



Test report 2024-0349-EMC-TR-24-0196-V02

Designation:	CAP H2 34T/37T F-AC-F1 [34T]
Manufacturer:	CommScope
Serial No(s):	BGH2AA2434005
ID No.	7857017-0001 Rev: 00
FCC ID	XS5-H23437
Test Specification(s):	ANSI 63.26:2015 FCC Rules and Regulations as listed in 47 CFR, Part 20 and Part 27:2024-10-28
Test Plan:	"BU-PC-2336-10 FCC CAP H2 34T37T" from customer.
Test Result:	Passed

Date of issue:	2025-02-25		Signature:
Version:	02	Technical Reviewer:	 Digitally signed by Thomas Gerngroß DN: cn=Thomas Gerngroß, o=Bureau Veritas CPS Germany GmbH, ou=ECL, email=thomas.gerngross@bureauveritas.com, c=DE Date: 2025.02.25 08:11:24 +01'00'
Date of delivery:	2024-10-28		
Performance date:	2024-12-02 – 2024-12-11	Report Reviewer:	 Digitally signed by Thomas Hufnagel Date: 2025.02.25 08:14:17 +01'00'



BNetzA-CAB-19/21-20



Deutsche
Akkreditierungsstelle
D-PL-12024-06-00

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EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Client:

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Andrew Wireless System GmbH
Industriering 10
86675 Buchdorf
Germany

Test laboratory:

Bureau Veritas Consumer Products Services Germany GmbH
Thurn-und-Taxis-Straße 18
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Test location:

Bureau Veritas Consumer Products Services Germany GmbH
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Laboratory accreditation no: DAKS D-PL-12024-06-04

BNETZA-CAB-19/21-20

FCC Designation Number: DE0023

FCC Test Firm Registration: 366481

Versions management:

V 01.00

Initial release

V 02.00

Supplement of used antenna ports at measurements and editorial changes.

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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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, 20 and 27, (10/28/2024 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 20, Commercial Mobiles Services

§ 20.21 Signal Boosters

Part 27; Miscellaneous Wireless Communications Services

Subpart C – Technical standards

§ 27.50 – Power and duty cycle limits

§ 27.53 – Emission limits

The tests were selected and performed with reference to:

- FCC Public Notice 935210 applying "Signal Boosters Basic Certification Requirements" 935210 D02, 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.
- ANSI C63.26: 2015

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RPRT-0024-NU-V04 / TEMP-0059-NU-EAW-V02



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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

1.2 FCC REFERENCE TABLE

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

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1.3 MEASUREMENT SUMMARY

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

§ 27.50

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

OP-Mode

Frequency Band, Direction, Input Power, Signal Type

34T, RF downlink, 0.3 dB < AGC, Wideband

34T, RF downlink, 3 dB > AGC, Wideband

34T, RF downlink, 0.3 dB < AGC, Wideband 5G

34T, RF downlink, 3 dB > AGC, Wideband 5G

FCC

Passed

Passed

Passed

Passed

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

§ 27.50

Peak to Average Ratio

The measurement was performed according to ANSI C63.26

Final Result

OP-Mode

Frequency Band, Direction, Input Power, Signal Type

34T, RF downlink, 0.3 dB < AGC, Wideband

34T, RF downlink, 3 dB > AGC, Wideband

34T, RF downlink, 0.3 dB < AGC, Wideband 5G

34T, RF downlink, 3 dB > AGC, Wideband 5G

FCC

Passed

Passed

Passed

Passed

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

§ 2.1049

Occupied Bandwidth/Input-versus-output Spectrum

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

Final Result

OP-Mode

Frequency Band, Direction, Input Power, Signal Type

34T, RF downlink, 0.3 dB < AGC, Wideband

34T, RF downlink, 3 dB > AGC, Wideband

34T, RF downlink, 0.3 dB < AGC, Wideband 5G

34T, RF downlink, 3 dB > AGC, Wideband 5G

FCC

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

FCC

Frequency Band, Direction, Signal Type

34T, RF downlink, lower, Wideband

Passed

34T, RF downlink, mid, Wideband

Passed

34T, RF downlink, upper, Wideband

Passed

34T, RF downlink, mid, Wideband 5G

Passed

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

Final Result

OP-Mode

FCC

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

Upper, 34T, 1, RF downlink, 0.3 dB < AGC, Wideband

Passed

Upper, 34T, 1, RF downlink, 3 dB > AGC, Wideband

Passed

Upper, 34T, 1, RF downlink, 0.3 dB < AGC, Wideband 5G

Passed

Upper, 34T, 1, RF downlink, 3 dB > AGC, Wideband 5G

Passed

Lower, 34T, 1, RF downlink, 0.3 dB < AGC, Wideband

Passed

Lower, 34T, 1, RF downlink, 3 dB > AGC, Wideband

Passed

Lower, 34T, 1, RF downlink, 0.3 dB < AGC, Wideband 5G

Passed

Lower, 34T, 1, RF downlink, 3 dB > AGC, Wideband 5G

Passed

Upper, 34T, 2, RF downlink, 0.3 dB < AGC, Wideband

Passed

Upper, 34T, 2, RF downlink, 3 dB > AGC, Wideband

Passed

Lower, 34T, 2, RF downlink, 0.3 dB < AGC, Wideband

Passed

Lower, 34T, 2, RF downlink, 3 dB > AGC, Wideband

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

34T, RF downlink

FCC

Passed

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

§ 2.1053, § 27.53

Field strength of spurious radiation

The measurement was performed according to ANSI C63.26

Final Result

OP-Mode

Frequency Band, Test Frequency, Direction

34T, RF downlink

FCC

Passed

The test case frequency stability was not performed, since the EUT is not equipped with signal processing that influences the output signal frequency/frequencies (see as well chapter 5.7).



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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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:

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RPRT-0024-NU-V04 / TEMP-0059-NU-EAW-V02

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

3 TEST OBJECT DATA**3.1 GENERAL EUT DESCRIPTION**

Kind of Device product description	Cellular Repeater
Product name	Cellular Repeater
Type	CAP H2 34T/37T F-AC-F1
Declared EUT data by the supplier	
General Product Description	The EUT is an industrial signal booster supporting the following: Band 34T: 3450 MHz - 3550 MHz Band 37T from 3700 MHz – 3980 MHz with the segments: Segment 1: 3700 MHz - 3800 MHz Segment 2: 3790 MHz - 3890 MHz Segment 3: 3880 MHz – 3980 MHz A RF operation is only supported for the downlink.
Booster Type	Industrial Signal Booster
Voltage Type	AC
Voltage Level	100 V to 240 V
Maximum Output Donor Port [Uplink]	-
Maximum Output Server Port [Downlink]	43 dBm in all bands
Maximum Gain [Uplink]	-
Maximum Gain [Downlink]	48 dB in all bands

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

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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

3.2 EUT MAIN COMPONENTS

Sample Parameter	Value
Serial Number	BGH2AA2434005
HW Version	7857017-0001 Rev: 00
SW Version	1.10.0.180007
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
-	-	-

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

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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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	GE Energy, SP800, 14CS12226993	Power supply rack
AUX2	GE Power Electronic Inc., CAR1212FPBC-Z, n. a.	Power plug-in module
AUX3	CommScope, ION-E WCS-2, SZAEJAJ1719A0003	Module rack
AUX4	CommScope, ION-E OPT, MA43	Optical plug-in module
AUX5	Commcope, 7680813,STPAP311A1802788	Optical plug in probe
AUX6	Commcope, 7680813,STPAP31184707735	Optical plug in probe
AUX8	CommScope, ION-E SUI, SZBEAC1934A0018	Interface card plug-in module
AUX8	CommScope, RFD HB, SZBEAQ2140A0014	RF card plug-in module
AUX9	CommScope, RFD HB, SZBEAQ3324A0084	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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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

3.6 OPERATING MODES

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

3.6.1 TEST CHANNELS

Band name	Direction	Lower Frequency Band Edge [MHz]	Upper Frequency Band Edge [MHz]	Center Frequency [MHz]	Port
34T	Downlink	3450.00	3550.00	3500.00	Donor

3.6.2 DEFINITION OF USED FREQUENCY BANDS

Wideband: representation by an AWGN signal with 4.1 MHz

Wideband 5G: representation by an AWGN signal with 98.3 MHz

3.6.3 USED ANTENNA PORTS FOR TESTS

At all test except MIMO tests antenna port 1 was used. At MIMO test antenna ports 1 and 2 were used.



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3.6.4 AUTOMATIC GAIN CONTROL LEVELS

AGC Levels							
Segment of the Band	Direction	Signal Type	AGC Start Pin [dBm]	AGC Start Pin -0.3 dB [dBm]	AGC Start Pin +3 dB [dBm]	Frequency [MHz]	Frequency
34T	downlink	Wideband	-2.6	-2.9	-0.6	3500.00	Mid
34T	downlink	Wideband 5G	-3.8	-4.0	-1.0	3500.00	
34T	downlink	Wideband	-3.0	-3.3	0.0	3452.50	Low
34T	downlink	Wideband	-3.4	-3.7	-0.4	3547.50	High
34T	downlink	Wideband	-3.80	-4.1	-0.7	3547.00	Max.Power
34T	downlink	Wideband 5G	-2.80	-3.1	0.1	3500.00	

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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.

4.3 MEASUREMENT UNCERTAINTY

The table below shows the measurement uncertainties for each measurement method. The expanded uncertainty was calculated with worst case values over the complete frequency area.

Measurement method	Parameter	Description	Exp. Uncertainty (k=2)
Radiated emissions – ALSE method (CISPR 25)	9 kHz – 30 MHz	Fully/Semi anechoic chamber	1.8 dB
	30 MHz – 1 GHz		1.8 dB
	1 GHz – 6 GHz		3.1 dB
Conducted emissions - Voltage method (CISPR 25)	150 kHz - 108 MHz	Fully/Semi anechoic chamber	1.1 dB
Conducted emissions – Current probe method (CISPR 25)	150 kHz – 245 MHz	Fully/Semi anechoic chamber	2.2 dB
Radiated emissions – Stripline method (CISPR 25)	100 kHz – 1 GHz	Fully/Semi anechoic chamber	1.5 dB
Radiated emissions – Capacitive voltage measurement method (OEM)	100 kHz – 30 MHz	Fully/Semi anechoic chamber	1 dB
Radiated emissions – Isotrope Magnetfeldspule 100 cm ² method (OEM)	1 Hz – 400 kHz	Fully/Semi anechoic chamber	5.1 dB
Radiated emissions – Magnetfeldspule 60 cm method (OEM)	9 kHz – 30 MHz	Fully/Semi anechoic chamber	1 dB
Radiated emissions – Magnetfeldspule 12 cm method (OEM)	20 Hz – 200 kHz	Fully/Semi anechoic chamber	1.5 dB
Electrical transient conduction along supply lines only (ISO 7637-2)	Voltage	EMI	4.3 dB
	Time		0,26 %

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5 TEST RESULTS

5.1 EFFECTIVE RADIATED POWER, MEAN OUTPUT POWER AND ZONE ENHANCE GAIN

Standard FCC Part 27, §27.50

The test was performed according to:

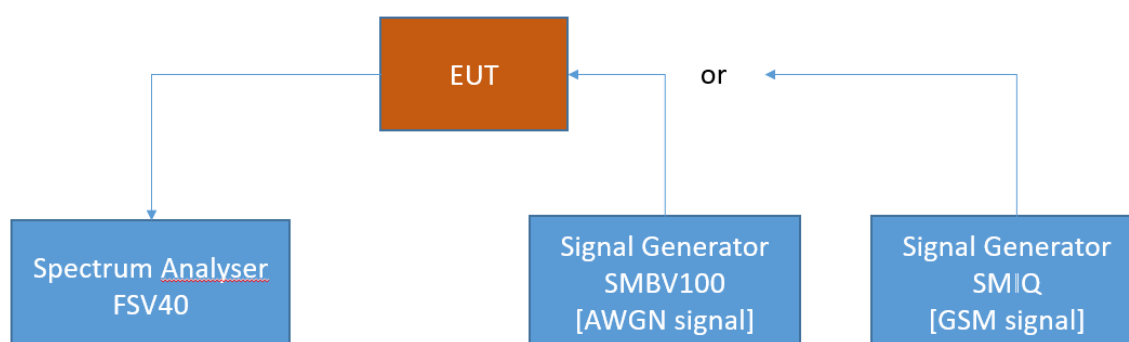
ANSI C63.26, KDB 935210 D05 v01r04: 3.5

Test date: 2024-12-02**Environmental conditions:** 25.4 °C; 20 % r. F..**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:



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.

5.1.2 TEST REQUIREMENTS/LIMITS

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50

- (k) The following power requirements apply to stations transmitting in the 3450-3550 MHz band:
- (1) The power of each fixed or base station transmitting in the 3450-3550 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.
 - (2) The power of each fixed or base station transmitting in the 3450-3550 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.
 - (3) Mobile and portable stations are limited to 1 Watt EIRP. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.
 - (4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
 - (5) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, and any other relevant factors, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

5.1.3 TEST PROTOCOL

Band, 34T, downlink							
Signal Type	Input Power	Frequency [MHz]	Input Power [dBm]	Maximum Average Output Power [dBm]	Limit Average Output Power [dBm]	Margin to Limit [dB]	Gain [dB]
Wideband	0.3 dB < AGC	3547.00	-4.1	43.3	62.1	18.8	47.4
Wideband	3 dB > AGC	3547.00	-0.7	43.3	62.1	18.8	44.0
Wideband 5G	0.3 dB < AGC	3500.00	-3.1	43.1	62.1	19.0	46.3
Wideband 5G	3 dB > AGC	3500.00	0.1	43.1	62.1	19.0	42.9

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

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

The highest power level in the tables above is

$p_{\text{highest}} = 43.3 \text{ dBm}$ at the channel which has the most output power of all channels.

Hereby at an antenna gain of $G_{\text{dB}} = 13 \text{ dBi}$ 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:

$$p_{\text{EIRP 1CH}} = 43.3 \text{ dBm} + 13 \text{ dB} = 56.3 \text{ dBm}$$

The equivalent power P is according the given formula:

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

$$P_{\text{EIRP 1CH}} [W] = 10 \exp \left(\frac{p_{\text{EIRP 1CH}} [\text{dBm}] - 30}{10} \right) \cdot 0.001 [W]$$

This results in:

$$P_{\text{EIRP 1CH}} [W] = 10 \exp \left(\frac{56.3 [\text{dBm}] - 30}{10} \right) \cdot 0.001 [W] = 427 \text{ W}$$

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

$$p_{\text{EIRP 2CH}} = 2 * p_{\text{EIRP 1CH}}$$

This results in:

$$p_{\text{EIRP 2CH}} = 2 * 427 \text{ W} = 854 \text{ W}$$

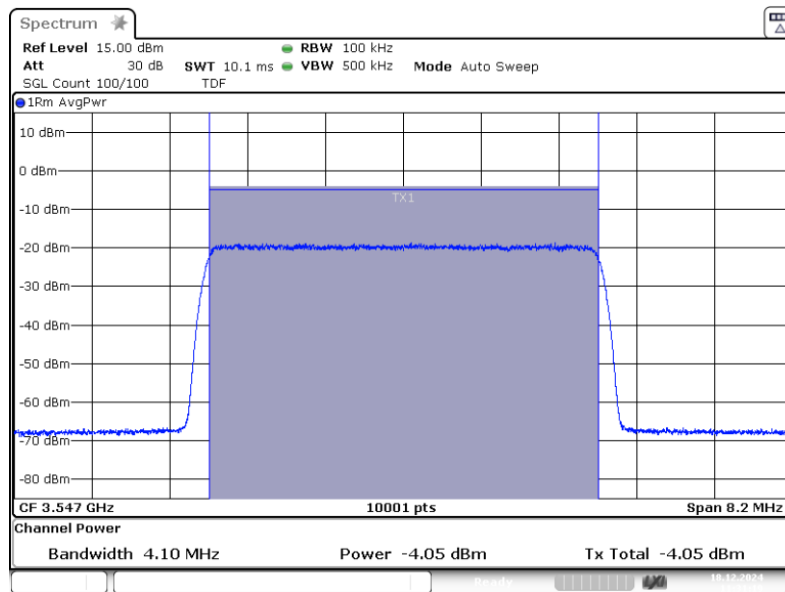
Final result of this consideration:

$p_{\text{EIRP 2CH}} = 854 \text{ W} < 1640 \text{ W}$, hereby 1640 W is the highest allowed limit in this band which equates 62.1 dBm.

The DUT doesn't exceed the limit.

