

Test report

284168-10TRFWL

Date of issue: December 1, 2018

Applicant:

Deltanode Solutions AB

Product:

Cellular

Model:

DMR408

FCC ID: V5FDMR001

IC: 11014A-DMR001

Specifications:

FCC Part 22H, RSS-131 Issue 3, RSS-132 Issue 3

Lab and test locations

Company name	Nemko Canada Inc.			
Facilities	Ottawa site: 303 River Road Ottawa, Ontario Canada K1V 1H2	Montréal site: 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8	Toronto site: 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2	Almonte site: 1500 Peter Robinson Road West Carleton, Ontario Canada K0A 1L0
	Tel: +1 613 737 9680 Fax: +1 613 737 9691	Tel: +1 514 694 2684 Fax: +1 514 694 3528	Tel: +1 519 650 4811	Tel: +1 613 256-9117 Fax: +1 613 256-8848
	Test site registration	Organization FCC ISED	Recognition numbers and location CA2040 (Ottawa); Test Firm Registration Number: 175281 CA2040A-4 (Ottawa)	
Website	www.nemko.com			

Tested by	Kevin Rose, Wireless/EMC Specialist
Reviewed by	Russell Grant, Senior Technical Assessor
Date	December 1, 2018
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 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 Statement of compliance	4
1.4 Exclusions	4
1.5 Test report revision history	4
Section 2. Summary of test results	5
2.1 FCC Part 22H, RSS-131 Issue 3, RSS-132 Issue 3, 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 D05 3.2, Measuring AGC threshold level	12
8.2 RSS-131 5.2.1, KDB 935210 D05 3.3, Out-of-band-rejection	14
8.3 RSS-131 5.2.2, KDB 935210 D05 3.4, Input-versus-output signal comparison	17
8.4 FCC 22.913(a)(d), RSS-131 5.2.3, RSS-132 5.4, KDB 935210 D05 3.5, Mean output power and amplifier/booster gain	22
8.5 FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.2, Out-of-band/out-of-block emissions conducted measurements	27
8.6 FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.3, Spurious emissions conducted measurements	36
8.7 FCC 22.917(a) RSS-132 5.5, KDB 935210 D05 3.8, Spurious emissions radiated measurements	39
Section 9. Setup Photos	41
9.1 Set-up	41
Section 10. Block diagrams of test set-ups	42
10.1 Measuring AGC threshold level, Out-of-band-rejection, Input-versus-output signal comparison, Mean output power and amplifier/booster gain, Spurious emissions conducted measurements, Spurious emissions radiated measurements	42
10.2 Out-of-band/out-of-block emissions conducted measurements	42
10.3 Spurious emissions radiated measurements	43
10.4 Spurious emissions radiated measurements (above 1GHz)	44

Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Deltanode Solutions AB
Address	Hammarby Fabriksvag 61
City	Stockholm
Province/State	
Postal/Zip code	SE-120 30
Country	Sweden

1.2 Test specifications

FCC Part 22H	Cellular Radiotelephone Service
935210 D05 Indus Booster Basic Meas v01r02	MEASUREMENTS GUIDANCE FOR INDUSTRIAL AND NON-CONSUMER SIGNAL BOOSTER, REPEATER, AND AMPLIFIER DEVICES
RSS-131 Issue 3	Zone Enhancers
RSS-132 Issue 3	Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz

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 22H, RSS-131 Issue 3, RSS-132 Issue 3, test results

KDB 935210 D05 3.2	Measuring AGC threshold level	Reported
RSS-131 5.2.1, KDB 935210 D05 3.3	Out-of-band-rejection	Pass
RSS-131 5.2.2, KDB 935210 D05 3.4	Input-versus-output signal comparison	Pass
FCC 22.913(a)(d), RSS-131 5.2.3, RSS-132 5.4, KDB 935210 D05 3.5	Mean output power and amplifier/booster gain	Pass
FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.2,	Out-of-band/out-of-block emissions conducted measurements	Pass
FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.3	Spurious emissions conducted measurements	Pass
FCC 22.355, RSS-131 5.2.4, RSS-132 5.3, KDB 935210 D05 3.7	Frequency stability measurements	N/A ¹
FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.8	Spurious emissions radiated measurements	Pass

Notes: ¹The signal booster does not alter the input signal in any way.

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	November 8, 2018
Nemko sample ID number	NEX 284168 - 1

3.2 EUT information

Product name	Cellular
Model	DMR408
Serial number	10667

3.3 Technical information

Operating band	824 – 849 / 869 – 894 MHz
Modulation type	GSM, CDMA, LTE
Channel Spacing	Standard
Power requirements	110 V _{AC} , ~3 A for entire system tested
Emission designator	200KGXW, 1M25F9W, 5M00F9W, 1M40D7W, 3M00D7W, 5M00D7W, and 10M0D7W
Gain	80 dB
Antenna information	External Antenna is not provided EUT used a 50 Ω termination.

3.4 Product description and theory of operation

Off air high power repeater 25 dBm of output power on DL, 25dBm of output power on UL, 80 dB gain in both DL and UL

3.5 EUT exercise details

The EUT was controlled via a Laptop interface with GUI to configure the system. The EUT uses set channels Bandwidths user settable to a maximum of 15 MHz.

3.6 EUT setup diagram

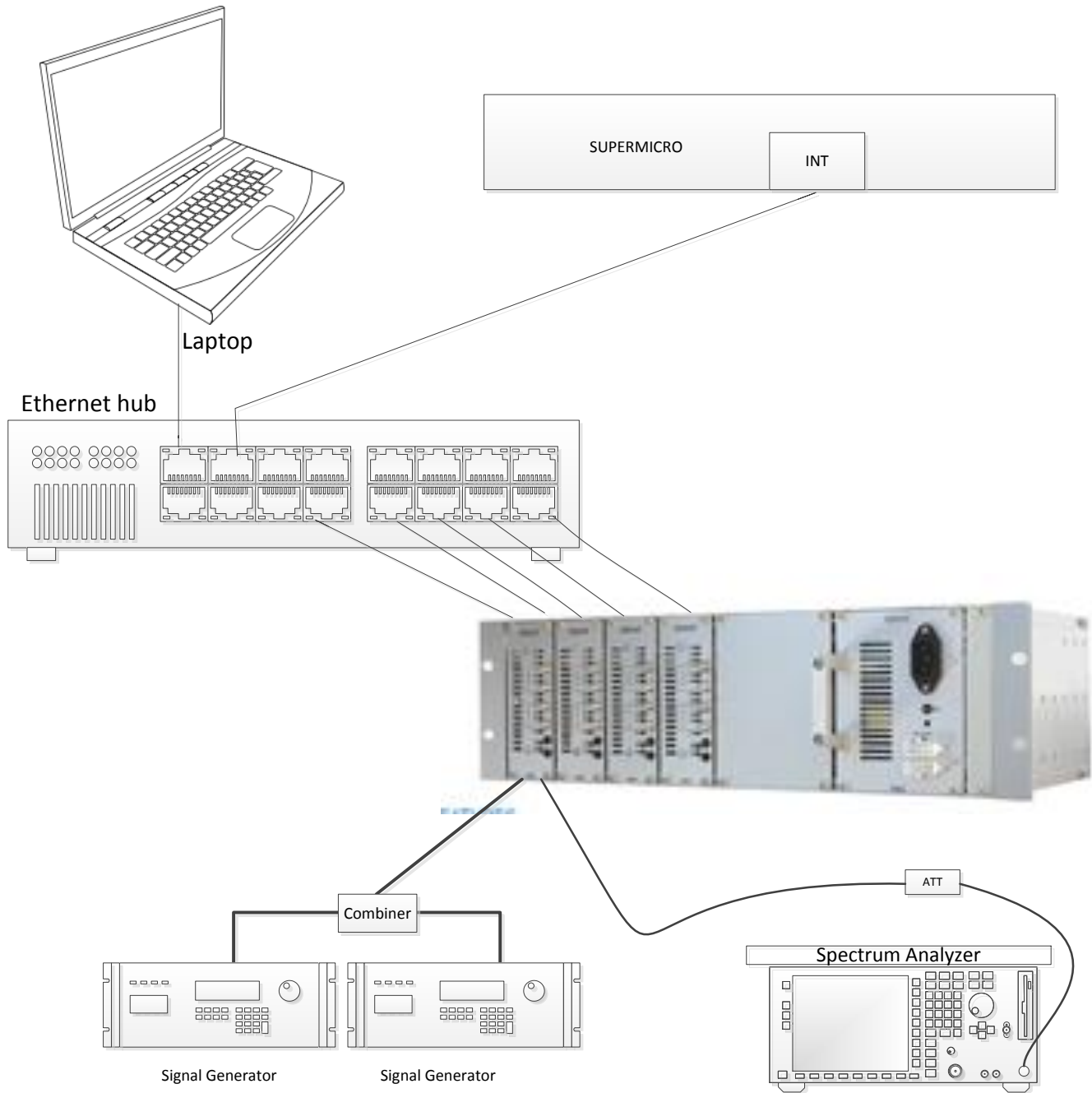


Figure 3.6-1: Setup diagram

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 $\pm 5\%$, 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.	Serial no.	Asset no.	Cal./Ver. cycle	Next cal./ver.
3 m EMI test chamber	TDK	SAC-3		FA003012	1 year	Aug. 22/19
Flush mount turntable	SUNAR	FM2022		FA003006	—	NCR
Controller	SUNAR	SC110V	050118-1	FA002976	—	NCR
Antenna mast	SUNAR	TLT2	042418-5	FA003007	—	NCR
AC Power source	Chroma			FA003020	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	101367	FA002969	1 year	Jan. 30/19
Spectrum analyzer	Rohde & Schwarz	FSW43	104437	FA002971	1 year	Mar. 16/19
Horn antenna (1–18 GHz)	ETS-Lindgren	3117	00052793	FA002911	1 year	Aug. 16/19
Preamp (1–18 GHz)	ETS-Lindgren	124334	00224880	FA002956	1 year	Sept 18/19
Bilog antenna (30–2000 MHz)	SUNAR	JB1	A053018-1	FA003009	1 year	Sept. 6/19
Vector Signal Generator	Rohde & Schwarz	SMW200A	101857	FA002970	1 year	Feb. 2/19

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

Section 8. Testing data

8.1 KDB 935210 D05 3.2, Measuring AGC threshold level

8.1.1 Definitions and limits

The AGC threshold is the input power at which a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output power.

8.1.2 Test summary

Test date	November 7, 2018	Temperature	22 °C
Test engineer	Kevin Rose	Air pressure	1003 mbar
Verdict	Pass	Relative humidity	33 %

8.1.3 Observations, settings and special notes

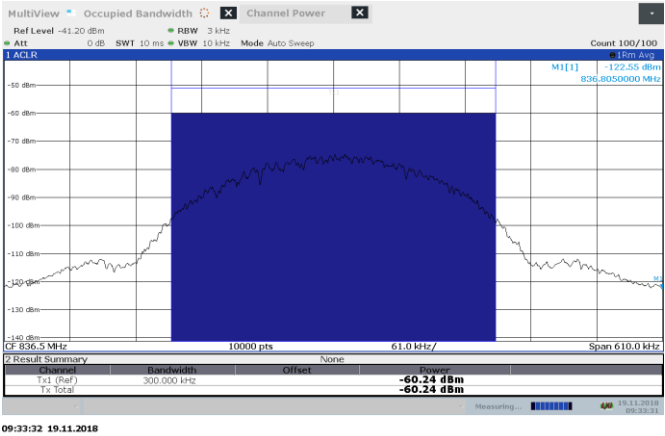
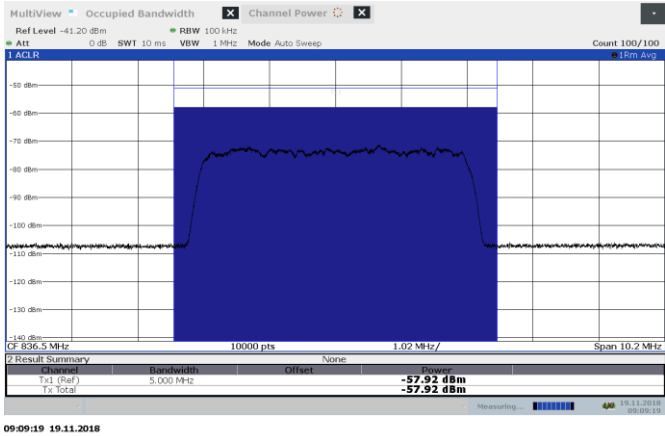
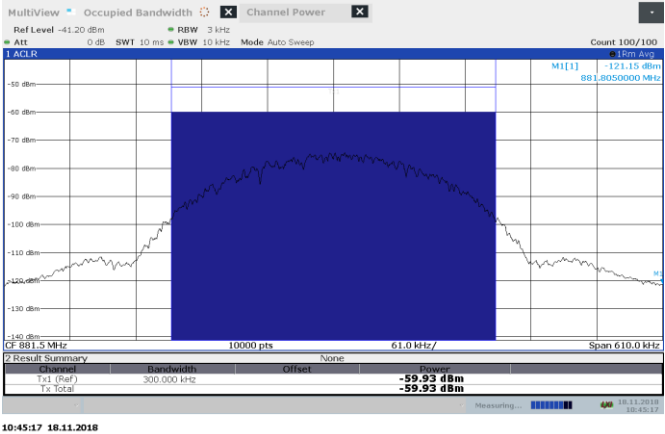
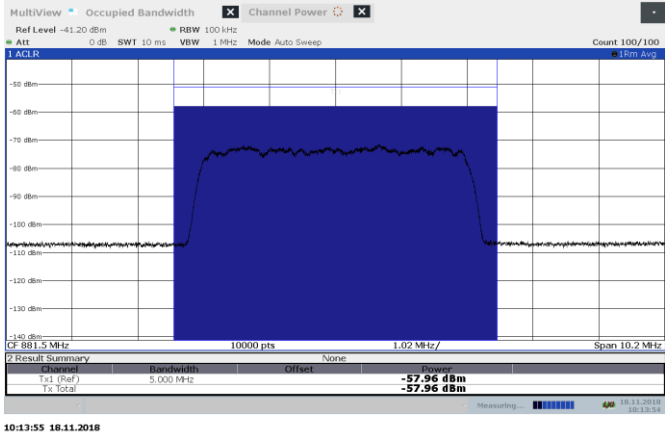
Test receiver settings:

Detector mode	RMS (for average), Peak (for peak)
Resolution bandwidth	20 kHz
Integration bandwidth	>OBW
Video bandwidth	>RBW
Trace mode	Power Average (for average), Max Hold (for peak)
Measurement time	Auto

8.1.4 Test data

Table 8.1-1: AGC Threshold

Modulation	Frequency, MHz	RF input power AVG, dBm
AWGN	881.5	-57.96
MSK	881.5	-59.93
AWGN	836.5	-57.92
MSK	836.5	-60.24



8.2 RSS-131 5.2.1, KDB 935210 D05 3.3, Out-of-band-rejection

8.2.1 Definitions and limits

The gain-versus-frequency response and the 20 dB bandwidth of the zone enhancer shall be reported. The zone enhancer shall reject amplification of other signals outside the passband of the zone enhancer.

