



TEST REPORT nr. R14082001
Federal Communication Commission (FCC)
Industry Canada (IC)

Test item

Description.....: Transceiver unit
Trademark.....: AUTECH
Model/Type: Model: RNF
Type: LA00M

Test Specification

Standard: FCC Rules & Regulations, Title 47:2013
Part 15 paragraph(s): 203, 204, 207, 209 and 249
RSS-210 (2010)

Client's name: AUTECH S.r.l.
Address: Via Pomaroli, 65 – 36030 Caldogno (VI) – ITALY

Manufacturer's name : Same as client
Address: --

Report

Tested by: G. Gandini – Technician
Approved by: R. Beghetto – Laboratory Manager
Date of issue: 02.12.14
Contents.....: 66 pages

G. Gandini

R. Beghetto

This test report shall not be reproduced except in full without the written approval of CMC.
The test results presented in this report relate only to the item tested.



Index

1. SUMMARY	3
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2.1 TEST SITE	4
3. TESTING AND SAMPLING	5
4. OPERATIVE CONDITIONS	5
5. PHOTOGRAPH(S) OF EUT	6
5.1 PHOTOGRAPH(S) OF EUT	6
6. EQUIPMENT LIST	7
7. MEASUREMENT UNCERTAINTY	8
8. REFERENCE DOCUMENTS	9
9. DEVIATION FROM TEST SPECIFICATION	10
10. TEST CASE VERDICTS	10
11. RESULTS	11
11.1 ANTENNA REQUIREMENTS	12
11.2 RADIATED EMISSIONS	13
11.3 CONDUCTED EMISSIONS	25
11.4 OCCUPIED BANDWIDTH (99% BW)	29
11.5 PEAK OUTPUT POWER	37
11.6 BAND EDGE	52
11.7 SPURIOUS EMISSION	64
<i>Environmental conditions</i>	64



1. Summary

Standard:

FCC Rules & Regulations, Title 47:2013
Part 15 paragraph(s): 203, 204, 207, 209 and 249
RSS-210 (2010) – Annex 2 (A2.9)

Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.203 IC – RSS-210	Antenna requirements	1	Complies
Part 15.207 IC – RSS-210 – Annex 2 (A2.9)	Conducted emissions	2	Complies
Part 15.209 IC – RSS-210 – Annex 2 (A2.9)	Radiated emissions	3	Complies
IC – RSS-210 – Annex 2 (A2.9)	Occupied bandwidth (99% BW)	4	Complies
Part 15.209 and 15.249 IC – RSS-210 – Annex 2 (A2.9)	Peak Output Power	5	Complies
Part 15.249 (d) IC – RSS-210 – Annex 2 (A2.9)	Band edge	6	Complies
Part 15.209 IC – RSS-210 – Annex 2 (A2.9)	Spurious emission	7	Complies

The Test Report was given to the Client representatives for necessary documentation of ratification of the tested equipment and it is valid for the FCC certification



2. Description of Equipment under test (EUT)

Power supply : 12/24Vdc – 24Vac
Tests executed with 24Vac

Serial Number : --

Type of equipment : ☒ Transmitter Unit
☒ Receiver Unit

Type of station : ☐ Fixed station
☒ Portable station
☐ Mobile station

Information on antenna : Embedded
External antenna: $\lambda/4$ stylus antenna
Type: A0ANTE00E0040

Nominal frequency : 902 – 928 MHz

FCC ID : OQA-RNFLA00M

IC number : 9061A-RNFLA00M

2.1 Test Site

Company : CMC Centro Misure Compatibilità S.r.l.

Address : Via dell'Elettronica, 12/C
36016 Thiene (VI) – ITALY

Test site facility's IC registration number : 9055A



3. Testing and sampling

Date of receipt of test item : 07.05.14

Testing start date..... : 08.05.14

Testing end date : 10.06.14

Samples tested nr..... : 1

Sampling procedure. : Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion

Internal identification : adhesive label with the product number P140462

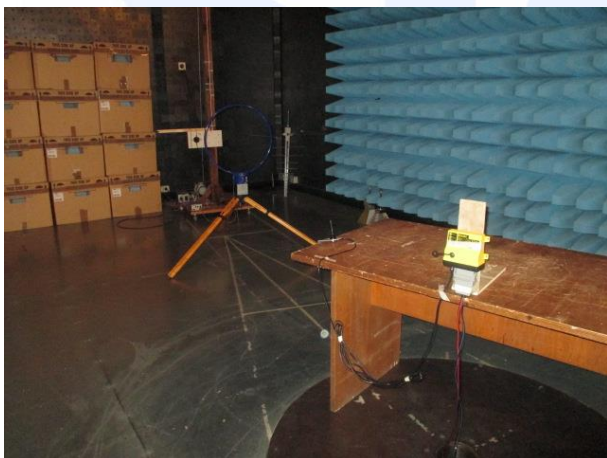
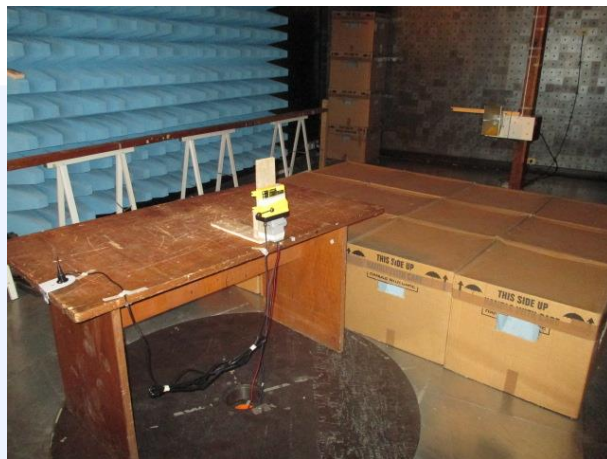
4. Operative conditions

