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Test report

316692-1TRFWL

Date of issue: October 14, 2016

Applicant:

Redline Communications

Product:

LTE Base Station

Model:

Ellipse-4G-HP

FCC ID:

QC8-B14

Specifications:

- FCC Part 90, Subpart R

  Regulations governing the licensing and use of frequencies in the 763–775 and 793–805 MHz bands

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: 176392; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by:	Andrey Adelberg, Senior Wireless/EMC Specialist
Reviewed by:	Kevin Rose, Wireless/EMC Specialist
Date:	October 14, 2016
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., Markham, ON, Canada, L3R 0E8

1.2 Test specifications

FCC Part 90, Subpart R	Private Land Mobile Radio Services; Regulations governing the licensing and use of frequencies in the 763–775 and 793–805 MHz bands

1.3 Test methods

KDB 971168 D01 v02r02	Power Meas License Digital Systems

1.4 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.

1.5 Exclusions

None

1.6 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, tests results

Clause	Test description	Verdict
90.210(n)	Emission mask	Pass
90.539	Frequency stability	Pass
90.542(a)	Broadband transmitting power limits.	Pass
90.543	Out-of-band emission limit	Pass
90.543(f)	Transmission in 1559–1610 MHz band	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	September 25, 2016
Nemko sample ID number	133-002783

3.2 EUT information

Product name	LTE Base Station
Model	Ellipse-4G-HP
Serial number	321RM16330001

3.3 Technical information

Operating band	758–768 MHz
Operating frequency	763 MHz (single channel)
Modulation type	QPSK, 16-QAM and 64-QAM
Occupied bandwidth (99 %)	9.26 MHz
Emission designator	D7W
Power requirements	120 V_{AC}, 60 Hz via AC/DC power supply

3.4 Product description and theory of operation

Ellipse 4G HP is an all outdoor LTE eNodeB (E-UTRAN Node B) single band small cell base station operating in LTE Band 14, 758–768 MHz.

3.5 EUT exercise details

EUT was controlled using laptop, connected to Ethernet port.
EUT was configured using E-UTRA test modes as per 3GPP 36.141 Release 8
E-TM1.1 for QPSK
E-TM3.2 for 16-QAM
E-TM3.1 for 64-QAM

3.6 EUT setup diagram

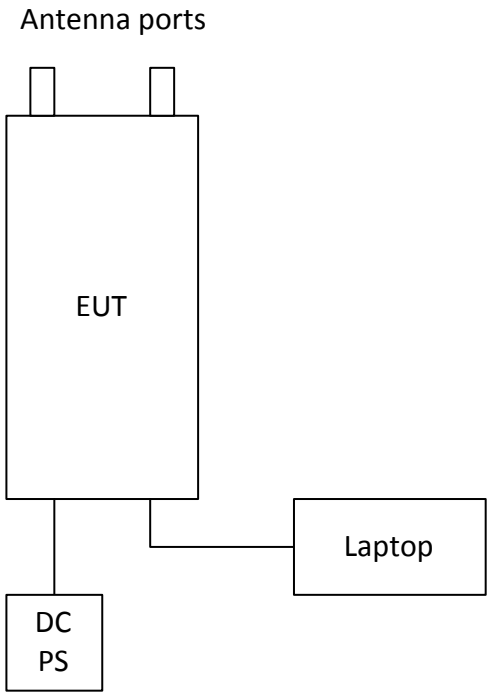

Figure 3.6-1: *Setup diagram*

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

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	Dec. 01/16
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
AC Power source	Chenwa	2700M-10k	FA002716	—	VOU
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/17
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	Apr. 28/17
Horn antenna (1–18 GHz)	EMCO	3115	FA000825	1 year	Apr. 26/17
Pre-amplifier (1–18 GHz)	JCA	JCA118-503	FA002091	1 year	April 26/17
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	Apr. 15/17
Temperature chamber	Espec	EPX-4H	FA002735	1 year	Jan 26/17

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

Section 8. Testing data

8.1 FCC 90.542(a)(3) Transmit carrier output power and ERP

8.1.1 Definitions and limits

Fixed and base stations transmitting a signal in the 758–768 MHz band with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz (60 dBm/MHz) ERP.

8.1.2 Test summary

Test date:	September 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1010 mbar
Verdict:	Pass	Relative humidity:	36 %

8.1.3 Observations settings and special notes

The transmit peak power density was measured with Spectrum analyzer using the following settings:

Resolution bandwidth:	1 MHz
Video bandwidth:	≥ 3 times the RBW
Detector mode:	Peak
Trace mode:	Max Hold

8.1.4 Test data

Table 8.1-1: *Power density measurement results*

Modulation	Frequency, MHz	Conducted peak power density, dBm/MHz			Combined peak power density, W/MHz	ERP limit, dBm/MHz	Margin, dB
		On Ant 1	On Ant 2	Combined			
QPSK	763	30.20	30.02	33.12	2.052	60.00	26.88
16-QAM	763	30.50	30.39	33.46	2.216	60.00	26.54
64-QAM	763	30.17	29.91	33.05	2.019	60.00	26.95

Note: Margin = ERP limit [dBm/MHz] − Combined conducted peak power density [dBm/MHz]

Maximum permitted antenna gain (without transmit power reduction) is 26.54 dBd (or 28.69 dBd)

if transmitting antennas of directional gain greater than 26.54 dBi are used, the conducted output power density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 28.69 dBi.

