

Wireless Test Report – 358252-1TRFWL

Applicant:

Teko Telecom Srl a Socio Unico

Product:

Remote unit Medium Power 600-600 (for Optical system)

Model:

TRU66WM/AC-WT

FCC ID:

XM2-MP66

Specification:

FCC 47 CFR Part 27

Miscellaneous wireless communications services

Date of issue: **November 6, 2018**

Test engineer(s): **Andrey Adelberg, Senior EMC/Wireless Specialist**

Signature:



Reviewed by: **David Duchesne, Senior EMC/Wireless Specialist**

Signature:



Lab and test locations

Company name	Nemko Canada Inc.	
Test location	Ottawa site: 303 River Road, Ottawa, ON, Canada, K1V 1H2 Tel: +1 613 737 9680 Fax: +1 613 737 9691	
Test site registration	Organization FCC ISED	Recognition numbers and location CA2040 (Ottawa) CA2040A-4 (Ottawa)
Website	www.nemko.com	

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 contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

© Nemko Canada Inc.

Table of contents

Table of contents	3
Section 1. Report summary	4
1.1 Applicant and manufacturer	4
1.2 Test specifications	4
1.3 Test methods	4
1.4 Statement of compliance	4
1.5 Exclusions	4
1.6 Test report revision history	4
Section 2. Summary of test results	5
2.1 FCC Part 27 test results	5
Section 3. Equipment under test (EUT) details	6
3.1 Sample information	6
3.2 EUT information	6
3.3 Technical information	6
3.4 Product description and theory of operation	6
3.5 EUT exercise details	6
3.6 EUT setup diagram	7
Section 4. Engineering considerations	8
4.1 Modifications incorporated in the EUT	8
4.2 Technical judgment	8
4.3 Deviations from laboratory tests procedures	8
Section 5. Test conditions	9
5.1 Atmospheric conditions	9
5.2 Power supply range	9
Section 6. Measurement uncertainty	10
6.1 Uncertainty of measurement	10
Section 7. Test equipment	11
7.1 Test equipment list	11
Section 8. Testing data	12
8.1 KDB 935210 Clause 3.2 AGC threshold	12
8.2 FCC 27.50(c)(3) and KDB 935210 Clause 3.5 Mean output power at RF antenna connector and booster gain	13
8.3 KDB 935210 Clause 3.3 Out-of-band rejection	15
8.4 FCC 27.53(g) and KDB 935210 Clause 3.6 Spurious emissions at RF antenna connector	17
8.5 FCC 27.53(g) and KDB 935210 Clause 3.8 Radiated spurious emissions	30
8.6 Part 2.1049 and KDB 935210 Clause 3.4 Occupied bandwidth: input versus output signal comparison	34
Section 9. Setup Photos	45
9.1 Set-up	45
Section 10. Block diagrams of test set-ups	46
10.1 Radiated emissions set-up for frequencies below 1 GHz	46
10.2 Radiated emissions set-up for frequencies above 1 GHz	46

Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Teko Telecom Srl a Socio Unico
Address	Via Meucci, 24/a I-40024 Castel S. Pietro Terme (BO), Italy

1.2 Test specifications

FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
--------------------	--

1.3 Test methods

KDB 935210 D05 Indus Booster Basic Meas v01r02	Measurements guidance for industrial and non-consumer signal booster, repeater, and amplifier devices
KDB 662911-D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
KDB 662911-D02 v01	MIMO with Cross-Polarized Antenna

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.5 below. 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

Table 1.6-1: Test report revision history

Revision #	Date of issue	Details of changes made to test report
TRF	November 6, 2018	Original report issued

Section 2. Summary of test results

2.1 FCC Part 27 test results

Table 2.1-1: Result summary

Part	Test description	Verdict
KDB 935210 Clause 3.2	AGC threshold	Pass
§27.50(c) and KDB 935210 Clause 3.5	Mean output power at RF antenna connector and booster gain	Pass
KDB 935210 Clause 3.3	Out-of-band rejection	Pass
§27.53(g) and KDB 935210 Clause 3.6	Spurious emissions at RF antenna connector	Pass
§27.53(g) and KDB 935210 Clause 3.8	Radiated spurious emissions	Pass
§27.54 and KDB 935210 Clause 3.7	Frequency stability	Not applicable ¹
§2.1049 and KDB 935210 Clause 3.4	Occupied bandwidth	Pass

Notes: ¹The EUT is not a Translator and does not alter the input signal in any way.

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	September 10, 2018
Nemko sample ID number	6

3.2 EUT information

Product name	Remote unit Medium Power 600-600 (for Optical system)
Model	TRU66WM/AC-WT
Serial number	1010660001

3.3 Technical information

Operating band	617–652 MHz
Modulation type	LTE: AWGN
Power requirements	110 V _{AC} , ~3 A for entire system tested
Channel BW	5 MHz
Emission designator	5M00D7W
Gain	38 dB
Antenna information	External Antenna is not provided EUT used a 50 Ω termination.

3.4 Product description and theory of operation

EUT is a medium power (2 W) repeater with two optical inputs and two output RF antenna ports with 38 dB gain.

3.5 EUT exercise details

The EUT was controlled via a Laptop interface with GUI to configure the system. Input of the EUT was connected to signal generator which replicated the AWGN test signal that has a 4.1 MHz 99 % occupied bandwidth (OBW) (representative of a 5 MHz LTE channel) with a pseudo-random symbol pattern.

3.6 EUT setup diagram

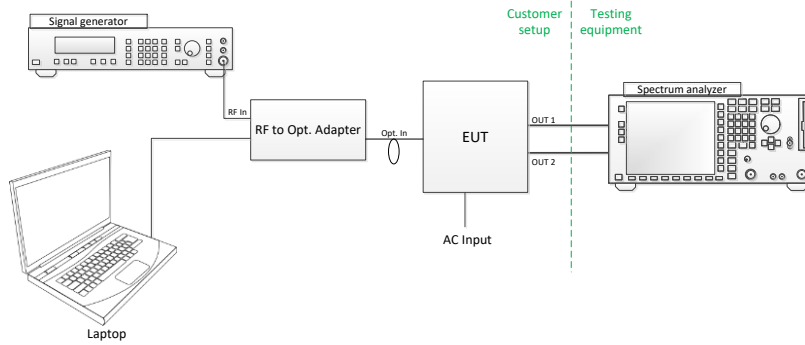


Figure 3.6-1: Setup diagram

Name	Info
RF to optical adapter (Master unit)	SUB-TRX-PSU, S/N: 101083001 (subrack)
	TPSU/AC, S/N: 100351574 (power supply)
	TSPV-R, S/N: 081300017 (supervision)
	TTRU4W-S-M, S/N: 1004185213 (optical module)
Laptop	Dell E5440, S/N:9XV5N12
Signal Generator	Agilent M/N N5182A MXG, S/N: MY48180714

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 $\pm 5\%$, 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

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.
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	Oct 26/18
Power meter	Agilent	E4418B	FA001678	1 year	June 5/19
Power sensor	HP	8482A	FA001944	1 year	May 30/19
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Mar. 26/19
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	Oct. 1/18
Horn antenna (1–18 GHz)	EMCO	3115	FA000649	1 year	Sept. 27/18
Preamp (1–18 GHz)	ETS-Lindgren	124334	FA002877	1 year	Nov. 14/18
50 Ω coax cable	Huber + Suhner	None	FA002830	1 year	May 8/19
50 Ω coax cable	C.C.A.	None	FA002555	1 year	May 1/19

Notes: None,

Section 8. Testing data

8.1 KDB 935210 Clause 3.2 AGC threshold

8.1.1 Definitions and limits

Test EUT to find an AGC threshold. In the case of fiber-optic distribution systems, the RF input port of the equipment under test (EUT) refers to the RF input of the supporting equipment RF to optical convertor.

8.1.2 Test summary

Test date	September 11, 2018
Test engineer	Andrey Adelberg

8.1.3 Observations, settings and special notes

The testing was performed with RMS power meter

8.1.4 Test data

Table 8.1-1: AGC threshold results at antenna port 1

Frequency, MHz	AGC threshold level	RF power at the input, dBm	RF power at the output, dBm	Gain, dB
619.5	Nominal	-5.3	32.80	38.10
619.5	Nominal + 1 dB	-4.3	33.45	37.75
634.5	Nominal	-5.3	33.02	38.32
634.5	Nominal + 1 dB	-4.3	33.62	37.92
649.5	Nominal	-5.3	32.69	37.99
649.5	Nominal + 1 dB	-4.3	33.15	37.45

Table 8.1-2: AGC threshold results at antenna port 2

Frequency, MHz	AGC threshold level	RF power at the input, dBm	RF power at the output, dBm	Gain, dB
619.5	Nominal	-3.74	32.98	36.72
619.5	Nominal + 1 dB	-2.78	33.52	36.30
634.5	Nominal	-3.74	33.04	36.78
634.5	Nominal + 1 dB	-2.78	33.88	36.66
649.5	Nominal	-3.17	33.02	36.19
649.5	Nominal + 1 dB	-2.17	33.41	35.58



8.2 FCC 27.50(c)(3) and KDB 935210 Clause 3.5 Mean output power at RF antenna connector and booster gain

8.2.1 Definitions and limits

FCC 27.50(c)(3) Fixed and base stations transmitting a signal 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 ERP in accordance with table below.

The passband gain shall not exceed the nominal gain by more than 1.0 dB.

Table 8.2-1: Permissible power and antenna heights for base and fixed stations in the 600 MHz band transmitting a signal with an emission bandwidth >1 MHz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) per MHz (watts/MHz)
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

8.2.2 Test summary

Test date	September 11, 2018
Test engineer	Andrey Adelberg

8.2.3 Observations, settings and special notes

The output power was measured by using a calibrated RMS power meter.

Test was repeated with input single carrier set to the 0.5 dB below AGC threshold level and 3 dB above AGC threshold level.



8.2.4 Test data

Table 8.2-2: Gain measurement results at antenna port 2

Frequency, MHz	AGC threshold level	RF power at the input, dBm	RF power at the output, dBm	Gain, dB
619.5	Nominal – 0.5 dB	-4.80	32.21	37.01
619.5	Nominal + 3 dB	-1.35	33.50	34.85
634.5	Nominal – 0.5 dB	-4.78	32.46	37.24
634.5	Nominal + 3 dB	-1.34	33.74	35.08
649.5	Nominal – 0.5 dB	-4.83	32.06	36.89
649.5	Nominal + 3 dB	-1.36	33.24	34.60

Table 8.2-3: ERP results for antenna port 2

Frequency, MHz	AGC threshold level	RF output power, dBm	ERP limit, dBm/MHz	Margin, dB
619.5	Nominal – 0.5 dB	32.21	60.00	27.79
619.5	Nominal + 3 dB	33.50	60.00	26.50
634.5	Nominal – 0.5 dB	32.46	60.00	27.54
634.5	Nominal + 3 dB	33.74	60.00	26.26
649.5	Nominal – 0.5 dB	32.06	60.00	27.94
649.5	Nominal + 3 dB	33.24	60.00	26.76

Note: maximum permitted antenna gain at an antenna height of up to 305 m HAAT is 26.26 dBd + 10 × Log₁₀(5 MHz / 1 MHz) = 33.25 dBd.

Table 8.2-4: Gain measurement results at antenna port 1

Frequency, MHz	AGC threshold level	RF power at the input, dBm	RF power at the output, dBm	Gain, dB
619.5	Nominal – 0.5 dB	-4.8	32.70	37.50
619.5	Nominal + 3 dB	-1.35	33.46	34.81
634.5	Nominal – 0.5 dB	-4.78	32.83	37.61
634.5	Nominal + 3 dB	-1.34	33.62	34.96
649.5	Nominal – 0.5 dB	-4.83	32.66	37.49
649.5	Nominal + 3 dB	-1.36	33.14	34.50

Table 8.2-5: ERP results for antenna port 1

Frequency, MHz	AGC threshold level	RF output power, dBm	ERP limit, dBm/MHz	Margin, dB
619.5	Nominal – 0.5 dB	32.70	60.00	27.30
619.5	Nominal + 3 dB	33.46	60.00	26.54
634.5	Nominal – 0.5 dB	32.83	60.00	27.17
634.5	Nominal + 3 dB	33.62	60.00	26.38
649.5	Nominal – 0.5 dB	32.66	60.00	27.34
649.5	Nominal + 3 dB	33.14	60.00	26.86

Note: maximum permitted antenna gain at an antenna height of up to 305 m HAAT is 26.26 dBd + 10 × Log₁₀(5 MHz / 1 MHz) = 33.25 dBd.

8.3 KDB 935210 Clause 3.3 Out-of-band rejection

8.3.1 Definitions and limits

Test EUT for out-of-band rejection of input signals to show the filter frequency response.

