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Test report

346210-2TRFWL

Date of issue: July 4, 2018

Applicant:

Redline Communications

Product:

Broad-band wireless infrastructure product

Model:

RDL-3000-RME

FCC ID:

QC8-RDL3000RME2

Specifications:

- FCC 47 CFR Part 27

  Miscellaneous Wireless Communications Services

Test location

Company name	Nemko Canada Inc.
Address	303 River Road
City	Ottawa
Province	Ontario
Postal code	K1V 1H2
Country	Canada
Telephone	+1 613 737 9680
Facsimile	+1 613 737 9691
Toll free	+1 800 563 6336
Website	www.nemko.com
Site number	FCC: CA2040 (3 m semi anechoic chamber)

Tested by	Andrey Adelberg, Senior Wireless/EMC Specialist
Reviewed by	Kevin Rose, Wireless/EMC Specialist
Review date	July 4, 2018
Reviewer signature	

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.

Copyright notification

Table of contents

Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Redline Communications
Address	302 Town Center Blvd.
City	Markham
Province/State	Ontario
Postal/Zip code	L3R 0E8
Country	Canada

1.2 Test specifications

FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services

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 27 test results

Part	Test description	Verdict
§27.50(h)	Peak output power at RF antenna connector	Pass
§27.53(m)	Emission limits	Pass
§27.54	Frequency stability	Pass
§27.53(m)(6)	Emission bandwidth	Pass

Notes: none

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	June 1, 2015
Nemko sample ID number	1

3.2 EUT information

Product name	Broad-band wireless infrastructure product
Model	RDL-3000-RME
Serial number	153PC13200072

3.3 Technical information

Frequency band	2496–2690 MHz
Frequency Min (MHz)	2496.75 (for 1.25 MHz channel); 2497.25 (for 2.5 MHz channel); 2498.50 (for 5 MHz channel); 2501.00 (for 10 MHz channel)
Frequency Max (MHz)	2689.25 (for 1.25 MHz channel); 2688.75 (for 2.5 MHz channel); 2687.50 (for 5 MHz channel); 2685.00 (for 10 MHz channel)
RF power Max (W), Conducted, combined	0.451 (for 1.25 MHz channel); 0.468 (for 2.5 MHz channel); 0.429 (for5 MHz channel); 0.410 (for 10 MHz channel)
Field strength, Units @ distance	N/A
Measured BW (kHz) (26 dB)	1250 (for 1.25 MHz channel); 2440 (for 2.5 MHz channel); 5060 (for 5 MHz channel); 9770 (for 10 MHz channel);
Type of modulation	BPSK, 256-QAM
Emission classification (F1D, G1D, D1D)	W7D
Transmitter spurious, Units @ distance	−16.08 dBm EIRP @16132 MHz, measured at 3 m
Power requirements	120 V_{AC} 60 Hz
Antenna information	Redline Embedded Antenna 30-00328-30, 15 dBi, 35 degrees, 2.3–2.7 GHz Redline AFS-DBG-02120-01, 14 dBi, 120 degrees, 2.3–2.7 GHz Redline AFS-DBG-0290-01, 14.5 dBi, 90 degrees, 2.3–2.7 GHz Redline AFS-DBG-0260-01, 16 dBi, 60 degrees, 2.3–2.7 GHz Redline APD-DB-02-4ft-01, 27 dBi, 7.3 degrees, 2.3–2.7 GHz The EUT is professionally installed.

3.4 Product description and theory of operation

The EUT is a 2×2 MIMO point-to-multipoint (PMP) carrier grade broadband wireless infrastructure module, designed to operate in the 2496–2690 MHz band. The EUT can be used as a base station as well as a user station.

3.5 EUT exercise details

The EUT was controlled to transmit at desired frequency and modulation from laptop using web GUI interface.

3.6 EUT setup diagram

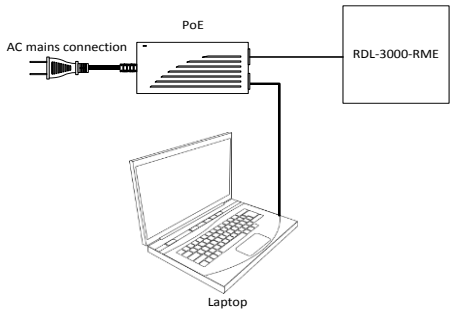


Figure 3.6-1: *Setup diagram*

3.7 EUT sub assemblies

Table 3.7-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number
PoE	Cincon Electronics Co.	TRG60A-POE-L	3345

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	860–1060 mbar

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

UKAS Lab 34 and TIA-603-B have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada, Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products.

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Feb. 25/16
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Power source	California Instruments	5001ix	FA002494	1 year	Jan. 22 /16
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/16
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	Mar. 27/16
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	Apr. 12/16
Horn antenna (1–18 GHz)	EMCO	3115	FA000825	1 year	Apr. 01/16
Pre-amplifier (1–18 GHz)	JCA	JCA118-503	FA002091	1 year	May 05/16
Pre-amplifier (18–26 GHz)	Narda	BBS-1826N612	FA001550	—	VOU
Horn antenna 18–26.5 GHz	Electro-metrics	SH-50/60-1	FA000479	—	VOU
Temperature chamber	Thermotron	SM-16C	FA001030	1 year	NCR

Note: NCR - no calibration required, VOU - verify on use

Section 8. Testing data

8.1 FCC 27.50(h) Peak output power

8.1.1 Definitions and limits

(1) Main, booster and base stations.

(i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW + 10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

(ii) If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in dBW in a given direction shall be determined by the following formula: EIRP = 33 dBW + 10 log(X/Y) dBW + 10 log(360/beamwidth) dBW, where X is the actual channel width in MHz, Y is either (i) 6 MHz if prior to transition or the station is in the MBS following transition or (ii) 5.5 MHz if the station is in the LBS and UBS following transition, and beamwidth is the total horizontal plane beamwidth of the individual transmitting antenna for the station or any sector measured at the half-power points.

(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

(3) For television transmission, the peak power of the accompanying aural signal must not exceed 10 percent of the peak visual power of the transmitter. The Commission may order a reduction in aural signal power to diminish the potential for harmful interference.

(4) For main, booster and response stations utilizing digital emissions with non-uniform power spectral density (e.g. unfiltered QPSK), the power measured within any 100 kHz resolution bandwidth within the 6 MHz channel occupied by the non-uniform emission cannot exceed the power permitted within any 100 kHz resolution bandwidth within the 6 MHz channel if it were occupied by an emission with uniform power spectral density, i.e., if the maximum permissible power of a station utilizing a perfectly uniform power spectral density across a 6 MHz channel were 2000 watts EIRP, this would result in a maximum permissible power flux density for the station of 2000/60 = 33.3 watts EIRP per 100 kHz bandwidth. If a non-uniform emission were substituted at the station, station power would still be limited to a maximum of 33.3 watts EIRP within any 100 kHz segment of the 6 MHz channel, irrespective of the fact that this would result in a total 6 MHz channel power of less than 2000 watts EIRP.

(i) Peak transmit power shall be measured over any interval of continuous transmission using instrumentation calibrated in terms of rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

8.1.2 Test summary

Test date	June 2, 2015	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1003 mbar
Verdict	Pass	Relative humidity	33 %

8.1.3 Observations, settings and special notes

Spectrum analyzer settings were:

Resolution bandwidth	100–300 kHz
Video bandwidth	1–3 MHz
Detector mode	RMS
Trace mode	Power averaging over channel bandwidth

EIRP limit line calculations.

For Redline AFS-DBG-02120-01, 14 dBi, 120 degrees, 2.3–2.7 GHz base station antenna:

$EIRP_{1.25\ MHz} = 63 + 10 \times Log_{10}(1.25 / 5.5) + 10 \times Log_{10}(360 / 120) = 61.34$ dBm

$EIRP_{2.5\ MHz} = 63 + 10 \times Log_{10}(2.5 / 5.5) + 10 \times Log_{10}(360 / 120) = 64.35$ dBm

$EIRP_{5\ MHz} = 63 + 10 \times Log_{10}(5 / 5.5) + 10 \times Log_{10}(360 / 120) = 67.36$ dBm

$EIRP_{10\ MHz} = 63 + 10 \times Log_{10}(10 / 5.5) + 10 \times Log_{10}(360 / 120) = 70.37$ dBm

For Redline AFS-DBG-0260-01, 16 dBi, 60 degrees, 2.3–2.7 GHz base station antenna:

$EIRP_{1.25\ MHz} = 63 + 10 \times Log_{10}(1.25 / 5.5) + 10 \times Log_{10}(360 / 60) = 64.35$ dBm

$EIRP_{2.5\ MHz} = 63 + 10 \times Log_{10}(2.5 / 5.5) + 10 \times Log_{10}(360 / 60) = 67.36$ dBm

$EIRP_{5\ MHz} = 63 + 10 \times Log_{10}(5 / 5.5) + 10 \times Log_{10}(360 / 60) = 70.37$ dBm

$EIRP_{10\ MHz} = 63 + 10 \times Log_{10}(10 / 5.5) + 10 \times Log_{10}(360 / 60) = 73.38$ dBm

For Redline AFS-DBG-0290-01, 14.5 dBi, 90 degrees, 2.3–2.7 GHz base station antenna:

$EIRP_{1.25\ MHz} = 63 + 10 \times Log_{10}(1.25 / 5.5) + 10 \times Log_{10}(360 / 90) = 62.59$ dBm

$EIRP_{2.5\ MHz} = 63 + 10 \times Log_{10}(2.5 / 5.5) + 10 \times Log_{10}(360 / 90) = 65.60$ dBm

$EIRP_{5\ MHz} = 63 + 10 \times Log_{10}(5 / 5.5) + 10 \times Log_{10}(360 / 90) = 68.61$ dBm

$EIRP_{10\ MHz} = 63 + 10 \times Log_{10}(10 / 5.5) + 10 \times Log_{10}(360 / 90) = 71.62$ dBm

For Redline APD-DB-02-4ft-01, 27 dBi, 2.3–2.7 GHz base station and user station antenna:

$EIRP_{1.25\ MHz} = 63 + 10 \times Log_{10}(1.25 / 5.5) + 10 \times Log_{10}(360 / 7.3) = 73.49$ dBm

$EIRP_{2.5\ MHz} = 63 + 10 \times Log_{10}(2.5 / 5.5) + 10 \times Log_{10}(360 / 7.3) = 76.50$ dBm

$EIRP_{5\ MHz} = 63 + 10 \times Log_{10}(5 / 5.5) + 10 \times Log_{10}(360 / 7.3) = 79.51$ dBm

$EIRP_{10\ MHz} = 63 + 10 \times Log_{10}(10 / 5.5) + 10 \times Log_{10}(360 / 7.3) = 82.53$ dBm

For Redline Embedded Antenna, 15 dBi, 35 degrees, 2.3–2.7 GHz base station and user station antenna:

$EIRP_{1.25\ MHz} = 63 + 10 \times Log_{10}(1.25 / 5.5) + 10 \times Log_{10}(360 / 35) = 66.69$ dBm

$EIRP_{2.5\ MHz} = 63 + 10 \times Log_{10}(2.5 / 5.5) + 10 \times Log_{10}(360 / 35) = 69.70$ dBm

$EIRP_{5\ MHz} = 63 + 10 \times Log_{10}(5 / 5.5) + 10 \times Log_{10}(360 / 35) = 72.71$ dBm

$EIRP_{10\ MHz} = 63 + 10 \times Log_{10}(10 / 5.5) + 10 \times Log_{10}(360 / 35) = 75.72$ dBm

Since EUT could be used as a base station as well as a user station, both output power and EIRP limits are applicable.

As per manufacturer declaration RDL-3000-RME is utilizing digital emissions with uniform power spectral density, hence power spectral density requirement is not applicable.

