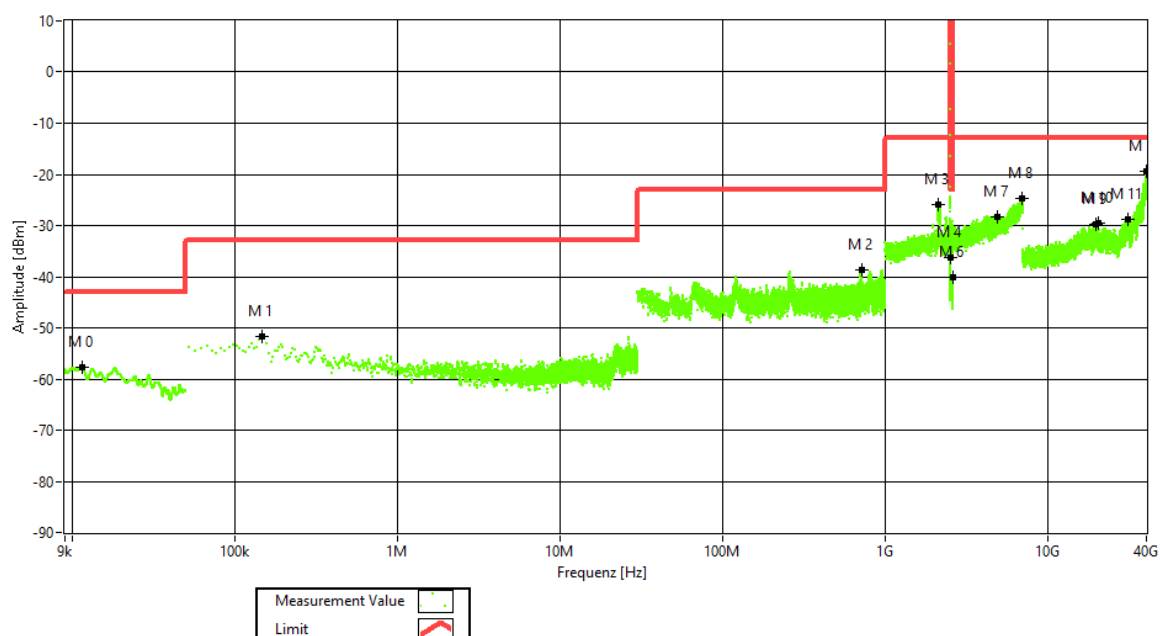
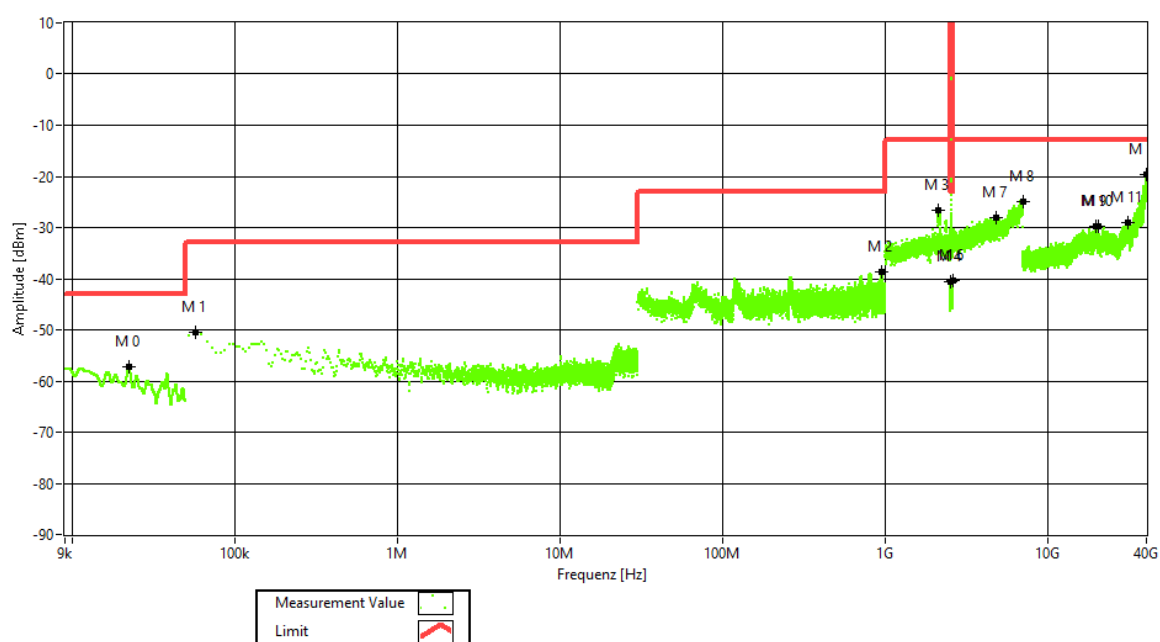


Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = low, Direction = RF downlink,  
Signal Type = Narrowband



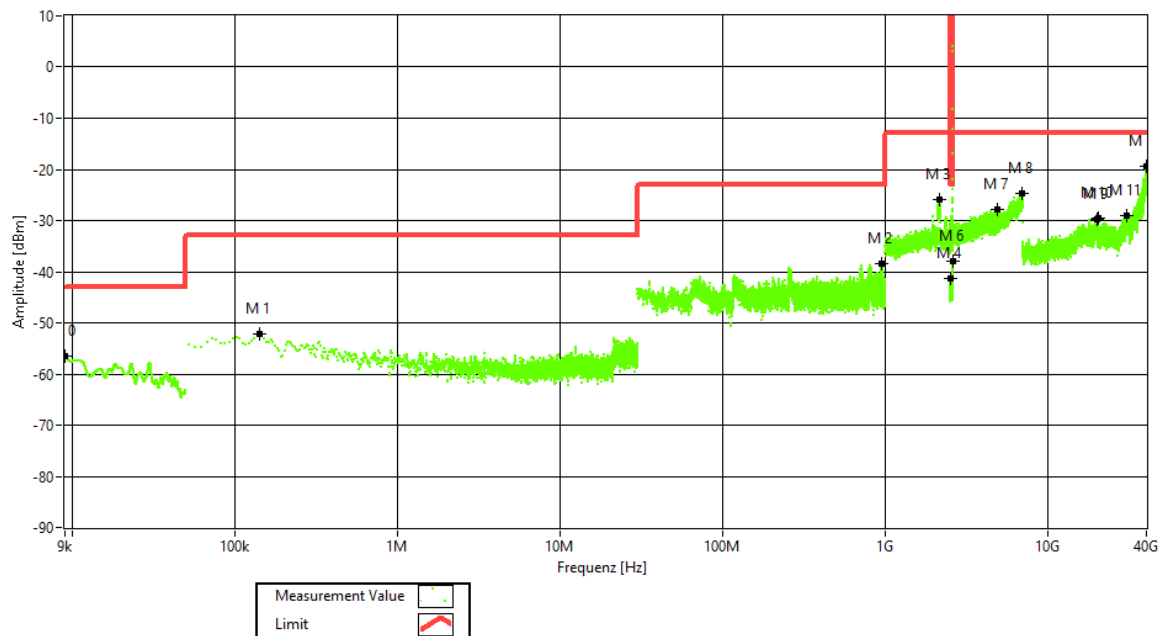
Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = mid, Direction = RF downlink,  
Signal Type = Narrowband



