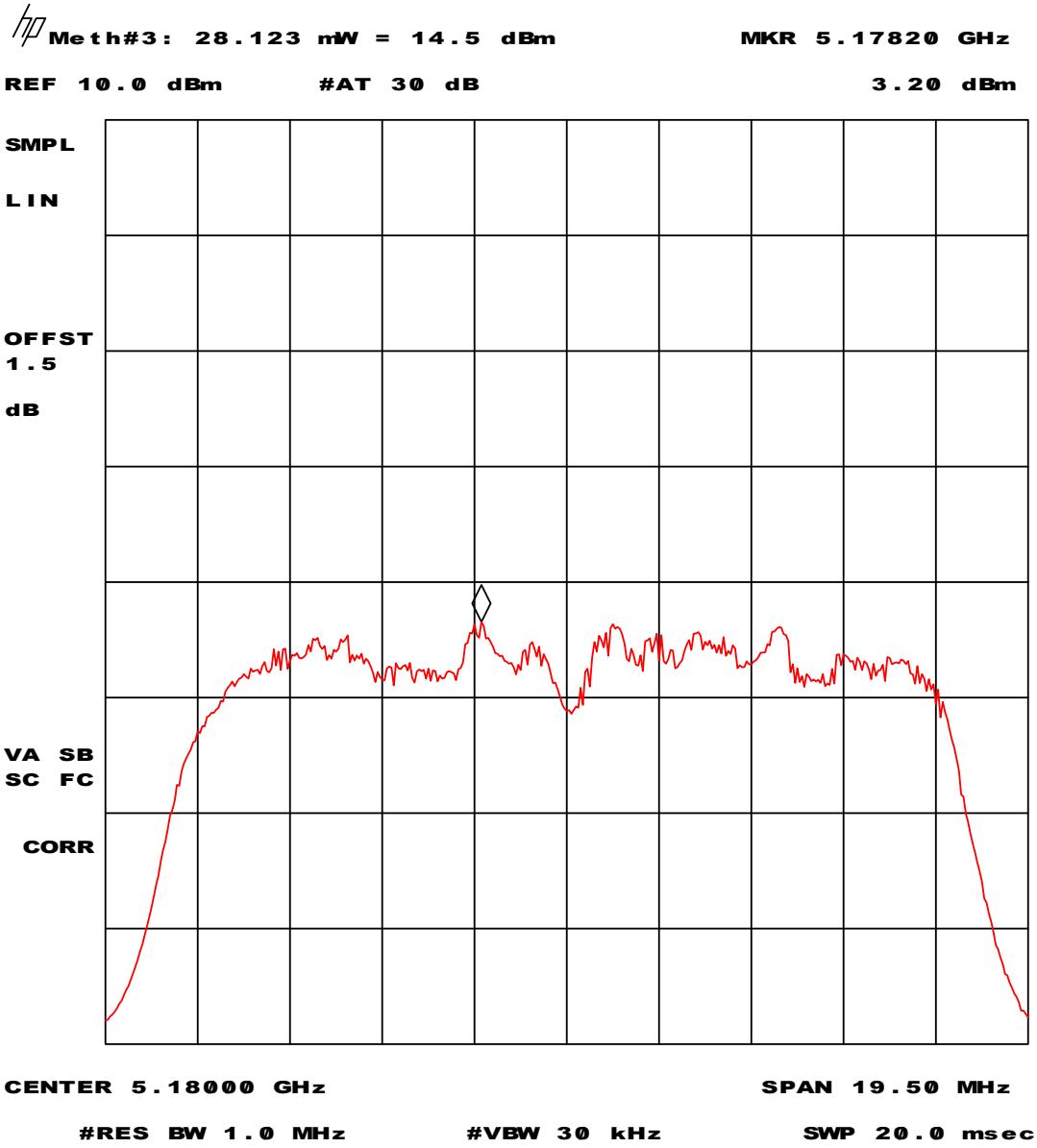
Plot 18 – Peak conducted transmit output power.

Plot 18 depicts the peak conducted transmit output power with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



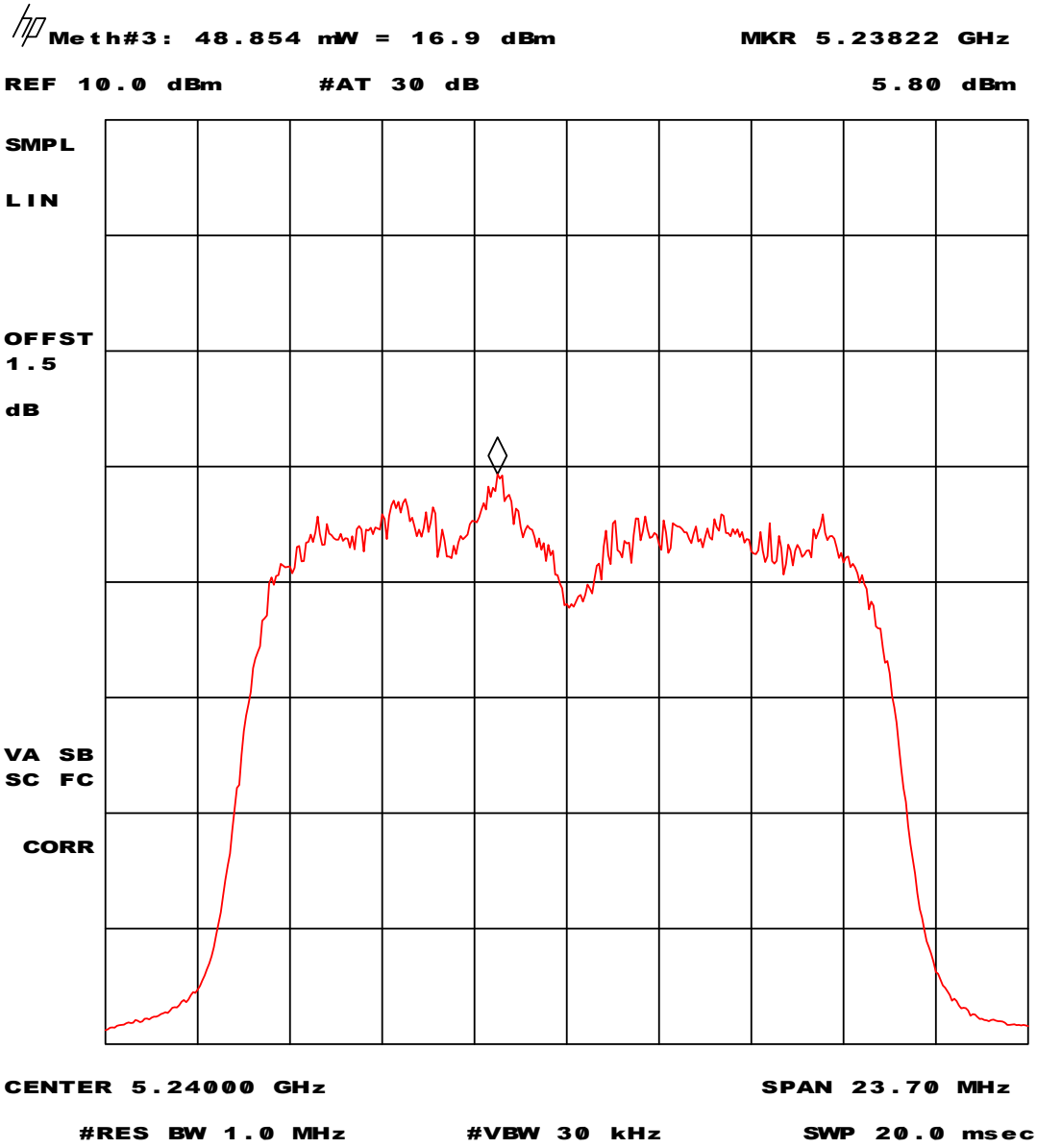
Plot 19 – Peak conducted transmit output power.

Plot 19 depicts the peak conducted transmit output power with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



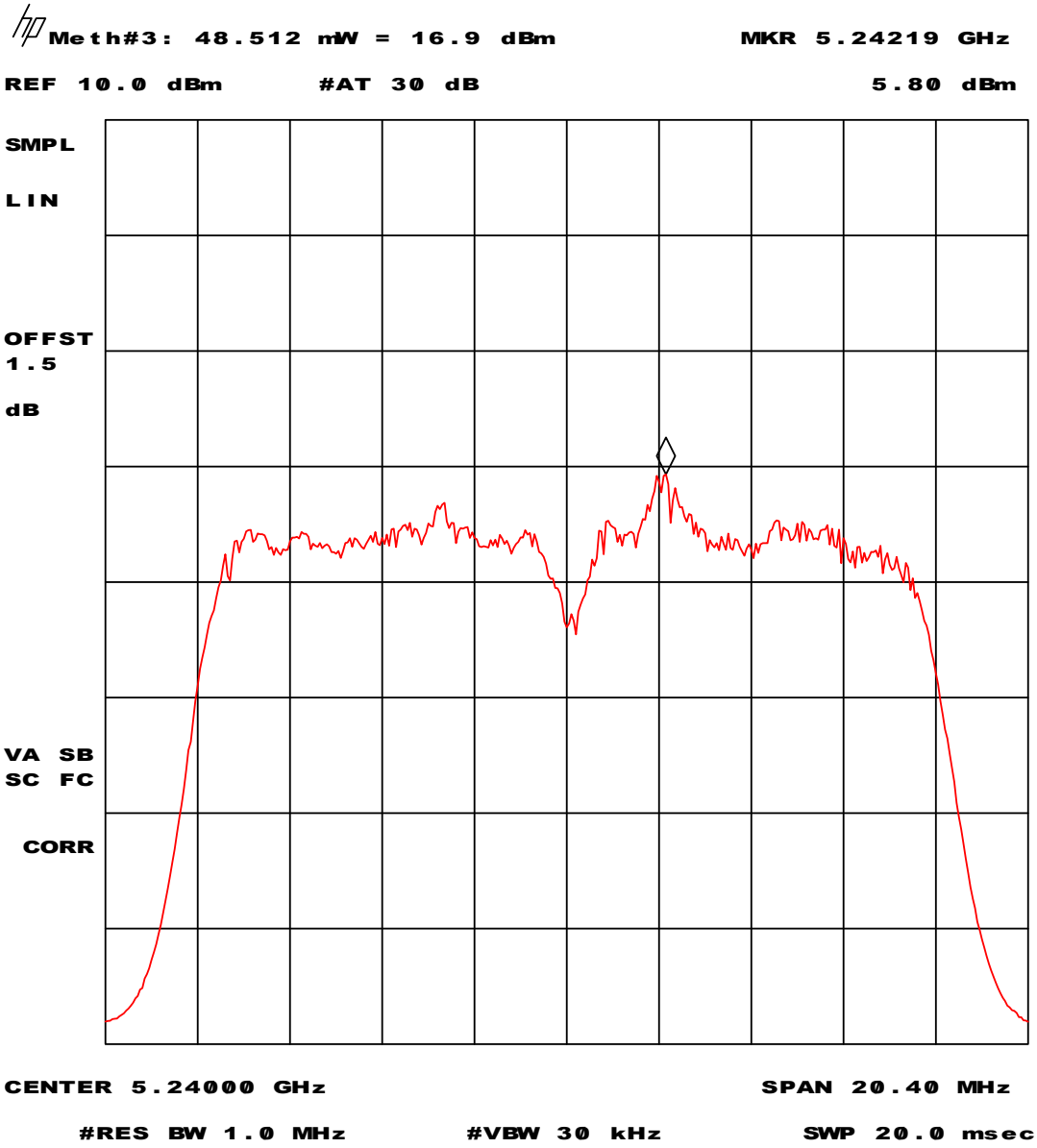
Plot 20 – Peak conducted transmit output power.

Plot 20 depicts the peak conducted transmit output power with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



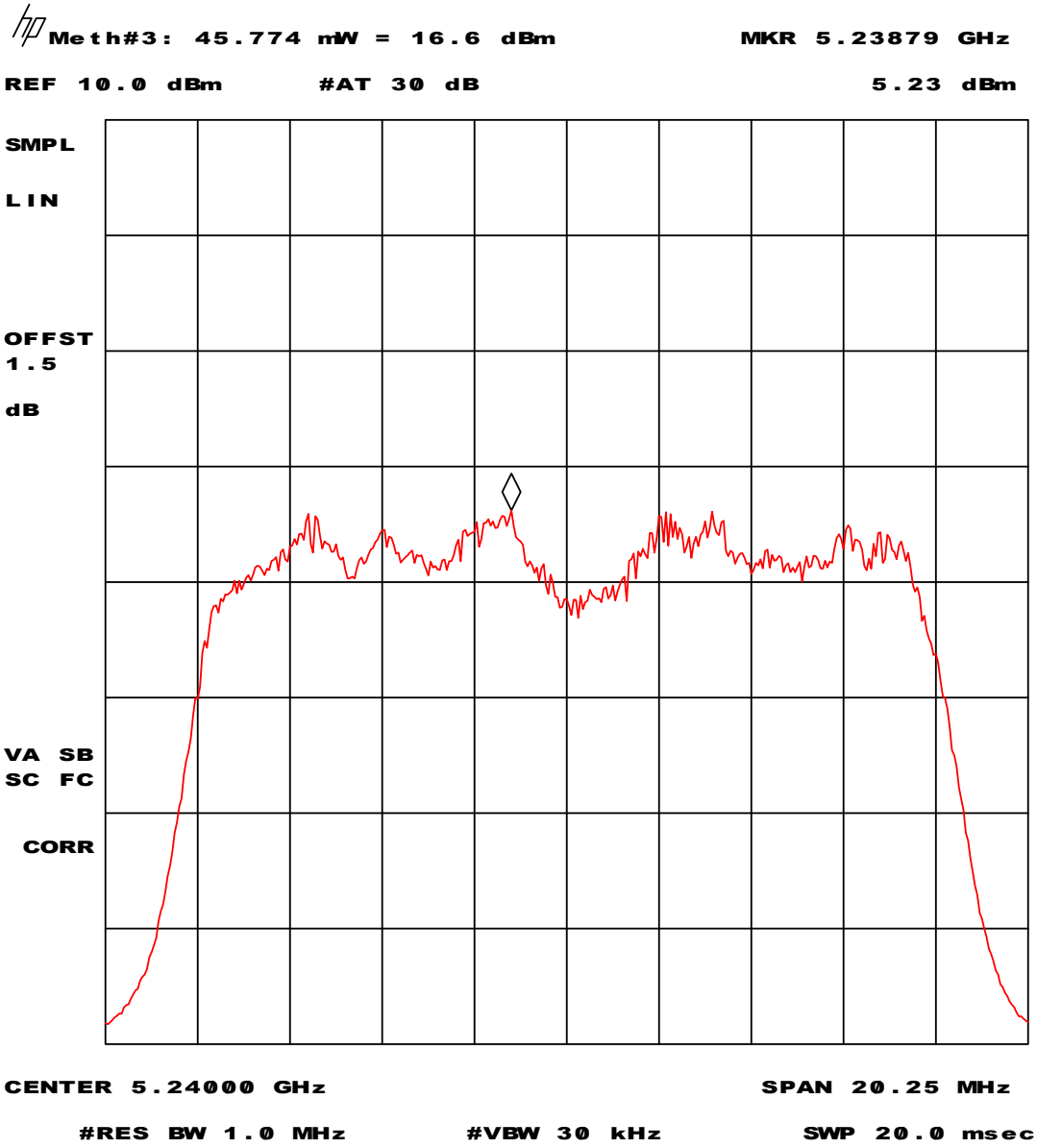
Plot 21 – Peak conducted transmit output power.

Plot 21 depicts the peak conducted transmit output power with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



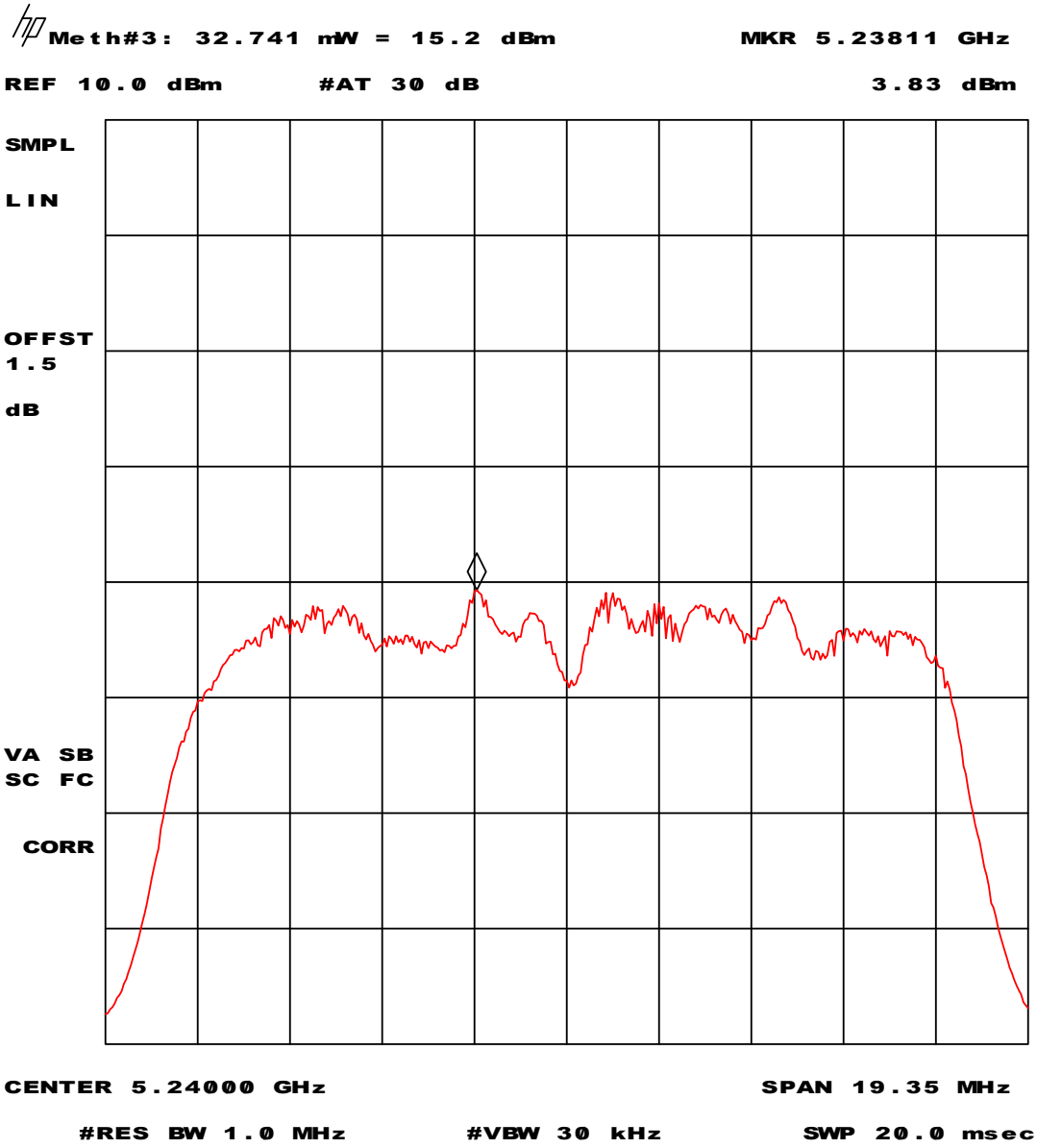
Plot 22 – Peak conducted transmit output power.

Plot 22 depicts the peak conducted transmit output power with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



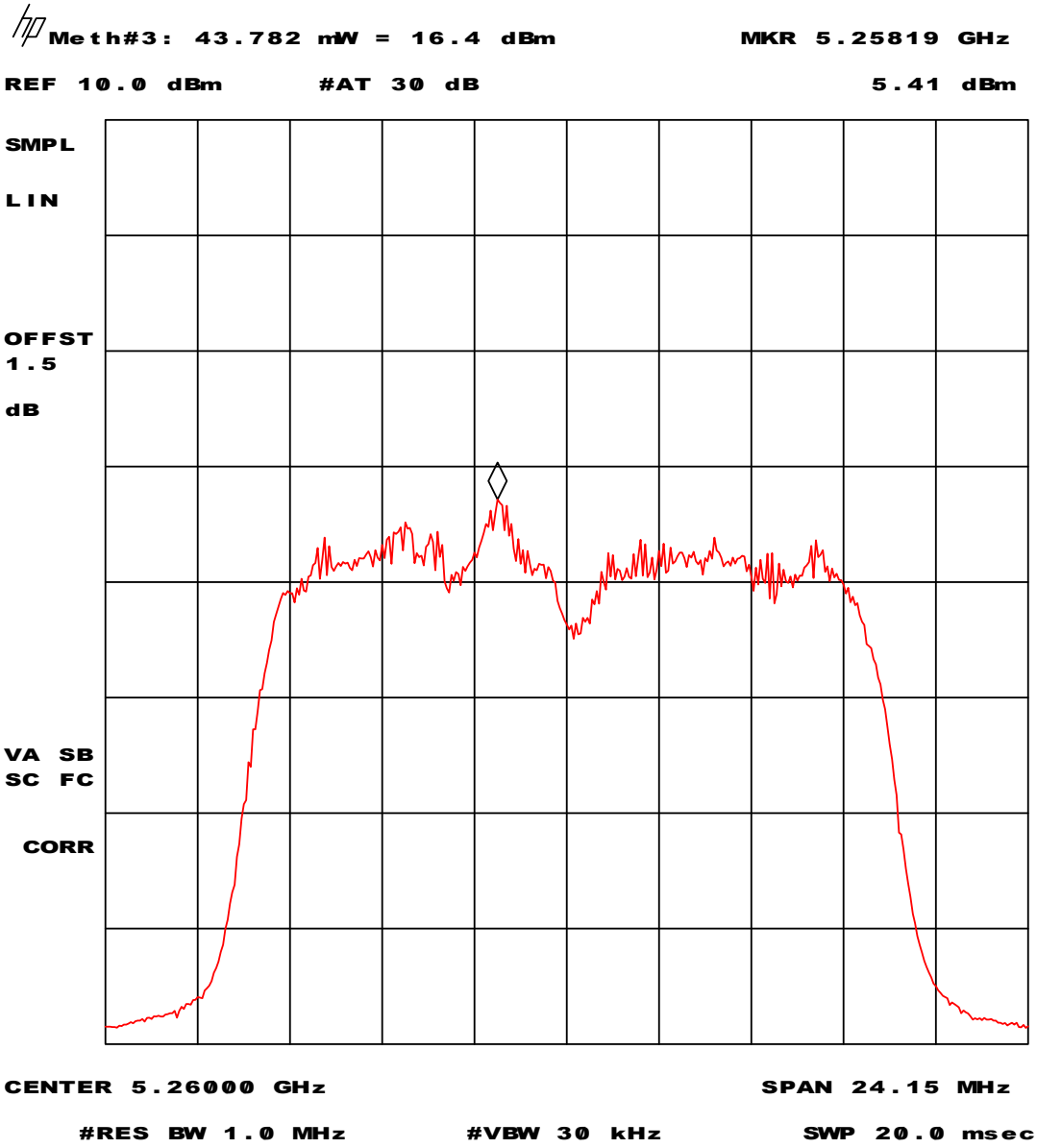
Plot 23 – Peak conducted transmit output power.