8.1.4 Test data

Table 8.1-1: *Output power and EIRP measurements results for 1.25 MHz channel bandwidth with Redline AFS-DBG-02120-01, 14 dBi, 120 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2496.75	23.62	22.87	26.27	33.00	6.73	14.00	40.27	61.34	21.07
BPSK	2689.25	23.67	23.39	26.54	33.00	6.46	14.00	40.54	61.34	20.80
256-QAM	2496.75	23.58	22.89	26.26	33.00	6.74	14.00	40.26	61.34	21.08
256-QAM	2689.25	23.70	23.34	26.53	33.00	6.47	14.00	40.53	61.34	20.81

Table 8.1-2: *Output power and EIRP measurements results for 1.25 MHz channel bandwidth with Redline AFS-DBG-0260-01, 16 dBi, 60 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2496.75	23.62	22.87	26.27	33.00	6.73	16.00	42.27	64.35	22.08
BPSK	2689.25	23.67	23.39	26.54	33.00	6.46	16.00	42.54	64.35	21.81
256-QAM	2496.75	23.58	22.89	26.26	33.00	6.74	16.00	42.26	64.35	22.09
256-QAM	2689.25	23.70	23.34	26.53	33.00	6.47	16.00	42.53	64.35	21.82

Table 8.1-3: *Output power and EIRP measurements results for 1.25 MHz channel bandwidth with Redline AFS-DBG-0290-01, 14.5 dBi, 90 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2496.75	23.62	22.87	26.27	33.00	6.73	14.50	40.77	62.59	21.82
BPSK	2689.25	23.67	23.39	26.54	33.00	6.46	14.50	41.04	62.59	21.55
256-QAM	2496.75	23.58	22.89	26.26	33.00	6.74	14.50	40.76	62.59	21.83
256-QAM	2689.25	23.70	23.34	26.53	33.00	6.47	14.50	41.03	62.59	21.56

Table 8.1-4: *Output power and EIRP measurements results for 1.25 MHz channel bandwidth with Redline APD-DB-02-4ft-01, 27 dBi, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2496.75	23.62	22.87	26.27	33.00	6.73	27.00	53.27	73.49	20.22
BPSK	2689.25	23.67	23.39	26.54	33.00	6.46	27.00	53.54	73.49	19.95
256-QAM	2496.75	23.58	22.89	26.26	33.00	6.74	27.00	53.26	73.49	20.23
256-QAM	2689.25	23.70	23.34	26.53	33.00	6.47	27.00	53.53	73.49	19.96

Table 8.1-5: *Output power and EIRP measurements results for 1.25 MHz channel bandwidth with Redline Embedded Antenna, 15 dBi, 35 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2496.75	23.62	22.87	26.27	33.00	6.73	15.00	41.27	66.69	25.42
BPSK	2689.25	23.67	23.39	26.54	33.00	6.46	15.00	41.54	66.69	25.15
256-QAM	2496.75	23.58	22.89	26.26	33.00	6.74	15.00	41.26	66.69	25.43
256-QAM	2689.25	23.70	23.34	26.53	33.00	6.47	15.00	41.53	66.69	25.16

Table 8.1-6: *Output power and EIRP measurements results for 2.5 MHz channel bandwidth with Redline AFS-DBG-02120-01, 14 dBi, 120 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2497.25	23.93	22.94	26.47	33.00	6.53	14.00	40.47	64.35	23.88
BPSK	2688.75	23.93	23.43	26.70	33.00	6.30	14.00	40.70	64.35	23.65
256-QAM	2497.25	23.63	22.89	26.29	33.00	6.71	14.00	40.29	64.35	24.06
256-QAM	2688.75	23.86	23.47	26.68	33.00	6.32	14.00	40.68	64.35	23.67

Table 8.1-7: *Output power and EIRP measurements results for 2.5 MHz channel bandwidth with Redline AFS-DBG-0260-01, 16 dBi, 60 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2497.25	23.93	22.94	26.47	33.00	6.53	16.00	42.47	67.36	24.89
BPSK	2688.75	23.93	23.43	26.70	33.00	6.30	16.00	42.70	67.36	24.66
256-QAM	2497.25	23.63	22.89	26.29	33.00	6.71	16.00	42.29	67.36	25.07
256-QAM	2688.75	23.86	23.47	26.68	33.00	6.32	16.00	42.68	67.36	24.68

Table 8.1-8: *Output power and EIRP measurements results for 2.5 MHz channel bandwidth with Redline AFS-DBG-0290-01, 14.5 dBi, 90 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2497.25	23.93	22.94	26.47	33.00	6.53	14.50	40.97	65.60	24.63
BPSK	2688.75	23.93	23.43	26.70	33.00	6.30	14.50	41.20	65.60	24.40
256-QAM	2497.25	23.63	22.89	26.29	33.00	6.71	14.50	40.79	65.60	24.81
256-QAM	2688.75	23.86	23.47	26.68	33.00	6.32	14.50	41.18	65.60	24.42

Table 8.1-9: *Output power and EIRP measurements results for 2.5 MHz channel bandwidth with Redline APD-DB-02-4ft-01, 27 dBi, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2497.25	23.93	22.94	26.47	33.00	6.53	27.00	53.47	76.50	23.03
BPSK	2688.75	23.93	23.43	26.70	33.00	6.30	27.00	53.70	76.50	22.80
256-QAM	2497.25	23.63	22.89	26.29	33.00	6.71	27.00	53.29	76.50	23.21
256-QAM	2688.75	23.86	23.47	26.68	33.00	6.32	27.00	53.68	76.50	22.82

Table 8.1-10: *Output power and EIRP measurements results for 2.5 MHz channel bandwidth with Redline Embedded Antenna, 15 dBi, 35 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2497.25	23.93	22.94	26.47	33.00	6.53	15.00	41.47	69.70	28.23
BPSK	2688.75	23.93	23.43	26.70	33.00	6.30	15.00	41.70	69.70	28.00
256-QAM	2497.25	23.63	22.89	26.29	33.00	6.71	15.00	41.29	69.70	28.41
256-QAM	2688.75	23.86	23.47	26.68	33.00	6.32	15.00	41.68	69.70	28.02

Table 8.1-11: *Output power and EIRP measurements results for 5 MHz channel bandwidth with Redline AFS-DBG-02120-01, 14 dBi, 120 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2498.50	23.54	22.61	26.11	33.00	6.89	14.00	40.11	67.36	27.25
BPSK	2687.50	23.60	22.79	26.22	33.00	6.78	14.00	40.22	67.36	27.14
256-QAM	2498.50	23.57	22.92	26.27	33.00	6.73	14.00	40.27	67.36	27.09
256-QAM	2687.50	23.75	22.82	26.32	33.00	6.68	14.00	40.32	67.36	27.04

Table 8.1-12: *Output power and EIRP measurements results for 5 MHz channel bandwidth with Redline AFS-DBG-0260-01, 16 dBi, 60 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2498.50	23.54	22.61	26.11	33.00	6.89	16.00	42.11	70.37	28.26
BPSK	2687.50	23.60	22.79	26.22	33.00	6.78	16.00	42.22	70.37	28.15
256-QAM	2498.50	23.57	22.92	26.27	33.00	6.73	16.00	42.27	70.37	28.10
256-QAM	2687.50	23.75	22.82	26.32	33.00	6.68	16.00	42.32	70.37	28.05

Table 8.1-13: *Output power and EIRP measurements results for 5 MHz channel bandwidth with Redline AFS-DBG-0290-01, 14.5 dBi, 90 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2498.50	23.54	22.61	26.11	33.00	6.89	14.50	40.61	68.61	28.00
BPSK	2687.50	23.60	22.79	26.22	33.00	6.78	14.50	40.72	68.61	27.89
256-QAM	2498.50	23.57	22.92	26.27	33.00	6.73	14.50	40.77	68.61	27.84
256-QAM	2687.50	23.75	22.82	26.32	33.00	6.68	14.50	40.82	68.61	27.79

Table 8.1-14: *Output power and EIRP measurements results for 5 MHz channel bandwidth with Redline APD-DB-02-4ft-01, 27 dBi, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2498.50	23.54	22.61	26.11	33.00	6.89	27.00	53.11	79.51	26.40
BPSK	2687.50	23.60	22.79	26.22	33.00	6.78	27.00	53.22	79.51	26.29
256-QAM	2498.50	23.57	22.92	26.27	33.00	6.73	27.00	53.27	79.51	26.24
256-QAM	2687.50	23.75	22.82	26.32	33.00	6.68	27.00	53.32	79.51	26.19

Table 8.1-15: *Output power and EIRP measurements results for 5 MHz channel bandwidth with Redline Embedded Antenna, 15 dBi, 35 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2498.50	23.54	22.61	26.11	33.00	6.89	15.00	41.11	72.71	31.60
BPSK	2687.50	23.60	22.79	26.22	33.00	6.78	15.00	41.22	72.71	31.49
256-QAM	2498.50	23.57	22.92	26.27	33.00	6.73	15.00	41.27	72.71	31.44
256-QAM	2687.50	23.75	22.82	26.32	33.00	6.68	15.00	41.32	72.71	31.39

Table 8.1-16: *Output power and EIRP measurements results for 10 MHz channel bandwidth with Redline AFS-DBG-02120-01, 14 dBi, 120 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2501.00	23.46	22.52	26.03	33.00	6.97	14.00	40.03	70.37	30.34
BPSK	2685.00	23.46	22.56	26.04	33.00	6.96	14.00	40.04	70.37	30.33
256-QAM	2501.00	23.47	22.50	26.02	33.00	6.98	14.00	40.02	70.37	30.35
256-QAM	2685.00	23.60	22.57	26.13	33.00	6.87	14.00	40.13	70.37	30.24

Table 8.1-17: *Output power and EIRP measurements results for 10 MHz channel bandwidth with Redline AFS-DBG-0260-01, 16 dBi, 60 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2501.00	23.46	22.52	26.03	33.00	6.97	16.00	42.03	73.38	31.35
BPSK	2685.00	23.46	22.56	26.04	33.00	6.96	16.00	42.04	73.38	31.34
256-QAM	2501.00	23.47	22.50	26.02	33.00	6.98	16.00	42.02	73.38	31.36
256-QAM	2685.00	23.60	22.57	26.13	33.00	6.87	16.00	42.13	73.38	31.25

Table 8.1-18: *Output power and EIRP measurements results for 10 MHz channel bandwidth with Redline AFS-DBG-0290-01, 14.5 dBi, 90 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2501.00	23.46	22.52	26.03	33.00	6.97	14.50	40.53	71.62	31.09
BPSK	2685.00	23.46	22.56	26.04	33.00	6.96	14.50	40.54	71.62	31.08
256-QAM	2501.00	23.47	22.50	26.02	33.00	6.98	14.50	40.52	71.62	31.10
256-QAM	2685.00	23.60	22.57	26.13	33.00	6.87	14.50	40.63	71.62	30.99

Table 8.1-19: *Output power and EIRP measurements results for 10 MHz channel bandwidth with Redline APD-DB-02-4ft-01, 27 dBi, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2501.00	23.46	22.52	26.03	33.00	6.97	27.00	53.03	82.53	29.50
BPSK	2685.00	23.46	22.56	26.04	33.00	6.96	27.00	53.04	82.53	29.49
256-QAM	2501.00	23.47	22.50	26.02	33.00	6.98	27.00	53.02	82.53	29.51
256-QAM	2685.00	23.60	22.57	26.13	33.00	6.87	27.00	53.13	82.53	29.40

Table 8.1-20: *Output power and EIRP measurements results for 10 MHz channel bandwidth with Redline Embedded Antenna, 15 dBi, 35 degrees, 2.3–2.7 GHz antenna*

Modulation	Frequency, MHz	Output power at ch0, dBm	Output power at ch1, dBm	Total output power, dBm	Output power limit, dBm	Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
BPSK	2501.00	23.46	22.52	26.03	33.00	6.97	15.00	41.03	75.72	34.69
BPSK	2685.00	23.46	22.56	26.04	33.00	6.96	15.00	41.04	75.72	34.68
256-QAM	2501.00	23.47	22.50	26.02	33.00	6.98	15.00	41.02	75.72	34.70
256-QAM	2685.00	23.60	22.57	26.13	33.00	6.87	15.00	41.13	75.72	34.59

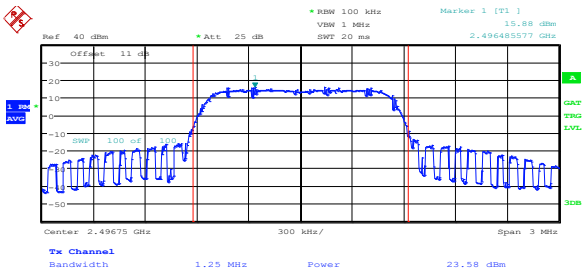


Figure 8.1-1: *Output power for 1.25 MHz channel BW, sample plot*

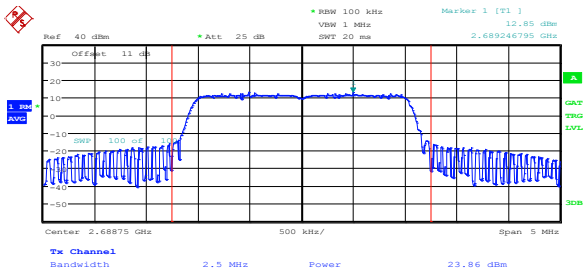


Figure 8.1-2: *Output power for 2.5 MHz channel BW, sample plot*

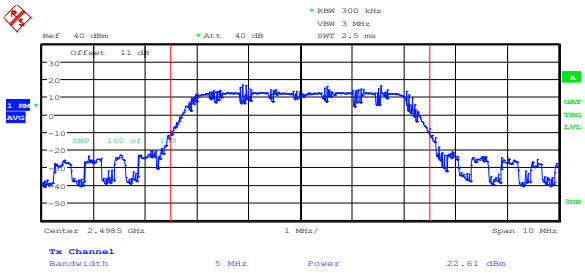


Figure 8.1-3: *Output power for 5 MHz channel BW, sample plot*

Figure 8.1-4: *Output power for 10 MHz channel BW, sample plot*

8.2 FCC 27.53(m) Emission limits

8.2.1 Definitions and limits

For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.
(1) Prior to the transition, and thereafter, solely within the MBS, for analog operations with an EIRP in excess of −9 dBW, the signal shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies.
(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 + 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least 67 + 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 + 10 log (P)−20 log (Dkm/1.5) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than −107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least 67 + 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least 67 + 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOBE by at least 67 + 10 log (P)−20 log (Dkm/1.5) measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than −107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least 67 + 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