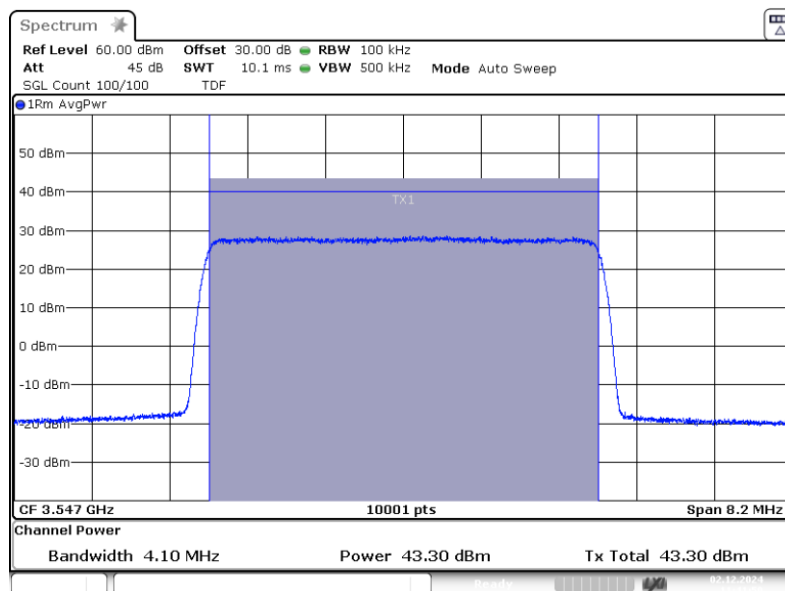
5.1.4 MEASUREMENT PLOTS

Band: 34T; Frequency: 3.5470 GHz; Band Edge: f0; Mod: AWGN; Input Power 0.3 dB < AGC



3.5.3 Power AWGN In-0.3 3.54700G

Band: 34T; Frequency: 3.5470 GHz; Band Edge: f0; Mod: AWGN; Output Power 0.3 dB < AGC



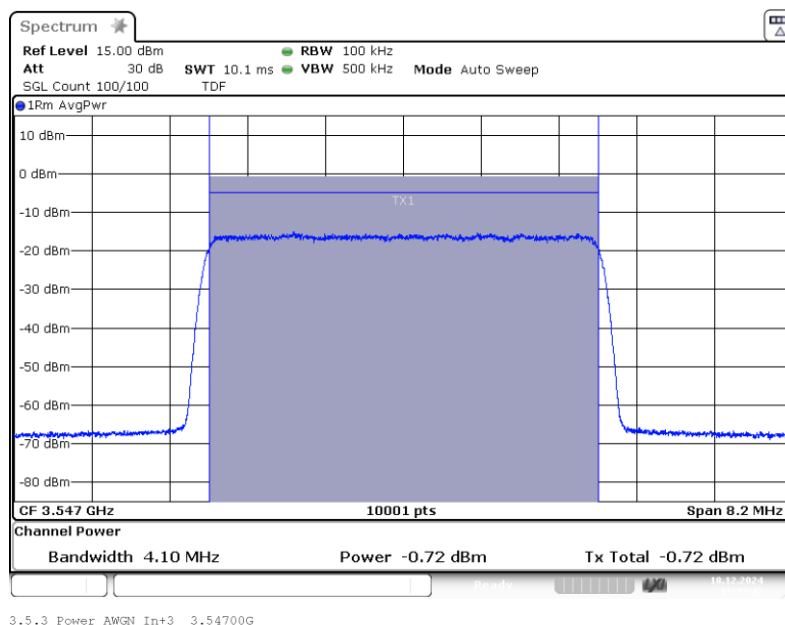
3.5.3 Power AWGN Out -0.3 3.54700G

The test results relate only to the tested item. The sample has been provided by the client.
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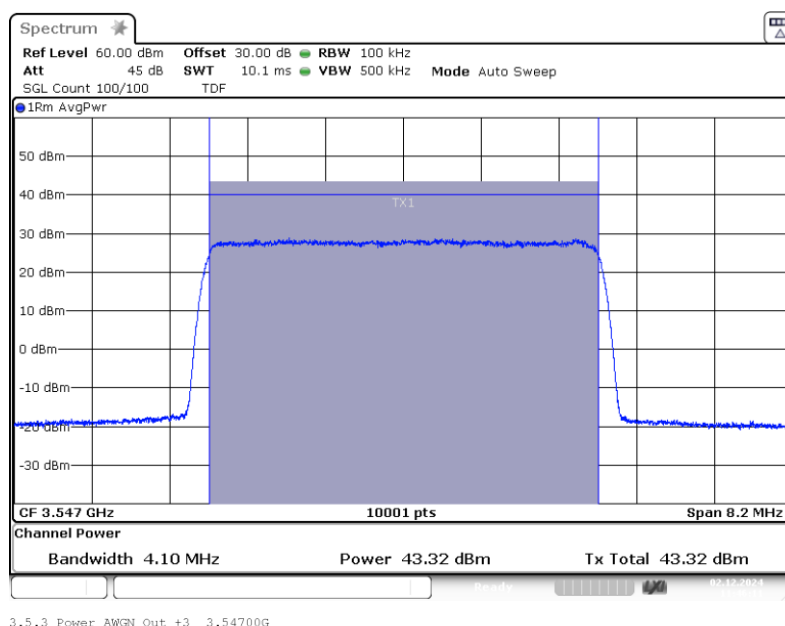
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.5470 GHz; Band Edge: f0; Mod: AWGN; Input Power 3 dB > AGC

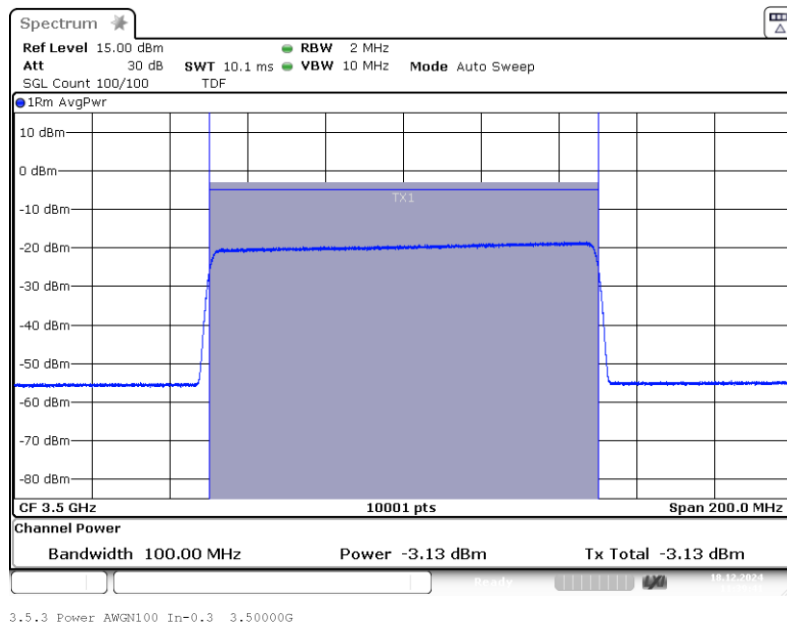


Band: 34T; Frequency: 3.5470 GHz; Band Edge: f0; Mod: AWGN; Output Power 3 dB > AGC

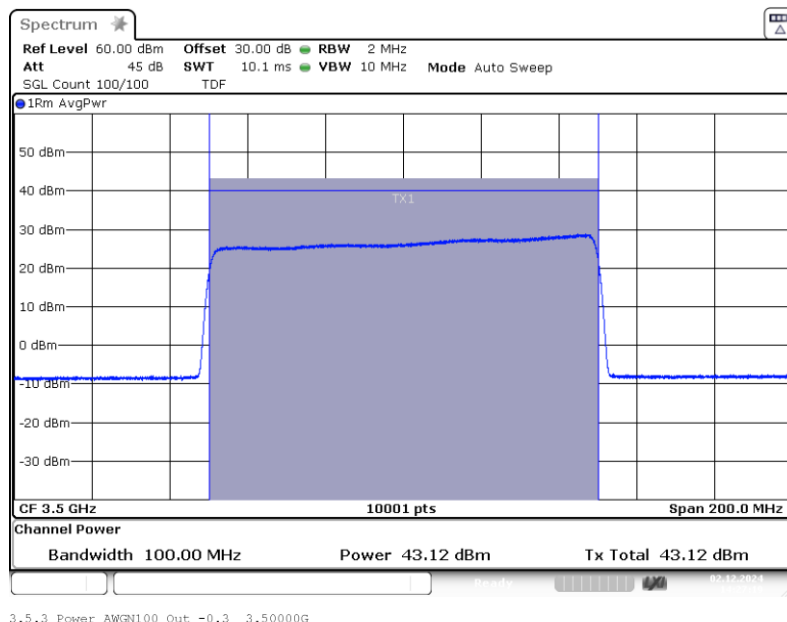


The test results relate only to the tested item. The sample has been provided by the client.
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Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
Input Power 0.3 dB < AGC

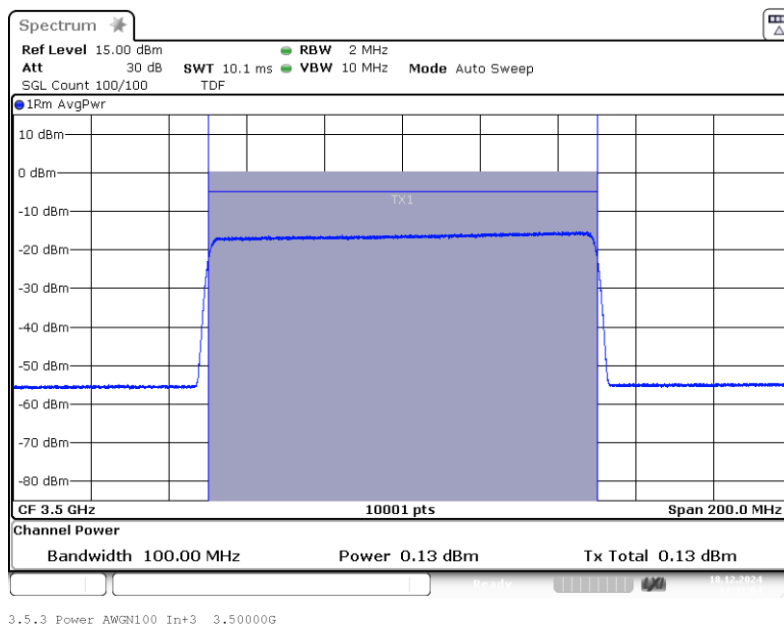


Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
Output Power 0.3 dB < AGC

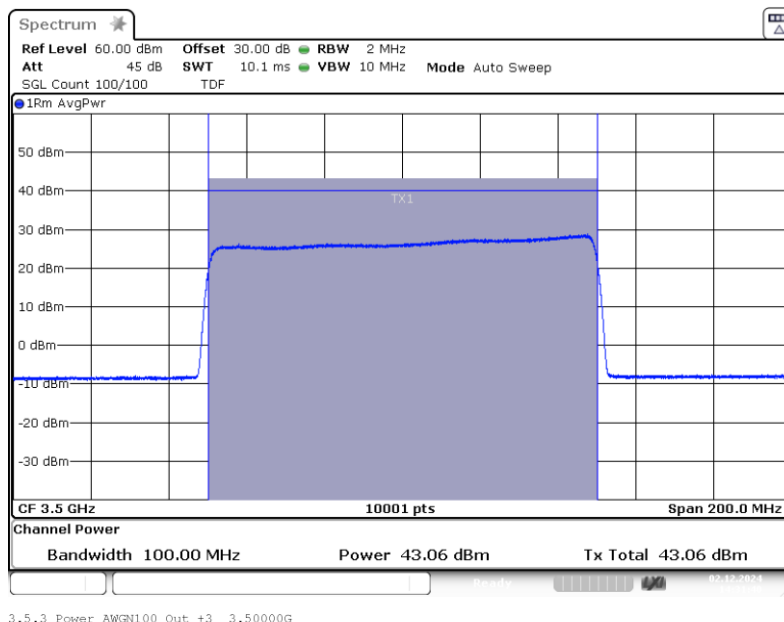


The test results relate only to the tested item. The sample has been provided by the client.
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Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
Input Power 3 dB > AGC



Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
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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EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.1.5 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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2024-0349-EMC-TR-24-0196-V02

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

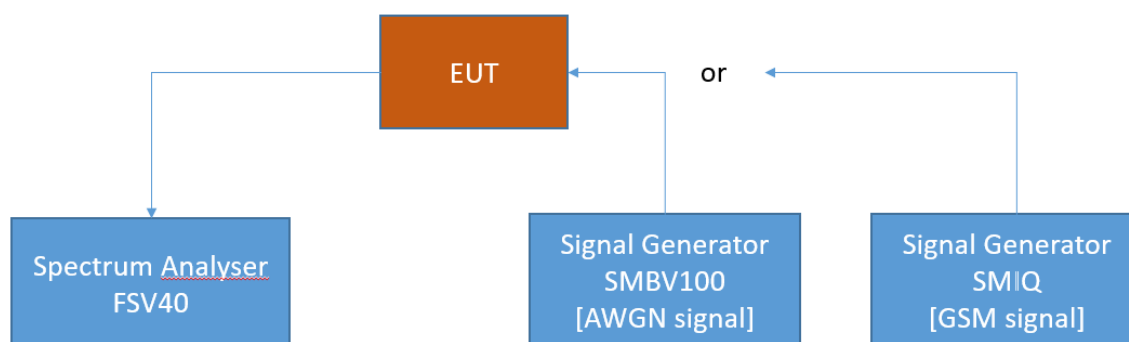
5.2 PEAK TO AVERAGE RATIO

Standard FCC Part 27, §27.50

The test was performed according to:
ANSI C63.26**Test date:** 2024-12-02**Environmental conditions:** 25,4 °C; 20 % r. F..**Test engineer:** Thomas Hufnagel**5.2.1 TEST DESCRIPTION**

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

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



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

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

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

5.2.2 TEST REQUIREMENTS/LIMITS

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50

- (j) The following power requirements apply to stations transmitting in the 3450-3550 MHz band:
 - (4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

**EMC Test Report No.: 24-0196**

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

**5.2.3 TEST PROTOCOL**

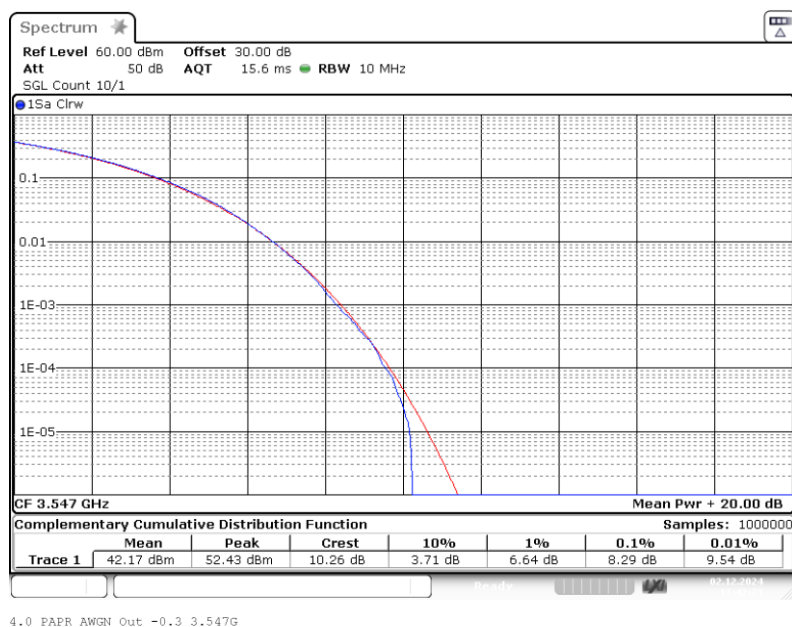
Band, 34T, downlink						
Signal Type	Input Power	Frequency [MHz]	Input Power [dBm]	PAPR [dB]	Limit PAPR [dB]	Margin to Limit [dB]
Wideband	0.3 dB < AGC	3547.00	-4,1	8,3	13,0	4,7
Wideband	3 dB > AGC	3547.00	-0,7	8,3	13,0	4,7
Wideband 5G	0.3 dB < AGC	3500.00	-3,1	8,5	13,0	4,5
Wideband 5G	3 dB > AGC	3500.00	0,1	8,5	13,0	4,5

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

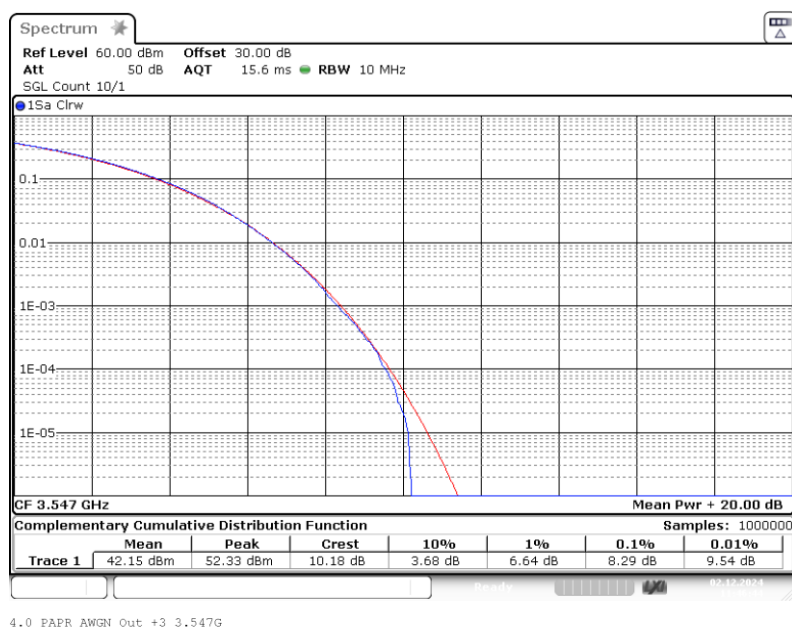
The test results relate only to the tested item. The sample has been provided by the client.
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5.2.4 MEASUREMENT PLOTS (SHOWING THE HIGHEST VALUE)

Band: 34T; Frequency: 3.5470 GHz; Band Edge: f0; Mod: AWGN; PAPR 0.3 dB < AGC



Band: 34T; Frequency: 3.5470 GHz; Band Edge: f0; Mod: AWGN; PAPR 3 dB > AGC

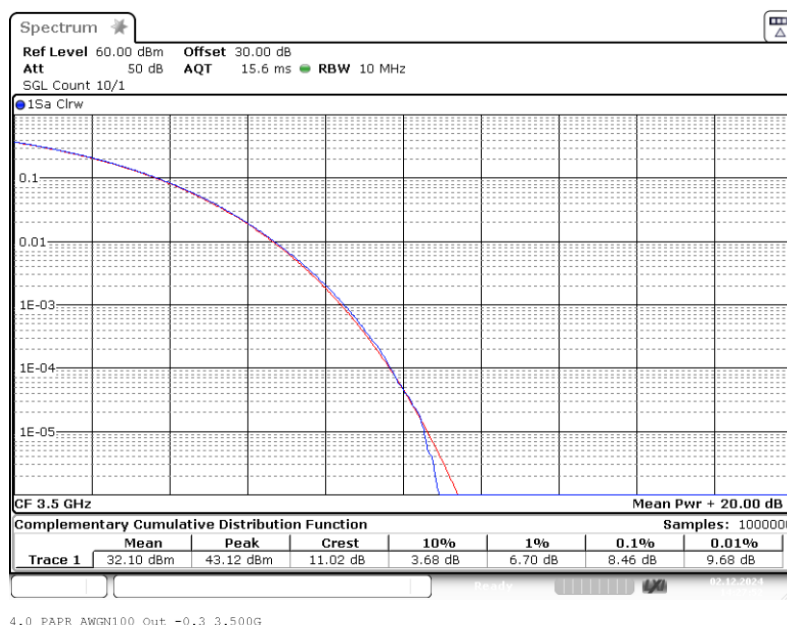


The test results relate only to the tested item. The sample has been provided by the client.
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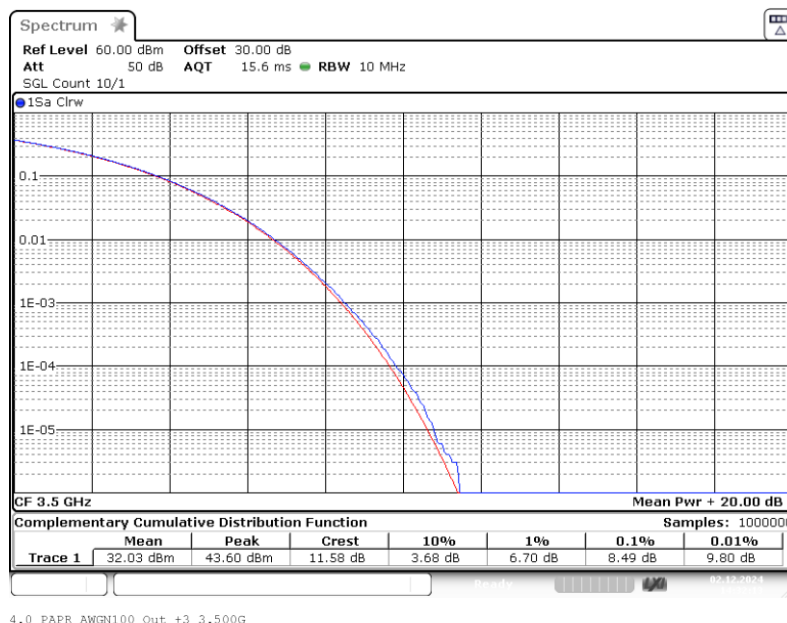
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100; PAPR 0.3 dB < AGC



Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100; 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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EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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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2024-0349-EMC-TR-24-0196-V02

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: 2024-12-02

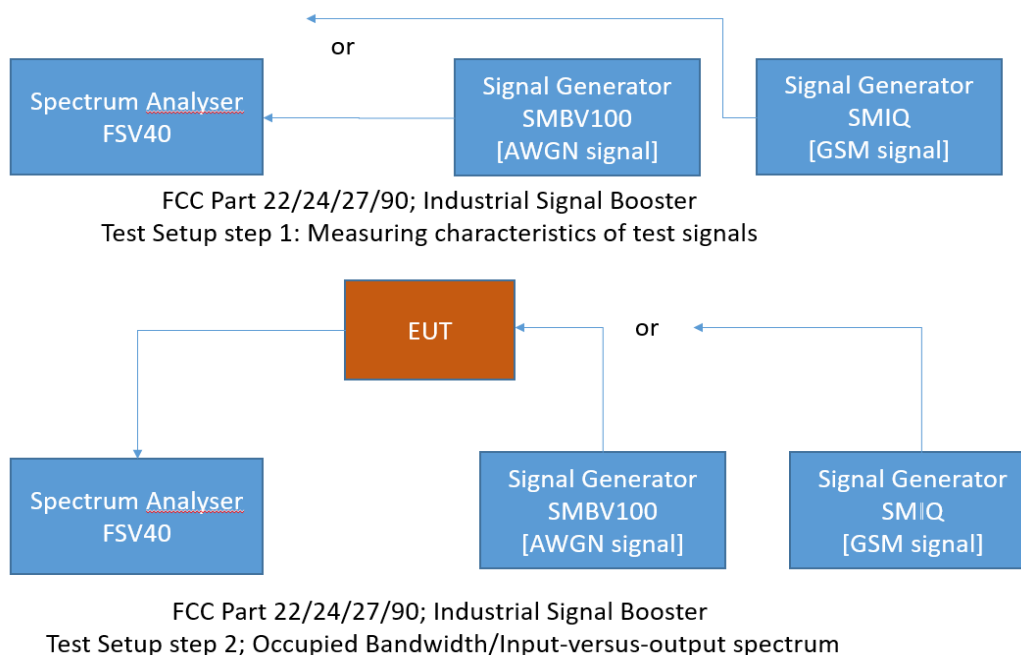
Environmental conditions: 25,4 °C; 20 % r. F..

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

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.



5.3.2 TEST REQUIREMENTS/LIMITS

FCC Part 2.1049; Occupied Bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

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

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



EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.3.3 TEST PROTOCOL

Band 34T 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	3500.0	4387.8	4383.5	4.3	205.0	200.7
Wideband	3 dB > AGC	3500.0	4386.0	4390.3	4.3	205.0	200.7
Wideband 5G	0.3 dB < AGC	3500.0	103045	102880	120	4915	4760
Wideband 5G	3 dB > AGC	3500.0	103270	102985	300	4915	4630

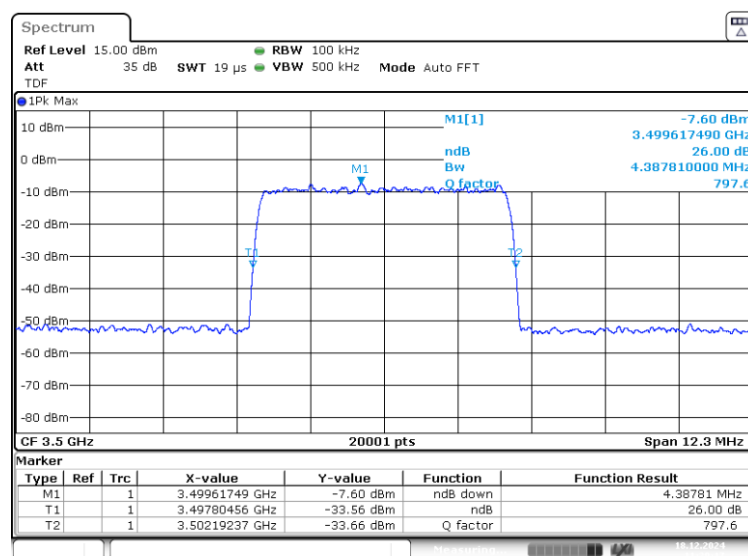
Remark: Please see next sub-clause for the measurement plot.

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

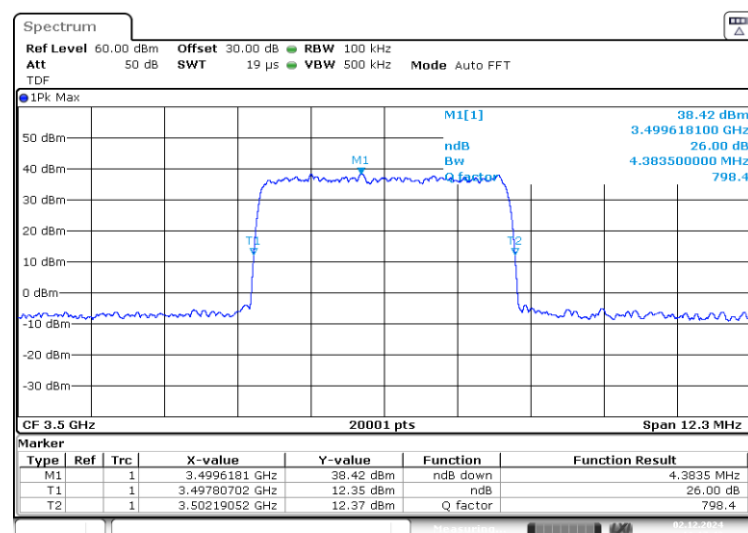
5.3.4 MEASUREMENT PLOTS

Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN;
Input OCBw 0.3 dB < AGC



3.4 OCBw AWGN In=0.3 3.5000G _26dB

Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN;
Output OCBw 0.3 dB < AGC



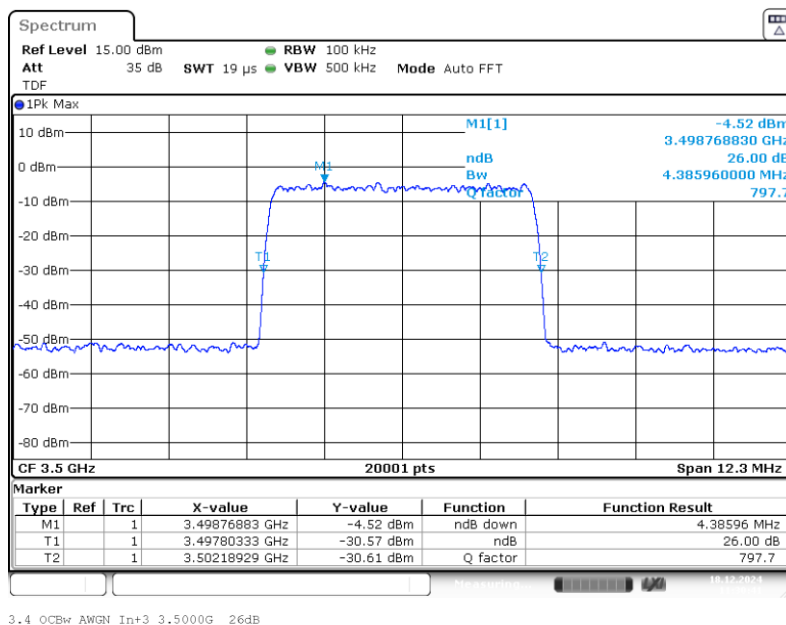
3.4 OCBw AWGN Out=0.3 3.5000G _26dB

The test results relate only to the tested item. The sample has been provided by the client.
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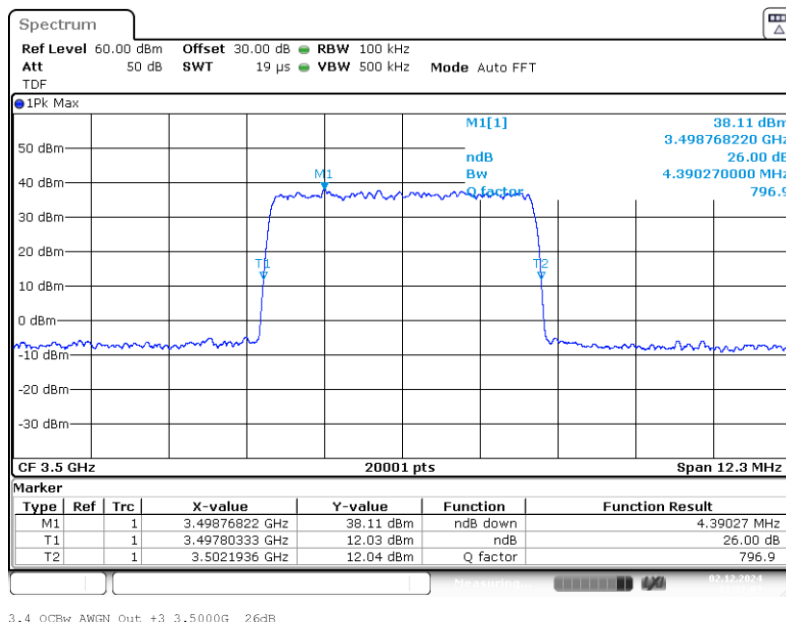
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN;
Input OCBw 3 dB > AGC



Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN;
Output OCBw 3 dB > AGC

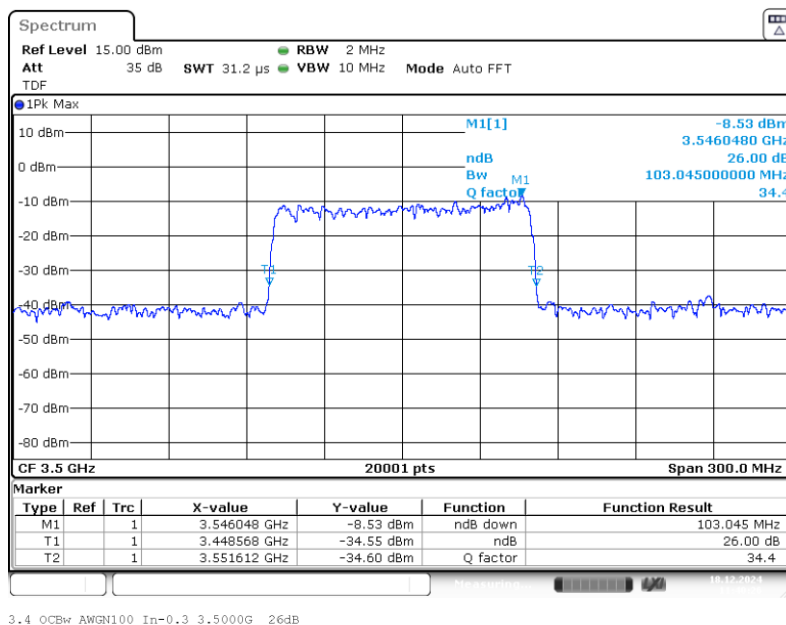


The test results relate only to the tested item. The sample has been provided by the client.
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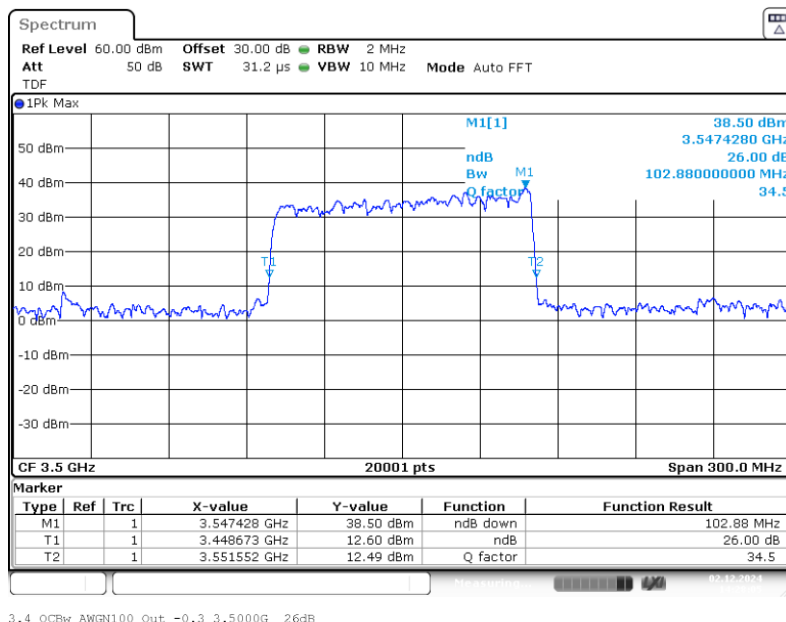
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
Input OCBw 0.3 dB < AGC



Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
Output OCBw 0.3 dB < AGC

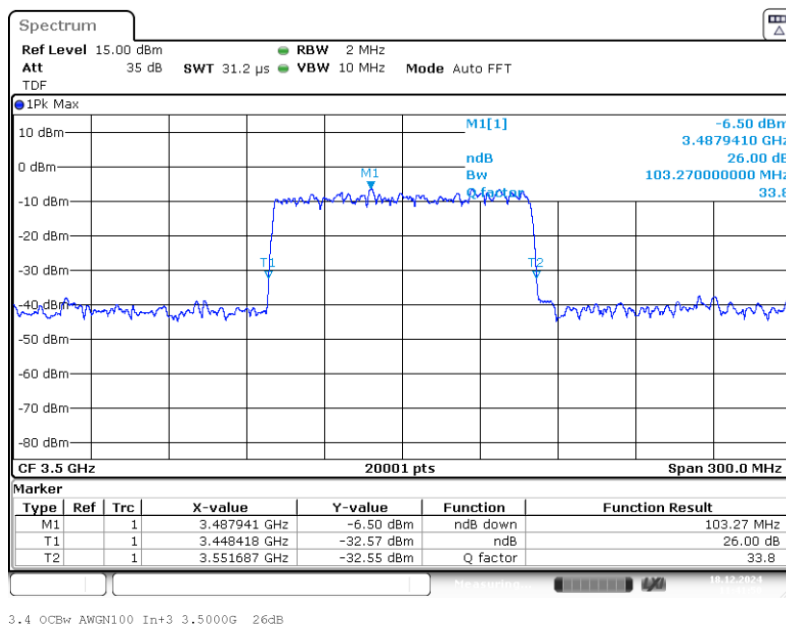


The test results relate only to the tested item. The sample has been provided by the client.
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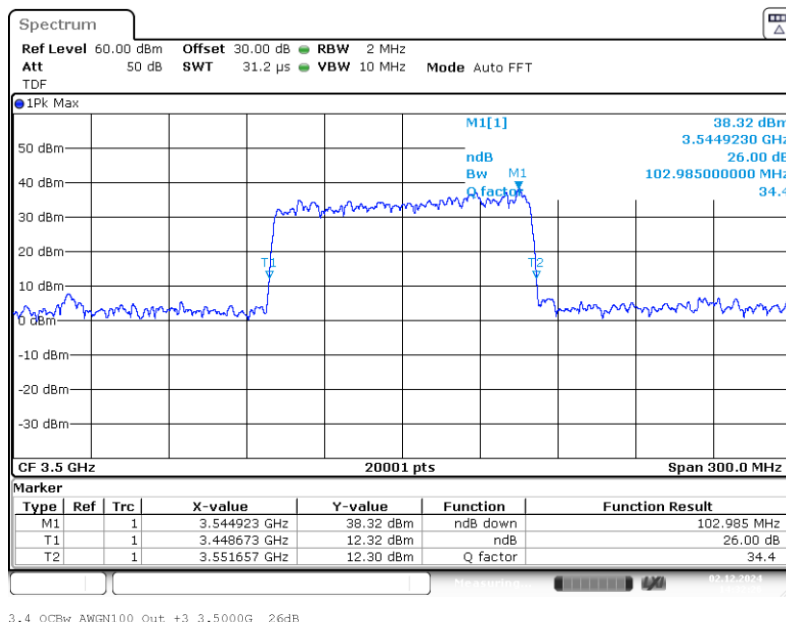
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
Input OCBw 3 dB > AGC



Band: 34T; Frequency: 3.5000 GHz; Band Edge: mid; Mod: AWGN100;
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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EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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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2024-0349-EMC-TR-24-0196-V02

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

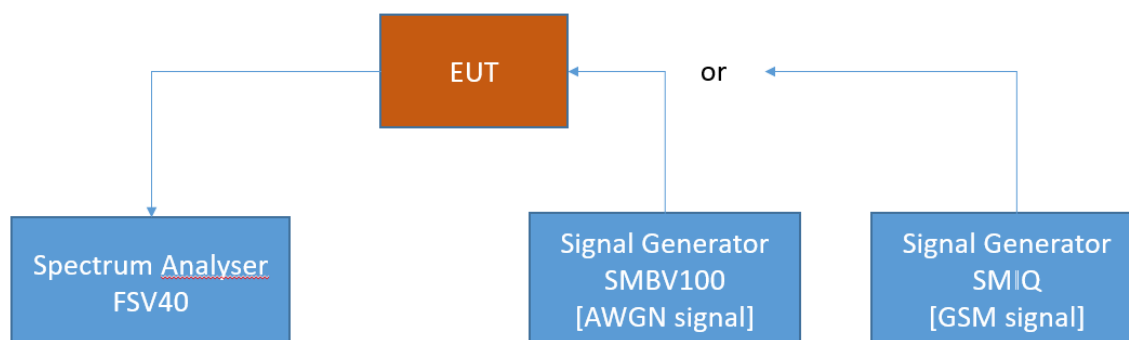
5.4 CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard FCC Part §2.1051. §27.53

The test was performed according to:
ANSI C63.26**Test date:** 2024-12-11**Environmental conditions:** 25,4 °C; 20 % r. F..**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:



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.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.4.2 TEST REQUIREMENTS/LIMITS

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.

