



BUREAU
VERITAS

EMC Test Report

2024-0450-EMC-TR-25-0093-V01

Designation:	UAP-R [WCS 2300]
Manufacturer:	CommScope
Serial No(s):	SZBEBE2508A0005
ID No.	7862370-00 Rev: 00
FCC ID	XS5-IONEUAPR
ISED ID	2237E-IONEUAPR
Test Specifications:	ANSI 63-26:2015
	Spot check according the following rules: FCC Rules and Regulations as listed in 47 CFR, Part 20 and Part 27 RSS-195 Issue 2 with RSS-GEN Issue 5, RSS-131 Issue 4 and SRSP-516 Issue 1
Test Plan:	"BU-PC-2336-58" from customer
Test Result:	Passed

Date of issue:	13.06.2025		Signature:
Version:	01	Technical Reviewer:	
Date of receipt EUT:	26.02.2025		
Performance date:	16.05.2025 and 30.05.2025	Report Reviewer:	



Bundesnetzagentur

BNetzA-CAB-19/21-20



Deutsche
Akkreditierungsstelle
D-PL-12024-06-00

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Client: CommScope

Andrew Wireless System GmbH
Industriering 10
86675 Buchdorf
Germany

Test laboratory: Bureau Veritas Consumer Products Services Germany GmbH

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Test location: Bureau Veritas Consumer Products Services Germany GmbH

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DAkkS D-PL-12024-06-04

Laboratory accreditation no:

BNETZA-CAB-19/21-20

FCC Designation Number: DE0023

FCC Test Firm Registration: 366481

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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 Chapter 1 Parts 2 and 20 and 27. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 20, Commercial Mobile Services

§ 20.21 Signal Boosters

Part 27; Miscellaneous Wireless Communications Services

Subpart C – Technical standards

§ 27.50 – Power and duty cycle limits

§ 27.54 – Frequency stability

§ 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, 2024-11-20.
- FCC Public Notice 935210 applying "Measurement guidance for industrial and non-consumer signal booster, repeater and amplifier devices" 935210 D05, 2020-04-03.
- FCC Public Notice 971168 applying "Measurement guidance for certification of licensed digital transmitters" 971168 D01, 2018-04-09.

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1.2 DECLARATION TO THE TESTS IN THIS REPORT

A similar type of signal booster with the AWS band, UAP-XR was tested in all required tests, see test report "2024-0451-EMC-TR-25-0069-V01".

The difference between UAP-XR and UAP-R is, that UAP-XR has one connector for an external antenna and UAP-R has two internal antennas connected via a BALUN to the internal RF output.

Therefore the power of each antenna output connector of the UAP-R is less than the output power of the UAP-XR at its one antenna connector.

In this report the values of the antenna port with the most output power are shown.

Because of the similarity of the two types only the most important tests regarding the conducted tests were performed.



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- ANSI C63.26: 2015 "American National Standard for Compliance Testing of Transmitters Used in Licensec Radio Services"
- RSS-195 Issue 2 "Wireless Communication Service (WCS) Equipment Operating in the Bands 2305-2320 MHz and 2345-2360 MHz"
- SRSP-516 Issue 1 "Technical Requirements for Wireless Communication Service (WCS) Operating in the Bands 2305-2320 MHz and 2345-2360 MHz"
- RSS-GEN Issue 5 "General Requirements for Compliance of Radio Apparatus"
- RSS-131 Issue 4 "Zone Enhancers"

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1.3 FCC-ISED 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	§ 27.50 KDB 935210 D05 v01r04: 3.5	RSS-GEN Issue 5, 6.12 RSS-195 Issue 2, 5.5 SRSP-516, Issue 1, 5.1.1
Peak to Average Ratio	§ 27.50	RSS-195 Issue 2, 5.5.1
Occupied bandwidth Input-versus-output spectrum	§ 2.1049 KDB 935210 D05 v01r04: 3.4	RSS-GEN Issue 5, 6.7 RSS-131 Issue 4: 9.2
Conducted spurious emission at antenna terminal	§ 2.1051 § 27.53 KDB 935210 D05 v01r04: 3.6	RSS-GEN Issue 5, 6.13 RSS-195 Issue 2, 5.6
Out-of-band emissions limits	§ 2.1051 § 27.53 KDB 935210 D05 v01r04: 3.6	RSS-GEN Issue 5, 6.13 RSS-195 Issue 2, 5.6
Out-of-band rejection	KDB 935210 D05 v01r04: 3.3	RSS-131 Issue 4: 9.1
All measurements	ANSI 63.26	ANSI 63.26

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1.4 MEASUREMENT SUMMARY/SIGNATURES

47 CFR CHAPTER I FCC PART 27 Subpart C [Base § 27.50 Stations/Repeater]

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

Final Result

OP-Mode

Frequency Band, Direction, Input Power, Signal Type
WCS 2300, RF downlink, 0.3 dB < AGC, Wideband
WCS 2300, RF downlink, 3 dB > AGC, Wideband
WCS 2300, RF downlink, 0.3 dB < AGC, Narrowband
WCS 2300, RF downlink, 3 dB > AGC, Narrowband
WCS 2300, RF downlink, 0.3 dB < AGC, Wideband 5G
WCS 2300, RF downlink, 3 dB > AGC, Wideband 5G

FCC ISED

Passed	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

WCS 2300, RF downlink, 0.3 dB < AGC, Wideband
WCS 2300, RF downlink, 3 dB > AGC, Wideband
WCS 2300, RF downlink, 0.3 dB < AGC, Narrowband
WCS 2300, RF downlink, 3 dB > AGC, Narrowband
WCS 2300, RF downlink, 0.3 dB < AGC, Wideband 5G
WCS 2300, RF downlink, 3 dB > AGC, Wideband 5G

FCC ISED

Passed	Passed

47 CFR CHAPTER I FCC PART 2 § 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
WCS 2300, RF downlink, 0.3 dB < AGC, Wideband
WCS 2300, RF downlink, 3 dB > AGC, Wideband
WCS 2300, RF downlink, 0.3 dB < AGC, Narrowband
WCS 2300, RF downlink, 3 dB > AGC, Narrowband
WCS 2300, RF downlink, 0.3 dB < AGC, Wideband 5G
WCS 2300, RF downlink, 3 dB > AGC, Wideband 5G

FCC ISED

Passed	Passed

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47 CFR CHAPTER I FCC PART 27 Subpart C [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	ISED
WCS 2300, low, RF downlink, Wideband	Passed	Passed
WCS 2300, mid, RF downlink, Wideband	Passed	Passed
WCS 2300, high, RF downlink, Wideband	Passed	Passed
WCS 2300 low, RF downlink, Narrowband	Passed	Passed
WCS 2300, mid, RF downlink, Narrowband	Passed	Passed
WCS 2300, high, RF downlink, Narrowband	Passed	Passed
WCS 2300, mid, RF downlink, Wideband 5G	Passed	Passed

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**BUREAU
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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

OP-Mode

Band Edge, Frequency Band, Number of signals, Direction, Input Power, Signal Type

	FCC	ISED
Upper, Band 30 WCS 2300, 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 30 WCS 2300, 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 30 WCS 2300, 1, RF downlink, 0.3 dB < AGC, Wideband 5G	Passed	Passed
Upper, Band 30 WCS 2300, 1, RF downlink, 3 dB > AGC, Wideband 5G	Passed	Passed
Upper, Band 30 WCS 2300, 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 30 WCS 2300, 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 30 WCS 2300, 1, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 30 WCS 2300, 1, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 30 WCS 2300, 1, RF downlink, 0.3 dB < AGC, Wideband 5G	Passed	Passed
Lower, Band 30 WCS 2300, 1, RF downlink, 3 dB > AGC, Wideband 5G	Passed	Passed
Lower, Band 30 WCS 2300, 1, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 30 WCS 2300, 1, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Upper, Band 30 WCS 2300, 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Upper, Band 30 WCS 2300, 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Upper, Band 30 WCS 2300, 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Upper, Band 30 WCS 2300, 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed
Lower, Band 30 WCS 2300, 2, RF downlink, 0.3 dB < AGC, Wideband	Passed	Passed
Lower, Band 30 WCS 2300, 2, RF downlink, 3 dB > AGC, Wideband	Passed	Passed
Lower, Band 30 WCS 2300, 2, RF downlink, 0.3 dB < AGC, Narrowband	Passed	Passed
Lower, Band 30 WCS 2300, 2, RF downlink, 3 dB > AGC, Narrowband	Passed	Passed

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47 CFR CHAPTER I FCC PART 27 Subpart C [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

Band 30 WCS 2300, RF downlink

Setup

FCC

ISED

Passed

Passed

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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. Jiri Čečka

2.3 MANUFACTURER DATA

Company Name: Please see applicant data.

Address:

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3 TEST OBJECT DATA

3.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Cellular repeater
Product name	Cellular repeater
Type	UAP-R
Declared EUT data by the supplier	
General Product Description	<p>The EUT is an industrial signal booster supporting the following:</p> <p>Band 30/WCS 2300: 2350 – 2360 MHz</p> <p>Band 41 (BRS 2500), Broadband Radio Service:</p> <ul style="list-style-type: none">• Lower Band Segment (LBS): 2496- 2568 MHz (Range for FCC)• Lower Band Segment (LBS): 2500- 2568 MHz (Range for ISED)• Middle Band Segment (MBS): 2572- 2614 MHz• Upper Band Segment (UBS): 2618 – 2690 MHz <p>Band 25/PCS 1900</p> <p>Band 66/AWS 1700</p> <p>A RF operation is only supported for the downlink.</p>
Booster Type	Industrial signal booster
Voltage Type	DC, supply about PoE
Voltage Level	-60 V - -36 V, -57 V nominal
Maximum Output Donor Port [Uplink]	-
Maximum Output Server Port [Downlink]	18 dBm in all bands at amplifier output. before the BALUN, after the BALUN about 13 dBm per antenna connection port.
Maximum Gain [Uplink]	-
Maximum Gain [Downlink]	20 dB in all bands at amplifier output before the BALUN, after the BALUN about 15 dB per antenna connection port.

After the amplifier output the signal is routed to a BALUN with two antenna port connectors. Two built in dipole antennas are connected to the antenna port connectors of the BALUN.

The measurements were taken at the antenna port with the higher output level, here Antenna port 1.

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

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3.2 EUT MAIN COMPONENTS

Sample Parameter	Value
Serial Number	SZBEBE2508A0005
HW Version	7862370-00 Rev: 00
SW Version	01.03.0012
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
-	-	-

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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; ION-E PSU Shelf AC; HD20882	Power supply rack
AUX1	CommScope; ION-E WCS-2; SZAEAJ1952A0032	Power supply rack
AUX3	GE Power Electronics Inc.; CAR1212FPBC-Z; FK69111	Power module
AUX4	GE Energy; CP2000AC54TEP-CM; LBLNPW13KZ07004506	Power module
AUX5	CommScope; ION E SUI; (e1)MA34	Ethernet module
AUX6	CommScope; ION E CAT; SZBEAE1810A0009	PoE module
AUX8	CommScope, ION E RFD, SZBEAG1825A0004	RF card plug-in module
AUX8	CommScope, ION E RFD, SZBEA G1849A0043	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
,		Setup for all tests

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3.6 OPERATING MODES

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

3.6.1 TEST CHANNELS

Band	Direction	Lower Frequency Band Edge [MHz]	Upper Frequency Band Edge [MHz]	Center Frequency [MHz]	Port
30, WCS 2300	Downlink	2350.0	2360.0	2355.0	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 9.4 MHz

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3.6.3 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
30	Downlink	Narrowband	-0.2	-0.5	2.8	2355.0	Mid
30	Downlink	Wideband	-0.8	-1.1	2.2	2355.0	
30	Downlink	Wideband 5G	-0.6	-0.9	2.4	2355.0	
30	Downlink	Narrowband	-0.8	-1.1	2.2	2350.2	Low
30	Downlink	Wideband	-0.6	-0.9	2.4	2352.5	
30	Downlink	Wideband 5G	-0.9	2.4	-0.9	2355.0	
30	Downlink	Narrowband	-1.2	-1.5	1.8	2359.8	High
30	Downlink	Wideband	-0.8	-1.1	2.2	2357.5	
30	Downlink	Wideband 5G	-0.9	2.4	-0.9	2355.0	
30	Downlink	Narrowband	-0.9	-1.2	2.2	2357./	Max.Power
30	Downlink	Wideband	-0.9	-1.2	2.1	2357.5	
30	Downlink	Wideband 5G	-0.6	-0.9	2.4	2355.0	

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 was 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 were performed, because of the signal width.

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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.

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4 DESCRIPTION OF EMC TEST CENTRE

4.1 CLIMATIC CONDITIONS DURING MEASUREMENTS

The climatic conditions were within the following ranges.

For ESD testing, the conditions during the test were denoted in the corresponding chapter.

Ambient temperature: 25 ± 10 °C

Relative humidity: 20 – 60 %

Air pressure: 860 - 1060 hPa

4.2 CONFORMITY STATEMENT/DECISION RULE

4.2.1 EMISSION

If the standard or the customer defines no decision rule, the laboratory applies a decision rule following the "Binary Statement for Simple Acceptance Rule ($w=0$)" (chapter 4.2.1) of ILAC Guidelines on Decision Rules and Statements of Conformity (ILAC-G8:09/2019). If the measured value is at the limit value, it is evaluated as PASS. The client has agreed with application of the decision rule prior testing and demanded a statement of conformity by the test laboratory.

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4.3 MEASUREMENT UNCERTAINTIES

KDB 935210 D05	Test laboratory
Power measurement	0,68 dB
Measuring AGC threshold level	0,90 dB
Out of band rejection	0,90 dB
Input-versus-output signal comparison	0,91 dB
Mean power output	0,90 dB
Measuring out-of-band/out-of-block (including intermodulation) emissions and spurious emissions	0,90 dB
Out-of-band/out-of-block emissions conducted measurements	0,90 dB
Spurious emissions conducted	2,18 dB
Spurious emissions radiated measurements	5,38 dB
Total frequency uncertainty	2×10^{-7}

Reference : ECL-MU5.4.6.3-EMC-14-001-V03.00 MU Wireless.xlsx

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5 TEST RESULTS

5.1 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 935210 D05 v01r04: 3.5

Test date: 2025-05-16

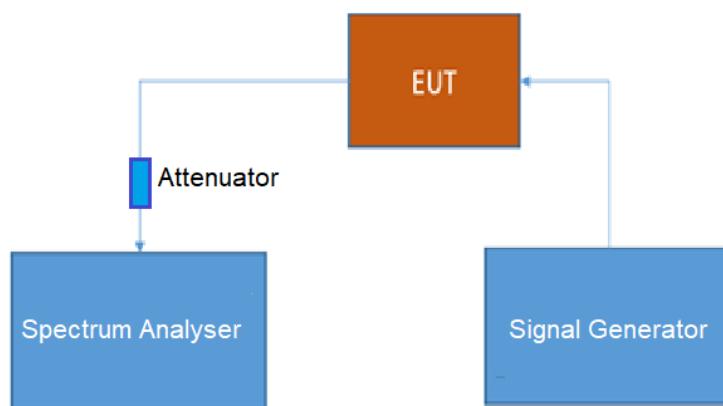
Environmental conditions: 26.3 °C; 36 % r. H.

Test engineer: Thomas Hufnagel

5.1.1 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:



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.

The test results relate only to the tested item. The sample has been provided by the client.
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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.1.2 TEST REQUIREMENTS/LIMITS

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50

Abstract § 27.50 from FCC:

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

(1) Base and fixed stations. (i) For base and fixed stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band:

(A) The average equivalent isotropically radiated power (EIRP) must not exceed 2,000 watts within any 5 megahertz of authorized bandwidth and must not exceed 400 watts within any 1 megahertz of authorized bandwidth.

Abstract RSS-195 from ISED:

5.5 Transmitter Output Power and Equivalent Isotropically Radiated Power

The equivalent isotropically radiated power (e.i.r.p.) of base and fixed station equipment shall comply with the e.i.r.p. limit in SRSP-516.

Abstract SRSP-516 from ISED:

5.1 Radiated Power Limits

5.1.1 Base and Fixed Stations

5.1.1.1 The equivalent isotropically radiated power (e.i.r.p.) of the base and fixed stations³ (with the exception of fixed subscriber stations) operating in the band 2305-2315 MHz or in the band 2350-2360 MHz shall not exceed 400 watts within any 1 MHz band; and shall not exceed 2000 W within any 5 MHz of bandwidth. The peak-to-average power ratio (PAPR) of these transmissions shall comply with the limits specified in RSS-195.

The test results relate only to the tested item. The sample has been provided by the client.

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Tests performed on UAP-R [WCS 2300]

5.1.3 TEST PROTOCOL

FCC table

Band 30 WCS 2300, downlink							
Signal type	Input power	Frequency [MHz]	Input power [dBm]	Maximum average output power [dBm]	Limit average output power [dBm] EIRP	Margin to limit [dB]	Gain [dB]
Wideband	0.3 dB < AGC	2357.5	-1.2	13.9	63.0	49.1	15.1
Wideband	3 dB > AGC	2357.5	2.1	13.4	63.0	49.6	11.3
Narrowband	0.3 dB < AGC	2357.7	-1.2	14.1	56.0	41.9	15.3
Narrowband	3 dB > AGC	2357.7	2.2	13.7	56.0	42.3	11.6
Wideband 5G	0.3 dB < AGC	2355.0	-0.9	14.0	63.0	49.0	14.9
Wideband 5G	3 dB > AGC	2355.0	2.4	13.6	63.0	49.4	11.2

ISED table

Band 30 WCS 2300, downlink							
Signal type	Input power	Frequency [MHz]	Input power [μ W; dBm]	Maximum average output power [mW; dBm]	Limit average output power [W; dBm] EIRP	Margin to limit [dB]	Gain [dB]
Wideband	0.3 dB < AGC	2357.5	759.3; -1.2	24.5; 13.9	2000; 63.0	44.3	20.2
Wideband	3 dB > AGC	2357.5	1630; 2.1	22.0; 13.4	2000; 63.0	44.8	16.4
Narrowband	0.3 dB < AGC	2357.7	764.3; -1.2	26.0; 14.1	400; 56.0	37.5	20.0
Narrowband	3 dB > AGC	2357.7	1670; 2.2	23.1; 13.6	400; 56.0	37.8	16.4
Wideband 5G	0.3 dB < AGC	2355.0	809.3; -0.9	25.2; 14.0	2000; 63.0	44.1	20.1
Wideband 5G	3 dB > AGC	2355.0	1740; 2.4	22.9; 13.5	2000; 63.0	44.5	16.3

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

The test results relate only to the tested item. The sample has been provided by the client.
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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.1.4 SAMPLE CALCULATION OF OUTPUT POWER

FCC calculation:

Maximum output power (EIRP) in consideration together with the send antennas

The highest power level in the table inconsideration together with the lowest margin above is $p_{\text{highest}} = 14.1 \text{ dBm}$ at the narrowband signal.

Hereby at an antenna gain of $G_{\text{dBi}} = 9.0 \text{ dB}$ the highest effecitve radiated output power EIRP $p_{\text{EIRP 1CH}}$ of one channel is:

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

This results in:

$$p_{\text{EIRP 1CH}} = 14.1 \text{ dBm} + 9.0 \text{ dB} = 23.1 \text{ dBm}$$

The eqivalent power P is according the given formula:

$$P_{\text{EIRP 1CH}} =$$

$$P_{\text{EIRP 1CH}} [W] = 10 \text{EXP} \left(\frac{p_{\text{EIRP 1CH}} [\text{dBm}]}{10} \right) * 0.001 [W]$$

This results in:

$$P_{\text{EIRP 1CH}} [W] = 10 \text{EXP} \left(\frac{23.1 [\text{dBm}]}{10} \right) * 0.001 [W] = 0.20 \text{ W}$$

MIMO level:

There are two antennas built in the device therefore at MIMO the maximum power is:

$$p_{\text{MIMO}} = 2 * p_{\text{EIRP 1CH}} = 2 * 0.20 \text{ W} = 0.40 \text{ W}$$

Final result of this consideration:

$p_{\text{EIRP all channels}} = 0.40 \text{ W} < 400 \text{ W/MHz}$, hereby 400 W/MHz is the highest allowed limit in this band which equates 56.0 dBm/MHz.

The DUT doesn't exceed the limit.



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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

ISED calculation:

Maximum output power (EIRP) in consideration together with the send antennas

The highest power level in consideration together with the lowest margin in the table above is $p_{\text{highest}} = 14.1 \text{ dBm}$ at the narrowband signal.

Hereby at an antenna gain of $G_{\text{dBi}} = 9.0 \text{ dB}$ the highest effective radiated output power EIRP $p_{\text{EIRP 1CH}}$ of one channel is:

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

This results in:

$$p_{\text{EIRP 1CH}} = 14.1 \text{ dBm} + 9.0 \text{ dB} = 23.1 \text{ dBm}$$

The equivalent power P is according the given formula:

$$P_{\text{EIRP 1CH}} =$$

$$P_{\text{EIRP 1CH}} [W] = 10 \text{EXP} \left(\frac{p_{\text{EIRP 1CH}} [\text{dBm}]}{10} \right) * 0.001 [W]$$

This results in:

$$P_{\text{EIRP 1CH}} [W] = 10 \text{EXP} \left(\frac{23.1 [\text{dBm}]}{10} \right) * 0.001 [W] = 0.20 \text{ W}$$

MIMO level:

There are two antennas built in the device therefore at MIMO the maximum power is:

$$p_{\text{MIMO}} = 2 * p_{\text{EIRP 1CH}} = 2 * 0.20 \text{ W} = 0.40 \text{ W}$$

Final result of this consideration:

$p_{\text{EIRP all channels}} = 0.40 \text{ W} < 400 \text{ W/MHz}$, hereby 400 W/MHz is the highest allowed limit in this band which equates 56.0 dBm/MHz.