(3) Prior to transition and thereafter solely within the MBS, and notwithstanding paragraph (l)(2) of this section, the maximum out-of-band power of a digital transmitter operating on a single 6 MHz channel with an EIRP in excess of −9 dBW employing digital modulation for the primary purpose of transmitting video programming shall be attenuated at the 6 MHz channel edges at least 25 dB relative to the licensed average 6 MHz channel power level, then attenuated along a linear slope to at least 40 dB at 250 kHz beyond the nearest channel edge, then attenuated along a linear slope from that level to at least 60 dB at 3 MHz above the upper and below the lower licensed channel edges, and attenuated at least 60 dB at all other frequencies.
(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

8.2.2 Test summary

Test date	June 4, 2015	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1007 mbar
Verdict	Pass	Relative humidity	31 %

8.2.3 Observations, settings and special notes

Spectrum analyser settings for 30 MHz to 40 GHz range:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak
Trace mode	Max-Hold

Spectrum analyser settings for band edge emissions (within 1 MHz right outside 2496–2690 MHz band)

Resolution bandwidth	20 kHz (for 1.25 MHz and 2.5 MHz channels BWs); 50 kHz (for 5 MHz channel BW); 100 kHz (for 10 MHz channel BW)
Video bandwidth	200 kHz (for 1.25 MHz and 2.5 MHz channels BWs); 500 kHz (for 5 MHz channel BW); 1000 kHz (for 10 MHz channel BW)
Detector mode	RMS
Trace mode	Power Average

8.2.4 Test data

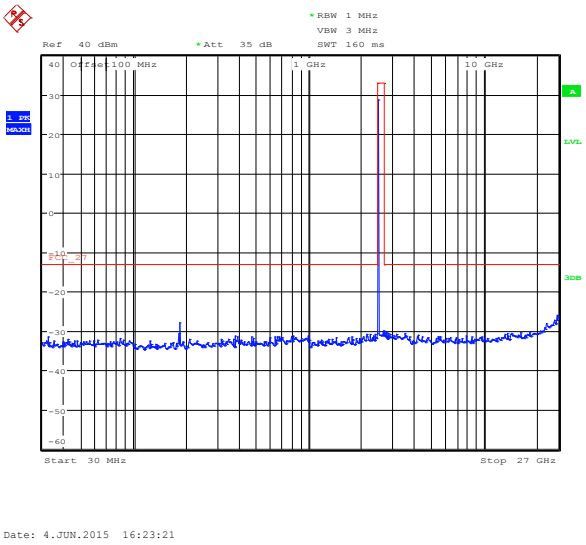


Figure 8.2-1: *Conducted spurious emissions at antenna port 1, low channel, 1.25 MHz BW, BPSK*

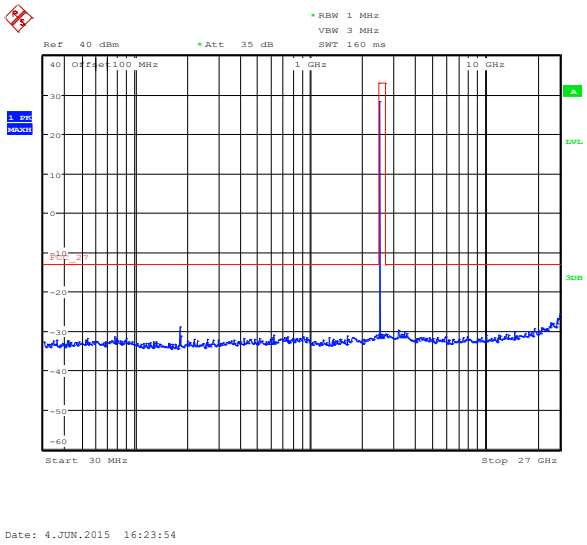


Figure 8.2-2: *Conducted spurious emissions at antenna port 2, low channel, 1.25 MHz BW, BPSK*

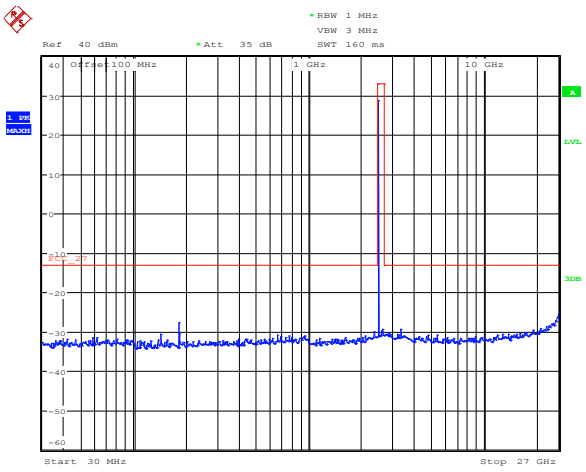


Figure 8.2-3: *Conducted spurious emissions at antenna port 1, low channel, 1.25 MHz BW, 256-QAM*

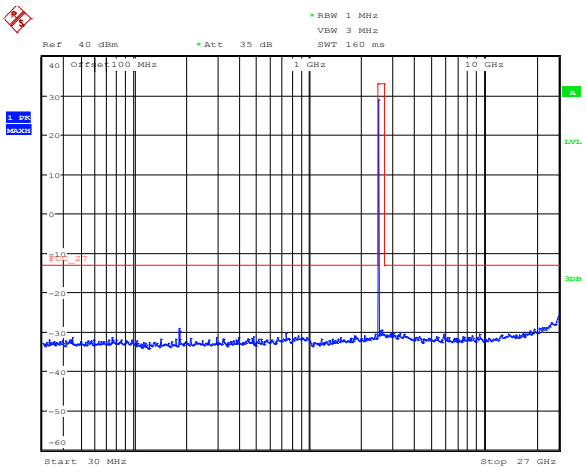


Figure 8.2-4: *Conducted spurious emissions at antenna port 2, low channel, 1.25 MHz BW, 256-QAM*

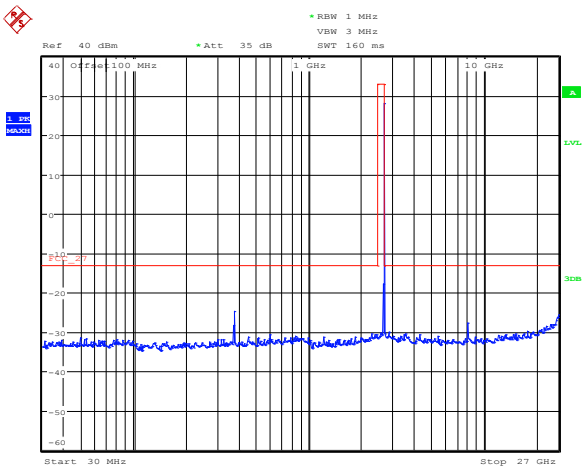


Figure 8.2-5: *Conducted spurious emissions at antenna port 1, high channel, 1.25 MHz BW, BPSK*

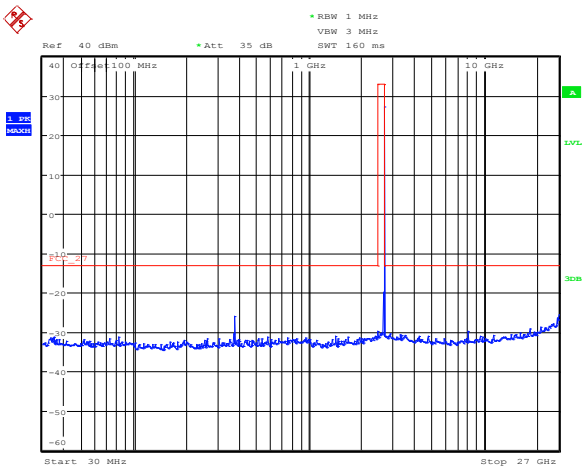


Figure 8.2-6: *Conducted spurious emissions at antenna port 2, high channel, 1.25 MHz BW, BPSK*

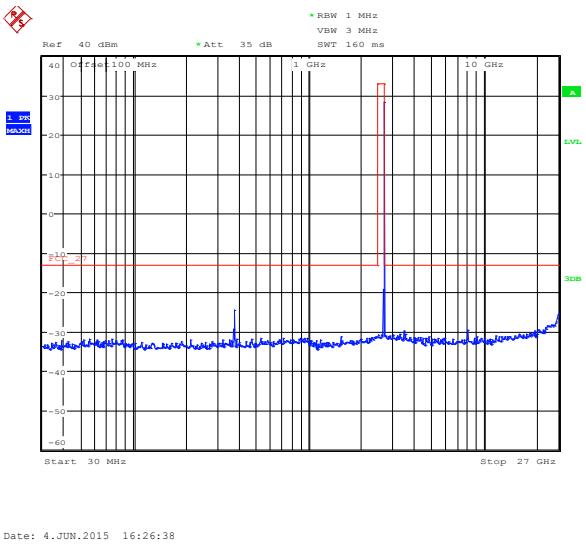


Figure 8.2-7: *Conducted spurious emissions at antenna port 1, high channel, 1.25 MHz BW, 256-QAM*

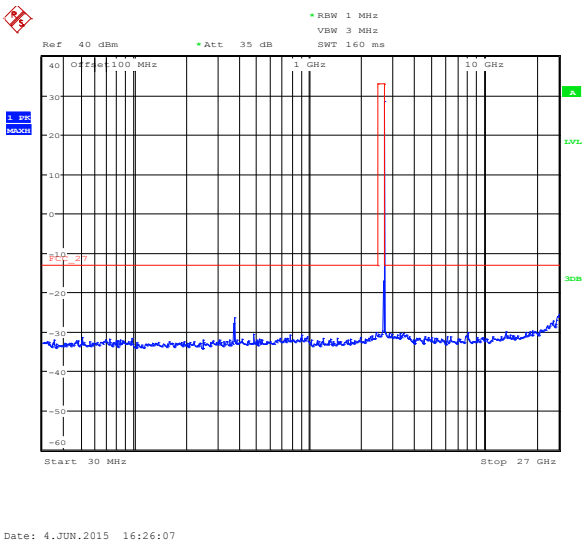


Figure 8.2-8: *Conducted spurious emissions at antenna port 2, high channel, 1.25 MHz BW, 256-QAM*

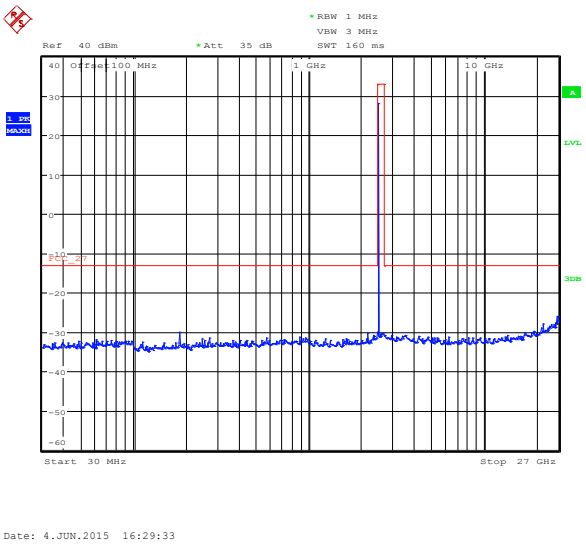


Figure 8.2-9: *Conducted spurious emissions at antenna port 1, low channel, 2.5 MHz BW, BPSK*

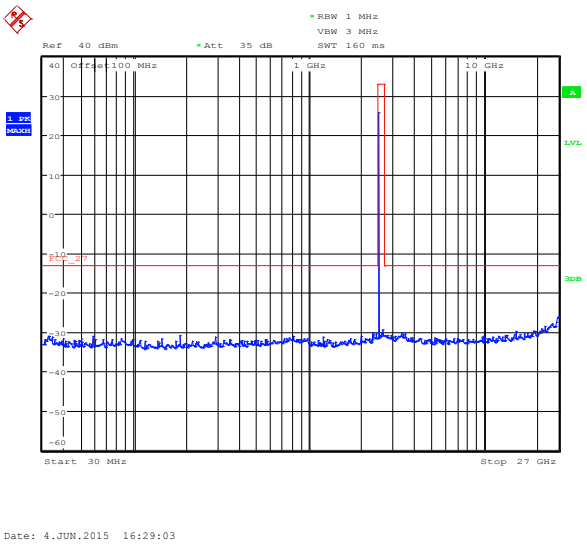


Figure 8.2-10: *Conducted spurious emissions at antenna port 2, low channel, 2.5 MHz BW, BPSK*

