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Compliance test report ID **196334-3TRFWL**

Date of issue
March 6, 2012

FCC 47 CFR Part 90

Private Land Mobile Services

Applicant **Redline Communications**
Product **Broad-band wireless infrastructure product**
Model **RDL-3000-RM**
FCC ID **QC8-RDL3000RM**

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

SCC Accredited LAB
LAB Accrédité CCN

Test location

Nemko Canada Inc.
303 River Road
Ottawa, ON, K1V 1H2
Canada

Telephone +1 613 737 9680
Facsimile +1 613 737 9691
Toll free +1 800 563 6336
Website www.nemko.com

Tested by Andrey Adelberg, Senior Wireless/EMC Specialist
Kevin Rose, Wireless/EMC Specialist

Reviewed by David Duchesne, Senior EMC/Wireless Specialist — March 6, 2012 **Date**

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1 Report summary

1.1 Applicant and manufacturer

Redline Communications
302 Town Center Blvd.
Markham, Ontario,
Canada, L3R 0E8

1.2 Test specifications

FCC 47 CFR Part 90 Private Land Mobile Radio Services

Subpart Y Regulations governing licensing and use of frequencies in the 4940–4990 MHz band.

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.4 Exclusions

None

1.5 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Section 2 Summary of test results

2.1 FCC Part 90 Subpart Y test results

Part	Test description	Verdict
90.1215	Occupied bandwidth	Pass
90.1215	Maximum conducted output power	Pass
90.1215	Power spectrum density	Pass
90.1215	The ratio of the peak excursion	Pass
90.210(m)	Spurious emissions at the antenna terminals	Pass
90.210(m)(6)	Radiated spurious emissions	Pass
90.213	Frequency stability	Pass

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date	January 17, 2012
Nemko sample ID number	3

3.2 EUT information

Product name	Broad-band wireless infrastructure product
Model	RDL-3000-RM
Serial number	117PC11510007

3.3 Technical information

Operating band	4940–4990 MHz
Operating frequency	5 MHz Channel: 4942.5–4987.5 MHz 10 MHz Channel: 4945–4985 MHz 20 MHz Channel: 4950–4980 MHz
Modulation type	OFDM using 64-QAM, 16-QAM, QPSK and BPSK modulation for sub-carriers
Occupied bandwidth	5 MHz, 10 MHz and 20 MHz
Emission designator	W7D
Power requirements	48 V_{DC} PoE via 120 V_{AC}, 60 Hz
Antenna information	Redline 4.9–6.1 GHz Dual Polarization/ Dual Slant Subscriber Antenna, 19 dBi, M/N: 30-00328-00

3.4 Product description and theory of operation

The EUT is a 2×2 MIMO point-to-multipoint (PMP) carrier grade broadband wireless infrastructure product, designed to operate in the 4940–4990 MHz band.

3.5 EUT exercise details

The EUT was in a continuous transmitting mode with random data frames. The modulation, channel bandwidth and channel frequency was changed using a Web-based interface of the Ethernet port.

3.6 EUT setup diagram

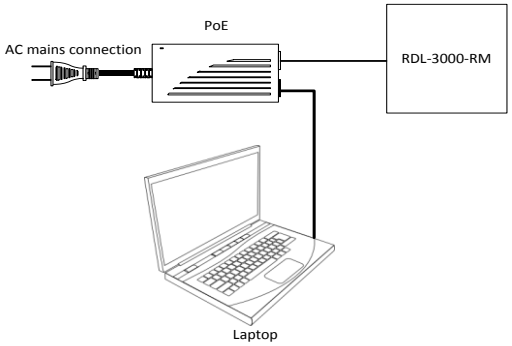


Diagram 3.6-1: Setup diagram

3.7 Support equipment

Description	Brand name	Model/Part number	Serial number
PoE	Cincon Electronics Co.	TRG60A-POE-L	1127

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature: 15–30 °C
Relative humidity: 20–75 %
Air pressure: 86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Test equipment

7.1 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/12
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	April 27/12
Biconical antenna	Sunol	BC2	FA002078	1 year	Jan. 04/13
Log periodic antenna	Sunol	LP5	FA002077	1 year	Dec. 28/12
Horn antenna #2	EMCO	3115	FA000825	1 year	Feb. 04/12
1–18 GHz pre-amplifier	JCA	JCA118-503	FA002091	1 year	Aug. 15/12
Horn antenna 18–26.5 GHz	Electro-metrics	SH-50/60-1	FA000479	—	VOU
18–26 GHz pre-amplifier	Narda	BBS-1826N612	FA001550	—	VOU
Temperature chamber	Thermotron	SM-16C	FA001030	1 year	NCR
Horn antenna #1	EMCO	3115	FA000649	1 year	Mar. 08/12
26 – 40.0 GHz Amplifier	NARDA	DBL-2640N610	FA001556	—	VOU
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	Feb. 09/13
Note: NCR - no calibration required, VOU - verify on use					

Section 8 Testing data

8.1 Clause 90.1215 Occupied bandwidth

8.1.1 Definitions and limits

The peak power spectral density is measured as conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of one MHz or the 26 dB emission bandwidth of the device whichever is less.

8.1.2 Test summary

Test date	January 30, 2012	**Test engineer**	Andrey Adelberg	**Verdict**	Pass
Temperature	23 °C	**Air pressure**	1002 mbar	**Relative humidity**	31 %

8.1.3 Observations/special notes

Spectrum analyzer settings:
For 5 MHz and 10 MHz channels: Peak detector with RBW/VBW of 100 kHz/300 kHz
For 20 MHz channel: Peak detector with RBW/VBW of 200 kHz/500 kHz

8.1.4 Test data

Table 8.1-1: 26 dB bandwidth of 5 MHz channel measurements

Modulation	Frequency (MHz)	26 dB bandwidth (MHz)
BPSK	4942.5	4.78
	4965.0	4.74
	4987.5	4.77
QPSK	4942.5	4.70
	4965.0	4.68
	4987.5	4.83
16-QAM	4942.5	4.79
	4965.0	4.74
	4987.5	4.79
64-QAM	4942.5	4.77
	4965.0	4.79
	4987.5	4.77

Table 8.1-2: 26 dB bandwidth of 10 MHz channel measurements

Modulation	Frequency (MHz)	26 dB bandwidth (MHz)
BPSK	4945.0	9.36
	4965.0	9.24
	4985.0	9.26
QPSK	4945.0	9.36
	4965.0	9.38
	4985.0	9.38
16-QAM	4945.0	9.34
	4965.0	9.32
	4985.0	9.34
64-QAM	4945.0	9.22
	4965.0	9.30
	4985.0	9.34

Table 8.1-3: 26 dB bandwidth of 20 MHz channel measurements

Modulation	Frequency (MHz)	26 dB bandwidth (MHz)
BPSK	4950.0	18.05
	4965.0	18.25
	4980.0	18.35
QPSK	4950.0	18.05
	4965.0	18.35
	4980.0	18.25
16-QAM	4950.0	18.05
	4965.0	18.25
	4980.0	18.50
64-QAM	4950.0	18.05
	4965.0	18.40
	4980.0	18.20

8.2 Clause 90.1215 Maximum conducted output power

8.2.1 Definitions and limits

The transmitting power of stations operating in the 4940–4990 MHz band must not exceed the maximum limits in this section.
(a)(1) The maximum conducted output power should not exceed:

Table 8.2-1: RF output power limits

Channel Bandwidth (MHz)	Low-power peak transmitter power (dBm)	High-power peak transmitter power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

(2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power or spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

8.2.2 Test summary

Test date	January 30, 2012	**Test engineer**	Andrey Adelberg	**Verdict**	Pass
Temperature	23 °C	**Air pressure**	1002 mbar	**Relative humidity**	31 %

8.2.3 Observations/special notes

Spectrum analyzer settings:
For 5 MHz channel: RMS detector with RBW/VBW of 5 MHz/10 MHz
For 10 MHz channel: RMS detector with RBW/VBW of 10 MHz/10 MHz
For 20 MHz channel: RMS detector with RBW/VBW of 20 MHz/30 MHz
MIMO test was performed as per KDB 662911 D01 Multiple Transmitter Output v01r01 guidance.
The power at each antenna port was measured individually and the aggregate power was summed up mathematically.

8.2.4 Test data

Table 8.2-2: RF power and EIRP measurement of 5 MHz channel

Modulation	Frequency (MHz)	Antenna 1 Power (dBm)	Antenna 2 Power (dBm)	Combined output power (dBm)	Output power limit (dBm)	Margin (dB)	Antenna gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Margin (dB)
BPSK	4942.5	19.07	18.34	21.73	27.00	5.27	19.00	40.73	53.00	12.27
	4965.0	18.91	19.00	21.97	27.00	5.03	19.00	40.97	53.00	12.03
	4987.5	19.41	19.65	22.54	27.00	4.46	19.00	41.54	53.00	11.46
QPSK	4942.5	18.60	18.29	21.46	27.00	5.54	19.00	40.46	53.00	12.54
	4965.0	18.65	20.12	22.46	27.00	4.54	19.00	41.46	53.00	11.54
	4987.5	18.33	19.31	21.86	27.00	5.14	19.00	40.86	53.00	12.14
16-QAM	4942.5	18.52	18.25	21.40	27.00	5.60	19.00	40.40	53.00	12.60
	4965.0	18.57	18.86	21.73	27.00	5.27	19.00	40.73	53.00	12.27
	4987.5	19.14	18.40	21.80	27.00	5.20	19.00	40.80	53.00	12.20
64-QAM	4942.5	18.76	19.44	22.12	27.00	4.88	19.00	41.12	53.00	11.88
	4965.0	18.79	18.77	21.79	27.00	5.21	19.00	40.79	53.00	12.21
	4987.5	19.53	19.25	22.40	27.00	4.60	19.00	41.40	53.00	11.60

8.2.4 Test data, continued

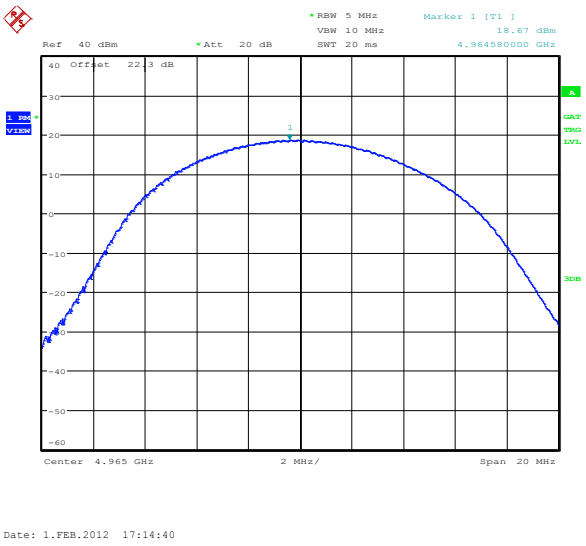
Table 8.2-3: RF power and EIRP measurement of 10 MHz channel

Modulation	Frequency (MHz)	Antenna 1 Power (dBm)	Antenna 2 Power (dBm)	Combined output power (dBm)	Output power limit (dBm)	Margin (dB)	Antenna gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Margin (dB)
BPSK	4945.0	18.55	19.26	21.93	30.00	8.07	19.00	40.93	56.00	15.07
	4965.0	18.45	18.67	21.57	30.00	8.43	19.00	40.57	56.00	15.43
	4985.0	18.91	19.03	21.98	30.00	8.02	19.00	40.98	56.00	15.02
QPSK	4945.0	18.16	19.22	21.73	30.00	8.27	19.00	40.73	56.00	15.27
	4965.0	18.07	19.78	22.02	30.00	7.98	19.00	41.02	56.00	14.98
	4985.0	18.82	18.92	21.88	30.00	8.12	19.00	40.88	56.00	15.12
16-QAM	4945.0	18.10	19.22	21.71	30.00	8.29	19.00	40.71	56.00	15.29
	4965.0	18.12	18.63	21.39	30.00	8.61	19.00	40.39	56.00	15.61
	4985.0	18.60	18.99	21.81	30.00	8.19	19.00	40.81	56.00	15.19
64-QAM	4945.0	18.54	19.22	21.90	30.00	8.10	19.00	40.90	56.00	15.10
	4965.0	18.56	18.56	21.57	30.00	8.43	19.00	40.57	56.00	15.43
	4985.0	19.17	18.89	22.04	30.00	7.96	19.00	41.04	56.00	14.96

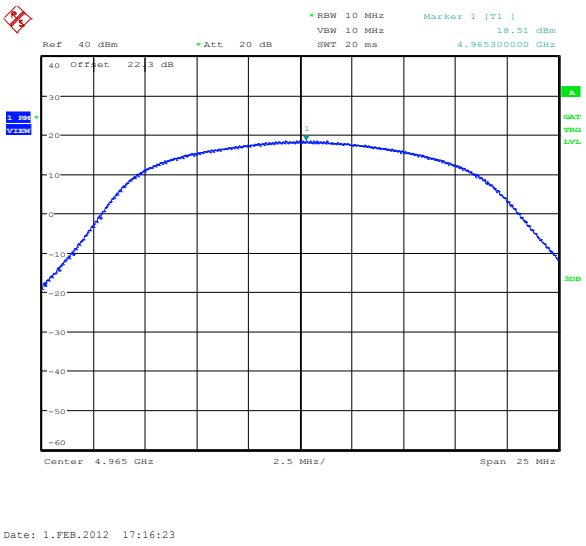
Table 8.2-4: RF power and EIRP measurement of 20 MHz channel

Modulation	Frequency (MHz)	Antenna 1 Power (dBm)	Antenna 2 Power (dBm)	Combined output power (dBm)	Output power limit (dBm)	Margin (dB)	Antenna gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Margin (dB)
BPSK	4950.0	20.08	20.95	23.55	33.00	9.45	19.00	42.55	59.00	16.45
	4965.0	19.73	20.04	22.90	33.00	10.10	19.00	41.90	59.00	17.10
	4980.0	20.11	20.23	23.18	33.00	9.82	19.00	42.18	59.00	16.82
QPSK	4950.0	20.45	20.71	23.59	33.00	9.41	19.00	42.59	59.00	16.41
	4965.0	19.88	19.95	22.93	33.00	10.07	19.00	41.93	59.00	17.07
	4980.0	20.23	20.13	23.19	33.00	9.81	19.00	42.19	59.00	16.81
16-QAM	4950.0	20.35	20.61	23.49	33.00	9.51	19.00	42.49	59.00	16.51
	4965.0	19.74	19.86	22.81	33.00	10.19	19.00	41.81	59.00	17.19
	4980.0	21.19	20.10	23.69	33.00	9.31	19.00	42.69	59.00	16.31
64-QAM	4950.0	19.98	20.84	23.44	33.00	9.56	19.00	42.44	59.00	16.56
	4965.0	19.59	19.97	22.79	33.00	10.21	19.00	41.79	59.00	17.21
	4980.0	19.97	20.17	23.08	33.00	9.92	19.00	42.08	59.00	16.92

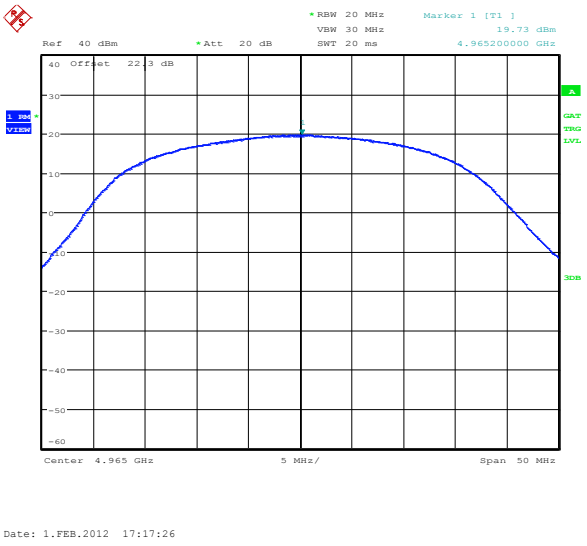
8.2.4 Test data, continued



Plot 8.2-1: Sample plot of power measurement for 5 MHz channel



Plot 8.2-2: Sample plot of power measurement for 10 MHz channel



Plot 8.2-3: Sample plot of power measurement for 20 MHz channel

8.3 Clause 90.1215 Power spectral density

8.3.1 Definitions and limits

2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power or spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

8.3.2 Test summary

Test date	January 31, 2012	**Test engineer**	Andrey Adelberg	**Verdict**	Pass
Temperature	23 °C	**Air pressure**	1002 mbar	**Relative humidity**	31 %

8.3.3 Observations/special notes

Spectrum analyzer settings:
RMS detector with RBW/VBW of 1 MHz/10 MHz
MIMO test was performed as per KDB 662911 D01 Multiple Transmitter Output v01r01 guidance.

8.3.4 Test data

Table 8.3-1: PSD and EIRP PSD measurement of 5 MHz channel

Modulation	Frequency (MHz)	Antenna 1 PSD (dBm/MHz)	Antenna 2 PSD (dBm/MHz)	Combined PSD (dBm/MHz)	PSD limit (dBm/MHz)	Margin (dB)	Antenna gain (dBi)	EIRP PSD (dBm/MHz)	EIRP PSD limit (dBm/MHz)	Margin (dB)
BPSK	4942.5	13.78	13.46	16.63	21.00	4.37	19.00	35.63	47.00	11.37
	4965.0	14.92	15.26	18.10	21.00	2.90	19.00	37.10	47.00	9.90
	4987.5	14.37	14.50	17.45	21.00	3.55	19.00	36.45	47.00	10.55
QPSK	4942.5	13.96	13.43	16.71	21.00	4.29	19.00	35.71	47.00	11.29
	4965.0	14.03	15.31	17.73	21.00	3.27	19.00	36.73	47.00	10.27
	4987.5	13.66	14.50	17.11	21.00	3.89	19.00	36.11	47.00	10.89
16-QAM	4942.5	13.89	13.36	16.64	21.00	4.36	19.00	35.64	47.00	11.36
	4965.0	15.02	15.16	18.10	21.00	2.90	19.00	37.10	47.00	9.90
	4987.5	14.50	13.37	16.98	21.00	4.02	19.00	35.98	47.00	11.02
64-QAM	4942.5	13.84	14.51	17.20	21.00	3.80	19.00	36.20	47.00	10.80
	4965.0	13.91	14.01	16.97	21.00	4.03	19.00	35.97	47.00	11.03
	4987.5	14.73	14.34	17.55	21.00	3.45	19.00	36.55	47.00	10.45

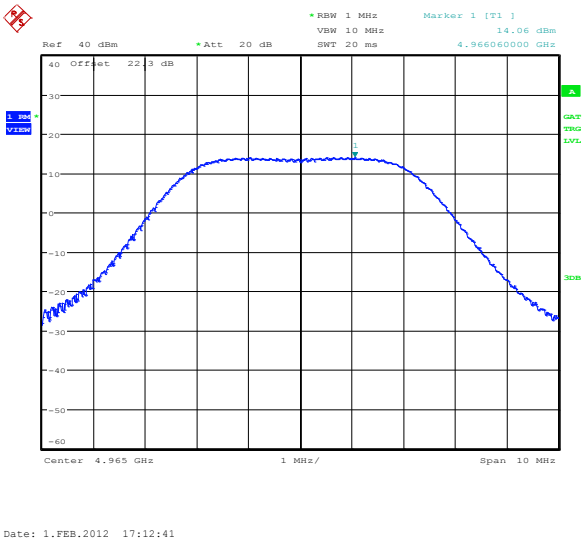
Table 8.3-2: PSD and EIRP PSD measurement of 10 MHz channel

Modulation	Frequency (MHz)	Antenna 1 PSD (dBm/MHz)	Antenna 2 PSD (dBm/MHz)	Combined PSD (dBm/MHz)	PSD limit (dBm/MHz)	Margin (dB)	Antenna gain (dBi)	EIRP PSD (dBm/MHz)	EIRP PSD limit (dBm/MHz)	Margin (dB)
BPSK	4945.0	11.00	11.79	14.42	21.00	6.58	19.00	33.42	47.00	13.58
	4965.0	11.02	11.31	14.18	21.00	6.82	19.00	33.18	47.00	13.82
	4985.0	11.55	11.51	14.54	21.00	6.46	19.00	33.54	47.00	13.46
QPSK	4945.0	11.20	11.67	14.45	21.00	6.55	19.00	33.45	47.00	13.55
	4965.0	11.30	12.33	14.86	21.00	6.14	19.00	33.86	47.00	13.14
	4985.0	11.82	11.49	14.67	21.00	6.33	19.00	33.67	47.00	13.33
16-QAM	4945.0	11.08	11.78	14.45	21.00	6.55	19.00	33.45	47.00	13.55
	4965.0	11.09	11.29	14.20	21.00	6.80	19.00	33.20	47.00	13.80
	4985.0	11.61	11.69	14.66	21.00	6.34	19.00	33.66	47.00	13.34
64-QAM	4945.0	11.15	11.72	14.45	21.00	6.55	19.00	33.45	47.00	13.55
	4965.0	11.31	11.19	14.26	21.00	6.74	19.00	33.26	47.00	13.74
	4985.0	11.82	11.39	14.62	21.00	6.38	19.00	33.62	47.00	13.38

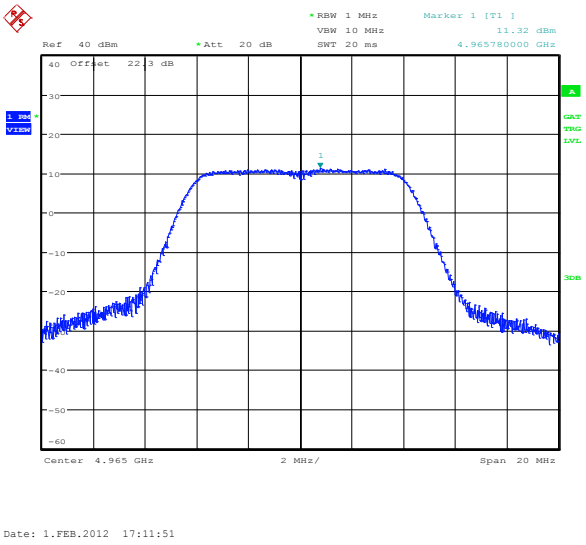
8.3.4 Test data, continued

Table 8.3-3: PSD and EIRP PSD measurement of 20 MHz channel

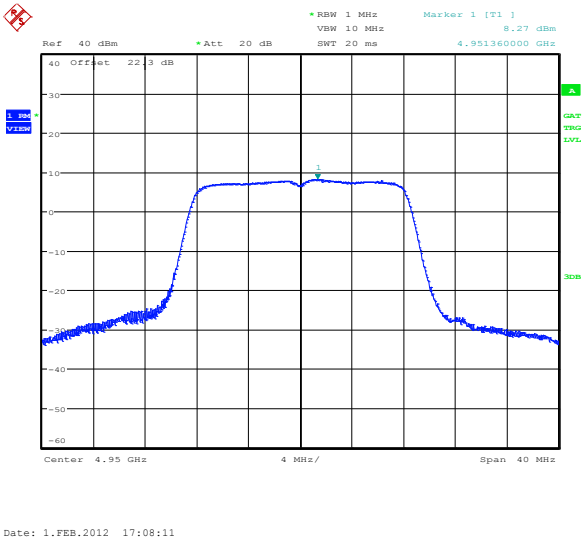
Modulation	Frequency (MHz)	Antenna 1 PSD (dBm/MHz)	Antenna 2 PSD (dBm/MHz)	Combined PSD (dBm/MHz)	PSD limit (dBm/MHz)	Margin (dB)	Antenna gain (dBi)	EIRP PSD (dBm/MHz)	EIRP PSD limit (dBm/MHz)	Margin (dB)
BPSK	4950.0	8.61	8.70	11.67	21.00	9.33	19.00	30.67	47.00	16.33
	4965.0	8.19	8.16	11.19	21.00	9.81	19.00	30.19	47.00	16.81
	4980.0	8.36	8.11	11.25	21.00	9.75	19.00	30.25	47.00	16.75
QPSK	4950.0	8.34	8.89	11.63	21.00	9.37	19.00	30.63	47.00	16.37
	4965.0	8.27	8.12	11.21	21.00	9.79	19.00	30.21	47.00	16.79
	4980.0	8.29	8.19	11.25	21.00	9.75	19.00	30.25	47.00	16.75
16-QAM	4950.0	8.61	8.78	11.71	21.00	9.29	19.00	30.71	47.00	16.29
	4965.0	8.17	8.14	11.17	21.00	9.83	19.00	30.17	47.00	16.83
	4980.0	9.42	8.15	11.84	21.00	9.16	19.00	30.84	47.00	16.16
64-QAM	4950.0	8.23	7.59	10.93	21.00	10.07	19.00	29.93	47.00	17.07
	4965.0	8.00	7.01	10.54	21.00	10.46	19.00	29.54	47.00	17.46
	4980.0	8.30	7.15	10.77	21.00	10.23	19.00	29.77	47.00	17.23



Plot 8.3-1: Sample plot of PSD measurement for 5 MHz channel



Plot 8.3-2: Sample plot of PSD measurement for 10 MHz channel



Plot 8.3-3: Sample plot of PSD measurement for 20 MHz channel

8.4 Clause 90.1215 The ratio of the peak excursion

8.4.1 Definitions and limits

(e) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

8.4.2 Test summary

Test date	December 20, 2011	**Test engineer**	Andrey Adelberg	**Verdict**	Pass
Temperature	21 °C	**Air pressure**	1003 mbar	**Relative humidity**	40 %

8.4.3 Observations/special notes

Spectrum analyzer settings:
Peak (trace 1) and RMS (trace 2) detectors with RBW/VBW of 1 MHz/10 MHz

8.4.4 Test data

Table 8.4-1: Peak excursion measurement of 5 MHz channel

Modulation	Frequency (MHz)	Excursion (dB)	Limit (dB)	Margin (dB)
BPSK	4942.5	6.66	13.00	6.34
	4965.0	6.95	13.00	6.05
	4987.5	7.99	13.00	5.01
QPSK	4942.5	7.65	13.00	5.35
	4965.0	6.80	13.00	6.20
	4987.5	7.32	13.00	5.68
16-QAM	4942.5	7.50	13.00	5.50
	4965.0	7.08	13.00	5.92
	4987.5	7.76	13.00	5.24
64-QAM	4942.5	7.30	13.00	5.70
	4965.0	6.77	13.00	6.23
	4987.5	7.61	13.00	5.39

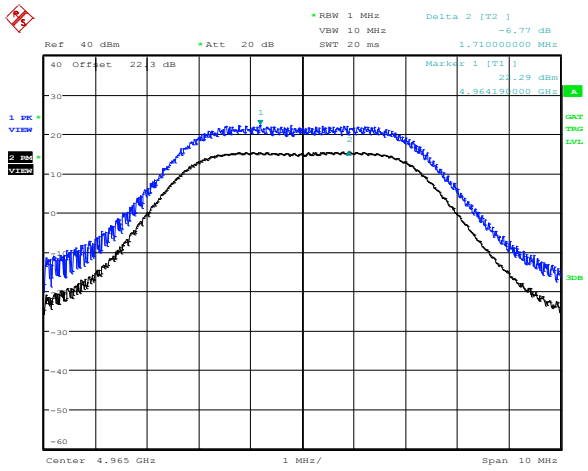
Table 8.4-2: Peak excursion measurement of 10 MHz channel

Modulation	Frequency (MHz)	Excursion (dB)	Limit (dB)	Margin (dB)
BPSK	4945.0	6.62	13.00	6.38
	4965.0	6.89	13.00	6.11
	4985.0	7.70	13.00	5.30
QPSK	4945.0	6.50	13.00	6.50
	4965.0	6.59	13.00	6.41
	4985.0	7.08	13.00	5.92
16-QAM	4945.0	6.74	13.00	6.26
	4965.0	6.82	13.00	6.18
	4985.0	6.73	13.00	6.27
64-QAM	4945.0	6.65	13.00	6.35
	4965.0	6.76	13.00	6.24
	4985.0	6.68	13.00	6.32

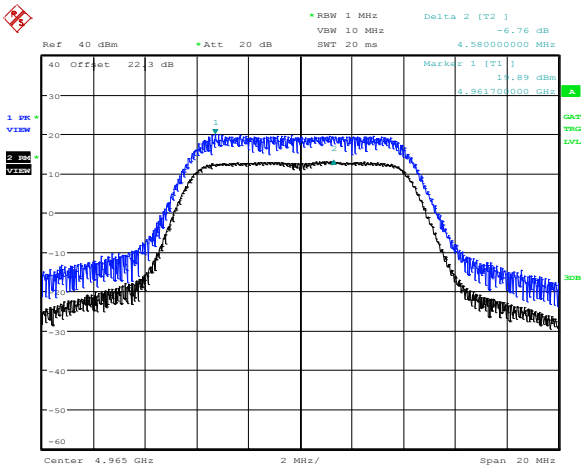
8.4.4 Test data, continued

Table 8.4-3: Peak excursion measurement of 20 MHz channel

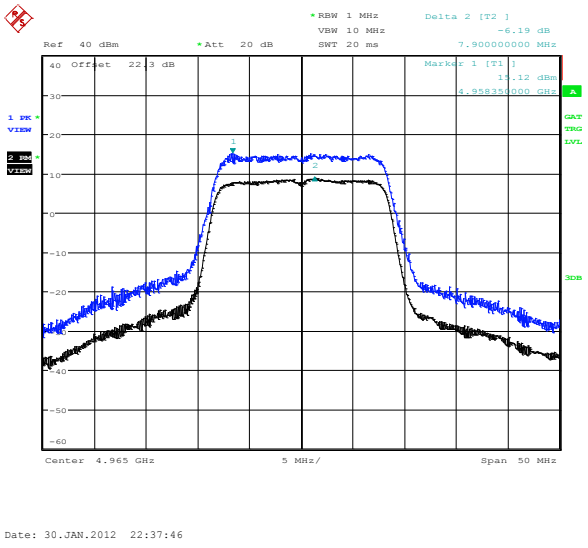
Modulation	Frequency (MHz)	Excursion (dB)	Limit (dB)	Margin (dB)
BPSK	4950.0	6.40	13.00	6.60
	4965.0	6.18	13.00	6.82
	4980.0	6.56	13.00	6.44
QPSK	4950.0	6.52	13.00	6.48
	4965.0	6.21	13.00	6.79
	4980.0	6.64	13.00	6.36
16-QAM	4950.0	6.34	13.00	6.66
	4965.0	6.26	13.00	6.74
	4980.0	6.55	13.00	6.45
64-QAM	4950.0	6.39	13.00	6.61
	4965.0	6.19	13.00	6.81
	4980.0	6.51	13.00	6.49



Plot 8.4-1: Sample plot for peak excursion for 5 MHz channel



Plot 8.4-2: Sample plot for peak excursion for 10 MHz channel



Plot 8.4-3: Sample plot for peak excursion for 20 MHz channel

8.5 Clause 90.210(m) Spurious emissions on the antenna terminals

8.5.1 Definitions and limits

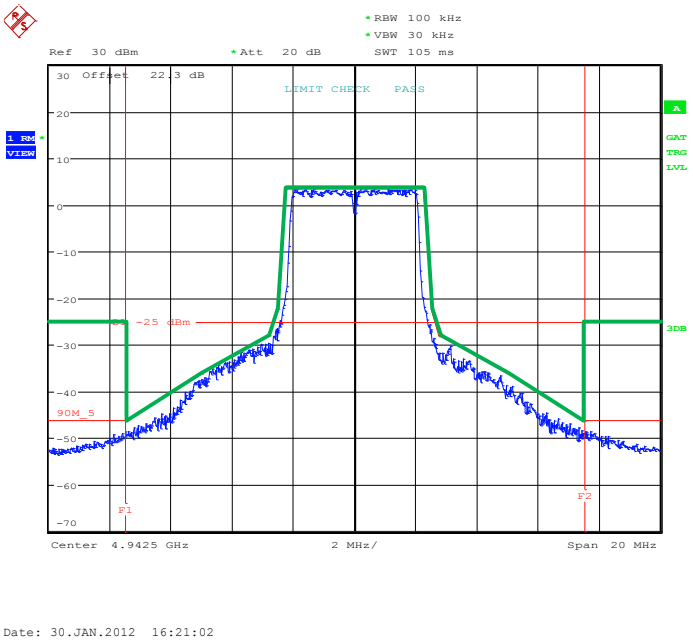
m) Emission Mask M. For high power transmitters (greater than 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:
(1) On any frequency removed from the assigned frequency between 0–45 % of the authorized bandwidth (BW): 0 dB.
(2) On any frequency removed from the assigned frequency between 45–50 % of the authorized bandwidth: 568 log (% of (BW)/45) dB.
(3) On any frequency removed from the assigned frequency between 50–55 % of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.
(4) On any frequency removed from the assigned frequency between 55–100 % of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB.
(5) On any frequency removed from the assigned frequency between 100–150 % of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB.
(6) On any frequency removed from the assigned frequency between above 150 % of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation..