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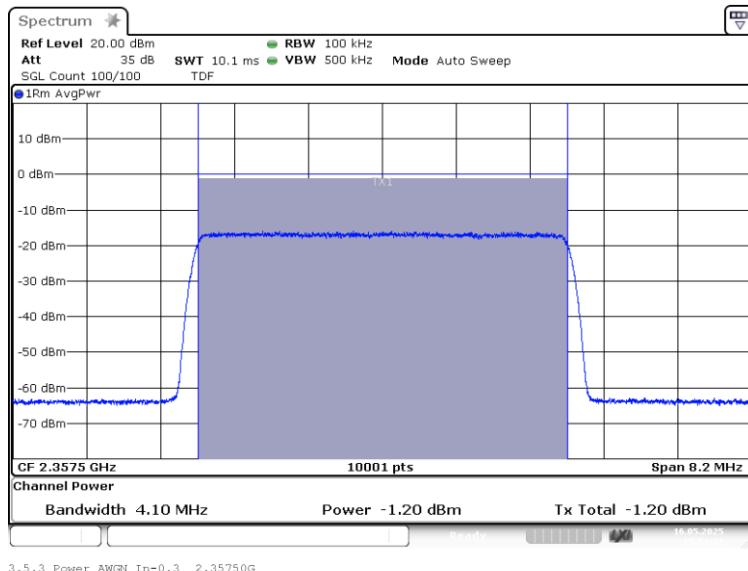
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.1.5 MEASUREMENT PLOT

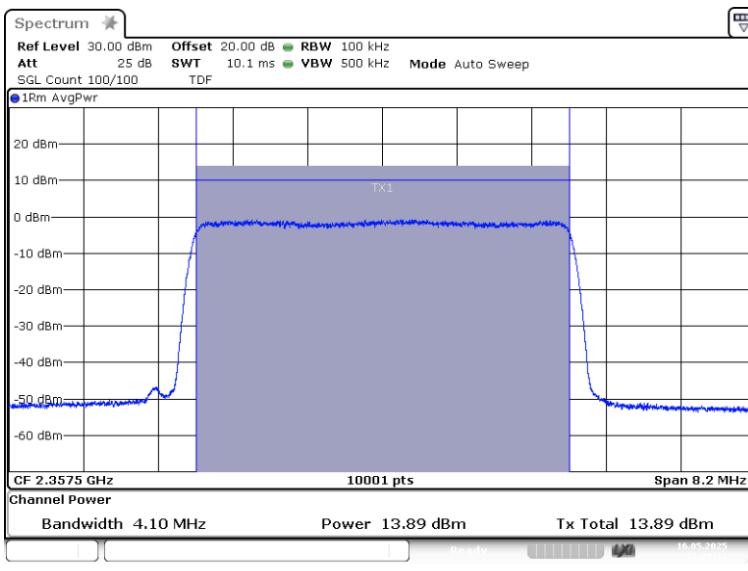
FCC plots

Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Input power 0.3 dB < AGC



3.5.3 Power AWGN In -0.3 2.35750G

Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Output power 0.3 dB < AGC



3.5.3 Power AWGN Out -0.3 2.35750G

The test results relate only to the tested item. The sample has been provided by the client.

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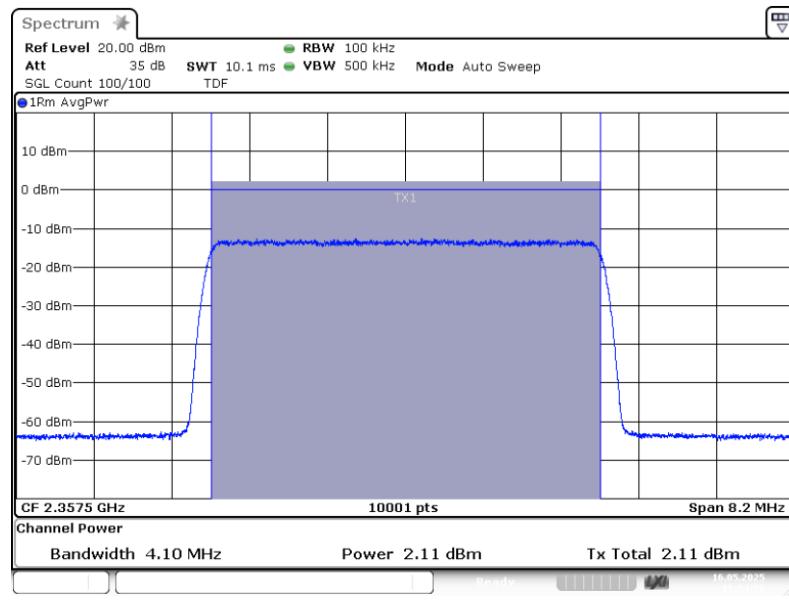


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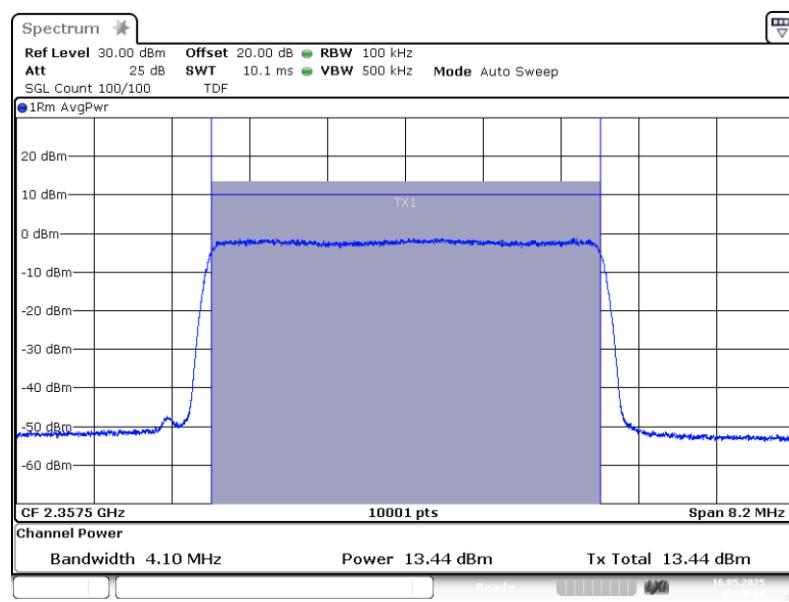
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Input power 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Output power 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.
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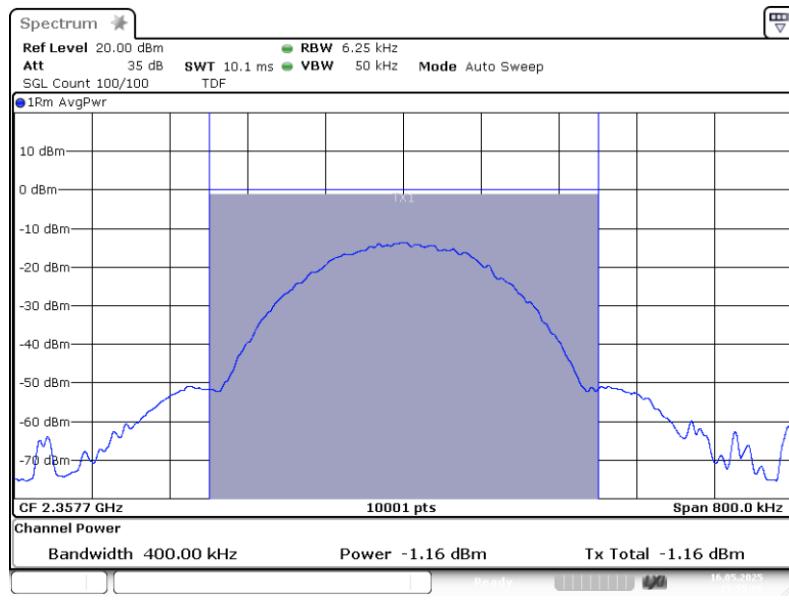


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Test Report No.: 25-0093

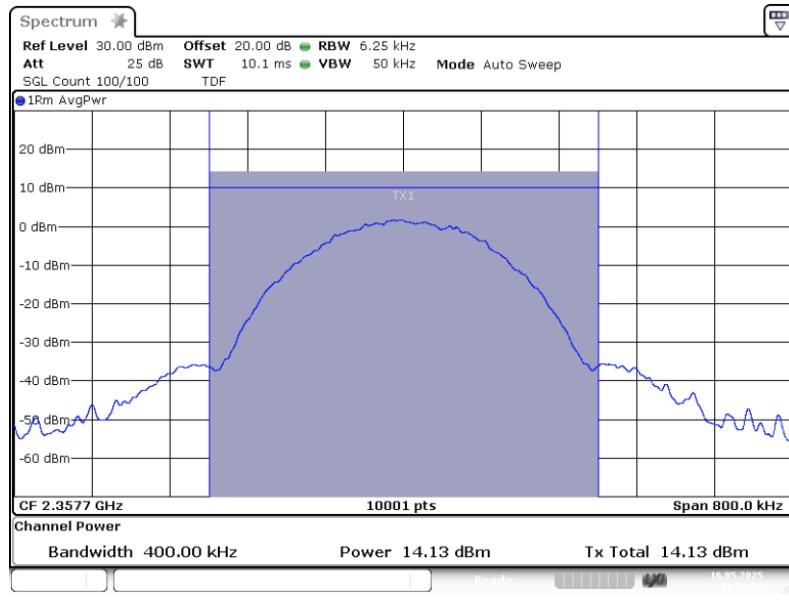
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Input power 0.3 dB < AGC



3.5.3 Power GSM In=0.3 2.35770G

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Output power 0.3 dB < AGC



3.5.3 Power GSM Out -0.3 2.35770G

The test results relate only to the tested item. The sample has been provided by the client.

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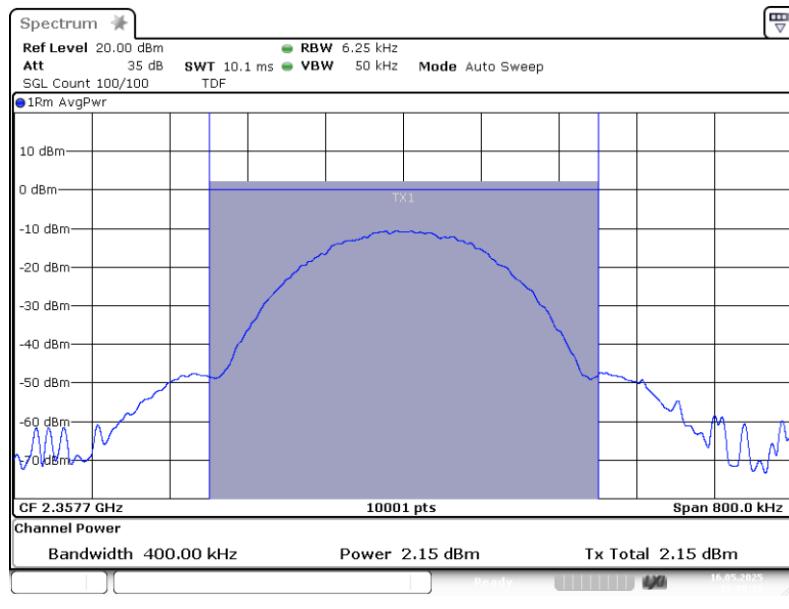


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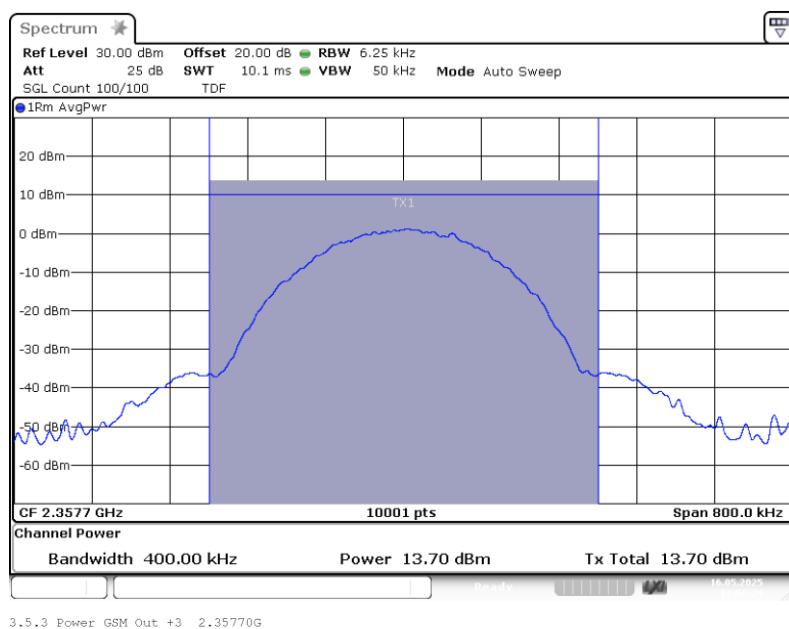
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Input power 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Output power 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.
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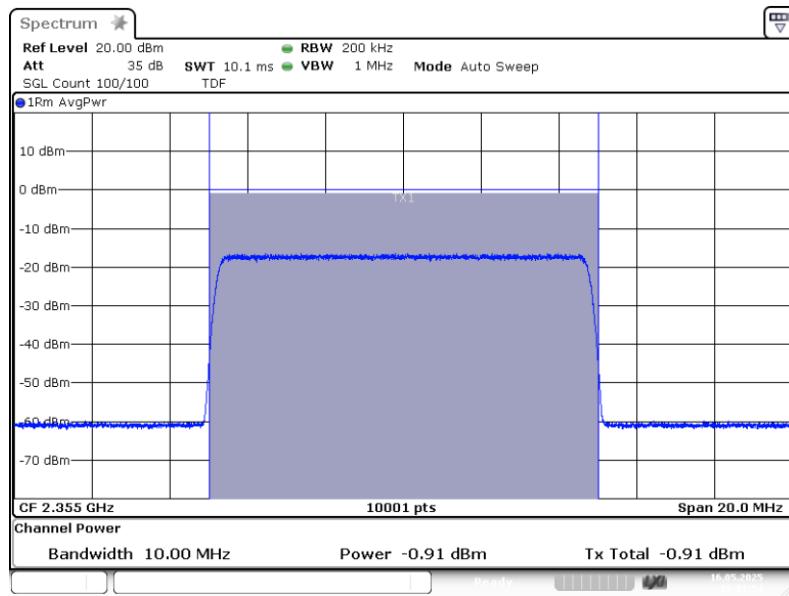


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Test Report No.: 25-0093

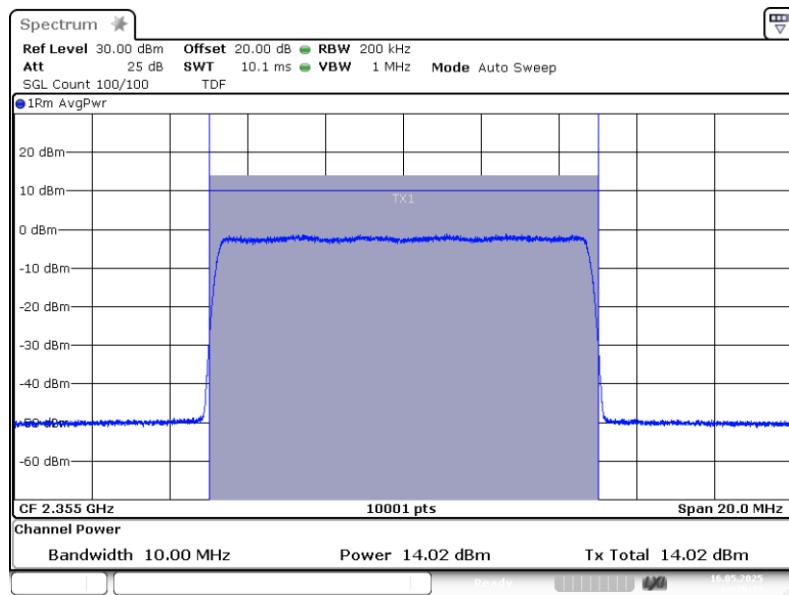
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Input power 0.3 dB < AGC



3.5.3 Power AWGN 10M In=0.3 2.3550G

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Output power 0.3 dB < AGC



3.5.3 Power AWGN 10M Out =0.3 2.3550G

The test results relate only to the tested item. The sample has been provided by the client.

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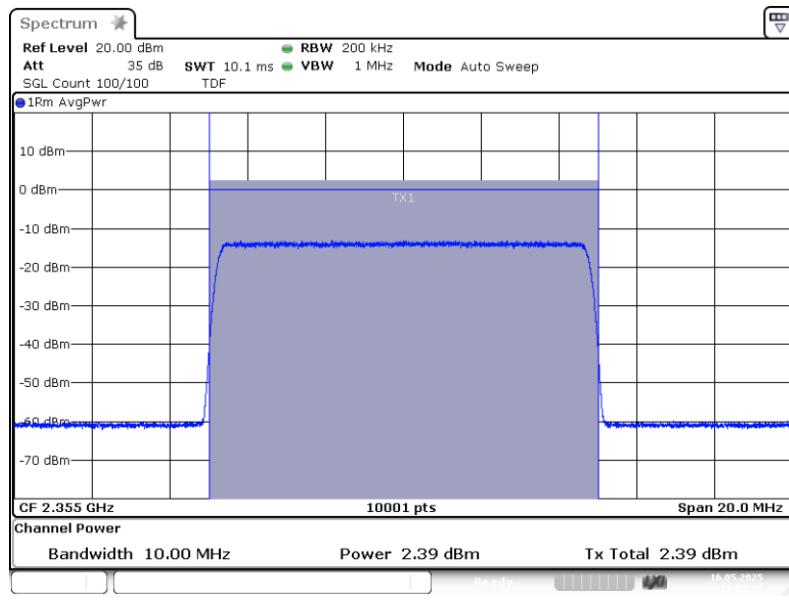


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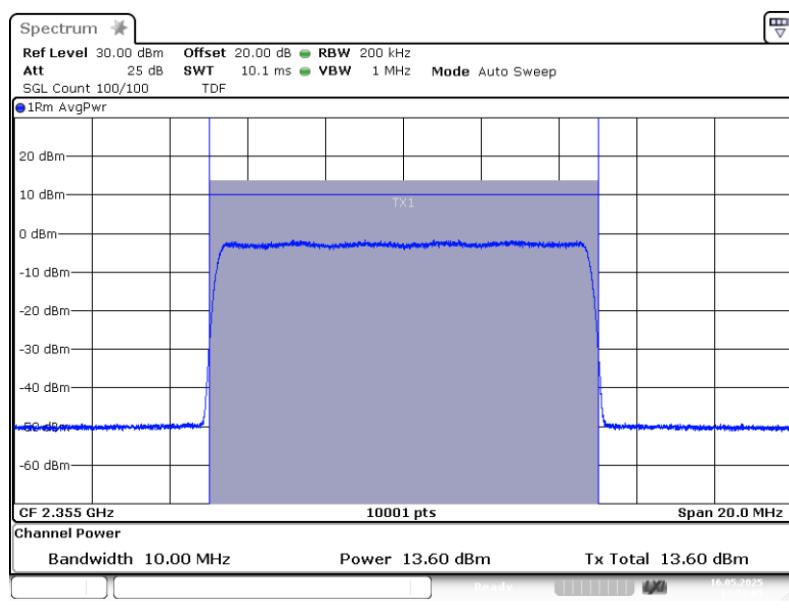
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Input power 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Output power 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

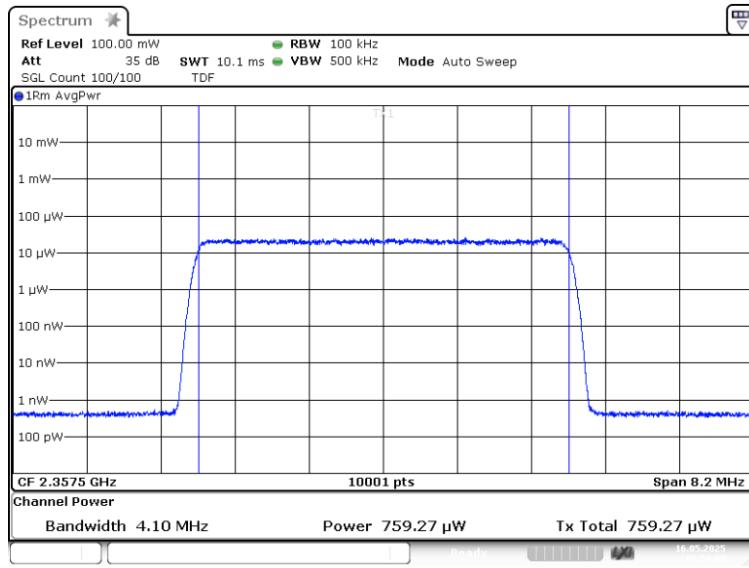
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Test Report No.: 25-0093

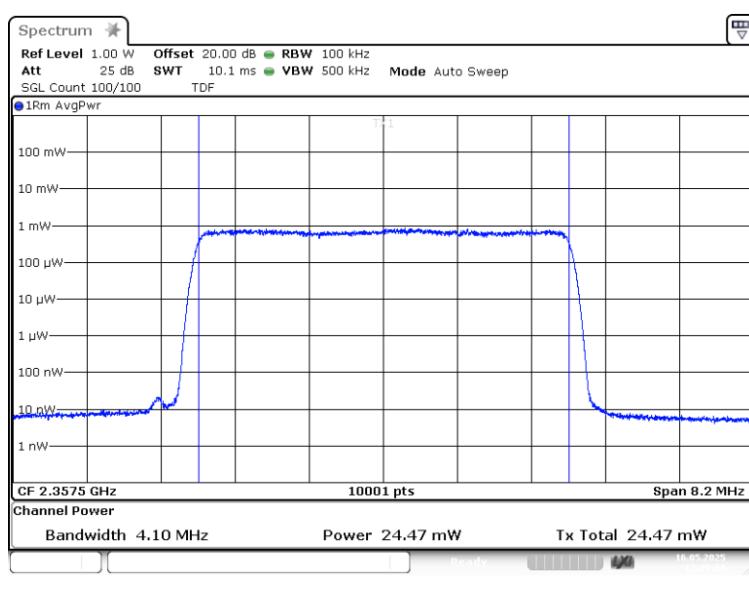
Tests performed on UAP-R [WCS 2300]

