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ELECTROMAGNETIC EMISSIONS TEST REPORT

according to 47CFR Part 90, subparts I, S

for

Dekolink Wireless Ltd.

EQUIPMENT UNDER TEST:

High power repeater

Model:MW-BDA-ESMR-50W90

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1 Project information

Description of equipment under test

Test items	: High power repeater
Manufacturer	: Dekolink Wireless Ltd.
Types (Models)	: MW-BDA-ESMR-50W90
Hardware version:	: 01

Applicant information

Applicant's responsible person	: Mr. David Levy, director of projects department
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:	: 15558
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-BDA-ESMR-50W90 high power 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 26, 29, 2003	4.1	Pass
Occupied bandwidth	90.209	Mrs. E. Pitt, Mr. Y. Neuman, test engineer	June 26, 29, 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	June 24, July 3, 2003	4.5	Pass
Radiated emissions	15.109	Mrs. E. Pitt, test engineer	June 24, 2003	4.6	Pass
Conducted emissions	15.107, 15.207	Mr. Y. Neuman, test engineer	June 19, 22, 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, bi-directional repeater, provides an exceptional repeater/booster performance to extend the coverage area for radio communications in buildings and RF shielded environments. 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 frequencies generated or used in the EUT are: 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 26, 29, 2003
RELATIVE HUMIDITY: 42 %
AMBIENT TEMPERATURE: 26°C
AIR PRESSURE: 1009 hPa
MEASUREMENT UNCERTAINTY: ±3.5 dB
OPERATING FREQUENCY RANGE: 851-866 MHz (downlink)
806-821 MHz (uplink)

Single frequency

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 (-21.9)	39.17	40 ± 1	0.83	1.83	A1	Pass
		Min (-51.6)	39.17		0.83	1.83	A2	Pass
Uplink	813.5125	Max (-31.8)	30.83	30 ± 1	-0.83	0.17	A3	Pass
		Min (-60.5)	30.83		-0.83	0.17	A4	Pass

Multi-carrier

Mode of operation	Frequencies, MHz	Input signal, dBm	Peak output power, dBm	Output power limit, dBm	Nominal* margin, dB	Maximum** margin, dB	Reference to Plots in Amendment 1	Verdict
Downlink	851.0125 851.0375 865.9872	Max (-21.9)	39.99	40 ± 1	0.01	1.01	1-7 to 1-10	Pass
		Min (-51.6)	40.05		-0.05	0.95	1-2 to 1-5	Pass

Peak output power in uplink mode measured with a power meter is equal to 31.55 dBm at minimum input signal and 31.61 dBm – at maximum input signal.

*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 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. Spectrum analyzer readings were corrected for RF path losses.

TEST EQUIPMENT USED:

HL 1097	HL 1424	HL 1824	HL 2254	HL 2399		

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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 26, 2003
RELATIVE HUMIDITY:	42 %
AMBIENT TEMPERATURE:	26°C
AIR PRESSURE:	1009 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 (-21.9)	input	16.45	20	3.55	A5	Pass
		output	16.40		3.60	A6	Pass
	Min (-51.6)	input	16.40		3.60	A7	Pass
		output	16.40		3.60	A8	Pass
Uplink @813.5125	Max (-31.8)	input	16.40		3.60	A9	Pass
		output	16.40		3.60	A10	Pass
	Min (-60.5)	input	16.40		3.60	A11	Pass
		output	16.40		3.60	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 1097	HL 1424	HL 1824	HL 2254	HL 2399		

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

DATE:	June 26, 2003
RELATIVE HUMIDITY:	42 %
AMBIENT TEMPERATURE:	26°C
AIR PRESSURE:	1009 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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4.3.1 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 A29 demonstrates MRK recording –75.67 dBm, external attenuation is 51 dB, hence, measured spurious emission level is –24.67 dBm. Attenuation below carrier is equal to 35.2 dBm – (-24.67 dBm) = 59.87 dB at 48.2 dB attenuation limit.
Test results are brought in table below and are shown in Plots A25 to A76.

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

TEST EQUIPMENT USED:

HL 0053	HL 0911	HL 1097	HL 1424	HL 1460	HL 1481	HL 1824
HL 2254	HL 2287	HL 2399				

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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	850.9625	-24.67	59.87	48.23	11.64	Pass	A29
		851.0647	-24.83	60.03	48.23	11.80	Pass	A30
		865.9121	-25.00	60.20	48.23	11.97	Pass	A31
		866.0375	-24.33	59.53	48.23	11.30	Pass	A32
	minimum	850.9625	-25.33	60.53	48.23	12.30	Pass	A42
		851.0640	-25.00	60.20	48.23	11.97	Pass	A43
		865.9118	-23.67	58.87	48.23	10.64	Pass	A44
		866.0375	-25.83	61.03	48.23	12.80	Pass	A45
		867.0000	-27.50	62.70	48.23	14.47	Pass	A46
Uplink	maximum	805.9625	-33.50	58.70	38.23	20.47	Pass	A55
		806.0625	-30.35	52.55	38.23	14.32	Pass	A56
		820.9123	-26.54	51.74	38.23	13.51	Pass	A57
		821.0375	-30.67	55.87	38.23	17.64	Pass	A58
	minimum	805.6850	-27.00	52.20	38.23	13.97	Pass	A67
		817.5300	-25.17	50.37	38.23	12.14	Pass	A68
		820.9121	-32.17	57.37	38.23	19.14	Pass	A70
		821.0380	-26.67	51.87	38.23	13.64	Pass	A71

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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:	June 24, July 3, 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 in the anechoic chamber:
with the loop antenna in the range 9 kHz to 30 MHz,
the biconilog - in the range 30 MHz to 1000 MHz,
the double ridged guide – in frequency range from 1000 to 9000 MHz.
The EUT was set up on the 80 cm height wooden table, as shown in Figures 4.5.1 and 4.5.2.

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
E = sqrt(30P) /r, where P = –13 dBm = 0.01 mW = 0.05 $x10^{-5}$ W.
E [dBμV/m] = 20 log {10^{6} x sqrt (30x0.05$x10^{-5}$)/3} = 82.3 dBμV/m.

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 full test results are shown in Plots A77 to A126. The spurious emissions found in 1.7 GHz – 1.74 GHz range were retested by substitution method..
The EUT was replaced with a substitution antenna (double ridge guide for the mentioned range) connected to signal generator. The measuring antenna height was changed from 1 to 4 m to find a maximum radiation. The level of the signal generator output was adjusted until the previously recorded field strength maximum reading was obtained as depicted in Table 4.5.1.

The maximum transmitter output power is 10 W (40 dBm), the calculated attenuation is equal to 43+10 log 10 = 53 dB.
The reference antenna equivalent power was calculated using the equation:

$$P_d \text{ (dBm)} = P_{out\ gen} \text{ (dBm)} - \text{cable loss (dB)} + G_a \text{ (dBd), where}$$

P_d is the dipole equivalent power
$P_{out\ gen}$ is the generator output power
G_a is the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.
The attenuation below the unmodulated carrier power is calculated according to the formula:

$$\text{Attenuation (dB)} = 10 \log \{P\ [mW]\}(\text{dBm}) - P_d \text{ (dBm)} = 40 \text{ dBm} - P_d \text{ (dBm)}$$

The test results for maximum and minimum input signals are recorded in Table 4.5.1.

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Table 4.5.1
Radiated emissions measurement results

Max input signal (refer to Plot A88)

Frequency, MHz	Radiated measured result, dB(uV/m)	Generator P_{out}, dBm	Cable loss, dB	Antenna gain, dBd	Dipole equivalent power, dBm	Attenuation, dBc	Limit, dBc	Margin, dB	Verdict
1716.970	62.54	-37.7	1.8+0.7	4.9	-35.3	75.3	53	22.3	Pass
1731.923	64.06	-35.6	1.8+0.7	4.9	-33.2	73.2	53	20.2	Pass

Min input signal (refer to Plot A101)

Frequency, MHz	Radiated measured result, dB(uV/m)	Generator P_{out}, dBm	Cable loss, dB	Antenna gain, dBd	Dipole equivalent power, dBm	Attenuation, dBc	Limit, dBc	Margin, dB	Verdict
1716.973	63.57	-36.7	1.8+0.7	4.9	-34.3	74.3	53	21.3	Pass
1731.943	63.71	-35.9	1.8+0.7	4.9	-33.5	73.5	53	20.5	Pass

TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0025	HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593
HL 0594	HL 0604	HL 1003	HL 1004	HL 1942	HL 1984	HL 2009
HL 2258						

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Figure 4.4.1

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

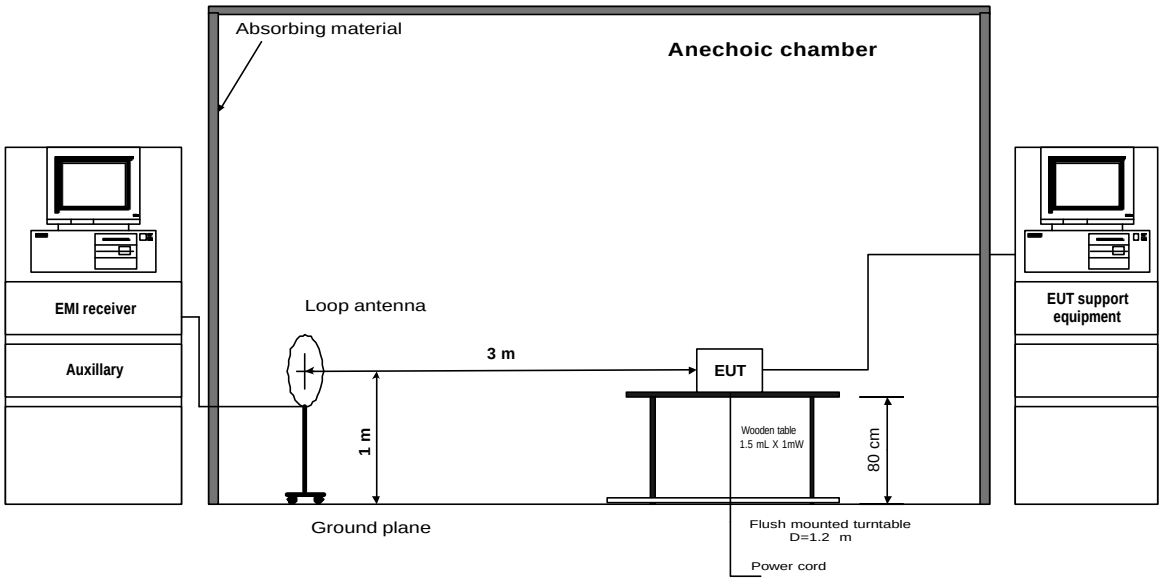
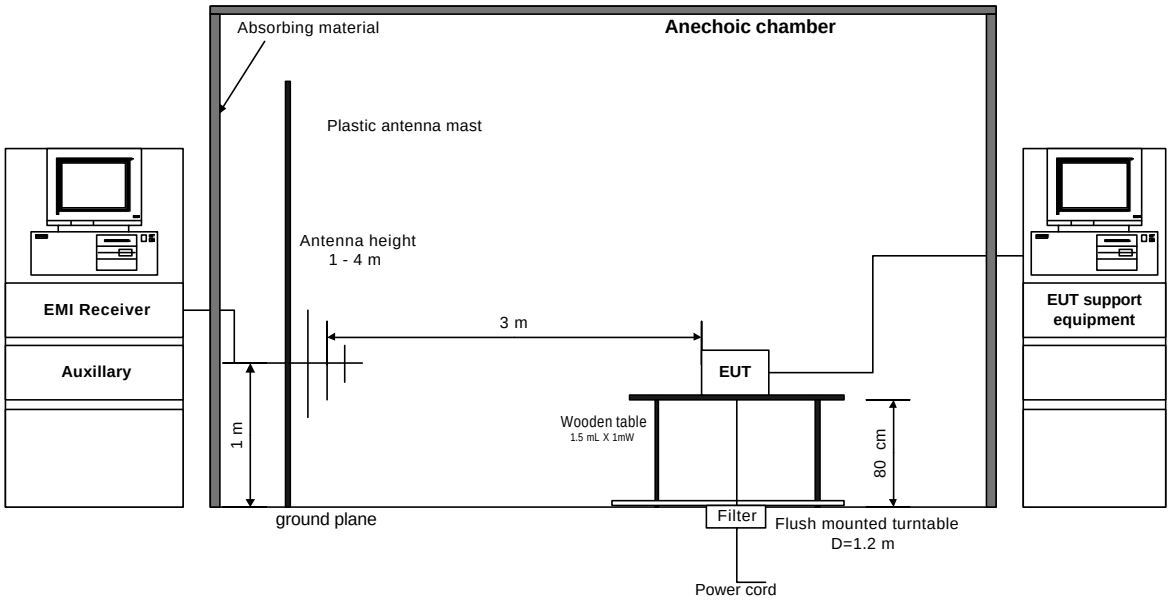


Figure 4.4.2

Set up for radiated emissions measurement



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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 24, 2003
TEST PERFROMED AT:	Anechoic chamber
AMBIENT TEMPERATURE:	24°C
RELATIVE HUMIDITY	44%
AIR PRESSURE:	1008 hPa
DISTANCE BETWEEN ANTENNA AND EUT:	3 m
THE EUT WAS TESTED AS:	Table-top
FREQUECNY RANGE:	30 MHz – 5 GHz
DETECTOR TYPE:	
MEASUREMENT UNCERTAINTY:	± 6 dB max

For test procedure and setup refer to section 4.5.

Frequency, MHz	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict
36.178	15.08	40.0	24.92	Pass
950.246	29.41	46.0	16.59	Pass

The test results listed in the table were obtained throughout measurements with quasi-peak detector, resolution bandwidth 120 kHz, and biconilog antenna in vertical polarization at 1 m height.
For full test results refer to plots A127, A128.

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

LIMIT (§ 15.109)

Frequency, MHz	Class B equipment @ 3 m dB(µV/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 A129 – A134.

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
0.185275	Neutral	40.77	64.28	23.51	Pass	A130
6.309400	Phase	38.49	60.0	21.51	Pass	A129
10.591489	Phase	52.18	60.0	7.82	Pass	A129
10.804321	Phase	52.90	60.0	7.10	Pass	A129
12.623320	Phase	42.11	60.0	17.89	Pass	A129
14.434918	Neutral	42.27	60.0	17.73	Pass	A130
21.172880	Phase	37.87	60.0	22.13	Pass	A129

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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
0.185275	Neutral	40.57	54.28	13.71	Pass	A130
6.309400	Phase	37.24	50.0	12.76	Pass	A129
10.591489	Phase	42.58	50.0	7.42	Pass	A129
10.804321	Phase	42.51	50.0	7.49	Pass	A129
12.623320	Phase	32.21	50.0	17.79	Pass	A129
14.434918	Neutral	32.99	50.0	17.01	Pass	A130
21.172880	Phase	29.47	50.0	20.53	Pass	A129

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 in the shielded room 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 0672	HL 0787	HL 1430	HL 1502	HL 1510	

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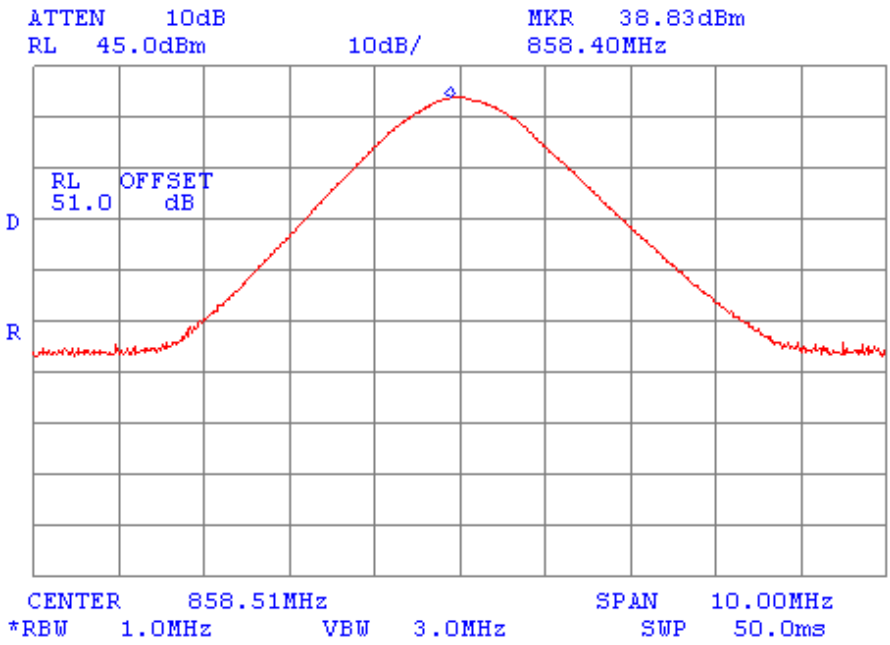
Amendment 1 Plots

Plot 1-1

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



Single frequency
External attenuator 51 dB.

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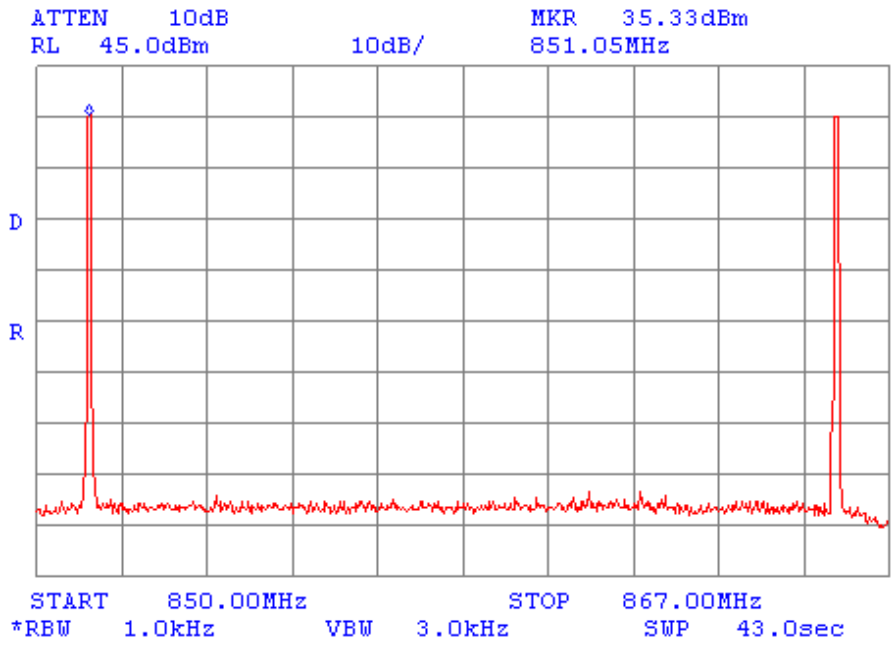
Plot 1-2

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



3 signals:
851.0125 MHz
851.0375 MHz
865.9875 MHz

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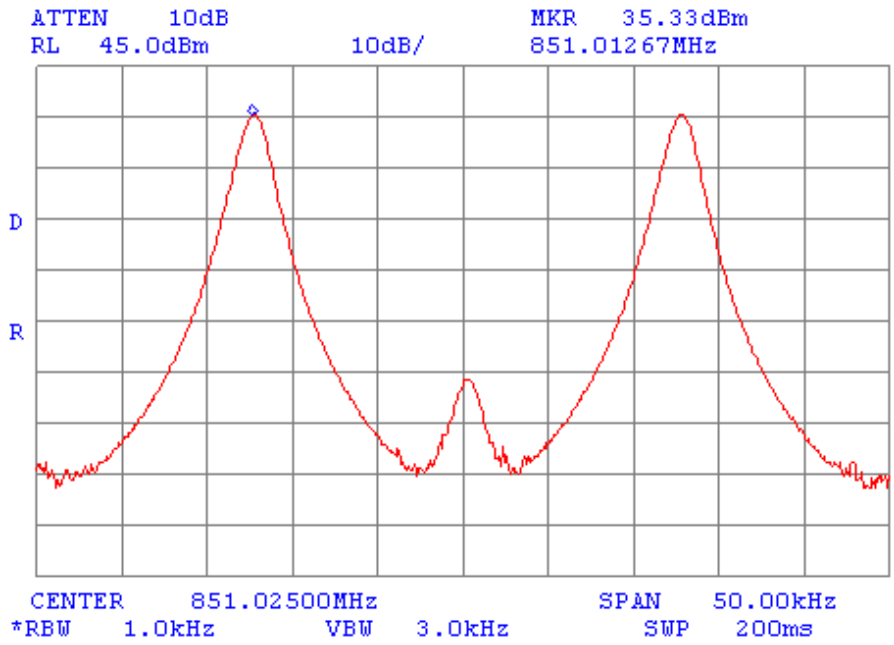
Plot 1-3

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



P1=35.33 dBm=3.412 W

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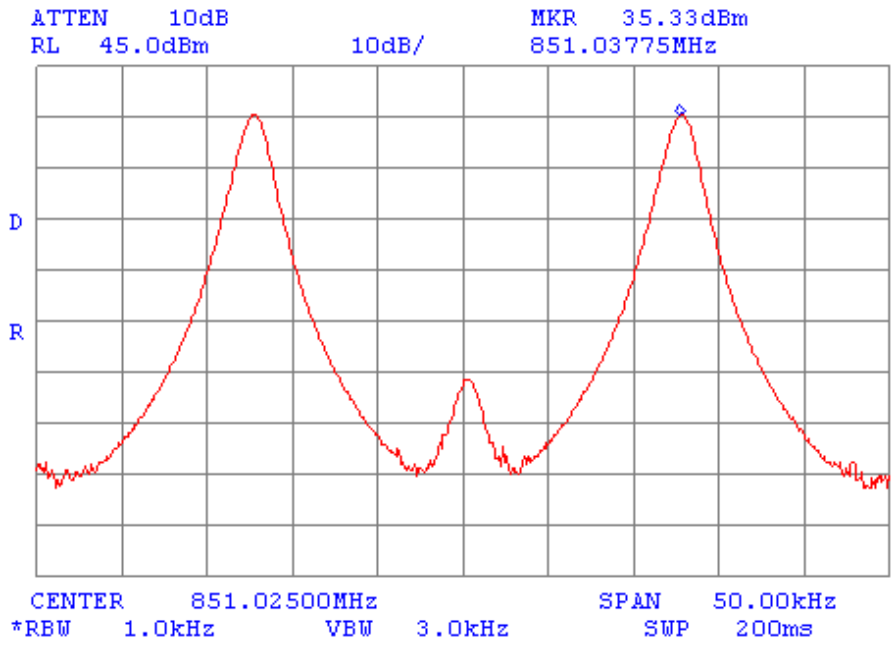
Plot 1-4

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



P2=35.33 dBm=3.412 W

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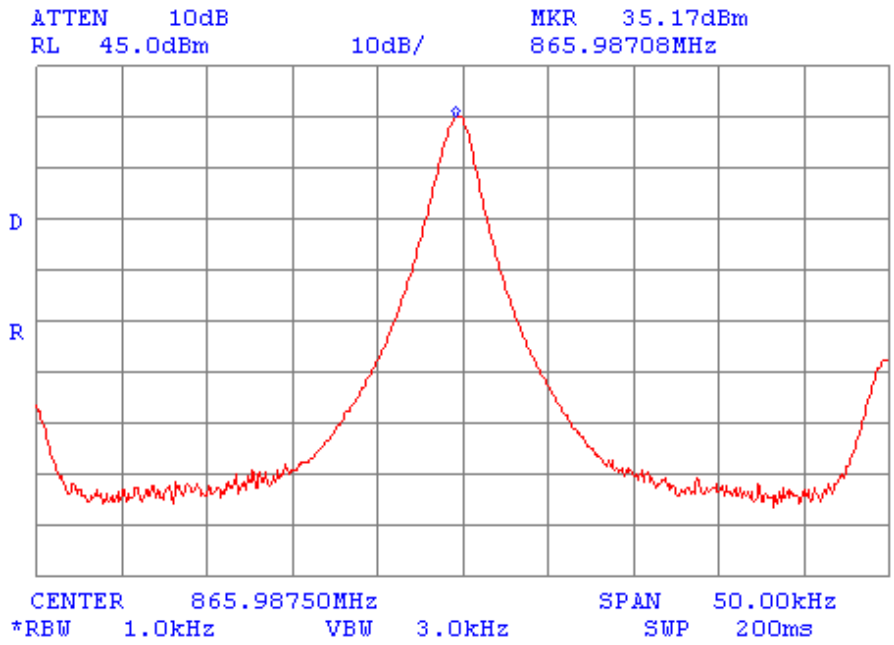
Plot 1-5

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



P3=35.17 dBm=3.289W

Aggregate power=3.412 W+3.412 W+3.289W=10.113 W (40.05 dBm)

Measured with power meter (HL#846, 460)=40.3 dBm

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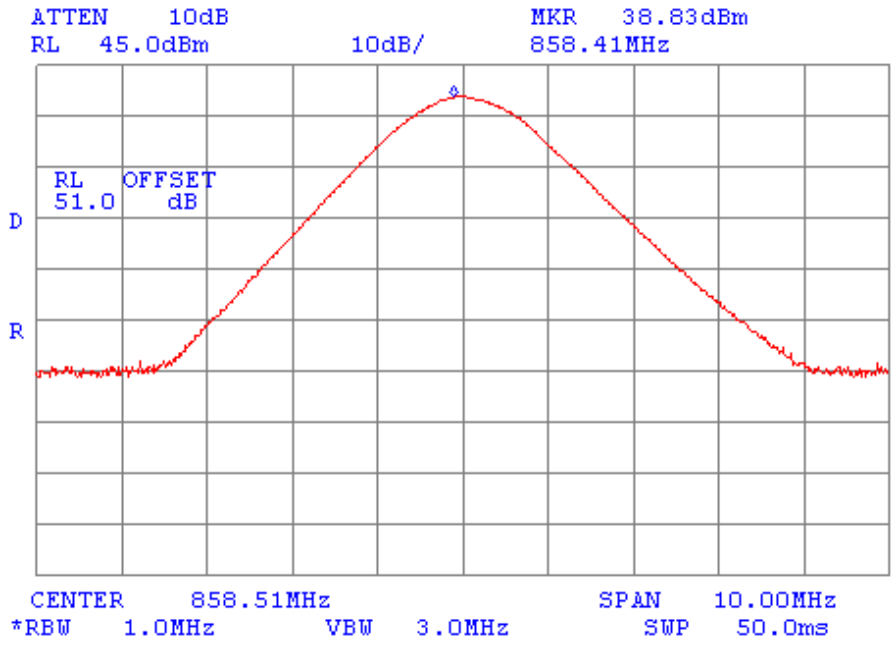
Plot 1-6

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



Single frequency
External attenuator 51 dB.

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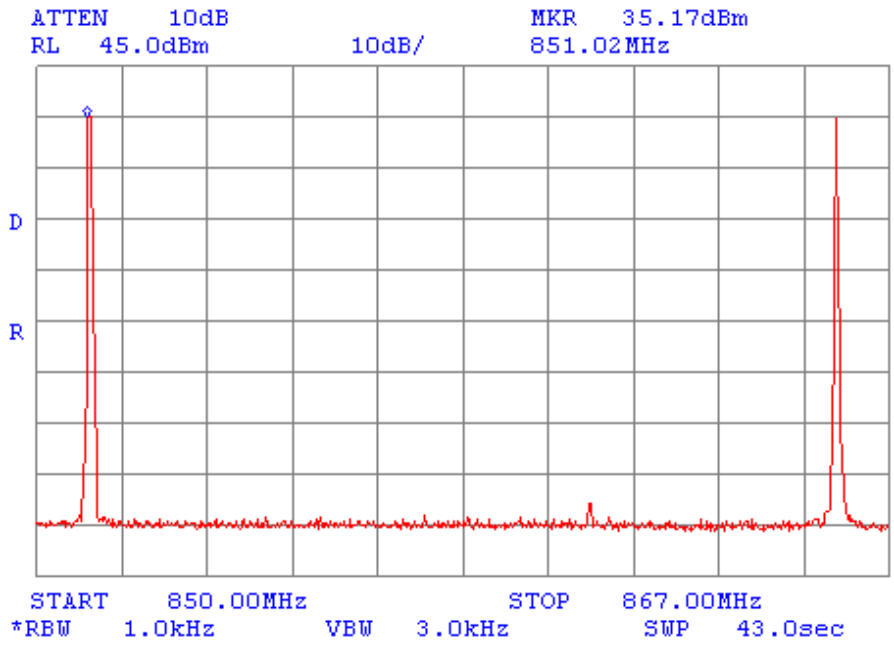
Plot 1-7

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



3 signals:
851.0125 MHz
851.0375 MHz
865.9875 MHz

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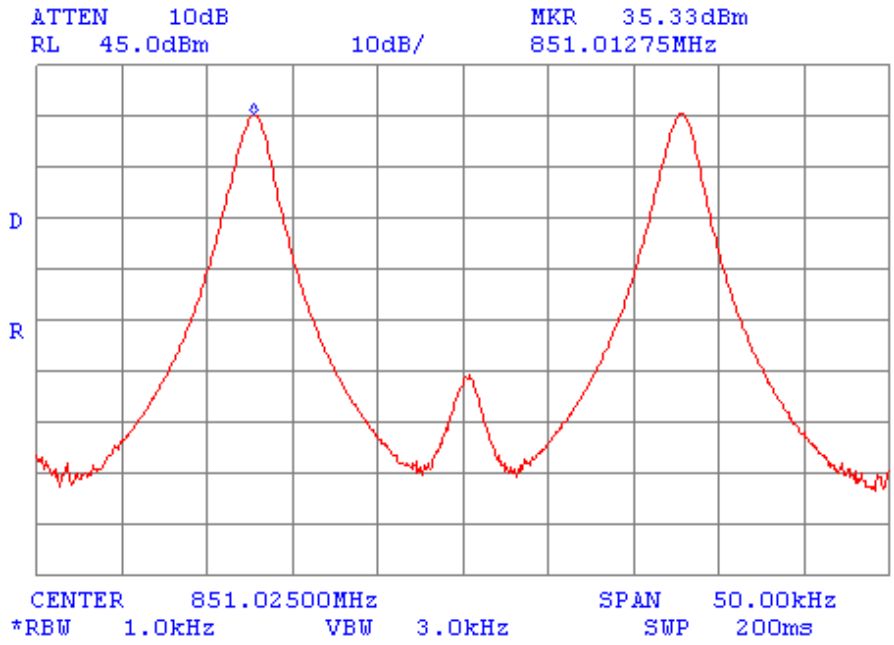
Plot 1-8

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



P1=35.33 dBm=3.412 W

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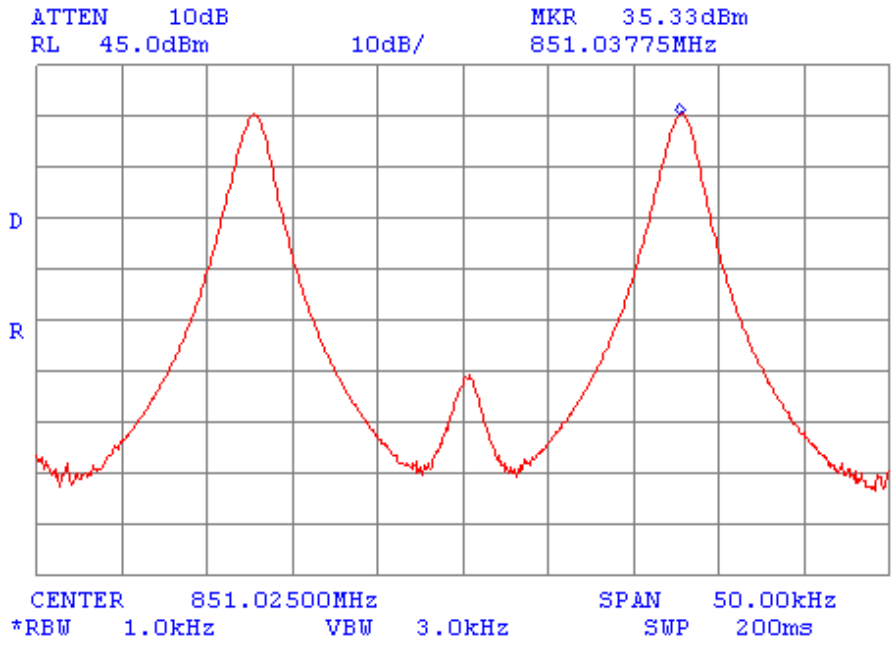
Plot 1-9

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



P2=35.33 dBm=3.412 W

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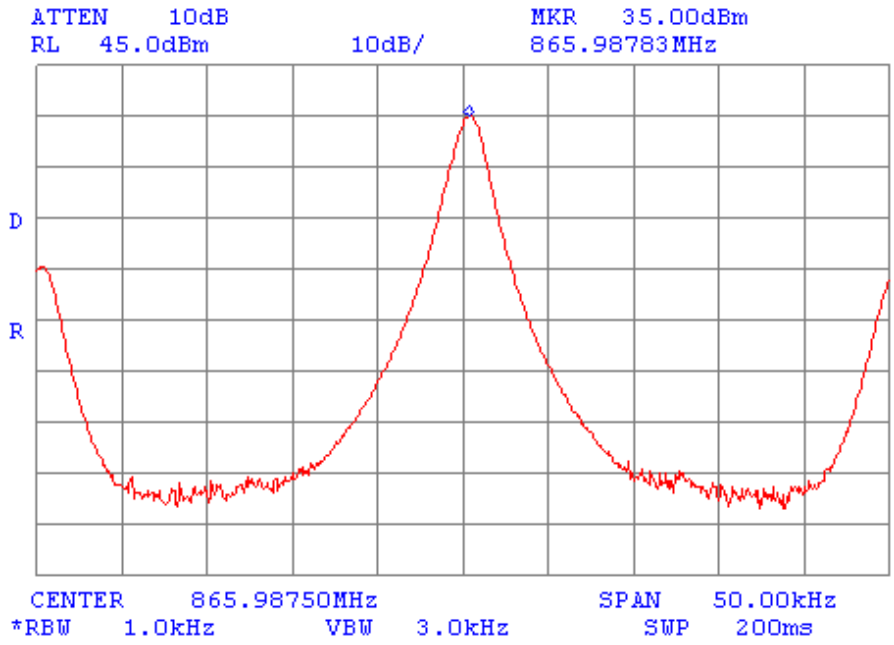
Plot 1-10

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



P3=35 dBm=3.162 W

Aggregate power=3.412 W+3.412 W+3.162W=9.986 W (39.99 dBm)

Measured with power meter (HL#846, 460)=40.23 dBm

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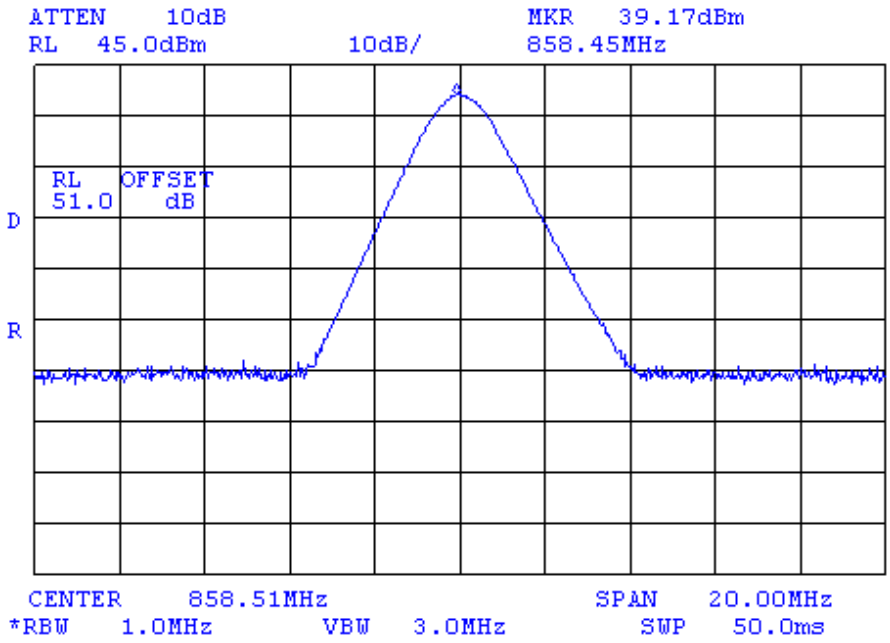
Appendix A Plots

Plot A 1

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



P_{out}=39.17 dBm
External attenuator 50 dB
Cable loss 1 dB

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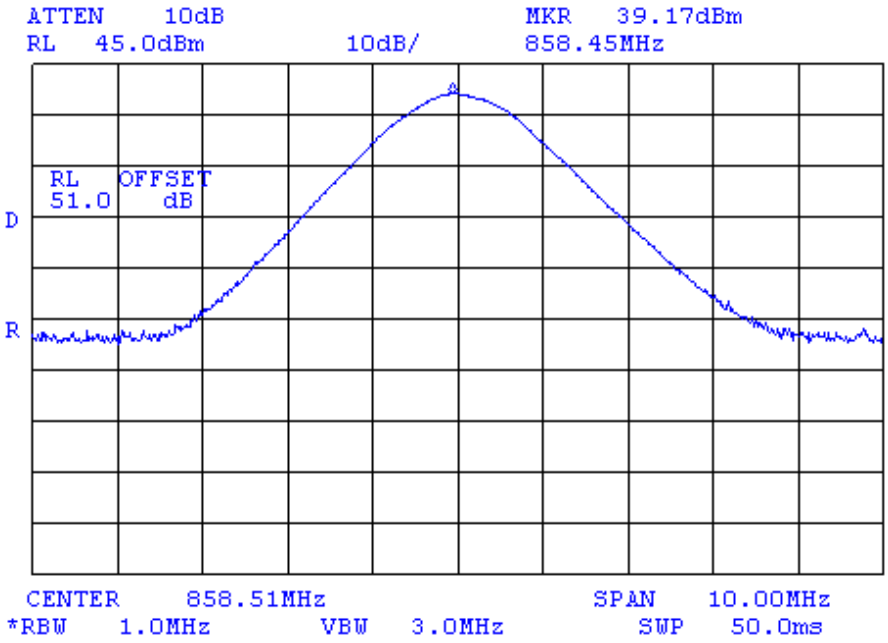
Plot A 2

