

Test report 2023-0314-EMC-TR-23-0214-V01

Test Result:	Passed
	customer.
Test Plan:	"Infoblatt_für_CAP M2 17E_19_21_25T_ID7856326-1010 " from
	and Part 27:2023-10-13
	FCC Rules and Regulations as listed in 47 CFR, Part 20
Test Specification(s):	ANSI 63.26:2015
FCC ID	XS5-CAPM217192325
-	
ID No.	7856326-1010 Rev: 00
Serial No(s):	FICMBA2338001
Manufacturer:	Commscope
Designation:	CAP M2 17E/19/23/25T [BRS] F-AC-F1

Date of issue:	2024-01-31		Signature:
Version:	01	Technical	
Date of delivery:	2023-10-13	Reviewer:	
Performance date:	2023-10-26 to 2023-12-11	Report Reviewer:	

Bundesnetzagentur

BNetzA-CAB-19/21-20



The test results relates only to the tested item. The sample has been provided by the client. Without the written consent of Burau Veritas Consumer Products Services Germany GmbH excerpts of this report shall not be reproduced.

Bureau Veritas Consumer Products ServicesSchwerin Tuerkheim Germany GmbH Wilhelm-Hennemann-Str. 8, 19061 Schwerin Businesspark A96, 86842 Tuerkheim www.bureauveritas.de/cps cps-schwerin@bureauveritas.com cps-tuerkheim@bureauveritas.com Tel.: +49 (0)40 - 740 41 - 0 Managing Director: Sebastian Doose / StefanHamburg Nuremberg Oehleckerring 40, 22419 Hamburg Kischka Thurn-und-Taxis-Str. 18, 90411 Nuremberg VAT-No.: DE164793120 cps-hamburg@bureauveritas.com cps-nuernberg@bureauveritas.com Reg.No.: Schwerin HRB 3564

RPRT-0168-NU-V01 / TEMP-0059-NU-V01

Client:	Commscope	
	Andrew Wireless System GmbH	
	Industriering 10	
	86675 Buchdorf	
	Germany	
Test laboratory:	Bureau Veritas Consumer Products Se	ervices Germany GmbH
	Thurn-und-Taxis-Straße 18	
	D-90411 Nürnberg	
	Tel.: +49 40 74041 0	
Test location:	Bureau Veritas Consumer Products Se	ervices Germany GmbH
	Thurn-und-Taxis-Straße 18	
	D-90411 Nürnberg	
	Laboratory accreditation no:	DAkkS D-PL-12024-06-04
	,	BNETZA-CAB-19/21-20
	FCC Designation Number:	DE0023
	FCC Test Firm Registration:	366481

Versions management:

V 01.00 Initial release



Table of Contents

1	AP	PLIED STANDARDS AND TEST SUMMARY	6
	1.1	CFR APPLIED STANDARDS	6
	1.2	FCC REFERENCE TABLE	7
	1.3	MEASUREMENT SUMMARY/SIGNATURES	8
2	AD	MINISTRATIVE DATA	.15
	2.1	TESTING LABORATORY	.15
	2.2	APPLICANT DATA	.15
	2.3	MANUFACTURER DATA	.15
3	TES	ST OBJECT DATA	.16
	3.1	GENERAL EUT DESCRIPTION	.16
	3.2	EUT MAIN COMPONENTS	.17
	3.3	ANCILLARY EQUIPMENT	.17
	3.4	AUXILIARY EQUIPMENT	.18
	3.5	EUT SETUPS	.19
	3.6	OPERATING MODES	.20
	3.6	5.1 TEST CHANNELS	.20
	3.6	5.2 DEFINITION OF USED FREQUENCY BANDS	.20
		5.3 AUTOMATIC GAIN CONTROL LEVEL	
	3.6	5.4 REMARKS TO THE MEASUREMENTS	.22
		PRODUCT LABELLING	
		7.1 FCC ID LABEL	
	3.7	7.2 LOCATION OF THE LABEL ON THE EUT	.22
4	TES	ST RESULTS	.23
	4.1	EFFECTIVE RADIATED POWER, MEAN OUTPUT POWER AND ZONE ENHANCER GAIN	
	4.1		
	4.1	1.2 TEST REQUIREMENTS/LIMITS	.24
	4.1	1.3 TEST PROTOCOL	.25
	4.1	1.4 MEASUREMENT PLOT	.27
	4.1	1.5 TEST EQUIPMENT USED	.39
	4.2	PEAK TO AVERAGE RATIO	.40
	4.2	2.1 TEST DESCRIPTION	.40



4.2.2	TEST REQUIREMENTS/LIMITS	41
4.2.3	TEST PROTOCOL	
4.2.4	MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE. "WORST CA	\SE").43
4.2.5	TEST EQUIPMENT USED	-
4.3 OC	CUPIED BANDWIDTH/INPUT-VERSUS-OUTPUT SPECTRUM	48
4.3.1	TEST DESCRIPTION	48
4.3.2	TEST REQUIREMENTS/LIMITS	49
4.3.3	TEST PROTOCOL	50
4.3.4	MEASUREMENT PLOT	51
4.3.5	TEST EQUIPMENT USED	63
4.4 CO	NDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS	64
4.4.1	TEST DESCRIPTION	64
4.4.2	TEST REQUIREMENTS/LIMITS	65
4.4.3	TEST PROTOCOL	67
4.4.4	MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE. "WORST CA	ASE").74
4.4.5	TEST EQUIPMENT USED	86
4.5 OU	T-OF-BAND EMISSION LIMITS	87
4.5.1	TEST DESCRIPTION	87
4.5.2	TEST REQUIREMENTS/LIMITS	88
4.5.3	TEST PROTOCOL	89
4.5.4	MEASUREMENT PLOT	91
4.5.5	TEST EQUIPMENT USED	111
4.6 OU	T-OF-BAND REJECTION	112
4.6.1	TEST DESCRIPTION	112
4.6.2	TEST REQUIREMENTS/LIMITS	112
4.6.3	TEST PROTOCOL	113
4.6.4	MEASUREMENT PLOTS	114
4.6.5	TEST EQUIPMENT USED	115
4.7 FR	EQUENCY STABILITY	116
4.8 FIE	LD STRENGTH OF SPURIOUS RADIATION	117
4.8.1	TEST DESCRIPTION	117
4.8.2	TEST REQUIREMENTS/LIMITS	121
4.8.3	TEST PROTOCOL	122
4.8.4	MEASUREMENT PLOTS (SHOWING THE HIGHEST VALUE. "WORST C	-
	WITH ONE ANTENNA	125



	4	.8.5	MEASUREMENT PLOTS (SHOWING THE HIGHEST VALUE. "WORST CAS	
			WITH TWO ANTENNAS (MIMO) FIELD STRENGTH CALCULATIONS TEST EQUIPMENT USED	137
5			QUIPMENT	
J	5.1		NDUCTED EMISSIONS	
	5.2	RAD	DIATED EMISSIONS	138
6	А	NTEN	NA FACTORS. CABLE LOSS AND SAMPLE CALCULATIONS	139
	6.1	ANT	FENNA CHASE CBL 6111C (30 MHZ – 1 GHZ)	139
	6.2	ANT	FENNA ROHDE & SCHWARZ HL 025 (1 GHZ – 18 GHZ)	140
	6.3		FENNA ARA INC. MWH-1826-B (18 GHZ – 26.5 GHZ) PARTIALLY IN NJUNCTION WITH PRE-AMPLIFIER MITEQ JS43-1800-4000: THE USE O	F
		THE	PRE-AMPLIFIER IS DEPENDENT FROM THE FIELD STRENGTH	141
7	Ν	1EASU	REMENT UNCERTAINTIES	142
8	Ρ	ното	REPORT	143
A	NNE	EX A: A	ACCREDITATION CERTIFICATE (FOR INFORMATION)	144
A	NNE	EX B: A	ADDITIONAL INFORMATION PROVIDED BY CLIENT	145



1 APPLIED STANDARDS AND TEST SUMMARY

1.1 CFR 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, 27, (10/13/2023 Edition). 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 duty cycle limits § 27.53 – Emission limits

The tests were selected and performed with reference to:

- FCC Public Notice 935210 applying "Signal Boosters Basic Certification Requirements" 935210 D02 v04r02, 2019-04-15.
- FCC Public Notice 935210 applying "Measurement guidance for industrial and nonconsumer signal booster, repeater and amplifier devices" 935210 D05 v01r04, 2020-04-03.
- FCC Public Notice 971168 applying "Measurement guidance for certification of licensed digital transmitters" 971168 D01 v03r01,2018-04-09
- 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 REFERENCE TABLE

Measurement	FCC reference
Effective radiated power, mean output power and zone enhancer gain	§ 2.1046 § 27.50 KDB 935210 D05 v01r04: 3.5
Peak to Average Ratio	§ 27.50
Occupied bandwidth Input-versus-output spectrum	§ 2.1049 KDB 935210 D05 v01r04: 3.4
Conducted spurious Emission at Antenna Terminal	§ 2.1051 § 27.53 KDB 935210 D05 v01r04: 3.6
Out-of-band emissions limits	§ 2.1051 § 27.53 KDB 935210 D05 v01r04: 3.6
Frequency stability	§ 2.1055 § 27.54
Field strength of spurious radiation	§ 2.1053 § 27.53
Out-of-band rejection	KDB 935210 D05 v01r04: 3.3
All measurements	ANSI 63.26



1.3 MEASUREMENT SUMMARY/SIGNATURES

Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband

Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband

47 CFR CHAPTER I FCC PART 27 Subpart C [Base §2.1046, §27	7 50
Stations/Repeater]	.50
Effective Radiated Power, mean output power and zone enhancer gain	
The measurement was performed according to ANSI C63.26, KDB 935210 D0	5 Final Result
v01r03: 3.5	o Filial Result
V01105. 5.5	
OP-Mode	
Frequency Band, Direction, Input Power, Signal Type	
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband 5G	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband 5G	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband 5G	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband 5G	Passed
47 CFR CHAPTER I FCC PART 27 Subpart C [Base §27.50	
Stations/Repeater]	
Peak to Average Ratio	
The measurement was performed according to ANSI C63.26	Final Result
OP-Mode	
Frequency Band, Direction, Input Power, Signal Type	
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed

Passed

Passed



Passed

Passed

Passed

Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband

Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband 5G

Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Wideband 5G

47 CFR CHAPTER I FCC PART 27 Subpart C [Base §2.1049	
Stations/Repeater]	
Occupied Bandwidth / Input-versus-output Spectrum	
The measurement was performed according to ANSI C63.26, KDB 935210 D05	Final Result
v01r03: 3.4	
OP-Mode	
Frequency Band, Direction, Input Power, Signal Type	
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Narrowband	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband	Passed
Band 41 BRS (UBS), RF downlink, 0.3 dB < AGC, Wideband 5G	Passed
Band 41 BRS (UBS), RF downlink, 3 dB > AGC, Wideband 5G	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Narrowband	Passed
Band 41 BRS (LBS), RF downlink, 3 dB > AGC, Narrowband	Passed
Band 41 BRS (LBS), RF downlink, 0.3 dB < AGC, Wideband	Passed

47 CFR CHAPTER I FCC PART 27 Subpart C [Base §2.1051, §27.53 Stations/Repeater] Conducted spurious emissions at antenna terminals The measurement was performed according to ANSI C63.26 **Final Result OP-Mode** Frequency Band, Test Frequency, Direction, Signal Type Band 41 BRS (UBS), low, RF downlink, Narrowband Passed Band 41 BRS (UBS), mid, RF downlink, Narrowband Passed Band 41 BRS (UBS), high, RF downlink, Narrowband Passed Band 41 BRS (UBS), low, RF downlink, Wideband Passed Band 41 BRS (UBS), mid, RF downlink, Wideband Passed Band 41 BRS (UBS), high, RF downlink, Wideband Passed Band 41 BRS (UBS), low, RF downlink, Wideband 5G Passed Band 41 BRS (UBS), mid, RF downlink, Wideband 5G Passed Band 41 BRS (UBS), high, RF downlink, Wideband 5G Passed Band 41 BRS (LBS), low, RF downlink, Narrowband Passed Band 41 BRS (LBS), mid, RF downlink, Narrowband Passed Band 41 BRS (LBS), high, RF downlink, Narrowband Passed Band 41 BRS (LBS), low, RF downlink, Wideband Passed Band 41 BRS (LBS), mid, RF downlink, Wideband Passed Band 41 BRS (LBS), high, RF downlink, Wideband Passed Band 41 BRS (LBS), low, RF downlink, Wideband 5G Passed Band 41 BRS (LBS), mid, RF downlink, Wideband 5G Passed Band 41 BRS (LBS), high, RF downlink, Wideband 5G Passed



47 CFR CHAPTER I FCC PART 27 Subpart C [Base Stations/Repeater]

Out-of-band emission limits The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r03: 3.6

OP-Mode

Band Edge, Frequency Band, Number of signals, Direction, Input Power, Signal Type Lower, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Narrowband Passed Lower, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Narrowband Passed Lower, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Wideband Passed Lower, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Wideband Passed Lower, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Wideband 5G Passed Lower, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Wideband 5G Passed Upper, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Narrowband Passed Upper, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Narrowband Passed Upper, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Wideband Passed Upper, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Wideband Passed Upper, Band 41 BRS (UBS), 1, RF downlink, 0.3 dB < AGC, Wideband 5G Passed Upper, Band 41 BRS (UBS), 1, RF downlink, 3 dB > AGC, Wideband 5G Passed Lower, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Narrowband Passed Lower, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Narrowband Passed Lower, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Wideband Passed Lower, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Wideband Passed Upper, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Narrowband Passed Upper, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Narrowband Passed Upper, Band 41 BRS (UBS), 2, RF downlink, 0.3 dB < AGC, Wideband Passed Upper, Band 41 BRS (UBS), 2, RF downlink, 3 dB > AGC, Wideband Passed

§2.1051, § 27.53

Final Result



47 CFR CHAPTER I FCC PART 27 Subpart C [Base Stations/Repeater]

Out-of-band emission limits The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r03: 3.6

OP-Mode

Band Edge, Frequency Band, Number of signals, Direction, Input Power, Signal Type Lower, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Narrowband Passed Lower, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Narrowband Passed Lower, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Wideband Passed Lower, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Wideband Passed Lower, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Wideband 5G Passed Lower, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Wideband 5G Passed Upper, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Narrowband Passed Upper, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Narrowband Passed Upper, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Wideband Passed Upper, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Wideband Passed Upper, Band 41 BRS (LBS), 1, RF downlink, 0.3 dB < AGC, Wideband 5G Passed Upper, Band 41 BRS (LBS), 1, RF downlink, 3 dB > AGC, Wideband 5G Passed Lower, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Narrowband Passed Lower, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Narrowband Passed Lower, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Wideband Passed Lower, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Wideband Passed Upper, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Narrowband Passed Upper, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Narrowband Passed Upper, Band 41 BRS (LBS), 2, RF downlink, 0.3 dB < AGC, Wideband Passed Upper, Band 41 BRS (LBS), 2, RF downlink, 3 dB > AGC, Wideband Passed

§2.1051, § 27.53

Final Result



47 CFR CHAPTER I FCC PART 27 Subpart C [Base Stations/Repeater]	KDB 935210 D05	v01r03: 3.3
Out-of-band rejection The measurement was performed according to ANSI C63.26		Final Result
OP-Mode Frequency Band, Direction Band 41 BRS (UBS), RF downlink Band 41 BRS (LBS), RF downlink		Passed Passed
47 CFR CHAPTER I FCC PART 27 Subpart C [Base Stations/Repeater] Frequency stability	§2.1055, §27.54	
		Final Result
OP-Mode Not applicable		Not applicable
47 CFR CHAPTER I FCC PART 27 Subpart C [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, one antenne in use Frequency Band, Test Frequency, Direction Band 41 BRS (UBS), high, RF downlink Band 41 BRS (UBS), low, RF downlink		Passed Passed
OP-Mode, MIMO Frequency Band, Direction Band 41 BRS (UBS), high, RF downlink Band 41 BRS (UBS), low, RF downlink		Passed Passed



Report version control			
Version	Release date	Change Description	Version validity
Initial	2024-01-31		Valid



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:

Address:

Contact Person:

86675 Buchdorf Germany Mr. Jiri Cecka

Industriering 10

Commscope

2.3 MANUFACTURER DATA

Company Name:

Address:

Please see applicant data.

Please see applicant data.