ISED plots

Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Input power 0.3 dB < AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Output power 0.3 dB < AGC



The test results relate only to the tested item. The sample has been provided by the client.
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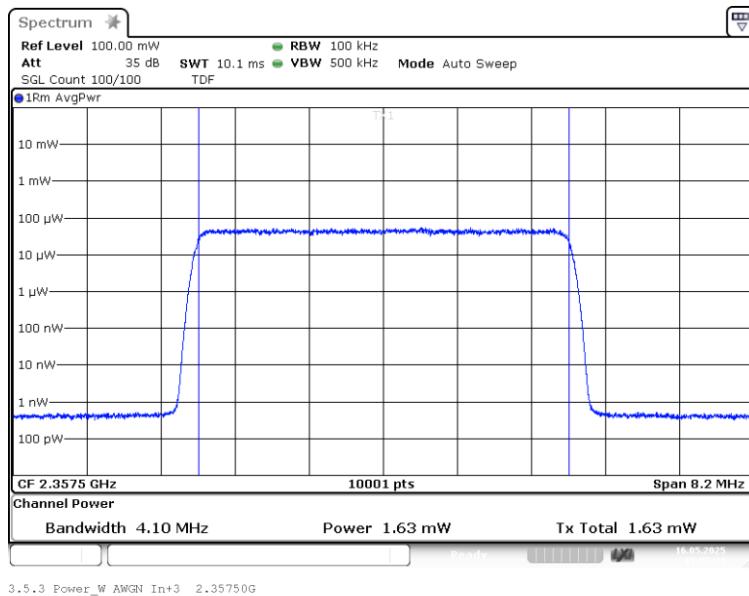


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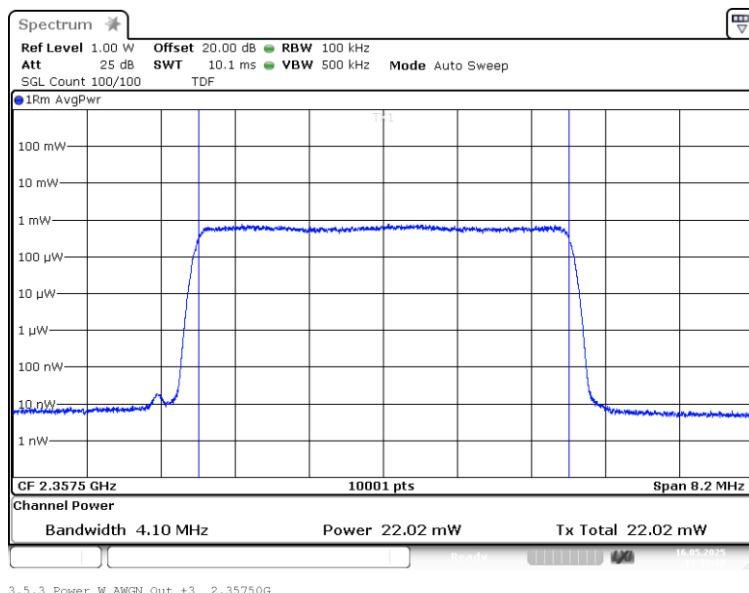
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Input power 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
Output power 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

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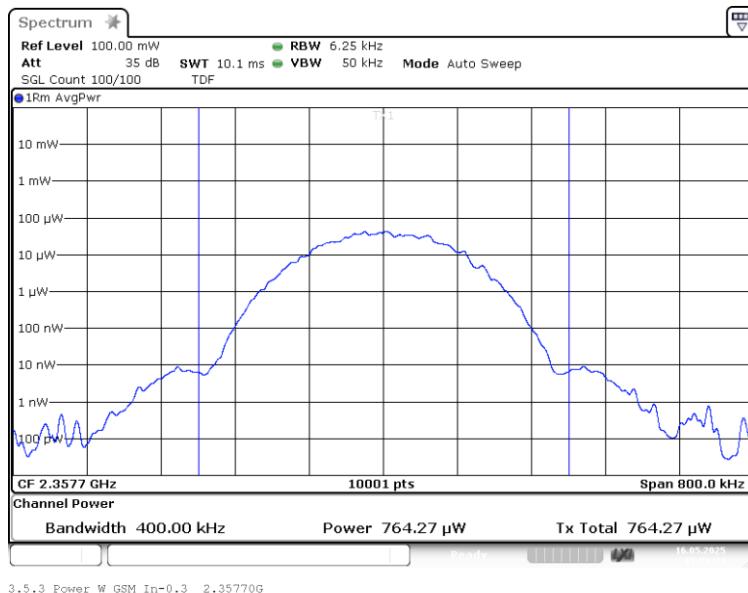


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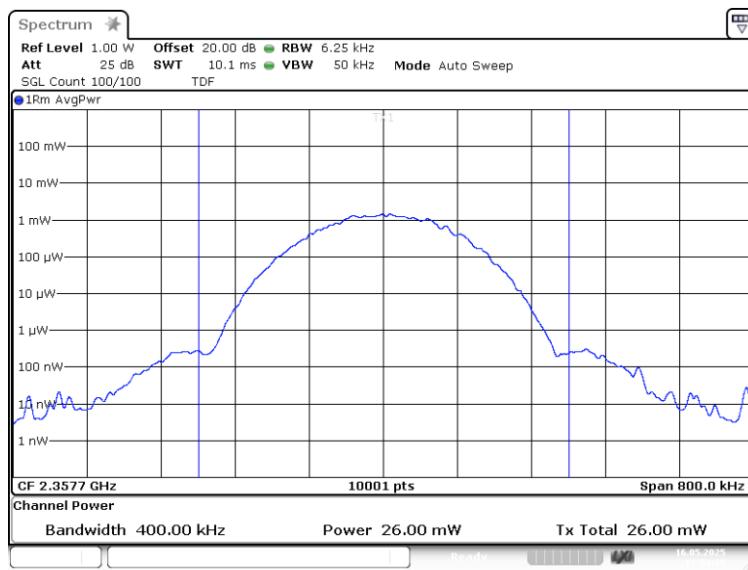
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Input power 0.3 dB < AGC



3.5.3 Power_W GSM In-0.3 2.35770G

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Output power 0.3 dB < AGC



3.5.3 Power_W GSM Out -0.3 2.35770G

The test results relate only to the tested item. The sample has been provided by the client.

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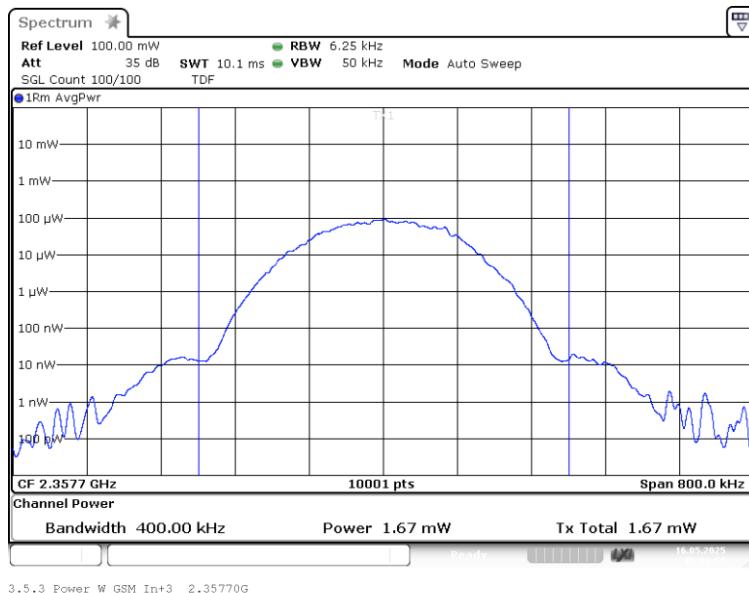


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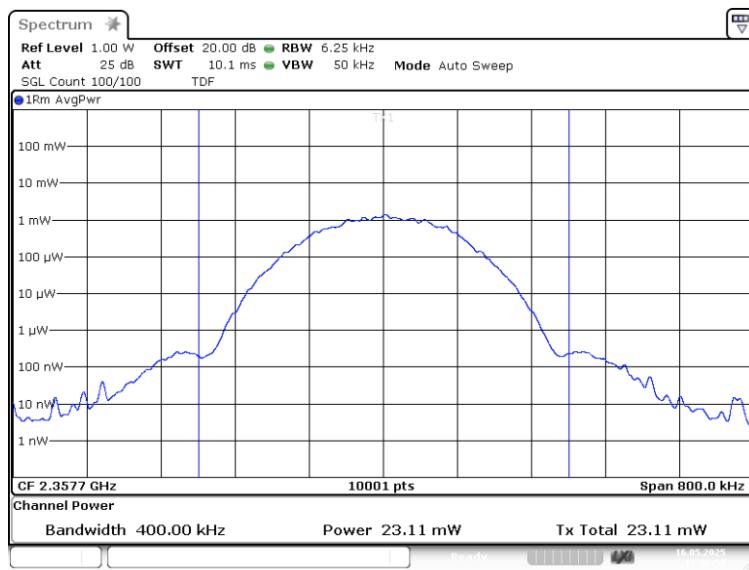
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Input power 3 dB > AGC



3.5.3 Power_W GSM In+3 2.35770G

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
Output power 3 dB > AGC



3.5.3 Power_W GSM Out +3 2.35770G

The test results relate only to the tested item. The sample has been provided by the client.

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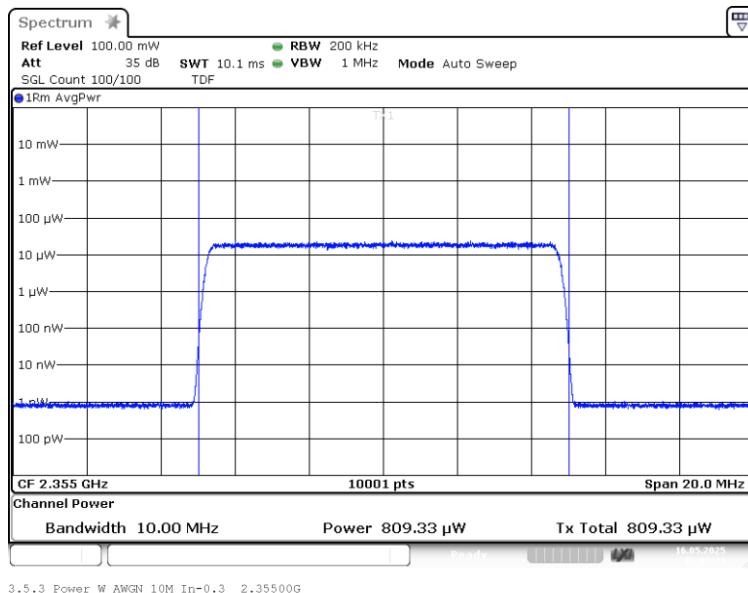


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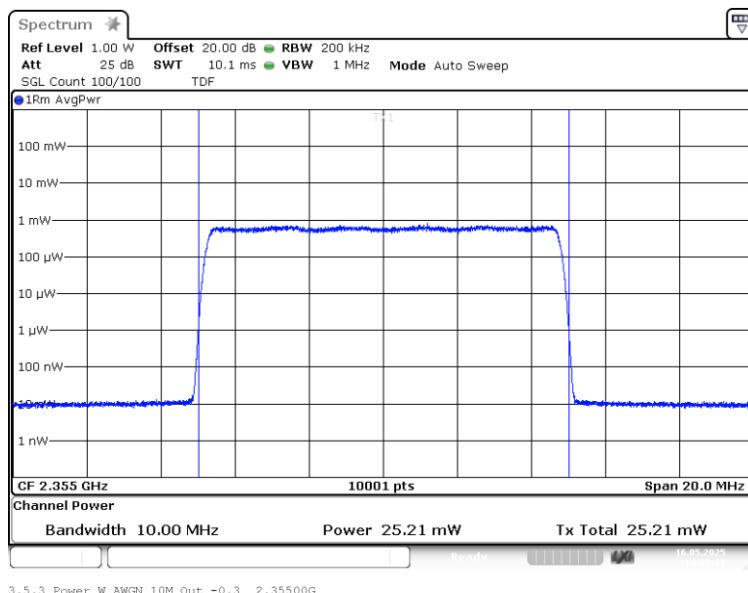
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Input power 0.3 dB < AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Output power 0.3 dB < AGC



The test results relate only to the tested item. The sample has been provided by the client.

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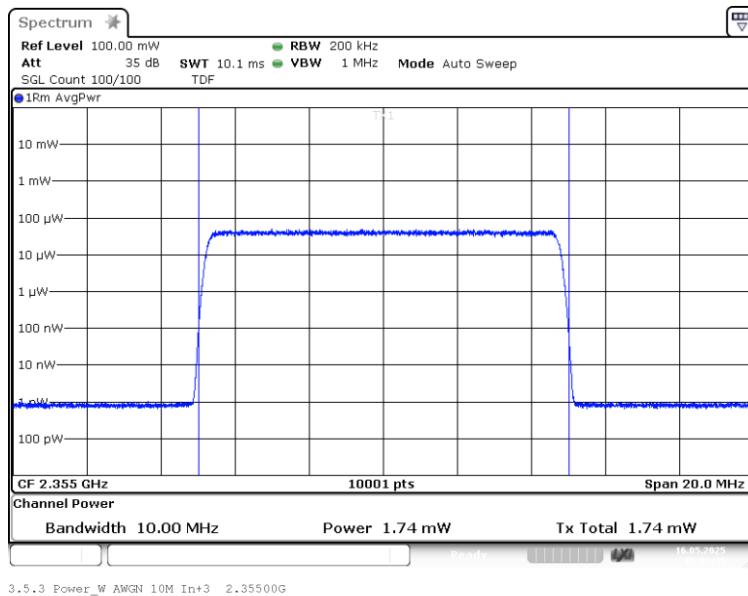


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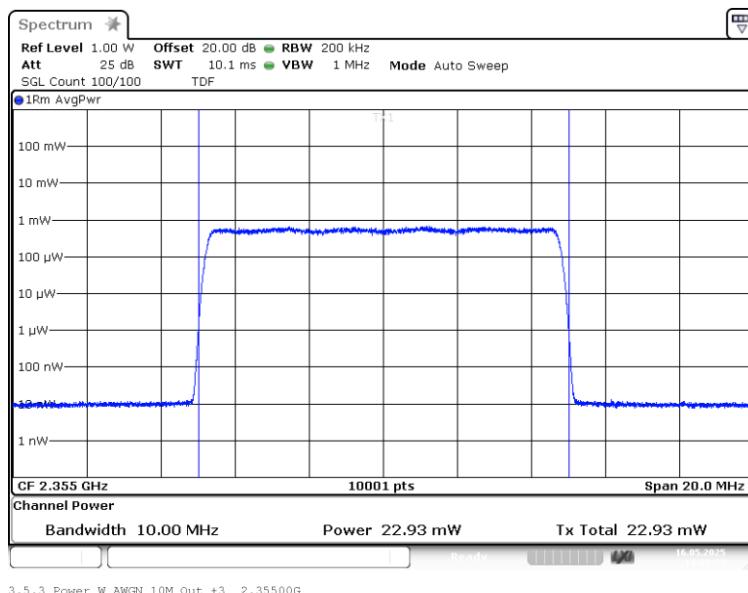
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Input power 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Output power 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.1.6 TEST EQUIPMENT USED

- Conducted

The test results relate only to the tested item. The sample has been provided by the client.
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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.2 PEAK TO AVERAGE RATIO

Standard FCC Part 27, §27.50

The test was performed according to:

ANSI C63.26

Test date: 2025-05-16

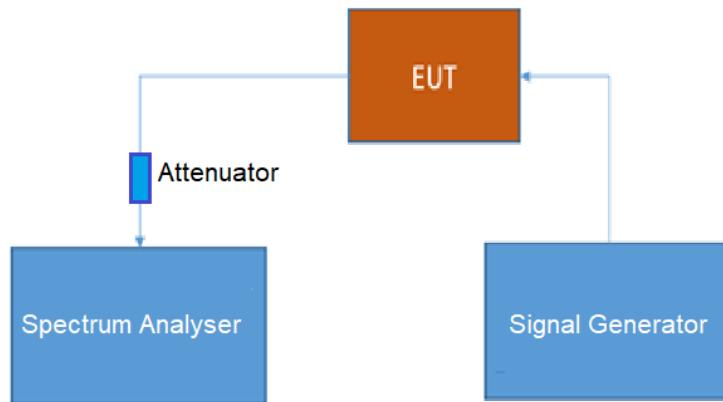
Environmental conditions: 26.3 °C; 36 % r. H.

Test engineer: Thomas Hufnagel

5.2.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the occupied bandwidth in comparison between the input and output signal of a booster.

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



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.



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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.2.2 TEST REQUIREMENTS/LIMITS

Subpart C – Technical standards

§ 27.50

Abstract § 27.50 from FCC:

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

(1) Base and fixed stations. (i) For base and fixed stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band:

(A)

(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-195 from ISED:

5.5.1 Peak to Average Power Ratio (PAPR) for Base and Fixed Station Equipment in the Frequency Ranges 2305-2315 MHz and 2350-2360 MHz

The PAPR of the transmitter output power of base and fixed station equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.



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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.2.3 TEST PROTOCOL

Band 30 WCS 2300, downlink						
Signal type	Input power	Frequency [MHz]	Input power [dBm]	PAPR [dB]	Limit PAPR [dB]	Margin to limit [dB]
Wideband	0.3 dB < AGC	2357.5	-1.2	8.4	13.0	4.6
Wideband	3 dB > AGC	2357.5	2.1	8.4	13.0	4.7
Narrowband	0.3 dB < AGC	2357.8	-1.2	0.2	13.0	12.8
Narrowband	3 dB > AGC	2357.8	2.2	0.1	13.0	12.9
Wideband 5G	0.3 dB < AGC	2355.0	-0.9	8.5	13.0	4.5
Wideband 5G	3 dB > AGC	2355.0	2.4	8.4	13.0	4.6

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

The test results relate only to the tested item. The sample has been provided by the client.
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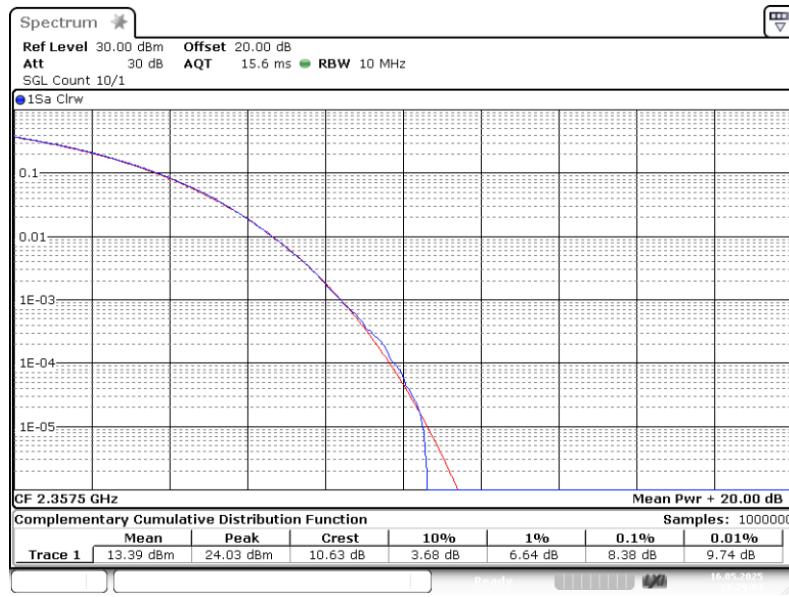
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Test Report No.: 25-0093

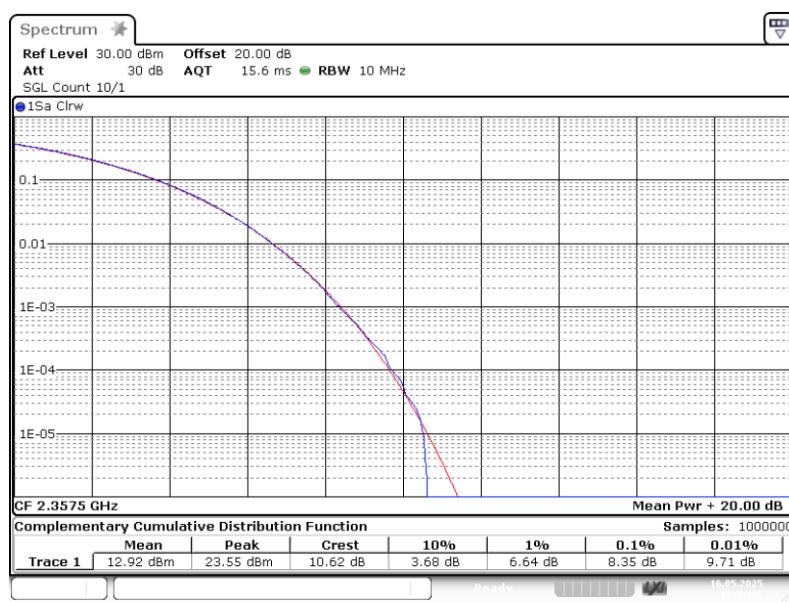
Tests performed on UAP-R [WCS 2300]

5.2.4 MEASUREMENT PLOT

Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
PAPR 0.3 dB < AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3575 GHz; Band edge: f0; Mod: AWGN;
PAPR 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

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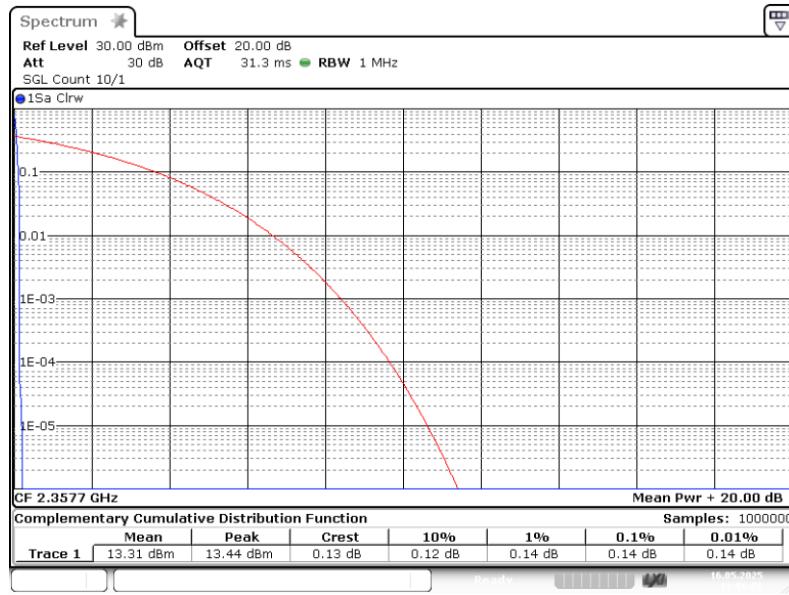
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
PAPR 0.3 dB < AGC



4.0 PAPR GSM Out -0.3 2.358G

Band: WCS 2300, Antenna 1; Frequency: 2.3577 GHz; Band edge: f0; Mod: GSM;
PAPR 3 dB > AGC



4.0 PAPR GSM Out +3 2.358G

The test results relate only to the tested item. The sample has been provided by the client.