Peak output power measurements

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



P_{out}=39.17 dBm
External attenuator 50 dB
Cable loss 1 dB

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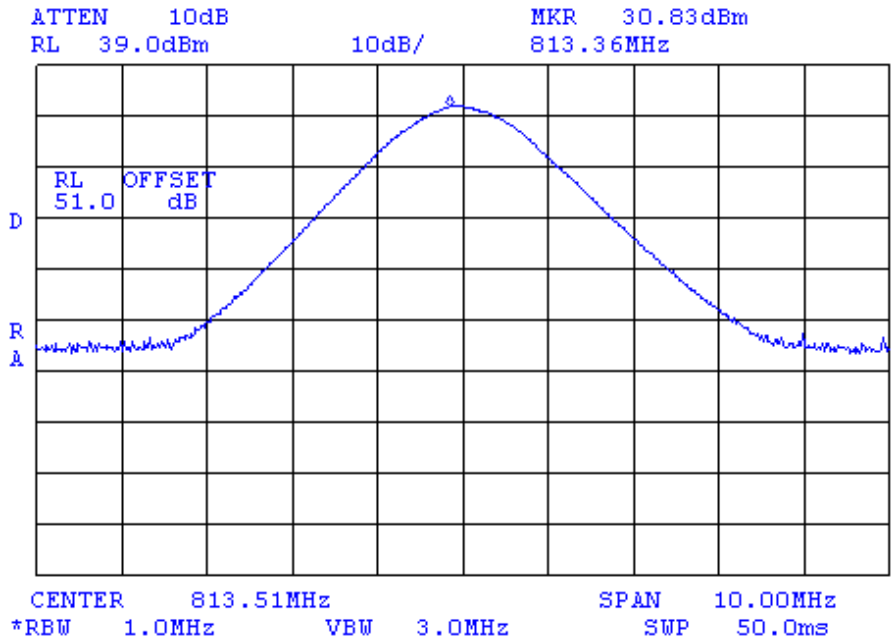
Plot A 3

Peak output power measurements

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)



P_{out}=30.83 dBm
External attenuator 50 dB
Cable loss 1 dB

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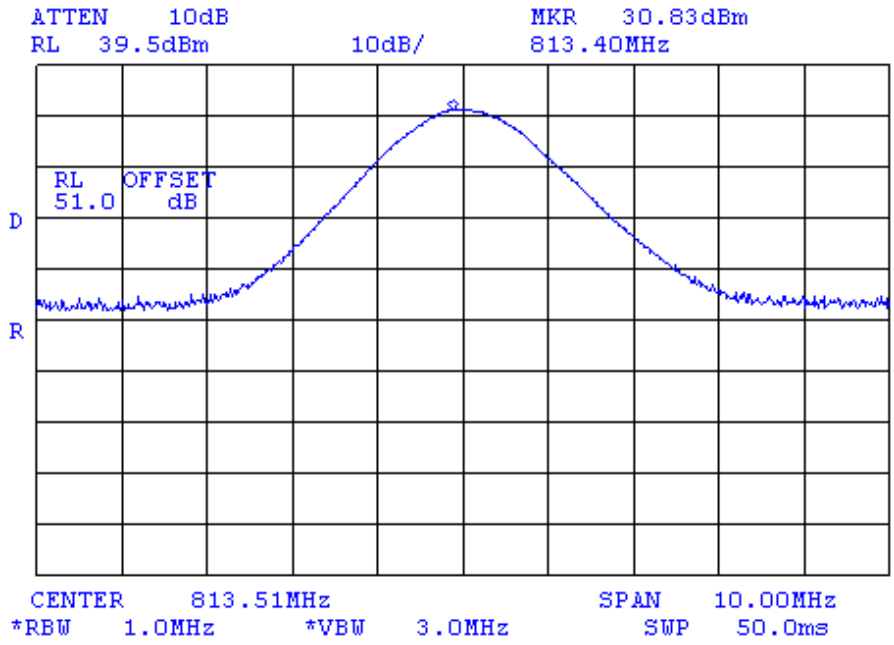
Plot A 4

Peak output power measurements

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)



P_{out}=30.83 dBm
External attenuator 50 dB
Cable loss 1 dB

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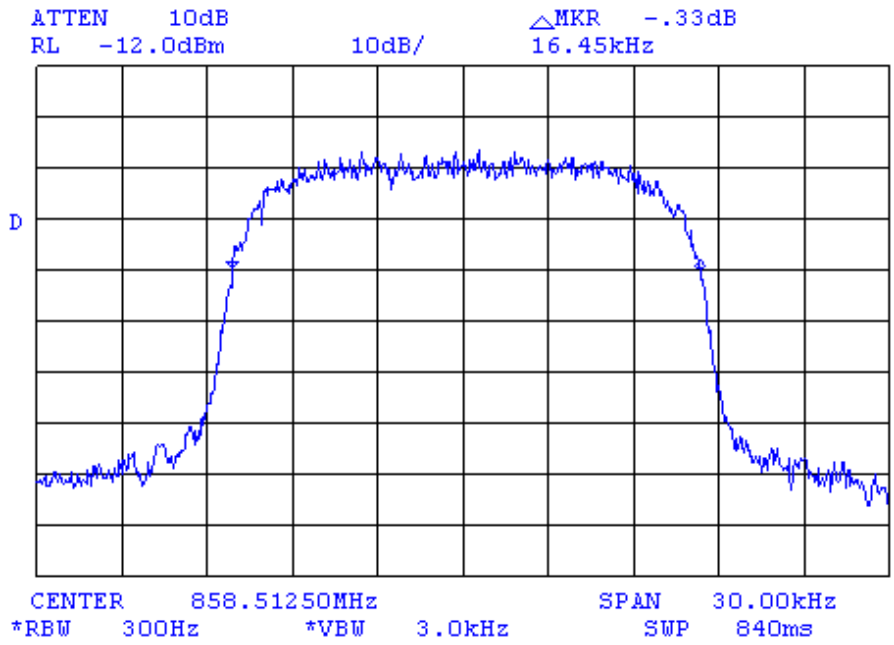
Plot A 5

Occupied bandwidth at the EUT input

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



External attenuator 50 dB
Cable loss 1 dB

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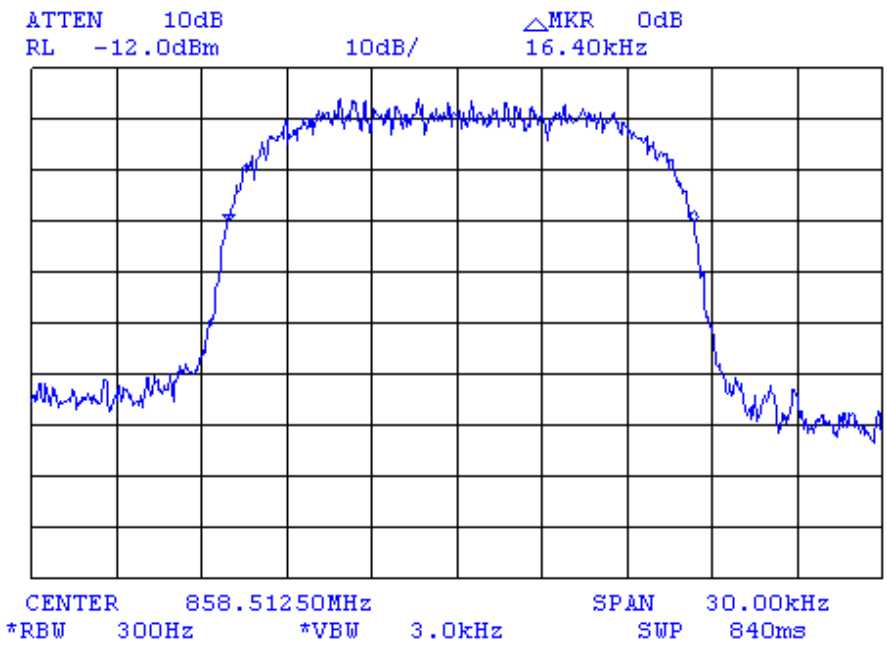
Plot A 6

Occupied bandwidth at the EUT output

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



External attenuator 50 dB
Cable loss 1 dB

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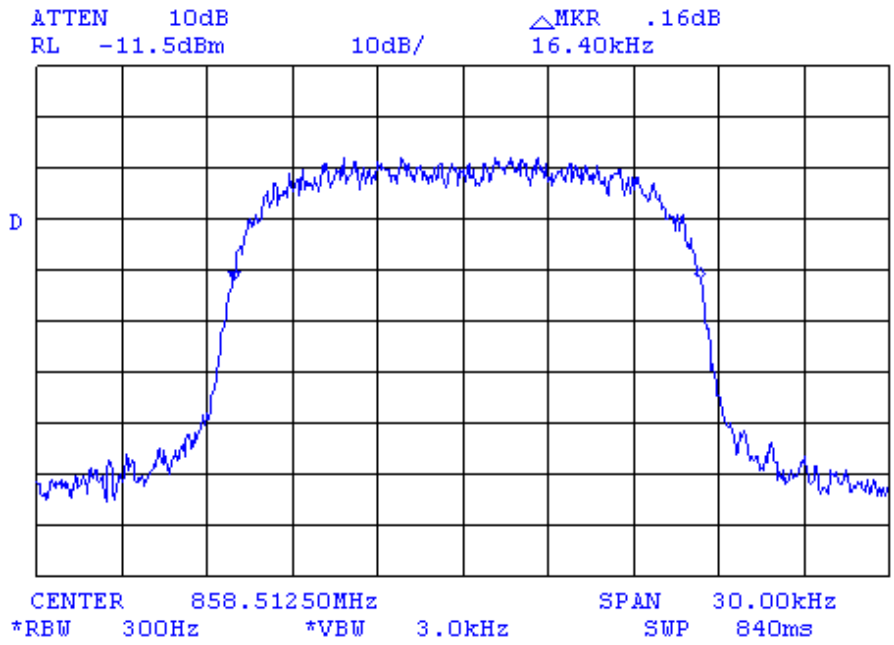
Plot A 7

Occupied bandwidth at the EUT input

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



External attenuator 50 dB
Cable loss 1 dB

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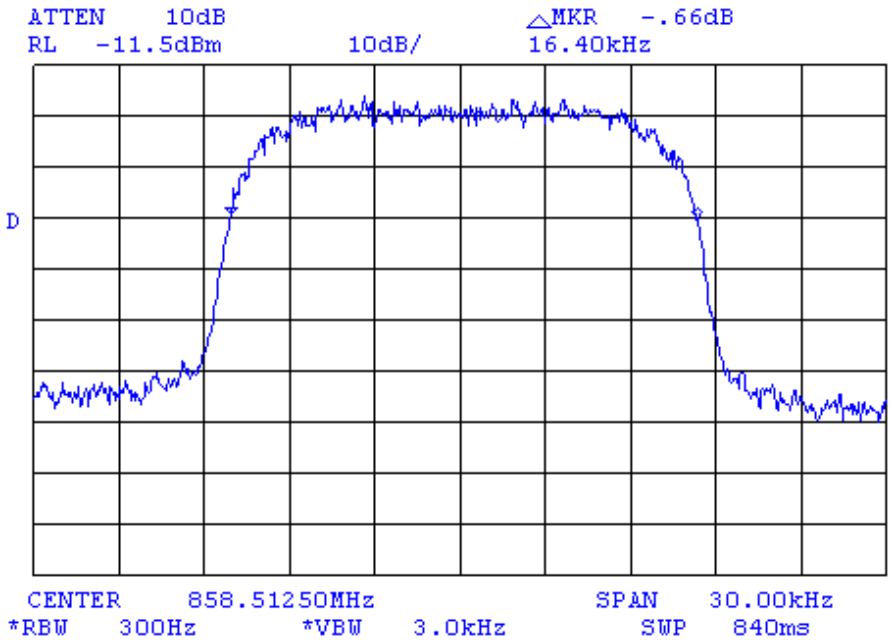
Plot A 8

Occupied bandwidth at the EUT output

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



External attenuator 50 dB
Cable loss 1 dB

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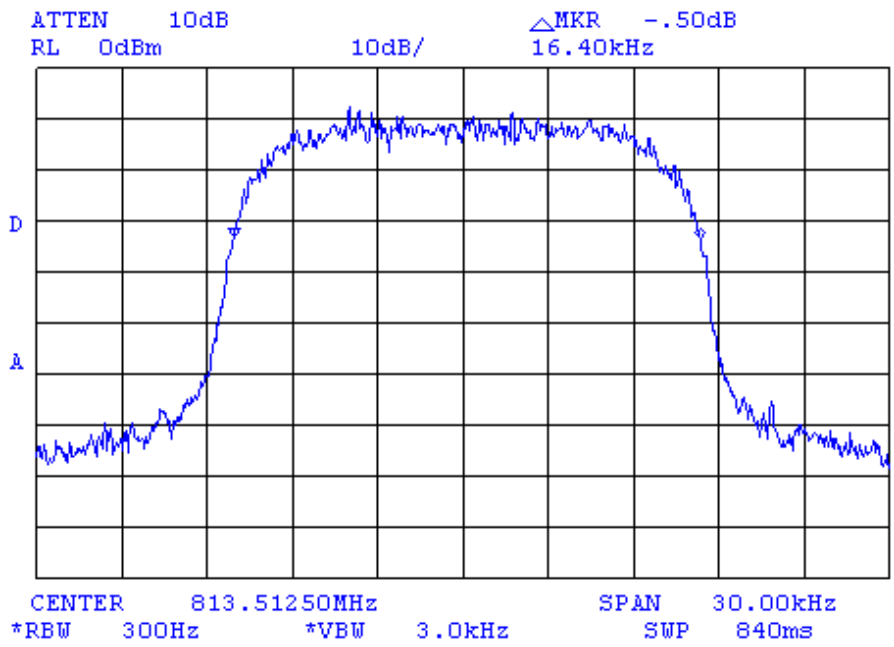
Plot A 9

Occupied bandwidth at the EUT input

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)



External attenuator 50 dB
Cable loss 1 dB

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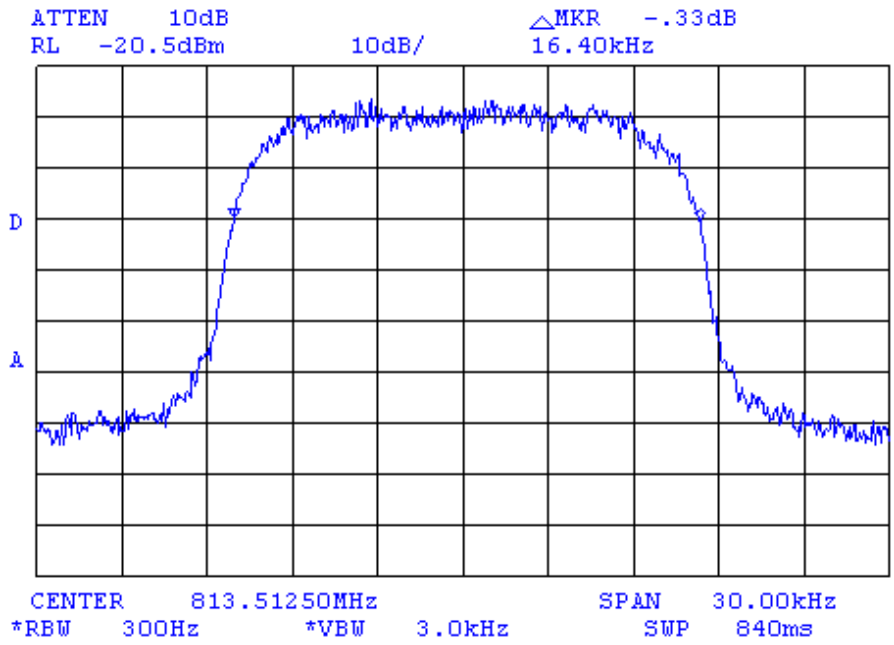
Plot A 10

Occupied bandwidth at the EUT output

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)



External attenuator 50 dB
Cable loss 1 dB

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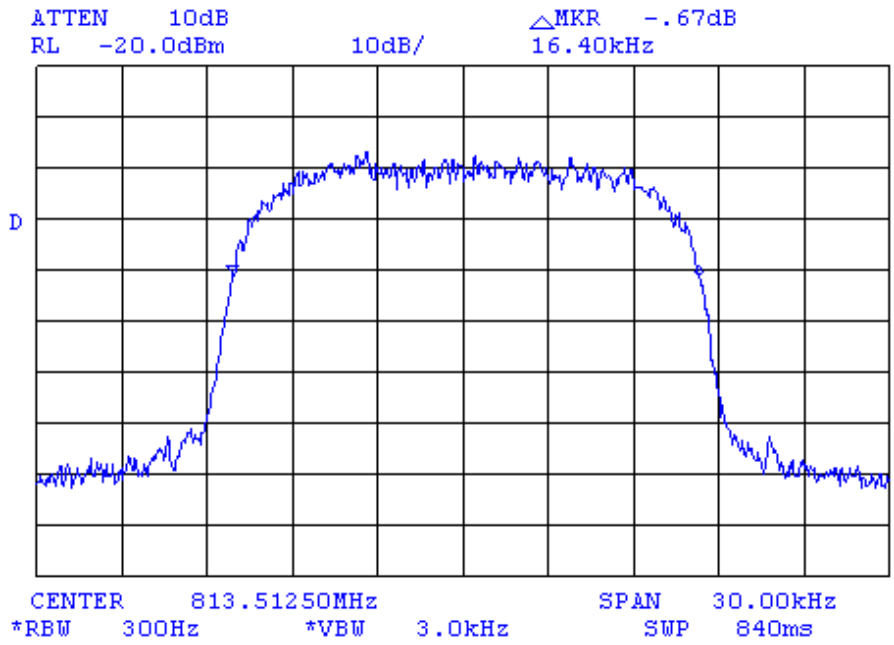
Plot A 11

Occupied bandwidth at the EUT input

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)



External attenuator 50 dB
Cable loss 1 dB

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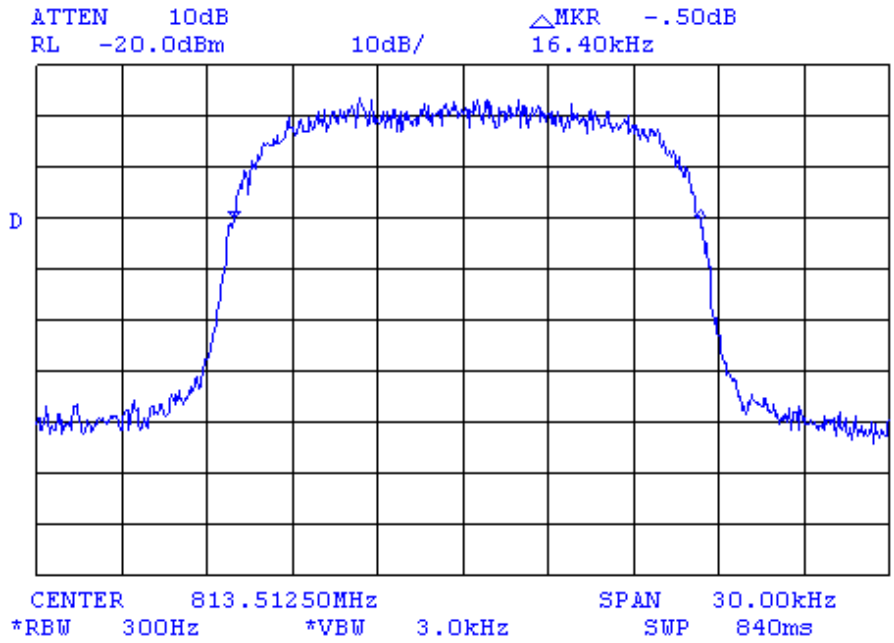
Plot A 12

Occupied bandwidth at the EUT output

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)



External attenuator 50 dB
Cable loss 1 dB

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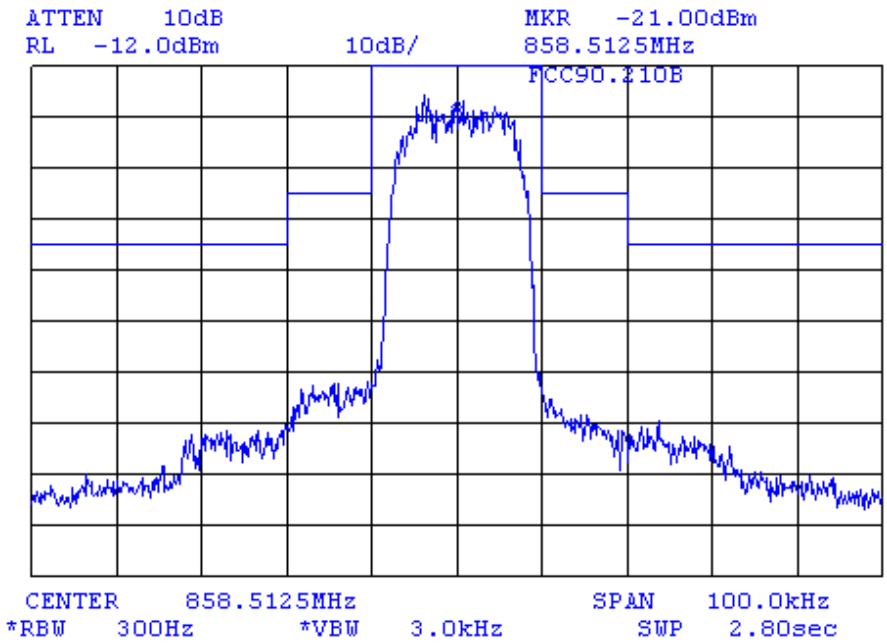
Plot A 13

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

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



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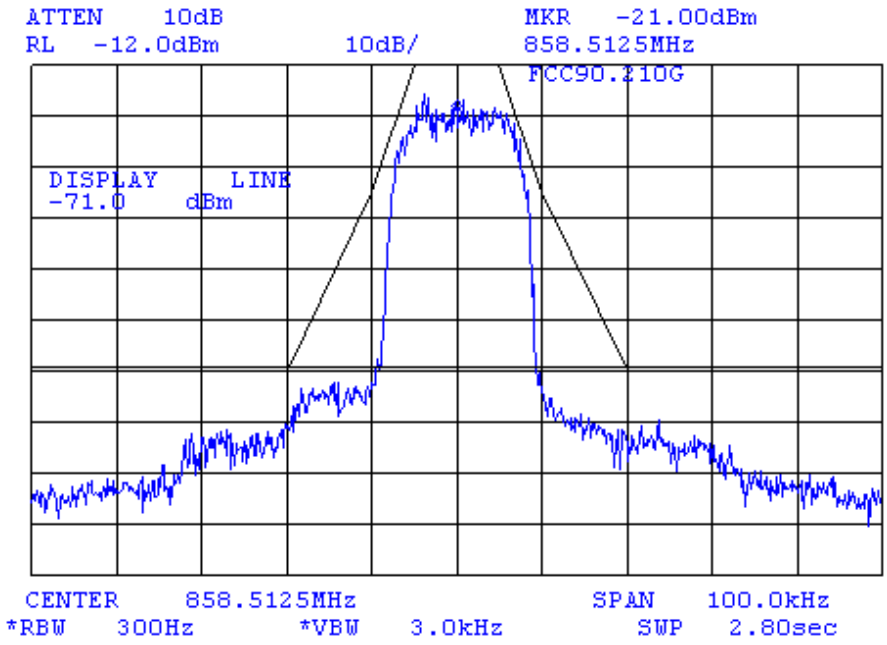
Plot A 14

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

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



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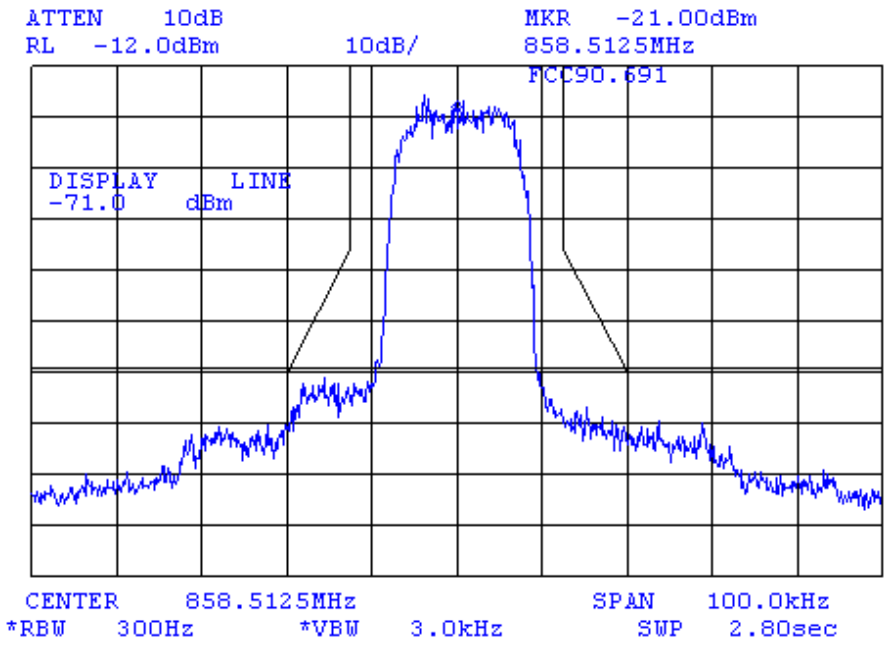
Plot A 15

Emission mask test results according to FCC part 90 §90.691

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)



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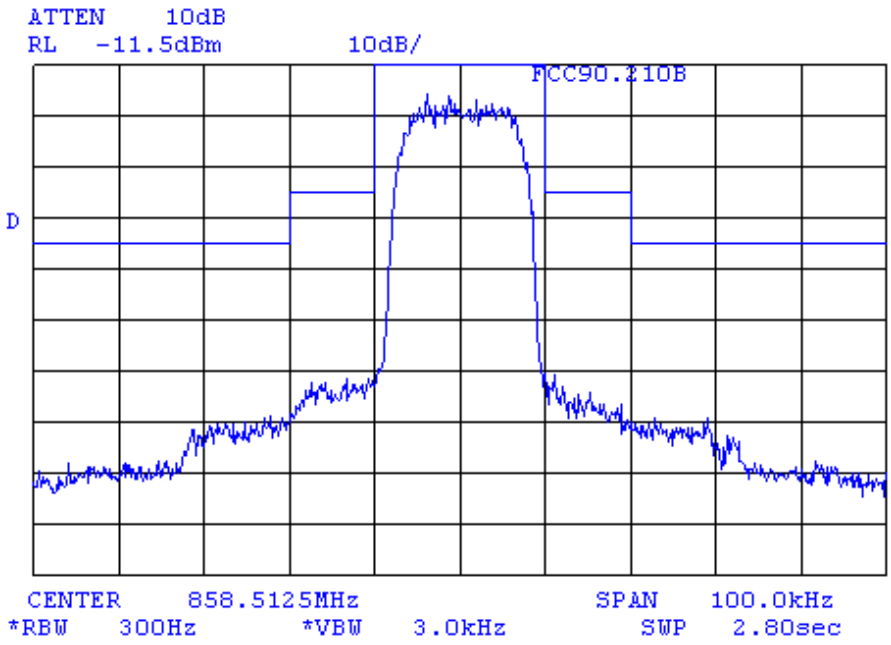
Plot A 16

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

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



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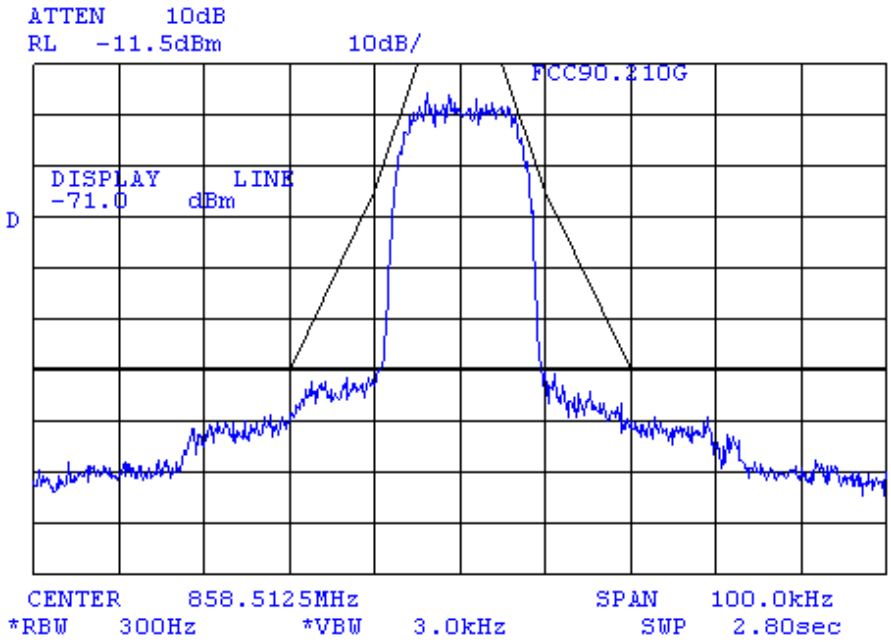
Plot A 17

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

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



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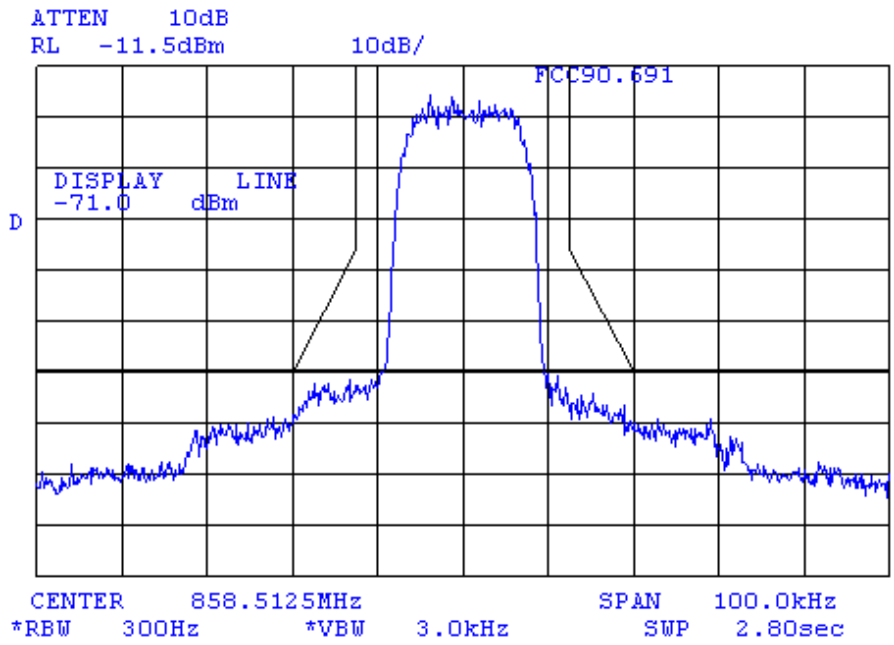
Plot A 18

Emission mask test results according to FCC part 90 §90.691

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)



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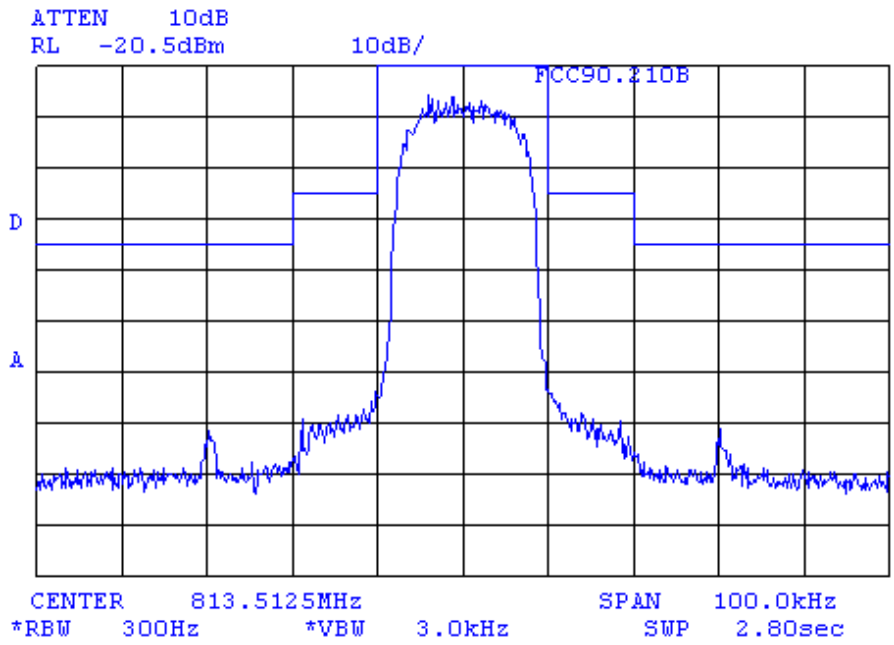
Plot A 19

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

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)



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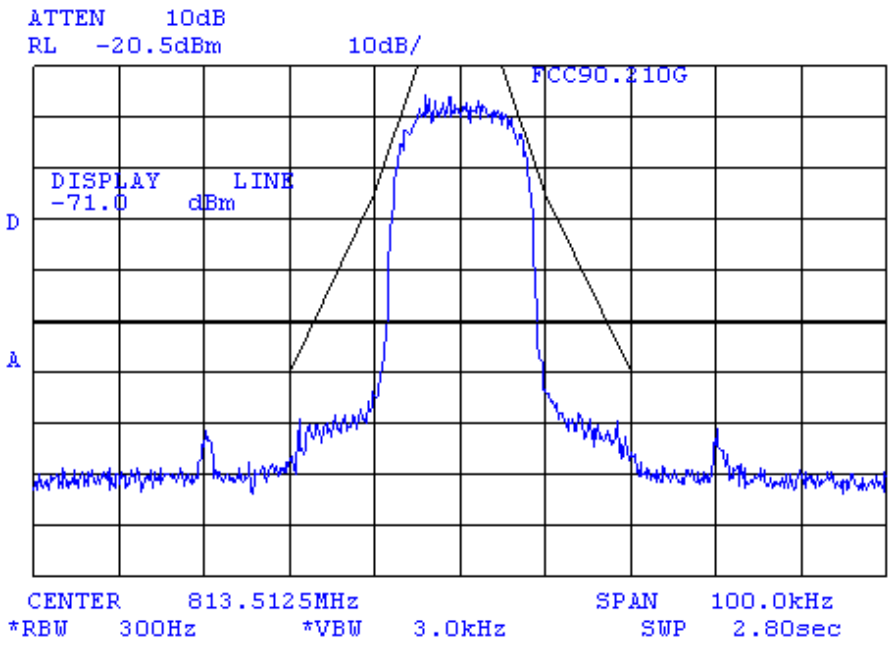
Plot A 20

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

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)



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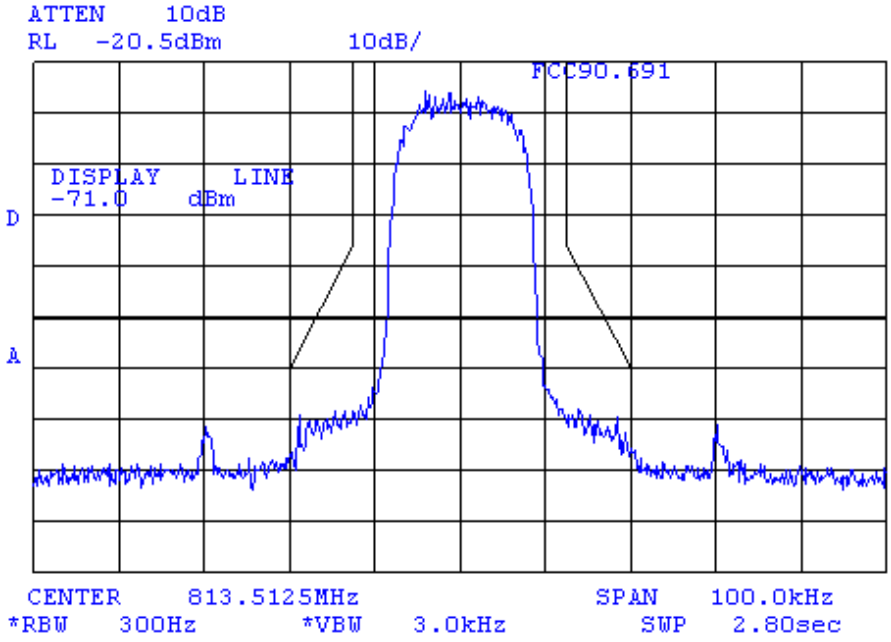
Plot A 21

Emission mask test results according to FCC part 90 §90.691

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)



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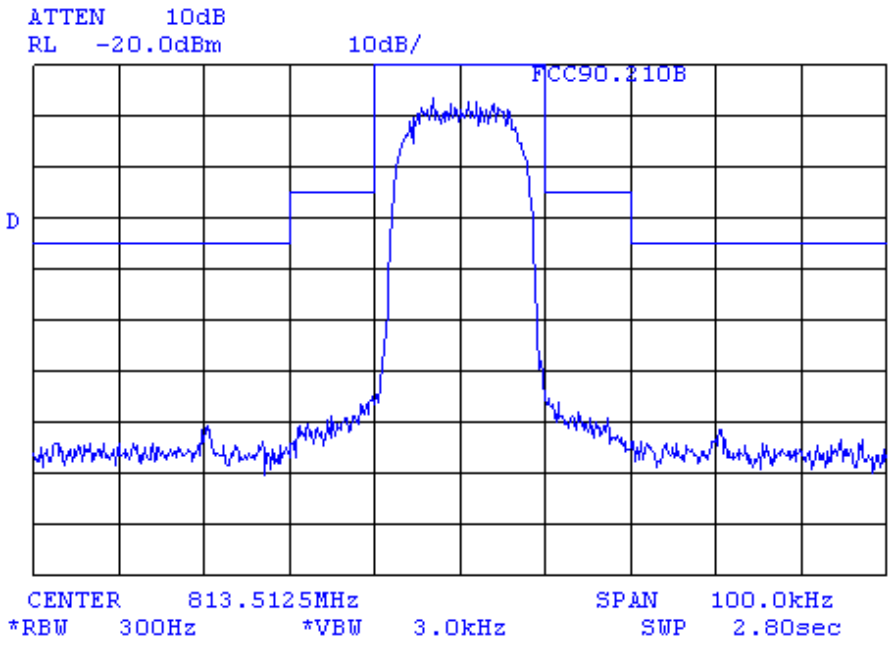
Plot A 22

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

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)



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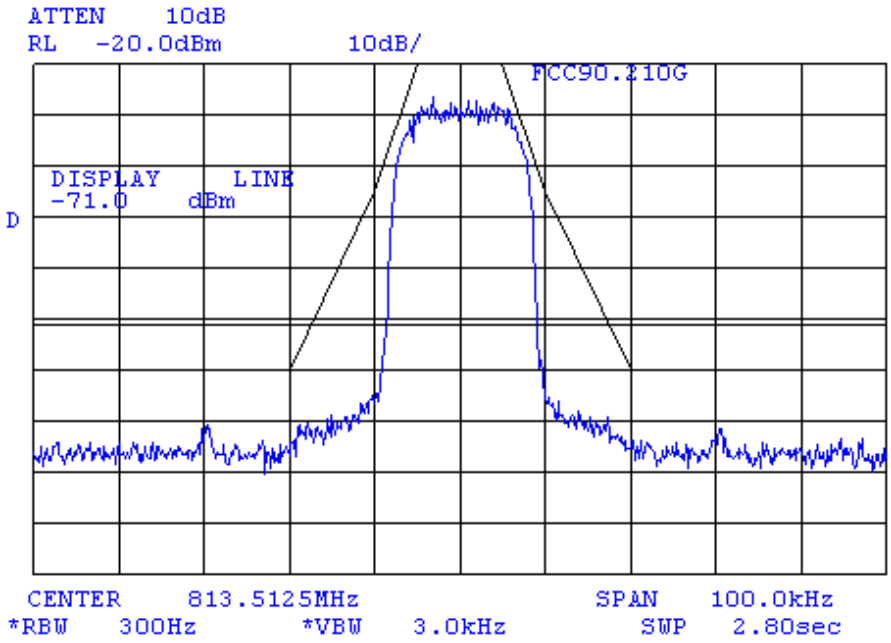
Plot A 23