8.5.2 Test summary

Test date	January 19, 2012	**Test engineer**	Andrey Adelberg	**Verdict**	Pass
Temperature	21 °C	**Air pressure**	1003 mbar	**Relative humidity**	40 %

8.5.3 Observations/special notes

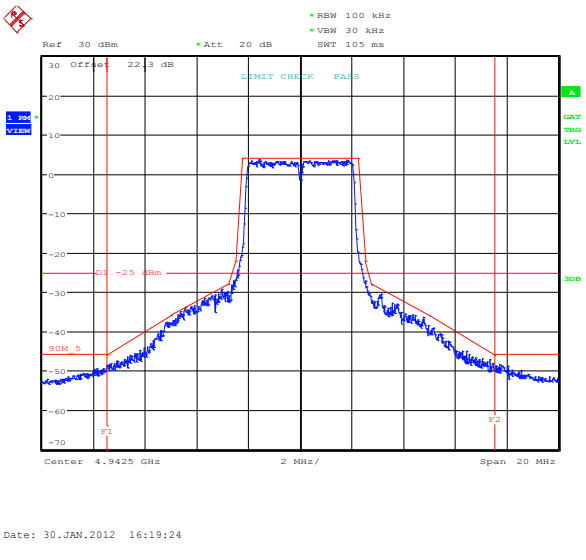
The Spectrum was searched from 30 MHz to the 40 GHz.
Spectrum analyzer settings for emission mask:
RMS detector with RBW/VBW of 100 kHz/30 kHz for 5 and 10 MHz channels; and 200 kHz/30 kHz for 20 MHz channel
Spectrum analyzer settings for spurious emissions outside the pass band:
Peak detector with RBW/VBW of 100 kHz/30 kHz for 5 and 10 MHz channels; and 200 kHz/30 kHz for 20 MHz channel
F1 and F2 on the following plots are frequencies indicating 150 % of the authorized bandwidth. From F1 and below and from F2 and above the −25 dBm limit line applies.



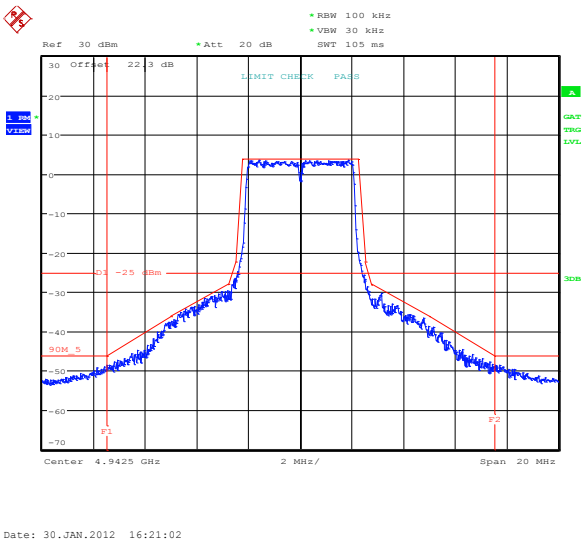
Plot 8.5-1: Emission mask application example

Note: all emissions shall lie below green line.

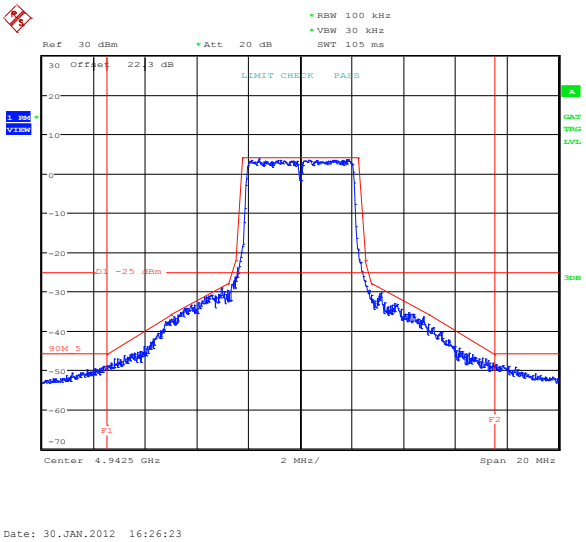
8.5.4 Test data



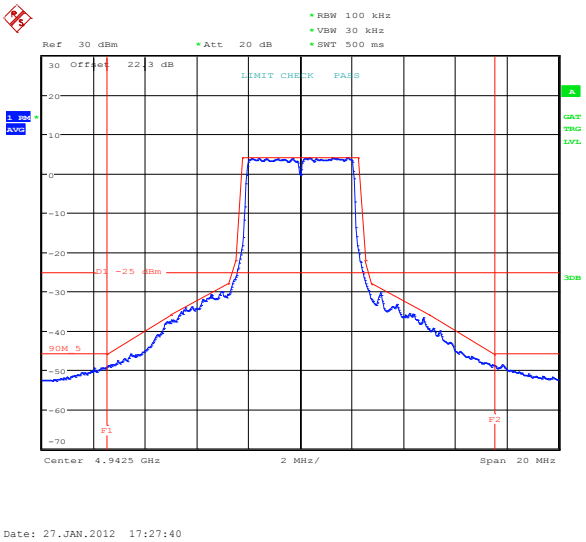
Plot 8.5-2: Emission mask for 5 MHz channel, antenna port 1, low frequency, BPSK



Plot 8.5-3: Emission mask for 5 MHz channel, antenna port 1, low frequency, QPSK

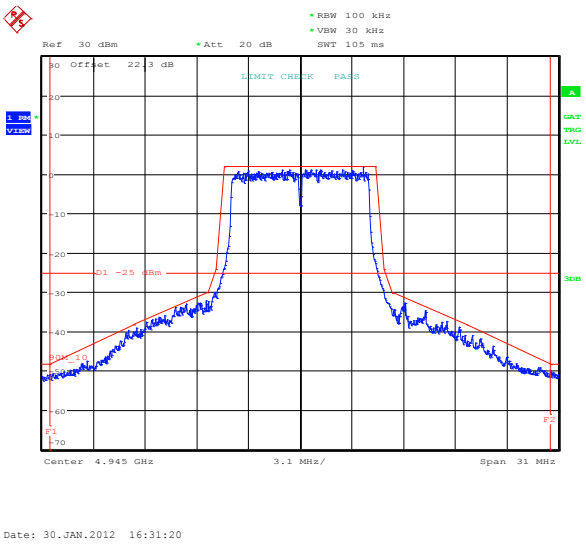


Plot 8.5-4: Emission mask for 5 MHz channel, antenna port 1, low frequency, 16-QAM

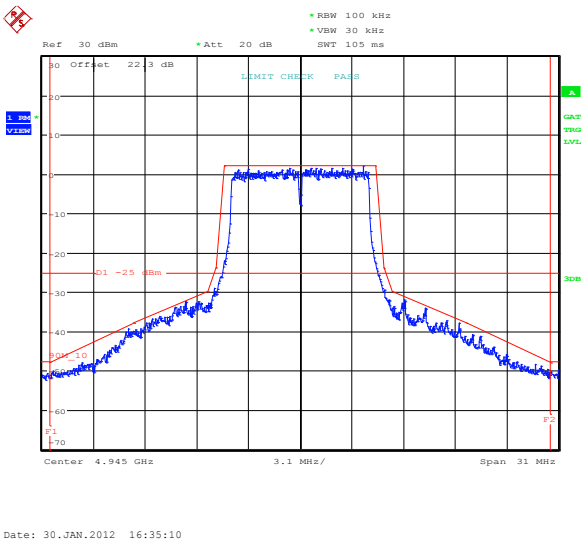


Plot 8.5-5: Emission mask for 5 MHz channel, antenna port 1, low frequency, 64-QAM

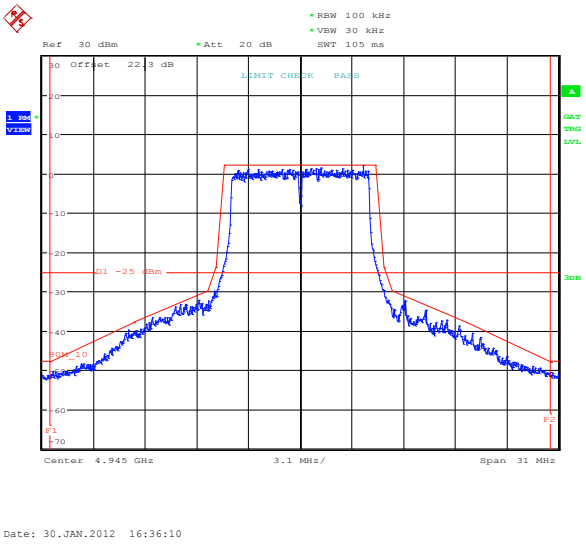
8.5.4 Test data, continued



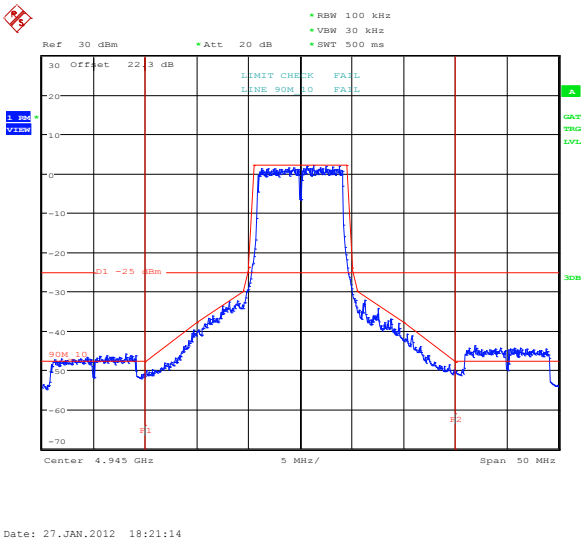
Plot 8.5-6: Emission mask for 10 MHz channel, antenna port 1, low frequency, BPSK



Plot 8.5-7: Emission mask for 10 MHz channel, antenna port 1, low frequency, QPSK



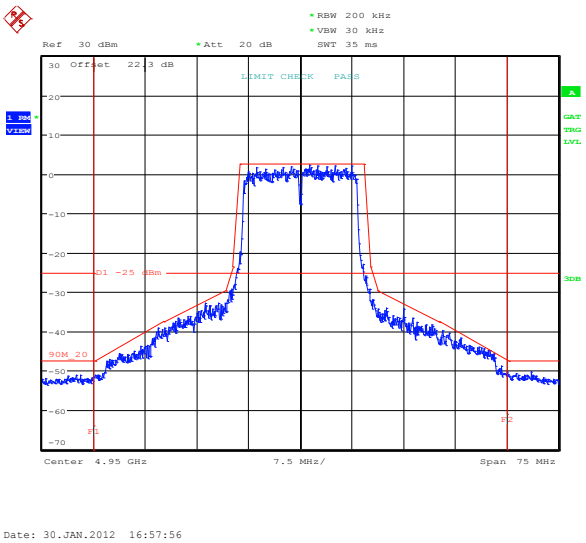
Plot 8.5-8: Emission mask for 10 MHz channel, antenna port 1, low frequency, 16-QAM



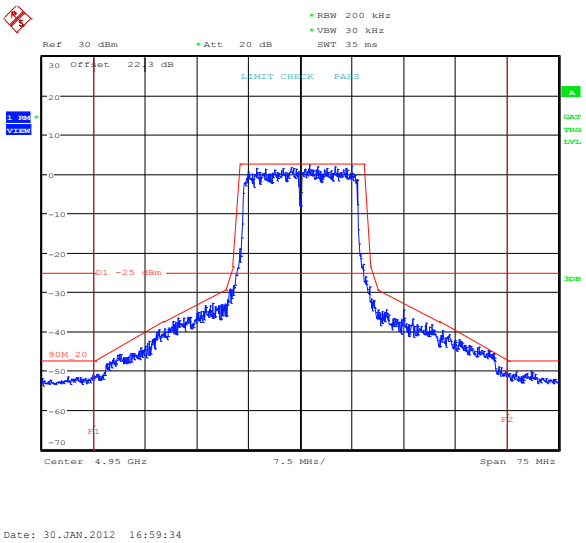
Plot 8.5-9: Emission mask for 10 MHz channel, antenna port 1, low frequency, 64-QAM

Note: Below vertical line *F1* and above *F2* the limit line of −25 dBm applies

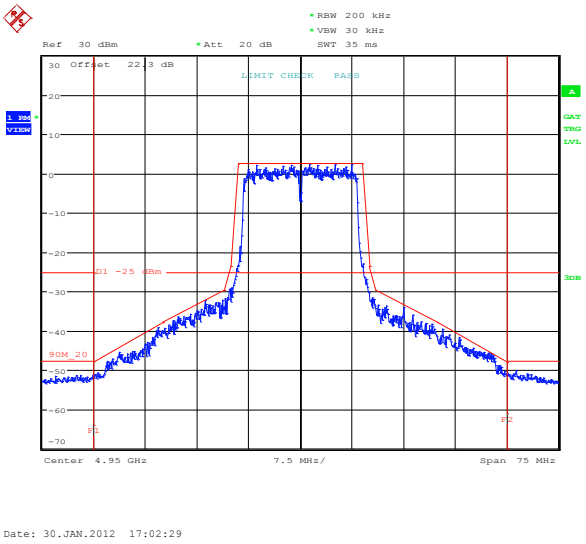
8.5.5 Test data, continued



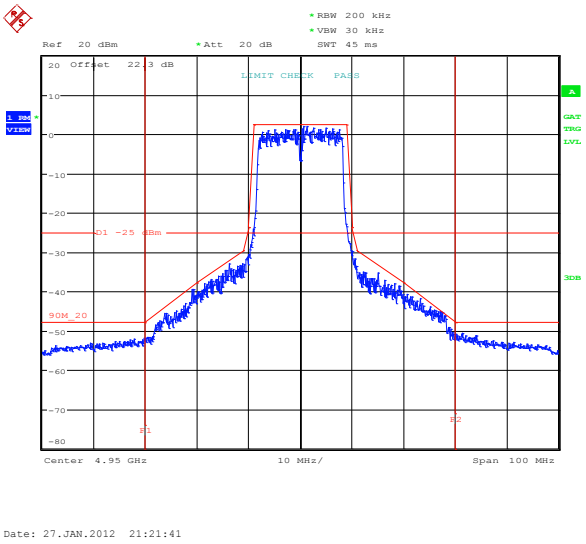
Plot 8.5-10: Emission mask for 20 MHz channel, antenna port 1, low frequency, BPSK



Plot 8.5-11: Emission mask for 20 MHz channel, antenna port 1, low frequency, QPSK

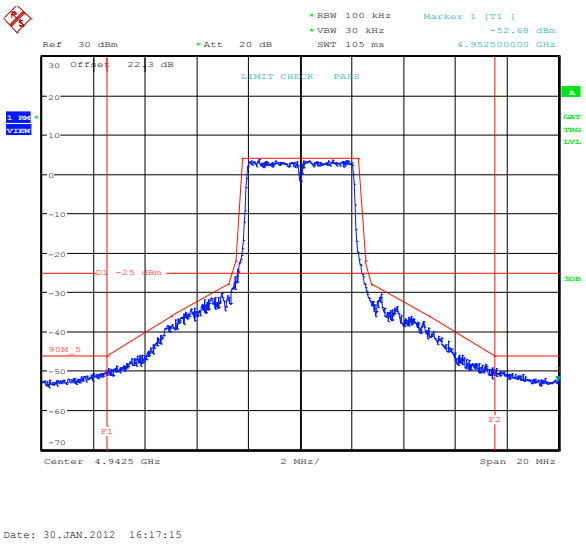


Plot 8.5-12: Emission mask for 20 MHz channel, antenna port 1, low frequency, 16-QAM

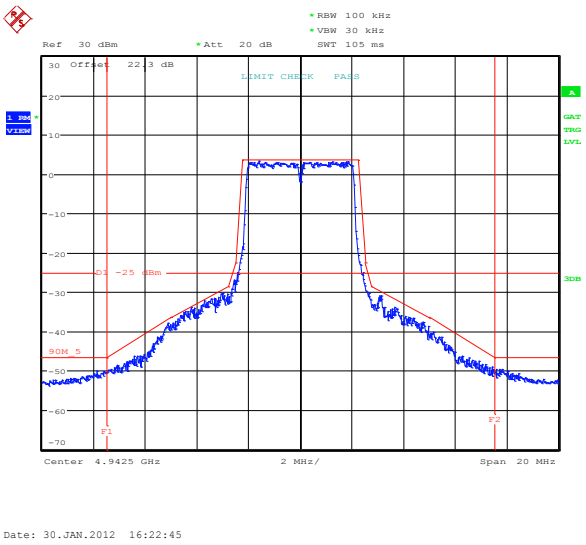


Plot 8.5-13: Emission mask for 20 MHz channel, antenna port 1, low frequency, 64-QAM

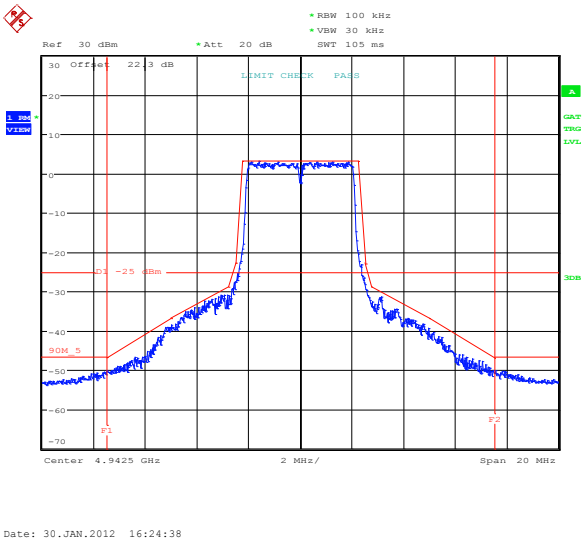
8.5.4 Test data, continued



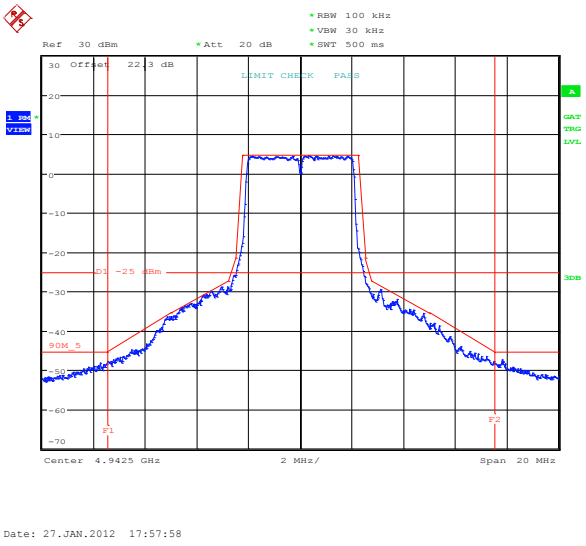
Plot 8.5-14: Emission mask for 5 MHz channel, antenna port 2, low frequency, BPSK



Plot 8.5-15: Emission mask for 5 MHz channel, antenna port 2, low frequency, QPSK

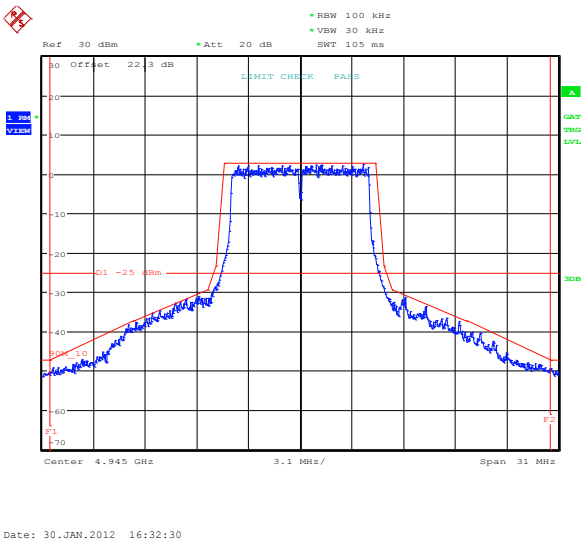


Plot 8.5-16: Emission mask for 5 MHz channel, antenna port 2, low frequency, 16-QAM

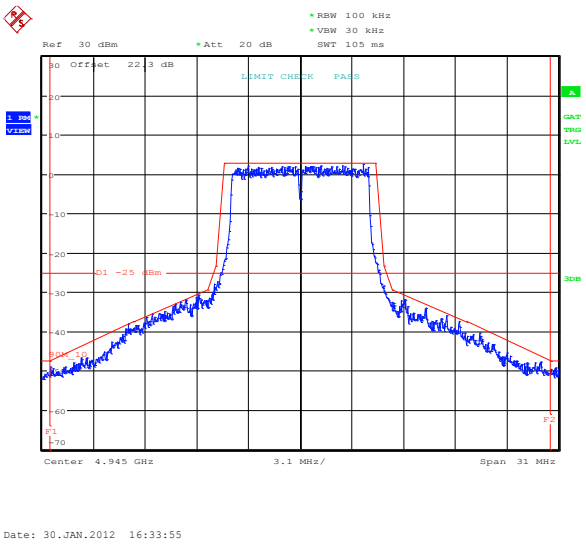


Plot 8.5-17: Emission mask for 5 MHz channel, antenna port 2, low frequency, 64-QAM

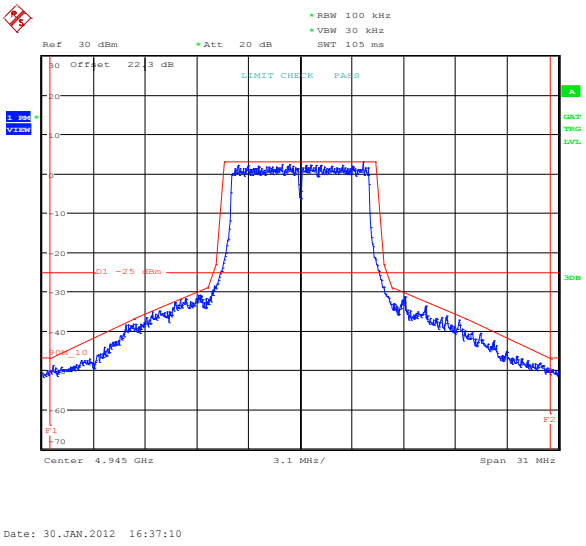
8.5.4 Test data, continued



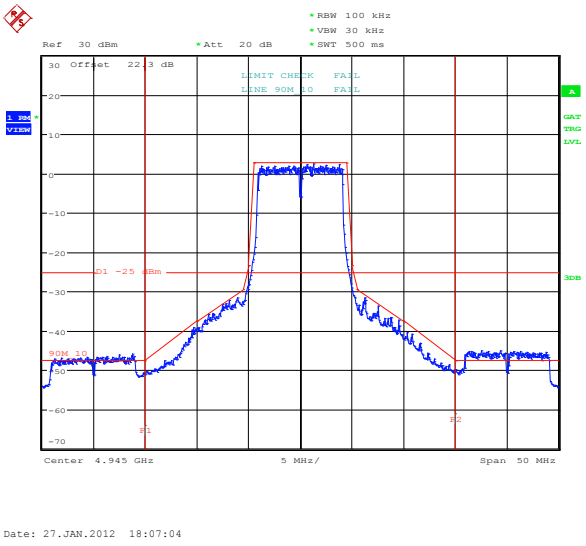
Plot 8.5-18: Emission mask for 10 MHz channel, antenna port 2, low frequency, BPSK



Plot 8.5-19: Emission mask for 10 MHz channel, antenna port 2, low frequency, QPSK



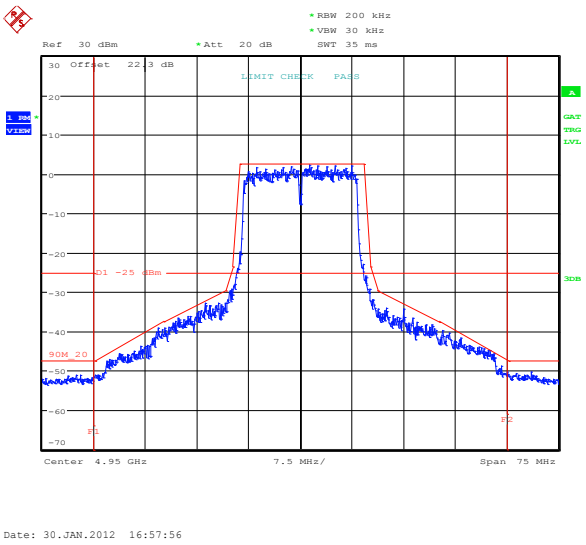
Plot 8.5-20: Emission mask for 10 MHz channel, antenna port 2, low frequency, 16-QAM



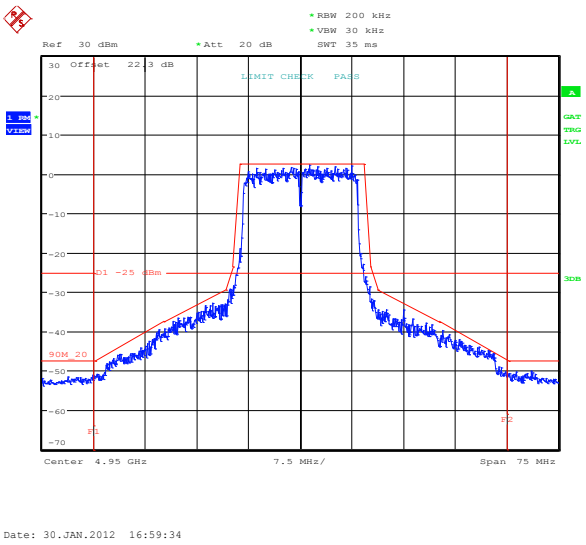
Plot 8.5-21: Emission mask for 10 MHz channel, antenna port 2, low frequency, 64-QAM

Note: Below vertical line *F1* and above *F2* the limit line of −25 dBm applies

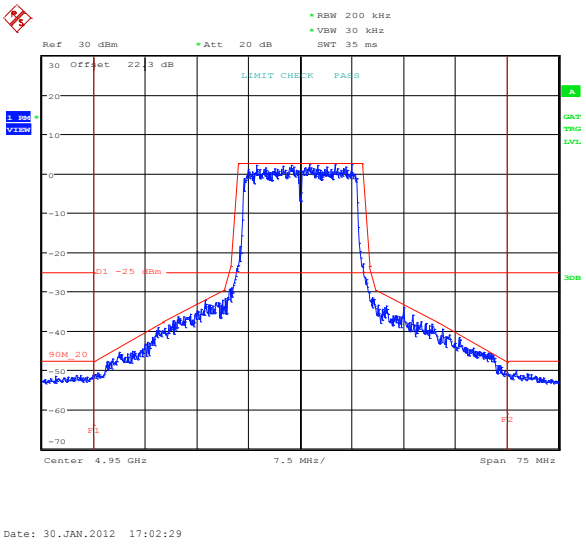
8.5.5 Test data, continued



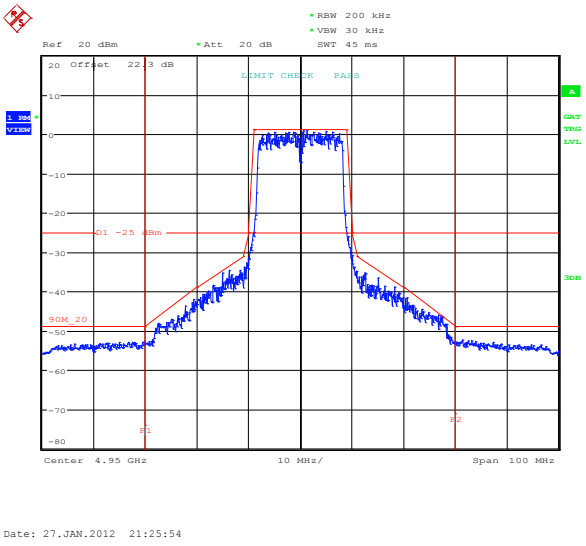
Plot 8.5-22: Emission mask for 20 MHz channel, antenna port 2, low frequency, BPSK



Plot 8.5-23: Emission mask for 20 MHz channel, antenna port 2, low frequency, QPSK

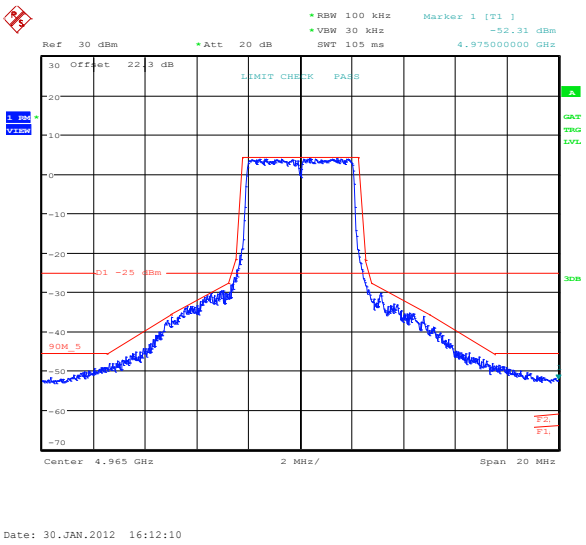


Plot 8.5-24: Emission mask for 20 MHz channel, antenna port 2, low frequency, 16-QAM

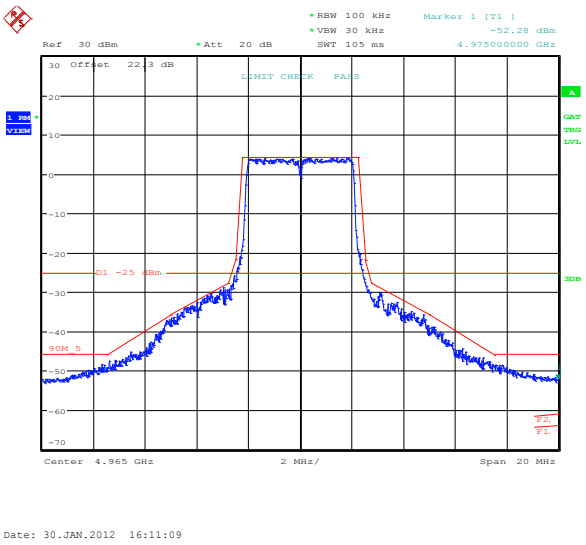


Plot 8.5-25: Emission mask for 20 MHz channel, antenna port 2, low frequency, 64-QAM

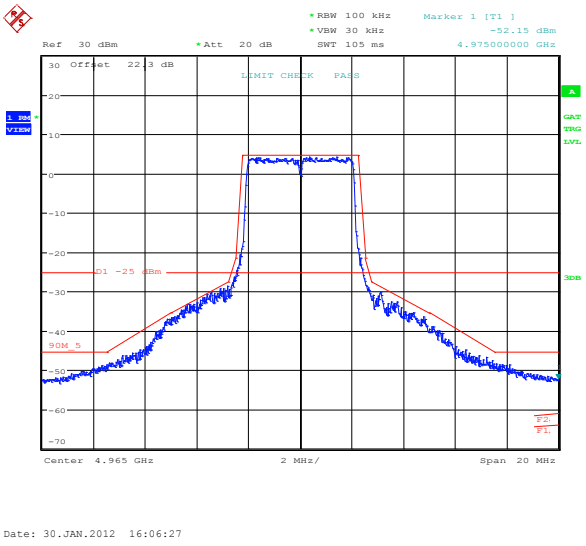
8.5.4 Test data, continued



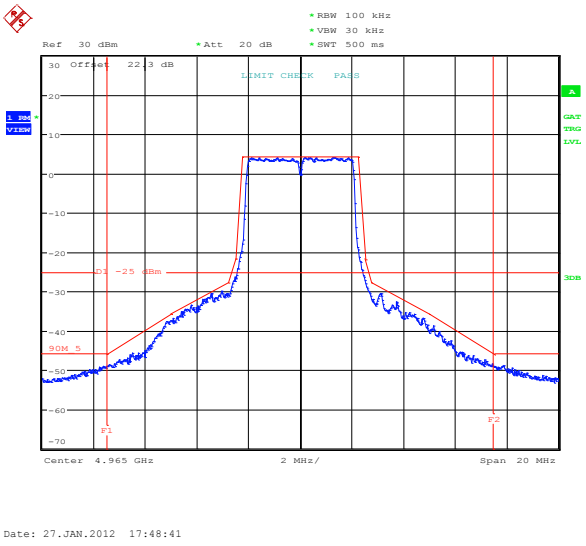
Plot 8.5-26: Emission mask for 5 MHz channel, antenna port 1, mid frequency, BPSK



Plot 8.5-27: Emission mask for 5 MHz channel, antenna port 1, mid frequency, QPSK

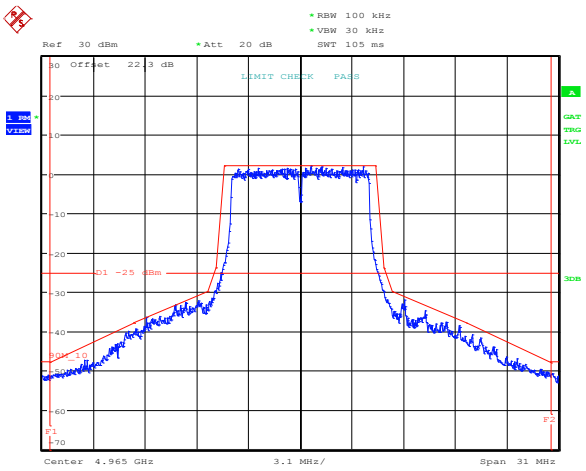


Plot 8.5-28: Emission mask for 5 MHz channel, antenna port 1, mid frequency, 16-QAM

