ECL-TA Test Report No.: 20-009

Designation:	CAP MX AC 6/7E/80-85/17E/19/23/25T
Manufacturer:	Andrew
Serial No(s):	8
ID No.	7830127-0001, Rev.: 00
Test Specification(s):	ANSI 63.26:2015 FCC Rules and Regulations as listed in 47 CFR, Part 20:2019-10-01
Test Plan:	Measurement of Band 41/BRS (LBS, MBS and UBS) downlink.
Test Result:	**Passed**

Date of issue:	2020-10-23		Signature:
Version:	01	Technical Reviewer:	Thomas Hufnagel Test Engineer Digitally signed by Thomas Hufnagel DN: cn=Thomas Hufnagel, o=Bureau Veritas CPS Germany GmbH, ou=ECL, email=thomas.hufnagel@de.bureauveritas.com, c=DE Date: 2020.12.04 13:57:39 +01'00'
Date of delivery:	2020-07		
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Versions management:

V01.00	Initial release

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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 APPLIED STANDARDS

Type of Authorization
Certification for an Industrial Signal Booster.

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 and 20, 22 and 24. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 20, Commercial Mobiles Services

§ 20.21 Signal Boosters

Part 27; Miscellaneous Wireless Communications Services
Subpart C – Technical standards

§ 27.50 – Power and antenna height limits
§ 27.54 – Frequency stability
§ 27.53 – Emission limitations for broadband PCS equuipment

The tests were selected and performed with reference to:

- FCC Public Notice 935210 applying "Signal Boosters Basic Certification Requirements" 935210 D02, 2019-15-04.
- FCC Public Notice 935210 applying "Measurement guidance for industrial and non-consumer signal booster, repeater and amplifier devices"
- 935210 D05, 2019-04-03.
- FCC Public Notice 971168 applying "Measurement guidance for certification of licensed digital transmitters" 971168 D01, 2019-04-09.
- ANSI C63.26: 2015

Summary Test Results:

The EUT complies with all performed tests as listed in chapter 1.3 Measurement Summary / Signatures.

1.2 FCC-IC CORRELATION TABLE

Correlation of measurement requirements for Industrial Signal Booster from FCC and ISED Canada

Measurement	FCC reference	ISED reference
Effective radiated power, mean output power and zone enhancer gain	§ 2.1046 § 27.50 KDB 935210 D05 v01r04: 3.5	RSS-GEN Issue 5, 6.12 RSS-131 Issue 3: 5.2.3 RSS-199 Issue 3, 4.4 SRSP-517, Issue 7, 5.1.1
Peak to Average Ratio	§ 27.50	RSS-199 Issue 3, 6.4
Occupied bandwidth Input-versus-output spectrum	§ 2.1049 KDB 935210 D05 v01r04: 3.4	RSS-GEN Issue 5, 6.7 RSS-131 Issue 3: 5.2.2
Conducted spurious Emission at Antenna Terminal	§ 2.1051 § 27.53 KDB 935210 D05 v01r04: 3.6	RSS-GEN Issue 5, 6.13 RSS-199 Issue 3, 4.5
Out-of-band emissions limits	§ 2.1051 § 27.53 KDB 935210 D05 v01r04: 3.6	RSS-GEN Issue 5, 6.13 RSS-199 Issue 3, 4.5
Frequency stability	§ 2.1055 § 27.54	RSS-GEN Issue 5, 6.11 RSS-131 Issue 3: 5.2.4 RSS-199 Issue 3, 4.3
Field strength of spurious radiation	§ 2.1053 § 27.53	RSS-GEN Issue 5, 6.13 RSS-199 Issue 3, 4.5
Out-of-band rejection	KDB 935210 D05 v01r04: 3.3	RSS-131 Issue 3: 5.2.1
All measurements	ANSI 63.26	ANSI 63.26

1.3 MEASUREMENT SUMMARY/SIGNATURES

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] **§ 2.1046, § 27.50**

Effective Radiated Power, mean output power and zone enhancer gain
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r04: 3.5

OP-Mode	**Final Result**	
Frequency Band, Direction, Input Power, Signal Type	**FCC**	**IC**
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] **§ 27.50**

Peak to Average Ratio
The measurement was performed according to ANSI C63.26 **Final Result**

Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] § 2.1049

Occupied Bandwidth/Input-versus-output Spectrum
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r04: 3.4

Final Result

OP-Mode Frequency Band, Direction, Input Power, Signal Type	FCC	IC
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] § 2.1051, § 27.53

Conducted spurious emissions at antenna terminals
The measurement was performed according to ANSI C63.26

Final Result

OP-Mode Frequency Band, Direction, Input Power, Signal Type	FCC	IC
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] § 2.1051, § 27.53

Out-of-band emission limits
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r04: 3.6

Final Result

OP-Mode Band Edge, Frequency Band, Number of signals, Direction, Input Power, Signal Type	FCC	IC
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (MBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] § 2.1051, § 27.53

Out-of-band emission limits
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r04: 3.6

Final Result

OP-Mode Band Edge, Frequency Band, Number of signals, Direction, Input Power, Signal Type	FCC	IC
Lower, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (MBS), 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (MBS), 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (MBS), 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (MBS), 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (MBS), 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (MBS), 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (MBS), 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (MBS), 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] **§ 2.1051, § 27.53**

Out-of-band emission limits
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r04: 3.6

Final Result

OP-Mode Band Edge, Frequency Band, Number of signals, Direction, Input Power, Signal Type	**FCC**	**IC**
Upper, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (MBS), 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (MBS), 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (MBS), 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (MBS), 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (MBS), 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (MBS), 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (MBS), 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (MBS), 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] **KDB 935210 D05 v01r04: 3.3**

Out-of-band rejection
The measurement was performed according to ANSI C63.26; KDB 935210 D05 v01r04: 3.3 **Final Result**

OP-Mode Frequency Band, Direction	Setup	FCC	IC
Band 41 BRS (LBS), RF downlink		Passed	Passed
Band 41 BRS (MBS), RF downlink		Passed	Passed
Band 41 BRS (UBS), RF downlink		Passed	Passed

47 CFR CHAPTER I FCC PART 24 Subpart E [Base Stations/Repeater] **§ 2.1053, § 27.53**

Field strength of spurious radiation
The measurement was performed according to ANSI C63.26 **Final Result**

OP-Mode Frequency Band, Test Frequency, Direction	FCC	IC
Band 41 BRS (LBS), high, RF downlink	Passed	Passed
Band 41 BRS (LBS), low, RF downlink	Passed	Passed
Band 41 BRS (LBS), mid, RF downlink	Passed	Passed
Band 41 BRS (MBS), high, RF downlink	Passed	Passed
Band 41 BRS (MBS), low, RF downlink	Passed	Passed
Band 41 BRS (MBS), mid, RF downlink	Passed	Passed
Band 41 BRS (UBS), high, RF downlink	Passed	Passed
Band 41 BRS (UBS), low, RF downlink	Passed	Passed
Band 41 BRS (UBS), mid, RF downlink	Passed	Passed

The test case frequency stability was not performed, since the EUT is not equipped with signal processing capabilities.

2 ADMINISTRATIVE DATA

2.1 TESTING LABORATORY

Bureau Veritas Consumer Products Services Germany GmbH
Thurn-und-Taxis-Straße 18
D-90411 Nürnberg
Tel.: +49 40 74041 0
Fax: +49 40 74041-2755

2.2 APPLICANT DATA

Company Name:	Commscope Andrew Wireless Systems GmbH
Address:	Industriering 10 86675 Buchdorf Germany
Contact Person:	Mr. Frank Futter

2.3 MANUFACTURER DATA

Company Name:	Please see applicant data.
Address:	

3 TEST OBJECT DATA

3.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Cellular Repeater
Product name	Cellular Repeater
Type	
Declared EUT data by the supplier	
General Product Description	The EUT is an industrial signal booster supporting the following: Band 5/CELL 850 Band 5 CELL 850/USA 700E Band 5 CELL 850/USA 750 Band 14/LMR 750 Band 25/PCS 1900 Band 27/CELL 800 Band 30/WCS 2300 Band 41/BRS Band 66/AWS 1700E (partly) Band 70/Band 70 Band 71/USA 600 A RF operation is only supported for the downlink.
Booster Type	Industrial Signal Booster
Voltage Type	AC/50 Hz – 60 Hz
Voltage Level	100 V - 240 V
Maximum Output Donor Port [Uplink]	-
Nominal Output Server Port [Downlink]	All bands: 33 dBm
Nominal Gain [Uplink]	-
Nominal Gain [Downlink]	All bands: 33 dB

The main components of the EUT are listed and described in chapter 3.2 EUT Main components.

3.2 EUT MAIN COMPONENTS

Sample Name	**FCC-ID**	**IC-ID**
	XS5-CAPMX	2237E-CAPMX
Sample Parameter	**Value**	
Serial Number	8	
HW Version	7830127-0001 Rev.: 00	
SW Version	2.9.0.292	
Comment	-----	

NOTE: The short description is used to simplify the identification of the EUT in this test report.

3.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Device	**Details (Manufacturer, Type Model, OUT Code)**	**Description**
-	-	-

3.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it.
But nevertheless Auxiliary Equipment can influence the test results.

Device	**Details (Manufacturer; Type; S/N)**	**Description**
AUX1	Commscope/General Electric; ION-E PSU Shelf, AC; DM77662	Rack in Conjunction with AUX 2
AUX2	Commsope/General Electric; Power Supply Unit; LBGEPE17KZ39047532	Power Supply
AUX3	Commscope; ION-E WCS-2; SZAEAJ1952A0032	Subrack in Conjunction with AUX 4, 5,6, 7 and 8
AUX4	Commscope; ION-E OPT; SZBEAD1951A0011	Optical Card
AUX5	Commscope; ION-E SUI; SZBEAC1746A0015	LAN System Interface
AUX6	Commscope; ION-E RFD; SZBEAP1920A0057	RF Card
AUX7	Commscope; ION-E RFD; SZBEAP1924A0023	RF Card
AUX 8	Commscope; ION-E RFD; SZBEAP1946A0003	RF Card

3.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	Combination of EUTs	Description and Rationale
	,	Setup for all tests

OPERATING MODES
This chapter describes the operating modes of the EUT used for testing.

3.5.1 TEST CHANNELS

Band	Direction	Lower Frequency Band Edge [MHz]	Upper Frequency Band Edge [MHz]	Center Frequency [MHz]	Port
41, BRS LBS	Downlink	2496	2568	2532	Donor
41, BRS MBS	Downlink	2572	2614	2593	Donor
41, BRS UBS	Downlink	2618	2690	2654	Donor

3.5.2 AUTOMATIC GAIN CONTROL LEVELS

AGC Levels							
Band	Direction	Signal Type	AGC Start Pin [dBm]	AGC Start Pin -0.3 dB [dBm]	AGC Start Pin +3 dB [dBm]	Frequency [MHz]	Frequency
41, BRS LBS	Downlink	Narrowband	1.6	1.3	4.6	2532.00	Mid
41, BRS LBS	Downlink	Wideband	1.8	1.5	4.8	2532.00	
41, BRS LBS	Downlink	Narrowband	2.8	2.5	5.8	2496.20	
41, BRS LBS	Downlink	Wideband	2.4	2.1	5.4	2498.50	Low
41, BRS LBS	Downlink	Narrowband	2.0	1.7	5.0	2567.80	
41, BRS LBS	Downlink	Wideband	1.4	1.1	4.4	2565.50	High
41, BRS LBS	Downlink	Narrowband	1.4	1.1	4.4	2545.23	
41, BRS LBS	Downlink	Wideband	1.6	1.3	4.6	2545.23	Max.Power

AGC Levels							
Band	**Direction**	**Signal Type**	**AGC Start Pin [dBm]**	**AGC Start Pin -0.3 dB [dBm]**	**AGC Start Pin +3 dB [dBm]**	**Frequency [MHz]**	**Frequency**
41, BRS MBS	Downlink	Narrowband	-0.6	-0.9	2.4	2593.00	Mid
41, BRS MBS	Downlink	Wideband	-0.2	-0.5	2.8	2593.00	
41, BRS MBS	Downlink	Narrowband	0.4	0.1	3.4	2572.20	
41, BRS MBS	Downlink	Wideband	0.4	0.1	3.4	2574.50	Low
41, BRS MBS	Downlink	Narrowband	-0.2	-0.5	2.8	2613.80	
41, BRS MBS	Downlink	Wideband	-0.2	-0.5	2.8	2611.50	High
41, BRS MBS	Downlink	Narrowband	-0.4	-0.7	2.6	2582.00	
41, BRS MBS	Downlink	Wideband	0.0	-0.3	3.0	2582.00	Max.Power

AGC Levels							
Band	**Direction**	**Signal Type**	**AGC Start Pin [dBm]**	**AGC Start Pin -0.3 dB [dBm]**	**AGC Start Pin +3 dB [dBm]**	**Frequency [MHz]**	**Frequency**
41, BRS UBS	Downlink	Narrowband	1.8	1.5	4.8	2654.00	Mid
41, BRS UBS	Downlink	Wideband	2.0	1.7	5.0	2654.00	
41, BRS UBS	Downlink	Narrowband	3.2	2.9	6.2	2618.20	
41, BRS UBS	Downlink	Wideband	3.4	3.1	6.4	2620.50	Low
41, BRS UBS	Downlink	Narrowband	2.2	1.9	5.2	2653.80	
41, BRS UBS	Downlink	Wideband	2.4	2.1	5.4	2651.50	High
41, BRS UBS	Downlink	Narrowband	2.2	1.9	5.2	2641.00	
41, BRS UBS	Downlink	Wideband	2.4	2.1	5.4	2641.00	Max.Power

Remark:

If the measured frequency f_0 for the max power has a too low distance to the band edges, because in the tests modulated signals must be used: The next possible frequency to the according band edge is used.
For example for minimum distances to the band edges:
GSM-Signal (narrowband): 0.2 MHz
AWGN-signal (wideband): 2.5 MHz

3.6 PRODUCT LABELLING

3.6.1 FCC ID LABEL

Please refer to the documentation of the applicant.

3.6.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

4 TEST RESULTS

4.1 EFFECTIVE RADIATED POWER, MEAN OUTPUT POWER AND ZONE ENHANCER GAIN

Standard FCC PART 24, § 27.50

The test was performed according to:
ANSI C63.26, KDB 935210 D05 v01r04: 3.5

Test date: .2020-07-28 to 2020-07-30

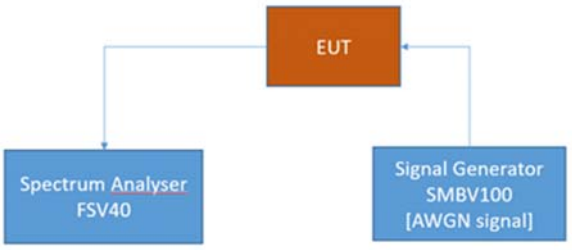
Environmental conditions: 25 ° C; 40 % r. F.

Test engineer: Thomas Hufnagel

4.1.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the signal booster power and gain limits and requirements for industrial signal boosters per FCC § 27.50, RSS-199 with subpart 4.4 and SRSP-517 with subpart 5.1.1.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; RF Output Power / Gain

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.1.2 TEST REQUIREMENTS/LIMITS: ABSTRACTS FROM STANDARDS

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50

Abstract § 27.50 from FCC:

(h) The following power limits shall apply in the BRS and EBS:

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

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

Abstract RSS-199 from ISED:

RSS-199; 4.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.)

The transmitter output power shall be measured in terms of average value.

For base station equipment, refer to SRSP-517 for the maximum permissible e.i.r.p.

Abstract SRSP-517 from ISED:

SRSP-517; 5.1 Radiated Power Limits and Antenna Height Limit

5.1.1 Fixed and Base Stations

Fixed and base stations (except fixed subscriber stations) are limited to a maximum permissible equivalent isotropically radiated power (e.i.r.p.) of 1640 W/MHz (i.e. no more than 1640 W e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT)7 up to 300 metres. For all installations with antenna HAAT in excess of 300 metres, a corresponding reduction in e.i.r.p. according to Table 2 shall be applied.