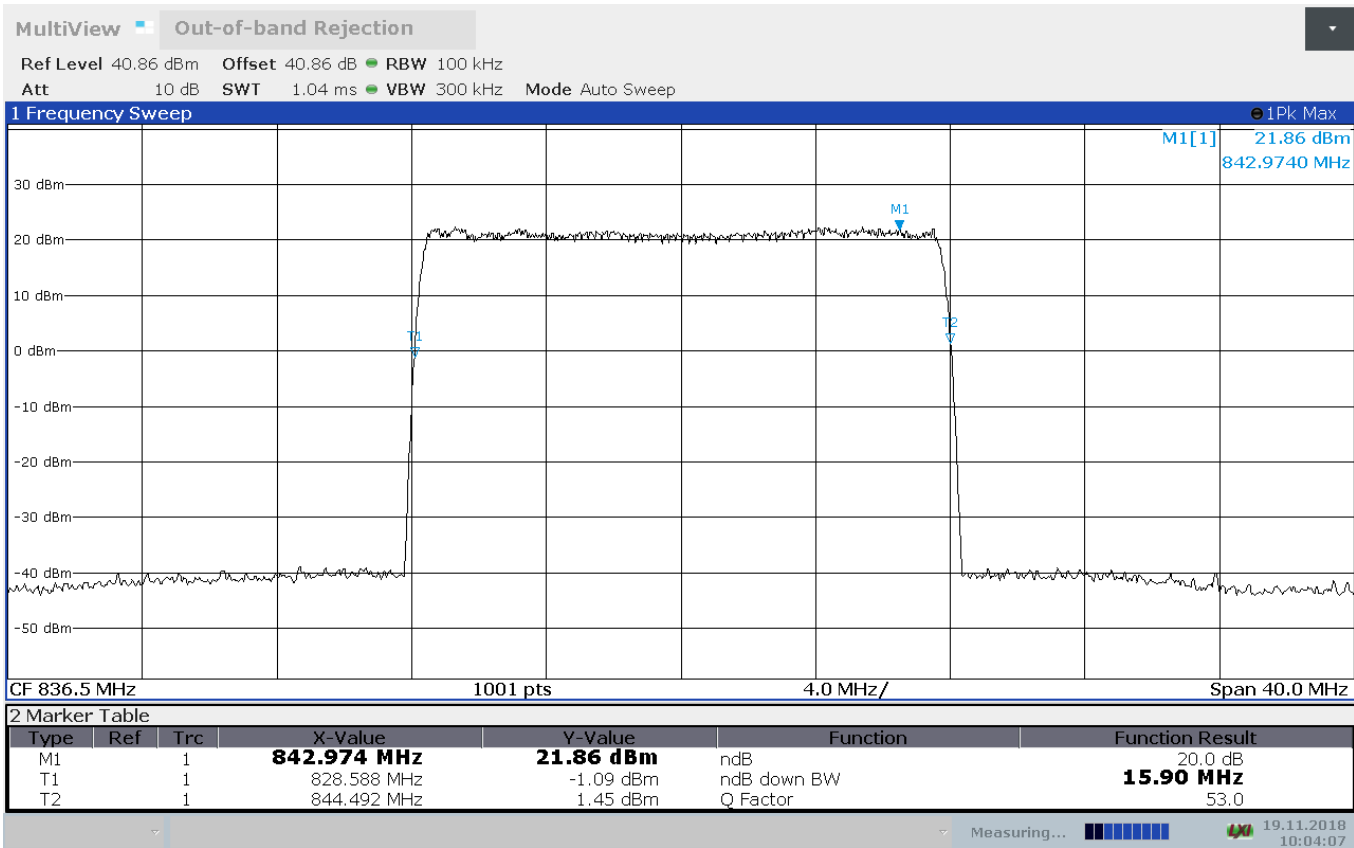
8.2.2 Test summary

Test date	November 7, 2018	Temperature	21 °C
Test engineer	Kevin Rose	Air pressure	1000 mbar
Verdict	Pass	Relative humidity	42 %

8.2.3 Observations, settings and special notes

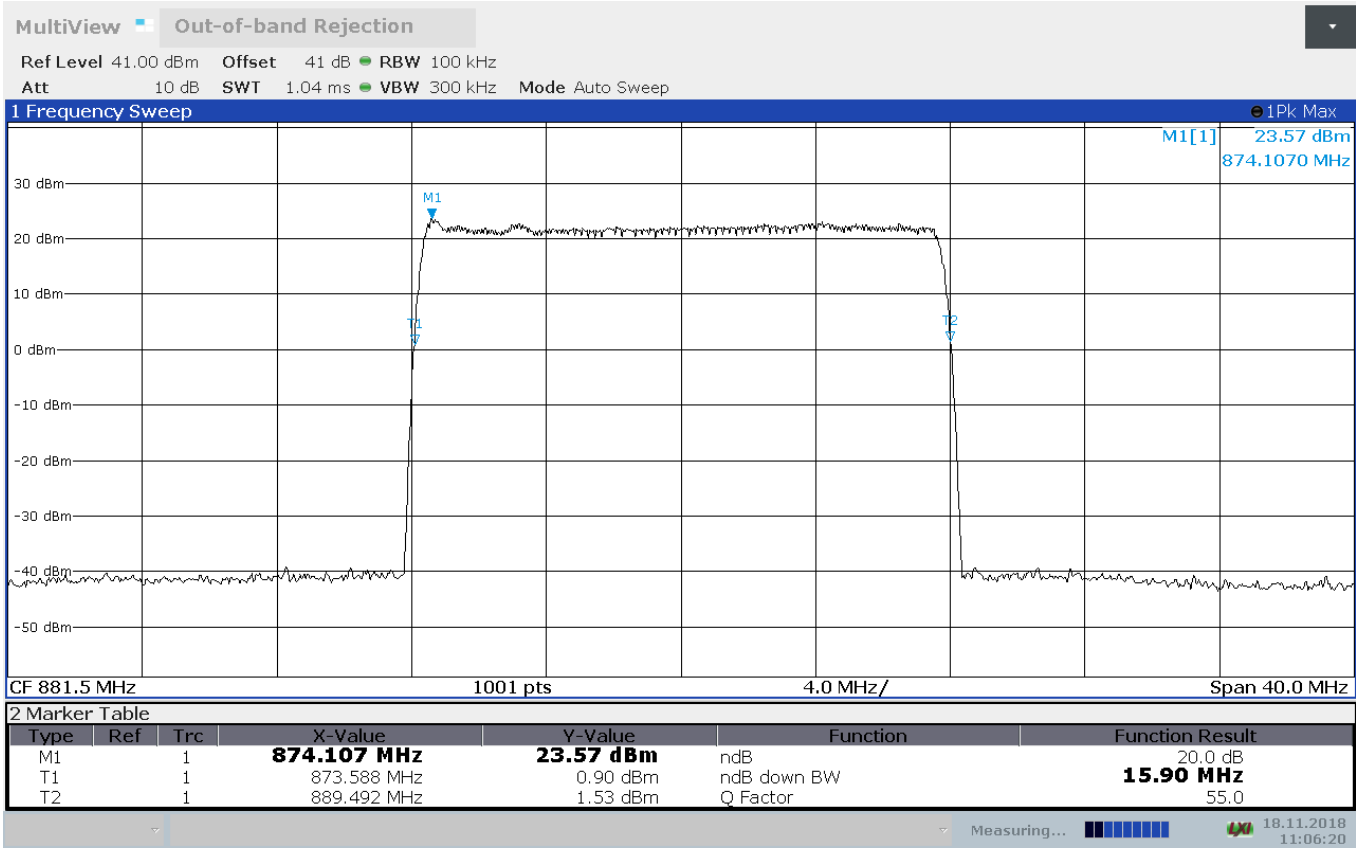
Frequency range	30 MHz to 10 th harmonic
Detector mode	Peak
Resolution bandwidth sweep	100 kHz (below 1 GHz), 1000 kHz (above 1 GHz)
Video bandwidth	>RBW
Trace mode	Max Hold
Measurement time	Auto

8.2.4 Test data



10:04:07 19.11.2018

Figure 8.2-1: Passband UL



11:06:21 18.11.2018

Figure 8.2-2: Passband DL

8.3 RSS-131 5.2.2, KDB 935210 D05 3.4, Input-versus-output signal comparison

8.3.1 Definitions and limits

The spectral growth of the 26 dB bandwidth of the output signal shall be less than 5% of the input signal spectrum.

A 26 dB bandwidth measurement shall be performed on the input signal and the output signal; alternatively, the 99% OBW can be measured and used.

8.3.2 Test summary

Test date	November 21, 2018	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1001 mbar
Verdict	Pass	Relative humidity	39 %

8.3.3 Observations, settings and special notes

Frequency range	250% of OBW
Detector mode	Peak
Resolution bandwidth	1 % to 5 % of the anticipated OBW
Video bandwidth	>RBW
Trace mode	Max Hold