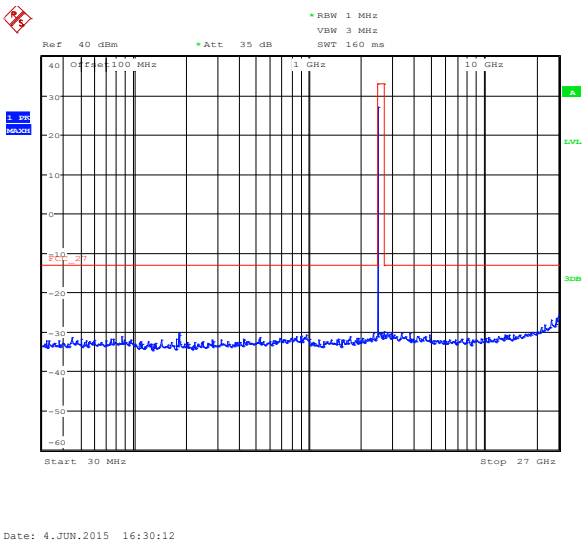


Figure 8.2-11: *Conducted spurious emissions at antenna port 1, low channel, 2.5 MHz BW, 256-QAM*

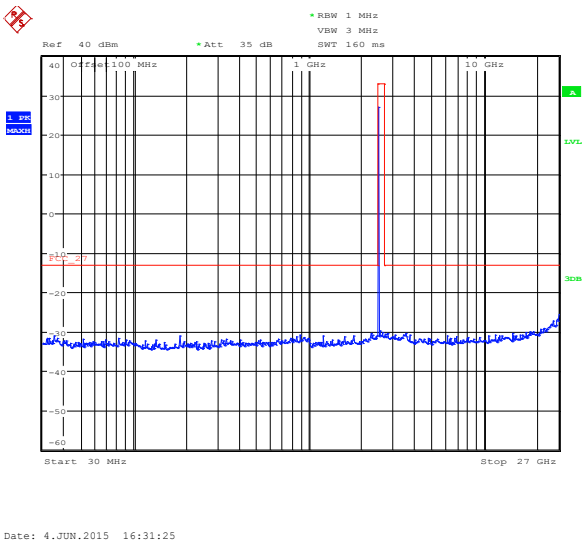


Figure 8.2-12: *Conducted spurious emissions at antenna port 2, low channel, 2.5 MHz BW, 256-QAM*

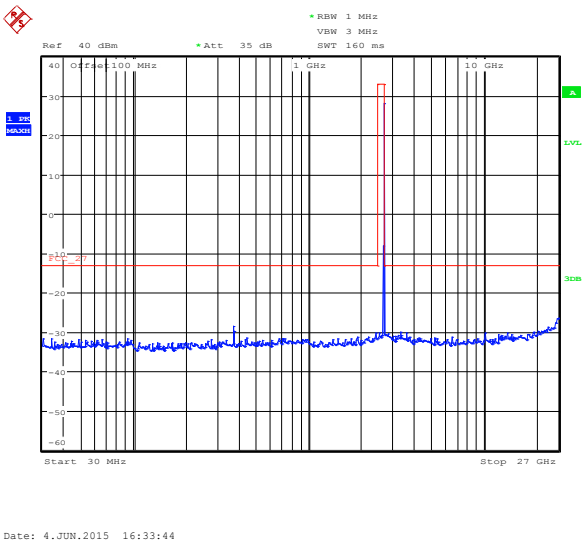


Figure 8.2-13: *Conducted spurious emissions at antenna port 1, high channel, 2.5 MHz BW, BPSK*

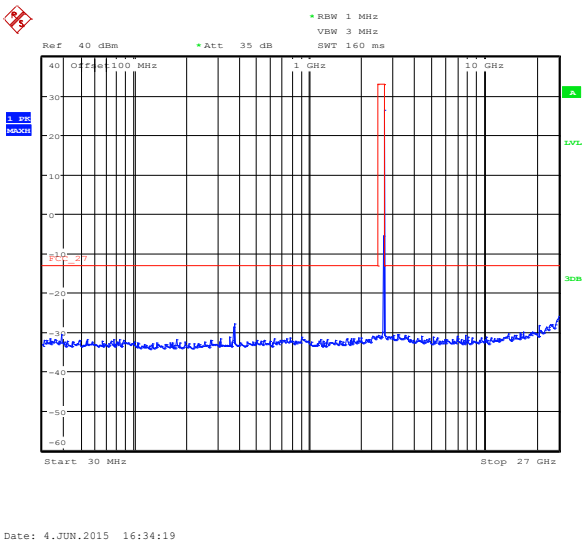


Figure 8.2-14: *Conducted spurious emissions at antenna port 2, high channel, 2.5 MHz BW, BPSK*

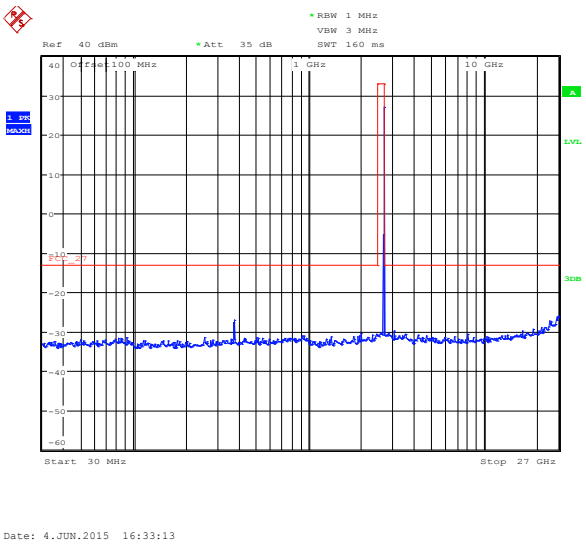


Figure 8.2-15: *Conducted spurious emissions at antenna port 1, high channel, 2.5 MHz BW, 256-QAM*

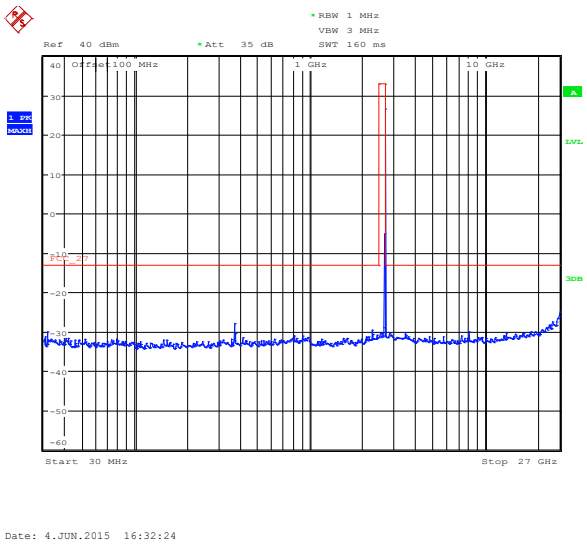


Figure 8.2-16: *Conducted spurious emissions at antenna port 2, high channel, 2.5 MHz BW, 256-QAM*

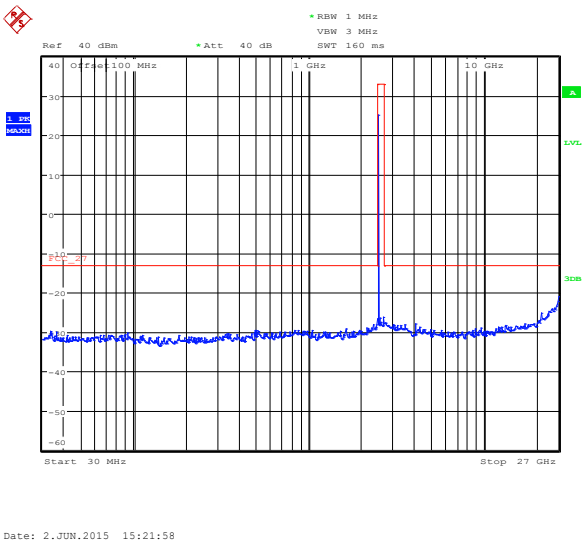


Figure 8.2-17: *Conducted spurious emissions at antenna port 1, low channel, 5 MHz BW, BPSK*

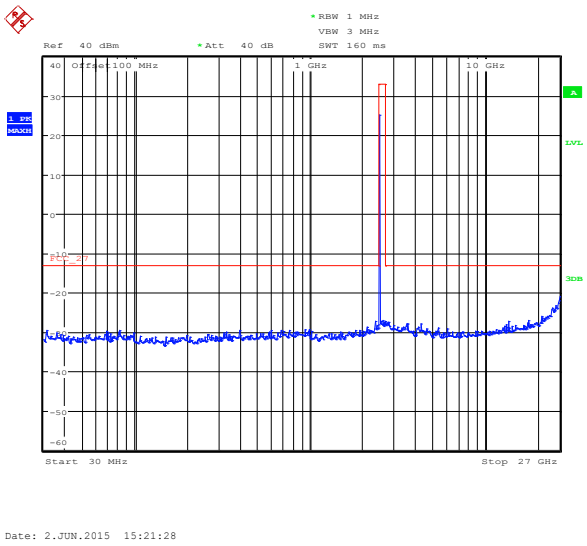


Figure 8.2-18: *Conducted spurious emissions at antenna port 2, low channel, 5 MHz BW, BPSK*

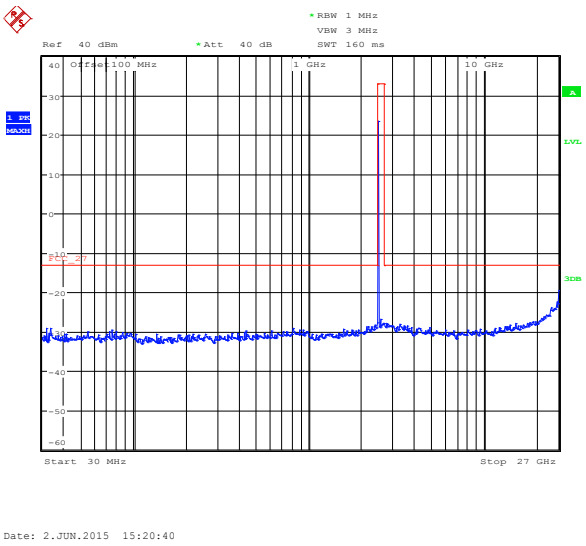


Figure 8.2-19: *Conducted spurious emissions at antenna port 1, low channel, 5 MHz BW, 256-QAM*

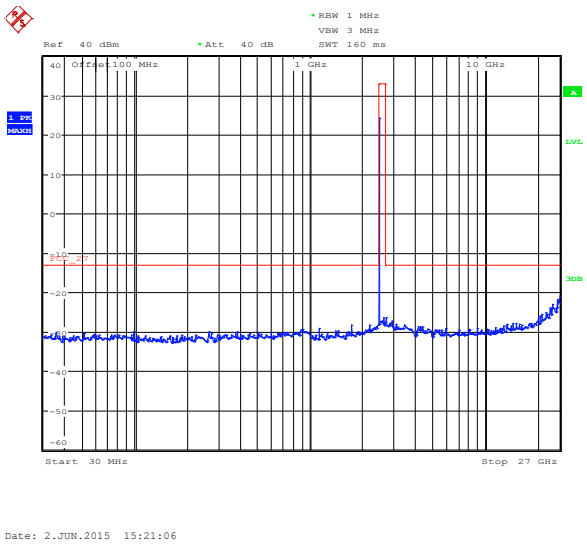


Figure 8.2-20: *Conducted spurious emissions at antenna port 2, low channel, 5 MHz BW, 256-QAM*

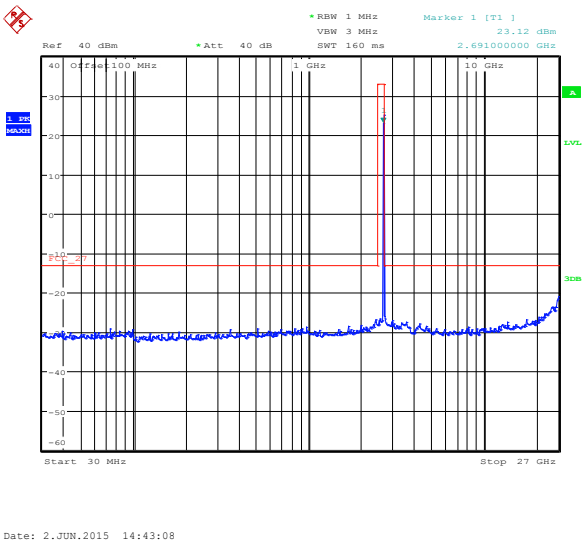


Figure 8.2-21: *Conducted spurious emissions at antenna port 1, high channel, 5 MHz BW, BPSK*

