TEST REPORT OF A 2.4/5 GHZ IEEE 802.11g/a WLAN CARDBUS CARD, BRAND AGERE, MODEL 1102, IN CONFORMITY WITH 47 CFR PART 15 (2003-03-13).

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

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MEASUREMENT/TECHNICAL REPORT

Agere Systems Nederland B.V.

Model: 1102

FCC ID: IMRCB1102

December 16, 2003

This report concerns:	Original grant/certification ~~Class 2 change~~ ~~Verification~~	
Equipment type:	Digital Transmission System	
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.
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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: December 16, 2003 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	:	Agere Systems Nederland B.V.
Brand	:	Agere
Model	:	1102
Serial numbers	:	03UT38900028
Revision	:	B1
Receipt number	:	1
Receipt date	:	November 17, 2003

Applicant information

Applicant's representative	:	Mr. W. Kerkhof
Company	:	Agere Systems Nederland B.V.
Address	:	Zadelstede 1-10
Postal code	:	3431 JZ
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Test(s) performed

Location	:	Niekerk
Test(s) started	:	November 17, 2003
Test(s) completed	:	December 15, 2003
Purpose of test(s)	:	Type approval / certification
Test specification(s)	:	47 CFR Part 15 (2003-03-13)

Test engineer	:	H.J. Pieters
Report written by	:	H.J. Pieters
Project leader	:	H.J. Pieters

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1 General information

1.1 Product description

The 2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card, brand Agere, model 1102, is designed to operate in the 5 GHz frequency band (5.725 GHz – 5.850 GHz), as specified by the Federal Communications Commission in the USA.

The 2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card, brand Agere, model 1102, utilizes Direct Sequence Spread Spectrum (DSSS) and OFDM modulation techniques.

The 2.4/5 GHz IEEE 802.11g/a WLAN Cardbus card, brand Agere, model 1102, 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	1102	03UT38900028	IMRCB1102	None.
Dell notebook computer	PP01L	TW-0791UH-12800-154-6532	n.a. (DoC)	-Unshielded DC power cord to AC/DC adapter -Shielded parallel cable to printer -Shielded USB mouse cable to USB mouse
Dell AC/DC power adapter 100-240 VAC/1.5 Amps to +20 VDC/3.5 Amps	AA20031	CN-09364U-16291-143-0070	n.a. (DoC)	-Unshielded DC power cord to notebook computer -Unshielded power cord to AC mains
Dell Wheel Mouse	IntelliMouse	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 15.247.

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 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 Cardbus slot of the host system 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 lowest operating frequency (channel 149: 5745 MHz), the operating frequency in the middle of the specified frequency band (channel 157: 5785 MHz) and the highest operating frequency (channel 165: 5825 MHz). Further details may be found in table 2 below.

Channel	Operating frequencies (MHz)	Rated output power (dBm)	Test performed
149	5745	+10.1	***yes***
153	5765	+10.1	no
157	5785	+10.1	***yes***
161	5805	+10.1	no
165	5825	+10.1	***yes***

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

The EUT is able to transmit at various transmission bit-rates and utilizes a number of modulation techniques and modulation schemes. Table 3 lists all possible transmission bit-rates, modulation techniques and modulation schemes the EUT may utilize. The choice of the various transmission bit-rates which should be selected during all tests is based on the results of pre-scans from which the worst-case behavior of the EUT at certain transmission bit-rates could be determined.

Transmission bit-rate (Mbit/s)	Modulation technique	Modulation	Test performed
6	OFDM	BPSK	no
9	OFDM	BPSK	***yes***
12	OFDM	QPSK	no
18	OFDM	QPSK	***yes***
24	OFDM	16 QAM	no
36	OFDM	16 QAM	***yes***
48	OFDM	64 QAM	no
54	OFDM	64 QAM	***yes***

Table 3 - Specification of transmission bit-rates, modulation techniques and modulation schemes.

1.7.2 EUT test software

The EUT could be enabled to transmit or receive continuously on channels 149 (5745 MHz), 157 (5785 MHz) and 165 (5825 MHz) by means of test software, which was supplied by the manufacturer of the EUT.

Furthermore, the utilized test software also enables access to transmission bit-rate settings in the range of: 6 Mbits/s, 9 Mbit/s, 12 Mbit/s, 18 Mbit/s, 24 Mbit/s, 36 Mbit/s, 48 Mbit/s and 54 Mbit/s (OFDM mode).

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 149

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 149 (5745 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				
51.23	14.1	< 10.0	-	-	-	-	120	46.0	-	-
201.44	15.0	14.0	-	-	-	-	120	46.0	-	-
260.12	27.6	21.2	-	-	-	-	120	46.0	-	-
455.20	32.4	29.1	-	-	-	-	120	46.0	-	-
1911.00	-	-	n.t.	n.t.	< 40.0	< 40.0	1000	-	54.0	74.0
3823.00	-	-	n.t.	n.t.	< 40.0	< 40.0	1000	-	54.0	74.0
7646.00	-	-	n.t.	n.t.	44.2	43.2	1000	-	54.0	74.0

Table 4 - Test results with the EUT operating in receive mode on channel 149 (5745 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 : December 10, 2003

2.2 Test results with EUT operating in receive mode on channel 157

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 157 (5785 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				
51.23	14.1	< 10.0	-	-	-	-	120	46.0	-	-
201.44	15.0	14.0	-	-	-	-	120	46.0	-	-
260.12	27.6	21.2	-	-	-	-	120	46.0	-	-
455.20	32.4	29.1	-	-	-	-	120	46.0	-	-
1925.00	-	-	n.t.	n.t.	< 40.0	< 40.0	1000	-	54.0	74.0
3850.00	-	-	n.t.	n.t.	< 40.0	< 40.0	1000	-	54.0	74.0
7700.00	-	-	n.t.	n.t.	47.8	44.2	1000	-	54.0	74.0

Table 5 - Test results with the EUT operating in receive mode on channel 157 (5785 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 5 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : H.J. Pieters

Date : December 10, 2003

2.3 Test results with EUT operating in receive mode on channel 165

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 165 (5825 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				
51.23	14.1	< 10.0	-	-	-	-	120	46.0	-	-
201.44	15.0	14.0	-	-	-	-	120	46.0	-	-
260.12	27.6	21.2	-	-	-	-	120	46.0	-	-
455.20	32.4	29.1	-	-	-	-	120	46.0	-	-
1938.00	-	-	n.t.	n.t.	< 40.0	< 40.0	1000	-	54.0	74.0
3786.00	-	-	n.t.	n.t.	< 40.0	< 40.0	1000	-	54.0	74.0
7753.00	-	-	n.t.	n.t.	48.3	51.2	1000	-	54.0	74.0

Table 6 - Test results with the EUT operating in receive mode on channel 165 (5825 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 6 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : H.J. Pieters

Date : December 10, 2003

2.4 Test results with EUT operating in transmit mode on channel 149

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 149 (5745 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				
51.23	14.1	< 10.0	-	-	-	-	120	46.0	-	-
201.44	15.0	14.0	-	-	-	-	120	46.0	-	-
260.12	27.6	21.2	-	-	-	-	120	46.0	-	-
455.20	32.4	29.1	-	-	-	-	120	46.0	-	-
1911.00	-	-	n.t.	n.t.	38.9	38.7	1000	-	54.0	74.0
3823.00	-	-	n.t.	n.t.	< 34.0	< 34.0	1000	-	54.0	74.0
7646.00	-	-	n.t.	n.t.	47.8	42.7	1000	-	54.0	74.0

Table 7 - Test results with the EUT operating in transmit mode on channel 149 (5745 MHz).

