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## Test report 2024-0007-EMC-TR-23-0223-V01

Designation:	CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]
Manufacturer:	Commscope
Serial No(s):	TJCXAA2305302
ID No.	7830127-0001 Rev: 04
FCC ID	X5S-CAPMX
Test Specification(s):	Class 2 Permissive Change Partly of FCC Rules and Regulations as listed in 47 CFR, Part 20 and Part 27:2024-01-01 EFFECTIVE RADIATED POWER, MEAN OUTPUT POWER AND ZONE ENHANCER GAIN OCCUPIED BANDWIDTH/INPUT-VERSUS-OUTPUT SPECTRUM OUT-OF-BAND EMISSION LIMITS
Test Plan:	“CAP MX Frequenzen” from customer

Date of issue:	2024-06-12		Signature:
Version:	01	Technical Reviewer:	
Date of receipt EUT:	2023-11-20		
Performance date:	2023-12-20 to 2024-01-05	Report Reviewer:	



BNetzA-CAB-19/21-20



The test results relates only to the tested item. The sample has been provided by the client.  
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**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

**Client:** Commscope  
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DAkkS D-PL-12024-06-04  
Laboratory accreditation no:  
BNETZA-CAB-19/21-20

FCC Designation Number: DE0023  
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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 Ch.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 antenna height limits

§ 27.54 – Frequency stability

§ 27.53 – Emission

The tests were selected and performed with reference to:

- FCC Public Notice 935210 applying “Signal Boosters Basic Certification Requirements” 935210 D02, 2019-15-04.
- FCC Public Notice 935210 applying “Measurement guidance for industrial and non-consumer signal booster, repeater and amplifier devices” 935210 D05, 2019-04-03.
- FCC Public Notice 971168 applying “Measurement guidance for certification of licensed digital transmitters” 971168 D01, 2018-04-09.
- ANSI C63.26: 2015



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### **Summary Test Results:**

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

### **1.2 FCC REFERENCE TABLE**

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



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### 1.3 MEASUREMENT SUMMARY/SIGNATURES

#### **47 CFR CHAPTER I FCC PART 27 Subpart C [Base § 2.1046, § 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

Passed  
Passed  
Passed  
Passed  
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

Passed  
Passed  
Passed  
Passed  
Passed  
Passed

#### **47 CFR CHAPTER I FCC PART 27 Subpart C [Base § 2.1049 Stations/Repeater]**

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

Passed  
Passed  
Passed  
Passed  
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

WCS 2300, low, RF downlink, Wideband

Passed

WCS 2300, mid, RF downlink, Wideband

Passed

WCS 2300, high, RF downlink, Wideband

Passed

WCS 2300low, RF downlink, Narrowband

Passed

WCS 2300, mid, RF downlink, Narrowband

Passed

WCS 2300, high, RF downlink, Narrowband

Passed

WCS 2300, low, RF downlink, Wideband 5G

Passed

WCS 2300, mid, RF downlink, Wideband 5G

Passed

WCS 2300, high, RF downlink, Wideband 5G

Passed



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

**§2.1051, § 27.53**

Out-of-band emission limits

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

**OP-Mode**

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

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

Passed

**47 CFR CHAPTER I FCC PART 27 Subpart C [Base**

**§2.1055, §27.54**

**Stations/Repeater]**

Frequency stability

**Final Result**

**OP-Mode**

Not applicable

Not applicable

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Report version control			
Version	Release date	Change Description	Version validity
Initial	2024-06-12	--	Valid



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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 Cecka

### 2.3 MANUFACTURER DATA

Company Name: Please see applicant data.  
Address: Please see applicant data.



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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	CAP MX 6/7E/80-85/17/E/19/23/25 T-AC
<b>Declared EUT data by the supplier</b>	
General Product Description	The EUT is an industrial signal booster supporting the following:  Band 30 (WCS-2300): 2350 – 2360 MHz  A RF operation is only supported for the downlink.
Booster Type	Industrial Signal Booster
Voltage Type	AC
Voltage Level	100 to 240 V
Maximum Output Donor Port [Uplink]	-
Nominal Output Server Port [Downlink]	30 dBm
Nominal Gain [Uplink]	-
Nominal Gain [Downlink]	33 dB

**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	F TJCXAA2305302
HW Version	7830127-0001 Rev: 04
SW Version	V5.0.0.191
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, HD20886	Power supply rack
	GE Power Electronisc Inc., CAR1212FPBC-Z, HF27298	Power plug-in module
AUX2	Commscope, ION-E WCS-4, SZAEC1722A0002	Module rack
	Commscope, ION-E OPT, SZBEAD1951A0011	Optical plug-in module
	Commscope, RFD HB, SZBEAQ2123A0007	RF card plug-in module
	Commscope, RFD HB, SZBEAQ2147A0009	RF card plug-in module
	Commscope, RFD HB, SZBEAQ2210A0003	RF card plug-in module
	Commscope, ION-E RFD, SZBEAG1503A0016	RF card plug-in module
	Commscope, ION-E RFD, SZBEAG1505A0009	RF card plug-in module



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### 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	2350.00	2360.00	2355.00	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



### 3.6.3 AUTOMATIC GAIN CONTROL LEVEL

<b>AGC Levels</b>							
<b>Band</b>	<b>Direction</b>	<b>Signal Type</b>	<b>AGC Start Pin [dBm]</b>	<b>AGC Start Pin -0.3 dB [dBm]</b>	<b>AGC Start Pin +3 dB [dBm]</b>	<b>Frequency [MHz]</b>	<b>Frequency</b>
30	Downlink	Narrowband	-4.1	-4.4	-1.1	2356.0	Mid
30	Downlink	Wideband	-3.9	-4.2	-0.9	2355.0	
30	Downlink	Wideband 5G	-4.3	-4.6	-1.6	2355.0	
30	Downlink	Narrowband	-3.8	-4.1	-0.8	2350.2	Low
30	Downlink	Wideband	-4.0	-4.3	-1.0	2357.5	
30	Downlink	Wideband 5G	-4.3	-4.6	-1.6	2355.0	
30	Downlink	Narrowband	-4.0	-4.3	-1.0	2359.8	High
30	Downlink	Wideband	-4.0	-4.3	-1.0	2357.5	
30	Downlink	Wideband 5G	-4.3	-4.6	-1.6	2355.0	
30	Downlink	Narrowband	-4.1	-4.4	-1.1	2357.3	Max.Power
30	Downlink	Wideband	-3.9	-4.2	-0.9	2357.3	
30	Downlink	Wideband 5G	-4.3	-4.6	-1.6	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 is used.

For example for minimum distances to the band edges:

GSM signal (narrowband): 0.2 MHz

AWGN signal (wideband): 2.5 MHz

AWGN signal (wideband 5G): Here only measurements at the mid frequency are possible, because the signal band has the same bandwidth as the used channel.



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### 3.6.4 REMARKS TO THE MEASUREMENTS

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

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

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

## 3.7 PRODUCT LABELLING

### 3.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

### 3.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.



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## 4 TEST RESULTS

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

Standard FCC Part 27, §27.50

**The test was performed according to:**

ANSI C63.26, KDB 935210 D05 v01r04: 3.5

**Test date:** 2023-12-20; 2024-01-05

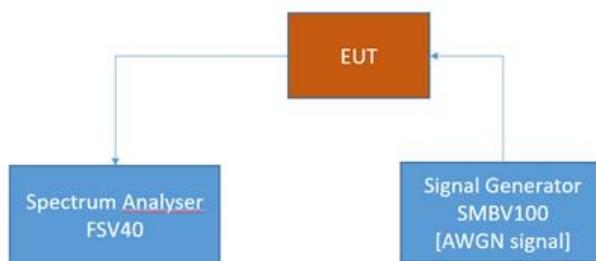
**Environmental conditions:** 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

**Test engineer:** Thomas Hufnagel

#### 4.1.1 TEST DESCRIPTION

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

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



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

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

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



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#### 4.1.2 TEST REQUIREMENTS/LIMITS: ABSTRACTS FROM STANDARDS

##### **Part 27; Miscellaneous Wireless Communication Services**

###### **Subpart C – Technical standards**

###### **§ 27.50**

###### Abstract § 27.50 from FCC:

(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.

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**BUREAU  
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<b>Band 30 WCS 2300, downlink</b>							
<b>Signal Type</b>	<b>Input Power</b>	<b>Frequency [MHz]</b>	<b>Input Power [dBm]</b>	<b>Maximum Average Output Power [dBm]</b>	<b>Limit Average Output Power [dBm]</b>	<b>Margin to Limit [dB]</b>	<b>Gain [dB]</b>
Wideband	0.3 dB < AGC	2357.3	-4.9	30.7	63.0	32.3	35.6
Wideband	3 dB > AGC	2357.3	-1.6	30.4	63.0	32.6	32.0
Narrowband	0.3 dB < AGC	2357.3	-4.8	31.0	56.0	25.0	35.8
Narrowband	3 dB > AGC	2357.3	-1.6	30.7	56.0	25.3	32.3
Wideband 5G	0.3 dB < AGC	2355.0	-4.8	30.8	63.0	32.2	35.6
Wideband 5G	3 dB > AGC	2355.0	-1.5	30.4	63.0	32.6	32.0

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



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

Calculation for the highest power level of the test protocol table:

The highest power level in the table above is

$p_{\text{highest}} = 31.0 \text{ dBm}$  at the channel which has the most output power of all channels.

Hereby at an antenna gain of  $G_{\text{dB}} = 9 \text{ dBi}$  the highest effective radiated output power EIRP  $p_{\text{EIRP 1CH}}$  of one channel is:

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

This results in:

$$p_{\text{EIRP 1CH}} = 31.0 \text{ dBm} + 9 \text{ dB} = 40.0 \text{ dBm}$$

The equivalent power  $p$  is according the given formula:

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

$$p \text{ EIRP 1CH [W]} = 10 \text{EXP}(p \text{ EIRP 1CH [dBm]} / 10) * 0.001 \text{ [W]}$$

This results in:

$$p \text{ EIRP 1CH [W]} = 10 \text{EXP}(40.0 \text{ [dBm]} / 10) * 0.001 \text{ [W]} = 10 \text{ W}$$

This repeater only has one output port, therefore the power of only one port is considered (no MIMO function possible):

$$p_{\text{EIRP 1CH}} = 1 * p_{\text{EIRP 1CH}}$$

This results in:

$$p_{\text{EIRP 1CH}} = * 10 \text{ W} = 10 \text{ W}$$

Final result of this consideration:

$p_{\text{EIRP 1CH}} = 10 \text{ W} < 400 \text{ W}$ , hereby 400 W is the highest allowed limit in this case.

**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

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According this calculation the EIRP for all power levels is:

<b>Band 30 WCS 2300, downlink</b>			<b>Maximum average output repeater plus send antenna with one output port [dBm]</b>	<b>Maximum average output repeater plus send antenna with one output port [W]</b>	<b>Limit according FCC rules [W]</b>	<b>PASS/FAIL</b>
<b>Signal Type</b>	<b>Input Power</b>	<b>Frequency [MHz]</b>				
Wideband	0.3 dB < AGC	2357.3	39.7	9.3	2000	PASS
Wideband	3 dB > AGC	2357.3	39.4	8.7	2000	PASS
Narrowband	0.3 dB < AGC	2357.3	40.0	10.0	400	PASS
Narrowband	3 dB > AGC	2357.3	39.7	9.3	400	PASS
Wideband 5G	0.3 dB < AGC	2355.0	39.8	9.5	2000	PASS
Wideband 5G	3 dB > AGC	2355.0	39.4	8.7	2000	PASS

