



TEST REPORT nr. R13203501
Federal Communication Commission (FCC)
Industry Canada (IC)

Test item

Description.....: Transceiver unit
Trademark.....: AUTECH
Model/Type: Model: AJS
Type: DA0BM

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

G. Gandini

Approved by: R. Beghetto – Laboratory Manager

R. Beghetto

Date of issue: 02.04.14

Contents.....: 49 pages

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.



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1. Summary

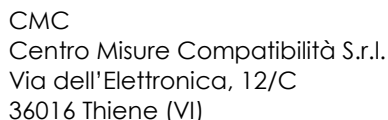
Standard:

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	--	N.A. (+)
Part 15.209 IC – RSS-210 – Annex 2 (A2.9)	Radiated emissions	2	Complies
IC – RSS-210 – Annex 2 (A2.9)	Occupied bandwidth (99% BW)	3	Complies
Part 15.209 and 15.249 IC – RSS-210 – Annex 2 (A2.9)	Peak Output Power	4	Complies
Part 15.249 (d) IC – RSS-210 – Annex 2 (A2.9)	Band edge	5	Complies
Part 15.209 IC – RSS-210 – Annex 2 (A2.9)	Spurious emission	6	Complies

(+) Devices which only employ battery power. See FCC Part 15.207 (c)

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 : 7,2Vdc

Serial Number..... : --

Type of equipment : ☒ Transmitter Unit
 ☒ Receiver Unit

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

Nominal frequency..... : 902 – 928 MHz

FCC ID : OQA-AJSDA0BM

IC number : 9061 A-AJSDA0BM

2.1 Test Site

Company..... : CMC Centro Misure Compatibilità S.r.l.
Address : Via dell'Elettronica, 12/C
36016 Thiene (VI) – ITALY

3. Testing and sampling

Date of receipt of test item : 18.11.13

Testing start date : 21.01.14

Testing end date : 27.01.14

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 P131155

4. Operative conditions

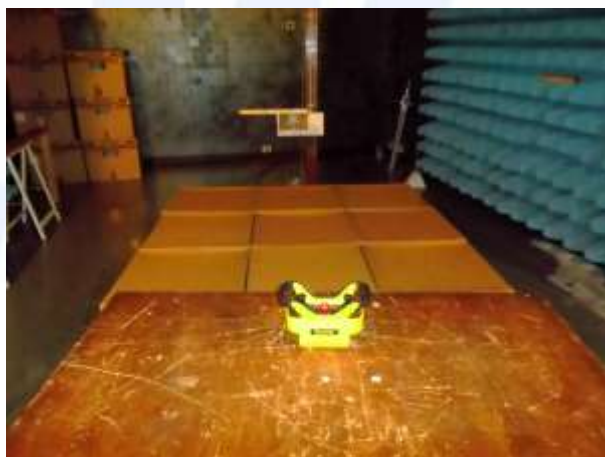
EUT exercising : EUT in continuous transmission at maximum power



CMC
Centro Misure Compatibilità S.r.l.
Via dell'Elettronica, 12/C
36016 Thiene (VI)

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		
(50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3.8 dB	1
(50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.3 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±3.3 dB	1
(50Ω/5μH AMN) - (150 kHz – 108 MHz)	±2.8 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50Ω/50μH 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		
	< 1x10 ⁻⁷	1
Modulation bandwidth		
	< 1x10 ⁻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
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 (%)
22	98	48

Result

Antenna Type	External R.F. power amplifier	Gain	Remarks	Results
Embedded	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	98	50

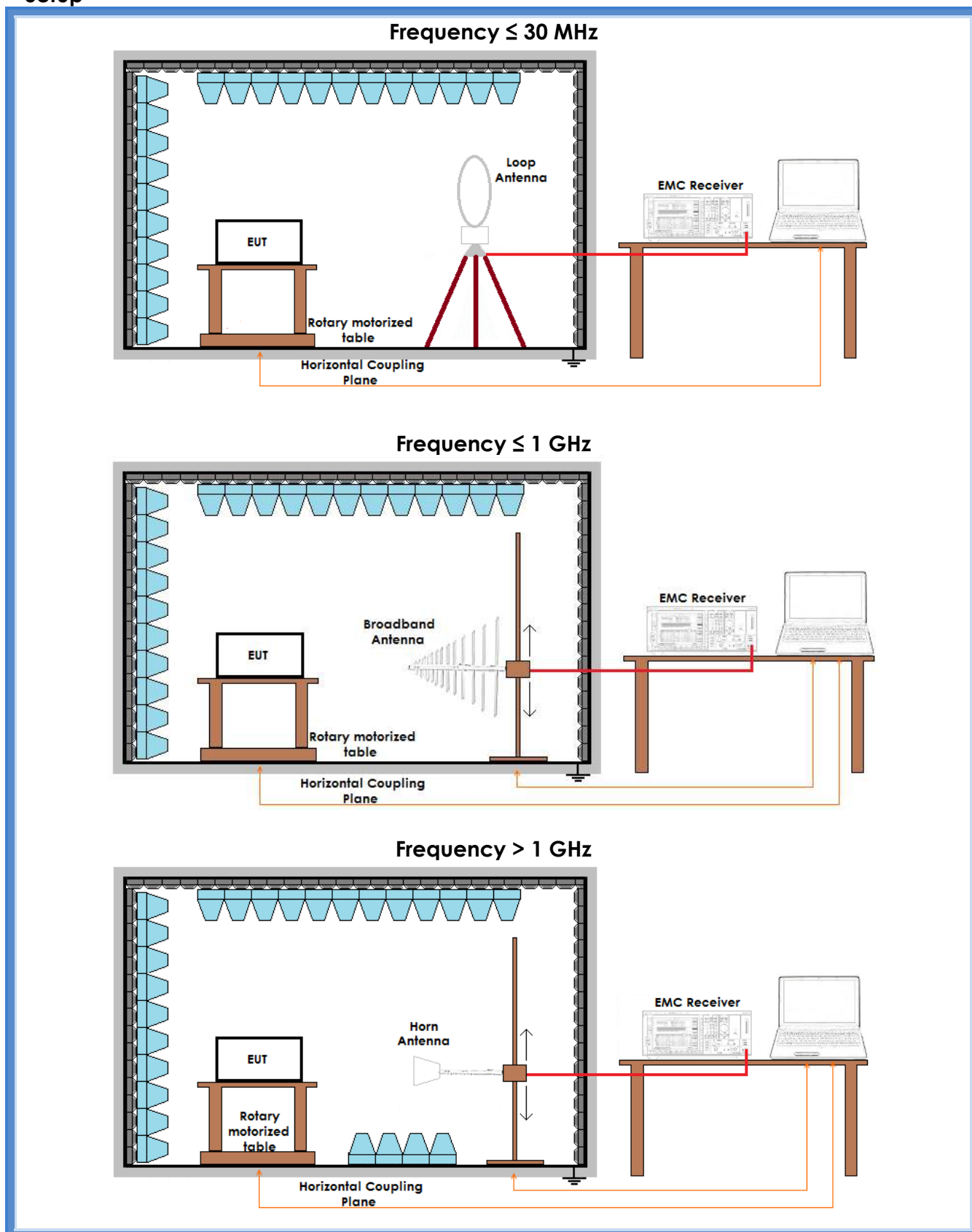
Acceptance limits

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	G13203509	--	Complies
915,050	H	30 – 1000	G13203515	--	Complies
915,050	V	30 – 1000	G13203519	--	Complies
921,000	H	30 – 1000	G13203501	--	Complies
921,000	V	30 – 1000	G13203505	--	Complies
927,750	H	30 – 1000	G13203531	--	Complies
927,750	V	30 – 1000	G13203524	--	Complies
915,050	H	1000 – 10000	G13203544	--	Complies
915,050	V	1000 – 10000	G13203543	--	Complies
921,000	H	1000 – 10000	G13203535	--	Complies
921,000	V	1000 – 10000	G13203536	--	Complies
927,750	H	1000 – 10000	G13203545	--	Complies
927,750	V	1000 – 10000	G13203546	--	Complies

Remarks: --

Graphs Legend

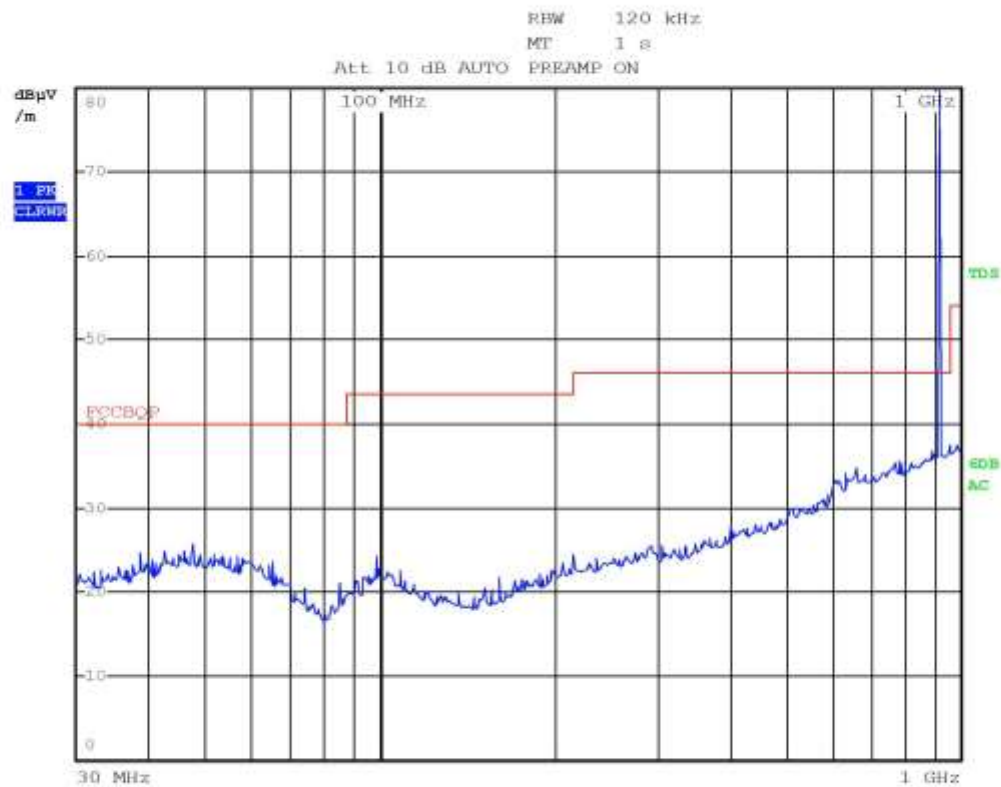
PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +

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



Graphs

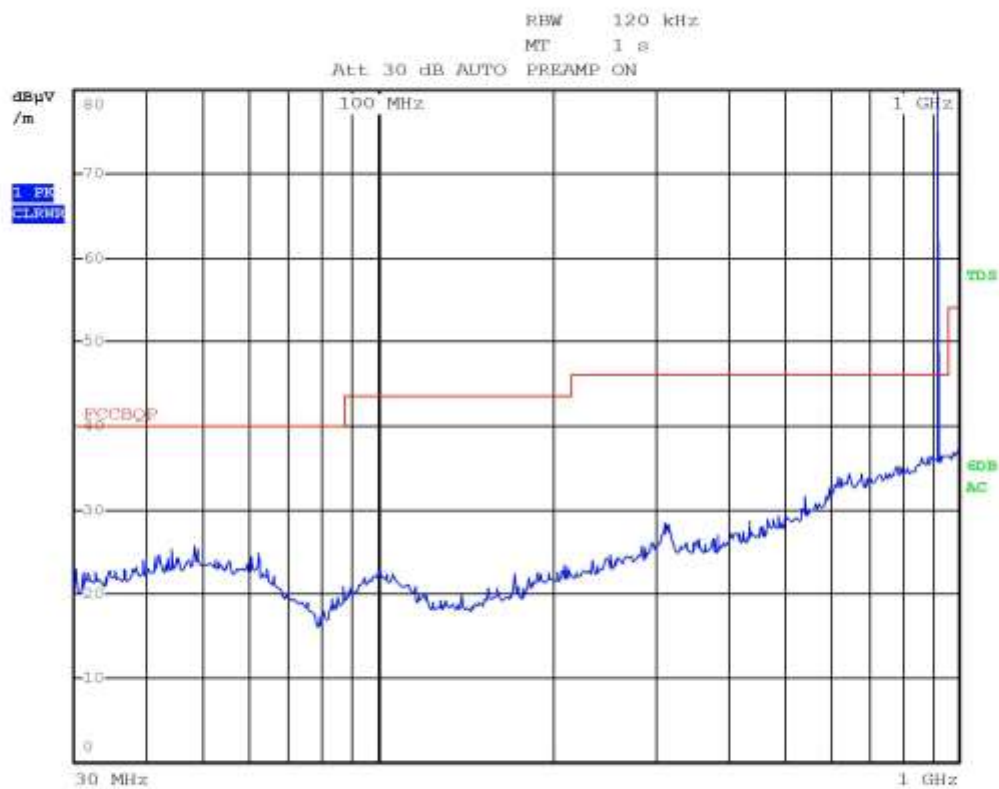
G13203501



Bertezzo 13203501 HORIZ - Fmed TX



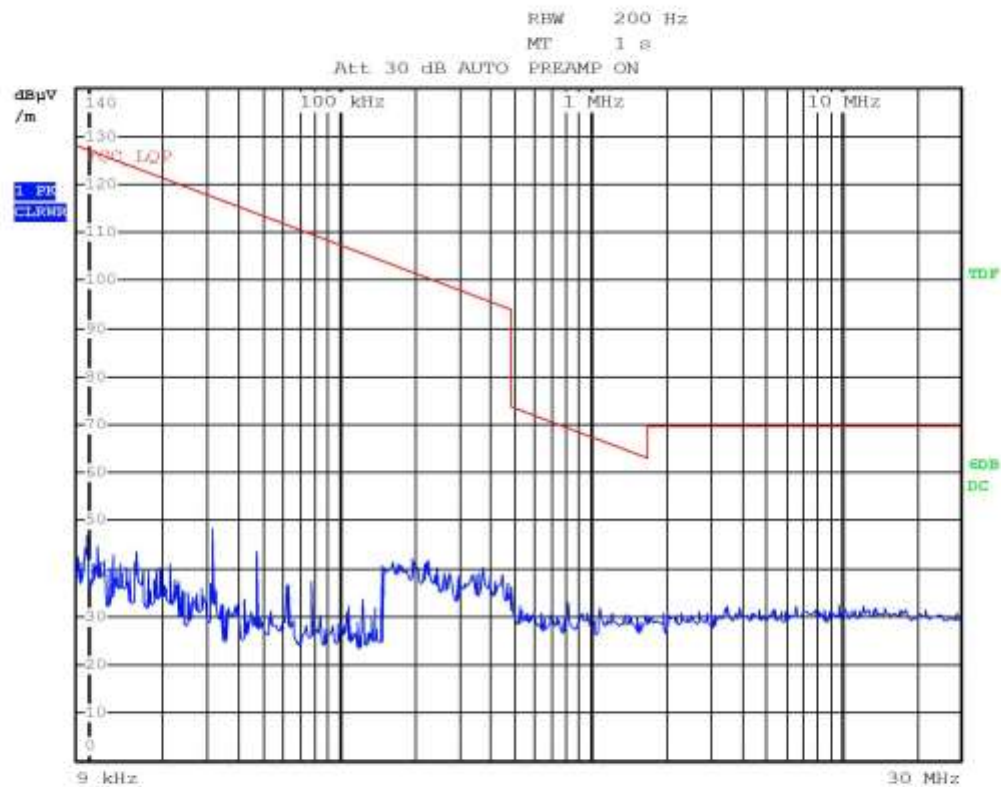
G13203505



Bertezzo 13203505 VERT - Fmed TX



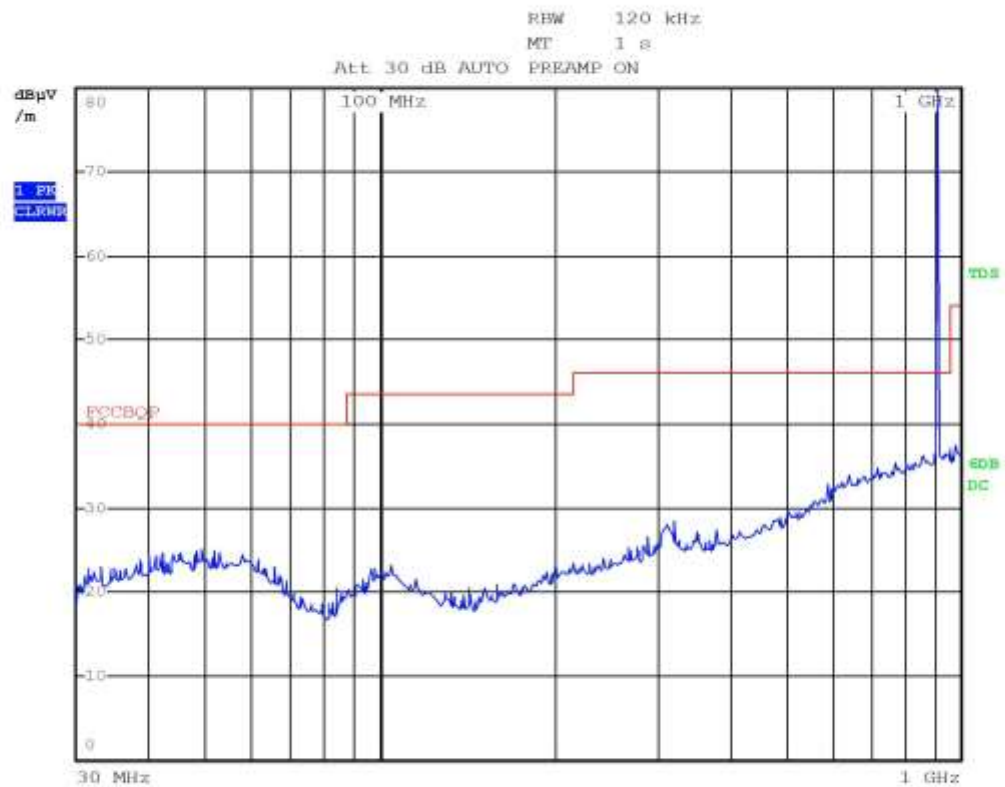
G13203509



Bertezzo 13203509 LOOP - Fmed TX



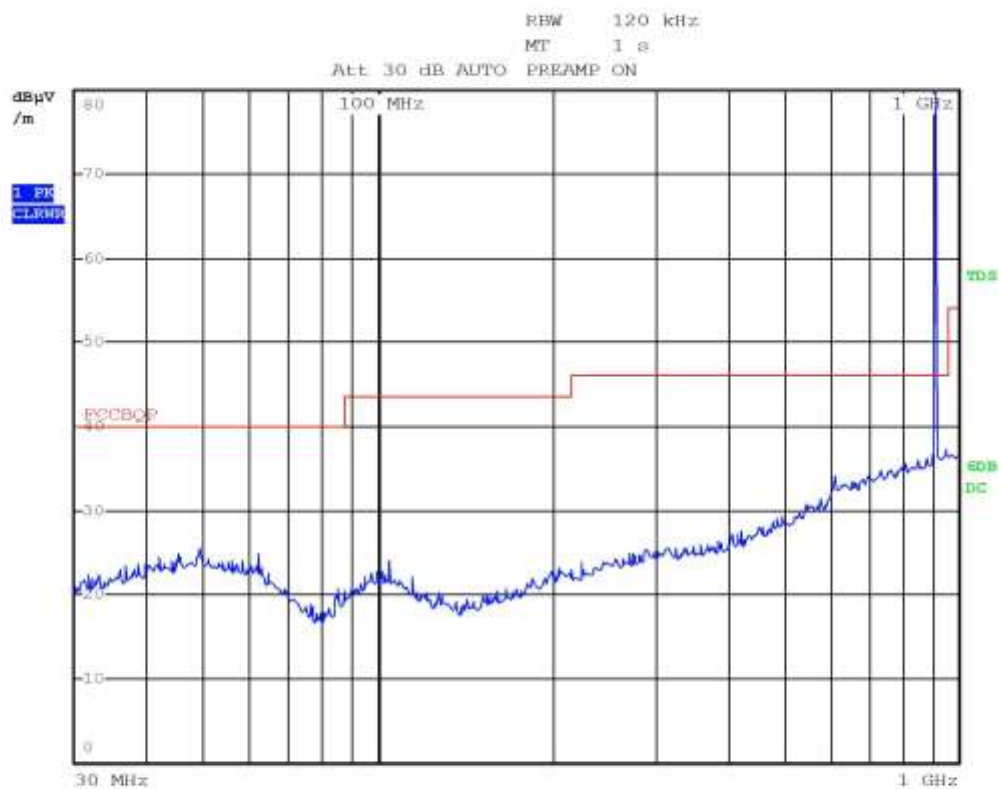
G13203515



Bertezzo 13203515 HORIZ - Fmin TX



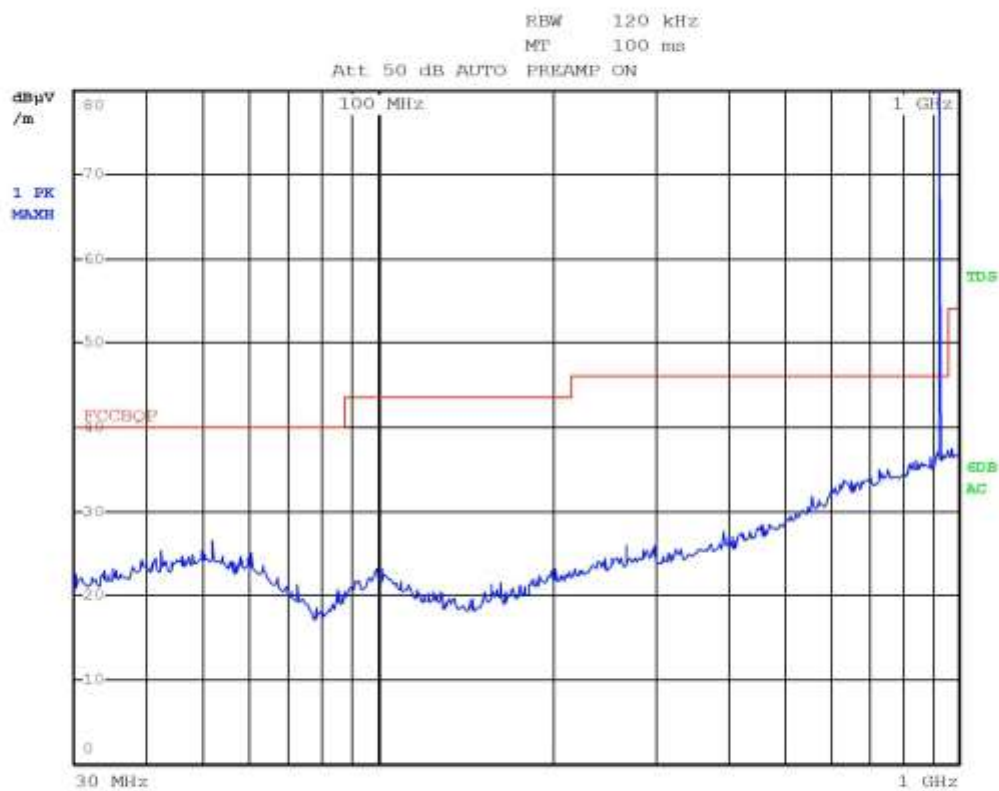
G13203519



Bertezzolo 13203519 VERT - Fmin TX



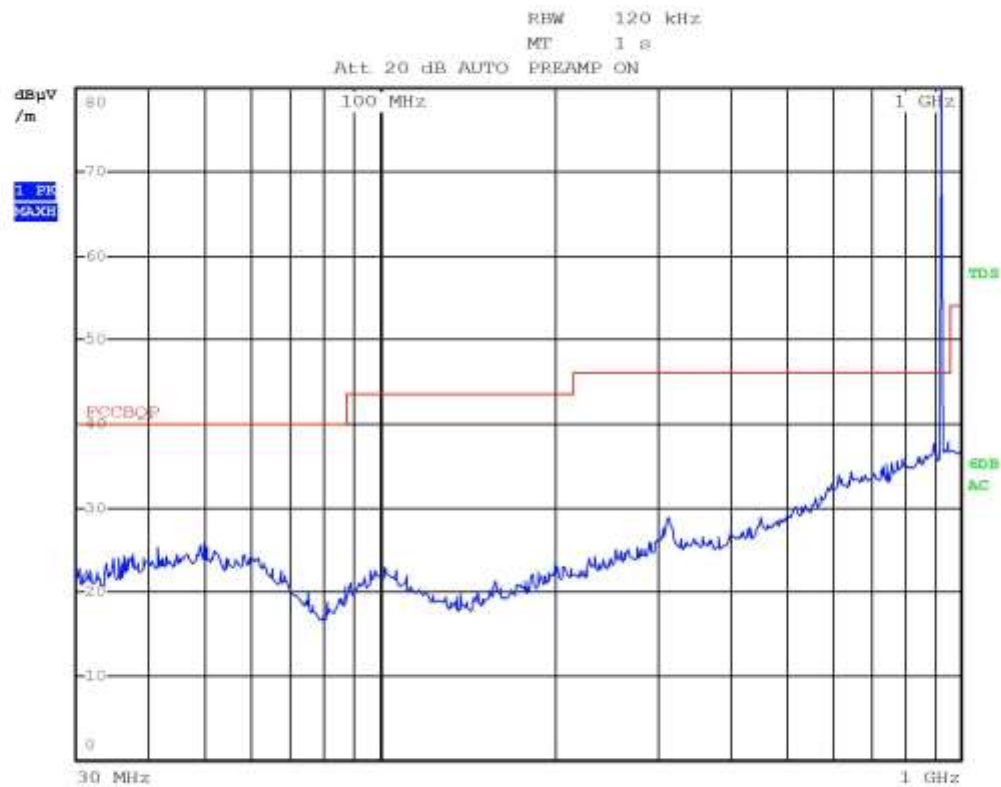
G13203524



Bertezzo 13203524 Vert -Fmax TX