Plot 23 depicts the peak conducted transmit output power with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



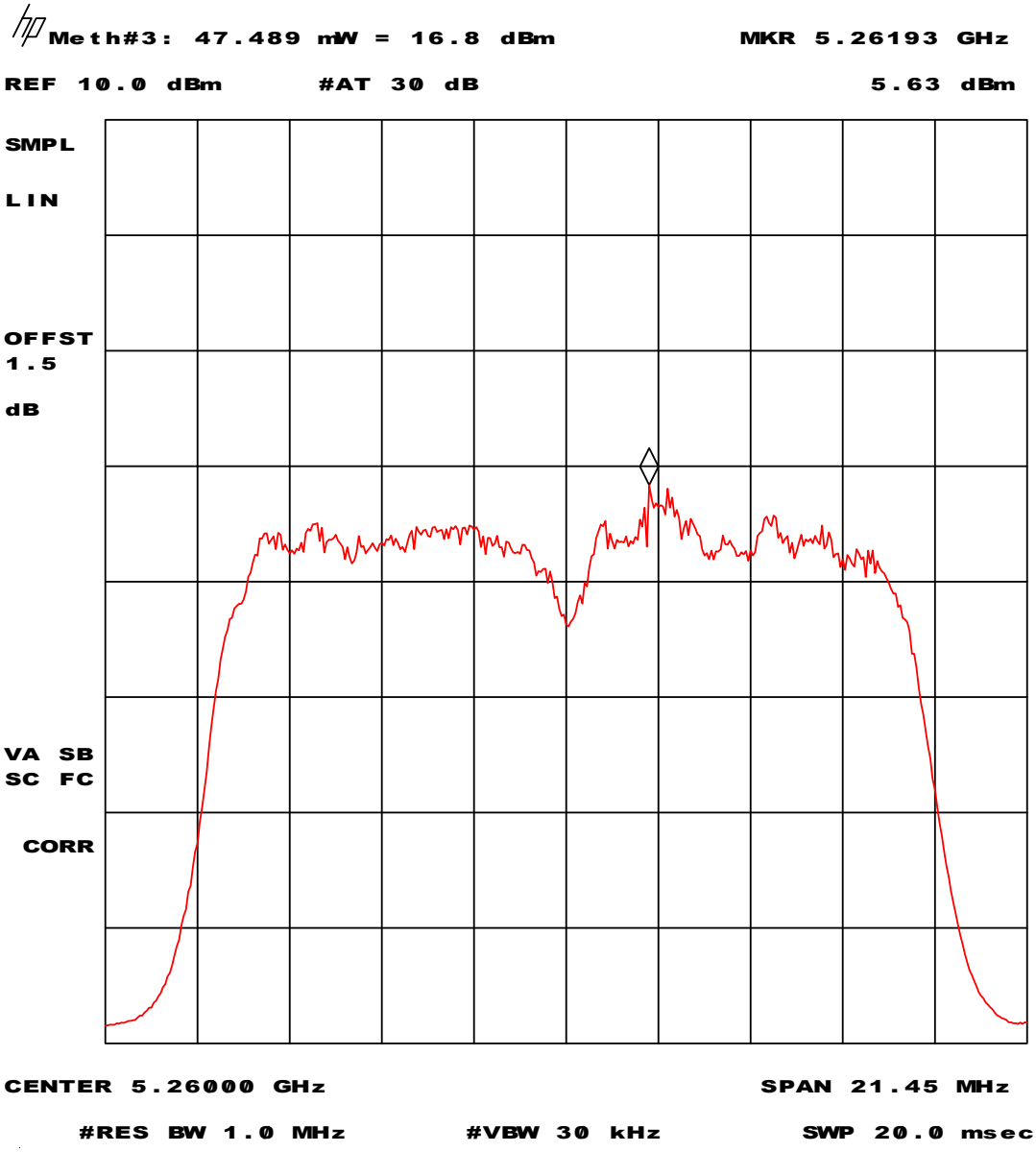
Plot 24 – Peak conducted transmit output power.

Plot 24 depicts the peak conducted transmit output power with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



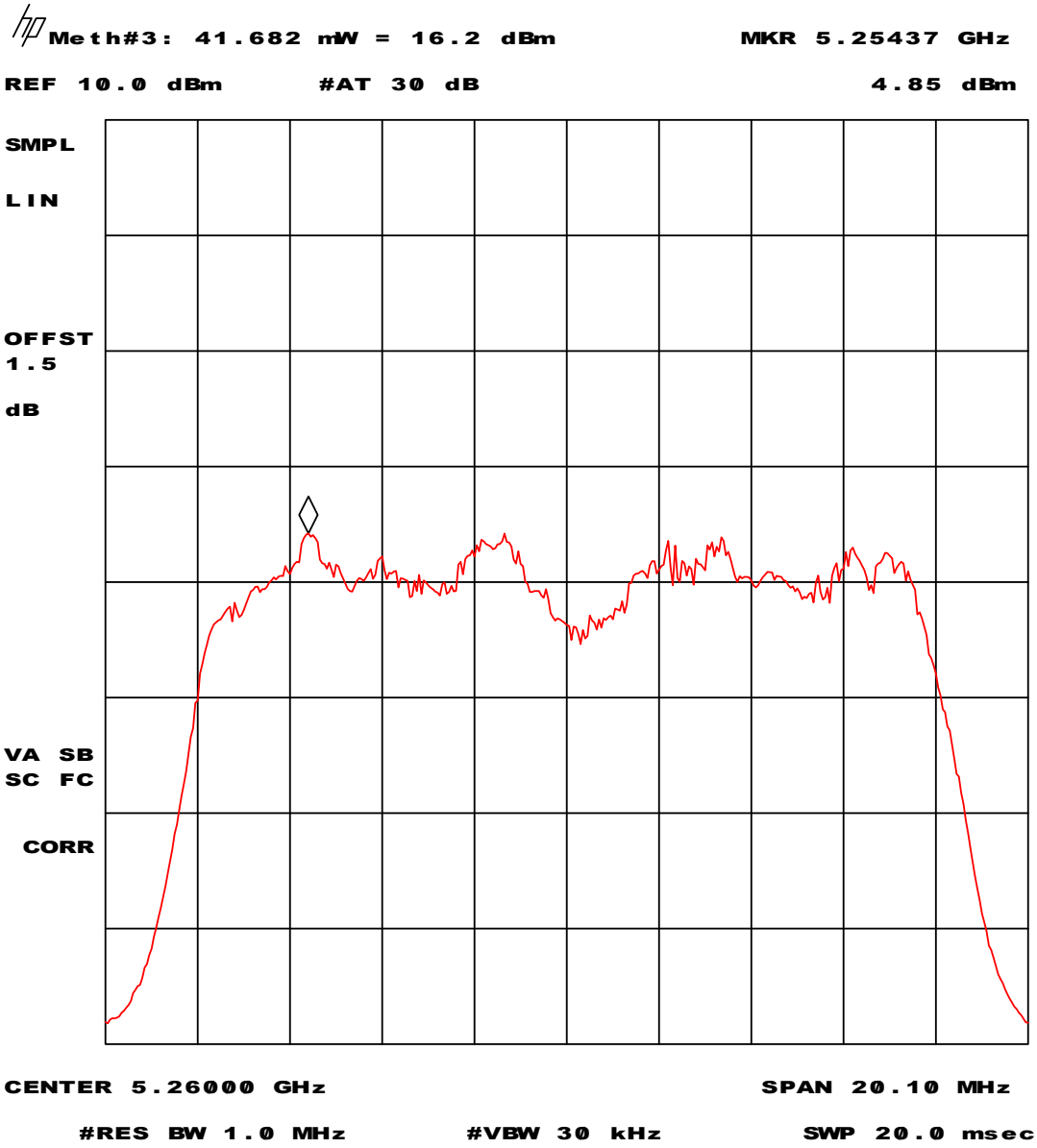
Plot 25 – Peak conducted transmit output power.

Plot 25 depicts the peak conducted transmit output power with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



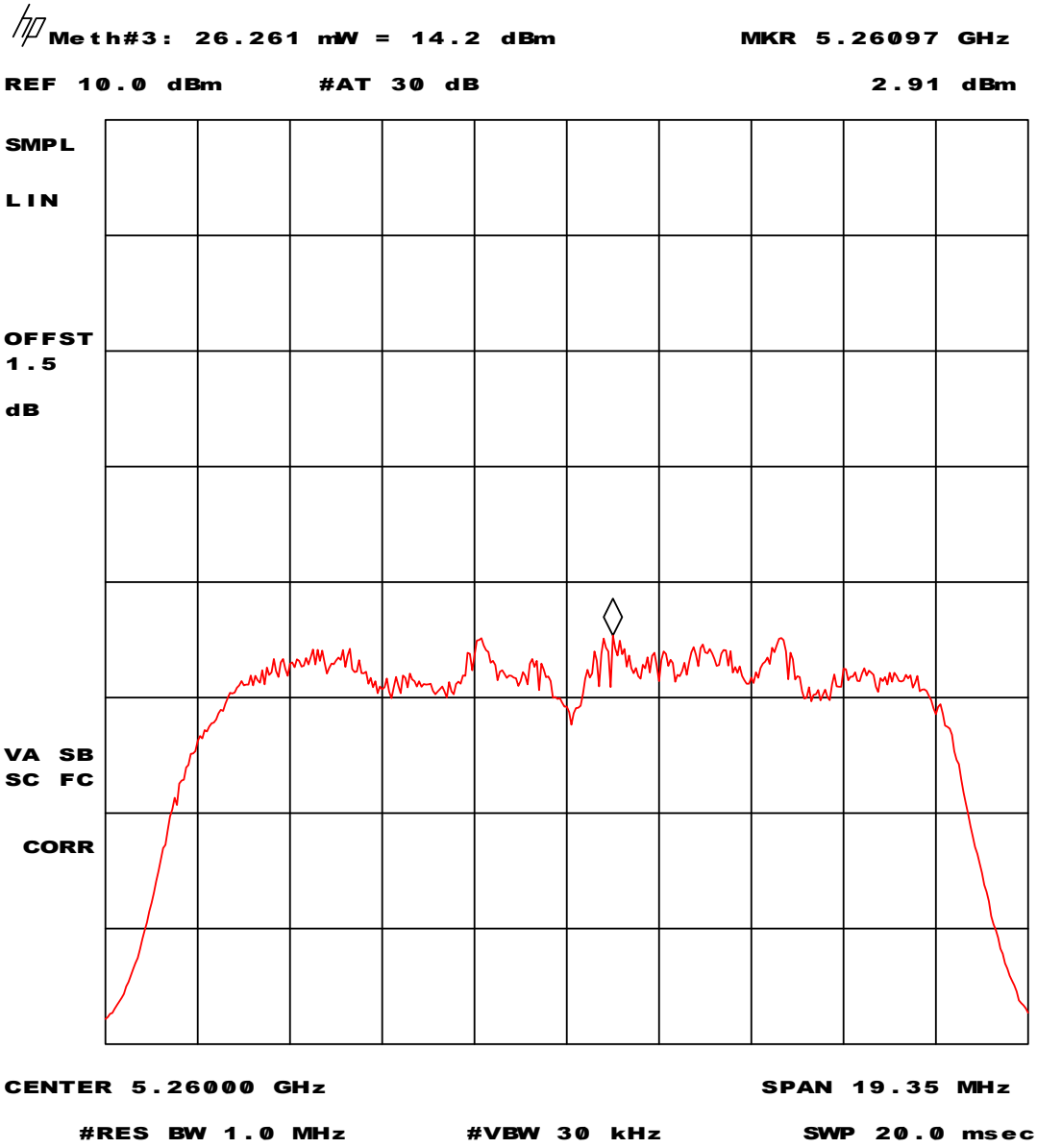
Plot 26 – Peak conducted transmit output power.

Plot 26 depicts the peak conducted transmit output power with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



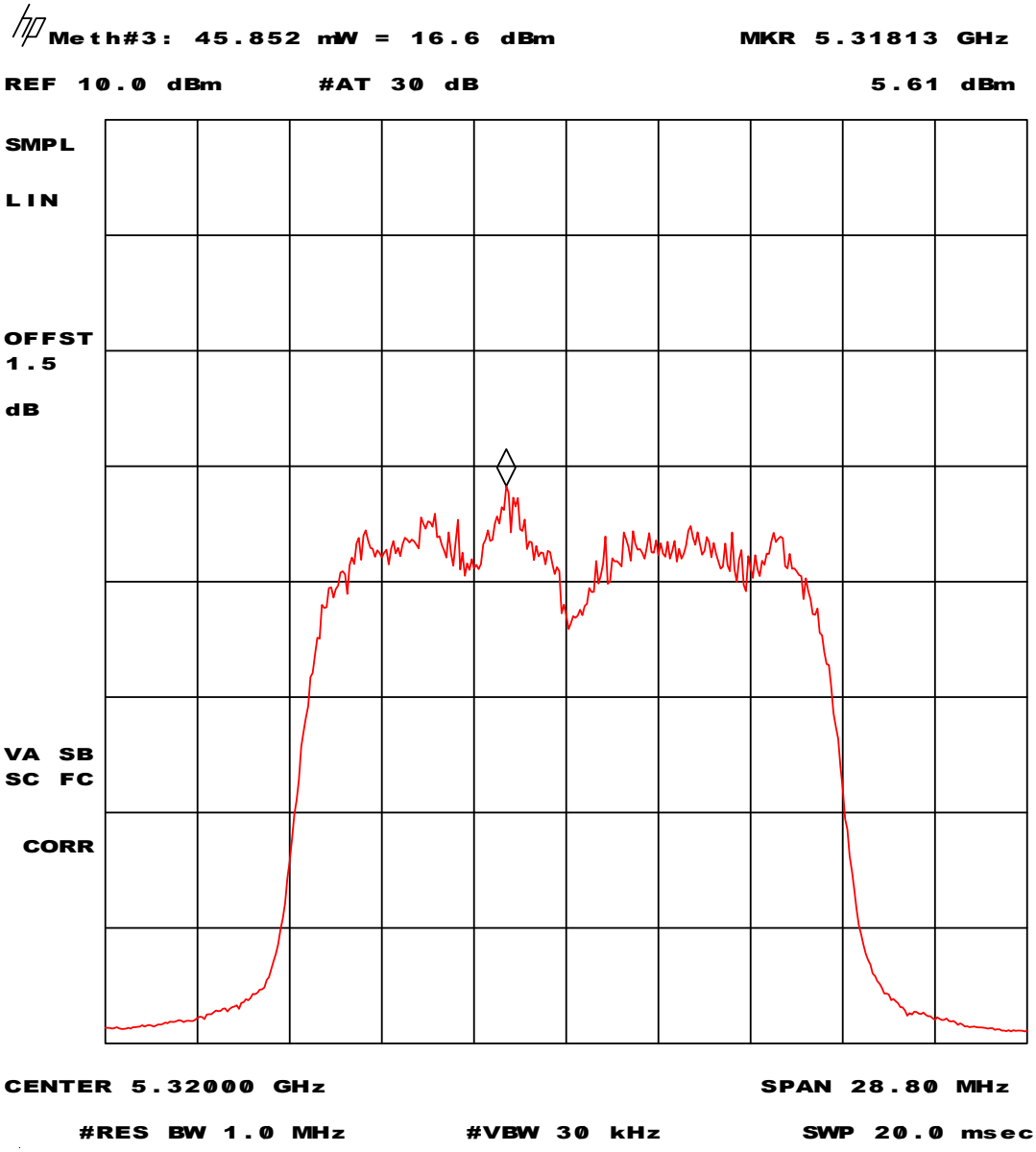
Plot 27 – Peak conducted transmit output power.

Plot 27 depicts the peak conducted transmit output power with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



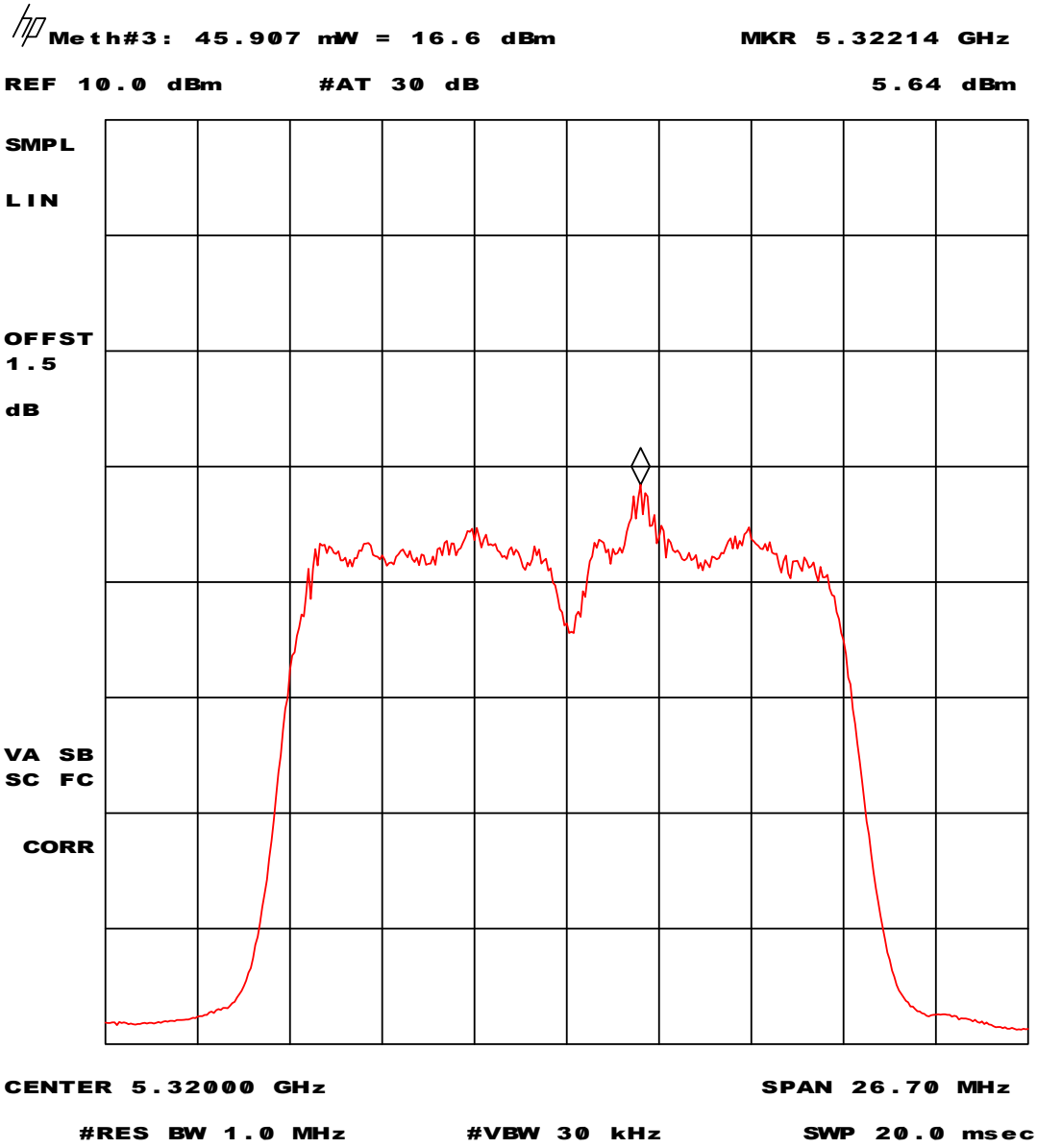
Plot 28 – Peak conducted transmit output power.

Plot 28 depicts the peak conducted transmit output power with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



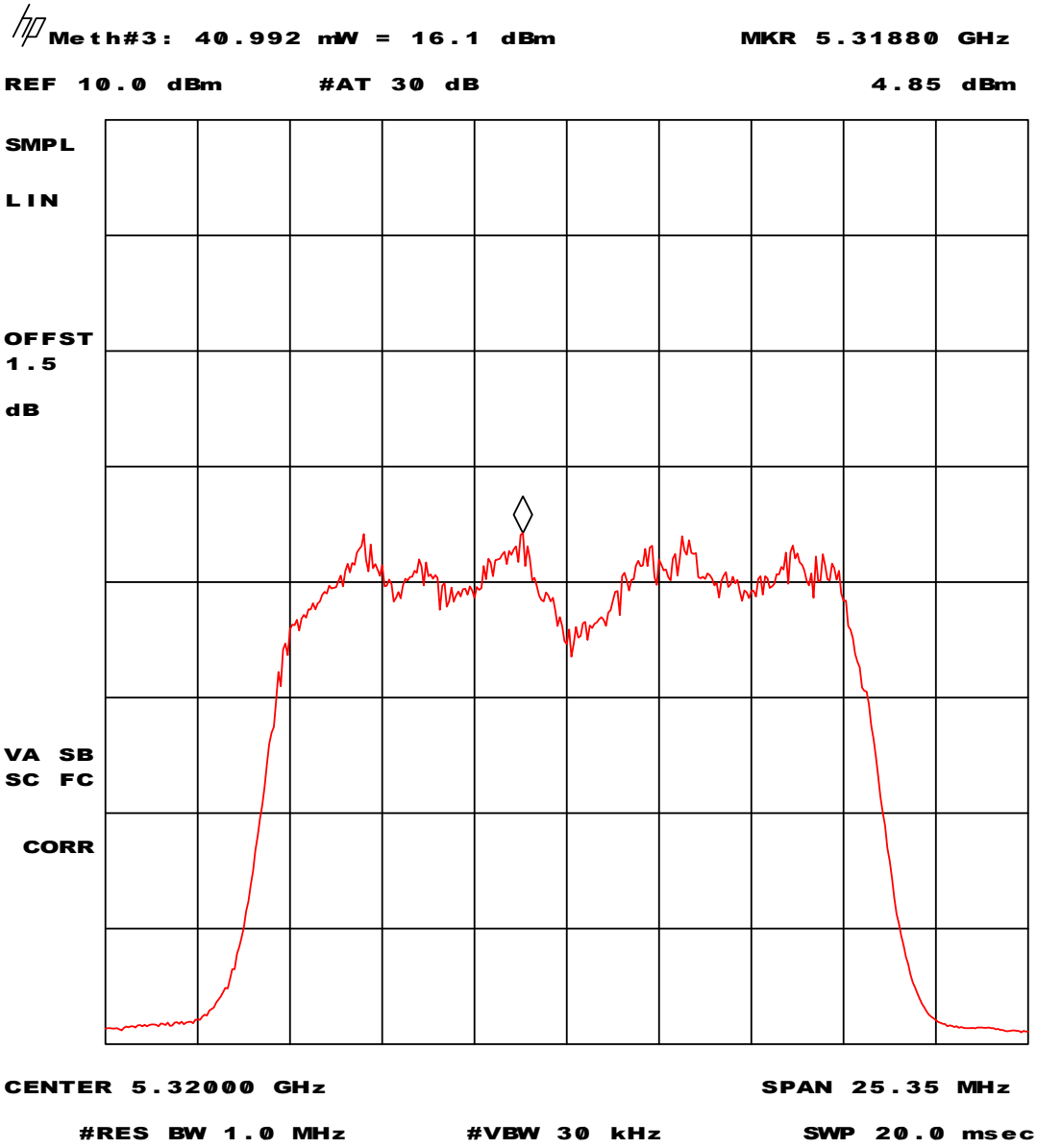
Plot 29 – Peak conducted transmit output power.