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: 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 : H.J. Pieters

Date : December 10, 2003

2.5 Test results with EUT operating in transmit mode on channel 157

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 157 (5785 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				
51.23	14.1	< 10.0	-	-	-	-	120	46.0	-	-
201.44	15.0	14.0	-	-	-	-	120	46.0	-	-
260.12	27.6	21.2	-	-	-	-	120	46.0	-	-
455.20	32.4	29.1	-	-	-	-	120	46.0	-	-
1925.00	-	-	n.t.	n.t.	36.2	36.6	1000	-	54.0	74.0
3850.00	-	-	n.t.	n.t.	< 34.0	< 34.0	1000	-	54.0	74.0
7700.00	-	-	n.t.	n.t.	46.9	43.2	1000	-	54.0	74.0

Table 8 - Test results with the EUT operating in transmit mode on channel 157 (5785 MHz).

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: 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 8 are more than 20 dB below the applicable limit.

Test engineer

Signature : 

Name : H.J. Pieters

Date : December 10, 2003

2.6 Test results with EUT operating in transmit mode on channel 165

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 165 (5825 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				
51.23	14.1	< 10.0	-	-	-	-	120	46.0	-	-
201.44	15.0	14.0	-	-	-	-	120	46.0	-	-
260.12	27.6	21.2	-	-	-	-	120	46.0	-	-
455.20	32.4	29.1	-	-	-	-	120	46.0	-	-
1938.00	-	-	n.t.	n.t.	< 36.0	< 36.0	1000	-	54.0	74.0
3876.00	-	-	n.t.	n.t.	< 34.0	< 34.0	1000	-	54.0	74.0
7753.00	-	-	n.t.	n.t.	45.7	46.0	1000	-	54.0	74.0

Table 9 - Test results with the EUT operating in transmit mode on channel 165 (5825 MHz).

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: 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 9 are more than 20 dB below the applicable limit.

Test engineer

Signature 

Name : H.J. Pieters

Date : December 10, 2003

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 notebook computer in which the EUT is mounted, 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 149 (5745 MHz), 157 (5785 MHz) and 165 (5825 MHz) while utilizing all possible transmission bit-rates (OFDM mode: 6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s), are depicted in table 10.

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	
0.15	43.0	14.6	44.5	15.8	66.0	56.0	-23.0	-41.4	-21.5	-40.2	PASS
0.20	46.0	38.0	45.9	38.1	63.6	53.6	-17.6	-15.6	-17.7	-15.5	PASS
0.39	30.3	27.8	30.9	28.3	58.1	48.1	-27.8	-20.3	-27.2	-19.8	PASS
0.83	31.5	29.4	32.5	30.5	56.0	46.0	-24.5	-16.6	-23.5	-15.5	PASS
1.78	33.2	28.2	33.8	29.4	56.0	46.0	-22.8	-17.8	-22.2	-16.6	PASS
4.30	29.9	25.3	29.8	25.2	56.0	46.0	-26.1	-20.7	-26.2	-20.8	PASS
7.00	27.0	21.7	27.7	21.4	60.0	50.0	-33.0	-28.3	-32.3	-28.6	PASS
11.00	21.7	16.8	20.9	15.9	60.0	50.0	-38.3	-33.2	-39.1	-34.1	PASS
17.50	16.3	11.3	15.5	10.7	60.0	50.0	-43.7	-38.7	-44.5	-39.3	PASS
24.50	20.4	14.9	19.3	13.7	60.0	50.0	-39.6	-35.1	-40.7	-36.3	PASS
29.50	15.8	10.7	16.6	11.3	60.0	50.0	-44.2	-39.3	-43.4	-38.7	PASS

Table 10 - Test results with the EUT operating in transmit and receive mode.

Note: Disturbance voltage values of conducted 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 : December 10, 2003

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 11.

The plots of the measurement results may be found in section 5.1 of this test report.

Transmission bitrate (Mbit/s)	Minimum 6 dB bandwidth (kHz)			Limit (kHz)
	Channel 149 (5745 MHz)	Channel 157 (5785 MHz)	Channel 165 (5825 MHz)	
9	18450	18450	18450	>500
18	18450	18375	18450	>500
36	18450	18450	16650	>500
54	18450	18375	16575	>500

Table 11 - Minimum 6 dB bandwidth.

Test engineer

Signature 

Name : H.J. Pieters

Date : December 7, 2003

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 12. The maximum peak output power (conducted) was measured directly at the antenna connector.

Transmission bitrate (Mbit/s)	Maximum peak output power (conducted, dBm)			Limit (dBm) Antenna gain < 6 dBi
	Channel 149 (5745 MHz)	Channel 157 (5785 MHz)	Channel 165 (5825 MHz)	
9	10.1	9.3	8.8	30.0
18	9.7	9.2	8.5	30.0
36	9.7	9.2	8.5	30.0
54	10.1	9.2	8.5	30.0

Table 12 - Maximum peak output power (conducted).

Note: During the measurements, the AC mains supply voltage of the notebook PC 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 12. 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 : H.J. Pieters

Date : December 7, 2003

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 13.

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 5.2 of this test report.

Frequency (MHz)	Level below working channel (dB)	Limit of level below working channel (dB)
5724.65	-30.61	< -20.0
5850.35	-40.77	< -20.0
other frequencies	< -40.0	< -20.0

Table 13 - Conducted emission data outside restricted bands.

Note: Worst case measurement values for transmissions with all possible transmission bit-rates (6/9 Mbit/s, 12/18 Mbit/s, 24/36 Mbit/s and 48/54 Mbit/s) and channel 149 (5745 MHz), channel 157 (5785 MHz) and channel 165 (5825 MHz)) combinations.

Test engineer

Signature : 

Name : H.J. Pieters

Date : December 7, 2003

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 14.

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

Transmission bitrate (Mbit/s)	Peak power spectral density (conducted) in any 3 kHz band (dBm)			Limit (dBm)
	Channel 149 (5745 MHz)	Channel 157 (5785 MHz)	Channel 165 (5825 MHz)	
9	-19.7	-19.8	-21.9	<8.0
18	-20.6	-20.7	-22.4	<8.0
36	-20.4	-20.8	-22.5	<8.0
54	-21.0	-20.0	-21.8	<8.0

Table 14 - Peak power spectral density.

Test engineer

Signature 

Name : H.J. Pieters

Date : December 7, 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.