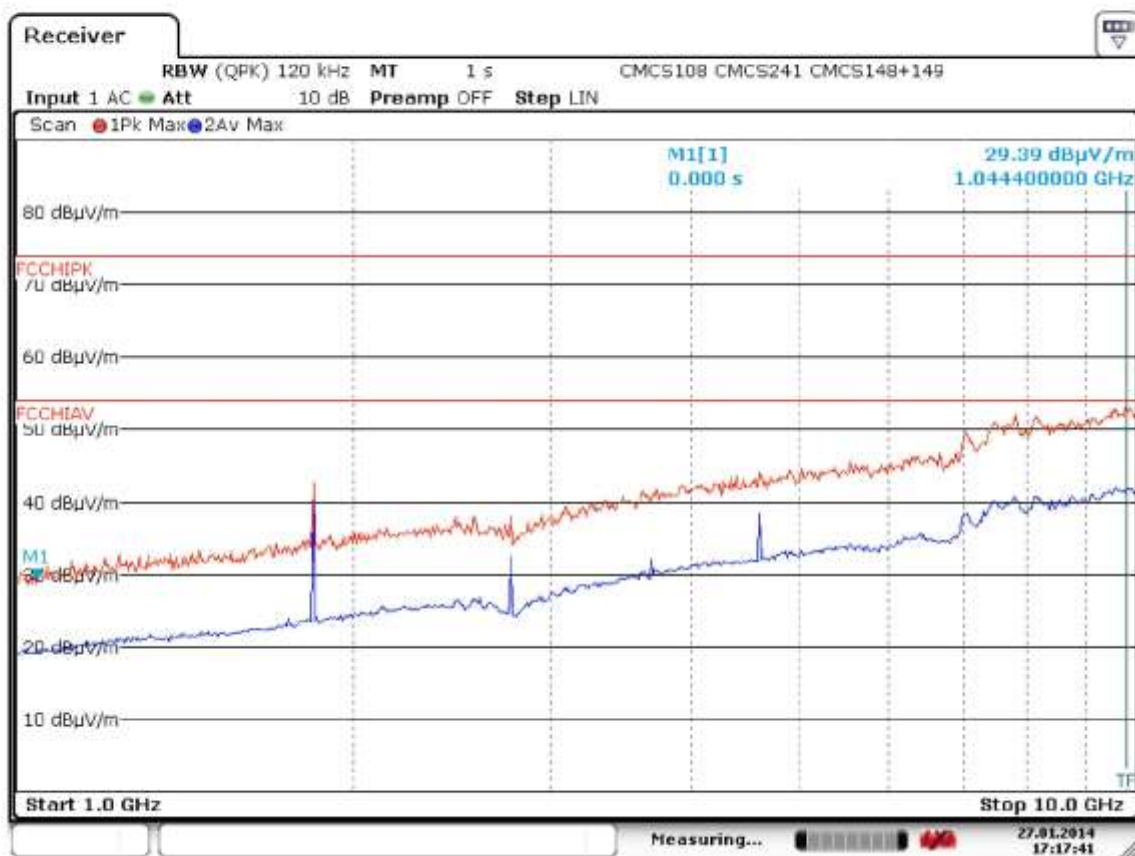
G13203531



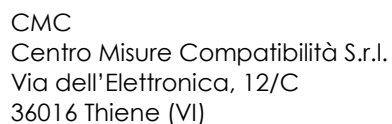
Bertezzo 13203531 HORIZ - Fmax TX



G13203535

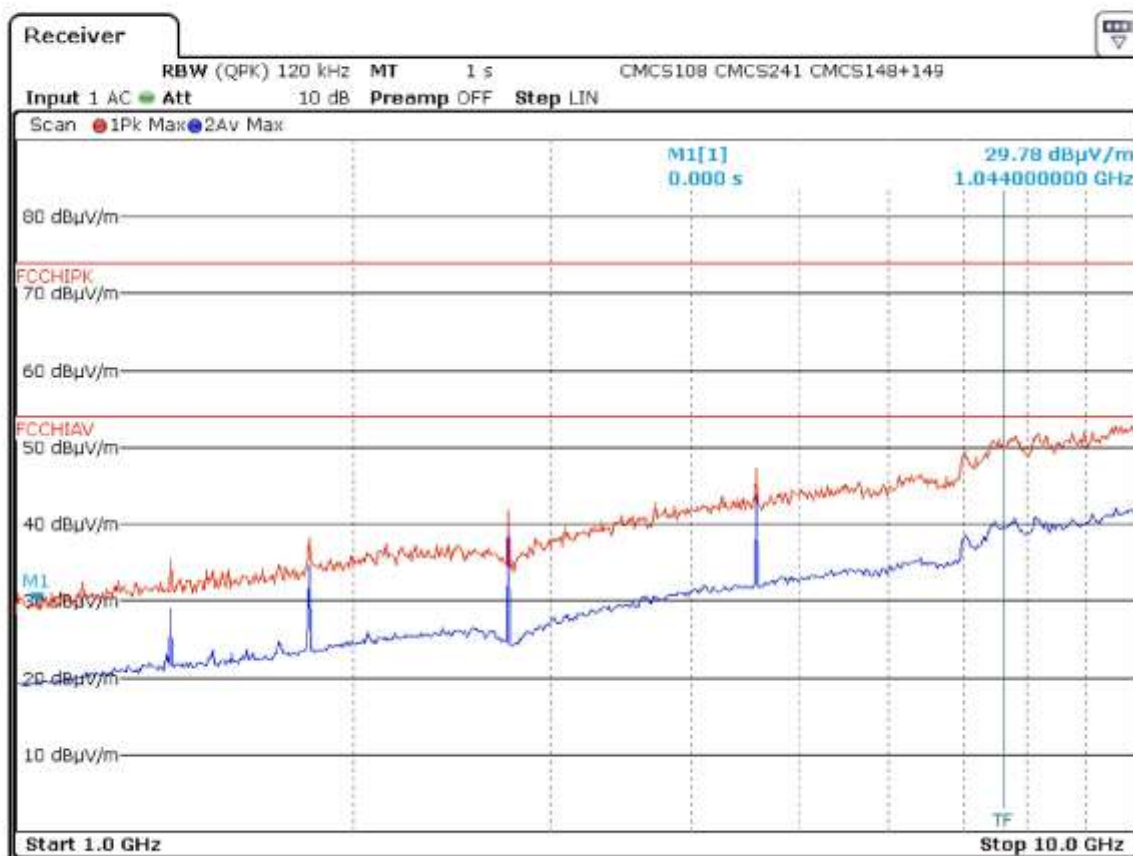


Bertezzo 13203535 HORIZ - Fmed TX





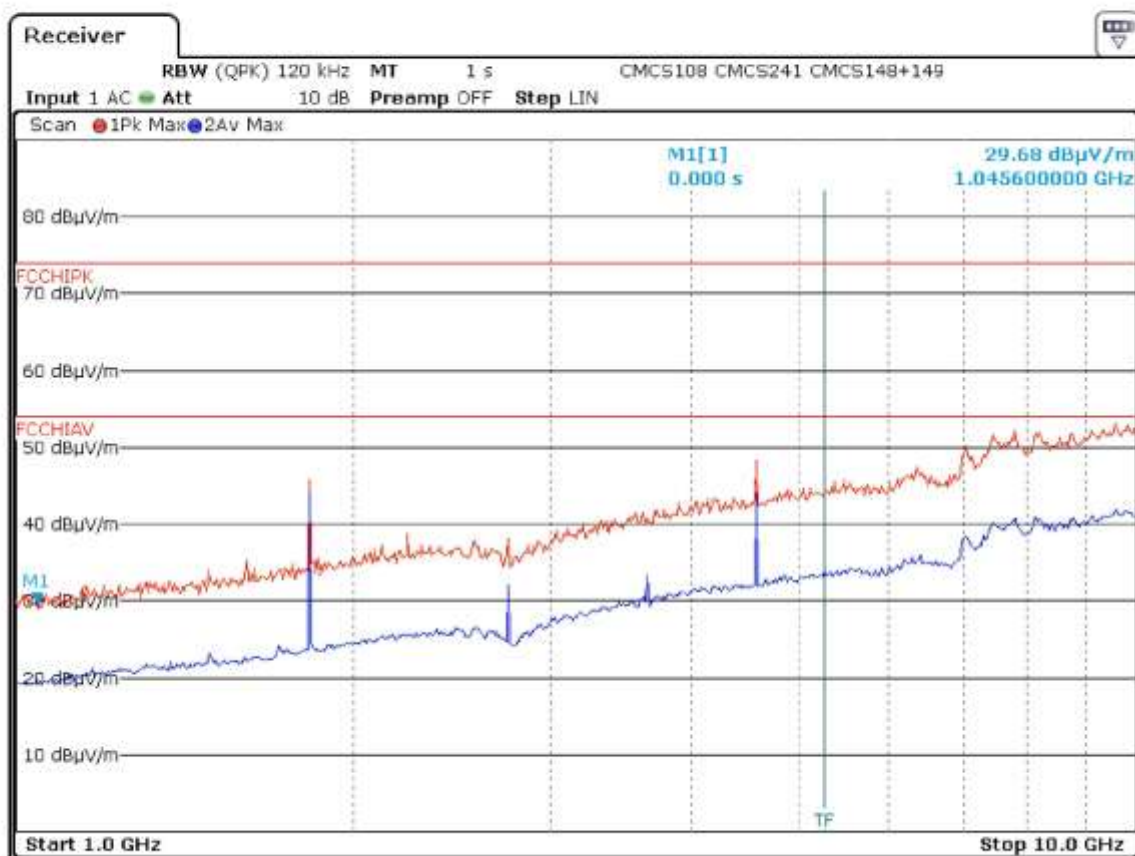
G13203543



Bertezzo 13203543 VERT - Fmin TX



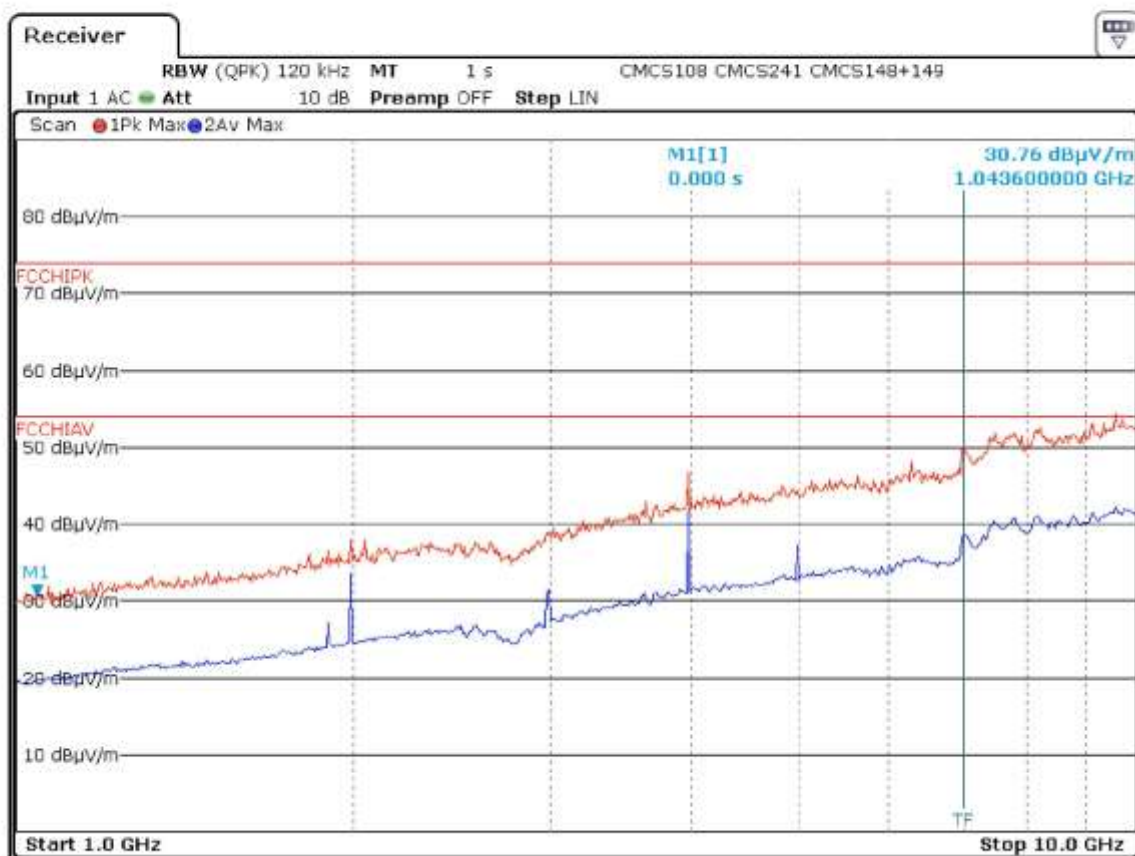
G13203544



Bertezzo 13203544 HORIZ - Fmin TX



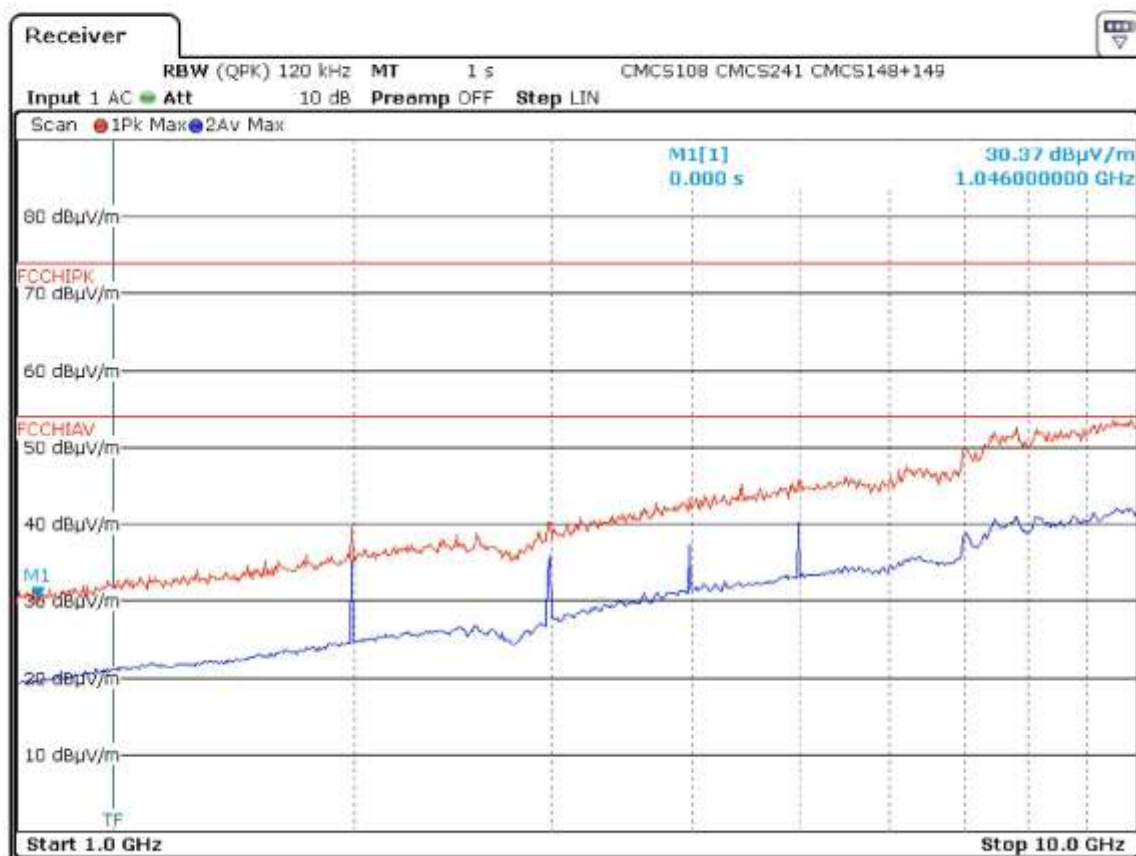
G13203545



Bertezzo 13203545 HORIZ - Fmax TX



G13203546



Bertezzo 13203546 VERT - Fmax TX

Result: The requirements are met