Table 2 — Reduction to Maximum Allowable E.I.R.P. for HAAT > 300 m

HAAT (m)	Reduction in maximum e.i.r.p. (dB)
300 < HAAT ≤500	2
500 < HAAT ≤1000	5
1000 < HAAT ≤1500	8
1500 < HAAT ≤2000	10

4.1.3 TEST PROTOCOL

Band 41 BRS (LBS), downlink,							
Signal Type	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**Maximum Average Output Power [dBm]**	**Limit Average Output Power [dBm]**	**Margin to Limit [dB]**	**Gain [dB]**
Wideband	0.3 dB < AGC	2545.23	1.3	35.1	62.1	27.0	33.8
Wideband	3 dB > AGC	2545.23	4.6	35.2	62.1	26.9	30.6
Narrowband	0.3 dB < AGC	2545.23	1.1	35.1	51.6	16.5	34.0
Narrowband	3 dB > AGC	2545.23	4.4	34.7	51.6	16.9	30.3

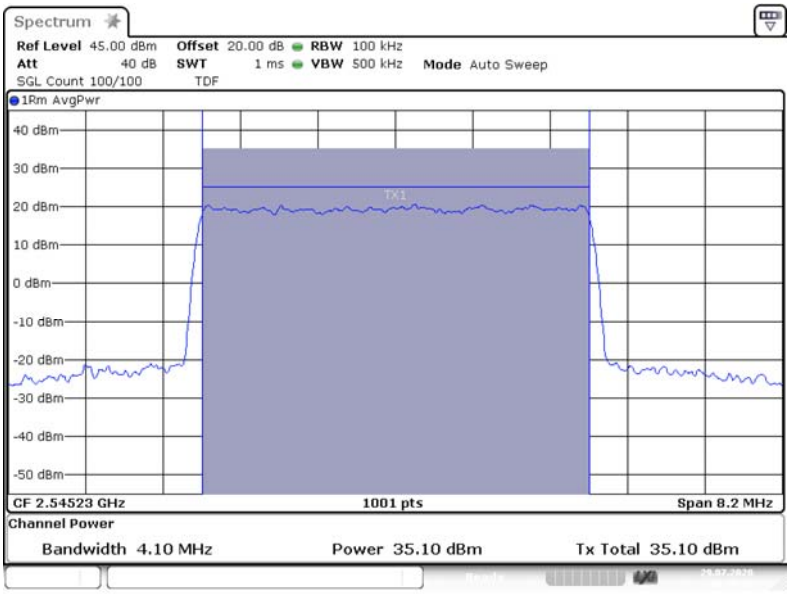
Band 41 BRS (MBS), downlink,							
Signal Type	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**Maximum Average Output Power [dBm]**	**Limit Average Output Power [dBm]**	**Margin to Limit [dB]**	**Gain [dB]**
Wideband	0.3 dB < AGC	2582,00	-0.3	34.1	62.1	28.0	34.4
Wideband	3 dB > AGC	2582,00	3.0	34.8	62.1	27.3	31.8
Narrowband	0.3 dB < AGC	2582,00	-0.7	34.1	51.2	17.1	34.8
Narrowband	3 dB > AGC	2582,00	2.6	34.0	51.2	17.2	31.4

Band 41 BRS (UBS), downlink,							
Signal Type	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**Maximum Average Output Power [dBm]**	**Limit Average Output Power [dBm]**	**Margin to Limit [dB]**	**Gain [dB]**
Wideband	0.3 dB < AGC	2641.00	2.1	35.1	62.1	27.0	33.0
Wideband	3 dB > AGC	2641.00	5.4	35.2	62.1	26.9	29.8
Narrowband	0.3 dB < AGC	2641.00	1.9	35.1	51.2	16.1	33.2
Narrowband	3 dB > AGC	2641.00	5.2	34.7	51.2	16.5	29.5

Remarks: Please see next sub-clause for the measurement plot.

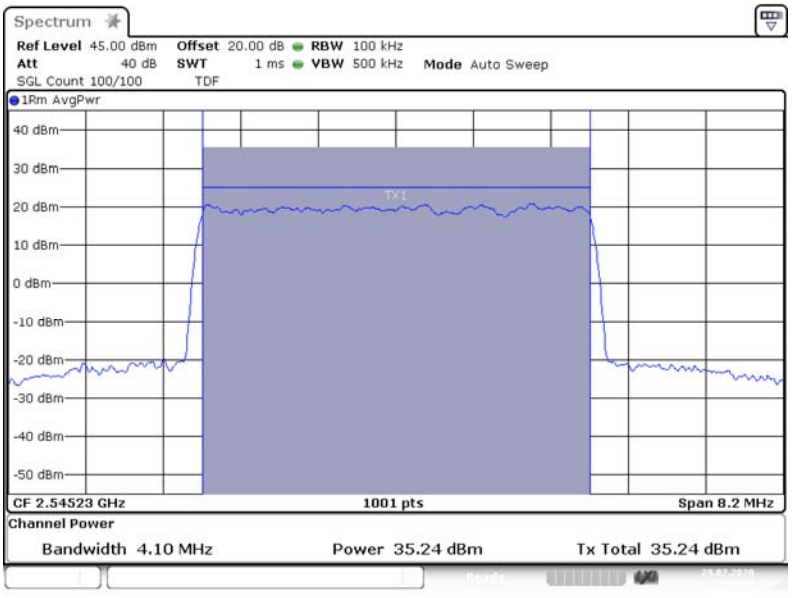
4.1.4 MEASUREMENT PLOT

Band: BRS LBS; Frequency: 2.5452 GHz; Band Edge: f0; Mod: AWGN; Output Power 0.3 dB < AGC



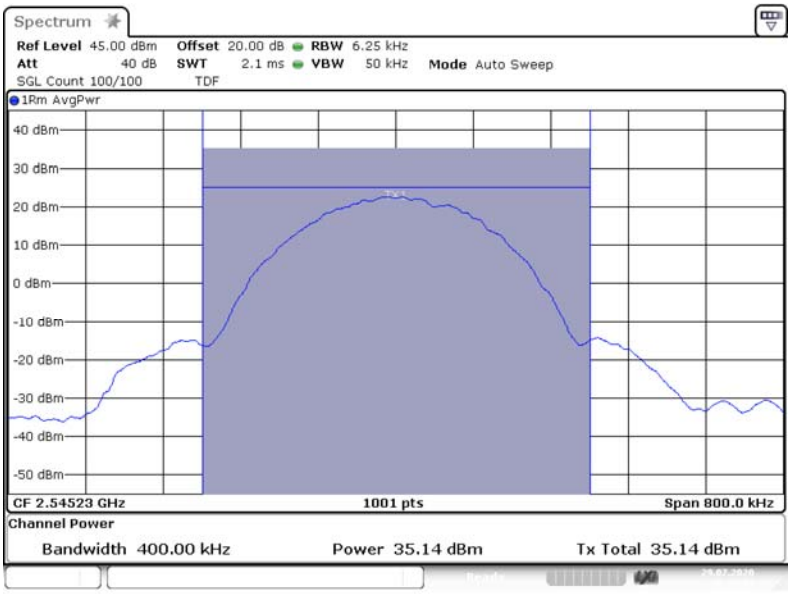
3.5.3 Power AWGN Out -0.3 2.54523G

Band: BRS LBS; Frequency: 2.5452 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC



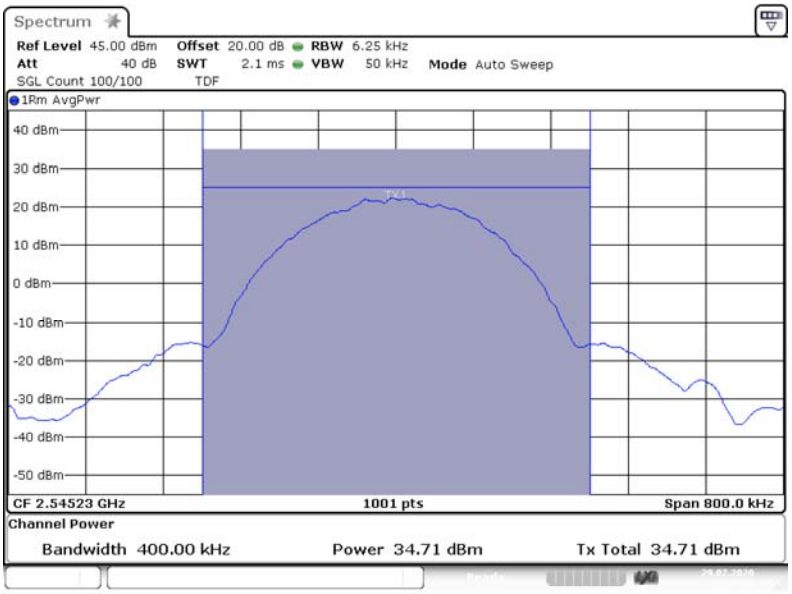
3.5.3 Power AWGN Out +3 2.54523G

Band: BRS LBS; Frequency: 2.5452 GHz; Band Edge: f0; Mod: GSM; Output Power 0.3 dB < AGC



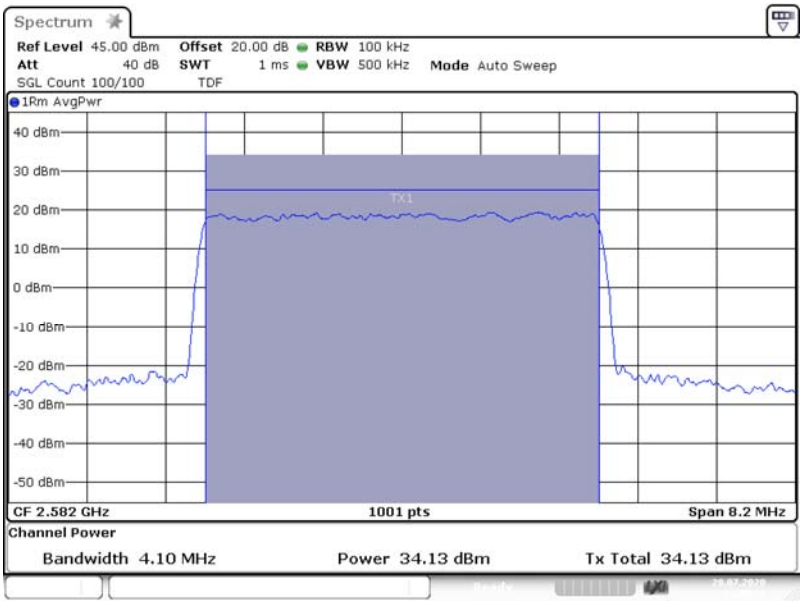
3.5.3 Power GSM Out -0.3 2.54523G

Band: BRS LBS; Frequency: 2.5452 GHz; Band Edge: f0; Mod: GSM; Output Power 3 dB > AGC



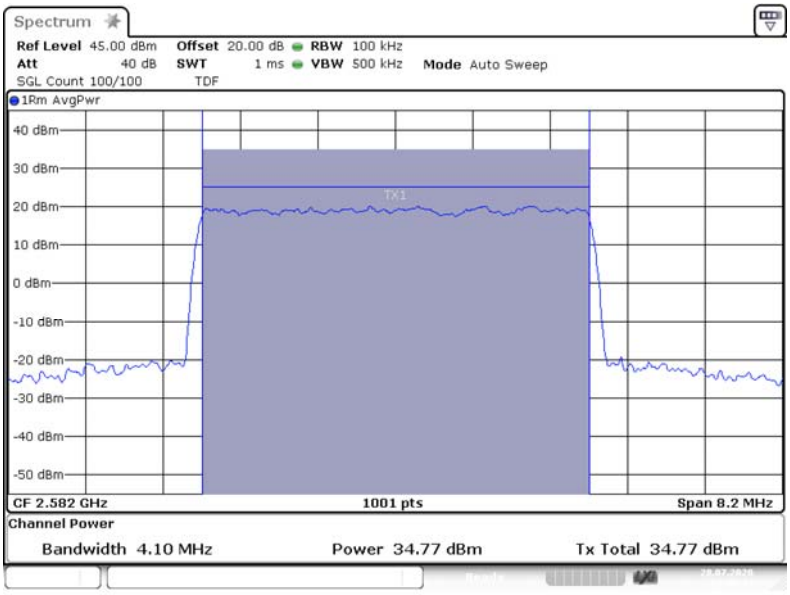
3.5.3 Power GSM Out +3 2.54523G

Band: BRS MBS; Frequency: 2.582.0 GHz; Band Edge: f0; Mod: AWGN; Output Power 0.3 dB < AGC



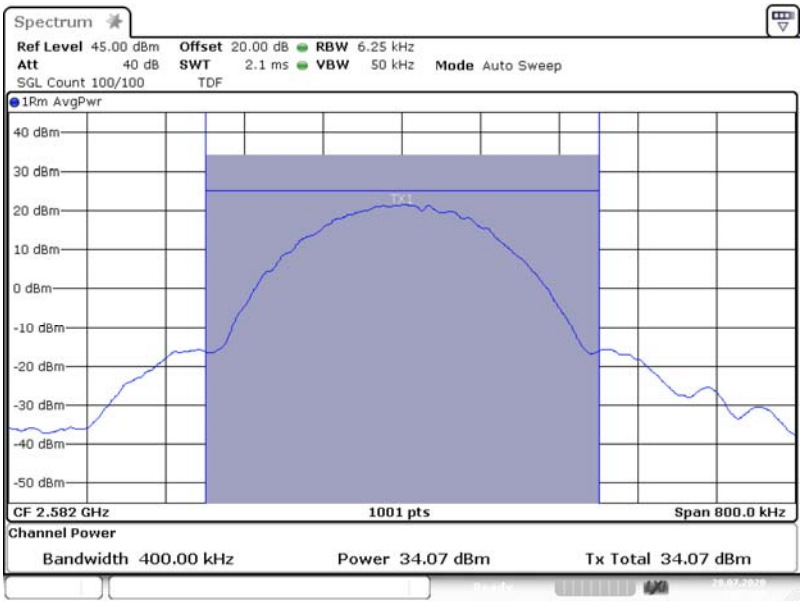
3.5.3 Power AWGN Out -0.3 2.58200G

Band: BRS MBS; Frequency: 2.5820 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC



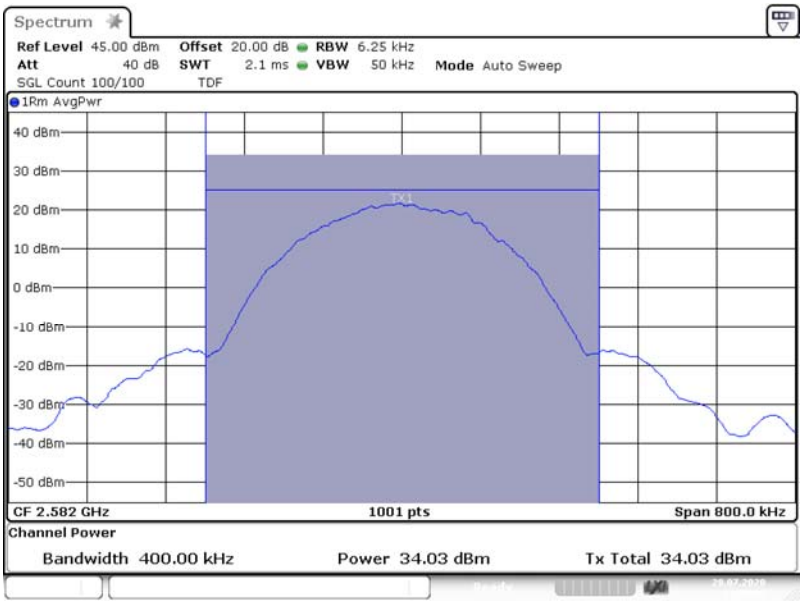
3.5.3 Power AWGN Out +3 2.58200G

Band: BRS MBS; Frequency: 2.5820 GHz; Band Edge: f0; Mod: GSM; Output Power 0.3 dB < AGC



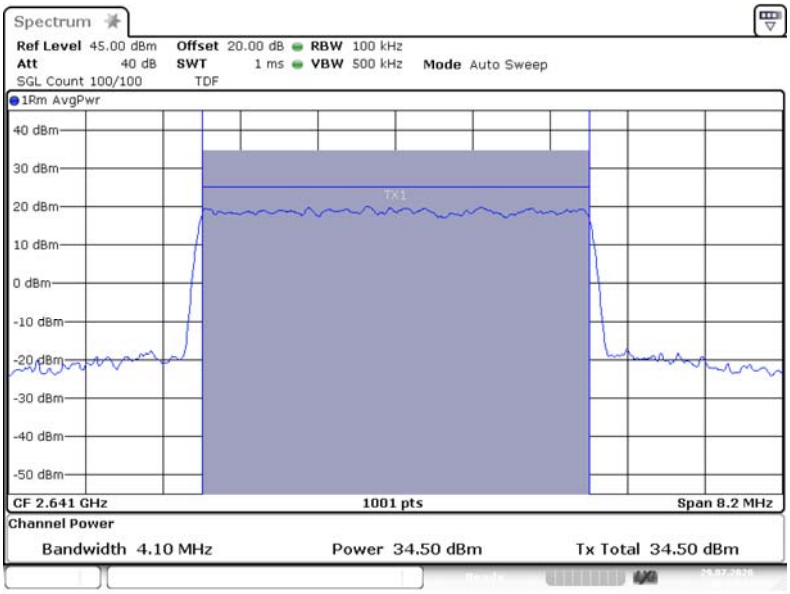
3.5.3 Power GSM Out -0.3 2.58200G

Band: BRS MBS; Frequency: 2.5820 GHz; Band Edge: f0; Mod: GSM; Output Power 3 dB > AGC