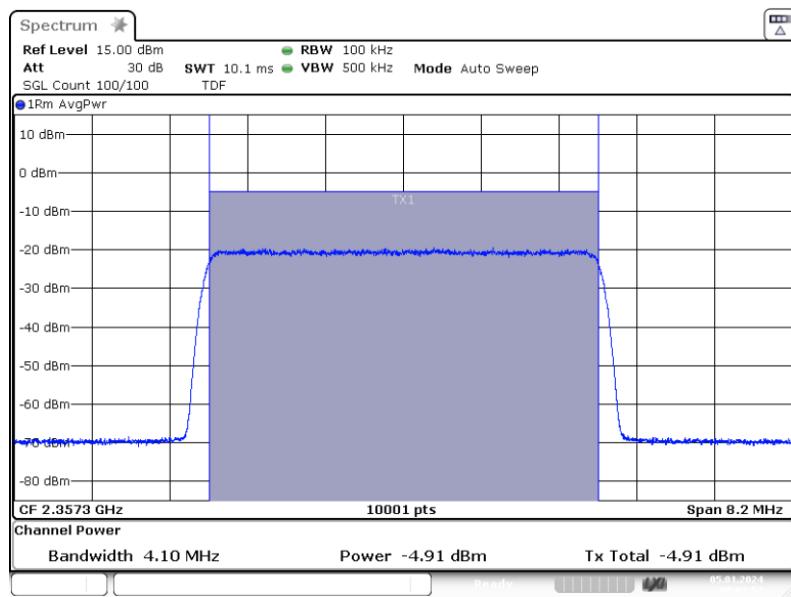
**The DUT doesn't exceed the limit.**

**EMC Test Report No.: 24-0007**

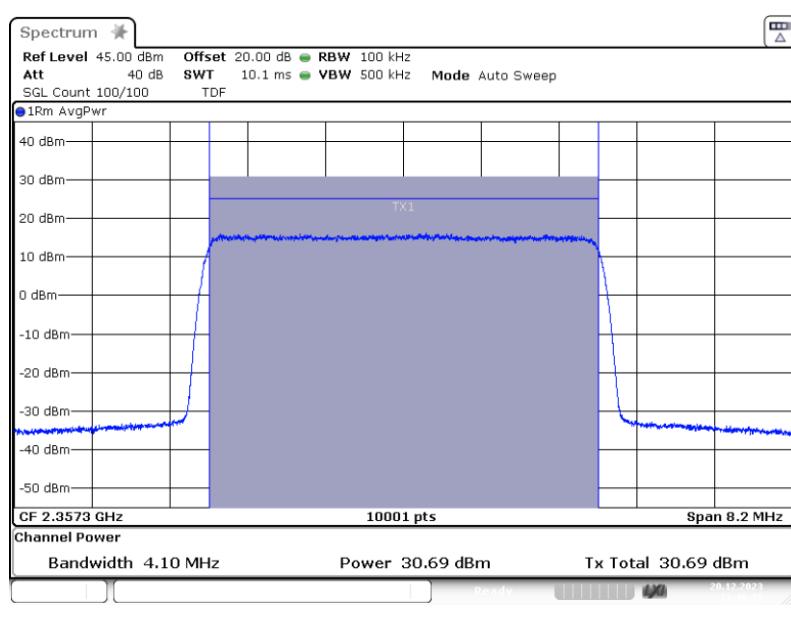
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

**4.1.4 MEASUREMENT PLOT**

Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: AWGN; Input Power 0.3 dB &lt; AGC



Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: AWGN; Output Power 0.3 dB &lt; AGC



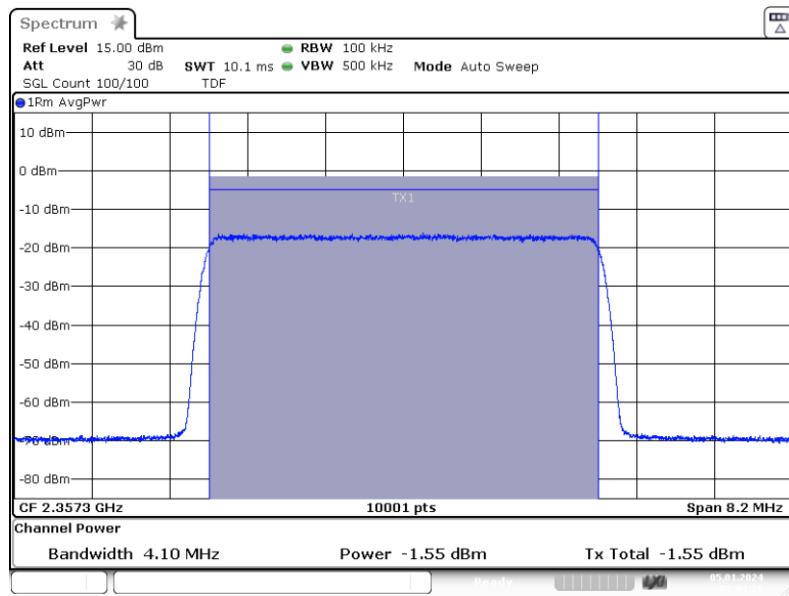


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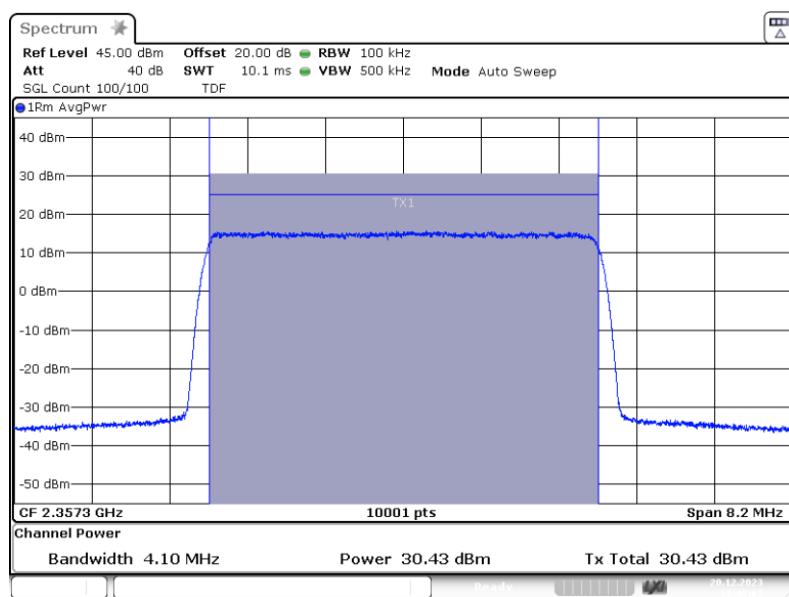
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: AWGN; Input Power 3 dB > AGC



Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC



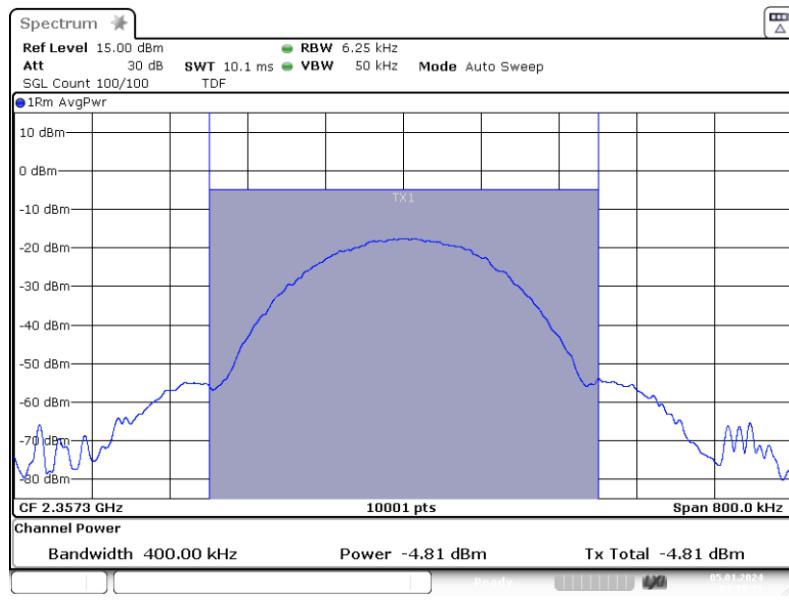


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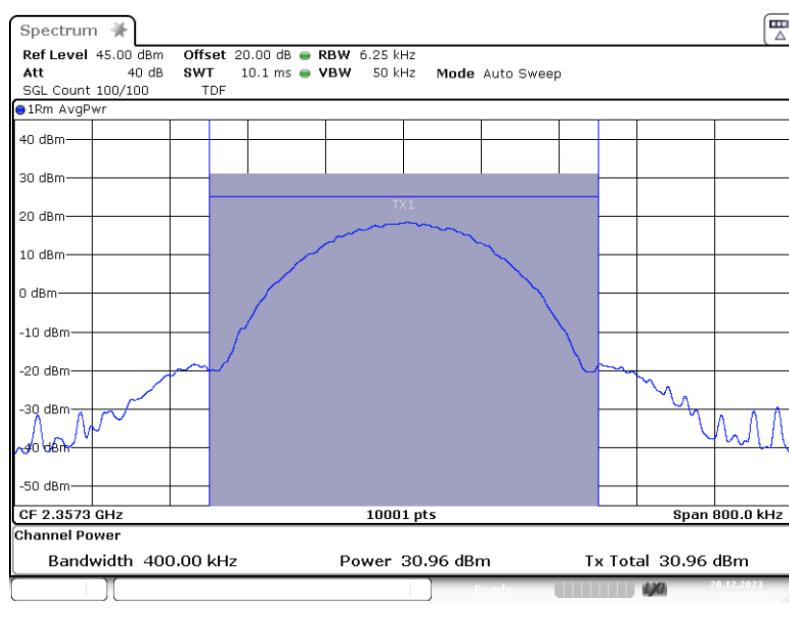
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: GSM; Input Power 0.3 dB < AGC



Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: GSM; Output Power 0.3 dB < AGC



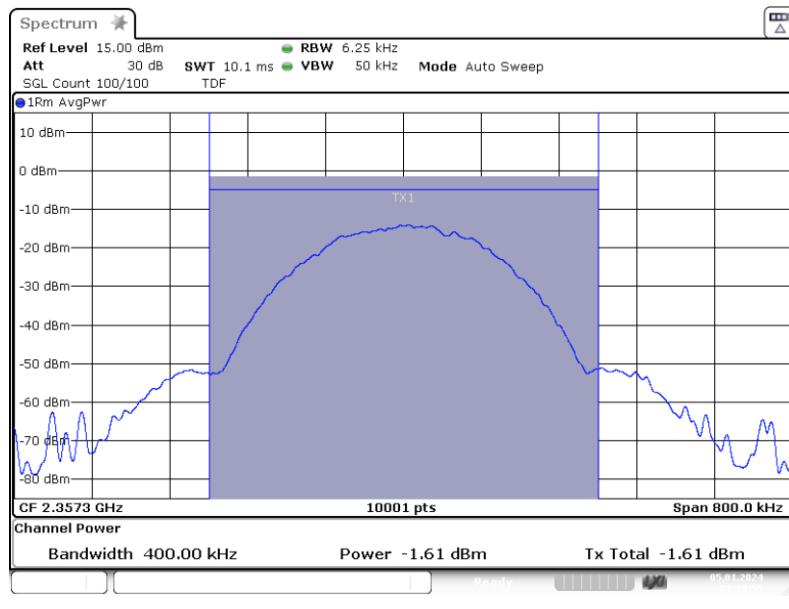


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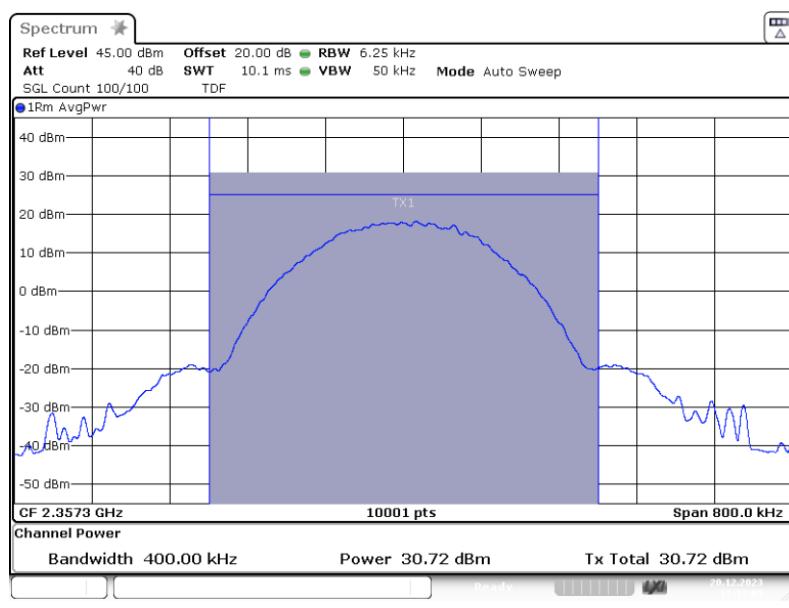
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: GSM; Input Power 3 dB > AGC



Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: GSM; Output Power 3 dB > AGC