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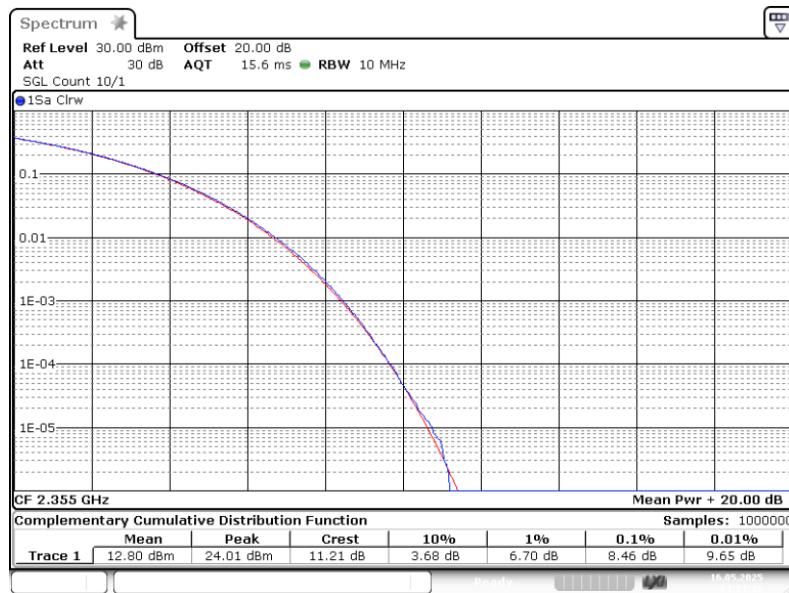


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Test Report No.: 25-0093

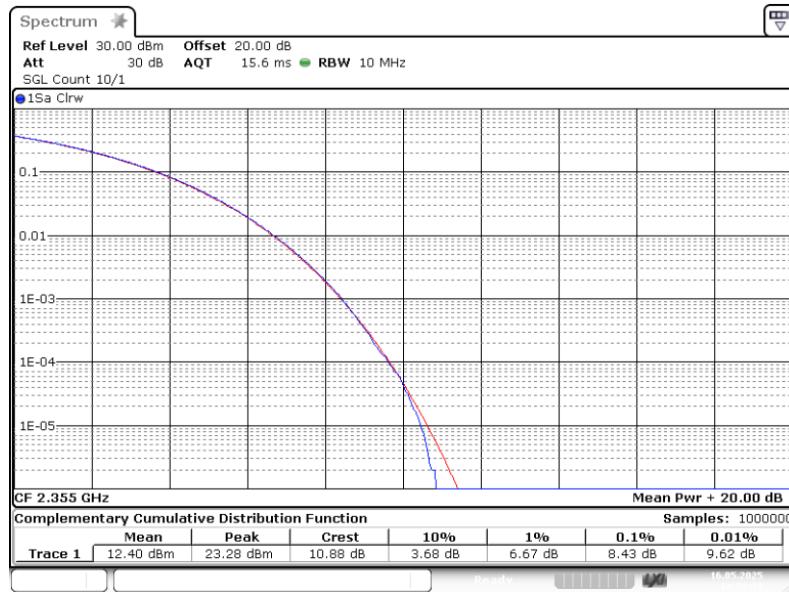
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
PAPR 0.3 dB < AGC



4.0 PAPR AWGN 10M Out -0.3 2.355G

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
PAPR 3 dB > AGC



4.0 PAPR AWGN 10M Out +3 2.355G

The test results relate only to the tested item. The sample has been provided by the client.

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Tests performed on UAP-R [WCS 2300]

5.2.5 TEST EQUIPMENT USED

- Conducted

The test results relate only to the tested item. The sample has been provided by the client.
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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

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5.3 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: 2025-05-16

Environmental conditions: 26.3 °C; 36 % r. H.

Test engineer: Thomas Hufnagel

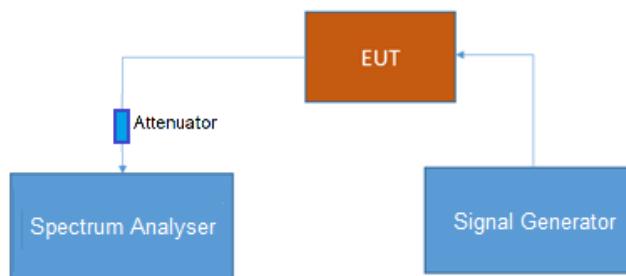
5.3.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission limits per FCC §2.1049, RSS-GEN 6.4 and RSS-131-5.2.2

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



Test Setup step 1: Measuring characteristics of test signals



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.

The test results relate only to the tested item. The sample has been provided by the client.
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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.3.2 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.

The test results relate only to the tested item. The sample has been provided by the client.

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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).



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Tests performed on UAP-R [WCS 2300]

Abstract RSS-131 from ISED:

RSS-131; 9.2 Input-versus-output spectrum

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

5.3.3 TEST PROTOCOL

Band 66 AWS 1700, 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	2355.0	4387.8	4386.0	1.9	205.0	203.2
Wideband	3 dB > AGC	2355.0	4390.3	4385.4	4.9	205.0	200.1
Narrowband	0.3 dB < AGC	2356.0	320.5	317.4	3.1	10.0	6.9
Narrowband	3 dB > AGC	2356.0	315.8	317.9	2.1	10.0	7.9
Wideband 5G	0.3 dB < AGC	2355.0	9953.5	9950.5	3.0	470.0	467.0
Wideband 5G	3 dB > AGC	2355.0	9944.5	9941.5	3.0	470.0	467.0

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



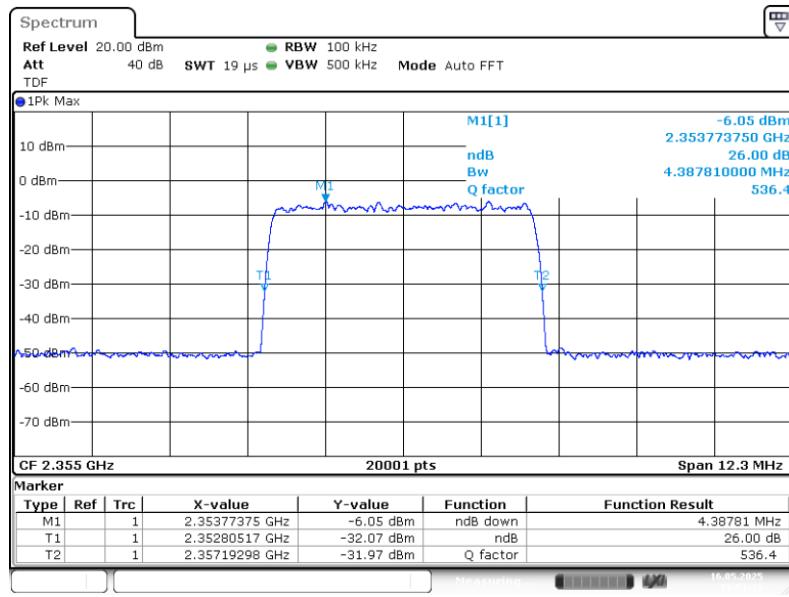
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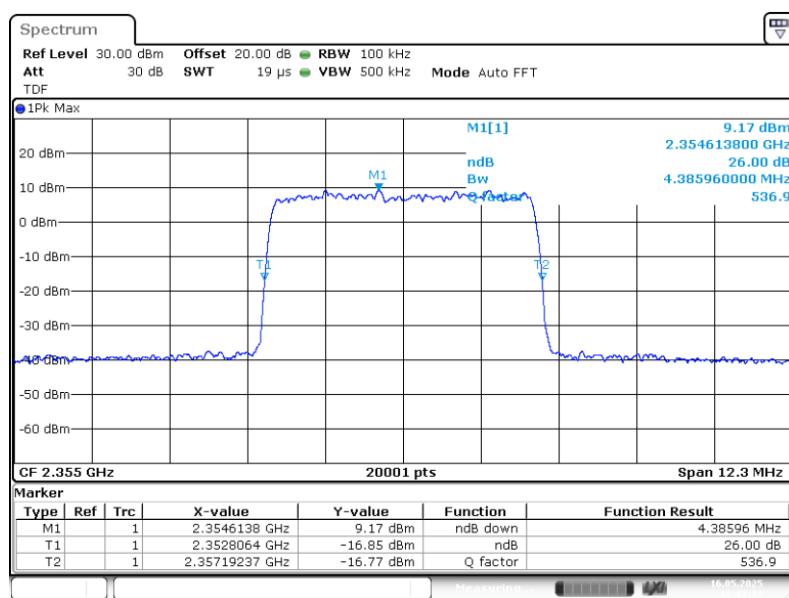
Tests performed on UAP-R [WCS 2300]

5.3.4 MEASUREMENT PLOT

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN;
Input OCBw 0.3 dB < AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN;
Output OCBw 0.3 dB < AGC



The test results relate only to the tested item. The sample has been provided by the client.

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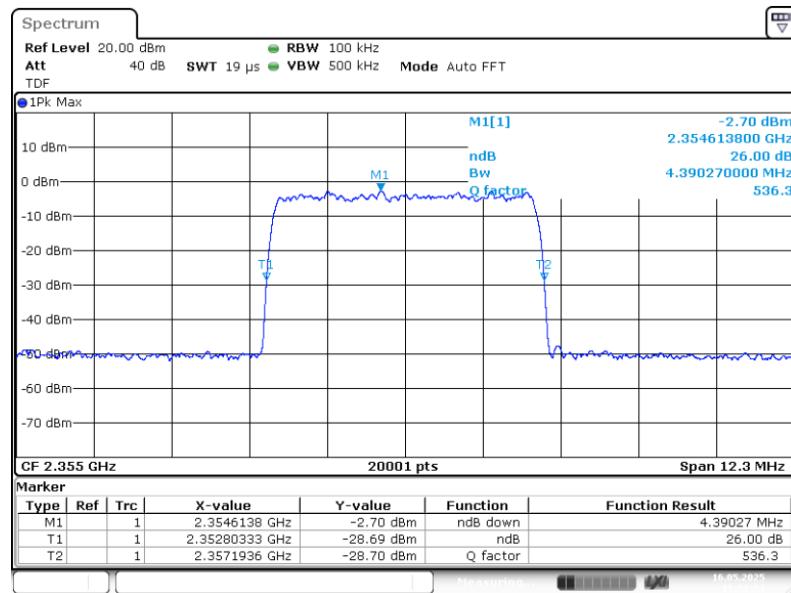


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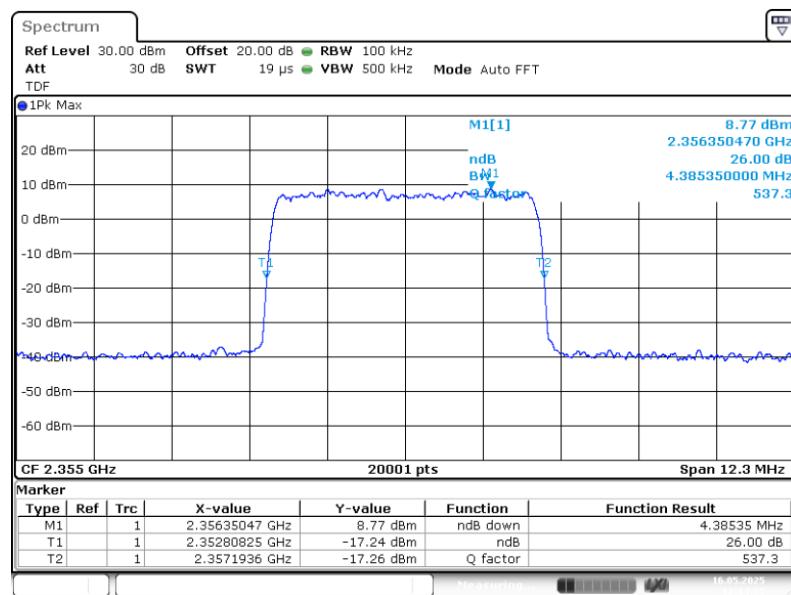
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN;
Input OCBw 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN;
Output OCBw 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

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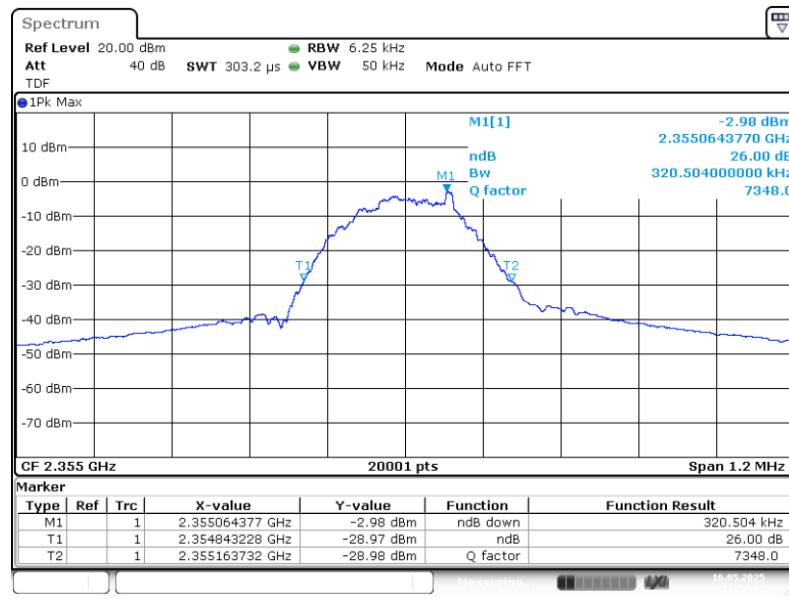


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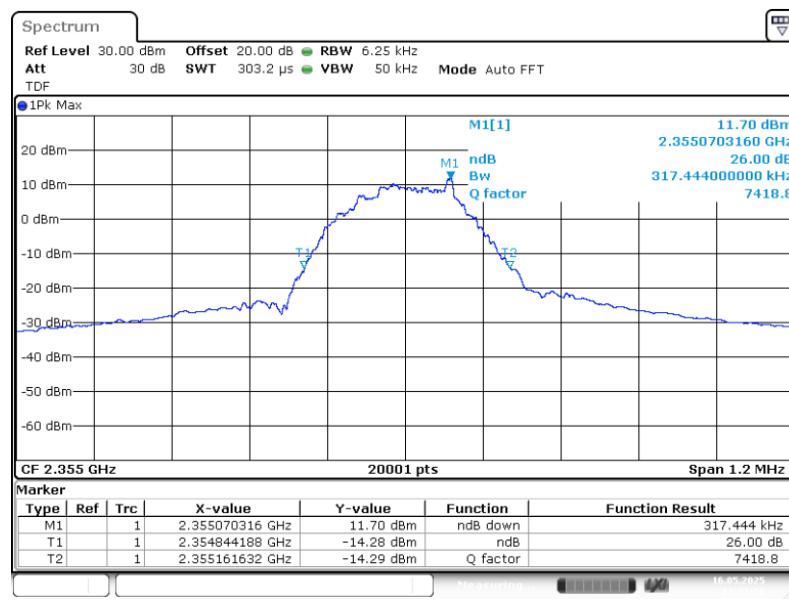
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: GSM;
Input OCBw 0.3 dB < AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: GSM;
Output OCBw 0.3 dB < AGC



The test results relate only to the tested item. The sample has been provided by the client.

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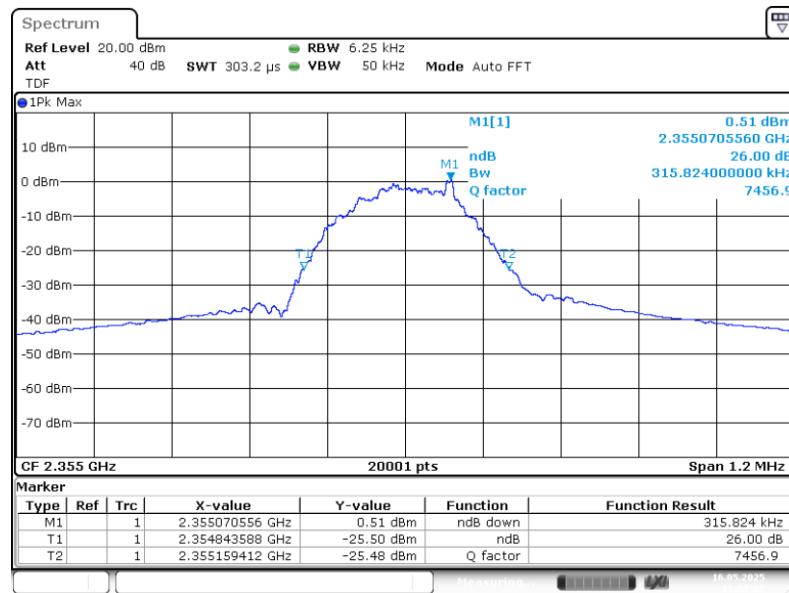


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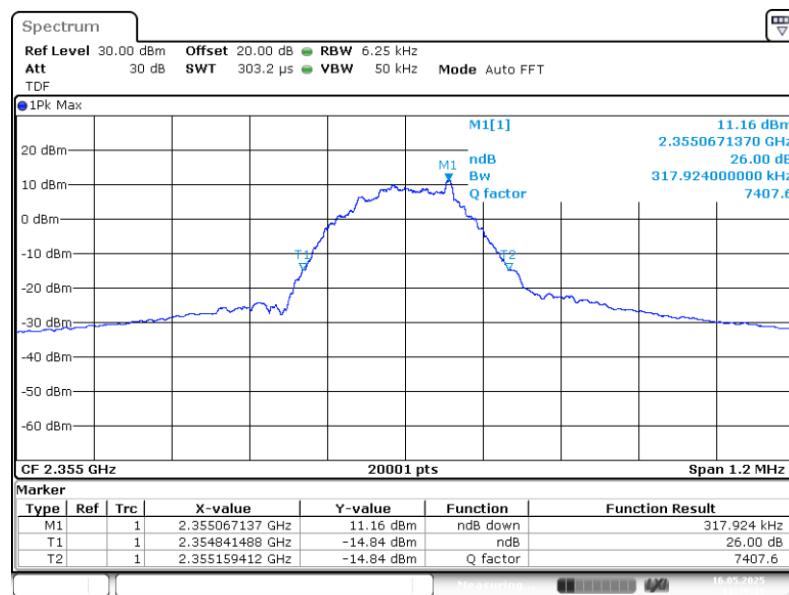
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: GSM;
Input OCBw 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: GSM;
Output OCBw 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

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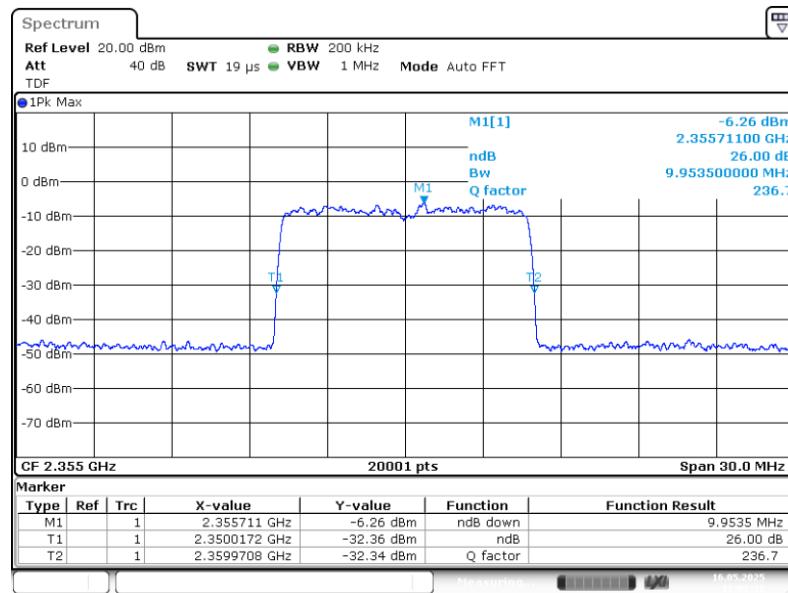


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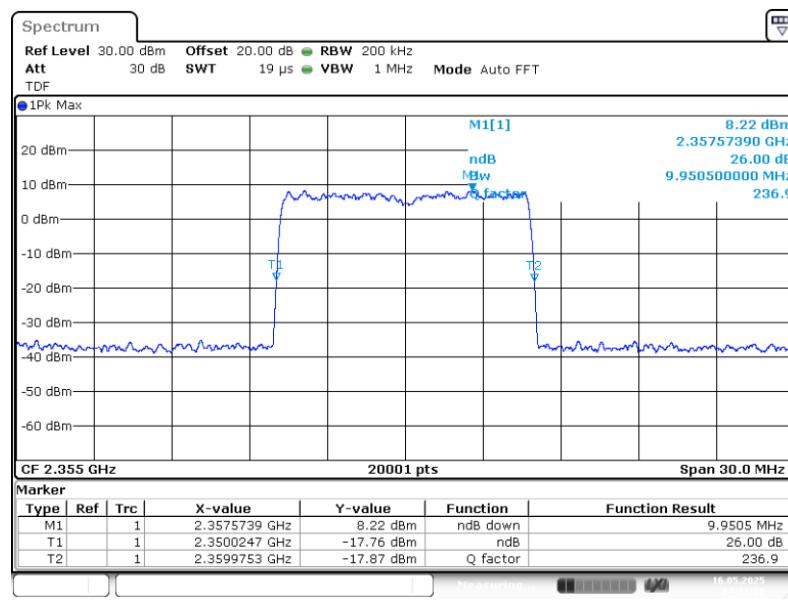
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Input OCBw 0.3 dB < AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Output OCBw 0.3 dB < AGC



The test results relate only to the tested item. The sample has been provided by the client.