EUT exercising : EUT in continuous transmission at maximum power



5. Photograph(s) of EUT

5.1 Photograph(s) of EUT





6. Equipment list

<i>Id. number</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Description</i>	<i>Serial number</i>	<i>Last calibration</i>	<i>Due date calibration</i>
CMC S010	Rohde & Schwarz	ESH3-Z2	Impulses Limiting Device	- - -	January '14	January '15
CMC S108	EMCO	3115	Horn Antenna	9811-5622	May '13	May '16
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	January '13	January '16
CMC S136	Schwarzbeck	VULB 9163	Broadband Antenna	9136-205	May '13	May '16
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '14	January '15
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '14	January '15
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '14	January '15



7. Measurement uncertainty

Test	Expanded Uncertainty	note
Conducted Emission		
(50 Ω /50 μ H AMN) - (9 kHz – 150 kHz)	± 3.8 dB	1
(50 Ω /50 μ H AMN) - (150 kHz – 30 MHz)	± 3.3 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	± 3.3 dB	1
(50 Ω /5 μ H AMN) - (150 kHz – 108 MHz)	± 2.8 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50 Ω /50 μ H AMN) - (150 kHz – 30 MHz)	± 3.3 dB	1
Disturbance Power (30 MHz – 300 MHz)		
	± 3.9 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	± 4.3 dB	1
(30 MHz – 1000 MHz)	± 4.4 dB	1
(1 GHz – 6 GHz)	± 4.6 dB	1
Electromagnetic field EMF		
	± 15.0 %	1
Harmonic current emissions test		
	± 2.7 %	1
Voltage fluctuation and flicker test		
	± 2.9 %	1
Insertion loss test		
	± 2.7 dB	1
Radiated electromagnetic disturbance test (loop antenna)		
	± 2.7 dB	1
Radiated electromagnetic field immunity test		
	0.77 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test		
	0.77 V/m at 3V/m	1
Injected currents immunity test		
	0.48 V at 3V	1
Bulk current		
	5.3 mA at 60 mA	1
Power frequency magnetic field immunity test		
	0.1 A/m at 10 A/m	1
Effective radiated power (F < 1GHz)		
	± 4.4 dB	1
Effective radiated power (F > 1GHz)		
	± 3.9 dB	1
Frequency error		
	$< 1 \times 10^{-7}$	1
Modulation bandwidth		
	$< 1 \times 10^{-7}$	1
Adjacent channel power		
	± 2.6 dB	1
Blocking		
	± 2.6 dB	1
Electrostatic discharge immunity test		
		2
Electrical fast transients / burst immunity test		
		2
Surge immunity test		
		2
Pulse magnetic field immunity test		
		2
Damped oscillatory magnetic field immunity test		
		2
Short interruption immunity test		
		2
Voltage transient emission test		
	± 2.2 %	1
Transient immunity test		
		2

Notes

Note 1:

The expanded uncertainty reported according to EN55016-4-2:2011 is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of $p = 95\%$

Note 2:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor $k = 2$.



8. Reference documents

Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2013	--
RSS-210 Issue 8 – December 2010	Low-power licence-exempt radiocommunication devices (all frequency bands): Category I Equipment
RSS-GEN Issue 4 – November 2014	General Requirements for Compliance of Radio Apparatus
ANSI C63.4: 2003	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
Internal Procedure PM001 rev. 2.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 8.2 (Quality Manual)	Measurement uncertainty calculation



9. Deviation from test specification

In agreement with the client, emission tests were performed with peak detector.

At the frequencies where the measures exceed the limit or within 6 dB from it, the test was repeated with quasi-peak detector and/or average detector.

10. Test case verdicts

Test case does not apply to the test object..... : N.A.

Test item does meet the requirement..... : Complies

Test item does not meet the requirement..... : Does not comply

Test not performed : N.E.



11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 8.2.

Judgement of compliance:

Case 1	Case 2	Case 3	Case 4
The sample is Complies.	The sample is Complies.	The sample is Not Complies.	The sample is Not Complies.
The measurement results is within the specification limit when the measurement uncertainty is taken into account.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty also the measurement result is upper the limit.	The measurement results is outside the specification limit when the measurement uncertainty is taken into account.

In agreement with ILAC-G8: 03/2009 Guidelines on the Reporting of Compliance with Specification.



11.1 Antenna requirements

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.203 and 15.204
- RSS-210
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

--
Measurement uncertainty: See clause 7 of this test report

Test specification

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	98	50

Result

Antenna Type	External R.F. power amplifier	Gain	Remarks	Results
Embedded	Not Present	0 dBi	--	Complies
External	Not Present	0 dBi	--	Complies

Result: The requirements are met



11.2 Radiated emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part. 15.209
- RSS-210
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Semi-anechoic chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S127, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Frequency range: 0,009 MHz – 1000 MHz
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	99	48