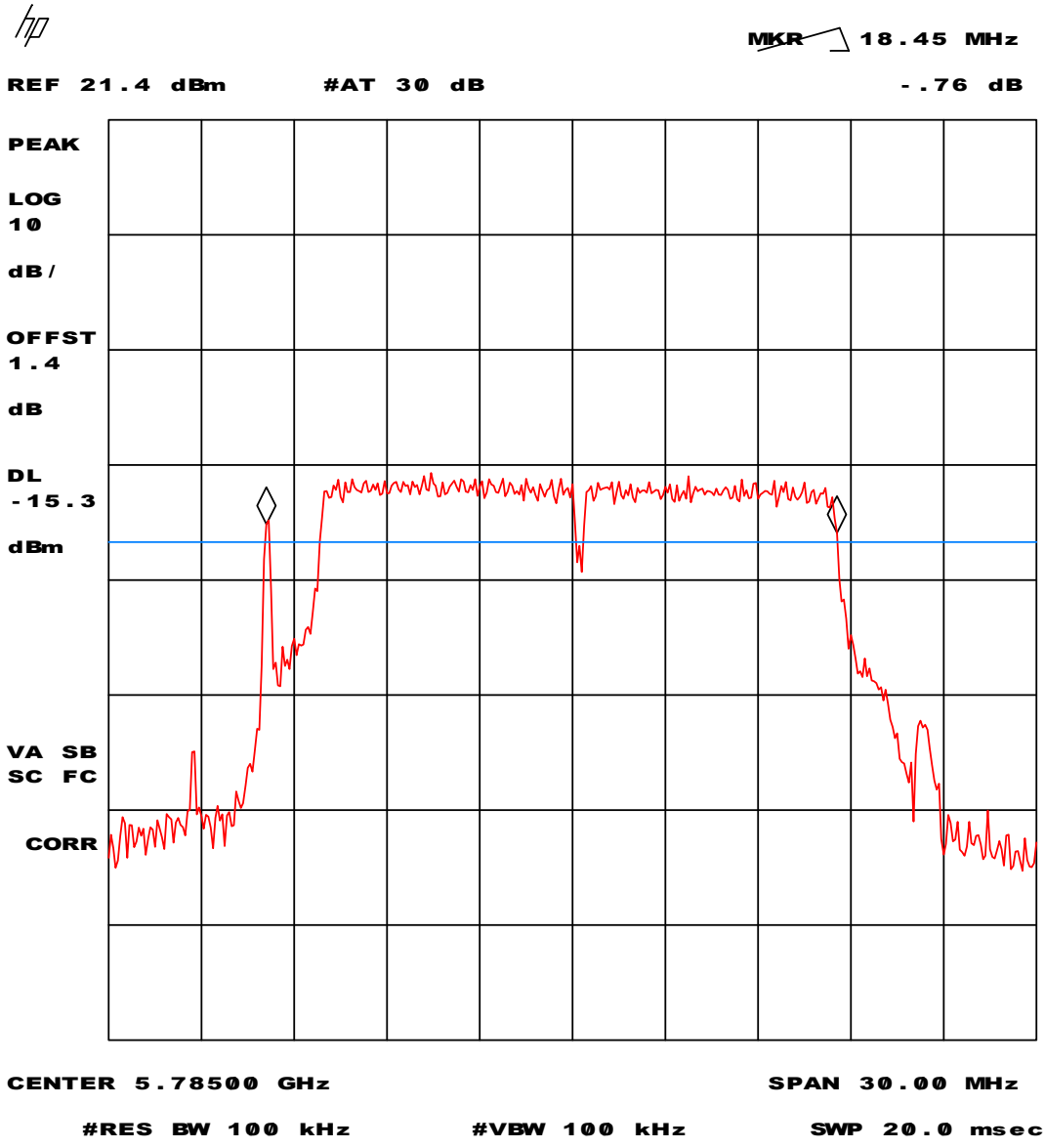
Test engineer

Signature : 