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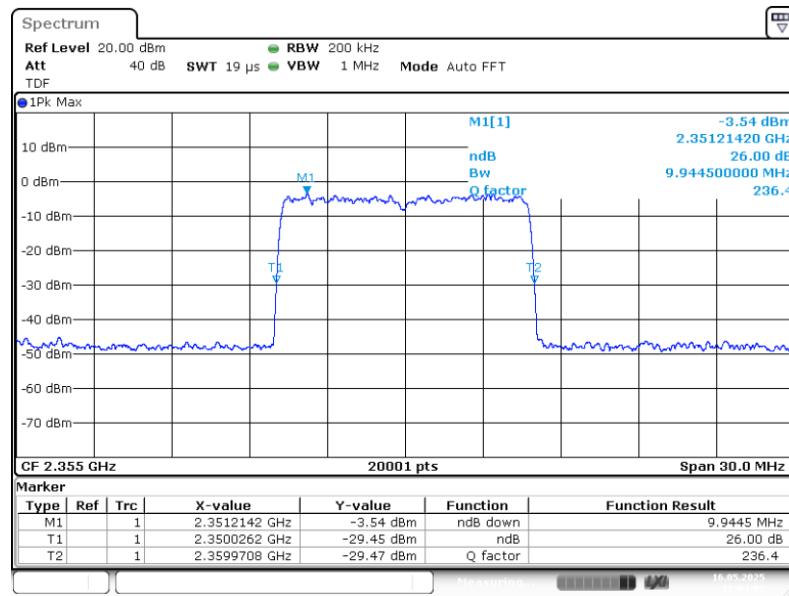


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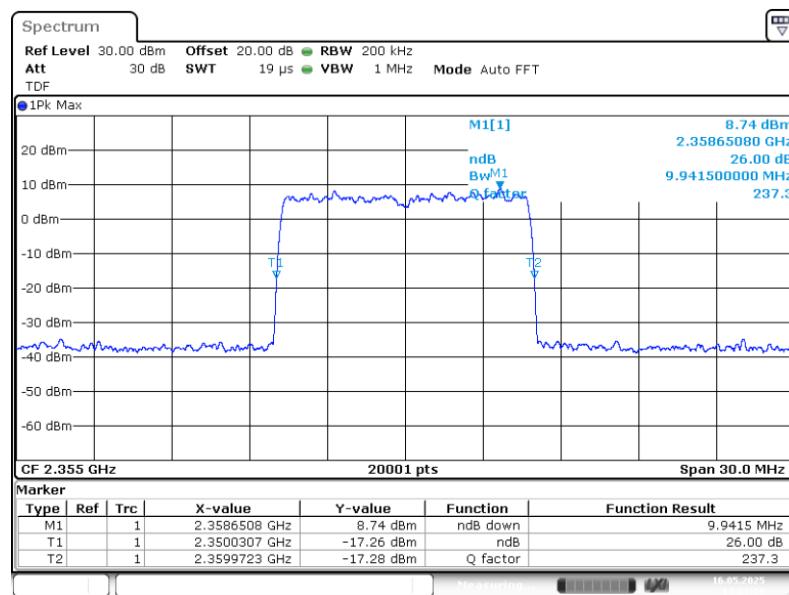
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Input OCBw 3 dB > AGC



Band: WCS 2300, Antenna 1; Frequency: 2.3550 GHz; Band edge: mid; Mod: AWGN 10M;
Output OCBw 3 dB > AGC



The test results relate only to the tested item. The sample has been provided by the client.

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.3.5 TEST EQUIPMENT USED

- Conducted

The test results relate only to the tested item. The sample has been provided by the client.
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Tests performed on UAP-R [WCS 2300]

5.4 CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard FCC Part §2.1051, §27.53

The test was performed according to:

ANSI C63.26

Test date: 2025-05-16; 2025-05-30

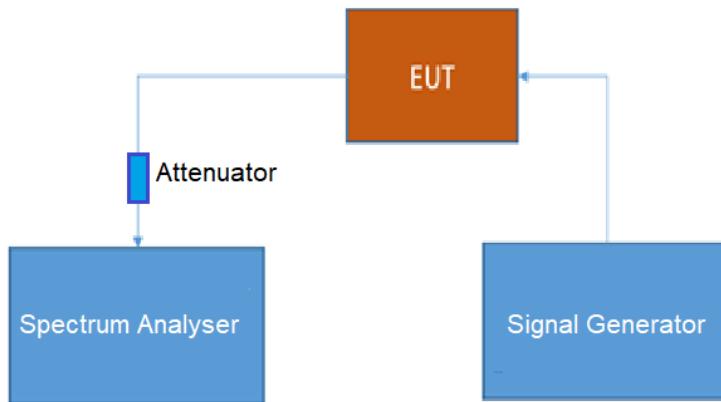
Environmental conditions: 26.3 °C; 36 % r. H./23.1 °C; 39 % r. H.

Test engineer: Thomas Hufnagel

5.4.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the signal booster power and gain limits and requirements for industrial signal boosters.

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



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.

The test results relate only to the tested item. The sample has been provided by the client.
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Tests performed on UAP-R [WCS 2300]

5.4.2 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:

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:

(i) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than $75 + 10 \log (P)$ dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2287.5 and 2300 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2285 and 2287.5 MHz, and $75 + 10 \log (P)$ dB below 2285 MHz;

(iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2362.5 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2362.5 and 2365 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2365 and 2367.5 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2367.5 and 2370 MHz, and $75 + 10 \log (P)$ dB above 2370 MHz.

The test results relate only to the tested item. The sample has been provided by the client.

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Tests performed on UAP-R [WCS 2300]

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:

- (i) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than $75 + 10 \log (P)$ dB on all frequencies between 2320 and 2345 MHz;
- (ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2287.5 and 2300 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2285 and 2287.5 MHz, and $75 + 10 \log (P)$ dB below 2285 MHz;
- (iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2362.5 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2362.5 and 2365 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2365 and 2367.5 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2367.5 and 2370 MHz, and $75 + 10 \log (P)$ dB above 2370 MHz.

(3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz average EIRP or less:

- (i) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log (P)$ dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than $61 + 10 \log (P)$ dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than $67 + 10 \log (P)$ dB on all frequencies between 2328 and 2337 MHz;
- (ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log (P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log (P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log (P)$ dB below 2288 MHz;
- (iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.

The test results relate only to the tested item. The sample has been provided by the client.

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Tests performed on UAP-R [WCS 2300]

Abstract RSS-195 from ISED

5.6 Transmitter Unwanted Emissions

The transmitter unwanted emissions shall be measured with a resolution bandwidth of 1 MHz. A smaller resolution bandwidth is permitted provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz. However, in the 1 MHz bands immediately adjacent to the edges of the frequency range(s) in which the equipment is allowed to operate, a resolution bandwidth of as close as possible to, without being less than 1% of the occupied bandwidth, shall be employed provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz#

5.6.1 Base Station, Fixed Station and High-Power Fixed Subscriber Equipment

The power of any emission outside the frequency range(s) in which the equipment operates shall be attenuated below the transmitter power, $P(\text{dBW})$, by the amount indicated in Table 1 and graphically represented in Figure 1, where p is the transmitter output power measured in watts.

Table 1 — Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment

Frequency (MHz)	Attenuation (dB)
<2200	$43 + 10 \log_{10}(p)$
2200 - 2285	$75 + 10 \log_{10}(p)$
2285 - 2287.5	$72 + 10 \log_{10}(p)$
2287.5 - 2300	$70 + 10 \log_{10}(p)$
2300 - 2305	$43 + 10 \log_{10}(p)$
2305 - 2320	$43 + 10 \log_{10}(p)$ ^{Note}
2320 - 2345	$75 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)$ ^{Note}
2360 - 2362.5	$43 + 10 \log_{10}(p)$
2362.5 - 2365	$55 + 10 \log_{10}(p)$
2365 - 2367.5	$70 + 10 \log_{10}(p)$
2367.5 - 2370	$72 + 10 \log_{10}(p)$
2370 - 2395	$75 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

Note: Measured at the edges of the highest and lowest frequency range(s) in which the equipment is designed to operate. See Section 5.2 for the permitted frequency ranges for the various equipment types.



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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.4.3 TEST PROTOCOL

General considerations concerning the limits:

The measuring bandwidth of 1 MHz was chosen according the test requirements except 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 at lower frequencies the measurement bandwidths were reduced to have the possibility to record the spurious emissions at these lower frequencies.

At frequencies where measuring bandwidths were reduced also the limit lines were reduced according the given formula:

$$p \text{ RBW}_{\text{reduced}} [\text{dBm}] = 10 * \log \left(\text{RBW}_{\text{reduced}} [\text{kHz}] / 1000 \text{ kHz} \right) + p \text{ RBW} \text{ 1000 kHz} [\text{dBm}]$$

Hereby "p" are the limit lines' values.

**Test Report No.: 25-0093**

Tests performed on UAP-R [WCS 2300]

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Band 30, WCS 2300, downlink							
Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
low	Wideband	0.01668	-90.3	RMS	1	-75.0	15.3
low	Wideband	0.10250	-82.1	RMS	10	-65.0	17.1
low	Wideband	708.6	-74.0	RMS	100	-55.0	19.0
low	Wideband	1600.5	-59.6	RMS	1000	-45.0	14.6
low	Wideband	2282.8	-68.1	RMS	1000	-45.0	23.1
low	Wideband	2290.4	-73.4	RMS	100	-50.0	23.4
low	Wideband	2303.3	-67.2	RMS	100	-23.0	44.2
low	Wideband	2303.3	-67.2	RMS	100	-23.0	44.2
low	Wideband	2328.7	-75.2	RMS	100	-45.0	30.2
low	Wideband	2330.1	-54.5	RMS	100	-55.0	-0.5
low	Wideband	2348.7	-63.2	RMS	100	-23.0	40.2
low	Wideband	2361.0	-66.9	RMS	100	-23.0	43.9
low	Wideband	2361.0	-66.9	RMS	100	-23.0	43.9
low	Wideband	2365.3	-75.2	RMS	100	-50.0	25.2
low	Wideband	2365.2	-75.4	RMS	100	-50.0	25.4
low	Wideband	2374.2	-71.5	RMS	100	-55.0	16.5
low	Wideband	2627.7	-50.5	RMS	1000	-45.0	5.5
low	Wideband	4705.2	-57.4	RMS	1000	-45.0	12.4
low	Wideband	19883.3	-61.5	RMS	1000	-45.0	16.5
low	Wideband	20315.7	-60.5	RMS	1000	-45.0	15.5
mid	Wideband	0.01868	-89.7	RMS	1	-75.0	14.7
mid	Wideband	0.12250	-83.0	RMS	10	-65.0	18.0
mid	Wideband	953.5	-73.4	RMS	100	-55.0	18.4
mid	Wideband	1600.5	-58.6	RMS	1000	-45.0	13.6
mid	Wideband	2285.1	-66.4	RMS	1000	-42.0	24.4
mid	Wideband	2294.5	-73.8	RMS	100	-50.0	23.8
mid	Wideband	2285.3	-66.7	RMS	1000	-42.0	24.7
mid	Wideband	2285.1	-66.4	RMS	1000	-42.0	24.4
mid	Wideband	2324.5	-75.2	RMS	100	-45.0	30.2
mid	Wideband	2331.0	-73.8	RMS	100	-55.0	18.8
mid	Wideband	2349.0	-66.2	RMS	100	-23.0	43.2
mid	Wideband	2361.9	-68.1	RMS	100	-23.0	45.1
mid	Wideband	2362.5	-67.2	RMS	100	-35.0	32.2
mid	Wideband	2365.5	-74.9	RMS	100	-50.0	24.9
mid	Wideband	2365.5	-74.9	RMS	100	-50.0	24.9
mid	Wideband	2365.5	-75.2	RMS	100	-50.0	25.2
mid	Wideband	2627.7	-50.2	RMS	1000	-45.0	5.2
mid	Wideband	4708.7	-57.7	RMS	1000	-45.0	12.7
mid	Wideband	19534.8	-60.9	RMS	1000	-45.0	15.9
mid	Wideband	20324.2	-60.3	RMS	1000	-45.0	15.3

The test results relate only to the tested item. The sample has been provided by the client.

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band 30, WCS 2300, downlink

Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
high	Wideband	0.01041	-88.1	RMS	1	-75.0	13.1
high	Wideband	0.15749	-82.9	RMS	10	-65.0	17.9
high	Wideband	950.5	-74.2	RMS	100	-55.0	19.2
high	Wideband	1600.5	-59.7	RMS	1000	-45.0	14.7
high	Wideband	2285.1	-66.3	RMS	1000	-42.0	24.3
high	Wideband	2289.8	-73.4	RMS	100	-50.0	23.4
high	Wideband	2285.7	-67.0	RMS	1000	-42.0	25.0
high	Wideband	2307.6	-66.2	RMS	100	-23.0	43.2
high	Wideband	2321.5	-75.4	RMS	100	-45.0	30.4
high	Wideband	2344.9	-74.4	RMS	100	-55.0	19.4
high	Wideband	2348.9	-65.9	RMS	100	-23.0	42.9
high	Wideband	2361.1	-64.9	RMS	100	-23.0	41.9
high	Wideband	2362.1	-67.0	RMS	100	-23.0	44.0
high	Wideband	2365.5	-74.4	RMS	100	-50.0	24.4
high	Wideband	2365.0	-75.2	RMS	100	-50.0	25.2
high	Wideband	2365.5	-74.4	RMS	100	-50.0	24.4
high	Wideband	2627.7	-50.0	RMS	1000	-45.0	5.0
high	Wideband	4714.7	-57.7	RMS	1000	-45.0	12.7
high	Wideband	19573.8	-61.4	RMS	1000	-45.0	16.4
high	Wideband	20321.2	-60.6	RMS	1000	-45.0	15.6

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**Test Report No.: 25-0093**

Tests performed on UAP-R [WCS 2300]

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Band 30, WCS 2300, downlink							
Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
low	Narrowband	0.01323	-87.6	RMS	1	-75.0	12.6
low	Narrowband	0.20248	-81.2	RMS	10	-65.0	16.2
low	Narrowband	798.0	-73.9	RMS	100	-55.0	18.9
low	Narrowband	1600.5	-58.0	RMS	1000	-45.0	13.0
low	Narrowband	2286.8	-66.3	RMS	1000	-42.0	24.3
low	Narrowband	2288.6	-73.4	RMS	100	-50.0	23.4
low	Narrowband	2280.8	-66.7	RMS	1000	-45.0	21.7
low	Narrowband	2305.0	-66.0	RMS	100	-23.0	43.0
low	Narrowband	2325.0	-74.1	RMS	100	-45.0	29.1
low	Narrowband	2331.7	-72.4	RMS	100	-55.0	17.4
low	Narrowband	2345.4	-61.9	RMS	100	-23.0	38.9
low	Narrowband	2361.6	-65.5	RMS	100	-23.0	42.5
low	Narrowband	2364.5	-61.7	RMS	100	-35.0	26.7
low	Narrowband	2367.1	-73.5	RMS	100	-50.0	23.5
low	Narrowband	2361.8	-69.9	RMS	100	-23.0	46.9
low	Narrowband	2367.1	-73.7	RMS	100	-50.0	23.7
low	Narrowband	2627.7	-51.5	RMS	1000	-45.0	6.5
low	Narrowband	4700.7	-53.2	RMS	1000	-45.0	8.2
low	Narrowband	19530.3	-61.1	RMS	1000	-45.0	16.1
low	Narrowband	20286.7	-60.7	RMS	1000	-45.0	15.7
mid	Narrowband	0.01795	-87.8	RMS	1	-75.0	12.8
mid	Narrowband	0.20248	-78.9	RMS	10	-65.0	13.9
mid	Narrowband	951.7	-73.3	RMS	100	-55.0	18.3
mid	Narrowband	1600.5	-58.1	RMS	1000	-45.0	13.1
mid	Narrowband	2280.8	-66.7	RMS	1000	-45.0	21.7
mid	Narrowband	2291.0	-73.7	RMS	100	-50.0	23.7
mid	Narrowband	2301.5	-62.1	RMS	100	-23.0	39.1
mid	Narrowband	2280.8	-66.7	RMS	1000	-45.0	21.7
mid	Narrowband	2323.4	-74.6	RMS	100	-45.0	29.6
mid	Narrowband	2342.5	-64.9	RMS	100	-55.0	9.9
mid	Narrowband	2348.8	-58.3	RMS	100	-23.0	35.3
mid	Narrowband	2361.2	-60.0	RMS	100	-23.0	37.0
mid	Narrowband	2361.0	-67.6	RMS	100	-23.0	44.6
mid	Narrowband	2361.1	-64.0	RMS	100	-23.0	41.0
mid	Narrowband	2361.1	-64.0	RMS	100	-23.0	41.0
mid	Narrowband	2367.4	-72.4	RMS	100	-50.0	22.4
mid	Narrowband	2627.7	-51.5	RMS	1000	-45.0	6.5
mid	Narrowband	4710.2	-52.9	RMS	1000	-45.0	7.9
mid	Narrowband	19882.8	-61.4	RMS	1000	-45.0	16.4
mid	Narrowband	20317.2	-60.2	RMS	1000	-45.0	15.2

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band 30, WCS 2300, downlink

Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
high	Narrowband	0.01832	-84.1	RMS	1	-75.0	9.1
high	Narrowband	0.11250	-79.1	RMS	10	-65.0	14.1
high	Narrowband	948.7	-73.2	RMS	100	-55.0	18.2
high	Narrowband	1600.5	-58.4	RMS	1000	-45.0	13.4
high	Narrowband	2286.4	-65.5	RMS	1000	-42.0	23.5
high	Narrowband	2289.1	-73.2	RMS	100	-50.0	23.2
high	Narrowband	2286.0	-66.3	RMS	1000	-42.0	24.3
high	Narrowband	2316.6	-63.3	RMS	100	-23.0	40.3
high	Narrowband	2325.1	-74.4	RMS	100	-45.0	29.4
high	Narrowband	2319.8	-68.4	RMS	100	-23.0	45.4
high	Narrowband	2345.4	-60.7	RMS	100	-23.0	37.7
high	Narrowband	2361.1	-61.4	RMS	100	-23.0	38.4
high	Narrowband	2364.6	-60.2	RMS	100	-35.0	25.2
high	Narrowband	2366.7	-72.8	RMS	100	-50.0	22.8
high	Narrowband	2365.5	-73.7	RMS	100	-50.0	23.7
high	Narrowband	2377.6	-72.2	RMS	100	-55.0	17.2
high	Narrowband	2627.7	-51.4	RMS	1000	-45.0	6.4
high	Narrowband	4719.7	-52.9	RMS	1000	-45.0	7.9
high	Narrowband	19628.3	-61.4	RMS	1000	-45.0	16.4
high	Narrowband	20290.7	-60.6	RMS	1000	-45.0	15.6

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Tests performed on UAP-R [WCS 2300]

Band 30, WCS 2300, downlink							
Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
mid	Wideband 5G	0.00977	-90.3	RMS	1	-75.0	15.3
mid	Wideband 5G	0.22248	-84.4	RMS	10	-65.0	19.4
mid	Wideband 5G	810.5	-74.4	RMS	100	-55.0	19.4
mid	Wideband 5G	1600.5	-59.2	RMS	1000	-45.0	14.2
mid	Wideband 5G	2282.8	-66.5	RMS	1000	-45.0	21.5
mid	Wideband 5G	2288.5	-73.2	RMS	100	-50.0	23.2
mid	Wideband 5G	2285.1	-67.1	RMS	1000	-42.0	25.1
mid	Wideband 5G	2283.3	-66.9	RMS	1000	-45.0	21.9
mid	Wideband 5G	2324.6	-74.8	RMS	100	-45.0	29.8
mid	Wideband 5G	2343.6	-72.0	RMS	100	-55.0	17.0
mid	Wideband 5G	2348.3	-64.8	RMS	100	-23.0	41.8
mid	Wideband 5G	2361.7	-65.7	RMS	100	-23.0	42.7
mid	Wideband 5G	2361.0	-65.8	RMS	100	-23.0	42.8
mid	Wideband 5G	2365.0	-73.3	RMS	100	-50.0	23.3
mid	Wideband 5G	2365.2	-75.3	RMS	100	-50.0	25.3
mid	Wideband 5G	2365.2	-74.5	RMS	100	-50.0	24.5
mid	Wideband 5G	2627.7	-51.8	RMS	1000	-45.0	6.8
mid	Wideband 5G	4711.2	-60.2	RMS	1000	-45.0	15.2
mid	Wideband 5G	19556.3	-61.2	RMS	1000	-45.0	16.2
mid	Wideband 5G	20333.2	-60.8	RMS	1000	-45.0	15.8