# EMC Test Report No.: 24-0007

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

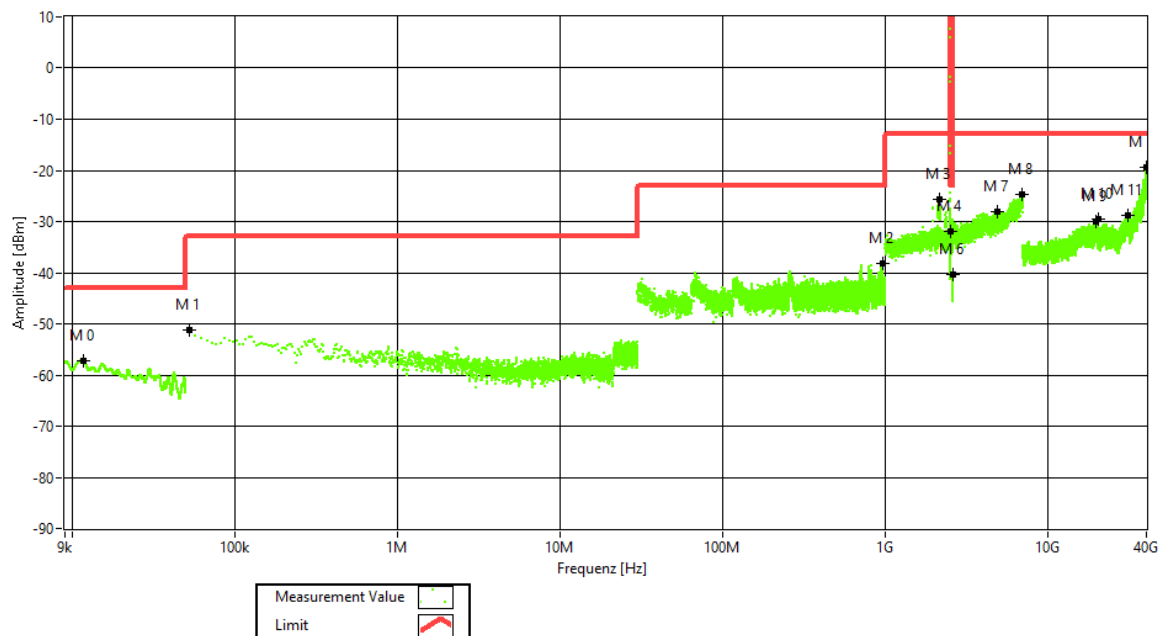
Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = high, Direction = RF downlink,  
Signal Type = Narrowband



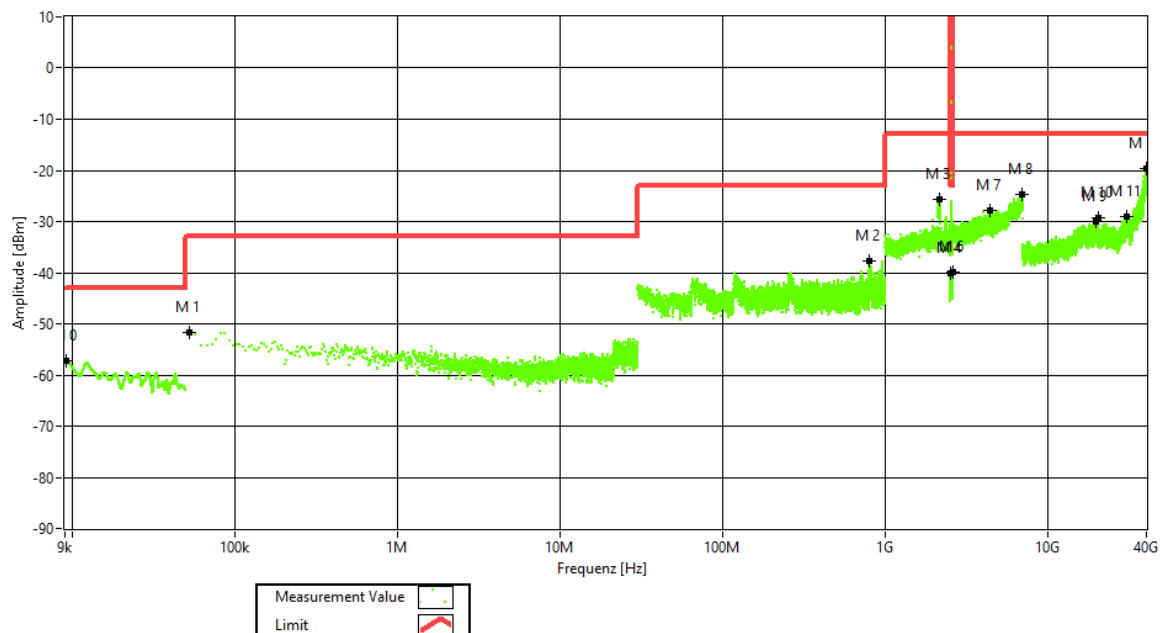
# EMC Test Report No.: 24-0007

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

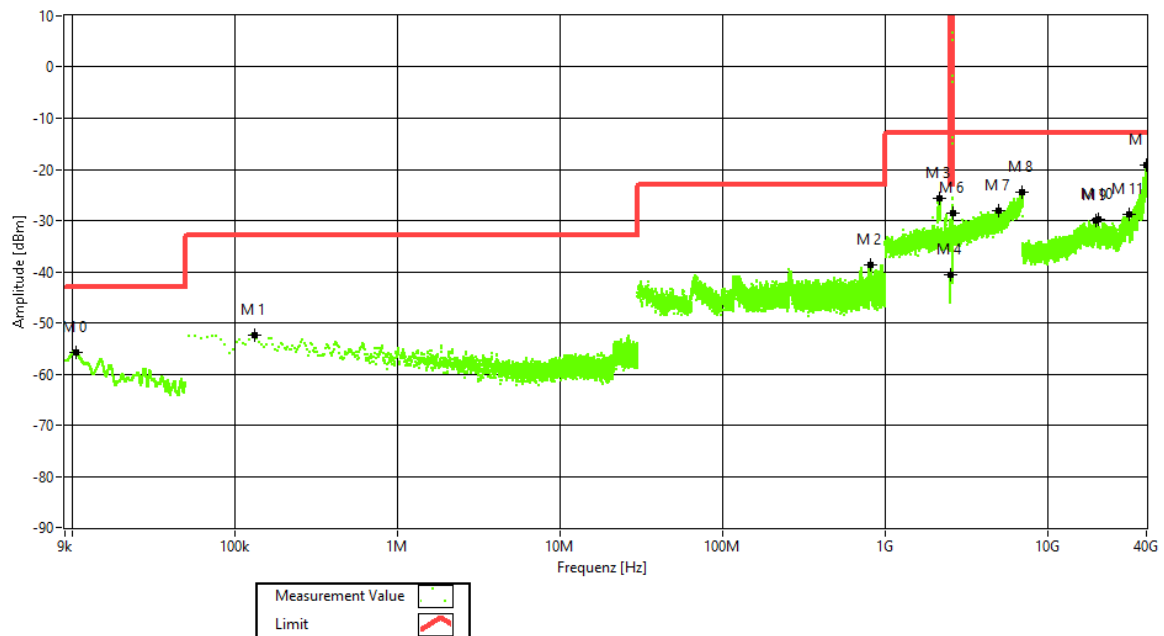
Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = low, Direction = RF downlink,  
Signal Type = AWGN



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



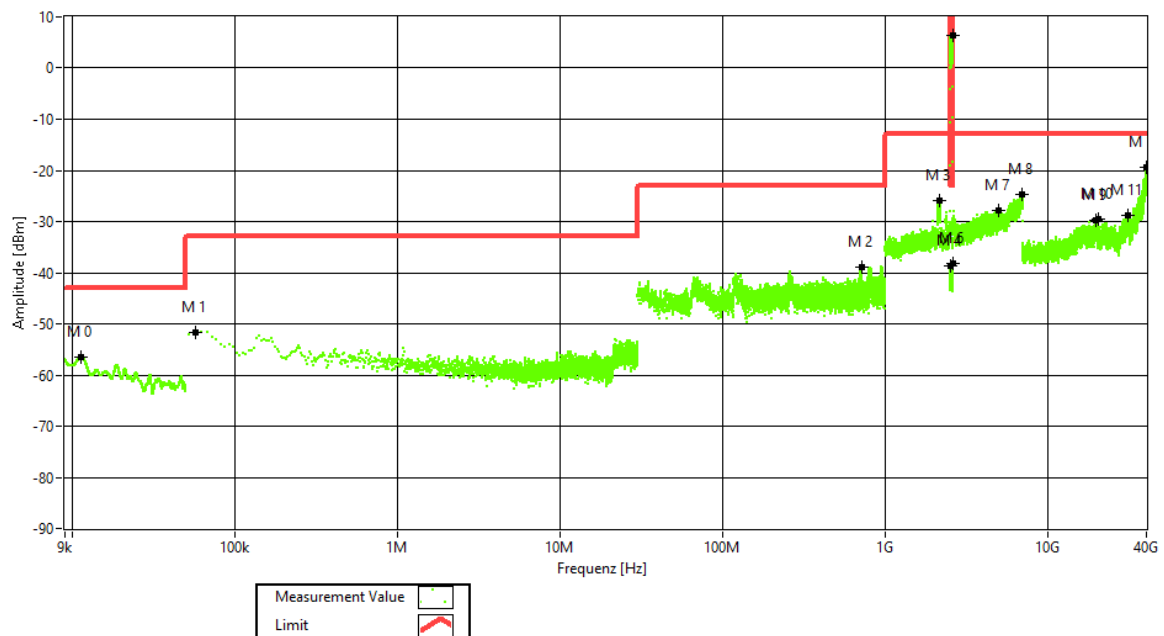
Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = high, Direction = RF downlink,  
Signal Type = AWGN