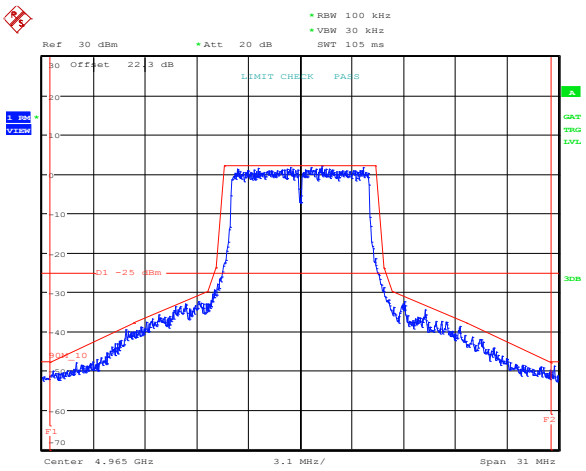


Plot 8.5-29: Emission mask for 5 MHz channel, antenna port 1, mid frequency, 64-QAM

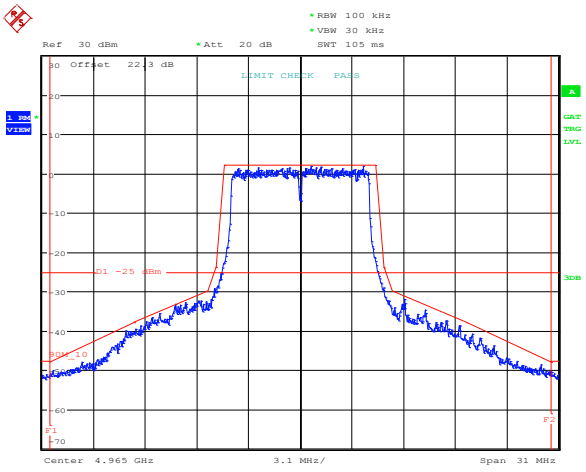
8.5.4 Test data, continued



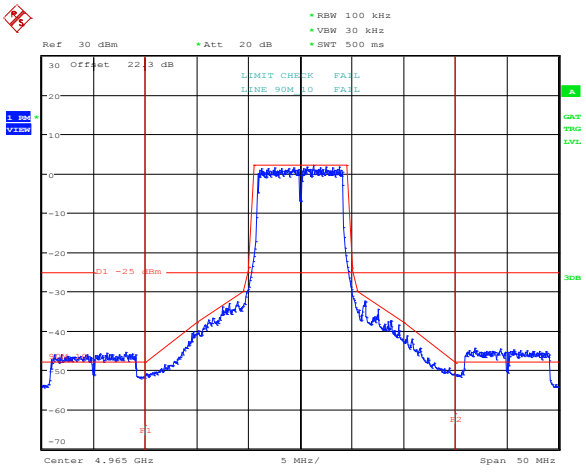
Plot 8.5-30: Emission mask for 10 MHz channel, antenna port 1, mid frequency, BPSK



Plot 8.5-31: Emission mask for 10 MHz channel, antenna port 1, mid frequency, QPSK



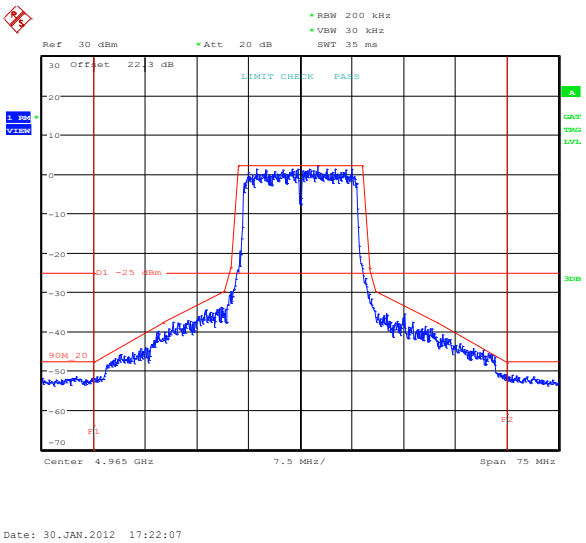
Plot 8.5-32: Emission mask for 10 MHz channel, antenna port 1, mid frequency, 16-QAM



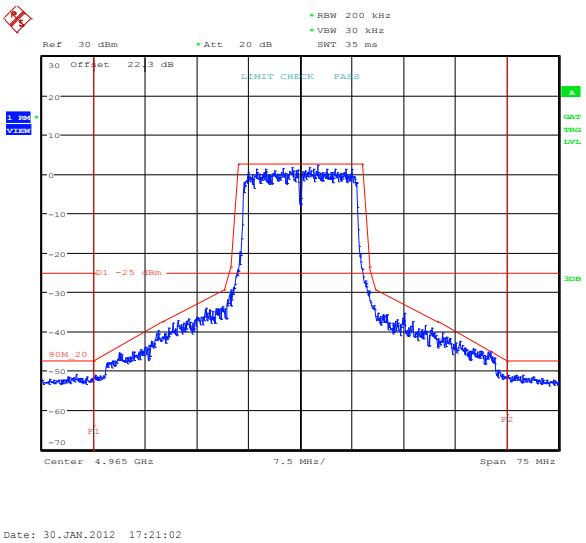
Plot 8.5-33: Emission mask for 10 MHz channel, antenna port 1, mid frequency, 64-QAM

Note: Below vertical line *F1* and above *F2* the limit line of −25 dBm applies

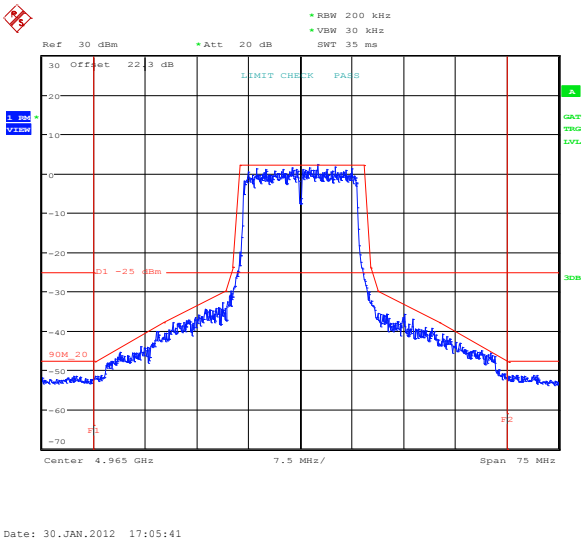
8.5.4 Test data, continued



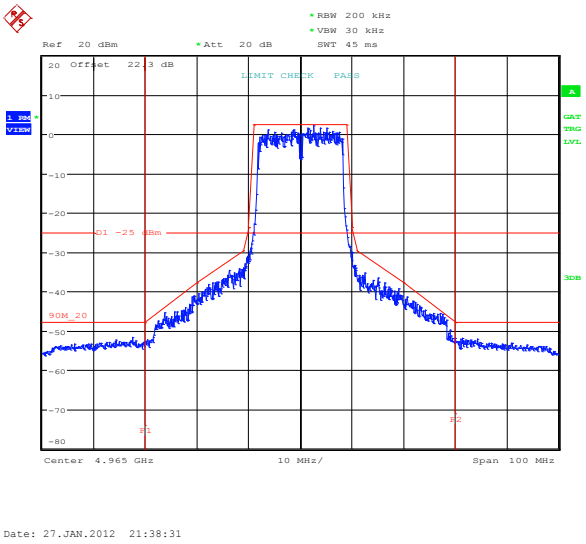
Plot 8.5-34: Emission mask for 20 MHz channel, antenna port 1, mid frequency, BPSK



Plot 8.5-35: Emission mask for 20 MHz channel, antenna port 1, mid frequency, QPSK

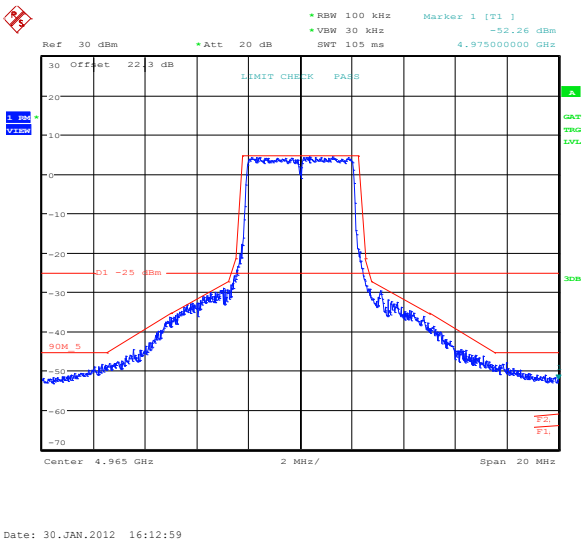


Plot 8.5-36: Emission mask for 20 MHz channel, antenna port 1, mid frequency, 16-QAM

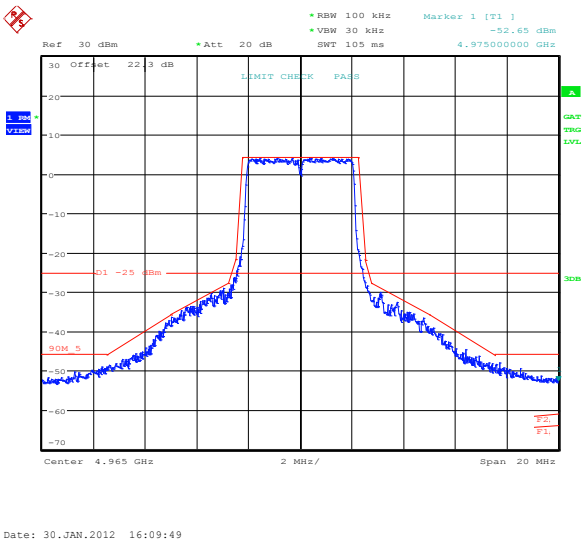


Plot 8.5-37: Emission mask for 20 MHz channel, antenna port 1, mid frequency, 64-QAM

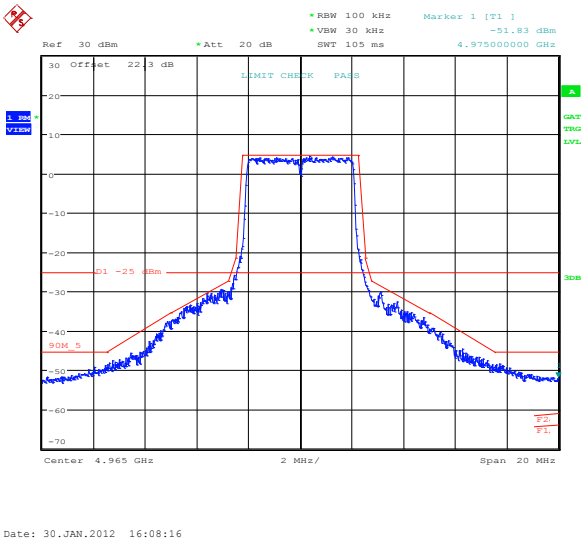
8.5.4 Test data, continued



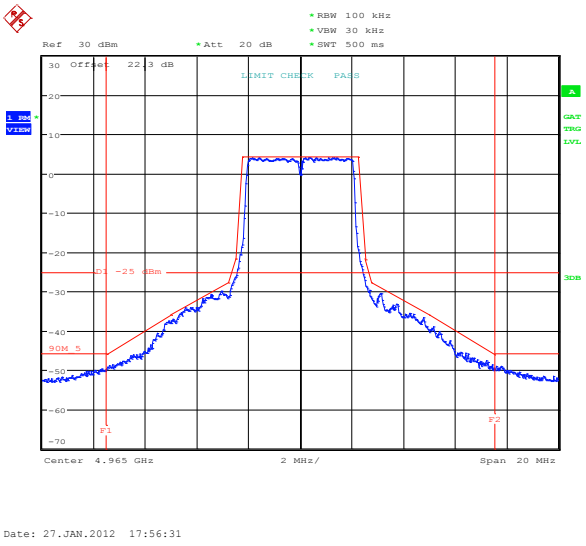
Plot 8.5-38: Emission mask for 5 MHz channel, antenna port 2, mid frequency, BPSK



Plot 8.5-39: Emission mask for 5 MHz channel, antenna port 2, mid frequency, QPSK

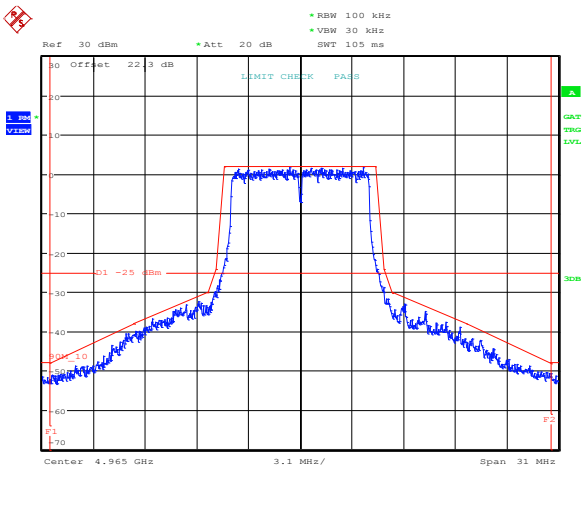


Plot 8.5-40: Emission mask for 5 MHz channel, antenna port 2, mid frequency, 16-QAM

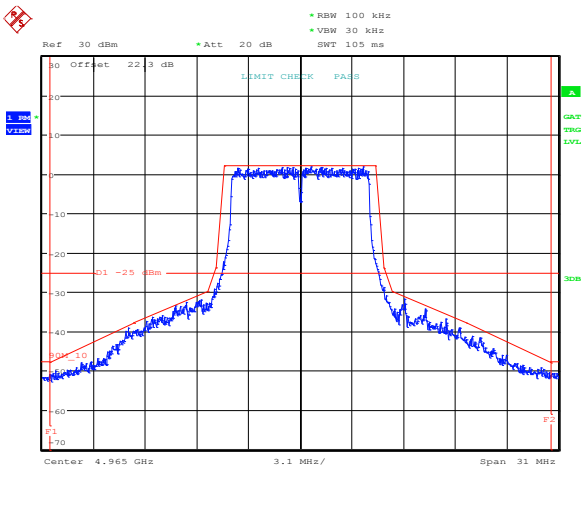


Plot 8.5-41: Emission mask for 5 MHz channel, antenna port 2, mid frequency, 64-QAM

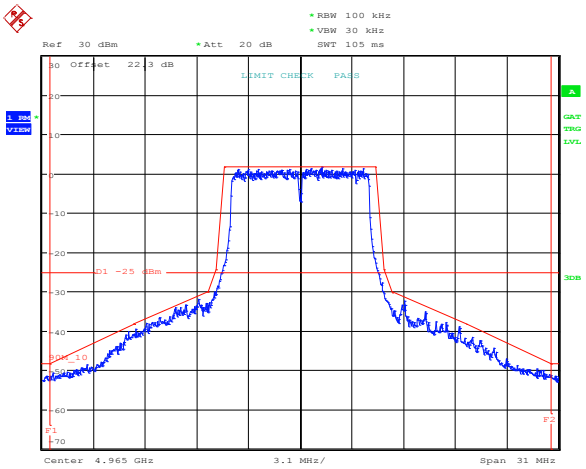
8.5.4 Test data, continued



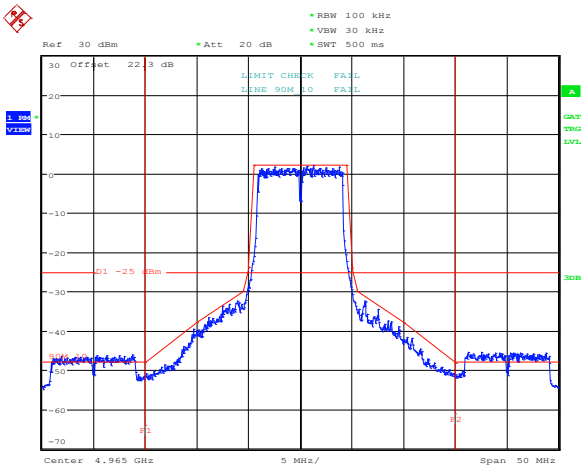
Plot 8.5-42: Emission mask for 10 MHz channel, antenna port 2, mid frequency, BPSK



Plot 8.5-43: Emission mask for 10 MHz channel, antenna port 2, mid frequency, QPSK



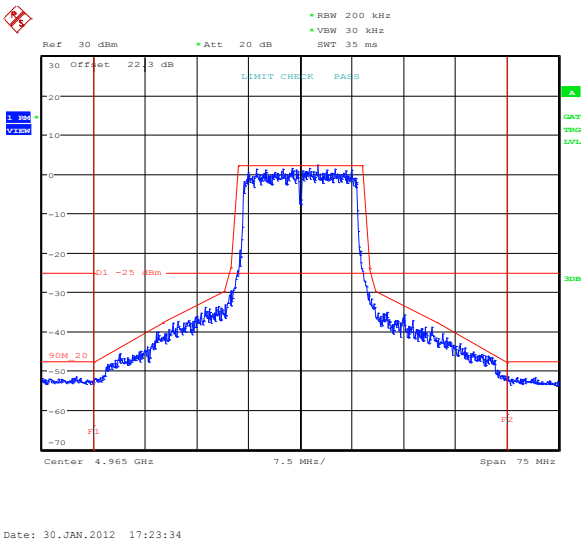
Plot 8.5-44: Emission mask for 10 MHz channel, antenna port 2, mid frequency, 16-QAM



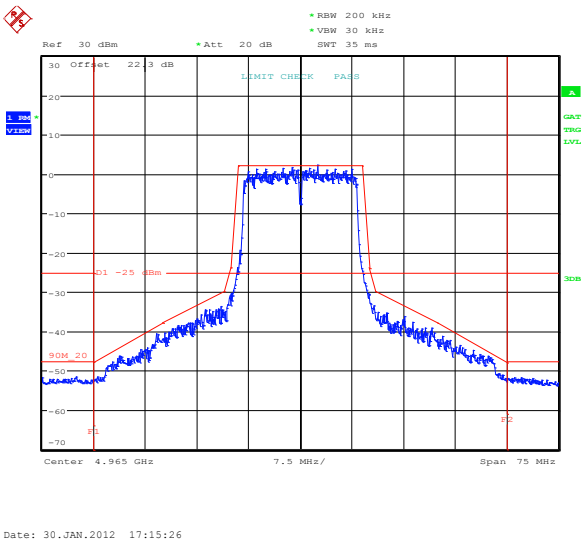
Plot 8.5-45: Emission mask for 10 MHz channel, antenna port 2, mid frequency, 64-QAM

Note: Below vertical line *F1* and above *F2* the limit line of −25 dBm applies

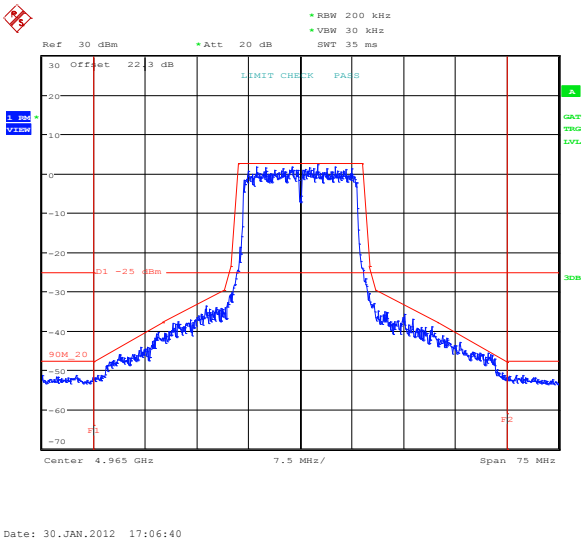
8.5.4 Test data, continued



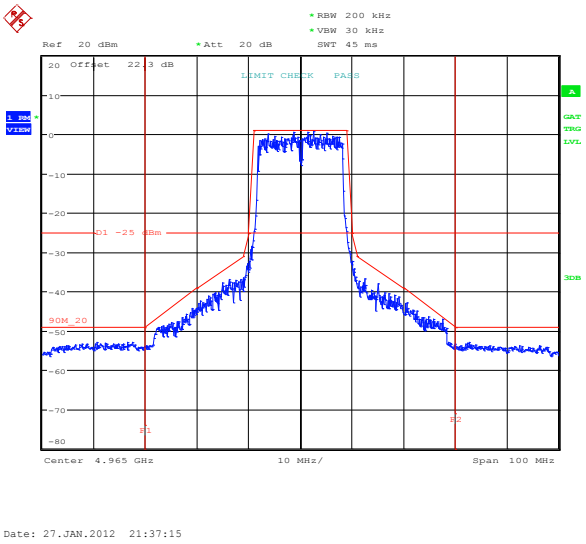
Plot 8.5-46: Emission mask for 20 MHz channel, antenna port 2, mid frequency, BPSK



Plot 8.5-47: Emission mask for 20 MHz channel, antenna port 2, mid frequency, QPSK

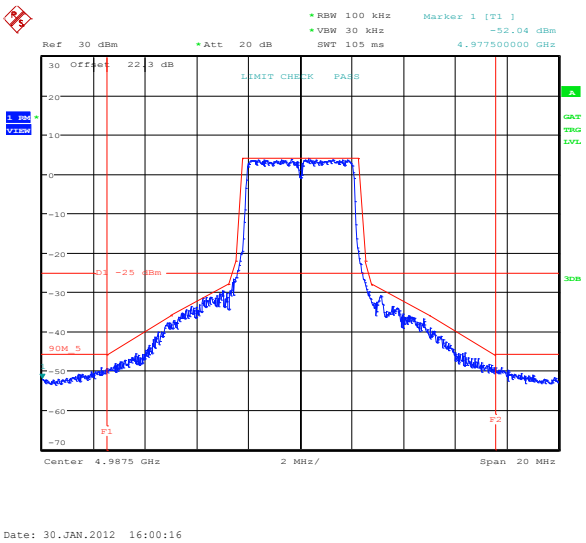


Plot 8.5-48: Emission mask for 20 MHz channel, antenna port 2, mid frequency, 16-QAM

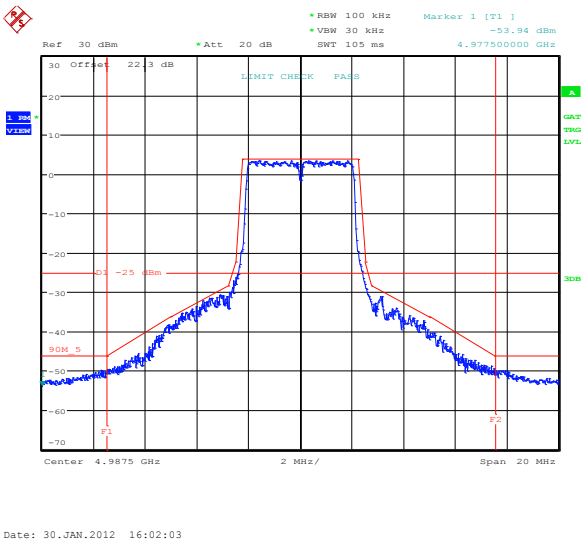


Plot 8.5-49: Emission mask for 20 MHz channel, antenna port 2, mid frequency, 64-QAM

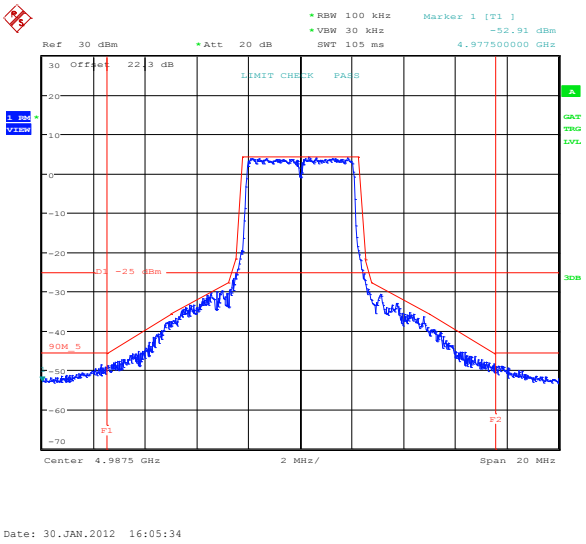
8.5.4 Test data, continued



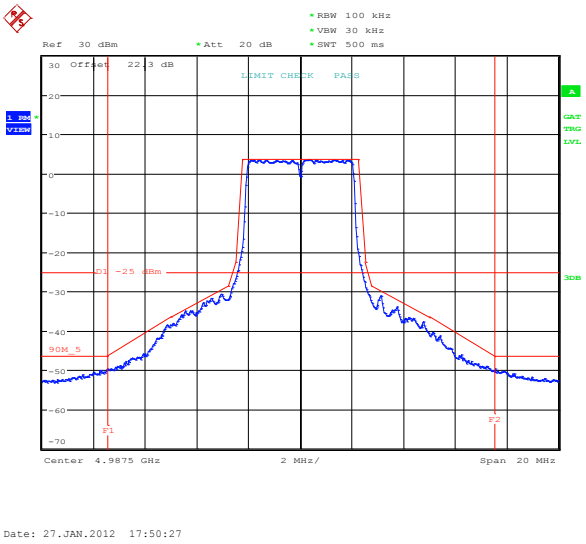
Plot 8.5-50: Emission mask for 5 MHz channel, antenna port 1, high frequency, BPSK



Plot 8.5-51: Emission mask for 5 MHz channel, antenna port 1, high frequency, QPSK

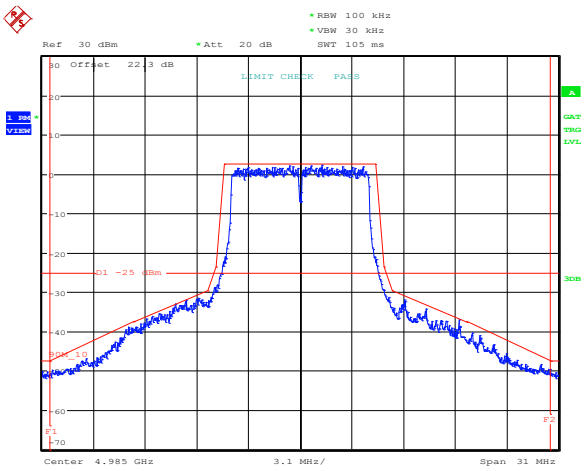


Plot 8.5-52: Emission mask for 5 MHz channel, antenna port 1, high frequency, 16-QAM

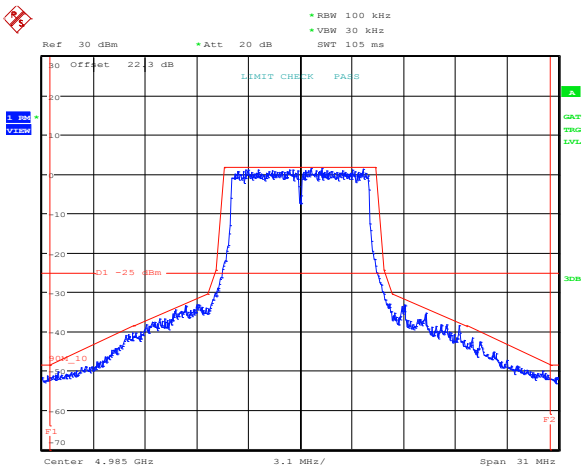


Plot 8.5-53: Emission mask for 5 MHz channel, antenna port 1, high frequency, 64-QAM

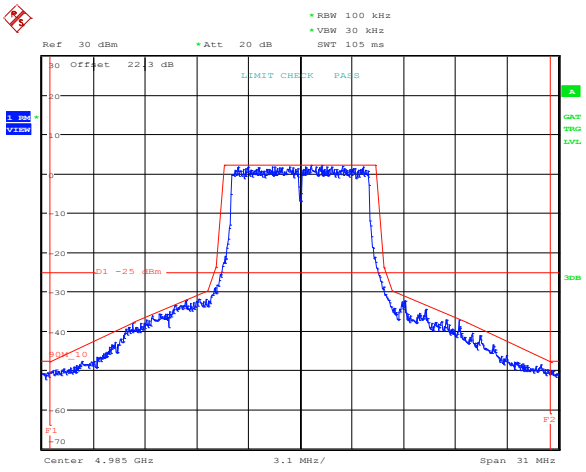
8.5.4 Test data, continued



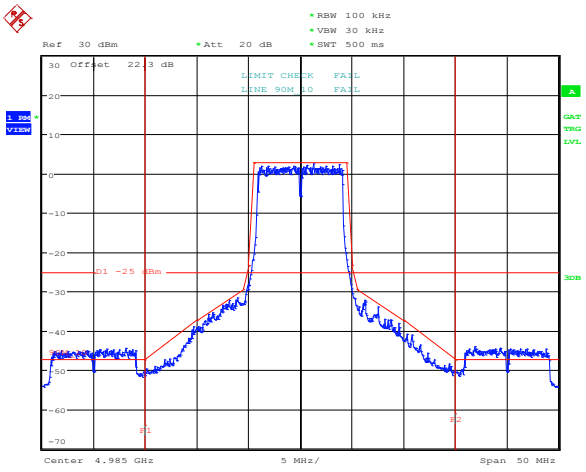
Plot 8.5-54: Emission mask for 10 MHz channel, antenna port 1, high frequency, BPSK



Plot 8.5-55: Emission mask for 10 MHz channel, antenna port 1, high frequency, QPSK



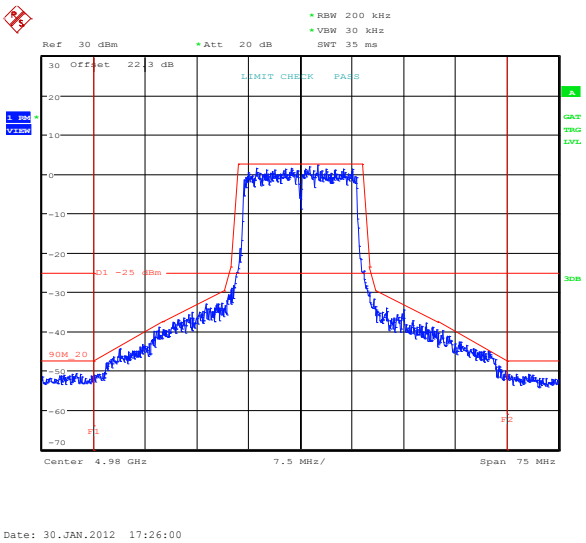
Plot 8.5-56: Emission mask for 10 MHz channel, antenna port 1, high frequency, 16-QAM



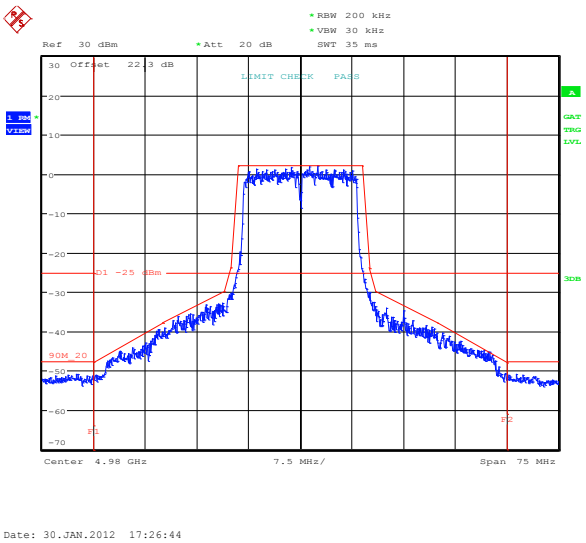
Plot 8.5-57: Emission mask for 10 MHz channel, antenna port 1, high frequency, 64-QAM

Note: Below vertical line *F1* and above *F2* the limit line of −25 dBm applies

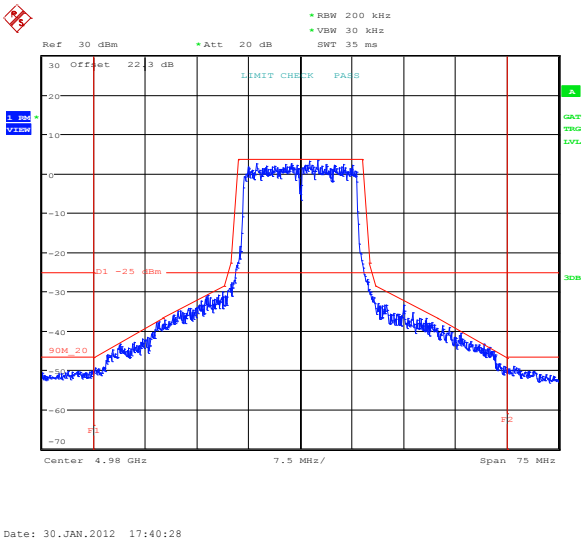
8.5.4 Test data, continued



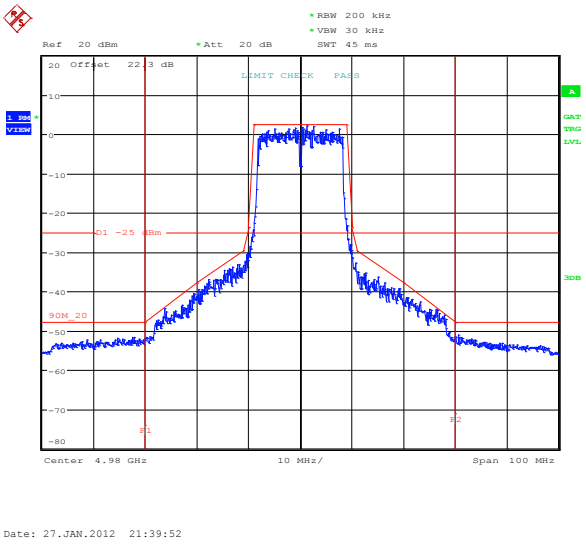
Plot 8.5-58: Emission mask for 20 MHz channel, antenna port 1, high frequency, BPSK