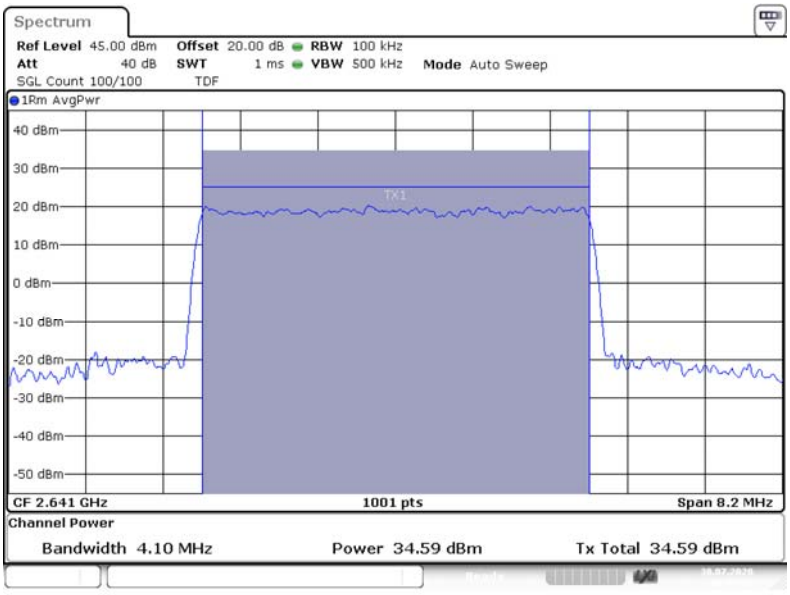
3.5.3 Power GSM Out +3 2.58200G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: AWGN; Output Power 0.3 dB < AGC



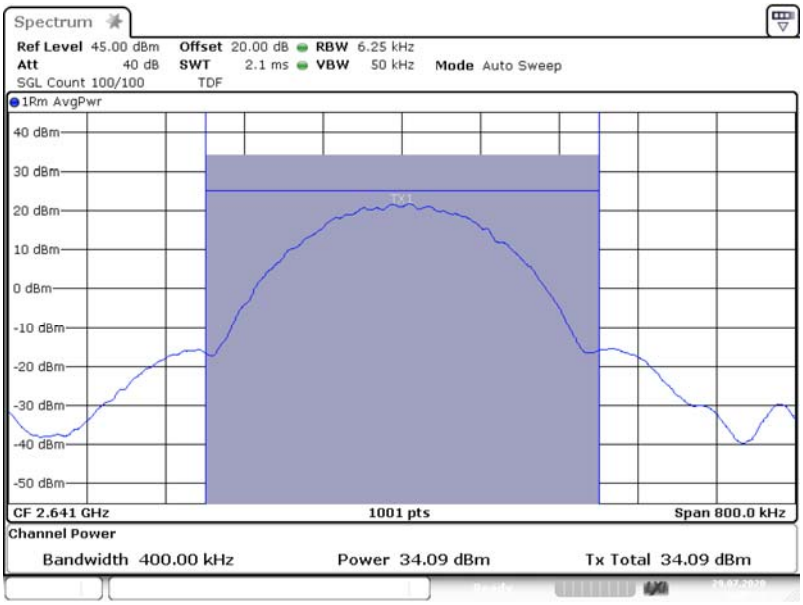
3.5.3 Power AWGN Out -0.3 2.64100G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC



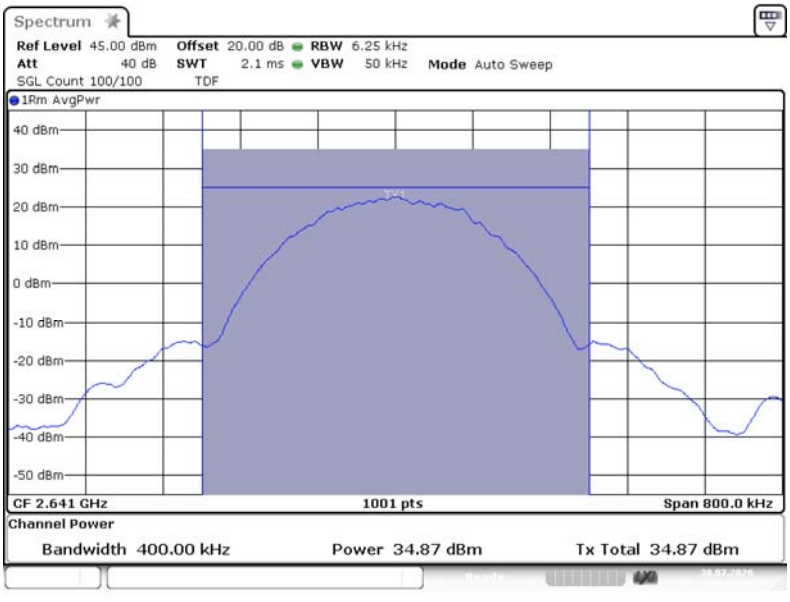
3.5.3 Power AWGN Out +3 2.64100G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: GSM; Output Power 0.3 dB < AGC



3.5.3 Power GSM Out -0.3 2.64100G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: GSM; Output Power 3 dB > AGC



3.5.3 Power GSM Out +3 2.64100G

4.1.5 TEST EQUIPMENT USED

- Conducted

4.2 PEAK TO AVERAGE RATIO

Standard FCC PART 24, § 27.50

The test was performed according to:
ANSI C63.26

Test date: .2020-07-28 to 2020-07-30

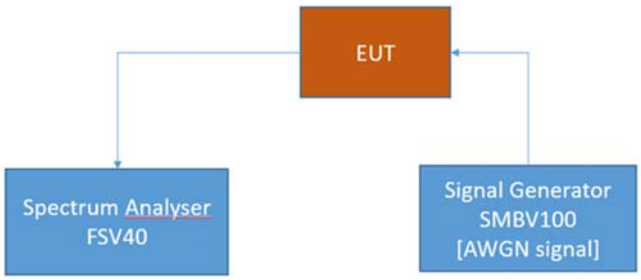
Environmental conditions: 25 ° C; 40 % r. F.

Test engineer: Thomas Hufnagel

4.2.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the signal booster power and gain limits and requirements for industrial signal boosters per FCC § 27.50 and RSS-199 with subpart 4.4.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; RF Output Power / Gain

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.2.2 TEST REQUIREMENTS/LIMITS

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50

Abstract § 27.50 from FCC:

For the band 41(BRS, LBS/MBS/UBS) exists no FCC peak-to-average power ratio (PAPR) limit. Although here no limit exits, a fictive limit with the same value as in band 30 in the table above is set and the margin to this fictive limit is calculated.

Band 30:
(a) The following power limits and related requirements apply to stations transmitting in the 2305-2320 MHz band or the 2345-2360 MHz band.

(B) The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

Abstract RSS-199 from ISED:

RSS-199; 4.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.)

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 and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

4.2.3 TEST PROTOCOL

Band 41 BRS (LBS), downlink						
Signal Type	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**PAPR [dB]**	**Limit PAPR [dB]**	**Margin to Fictive Limit [dB]**
Wideband	0.3 dB < AGC	2532.00	1.5	9.1	13.0	3.9
Wideband	3 dB > AGC	2532.00	4.8	8.4	13.0	4.6
Narrowband	0.3 dB < AGC	2532.00	1.3	0.2	13.0	12.8
Narrowband	3 dB > AGC	2532.00	4.6	0.2	13.0	12.8

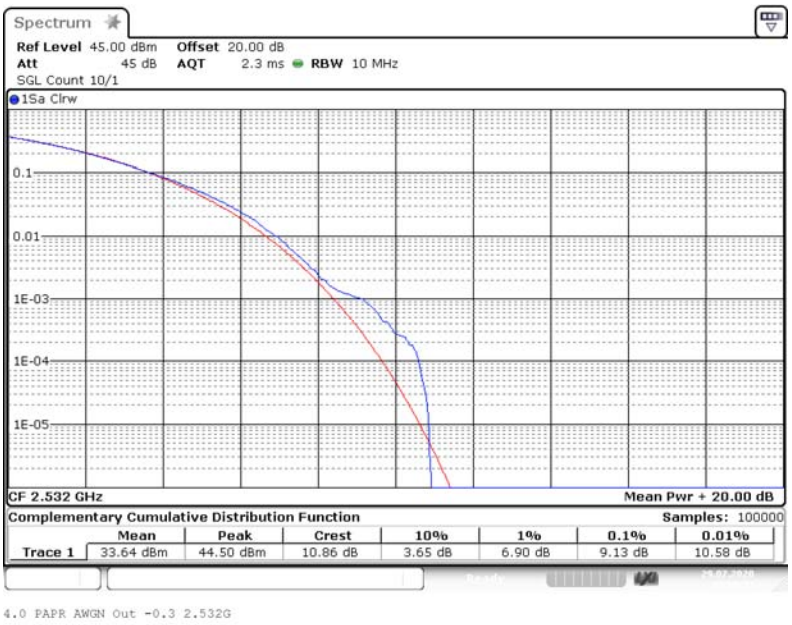
Band 41 BRS (MBS), downlink						
Signal Type	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**PAPR [dB]**	**Limit PAPR [dB]**	**Margin to Fictive Limit [dB]**
Wideband	0.3 dB < AGC	2593.00	-0.5	8.9	13.0	4.1
Wideband	3 dB > AGC	2593.00	2.8	9.0	13.0	4.0
Narrowband	0.3 dB < AGC	2593.00	-0.9	0.2	13.0	12.8
Narrowband	3 dB > AGC	2582.00	2.6	0.2	13.0	12.8

Band 41 BRS (UBS), downlink						
Signal Type	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**PAPR [dB]**	**Limit PAPR [dB]**	**Margin to Fictive Limit [dB]**
Wideband	0.3 dB < AGC	2641.00	2.1	8.8	13.0	4.2
Wideband	3 dB > AGC	2654.00	5.0	8.9	13.0	4.1
Narrowband	0.3 dB < AGC	2641.00	1.5	0.2	13.0	12.8
Narrowband	3 dB > AGC	2641.00	4.8	0.3	13.0	12.7

Remark: Please see next sub-clause for the measurement plot.

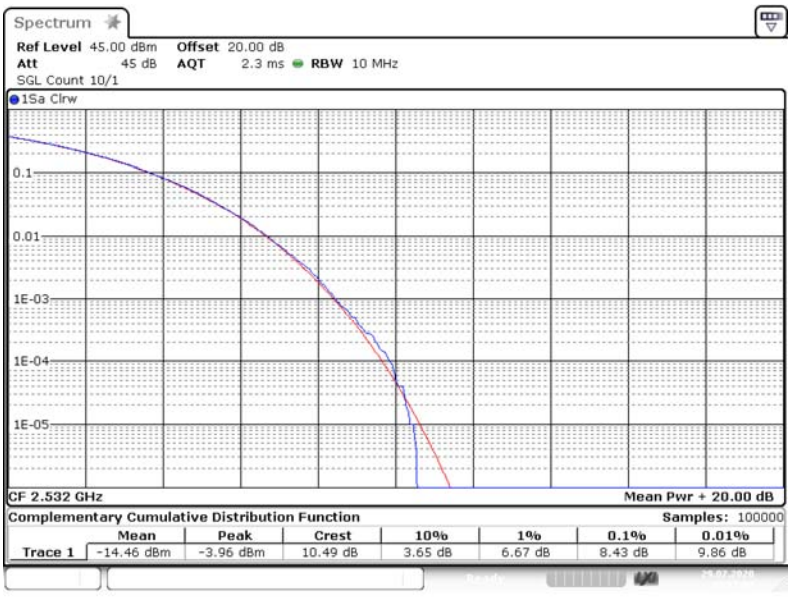
4.2.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Band: BRS LBS; Frequency: 2.5320 GHz; Band Edge: mid; Mod: AWGN; PAPR 0.3 dB < AGC



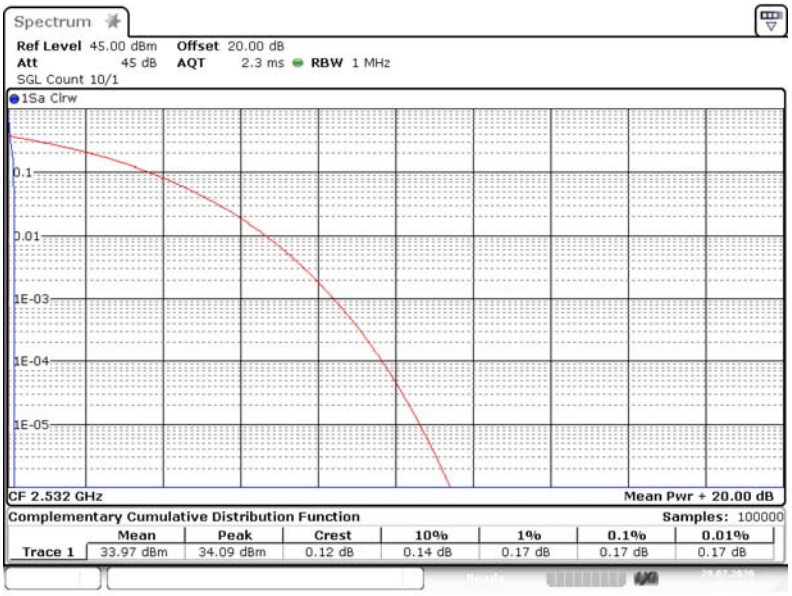
4.0 PAPR AWGN Out -0.3 2.532G

Band: BRS LBS; Frequency: 2.5320 GHz; Band Edge: mid; Mod: AWGN; PAPR 3 dB > AGC



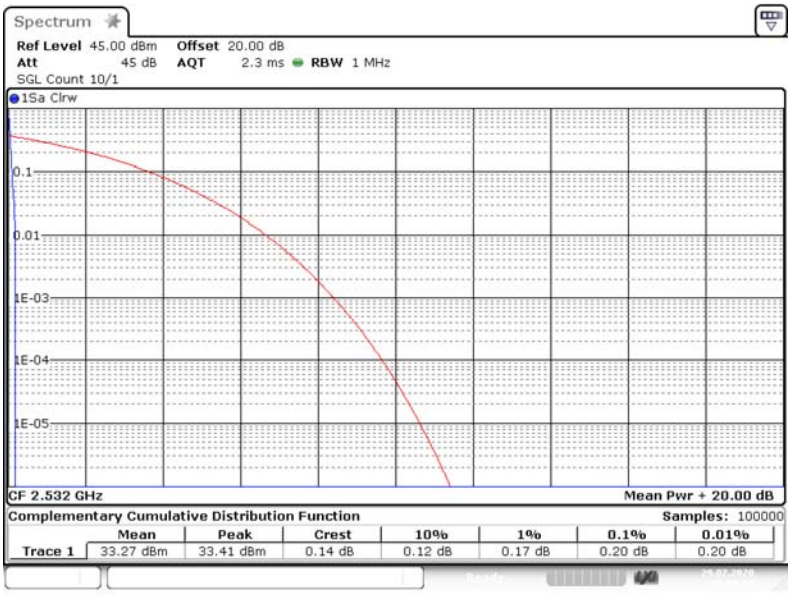
4.0 PAPR AWGN Out +3 2.532G

Band: BRS LBS; Frequency: 2.5320 GHz; Band Edge: mid; Mod: GSM; PAPR 0.3 dB < AGC