Andrew Wireless Systems GmbH



3 TEST OBJECT DATA

3.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Cellular Repeater
Product name	Cellular Repeater
Туре	CAP M2 17E/19/23/25T F-AC-F1
Declared EUT data by	the supplier
General Product Description	The EUT is an industrial signal booster supporting the following:
	Band 41 (BRS-2500), Broadband Radio Service:
	• Lower Band Segment (LBS): 2496- 2596 MHz
	• Upper Band Segment (UBS): 2590 – 2690 MHz
	A RF operation is only supported for the downlink.
Booster Type	Industrial Signal Booster
Voltage Type	AC
Voltage Level	100 to 240 V
Maximum Output Donor Port [Uplink]	-
Maximum Output Server Port [Downlink]	33 dBm
Maximum Gain [Uplink]	-
Maximum Gain [Downlink]	38 dB

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



3.2 EUT MAIN COMPONENTS

Sample Parameter	Value
Serial Number	FICMBA2338001
HW Version	7856326-1010 Rev: 00
SW Version	V5.0.0.196
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		
A L 1)/ 1	Commscope, ION-E PSU Shelf AC, DC18596	Power supply rack		
AUX1	GE Power Electronisc Inc., CAR1212FPBC-Z, DC17936	Power plug-in module		
	Commscope, ION-E WCS-2, SZAEAJ1819A0005	Module rack		
	Commscope, ION-E OPT, SZBEAD2012A0115	Optical plug-in module		
	Commscope, RFD HB, SZBEAQ2140A0006	RF card plug-in module		
AUX2	Commscope, RFD HB, SZBEAG2210A0008	RF card plug-in module		
	Commscope, ION-E RFD, SZBEAG1825A0018	RF card plug-in module		
	Commscope, ION-E RFD, SZBEAP2103A0457	RF card plug-in module		

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
	1	Setup for all tests



3.6 OPERATING MODES

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

3.6.1 TEST CHANNELS

Band name	Direction	Lower Frequency Band Edge [MHz]	Upper Frequency Band Edge [MHz]	Center Frequency [MHz]	Port
41, BRS (UBS)	Downlink	2590	2690	2640	Donor
41, BRS (LBS)	Downlink	2496	2596	2546	Donor

3.6.2 DEFINITION OF USED FREQUENCY BANDS

Narrowband: representation by a GSM signal Wideband : representation by an AWGN signal with 4.1 MHz Wideband 5G: representation by an AWGN signal with 98.3 MHz



3.6.3 AUTOMATIC GAIN CONTROL LEVEL

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	-3.6	-3.9	-0.6	2641.0	
41, BRS (UBS)	Downlink	Wideband	-3.6	-3.9	-0.6	2640.0	
41, BRS (UBS)	Downlink	Wideband 5G	-5.1	-5.4	-2.1	2640.0	– Mid
41, BRS (LBS)	Downlink	Narrowband	-3.2	-3.5	-0.2	2547.0	ivilu
41, BRS (LBS)	Downlink	Wideband	-3.2	-3.5	-0.2	2546.0	
41, BRS (LBS)	Downlink	Wideband 5G	-4.6	-4.8	-1.6	2546.0	
41, BRS (UBS)	Downlink	Narrowband	-3.2	-3.5	-0.2	2590.2	
41, BRS (UBS)	Downlink	Wideband	-4.8	-5.1	-1.8	2592.5	- Low
41, BRS (LBS)	Downlink	Narrowband	-3.4	-3.7	-0.4	2496.2	
41, BRS (LBS)	Downlink	Wideband	-3.8	-4.1	-0.8	2498.5	
41, BRS (UBS)	Downlink	Narrowband	-4.4	-4.7	-1.4	2689.8	
41, BRS (UBS)	Downlink	Wideband	-5.2	-5.5	-2.2	2687.5	lligh
41, BRS (LBS)	Downlink	Narrowband	-3.2	-3.5	-0.2	2595.8	- High
41, BRS (LBS)	Downlink	Wideband	-4.0	-4.3	-1.0	2593.5	
41, BRS (UBS)	Downlink	Narrowband	-6.3	-6.5	-3.3	2687.5	
41, BRS (UBS)	Downlink	Wideband	-5.9	-6.1	-2.9	2687.5	
41, BRS (UBS)	Downlink	Wideband 5G	-5.1	-5.4	-2.1	2640.0	
41, BRS (LBS)	Downlink	Narrowband	-4.8	-5.2	-1.8	2590.6	Max. Power
41, BRS (LBS)	Downlink	Wideband	-5.1	-5.4	-2.1	2590.6	
41, BRS (LBS)	Downlink	Wideband 5G	-4.6	-4.8	-1.6	2546.0]

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

AWGN signal (wideband 5G): Here only measurements at the mid frequency are possible,

because the signal band has the same bandwidth as the used channel.



3.6.4 REMARKS TO THE MEASUREMENTS

Cause of an inappropriate control mode in the transmission of the narrowband signal (GSM signal) at f_{mid} , f_{mid} is increased by 1 MHz, Hereby the abbreviations are:

f_{mid} for wideband signals (AWGN signals) f_{mid+1} for narrowband signals (GSM signals)

In the real use of the repeater narrowband signals aren't used.

3.7 PRODUCT LABELLING

3.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

3.7.2 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 27, §27.50

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

Test date: 2023-10-26 - 2023-10-27; 2023-11-28

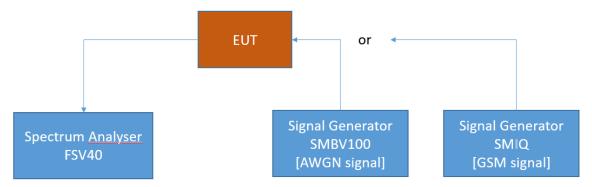
Environmental conditions: 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

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.

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

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50

Band 41:

(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 + $10\log(X/Y)$ 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 $\log(360/\text{beamwidth})$ 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.



4.1.3 TEST PROTOCOL

Band 41, BR	S (UBS), dov						
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]
Narrowband	0.3 dB < AGC	2687.5	-6.1	32.9	51.5	18.6	39.0
Narrowband	3 dB > AGC	2687.5	-2.9	32.7	51.5	18.8	35.6
Wideband	0.3 dB < AGC	2687.5	-6.5	32.9	62.6	29.7	39.4
Wideband	3 dB > AGC	2687.5	-3.3	32.8	62.6	29.8	36.1
Wideband 5G	0.3 dB < AGC	2640.0	-5.4	33.0	76.0	43.0	38.4
Wideband 5G	3 dB > AGC	2640.0	-2.1	33.0	76.0	43.0	35.1

Band 41, BR	S (LBS), dow]					
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]
Narrowband	0.3 dB < AGC	2590.6	-5.2	33.0	51.5	18.5	38.2
Narrowband	3 dB > AGC	2590.6	-1.8	33.0	51.5	18.5	34.8
Wideband	0.3 dB < AGC	2590.6	-5.4	33.1	62.6	29.5	38.5
Wideband	3 dB > AGC	2590.6	-2.1	33.1	62.6	29.5	35.2
Wideband 5G	0.3 dB < AGC	2546.0	-4.8	33.0	76.0	43.0	34.6
Wideband 5G	3 dB > AGC	2546.0	-1.6	33.0	76.0	43.0	37.8

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

Maximum output power at the worst case consideration

The highest power level in the tables above is:

 $p_{highest} = 31.5$ dBm at the channel which has the most output power of all channels.

Hereby at an antenna gain of G_{dB} = 15 dBi the highest effecitve radiated output power EIRP $p_{EIRP \ 1CH}$ of one channel is:

 $p_{\text{EIRP 1CH}} = p_{\text{highest}} + G_{\text{dB}}$

This results are:

p_{EIRP 1CH} = 33.1 dBm + 15 dB = 48.1 dBm

Hereby the channel bandwidth is 5 MHz and it is used in the LBS band.