8.3.2 Test summary

Test date	September 11, 2018
Test engineer	Andrey Adelberg

8.3.3 Observations, settings and special notes

The signal generator at the EUT input swept from 590 MHz to 679 MHz with CW signal.
The testing was performed with spectrum analyser with the following settings:

Spectrum analyzer settings:

Frequency range	250% of passband
Detector mode	Peak
Resolution bandwidth	50 kHz and 300 kHz
Video bandwidth	>RBW
Trace mode	Max Hold
Measurement time	Auto

8.3.4 Test data

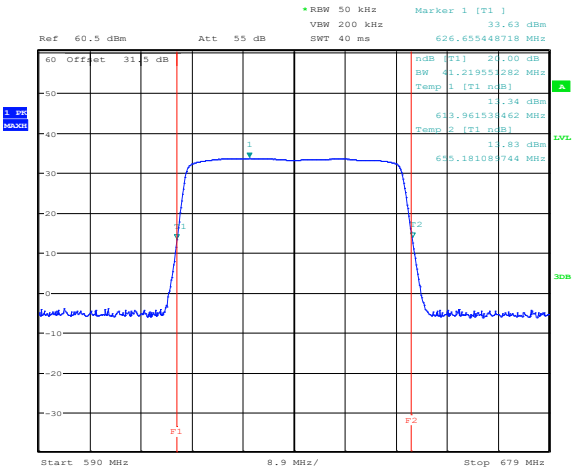


Figure 8.3-1: Out-of-band rejection at 1 % of EBW – Antenna port 1

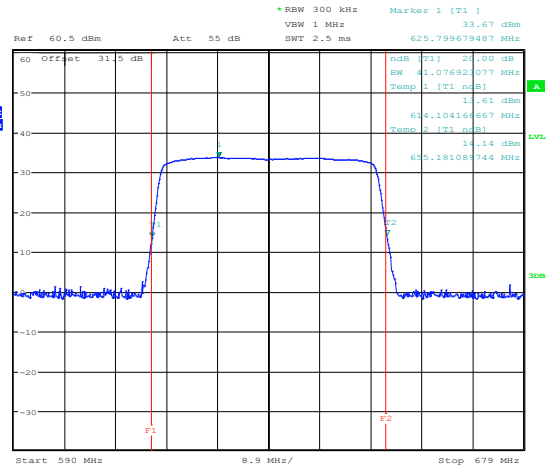


Figure 8.3-2: Out-of-band rejection at 1 % of pass band – Antenna port 1

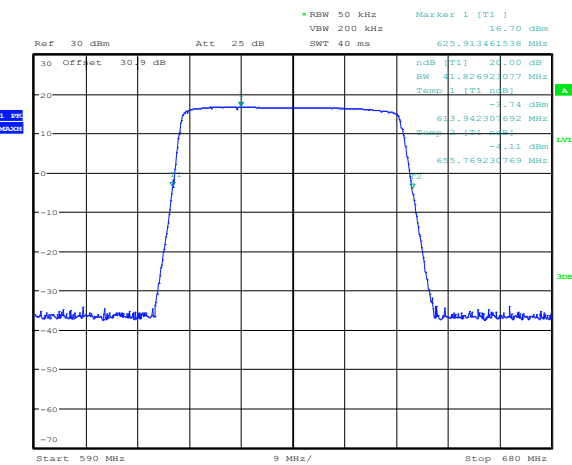


Figure 8.3-3: Out-of-band rejection at 1 % of EBW – Antenna port 2

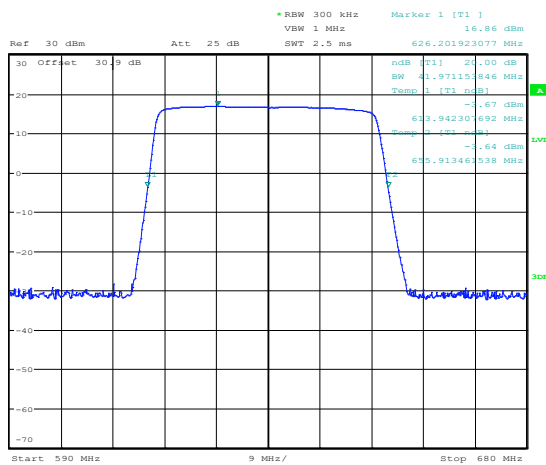


Figure 8.3-4: Out-of-band rejection at 1 % of pass band – antenna port 2

8.4 FCC 27.53(g) and KDB 935210 Clause 3.6 Spurious emissions at RF antenna connector

8.4.1 Definitions and limits

FCC 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

8.4.2 Test summary

Test date	September 11, 2018
Test engineer	Andrey Adelberg

8.4.3 Observations, settings and special notes

For intermodulation testing signal generator provided two identical adjacent channels at the EUT input.

Spectrum analyzer settings:

Frequency range	30 MHz to 10 th harmonic
Detector mode	RMS
Resolution bandwidth sweep	100 kHz (below 1 GHz), 1000 kHz (above 1 GHz)
Resolution bandwidth band edge	> 1 -5% of OBW
Video bandwidth	>RBW
Trace mode	Max Hold
Measurement time	Averaging

8.4.4 Test data

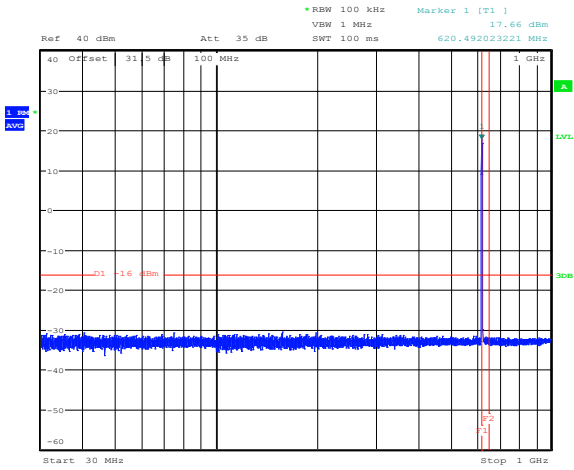


Figure 8.4-1: Conducted spurious emissions at antenna port 1 below 1 GHz for low channel

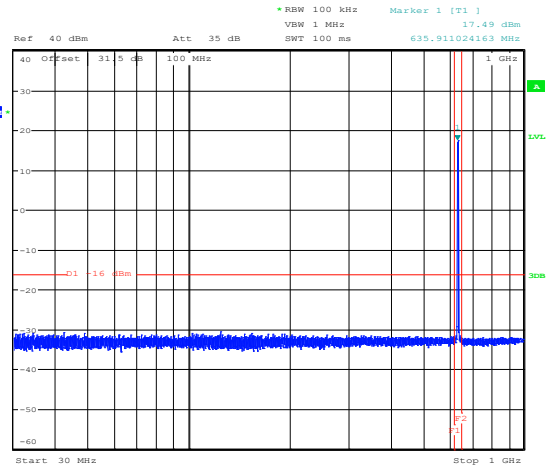


Figure 8.4-2: Conducted spurious emissions at antenna port 1 below 1 GHz for mid channel

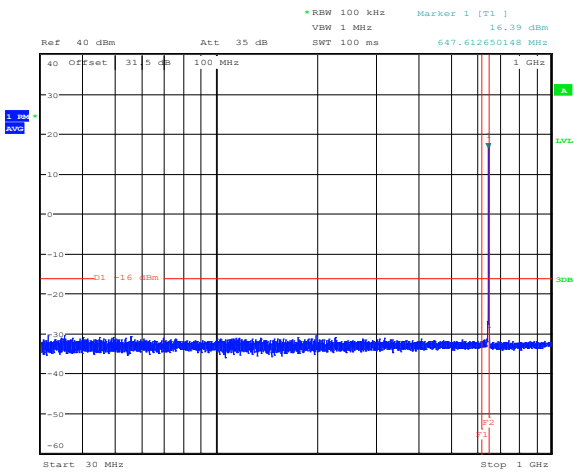


Figure 8.4-3: Conducted spurious emissions at antenna port 1 below 1 GHz for high channel

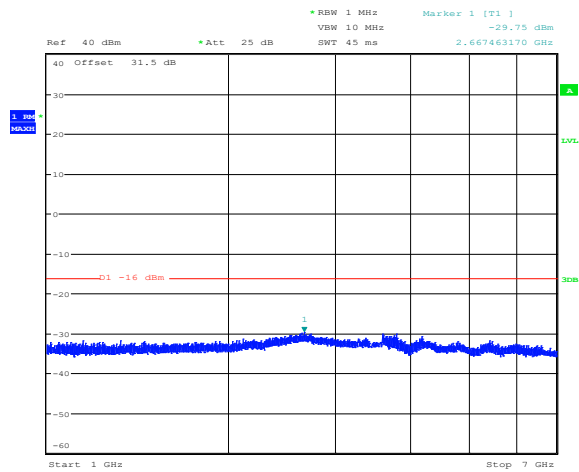


Figure 8.4-4: Conducted spurious emissions at antenna port 1 above 1 GHz for low channel

8.4.5 Test data, continued

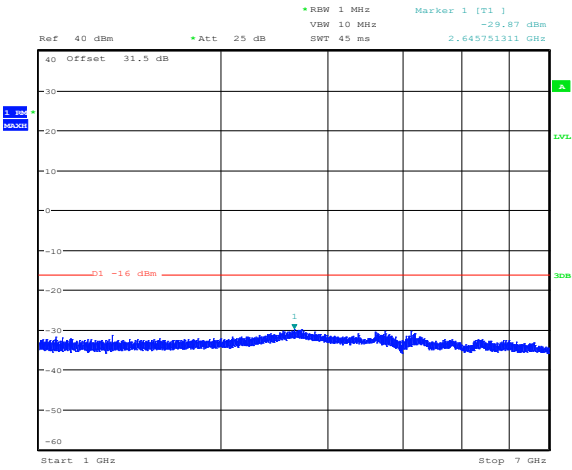


Figure 8.4-5: Conducted spurious emissions at antenna port 1 above 1 GHz for mid channel

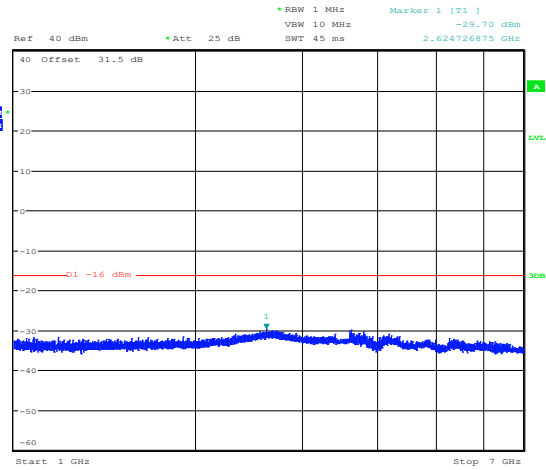


Figure 8.4-6: Conducted spurious emissions at antenna port 1 above 1 GHz for high channel

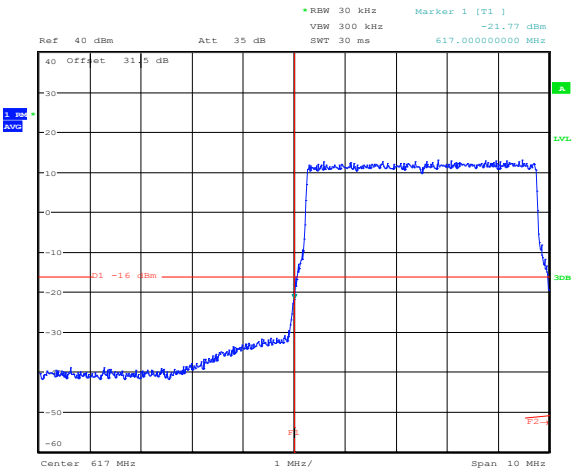


Figure 8.4-7: Conducted lower band edge at 617 MHz at AGC threshold, antenna port 1

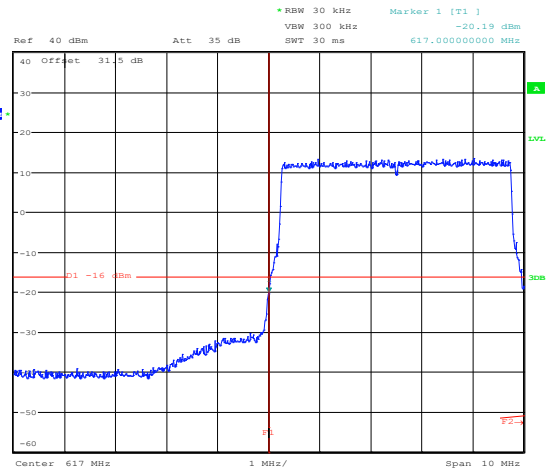


Figure 8.4-8: Conducted lower band edge at 617 MHz at AGC threshold + 3 dB, antenna port 1

8.4.6 Test data, continued

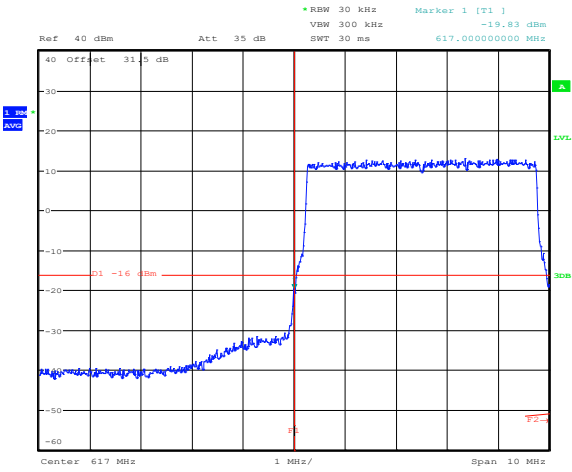


Figure 8.4-9: Conducted lower band edge at 616.9 MHz at AGC threshold, antenna port 1

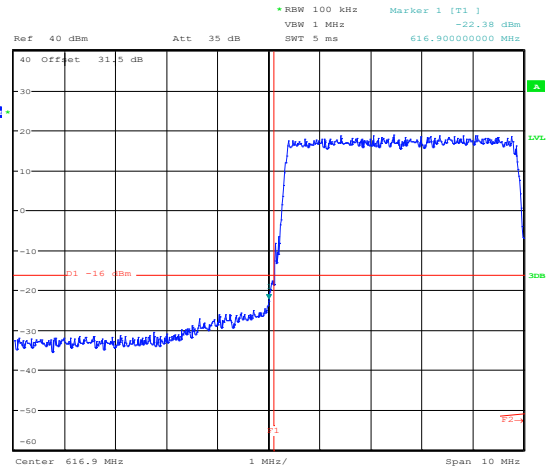


Figure 8.4-10: Conducted lower band edge at 616.9 MHz at AGC threshold + 3 dB, antenna port 1

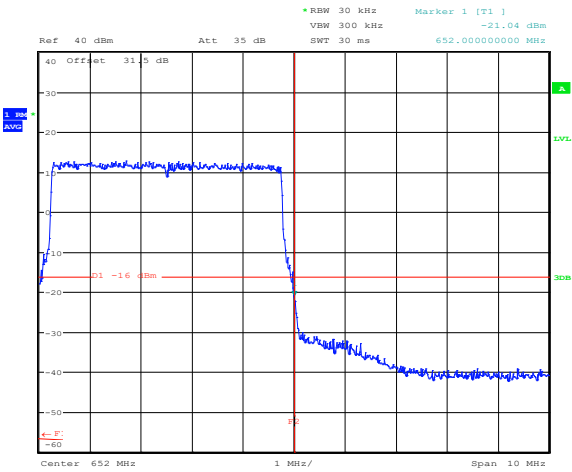


Figure 8.4-11: Conducted upper band edge at 652 MHz at AGC threshold, antenna port 1