8.3.4 Test data

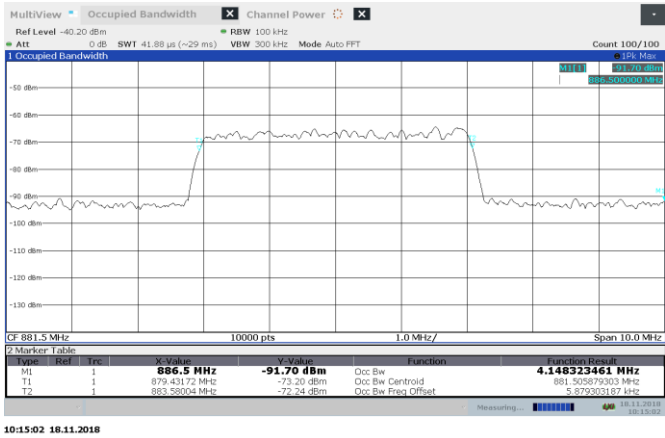


Figure 8.3-1: AWGN AGC -0.5 dB 881.5 MHz input 99% BW DL

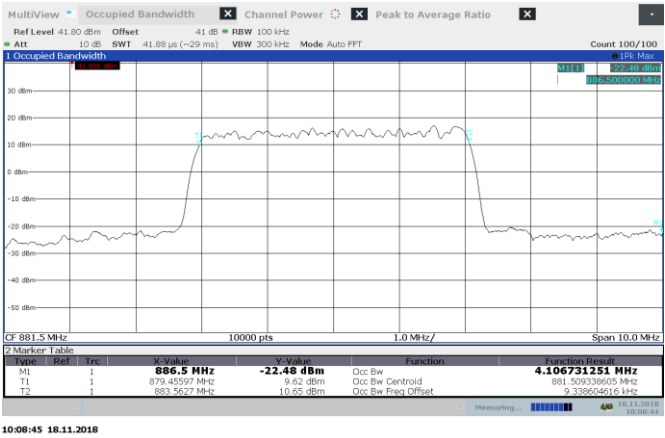


Figure 8.3-2: AWGN AGC -0.5 dB 881.5 MHz output 99% BW DL

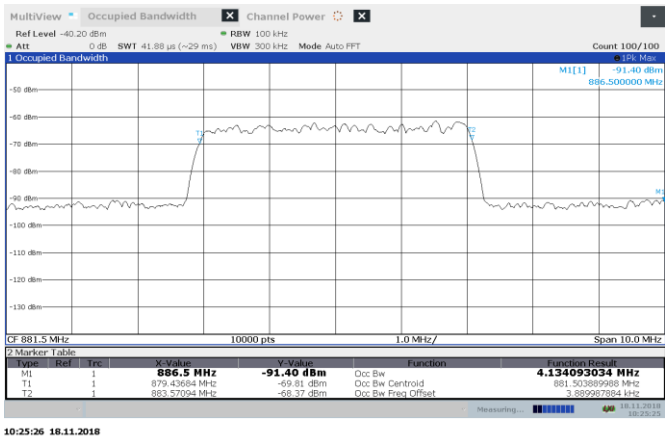


Figure 8.3-3: AWGN AGC +3dB 881.5 MHz input 99% BW DL

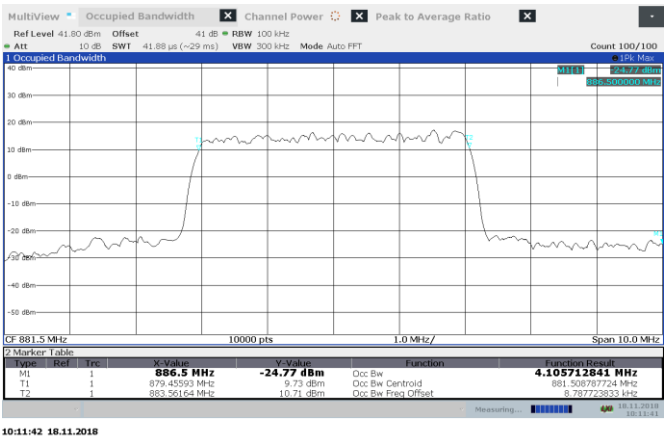


Figure 8.3-4: AWGN AGC +3dB 881.5 MHz output 99% BW DL

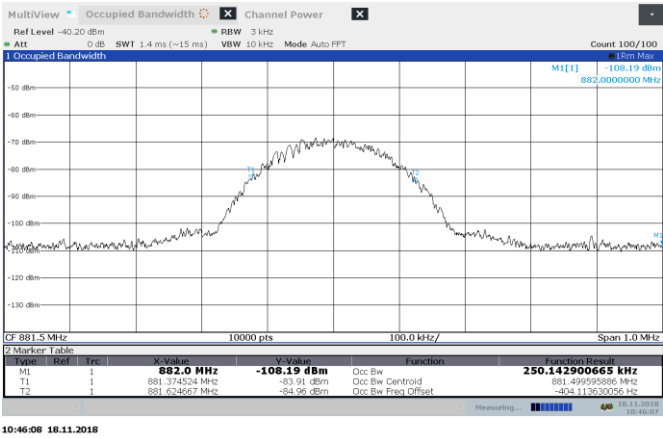


Figure 8.3-5: MSK AGC -0.5 dB 881.5 MHz input 99% BW DL

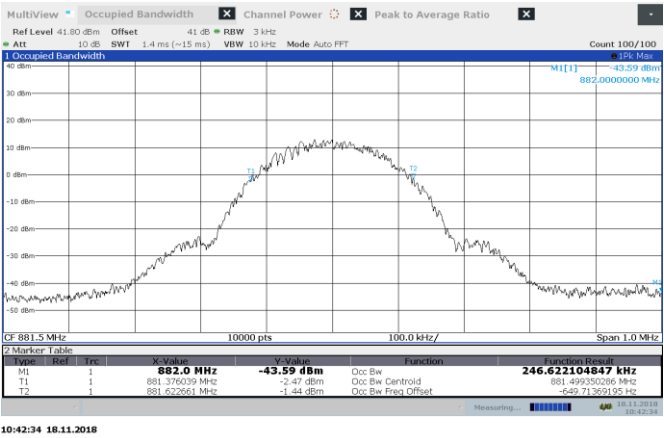


Figure 8.3-6: MSK AGC -0.5 dB 881.5 MHz output 99% BW DL

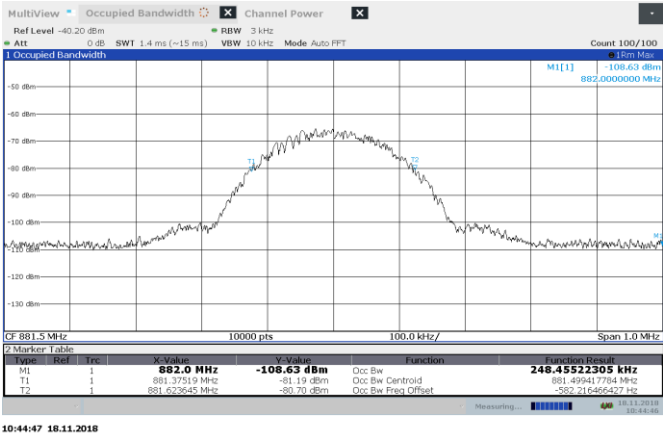


Figure 8.3-7: MSK AGC +3dB 881.5 MHz input 99% BW DL

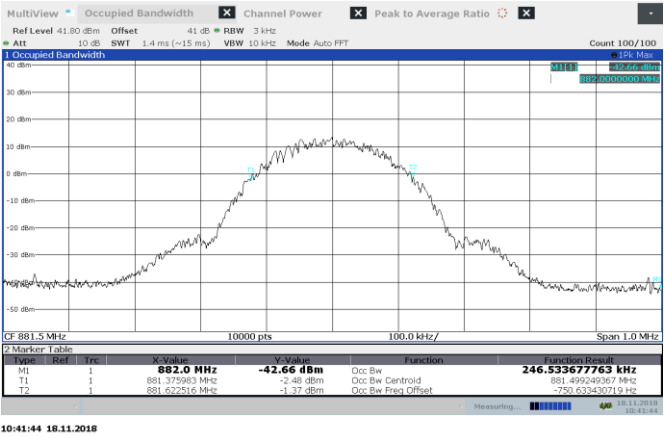


Figure 8.3-8: MSK AGC +3dB 881.5 MHz output 99% BW DL

Section 8
Test name
Specification

Testing data
Input-versus-output signal comparison
RSS-131 5.2.2, KDB 935210 D05 3.4

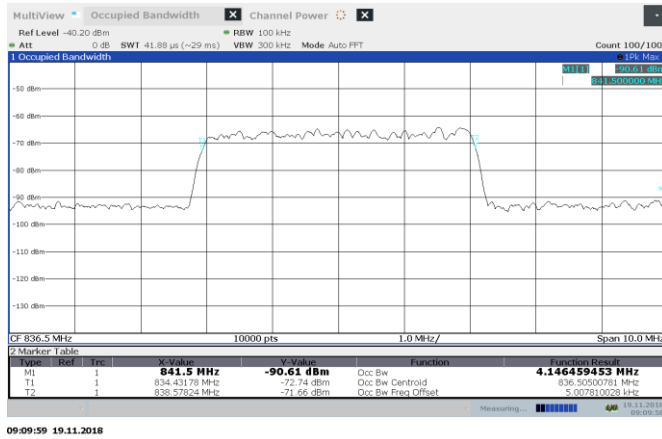


Figure 8.3-9: AWGN AGC -0.5 dB 836.5 MHz input 99% BW UL

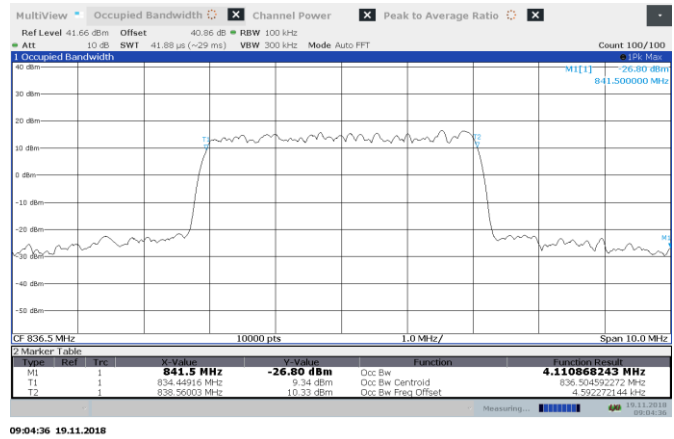


Figure 8.3-10: AWGN AGC -0.5 dB 836.5 MHz output 99% BW UL

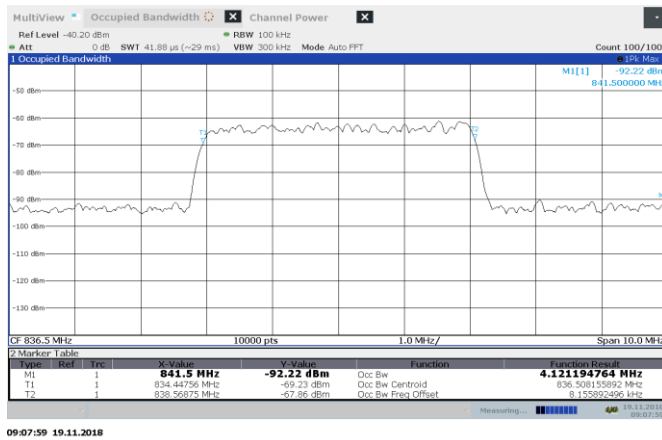


Figure 8.3-11: AWGN AGC +3dB 836.5 MHz input 99% BW UL

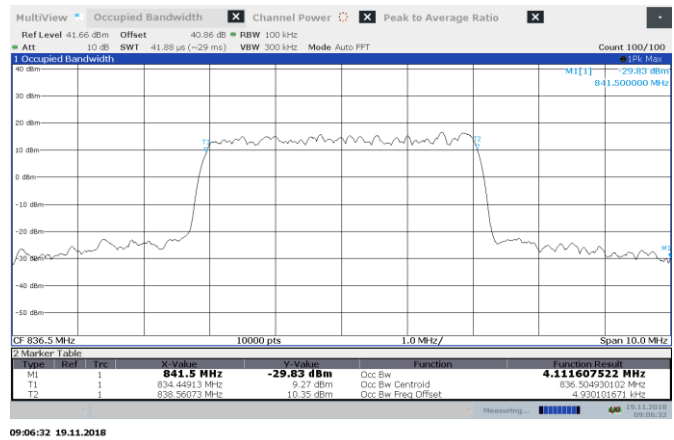
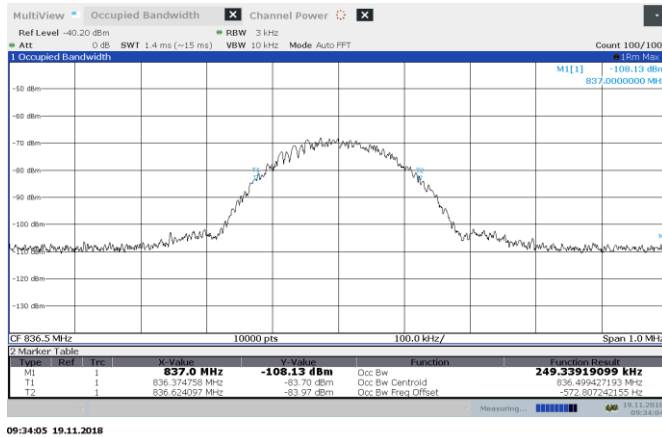


Figure 8.3-12: AWGN AGC +3dB 836.5 MHz output 99% BW UL

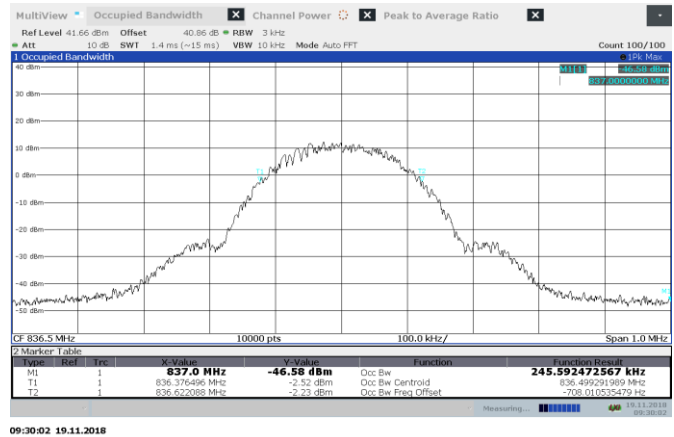
Section 8
Test name
Specification

Testing data
Input-versus-output signal comparison
RSS-131 5.2.2, KDB 935210 D05 3.4



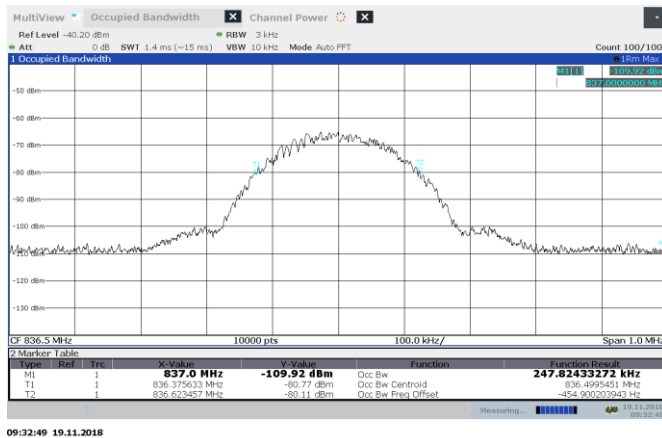
09:34:05 19.11.2018

Figure 8.3-13: MSK AGC -0.5 dB 881.5 MHz input 99% BW DL



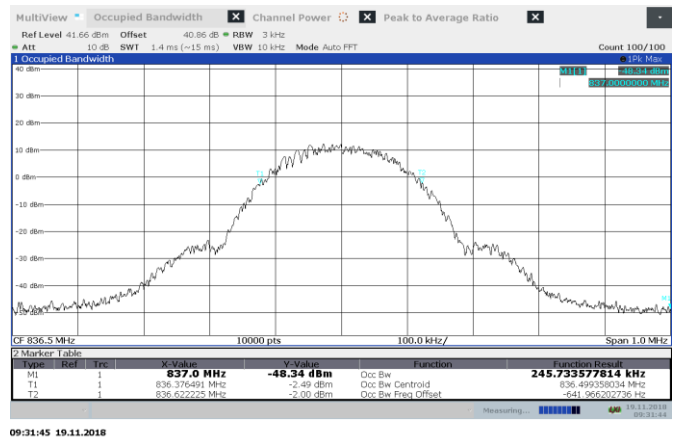
09:30:02 19.11.2018

Figure 8.3-14: MSK AGC -0.5 dB 881.5 MHz output 99% BW DL



09:32:49 19.11.2018

Figure 8.3-15: MSK AGC +3dB 881.5 MHz input 99% BW DL



09:31:45 19.11.2018

Figure 8.3-16: MSK AGC +3dB 881.5 MHz output 99% BW DL

8.4 FCC 22.913(a)(d), RSS-131 5.2.3, RSS-132 5.4, KDB 935210 D05 3.5, Mean output power and amplifier/booster gain

8.4.1 Definitions and limits

FCC 22.913

(a) High Density 500 W ERP, Low Density 1000 W ERP

(d) The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB

RSS-131 5.2.3

The zone enhancer gain shall not exceed the nominal gain by more than 1.0 dB. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point

RSS-132 5.4 refer to SRSP-503. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

8.4.2 Test summary

Test date	November 21, 2018	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1001 mbar
Verdict	Pass	Relative humidity	39 %

8.4.3 Observations, settings and special notes

Detector mode	RMS (for average), Peak (for peak)
Resolution bandwidth	100 kHz
Integration bandwidth	>OBW
Video bandwidth	>RBW
Trace mode	Power Average (for average), Max Hold (for peak)
Measurement time	Auto

Table 8.4-1: Output power results

Frequency, MHz	RF output power Peak, dBm
AWGN 881.5	23.81
Gain = 82.74dB	PAR = 6.72 dB
MSK 881.5	21.73
Gain = 82.48dB	PAR = 0.38 dB
AWGN 836.5	23.61
Gain = 82.57dB	PAR = 6.68 dB
MSK 836.5	21.62
Gain = 82.56dB	PAR = 0.62 dB

8.4.1 Test data

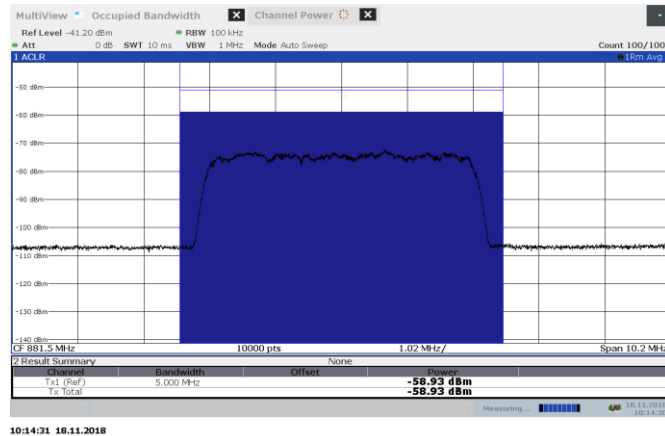


Figure 8.4-1: AWGN AGC—0.5 dB 881.5 MHz input DL

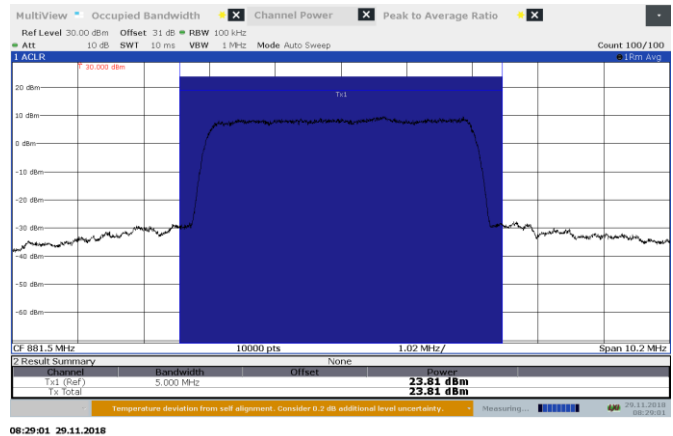


Figure 8.4-2: AWGN AGC—0.5 dB 881.5 MHz output DL

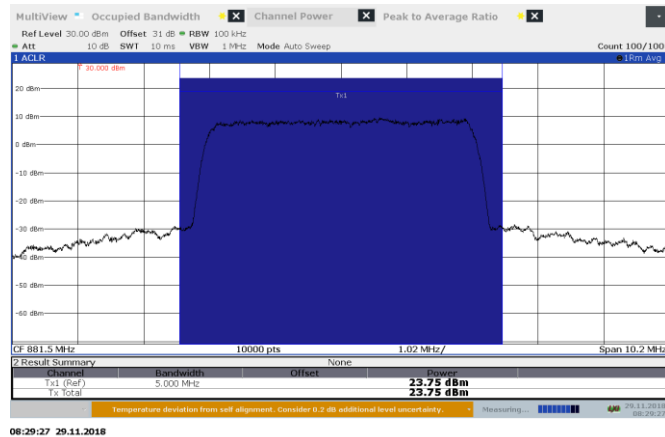


Figure 8.4-3: AWGN AGC +3dB 881.5 MHz output DL

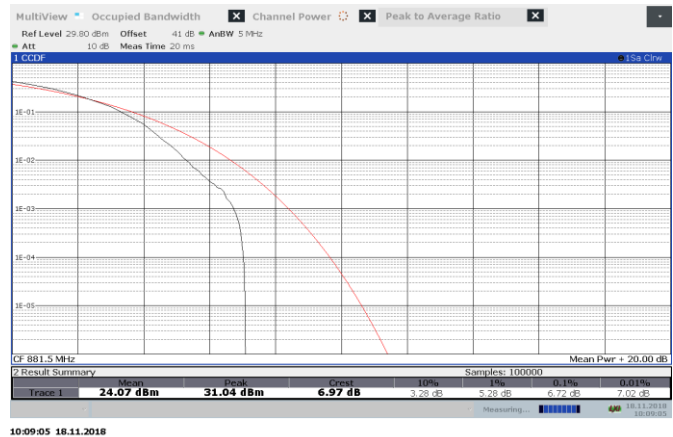


Figure 8.4-4: AWGN AGC —0.5 PAR 881.5 MHz DL

Section 8
Test name
Specification

Testing data
Mean output power and amplifier/booster gain
FCC 22.913(a)(d), RSS-131 5.2.3, RSS-132 5.4, KDB 935210 D05 3.5