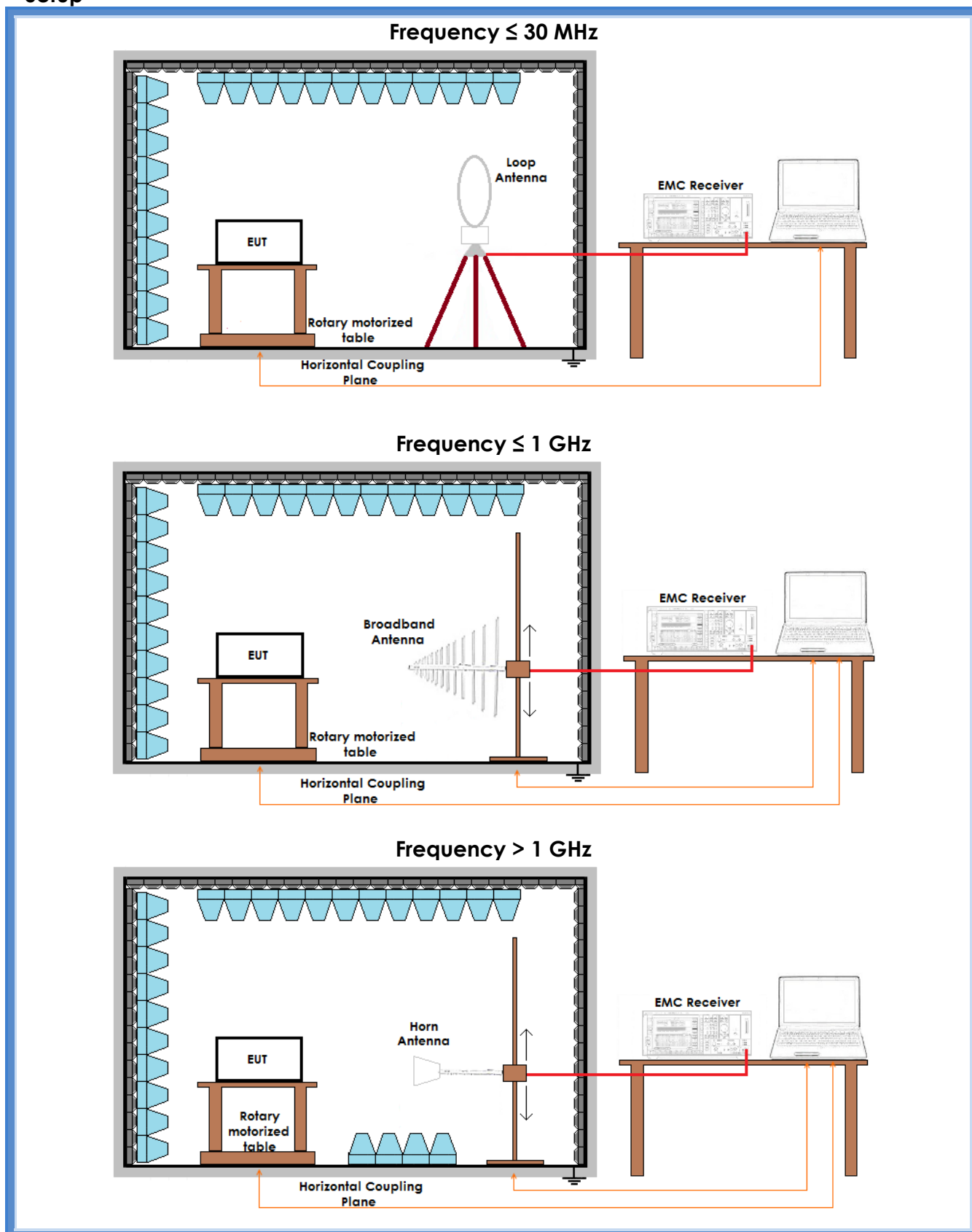
Acceptance limits

Frequency range (MHz)	Limits [dB(μV/m)]
0,009 to 0,490	128,51 to 93,80
0,490 to 1,705	73,80 to 62,97
1,705 to 30	69,54
30 to 88	40
88 to 216	43,52
216 to 960	46,02
Above 960	53,98

Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.



Setup





Result

Channel	Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
--	Loop	0,009 – 30	G14082009	--	Complies
915,050	H	30 – 1000	G14082008	--	Complies
915,050	V	30 – 1000	G14082007	--	Complies
921,000	H	30 – 1000	G14082006	--	Complies
921,000	V	30 – 1000	G14082005	--	Complies
927,750	H	30 – 1000	G14082004	--	Complies
927,750	V	30 – 1000	G14082003	--	Complies
927,750	H	1000 – 10000	G14082002	--	Complies
927,750	V	1000 – 10000	G14082001	--	Complies

Remarks: --

Graphs Legend

PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +

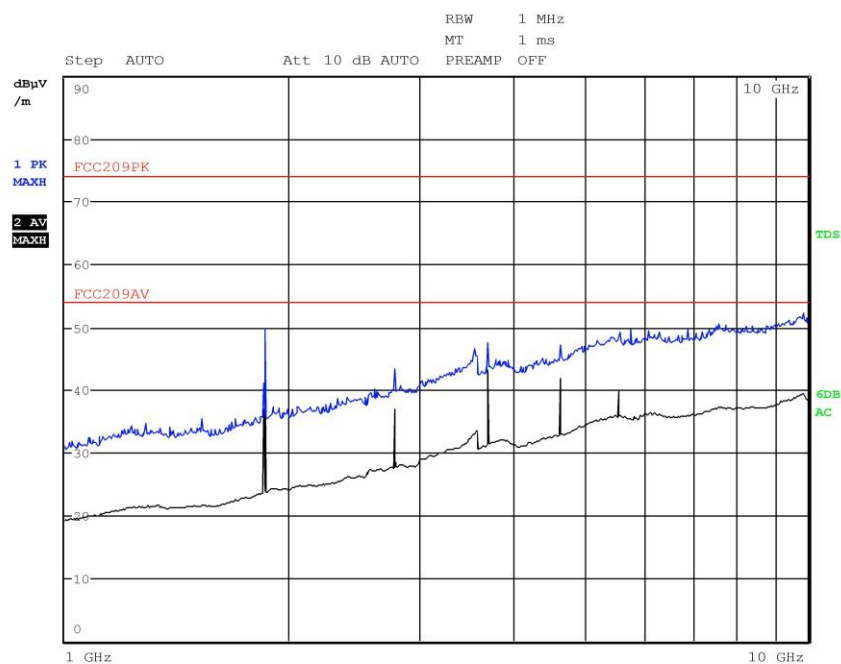
AV: Average; AV [1s] (average at 1 second) values are marked with a x



Graphs

G140820001

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Ant. 5m
Operator Gandini 14082001
Test Spec
Vert



