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RADIO TEST REPORT

according to 47CFR Part 15, §15.247 and subpart B
for

Airspan Networks (Israel) Ltd.

EQUIPMENT UNDER TEST:

Indoor radio adapter

Models: IDR 900MHz TDD Ext A, IDR 900MHz TDD V-pol A

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1 Project information

EUT attributes

Test item	Indoor radio adapter
Types (Models)	IDR 900MHz TDD Ext A, IDR 900MHz TDD V-pol A
Equipment FCC code	DSS

Applicant information

Applicant's responsible person	Mr. Zion Levi, compliance & testing engineer
Applicant/Manufacturer	Airspan Networks (Israel) Ltd.
Address	1, Harava street, "Unitronics" building
P.O.B.	199
City	Airport City
Postal code	70100
Country	Israel
Telephone number	+972 3977 7444
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Test details

Project number	15693
Location	Hermon Laboratories
Test performed	October 2003, March - April, 2004
Purpose of test	Apparatus compliance verification in accordance with emission requirements
Test specifications	47CFR Part 15, §15.247 and subpart B

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2 Summary of tests and signatures

The tests listed in the table below were performed.
The EUT was found complying with the limits of 47CFR Part 15, §15.247 and subpart B.

Test description	Specification reference	Tested by	Date tested	Test report paragraph	Verdict
Hybrid system					
Peak power spectral density at frequency hopping operation turned off	15.247(f)	Mr. Y. Neuman, test engineer	March 25, 2004	4.1	Pass
Average time of occupancy at frequency hopping operation turned on	15.247(f)	Mr. Y. Neuman, test engineer	October 15, 2003	4.2	Pass
Maximum peak output power at frequency hopping operation turned off	15.247(b)(3)	Mr. Y. Neuman, test engineer	March 25, 2004	4.3	Pass
Minimum channel separation	15.247(a)(1)	Manufacturer statement	NA	4.4	Pass
6 dB bandwidth	15.247(a)(2)	Mr. I. Fershtater, test engineer	October 2, 2003	4.4	Pass
Spurious emissions (conducted)	15.247(c)	Mr. Y. Neuman, test engineer	March 25, 2004	4.5	Pass
Spurious emissions (radiated) in restricted bands	15.209(a), 15.205(a, c)	Mr. Y. Neuman, test engineer	October 1, 2003 April 19, 20, 2004	4.6	Pass
Unintentional radiation					
Conducted emissions	15.207, 15.107	Mr. Y. Neuman, test engineer	December 18, 2003	4.7	Pass
Radiated emissions	15.109	Mr. Y. Neuman, test engineer	December 18, 2003 April 19, 2004	4.8	Pass

Test report prepared by:

Mrs. M. Cherniavsky, MScEE, certification engineer

Test report approved by:

Mr. Michael Nikishin, MScEE, group leader

Mr. Edward Usoskin, PhD, C.E.O.

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3 EUT description

3.1 General description

The indoor radio adapter, model numbers IDR 900MHz TDD Ext A and IDR 900MHz TDD V-pol A, is a part of a WipLL broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network itself to give high-speed data access. The EUT is a hybrid system transceiver (8FSK digital modulation with frequency hopping, data rate 3 Mbps and 4 Mbps), operating in 903 MHz to 927 MHz range and powered by mains. The IDR is installed inside the subscriber's premises, typically mounted on a wall, desktop, or pole. The IDR 900MHz TDD Ext A is connected to a third-party 6.5 dBi or 10 dBi gain external antenna, which is typically mounted outside to provide line-of-site with the base station. The IDR 900MHz TDD V-pol A is equipped with 8 dBi integral antenna.

3.2 EUT test configuration

Throughout testing the communication link with BSR base station unit was established. The EUT operating frequencies generated by clocks and oscillators: 350 MHz - first IF, 6 MHz – second IF, 1277 MHz - LO of the superheterodyne receiver .
The WipLL system architecture is shown in Figure 3.2.1, the EUT configuration with PC – in Figure 3.2.2, the test/support equipment is given in Table 3.2.1.

Figure 3.2.1

WipLL system architecture

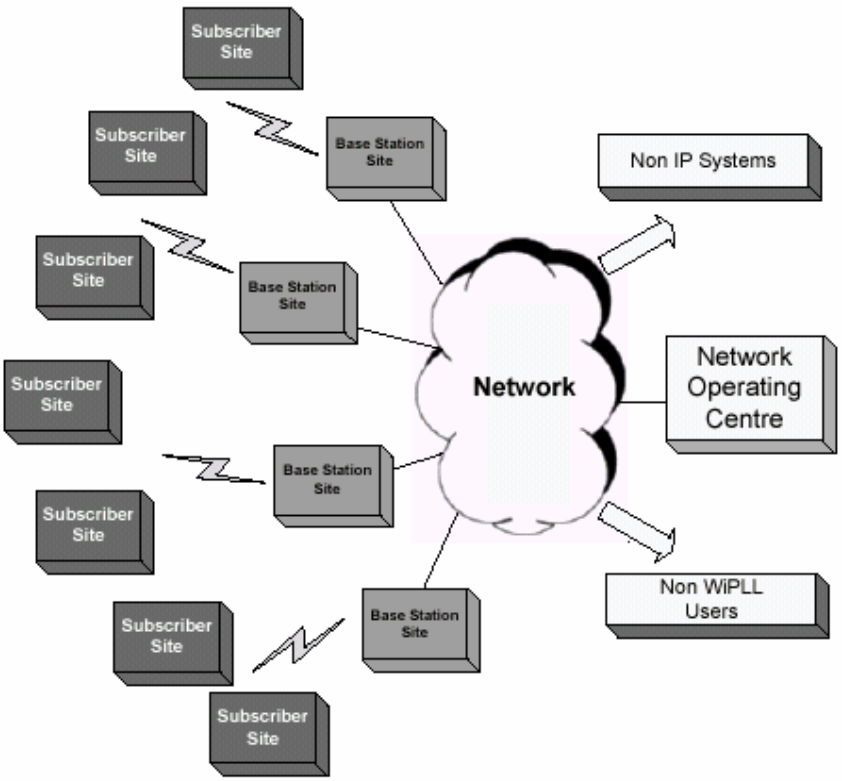

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Figure 3.2.2

EUT test configuration

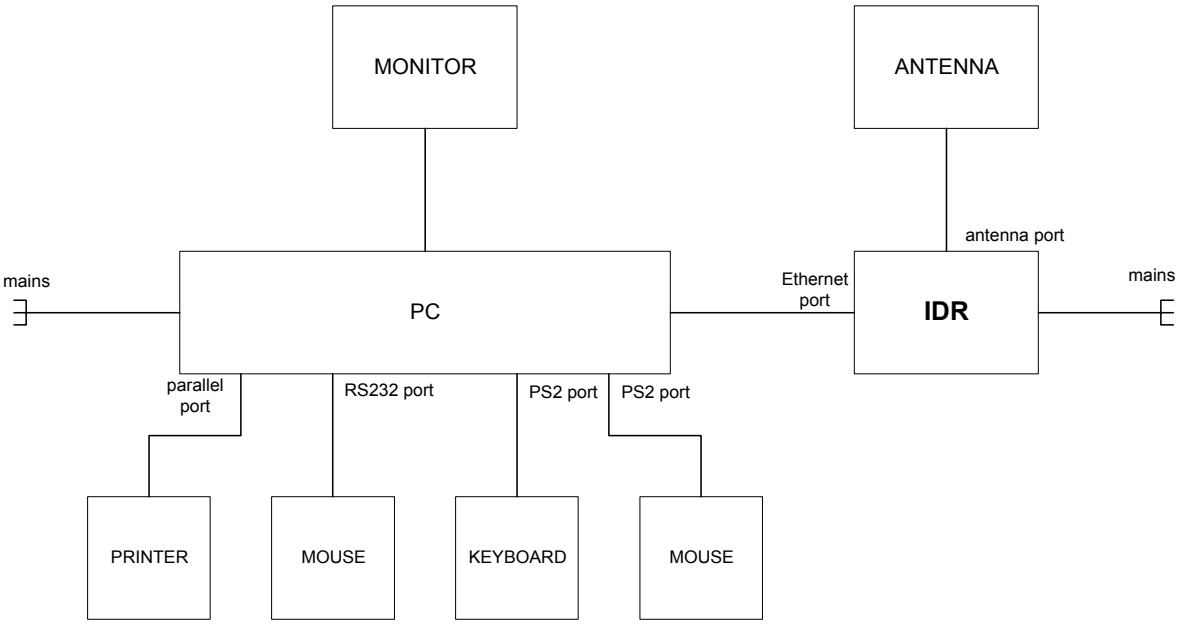

Table 3.2.1

EUT support equipment

Description	Manufacturer	Model number	Serial number
PC	Siemens Nixdorf	Scenic Pro M5	QK 079816
Monitor	MAG Innovision	XJ707	NA
Keyboard	IBM	Aptiva	55-FHOHD
Mouse	Hewlett Packard	M-S34	LZA 75058804
Mouse (RS 232 termination)	Microsoft Corp.	90030	00307296
Printer LX-810	Seiko Epson Corp.	P80SA	44B1127035

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4 Test results

4.1 Peak power spectral density of a hybrid system according to § 15.247(f),(d)

METHOD OF MEASUREMENTS	FCC Docket No.96-8; FCC 97-114
DATE of TEST:	March 25, 2004
AMBIENT TEMPERATURE:	25°C
RELATIVE HUMIDITY:	44 %
AIR PRESSURE:	1017 hPa
RATED OUTPUT POWER:	23.33 dBm
OPERATING FREQUENCY RANGE:	903 - 927 MHz
MEASUREMENT UNCERTAINTY:	± 3.5 dB

Frequency hopping function was turned off.

Carrier frequency, MHz	Data transmission rate, Mbit/s	Peak power spectral density, dBm		Verdict	Reference to plots in Appendix A
		Measured	Limit		
903	4	7.67	8	Pass	A1
903	3	7.67		Pass	A2
915	4	7.33		Pass	A3
915	3	7.67		Pass	A4
927	4	7.17		Pass	A5
927	3	7.50		Pass	A6

LIMIT

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

TEST PROCEDURE

The EUT RF output was connected via attenuator to the spectrum analyzer; the settings are shown in the plots. Spectrum analyzer readings were corrected for external attenuation and cable loss. The measurements were performed in continuous transmission mode of operation for carrier (channel) frequency modulated with PRBS at low and high edges and at the middle of the range according to method #1 for peak power spectral density.

TEST EQUIPMENT USED:

HL 1424	HL 1650	HL 1651	HL 2254			

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4.2 Average time of hopping frequency occupancy according to § 15.247(f), (a)(1)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.7
DATE of TEST: October 15, 2003
AMBIENT TEMPERATURE: 23°C
RELATIVE HUMIDITY: 44 %
AIR PRESSURE: 1012 hPa
OPERATING FREQUENCY RANGE: 903 - 927 MHz
MEASUREMENT UNCERTAINTY: ±1%

Frequency hopping function was turned on.

Carrier frequency, MHz	Quantity of transmissions at one frequency	Tx ON of 1 transmission at one frequency, ms	Average time of occupancy during 10 s period, ms	Verdict	Reference to plots in Appendix A
903	8	25.583	204.664	Pass	A7, A8

LIMIT

Operating mode	Limit
Hybrid	With the hopping system operation turned on, an average time of occupancy on any frequency shall not exceed 0.4 s within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4: 25 x 0.4 = 10 (sec)

TEST PROCEDURE

The EUT RF output was connected via attenuator to spectrum analyzer, which settings are shown in the plots. Spectrum analyzer readings were corrected for external attenuation and cable loss.

TEST EQUIPMENT USED:

HL 1097	HL 1424	HL 2399				

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4.3 Maximum peak output power test according to §15.247(b)(3)

METHOD OF MEASUREMENTS:	ANSI 63.4 §13.1.4
DATE of TEST:	March 25, 2004
AMBIENT TEMPERATURE:	25°C
RELATIVE HUMIDITY:	44 %
AIR PRESSURE:	1017 hPa
OPERATING FREQUENCY RANGE:	903 -927 MHz
MEASUREMENT UNCERTAINTY:	± 3.5 dB

Carrier frequency, MHz	Data rate, Mbit/s	Peak output power, dBm	Limit, dBm	Margin, dB	Verdict	Reference to plots in Appendix A
903	4	23.33	26	2.67	Pass	A9
903	3	17.67	26	8.33	Pass	A10
915	4	23.33	26	2.67	Pass	A11
915	3	17.50	26	8.50	Pass	A12
927	4	23.17	26	2.83	Pass	A13
927	3	17.50	26	8.50	Pass	A14

LIMIT

Operating frequency range, MHz	Number of hopping channels	Maximum peak output power*, W
Hybrid	any admissible	1

* Notes to table
If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced below the stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Antenna gain is 10 dBi, peak output power limit is 26 dBm.

TEST PROCEDURE

The EUT RF output was connected via attenuator to spectrum analyzer, which settings are shown in the plots. Spectrum analyzer readings were corrected for external attenuation and cable loss.

TEST EQUIPMENT USED:

HL 1097	HL 1424	HL 2399				

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4.4 Minimum channel separation and occupied bandwidth according to § 15.247(a)(1), (2)

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.7
DATE of TEST: October 2, 2003
AMBIENT TEMPERATURE: 23°C
RELATIVE HUMIDITY: 46 %
AIR PRESSURE: 1012 hPa
OPERATING FREQUENCY RANGE: 903 -927 MHz
MEASUREMENT UNCERTAINTY: ± 2.3 dB

According to applicant statement the minimum channel separation is 1 MHz.

Carrier frequency, MHz	Data rate, Mbit/s	6 dB bandwidth, kHz		Verdict	Reference to plots in Appendix A
		Measured	Limit		
903	4	800	500	Pass	A15
903	3	520	500	Pass	A16
915	4	792	500	Pass	A17
915	3	525	500	Pass	A18
927	4	800	500	Pass	A19
927	3	520	500	Pass	A20

LIMIT

Operating frequency range, MHz	Allowed bandwidth	Channel carrier frequency separation (minimum)
Hybrid	any admissible	25 kHz or 20 dB bandwidth, which is greater

TEST PROCEDURE

The EUT RF output was connected to the spectrum analyzer, which settings are shown in the plots. Spectrum analyzer readings were corrected for external attenuation and cable loss.

TEST EQUIPMENT USED:

HL 1097	HL 1424	HL 2399				

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4.5 Out of band conducted emissions test according to §15.247(c)

METHOD OF MEASUREMENTS:	ANSI 63.4 §13.1.5
DATE of TEST:	March 25, 2004
AMBIENT TEMPERATURE:	25°C
RELATIVE HUMIDITY:	44 %
AIR PRESSURE:	1017 hPa
OPERATING FREQUENCY RANGE:	903 -927 MHz
RATED RF OUTPUT POWER:	23.33 dBm
MODULATION TECHNIQUE:	hybrid
FREQUENCY RANGE:	9 kHz – 9.5 GHz
MEASUREMENT UNCERTAINTY:	± 4.3 dB

The frequency spectrum was investigated from 9 kHz up to 10th harmonic. The measurements were performed at maximum output power settings and 3 Mbit/s modulation rate that yields maximum power density.
The effect of the data rate was observed therefore the 3 Mbit/s rate was used for measurements (refer to plots A21&A28, A36 & A43).
All measured emissions were found below specified limit. Test results are shown in Plots A21 to A44.

Frequency, MHz	Carrier frequency, MHz	Data rate, Mbit/s	Resolution bandwidth, kHz	Spurious emission level, dBm	Spurious calculated limit, dBm	Margin, dB	Reference to plots in Appendix A
901.987	903	3	100	-16.67	2.2	18.87	A21, A25
901.700	903	4	100	-14.67	0.3	14.97	A28, A29
928.003	927	3	100	-16.83	2.9	19.73	A36, A40
928.253	927	4	100	-14.00	0.7	14.70	A43, A44

LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

TEST PROCEDURE

The EUT RF output was connected via attenuator to spectrum analyzer, which settings are shown in the plots. Spectrum analyzer readings were corrected for external attenuation and cable loss. Spurious emission measurements were performed at the lowest (903 MHz), the highest (927 MHz) and one of the middle channel (915 MHz) frequencies.

TEST EQUIPMENT USED:

HL 1424	HL 1650	HL 1651	HL 2254			

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4.6 Radiated emissions which fall in restricted bands test according to §15.247(c) and § 15.205, §15.209(a)

METHOD OF MEASUREMENTS:	ANSI 63.4 §13.1.4/ §13.1.5
TEST PERFROMED IN:	Anechoic chamber, OATS
TEST DISTANCE	3 m
OPERATING FREQUENCY RANGE:	903 -927 MHz
RATED RF OUTPUT POWER:	23.33 dBm
MEASUREMENT UNCERTAINTY:	± 4.3 dB

LIMIT

Radiated emissions, which fall in the restricted bands, must comply with §15.209(a) limits.

TEST PROCEDURE

The measurements were performed at maximum output power settings and 3 Mbit/s modulation rate that yield maximum power density.

The test was performed with transmitter operating at 3 carrier frequencies F_{min} = 903 MHz, F_{middle} = 915 MHz, F_{max} = 927 MHz. The measurements were performed at 3 m test distance from 150 kHz to 5.5 GHz in the anechoic chamber, up to 9.2 GHz – at the OATS. The EUT was placed on a wooden 80 cm height turntable.

150 kHz – 30 MHz frequency range. The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

30 MHz – 9.2 GHz frequency range. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

All emissions were found below the specified limit. For test results refer to Plots A45 – A68 for EUT with the external antenna and to Plots A71 – A100 - for EUT with the internal antenna.

EUT type:	IDR 900MHz TDD Ext A (with 10 dBi external antenna)
DATE of TEST:	September 30, October 1, 2003
AMBIENT TEMPERATURE:	23°C
RELATIVE HUMIDITY:	41 %
AIR PRESSURE:	1012 hPa

Quasi-peak detector

Frequency, MHz	Turntable position, °	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Reference to plots in Appendix A
133.64	219	25.78	43.50	17.72	A46
167.05	192	30.96	43.50	12.54	A46
971.50	0	35.91	54.00	18.09	A47
986.20	0	35.08	54.00	18.92	A55

The recorded test results were obtained through measurements with biconilog antenna in vertical polarization at 1 m height**.** Turntable position: 0° = EUT front panel faces the receiving antenna

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Peak detector, average limit

Frequency, MHz	Antenna height, m	Turntable position, °	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Reference to plots in Appendix A
1104.00	1.9	238	44.18	54	9.82	A48
1152.00	2.4	227	49.91	54	4.09	A48
1200.00	2.3	237	48.64	54	5.36	A48
1392.00	1.8	271	43.84	54	10.16	A48
1584.00	1.6	182	45.89	54	8.11	A48
1680.00	1.4	176	46.47	54	7.53	A48
2208.00	1.3	14	48.76	54	5.24	A48

The recorded test results were obtained through measurements with double ridged guide antenna in horizontal polarization.

Table abbreviations:
Margin = dB below (negative if above) specification limit.
Turntable position: 0^o = EUT front panel faces the receiving antenna

TEST EQUIPMENT USED AT OATS:

HL 0038	HL 0091	HL 0287	HL 1200	HL 1424	HL 1942	HL 2254
HL 2259	HL 2432					

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 1004	HL 1947	HL 1984	HL 2009		

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EUT type: IDR 900MHz TDD V-pol A (with internal antenna)
DATE of TEST: April 19, 20, 2004
AMBIENT TEMPERATURE: 23°C
RELATIVE HUMIDITY: 48 %
AIR PRESSURE: 998 hPa

Quasi-peak detector

Frequency, MHz	Turntable position, °	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Reference to plots in Appendix A
400.00	163	44.99	46.00	1.01	A73, A85, A94

The recorded test results were obtained throughout measurements with biconilog antenna in vertical polarization at 1 m height.
Turntable position: 0^o = EUT front panel faces the receiving antenna

Peak detector, average limit

Frequency, MHz	Antenna height, m	Turntable position, °	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Reference to plots in Appendix A
1152.00	1.33	332	51.82	54	2.18	A75, A87
1200.00	1.40	0	51.78	54	2.22	A75, A87
1332.50	1.23	225	49.78	54	4.22	A75, A87

Average detector

Frequency, MHz	Antenna height, m	Turntable position, °	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Reference to plots in Appendix A
1152.00	1.33	332	49.90	54	4.10	A76
1200.00	1.40	0	49.10	54	4.90	A77
1332.50	1.23	225	32.36	54	21.64	A78

The recorded test results were obtained through measurements with double ridged guide antenna in horizontal polarization.

Table abbreviations:
Margin = dB below (negative if above) specification limit.
Turntable position: 0^o = EUT front panel faces the receiving antenna

TEST EQUIPMENT USED AT OATS:

HL 0038	HL 0091	HL 0287	HL 1200	HL 1424	HL 1942	HL 1984
HL 2254	HL 2259					

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 1004	HL 1947	HL 1984	HL 2009		

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4.7 Conducted emissions test according to §15.107, 15.207

METHOD OF MEASUREMENTS:	ANSI 63.4 §13.1.3
DATE of TEST:	October 19, December 18, 2003
AMBIENT TEMPERATURE:	22°C
RELATIVE HUMIDITY:	43 %
AIR PRESSURE:	1008 hPa
FREQUECNY RANGE:	150 kHz – 30 MHz
RESOLUTION BANDWIDTH:	9 kHz
MEASUREMENT UNCERTAINTY, dB	± 3.9 dB in 9 – 150 kHz ± 3.8 dB in 150 kHz – 30 MHz

OPERATION MODE: Receive

Quasi-peak detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification QP limit, dB (µV)	Margin, dB	Verdict	Reference to plots in Appendix A
0.16	Line 1	56.33	65.66	9.33	Pass	A103
0.21	Line 2	49.45	63.28	13.83	Pass	A104
0.26	Line 1	42.95	61.44	18.49	Pass	A103

Average detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification AVRG limit, dB (µV)	Margin, dB	Verdict	Reference to Plots in Appendix A
0.16	Line 1	46.09	55.66	9.57	Pass	A103
0.21	Line 2	39.94	53.28	13.34	Pass	A104
0.26	Line 1	34.06	51.44	17.38	Pass	A103

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OPERATION MODE: Transmit

Quasi-peak detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification QP limit, dB (µV)	Margin, dB	Verdict	Reference to plots in Appendix A
0.16	Line 1	56.33	65.66	9.33	Pass	A107
0.21	Line 2	49.45	63.28	13.83	Pass	A108
0.26	Line 1	42.95	61.44	18.49	Pass	A107
2.53	Line 2	40.14	56.00	15.86	Pass	A108
2.87	Line 1	40.62	56.00	15.38	Pass	A107
3.15	Line 1	47.48	56.00	8.52	Pass	A107
3.21	Line 1	47.33	56.00	8.67	Pass	A107

Average detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification AVRG limit, dB (µV)	Margin, dB	Verdict	Reference to plots in Appendix A
0.16	Line 1	46.09	55.66	9.57	Pass	A107
0.21	Line 2	39.94	53.28	13.34	Pass	A108
0.26	Line 1	34.06	51.44	17.38	Pass	A107
2.53	Line 2	30.32	46.00	15.68	Pass	A108
2.87	Line 1	33.48	46.00	12.52	Pass	A107
3.15	Line 1	43.73	46.00	2.27	Pass	A107
3.21	Line 1	42.75	46.00	3.25	Pass	A107

Limit

Frequency, MHz	Class B equipment, dB(µV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

*The limit decreases linearly with the logarithm of frequency.

TEST PROCEDURE

The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The unused coaxial connector of the LISN was terminated with 50 Ω. The measurements were made with quasi-peak and average detectors as referred to in the tables.
The position of the EUT cables was varied to determine maximum emission level.

TEST EQUIPMENT USED:

HL 0447	HL 0466	HL 0521	HL 0787	HL 1003	HL 1205	HL 1503

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4.8 Unintentional radiated emissions test according to §15.109

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
DATE of TEST: December 18, 2003
AMBIENT TEMPERATURE: 22°C
RELATIVE HUMIDITY: 49 %
AIR PRESSURE: 1011 hPa
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
THE EUT WAS TESTED AS: TABLE-TOP
FREQUECNY RANGE: 30 MHz – 2.9 GHz (second harmonic of the superheterodyne receiver local oscillator)
RESOLUTION BANDWIDTH: Shown in the plots A69 to A70

Frequency, MHz	Detector type	Antenna type	Antenna polariz.	Antenna height, m	Turntable position, (^{o})	Radiated emissions, dB (μV/m)	Limit, dB (μV/m)	Margin, dB	Verdict
465.35	Quai-peak	Biconilog	H	1.36	295	43.53	46.00	2.47	Pass
598.32	Quai-peak	Biconilog	V	1.00	295	41.92	46.00	4.08	Pass
731.24	Quai-peak	Biconilog	V	1.06	295	39.10	46.00	6.90	Pass
797.73	Quai-peak	Biconilog	V	1.06	295	45.23	46.00	0.77	Pass
930.67	Quai-peak	Biconilog	H	1.17	125	43.58	46.00	2.42	Pass
997.15	Quai-peak	Biconilog	H	1.43	190	42.68	54.00	11.32	Pass
1776.00	Average	DRG	H	1.18	173	49.95	54.00	4.05	Pass

Table abbreviations:
Turntable position: 0^o = EUT front panel faces the receiving antenna
Margin = dB below (negative if above) specification limit.

LIMIT (§ 15.109)

Frequency, MHz	Class B equipment @ 3 m dB(μV/m)
30 - 88	40
88 - 216	43.5
216 - 960	46
960 - 5000	54

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 1004	HL 1947	HL 2009	HL 2432			

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METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
DATE of TEST: April 19, 2004
AMBIENT TEMPERATURE: 22°C
RELATIVE HUMIDITY: 48 %
AIR PRESSURE: 998 hPa
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
THE EUT WAS TESTED AS: TABLE-TOP
FREQUECNY RANGE: 30 MHz – 2.9 GHz
RESOLUTION BANDWIDTH: Shown in the plots A101 to A102

Frequency, MHz	Detector type	Antenna type	Antenna polariz.	Antenna height, m	Turntable position, (°)	Radiated emissions, dB (μV/m)	Limit, dB (μV/m)	Margin, dB	Verdict
199.84	Quai-peak	Biconilog	V	1.00	0	29.72	43.50	13.78	Pass
399.72	Quai-peak	Biconilog	V	1.00	163	44.99	46.00	1.01	Pass
430.85	Quai-peak	Biconilog	H	1.00	0	32.70	46.00	13.30	Pass
466.50	Quai-peak	Biconilog	V	1.00	12	34.38	46.00	11.62	Pass
530.14	Quai-peak	Biconilog	V	1.00	271	37.04	46.00	8.96	Pass
662.99	Quai-peak	Biconilog	V	1.00	326	40.50	46.00	5.50	Pass
799.67	Quai-peak	Biconilog	V	1.00	169	37.08	46.00	8.92	Pass
1152.00	Average	DRG	H	1.33	332	50.00	54.00	4.00	Pass
1200.00	Average	DRG	H	1.40	0	49.33	54.00	4.67	Pass
1248.00	Average	DRG	H	1.31	11	43.46	54.00	10.54	Pass
1296.00	Average	DRG	H	1.37	351	43.16	54.00	10.84	Pass
1332.50	Average	DRG	H	1.23	225	34.75	54.00	19.25	Pass

Table abbreviations:
Turntable position: 0^o = EUT front panel faces the receiving antenna
Margin = dB below (negative if above) specification limit.

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 1004	HL 1947	HL 1984	HL 2009			

TEST PROCEDURE

The test was performed in anechoic chamber from 30 MHz up to second harmonic of the LO of the superheterodyne receiver (1277 MHz x 2 = 2554 MHz). The EUT was placed on a wooden 80 cm height turntable. To find maximum radiation the turntable was rotated 360^o, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal.