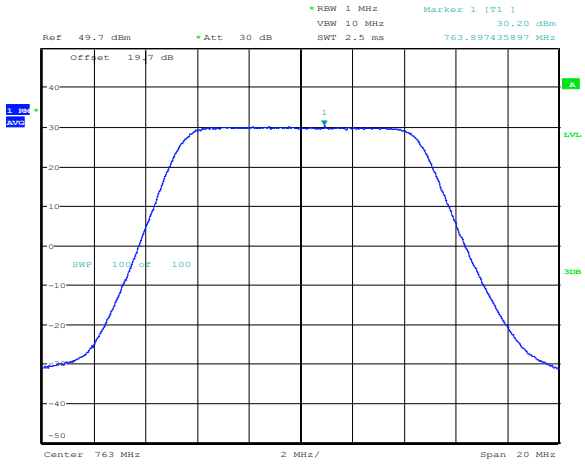

Figure 8.1-1: *Peak power spectral density at Ant 1, QPSK*

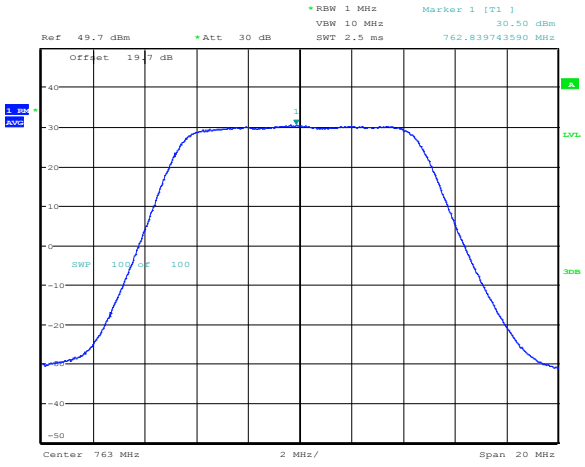

Figure 8.1-2: *Peak power spectral density at Ant 1, 16-QAM*

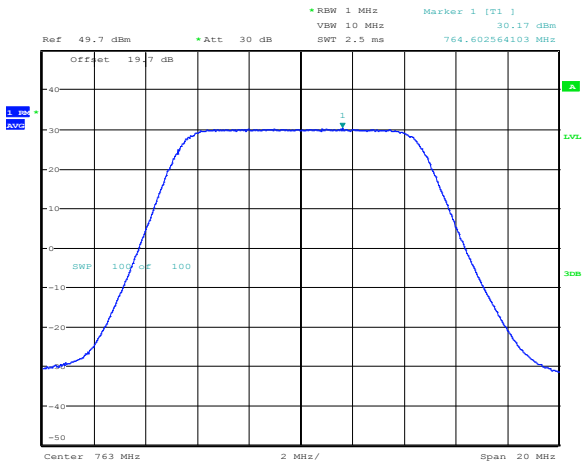

Figure 8.1-3: *Peak power spectral density at Ant 1, 64-QAM*

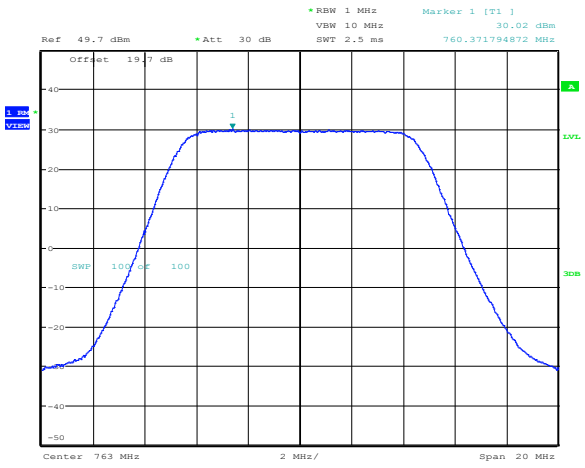

Figure 8.1-4: *Peak power spectral density at Ant 2, QPSK*

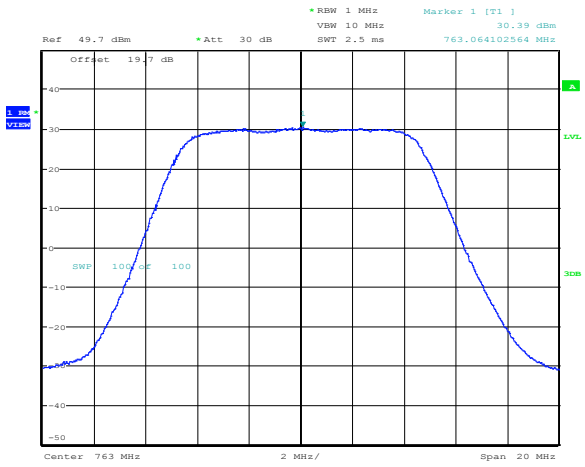

Figure 8.1-5: *Peak power spectral density at Ant 2, 16-QAM*

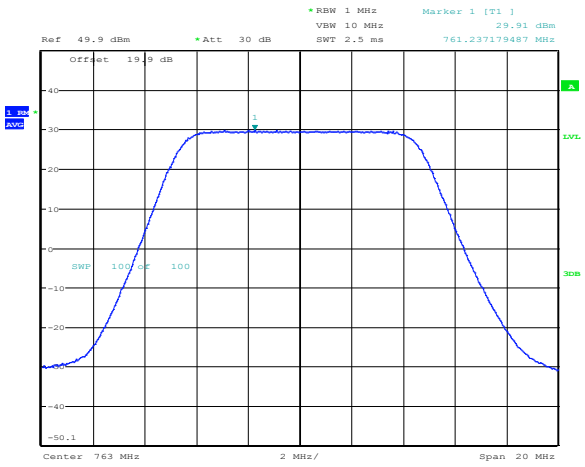

Figure 8.1-6: *Peak power spectral density at Ant 2, 64-QAM*

8.2 FCC 2.1049 Occupied bandwidth

8.2.1 Definitions and limits

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

8.2.2 Test summary

Test date:	September 26, 2013	Temperature:	25 °C
Test engineer:	Andrey Adelberg	Air pressure:	1020 mbar
Verdict:	Pass	Relative humidity:	34 %

8.2.3 Observations/special notes

Spectrum analyser settings:

Resolution bandwidth:	500 kHz
Video bandwidth:	≥3 × RBW
Frequency span:	20 MHz
Detector mode:	Peak
Trace mode:	Max Hold

8.2.4 Test data

Table 8.2-1: *99 % occupied bandwidth results*

Antenna port	Modulation	Frequency, MHz	99 % bandwidth, MHz
Ant 1	QPSK	763	9.23
	16-QAM	763	9.23
	64-QAM	763	9.26
Ant 2	QPSK	763	9.23
	16-QAM	763	9.26
	64-QAM	763	9.26

8.2.4 Test data, continued

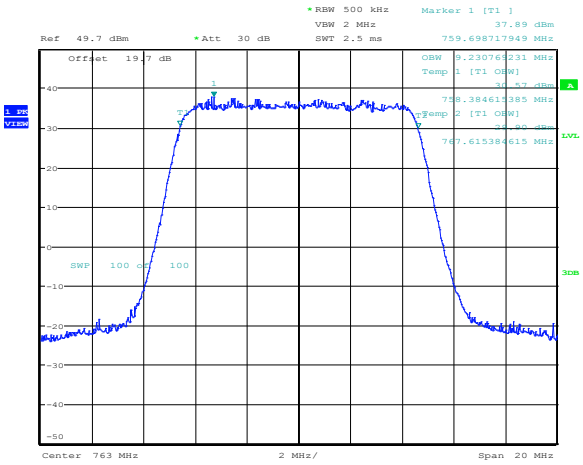

Figure 8.2-1: *99 % bandwidth Ant 1, QPSK*

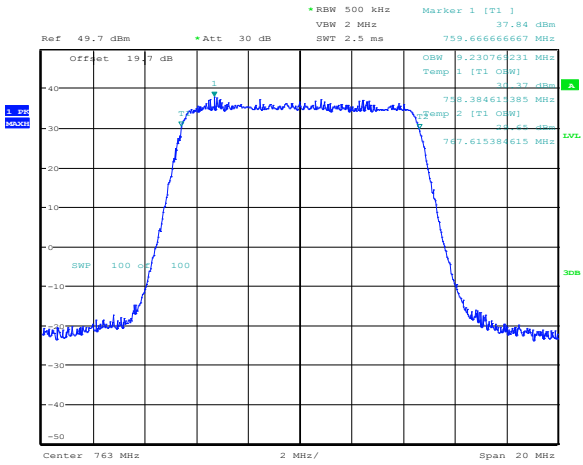

Figure 8.2-2: *99 % bandwidth Ant 1, 16-QAM*

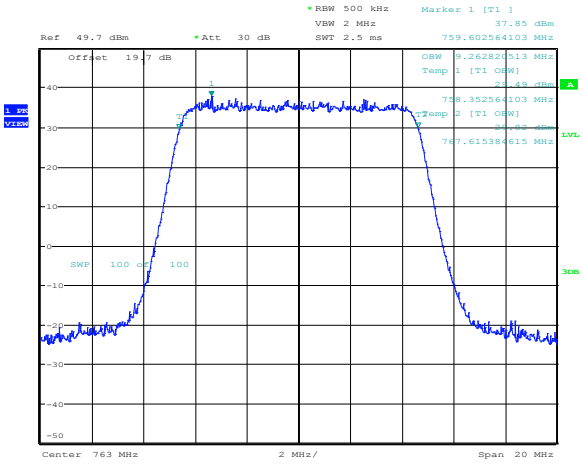

Figure 8.2-3: *99 % bandwidth Ant 1, 64-QAM*

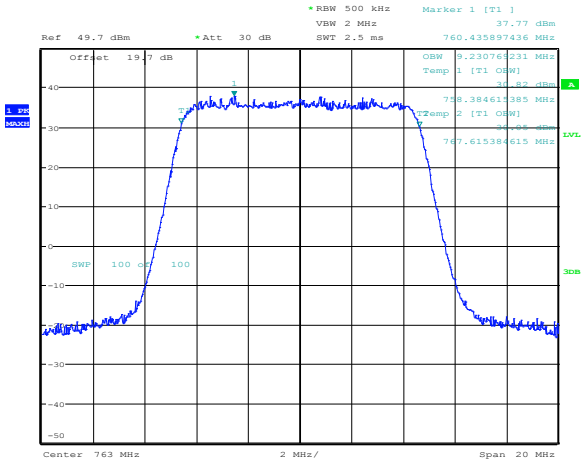

Figure 8.2-4: *99 % bandwidth Ant 2, QPSK*

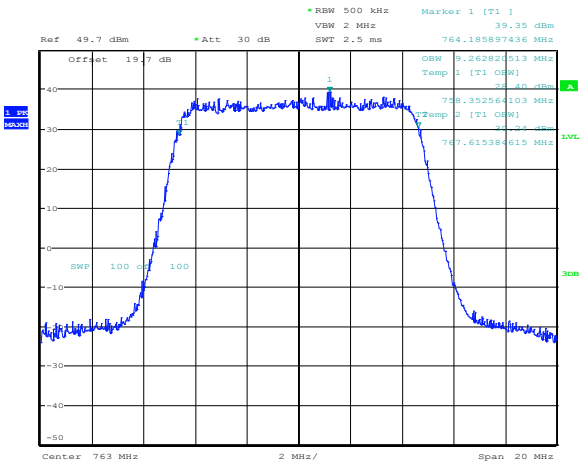

Figure 8.2-5: *99 % bandwidth Ant 2, 16-QAM*

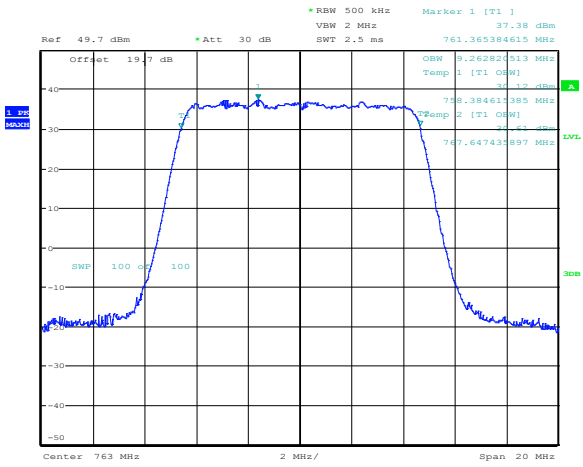

Figure 8.2-6: *99 % bandwidth Ant 2, 64-QAM*

8.3 FCC 90.210(b) Transmitter unwanted emissions, emission mask

8.3.1 Definitions and limits

Emission Mask B. Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least −13 dBm.

8.3.2 Test summary

Test date:	September 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1010 mbar
Verdict:	Pass	Relative humidity:	36 %

8.3.3 Observations settings and special notes

The 0 dB reference level in the unwanted emission mask is the maximum in-band power spectral density measured in terms of peak power in the equipment's channel bandwidth, using a resolution bandwidth of 20 MHz, and a video bandwidth of 30 MHz.