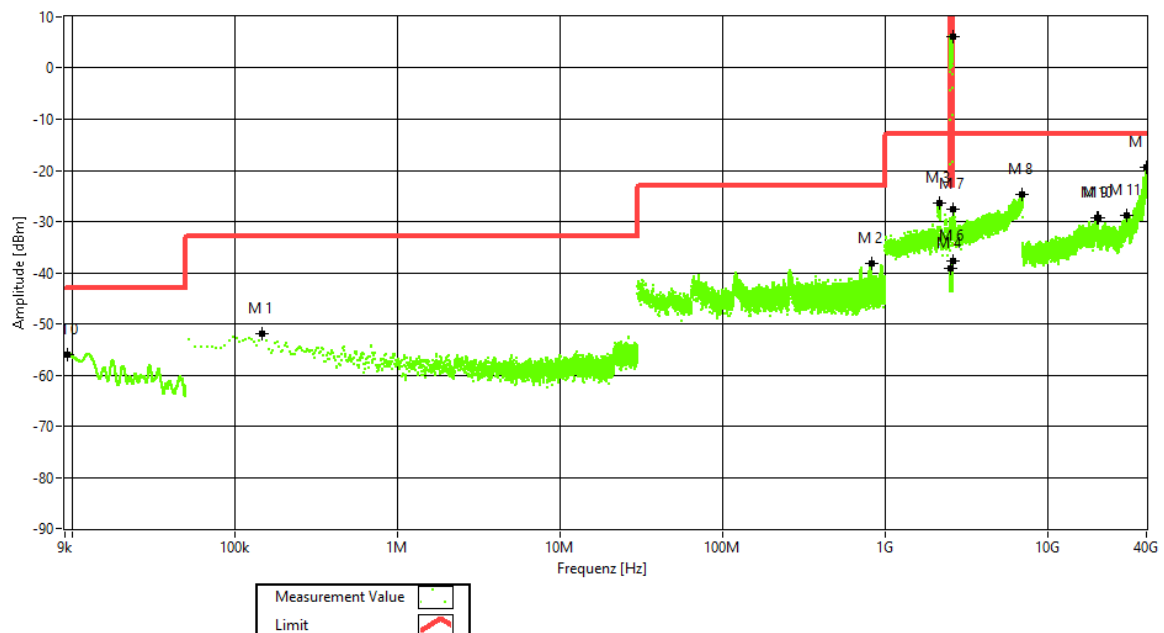
# EMC Test Report No.: 24-0007

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

Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = low, Direction = RF downlink,  
Signal Type = AWGN100



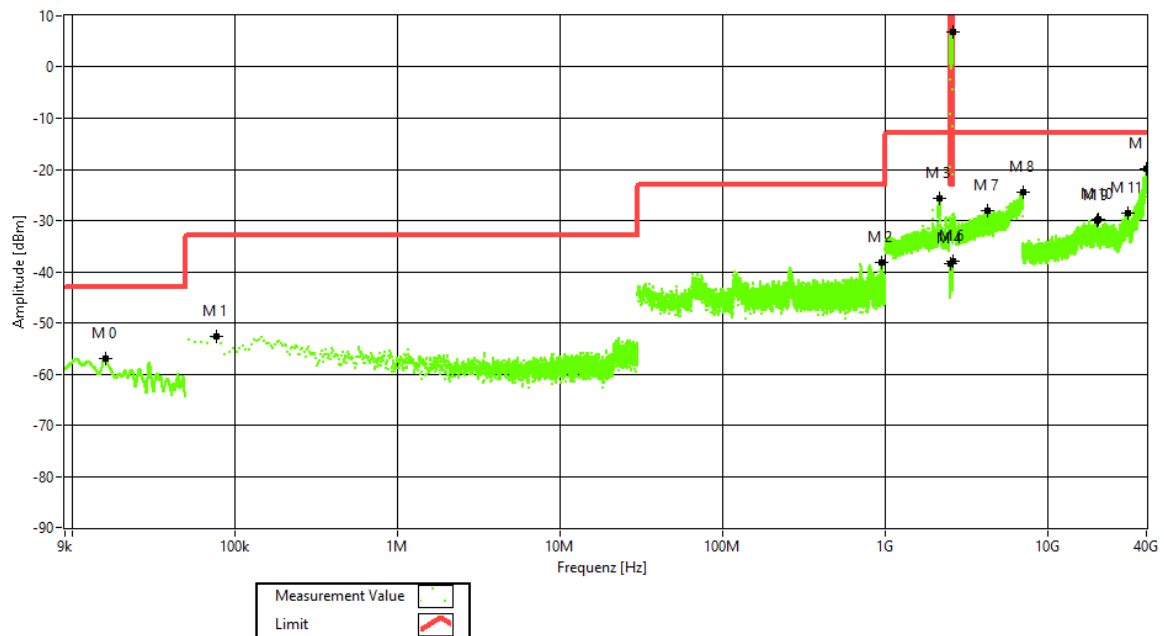
Frequency Band = Band 30 WCS 2300 (LBS), Test Frequency = mid, Direction = RF downlink,  
Signal Type = AWGN100



# 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 (LBS), Test Frequency = high, Direction = RF downlink,  
Signal Type = AWGN100



**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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#### 4.4.5 TEST EQUIPMENT USED

- Conducted

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

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

## 4.5 OUT-OF-BAND EMISSION LIMITS

Standard FCC Part § 2.1051, § 27.53

**The test was performed according to:**

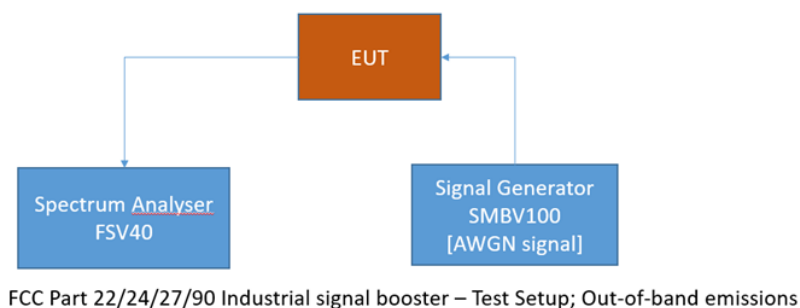
ANSI C63.26, KDB 935210 D05 v01r04: 3.6

**Test date:** 2023-12-20**Environmental conditions:** 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.**Test engineer:** Thomas Hufnagel

### 4.5.1 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.



## 4.5.2 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.



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

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

(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.

### 4.5.3 TEST PROTOCOL

<b>Band 30 WCS 2300, downlink, Number of input signals = 1</b>							
<b>Signal Type</b>	<b>Input Power</b>	<b>Band Edge</b>	<b>Signal Frequency [MHz]</b>	<b>Input Power [dBm]</b>	<b>Maximum Out-of-band Power [dBm]</b>	<b>Limit Out-of-band Power [dBm]</b>	<b>Margin to Limit [dB]</b>
Wideband	-0.3 dB < AGC	upper	2357.50	-4.3	-37.5	-23.0	14.5
Wideband	3 dB > AGC	upper	2357.50	-1.0	-37.9	-23.0	14.9
Wideband 5G	-0.3 dB < AGC	upper	2355.00	-4.6	-35.4	-23.0	12.4
Wideband 5G	3 dB > AGC	upper	2355.00	-1.6	-36.0	-23.0	13.0
Narrowband	-0.3 dB < AGC	upper	2359.80	-4.3	-30.4	-23.0	7.4
Narrowband	3 dB > AGC	upper	2359.80	-1.0	-29.6	-23.0	6.6
Wideband	-0.3 dB < AGC	lower	2352.50	-4.1	-37.3	-23.0	14.3
Wideband	3 dB > AGC	lower	2352.50	-0.8	-37.5	-23.0	14.5
Wideband 5G	-0.3 dB < AGC	lower	2355.00	-4.4	-36.4	-23.0	13.4
Wideband 5G	3 dB > AGC	lower	2355.00	-1.4	-35.8	-23.0	12.8
Narrowband	-0.3 dB < AGC	lower	2350.20	-4.1	-31.4	-23.0	8.4
Narrowband	3 dB > AGC	lower	2350.20	-0.8	-30.3	-23.0	7.3