Plot 29 depicts the peak conducted transmit output power with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



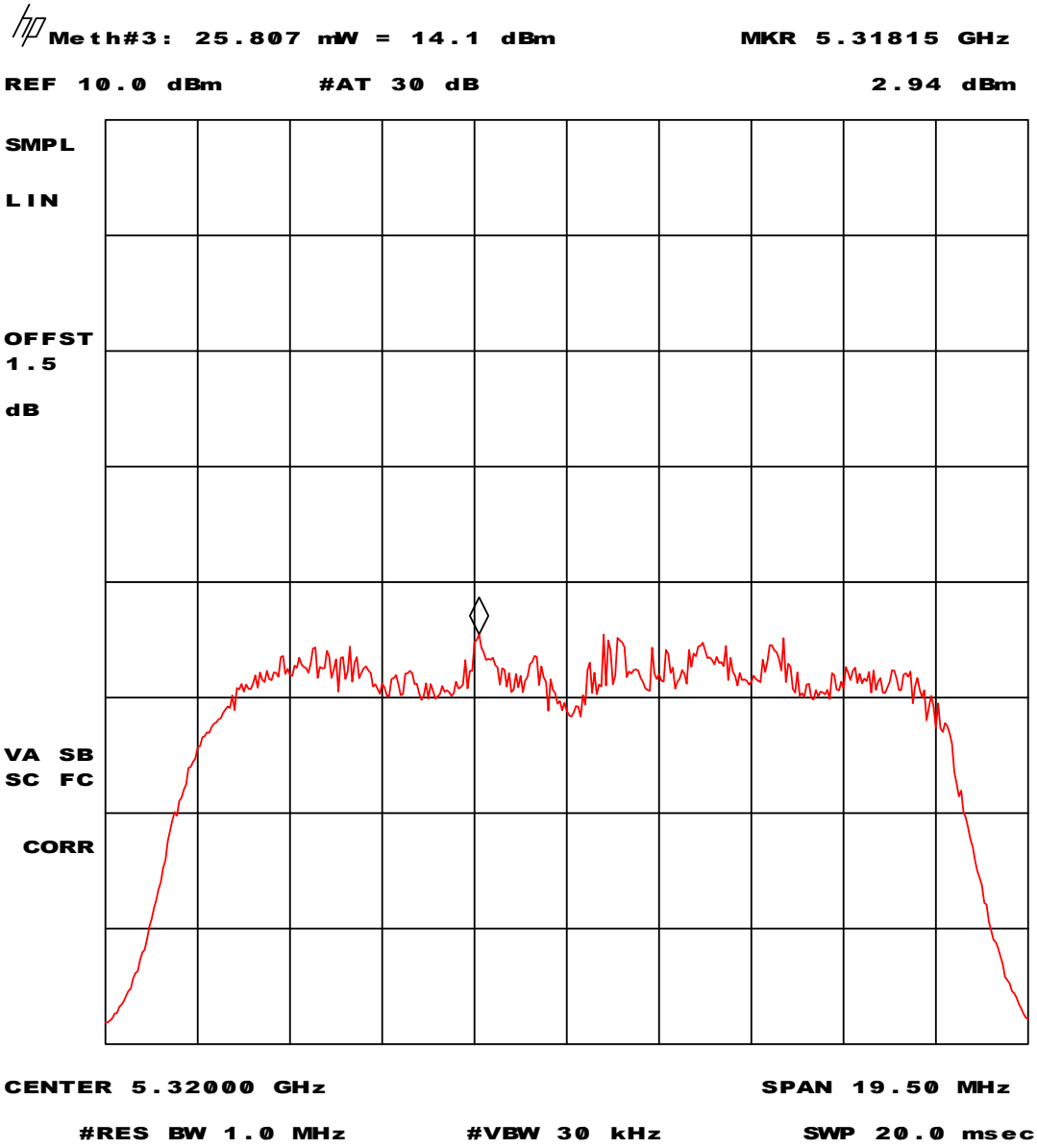
Plot 30 – Peak conducted transmit output power.

Plot 30 depicts the peak conducted transmit output power with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



Plot 31 – Peak conducted transmit output power.

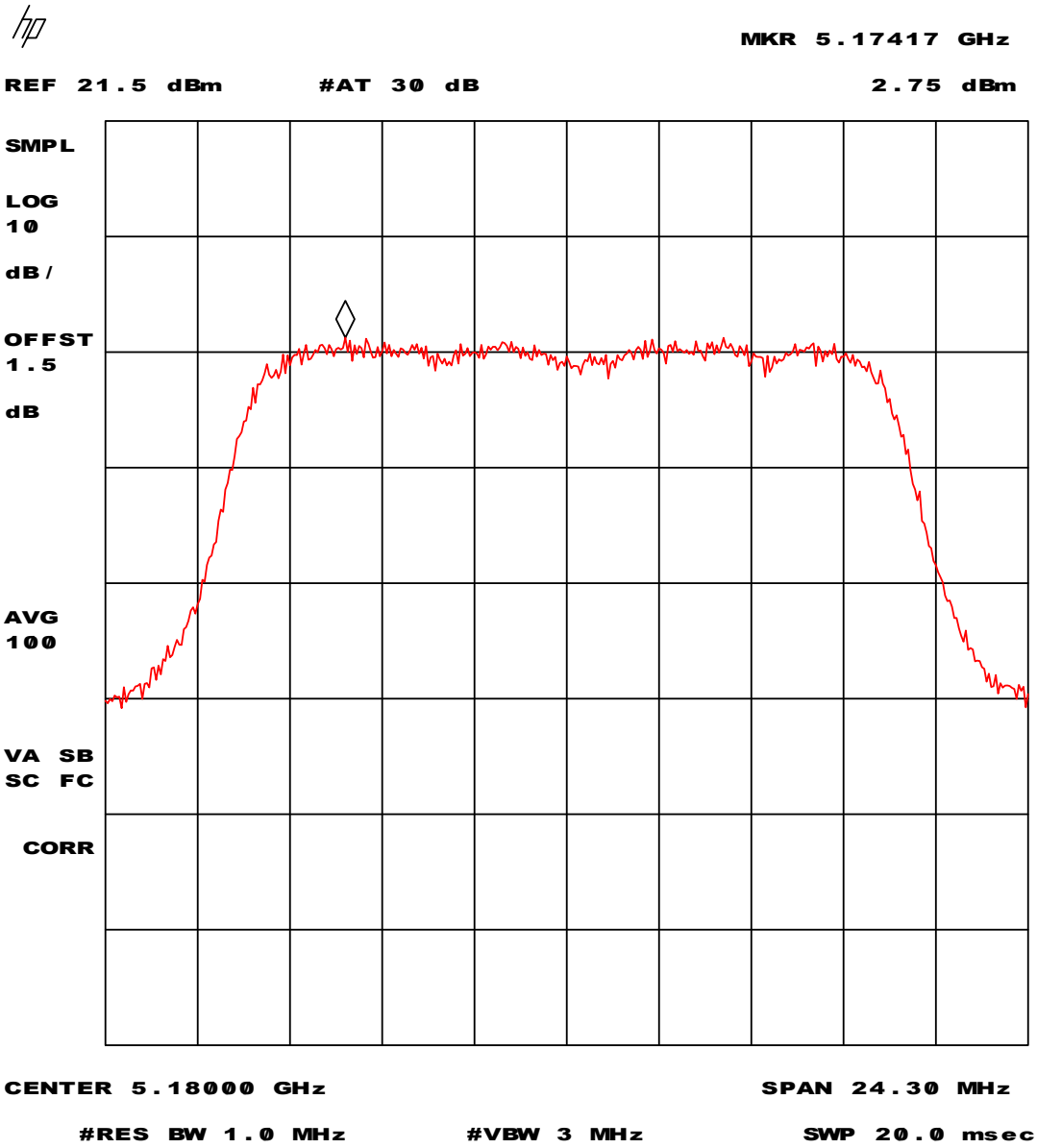
Plot 31 depicts the peak conducted transmit output power with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



Plot 32 – Peak conducted transmit output power.

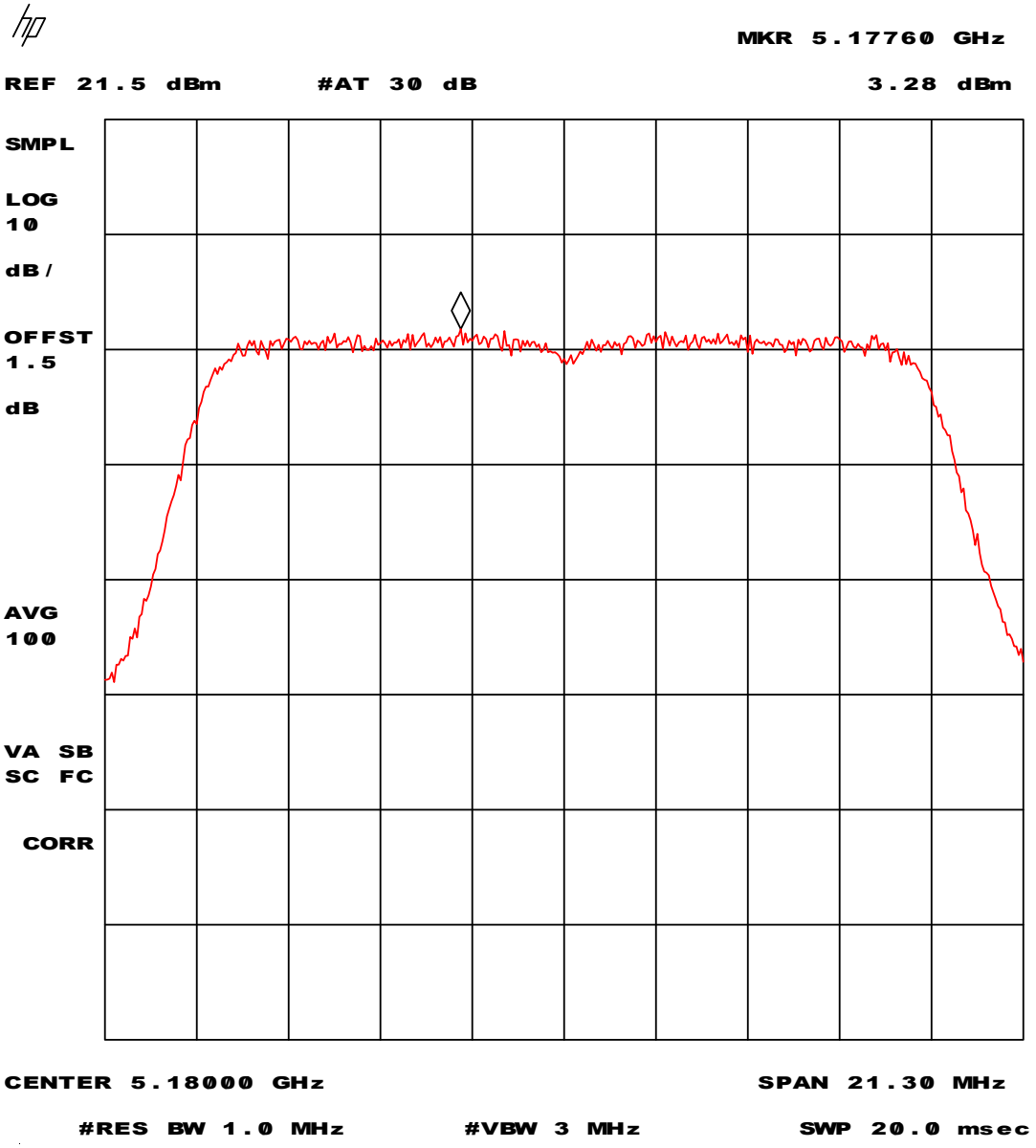
Plot 32 depicts the peak conducted transmit output power with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.

5.3 Peak power spectral density.



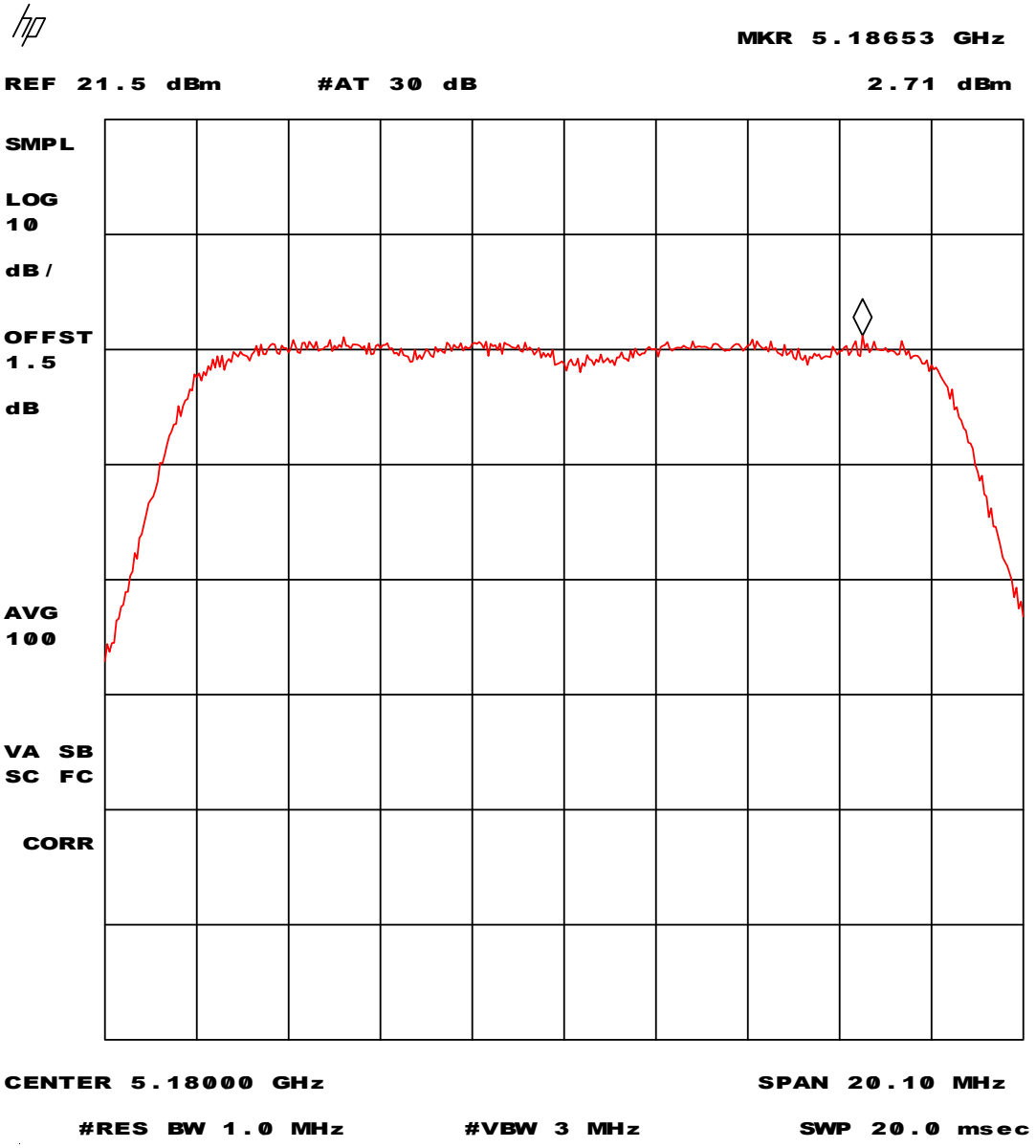
Plot 33 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 33 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



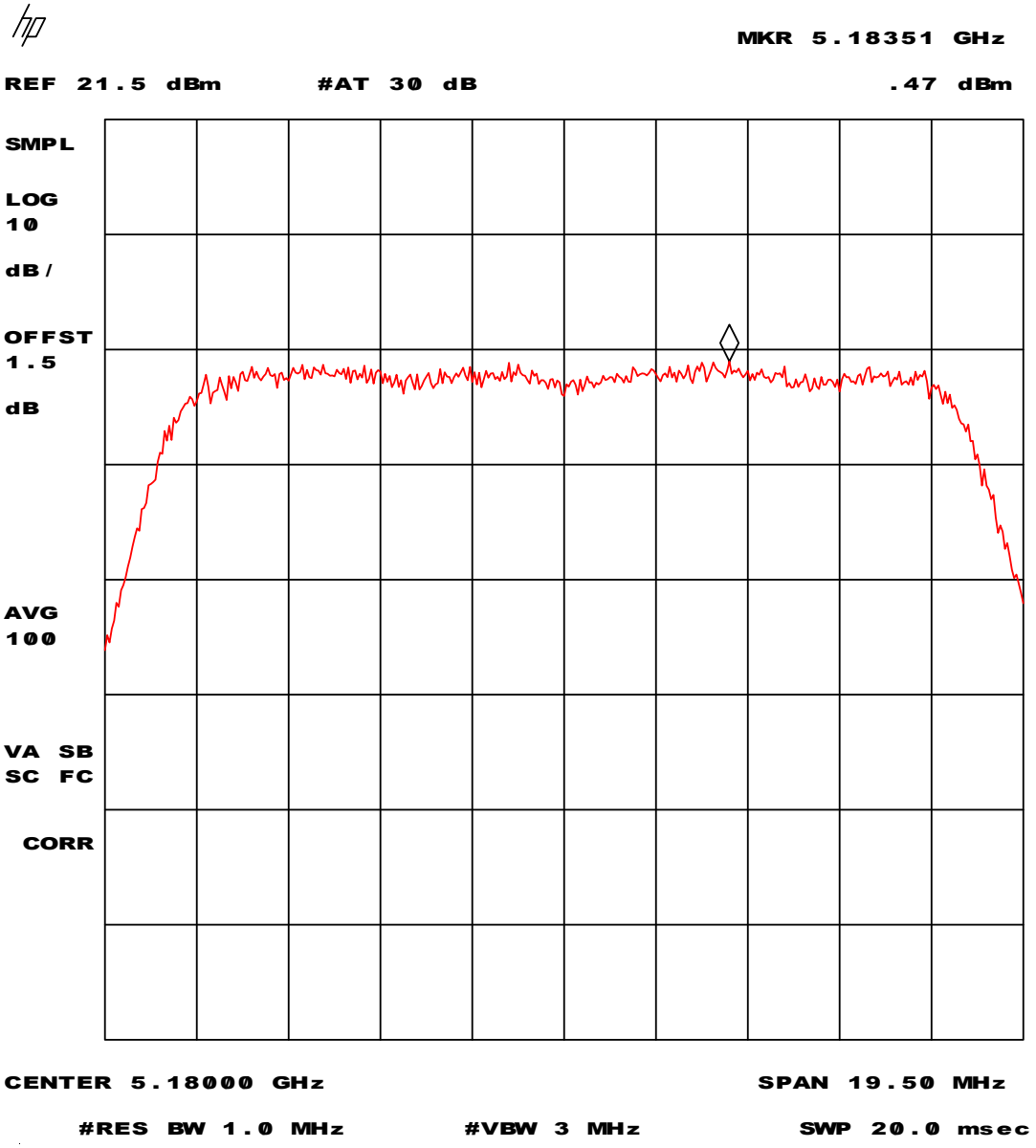
Plot 34 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 34 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



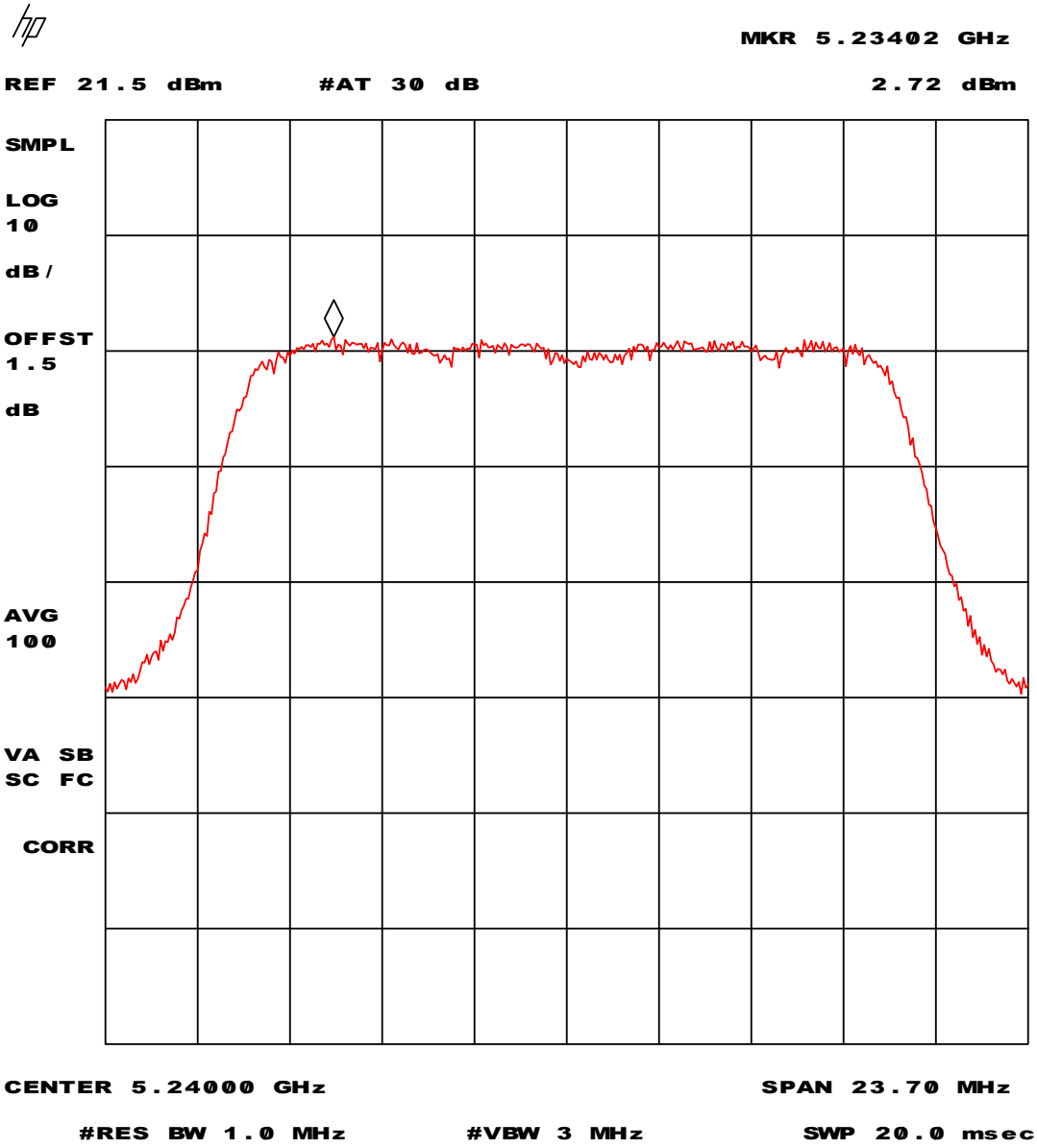
Plot 35 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 35 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



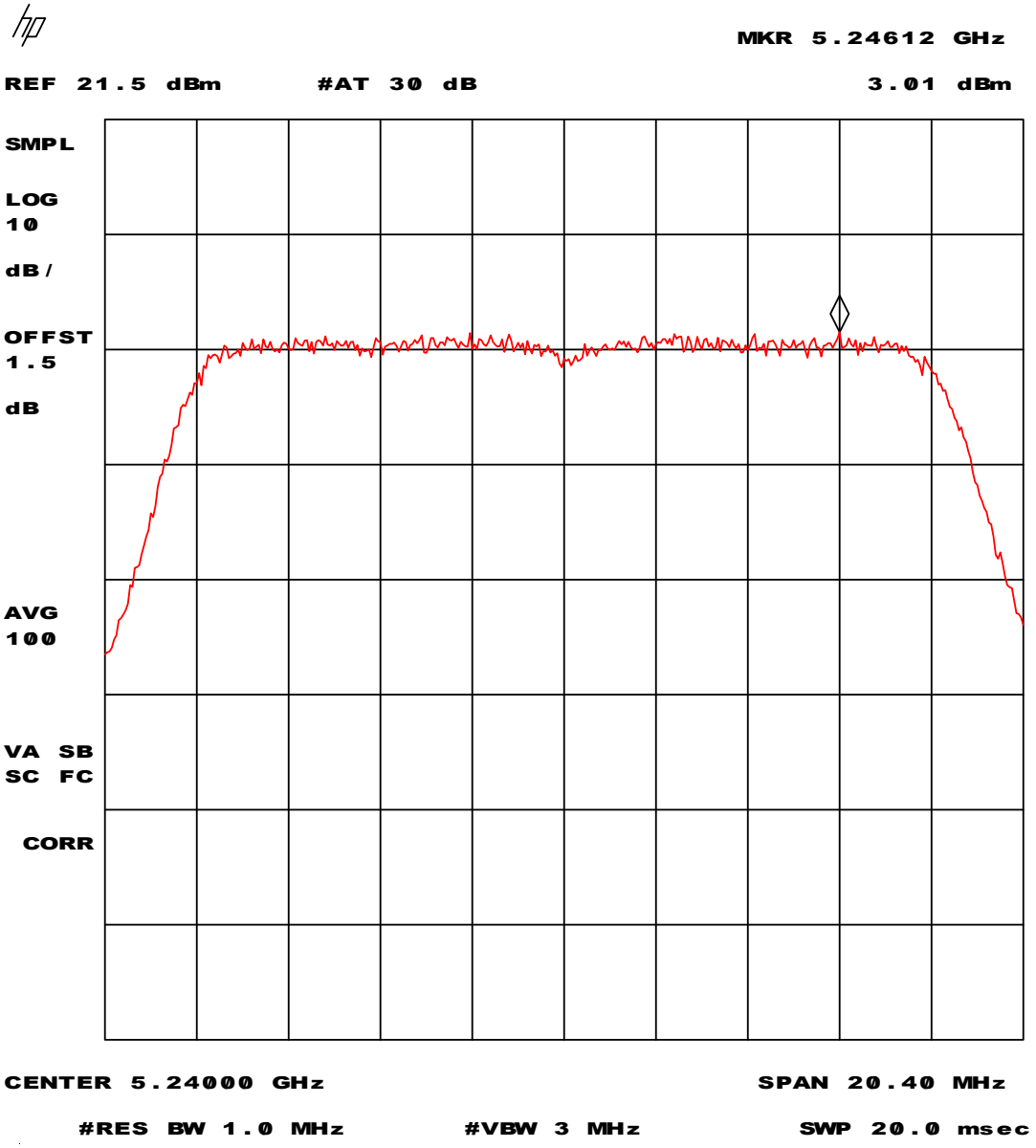
Plot 36 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 36 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



