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ELECTROMAGNETIC EMISSIONS TEST REPORT

according to 47CFR Part 15, subparts C, B
for

SercoNet Ltd.

EQUIPMENT UNDER TEST:

Wireless access point and outlet units
Models SRC-10AP802B, SRC-10MPS

Approved by: _____
Mr. Ilan Gabrieli, Verification Engineer
SercoNet Ltd.

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1 Project information

Description of equipment under test

Test item	: Wireless access point and outlet units
Models	: SRC-10AP802B, SRC-10MPS
Manufacturer	: SercoNet Ltd.
Software release	: 01
Hardware version	: 1.03
Equipment FCC code	: DSS

Applicant information

Applicant's responsible person	: Mr. Ilan Gabrieli, verification engineer
Company	: SercoNet Ltd.
Address	: 16, Haharoshet street, P.O.B. 2009
City	: Raanana
Postal code	: 43657
Country	: Israel
Telephone number	:+972 9741 1833
Telefax number	:+972 9748 1333

Test performance

Project Number:	: 15519
Location	: Hermon Laboratories
Receipt date	: April 27, 2003
Test started	: April 27, 2003
Test completed	: June 1, 2003
Purpose of test	: Apparatus compliance verification in accordance with emission requirements
Test specification(s)	47CFR part 15 §§15.247, 15.109, 15.107, part 1 §1.1310

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2 Summary of tests

The tests listed in the table below were performed. The EUT was found complying with the limits of 47CFR Part 15, §§15.247, 15.207, 15.109, 15.107.

Parameter	Subclause	Tested by	Date tested	Verdict	Remarks
Transmitter characteristics, §15.247					
Direct sequence systems					
Minimum 6 dB bandwidth	a(2)	Mr. Y. Neuman, test engineer	May 27, 28, 2003	**Pass**	
Maximum peak output power	b(3)	Mrs. E. Pitt, test engineer	June 1, 2003	**Pass**	
Exposure compliance requirements	b(5)	NA	NA	**Pass**	Refer to the test report section 4.3
Spurious emissions (radiated)	c	Mrs. E. Pitt, test engineer	May 30, June 1, 2003	**Pass**	
Spurious emissions (radiated) in restricted bands	15.209, 15.205 (a, c)	Mrs. E. Pitt, test engineer	May 30, June 1, 2003	**Pass**	
Peak power spectral density	d	Mrs. E. Pitt, test engineer	June 1, 2003	**Pass**	
Duty cycle during testing		Mr. Y. Neuman, test engineer	May 30, 2003	**Pass**	
Unintentional radiation					
Conducted emissions	15.107, 15.207	Mr. M. Nikishin, EMC group leader	June 1, 2003	**Pass**	
Radiated emissions	15.109	Mrs. E. Pitt, test engineer	June 1, 2003	**Pass**	

Test report prepared by: Mrs. M. Cherniavsky, MSc, certification engineer

Test report approved by: Mr. M. Nikishin, MSc, EMC group leader

Mr. E. Usoskin, PhD, CEO

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3 EUT description

3.1 General description

The EUT, a wireless access point (WAP) unit with an outlet unit (OU), is a long-range, high performance LAN product, which provides access of point services to a 2.4 GHz RF network and bridges to an Ethernet backbone. It receives data from the both networks, stores it locally for further processing, installs and maintains connections, and transmits the packets to the proper destination.
This wireless LAN access point unit connects computers and laptops to a local network through wireless connection and is powered from mains via power unit and auxiliary OU.
The clocks and operating frequencies used in the EUT circuits are: 4.8 MHz, 20.0 MHz, 44.0 MHz.

3.2 EUT test configuration

The EUT ports and lines description is given in Table 3.2.1, the support/test equipment description - in Table 3.2.2, operating frequencies generated by clocks and oscillators are provided in Table 3.2.3 and test configuration - in Figure 3.2.1.

Table 3.2.1

EUT ports and lines

Port type	Port description	Connector type	Quantity	Cable type description	Cable length, m	Connected from
Signal	Ethernet	RJ45	1	Unshielded, 4-wire	1.6	OU to PC
Signal	Telephone	RJ11	1	Unshielded, 2-wire	10.0	OU to phone No. 2
Signal	60 V DC + telephone + ethernet	Terminal block	1	UTP, 2-wire	0.2	OU to WAP
Signal+ Power	60 V DC + telephone + ethernet	Terminal block	1	UTP, 2-wire	25.0	OU to auxiliary OU
AC Power	AC	IEC 60320	1	Unshielded	1.5	PC to mains
Signal	Video	Video	1	Shielded	1.5	PC to monitor
Signal	Keyboard	Keyboard	1	Unshielded	1.5	PC to keyboard
Signal	Mouse	PS/2	1	Unshielded	1.5	PC to mouse
Signal	Serial	RS 232	1	Unshielded	1.5	PC to mouse
Signal	Parallel	D-type, 25 pin	1	Unshielded	1.5	PC to printer

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3.2.1 EUT operation during the tests

The EUT received random, broadcast type, Ethernet packets being transmitted from the auxiliary outlet unit to the EUT's outlet unit. The Ethernet transmission was created by using a laptop running a 10 Mbps Ethernet Communication SW. The above-mentioned transmitted Ethernet packets were also received at the SRC-10AP802B (the WAP Unit), in which they were further transferred to the Askey's, model RT230W-D58, wireless LAN card installed inside the SRC-10AP802B. These packets were finally transmitted by a wireless mode [by using a direct sequence spread spectrum (DSSS) signal modulating the 2.4 GHz carrier frequency].

Table 3.2.2

EUT support/test equipment

Description	Manufacturer	Model number	Serial number
Laptop	COMPAC	Armada M700	NA
Power unit (PU)	SercoNet	SRC-POWERU	F2450032711
Auxiliary outlet unit (Aux. OU)	SercoNet	SRC-10MPS	F2450022201
Central office (CO) simulator	Viking	DLE-300	22020005
PC (HL 729)	Siemens Nixdorf	Scenic Pro M5	QK 079816
Monitor (HL 1037)	MAG Innovision	XJ707	NA
Keyboard (HL 0731)	IBM	Aptiva	55-FHOHD
Mouse	HP	M-S34	LZA 75058804
Mouse (RS 232 termination)	Microsoft Corp.	Serial mouse 2.1A	00307296
Printer LX-810	Seiko Epson Corp.	P80SA	44B1127035

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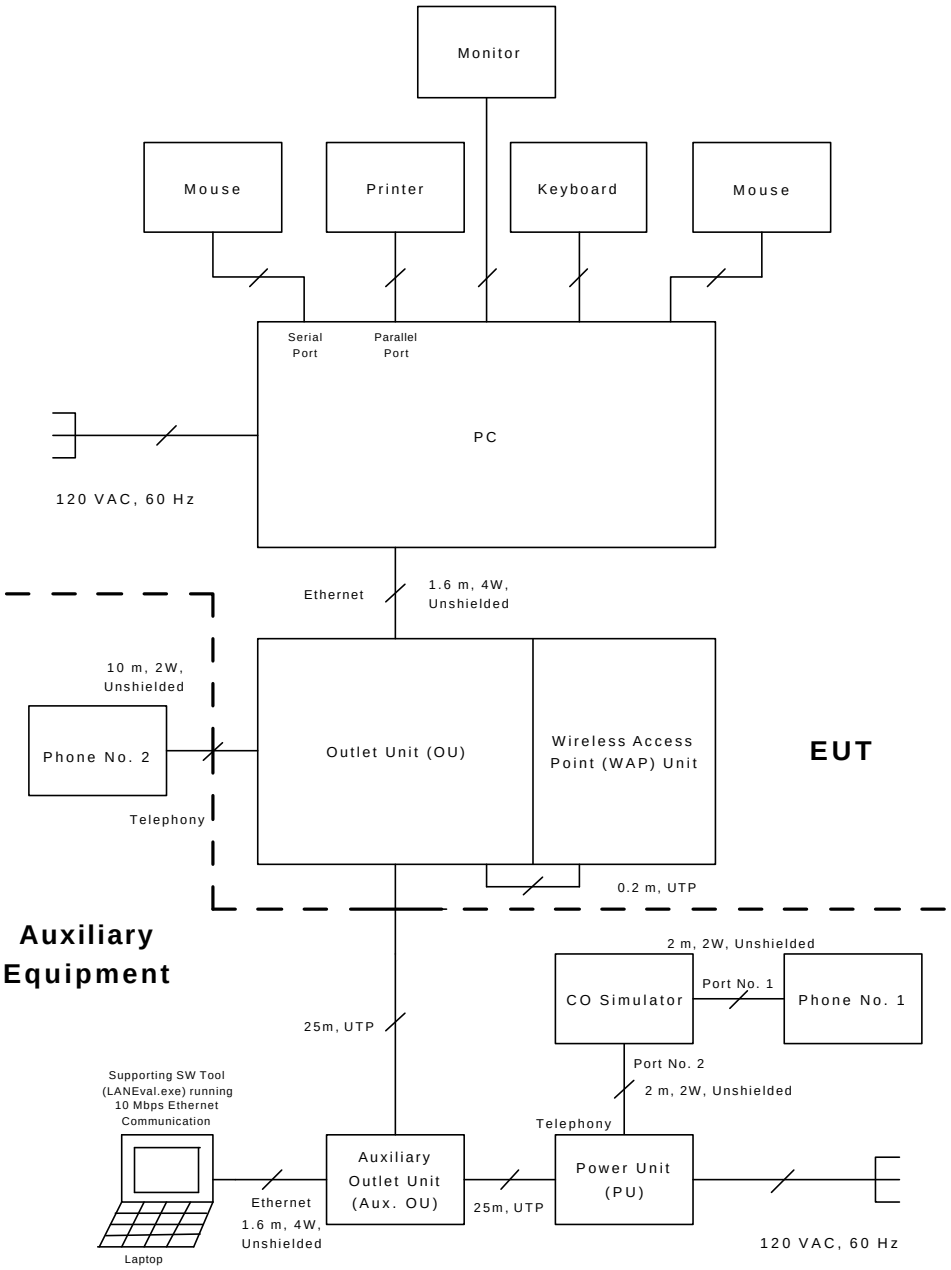
Figure 3.2.1

EUT test configuration



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3.3 EUT technical characteristics

Type of equipment							
	Stand-alone (Equipment with or without its own control provisions)						
X	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)						
	Plug-in card (Equipment intended for a variety of host systems)						
Operating frequency range	2412 – 2462 MHz						
Spread spectrum technique used							
	Frequency hopping (FHSS)						
X	Direct sequence (DSSS)						
	Combined						
Spread spectrum parameters							
X	chip sequence length (bits)	11 bits for DBPSK and DQBSK 8 bits for CCK					
	spectrum width (MHz)	22 MHz for each channel					
Transmitter aggregate data rate	11.0 / 5.5 / 2.0 / 1.0 Mbps						
Normal test signal							
Maximum rated output power							
At transmitter permanent external 50 Ω rf output connector (dBm)	NA						
Effective radiated power (for equipment with integral antenna) (dBm)	19.9 dBm						
Is transmitter output power variable?	X	No					
		Yes		continuous variable			
				stepped variable			
				stepsize :.....			
				minimum RF power			
				maximum RF power			
Transmitter power source							
	Battery	**Nominal rated voltage (VDC)**					
	Lithium						
	Other						
X	**DC**	**Nominal rated voltage**	5 V DC				
	AC mains	**Nominal rated voltage (VAC)**					
Is there common power source for transmitter and receiver	X	yes		no			

Antenna technical characteristics

			Type	Manufacturer	Model number	Gain
Integral		with temporary RF connector	2.4 G dipole antenna	Antenniques Co., Ltd.	D2R01001-103	2 dBi
	X	without temporary RF connector				
External			NA	NA	NA	NA

External antenna connection - NA			
	standard connector		unique coupling

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4 Test results

4.1 Occupied bandwidth for DSSS systems according to § 15.247(a) (2)

METHOD OF MEASUREMENTS: FCC Docket No.96-8; FCC 97-114
DATE: May 28, 2003
RELATIVE HUMIDITY: 42 %
AMBIENT TEMPERATURE: 28°C
AIR PRESSURE: 1015 hPa
OPERATING FREQUENCY RANGE: 2.412 – 2.462 GHz
MEASUREMENT UNCERTAINTY: ±487 Hz

Carrier frequency, GHz	Data rate, Mbit/s	Measured 6 dB bandwidth, MHz	Verdict	Reference to Plot in Appendix A
2.412	1.0	10.13	Pass	A1
	2.0	10.03	Pass	A2
	5.5	10.10	Pass	A3
	11.0	11.08	Pass	A4
2.437	1.0	10.08	Pass	A5
	2.0	10.07	Pass	A6
	5.5	10.03	Pass	A7
	11.0	11.25	Pass	A8
2.462	1.0	10.13	Pass	A9
	2.0	10.13	Pass	A10
	5.5	10.17	Pass	A11
	11.0	11.17	Pass	A12

LIMIT

Operating frequency range, MHz	Minimum allowed bandwidth
2400 - 2483.5	≥ 500 kHz @ 6 dBc

TEST PROCEDURE

The EUT was set up at open area test site (OATS) as shown in Figure 4.1.1. The measuring antenna was connected to spectrum analyzer, which settings are shown in Plots.
The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at low and high edges and at the middle of the 2.412 - 2.462 GHz frequency range under all data transfer bit rates.

TEST EQUIPMENT USED:

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

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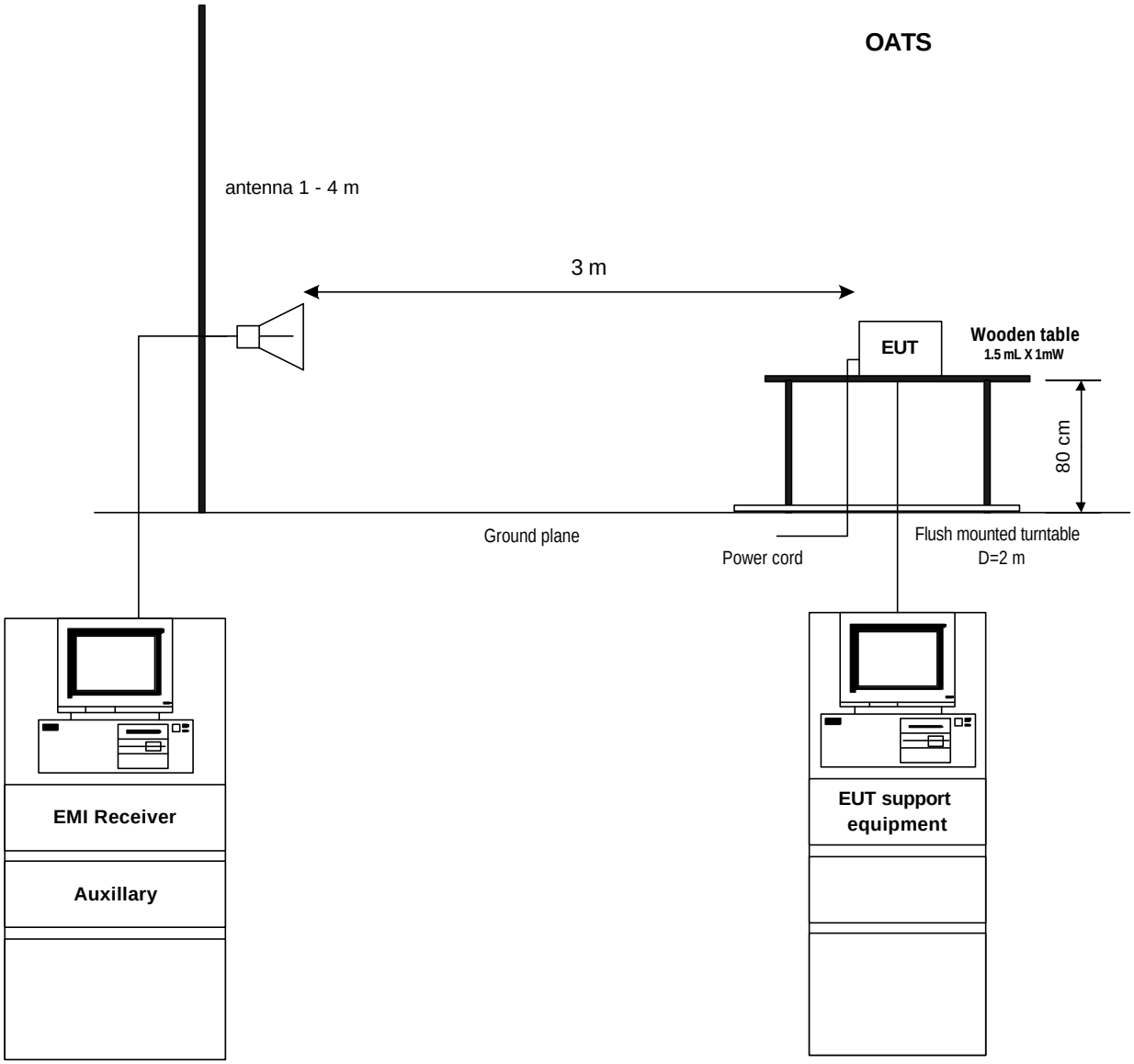
Figure 4.1.1



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

METHOD OF MEASUREMENTS	ANSI C63.4 §13.1.4
DATE:	June 1, 2003
RELATIVE HUMIDITY:	39 %
AMBIENT TEMPERATURE:	23°C
AIR PRESSURE:	1010 hPa
OPERATING FREQUENCY RANGE	2.412 – 2.462 GHz
MEASUREMENT UNCERTAINTY:	±4.5 dB

Carrier frequency, GHz	Data rate, Mbit/s	Measured field strength@ 3 m distance, dB(µV/m)	Peak output power, dBm	Limit, dBm	Margin, dB	Verdict	Reference to Plot in Appendix A
2.412	1.0	111.1	13.87	30	16.13	Pass	A13
	2.0	114.6	17.37		12.63	Pass	A14
	5.5	115.4	18.17		11.83	Pass	A15
	11.0	117.1	19.87		10.13	Pass	A16
2.437	1.0	112.5	15.27		14.73	Pass	A17
	2.0	112.8	15.57		14.43	Pass	A18
	5.5	114.4	17.17		12.83	Pass	A19
	11.0	114.5	17.27		12.73	Pass	A20
2.462	1.0	109.1	11.87		18.13	Pass	A21
	2.0	110.3	13.07		16.93	Pass	A22
	5.5	111.1	13.87		16.13	Pass	A23
	11.0	112.4	15.17		14.83	Pass	A24

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LIMIT

Operating frequency range, MHz	Maximum peak output power, W
2400 - 2483.5	1

TEST PROCEDURE

The EUT was set up at the OATS as shown in Figure 4.1.1. The measurements were performed at 3 m test distance. 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 antennas polarization was changed from vertical to horizontal.
The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at low and high edges and at the middle of the 2.412 - 2.462 GHz frequency range under all data transfer bit rates.

The maximum power was calculated using the equation:
$P = (Ed)^2 /30G$, where
G = 1.58 (for antenna gain 2 dBi)

For example:
E = 111.1 dB(μV/m) - measured field strength at 3 m for 2.412 GHz, data rate of 1.0 Mbit/s
E (V/m) is equal to 0.36 (V/m);
$P = (0.36 \times 3)^2/(30 \times 1.58) = 24.6$ mW = 13.87 dBm

TEST EQUIPMENT USED:

HL 0038	HL 0041	HL 0091	HL 0275	HL 0287	HL 1424	HL 1942

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4.3 Exposure limit according to §15.247(b)(5) and §1.1310

Limit for power density for general population/uncontrolled exposure is 1 mW/cm^2 (for 1500 –100,000 MHz frequency range).

The power density **$P\ (mW/cm^2) = P_T / 4\pi r^2$**, where
P_T is the transmitted power, which is equal to the transmitter output power plus maximum antenna gain. The maximum equivalent isotropically radiated power EIRP is equal to measured 19.87 dBm plus 2 dBi antenna gain

$$P_T = 19.87\ dBm + 2\ dBi = 21.87\ dBm = 153.8\ mW.$$

The minimum safe distance "r", where RF exposure does not exceed FCC permissible limit, is 3.5 cm.

$$r = \sqrt{(P_T / (P \times 4\pi))} = \sqrt{(153.8 / 12.56)} = 3.5\ cm$$

Conclusion: The public cannot be exposed to dangerous RF level.

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4.4 Out of band radiated emissions that do not fall in restricted bands test according to §15.247(c)

METHOD OF MEASUREMENTS	ANSI C63.4 §13.1.4
DATE:	May 27 to 30, June 1, 2003
RELATIVE HUMIDITY:	44 %
AMBIENT TEMPERATURE:	28°C
AIR PRESSURE:	1015 hPa
OPERATING FREQUENCY RANGE	2.412 – 2.462 MHz
FREQUENCY RANGE*	9 kHz - 25 GHz
BIT RATE:	1 Mbit/s
MEASUREMENT UNCERTAINTY:	± 4.5 dB

* The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency. The emission levels of the EUT in peak mode more than 20 dB lower than the specified limit were not recorded in the table below. For the test results refer to Plots A49 – A132. Test results found in 30 – 1000 MHz are brought in section 4.7 of this test report.
All emissions were found below the specified limit.

a) carrier frequency = 2412 MHz

Peak detector, RBW = 1 MHz; VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
2397	72.17	82.0	9.83	Pass	A49, A59

b) carrier frequency = 2437 MHz

Peak detector, RBW = 1 MHz; VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
2400	62.17	80.0	17.83	Pass	A79, A86
13677	61.50	80.0	18.50	Pass	A98

Table abbreviations:
Margin = dB below (negative if above) specification limit.

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c) carrier frequency = 2462 MHz

Peak detector, RBW = 1 MHz; VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
2975.9	62.00	77.17	15.17	Pass	A105, A113
13710	61.83	77.17	15.34	Pass	A126

Table abbreviations:
Margin = dB below (negative if above) specification limit.

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 test was performed with transmitter operating at 3 carrier frequencies F_{min} = 2412 MHz, F_{cent} = 2437 MHz, F_{max} = 2462 MHz from 9 kHz to 25 GHz.

9 kHz – 30 MHz frequency range. The EUT was placed on a wooden 80 cm height turntable. The measurements were performed at 3 m test distance. The loop antenna was positioned with its plane vertical. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

30 MHz – 25 GHz frequency range. The EUT was placed on a wooden 80 cm height turntable. The measurements were performed at 3 m test distance. 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.

TEST EQUIPMENT USED AT OATS:

HL 0038	HL 0041	HL 0768	HL 1200	HL 1424	HL 1940	HL 1942
HL 1984	HL 2259	HL 2260				

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 1003	HL 1004	HL 2009			

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

METHOD OF MEASUREMENTS	ANSI C63.4 §13.1.4
DATE:	May 27 to 30, June 1, 2003
RELATIVE HUMIDITY:	44 %
AMBIENT TEMPERATURE:	28°C
AIR PRESSURE:	1015 hPa
OPERATING FREQUENCY RANGE	2.412 – 2.462 MHz
BIT RATE:	1 Mbit/s
FREQUENCY RANGE*	9 kHz - 25 GHz
MEASUREMENT UNCERTAINTY:	± 4.5 dB

* The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency.
All emissions that fell in restricted bands were measured both in peak mode, by setting the spectrum analyzer RBW and VBW to 1 MHz and 3 MHz respectively, and in average mode, by setting the spectrum analyzer RBW and VBW to 1 MHz and 300 Hz respectively. VBW was chosen to average emission level within transmitter t_{on} time of 8.7 msec for the highest power spectral density under 1 Mbit/s data transfer ratio.
VBW ≥ 1/ t_{on} ≥ 1/8.7 msec ≥ 115 Hz; VBW = 300 Hz (refer to plots A37-A48).

Average correction factor, being 20 log (duty cycle) within100 msec time interval, was calculated and found negligible, and was further omitted from the average test results.
All emissions were found below the specified limit. For all test results refer to Plots A49 – A132.

LIMIT

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

TEST PROCEDURE

The test was performed with transmitter operating 3 carrier frequencies F_{min} = 2412 MHz, F_{cent} = 2437 MHz, F_{max} = 2462 MHz from 9 kHz to 25 GHz.

9 kHz – 30 MHz frequency range. The EUT was placed on a wooden 80 cm height turntable. The measurements were performed at 3 m test distance. The loop antenna was positioned with its plane vertical. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

30 MHz – 25 GHz frequency range. The EUT was placed on a wooden 80 cm height turntable. The measurements were performed at 3 m test distance. 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.

Quasi-peak detector

Frequency, MHz	Antenna polarization	Turntable position, °	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to Plots in Appendix A
120.00	Vertical	4	42.1	43.50	1.4	A52
240.00	Horizontal	96	39.50	46.00	6.50	A83
259.99	Horizontal	104	37.57	46.00	8.43	A83
279.99	Horizontal	106	35.27	46.00	10.73	A83

The recorded test results were obtained through measurements with biconilog antenna at 1 m height**.**

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a) carrier frequency = 2412 MHz

Peak detector, RBW = 1 MHz, VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to plots in Ap pendix A
2388.7	65.67	74	8.33	A56
4823.9*	46.33	74	27.67	A66
17827*	53.17	74	20.83	A74

***** below average limit 54 dB (μV/m)

Average detector, RBW = 1 MHz; VBW = 300 Hz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to plots in Appendix A
2386.3	47.33	54	6.67	A58
8151.7	35.83	54	18.17	A69
17811	41.50	54	12.50	A77

b) carrier frequency = 2437 MHz

Peak detector, RBW = 1 MHz, VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to plots in Appendix A
1056.1*	41.54	74	32.46	A84, A85
4873.9*	46.67	74	27.33	A92, A93
17900*	52.83	74	21.17	A100

***** below average limit 54 dB (μV/m)

Average detector, RBW = 1 MHz; VBW = 300 Hz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to plots in Appendix A
2355.8	46.00	54	8.00	A87
17811	41.67	54	12.33	A103

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

Table abbreviations:
Margin = dB below (negative if above) specification limit.

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c) carrier frequency = 2462 MHz

Peak detector, RBW = 1 MHz, VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to plots in Appendix A
4175.2*	44.33	74	29.67	A121
4924.0*	46.33	74	27.67	A119
17893	55.33	74	18.67	A128

***** below average limit 54 dB (μV/m)

Average detector, RBW = 1 MHz; VBW = 300 Hz

Frequency, MHz	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Reference to plots in Appendix A
4924.0	38.17	54	15.83	A120
17810.5	41.17	54	12.83	A131

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

Table abbreviations:
Margin = dB below (negative if above) specification limit.

TEST EQUIPMENT USED AT OATS:

HL 0038	HL 0041	HL 0768	HL 1200	HL 1424	HL 1940	HL 1942
HL 1984	HL 2259	HL 2260				

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 1003	HL 1004	HL 2009			

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4.6 Peak power spectral density of DSSS according to § 15.247(d)

DATE:	June 1, 2003
RELATIVE HUMIDITY:	39 %
AMBIENT TEMPERATURE:	23°C
AIR PRESSURE:	1010 hPa
OPERATING FREQUENCY RANGE	2412 - 2462 MHz
MEASUREMENT UNCERTAINTY:	±4.5 dB

Carrier frequency, MHz	Data rate, Mbit/s	Electric field strength @3 m distance, dB(mV/m)/Hz	Electric field strength @3 m distance, dB(mV/m)/3 kHz	Peak power spectral density, dBm/3 kHz	Limit, dBm	Verdict	Reference to plots in Appendix A
2.412	1.0	52.4	87.17	-10.06	8	Pass	A25
	2.0	53.56	88.33	-8.90	8	Pass	A26
	5.5	52.56	87.33	-9.90	8	Pass	A27
	11.0	52.06	86.83	-10.40	8	Pass	A28
2.437	1.0	50.56	85.33	-11.90	8	Pass	A29
	2.0	50.4	85.17	-12.06	8	Pass	A30
	5.5	49.06	83.83	-13.40	8	Pass	A31
	11.0	48.56	83.33	-13.90	8	Pass	A32
2.462	1.0	47.23	82.00	-15.23	8	Pass	A33
	2.0	47.06	81.83	-15.40	8	Pass	A34
	5.5	47.06	81.83	-15.40	8	Pass	A35
	11.0	47.06	81.83	-15.40	8	Pass	A36

TEST PROCEDURE

The EUT was set up at OATS. The measurements were performed at 3 m test distance. The EUT was placed on a wooden 80 cm height turntable. 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.
The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at low and high edges and at the middle of the 2.412 - 2.462 GHz frequency range under all data transfer bit rates.
The power density was calculated using the equation:
$P = (Ed)^2 /30G$, where G=1.58 (refer to section 4.2).

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 EQUIPMENT USED:

HL 0038	HL 0041	HL 0091	HL 0287	HL 0768	HL 1424	HL 1940
HL 1942	HL 2260					

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4.7 Unintentional radiated emissions test according to §15.109

METHOD OF MEASUREMENT:	ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
DATE	June 1, 2003
TEST PERFROMED AT:	OATS
AMBIENT TEMPERATURE:	39 %
RELATIVE HUMIDITY:	23°C
AIR PRESSURE:	1010 hPa
DISTANCE BETWEEN ANTENNA AND EUT:	3 m
THE EUT WAS TESTED AS:	Table-top
FREQUECNY RANGE:	30 MHz – 1 GHz
DETECTOR TYPE:	Quasi-peak
RESOLUTION BANDWIDTH:	120 kHz
MEASUREMENT UNCERTAINTY:	± 6 dB max

Frequency, MHz	Antenna polarization	Turntable position (^{o})	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Verdict	Reference to plots in Appendix A
40.0	Vertical	358	38.1	40.0	1.9	Pass	A82
60.0	Vertical	8	32.3	40.0	7.7	Pass	A82
70.0	Vertical	342	37.3	40.0	2.7	Pass	A108
80.0	Vertical	95	33.9	40.0	6.1	Pass	A82
200.0	Horizontal	102	38.6	43.5	4.9	Pass	A109
239.99	Vertical	311	30.41	46.0	15.59	Pass	A82

Table abbreviations:
Turntable position: 0^o = EUT front panel faces the receiving antenna

LIMIT (§ 15.109)

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

TEST EQUIPMENT USED:

HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 1003	HL 2009					

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4.8 Conducted emissions test according to §15.207, 15.107

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.3
DATE:	June 1, 2003
RELATIVE HUMIDITY:	56 %
AMBIENT TEMPERATURE:	25 °C
AIR PRESSURE:	1010 hPa
THE EUT WAS TESTED AS:	TABLE-TOP
DETECTOR USED:	QUASI-PEAK, AVERAGE
FREQUECNY RANGE:	150 kHz – 30 MHz
RESOLUTION BANDWIDTH:	9 kHz
MEASUREMENT UNCERTAINTY:	± 3.9 dB in 9 – 150 kHz ± 3.8 dB in 150 kHz – 30 MHz

Quasi-peak detector

Frequency, MHz	Line identification	Measured emissions, dB (mV)	Specification QP limit, dB (mV)	Margin, dB	Verdict
0.200547	Phase	45.22	63.63	18.41	**Pass**
0.210000	Phase	47.70	63.27	15.57	**Pass**
0.211034	Neutral	46.80	63.23	16.43	**Pass**
16.036044	Phase	38.96	60.00	21.04	**Pass**
16.109963	Neutral	39.66	60.00	20.34	**Pass**
20.000365	Neutral	51.22	60.00	8.78	**Pass**

Average detector

Frequency, MHz	Line identification	Measured emissions, dB (mV)	Specification AVRG limit, dB (mV)	Margin, dB	Verdict
0.200547	Phase	29.09	53.63	24.54	**Pass**
0.210000	Phase	27.84	53.27	25.43	**Pass**
0.211034	Neutral	25.45	53.23	27.78	**Pass**
16.036044	Phase	31.97	50.00	18.03	**Pass**
16.109963	Neutral	32.49	50.00	17.51	**Pass**
20.000365	Neutral	47.74	50.00	2.26	**Pass**

For full test results refer to plots A133, A134.

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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 0465	HL 0521	HL 0787	HL 1204		

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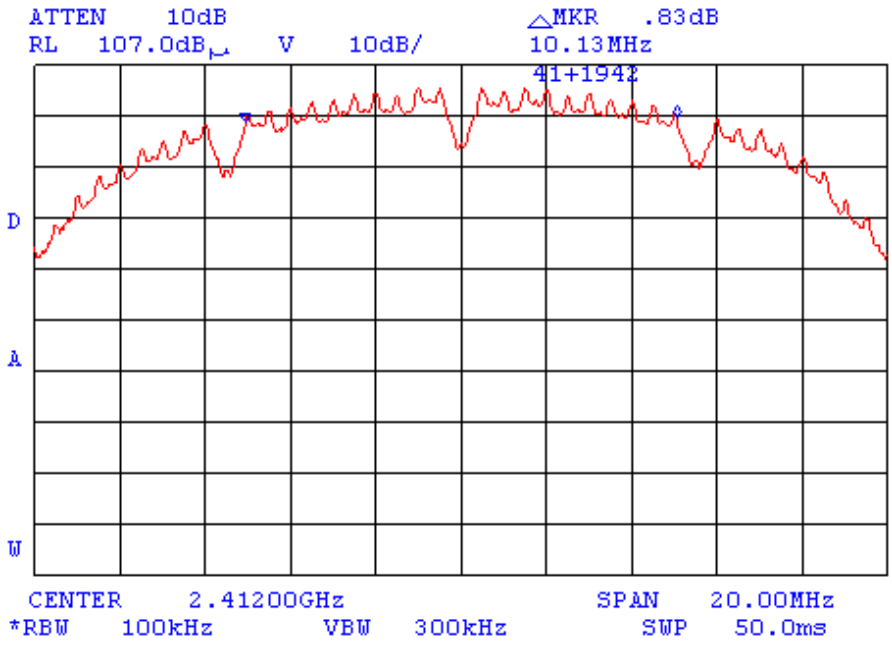
Appendix A Plots

Plot A 1

6 dB bandwidth @ 2.412 GHz and 1.0 Mbit/s



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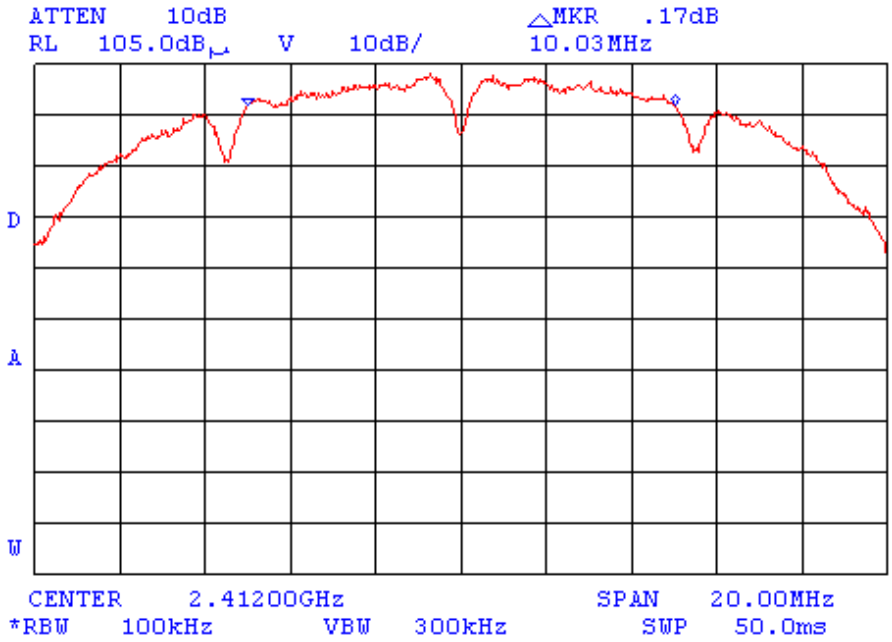
Plot A 2

6 dB bandwidth @ 2.412 GHz and 2.0 Mbit/s



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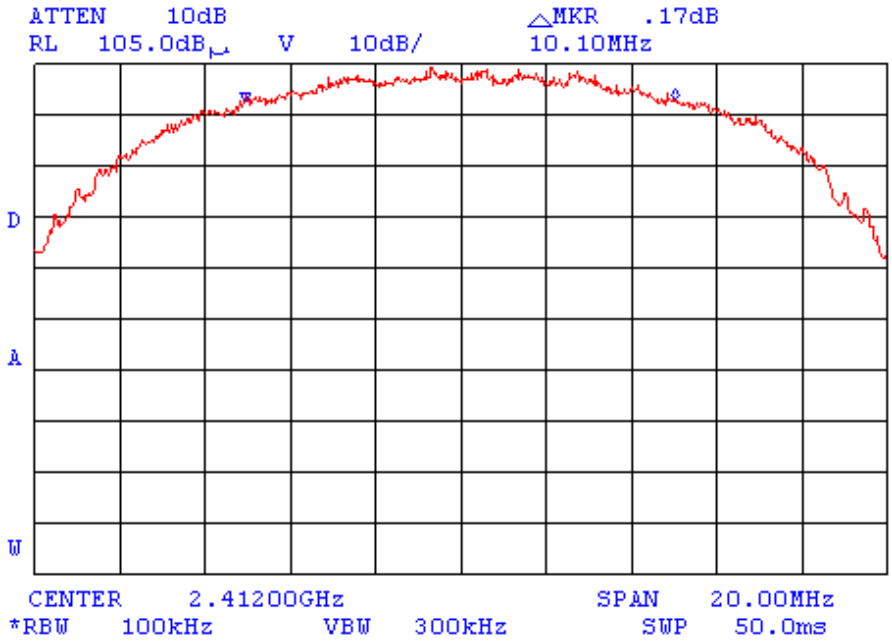
Plot A 3