11.3 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

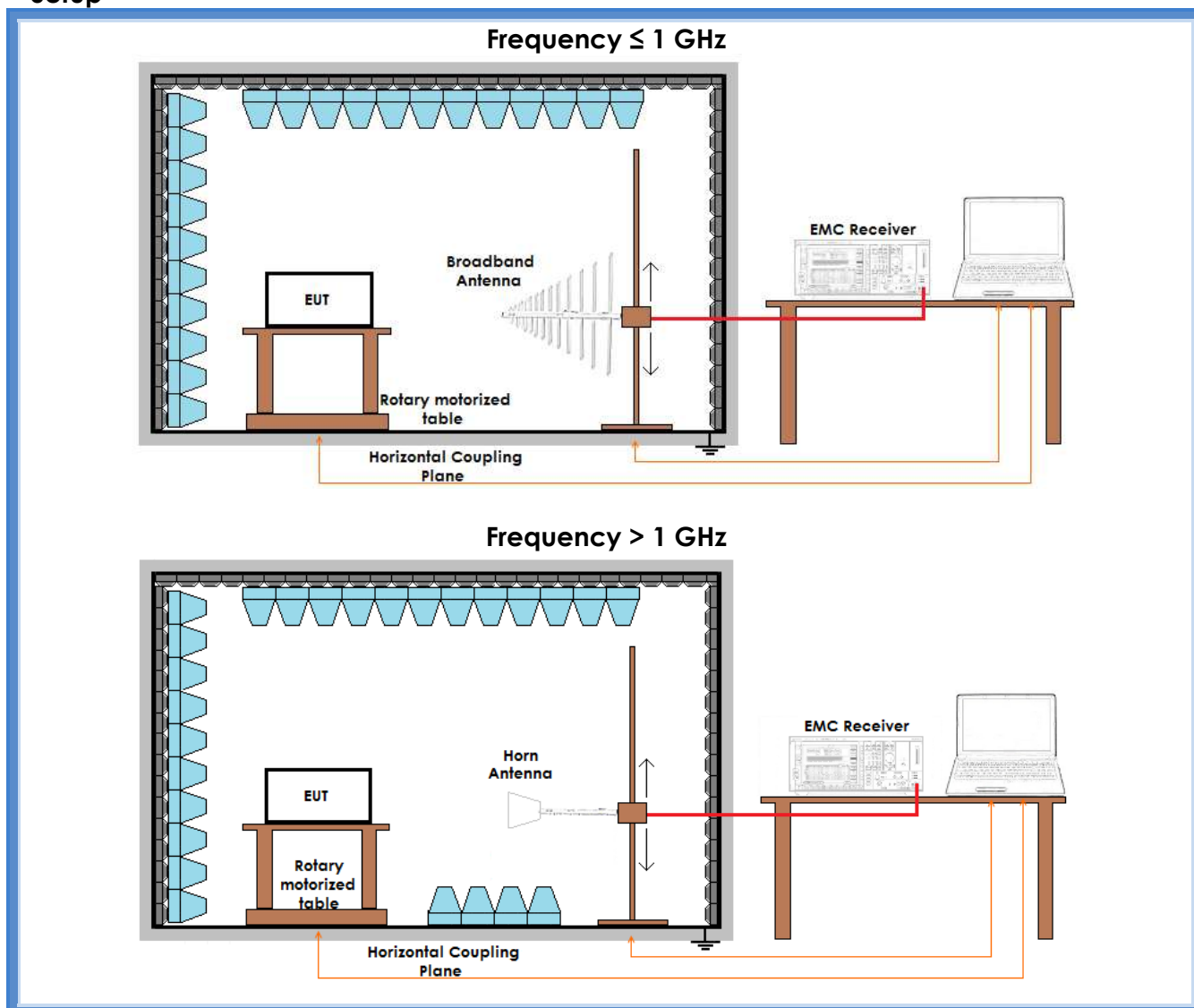
RSS 210 Annex 2 (A2.9)

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	99	51



Setup



Result

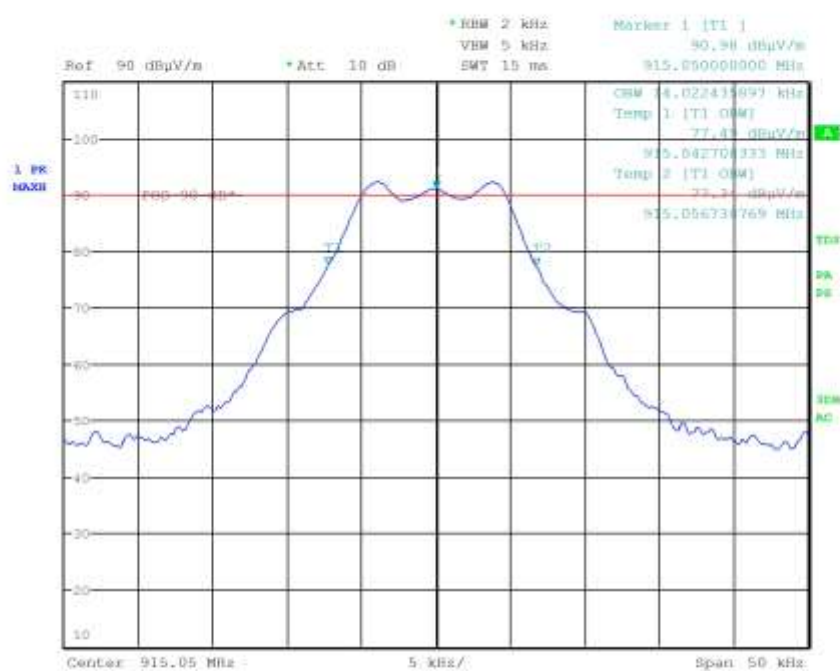
f (MHz)	99% bandwidth (kHz)	Graphs	Results
915,050	14,0	G13203553	Complies
921,000	14,1	G13203562	Complies
927,750	14,2	G13203558	Complies

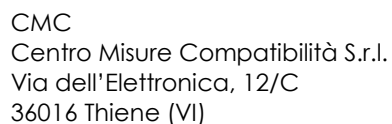


Graphs

G13203553

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMIN
Operator Gandini 13203553
Test Spec
Horiz





1 PR
MAX

Ref: 80 dBuV/m * Att: 0 dB * RBW: 2 kHz VBW: 5 kHz SWT: 15 ms Marker 1 [T1 1] 88.70 dBuV/m 927.750000000 MHz

