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ELECTROMAGNETIC EMISSIONS TEST REPORT

according to 47CFR Part 90, subparts I, S

for

Dekolink Wireless Ltd.

EQUIPMENT UNDER TEST:

Digital repeater

Model:MW-DR-800-50W90B

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1 Project information

Description of equipment under test

Test items	: Digital repeater
Manufacturer	: Dekolink Wireless Ltd.
Types (Models)	: MW-DR-800-50W90B
Software release	: 3.2E
Hardware version	: 01

Applicant information

Applicant's responsible person	: Mr. Alex Baber, project manager
Company	: Dekolink Wireless Ltd.
Address	: 16, Bazel street
Postal code	: 49001
City	: Petach-Tikva
Country	: Israel
Telephone number	:+972-3918 0175
Telefax number	:+972-3918 0190

Test performance

Project Number:	: 15557
Location	: Hermon Laboratories
Receipt date	: May 29, 2003
Test started	: May 29, 2003
Test completed	: July 16, 2003
Purpose of test	: Apparatus compliance verification in accordance with emission requirements
Test specification(s)	47CFR part 90, §§90.205, 90.209, 90.210, 90.635, 90.691 part 15 §15.207, §§15.107, 15.109

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2 Summary and signatures

The EUT, MW-DR-800-50W90B digital repeater, was tested according to FCC part 90 subparts I, S, §§90.205(j), 90.209, 90.210, 90.635, 90.691, part 15 §15.207, §§15.107, 15.109 and found to comply with the standard requirements.

Test description	Specification reference	Tested by	Date tested	Test report paragraph	Verdict
RF output power	90.205(j), 90.635	Mrs. E. Pitt, Mr. Y. Neuman, test engineer	June 19, 23, 2003	4.1	Pass
Occupied bandwidth	90.209	Mrs. E. Pitt, Mr. Y. Neuman, test engineer	June 19, July 13, 2003	4.2	Pass
Emission mask	90.210 90.691	Mrs. E. Pitt, Mr. Y. Neuman, test engineer	June 26, 29, 2003	4.3	Pass
Conducted spurious emissions	90.210	Mr. Y. Neuman, test engineer	July 3, 2003	4.4	Pass
Radiated spurious emissions	90.210	Mr. Y. Neuman, test engineer	July 13, 2003	4.5	Pass
Radiated emissions	15.109	Mr. Y. Neuman, test engineer	June 18, 2003	4.6	Pass
Conducted emissions	15.107, 15.207	Mr. Y. Neuman, test engineer	July 10, 2003	4.7	Pass

Test report prepared by:

Mrs. M. Cherniavsky, MSc, certification engineer _____

Test report approved by:

Mr. Michael Nikishin, MSc, EMC group leader _____

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

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3 EUT description

3.1 General description

The EUT is a high power repeater intended for outdoor applications to cover large areas. The unit is based on a duplexed path configuration, having sharp out of band attenuation for improved isolation between the receiving and transmitting paths. The repeater downlink path receives the RF signals from a base station, amplifies them and transmits to the subscriber. The repeater uplink path receives the RF signals from the subscriber, amplifies them and transmits to the base station. Two duplexers separate the signals to the proper amplifying path and isolate the two signals.
Downlink frequency range is 851 – 866 MHz, uplink – 806 –821 MHz; RF power of the downlink channel is 10 W, of the uplink channel – 1 W.
The EUT is powered from the mains. The EUT clocks generate 11.0592 MHz, 16 MHz, 65.536 MHz, 791 MHz, 836 MHz.

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4 Test results

4.1 Peak output power test according to part 90 §§90.205 (j), 90.635

DATE: June 19, 23, 2003
RELATIVE HUMIDITY: 48 %
AMBIENT TEMPERATURE: 23°C
AIR PRESSURE: 1008 hPa
MEASUREMENT UNCERTAINTY: ±3.5 dB
OPERATING FREQUENCY RANGE: 851-866 MHz (downlink)
806-821 MHz (uplink)

Mode of operation	Carrier frequency, MHz	Input signal, dBm	Peak output power, dBm	Output power limit, dBm	Nominal* margin, dB	Maximum** margin, dB	Reference to Plots in Appendix A	Verdict
Downlink	858.5125	Max (-23)	39.8	40 ± 1	0.2	1.2	A1	Pass
		Min (-50)	39.8		0.2	1.2	A2	Pass
Uplink	813.5125	Max (-33)	30.62	30 ± 1	-0.62	0.38	A3	Pass
		Min (-60)	30.8		-0.8	0.2	A4	Pass

Notes:
*Nominal margin= dB below (negative if above) nominal power limit.
**Maximum margin= dB below (negative if above) declared by manufacturer maximum rated power.

LIMITATION ON POWER

Mode of operation	Output power declared by the manufacturer, dBm	
	Nominal	Rated
Downlink	40	40 ± 1
Uplink	30	30 ± 1

TEST PROCEDURE

The EUT RF output was connected to the spectrum analyzer through external attenuator, the settings are shown in the plots. The measurements were performed in downlink and uplink transmit modes of operation at both maximum and minimum input signals at the middle carrier (channel) frequency. Spectrum analyzer readings were corrected for RF path losses.

TEST EQUIPMENT USED:

HL 1424	HL 1465	HL 1528	HL 1542	HL 1653	HL 1824	HL 2012
HL 2014						

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4.2 Occupied bandwidth according to part 90 §90.209(5)

METHOD OF MEASUREMENTS	ANSI C63.4 §13.1.7
DATE:	June 19, 2003
RELATIVE HUMIDITY:	48 %
AMBIENT TEMPERATURE:	23°C
AIR PRESSURE:	1008 hPa
MEASUREMENT UNCERTAINTY:	±168 Hz
OPERATING FREQUENCY RANGE:	851-866 MHz (downlink) 806-821 MHz (uplink)

Mode of operation & carrier frequency, MHz	Input signal, dBm	Measured at	Measured 23 dB bandwidth, kHz	Authorized bandwidth, kHz	Margin, kHz	Reference to Plots in Appendix A	Verdict
Downlink @858.5125	Max (-23)	input	19.58	20	0.42	A5	Pass
		output	19.05		0.95	A6	Pass
	Min (-50)	input	19.58		0.42	A7	Pass
		output	19.43		0.57	A8	Pass
Uplink @813.5125	Max (-33)	input	19.58		0.42	A9	Pass
		output	19.58		0.42	A10	Pass
	Min (-60)	input	19.80		0.20	A11	Pass
		output	19.43		0.57	A12	Pass

LIMIT

Operating frequency range, MHz	Authorized bandwidth, kHz
806 – 821/851 - 866	20

TEST PROCEDURE

The EUT RF output was connected to the spectrum analyzer through external attenuator, the settings are shown in the plots. The measurements were performed at the EUT input and output ports in downlink and uplink transmit modes of operation at both maximum and minimum input signals for middle carrier (channel) frequency. Occupied bandwidth was measured as frequency band between 23 dBc points.

TEST EQUIPMENT USED:

HL 1465	HL 1528	HL 1542	HL 1653	HL 1824	HL 2012	

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4.3 Emission mask test according to part 90 §§90.210(b), 90.210(g), 90.691

DATE:	July 13, 2003
RELATIVE HUMIDITY:	43 %
AMBIENT TEMPERATURE:	26°C
AIR PRESSURE:	1008 hPa
FREQUENCY RANGE:	9 kHz - 9 GHz
MEASUREMENT UNCERTAINTY:	±4.5 dB

Emission mask according to §90.210(b):

The power of any emission must be attenuated below the transmitter unmodulated carrier output power (P in watts) as follows:

1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: at least 25 dB
2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: at least 35 dB
3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10 log (P) dB.

Emission mask according to §90.210(g):

The power of any emission must be attenuated below the transmitter unmodulated carrier output power (P in watts) as follows:

1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: at least 83 log (f_d / 5) dB;
2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: at least 116 log (f_d / 6.1) dB, or 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation;
3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: at least 43 + 10 log (P) dB.

Emission mask according to §90.691:

The power of any emission must be attenuated below the transmitter power (P in watts) as follows:

1) For any frequency removed from the economic area licensee's frequency block by up to and including 37.5 kHz by at least 116 log (f / 6.1) dB, or 50 + 10 log (P) dB or 80 dB, whichever is the lesser attenuation, where **f** is the frequency removed from the center of the outer channel in the block in kHz and where **f** is greater than 12.5 kHz;
2) For any frequency removed from the economic area licensee's frequency block greater than 37.5 kHz by at least 43 + 10 log (P) dB or 80 dB whichever is the lesser attenuation, where **f** is the frequency removed from the center of the outer channel in the block in kHz and where **f** is greater than 37.5 kHz.

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Test procedure

The EUT RF output was connected to the spectrum analyzer, the settings are shown in the plots. The measurements were performed in downlink and uplink transmit modes of operation at both maximum and minimum input signals.

The emission mask calculated according to formulas (1) – (3) and measured results are shown in Plots A13 to A24. The measurements were performed with one modulated carrier at the middle frequency of the band.

Conducted spurious emissions were measured at the EUT output terminals in the frequency range from 9 kHz up to 9 GHz beyond ±250% of the authorized bandwidth from the carrier.

Three carrier (channel) signals of an equal magnitude, two modulated at one edge and one CW at the other edge of the assigned band, were applied to the EUT input. The specified limit 43 + 10 log (P) was calculated separately for downlink and uplink modes.
For downlink mode the composite output power is 40 dBm or 10 W, for uplink – 30 dBm or 1 W. Output power P for each channel is equal to composite power in watts divided by 3 (or reduced by 4.8 dB) and attenuation limit L below carrier is equal to:

Downlink mode: L_D (dB) = 43 + 10 log (P) = 43 + 10 log (10 W/3) = 48.23 dB
Uplink mode: L_U (dB) = 43 + 10 log (P) = 43 + 10 log (1 W/3) = 38.23 dB

These limits were applied to spurious emissions throughout the following frequency ranges:

9 kHz to 850.9625 MHz, 851.0875 to 865.9375 MHz and 866.0375 MHz to 9 GHz (downlink),
9 kHz to 805.9625 MHz, 806.0875 to 820.9375 MHz and 821.0375 MHz to 9 GHz (uplink).

Attenuation below carrier was calculated by subtraction of a measured spurious power from a carrier output power for each channel. The carrier output power for each channel is equal to the composite output power reduced by 4.8 dB: 35.2 dBm for downlink mode, 25.2 dBm for uplink.

For example, plot A30 demonstrates MRK recording –75 dBm, external attenuation is 51 dB, hence, measured spurious emission level is –24 dBm. Attenuation below carrier is equal to 35.2 dBm – (-24 dBm) = 59.2 dB at 48.2 dB attenuation limit.
Test results are brought in table below and are shown in Plots A25 to A78.

Radiated spurious emissions – refer to this test report section 4.5.

TEST EQUIPMENT USED:

HL 0051	HL 1424	HL 1460	HL 1481			

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Conducted spurious emissions test results

Mode of operation	Input signal	Frequency, MHz	Spurious emission level, dBm	Attenuation below carrier, dB	Spurious attenuation limit, dB	Margin, dB	Verdict	Reference to Plots in Appendix A
Downlink	maximum	851.0875	-24.00	59.20	48.23	10.97	Pass	A30
		865.9375	-22.17	57.17	48.23	8.94	Pass	A32
		866.0375	-23.33	58.53	48.23	10.30	Pass	A33
	minimum	851.0000	-23.83	59.03	48.23	10.80	Pass	A41
		851.0875	-21.83	57.03	48.23	8.80	Pass	A42
		865. 9375	-18.83	54.03	48.23	5.80	Pass	A44
		866.0375	-19.33	54.53	48.23	6.30	Pass	A45
		866.5000	-24.00	59.20	48.23	10.97	Pass	A46
Uplink	maximum	806.0250	-	48.00	38.23	9.77	Pass	A53, A54
		806.0875	-20.67	45.87	38.23	7.64	Pass	A55
		820.9346	-30.17	55.37	38.23	17.14	Pass	A57
		821.0375	-22.83	48.03	38.23	9.80	Pass	A58
		826.9000	-26.00	51.20	38.23	12.97	Pass	A60
	minimum	805.9250	-31.17	56.37	38.23	18.14	Pass	A66
		806.0250	-	49.00	38.23	10.77	Pass	A67, A68
		806.0882	-20.67	45.87	38.23	7.64	Pass	A69
		811.5883	-26.50	51.70	38.23	13.47	Pass	A71
		820.9368	-24.50	49.70	38.23	11.47	Pass	A72
		821.0398	-25.67	50.87	38.23	12.64	Pass	A73
		826.5515	-21.00	46.20	38.23	7.97s	Pass	A75, A76

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4.4 Radiated emissions test according to part 90 §§90.210(b), 90.210(g), 90.691

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.4
DATE:	July 13, 2003
RELATIVE HUMIDITY:	44 %
AMBIENT TEMPERATURE:	26°C
AIR PRESSURE:	1008 hPa
FREQUENCY RANGE	9 kHz - 9 GHz
MEASUREMENT UNCERTAINTY:	± 4.5 dB

Radiated spurious emissions were measured in downlink and uplink modes of operation at both maximum and minimum input signals (minimum and maximum gain).
Three carrier (channel) signals of an equal magnitude, two modulated at one edge and one CW at the other edge of the assigned band, were applied to the EUT input.

The measurements were performed at 3-m test distance:
with the loop antenna in the range 9 kHz to 30 MHz (in the anechoic chamber),
the biconilog - in the range 30 MHz to 1000 MHz (in the anechoic chamber),
the double ridged guide – in frequency range from 1000 to 5000 MHz in the anechoic chamber, from 5000 to 9000 MHz – at the open area test site.
The EUT was set up on the 80 cm height wooden table, as shown in Figures 4.5.1 to 4.5.3.

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

30 MHz – 9 GHz frequency range. 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 specified limit 43 + 10 log (P) was converted in 82.2 dB(µV/m) equivalent field strength at 3 m and this limit was applied to spurious emissions throughout the following frequency ranges:

9 kHz to 850.9625 MHz, 851.0875 to 865.9375 MHz and 866.0375 MHz to 9 GHz (downlink),
9 kHz to 805.9625 MHz, 806.0875 to 820.9375 MHz and 821.0375 MHz to 9 GHz (uplink).

The test results are shown in Plots A79 to A110. All spurious emissions were found at least 20 dB below limit.

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

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

TEST EQUIPMENT USED AT OPEN AREA TEST SITE:

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

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Figure 4.4.1

Set up for radiated emissions measurement in 9 kHz to 30 MHz range

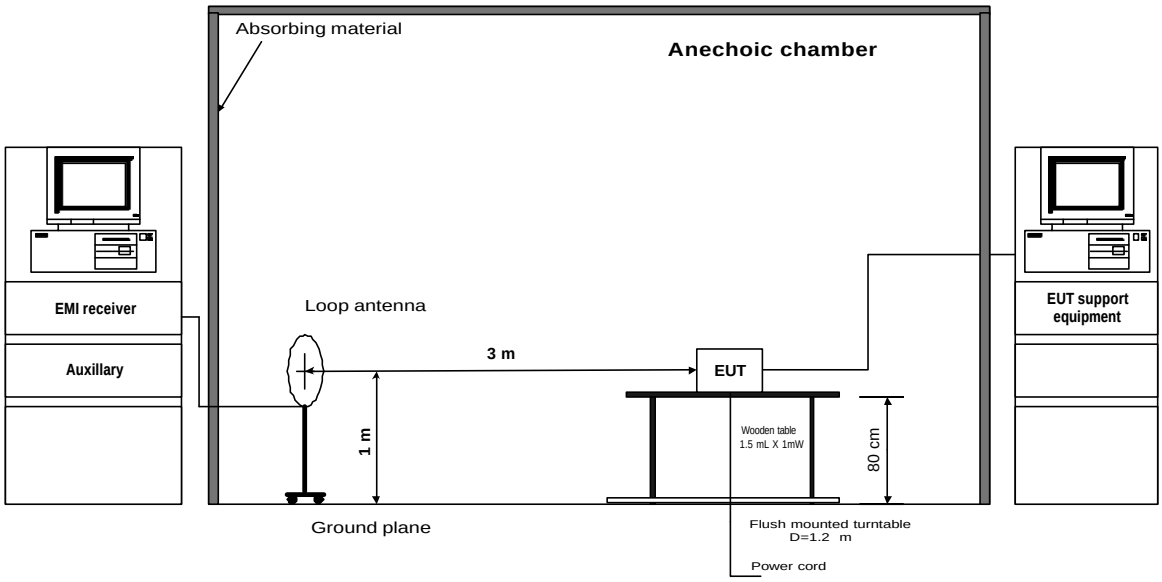

Figure 4.4.2

Set up for radiated emissions measurement

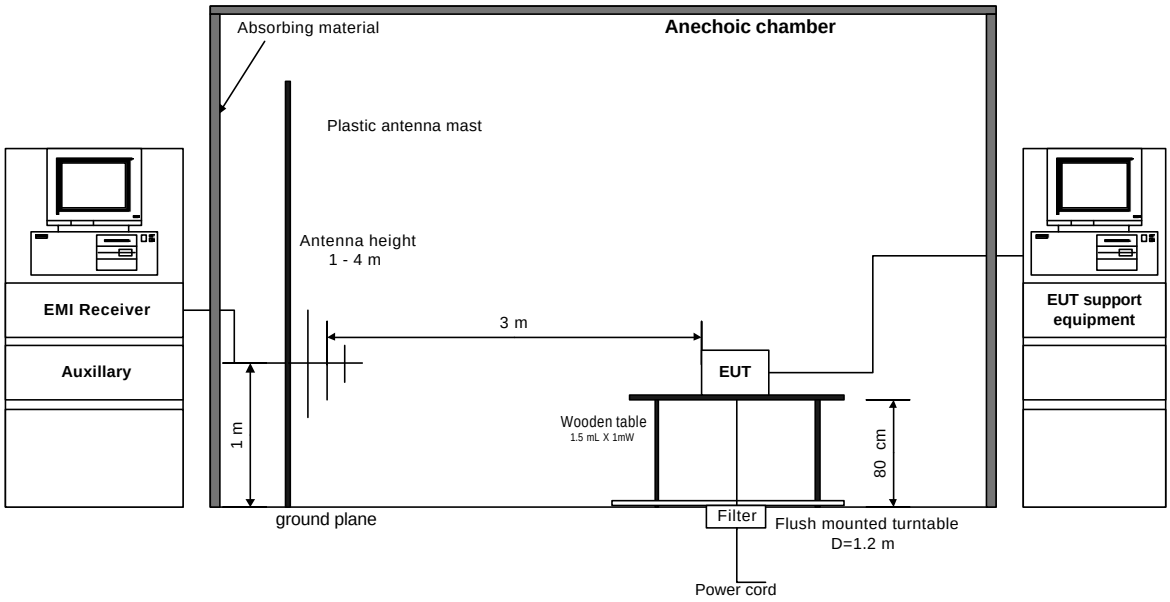

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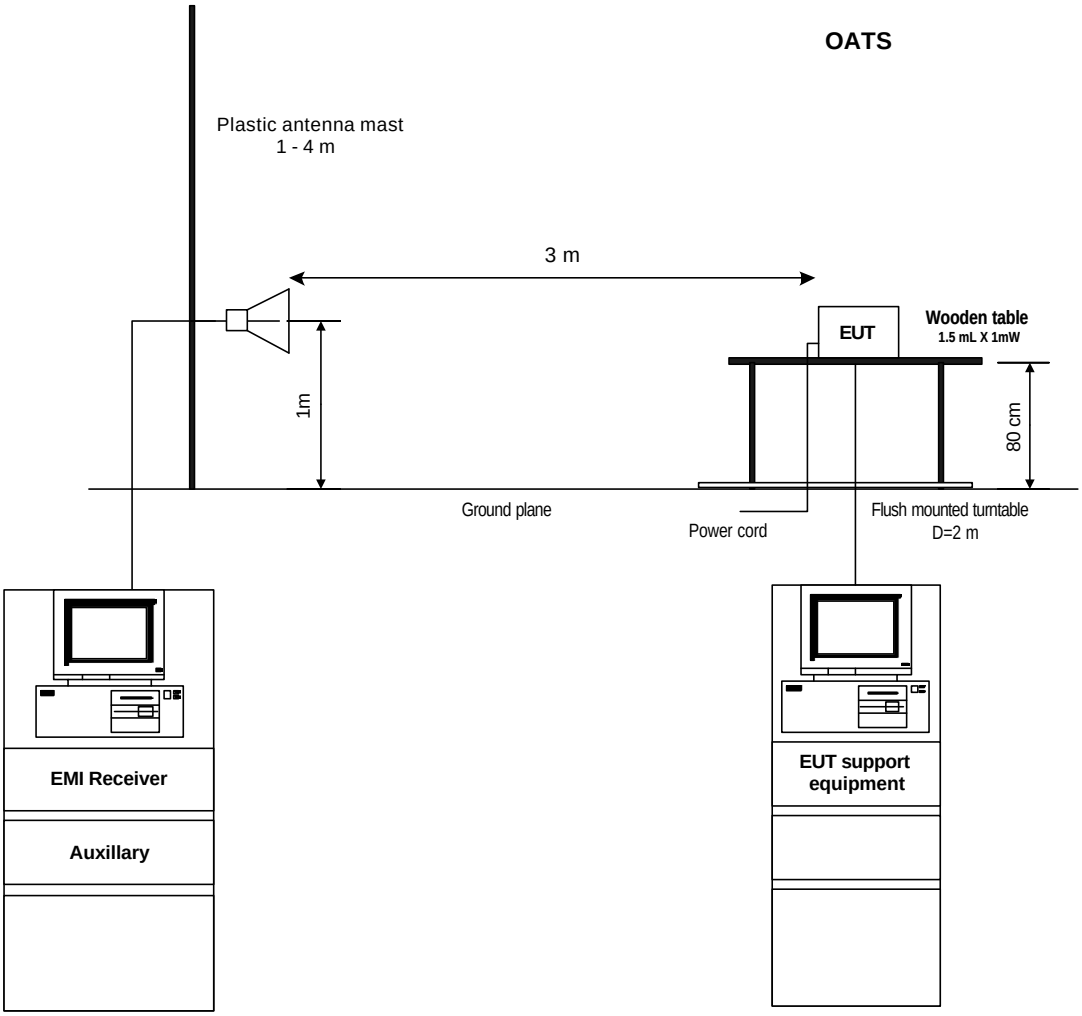
Figure 4.4.3

Set up for radiated emissions measurement



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4.5 Unintentional radiated emissions test according to §15.109

METHOD OF MEASUREMENT:	ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
DATE	June 18, 2003
TEST PERFROMED AT:	Anechoic chamber
AMBIENT TEMPERATURE:	23°C
RELATIVE HUMIDITY	40%
AIR PRESSURE:	1015 hPa
DISTANCE BETWEEN ANTENNA AND EUT:	3 m
THE EUT WAS TESTED AS:	Table-top
FREQUECNY RANGE:	30 MHz – 5 GHz
MEASUREMENT UNCERTAINTY:	± 6 dB max

For test procedure and setup refer to section 4.5.

Frequency, MHz	Detector type	RBW, kHz	Ant. type	Ant. polariz.	Ant, hgt, m	TT pos., (°)	Radiated emissions, dB (mV/m)	Limit, dB (mV/m)	Margin, dB	Verdict
65.553	QP	120	BL	Vertical	1.0	356	37.65	40.0	2.35	Pass
131.080	QP	120	BL	Vertical	1.0	116	41.55	43.5	1.95	Pass
196.605	QP	120	BL	Horizontal	1.7	208	39.41	43.5	4.09	Pass
327.680	QP	120	BL	Horizontal	1.3	176	45.93	46.0	0.07	Pass
458.744	QP	120	BL	Horizontal	1.2	350	37.07	46.0	8.93	Pass
2373.199	AVG	1000	DRG	Vertical	1.0	24	53.20	54.0	0.80	Pass
2508.101	AVG	1000	DRG	Vertical	1.0	143	46.03	54.0	7.97	Pass

The “Pass” decision was made without Hermon Labs uncertainty. For full test results refer to plots A111, A112.

Table abbreviations:

Ant. type = antenna type (BL – biconilog, DRG – double ridged guide)
Ant. pol. = antenna polarization
Ant. hgt. = antenna height
TT pos. = turntable position in degrees, (EUT front panel = 0°).
Margin = dB below (negative if above) specification limit.

LIMIT (§ 15.109)

Frequency, MHz	Class B equipment @ 3 m dB(mV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 5000	54.0

TEST EQUIPMENT USED:

HL 0041	HL 0465	HL 0521	HL 0592	HL 0593	HL 0594	HL 0604
HL 1942						

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4.6 Conducted emissions test according to §15.207, 15.107

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.3
DATE:	July 10, 2003
RELATIVE HUMIDITY:	43 %
AMBIENT TEMPERATURE:	24 °C
AIR PRESSURE:	1007 hPa
THE EUT WAS TESTED AS:	TABLE-TOP
FREQUECNY RANGE:	150 kHz – 30 MHz
RESOLUTION BANDWIDTH:	9 kHz
MEASUREMENT UNCERTAINTY, dB	± 3.8 dB

The measurements were performed in transmit mode as per §15.207 (downlink and uplink) and in stand-by mode as per §15.107. The worst test results were found in downlink transmit mode and are brought in the tables below. For all test results refer to plots A113 – A118.

Quasi-peak detector

Frequency, MHz	Line identification	Measured emissions, dB (mV)	Specification QP limit, dB (mV)	Margin, dB	Verdict	Reference to Plots in Appendix A
0.181382	N	47.98	64.47	16.49	Pass	A114
0.211607	Ph	53.96	63.21	9.25	Pass	A113
0.317032	Ph	42.09	59.81	17.72	Pass	A113
0.364522	N	37.40	58.68	21.28	Pass	A114
1.277643	Ph	39.61	56.0	16.39	Pass	A113
1.459698	Ph	40.55	56.0	15.45	Pass	A113
2.009608	Ph	38.24	56.0	17.76	Pass	A113
27.925790	Ph	43.14	60.0	16.86	Pass	A113

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Average detector

Frequency, MHz	Line identification	Measured emissions, dB (mV)	Specification AVRG limit, dB (mV)	Margin, dB	Pass/ Fail	Reference to Plots in Appendix A
0.181382	N	47.45	54.47	7.02	Pass	A114
0.211607	Ph	47.87	53.21	5.34	Pass	A113
0.317032	Ph	37.60	49.81	12.21	Pass	A113
0.364522	N	37.18	48.68	11.50	Pass	A114
1.277643	Ph	38.90	46.0	7.10	Pass	A113
1.459698	Ph	40.42	46.0	5.58	Pass	A113
2.009608	Ph	35.32	46.0	10.68	Pass	A113
27.925790	Ph	31.63	50.0	18.37	Pass	A113

LIMIT

Frequency, MHz	Class B equipment, dB(mV)	
	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 0787	HL 1430	HL 1502	HL 1510		

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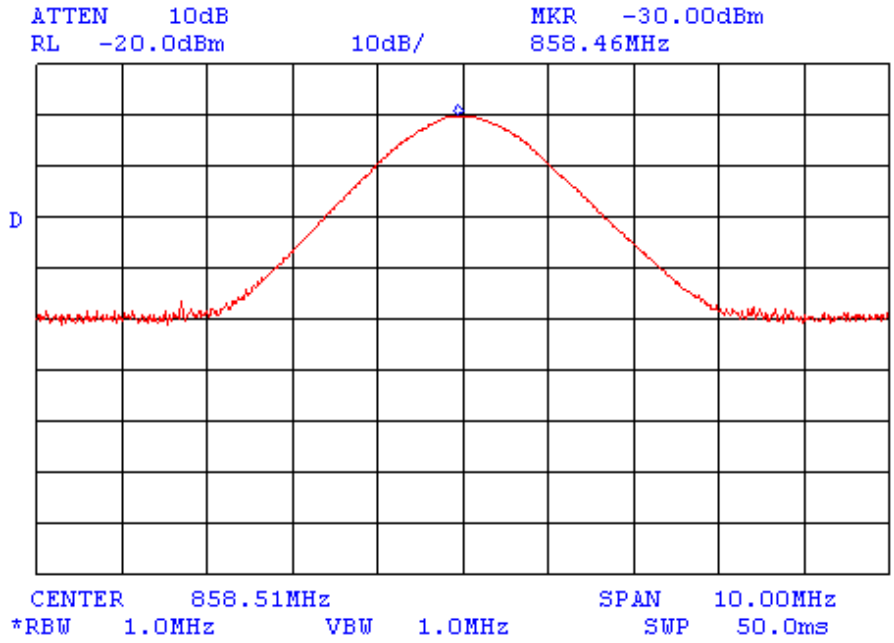
Appendix A Plots

Plot A 1

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)



P_{out}=- 30 dBm + 69.8 dB = 39.8 dBm
External attenuation 69.8 dB

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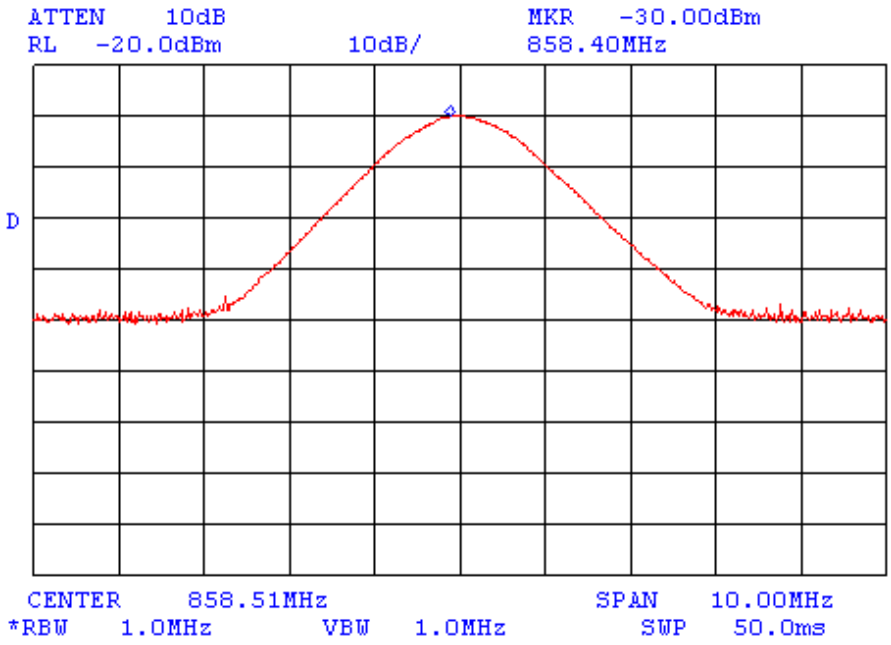
Plot A 2

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)



P_{out}=- 30 dBm + 69.8 dB = 39.8 dBm
External attenuation 69.8 dB

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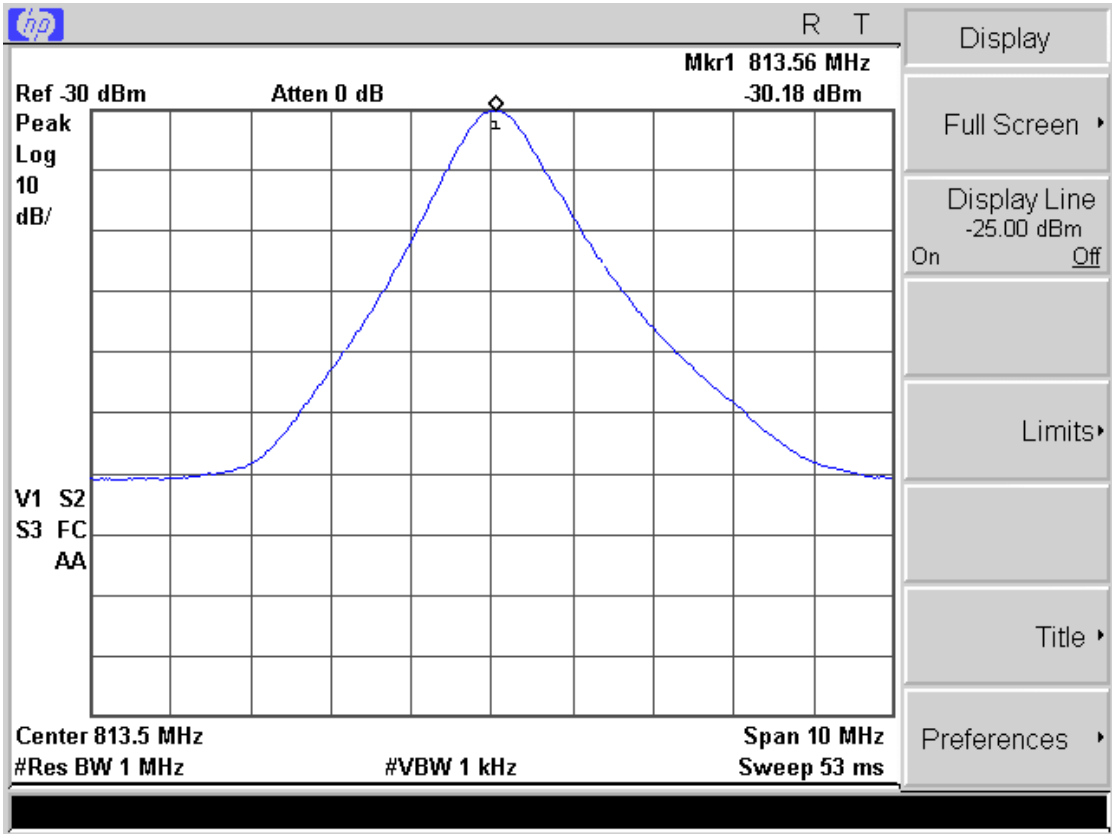
Plot A 3

Peak output power measurements

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)