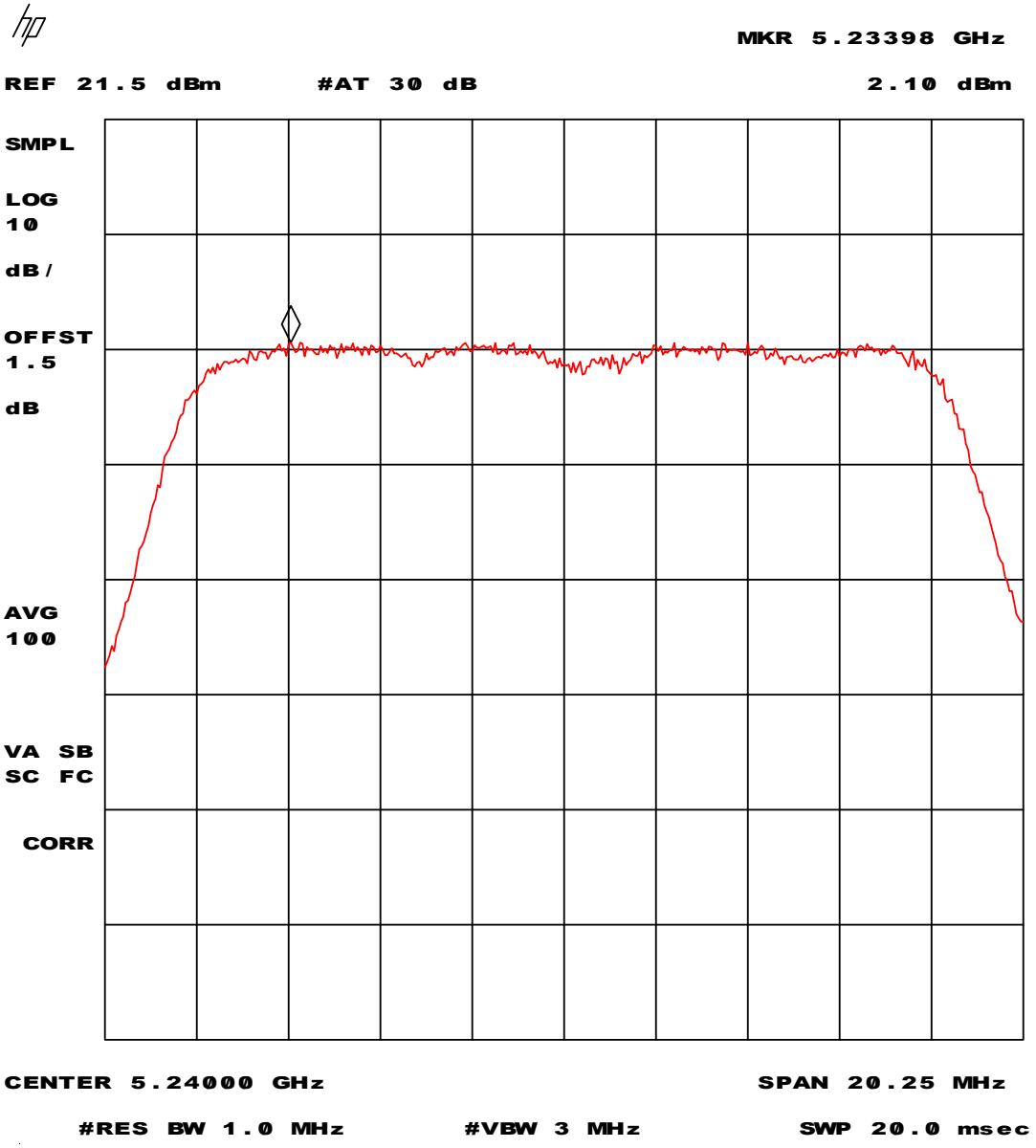
Plot 37 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 37 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



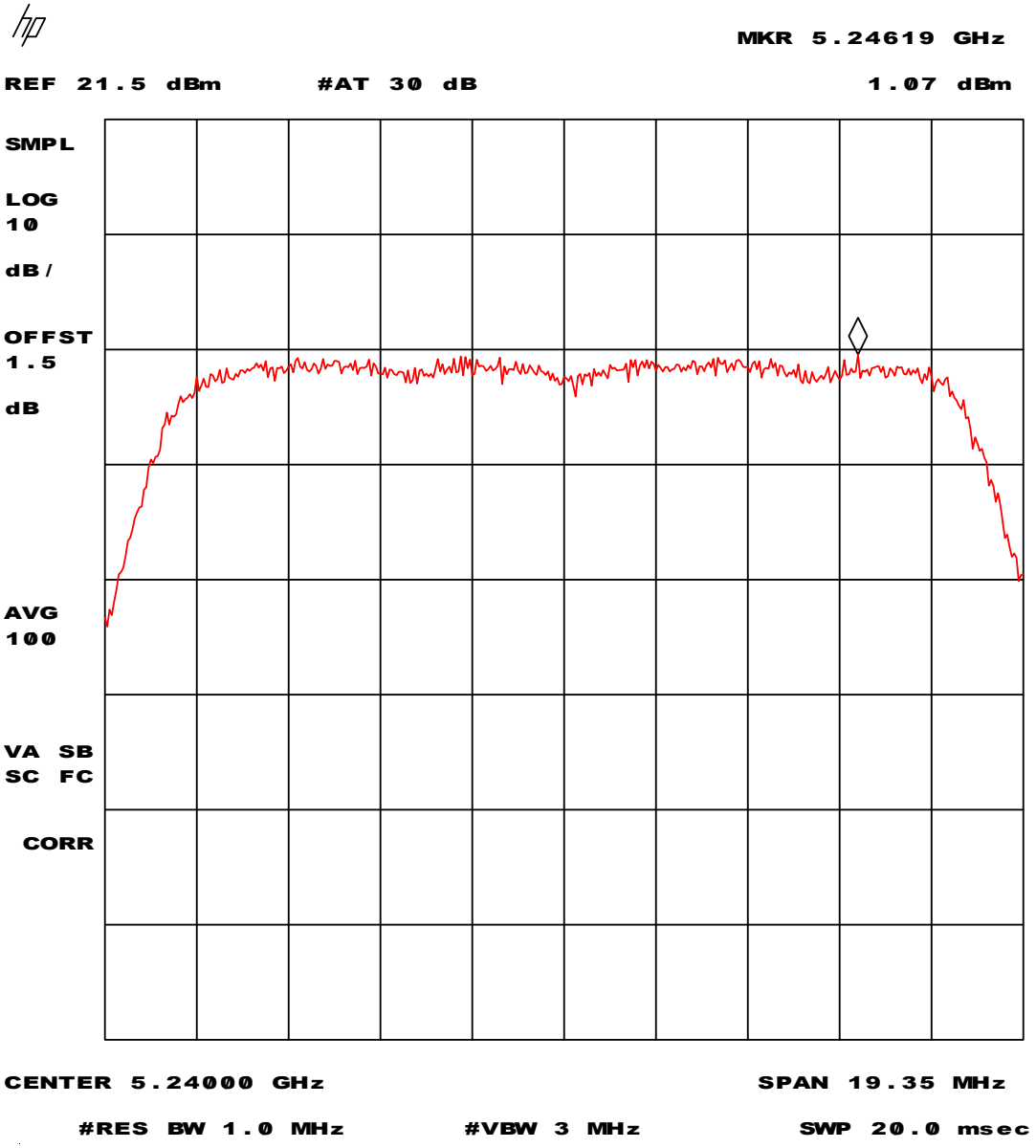
Plot 38 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 38 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



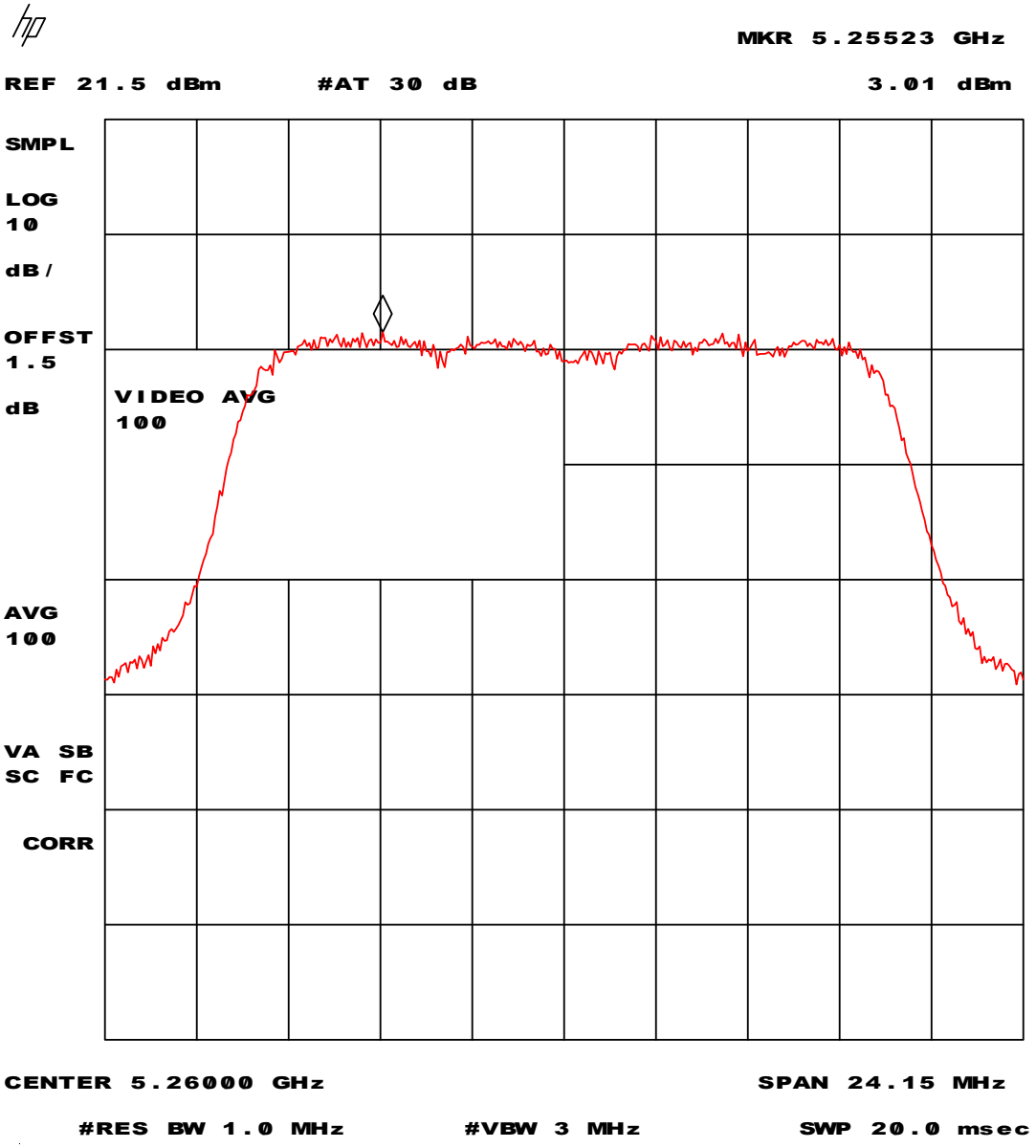
Plot 39 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 39 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



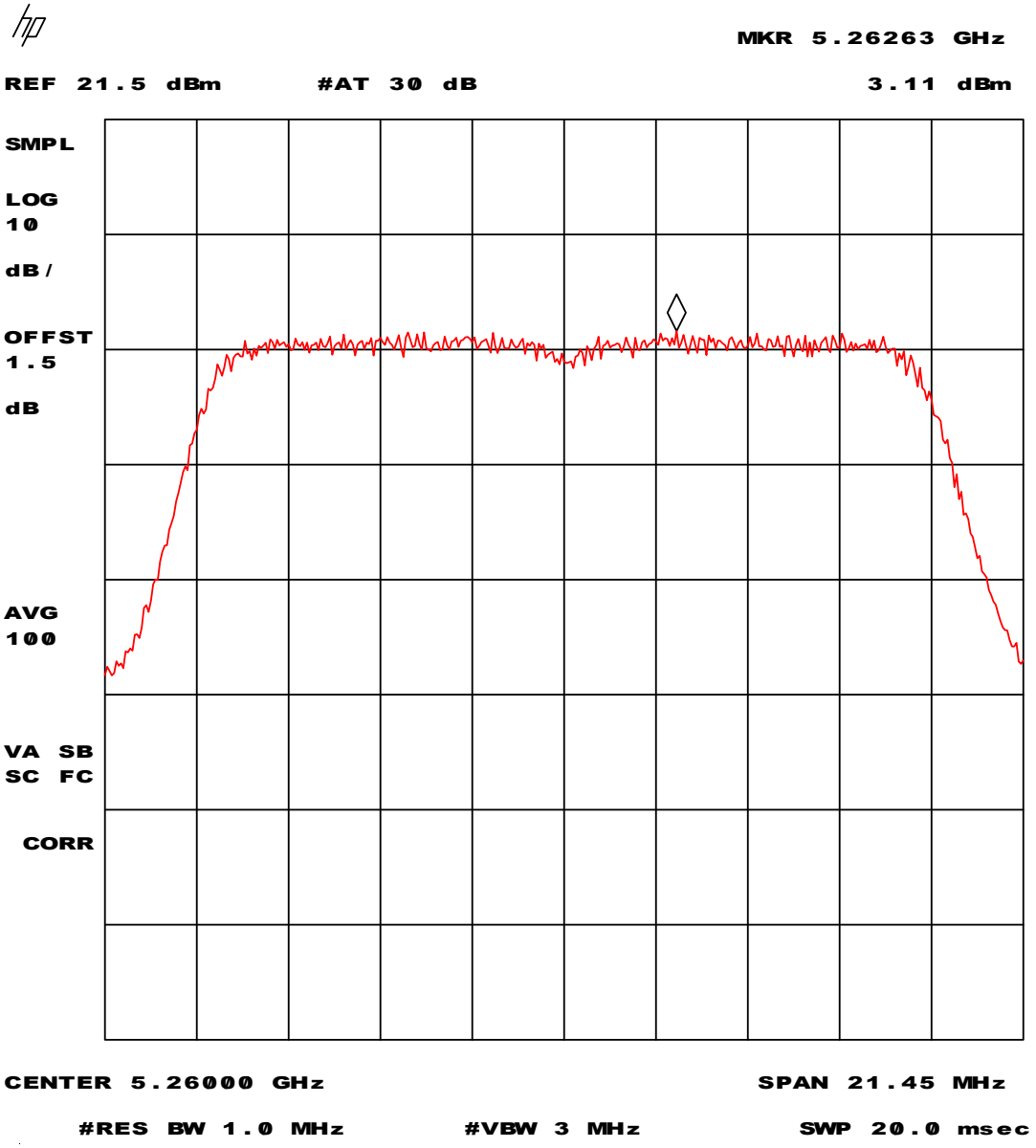
Plot 40 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 40 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



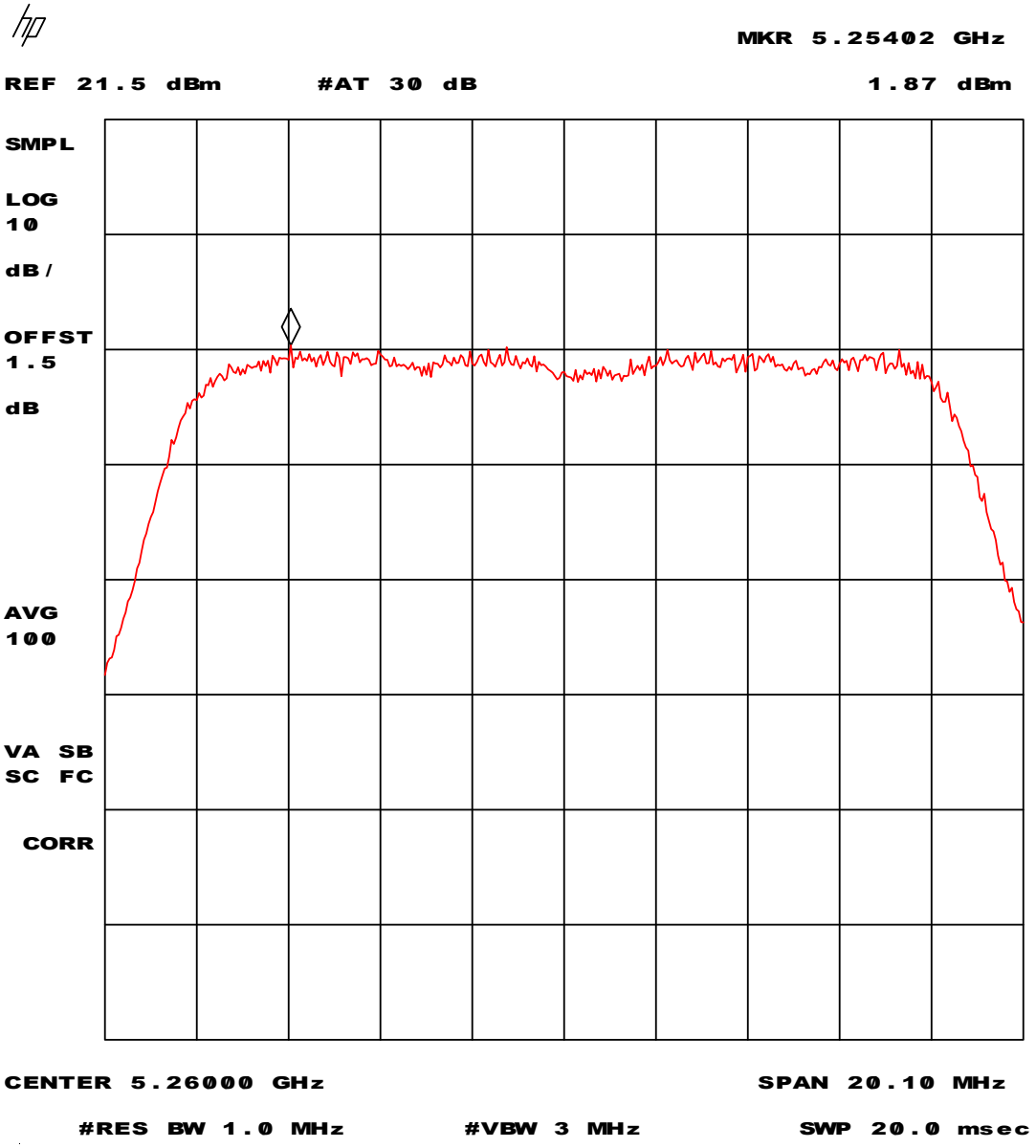
Plot 41 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 41 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



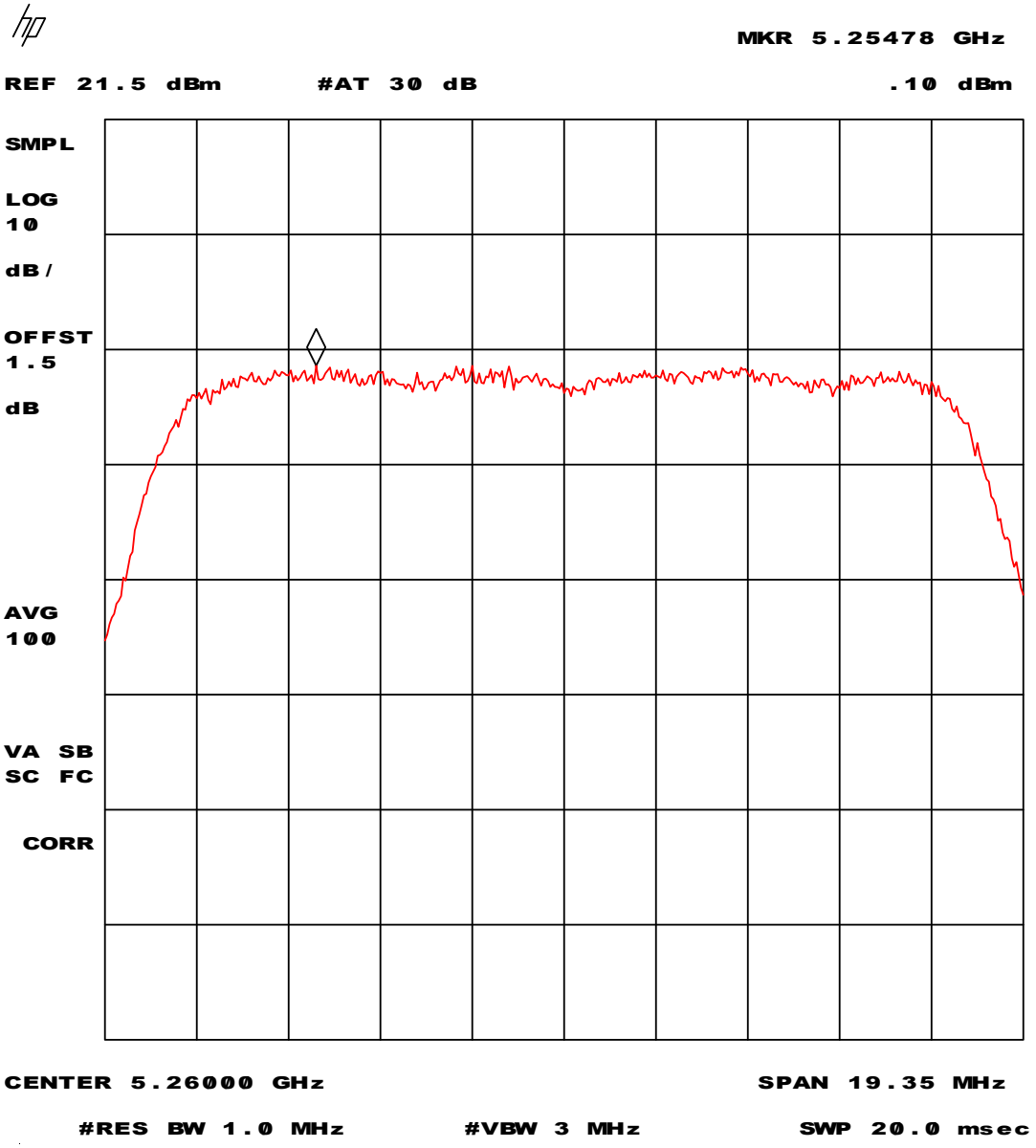
Plot 42 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 42 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