Spectrum analyzer settings for mask measurements:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	RMS
Sweep time:	10 s

8.3.4 Test data

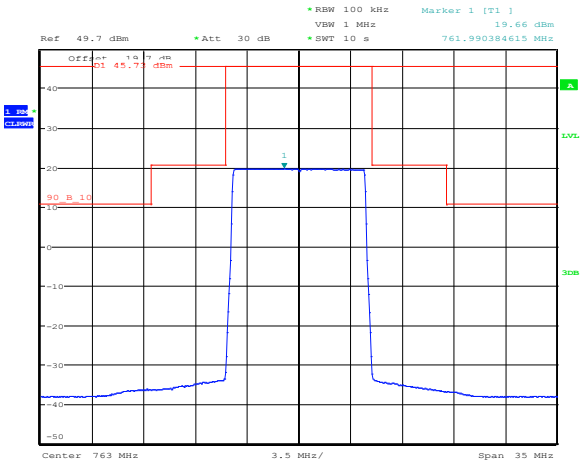

Figure 8.3-1: *Emission mask at Ant 1, QPSK*

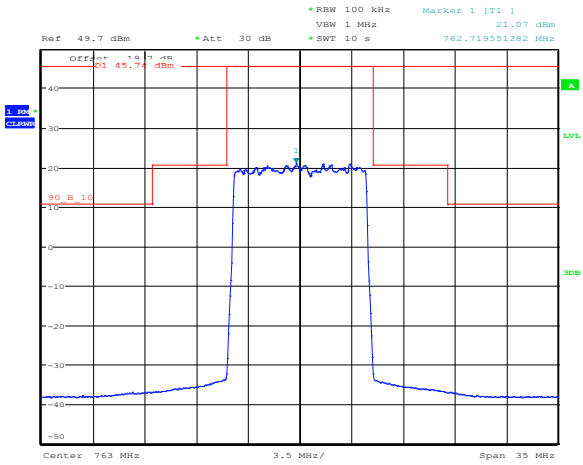

Figure 8.3-2: *Emission mask at Ant 1, 16-QAM*

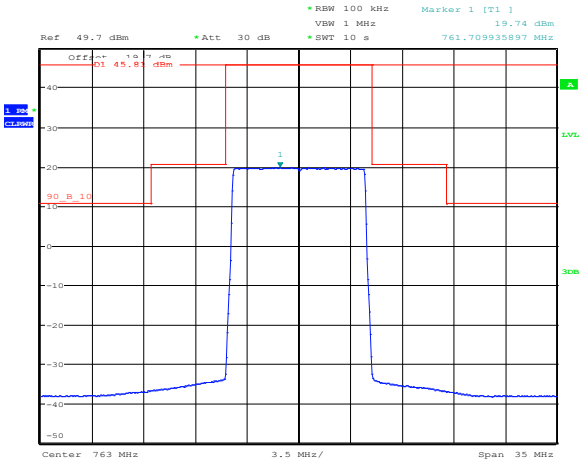

Figure 8.3-3: *Emission mask at Ant 1, 64-QAM*

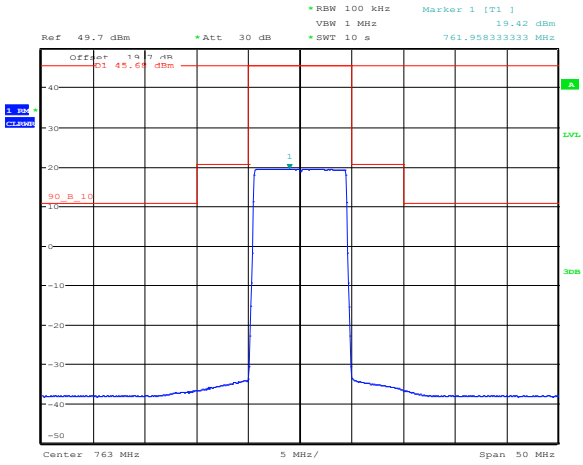

Figure 8.3-4: *Emission mask at Ant 2, QPSK*

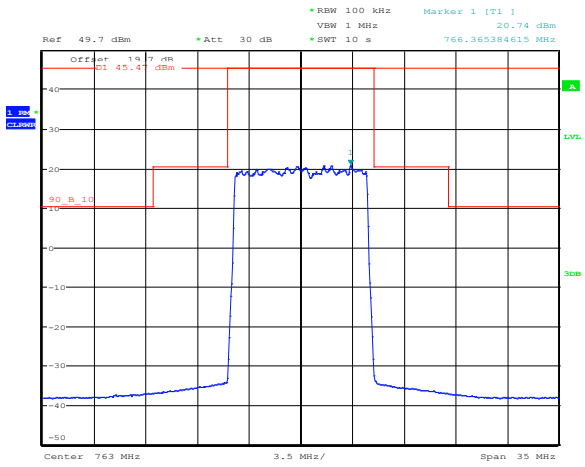

Figure 8.3-5: *Emission mask at Ant 2, 16-QAM*

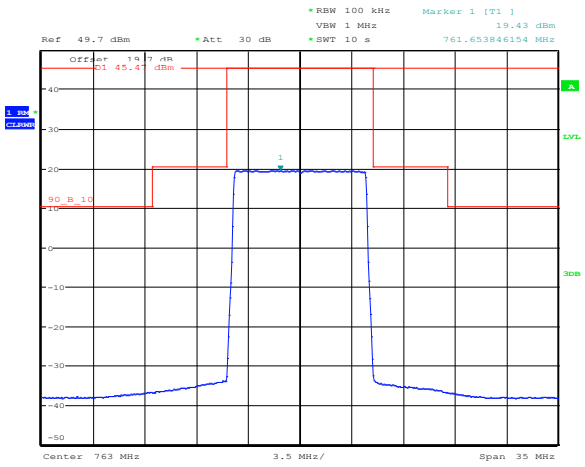

Figure 8.3-6: *Emission mask at Ant 2, 64-QAM*

8.4 FCC 90.543 Transmitter out-of-band emissions

8.4.1 Definitions and limits

(c) *Out-of-band emission limit:* On any frequency outside of the frequency ranges covered by the ACP tables in this section, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB (or −13 dBm) measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

(e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB (or −46 dBm) in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB (or −35 dBm) in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB (or −13 dBm).

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.
(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to −70 dBW/MHz (−40 dBm/MHz) equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW (−50 dBm) EIRP for discrete emissions of less than 700 Hz bandwidth.

8.4.2 Test summary

Test date:	September 26, 2013	Temperature:	25 °C
Test engineer:	Andrey Adelberg	Air pressure:	1020 mbar
Verdict:	Pass	Relative humidity:	34 %

8.4.3 Observations settings and special notes

Radiated measurements were performed at a distance of 3 m, the EUT was transmitting on both MIMO chains simultaneously. Radiated emissions were performed while both antenna connectors were terminated with 50 Ω load. No spurious emissions were detected above test instrument's noise floor.

Spectrum analyzer settings for measurements:

Resolution bandwidth:	100 kHz (below 1 GHz); 1000 kHz (above 1 GHz)
Video bandwidth:	≥ 3 × RBW
Detector mode:	RMS
Trace mode:	Power averaging

8.4.4 Test data

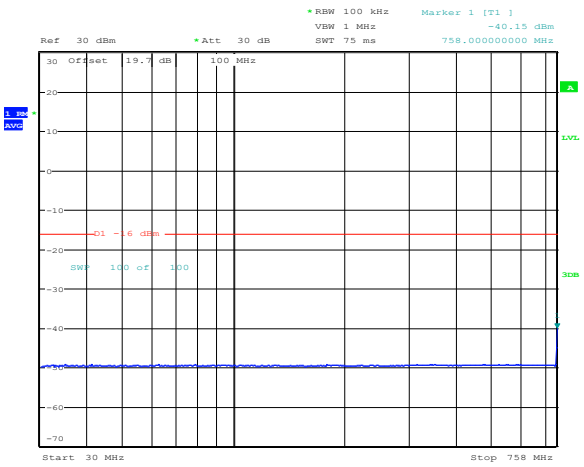

Figure 8.4-1: *Conducted out of band emissions within 30–758 MHz, Ant 1, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

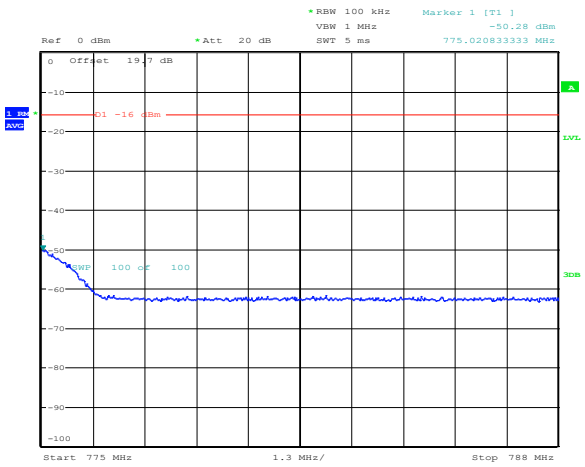

Figure 8.4-2: *Conducted out of band emissions within 775–788 MHz, Ant 1, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

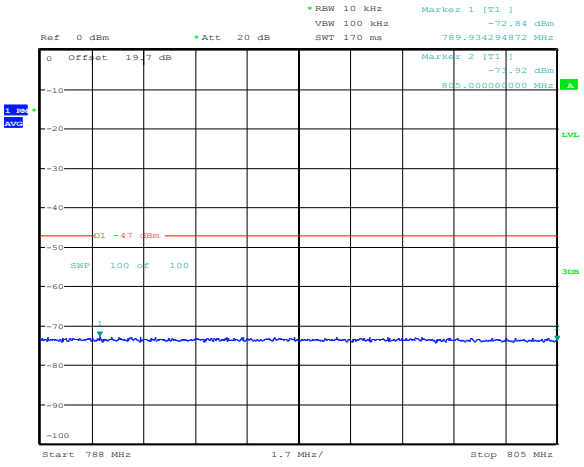

Figure 8.4-3: *Conducted out of band emissions within 788–805 MHz, Ant 1, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port, in addition 2 dB BW correction factor was subtracted from the limit line in order to compensate for the higher RBW ($10 \times \text{Log}_{10}$ (6.25/10) = −2 dB).