CHW: 14.102564103 kHz Temp: 1 [T1: 0dB] 75.97 dBuV/m 927.742147436 MHz Temp: 2 [T1: 0dB] 75.84 dBuV/m 927.756250000 MHz

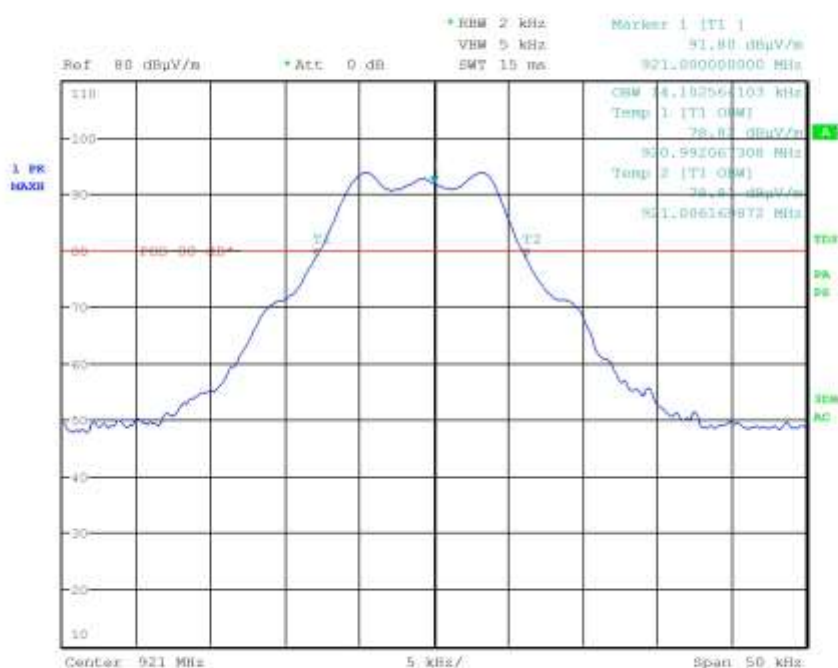
60 dB

Center: 927.75 MHz 5 kHz/ Span: 50 kHz



G13203562

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMED
Operator Gandini 13203562
Test Spec
Horiz



Result: The requirements are met



11.4 Peak Output Power

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and Part 15.249
- 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 S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
24	99	52