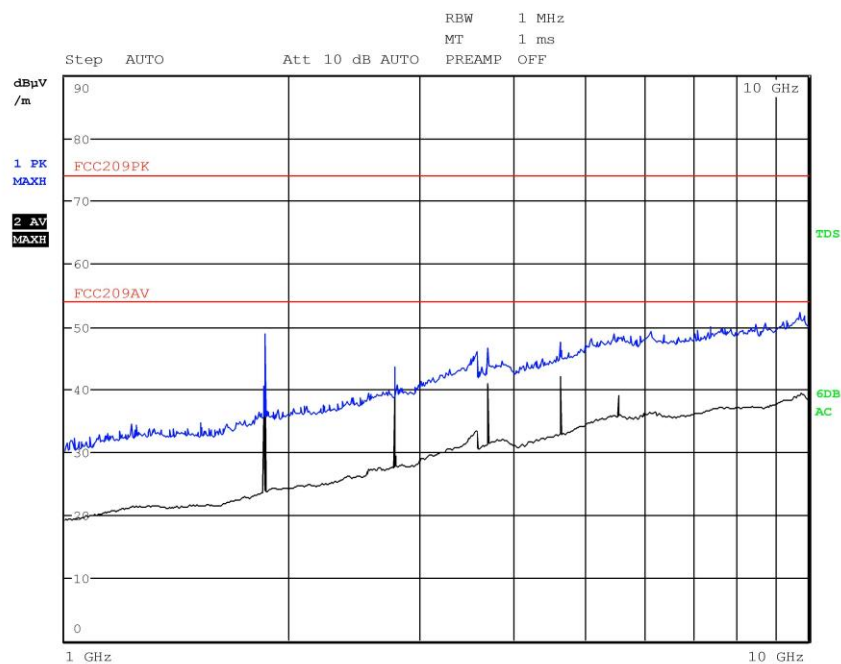
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Peaks: 0



G140820002

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Ant. 5m
Operator Gandini 14082002
Test Spec
Horiz



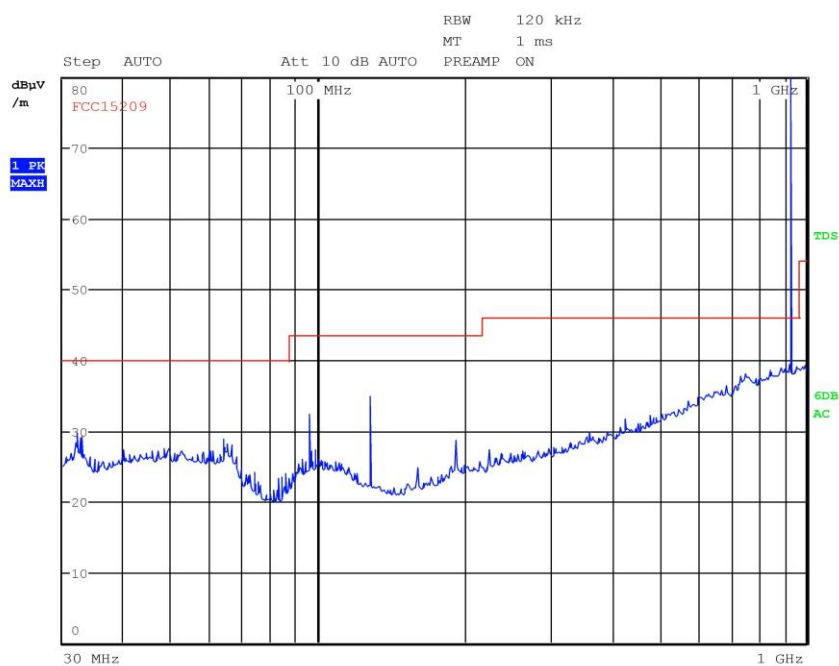
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Peaks: 0



G140820003

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Fmax - Ant.5m
Operator Gandini 14082003
Test Spec
Vert



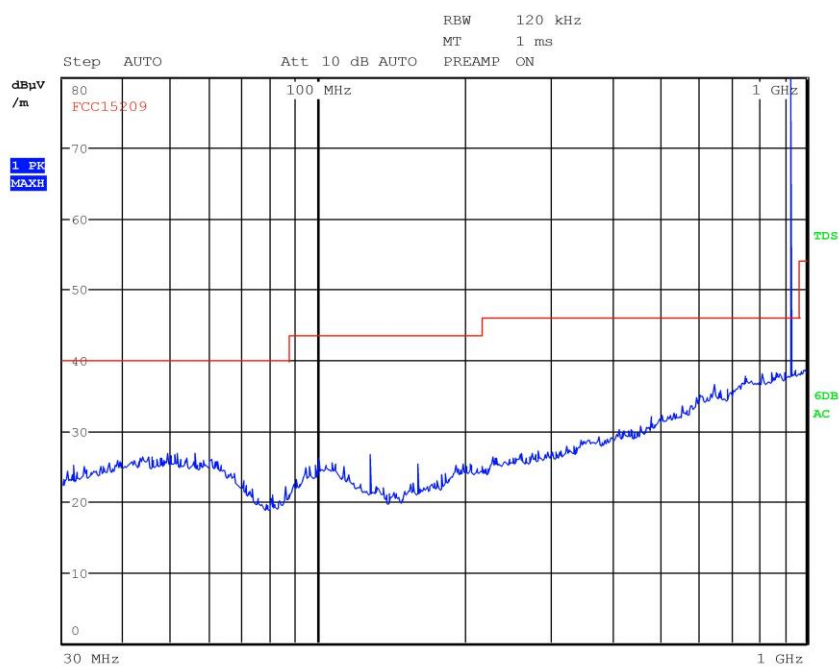
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0



G140820004

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Fmax - Ant.5m
Operator Gandini 14082004
Test Spec
Horiz