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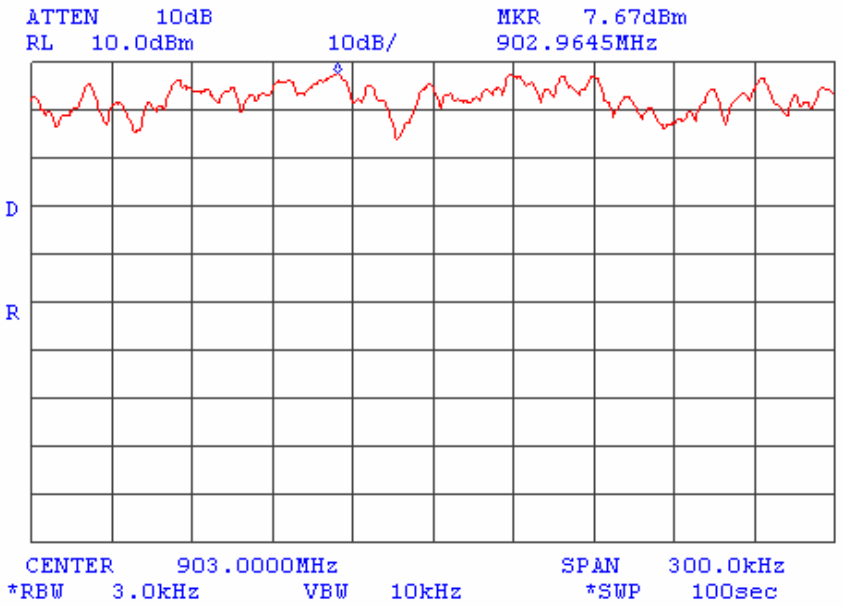
Appendix A Plots

Plot A1

Power density measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	4 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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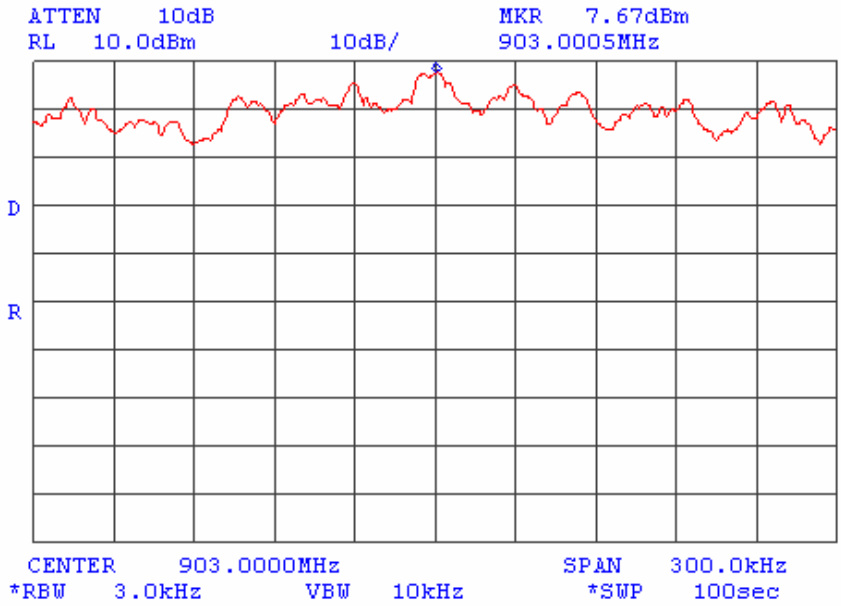
Plot A2

Power density measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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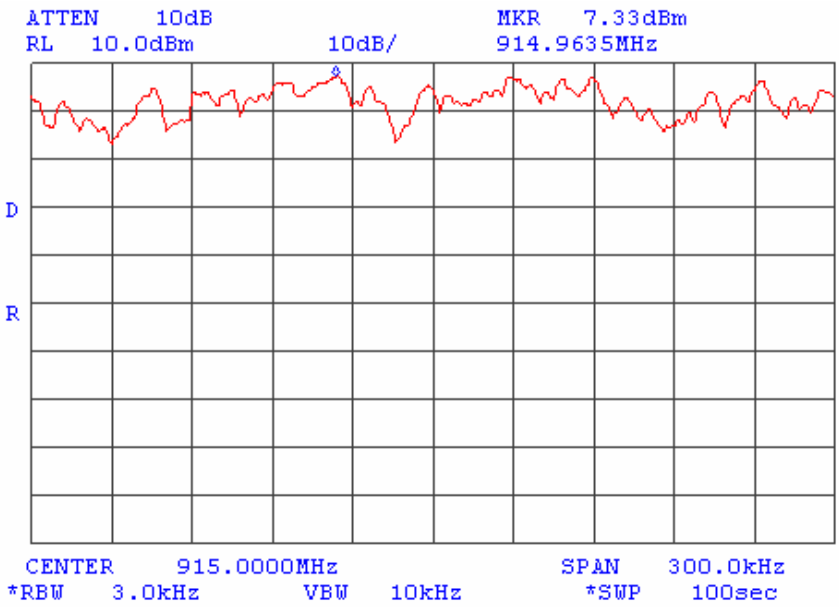
Plot A3

Power density measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	4 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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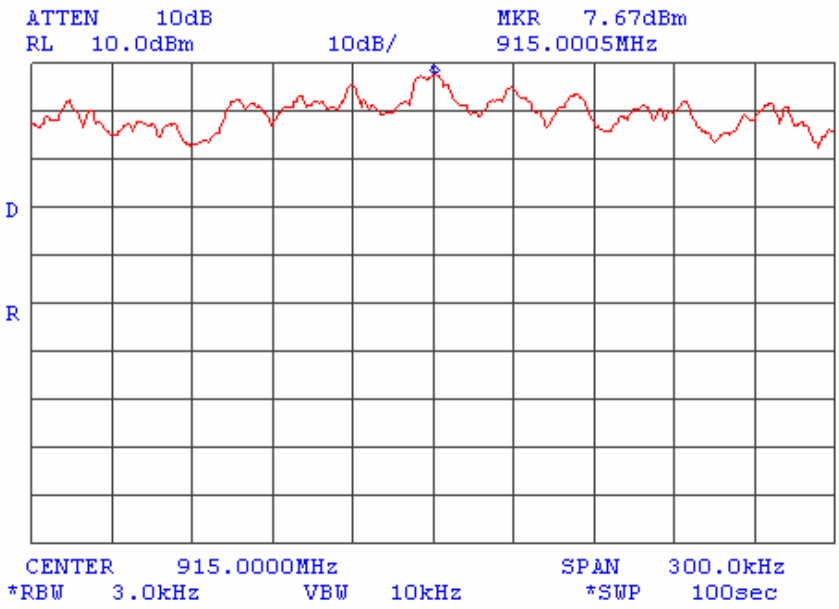
Plot A4

Power density measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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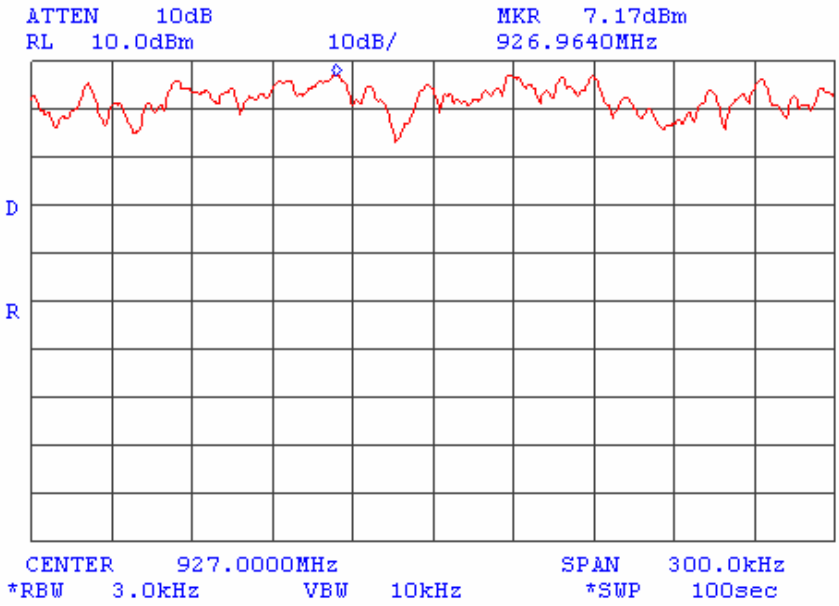
Plot A5

Power density measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	4 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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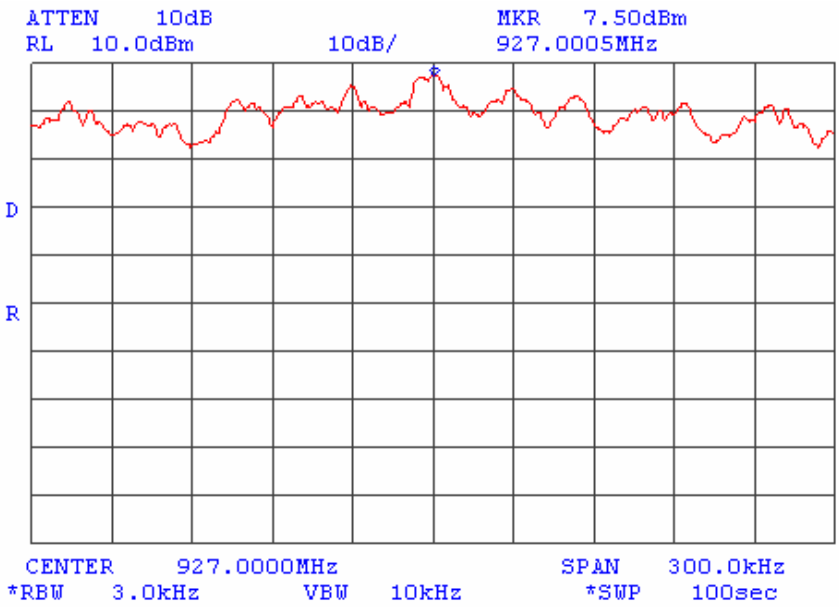
Plot A6

Power density measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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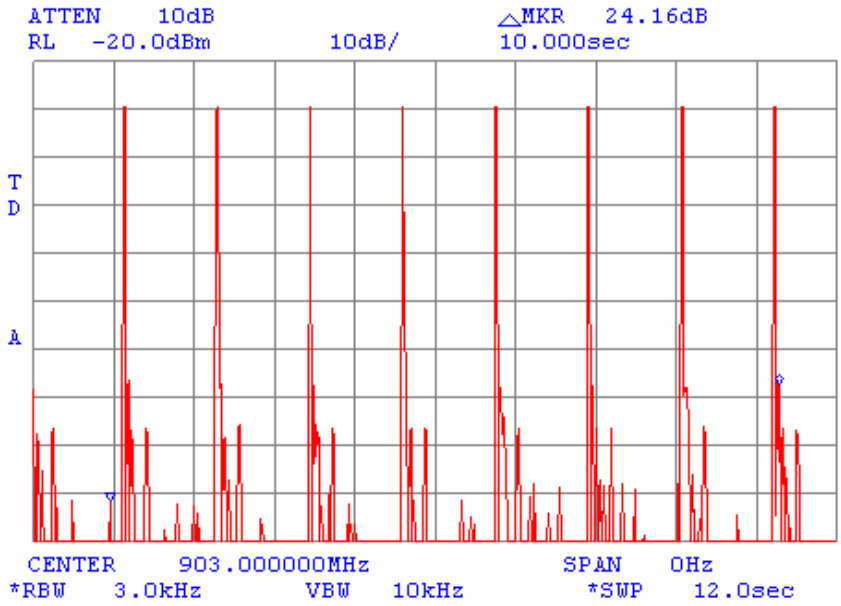
Plot A7

Average time of occupancy

Mode: Hopping turned on



8 transmissions within 10 sec interval

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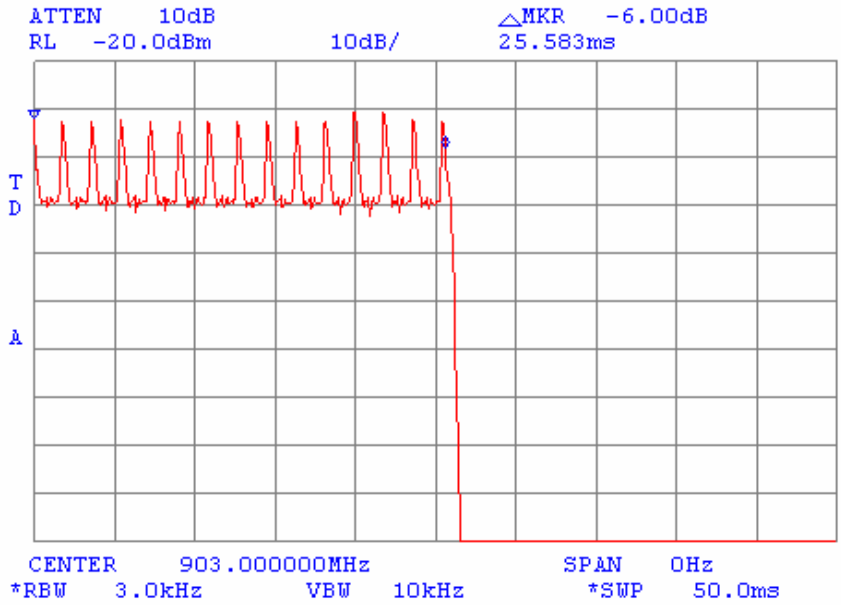
Plot A8

Average time of occupancy

Mode: Hopping turned on



Average time of occupancy calculation:

25.583 ms x 8 times=204.664 ms
204.664 ms <400 ms
Verdict: PASS

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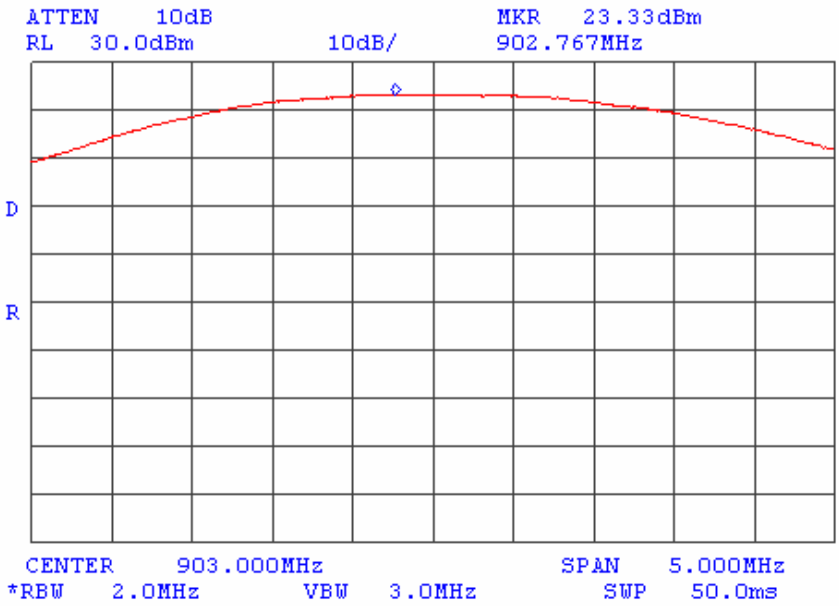
Plot A9

Peak output power

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	4 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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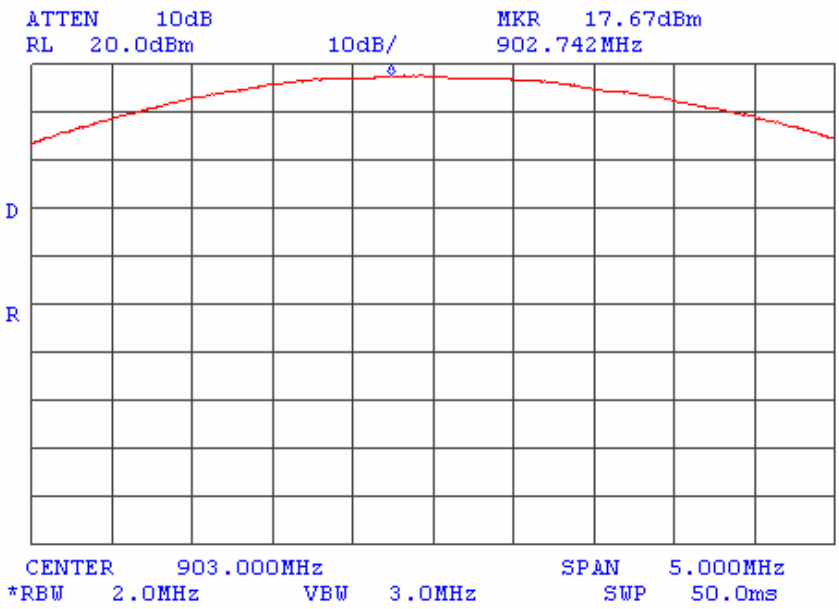
Plot A10

Peak output power

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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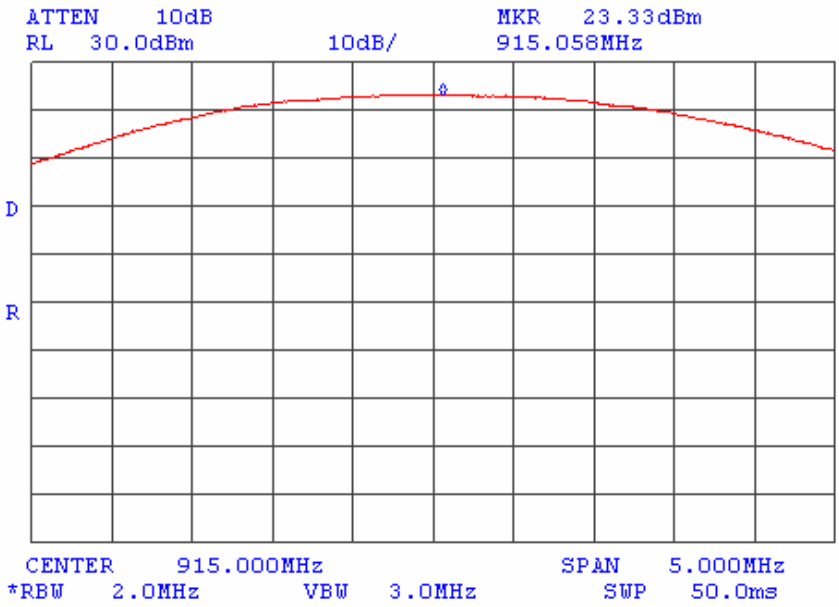
Plot A11

Peak output power

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	4 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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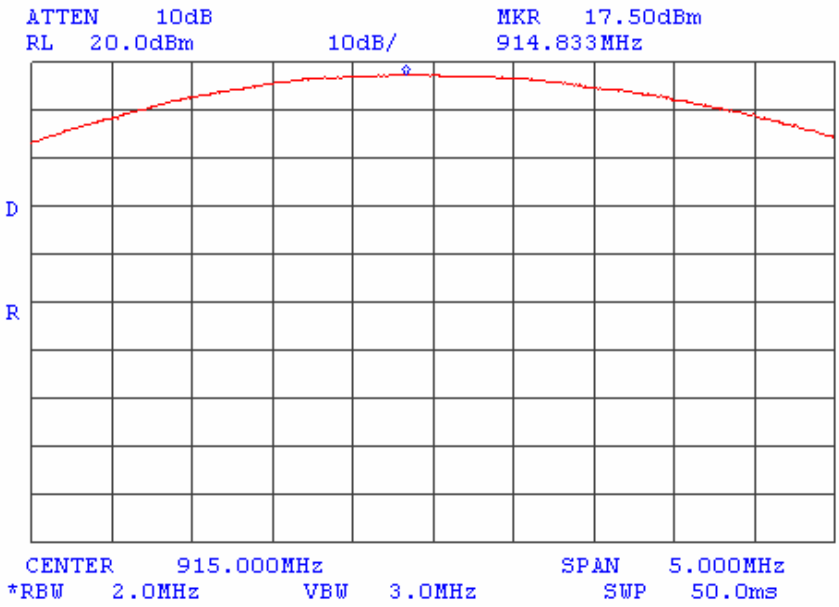
Plot A12

Peak output power

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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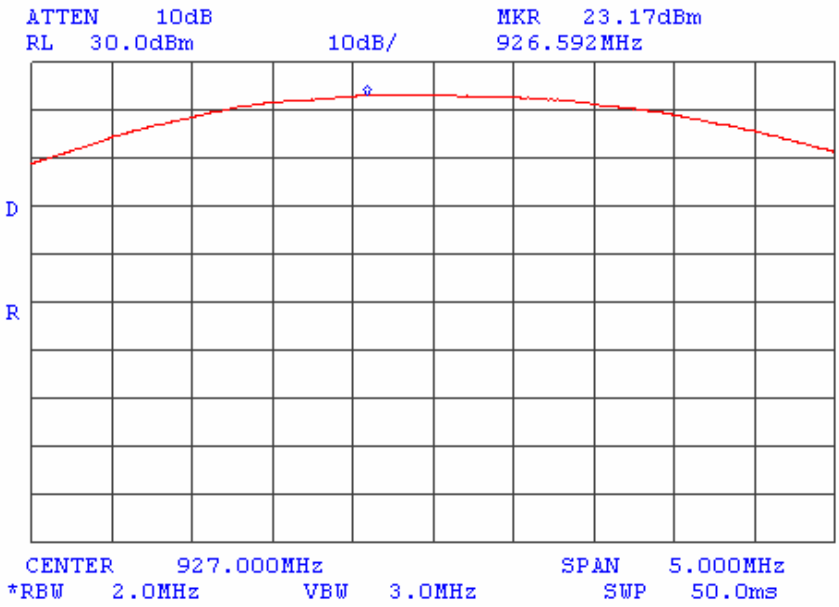
Plot A13

Peak output power

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	4 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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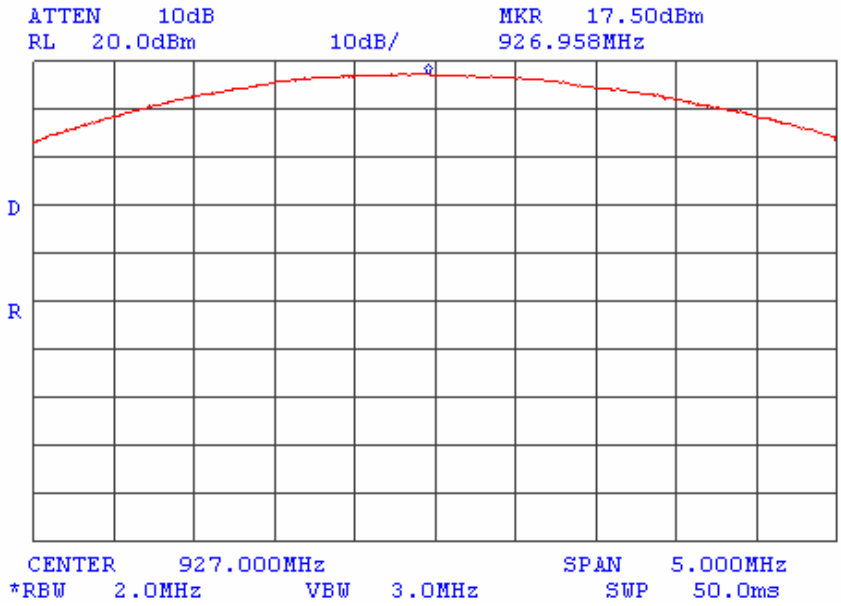
Plot A14

Peak output power

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s



External attenuation (40 dB) and cable loss (0.3 dB) included in test results

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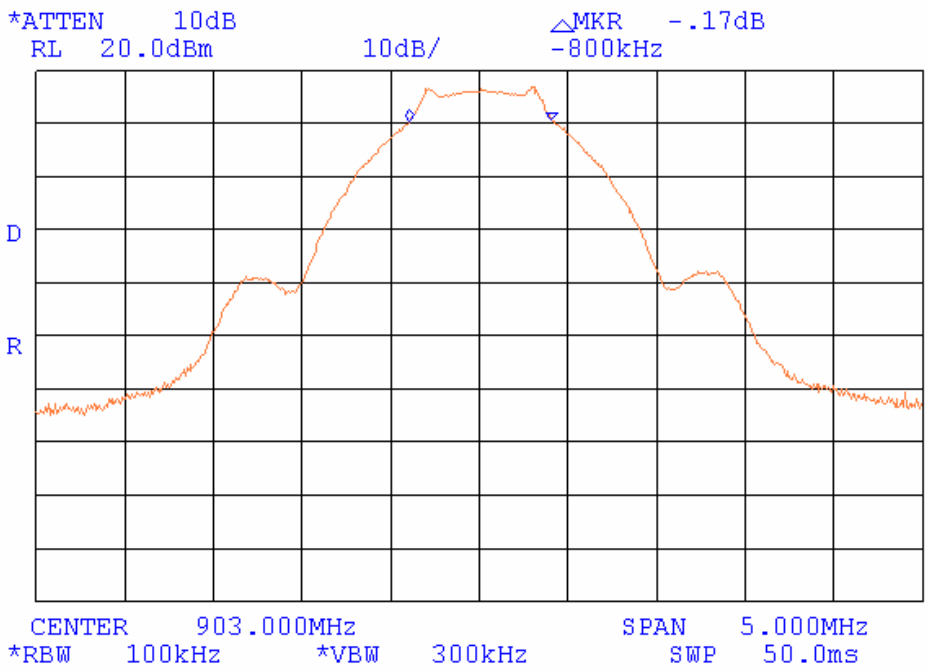
Plot A15

6 dB bandwidth

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	4 Mbit/s



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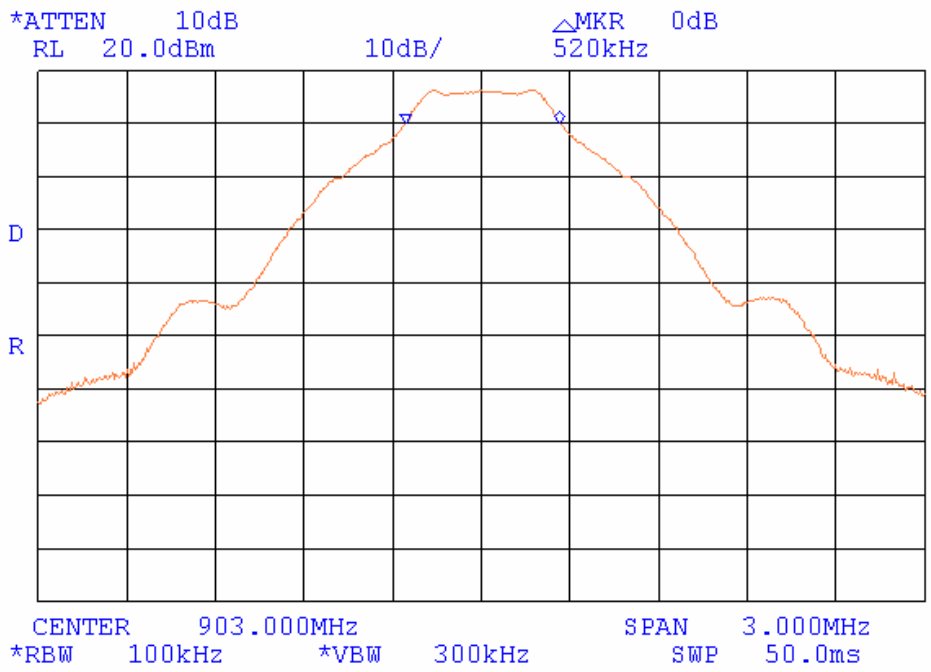
Plot A16

6 dB bandwidth

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s



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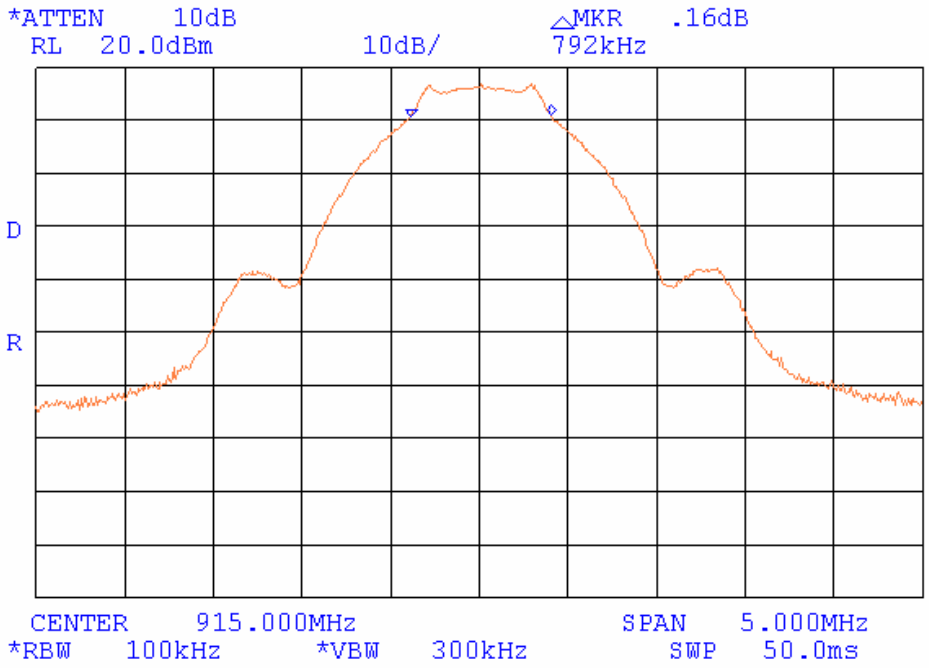
Plot A17

6 dB bandwidth

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	4 Mbit/s



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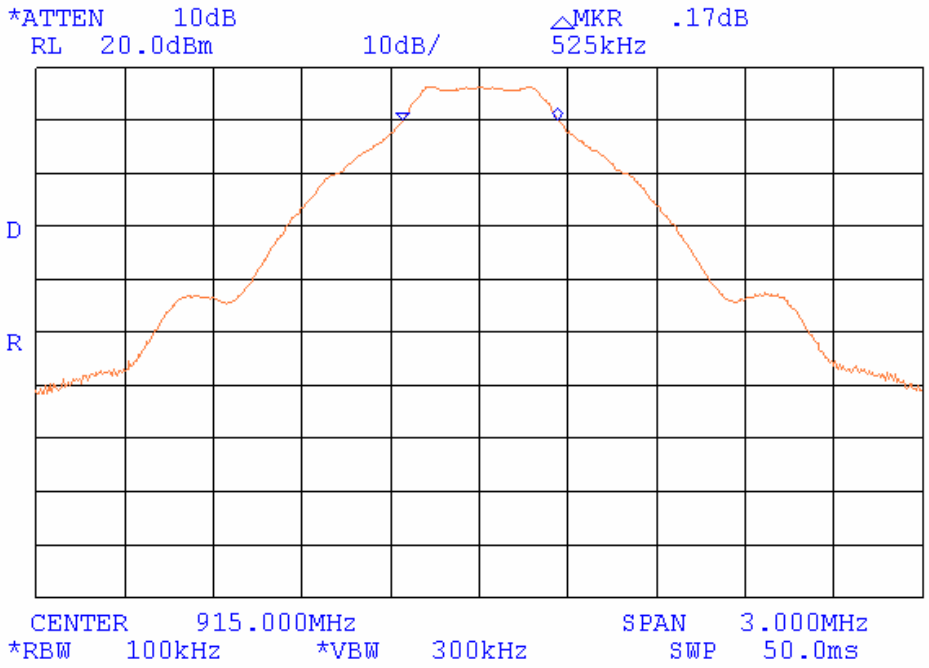
Plot A18

6 dB bandwidth

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s



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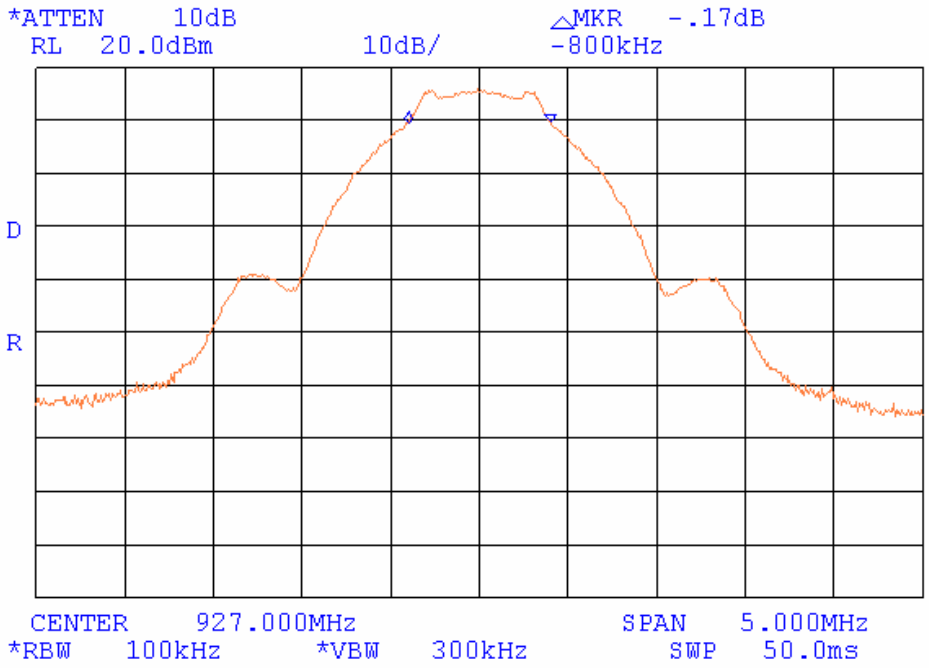
Plot A19

6 dB bandwidth

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	4 Mbit/s



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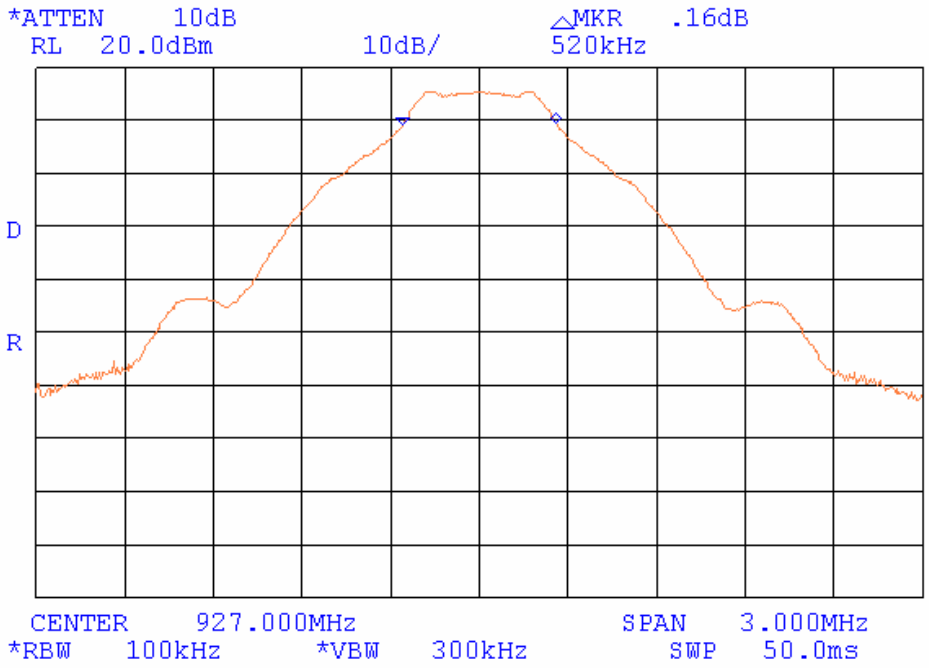
Plot A20