P_{out}= -30.18 dBm + 60.8 dB = 30.62 dBm
External attenuation 60.8 dB

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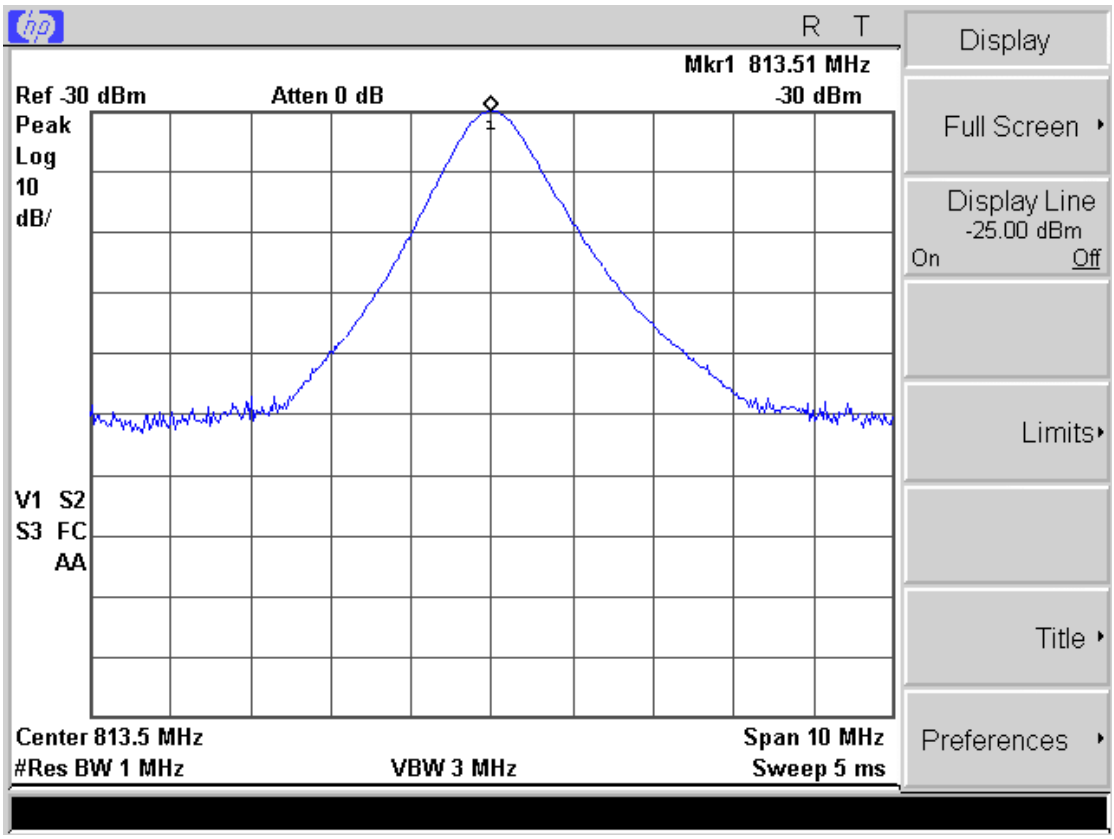
Plot A 4

Peak output power measurements

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)



P_{out}= -30.0 dBm + 60.8 dB = 30.8 dBm
External attenuation 60.8 dB

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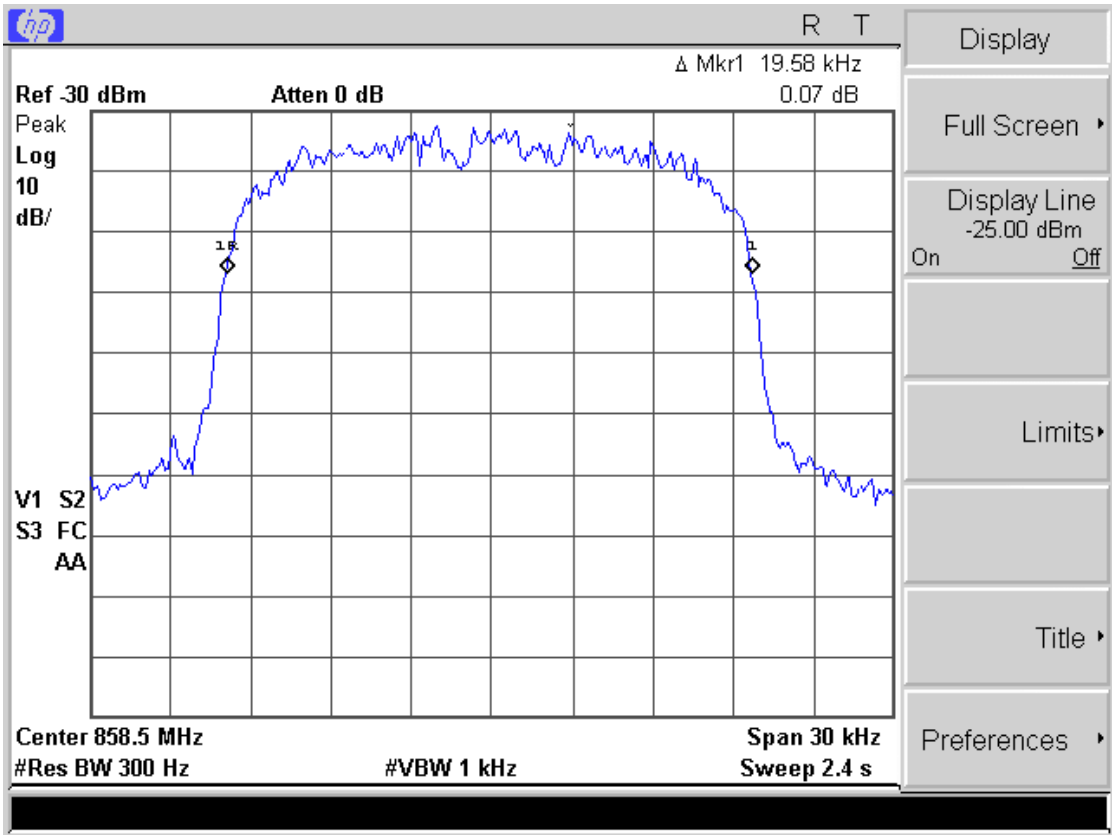
Plot A 5

Occupied bandwidth at the EUT input

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)



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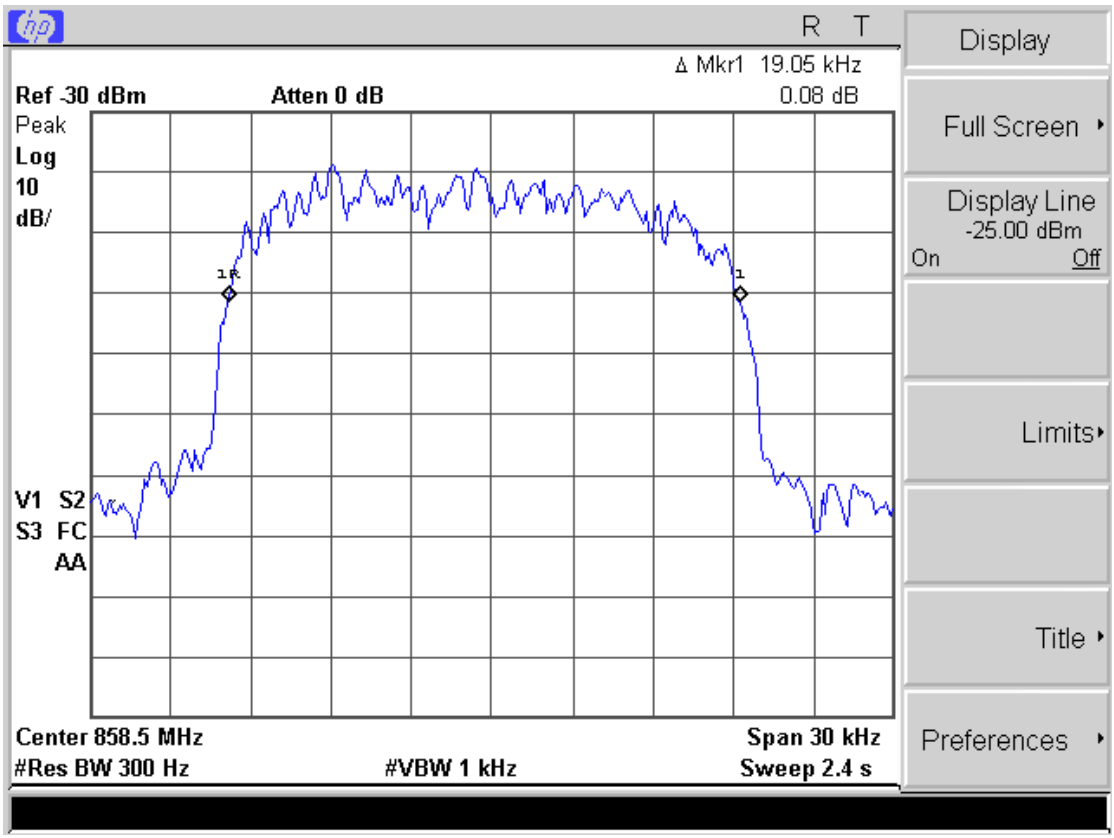
Plot A 6

Occupied bandwidth at the EUT output

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)



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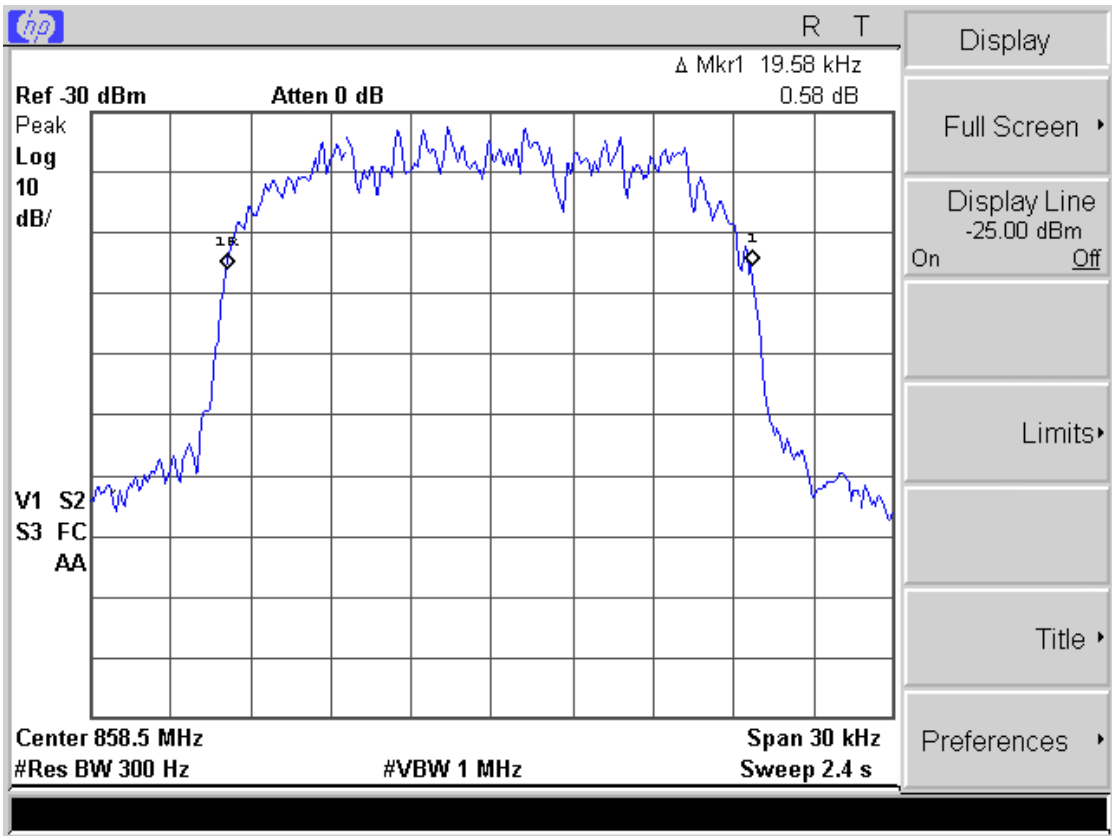
Plot A 7

Occupied bandwidth at the EUT input

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)



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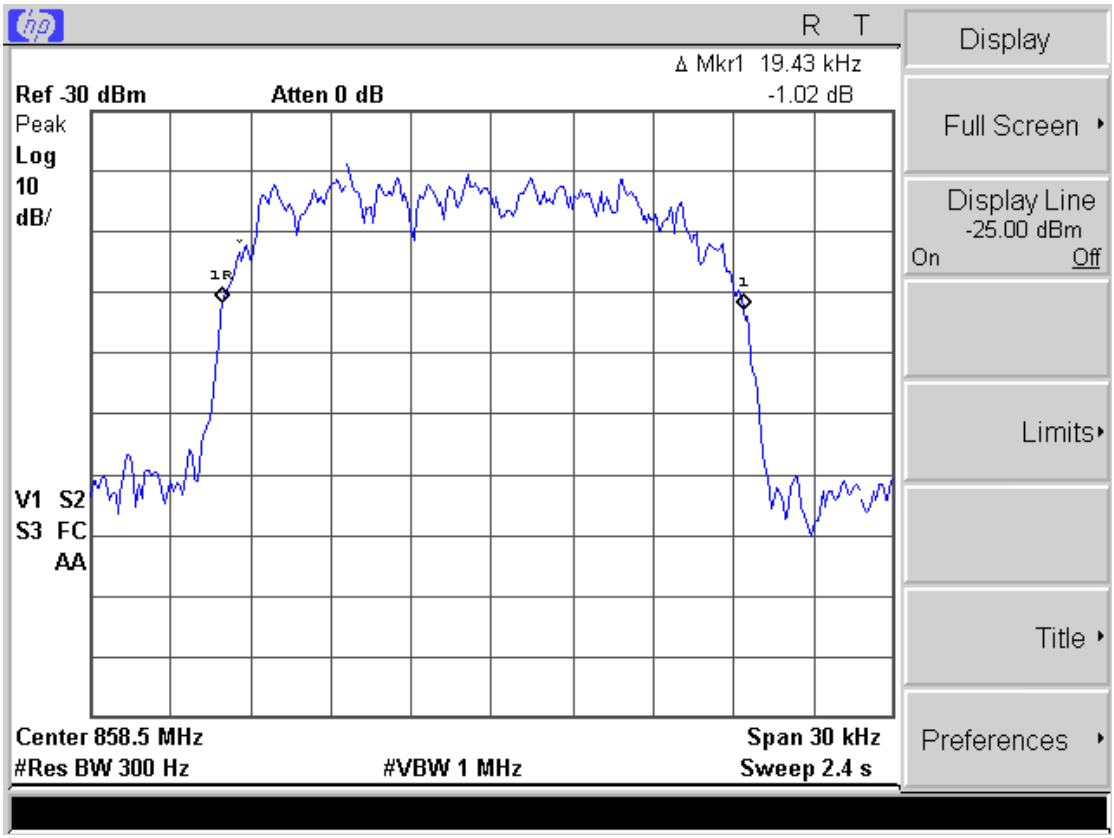
Plot A 8

Occupied bandwidth at the EUT output

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)



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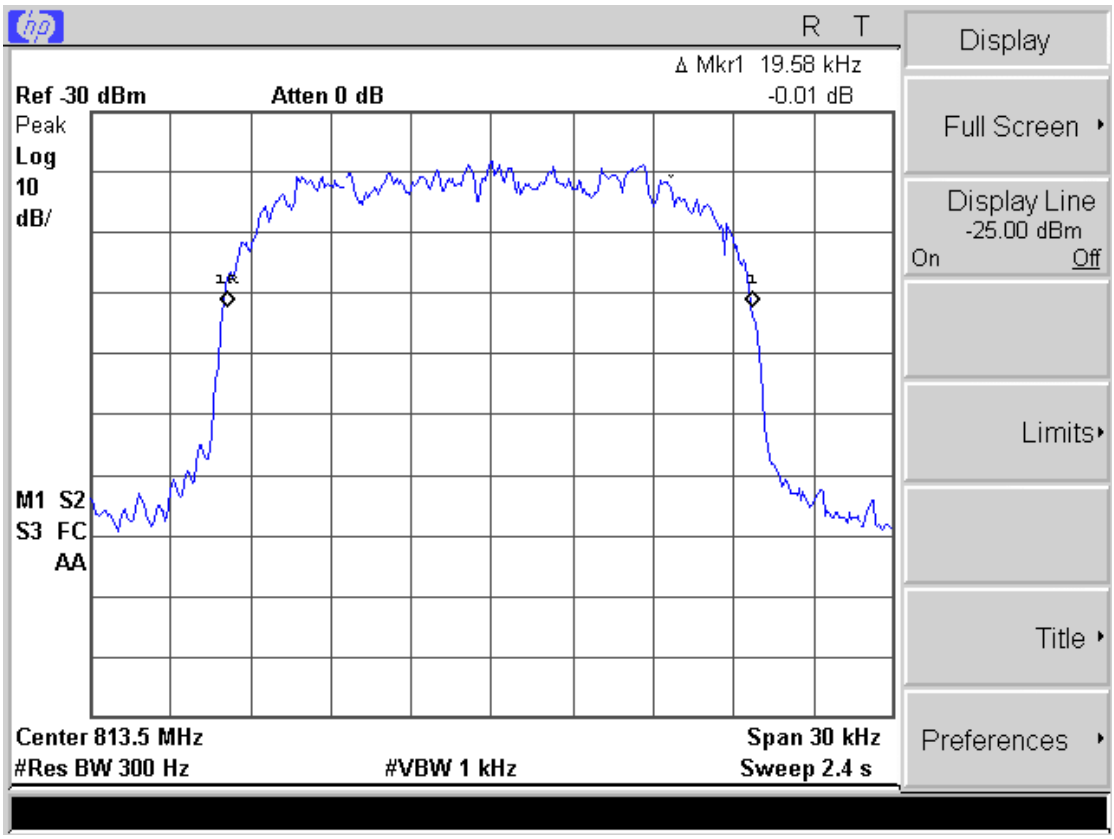
Plot A 9

Occupied bandwidth at the EUT input

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)



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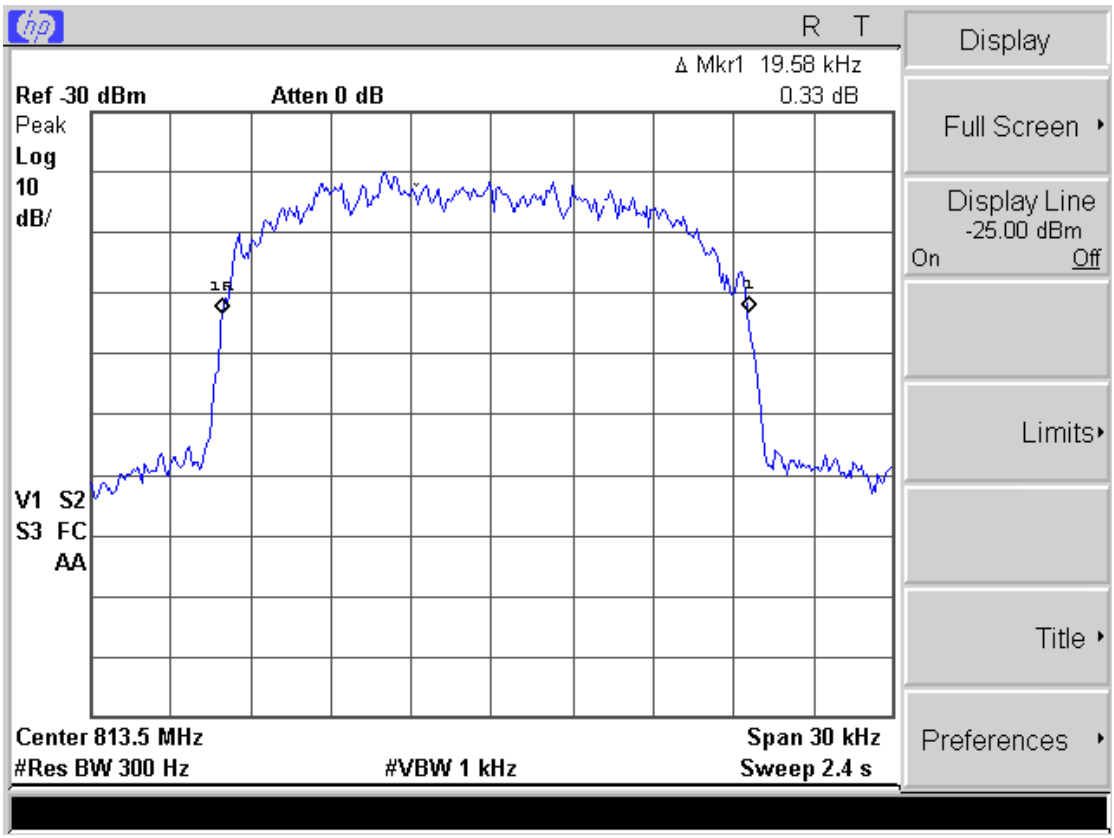
Plot A 10

Occupied bandwidth at the EUT output

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)



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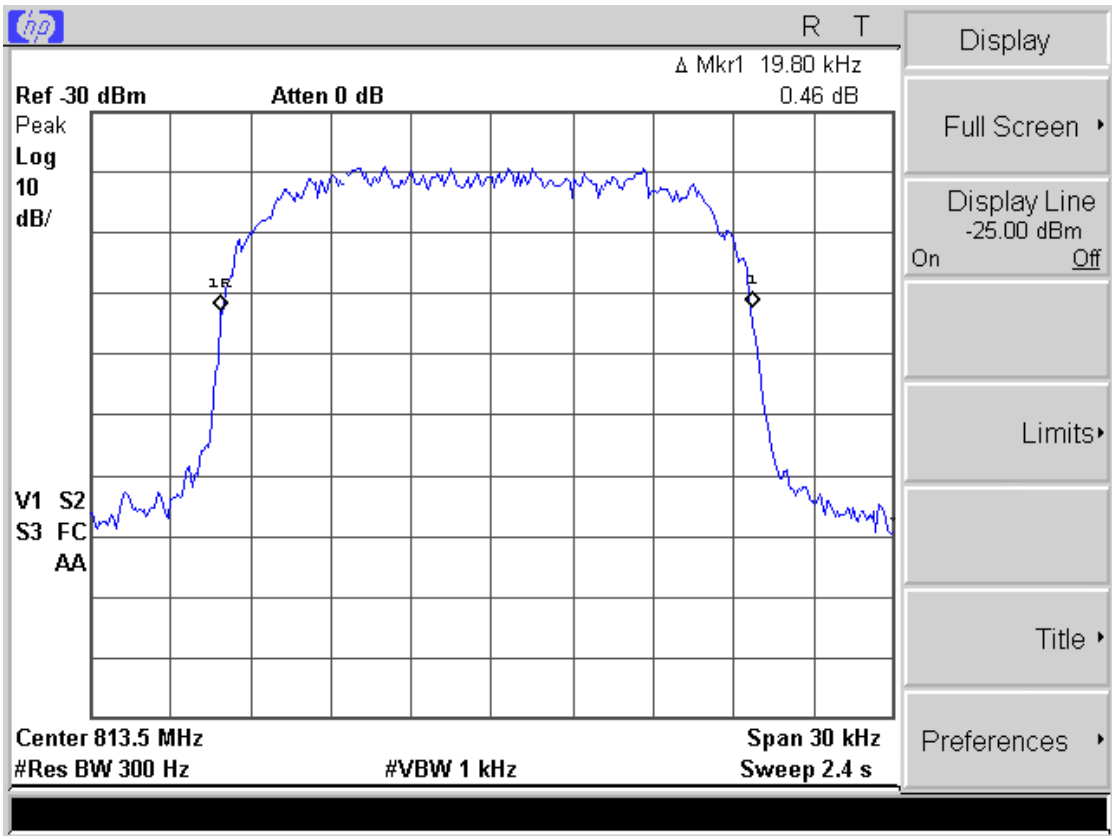
Plot A 11

Occupied bandwidth at the EUT input

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)



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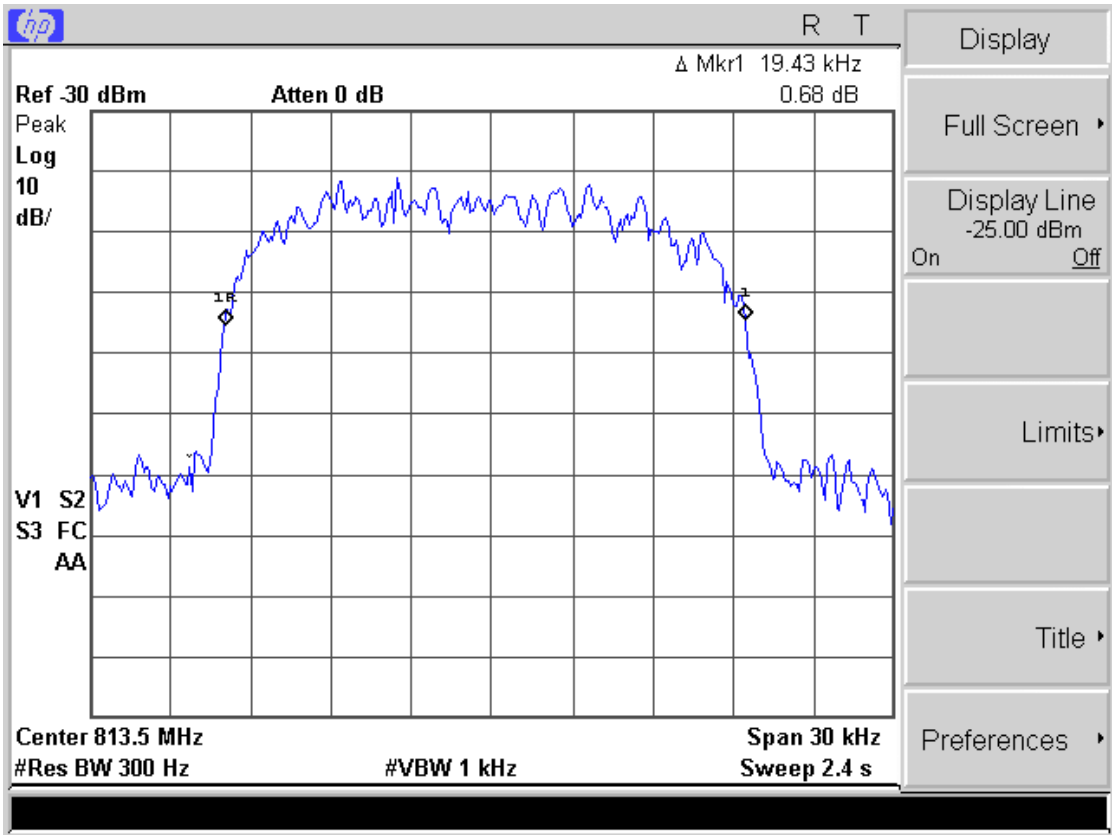
Plot A 12

Occupied bandwidth at the EUT output

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)



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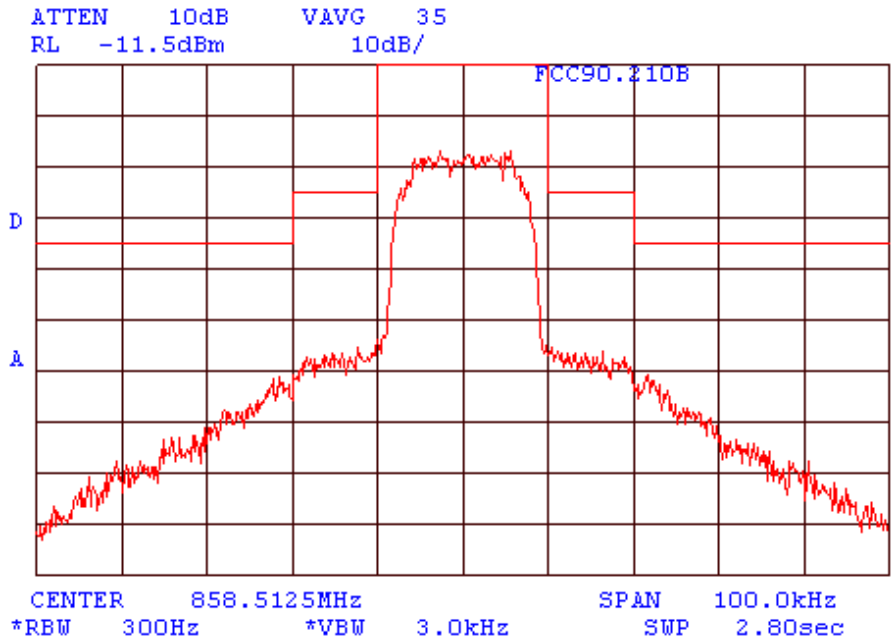
Plot A 13

Emission mask test results according to FCC part 90 §90.210(b)

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)



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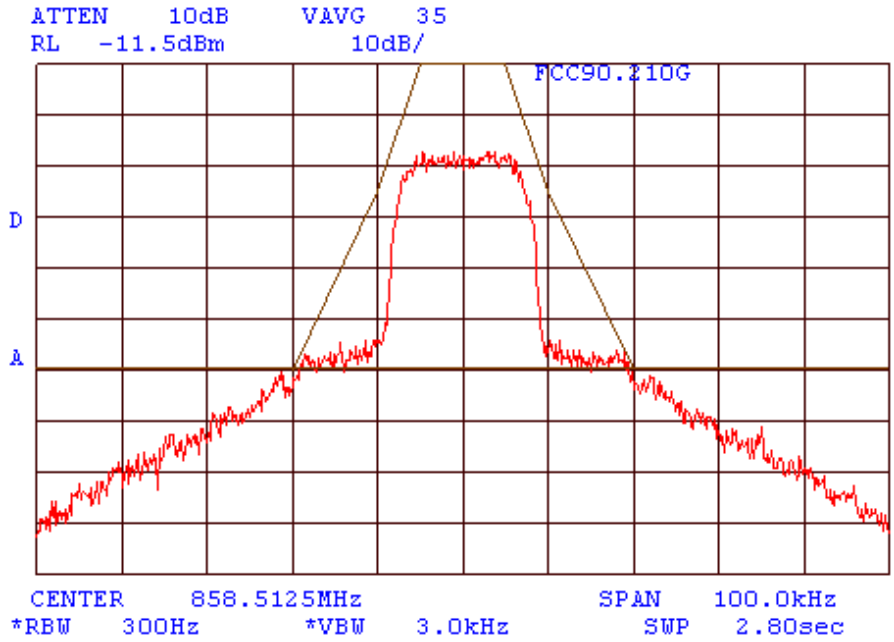
Plot A 14

Emission mask test results according to FCC part 90 §90.210(g)

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)



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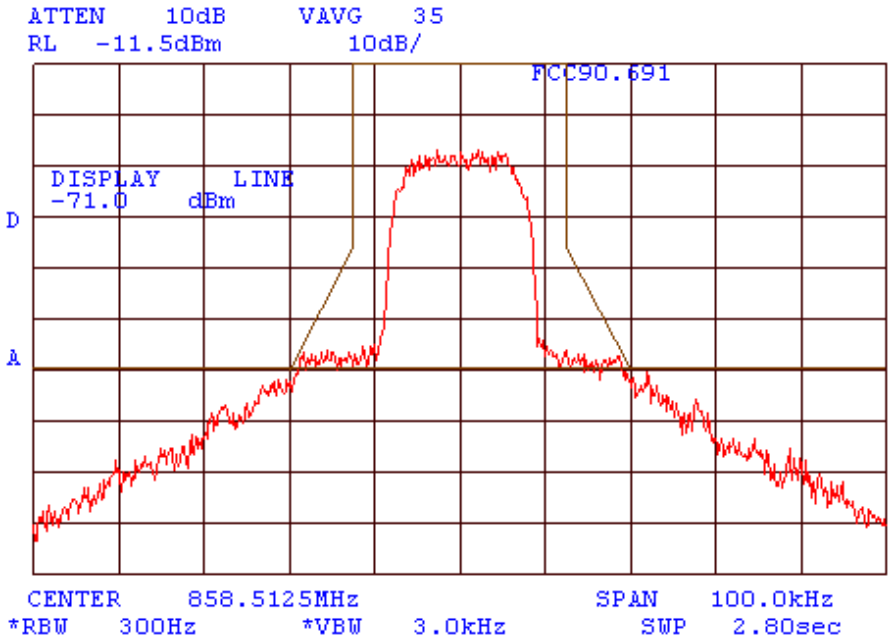
Plot A 15

Emission mask test results according to FCC part 90 §90.691

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)



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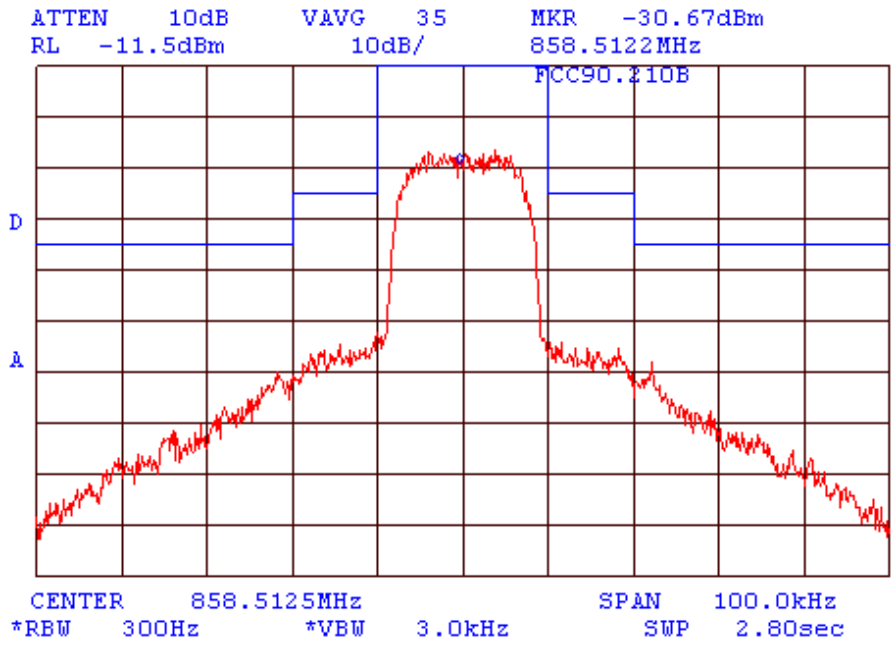
Plot A 16

Emission mask test results according to FCC part 90 §90.210(b)

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)



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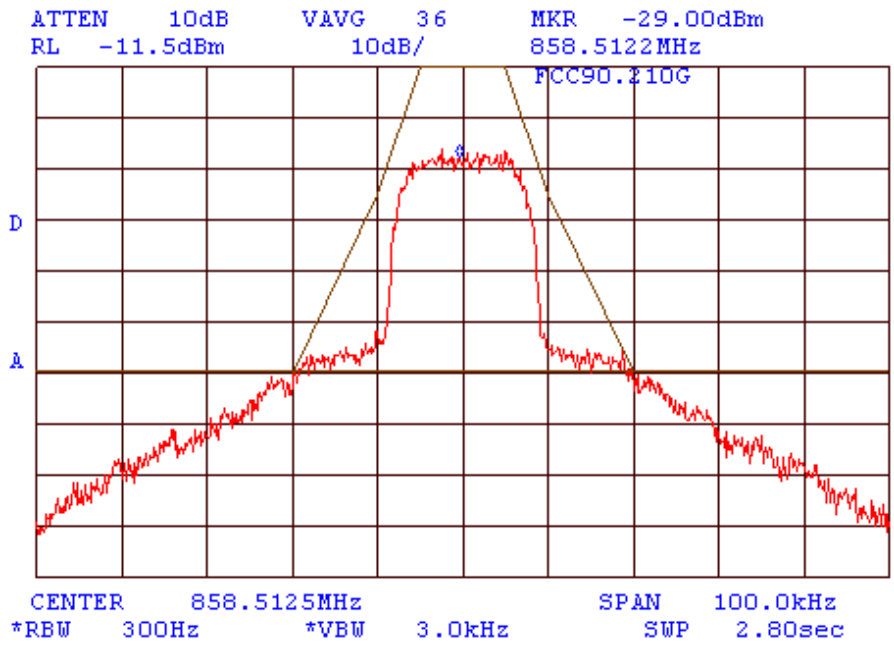
Plot A 17