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

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2024-0349-EMC-TR-24-0196-V02

RPRT-0024-NU-V04 / TEMP-0059-NU-EAW-V02

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§27.53 – Emission limits

(n) 3.5 GHz Service

The following emission limits apply to stations transmitting in the 3450–3550 MHz band:

- (1) For base station operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed –13 dBm/MHz. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Notwithstanding the channel edge requirement of –13 dBm per megahertz, for base station operations in the 3450–3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed –25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed –40 dBm/MHz.
- (2) For mobile operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed –13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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:

$$p_{RBWreduced} [dBm] = 10 * \log \left(\frac{RBWreduced [kHz]}{1000 kHz} \right) + p_{RBW 1000 kHz} [dBm]$$

Hereby "p" are the limit lines' values.

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band 34T downlink							
Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
low	Wideband	0,01029	-79,4	RMS	1	-70	9,4
low	Wideband	0,05750	-72,1	RMS	10	-60	12,1
low	Wideband	950,5	-62,6	RMS	100	-50	12,6
low	Wideband	3402,3	-55,2	RMS	1000	-40	15,2
low	Wideband	3436,9	-45,2	RMS	100	-35	10,2
low	Wideband	3449,0	-33,8	RMS	100	-23	10,8
low	Wideband	3551,6	-41,3	RMS	100	-23	18,3
low	Wideband	3551,8	-44,9	RMS	100	-23	21,9
low	Wideband	4115,1	-43,4	RMS	1000	-40	3,4
low	Wideband	6906,1	-50,7	RMS	1000	-40	10,7
low	Wideband	10359,2	-50,2	RMS	1000	-40	10,2
low	Wideband	20004,7	-42,5	RMS	1000	-40	2,5
low	Wideband	30302,5	-44,7	RMS	1000	-40	4,7
low	Wideband	39989,3	-46,5	RMS	1000	-40	6,5
mid	Wideband	0,01566	-78,8	RMS	1	-70	8,8
mid	Wideband	1,69222	-71,5	RMS	10	-60	11,5
mid	Wideband	811,4	-63,2	RMS	100	-50	13,2
mid	Wideband	1045,7	-45,3	RMS	1000	-40	5,3
mid	Wideband	3434,4	-45,5	RMS	100	-35	10,5
mid	Wideband	3449,0	-43,4	RMS	100	-23	20,4
mid	Wideband	3552,3	-40,7	RMS	100	-23	17,7
mid	Wideband	3555,4	-45,1	RMS	100	-23	22,1
mid	Wideband	4996,8	-43,4	RMS	1000	-40	3,4
mid	Wideband	6869,1	-51,0	RMS	1000	-40	11,0
mid	Wideband	17499,9	-46,9	RMS	1000	-40	6,9
mid	Wideband	20001,2	-42,3	RMS	1000	-40	2,3
mid	Wideband	30277,0	-44,3	RMS	1000	-40	4,3
mid	Wideband	39983,3	-46,4	RMS	1000	-40	6,4
high	Wideband	0,00992	-79,6	RMS	1	-70	9,6
high	Wideband	2,02716	-72,5	RMS	10	-60	12,5
high	Wideband	952,6	-63,3	RMS	100	-50	13,3
high	Wideband	1116,7	-54,1	RMS	1000	-40	14,1
high	Wideband	3431,6	-45,0	RMS	100	-35	10,0
high	Wideband	3447,7	-40,7	RMS	100	-23	17,7
high	Wideband	3551,0	-28,7	RMS	100	-23	5,7
high	Wideband	3557,3	-44,1	RMS	100	-23	21,1
high	Wideband	4305,0	-43,3	RMS	1000	-40	3,3
high	Wideband	6867,1	-50,3	RMS	1000	-40	10,3
high	Wideband	17893,4	-52,0	RMS	1000	-40	12,0
high	Wideband	20007,2	-42,1	RMS	1000	-40	2,1
high	Wideband	30301,5	-44,1	RMS	1000	-40	4,1
high	Wideband	39967,3	-46,8	RMS	1000	-40	6,8

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

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**EMC Test Report No.: 24-0196**

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]



Band 34T downlink							
Test Frequency	Signal Type	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
mid	Wideband 5G	0,01029	-79,3	RMS	1	-70	9,3
mid	Wideband 5G	0,09749	-72,3	RMS	10	-60	12,3
mid	Wideband 5G	811,7	-63,4	RMS	100	-50	13,4
mid	Wideband 5G	3311,3	-45,7	RMS	1000	-40	5,7
mid	Wideband 5G	3435,7	-44,6	RMS	100	-35	9,6
mid	Wideband 5G	3446,5	-36,7	RMS	100	-23	13,7
mid	Wideband 5G	3552,2	-33,9	RMS	100	-23	10,9
mid	Wideband 5G	3557,7	-44,4	RMS	100	-23	21,4
mid	Wideband 5G	3582,2	-43,4	RMS	1000	-40	3,4
mid	Wideband 5G	6955,1	-50,8	RMS	1000	-40	10,8
mid	Wideband 5G	10556,2	-45,9	RMS	1000	-40	5,9
mid	Wideband 5G	20000,7	-41,9	RMS	1000	-40	1,9
mid	Wideband 5G	30291,0	-44,4	RMS	1000	-40	4,4
mid	Wideband 5G	39967,3	-46,6	RMS	1000	-40	6,6

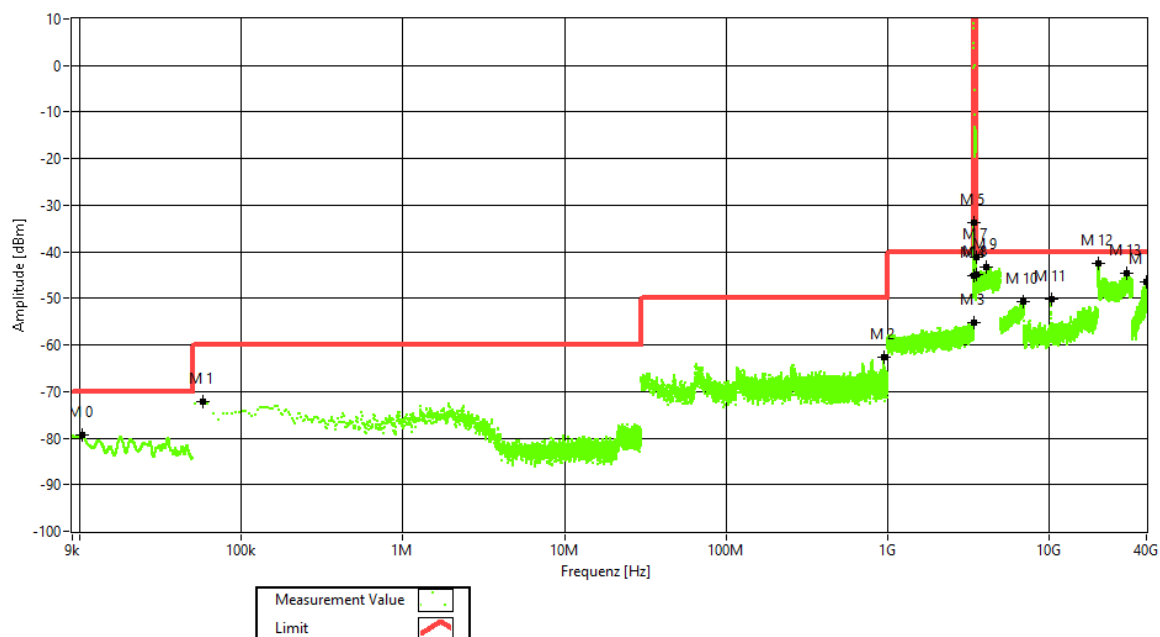
Remark: Please see next sub-clause for the measurement plot.

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

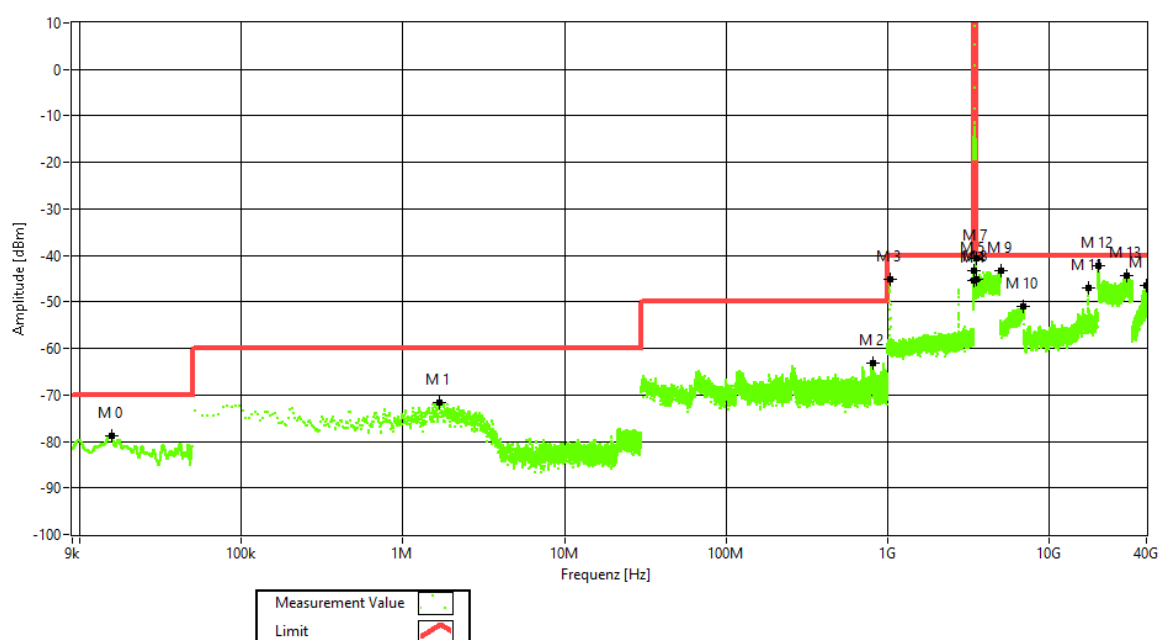
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5.4.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE)

Frequency Band = 34T, Test Frequency = low, Direction = RF downlink,
Signal Type = Wideband



Frequency Band = 34T, Test Frequency = mid, Direction = RF downlink,
Signal Type = Wideband



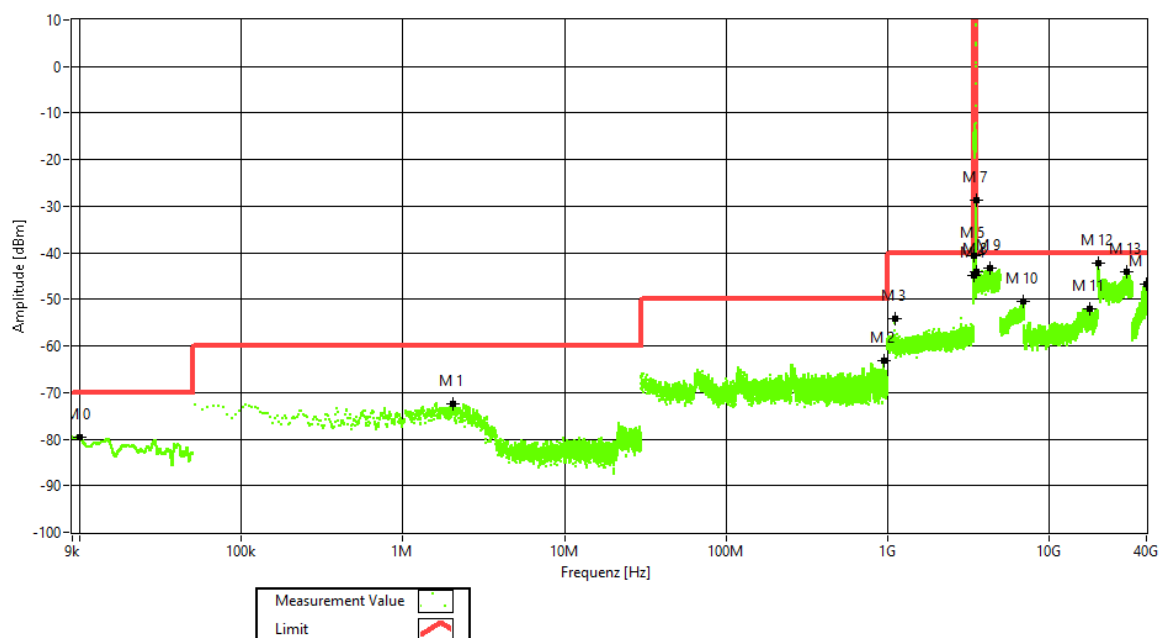
The test results relate only to the tested item. The sample has been provided by the client.

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EMC Test Report No.: 24-0196

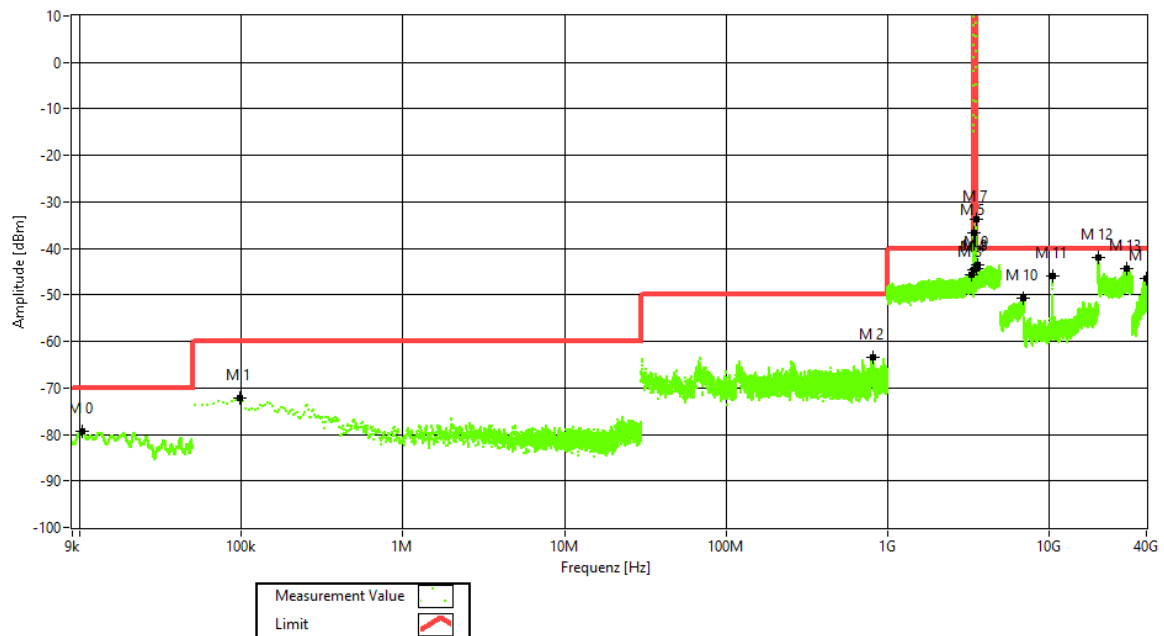
EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Frequency Band = 34T, Test Frequency = high, 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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Frequency Band = 34T, Segment 1. 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: 2024-12-02

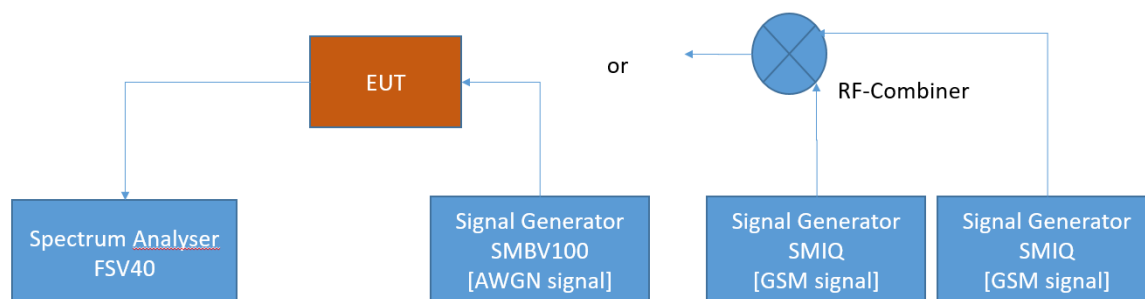
Environmental conditions: 25,4 °C; 20 % r. F..

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:



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

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.

5.5.2 TEST REQUIREMENTS/LIMITS

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§27.53 – Emission limits

(n) 3.5 GHz Service

The following emission limits apply to stations transmitting in the 3450–3550 MHz band:

- (1) For base station operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Notwithstanding the channel edge requirement of -13 dBm per megahertz, for base station operations in the 3450–3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed -40 dBm/MHz.
- (2) For mobile operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.5.3 TEST PROTOCOL

Band34T. 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	3547.50	-3.7	-25.3	-13	12.3
Wideband	3 dB > AGC	upper	3547.50	-0.4	-25.6	-13	12.6
Wideband 5G	0.3 dB < AGC	upper	3500.00	-4.0	-20.7	-13	7.7
Wideband 5G	3 dB > AGC	upper	3500.00	-1.0	-21.3	-13	8.3
Wideband	0.3 dB < AGC	lower	3452.50	-3.3	-25.5	-13	12.5
Wideband	3 dB > AGC	lower	3452.50	0.0	-25.9	-13	12.9
Wideband 5G	0.3 dB < AGC	lower	3500.00	-3.6	-22.8	-13	9.8
Wideband 5G	3 dB > AGC	lower	3500.00	-0.6	-23.0	-13	10.0

Band34T. 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]
WB*	0.3 dB < AGC	upper	3547.50	3545.00	-3.7	-25.9	-13.0	12.9
WB*	3 dB > AGC	upper	3547.50	3545.00	-0.4	-26.1	-13.0	13.1
WB*	0.3 dB < AGC	lower	3452.50	3455.00	-3.3	-27.5	-13.0	14.5
WB*	3 dB > AGC	lower	3452.50	3455.00	0.0	-27.0	-13.0	14.0

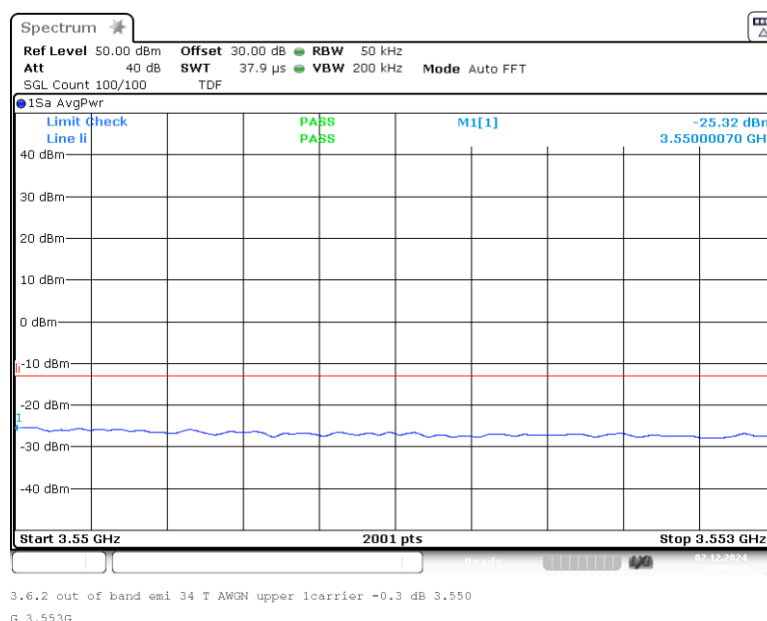
Remark: Please see next sub-clause for the measurement plot.