6 dB bandwidth

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s



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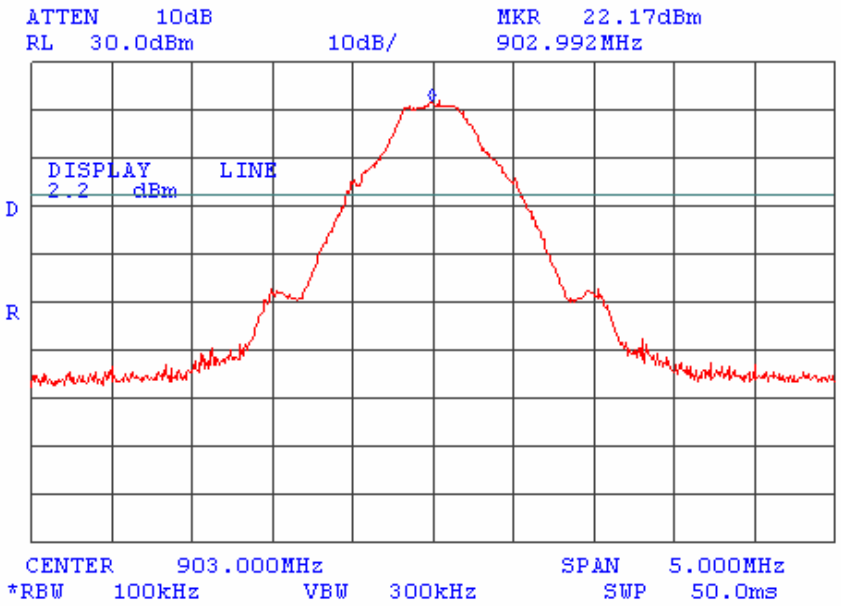
Plot A21

Conducted emission measurements within the band

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s



In band emissions level measured with RBW=100 kHz is 22.17 dBm
Limit for spurious emissions: 22.17 dBm – 20 dB = 2.2 dBm

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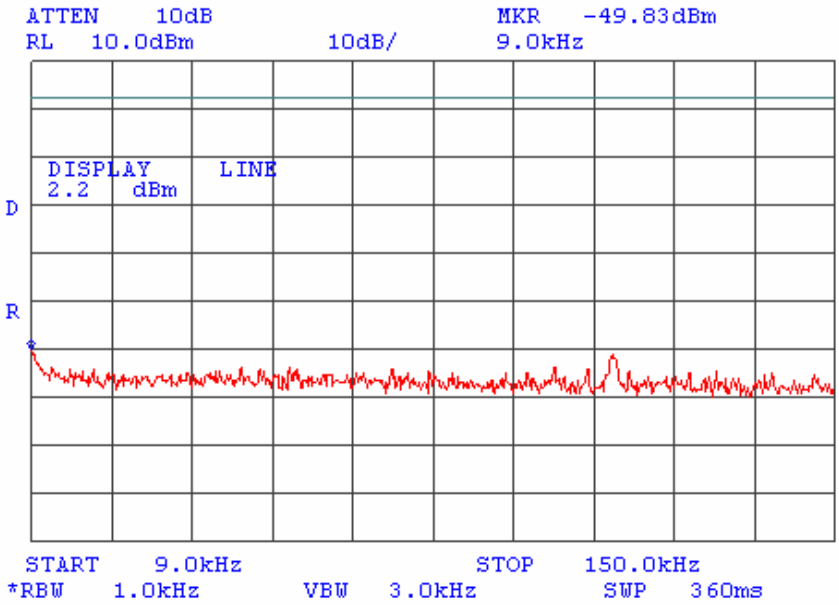
Plot A22

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s
Frequency range:	9 kHz – 150 kHz



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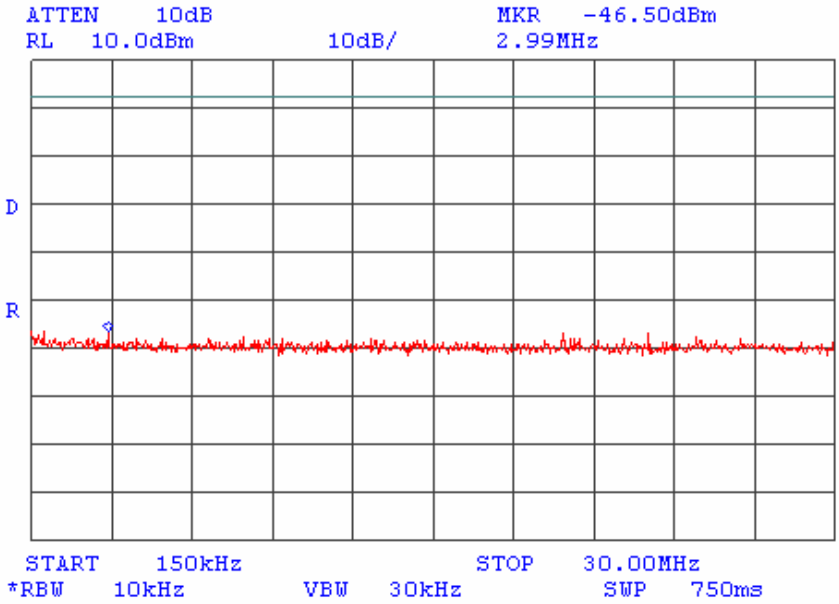
Plot A23

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s
Frequency range:	150 kHz – 30 MHz



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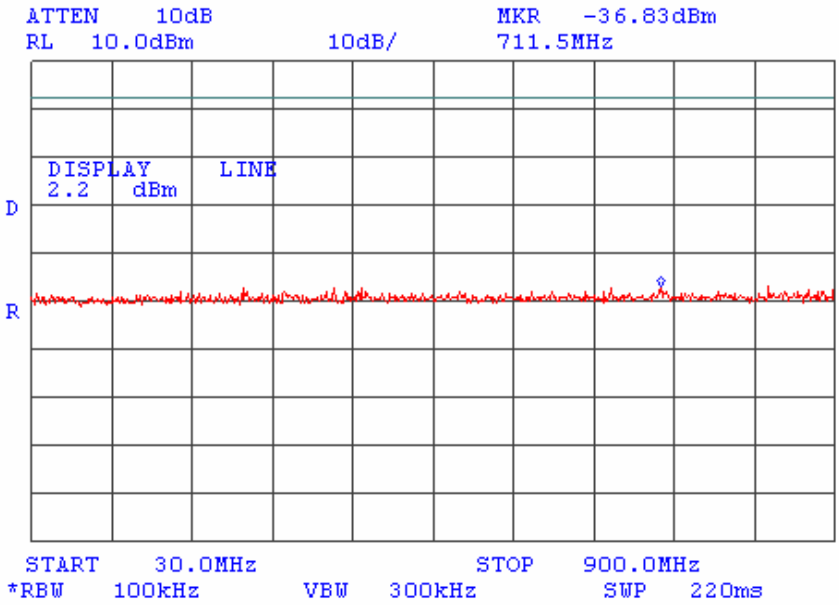
Plot A24

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s
Frequency range:	30 MHz – 900 MHz



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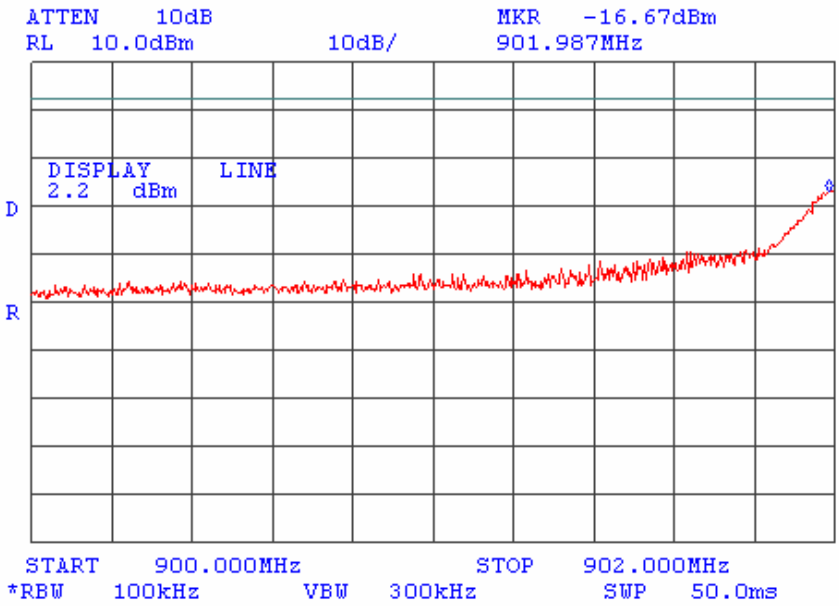
Plot A25

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s
Frequency range:	900 – 902 MHz



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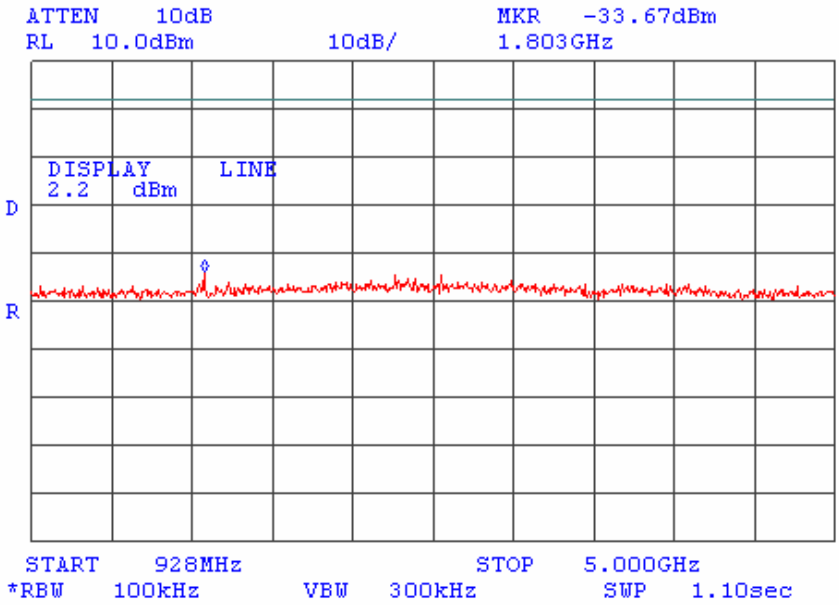
Plot A26

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s
Frequency range:	928 MHz - 5 GHz



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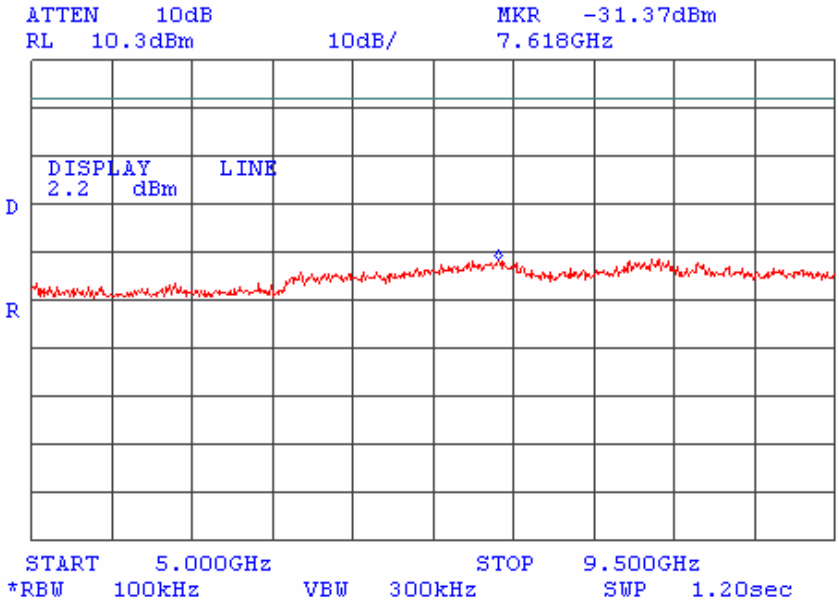
Plot A27

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	3 Mbit/s
Frequency range:	5 – 9.5 GHz



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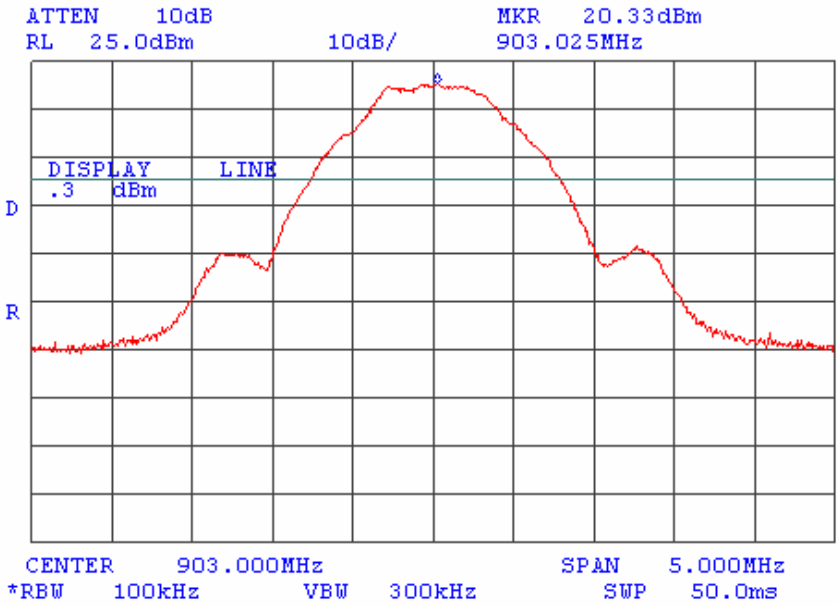
Plot A28

Conducted emission measurements within the band

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	4 Mbit/s



In band emissions level measured with RBW=100 kHz is 20.3 dBm
Limit for spurious emissions is 0.3 dBm.

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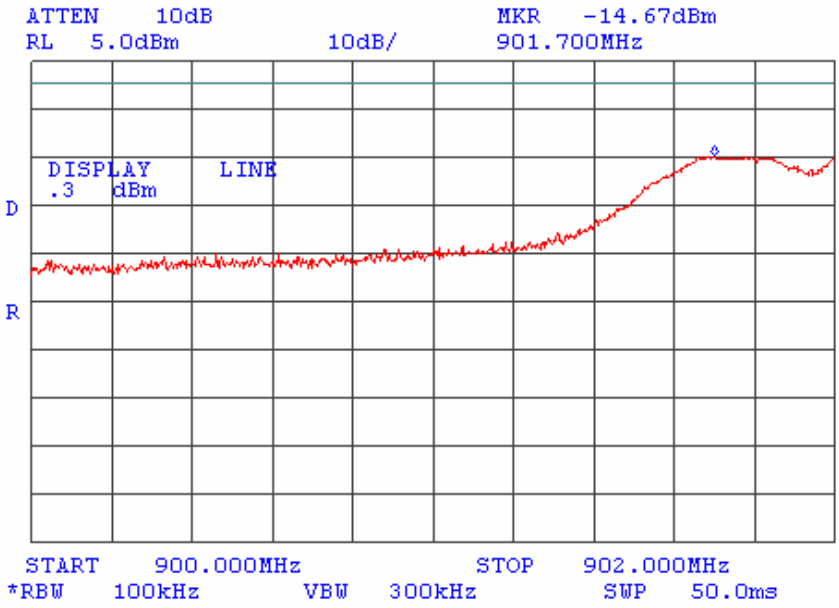
Plot A29

Conducted spurious emission measurements

Mode:	Hybrid
F_{LOW}:	903 MHz
Bit rate:	4 Mbit/s
Frequency range:	900 – 902 MHz



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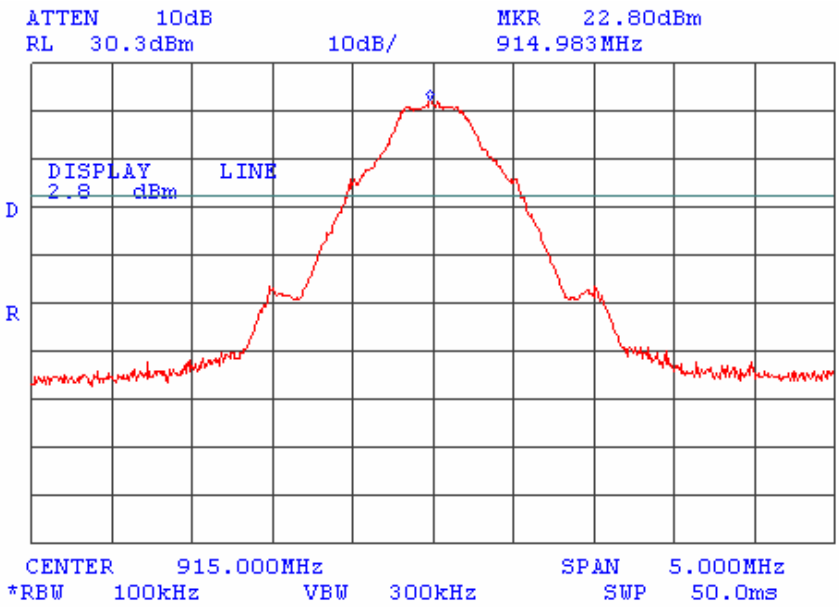
Plot A30

Conducted emission measurements within the band

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s



In band emissions level measured with RBW=100 kHz is 22.8 dBm
Limit for spurious emissions = 22.8 dBm –20 dB = 2.8 dBm

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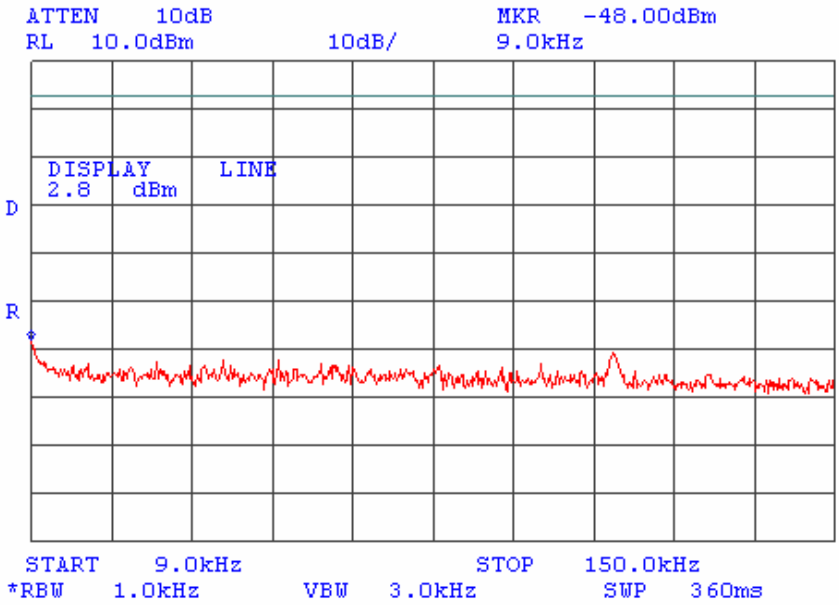
Plot A31

Conducted spurious emission measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s
Frequency range:	9 kHz – 150 kHz



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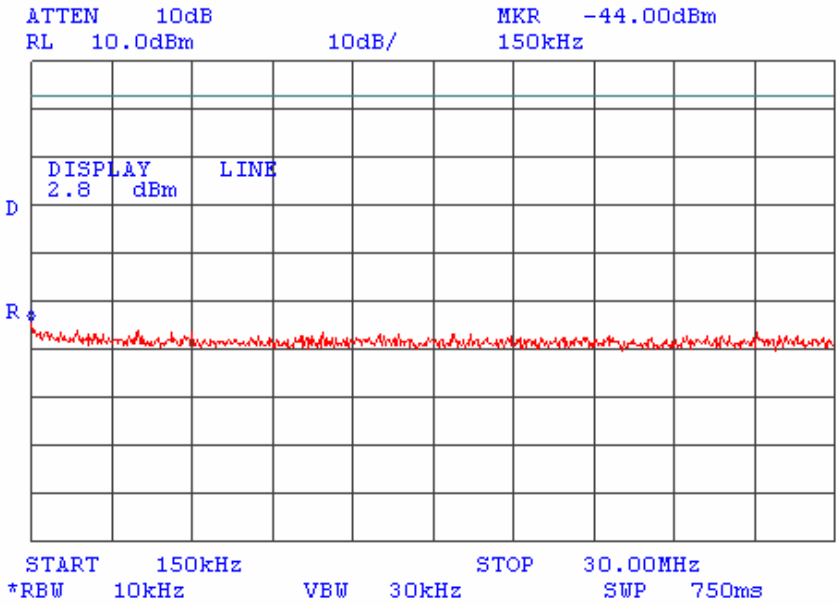
Plot A32

Conducted spurious emission measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s
Frequency range:	150 kHz – 30 MHz



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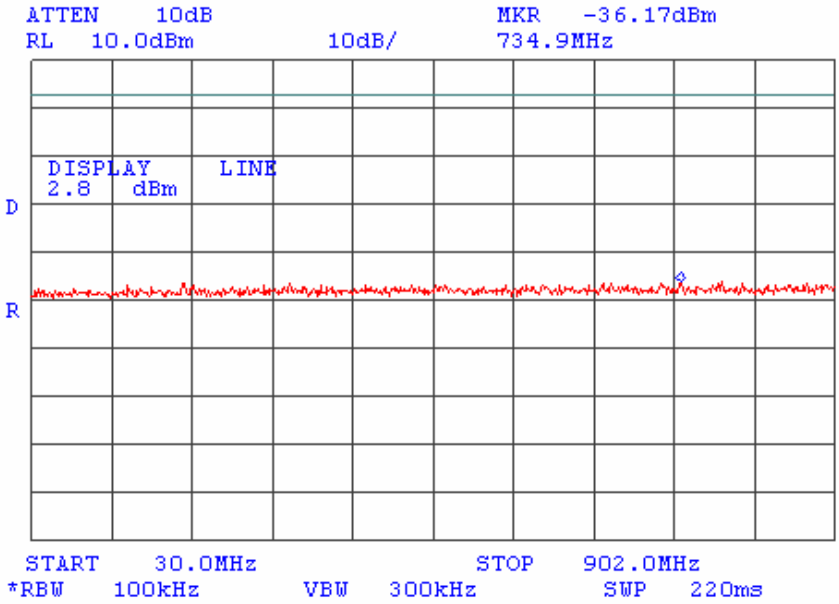
Plot A33

Conducted spurious emission measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s
Frequency range:	30 – 902 MHz



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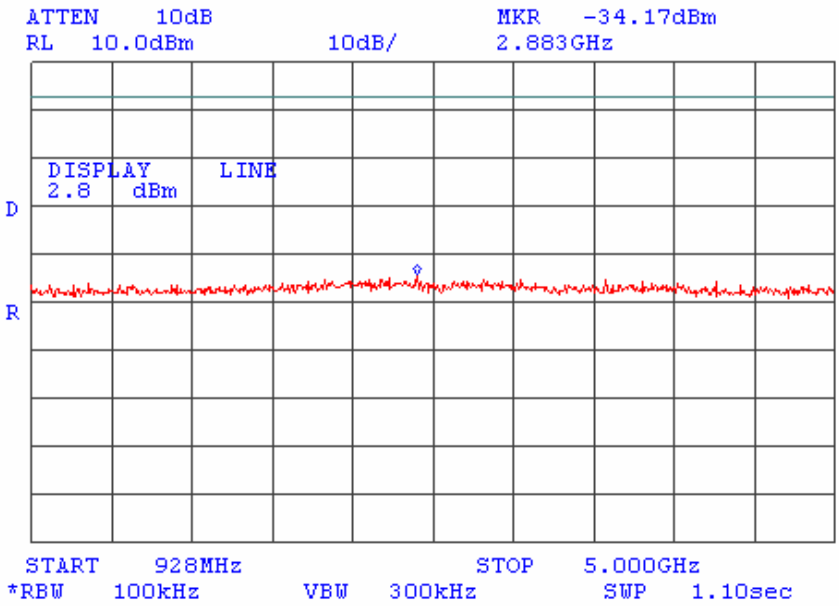
Plot A34

Conducted spurious emission measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s
Frequency range:	928 MHz – 5 GHz



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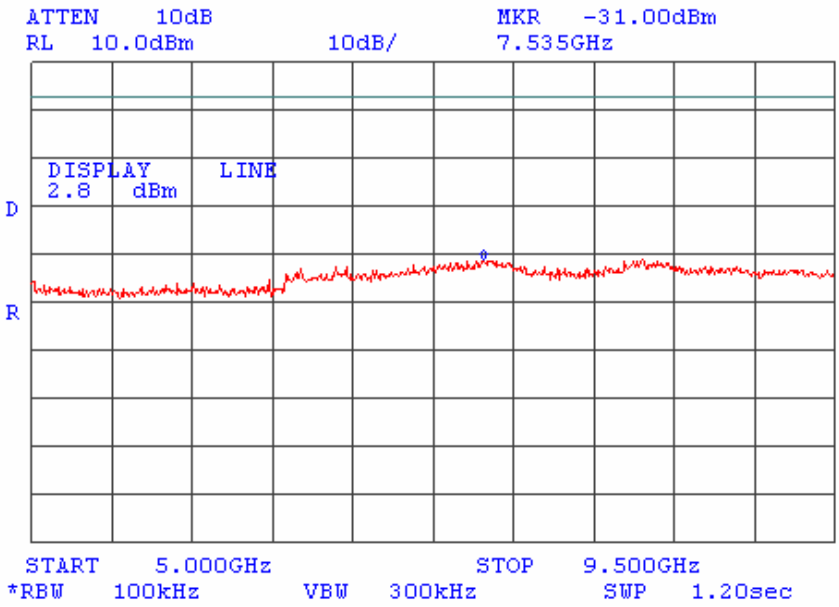
Plot A35

Conducted spurious emission measurements

Mode:	Hybrid
F_{MIDDLE}:	915 MHz
Bit rate:	3 Mbit/s
Frequency range:	5 – 9.5 GHz



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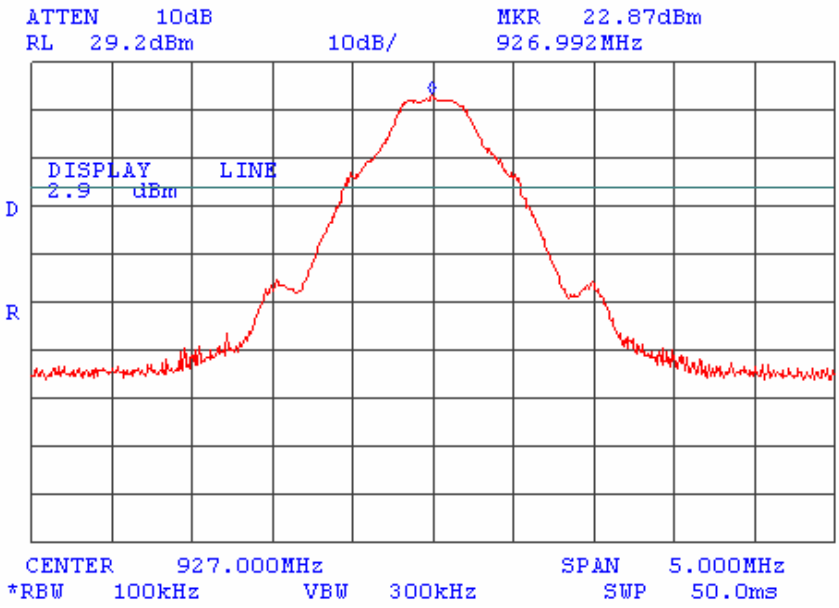
Plot A36

Conducted emission measurements within the band

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s



In band emissions level measured with RBW=100 kHz is 22.9 dBm
Limit for spurious emissions is 2.9 dBm

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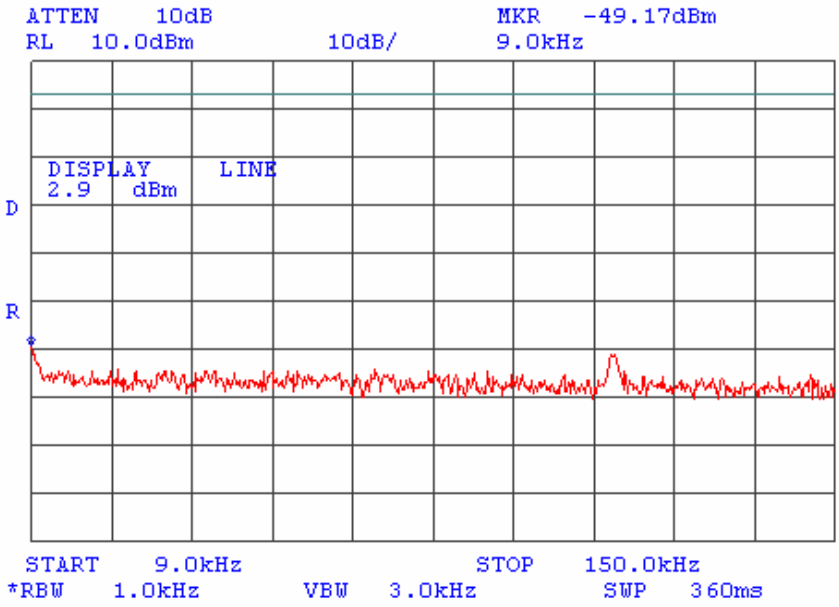
Plot A37

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s
Frequency range:	9 kHz – 150 kHz



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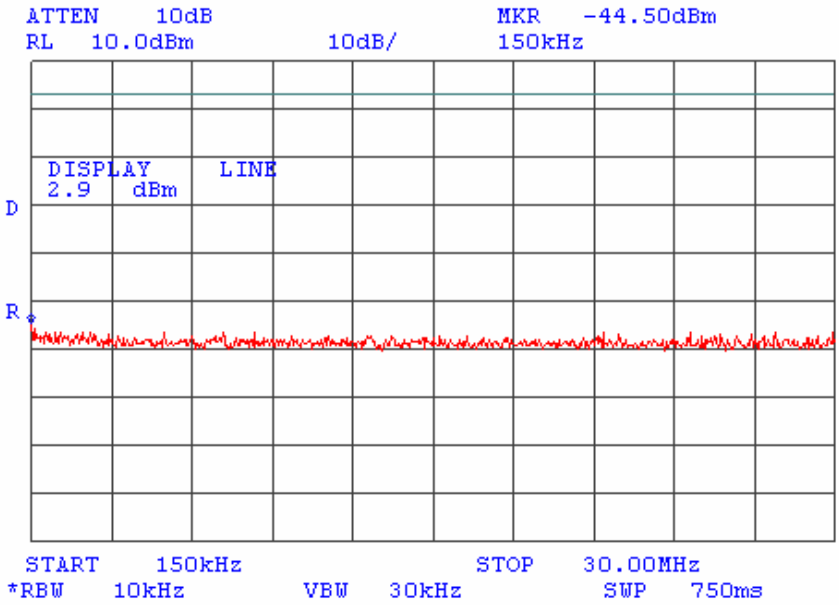
Plot A38

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s
Frequency range:	150 kHz – 30 MHz