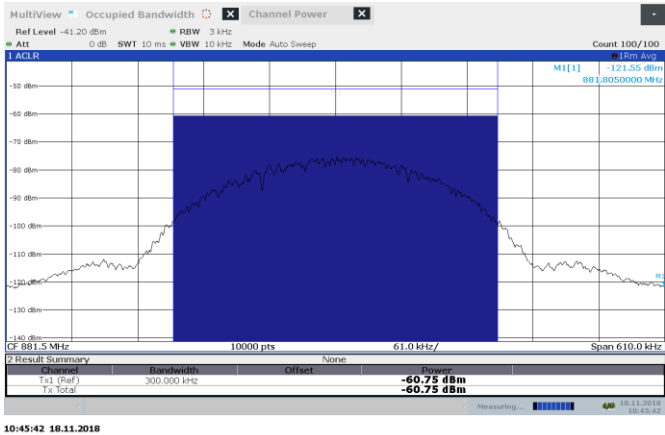


Figure 8.4-5: MSK AGC—0.5 dB 881.5 MHz input DL

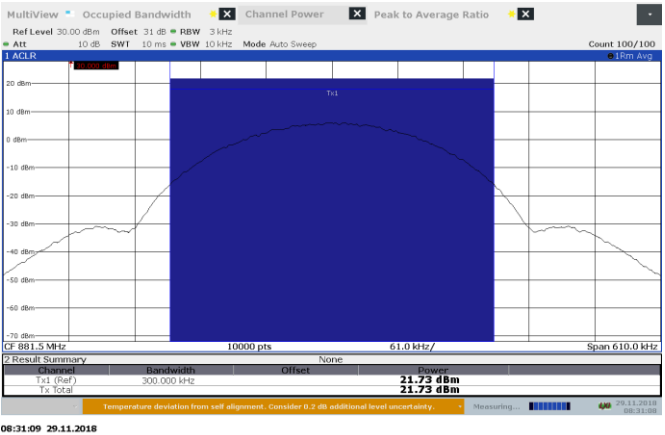


Figure 8.4-6: MSK AGC—0.5 dB 881.5 MHz output DL

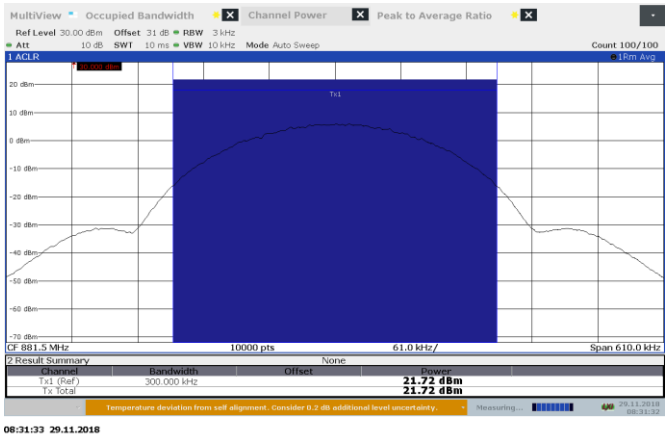


Figure 8.4-7: MSK AGC +3dB 881.5 MHz output DL

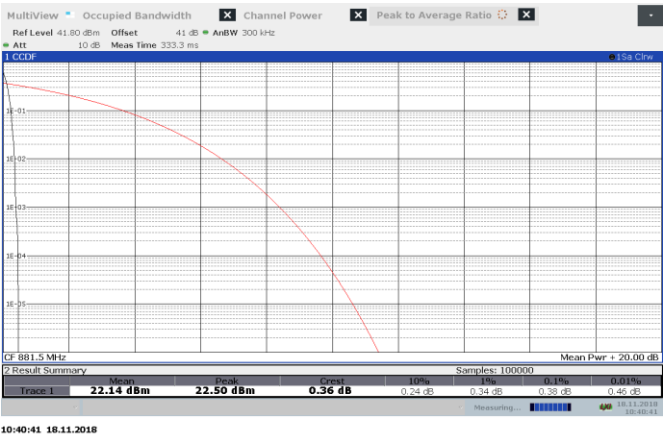


Figure 8.4-8: MSK AGC—0.5 dB 881.5 MHz PAR DL

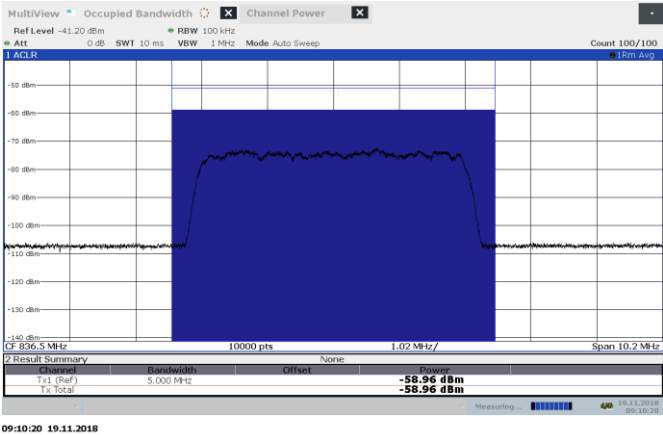


Figure 8.4-9: AWGN AGC—0.5 dB 836.5 MHz input UL

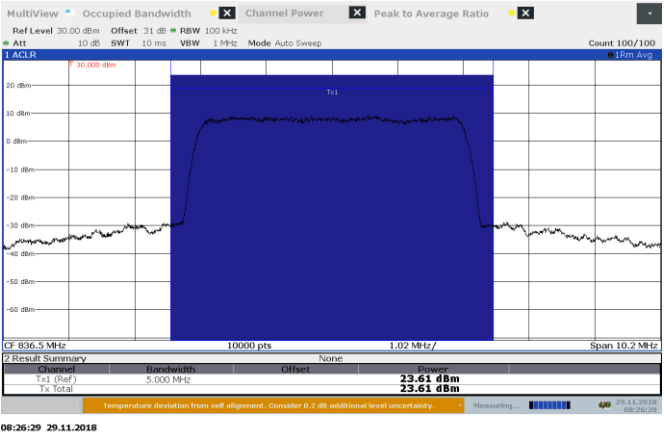


Figure 8.4-10: AWGN AGC—0.5 dB 836.5 MHz output UL

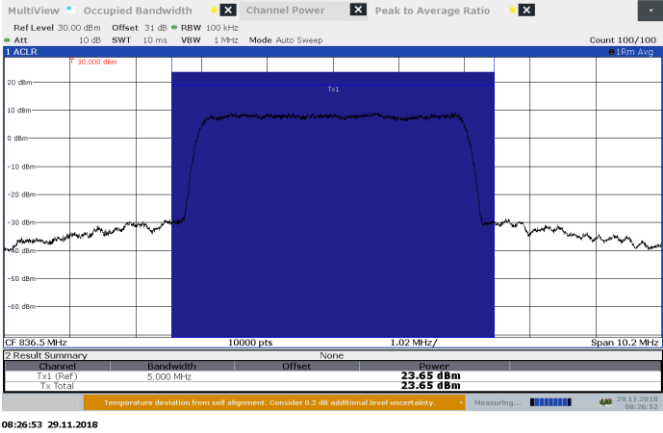


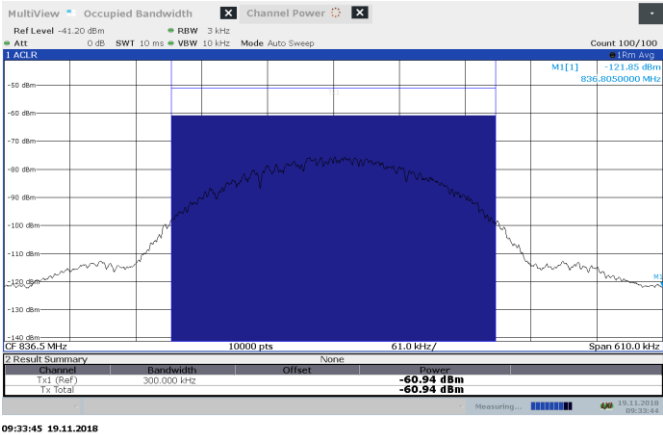
Figure 8.4-11: AWGN AGC +3dB 836.5 MHz output UL



Figure 8.4-12: AWGN AGC -0.5 PAR 836.5 MHz UL

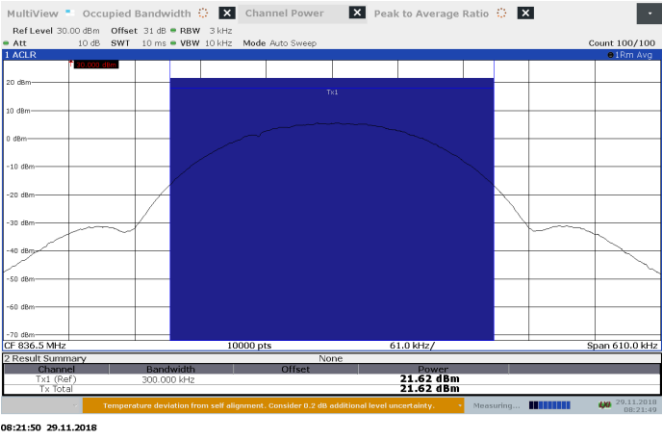
Section 8
Test name
Specification

Testing data
Mean output power and amplifier/booster gain
FCC 22.913(a)(d), RSS-131 5.2.3, RSS-132 5.4, KDB 935210 D05 3.5



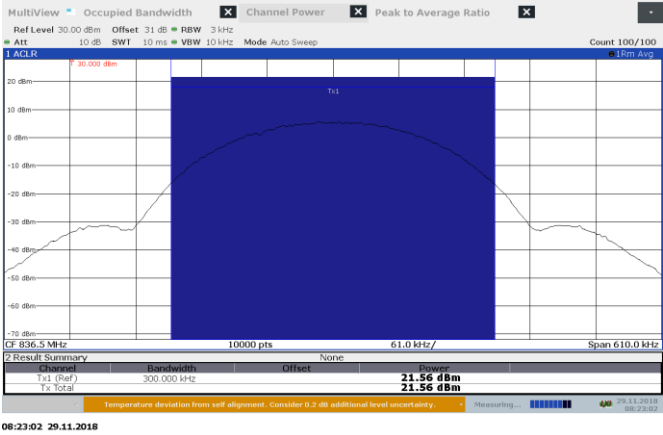
09:33:45 19.11.2018

Figure 8.4-13: MSK AGC—0.5 dB 836.5 MHz input UL



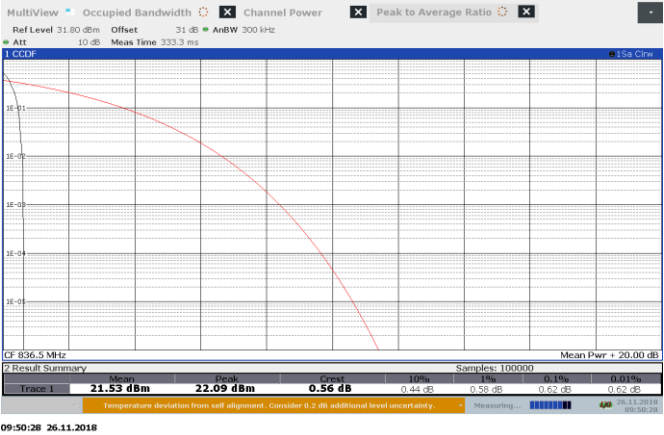
08:21:50 29.11.2018

Figure 8.4-14: MSK AGC—0.5 dB 836.5 MHz output UL



08:23:02 29.11.2018

Figure 8.4-15: MSK AGC +3dB 836.5 MHz output UL



09:50:28 26.11.2018

Figure 8.4-16: MSK AGC—0.5 dB 836.5 MHz PAR UL

8.5 FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.2, Out-of-band/out-of-block emissions conducted measurements

8.5.1 Definitions and limits

FCC 22.917(a) / RSS-132 5.5 The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB

8.5.2 Test summary

Test date	November 21, 2018	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1001 mbar
Verdict	Pass	Relative humidity	39 %

8.5.3 Observations, settings and special notes

Test receiver settings:

Detector mode	RMS
Resolution bandwidth	3 kHz
Integration bandwidth	>OBW
Video bandwidth	>RBW
Trace mode	Power Average (100 sweeps)
Measurement time	Auto