Emission mask test results according to FCC part 90 §90.210(g)

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)



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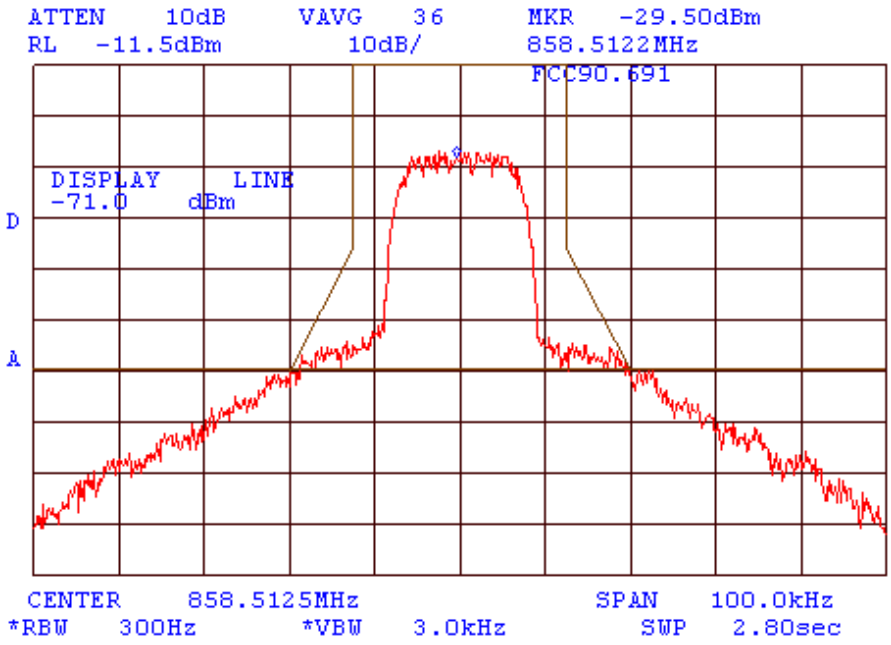
Plot A 18

Emission mask test results according to FCC part 90 §90.691

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)



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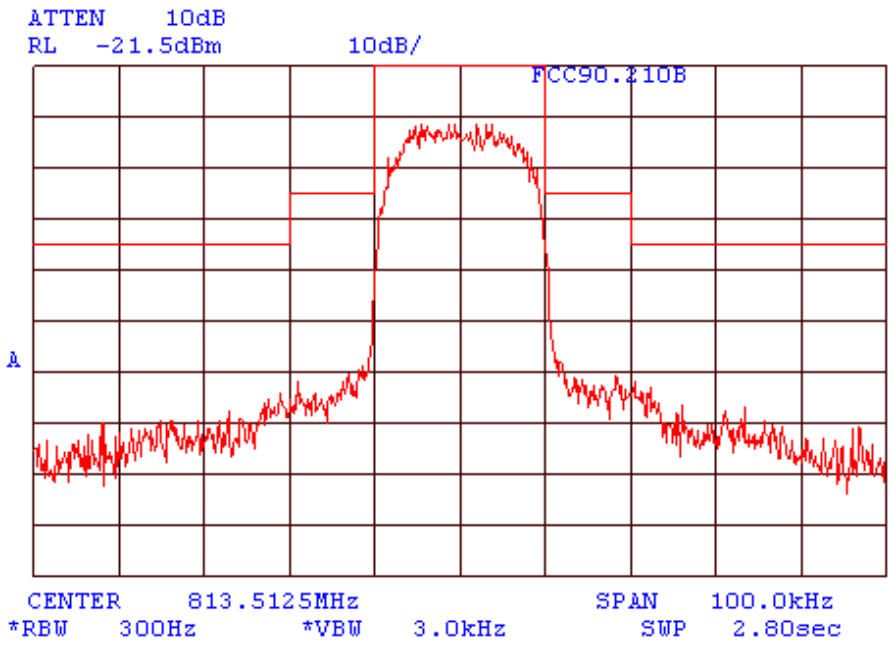
Plot A 19

Emission mask test results according to FCC part 90 §90.210(b)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)



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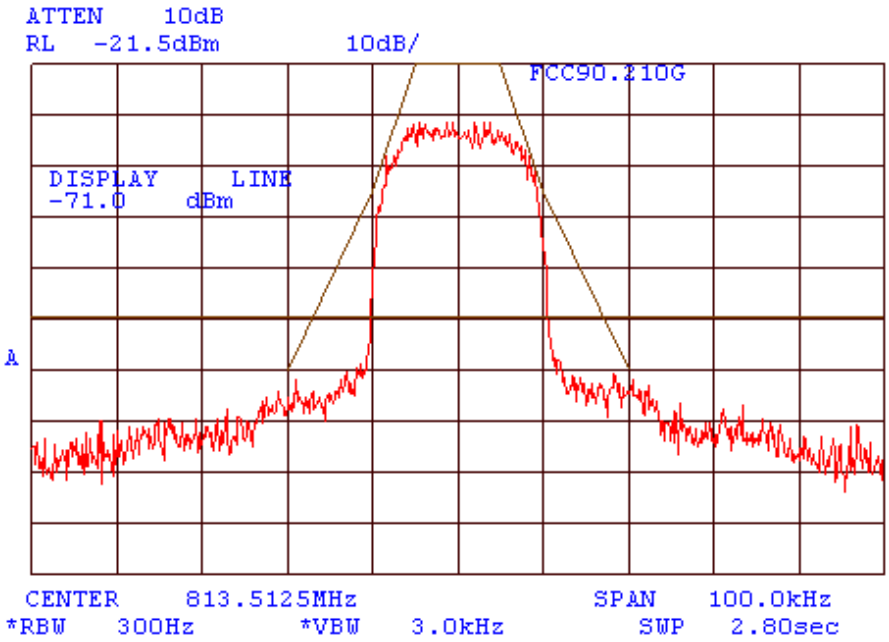
Plot A 20

Emission mask test results according to FCC part 90 §90.210(g)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)



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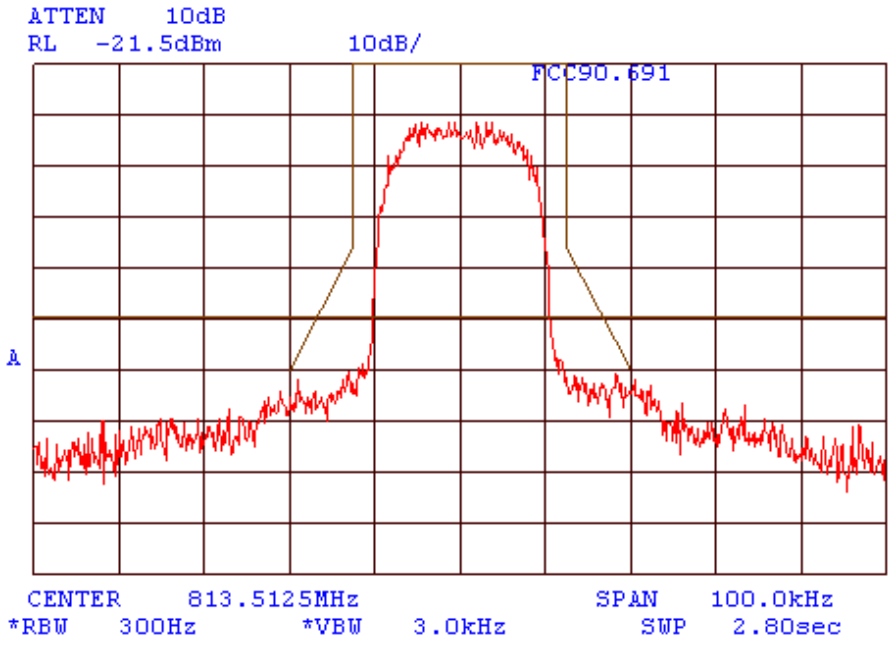
Plot A 21

Emission mask test results according to FCC part 90 §90.691

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)



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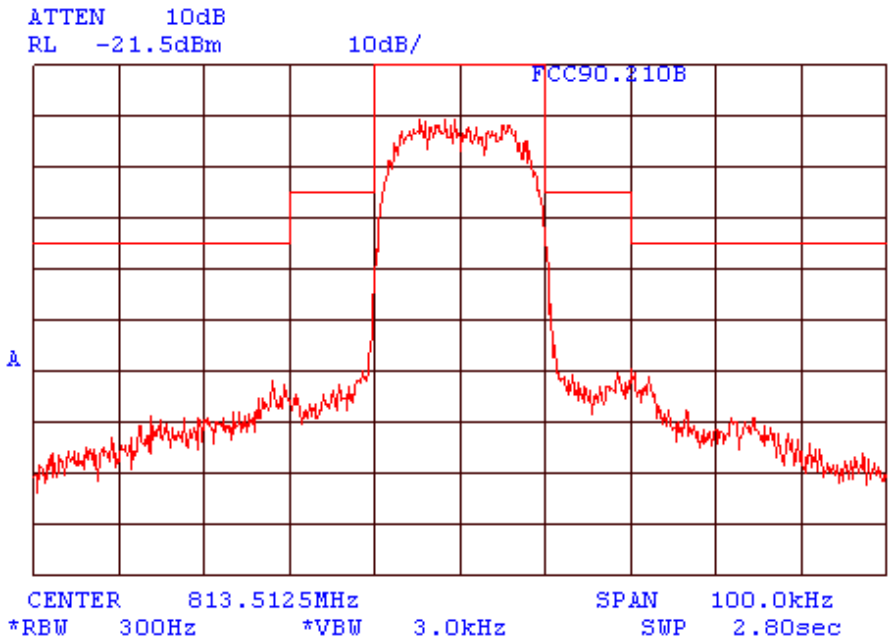
Plot A 22

Emission mask test results according to FCC part 90 §90.210(b)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)



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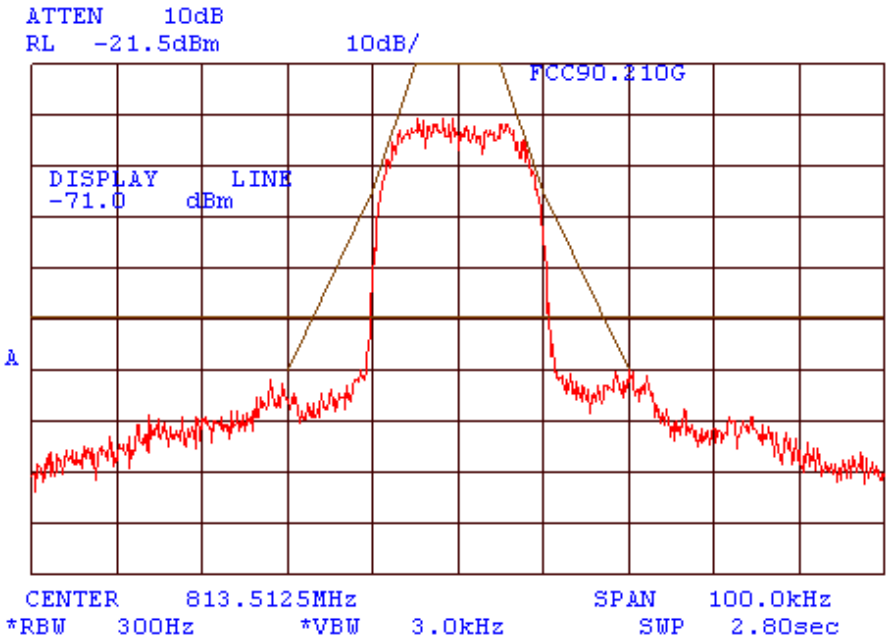
Plot A 23

Emission mask test results according to FCC part 90 §90.210(g)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)



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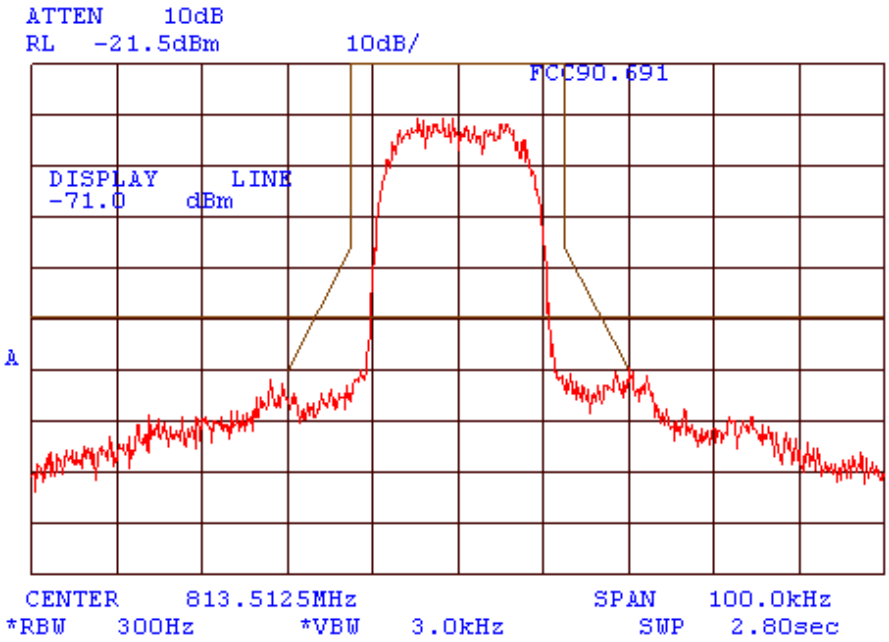
Plot A 24

Emission mask test results according to FCC part 90 §90.691

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)



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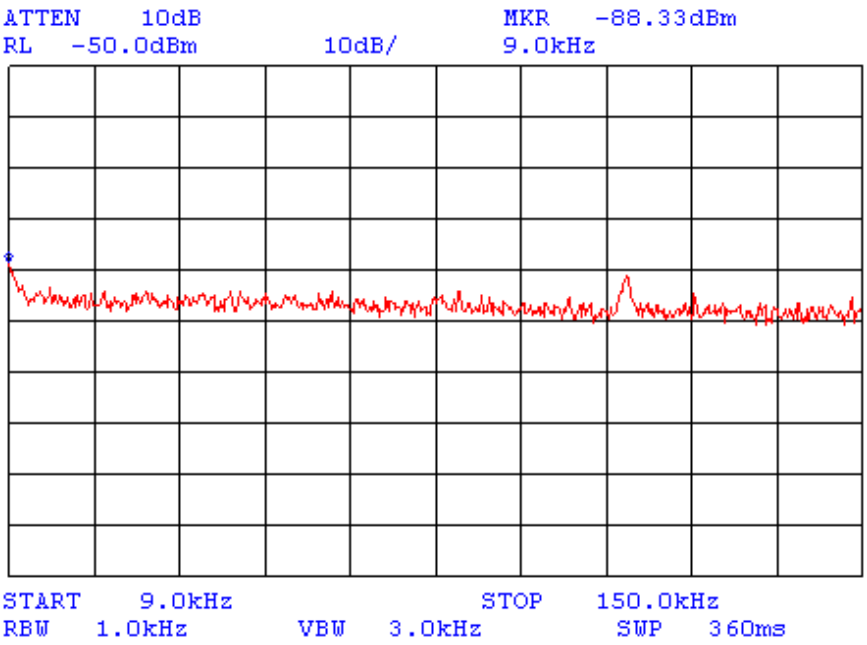
Plot A 25

Conducted spurious emission measurements in 9 kHz – 150 kHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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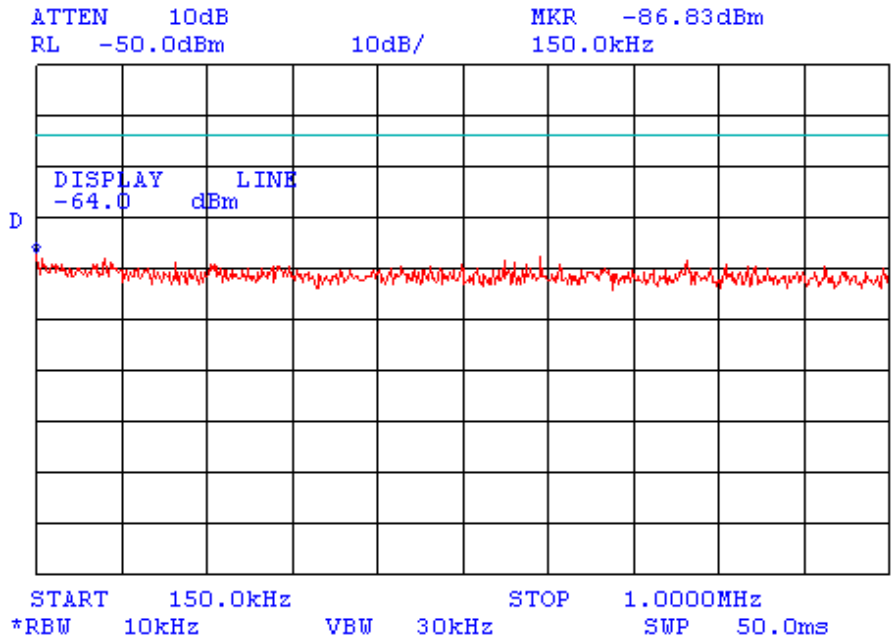
Plot A 26

Conducted spurious emission measurements in 150 kHz – 1 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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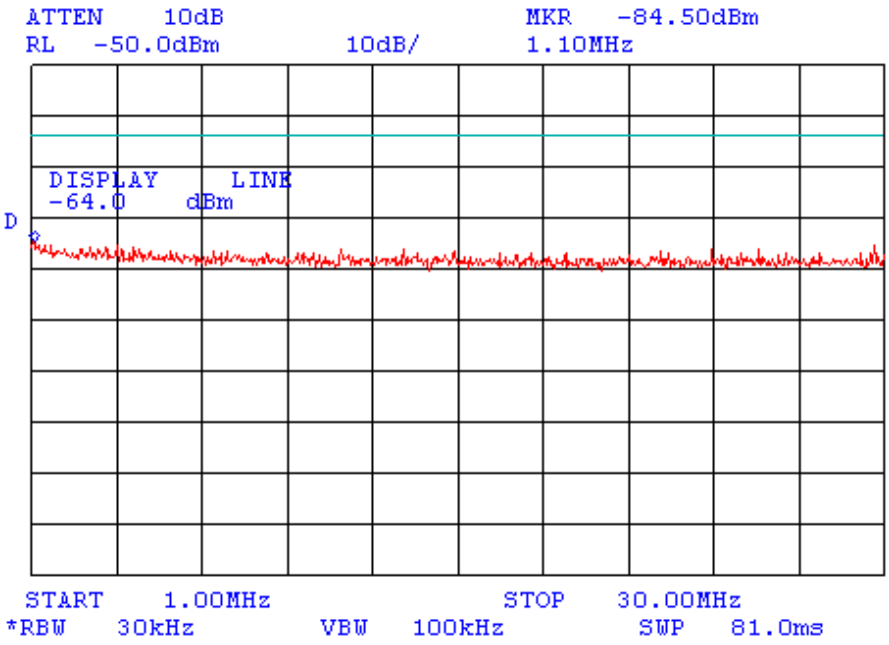
Plot A 27

Conducted spurious emission measurements in 1 MHz – 30 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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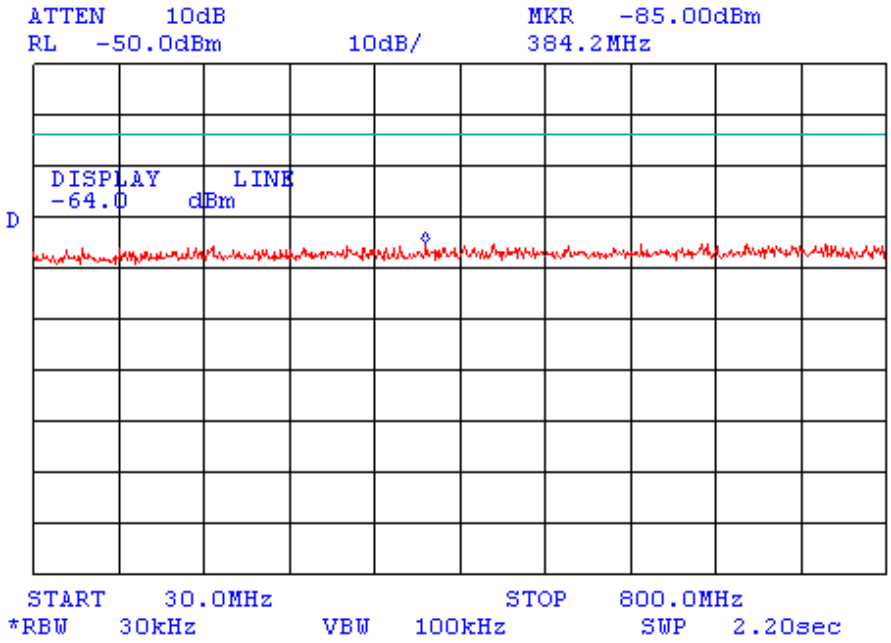
Plot A 28

Conducted spurious emission measurements in 30 MHz – 800 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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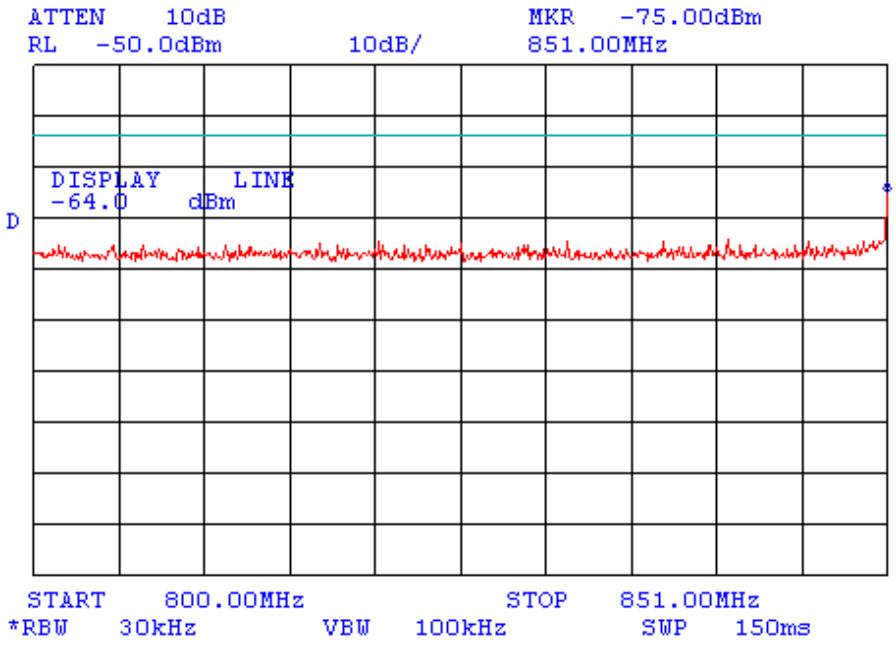
Plot A 29

Conducted spurious emission measurements in 800 MHz – 851 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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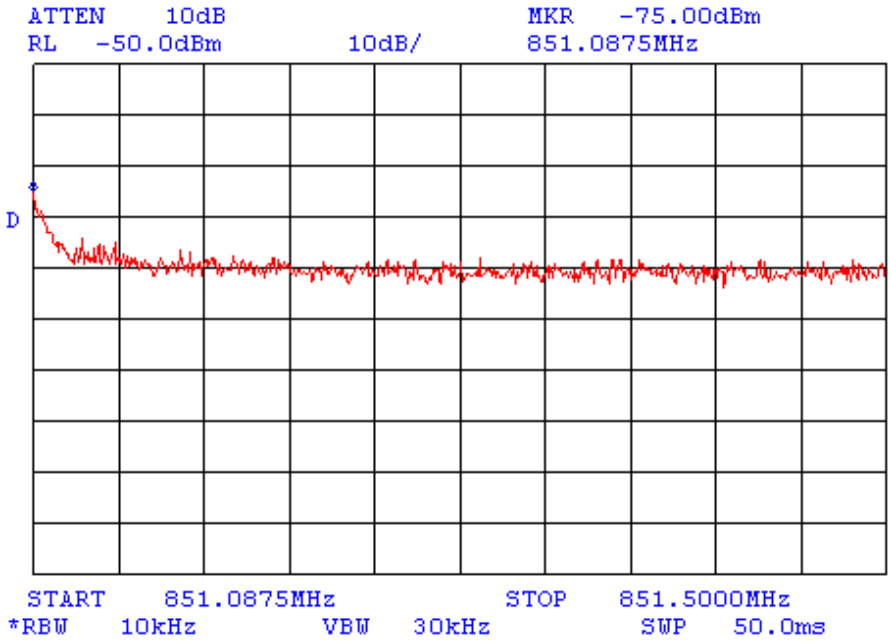
Plot A 30

Conducted spurious emission measurements in 851.0875 MHz – 851.500 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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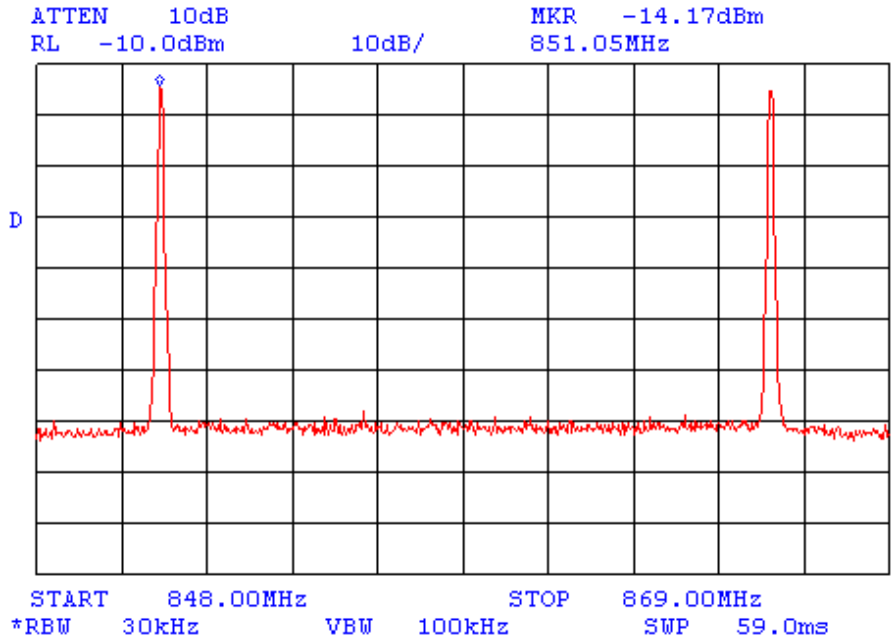
Plot A 31

Conducted spurious emission measurements in 848.00 MHz – 869.00 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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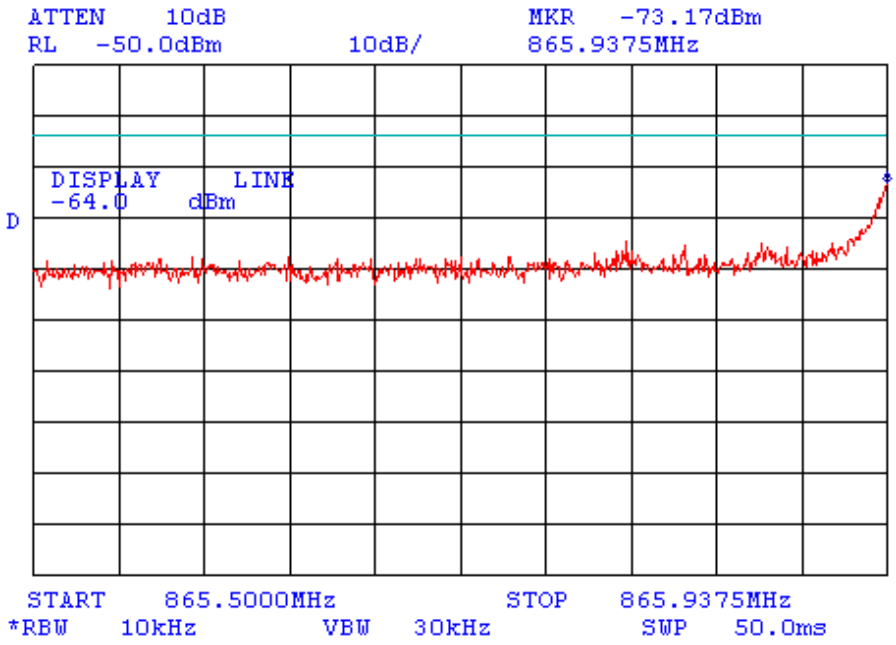
Plot A 32

Conducted spurious emission measurements in 865.500 MHz – 865.9375 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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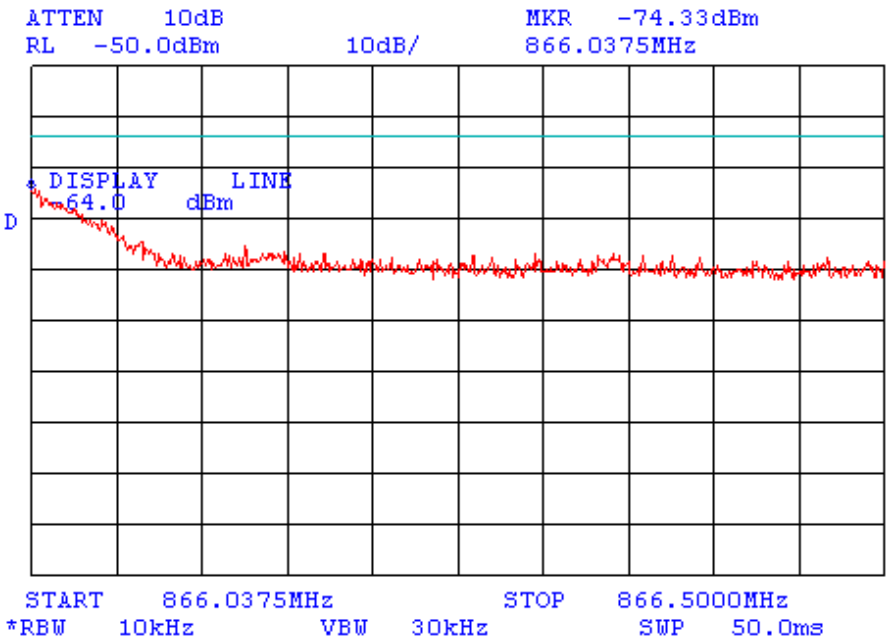
Plot A 33

Conducted spurious emission measurements in 866.0375 MHz – 866.500 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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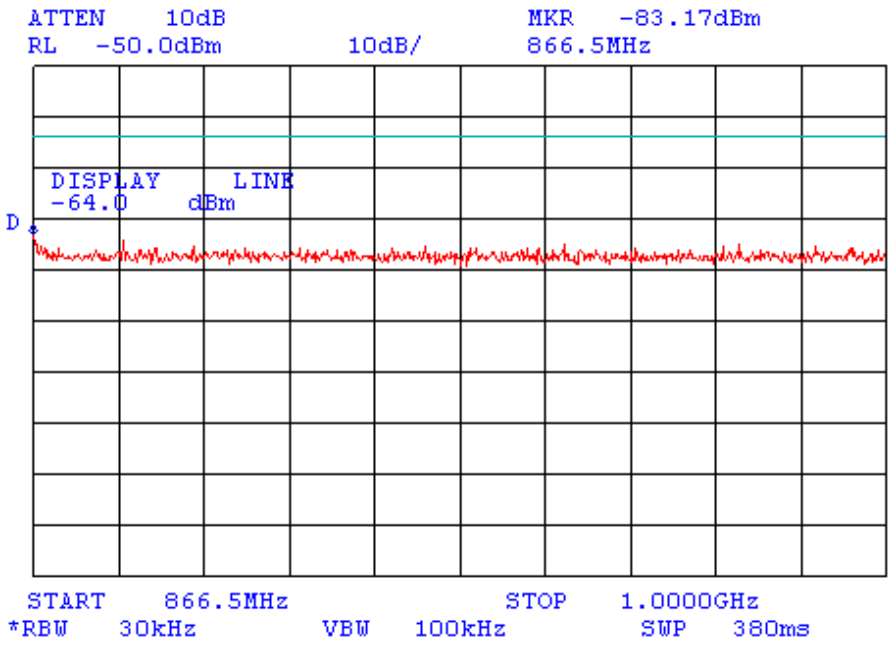
Plot A 34

Conducted spurious emission measurements in 866.5 MHz – 1000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	51 dB



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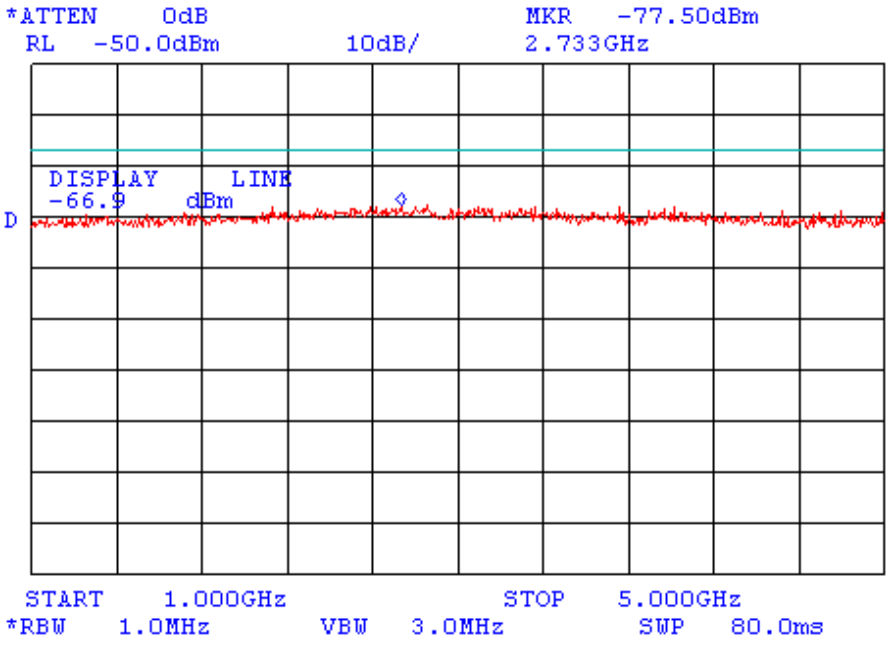
Plot A 35

Conducted spurious emission measurements in 1000 MHz – 5000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	53.9 dB