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]	Margin to Limit [dB]
Wideband	-0.3 dB < AGC	upper	2565.50	2563.00	-4.3	-39.6	-23.0	16.6
Wideband	3 dB > AGC	upper	2565.50	2563.00	-1.0	-39.7	-23.0	16.7
Narrowband	-0.3 dB < AGC	upper	2567.80	2567.60	-4.3	-31.1	-23.0	8.1
Narrowband	3 dB > AGC	upper	2567.80	2567.60	-1.0	-33.0	-23.0	10.0
Wideband	-0.3 dB < AGC	lower	2498.50	2501.00	-4.3	-40.1	-23.0	17.1
Wideband	3 dB > AGC	lower	2498.50	2501.00	-1.0	-40.4	-23.0	17.4
Narrowband	-0.3 dB < AGC	lower	2496.20	2496.40	-4.3	-33.1	-23.0	10.1
Narrowband	3 dB > AGC	lower	2496.20	2406.40	-1.0	-33.7	-23.0	10.7

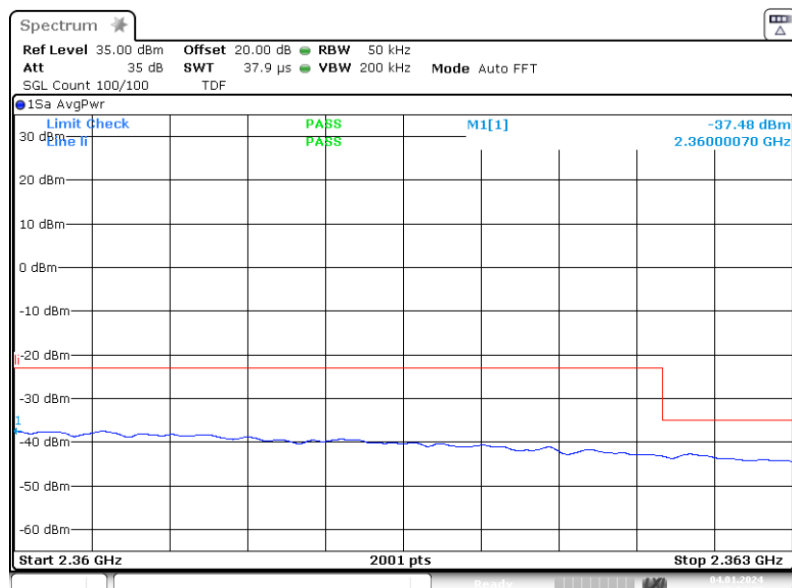
Remark: Please see next sub-clause for the measurement plot.

# EMC Test Report No.: 24-0007

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

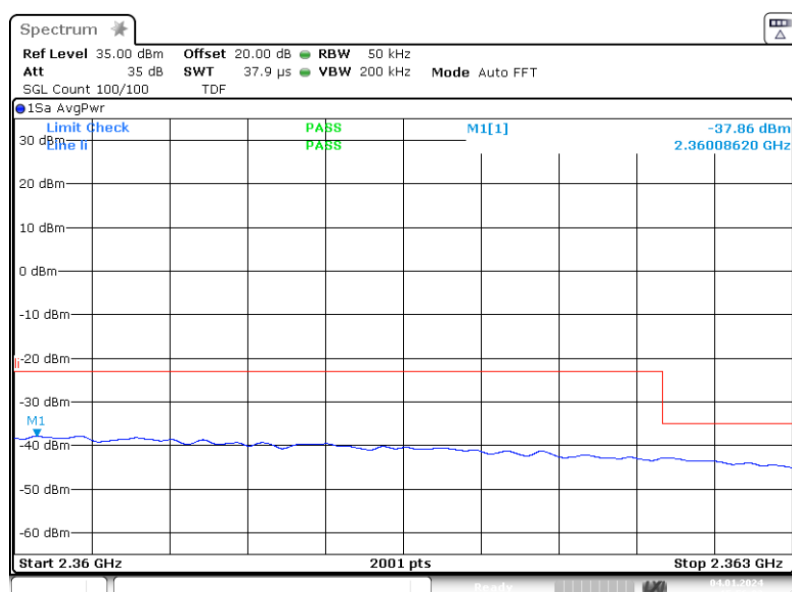
## 4.5.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