8.5.4 Test data

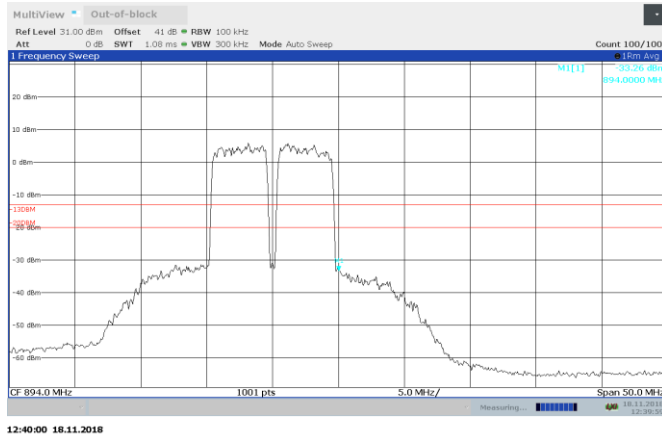


Figure 8.5-1: AWGN 886.5 and 891.5 MHz AGC - 0.5dB Out-of-block DL

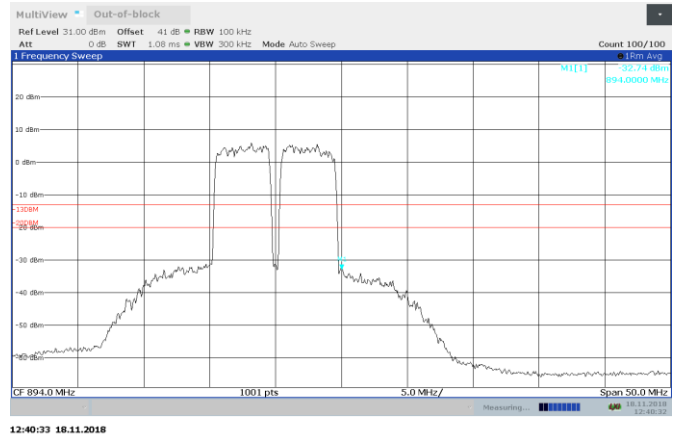


Figure 8.5-2: AWGN 886.5 and 891.5 MHz AGC +3dB Out-of-block DL

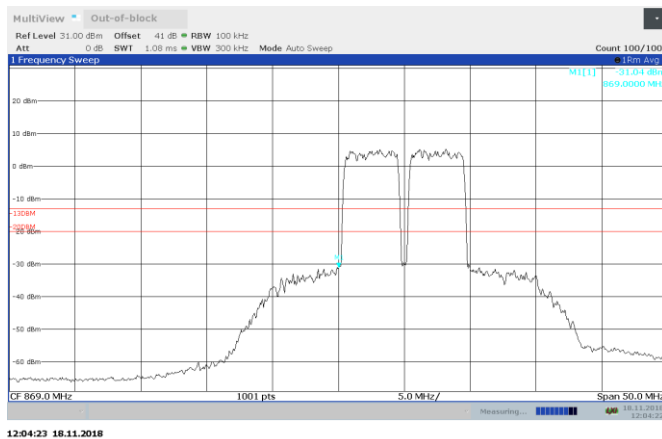


Figure 8.5-3: AWGN 871.5 and 876.5 MHz AGC - 0.5dB Out-of-block DL

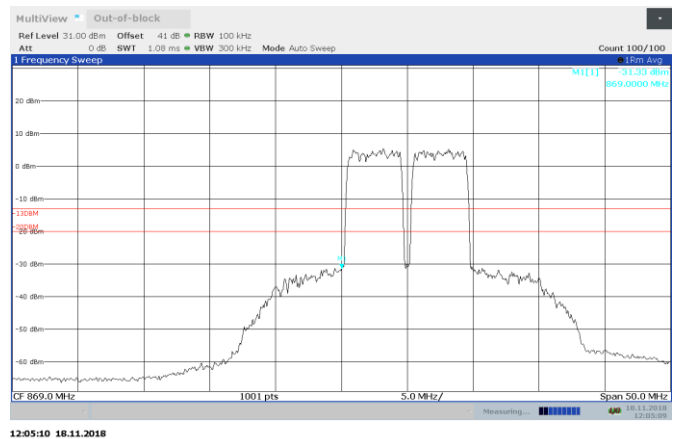


Figure 8.5-4: AWGN 871.5 and 876.5 MHz AGC +3dB Out-of-block DL

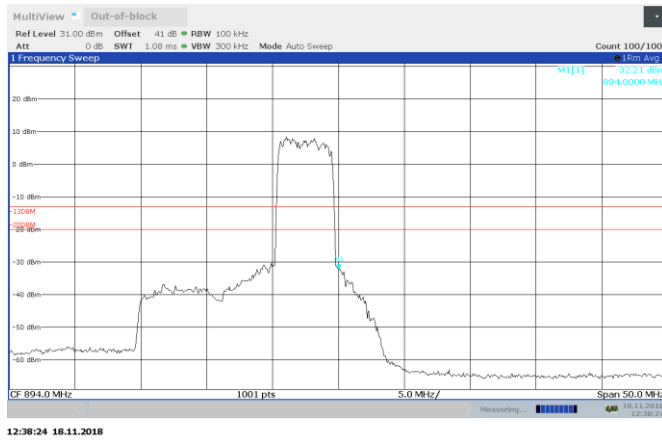


Figure 8.5-5: AWGN 891.5 MHz AGC - 0.5dB Out-of-block DL

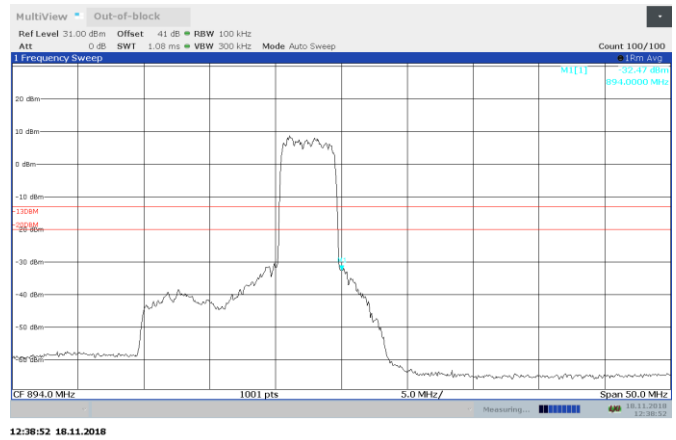


Figure 8.5-6: AWGN 891.5 MHz AGC+ 3dB Out-of-block DL

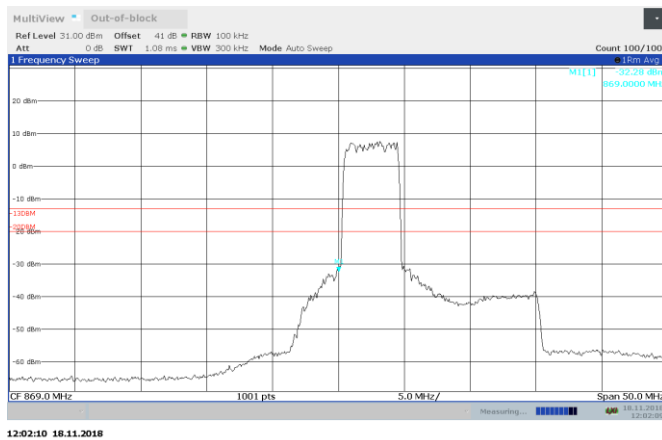


Figure 8.5-7: AWGN 871.5 MHz AGC - 0.5dB Out-of-block DL

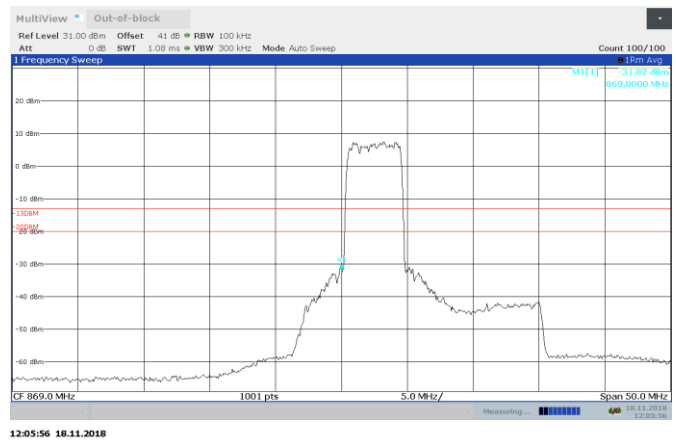


Figure 8.5-8: AWGN 871.5 MHz AGC + 3dB Out-of-block DL

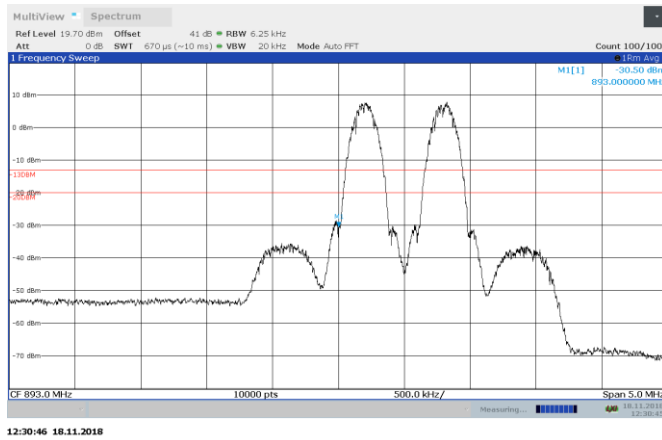


Figure 8.5-9: MSK 893.2 and 893.8 MHz AGC - 0.5dB Out-of-block DL

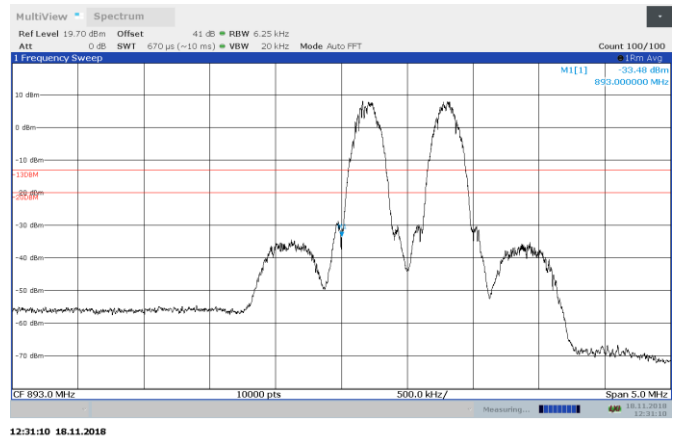


Figure 8.5-10: MSK 893.2 and 893.8 MHz AGC +3dB Out-of-block DL

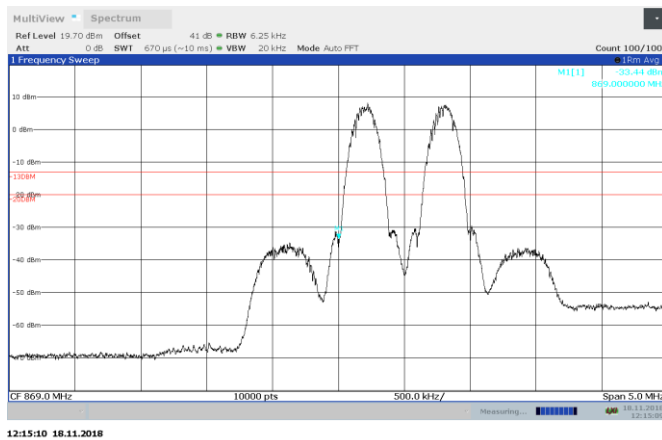


Figure 8.5-11: MSK 869.2 and 869.8 MHz AGC - 0.5dB Out-of-block DL

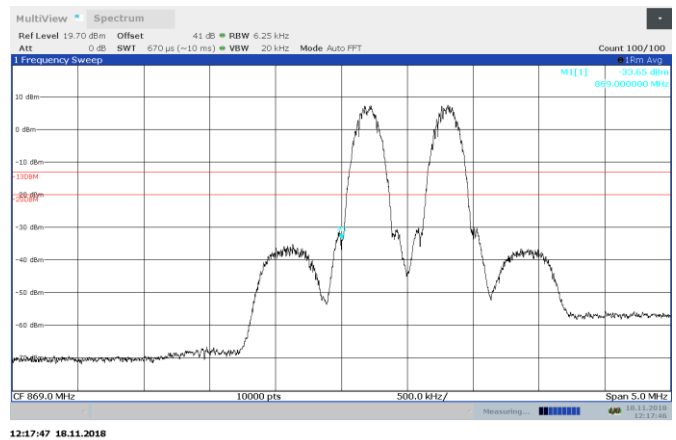


Figure 8.5-12: MSK 869.2 and 869.8 MHz AGC +3dB Out-of-block DL

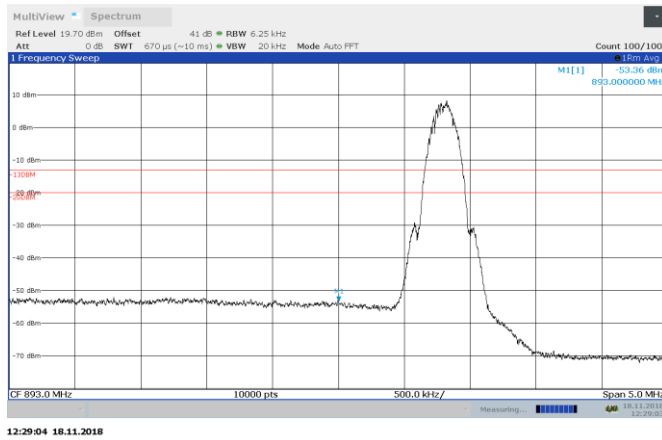


Figure 8.5-13: MSK 893.8 MHz AGC - 0.5dB Out-of-block DL

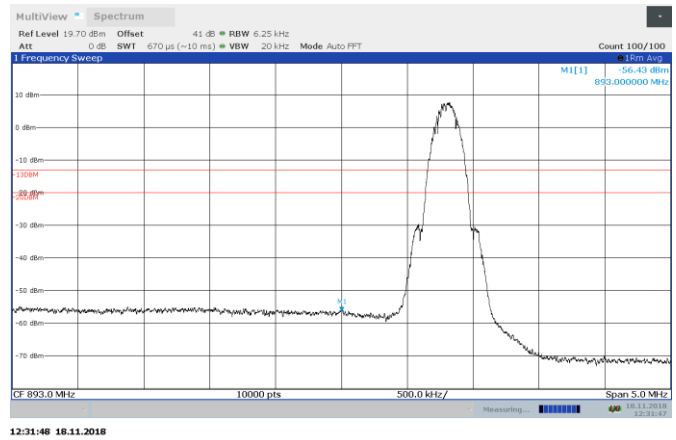


Figure 8.5-14: MSK 893.8 MHz AGC +3dB Out-of-block DL

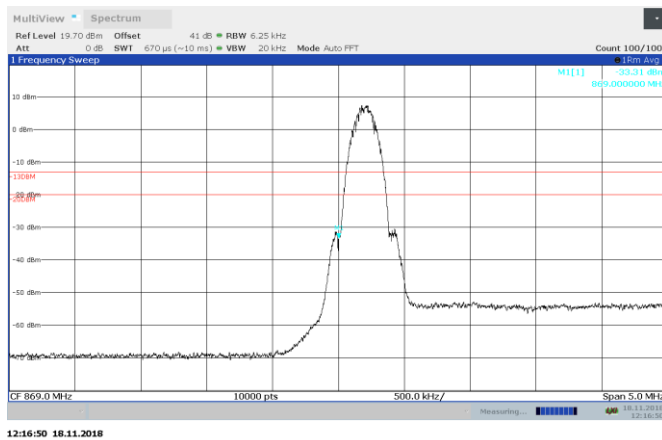


Figure 8.5-15: MSK 869.2 MHz AGC - 0.5dB Out-of-block DL

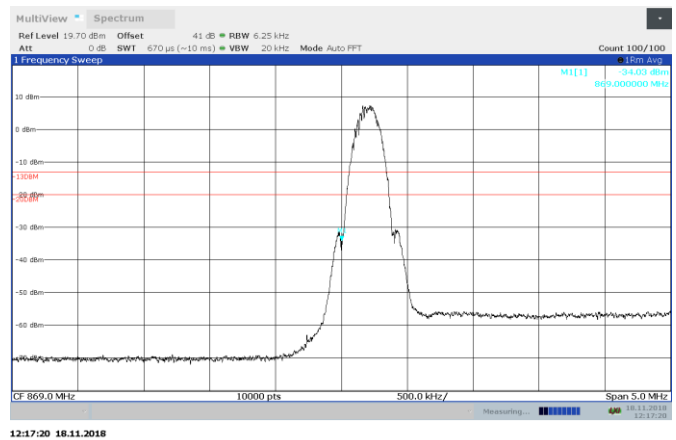


Figure 8.5-16: MSK 869.2 MHz AGC +3dB Out-of-block DL

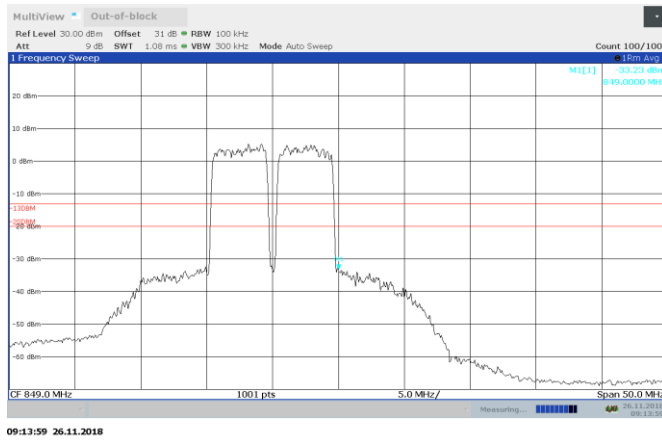


Figure 8.5-17: AWGN 841.5 and 846.5 MHz AGC - 0.5dB Out-of-block UL

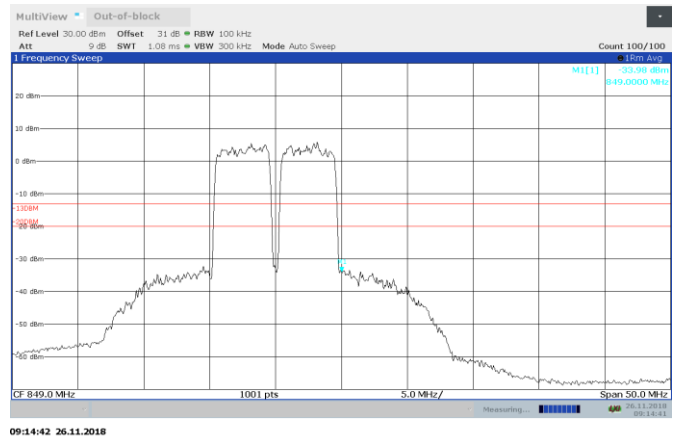