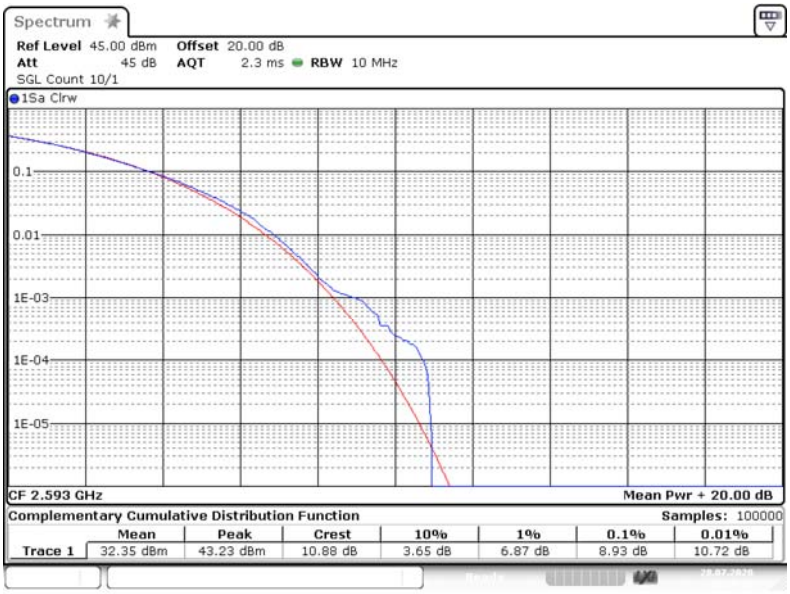
4.0 PAPR GSM Out -0.3 2.532G

Band: BRS LBS; Frequency: 2.5320 GHz; Band Edge: mid; Mod: GSM; PAPR 3 dB > AGC



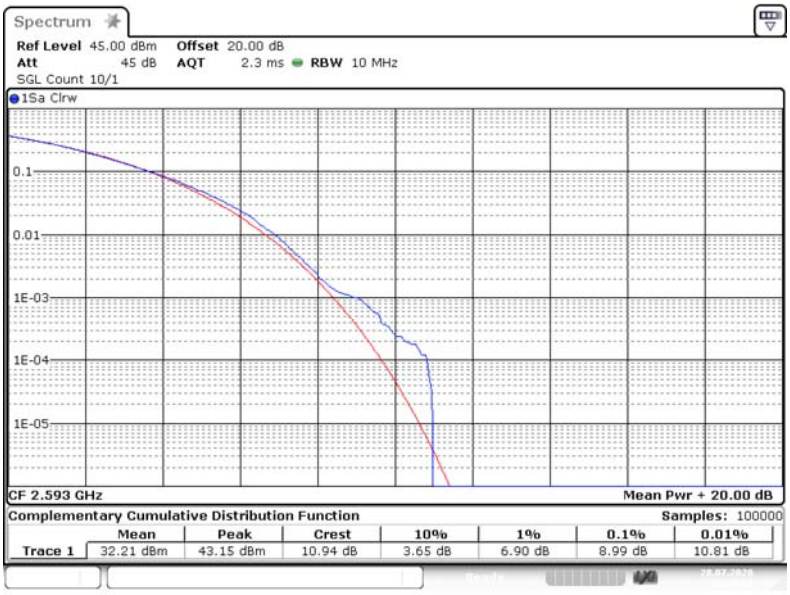
4.0 PAPR GSM Out +3 2.532G

Band: BRS MBS; Frequency: 2.5930 GHz; Band Edge: mid; Mod: AWGN; PAPR 0.3 dB < AGC



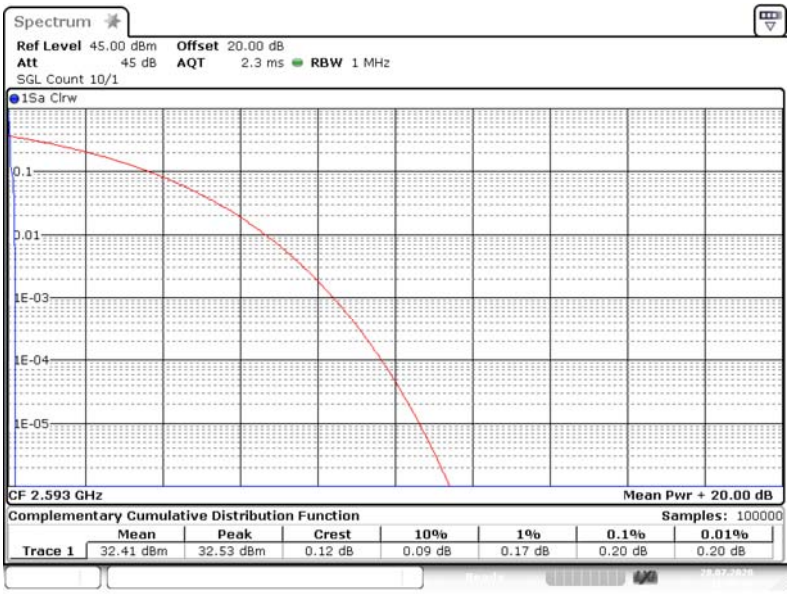
4.0 PAPR AWGN Out -0.3 2.593G

Band: BRS MBS; Frequency: 2.5930 GHz; Band Edge: mid; Mod: AWGN; PAPR 3 dB > AGC



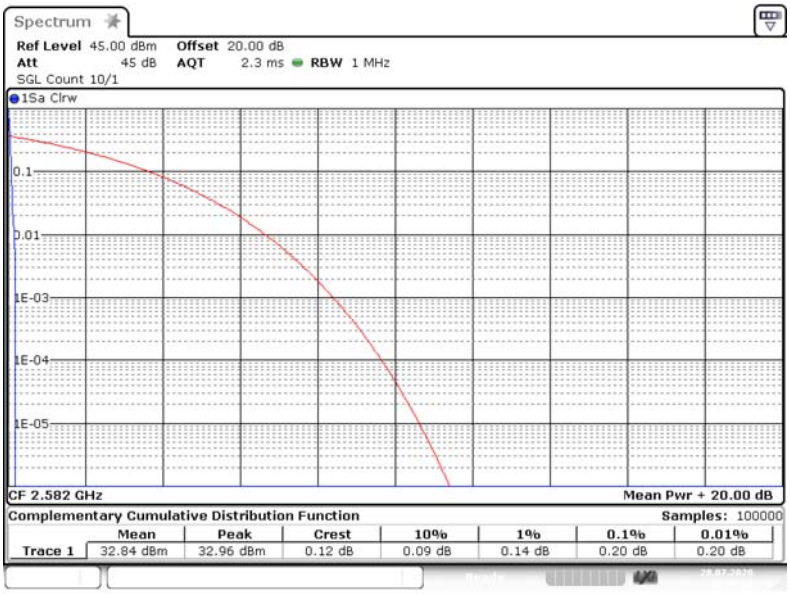
4.0 PAPR AWGN Out +3 2.593G

Band: BRS MBS; Frequency: 2.5930 GHz; Band Edge: mid; Mod: GSM; PAPR 0.3 dB < AGC



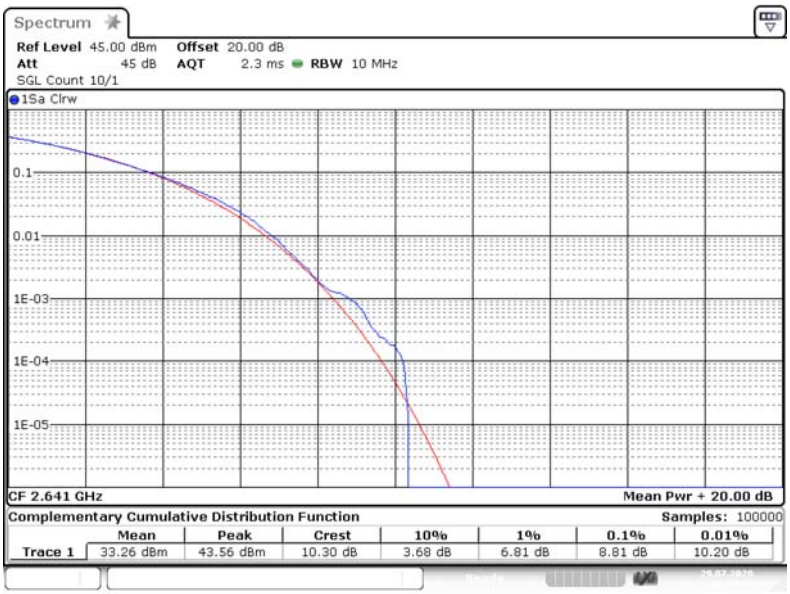
4.0 PAPR GSM Out -0.3 2.593G

Band: BRS MBS; Frequency: 2.5820 GHz; Band Edge: f0; Mod: GSM; PAPR 3 dB > AGC



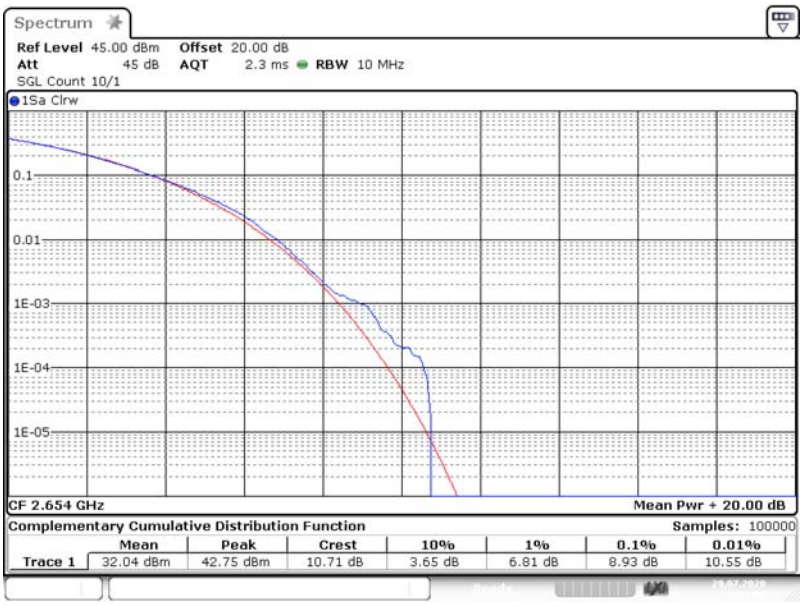
4.0 PAPR GSM Out +3 2.582G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: AWGN; PAPR 0.3 dB < AGC



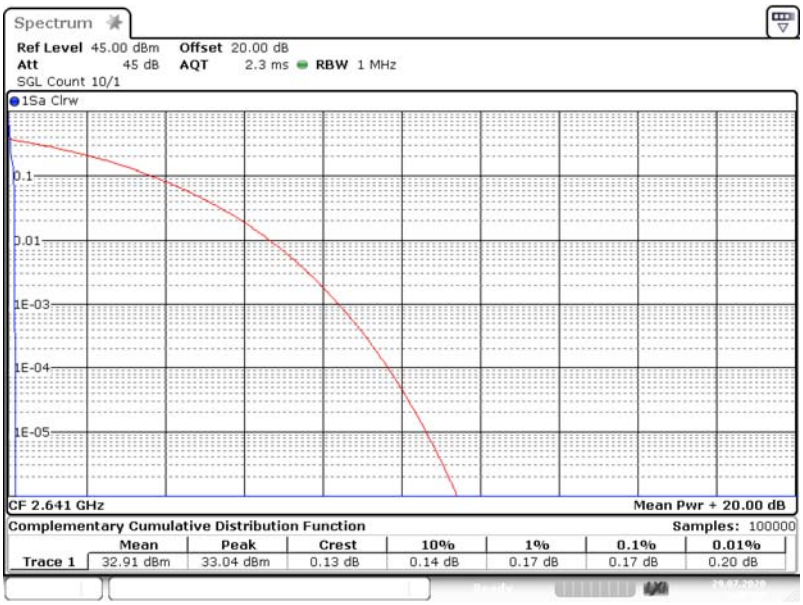
4.0 PAPR AWGN Out -0.3 2.641G

Band: BRS UBS; Frequency: 2.6540 GHz; Band Edge: mid; Mod: AWGN; PAPR 3 dB > AGC



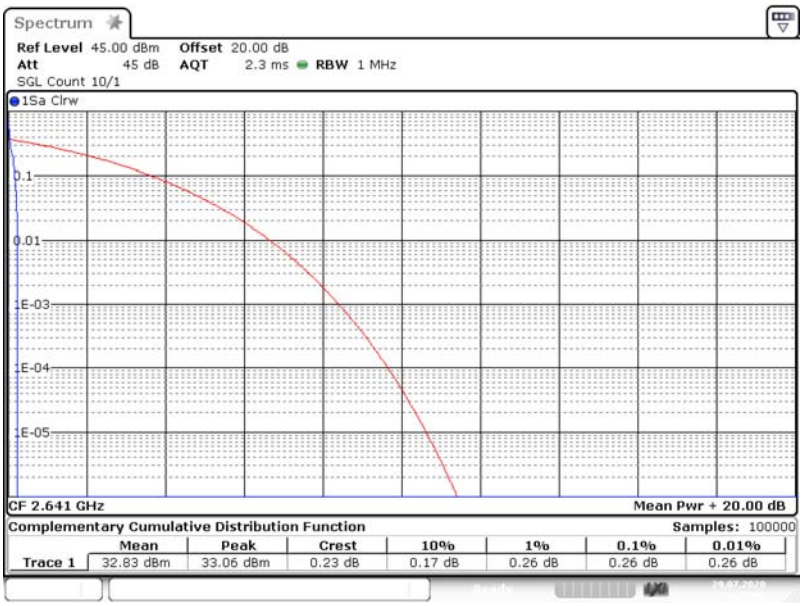
4.0 PAPR AWGN Out +3 2.654G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: GSM; PAPR 0.3 dB < AGC



4.0 PAPR GSM Out -0.3 2.641G

Band: BRS UBS; Frequency: 2.6410 GHz; Band Edge: f0; Mod: GSM; PAPR 3 dB > AGC



4.0 PAPR GSM Out +3 2.641G

4.2.5 TEST EQUIPMENT USED

- Conducted

4.3 OCCUPIED BANDWIDTH/INPUT-VERSUS-OUTPUT SPECTRUM

Standard FCC Part 2.1049; Occupied Bandwidth

The test was performed according to:
ANSI C63.26, KDB 935210 D05 v01r04: 3.4

Test date: .2020-07-28 to 2020-07-30

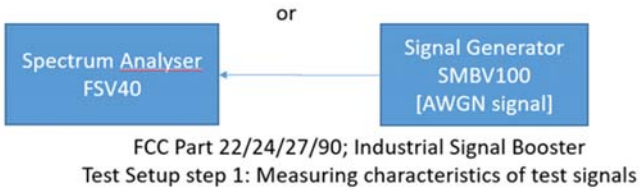
Environmental conditions: 25 ° C; 40 % r. F.

Test engineer: Thomas Hufnagel

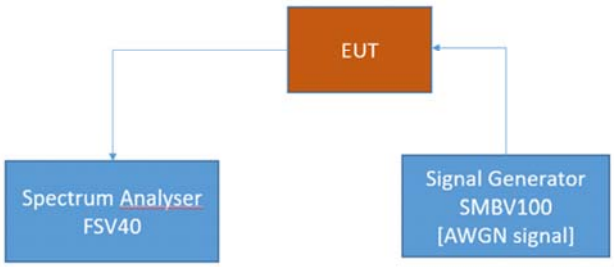
4.3.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission limits per FCC § 2.1049, RSS-GEN with subpart 6.7 and RSS-131 with subpart 5.2.2

The EUT was connected to the test setups according to the following diagram:



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 1: Measuring characteristics of test signals



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 2; Occupied Bandwidth/Input-versus-output spectrum

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.3.2 TEST REQUIREMENTS/LIMITS

Abstract § 2.1049 from FCC:

FCC Part 2.1049; Occupied Bandwidth:

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 0.3 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

(i) Transmitters designed for other types of modulation—when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

Abstract RSS-GEN from ISED:

RSS-GEN; 6.7 Occupied Bandwidth

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "x dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

- The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.

- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

Abstract RSS-131 from ISED:

RSS-131; 5.2.2 Input-versus-output spectrum

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

4.3.3 TEST PROTOCOL

Band 41 BRS (LBS), downlink							
Signal Type	**Input Power**	**Signal Frequency [MHz]**	**Occupied Bandwidth SG [kHz]**	**Occupied Bandwidth Booster [kHz]**	**Delta Occupied Bandwidth [kHz]**	**Limit Delta Occupied Bandwidth [kHz]**	**Margin to Limit [kHz]**
Wideband	0.3 dB < AGC	2532.00	4334.1	4336.5	2.4	205.0	202.6
Wideband	3 dB > AGC	2532.00	4334.1	4335.3	1.2	205.0	203.8
Narrowband	0.3 dB < AGC	2532.00	319.3	318.9	0.4	10.0	9.6
Narrowband	3 dB > AGC	2532.00	315.7	315.8	0.1	10.0	9.9

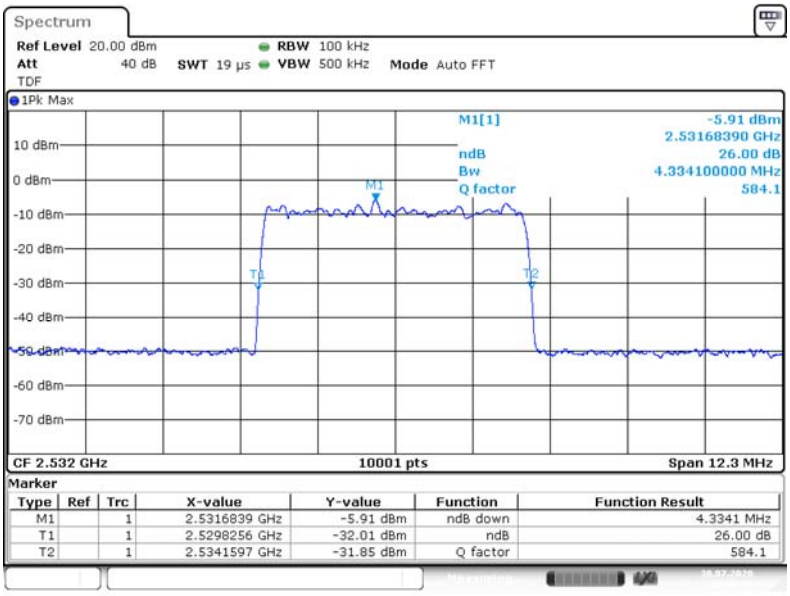
Band 41 BRS (MBS), downlink							
Signal Type	**Input Power**	**Signal Frequency [MHz]**	**Occupied Bandwidth SG [kHz]**	**Occupied Bandwidth Booster [kHz]**	**Delta Occupied Bandwidth [kHz]**	**Limit Delta Occupied Bandwidth [kHz]**	**Margin to Limit [kHz]**
Wideband	0.3 dB < AGC	2593.00	4334.1	4332.9	1.2	205.0	203.8
Wideband	3 dB > AGC	2593.00	4334.1	4335.3	1.2	205.0	203.8
Narrowband	0.3 dB < AGC	2593.00	322.2	318.7	3.5	10.0	6.5
Narrowband	3 dB > AGC	2593.00	318.0	319.5	1.5	10.0	8.5

Band 41 BRS (UBS), downlink							
Signal Type	**Input Power**	**Signal Frequency [MHz]**	**Occupied Bandwidth SG [kHz]**	**Occupied Bandwidth Booster [kHz]**	**Delta Occupied Bandwidth [kHz]**	**Limit Delta Occupied Bandwidth [kHz]**	**Margin to Limit [kHz]**
Wideband	0.3 dB < AGC	2654,00	4334.1	4336.5	2.4	205.0	202.6
Wideband	3 dB > AGC	2654,00	4334.1	4335.3	1.2	205.0	203.8
Narrowband	0.3 dB < AGC	2654,00	319.3	318.9	0.4	10.0	9.6
Narrowband	3 dB > AGC	2654,00	315.7	315.8	0.1	10.0	9.9

Remark: Please see next sub-clause for the measurement plot.