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

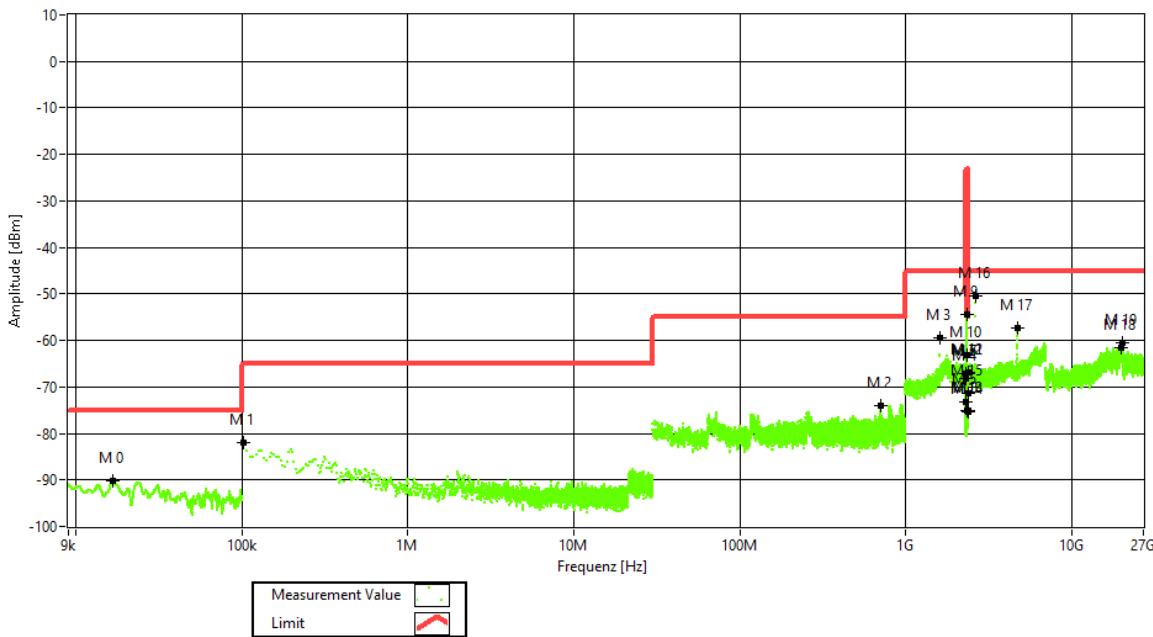
The test results relate only to the tested item. The sample has been provided by the client.
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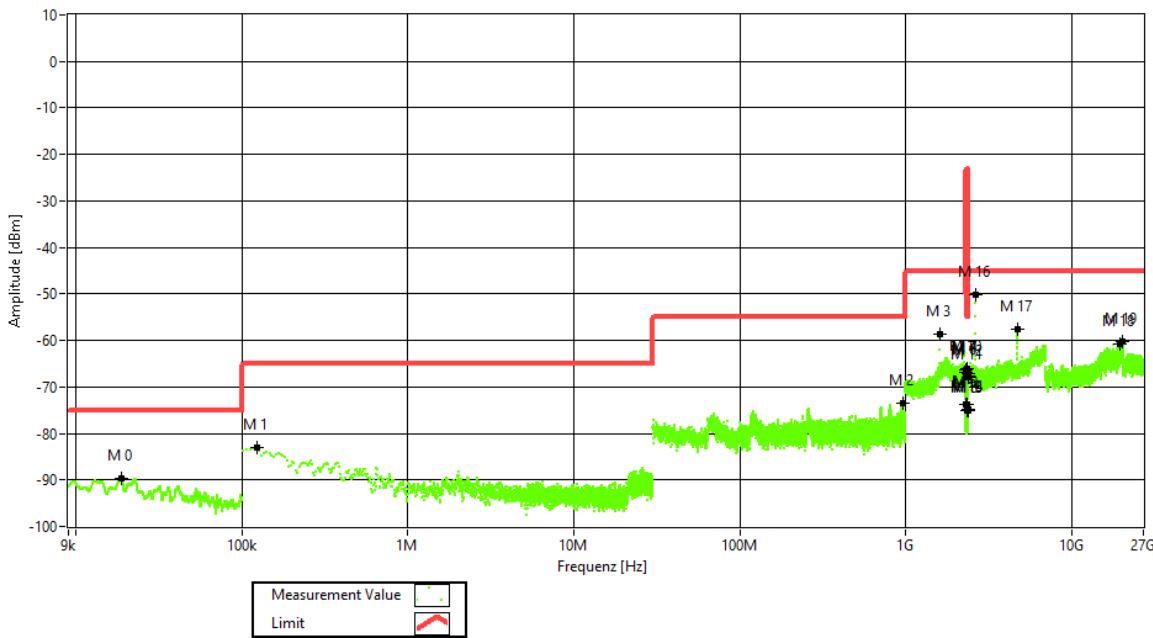
Tests performed on UAP-R [WCS 2300]

5.4.4 MEASUREMENT PLOT

Frequency Band = WCS 2300; Test frequency = low; Direction = RF downlink;
Signal type = Wideband



Frequency Band = WCS 2300; Test frequency = mid; Direction = RF downlink;
Signal type = Wideband



The test results relate only to the tested item. The sample has been provided by the client.

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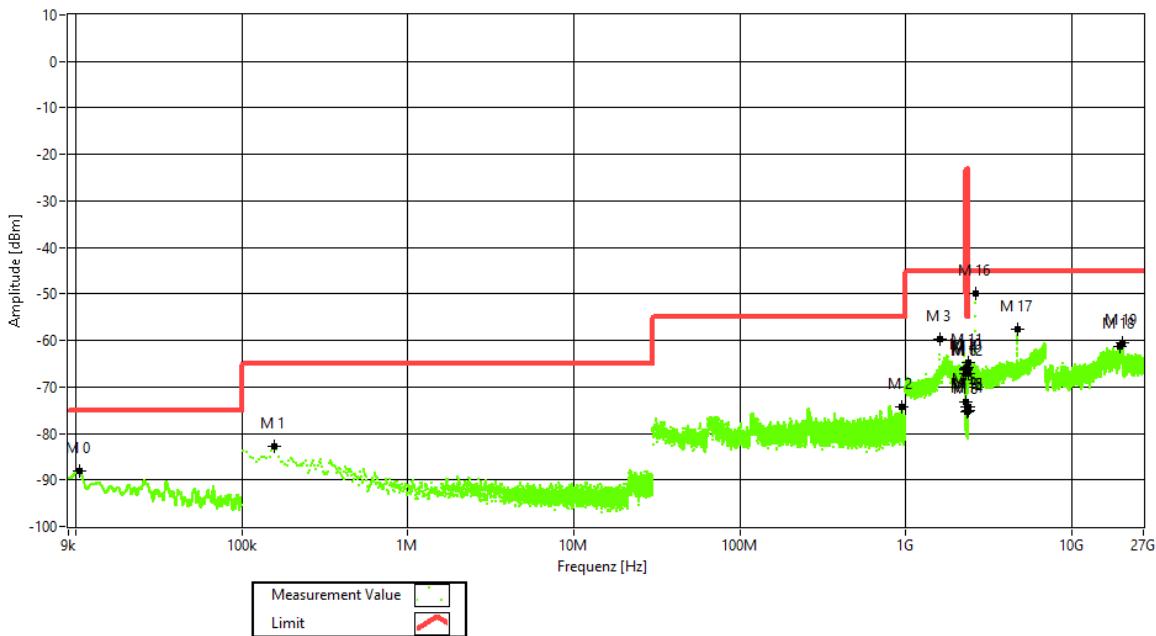


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Tests performed on UAP-R [WCS 2300]

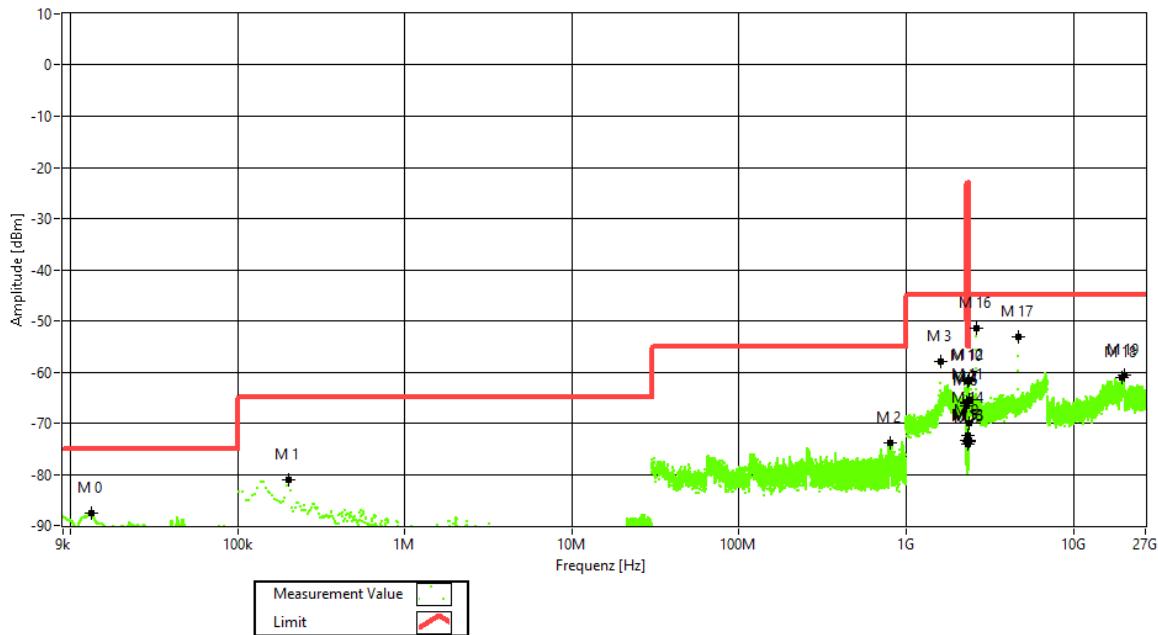
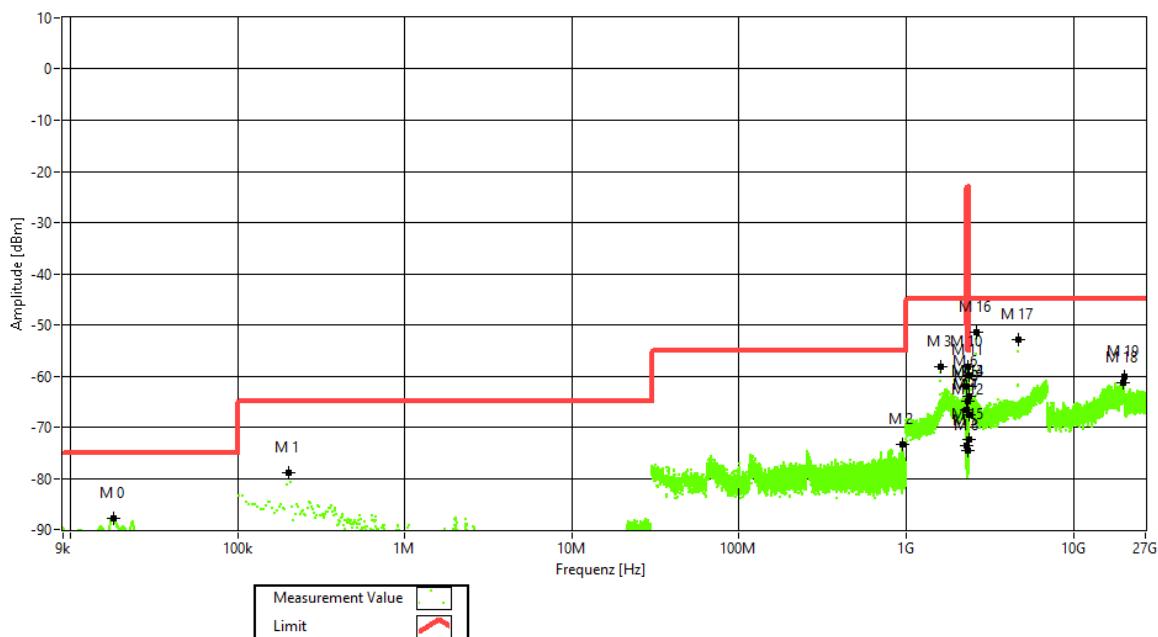
Frequency Band = WCS 2300; Test frequency = high; Direction = RF downlink;
Signal type = Wideband



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Tests performed on UAP-R [WCS 2300]

 Frequency Band = WCS 2300; Test frequency = low; Direction = RF downlink;
 Signal type = Narrowband

 Frequency Band = WCS 2300; Test frequency = mid; Direction = RF downlink;
 Signal type = Narrowband


The test results relate only to the tested item. The sample has been provided by the client.

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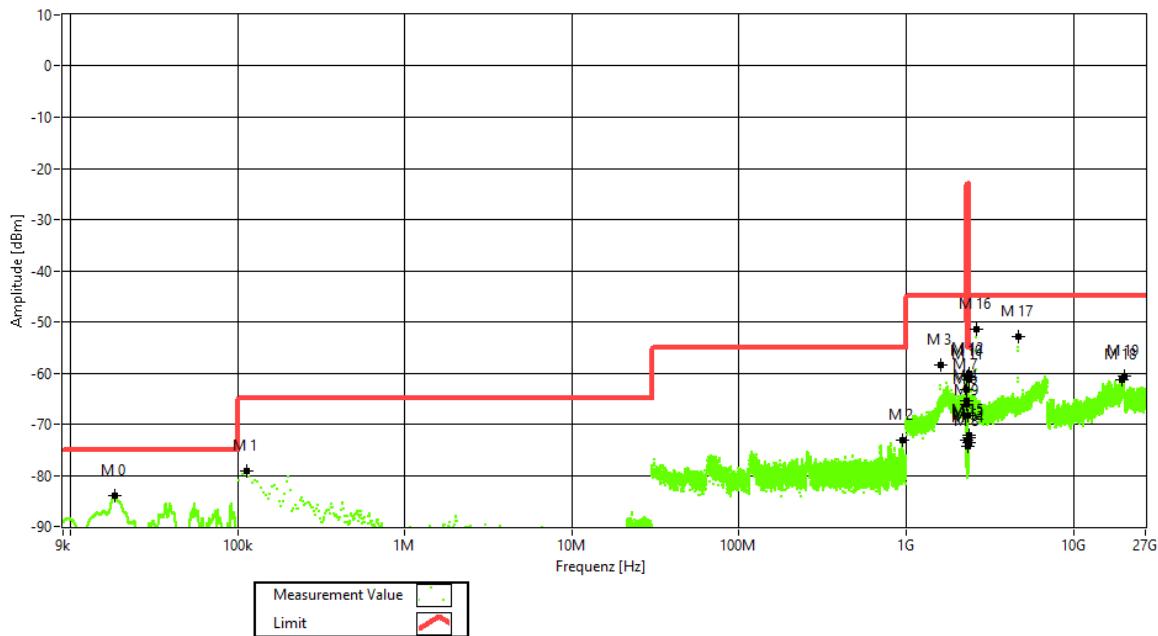


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Test Report No.: 25-0093

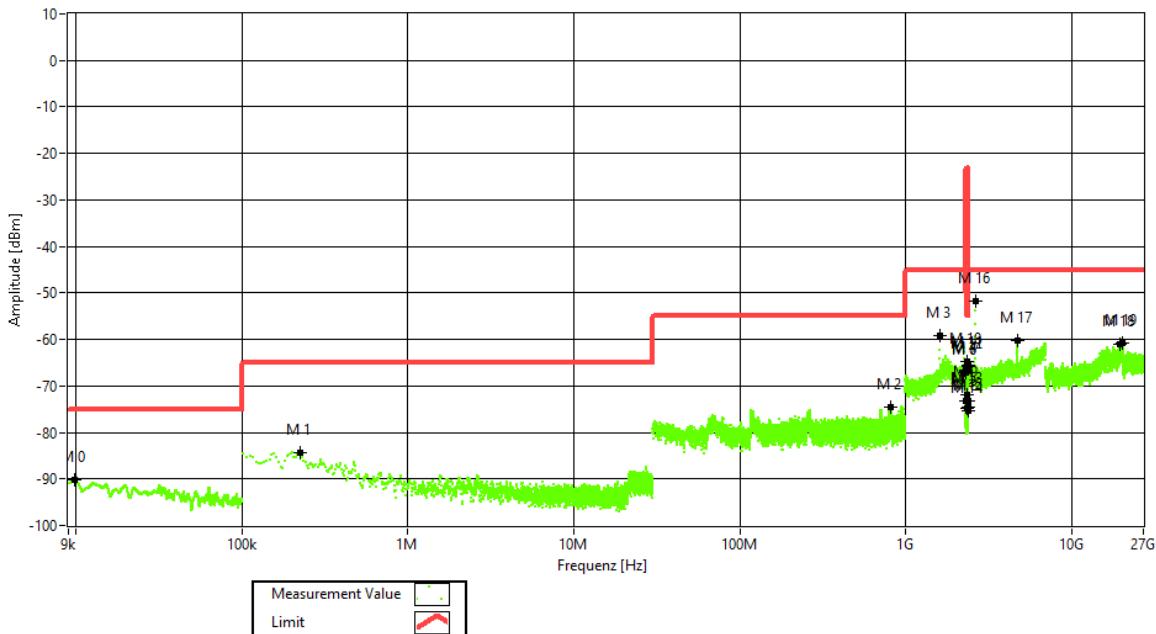
Tests performed on UAP-R [WCS 2300]

Frequency Band = WCS 2300; Test frequency = high; Direction = RF downlink;
Signal type = Narrowband



The test results relate only to the tested item. The sample has been provided by the client.
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Frequency Band = WCS 2300; Test frequency = mid; Direction = RF downlink;
Signal type = Wideband 5G



5.4.5 TEST EQUIPMENT USED

- Conducted

5.5 OUT-OF-BAND EMISSION LIMITS

Standard FCC Part §2.1051, §27.53

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

Test date: 2025-05-16

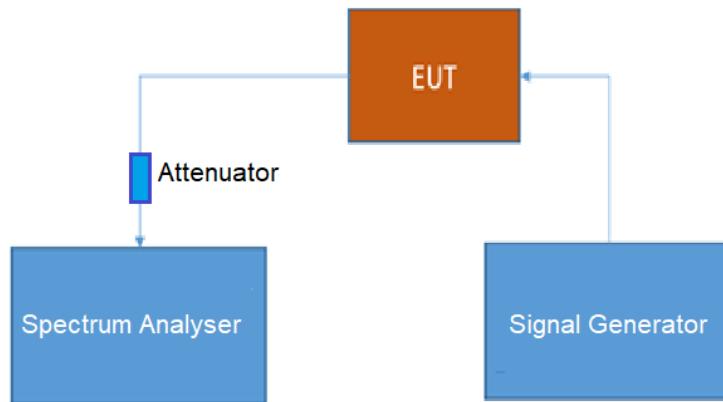
Environmental conditions: 26.3 °C; 36 % r. H.

Test engineer: Thomas Hufnagel

5.5.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the out-of-band emission limit for industrial signal boosters. The limits itself come from the applicable rule part for each operating band.

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



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.



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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

5.5.2 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:

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:

(i) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than $75 + 10 \log (P)$ dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2287.5 and 2300 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2285 and 2287.5 MHz, and $75 + 10 \log (P)$ dB below 2285 MHz;

(iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2362.5 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2362.5 and 2365 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2365 and 2367.5 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2367.5 and 2370 MHz, and $75 + 10 \log (P)$ dB above 2370 MHz.

The test results relate only to the tested item. The sample has been provided by the client.

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:

- (i) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than $75 + 10 \log (P)$ dB on all frequencies between 2320 and 2345 MHz;
- (ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2287.5 and 2300 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2285 and 2287.5 MHz, and $75 + 10 \log (P)$ dB below 2285 MHz;
- (iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2362.5 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2362.5 and 2365 MHz, $70 + 10 \log (P)$ dB on all frequencies between 2365 and 2367.5 MHz, $72 + 10 \log (P)$ dB on all frequencies between 2367.5 and 2370 MHz, and $75 + 10 \log (P)$ dB above 2370 MHz.

(3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz average EIRP or less:

- (i) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log (P)$ dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than $61 + 10 \log (P)$ dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than $67 + 10 \log (P)$ dB on all frequencies between 2328 and 2337 MHz;
- (ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log (P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log (P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log (P)$ dB below 2288 MHz;
- (iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.

The test results relate only to the tested item. The sample has been provided by the client.

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Abstract RSS-195 from ISED

5.6 Transmitter Unwanted Emissions

The transmitter unwanted emissions shall be measured with a resolution bandwidth of 1 MHz. A smaller resolution bandwidth is permitted provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz. However, in the 1 MHz bands immediately adjacent to the edges of the frequency range(s) in which the equipment is allowed to operate, a resolution bandwidth of as close as possible to, without being less than 1% of the occupied bandwidth, shall be employed provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz#

5.6.1 Base Station, Fixed Station and High-Power Fixed Subscriber Equipment

The power of any emission outside the frequency range(s) in which the equipment operates shall be attenuated below the transmitter power, $P(\text{dBW})$, by the amount indicated in Table 1 and graphically represented in Figure 1, where p is the transmitter output power measured in watts.

