



TEST REPORT nr. R15095701
Federal Communication Commission (FCC)

Test item

Description.....: TRANSCEIVER UNIT
Trademark.....: AUTEC
Model/Type: Model A08
FCC ID.....: OQA-A08LA0AM

Test Specification

Standard: FCC Rules & Regulations, Title 47:2014
Part 15 paragraph(s): 203, 204, 207, 209 and 249

Client's name: AUTEC 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: 21.07.15
Contents.....: 37 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.

CMC Centro Misure Compatibilità S.r.l.



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1. Summary

Standard:

FCC Rules & Regulations, Title 47:2014
Part 15 paragraph(s): 203, 204, 207, 209 and 249

<i>Test specifications</i>	<i>Environmental Phenomena</i>	<i>Tests sequence</i>	<i>Result</i>
Part 15.209	Radiated emissions	1	Complies
Part 15.209	Spurious emission	2	Complies

NOTE: tests performed on EUT with the new address key plugged on board

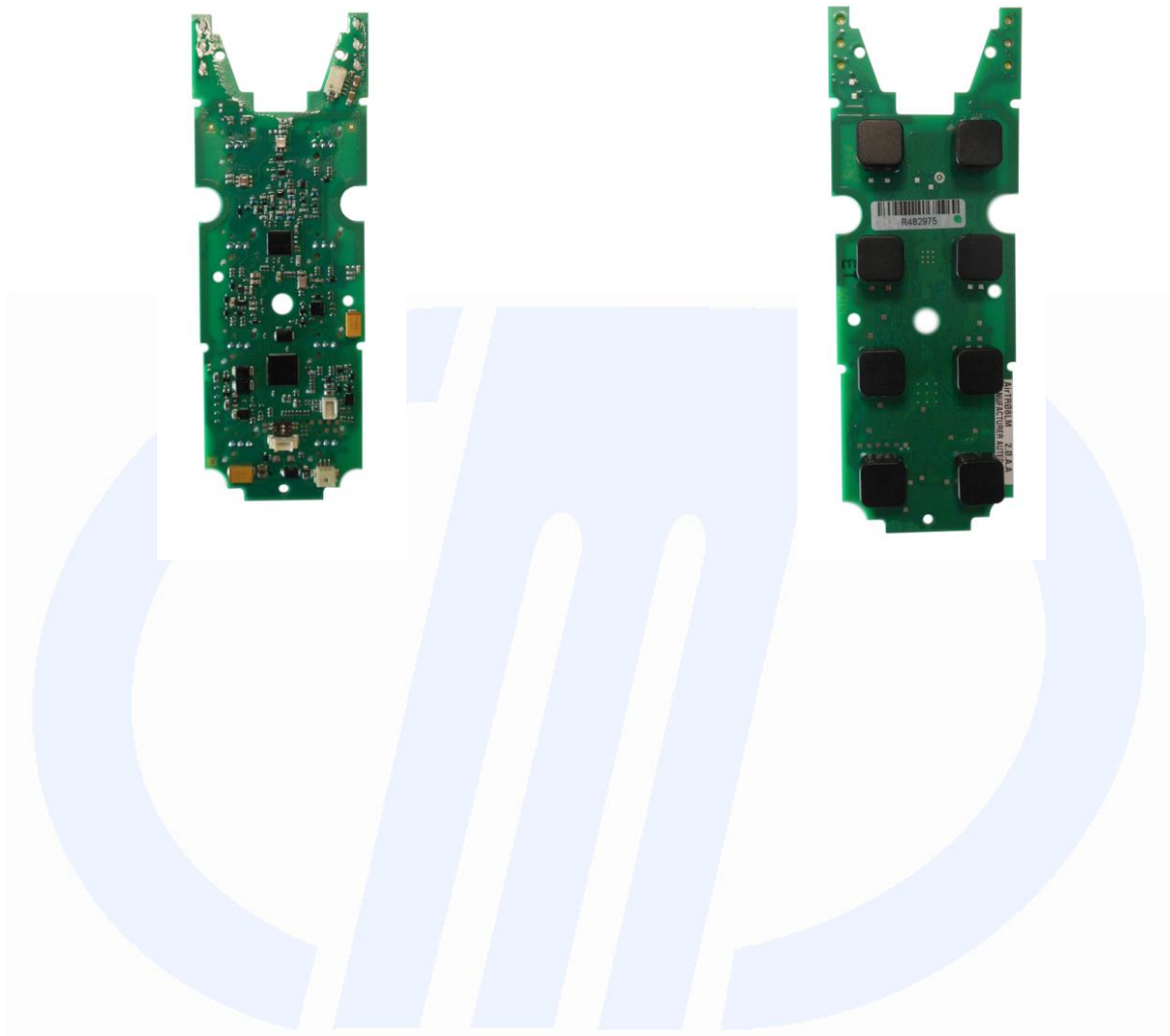
The Test Report was given to the Client representatives for necessary documentation of ratification of the tested equipment and it is valid for the FCC certification



5. Photograph(s) of EUT

5.1 Photograph(s) of EUT







5.2 Photograph(s) of setup





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 '15	January '16
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 '15	January '16
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '15	January '16
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '15	January '16



7. Measurement uncertainty

Test	Expanded Uncertainty	note
Conducted Emission		
(50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3.6 dB	1
(50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.0 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±2.8 dB	1
(50Ω/5μH AMN) - (150 kHz – 108 MHz)	±2.6 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.0 dB	1
Disturbance Power (30 MHz – 300 MHz)		
	±3.7 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±4.0 dB	1
(30 MHz – 1000 MHz)	±4.3 dB	1
(1 GHz – 6 GHz)	±4.5 dB	1
Electromagnetic field EMF		
	±10.5 %	1
Harmonic current emissions test		
	±1.8 %	1
Voltage fluctuation and flicker test		
	±2.6 %	1
Insertion loss test		
	±2.0 dB	1
Radiated electromagnetic disturbance test (loop antenna)		
	±2.1 dB	1
Radiated electromagnetic field immunity test		
	0.81 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test		
	0.81 V/m at 3V/m	1
Injected currents immunity test		
	0.45 V at 3V	1
Bulk current		
	3.7 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)		
	±4.3 dB	1
Effective radiated power (F > 1GHz)		
	±3.7 dB	1
Frequency error		
	< 1x10 ⁻⁷	1
Modulation bandwidth		
	< 1x10 ⁻⁷	1
Conducted RF power and spurious emission		
	±0.7 dB	1
Adjacent channel power		
	±1.2 dB	1
Blocking		
	±1.2 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 15:2014	--
ANSI C63.4:2009	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.