6 dB bandwidth @ 2.412 GHz and 5.5 Mbit/s



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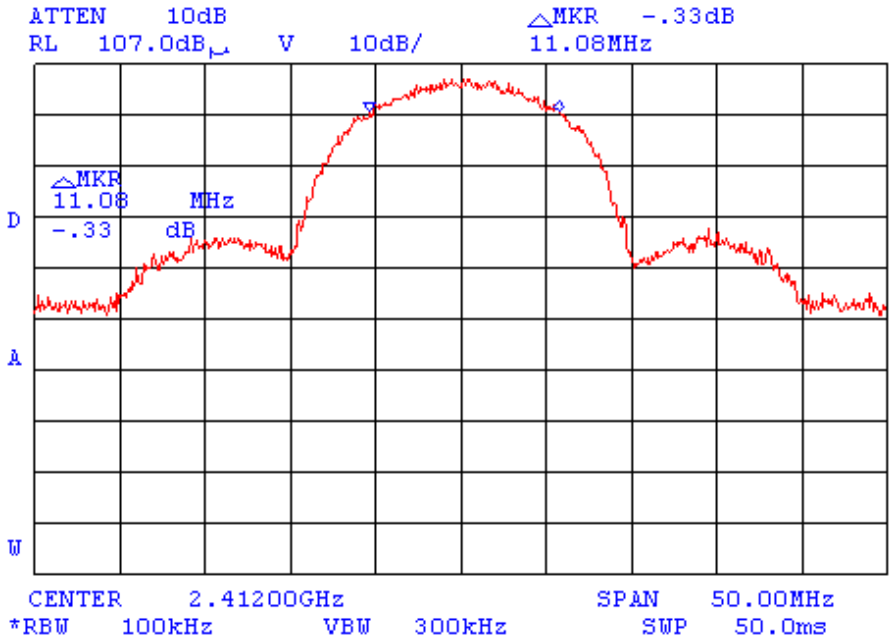
Plot A 4

6 dB bandwidth @ 2.412 GHz and 11.0 Mbit/s



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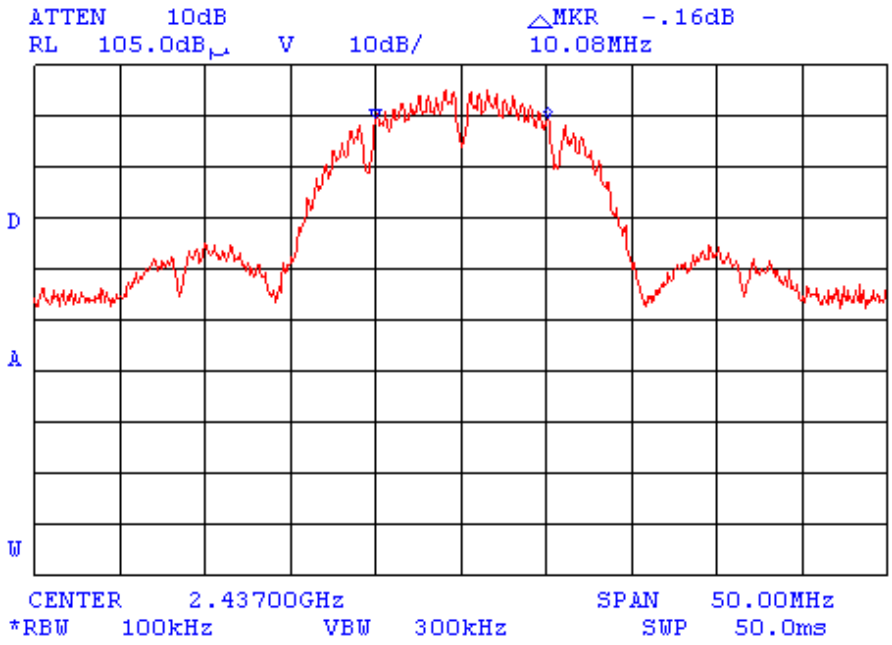
Plot A 5

6 dB bandwidth @ 2.437 GHz and 1.0 Mbit/s



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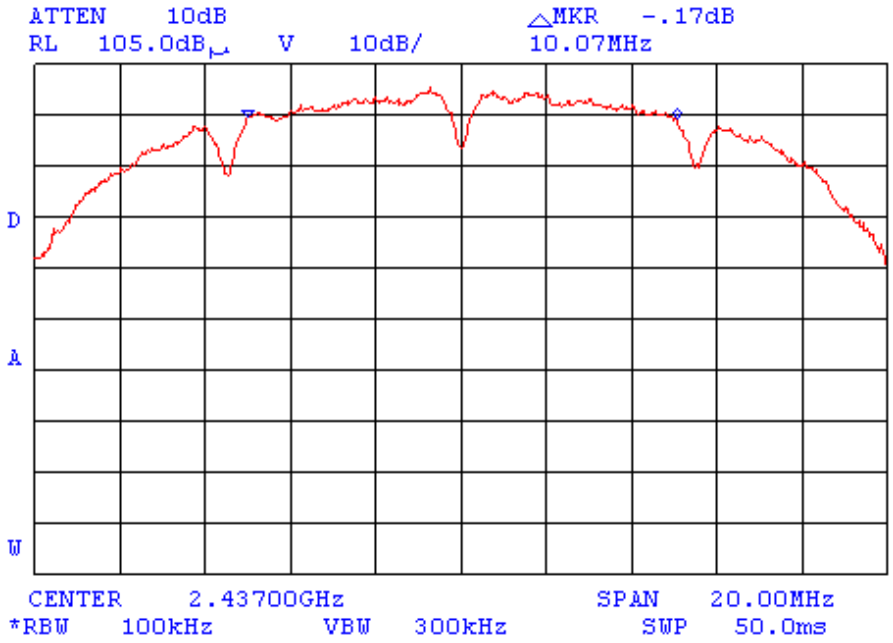
Plot A 6

6 dB bandwidth @ 2.437 GHz and 2.0 Mbit/s



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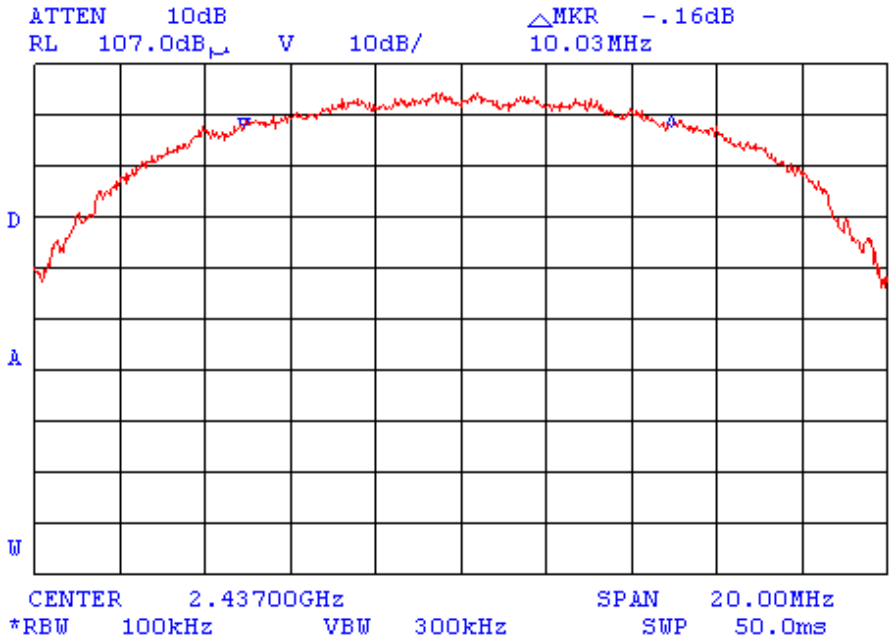
Plot A 7

6 dB bandwidth @ 2.437 GHz and 5.5 Mbit/s



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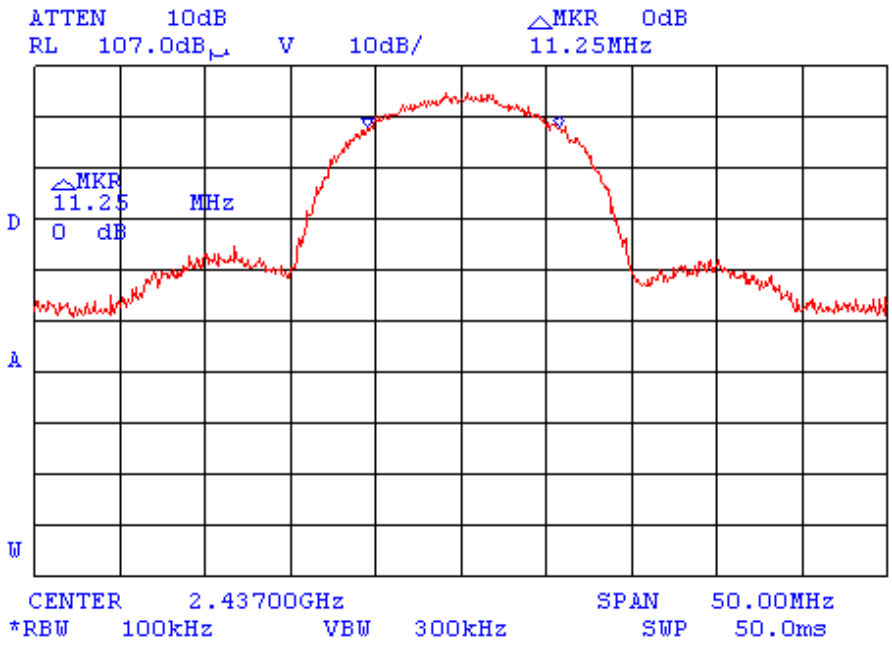
Plot A 8

6 dB bandwidth @ 2.437 GHz and 11.0 Mbit/s



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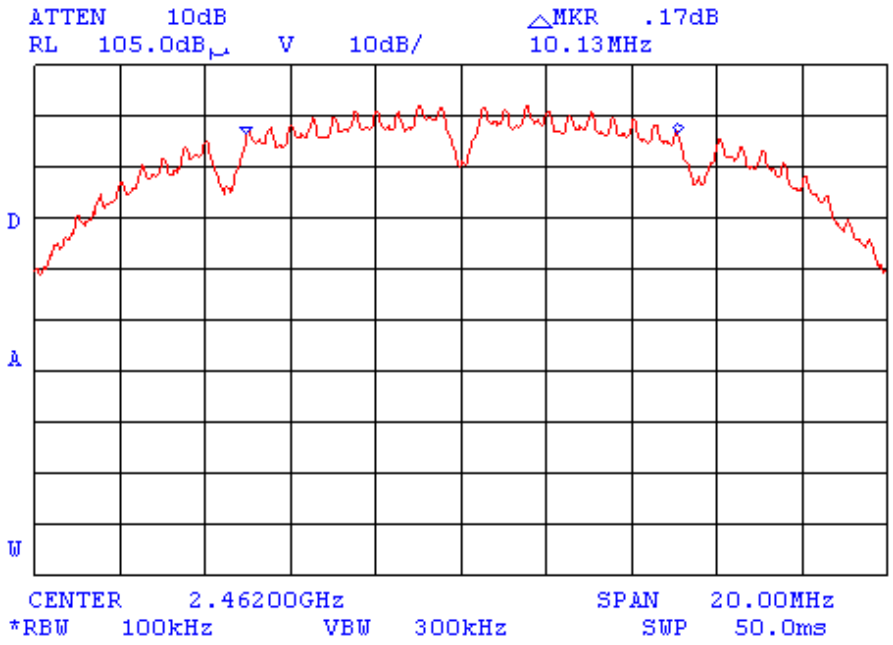
Plot A 9

6 dB bandwidth @ 2.462 GHz and 1.0 Mbit/s



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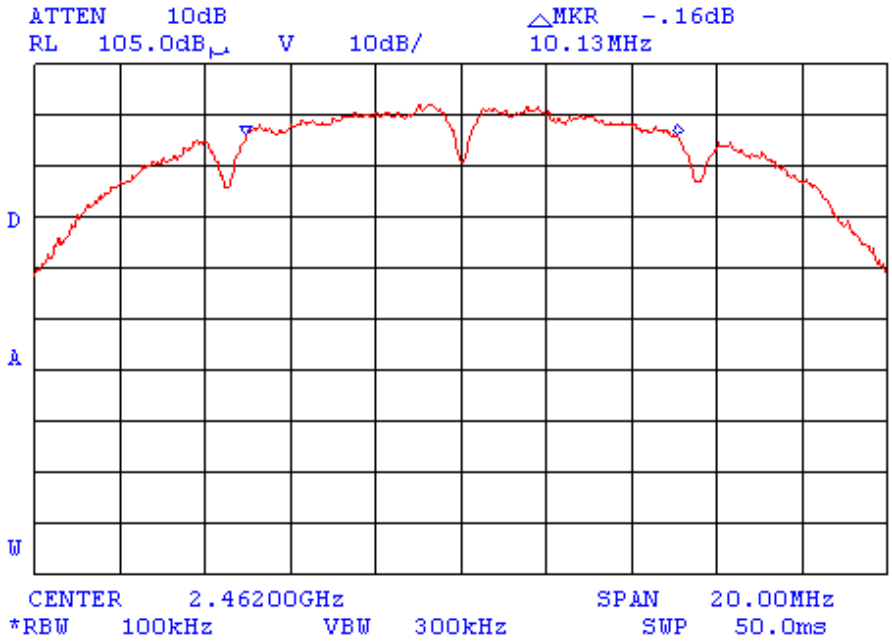
Plot A 10

6 dB bandwidth @ 2.462 GHz and 2.0 Mbit/s



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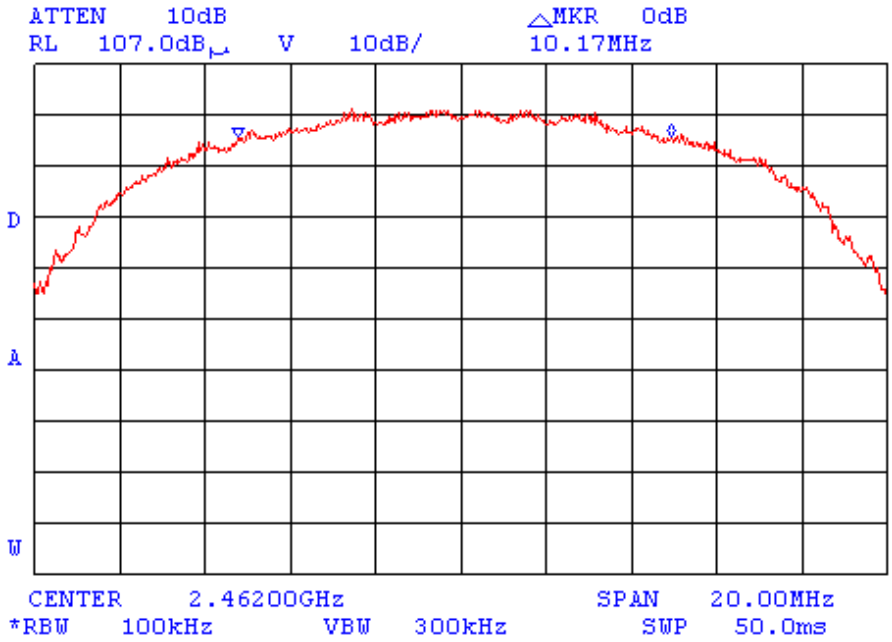
Plot A 11

6 dB bandwidth @ 2.462 GHz and 5.5 Mbit/s



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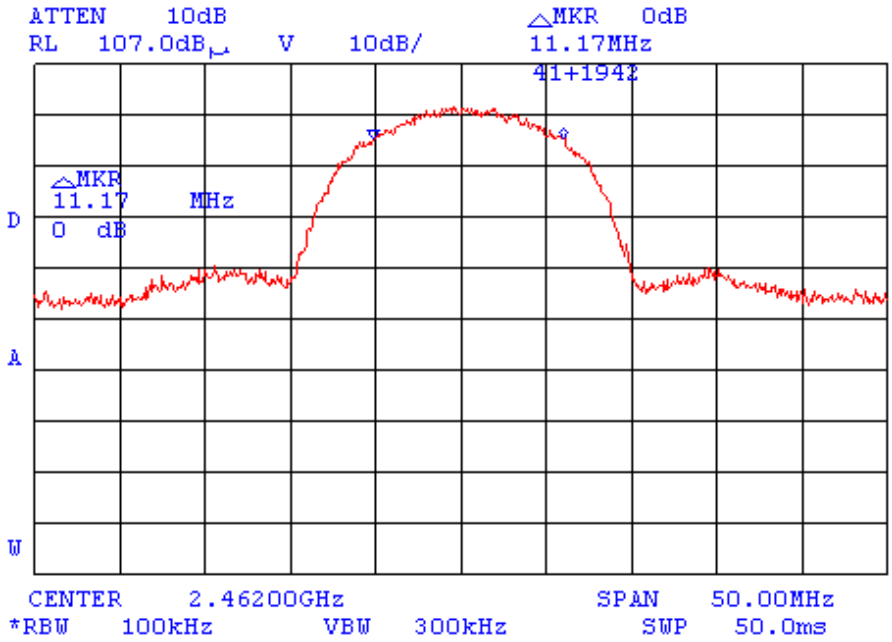
Plot A 12

6 dB bandwidth @ 2.462 GHz and 11.0 Mbit/s



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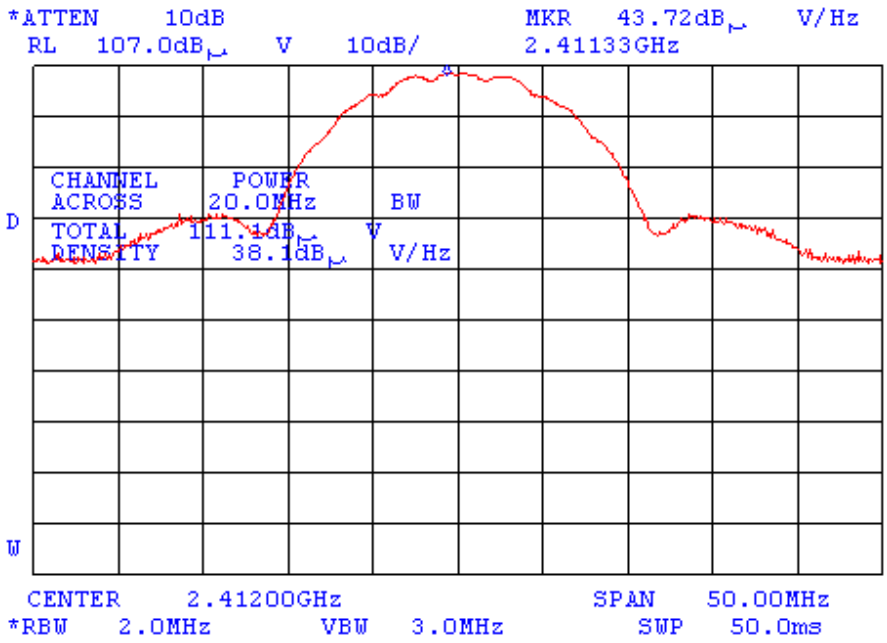
Plot A 13

Field strength measurement at 3 m distance @2.412 GHz and 1.0 Mbit/s



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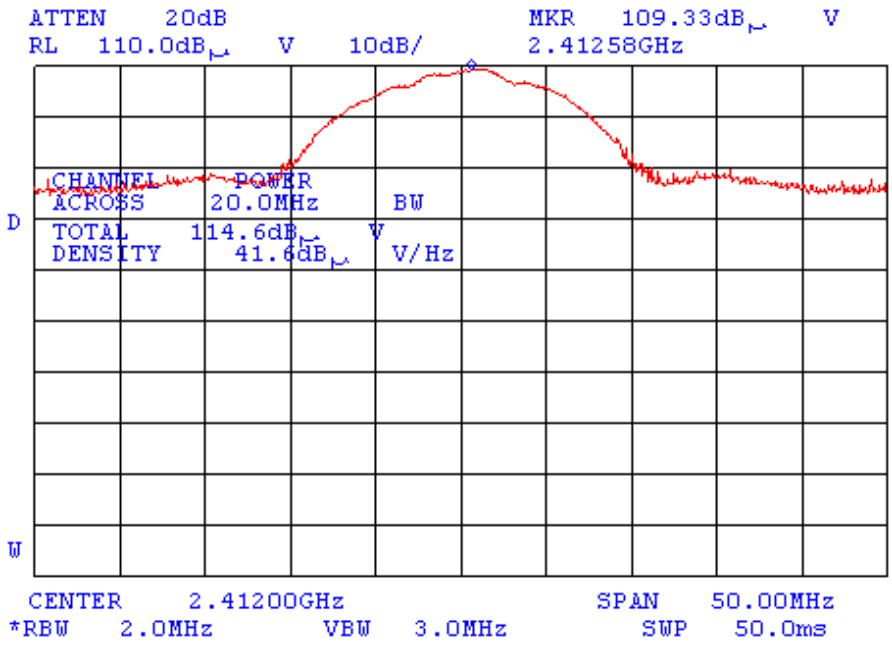
Plot A 14

Field strength measurement at 3 m distance @2.412 GHz and 2.0 Mbit/s



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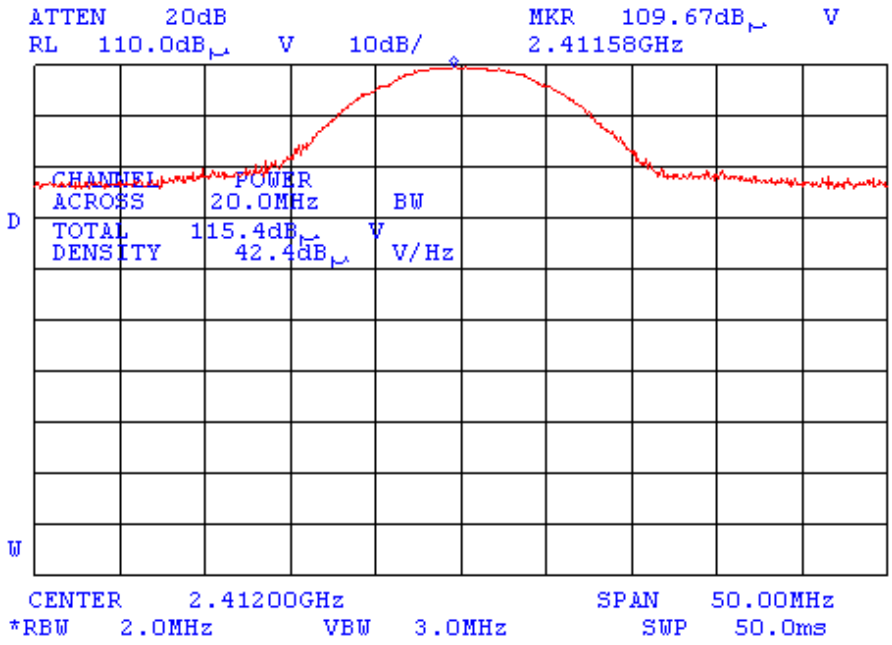
Plot A 15

Field strength measurement at 3 m distance @2.412 GHz and 5.5 Mbit/s



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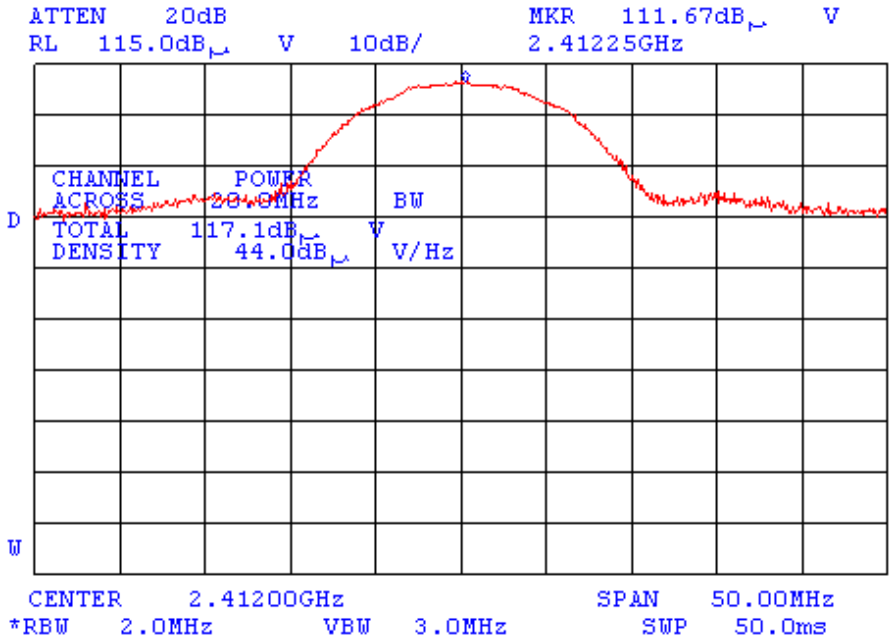
Plot A 16

Field strength measurement at 3 m distance @2.412 GHz and 11.0 Mbit/s



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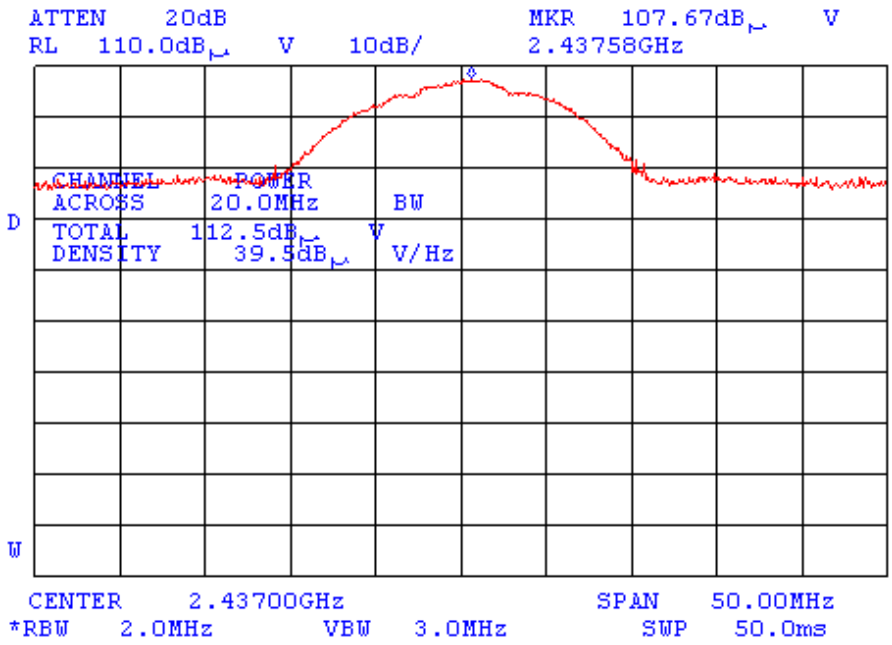
Plot A 17

Field strength measurement at 3 m distance @2.437 GHz and 1.0 Mbit/s



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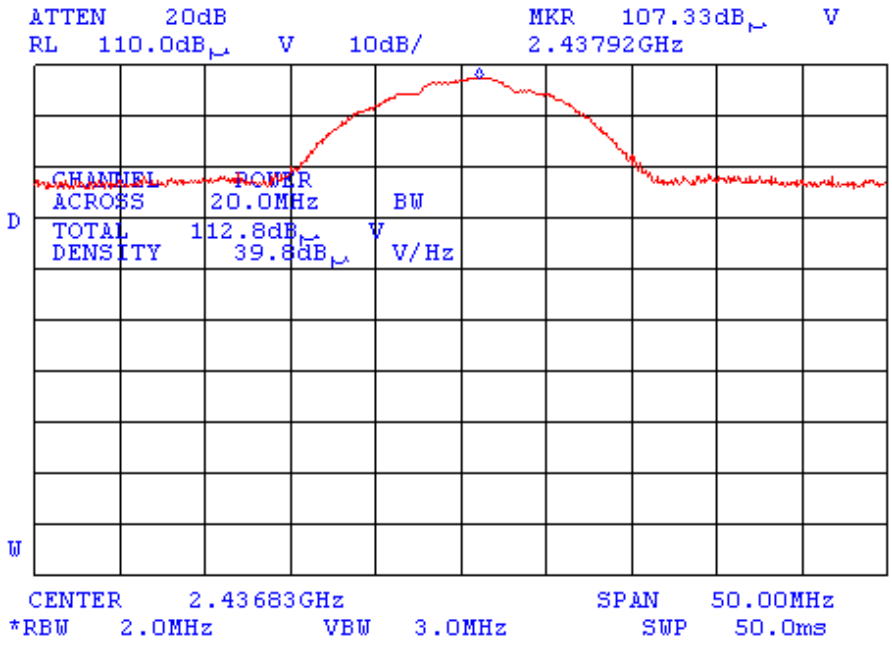
Plot A 18

Field strength measurement at 3 m distance @2.437 GHz and 2.0 Mbit/s



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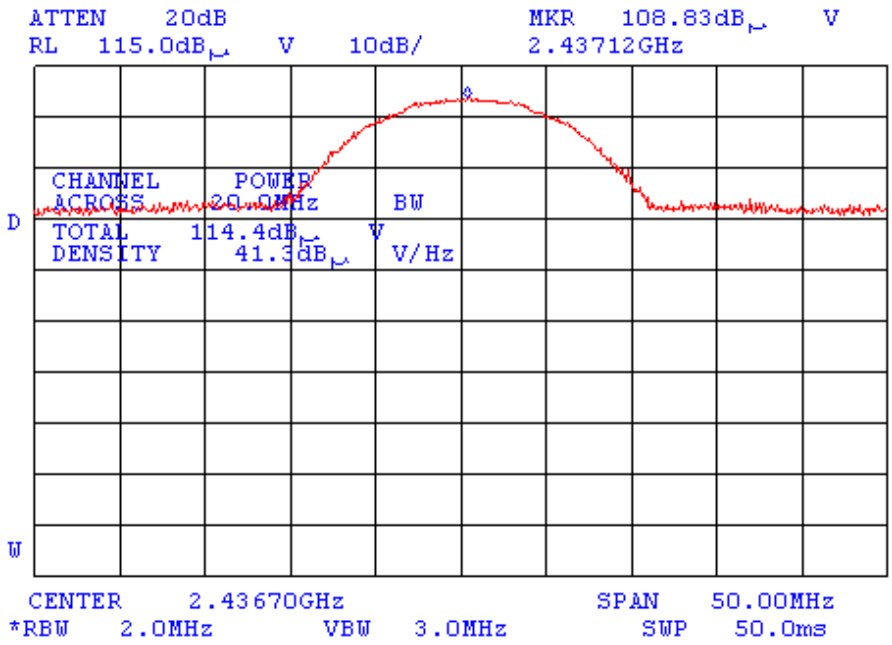
Plot A 19

Field strength measurement at 3 m distance @2.437 GHz and 5.5 Mbit/s



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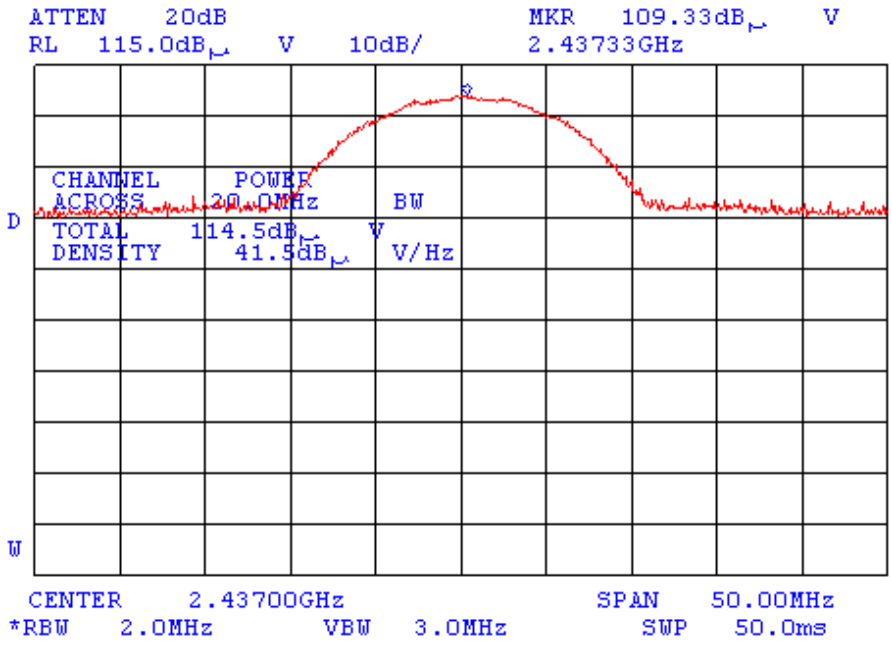
Plot A 20

Field strength measurement at 3 m distance @2.437 GHz and 11.0 Mbit/s



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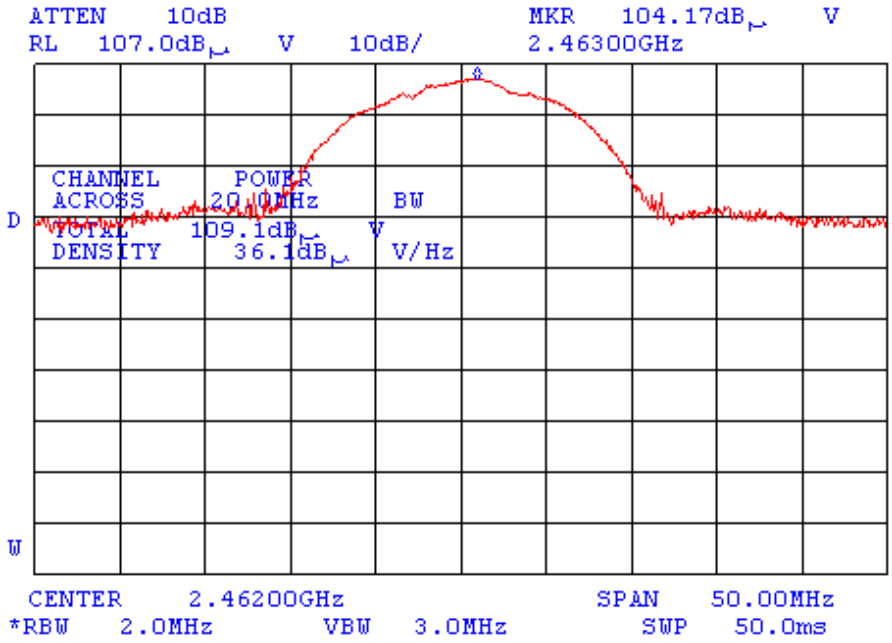
Plot A 21

Field strength measurement at 3 m distance @2.462 GHz and 1.0 Mbit/s



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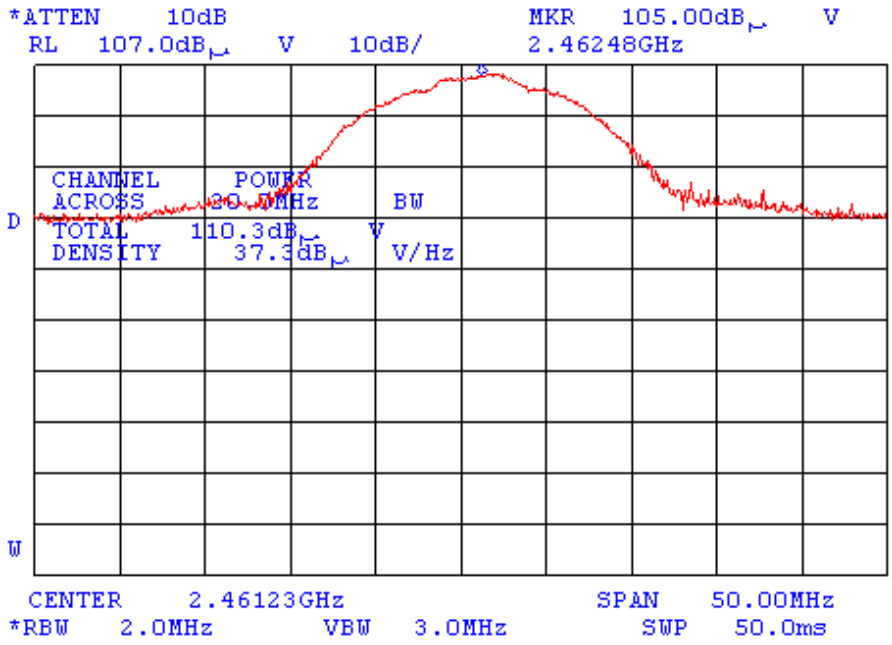
Plot A 22

Field strength measurement at 3 m distance @2.462 GHz and 2.0 Mbit/s



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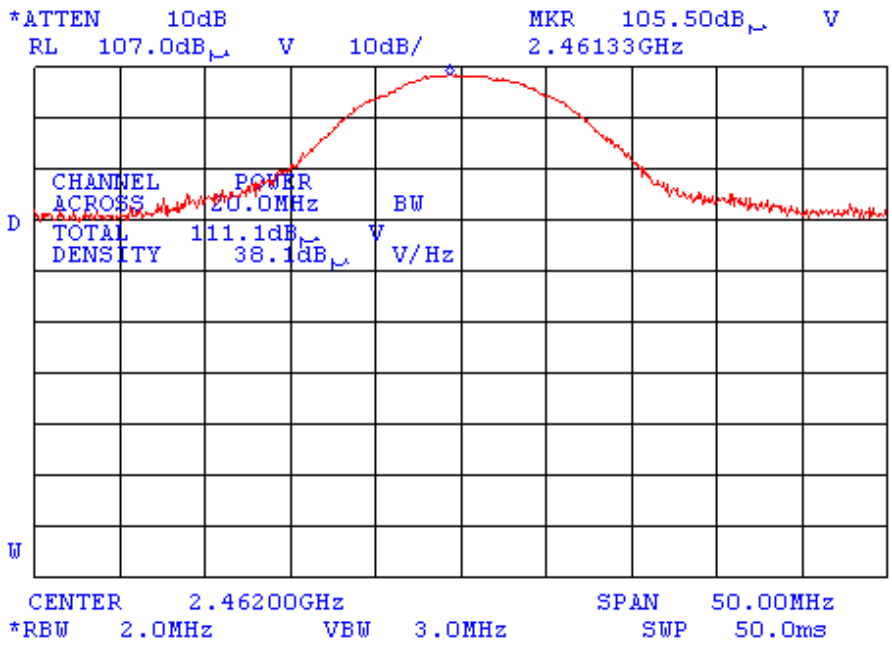
Plot A 23