Figure 8.5-18: AWGN 841.5 and 846.5 MHz AGC + 3 dB Out-of-block UL

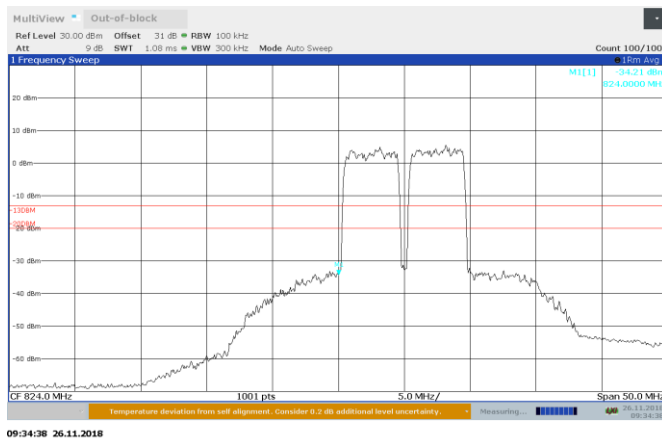


Figure 8.5-19: AWGN 826.5 and 831.5 MHz AGC - 0.5dB Out-of-block UL

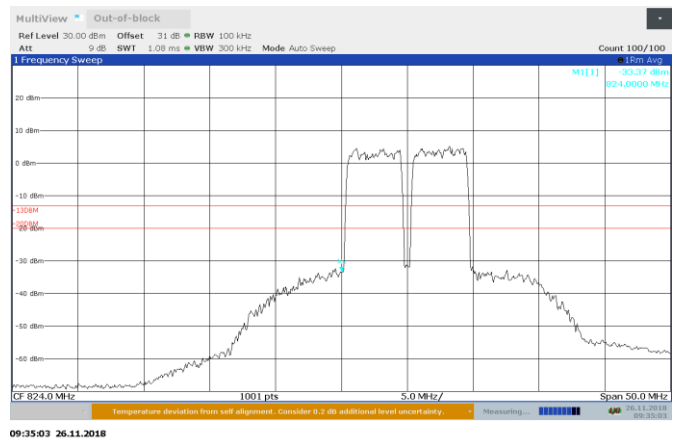


Figure 8.5-20: AWGN 826.5 and 831.5 MHz AGC - 0.5dB Out-of-block UL

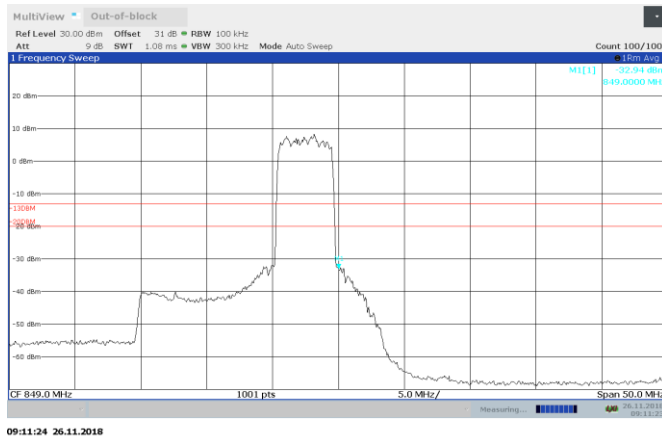


Figure 8.5-21: AWGN 846.5 MHz AGC - 0.5dB Out-of-block UL

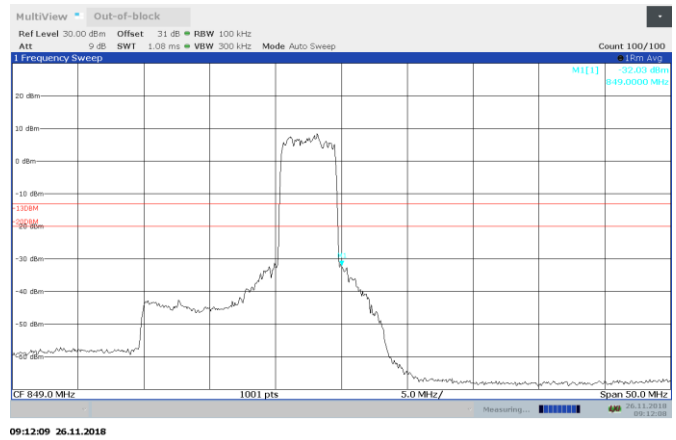


Figure 8.5-22: AWGN 846.5 MHz AGC +3dB Out-of-block UL

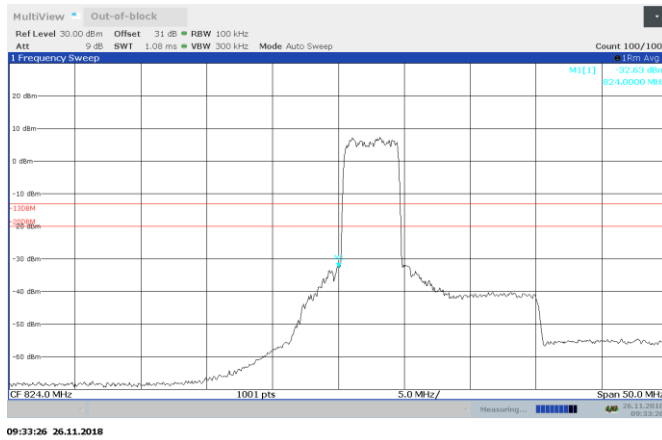


Figure 8.5-23: AWGN 826.5 MHz AGC - 0.5dB Out-of-block UL

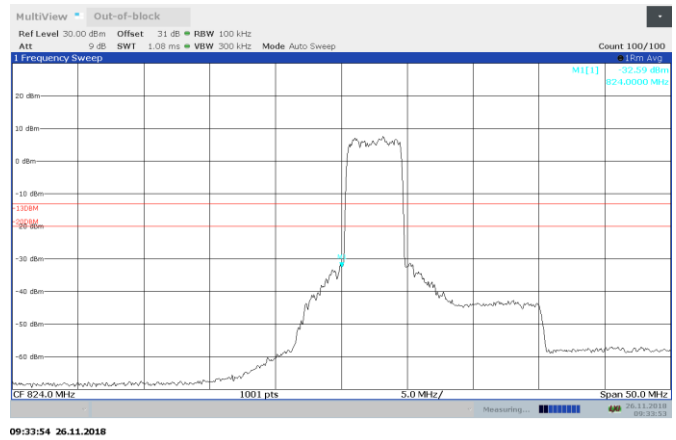


Figure 8.5-24: AWGN 826.5 MHz AGC +3dB Out-of-block UL

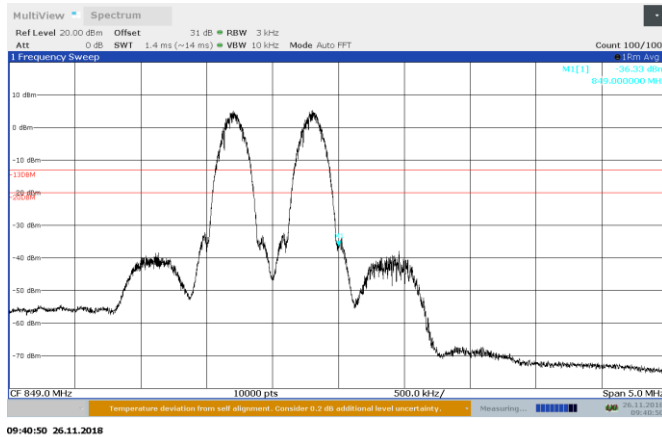


Figure 8.5-25: MSK 848.2 and 848.8 MHz AGC - 0.5dB Out-of-block UL

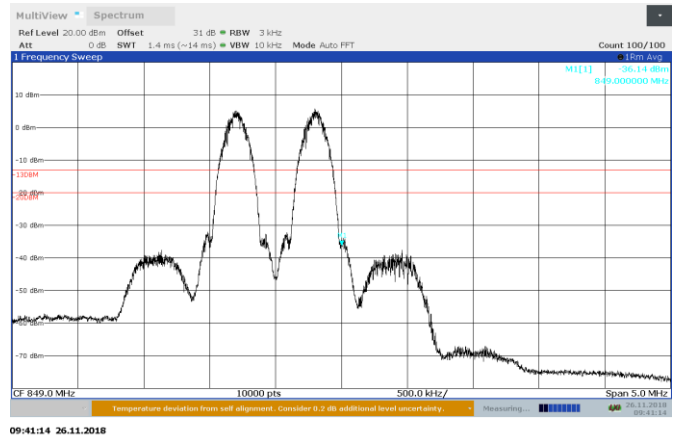


Figure 8.5-26: MSK 848.2 and 848.8 MHz AGC + 3 dB Out-of-block UL

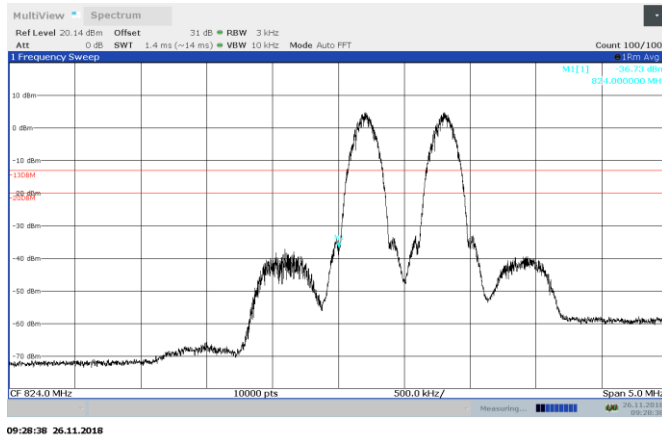


Figure 8.5-27: MSK 824.2 and 828.8 MHz AGC - 0.5dB Out-of-block UL

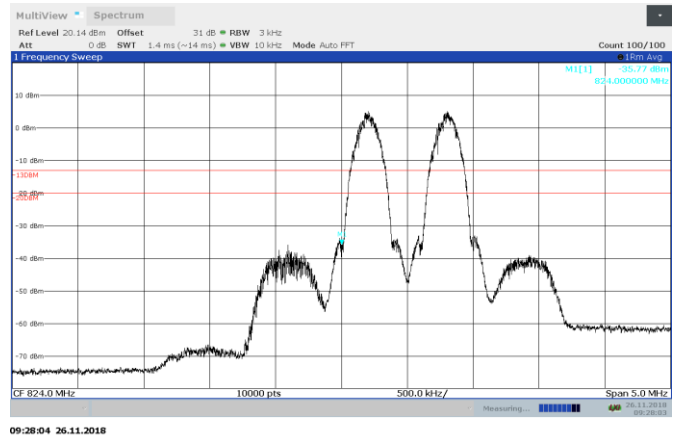


Figure 8.5-28: MSK 824.2 and 828.8 MHz AGC + 3 dB Out-of-block UL

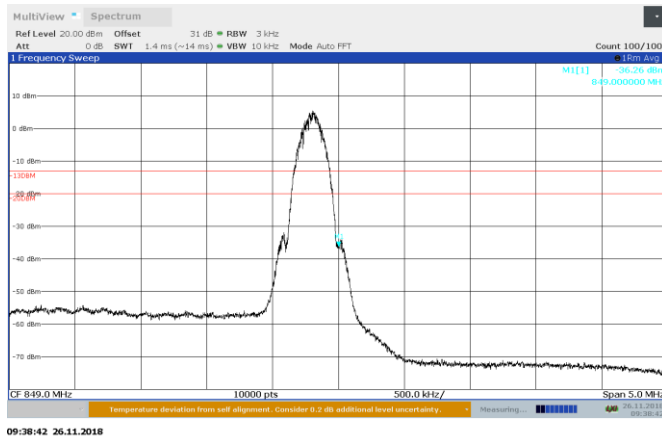


Figure 8.5-29: MSK 848.8 MHz AGC - 0.5dB Out-of-block UL

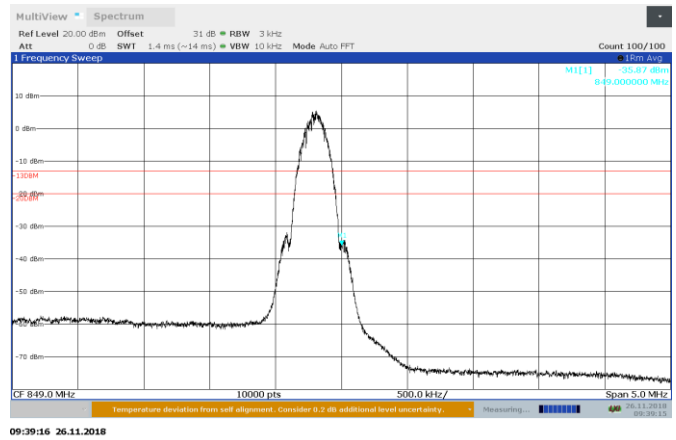


Figure 8.5-30: MSK 848.8 MHz AGC + 3 dB Out-of-block UL

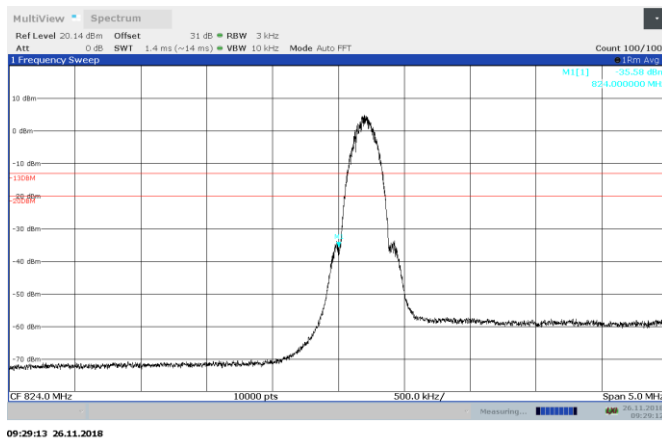


Figure 8.5-31: MSK 824.2 MHz AGC - 0.5dB Out-of-block UL

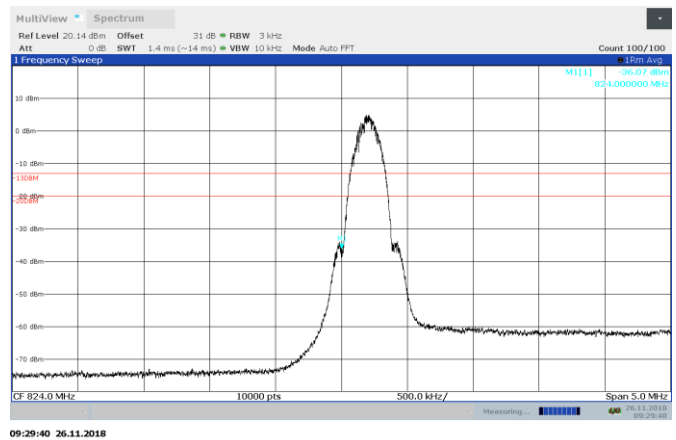


Figure 8.5-32: MSK 824.2 MHz AGC + 3 dB Out-of-block UL

8.6 FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.3, Spurious emissions conducted measurements

FCC 22.917(a) / RSS-132 5.5 The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB

8.6.1 Test summary

Test date	November 21, 2018	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1000 mbar
Verdict	Pass	Relative humidity	39 %