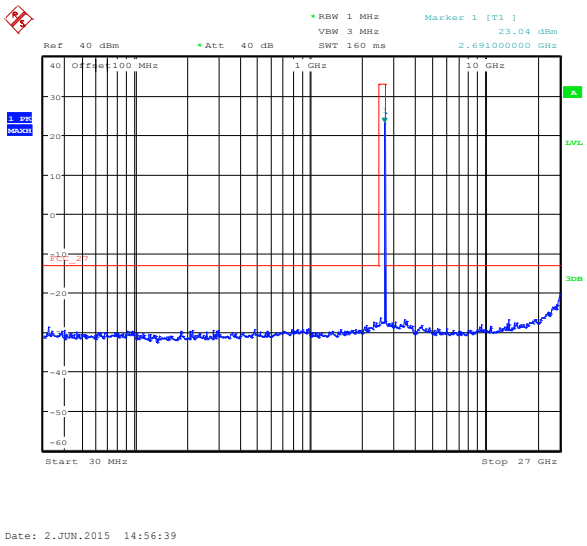


Figure 8.2-22: *Conducted spurious emissions at antenna port 2, high channel, 5 MHz BW, BPSK*

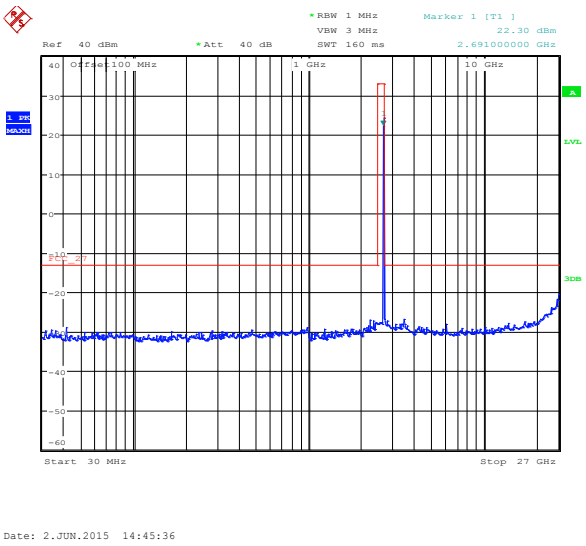


Figure 8.2-23: *Conducted spurious emissions at antenna port 1, high channel, 5 MHz BW, 256-QAM*

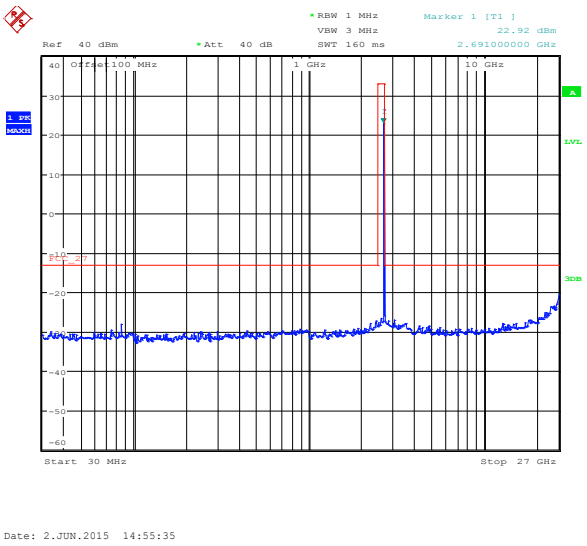


Figure 8.2-24: *Conducted spurious emissions at antenna port 2, high channel, 5 MHz BW, 256-QAM*

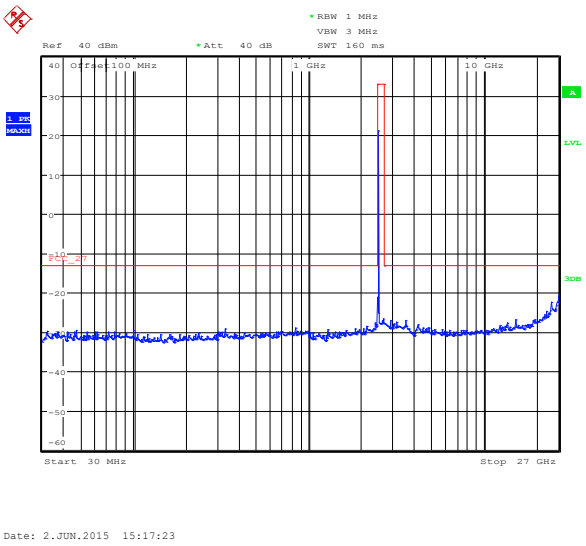


Figure 8.2-25: *Conducted spurious emissions at antenna port 1, low channel, 10 MHz BW, BPSK*

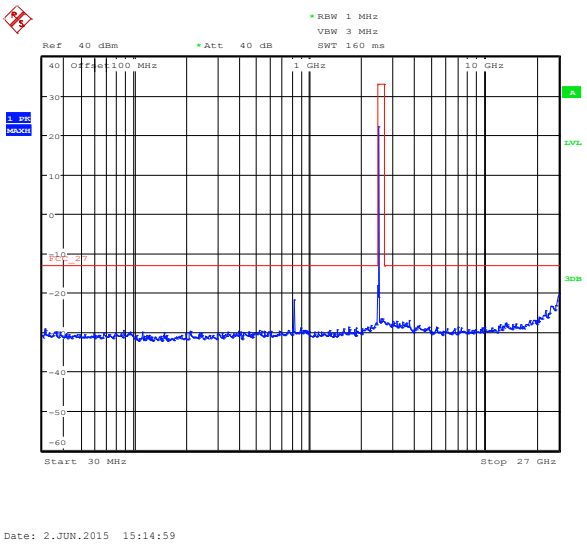


Figure 8.2-26: *Conducted spurious emissions at antenna port 2, low channel, 10 MHz BW, BPSK*

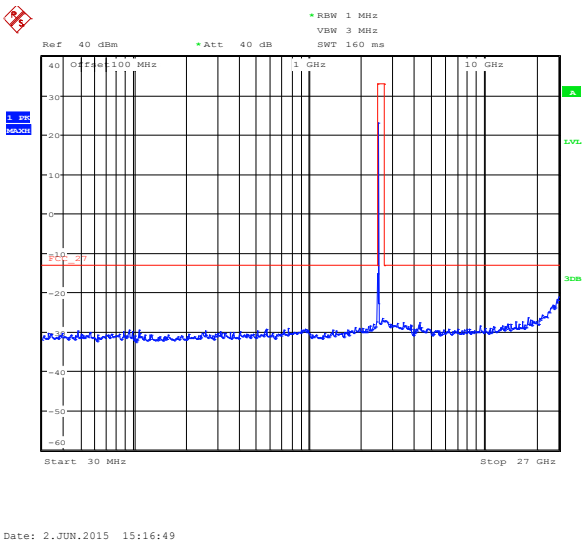


Figure 8.2-27: *Conducted spurious emissions at antenna port 1, low channel, 10 MHz BW, 256-QAM*

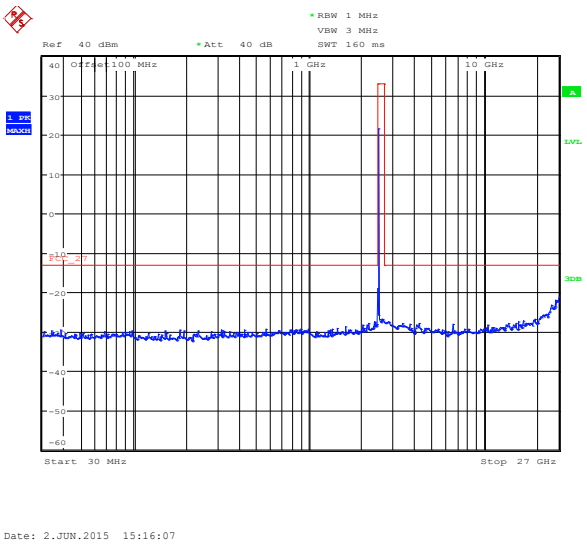


Figure 8.2-28: *Conducted spurious emissions at antenna port 2, low channel, 10 MHz BW, 256-QAM*

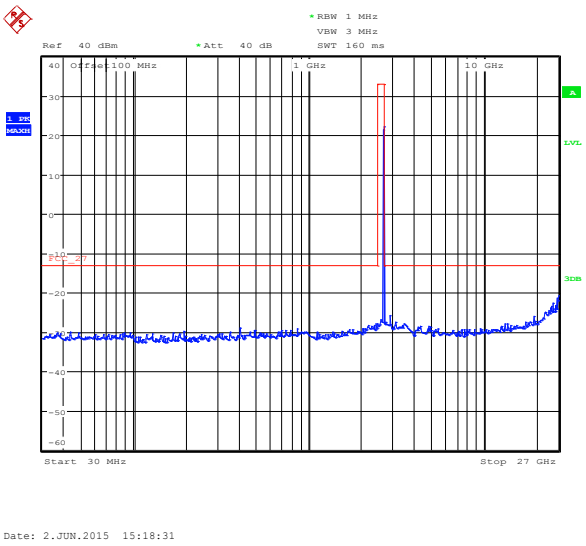


Figure 8.2-29: *Conducted spurious emissions at antenna port 1, high channel, 10 MHz BW, BPSK*

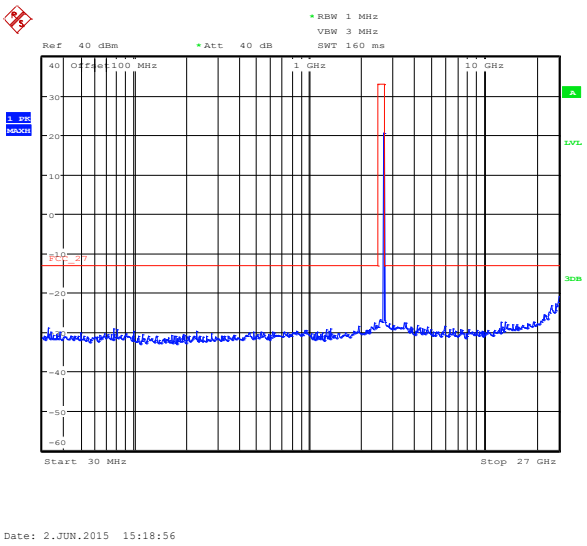


Figure 8.2-30: *Conducted spurious emissions at antenna port 2, high channel, 10 MHz BW, BPSK*

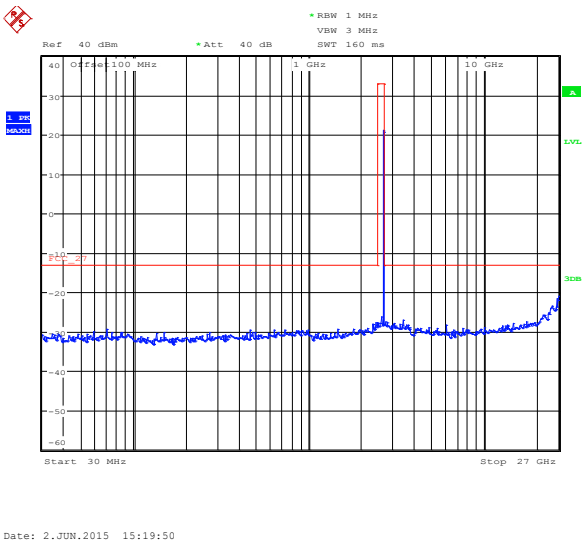


Figure 8.2-31: *Conducted spurious emissions at antenna port 1, high channel, 10 MHz BW, 256-QAM*

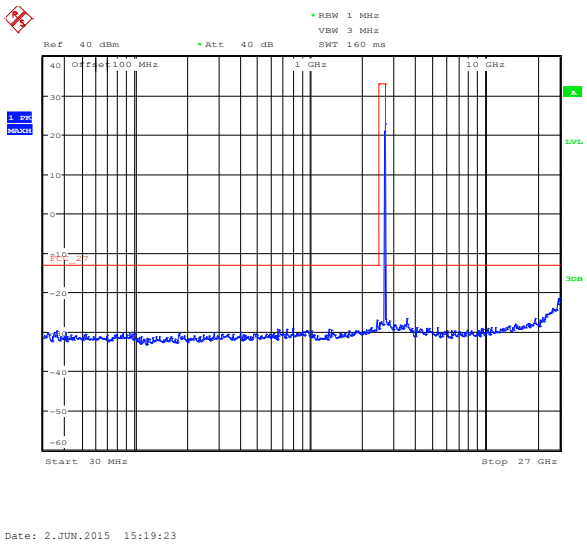


Figure 8.2-32: *Conducted spurious emissions at antenna port 2, high channel, 10 MHz BW, 256-QAM*

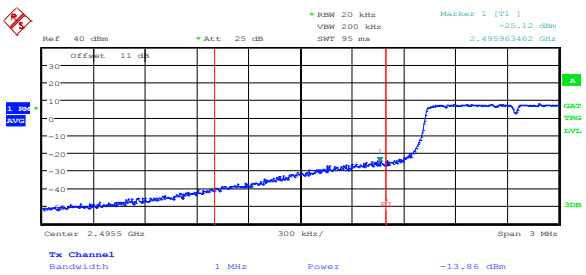


Figure 8.2-33: *Conducted lower band edge emissions at antenna port 1, 1.25 MHz BW, BPSK*