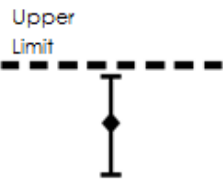
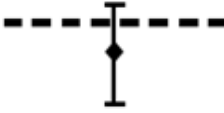
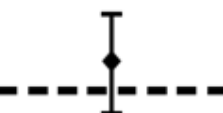



11. Results

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 complies with the requirement.	The sample complies with the requirement.	The sample does not comply with the requirement.	The sample does not comply with the requirement.
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 Radiated emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part. 15.209
- 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 (%)
20	100	42

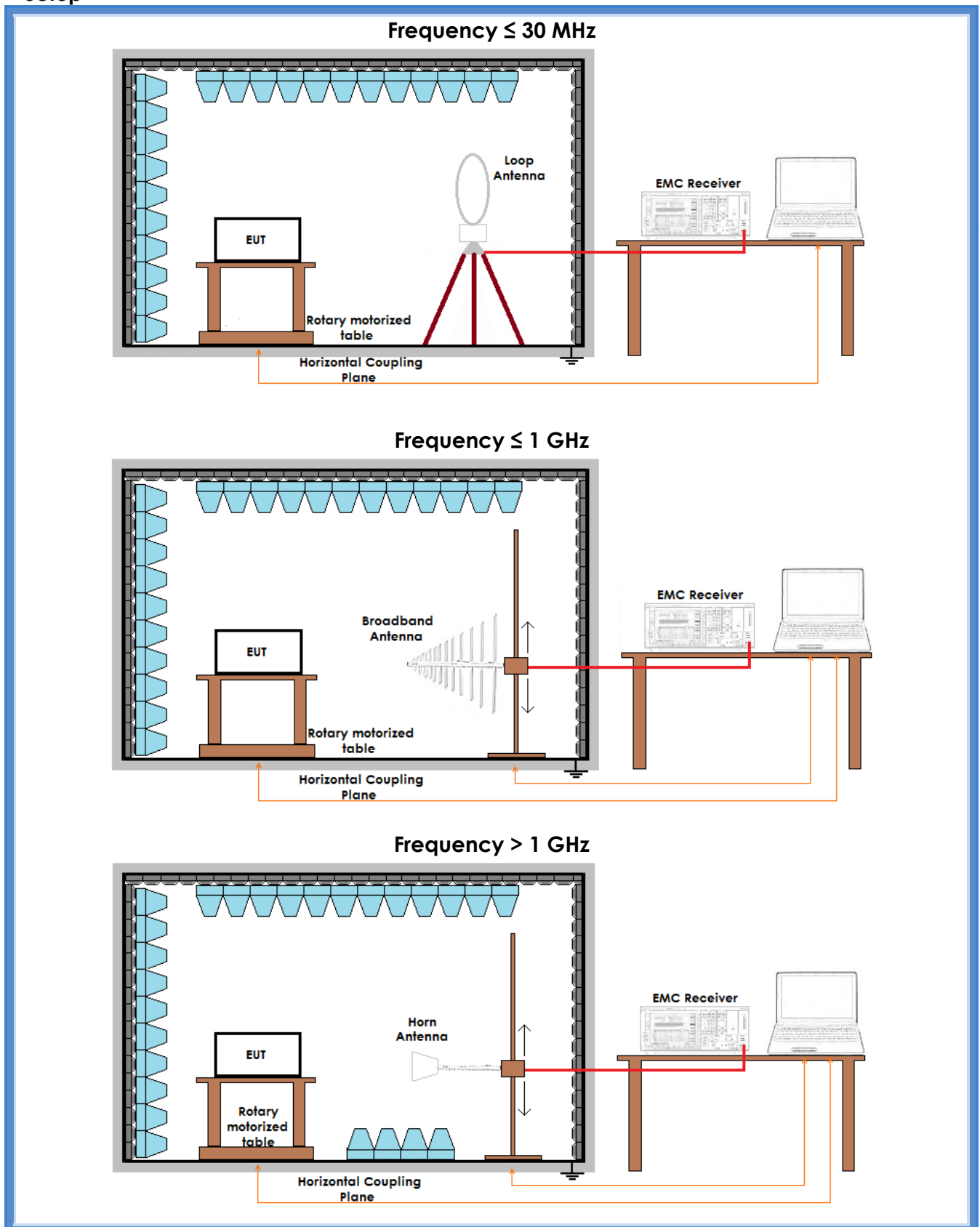
Acceptance limits

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

Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
Loop	0,009 – 30	G15095713	Worst case	Complies
V	30 – 1000	G15095714	Lowest channel	Complies
H	30 – 1000	G15095715	Lowest channel	Complies
H	30 – 1000	G15095716	Medium channel	Complies
V	30 – 1000	G15095717	Medium channel	Complies
V	30 – 1000	G15095718	Highest channel	Complies
H	30 – 1000	G15095719	Highest channel	Complies
Remarks: --				

Graphs Legend

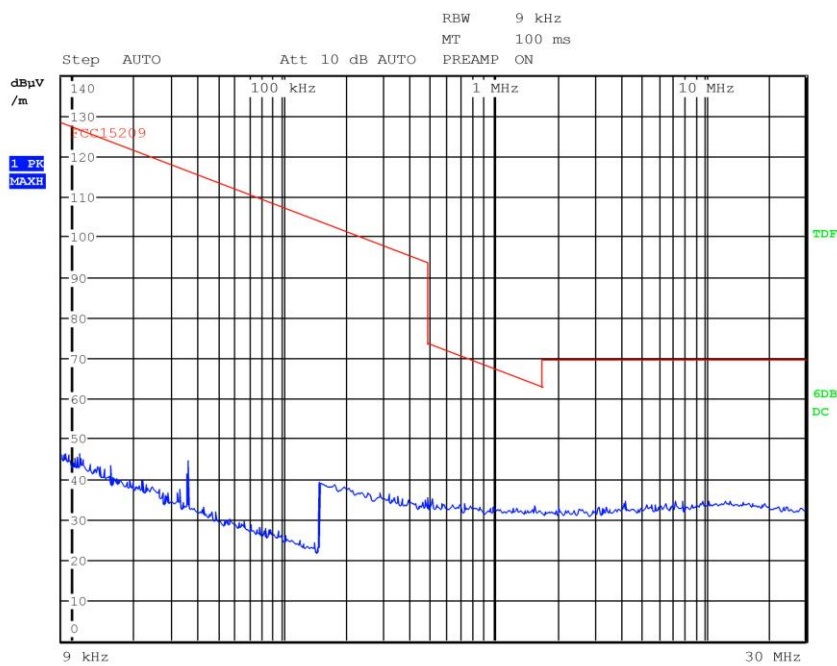
PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +
AV: Average; AV [1s] (average at 1 second) values are marked with a x