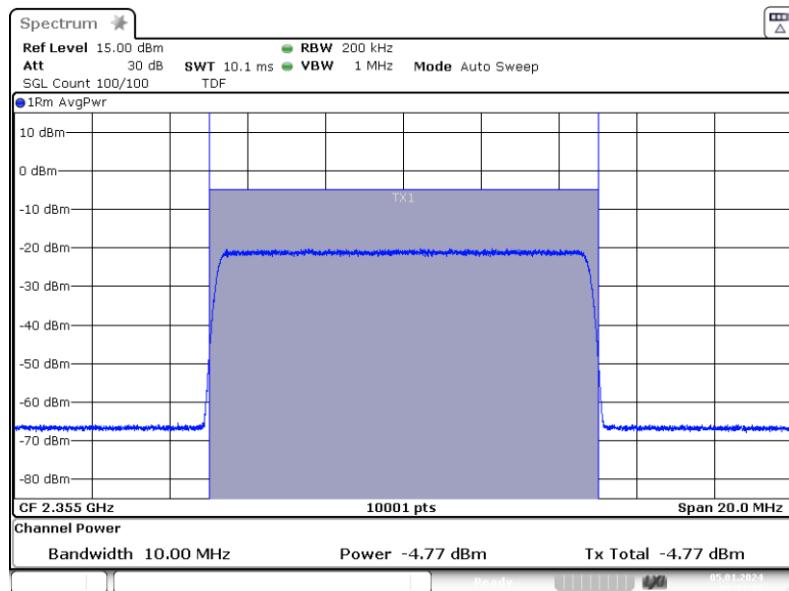


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## EMC Test Report No.: 24-0007

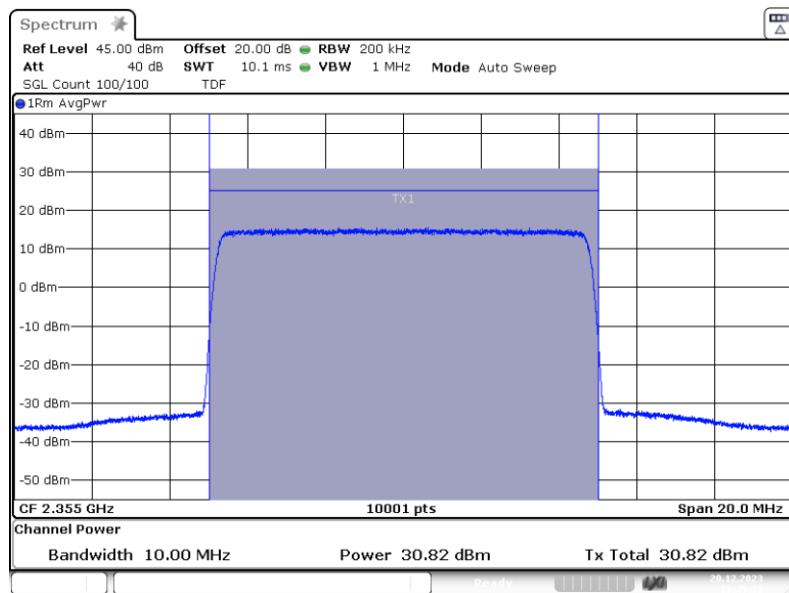
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; 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 2.35500G

Band: WCS 2300; 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 2.35500G

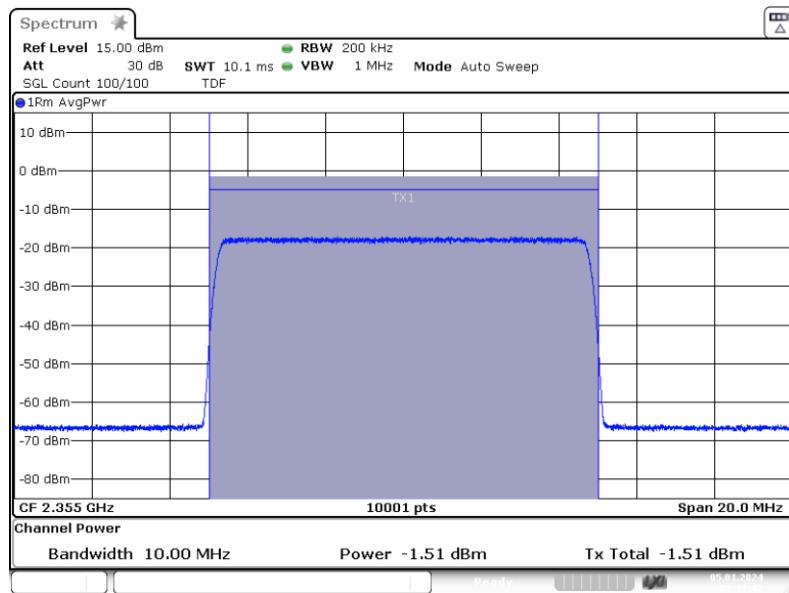


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## EMC Test Report No.: 24-0007

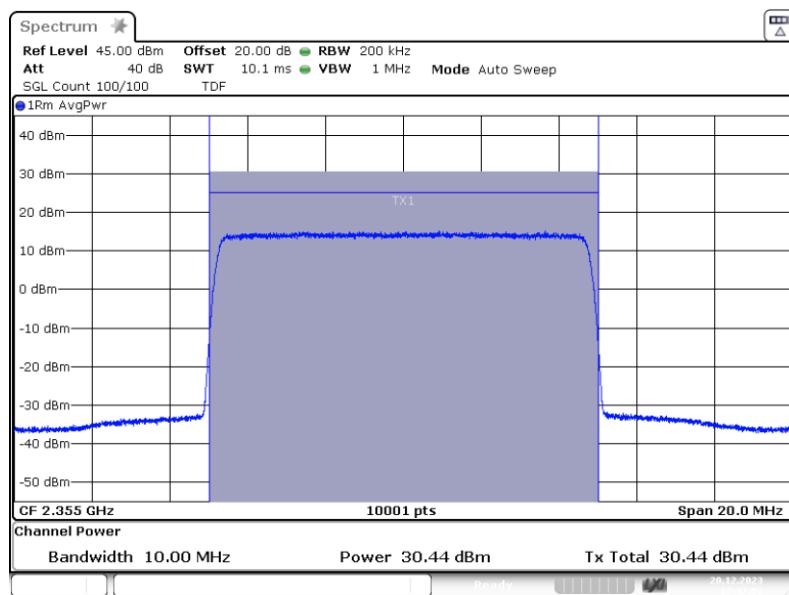
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; Input Power 3 dB > AGC



3.5.3 Power AWGN 10M In+3 2.35500G

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; Output Power 3 dB > AGC



3.5.3 Power AWGN 10M Out +3 2.35500G



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**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

#### 4.1.5 TEST EQUIPMENT USED

- Conducted



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## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

### 4.2 PEAK TO AVERAGE RATIO

Standard FCC PART 27, § 27.50

**The test was performed according to:**

ANSI C63.26

**Test date:** 2023-12-20

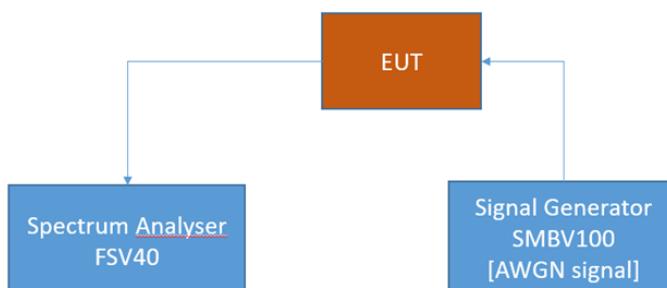
**Environmental conditions:** 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

**Test engineer:** Thomas Hufnagel

#### 4.2.1 TEST DESCRIPTION

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

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



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

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

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



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**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

#### 4.2.2 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.

(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.

**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

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<b>Band 30 WCS 2300, downlink</b>						
<b>Signal Type</b>	<b>Input Power</b>	<b>Frequency [MHz]</b>	<b>Input Power [dBm]</b>	<b>PAPR [dB]</b>	<b>Limit PAPR [dB]</b>	<b>Margin to Fictive Limit [dB]</b>
Wideband	0.3 dB < AGC	2357.3	-4.9	8.5	13.0	4.5
Wideband	3 dB > AGC	2357.3	-1.6	8.5	13.0	4.5
Narrowband	0.3 dB < AGC	2357.3	-4.8	0.2	13.0	12.8
Narrowband	3 dB > AGC	2357.3	-1.6	0.2	13.0	12.8
Wideband 5G	0.3 dB < AGC	2355.0	-4.8	8.5	13.0	4.5
Wideband 5G	3 dB > AGC	2355.0	-1.5	8.5	13.0	4.5

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



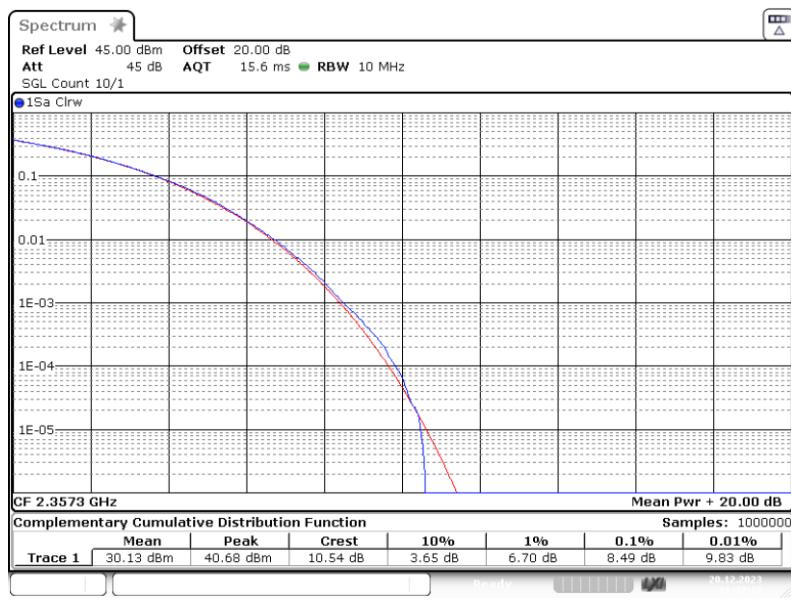
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## EMC Test Report No.: 24-0007

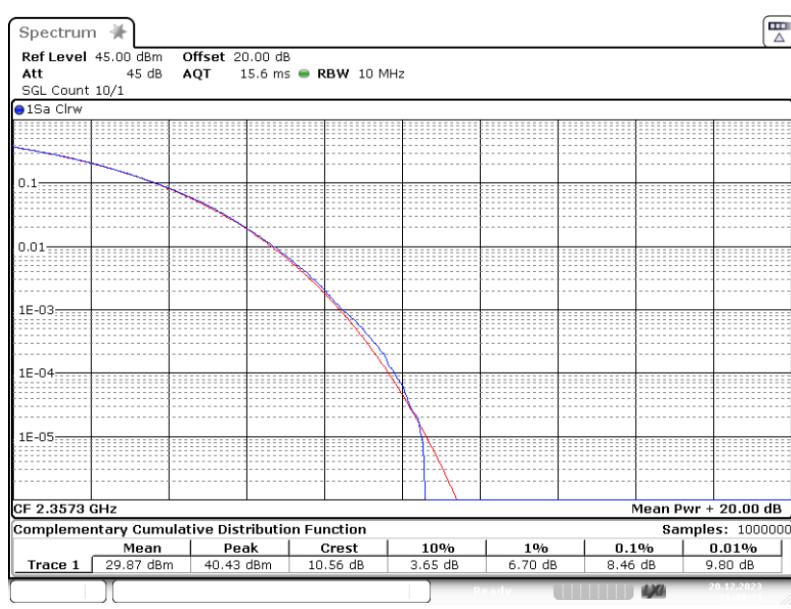
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