Therefore the maximum allowed power pEIRP is calculated according the given formula:

$$pEIRP \ 1CH \ [dBm] = pEIRP \ 1CH \ [dBW] + 10 * \ log \left(\frac{channel \ bandwidth}{5.5 \ MHz}\right) + 30 \ dB$$

This results dBm are:

$$pEIRP \ 1CH \ [dBm] = 33 \ [dBW] + 10 * \ log \left(\frac{5 \ MHz}{5.5 \ MHz}\right) + 30 \ dB = 62.6 \ dBm$$

Supposed all two antenna ports are working together in MIMO operation the worst case of the highest output power $p_{\text{EIRP 2CH}}$ is:

 $p_{\text{EIRP 2CH}} = p_{\text{EIRP 1CH} + 3 \text{ dB}}$

Hereby the result is:

 $p_{EIRP 2CH} = 48.1 \text{ dBm} + 3 \text{ dB} = 51.1 \text{ dBm}$

The f inal comparison of this consideration is:

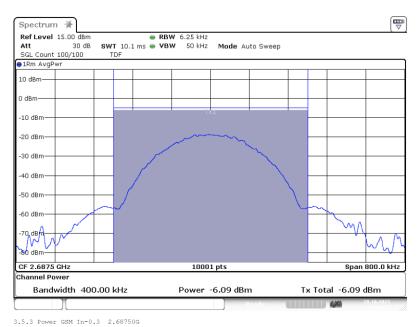
 $p_{EIRP 4CH} = 51.1 \text{ dBm} < 62.6 \text{ dBm}$, hereby 62.6 dBm is the highest allowed limit in this band.

The DUT doesn't exceed the limit.

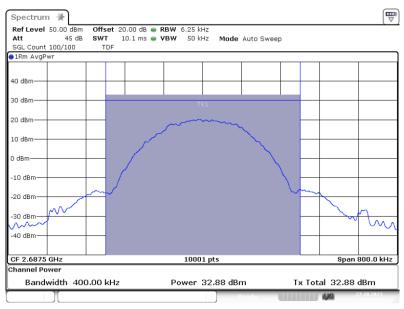


4.1.4 MEASUREMENT PLOT

Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: GSM; Input Power 0.3 dB < AGC



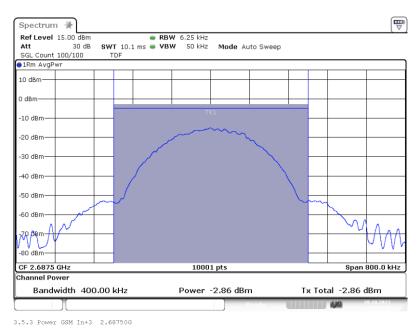
Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: GSM; Output Power 0.3 dB < AGC



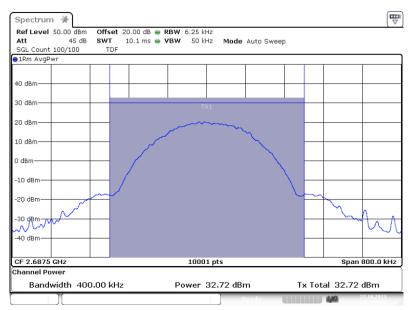
3.5.3 Power GSM Out -0.3 2.68750G



Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: GSM; Input Power 3 dB > AGC



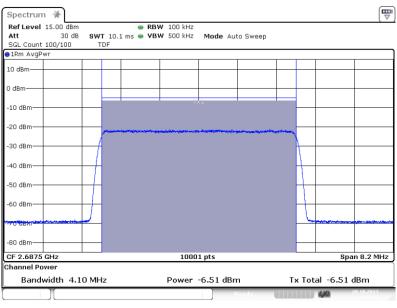
Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: GSM; Output Power 3 dB > AGC



3.5.3 Power GSM Out +3 2.68750G

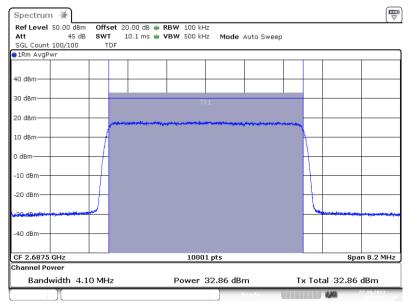


Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: AWGN; Input Power 0.3 dB < AGC



3.5.3 Power AWGN In-0.3 2.68750G

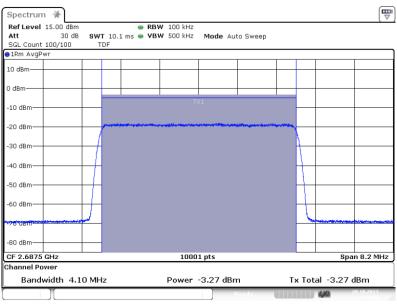
Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: AWGN; Output Power 0.3 dB < AGC



3.5.3 Power AWGN Out -0.3 2.68750G

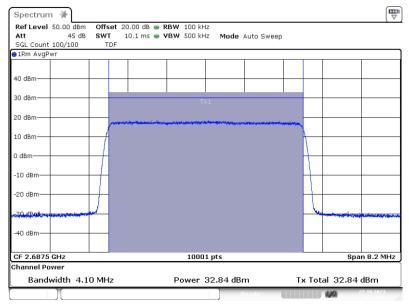


Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: AWGN; Input Power 3 dB > AGC



3.5.3 Power AWGN In+3 2.68750G

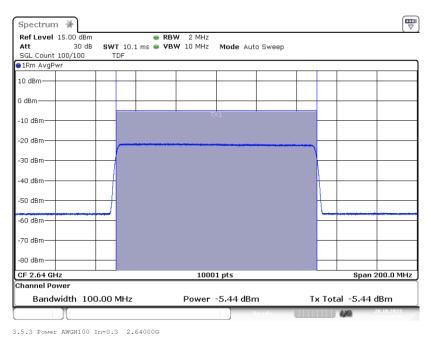
Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC



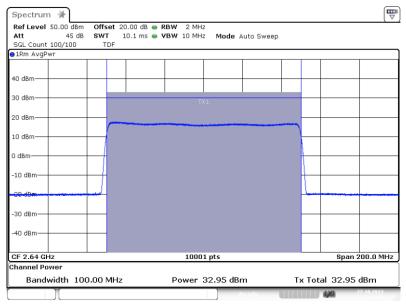
3.5.3 Power AWGN Out +3 2.68750G



Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN100; Input Power 0.3 dB < AGC



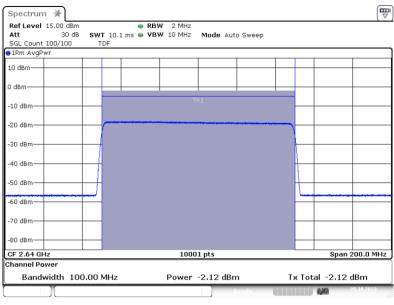
Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN100; Output Power 0.3 dB < AGC



3.5.3 Power AWGN100-0.3 2.64000G

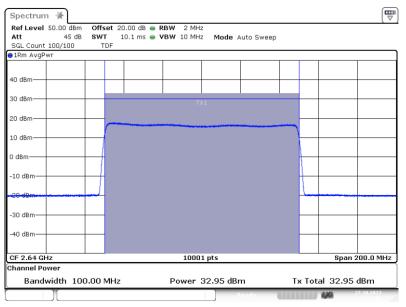


Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN100; Input Power 3 dB > AGC



3.5.3 Power AWGN100 In+3 2.64000G

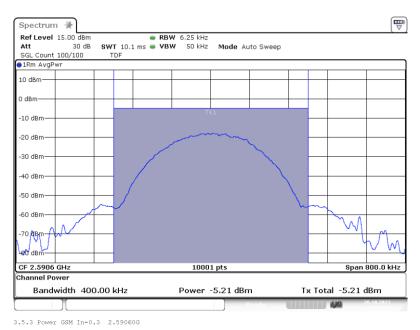
Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN100; Output Power 3 dB > AGC



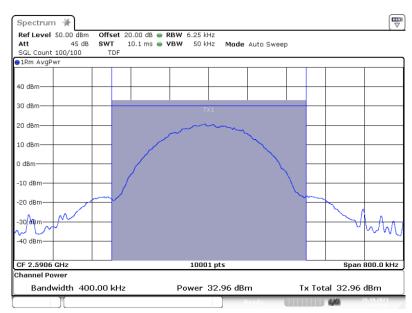
3.5.3 Power AWGN100+3 2.64000G



Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: GSM; Input Power 0.3 dB < AGC



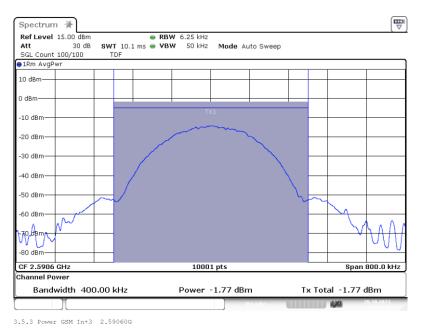
Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: GSM; Output Power 0.3 dB < AGC