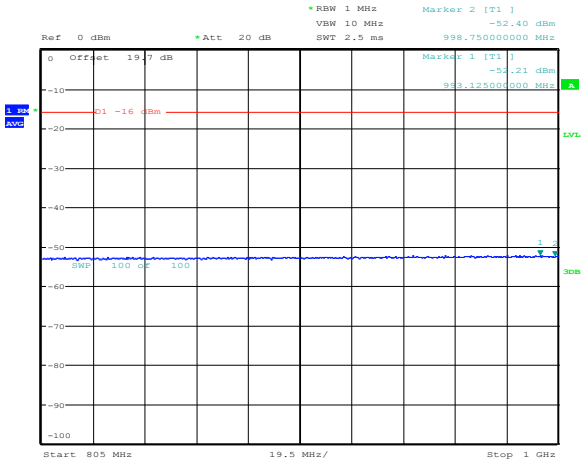

Figure 8.4-4: *Conducted out of band emissions within 805–1000 MHz, Ant 1, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

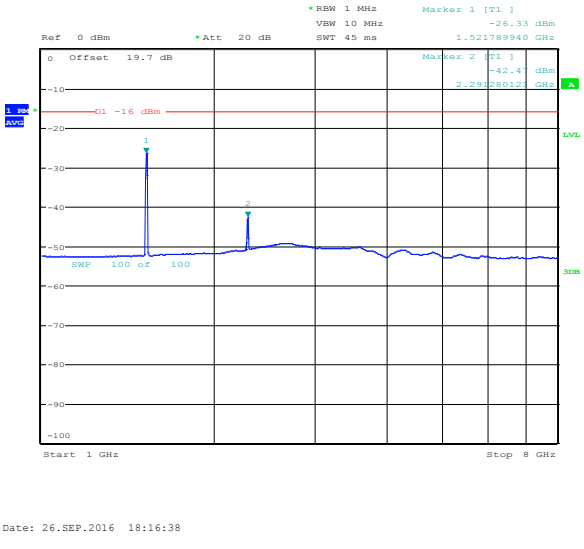

Figure 8.4-5: *Conducted out of band emissions within 1000–8000 MHz, Ant 1, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

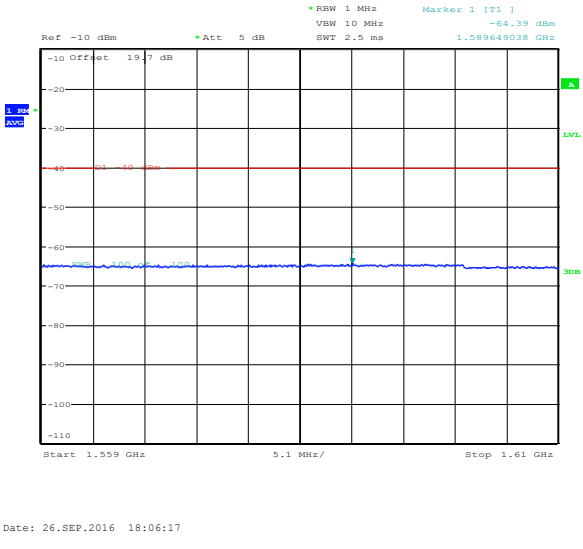

Figure 8.4-6: *Conducted out of band emissions within 1559–1610 MHz, Ant 1, QPSK.*

Note: 3 dB correction factor should be added to the marker result in order to compensate for the second antenna port.
Limit margin is: −40 dBm/MHz – (−61.39 dBm) = 21.39 dB

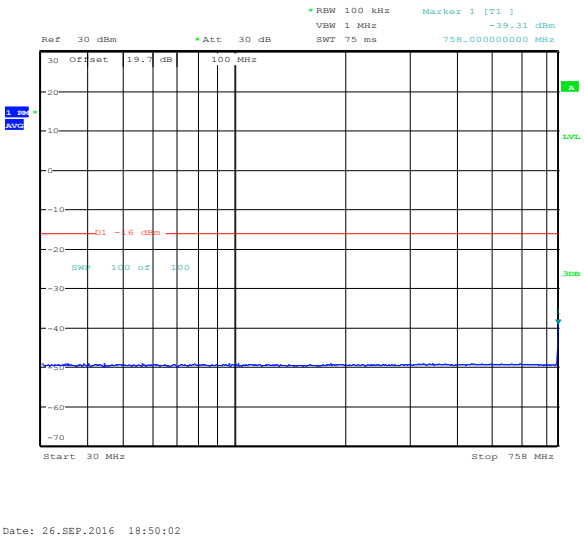

Figure 8.4-7: *Conducted out of band emissions within 30–758 MHz, Ant 1, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

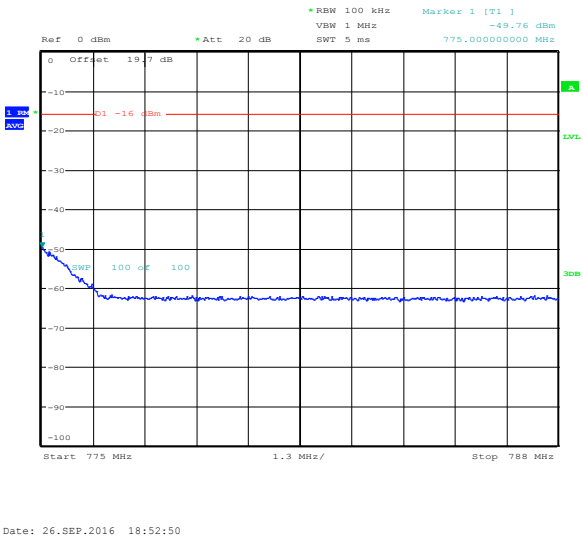

Figure 8.4-8: *Conducted out of band emissions within 775–788 MHz, Ant 1, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

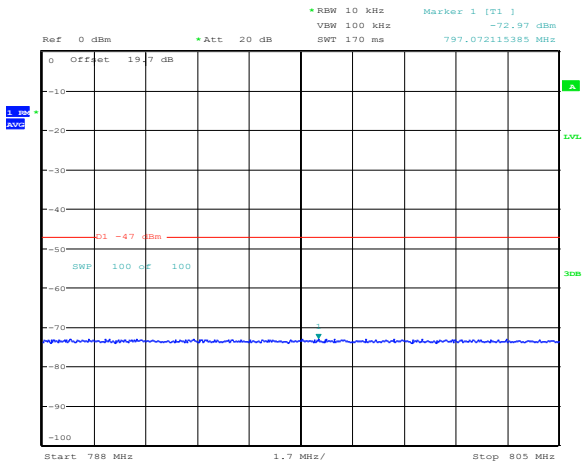

Figure 8.4-9: *Conducted out of band emissions within 788–805 MHz, Ant 1, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port, in addition 2 dB BW correction factor was subtracted from the limit line in order to compensate for the higher RBW ($10 \times \text{Log}_{10}$ (6.25/10) = −2 dB).

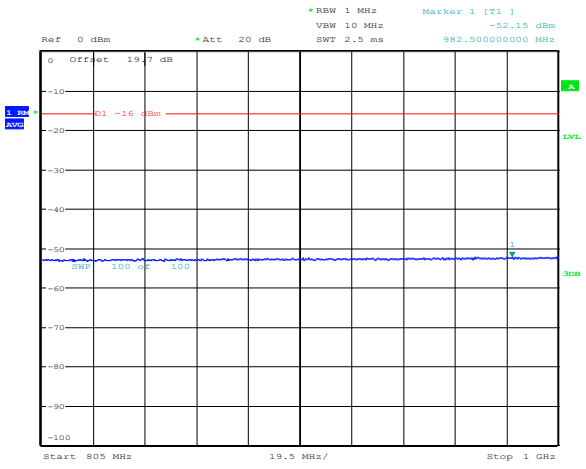

Figure 8.4-10: *Conducted out of band emissions within 805–1000 MHz, Ant 1, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

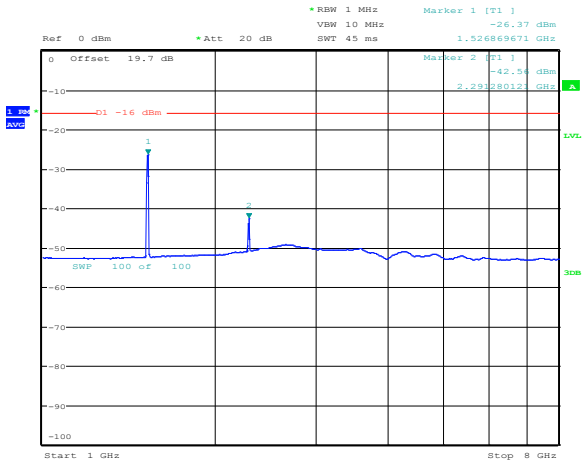

Figure 8.4-11: *Conducted out of band emissions within 1000–8000 MHz, Ant 1, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

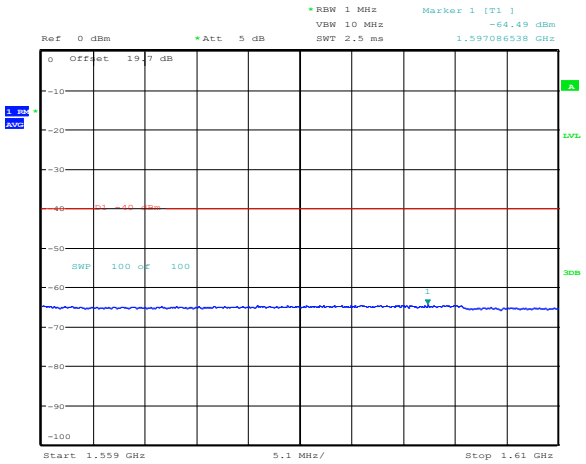

Figure 8.4-12: *Conducted out of band emissions within 1559–1610 MHz, Ant 1, 16-QAM.*