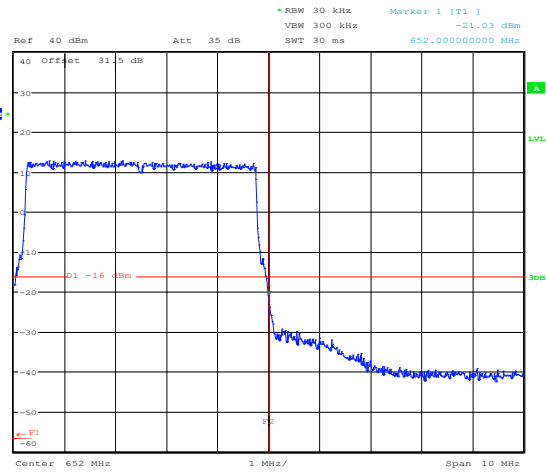


Figure 8.4-12: Conducted upper band edge at 652 MHz at AGC threshold + 3 dB, antenna port 1

8.4.7 Test data, continued

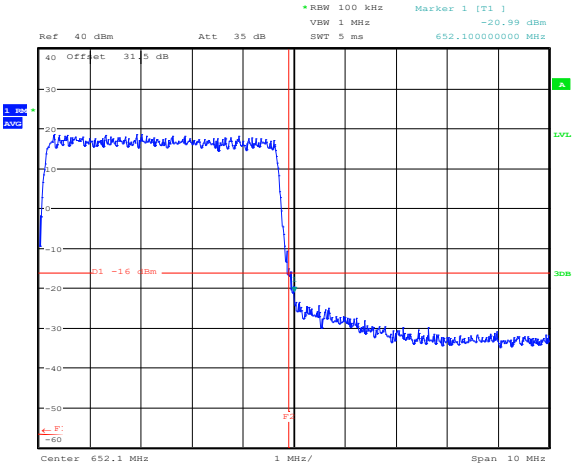


Figure 8.4-13: Conducted upper band edge at 652.1 MHz at AGC threshold, antenna port 1

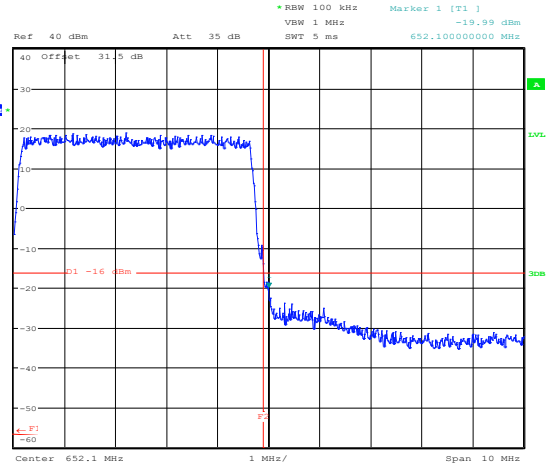


Figure 8.4-14: Conducted upper band edge at 652.1 MHz at AGC threshold + 3 dB, antenna port 1

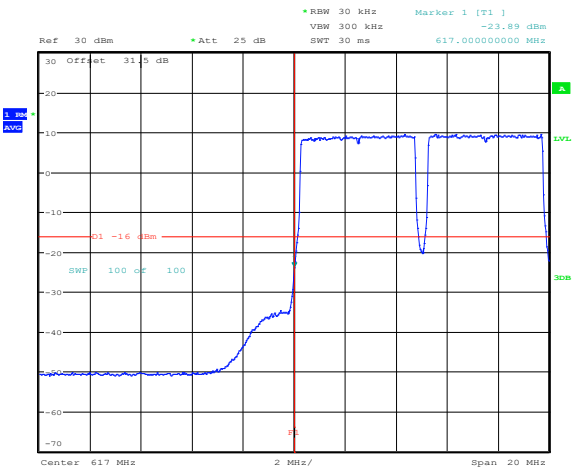


Figure 8.4-15: Conducted lower band edge at 617 MHz at AGC threshold (intermodulation), antenna port 1

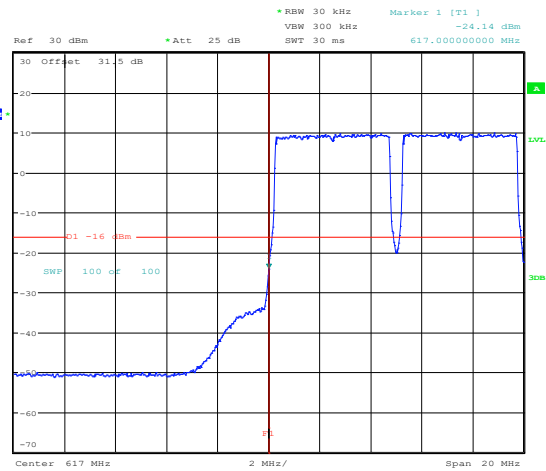


Figure 8.4-16: Conducted lower band edge at 617 MHz at AGC threshold + 3 dB (intermodulation), antenna port 1

8.4.8 Test data, continued

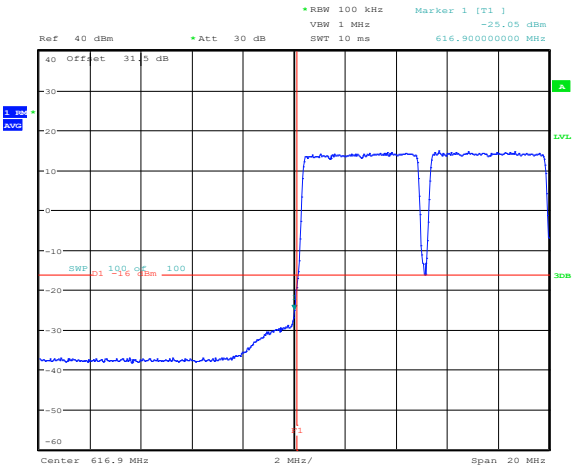


Figure 8.4-17: Conducted lower band edge at 616.9 MHz at AGC threshold (intermodulation), antenna port 1

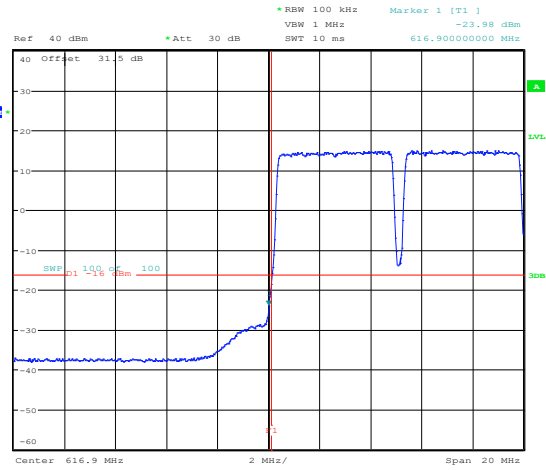


Figure 8.4-18: Conducted lower band edge at 616.9 MHz at AGC threshold + 3 dB (intermodulation), antenna port 1

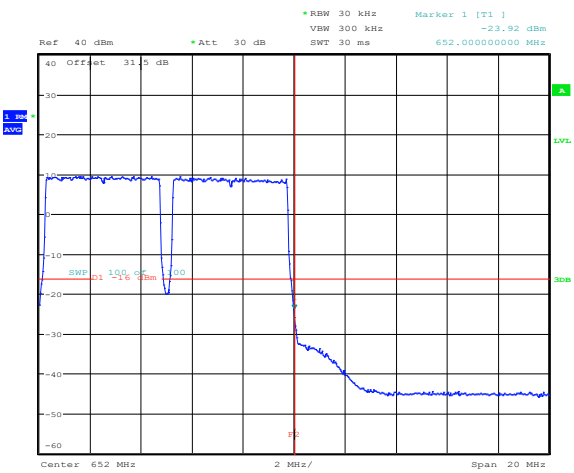


Figure 8.4-19: Conducted upper band edge at 652 MHz at AGC threshold (intermodulation), antenna port 1

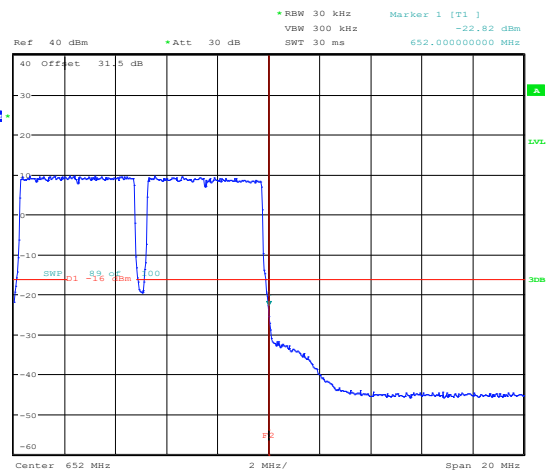


Figure 8.4-20: Conducted upper band edge at 652 MHz at AGC threshold + 3 dB (intermodulation), antenna port 1

8.4.4 Test data, continued

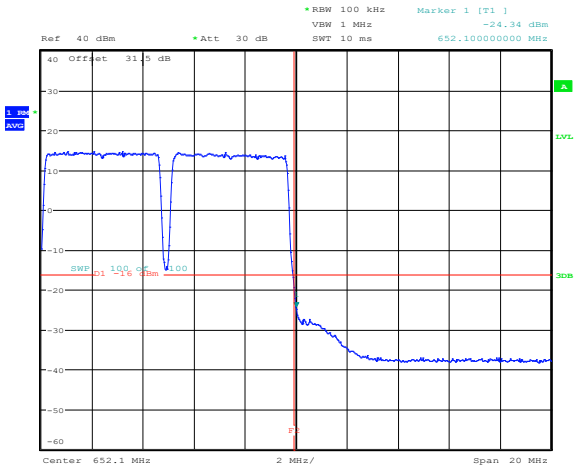


Figure 8.4-21: Conducted upper band edge at 652.1 MHz at AGC threshold (intermodulation), antenna port 1

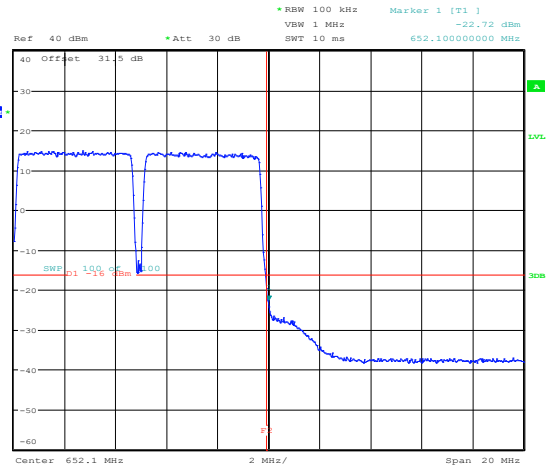


Figure 8.4-22: Conducted upper band edge at 652.1 MHz at AGC threshold + 3 dB (intermodulation), antenna port 1

8.4.4 Test data, continued

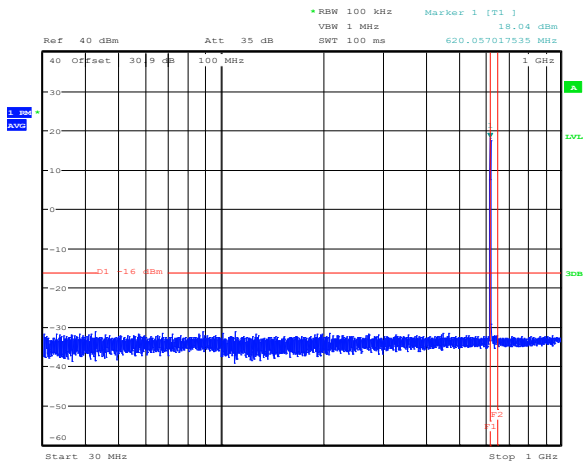


Figure 8.4-23: Conducted spurious emissions at antenna port 2 below 1 GHz for low channel

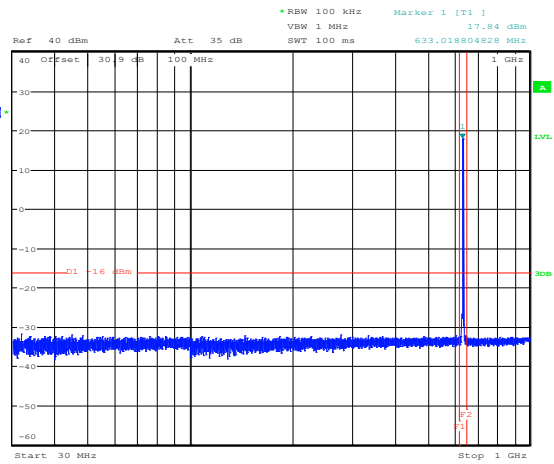


Figure 8.4-24: Conducted spurious emissions at antenna port 2 below 1 GHz for mid channel

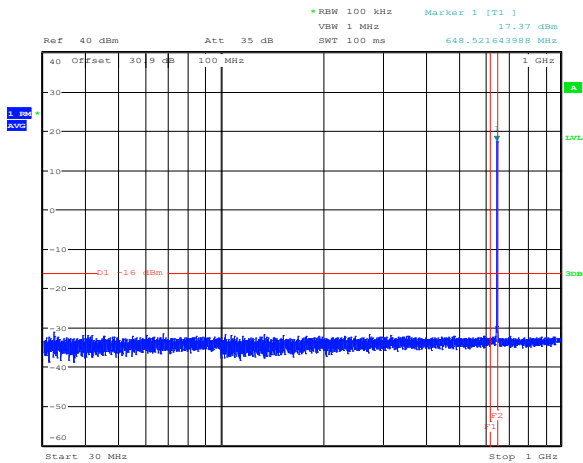


Figure 8.4-25: Conducted spurious emissions at antenna port 2 below 1 GHz for high channel