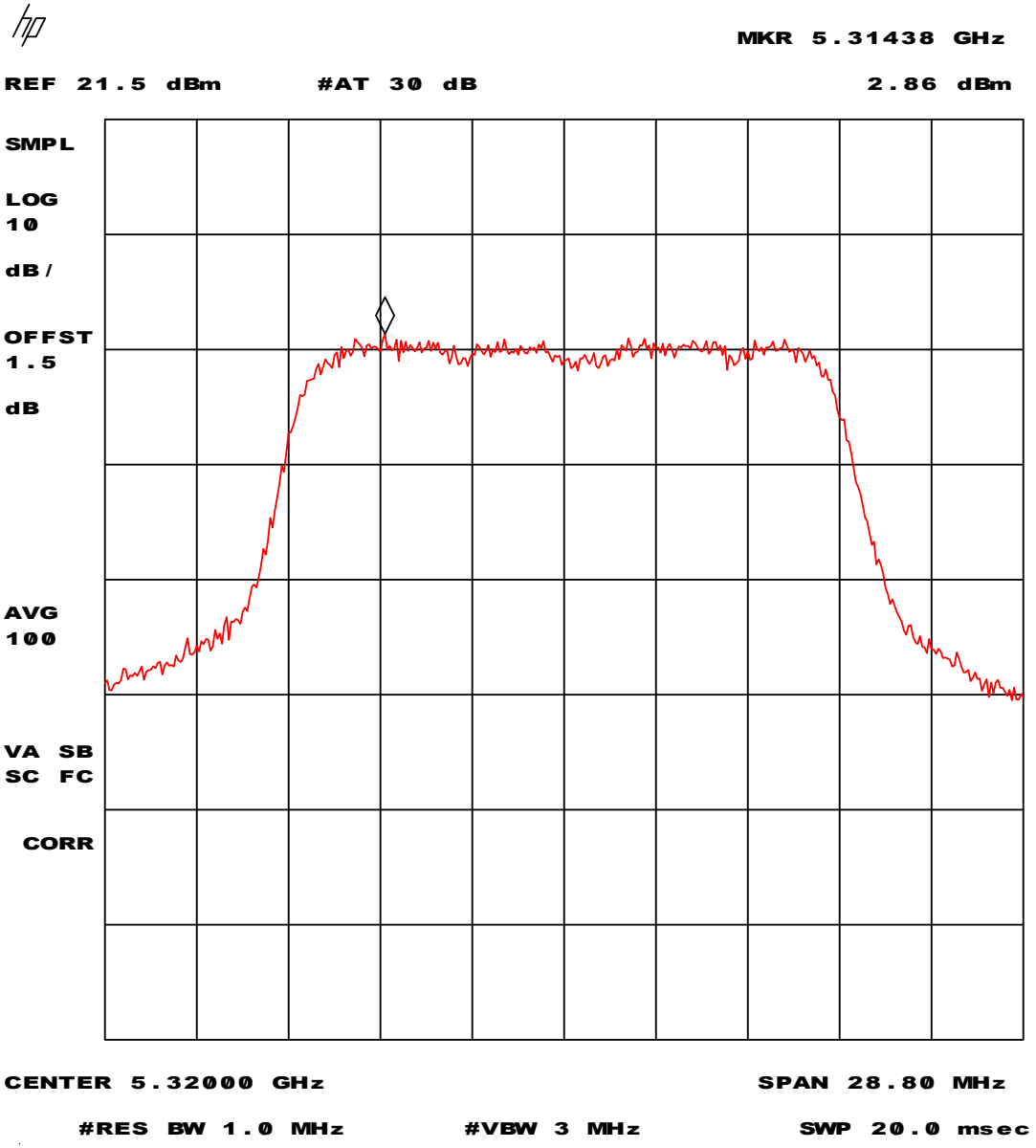
Plot 43 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 43 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



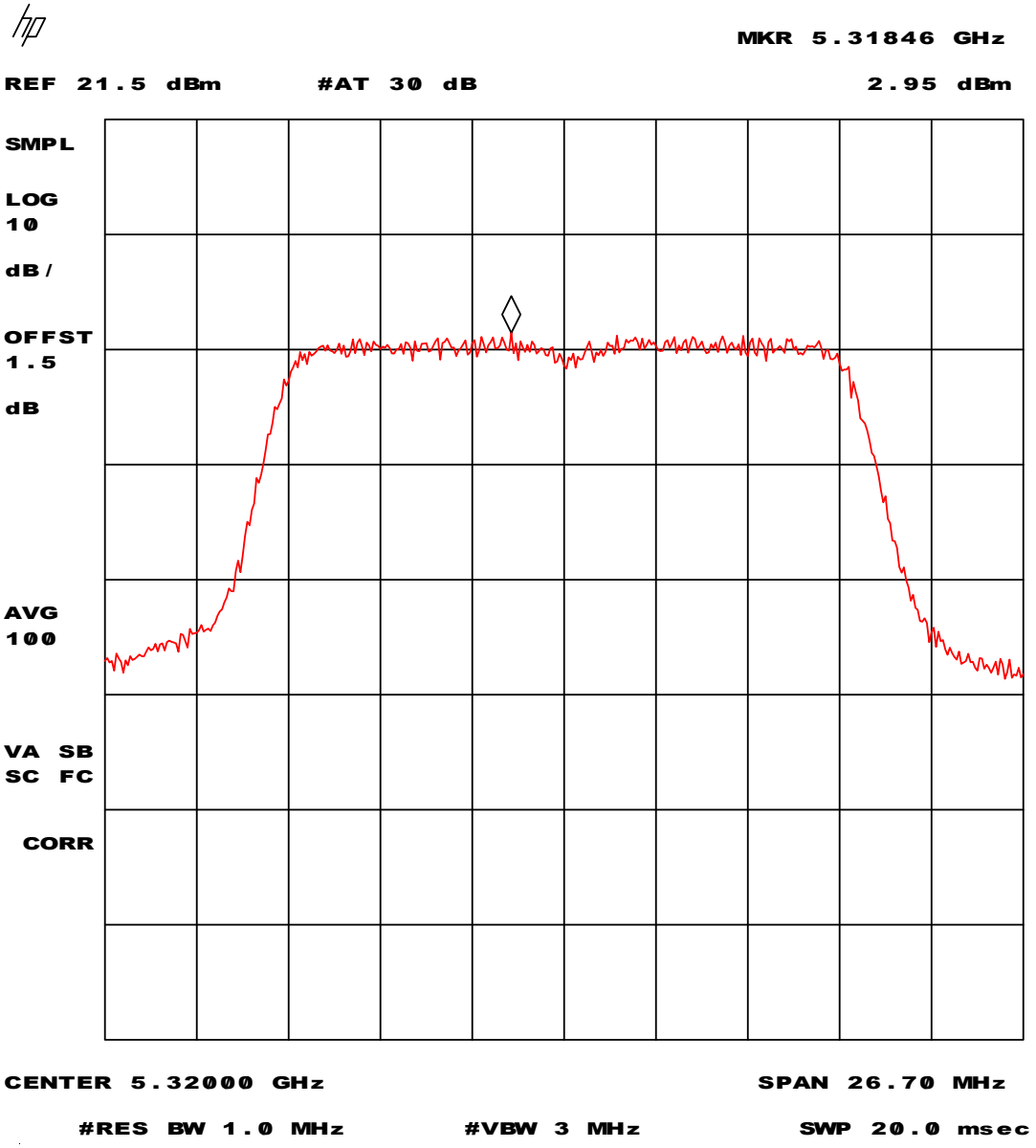
Plot 44 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 44 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



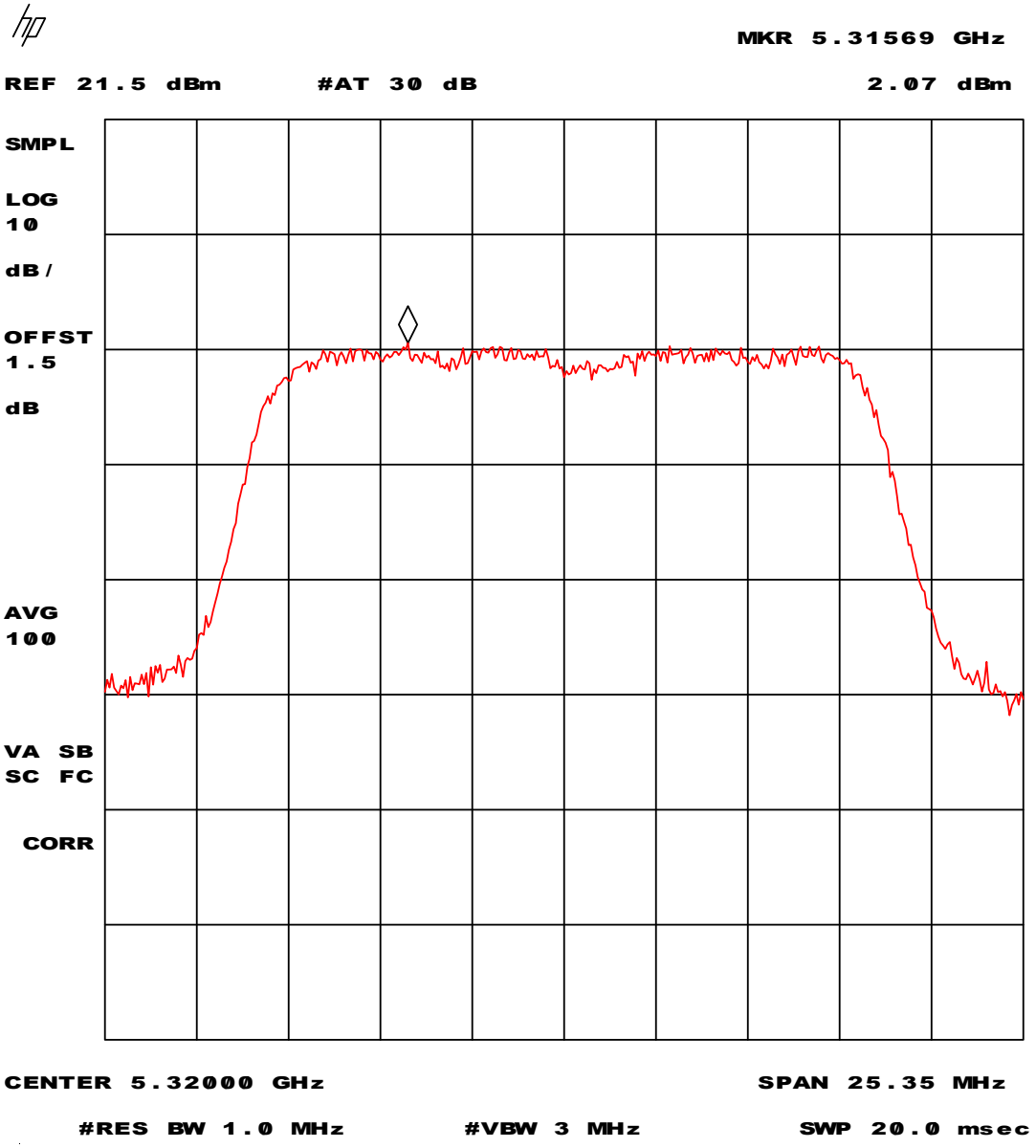
Plot 45 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 45 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



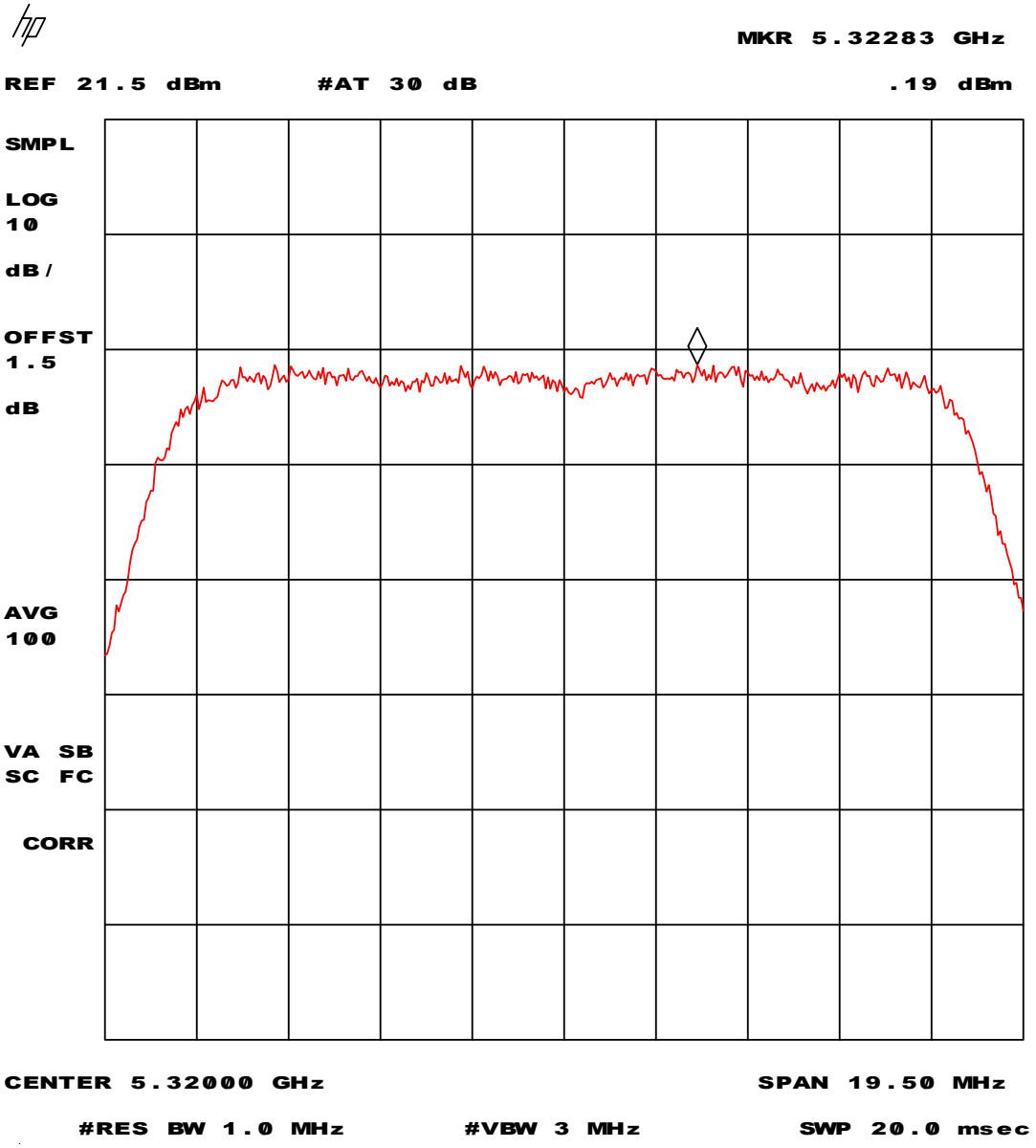
Plot 46 - Peak power spectral density (conducted) in any 1 MHz band.

Plot 46 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



Plot 47 - Peak power spectral density (conducted) in any 1 MHz band.

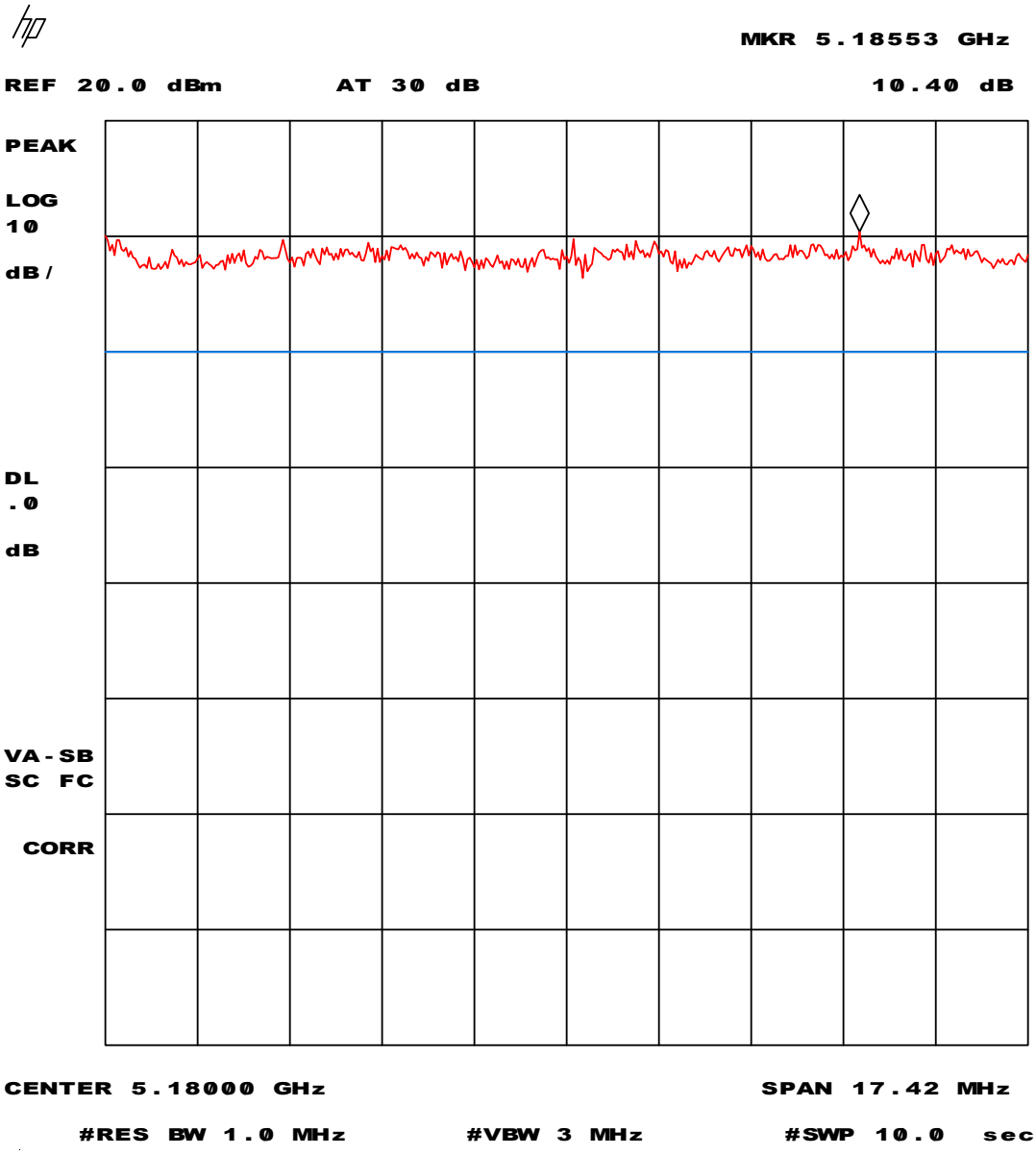
Plot 47 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 36 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.



Plot 48 - Peak power spectral density (conducted) in any 1 MHz band.

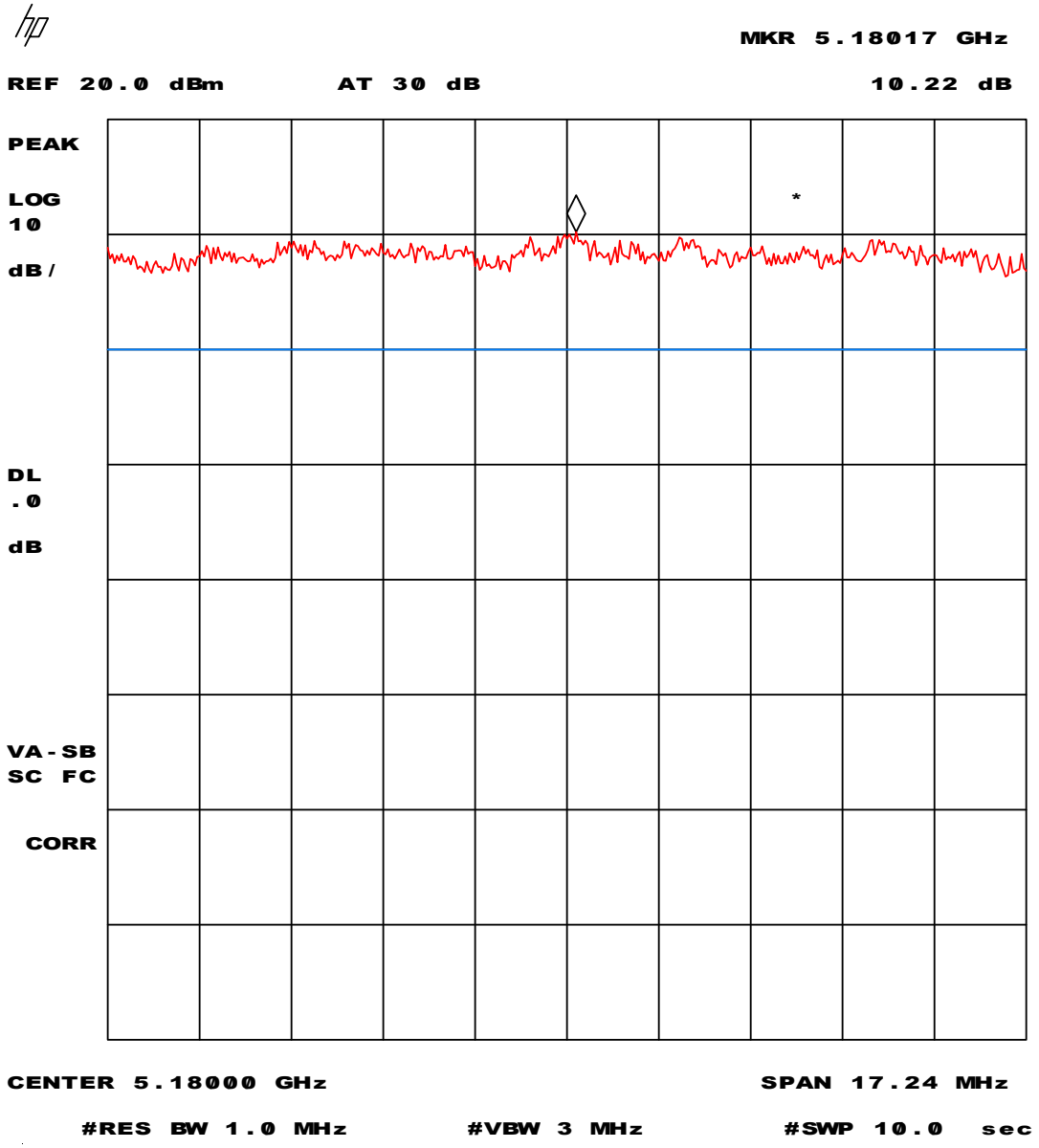
Plot 48 depicts the peak power spectral density (conducted) in any 1 MHz band with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 54 Mbit/s. Corrected (offset) for measurement cable losses of 1.5 dB.

5.4 Ratio of the peak excursion of the modulation envelope.



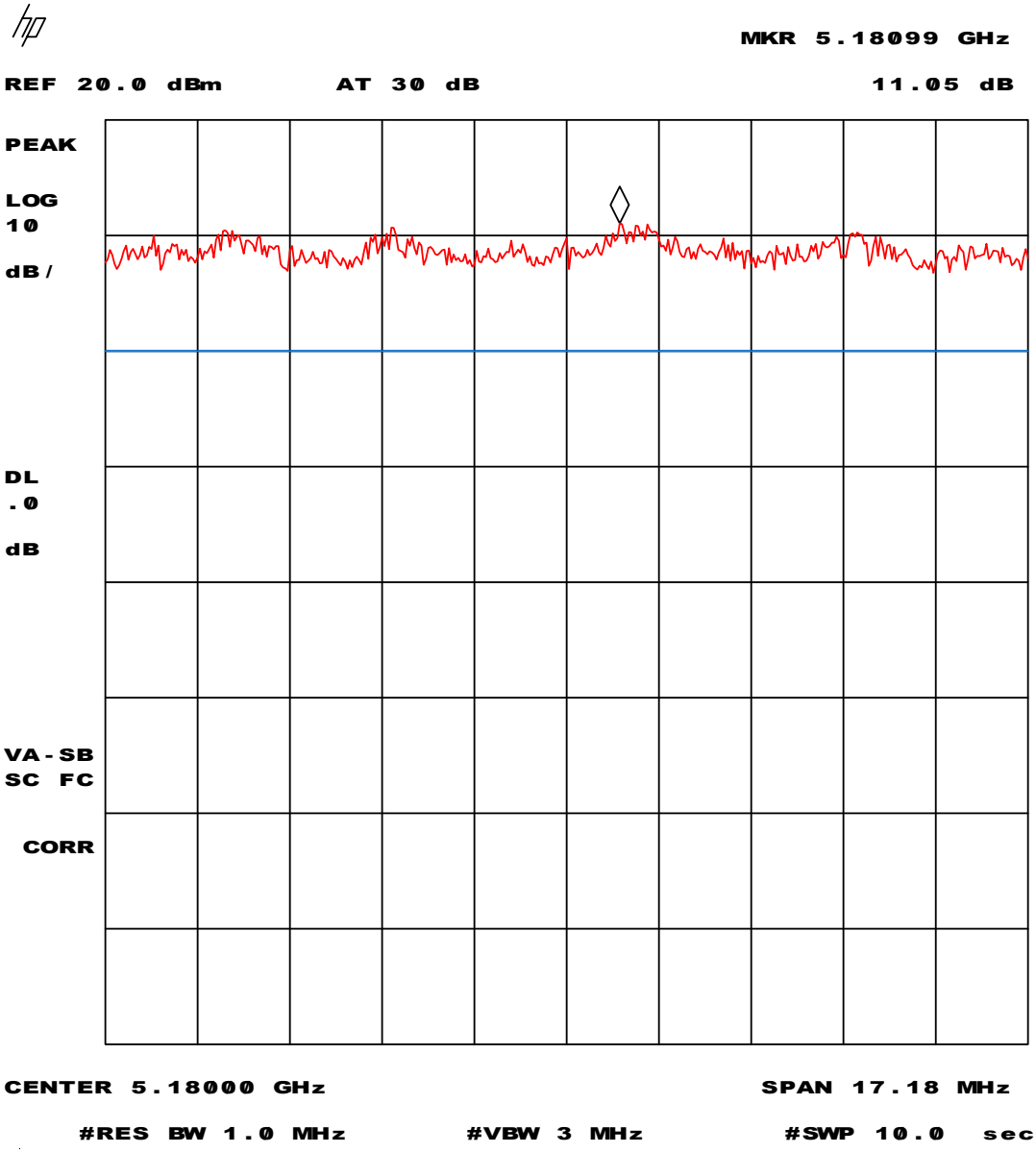
Plot 49 – Ratio of the peak excursion of the modulation envelope.