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



3.6.2 out of band emi WCS2300 AWGN upper 1carrier -0.3 dB 2.  
360G 2.363G

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



3.6.2 out of band emi WCS2300 AWGN upper 1carrier +3.0 dB 2.  
360G 2.363G

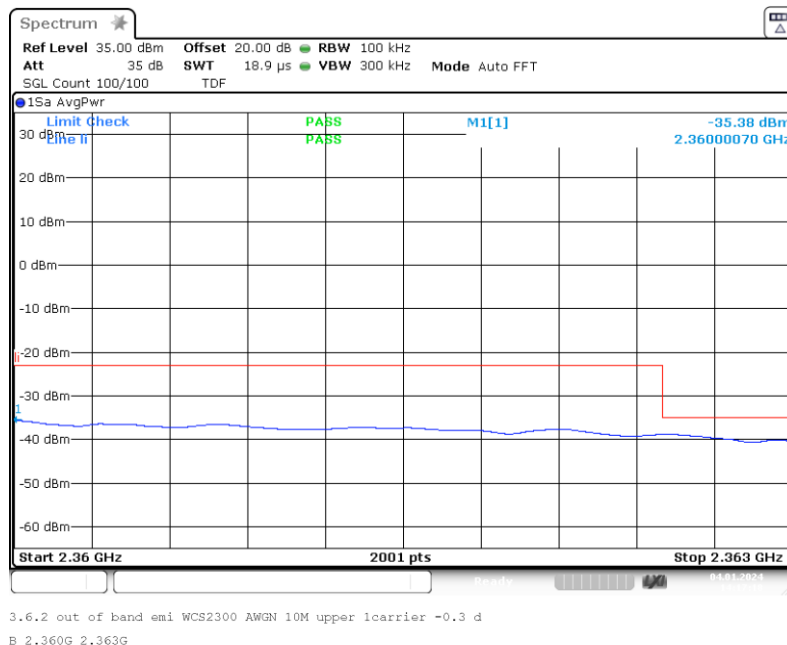


BUREAU  
VERITAS

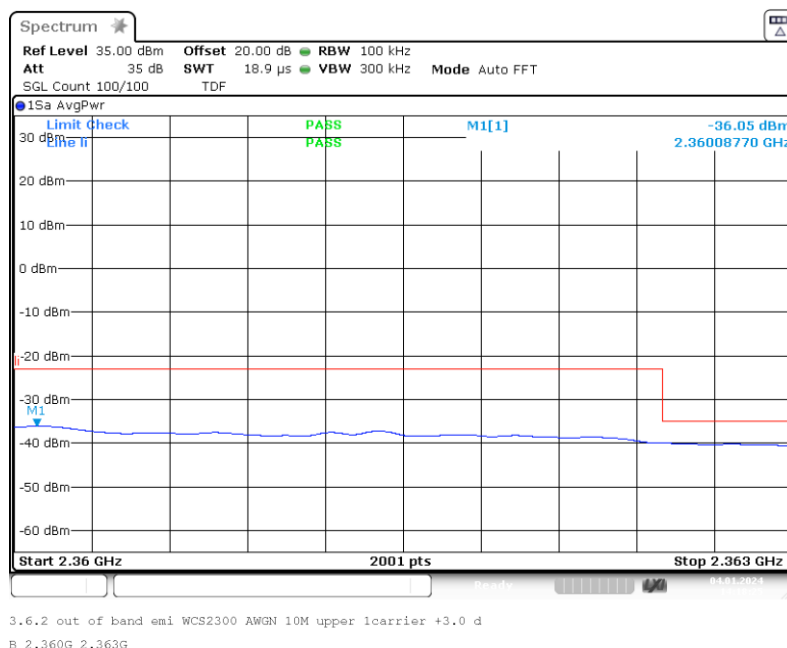
## EMC Test Report No.: 24-0007

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

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



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



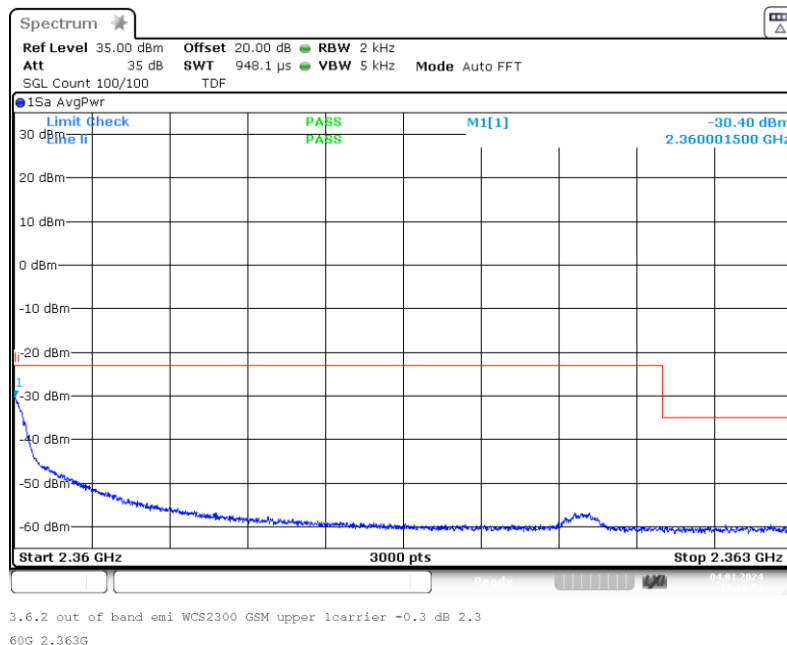


BUREAU  
VERITAS

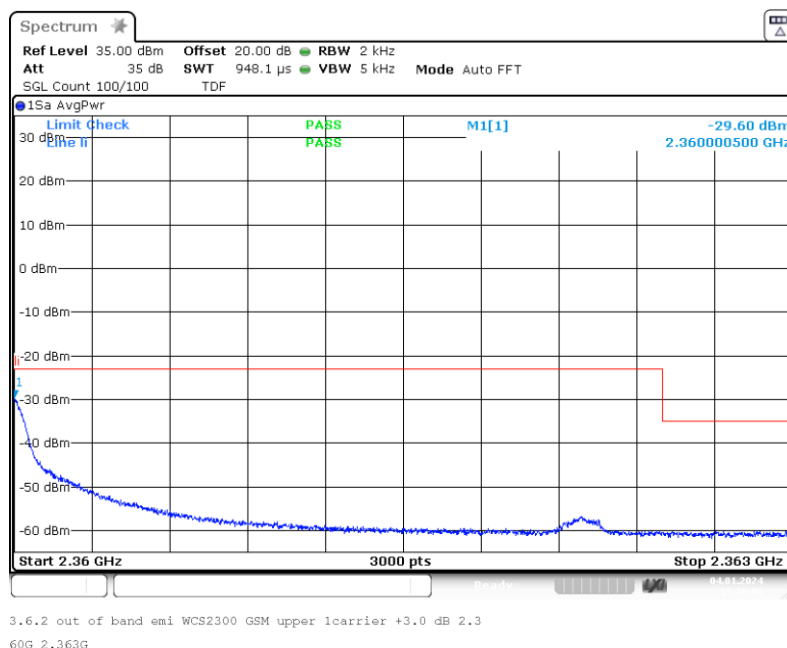
## EMC Test Report No.: 24-0007

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

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



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



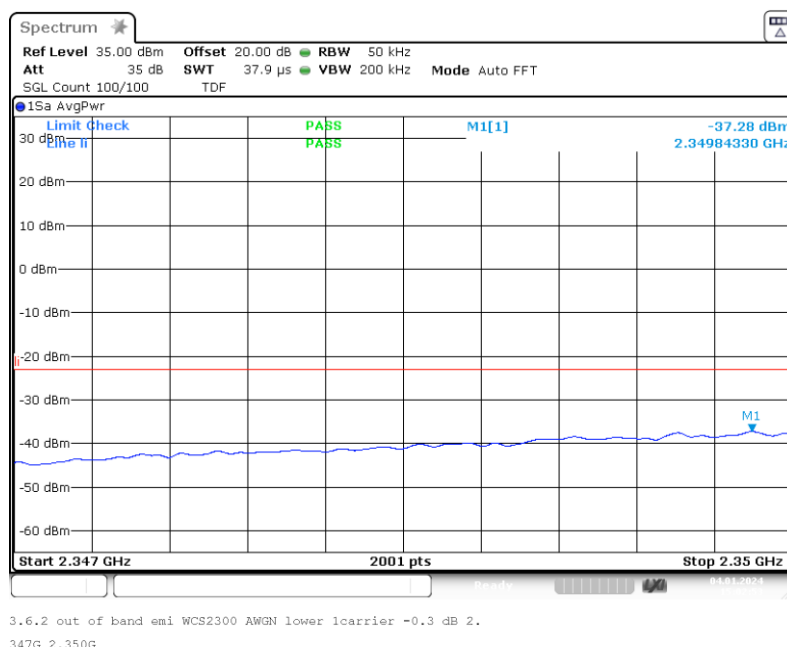


BUREAU  
VERITAS

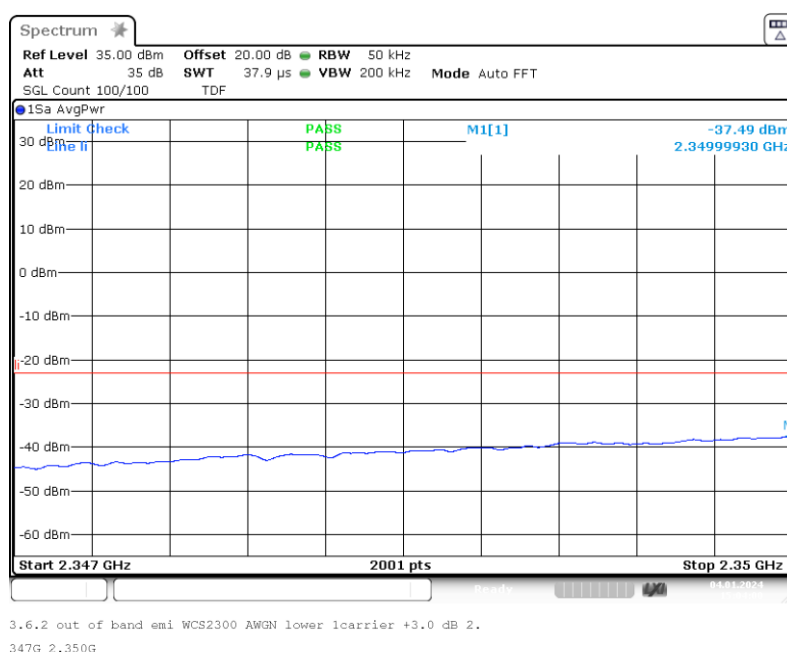
## EMC Test Report No.: 24-0007

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