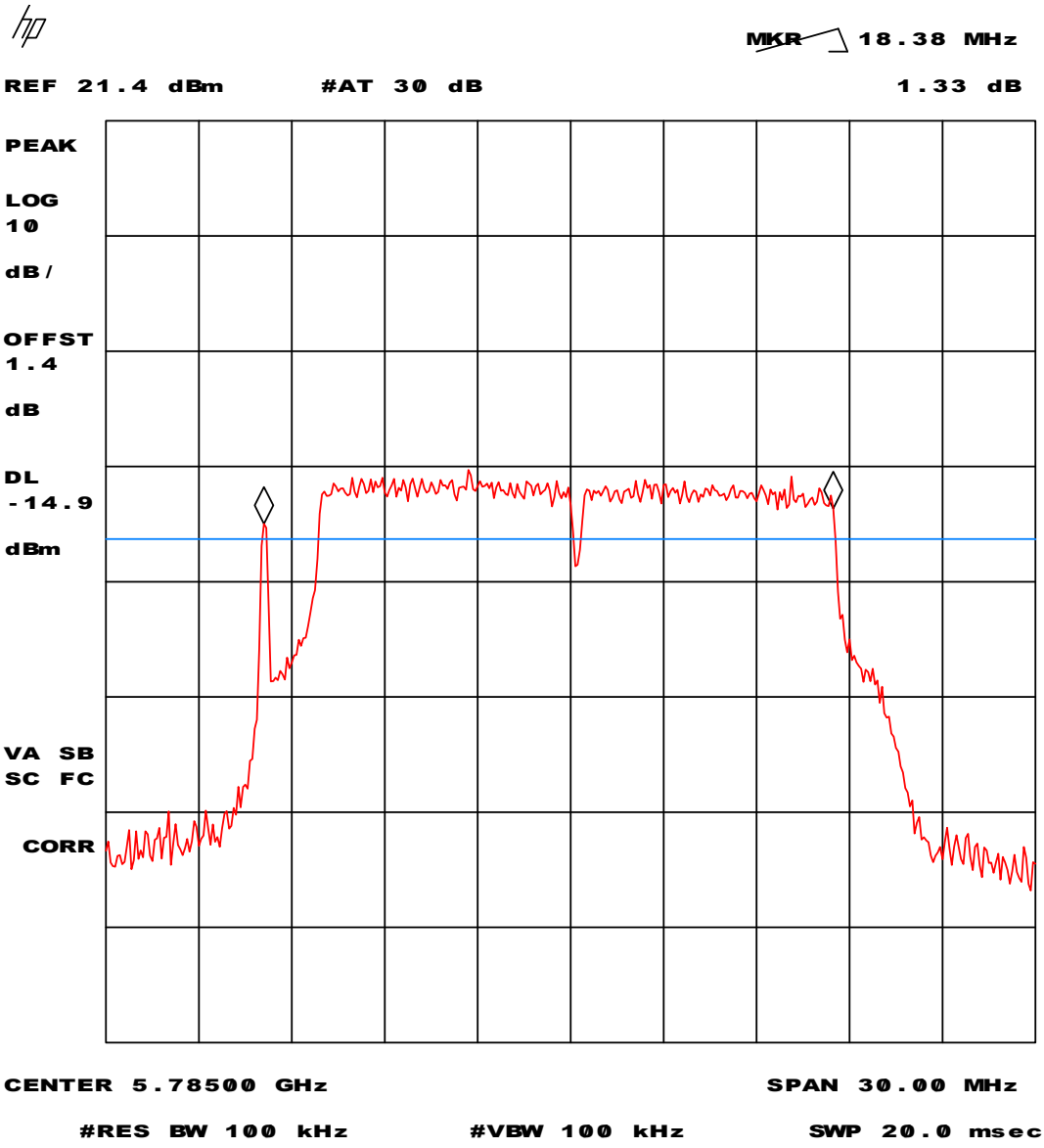
Name : H.J. Pieters

Date : December 7, 2003

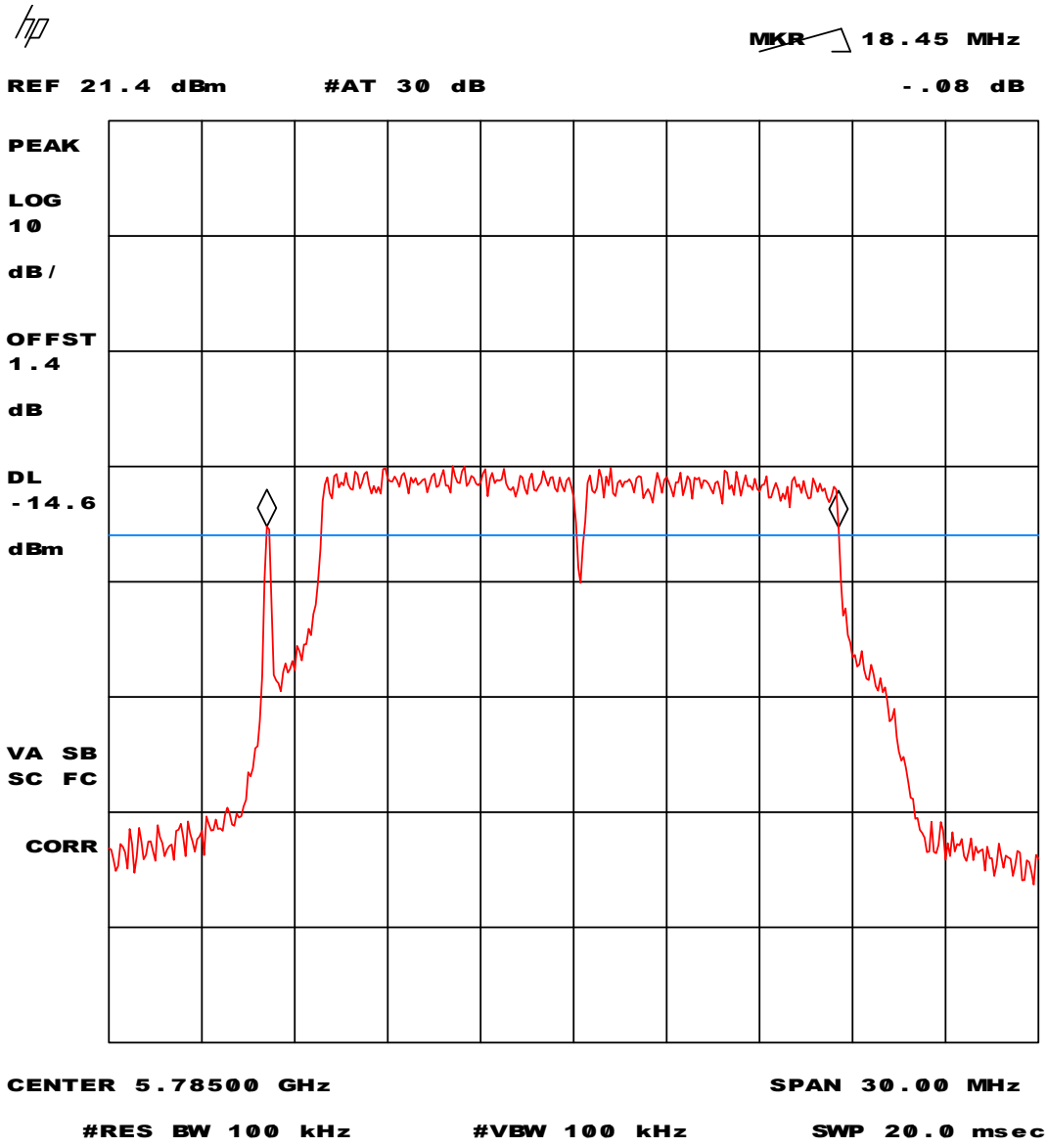
5.1 Minimum 6 dB bandwidth



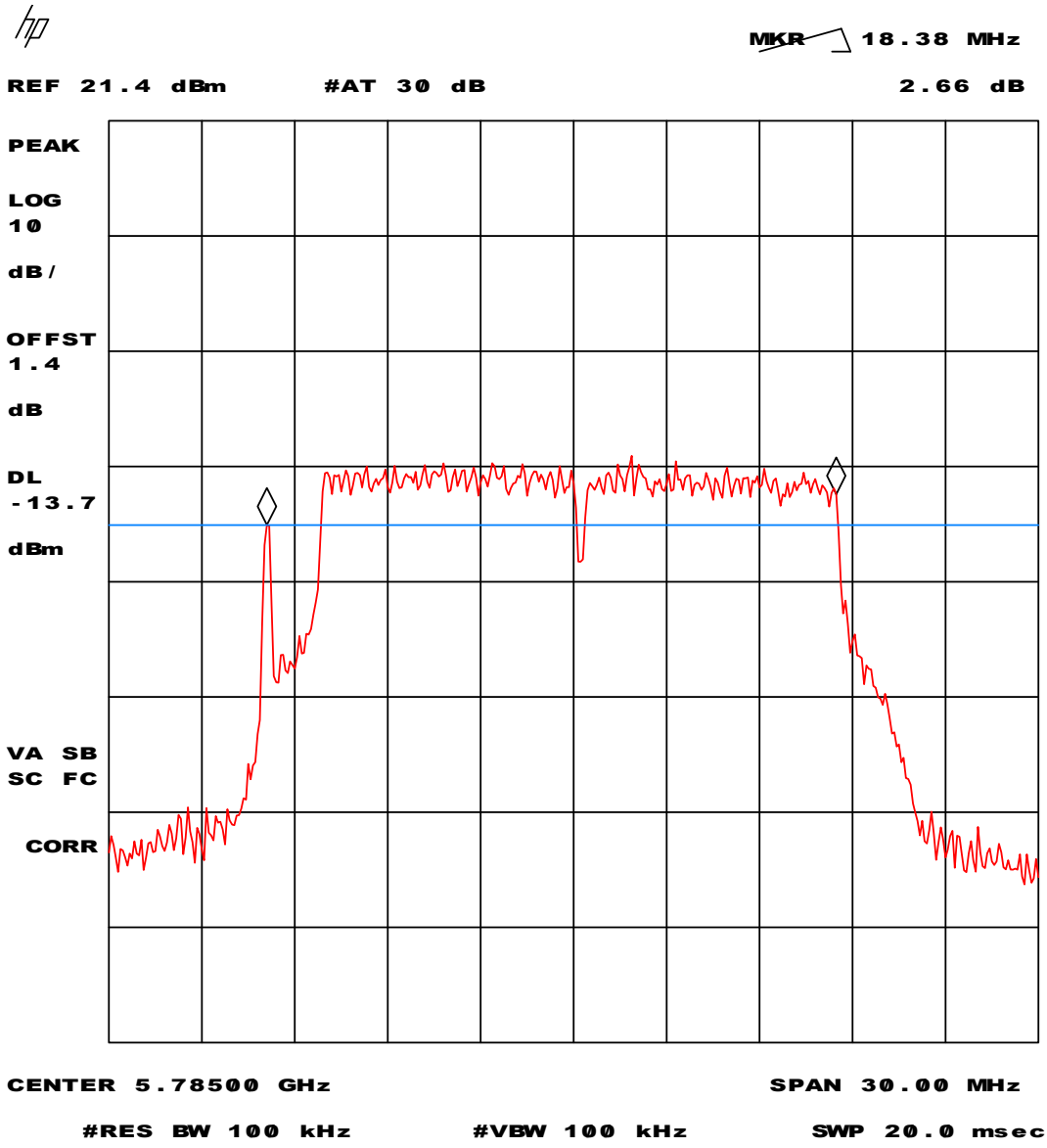
Plot 1 - Minimum 6 dB bandwidth at a transmission bit-rate of 9 Mbit/s.