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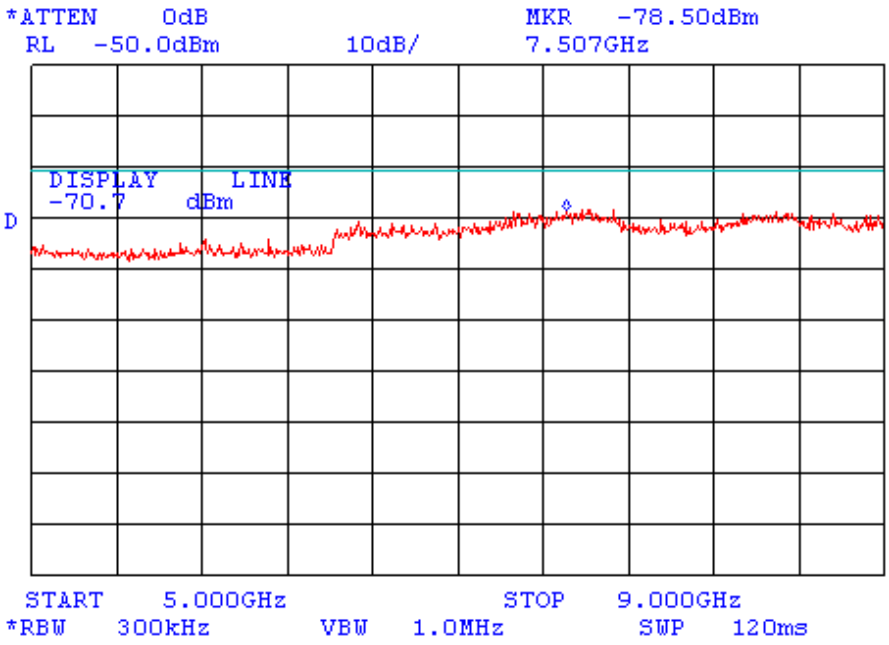
Plot A 36

Conducted spurious emission measurements in 5000 MHz – 9000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-23 dBm)
External attenuation	57.7 dB



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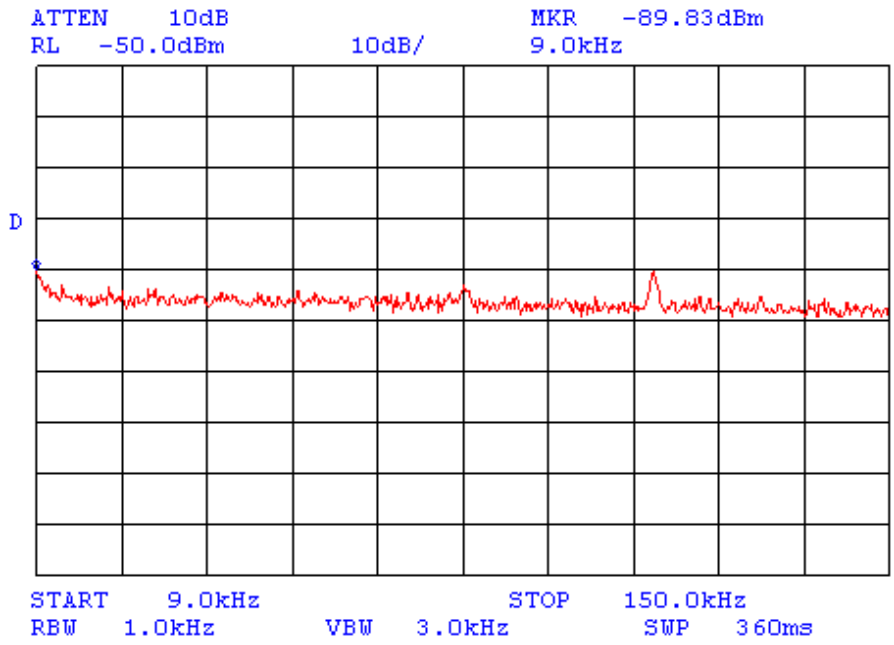
Plot A 37

Conducted spurious emission measurements in 9 kHz – 150 kHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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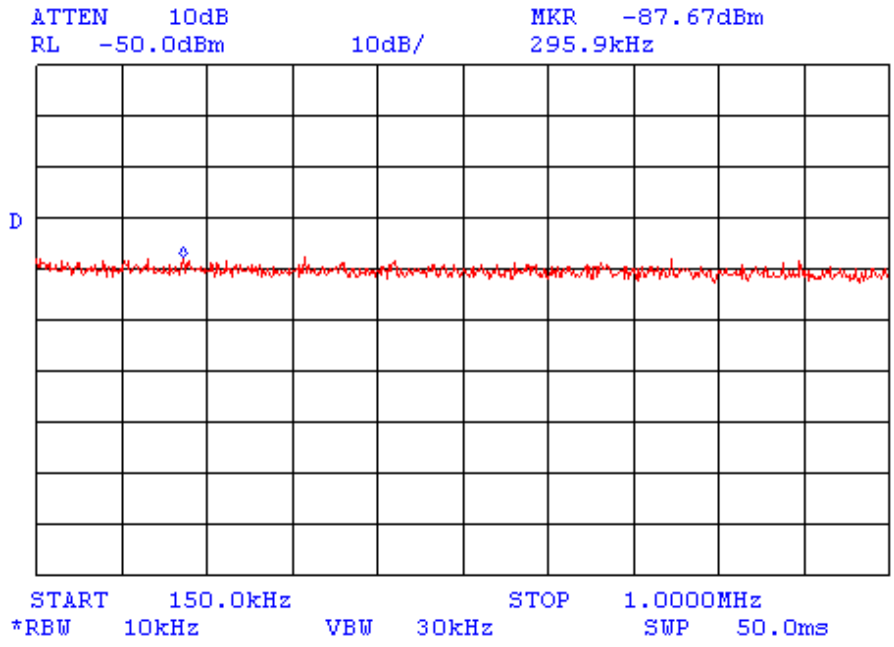
Plot A 38

Conducted spurious emission measurements in 150 kHz – 1 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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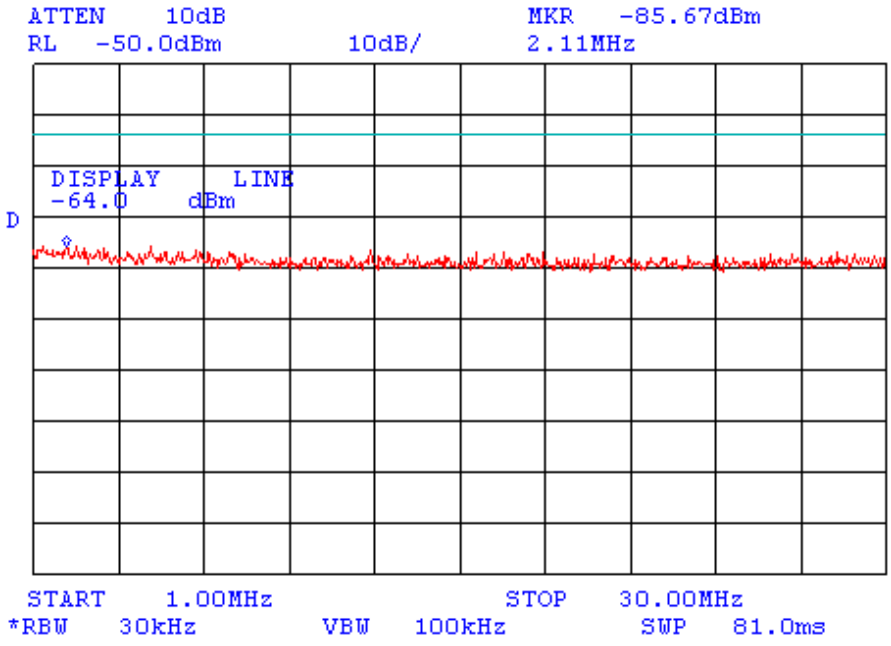
Plot A 39

Conducted spurious emission measurements in 1 MHz – 30 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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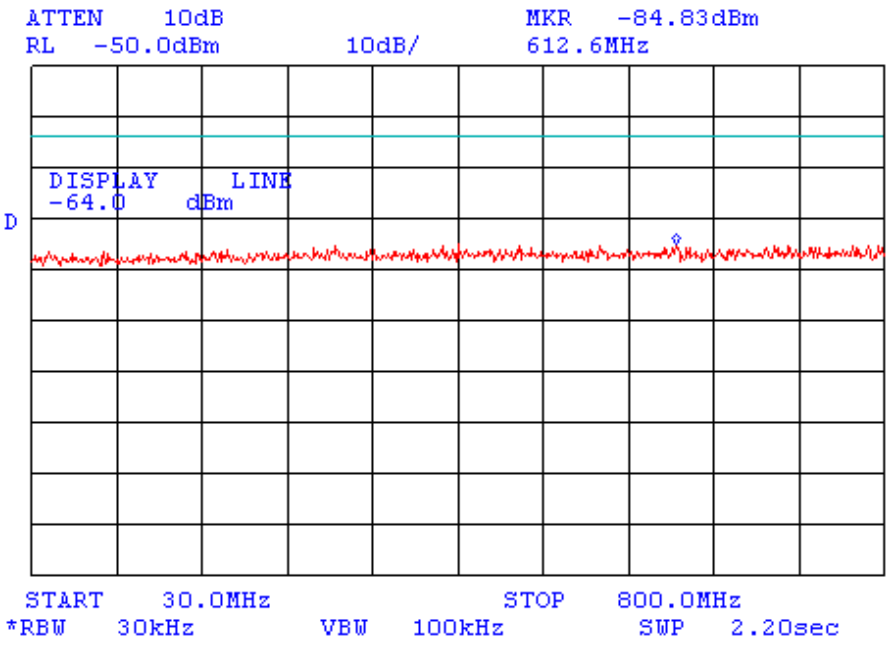
Plot A 40

Conducted spurious emission measurements in 30 MHz – 800 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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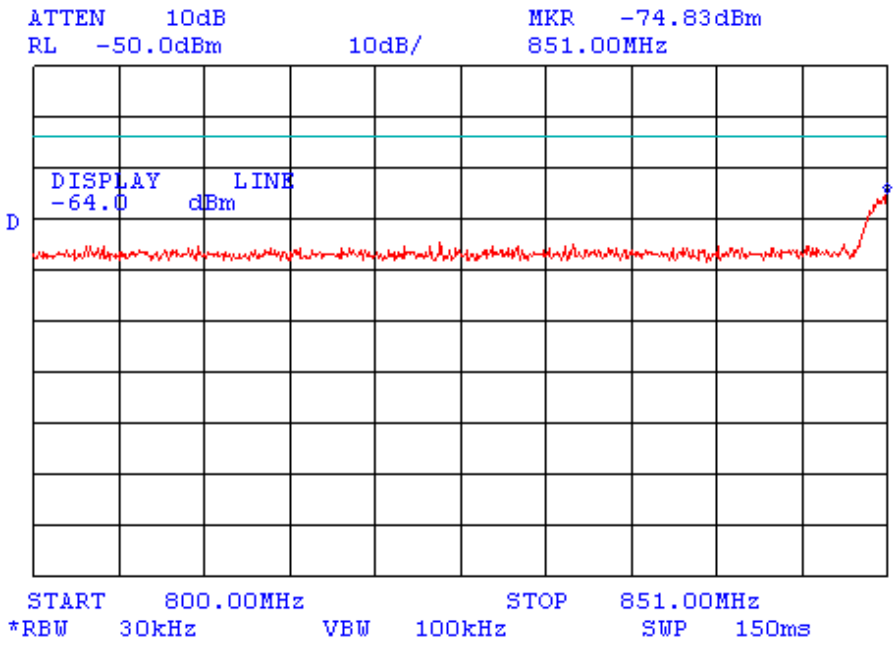
Plot A 41

Conducted spurious emission measurements in 800 MHz - 851 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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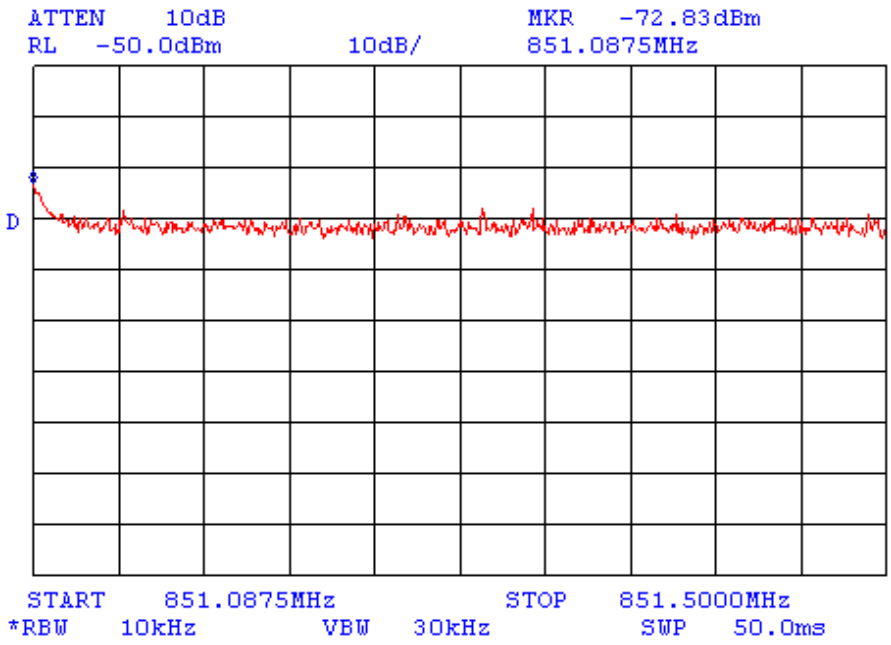
Plot A 42

Conducted spurious emission measurements in 851.0875 MHz – 851.500 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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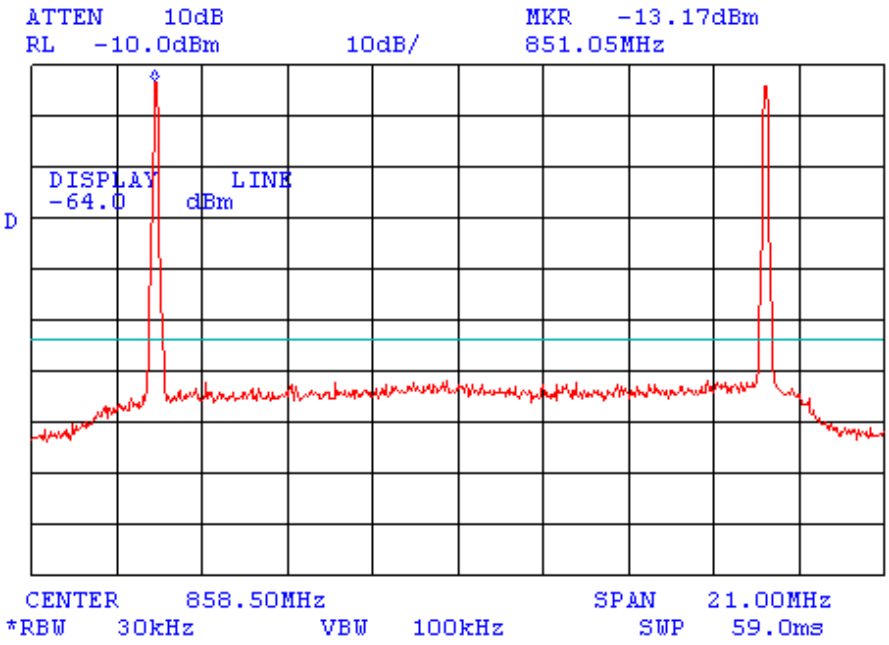
Plot A 43

Conducted spurious emission measurements in 848 MHz – 869 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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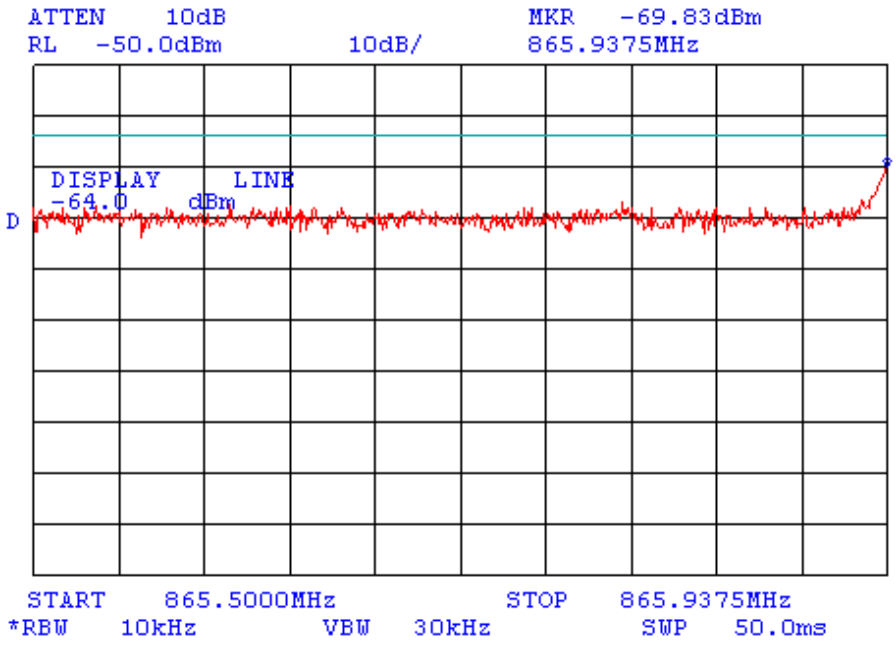
Plot A 44

Conducted spurious emission measurements in 865.500 MHz – 865.9375 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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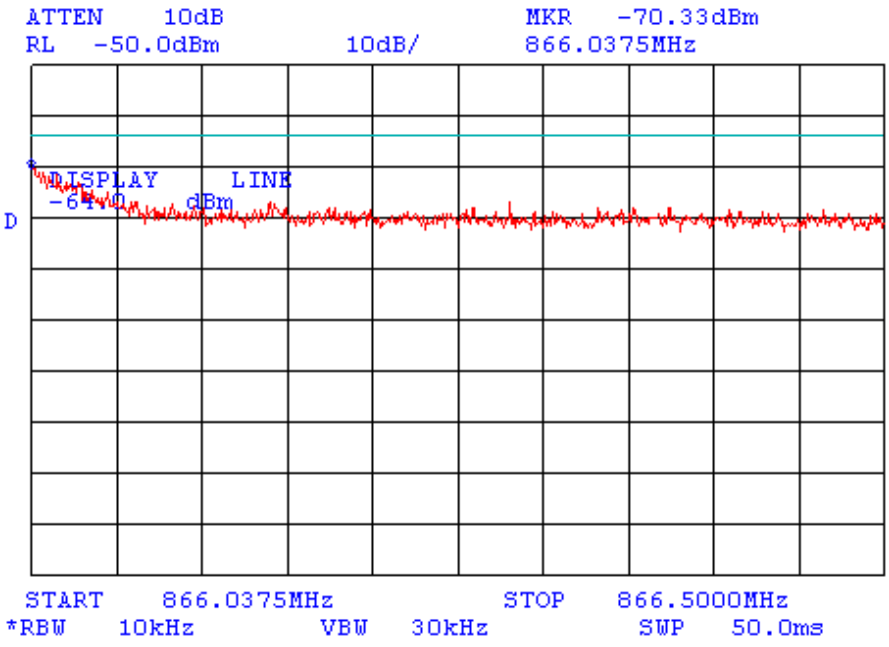
Plot A 45

Conducted spurious emission measurements in 866.0375 MHz – 866.500 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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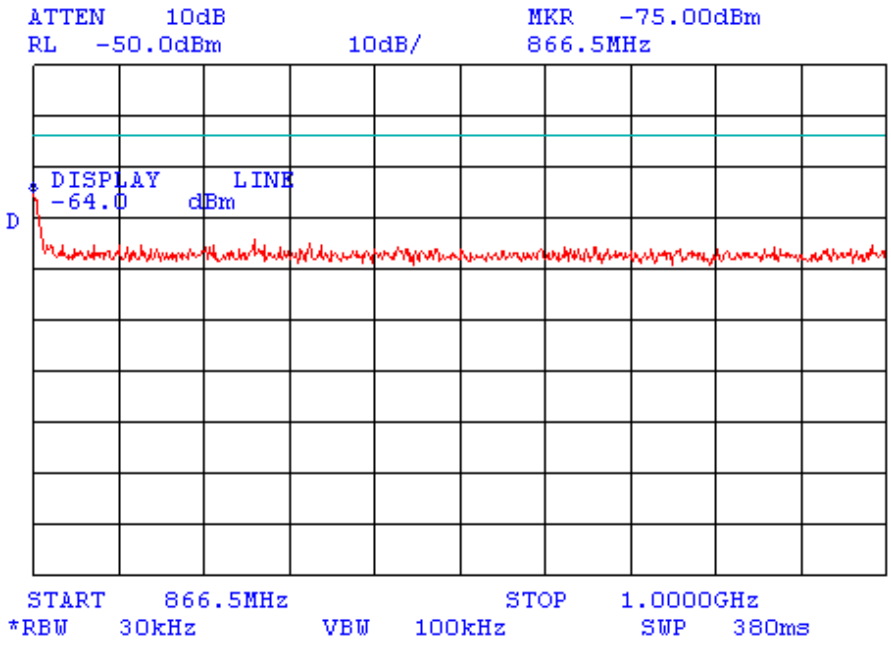
Plot A 46

Conducted spurious emission measurements in 866.5 MHz – 1000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	51 dB



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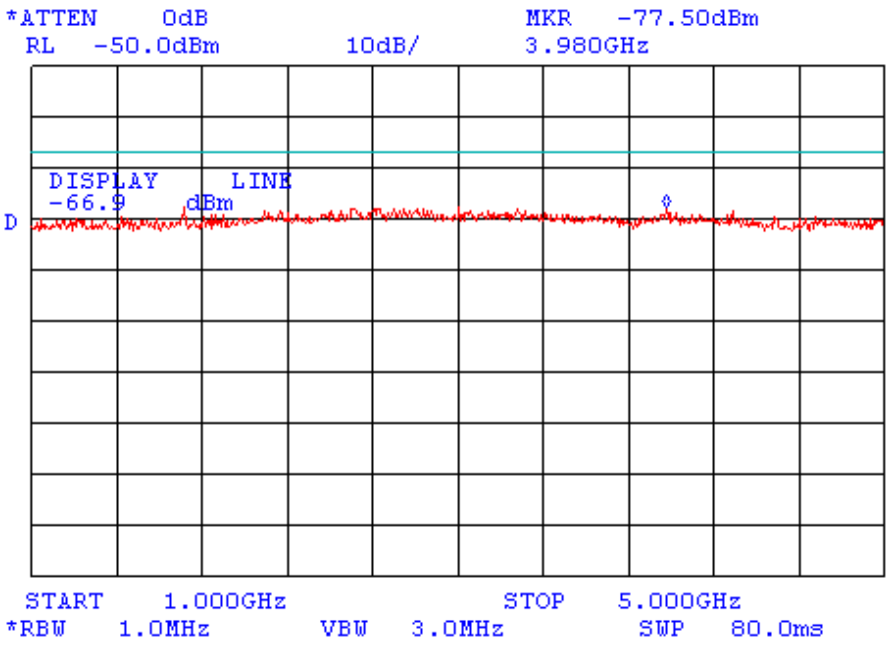
Plot A 47

Conducted spurious emission measurements in 1000 MHz – 5000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	53.9 dB



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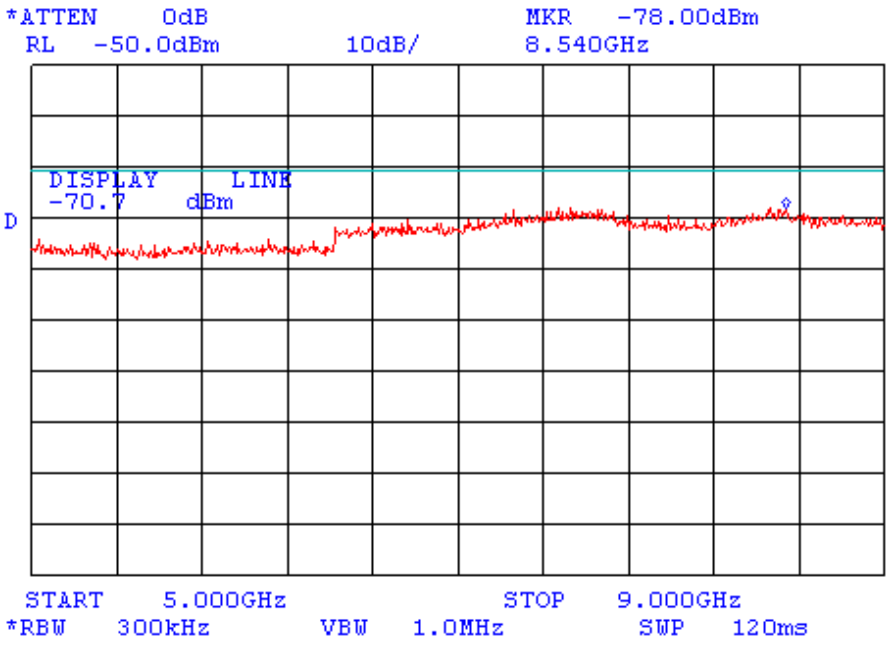
Plot A 48

Conducted spurious emission measurements in 5000 MHz – 9000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-50 dBm)
External attenuation	57.7 dB



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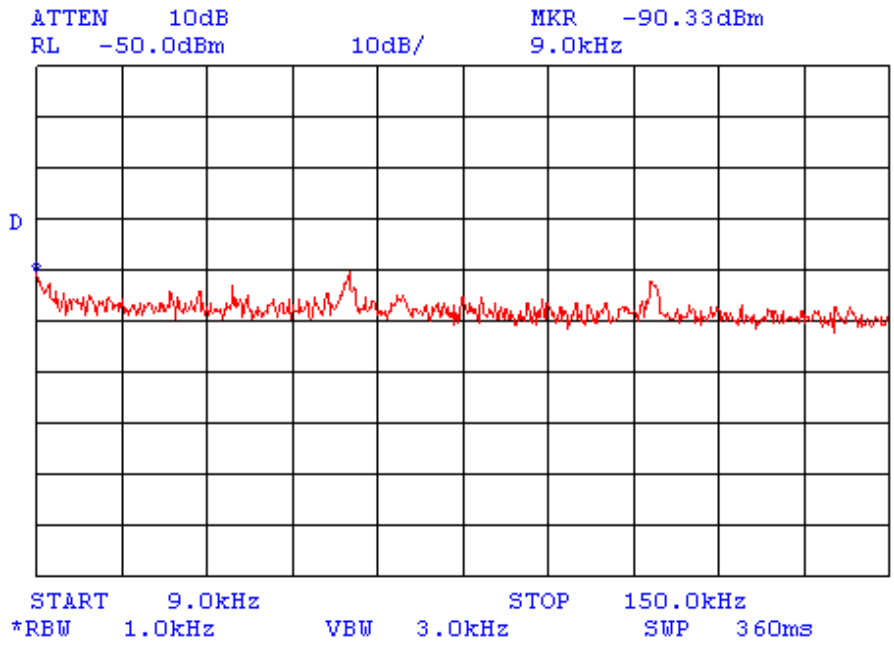
Plot A 49

Conducted spurious emission measurements in 9 kHz – 150 kHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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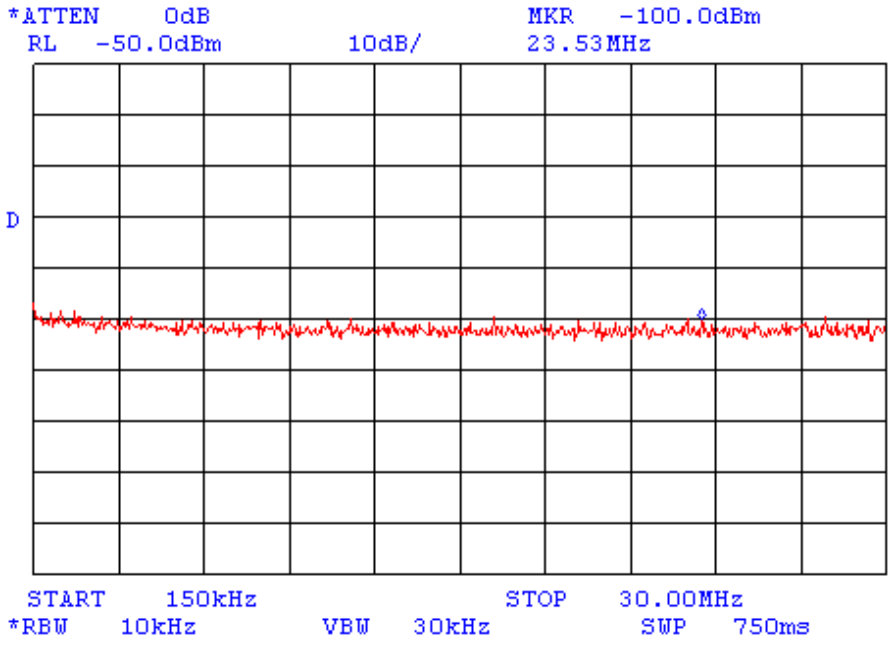
Plot A 50

Conducted spurious emission measurements in 150 kHz – 30 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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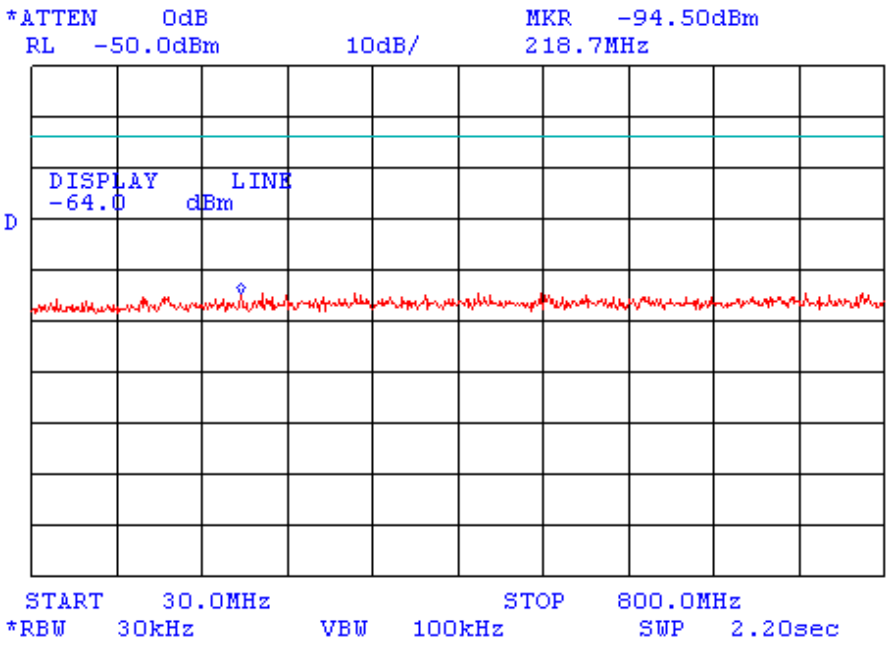
Plot A 51

Conducted spurious emission measurements in 30 MHz – 800 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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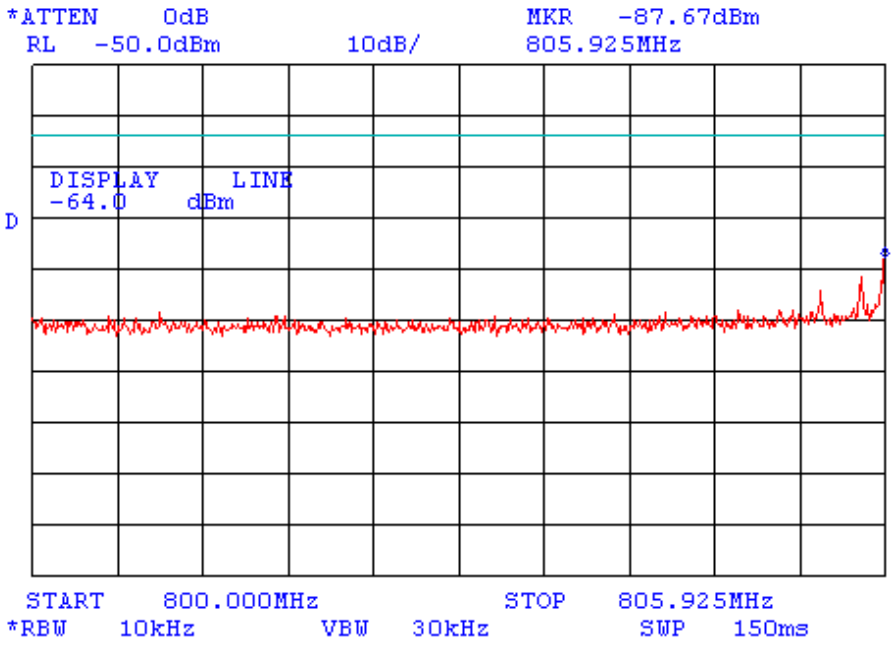
Plot A 52

Conducted spurious emission measurements in 800 MHz – 805.925 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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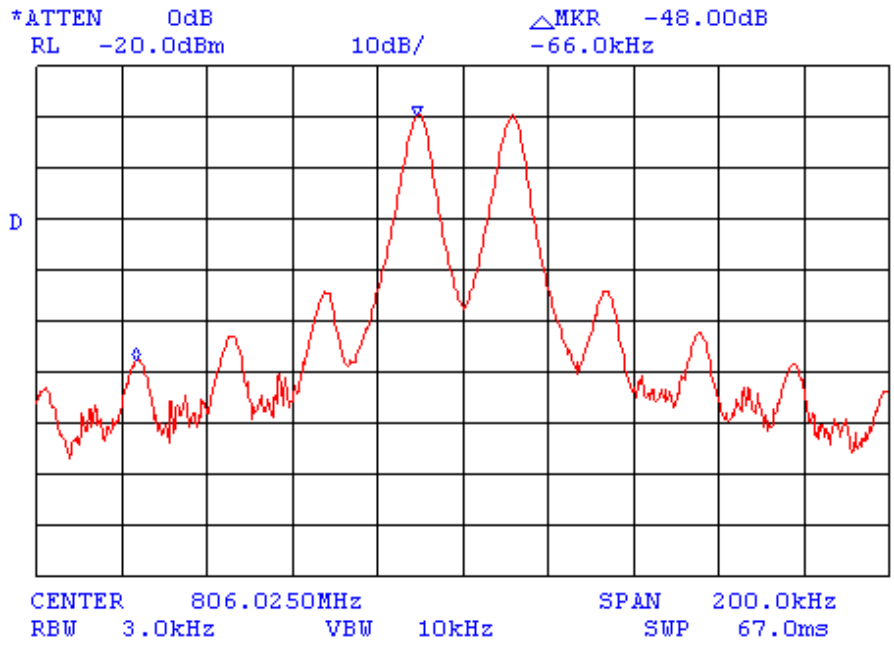
Plot A 53