Note: 3 dB correction factor should be added to the marker result in order to compensate for the second antenna port.
Limit margin is: −40 dBm/MHz – (−61.49 dBm) = 21.49 dB

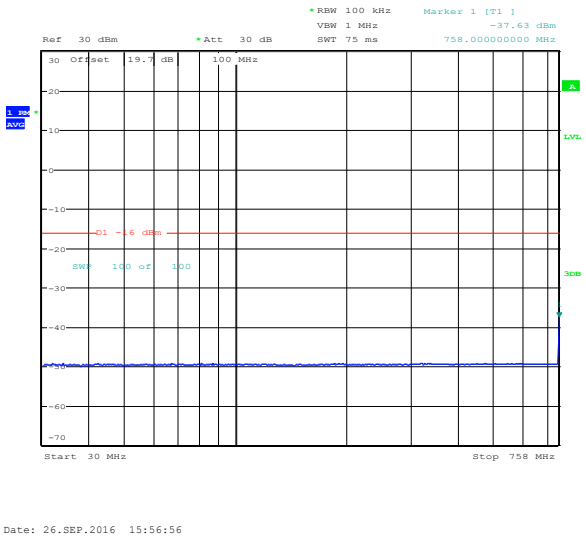

Figure 8.4-13: *Conducted out of band emissions within 30–758 MHz, Ant 1, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

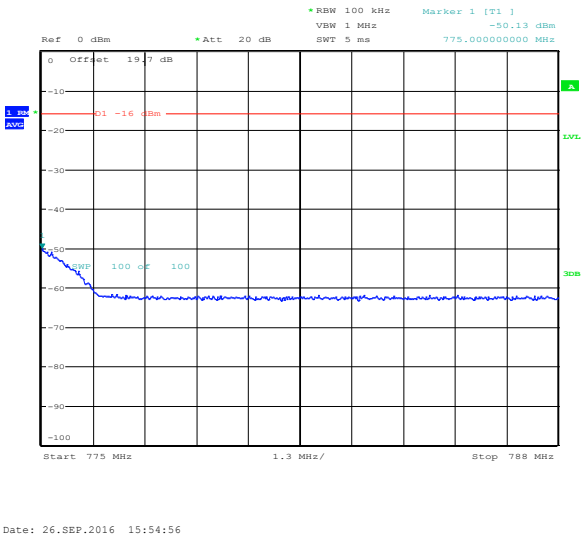

Figure 8.4-14: *Conducted out of band emissions within 775–788 MHz, Ant 1, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

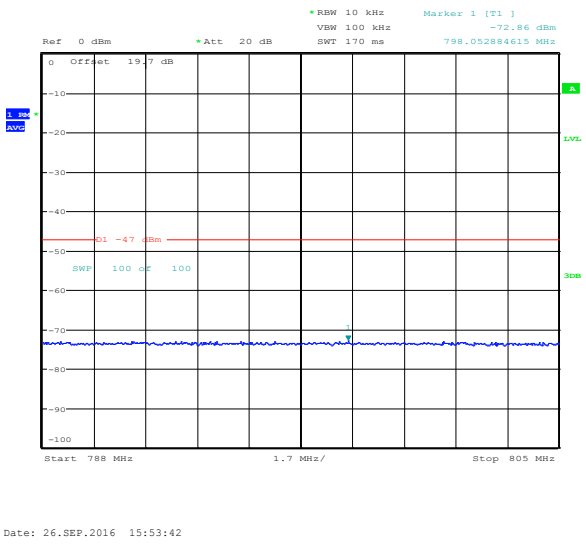

Figure 8.4-15: *Conducted out of band emissions within 788–805 MHz, Ant 1, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port, in addition 2 dB BW correction factor was subtracted from the limit line in order to compensate for the higher RBW ($10 \times \text{Log}_{10}$ (6.25/10) = −2 dB).

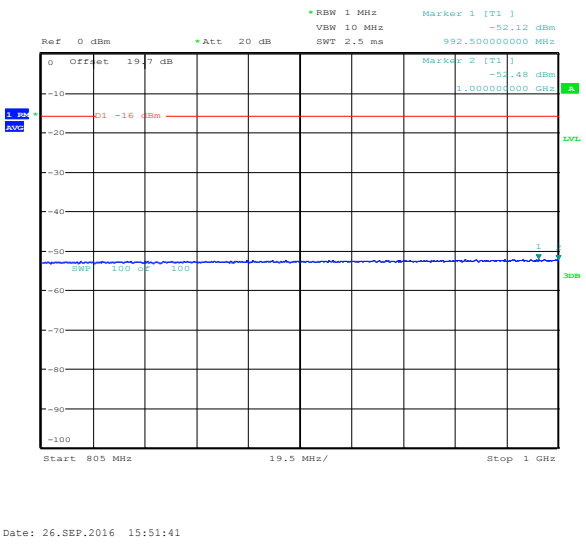

Figure 8.4-16: *Conducted out of band emissions within 805–1000 MHz, Ant 1, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

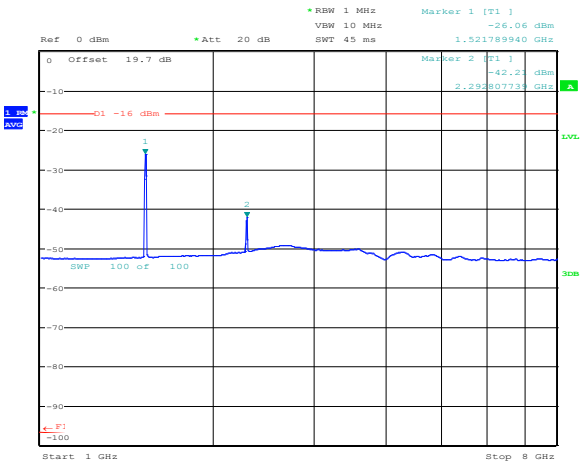

Figure 8.4-17: *Conducted out of band emissions within 1000–8000 MHz, Ant 1, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

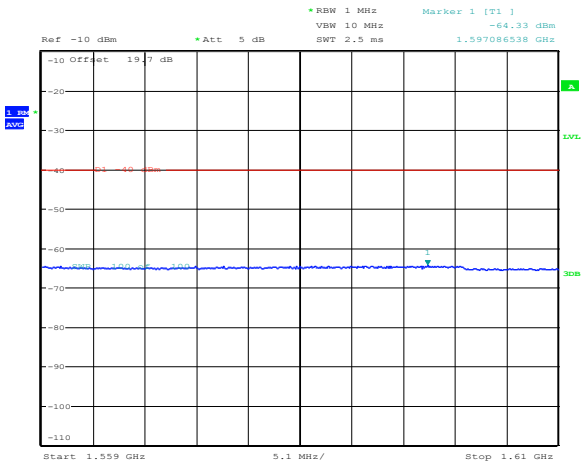

Figure 8.4-18: *Conducted out of band emissions within 1559–1610 MHz, Ant 1, 64-QAM.*

Note: 3 dB correction factor should be added to the marker result in order to compensate for the second antenna port.
Limit margin is: −40 dBm/MHz – (−61.33 dBm) = 21.33 dB

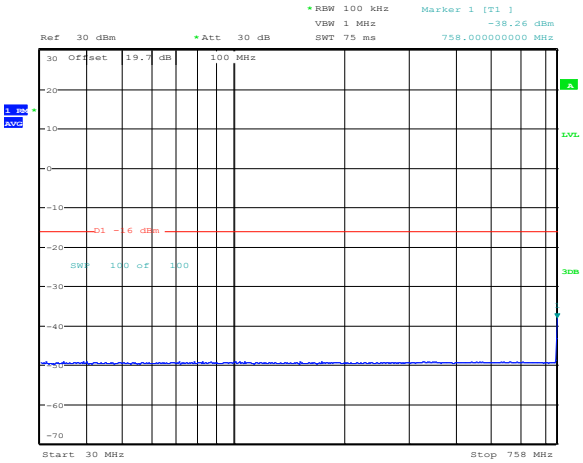

Figure 8.4-19: *Conducted out of band emissions within 30–758 MHz, Ant 2, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

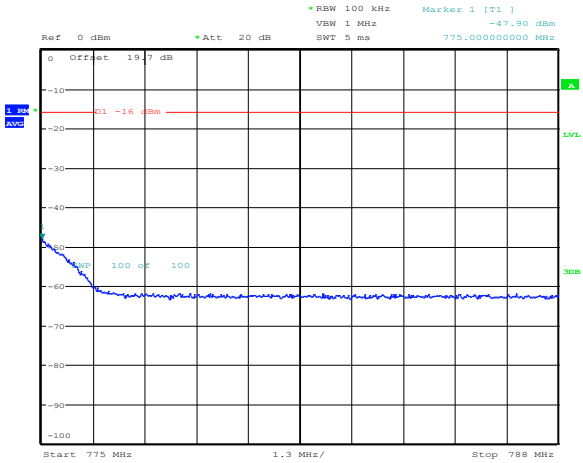

Figure 8.4-20: *Conducted out of band emissions within 775–788 MHz, Ant 2, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

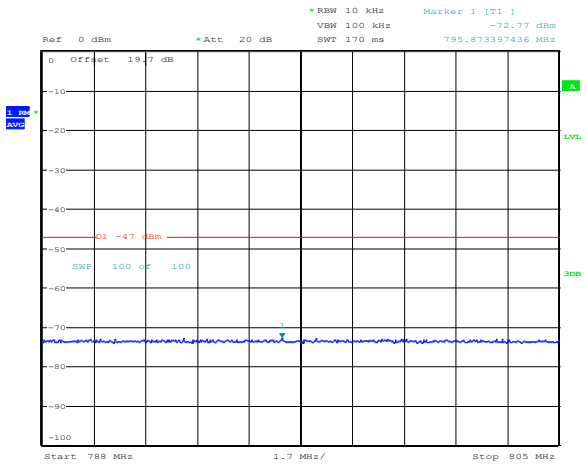

Figure 8.4-21: *Conducted out of band emissions within 788–805 MHz, Ant 2, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port, in addition 2 dB BW correction factor was subtracted from the limit line in order to compensate for the higher RBW ($10 \times \text{Log}_{10}(6.25/10) = -2$ dB).