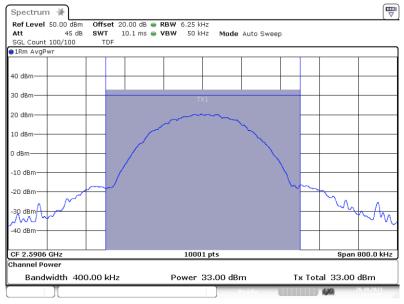
3.5.3 Power GSM Out -0.3 2.59060G



Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: GSM; Input Power 3 dB > AGC



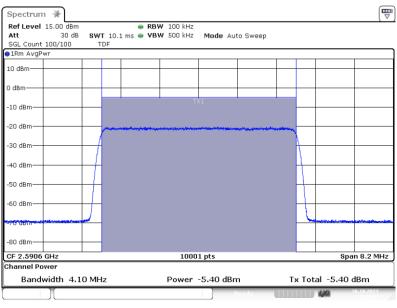
Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: GSM; Output Power 3 dB > AGC



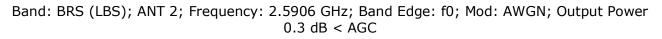
3.5.3 Power GSM Out +3 2.59060G

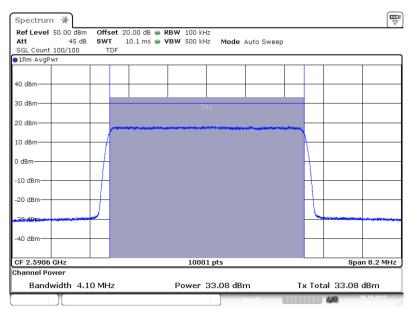


Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: AWGN; Input Power 0.3 dB < AGC



3.5.3 Power AWGN In-0.3 2.59060G

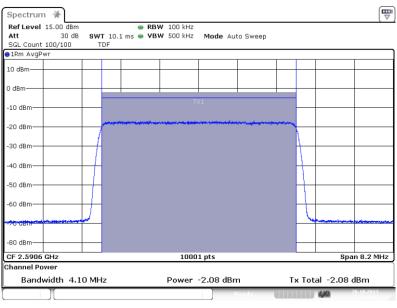




3.5.3 Power AWGN Out -0.3 2.59060G

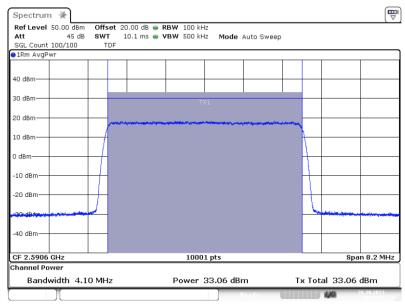


Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: AWGN; Input Power 3 dB > AGC



3.5.3 Power AWGN In+3 2.59060G

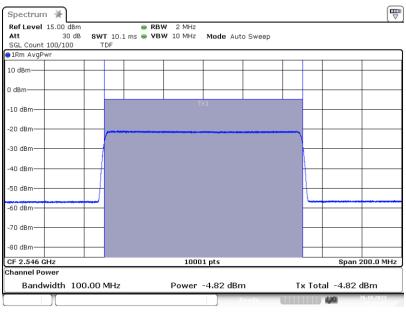
Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC



3.5.3 Power AWGN Out +3 2.59060G



Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN100; Input Power 0.3 dB < AGC



3.5.3 Power AWGN100 In-0.3 2.54600G

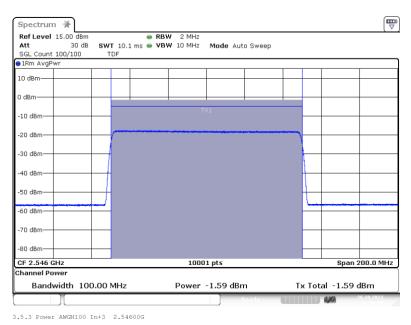
Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN100; Output Power 0.3 dB < AGC

Ref Level 50.00 dBm	Offset 20.00 dB	BBW 2 MHz	E S
Att 45 dB		VBW 10 MHz Mode Auto Swee	en
SGL Count 100/100	TDF		
1Rm AvgPwr			
O dBm			
IO dBm		TX1	
20 dBm			
.0 dBm			
	A		
) dBm			
10 dBm			
20. dBm			
30 dBm	-		
40 dBm	-		
CF 2.546 GHz		10001 pts	Span 200.0 MH
hannel Power			
Bandwidth 100	00.00	Power 32.96 dBm	Tx Total 32.96 dBm

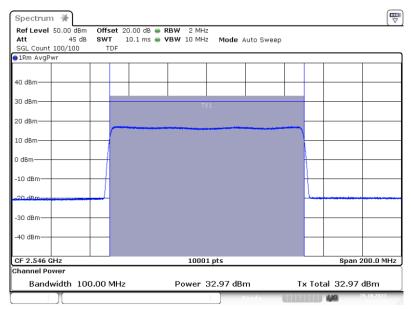
3.5.3 Power AWGN100-0.3 2.54600G



Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN100; Input Power 3 dB > AGC



Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN100; Output Power 3 dB > AGC



3.5.3 Power AWGN100+3 2.54600G



4.1.5 TEST EQUIPMENT USED

- Conducted

4.2 PEAK TO AVERAGE RATIO

Standard FCC Part 27, §27.50

The test was performed according to: ANSI C63.26

Test date: 2023-10-26 - 2023-10-27; 2023-11-28

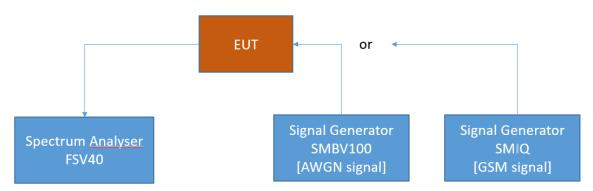
Environmental conditions: 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

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.

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

Band 41:

For the band 41(BRS, LBS/UBS) exists no FCC peak-to-average power ratio (PAPR) limit. Although here no limit exits, a fictive limit with the usual 13 dB value is set and the margin to this fictive limit is calculated.



4.2.3 TEST PROTOCOL

Band 41 BRS	(UBS), downlin	k				
Signal Type	Input Power	Frequency [MHz]	Input Power [dBm]	PAPR [dB]	Fictive Limit PAPR [dB]	Margin to fictive Limit [dB]
Narrowband	0.3 dB < AGC	2687.5	-6.5	0.1	13.0	12.9
Narrowband	3 dB > AGC	2687.5	-3.3	0.1	13.0	12.9
Wideband	0.3 dB < AGC	2687.5	-6.1	6.6	13.0	6.4
Wideband	3 dB > AGC	2687.5	-2.9	6.6	13.0	6.4

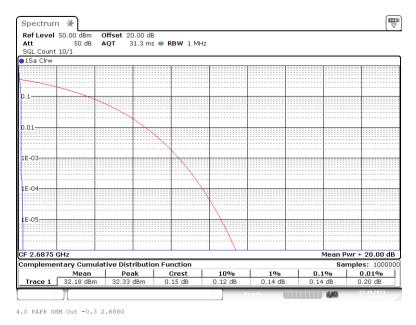
Band 41 BRS	(LBS), downlin	k				
Signal Type	Input Power	Frequency [MHz]	Input Power [dBm]	PAPR [dB]	Fictive Limit PAPR [dB]	Margin to Fictive Limit [dB]
Narrowband	0.3 dB < AGC	2590.6	-5.2	0.1	13.0	12.9
Narrowband	3 dB > AGC	2590.6	-1.8	0.1	13.0	12.9
Wideband	0.3 dB < AGC	2590.6	-5.4	6.6	13.0	6.4
Wideband	3 dB > AGC	2590.6	-2.1	6.6	13.0	6.4

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

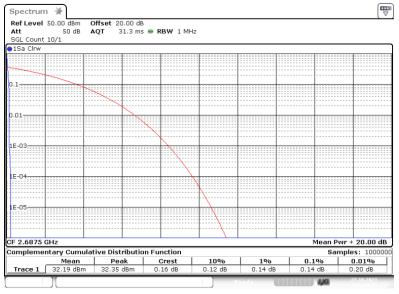


4.2.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE. "WORST CASE")

Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: GSM; PAPR 0.3 dB < AGC



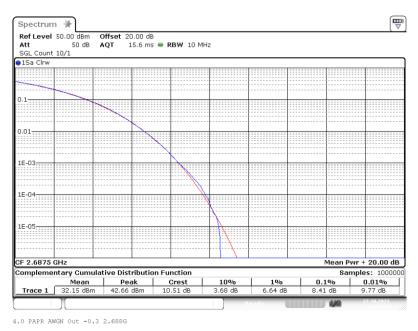
Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: GSM; PAPR 3 dB > AGC



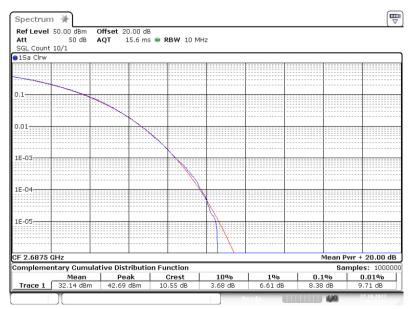
4.0 PAPR GSM Out +3 2.688G



Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: AWGN; PAPR 0.3 dB < AGC



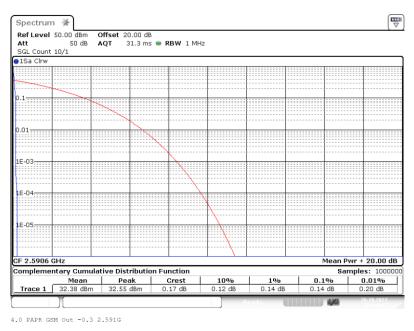
Band: BRS (UBS); ANT 2; Frequency: 2.6875 GHz; Band Edge: f0; Mod: AWGN; PAPR 3 dB > AGC



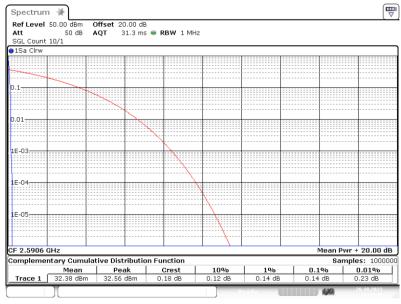
4.0 PAPR AWGN Out +3 2.688G







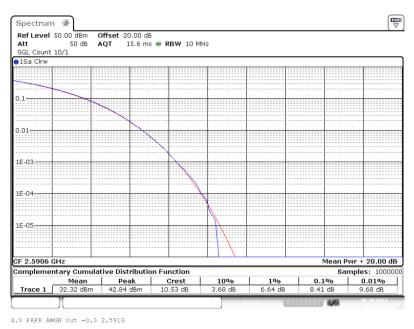
Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: GSM; PAPR 3 dB > AGC



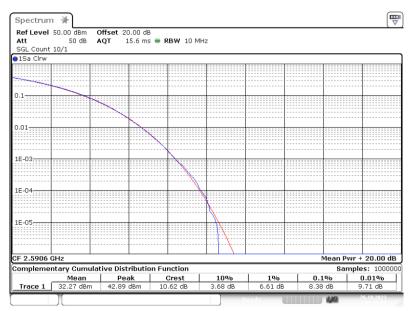
4.0 PAPR GSM Out +3 2.591G







Band: BRS (LBS); ANT 2; Frequency: 2.5906 GHz; Band Edge: f0; Mod: AWGN; PAPR 3 dB > AGC



4.0 PAPR AWGN Out +3 2.591G



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 KDB 935210 D05 v01r04: 3.4

Test date: 2023-10-26 - 2023-10-27; 2023-11-28

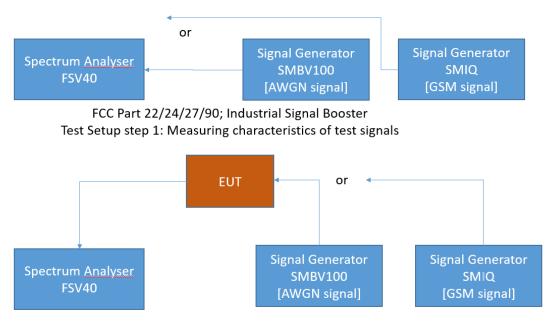
Environmental conditions: 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

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 $\S2.1049$

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 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

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 0.5 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.



4.3.3 TEST PROTOCOL

Band 41 BRS	(UBS), downl	ink	-		-		
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]
Narrowband	0.3 dB < AGC	2641.0	312.6	314.3	1.7	10.0	8.3
Narrowband	3 dB > AGC	2641.0	313.5	317.9	4.4	10.0	5.6
Wideband	0.3 dB < AGC	2640.0	4392.7	4386.6	6.1	205.0	198.9
Wideband	3 dB > AGC	2640.0	4394.6	4389.0	5.6	205.0	199.4
Wideband 5G	0.3 dB < AGC	2640.0	103375	103240	135.0	4915	4780
Wideband 5G	3 dB > AGC	2640.0	103315	103255	60	4915	4855

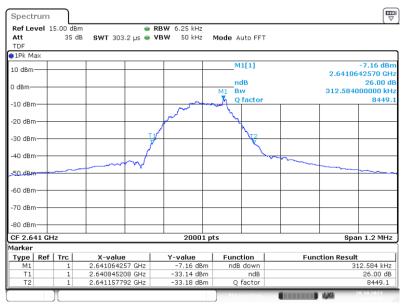
Band 41 BRS	(LBS), downl	ink	_				
Signal Type	Input Power	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Limit Delta Occupied Bandwidth [kHz]	Margin to Limit [kHz]
Narrowband	0.3 dB < AGC	2547.0	314.9	316.2	1.3	10.0	8.7
Narrowband	3 dB > AGC	2547.0	315.6	311.6	4.0	10.0	6.0
Wideband	0.3 dB < AGC	2546.0	4389.7	4389.7	0.0	205.0	205.0
Wideband	3 dB > AGC	2546.0	4389.7	4386.0	3.7	205.0	201.3
Wideband 5G	0.3 dB < AGC	2546.0	103225	103195	30	4915	4885
Wideband 5G	3 dB > AGC	2546.0	103015	103165	150	4915	4765

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



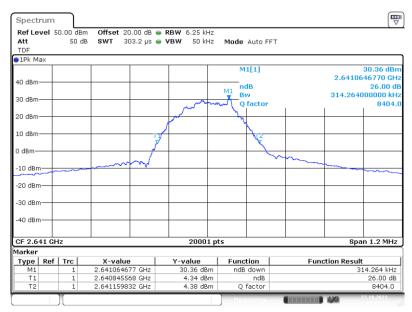
4.3.4 MEASUREMENT PLOT

Band: BRS (UBS); ANT 2; Frequency: 2.6410 GHz; Band Edge: mid; Mod: GSM; Input OCBw 0.3 dB < AGC



3.4 OCBw GSM In-0.3 2.6410G _26dB

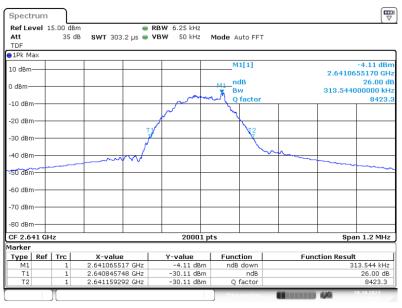
Band: BRS (UBS); ANT 2; Frequency: 2.6410 GHz; Band Edge: mid; Mod: GSM; Output OCBw 0.3 dB < AGC



3.4 OCBw GSM Out -0.3 2.6410G _26dB



Band: BRS (UBS); ANT 2; Frequency: 2.6410 GHz; Band Edge: mid; Mod: GSM; Input OCBw 3 dB > AGC



3.4 OCBw GSM In+3 2.6410G _26dB

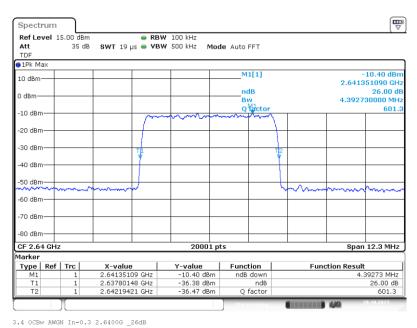
Band: BRS (UBS); ANT 2; Frequency: 2.6410 GHz; Band Edge: mid; Mod: GSM; Output OCBw 3 dB > AGC