Plot 8.5-59: Emission mask for 20 MHz channel, antenna port 1, high frequency, QPSK

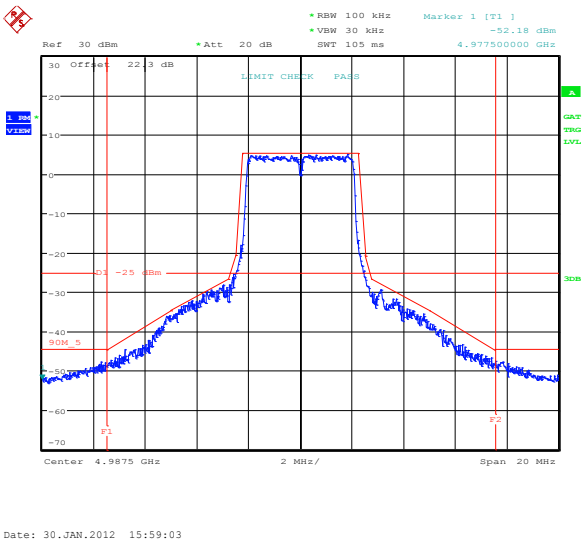


Plot 8.5-60: Emission mask for 20 MHz channel, antenna port 1, high frequency, 16-QAM

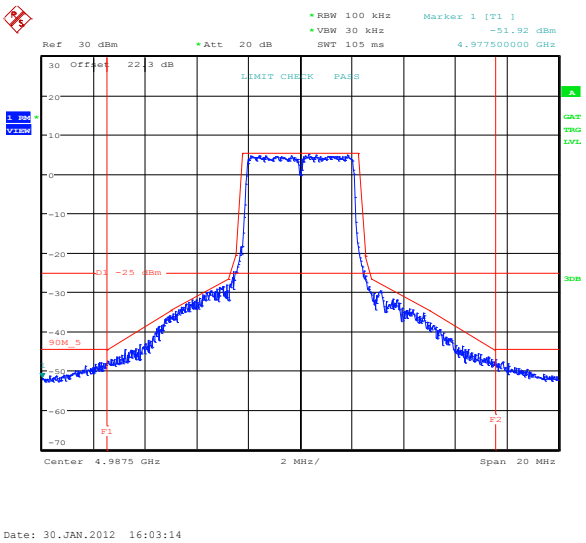


Plot 8.5-61: Emission mask for 20 MHz channel, antenna port 1, high frequency, 64-QAM

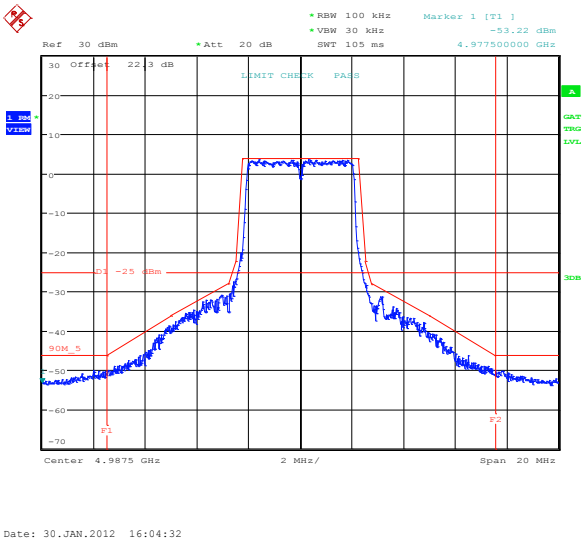
8.5.4 Test data, continued



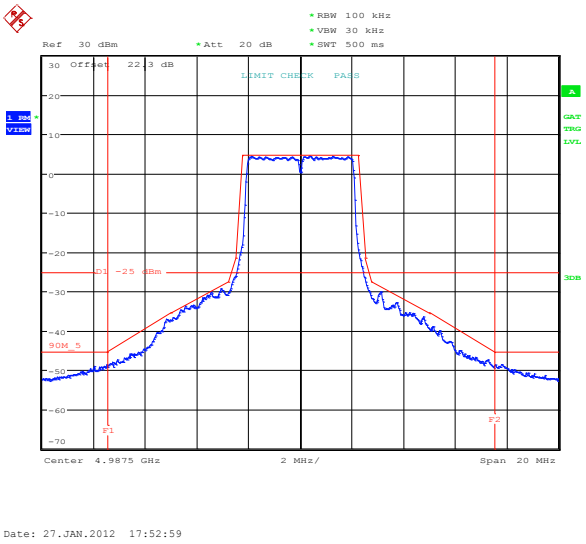
Plot 8.5-62: Emission mask for 5 MHz channel, antenna port 2, high frequency, BPSK



Plot 8.5-63: Emission mask for 5 MHz channel, antenna port 2, high frequency, QPSK

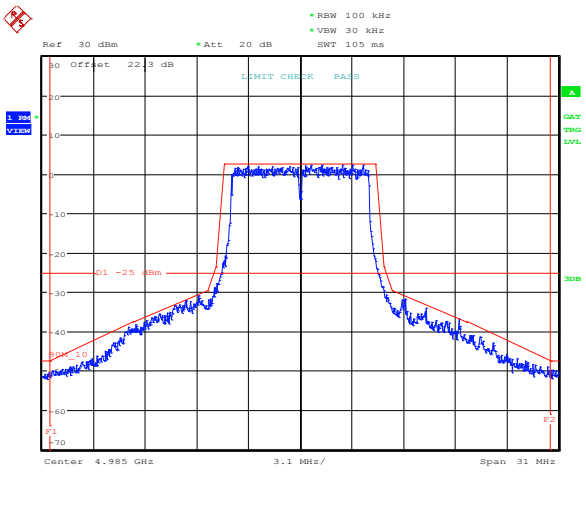


Plot 8.5-64: Emission mask for 5 MHz channel, antenna port 2, high frequency, 16-QAM

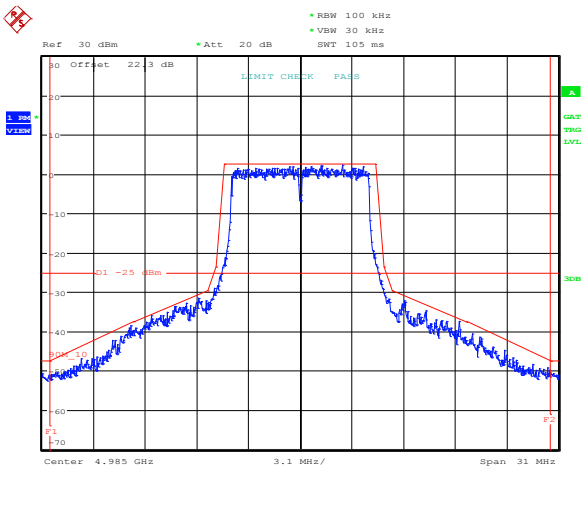


Plot 8.5-65: Emission mask for 5 MHz channel, antenna port 2, high frequency, 64-QAM

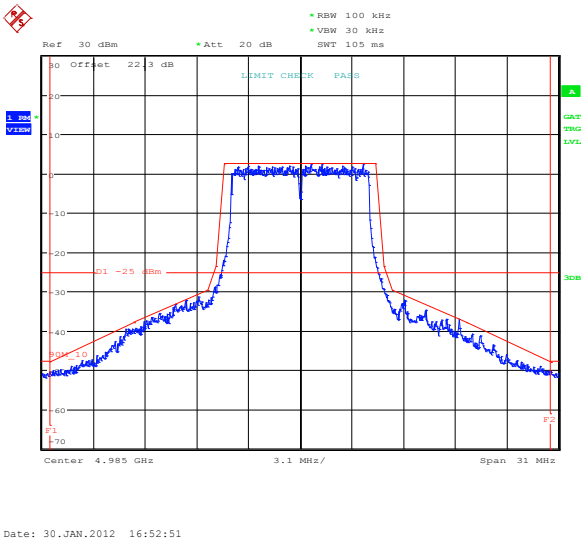
8.5.4 Test data, continued



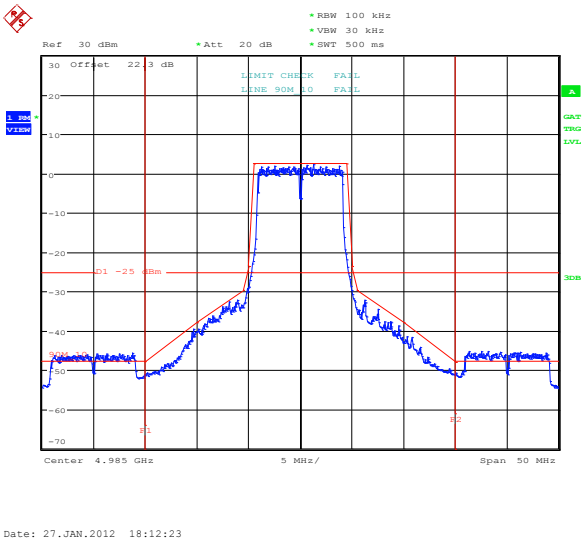
Plot 8.5-66: Emission mask for 10 MHz channel, antenna port 2, high frequency, BPSK



Plot 8.5-67: Emission mask for 10 MHz channel, antenna port 2, high frequency, QPSK



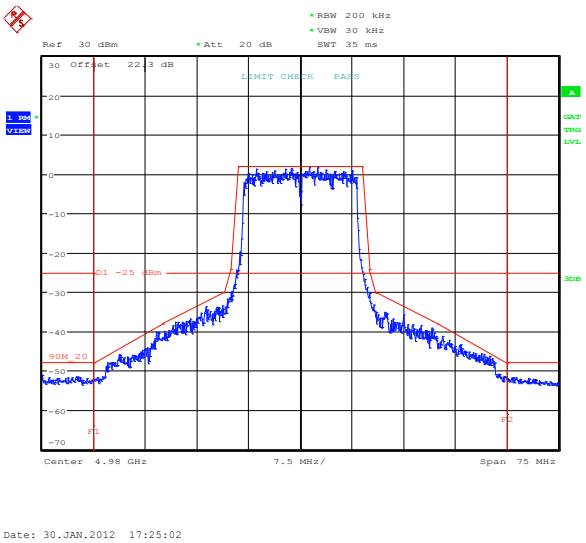
Plot 8.5-68: Emission mask for 10 MHz channel, antenna port 2, high frequency, 16-QAM



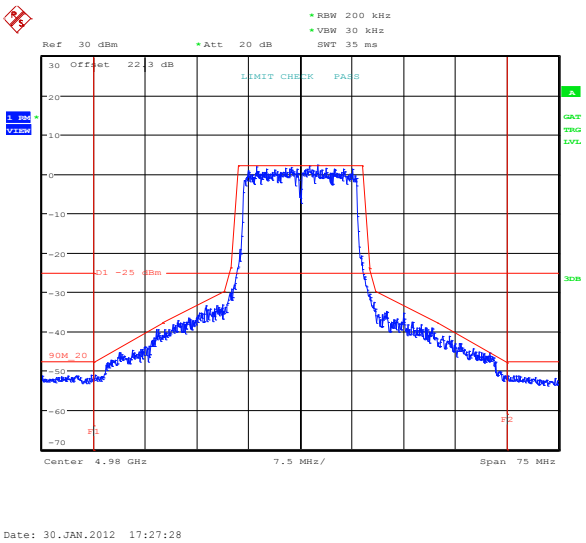
Plot 8.5-69: Emission mask for 10 MHz channel, antenna port 2, high frequency, 64-QAM

Note: Below vertical line *F1* and above *F2* the limit line of −25 dBm applies

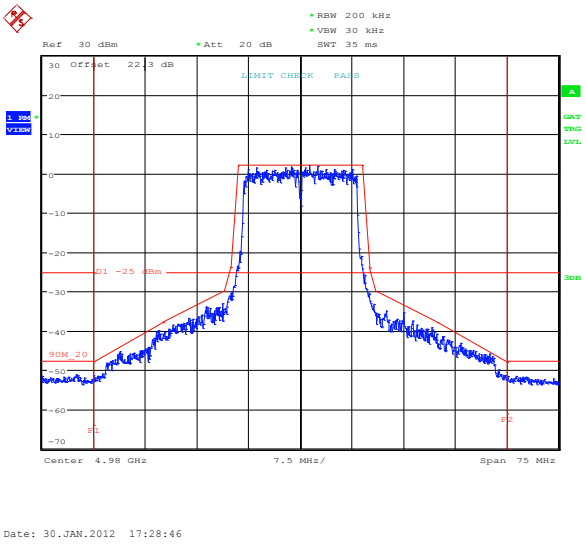
8.5.4 Test data, continued



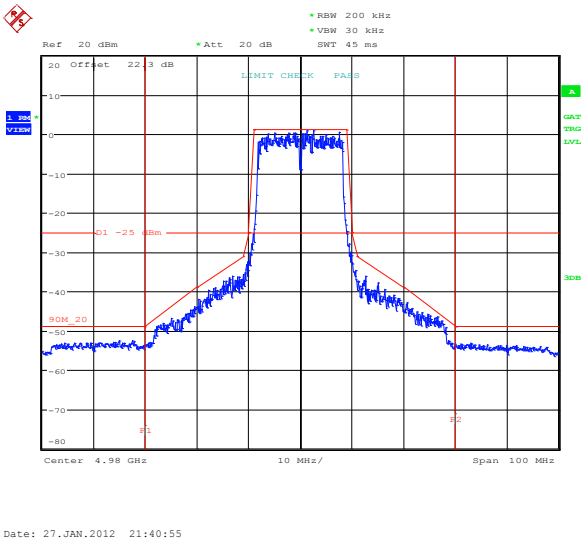
Plot 8.5-70: Emission mask for 20 MHz channel, antenna port 2, high frequency, BPSK



Plot 8.5-71: Emission mask for 20 MHz channel, antenna port 2, high frequency, QPSK

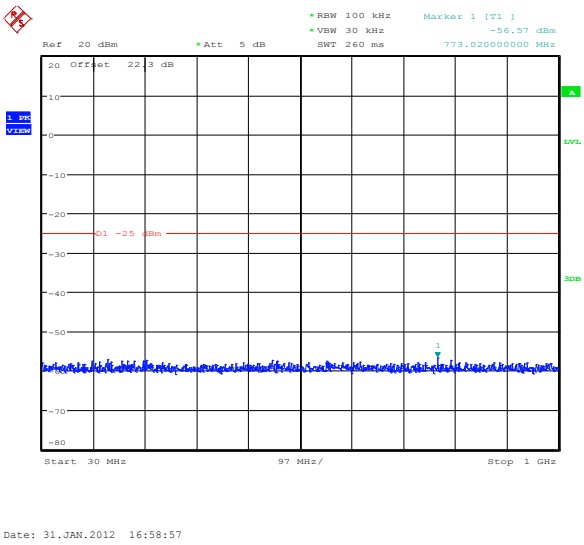


Plot 8.5-72: Emission mask for 20 MHz channel, antenna port 2, high frequency, 16-QAM

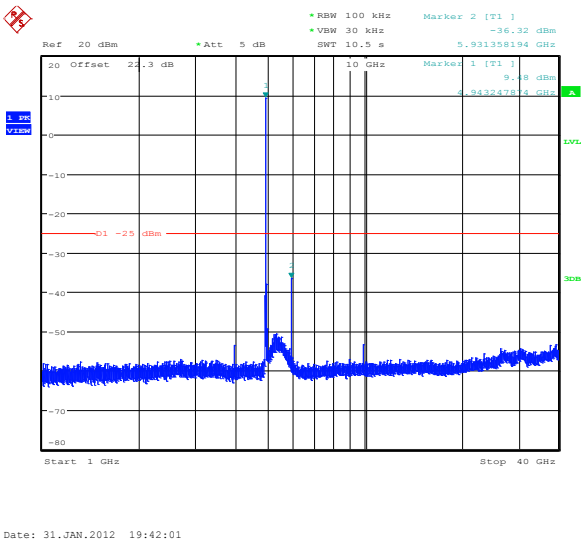


Plot 8.5-73: Emission mask for 20 MHz channel, antenna port 2, high frequency, 64-QAM

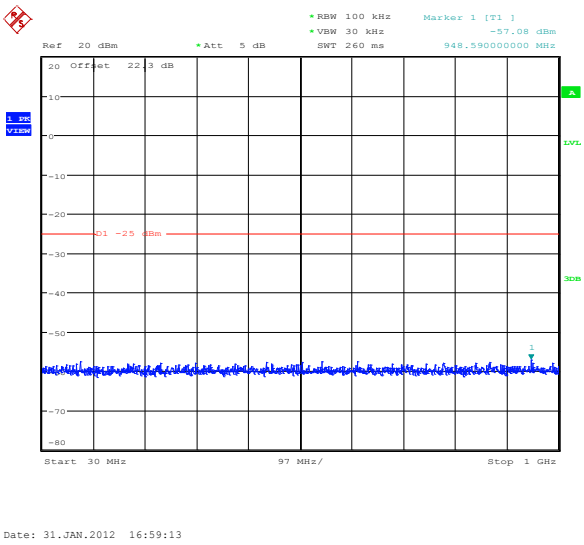
8.5.4 Test data, continued



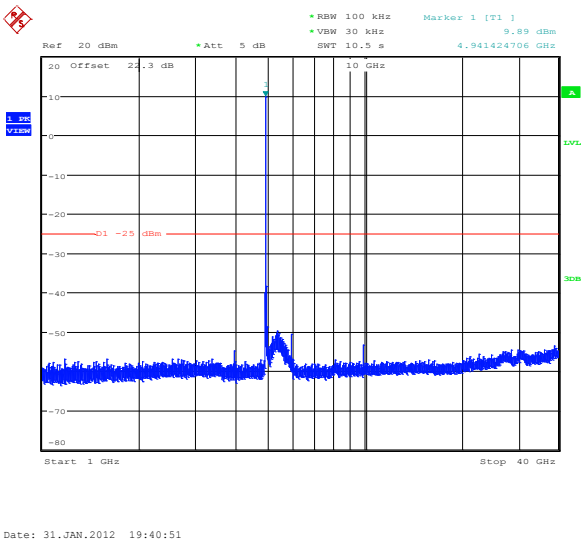
Plot 8.5-74: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, low frequency, BPSK



Plot 8.5-75: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, low frequency, BPSK

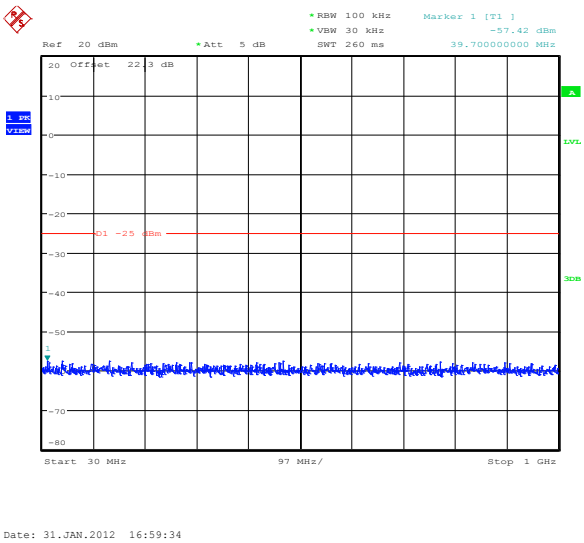


Plot 8.5-76: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, low frequency, QPSK

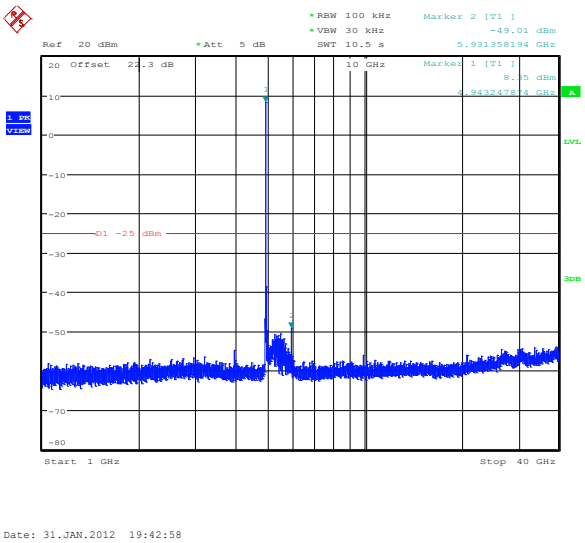


Plot 8.5-77: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, low frequency, QPSK

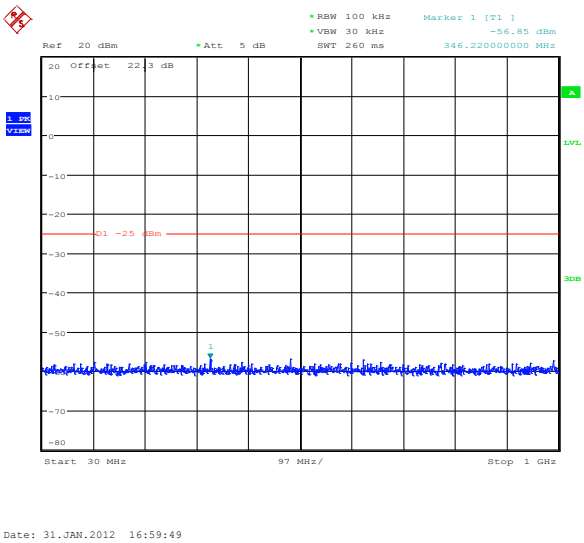
8.5.1 Test data, continued



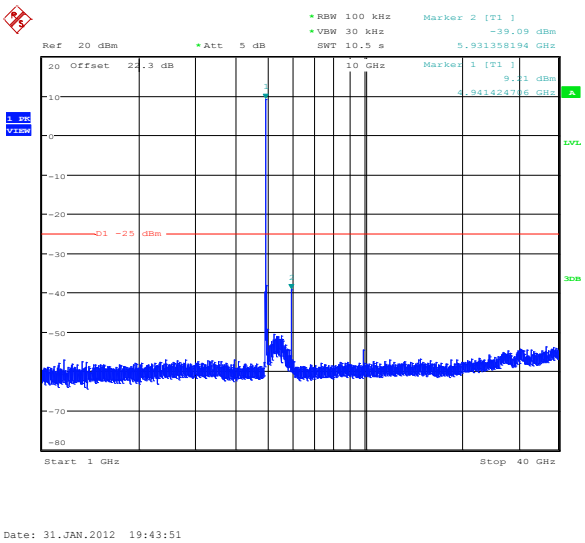
Plot 8.5-78: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, low frequency, 16-QAM



Plot 8.5-79: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, low frequency, 16-QAM

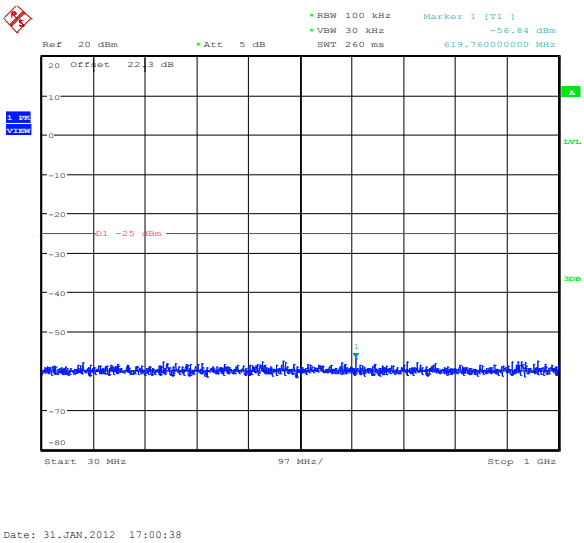


Plot 8.5-80: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, low frequency, 64-QAM

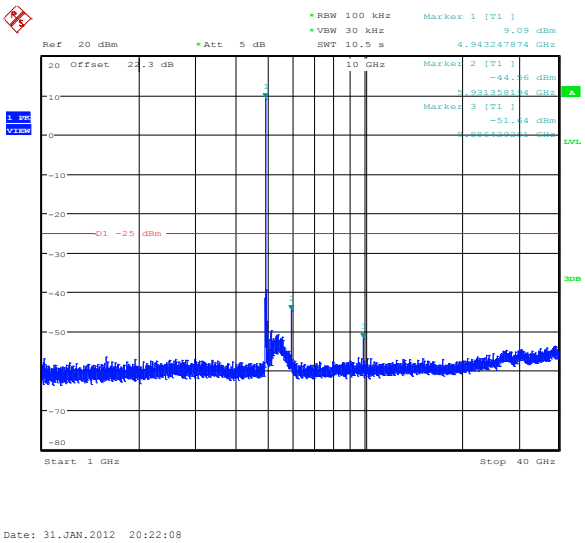


Plot 8.5-81: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, low frequency, 64-QAM

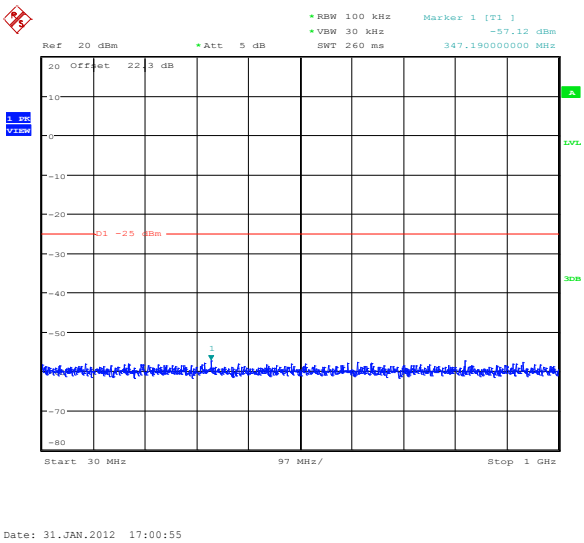
8.5.1 Test data, continued



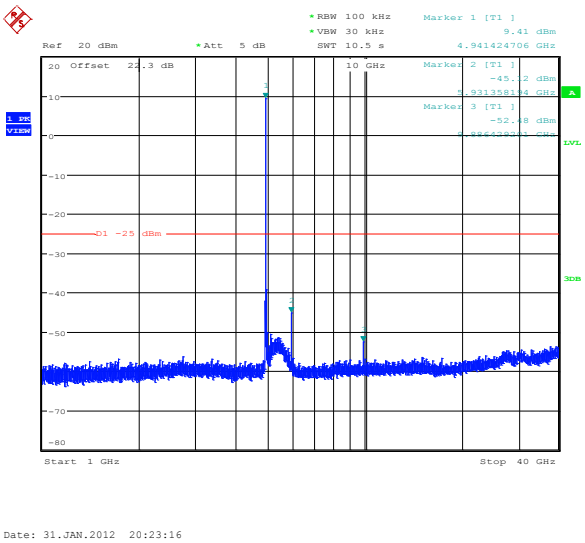
Plot 8.5-82: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, low frequency, BPSK



Plot 8.5-83: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, low frequency, BPSK

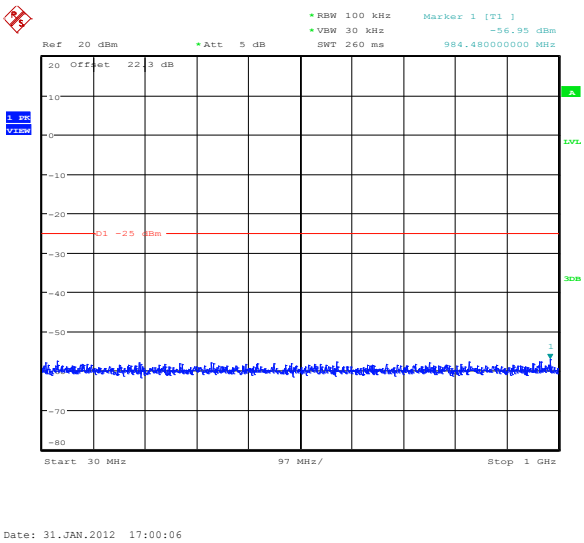


Plot 8.5-84: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, low frequency, QPSK

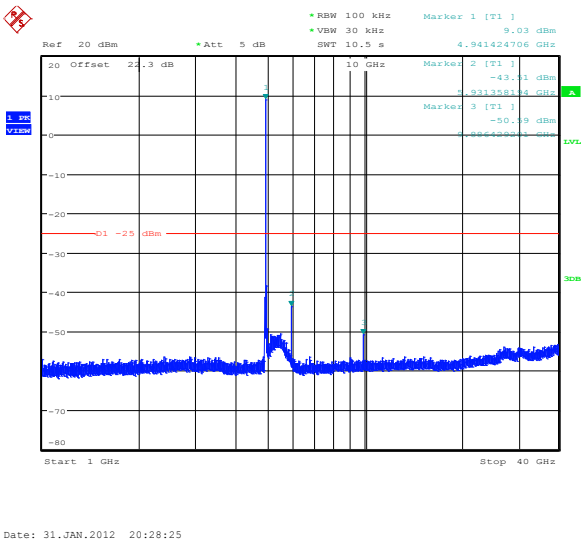


Plot 8.5-85: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, low frequency, QPSK

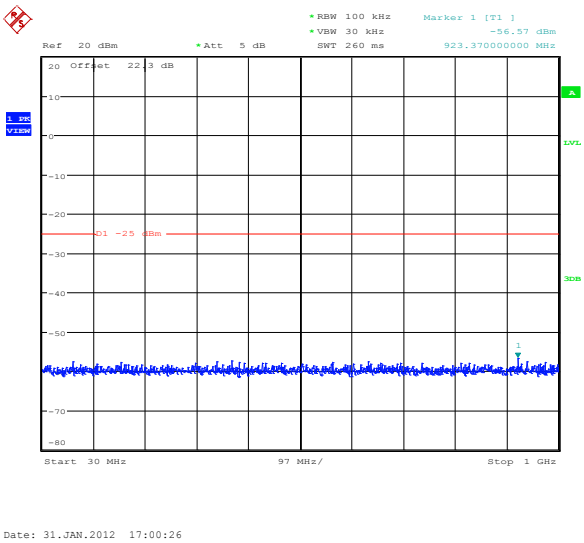
8.5.1 Test data, continued



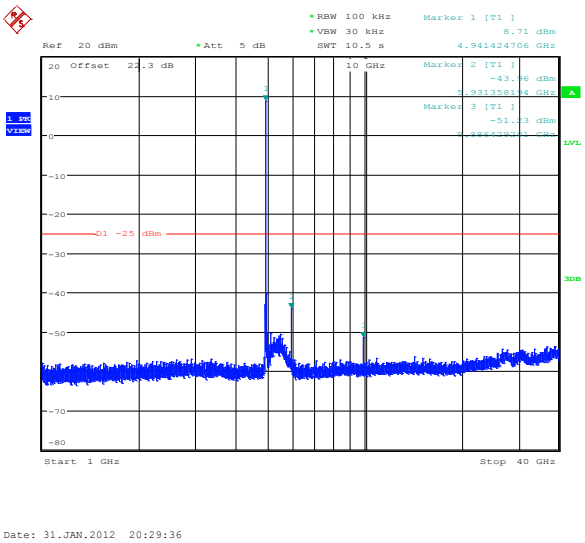
Plot 8.5-86: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, low frequency, 16-QAM



Plot 8.5-87: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, low frequency, 16-QAM

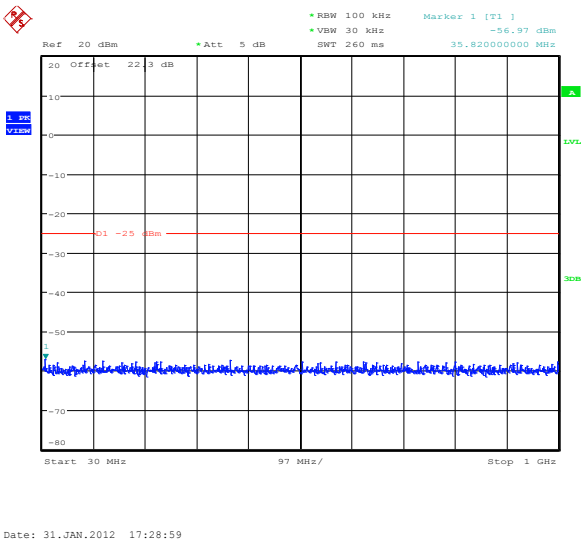


Plot 8.5-88: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, low frequency, 64-QAM

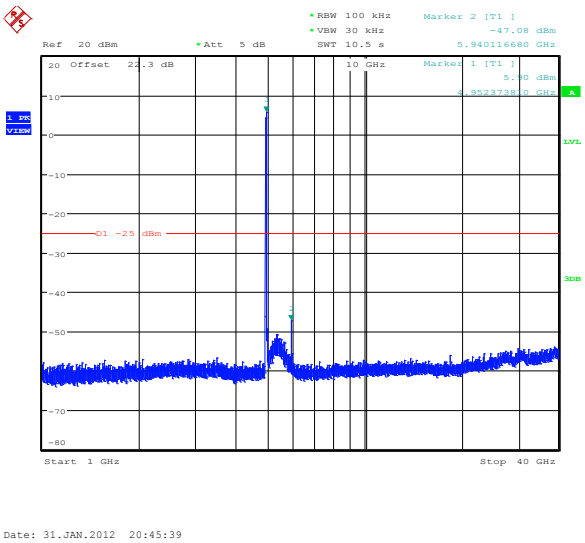


Plot 8.5-89: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, low frequency, 64-QAM