Field strength measurement at 3 m distance @2.462 GHz and 5.5 Mbit/s



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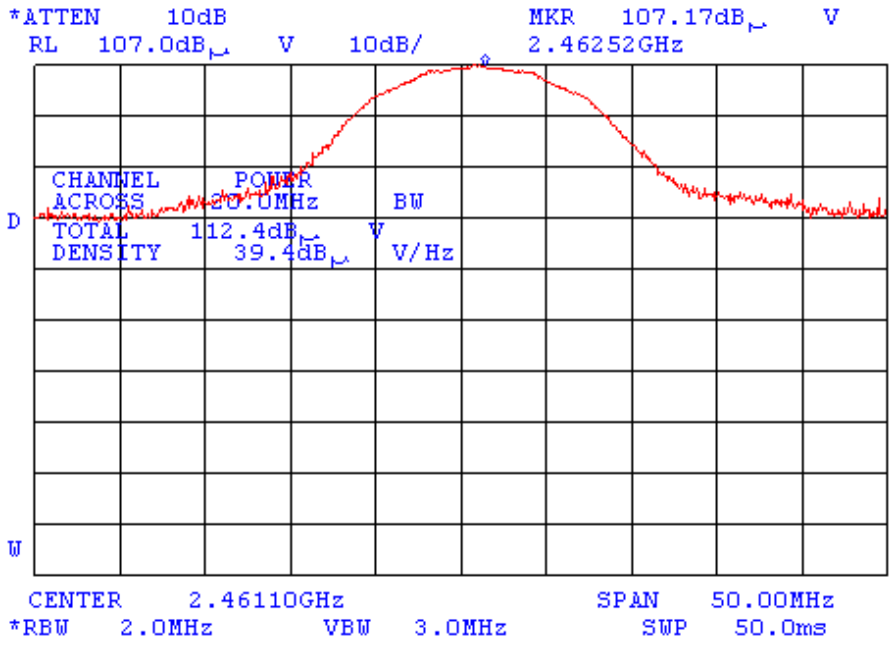
Plot A 24

Field strength measurement at 3 m distance @2.462 GHz and 11.0 Mbit/s



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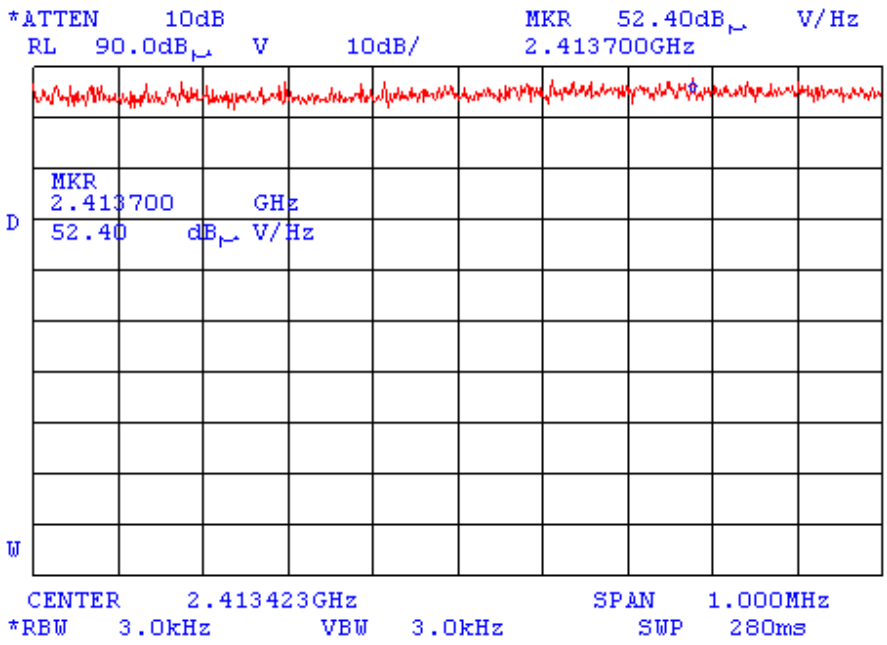
Plot A 25

Power spectral density measurement at 3 m distance @ 2.412 GHz and 1.0 Mbit/s



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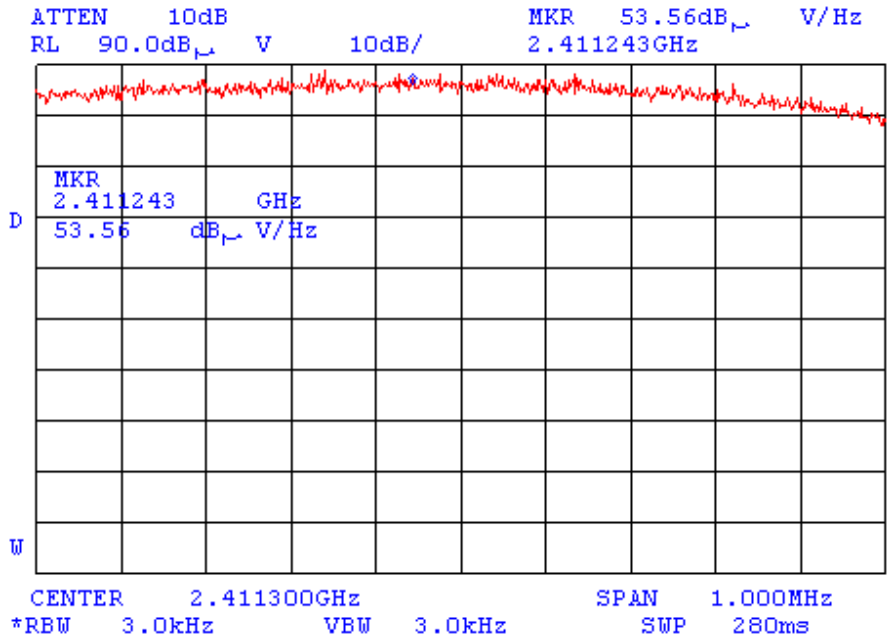
Plot A 26

Power spectral density measurement at 3 m distance @ 2.412 GHz and 2.0 Mbit/s



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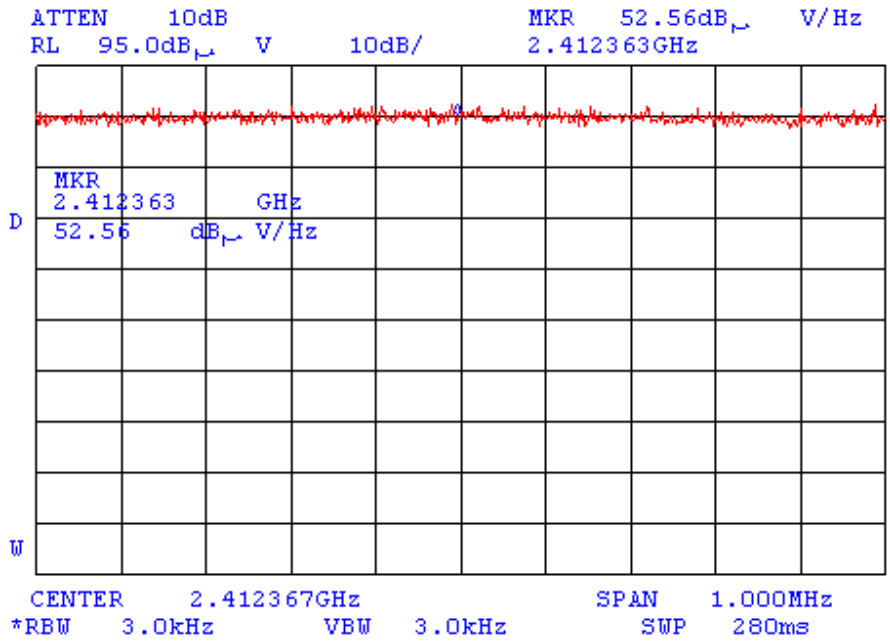
Plot A 27

Power spectral density measurement at 3 m distance @ 2.412 GHz and 5.5 Mbit/s



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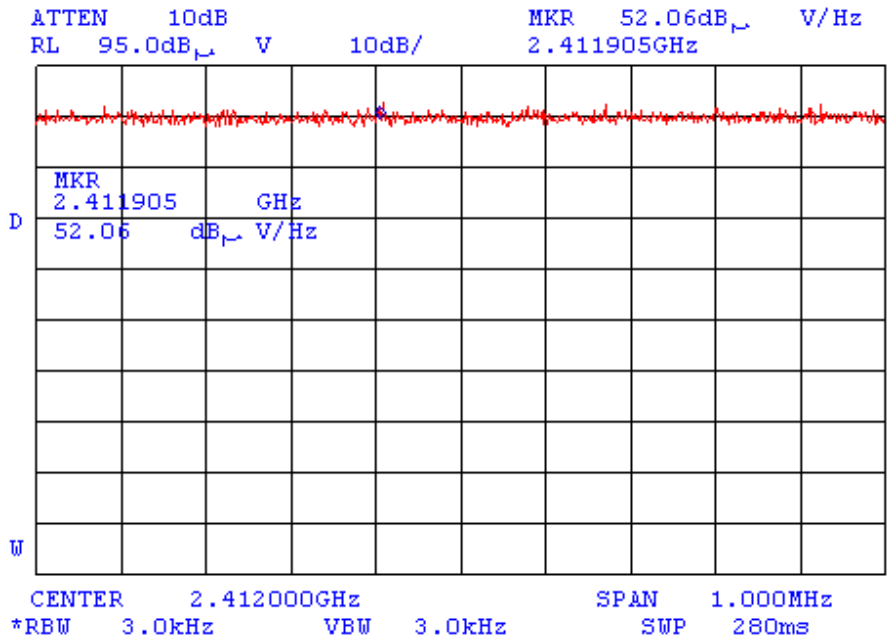
Plot A 28

Power spectral density measurement at 3 m distance @ 2.412 GHz and 11.0 Mbit/s



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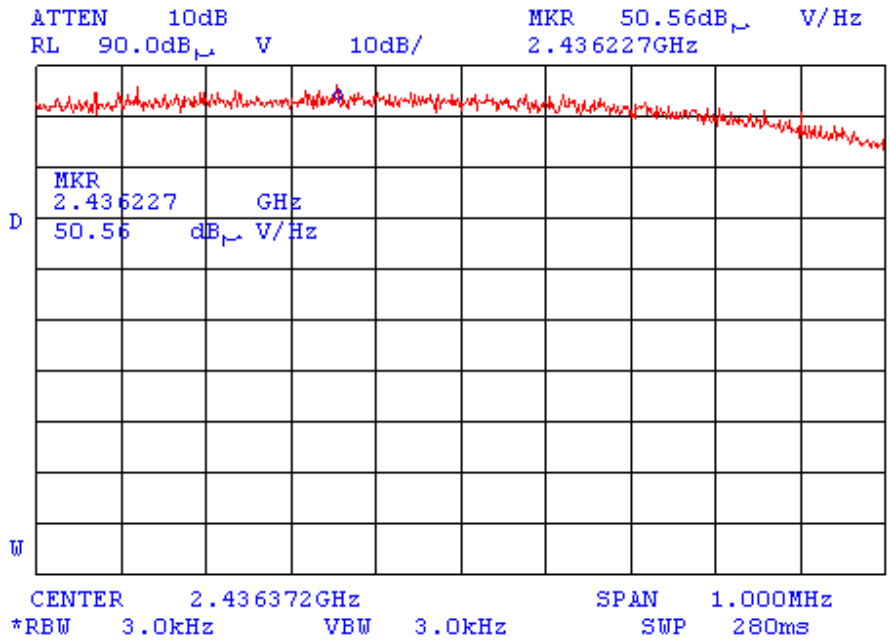
Plot A 29

Power spectral density measurement at 3 m distance @ 2.437 GHz and 1.0 Mbit/s



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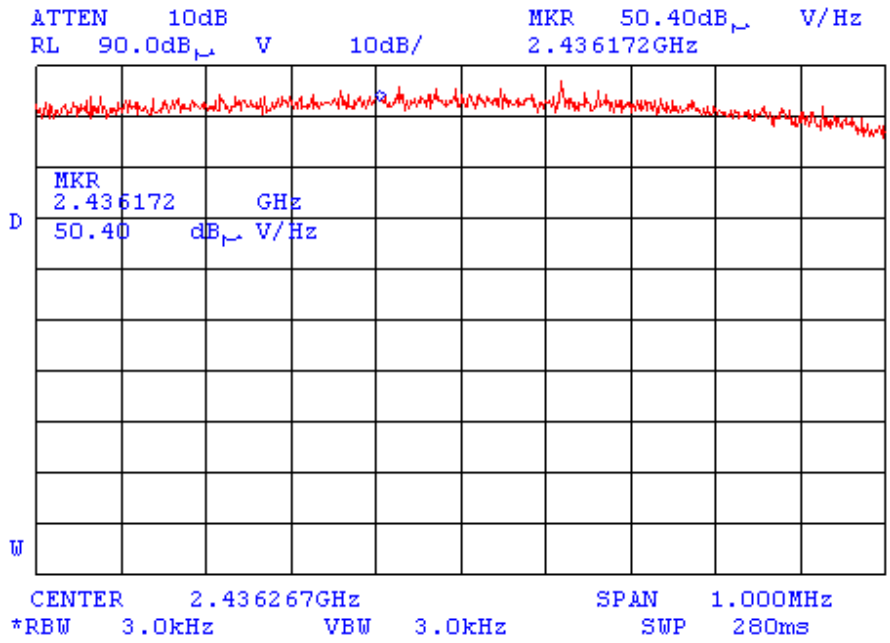
Plot A 30

Power spectral density measurement at 3 m distance @ 2.437 GHz and 2.0 Mbit/s



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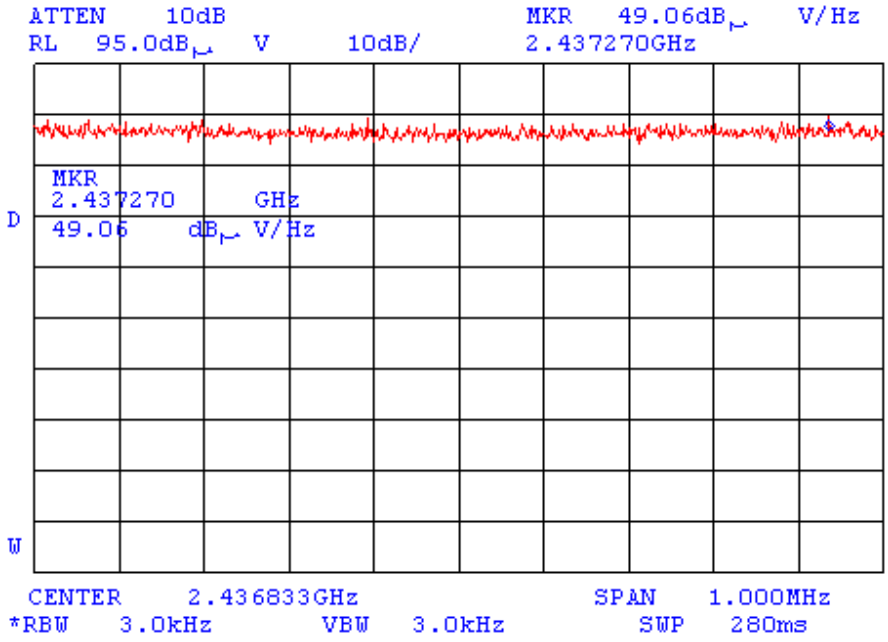
Plot A 31

Power spectral density measurement at 3 m distance @ 2.437 GHz and 5.5 Mbit/s



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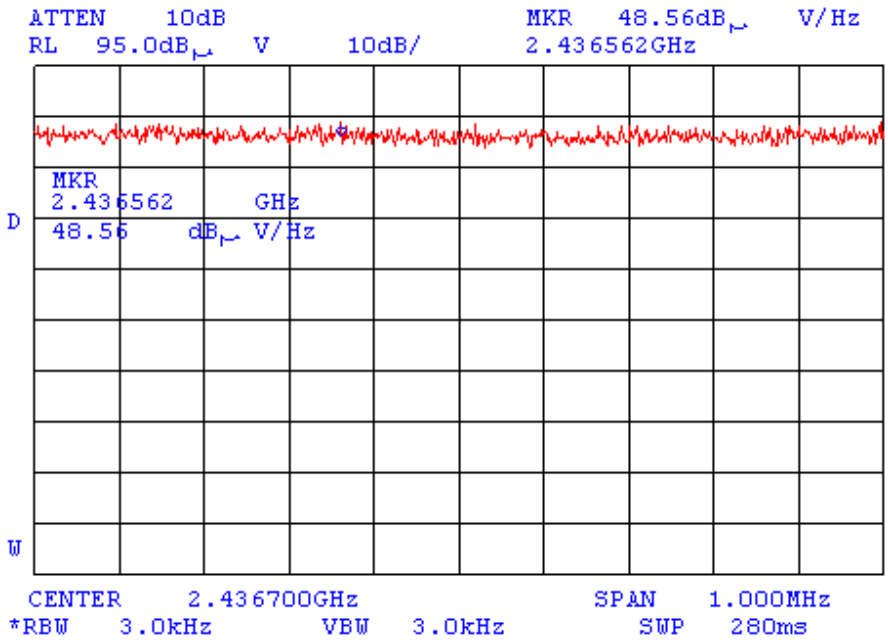
Plot A 32

Power spectral density measurement at 3 m distance @ 2.437 GHz and 11.0 Mbit/s



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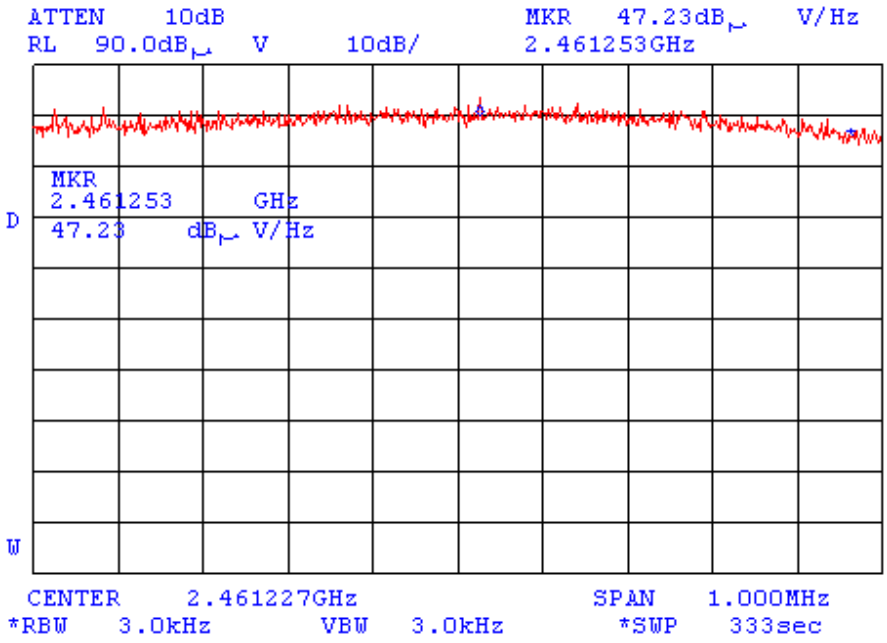
Plot A 33

Power spectral density measurement at 3 m distance @ 2.462 GHz and 1.0 Mbit/s



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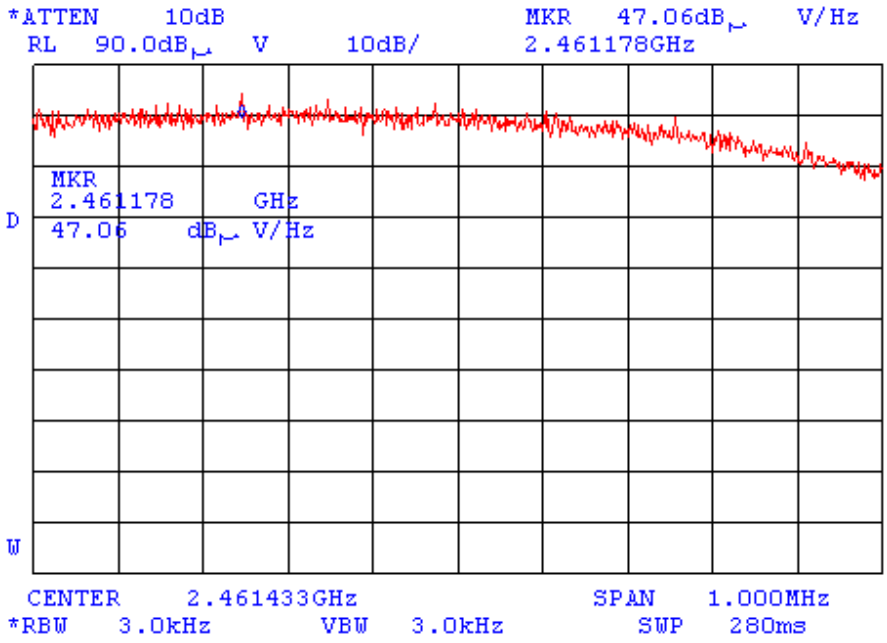
Plot A 34

Power spectral density measurement at 3 m distance @ 2.462 GHz and 2.0 Mbit/s



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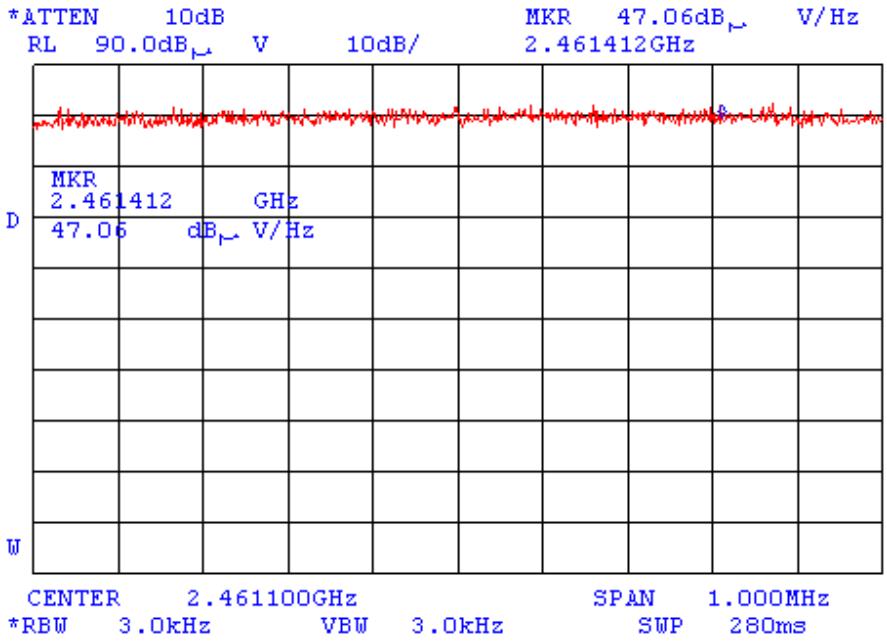
Plot A 35

Power spectral density measurement at 3 m distance @ 2.462 GHz and 5.5 Mbit/s



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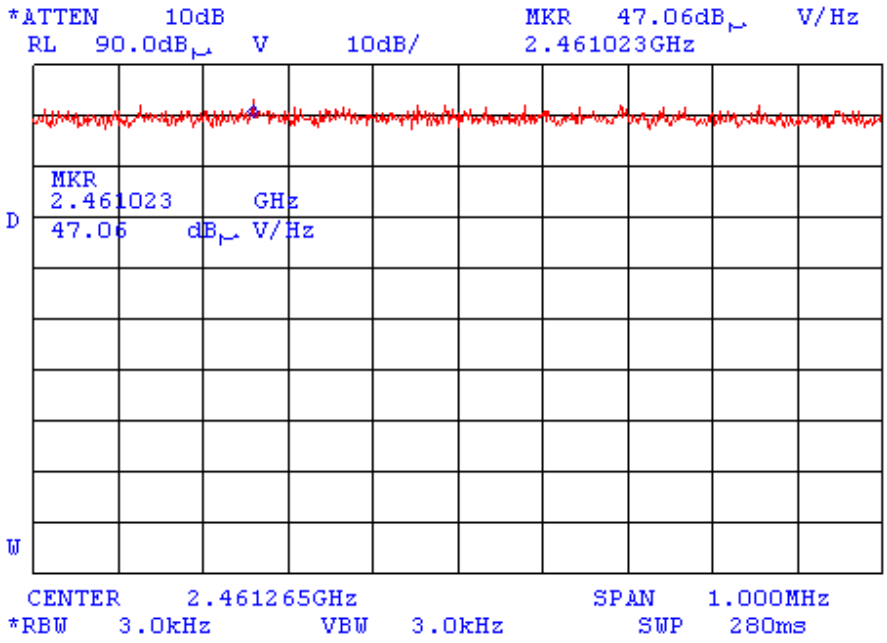
Plot A 36

Power spectral density measurement at 3 m distance @ 2.462 GHz and 11.0 Mbit/s



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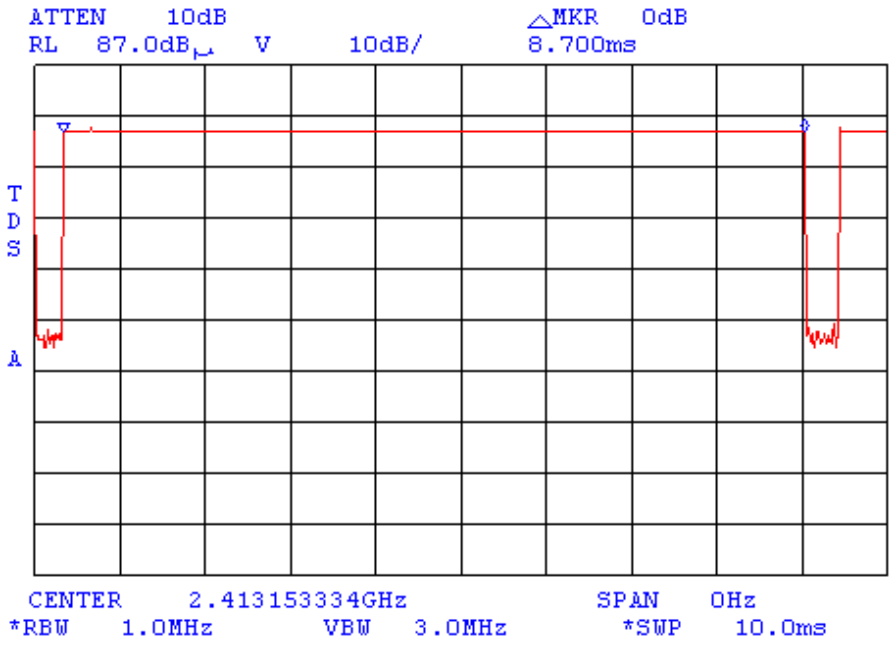
Plot A 37

Duty cycle measurement and average bandwidth determination @ 1.0 Mbit/s, Ton duration



t_{on}=8.7 msec
VBW≥1/t_{on}=1/8.7 msec=115 Hz

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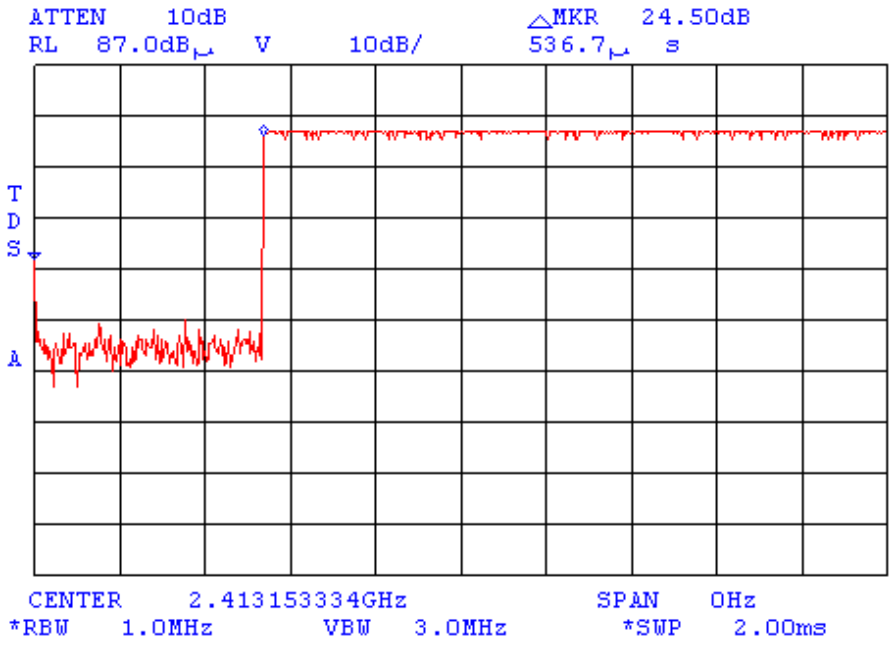
Plot A 38

Duty cycle measurement and average bandwidth determination @ 1.0 Mbit/s, Toff duration



t_{off}=0.5367 msec

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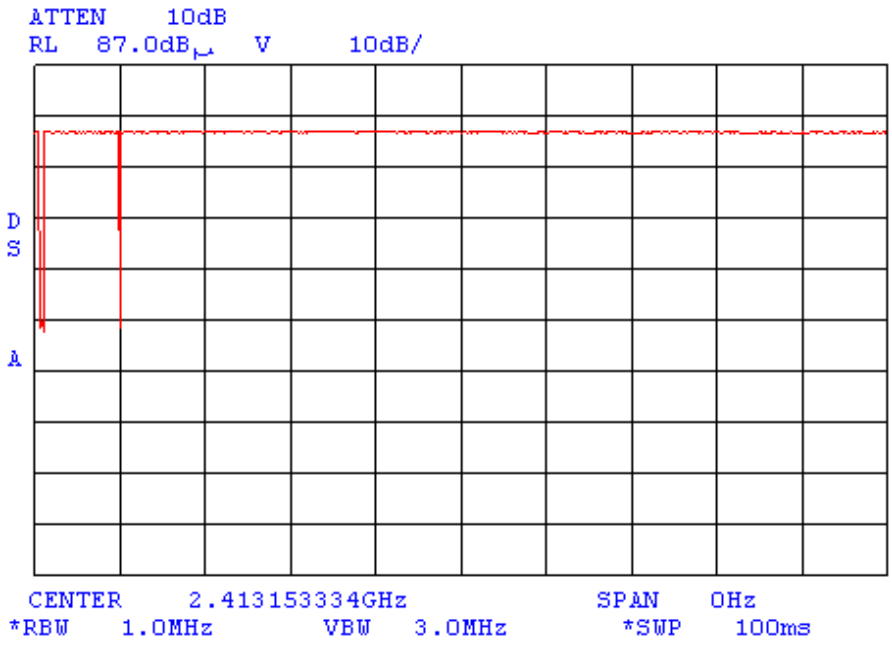
Plot A 39

Duty cycle measurement and average factor determination @ 1.0 Mbit/s



Minimum 2 times t_{off} in 100 msec.
The worst case of duty cycle is (100-2*0.5367)/100=0.989
Average factor=20*log(0.989)= -0.09 dB

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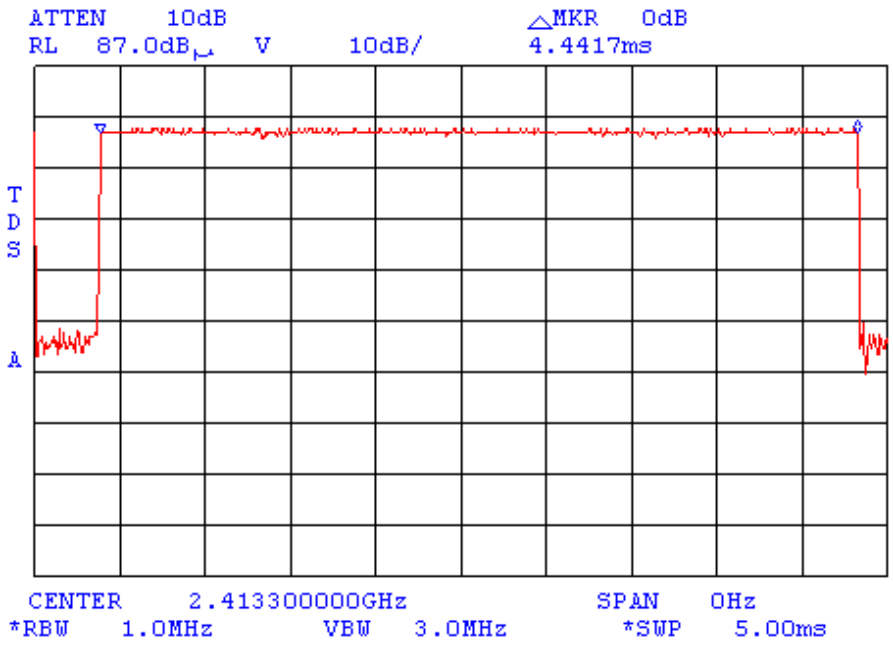
Plot A 40

Duty cycle measurement and average bandwidth determination @ 2.0 Mbit/s, Ton duration



t_{on}=4.4417 msec
VBW≥1/t_{on}=1/4.4417 msec=225 Hz

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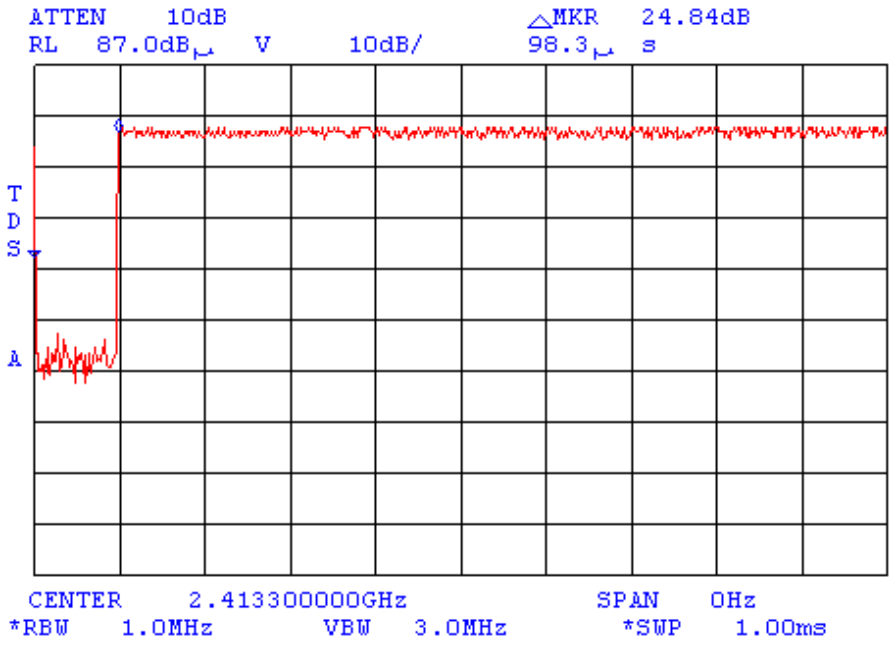
Plot A 41

Duty cycle measurement and average bandwidth determination @ 2.0 Mbit/s, Toff duration



minimum t_{off}=0.0983 msec

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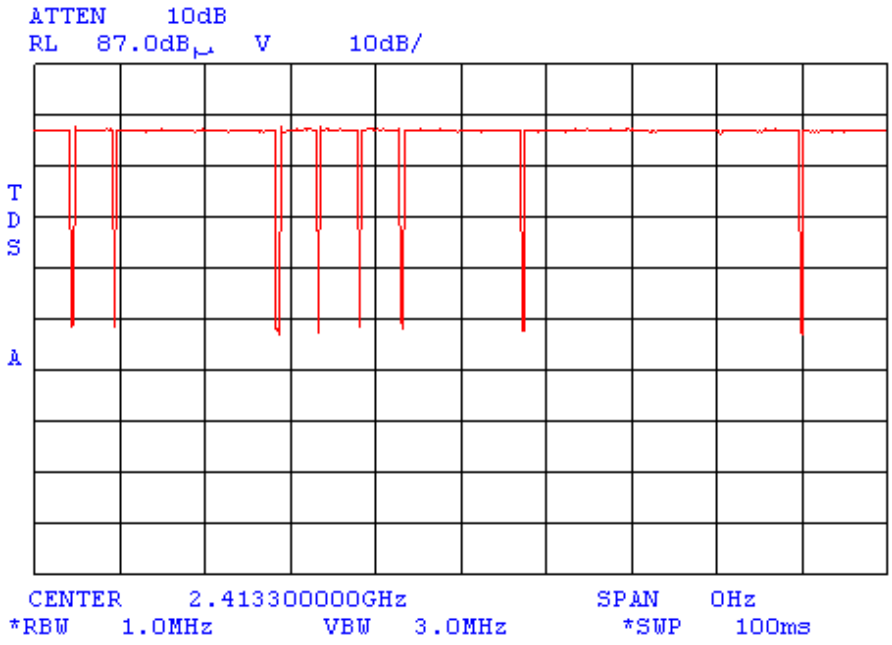
Plot A 42

Duty cycle measurement and average factor determination @ 2.0 Mbit/s



Minimum 8 times t_{off} in 100 msec.
The worst case of duty cycle is (100-8*0. 0983)/100=0.992
Average factor=20*log(0.992)=-0.07 dB

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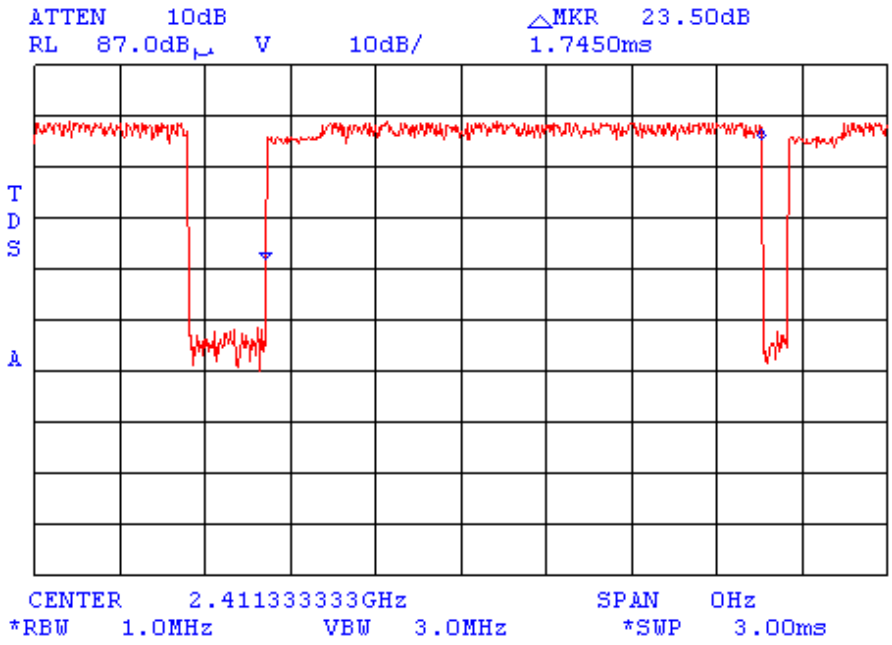
Plot A 43