Graphs

G15095713

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 15095713
Test Spec
Loop



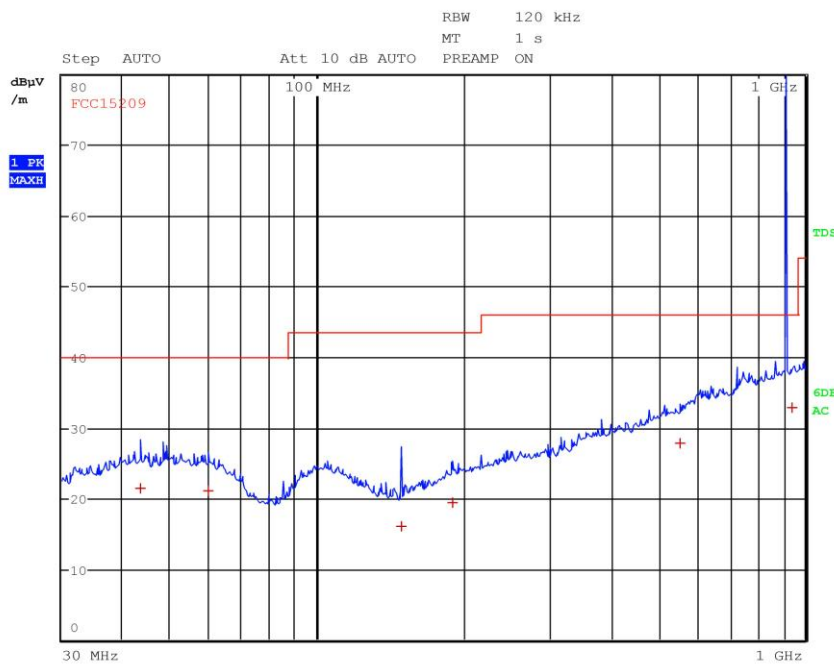
Final Measurement

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



G15095714

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15095714
Test Spec
 Vert



Final Measurement

Meas Time: 1 s
 Margin: 20 dB
 Subranges: 6

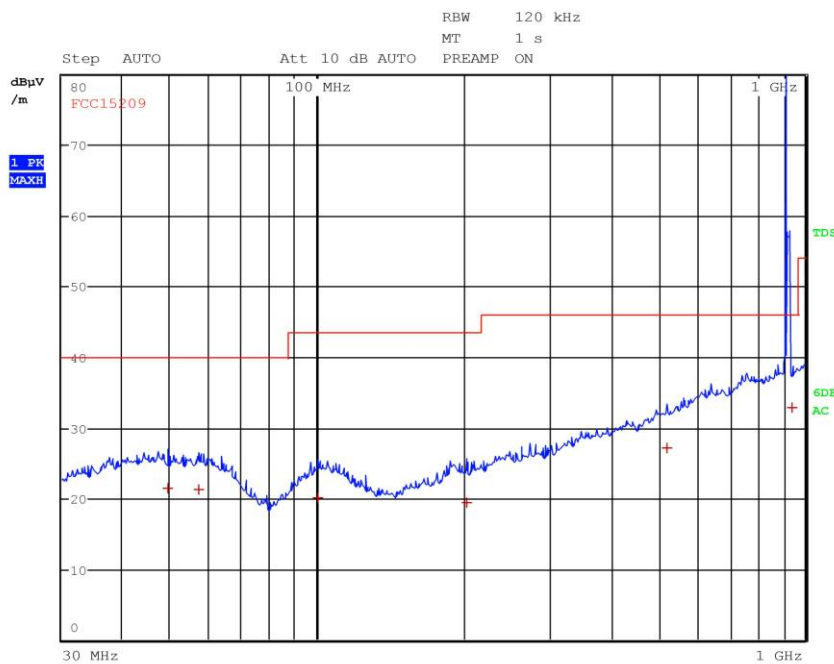
Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	43.400000000 MHz	21.50	Quasi Peak	-18.50
1	60.000000000 MHz	21.16	Quasi Peak	-18.84
1	148.880000000 MHz	15.99	Quasi Peak	-27.53
1	189.440000000 MHz	19.44	Quasi Peak	-24.08
1	555.600000000 MHz	27.74	Quasi Peak	-18.28
1	938.880000000 MHz	32.86	Quasi Peak	-13.16

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G15095715

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15095715
Test Spec
 Horiz



Final Measurement

Meas Time: 1 s
 Margin: 20 dB
 Subranges: 6

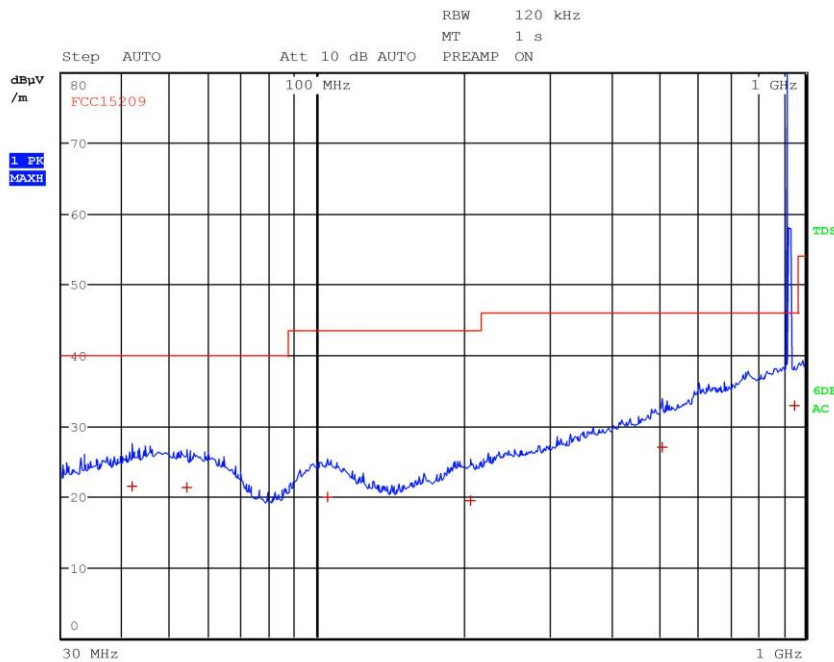
Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	49.360000000 MHz	21.51	Quasi Peak	-18.49
1	57.360000000 MHz	21.18	Quasi Peak	-18.82
1	100.120000000 MHz	20.01	Quasi Peak	-23.51
1	202.960000000 MHz	19.42	Quasi Peak	-24.10
1	522.160000000 MHz	27.19	Quasi Peak	-18.83
1	940.200000000 MHz	32.90	Quasi Peak	-13.12