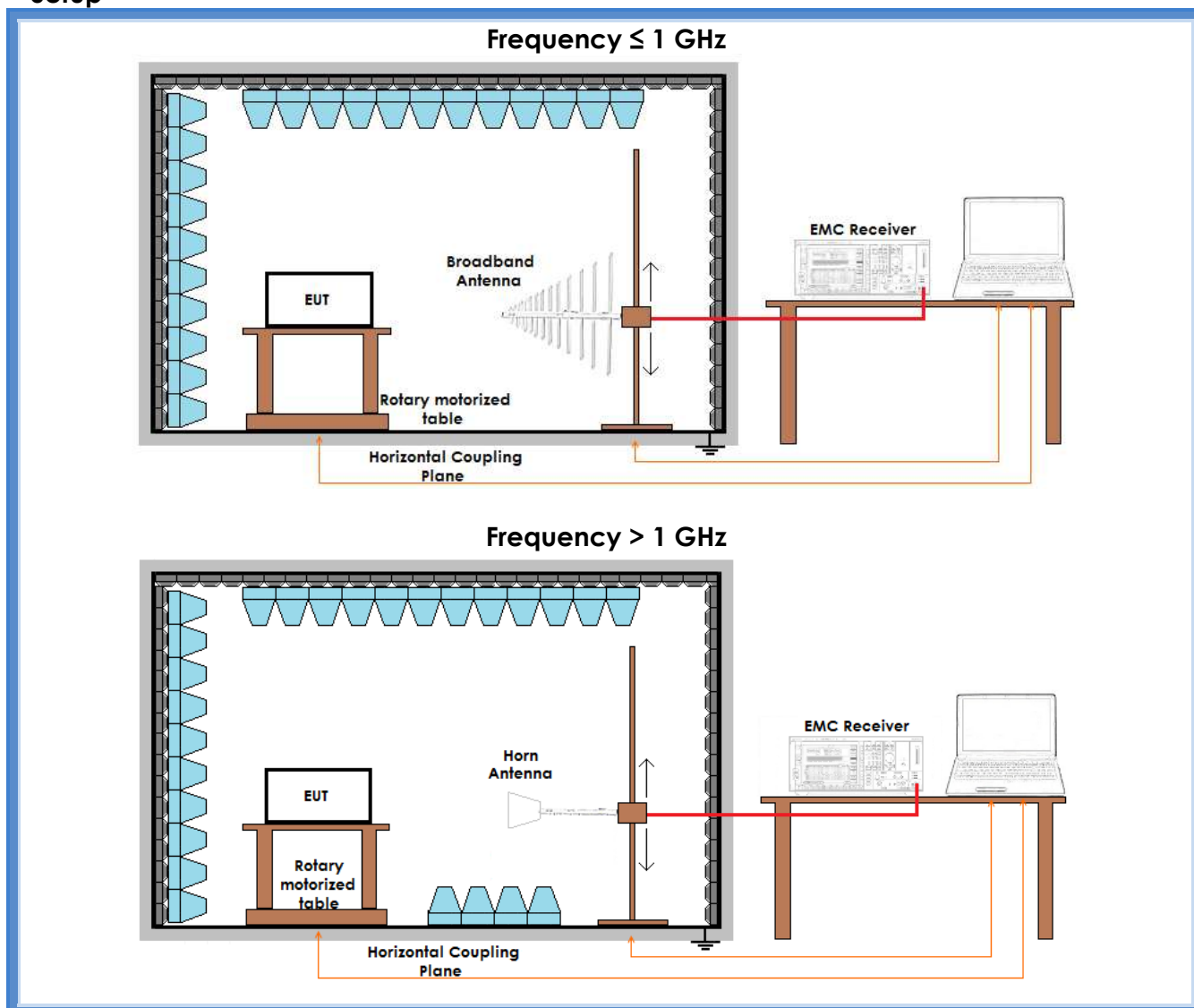
Acceptance limits

Frequency range (MHz)	RF Power Output dB(μV/m)
902 – 928	94

Frequency range (MHz)	RF Power Output dB(μV/m)
2400 – 2483,5	94



Setup



Result

Frequency (MHz)	Polarization	Graphs	Measured QP level (dB μ V/m)	Peak Output Power (mW)	Remarks
915,050	Horizontal	G13203550	92.61	0,55	--
915,050	Vertical	G13203554	87.77	0,18	--
921,000	Horizontal	G13203561	93.84	0,73	--
921,000	Vertical	G13203560	91.41	0,41	--
927,750	Horizontal	G13203555	90.61	0,34	--
927,750	Vertical	G13203559	86.94	0,15	--

Remarks

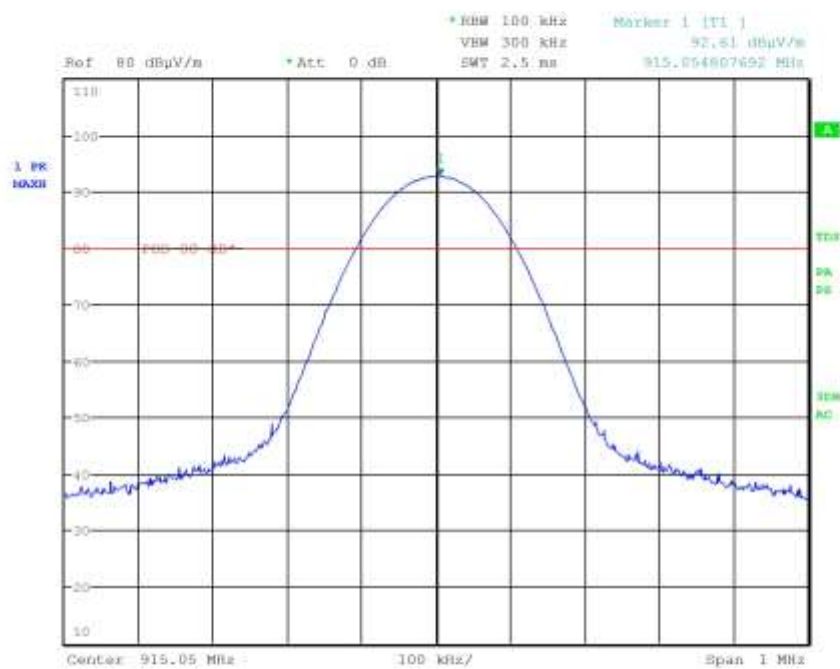
////////



Graphs

G13203550

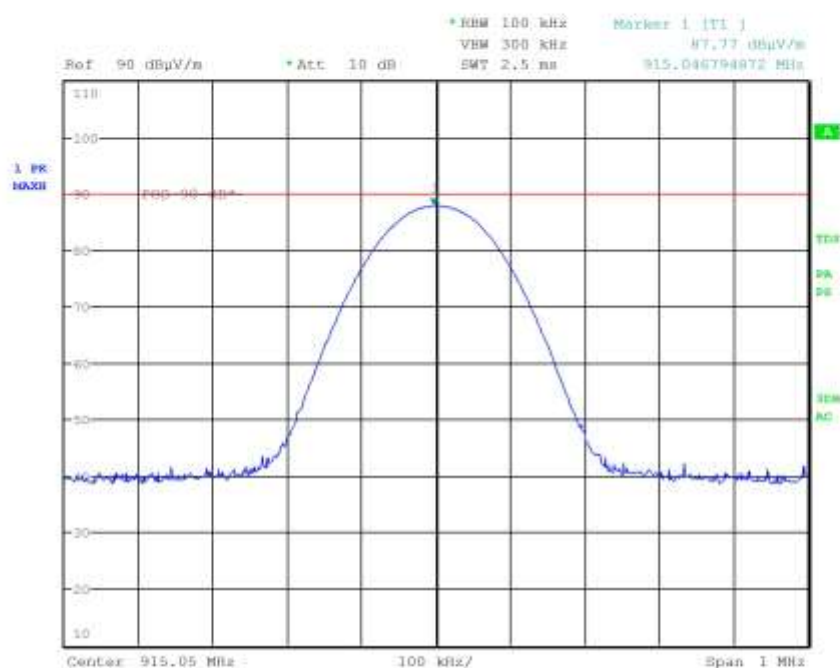
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMIN
Operator Gandini 13203550
Test Spec
Horiz





G13203554

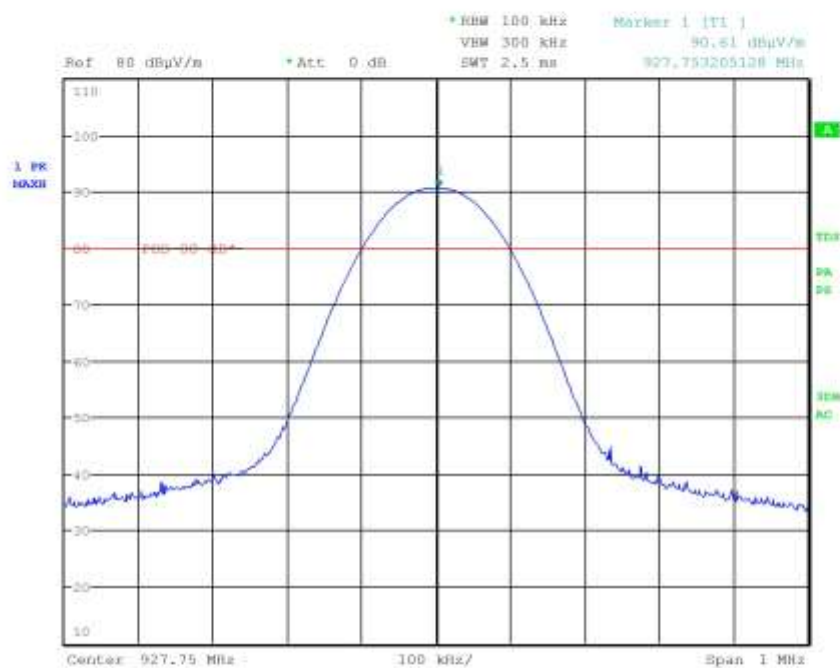
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMIN
Operator Gandini 13203554
Test Spec
Vert





G13203555

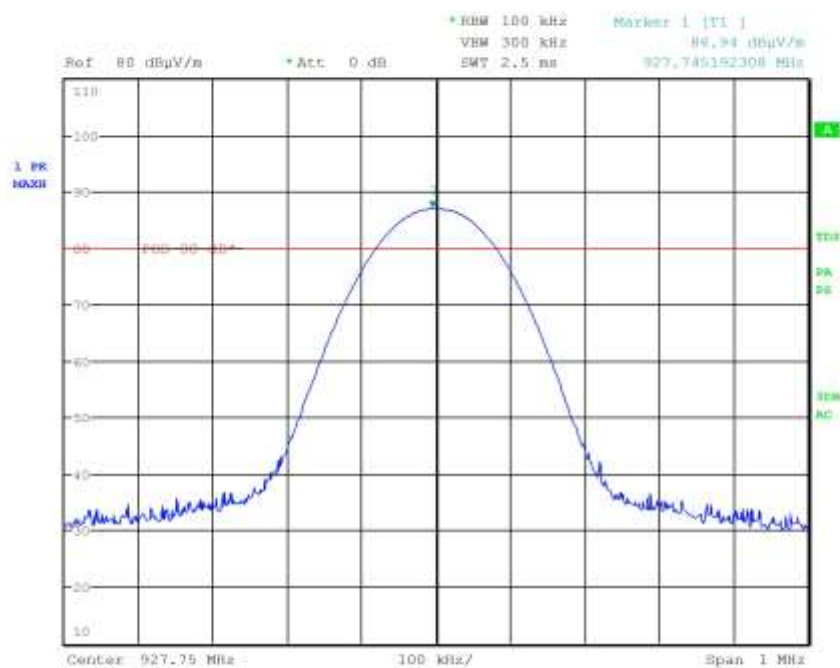
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMAX
Operator Gandini 13203555
Test Spec
Horiz