### 4.2.4 MEASUREMENT PLOT (SHOWING VALUE)

Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: AWGN; PAPR 0.3 dB < AGC



Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: AWGN; PAPR 3 dB > AGC



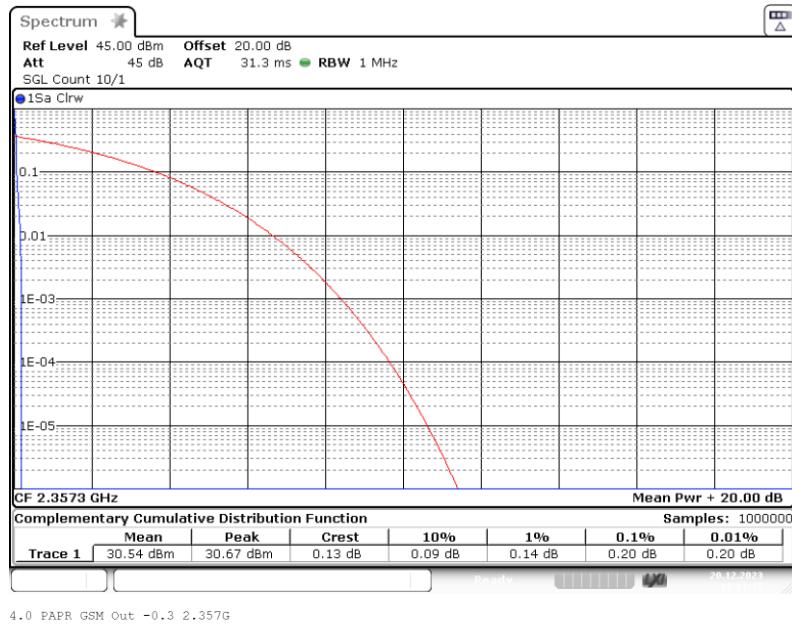


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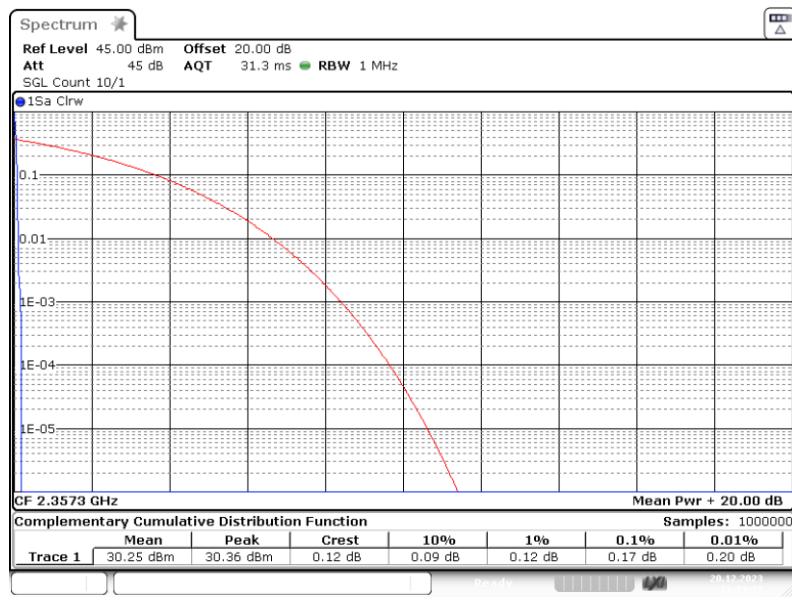
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: GSM; PAPR 0.3 dB < AGC



Band: WCS 2300; Frequency: 2.3573 GHz; Band Edge: f0; Mod: GSM; PAPR 3 dB > AGC





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## EMC Test Report No.: 24-0007

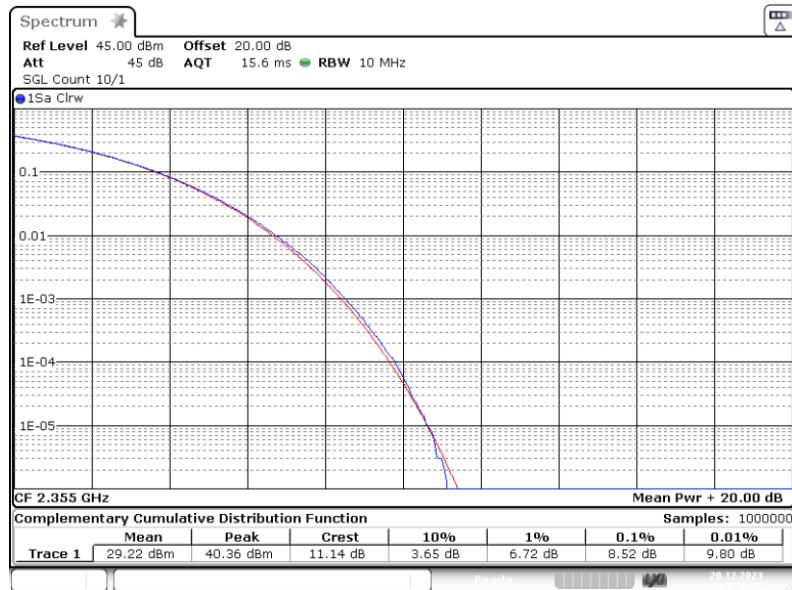
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; 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; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; PAPR 3 dB > AGC



4.0 PAPR AWGN 10M Out +3 2.355G



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**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

#### 4.2.5 TEST EQUIPMENT USED

- Conducted



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## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

### 4.3 OCCUPIED BANDWIDTH/INPUT-VERSUS-OUTPUT SPECTRUM

Standard FCC Part 2.1049; Occupied Bandwidth

**The test was performed according to:**

ANSI C63.26, KDB 935210 D05 v01r04: 3.4

**Test date:** 2023-12-20; 05.01.2024

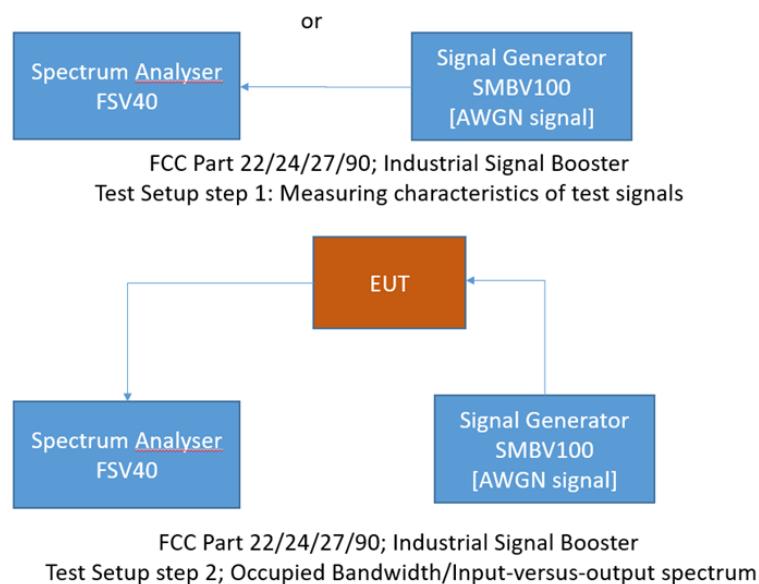
**Environmental conditions:** 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

**Test engineer:** Thomas Hufnagel

#### 4.3.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission limits.

The EUT was connected to the test setups 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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**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

#### 4.3.2 TEST REQUIREMENTS/LIMITS

Abstract § 2.1049 from FCC:

**FCC Part 2.1049; Occupied Bandwidth:**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.3 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

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



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## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

### 4.3.3 TEST PROTOCOL

<b>Band 30 WCS 2300, downlink</b>							
<b>Signal Type</b>	<b>Input Power</b>	<b>Signal Frequency [MHz]</b>	<b>Occupied Bandwidth SG [kHz]</b>	<b>Occupied Bandwidth Booster [kHz]</b>	<b>Delta Occupied Bandwidth [kHz]</b>	<b>Limit Delta Occupied Bandwidth [kHz]</b>	<b>Margin to Limit [kHz]</b>
Wideband	0.3 dB < AGC	2355.0	4390.9	4388.4	2.5	205.0	202.5
Wideband	3 dB > AGC	2355.0	4389.0	4389.0	0.0	205.0	205.0
Narrowband	0.3 dB < AGC	2356.0	318.5	312.8	5.7	10.0	4.3
Narrowband	3 dB > AGC	2356.0	317.3	314.5	2.8	10.0	7.2
Wideband 5G	0.3 dB < AGC	2355.0	9937.0	9925.0	12.0	470.0	458.0
Wideband 5G	3 dB > AGC	2355.0	9947.5	9914.5	33.0	470.0	437.0

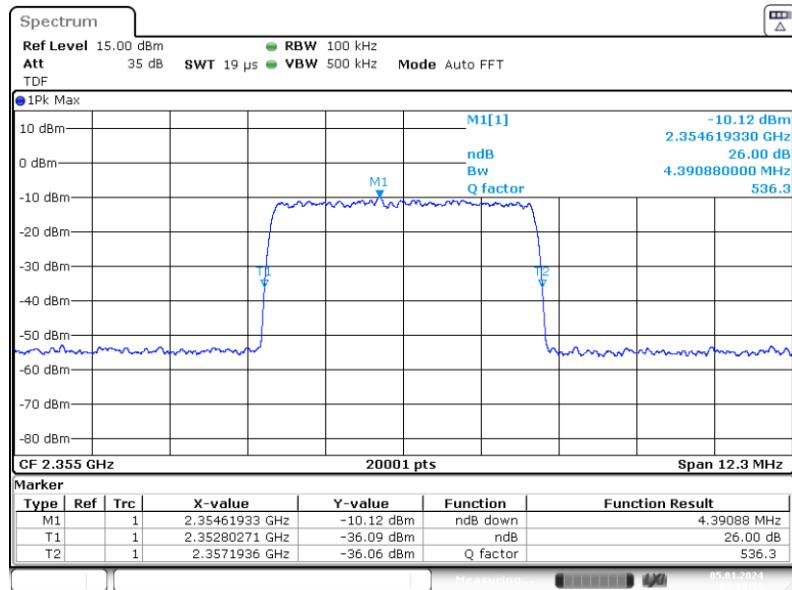
Remark: Please see next sub-clause for the measurement plot.

**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

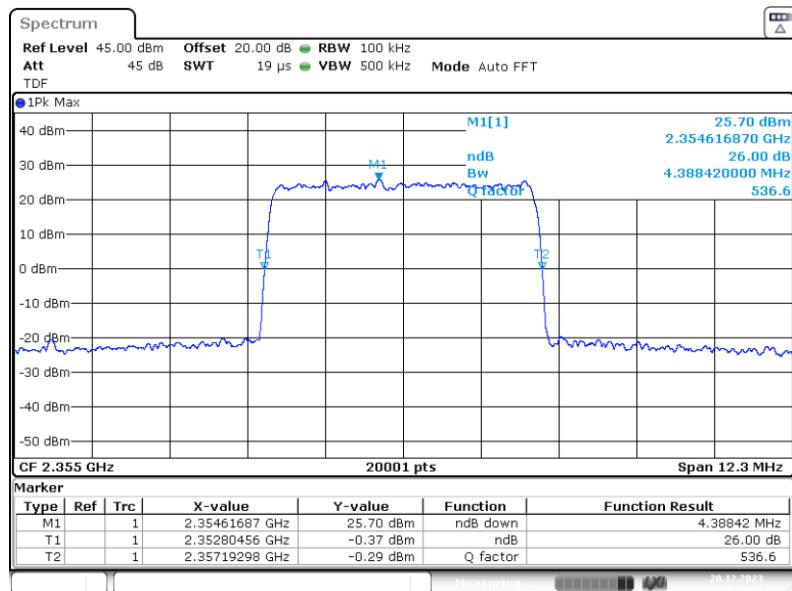
**4.3.4 MEASUREMENT PLOT**

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 0.3 dB &lt; AGC



3.4 OCBw AWGN In-0.3 2.3550G \_26dB

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN; Output OCBw 0.3 dB &lt; AGC



3.4 OCBw AWGN Out -0.3 2.3550G \_26dB

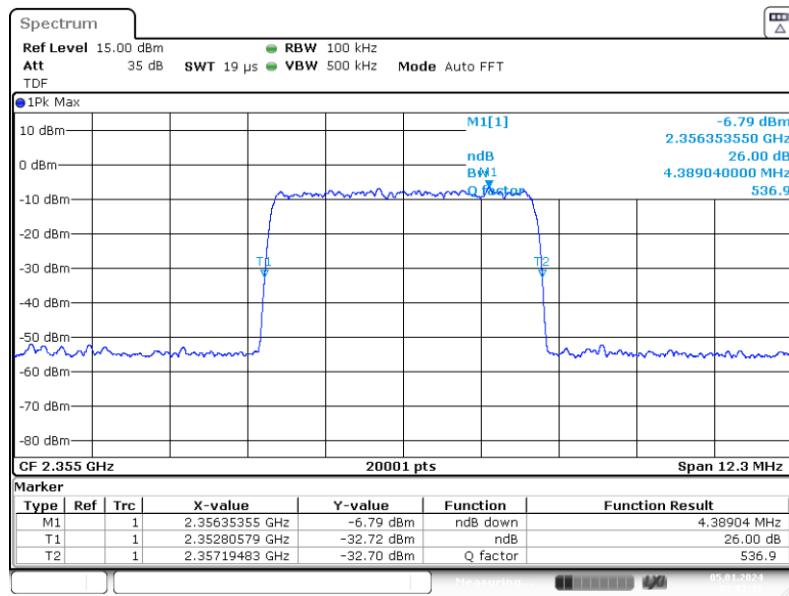


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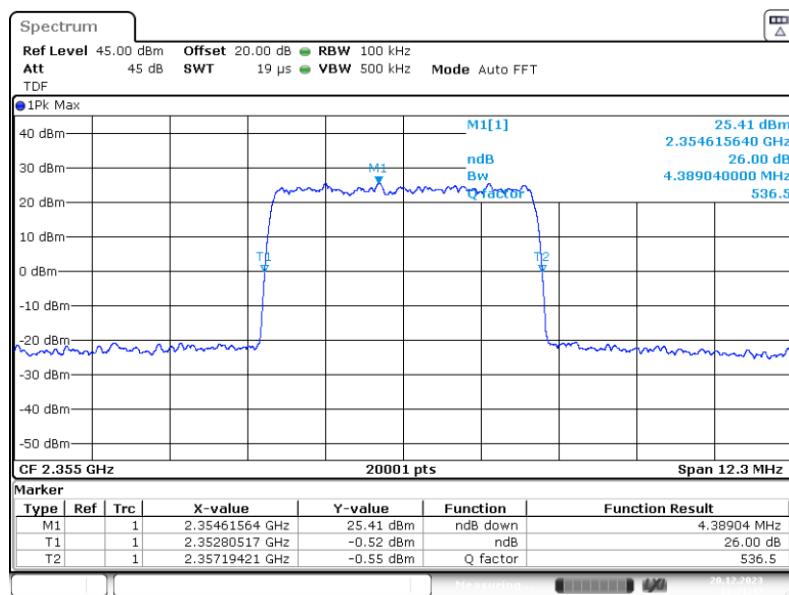
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN; Input OCBw 3 dB > AGC



Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN; Output OCBw 3 dB > AGC



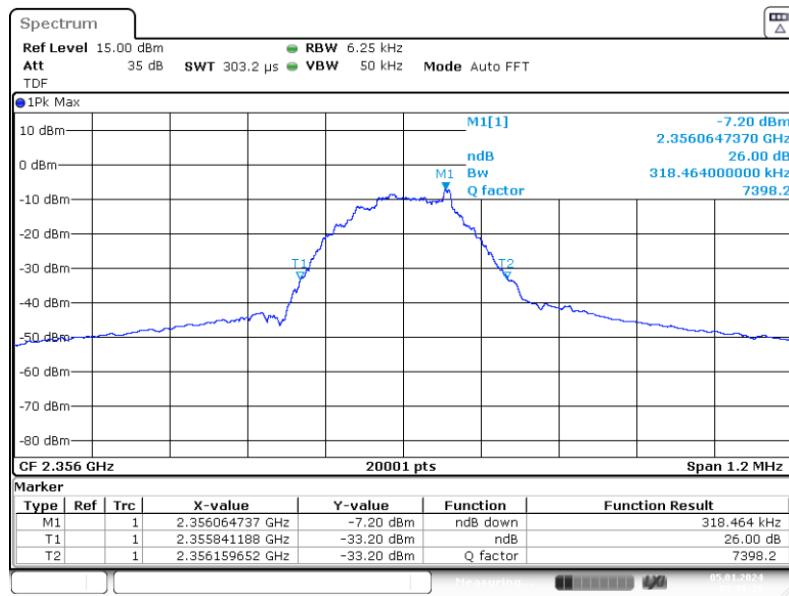


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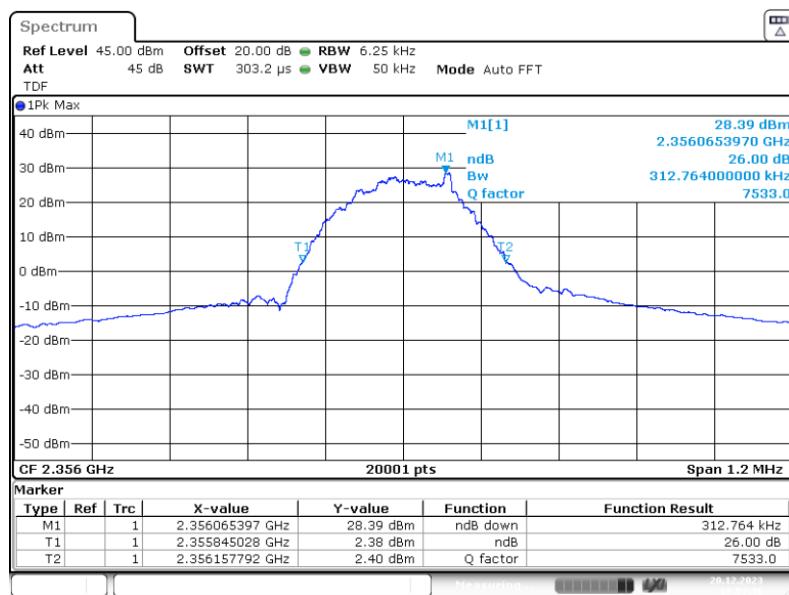
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3560 GHz; Band Edge: mid; Mod: GSM; Input OCBw 0.3 dB < AGC



Band: WCS 2300; Frequency: 2.3560 GHz; Band Edge: mid; Mod: GSM; Output OCBw 0.3 dB < AGC



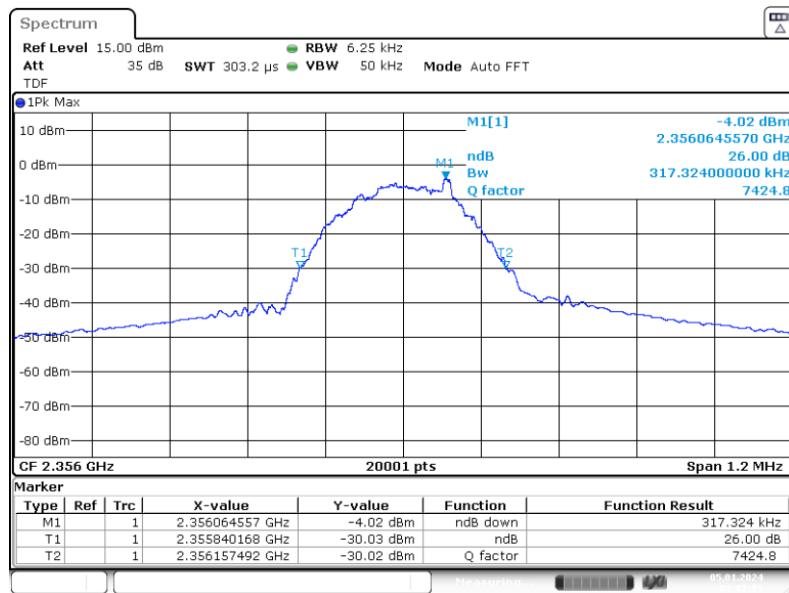


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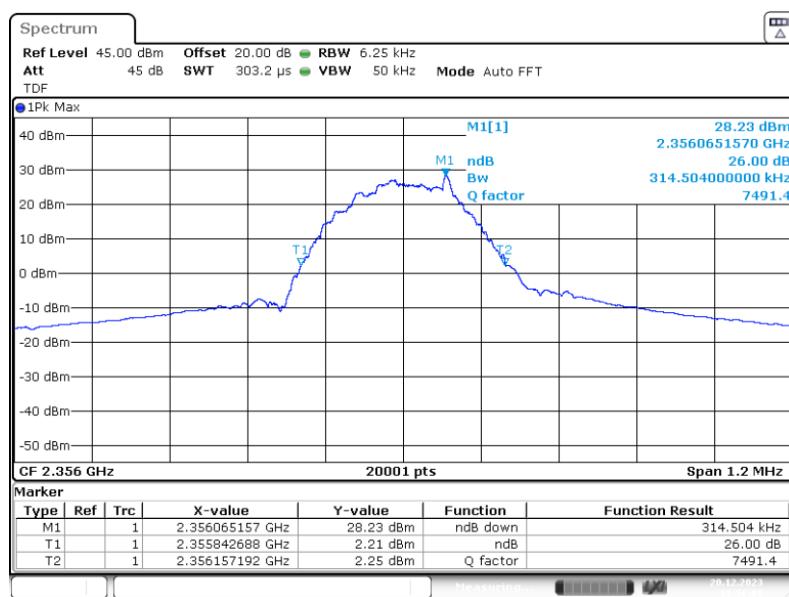
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3560 GHz; Band Edge: mid; Mod: GSM; Input OCBw 3 dB > AGC



Band: WCS 2300; Frequency: 2.3560 GHz; Band Edge: mid; Mod: GSM; Output OCBw 3 dB > AGC



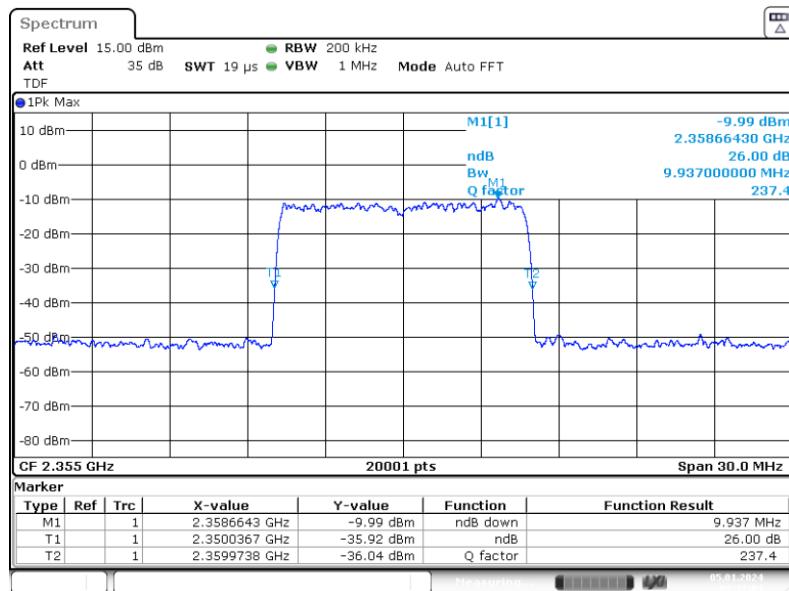


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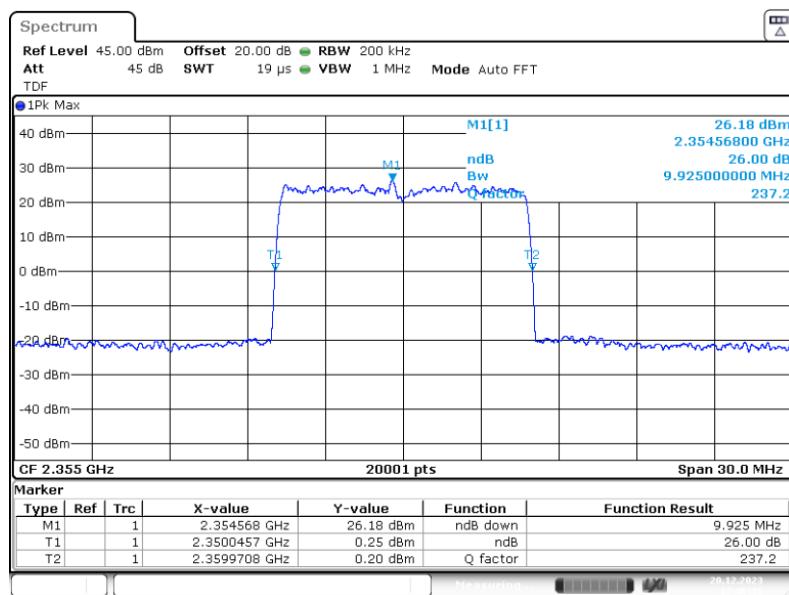
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; Input OCBw 0.3 dB < AGC



Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; Output OCBw 0.3 dB < AGC



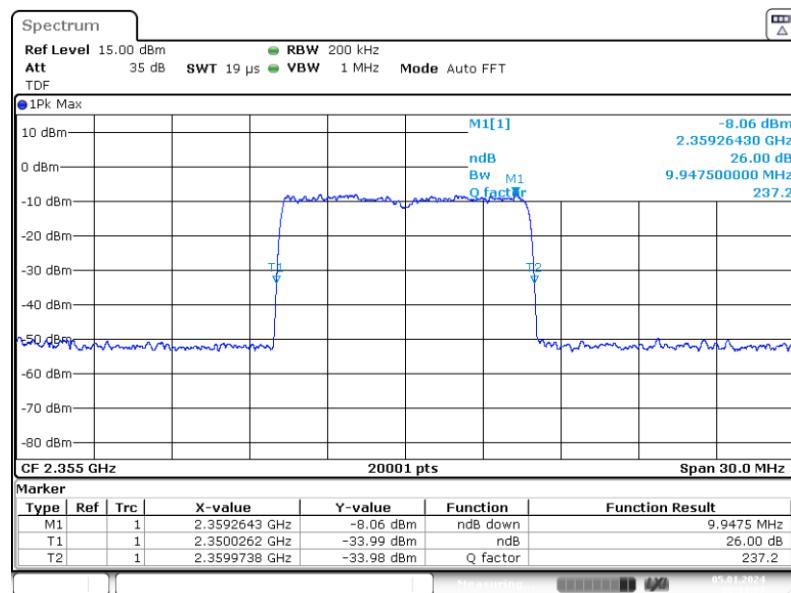


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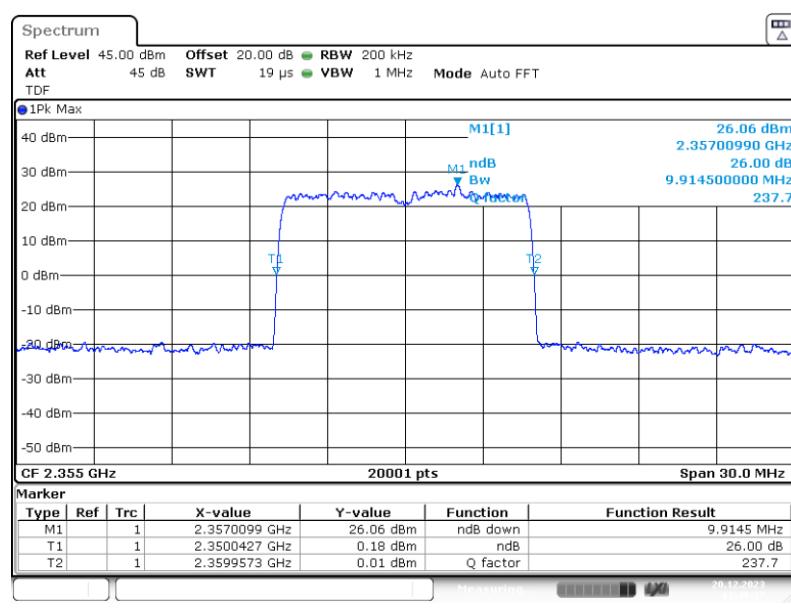
## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; Input OCBw 3 dB > AGC