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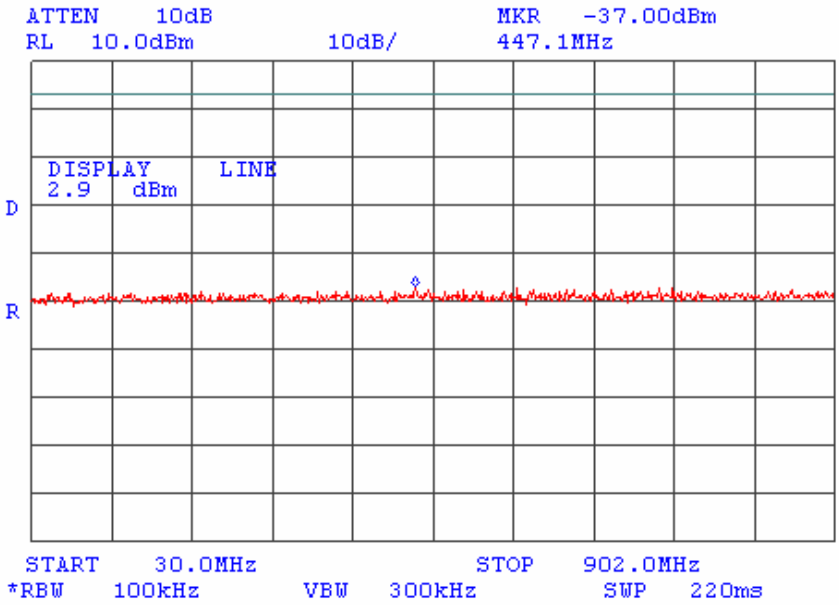
Plot A39

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s
Frequency range:	30 – 902 MHz



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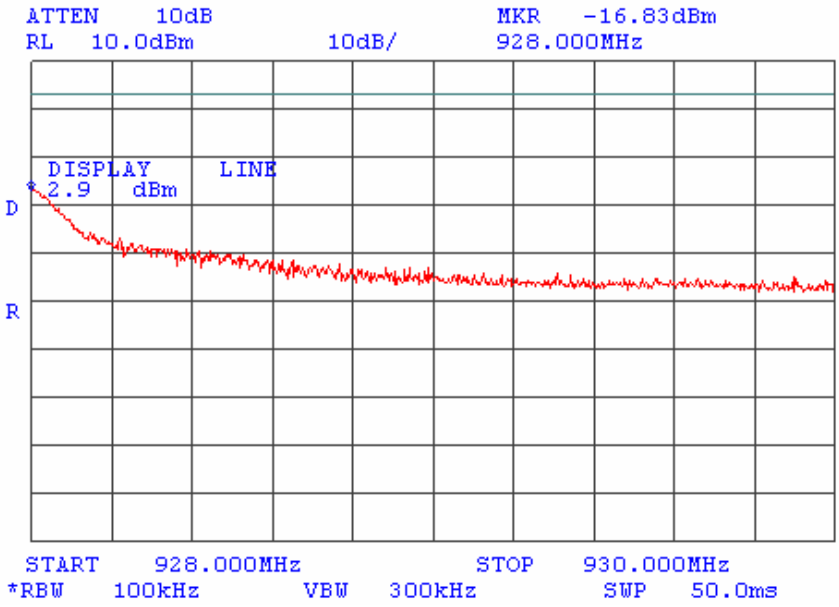
Plot A40

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s
Frequency range:	928 – 930 MHz



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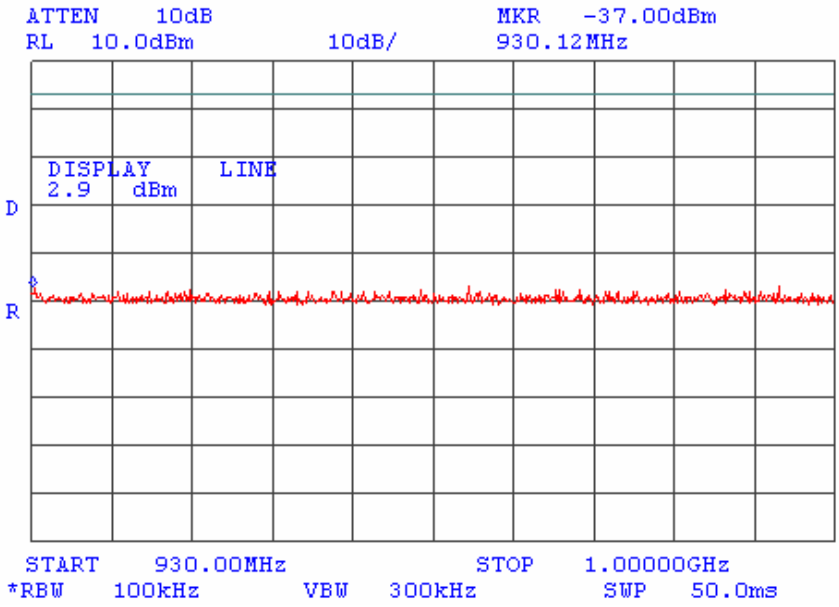
Plot A41

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s
Frequency range:	930 – 1000 MHz



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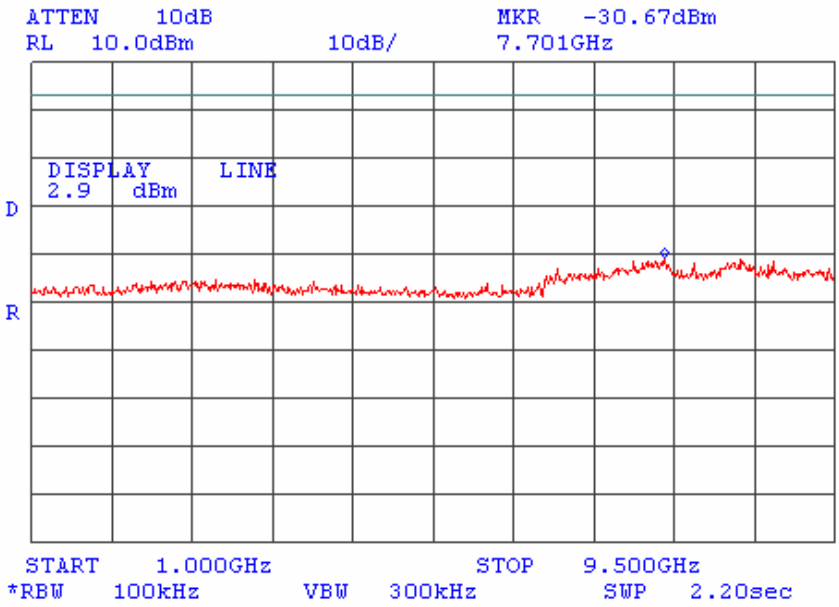
Plot A42

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	3 Mbit/s
Frequency range:	1 – 9.5 GHz



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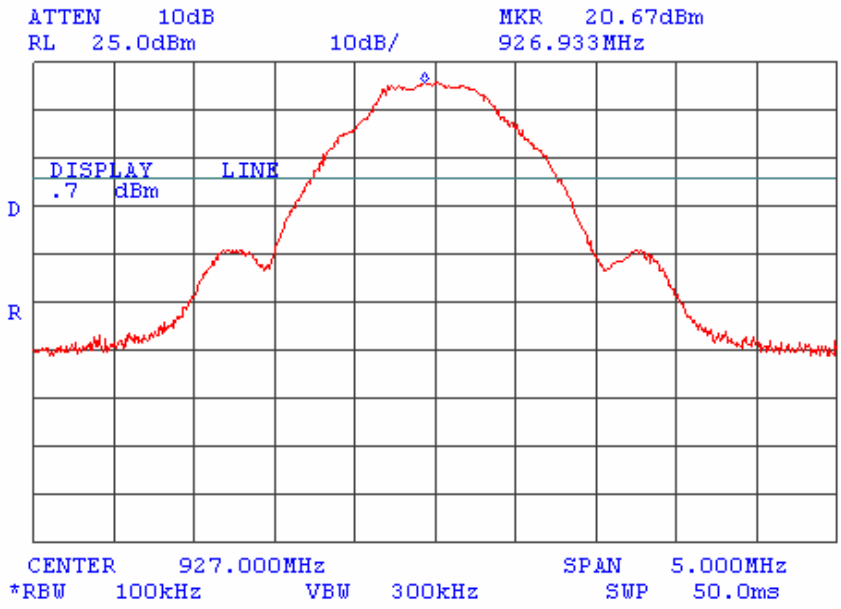
Plot A43

Conducted emission measurements within the band

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	4 Mbit/s



In band emissions level measured with RBW=100 kHz is 20.7 dBm
Limit for spurious emissions is 0.7 dBm

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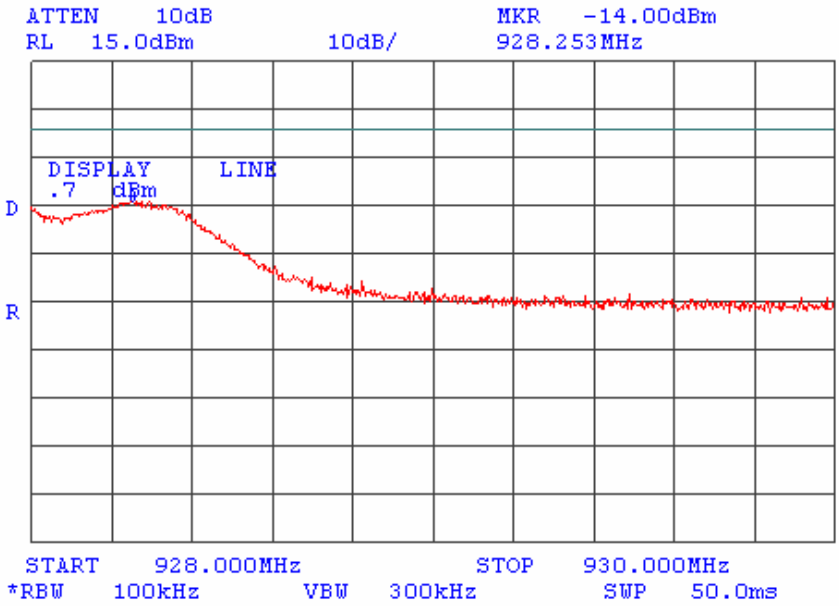
Plot A44

Conducted spurious emission measurements

Mode:	Hybrid
F_{HIGH}:	927 MHz
Bit rate:	4 Mbit/s
Frequency range:	928 – 930 MHz



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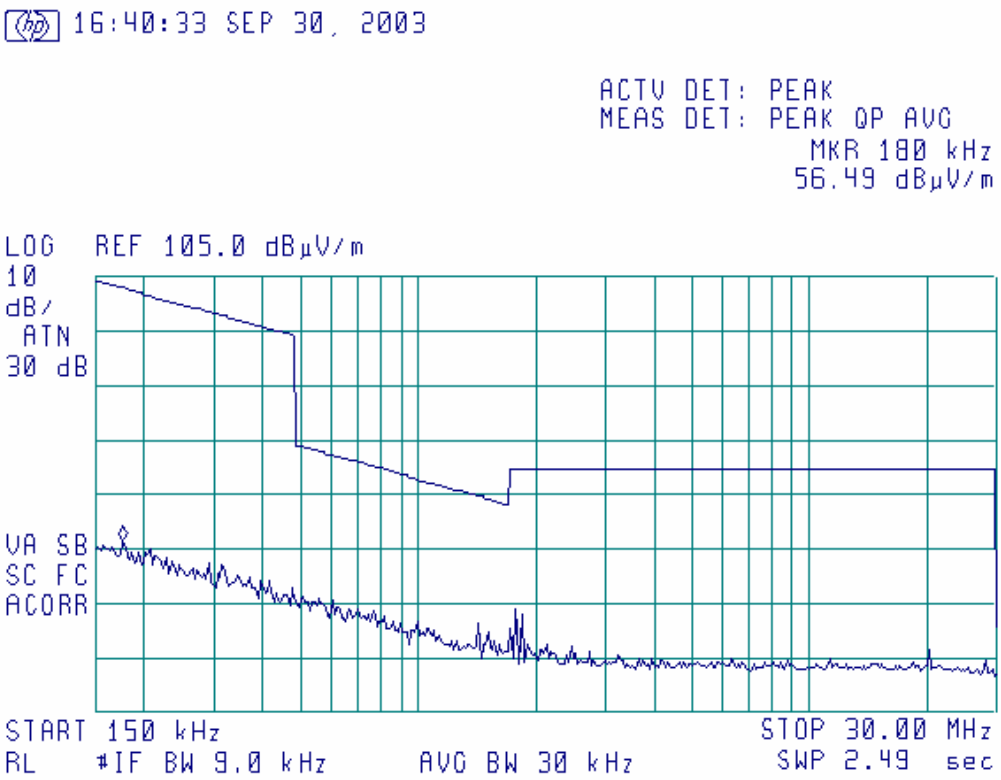
Plot A45

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, carrier frequency 903 MHz, 10 dBi external antenna



No spurious emissions were found

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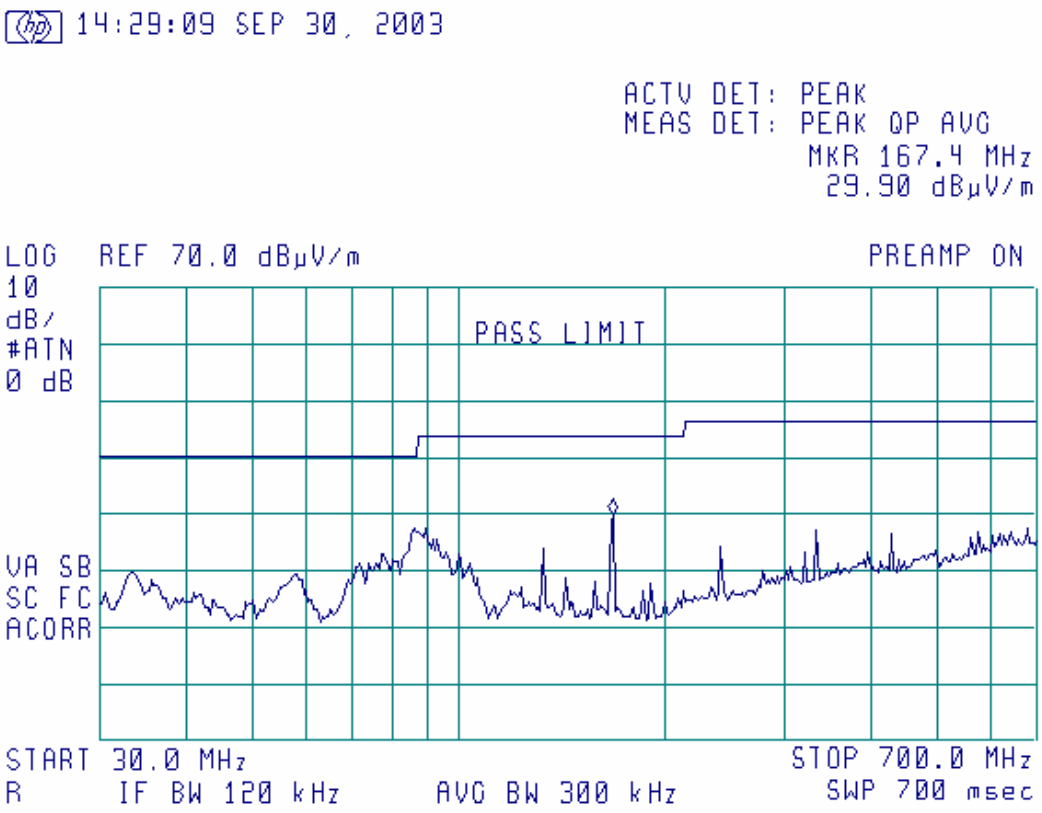
Plot A46

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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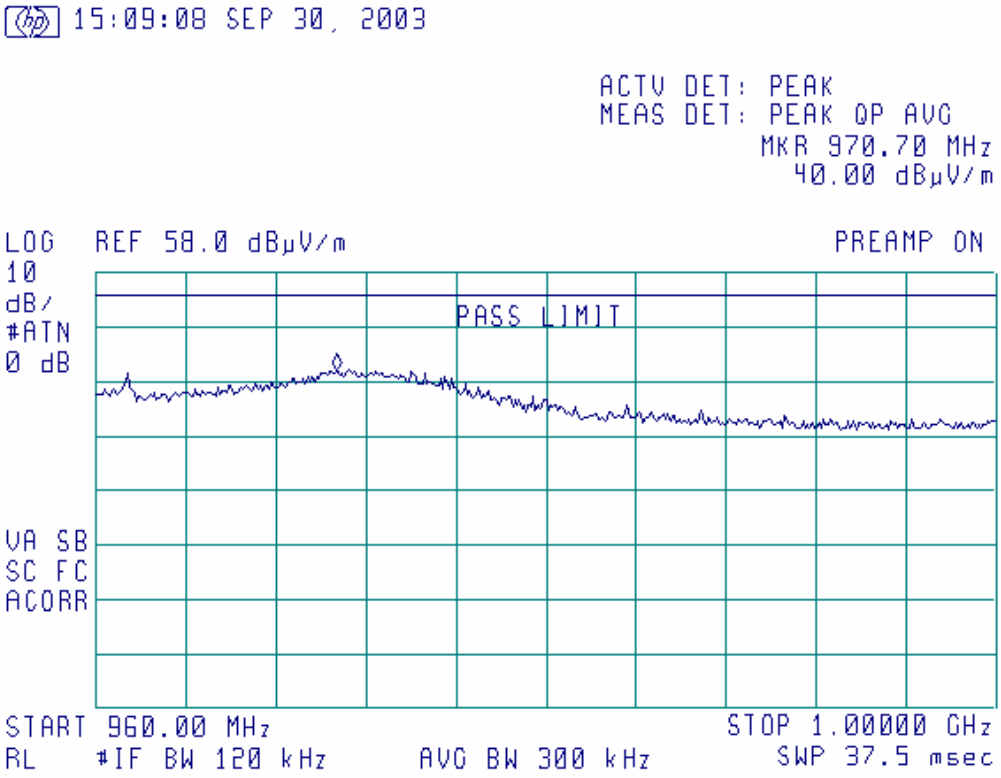
Plot A47

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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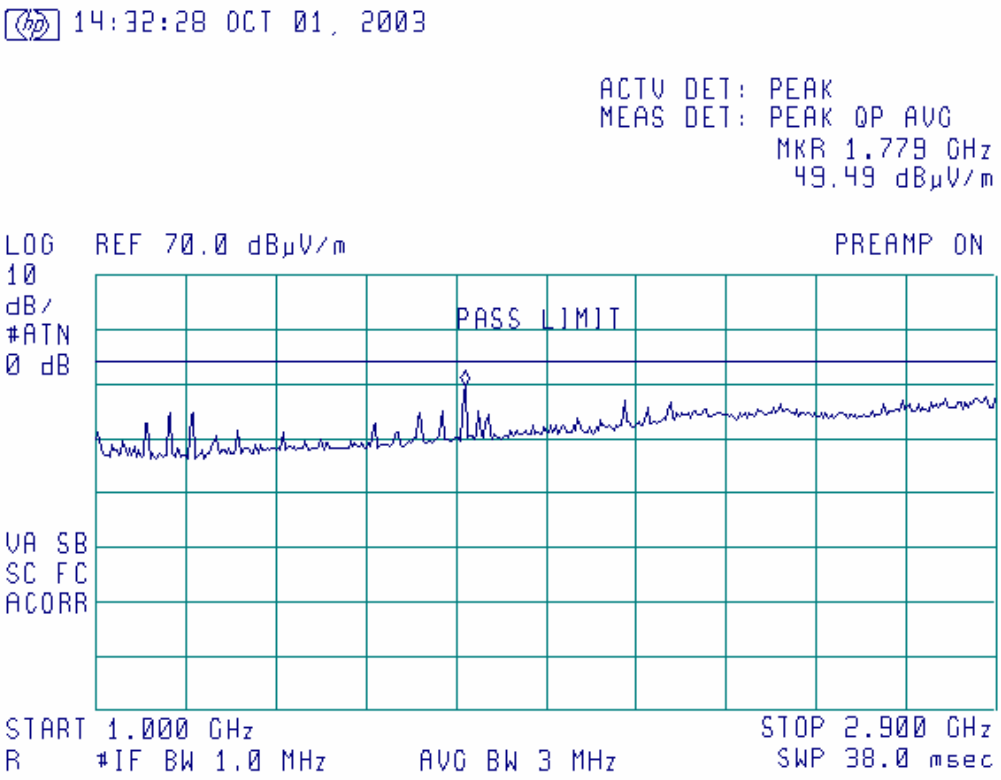
Plot A48

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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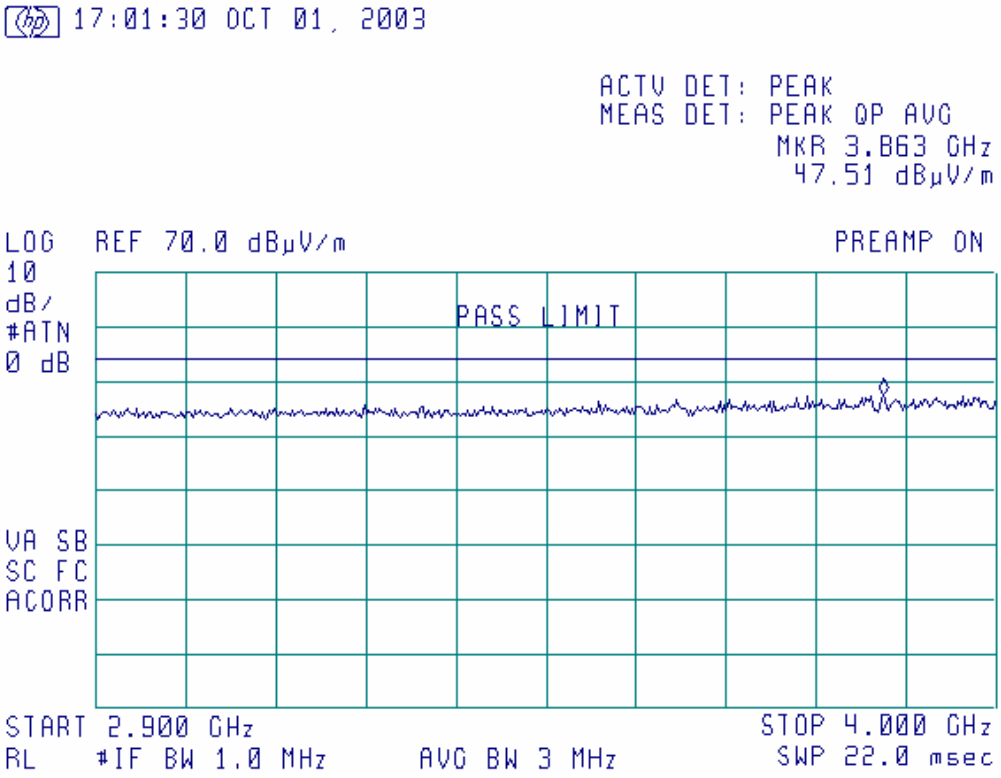
Plot A49

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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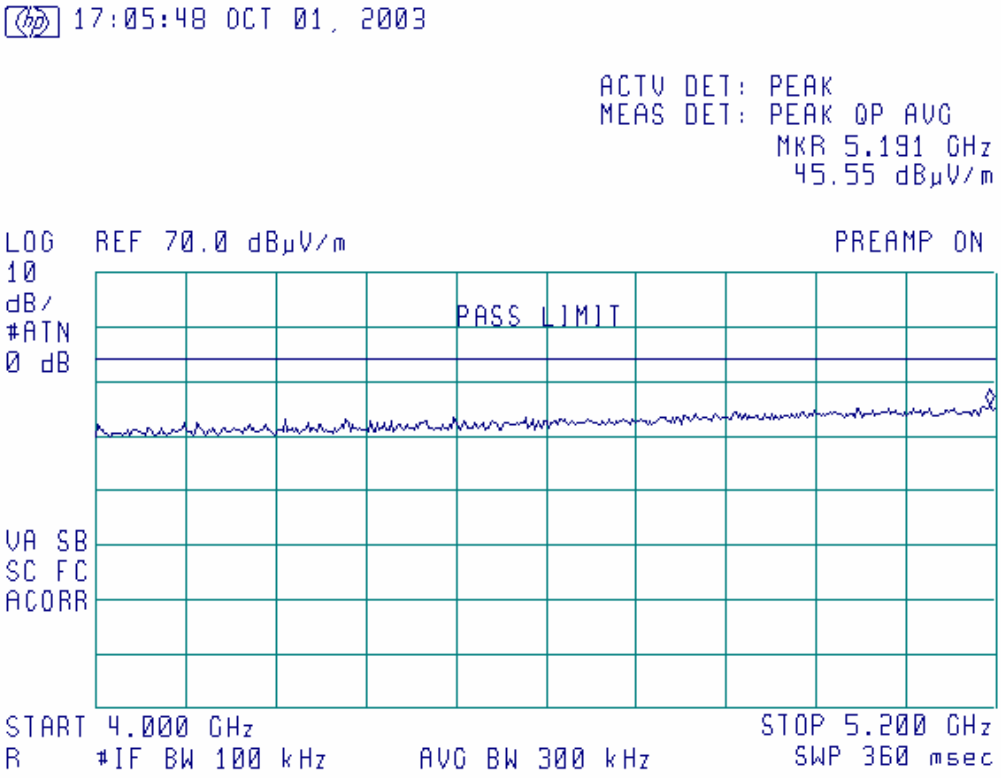
Plot A50

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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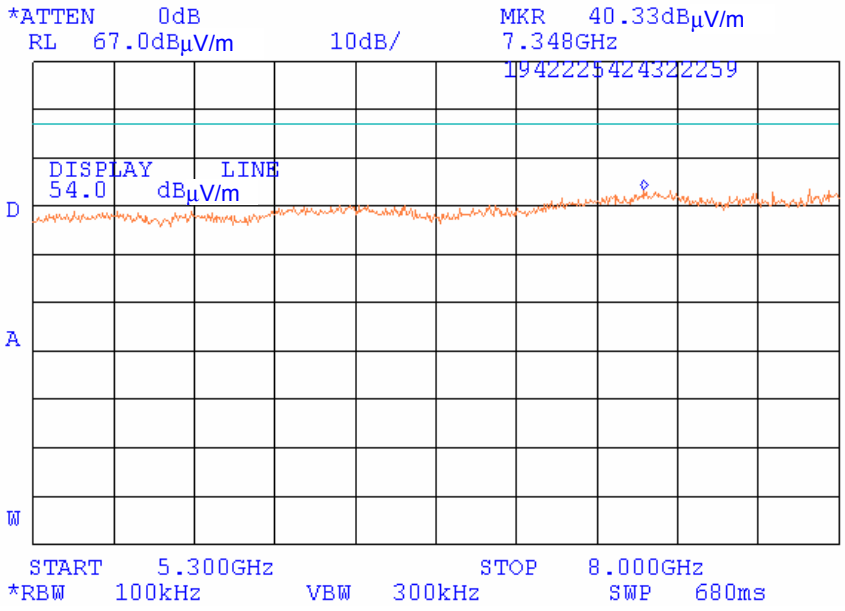
Plot A51

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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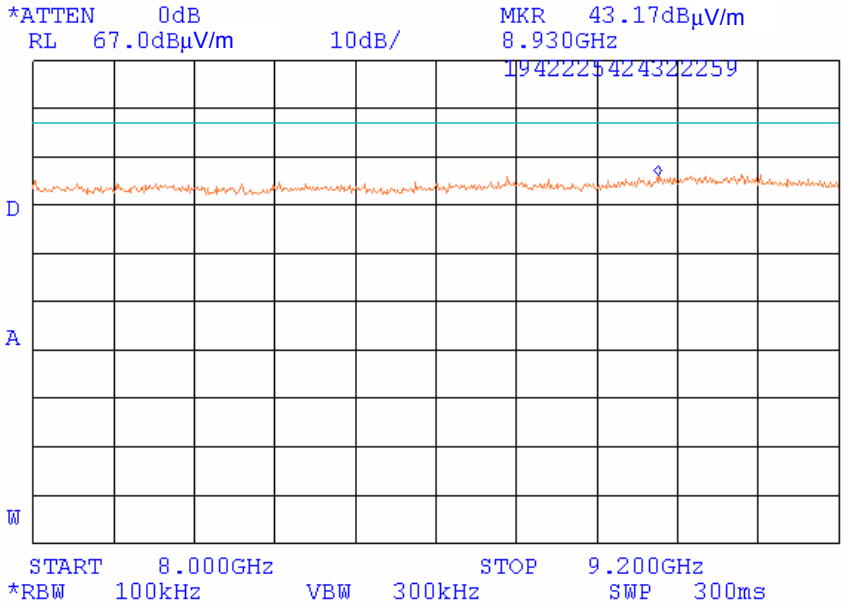
Plot A52

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 903 MHz, 10 dBi external antenna



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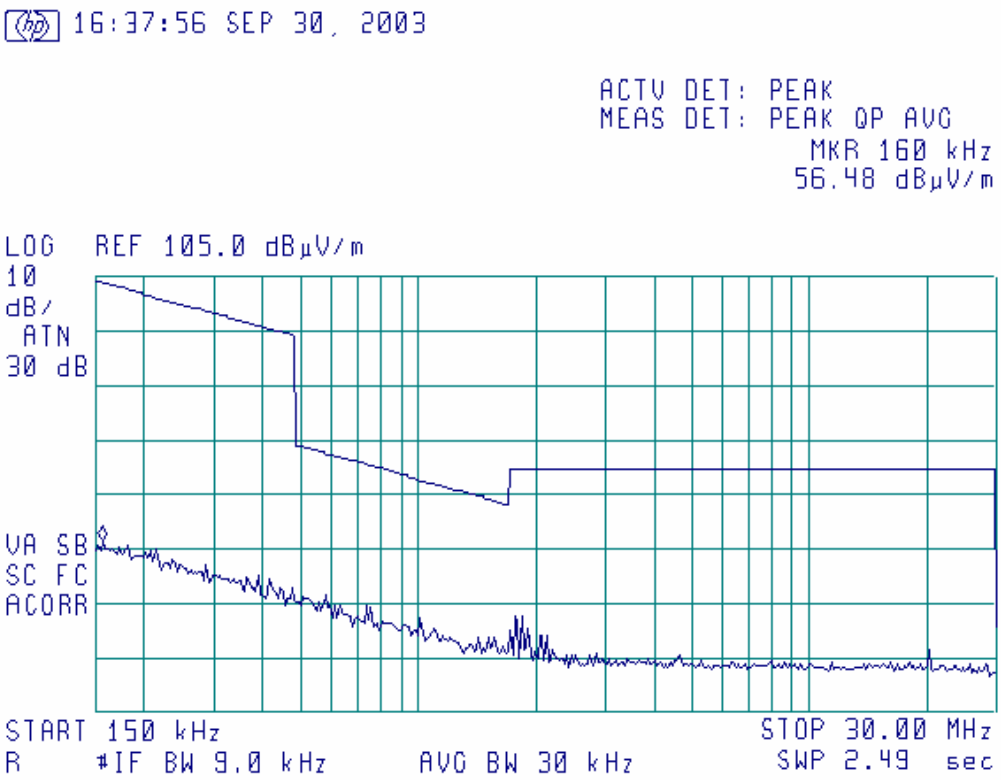
Plot A53

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, carrier frequency 915 MHz, 10 dBi external antenna