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

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)



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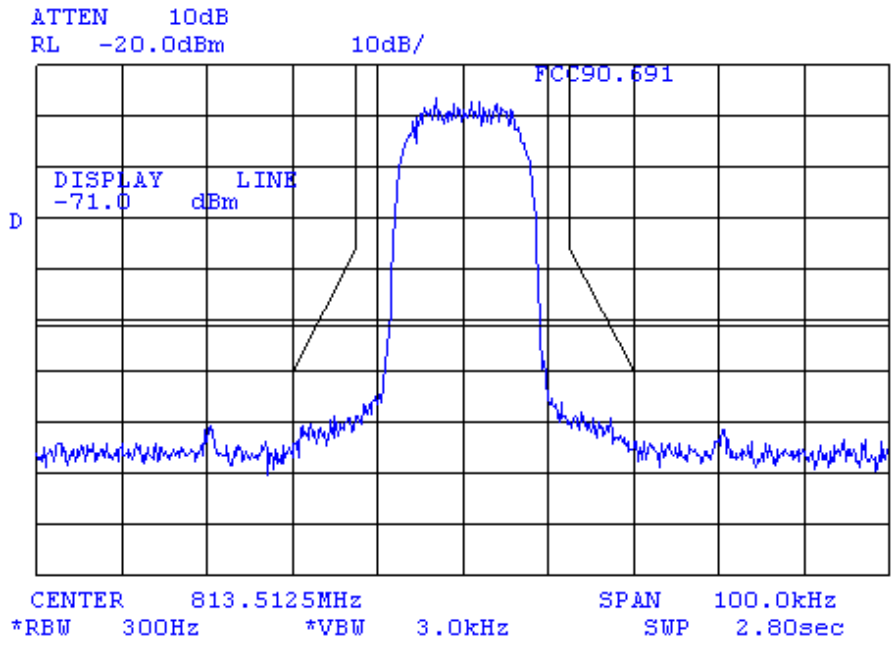
Plot A 24

Emission mask test results according to FCC part 90 §90.691

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)



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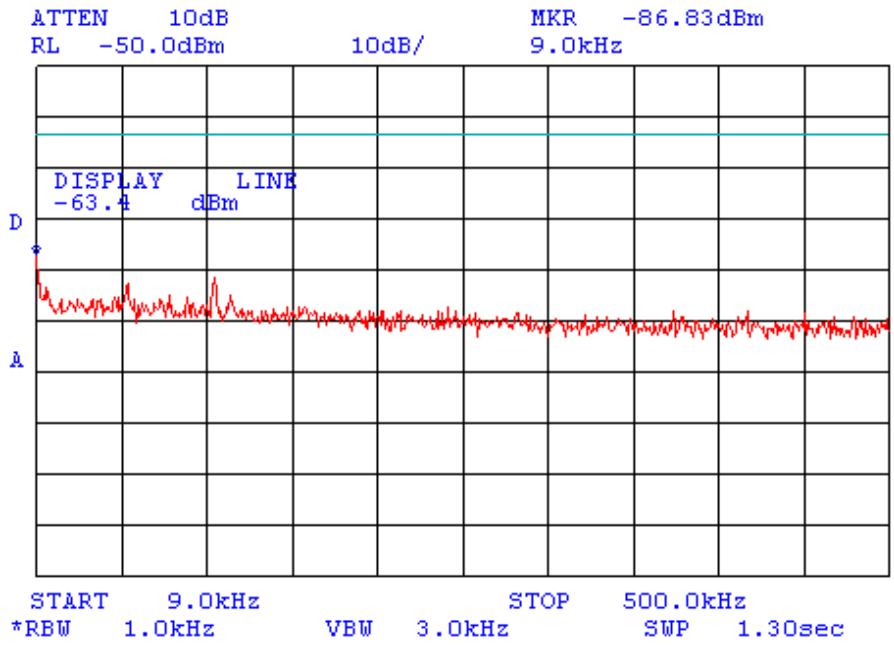
Plot A 25

Conducted spurious emission measurements in 9 kHz – 500 kHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	50.4 dB



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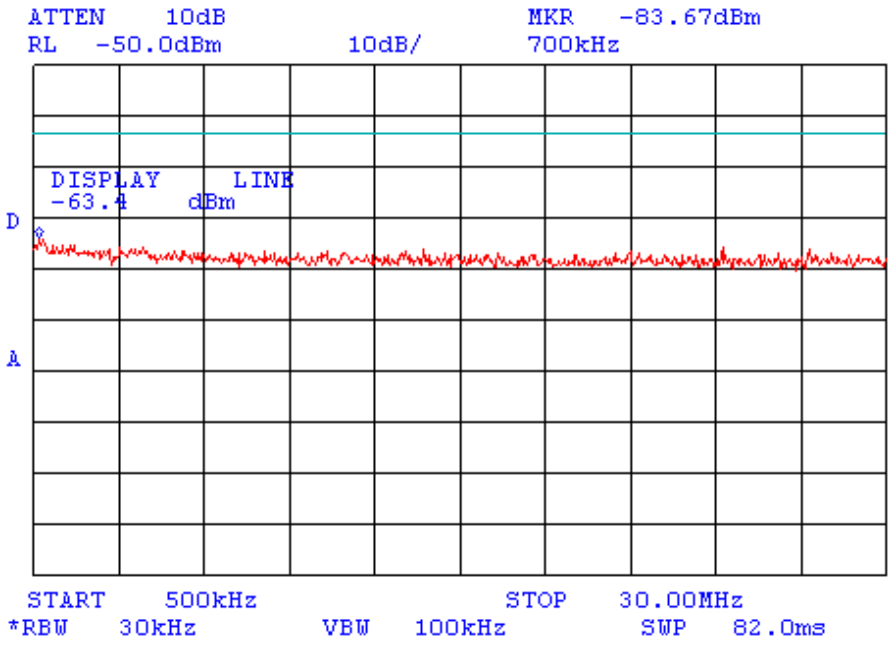
Plot A 26

Conducted spurious emission measurements in 500 kHz – 30 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	50.4 dB



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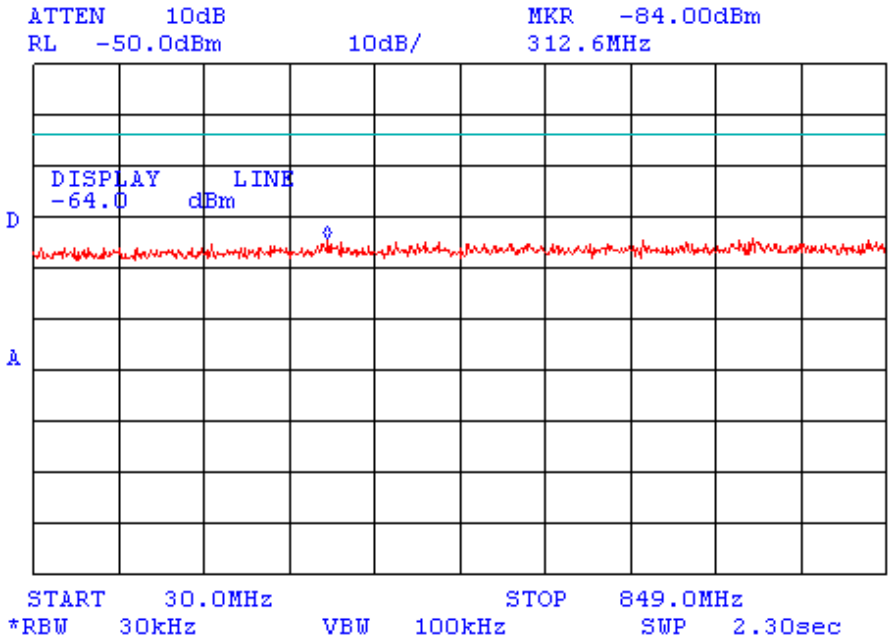
Plot A 27

Conducted spurious emission measurements in 30 MHz – 849 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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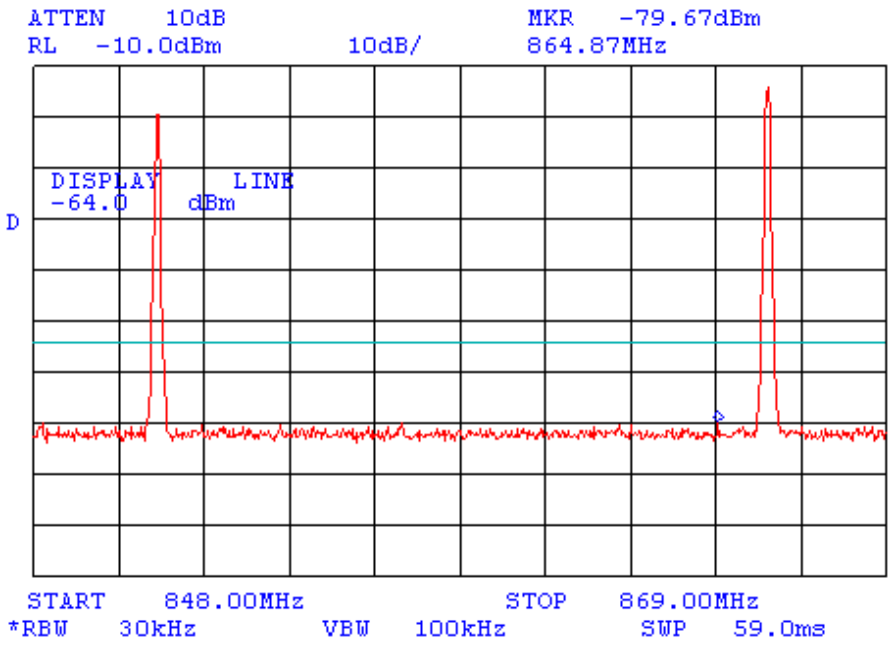
Plot A 28

Conducted spurious emission measurements in 848.00 MHz – 869.00 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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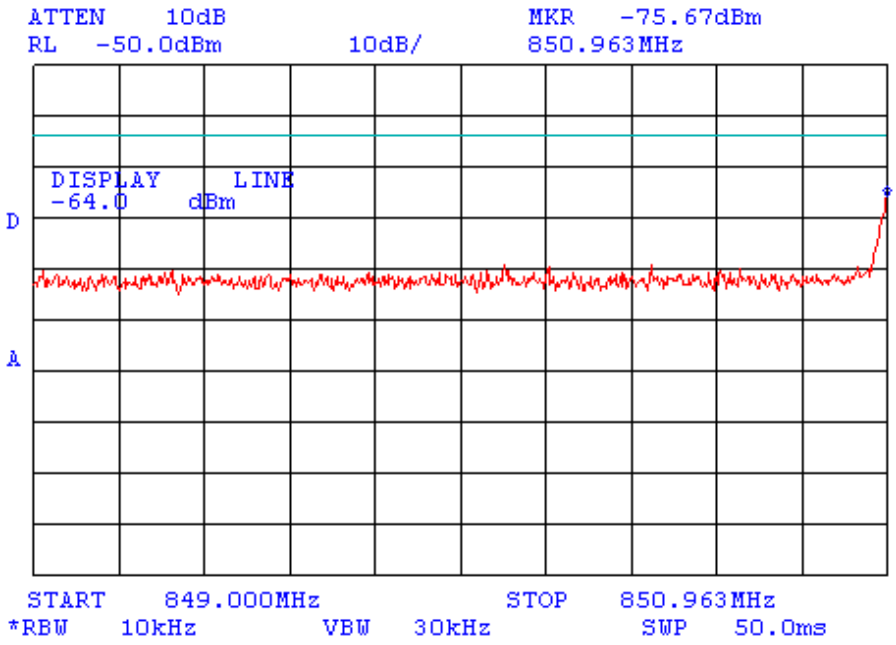
Plot A 29

Conducted spurious emission measurements in 849.00 MHz – 850.963 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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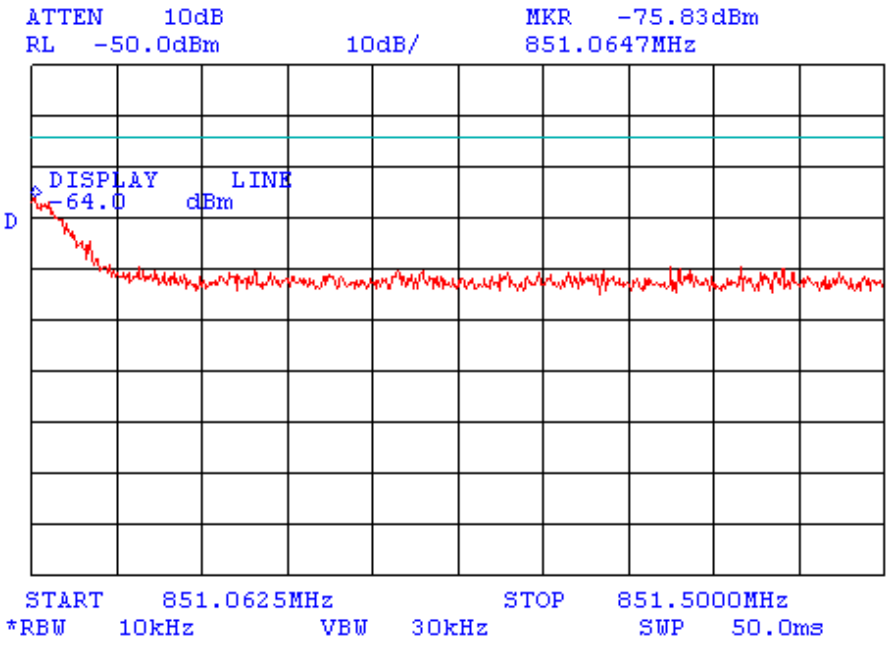
Plot A 30

Conducted spurious emission measurements in 851.0625 MHz – 851.5000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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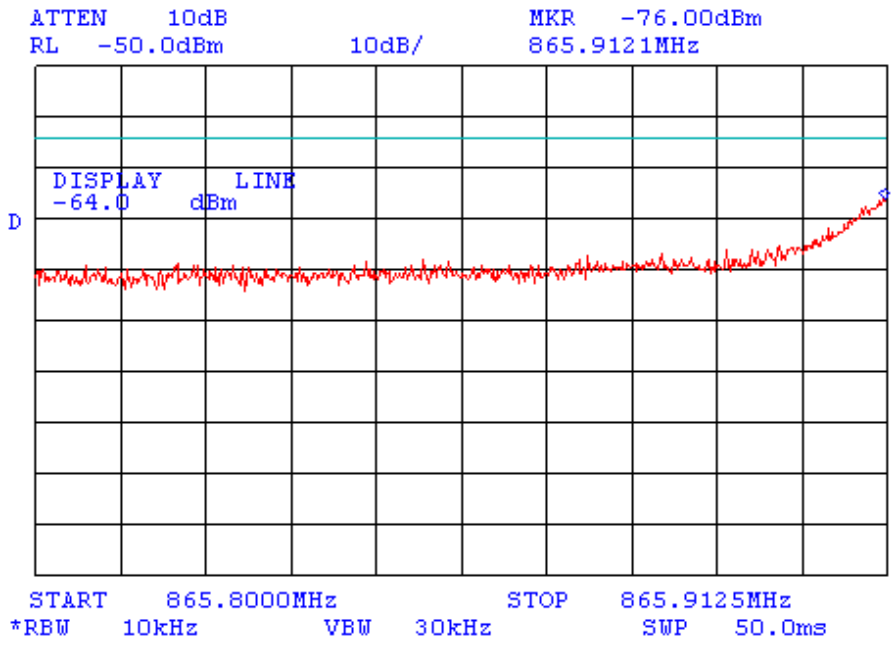
Plot A 31

Conducted spurious emission measurements in 865.8000 MHz – 865.9125 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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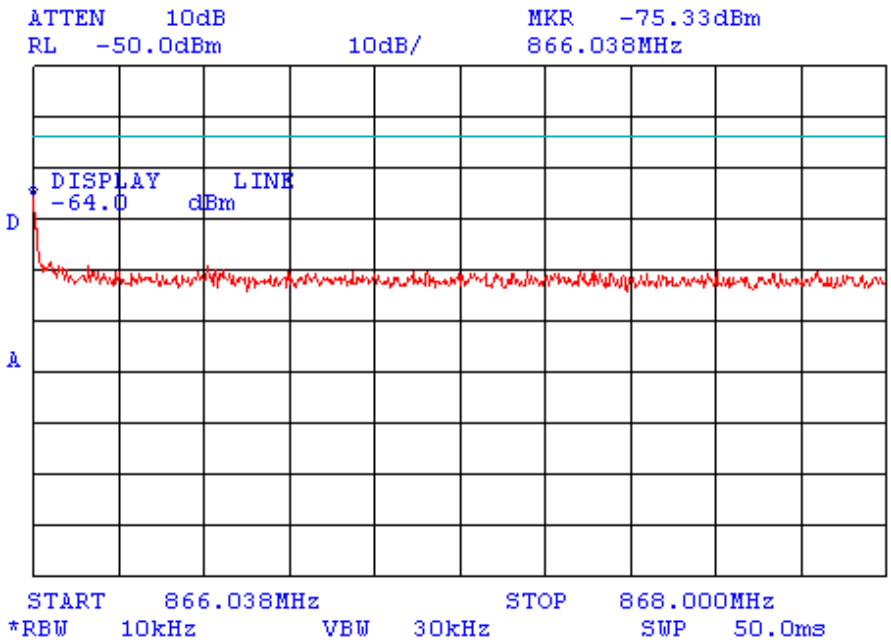
Plot A 32

Conducted spurious emission measurements in 866.038 MHz – 868.000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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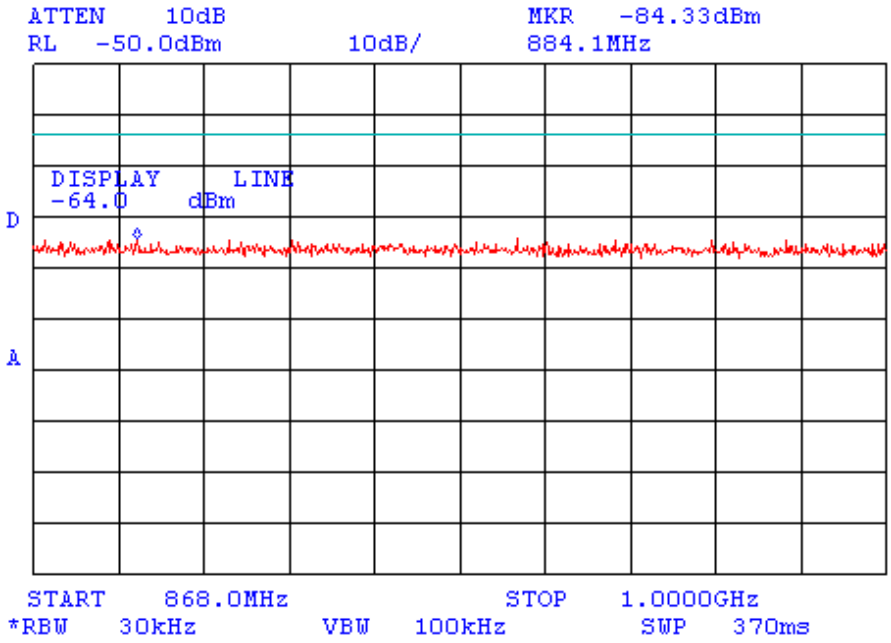
Plot A 33

Conducted spurious emission measurements in 868.0 MHz – 1000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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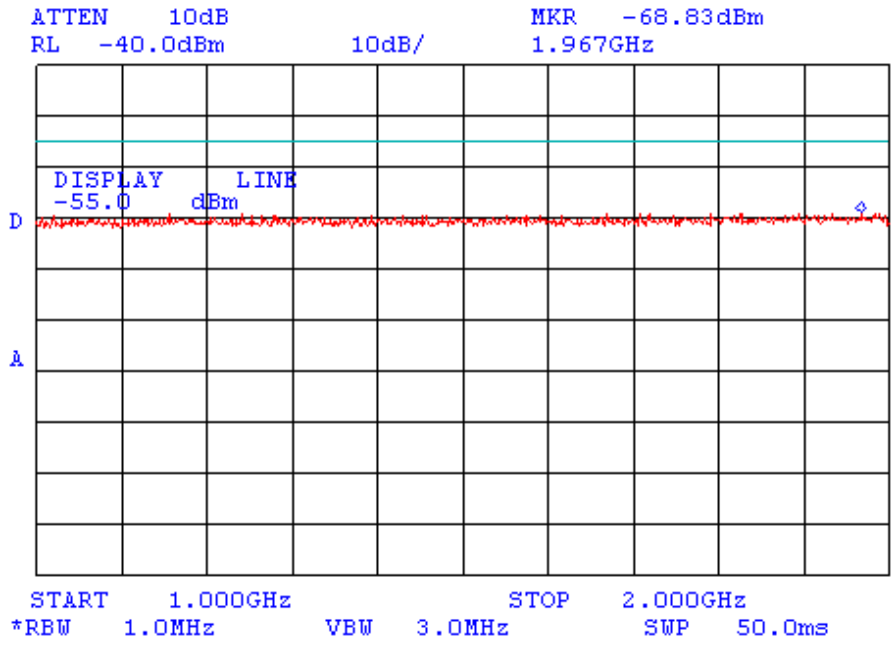
Plot A 34

Conducted spurious emission measurements in 1000 MHz – 2000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	42 dB



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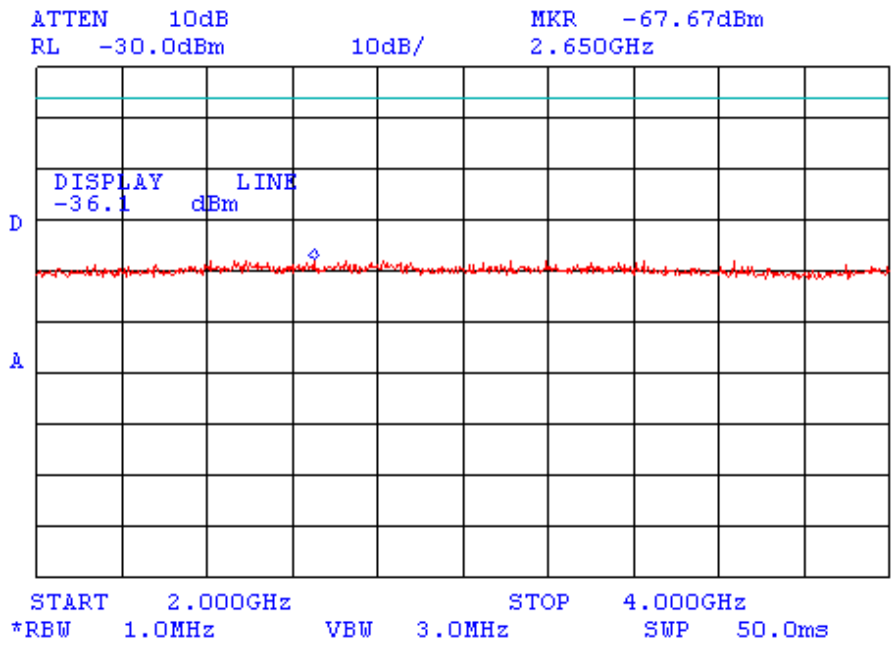
Plot A 35

Conducted spurious emission measurements in 2000 MHz – 4000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	23.1 dB



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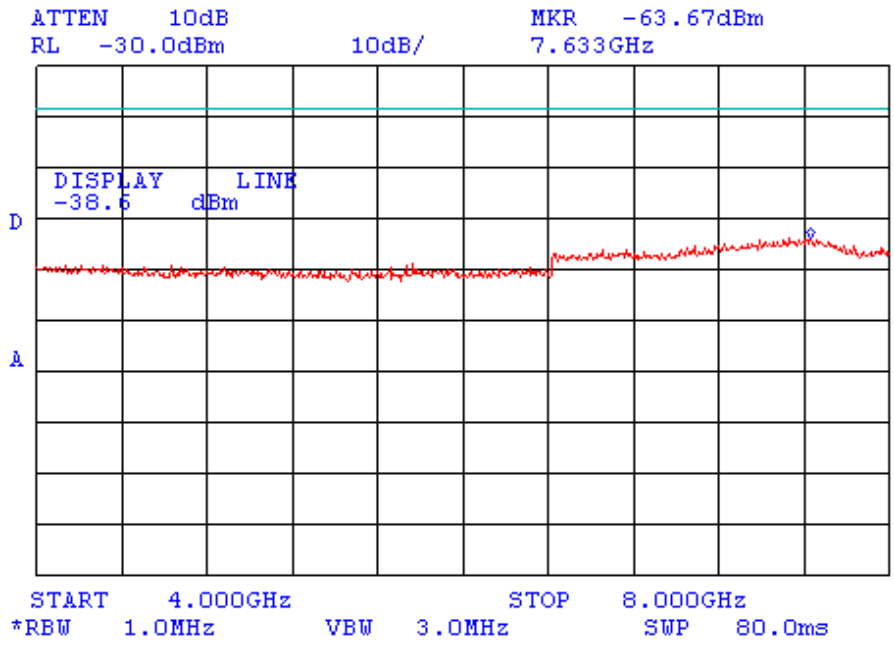
Plot A 36

Conducted spurious emission measurements in 4000 MHz – 8000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	25.6 dB



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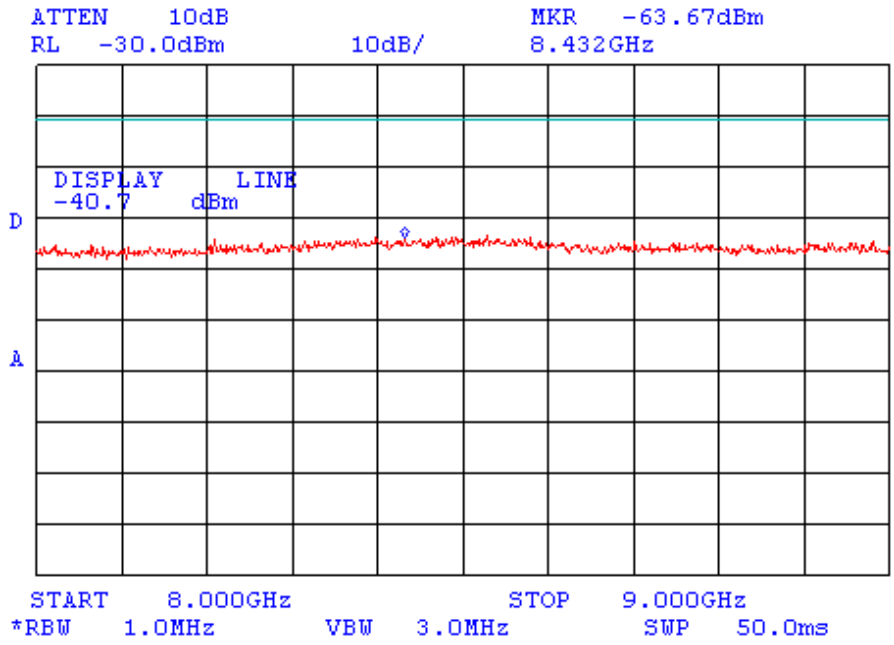
Plot A 37

Conducted spurious emission measurements in 8000 MHz – 9000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-21.9 dBm)
External attenuation	51 dB



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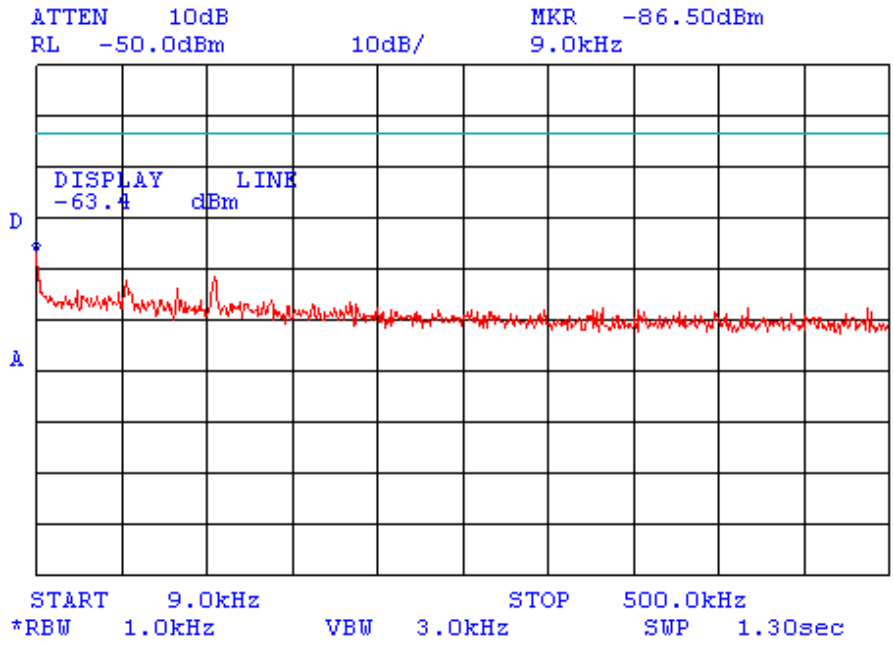
Plot A 38

Conducted spurious emission measurements in 9 kHz – 500 kHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	50.4 dB



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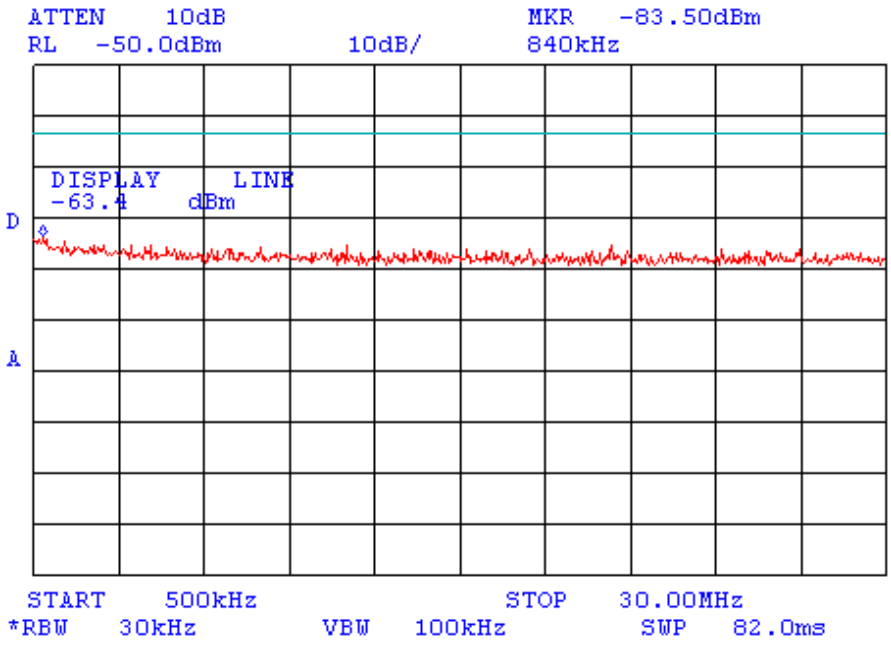
Plot A 39

Conducted spurious emission measurements in 500 kHz – 30 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	50.4 dB



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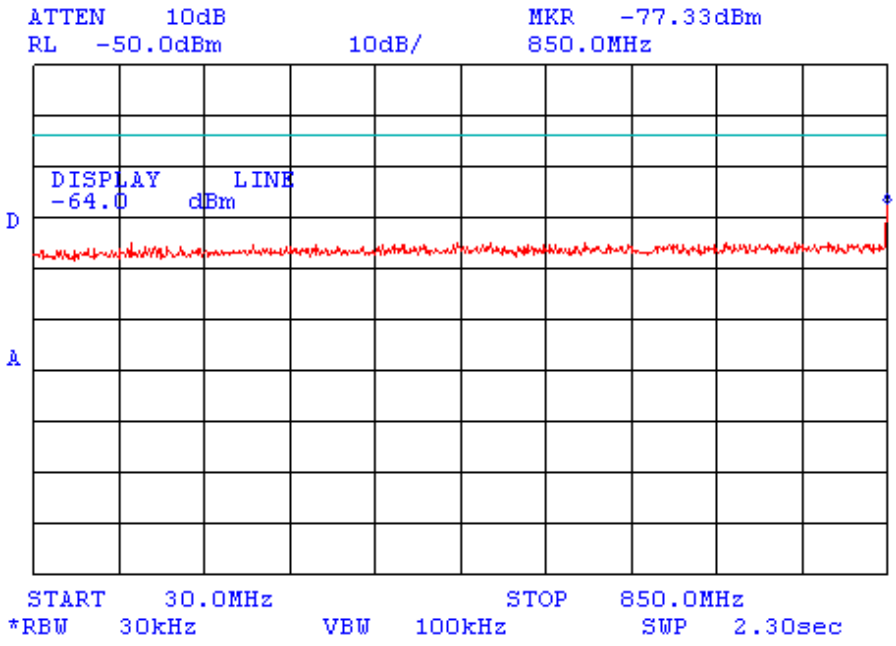
Plot A 40

Conducted spurious emission measurements in 30.0 MHz – 850.0 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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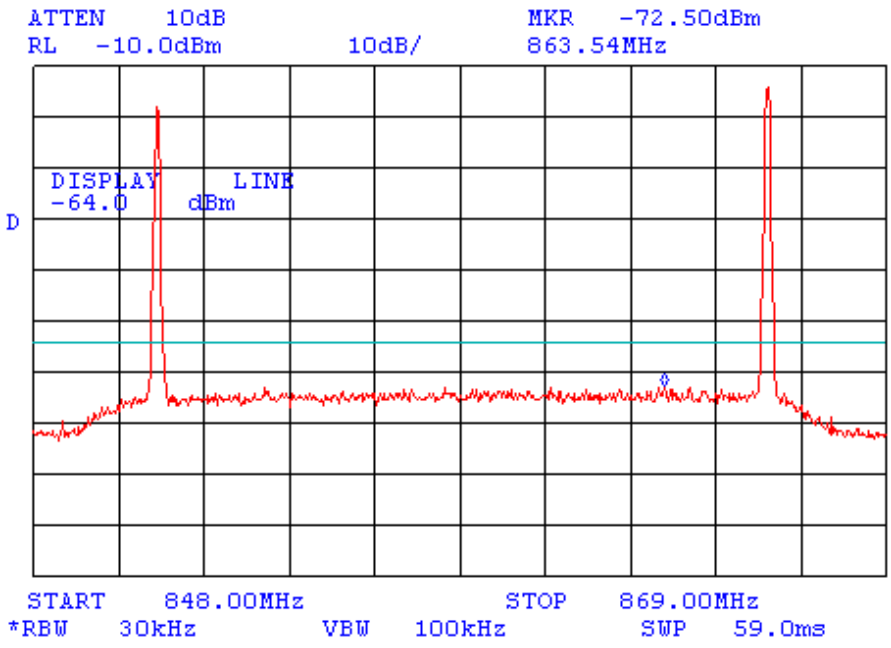
Plot A 41

Conducted spurious emission measurements in 848.00 MHz – 869.00 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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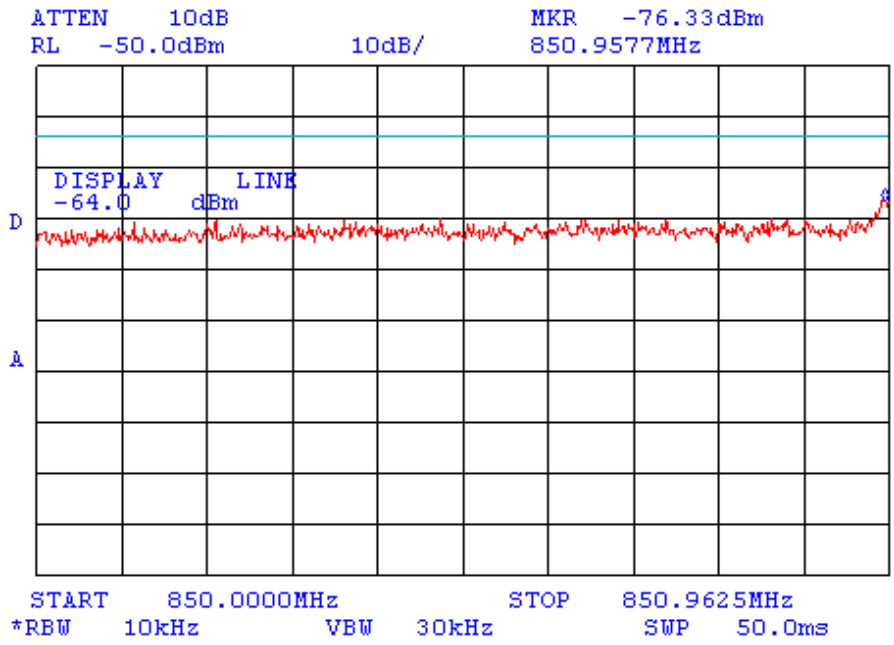
Plot A 42

Conducted spurious emission measurements in 850.00 MHz – 850.9625 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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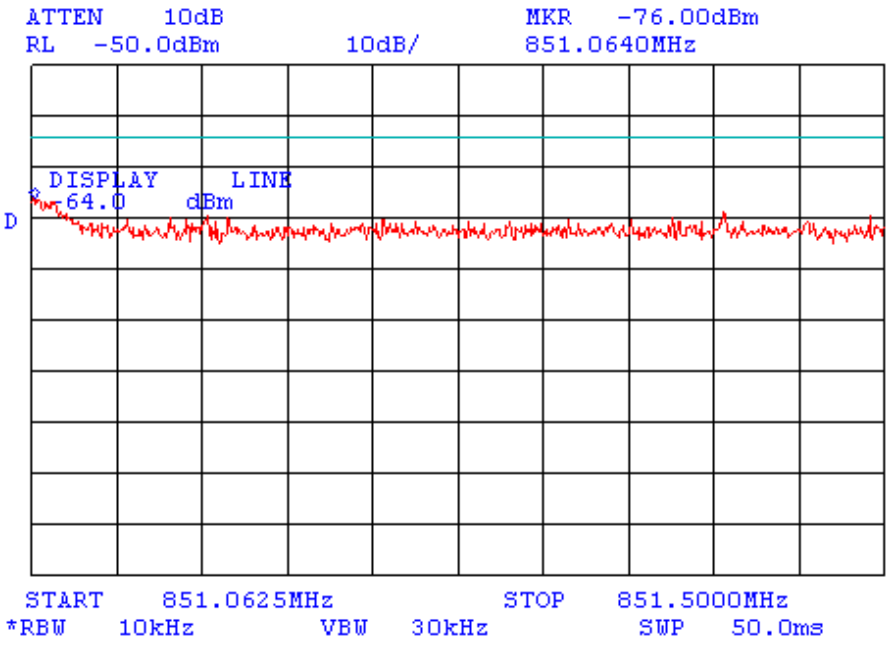
Plot A 43