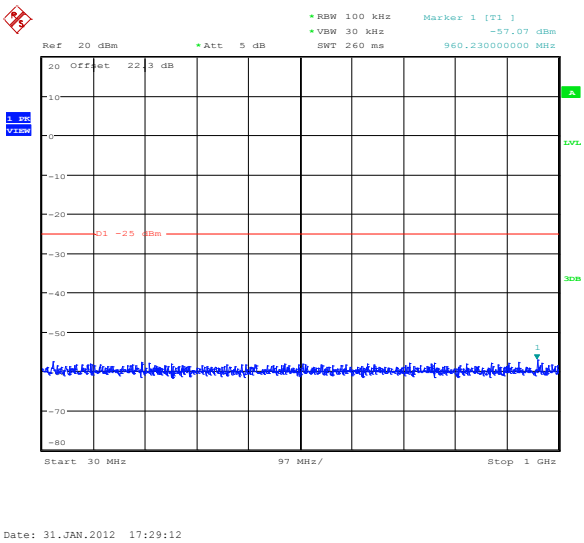
8.5.1 Test data, continued



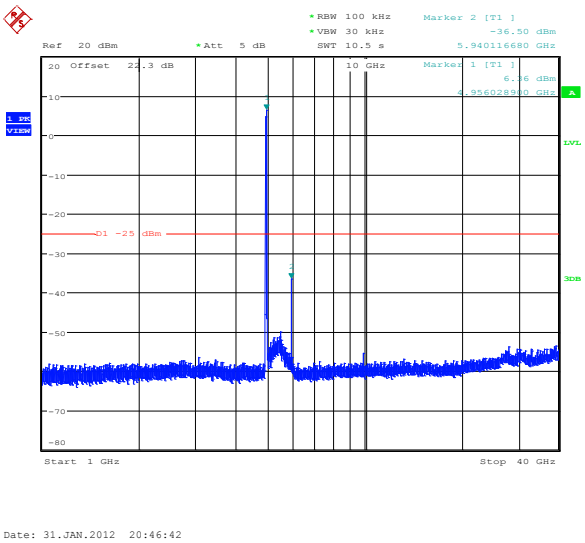
Plot 8.5-90: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, low frequency, BPSK



Plot 8.5-91: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, low frequency, BPSK

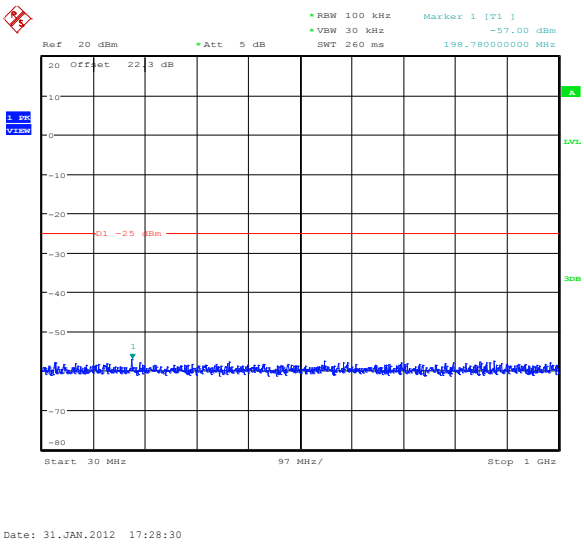


Plot 8.5-92: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, low frequency, QPSK

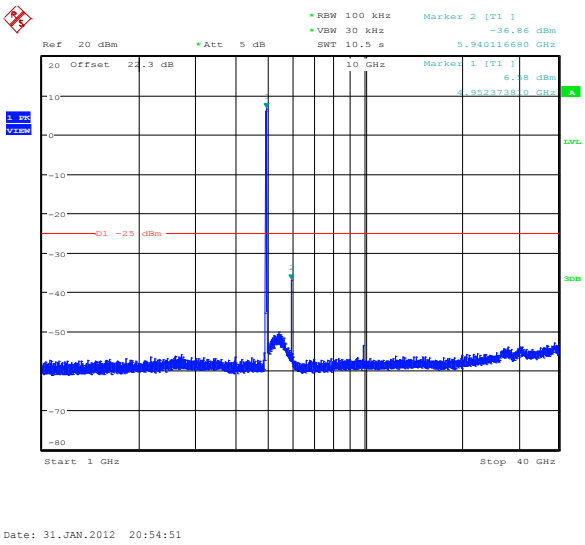


Plot 8.5-93: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, low frequency, QPSK

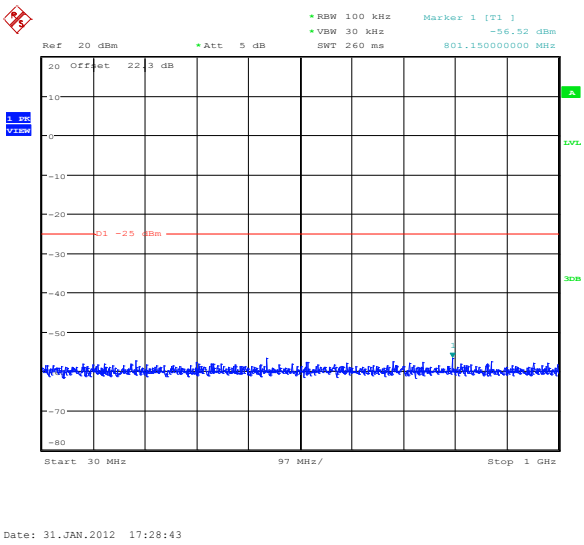
8.5.1 Test data, continued



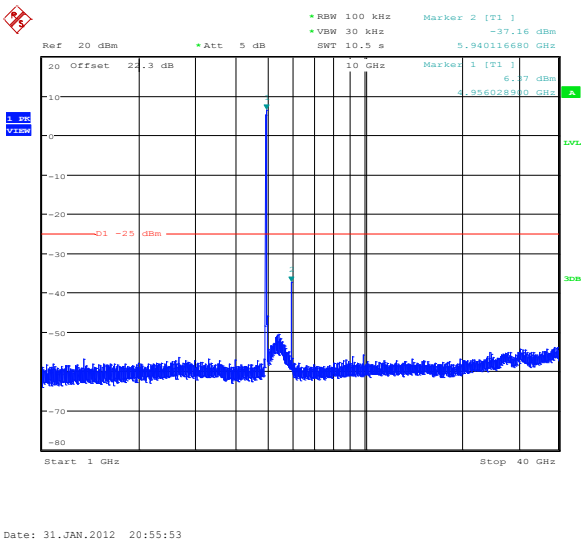
Plot 8.5-94: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, low frequency, 16-QAM



Plot 8.5-95: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, low frequency, 16-QAM

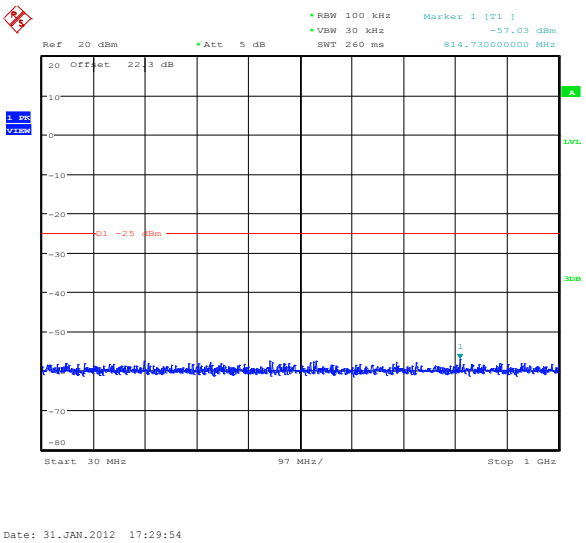


Plot 8.5-96: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, low frequency, 64-QAM

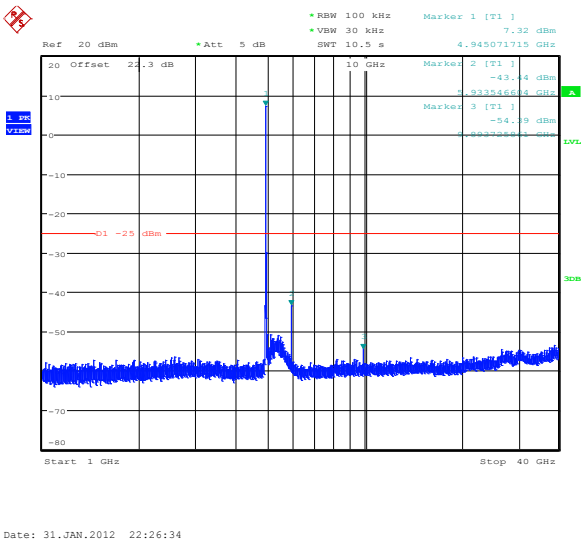


Plot 8.5-97: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, low frequency, 64-QAM

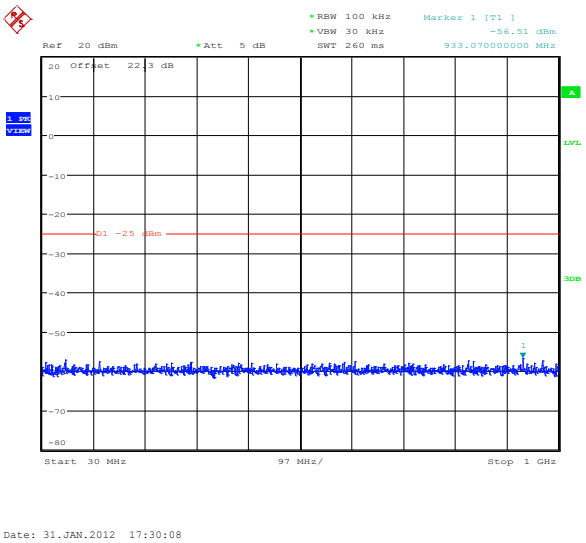
8.5.1 Test data, continued



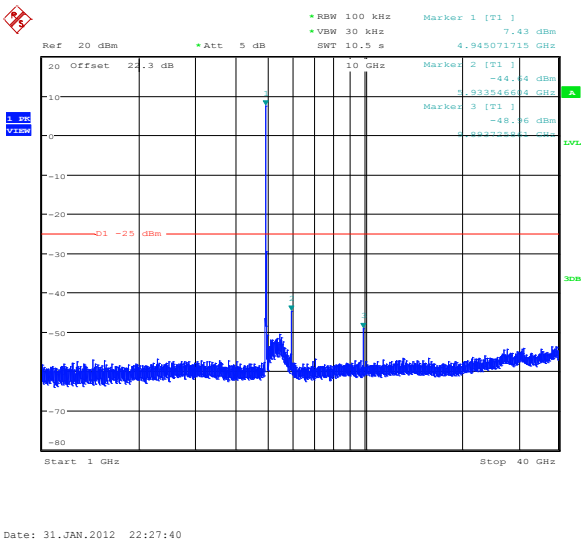
Plot 8.5-98: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, low frequency, BPSK



Plot 8.5-99: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, low frequency, BPSK

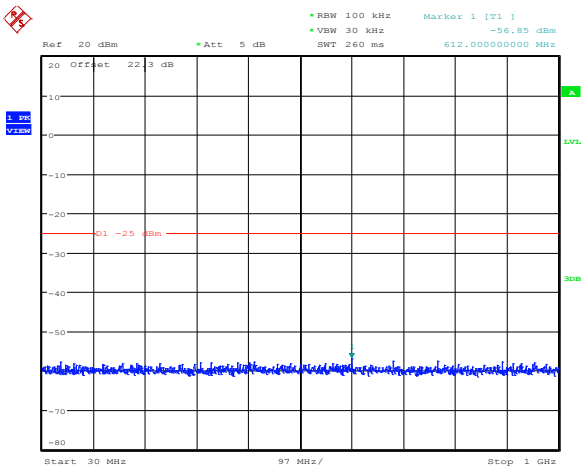


Plot 8.5-100: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, low frequency, QPSK

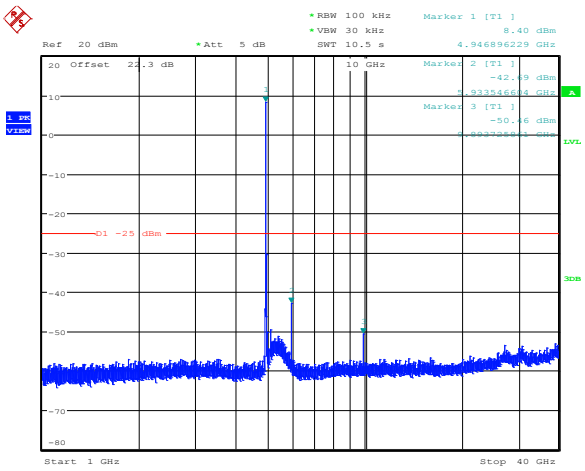


Plot 8.5-101: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, low frequency, QPSK

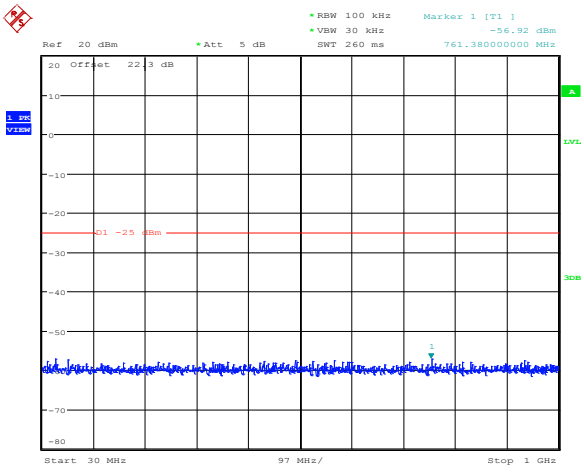
8.5.1 Test data, continued



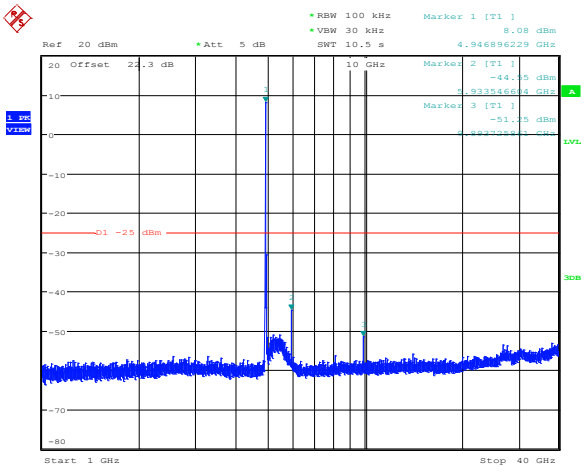
Plot 8.5-102: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, low frequency, 16-QAM



Plot 8.5-103: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, low frequency, 16-QAM

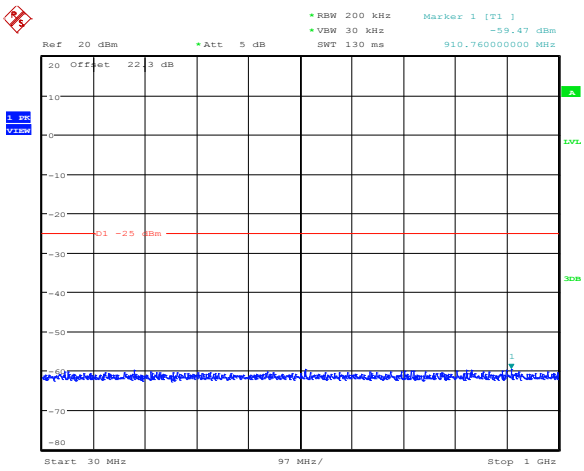


Plot 8.5-104: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, low frequency, 64-QAM

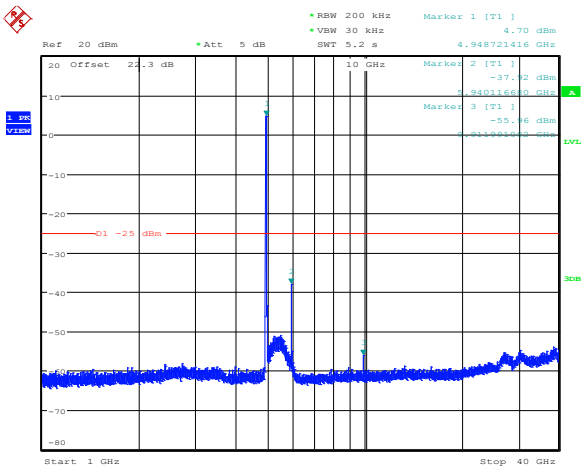


Plot 8.5-105: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, low frequency, 64-QAM

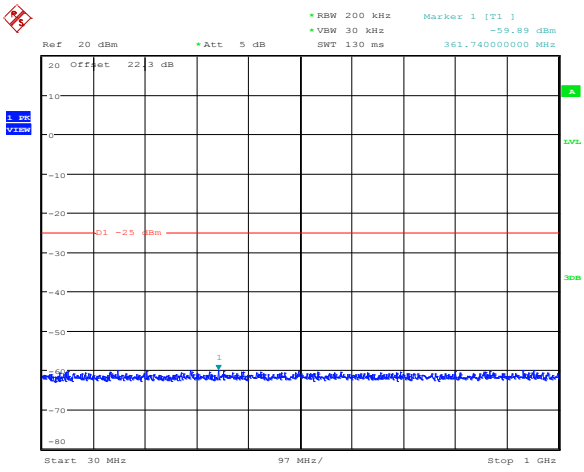
8.5.2 Test data, continued



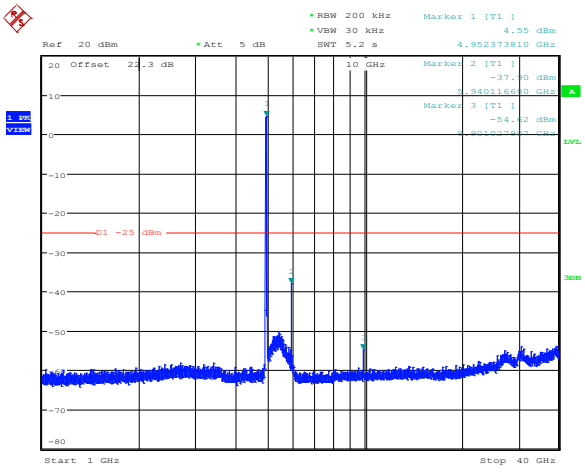
Plot 8.5-106: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, low frequency, BPSK



Plot 8.5-107: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, low frequency, BPSK

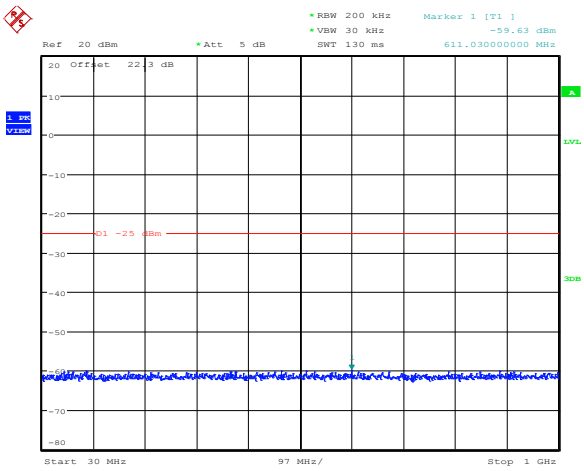


Plot 8.5-108: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, low frequency, QPSK

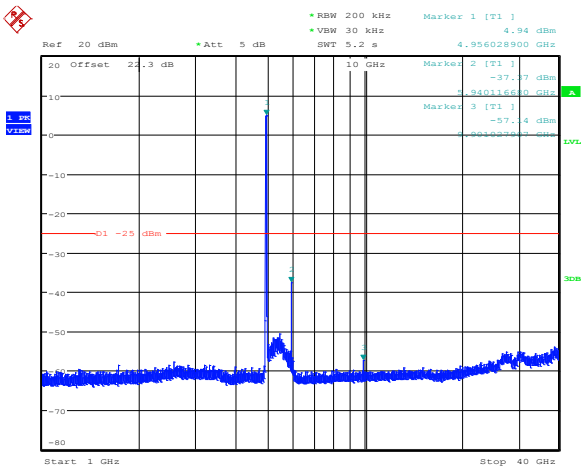


Plot 8.5-109: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, low frequency, QPSK

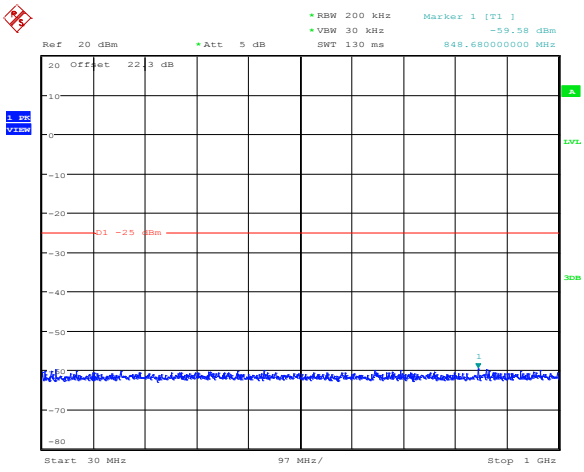
8.5.3 Test data, continued



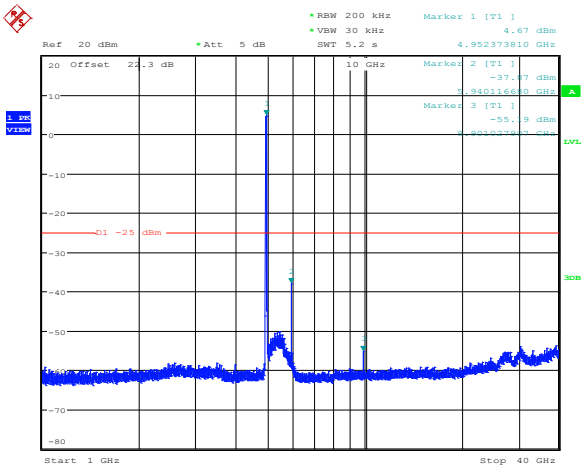
Plot 8.5-110: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, low frequency, 16-QAM



Plot 8.5-111: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, low frequency, 16-QAM

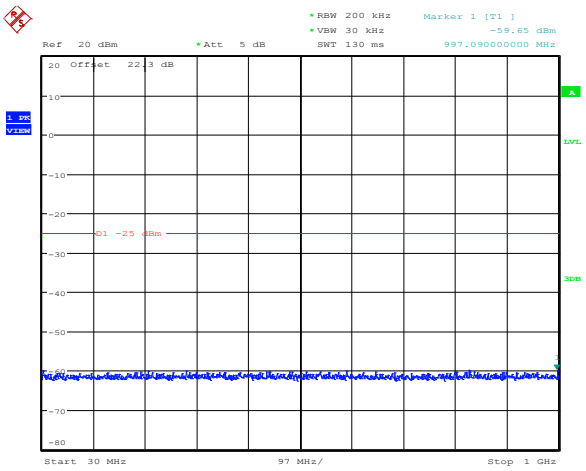


Plot 8.5-112: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, low frequency, 64-QAM

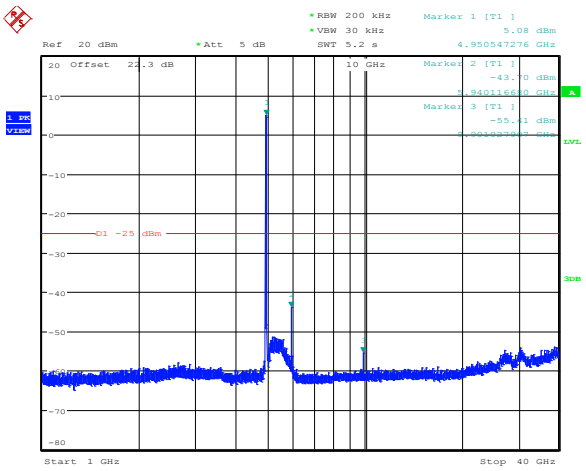


Plot 8.5-113: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, low frequency, 64-QAM

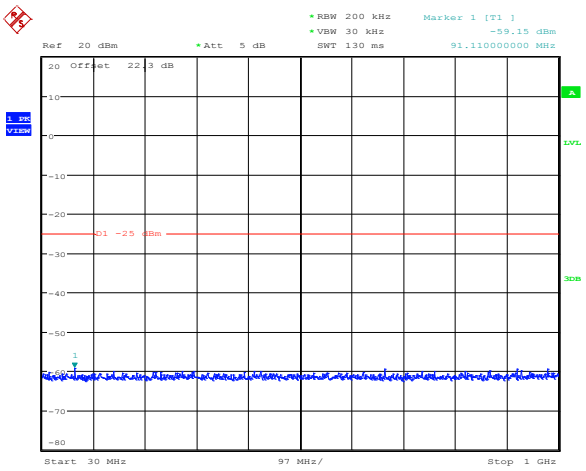
8.5.4 Test data, continued



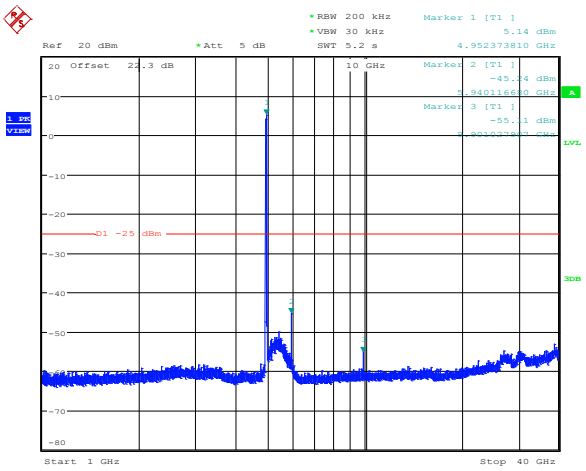
Plot 8.5-114: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, low frequency, BPSK



Plot 8.5-115: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, low frequency, BPSK

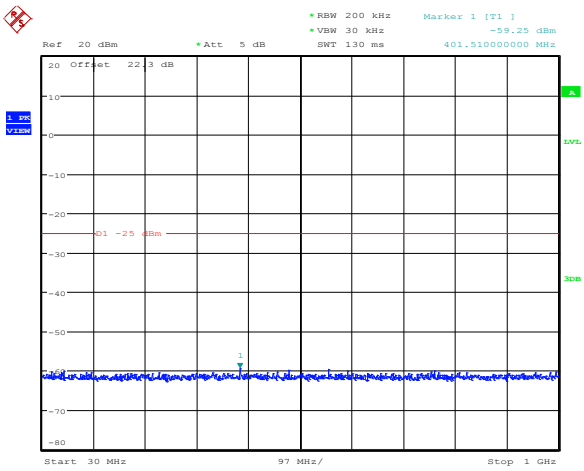


Plot 8.5-116: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, low frequency, QPSK

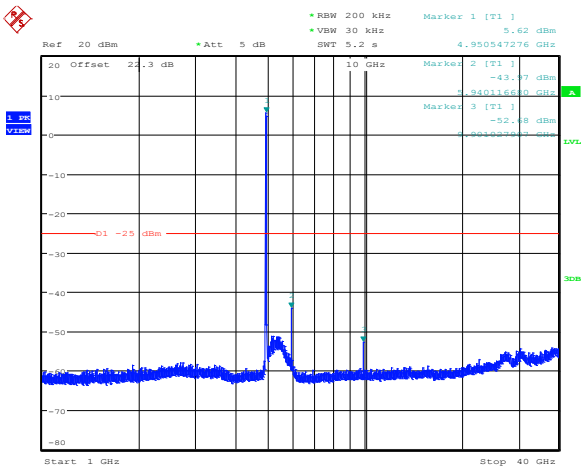


Plot 8.5-117: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, low frequency, QPSK

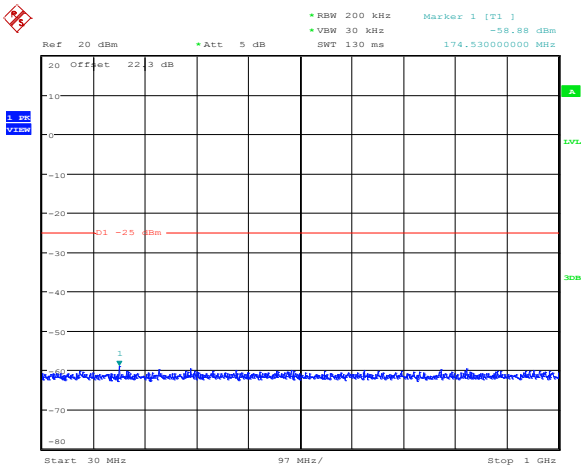
8.5.5 Test data, continued



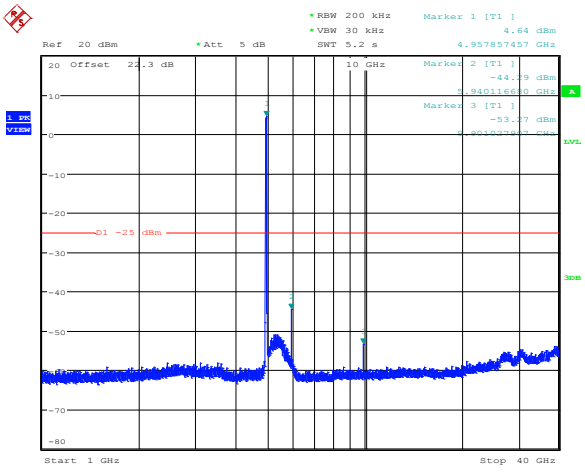
Plot 8.5-118: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, low frequency, 16-QAM



Plot 8.5-119: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, low frequency, 16-QAM

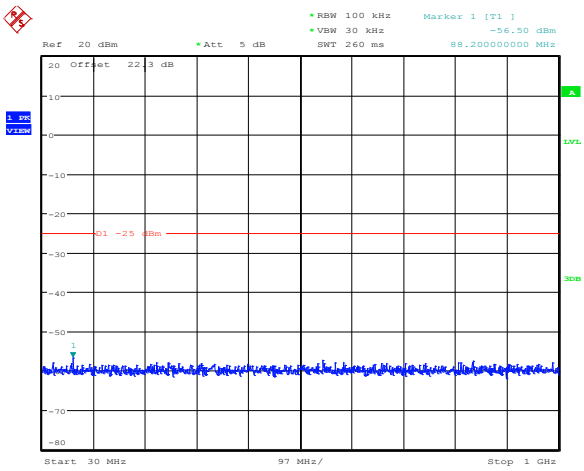


Plot 8.5-120: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, low frequency, 64-QAM

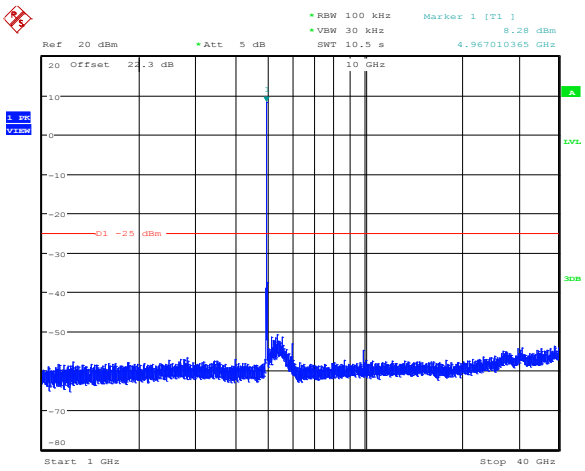


Plot 8.5-121: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, low frequency, 64-QAM

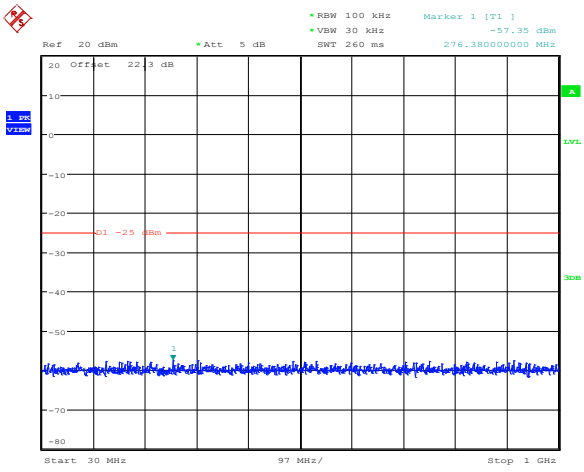
8.5.6 Test data, continued



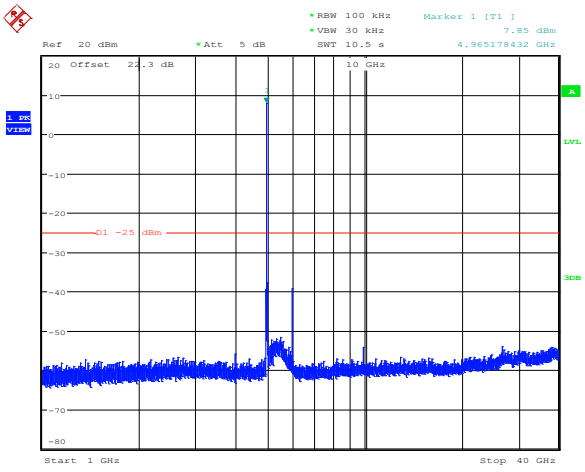
Plot 8.5-122: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, mid frequency, BPSK



Plot 8.5-123: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, mid frequency, BPSK