Conducted spurious emission measurements at 806.0250 MHz (unmodulated signal)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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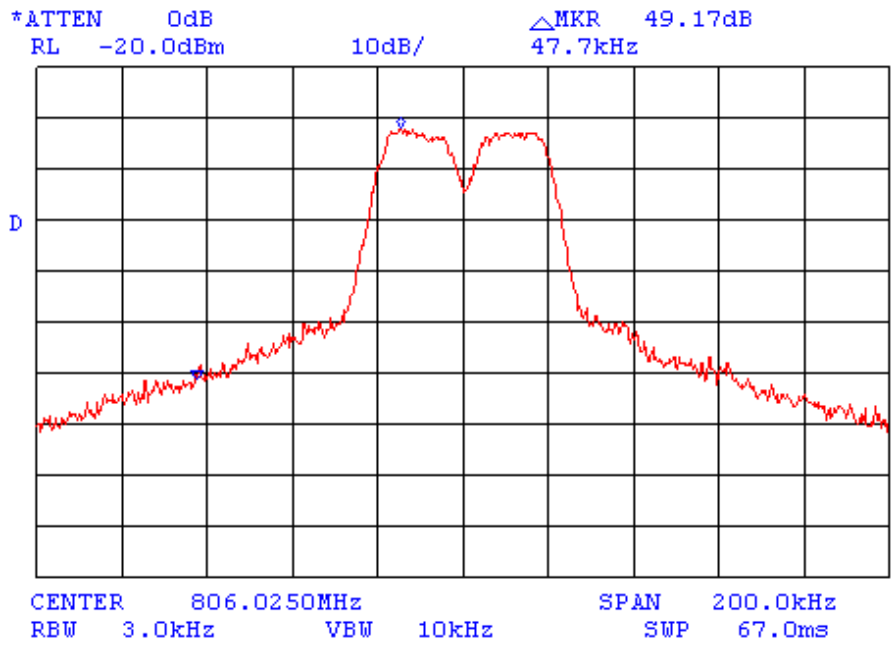
Plot A 54

Conducted spurious emission measurements at 806.0250 MHz (modulated signal)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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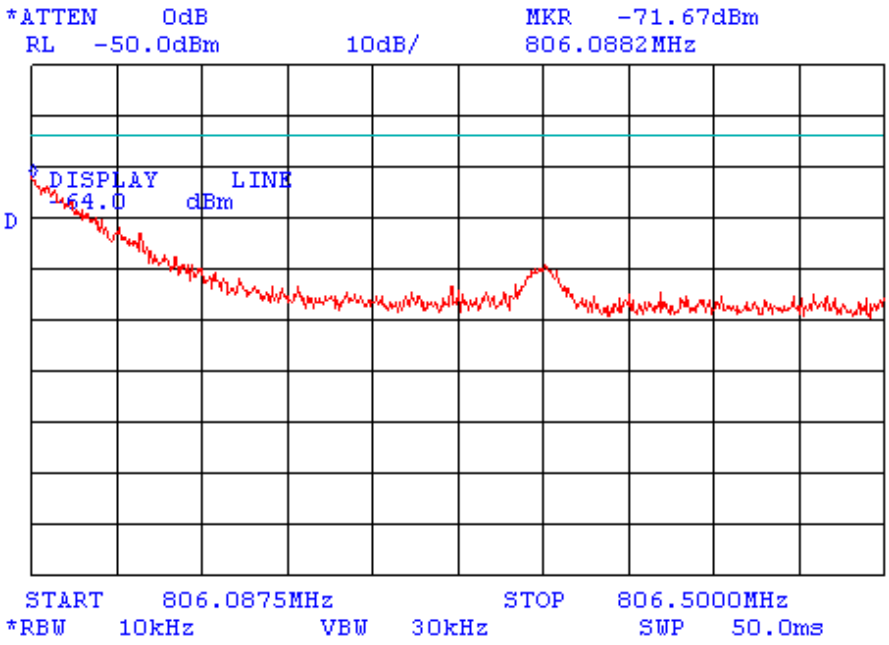
Plot A 55

Conducted spurious emission measurements in 806.0875 MHz – 806.500 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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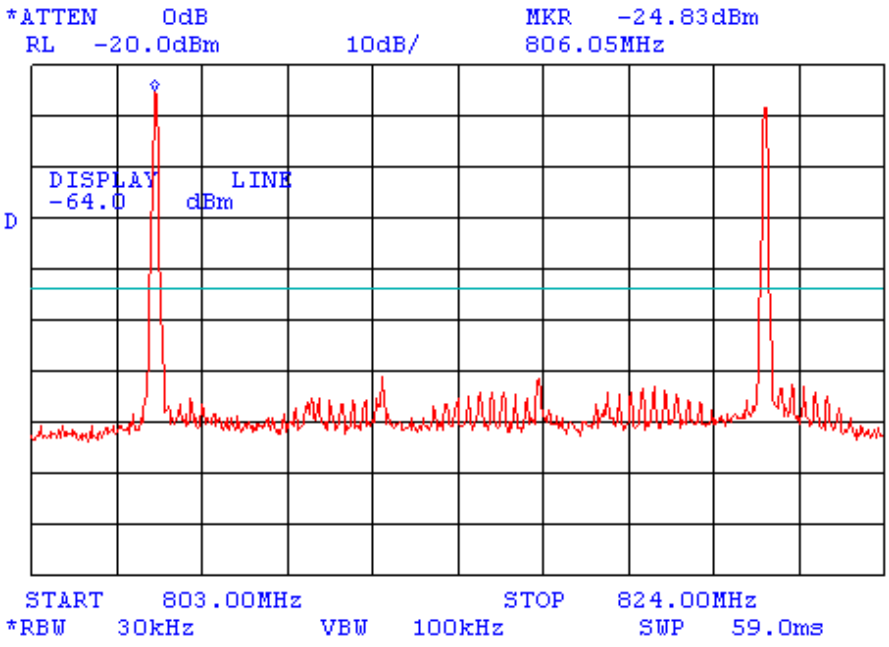
Plot A 56

Conducted spurious emission measurements in 803.0 MHz – 824.0 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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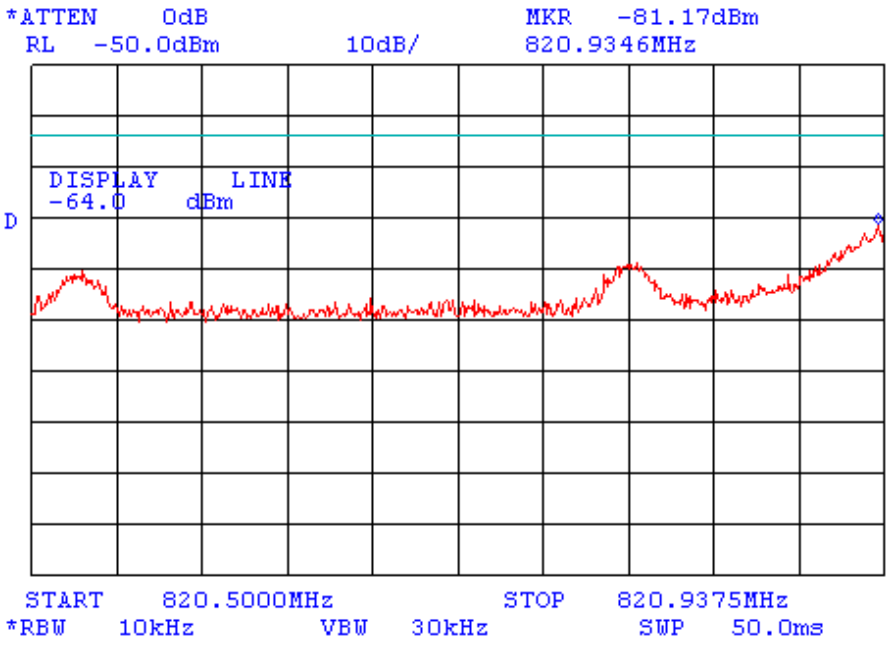
Plot A 57

Conducted spurious emission measurements in 820.500 MHz – 820.9375 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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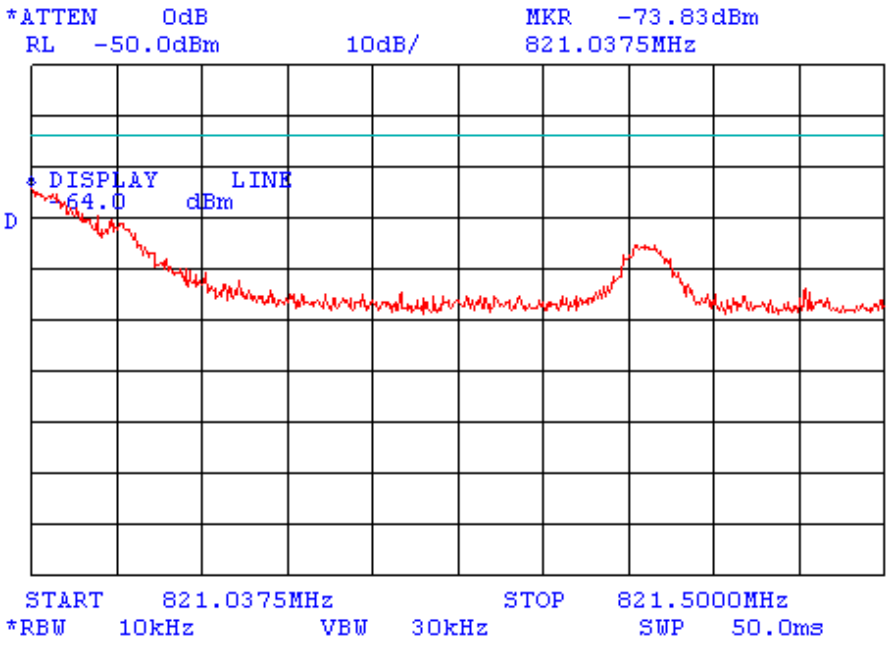
Plot A 58

Conducted spurious emission measurements in 821.0375 MHz – 821.500 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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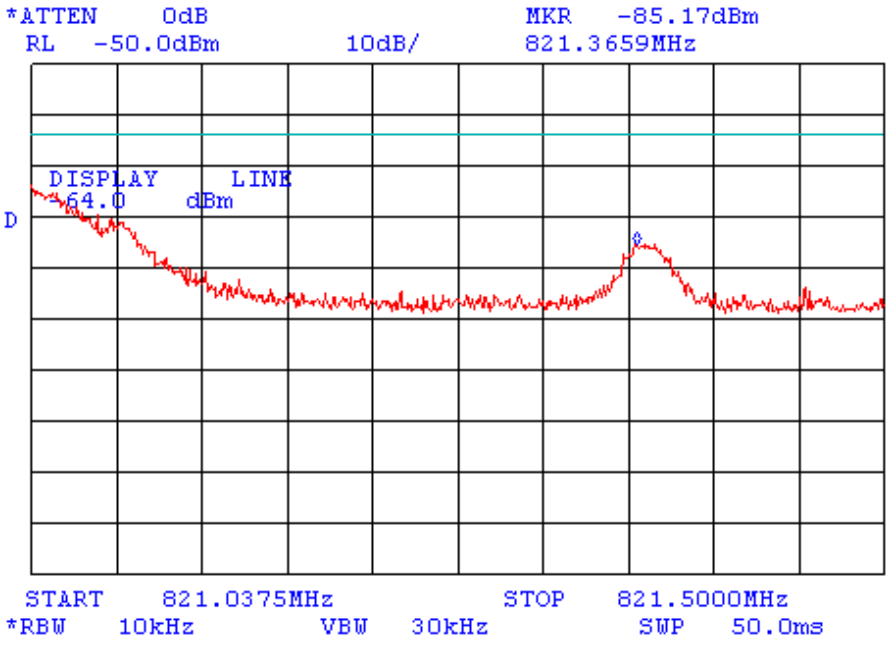
Plot A 59

Conducted spurious emission measurements in 821.0375 MHz – 821.500 MHz MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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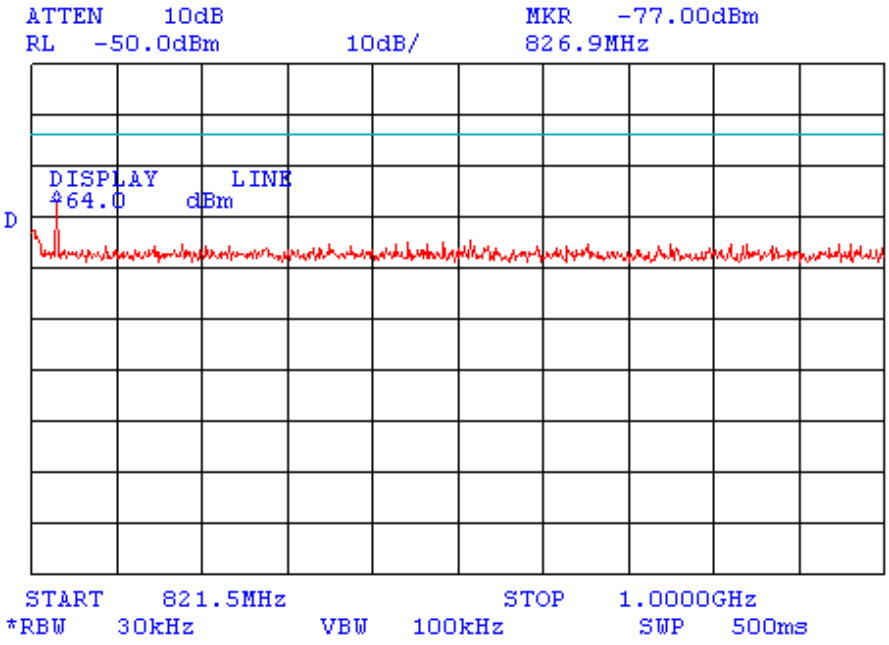
Plot A 60

Conducted spurious emission measurements in 821.5 MHz – 1000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	51 dB



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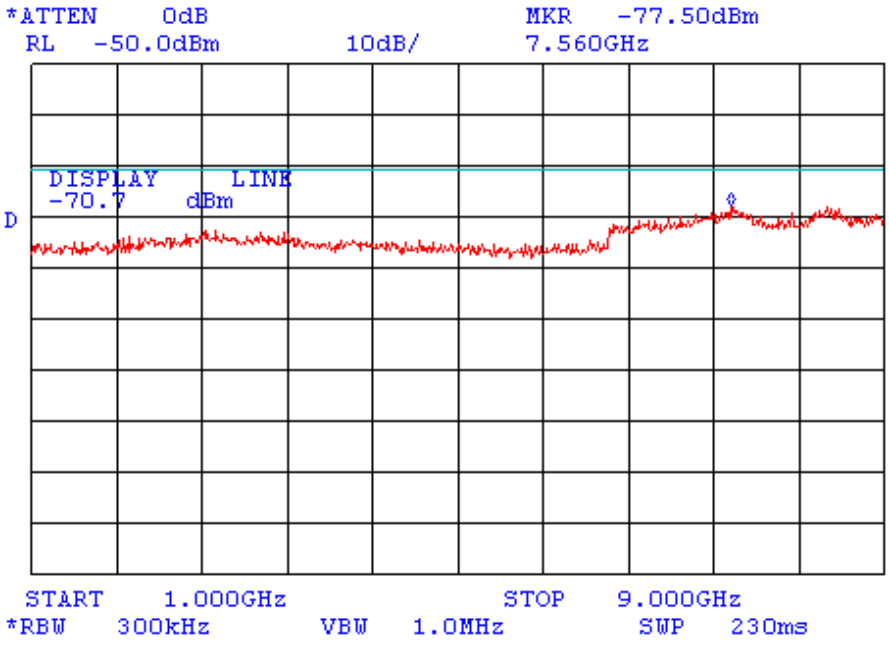
Plot A 61

Conducted spurious emission measurements in 1000 MHz – 9000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-33 dBm)
External attenuation	57.7 dB



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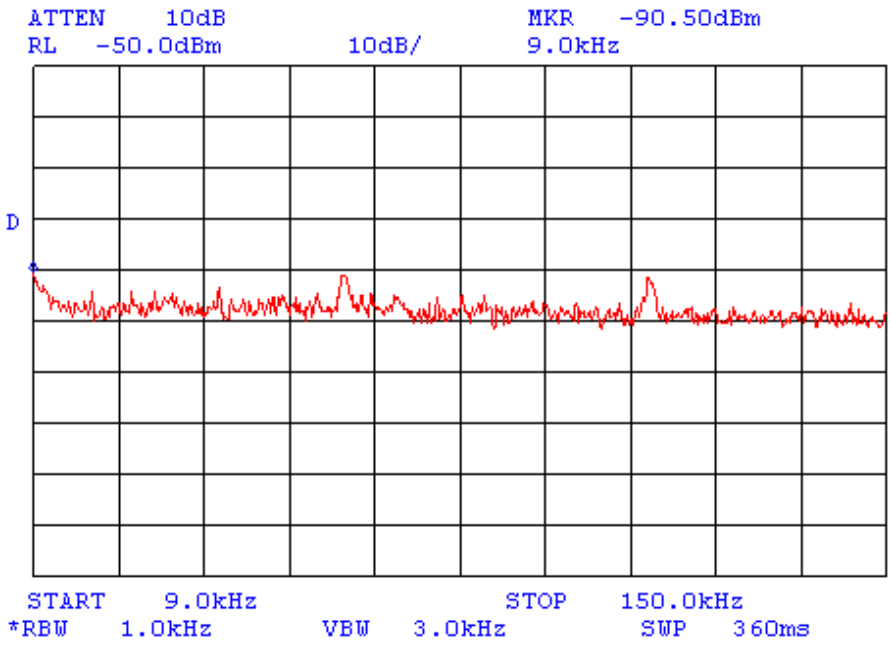
Plot A 62

Conducted spurious emission measurements in 9 kHz – 150 kHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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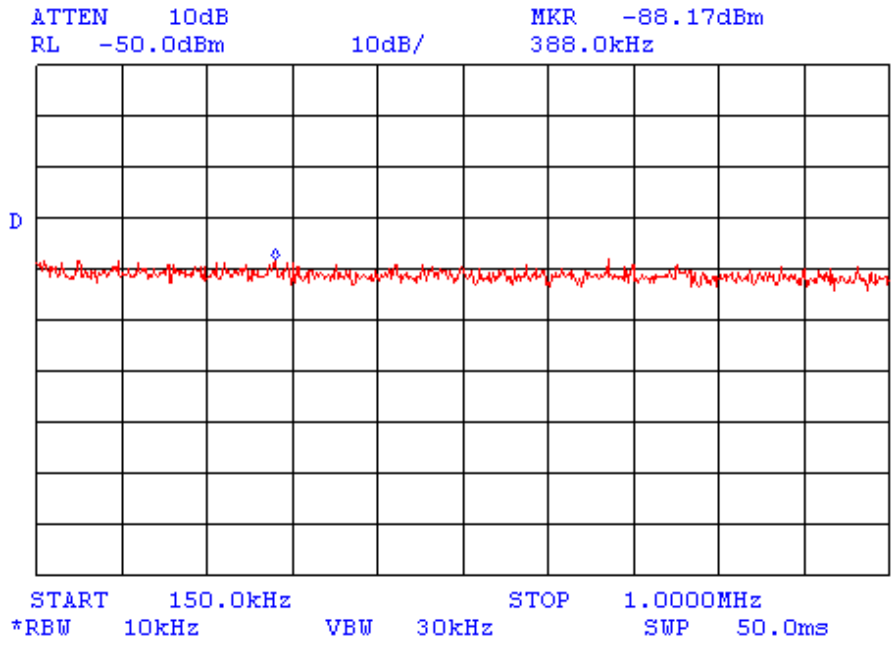
Plot A 63

Conducted spurious emission measurements in 150 kHz – 1 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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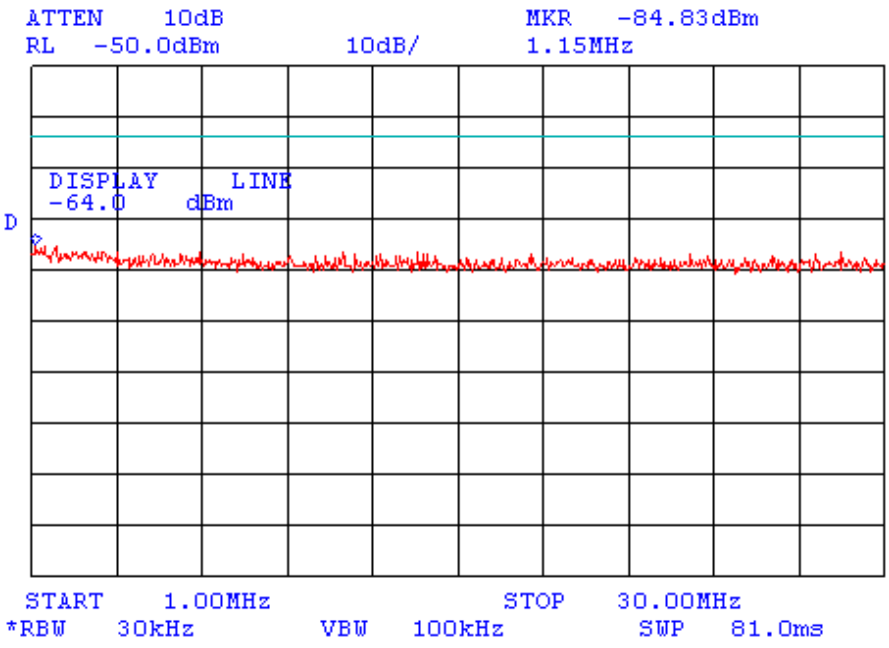
Plot A 64

Conducted spurious emission measurements in 1 MHz – 30 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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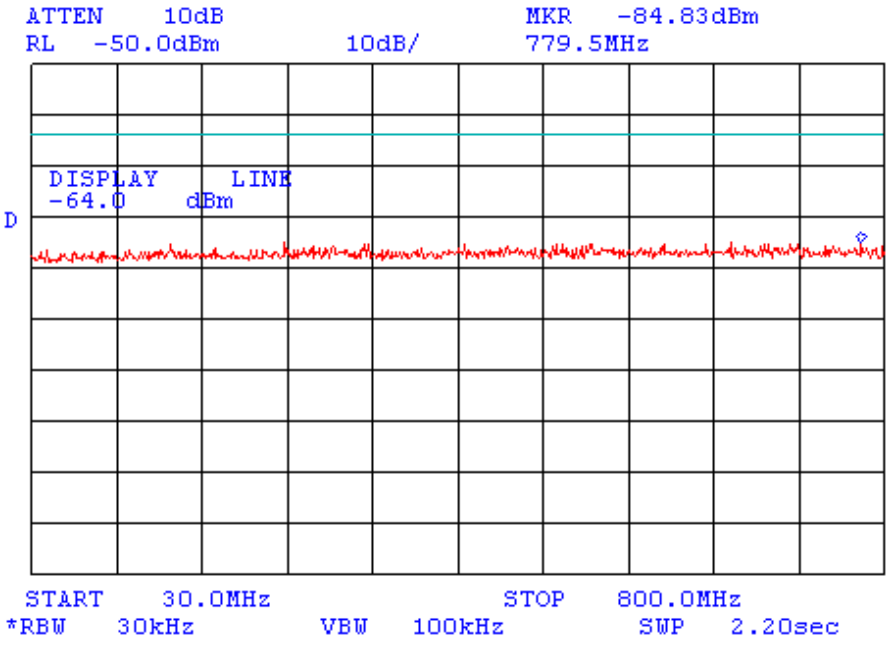
Plot A 65

Conducted spurious emission measurements in 30 MHz – 800 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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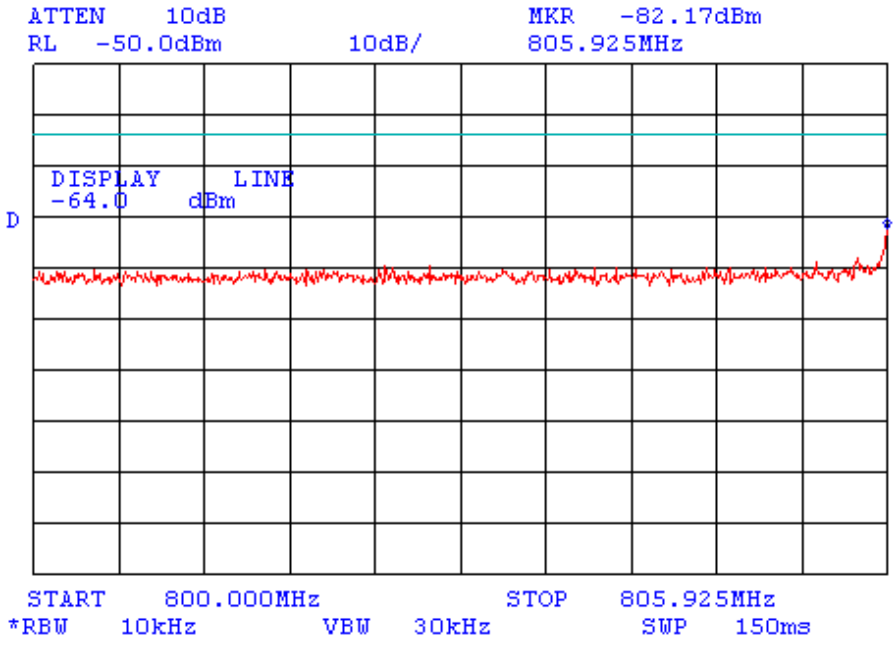
Plot A 66

Conducted spurious emission measurements in 800 MHz – 805.925 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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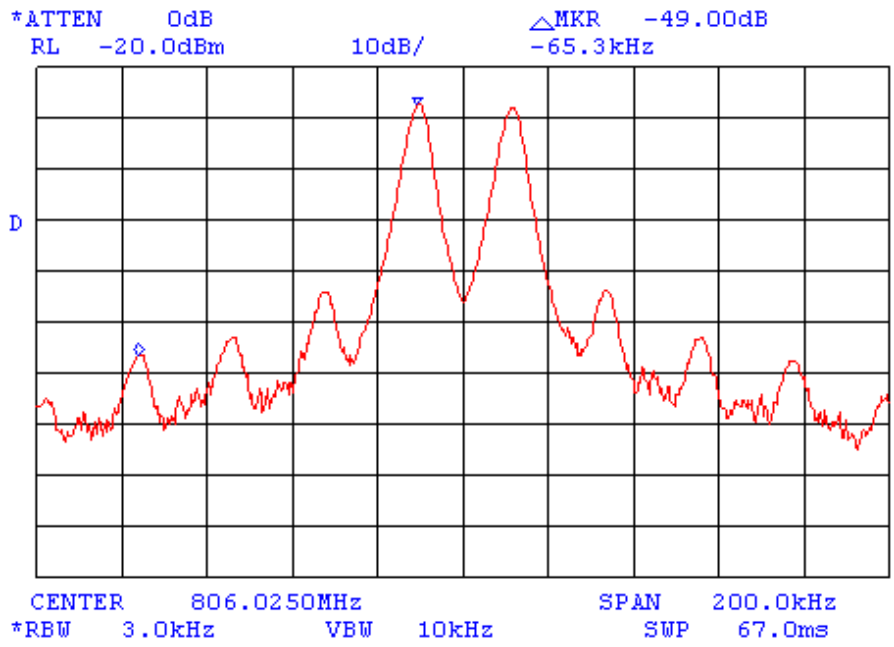
Plot A 67

Conducted spurious emission measurements at 806.025 MHz (unmodulated signal)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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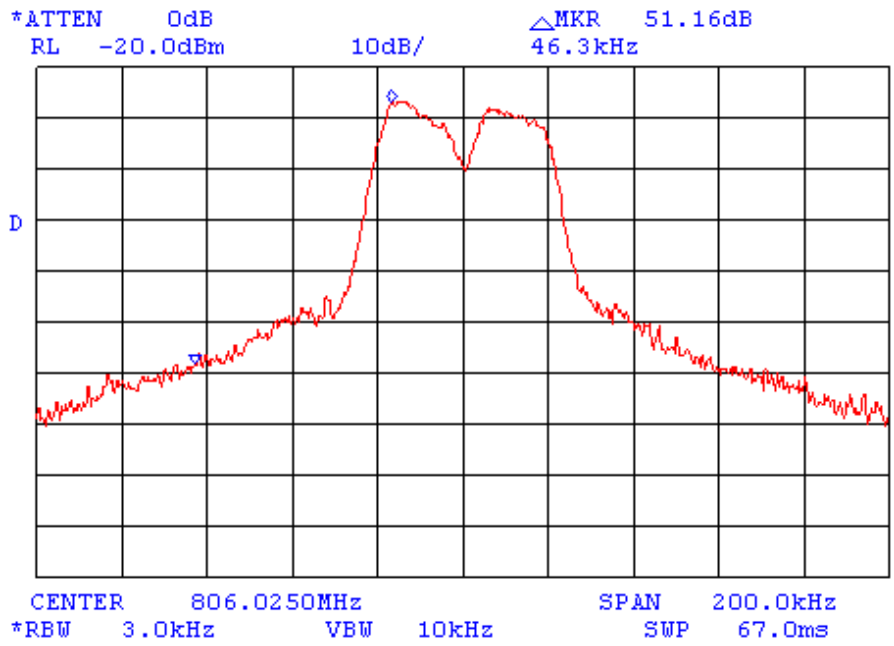
Plot A 68

Conducted spurious emission measurements at 806.025 MHz (modulated signal)

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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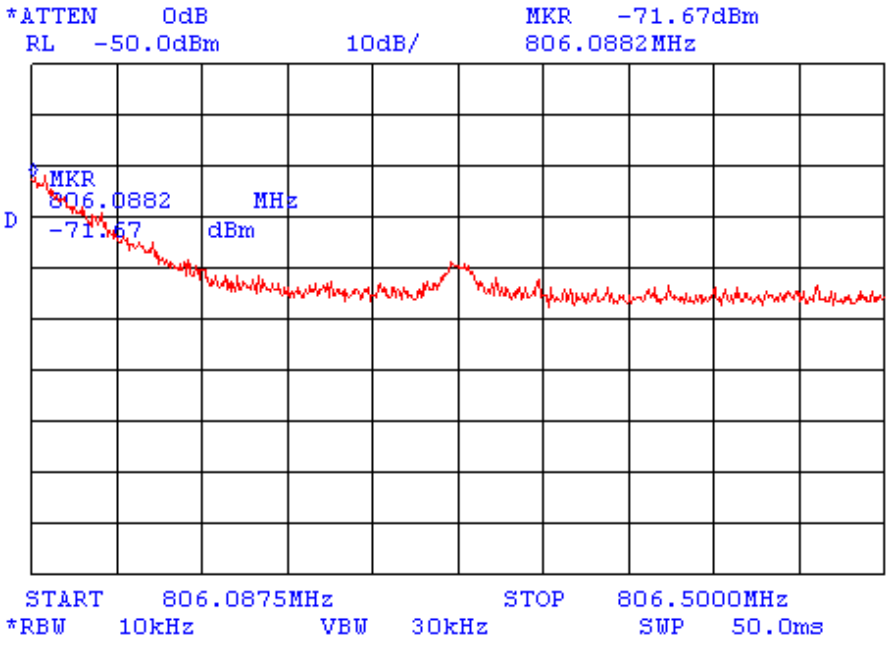
Plot A 69

Conducted spurious emission measurements in 806.0875 MHz – 806.500 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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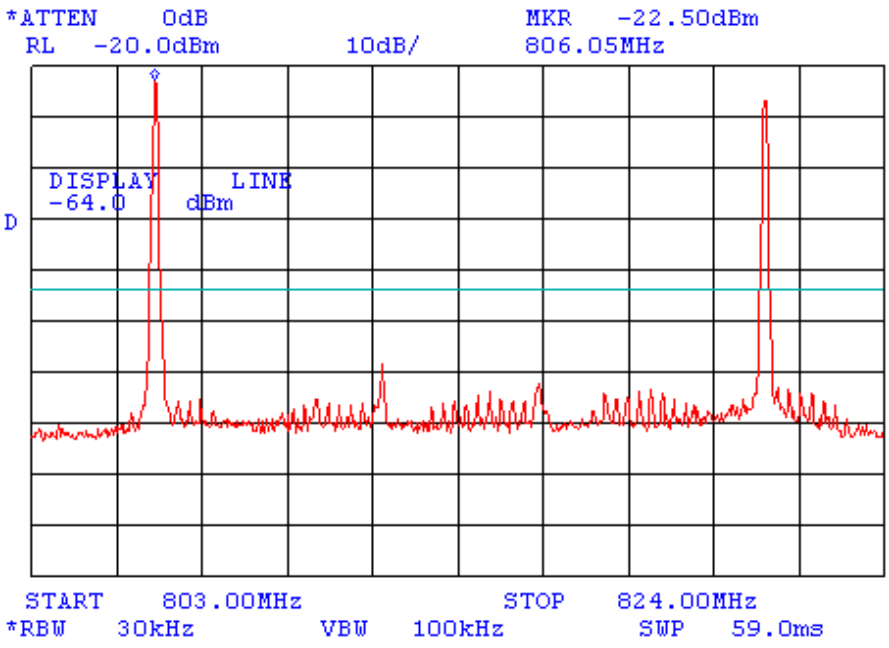
Plot A 70

Conducted spurious emission measurements in 803.0 MHz – 824.0 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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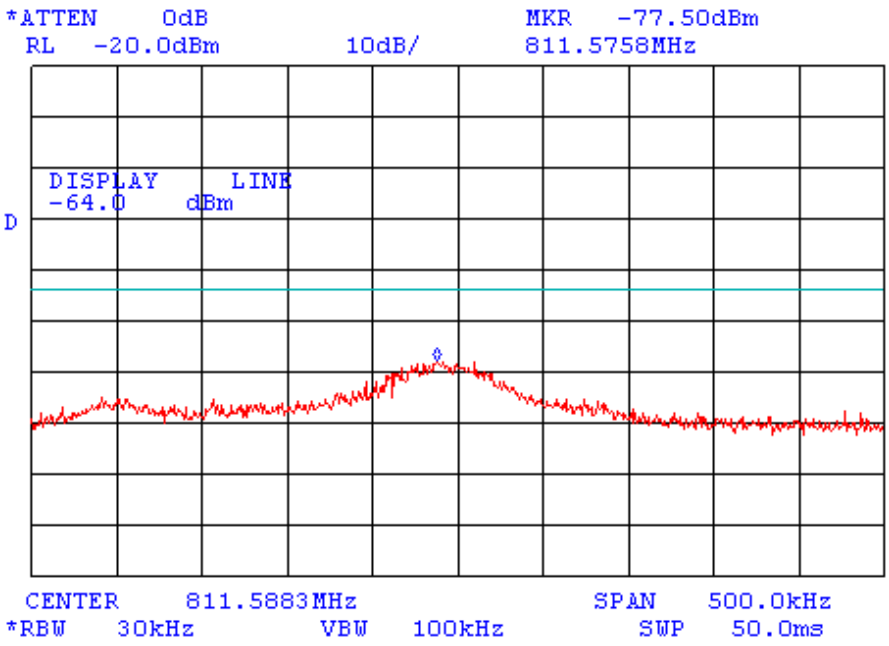
Plot A 71