Plot 2 - Minimum 6 dB bandwidth at a transmission bit-rate of 18 Mbit/s.

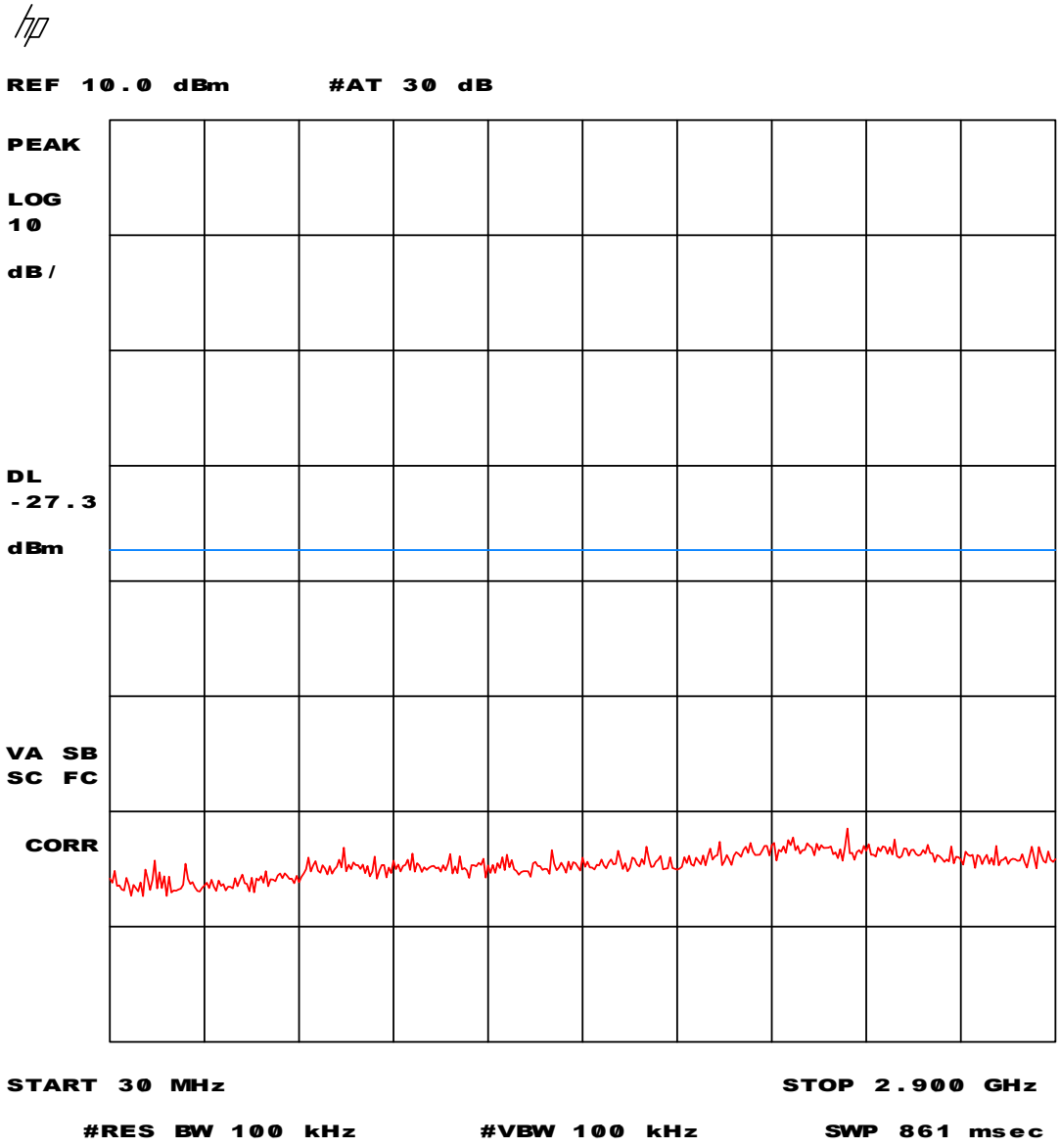


Plot 3 - Minimum 6 dB bandwidth at a transmission bit-rate of 36 Mbit/s.



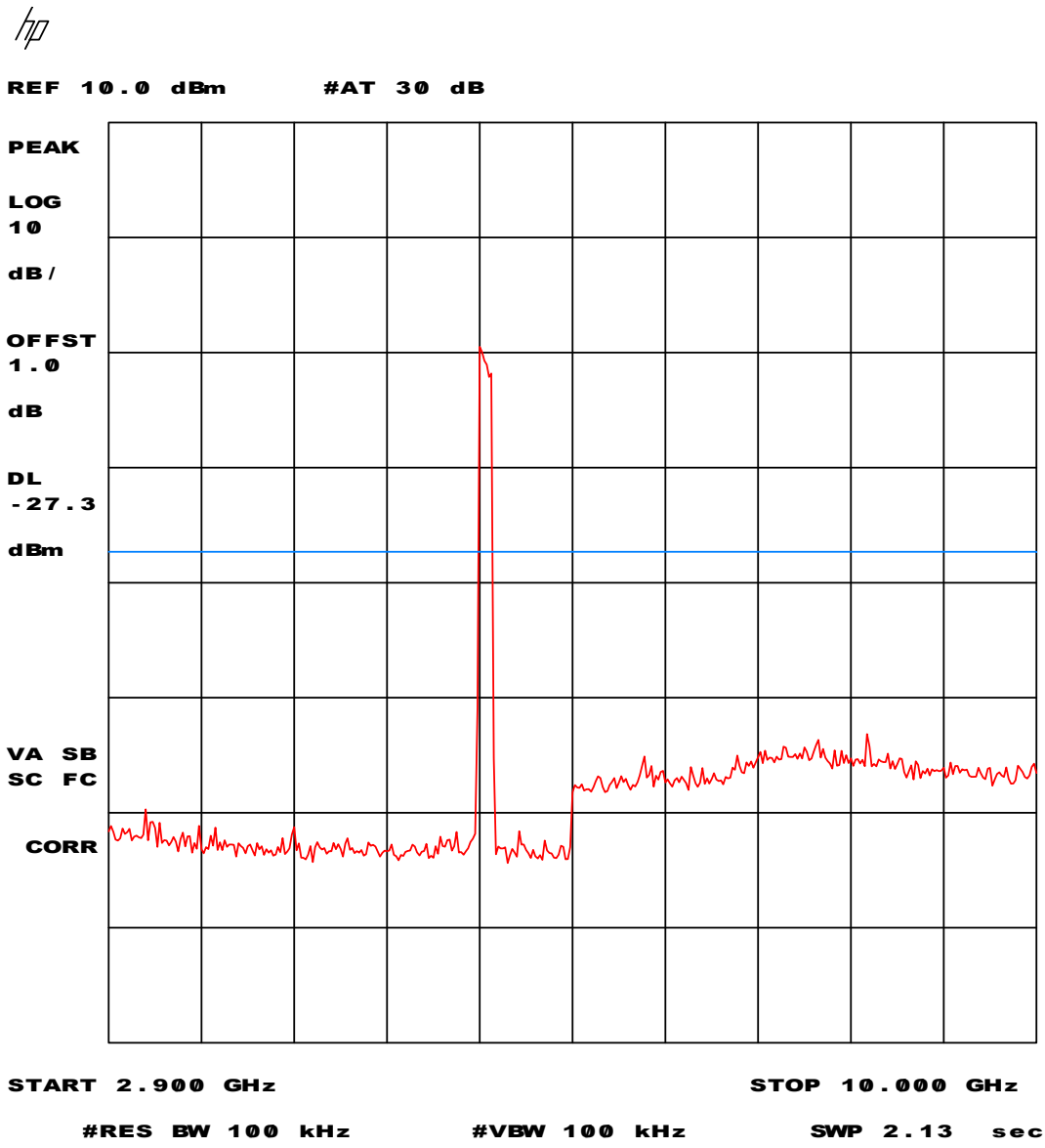
Plot 4 - Minimum 6 dB bandwidth at a transmission bit-rate of 54 Mbit/s.