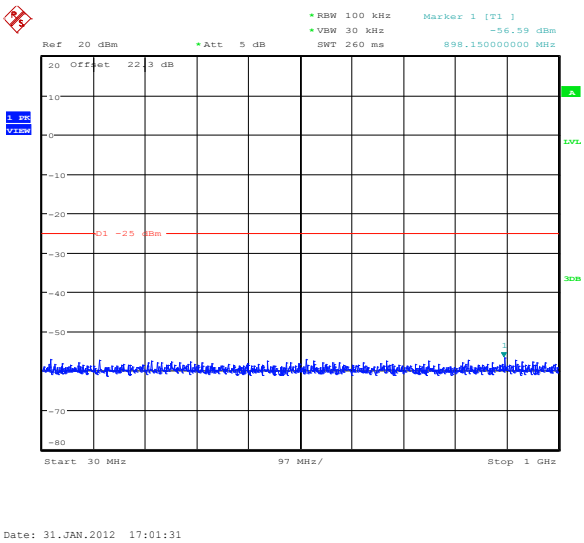


Plot 8.5-124: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, mid frequency, QPSK

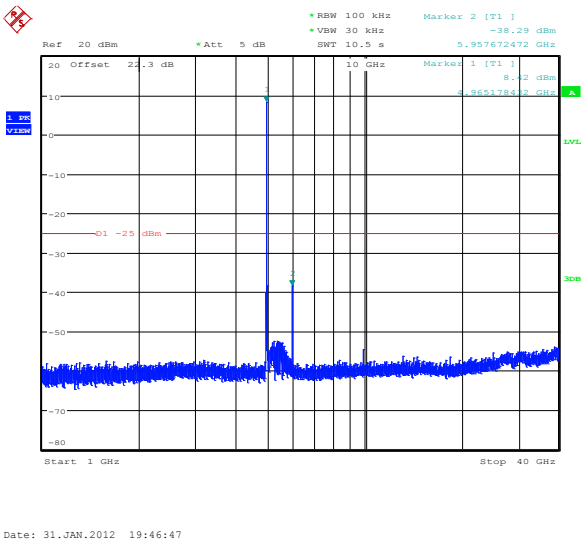


Plot 8.5-125: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, mid frequency, QPSK

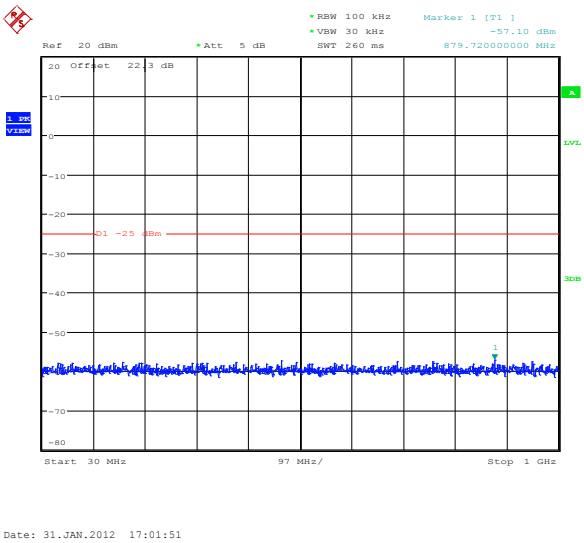
8.5.7 Test data, continued



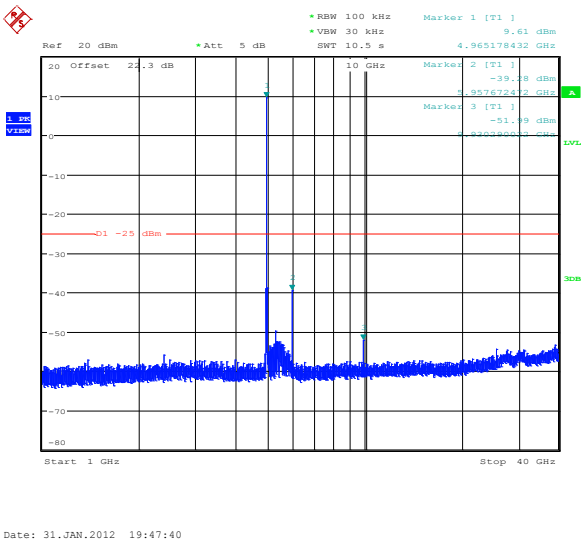
Plot 8.5-126: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, mid frequency, 16-QAM



Plot 8.5-127: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, mid frequency, 16-QAM

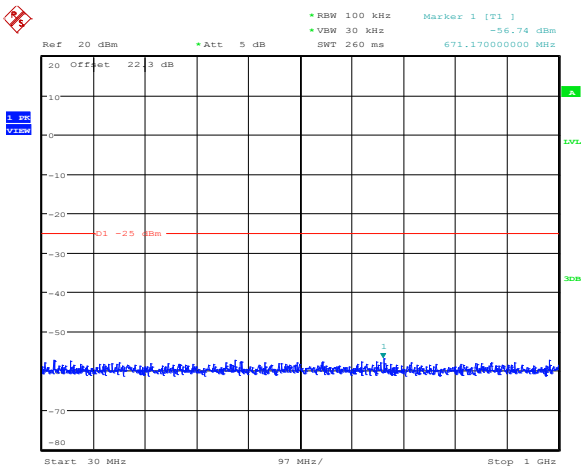


Plot 8.5-128: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, mid frequency, 64-QAM

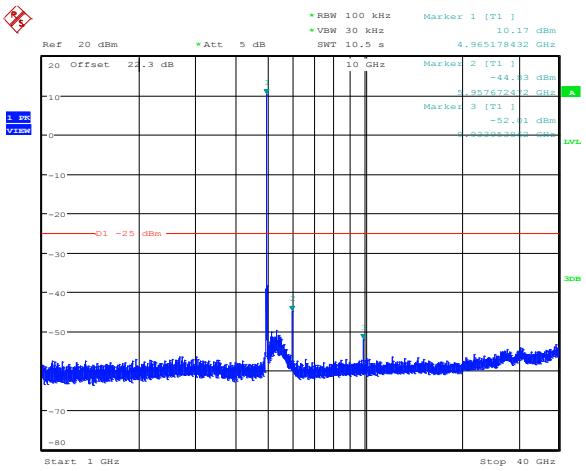


Plot 8.5-129: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, mid frequency, 64-QAM

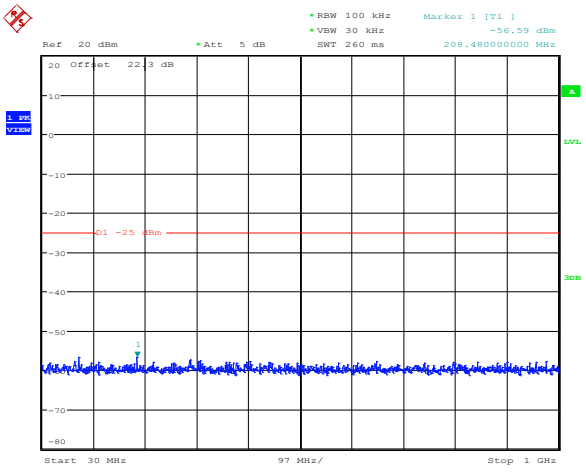
8.5.8 Test data, continued



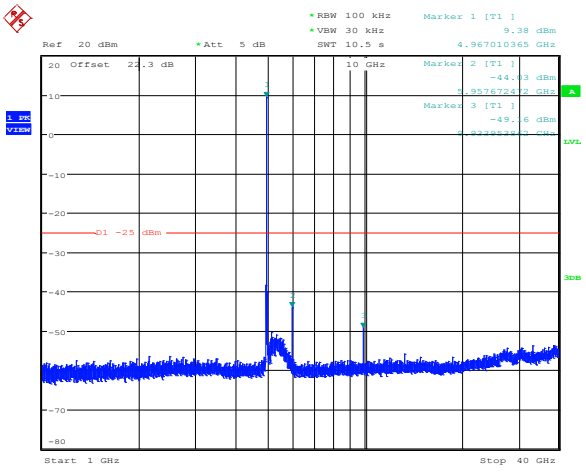
Plot 8.5-130: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, mid frequency, BPSK



Plot 8.5-131: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, mid frequency, BPSK

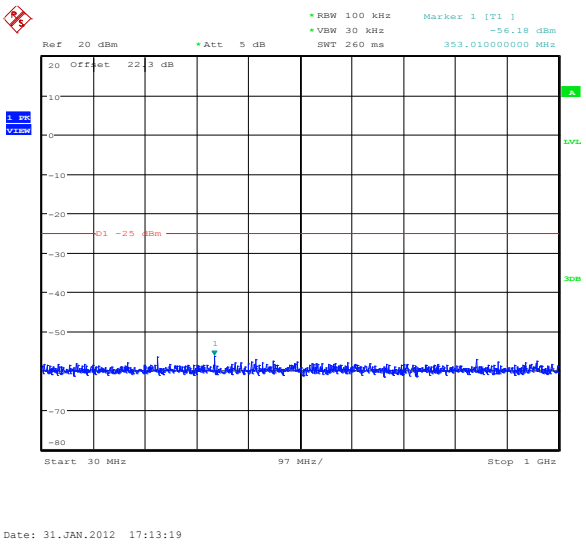


Plot 8.5-132: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, mid frequency, QPSK

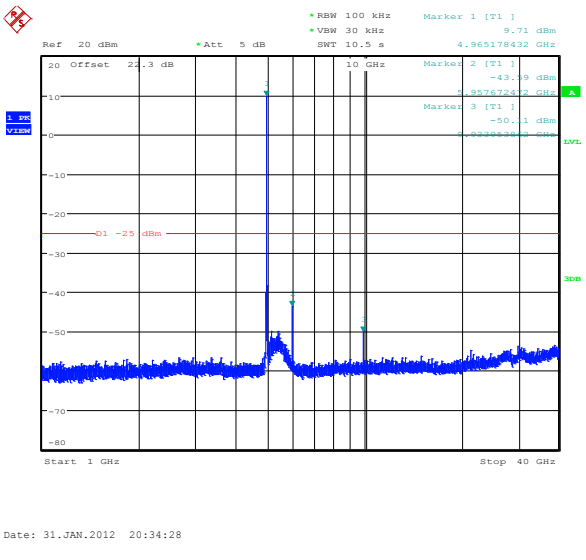


Plot 8.5-133: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, mid frequency, QPSK

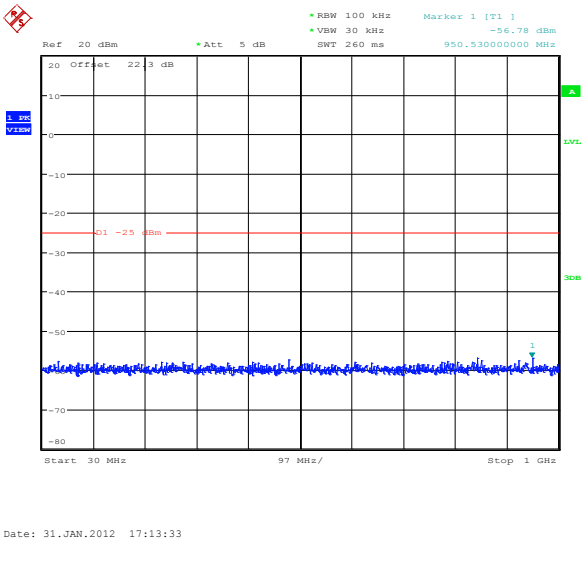
8.5.9 Test data, continued



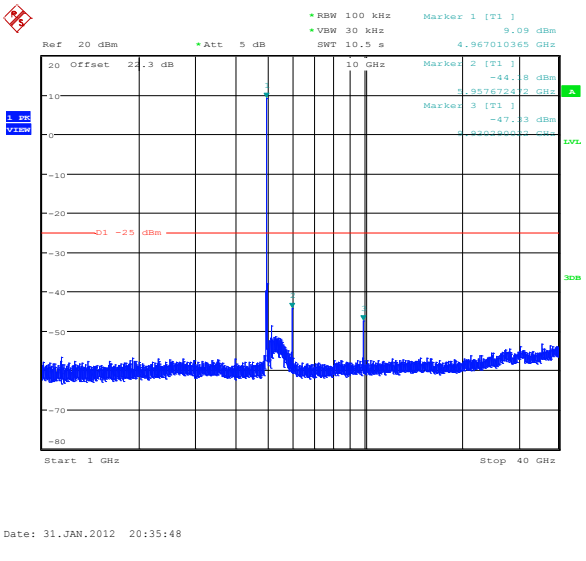
Plot 8.5-134: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, mid frequency, 16-QAM



Plot 8.5-135: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, mid frequency, 16-QAM

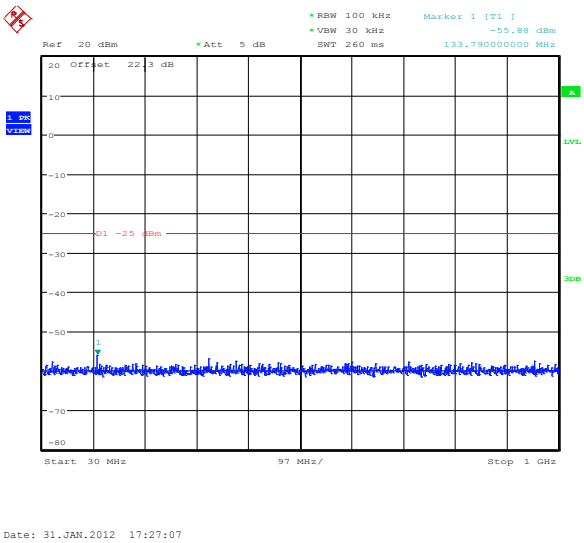


Plot 8.5-136: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, mid frequency, 64-QAM

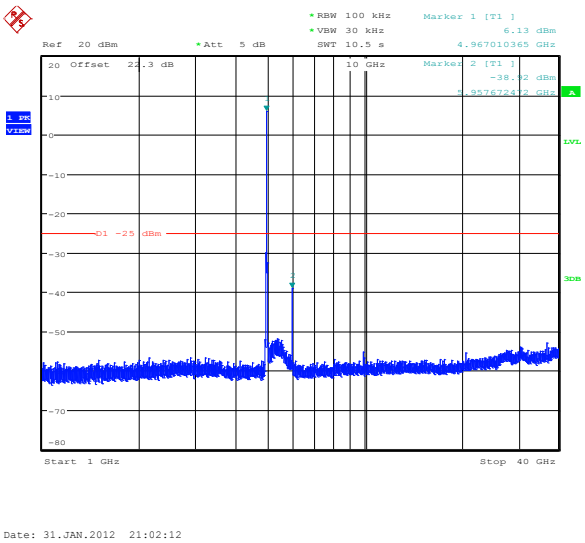


Plot 8.5-137: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, mid frequency, 64-QAM

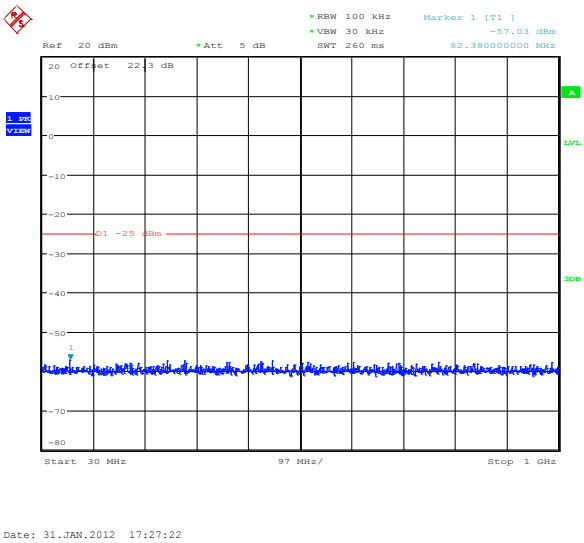
8.5.10 Test data, continued



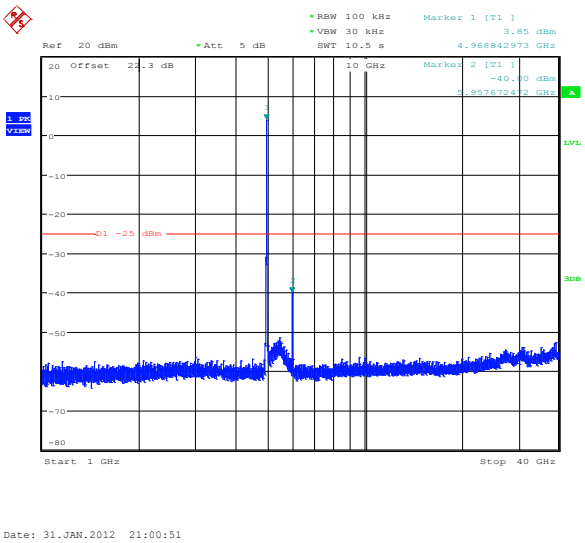
Plot 8.5-138: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, mid frequency, BPSK



Plot 8.5-139: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, mid frequency, BPSK

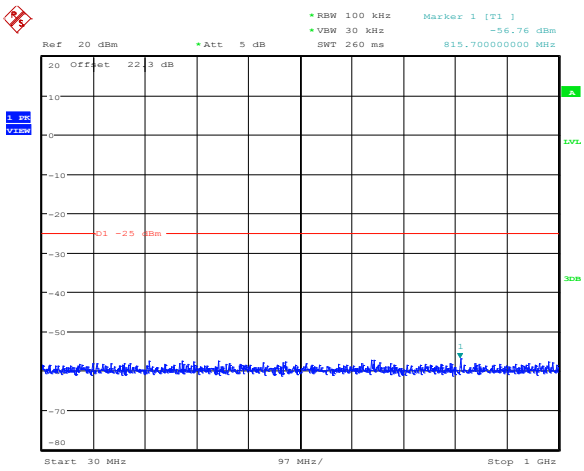


Plot 8.5-140: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, mid frequency, QPSK

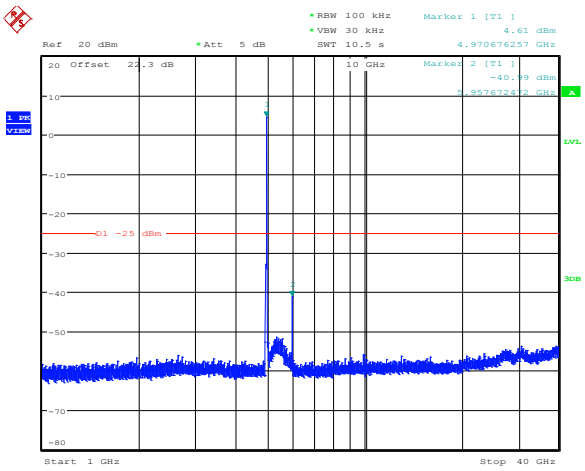


Plot 8.5-141: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, mid frequency, QPSK

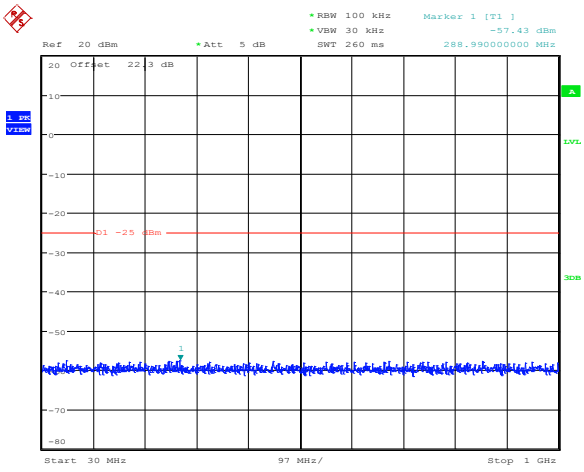
8.5.11 Test data, continued



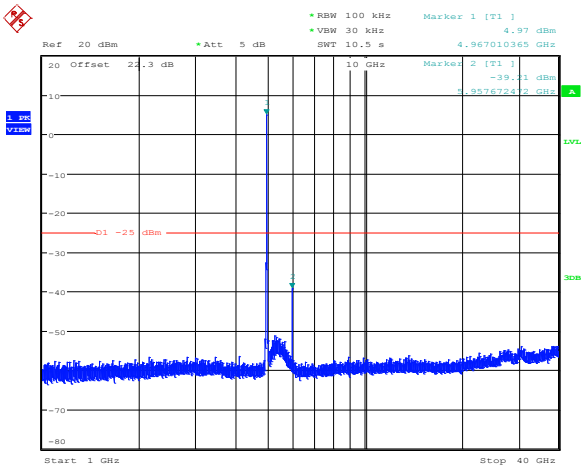
Plot 8.5-142: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, mid frequency, 16-QAM



Plot 8.5-143: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, mid frequency, 16-QAM

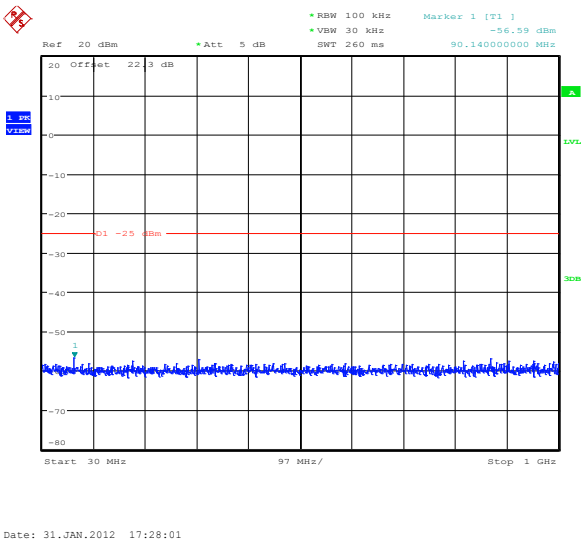


Plot 8.5-144: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, mid frequency, 64-QAM

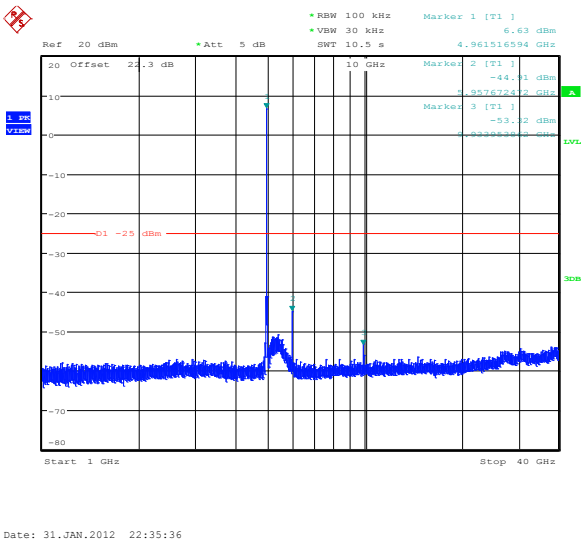


Plot 8.5-145: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, mid frequency, 64-QAM

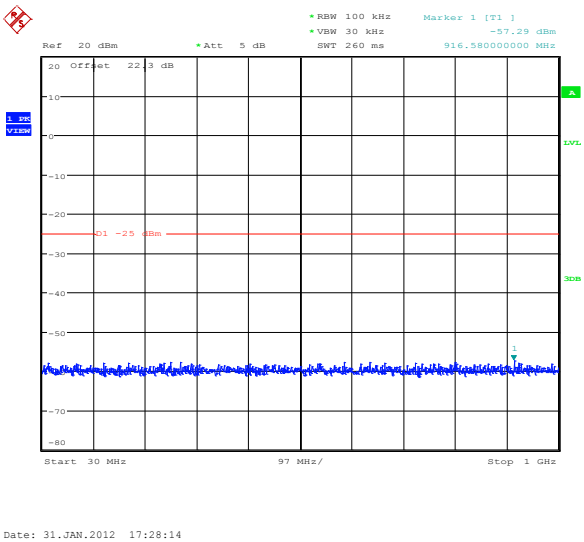
8.5.12 Test data, continued



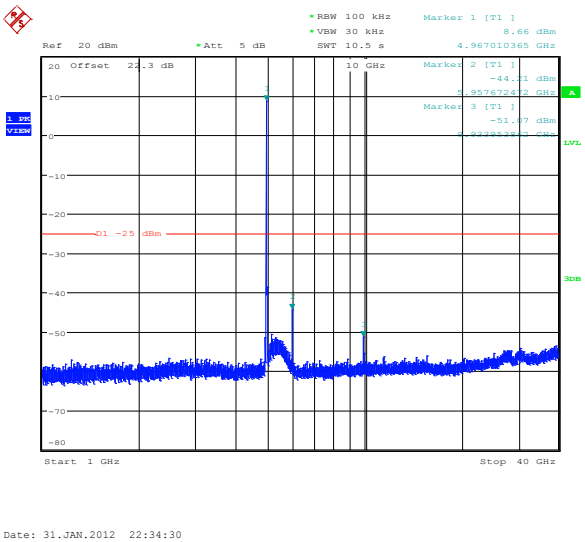
Plot 8.5-146: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, mid frequency, BPSK



Plot 8.5-147: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, mid frequency, BPSK

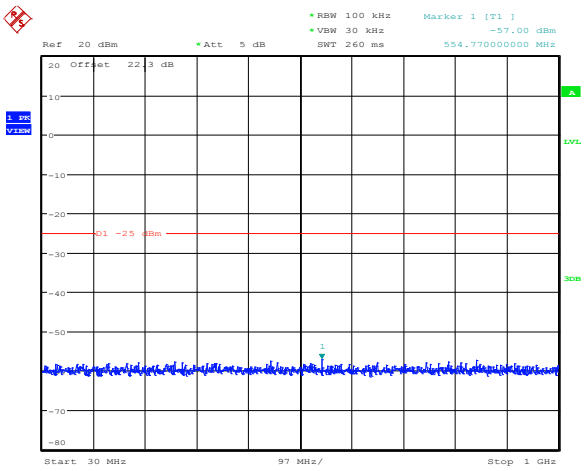


Plot 8.5-148: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, mid frequency, QPSK

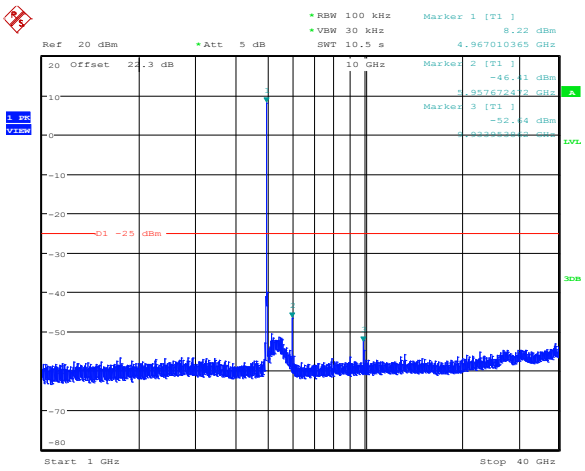


Plot 8.5-149: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, mid frequency, QPSK

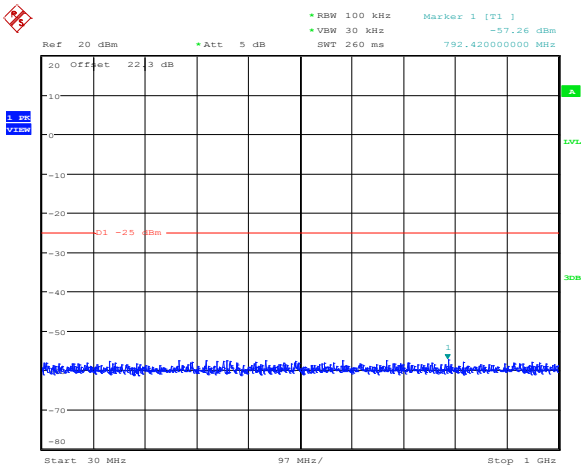
8.5.13 Test data, continued



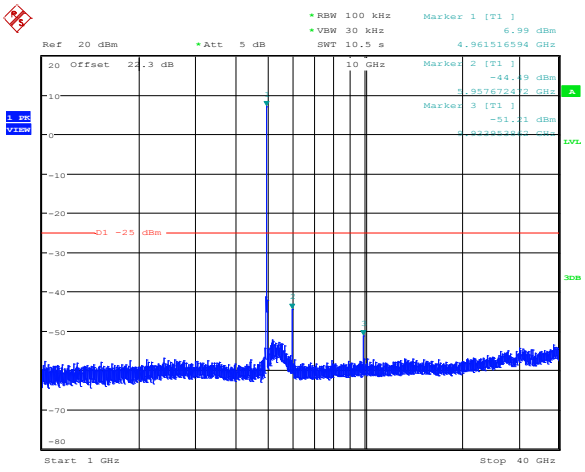
Plot 8.5-150: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, mid frequency, 16-QAM



Plot 8.5-151: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, mid frequency, 16-QAM

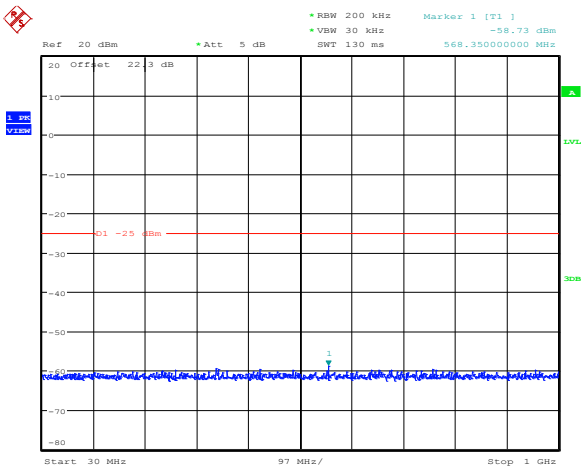


Plot 8.5-152: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, mid frequency, 64-QAM

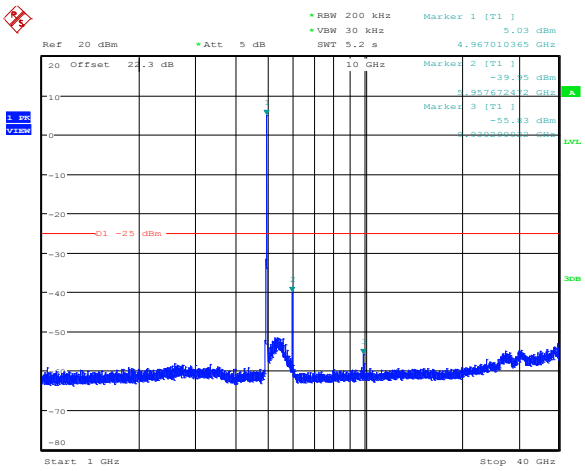


Plot 8.5-153: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, mid frequency, 64-QAM

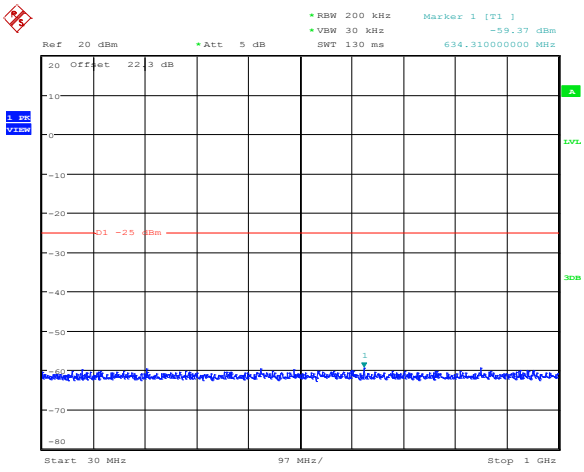
8.5.14 Test data, continued



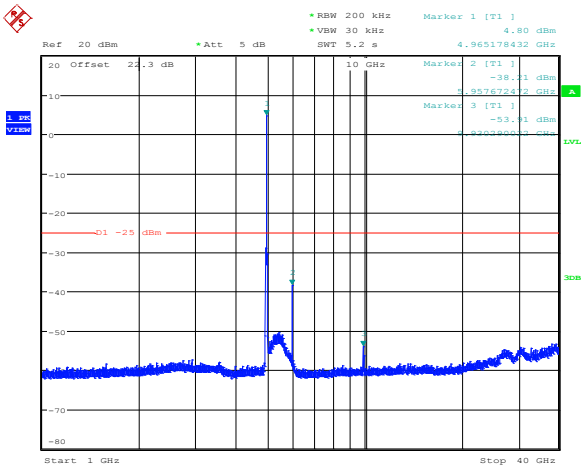
Plot 8.5-154: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, mid frequency, BPSK



Plot 8.5-155: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, mid frequency, BPSK

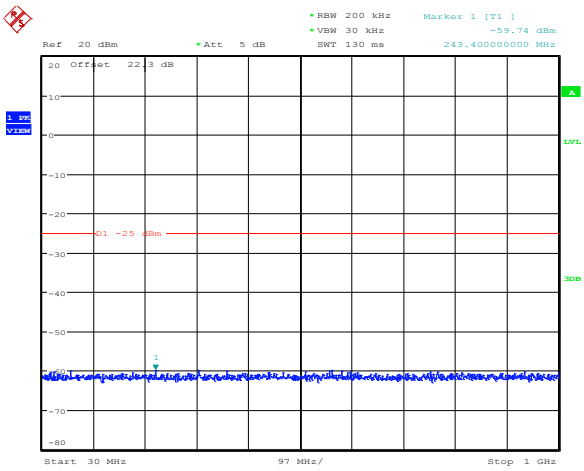


Plot 8.5-156: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, mid frequency, QPSK