Conducted spurious emission measurements

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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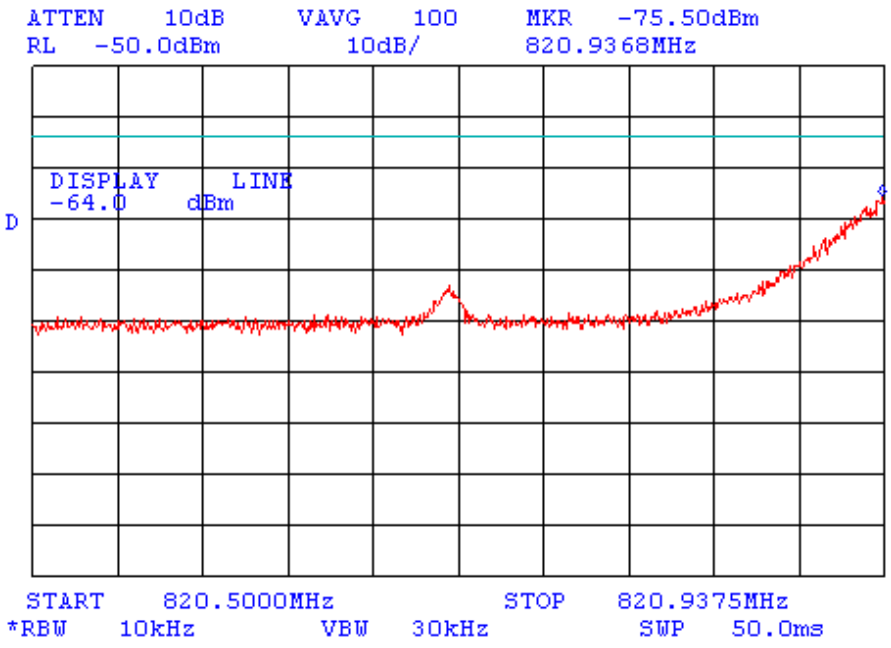
Plot A 72

Conducted spurious emission measurements in 820.500 MHz – 820.9375 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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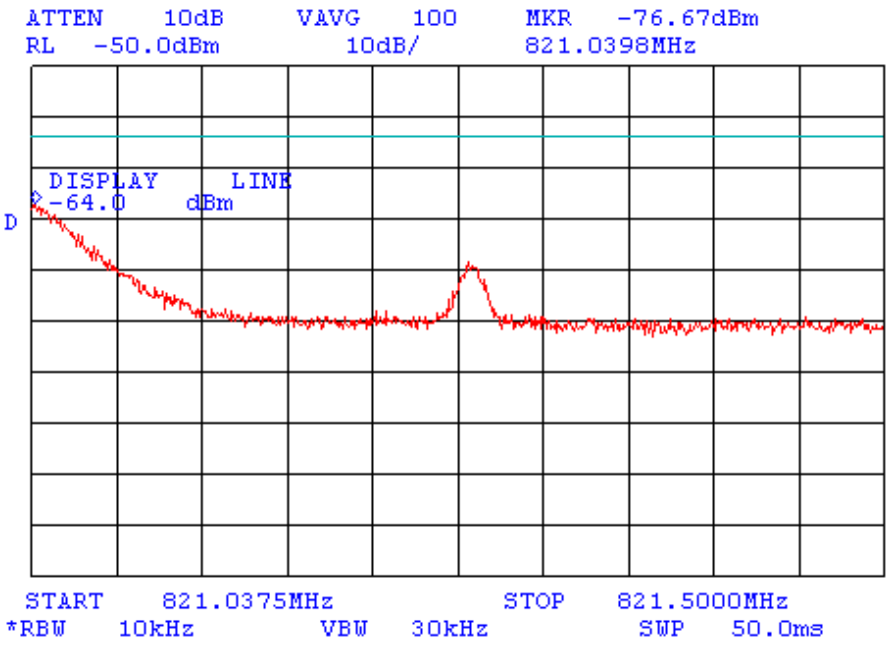
Plot A 73

Conducted spurious emission measurements in 821.0375 MHz – 821.500 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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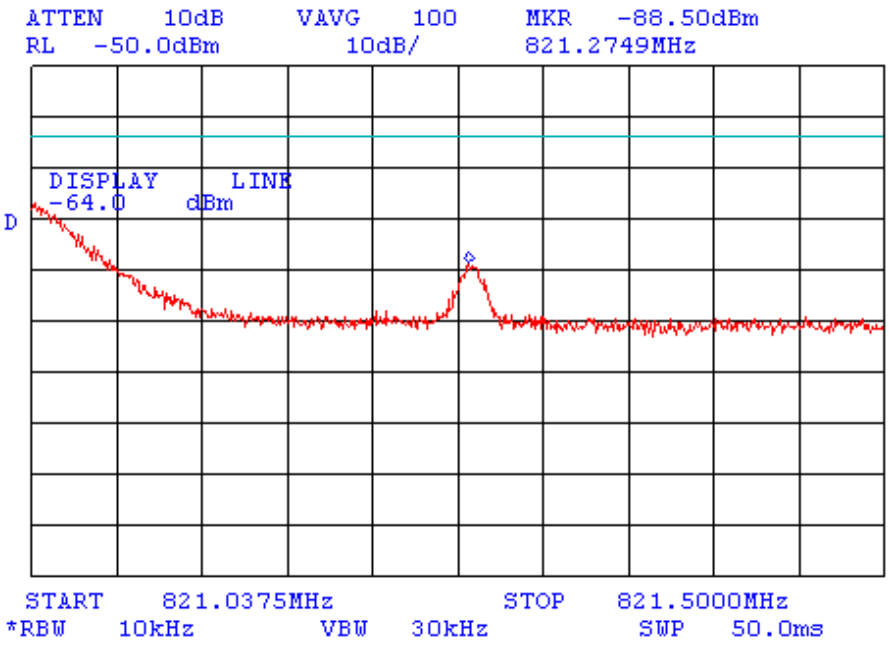
Plot A 74

Conducted spurious emission measurements in 821.0375 MHz – 821.500 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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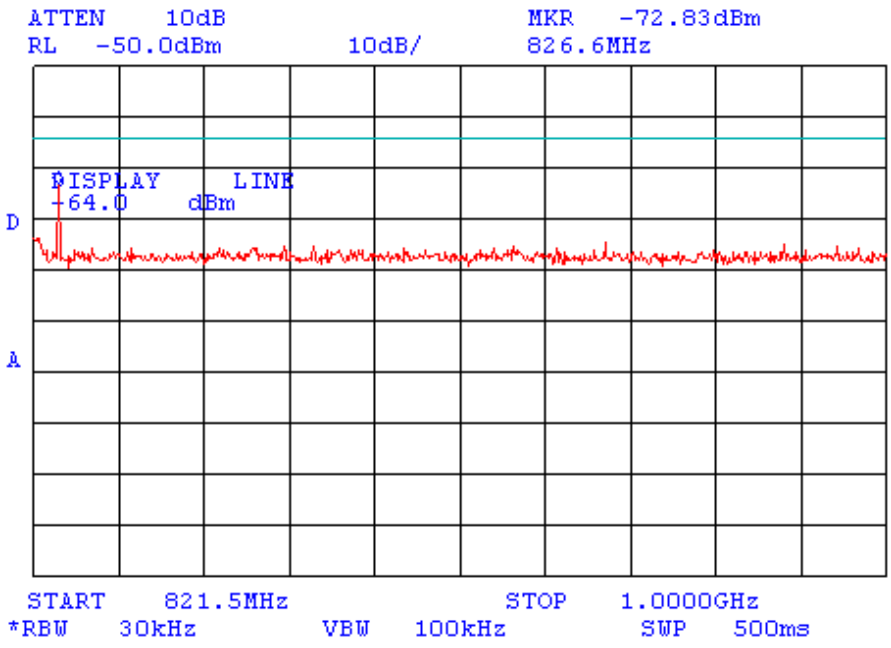
Plot A 75

Conducted spurious emission measurements in 821.5 MHz – 1 GHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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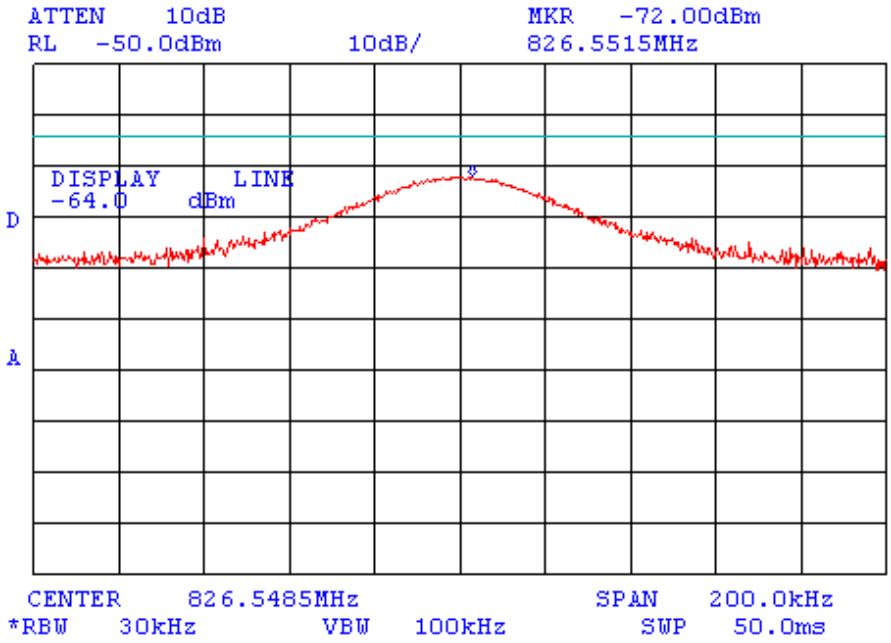
Plot A 76

Conducted spurious emission measurements

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	51 dB



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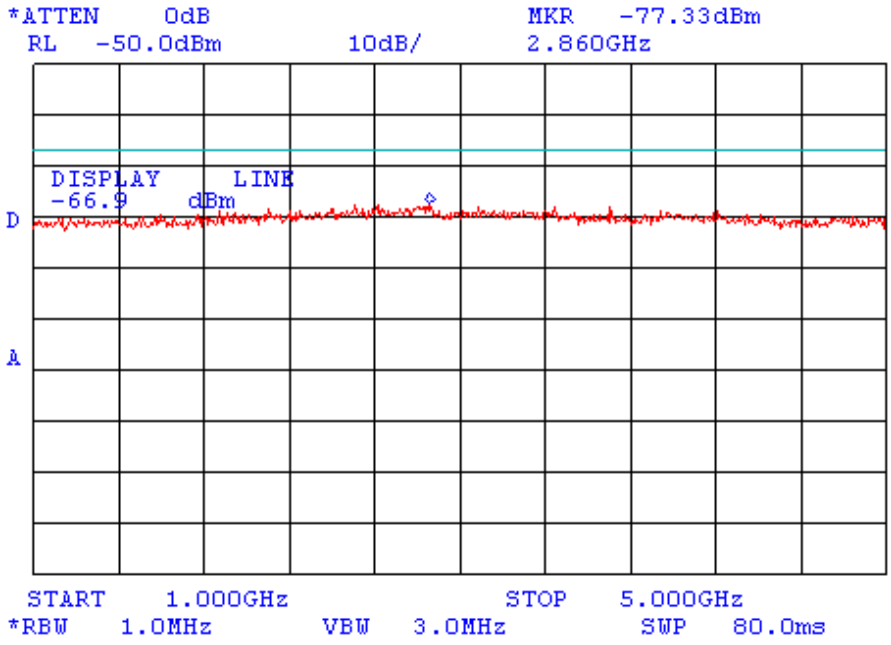
Plot A 77

Conducted spurious emission measurements in 1 GHz – 5 GHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	53.9 dB



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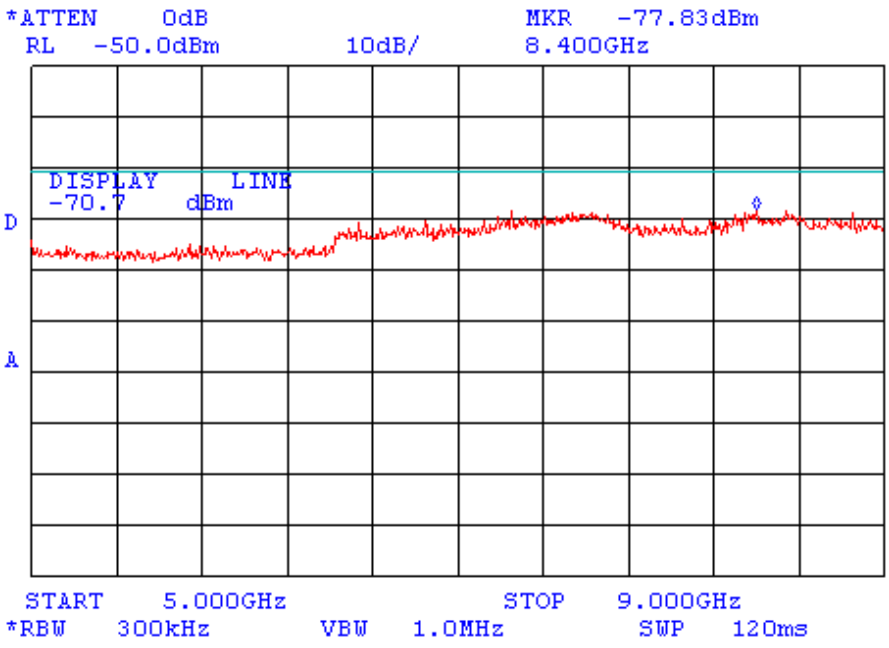
Plot A 78

Conducted spurious emission measurements in 5 GHz – 9 GHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60 dBm)
External attenuation	57.7 dB



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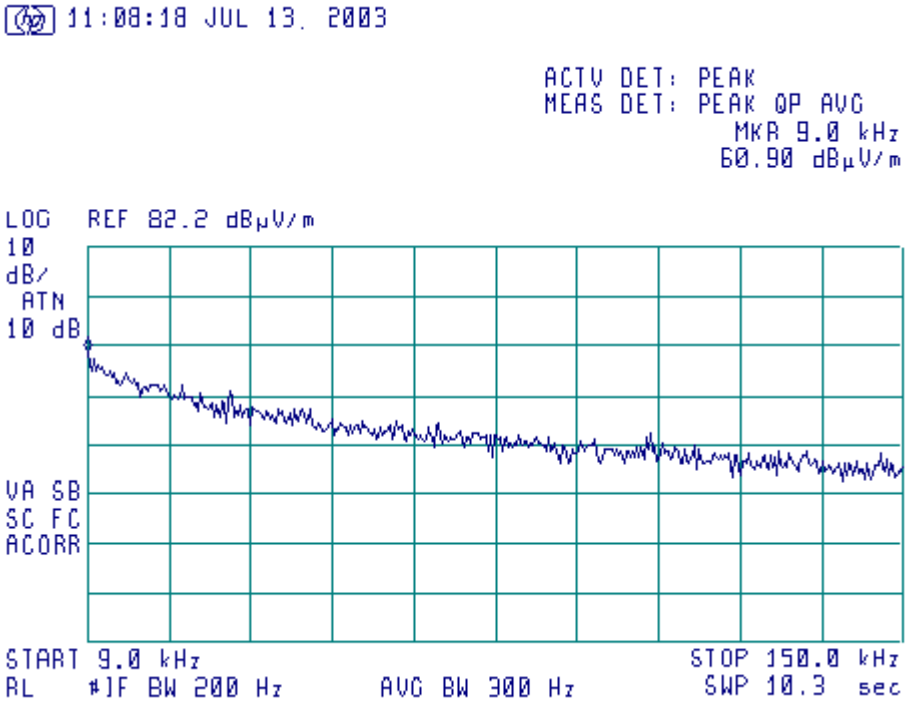
Plot A 79

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in downlink mode @ maximum input signal (–23 dBm)



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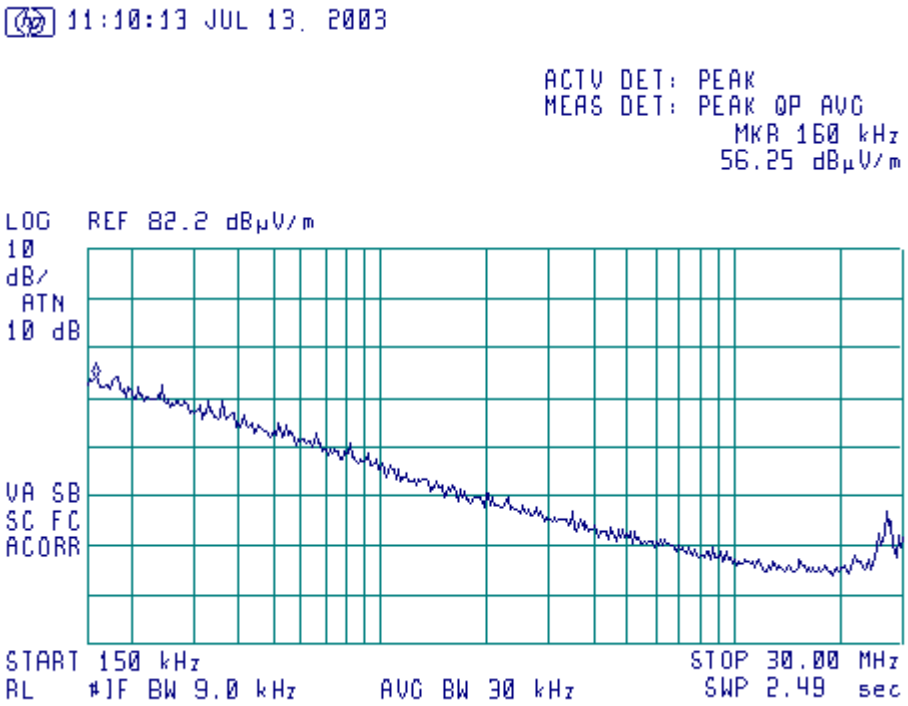
Plot A 80

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in downlink mode @ maximum input signal (–23 dBm)



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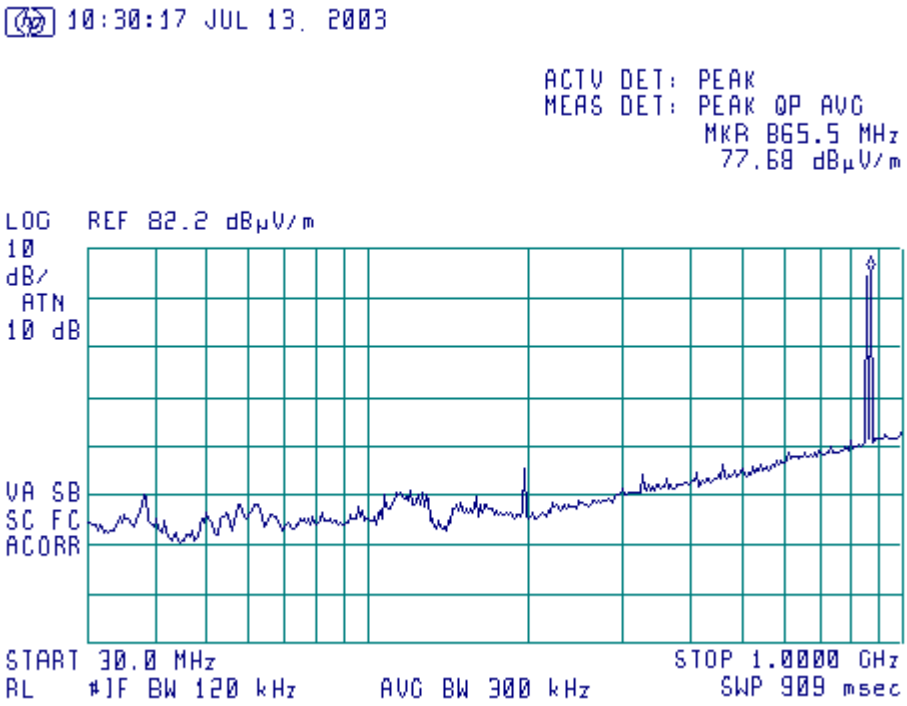
Plot A 81

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 1 GHz, in downlink mode @ maximum input signal (–23 dBm)



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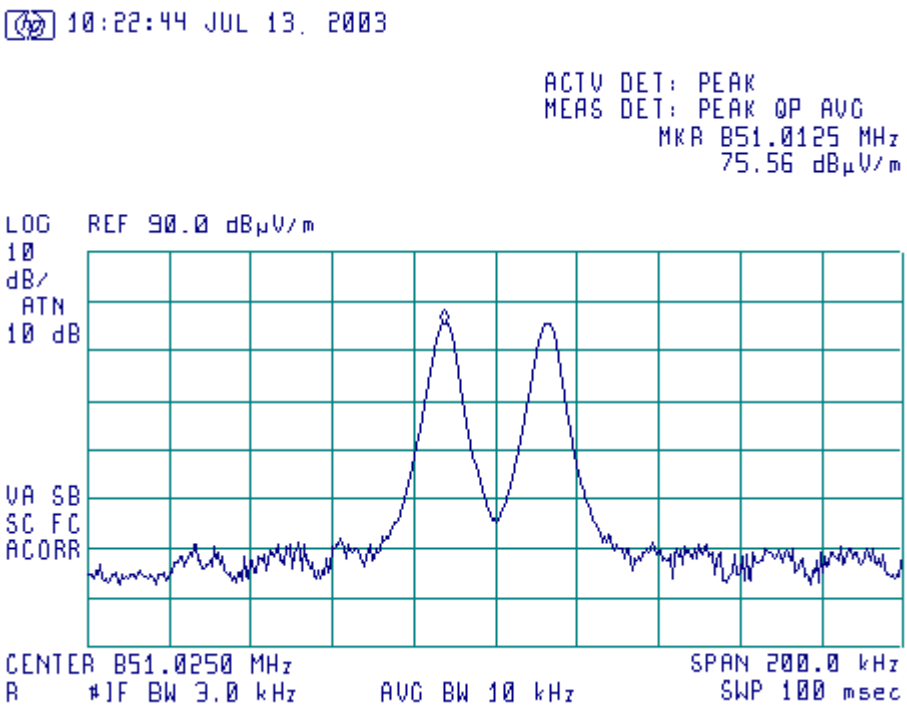
Plot A 82

Radiated spurious emission measurements in the anechoic chamber, in downlink mode @ maximum input signal (–23 dBm)



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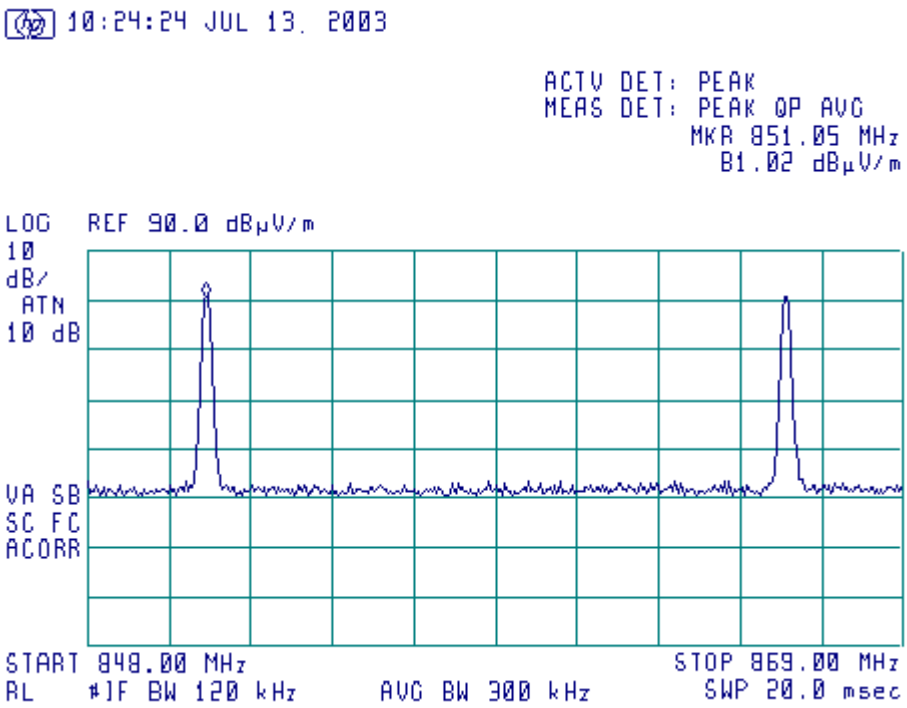
Plot A 83

Radiated spurious emission measurements in the anechoic chamber, in downlink mode @ maximum input signal (–23 dBm)



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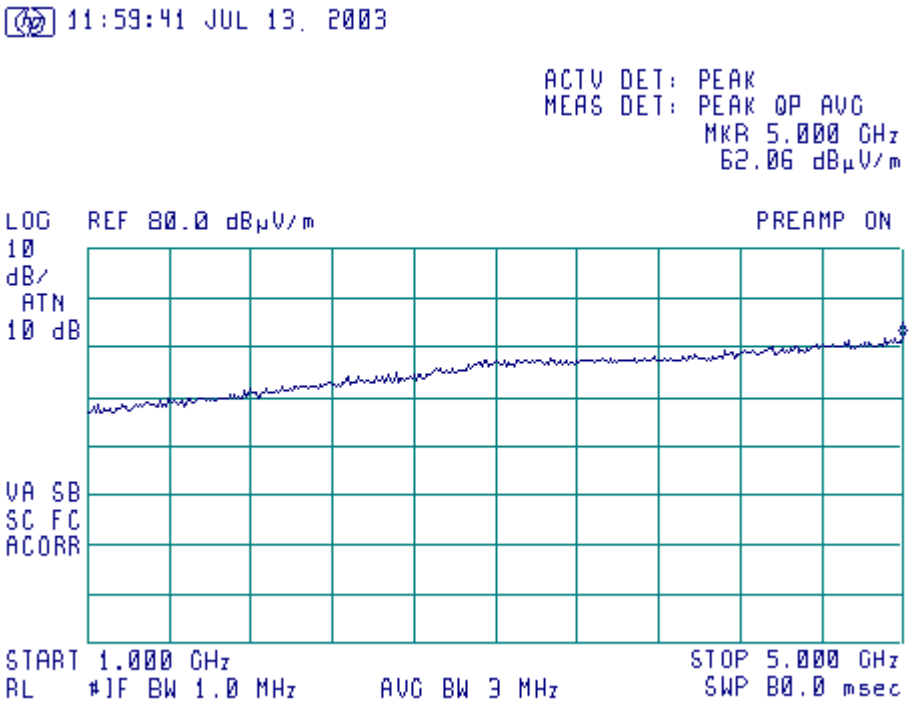
Plot A 84

Radiated spurious emission measurements in the anechoic chamber from 1 GHz to 5 GHz, in downlink mode @ maximum input signal (–23 dBm)



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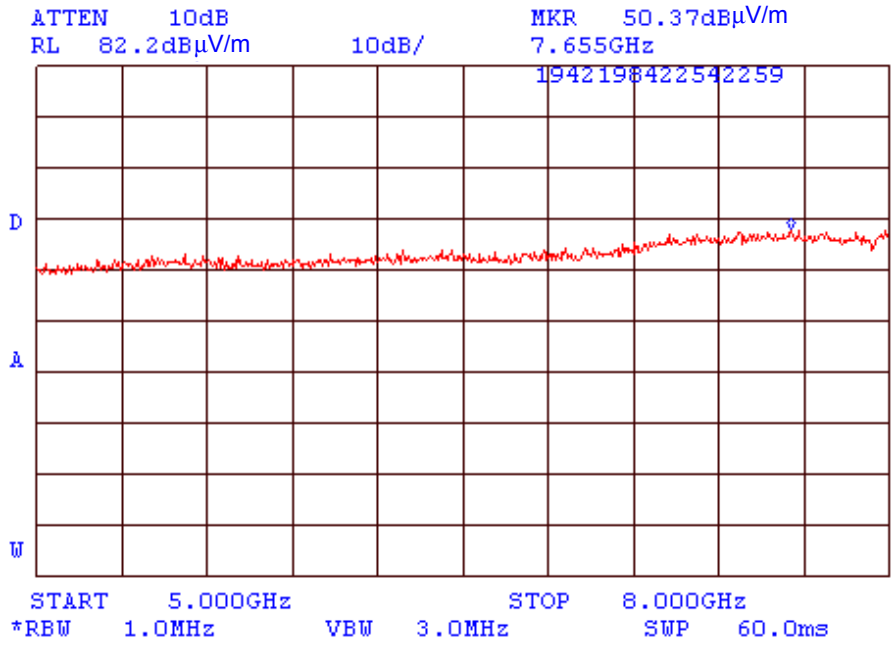
Plot A 85

Radiated spurious emission measurements at the OATS from 5 GHz to 8 GHz, in downlink mode @ maximum input signal (–23 dBm)



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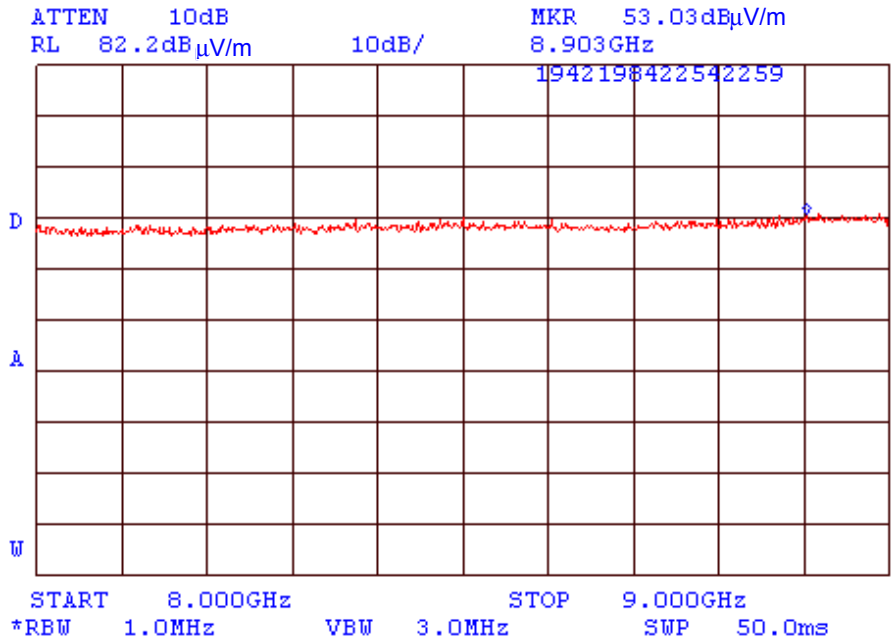
Plot A 86

Radiated spurious emission measurements at the OATS from 8 GHz to 9 GHz, in downlink mode @ maximum input signal (–23 dBm)



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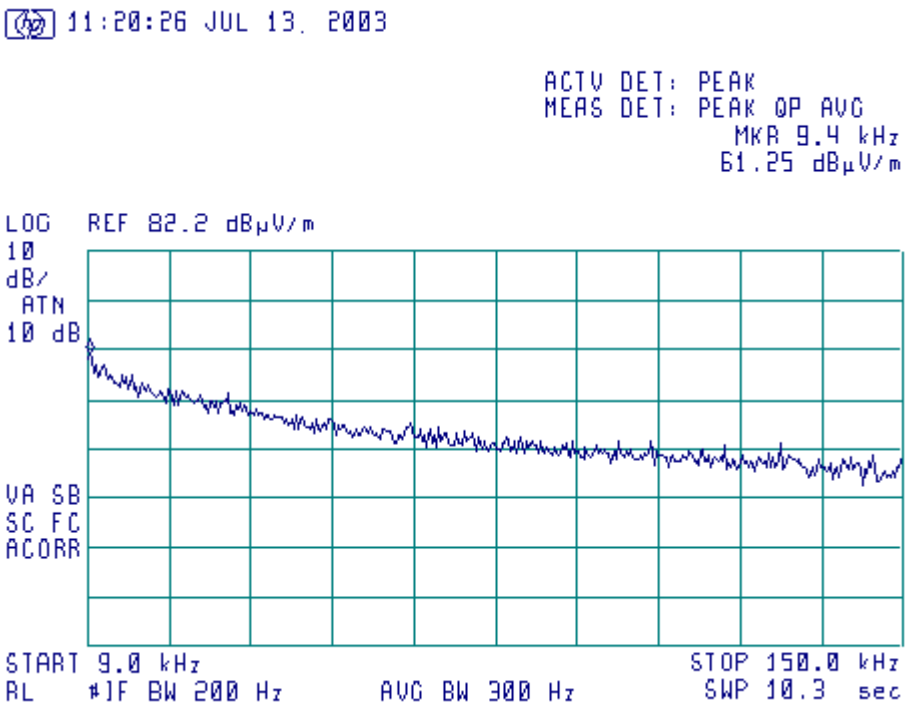
Plot A 87

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in downlink mode @ minimum input signal (–50 dBm)



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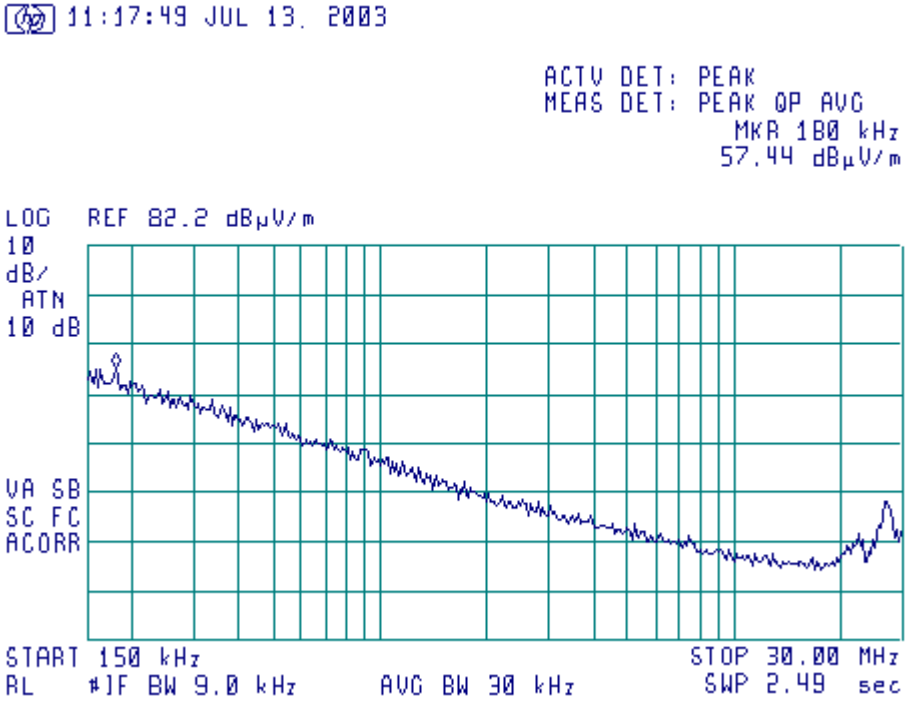
Plot A 88