Conducted spurious emission measurements in 851.0625 MHz – 851.5000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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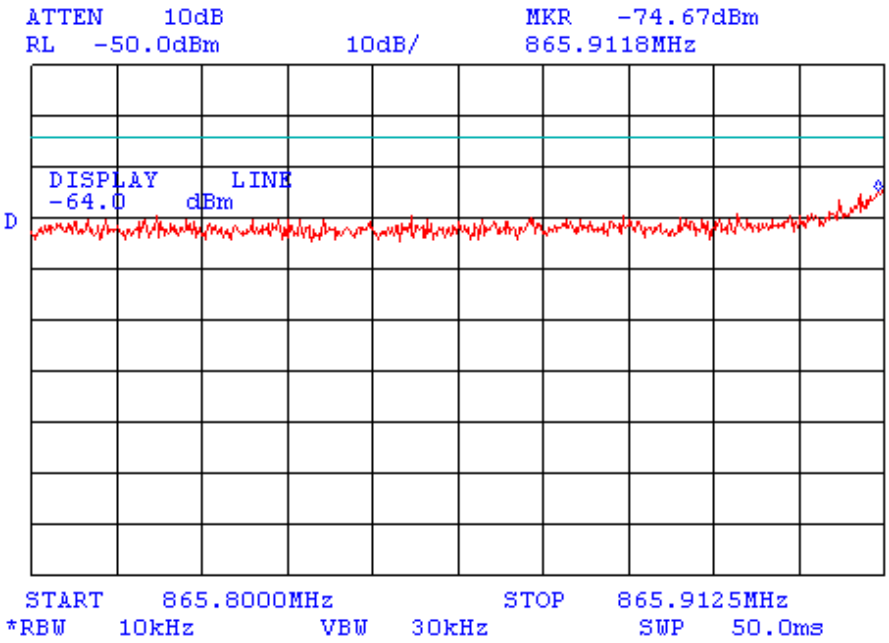
Plot A 44

Conducted spurious emission measurements in 865.8000 MHz – 865.9125 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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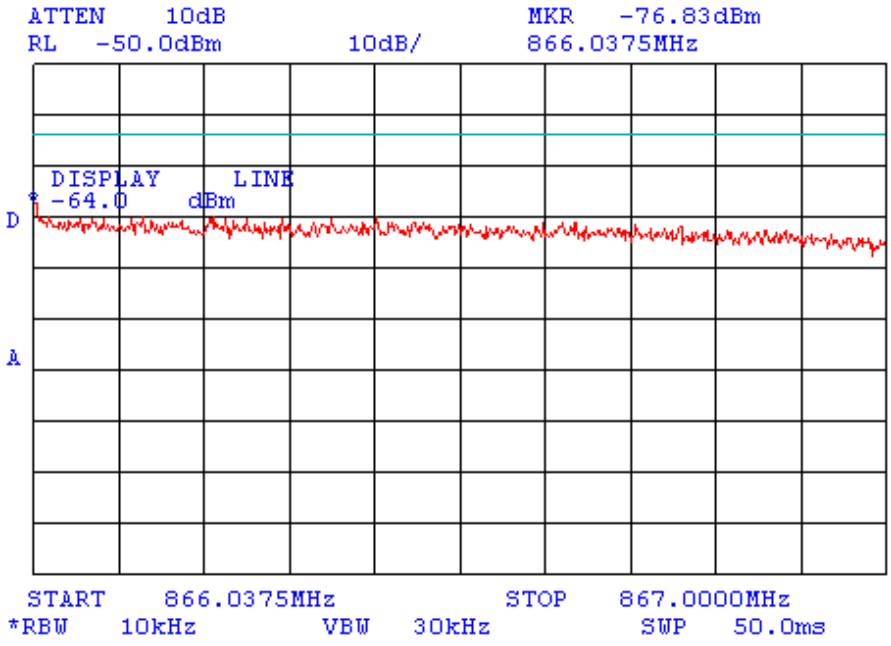
Plot A 45

Conducted spurious emission measurements in 866.0375 MHz – 867.0000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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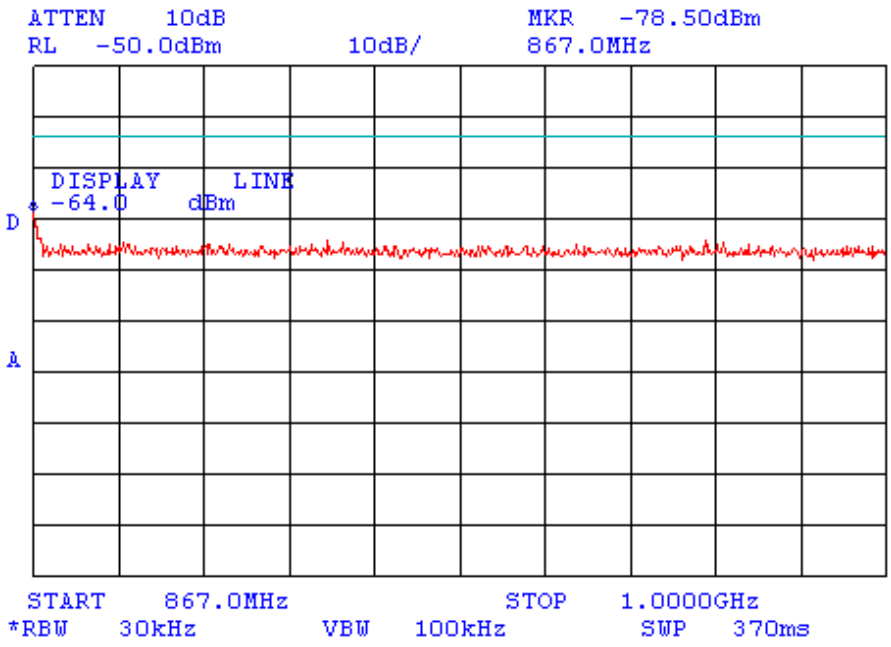
Plot A 46

Conducted spurious emission measurements in 867.0 MHz – 1000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	51 dB



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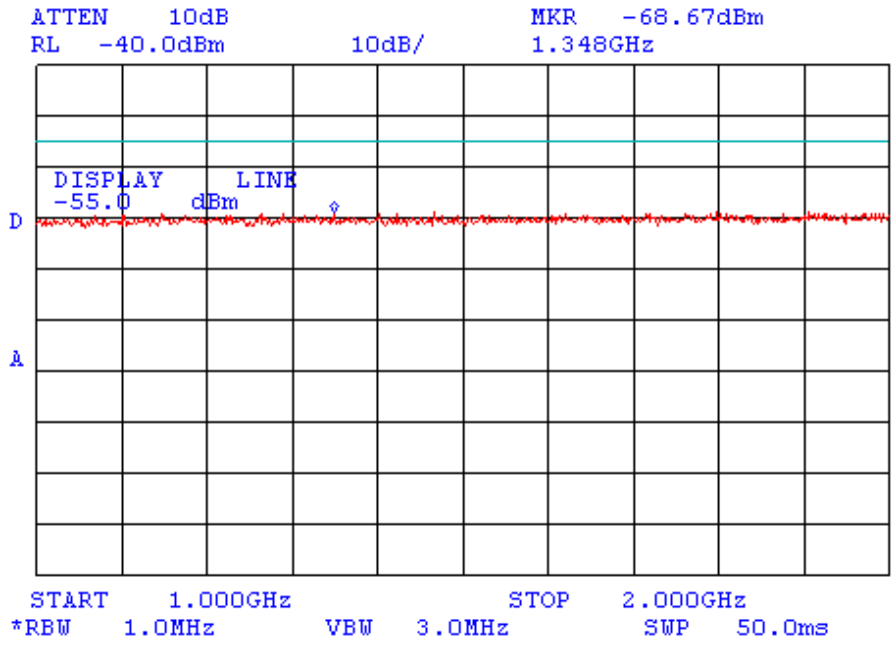
Plot A 47

Conducted spurious emission measurements in 1000 MHz – 2000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	42 dB



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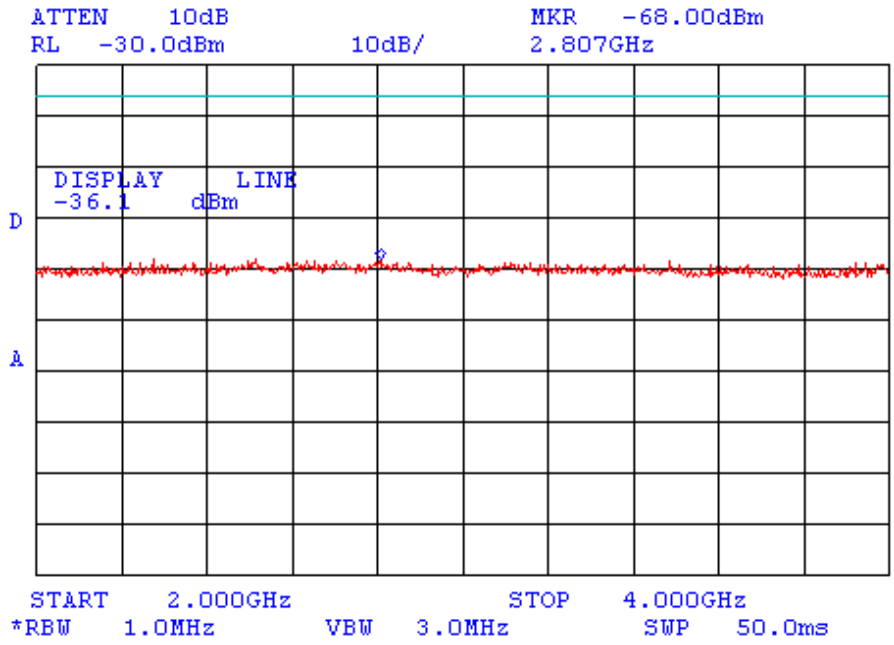
Plot A 48

Conducted spurious emission measurements in 2000 MHz – 4000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	23.1 dB



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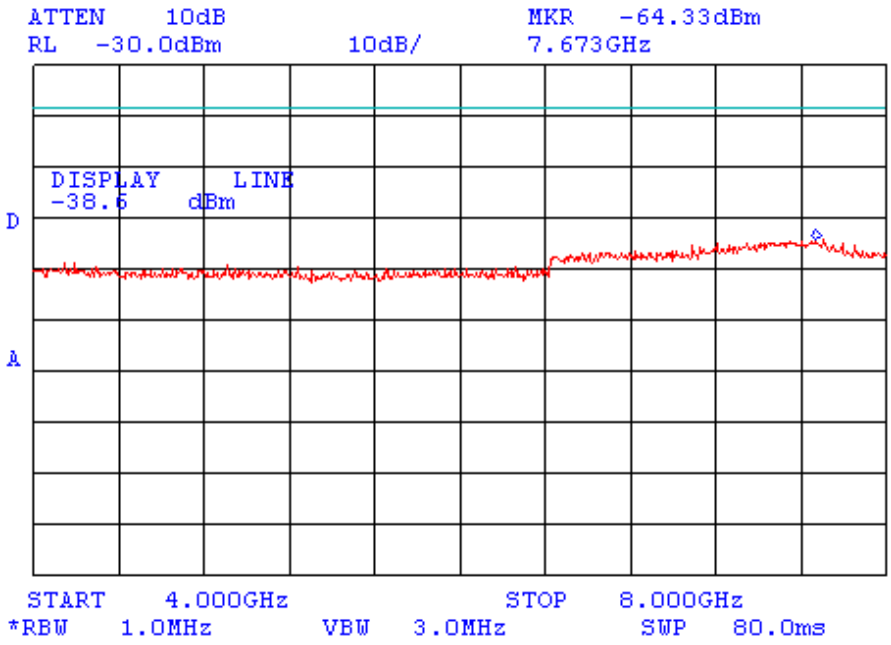
Plot A 49

Conducted spurious emission measurements in 4000 MHz – 8000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	25.6 dB



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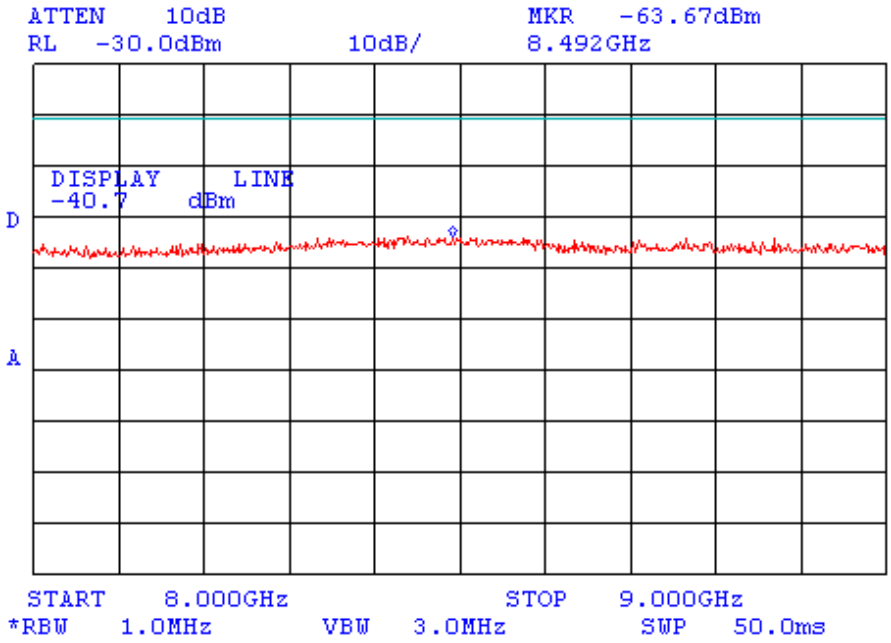
Plot A 50

Conducted spurious emission measurements in 8000 MHz – 9000 MHz

Mode	downlink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-51.6 dBm)
External attenuation	27.7 dB



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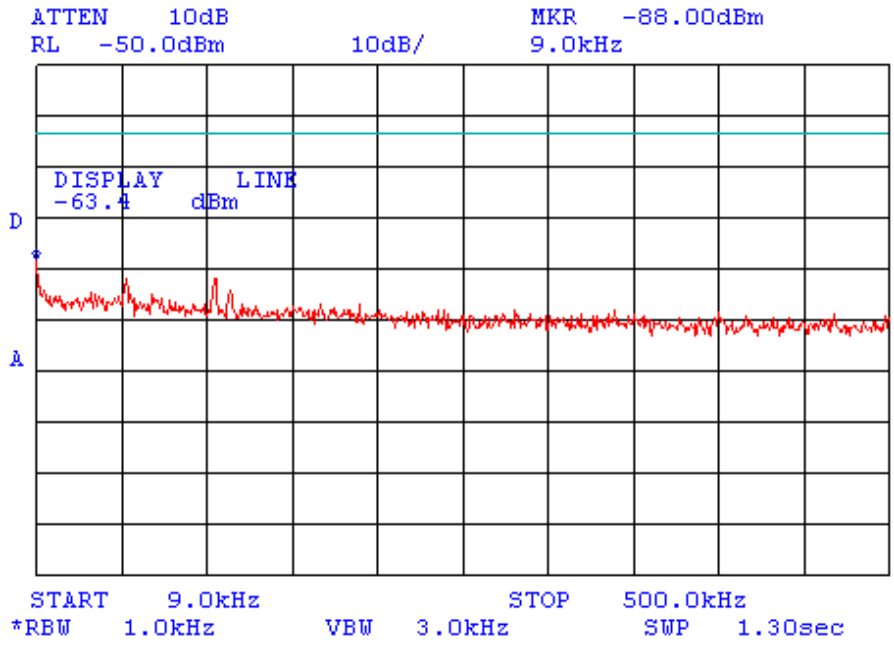
Plot A 51

Conducted spurious emission measurements in 9 kHz – 500 kHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	50.4 dB



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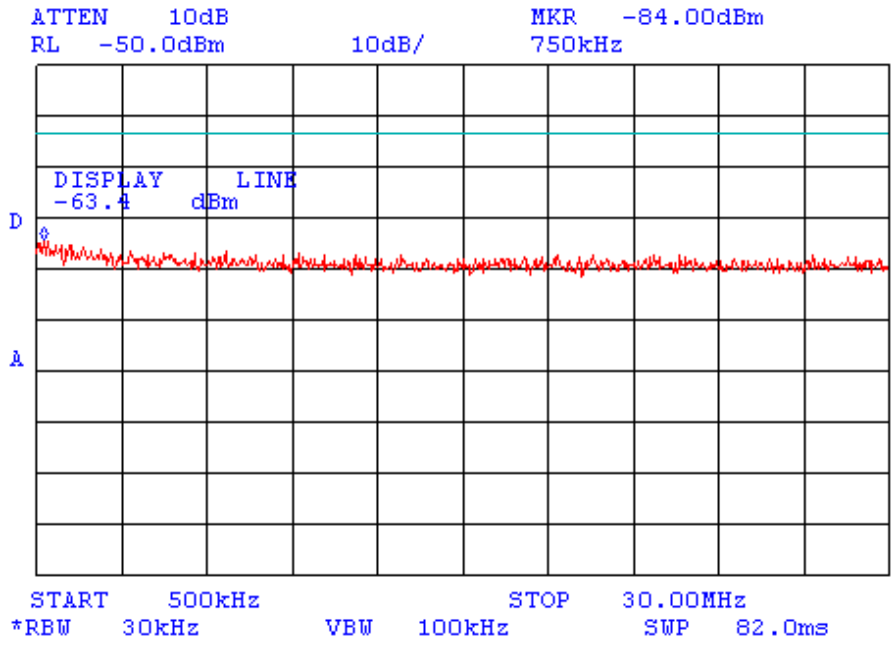
Plot A 52

Conducted spurious emission measurements in 500 kHz – 30 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	50.4 dB



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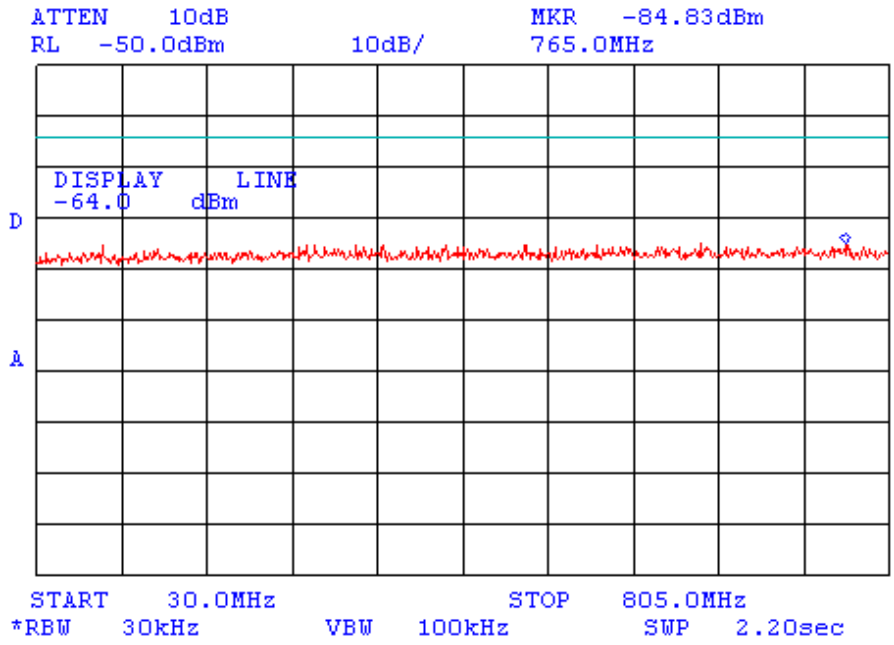
Plot A 53

Conducted spurious emission measurements in 30.0 MHz – 805.0 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



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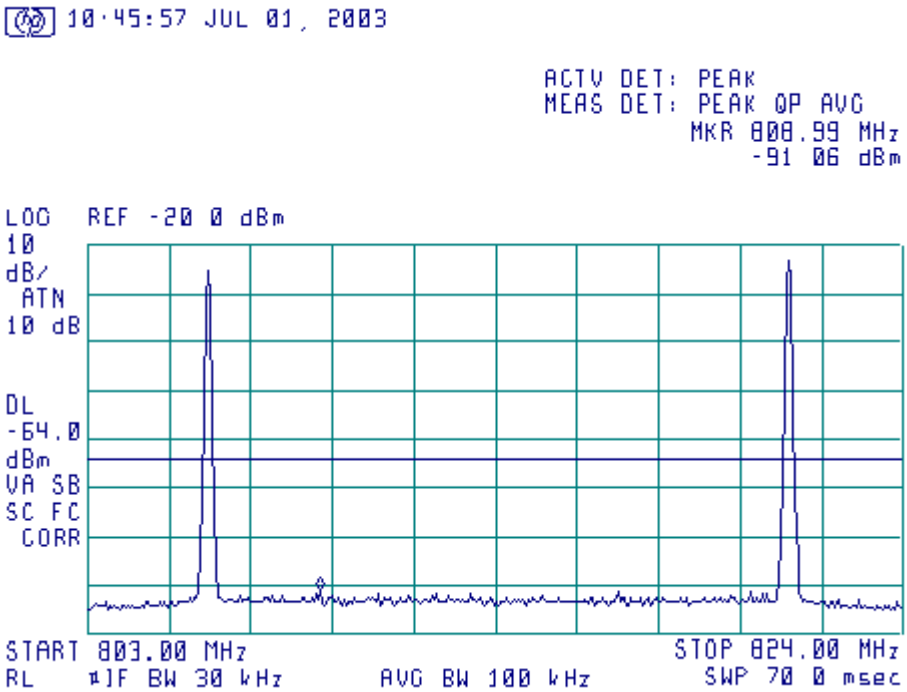
Plot A 54

Conducted spurious emission measurements in 803.00 MHz - 824.00 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



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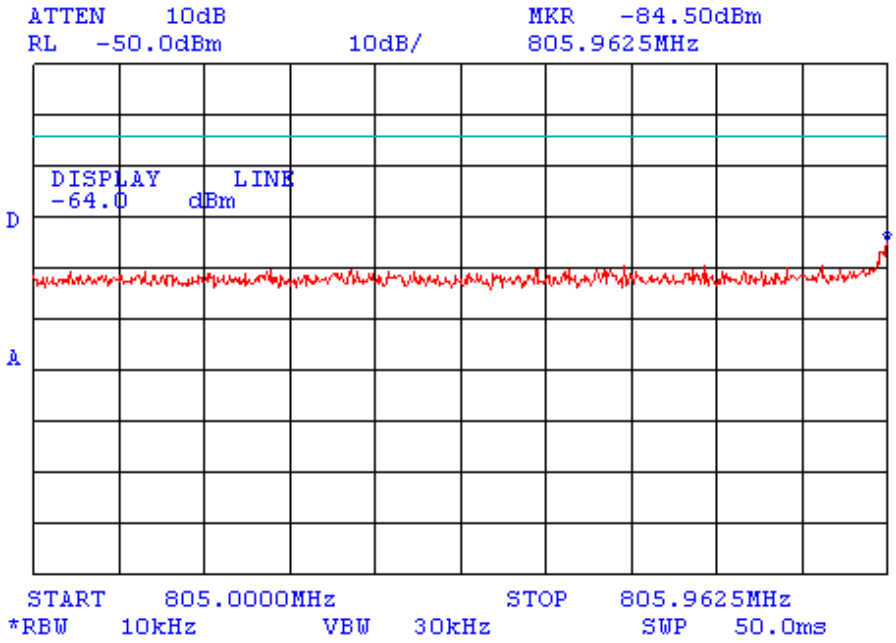
Plot A 55

Conducted spurious emission measurements in 805.0000 MHz – 805.9625 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



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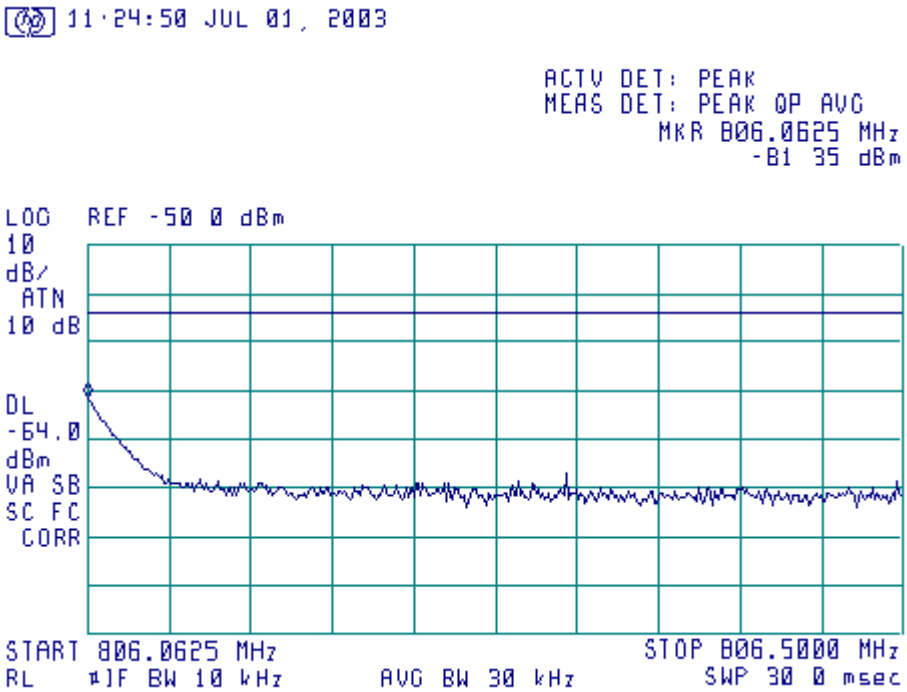
Plot A 56

Conducted spurious emission measurements in 806.0625 MHz – 806.5000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



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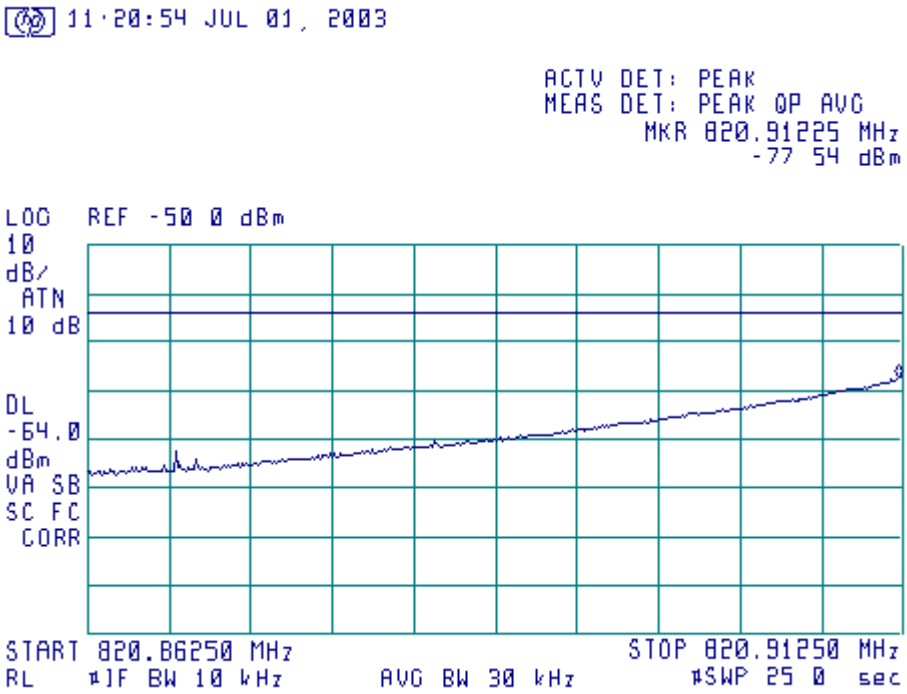
Plot A 57

Conducted spurious emission measurements in 820.8625 MHz – 820.9125 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



At sweep time =2000 Hz/sec. the same result was received

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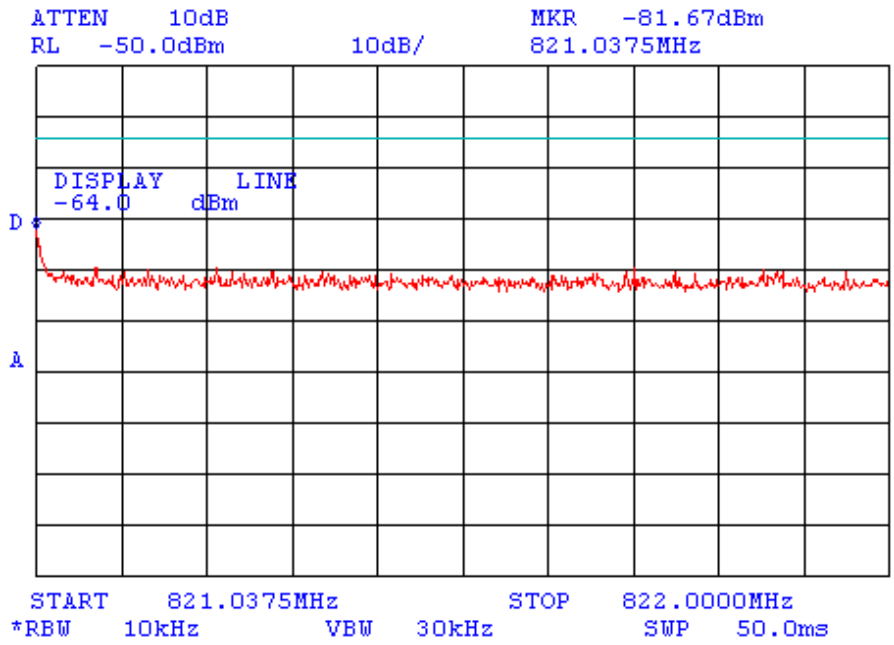
Plot A 58

Conducted spurious emission measurements in 821.0375 MHz – 822.0000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



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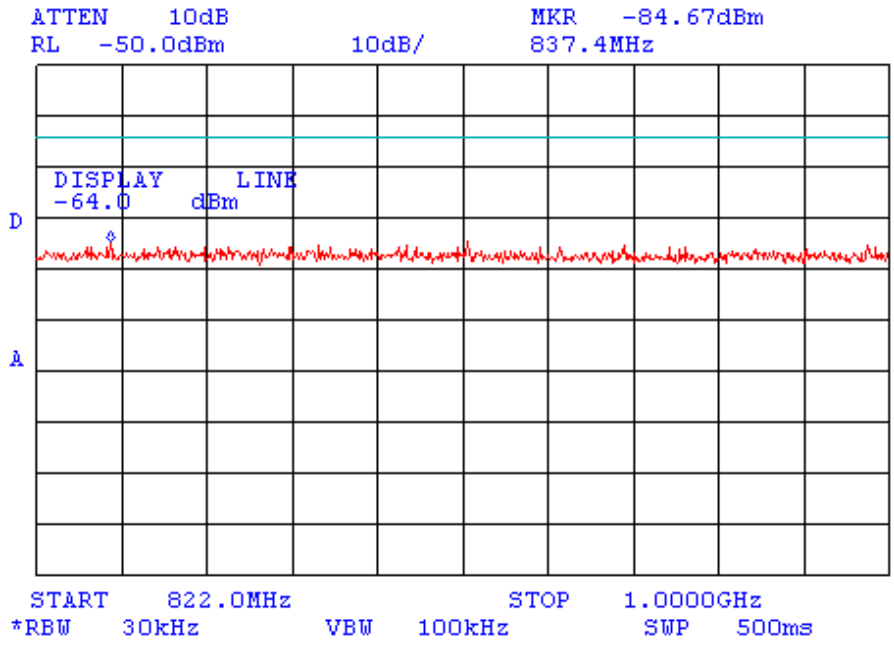
Plot A 59

Conducted spurious emission measurements in 822.0000 MHz – 1000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	51 dB



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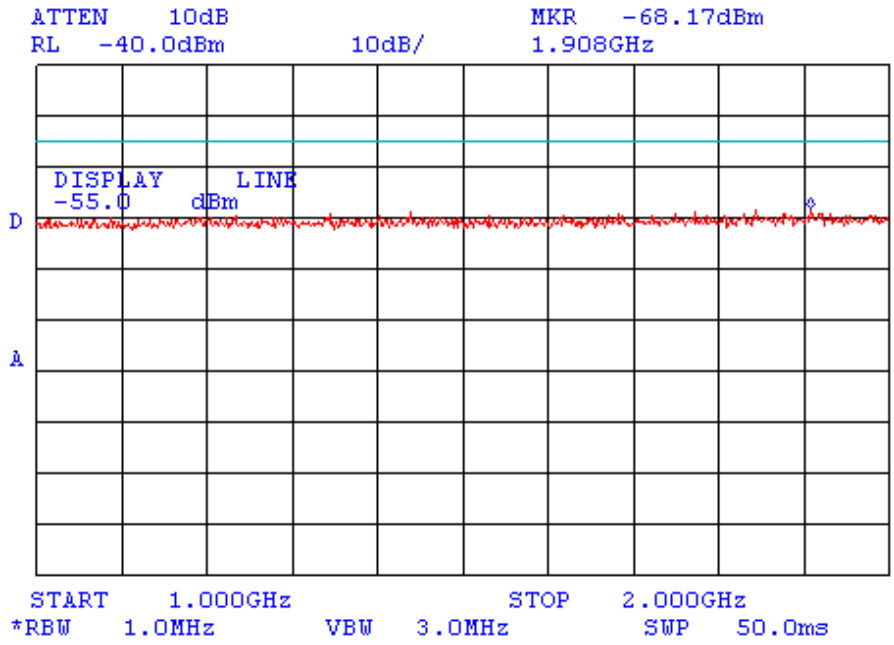
Plot A 60

Conducted spurious emission measurements in 1000 MHz – 2000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	42 dB



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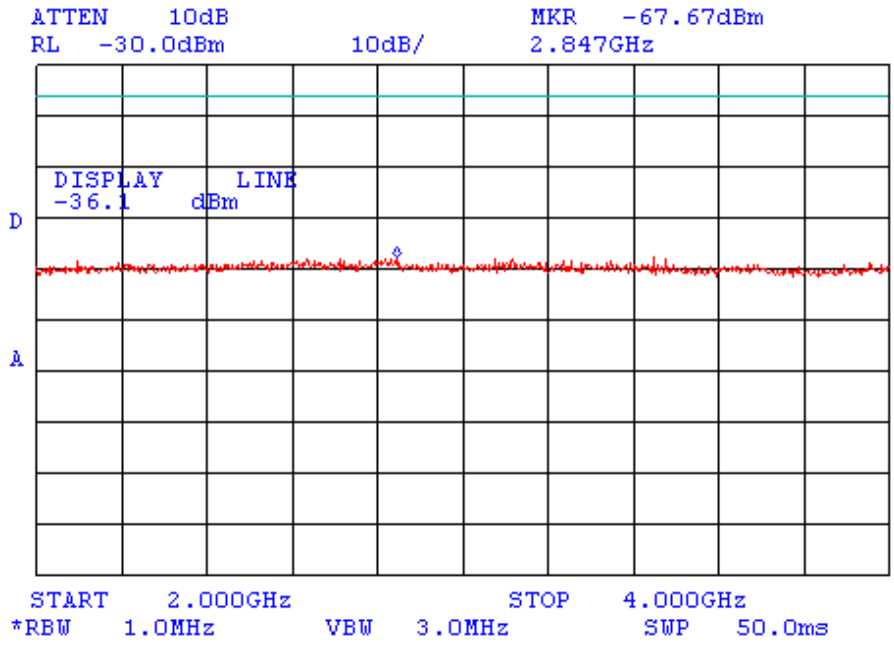
Plot A 61

Conducted spurious emission measurements in 2000 MHz – 4000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	23.1 dB



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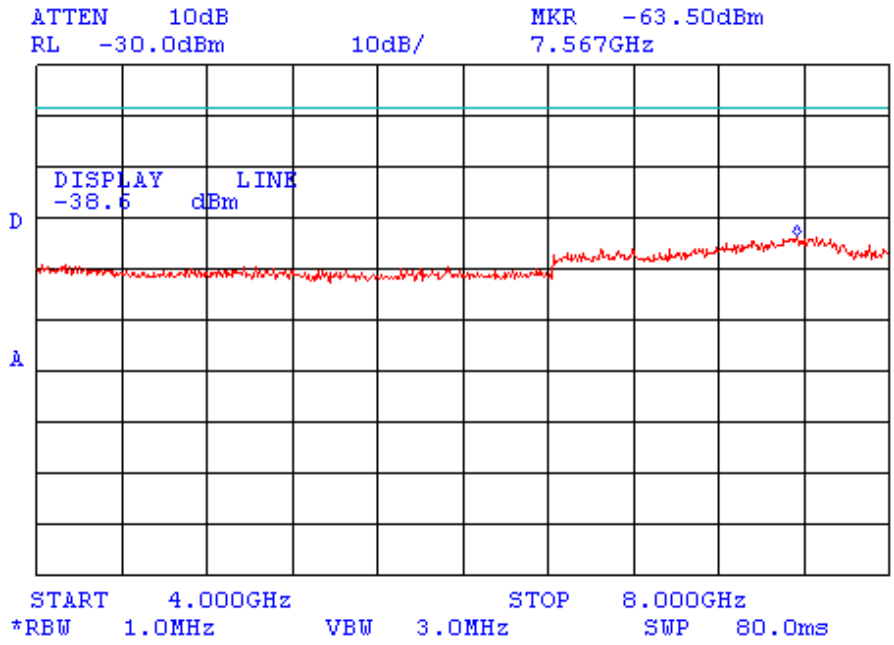
Plot A 62

Conducted spurious emission measurements in 4000 MHz – 8000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	25.6 dB



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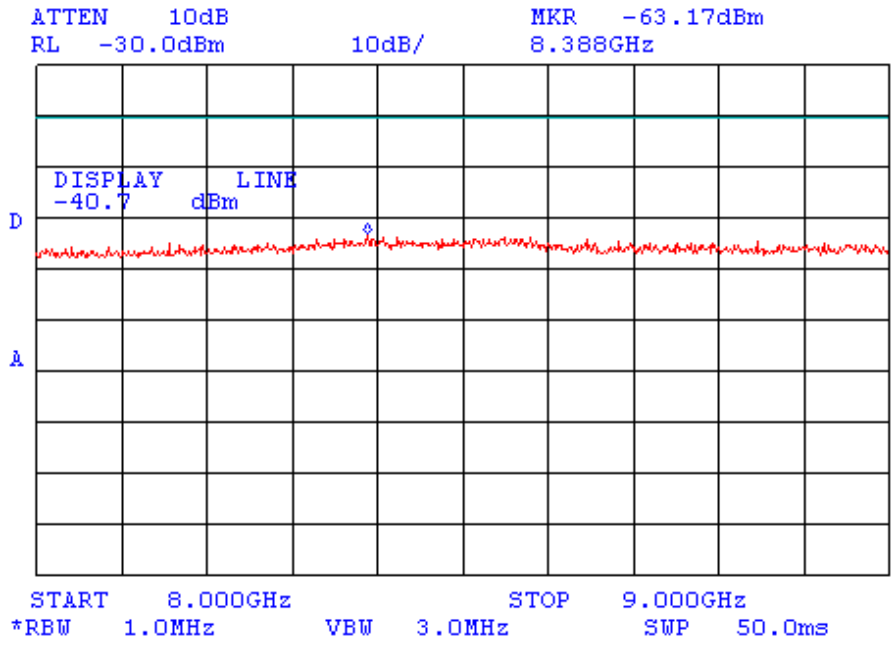
Plot A 63