Table 1 — Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment

Frequency (MHz)	Attenuation (dB)
<2200	$43 + 10 \log_{10}(p)$
2200 - 2285	$75 + 10 \log_{10}(p)$
2285 - 2287.5	$72 + 10 \log_{10}(p)$
2287.5 - 2300	$70 + 10 \log_{10}(p)$
2300 - 2305	$43 + 10 \log_{10}(p)$
2305 - 2320	$43 + 10 \log_{10}(p)$ ^{Note}
2320 - 2345	$75 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)$ ^{Note}
2360 - 2362.5	$43 + 10 \log_{10}(p)$
2362.5 - 2365	$55 + 10 \log_{10}(p)$
2365 - 2367.5	$70 + 10 \log_{10}(p)$
2367.5 - 2370	$72 + 10 \log_{10}(p)$
2370 - 2395	$75 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

Note: Measured at the edges of the highest and lowest frequency range(s) in which the equipment is designed to operate. See Section 5.2 for the permitted frequency ranges for the various equipment types.

**Test Report No.: 25-0093**

Tests performed on UAP-R [WCS 2300]

**BUREAU
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Band 30 WCS 2300, downlink, Number of input signals = 1							
Signal type	Input power	Band edge	Signal frequency [MHz]	Input power [dBm]	Maximum out-of-band power [dBm]	Limit out-of-band power [dBm]	Margin to limit [dB]
Wideband	0.3 dB < AGC	upper	2357.5	-1.1	-57.1	-13.0	44.1
Wideband	3 dB > AGC	upper	2357.5	2.2	-57.5	-13.0	44.5
Wideband 5G	0.3 dB < AGC	upper	2355.0	-1.4	-52.9	-13.0	39.9
Wideband 5G	3 dB > AGC	upper	2355.0	1.6	-52.9	-13.0	39.9
Narrowband	0.3 dB < AGC	upper	2359.8	-1.5	-44.9	-13.0	31.9
Narrowband	3 dB > AGC	upper	2359.8	1.8	-46.1	-13.0	33.1
Wideband	0.3 dB < AGC	lower	2352.5	-0.9	-55.9	-13.0	42.9
Wideband	3 dB > AGC	lower	2352.5	2.4	-57.0	-13.0	44.0
Wideband 5G	0.3 dB < AGC	lower	2355.0	-1.2	-52.2	-13.0	39.2
Wideband 5G	3 dB > AGC	lower	2355.0	1.8	-53.9	-13.0	40.9
Narrowband	0.3 dB < AGC	lower	2350.2	-1.1	-43.8	-13.0	30.8
Narrowband	3 dB > AGC	lower	2350.2	2.2	-44.6	-13.0	31.6

Band 30 WCS 2300, downlink, Number of input signals = 2								
Signal type	Input power	Band edge	Signal frequency f1 [MHz]	Signal frequency f2 [MHz]	Input power [dBm]	Maximum out-of-band power [dBm]	Limit out-of-band power [dBm]	
Wideband	0.3 dB < AGC	upper	2357.5	2355.0	-0.9	-58.8	-13.0	45.8
Wideband	3 dB > AGC	upper	2357.5	2355.0	2.4	-59.0	-13.0	46.0
Narrowband	0.3 dB < AGC	upper	2359.8	2359.6	-1.5	-47.4	-13.0	34.4
Narrowband	3 dB > AGC	upper	2359.8	2359.6	1.8	-47.6	-13.0	34.6
Wideband	0.3 dB < AGC	lower	2352.5	2355.0	-0.9	-58.2	-13.0	45.2
Wideband	3 dB > AGC	lower	2352.5	2355.0	2.4	-58.4	-13.0	45.4
Narrowband	0.3 dB < AGC	lower	2350.2	2350.4	-1.1	-46.1	-13.0	33.1
Narrowband	3 dB > AGC	lower	2350.2	2350.4	2.2	-47.1	-13.0	34.1

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

The test results relate only to the tested item. The sample has been provided by the client.
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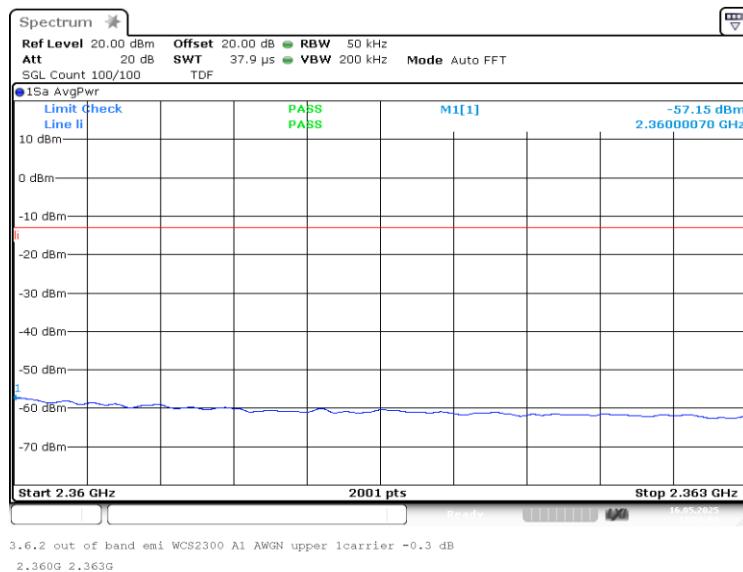
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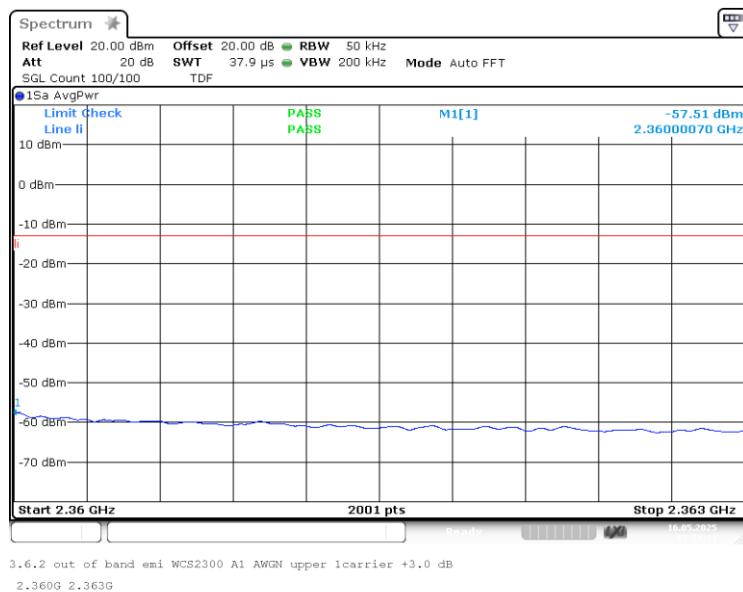
Tests performed on UAP-R [WCS 2300]

5.5.4 MEASUREMENT PLOT

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: AWGN; Input power = 0.3 dB < AGC; Number of signals 1



Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: AWGN; Input power = 3 dB > AGC; Number of signals 1



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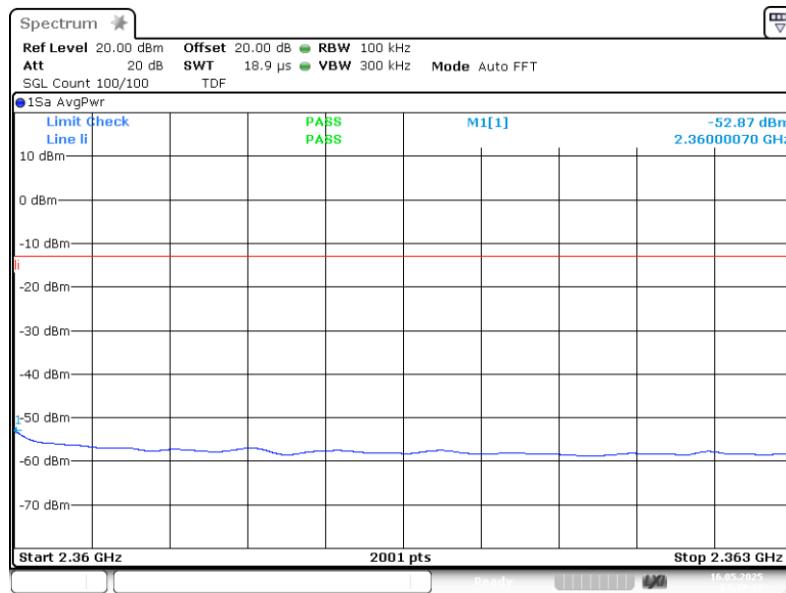


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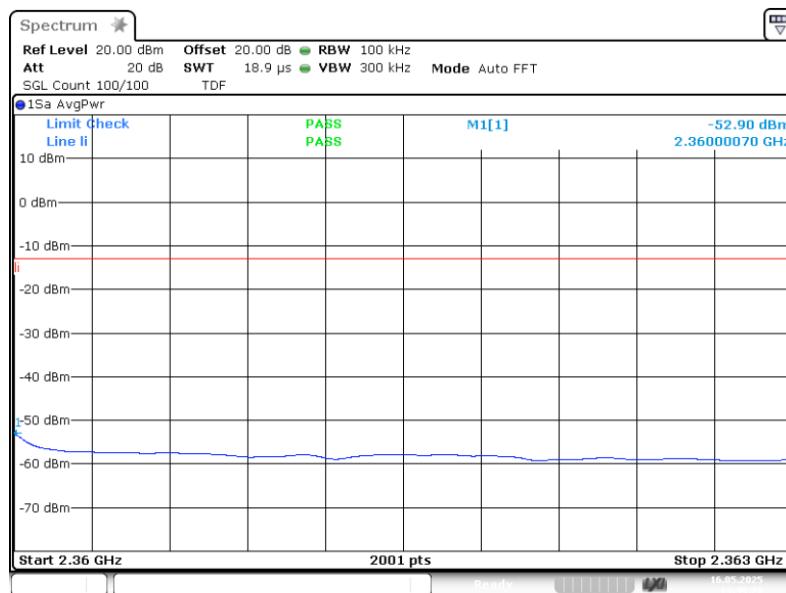
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: AWGN 10M; Input power = 0.3 dB < AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 AWGN 10M upper 1carrier -0.
3 dB 2.360G 2.363G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: AWGN 10M; Input power = 3 dB > AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 AWGN 10M upper 1carrier +3.
0 dB 2.360G 2.363G

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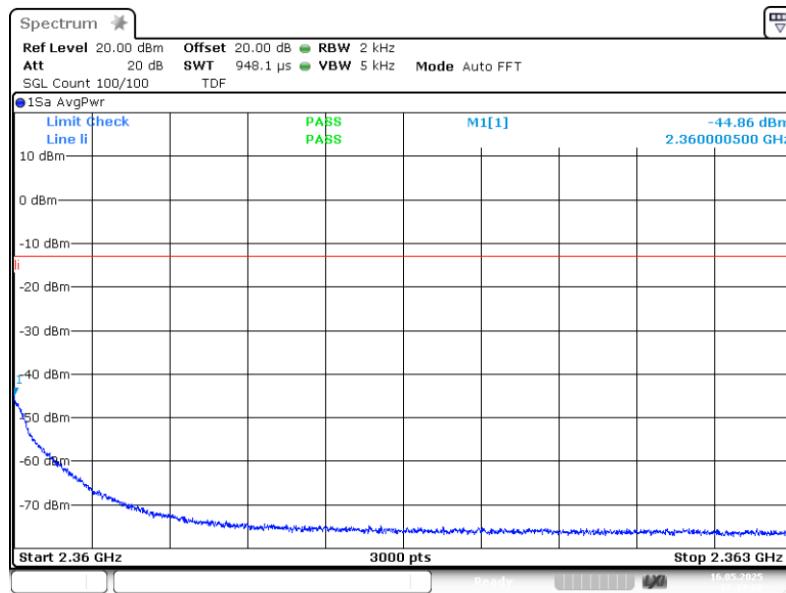


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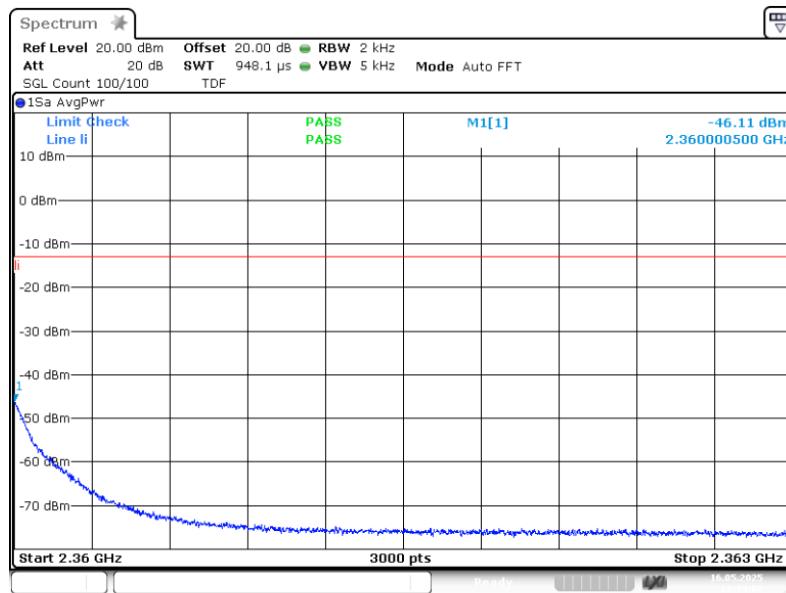
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: GSM; Input power = 0.3 dB < AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 GSM upper 1carrier -0.3 dB
2.360G 2.363G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: GSM; Input power = 3 dB > AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 GSM upper 1carrier +3.0 dB
2.360G 2.363G

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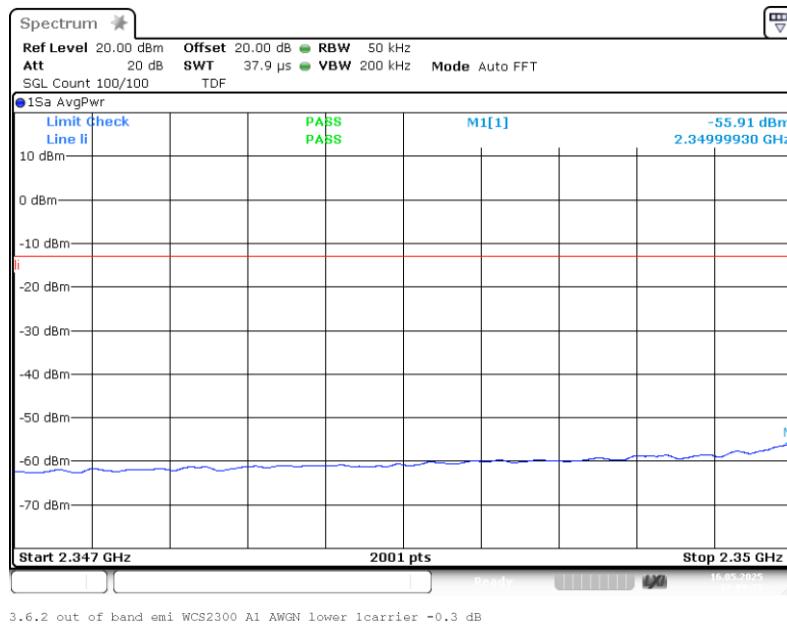


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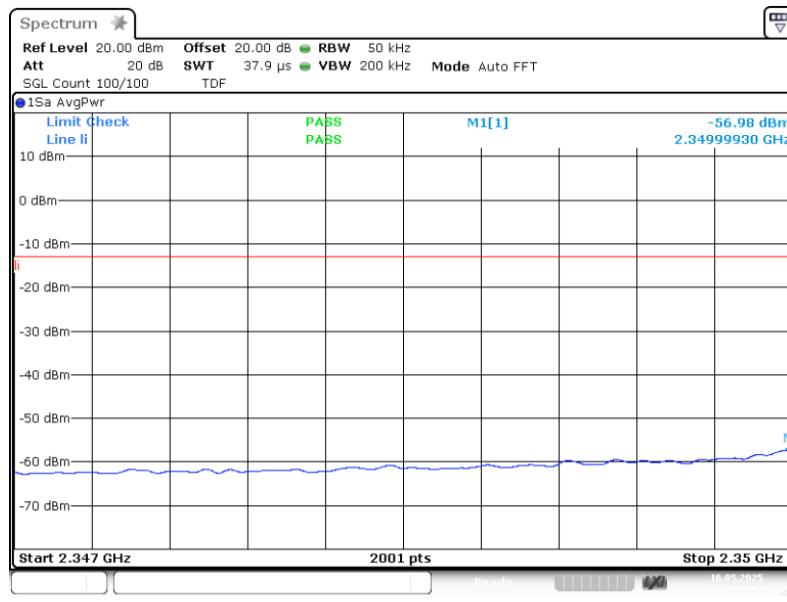
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: AWGN; Input power = 0.3 dB < AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 AWGN lower 1carrier -0.3 dB
2.347G 2.350G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: AWGN; Input power = 3 dB > AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 AWGN lower 1carrier +3.0 dB
2.347G 2.350G

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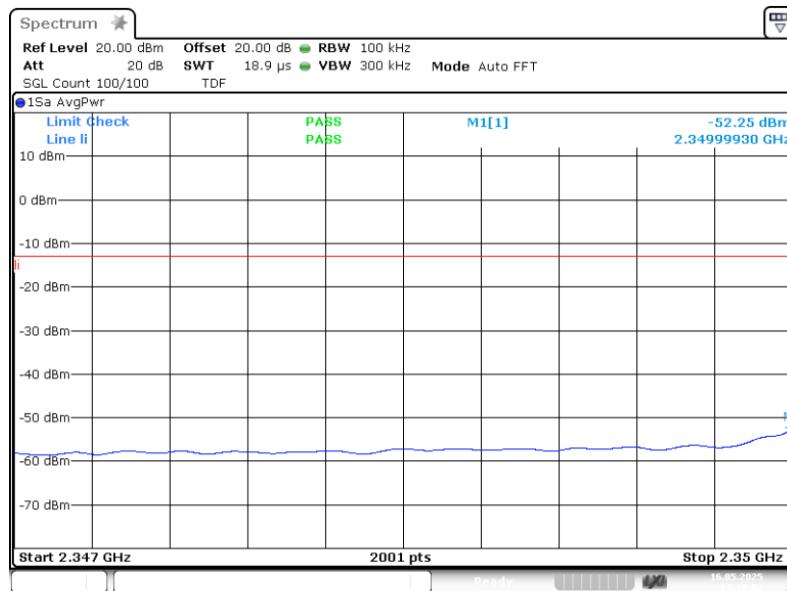


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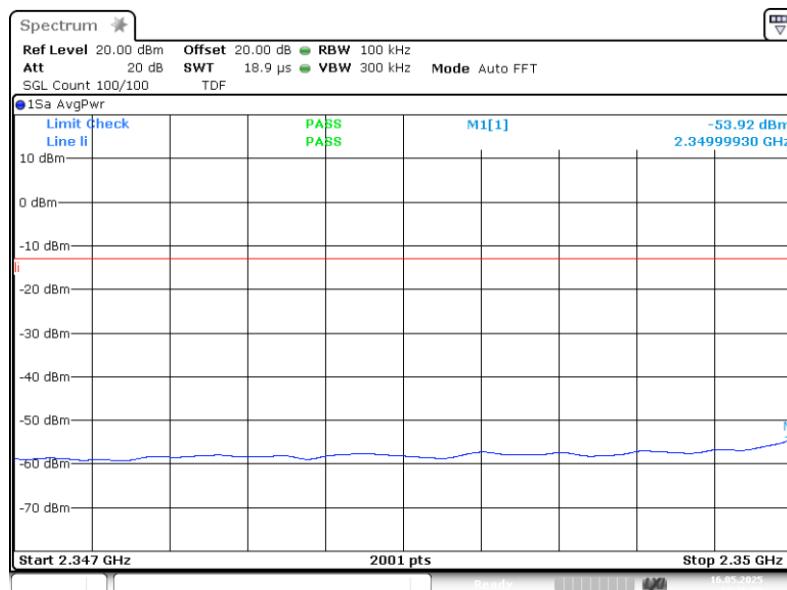
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: AWGN 10M; Input power = 0.3 dB < AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 AWGN 10M lower lcarrier -0.
3 dB 2.347G 2.350G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: AWGN 10M; Input power = 3 dB > AGC; Number of signals 1



3.6.2 out of band emi WCS2300 A1 AWGN 10M lower lcarrier +3.
0 dB 2.347G 2.350G

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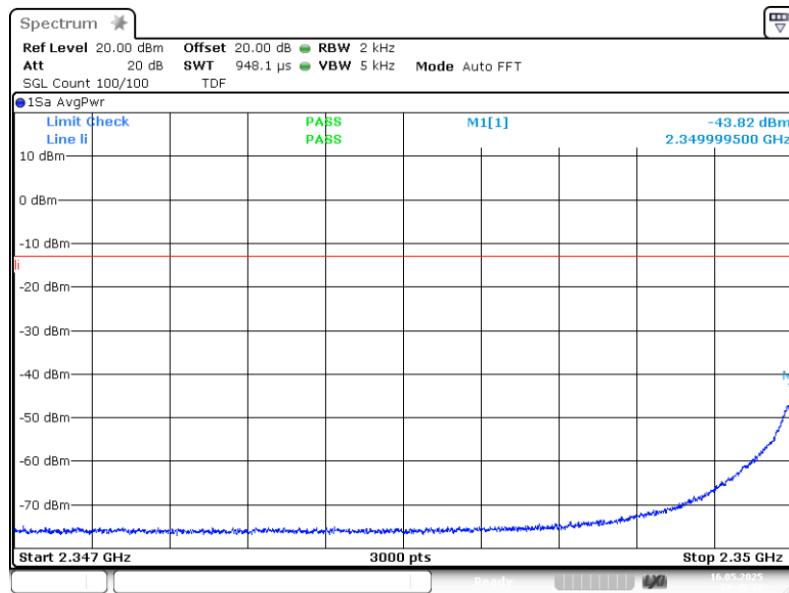