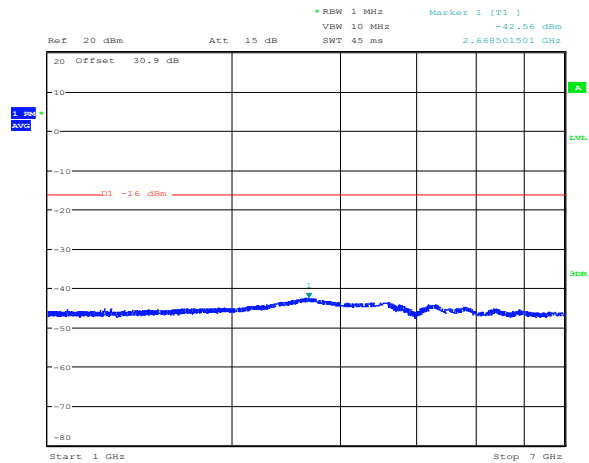


Figure 8.4-26: Conducted spurious emissions at antenna port 2 above 1 GHz for low channel

8.4.4 Test data, continued

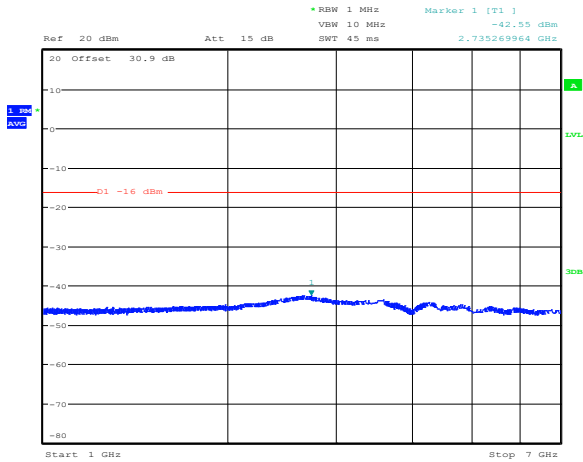


Figure 8.4-27: Conducted spurious emissions at antenna port 2 above 1 GHz for mid channel

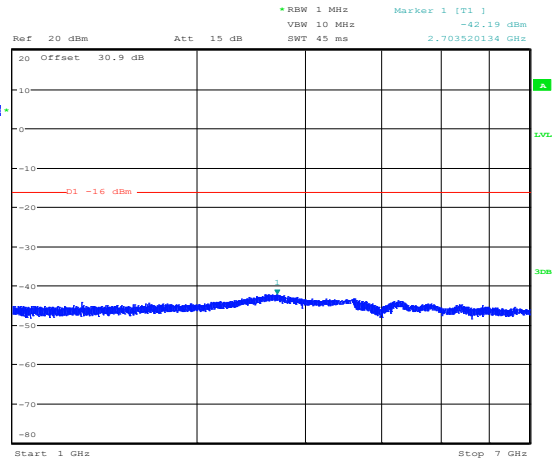


Figure 8.4-28: Conducted spurious emissions at antenna port 2 above 1 GHz for high channel

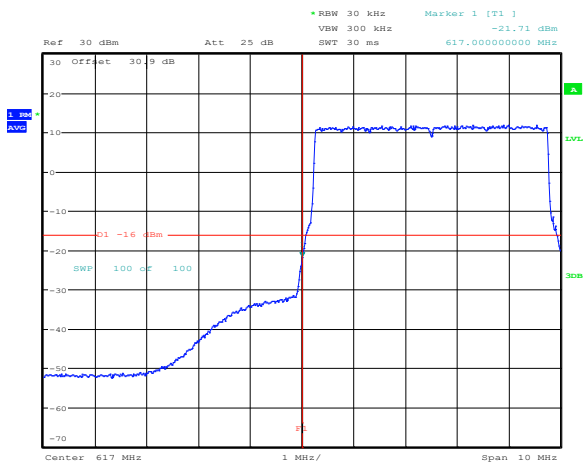


Figure 8.4-29: Conducted lower band edge at 617 MHz at AGC threshold, antenna port 2

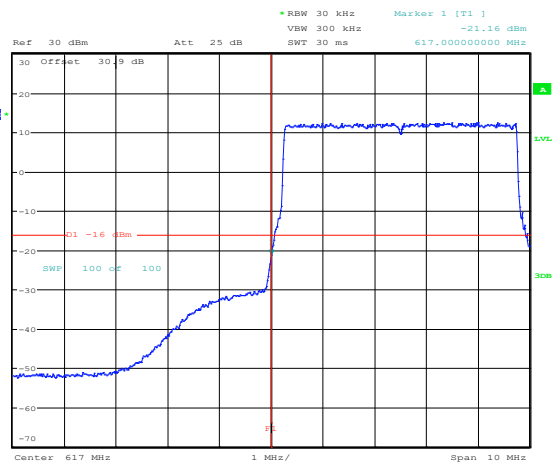


Figure 8.4-30: Conducted lower band edge at 617 MHz at AGC threshold + 3 dB, antenna port 2

8.4.4 Test data, continued

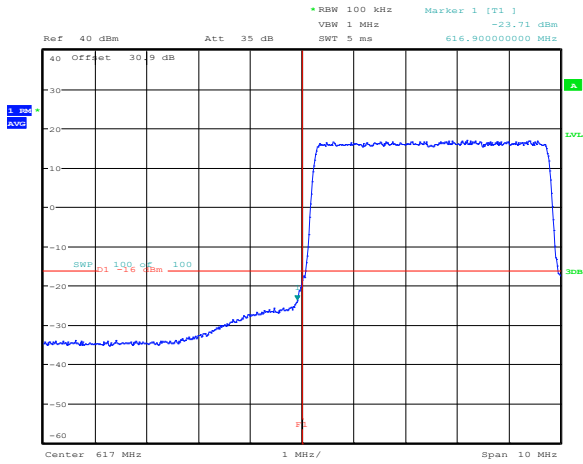


Figure 8.4-31: Conducted lower band edge at 616.9 MHz at AGC threshold, antenna port 2

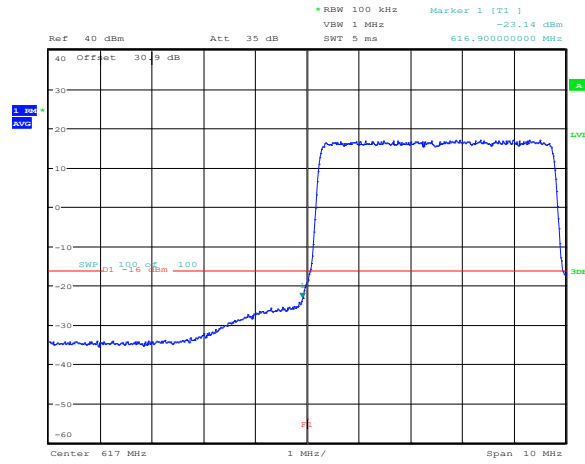


Figure 8.4-32: Conducted lower band edge at 616.9 MHz at AGC threshold + 3 dB, antenna port 2

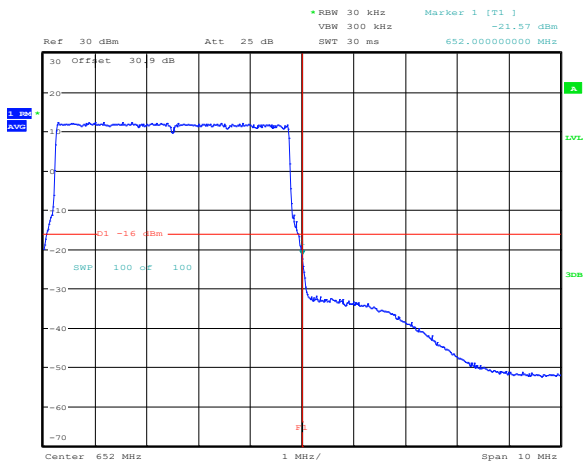


Figure 8.4-33: Conducted upper band edge at 652 MHz at AGC threshold, antenna port 2

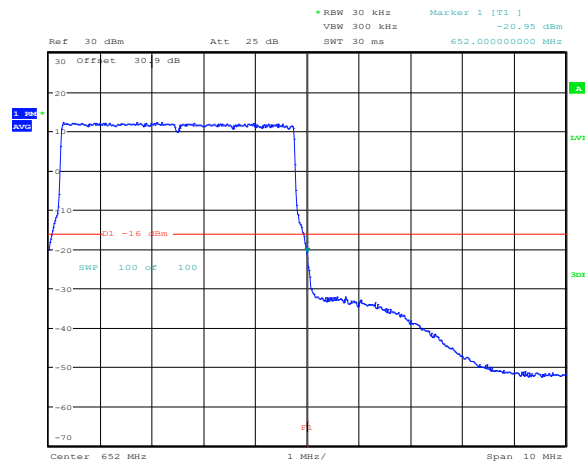


Figure 8.4-34: Conducted upper band edge at 652 MHz at AGC threshold + 3 dB, antenna port 2

8.4.4 Test data, continued

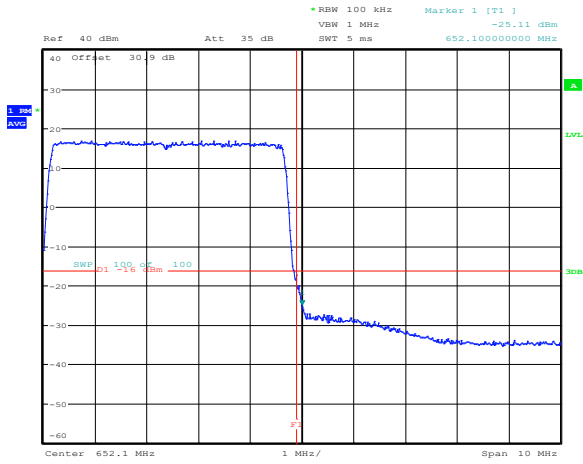


Figure 8.4-35: Conducted upper band edge at 652.1 MHz at AGC threshold, antenna port 2

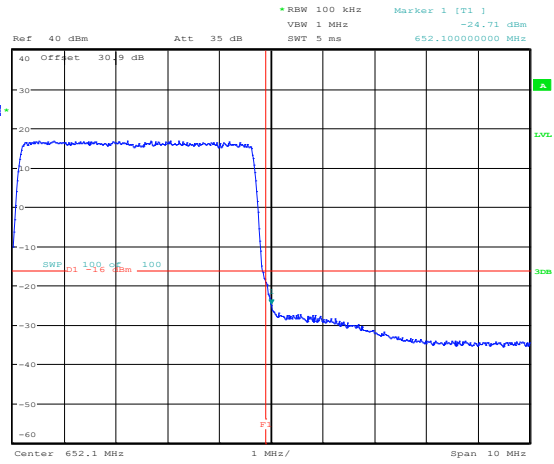


Figure 8.4-36: Conducted upper band edge at 652.1 MHz at AGC threshold + 3 dB, antenna port 2

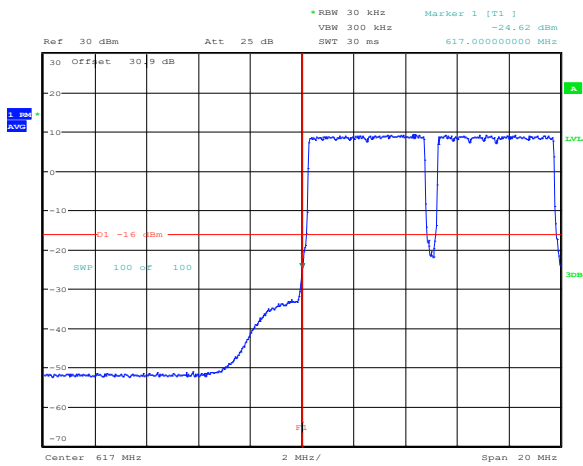


Figure 8.4-37: Conducted lower band edge at 617 MHz at AGC threshold (intermodulation), antenna port 2

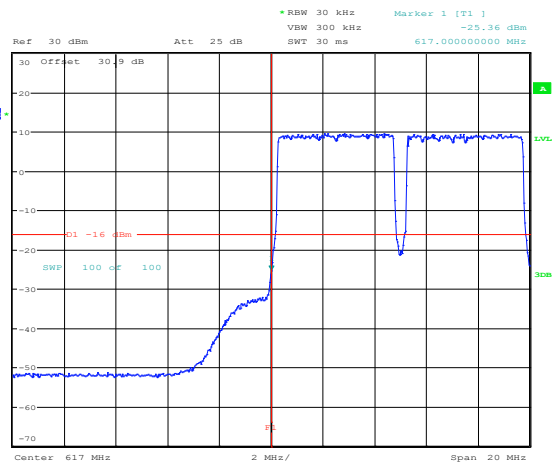


Figure 8.4-38: Conducted lower band edge at 617 MHz at AGC threshold + 3 dB (intermodulation), antenna port 2

8.4.5 Test data, continued

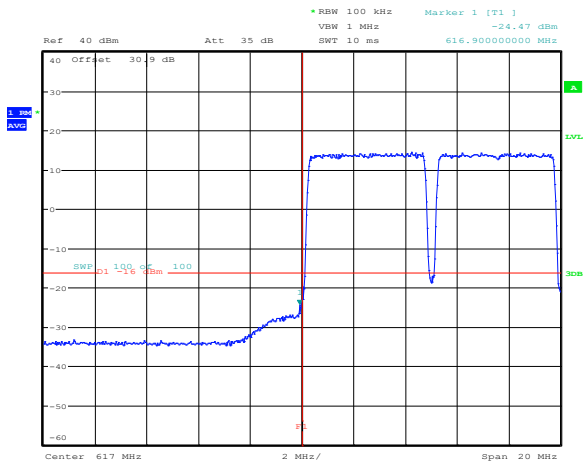


Figure 8.4-39: Conducted lower band edge at 616.9 MHz at AGC threshold (intermodulation), antenna port 2