Duty cycle measurement and average bandwidth determination @ 5.5 Mbit/s, Ton duration



t_{on}=1.745 msec
VBW≥1/t_{on}=1/1.745 msec=573 Hz

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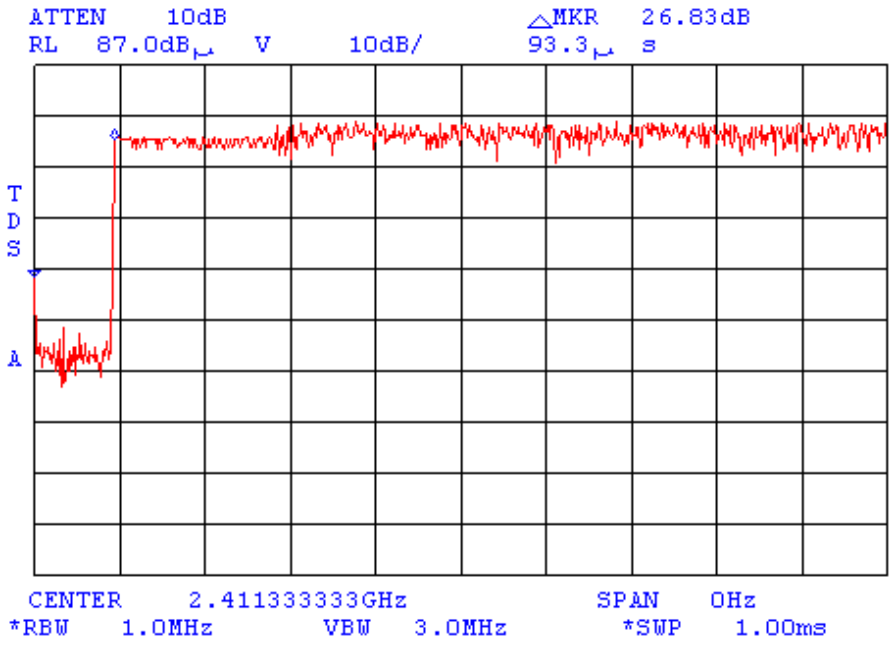
Plot A 44

Duty cycle measurement and average bandwidth determination @ 5.5 Mbit/s, Toff duration



minimum t_{off}=0.0933 msec

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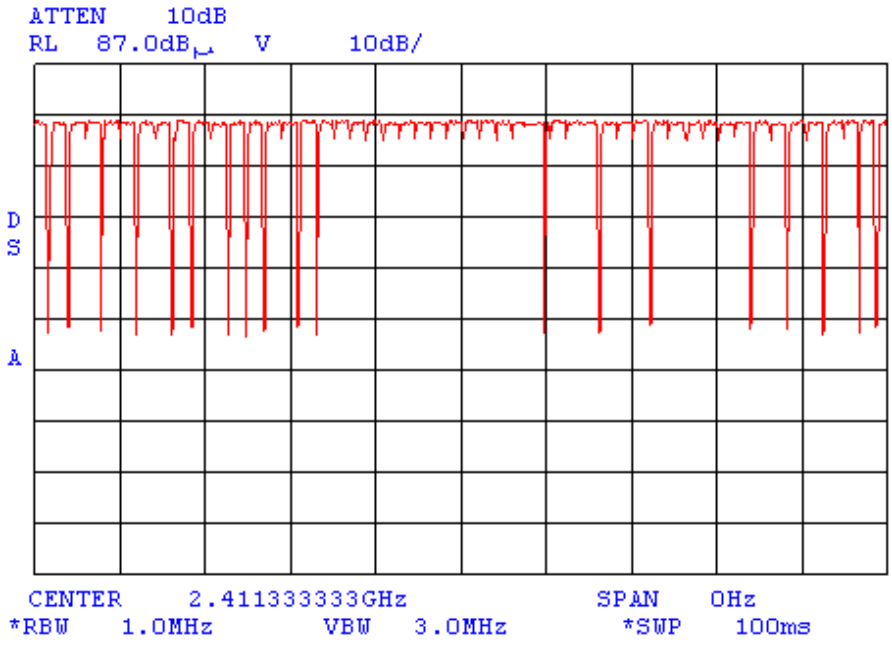
Plot A 45

Duty cycle measurement and average factor determination @ 5.5 Mbit/s



Minimum 19 times t_{off} in 100 msec.
The worst case of duty cycle is (100-19*0. 0933)/100=0.982
Average factor=20*log(0.982)= -0.16 dB

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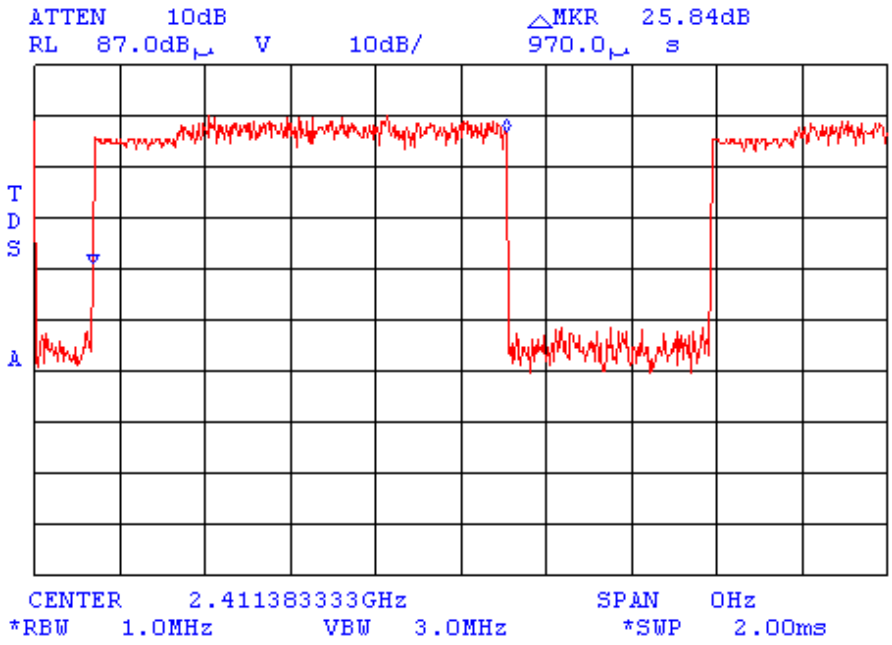
Plot A 46

Duty cycle measurement and average bandwidth determination @ 11.0 Mbit/s, Ton duration



t_{on}=0.97 msec
VBW≥1/t_{on}=1/0.97 msec=1.03 kHz

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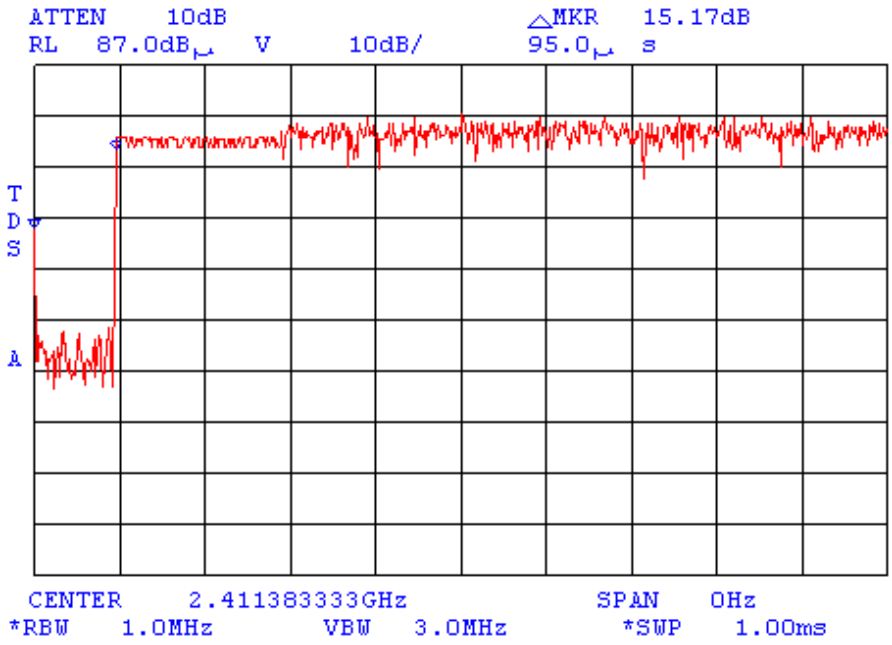
Plot A 47

Duty cycle measurement and average bandwidth determination @ 11.0 Mbit/s, Toff duration



Minimum t_{off}=0.095 msec

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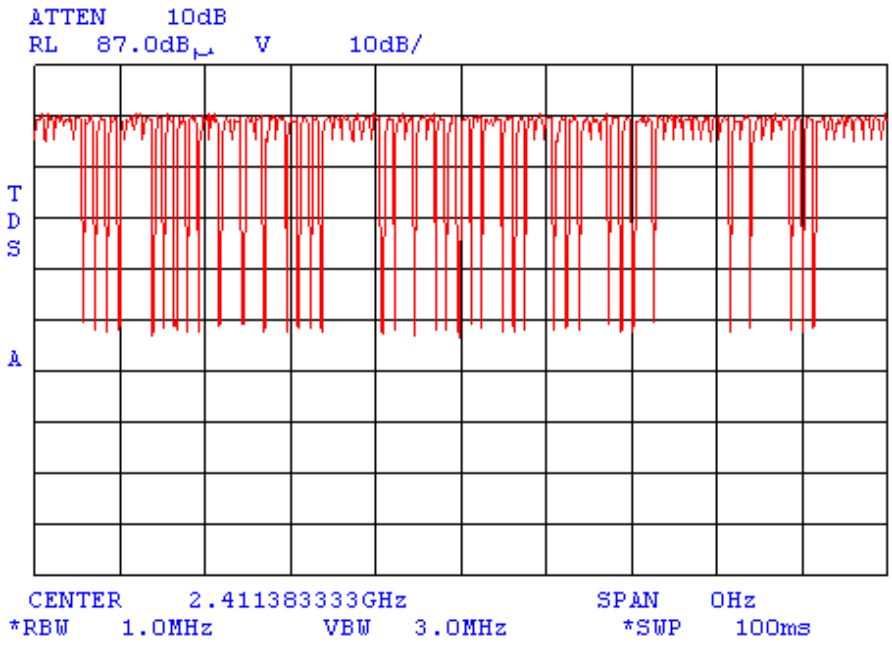
Plot A 48

Duty cycle measurement and average factor determination @ 11.0 Mbit/s



Minimum 39 times t_{off} in 100 msec.
The worst case of duty cycle is (100-39*0.095)/100=0.963
Average factor=20*log(0.989)= -0.33 dB

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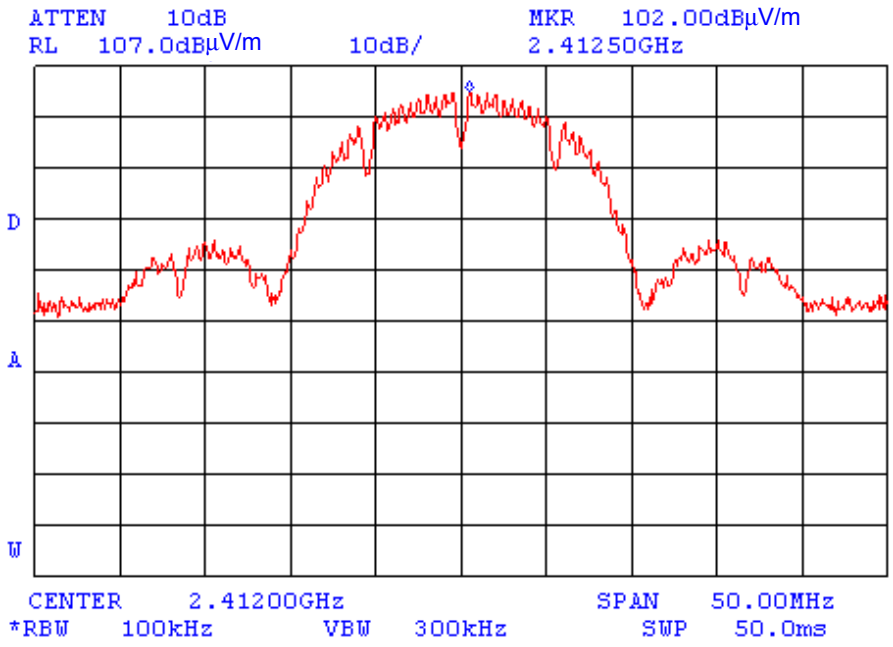
Plot A 49

In-band emission measurements @ 2.412 MHz carrier at the OATS, 1 Mbit/s



The maximum E=102 dBuV/m was found with vertical polarization of antenna

Limit for spurious=102 dB(µV/m) – 20 dB = 82 dB(µV/m)

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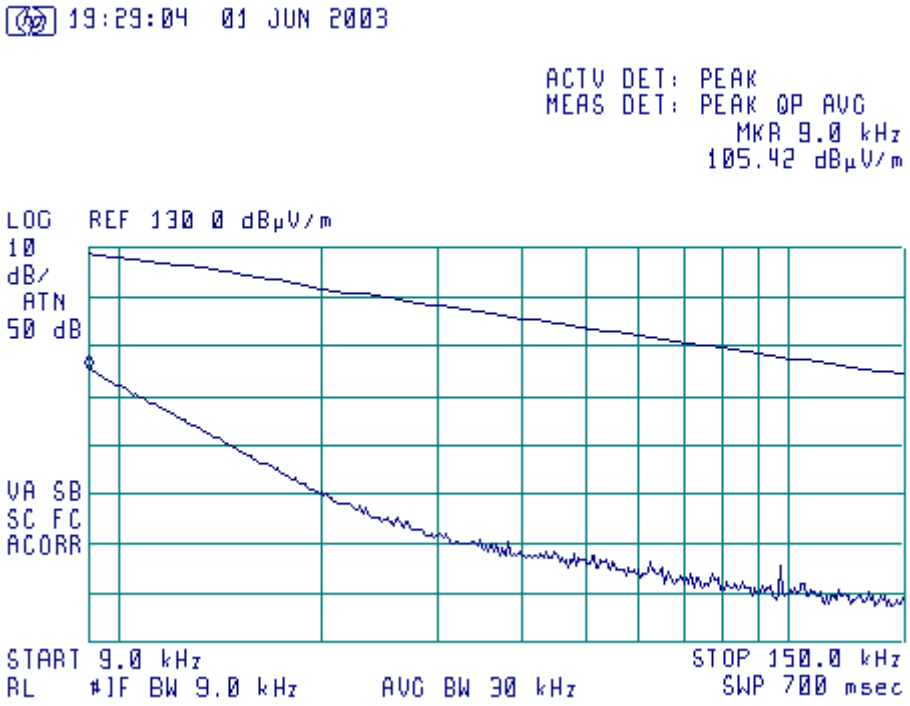
Plot A 50

Spurious emission measurements in 9 kHz – 150 kHz range in the anechoic chamber, carrier frequency 2412 MHz, 1 Mbit/s



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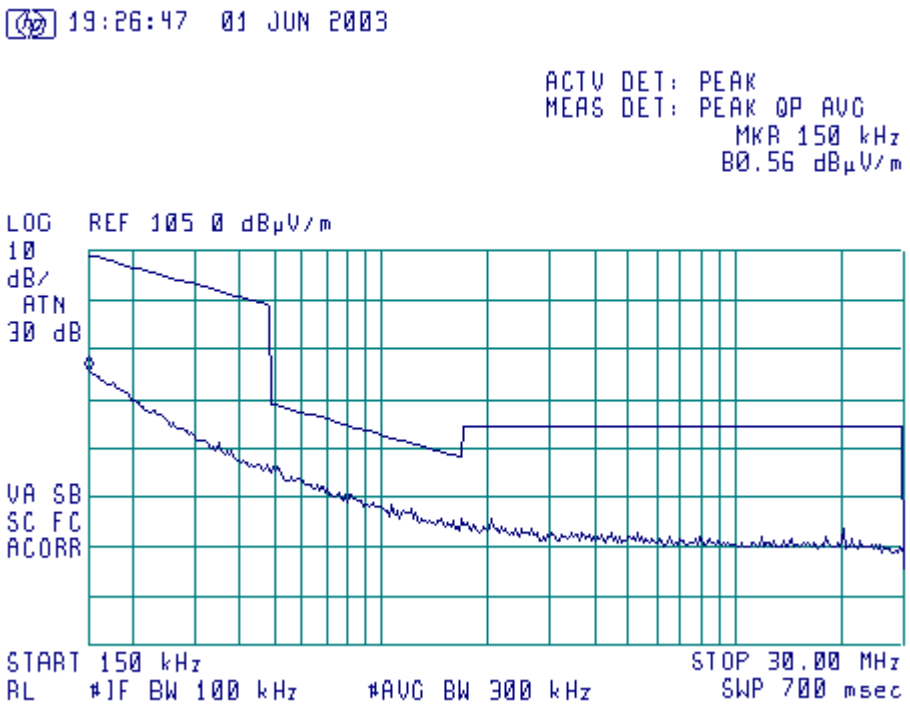
Plot A 51

Spurious emission measurements in 150 kHz – 30 MHz range in the anechoic chamber, carrier frequency 2412 MHz, 1 Mbit/s



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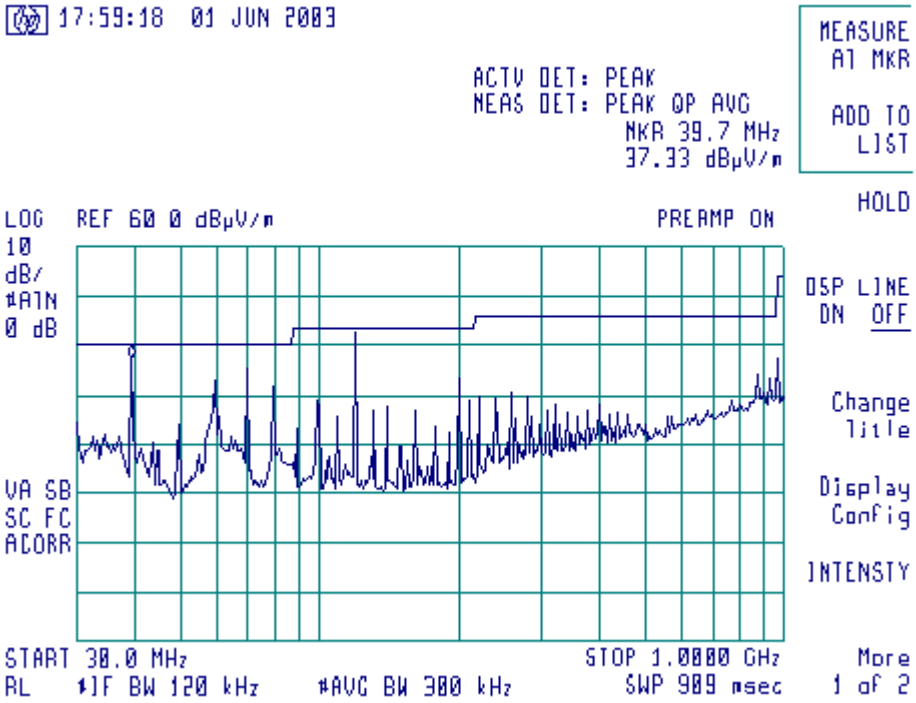
Plot A 52

Spurious emission measurements in 30 MHz – 1000 MHz range in the anechoic chamber, carrier frequency 2412 MHz, 1 Mbit/s

Vertical polarization



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB
40.00	36.9	34.2	40.0	5.8
120.00	42.9	42.1	43.50	1.4

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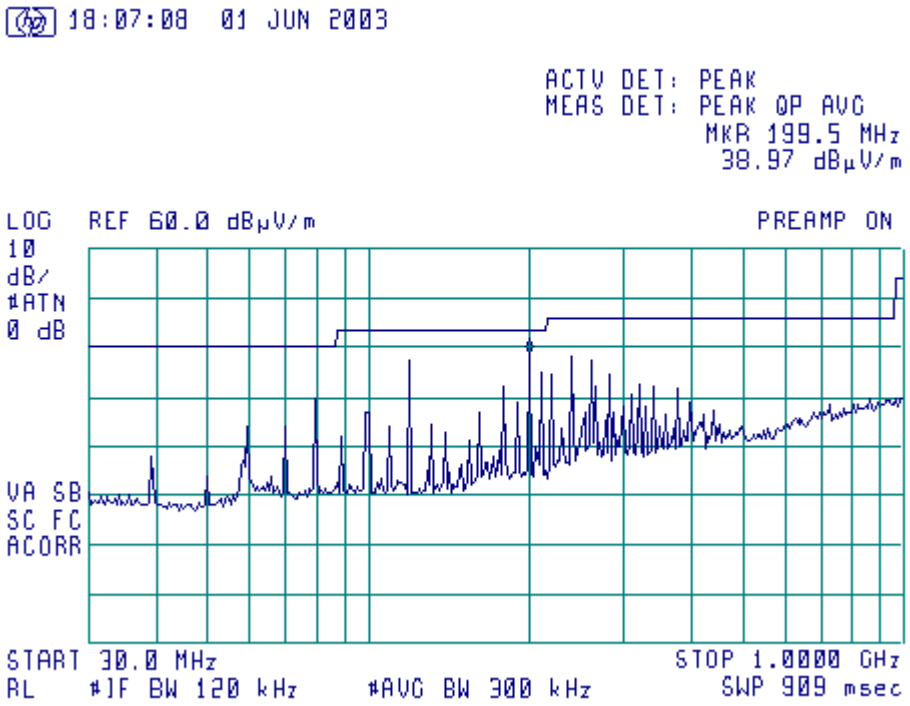
Plot A 53

Spurious emission measurements in 30 MHz – 1000 MHz range in the anechoic chamber, carrier frequency 2412 MHz, 1 Mbit/s

Horizontal polarization



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB
120.00	39.6	39.2	43.5	4.3
200.00	41.6	40.6	43.50	2.9

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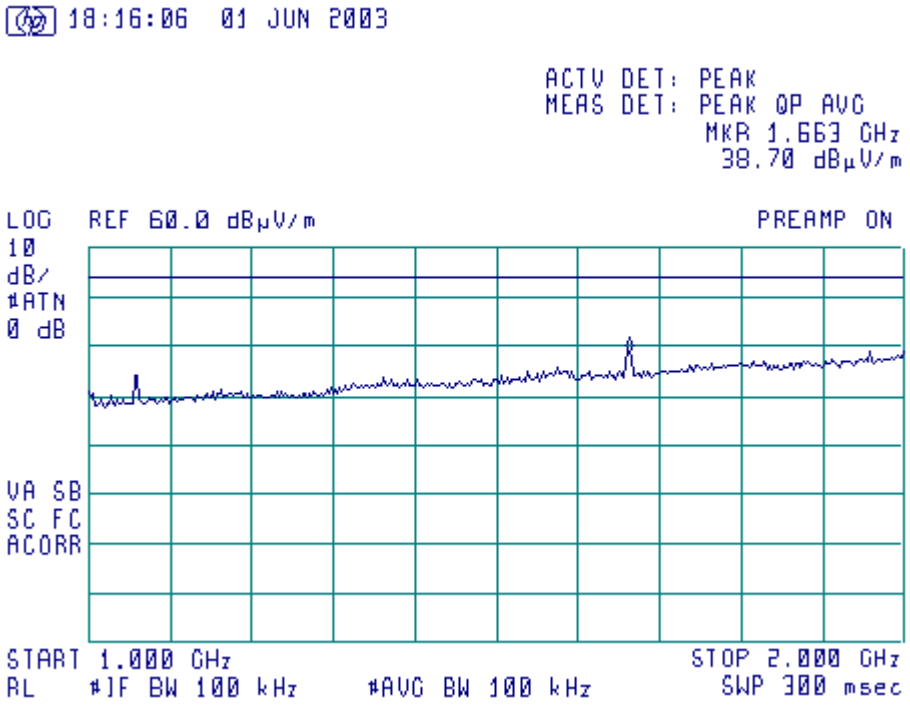
Plot A 54

Spurious emission measurements in 1000 MHz – 2000 MHz range in the anechoic chamber, carrier frequency 2412 MHz, 1 Mbit/s



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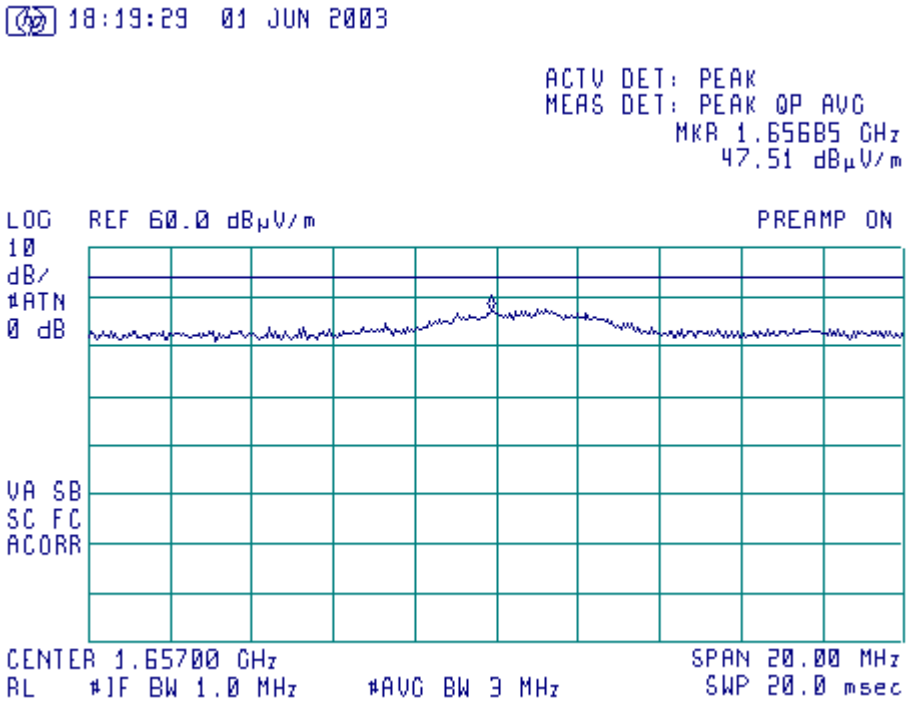
Plot A 55

**Spurious emission measurements in the anechoic chamber,
carrier frequency 2412 MHz, 1 Mbit/s**



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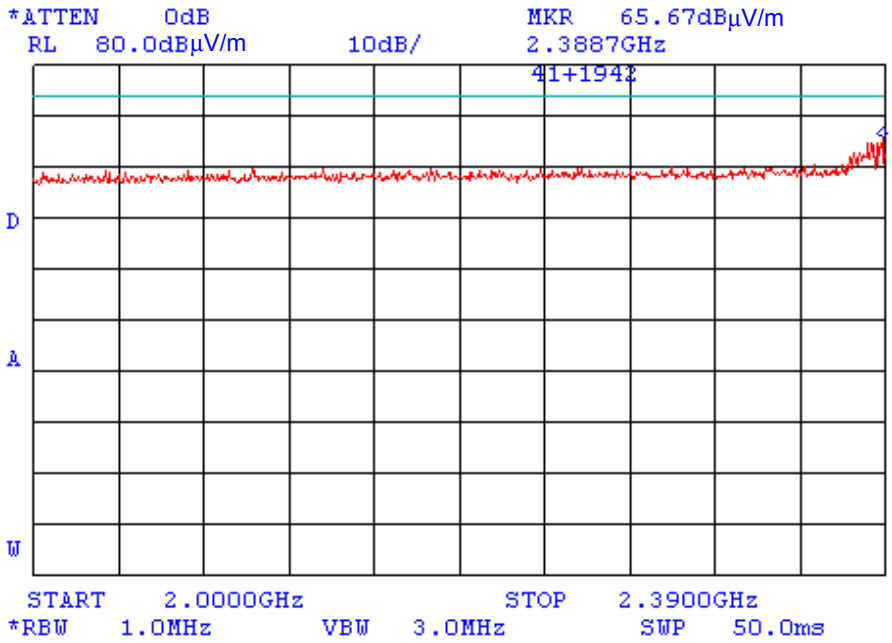
Plot A 56
Spurious emission measurements in 2000 MHz – 2390 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35

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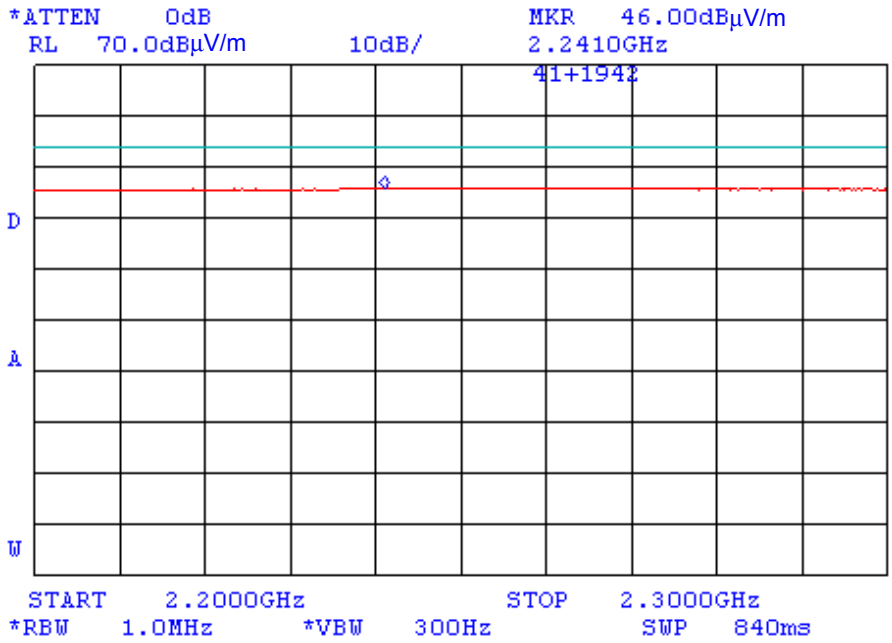
Plot A 57

Spurious emission measurements in 2200 MHz –2300 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 46.00 dB(µV/m)

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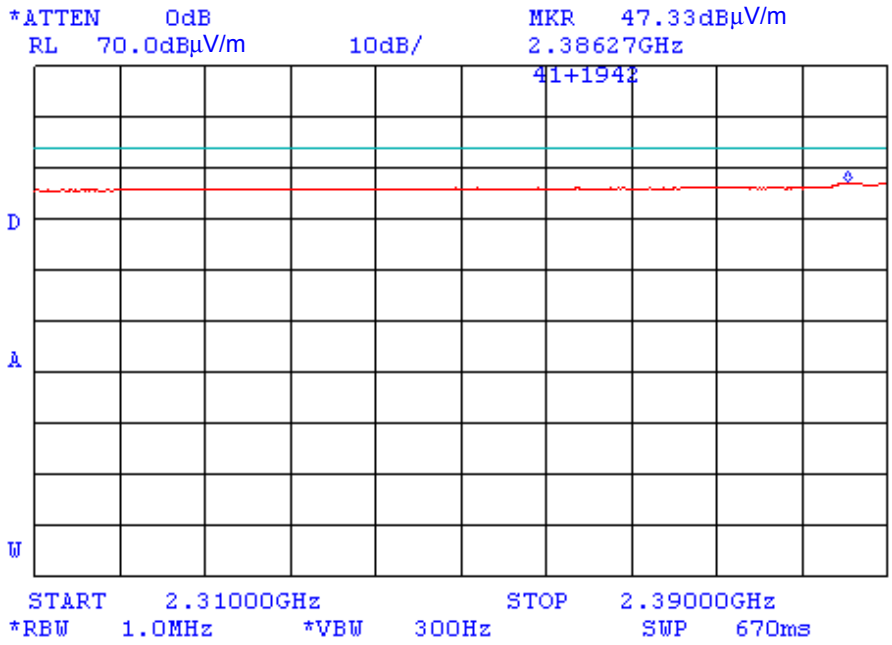
Plot A 58

Spurious emission measurements in 2483 MHz – 2500 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 47.33 dB(µV/m)

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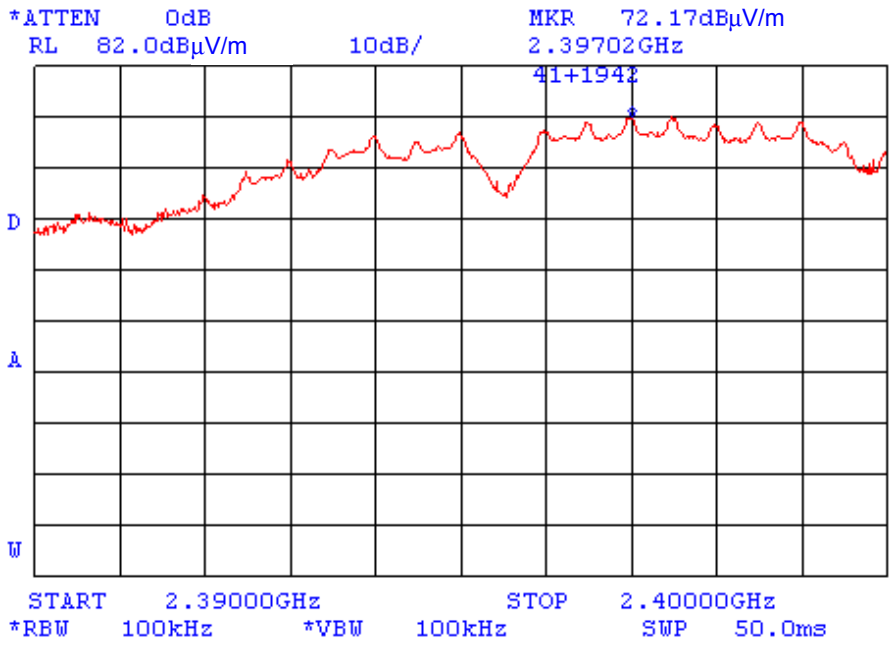
Plot A 59

Spurious emission measurements in 2390 MHz – 2400 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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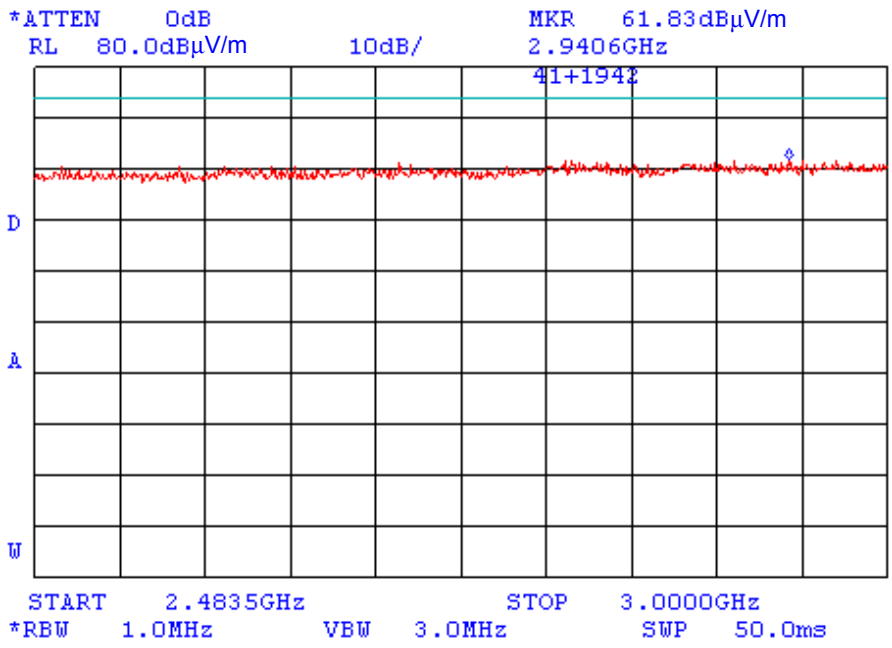
Plot A 60

Spurious emission measurements in 2483.5 MHz – 3000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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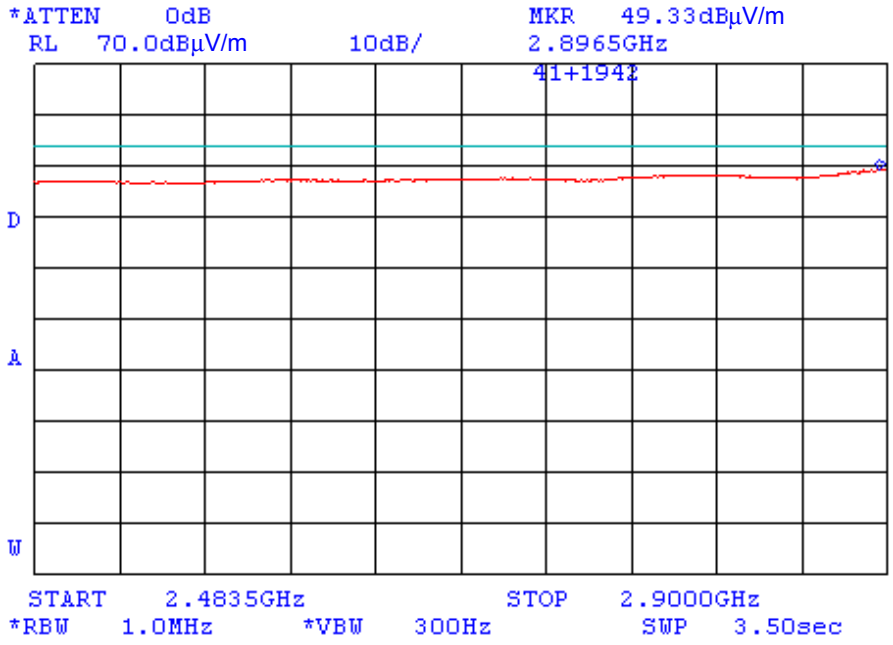
Plot A 61

Spurious emission measurements in 2483.5 MHz – 2900 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 49.33 dB(µV/m)