No spurious emissions were found

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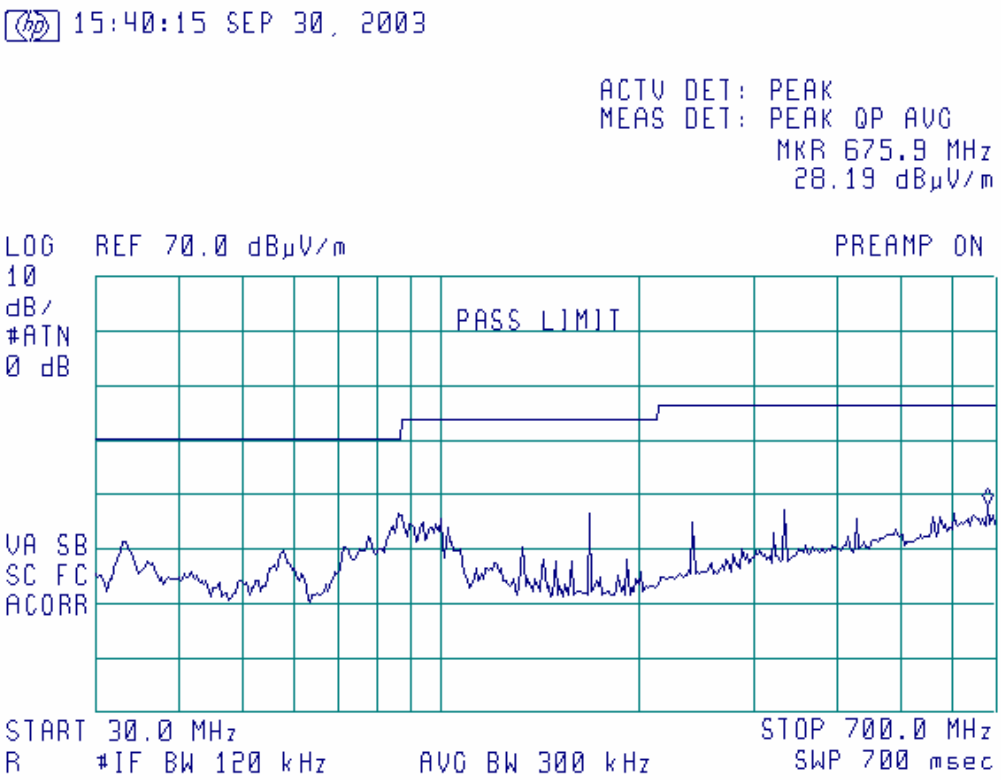
Plot A54

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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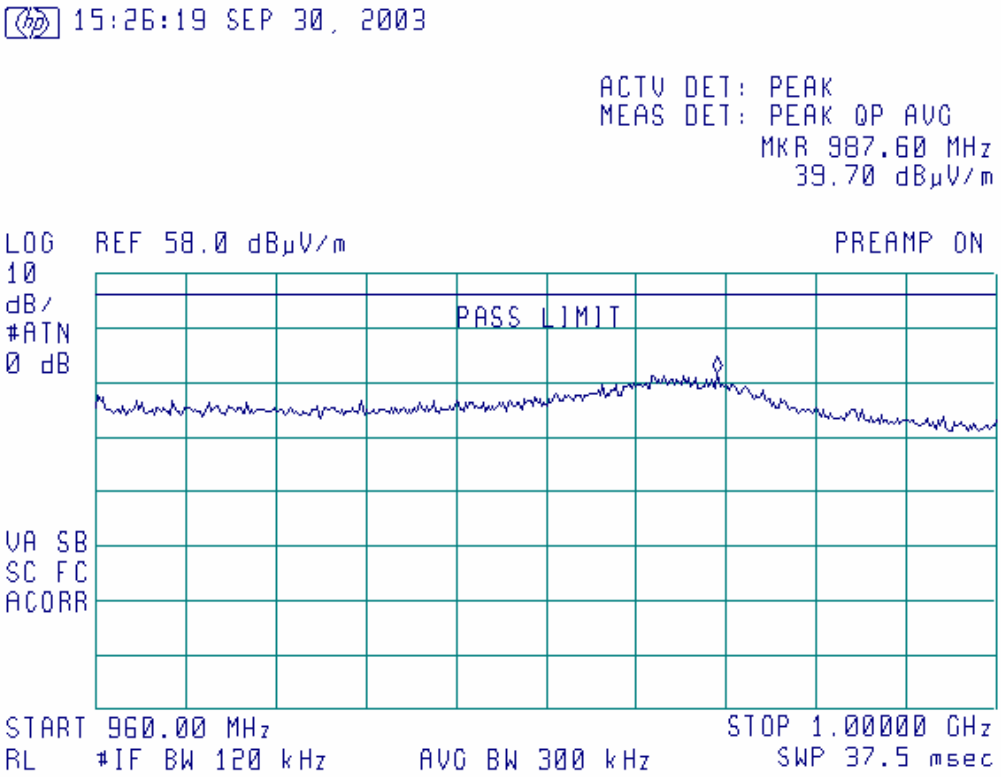
Plot A55

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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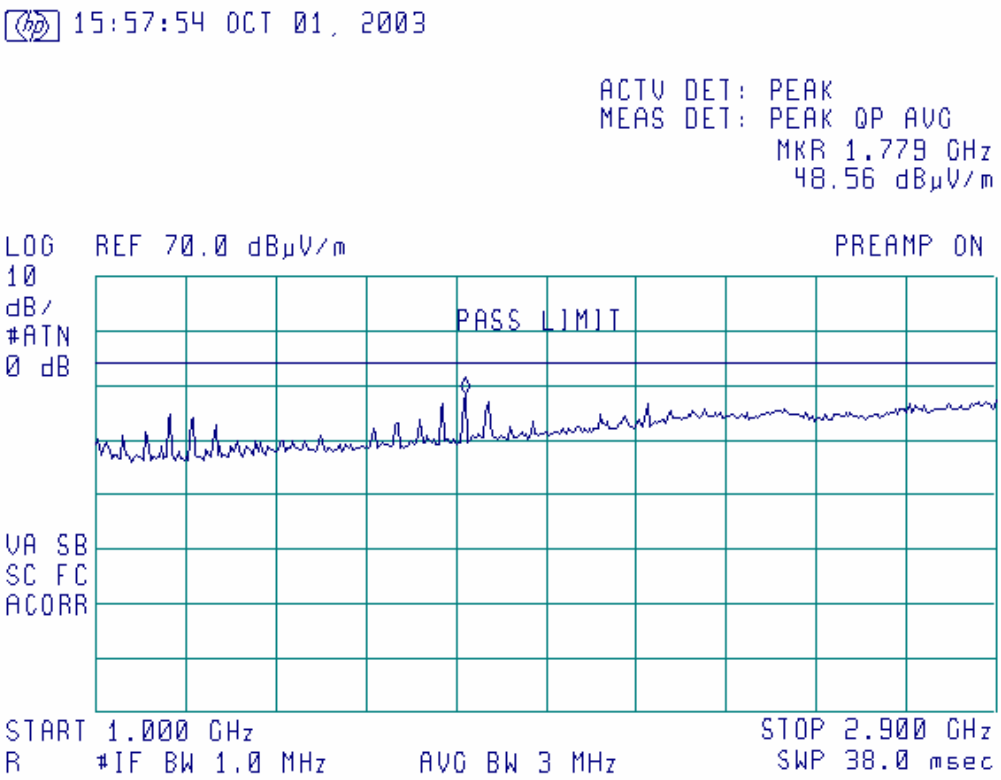
Plot A56

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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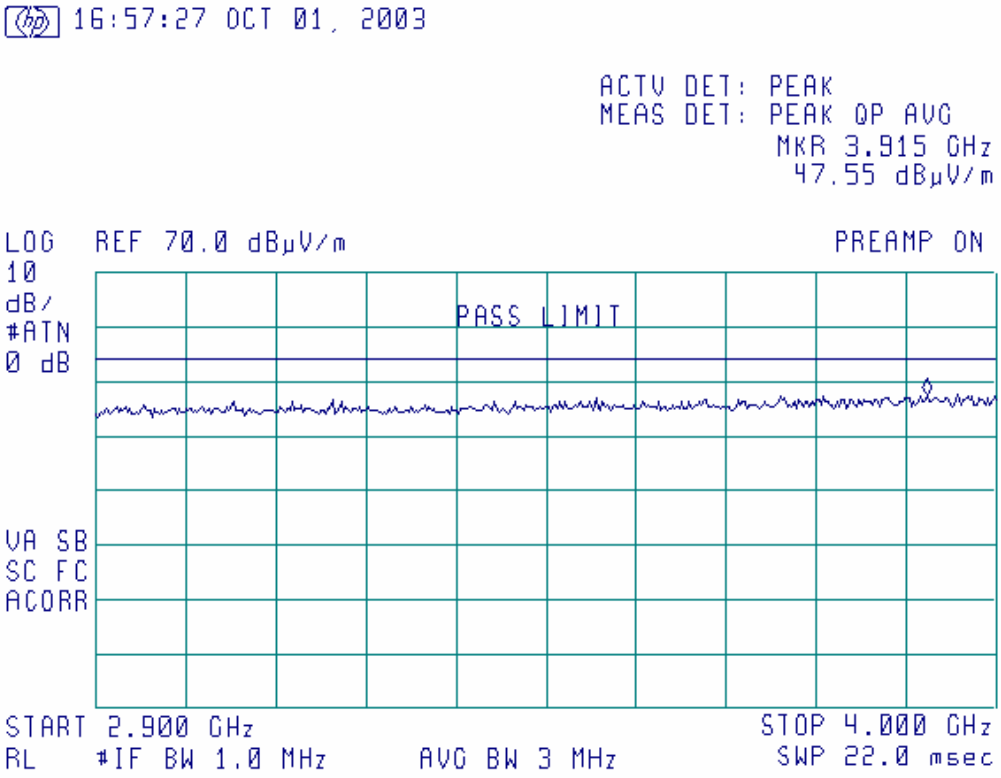
Plot A57

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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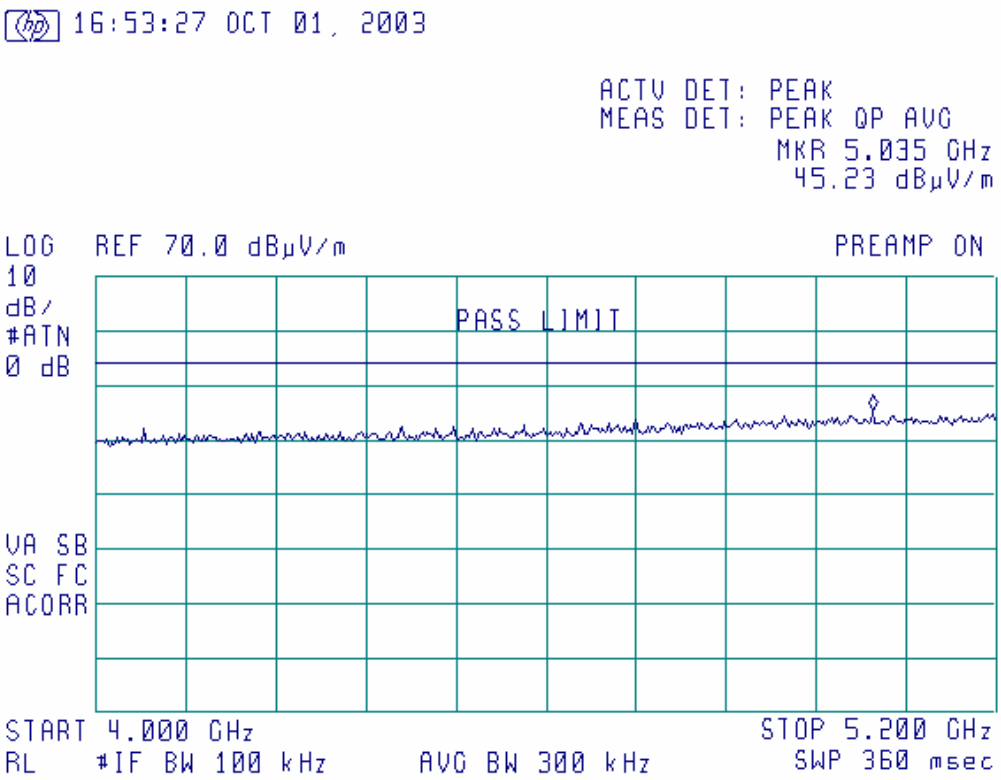
Plot A58

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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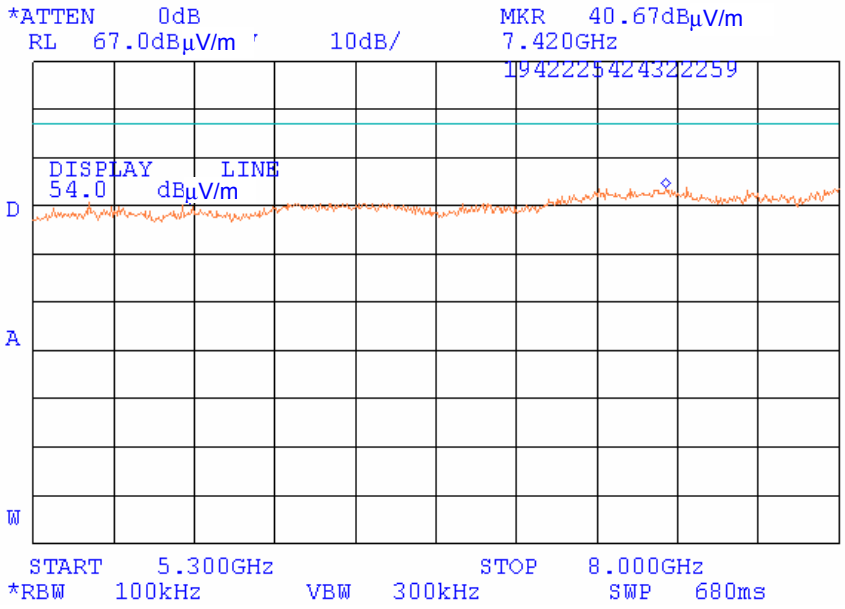
Plot A59

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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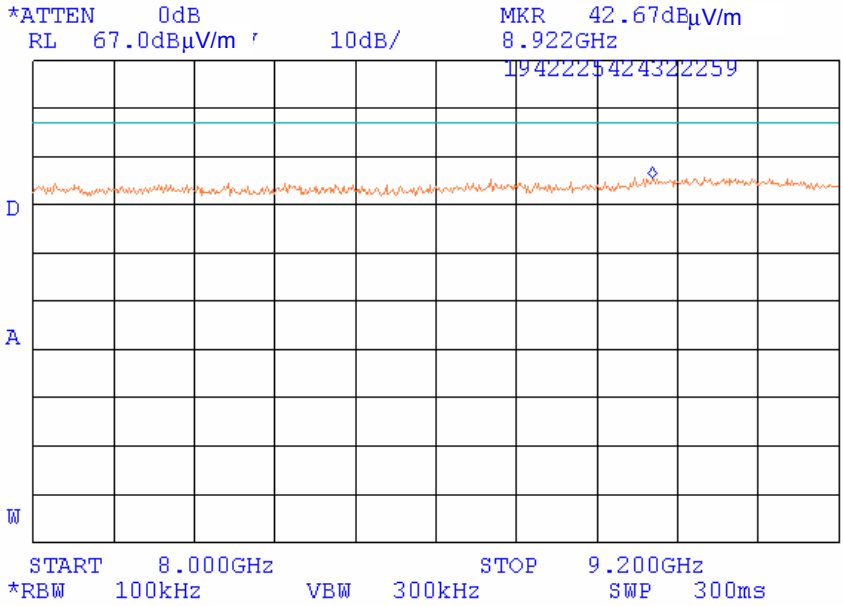
Plot A60

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 915 MHz, 10 dBi external antenna



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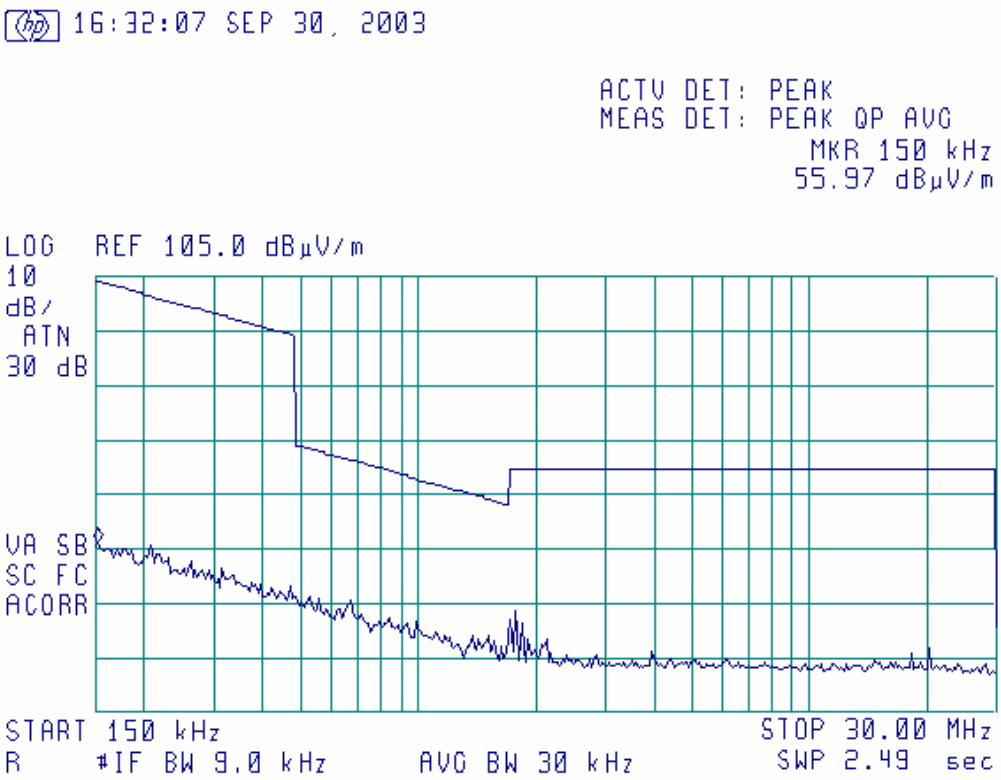
Plot A61

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, carrier frequency 927 MHz, 10 dBi external antenna



No spurious emissions were found

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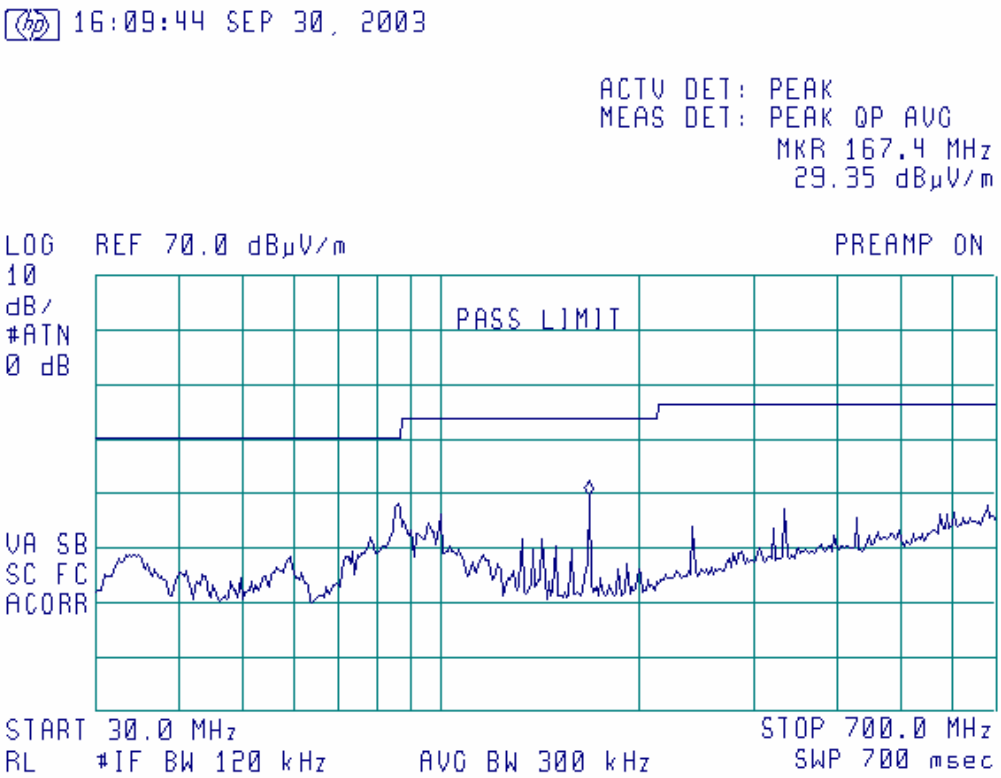
Plot A62

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



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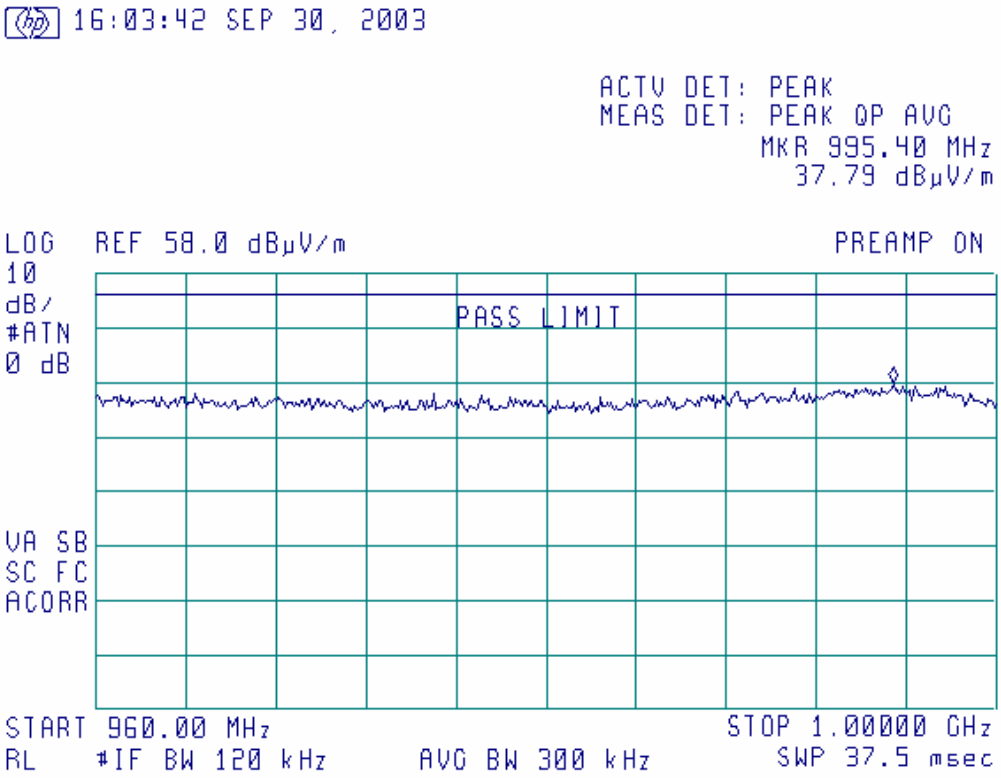
Plot A63

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



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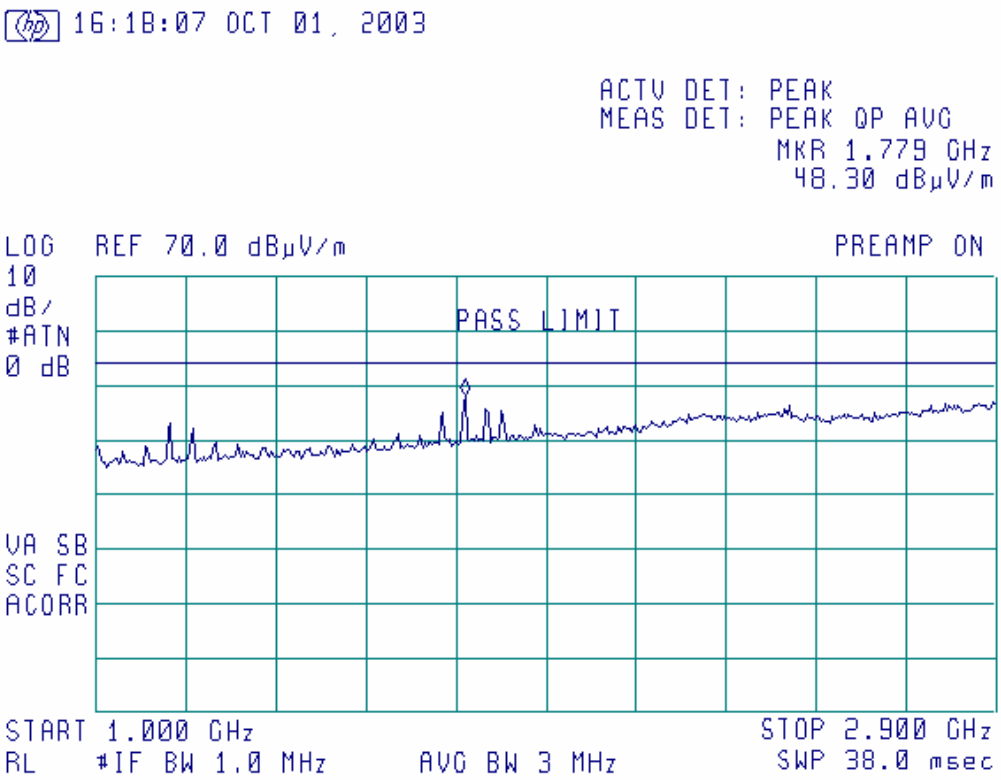
Plot A64

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



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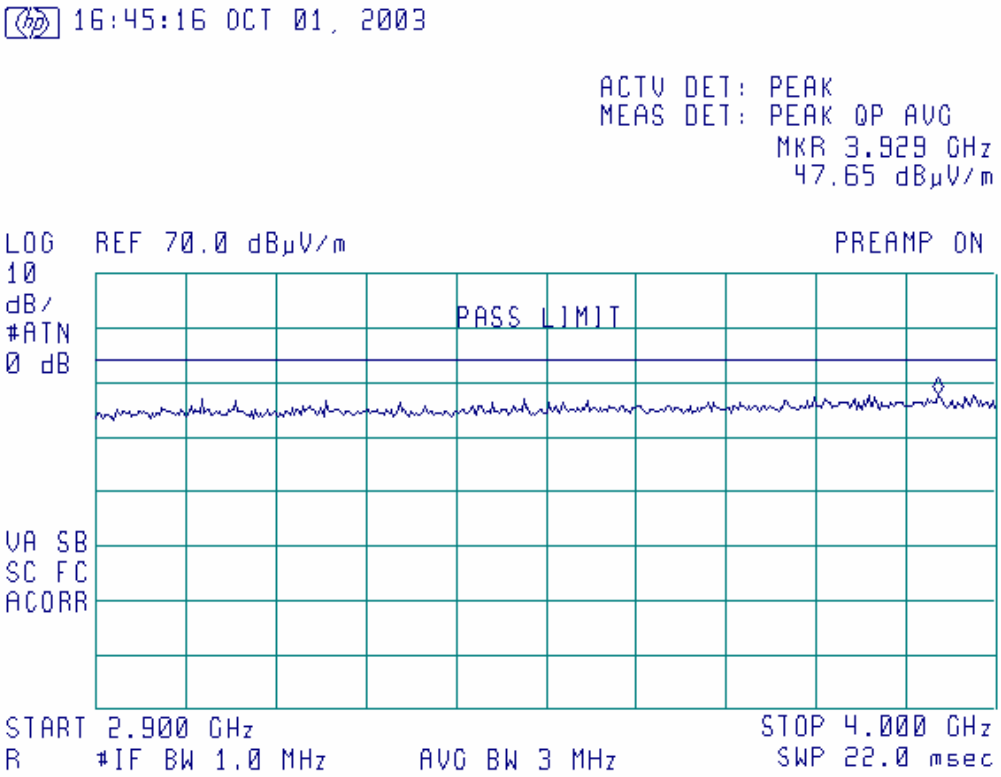
Plot A65

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



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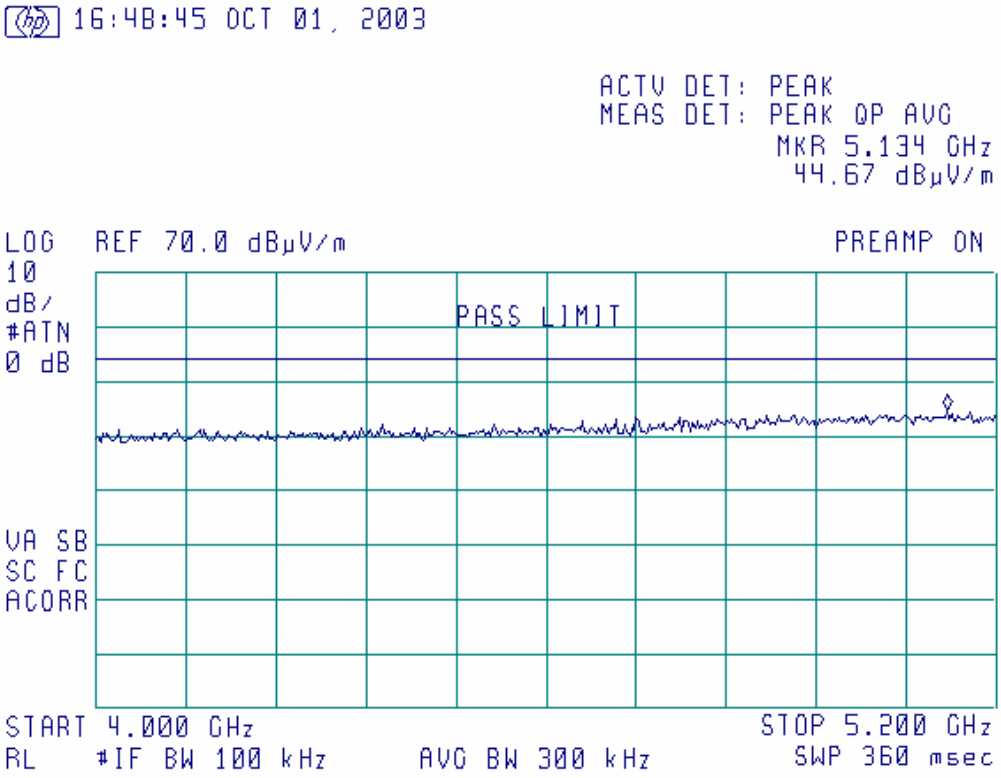
Plot A66

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



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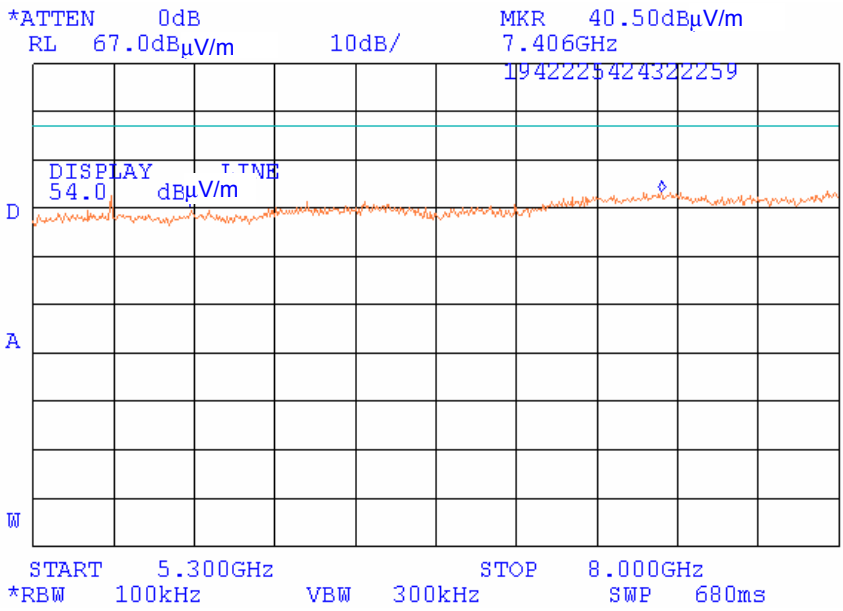
Plot A67

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



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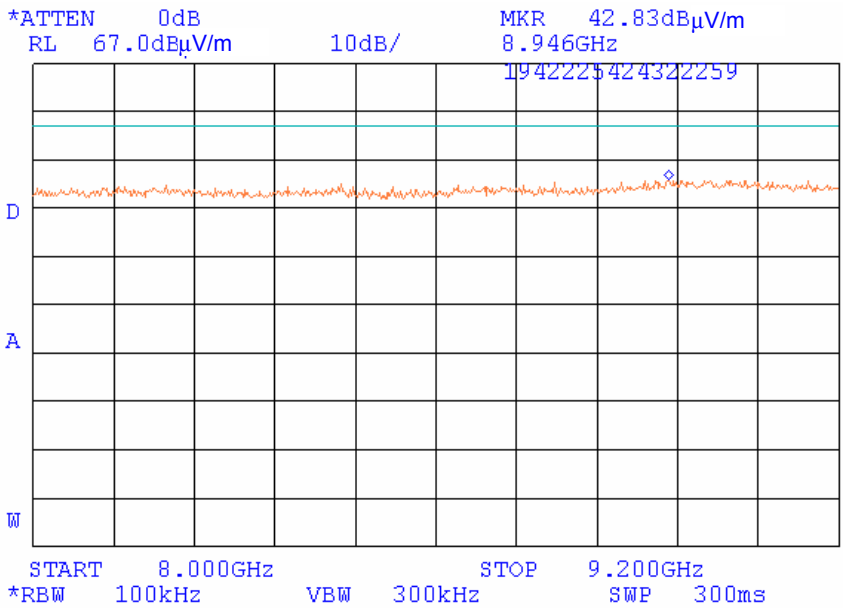
Plot A68

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 927 MHz, 10 dBi external antenna



No spurious emissions were found.