Plot 49 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 9 Mbit/s.



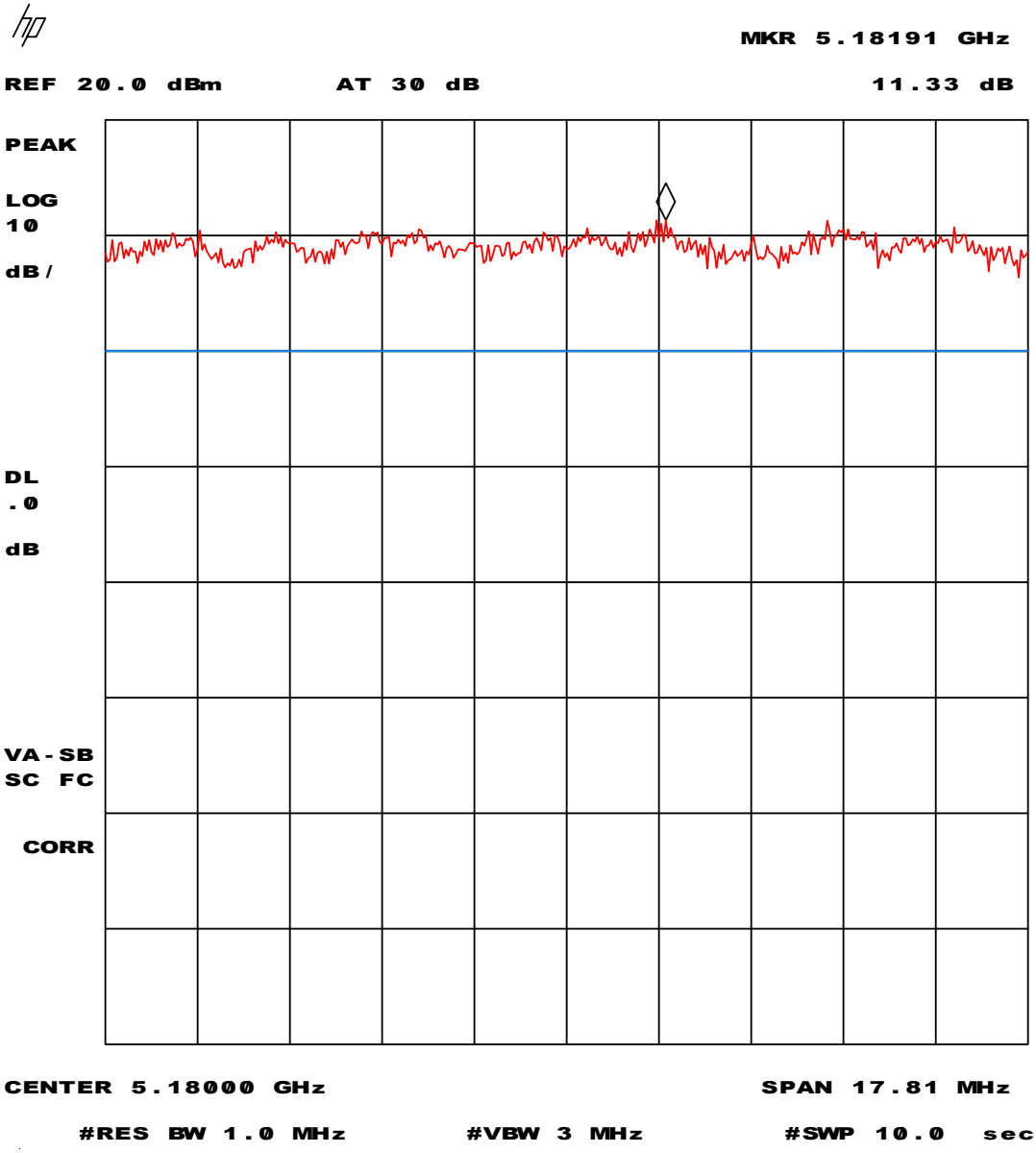
Plot 50 – Ratio of the peak excursion of the modulation envelope.

Plot 50 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 18 Mbit/s.



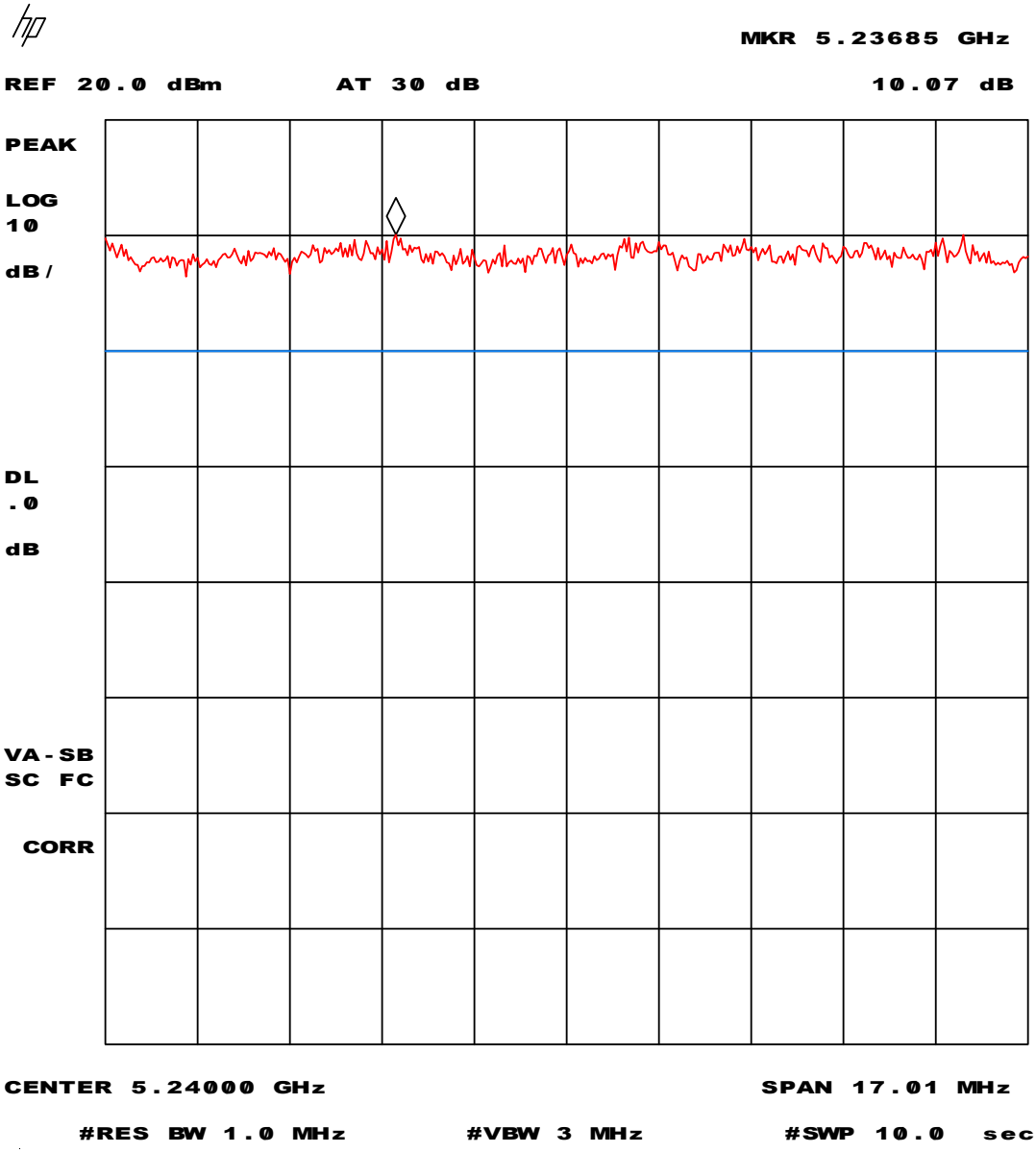
Plot 51 – Ratio of the peak excursion of the modulation envelope.

Plot 51 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 36 Mbit/s.



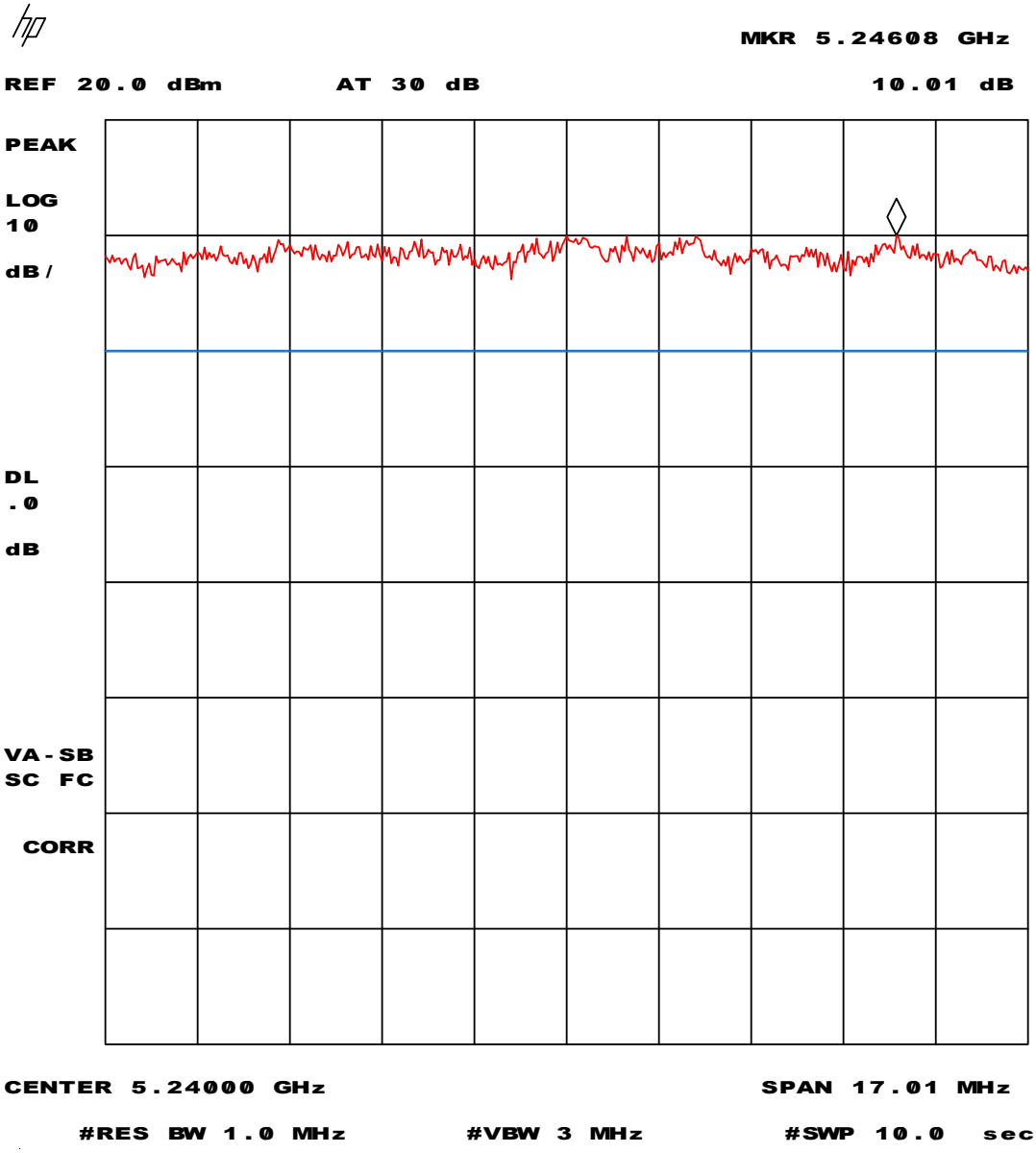
Plot 52 – Ratio of the peak excursion of the modulation envelope.

Plot 52 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 36 (5180 MHz) and at a transmission bit-rate of 54 Mbit/s.



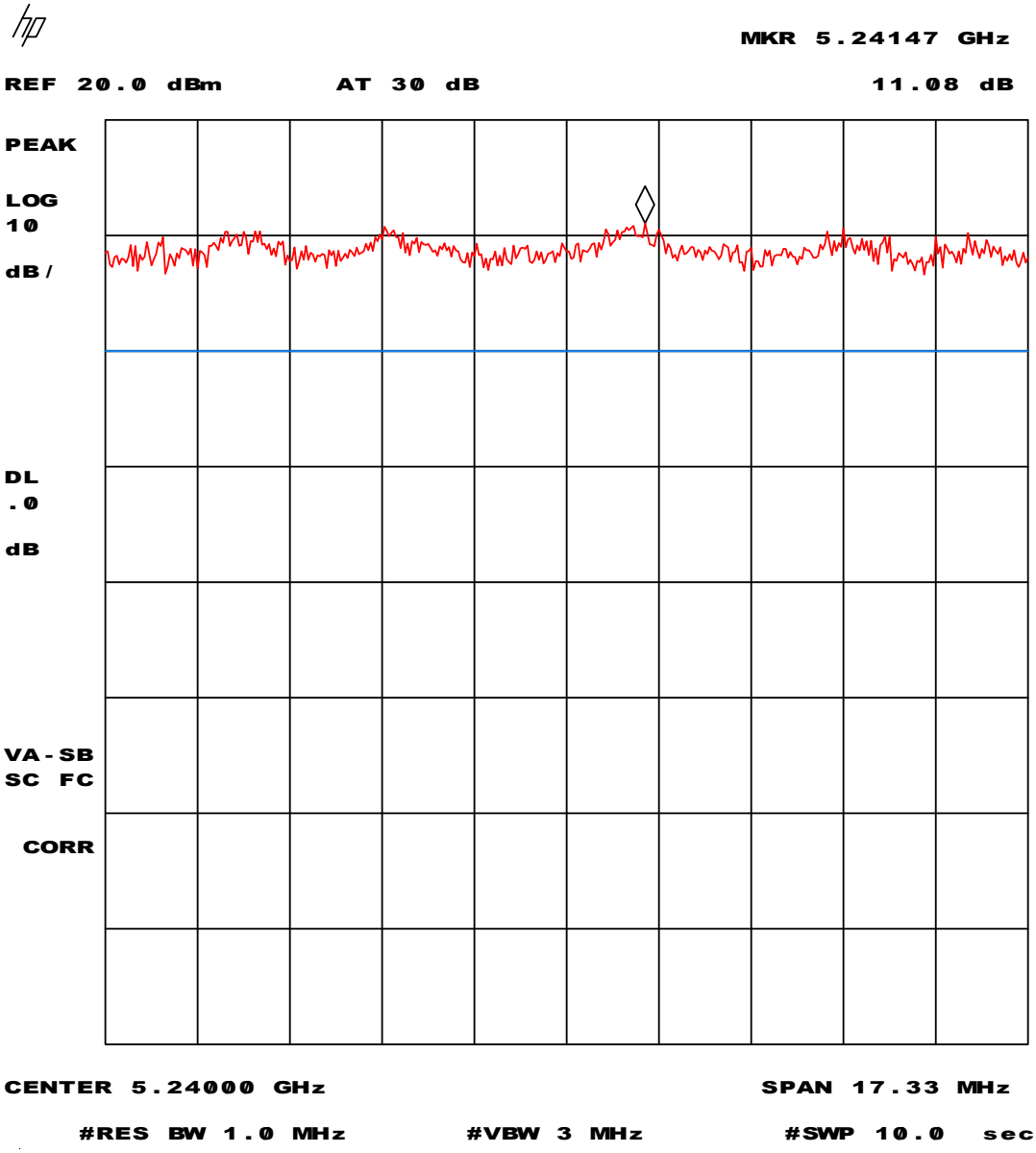
Plot 53 – Ratio of the peak excursion of the modulation envelope.

Plot 53 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 9 Mbit/s.



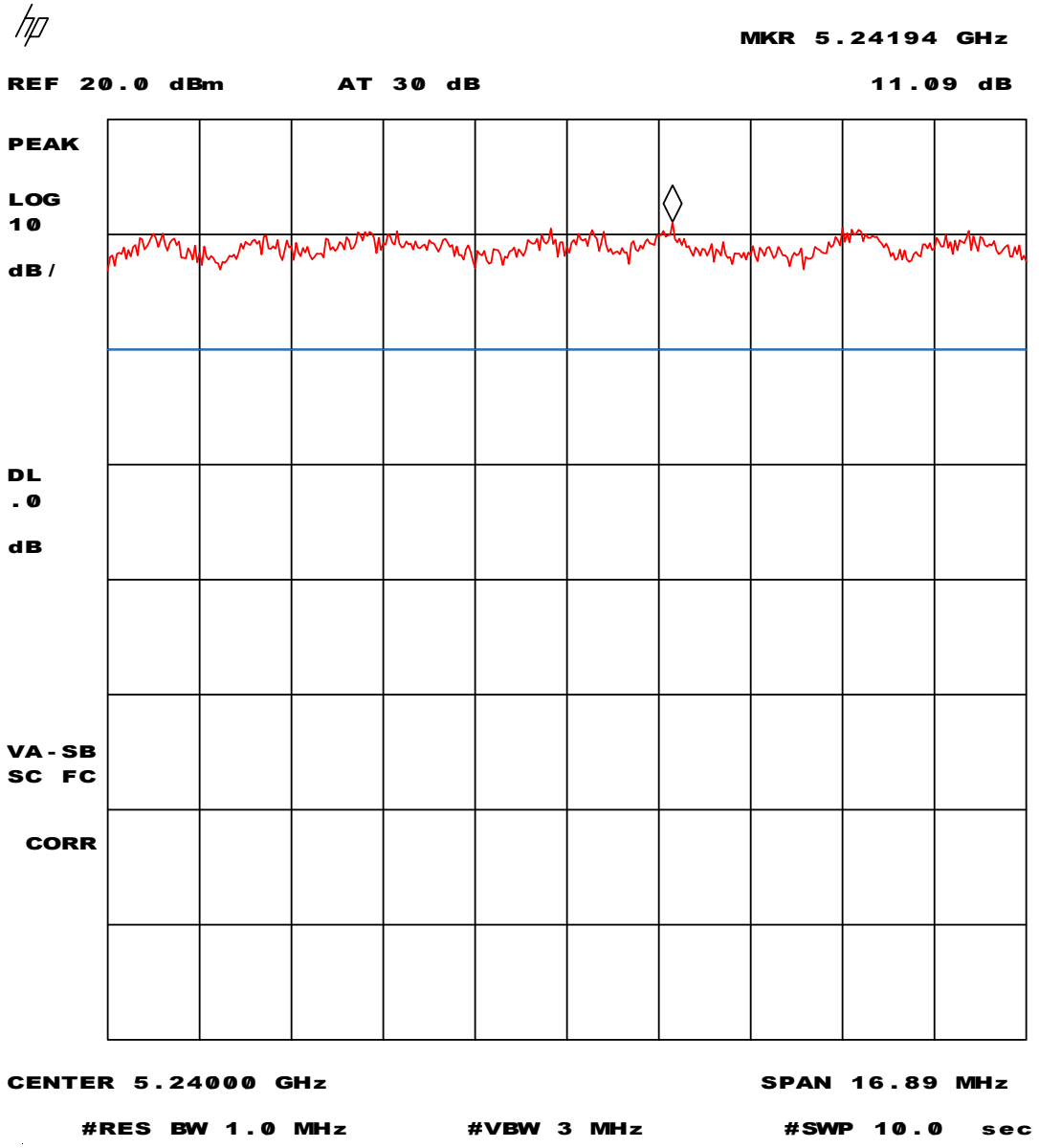
Plot 54 – Ratio of the peak excursion of the modulation envelope.

Plot 54 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 18 Mbit/s.



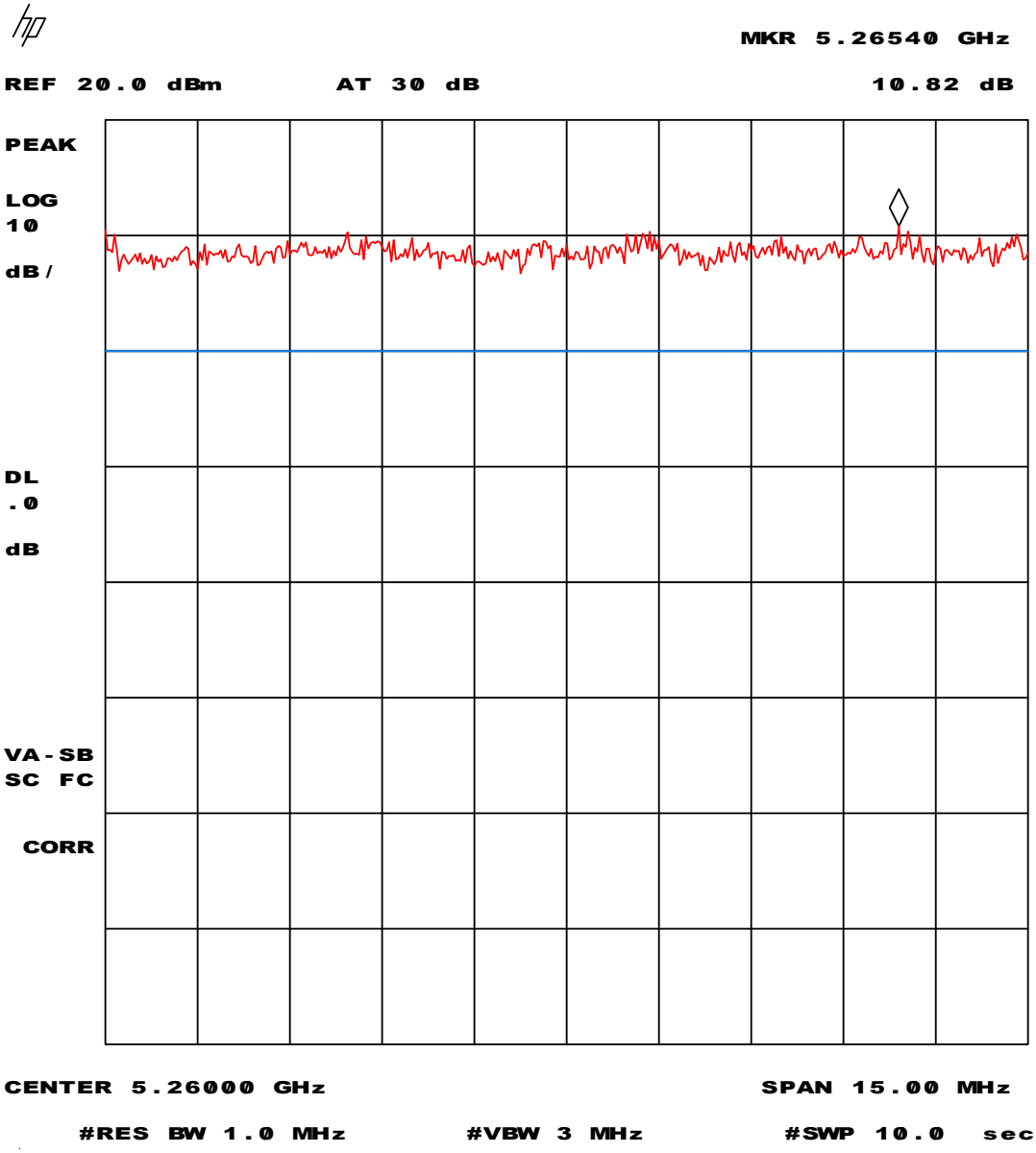
Plot 55 – Ratio of the peak excursion of the modulation envelope.