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in downlink mode @ minimum input signal (–50 dBm)



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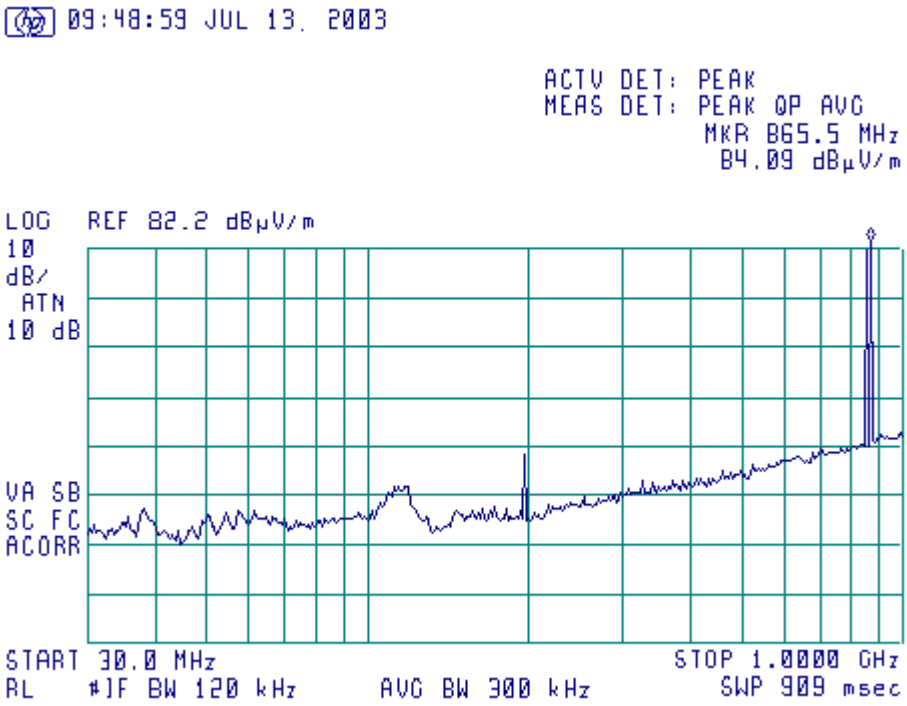
Plot A 89

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 1 GHz, in downlink mode @ minimum input signal (–50 dBm)



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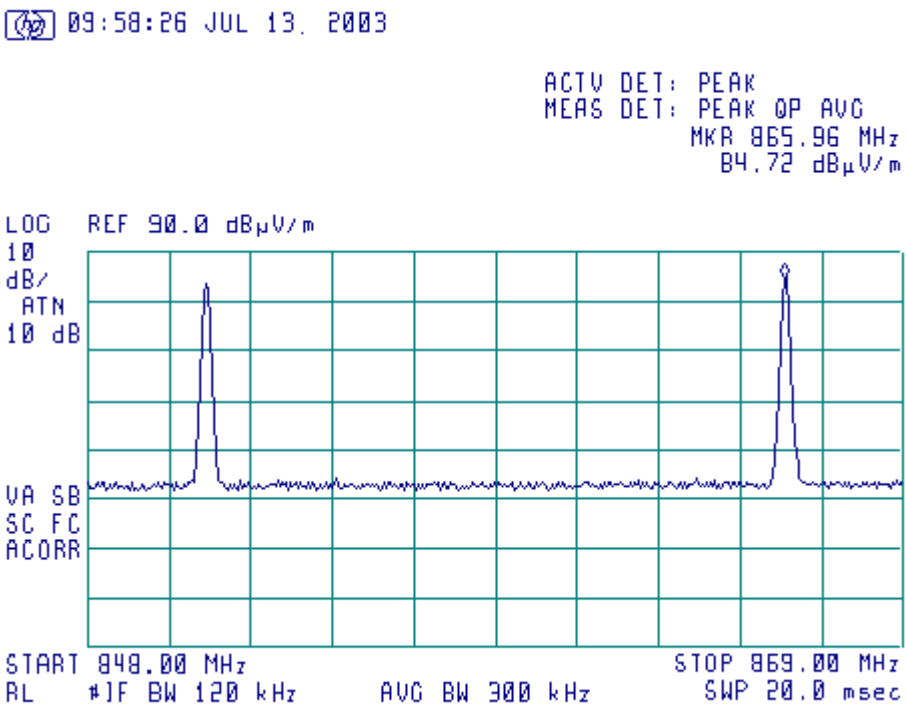
Plot A 90

Radiated spurious emission measurements in the anechoic chamber, in downlink mode @ minimum input signal (–50 dBm)



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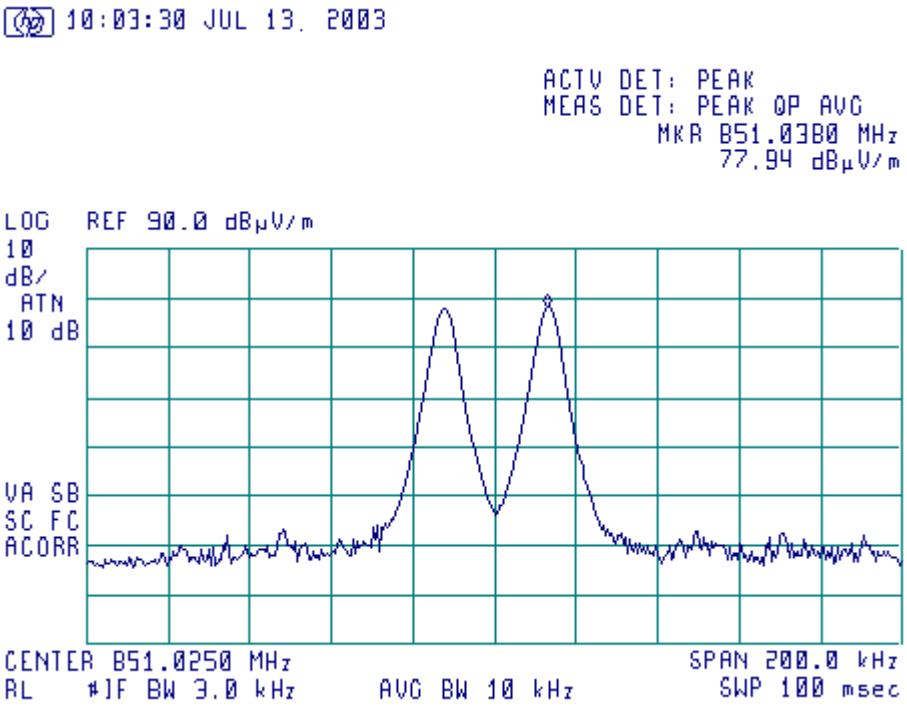
Plot A 91

Radiated spurious emission measurements in the anechoic chamber, in downlink mode @ minimum input signal (–50 dBm)



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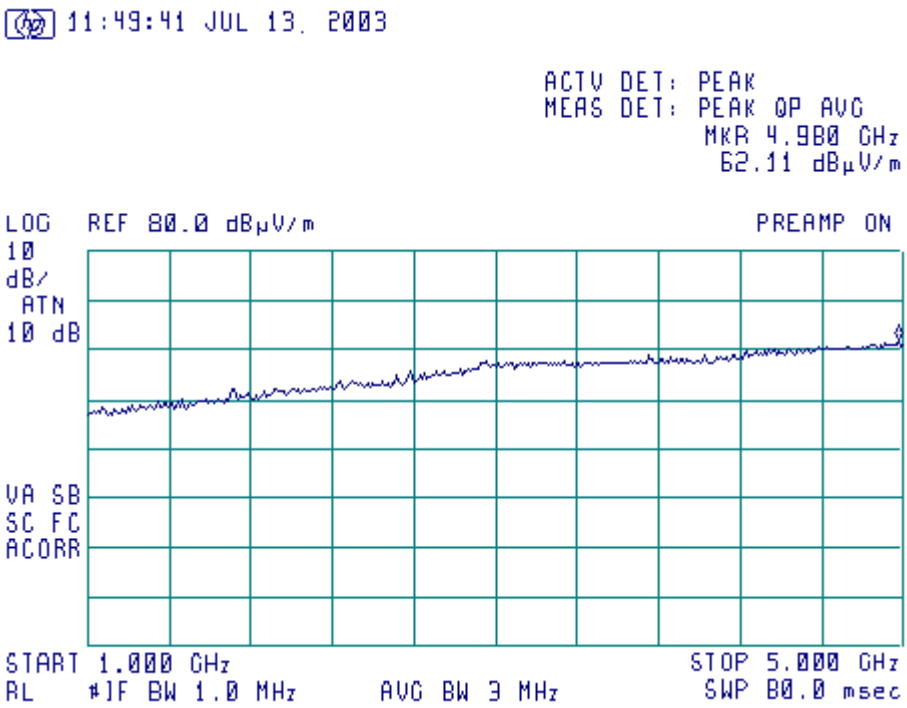
Plot A 92

Radiated spurious emission measurements in the anechoic chamber from 1 GHz to 5 GHz, in downlink mode @ minimum input signal (–50 dBm)



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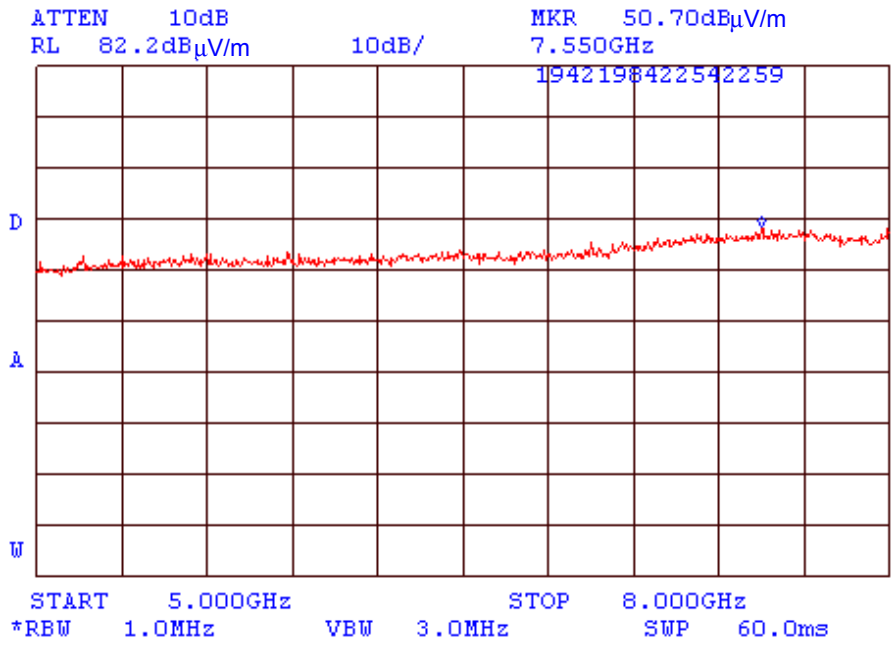
Plot A 93

Radiated spurious emission measurements at the OATS from 5 GHz to 8 GHz, in downlink mode @ minimum input signal (–50 dBm)



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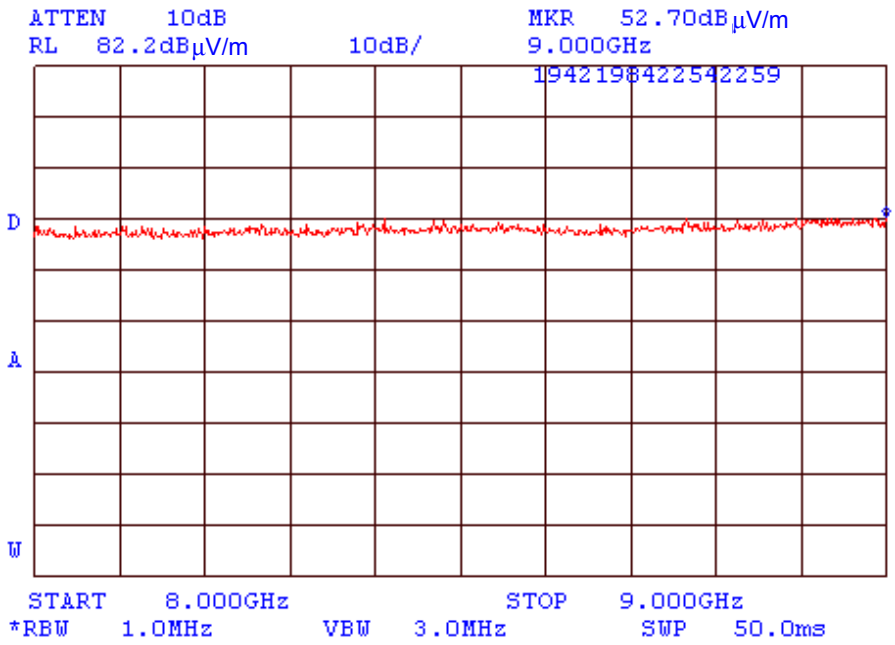
Plot A 94

Radiated spurious emission measurements at the OATS from 8 GHz to 9 GHz, in downlink mode @ minimum input signal (–50 dBm)



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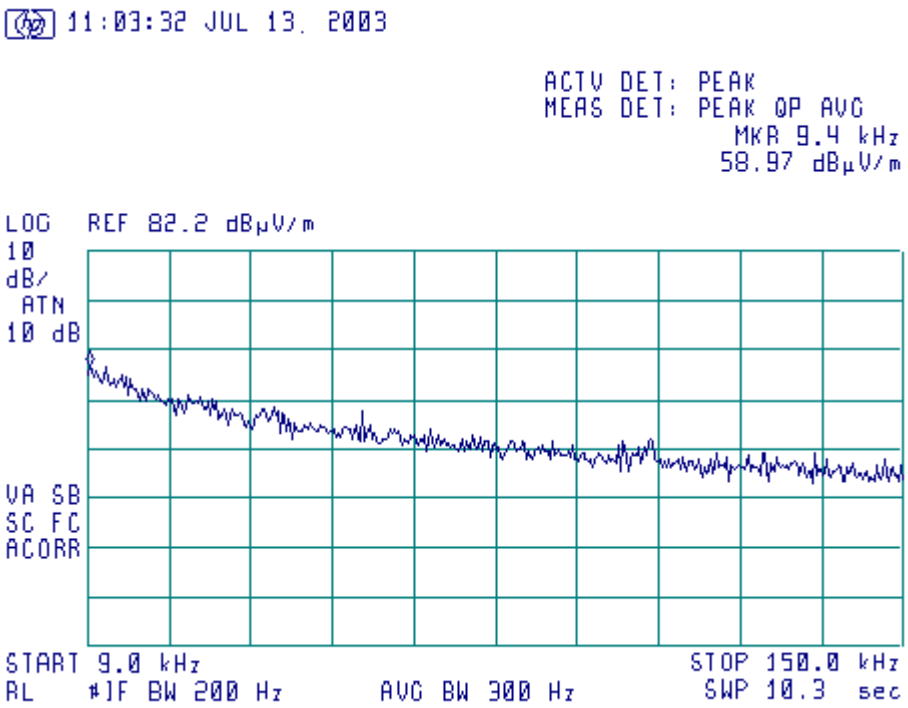
Plot A 95

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 MHz, in uplink mode @ maximum input signal (–33 dBm)



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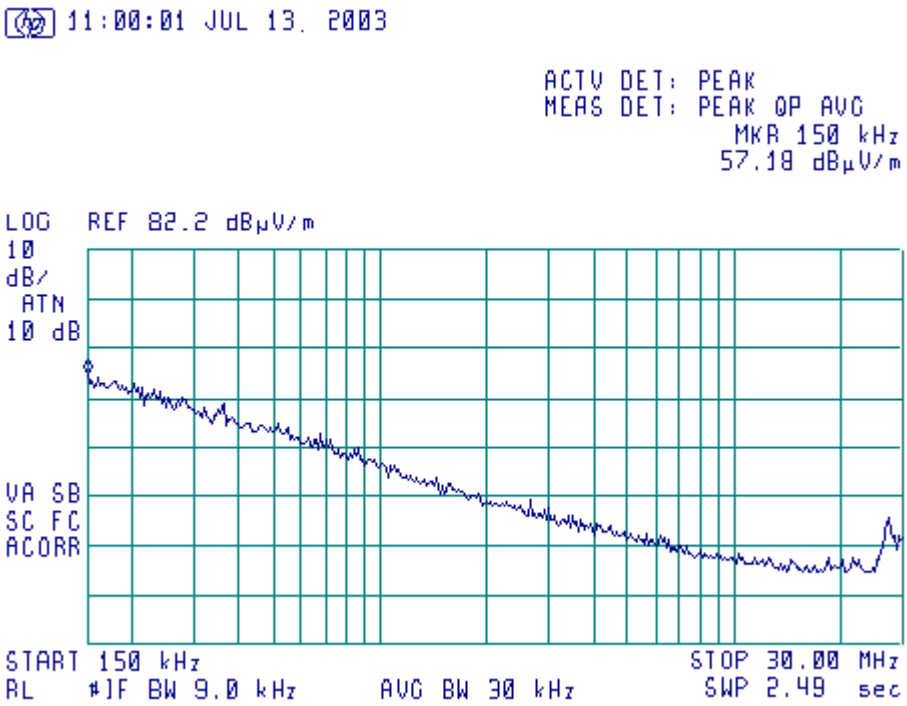
Plot A 96

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in uplink mode @ maximum input signal (–33 dBm)



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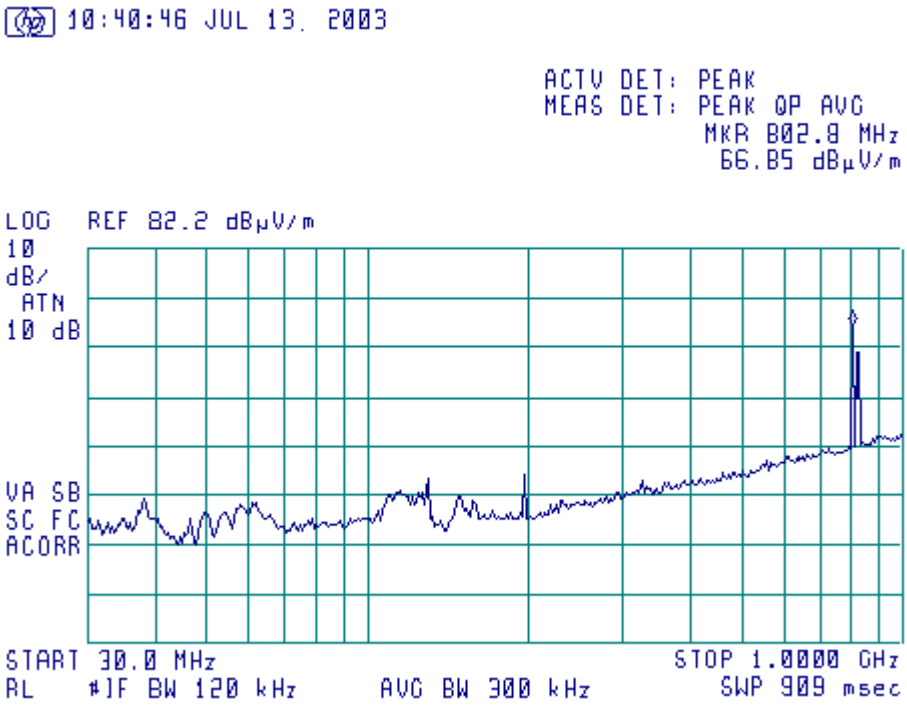
Plot A 97

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 1 GHz, in uplink mode @ maximum input signal (–33 dBm)



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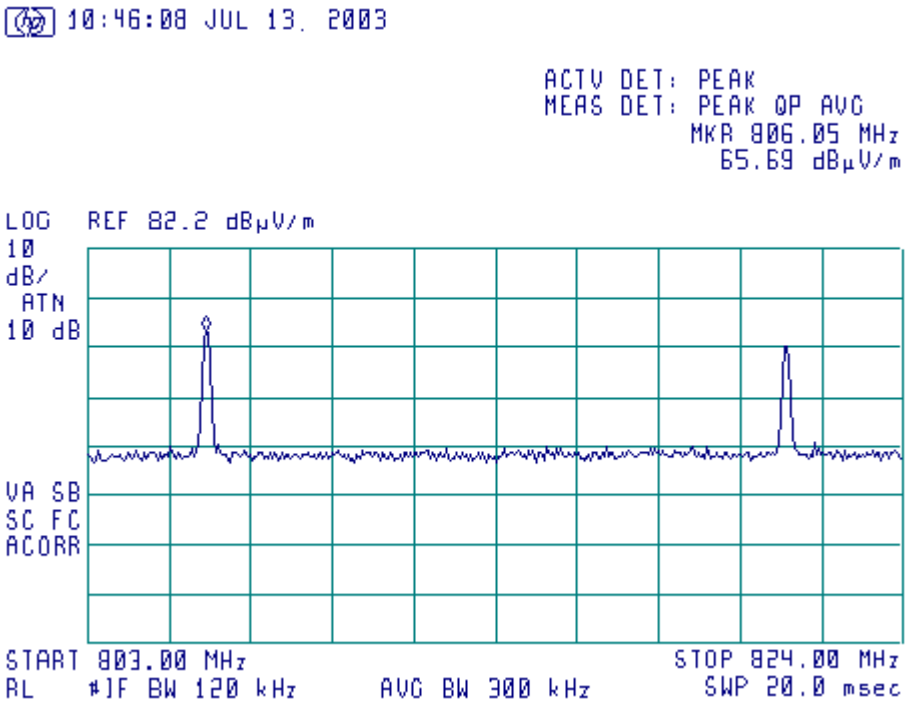
Plot A 98

Radiated spurious emission measurements in the anechoic chamber, in uplink mode @ maximum input signal (–33 dBm)



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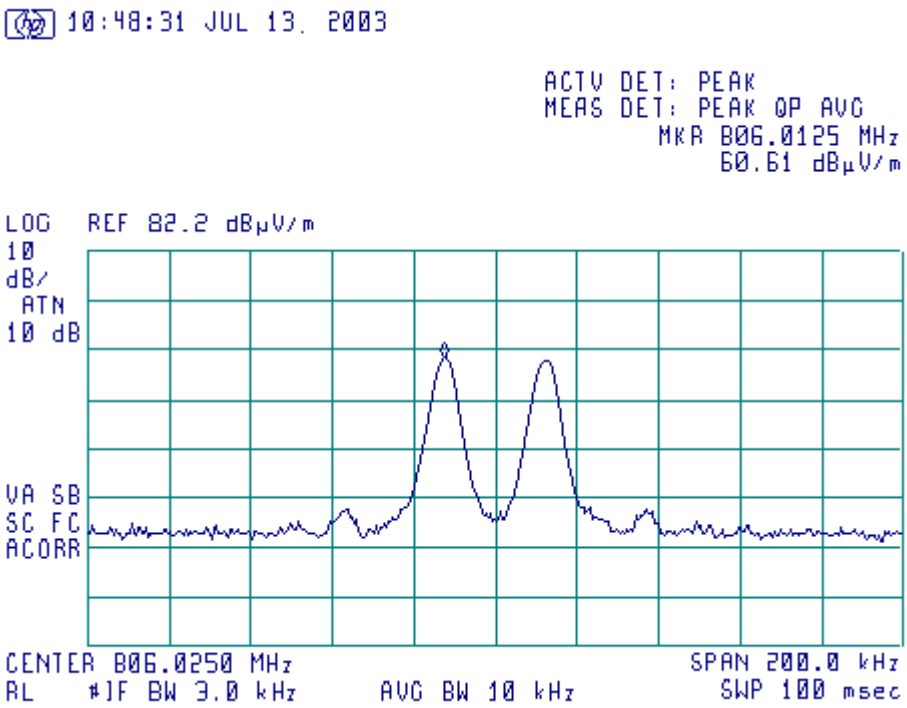
Plot A 99

Radiated spurious emission measurements in the anechoic chamber, in uplink mode @ maximum input signal (–33 dBm)



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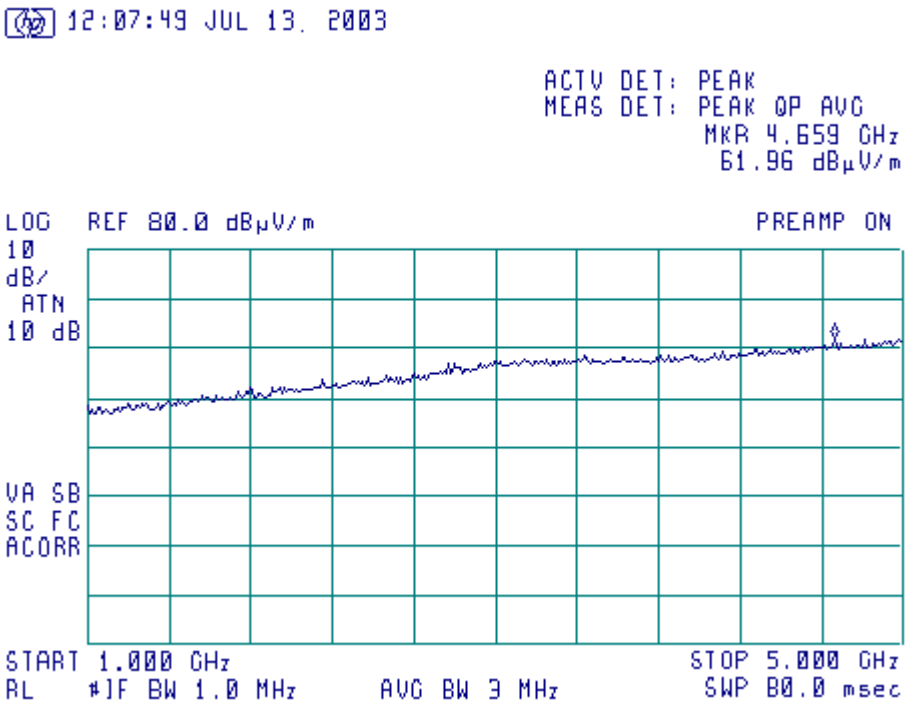
Plot A 100

Radiated spurious emission measurements in the anechoic chamber from 1 GHz to 5 GHz, in uplink mode @ maximum input signal (–33 dBm)



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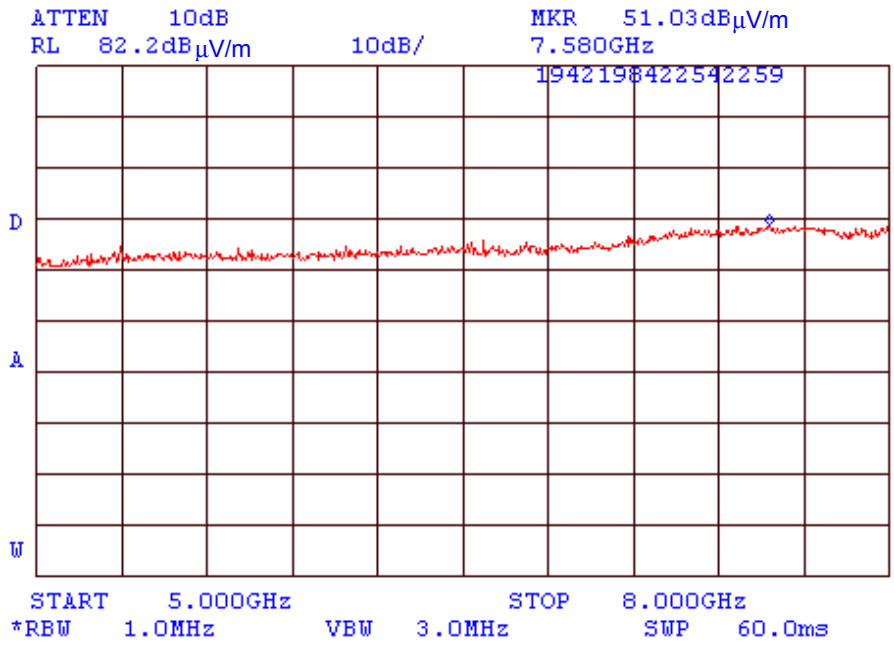
Plot A 101

Radiated spurious emission measurements at the OATS from 5 GHz to 8 GHz, in uplink mode @ maximum input signal (–33 dBm)



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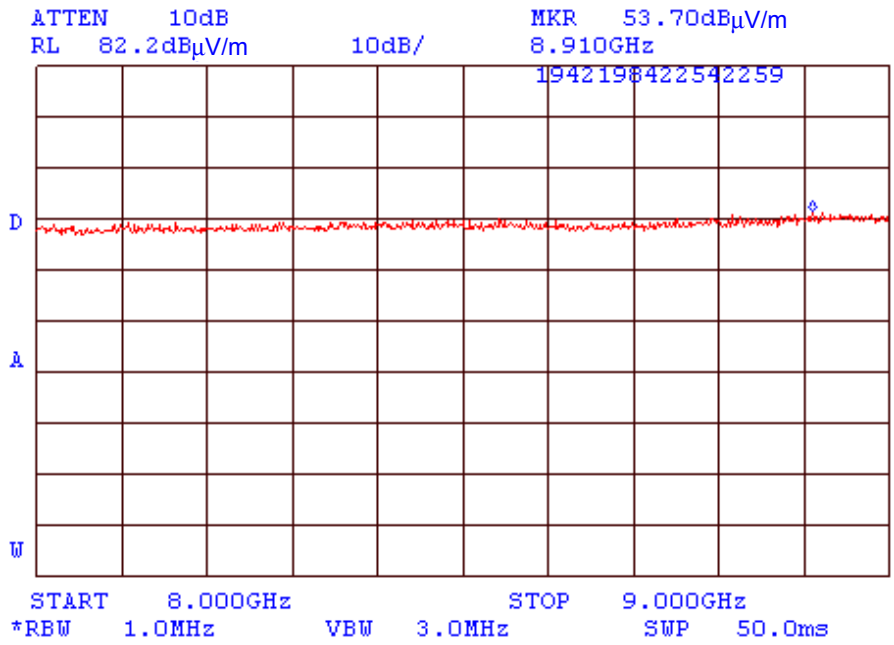
Plot A 102

Radiated spurious emission measurements at the OATS from 8 GHz to 9 GHz, in uplink mode @ maximum input signal (–33 dBm)



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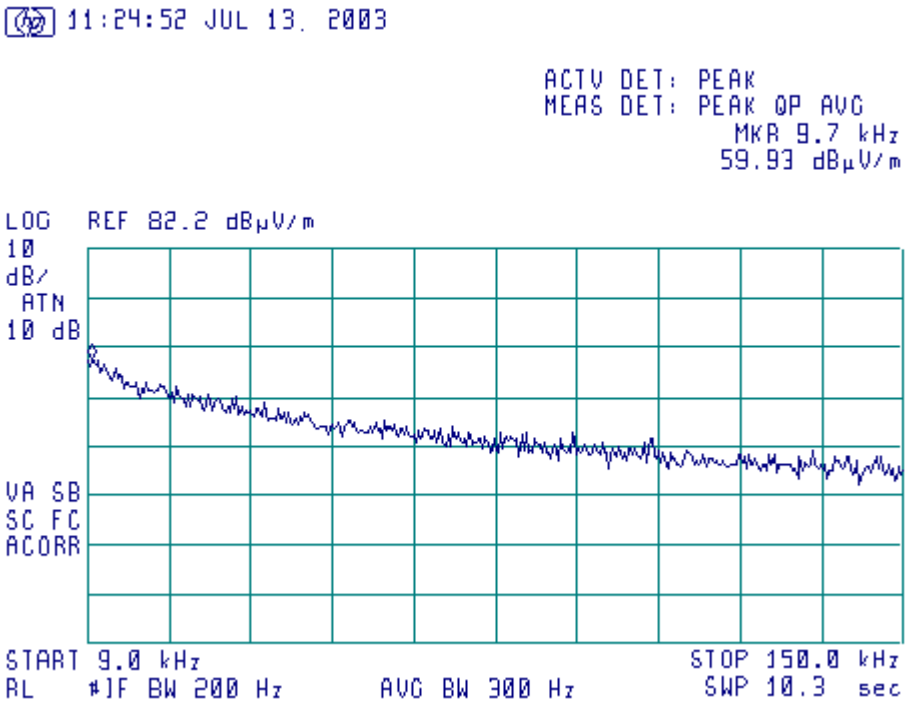
Plot A 103

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in uplink mode @ minimum input signal (–60 dBm)



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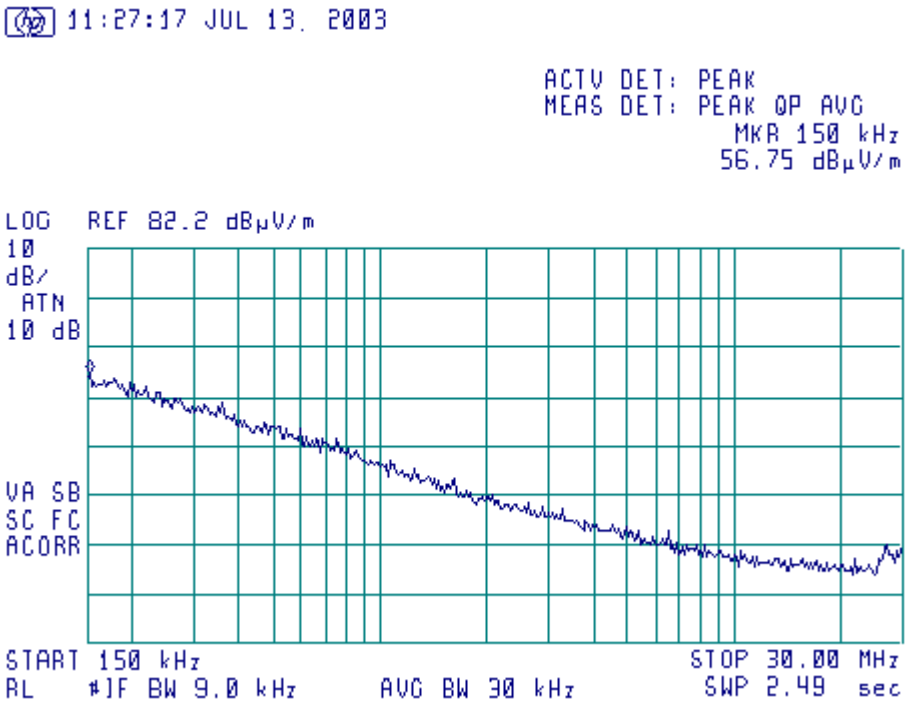
Plot A 104

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in uplink mode @ minimum input signal (–60 dBm)