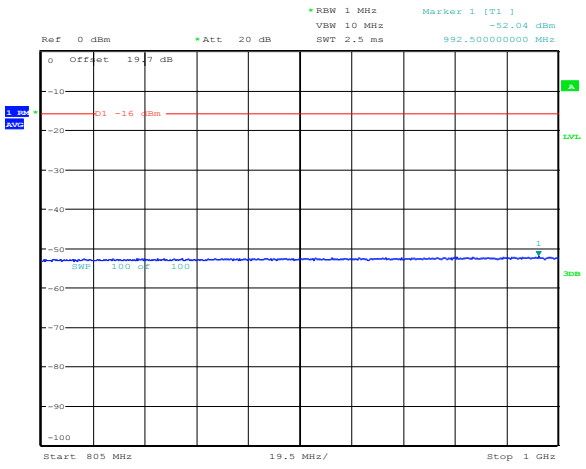

Figure 8.4-22: *Conducted out of band emissions within 805–1000 MHz, Ant 2, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

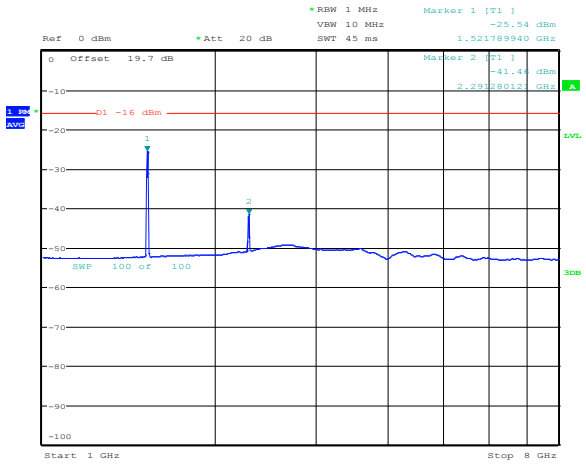

Figure 8.4-23: *Conducted out of band emissions within 1000–8000 MHz, Ant 2, QPSK.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

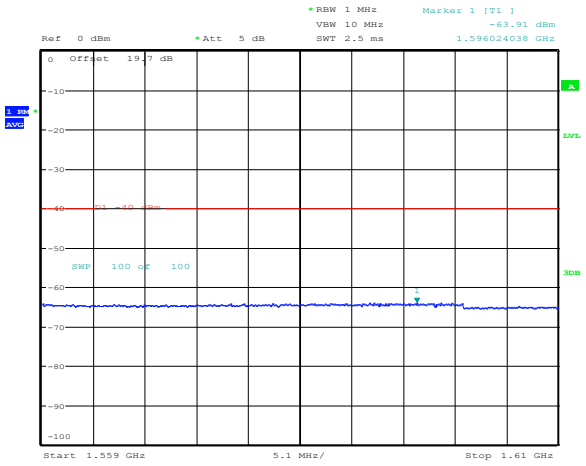

Figure 8.4-24: *Conducted out of band emissions within 1559–1610 MHz, Ant 2, QPSK.*

Note: 3 dB correction factor should be added to the marker result in order to compensate for the second antenna port.
Limit margin is: −40 dBm/MHz – (−60.91 dBm) = 20.91 dB

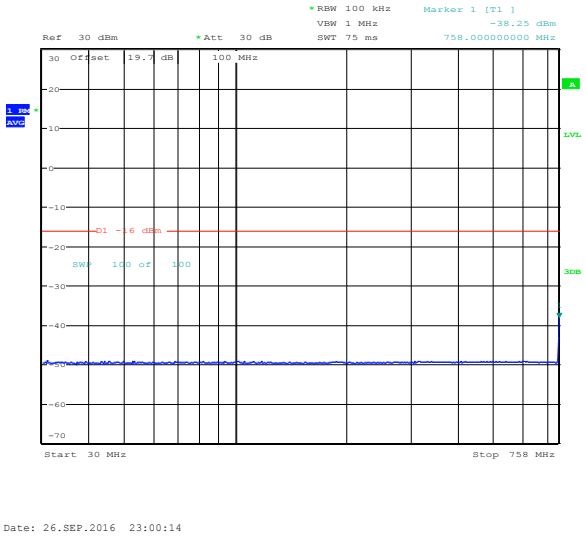

Figure 8.4-25: *Conducted out of band emissions within 30–758 MHz, Ant 2, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

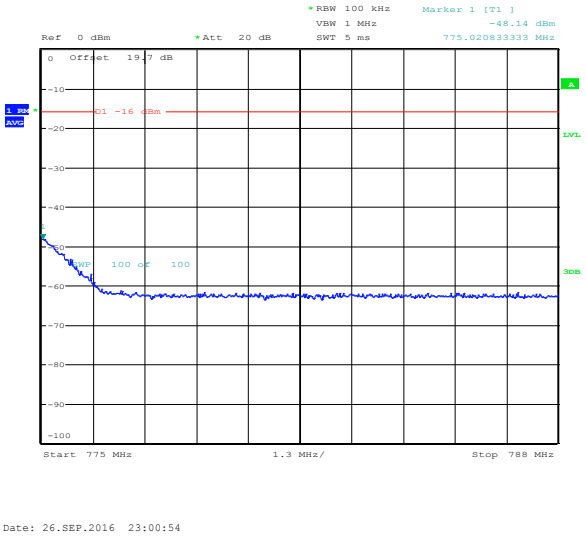

Figure 8.4-26: *Conducted out of band emissions within 775–788 MHz, Ant 2, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

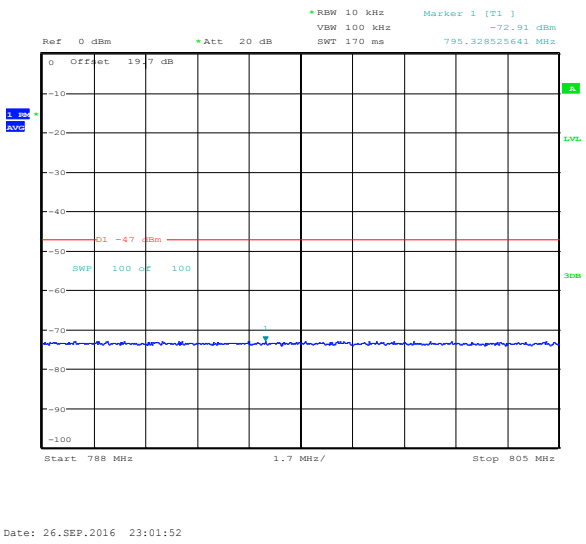

Figure 8.4-27: *Conducted out of band emissions within 788–805 MHz, Ant 2, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port, in addition 2 dB BW correction factor was subtracted from the limit line in order to compensate for the higher RBW ($10 \times \text{Log}_{10}$ (6.25/10) = −2 dB).

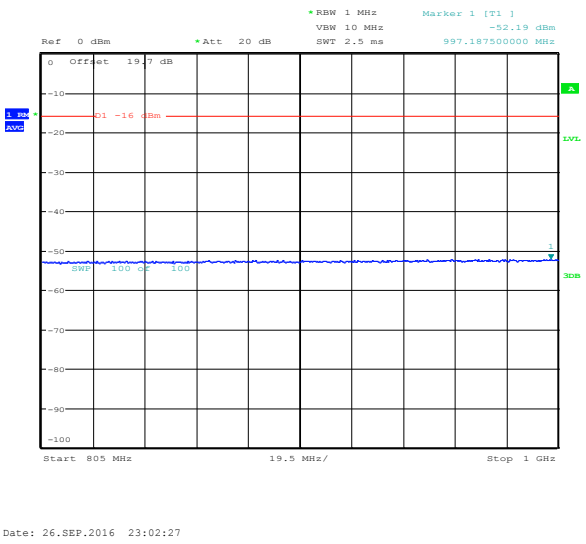

Figure 8.4-28: *Conducted out of band emissions within 805–1000 MHz, Ant 2, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

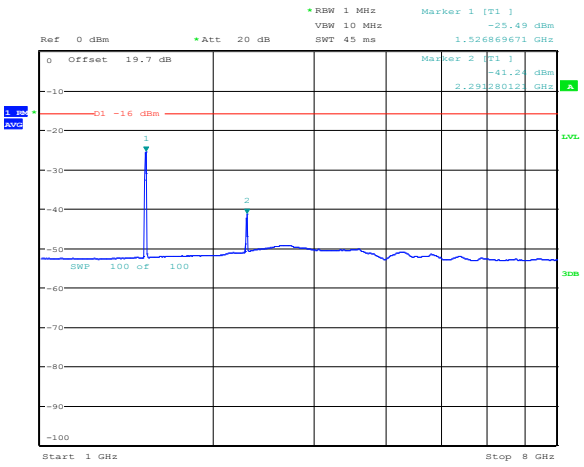

Figure 8.4-29: *Conducted out of band emissions within 1000–8000 MHz, Ant 2, 16-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