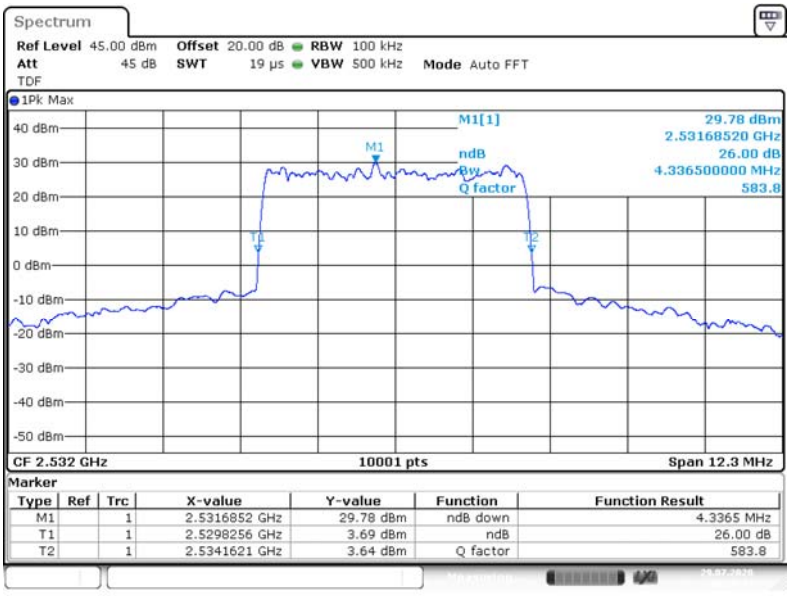
4.3.4 MEASUREMENT PLOT

Band: BRS LBS; Frequency: 2532.0 MHz; Band Edge: mid; Mod: AWGN; Input OCBW 0.3 dB < AGC



3.4 OCBw AWGN In -0.3 2.5320G _26dB

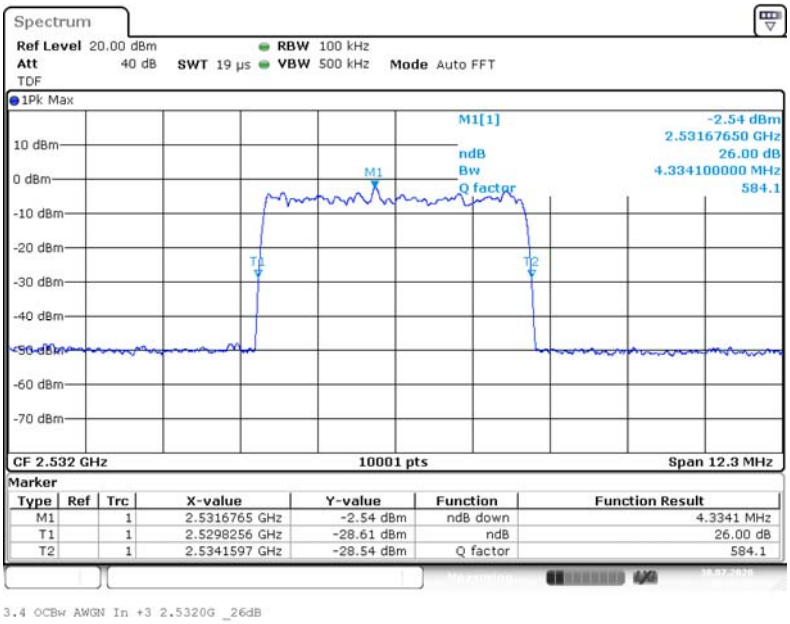
Input Signal



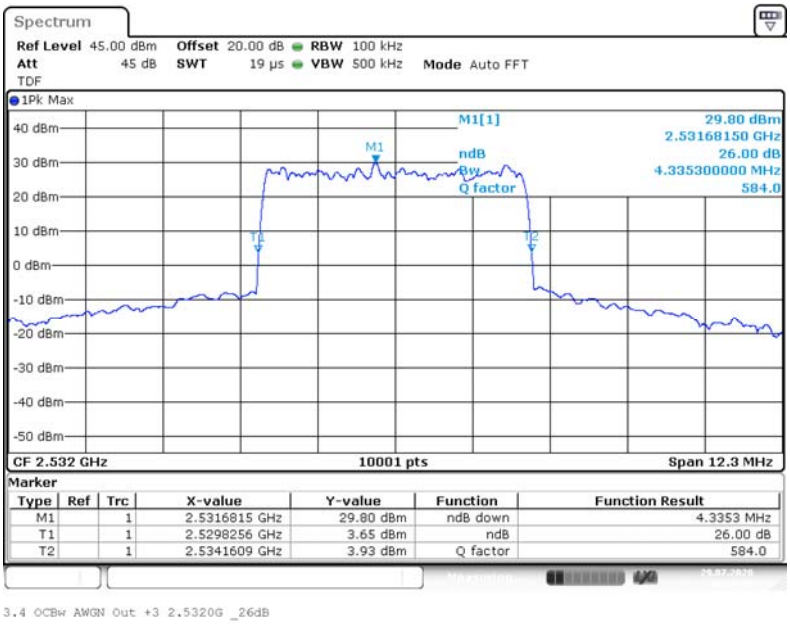
3.4 OCBw AWGN Out -0.3 2.5320G _26dB

Output Signal

Band: BRS LBS; Frequency: 2532.0 MHz; Band Edge: mid; Mod: AWGN; Input OCBW 3 dB > AGC

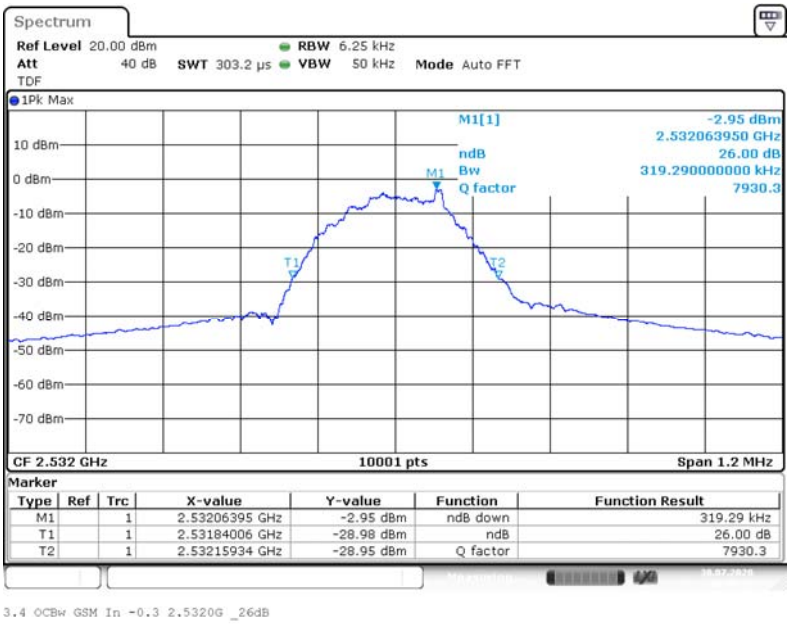


Input Signal

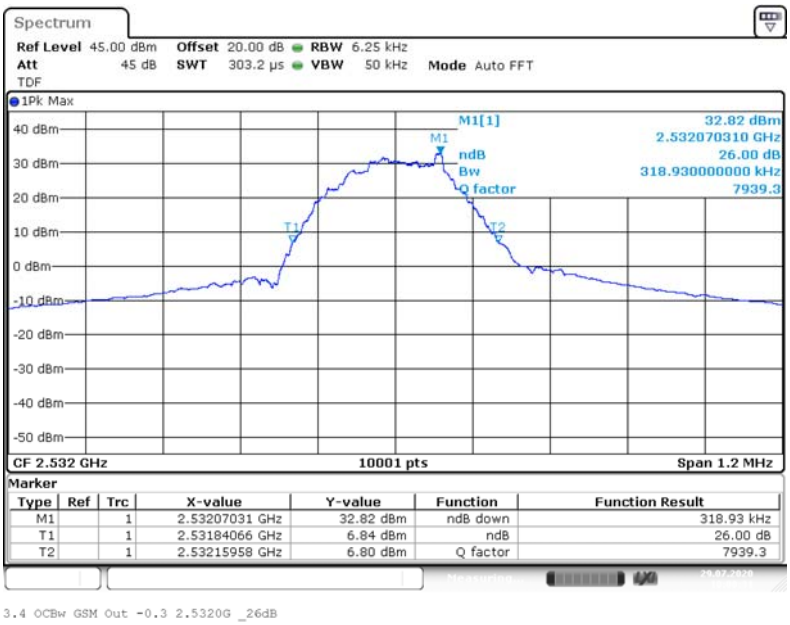


Output Signal

Band: BRS LBS; Frequency: 2532.0 MHz; Band Edge: mid; Mod: GSM; Input OCBW 0.3 dB < AGC

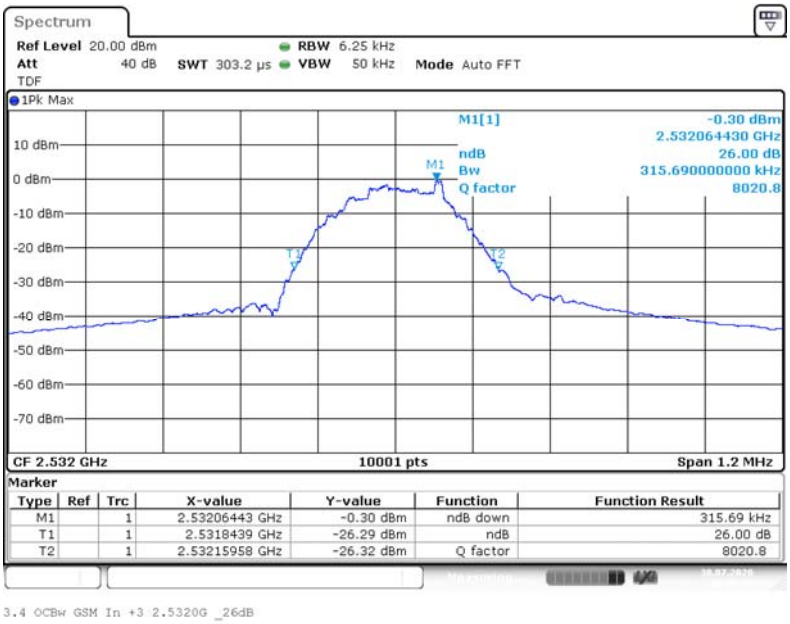


Input Signal

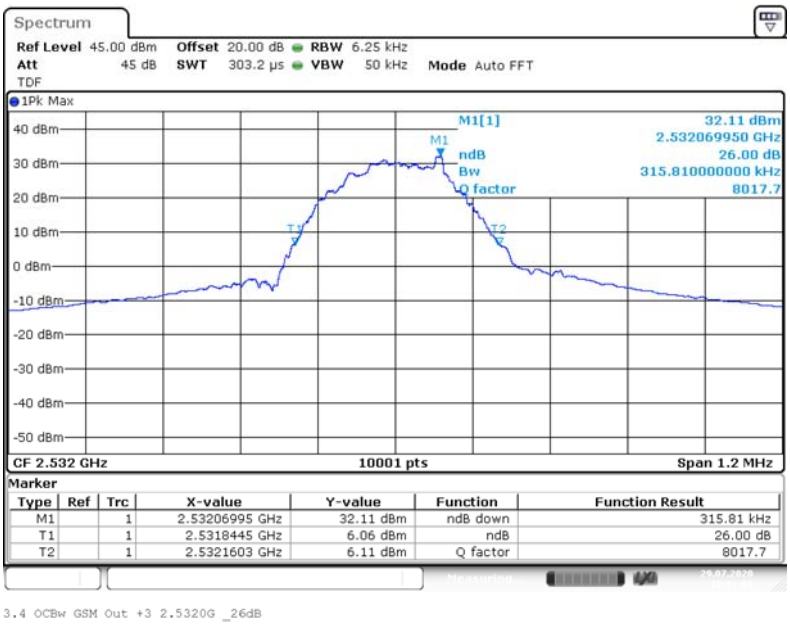


Output Signal

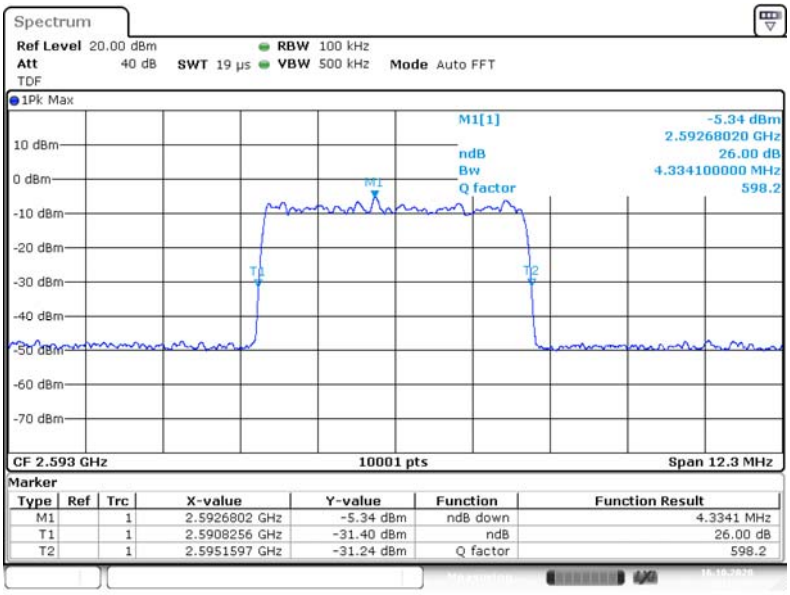
Band: BRS LBS; Frequency: 2532.0 MHz; Band Edge: mid; Mod: GSM; Input OCBW 3 dB > AGC



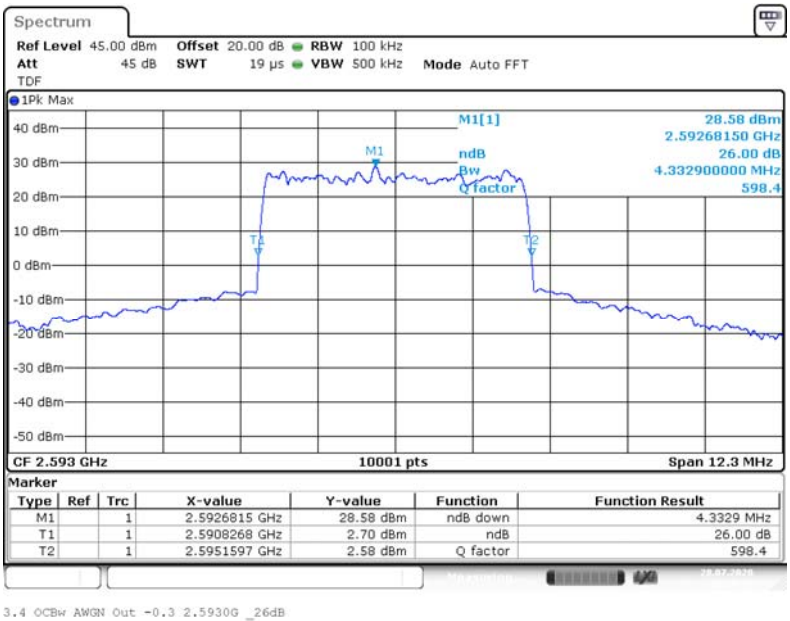
Input Signal



Band: BRS MBS; Frequency: 2593.0 MHz; Band Edge: mid; Mod: AWGN; Input OCBW 0.3 dB < AGC