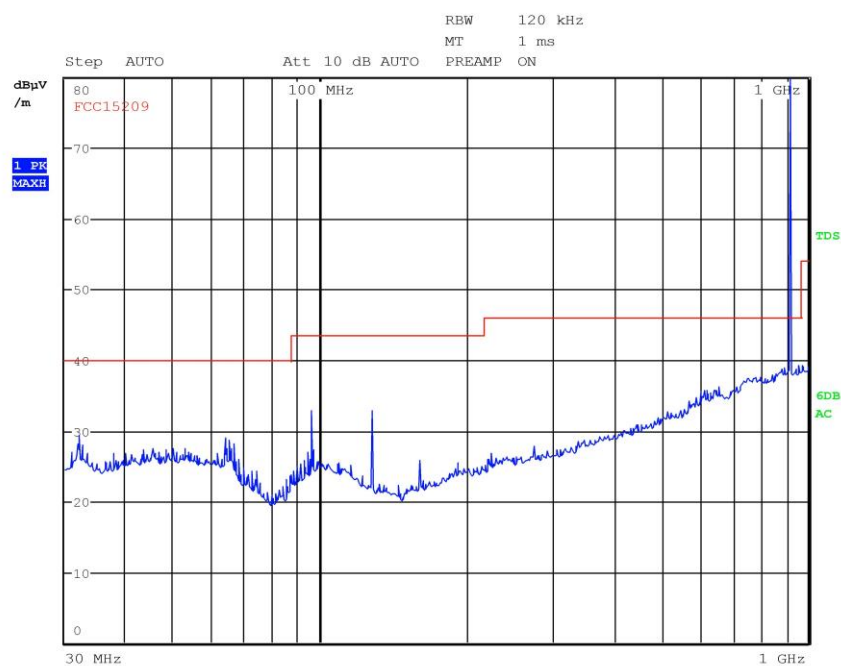
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0



G140820005

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Fmed - Ant.5m
Operator Gandini 14082005
Test Spec
Vert



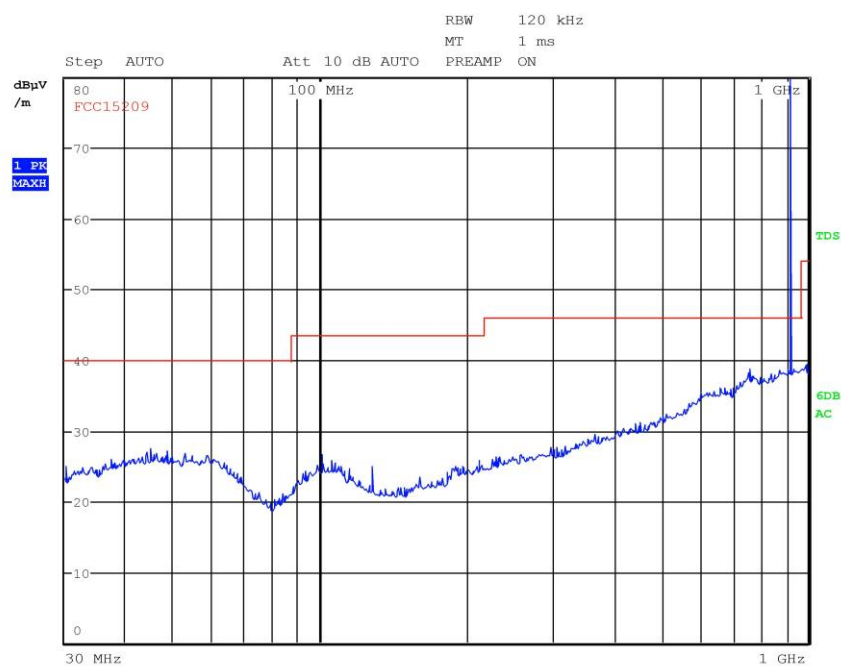
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0



G140820006

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Fmed - Ant.5m
Operator Gandini 14082006
Test Spec
Horiz



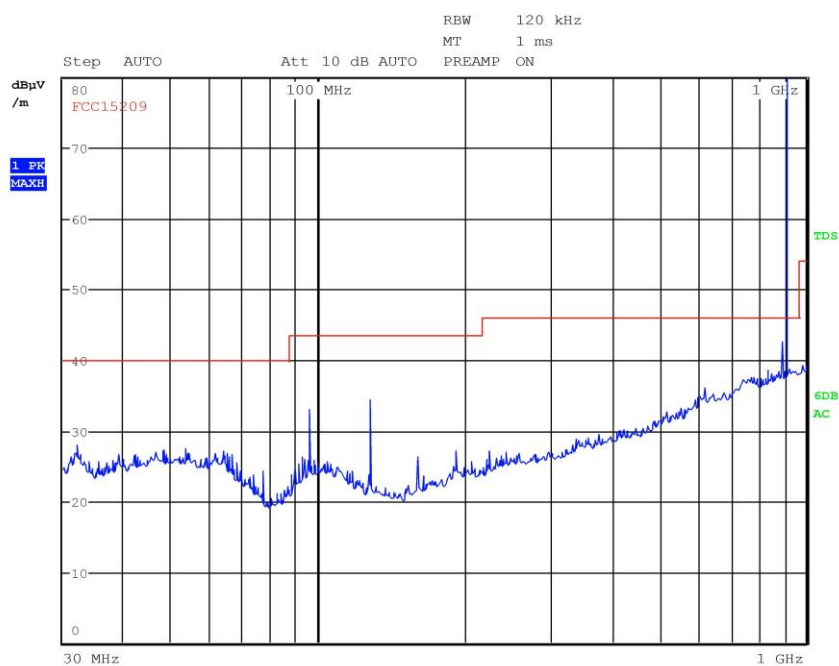
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0



G140820007

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Fmin - Ant.5m
Operator Gandini 14082007
Test Spec
Vert