Conducted spurious emission measurements in 8000 MHz – 9000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – maximum (-31.8 dBm)
External attenuation	27.7 dB



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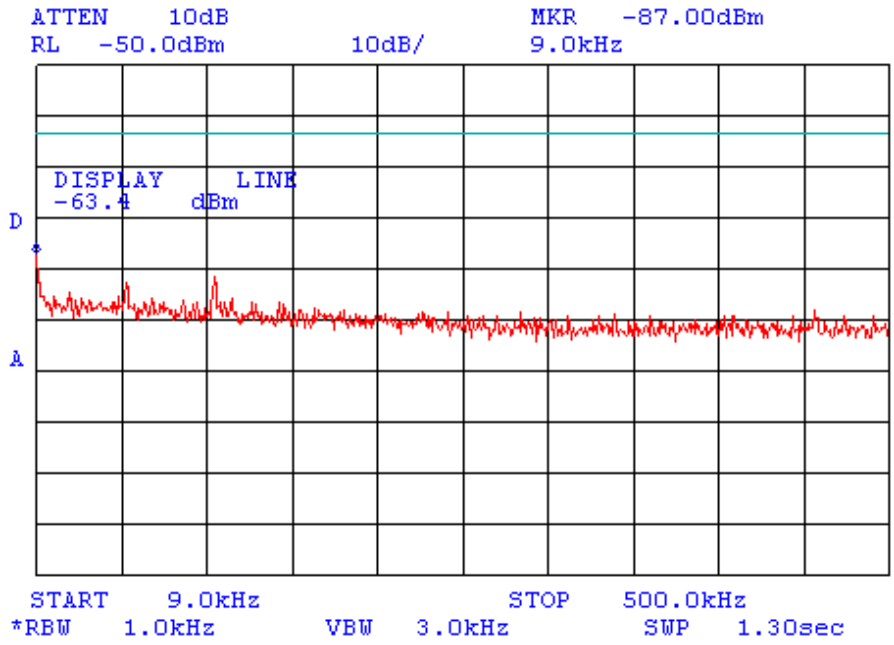
Plot A 64

Conducted spurious emission measurements in 9 kHz – 500 kHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	50.4 dB



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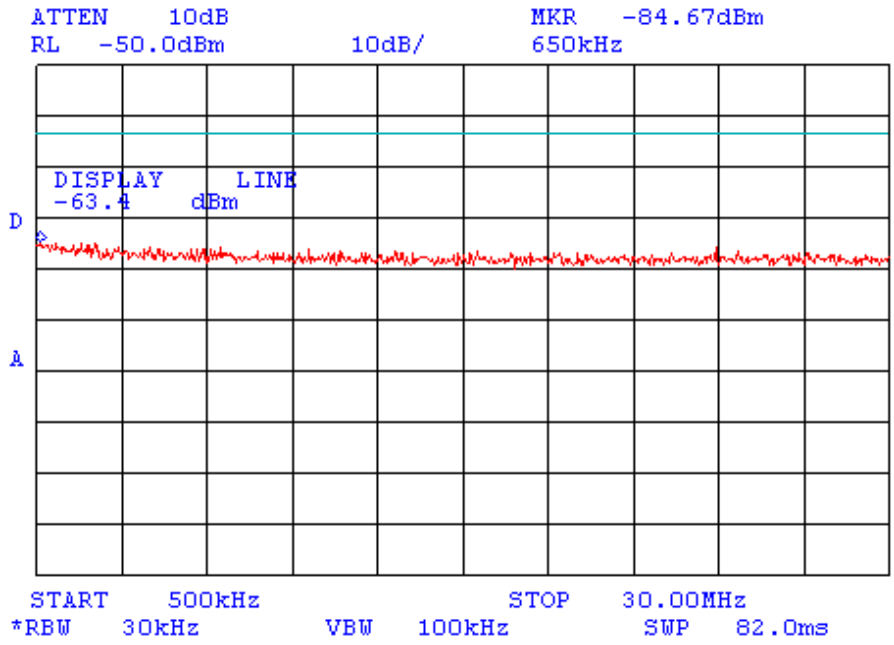
Plot A 65

Conducted spurious emission measurements in 500 kHz – 30 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	50.4 dB



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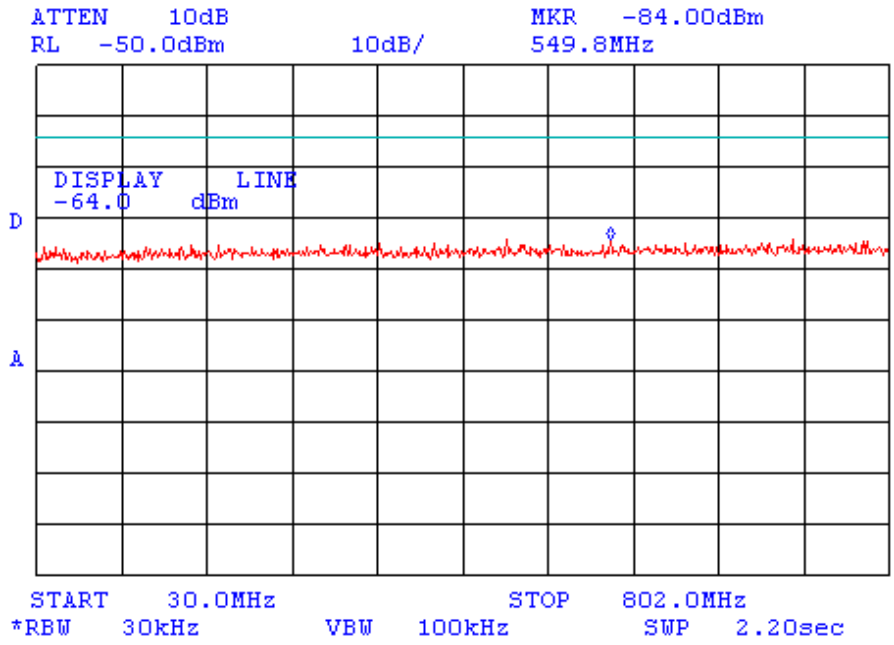
Plot A 66

Conducted spurious emission measurements in 30.0 MHz – 802.0 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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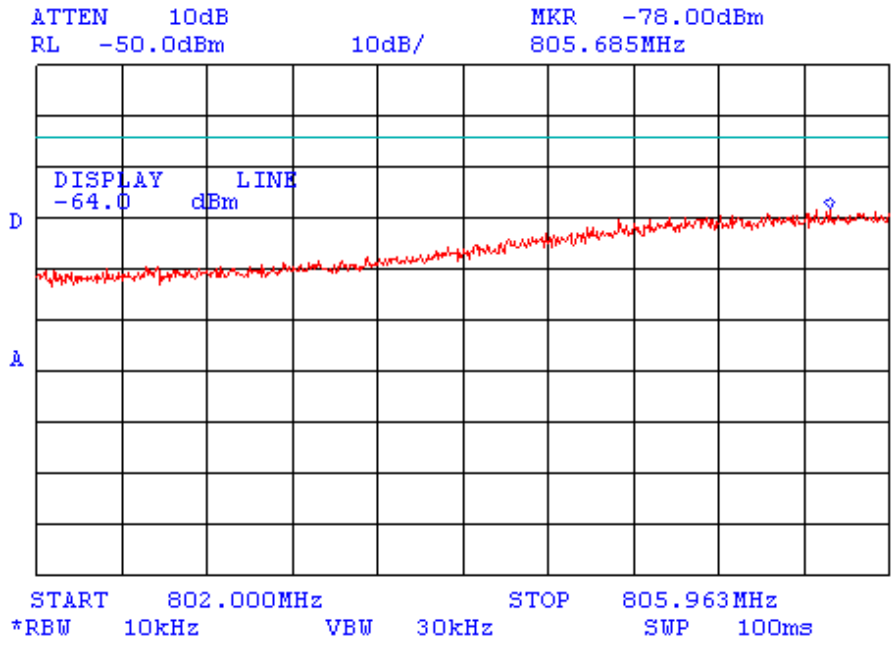
Plot A 67

Conducted spurious emission measurements in 802.00 MHz - 805.963 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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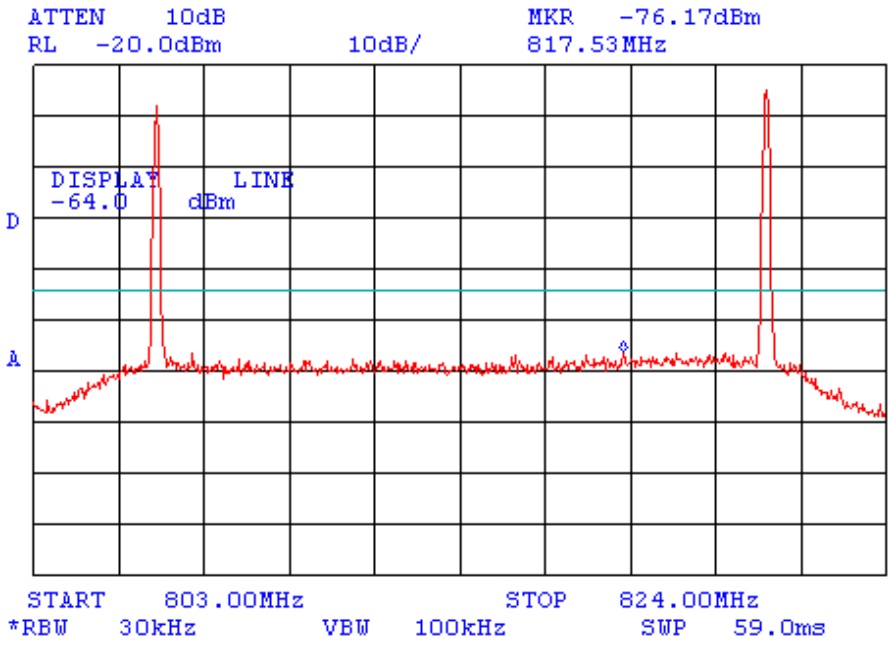
Plot A 68

Conducted spurious emission measurements in 803.00 MHz – 824.00 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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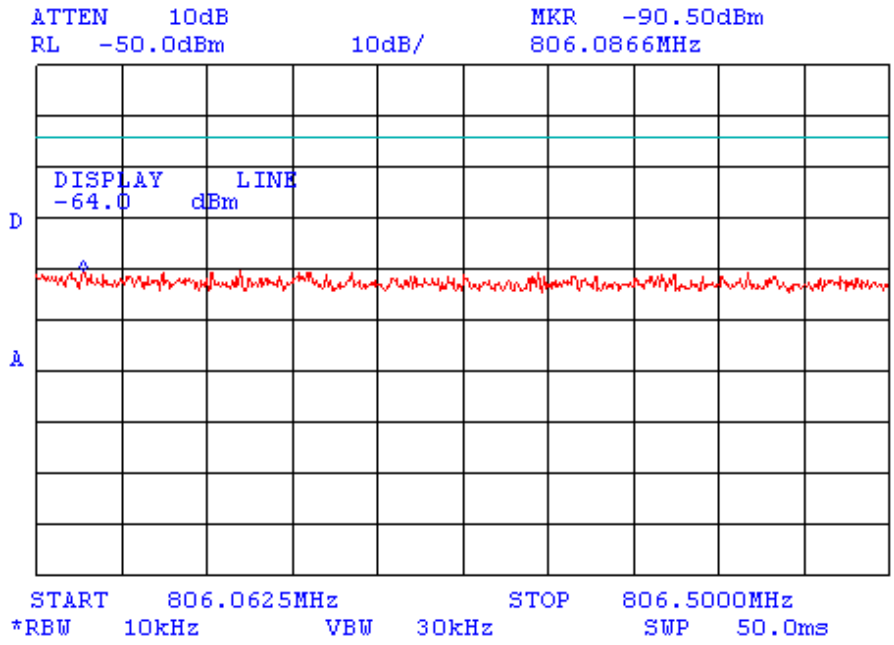
Plot A 69

Conducted spurious emission measurements in 806.0625 MHz – 806.5000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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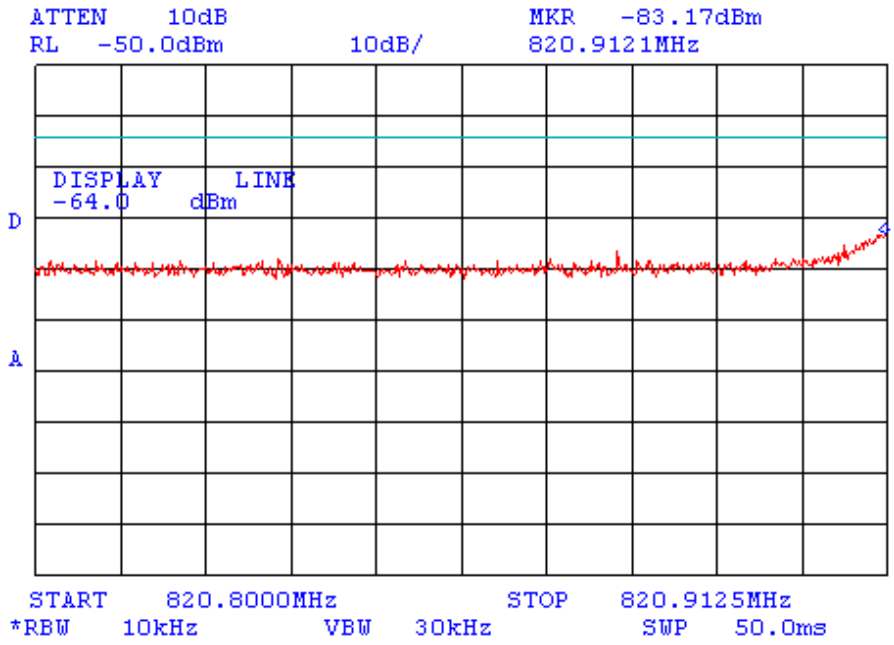
Plot A 70

Conducted spurious emission measurements in 820.8625 MHz – 820.9125 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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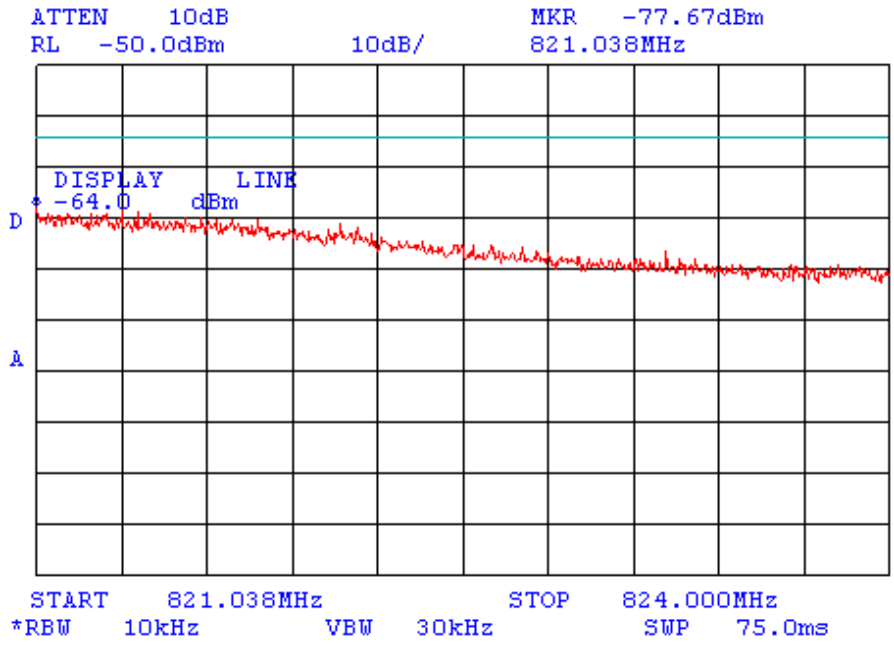
Plot A 71

Conducted spurious emission measurements in 821.0375 MHz – 824.0000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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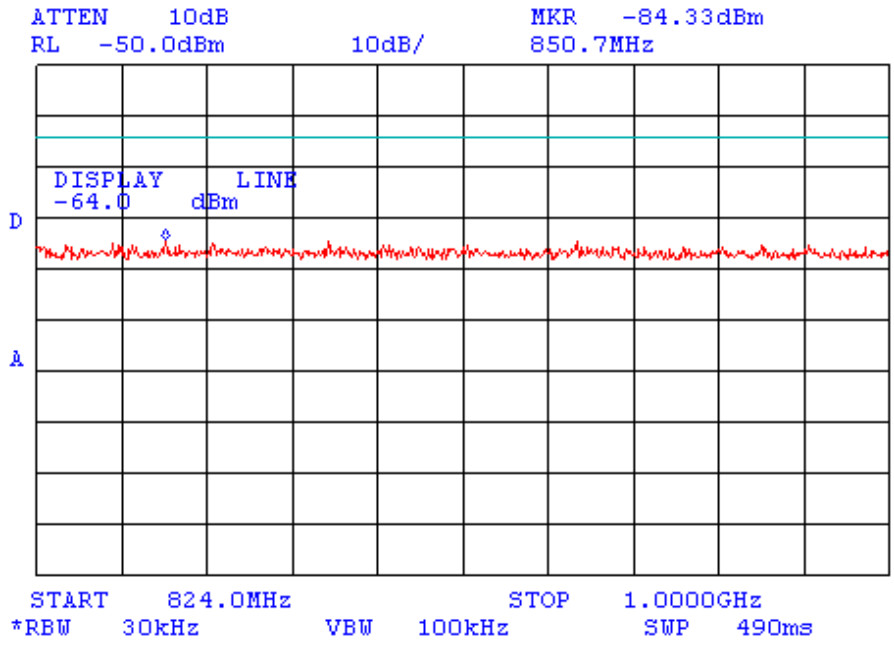
Plot A 72

Conducted spurious emission measurements in 824.0000 MHz – 1000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	51 dB



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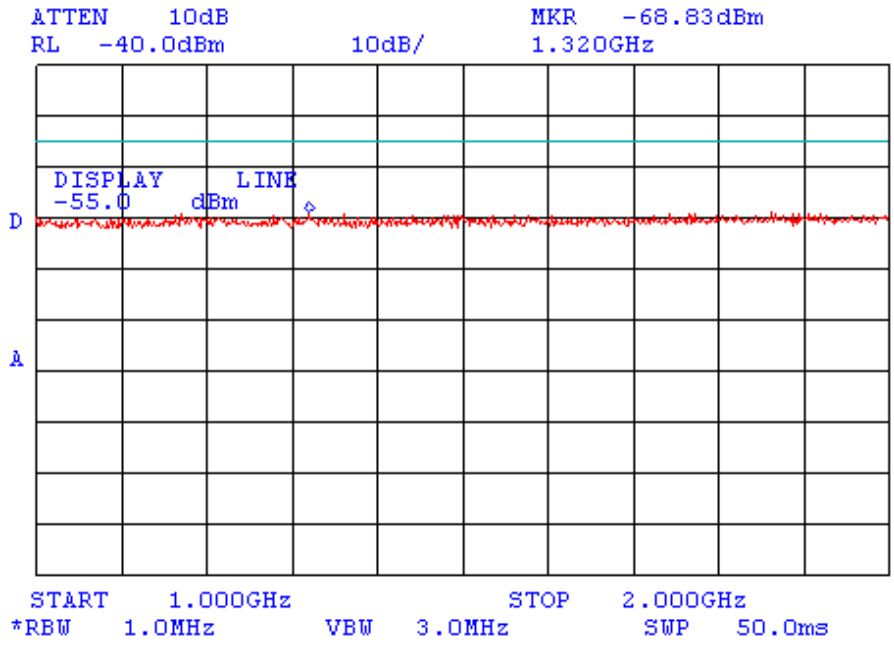
Plot A 73

Conducted spurious emission measurements in 1000 MHz – 2000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	42 dB



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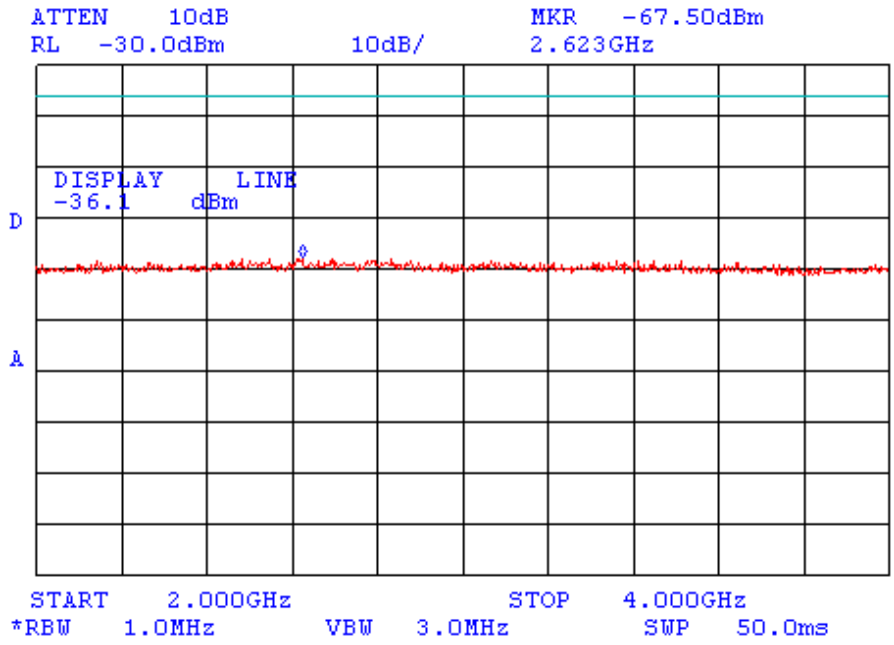
Plot A 74

Conducted spurious emission measurements in 2000 MHz – 4000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	23.1 dB



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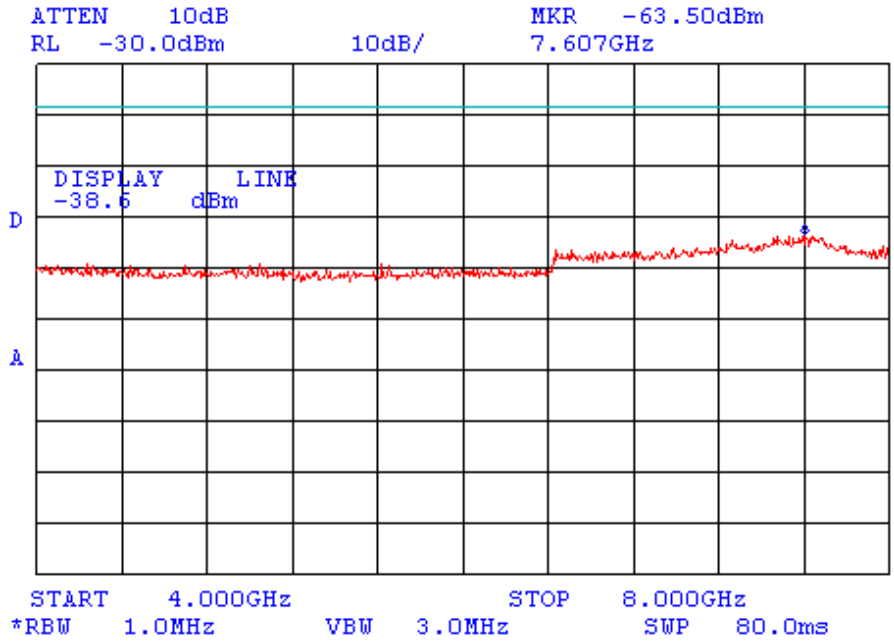
Plot A 75

Conducted spurious emission measurements in 4000 MHz – 8000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	25.6 dB



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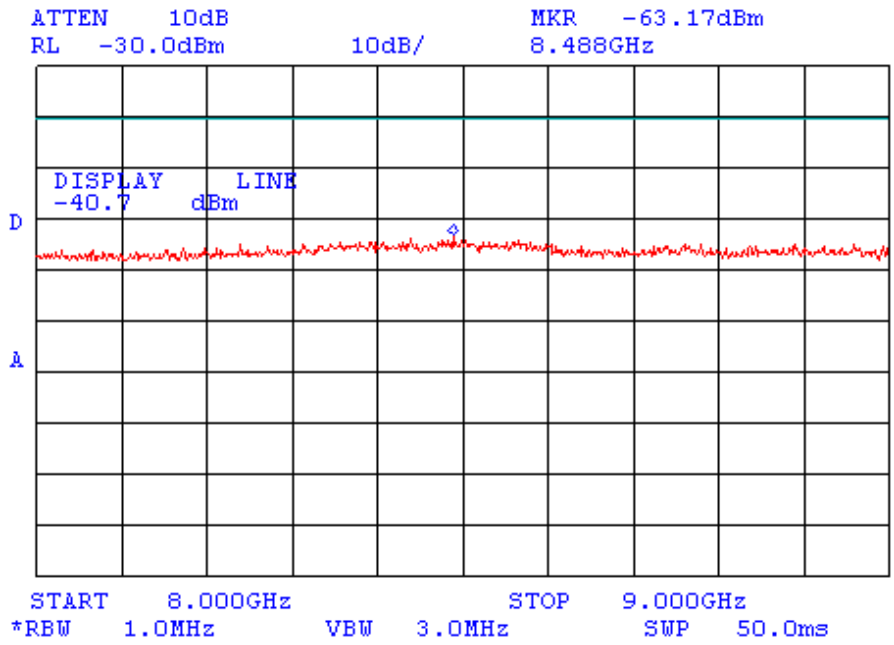
Plot A 76

Conducted spurious emission measurements in 8000 MHz – 9000 MHz

Mode	uplink
Test method:	measurement at antenna connector
Notes	Input signal – minimum (-60.5 dBm)
External attenuation	27.7 dB



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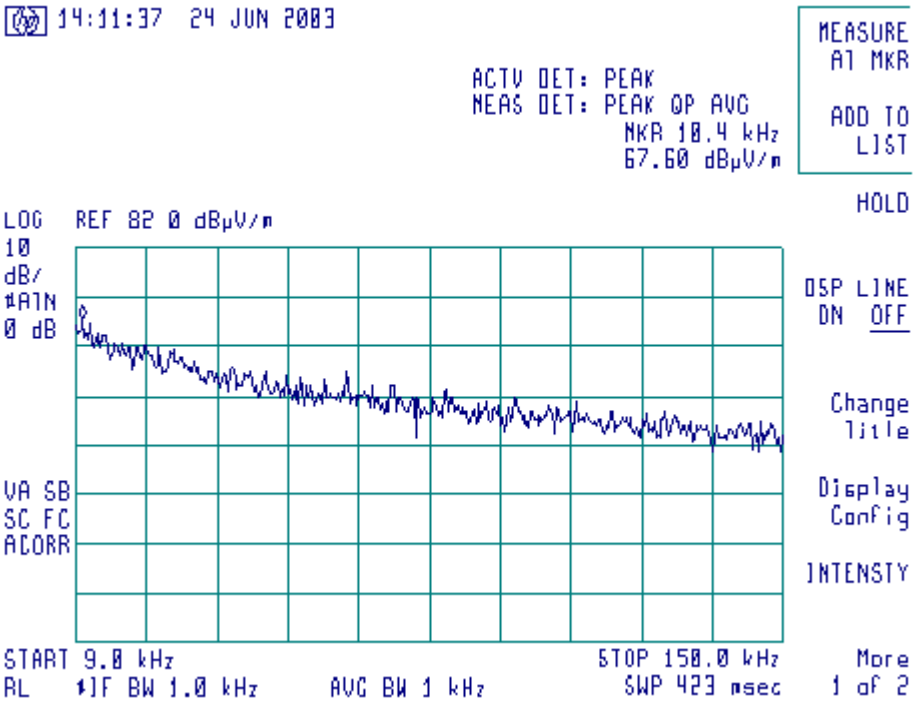
Plot A 77

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in downlink mode @ maximum input signal (–21.9 dBm)



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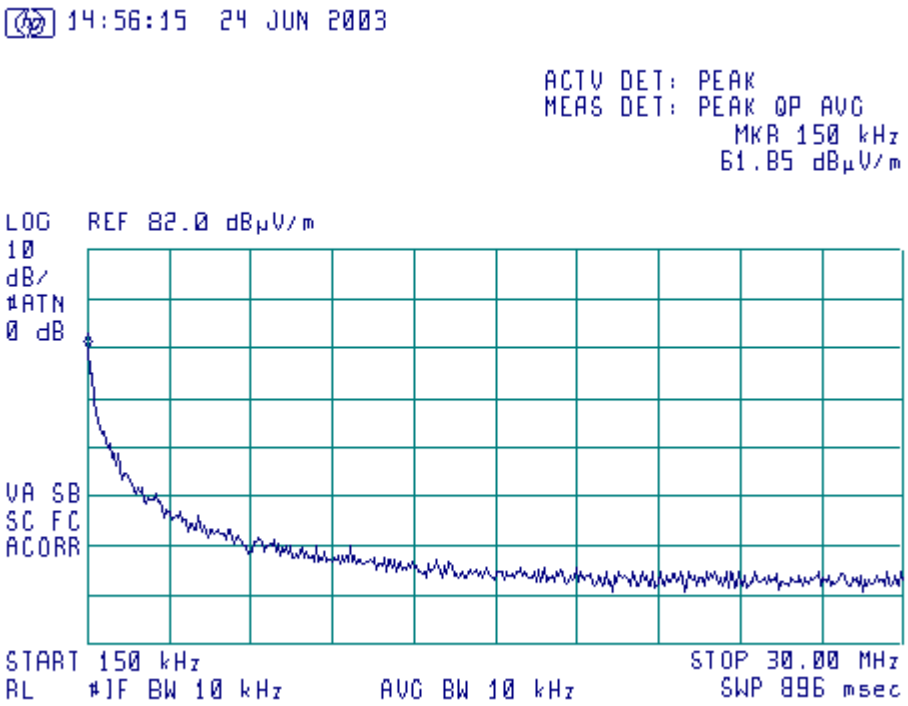
Plot A 78

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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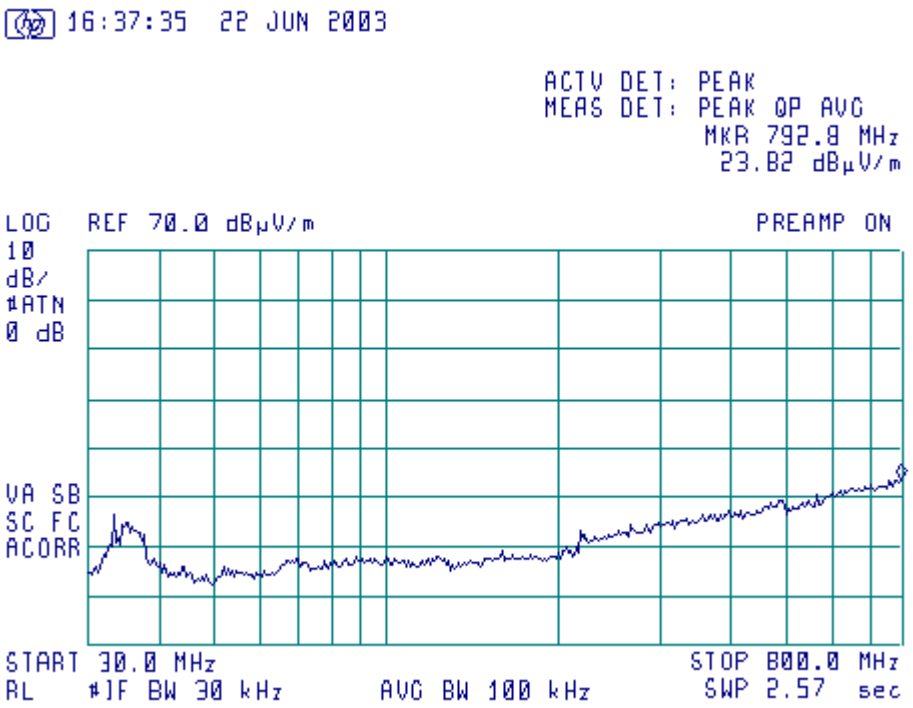
Plot A 79

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 800 MHz, in downlink mode @ maximum input signal (–21.9 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



No spurious emissions were found

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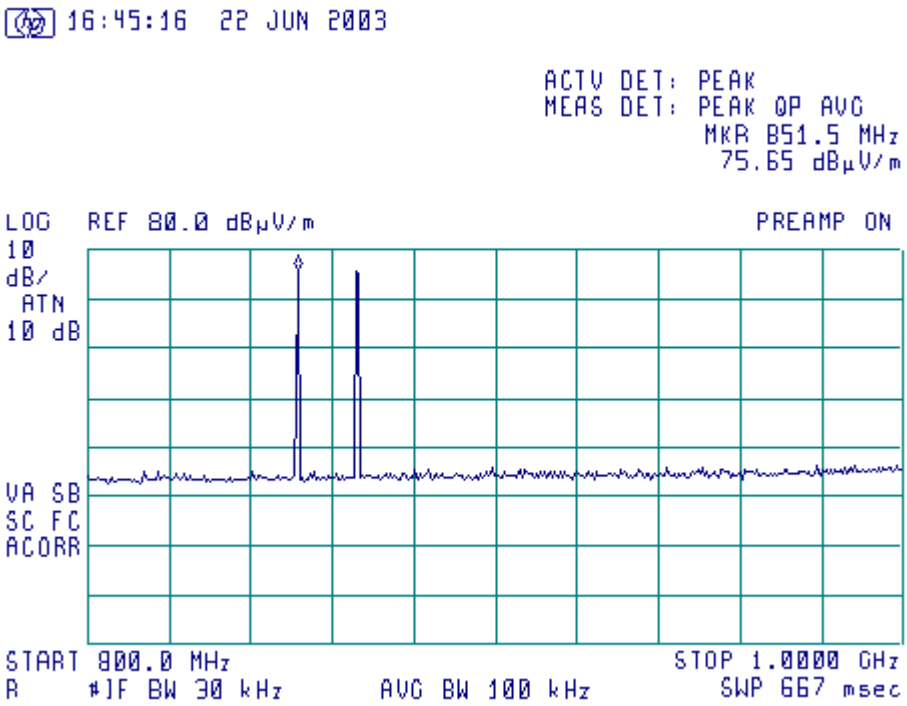
Plot A 80

Radiated spurious emission measurements in the anechoic chamber from 800 MHz to 1000 MHz, in downlink mode @ maximum input signal (–21.9 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



No spurious emissions were found

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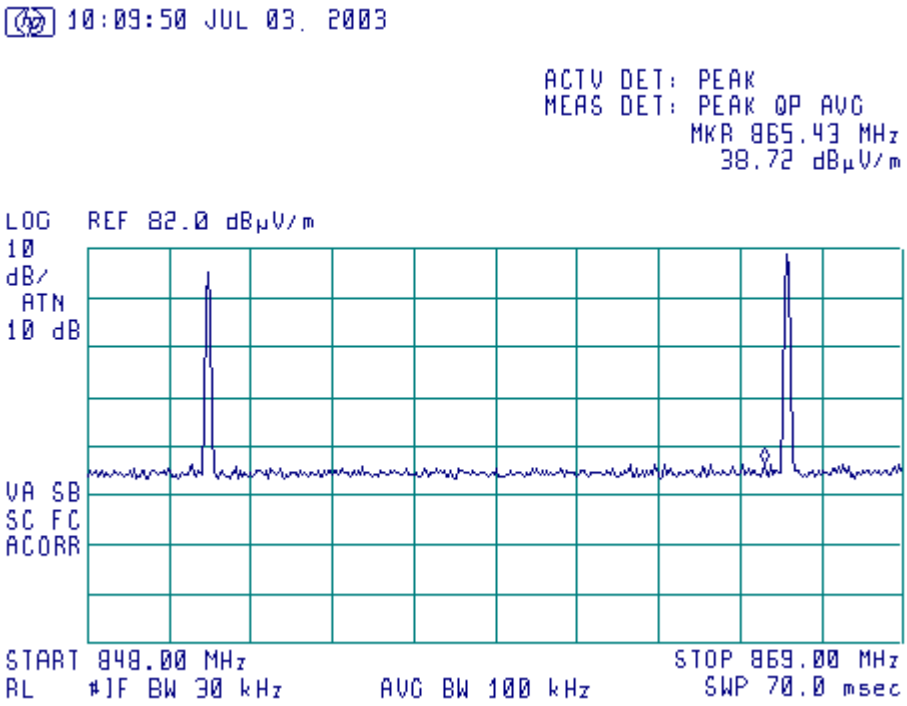
Plot A 81

Radiated spurious emission measurements in the anechoic chamber from 848.00 MHz to 869.00 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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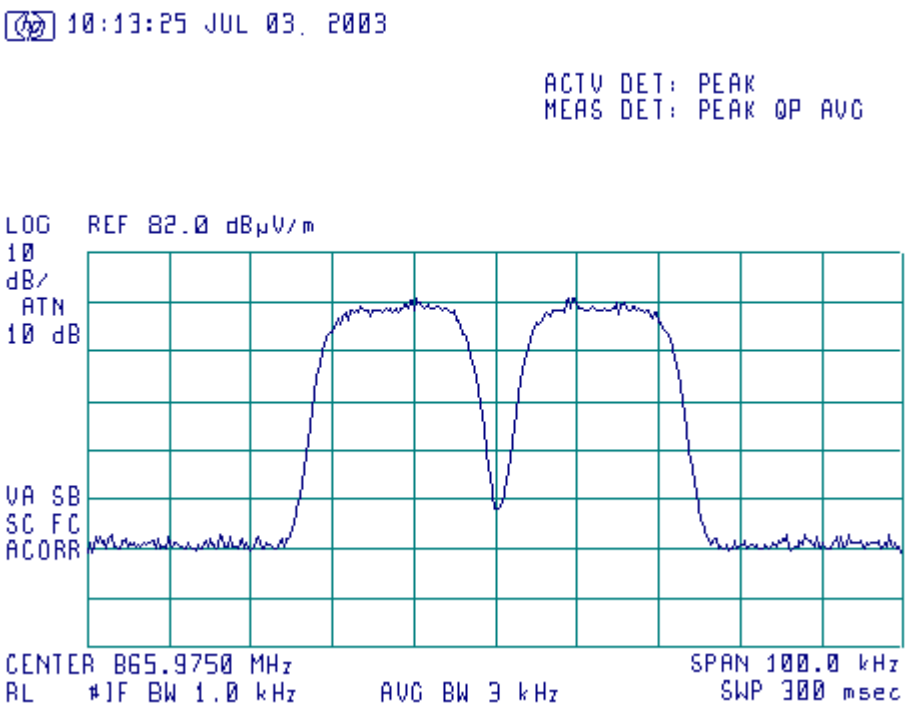
Plot A 82