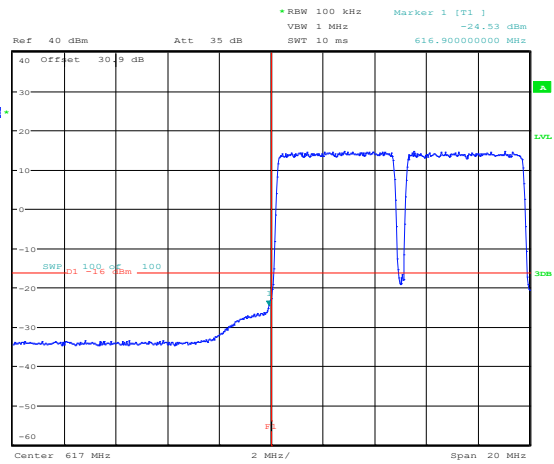


Figure 8.4-40: Conducted lower band edge at 616.9 MHz at AGC threshold + 3 dB (intermodulation), antenna port 2

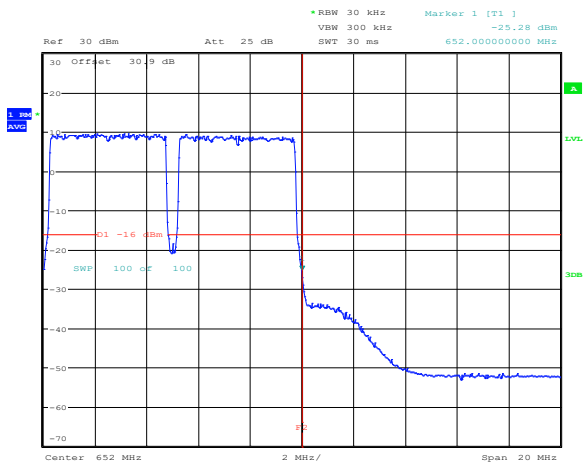


Figure 8.4-41: Conducted upper band edge at 652 MHz at AGC threshold (intermodulation), antenna port 2

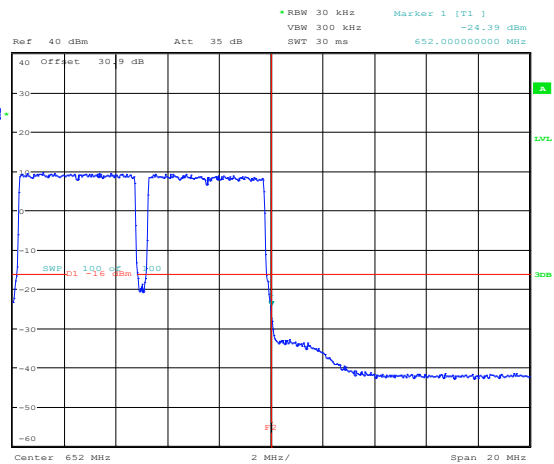


Figure 8.4-42: Conducted upper band edge at 652 MHz at AGC threshold + 3 dB (intermodulation), antenna port 2

8.4.4 Test data, continued

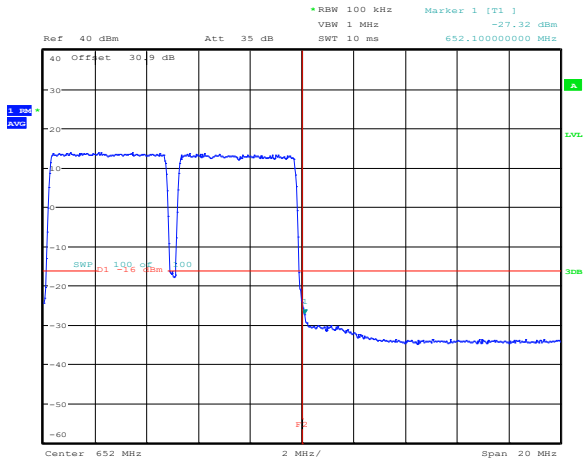


Figure 8.4-43: Conducted upper band edge at 652.1 MHz at AGC threshold (intermodulation), antenna port 2

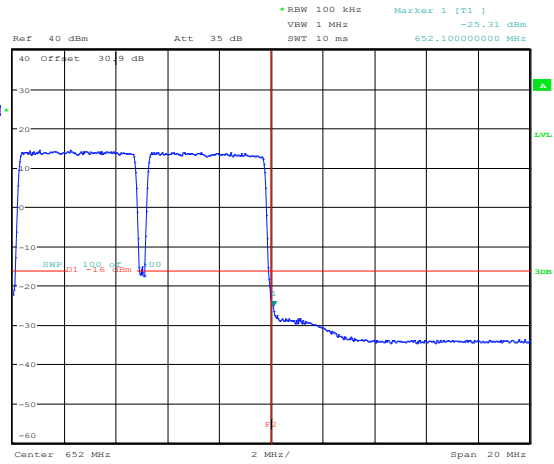


Figure 8.4-44: Conducted upper band edge at 652.1 MHz at AGC threshold + 3 dB (intermodulation), antenna port 2

8.5 FCC 27.53(g) and KDB 935210 Clause 3.8 Radiated spurious emissions

8.5.1 Definitions and limits

FCC 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

8.5.2 Test summary

Test date	November 19, 2015
Test engineer	Andrey Adelberg

8.5.3 Observations, settings and special notes

Receiver settings were:

Frequency range	30 MHz to 10 th harmonic
Detector mode	Peak
Resolution bandwidth	100 kHz (below 1 GHz), 1000 kHz (above 1 GHz)
Video bandwidth	>RBW
Trace mode	Max Hold

8.5.4 Test data

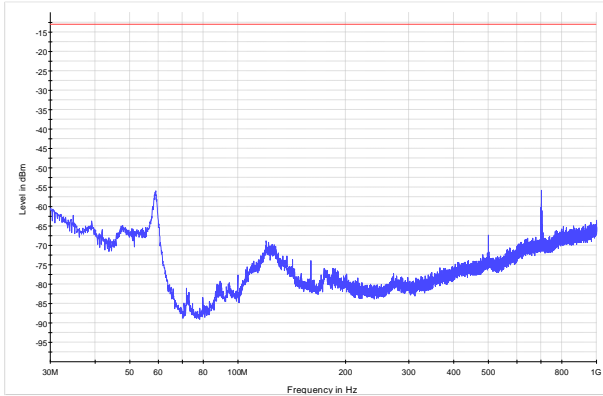


Figure 8.5-1: Radiated spurious emissions within 30 MHz to 1 GHz for low channel – Antenna port 1

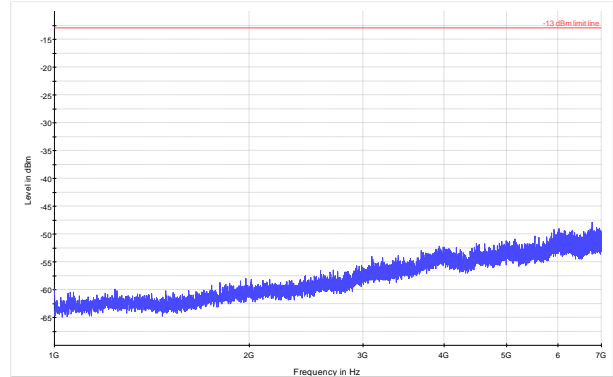


Figure 8.5-2: Radiated spurious emissions within 1 GHz to 8 GHz for low channel – Antenna port 1

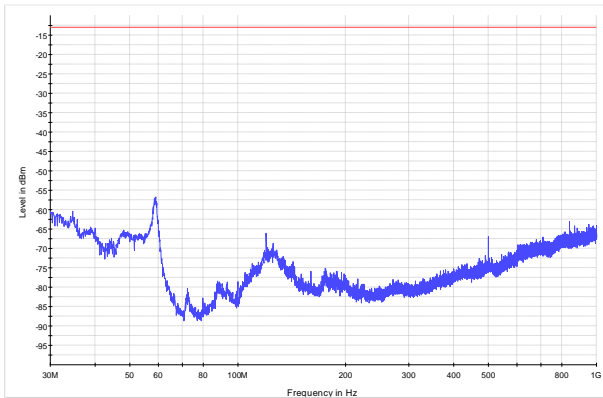


Figure 8.5-3: Radiated spurious emissions within 30 MHz to 1 GHz for mid channel – Antenna port 1

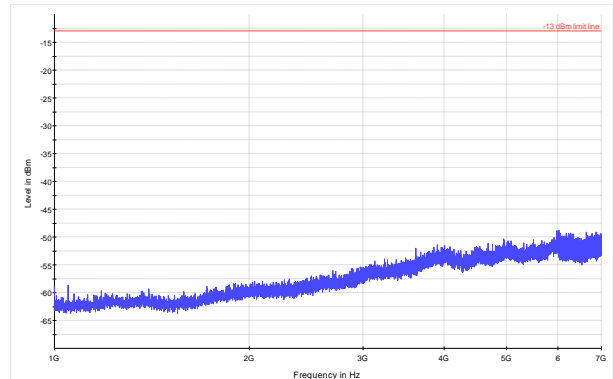


Figure 8.5-4: Radiated spurious emissions within 1 GHz to 8 GHz for mid channel – Antenna port 1

8.5.4 Test data, continued

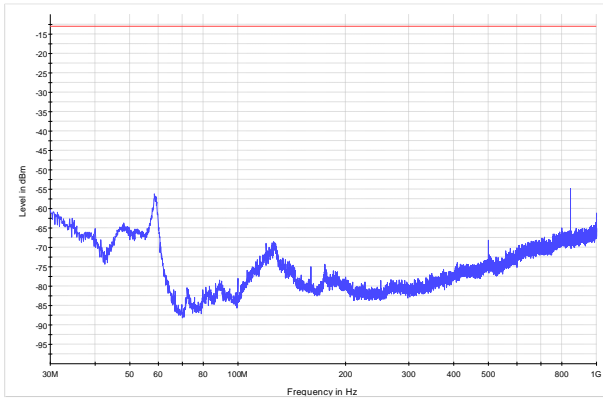


Figure 8.5-5: Radiated spurious emissions within 30 MHz to 1 GHz for high channel – Antenna port 1

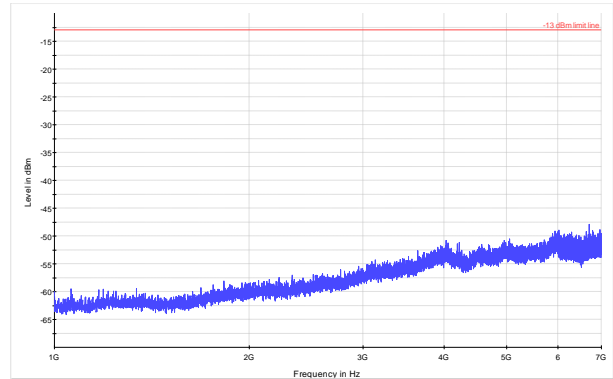


Figure 8.5-6: Radiated spurious emissions within 1 GHz to 8 GHz for high channel – Antenna port 1

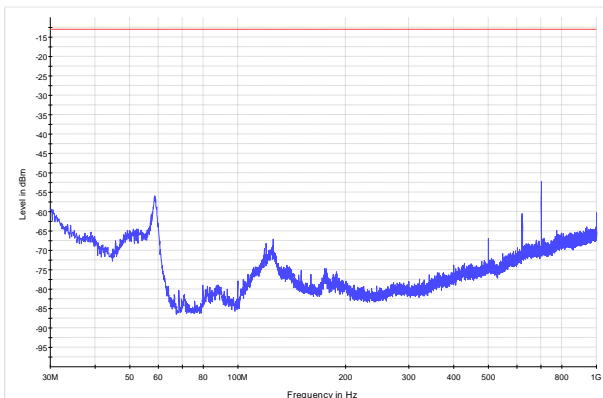


Figure 8.5-7: Radiated spurious emissions within 30 MHz to 1 GHz for low channel – Antenna port 2

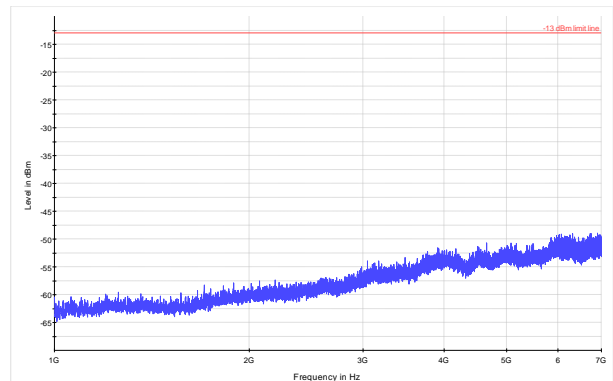


Figure 8.5-8: Radiated spurious emissions within 1 GHz to 8 GHz for low channel – Antenna port 2

8.5.4 Test data, continued

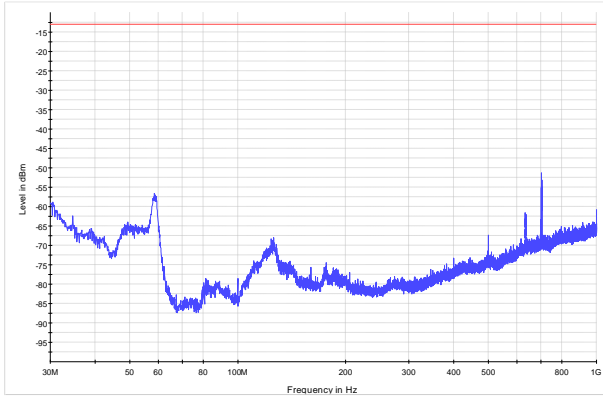


Figure 8.5-9: Radiated spurious emissions within 30 MHz to 1 GHz for mid channel – Antenna port 2