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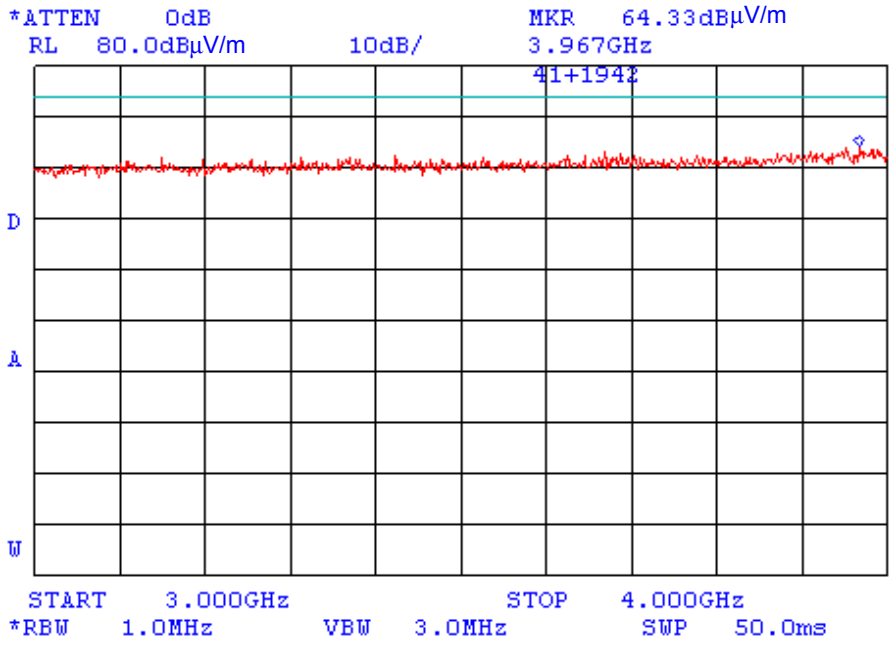
Plot A 62

Spurious emission measurements in 3000 MHz – 4000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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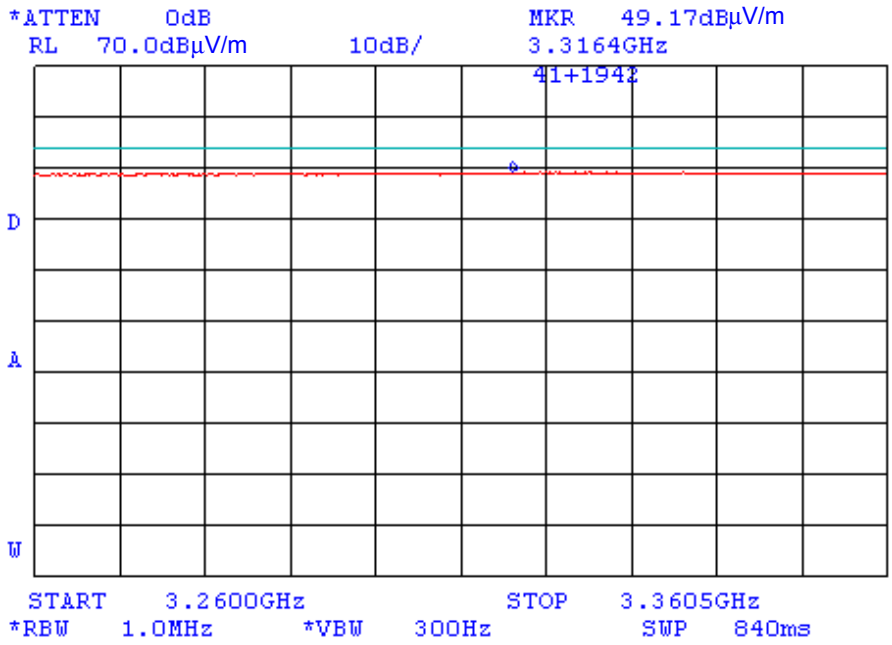
Plot A 63

**Spurious emission measurements at the OATS,
carrier frequency 2412 MHz, 1 Mbit/s**



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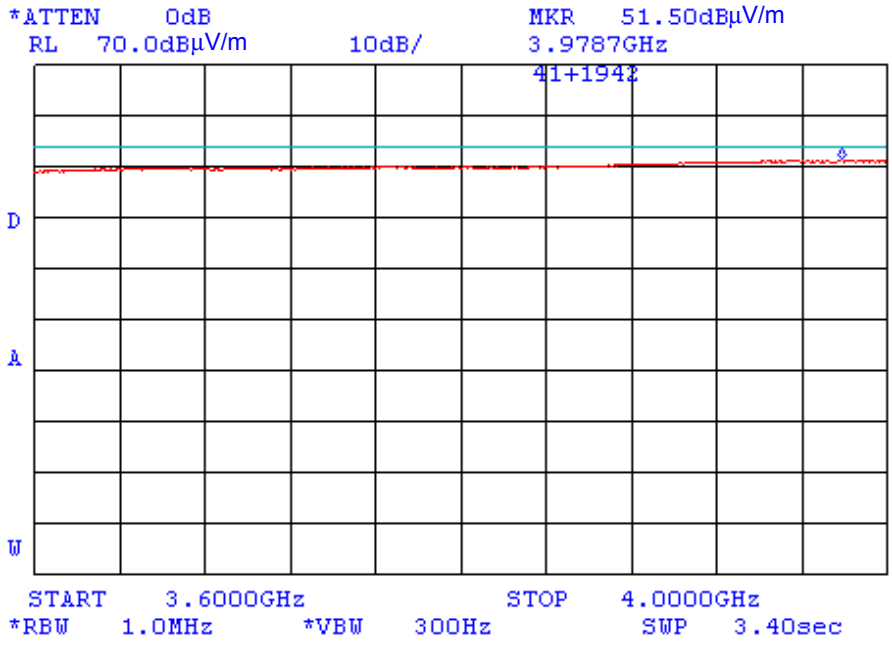
Plot A 64

Spurious emission measurements in 3600 MHz – 4000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 51.50 dB(µV/m)

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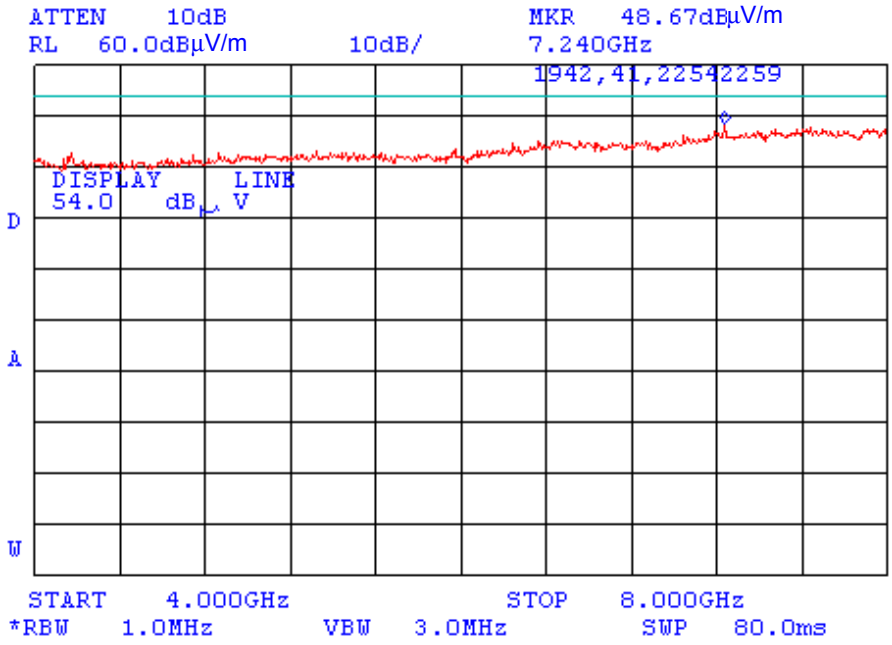
Plot A 65

Spurious emission measurements in 4000 MHz – 8000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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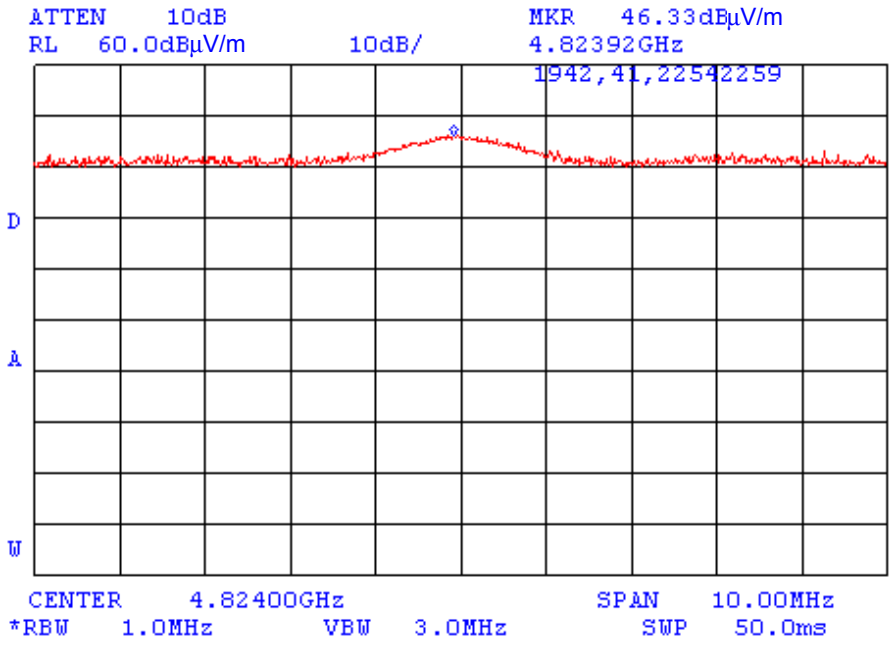
Plot A 66

**Spurious emission measurements at the OATS,
carrier frequency 2412 MHz, 1 Mbit/s**



The 2nd harmonic of fundamental.
The maximum was found with vertical polarization of antenna.
E(peak)=46.33 dB(uV/m) < peak limit = 74 dB(uV/m)
average limit = 54 dB(uV/m)

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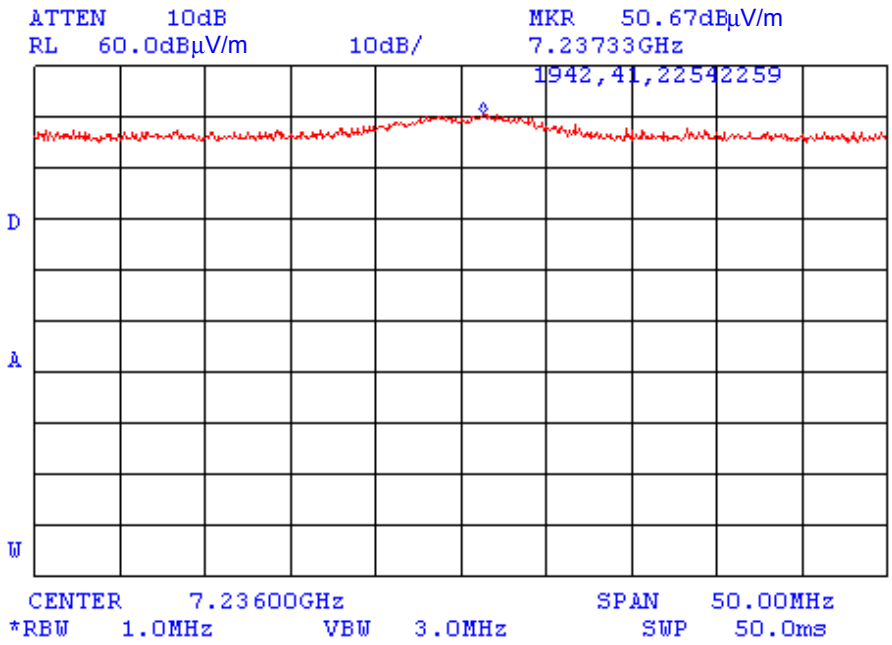
Plot A 67

**Spurious emission measurements at the OATS,
carrier frequency 2412 MHz, 1 Mbit/s**



The 3rd harmonic of fundamental.
The maximum was found with vertical polarization of antenna.
E(peak)=50.67 dB(uV/m) < 82 dB(uV/m)

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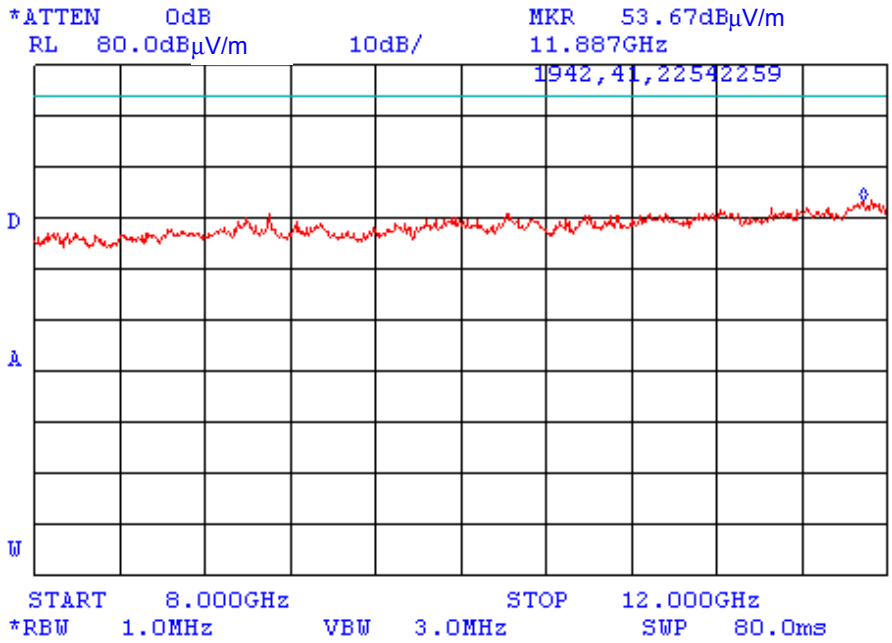
Plot A 68

Spurious emission measurements in 8000 MHz – 12000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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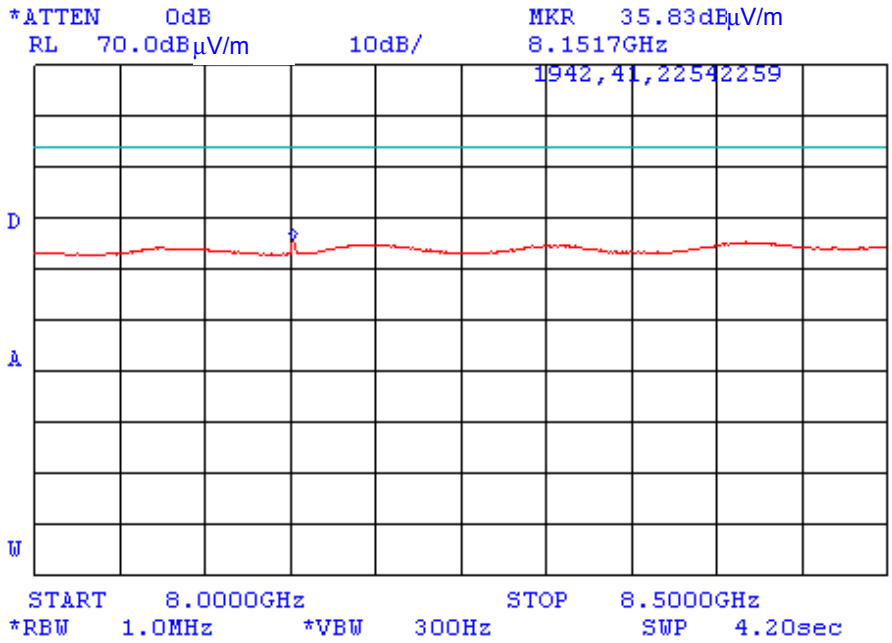
Plot A 69

Spurious emission measurements in 8000 MHz – 8500 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 35.83 dB(µV/m)

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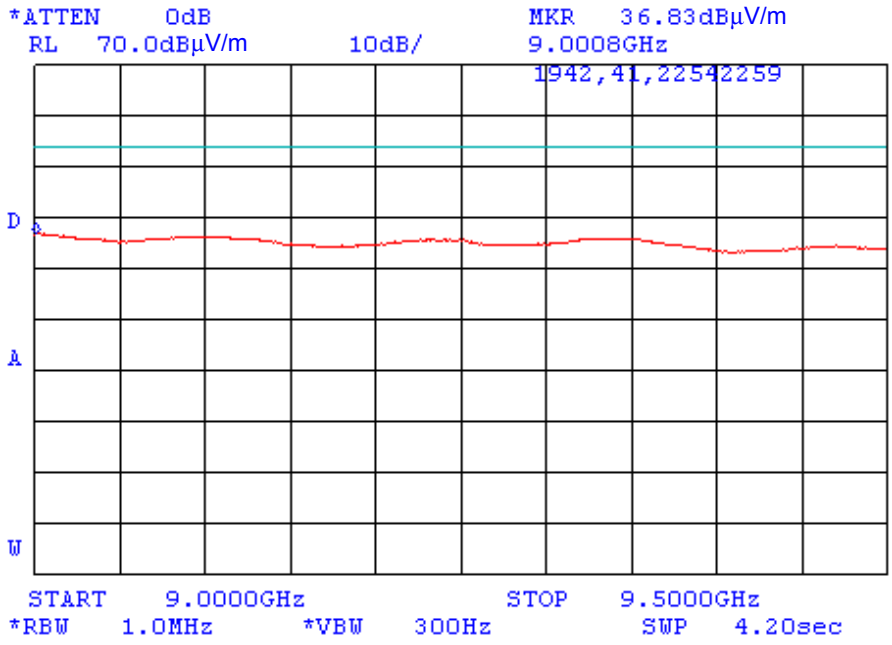
Plot A 70

Spurious emission measurements in 9000 MHz – 9500 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 36.83 dB(µV/m)

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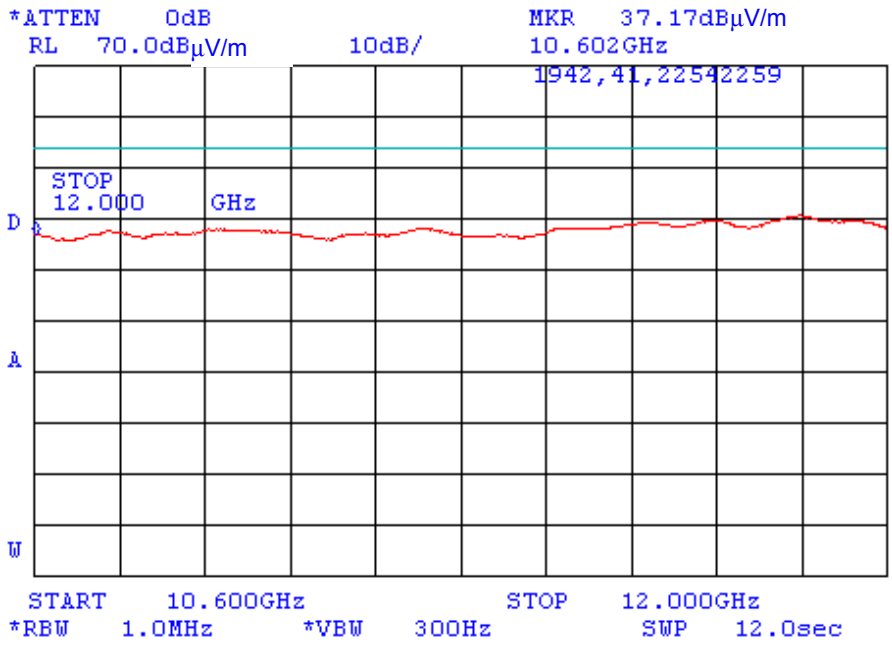
Plot A 71

Spurious emission measurements in 10600 MHz – 12000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 37.17 dB(µV/m)

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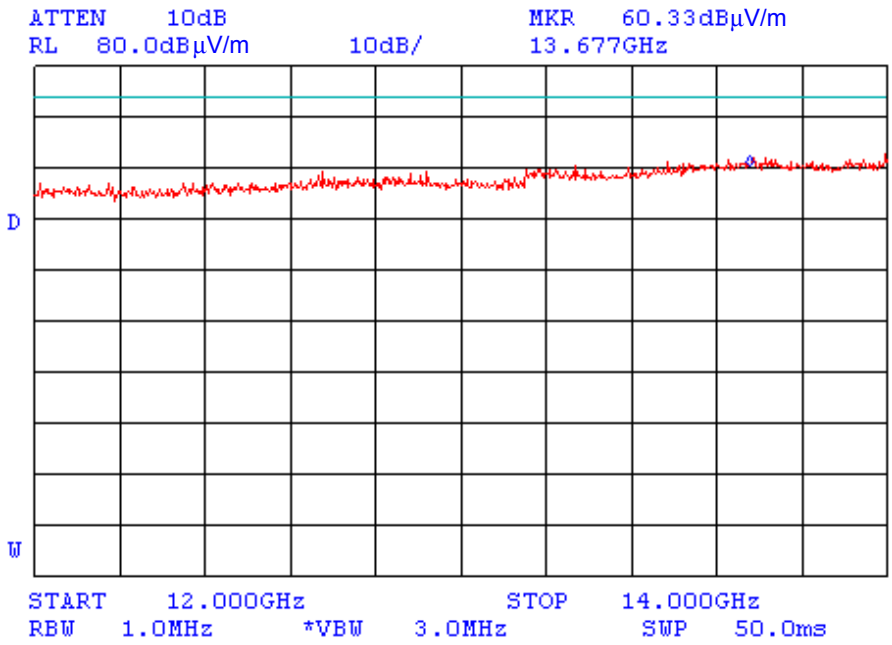
Plot A 72

Spurious emission measurements in 12000 MHz – 14000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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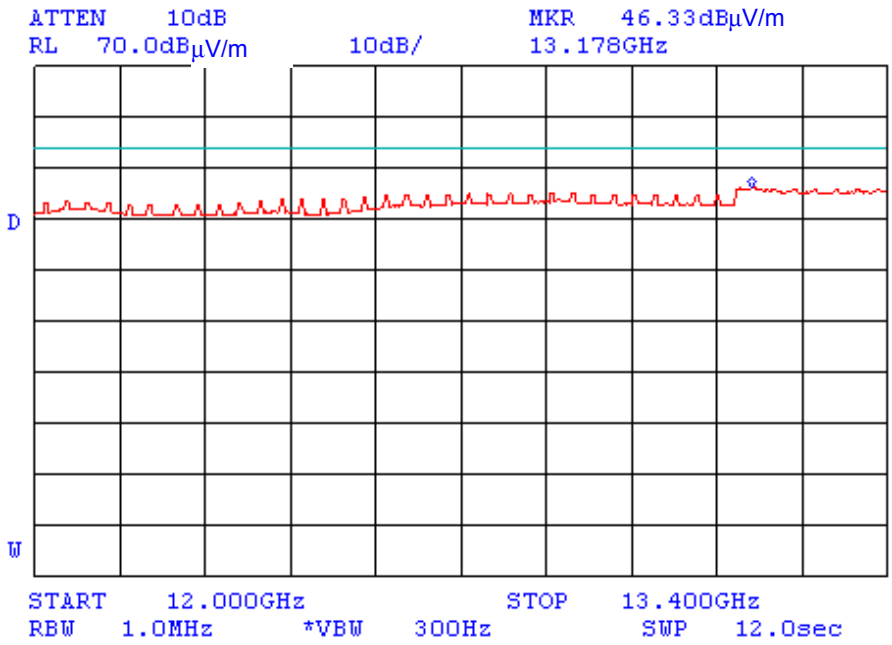
Plot A 73

Spurious emission measurements 12000 MHz – 13400 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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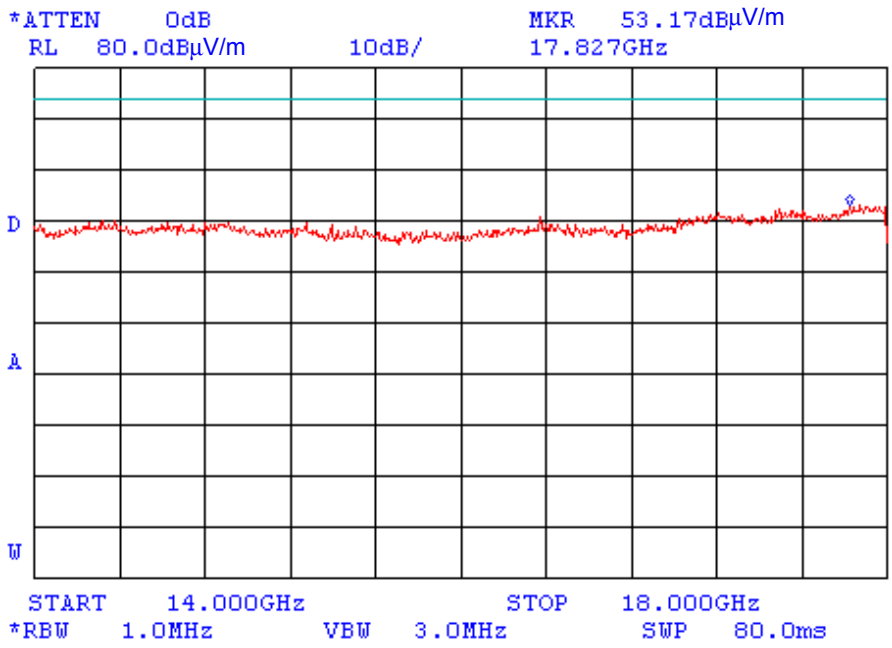
Plot A 74

Spurious emission measurements in 14000 MHz – 18000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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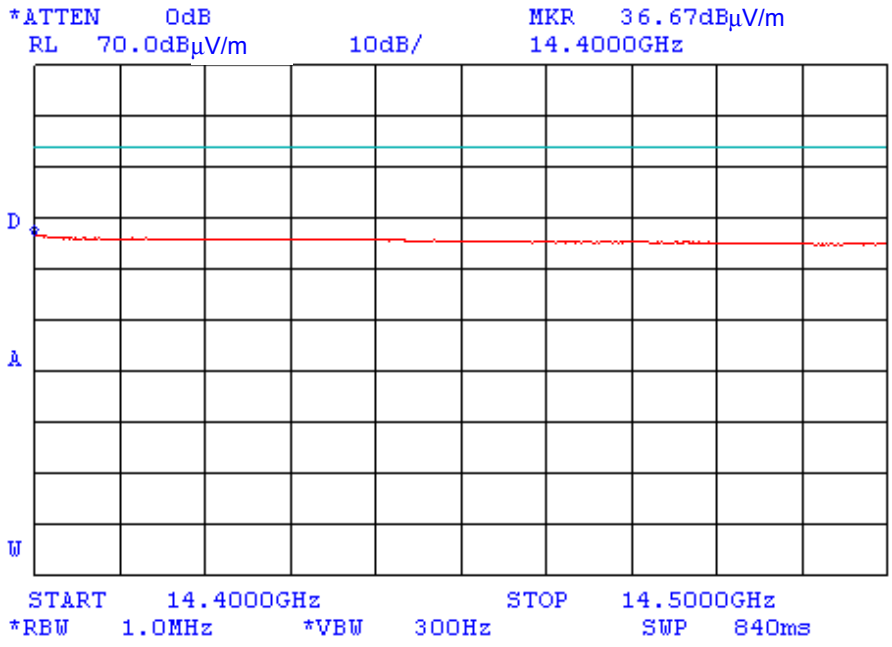
Plot A 75

Spurious emission measurements in 14400 MHz – 14500 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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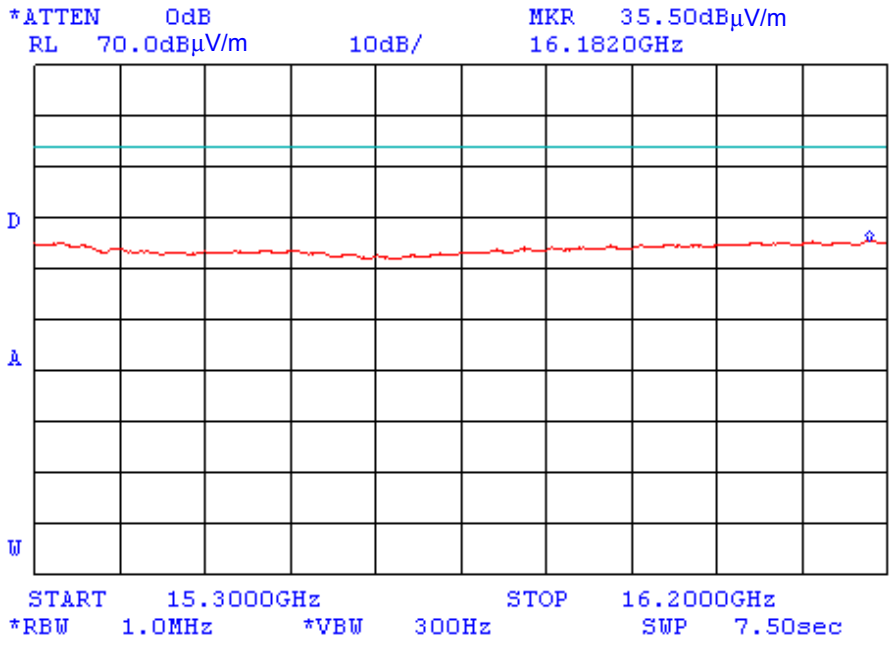
Plot A 76

Spurious emission measurements in 15300 MHz – 16200 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 35.50 dB(µV/m)

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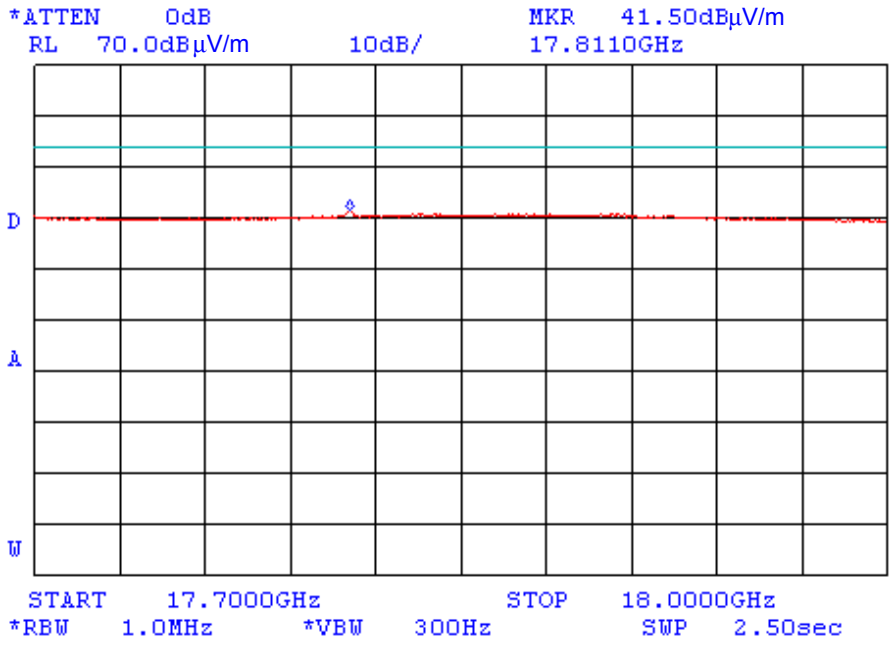
Plot A 77

Spurious emission measurements in 17700 MHz – 18000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 41.50 dB(µV/m)

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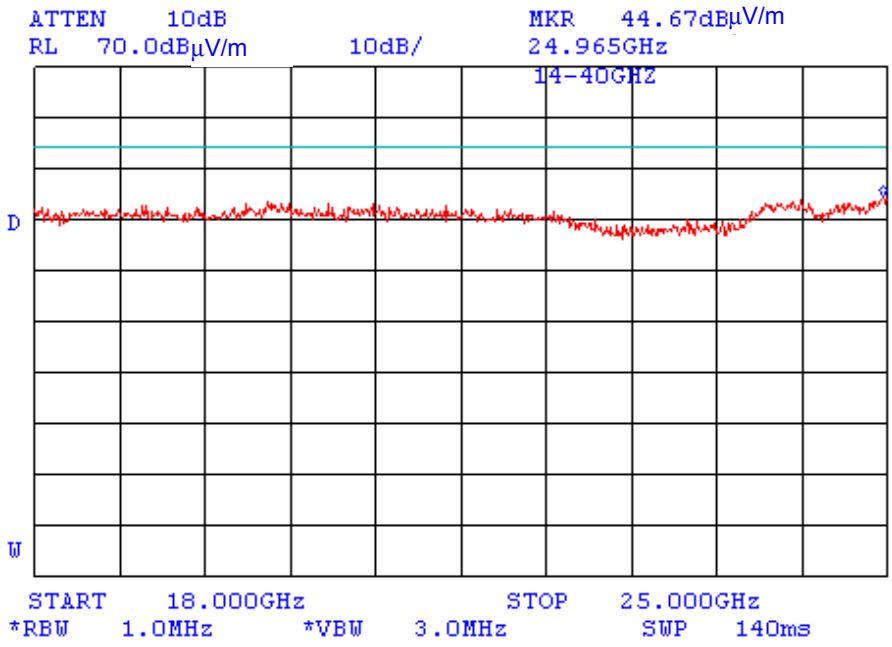
Plot A 78

Spurious emission measurements in 18000 MHz - 25000 MHz range at the OATS, carrier frequency 2412 MHz, 1 Mbit/s



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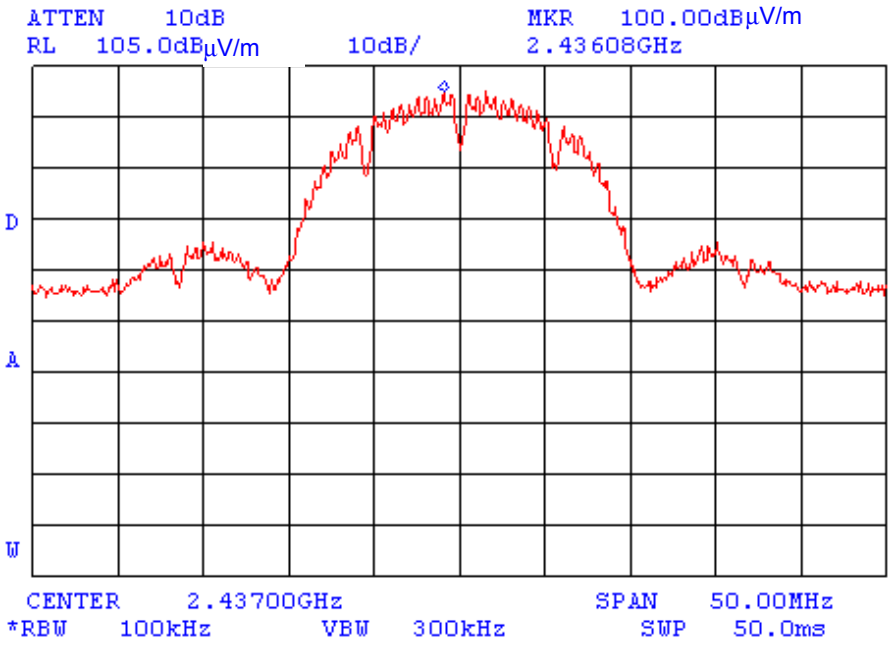
Plot A 79

In-band emission measurements @ 2.437 MHz carrier at the OATS, 1 Mbit/s



The maximum E=100 dB(uV/m) was found with vertical polarization of antenna.
Limit for spurious=100.0 dB(µV/m) – 20 dB = 80.0 dB(µV/m)

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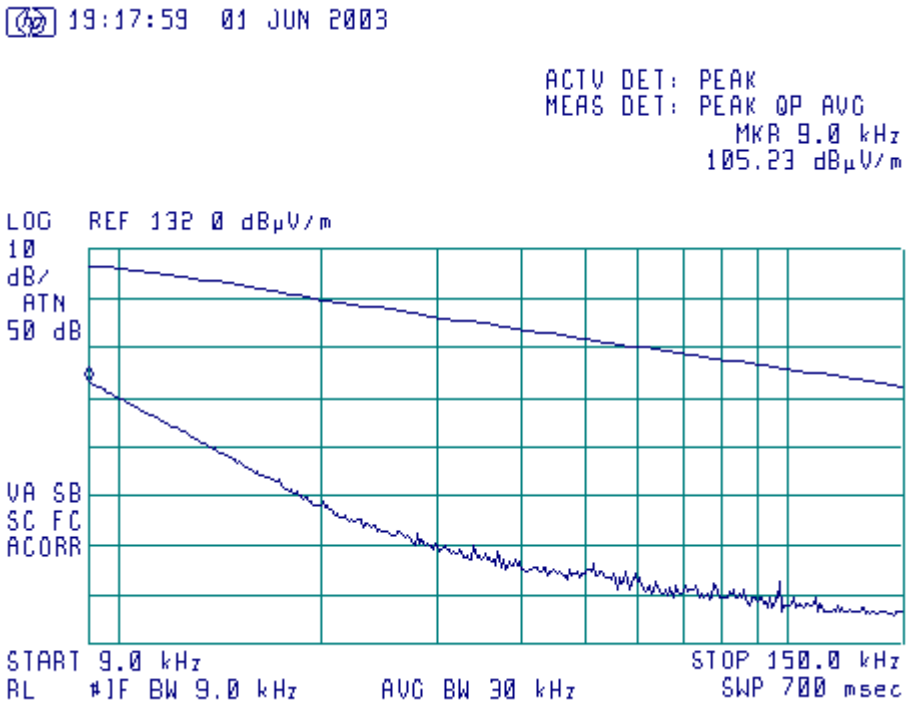
Plot A 80

Spurious emission measurements in 9 kHz – 150 kHz range in the anechoic chamber, carrier frequency 2437 MHz, 1 Mbit/s