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



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



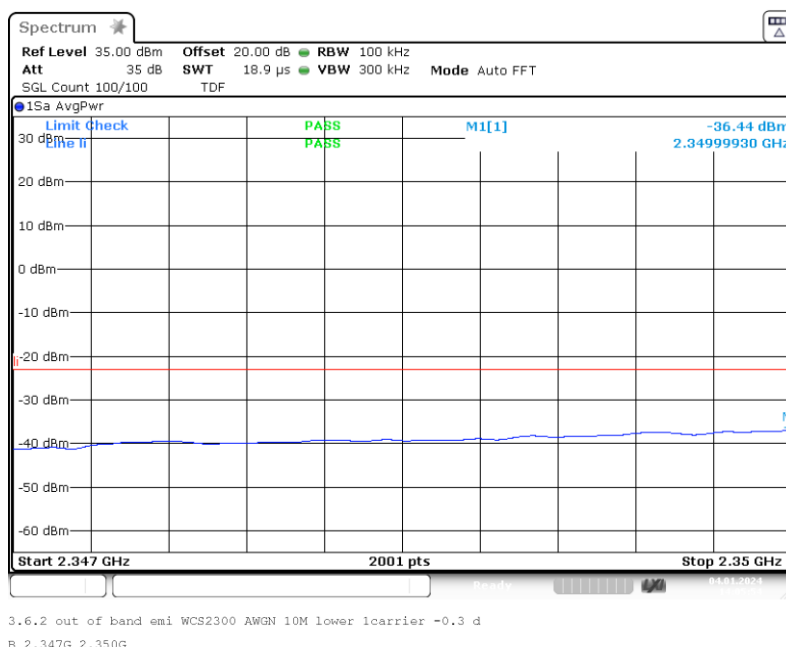


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VERITAS

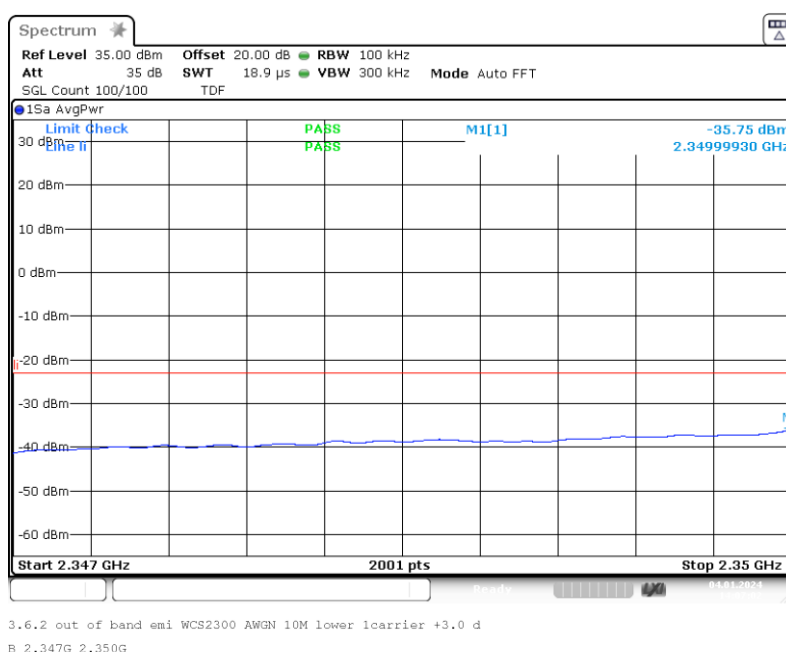
## EMC Test Report No.: 24-0007

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

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



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





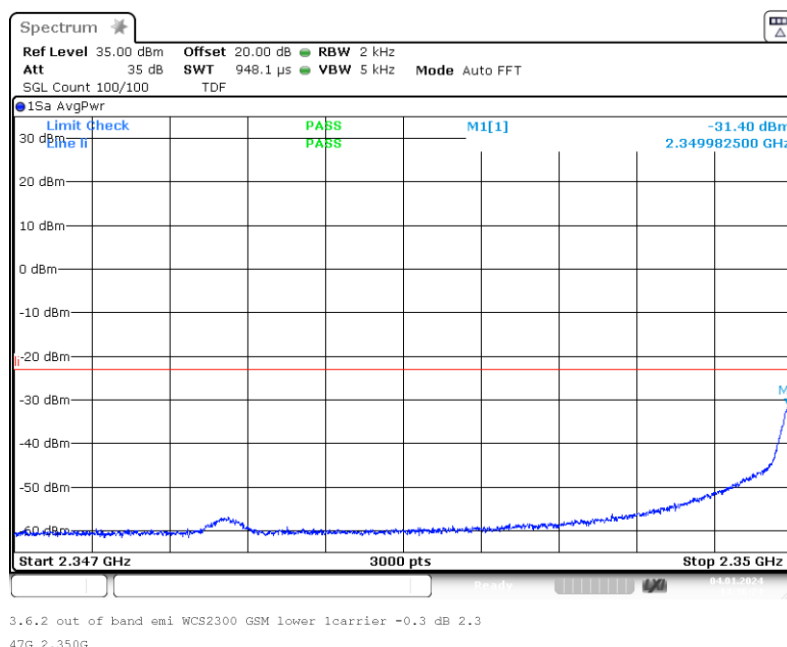


BUREAU  
VERITAS

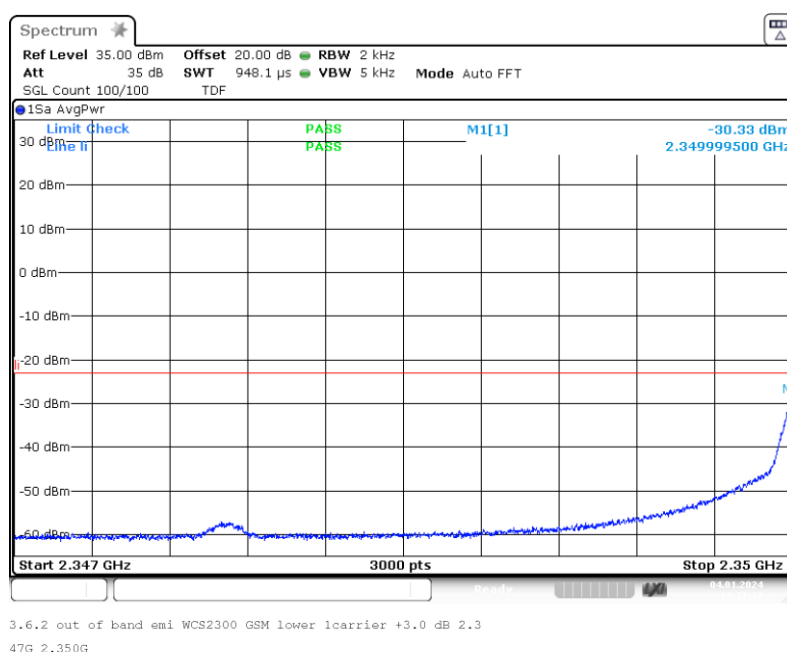
## EMC Test Report No.: 24-0007

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

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



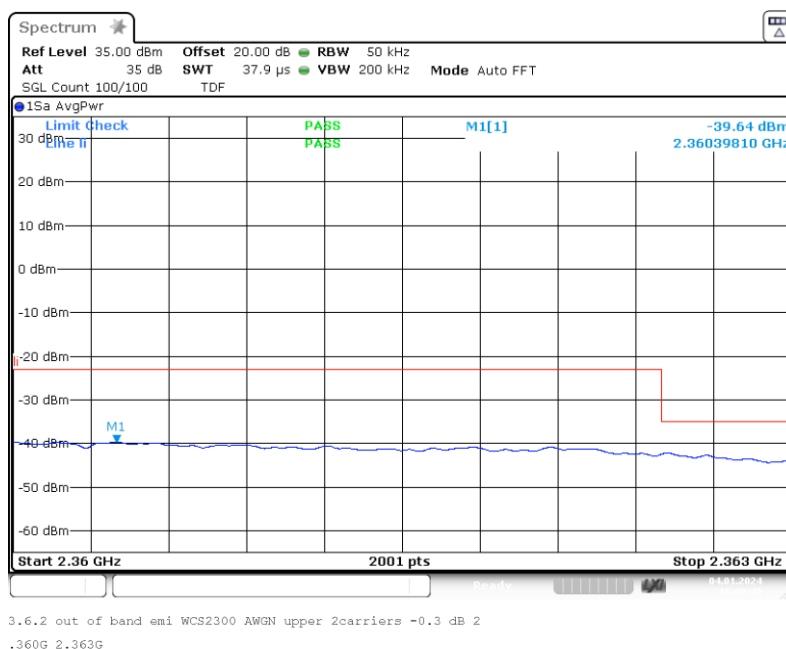


BUREAU  
VERITAS

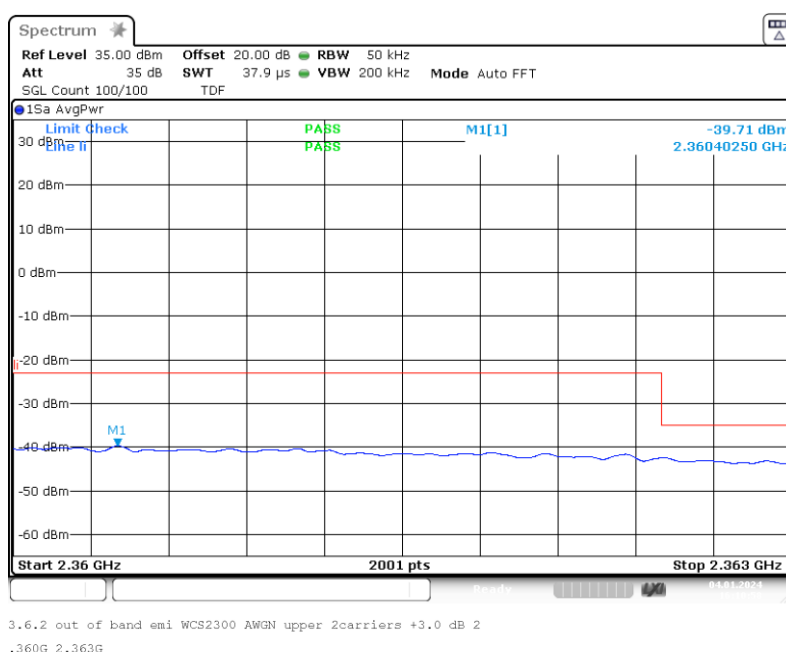
## EMC Test Report No.: 24-0007

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

Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: AWGN;  
Input Power = 0.3 dB < AGC; Number of signals 2