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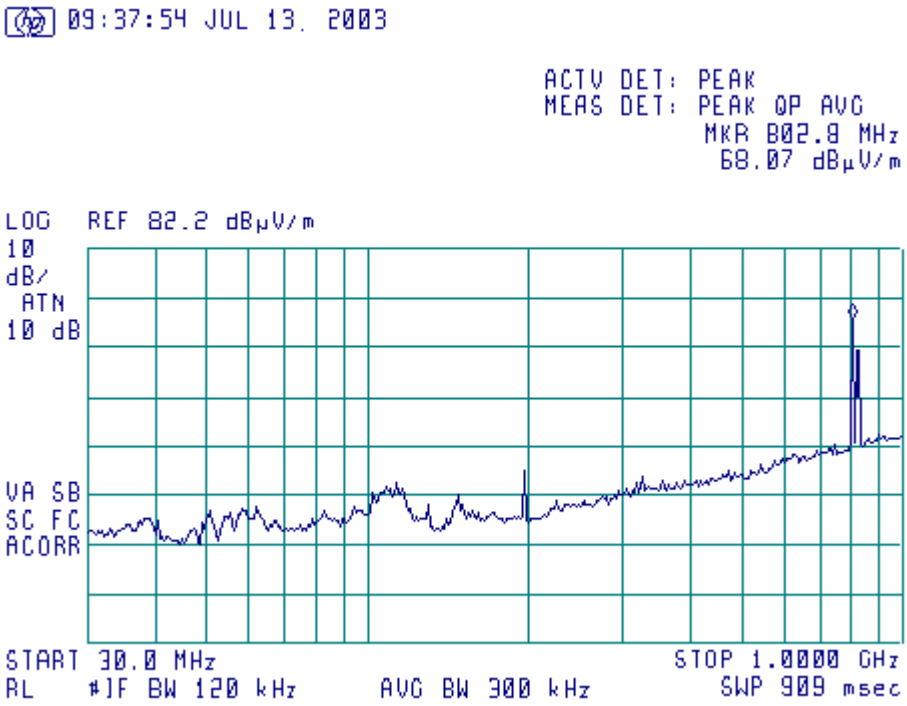
Plot A 105

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 1 GHz, in uplink mode @ minimum input signal (–60 dBm)



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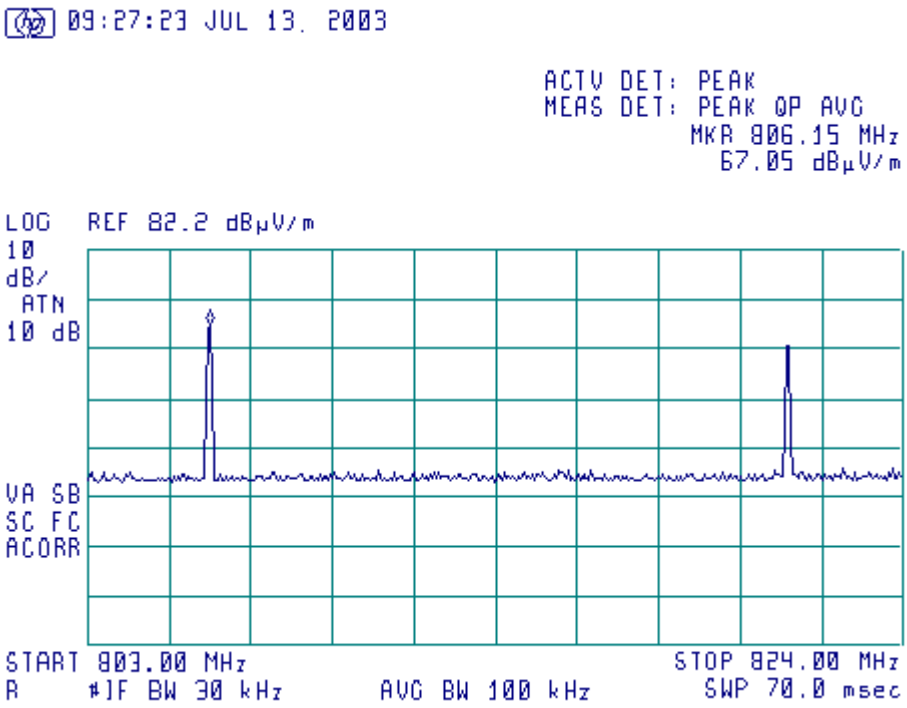
Plot A 106

Radiated spurious emission measurements in the anechoic chamber, in uplink mode @ minimum input signal (–60 dBm)



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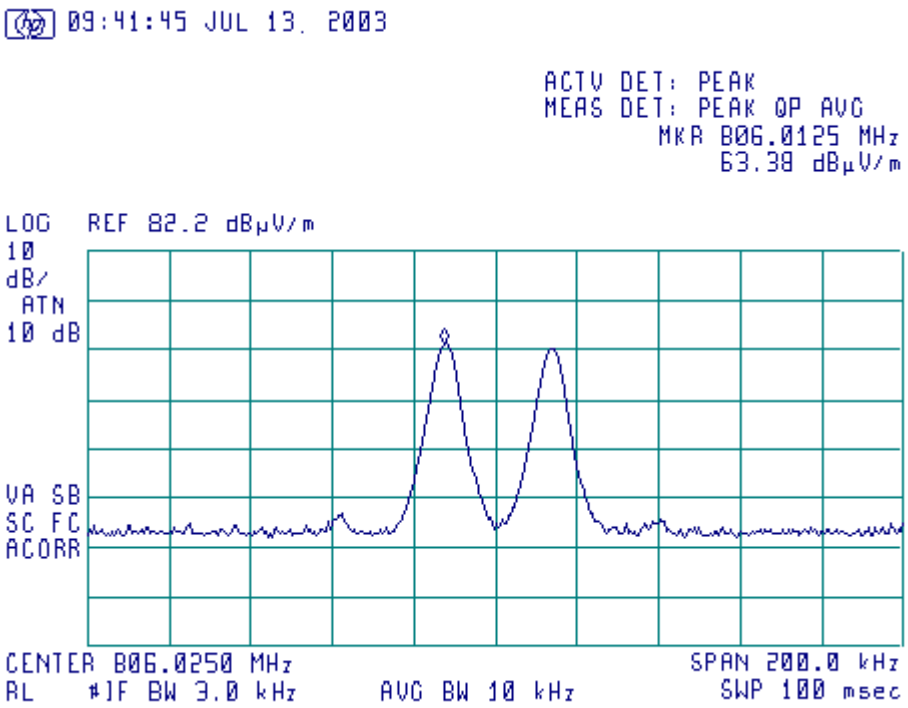
Plot A 107

Radiated spurious emission measurements in the anechoic chamber, in uplink mode @ minimum input signal (–60 dBm)



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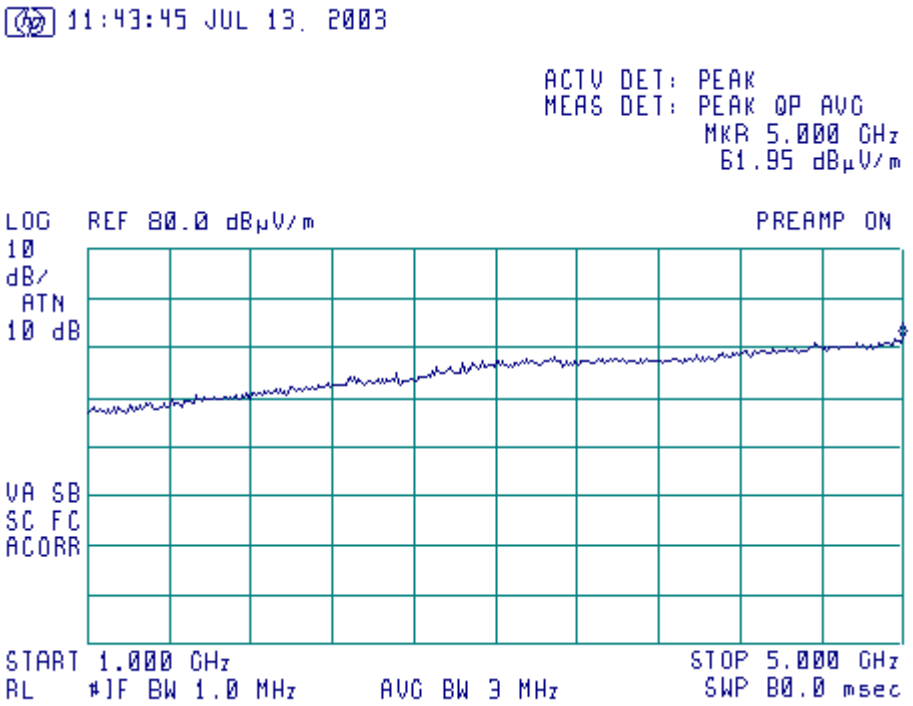
Plot A 108

Radiated spurious emission measurements in the anechoic chamber from 1 GHz to 5 GHz, in uplink mode @ minimum input signal (–60 dBm)



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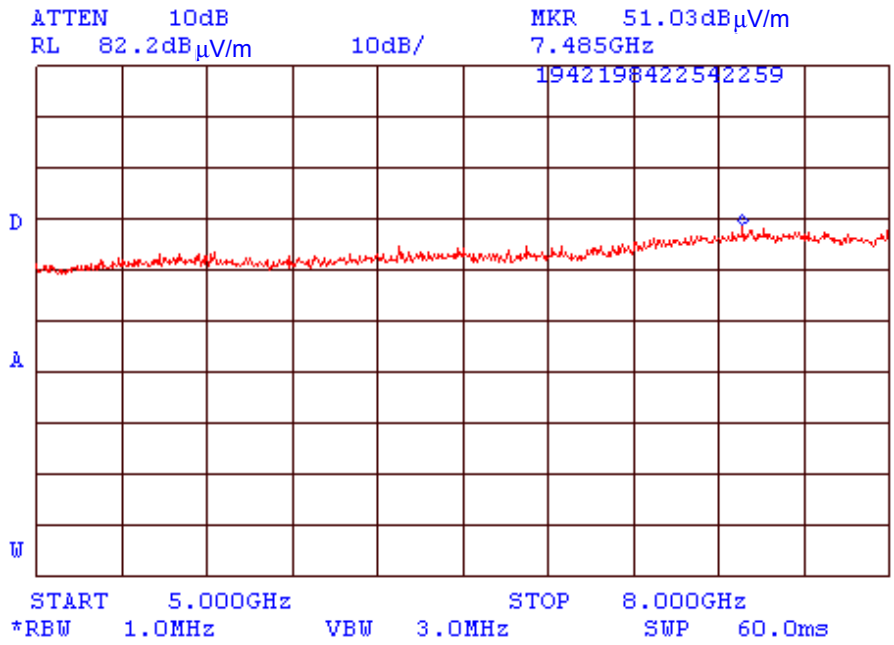
Plot A 109

Radiated spurious emission measurements at the OATS from 5 GHz to 8 GHz, in uplink mode @ minimum input signal (–60 dBm)



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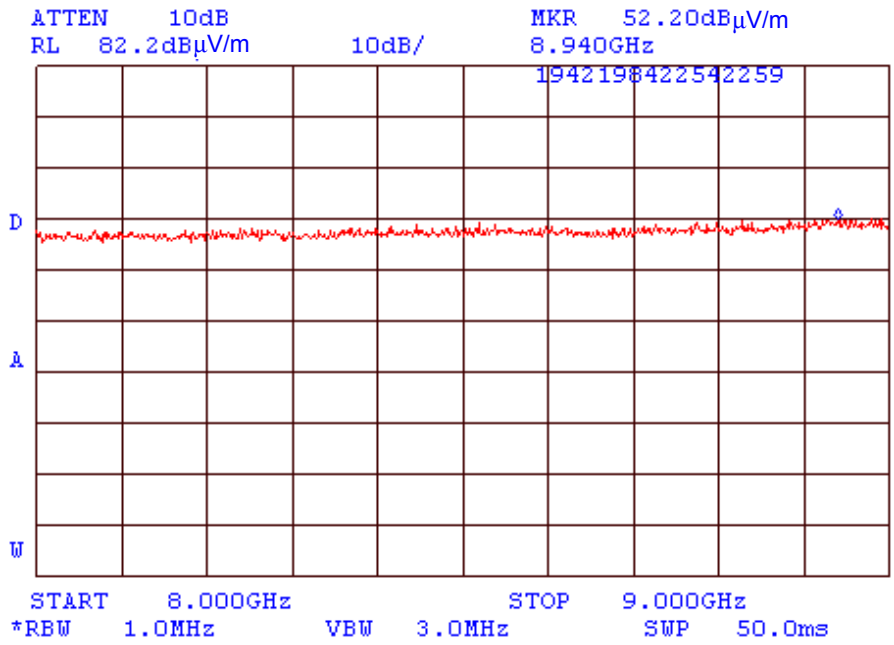
Plot A 110

Radiated spurious emission measurements at the OATS from 8 GHz to 9 GHz, in uplink mode @ minimum input signal (–60 dBm)



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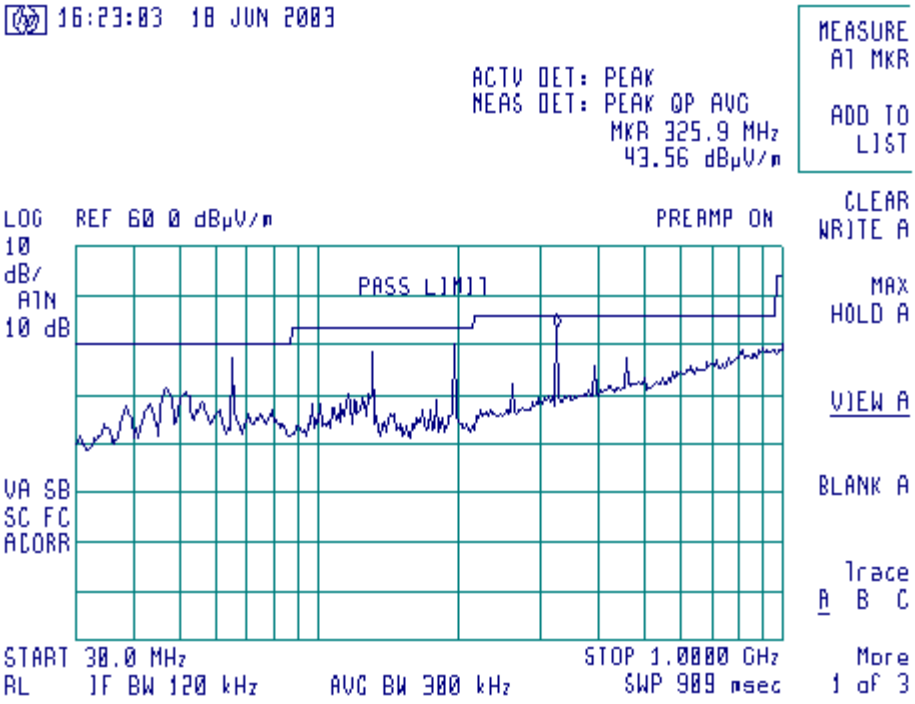
Plot A 111

Radiated emission measurements test results in 30 MHz – 1000 MHz range in anechoic chamber



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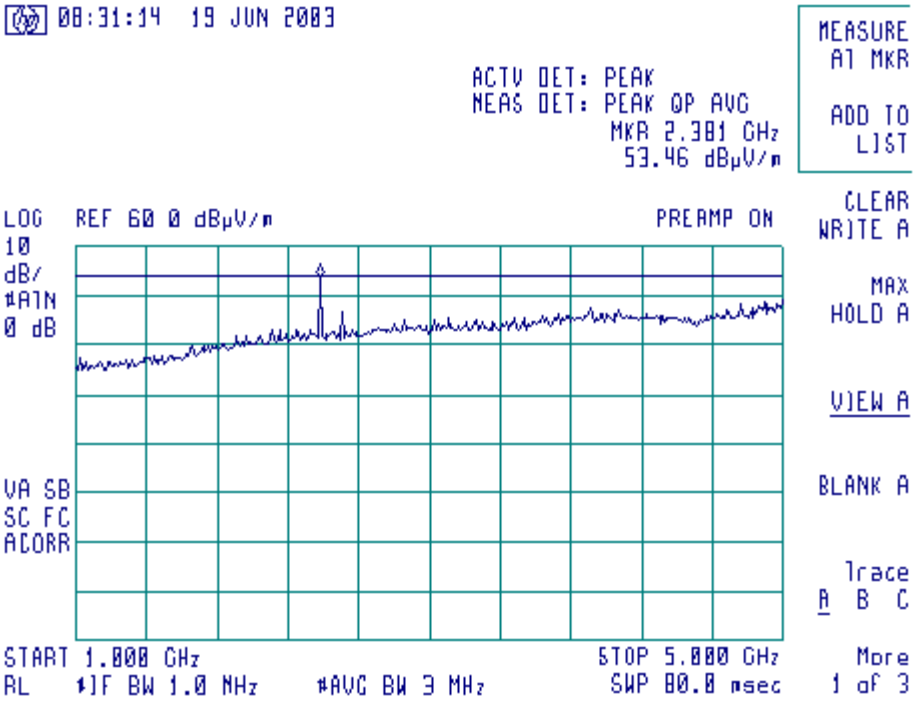
Plot A 112

Radiated emission measurements test results in 1000 MHz - 5000 MHz range in anechoic chamber



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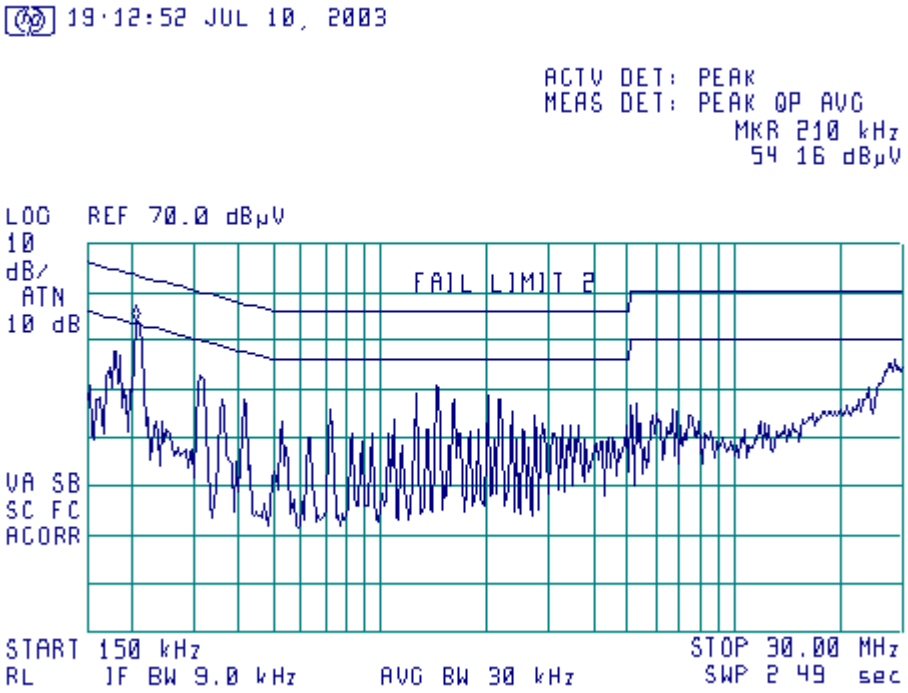
Plot A 113

Conducted emission measurements test results at the phase line in downlink mode



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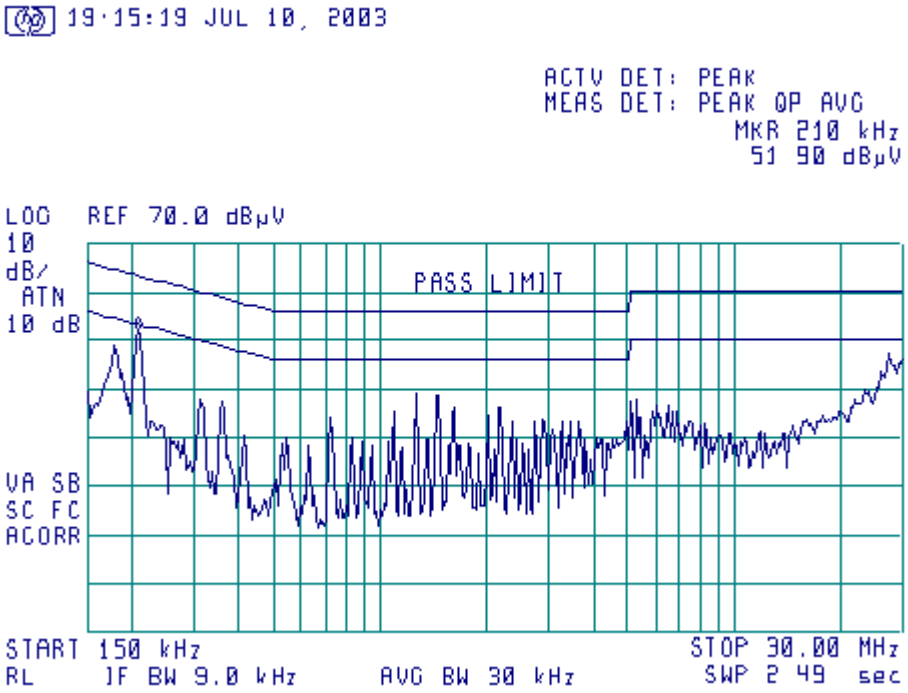
Plot A 114

Conducted emission measurements test results at the neutral line in downlink mode



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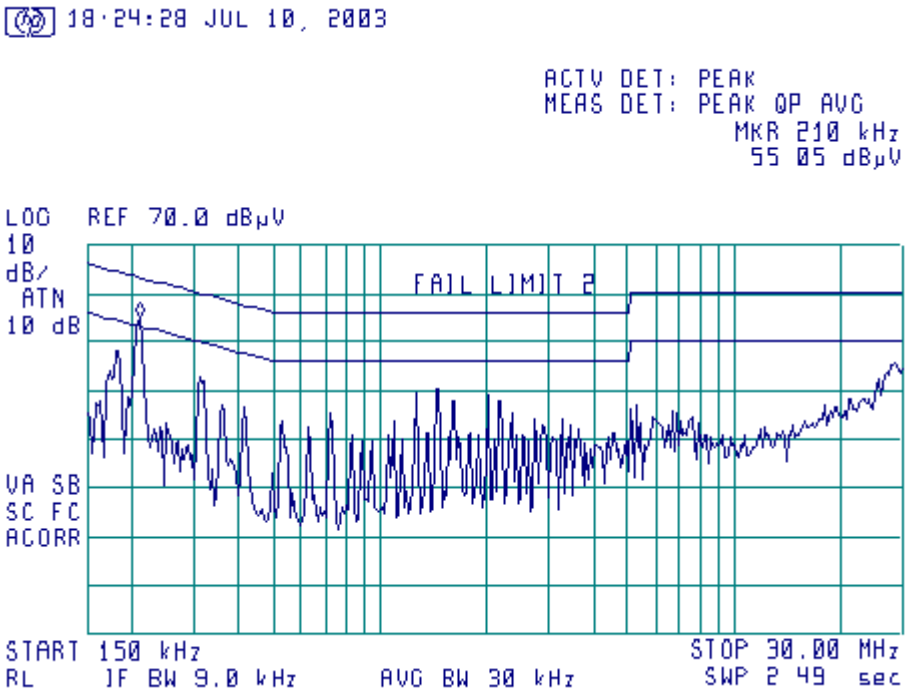
Plot A 115

Conducted emission measurements test results at the phase line in uplink mode



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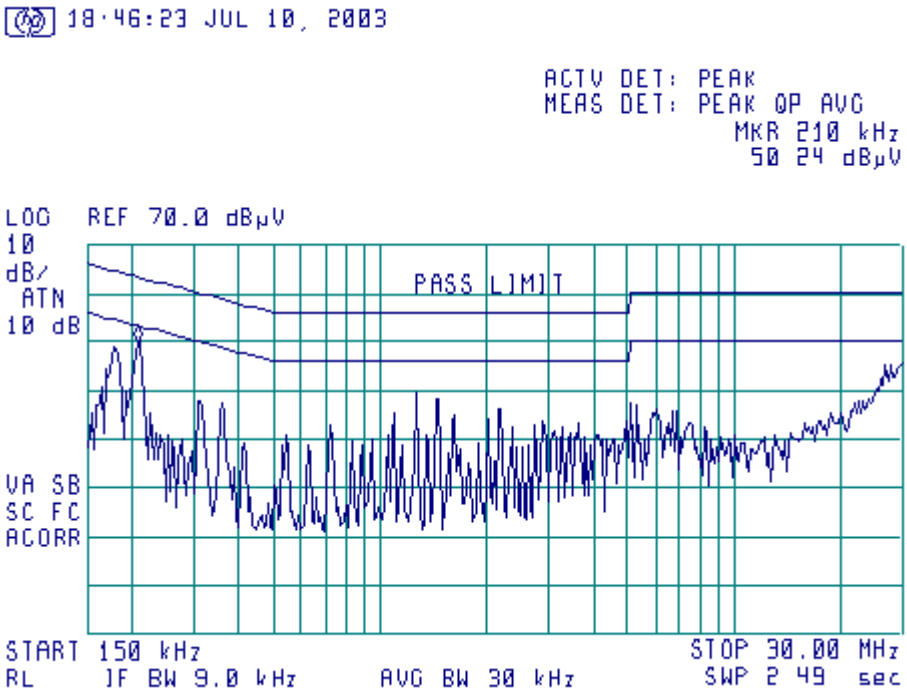
Plot A 116

Conducted emission measurements test results at the neutral line in uplink mode



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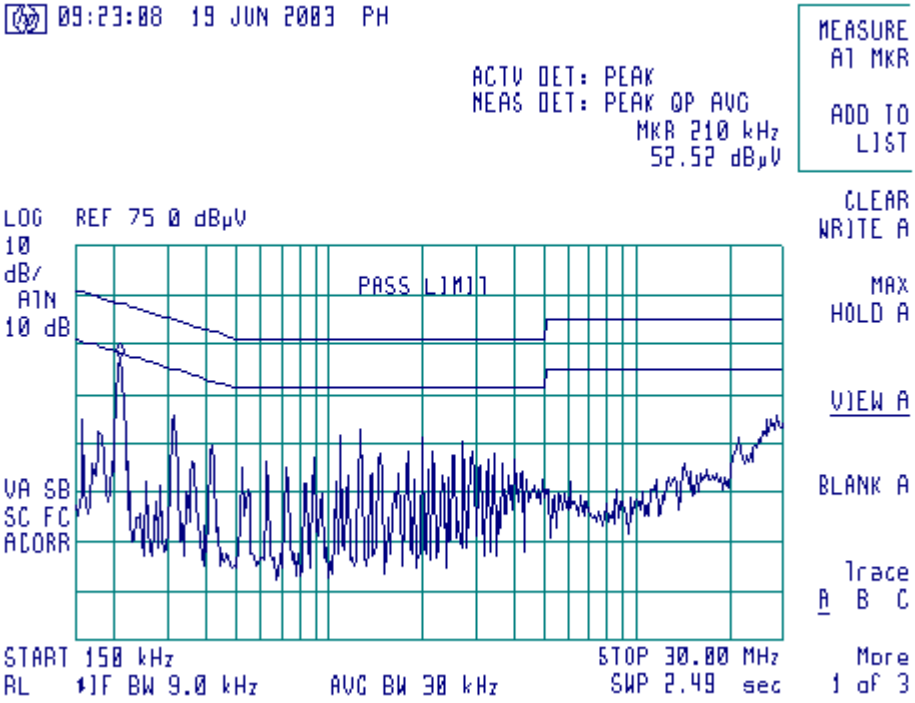
Plot A 117

Conducted emission measurements test results at the phase line in stand-by mode



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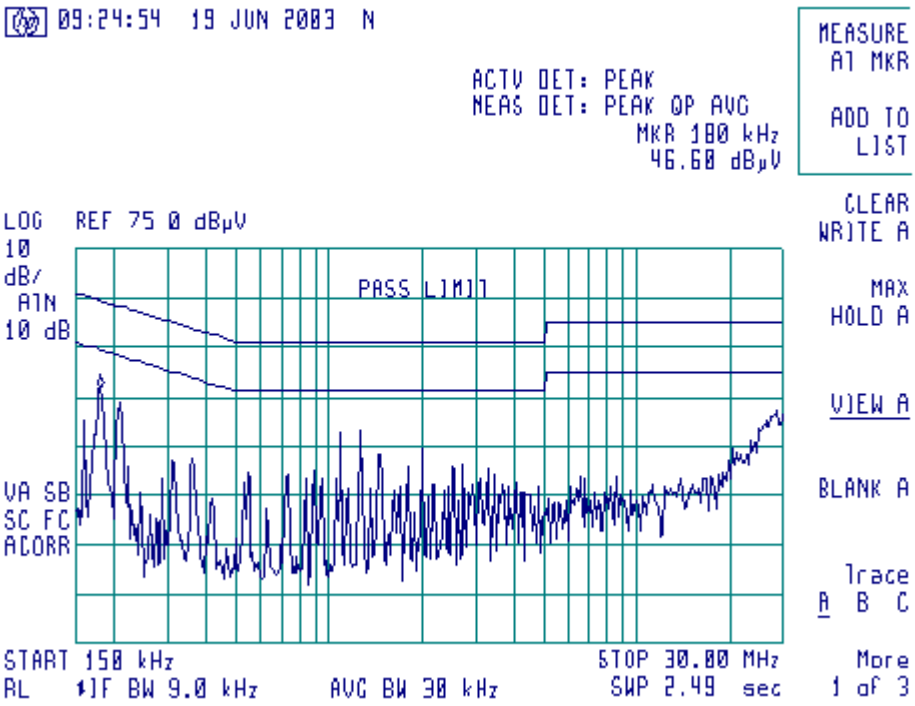
Plot A 118

Conducted emission measurements test results at the neutral line in stand-by mode



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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
0051	Attenuator 50 Ohm, 100 W, 30 dB	Bird	8323	1640	12/03
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
0787	Transient limiter	Hewlett Packard	11947A-8ZE	3107A01877	11/03
1004	Cable, coaxial ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/03
1424	Spectrum analyzer, 30 Hz - 40 GHz	Agilent Technologies	8564EC	3946A00219	8/03

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HL Serial No.	Description	Manufacturer information			Due Calibr. Month/ year
		Name	Model No.	Serial No.	
1430	EMI Receiver System, 9 kHz - 2.9 GHz	Agilent Technologies	8542E	3807A00262	9/03
1460	Cable, 1 m	Harbour Industries	MIL 17/60 RG142	1460	9/03
1465	Cable, 0.5 m	Harbour Industries	MIL 17/60 RG142	1465	9/03
1481	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1481	9/03
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	12/03 check
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	12/03
1528	Cable RF, 1.0 m	Alpha wire	RG-213/U	1528	9/03
1542	Cable RF, 0.4 m	Suhner Switzerland	RG-214/U	1542	9/03
1653	Analyzer EMC, 9 KHz – 1.5 GHz	Aglient Technologies	F7401	US39440281	2/04
1824	Attenuator coaxial , 30 dB , 100 W , 50 Ohm	Bird	8323	1185	12/03
1942	Cable 18 GHz, 4 m, blue	Rhophase Microwave Ltd	SPS-1803A-4000-NPS	T4658	10/03
1947	Cable 18 GHz, 6.5 m, blue	Rhophase Microwave Ltd	NPS-1803A-6500-NPS	T4974	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
2012	Attenuator, manual step, 0-99/1 dB, 0-4 GHz, 2 W	Weinschel	AC9004-99-11	2012	12/03
2014	Attenuator, manual step, 0-99/1 dB, 0-4 GHz, 2 W	Weinschel	AC9004-99-11	16924	12/03
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave	KPS-1503A-800-KPS	W4907	11/03
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	11/03
5000	ESG-D Series signal generator	Agilent	E4432BF	US40053757	9/03

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Appendix C Antenna factors and cable loss

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

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

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

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

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Antenna Factor
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
Active Loop Antenna
Model 6502
S/N 2857

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

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

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

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

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

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

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

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

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

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

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

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

No.	Frequency, MHz	Cable loss, dB	Measurement uncertainty, dB
1	1	0.10	±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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Cable loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1502

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

Cable loss
Cable M17/167 MIL-C-17, HL 1510

Frequency, MHz	Cable loss, dB
0.1	0.05
1	0.09
3	0.16
5	0.18
10	0.27
30	0.44
50	0.58
80	0.69
100	0.82
300	1.48
500	2.01
800	2.65
1000	3.12

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Cable loss
Cable MIL 17/60-RG142, HL 1460

Frequency, GHz	Cable loss, dB
2	1
2.2	1
2.4	1
2.6	1.1
2.8	1.1
3	1.2
3.2	1.2
3.4	1.3
3.6	1.4
3.8	1.4
4	1.5
4.2	1.6
4.4	1.6
4.6	1.8
4.8	1.8
5	1.9
5.2	1.9
5.4	2
5.6	2
5.8	2
6	2.1
6.2	2.1
6.4	2.1
6.6	2.2
6.8	2.4
7	2.5
7.2	2.7
7.4	2.7
7.6	2.7
7.8	2.8
8	2.9
8.2	3
8.4	3
8.6	3.2
8.8	3.4
9	3.7

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Cable loss
Cable MIL 17/60-RG142, HL 1481

Frequency, GHz	Cable loss, dB
2	1
2.2	1.1
2.4	1.1
2.6	1.2
2.8	1.2
3	1.2
3.2	1.3
3.4	1.3
3.6	1.5
3.8	1.5
4	1.6
4.2	1.7
4.4	1.8
4.6	1.9
4.8	2
5	2
5.2	2
5.4	2.1
5.6	2.1
5.8	2.2
6	2.2
6.2	2.2
6.4	2.3
6.6	2.3
6.8	2.3
7	2.4
7.2	2.4
7.4	2.5
7.6	2.5
7.8	2.6
8	2.7
8.2	2.8
8.4	3.1
8.6	3.3
8.8	3.5
9	4

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Cable loss
Cable coaxial, 1 m, Alpha Wire, model: RG-213/U, HL 1528

Frequency, MHz	Cable loss, dB
10	0.05
20	0.05
30	0.07
40	0.05
50	0.07
60	0.07
70	0.07
80	0.07
90	0.07
100	0.07
200	0.12
300	0.13
400	0.18
500	0.19
600	0.20
700	0.28
800	0.28
1000	0.28
2000	0.47
2900	0.75

Cable loss
Cable coaxial, 0.4 m, Suhner Switzerland, model: RG-214/U, HL 1542

Frequency, MHz	Cable loss, dB
10	0.02
20	0.02
30	0
40	0
50	0.02
60	0.02
70	0.03
80	0
90	0.02
100	0.02
200	0.04
300	0.05
400	0.07
500	0.04
600	0.09
700	0.07
800	0.04
1000	0.09
2000	0.24

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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
CW	continuous wave
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
m	meter
MHz	megahertz
NA	not applicable
QP	quasi-peak
RF	radio frequency
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.