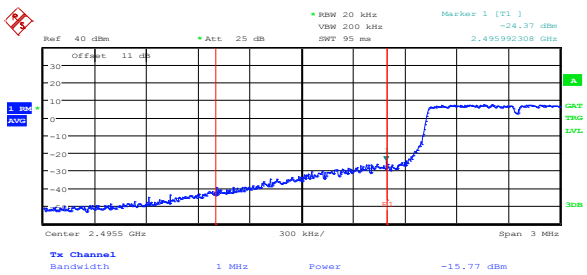


Figure 8.2-34: *Conducted lower band edge emissions at antenna port 2, 1.25 MHz BW, BPSK*

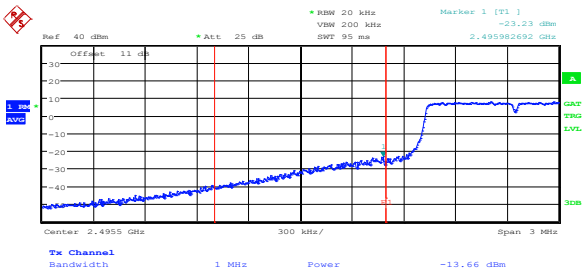


Figure 8.2-35: *Conducted lower band edge emissions at antenna port 1, 1.25 MHz BW, 256-QAM*

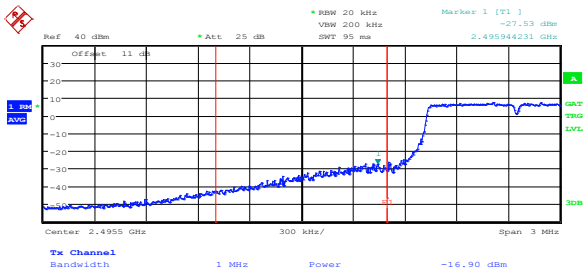


Figure 8.2-36: *Conducted lower band edge emissions at antenna port 2, 1.25 MHz BW, 256-QAM*

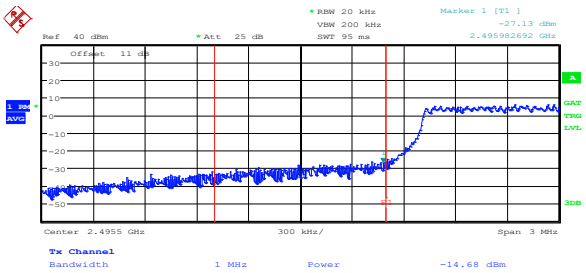


Figure 8.2-37: *Conducted lower band edge emissions at antenna port 1, 2.5 MHz BW, BPSK*

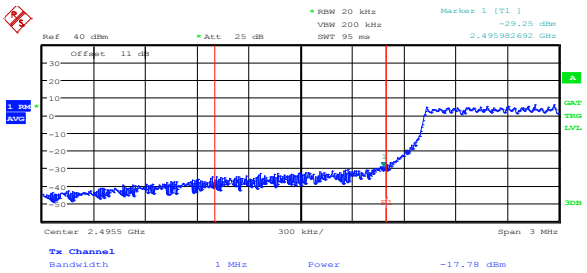


Figure 8.2-38: *Conducted lower band edge emissions at antenna port 2, 2.5 MHz BW, BPSK*

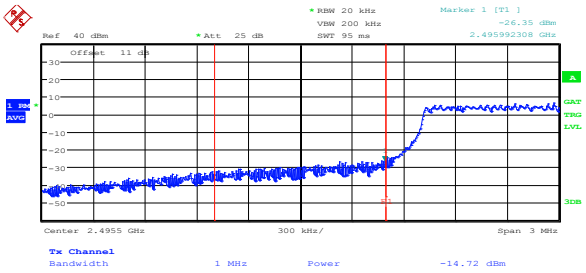


Figure 8.2-39: *Conducted lower band edge emissions at antenna port 1, 2.5 MHz BW, 256-QAM*

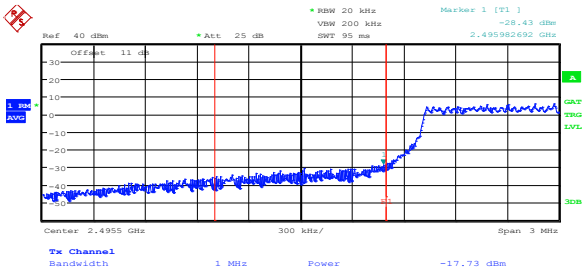


Figure 8.2-40: *Conducted lower band edge emissions at antenna port 2, 2.5 MHz BW, 256-QAM*

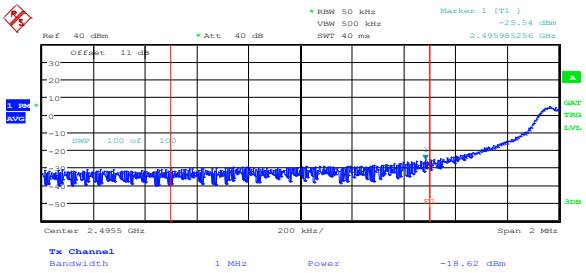


Figure 8.2-41: *Conducted lower band edge emissions at antenna port 1, 5 MHz BW, BPSK*

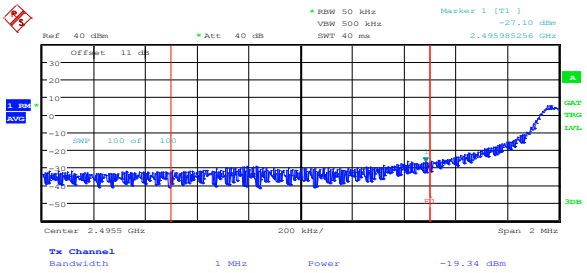


Figure 8.2-42: *Conducted lower band edge emissions at antenna port 2, 5 MHz BW, BPSK*

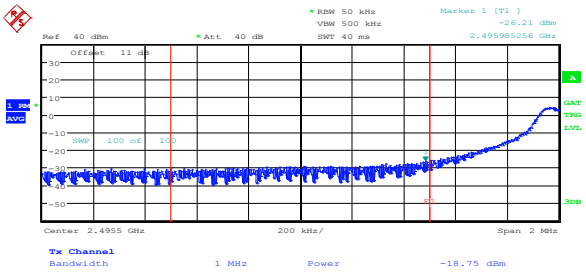


Figure 8.2-43: *Conducted lower band edge emissions at antenna port 1, 5 MHz BW, 256-QAM*

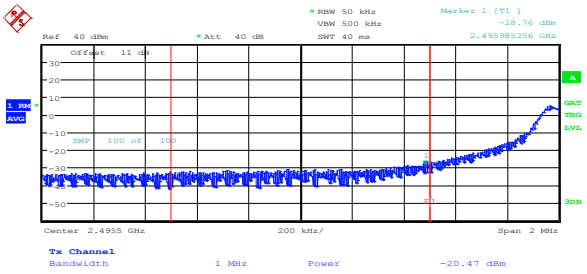


Figure 8.2-44: *Conducted lower band edge emissions at antenna port 2, 5 MHz BW, 256-QAM*

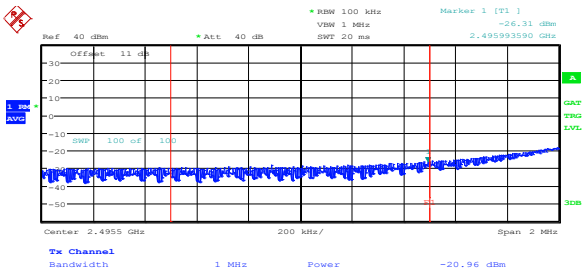


Figure 8.2-45: *Conducted lower band edge emissions at antenna port 1, 10 MHz BW, BPSK*

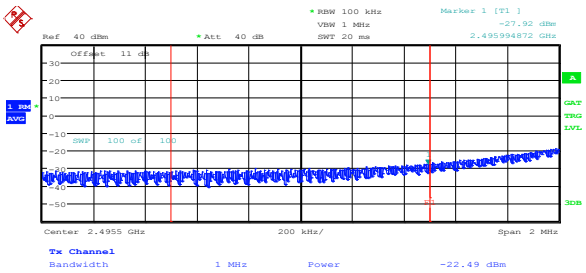


Figure 8.2-46: *Conducted lower band edge emissions at antenna port 2, 10 MHz BW, BPSK*

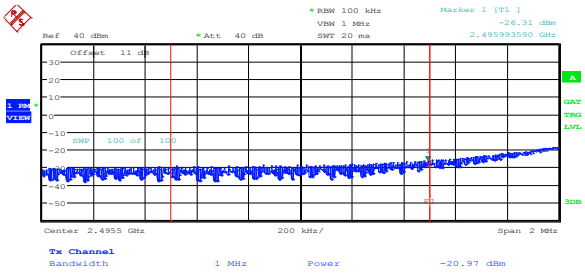


Figure 8.2-47: *Conducted lower band edge emissions at antenna port 1, 10 MHz BW, 256-QAM*

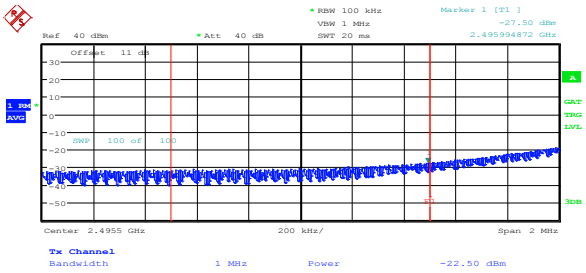


Figure 8.2-48: *Conducted lower band edge emissions at antenna port 2, 10 MHz BW, 256-QAM*

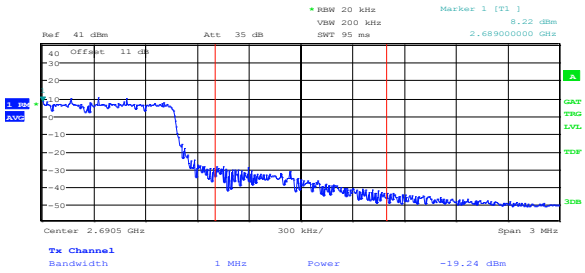


Figure 8.2-49: *Conducted upper band edge emissions at antenna port 1, 1.25 MHz BW, BPSK*

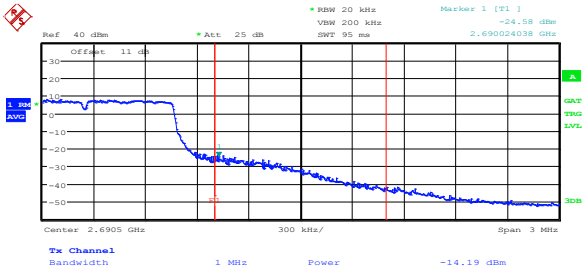


Figure 8.2-50: *Conducted upper band edge emissions at antenna port 2, 1.25 MHz BW, BPSK*

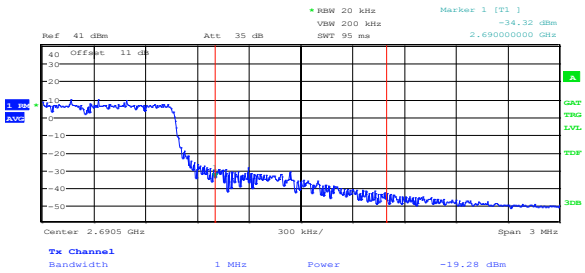


Figure 8.2-51: *Conducted upper band edge emissions at antenna port 1, 1.25 MHz BW, 256-QAM*

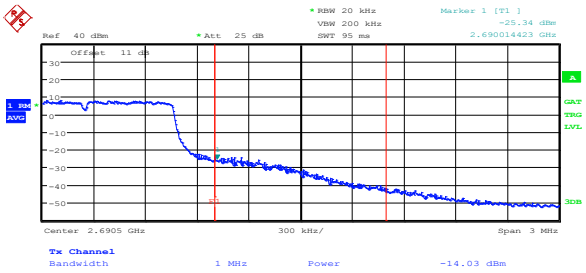


Figure 8.2-52: *Conducted upper band edge emissions at antenna port 2, 1.25 MHz BW, 256-QAM*

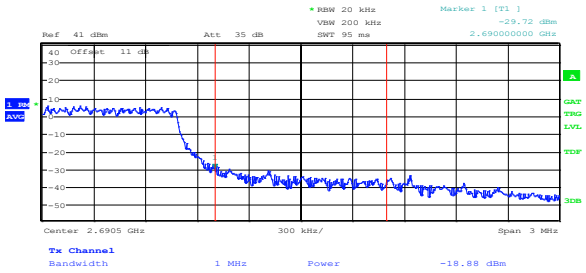


Figure 8.2-53: *Conducted upper band edge emissions at antenna port 1, 2.5 MHz BW, BPSK*

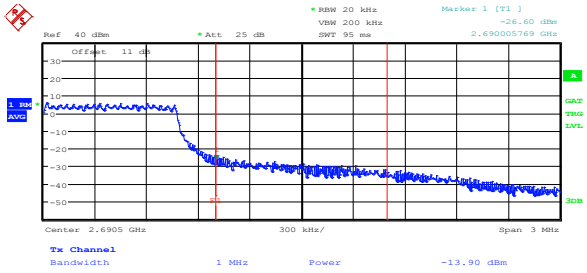


Figure 8.2-54: *Conducted upper band edge emissions at antenna port 2, 2.5 MHz BW, BPSK*