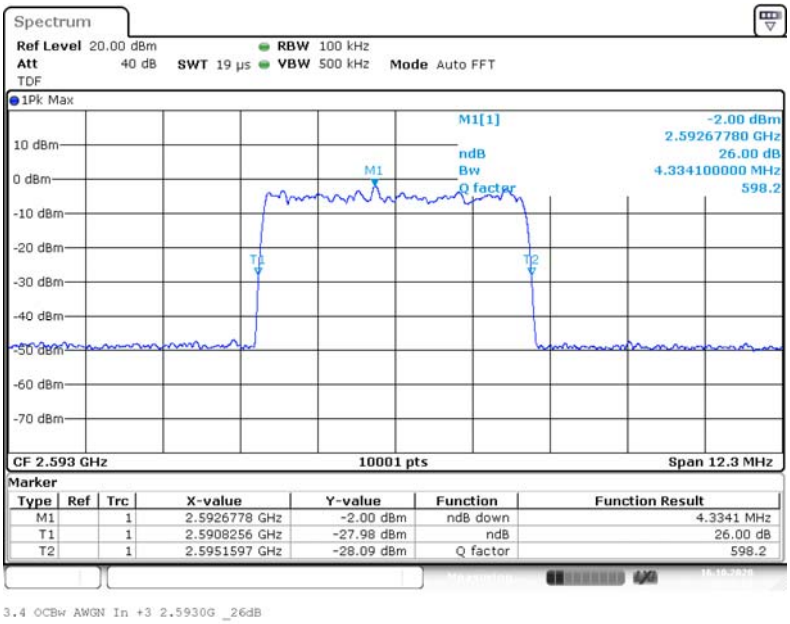


Input Signal

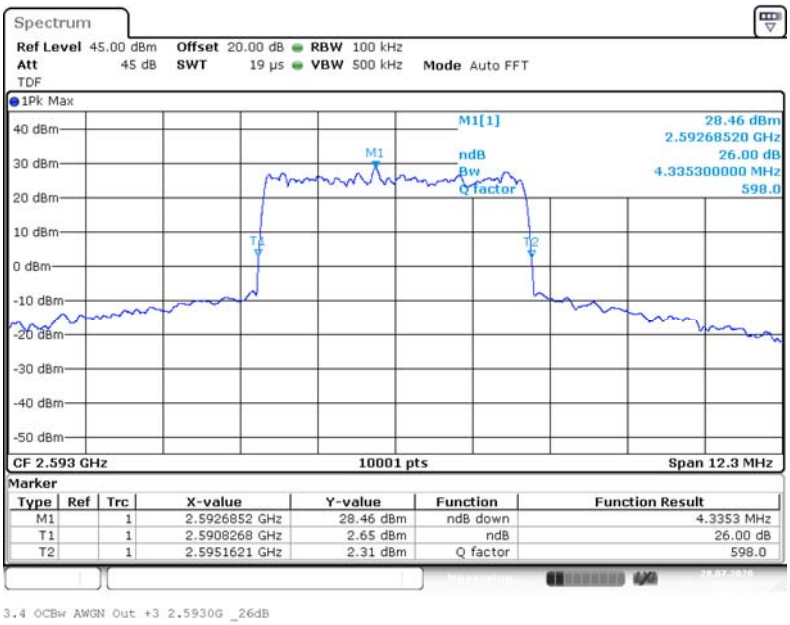


Output Signal

Band: BRS MBS; Frequency: 2593.0 MHz; Band Edge: mid; Mod: AWGN; Input OCBW 3 dB > AGC

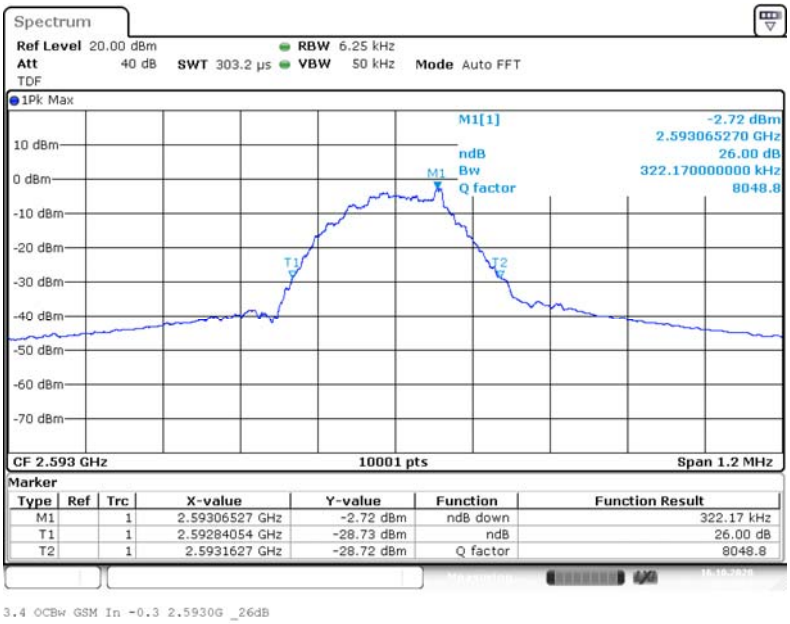


Input Signal

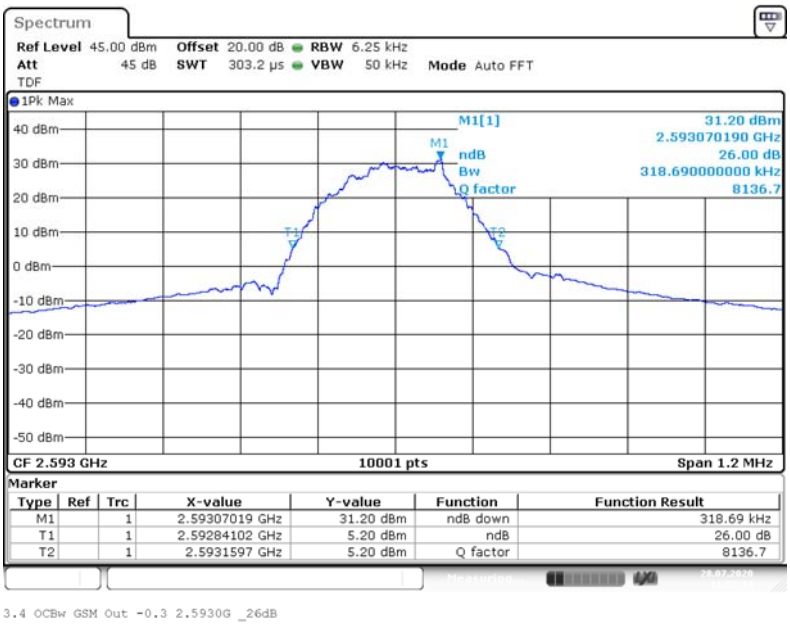


Output Signal

Band: BRS MBS; Frequency: 2593.0 MHz; Band Edge: mid; Mod: GSM; Input OCBW 0.3 dB < AGC

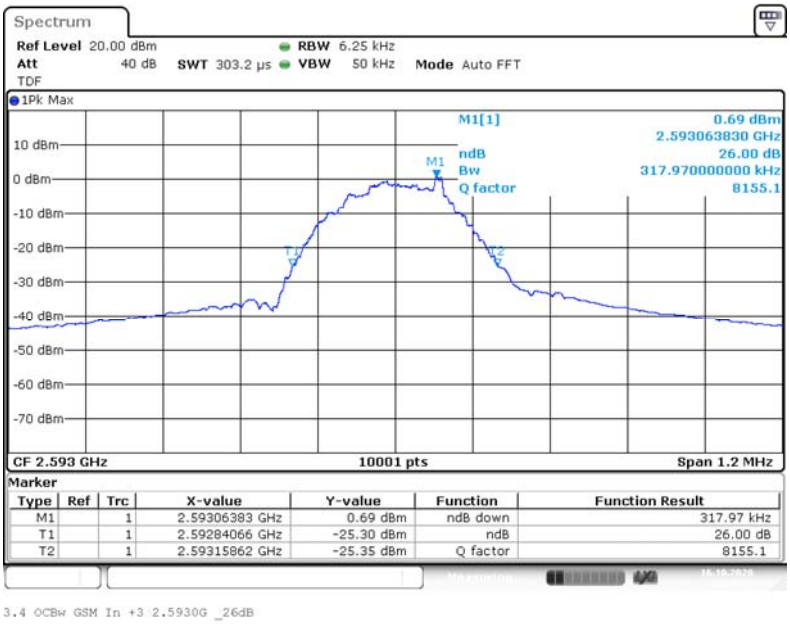


Input Signal

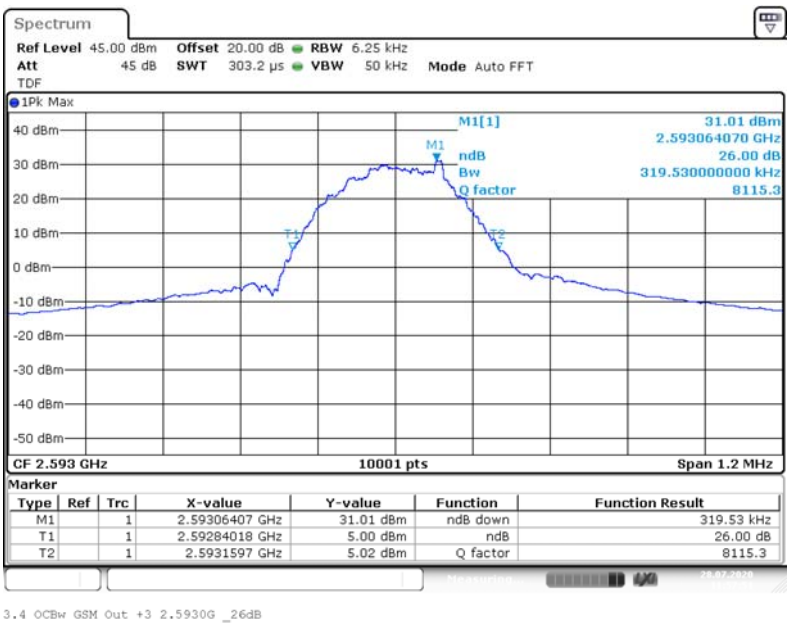


Output Signal

Band: BRS MBS; Frequency: 2593.0 MHz; Band Edge: mid; Mod: GSM; Input OCBW 3 dB > AGC

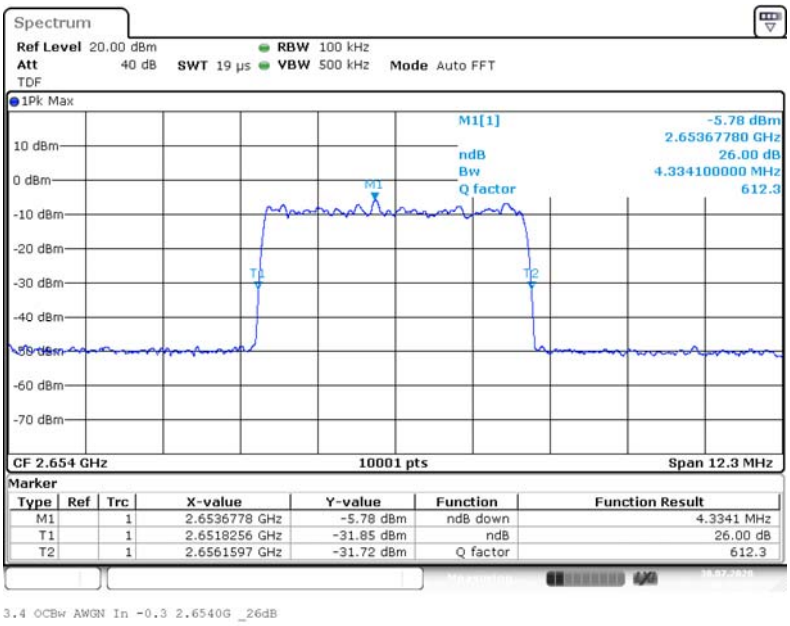


Input Signal

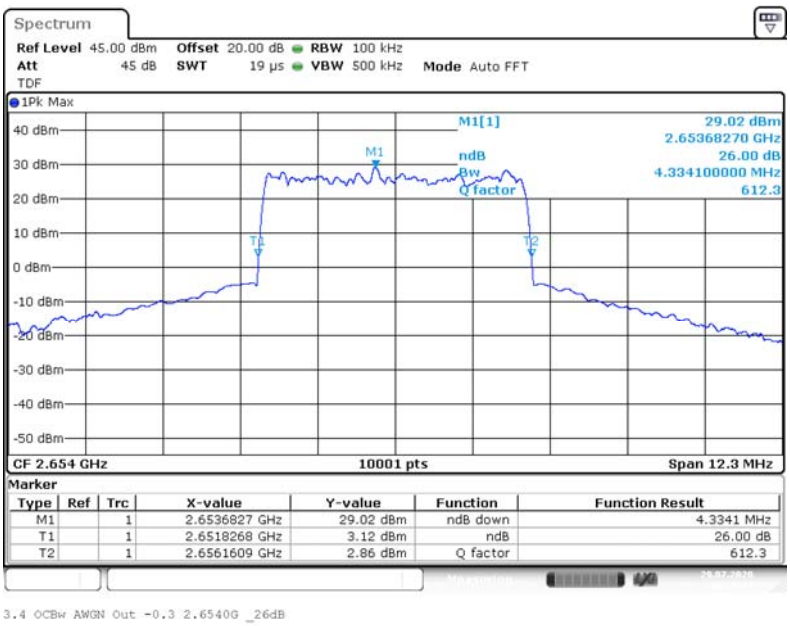


Output Signal

Band: BRS UBS; Frequency: 2.6540 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 0.3 dB < AGC

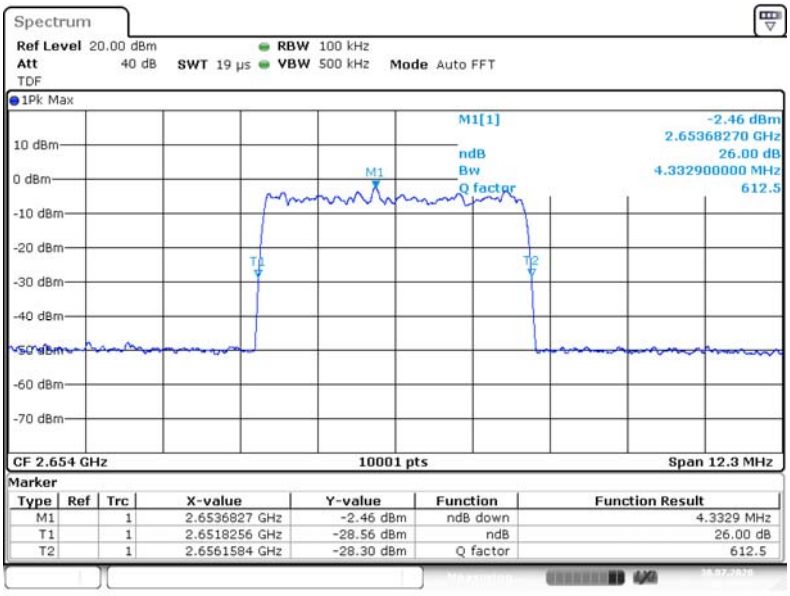


Input Signal

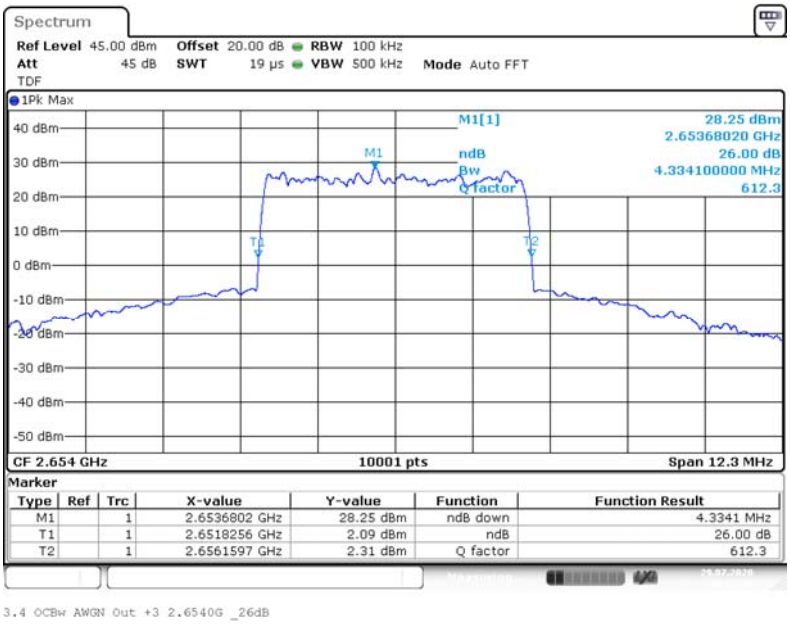


Output Signal

Band: BRS UBS; Frequency: 2.6540 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 3 dB > AGC