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G15095716

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15095716
Test Spec
 Horiz



Final Measurement

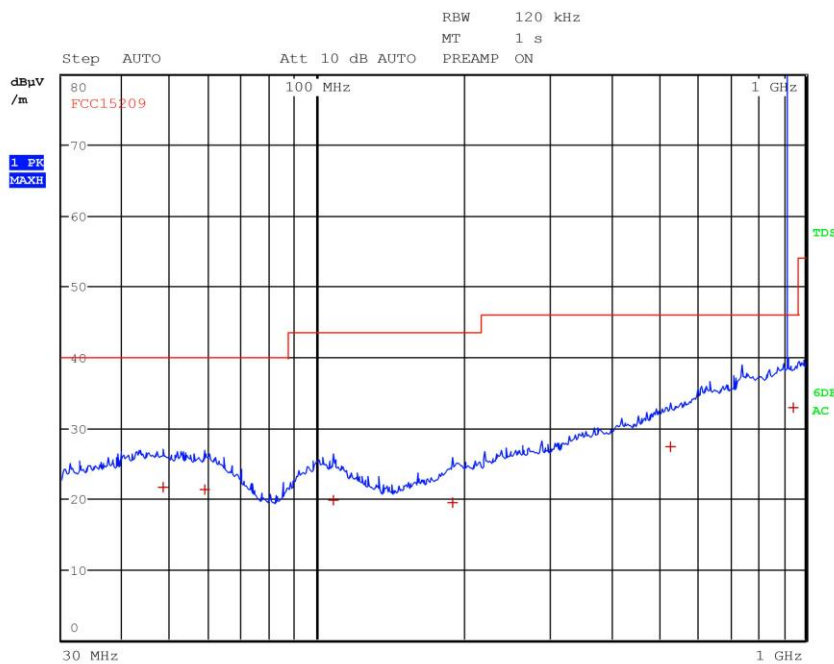
Meas Time: 1 s
 Margin: 20 dB
 Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	41.800000000 MHz	21.38	Quasi Peak	-18.62
1	54.080000000 MHz	21.19	Quasi Peak	-18.81
1	105.120000000 MHz	19.96	Quasi Peak	-23.56
1	206.200000000 MHz	19.40	Quasi Peak	-24.12
1	508.960000000 MHz	26.95	Quasi Peak	-19.07
1	950.040000000 MHz	32.84	Quasi Peak	-13.18



G15095717

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15095717
Test Spec
 Vert



Final Measurement

Meas Time: 1 s
 Margin: 20 dB
 Subranges: 6

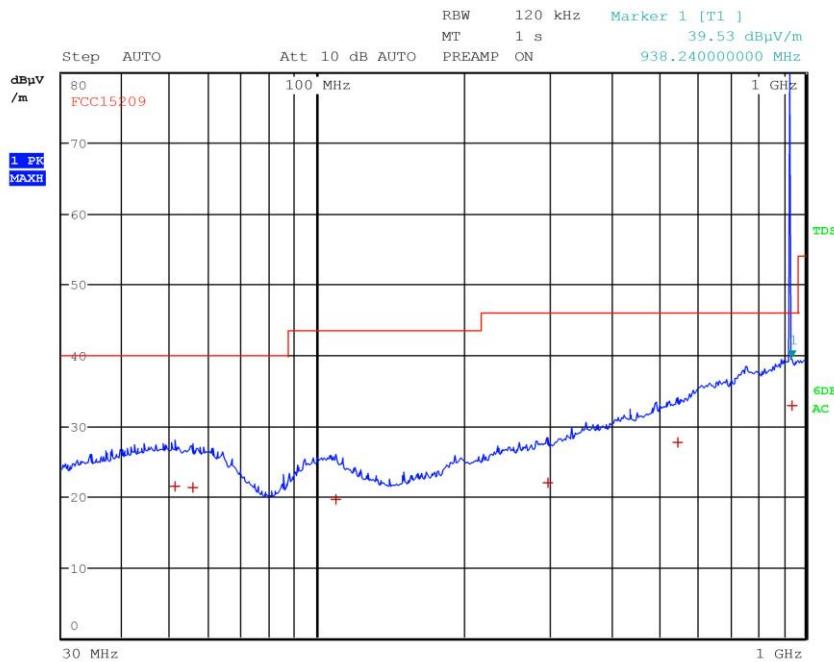
Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	48.200000000 MHz	21.61	Quasi Peak	-18.39
1	58.920000000 MHz	21.18	Quasi Peak	-18.82
1	108.120000000 MHz	19.81	Quasi Peak	-23.71
1	189.000000000 MHz	19.43	Quasi Peak	-24.09
1	531.160000000 MHz	27.31	Quasi Peak	-18.71
1	944.040000000 MHz	32.87	Quasi Peak	-13.15

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G15095718

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15095718
Test Spec
 Vert



Final Measurement

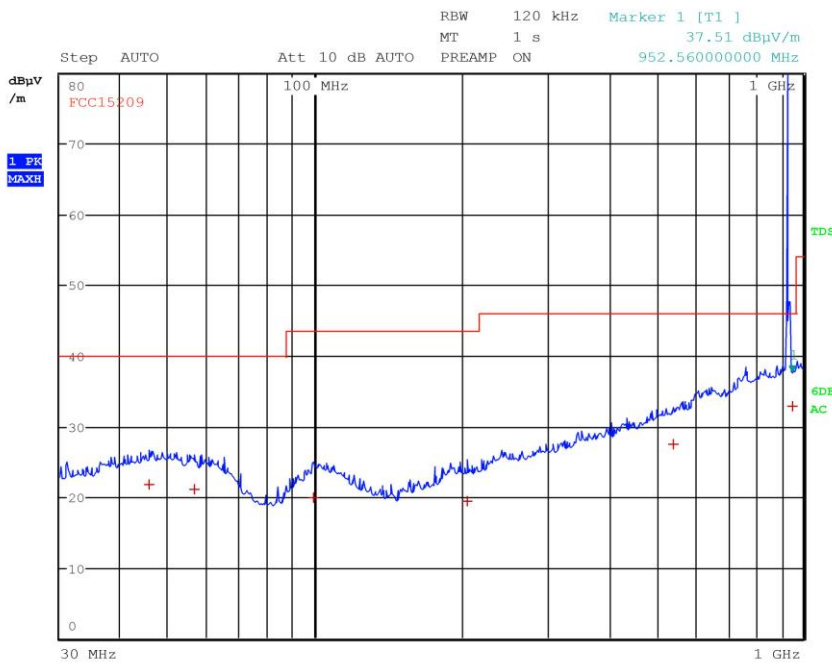
Meas Time: 1 s
 Margin: 20 dB
 Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	51.20000000 MHz	21.47	Quasi Peak	-18.53
1	55.76000000 MHz	21.21	Quasi Peak	-18.79
1	109.36000000 MHz	19.66	Quasi Peak	-23.86
1	296.44000000 MHz	21.88	Quasi Peak	-24.14
1	547.80000000 MHz	27.58	Quasi Peak	-18.44
1	938.24000000 MHz	32.85	Quasi Peak	-13.17



G15095719

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15095719
Test Spec
 Horiz



Final Measurement

Meas Time: 1 s
 Margin: 20 dB
 Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	45.640000000 MHz	21.71	Quasi Peak	-18.29
1	56.480000000 MHz	21.17	Quasi Peak	-18.83
1	99.520000000 MHz	19.87	Quasi Peak	-23.65
1	205.520000000 MHz	19.41	Quasi Peak	-24.11
1	543.160000000 MHz	27.46	Quasi Peak	-18.56
1	952.560000000 MHz	32.90	Quasi Peak	-13.12

Result: The requirements are met



11.2 Spurious Emission

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- 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