Radiated spurious emission measurements in the anechoic chamber at 865.9750 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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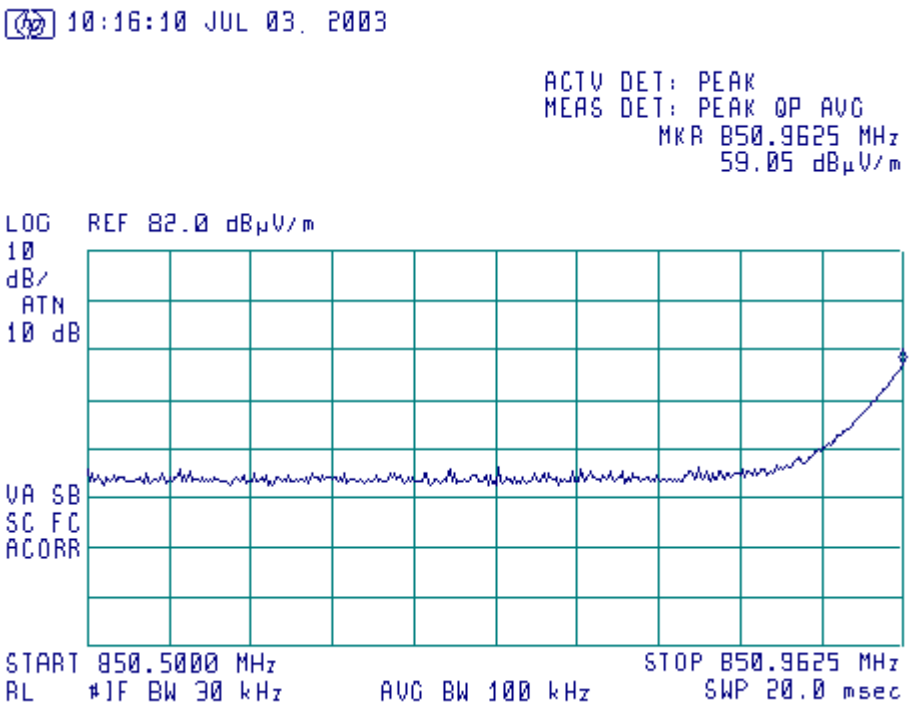
Plot A 83

Radiated spurious emission measurements in the anechoic chamber from 850.5000 MHz to 850.9625 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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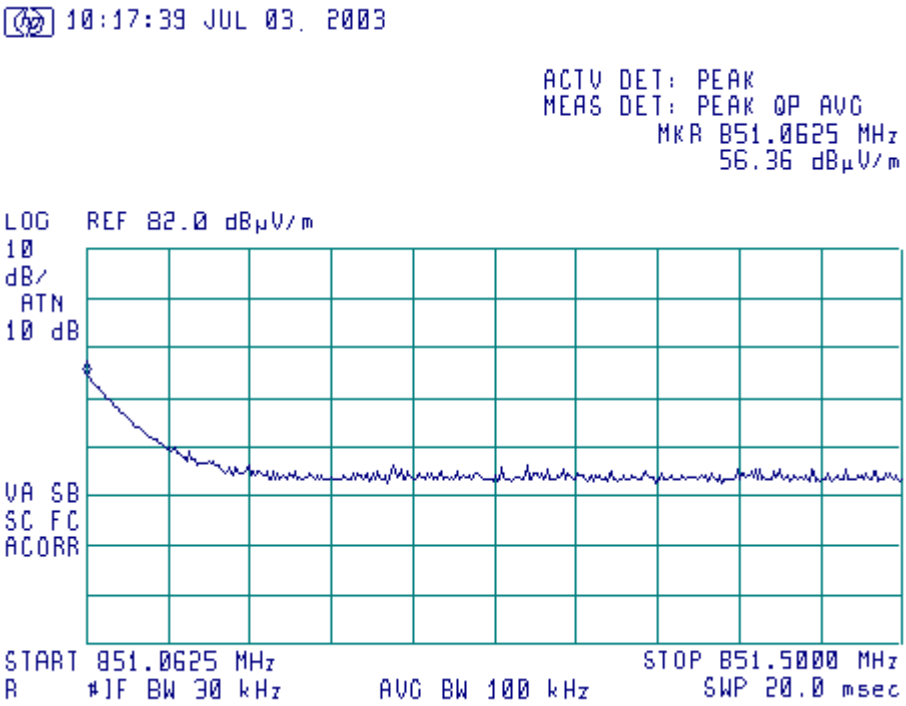
Plot A 84

Radiated spurious emission measurements in the anechoic chamber from 851.0625 MHz to 851.5000 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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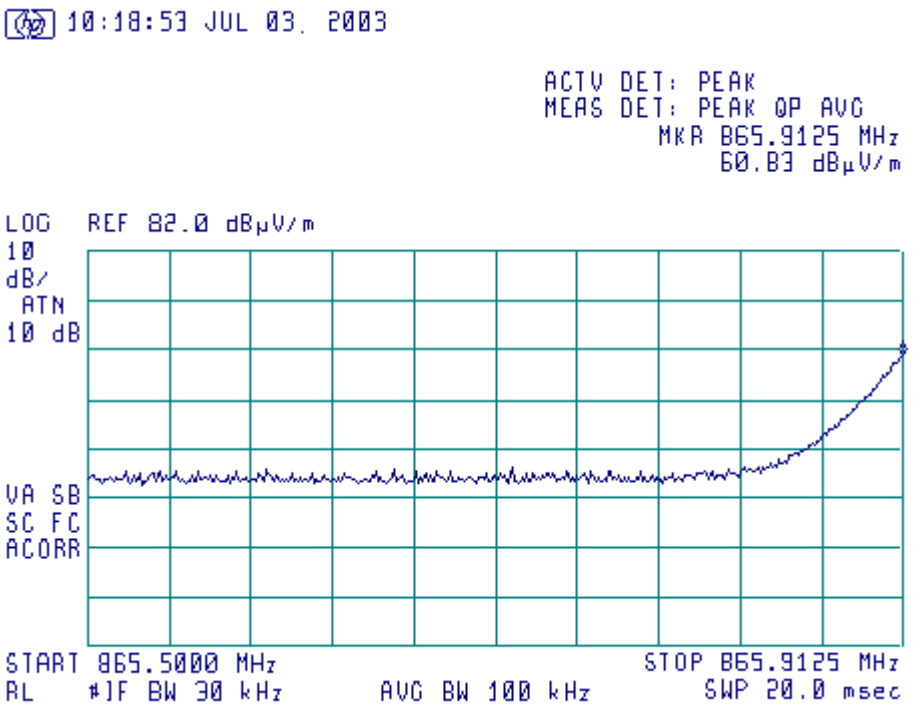
Plot A 85

Radiated spurious emission measurements in the anechoic chamber from 865.5000 MHz to 865.9125 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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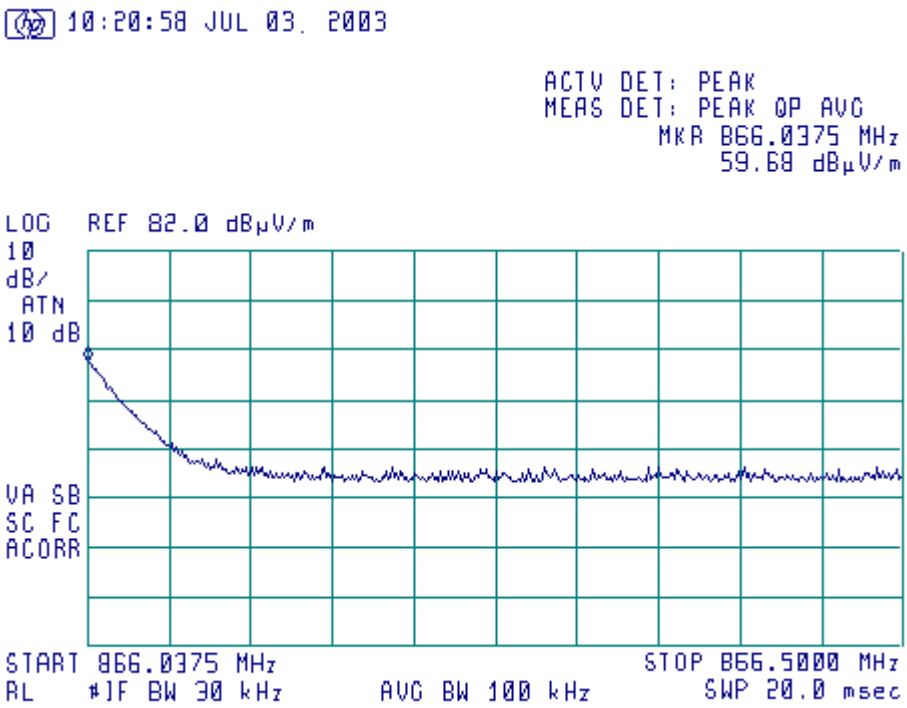
Plot A 86

Radiated spurious emission measurements in the anechoic chamber from 866.0375 MHz to 866.5000 MHz, in downlink mode @ maximum input signal (–21.9 dBm)



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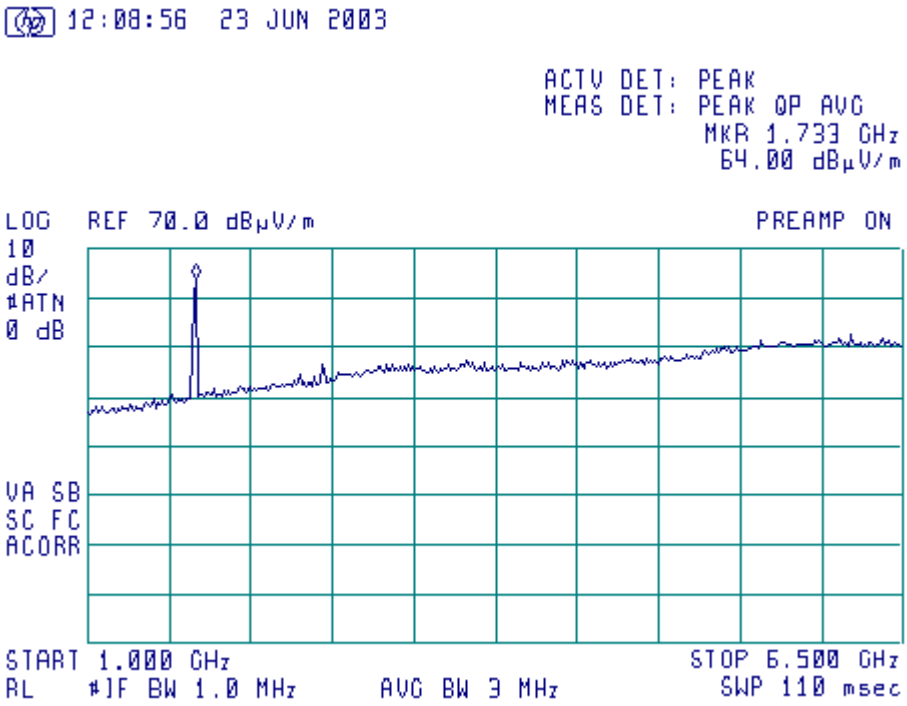
Plot A 87

Radiated spurious emission measurements in the anechoic chamber from 1.000 GHz to 6.500 GHz, in downlink mode @ maximum input signal (–21.9 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



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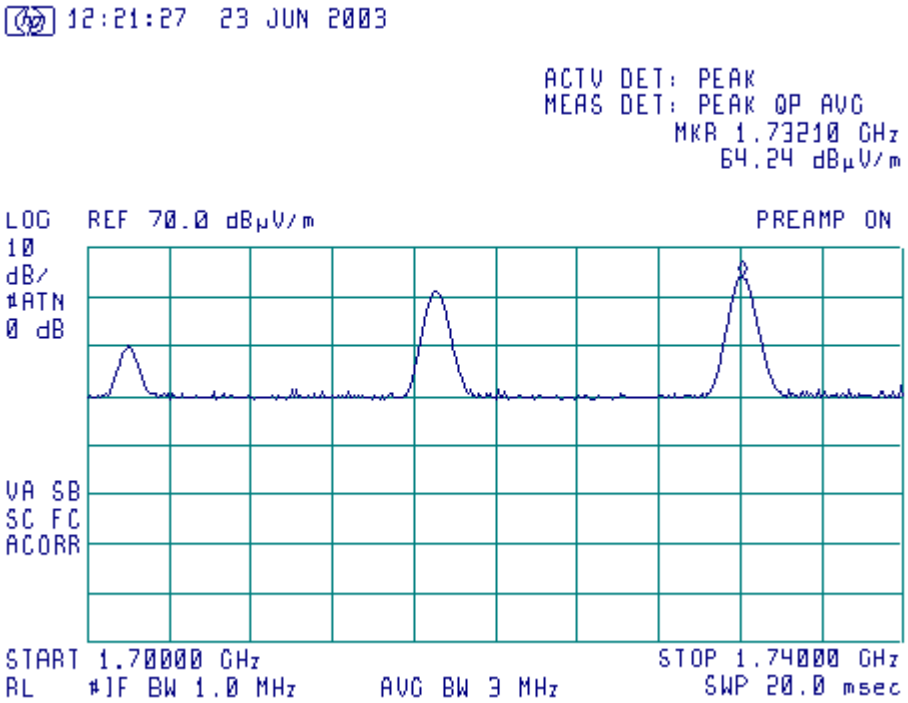
Plot A 88

Radiated spurious emission measurements in the anechoic chamber from 1.7000 GHz to 1.7400 GHz, in downlink mode @ maximum input signal (–21.9 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



Frequency, MHz	Peak measurement, dB(uV/m	Antenna polarization	Generator output power, dBm	Cable loss, dB	Antenna gain, dBd	ERP, dBm
1716.970250	62.54	Vertical	-37.7	1.8+0.7	4.9	-35.3
1731.923175	64.06	Vertical	-35.6	1.8+0.7	4.9	-33.2

Limit=-13 dBm (Att.=43+10log(P))
Attenuation below the carrier should be calculated.
Verdict: PASS

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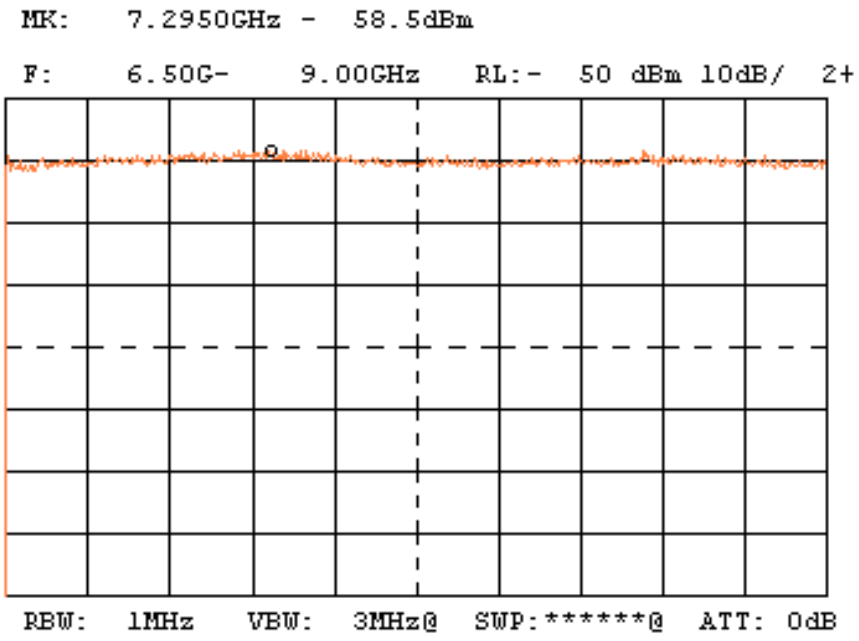
Plot A 89

Radiated spurious emission measurements in the anechoic chamber from 6.50 GHz to 9.00 GHz, in downlink mode @ maximum input signal (–21.9 dBm)



Noise floor:
-58.5 dBm+107 dB+37.1 dB(1/m)(AF)+5.5 dB(CL)-39 dB(LNA)=52.1 dBuV/m
Limit=82.23 dBuV/m
Verdict: PASS

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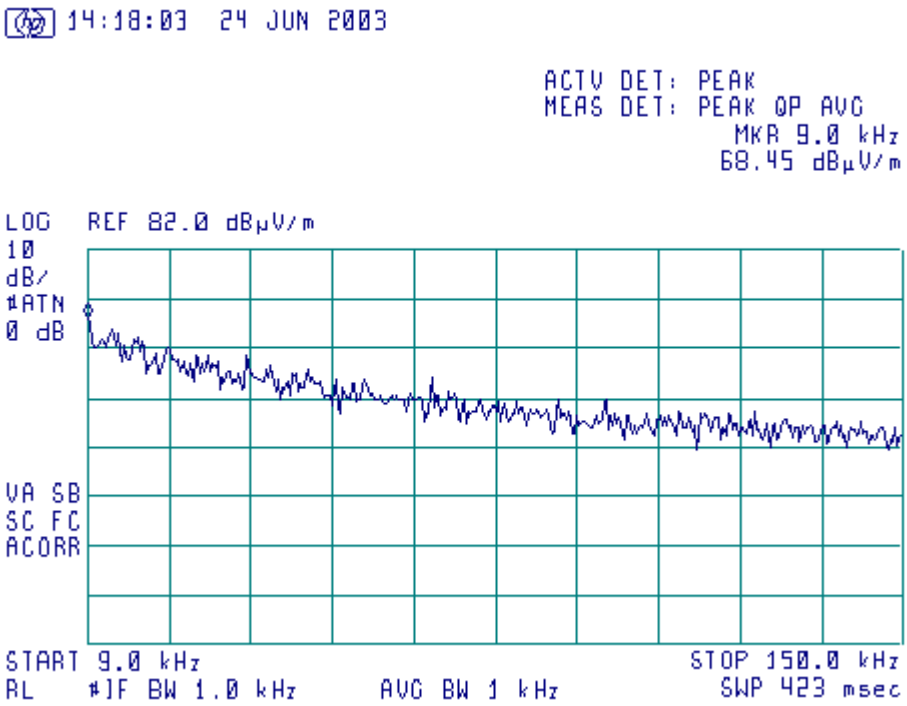
Plot A 90

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in downlink mode @ minimum input signal (–51.6 dBm)



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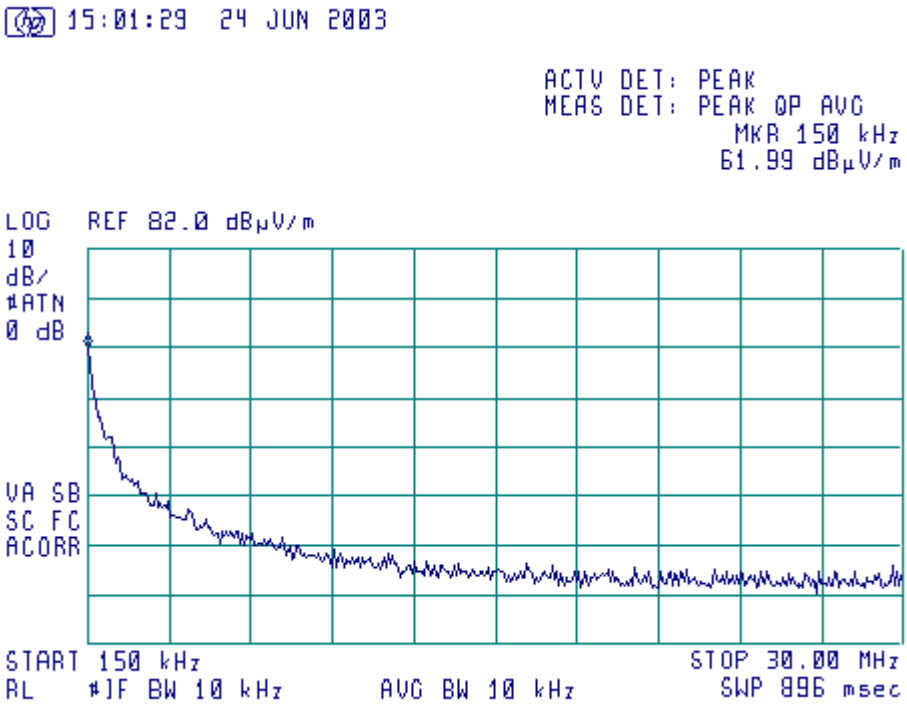
Plot A 91

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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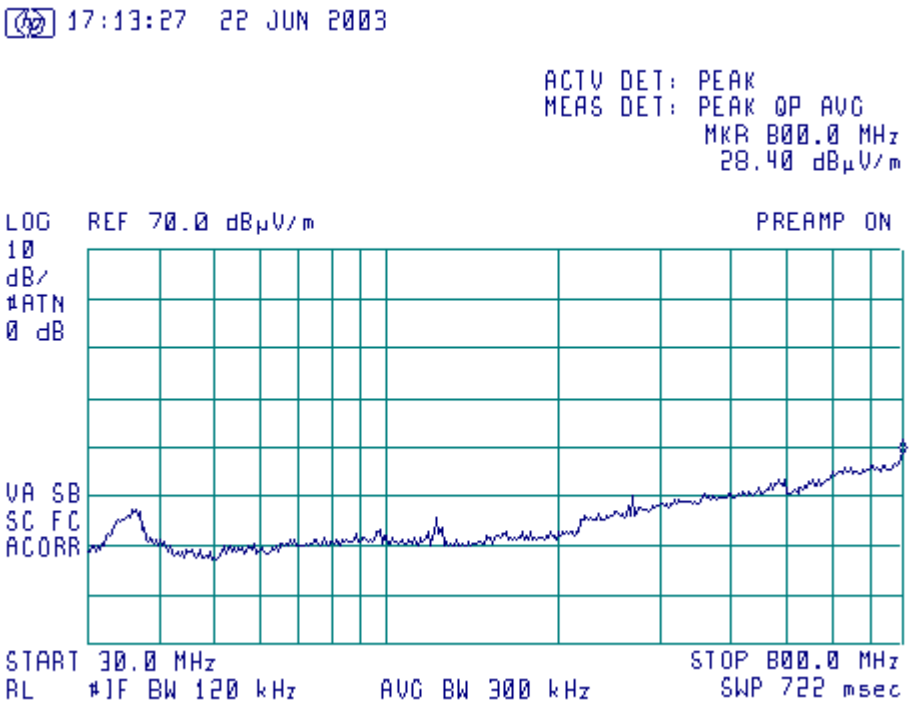
Plot A 92

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 800 MHz, in downlink mode @ minimum input signal (–51.6 dBm))

VERTICAL AND HORIZONTAL POLARIZATION



No spurious emissions were found

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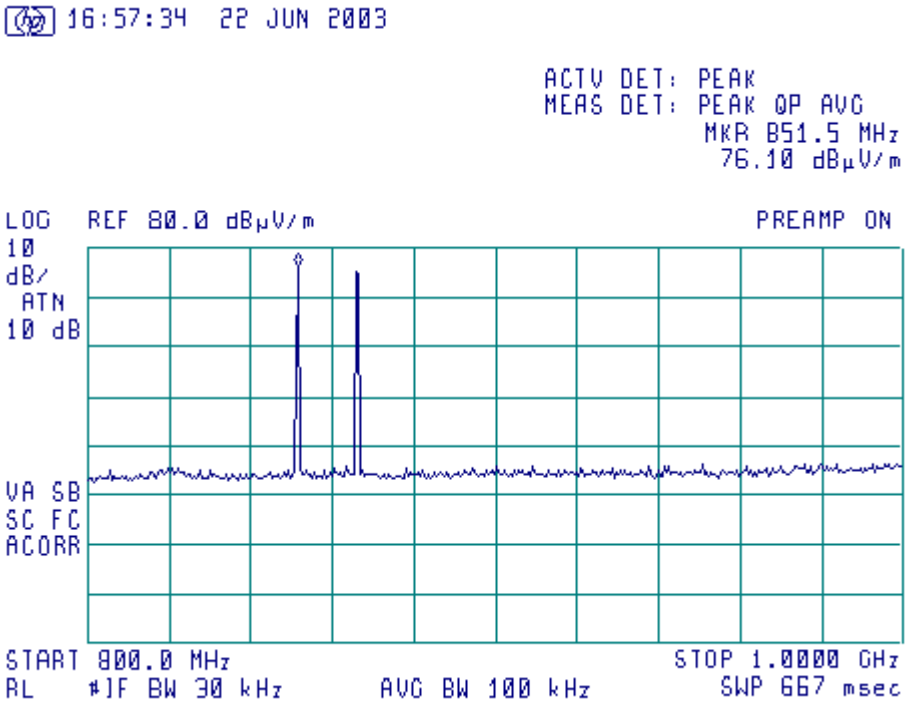
Plot A 93

Radiated spurious emission measurements in the anechoic chamber from 800 MHz to 1000 MHz, in downlink mode @ minimum input signal (–51.6 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



No spurious emissions were found

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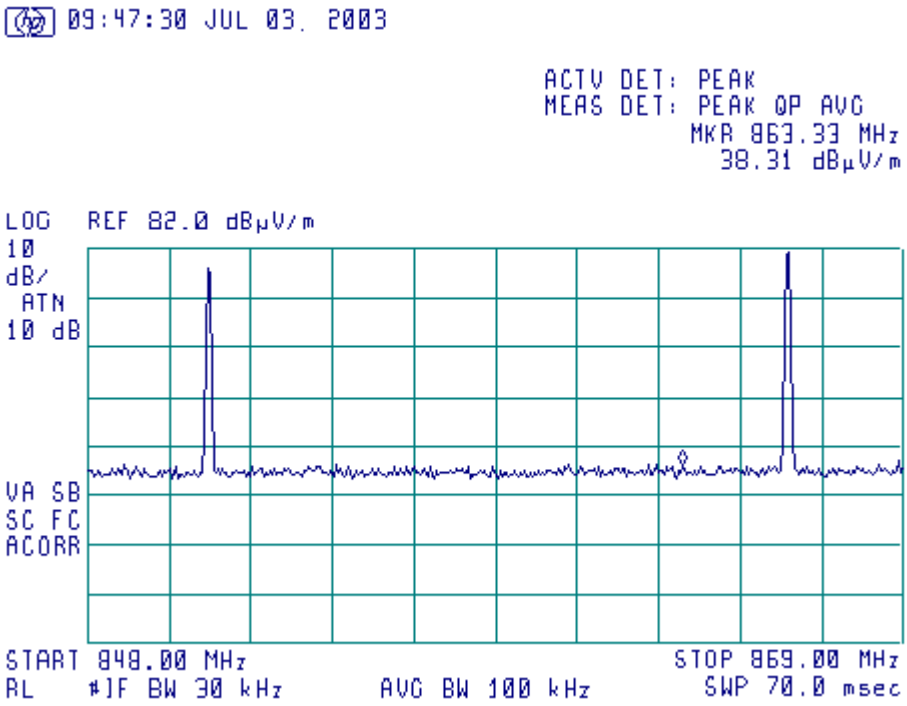
Plot A 94

Radiated spurious emission measurements in the anechoic chamber from 848.00 MHz to 869.00 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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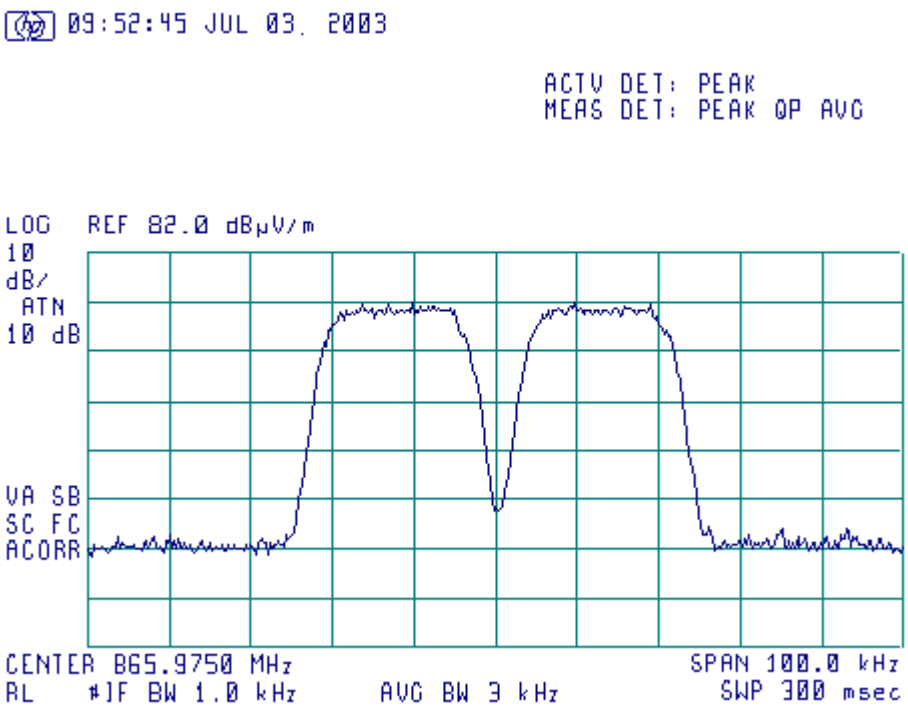
Plot A 95

Radiated spurious emission measurements in the anechoic chamber at 865.9750 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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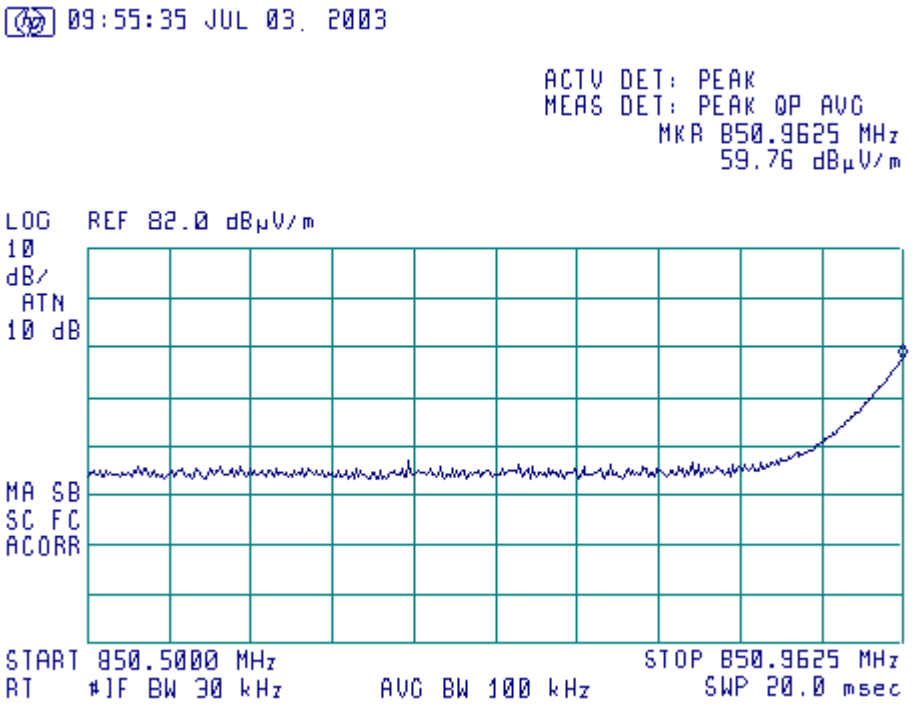
Plot A 96

Radiated spurious emission measurements in the anechoic chamber from 850.5000 MHz to 850.9625 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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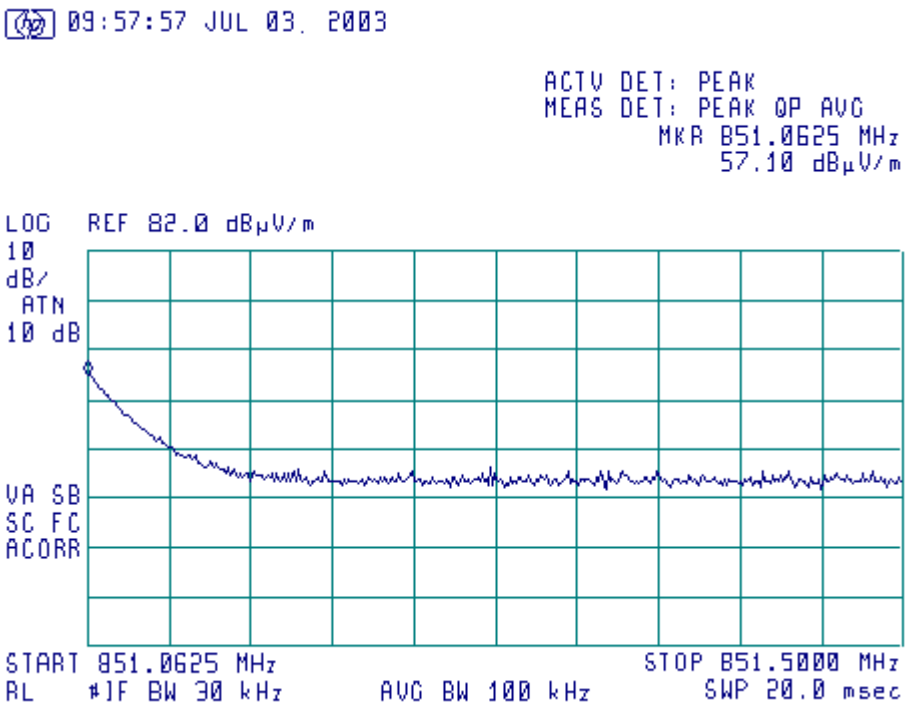
Plot A 97

Radiated spurious emission measurements in the anechoic chamber from 851.0625 MHz to 851.5000 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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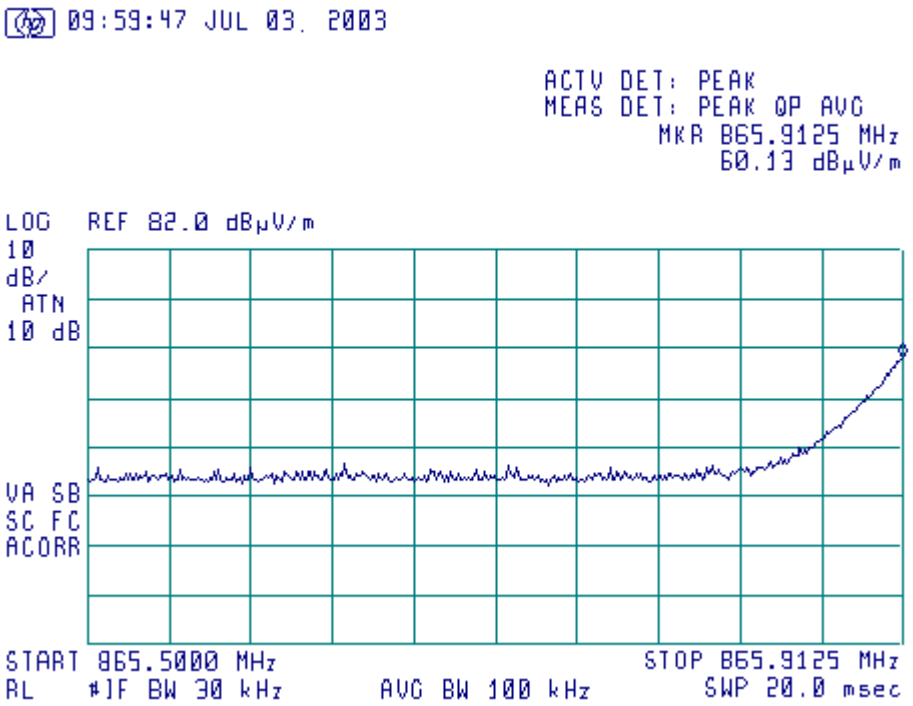
Plot A 98

Radiated spurious emission measurements in the anechoic chamber from 865.5000 MHz to 865.9125 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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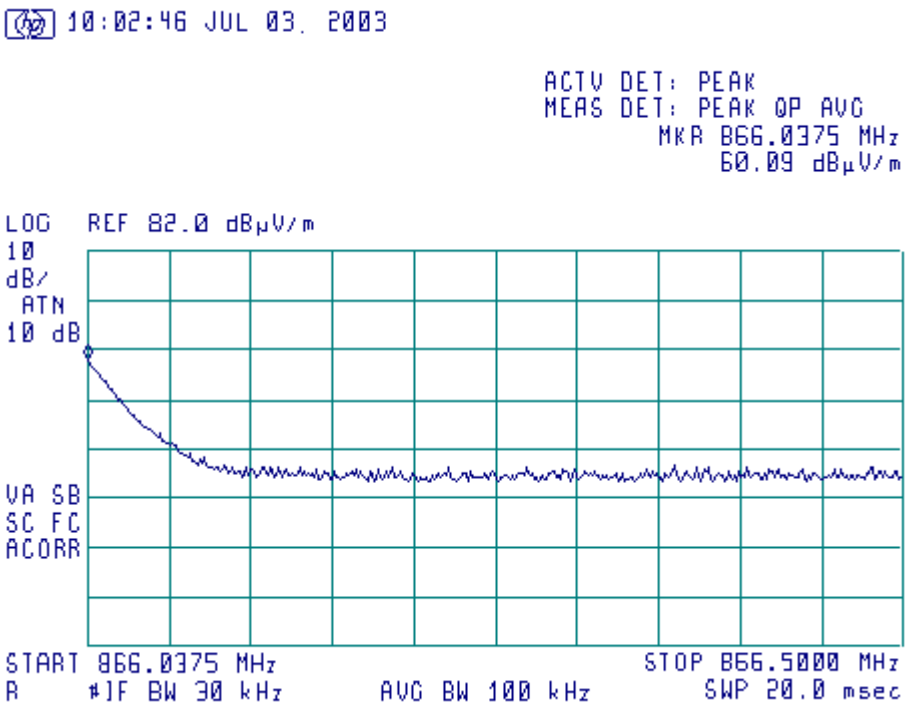
Plot A 99

Radiated spurious emission measurements in the anechoic chamber from 866.0375 MHz to 866.5000 MHz, in downlink mode @ minimum input signal (–51.6 dBm)