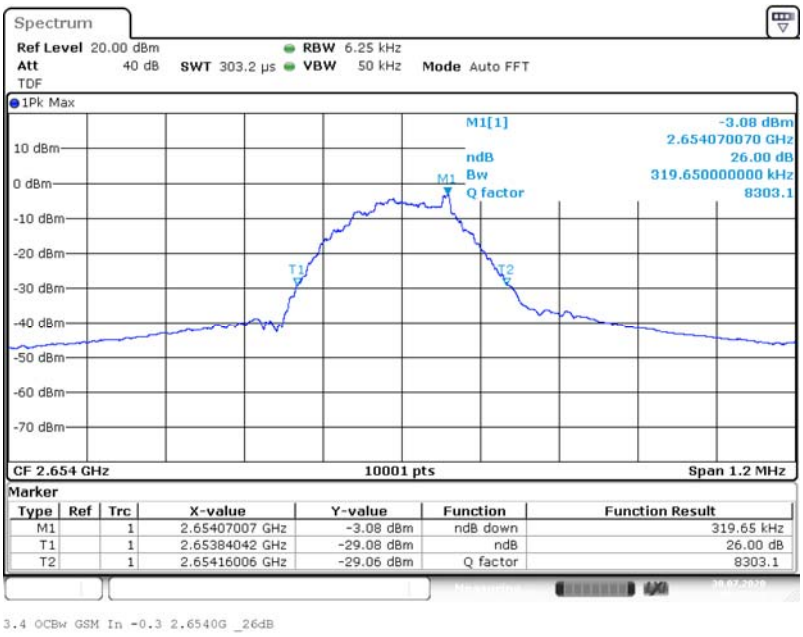


Input Signal

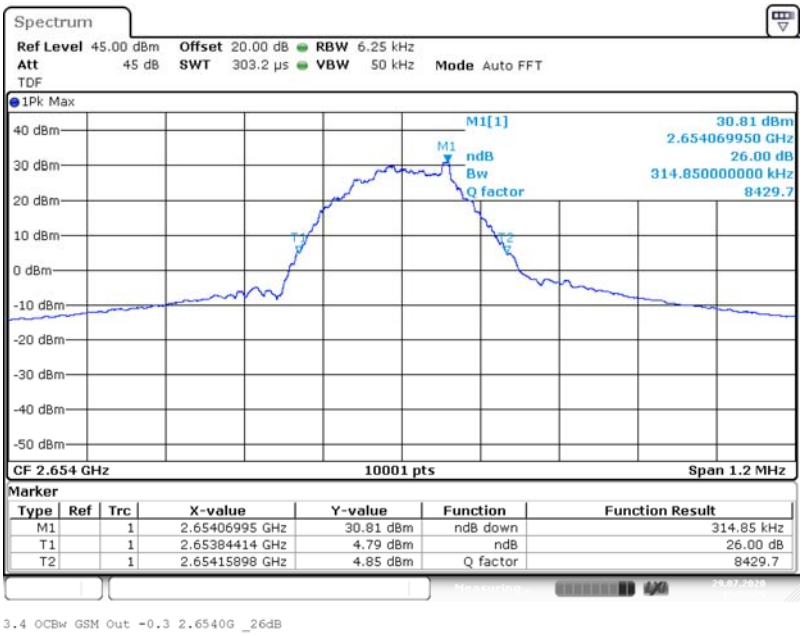


Output Signal

Band: BRS UBS; Frequency: 2.6540 GHz; Band Edge: mid; Mod: GSM; Input OCBw 0.3 dB < AGC

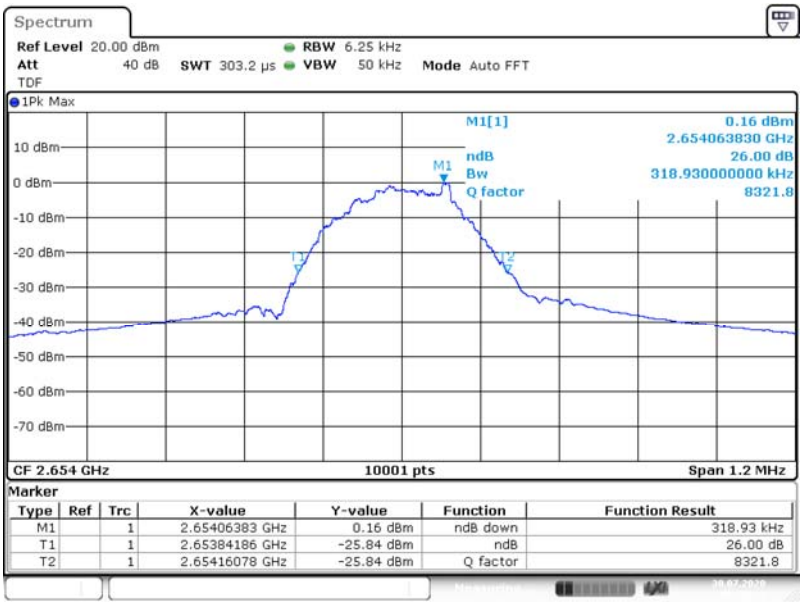


Input Signal

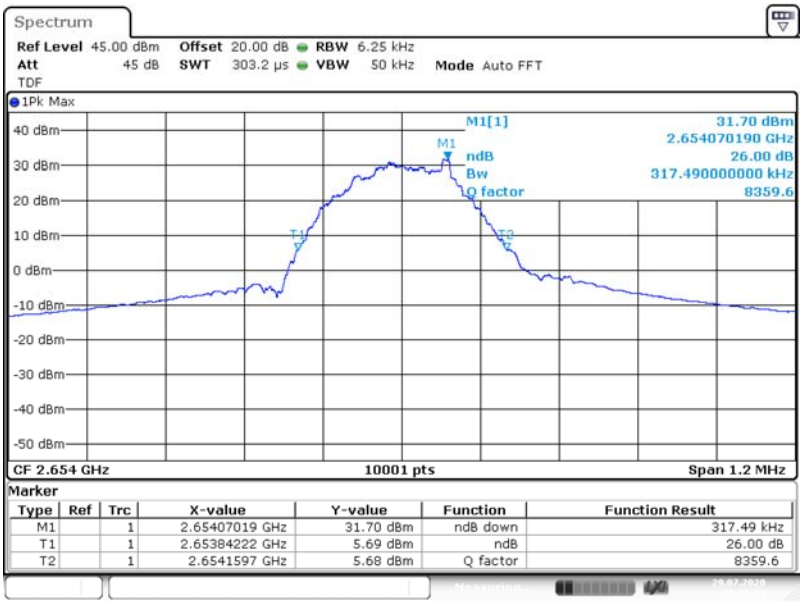


Output Signal

Band: BRS UBS; Frequency: 2.6540 GHz; Band Edge: mid; Mod: GSM; Input OCBw 3 dB > AGC



Input Signal



Output Signal

4.3.5 TEST EQUIPMENT USED

- Conducted

4.4 CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard FCC Part § 2.1051, § 27.53

The test was performed according to:
ANSI C63.26, KDB 935210 D05 v01r04: 3.6

Test date: 2020-09-09

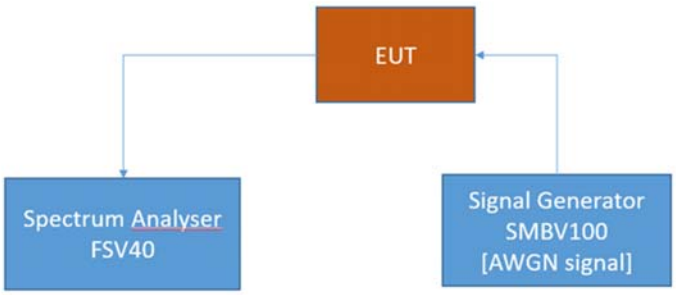
Environmental conditions: 24 ° C; 43 % r. F.

Test engineer: Thomas Hufnagel

4.4.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the signal booster power and gain limits and requirements for industrial signal boosters per FCC § 2.1051, FCC § 27.53, RSS-GEN with subpart 6.13 and RSS-199 with subpart 4.5.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; RF Output Power / Gain

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.4.2 TEST REQUIREMENTS/LIMITS

Abstract § 2.1051 from FCC:

FCC Part 2.1051; Measurement required: Spurious emissions at antenna terminal:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§27.53 – Emission limits

Abstract § 27.53 FCC:

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(1) Prior to the transition, and thereafter, solely within the MBS, for analog operations with an EIRP in excess of −9 dBW, the signal shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies.

(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Abstract RSS-199 from ISED:

RSS-199; 4.5 Transmitter unwanted emissions

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment, and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% or 2% of the occupied bandwidth, as applicable.

Equipment shall comply with the following unwanted emission limits:

(a) for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least 43 + 10 log10 p.

(i) 40 + 10 log10 p from the channel edges to 5 MHz away
(ii) 43 + 10 log10 p between 5 MHz and X MHz from the channel edges, and
(iii) 55 + 10 log10 p at X MHz and beyond from the channel edges.

In addition, the attenuation shall not be less than 43 + 10 log10 p on all frequencies between 2490.5 MHz and 2496 MHz, and 55 + 10 log10 p at or below 2490.5 MHz. (b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

4.4.3 TEST PROTOCOL

Band 41, BRS (LBS), downlink							
Test Frequency	**Signal Type**	**Spurious Freq. [MHz]**	**Spurious Level [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
low	Wideband	0.0487917	-56.0	RMS	1	-33	23.0
low	Wideband	0.0524996	-48.7	RMS	10	-23	25.7
low	Wideband	120.4654	-45.4	RMS	100	-13	32.4
low	Wideband	889.8602	-34.9	RMS	1000	-13	21.9
low	Wideband	2486.8	-35.6	RMS	1000	-13	22.6
low	Wideband	2494.8	-25.2	RMS	100	-13	12.2
low	Wideband	2569.8	-45.4	RMS	100	-13	32.4
low	Wideband	6872.5	-30.6	RMS	1000	-13	17.6
low	Wideband	19911.3	-30.3	RMS	1000	-13	17.3
low	Wideband	20311.2	-29.6	RMS	1000	-13	16.6
mid	Wideband	0.019506	-56.1	RMS	1	-33	23.1
mid	Wideband	0.7723794	-49.3	RMS	10	-23	26.3
mid	Wideband	66.1212	-45.2	RMS	100	-13	32.2
mid	Wideband	892.8572	-34.9	RMS	1000	-13	21.9
mid	Wideband	1670.0	-36.9	RMS	1000	-13	23.9
mid	Wideband	2487.5	-38.0	RMS	100	-13	25.0
mid	Wideband	2572.0	-45.3	RMS	100	-13	32.3
mid	Wideband	6812.0	-31.1	RMS	1000	-13	18.1
mid	Wideband	19581.3	-30.6	RMS	1000	-13	17.6
mid	Wideband	20280.2	-29.6	RMS	1000	-13	16.6
high	Wideband	0.0090205	-60.2	RMS	1	-33	27.2
high	Wideband	0.2374687	-52.1	RMS	10	-23	29.1
high	Wideband	69.5708	-45.4	RMS	100	-13	32.4
high	Wideband	892.8572	-34.5	RMS	1000	-13	21.5
high	Wideband	1854.5	-37.0	RMS	1000	-13	24.0
high	Wideband	2487.5	-39.2	RMS	100	-13	26.2
high	Wideband	2569.0	-29.8	RMS	100	-13	16.8
high	Wideband	6852.5	-30.9	RMS	1000	-13	17.9
high	Wideband	19978.3	-30.4	RMS	1000	-13	17.4
high	Wideband	20312.2	-29.7	RMS	1000	-13	16.7

Band 41, BRS (MBS), downlink							
Test Frequency	**Signal Type**	**Spurious Freq. [MHz]**	**Spurious Level [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
low	Wideband	0.0487917	-56.9	RMS	1	-33	23.9
low	Wideband	0.0524996	-50.0	RMS	10	-23	27.0
low	Wideband	69.3208	-45.0	RMS	100	-13	32.0
low	Wideband	849.4006	-35.1	RMS	1000	-13	22.1
low	Wideband	2512.3	-34.6	RMS	1000	-13	21.6
low	Wideband	2571.0	-28.3	RMS	100	-13	15.3
low	Wideband	2615.2	-44.6	RMS	100	-13	31.6
low	Wideband	6886.0	-30.8	RMS	1000	-13	17.8
low	Wideband	19538.8	-30.2	RMS	1000	-13	17.2
low	Wideband	20321.2	-30.2	RMS	1000	-13	17.2
mid	Wideband	0.0488327	-57.9	RMS	1	-33	24.9
mid	Wideband	0.0524996	-49.0	RMS	10	-23	26.0
mid	Wideband	127.5146	-45.9	RMS	100	-13	32.9
mid	Wideband	893.8561	-34.6	RMS	1000	-13	21.6
mid	Wideband	2512.8	-34.1	RMS	1000	-13	21.1
mid	Wideband	2571.0	-44.3	RMS	100	-13	31.3
mid	Wideband	2615.0	-44.7	RMS	100	-13	31.7
mid	Wideband	6802.0	-30.0	RMS	1000	-13	17.0
mid	Wideband	19943.3	-30.8	RMS	1000	-13	17.8
mid	Wideband	20305.7	-30.2	RMS	1000	-13	17.2
high	Wideband	0.0273292	-58.1	RMS	1	-33	25.1
high	Wideband	0.0524996	-50.6	RMS	10	-23	27.6
high	Wideband	122.7151	-45.3	RMS	100	-13	32.3
high	Wideband	721.029	-35.4	RMS	1000	-13	22.4
high	Wideband	2512.8	-33.7	RMS	1000	-13	20.7
high	Wideband	2568.5	-44.4	RMS	100	-13	31.4
high	Wideband	2615.7	-30.8	RMS	100	-13	17.8
high	Wideband	6882.0	-31.1	RMS	1000	-13	18.1
high	Wideband	19552.8	-30.8	RMS	1000	-13	17.8
high	Wideband	20277.2	-30.2	RMS	1000	-13	17.2

Band 41, BRS (UBS), downlink							
Test Frequency	**Signal Type**	**Spurious Freq. [MHz]**	**Spurious Level [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
low	Wideband	0,0487917	-58,1	RMS	1	-33	25,1
low	Wideband	0,0524996	-51,5	RMS	10	-23	28,5
low	Wideband	118,1656	-45,3	RMS	100	-13	32,3
low	Wideband	711,5384	-35,2	RMS	1000	-13	22,2
low	Wideband	2487,8	-35,2	RMS	1000	-13	22,2
low	Wideband	2564,5	-45,0	RMS	100	-13	32,0
low	Wideband	2622,2	20,4	RMS	100	-13	-33,4
low	Wideband	2618,5	17,1	RMS	1000	-13	-30,1
low	Wideband	19563,3	-30,4	RMS	1000	-13	17,4
low	Wideband	20317,2	-30,0	RMS	1000	-13	17,0
mid	Wideband	0,0487917	-60,0	RMS	1	-33	27,0
mid	Wideband	0,0874937	-52,1	RMS	10	-23	29,1
mid	Wideband	67,871	-44,1	RMS	100	-13	31,1
mid	Wideband	891,3587	-34,3	RMS	1000	-13	21,3
mid	Wideband	2512,8	-35,7	RMS	1000	-13	22,7
mid	Wideband	2564,2	-45,0	RMS	100	-13	32,0
mid	Wideband	2619,1	-36,9	RMS	100	-13	23,9
mid	Wideband	2655,2	27,7	RMS	1000	-13	-40,7
mid	Wideband	19552,3	-30,9	RMS	1000	-13	17,9
mid	Wideband	20355,2	-29,9	RMS	1000	-13	16,9
high	Wideband	0,0090205	-59,5	RMS	1	-33	26,5
high	Wideband	0,0524996	-53,0	RMS	10	-23	30,0
high	Wideband	119,8154	-44,4	RMS	100	-13	31,4
high	Wideband	851,3986	-35,2	RMS	1000	-13	22,2
high	Wideband	2487,8	-35,1	RMS	1000	-13	22,1
high	Wideband	2563,6	-44,1	RMS	100	-13	31,1
high	Wideband	2621,4	-37,1	RMS	100	-13	24,1
high	Wideband	2689,2	25,8	RMS	1000	-13	-38,8
high	Wideband	19541,8	-31,0	RMS	1000	-13	18,0
high	Wideband	20253,2	-30,0	RMS	1000	-13	17,0