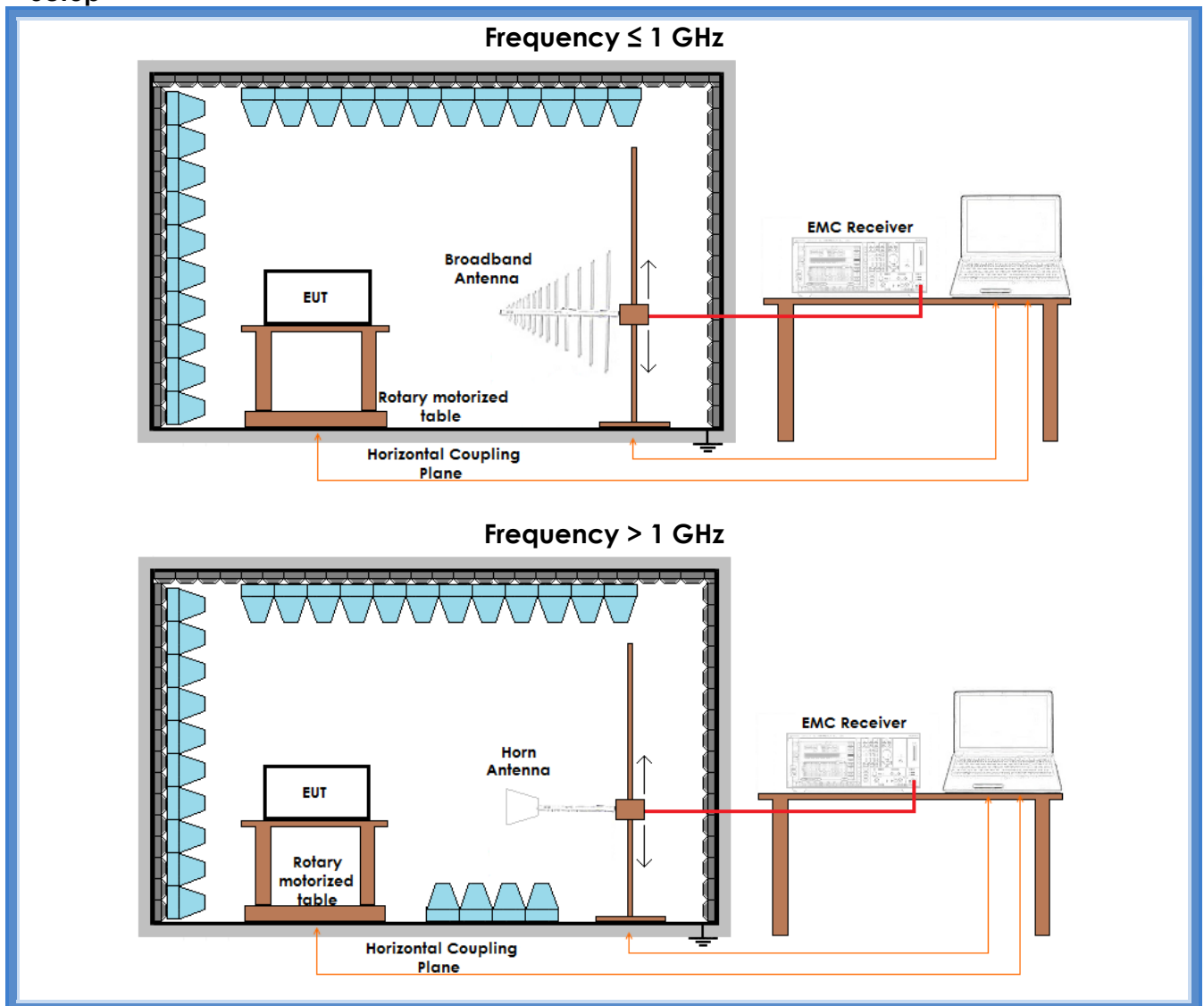
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	101	45

Acceptance limits

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



Setup



Graphs:

G15095701, G15095702, G15095703, G15095704,
G15095705, G15095706, G15095707, G15095708,
G15095709, G15095710, G15095711, G15095712



Result – AV detector

Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		915,250 MHz	921,000 MHz	927,750 MHz	
II	54	45,0	45,0	44,7	Complies
III	54	52,9	52,8	52,8	Complies
IV	54	46,3	45,1	46,8	Complies
V	54	51,5	48,7	49,0	Complies
VI	54	48,2	51,9	51,9	Complies
VII	54	46,0	45,7	47,3	Complies
VIII	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
IX	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
X	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies

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

Result – Peak detector

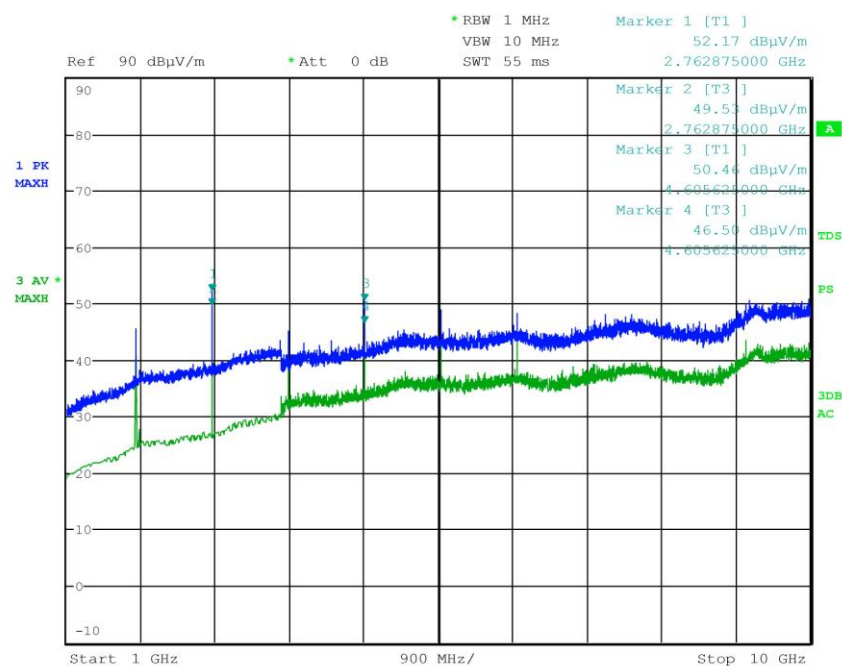
Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		915,250 MHz	921,000 MHz	927,750 MHz	
II	74	46,5	46,5	46,8	Complies
III	74	53,6	53,4	53,4	Complies
IV	74	49,7	48,8	48,7	Complies
V	74	54,0	51,6	51,8	Complies
VI	74	51,7	54,4	54,6	Complies
VII	74	50,2	50,1	51,5	Complies
VIII	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
IX	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
X	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies

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



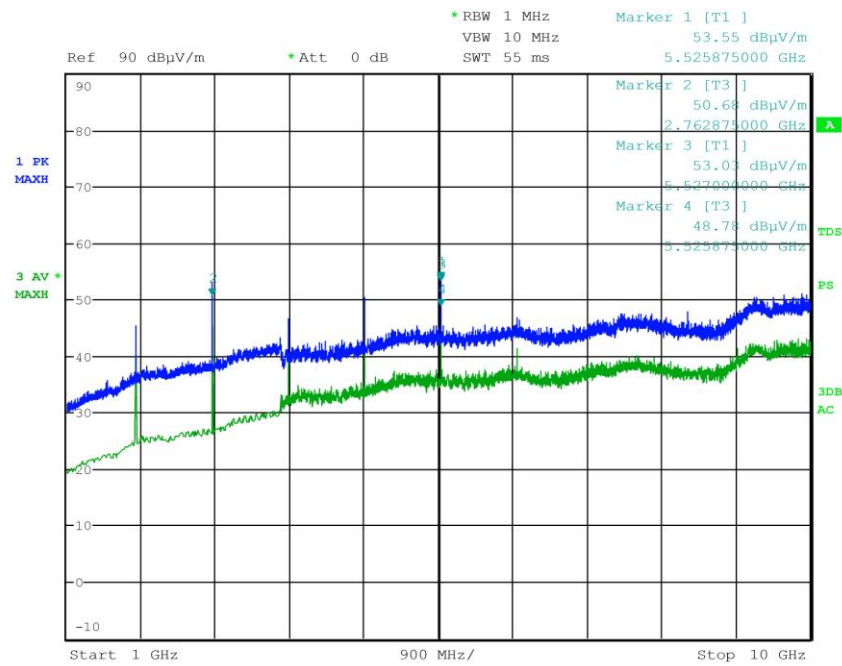
Graphs

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15095701
Test Spec
 Horiz-EUT Vert





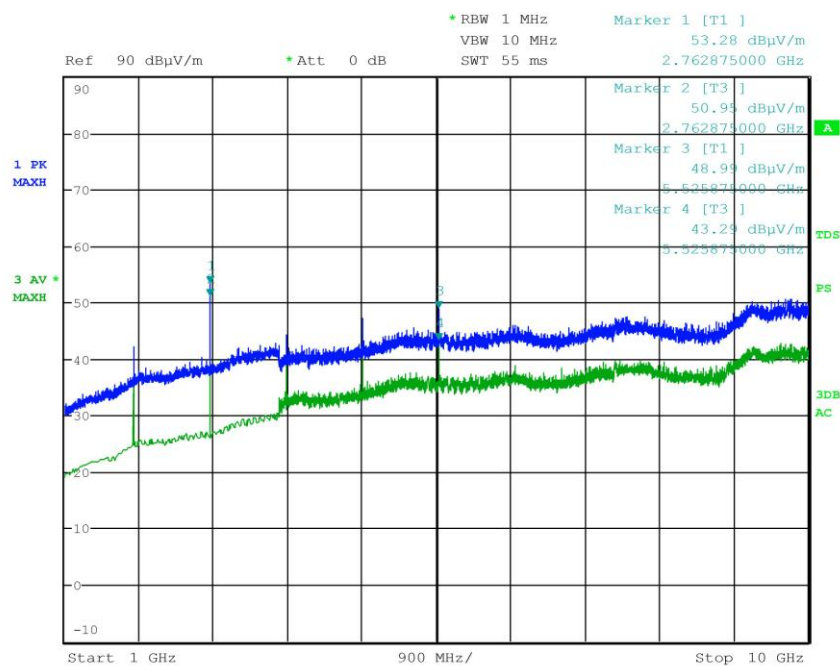
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Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15095702
Test Spec
Vert-EUT Vert



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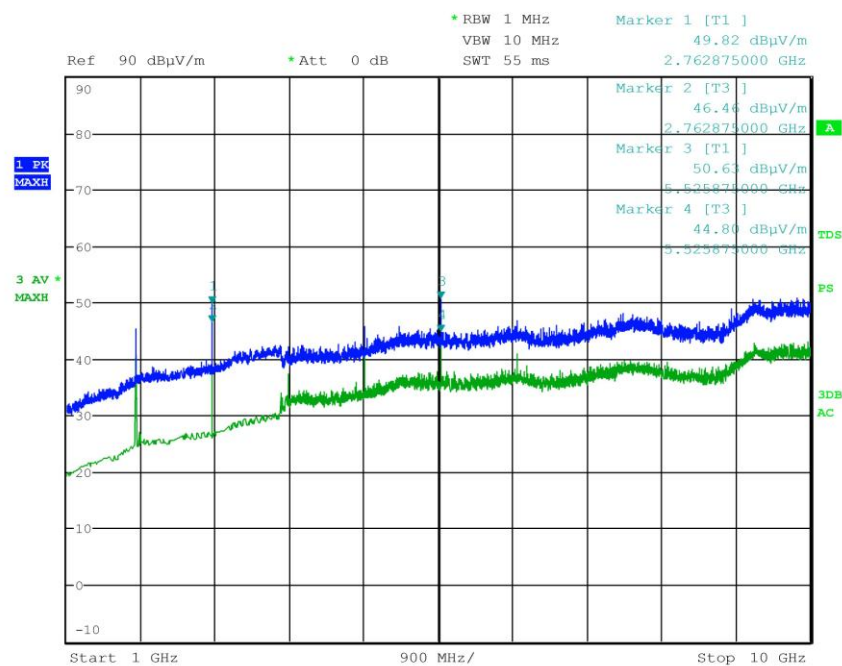
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15095703
Test Spec
Vert-EUT Horiz



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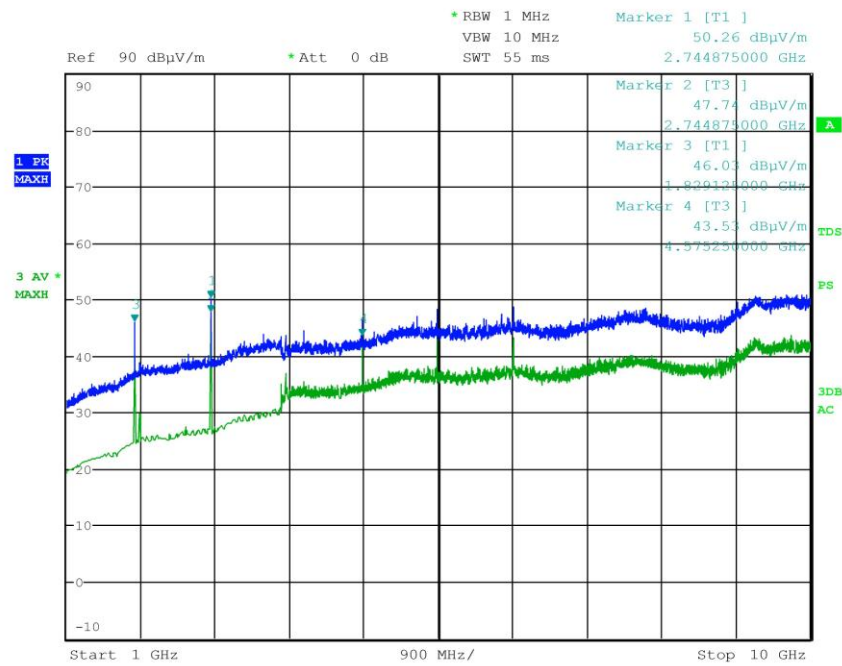
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15095704
Test Spec
Vert-EUT Horiz