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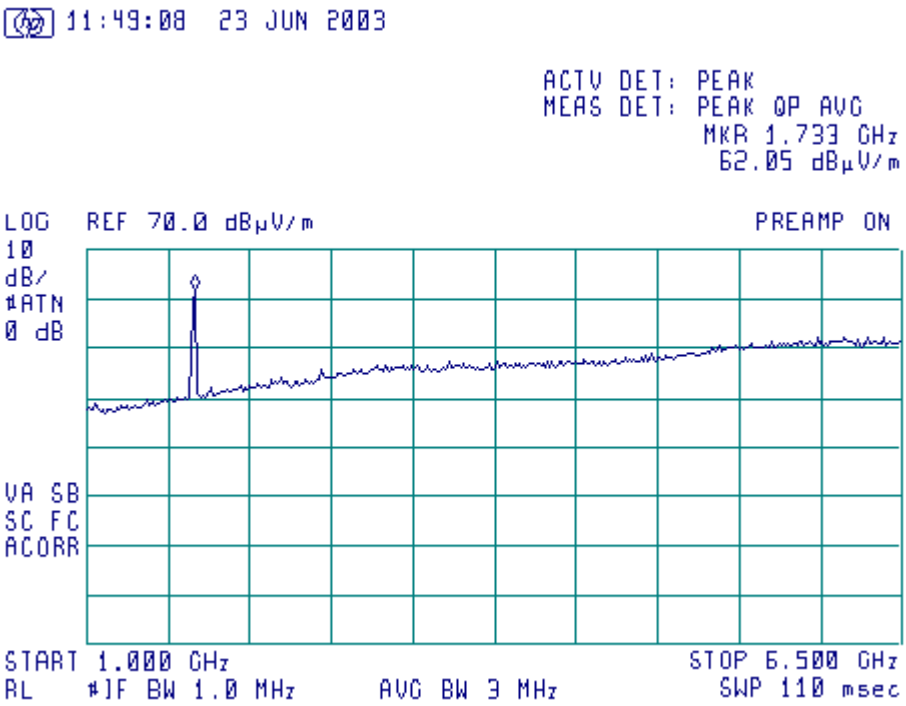
Plot A 100

Radiated spurious emission measurements in the anechoic chamber from 1.000 GHz to 6.500 GHz, in downlink mode @ minimum input signal (–51.6 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



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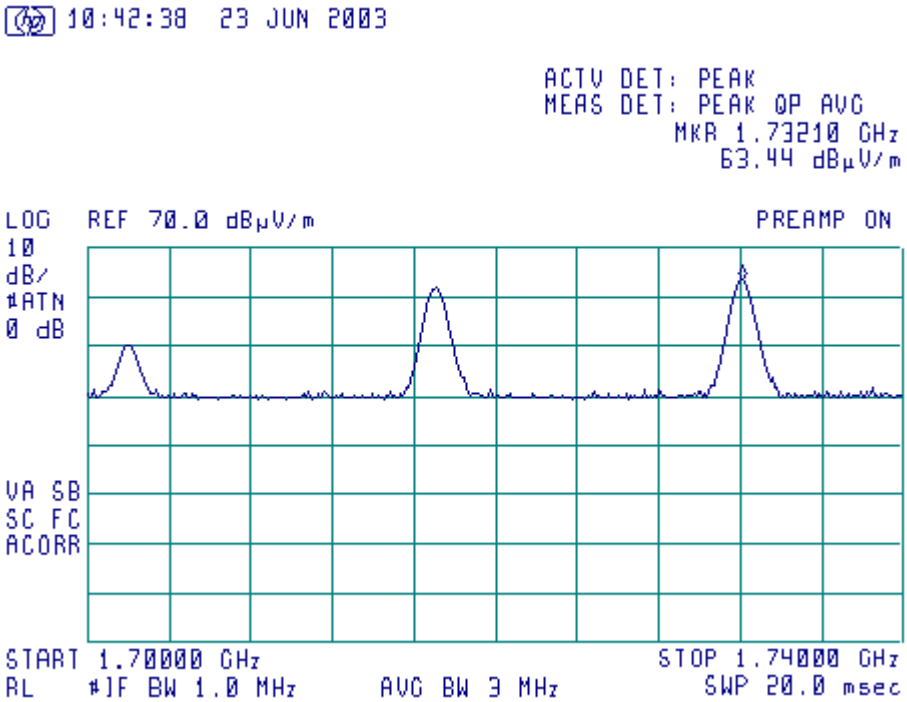
Plot A 101

Radiated spurious emission measurements in the anechoic chamber from 1.7000 GHz to 1.7400 GHz, in downlink mode @ minimum input signal (–51.6 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



Frequency, MHz	Peak measurement, dB(uV/m	Antenna polarization	Generator output power, dBm	Cable loss, dB	Antenna gain, dBd	ERP, dBm
1716.972500	63.57	Vertical	-36.7	1.8+0.7	4.9	-34.3
1731.942500	63.71	Vertical	-35.9	1.8+0.7	4.9	-33.5

Limit=-13 dBm (Att.=43+10log(P))
Attenuation below the carrier should be calculated.
Verdict: PASS

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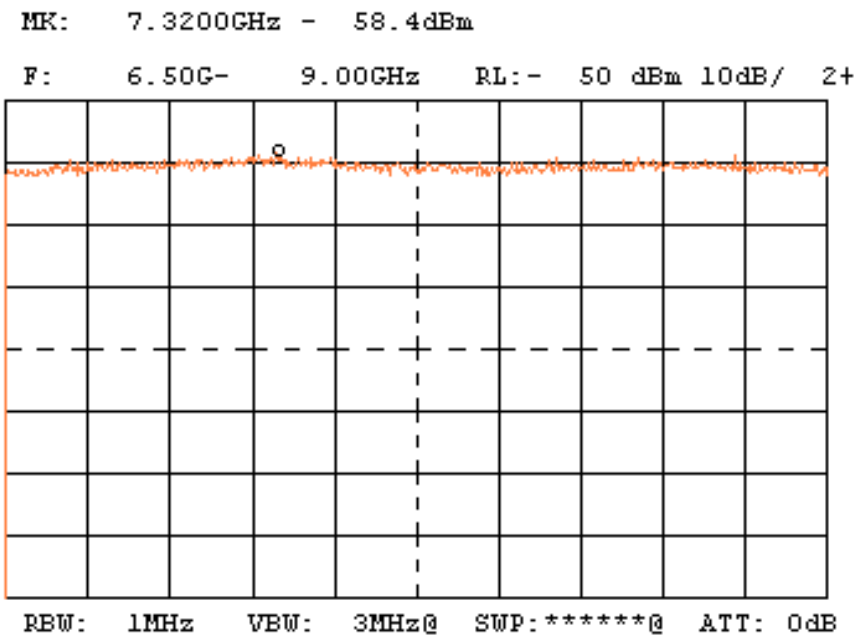
Plot A 102

Radiated spurious emission measurements in the anechoic chamber from 6.50 GHz to 9.00 GHz, in downlink mode @ minimum input signal (–51.6 dBm)



Noise floor:
-58.4 dBm+107 dB+37.2 dB(1/m)(AF)+5.5 dB(CL)-39 dB(LNA)=52.3 dBuV/m
Limit=82.23 dBuV/m
Verdict: PASS

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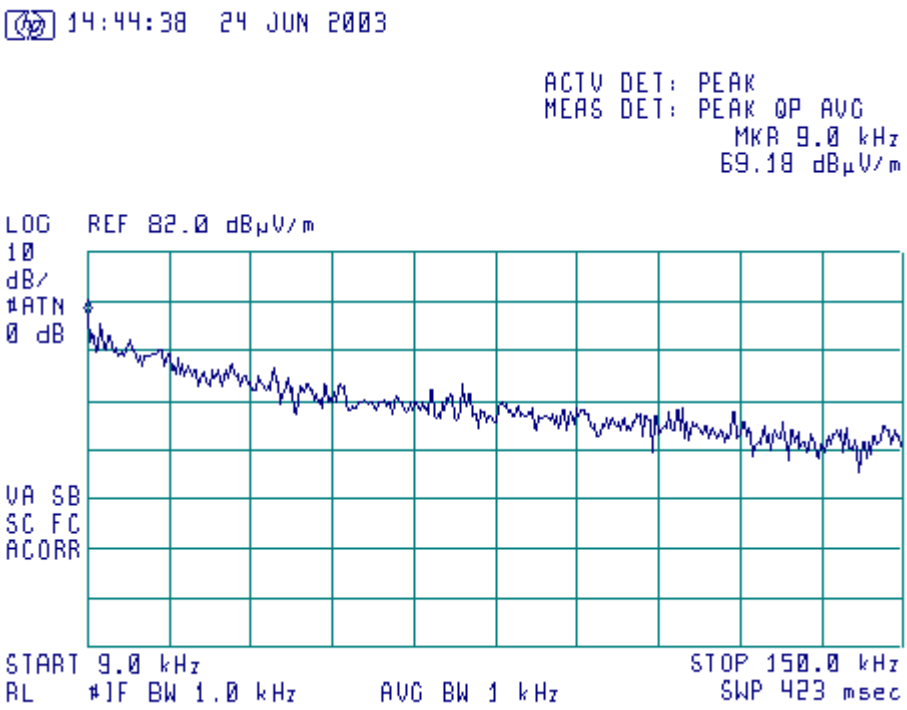
Plot A 103

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in uplink mode @ maximum input signal (–31.8 dBm)



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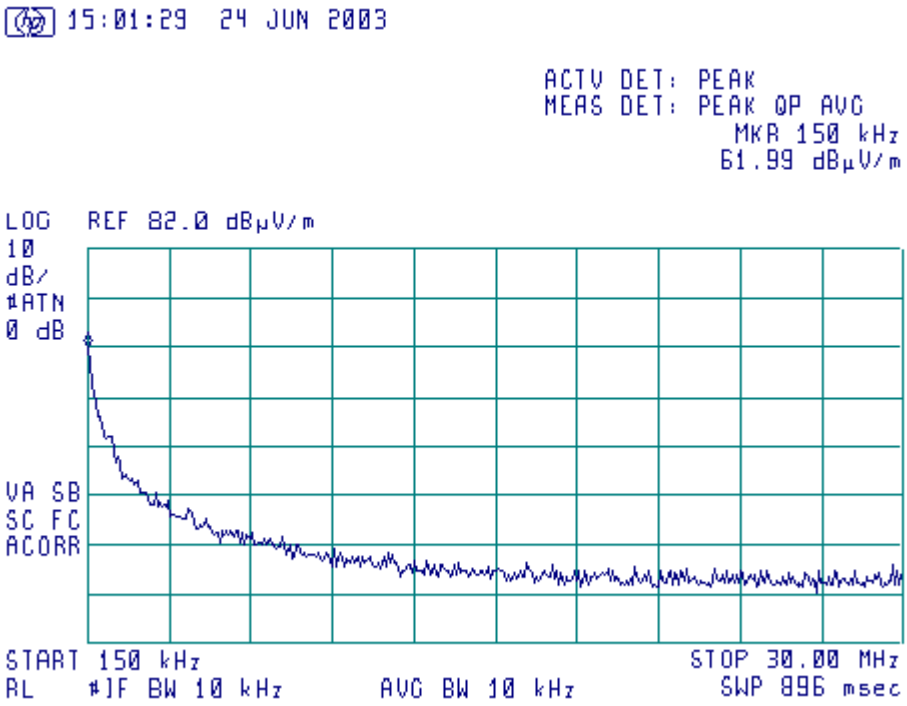
Plot A 104

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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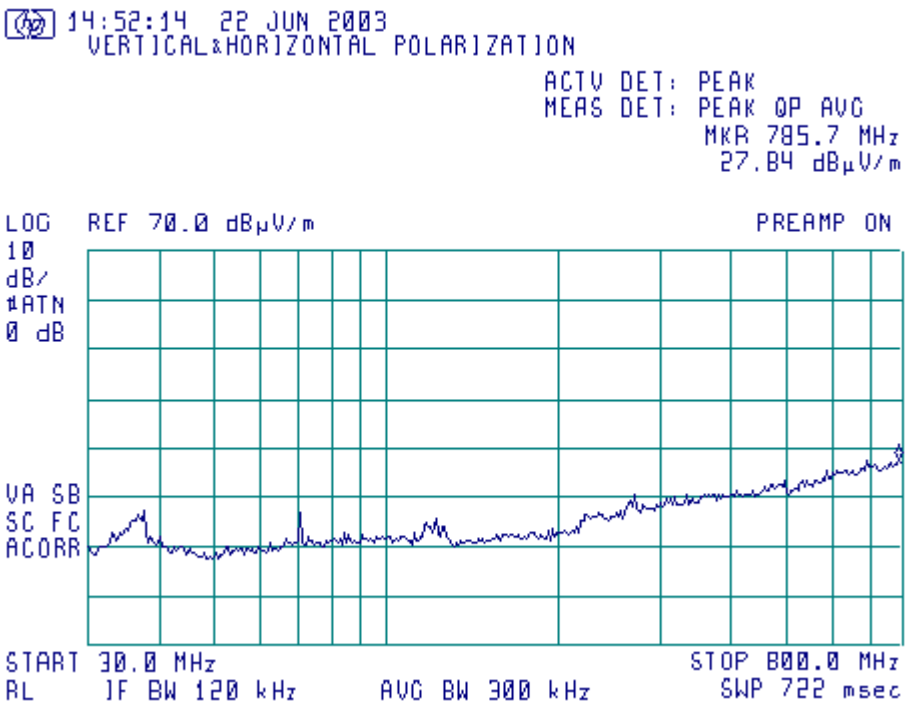
Plot A 105

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 800 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



No spurious emissions were found

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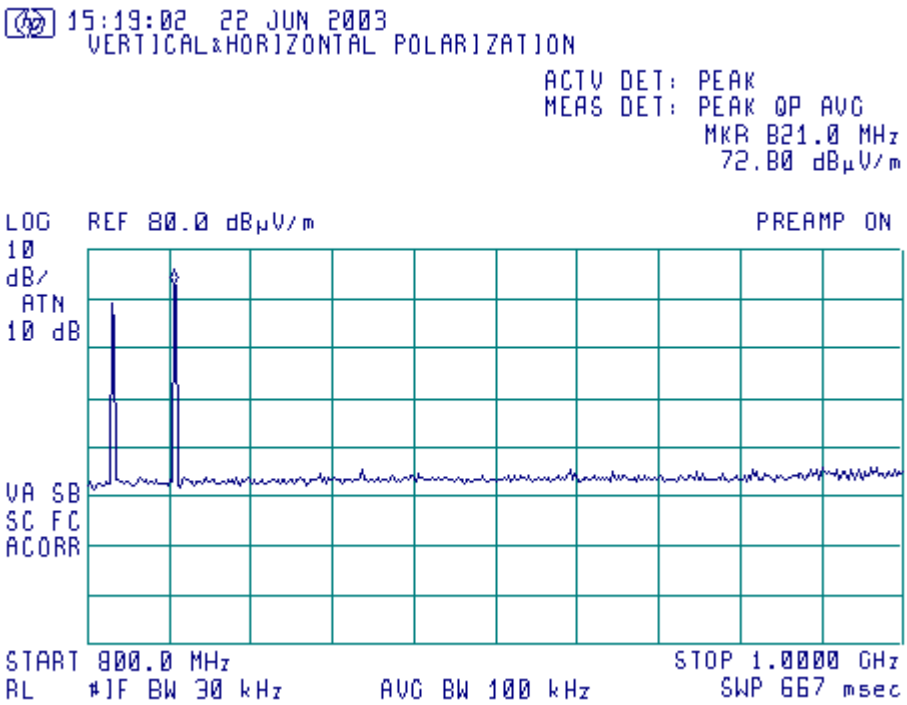
Plot A 106

Radiated spurious emission measurements in the anechoic chamber from 800 MHz to 1000 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



No spurious emissions were found

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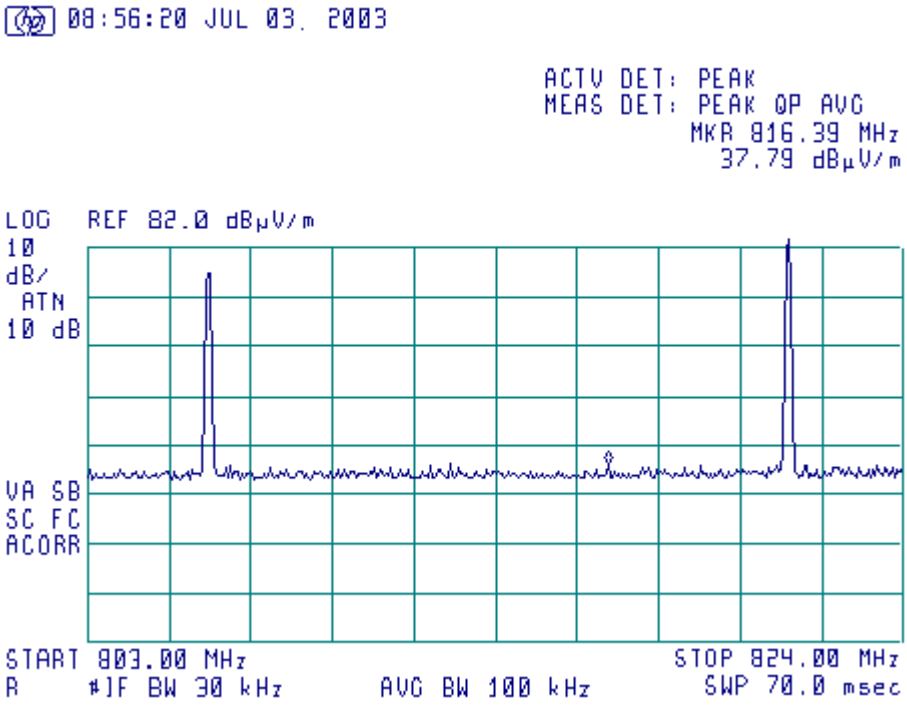
Plot A 107

Radiated spurious emission measurements in the anechoic chamber from 803.00 MHz to 824.00 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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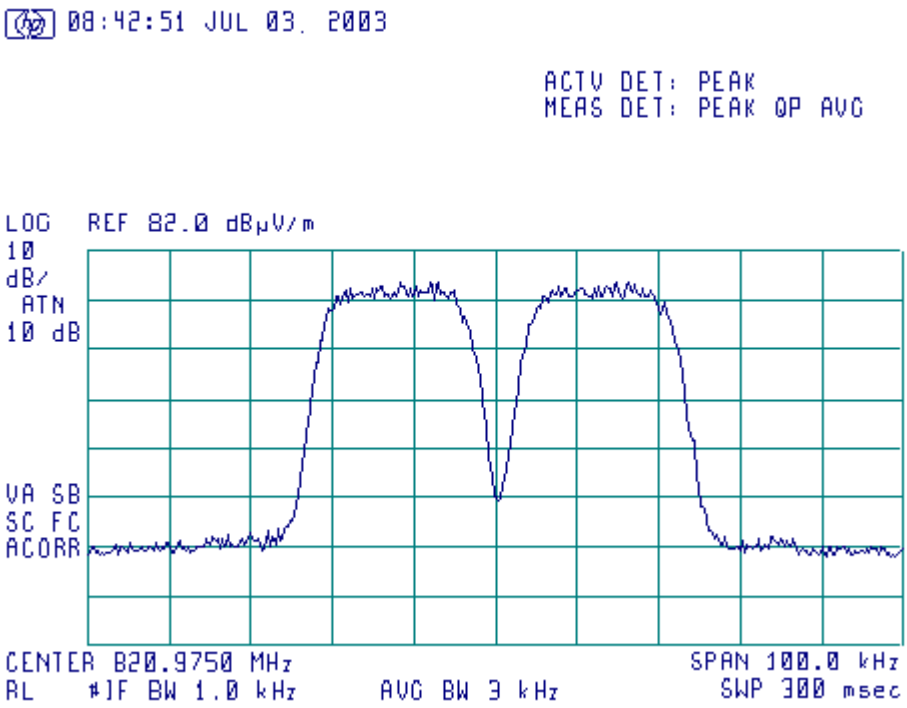
Plot A 108

Radiated spurious emission measurements in the anechoic chamber at 820.9750 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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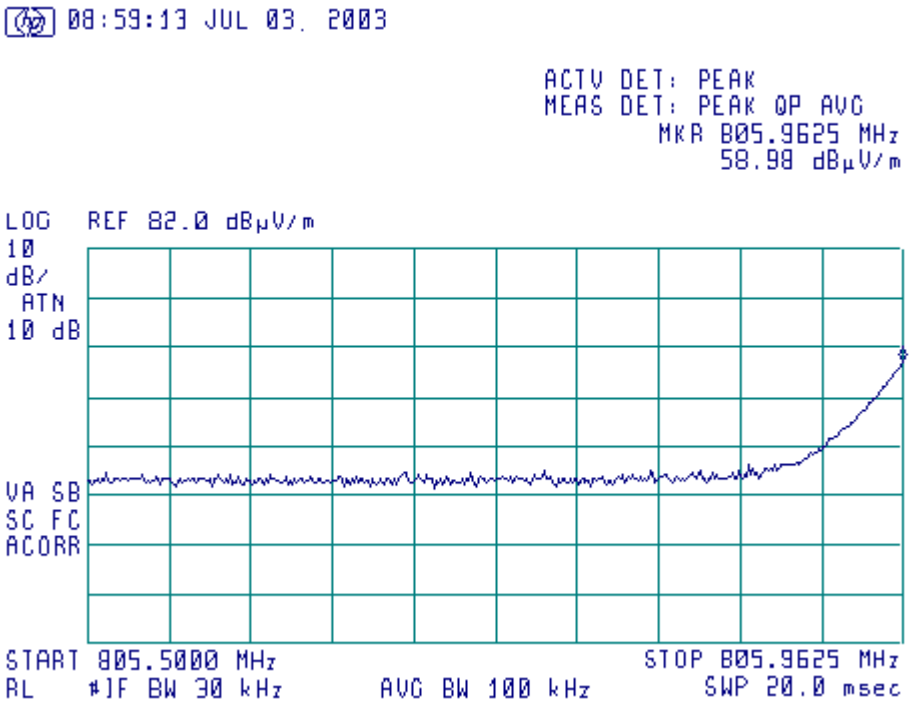
Plot A 109

Radiated spurious emission measurements in the anechoic chamber from 805.5000 MHz to 850.9625 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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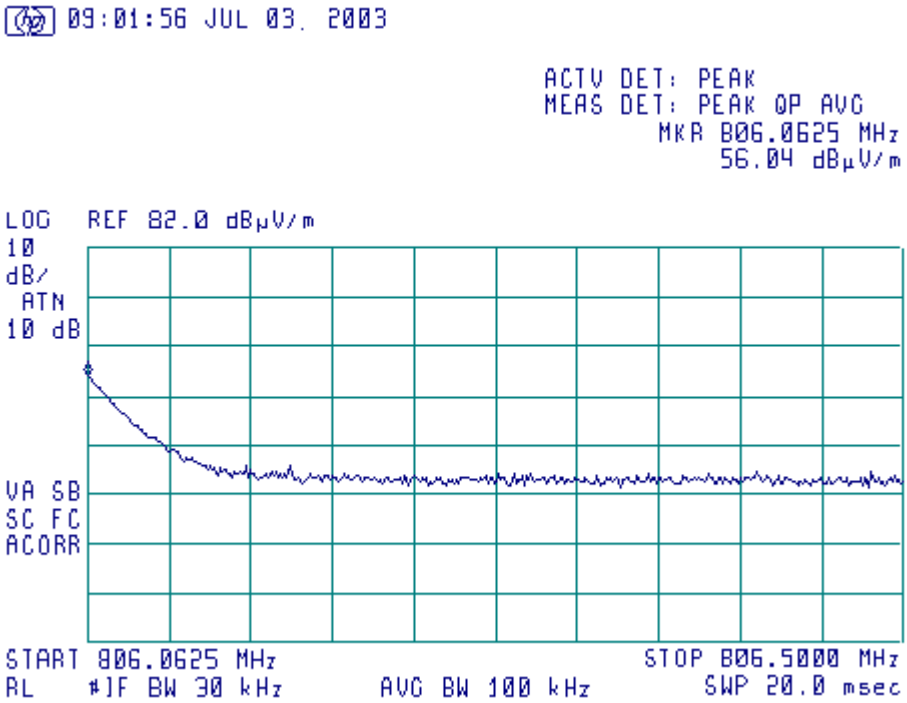
Plot A 110

Radiated spurious emission measurements in the anechoic chamber from 806.0625 MHz to 806.5000 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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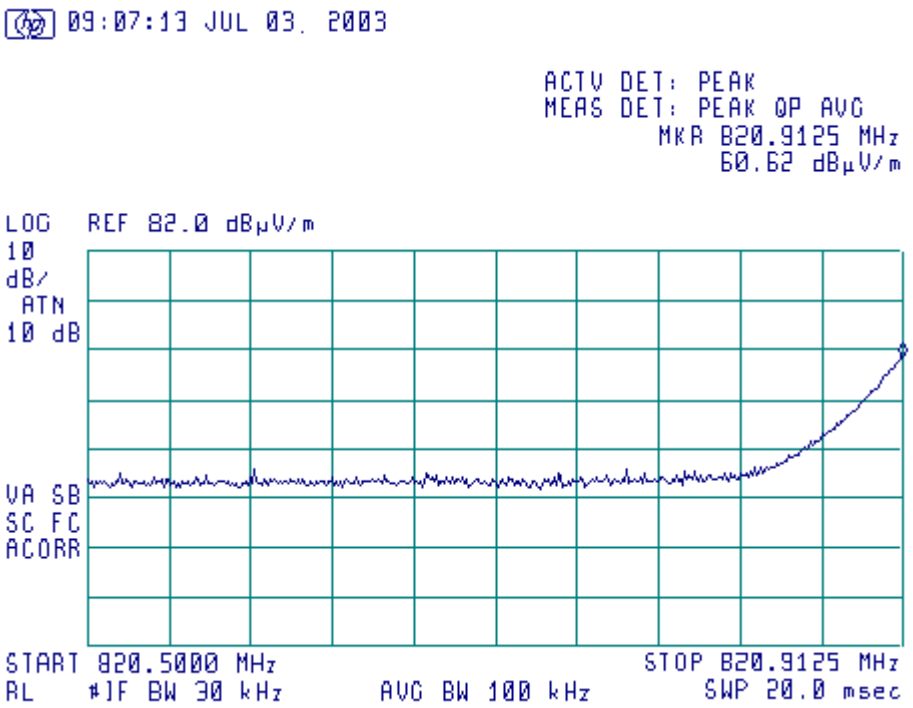
Plot A 111

Radiated spurious emission measurements in the anechoic chamber from 820.5000 MHz to 820.9125 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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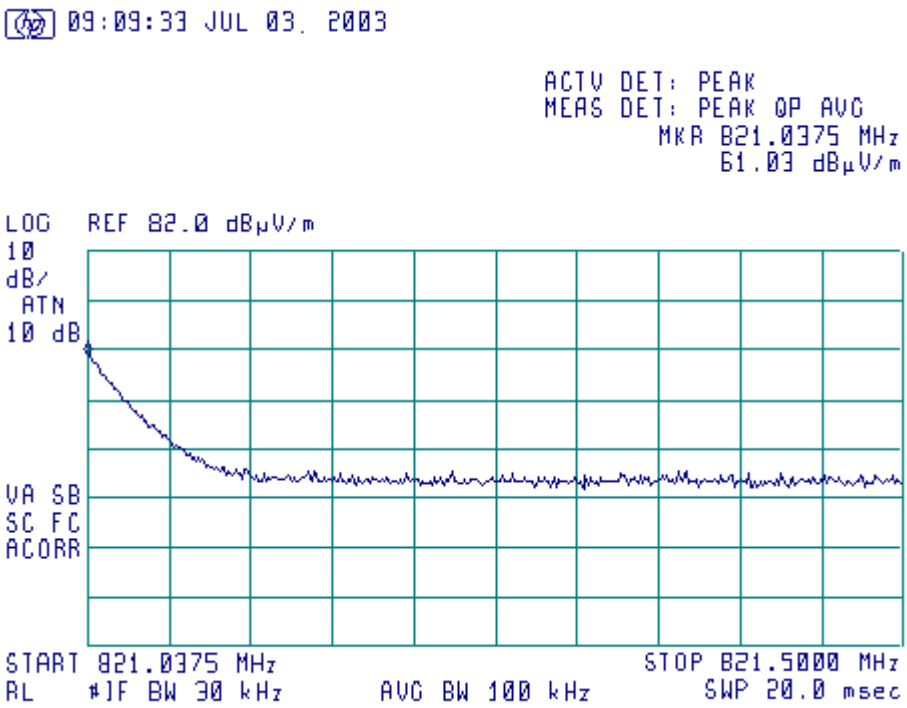
Plot A 112

Radiated spurious emission measurements in the anechoic chamber from 821.0375 MHz to 821.5000 MHz, in uplink mode @ maximum input signal (–31.8 dBm)



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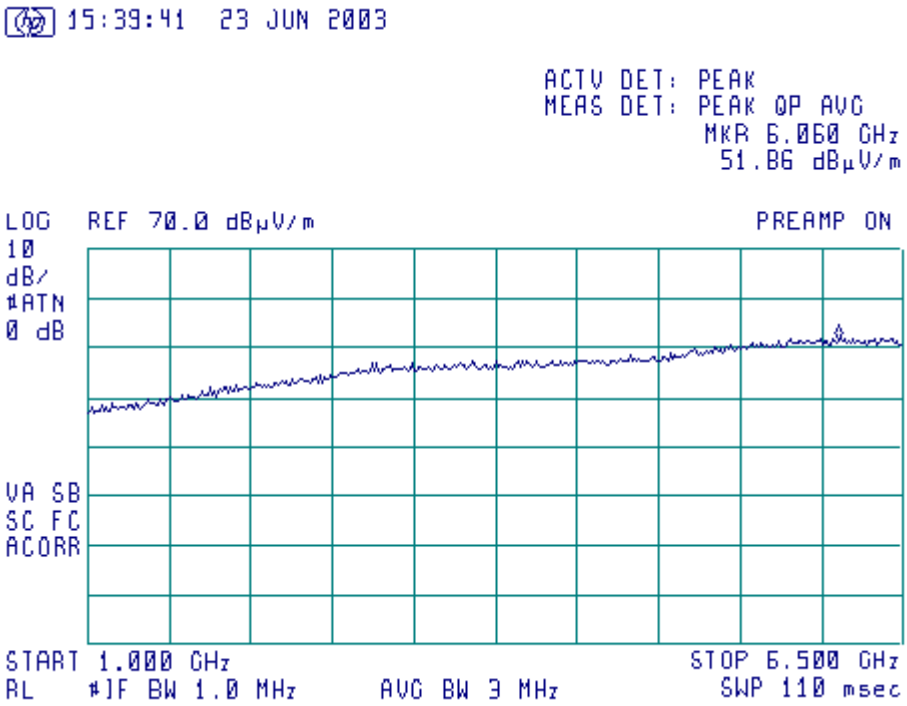
Plot A 113

Radiated spurious emission measurements in the anechoic chamber from 1.000 GHz to 6.500 GHz, in uplink mode @ maximum input signal (–31.8 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



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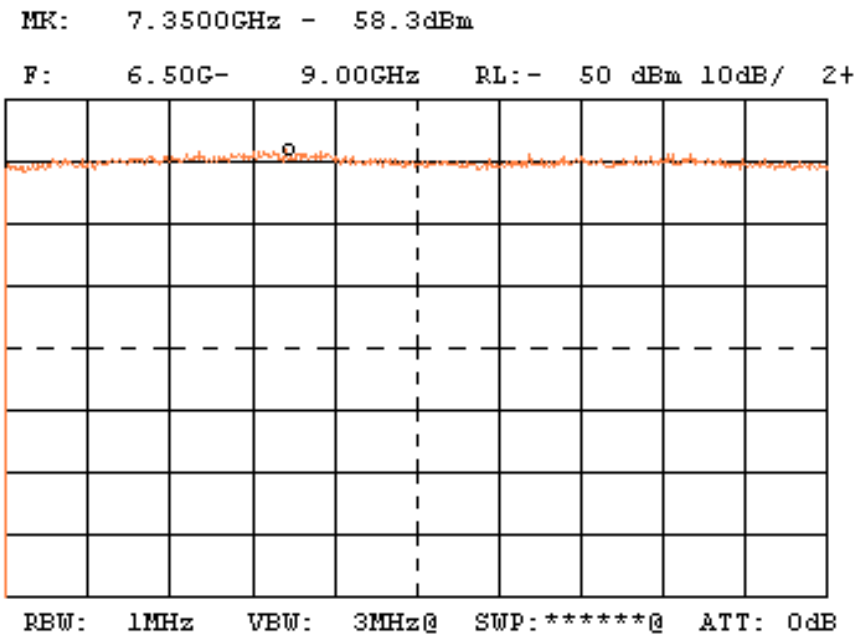
Plot A 114

Radiated spurious emission measurements in the anechoic chamber from 6.50 GHz to 9.00 GHz, in uplink mode @ maximum input signal (–31.8 dBm)



Noise floor:
-58.3 dBm+107 dB+37.3 dB(1/m)(AF)+5.5 dB(CL)-39 dB(LNA)=52.5 dBuV/m
Limit=82.23 dBuV/m
Verdict: PASS

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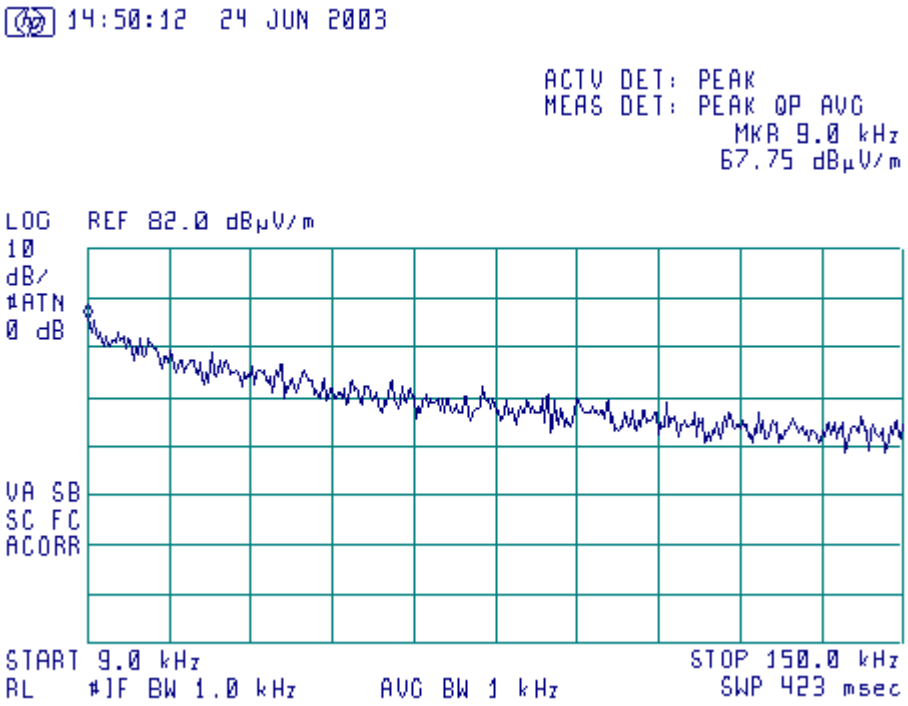
Plot A 115

Radiated spurious emission measurements in the anechoic chamber from 9 kHz to 150 kHz, in uplink mode @ minimum input signal (–60.5 dBm)



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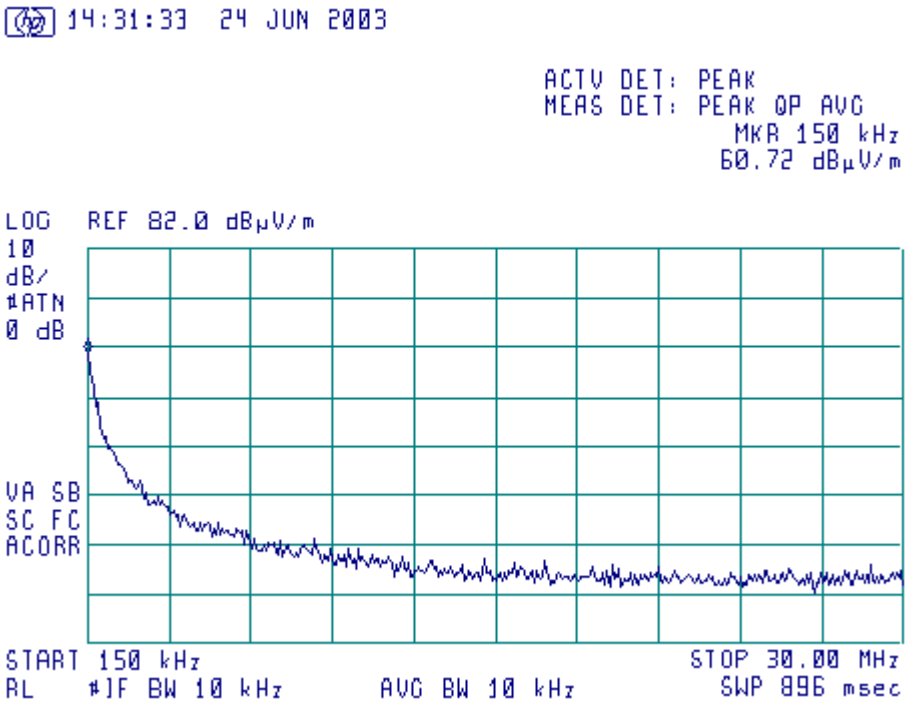
Plot A 116

Radiated spurious emission measurements in the anechoic chamber from 150 kHz to 30 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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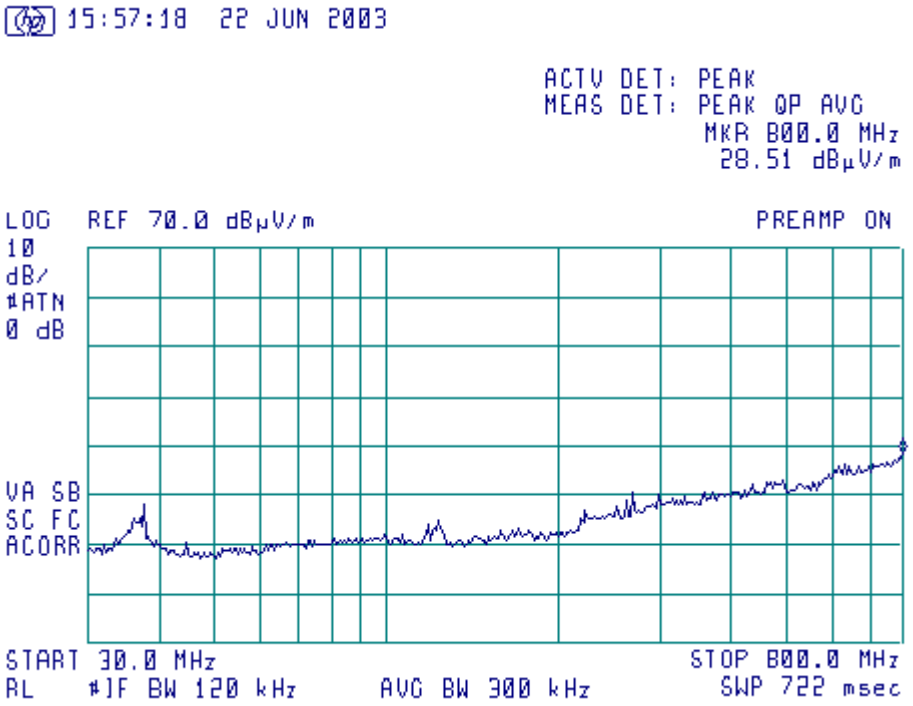
Plot A 117