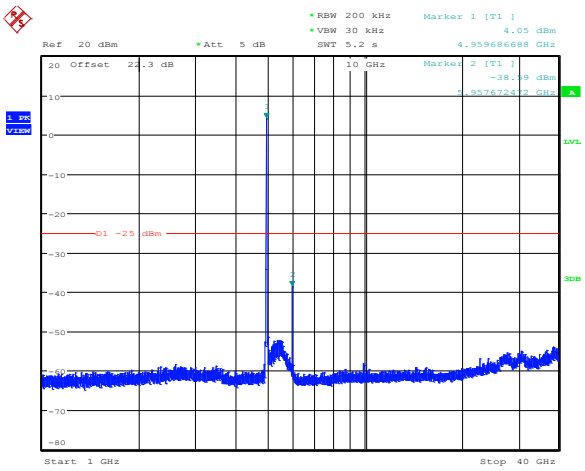


Plot 8.5-157: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, mid frequency, QPSK

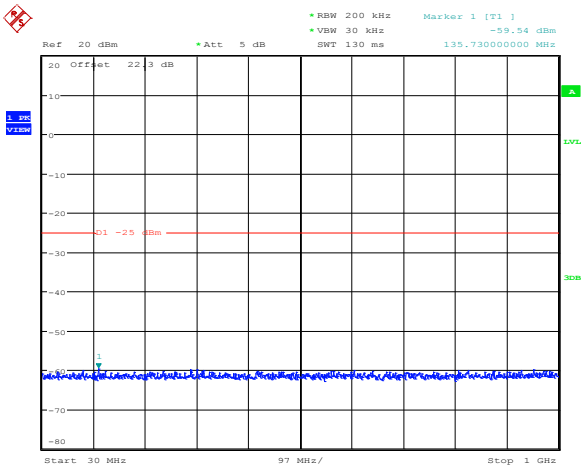
8.5.15 Test data, continued



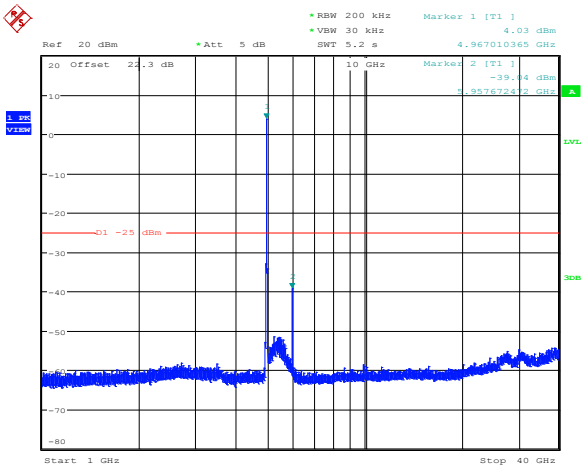
Plot 8.5-158: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, mid frequency, 16-QAM



Plot 8.5-159: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, mid frequency, 16-QAM

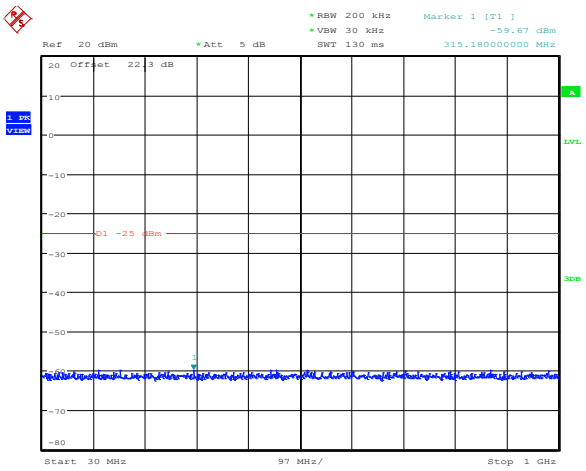


Plot 8.5-160: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, mid frequency, 64-QAM

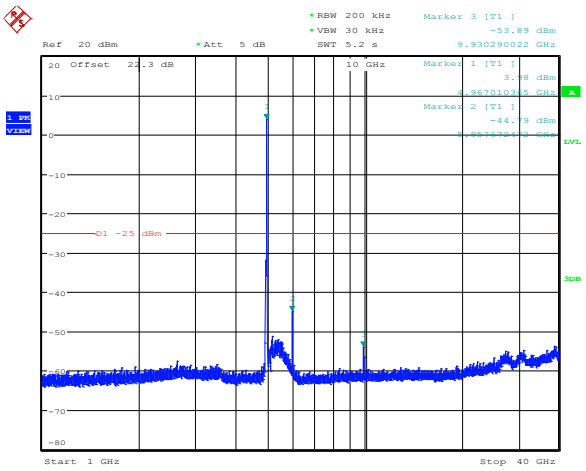


Plot 8.5-161: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, mid frequency, 64-QAM

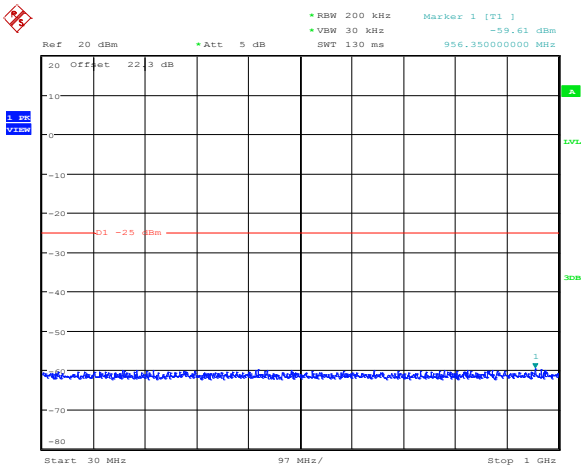
8.5.16 Test data, continued



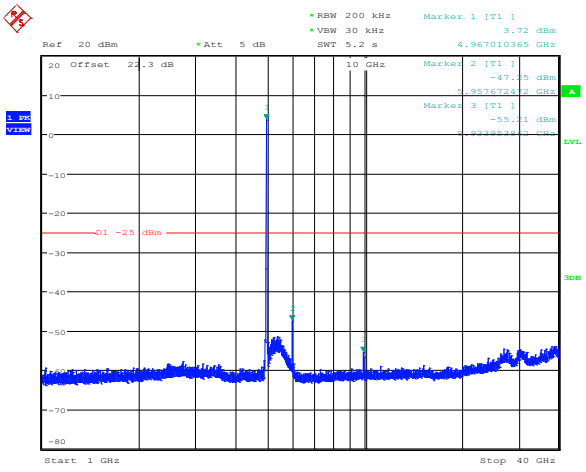
Plot 8.5-162: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, mid frequency, BPSK



Plot 8.5-163: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, mid frequency, BPSK

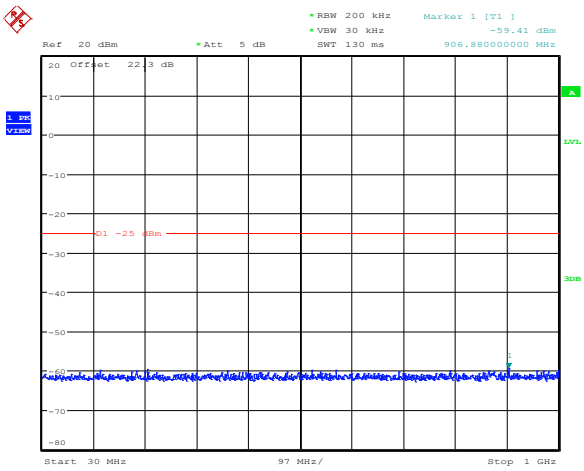


Plot 8.5-164: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, mid frequency, QPSK

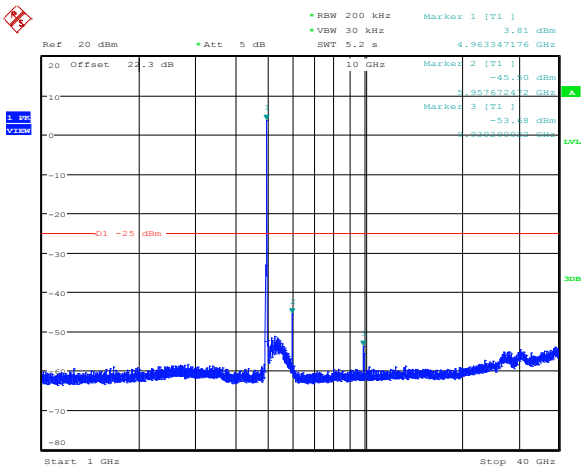


Plot 8.5-165: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, mid frequency, QPSK

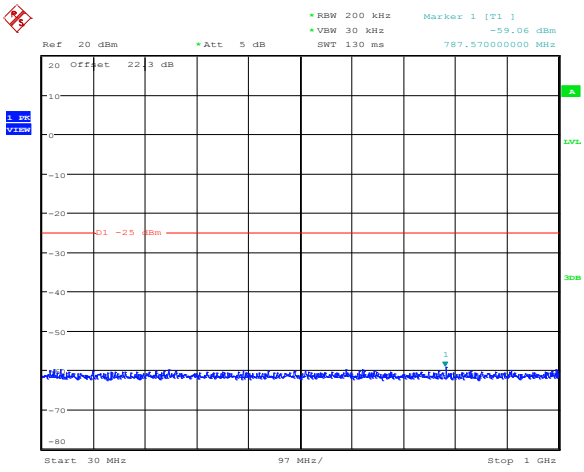
8.5.17 Test data, continued



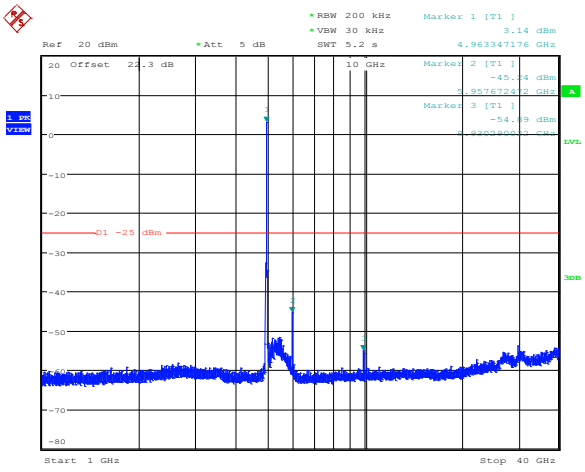
Plot 8.5-166: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, mid frequency, 16-QAM



Plot 8.5-167: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, mid frequency, 16-QAM

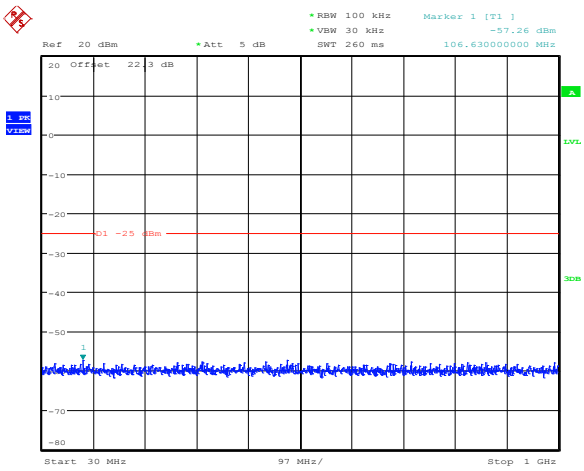


Plot 8.5-168: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, mid frequency, 64-QAM

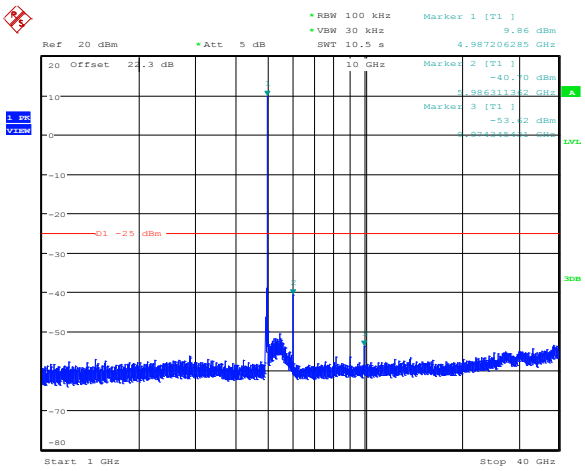


Plot 8.5-169: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, mid frequency, 64-QAM

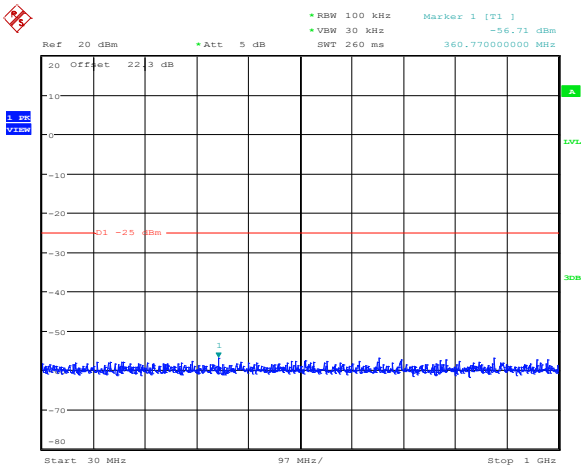
8.5.18 Test data, continued



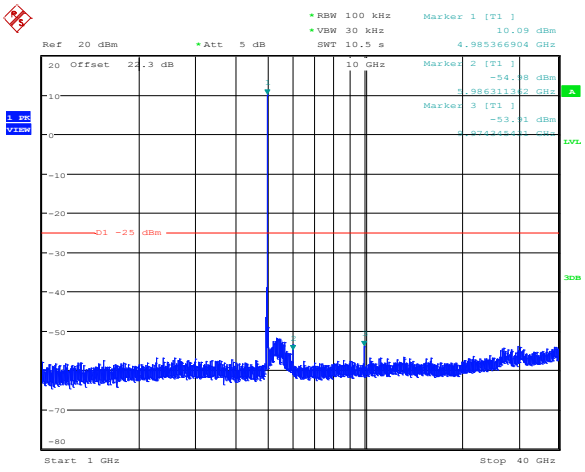
Plot 8.5-170: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, high frequency, BPSK



Plot 8.5-171: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, high frequency, BPSK

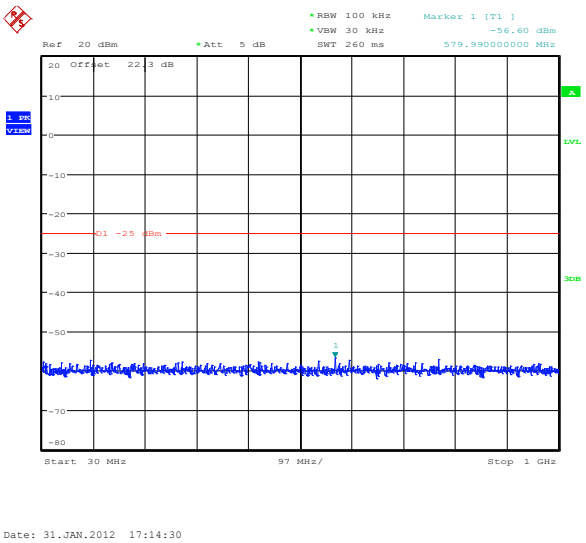


Plot 8.5-172: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, high frequency, QPSK

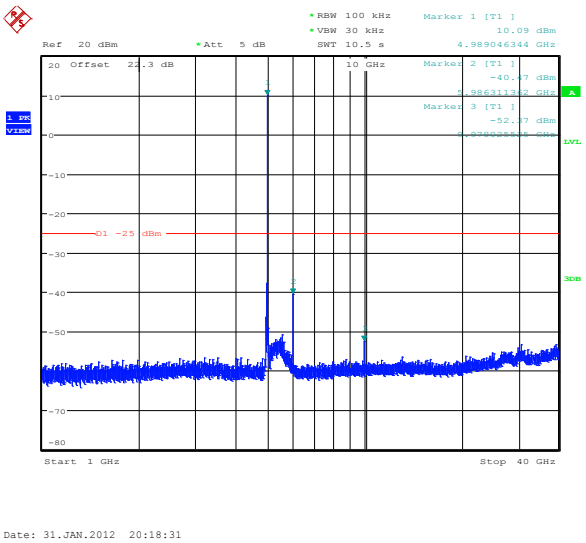


Plot 8.5-173: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, high frequency, QPSK

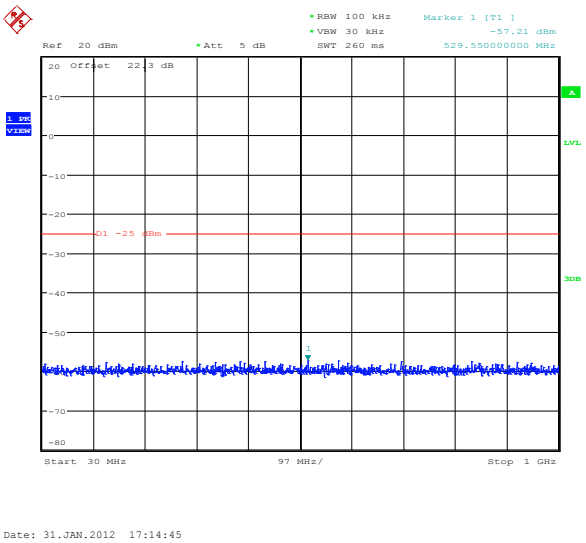
8.5.19 Test data, continued



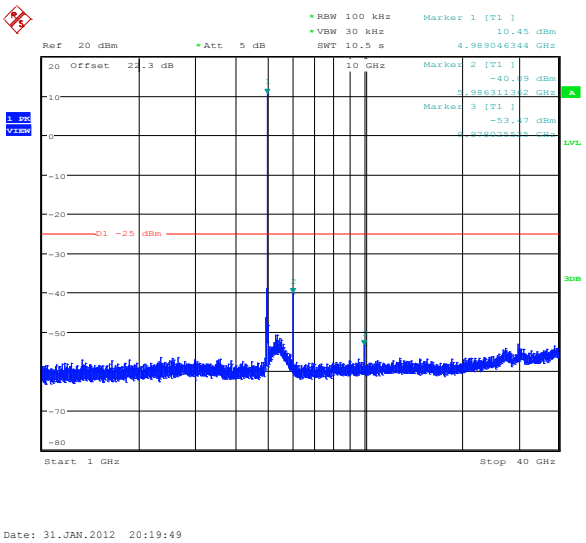
Plot 8.5-174: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, high frequency, 16-QAM



Plot 8.5-175: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, high frequency, 16-QAM

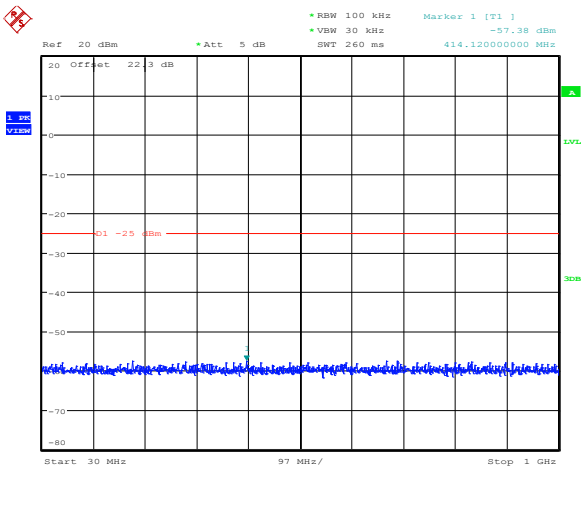


Plot 8.5-176: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 1, high frequency, 64-QAM

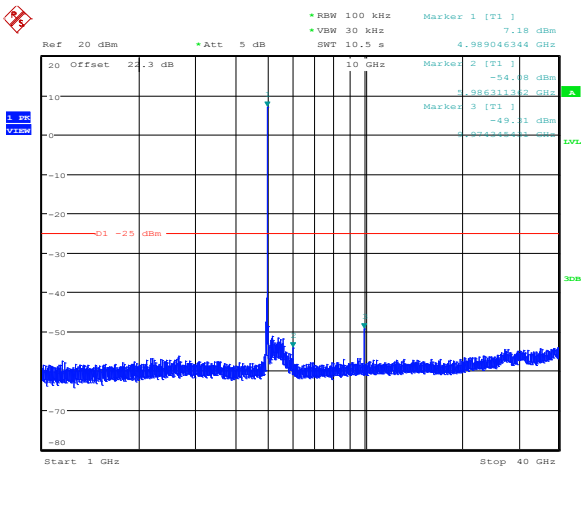


Plot 8.5-177: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 1, high frequency, 64-QAM

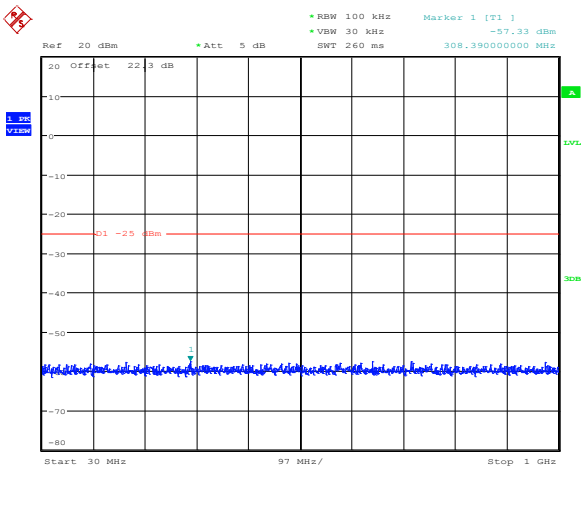
8.5.20 Test data, continued



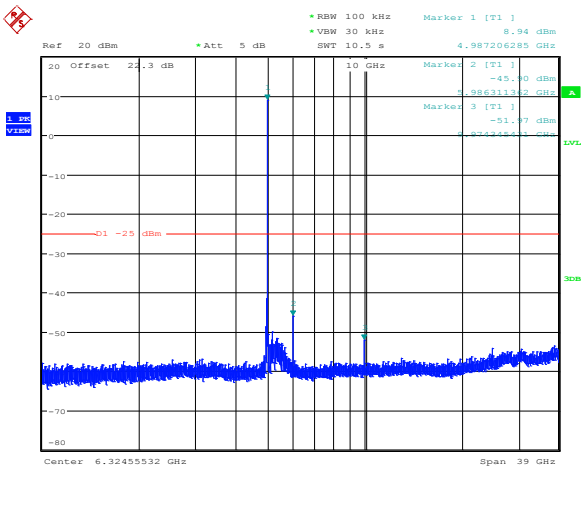
Plot 8.5-178: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, high frequency, BPSK



Plot 8.5-179: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, high frequency, BPSK

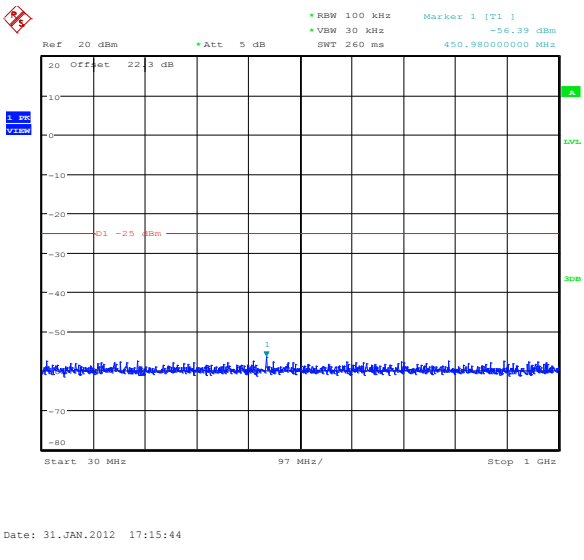


Plot 8.5-180: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, high frequency, QPSK

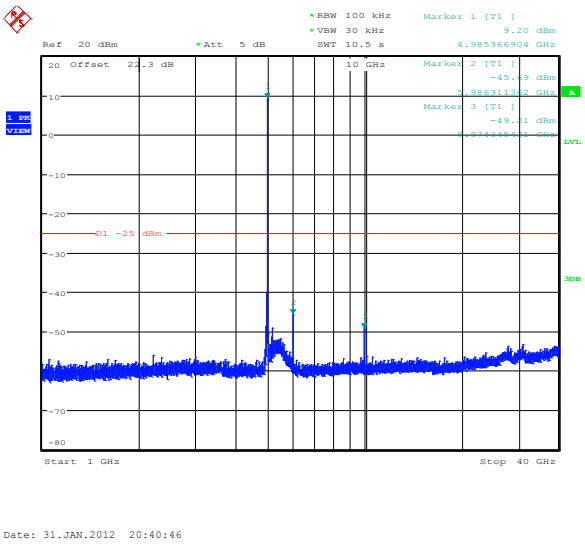


Plot 8.5-181: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, high frequency, QPSK

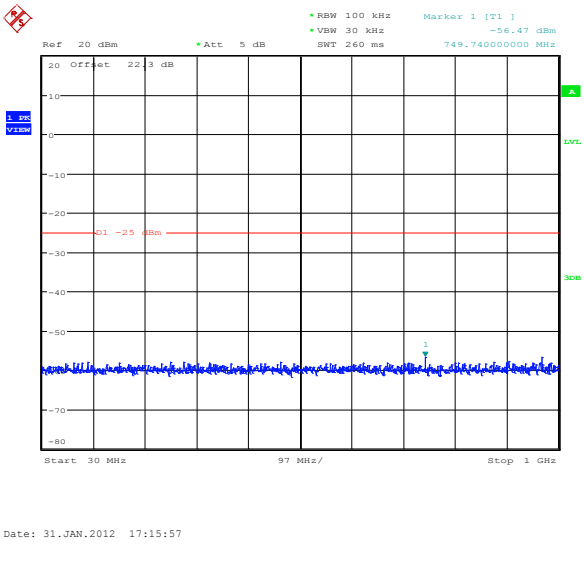
8.5.21 Test data, continued



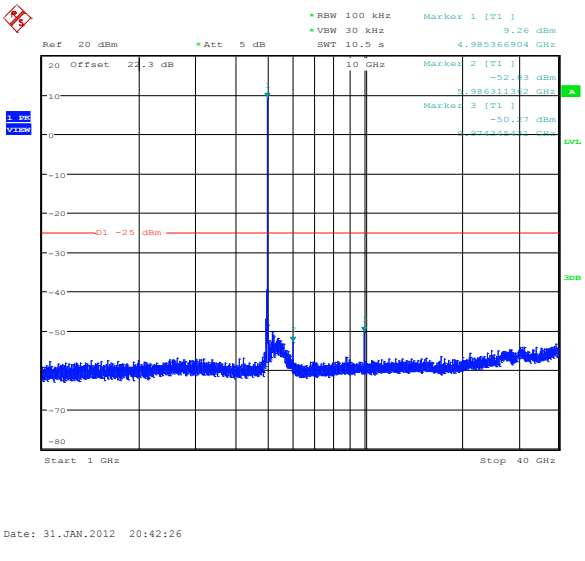
Plot 8.5-182: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, high frequency, 16-QAM



Plot 8.5-183: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, high frequency, 16-QAM

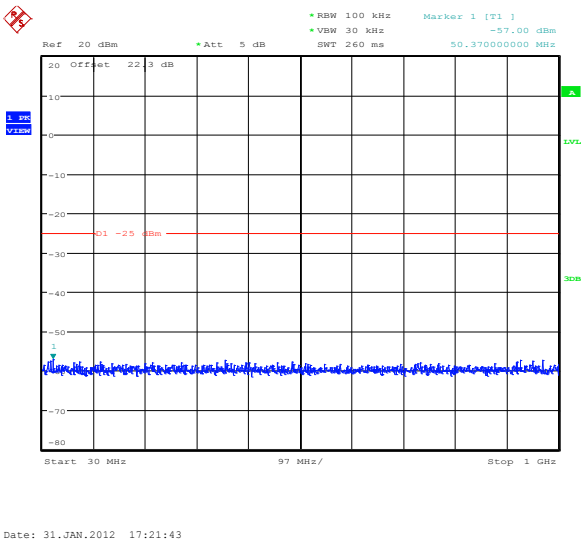


Plot 8.5-184: Spurious emissions below 1 GHz for 5 MHz channel, antenna port 2, high frequency, 64-QAM

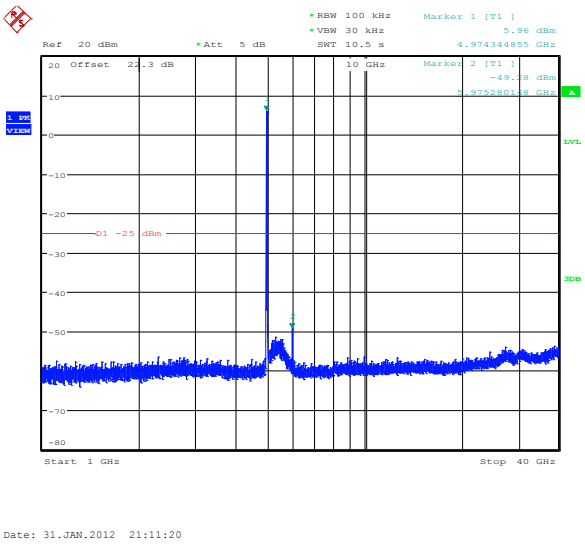


Plot 8.5-185: Spurious emissions above 1 GHz for 5 MHz channel, antenna port 2, high frequency, 64-QAM

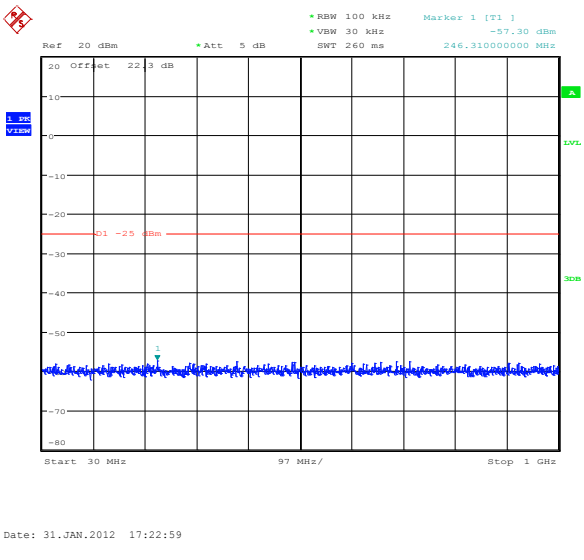
8.5.22 Test data, continued



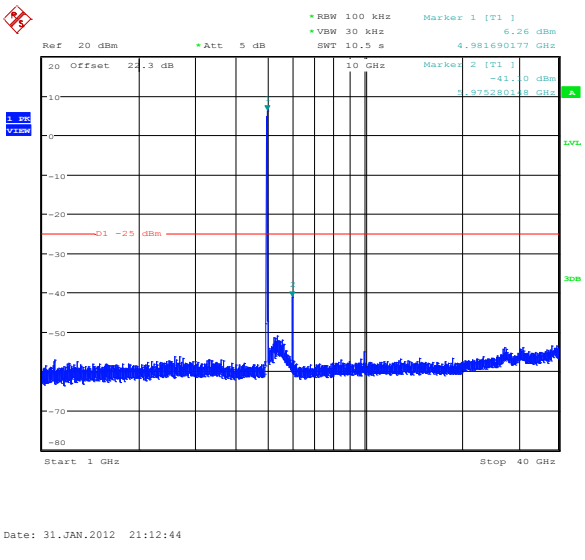
Plot 8.5-186: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, high frequency, BPSK



Plot 8.5-187: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, high frequency, BPSK

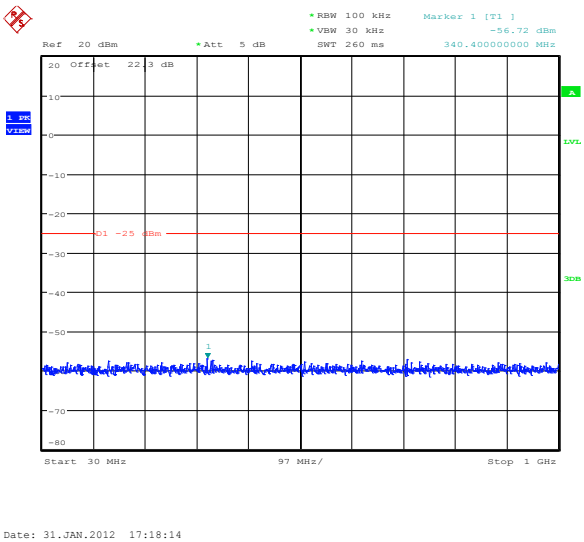


Plot 8.5-188: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, high frequency, QPSK

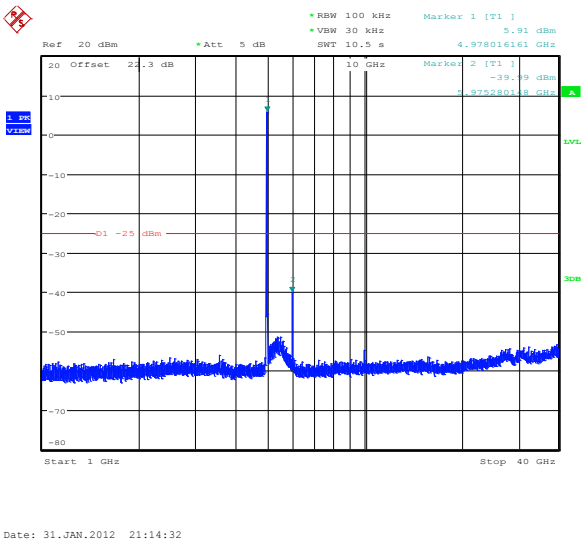


Plot 8.5-189: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, high frequency, QPSK