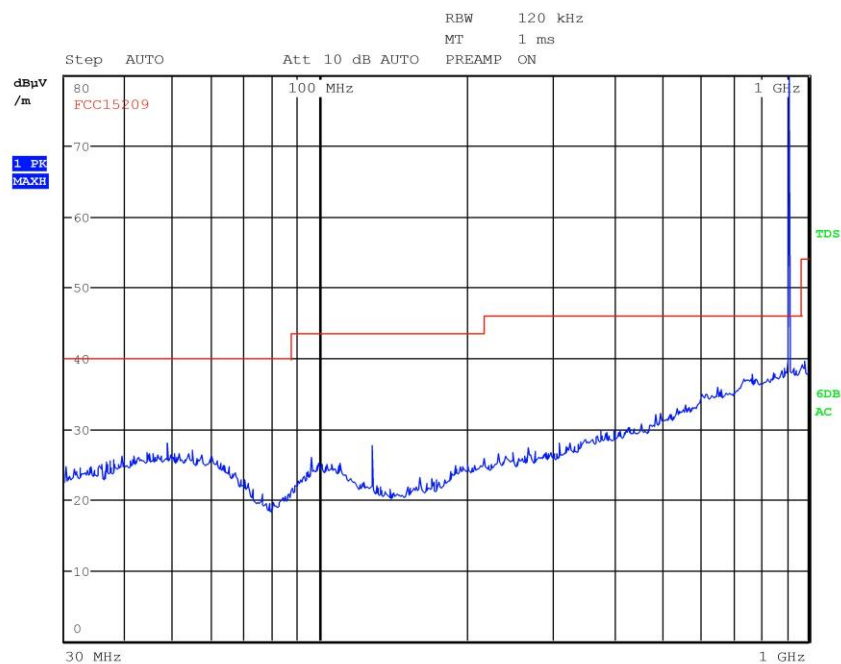
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0



G140820008

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx - Fmin - Ant.5m
Operator Gandini 14082008
Test Spec
Horiz



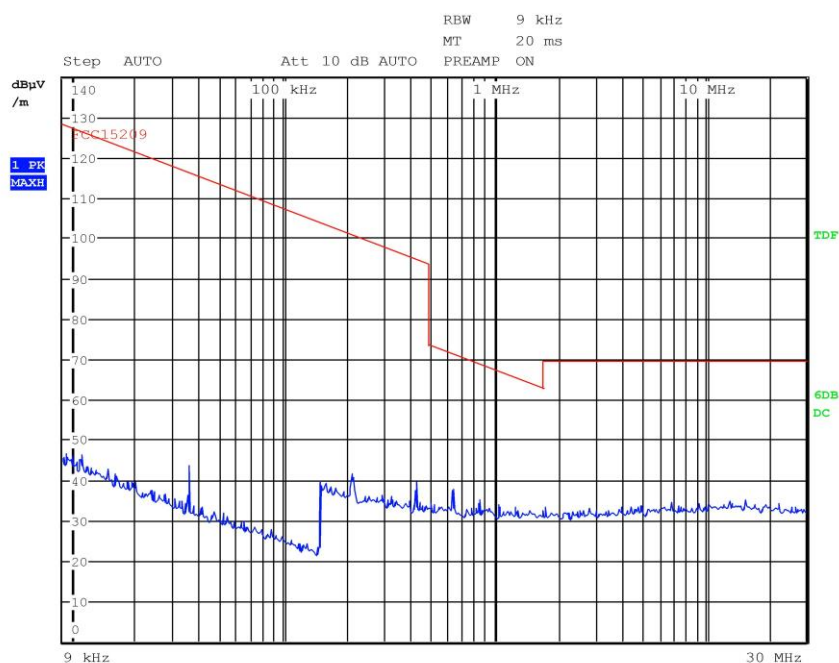
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0



G140820009

Meas Type Emission 0.009-30MHz
Equipment under Test
Manufacturer
OP Condition Tx - Ant.5m
Operator Gandini 14082009
Test Spec
Loop



Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0

Result: The requirements are met



11.3 Conducted emissions

Test set-up and execution

- FCC Rules and Regulation;
Titles 47 Part 15.207
- RSS 210 Annex 2 (A2.9)
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Shielded chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S010, CMC S200, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Main port
Frequency range: 150 kHz – 30 MHz

Environmental conditions

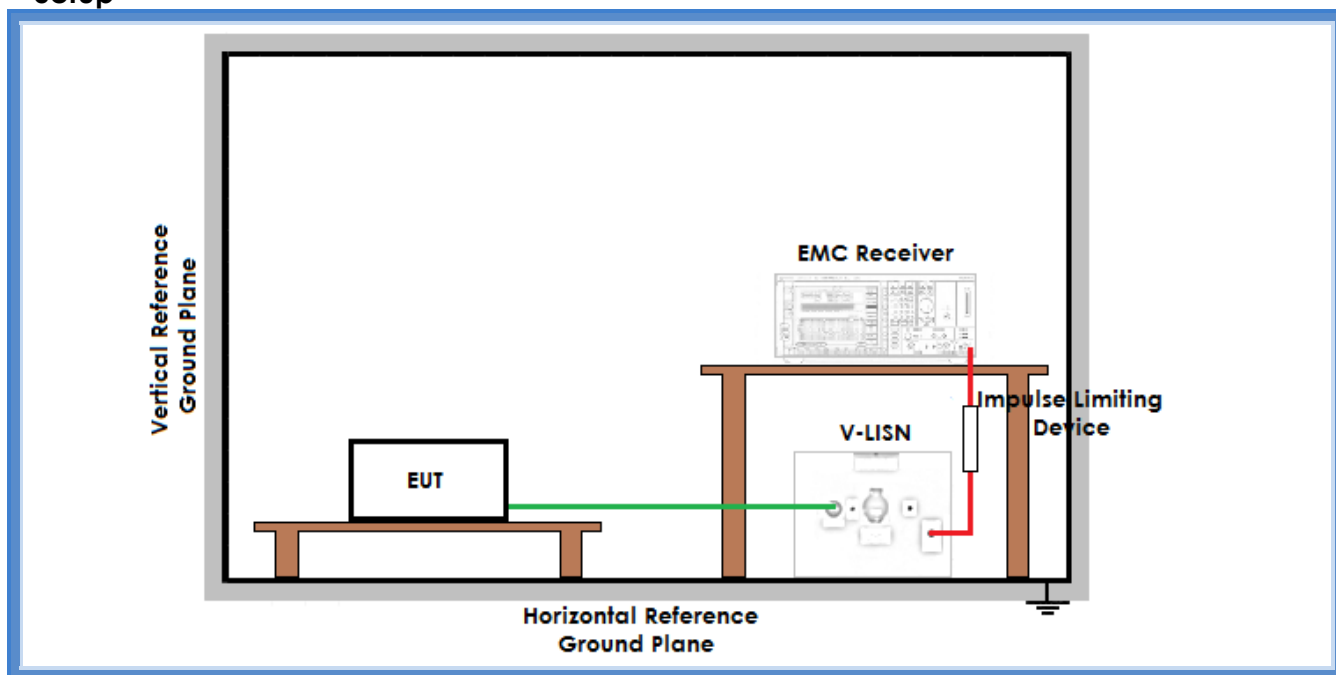
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	98	50