8.6.2 Observations, settings and special notes

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

8.6.3 Test data

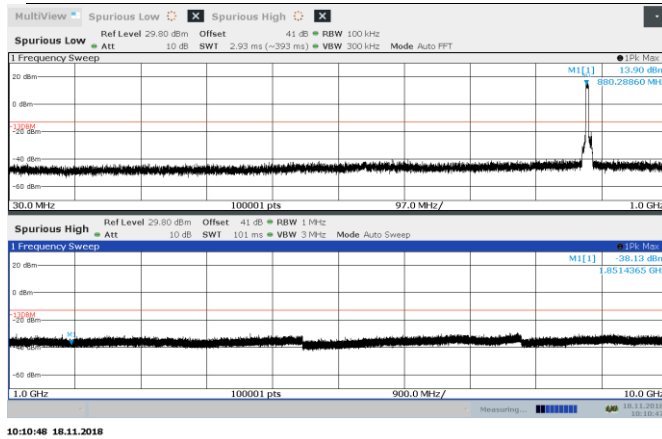


Figure 8.6-1: AWGN 881.5 MHz conducted emission DL

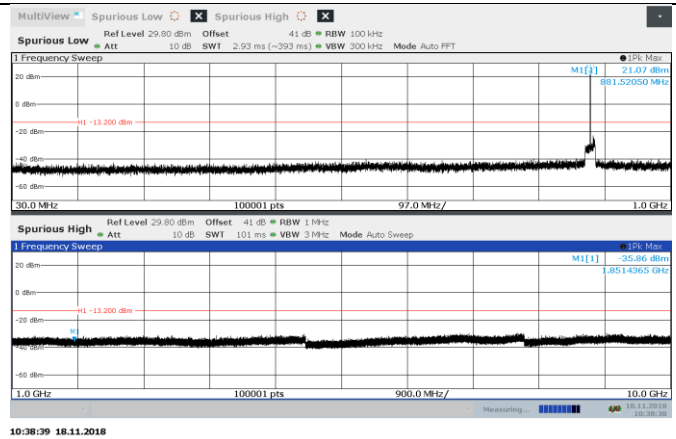


Figure 8.6-2: MSK 881.5 MHz conducted emission DL

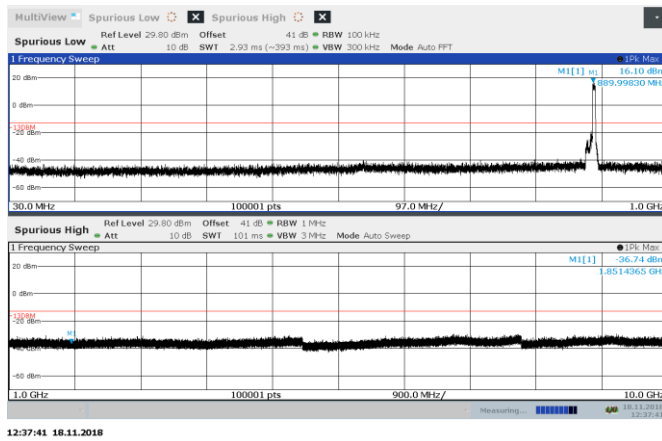


Figure 8.6-3: AWGN 891.5 MHz conducted emission DL

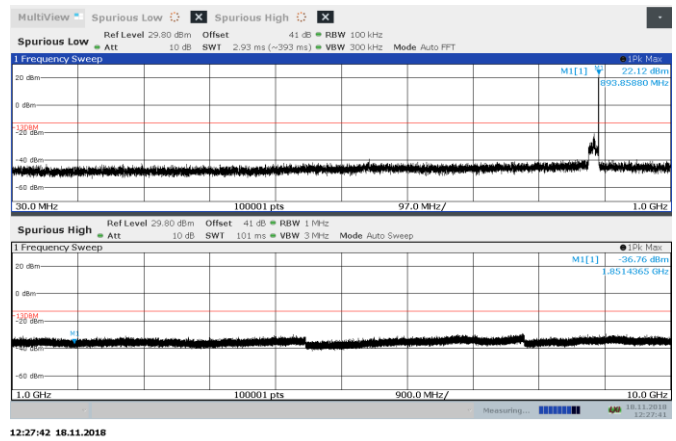


Figure 8.6-4: MSK 891.5 MHz conducted emission DL

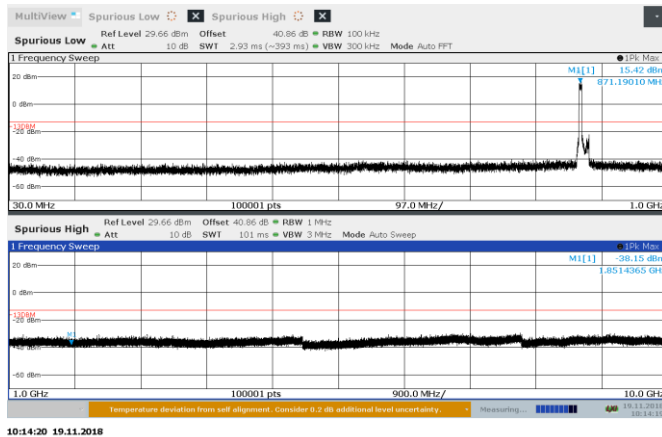


Figure 8.6-5: AWGN 871.5 MHz conducted emission DL

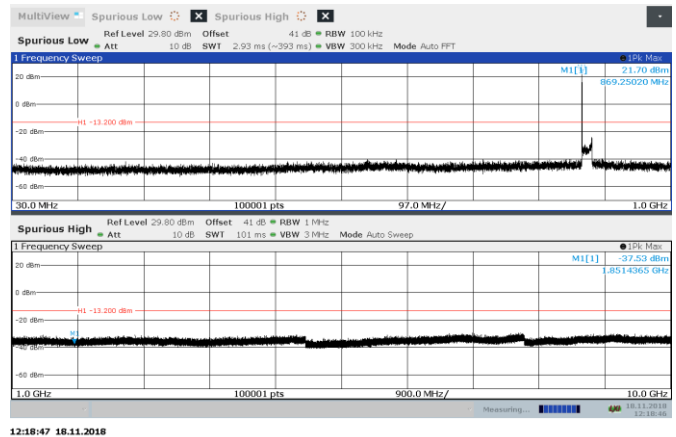


Figure 8.6-6: MSK 869.2 MHz conducted emission DL

Section 8
Test name
Specification

Testing data
Spurious emissions conducted measurements
FCC 22.917(a), RSS-132 5.5, KDB 935210 D05 3.6.3

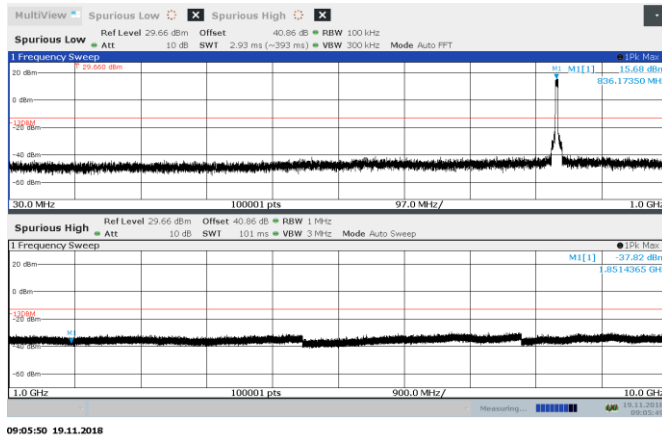


Figure 8.6-7: AWGN 836.5 MHz conducted emission UL

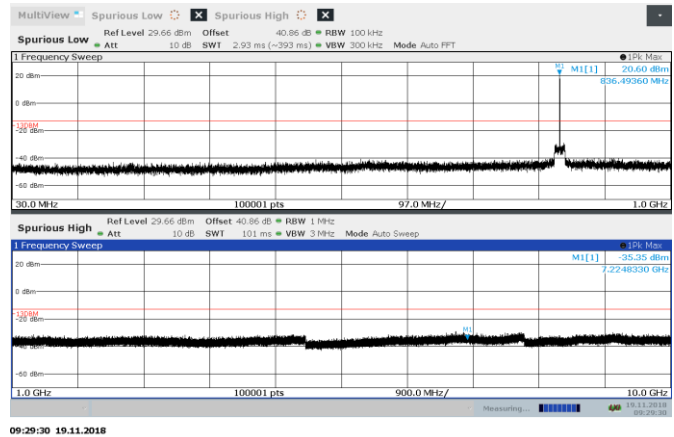


Figure 8.6-8: MSK 836.5 MHz conducted emission UL

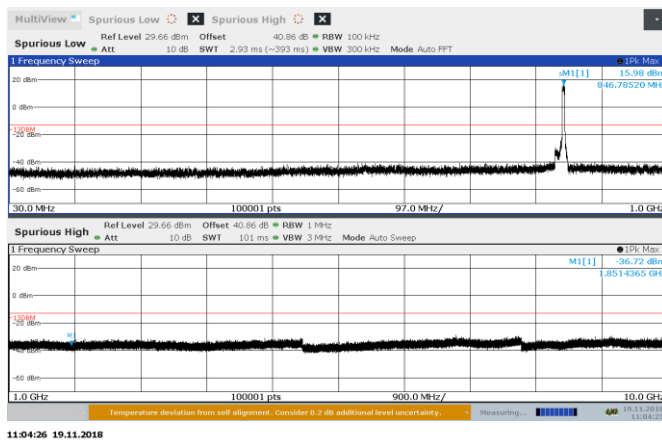


Figure 8.6-9: AWGN 846.5 MHz conducted emission UL

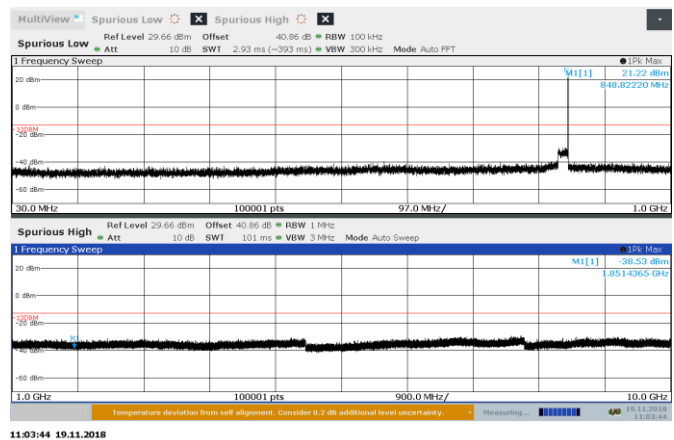


Figure 8.6-10: MSK 848.8 MHz conducted emission UL

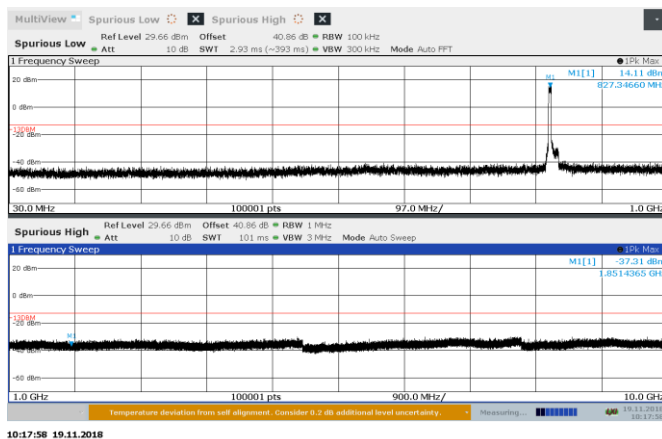


Figure 8.6-11: AWGN 826.5 MHz conducted emission UL

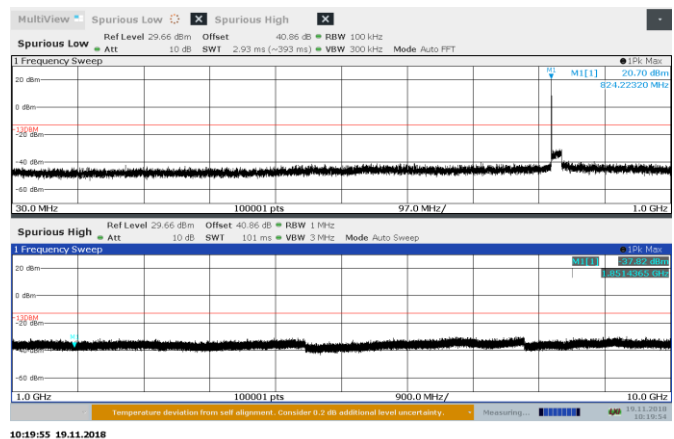


Figure 8.6-12: MSK 824.2 MHz conducted emission UL

8.7 FCC 22.917(a) RSS-132 5.5, KDB 935210 D05 3.8, Spurious emissions radiated measurements

8.7.1 Definitions and limits

FCC 22.917(a) / RSS-132 5.5 The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB

8.7.2 Test summary

Test date	June 27, 2018	Temperature	21 °C
Test engineer	Kevin Rose	Air pressure	1000 mbar
Verdict	Pass	Relative humidity	42 %

8.7.3 Observations, settings and special notes

Worst case examples are provided. No emissions within 20 dB of the limit were detected.