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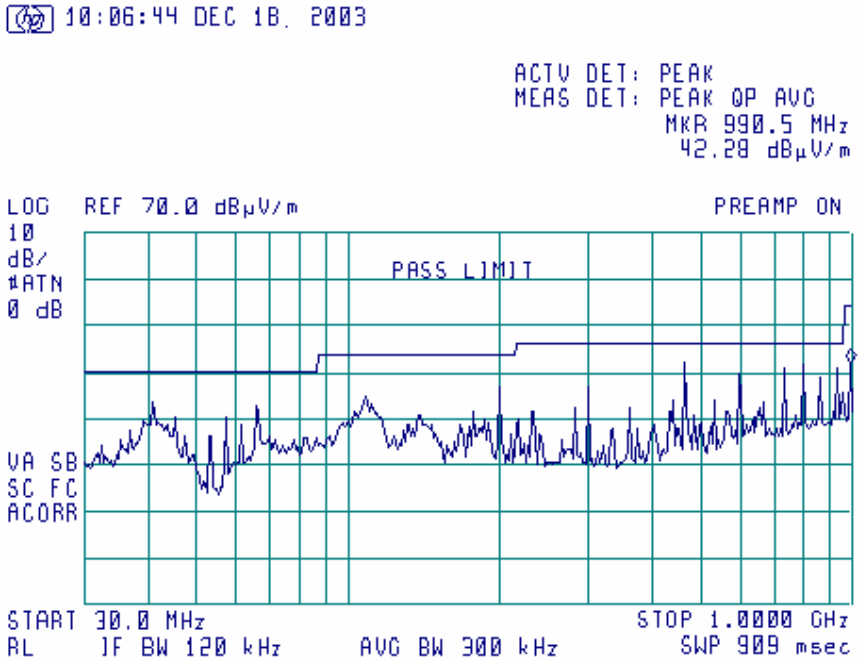
Plot A69

Radiated emission measurements of the EUT with 10 dBi external antenna in the anechoic chamber at receive mode, vertical and horizontal antenna polarization



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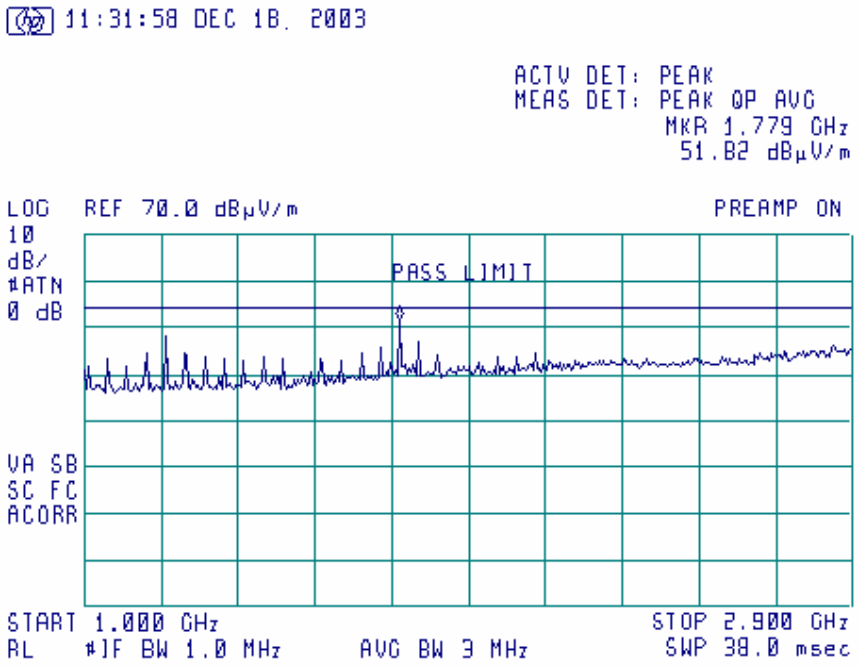
Plot A70

Radiated emission measurements of the EUT with 10 dBi external antenna in the anechoic chamber at receive mode, vertical and horizontal antenna polarization



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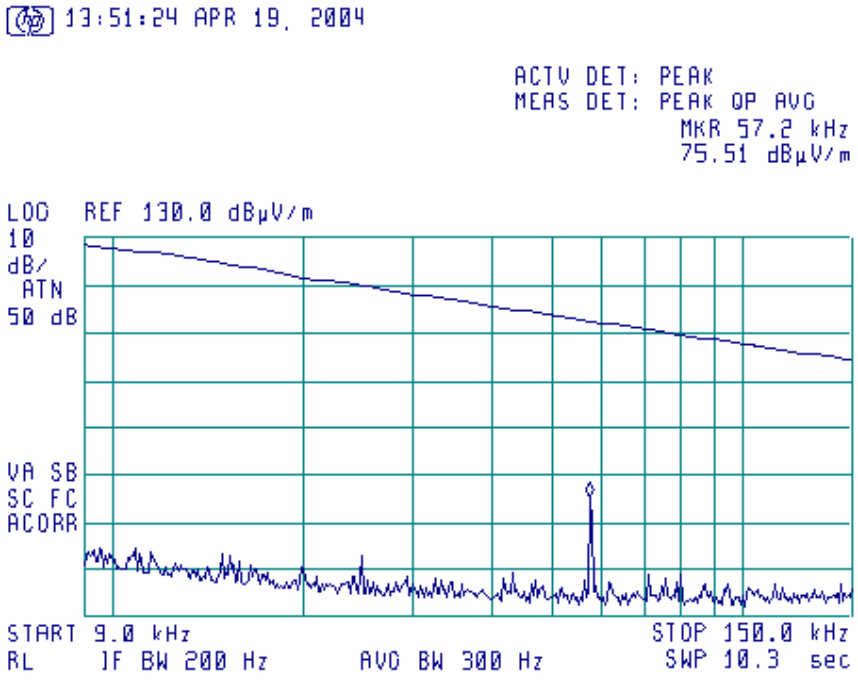
Plot A71

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, carrier frequency 903 MHz, internal antenna



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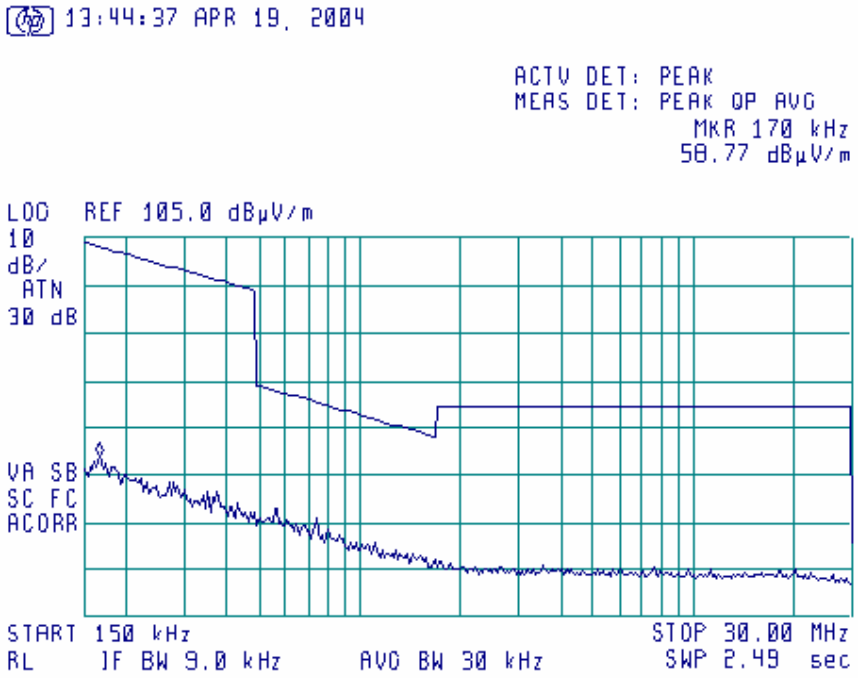
Plot A72

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, carrier frequency 903 MHz, internal antenna



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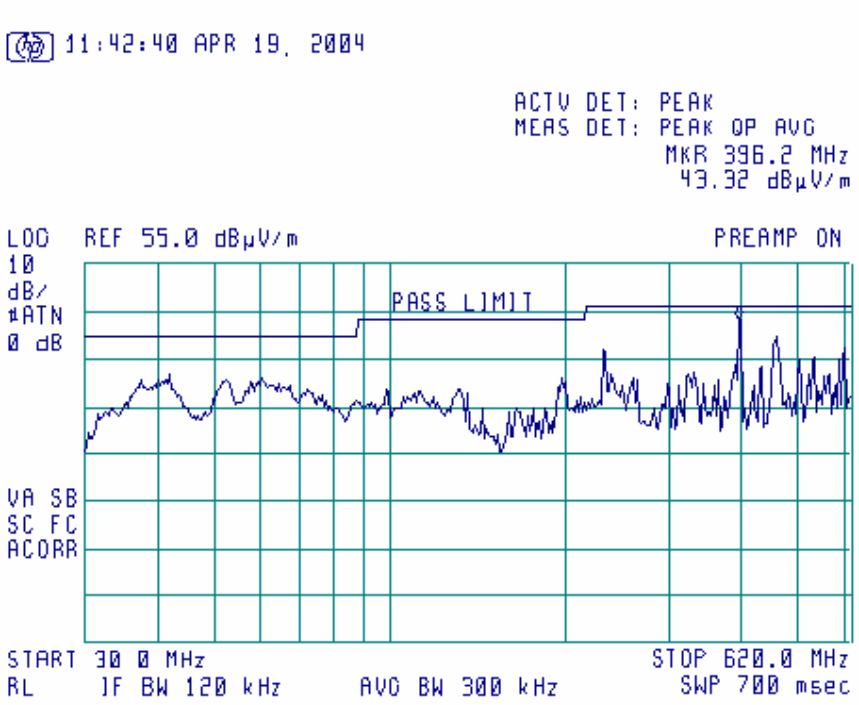
Plot A73

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB	Comments
400	50.17	44.99	46.00	1.01	V, 1m, 163°,

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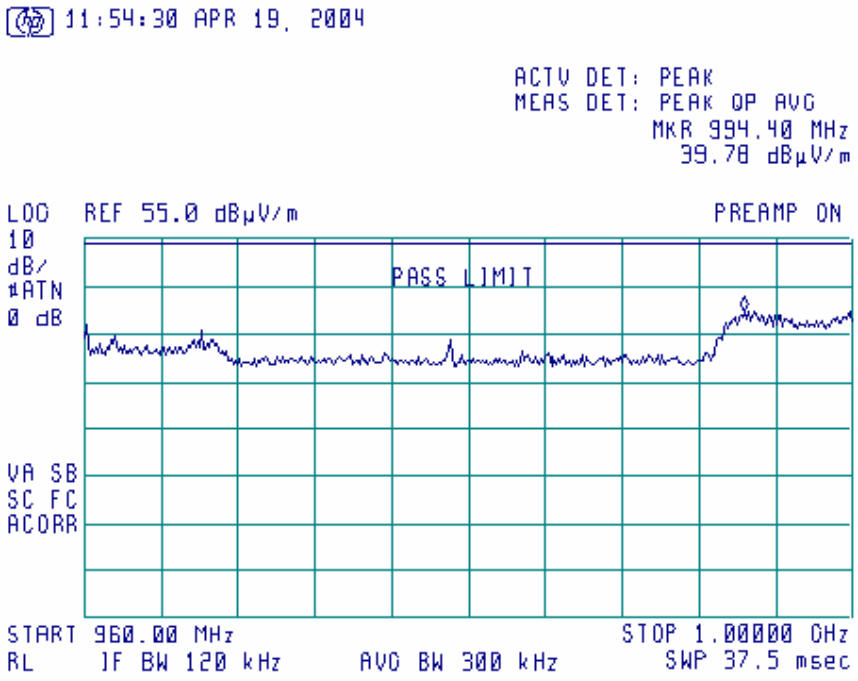
Plot A74

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



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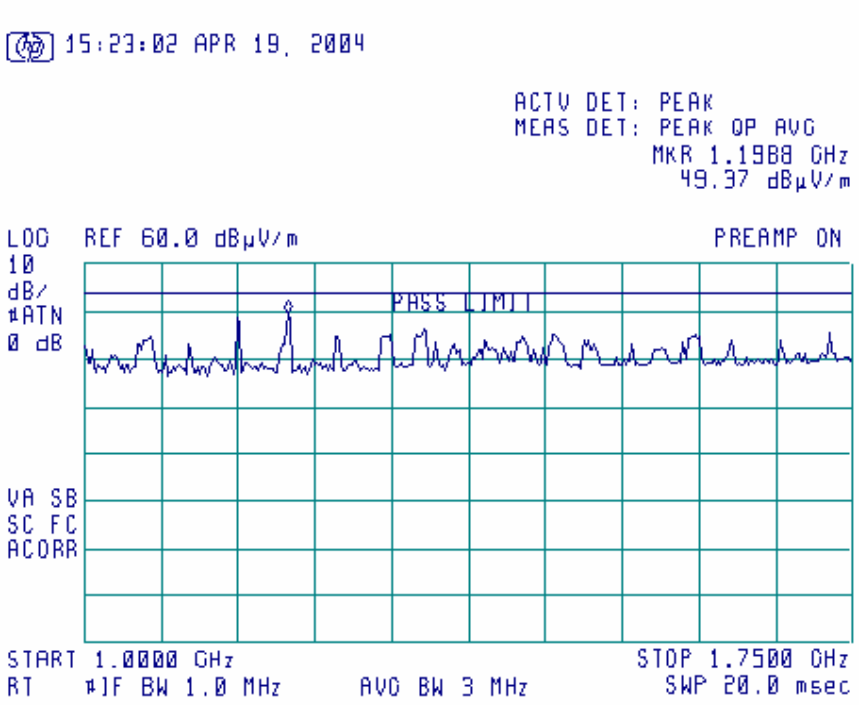
Plot A75

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



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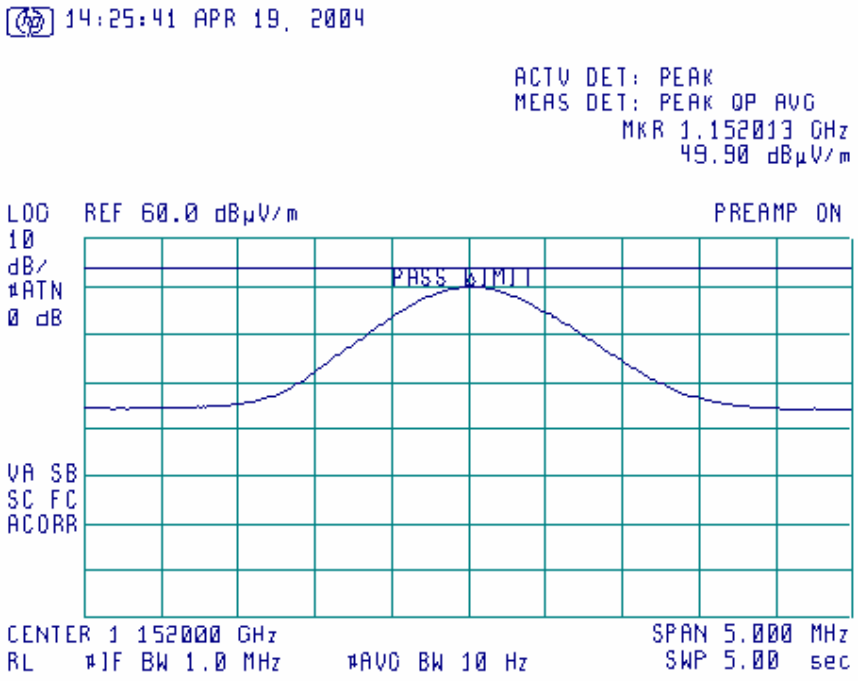
Plot A76

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



Average value measured with 10 Hz VBW. No average factor is applicable for this measurement.

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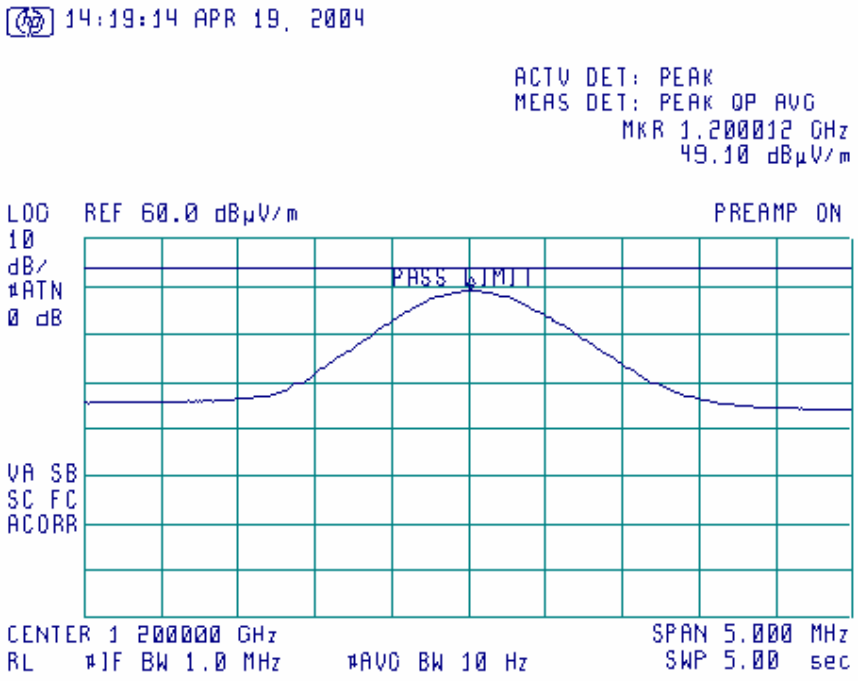
Plot A77

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



Average value measured with 10 Hz VBW. No average factor is applicable for th**is** measurement.

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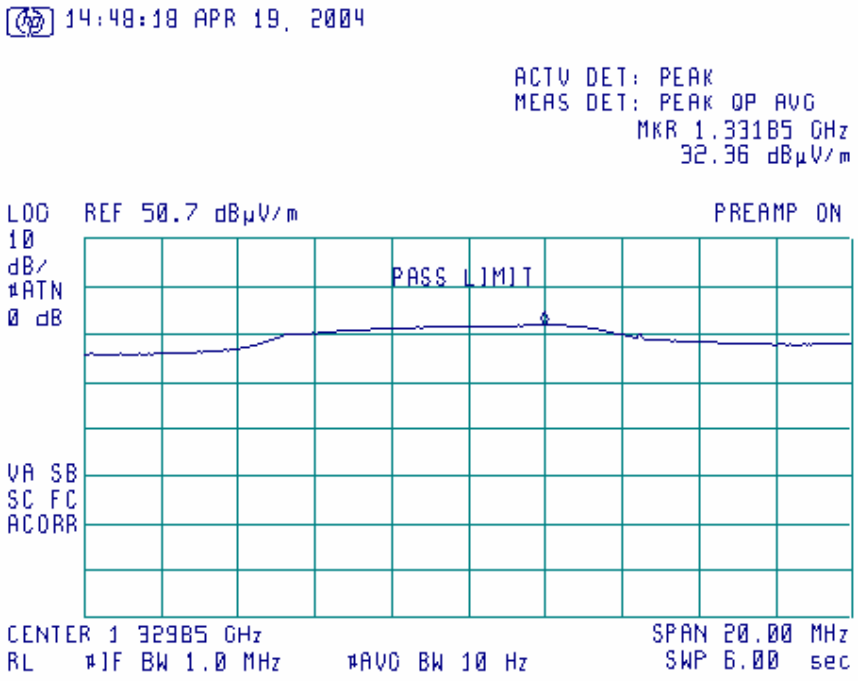
Plot A78

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



Average value measured with 10 Hz VBW. No average factor is applicable for th**is** measurement.

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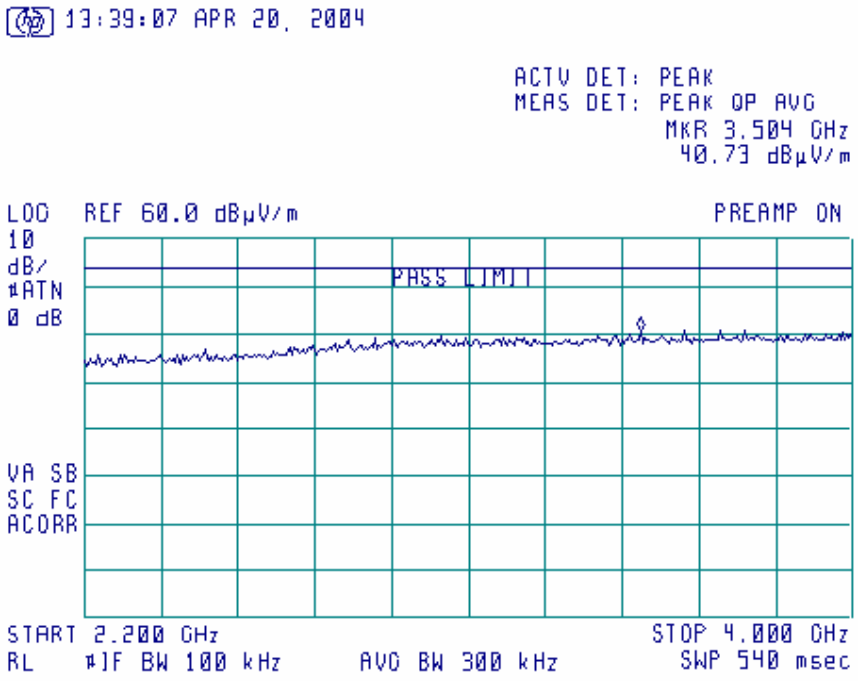
Plot A79

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



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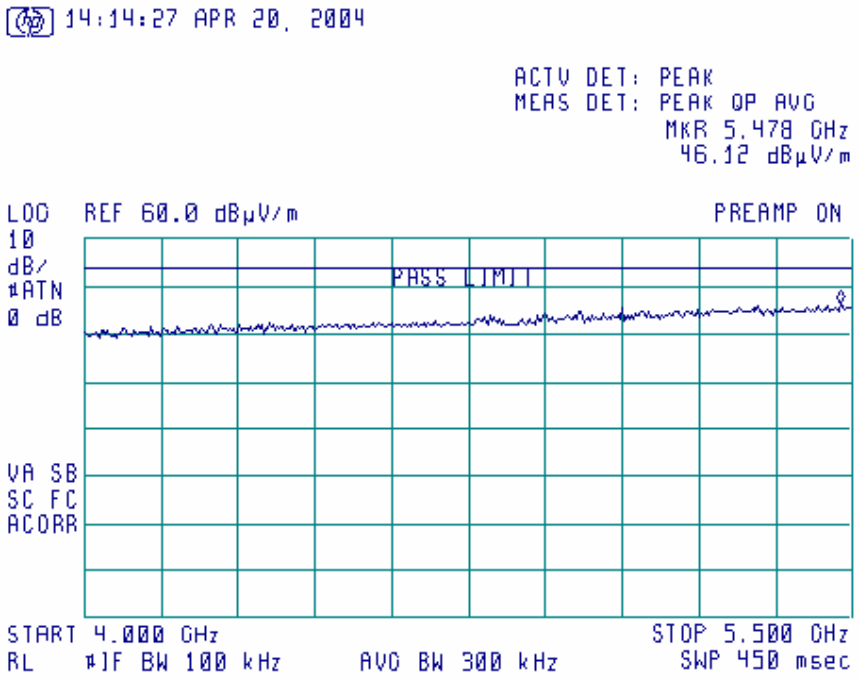
Plot A80

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 903 MHz, internal antenna



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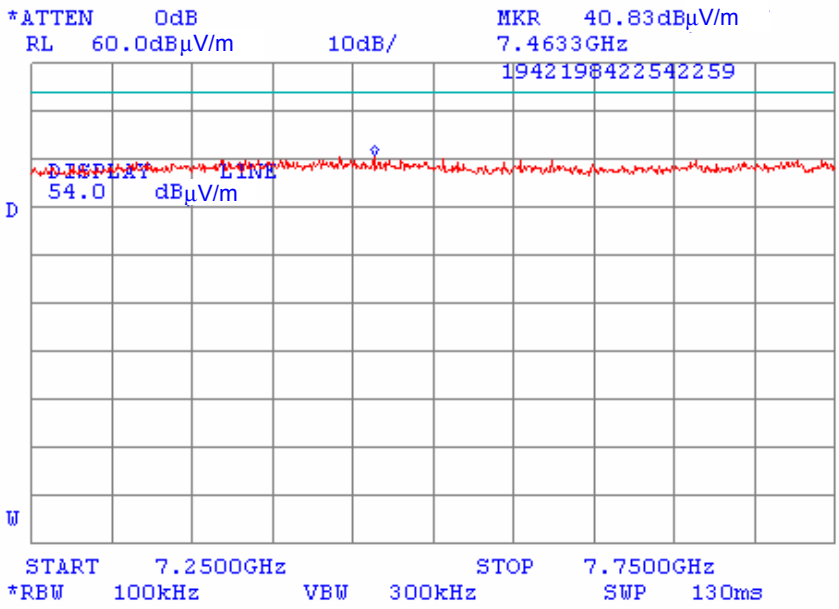
Plot A81

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 903 MHz, internal antenna



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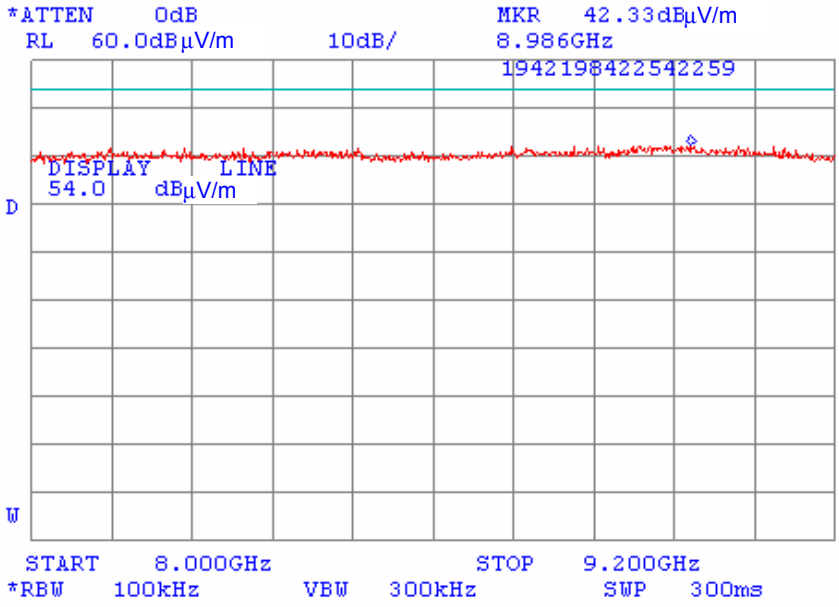
Plot A82

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 903 MHz, internal antenna



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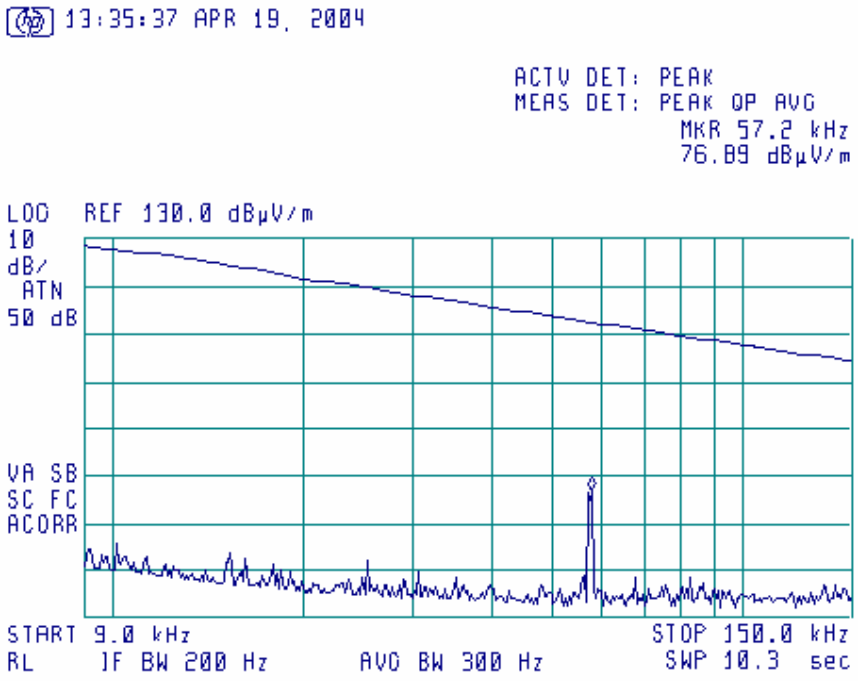
Plot A83

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, carrier frequency 915 MHz, internal antenna



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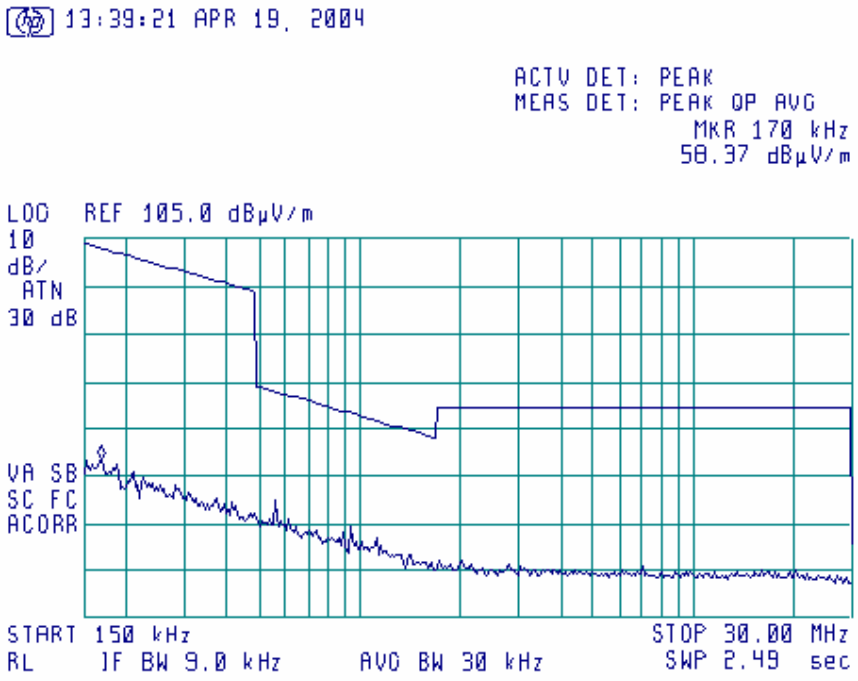
Plot A84