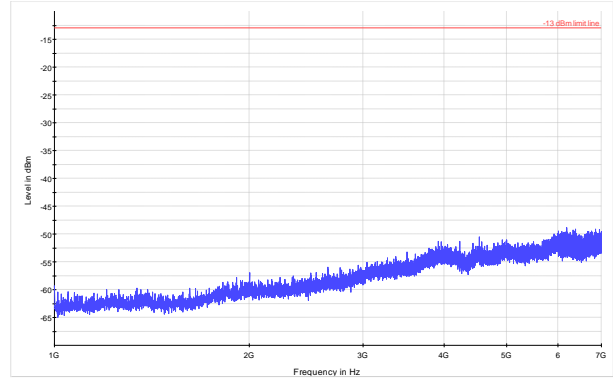


Figure 8.5-10: Radiated spurious emissions within 1 GHz to 8 GHz for mid channel – Antenna port 2

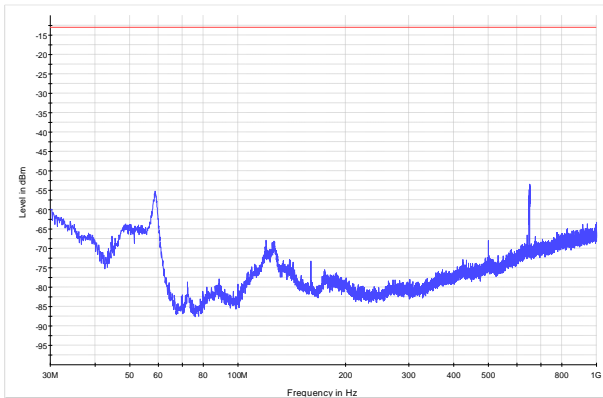


Figure 8.5-11: Radiated spurious emissions within 30 MHz to 1 GHz for high channel – Antenna port 2

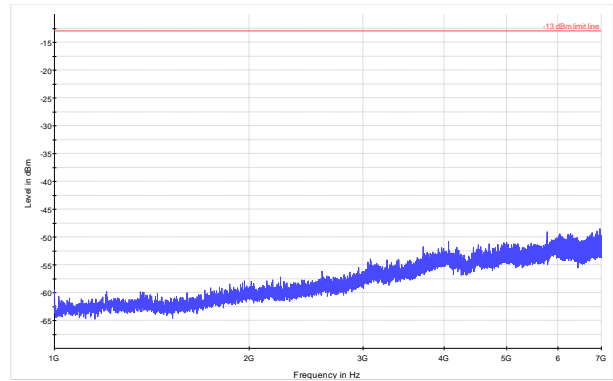


Figure 8.5-12: Radiated spurious emissions within 1 GHz to 8 GHz for high channel – Antenna port 2

8.6 Part 2.1049 and KDB 935210 Clause 3.4 Occupied bandwidth: input versus output signal comparison

8.6.1 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. The spectral shape of the output should look similar to the input. Input OBW and output OBW were assessed and compared side by side.

8.6.2 Test summary

Test date	September 11, 2018
Test engineer	Andrey Adelberg

8.6.3 Observations, settings and special notes

Spectrum analyzer settings:

Detector mode	Peak
Resolution bandwidth	$\geq 1\%$ of OBW
Video bandwidth	\geq RBW
Trace mode	Max Hold



8.6.4 Test data

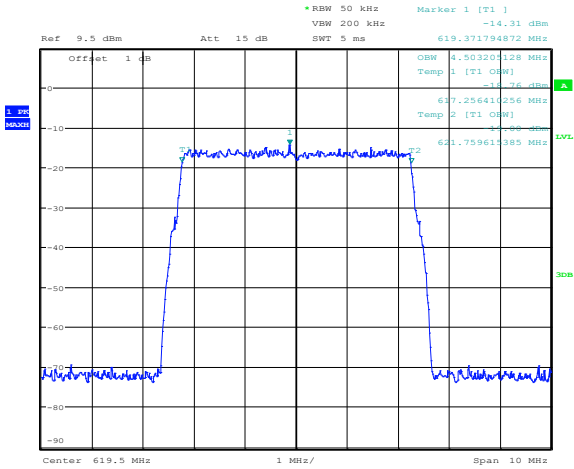


Figure 8.6-1: 99% OBW at the input of the EUT at AGC threshold, low channel

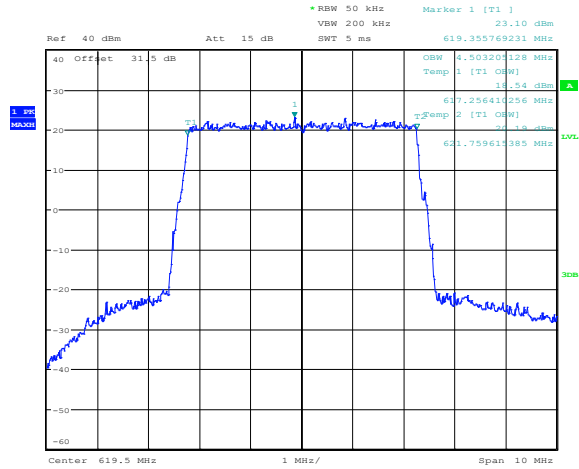


Figure 8.6-2: 99% OBW at the output antenna port 1 of the EUT at AGC threshold, low channel

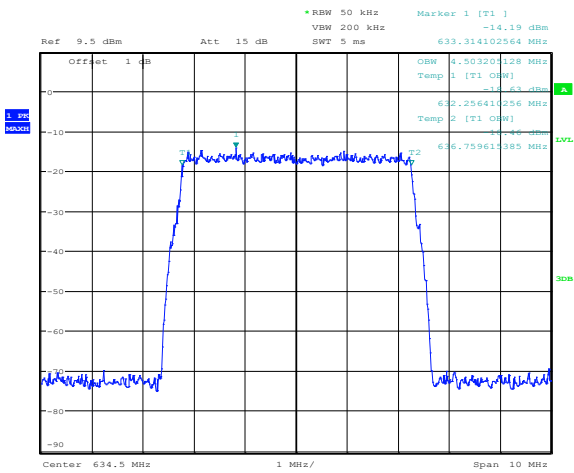


Figure 8.6-3: 99% OBW at the input of the EUT at AGC threshold, mid channel

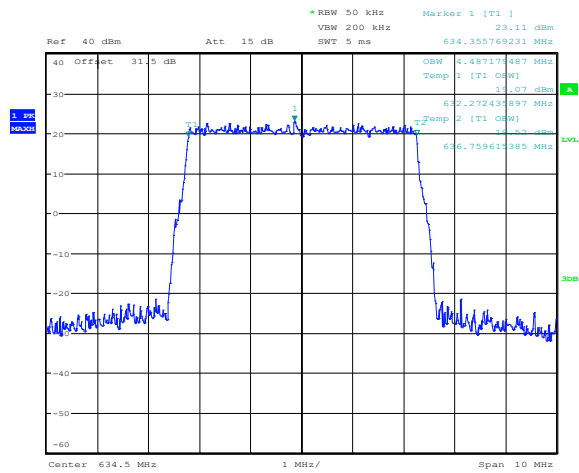


Figure 8.6-4: 99% OBW at the output antenna port 1 of the EUT at AGC threshold, mid channel



8.6.5 Test data, continued

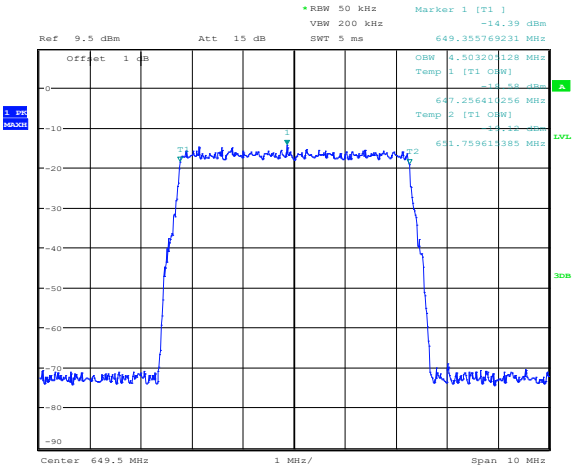


Figure 8.6-5: 99% OBW at the input of the EUT at AGC threshold, high channel

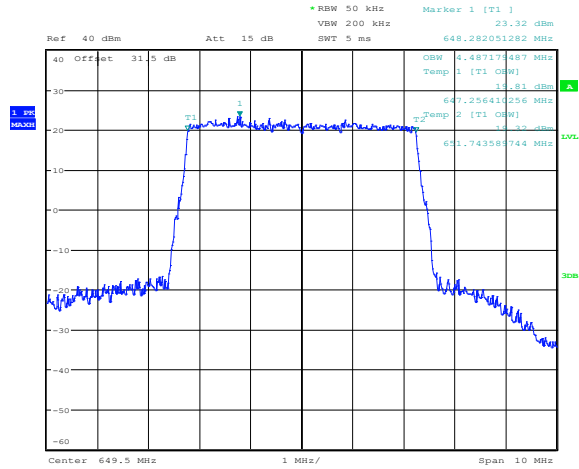


Figure 8.6-6: 99% OBW at the output antenna port 1 of the EUT at AGC threshold, high channel

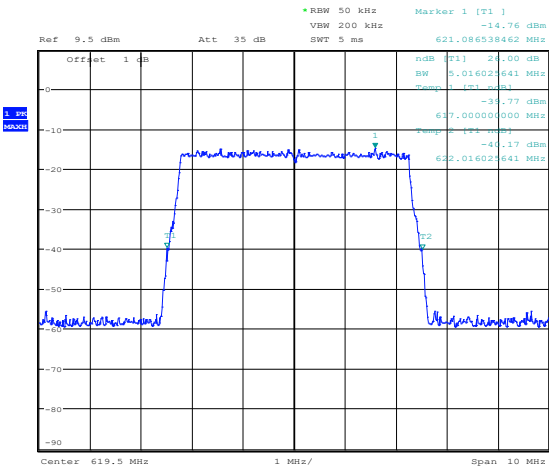


Figure 8.6-7: 26 dB EBW at the input of the EUT at AGC threshold, low channel

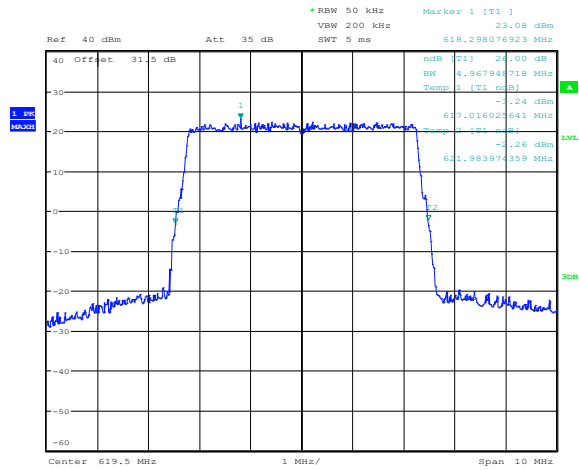


Figure 8.6-8: 26 dB EBW at the output antenna port 1 of the EUT at AGC threshold, low channel



8.6.6 Test data, continued

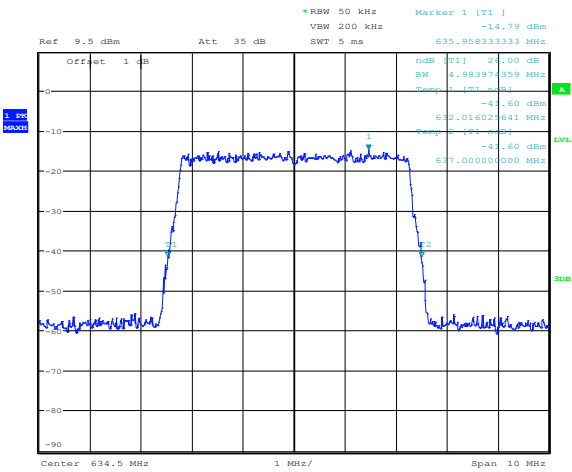


Figure 8.6-9: 26 dB EBW at the input of the EUT at AGC threshold, mid channel

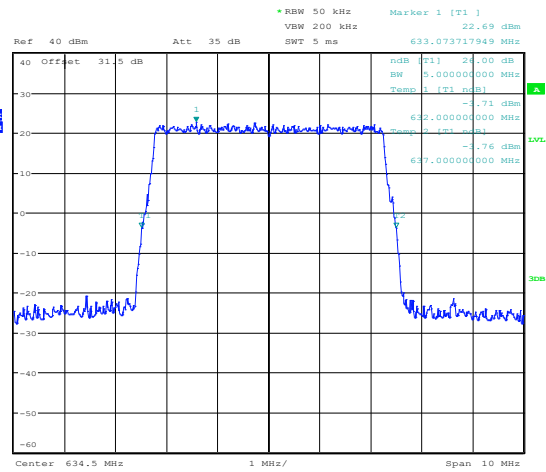


Figure 8.6-10: 26 dB EBW at the output antenna port 1 of the EUT at AGC threshold, mid channel

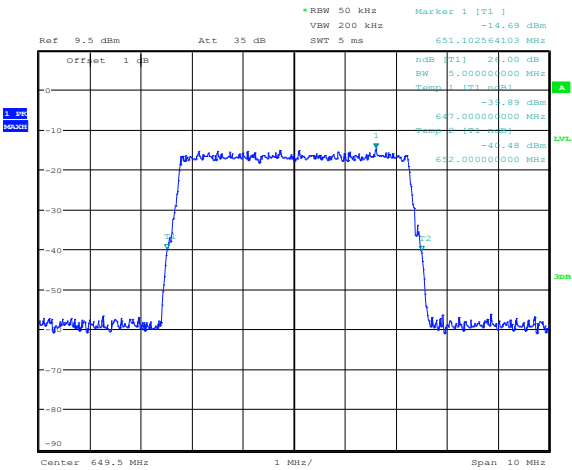


Figure 8.6-11: 26 dB EBW at the input of the EUT at AGC threshold, high channel

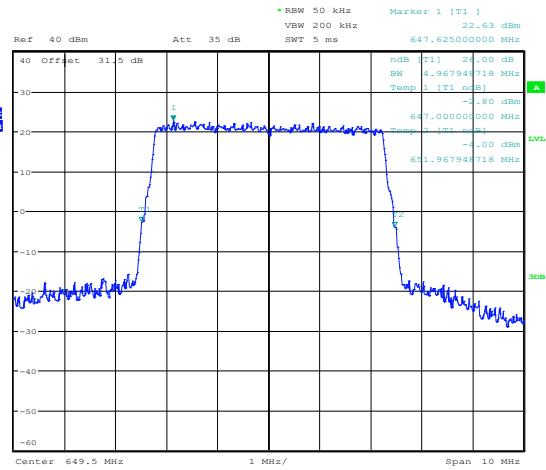


Figure 8.6-12: 26 dB EBW at the output antenna port 1 of the EUT at AGC threshold, high channel