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

8.7.4 Test data

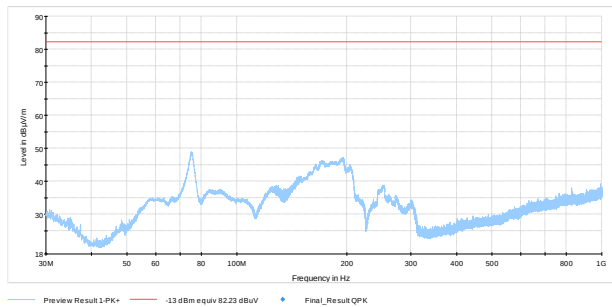


Figure 8.7-1: 30 MHz to 1 GHz Radiated UL

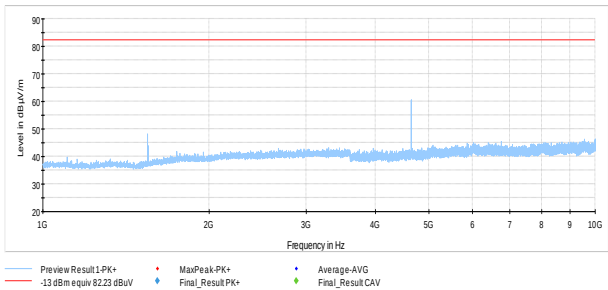


Figure 8.7-2: 1GHz to 9 GHz Radiated UL

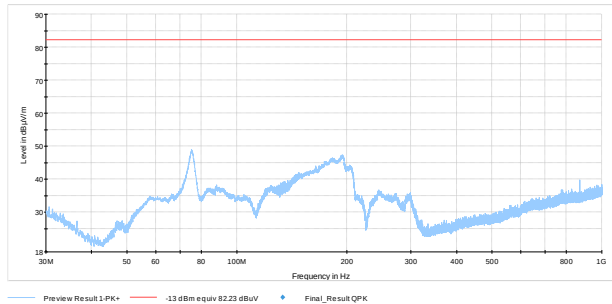


Figure 8.7-3: 30 MHz to 1 GHz Radiated DL

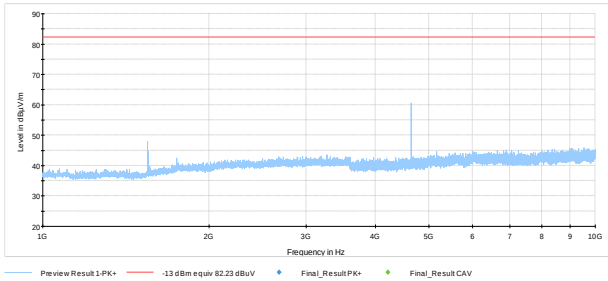


Figure 8.7-4: 1GHz to 9 GHz Radiated DL

Section 9. Setup Photos

9.1 Set-up



Figure 9.1-1: Radiated setup photo

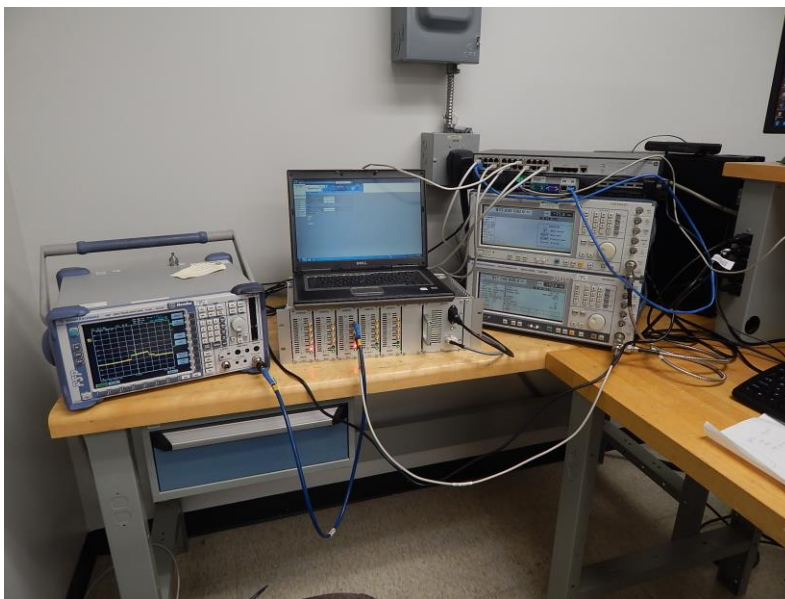
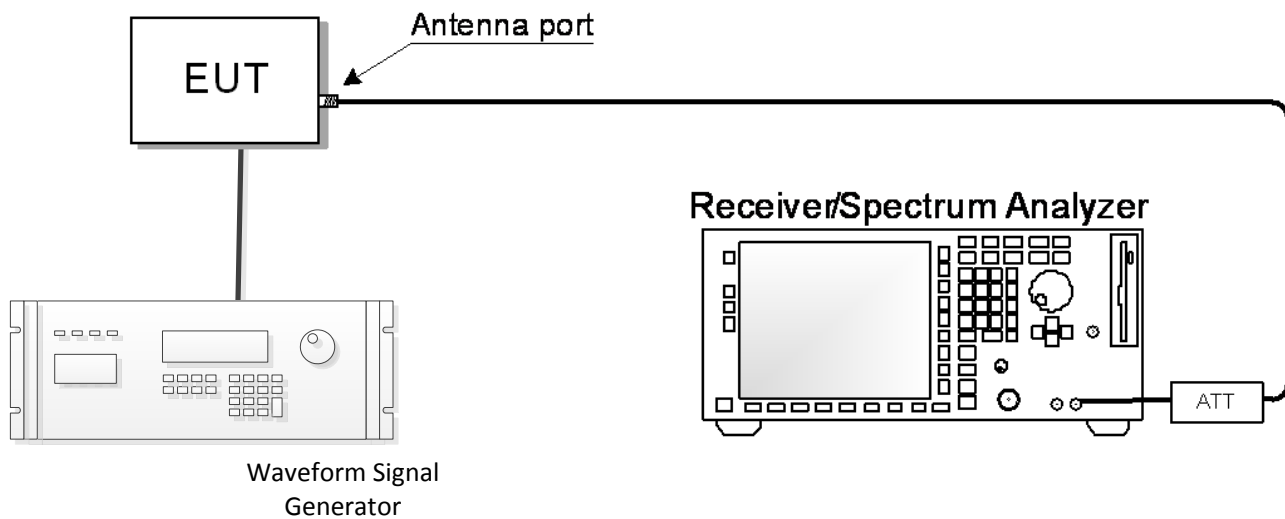


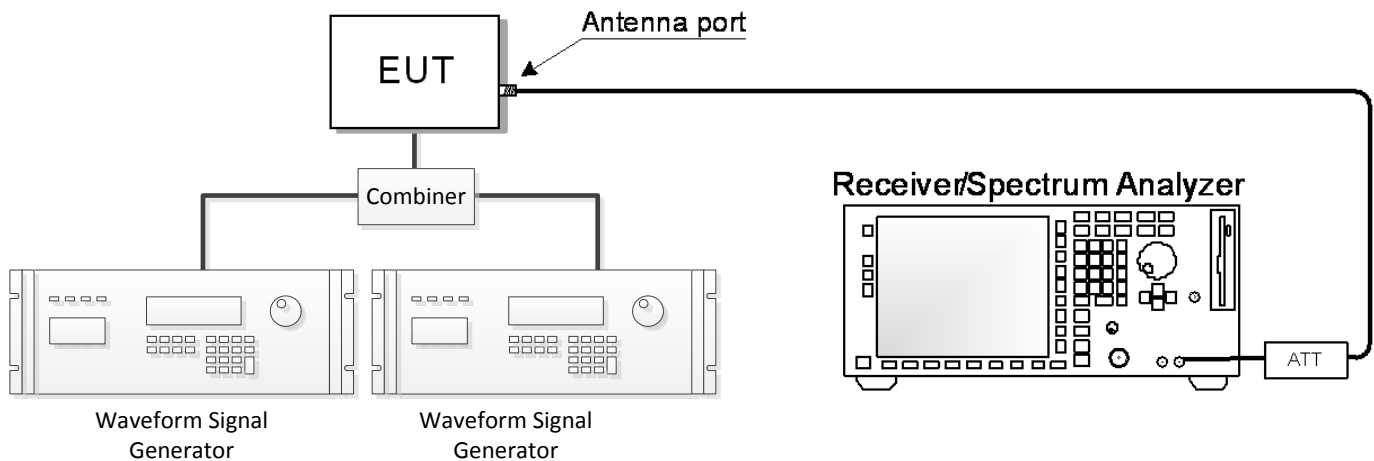
Figure 9.1-2: Conducted setup photo

Section 10. Block diagrams of test set-ups

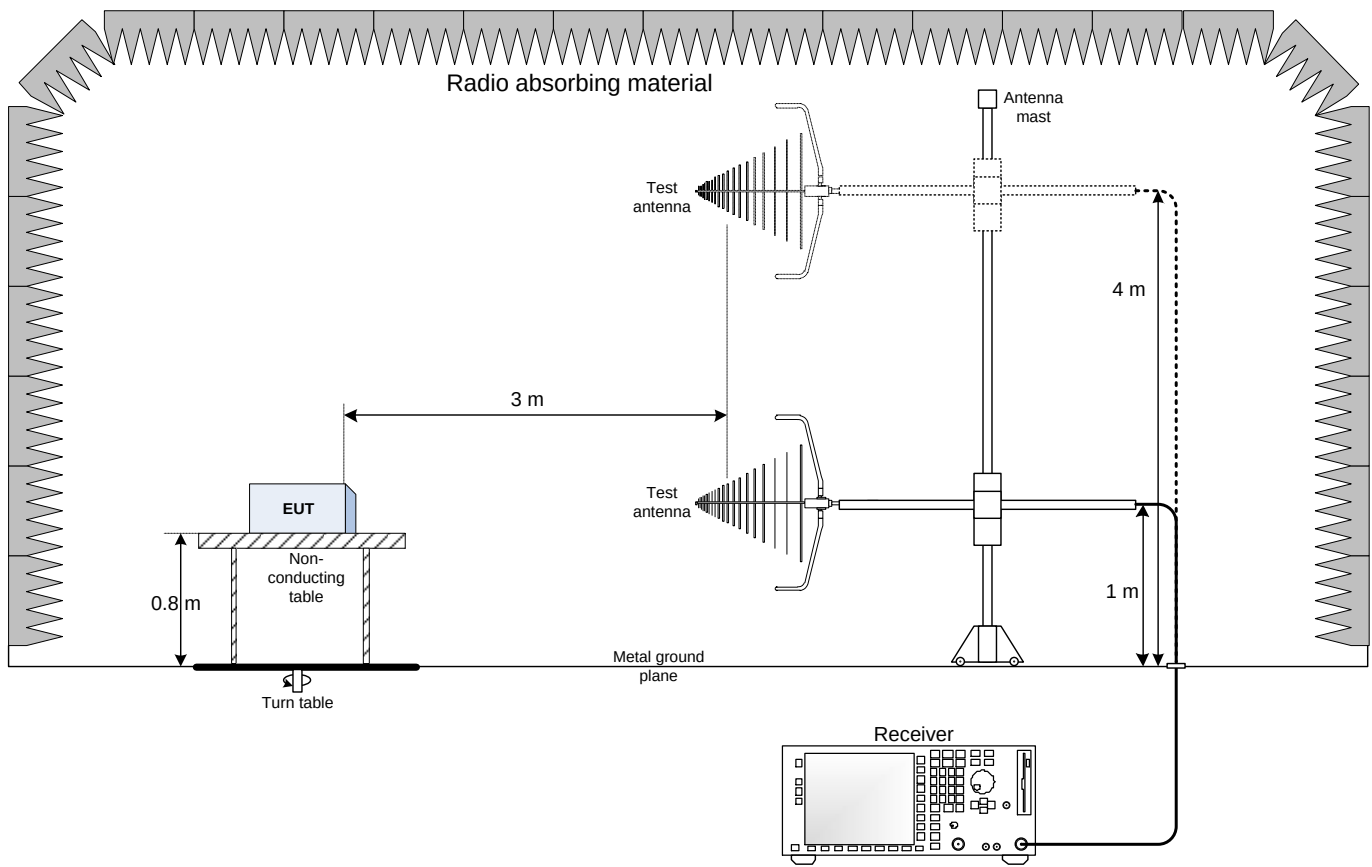
10.1 Measuring AGC threshold level, Out-of-band-rejection, Input-versus-output signal comparison, Mean output power and amplifier/booster gain, Spurious emissions conducted measurements, Spurious emissions radiated measurements



10.2 Out-of-band/out-of-block emissions conducted measurements



10.3 Spurious emissions radiated measurements



10.4 Spurious emissions radiated measurements (above 1GHz)