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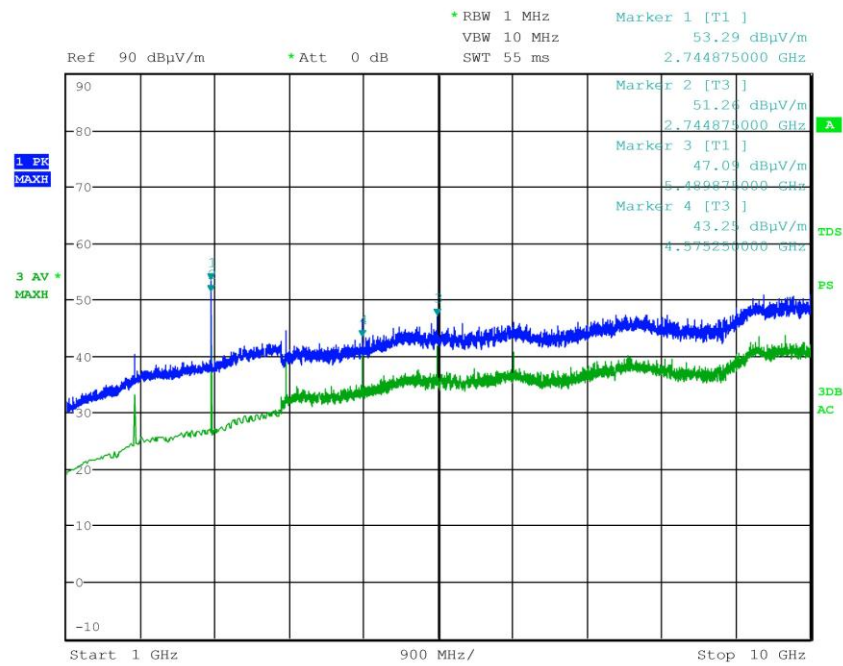


Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15095705
Test Spec
Horiz-EUT Horiz



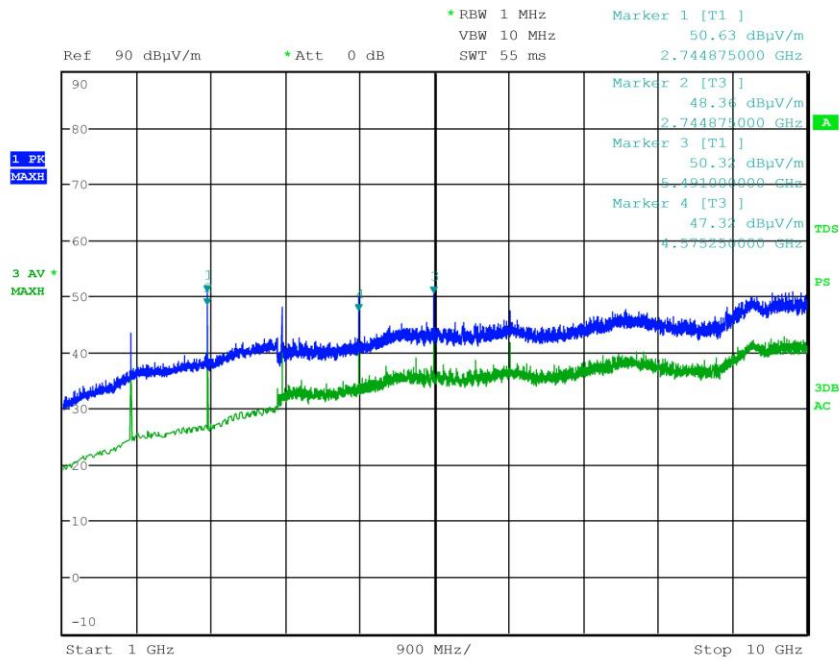


Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15095706
Test Spec
Vert-EUT Horiz



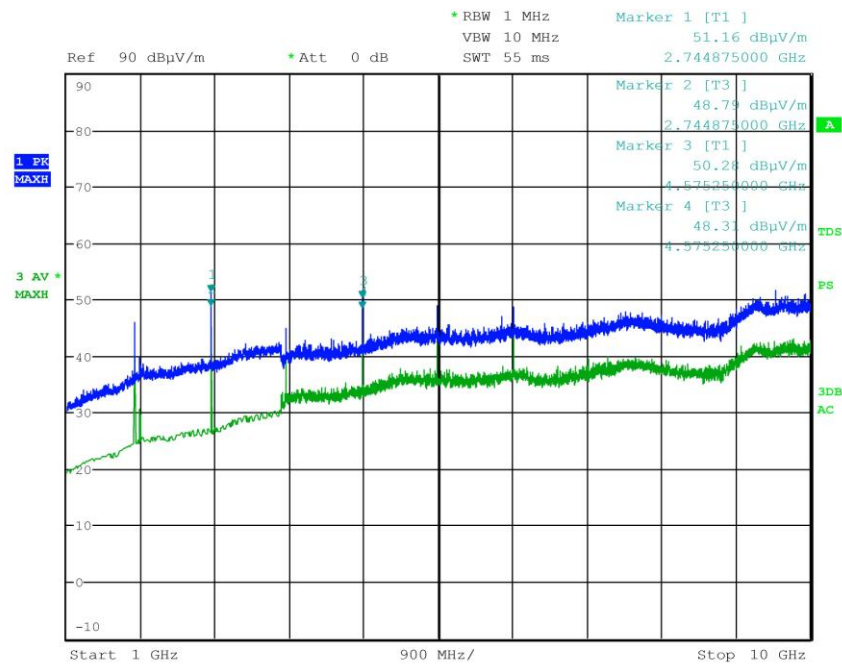


Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15095707
Test Spec
Vert-EUT Vert