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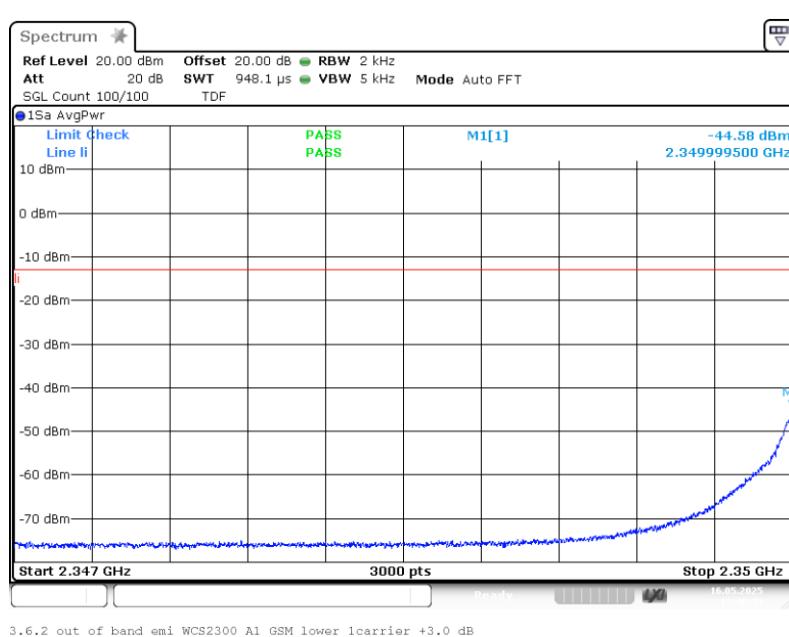
Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: GSM; Input power = 0.3 dB < AGC; Number of signals 1



Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: GSM; Input power = 3 dB > AGC; Number of signals 1



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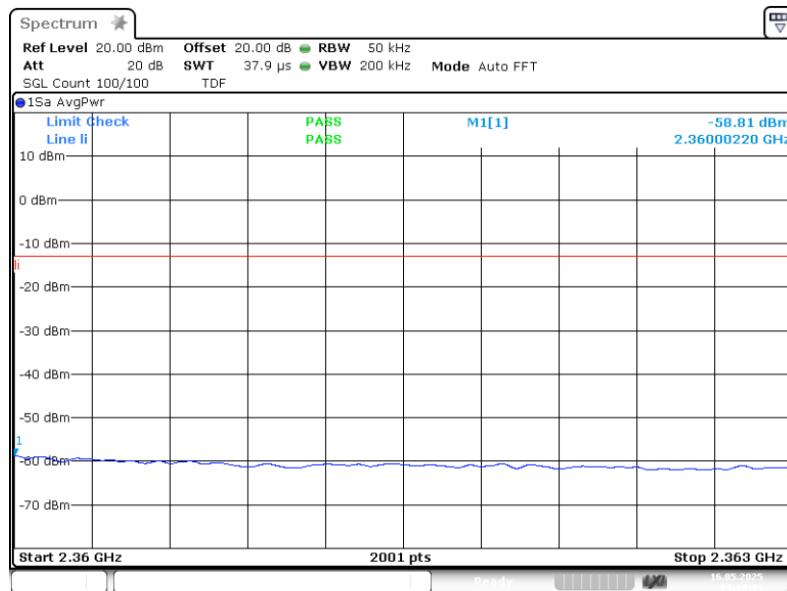


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Test Report No.: 25-0093

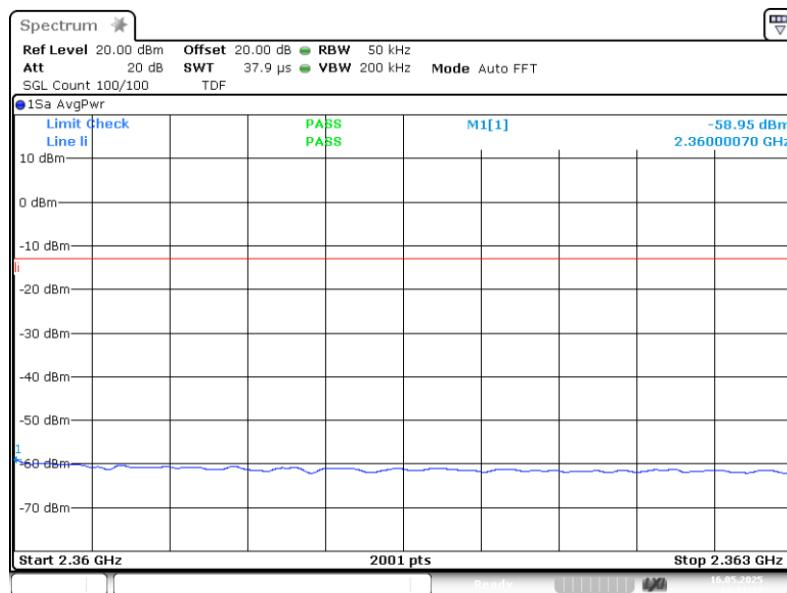
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: AWGN; Input power = 0.3 dB < AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 AWGN upper 2carriers -0.3 d
B 2.360G 2.363G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: AWGN; Input power = 3 dB > AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 AWGN upper 2carriers +3.0 d
B 2.360G 2.363G

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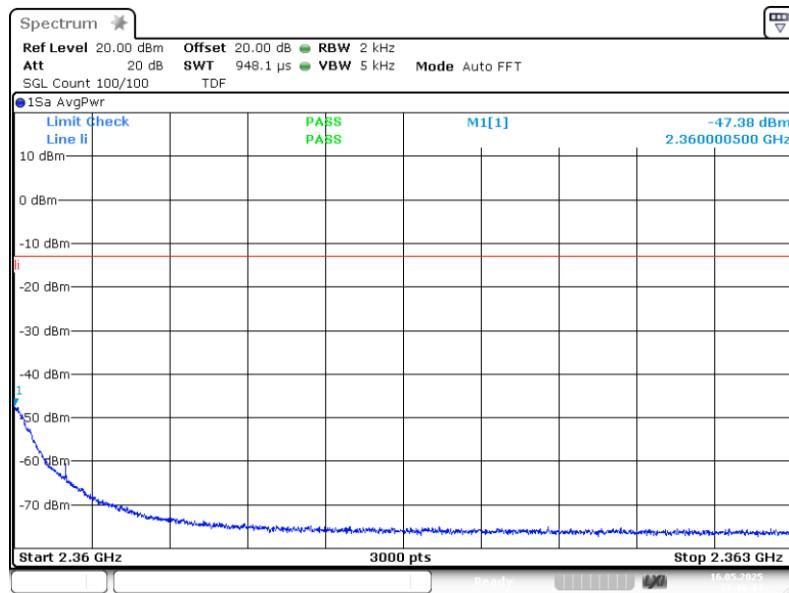


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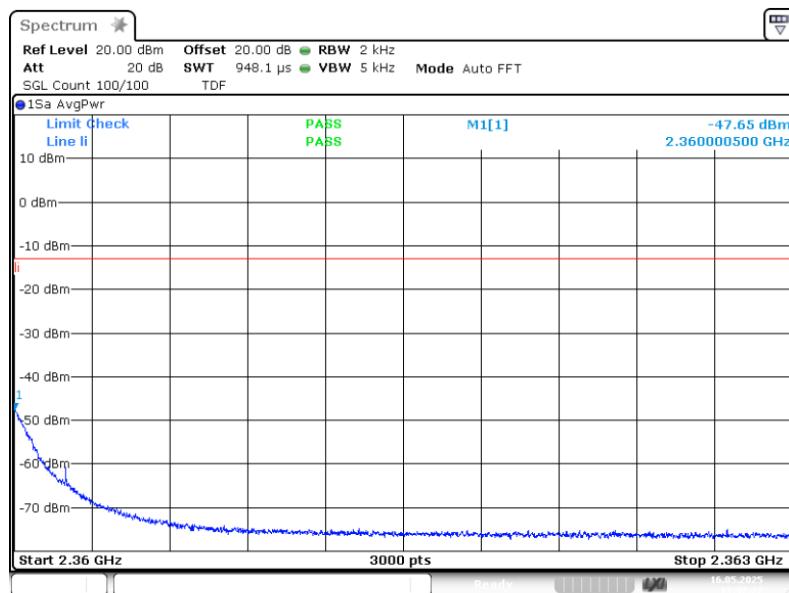
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: GSM; Input power = 0.3 dB < AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 GSM upper 2carriers -0.3 dB
2.360G 2.363G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: upper;
Mod: GSM; Input power = 3 dB > AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 GSM upper 2carriers +3.0 dB
2.360G 2.363G

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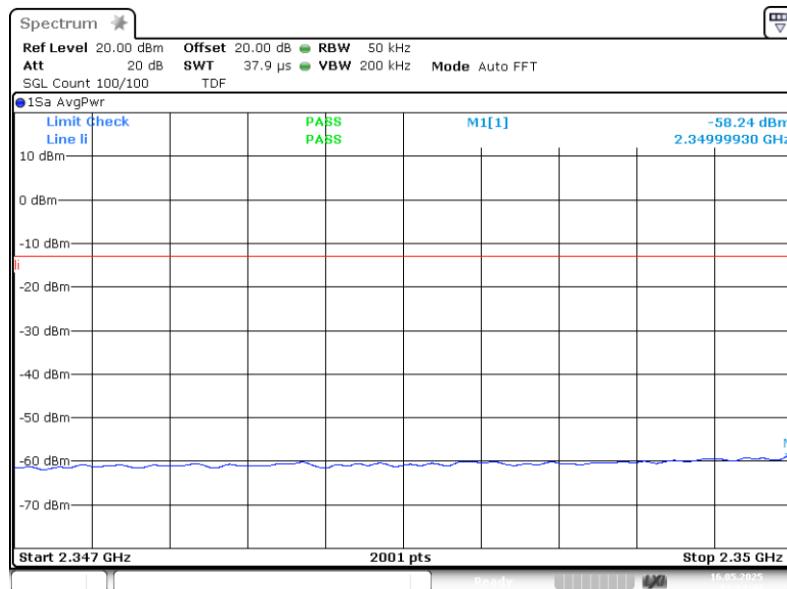


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Test Report No.: 25-0093

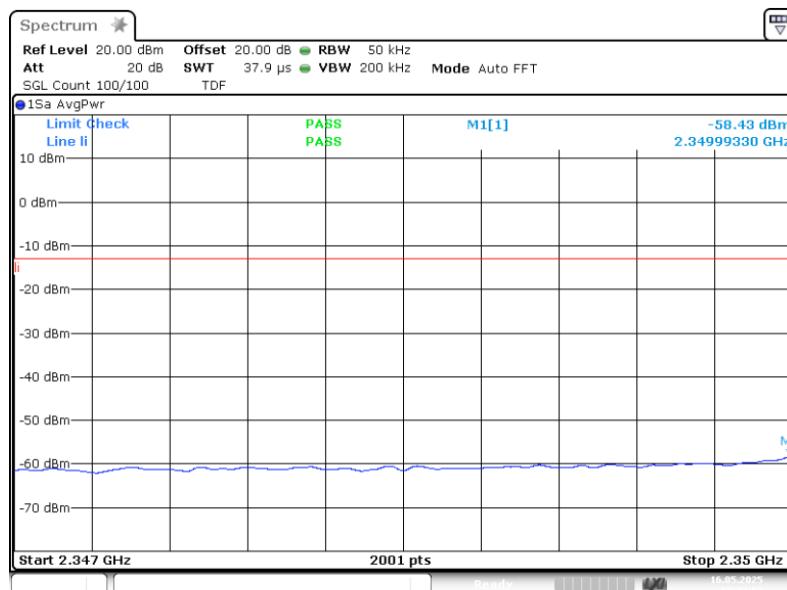
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: AWGN; Input power = 0.3 dB < AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 AWGN lower 2carriers -0.3 d
B 2.347G 2.350G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: AWGN; Input power = 3 dB > AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 AWGN lower 2carriers +3.0 d
B 2.347G 2.350G

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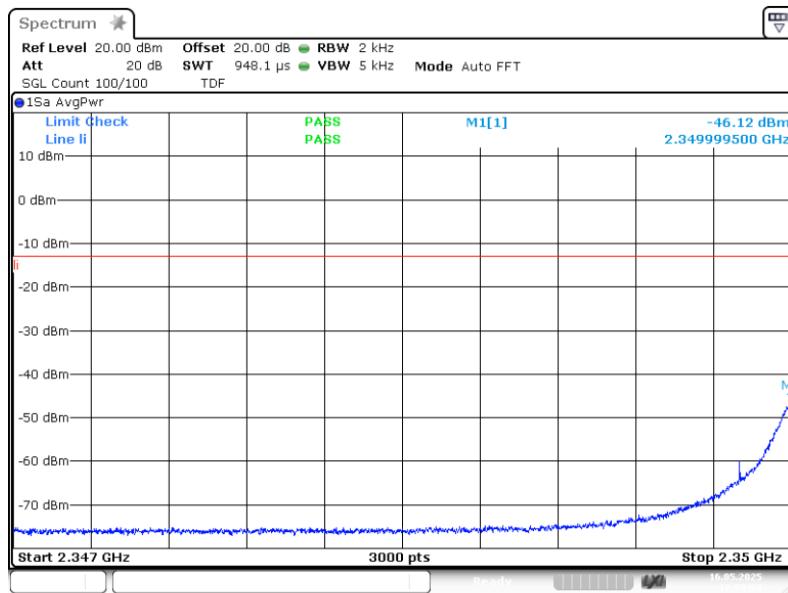


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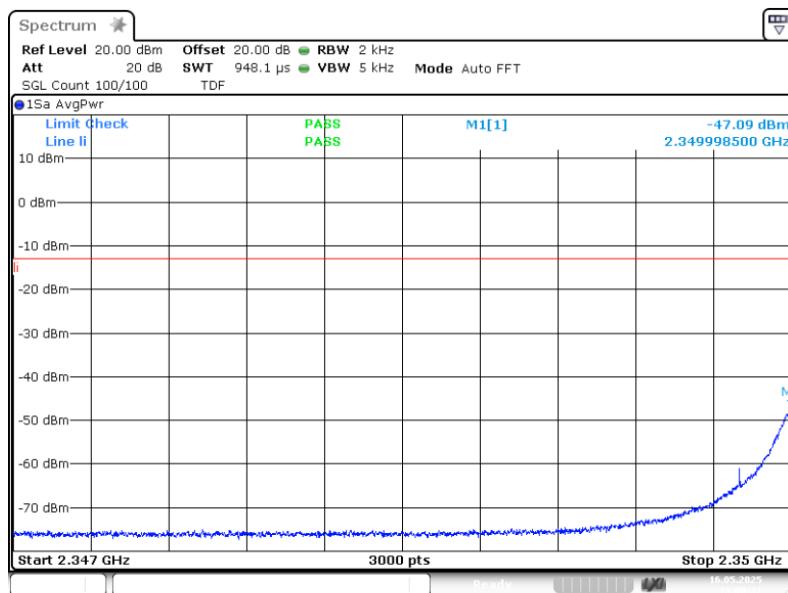
Tests performed on UAP-R [WCS 2300]

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: GSM; Input power = 0.3 dB < AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 GSM lower 2carriers -0.3 dB
2.347G 2.350G

Band: WCS 2300 Antenna 1; Frequency: 2.3500 GHz to 2.3600 GHz; Band edge: lower;
Mod: GSM; Input power = 3 dB > AGC; Number of signals 2



3.6.2 out of band emi WCS2300 A1 GSM lower 2carriers +3.0 dB
2.347G 2.350G

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Tests performed on UAP-R [WCS 2300]

5.5.5 TEST EQUIPMENT USED

- Conducted

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5.6 OUT-OF-BAND REJECTION

Standard FCC Part 27

The test was performed according to:

ANSI C63.26

Test date: 2025-05-16

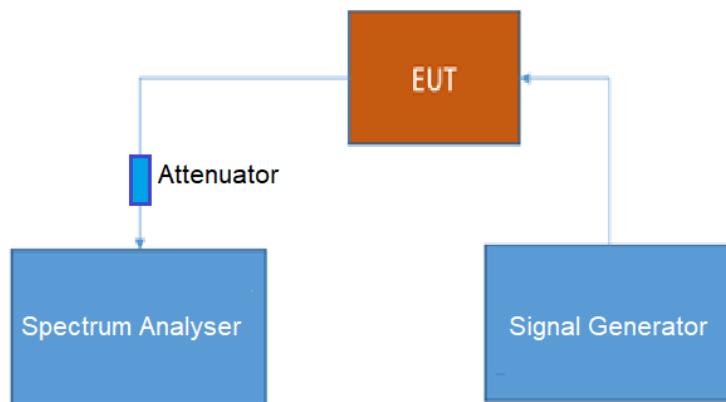
Environmental conditions: 26.3 °C; 36 % r. H.

Test engineer: Thomas Hufnagel

5.6.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the out-of-band rejection test case for industrial signal boosters.

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



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.



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Tests performed on UAP-R [WCS 2300]

TEST REQUIREMENTS/LIMITS

Abstract RSS-131 from ISED:

9.1 Out-of-band rejection

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

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Tests performed on UAP-R [WCS 2300]

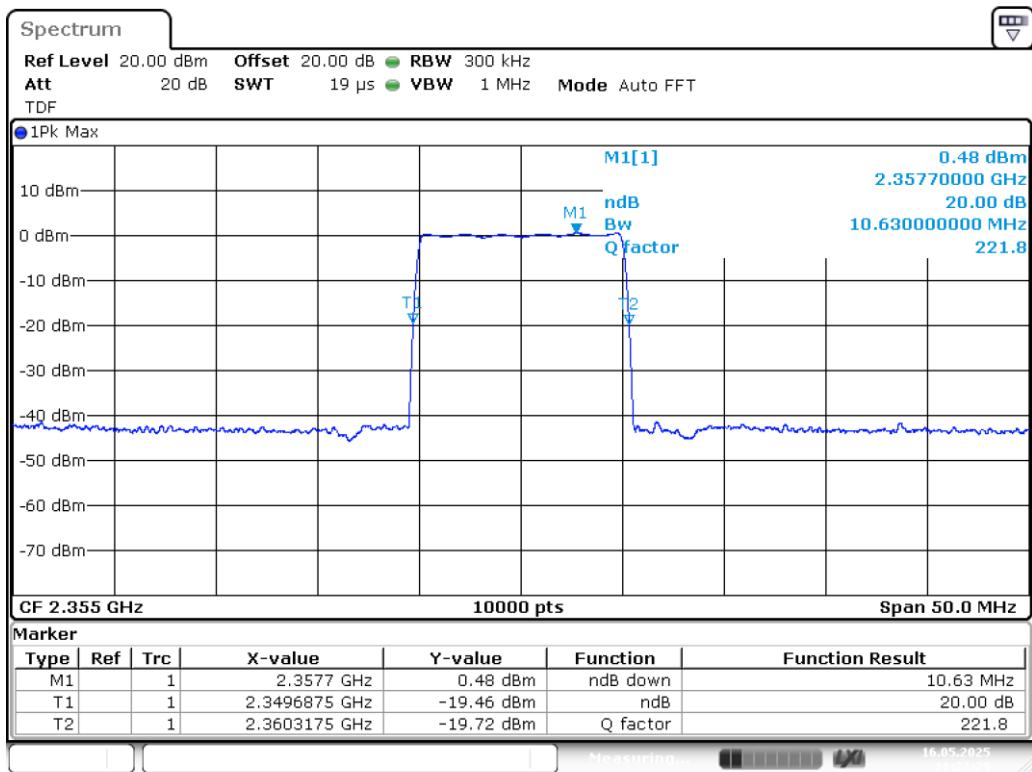
5.6.2 TEST PROTOCOL

Band 66 AWS 1700, downlink				
Highest power frequency [MHz]	Output power [dBm]	Lower highest power -20 dB frequency [MHz]	Upper highest power -20 dB frequency [MHz]	20 dB bandwidth [MHz]
2357.7	0.48	2349.6875	2360.3175	10.6300

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

5.6.3 MEASUREMENT PLOT

Frequency Band = WCS 2300, Antenna 1, Direction = RF downlink



5.6.4 TEST EQUIPMENT USED

- Conducted

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Tests performed on UAP-R [WCS 2300]

6 TEST EQUIPMENT

6.1 CONDUCTED EMISSIONS

Ref.No.	Type	Description	Manufacturer	Inventory no.	Last calibration	Calibration due
1.1	FSV40	Signal Analyzer 10 Hz - 40 GHz	Rohde & Schwarz	E-003138	2023-10	2025-10
1.2	SMBV100A	Vector Signal Generator 9 kHz - 6 GHz	Rohde & Schwarz	E-003206	2023-01	2026-01
1.3	CA-2.9MF-20-40-10W-RDC	Attenuator 20 dB	Tactron	E-004057	2024-10	2026-10
1.4	testo 175 H1	Thermo-Hygrometer	Testo	E-003922	2024-12	2025-12
1.5	Auto Messung 1 Channel V8.1	Software	Bureau Veritas	Software V8.1	---	---

The calibration interval is the time interval between "Last Calibration" and "Calibration Due".

6.2 ANTENNA FACTORS. CABLE LOSS AND SAMPLE CALCULATION

The used factors for antennas, cables etc. are deposited in the used test systems (LabView program and BAT EMC programm). They are actualised by the returing calibration control.

Sample calculation

$$E (\text{dB } \mu\text{V/m}) = U (\text{dB } \mu\text{V}) + AF (\text{dB } 1/\text{m}) + \text{Corr. (dB)}$$

U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
distance correction = $-20 * \text{LOG} (d_{\text{Limit}}/ d_{\text{used}})$
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

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Test Report No.: 25-0093

Tests performed on UAP-R [WCS 2300]

7 PHOTO REPORT

Please see separate photo report.

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Tests performed on UAP-R [WCS 2300]

Annex A: Accreditation certificate (for information)

The accreditation relates to competences stated on the accreditation certificate. The current certificate is available on the homepage of the DAkkS and can be downloaded under accredited bodies with the processing number:

<https://www.dakks.de/en>

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Tests performed on UAP-R [WCS 2300]

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Annex B: Additional information provided by client

None.

***** End of test report *****

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