Plot 55 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 36 Mbit/s.



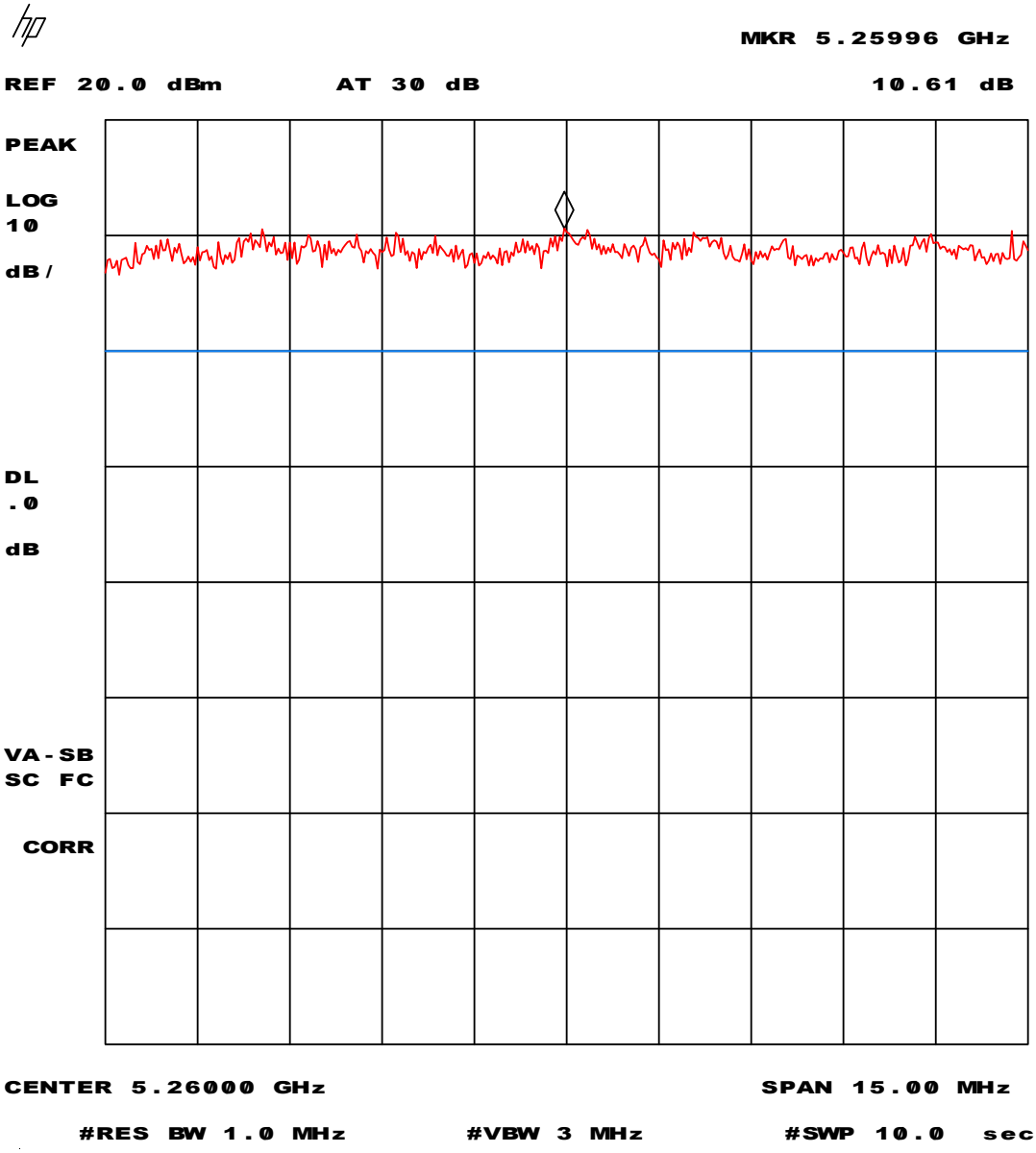
Plot 56 – Ratio of the peak excursion of the modulation envelope.

Plot 56 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 48 (5240 MHz) and at a transmission bit-rate of 54 Mbit/s.



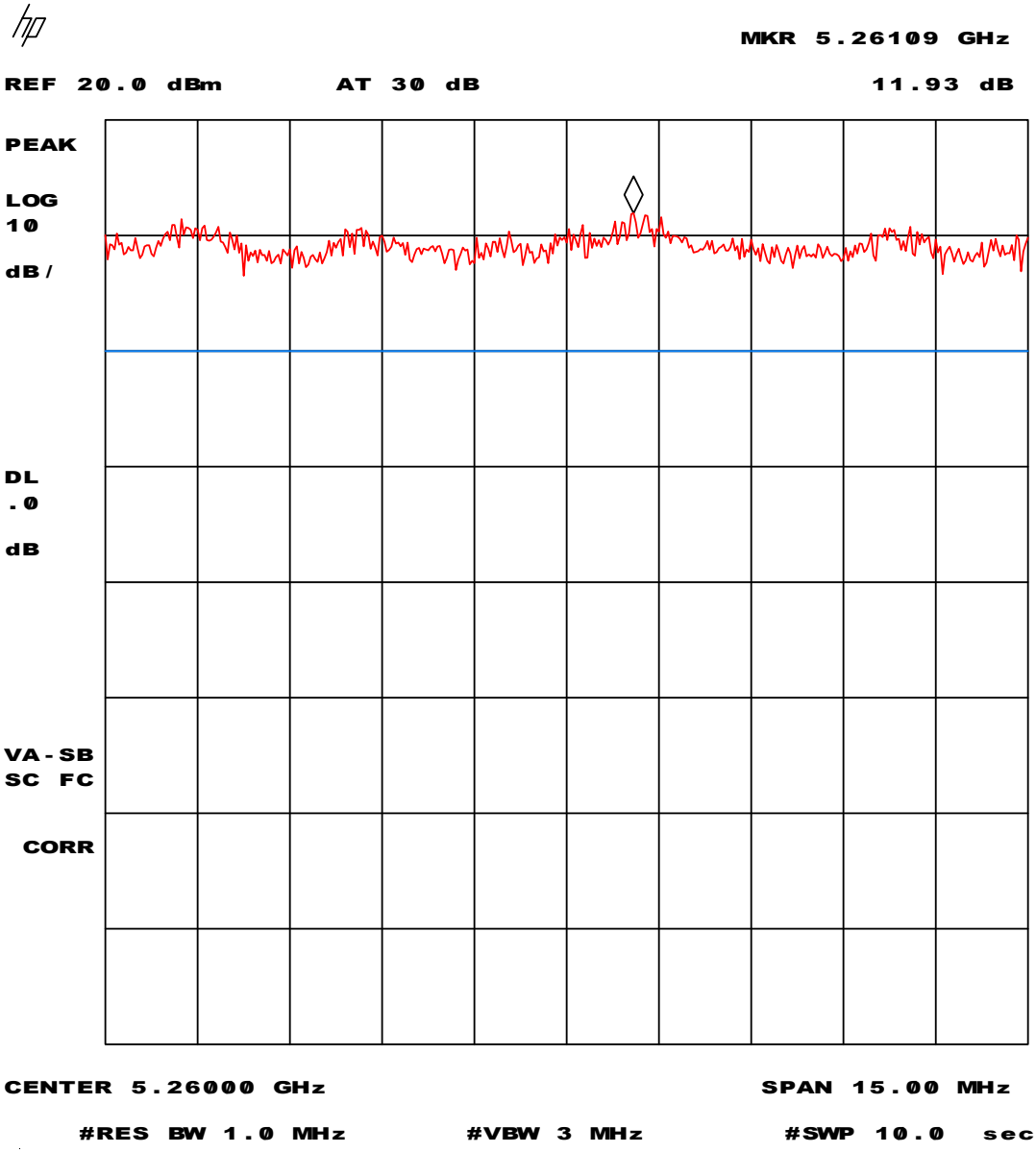
Plot 57 – Ratio of the peak excursion of the modulation envelope.

Plot 57 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 9 Mbit/s.



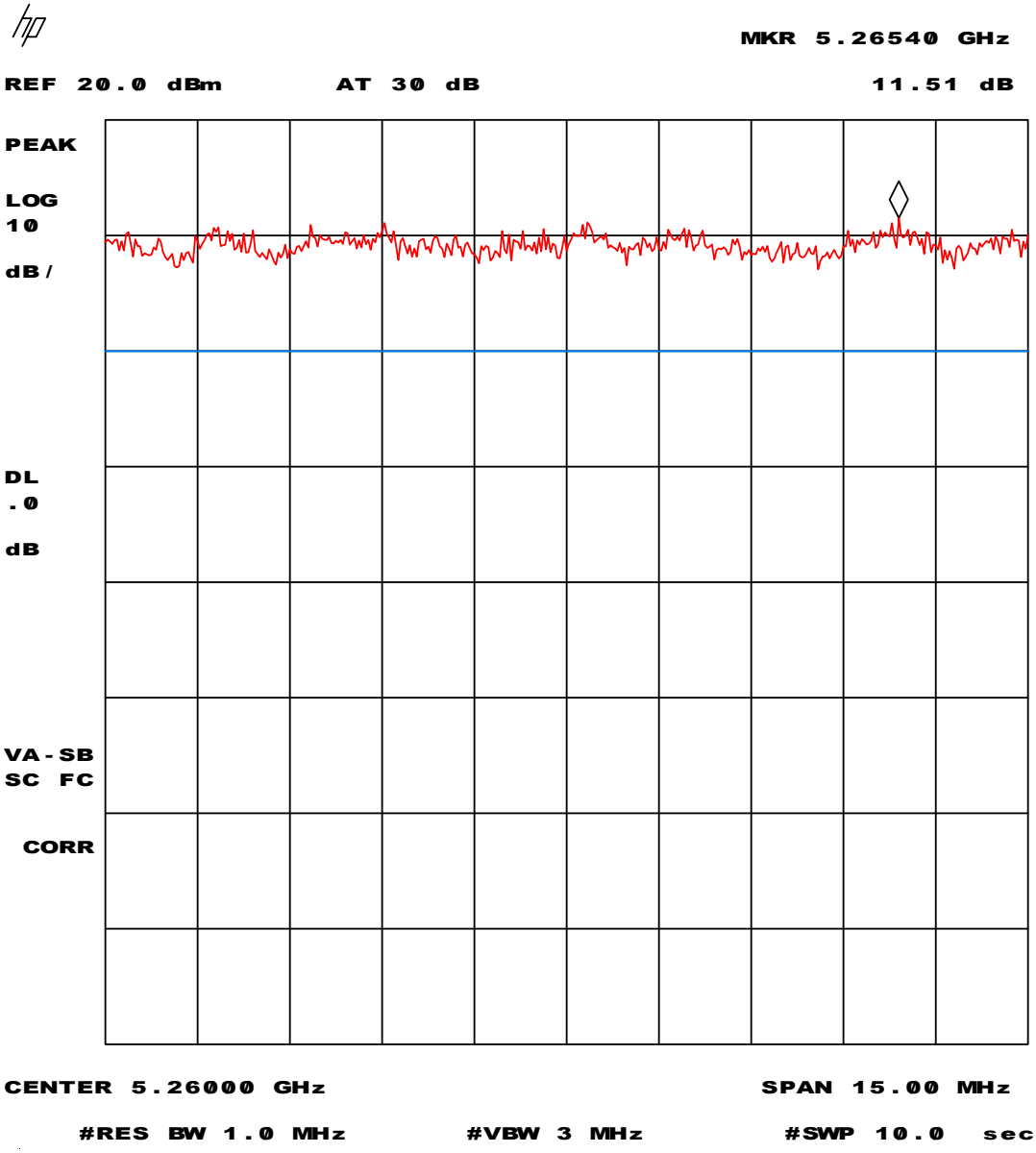
Plot 58 – Ratio of the peak excursion of the modulation envelope.

Plot 58 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 18 Mbit/s.



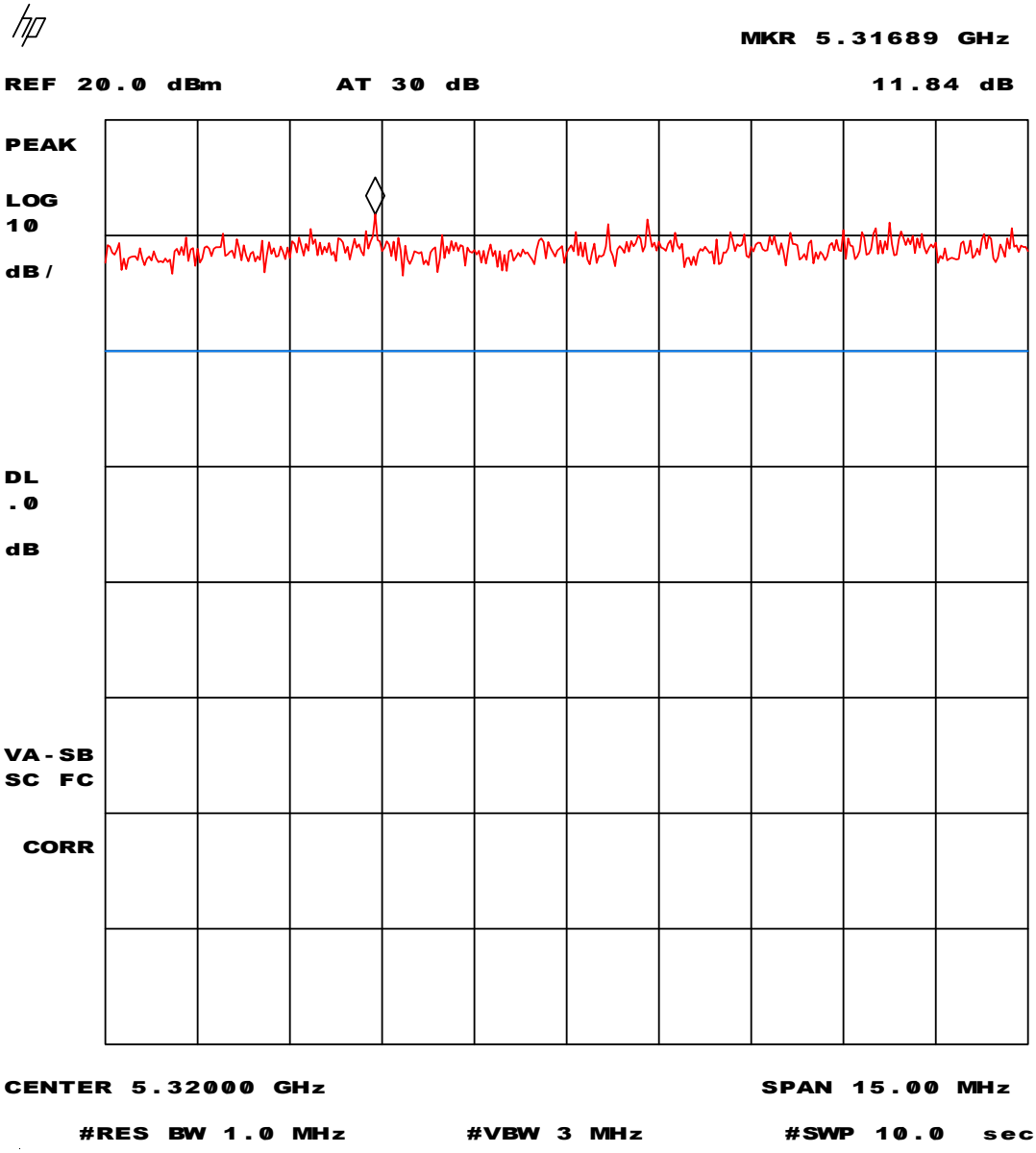
Plot 59 – Ratio of the peak excursion of the modulation envelope.

Plot 59 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 36 Mbit/s.



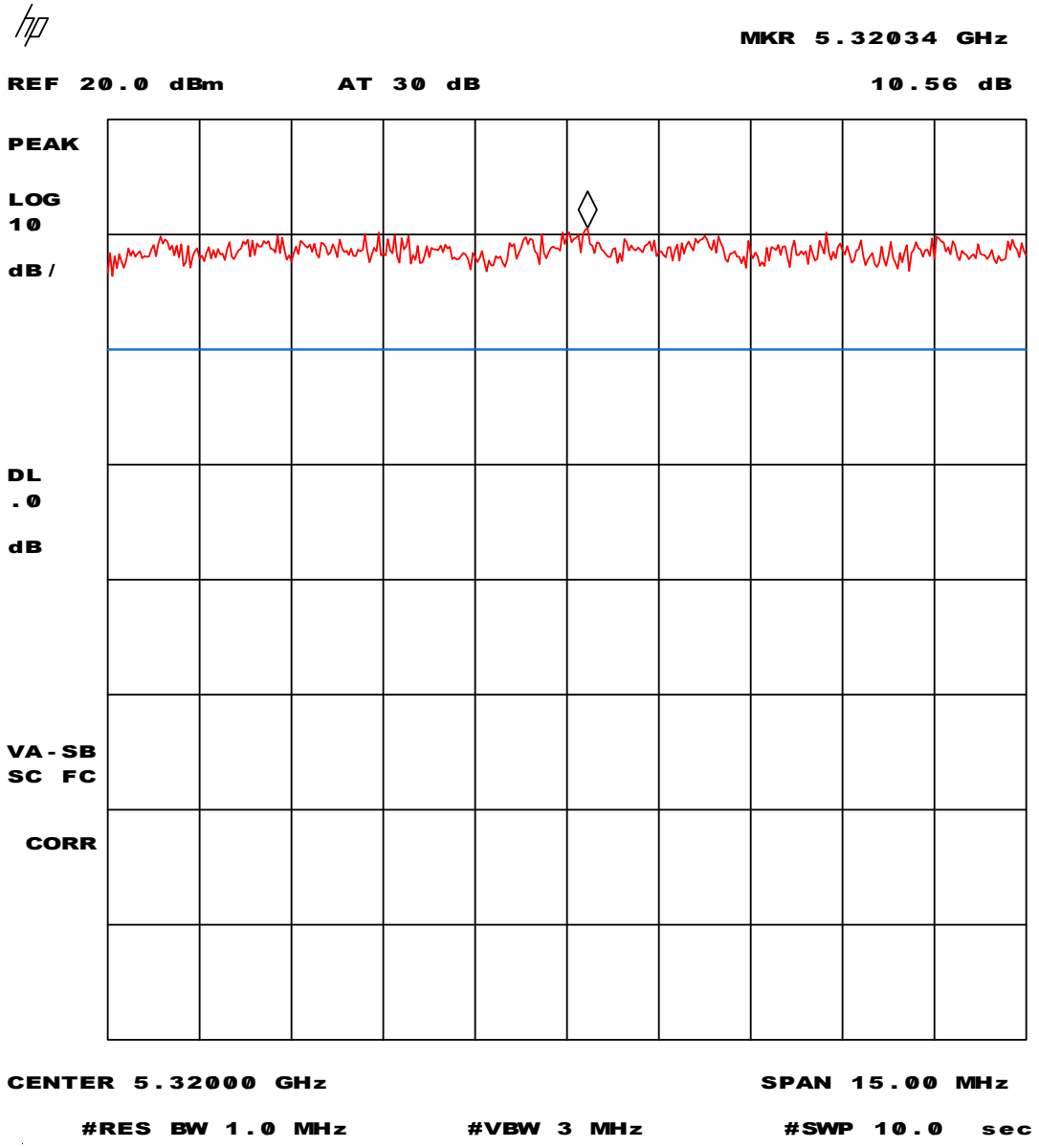
Plot 60 – Ratio of the peak excursion of the modulation envelope.

Plot 60 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 52 (5260 MHz) and at a transmission bit-rate of 54 Mbit/s.



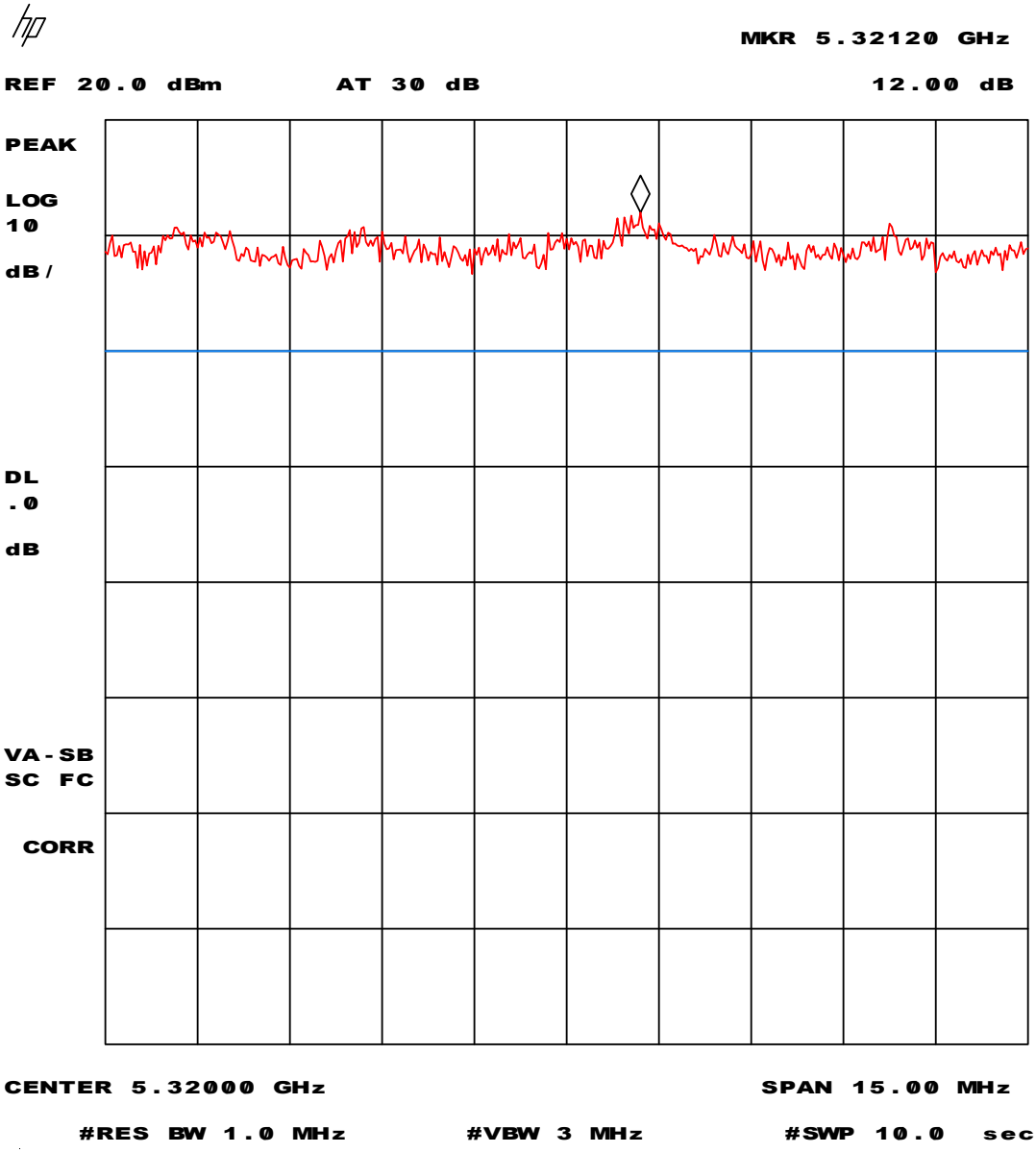
Plot 61 – Ratio of the peak excursion of the modulation envelope.