*: Explanations concerning table with two input signals:

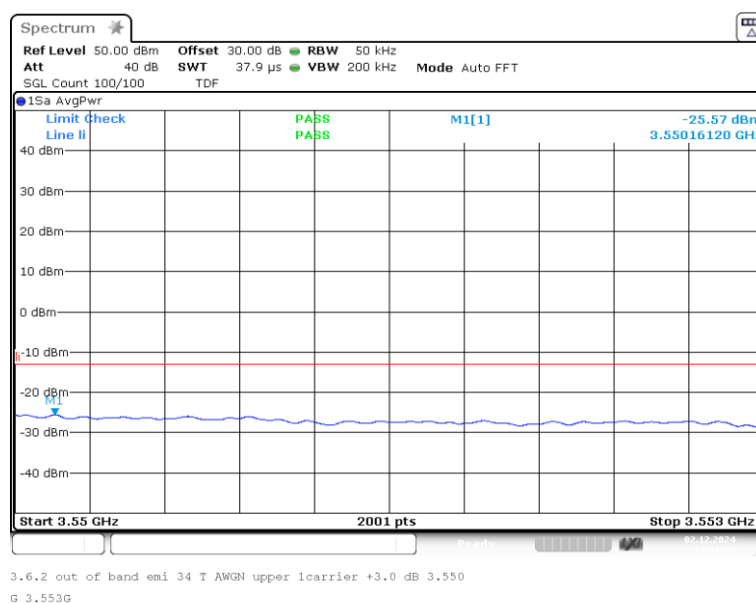
“WB” means Wideband.

5.5.4 MEASUREMENT PLOTS

Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: upper; Mod: AWGN;
Input Power = 0.3 dB < AGC; Number of signals 1



Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: upper; Mod: AWGN;
Input Power = 3 dB > AGC; Number of signals 1

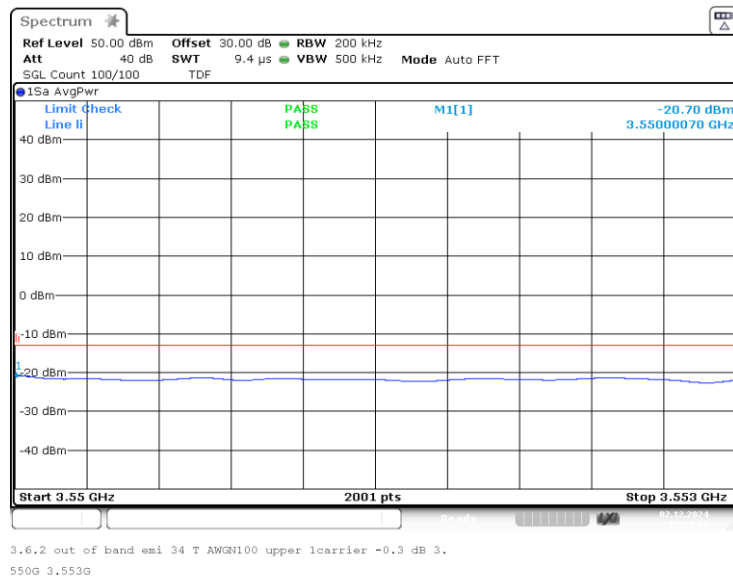


The test results relate only to the tested item. The sample has been provided by the client.
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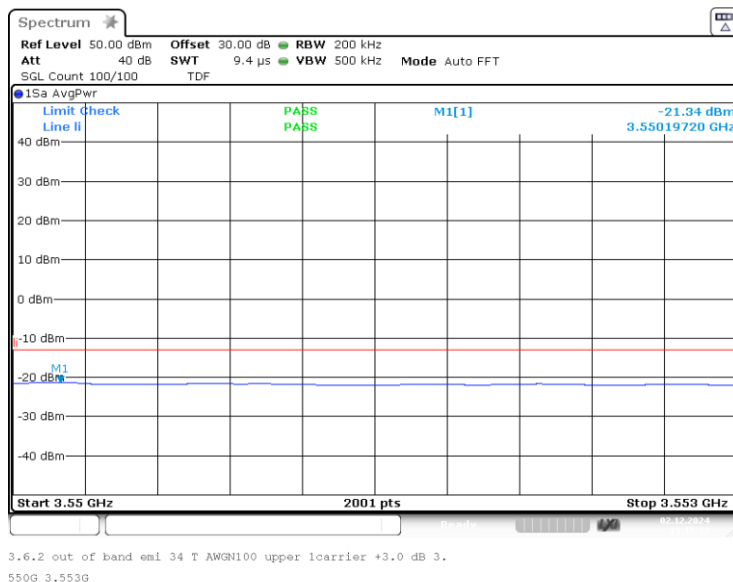
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: upper; Mod: AWGN100;
Input Power = 0.3 dB < AGC; Number of signals 1



Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: upper; Mod: AWGN100;
Input Power = 3 dB > AGC; Number of signals 1

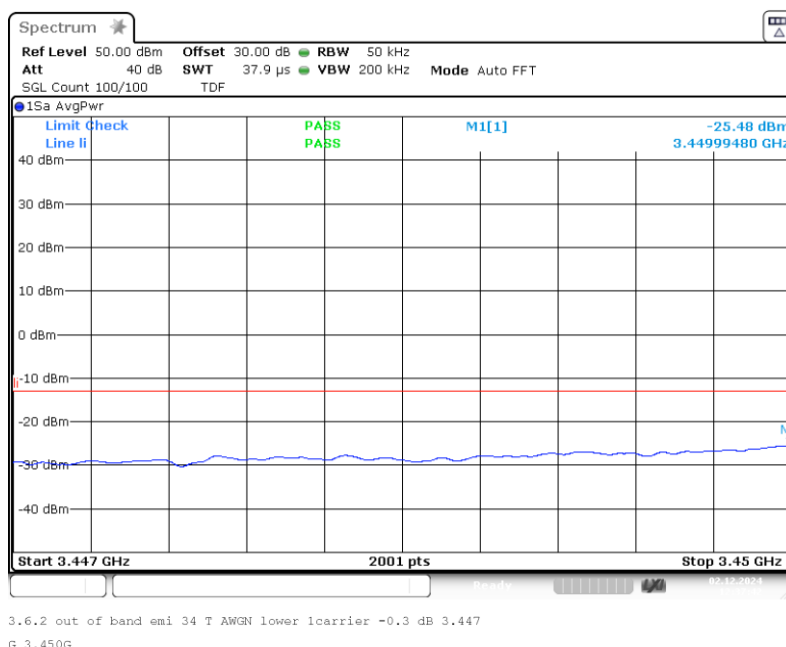


The test results relate only to the tested item. The sample has been provided by the client.
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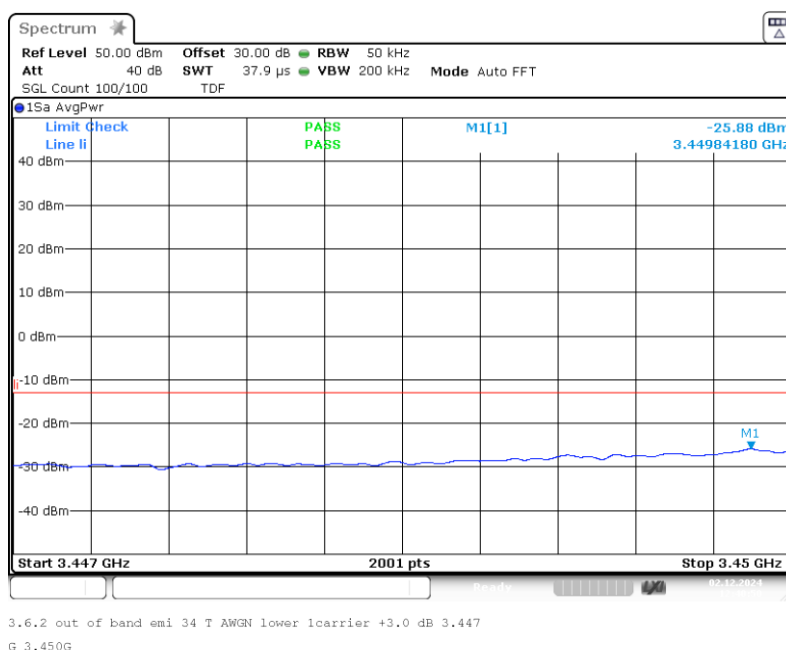
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: lower; Mod: AWGN;
Input Power = 0.3 dB < AGC; Number of signals 1



Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: lower; Mod: AWGN;
Input Power = 3 dB > AGC; Number of signals 1

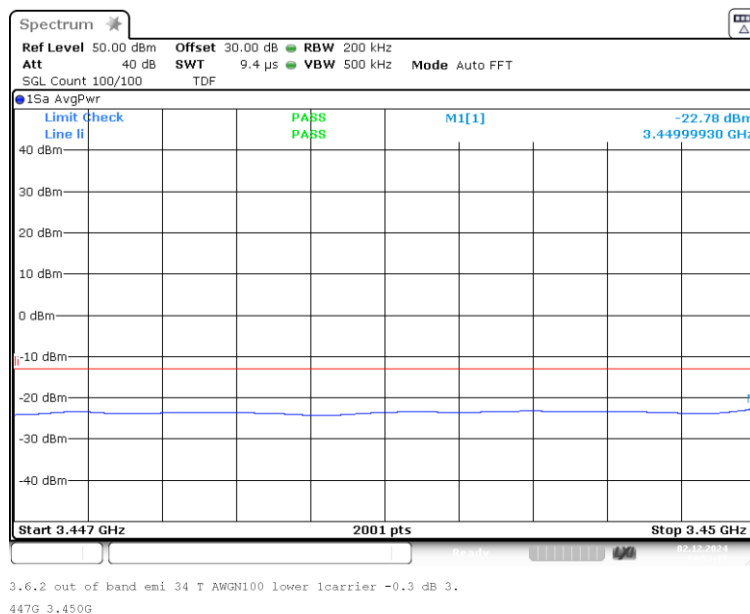


The test results relate only to the tested item. The sample has been provided by the client.
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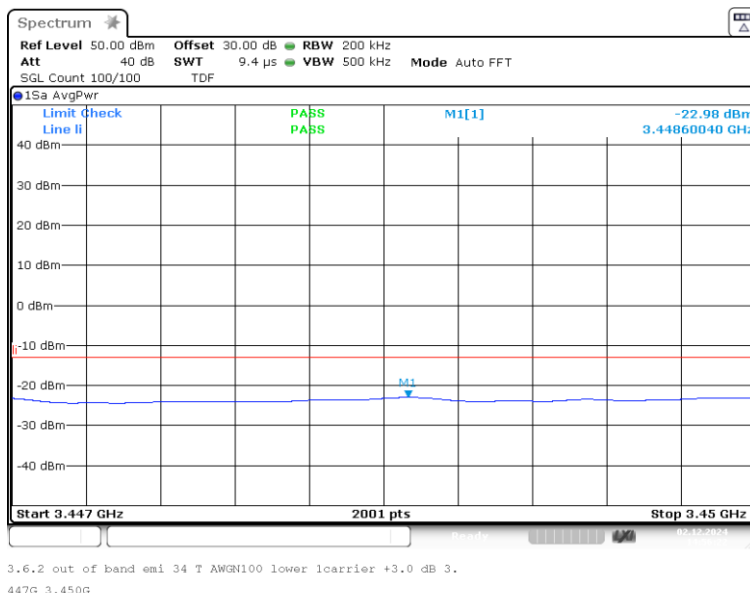
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: lower; Mod: AWGN100;
Input Power = 0.3 dB < AGC; Number of signals 1



Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: lower; Mod: AWGN100;
Input Power = 3 dB > AGC; Number of signals 1

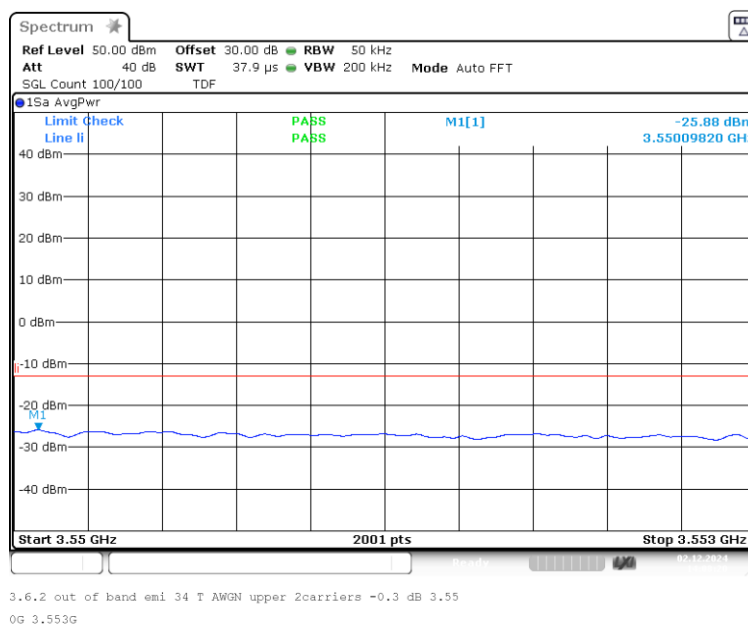


The test results relate only to the tested item. The sample has been provided by the client.
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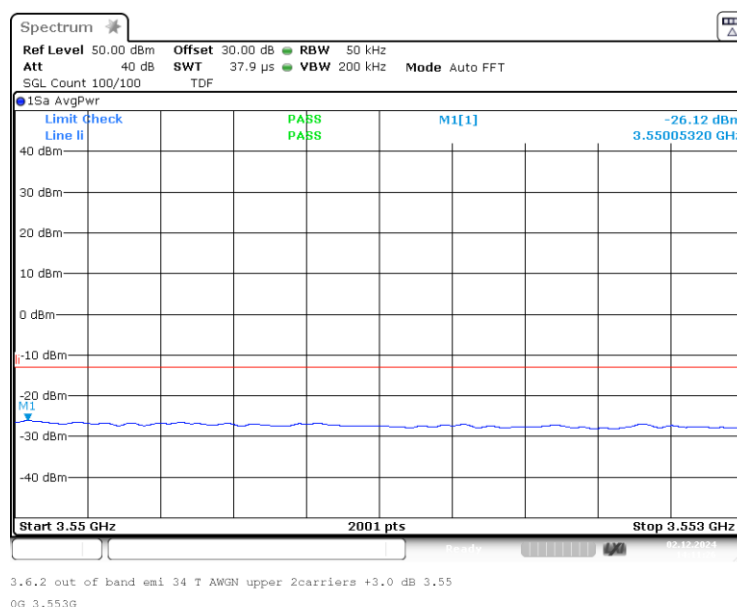
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: upper; Mod: AWGN;
Input Power = 0.3 dB < AGC; Number of signals 2



Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: upper; Mod: AWGN;
Input Power = 3 dB > AGC; Number of signals 2

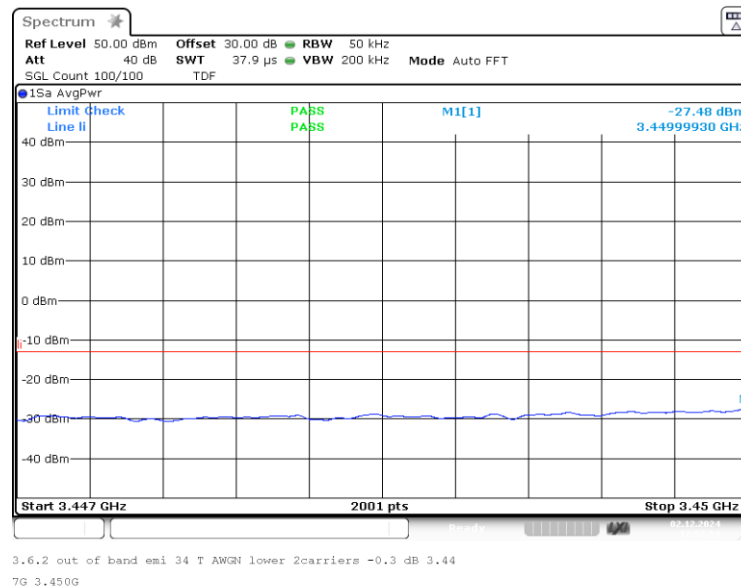


The test results relate only to the tested item. The sample has been provided by the client.
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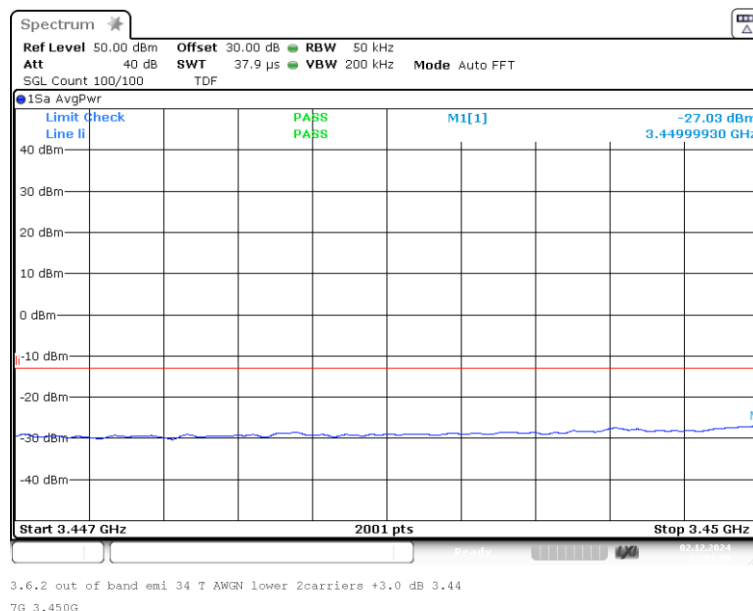
EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: lower; Mod: AWGN;
Input Power = 0.3 dB < AGC; Number of signals 2



Band: 34T; Frequency: 3.4500 GHz to 3.5500 GHz; Band Edge: lower; Mod: AWGN;
Input Power = 3 dB > AGC; Number of signals 2



The test results relate only to the tested item. The sample has been provided by the client.
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EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.5.5 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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2024-0349-EMC-TR-24-0196-V02

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.6 OUT-OF-BAND REJECTION

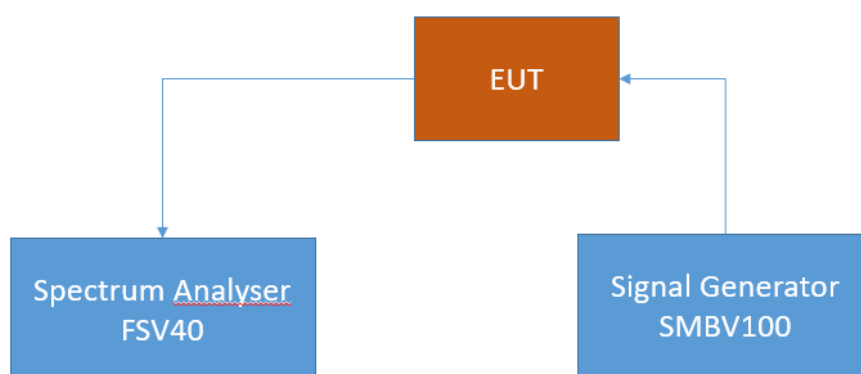
Standard FCC Part 27

The test was performed according to:
ANSI C63.26**Test date:** 2024-12-02**Environmental conditions:** 25,4 °C; 20 % r. F..**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:



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.