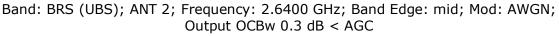
Ref Level 5	0.00 dBn	n Offset 20.00 dB 🖷	RBW 6.25 kHz			(
Att	50 di	в SWT 303.2 µs 🖷	VBW 50 kHz	Mode Auto FR	Τ	
TDF						
1Pk Max						
				M1[1]		30.49 dB
40 dBm						2.6410644370 G
to abiii				M1 ndB		26.00 0
30 dBm				T BW	:	317.924000000 kH
			man	Q factor		8307
20 dBm				<u> </u>		
			A	પ્		
10 dBm			/			
				V V		
0 dBm				\		
					m	
-10 dBm						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-20 dBm						
-30 dBm						
-40 dBm						
CF 2.641 GF	łz		20001 pt	ts		Span 1.2 MH
1arker						
Type Ref		X-value	Y-value	Function	Functio	on Result
M1	1	2.641064437 GHz	30.49 dBm	ndB down		317.924 kH:
T1	1	2.640840948 GHz	4.48 dBm	ndB		26.00 de
T2	1	2.641158872 GHz	4.49 dBm	Q factor		8307.2

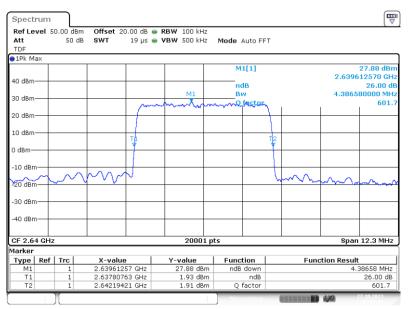
3.4 OCBw GSM Out +3 2.6410G _26dB



Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 0.3 dB < AGC



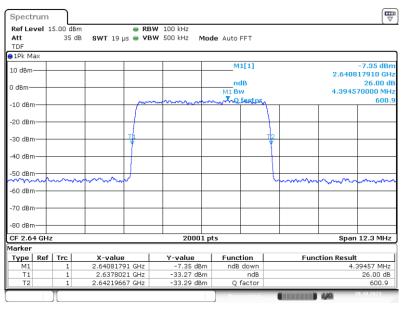




3.4 OCBw AWGN Out -0.3 2.6400G _26dB



Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 3 dB > AGC



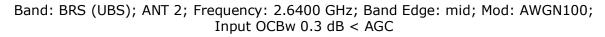
^{3.4} OCBw AWGN In+3 2.6400G _26dB

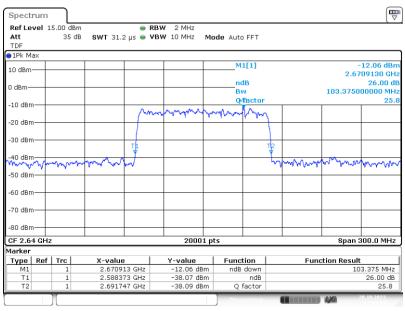
Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN; Output OCBw 3 dB > AGC

Ref Le	vel 5	0.00 dBm	Offset 20	.00 dB	RBW	100 kHz						
Att TDF		50 dB	SWT	19 µs	● VBW	500 kHz	Mode	Auto FF	т			
1Pk M	ах											
							M	1[1]				27.83 dB
40 dBm·											2.638	772520 GH
to ubiii							n					26.00 d
30 dBm·					M1		B				4.3890	040000 MH
00 00111				m	mm	m	$\sim\sim\sim\sim$	tactor				601
20 dBm	_								<u>\</u>			
									1			
10 dBm	_				_				+			
				T₽ -					72			
0 dBm—	-		-						+			
									1			
-10 dBm	–ר			1								
-20 dBn	m	m	mm	\sim					<u>ц</u>	Ann	mm	
-20 aBn	<u> </u>											
-30 dBrr												
-30 UBII												
-40 dBm												
10 0011	.											
CF 2.64	4 GHz	:				20001 pt	s				Spar	12.3 MH
1arker												
Туре	Ref	Trc	X-value		Y-1	/alue	Func	tion		Fund	ction Resul	t
M1		1	2.6387725			7.83 dBm	ndB	down			4.	38904 MH;
Τ1		1	2.6378057			1.86 dBm		ndB				26.00 dE
Т2		1	2.6421948	33 GHz		1.76 dBm	Q	factor				601.2

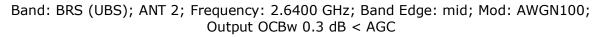
3.4 OCBw AWGN Out +3 2.6400G _26dB

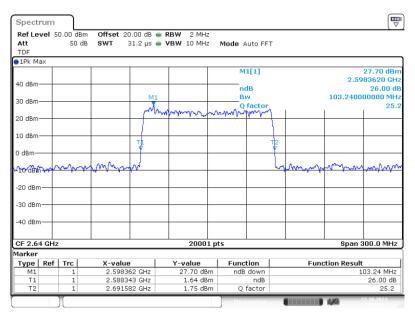






3.4 OCBw AWGN100 In-0.3 2.6400G _26dB

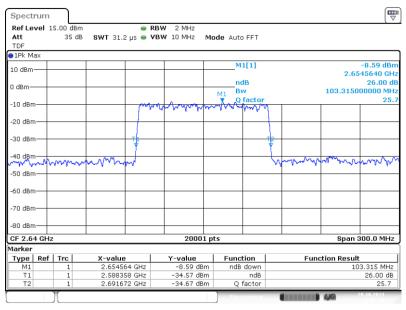




3.4 OCBw AWGN100-0.3 2.6400G _26dB



Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN100; Input OCBw 3 dB > AGC



3.4 OCBw AWGN100 In+3 2.6400G _26dB

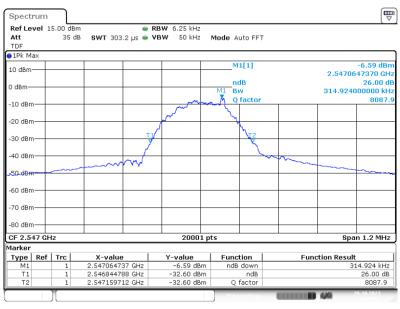
Band: BRS (UBS); ANT 2; Frequency: 2.6400 GHz; Band Edge: mid; Mod: AWGN100; Output OCBw 3 dB > AGC

	rum vel 5	0.00 dBm	Offset 2	0.00 dB 👄	RBW 2 MHz						
Att TDF		50 dB	SWT	31.2 µs 🖷	VBW 10 MHz	Mode A	uto FFT				
1Pk M	ах										
						M	1[1]				26.57 dBi
40 dBm										2.61	53560 GH
to ubiii						n					26.00 d
30 dBm·					M1	B			1	03.2550	00000 MH
50 GDIII				mm	Margan and	man	factor				25
20 dBm·	_			-	and it works	A., A., AA.	hart a				
10 dBm	-			+							
				т			1	2			
0 dBm—	-			V				Ψ.			
		A	1. A.							m.	
10 dBr	les A fre	4 *****	and mary m	4~				howard	1 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	my	handhale.
-20 dBm	-										
-30 dBm											
-40 dBm											
CF 2.6	4 GHz				20001	pts				Span 3	800.0 MHz
1arker											
Туре	Ref		X-valu		Y-value	Func			Functio	on Result	
M1		1		356 GHz	26.57 dBm		down			10	3.255 MHz
T1		1		388 GHz	0.69 dBm		ndB				26.00 dB
T2		1	2.6916	542 GHz	0.51 dBm	Q.	factor				25.3

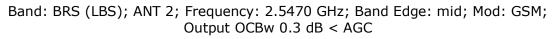
3.4 OCBw AWGN100+3 2.6400G _26dB

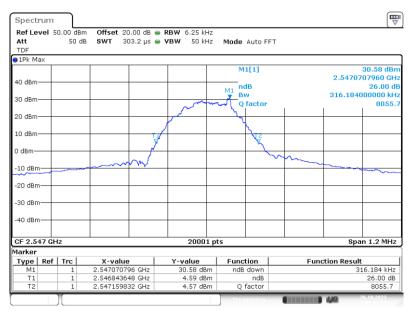


Band: BRS (LBS); ANT 2; Frequency: 2.5470 GHz; Band Edge: mid; Mod: GSM; Input OCBw 0.3 dB < AGC