G13203559

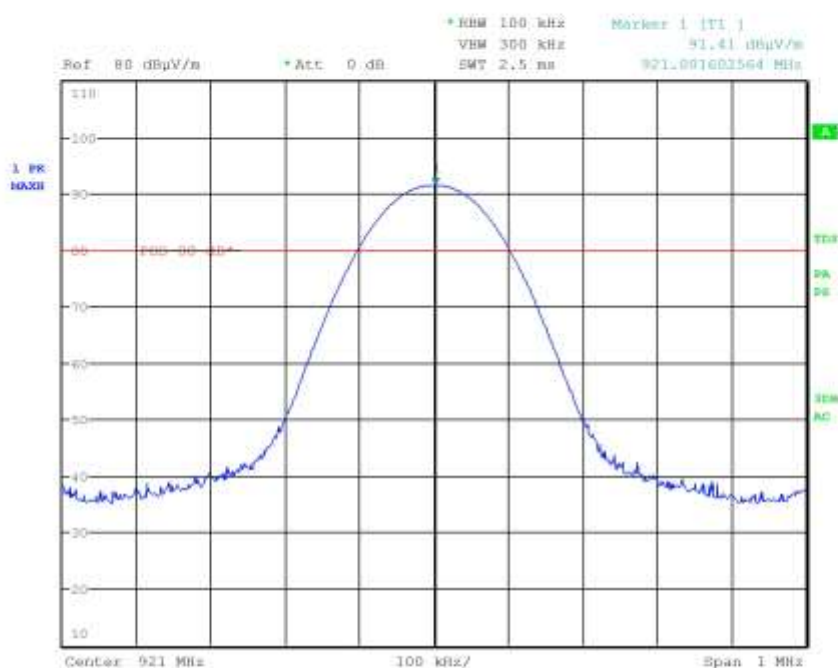
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMAX
Operator Gandini 13203559
Test Spec
Vert





G13203560

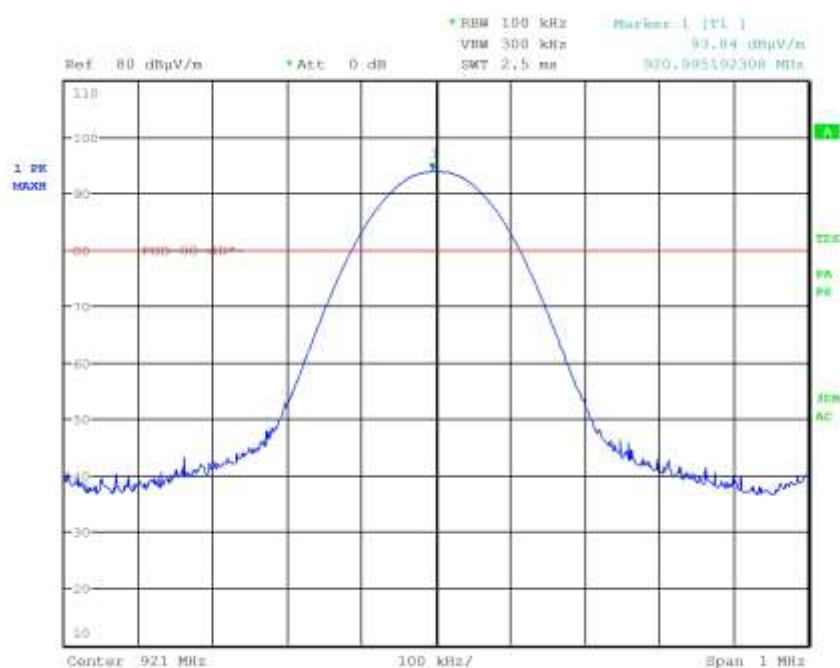
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMED
Operator Gandini 13203560
Test Spec
Vert





G13203561

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMED
Operator Gandini 13203561
Test Spec
Horiz



Result: The requirements are met



11.5 Band edge

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.249 (d)
- 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

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

Test specification

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation

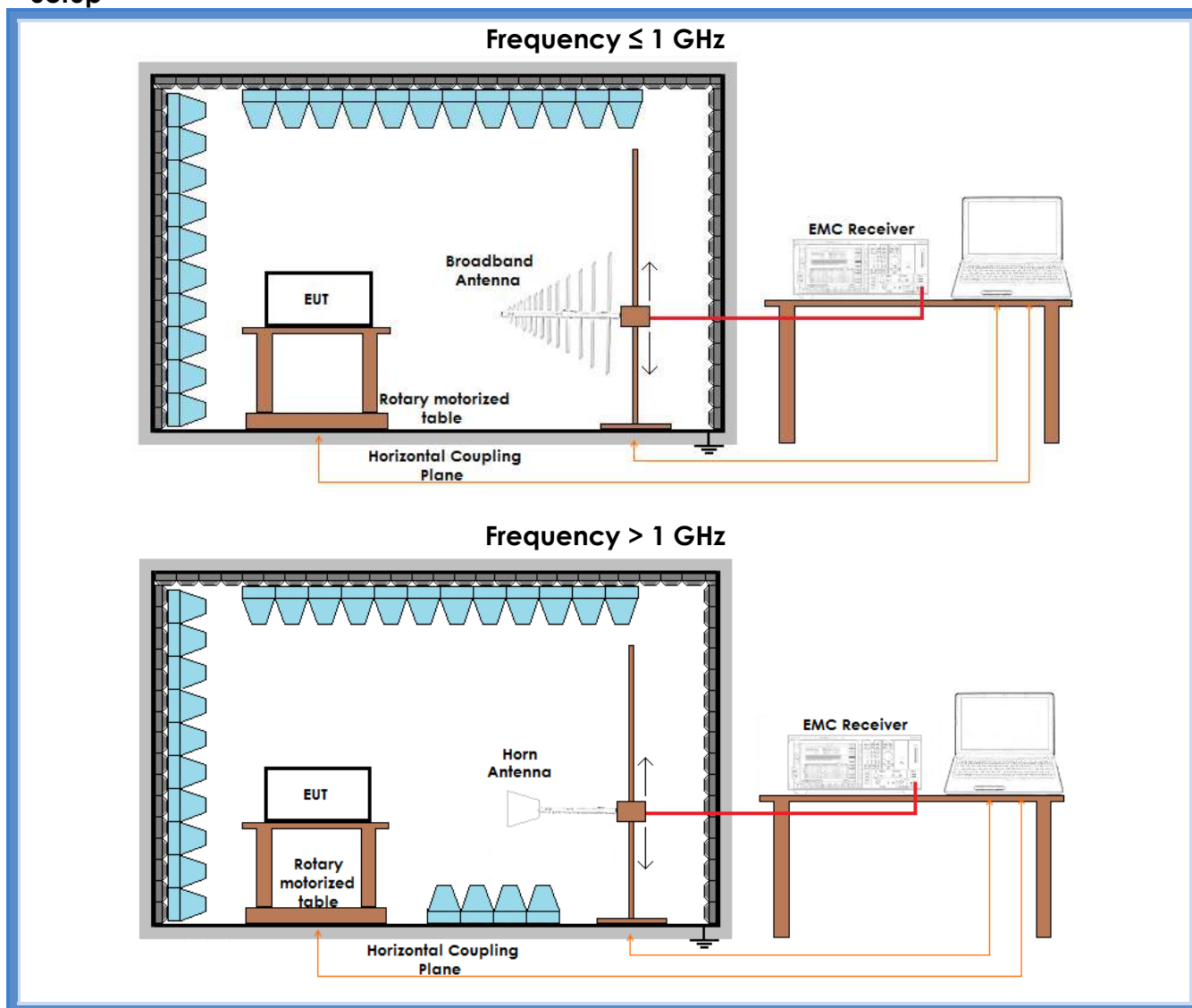
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	98	49

Acceptance limits: operation within the band 902 – 928 MHz MHz



Setup



Result

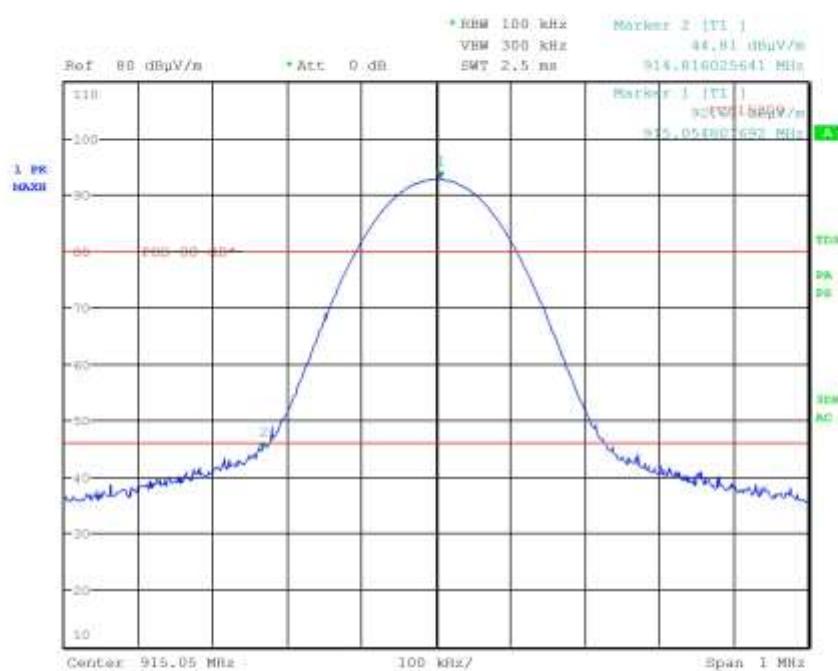
Frequency (MHz)	Graph(s)	Results	
915,050	G13203551	F _L : 914,816	Complies
	G13203552		
927,750	G13203556	F _H : 927,969	Complies
	G13203557		