5.6.2 TEST REQUIREMENTS/LIMITS

For this test case exists no applicable limit



EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]



5.6.3 TEST PROTOCOL

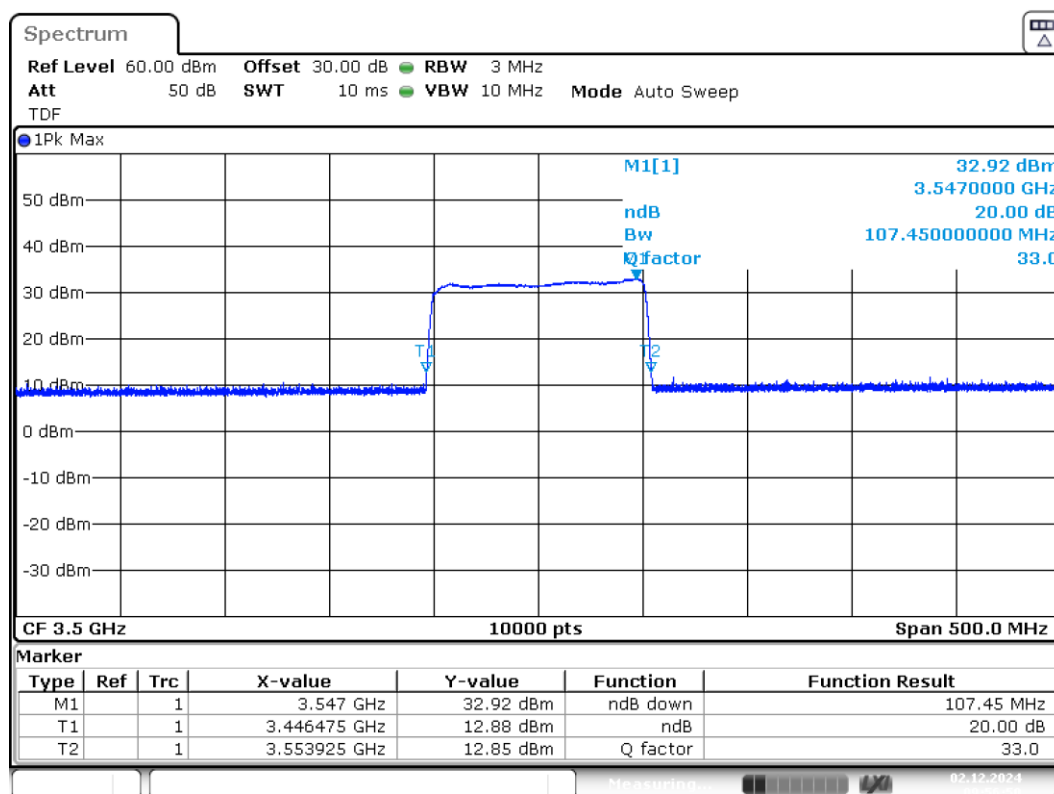
Band 34T downlink				
Highest Power Frequency [MHz]	Output Power [dBm]	Lower Highest Power -20 dB Frequency [MHz]	Upper Highest Power -20 dB Frequency [MHz]	20 dB Bandwidth [MHz]
3547.00	32.92	3446.475	3553.925	107.45

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

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

Frequency band = Band. 34T. Direction = RF downlink



3.3 Out of band rejection 34 T 3.50000G

_20dB

5.6.5 TEST EQUIPMENT USED

- Conducted



EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.7 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 (26dB 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.

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Standard FCC Part 27. §27.53

The test was performed according to:
ANSI C63.26

Test date: 2024-11-18 - 2024-11-21

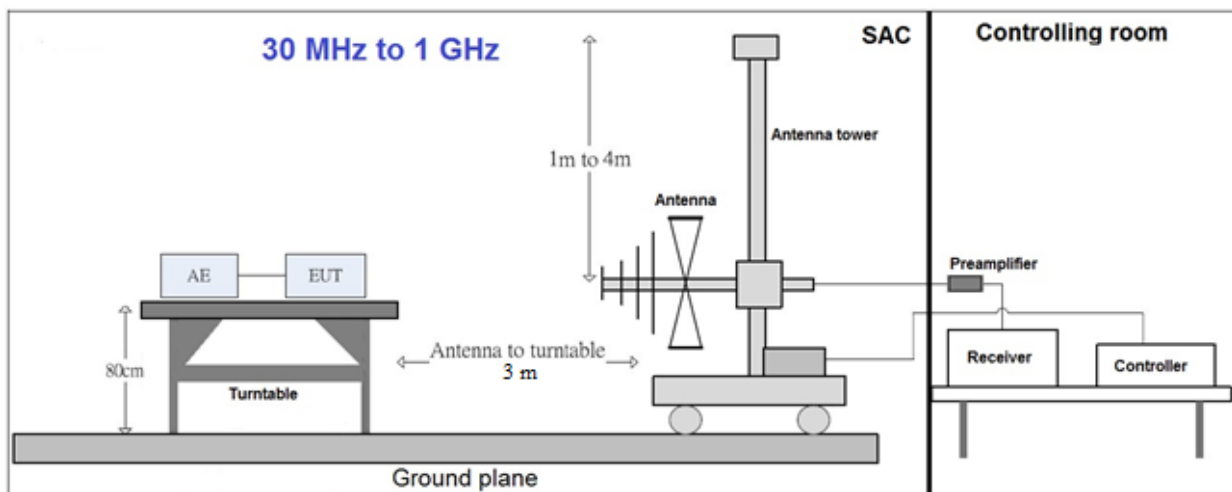
Environmental conditions: 23.6 °C; 32 % r. F..

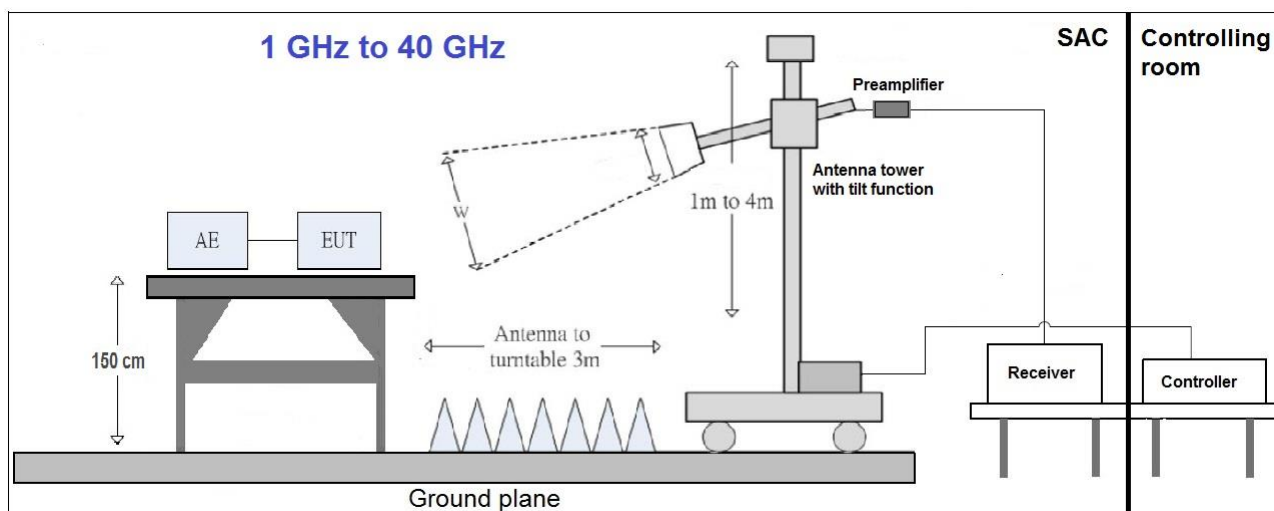
Test engineer: Thomas Hufnagel, Anh Bui, Nikola Todorović

5.8.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable radiated spurious emission measurements per § 2.1053

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





The test set-up was made in accordance to the general provisions of ANSI C63.4 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.5 x 1.5 m² in the semi-anechoic chamber. 0.8 meters above the ground or floor-standing arrangement shall be placed on the horizontal ground reference plane. The influence of the EUT support table that is used between 30–1000 MHz was evaluated. For the initial measurements, the receiving antenna is varied from 1-4 meters height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions.

The measurement procedure is implemented into the EMI test software BAT EMC from NEXIO. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered by a DC power source.

1. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

This is a preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Antenna distance: 3 m
- Detector: PEAK
- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF-Bandwidth: 100 kHz
- Turntable angle range: -180° to 180°
- Turntable step size: 15°
- Height variation range: 1 – 4 m
- Height variation step size: 1 m
- Polarisation: Horizontal + Vertical

Intention of this step is. to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency. which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by $\pm 15^{\circ}$ around this value. During this action. the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position. the antenna height will also slowly vary by ± 100 cm around the antenna height determined. During this action. the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: PEAK
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 100 kHz
- Turntable angle range: $\pm 15^{\circ}$ around the determined value
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with PEAK detector

With the settings determined in step 3. the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: PEAK (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 100 kHz

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

3. Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

Step 1:

The Equipment Under Test (EUT) was set up on a non-conductive support at 1.5 m height in the semi-anechoic chamber. Absorbers are placed around and between the turn table and the antenna tower.

All steps were performed with one height (1.5 m) of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis. with a step size of 15 °.

The turn table step size (azimuth angle) for the preliminary measurement is 15 °.

Step 2:

The maximum RFI field strength was determined during the measurement by rotating the turntable (± 180 degrees) and varying the height of the receive antenna ($h = 1 \dots 4$ m) with a additional tilt function of the antenna. The turn table azimuth will slowly vary by $\pm 15^\circ$.

EMI receiver settings (for all steps):

- Detector: PEAK
- IF Bandwidth = 1 MHz

Step 3:

Spectrum analyser settings for step 3:

- Detector: PEAK
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 1 MHz

5.8.2 TEST REQUIREMENTS/LIMITS

FCC Part 2.1053; Measurement required: Field strength of spurious radiation:

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.

Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§27.53 – Emission limits

(I) 3.5 GHz Service.

The following emission limits apply to stations transmitting in the 3450-3550 MHz band:

- (1) For base station operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (I)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
- (2) For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (I)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

EMC Test Report No.: 24-0196

EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

5.8.3 TEST PROTOCOL

General considerations concerning the limits:

The measuring bandwidth of 1 MHz was chosen according the test requirements except at the bands from 30 MHz to 1 GHz: At these bands reducing of measurement bandwidth was done.

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:

$$p_{RBWreduced} [dBm] = 10 * \log \left(\frac{RBWreduced [kHz]}{1000 kHz} \right) + p_{RBW 1000 kHz} [dBm]$$

Hereby "p" are the limit lines' values.

Considerations to MIMO operation:

At this test the two output ports ANT 1 and ANT 2 are together in function according KDB 935210 D02 v04r02 chapter II (o) (2).

Measurement tables (showing the highest value) with one antenna

At this tables the highest peak value of spurious radiation per frequency test band is shown.

Band. 34T. downlink;						
Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
400.0/hor.	-83.1	-3.9	RMS	100	-23.0	13.4
400.0/vert.	-83.1	-3.9	RMS	100	-23.0	13.4
3449.7/hor.	-37.2	-3.9	RMS	1000	-13.0	25.2
3449.7/vert.	-34.8	-3.9	RMS	1000	-13.0	25.0
20625/hor.	-64.7	-3.9	RMS	1000	-13.0	51.7
23906/vert.	-66.0	-3.9	RMS	1000	-13.0	53.0
35540/hor.	-67.3	-3.9	RMS	1000	-13.0	54.3
36019/vert.	-66.9	-3.9	RMS	1000	-13.0	53.9

Measurement tables (showing the highest value) with two antennas (MIMO)

At this tables the highest peak value of spurious radiation per frequency test band is shown.

Band. 34T. downlink;						
Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
166.1/hor.	-80.2	-3.9	RMS	100	-23.0	57.2
142.0/vert.	-80.1	-3.9	RMS	1000	-23.0	57.1
3450/hor.	-31.2	-3.9	RMS	1000	-13.0	18.2
3549/vert.	-32.2	-3.9	RMS	1000	-13.0	19.2
23906/hor.	-67.1	-3.9	RMS	1000	-13.0	54.1
20625/vert.	-66.8	-3.9	RMS	1000	-13.0	53.8
39162/hor.	-65.8	-3.9	RMS	1000	-13.0	52.8
39769/vert.	-65.6	-3.9	RMS	1000	-13.0	52.6

Abbreviations:

Hor.: horizontal position

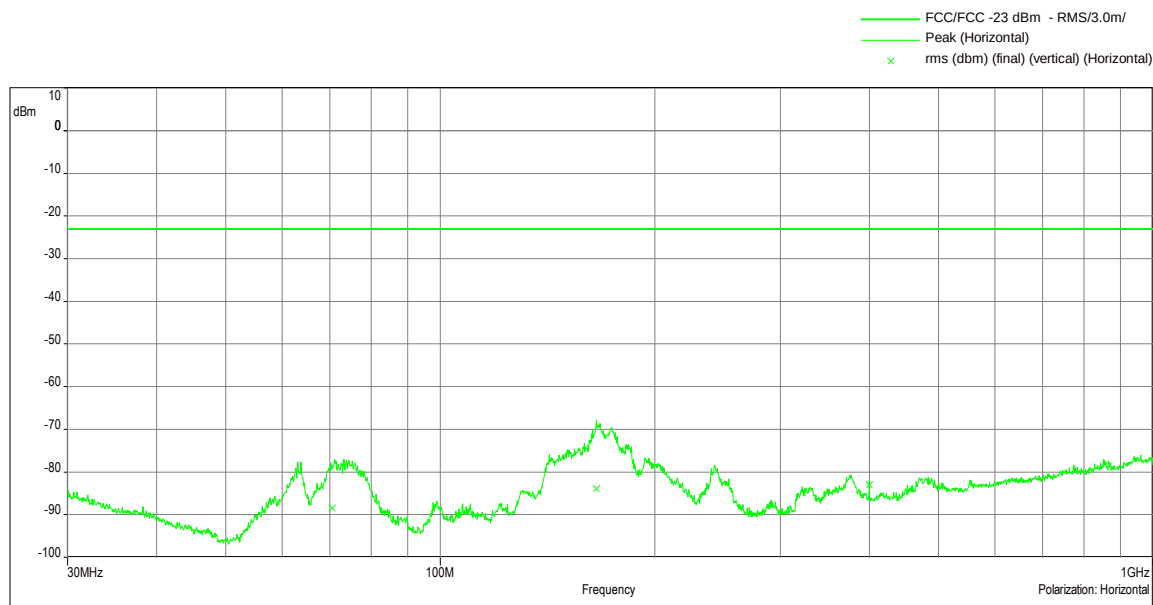
Vert.: vertical position

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

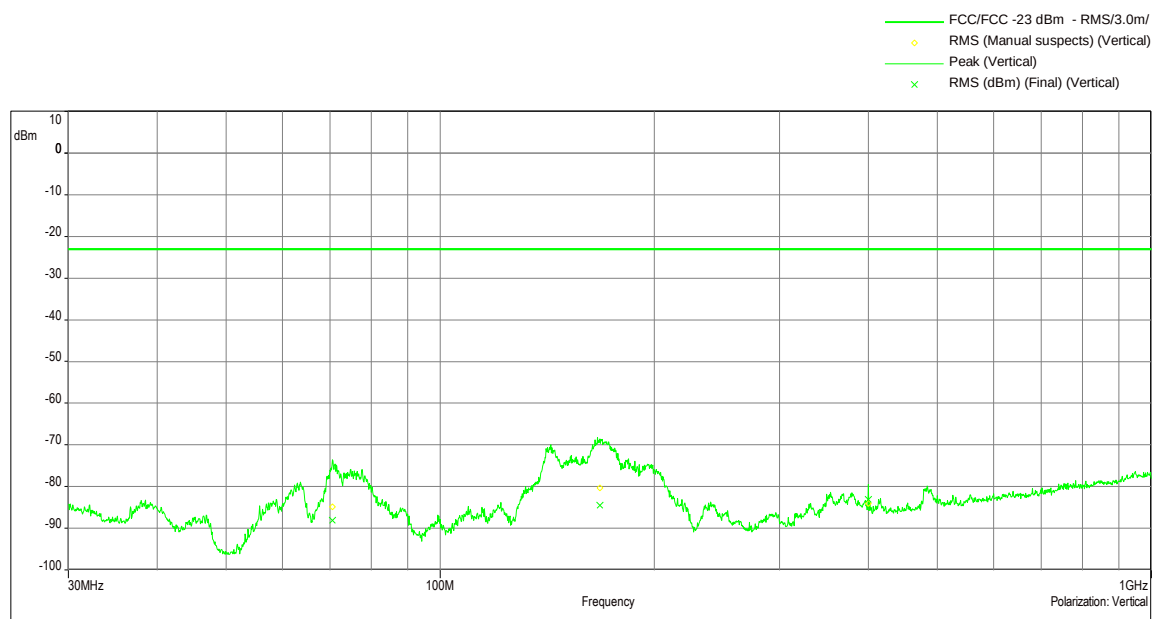
5.8.4 MEASUREMENT PLOTS (SHOWING THE HIGHEST VALUE) WITH ONE ANTENNA

5.8.4.1 Frequency Band = Band. 34T. ANT 1. Direction = RF downlink

30 MHz - 1 GHz. Horizontal



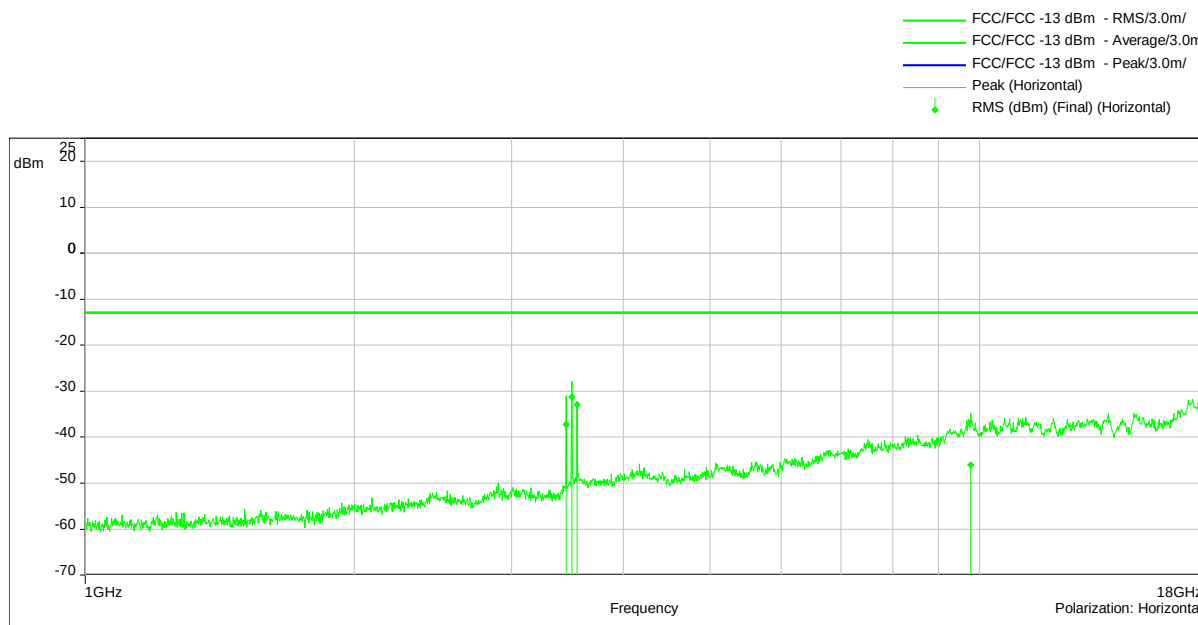
30 MHz - 1 GHz. Vertical



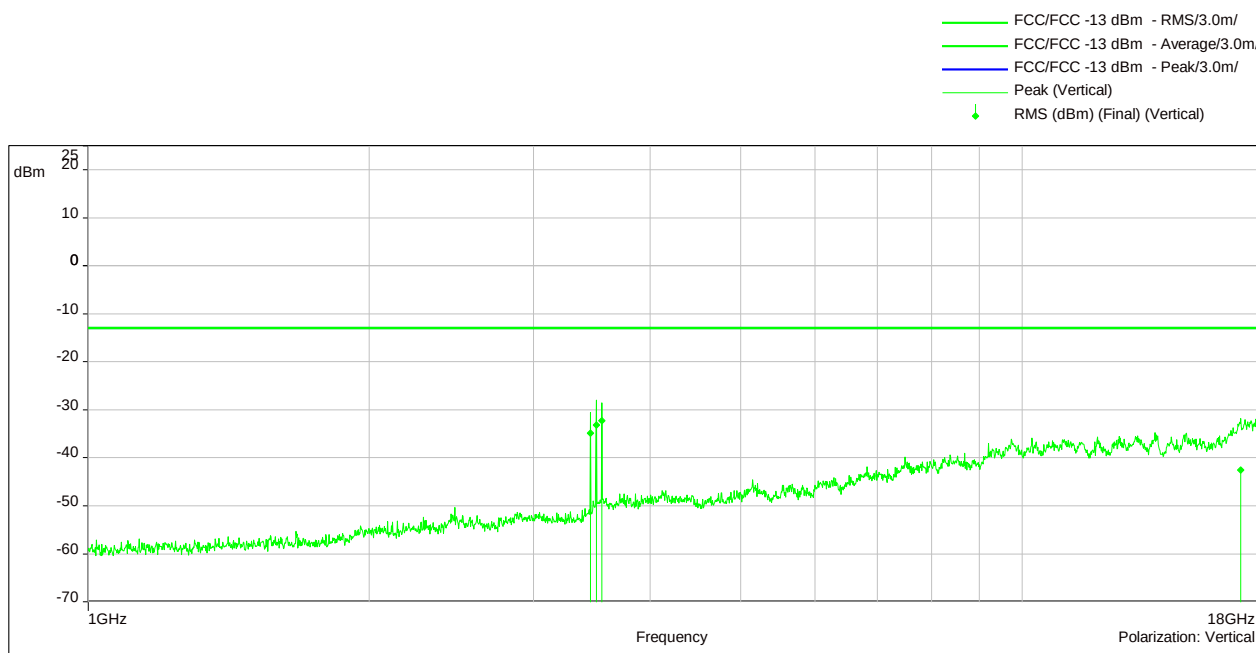
The test results relate only to the tested item. The sample has been provided by the client.

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1 GHz - 18 GHz. horizontal

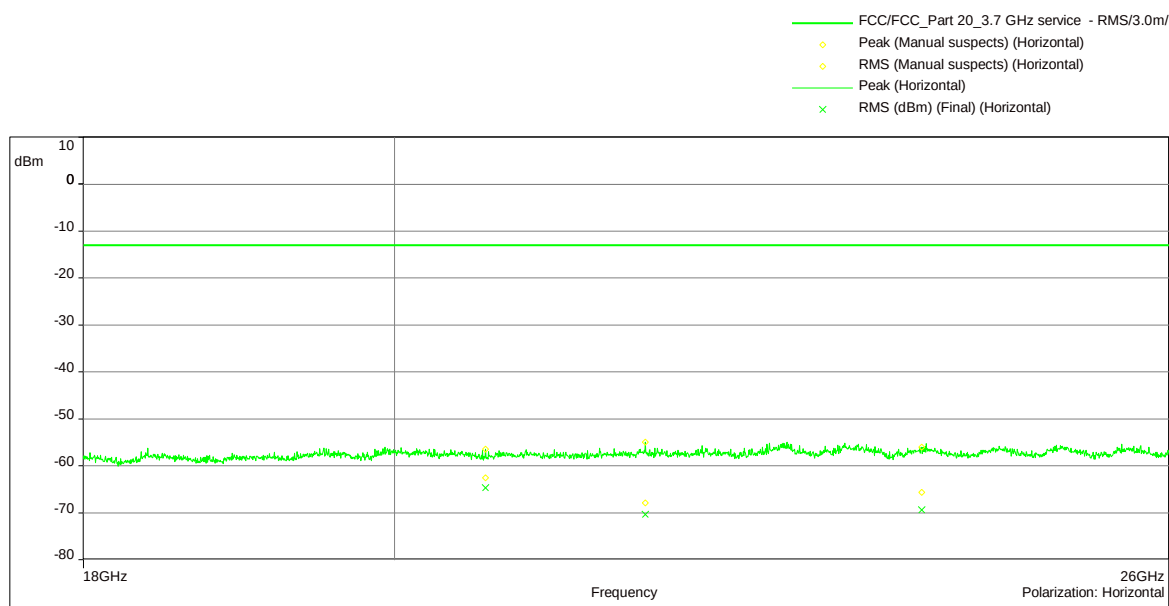


1 GHz - 18 GHz. vertical

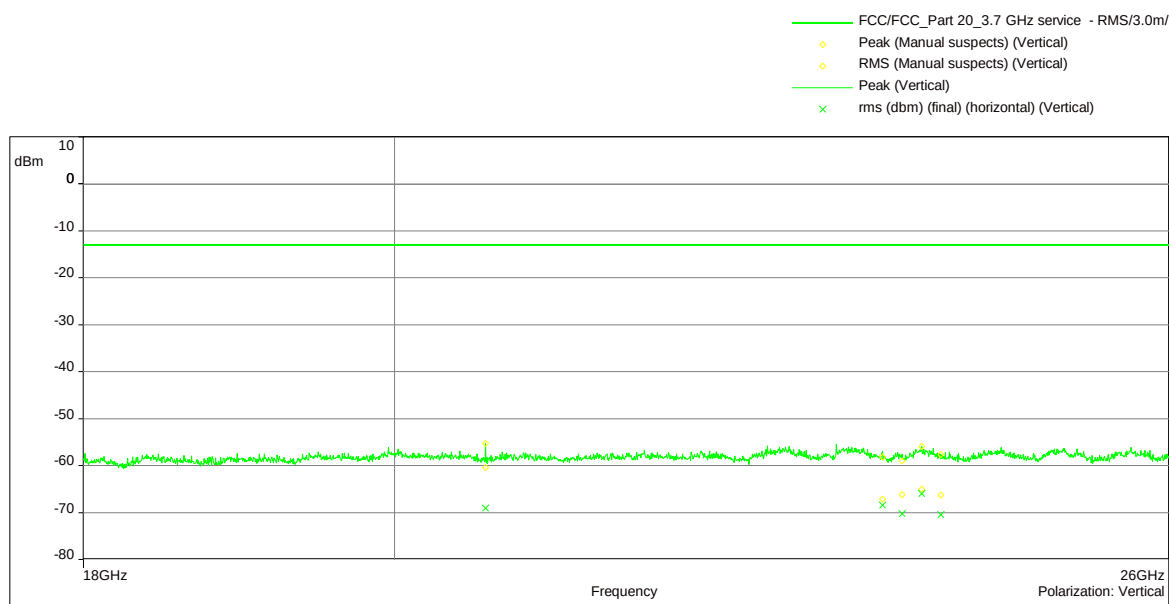


The test results relate only to the tested item. The sample has been provided by the client.
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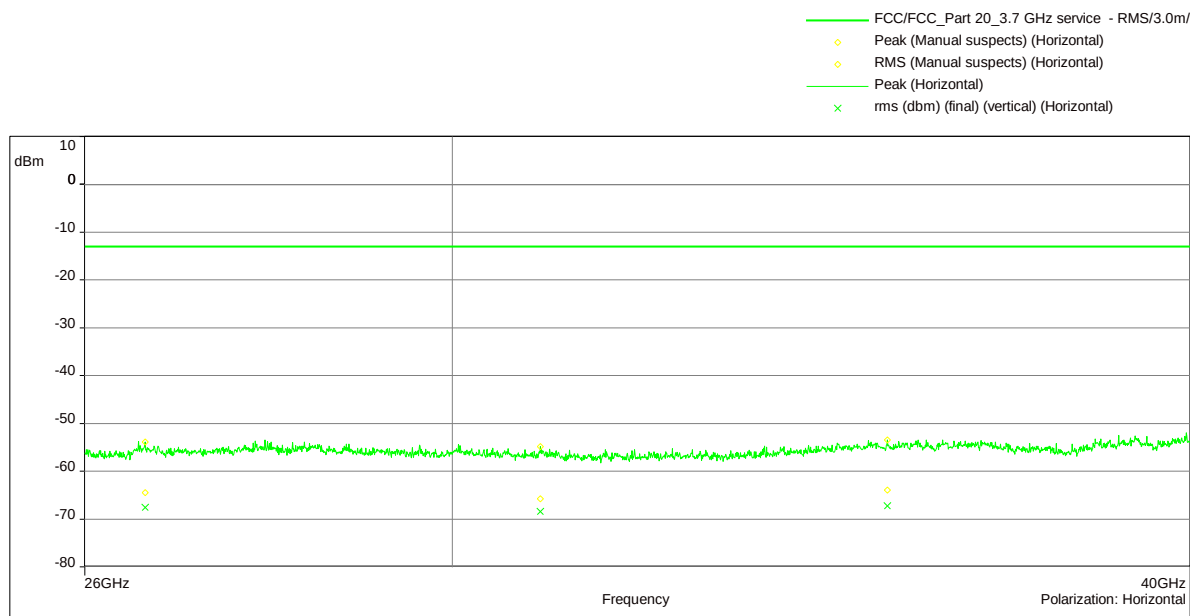
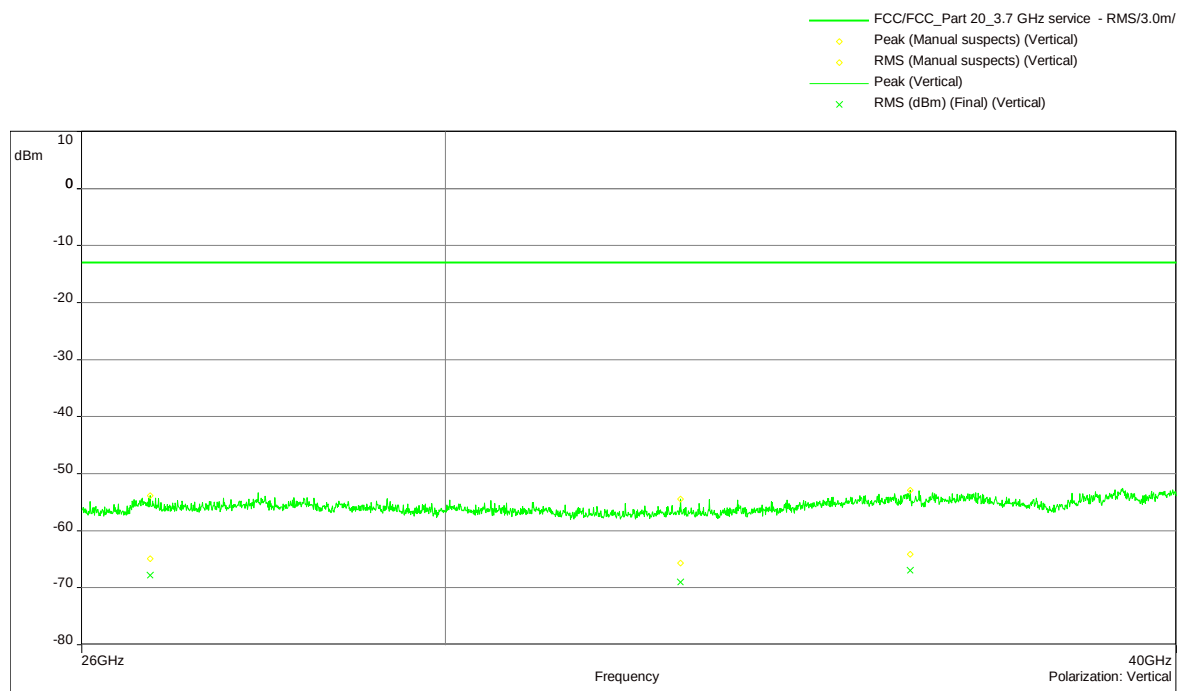
18 GHz - 26 GHz. horizontal



18 GHz - 26 GHz. vertical



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26 GHz - 40 GHz. horizontal**26 GHz - 40 GHz. vertical**

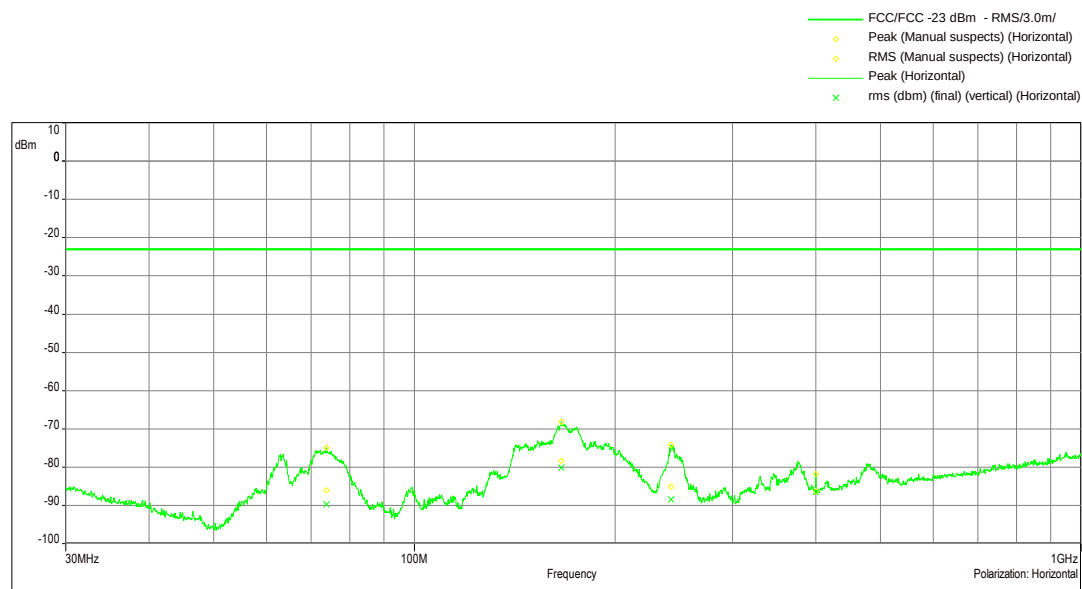
The test results relate only to the tested item. The sample has been provided by the client.