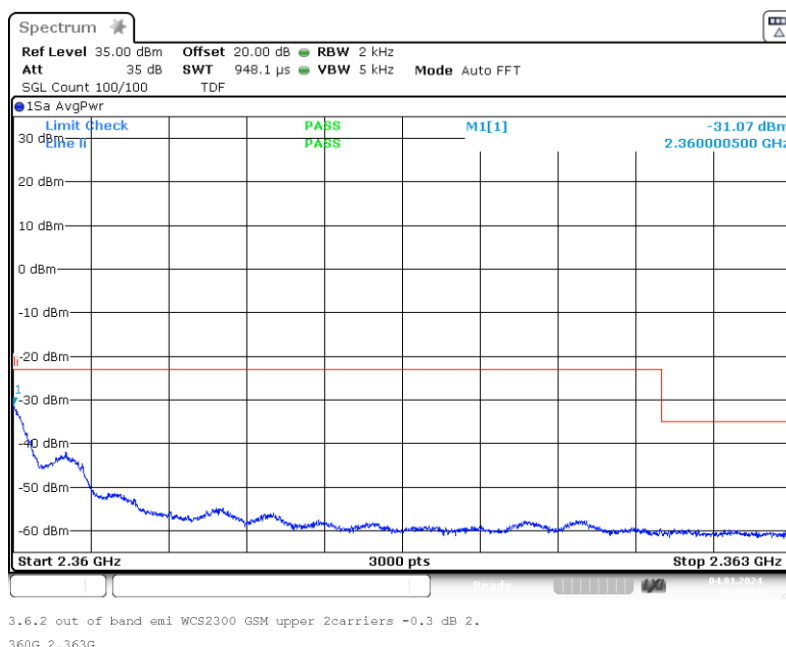
Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: AWGN;  
Input Power = 3 dB > AGC; Number of signals 2



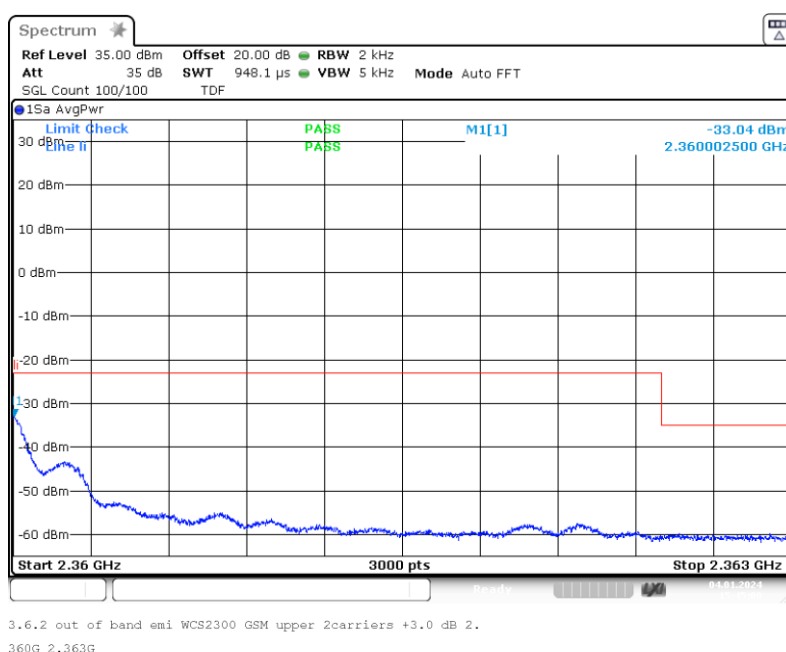
# EMC Test Report No.: 24-0007

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

Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: GSM;  
Input Power = 0.3 dB < AGC; Number of signals 2



Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: GSM;  
Input Power = 3 dB > AGC; Number of signals 2



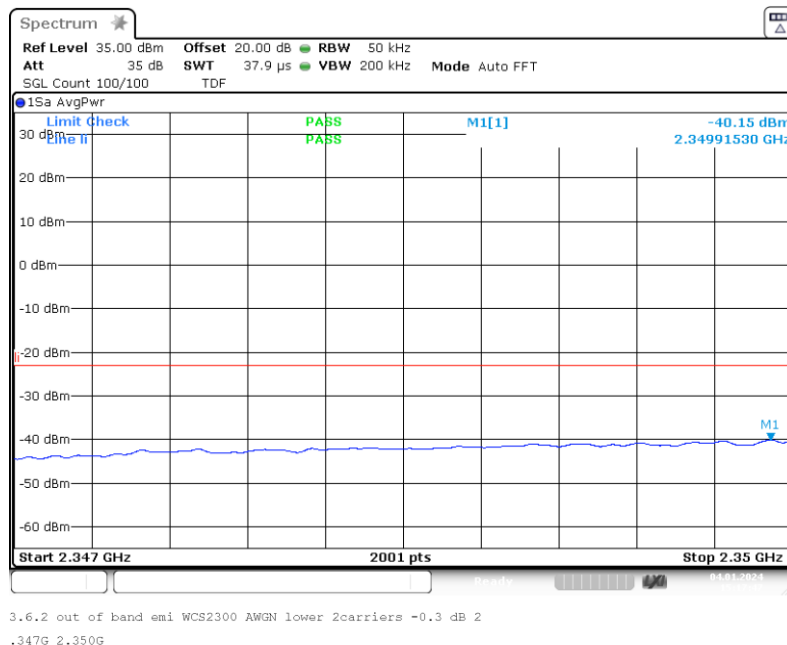


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VERITAS

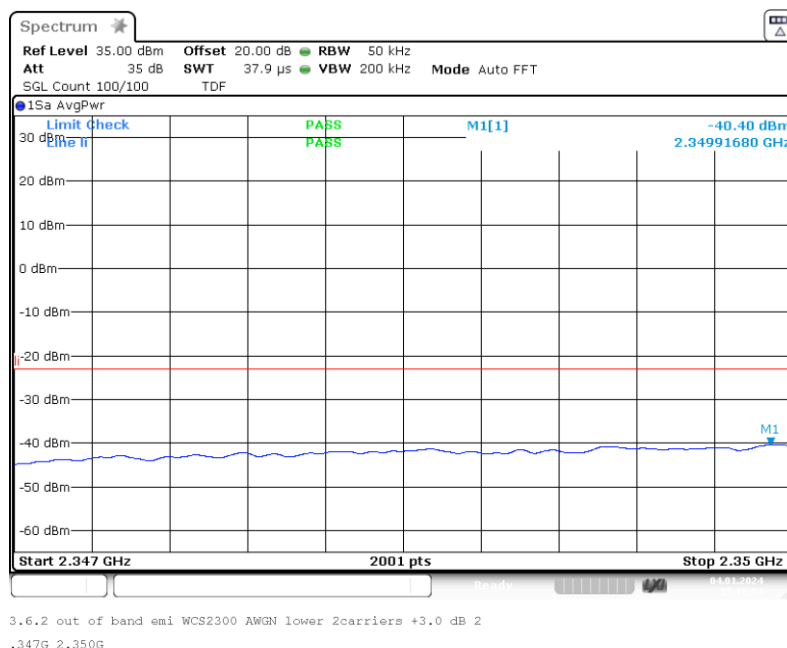
## EMC Test Report No.: 24-0007

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

Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: AWGN;  
Input Power = 0.3 dB < AGC; Number of signals 2



Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: AWGN;  
Input Power = 3 dB > AGC; Number of signals 2