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, carrier frequency 915 MHz, internal antenna



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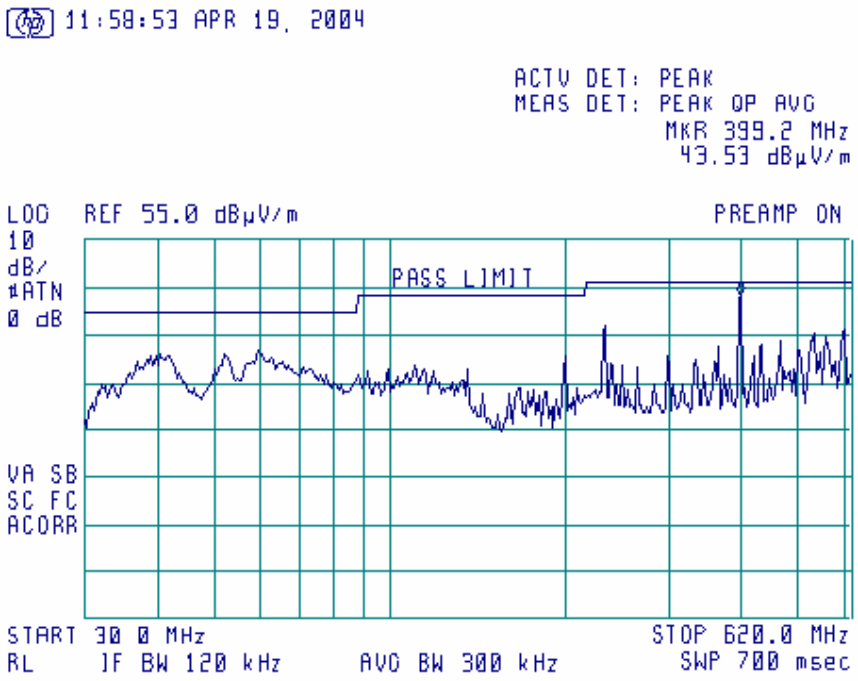
Plot A85

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, internal antenna



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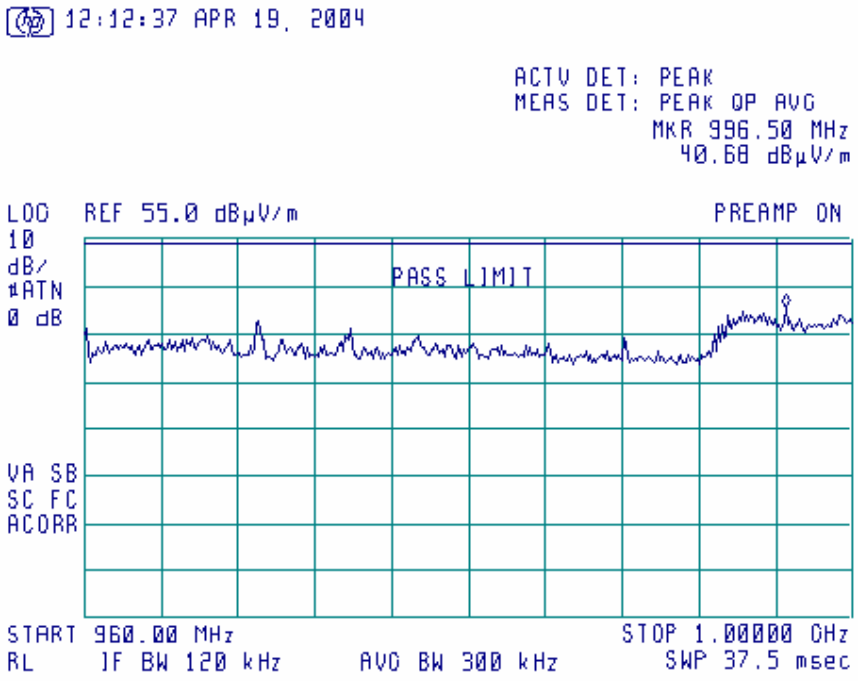
Plot A86

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, internal antenna



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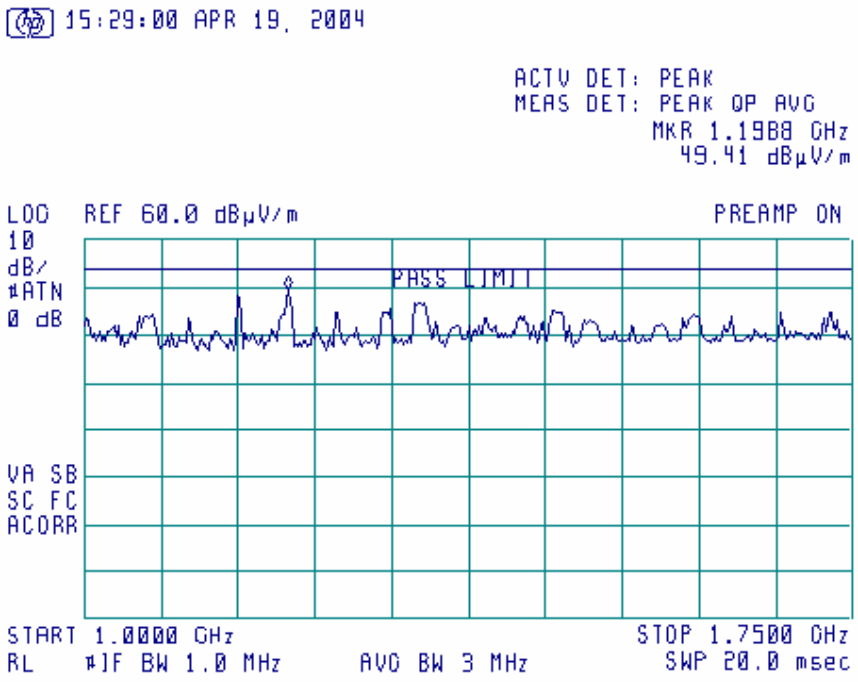
Plot A87

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, internal antenna



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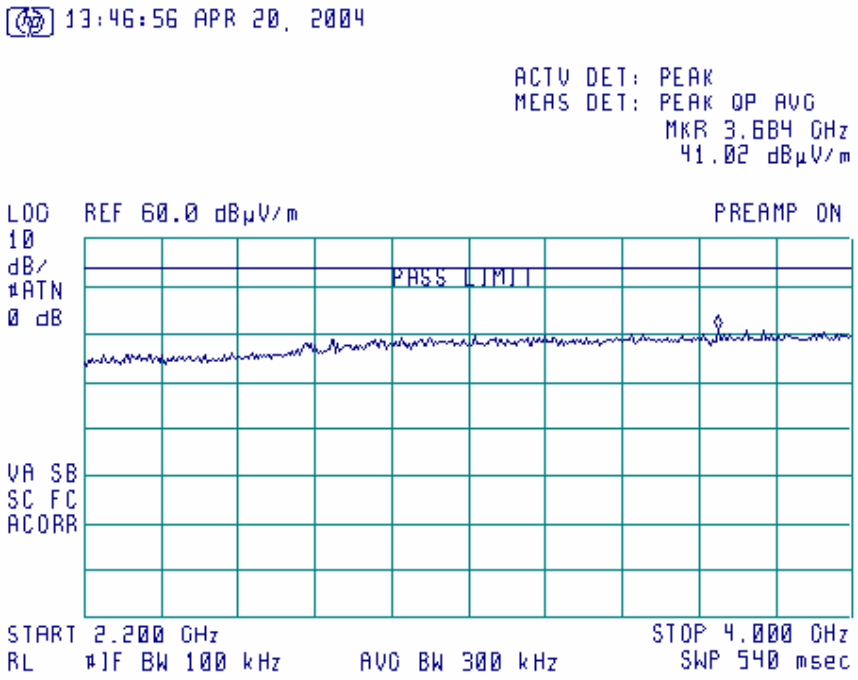
Plot A88

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, internal antenna



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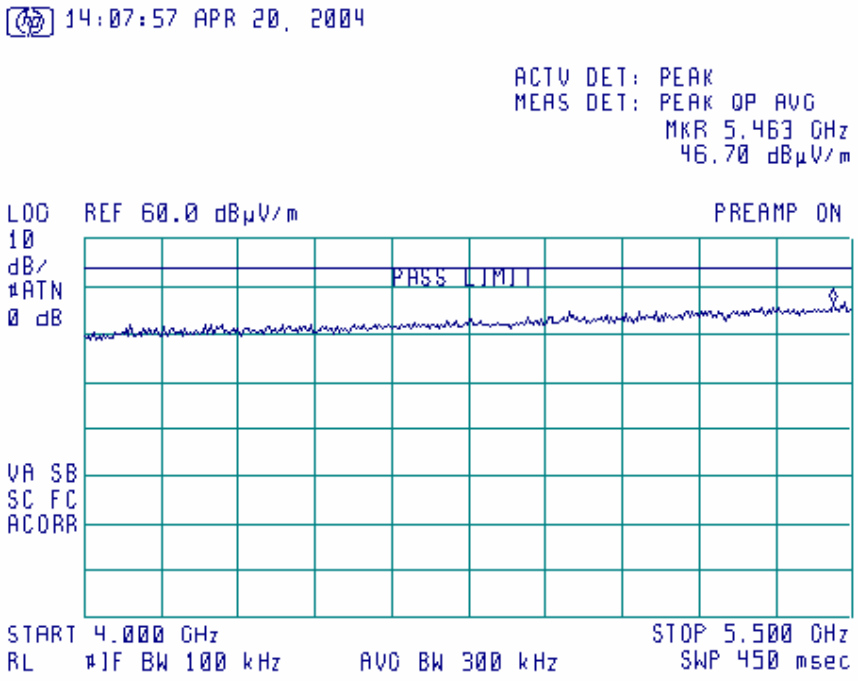
Plot A89

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 915 MHz, internal antenna



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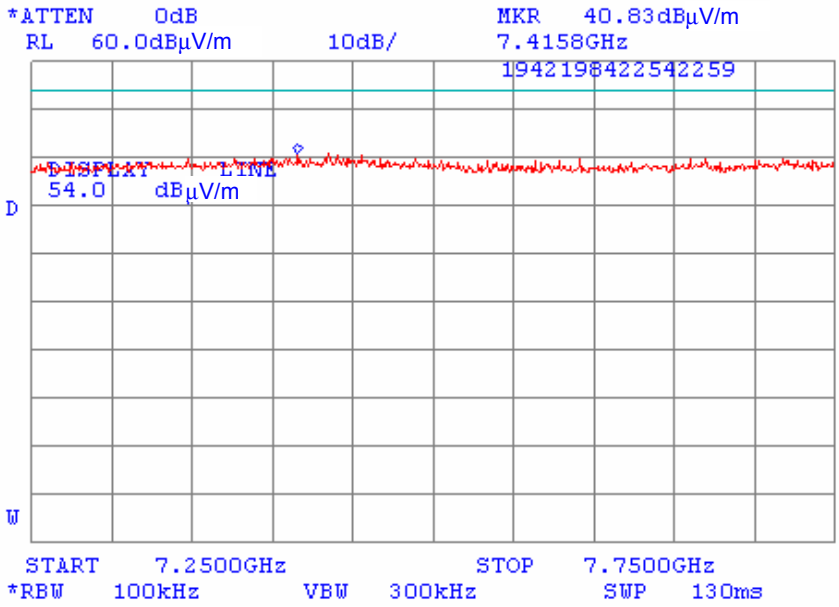
Plot A90

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 915 MHz, internal antenna



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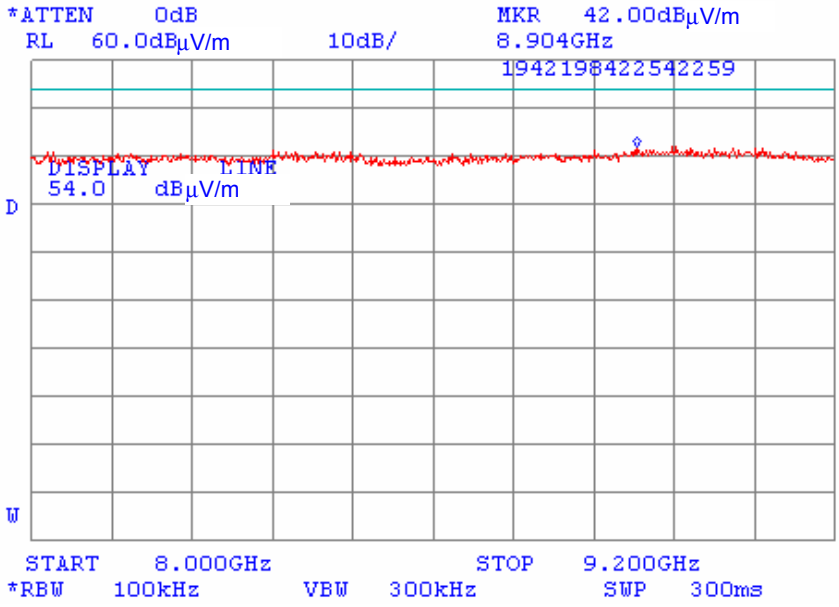
Plot A91

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 915 MHz, internal antenna



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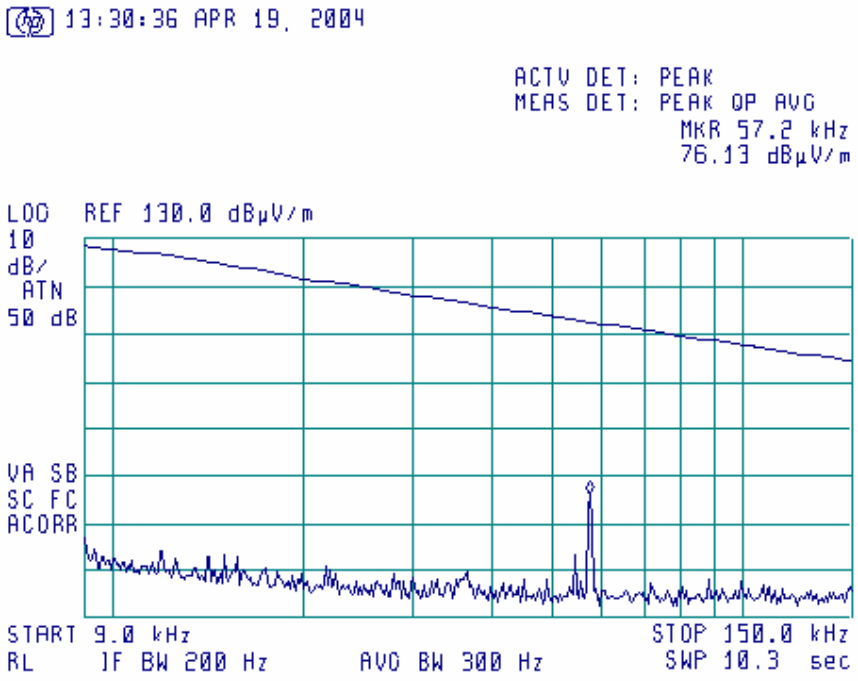
Plot A92

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, carrier frequency 927 MHz, internal antenna



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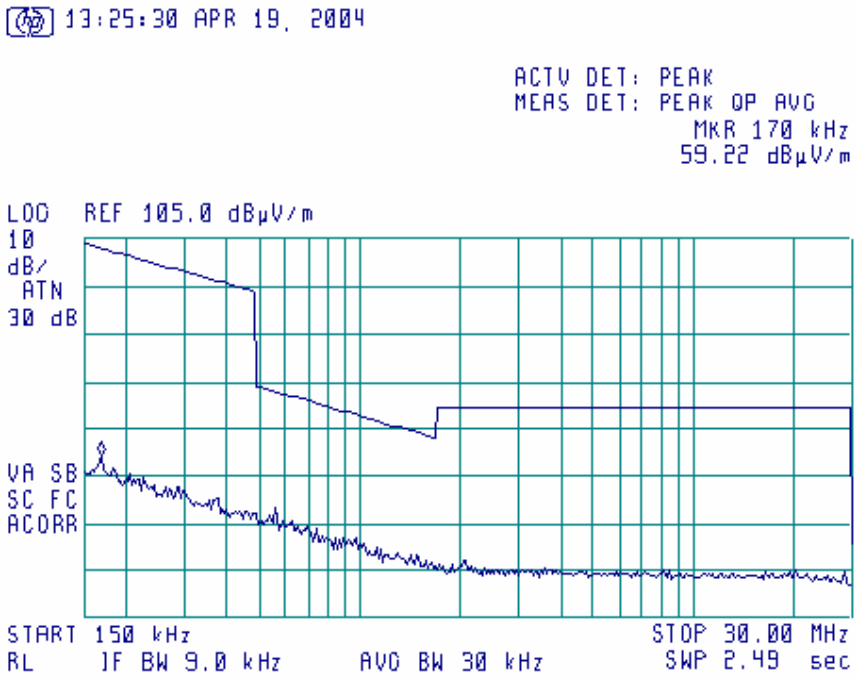
Plot A93

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, carrier frequency 927 MHz, internal antenna



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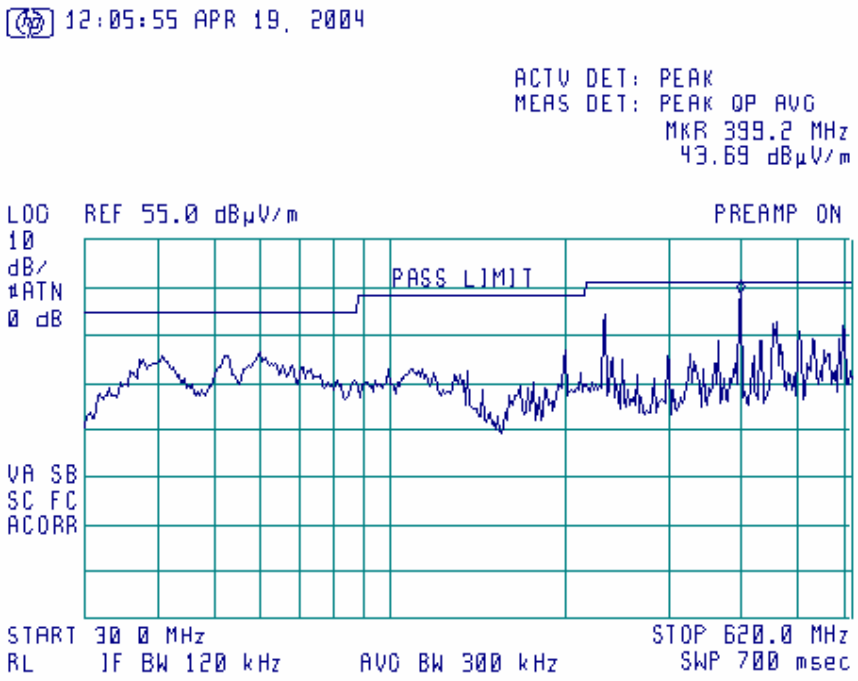
Plot A94

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, internal antenna



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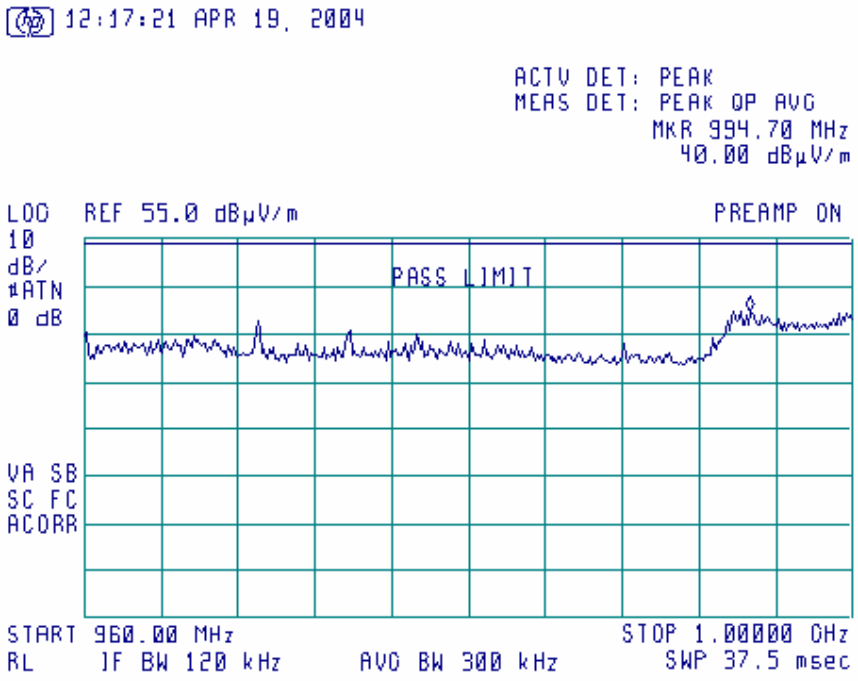
Plot A95

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, internal antenna



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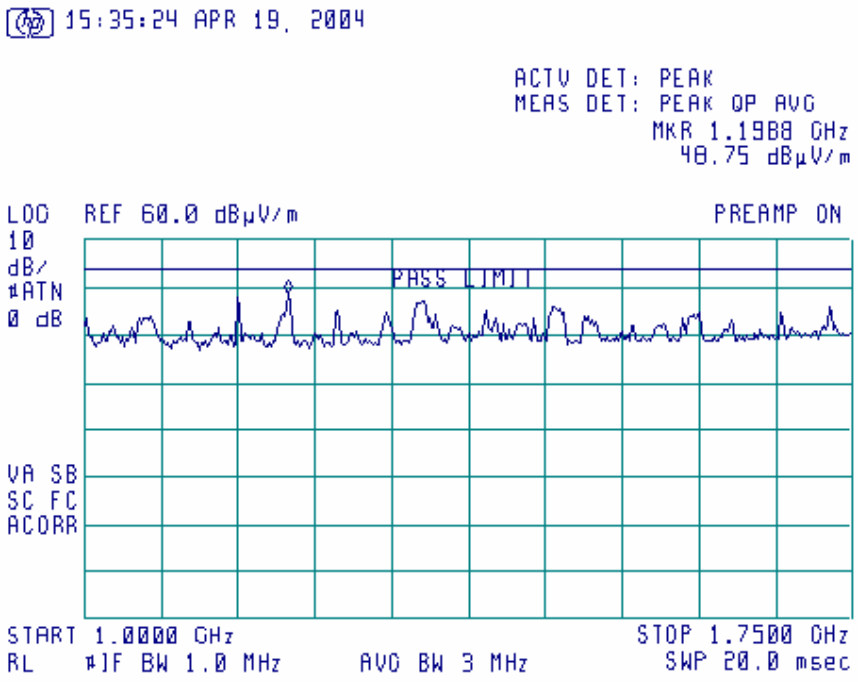
Plot A96

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, internal antenna



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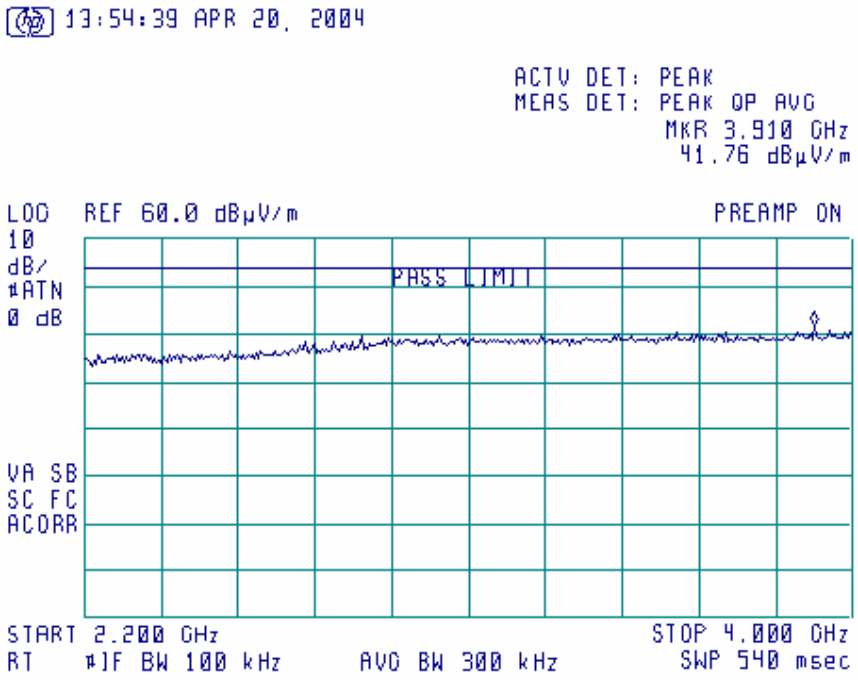
Plot A97

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, internal antenna



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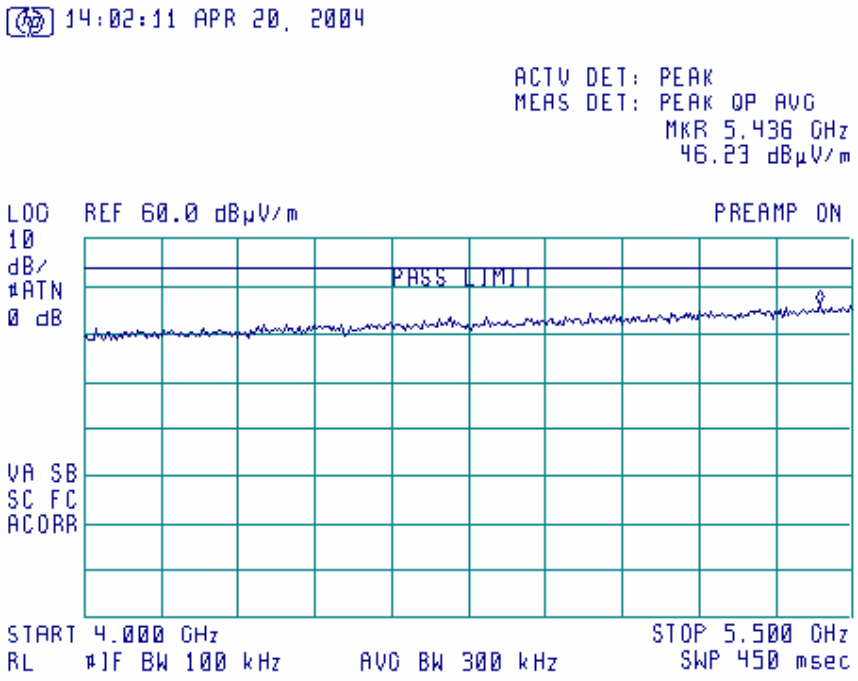
Plot A98

Radiated spurious emission measurements in the anechoic chamber in restricted bands, carrier frequency 927 MHz, internal antenna



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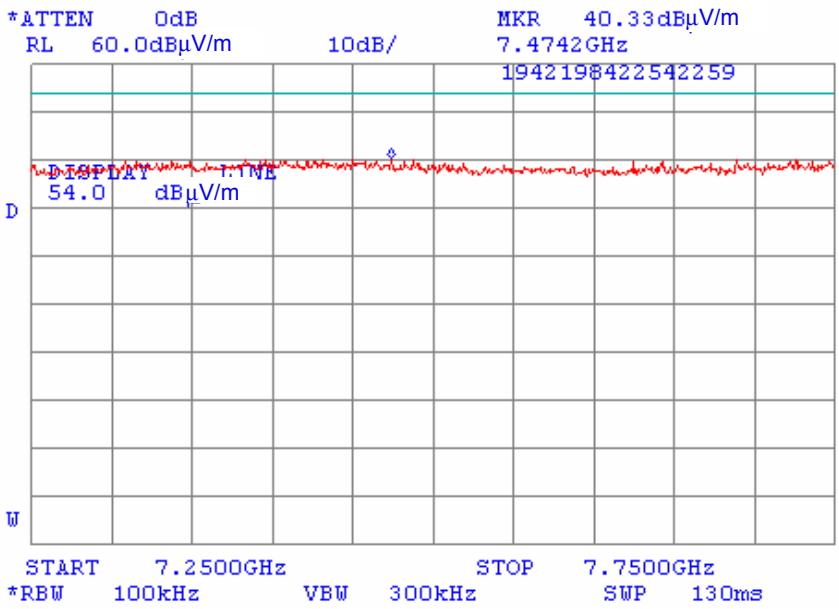
Plot A99

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 927 MHz, internal antenna



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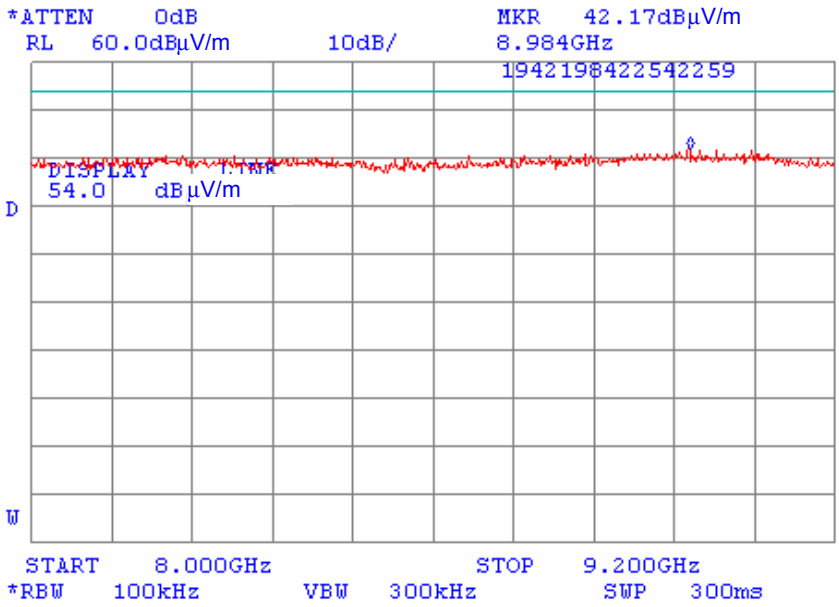
Plot A100

Radiated spurious emission measurements at the OATS in restricted bands, carrier frequency 927 MHz, internal antenna



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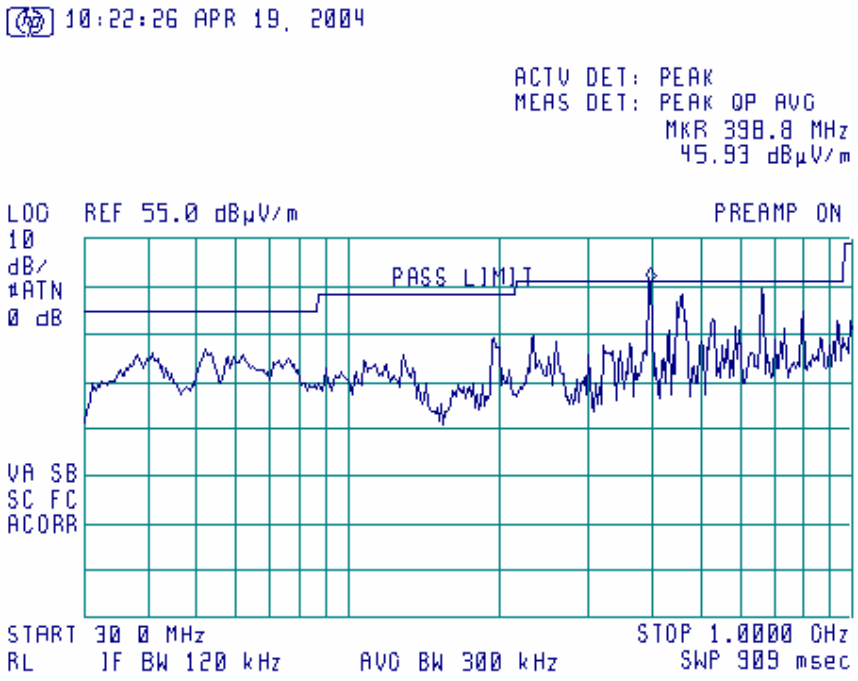
Plot A101