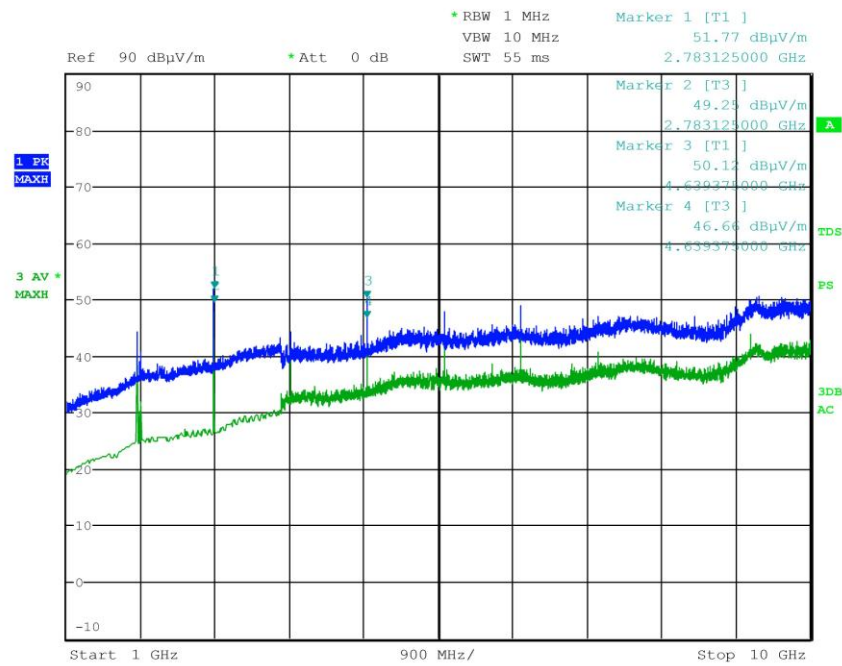
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15095708
Test Spec
Horiz-EUT Vert



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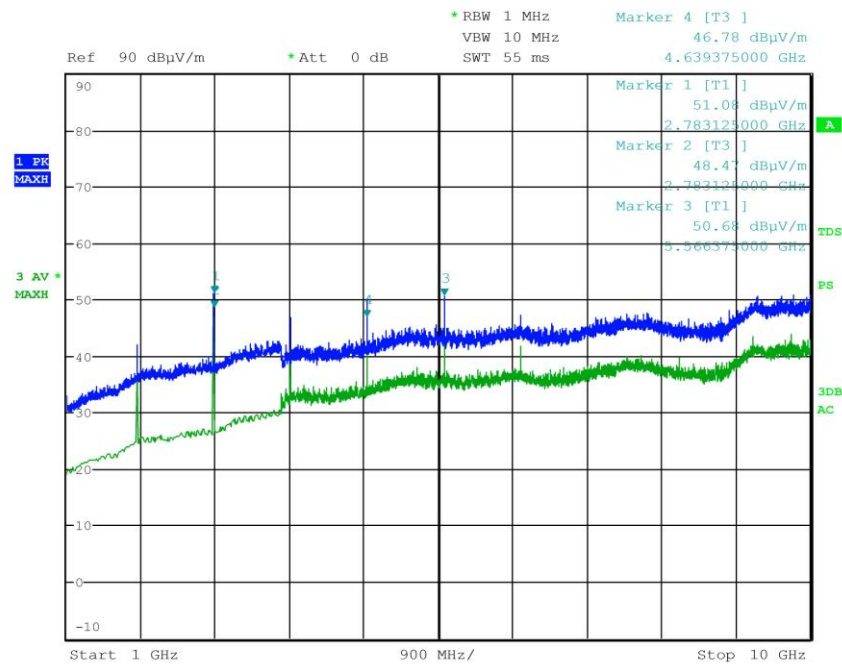
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15095709
Test Spec
Horiz-EUT Vert



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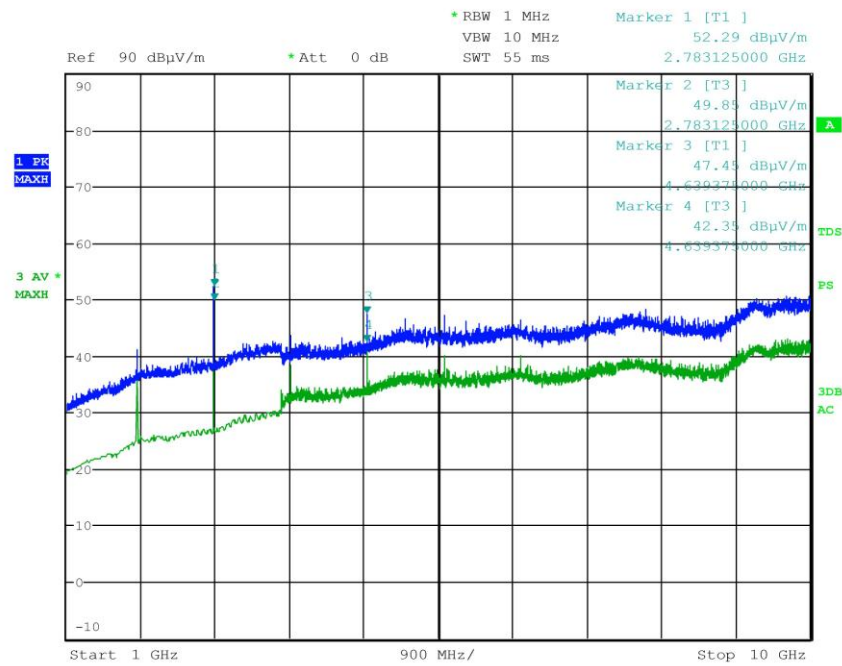


Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15095710
Test Spec
Vert-EUT Vert



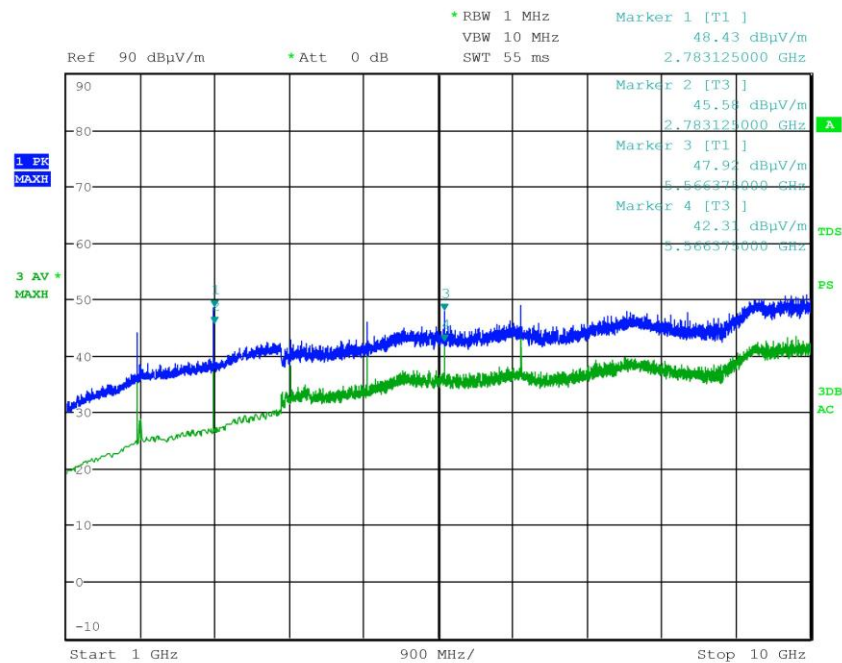


Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15095711
Test Spec
Vert-EUT Horiz





Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15095712
Test Spec
Horiz-EUT Horiz



Result: The requirements are met