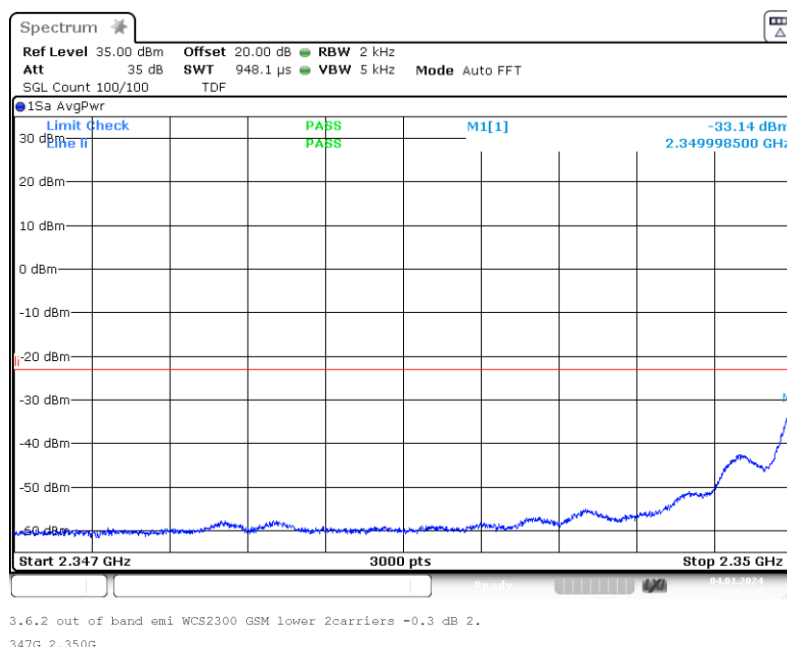


BUREAU  
VERITAS

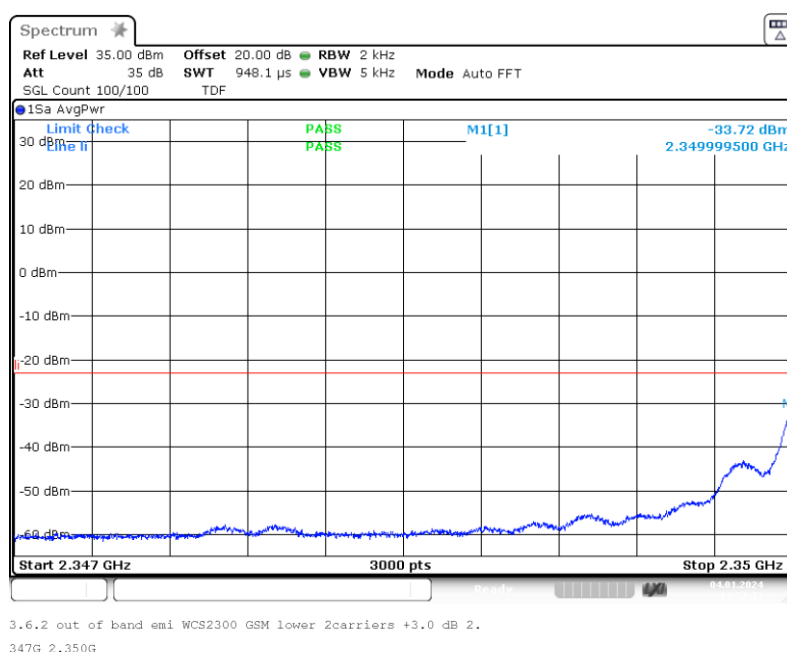
## EMC Test Report No.: 24-0007

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

Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: GSM;  
Input Power = 0.3 dB < AGC; Number of signals 2



Band: WCS 2300; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: GSM;  
Input Power = 3 dB > AGC; Number of signals 2



**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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#### 4.5.5 TEST EQUIPMENT USED

- Conducted

## 4.6 OUT-OF-BAND REJECTION

Standard KDB 935210 D05

**The test was performed according to:**

ANSI C63.26; KDB 935210 D05

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

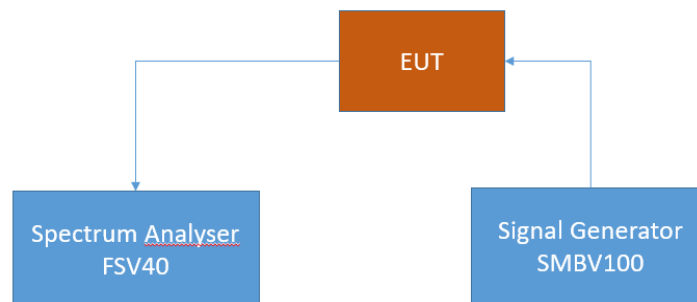
**Environmental conditions:** 23 °C ± 5 K; 40 % r. F. ± 20 % r. F.

**Test engineer:** Thomas Hufnagel

### 4.6.1 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:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; Out-of-band rejection

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

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

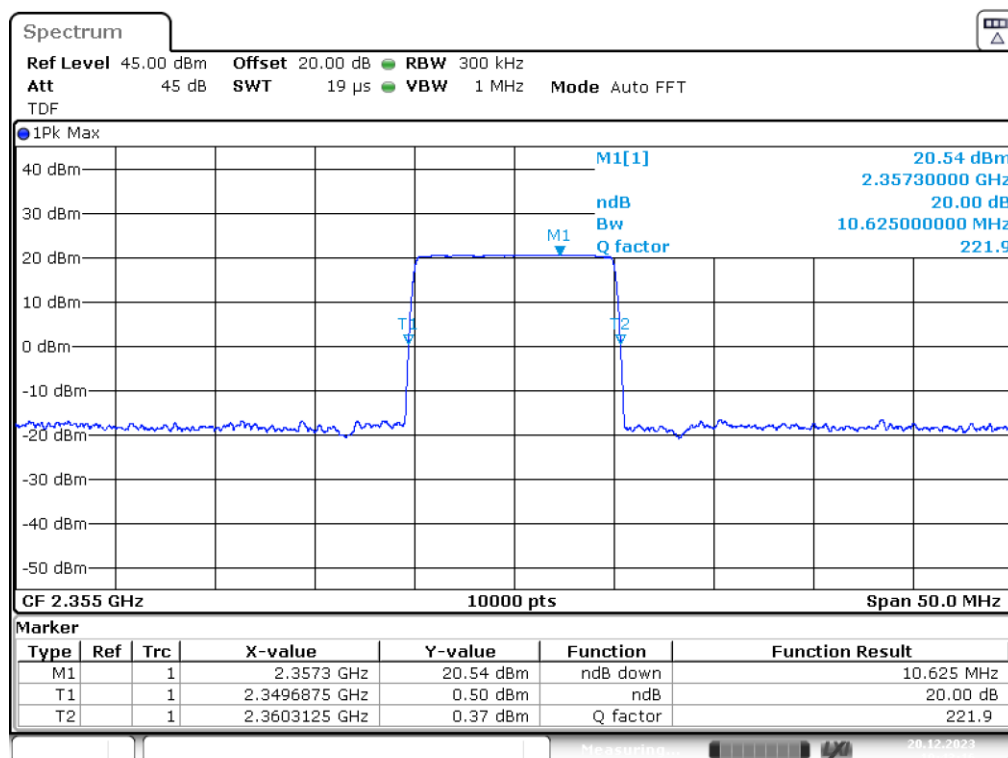
#### 4.6.2 TEST PROTOCOL

Band 30 WCS 2300, 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]
2357.30	20.54	2349.6875	2360.3125	10.625

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

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

Frequency Band = WCS 2300, Direction = RF downlink



3.3 Out of band rejection WCS2300 2.35500G  
\_20dB

#### 4.6.4 TEST EQUIPMENT USED

- Conducted





**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]

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### **4.7 FREQUENCY STABILITY**

The frequency stability test case was not carried out, as any frequency errors are eliminated by the given system architecture. This is achieved by generating the LOs in the head-end station and the LOs in the remote unit with a common reference clock. This reference clock is transmitted from the head-end station to the remote unit and regenerated there. This means that the same reference frequency is used for all signal conversions (up- and down-conversion as well as analog-to-digital and digital-to-analog conversion) and any frequency error in the reference clock is compensated therefore. This is already clear from the measurement markings for the occupied bandwidth (26 dB bandwidth). It can be seen that the DUT has no influence on the frequency (comparison between input and output signal). In addition, it is operationally necessary for the frequency deviation to be significantly smaller than the spectral distance between the transmission bandwidth edge and the channel bandwidth edge in order to meet the signal quality requirement (signal purity) and such ensure that the fundamental emissions remain within the authorized bands of operation.

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## 5 TEST EQUIPMENT

### 5.1 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-003139	2023-10	2024-10
1.2	SMBV100A	Vector Signal Generator 9 kHz - 6 GHz	Rohde & Schwarz	E-003206	2023-01	2025-01
1.3	n. a.	Switchbox for Wireless	Bureau Veritas	E-003951	2023-10	2024-10
1.4	LabView	Software	NI	Auto Messung 1 Channel V8	---	---

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**6 MEASUREMENT UNCERTAINTIES**

<b>KDB 935210 D05</b>	<b>ECL</b>
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	$2 \times 10^{-7}$

Reference :

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

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## 7 PHOTO REPORT

Please see separate photo report.



**BUREAU  
VERITAS**

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**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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**ANNEX B: ADDITIONAL INFORMATION PROVIDED BY CLIENT**

None.

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