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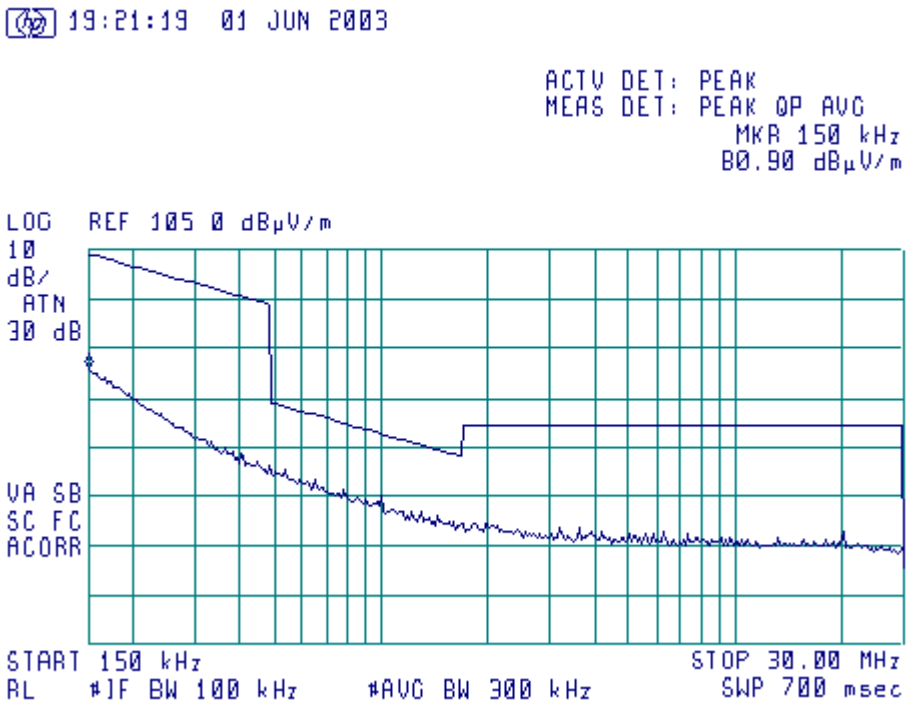
Plot A 81

Spurious emission measurements in 150 kHz – 30 MHz range in the anechoic chamber, carrier frequency 2437 MHz, 1 Mbit/s



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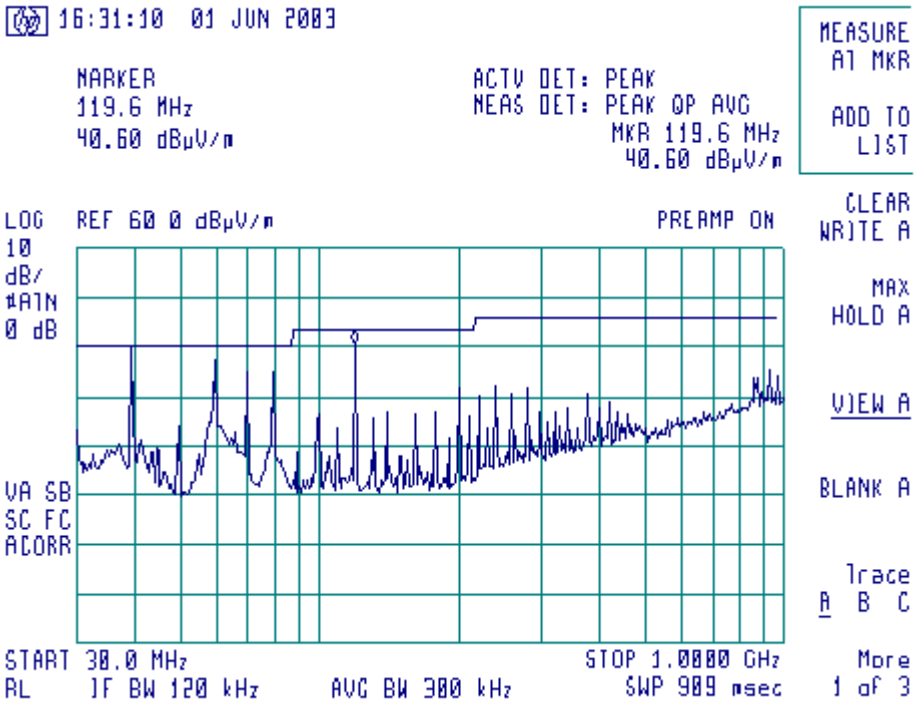
Plot A 82

Spurious emission measurements 30 MHz –1000 MHz range in the anechoic chamber, carrier frequency 2437 MHz, 1 Mbit/s

Vertical polarization



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB
40.00	38.8	38.1	40.0	1.9
60.00	36.1	32.3	40.0	7.7
80.00	35.4	33.9	40.0	6.1
120.00	39.59	38.88	43.50	4.62
239.99	32.09	30.41	46.00	15.59
259.99	33.63	32.04	46.00	13.96
280.00	32.38	30.47	46.00	15.53

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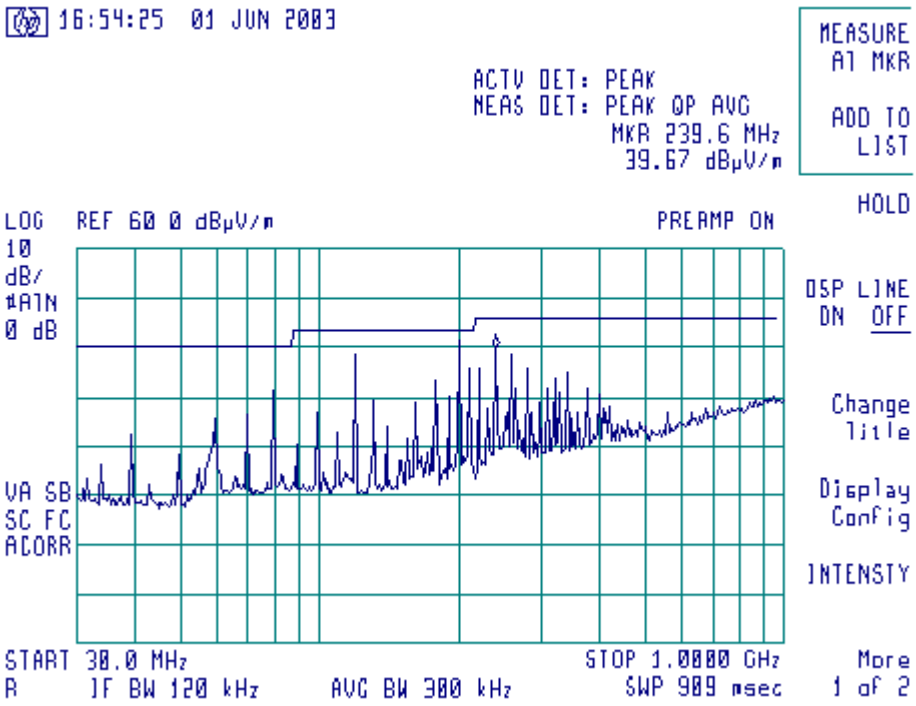
Plot A 83

Spurious emission measurements in 30 MHz –1000 MHz in the anechoic chamber, carrier frequency 2437 MHz, 1 Mbit/s

Horizontal polarization



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB
120.010400	38.04	37.52	43.50	5.98
240.001000	41.19	39.50	46.00	6.50
259.990000	38.80	37.57	46.00	8.43
279.991200	36.57	35.27	46.00	10.73

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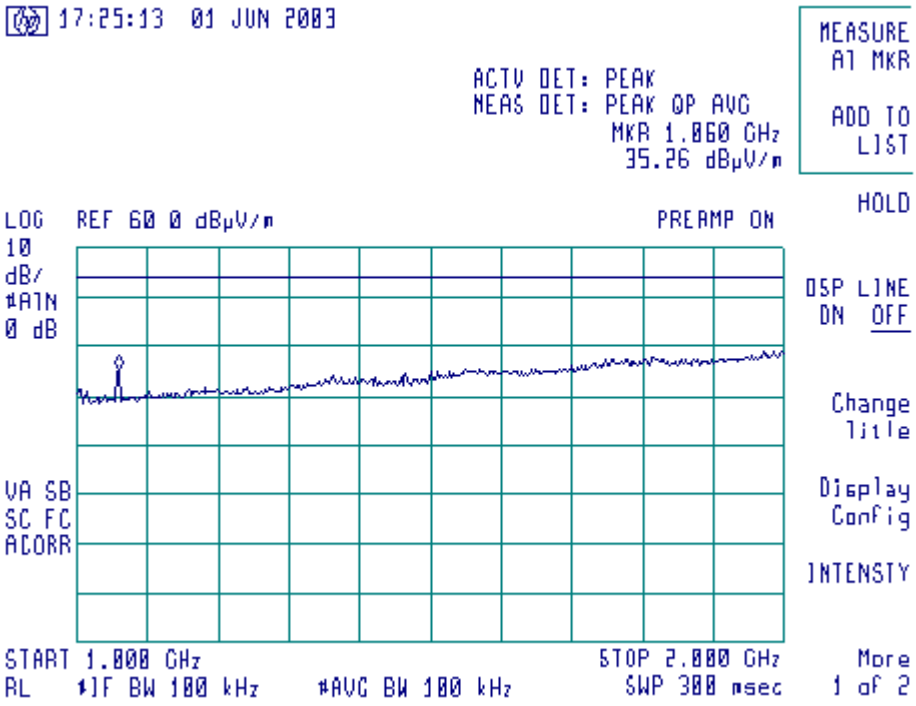
Plot A 84

Spurious emission measurements in 1000 MHz –2000 MHz in the anechoic chamber, carrier frequency 2437 MHz, 1 Mbit/s



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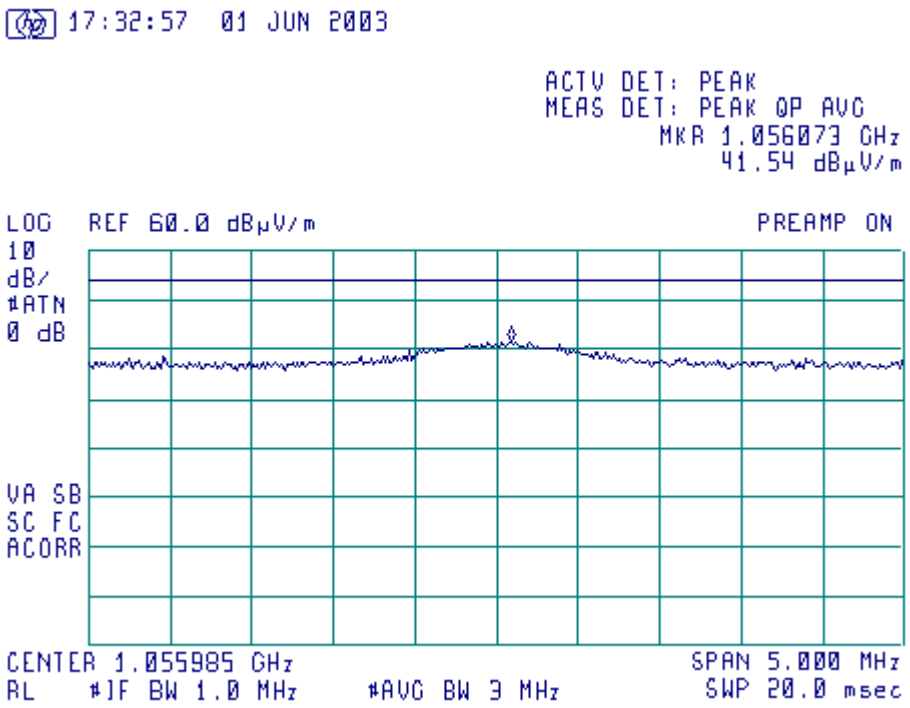
Plot A 85

**Spurious emission measurements in the anechoic chamber,
carrier frequency 2437 MHz, 1 Mbit/s**



RESTRICTED BAND
Limit: according to §15.209, 15.35

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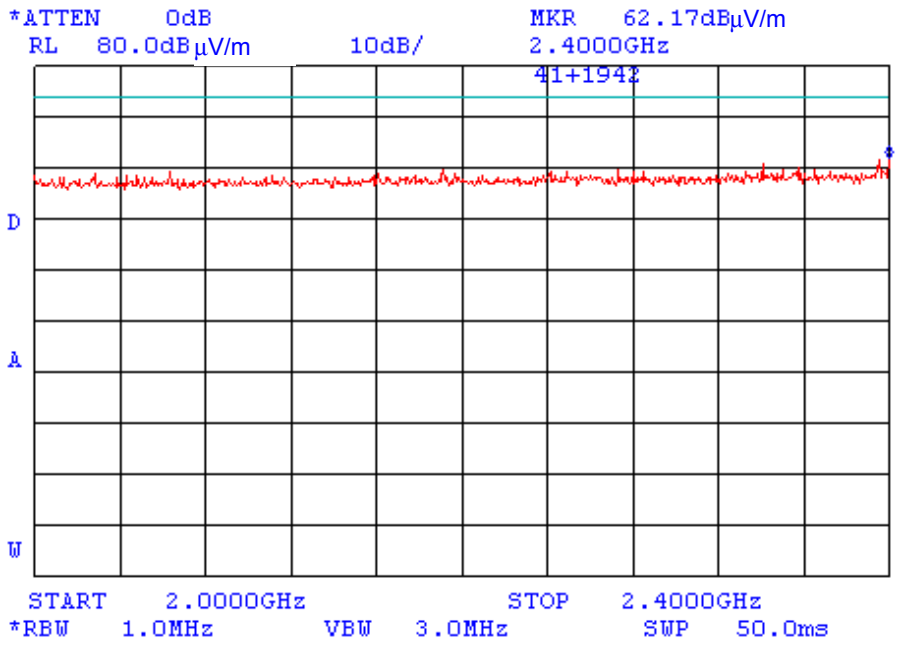
Plot A 86

Spurious emission measurements in 2000 MHz – 2400 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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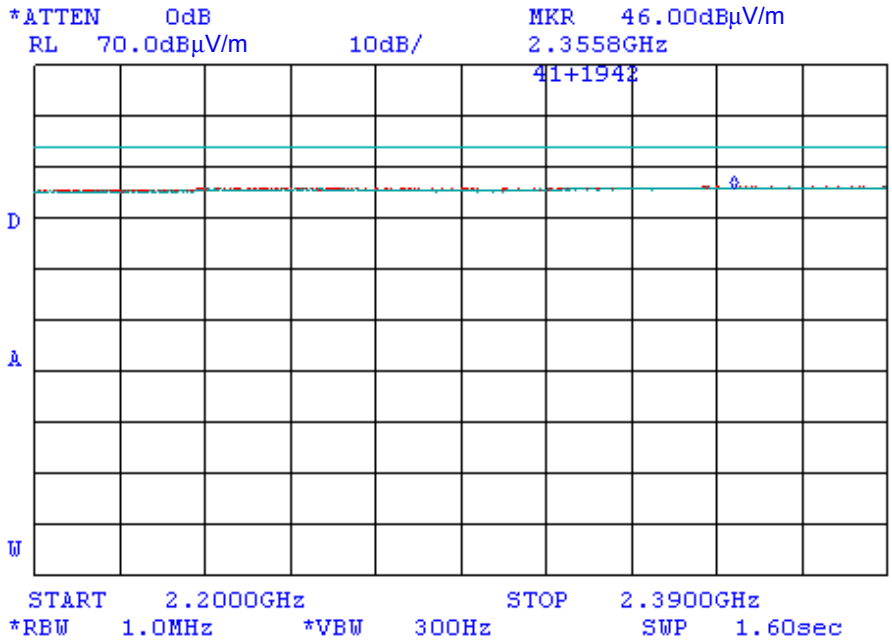
Plot A 87

Spurious emission measurements in 2200 MHz – 2390 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 46.00 dB(µV/m)

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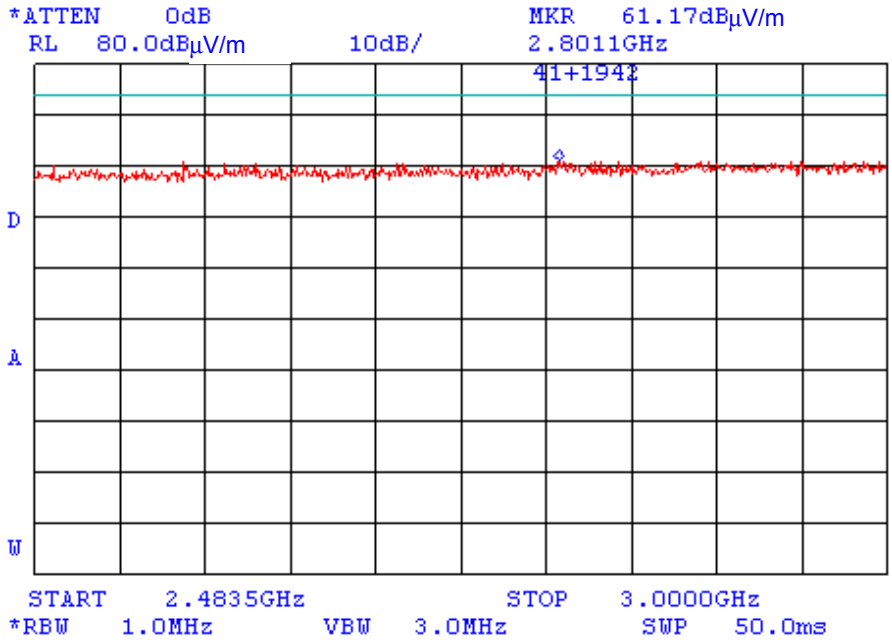
Plot A 88

Spurious emission measurements in 2483.5 MHz –3000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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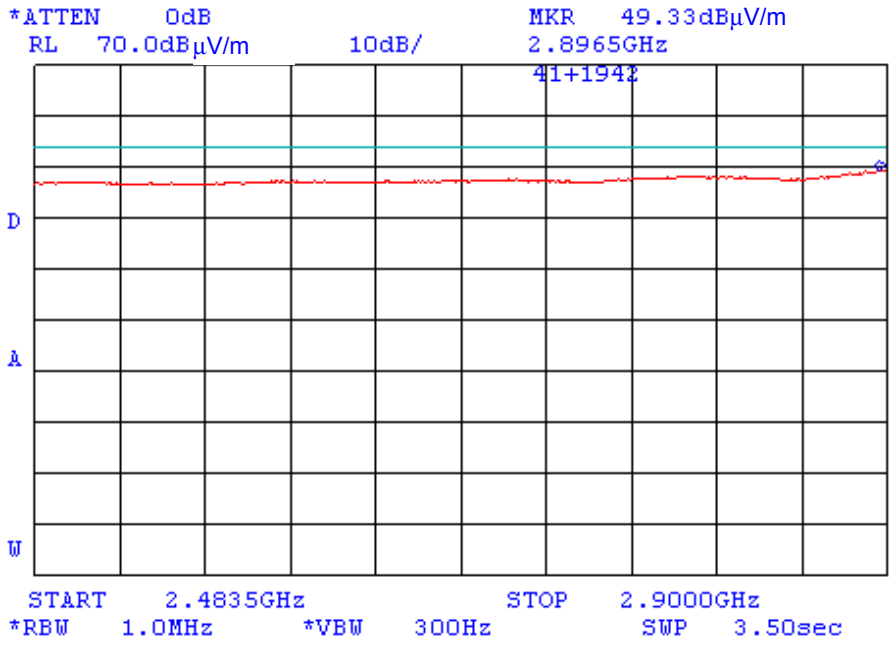
Plot A 89

Spurious emission measurements in 2483.5 MHz – 2900 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 49.33 dB(µV/m)

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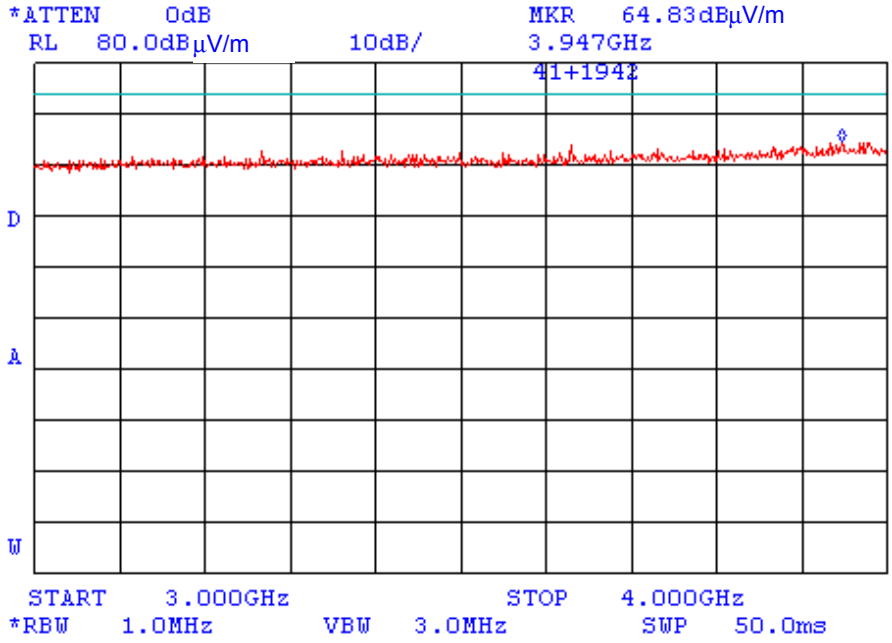
Plot A 90

Spurious emission measurements in 3000 MHz – 4000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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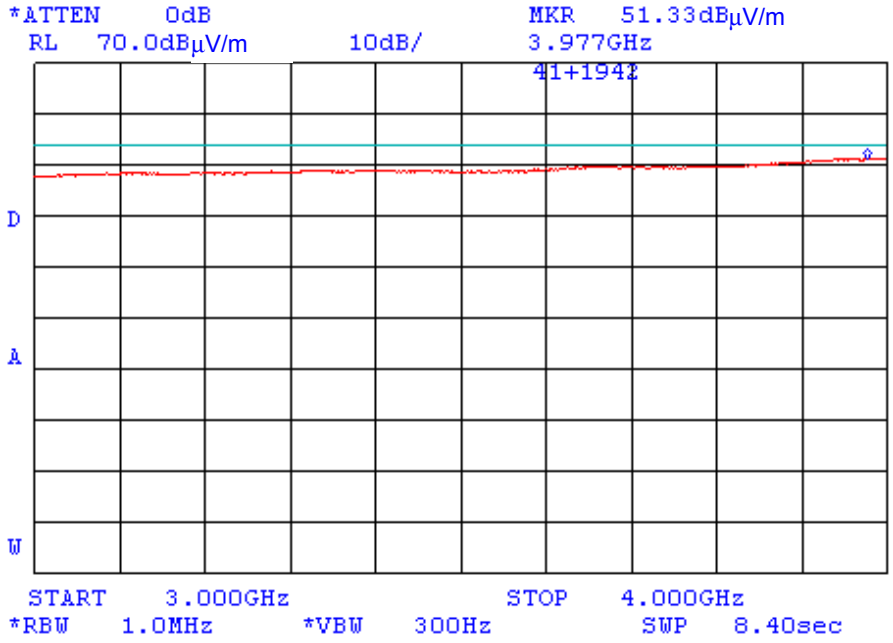
Plot A 91

Spurious emission measurements in 3000 MHz – 4000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 51.33 dB(µV/m)

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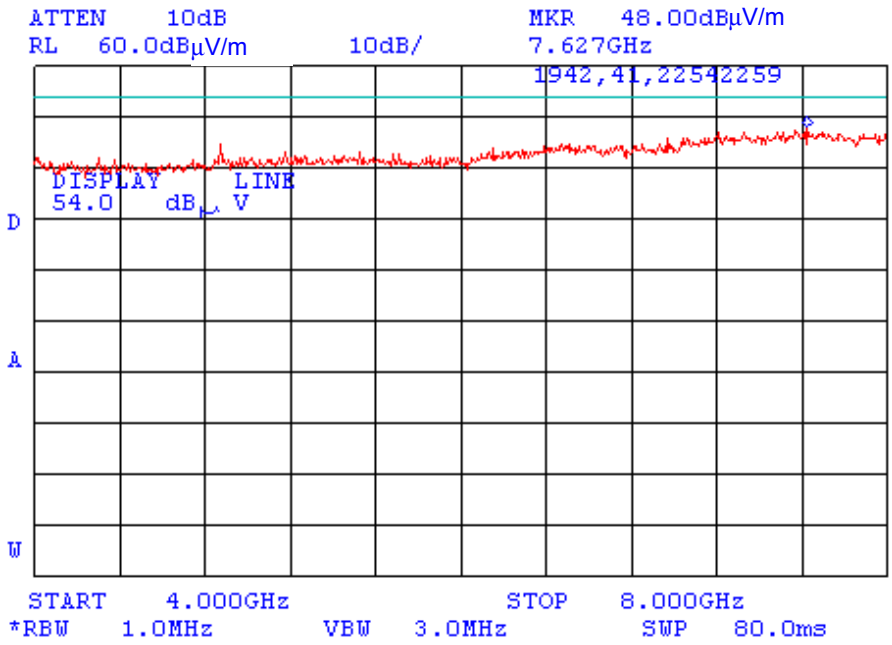
Plot A 92

Spurious emission measurements in 4000 MHz – 8000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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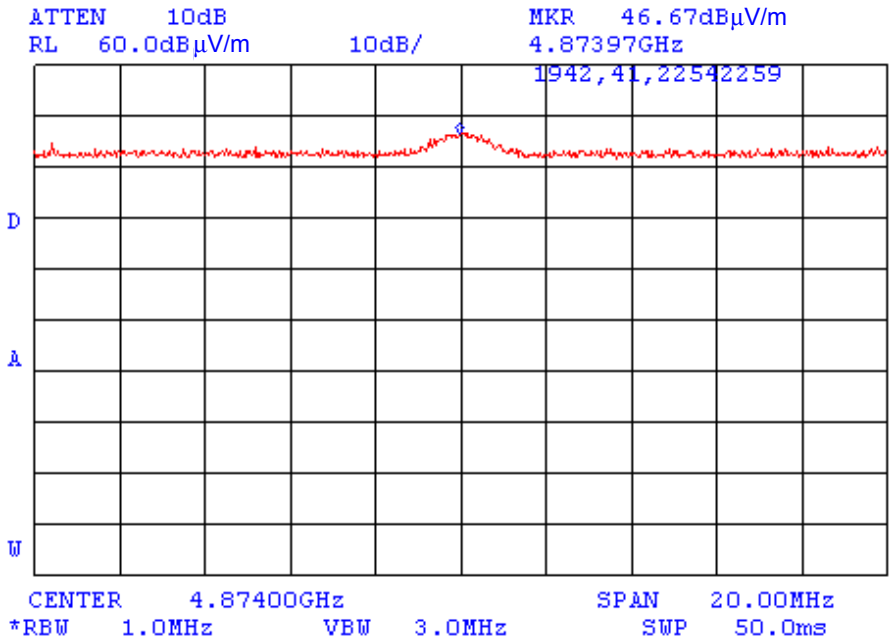
Plot A 93

**Spurious emission measurements at the OATS,
carrier frequency 2437 MHz, 1 Mbit/s**



The 2nd harmonic of fundamental.
The maximum was found with vertical polarization of antenna.
E(peak)=46.67 dBuV/m < peak limit =74 dB(uV/m);
< average limit =54 dB(uV/m)

The 3rd harmonic of fundamental was not found.

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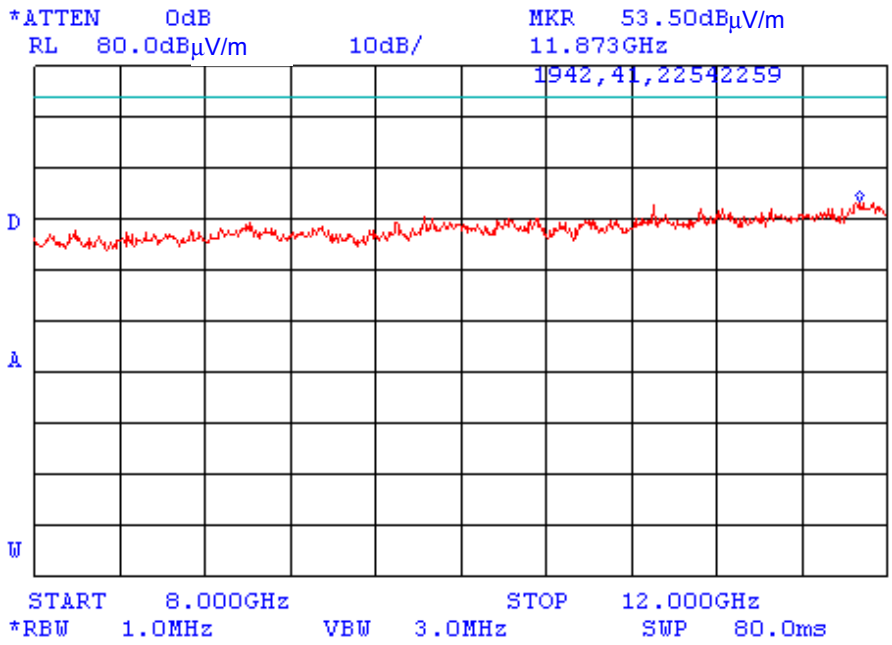
Plot A 94

Spurious emission measurements in 8000 MHz –12000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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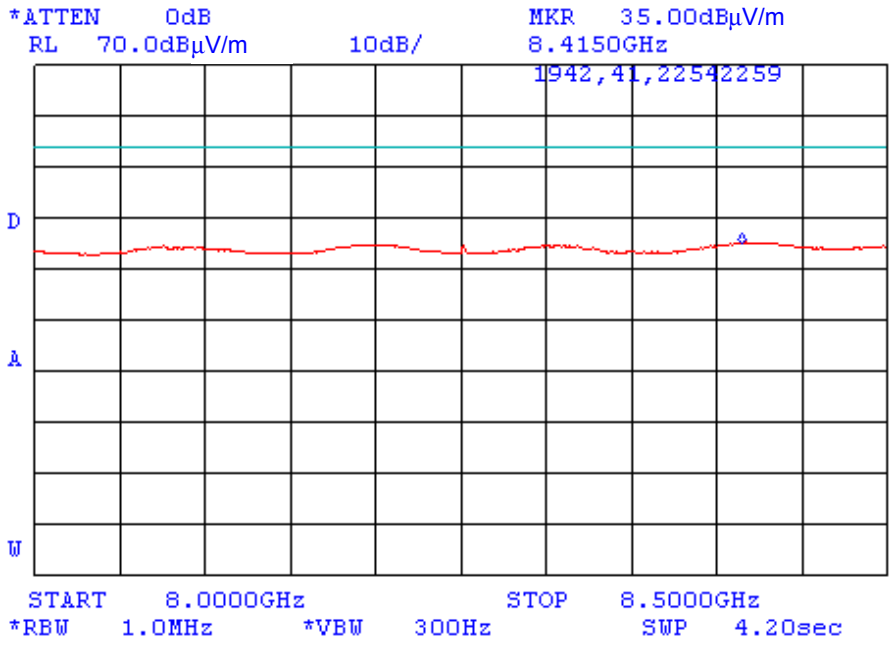
Plot A 95

Spurious emission measurements in 8000 MHz – 8500 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 35.00 dB(µV/m)

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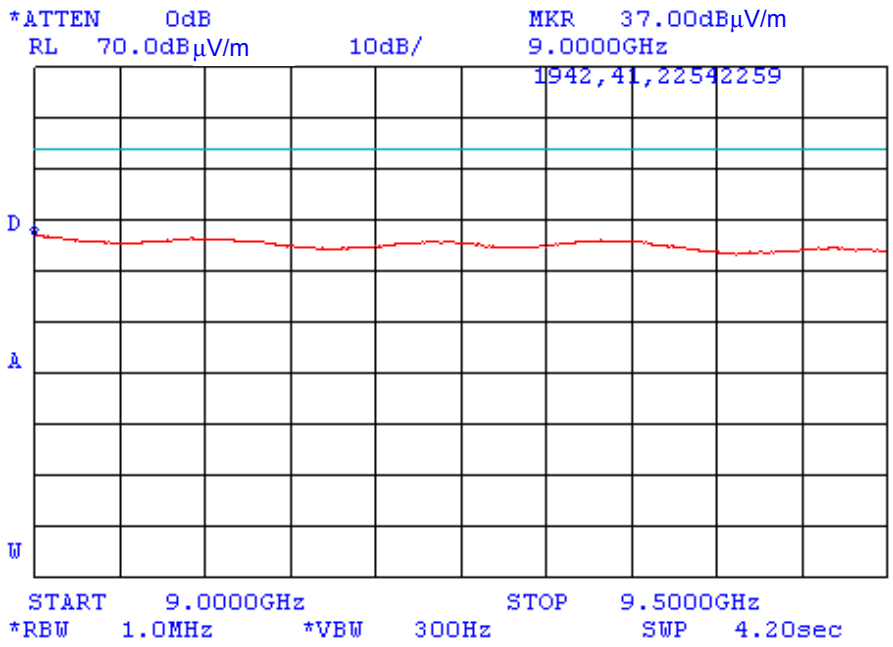
Plot A 96

Spurious emission measurements in 9000 MHz – 9500 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 37.00 dB(µV/m)

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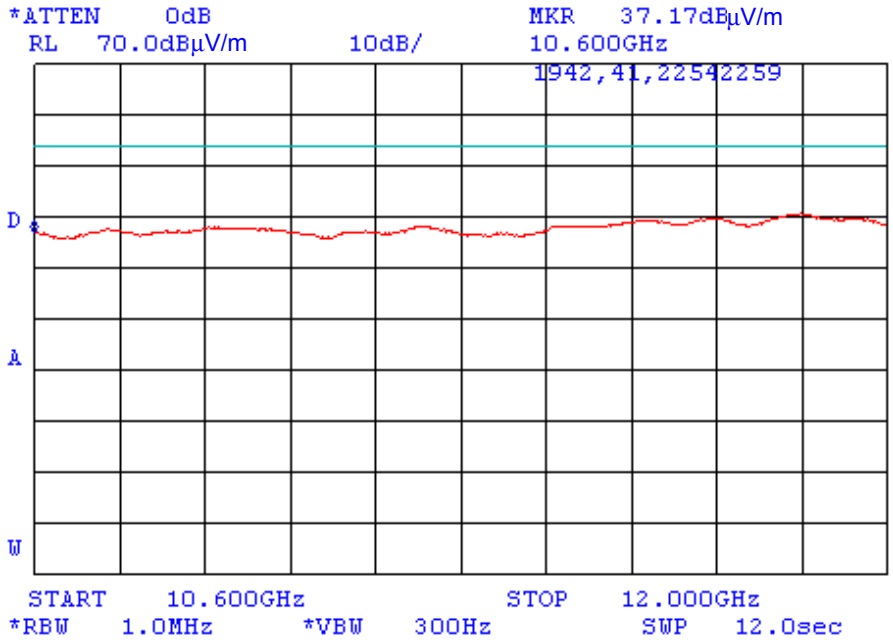
Plot A 97

Spurious emission measurements in 10600 MHz – 12000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 37.17 dB(µV/m)

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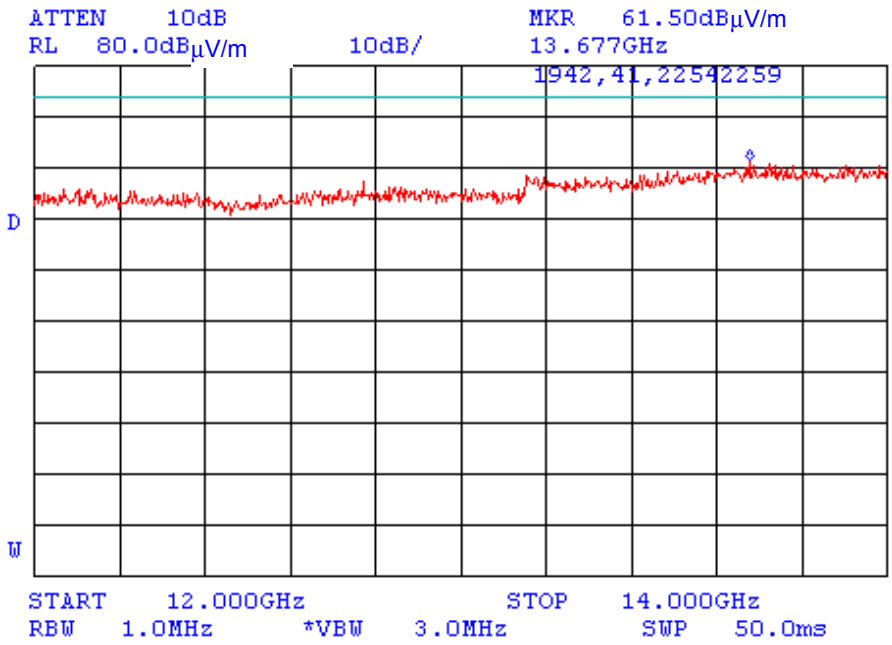
Plot A 98

Spurious emission measurements in 12000 MHz – 14000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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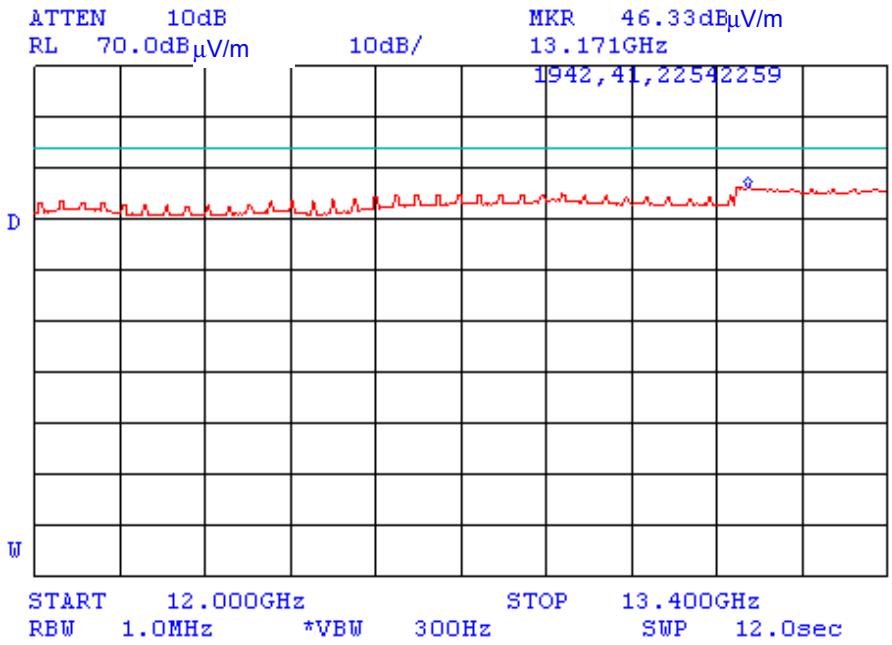
Plot A 99