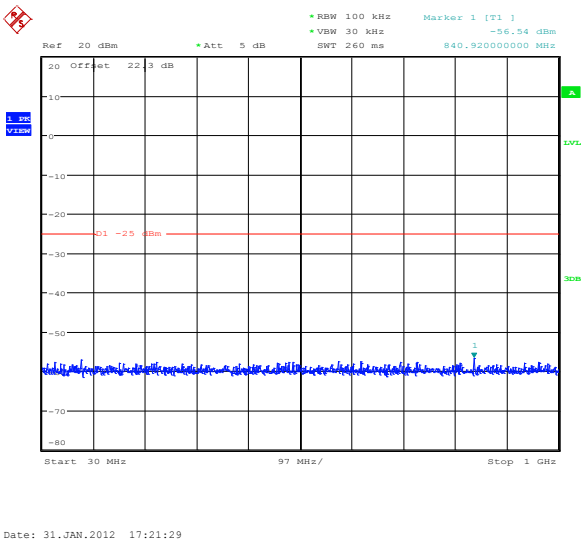
8.5.23 Test data, continued



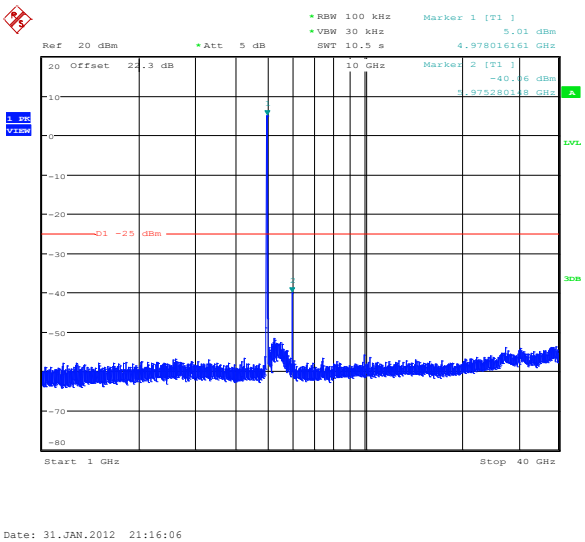
Plot 8.5-190: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, high frequency, 16-QAM



Plot 8.5-191: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, high frequency, 16-QAM

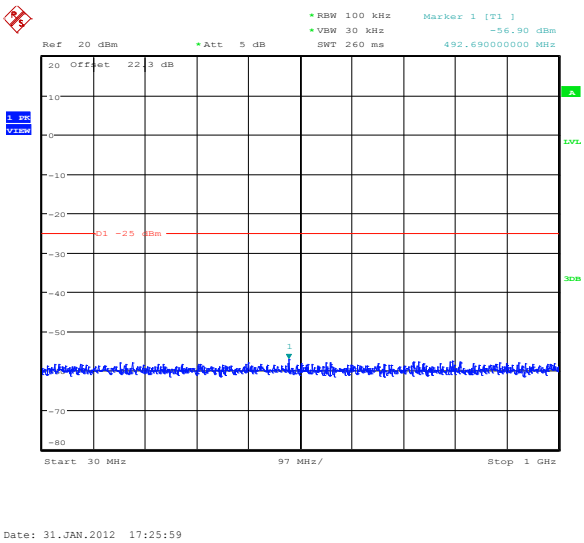


Plot 8.5-192: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 1, high frequency, 64-QAM

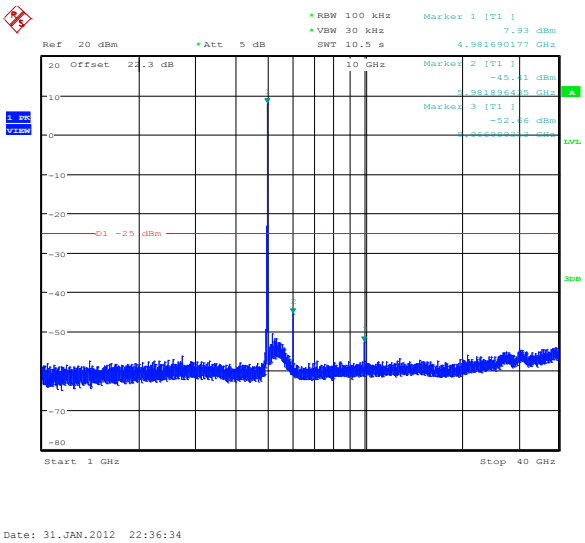


Plot 8.5-193: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 1, high frequency, 64-QAM

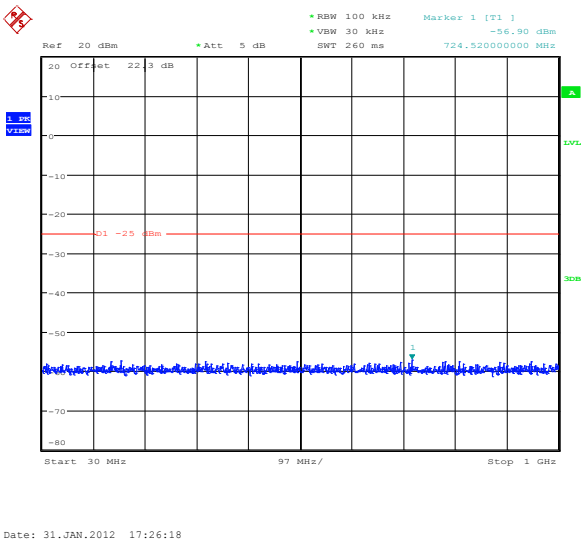
8.5.24 Test data, continued



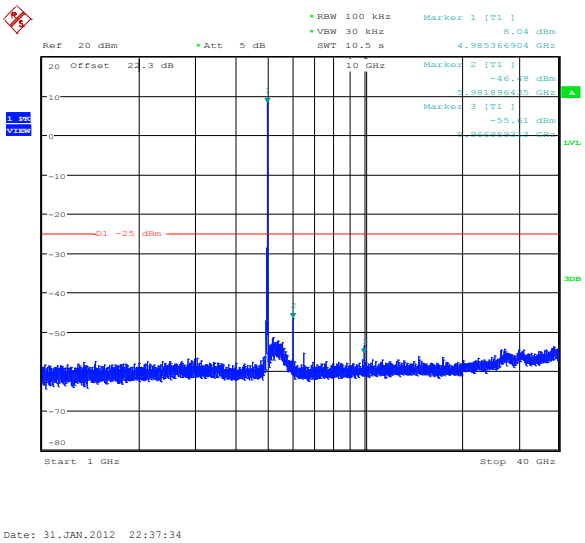
Plot 8.5-194: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, high frequency, BPSK



Plot 8.5-195: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, high frequency, BPSK

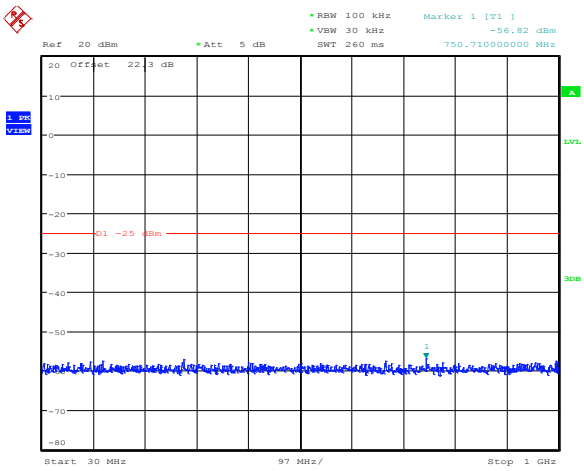


Plot 8.5-196: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, high frequency, QPSK

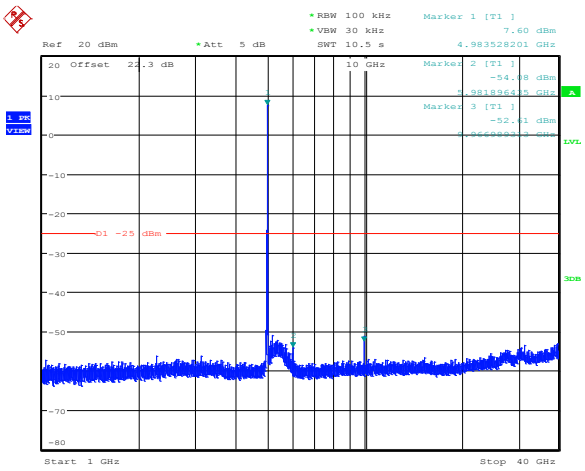


Plot 8.5-197: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, high frequency, QPSK

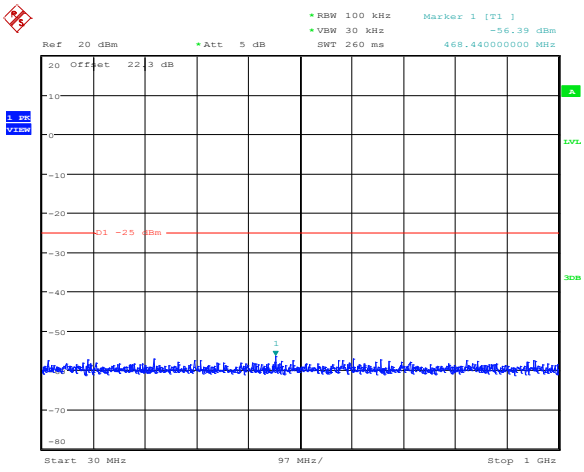
8.5.25 Test data, continued



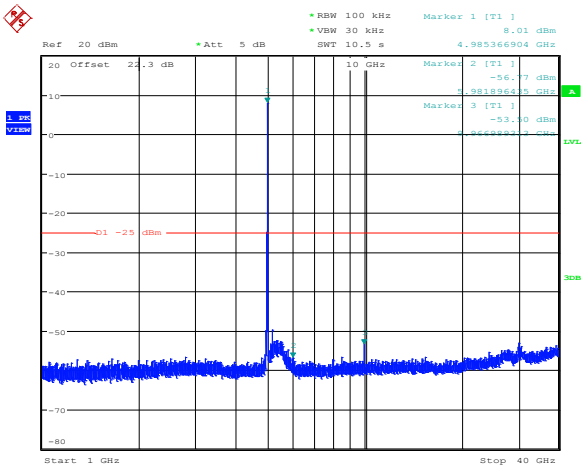
Plot 8.5-198: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, high frequency, 16-QAM



Plot 8.5-199: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, high frequency, 16-QAM

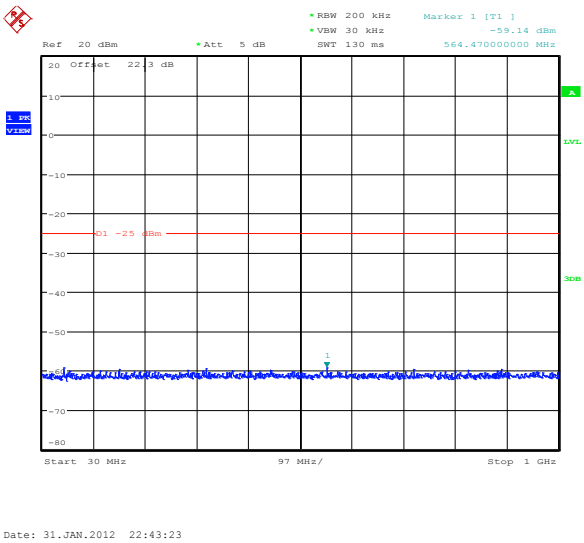


Plot 8.5-200: Spurious emissions below 1 GHz for 10 MHz channel, antenna port 2, high frequency, 64-QAM

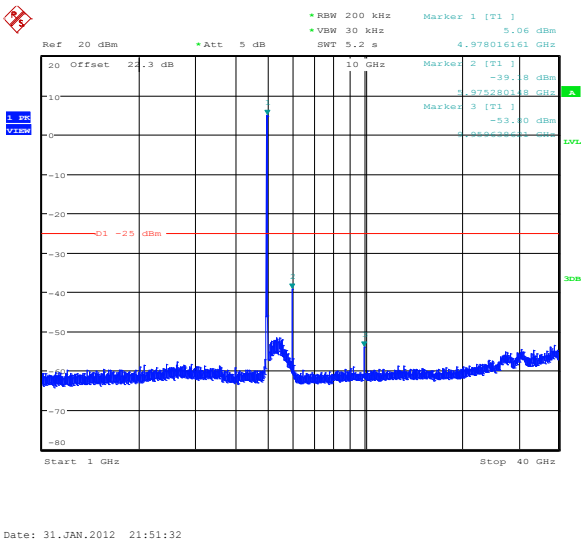


Plot 8.5-201: Spurious emissions above 1 GHz for 10 MHz channel, antenna port 2, high frequency, 64-QAM

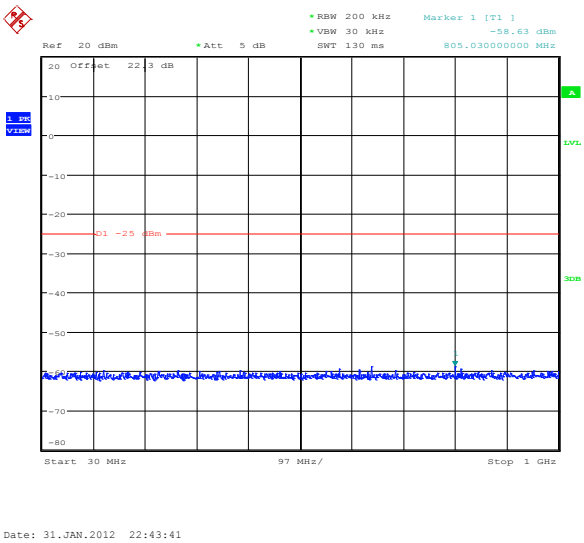
8.5.26 Test data, continued



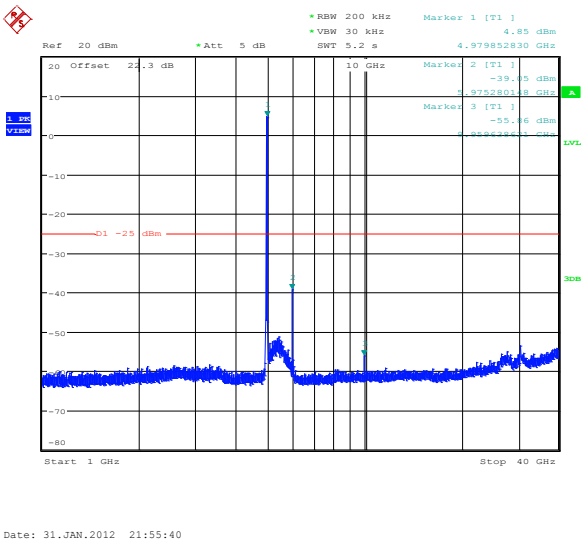
Plot 8.5-202: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, high frequency, BPSK



Plot 8.5-203: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, high frequency, BPSK

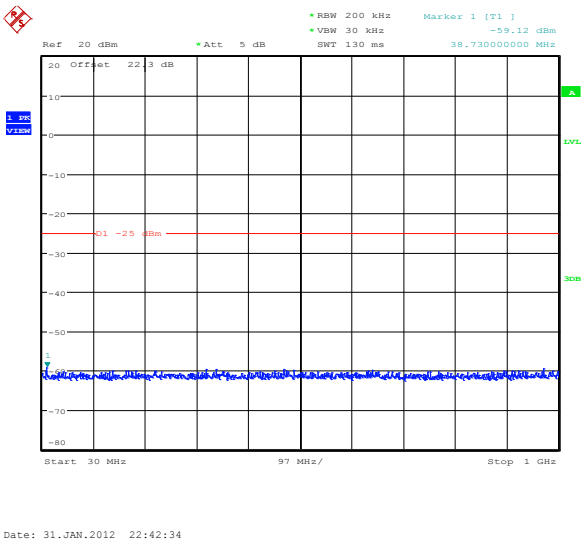


Plot 8.5-204: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, high frequency, QPSK

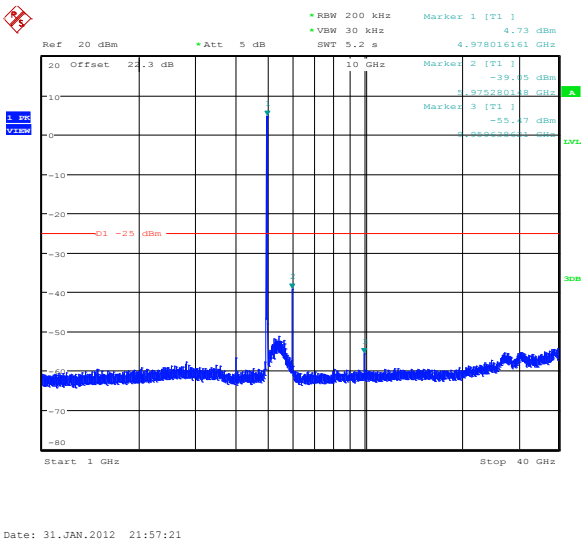


Plot 8.5-205: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, high frequency, QPSK

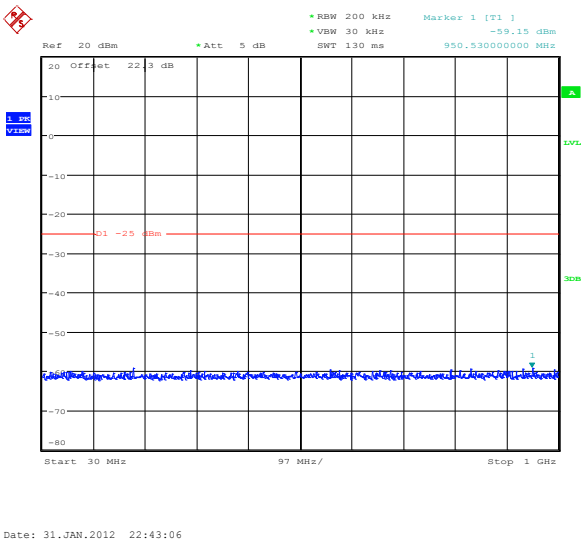
8.5.27 Test data, continued



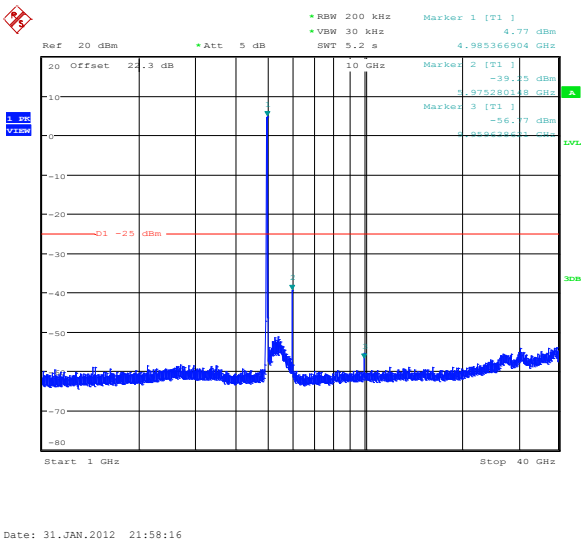
Plot 8.5-206: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, high frequency, 16-QAM



Plot 8.5-207: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, high frequency, 16-QAM

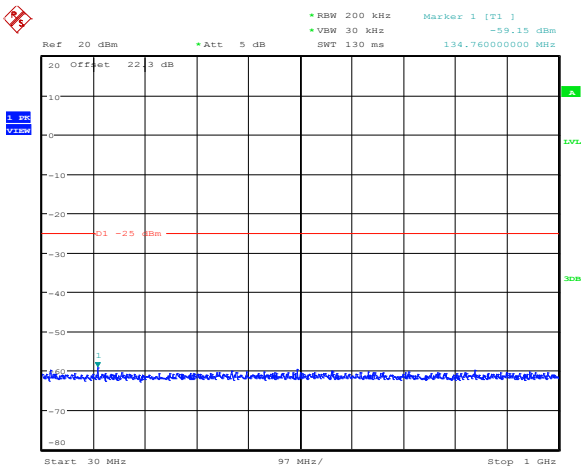


Plot 8.5-208: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 1, high frequency, 64-QAM

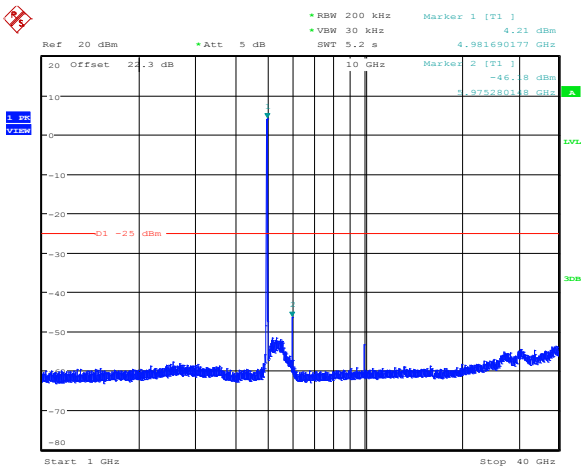


Plot 8.5-209: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 1, high frequency, 64-QAM

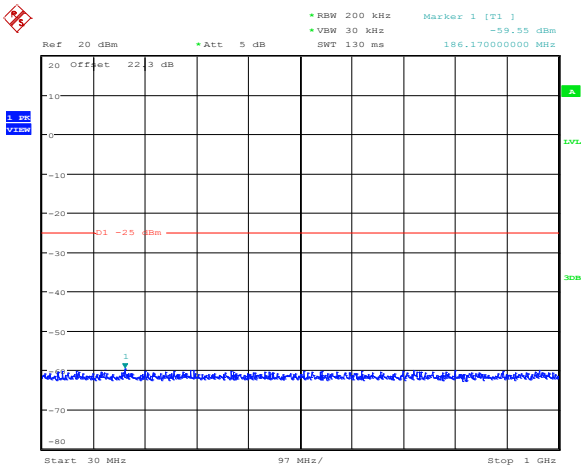
8.5.28 Test data, continued



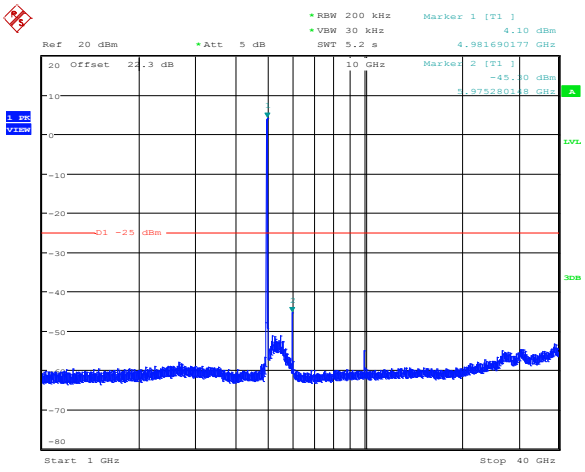
Plot 8.5-210: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, high frequency, BPSK



Plot 8.5-211: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, high frequency, BPSK

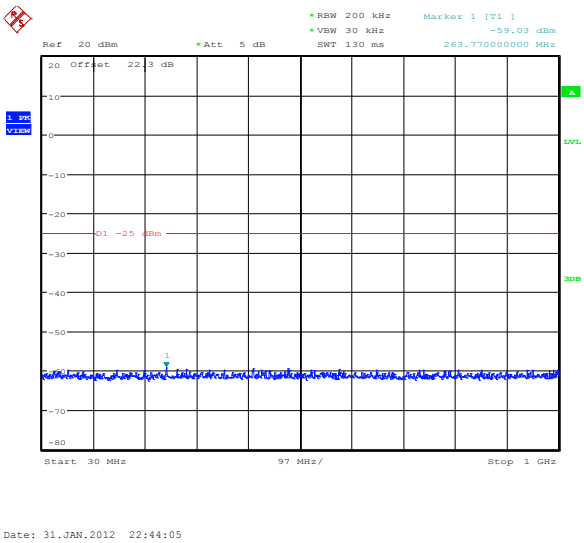


Plot 8.5-212: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, high frequency, QPSK

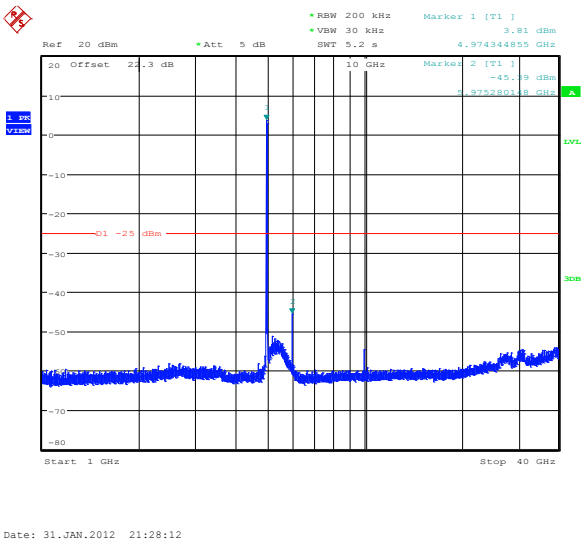


Plot 8.5-213: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, high frequency, QPSK

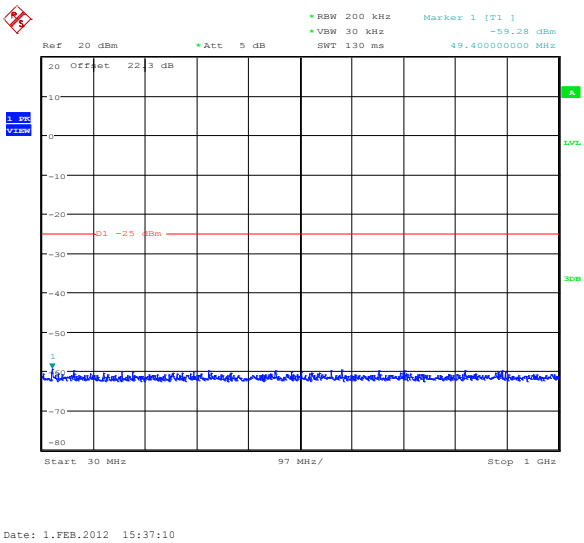
8.5.29 Test data, continued



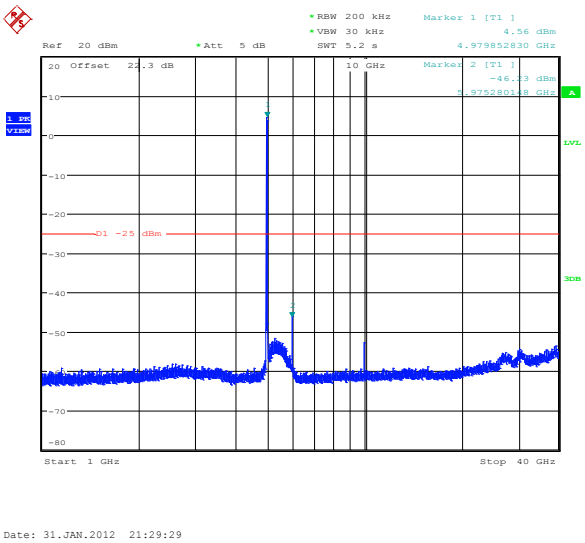
Plot 8.5-214: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, high frequency, 16-QAM



Plot 8.5-215: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, high frequency, 16-QAM



Plot 8.5-216: Spurious emissions below 1 GHz for 20 MHz channel, antenna port 2, high frequency, 64-QAM



Plot 8.5-217: Spurious emissions above 1 GHz for 20 MHz channel, antenna port 2, high frequency, 64-QAM

8.6 Clause 90.210(m)(6) Radiated spurious emissions

8.6.1 Definitions and limits

m) Emission Mask M. For high power transmitters (greater than 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:
(6) On any frequency removed from the assigned frequency between above 150 % of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

8.6.2 Test summary

Test date	February 1, 2012	**Test engineer**	Kevin Rose	**Verdict**	Pass
Temperature	26 °C	**Air pressure**	990 mbar	**Relative humidity**	32 %

8.6.3 Observations/special notes and test results

The spectrum was searched from 30 MHz to 40 GHz.
All measurements were performed a 3 m distance.

The pre-scan was performed with spectrum analyzer, using peak detector with 100 kHz RBW for frequencies below 1 GHz and 1 MHz RBW for frequencies above 1 GHz.

The cabinet radiation was performed while antenna ports were terminated with 50 Ω compatible load. The final measurements were performed using substitution method.

No emissions higher that 20 dB below the limit were detected.

8.7 Clause 90.213 Frequency stability

8.7.1 Definitions and limits

a) Unless noted elsewhere, transmitters used in the services governed by this part must have minimum frequency stability as specified in the following table.

Table 8.7-1: Minimum frequency stability

Frequency range (MHz)	Minimum Frequency Stability parts per million (ppm)		
	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	100	100	200
25–50	20	20	50
72–76	5	–	50
150–174	50	5	50
216–220	1.0	–	1.0
220–222	0.1	1.5	1.5
421–512	2.5	5	5
806–809	1.0	1.5	1.5
809–824	1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	0.1	1.5	1.5
902–928	2.5	2.5	2.5
929–930	1.5	–	–
935–940	0.1	1.5	1.5
1427–1435	300	300	300
Above 2450	–	–	–

8.7.2 Test summary

Test date	February 1, 2012	**Test engineer**	Andrey Adelberg	**Verdict**	Pass
Temperature	22 °C	**Air pressure**	1000 mbar	**Relative humidity**	31 %

8.7.3 Observations/special notes

Frequency stability was performed on three channels, since there is no specific limit for this frequency range only worst case is presented in the report.

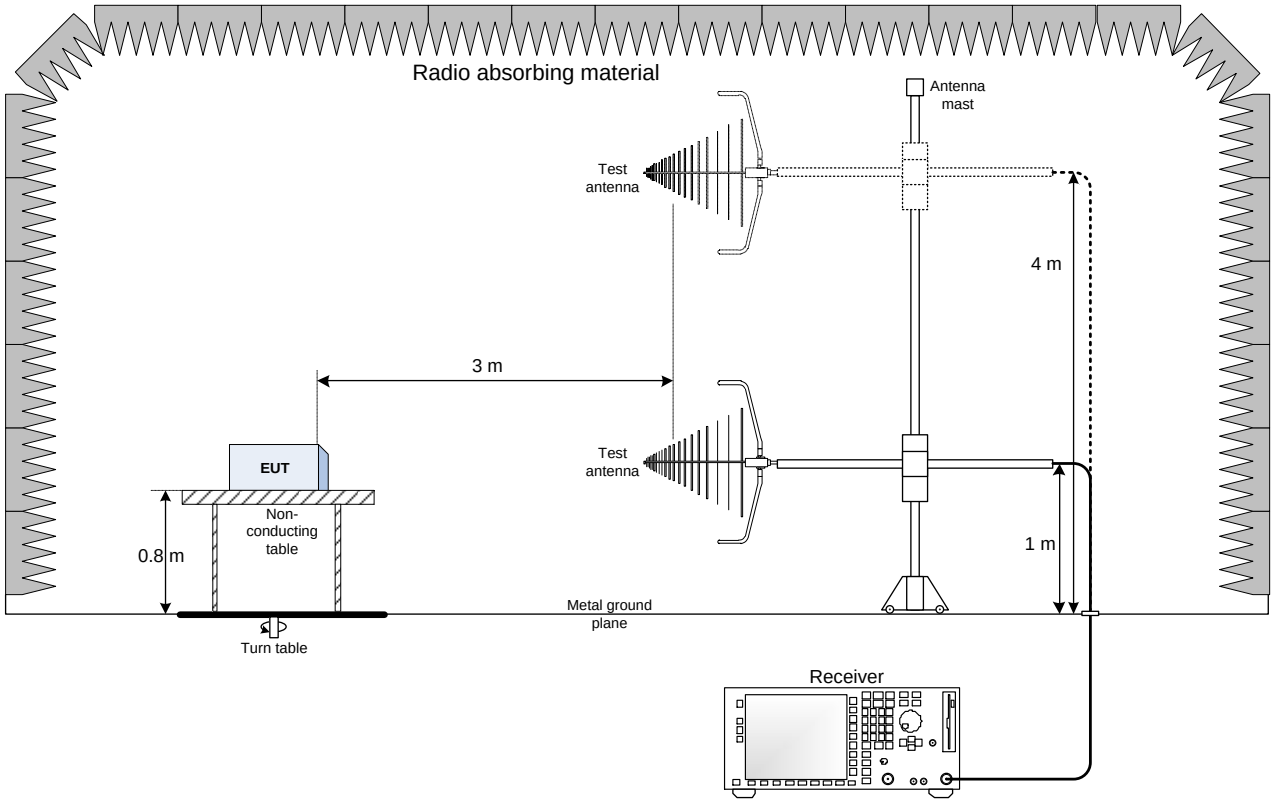
8.7.4 Test data

Table 8.7-2: Frequency stability results

Temperature	Voltage	$F_{measured}$	Offset (Hz)	Offset (ppm)
50	Nominal	4.964992379	5921	-1.19
40	Nominal	4.964992048	6252	-1.26
30	Nominal	4.964992998	5302	-1.07
20	Nominal +15 %	4.964996063	2237	-0.45
20	Nominal	4.964998300	Reference	
20	Nominal −15 %	4.964990970	7330	-1.48
10	Nominal	4.964995864	2436	-0.49
0	Nominal	4.965002095	-3795	0.76
-10	Nominal	4.965000090	-1790	0.36
-20	Nominal	4.965001654	-3354	0.68
-30	Nominal	4.965000086	-1786	0.36

Section 9 Block diagrams of test set-ups

9.1 Radiated emissions set-up



9.2 Conducted emissions set-up