Acceptance limits

Frequency range (MHz)	dB(μV) Quasi-peak	dB(μV) Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50



Setup



Result

Line	Graphs	Remarks	Result
N	G14082023	--	Complies
L1	G14082024	--	Complies
Remarks: --			

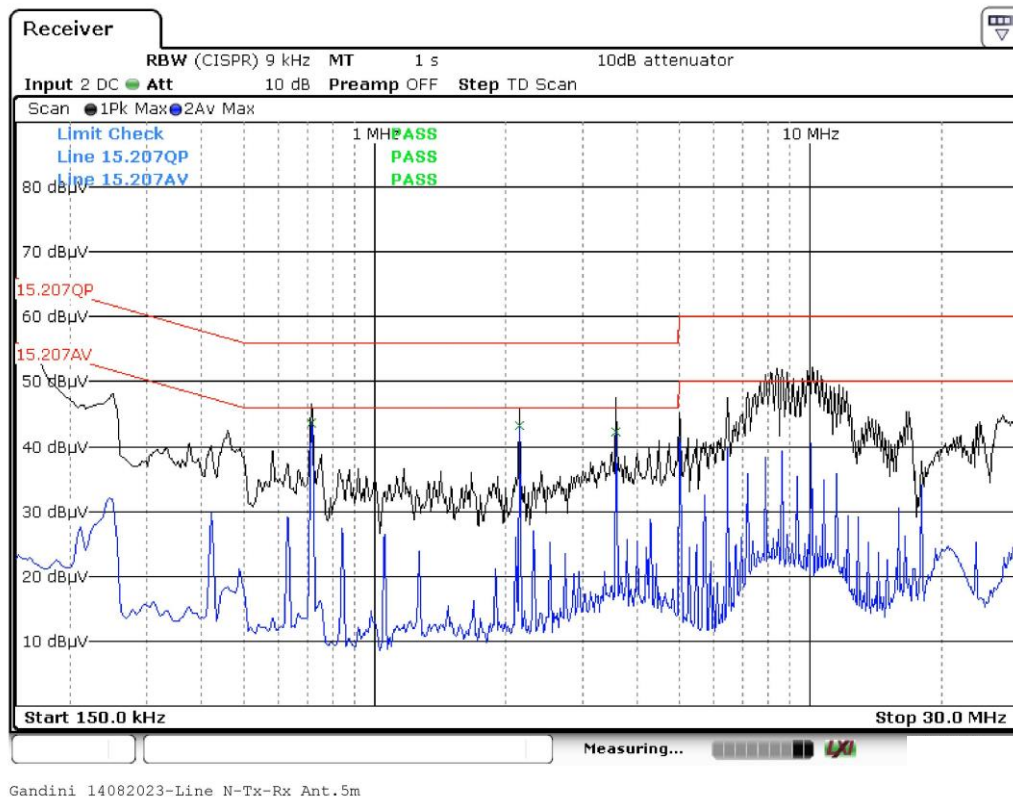
Graphs Legend

PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +
AV: Average; AV [1s] (average at 1 second) values are marked with a X