Spurious emission measurements in 12000 MHz – 13400 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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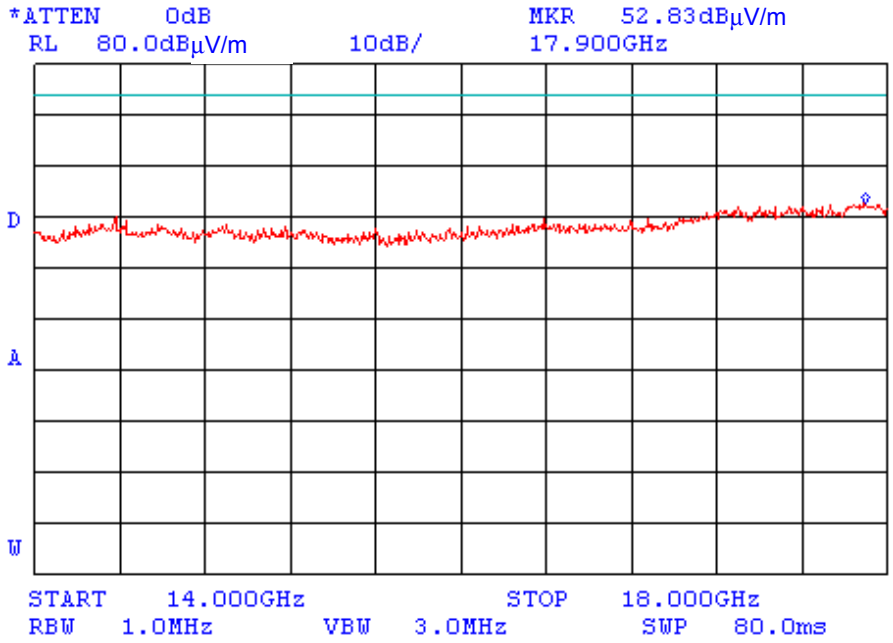
Plot A 100

Spurious emission measurements in 14000 MHz – 18000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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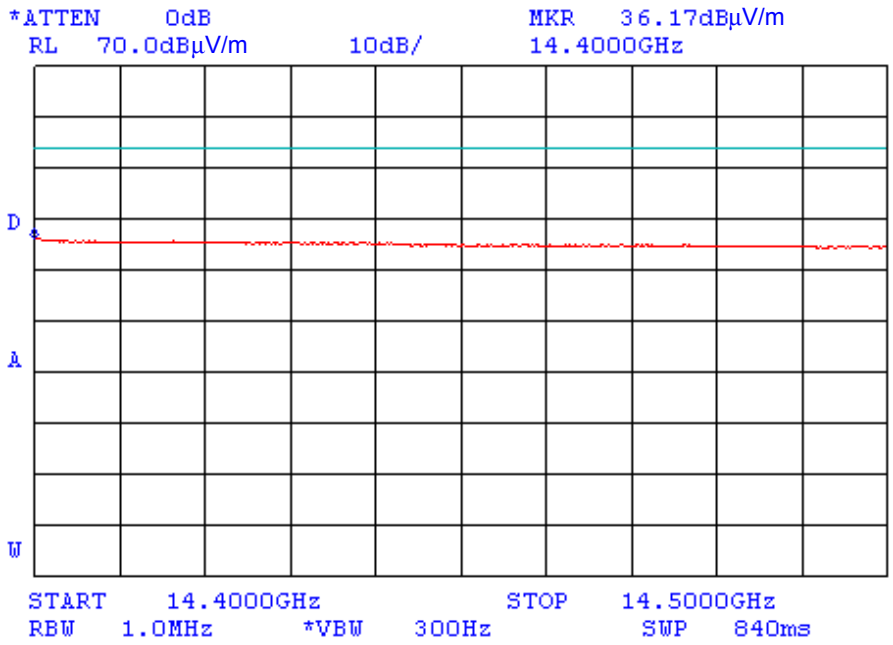
Plot A 101

Spurious emission measurements in 14400 MHz – 14500 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



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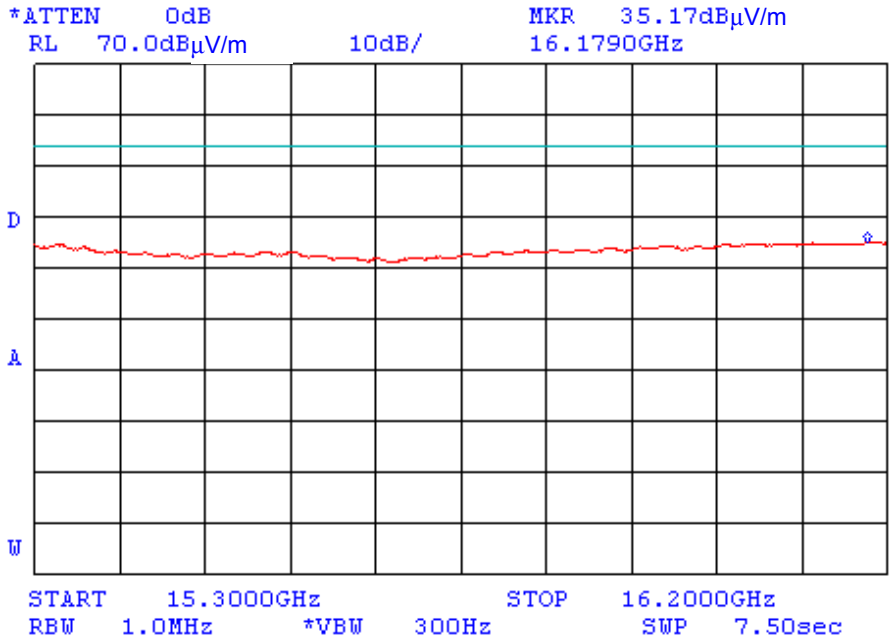
Plot A 102

Spurious emission measurements in 15300 MHz – 16200 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 35.17 dB(µV/m)

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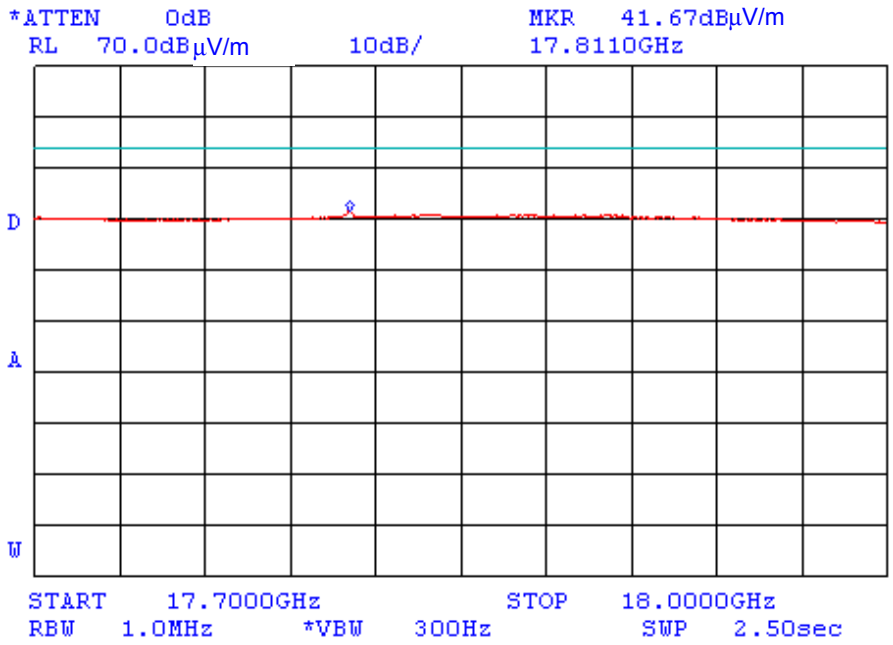
Plot A 103

Spurious emission measurements in 17700 MHz – 18000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 41.67 dB(µV/m)

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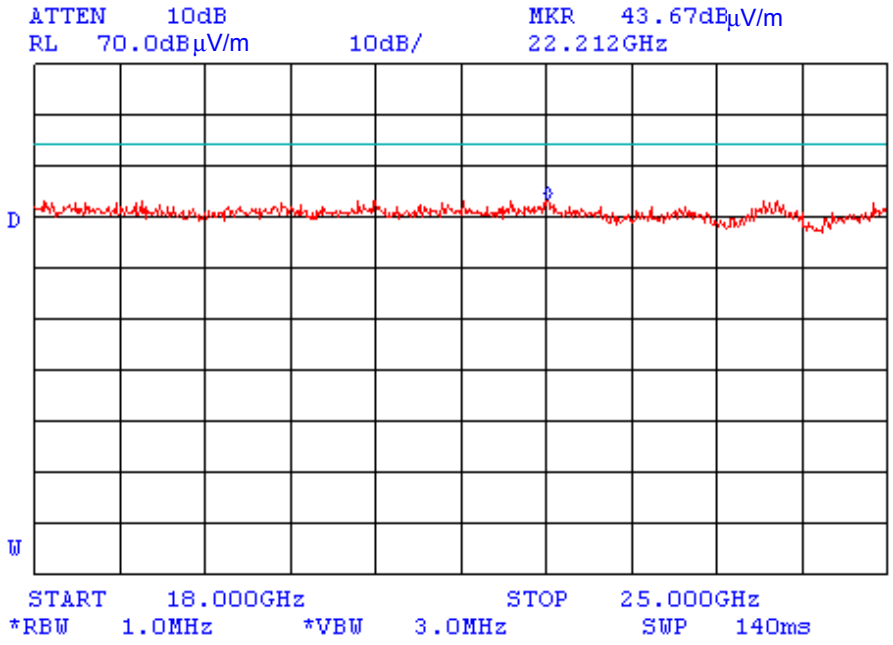
Plot A 104

Spurious emission measurements in 18000 MHz – 25000 MHz range at the OATS, carrier frequency 2437 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 43.67 dB(µV/m)

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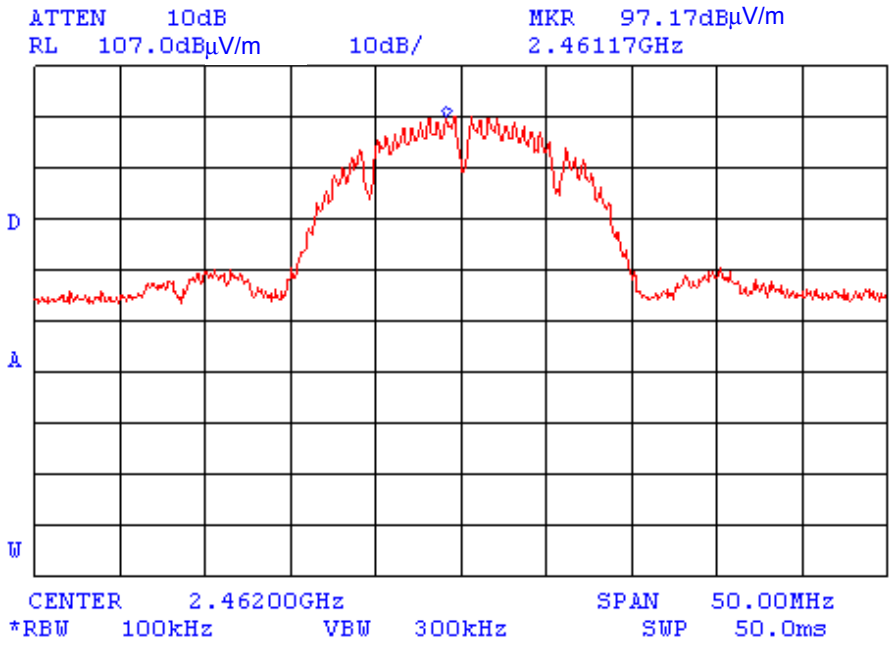
Plot A 105

In-band emission measurements @ 2.462 MHz carrier at the OATS, 1 Mbit/s



The maximum E=97.17 dB(uV/m) was found with vertical polarization of antenna.

Limit for spurious=97.17 dB(µV/m) – 20 dB = 77.17 dB(µV/m)

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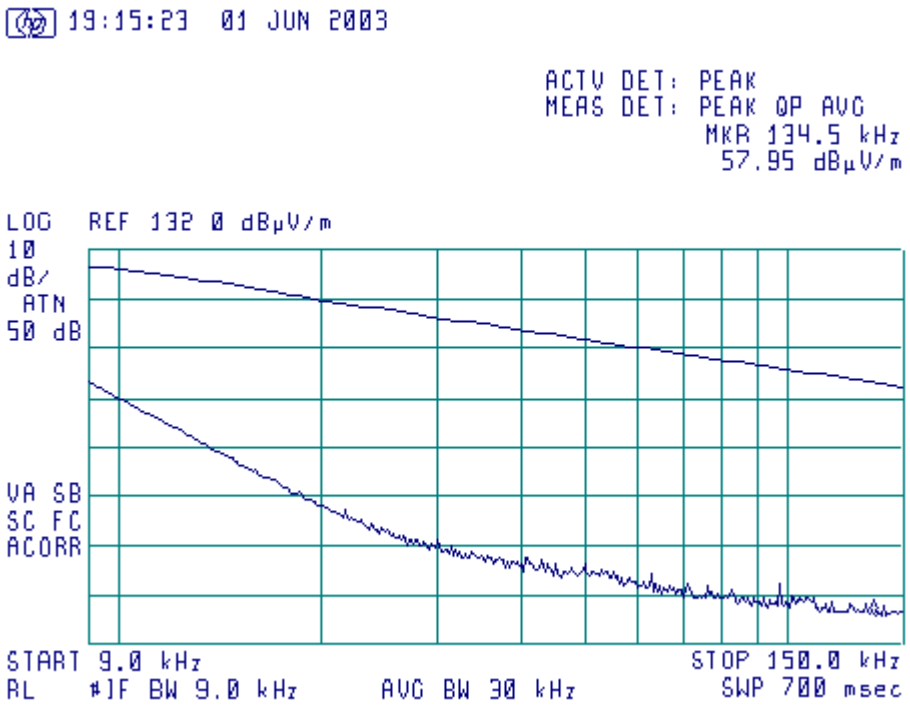
Plot A 106

Spurious emission measurements in 9 kHz – 150 kHz range in the anechoic chamber, carrier frequency 2462 MHz, 1 Mbit/s



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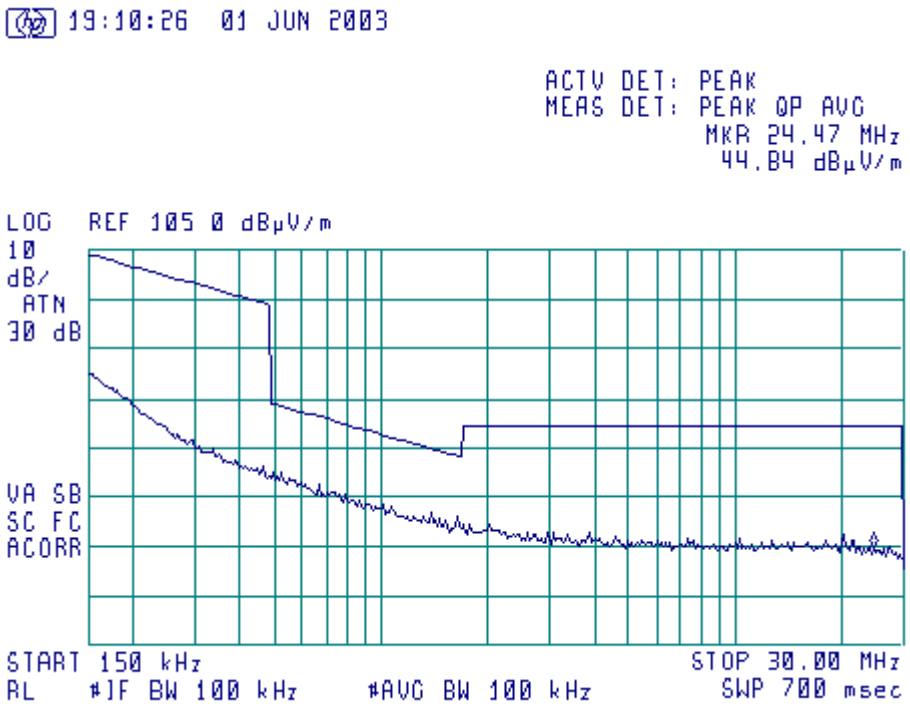
Plot A 107

Spurious emission measurements in 150 kHz – 30 MHz range in the anechoic chamber, carrier frequency 2462 MHz, 1 Mbit/s



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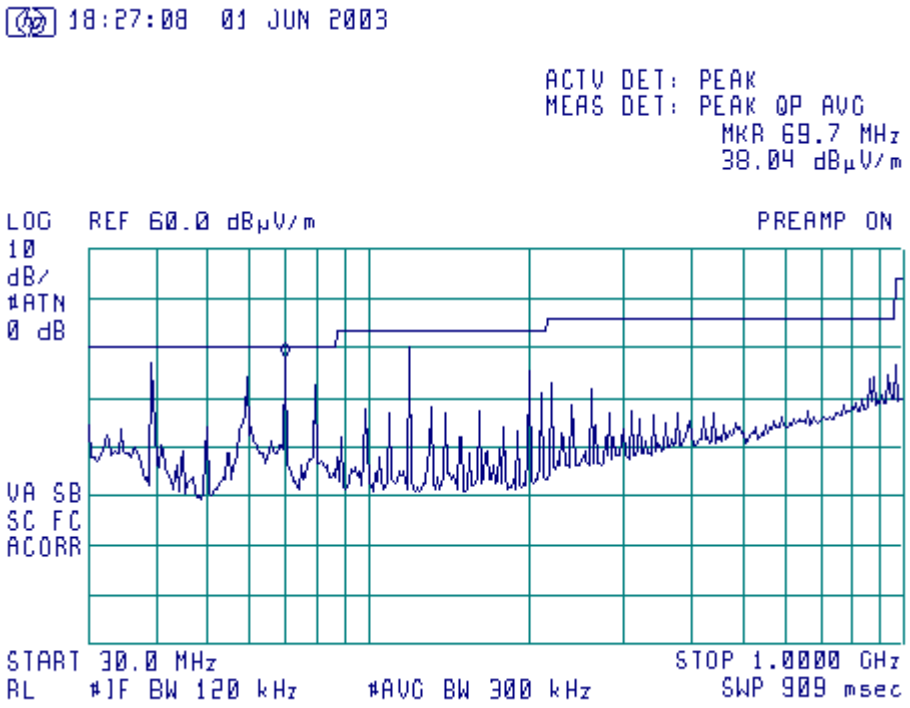
Plot A 108

Spurious emission measurements in 30 MHz – 1000 MHz range in the anechoic chamber, carrier frequency 2462 MHz, 1 Mbit/s

Vertical polarization



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB
40.00	37.7	36.5	40	3.5
70.00	38.5	37.3	40	2.7
120.00	40.2	39.6	43.5	3.9

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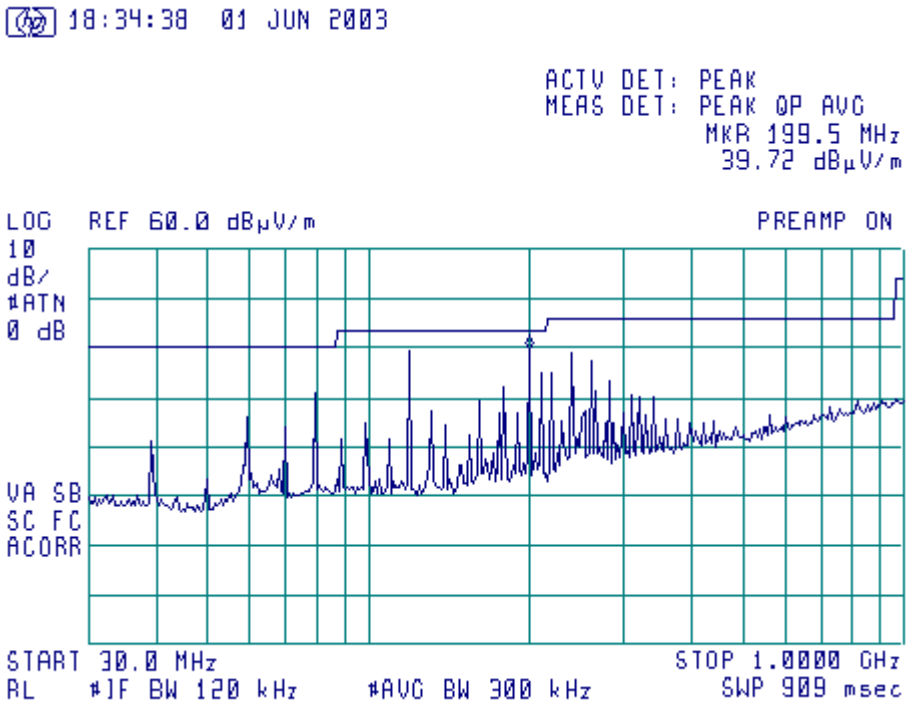
Plot A 109

Spurious emission measurements in 30 MHz – 1000 MHz range in the anechoic chamber, carrier frequency 2462 MHz, 1 Mbit/s

Horizontal polarization



Frequency, MHz	Peak measurement, dB(uV/m)	QP measurement, dB(uV/m)	Limit, dB(uV/m)	Margin, dB
120.01	39.3	38.4	43.50	5.1
200.00	39.7	38.6	43.50	4.9
240.00	38.8	37.3	46.00	8.7

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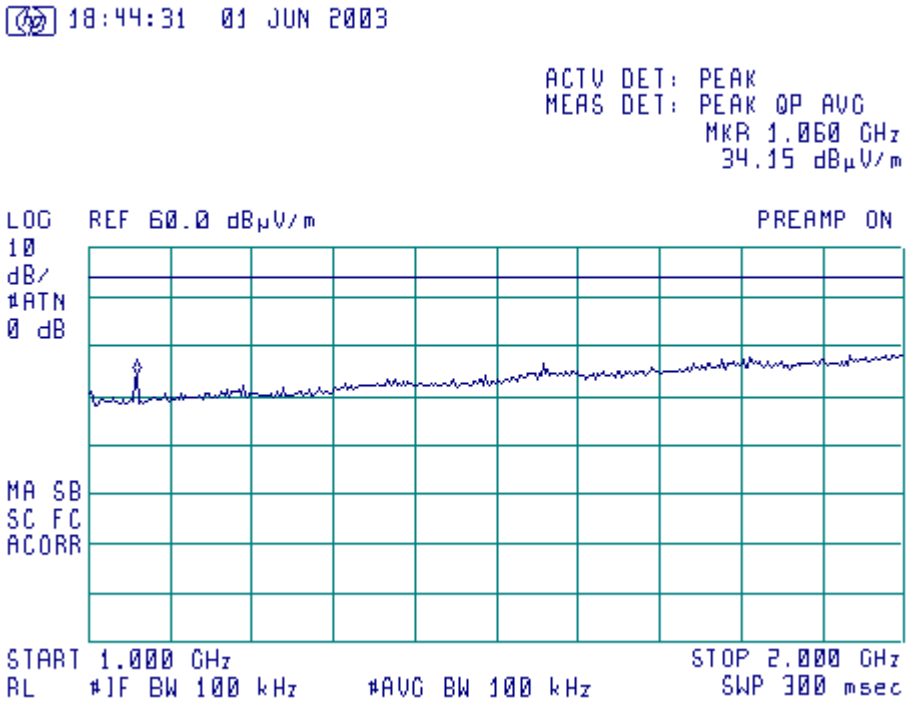
Plot A 110

Spurious emission measurements in 1000 MHz – 2000 MHz range in the anechoic chamber, carrier frequency 2462 MHz, 1 Mbit/s



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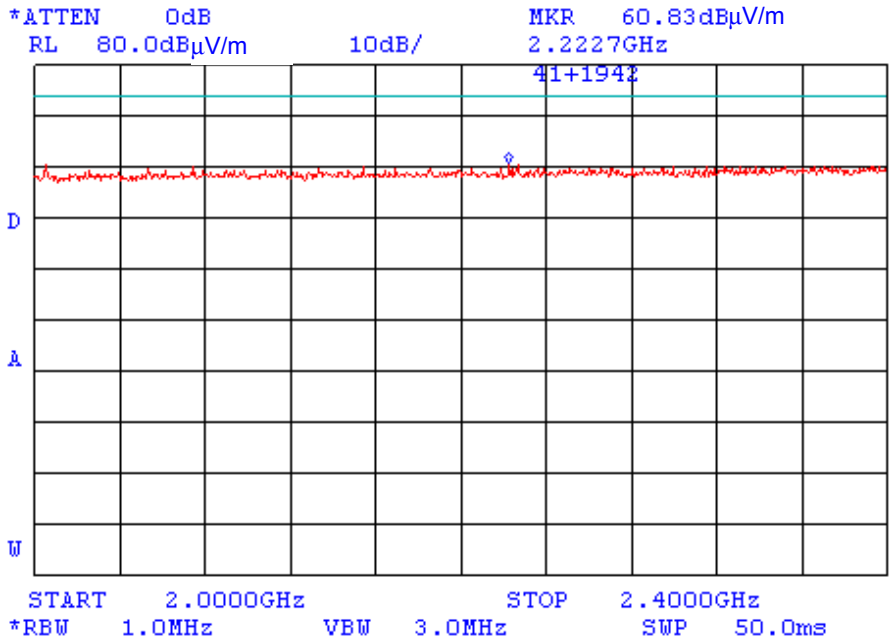
Plot A 111

Spurious emission measurements in 2000 MHz – 2400 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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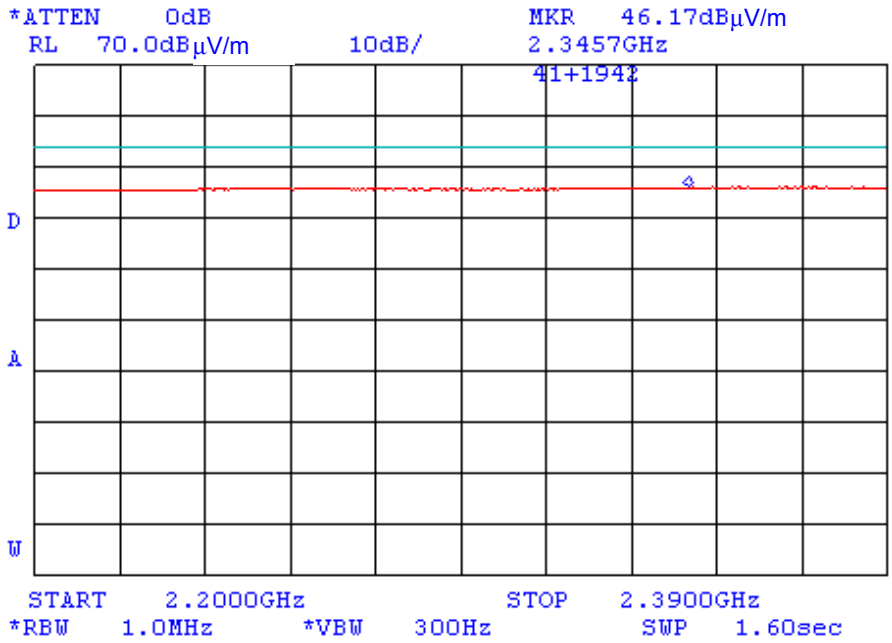
Plot A 112

Spurious emission measurements in 2200 MHz – 2390 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 46.17 dB(µV/m)

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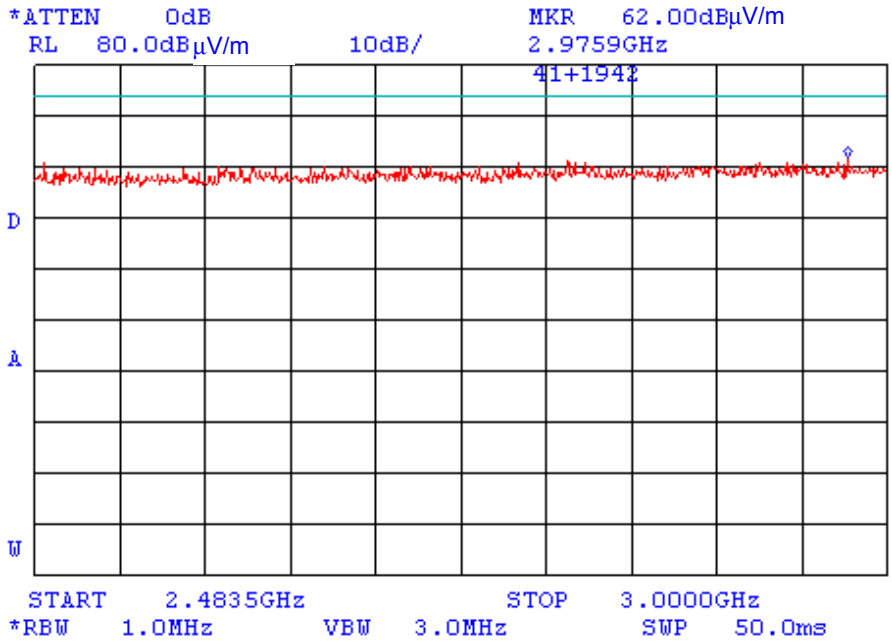
Plot A 113

Spurious emission measurements in 2483.5 MHz –3000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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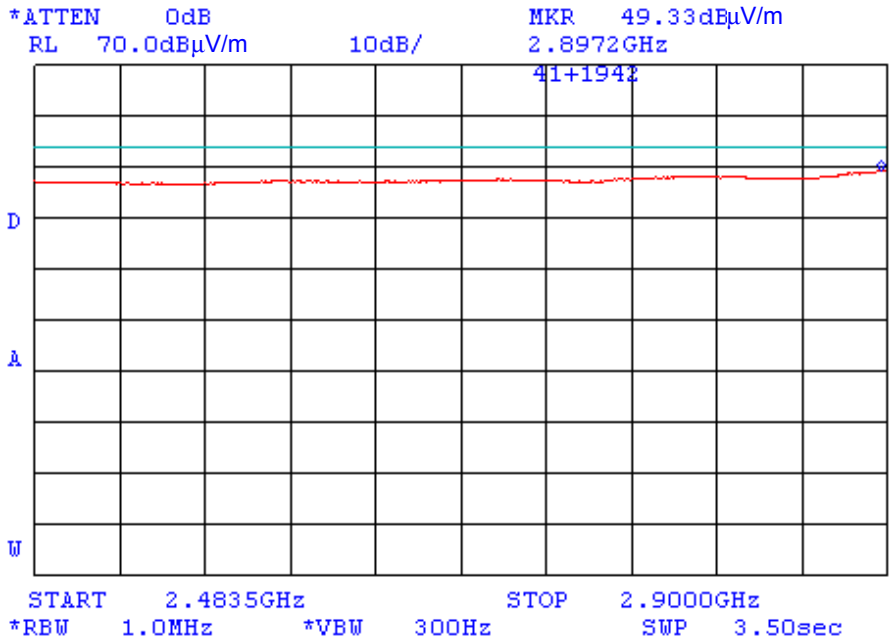
Plot A 114

Spurious emission measurements in 2483.5 MHz – 2900 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 49.33 dB(µV/m)

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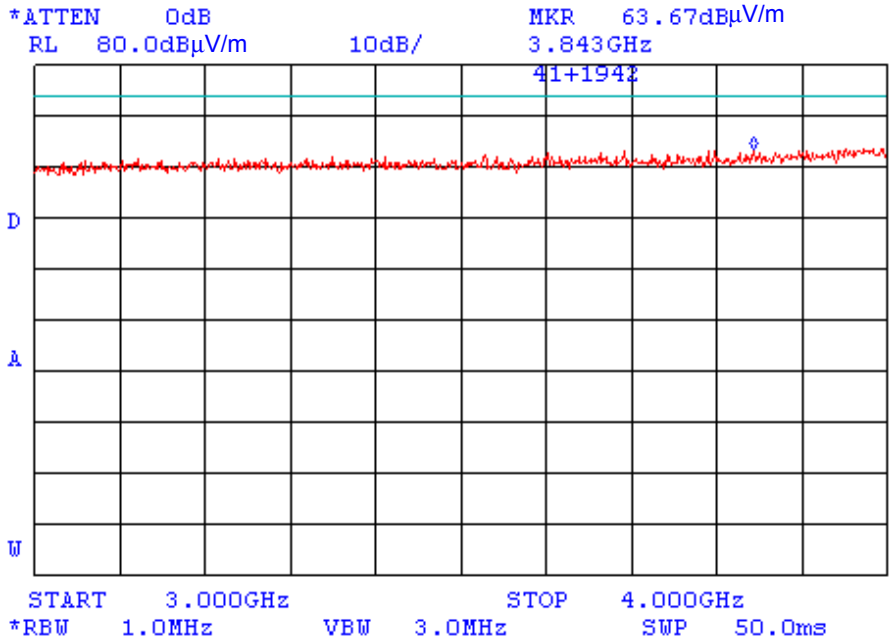
Plot A 115

Spurious emission measurements in 3000 MHz – 4000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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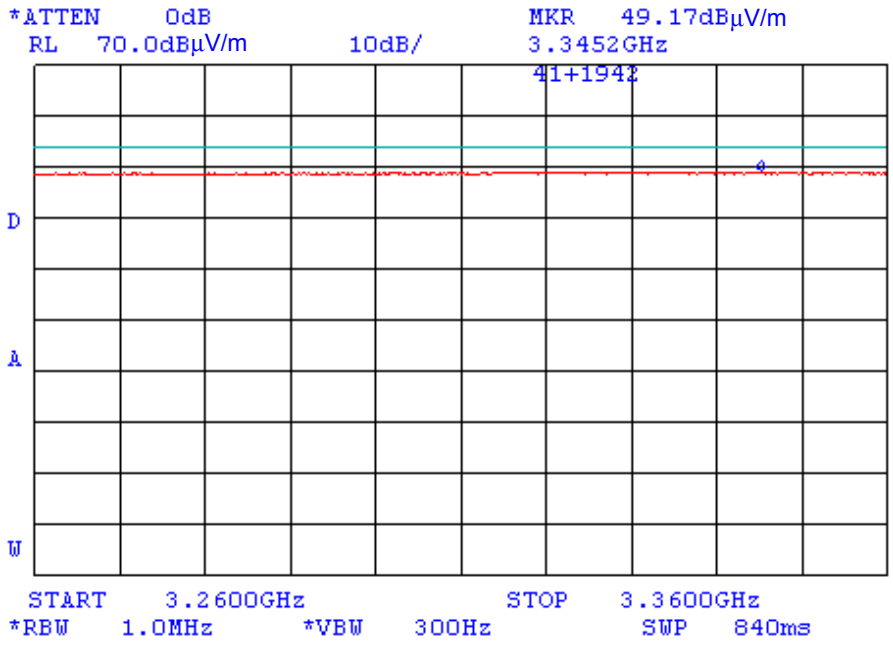
Plot A 116

Spurious emission measurements in 3260 MHz – 3360 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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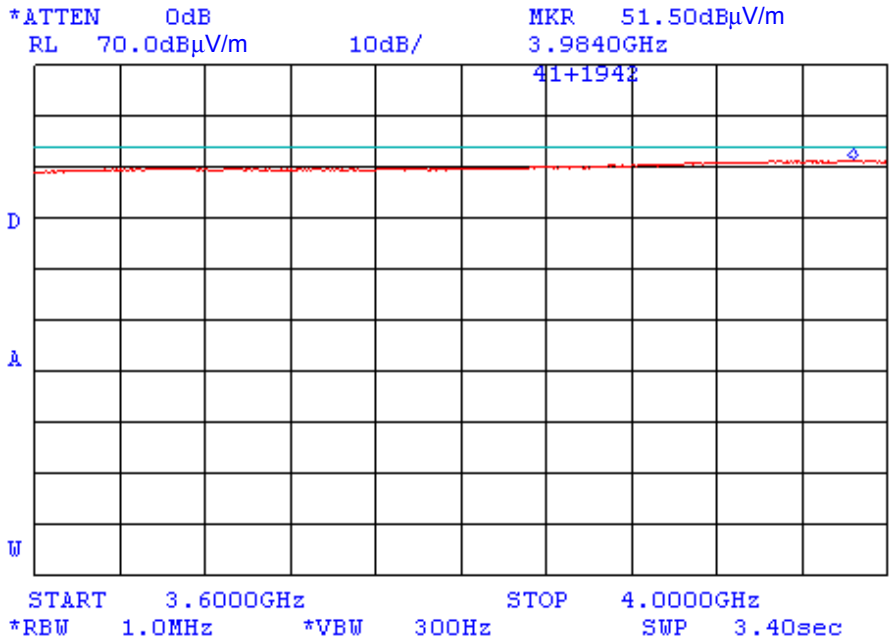
Plot A 117

Spurious emission measurements in 3600 MHz – 4000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 51.50 dB(µV/m)

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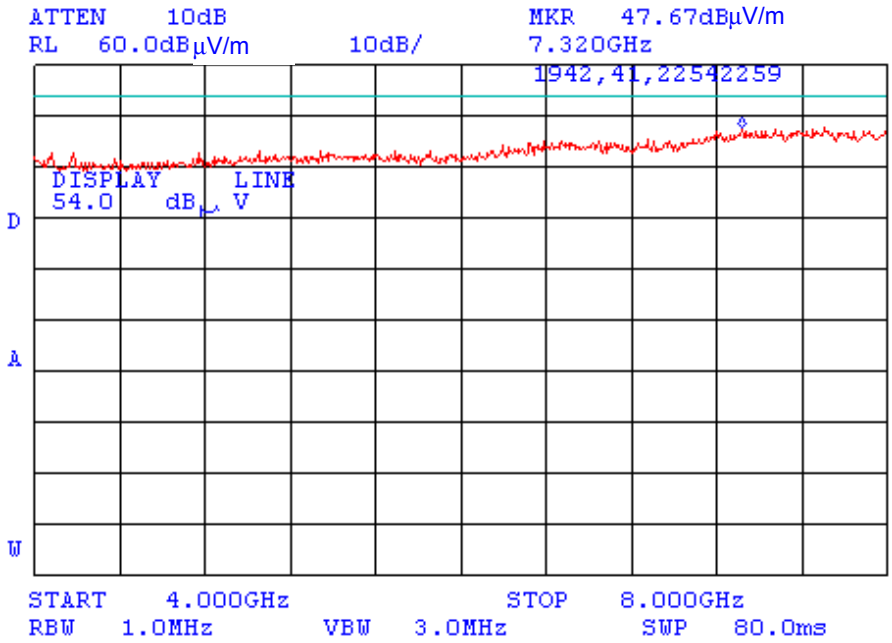
Plot A 118

Spurious emission measurements in 4000 MHz – 8000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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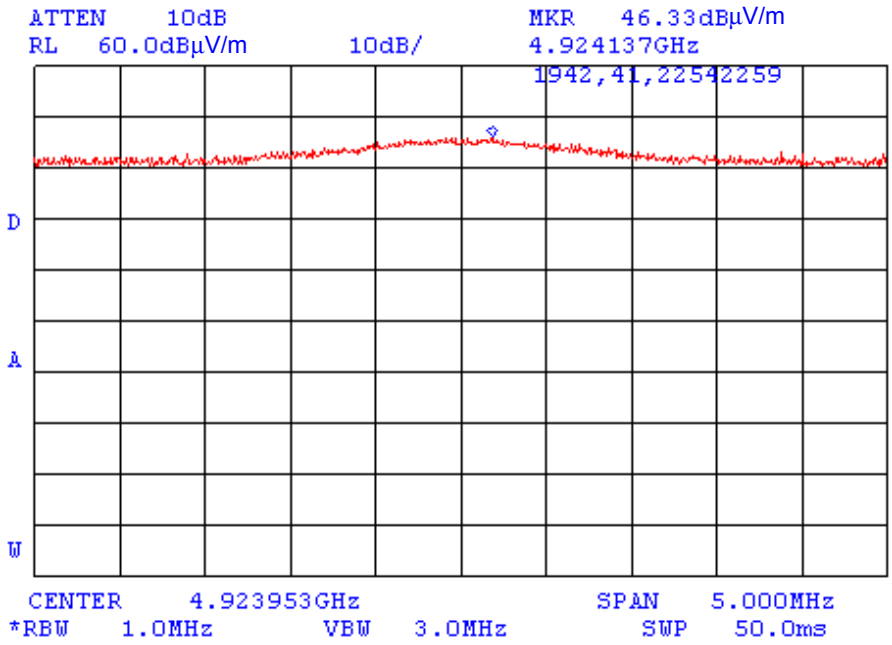
Plot A 119

**Spurious emission measurements at the OATS,
carrier frequency 2462 MHz, 1 Mbit/s**



The 2nd harmonic of fundamental.
The maximum was found with vertical polarization of antenna.
E(peak)=46.33 dBuV/m < peak limit =74 dBuV/m.