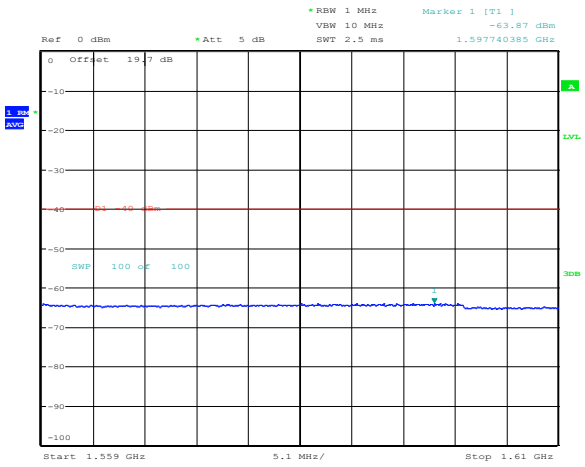

Figure 8.4-30: *Conducted out of band emissions within 1559–1610 MHz, Ant 2, 16-QAM.*

Note: 3 dB correction factor should be added to the marker result in order to compensate for the second antenna port.
Limit margin is: −40 dBm/MHz – (−60.87 dBm) = 20.87 dB

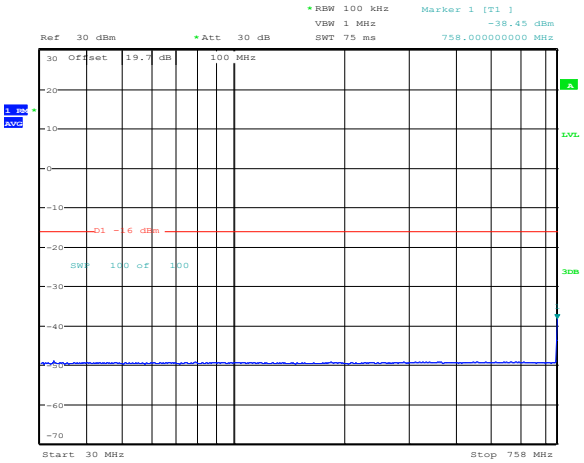

Figure 8.4-31: *Conducted out of band emissions within 30–758 MHz, Ant 2, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

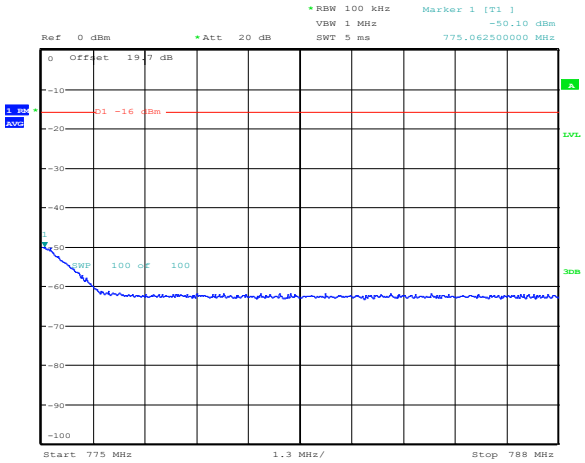

Figure 8.4-32: *Conducted out of band emissions within 775–788 MHz, Ant 2, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

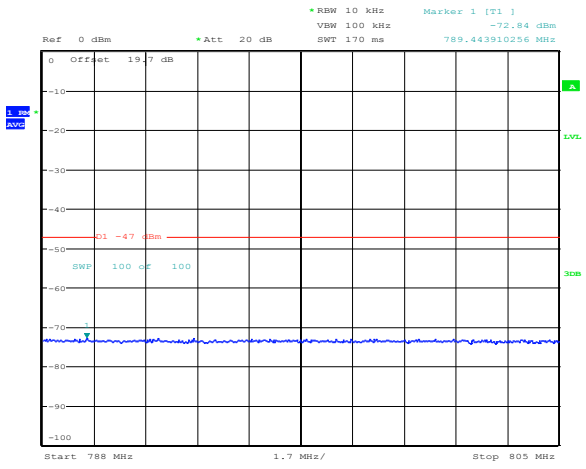

Figure 8.4-33: *Conducted out of band emissions within 788–805 MHz, Ant 2, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port, in addition 2 dB BW correction factor was subtracted from the limit line in order to compensate for the higher RBW ($10 \times \text{Log}_{10}$ (6.25/10) = −2 dB).

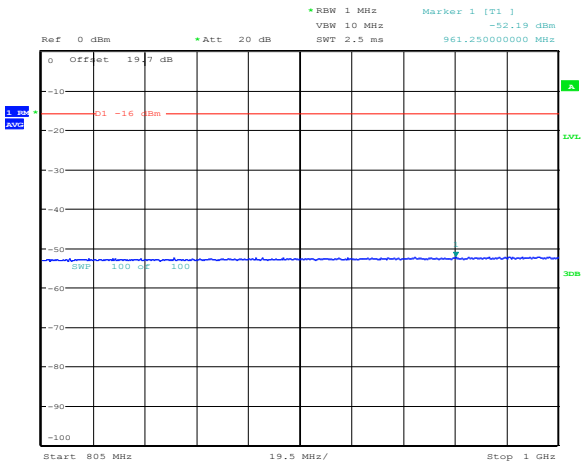

Figure 8.4-34: *Conducted out of band emissions within 805–1000 MHz, Ant 2, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

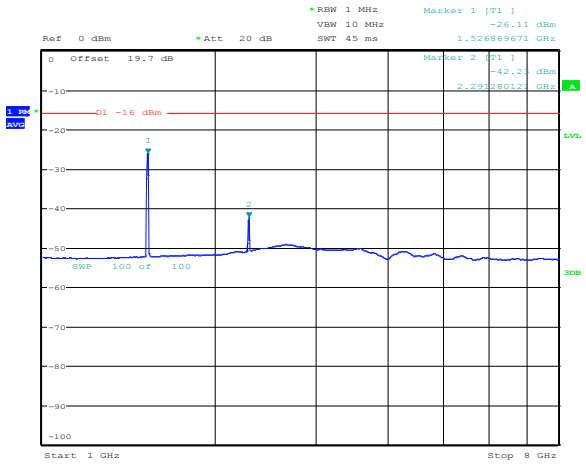

Figure 8.4-35: *Conducted out of band emissions within 1000–8000 MHz, Ant 2, 64-QAM.*

Note: 3 dB correction factor was added to the limit line in order to compensate for the second antenna port.

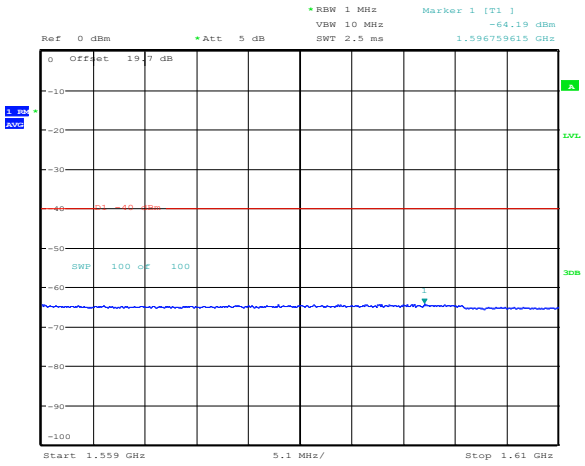

Figure 8.4-36: *Conducted out of band emissions within 1559–1610 MHz, Ant 2, 64-QAM.*

Note: 3 dB correction factor should be added to the marker result in order to compensate for the second antenna port.
Limit margin is: −40 dBm/MHz – (−61.19 dBm) = 21.19 dB