Band 41, BRS (LBS), downlink							
Test Frequency	**Signal Type**	**Spurious Freq. [MHz]**	**Spurious Level [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
low	Narrowband	0.0097987	-60.8	RMS	1	-33	27.8
low	Narrowband	0.1524829	-54.4	RMS	10	-23	31.4
low	Narrowband	68.071	-45.1	RMS	100	-13	32.1
low	Narrowband	850.3996	-34.9	RMS	1000	-13	21.9
low	Narrowband	2368.3	-36.8	RMS	1000	-13	23.8
low	Narrowband	2483.3	-38.1	RMS	100	-13	25.1
low	Narrowband	2569.5	-45.5	RMS	100	-13	32.5
low	Narrowband	6185.0	-31.0	RMS	1000	-13	18.0
low	Narrowband	19993.2	-30.5	RMS	1000	-13	17.5
low	Narrowband	20335.2	-29.9	RMS	1000	-13	16.9
mid	Narrowband	0.0091024	-60.9	RMS	1	-33	27.9
mid	Narrowband	0.0824946	-55.6	RMS	10	-23	32.6
mid	Narrowband	73.8203	-45.9	RMS	100	-13	32.9
mid	Narrowband	892.3576	-34.4	RMS	1000	-13	21.4
mid	Narrowband	2482.3	-36.1	RMS	1000	-13	23.1
mid	Narrowband	2483.8	-37.9	RMS	100	-13	24.9
mid	Narrowband	2575.5	-45.2	RMS	100	-13	32.2
mid	Narrowband	6870.5	-31.0	RMS	1000	-13	18.0
mid	Narrowband	19550.3	-30.7	RMS	1000	-13	17.7
mid	Narrowband	20337.7	-29.9	RMS	1000	-13	16.9
high	Narrowband	0.0129935	-61.6	RMS	1	-33	28.6
high	Narrowband	0.0574988	-54.5	RMS	10	-23	31.5
high	Narrowband	117.5657	-45.3	RMS	100	-13	32.3
high	Narrowband	894.3556	-34.9	RMS	1000	-13	21.9
high	Narrowband	1904.4	-37.2	RMS	1000	-13	24.2
high	Narrowband	2487.5	-39.6	RMS	100	-13	26.6
high	Narrowband	2569.7	-44.0	RMS	100	-13	31.0
high	Narrowband	6856.0	-31.0	RMS	1000	-13	18.0
high	Narrowband	19540.8	-31.1	RMS	1000	-13	18.1
high	Narrowband	20274.7	-29.9	RMS	1000	-13	16.9

Band 41, BRS (MBS), downlink							
Test Frequency	**Signal Type**	**Spurious Freq. [MHz]**	**Spurious Level [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
low	Narrowband	0.0097168	-59.1	RMS	1	-33	26.1
low	Narrowband	0.0524996	-54.3	RMS	10	-23	31.3
low	Narrowband	68.6209	-44.5	RMS	100	-13	31.5
low	Narrowband	709.041	-34.7	RMS	1000	-13	21.7
low	Narrowband	2512.8	-33.2	RMS	1000	-13	20.2
low	Narrowband	2567.1	-40.5	RMS	100	-13	27.5
low	Narrowband	2622.2	-44.1	RMS	100	-13	31.1
low	Narrowband	6868.5	-30.8	RMS	1000	-13	17.8
low	Narrowband	19539.8	-30.3	RMS	1000	-13	17.3
low	Narrowband	20300.2	-29.6	RMS	1000	-13	16.6
mid	Narrowband	0.0095529	-60.4	RMS	1	-33	27.4
mid	Narrowband	0.0924929	-54.1	RMS	10	-23	31.1
mid	Narrowband	68.8209	-45.0	RMS	100	-13	32.0
mid	Narrowband	850.3996	-34.2	RMS	1000	-13	21.2
mid	Narrowband	2512.8	-35.5	RMS	1000	-13	22.5
mid	Narrowband	2571.0	-43.7	RMS	100	-13	30.7
mid	Narrowband	2615.8	-44.8	RMS	100	-13	31.8
mid	Narrowband	6913.0	-31.1	RMS	1000	-13	18.1
mid	Narrowband	19546.3	-30.4	RMS	1000	-13	17.4
mid	Narrowband	20304.7	-29.2	RMS	1000	-13	16.2
high	Narrowband	0.0091024	-62.0	RMS	1	-33	29.0
high	Narrowband	0.0524996	-55.2	RMS	10	-23	32.2
high	Narrowband	125.3149	-45.2	RMS	100	-13	32.2
high	Narrowband	892.8572	-33.9	RMS	1000	-13	20.9
high	Narrowband	2487.8	-34.9	RMS	1000	-13	21.9
high	Narrowband	2563.4	-45.0	RMS	100	-13	32.0
high	Narrowband	2615.0	-44.6	RMS	100	-13	31.6
high	Narrowband	6728.5	-31.0	RMS	1000	-13	18.0
high	Narrowband	19617.3	-30.9	RMS	1000	-13	17.9
high	Narrowband	20293.2	-29.6	RMS	1000	-13	16.6

Band 41, BRS (UBS), downlink							
Test Frequency	**Signal Type**	**Spurious Freq. [MHz]**	**Spurious Level [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
low	Narrowband	0,0138946	-61,0	RMS	1	-33	28,0
low	Narrowband	0,0524996	-54,2	RMS	10	-23	31,2
low	Narrowband	118,8655	-44,6	RMS	100	-13	31,6
low	Narrowband	851,3986	-35,0	RMS	1000	-13	22,0
low	Narrowband	2518,3	-34,8	RMS	1000	-13	21,8
low	Narrowband	2568,2	-44,6	RMS	100	-13	31,6
low	Narrowband	2618,2	32,1	RMS	100	-13	-45,1
low	Narrowband	2617,9	-26,6	RMS	1000	-13	13,6
low	Narrowband	19563,8	-30,6	RMS	1000	-13	17,6
low	Narrowband	20306,7	-30,0	RMS	1000	-13	17,0
mid	Narrowband	0,0090205	-60,9	RMS	1	-33	27,9
mid	Narrowband	0,0824946	-55,8	RMS	10	-23	32,8
mid	Narrowband	66,6711	-45,4	RMS	100	-13	32,4
mid	Narrowband	849,9001	-33,3	RMS	1000	-13	20,3
mid	Narrowband	2513,3	-34,9	RMS	1000	-13	21,9
mid	Narrowband	2563,0	-44,7	RMS	100	-13	31,7
mid	Narrowband	2620,4	-35,2	RMS	100	-13	22,2
mid	Narrowband	2654,2	32,7	RMS	1000	-13	-45,7
mid	Narrowband	19913,3	-30,8	RMS	1000	-13	17,8
mid	Narrowband	20330,2	-29,8	RMS	1000	-13	16,8
high	Narrowband	0,0092662	-61,5	RMS	1	-33	28,5
high	Narrowband	0,1024912	-55,3	RMS	10	-23	32,3
high	Narrowband	119,6155	-45,0	RMS	100	-13	32,0
high	Narrowband	850,3996	-35,1	RMS	1000	-13	22,1
high	Narrowband	2490,3	-33,2	RMS	1000	-13	20,2
high	Narrowband	2565,5	-45,2	RMS	100	-13	32,2
high	Narrowband	2622,2	-37,6	RMS	100	-13	24,6
high	Narrowband	2689,7	30,1	RMS	1000	-13	-43,1
high	Narrowband	19548,8	-31,0	RMS	1000	-13	18,0

Remark: Please see next sub-clause for the measurement plot.

General cosiderations concerning the measurement plots:

The measuring bandwidth of 100 kHz was chosen according the test requirements exept at the band edges: At the band edges reducing of measurement bandwidth was necessary to prevent overlaying the RF-signal over the spurious emissions.
Also outside the downlink frequency band ath lower frequencies the measurement bandwidths were reduced to have the possibility to record the spurious emissions at these lower frequencies.

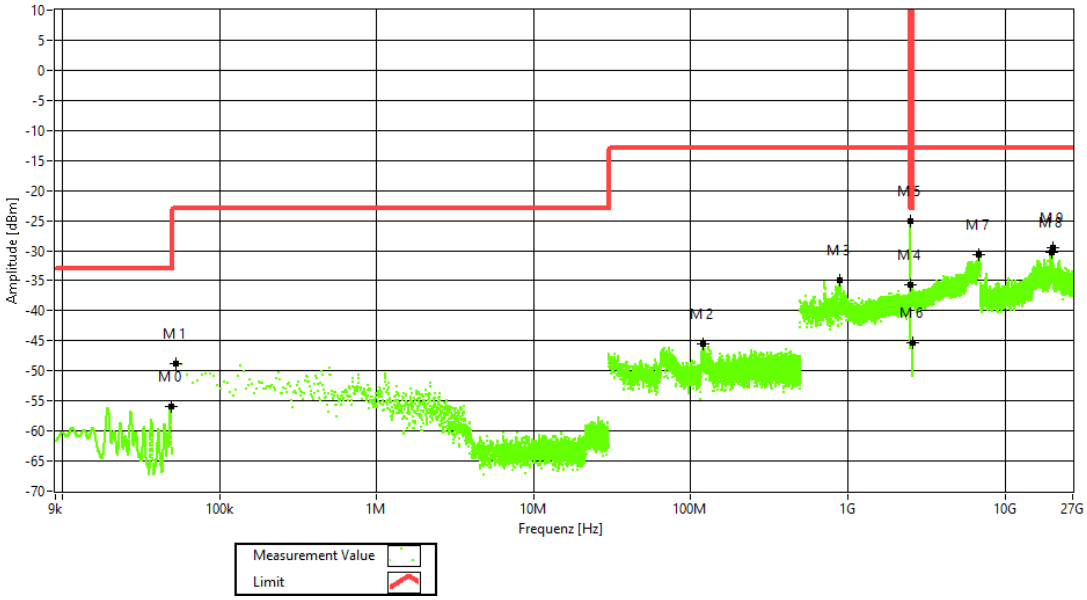
At frequencies were measuring bandwidths were reduced also the border lines were reduced acoording the given formula:

$$p\ RBWreduced\ [dBm] = 10 * \log\left(RBWreduced\ [kHz] — 100\ kHz\right) + pRBW\ 100\ kHz[dBm]$$

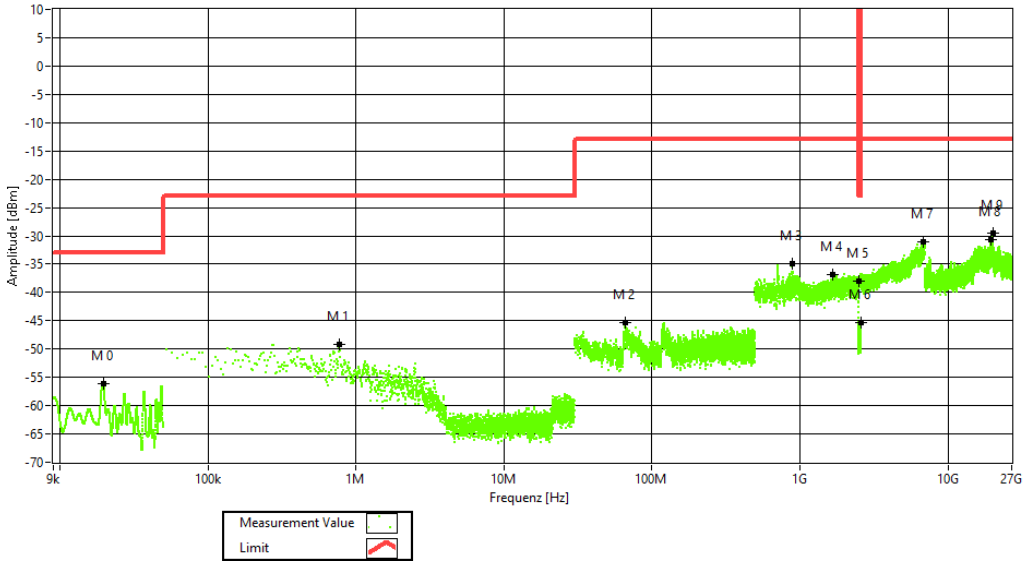
Hereby "p" are the border lines' values.

4.4.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

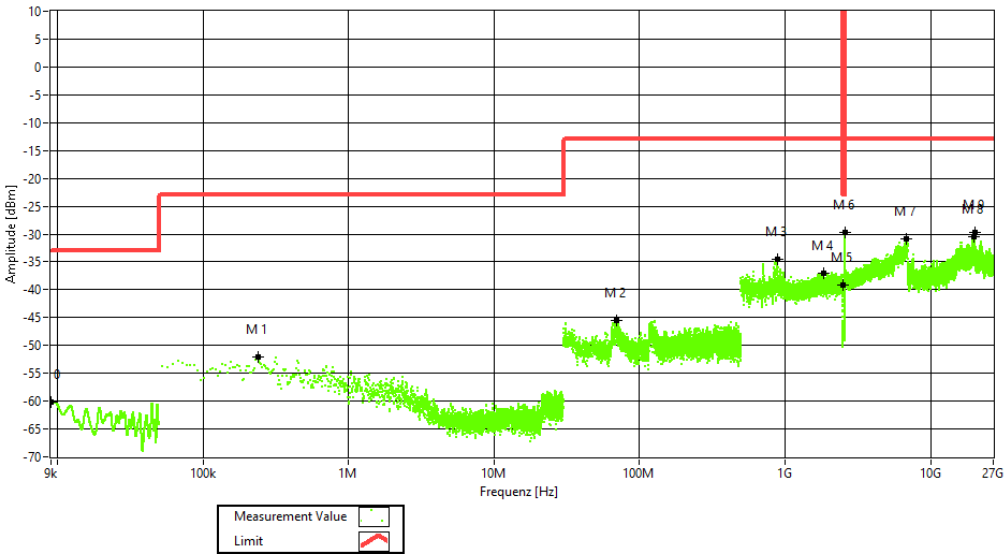
Frequency Band = BRS LBS, Test Frequency = low, Direction = RF downlink, Signal Type = AWGN



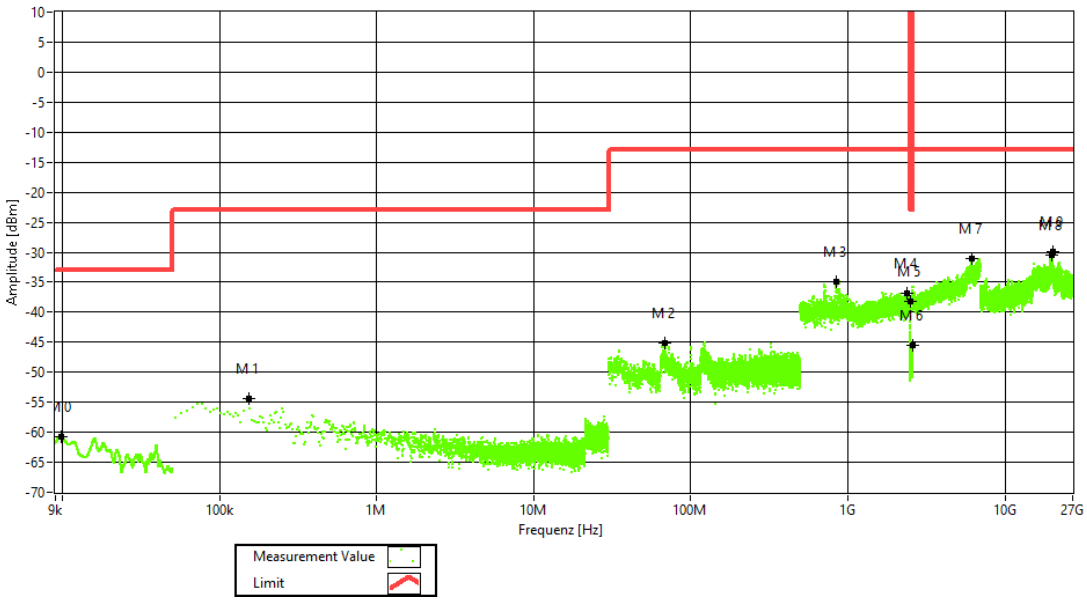
Frequency Band = BRS LBS, Test Frequency = mid, Direction = RF downlink, Signal Type = AWGN



Frequency Band = BRS LBS, Test Frequency = high, Direction = RF downlink, Signal Type = AWGN



Frequency Band = BRS LBS, Test Frequency = low, Direction = RF downlink, Signal Type = GSM



Frequency Band = BRS LBS, Test Frequency = mid, Direction = RF downlink, Signal Type = GSM