The 3rd harmonic of fundamental was not found.

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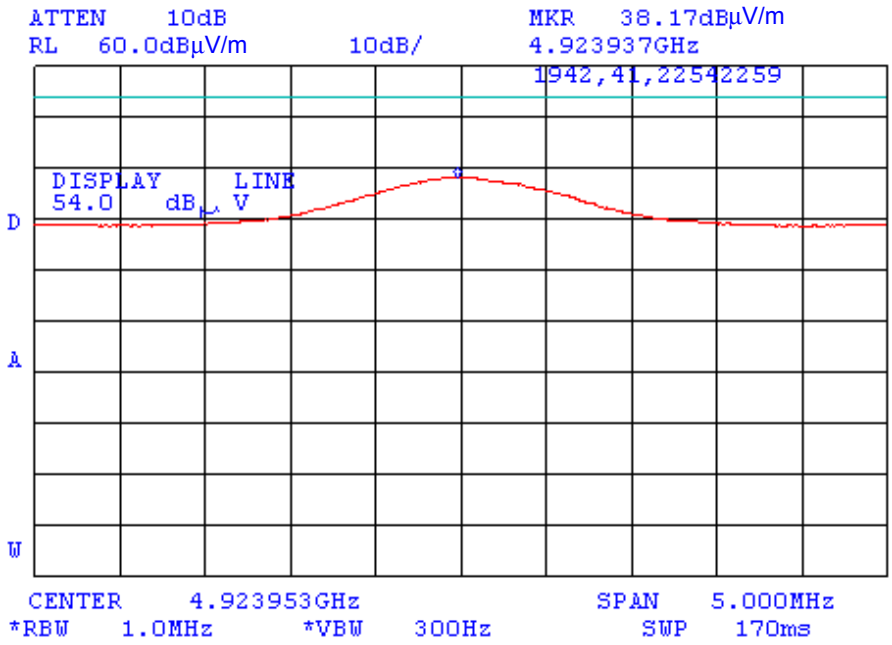
Plot A 120

**Spurious emission measurements at the OATS,
carrier frequency 2462 MHz, 1 Mbit/s**



The 2nd harmonic of fundamental.
The maximum was found with vertical polarization of antenna.
E(average)=38.17 dBuV/m < average limit =54 dBuV/m.

The 3rd harmonic of fundamental is not found.

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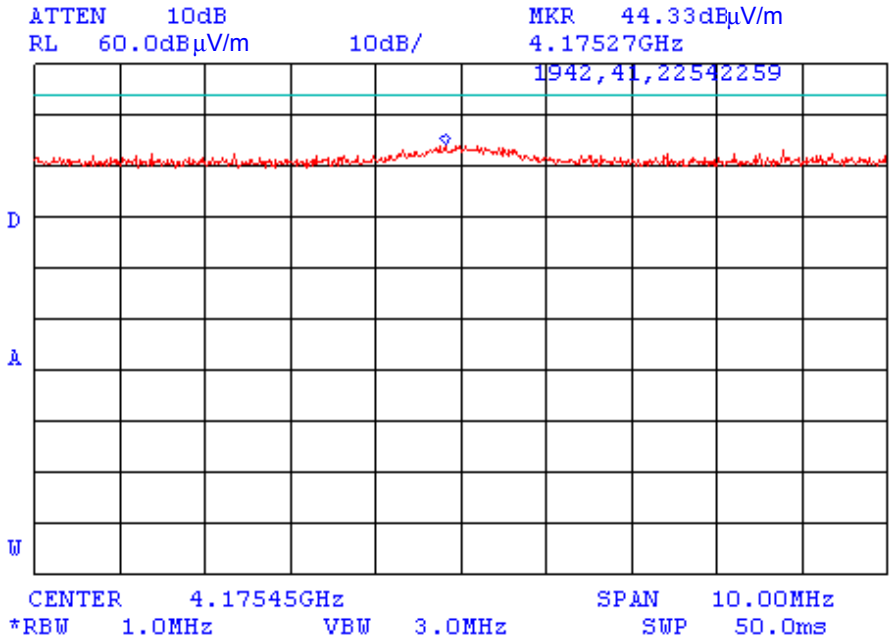
Plot A 121

**Spurious emission measurements at the OATS,
carrier frequency 2462 MHz, 1 Mbit/s**



The maximum was found with horizontal polarization of antenna.
E(peak)=44.33 dBuV/m < peak limit =74 dBuV/m

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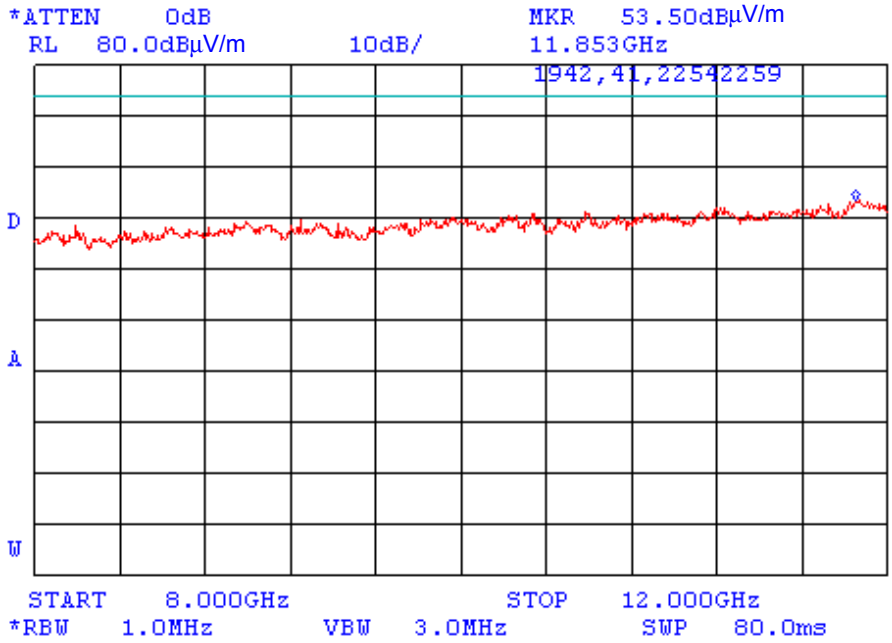
Plot A 122

Spurious emission measurements in 8000 MHz – 12000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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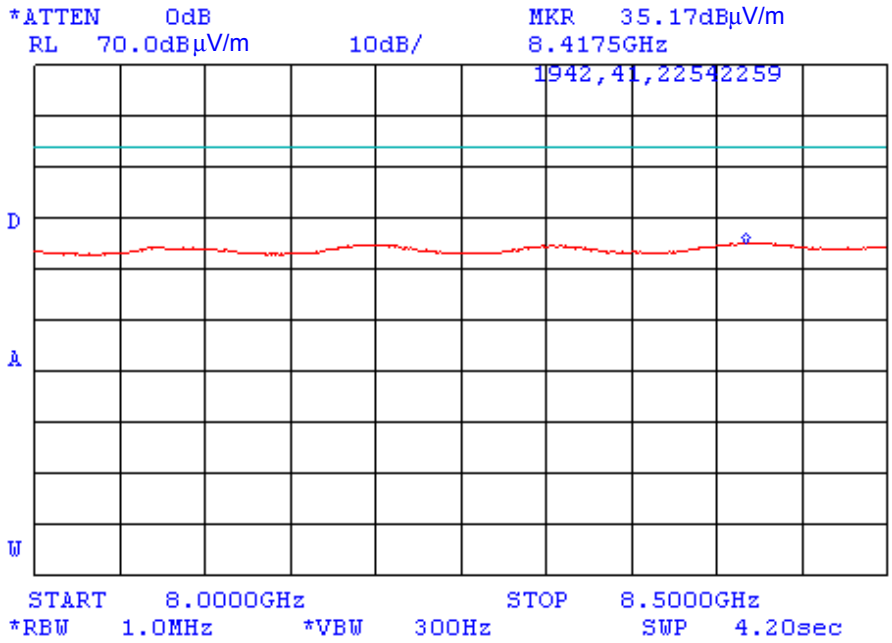
Plot A 123

Spurious emission measurements in 8000 MHz – 8500 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 35.17 dB(µV/m)

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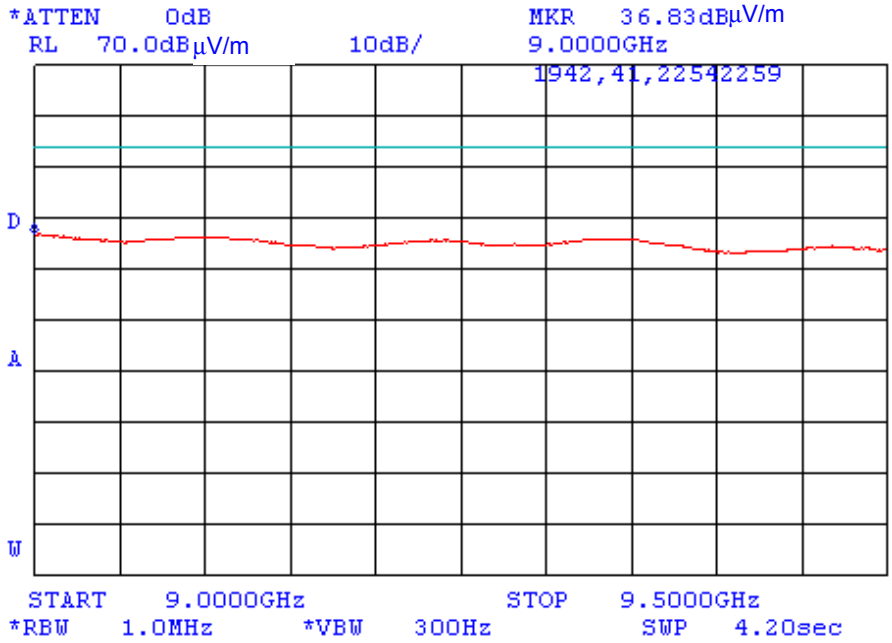
Plot A 124

Spurious emission measurements in 9000 MHz – 9500 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 36.83 dB(µV/m)

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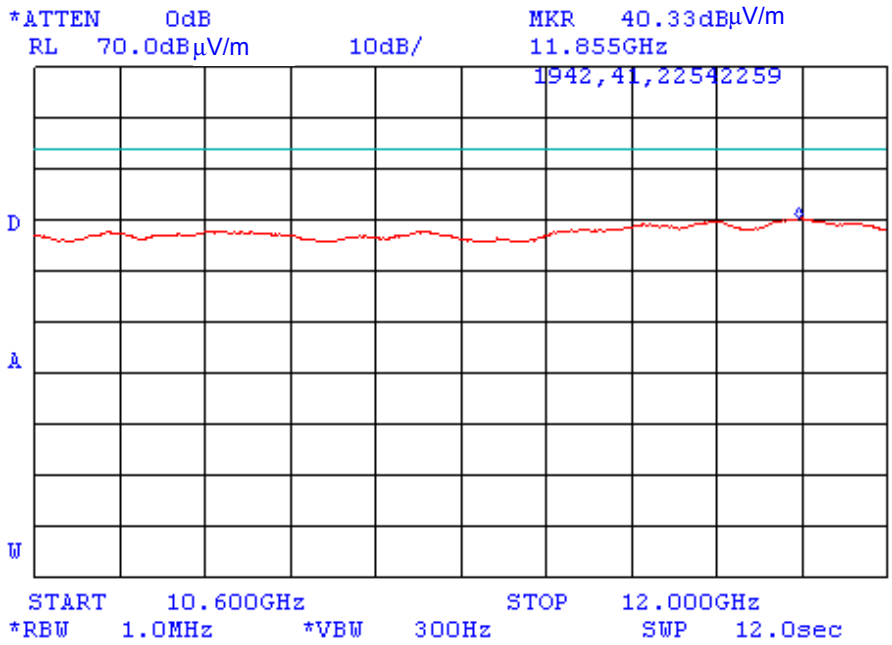
Plot A 125

Spurious emission measurements in 10600 MHz – 12000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 40.33 dB(µV/m)

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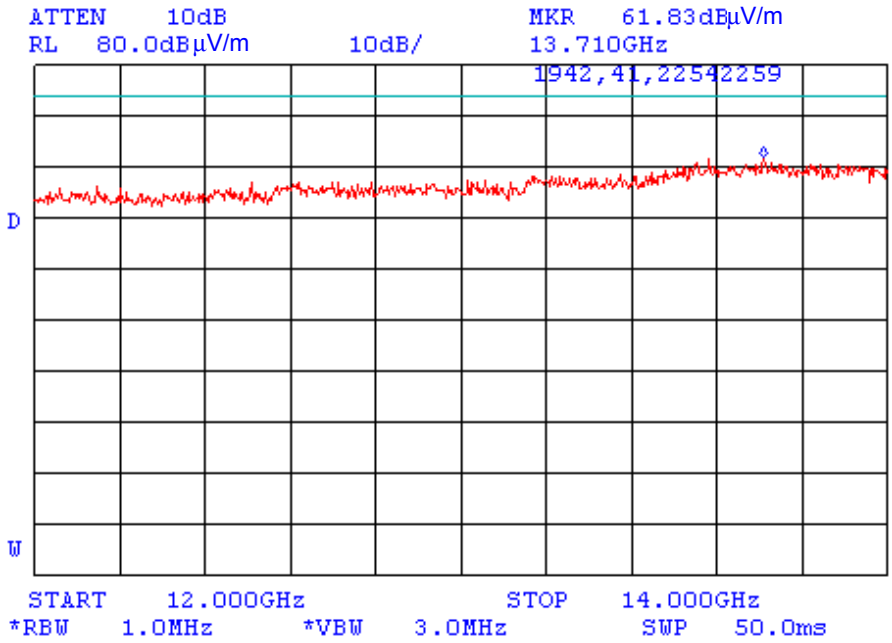
Plot A 126

Spurious emission measurements in 12000 MHz – 14000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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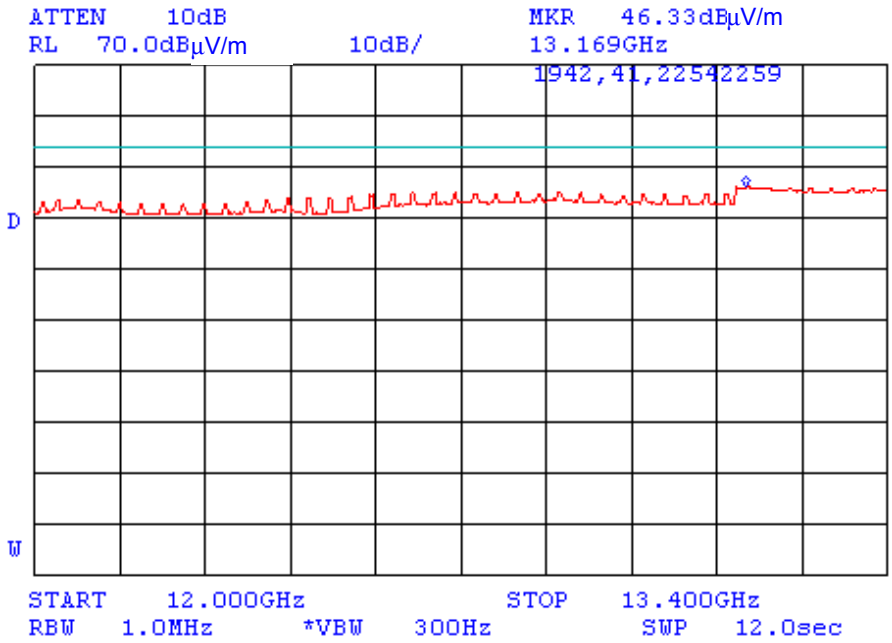
Plot A 127

Spurious emission measurements in 12000 MHz – 13400 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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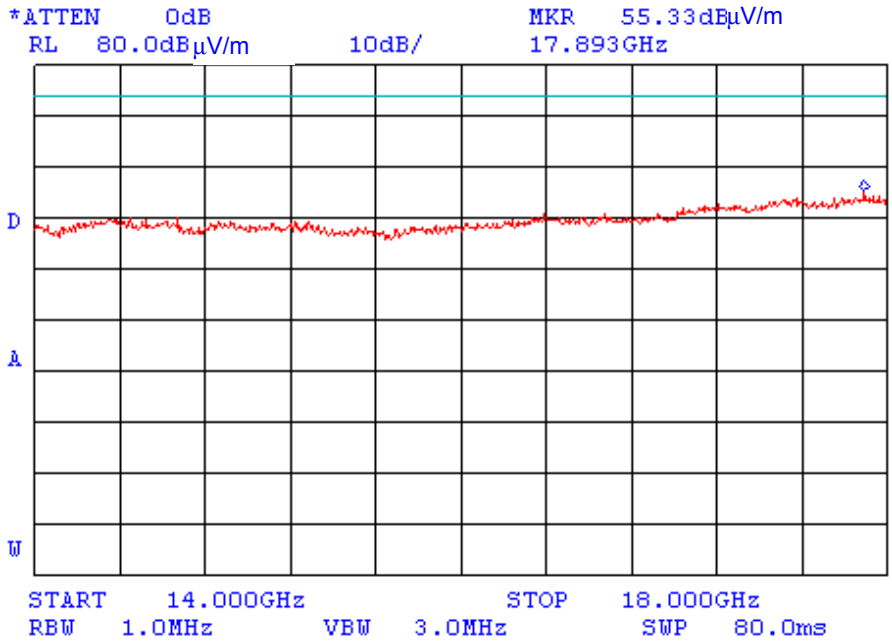
Plot A 128

Spurious emission measurements in 14000 MHz – 18000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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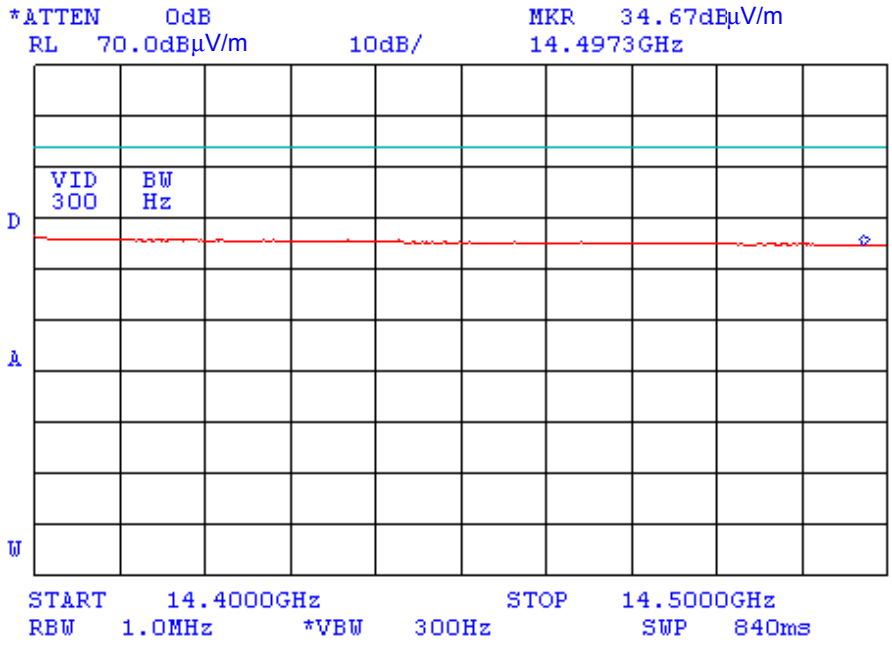
Plot A 129

Spurious emission measurements in 14400 MHz – 14500 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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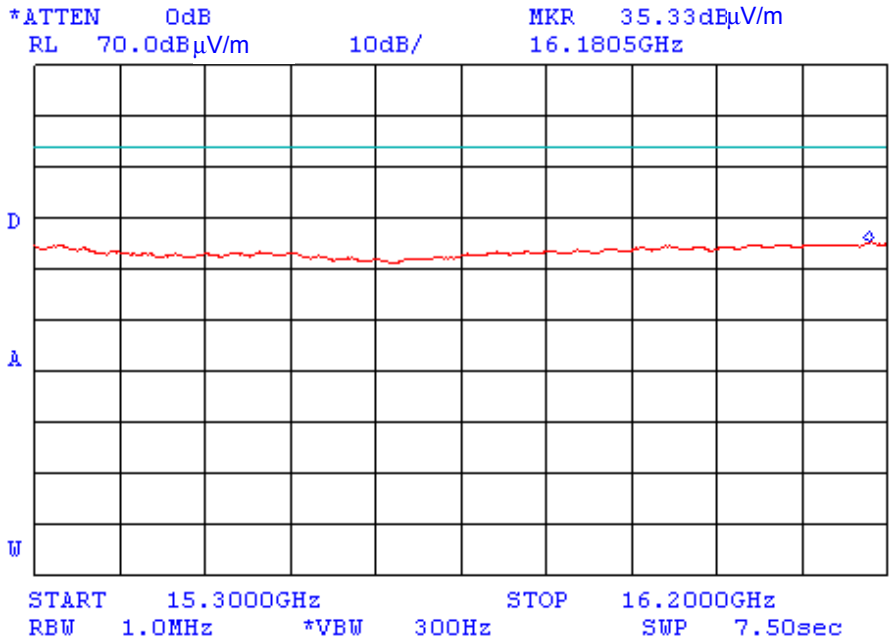
Plot A 130

Spurious emission measurements in 15300 MHz – 16200 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 35.33 dB(µV/m)

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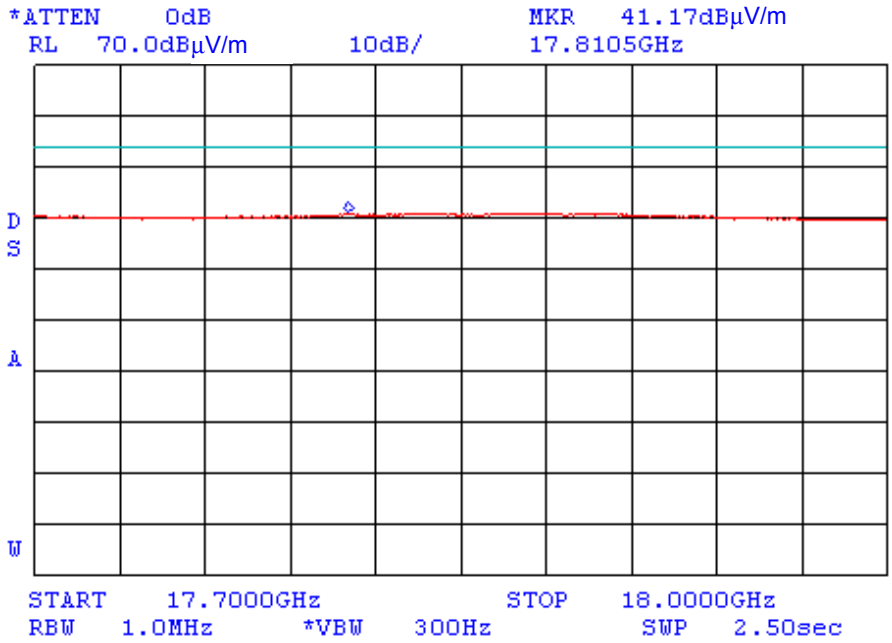
Plot A 131

Spurious emission measurements in 17700 MHz – 18000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



RESTRICTED BAND
Limit: according to §15.209, 15.35
Average value 41.17 dB(µV/m)

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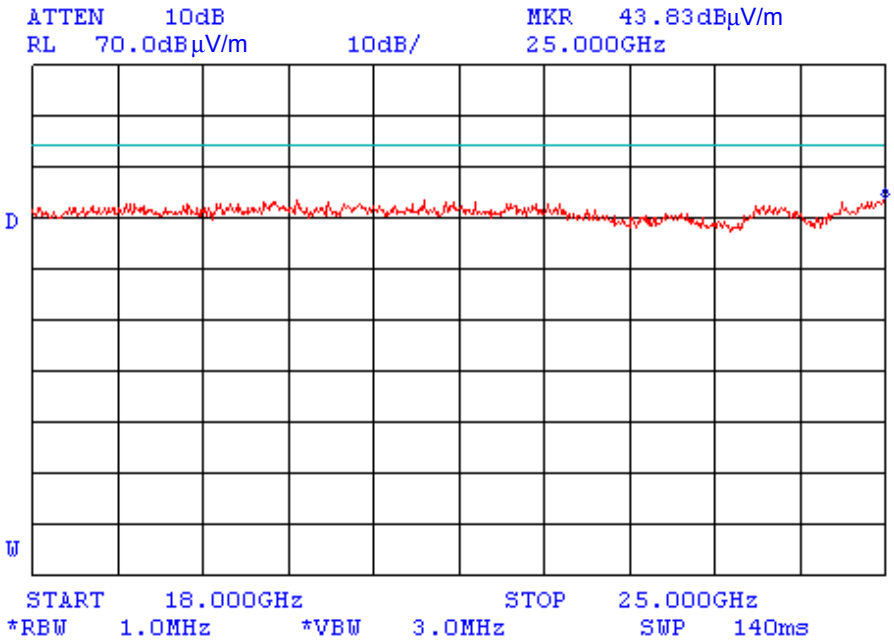
Plot A 132

Spurious emission measurements in 18000 MHz –25000 MHz range at the OATS, carrier frequency 2462 MHz, 1 Mbit/s



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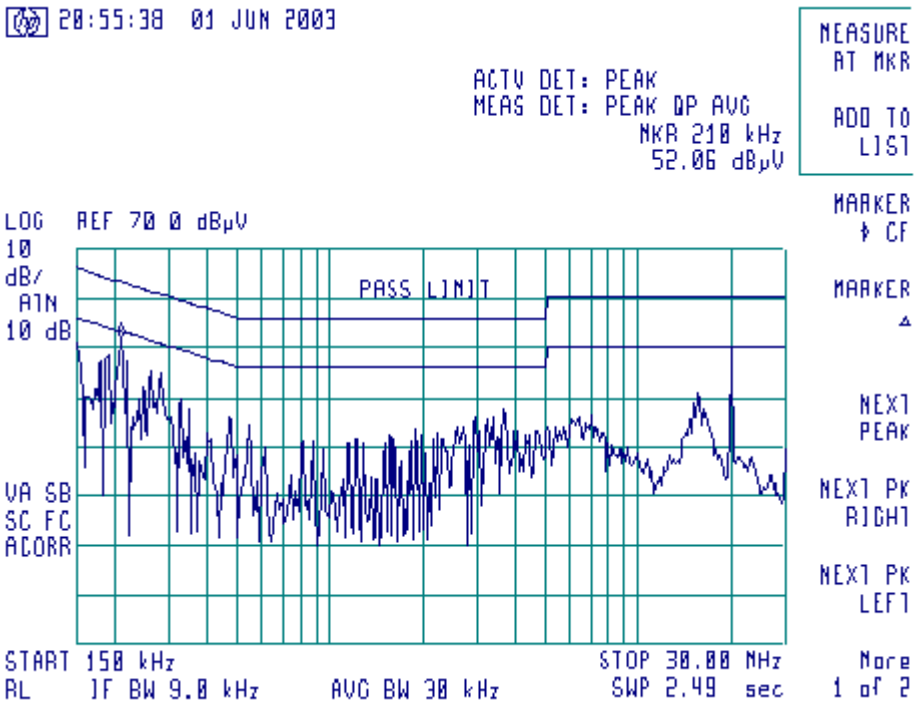
Plot A 133

Conducted emission measurements results at phase line



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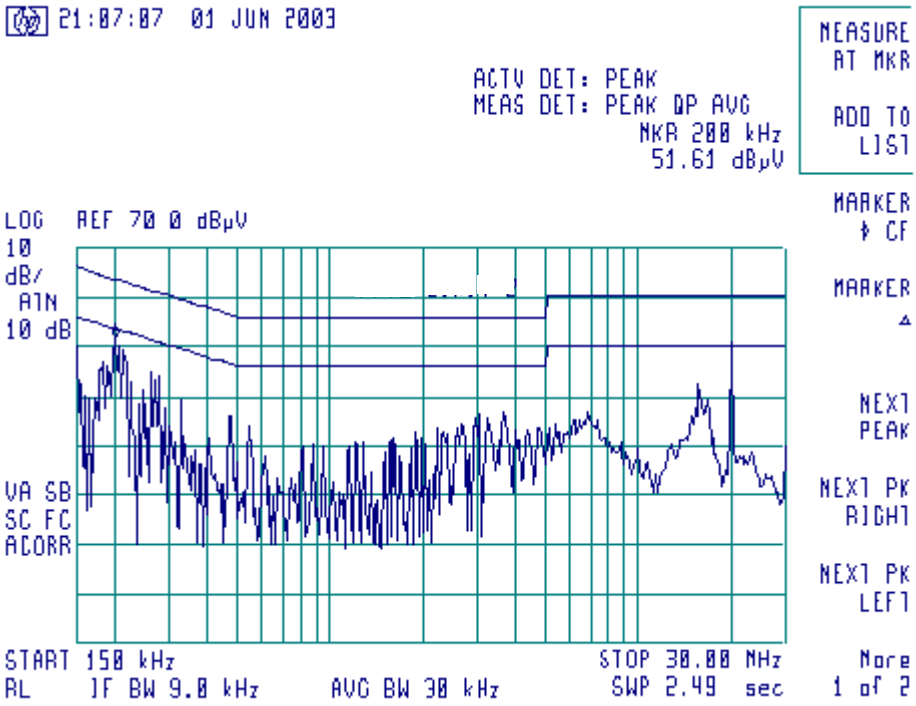
Plot A 134

Conducted emission measurements results at neutral line



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Appendix B Test equipment used for tests

HL Serial No.	Description	Manufacturer information			Due Calibr. Month/ year
		Name	Model No.	Serial No.	
0038	Antenna Mast, 1-4 m	Hermon Labs	AM-1	028	2/04 Check
0041	Double ridged guide antenna, 1-18 GHz	Electro-Metrics	RGA 50/60	2811	3/04
0091	Position controller for antenna mast + turntable, OFTS	Hermon Labs	CRL-2	091	4/04 Check
0275	Table non-metallic, 1.5 x 1.0 x 0.8 m	Hermon Labs	TNM	040	3/04 Check
0287	Turntable, motorized diameter, 2 m	Hermon Labs	TMD-2	042	11/03 Check
0446	Active Loop Antenna, 10 kHz-30 MHz	Electro-Mechanics	6502	2857	10/03
0447	LISN, 16/2, 300 V RMS	Hermon Labs	LISN 16-1	447	11/03
0465	Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	10/05 check
0521	Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	9/03
0589	Cable coaxial, GORE A2POL118.2, 3 m	Hermon Labs	GORE-3	589	11/03
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	2/04 check
0594	Turntable for anechoic chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	102	1/04 check
0604	Antenna biconilog log-periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141	9611-1011	1/04
0768	Antenna standard gain horn 18-26.5 GHz, WR-42, K-band, gain – 25 dB	Quinstar Technology	QWH-4200-BA	110	7/04 check
0787	Transient limiter	Hewlett Packard	11947A-8ZE	3107A01877	11/03
1003	Cable coaxial, M17/164, 10 m	Hermon Labs	C17164-10	161	11/03
1004	Cable, coaxial ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/03
1200	Quadruplexer, 1-12 GHz	Elettronica S.p.A.-Roma	UE 84	0240	4/04 check
1204	One phase voltage regulator, 2 kVA, 0-250 V	Hermon Labs	TDGC-2	99	6/03 check
1424	Spectrum analyzer, 30 Hz - 40 GHz	Agilent Technologies	8564EC	3946A00219	8/03
1940	Cable 40 GHz, 1.5 m, blue	Rhophase Microwave Ltd.	KPS-1503A-1500-KPS	T4663	10/03
1942	Cable 18 GHz, 4 m, blue	Rhophase Microwave Ltd	SPS-1803A-4000-NPS	T4658	10/03
1984	Antenna, double ridged waveguide horn, 1-18 GHz, 300W, N-type	EMC Test Systems	3115	9911-5964	3/04
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	12/03
2254	Cable 40GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	11/03
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	11/03
2260	Amplifier Low Noise 14-33 GHz	Sophia Wireless	LNA28-B	0233	11/03

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Appendix C Antenna factors and cable loss

Antenna factor
Double ridged guide antenna
Model RGA-50/60, S/N 2811, HL 0041

Frequency, MHz	Antenna factor, dB
1000	24.3
1500	25.4
2000	28.4
2500	29.2
3000	30.5
3500	31.6
4000	33.7
4500	32.2
5000	34.5
5500	34.5
6000	34.6
6500	35.3
7000	35.5
7500	35.9
8000	36.6
8500	37.3
9000	37.7
9500	37.7
10000	38.2
10500	38.5
11000	39.0
11500	40.1
12000	40.2
12500	39.3
13000	39.9
13500	40.6
14000	41.1
14500	40.5
15000	39.9
15500	37.8
16000	39.1
16500	41.1
17000	41.7
17500	45.1
18000	44.3

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
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.112, HL 0768, 0769, 0770

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

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).

Antenna factor
Active Loop Antenna
Model 6502, S/N 2857, HL 0446

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
Ser.No.1011

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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Correction Factor
Line Impedance Stabilization Network
Model LISN 16 – 1, HL 0447

Frequency, kHz	Correction Factor
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 40 GHz, 1.5 m, blue, model: KPS-1503A-1500-KPS, S/N T4663, HL 1940

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.13	5.10	1.33	15.00	2.27
0.05	0.14	5.30	1.33	15.50	2.32
0.10	0.19	5.50	1.38	16.00	2.39
0.20	0.25	5.70	1.41	16.50	2.41
0.30	0.31	5.90	1.43	17.00	2.36
0.40	0.37	6.10	1.50	17.50	2.42
0.50	0.41	6.30	1.47	18.00	2.50
0.60	0.46	6.50	1.56	18.50	2.89
0.70	0.49	6.70	1.50	19.00	2.86
0.80	0.53	6.90	1.53	19.50	2.84
0.90	0.56	7.10	1.53	20.00	2.77
1.00	0.59	7.30	1.56	20.50	2.73
1.10	0.62	7.50	1.59	21.00	3.05
1.20	0.65	7.70	1.62	21.50	3.07
1.30	0.68	7.90	1.68	22.00	2.97
1.40	0.70	8.10	1.67	22.50	2.91
1.50	0.73	8.30	1.70	23.00	3.02
1.60	0.76	8.50	1.69	23.50	3.29
1.70	0.77	8.70	1.70	24.00	3.31
1.80	0.80	8.90	1.68	24.50	3.49
1.90	0.82	9.10	1.70	25.00	3.37
2.00	0.84	9.30	1.70	25.50	3.56
2.10	0.85	9.50	1.77	26.00	3.56
2.20	0.87	9.70	1.80	26.50	3.33
2.30	0.88	9.90	1.88	27.00	3.52
2.40	0.90	10.10	1.93	28.00	3.38
2.50	0.91	10.30	1.94	29.00	3.34
2.60	0.93	10.50	1.99	30.00	3.33
2.70	0.95	10.70	1.91	31.00	3.48
2.80	0.97	10.90	2.00	32.00	3.63
2.90	0.98	11.10	1.92	33.00	3.69
3.10	1.02	11.30	1.97	34.00	3.79
3.30	1.05	11.50	1.98	35.00	3.77
3.50	1.09	11.70	1.99	36.00	3.92
3.70	1.12	11.90	2.06	37.00	3.94
3.90	1.15	12.10	2.01	38.00	3.80
4.10	1.18	12.40	2.08	39.00	4.15
4.30	1.21	13.00	2.05	40.00	4.03
4.50	1.24	13.50	2.15		
4.70	1.29	14.00	2.25		
4.90	1.27	14.50	2.26		

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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
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, S/N 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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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) and approved by Israel Ministry of environmental protection, radiation hazards department (Permit number 1158).

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Abbreviations and acronyms

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

AC	alternating current
cm	centimeter
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
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
kV	kilovolt
L	length
LNA	low noise amplifier
m	meter
Mbps	megabit per second
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: 2002	Radio Frequency Devices
ANSI C63.2:96	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4:92	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.