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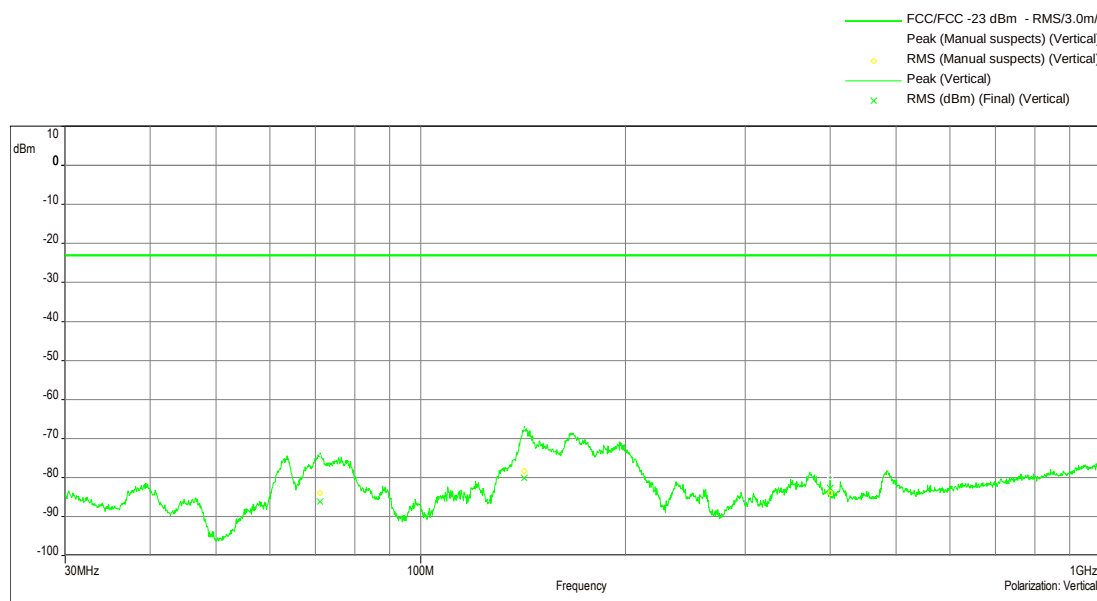
5.8.5 MEASUREMENT PLOTS (SHOWING THE HIGHEST VALUE) WITH TWO ANTENNAS (MIMO)

5.8.5.1 Frequency Band = Band. 34T. ANT 1 and 2 (MIMO). Direction = RF downlink

30 MHz - 1 GHz. horizontal



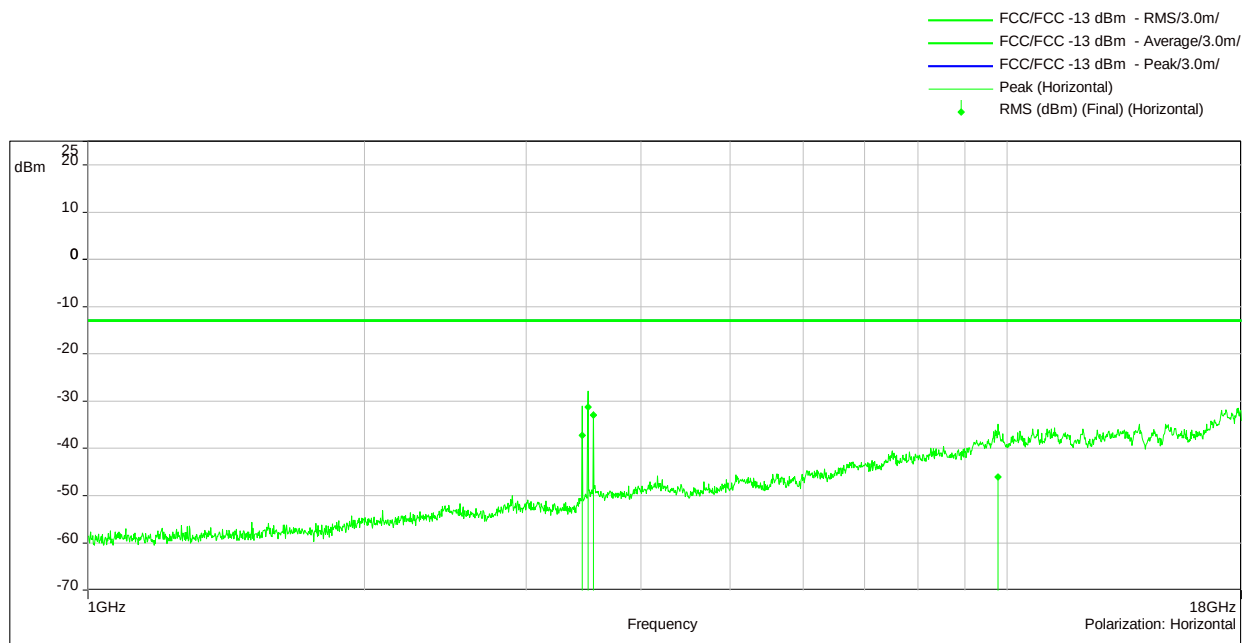
30 MHz - 1 GHz. vertical



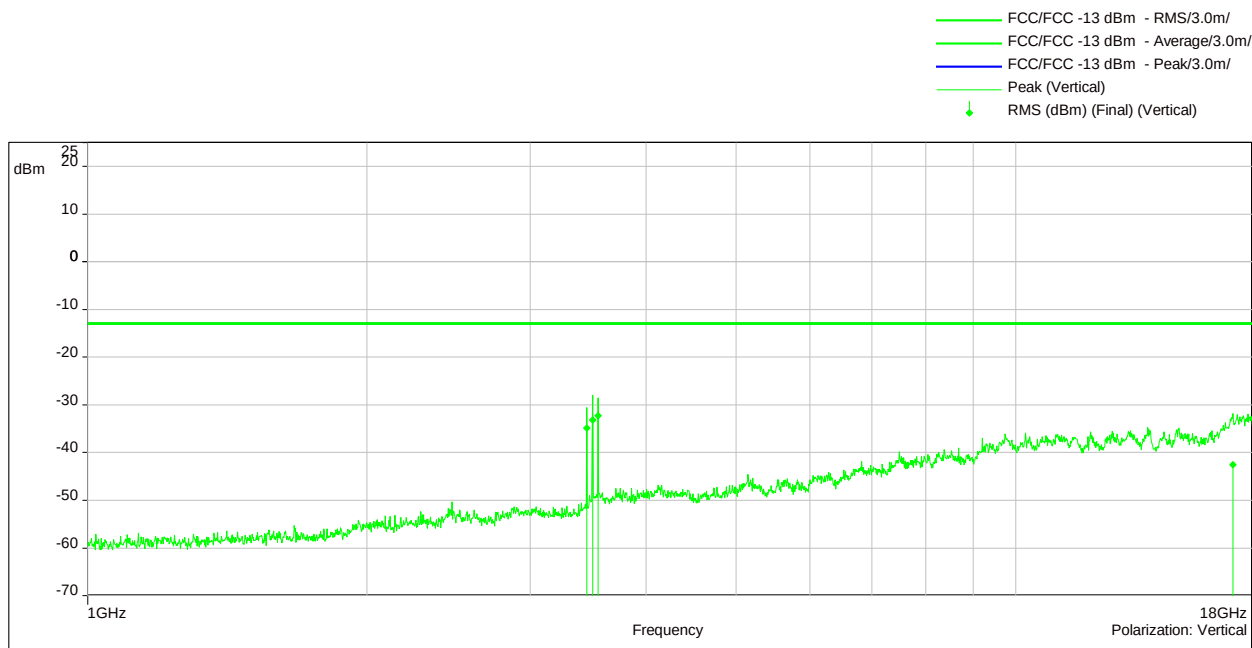
The test results relate only to the tested item. The sample has been provided by the client.

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1 GHz - 18 GHz. horizontal



1 GHz - 18 GHz. vertical

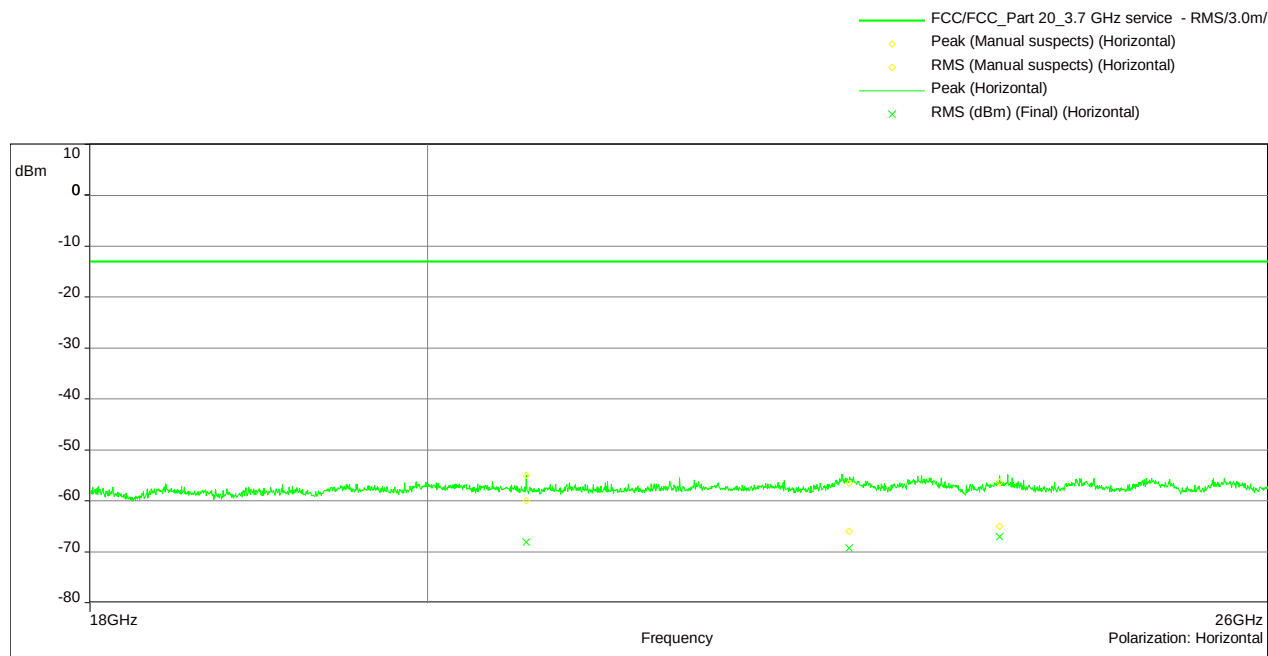
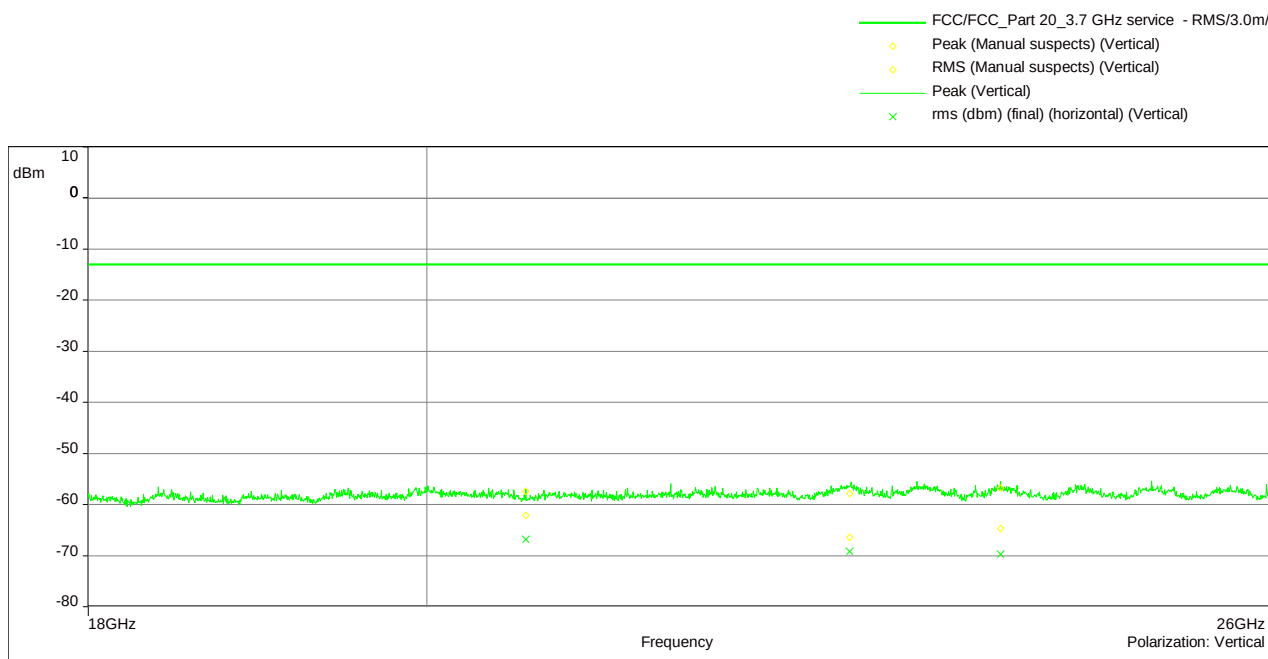


The test results relate only to the tested item. The sample has been provided by the client.

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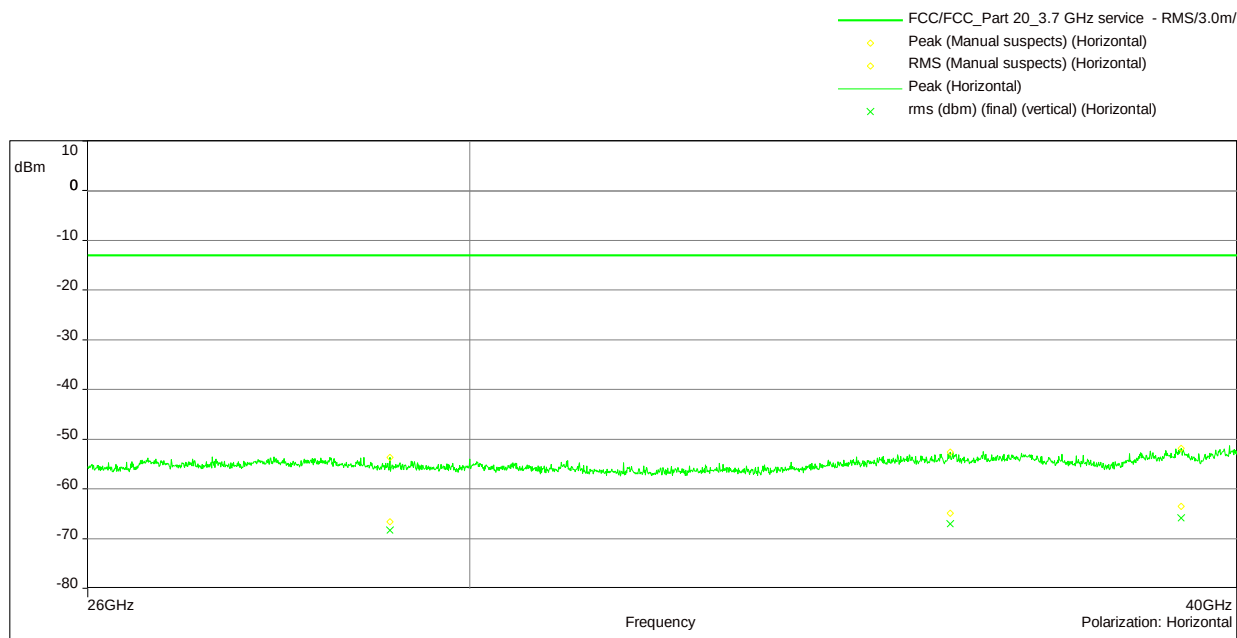
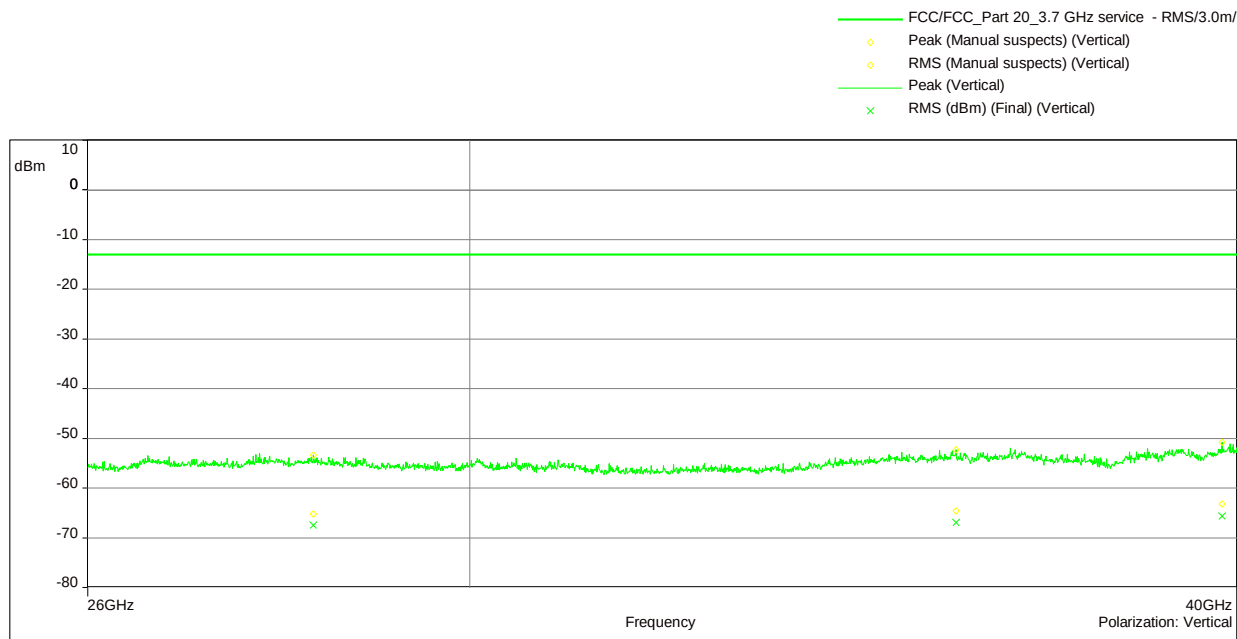
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18 GHz - 26 GHz. horizontal**18 GHz - 26 GHz. vertical**

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26 GHz - 40 GHz. horizontal**26 GHz - 40 GHz. vertical**

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

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5.8.6 FIELD STRENGTH CALCULATIONS

$$\mathbf{FS} = \mathbf{SA} + \mathbf{AF} + \mathbf{CL} + \mathbf{PA}$$

Where as:

- FS** = Field strength
- SA** = EMC test receiver reading
- AF** = Antenna factor
- CL** = Cable loss
- PA** = Preamplifier

5.8.7 TEST EQUIPMENT USED

- Radiated Emissions



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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

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	Arduino & HTY939	Thermo-Hygrometer	Bureau Veritas	E-003998	2024-02	2025-02
1.4	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 RADIATED EMISSIONS

Ref.No.	Type	Description	Manufacturer	Inventory no.	Last Calibration	Calibration Due
1.5	ESU40	EMI test receiver 10 Hz - 40 GHz	Rohde & Schwarz	E-003138	2024-10	2025-10
1.6	CBL 6111C	Antenna 30 MHz - 1 GHz	Chase	E-003226	2024-02	2026-02
1.7	LB-8180-SF	Antenna 0.8 GHz - 18 GHz	A-Info Inc.	E-004052	2024-08	2025-08
1.8	MWH-1826/B	Antenna 18 GHz - 26.5 GHz	ARA Inc.	E-004043	2024-09	2025-09
1.9	MWH-2640/B	Antenna 26 GHz - 40 GHz	ARA Inc.	E-004046	2024-05	2025-05
1.10	AM1431 *	Pre amplifier 10 kHz - 1 GHz	Miteq	E-003365	2024-10	2025-10
1.11	AFS4-00102000	Preamplifier 100 MHz - 20 GHz	Miteq	E-003633	2024-10	2025-10
1.12	AMP-2000-43000- 50-10-2.9-F	Preamplifier 2 GHz - 43 GHz	Miteq	E-004003	2024-10	2025-10
1.13	CO3000	Controller SAC	Innco systems GmbH	E-003052 with Software 1.02.62	---	---
1.14	Arduino & HTY939	Thermo- Hygrometer	Bureau Veritas	E-004027	2024-02	2025-02
1.15	BAT-EMC	Software	Nexio	V 2024.0.5.2	---	---

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

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7 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 returning calibration control.

Sample calculation

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

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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8 MEASUREMENT UNCERTAINTIES

KDB 935210 D05	ECL
Power measurement	0.68 dB
Measuring AGC threshold level	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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EMC tests on CAP H2 34T/37T F-AC-F1 [34T]

9 PHOTO REPORT

Please see separate photo report.

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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 *****

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