3.4 OCBw GSM In-0.3 2.5470G _26dB

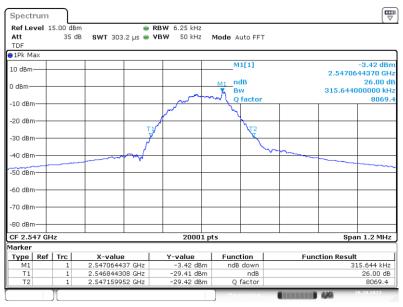




3.4 OCBw GSM Out -0.3 2.5470G _26dB



Band: BRS (LBS); ANT 2; Frequency: 2.5470 GHz; Band Edge: mid; Mod: GSM; Input OCBw 3 dB > AGC



^{3.4} OCBw GSM In+3 2.5470G _26dB

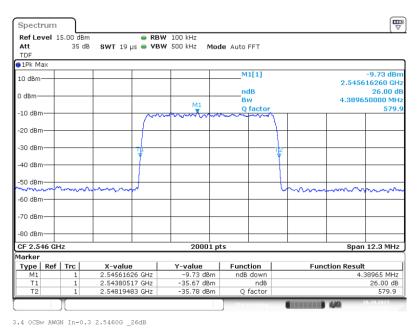
Band: BRS (LBS); ANT 2; Frequency: 2.5470 GHz; Band Edge: mid; Mod: GSM; Output OCBw 3 dB > AGC

Rof I o		0.00 dBr	n Offset 20.00 dB	BBW 6.25 kHz			
Att	vei 5	50 di			Mode Auto Fl	FT	
TDF					House Hate H		
∋1Pk M	ах						
					M1[1]		30.63 dB
40 dBm							2.5470707360 GF
10 0011					M1 ndB		26.00 d
30 dBm-					J BW		311.564000000 kH
				~~~~~	Q factor		8175
20 dBm	_			~	2		
				1	X		
10 dBm	-		T	1	¥2		
				7	×,		
0 dBm—					~	man l	
-10 dBm			m			e m	~~~~
-10 080							
-20 dBm							
20 0011							
-30 dBm							
-40 dBm	<u>ا</u>						
CF 2.5	47 GH	Iz		20001 p	its		Span 1.2 MHz
4arker							
Туре	Ref	Trc	X-value	Y-value	Function	Func	tion Result
M1		1	2.547070736 GHz	30.63 dBm	ndB down		311.564 kHz
Τ1		1	2.546846288 GHz	4.66 dBm	ndB		26.00 dB
T2		1	2.547157852 GHz	4.63 dBm	Q factor		8175.1

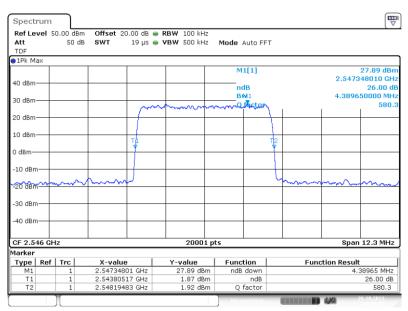
3.4 OCBw GSM Out +3 2.5470G _26dB



#### Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 0.3 dB < AGC



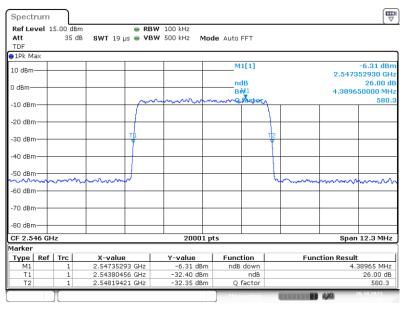
Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN; Output OCBw 0.3 dB < AGC



3.4 OCBw AWGN Out -0.3 2.5460G _26dB



## Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 3 dB > AGC



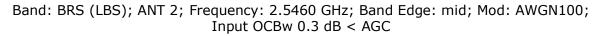
3.4 OCBw AWGN In+3 2.5460G _26dB

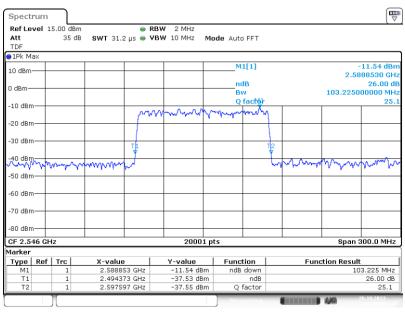
## Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN; Output OCBw 3 dB > AGC

Ref Le [®] Att TDF	vel 5	0.00 dBm 50 dB				100 kHz 500 kHz	Mode /	Auto FF	т			
1Pk Ma	эх											
							M	1[1]				27.82 dB
40 dBm-											2.544	769450 GH
ie abiii							no					26.00 0
30 dBm-	_		_		M1		B				4.3859	960000 MI
				m	$\sim$	$\sim$	m	fractor/				580
20 dBm-				$\vdash$					$\left\{-\right\}$			
									1			
LO dBm-	-			-					Т2			
				T‡ _					₹			
) dBm—	-								+			
									1			
-10 dBm									t			
20 284	$\sim$	$\sim$	m~~~						~	m	han	home
20 aBm												
30 dBm												
50 ubn	· .											
40 dBm												
10 0011	·											
CF 2.54	16 GH	z				20001 pt	s				Spar	112.3 MH
larker												
Туре	Ref	Trc	X-value		Y-1	value	Func	tion		Fund	ction Resul	t
M1		1	2.544769			7.82 dBm	ndB	down			4	38596 MH
Τ1		1	2.54380			1.89 dBm		ndB				26.00 di
T2		1	2.548192	37 GHz		1.87 dBm	Q	factor				580.2

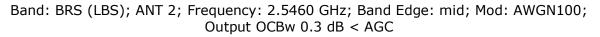
3.4 OCBw AWGN Out +3 2.5460G _26dB







3.4 OCBw AWGN100 In-0.3 2.5460G _26dB

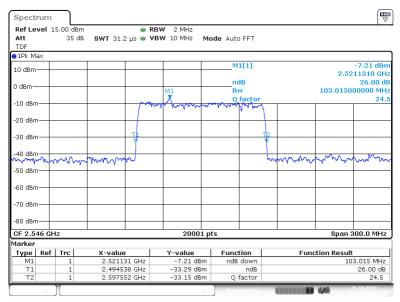


Ref Level Att TDF	50.00 dBm 50 dB			Mode Auto FF1	Т
1Pk Max					
				M1[1]	27.04 dBn
40 dBm				ndB	2.5314960 GH 26.00 dl
				BW	26.00 a 103.19500000 MH
30 dBm			M1	Q factor	24.
		m	my when	Mound	<b>λ Ι Ι Ι Ξ</b>
20 dBm					
10 dBm					
10 00111		Τh			T12
0 dBm		V			*
					hannahannahan
viete Wisth	www.	who we have a fear			a few high to be about a start way a man
-20 dBm					
-20 dBm					
-30 dBm					
50 abiii					
-40 dBm					
CF 2.546	GHz		20001 pt	s	Span 300.0 MHz
1arker					
Type   Re	f   Trc	X-value	Y-value	Function	Function Result
M1	1	2.531496 GHz	27.04 dBm	ndB down	103.195 MHz
T1 T2	1	2.494328 GHz	0.98 dBm	ndB	26.00 dB
	1	2.597522 GHz	1.11 dBm	Q factor	24.5

3.4 OCBw AWGN100-0.3 2.5460G _26dB

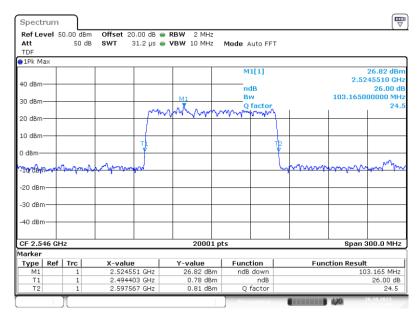


## Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN100; Input OCBw 3 dB > AGC



3.4 OCBw AWGN100 In+3 2.5460G _26dB

## Band: BRS (LBS); ANT 2; Frequency: 2.5460 GHz; Band Edge: mid; Mod: AWGN100; Output OCBw 3 dB > AGC



3.4 OCBw AWGN100+3 2.5460G _26dB



## 4.3.5 TEST EQUIPMENT USED

- Conducted