5.2 Conducted emission data outside restricted bands



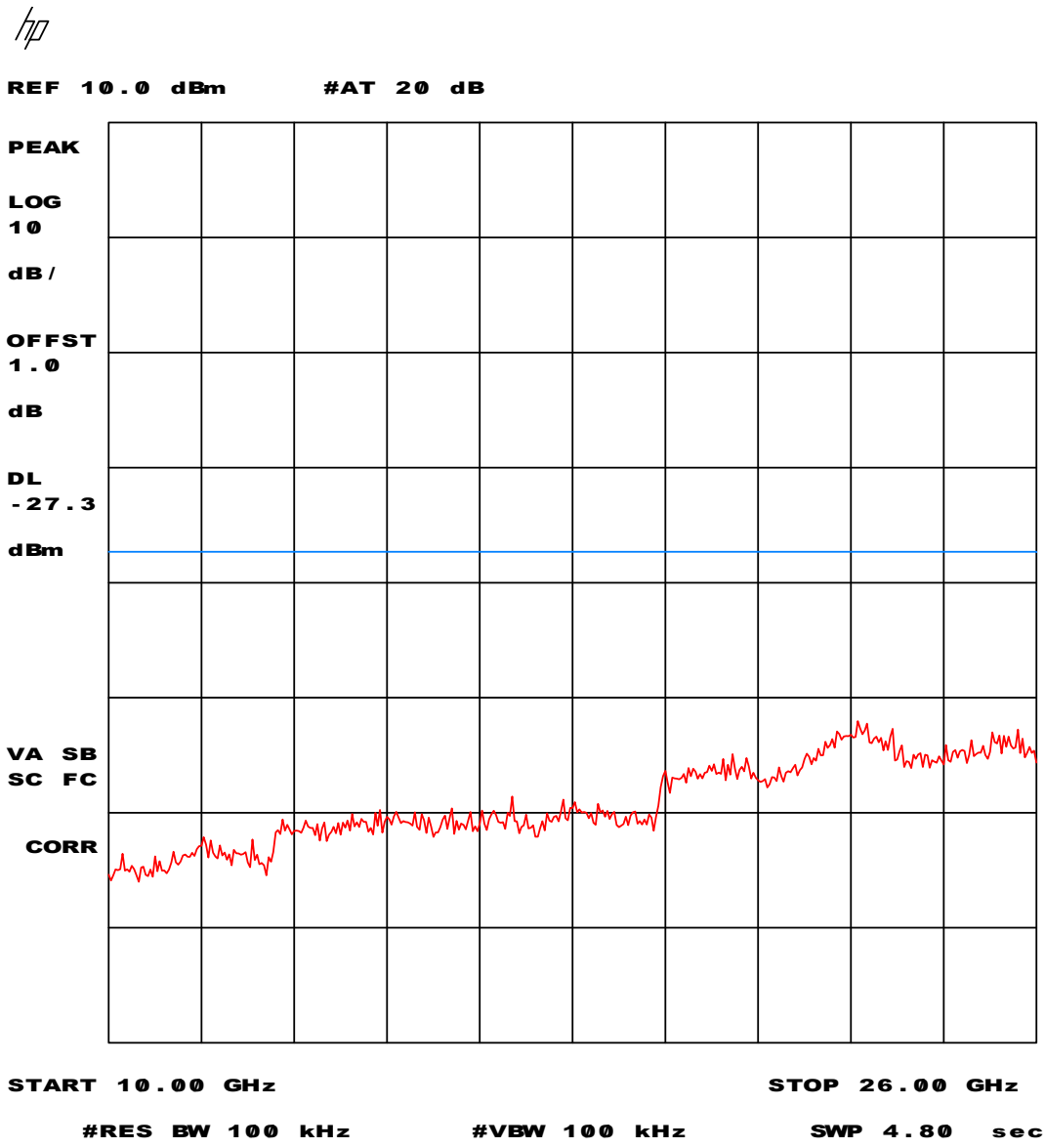
Plot 5 - Conducted emission outside restricted bands (OFDM mode).

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 6 - Conducted emission outside restricted bands (OFDM mode).