Plot 61 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 9 Mbit/s.



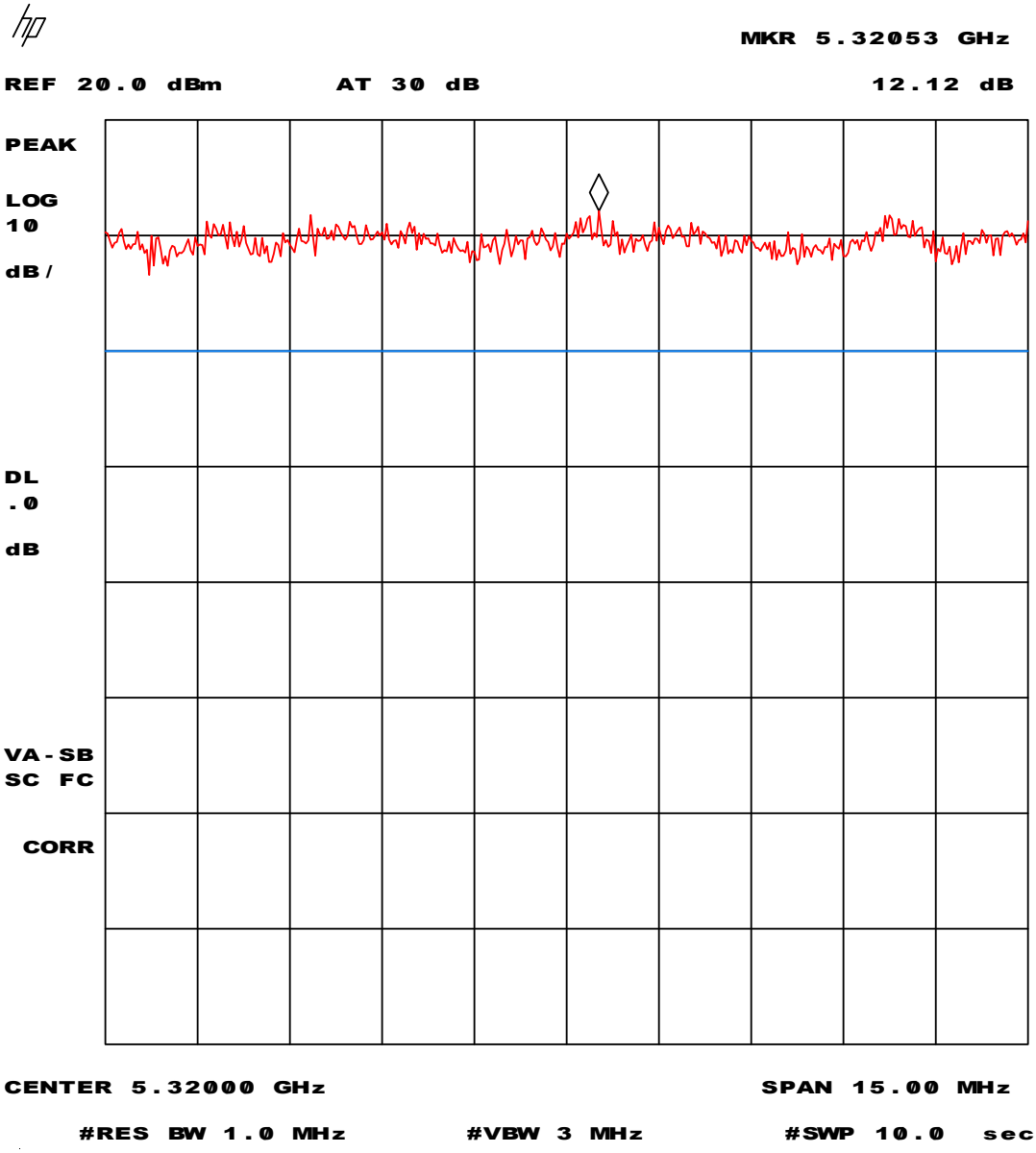
Plot 62 – Ratio of the peak excursion of the modulation envelope.

Plot 62 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 18 Mbit/s.



Plot 63 – Ratio of the peak excursion of the modulation envelope.

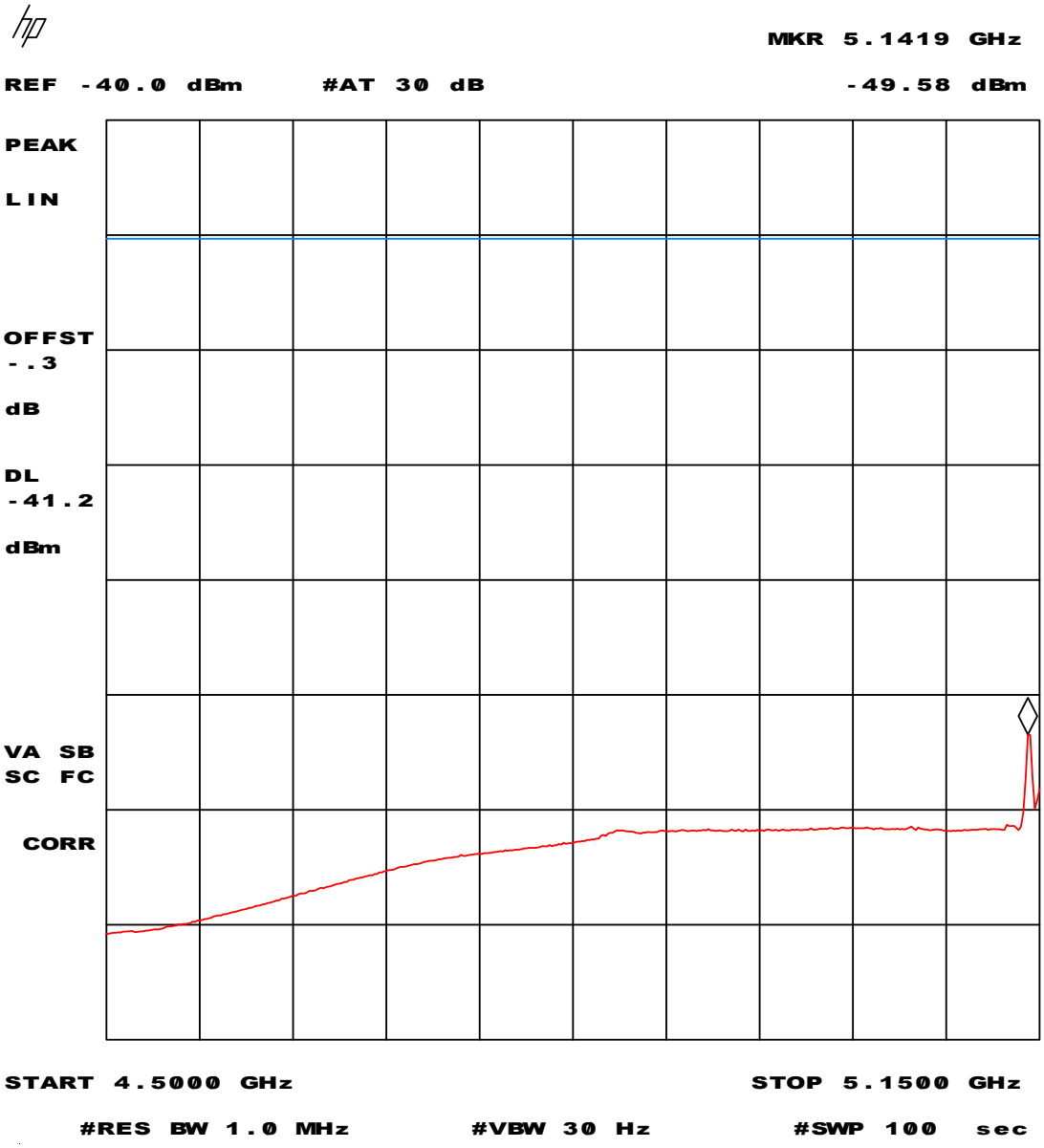
Plot 63 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 36 Mbit/s.



Plot 64 – Ratio of the peak excursion of the modulation envelope.

Plot 64 depicts the ratio of the peak excursion of the modulation envelope with the EUT operating on channel 64 (5320 MHz) and at a transmission bit-rate of 54 Mbit/s.

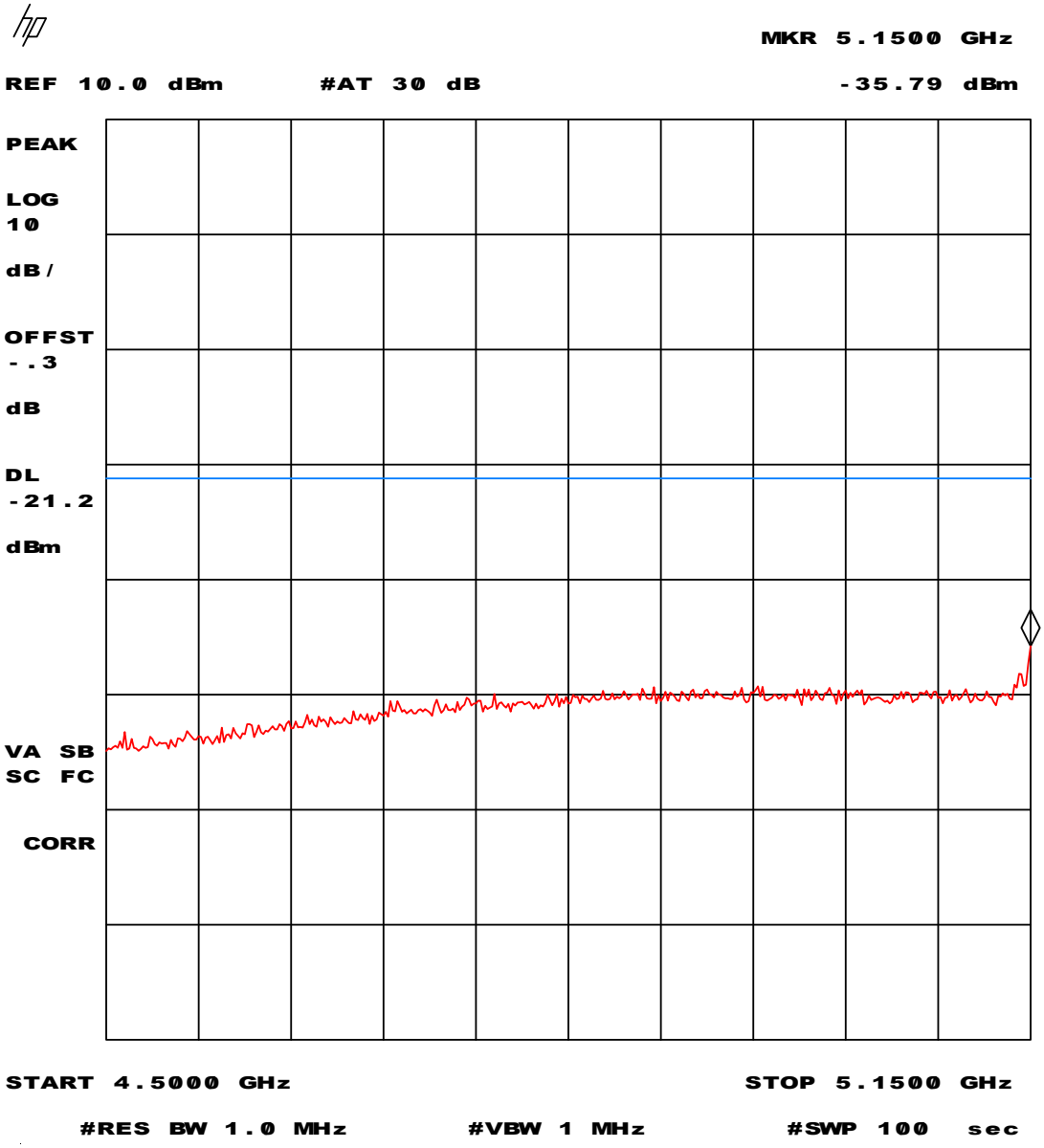
5.5 Emission in restricted bands nearest to the band of 5.15 – 5.35 GHz.



Plot 65 – Average measurement values in the 4.50 – 5.15 GHz restricted band of operation

Plot 65 depicts the average measurement values in the restricted band nearest to 5.15 – 5.35 GHz. All possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s), conducted measurement, corrected for –1.8 dBi antenna gain (including antenna cable losses) and 1.5 dB measurement cable losses.

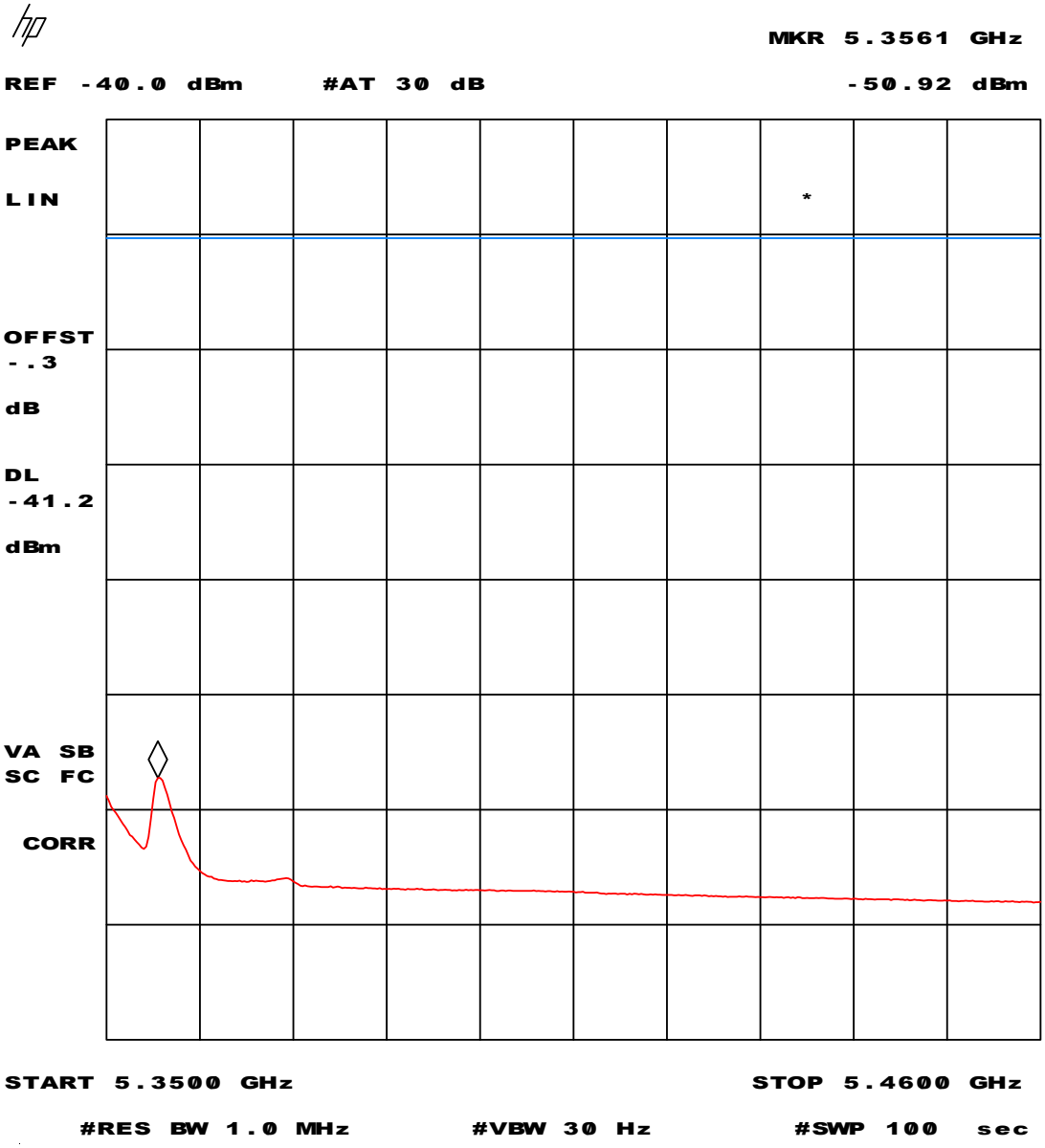
Note: 54 dBµV/m :: -41.2 dBm display line setting.



Plot 66 – Peak measurement values in the 4.50 – 5.15 GHz restricted band of operation

Plot 66 depicts the peak measurement values in the restricted band nearest to 5.15 – 5.35 GHz with the EUT transmitting in all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s), conducted measurement, corrected for –1.8 dBi antenna gain (including antenna cable losses) and 1.5 dB measurement cable losses.

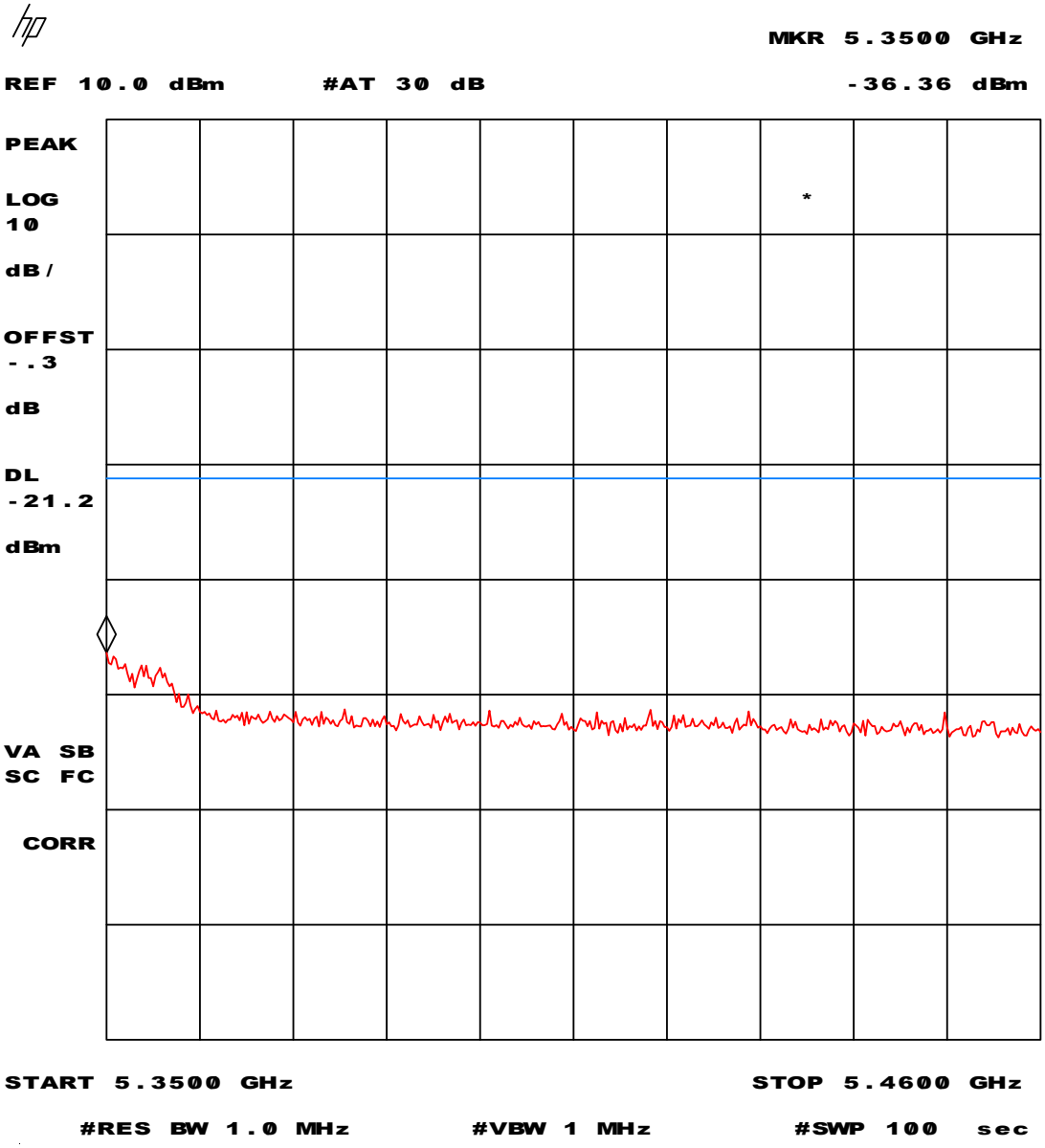
Note: 74 dBµV/m :: -21.2 dBm display line setting.



Plot 67 – Average measurement values in the 5.35 – 5.46 GHz restricted band of operation

Plot 67 depicts the average measurement values in the restricted band nearest to 5.35 – 5.46 GHz with the EUT transmitting in all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s), conducted measurement, corrected for –1.8 dBi antenna gain (including antenna cable losses) and 1.5 dB measurement cable losses.

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



Plot 68 – Peak measurement values in the 5.35 – 5.46 GHz restricted band of operation

Plot 68 depicts the peak measurement values in the restricted band nearest to 5.35 – 5.46 GHz with the EUT transmitting in all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s), conducted measurement, corrected for –1.8 dBi antenna gain (including antenna cable losses) and 1.5 dB measurement cable losses.

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

6 List of utilized test equipment.

Inventory number	Description	Brand	Model
12471	Biconical antenna 20MHz-200MHz	EATON	94455-1
12473	Log-per antenna 200-1000MHz	EATON	96005
12476	Antenna mast	EMCO	TR3
12477	Antenna mast 1-4 mtr	Poelstra	--
12482	Loop antenna	EMCO	6507
12483	Guidehorn	EMCO	3115
12484	Guidehorn	EMCO	3115
12486	Guidehorn 18 – 40 GHz	EMCO	3116
12488	Guidehorn 18 - 26.5 GHz	EMCO	RA42-K-F-4B-C
12533	Signalgenerator	MARCONI	2032
12559	Digital storage oscilloscope	Le Croy	9310M
12561	DC Power Supply 20A/70V	DELTA	SM7020D
12567	Plotter	HP	7440A
12605	calibrated dipole 28MHz-1GHz	Emco	3121c
12608	HF milliwattmeter	Hewlett Packard	HP435a
12609	Power sensor 10MHz-18GHz	Hewlett Packard	HP8481A
12636	Polyester chamber	Polyforce	--
12640	Temperature chamber	Heraeus	VEM03/500
13664	Spectrum analyzer	HP	HP8593E
13078	Preamplifier 0.1 GHz - 12 GHz	Miteq	AMF-3D-001120-35-14p
13452	Digital multi meter	HP	34401A
13526	Signalgenerator 20 GHz	Hewlett & Packard	83620A
13594	Preamplifier 10 GHz - 25 GHz	Miteq	AMF-6D-100250-10p
13886	Open Area testsite	Comtest	--
14051	Anechoic room	Comtest	--
14450	2.4 GHz bandrejectfilter	BSC	XN-1783
15633	Biconilog Testantenna	Chase	CBL 6111B
15667	Measuring receiver	R&S	ESCS 30
99045	DC Power Supply 3A/30V	DELTA	E030/3
99055	Non-conducting support	NMi	--
99061	Non-conducting support 150cm	NMi	--
99068	Detector N-F/BNC-F	Radiall	R451576000
99069	Cable 5m RG214	NMi	--
99071	Cable 10m RG214	NMi	--
99076	Bandpassfilter 4 - 10 GHz	Reactel	7AS-7G-6G-511
99077	Regulating trafo	RFT	LTS006
99112	Tripod	Chase	--
99136	Bandpassfilter 10 - 26.5 GHz	Reactel	9HS-10G/26.5G-S11
99199	Spectrum Analyzer	R&S	FSP40