8.6.7 Test data, continued

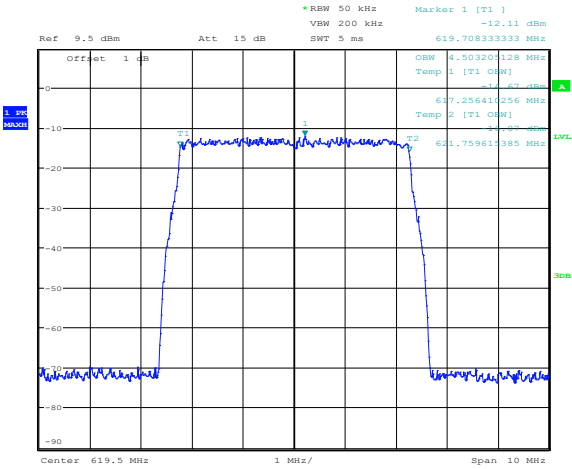


Figure 8.6-13: 99% OBW at the input of the EUT at AGC threshold + 3 dB, low channel

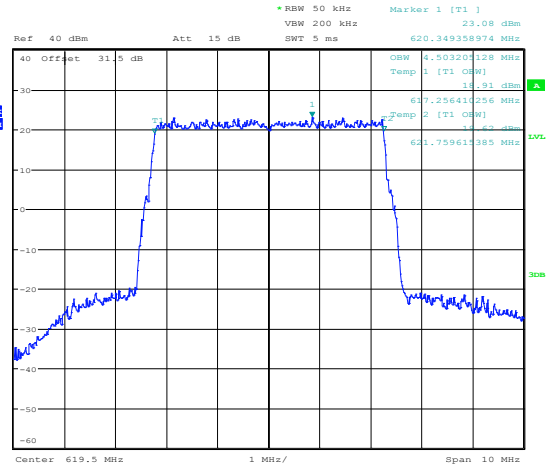


Figure 8.6-14: 99% OBW at the output antenna port 1 of the EUT at AGC threshold + 3 dB, low channel

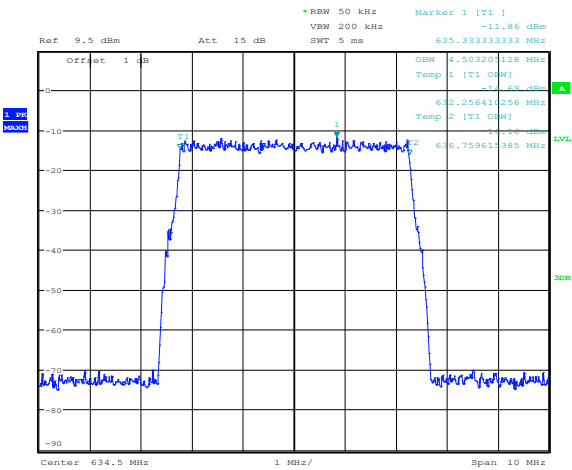


Figure 8.6-15: 99% OBW at the input of the EUT at AGC threshold + 3 dB, mid channel

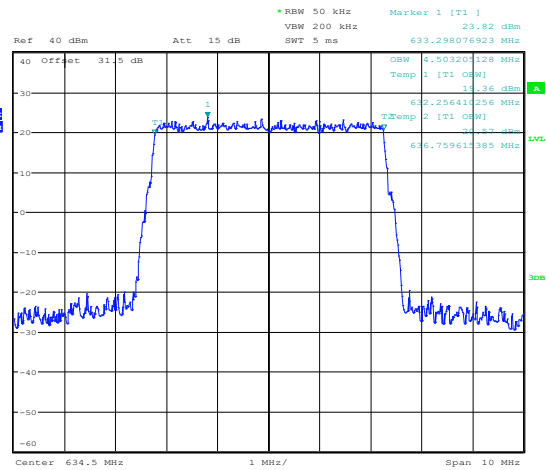


Figure 8.6-16: 99% OBW at the output antenna port 1 of the EUT at AGC threshold + 3 dB, mid channel



8.6.8 Test data, continued

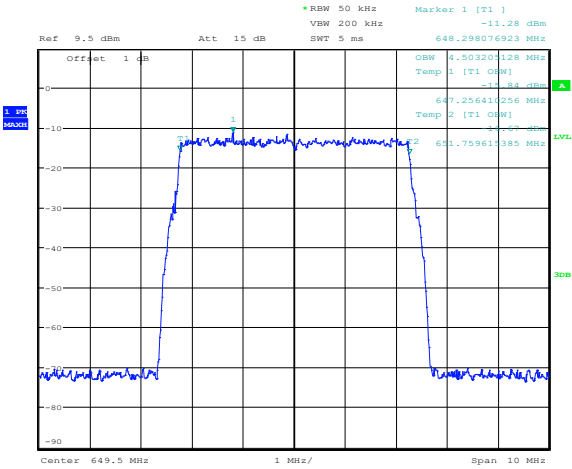


Figure 8.6-17: 99% OBW at the input of the EUT at AGC threshold + 3 dB, high channel

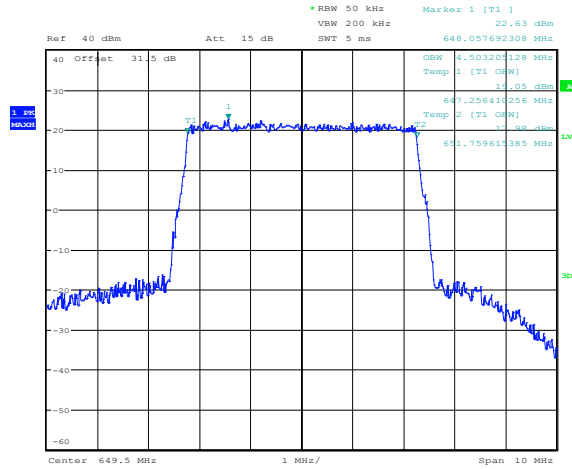


Figure 8.6-18: 99% OBW at the output antenna port 1 of the EUT at AGC threshold + 3 dB, high channel

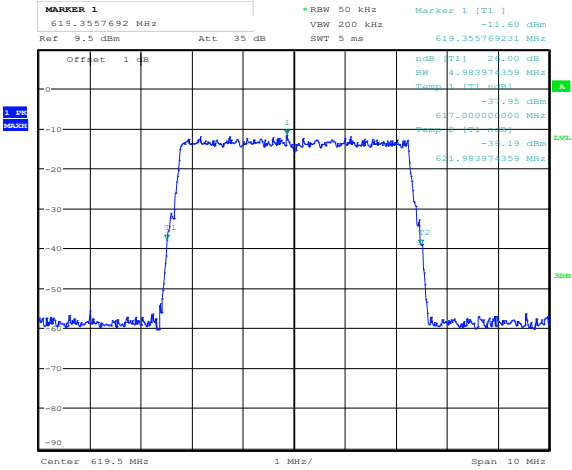


Figure 8.6-19: 26 dB EBW at the input of the EUT at AGC threshold + 3 dB, low channel

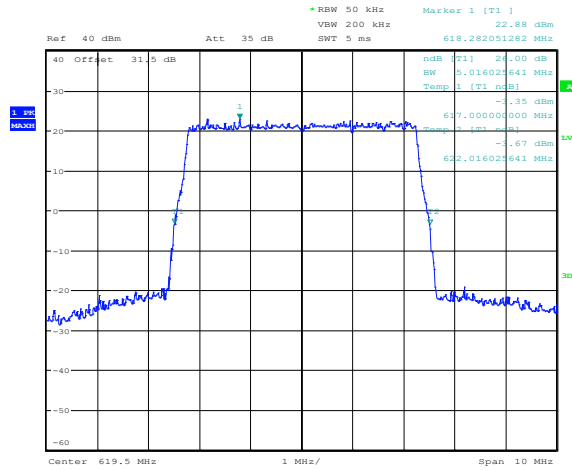


Figure 8.6-20: 26 dB EBW at the output antenna port 1 of the EUT at AGC threshold + 3 dB, low channel



8.6.9 Test data, continued

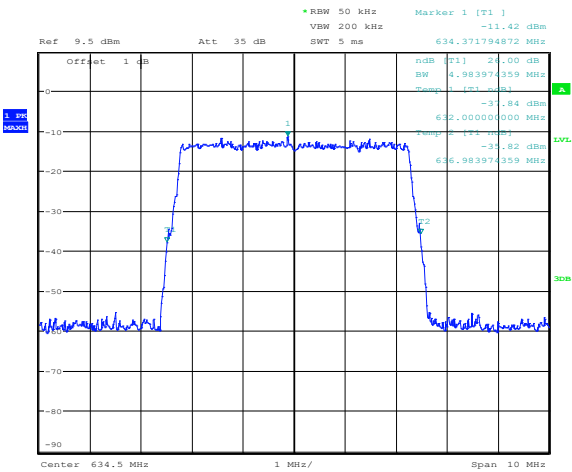


Figure 8.6-21: 26 dB EBW at the input of the EUT at AGC threshold + 3 dB, mid channel

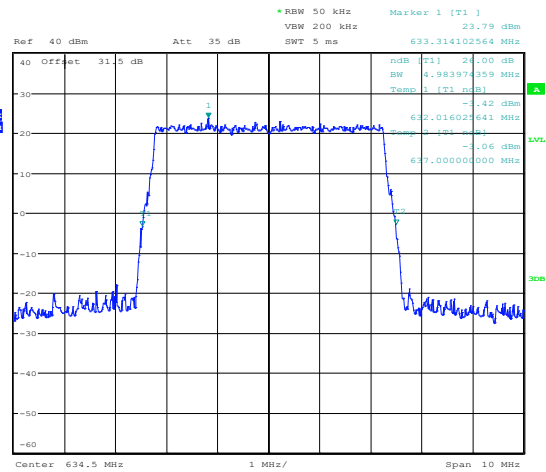


Figure 8.6-22: 26 dB EBW at the output antenna port 1 of the EUT at AGC threshold + 3 dB, mid channel

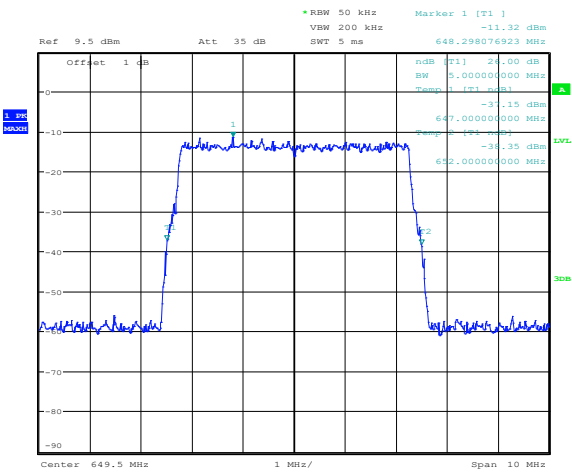


Figure 8.6-23: 26 dB EBW at the input of the EUT at AGC threshold + 3 dB, high channel

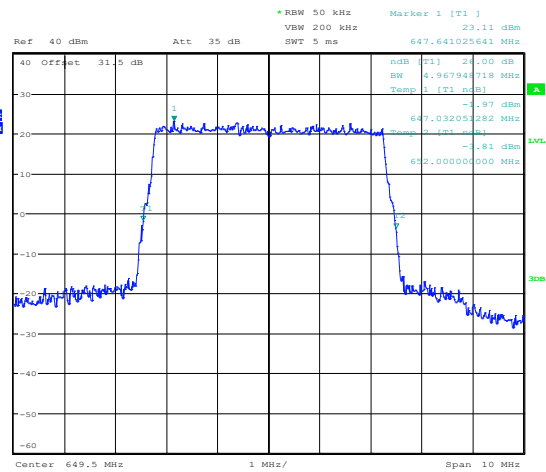


Figure 8.6-24: 26 dB EBW at the output antenna port 1 of the EUT at AGC threshold + 3 dB, high channel

Section 8

Test name

Specification

Testing data
 Part 2.1049 and KDB 935210 Clause 3.4 Occupied bandwidth: input versus output signal comparison
 FCC Part 2 and 935210 D05 Indus Booster Basic Meas v01r02



8.6.4 Test data, continued

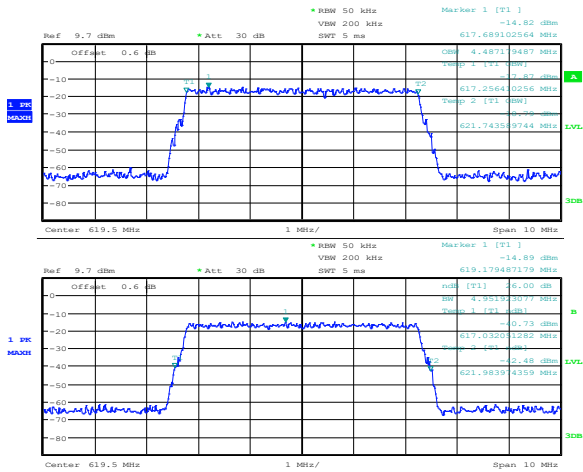


Figure 8.6-25: 99% OBW/26 dB EBW at the input of the EUT at AGC threshold, low channel