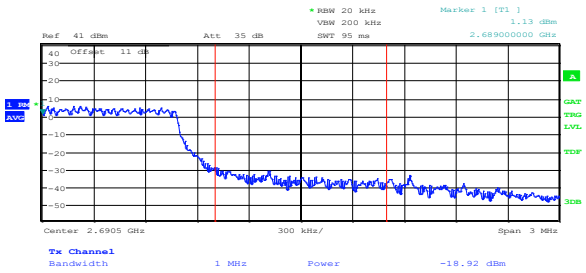


Figure 8.2-55: *Conducted upper band edge emissions at antenna port 1, 2.5 MHz BW, 256-QAM*

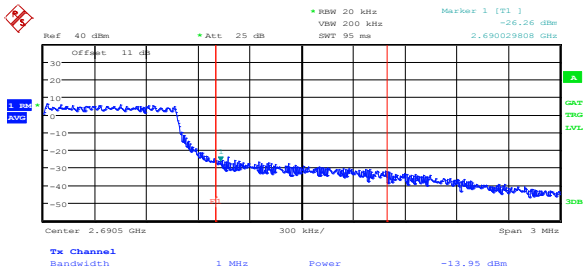


Figure 8.2-56: *Conducted upper band edge emissions at antenna port 2, 2.5 MHz BW, 256-QAM*

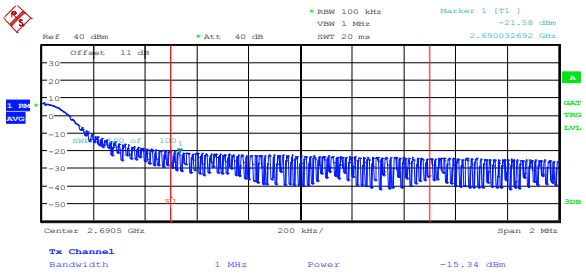


Figure 8.2-57: *Conducted upper band edge emissions at antenna port 1, 5 MHz BW, BPSK*

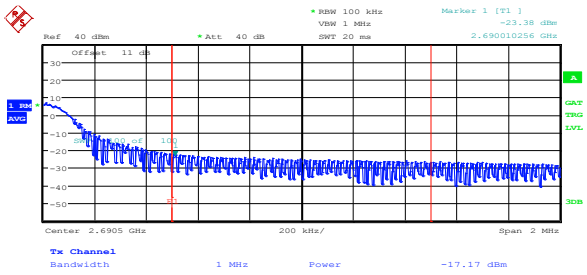


Figure 8.2-58: *Conducted upper band edge emissions at antenna port 2, 5 MHz BW, BPSK*

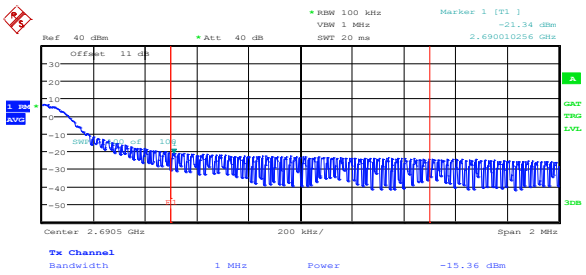


Figure 8.2-59: *Conducted upper band edge emissions at antenna port 1, 5 MHz BW, 256-QAM*

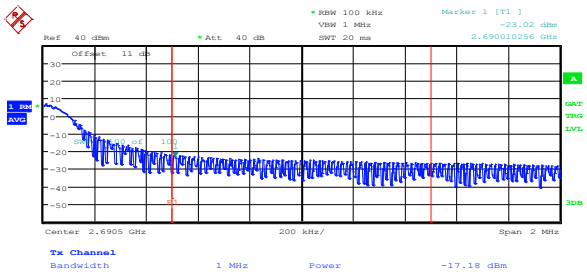


Figure 8.2-60: *Conducted upper band edge emissions at antenna port 2, 5 MHz BW, 256-QAM*

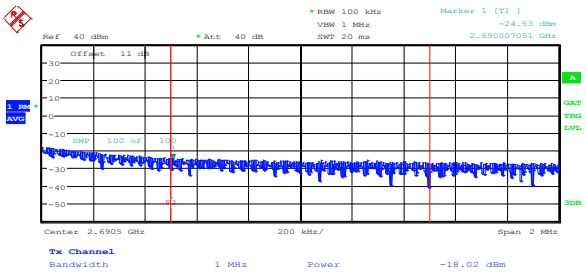


Figure 8.2-61: *Conducted upper band edge emissions at antenna port 1, 10 MHz BW, BPSK*

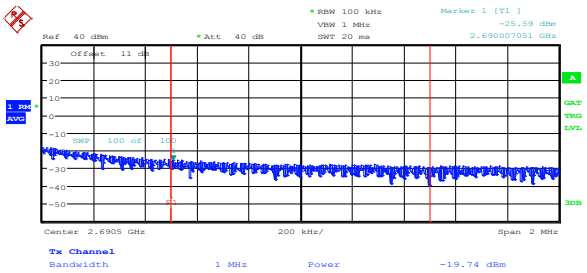


Figure 8.2-62: *Conducted upper band edge emissions at antenna port 2, 10 MHz BW, BPSK*

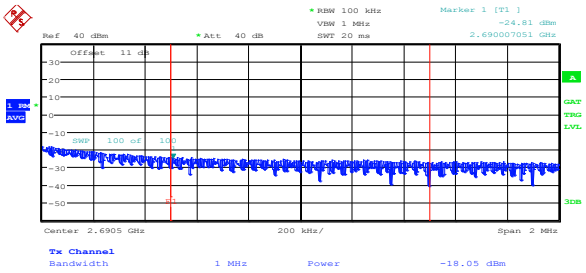


Figure 8.2-63: *Conducted upper band edge emissions at antenna port 1, 10 MHz BW, 256-QAM*

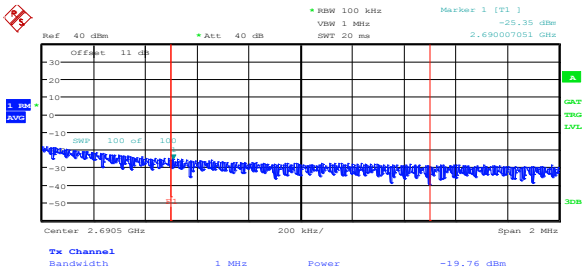


Figure 8.2-64: *Conducted upper band edge emissions at antenna port 2, 10 MHz BW, 256-QAM*

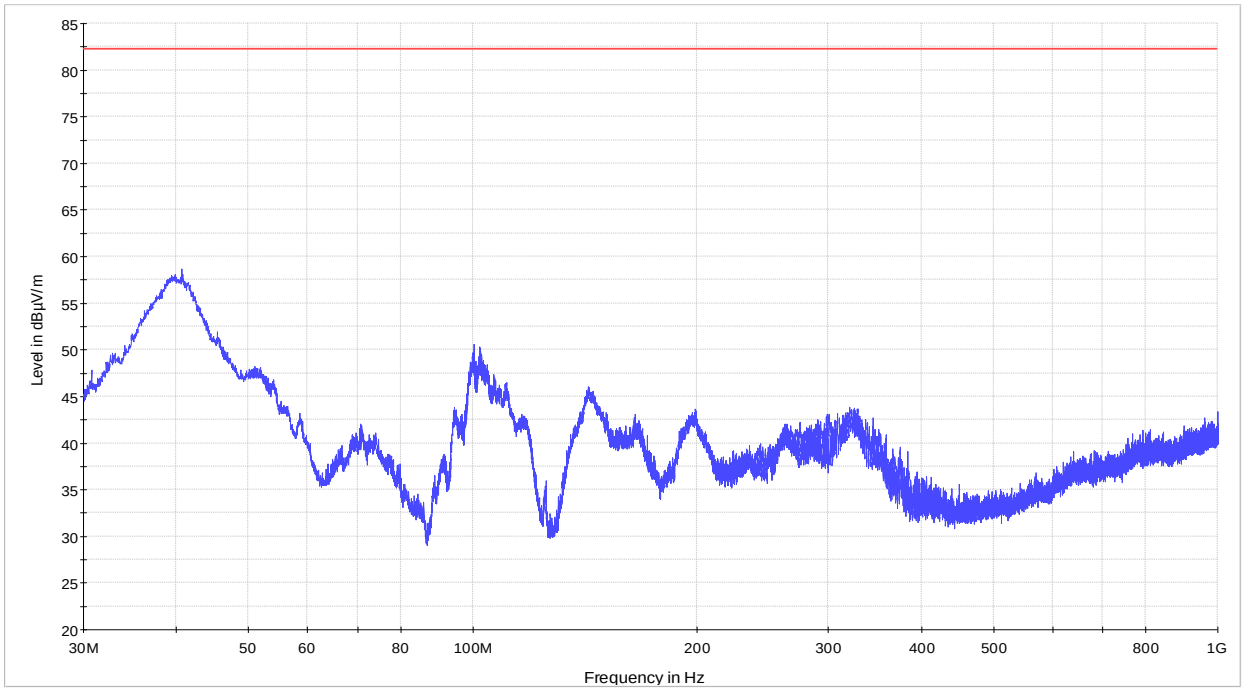


Figure 8.2-65: *Cabinet radiation below 1 GHz, sample plot*

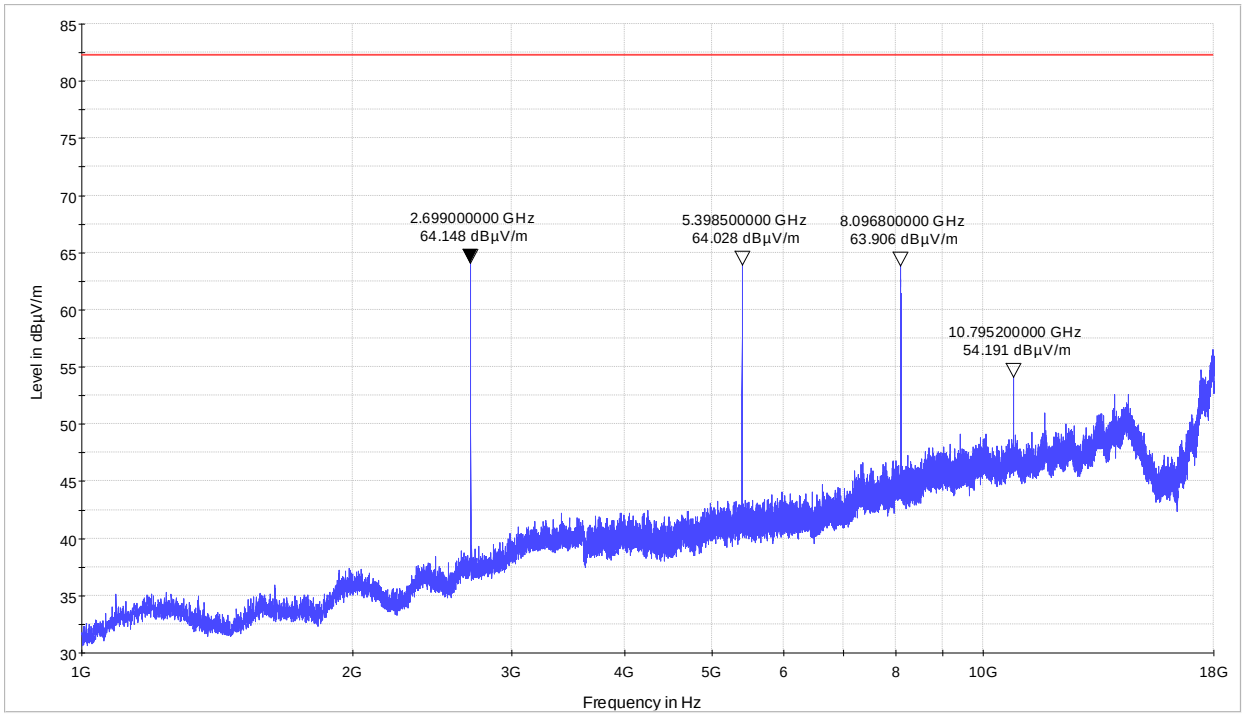


Figure 8.2-66: *Cabinet radiation above 1 GHz, sample plot*

Table 8.2-1: *Radiated spurious emissions results for 1.25 MHz channel BW*

Channel	Frequency, GHz	ERP, dBm	ERP limit, dBm	Margin, dB
Low	4.9935	-32.89	-13.00	19.89
Low	7.4904	-40.18	-13.00	27.18
Low	9.9876	-26.88	-13.00	13.88
High	5.3985	-33.35	-13.00	20.35
High	8.0968	-33.47	-13.00	20.47
High	10.7952	-43.19	-13.00	30.19

Table 8.2-2: *Radiated spurious emissions results for 2.5 MHz channel BW*

Channel	Frequency, MHz	ERP, dBm	ERP limit, dBm	Margin, dB
Low	4.8970	-35.76	-13.00	22.76
Low	7.3216	-46.59	-13.00	33.59
Low	9.7624	-34.68	-13.00	21.68
High	5.3875	-35.03	-13.00	22.03
High	8.0648	-32.47	-13.00	19.47
High	10.7544	-44.17	-13.00	31.17

Table 8.2-3: *Radiated spurious emissions results for 5 MHz channel BW*

Channel	Frequency, GHz	ERP, dBm	ERP limit, dBm	Margin, dB
Low	4.9990	-37.69	-13.00	24.69
Low	9.9968	-35.05	-13.00	22.05
High	5.3775	-36.85	-13.00	23.85
High	8.0620	-34.88	-13.00	21.88
High	10.7504	-43.43	-13.00	30.43

Table 8.2-4: *Radiated spurious emissions results for 10 MHz channel BW*

Channel	Frequency, GHz	ERP, dBm	ERP limit, dBm	Margin, dB
Low	5.0020	-39.03	-13.00	26.03
Low	7.5060	-47.61	-13.00	34.61
Low	10.0128	-36.43	-13.00	23.43
High	5.3675	-41.24	-13.00	28.24
High	8.0548	-36.14	-13.00	23.14
High	10.7400	-42.51	-13.00	29.51

8.3 FCC 27.55 Frequency stability

8.3.1 Definitions and limits

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

8.3.2 Test summary

Test date	June 4, 2015	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1005 mbar
Verdict	Pass	Relative humidity	33 %

8.3.3 Observations, settings and special notes

RBW was set to 300 Hz.