Band: WCS 2300; Frequency: 2.3550 GHz; Band Edge: mid; Mod: AWGN 10M; Output OCBw 3 dB > AGC





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**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

#### 4.3.5 TEST EQUIPMENT USED

- Conducted



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## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

### 4.4 CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard FCC Part § 2.1051, § 27.53

**The test was performed according to:**

ANSI C63.26, KDB 935210 D05 v01r04: 3.6

**Test date:** 2023-12-20

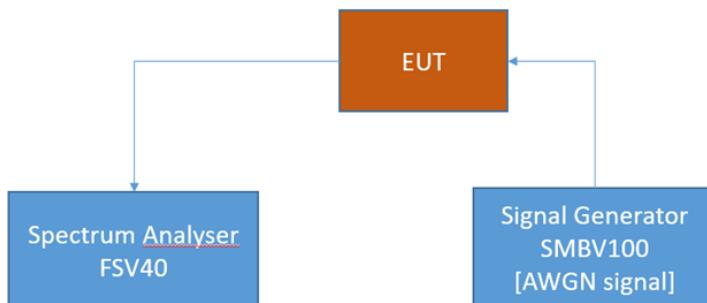
**Environmental conditions:** 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

**Test engineer:** Thomas Hufnagel

#### 4.4.1 TEST DESCRIPTION

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

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



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

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

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



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## EMC Test Report No.: 24-0007

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

### 4.4.2 TEST REQUIREMENTS/LIMITS

Abstract § 2.1051 from FCC:

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

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

### **Part 27; Miscellaneous Wireless Communication Services**

#### **Subpart C – Technical standards**

##### **§27.53 – Emission limits**

Abstract § 27.53 FCC:

(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.



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(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.



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### 4.4.3 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:

$$p \text{ RBW reduced } [\text{dBm}] = 10 * \log\left(\frac{\text{RBW reduced } [\text{kHz}]}{1000 \text{ kHz}}\right) + p \text{ RBW } 1 \text{ MHz } [\text{dBm}]$$

Hereby "p" are the limit lines' values.

**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	0.00905	-89.6	RMS	1	-75.0	14.6
low	Wideband	0.15249	-75.0	RMS	10	-65.0	10.0
low	Wideband	792.9	-64.1	RMS	100	-55.0	9.1
low	Wideband	2158.3	-47.2	RMS	1000	-45.0	2.2
low	Wideband	2282.3	-49.4	RMS	1000	-45.0	4.4
low	Wideband	2290.4	-55.2	RMS	100	-50.0	5.2
low	Wideband	2300.9	-47.9	RMS	100	-23.0	24.9
low	Wideband	2312.0	-47.1	RMS	100	-23.0	24.1
low	Wideband	2323.0	-65.9	RMS	100	-45.0	20.9
low	Wideband	2330.1	-56.0	RMS	100	-55.0	1.0
low	Wideband	2360.1	-44.7	RMS	100	-23.0	21.7
low	Wideband	2360.5	-47.2	RMS	100	-23.0	24.2
low	Wideband	2366.4	-58.0	RMS	100	-50.0	8.0
low	Wideband	2369.4	-56.6	RMS	100	-52.0	4.6
low	Wideband	2369.3	-57.4	RMS	100	-52.0	5.4
low	Wideband	3646.9	-54.7	RMS	1000	-45.0	9.7
low	Wideband	6972.0	-51.3	RMS	1000	-45.0	6.3
low	Wideband	19584.3	-51.0	RMS	1000	-45.0	6.0
low	Wideband	20011.7	-50.9	RMS	1000	-45.0	5.9
mid	Wideband	0.01177	-90.3	RMS	1	-75.0	15.3
mid	Wideband	0.10750	-75.6	RMS	10	-65.0	10.6
mid	Wideband	812.2	-63.9	RMS	100	-55.0	8.9
mid	Wideband	2156.3	-47.6	RMS	1000	-45.0	2.6
mid	Wideband	2287.2	-49.0	RMS	1000	-42.0	7.0
mid	Wideband	2287.8	-54.4	RMS	100	-50.0	4.4
mid	Wideband	2304.9	-47.4	RMS	100	-42.0	5.4
mid	Wideband	2306.9	-46.8	RMS	100	-23.0	23.8
mid	Wideband	2320.0	-66.4	RMS	100	-45.0	21.4
mid	Wideband	2343.1	-56.6	RMS	100	-55.0	1.6
mid	Wideband	2360.0	-39.2	RMS	100	-23.0	16.2
mid	Wideband	2361.8	-47.4	RMS	100	-23.0	24.4
mid	Wideband	2367.2	-57.5	RMS	100	-50.0	7.5
mid	Wideband	2369.0	-56.3	RMS	100	-50.0	6.3
mid	Wideband	2368.9	-56.9	RMS	100	-50.0	6.9
mid	Wideband	3847.3	-55.1	RMS	1000	-45.0	10.1
mid	Wideband	6827.0	-51.5	RMS	1000	-45.0	6.5
mid	Wideband	19901.8	-51.2	RMS	1000	-45.0	6.2
mid	Wideband	20332.7	-49.8	RMS	1000	-45.0	4.8



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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]
high	Wideband	0.01241	-90.7	RMS	1	-75.0	15.7
high	Wideband	0.15249	-75.5	RMS	10	-65.0	10.5
high	Wideband	810.5	-63.7	RMS	100	-55.0	8.7
high	Wideband	2015.4	-47.3	RMS	1000	-45.0	2.3
high	Wideband	2286.3	-48.2	RMS	1000	-45.0	3.2
high	Wideband	2291.2	-55.1	RMS	100	-50.0	5.1
high	Wideband	2304.6	-47.6	RMS	100	-23.0	24.6
high	Wideband	2310.2	-46.5	RMS	100	-23.0	23.5
high	Wideband	2325.2	-66.7	RMS	100	-45.0	21.7
high	Wideband	2344.7	-56.9	RMS	100	-55.0	1.9
high	Wideband	2360.3	-36.0	RMS	100	-23.0	13.0
high	Wideband	2362.2	-43.7	RMS	100	-23.0	20.7
high	Wideband	2367.5	-57.2	RMS	100	-50.0	7.2
high	Wideband	2367.5	-57.2	RMS	100	-52.0	5.2
high	Wideband	2375.4	-56.6	RMS	100	-52.0	4.6
high	Wideband	3399.9	-55.0	RMS	1000	-45.0	10.0
high	Wideband	6862.5	-51.6	RMS	1000	-45.0	6.6
high	Wideband	19571.3	-51.1	RMS	1000	-45.0	6.1
high	Wideband	20313.2	-50.7	RMS	1000	-45.0	5.7

**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	0.00905	-90.1	RMS	1	-75.0	15.1
low	Narrowband	0.10250	-77.0	RMS	10	-65.0	12.0
low	Narrowband	948.5	-64.0	RMS	100	-55.0	9.0
low	Narrowband	2086.3	-47.4	RMS	1000	-45.0	2.4
low	Narrowband	2283.8	-48.7	RMS	1000	-45.0	3.7
low	Narrowband	2289.6	-55.1	RMS	100	-50.0	5.1
low	Narrowband	2304.7	-48.4	RMS	100	-23.0	25.4
low	Narrowband	2305.7	-46.8	RMS	100	-23.0	23.8
low	Narrowband	2328.9	-66.4	RMS	100	-45.0	21.4
low	Narrowband	2331.1	-56.3	RMS	100	-55.0	1.3
low	Narrowband	2360.1	-47.6	RMS	100	-23.0	24.6
low	Narrowband	2360.1	-47.6	RMS	100	-23.0	24.6
low	Narrowband	2366.5	-58.0	RMS	100	-50.0	8.0
low	Narrowband	2369.9	-57.4	RMS	100	-52.0	5.4
low	Narrowband	2376.8	-57.1	RMS	100	-52.0	5.1
low	Narrowband	3961.3	-52.3	RMS	1000	-45.0	7.3
low	Narrowband	6884.5	-51.3	RMS	1000	-45.0	6.3
low	Narrowband	19571.3	-50.8	RMS	1000	-45.0	5.8
low	Narrowband	20256.2	-50.4	RMS	1000	-45.0	5.4
mid	Narrowband	0.01350	-90.5	RMS	1	-75.0	15.5
mid	Narrowband	0.21748	-76.1	RMS	10	-65.0	11.1
mid	Narrowband	951.1	-64.0	RMS	100	-55.0	9.0
mid	Narrowband	1827.4	-47.1	RMS	1000	-45.0	2.1
mid	Narrowband	2285.1	-47.7	RMS	1000	-42.0	5.7
mid	Narrowband	2294.2	-55.3	RMS	100	-50.0	5.3
mid	Narrowband	2300.6	-46.6	RMS	100	-42.0	4.6
mid	Narrowband	2300.5	-47.3	RMS	100	-23.0	24.3
mid	Narrowband	2321.6	-66.7	RMS	100	-45.0	21.7
mid	Narrowband	2342.2	-57.1	RMS	100	-55.0	2.1
mid	Narrowband	2362.2	-46.6	RMS	100	-23.0	23.6
mid	Narrowband	2360.1	-47.9	RMS	100	-23.0	24.9
mid	Narrowband	2365.7	-56.9	RMS	100	-50.0	6.9
mid	Narrowband	2369.7	-56.6	RMS	100	-50.0	6.6
mid	Narrowband	2365.7	-56.9	RMS	100	-50.0	6.9
mid	Narrowband	3842.3	-55.3	RMS	1000	-45.0	10.3
mid	Narrowband	6825.0	-51.6	RMS	1000	-45.0	6.6
mid	Narrowband	19972.8	-51.5	RMS	1000	-45.0	6.5
mid	Narrowband	20312.2	-50.6	RMS	1000	-45.0	5.6



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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]
high	Narrowband	0.01550	-90.3	RMS	1	-75.0	15.3
high	Narrowband	0.12250	-75.5	RMS	10	-65.0	10.5
high	Narrowband	953.5	-63.9	RMS	100	-55.0	8.9
high	Narrowband	1517.5	-47.2	RMS	1000	-45.0	2.2
high	Narrowband	2282.3	-49.8	RMS	1000	-45.0	4.8
high	Narrowband	2293.3	-55.4	RMS	100	-50.0	5.4
high	Narrowband	2302.9	-47.1	RMS	100	-23.0	24.1
high	Narrowband	2316.7	-46.3	RMS	100	-23.0	23.3
high	Narrowband	2322.0	-66.4	RMS	100	-45.0	21.4
high	Narrowband	2341.6	-56.7	RMS	100	-55.0	1.7
high	Narrowband	2361.1	-47.1	RMS	100	-23.0	24.1
high	Narrowband	2365.4	-57.4	RMS	100	-23.0	34.4
high	Narrowband	2365.4	-58.0	RMS	100	-50.0	8.0
high	Narrowband	2377.4	-56.1	RMS	100	-52.0	4.1
high	Narrowband	3809.3	-55.0	RMS	1000	-42.0	13.0
high	Narrowband	6800.5	-51.3	RMS	1000	-45.0	6.3
high	Narrowband	19518.3	-51.1	RMS	1000	-45.0	6.1
high	Narrowband	20364.2	-50.3	RMS	1000	-45.0	5.3