Graphs

G13203551

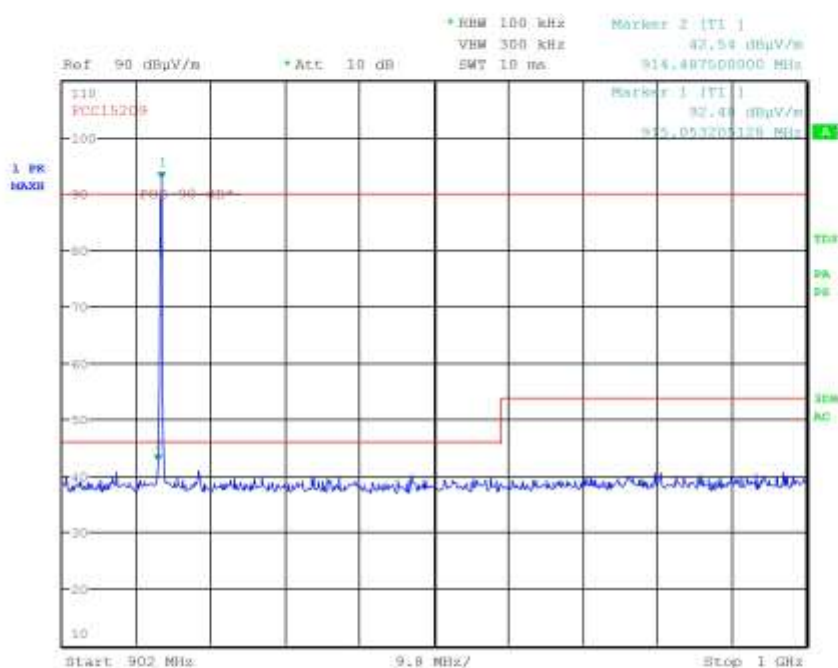
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMIN
Operator Gandini 13203551
Test Spec
Horiz





G13203552

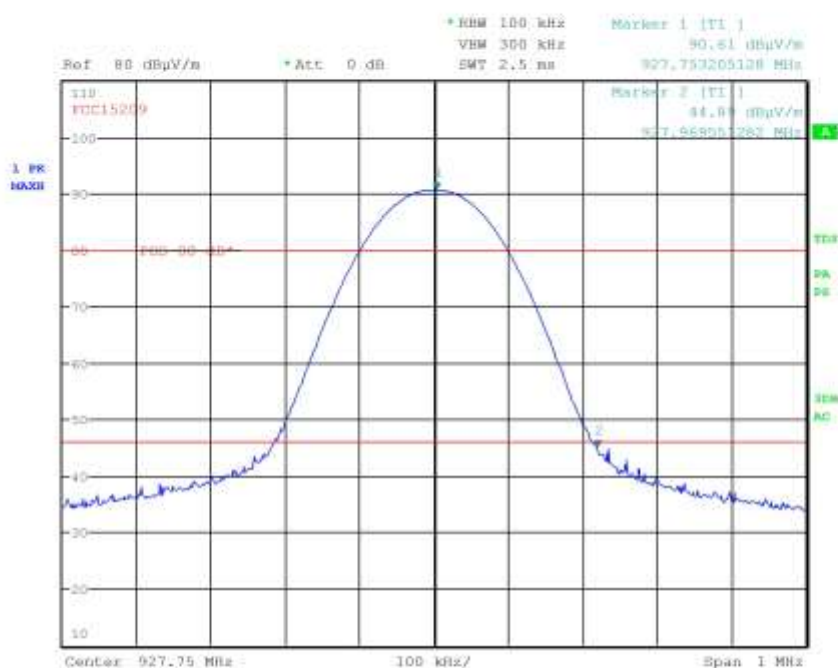
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMIN
Operator Gandini 13203552
Test Spec
Horiz





G13203556

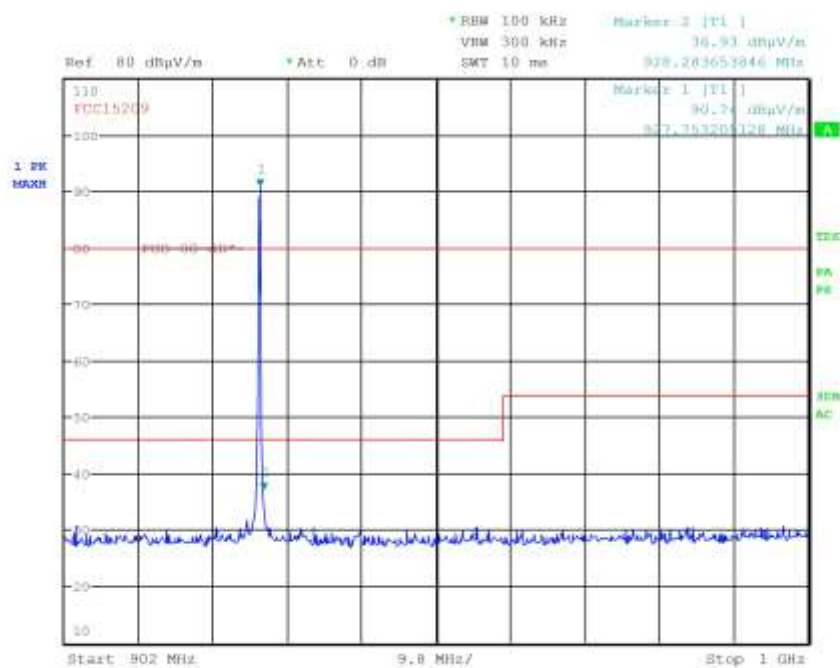
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMAX
Operator Gandini 13203556
Test Spec
Horiz





G13203557

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition FMAX
Operator Gandini 13203557
Test Spec
Horiz



Result: The requirements are met



11.6 Spurious Emission

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

Test specification

Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m
Detector AV + Peak

Environmental conditions

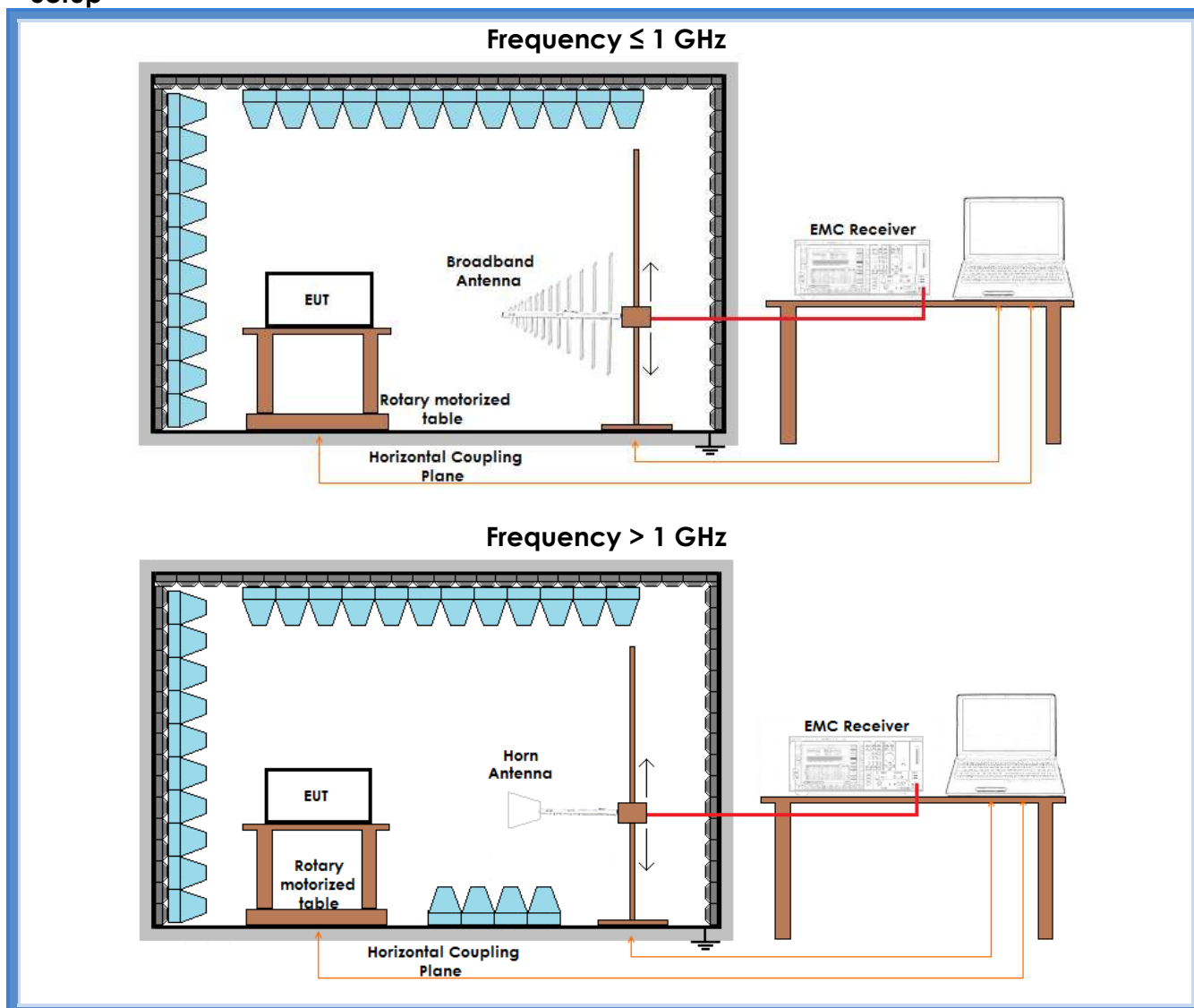
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	98	50

Acceptance limits

Frequency (MHz)	AV limits [dB(μV/m)]	Peak limits [dB(μV/m)]
> 1000	54	74



Setup





Graph:	From G13145343
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Result – AV detector

Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		915,050 MHz	921,000 MHz	927,750 MHz	
II	54	41,5	38,5	41,4	Complies
III	54	41,4	43,0	39,0	Complies
IV	54	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
V	54	44,2	46,5	43,8	Complies
VI	54	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
VII	54	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
VIII	54	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
IX	54	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
X	54	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values

Result – Peak detector

Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		915,050 MHz	921,000 MHz	927,750 MHz	
II	74	44,3	41,9	44,1	Complies
III	74	44,5	45,9	42,2	Complies
IV	74	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
V	74	48,3	50,7	48,0	Complies
VI	74	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
VII	74	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
VIII	74	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
IX	74	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies
X	74	More than 15dB below limit	More than 15dB below limit	More than 15dB below limit	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values

Result: The requirements are met