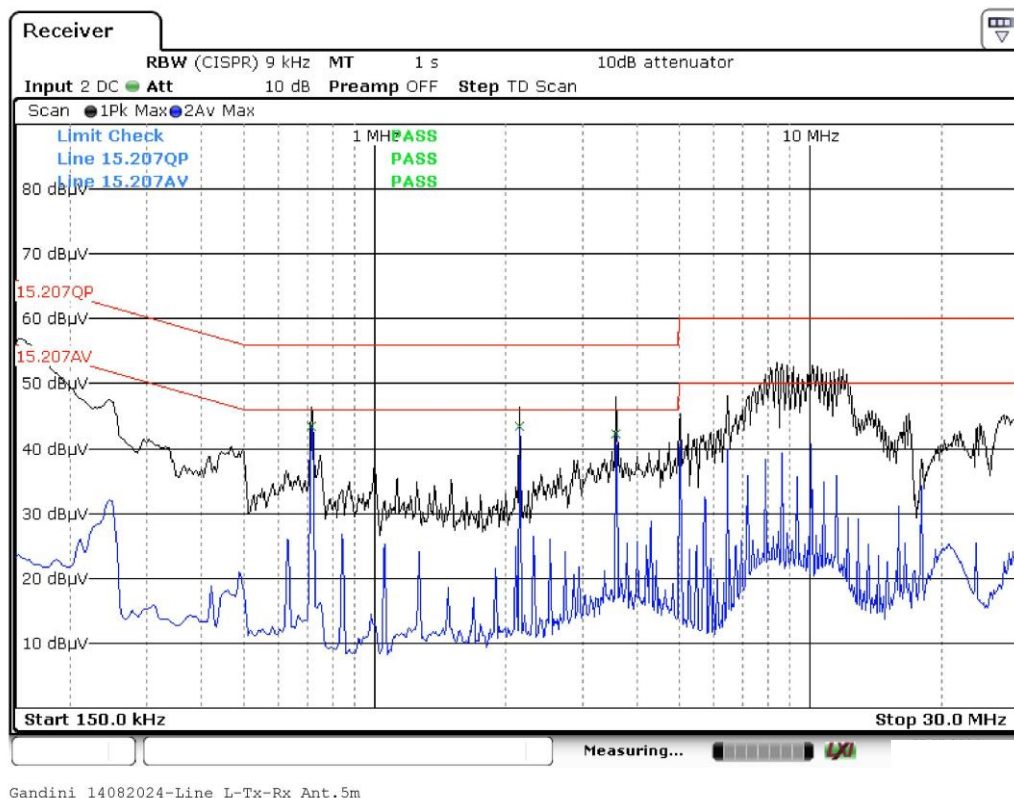
Graphs

G14082023





G14082024



Result: The requirements are met



11.4 Occupied bandwidth (99% BW)

Test set-up and execution

- RSS 210 Annex 2 (A2.9)
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

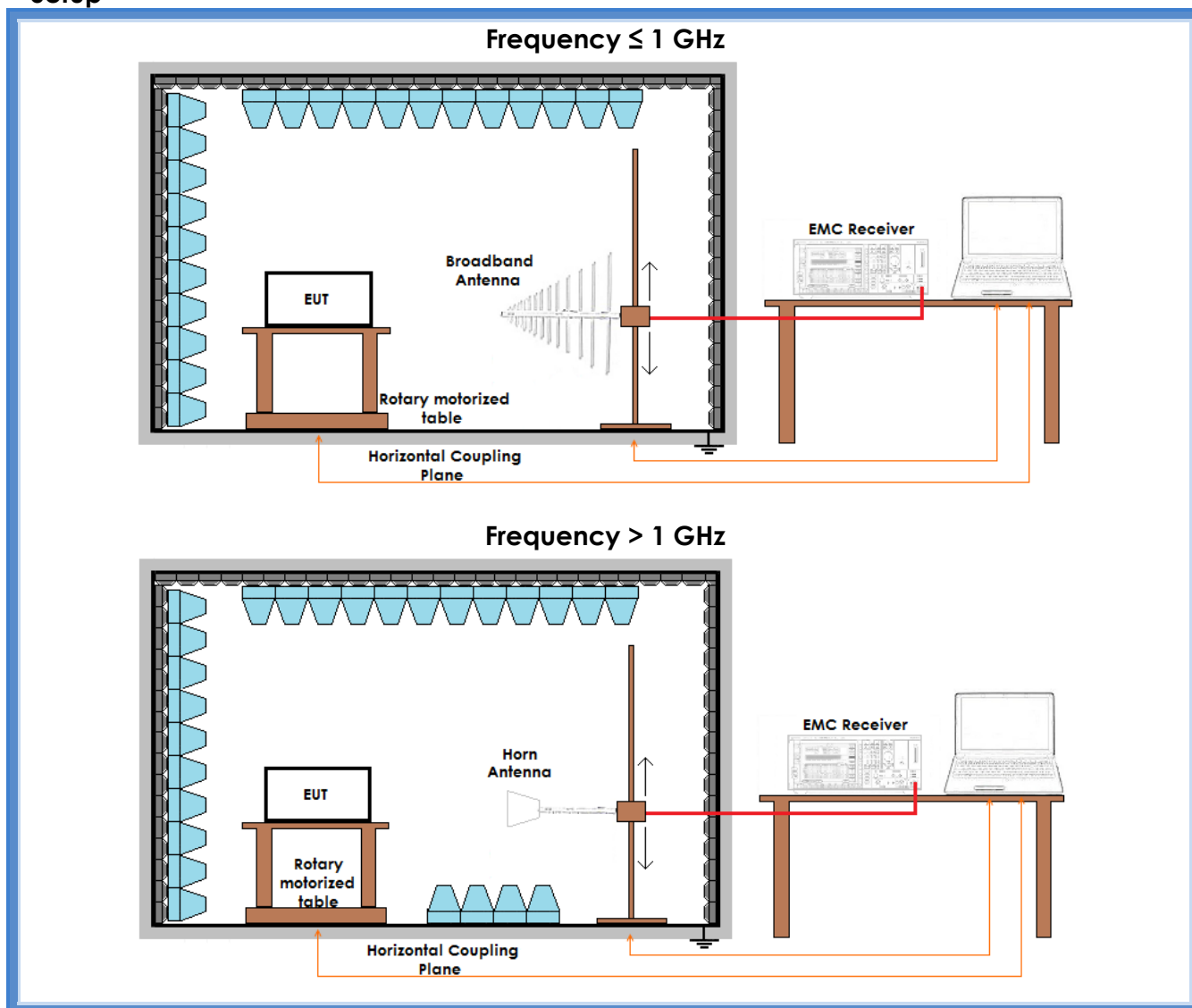
RSS 210 Annex 2 (A2.9)

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	99	50



Setup



Result

f (MHz)	99% bandwidth (kHz)	Graphs	Results	Remarks
915,050	12,98	G14082040	Complies	Antenna: Embedded
921,000	13,06	G14082029	Complies	
927,750	13,14	G14082034	Complies	
915,050	12,98	G14082021	Complies	Antenna: External
921,000	13,06	G14082017	Complies	
927,750	13,22	G14082013	Complies	