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<b>Test Frequency</b>	<b>Signal Type</b>	<b>Spurious Freq. [MHz]</b>	<b>Spurious Level [dBm]</b>	<b>Detector</b>	<b>RBW [kHz]</b>	<b>Limit [dBm]</b>	<b>Margin to Limit [dB]</b>
low	Wideband 5G	0.00905	-90.0	RMS	1	-75.0	15.0
low	Wideband 5G	0.13749	-75.1	RMS	10	-65.0	10.1
low	Wideband 5G	951.9	-64.0	RMS	100	-55.0	9.0
low	Wideband 5G	2160.8	-46.8	RMS	1000	-45.0	1.8
low	Wideband 5G	2286.6	-50.0	RMS	1000	-45.0	5.0
low	Wideband 5G	2287.6	-55.3	RMS	100	-50.0	5.3
low	Wideband 5G	2302.9	-47.6	RMS	100	-23.0	24.6
low	Wideband 5G	2313.5	-47.1	RMS	100	-23.0	24.1
low	Wideband 5G	2320.0	-66.8	RMS	100	-45.0	21.8
low	Wideband 5G	2338.9	-56.9	RMS	100	-55.0	1.9
low	Wideband 5G	2360.0	-38.2	RMS	100	-23.0	15.2
low	Wideband 5G	2361.1	-42.9	RMS	100	-23.0	19.9
low	Wideband 5G	2366.5	-56.9	RMS	100	-50.0	6.9
low	Wideband 5G	2366.4	-57.2	RMS	100	-52.0	5.2
low	Wideband 5G	2366.4	-57.5	RMS	100	-52.0	5.5
low	Wideband 5G	3765.8	-55.0	RMS	1000	-45.0	10.0
low	Wideband 5G	6872.0	-51.1	RMS	1000	-45.0	6.1
low	Wideband 5G	19540.3	-51.4	RMS	1000	-45.0	6.4
low	Wideband 5G	20276.7	-51.0	RMS	1000	-45.0	6.0
mid	Wideband 5G	0.00977	-89.4	RMS	1	-75.0	14.4
mid	Wideband 5G	0.11750	-76.1	RMS	10	-65.0	11.1
mid	Wideband 5G	793.9	-63.7	RMS	100	-55.0	8.7
mid	Wideband 5G	1709.5	-46.8	RMS	1000	-45.0	1.8
mid	Wideband 5G	2285.1	-48.3	RMS	1000	-42.0	6.3
mid	Wideband 5G	2289.2	-55.8	RMS	100	-50.0	5.8
mid	Wideband 5G	2301.4	-47.7	RMS	100	-42.0	5.7
mid	Wideband 5G	2305.1	-46.6	RMS	100	-23.0	23.6
mid	Wideband 5G	2321.0	-66.2	RMS	100	-45.0	21.2
mid	Wideband 5G	2342.8	-56.8	RMS	100	-55.0	1.8
mid	Wideband 5G	2360.0	-37.7	RMS	100	-23.0	14.7
mid	Wideband 5G	2362.0	-41.6	RMS	100	-23.0	18.6
mid	Wideband 5G	2366.5	-56.9	RMS	100	-50.0	6.9
mid	Wideband 5G	2365.5	-57.4	RMS	100	-50.0	7.4
mid	Wideband 5G	2366.5	-56.9	RMS	100	-50.0	6.9
mid	Wideband 5G	3531.9	-54.7	RMS	1000	-45.0	9.7
mid	Wideband 5G	6857.0	-50.6	RMS	1000	-45.0	5.6
mid	Wideband 5G	19958.3	-50.6	RMS	1000	-45.0	5.6
mid	Wideband 5G	20289.2	-50.7	RMS	1000	-45.0	5.7

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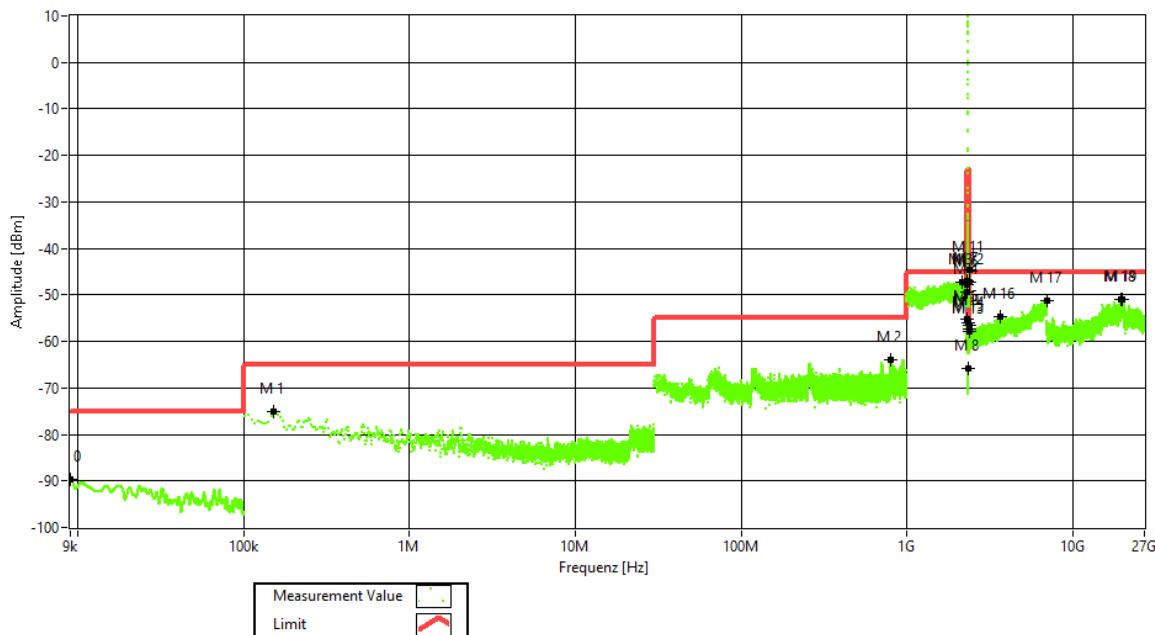
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Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
high	Wideband 5G	0.00959	-88.8	RMS	1	-75.0	13.8
high	Wideband 5G	0.15249	-73.7	RMS	10	-65.0	8.7
high	Wideband 5G	950.3	-63.5	RMS	100	-55.0	8.5
high	Wideband 5G	1855.9	-47.0	RMS	1000	-45.0	2.0
high	Wideband 5G	2287.1	-49.0	RMS	1000	-45.0	4.0
high	Wideband 5G	2292.0	-55.3	RMS	100	-50.0	5.3
high	Wideband 5G	2301.0	-47.6	RMS	100	-23.0	24.6
high	Wideband 5G	2305.9	-46.2	RMS	100	-23.0	23.2
high	Wideband 5G	2321.2	-66.4	RMS	100	-45.0	21.4
high	Wideband 5G	2335.9	-56.9	RMS	100	-55.0	1.9
high	Wideband 5G	2360.8	-38.9	RMS	100	-23.0	15.9
high	Wideband 5G	2361.6	-41.8	RMS	100	-23.0	18.8
high	Wideband 5G	2367.5	-56.7	RMS	100	-50.0	6.7
high	Wideband 5G	2367.5	-56.7	RMS	100	-52.0	4.7
high	Wideband 5G	2365.9	-57.1	RMS	100	-52.0	5.1
high	Wideband 5G	3835.3	-55.0	RMS	1000	-45.0	10.0
high	Wideband 5G	6874.0	-50.9	RMS	1000	-45.0	5.9
high	Wideband 5G	19515.8	-50.9	RMS	1000	-45.0	5.9
high	Wideband 5G	20306.2	-50.5	RMS	1000	-45.0	5.5

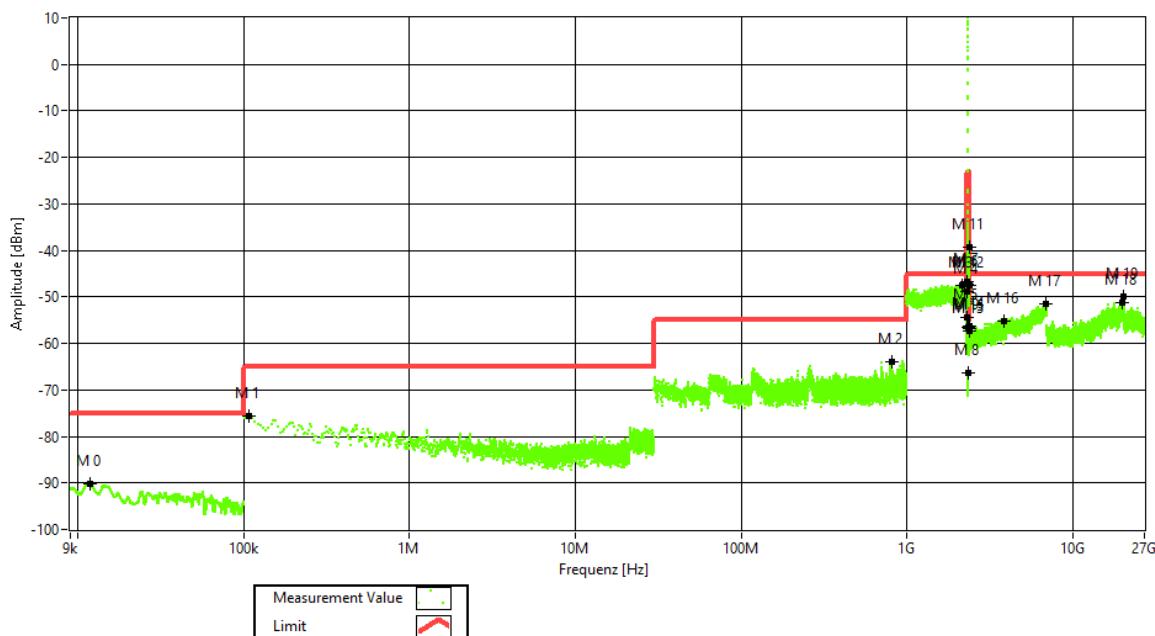
Remark: Please see next sub-clause for the measurement plot.

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

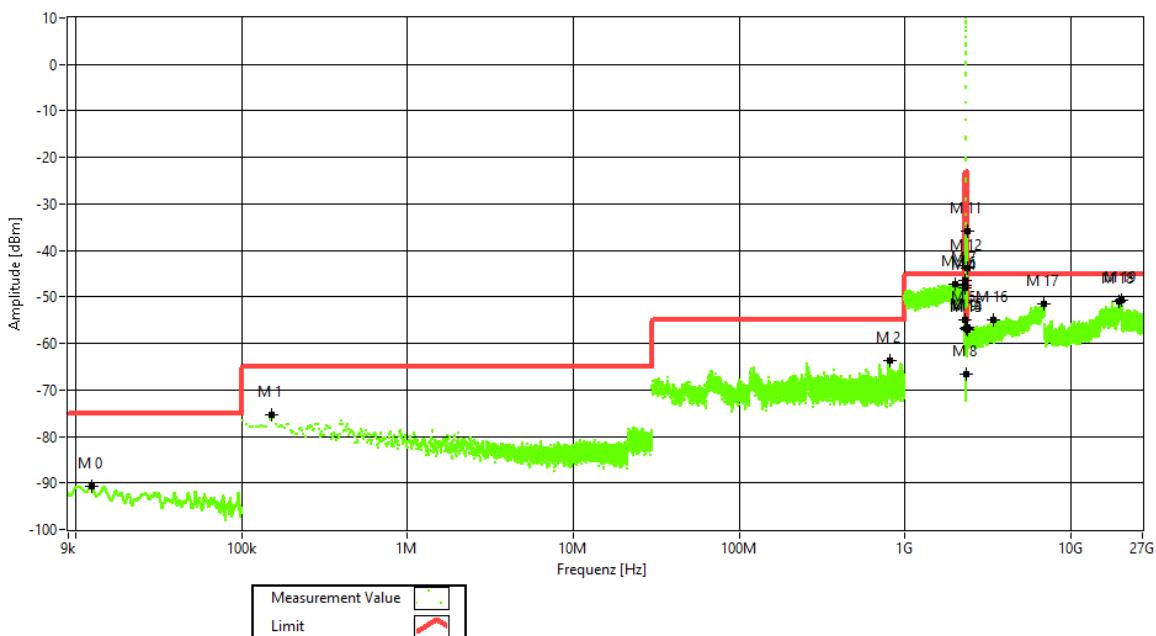
Frequency Band = Band 30 WCS 2300, Test Frequency = low, Direction = RF downlink,  
Signal Type = AWGN



Frequency Band = Band 30 WCS 2300, Test Frequency = mid, Direction = RF downlink,  
Signal Type = AWGN



Frequency Band = Band 30 WCS 2300, Test Frequency = high, Direction = RF downlink,  
Signal Type = AWGN