Radiated emission measurements of the EUT with internal antenna in the anechoic chamber at receive mode, vertical and horizontal antenna polarization



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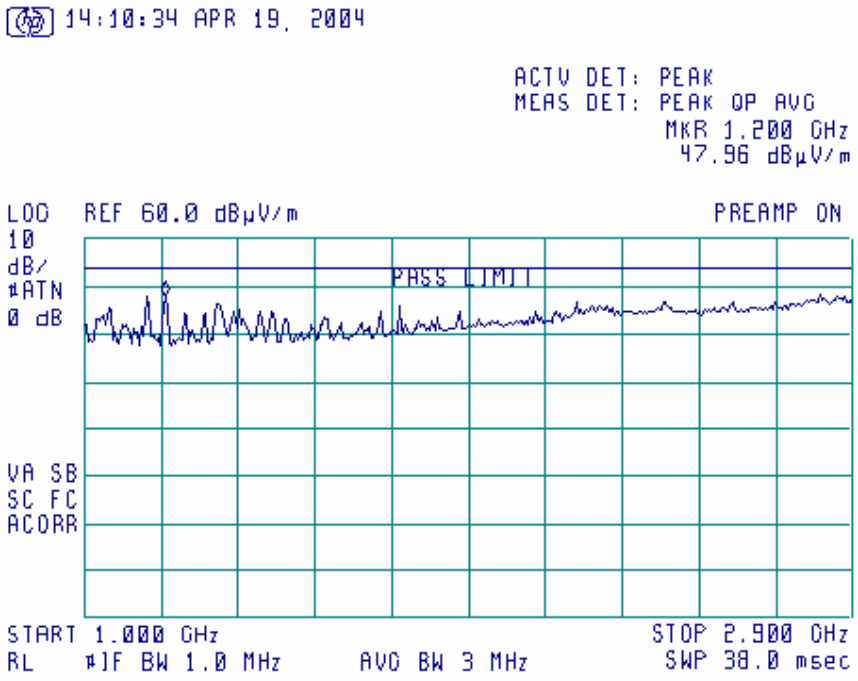
Plot A102

Radiated emission measurements of the EUT with internal antenna in the anechoic chamber at receive mode, vertical and horizontal antenna polarization



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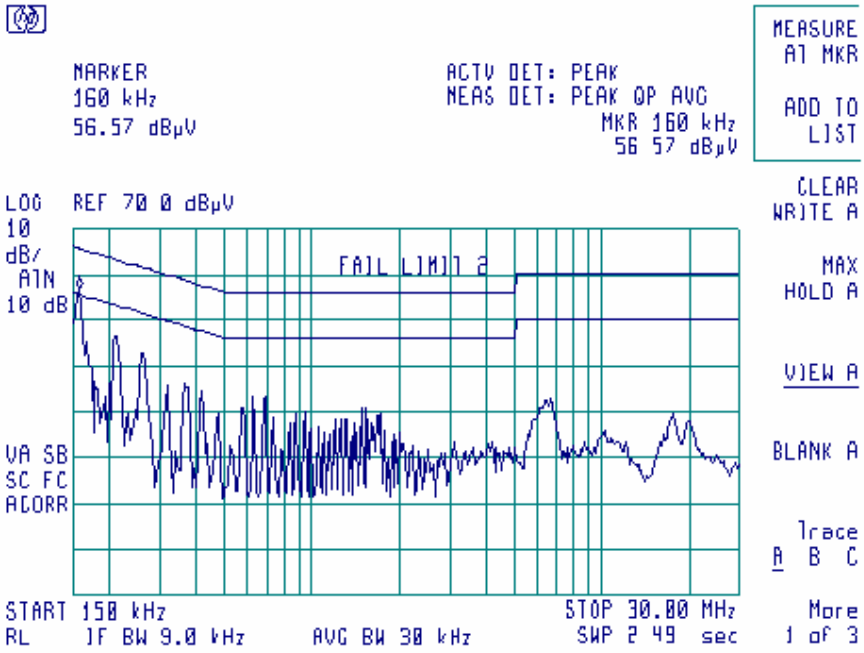
Plot A103

Conducted emission measurements at IDR AC power line in receive mode

Line identification:	Line 1
Limit:	Quasi-peak, average



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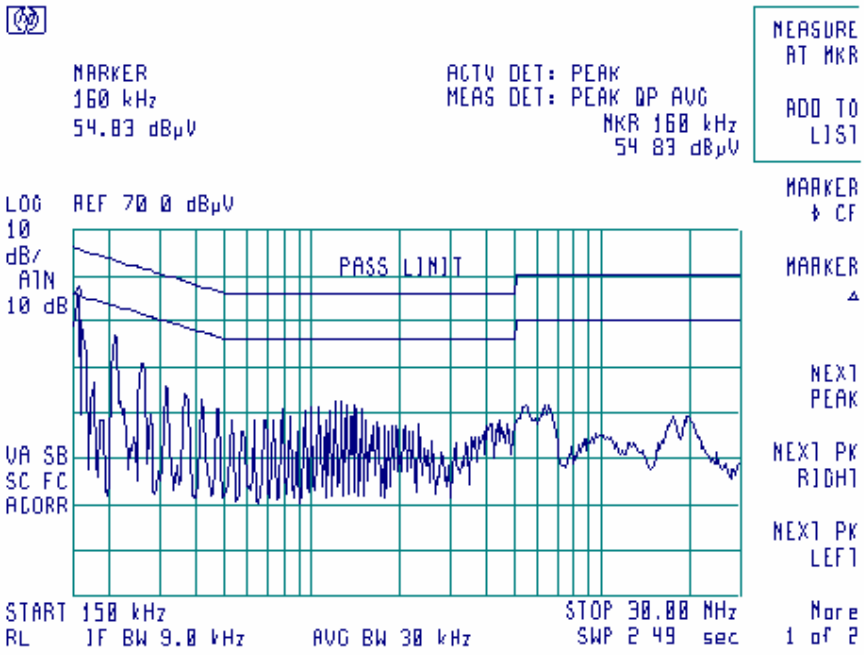
Plot A104

Conducted emission measurements at IDR AC power line in receive mode

Line identification:	Line 2
Limit:	Quasi-peak, average



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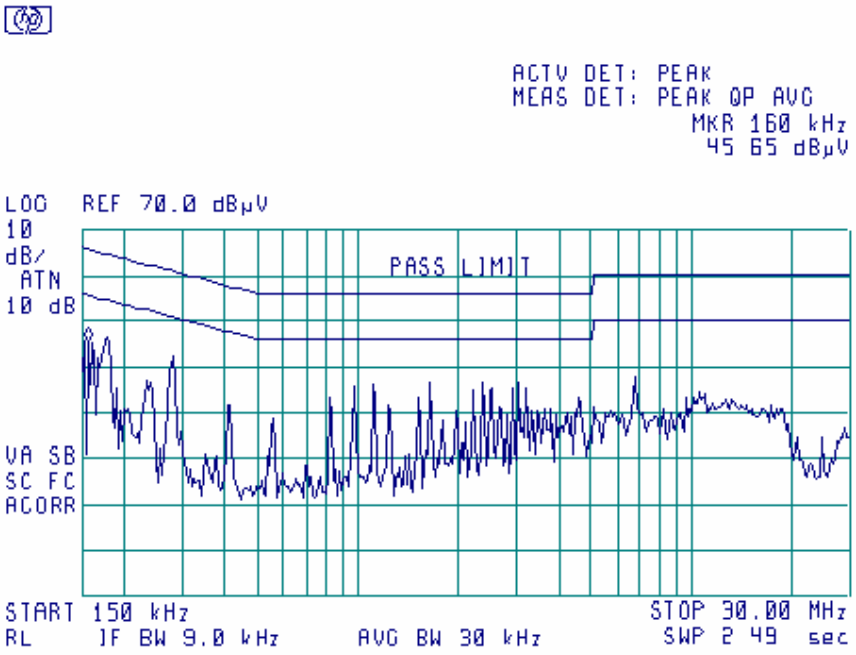
Plot A105

Conducted emission measurements at PC AC power line in receive mode

Line identification:	Line 1
Limit:	Quasi-peak, average



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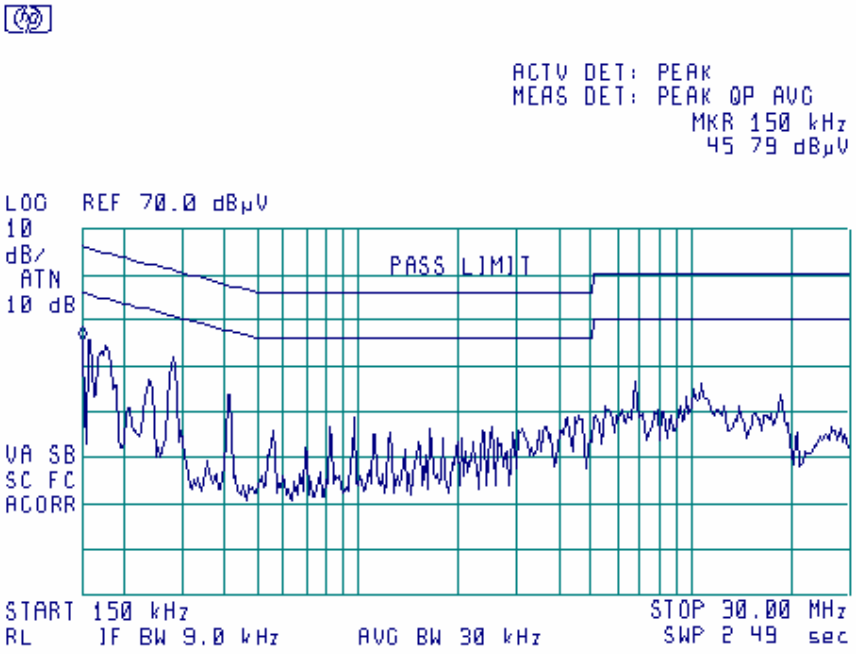
Plot A106

Conducted emission measurements at PC AC power line in receive mode

Line identification:	Line 2
Limit:	Quasi-peak, average



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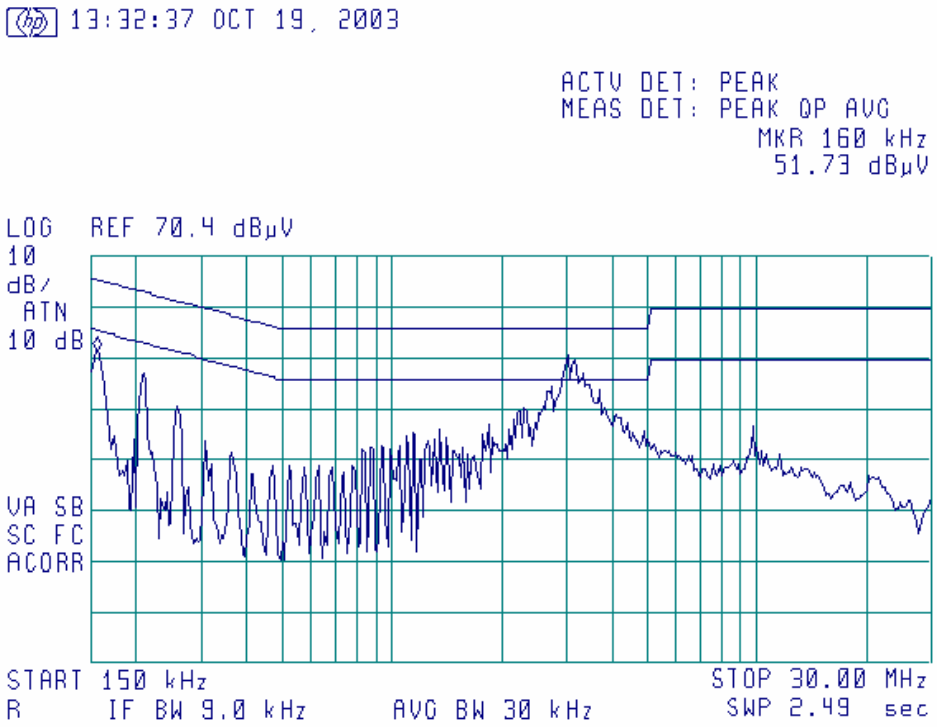
Plot A107

Conducted emission measurements at IDR AC power line in transmit mode

Line identification:	Line 1
Limit:	Quasi-peak, average



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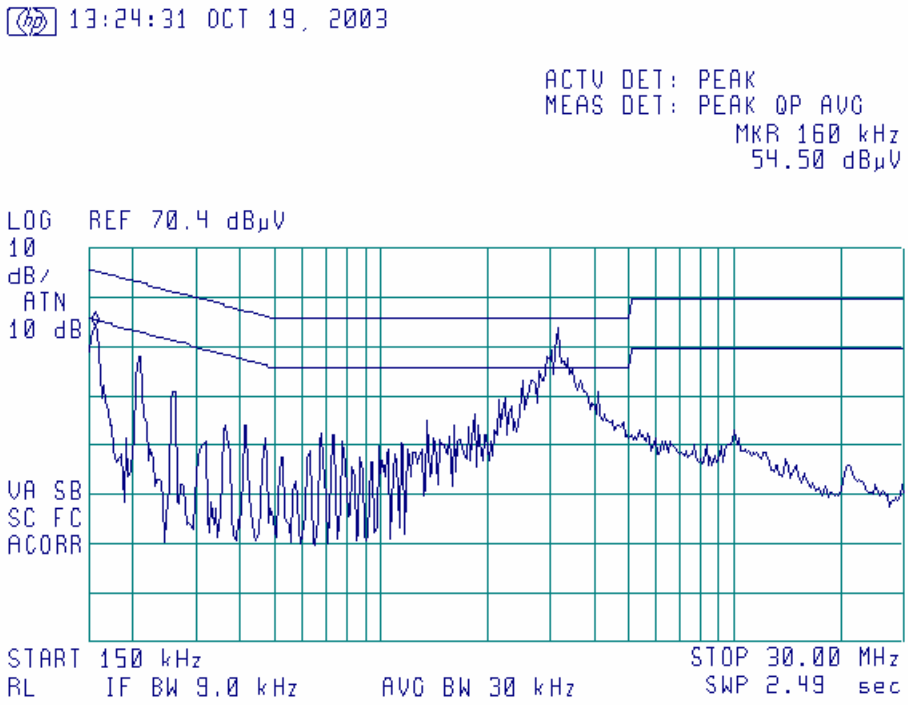
Plot A108

Conducted emission measurements at IDR AC power line in transmit mode

Line identification:	Line 2
Limit:	Quasi-peak, average



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Appendix B Test equipment used for tests

HL Serial No.	Description	Manufacturer information			Due calibration Month/ year
		Name	Model No.	Serial No.	
0038	Antenna Mast, 1-4 m	Hermon Labs	AM-1	028	2/05 check
0091	Position controller for antenna mast + turntable, OFTS	Hermon Labs	CRL-2	NA	4/05 check
0287	Turntable, motorized diameter, 2 m	Hermon Labs	TMD-2	042	11/04 check
0446	Active loop antenna 10 kHz-30 MHz	Electro-Mechanics	6502	2857	10/04
0447	LISN, 16/2, 300 V RMS	Hermon Labs	LISN 16-1	447	11/04
0465	Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	10/05
0466	Shielded room 3 (L) x 3 (W) x 2.4 (H) m	Hermon Labs	SR-1	024	11/04 check
0521	Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	7/04
0589	Cable coaxial, GORE A2POL118.2, 3m	Hermon Labs	GORE-3	589	11/04
0592	Position controller	Hermon Labs	L2-SR3000	100	5/04 check
0593	Antenna Mast, 1-4 m/ 1-6 m Pneumatic	Hermon Labs	AM-F1	101	2/05 check
0594	Turntable for Anechoic Chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	102	1/05 check
0604	Antenna biconilog log-periodic/T bow-tie, 26 - 2000 MHz	EMCO	3141	9611-1011	1/05
0787	Transient limiter	Hewlett Packard	11947A-8ZE	3107A01877	11/04
1003	Cable coaxial, M17/164, 10 m	Hermon Labs	C17164-10	161	11/04
1004	Cable coaxial, ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/04
1097	Attenuator, 50 Ohm, 2 W, DC to 8 GHz, 20 dB	Midwest Microwave	0793-20-NN-07	1097	1/05
1200	Quadruplexer	Electronica	UE 84	0240	4/05 check
1205	One phase voltage regulator, 2kVA, 0-250V	Hermon Labs	TDGC-2	109	6/04 check
1424	Spectrum analyzer, 30 Hz - 40 GHz	Agilent Technologies	8564EC	3946A00219	8/04

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HL Serial No.	Description	Manufacturer information			Due calibration Month/ year
		Name	Model No.	Serial No.	
1503	Cable RF, 6 m	Belden	M17/167 MIL-C-17	NA	9/04 check
1650	Attenuators set (2, 3, 5, 20 dB), DC – 18 GHz	M/A –COM	2082	1650	3/05
1651	Attenuators set (2, 3, 5, 20 dB), DC – 18 GHz	M/A –COM	2082	1651	3/05
1942	Cable 18 GHz, 4 m, blue	Rhophase Microwave Ltd	SPS-1803A-4000-NPS	T4658	10/04
1947	Cable 18 GHz, 6.5 m, blue	Rhophase Microwave Ltd	NPS-1803A-6500-NPS	T4974	10/04
1984	Antenna, double ridged waveguide horn, 1-18 GHz, 300W, N-type	EMC Test Systems	3115	9911-5964	3/05
2009	Cable RF, 8 m	Alpha Wire	RG-214	2009	12/04
2254	Cable 40GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	11/04
2259	Amplifier low noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	11/04
2399	Cable 40 GHz, 1.5 m, blue	Rhophase Microwave Ltd.	KPS-1503A-1500-KPS	X2945	6/04
2432	Antenna, double-ridged waveguide horn	EMC Test Systems	3115	000271777	7/04

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Appendix C Test equipment correction factors

Antenna factor
Active Loop Antenna
Model 6502
S/N 2857

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

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Antenna factor,
biconilog antenna EMCO, model 3141,
serial number1011 (HL 0604)

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
26	7.8	940	24.0
28	7.8	960	24.1
30	7.8	980	24.5
40	7.2	1000	24.9
60	7.1	1020	25.0
70	8.5	1040	25.2
80	9.4	1060	25.4
90	9.8	1080	25.6
100	9.7	1100	25.7
110	9.3	1120	26.0
120	8.8	1140	26.4
130	8.7	1160	27.0
140	9.2	1180	27.0
150	9.8	1200	26.7
160	10.2	1220	26.5
170	10.4	1240	26.5
180	10.4	1260	26.5
190	10.3	1280	26.6
200	10.6	1300	27.0
220	11.6	1320	27.8
240	12.4	1340	28.3
260	12.8	1360	28.2
280	13.7	1380	27.9
300	14.7	1400	27.9
320	15.2	1420	27.9
340	15.4	1440	27.8
360	16.1	1460	27.8
380	16.4	1480	28.0
400	16.6	1500	28.5
420	16.7	1520	28.9
440	17.0	1540	29.6
460	17.7	1560	29.8
480	18.1	1580	29.6
500	18.5	1600	29.5
520	19.1	1620	29.3
540	19.5	1640	29.2
560	19.8	1660	29.4
580	20.6	1680	29.6
600	21.3	1700	29.8
620	21.5	1720	30.3
640	21.2	1740	30.8
660	21.4	1760	31.1
680	21.9	1780	31.0
700	22.2	1800	30.9
720	22.2	1820	30.7
740	22.1	1840	30.6
760	22.3	1860	30.6
780	22.6	1880	30.6
800	22.7	1900	30.6
820	22.9	1920	30.7
840	23.1	1940	30.9
860	23.4	1960	31.2
880	23.8	1980	31.6
900	24.1	2000	32.0
920	24.1		

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

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Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

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Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL2432

Frequency, MHz	Antenna factor. dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

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Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories

Frequency, kHz	Correction factor, dB
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

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Cable loss
Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, HL 0589
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, HL 1004

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	30	0.33	≤ 6.5	±0.12
2	50	0.40		
3	100	0.57		
4	300	0.97		
5	500	1.25		
6	800	1.59		
7	1000	1.81		
8	1200	1.97		
9	1400	2.15		
10	1600	2.28		
11	1800	2.43		
12	2000	2.61		
13	2200	2.75		
14	2400	2.89		
15	2600	2.97		
16	2800	3.21	≤ 6.5	±0.12
17	3000	3.32		
18	3300	3.47		
19	3600	3.62		
20	3900	3.84		
21	4200	3.92		±0.17
22	4500	4.07		
23	4800	4.36		
24	5100	4.62		
25	5400	4.78		
26	5700	5.16		
27	6000	5.67		
28	6500	5.99		

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Cable loss
Cable coaxial, M17/164, model: C17164-10, s/n 161, HL 1003

No.	Frequency, MHz	Cable loss, dB	Tolerance, dB	Measurement uncertainty, dB
1	30	0.41	≤ 12.5	±0.12
2	50	0.52		
3	100	0.75		
4	300	1.45		
5	500	2.01		
6	800	2.71		
7	1000	3.14		
8	1200	3.56		
9	1400	3.93		
10	1600	4.31		
11	1800	4.63		
12	2000	4.97		
13	2200	5.32		
14	2400	5.65		
15	2600	6.01		
16	2800	6.42	≤ 12.5	±0.12
17	3000	6.76		
18	3300	7.12		
19	3600	7.53		
20	3900	7.95		
21	4200	8.32		±0.17
22	4500	8.72		
23	4800	9.14		
24	5100	9.59		
25	5400	10.00		
26	5700	10.49		
27	6000	11.07		
28	6500	11.80		

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Cable loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1503

Frequency, MHz	Cable loss, dB
0.1	0.02
1	0.07
3	0.15
5	0.17
10	0.26
30	0.43
50	0.57
80	0.72
100	0.81
300	1.48
500	2.00
800	2.70
1000	3.09

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Cable loss
Cable 18 GHz, 4 m, blue, model: SPS-1803A-4000-NPS, S/N T4658, HL 1942

Frequency, GHz	Cable loss, dB
0.03	0.21
0.05	0.26
0.10	0.36
0.20	0.50
0.30	0.61
0.40	0.70
0.50	0.78
0.60	0.85
0.70	0.93
0.80	0.99
0.90	1.04
1.00	1.10
1.10	1.16
1.20	1.22
1.30	1.26
1.40	1.31
1.50	1.35
1.60	1.41
1.70	1.45
1.80	1.49
1.90	1.53
2.00	1.57
2.10	1.61
2.20	1.65
2.30	1.69
2.40	1.72
2.50	1.76
2.60	1.79
2.70	1.83
2.80	1.87
2.90	1.90
3.10	1.97
3.30	2.04
3.50	2.11
3.70	2.18
3.90	2.24
4.10	2.31
4.30	2.38
4.50	2.43
4.70	2.53
4.90	2.53
5.10	2.63
5.30	2.65
5.50	2.72
5.70	2.76
5.90	2.79

Frequency, GHz	Cable loss, dB
6.10	2.88
6.30	2.90
6.50	2.97
6.70	3.02
6.90	3.04
7.10	3.07
7.30	3.12
7.50	3.13
7.70	3.19
7.90	3.24
8.10	3.30
8.30	3.36
8.50	3.45
8.70	3.41
8.90	3.45
9.10	3.42
9.30	3.55
9.50	3.48
9.70	3.58
9.90	3.61
10.10	3.66
10.30	3.68
10.50	3.70
10.70	3.70
10.90	3.75
11.10	3.78
11.30	3.86
11.50	3.98
11.70	4.10
11.90	4.12
12.10	4.09
12.40	4.13
13.00	4.23
13.50	4.35
14.00	4.40
14.50	4.44
15.00	4.57
15.50	4.66
16.00	4.64
16.50	4.66
17.00	4.75
17.50	4.85
18.00	4.93

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Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

Frequency, GHz	Cable loss, dB
0.03	0.30
0.05	0.38
0.10	0.53
0.20	0.74
0.30	0.91
0.40	1.05
0.50	1.18
0.60	1.29
0.70	1.40
0.80	1.50
0.90	1.59
1.00	1.68
1.10	1.77
1.20	1.86
1.30	1.94
1.40	2.01
1.50	2.08
1.60	2.16
1.70	2.22
1.80	2.29
1.90	2.36
2.00	2.42
2.10	2.48
2.20	2.54
2.30	2.60
2.40	2.66
2.50	2.71
2.60	2.77
2.70	2.83
2.80	2.89
2.90	2.95
3.10	3.06
3.30	3.17
3.50	3.28
3.70	3.39
3.90	3.51
4.10	3.62
4.30	3.76
4.50	3.87
4.70	4.01
4.90	4.10
5.10	4.21
5.30	4.31
5.50	4.43
5.70	4.56
5.90	4.71

Frequency, GHz	Cable loss, dB
6.10	4.87
6.30	4.95
6.50	4.94
6.70	4.88
6.90	4.87
7.10	4.83
7.30	4.85
7.50	4.86
7.70	4.91
7.90	4.96
8.10	5.03
8.30	5.08
8.50	5.13
8.70	5.21
8.90	5.22
9.10	5.34
9.30	5.35
9.50	5.52
9.70	5.51
9.90	5.66
10.10	5.70
10.30	5.78
10.50	5.79
10.70	5.82
10.90	5.86
11.10	5.94
11.30	6.06
11.50	6.21
11.70	6.44
11.90	6.61
12.10	6.76
12.40	6.68
13.00	6.66
13.50	6.81
14.00	6.90
14.50	6.90
15.00	6.97
15.50	7.17
16.00	7.28
16.50	7.27
17.00	7.38
17.50	7.68
18.00	7.92

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Cable loss
RF cable 8 m, model RG-214, HL 2009

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	1	0.10	NA	±0.12
2	10	0.14		
3	30	0.25		
4	50	0.34		
5	100	0.53		
6	300	0.99		
7	500	1.31		
8	800	1.73		
9	1000	1.98		
10	1100	2.11		
11	1200	2.21		
12	1300	2.35		
13	1400	2.46		
14	1500	2.55		
15	1600	2.68		
16	1700	2.78		
17	1800	2.88		
18	1900	2.98		
19	2000	3.09		

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Cable loss
Cable 40 GHz, 0.8 m, blue, model: KPS-1503A-800-KPS, serial number W4907 (HL 2254)

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.04	5.10	0.80	15.00	1.49
0.05	0.07	5.30	0.83	15.50	1.49
0.10	0.09	5.50	0.83	16.00	1.46
0.20	0.15	5.70	0.84	16.50	1.47
0.30	0.19	5.90	0.87	17.00	1.50
0.40	0.25	6.10	0.86	17.50	1.57
0.50	0.29	6.30	0.89	18.00	1.63
0.60	0.33	6.50	0.90	18.50	1.57
0.70	0.37	6.70	0.89	19.00	1.63
0.80	0.41	6.90	0.93	19.50	1.65
0.90	0.44	7.10	0.92	20.00	1.64
1.00	0.45	7.30	0.95	20.50	1.75
1.10	0.48	7.50	0.96	21.00	1.72
1.20	0.51	7.70	0.97	21.50	1.78
1.30	0.53	7.90	1.01	22.00	1.76
1.40	0.54	8.10	1.00	22.50	1.72
1.50	0.57	8.30	1.05	23.00	1.83
1.60	0.59	8.50	1.04	23.50	1.80
1.70	0.04	8.70	1.07	24.00	1.90
1.80	0.07	8.90	1.11	24.50	1.81
1.90	0.09	9.10	1.09	25.00	1.98
2.00	0.15	9.30	1.14	25.50	1.91
2.10	0.19	9.50	1.12	26.00	2.02
2.20	0.25	9.70	1.15	26.50	1.92
2.30	0.29	9.90	1.16	27.00	1.97
2.40	0.33	10.10	1.16	28.00	2.02
2.50	0.37	10.30	1.19	29.00	1.95
2.60	0.41	10.50	1.14	30.00	1.94
2.70	0.44	10.70	1.19	31.00	2.11
2.80	0.45	10.90	1.17	32.00	2.17
2.90	0.48	11.10	1.13	33.00	2.27
3.10	0.61	11.30	1.20	34.00	2.27
3.30	0.64	11.50	1.13	35.00	2.29
3.50	0.65	11.70	1.20	36.00	2.35
3.70	0.68	11.90	1.18	37.00	2.37
3.90	0.69	12.10	1.14	38.00	2.40
4.10	0.71	12.40	1.19	39.00	2.57
4.30	0.73	13.00	1.34	40.00	2.36
4.50	0.75	13.50	1.33		
4.70	0.77	14.00	1.48		
4.90	0.79	14.50	1.45		

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Cable loss
Cable coaxial, 40GHz, 1.5 m, Blue, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2399

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.07	6.5	1.57	15.50	2.50
0.05	0.10	6.7	1.60	16.00	2.51
0.1	0.16	6.9	1.55	16.50	2.58
0.2	0.26	7.1	1.65	17.00	2.65
0.3	0.33	7.3	1.65	17.50	2.73
0.5	0.38	7.5	1.70	18.00	2.74
0.7	0.41	7.7	1.71	18.50	2.67
0.9	0.58	7.9	1.73	19.00	2.67
1.1	0.64	8.1	1.79	19.50	2.74
1.3	0.70	8.3	1.81	20.00	2.69
1.5	0.75	8.5	1.84	20.50	2.80
1.7	0.79	8.7	1.85	21.00	2.82
1.9	0.83	8.9	1.90	21.50	2.87
2.1	0.88	9.1	1.95	22.00	2.87
2.3	0.93	9.3	1.93	22.50	2.92
2.5	0.97	9.5	1.98	23.50	3.04
2.7	1.01	9.7	1.96	24.00	3.05
2.9	1.04	9.9	2.03	24.50	3.03
3.1	1.08	10.1	1.99	25.00	3.11
3.3	1.14	10.30	2.02	25.50	3.10
3.5	1.17	10.50	2.02	26.00	3.17
3.7	1.21	10.70	2.02	26.50	3.11
3.9	1.24	10.90	2.08	27.00	3.16
4.1	1.26	11.10	2.02	28.00	3.19
4.3	1.26	11.30	2.09	29.00	3.19
4.5	1.29	11.50	2.05	30.00	3.30
4.7	1.34	11.70	2.11	31.00	3.31
4.9	1.34	11.90	2.11	32.00	3.35
5.1	1.40	12.10	2.12	33.00	3.46
5.3	1.43	12.40	2.17	34.00	3.45
5.5	1.45	13.00	2.29	35.00	3.49
5.7	1.47	13.50	2.31	36.00	3.54
5.9	1.40	14.00	2.43	37.00	3.62
6.1	1.53	14.50	2.43	39.00	3.69
6.3	1.55	15.00	2.46	40.00	3.75

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Appendix D General information

Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

AC	alternating current
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
DSS	Part 15 spread spectrum transmitter
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
kV	kilovolt
L	length
LO	local oscillator
LISN	line impedance stabilization network
m	meter
MHz	megahertz
NA	not applicable
QP	quasi-peak
RF	radio frequency
RE	radiated emission
rms	root mean square
s	second
V	volt
W	width

Specification references

47CFR part 15: 2003	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2001	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.