Radiated spurious emission measurements in the anechoic chamber from 30 MHz to 800 MHz, in uplink mode @ minimum input signal (–60.5 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



No spurious emissions were found

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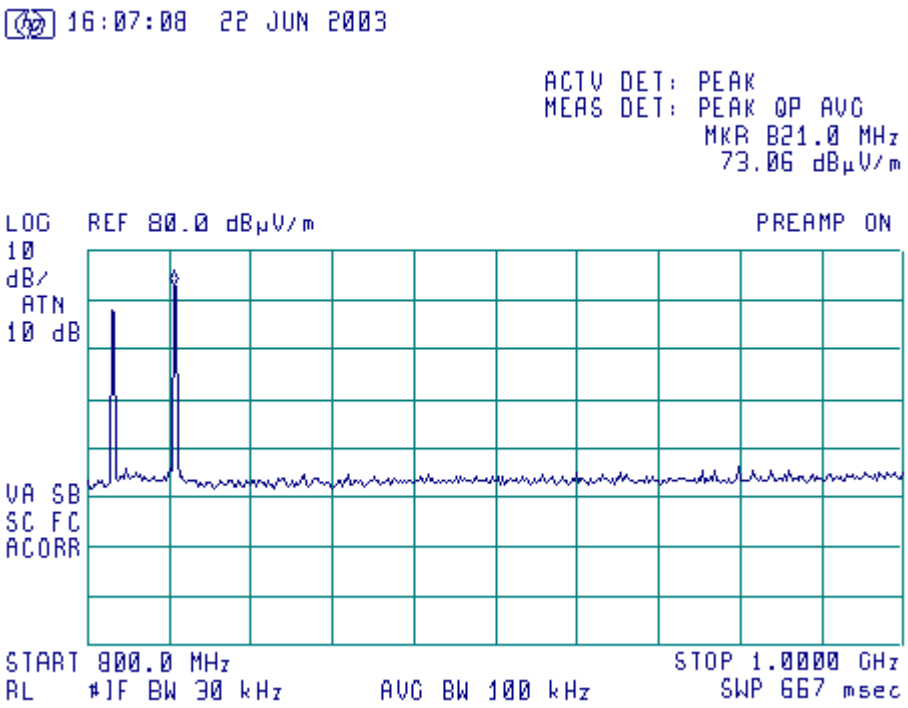
Plot A 118

Radiated spurious emission measurements in the anechoic chamber from 800 MHz to 1000 MHz, in uplink mode @ minimum input signal (–60.5 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



No spurious emissions were found

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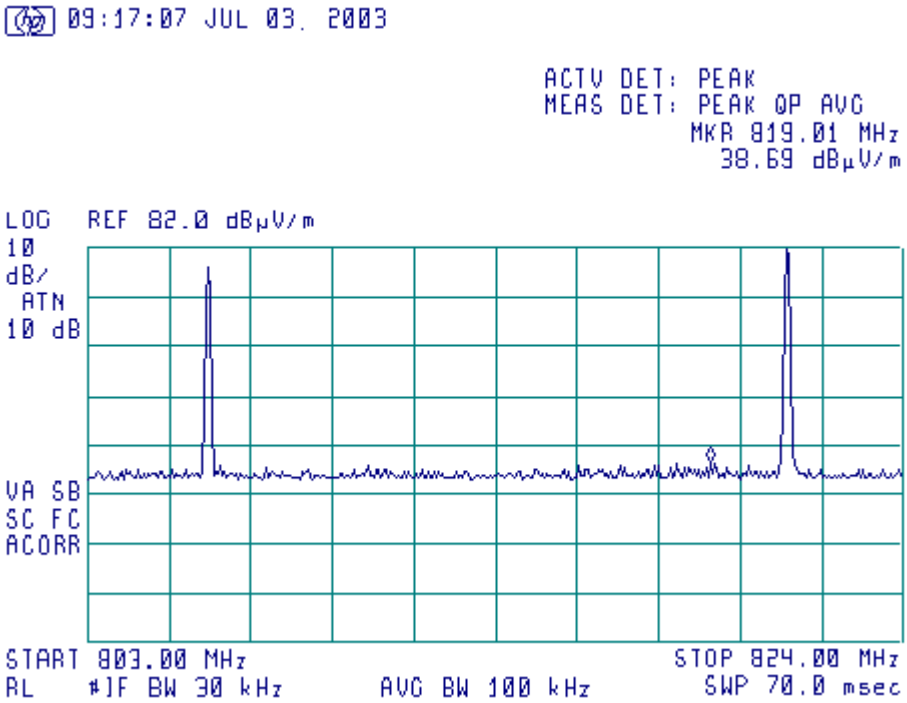
Plot A 119

Radiated spurious emission measurements in the anechoic chamber from 803.00 MHz to 824.00 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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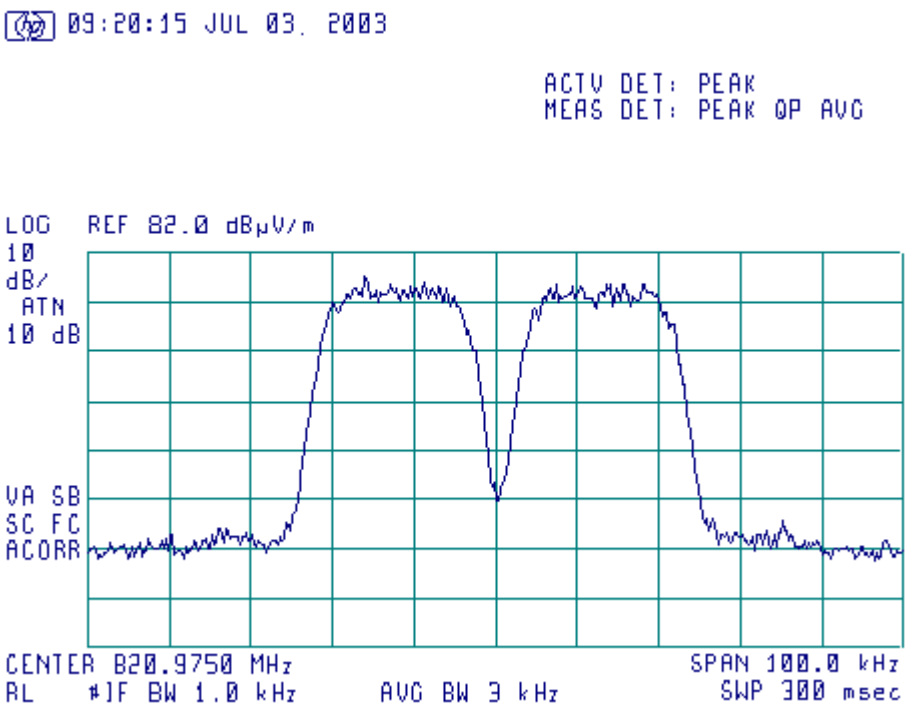
Plot A 120

Radiated spurious emission measurements in the anechoic chamber at 820.9750 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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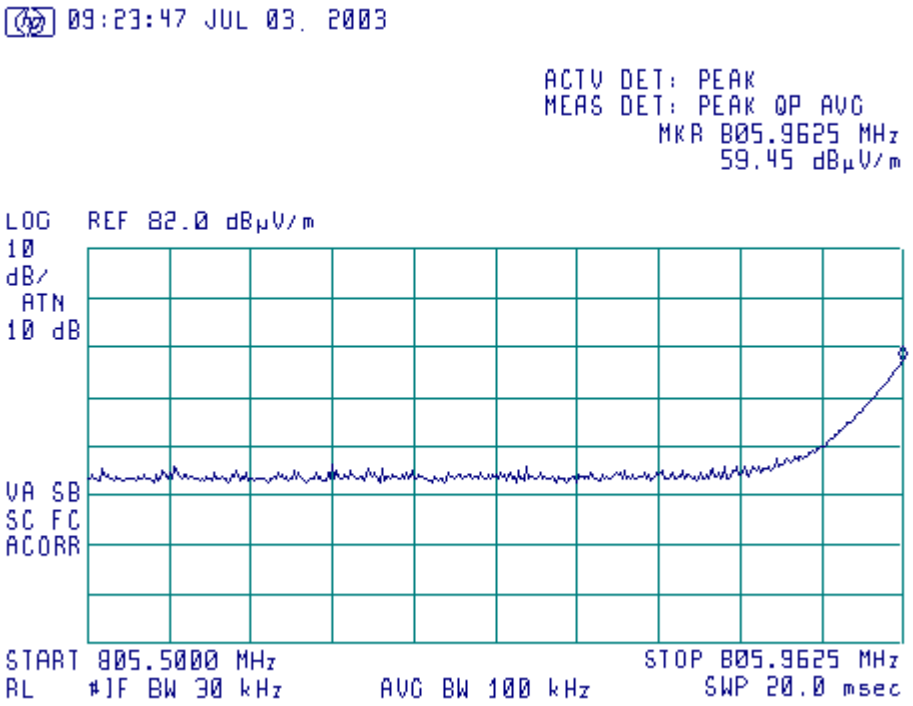
Plot A 121

Radiated spurious emission measurements in the anechoic chamber from 805.5000 MHz to 805.9625 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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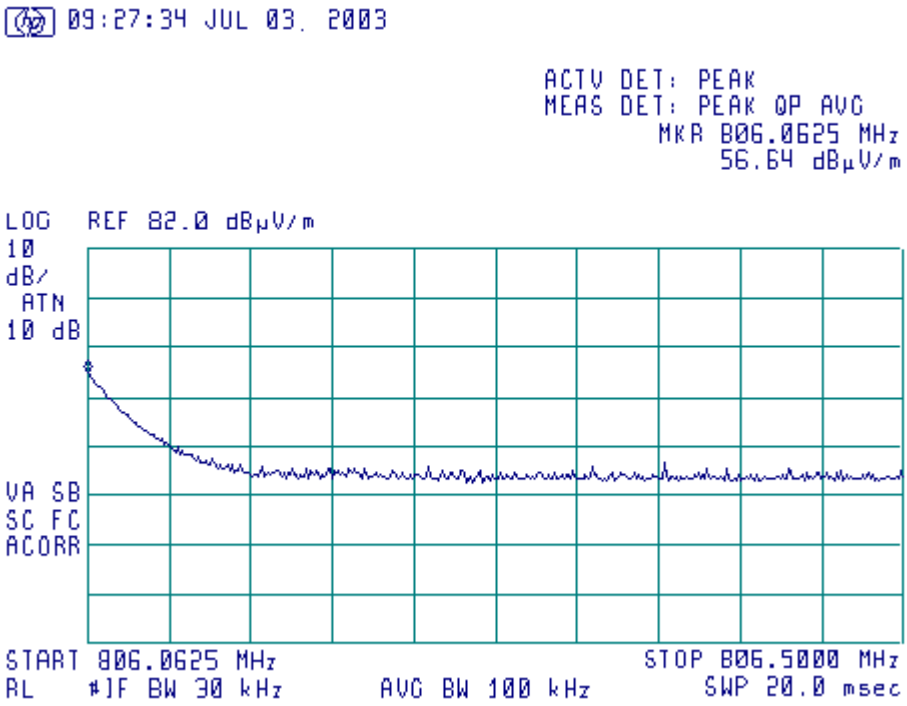
Plot A 122

Radiated spurious emission measurements in the anechoic chamber from 806.0625 MHz to 806.5000 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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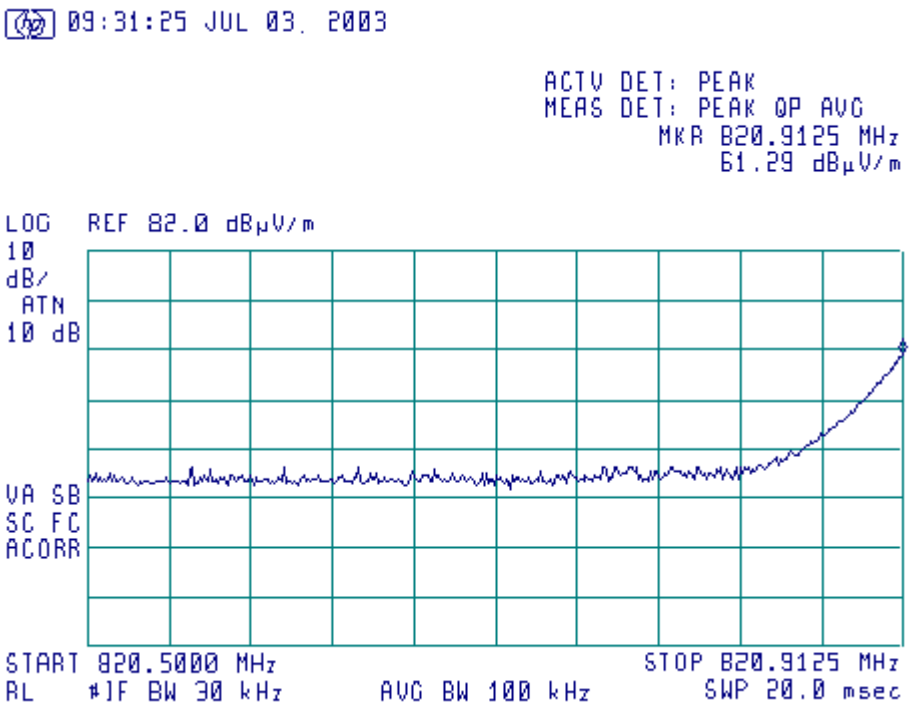
Plot A 123

Radiated spurious emission measurements in the anechoic chamber from 820.5000 MHz to 820.9125 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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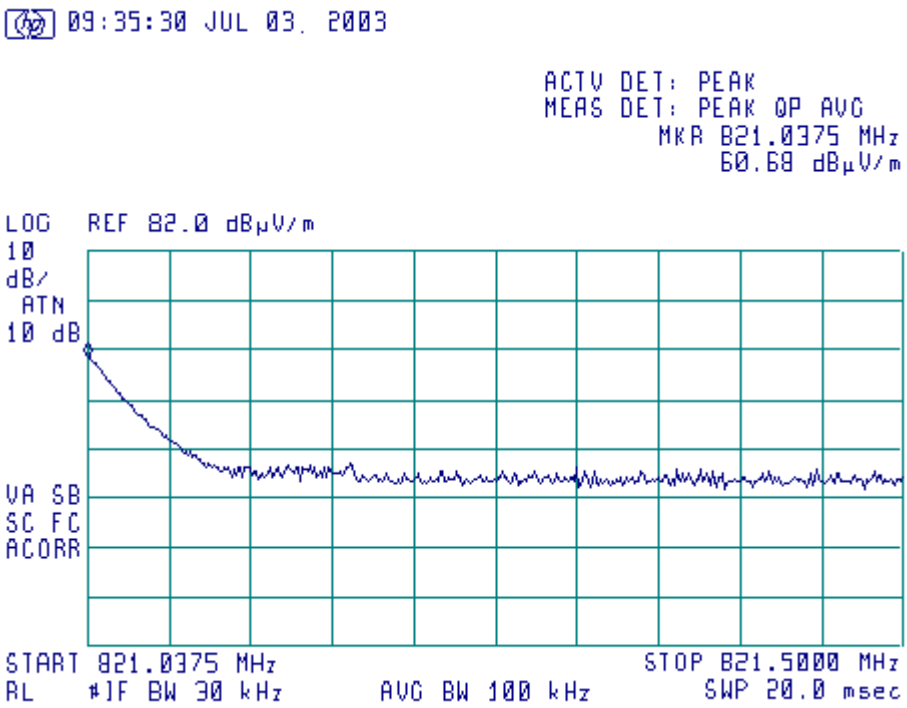
Plot A 124

Radiated spurious emission measurements in the anechoic chamber from 821.0375 MHz to 821.5000 MHz, in uplink mode @ minimum input signal (–60.5 dBm)



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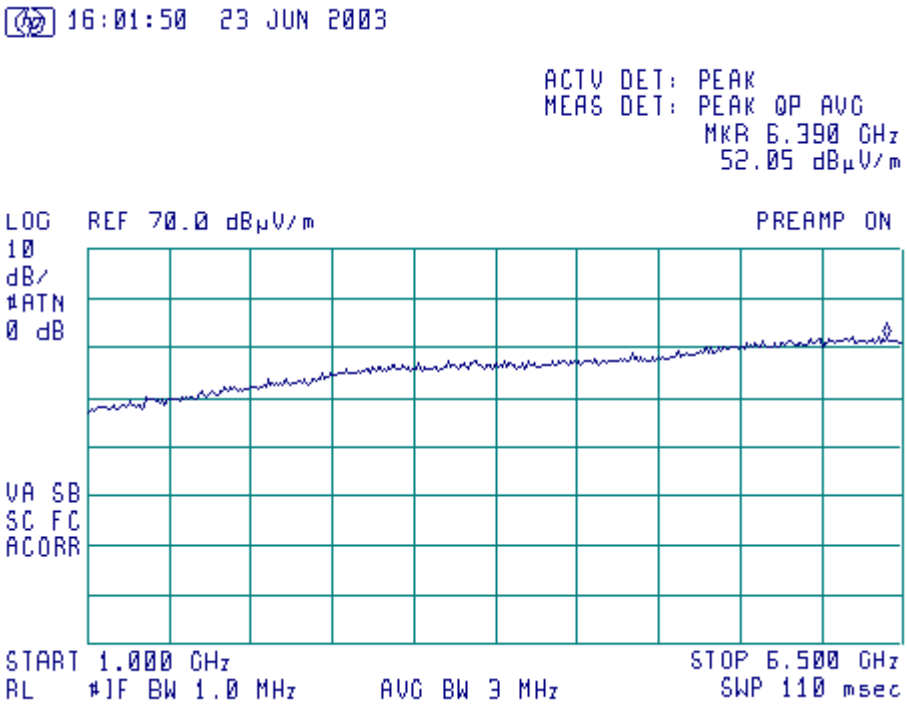
Plot A 125

Radiated spurious emission measurements in the anechoic chamber from 1.000 GHz to 6.500 GHz, in uplink mode @ minimum input signal (–60.5 dBm)

VERTICAL AND HORIZONTAL POLARIZATION



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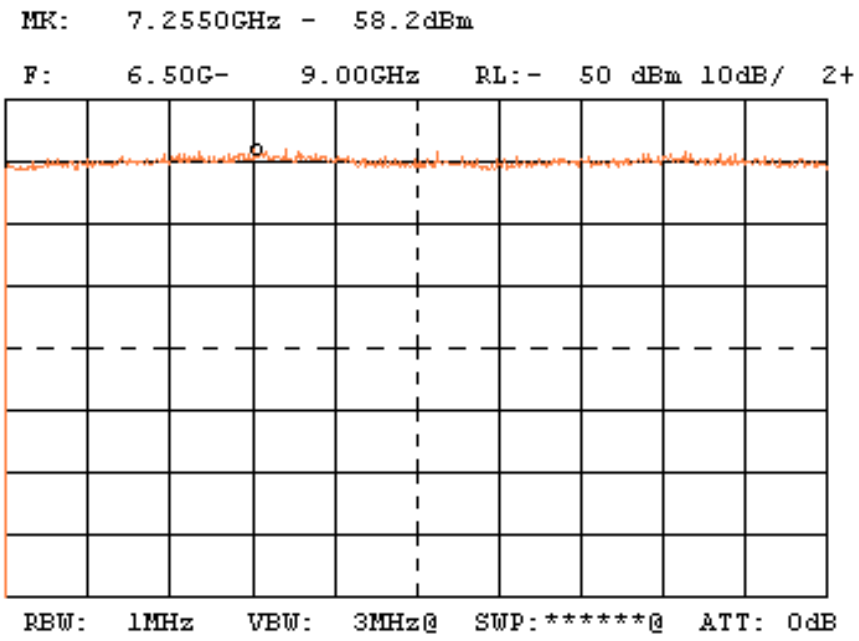
Plot A 126

Radiated spurious emission measurements in the anechoic chamber from 6.50 GHz to 9.00 GHz, in uplink mode @ minimum input signal (–60.5 dBm)



Noise floor:
-58.2 dBm+107 dB+37 dB(1/m)(AF)+5.5 dB(CL)-39 dB(LNA)=52.3 dBuV/m
Limit=82.23 dBuV/m
Verdict: PASS

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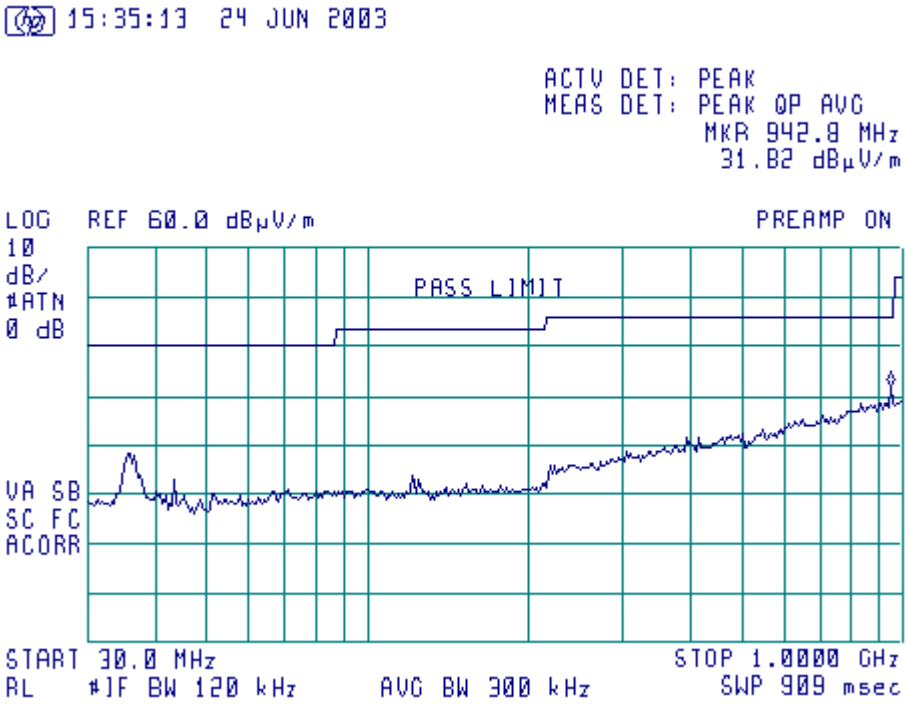
Plot A 127

Radiated emission measurements in the anechoic chamber from 30 MHz to 1 GHz, test distance 3 m, vertical & horizontal antenna polarization



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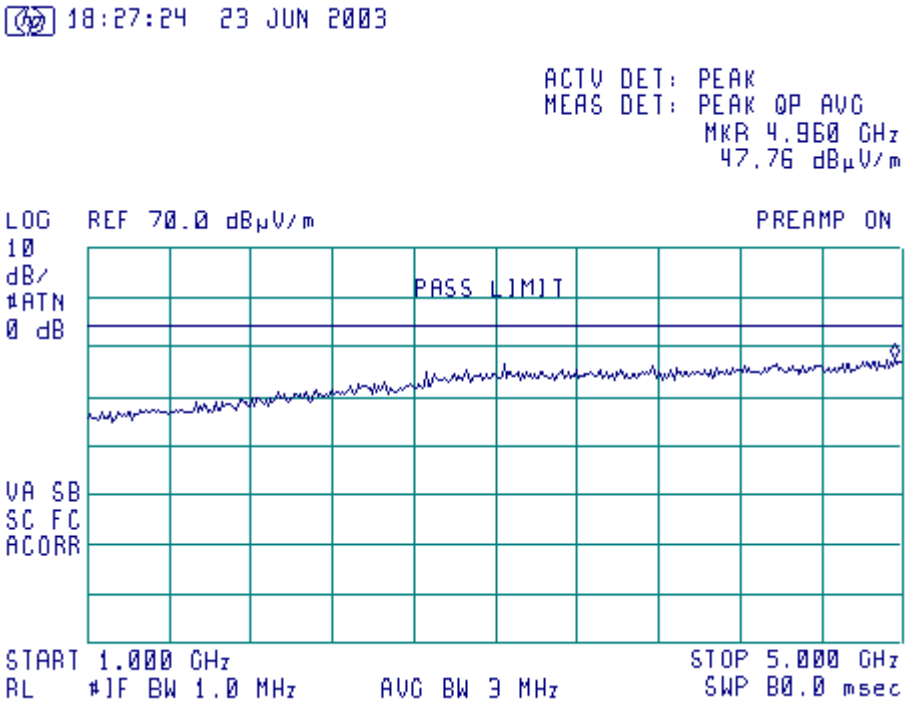
Plot A 128

Radiated emission measurements in the anechoic chamber from 1 to 5 GHz, test distance 3 m, vertical & horizontal antenna polarization



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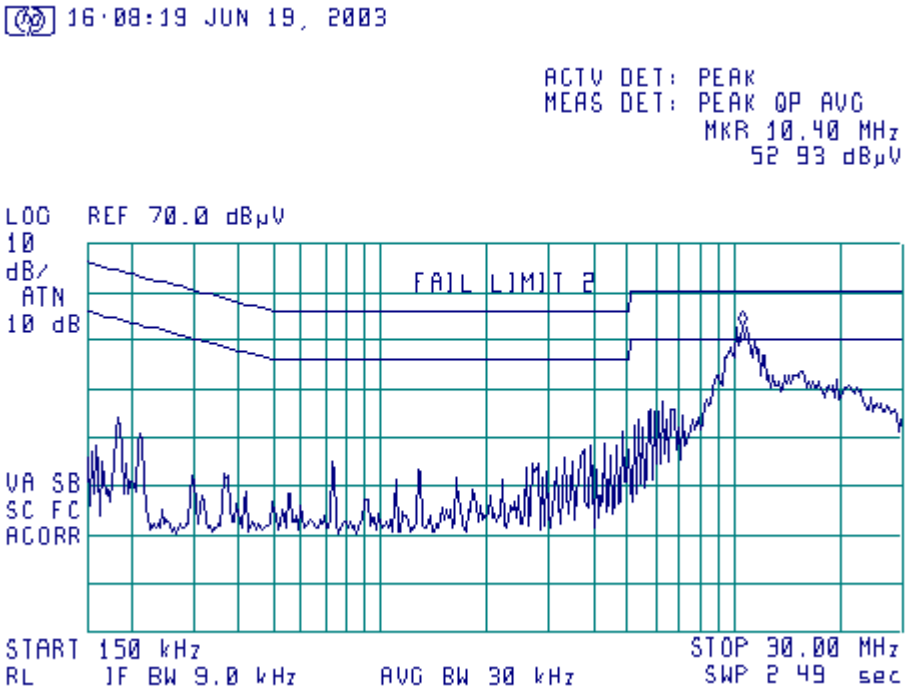
Plot A 129

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



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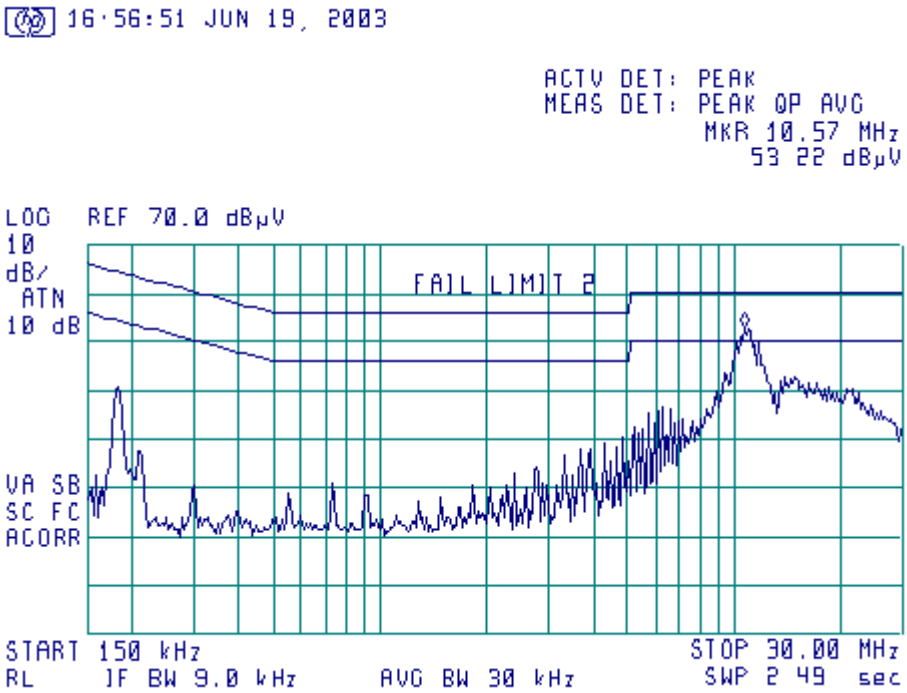
Plot A 130

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



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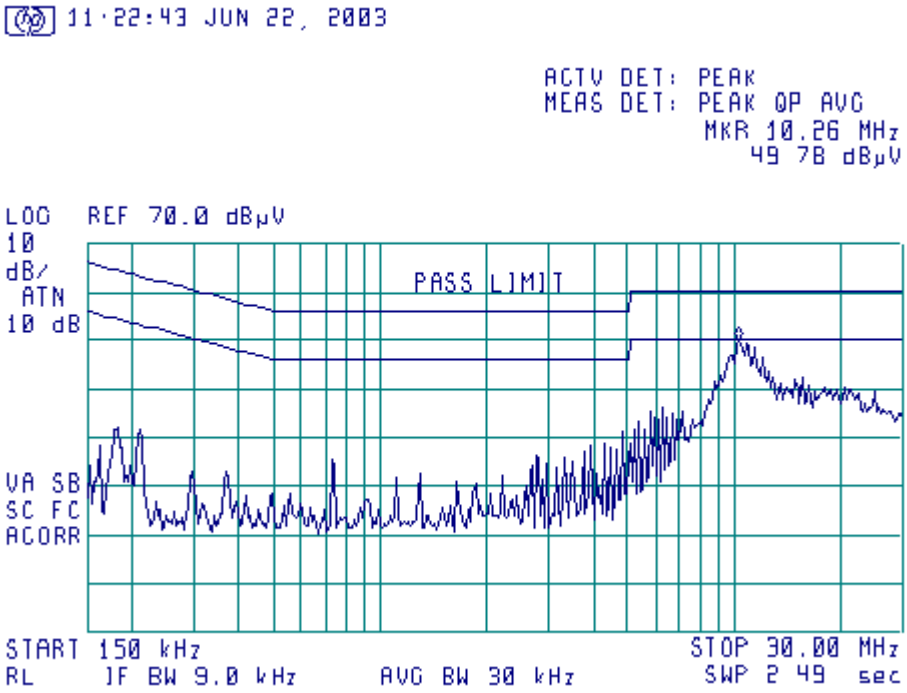
Plot A 131

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



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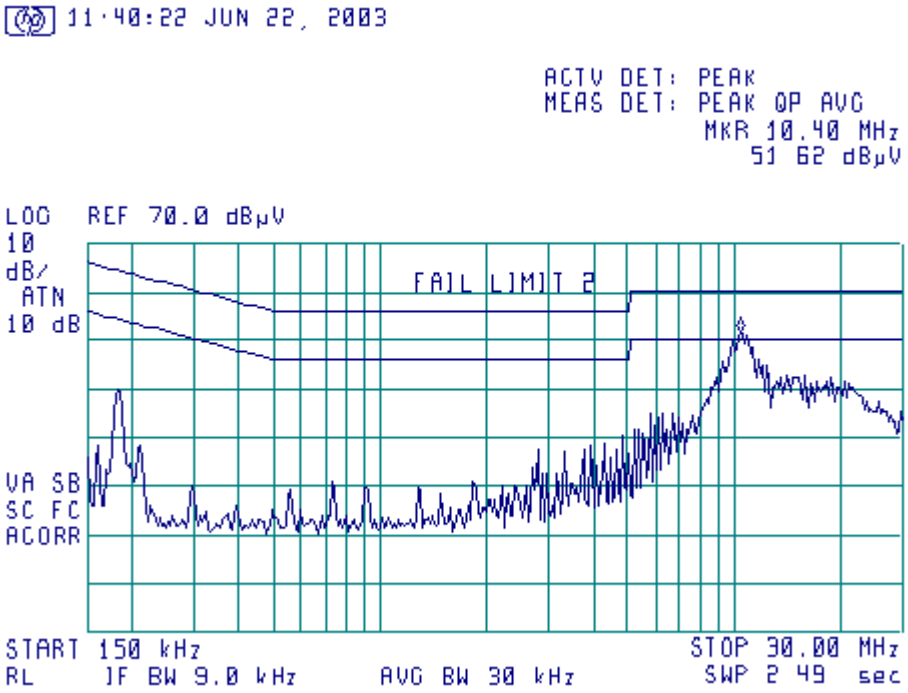
Plot A 132

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



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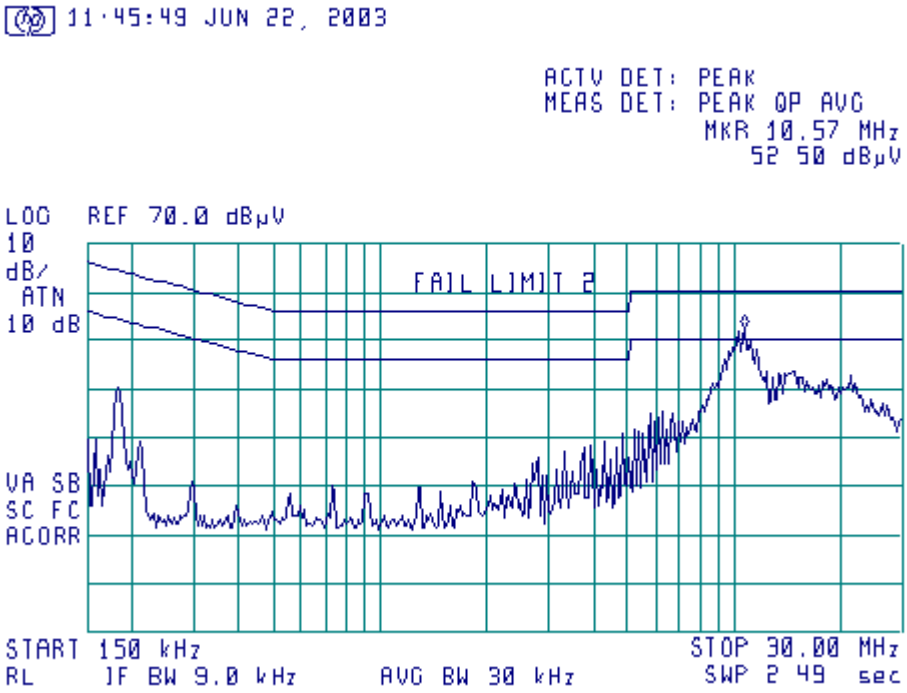
Plot A 133

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



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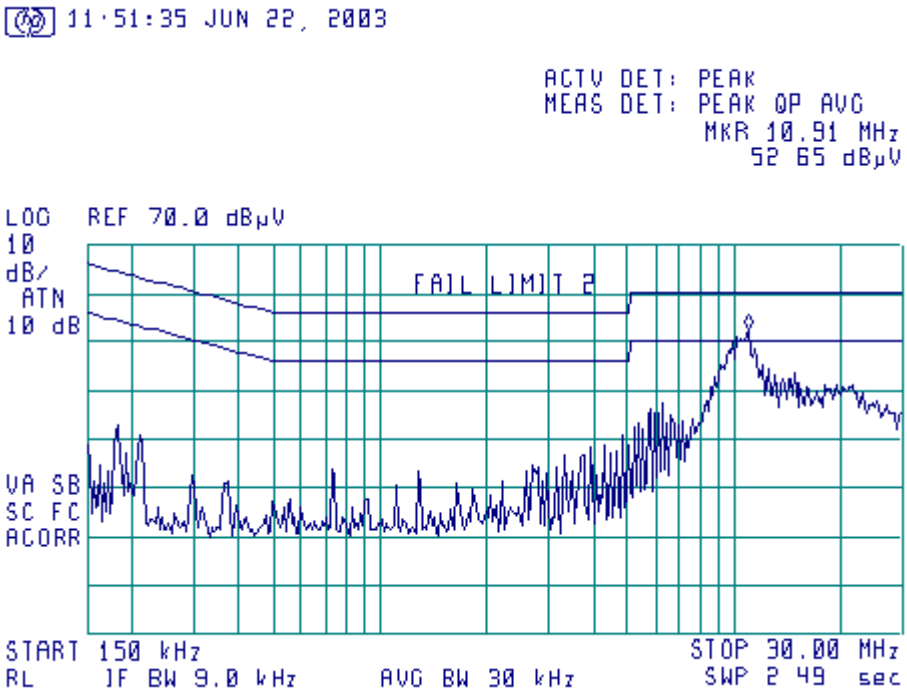
Plot A 134

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.	
0025	Spectrum analyzer, 10 kHz-23 GHz	Anritsu	MS-710C	5837	10/03
0041	Double ridged guide antenna, 1-18 GHz	Electro-Metrics	RGA 50/60	2811	3/04
0053	Attenuator, 50 Ohm, 2W, 0-18 GHz, 10 dB	Hewlett Packard	8492A	7538	3/04
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
0460	Power sensor 500 kHz to 18 GHz, 50 Ohm	Boonton	51075	27705	2/04
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
0672	Shielded room 4.6(L) x 4.2(W) x2.4(H) m	Hermon Labs	SR-3	027	11/03 check
0787	Transient limiter	Hewlett Packard	11947A-8ZE	3107A01877	11/03
0846	Power meter, RF	Boonton	4200	232919BE	12/03
0911	Coupler dual directional, 20 dB, 0.1 – 2.0 GHz	Hewlett Packard	778D	1144A07827	3/04
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
1097	Attenuator, 50 Ohm, 2 W, DC to 8 GHz, 20 dB	Midwest Microwave	0793-20-NN-07	1097	1/04
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
1481	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1481	9/03
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	NA	12/03 check
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	12/03
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
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 40 GHz, 0.8 m, blue	Rhophase Microwave	KPS-1503A-800-KPS	W4907	11/03
2258	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0222	11/03
2287	Attenuator 10 dB, DC-18 GHz	Weinschel	NA	5776	1/04
2399	Cable 40 GHz, 1.5 m, blue	Rhophase Microwave Ltd.	KPS-1503A-1500-KPS	X2945	6/04
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 wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

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

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

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Antenna factor
Double ridged guide 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
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 coaxial, M17/164, model: C17164-10, s/n 161, HL 1003

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

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Cable loss
Cable Coaxial, 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 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, 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

No.	Frequency, MHz	Cable loss, dB
1	0.1	0.05
2	1	0.09
3	3	0.16
4	5	0.18
5	10	0.27
6	30	0.44
7	50	0.58
8	80	0.69
9	100	0.82
10	300	1.48
11	500	2.01
12	800	2.65
13	1000	3.12

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

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

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Appendix D General information

Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01) 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
MHz	megahertz
NA	not applicable
QP	quasi-peak
RF	radio frequency
rms	root mean square
s	second
UNII	Unlicensed National Information Infrastructure
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.