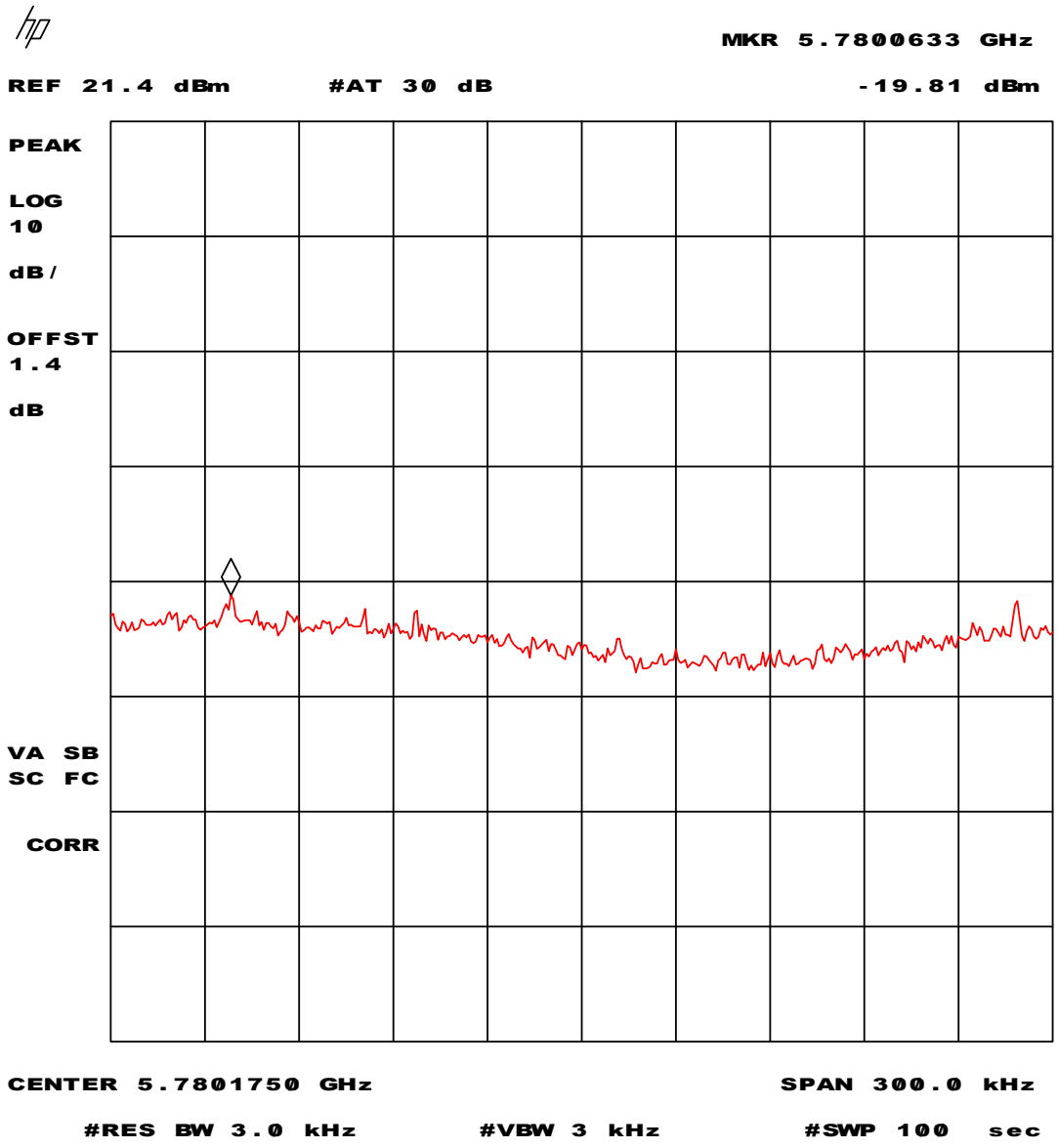
Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band. Display line: -20 dB limit line.



Plot 7 - Conducted emission outside restricted band (OFDM mode).

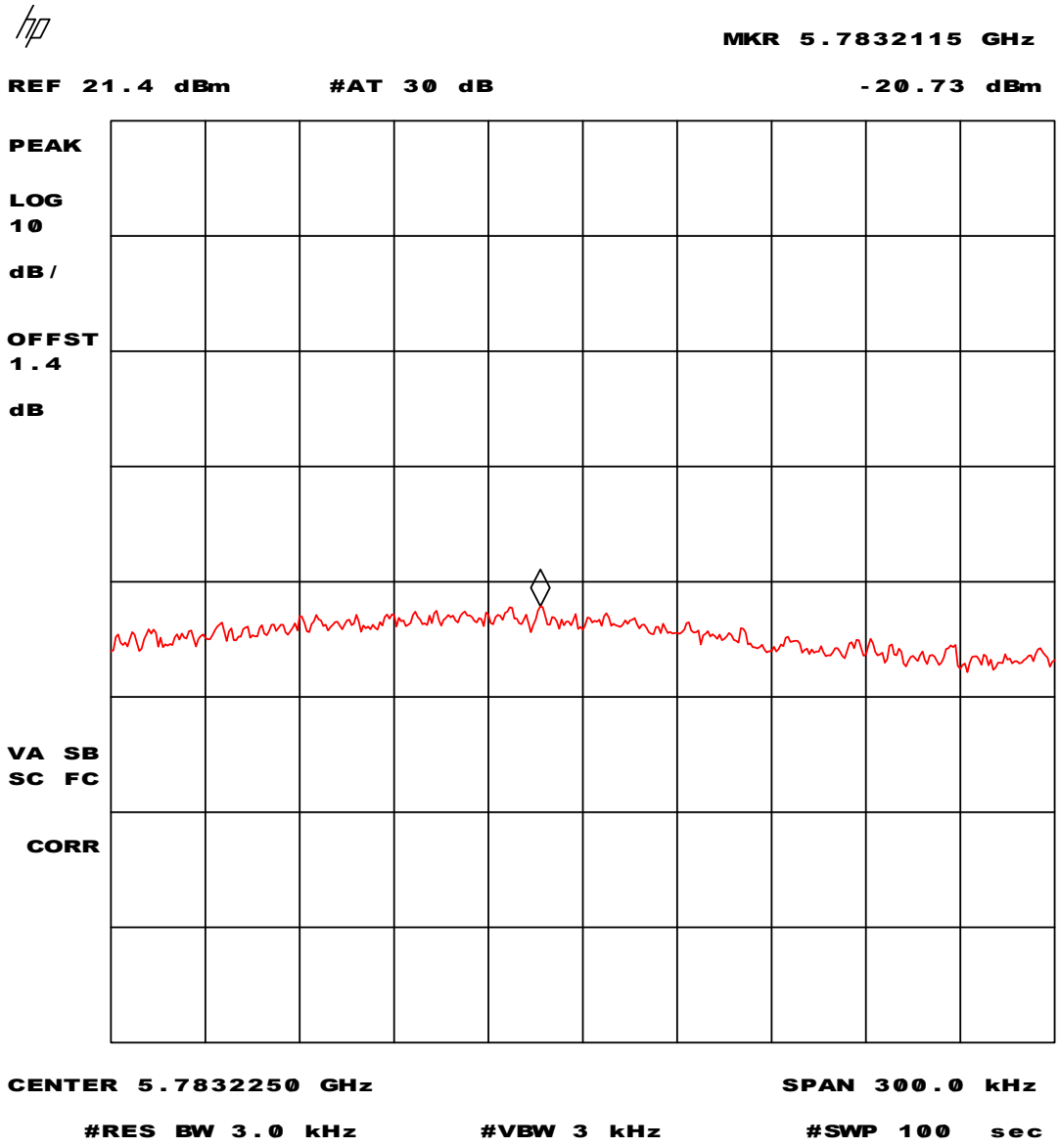
Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band. Display line: -20 dB limit line. Corrected (offset) for cable losses.