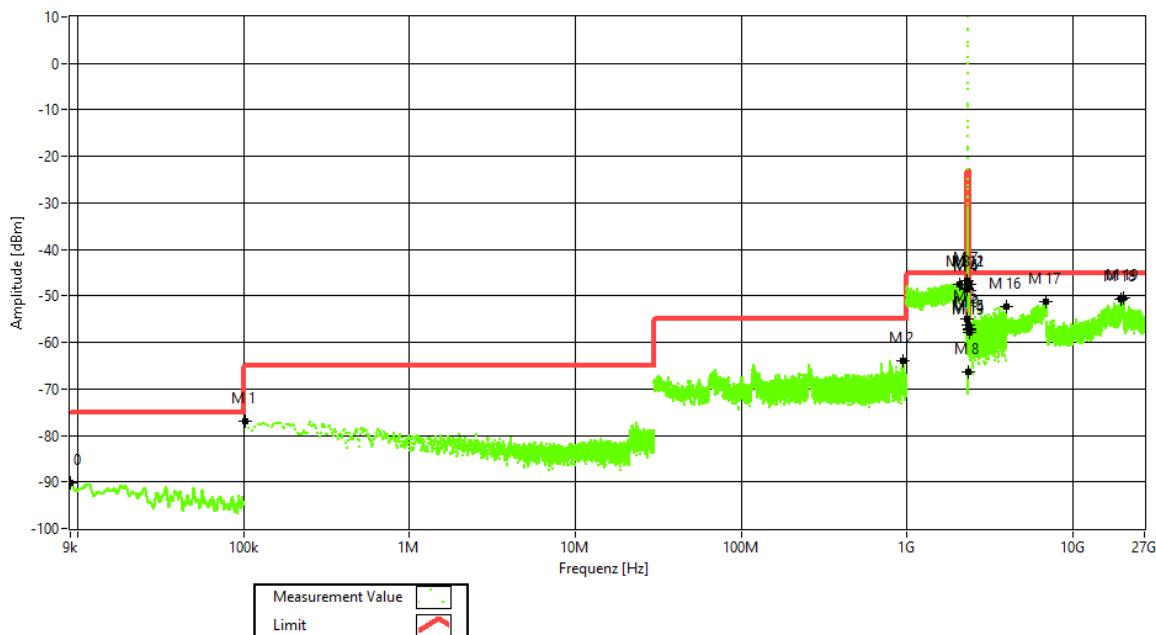


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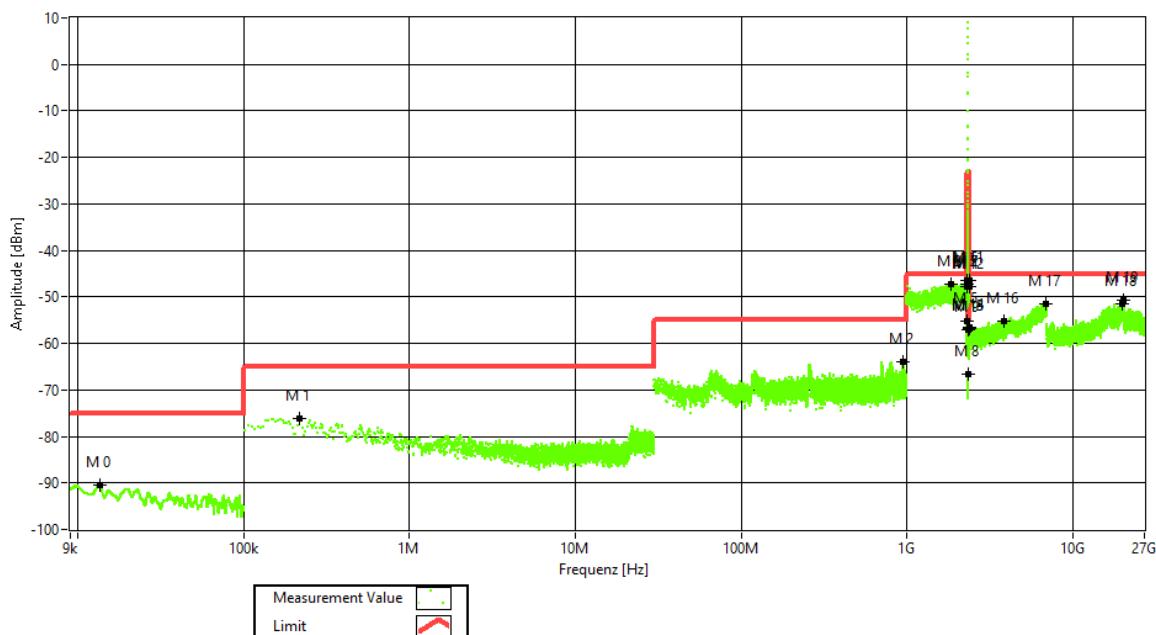
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

**BUREAU  
VERITAS**

Frequency Band = Band 30 WCS 2300, Test Frequency = low, Direction = RF downlink,  
Signal Type = GSM



Frequency Band = Band 30 WCS 2300, Test Frequency = mid, Direction = RF downlink,  
Signal Type = GSM

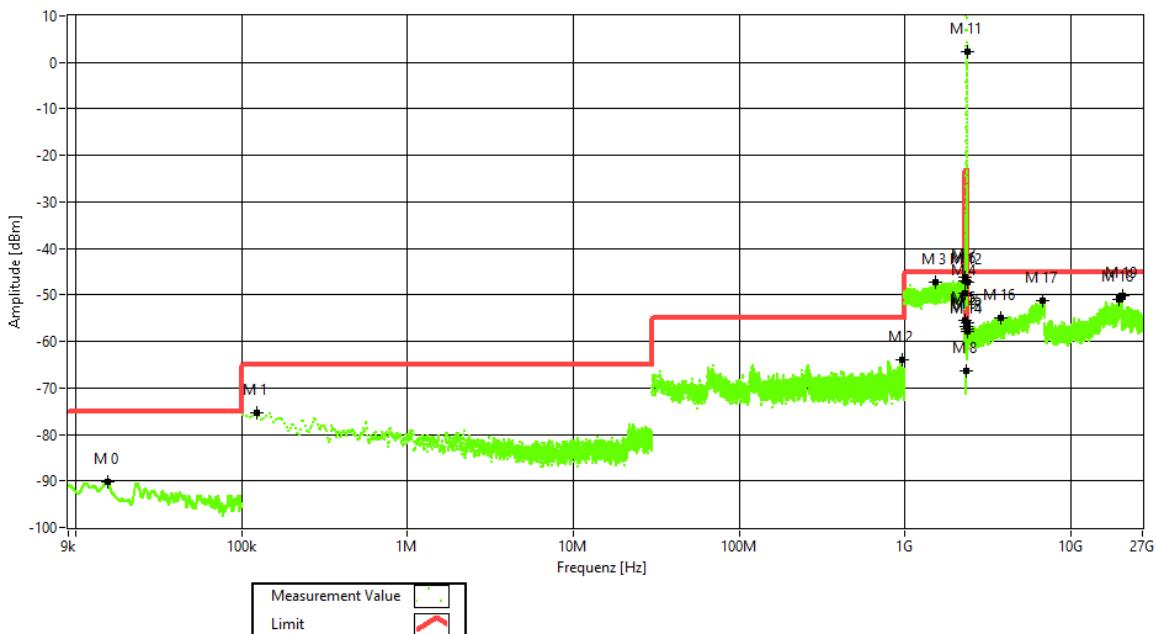


**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

**BUREAU  
VERITAS**

Frequency Band = Band 30 WCS 2300, Test Frequency = high, Direction = RF downlink,  
Signal Type = GSM

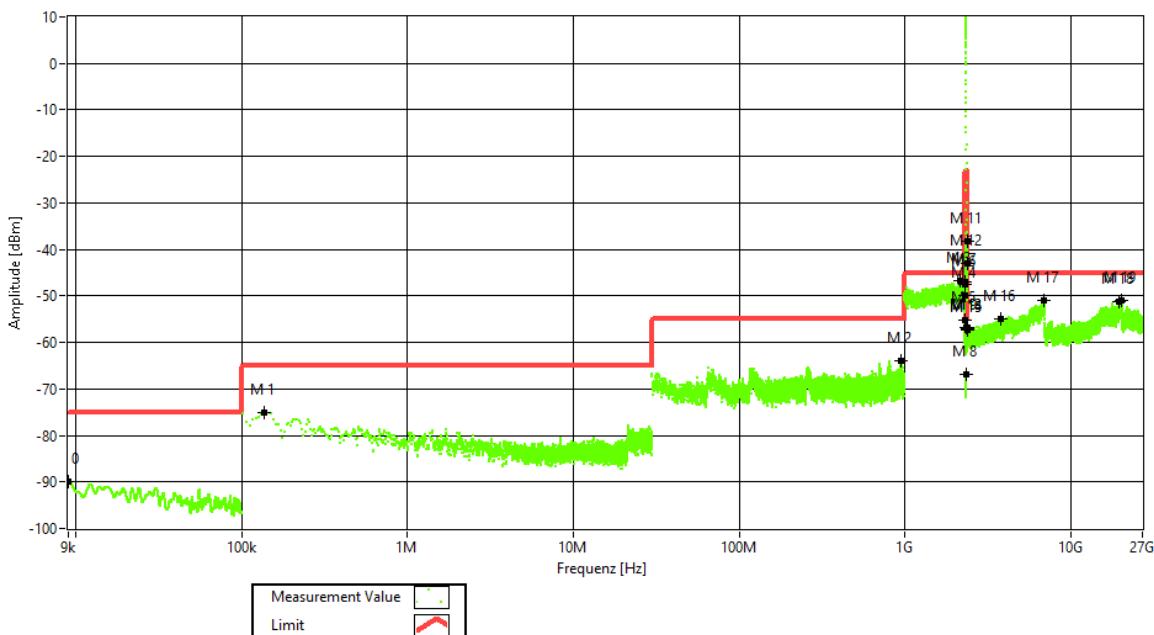


**EMC Test Report No.: 24-0007**

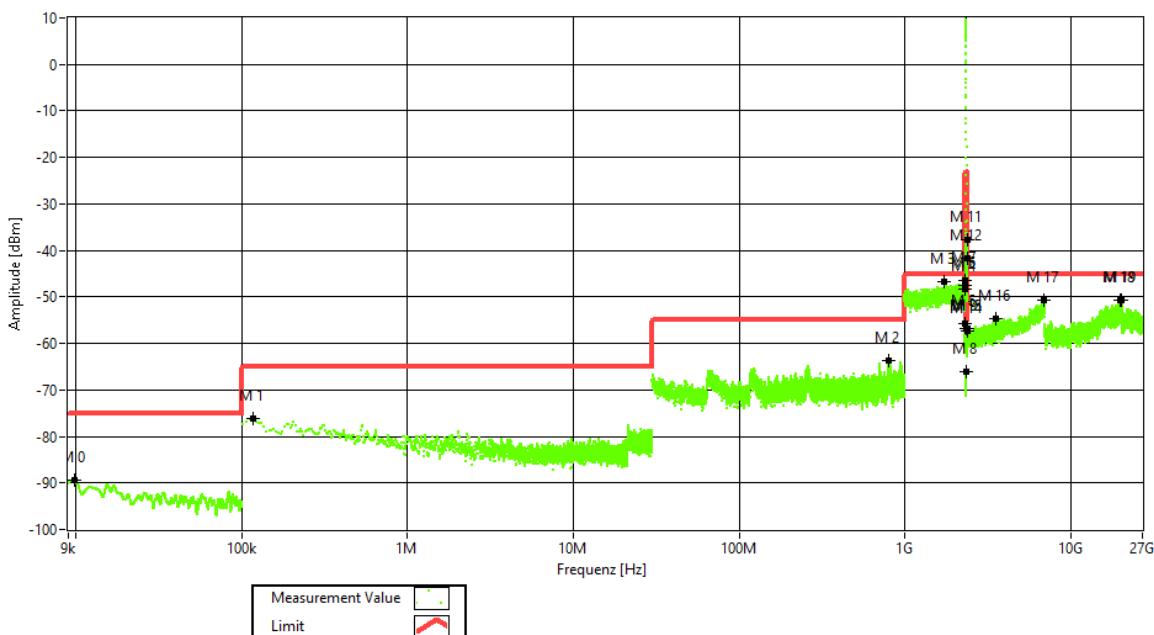
EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

**BUREAU  
VERITAS**

Frequency Band = Band 30 WCS 2300, Test Frequency = low, Direction = RF downlink,  
Signal Type = AWGN10



Frequency Band = Band 30 WCS 2300, Test Frequency = mid, Direction = RF downlink,  
Signal Type = AWGN10





BUREAU  
VERITAS

**EMC Test Report No.: 24-0007**

EMC tests on Andrew CAP MX 6/7E/80-85/17/E/19/23/25 T-AC [WCS]

Frequency Band = Band 30 WCS 2300, Test Frequency = high, Direction = RF downlink,  
Signal Type = AWGN10