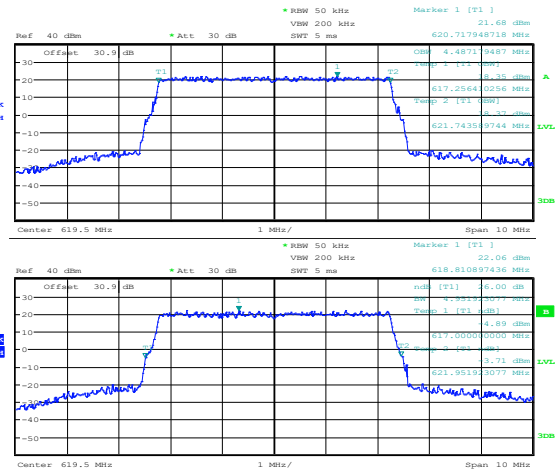


Figure 8.6-26: 99% OBW/26 dB EBW at the output antenna port 2 of the EUT at AGC threshold, low channel

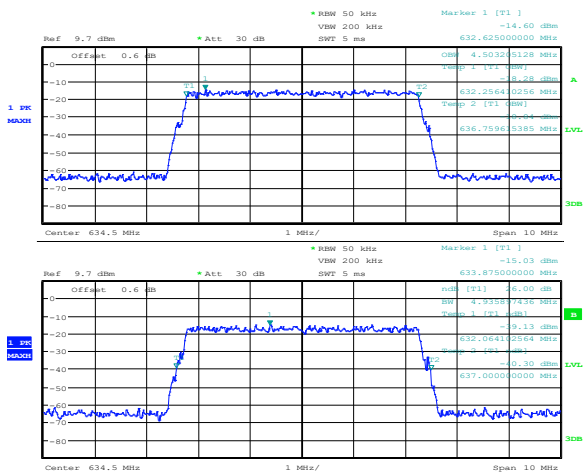


Figure 8.6-27: 99% OBW/26 dB EBW at the input of the EUT at AGC threshold, mid channel

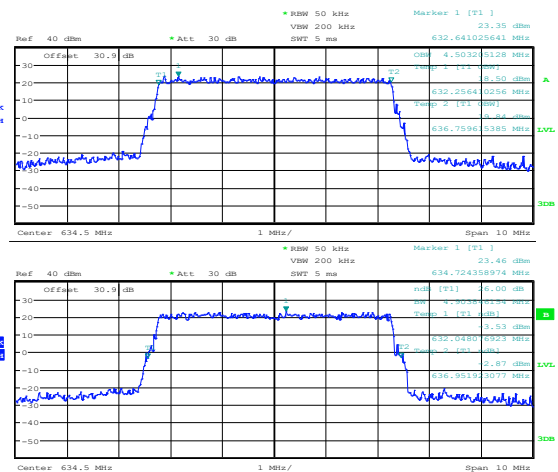


Figure 8.6-28: 99% OBW/26 dB EBW at the output antenna port 2 of the EUT at AGC threshold, mid channel

8.6.4 Test data, continued

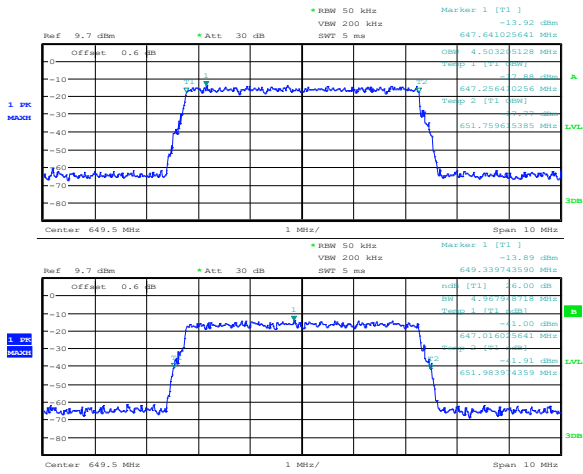


Figure 8.6-29: 99% OBW/26 dB EBW at the input of the EUT at AGC threshold, high channel

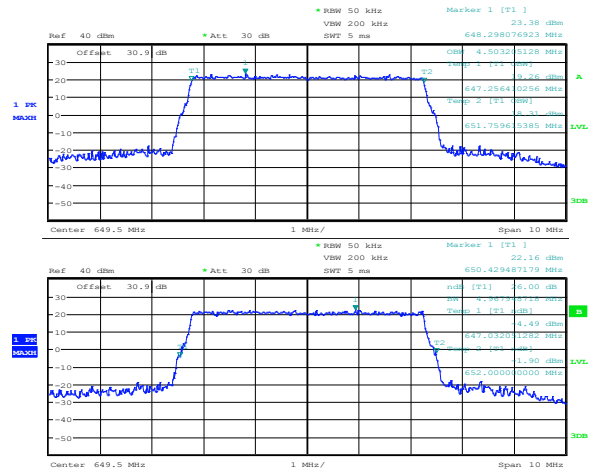


Figure 8.6-30: 99% OBW/26 dB EBW at the output antenna port 2 of the EUT at AGC threshold, high channel

8.6.4 Test data, continued

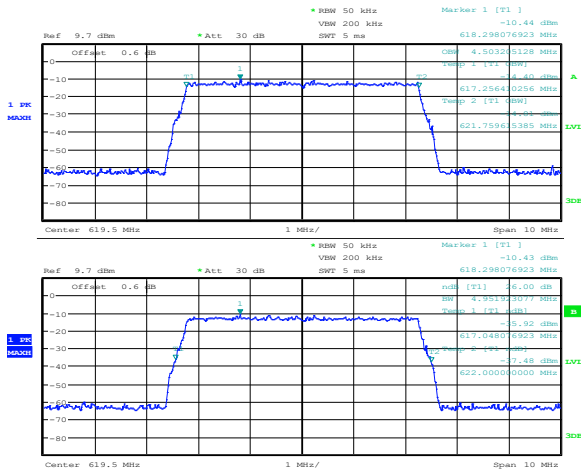


Figure 8.6-31: 99% OBW/26 dB EBW at the input of the EUT at AGC threshold + 3 dB, low channel

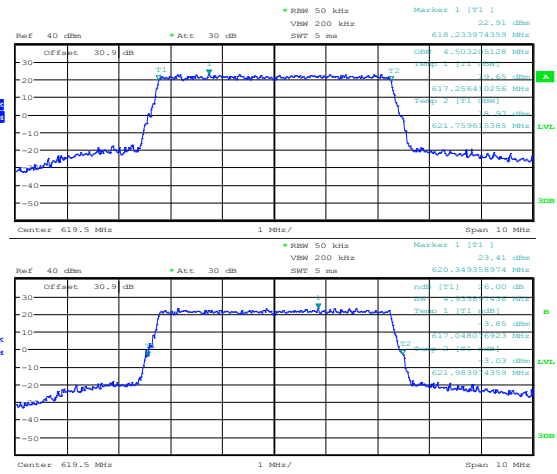


Figure 8.6-32: 99% OBW/26 dB EBW at the output antenna port 2 of the EUT at AGC threshold + 3 dB, low channel

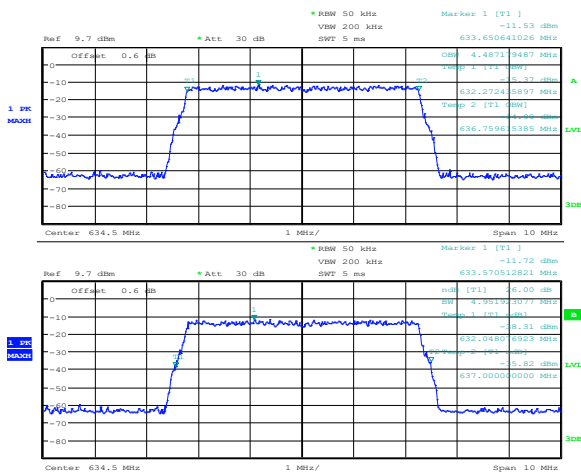


Figure 8.6-33: 99% OBW/26 dB EBW at the input of the EUT at AGC threshold + 3 dB, mid channel

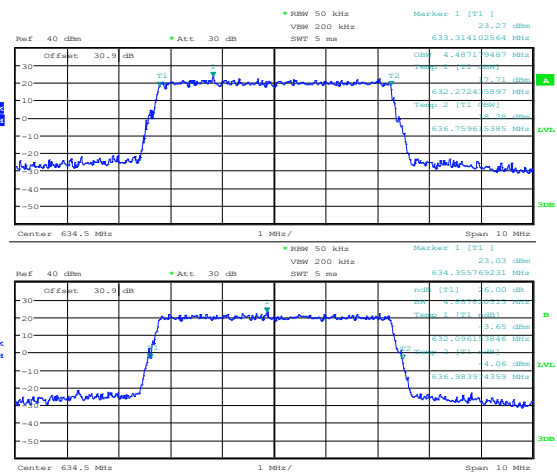


Figure 8.6-34: 99% OBW/26 dB EBW at the output antenna port 2 of the EUT at AGC threshold + 3 dB, mid channel

Section 8

Testing data

Test name

Part 2.1049 and KDB 935210 Clause 3.4 Occupied bandwidth: input versus output signal comparison

Specification

FCC Part 2 and 935210 D05 Indus Booster Basic Meas v01r02



8.6.4 Test data, continued

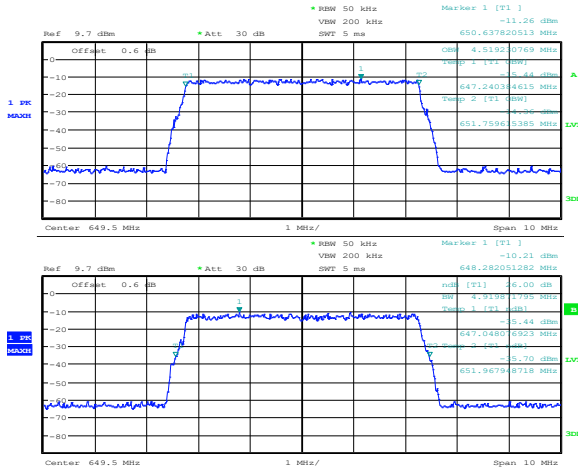


Figure 8.6-35: 99% OBW/26 dB EBW at the input of the EUT at AGC threshold + 3 dB, high channel

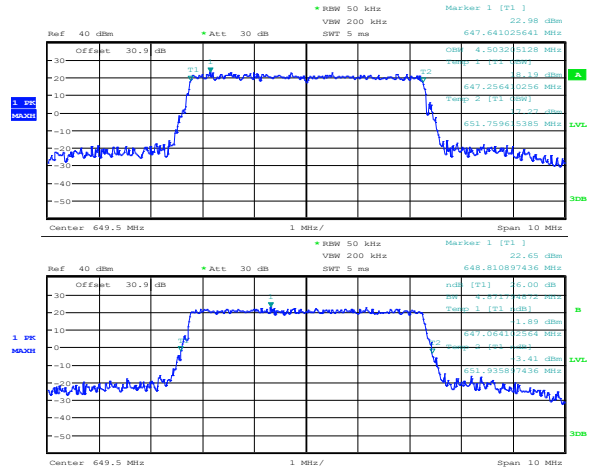


Figure 8.6-36: 99% OBW/26 dB EBW at the output antenna port 2 of the EUT at AGC threshold + 3 dB, high channel

Section 9. Setup Photos

9.1 Set-up



Figure 9.1-1: Radiated setup photo below 1 GHz



Figure 9.1-2: Radiated setup photo below 1 GHz

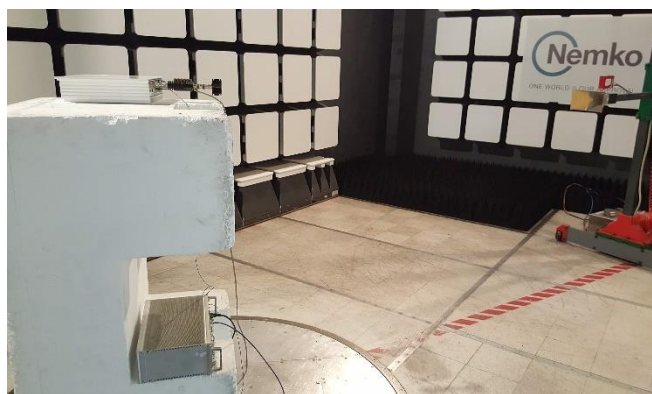


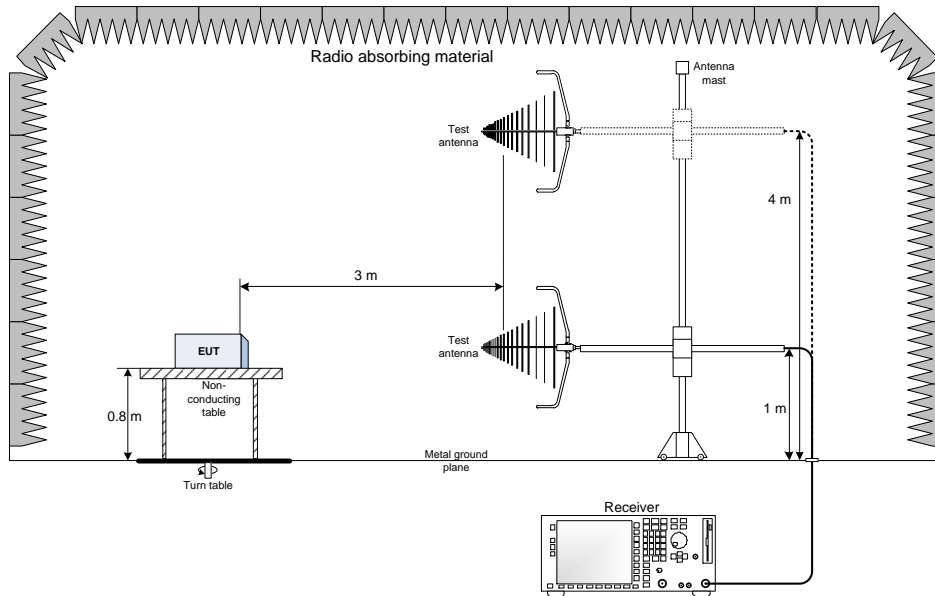
Figure 9.1-3: Radiated setup photo above 1 GHz



Figure 9.1-4: Radiated setup photo above 1 GHz

Section 10. Block diagrams of test set-ups

10.1 Radiated emissions set-up for frequencies below 1 GHz



10.2 Radiated emissions set-up for frequencies above 1 GHz