5.3 Peak power spectral density



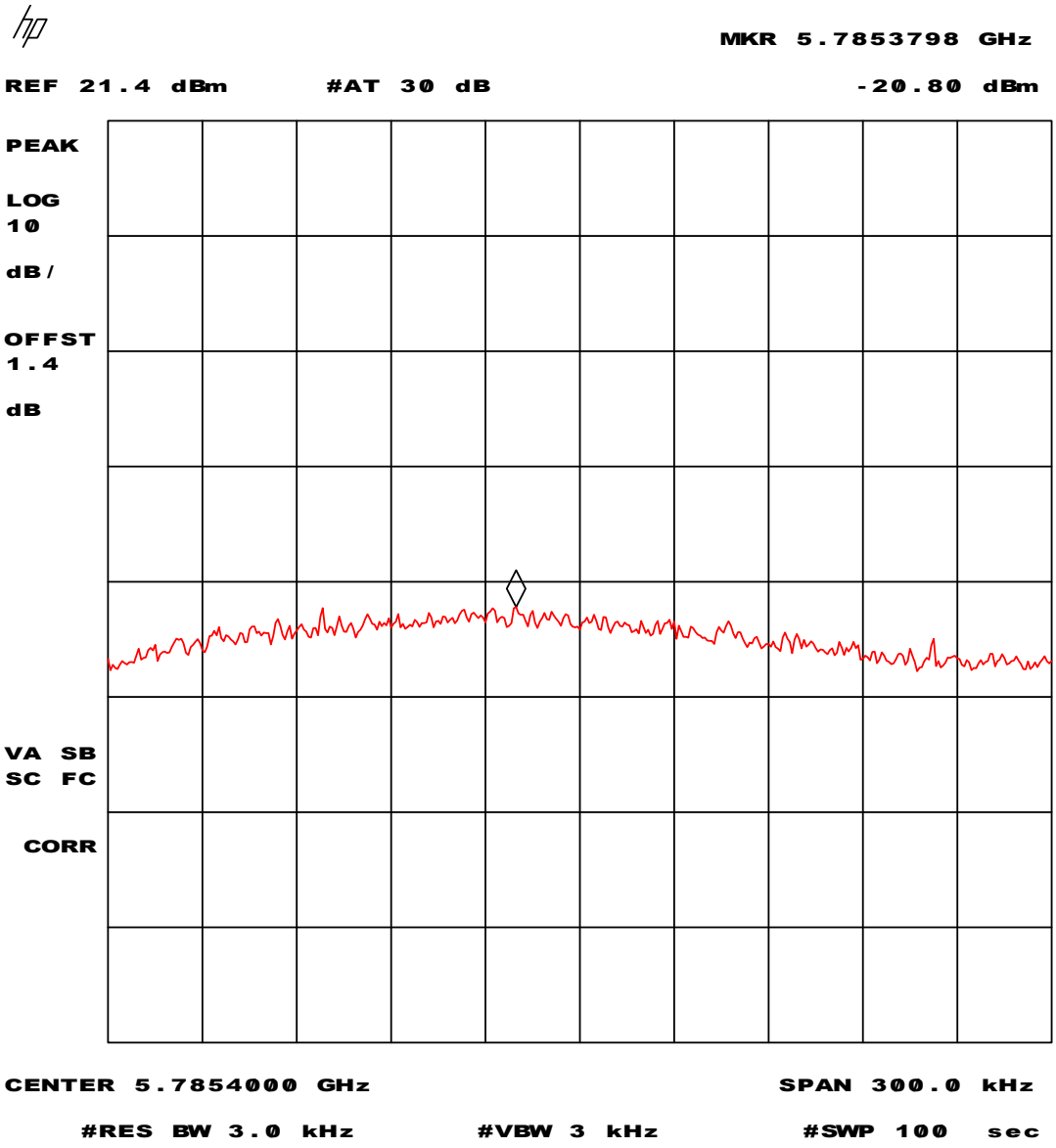
Plot 8 - Peak power spectral density (conducted) from the intentional radiator in any 3 kHz band.

Peak power spectral density (conducted) in a 3 kHz bandwidth at a transmission bit-rate of 9 Mbit/s. Corrected (offset) for cable losses.



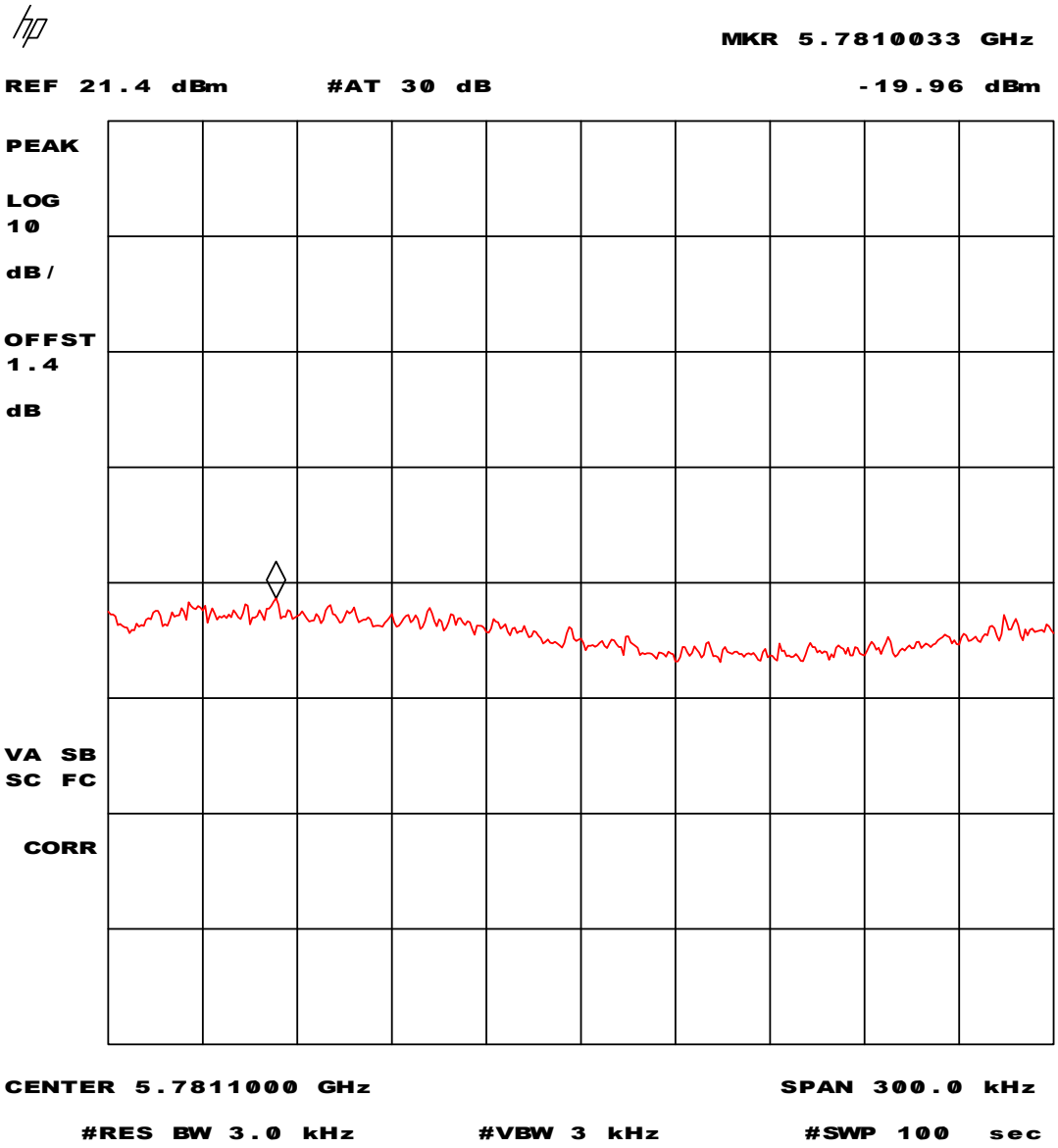
Plot 9 - Peak power spectral density (conducted) from the intentional radiator in any 3 kHz band.

Peak power spectral density (conducted) in a 3 kHz bandwidth at a transmission bit-rate of 18 Mbit/s. Corrected (offset) for cable losses.



Plot 10 - 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 bit-rate of 36 Mbit/s. Corrected (offset) for cable losses.



Plot 11 - 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 bit-rate of 54 Mbit/s. Corrected (offset) for cable losses.

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
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