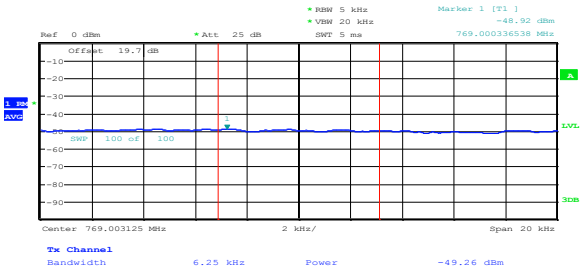

Figure 8.4-37: *Conducted at the band edge at 769 MHz, Ant 1, QPSK*

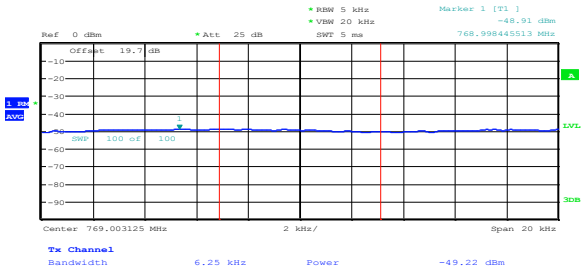

Figure 8.4-38: *Conducted at the band edge at 769 MHz, Ant 1, 16-QAM*

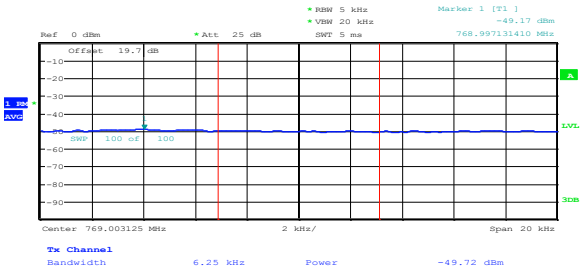

Figure 8.4-39: *Conducted at the band edge at 769 MHz, Ant 1, 64-QAM*

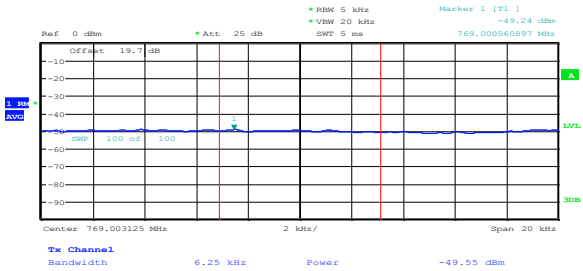

Figure 8.4-40: *Conducted at the band edge at 769 MHz, Ant 2, QPSK*

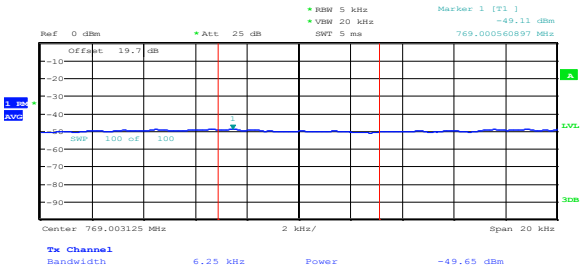

Figure 8.4-41: *Conducted at the band edge at 769 MHz, Ant 2, 16-QAM*

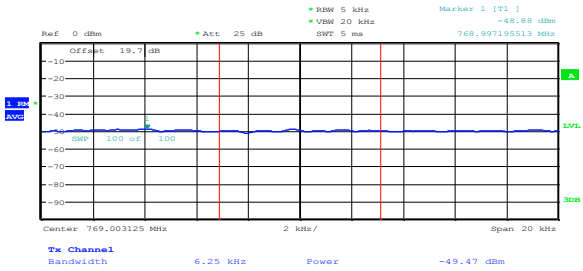

Figure 8.4-42: *Conducted at the band edge at 769 MHz, Ant 2, 64-QAM*

Note: band edge limit is −46 dBm/6.25 kHz. The measurement was performed with 5 kHz BW and integrated over the 6.25 kHz. Additional 3 dB for the MIMO 2×2 was added to a limit line. Corrected limit is −49 dBm/6.25 kHz

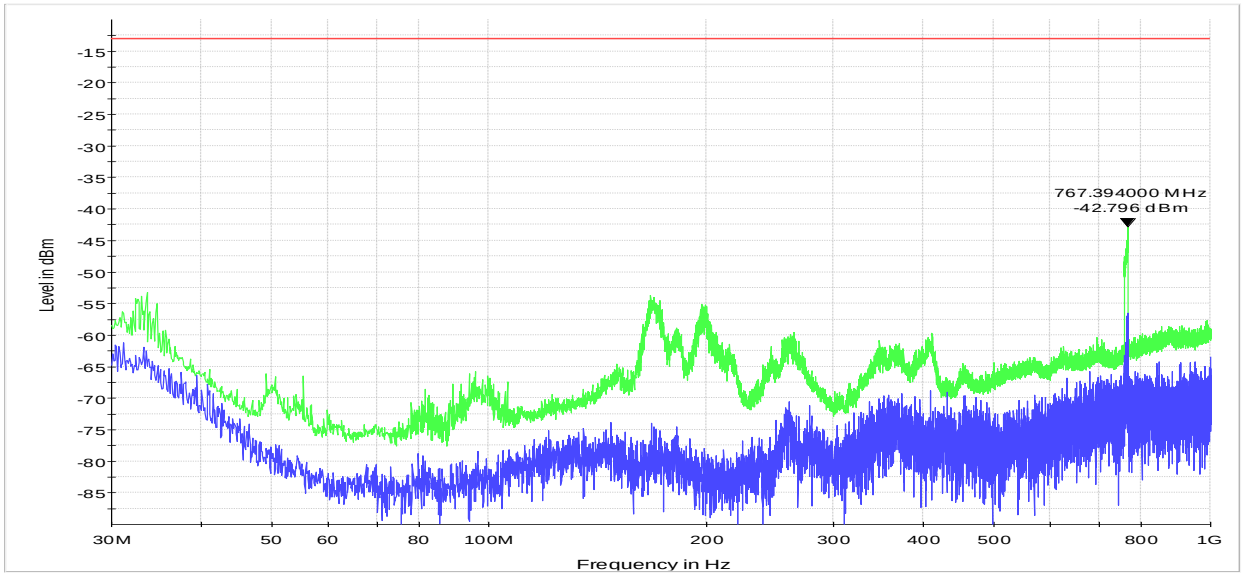

Figure 8.4-43: *Radiated emissions within 30–1000 MHz*

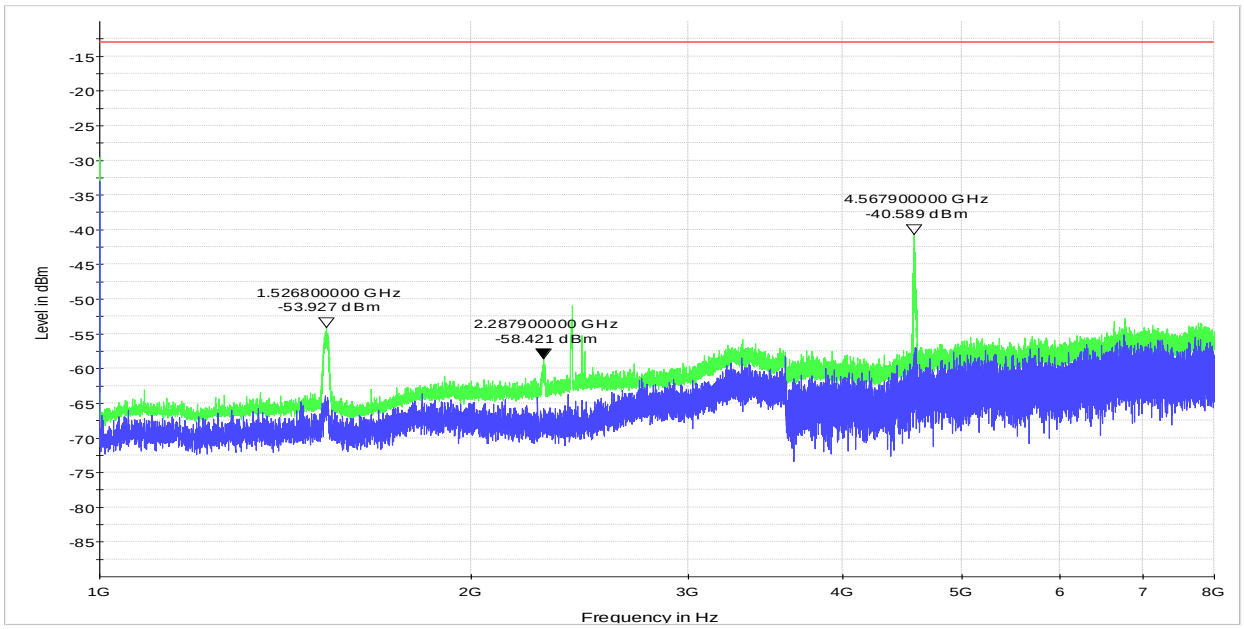

Figure 8.4-44: *Radiated emissions within 1000–8000 MHz*

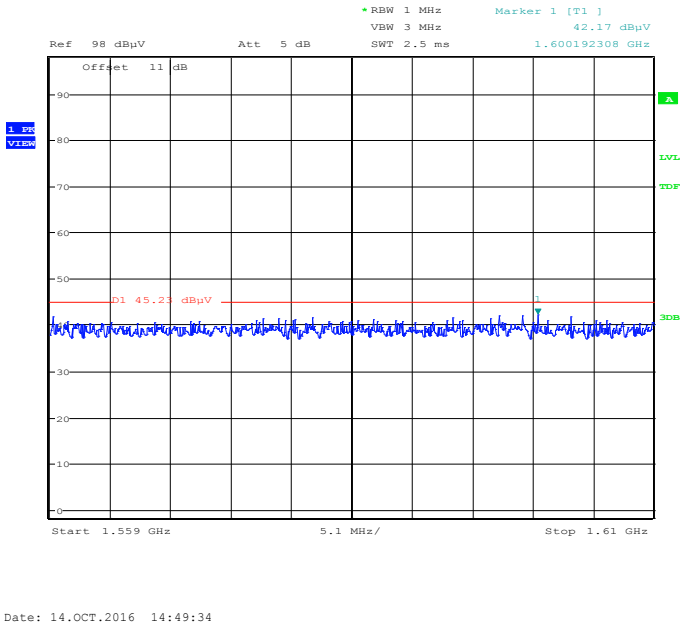

Figure 8.4-45: *Radiated emissions within 1559–1610 MHz*

8.5 FCC 90.539(d) Transmitter frequency stability

8.5.1 Definitions and limits

The frequency stability of base transmitters operating in the wideband segment must be 1 part per million or better.

8.5.2 Test summary

Test date:	September 26, 2013	Temperature:	25 °C
Test engineer:	Andrey Adelberg	Air pressure:	1020 mbar
Verdict:	Pass	Relative humidity:	34 %

8.5.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	3 kHz
Video bandwidth:	30 kHz
Detector mode:	Peak
Trace mode:	Max Hold

8.5.4 Test data

Table 8.5-1: *Frequency drift measurement*

Test conditions	Frequency, MHz	Drift, Hz
+60 °C, Nominal	762.999951	1
+50 °C, Nominal	762.999951	1
+40 °C, Nominal	762.999951	1
+30 °C, Nominal	762.999950	0
+20 °C, +15 %	762.999951	1
+20 °C, Nominal	762.999950	*Reference*
+20 °C, −15 %	762.999951	1
+10 °C, Nominal	762.999950	0
0 °C, Nominal	762.999951	1
−10 °C, Nominal	762.999950	0
−20 °C, Nominal	762.999951	1
−30 °C, Nominal	762.999951	1

Note: maximum observed drift was 1 Hz. The limit is 1 ppm of 762.999950 MHz, which is 763 Hz.

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up