8.3.4 Test data

Table 8.3-1: *Frequency tolerance measurements*

Test conditions	Frequency, Hz	Offset, Hz
+50 °C, Nominal	2687483975	31051
+40 °C, Nominal	2687542540	27514
+30 °C, Nominal	2687525348	10322
+20 °C, +15 %	2687520143	5117
+20 °C, Nominal	2687515026	Reference
+20 °C, -15 %	2687512586	-2440
+10 °C, Nominal	2687516035	1009
0 °C, Nominal	2687518821	3795
-10 °C, Nominal	2687519489	4463
-20 °C, Nominal	2687517427	2401
-30 °C, Nominal	2687516359	1333

8.4 FCC 27.53(m)(6) Emission bandwidth

8.4.1 Definitions and limits

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.4.2 Test summary

Test date	June 4, 2015	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1005 mbar
Verdict	Pass	Relative humidity	33 %

8.4.3 Observations, settings and special notes

Spectrum analyzer settings

Resolution bandwidth	30 kHz (for 1.25 MHz channel BW); 50 kHz (for 2.5 MHz channel BW); 100 kHz (for 5 MHz channel BW); 200 kHz (for 10 MHz channel BW)
Video bandwidth	100 kHz (for 1.25 MHz channel BW); 200 kHz (for 2.5 MHz channel BW); 300 kHz (for 5 MHz channel BW); 500 kHz (for 10 MHz channel BW)
Detector mode	Peak
Trace mode	Max-hold

8.4.4 Test data

Table 8.4-1: *26 dB bandwidth for 1.25 MHz channel*

Antenna port	Modulation	Frequency, MHz	26 dB bandwidth, MHz
1	BPSK	2496.75	1.24
1	BPSK	2689.25	1.21
1	256-QAM	2496.75	1.25
1	256-QAM	2689.25	1.22
2	BPSK	2496.75	1.25
2	BPSK	2689.25	1.24
2	256-QAM	2496.75	1.21
2	256-QAM	2689.25	1.25

Table 8.4-2: *26 dB bandwidth for 2.5 MHz channel*

Antenna port	Modulation	Frequency, MHz	26 dB bandwidth, MHz
1	BPSK	2497.25	2.39
1	BPSK	2688.75	2.39
1	256-QAM	2497.25	2.38
1	256-QAM	2688.75	2.44
2	BPSK	2497.25	2.39
2	BPSK	2688.75	2.39
2	256-QAM	2497.25	2.40
2	256-QAM	2688.75	2.39

Table 8.4-3: *26 dB bandwidth for 5 MHz channel*

Antenna port	Modulation	Frequency, MHz	26 dB bandwidth, MHz
1	BPSK	2496.75	4.76
1	BPSK	2689.25	4.79
1	256-QAM	2496.75	4.92
1	256-QAM	2689.25	4.74
2	BPSK	2496.75	5.00
2	BPSK	2689.25	4.87
2	256-QAM	2496.75	5.06
2	256-QAM	2689.25	4.84

Table 8.4-4: *26 dB bandwidth for 10 MHz channel*

Antenna port	Modulation	Frequency, MHz	26 dB bandwidth, MHz
1	BPSK	2501.00	9.61
1	BPSK	2685.00	9.48
1	256-QAM	2501.00	9.35
1	256-QAM	2685.00	9.42
2	BPSK	2501.00	9.64
2	BPSK	2685.00	9.61
2	256-QAM	2501.00	9.48
2	256-QAM	2685.00	9.77

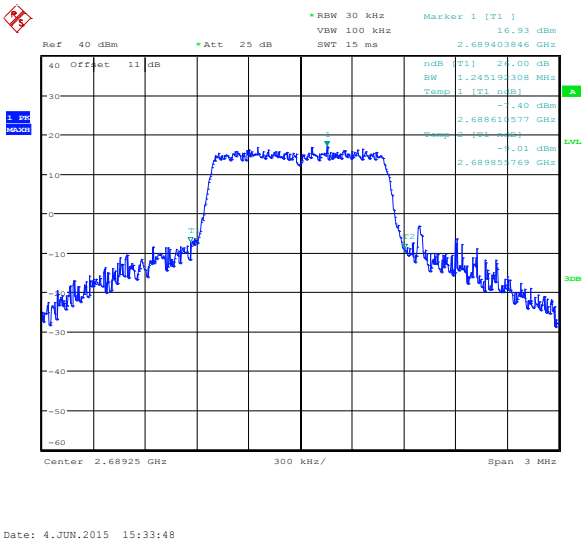


Figure 8.4-1: *26 dB BW on 1.25 MHz channel, sample plot*

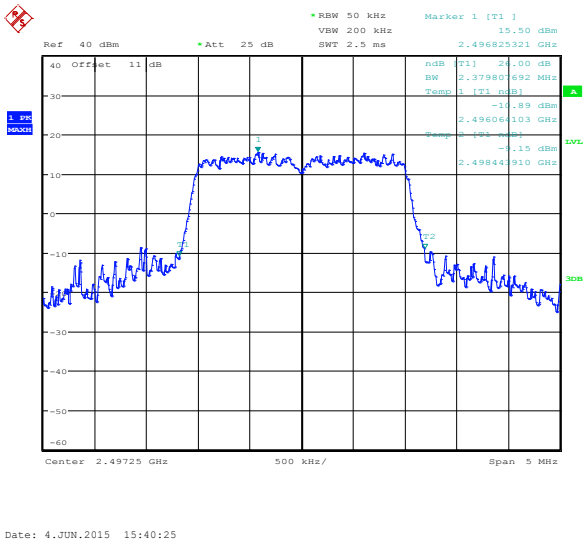


Figure 8.4-2: *26 dB BW on 2.5 MHz channel, sample plot*

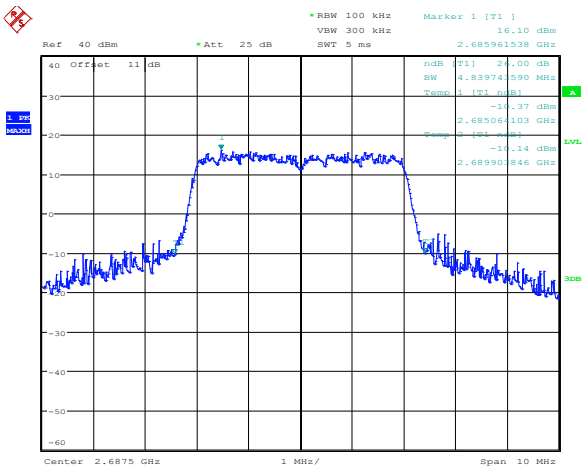


Figure 8.4-3: *26 dB BW on 5 MHz channel, sample plot*

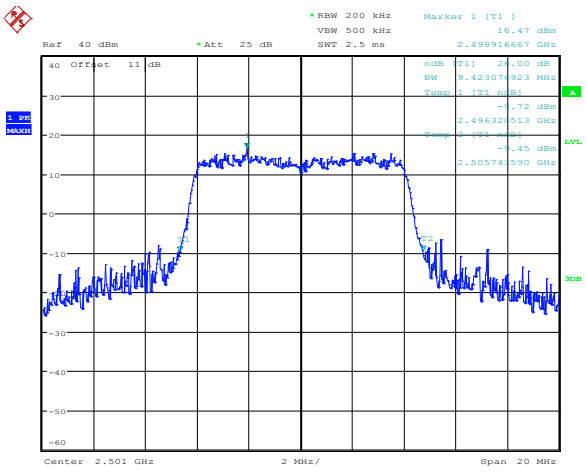
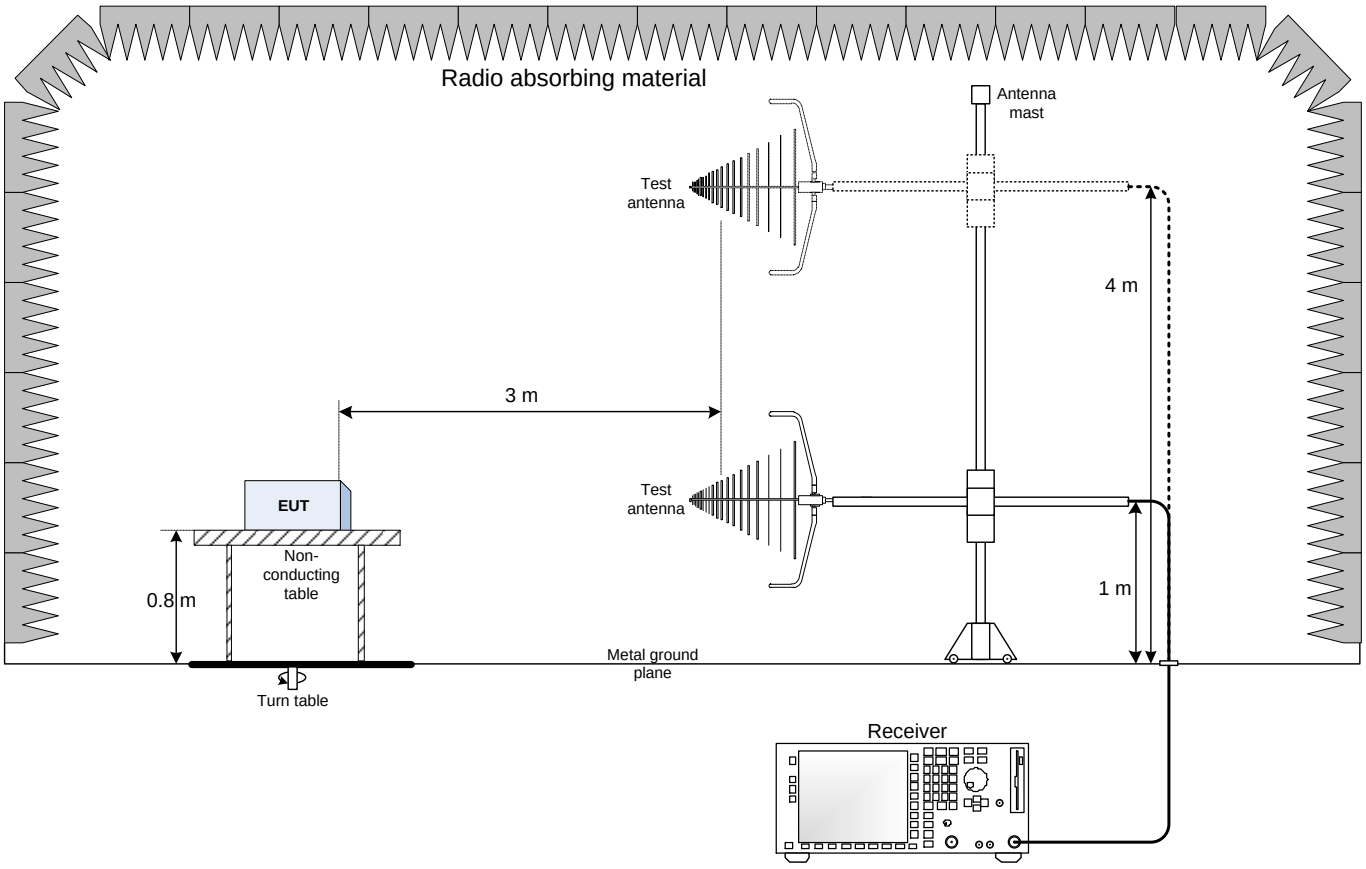


Figure 8.4-4: *26 dB BW on 10 MHz channel, sample plot*

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up for frequencies below 1 GHz



9.2 Radiated emissions set-up for frequencies above 1 GHz