



CMC Centro Misure Compatibilità S.r.l.
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LAB N° 0168

Independent Testing Laboratory
Accredited by ACCREDIA according to UNI CEI EN ISO/IEC 17025 cert. nr. 0168

TEST REPORT nr. R17083001

Federal Communication Commission (FCC)

Test item

Description: RBAND GATE EDGE RECEIVER
Trademark: JCM TECHNOLOGIES
Model/Type: RB-G-RX10
FCC ID: U5Z-RB-G-RX10

Test Specification

Standard: FCC Rules & Regulations, Title 47:2016
Part 15 paragraph(s): 203, 207, 209 and 231

Client's name: JCM TECHNOLOGIES S.A.

Address: Bisbe Morgades, 46 (Baixos) – 08500 Vic – SPAIN

Manufacturer's name : Same as client

Address: --

Report

Tested by: A. Bertezzolo – Technician

Approved by: R. Beghetto – Laboratory Manager

Date of issue: 20.06.17

Contents: 62 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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ANNEX 1: photographs of test setup



1. Summary

Standard:

FCC Rules & Regulations, Title 47:2016
Part 15 paragraph(s): 203, 207, 209 and 231

Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.203	Antenna requirements	1	Complies
Part 15.207	Conducted emissions	2	Complies
Part 15.209	Radiated emissions	3	Complies
Part 15.209 and 15.231(b)	Fundamental and spurious emissions (≤ 1 GHz)	4	Complies
Part 15.209 and 15.231	Spurious emissions (> 1 GHz)	5	Complies
Part 15.231(c)	Occupied channel bandwidth	6	Complies
Part 15.231(a3)	Periodic operation characteristics	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



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2. Description of Equipment under test (EUT)

Power supply : 12/24 Vdc
12/24 V ~ single-phase

Serial Number : --

Type of equipment : Transmitter Unit
 Receiver Unit

Type of station : Fixed station
 Portable station
 Mobile station

Nominal frequency : 902,30 MHz
915,65 MHz
927,70 MHz

Duty cycle evaluation : 2,19 ms
Evaluation has been performed in agreement with FCC Part 15.35c. This transmission is intended as a train of pulses of 2,19 ms ON and 97,81 ms OFF on 100 ms evaluation. See also graph G17083023

Delta (dB) for the performing of tests : $20\log(2,19 \text{ ms} / 100 \text{ ms}) = -33,2 \text{ dB}$



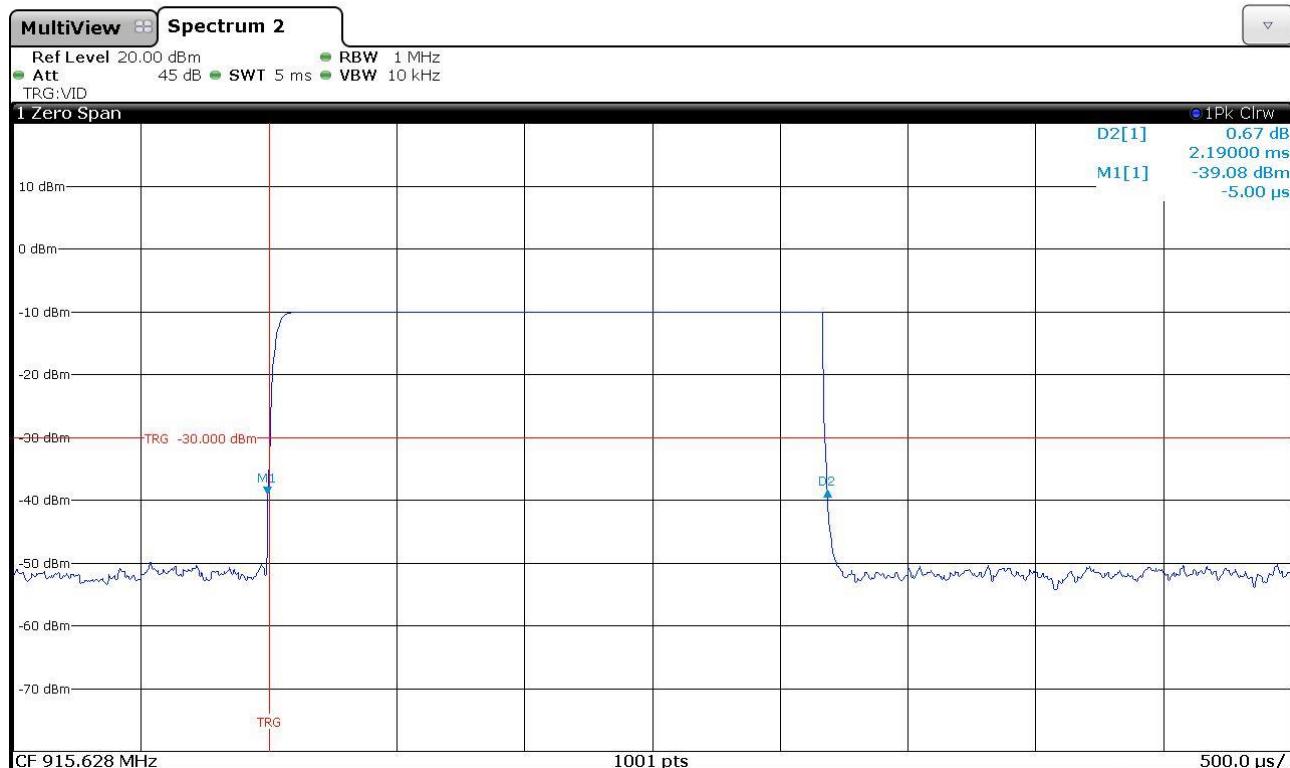
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Bertezzolo17083023





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2.1 Test Site

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

Address : Via della Fisica, 20

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Test site facility's FCC registration number : 182474

3. Testing and sampling

Date of receipt of test item : 28.02.17

Testing start date : 16.03.17

Testing end date : 20.06.17

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 P170219

4. Operative conditions

EUT exercising : EUT in continuous transmission at the maximum power on each operating frequency



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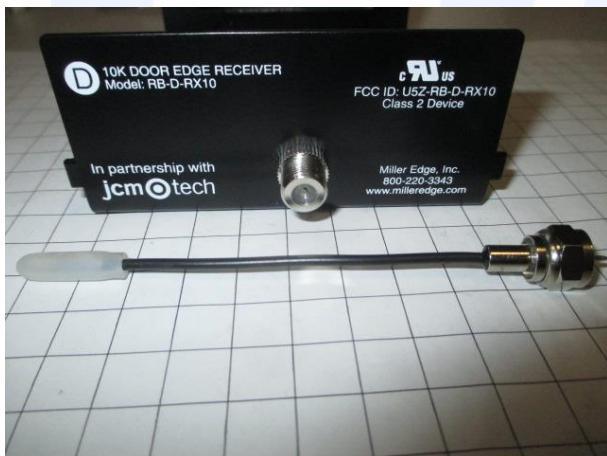
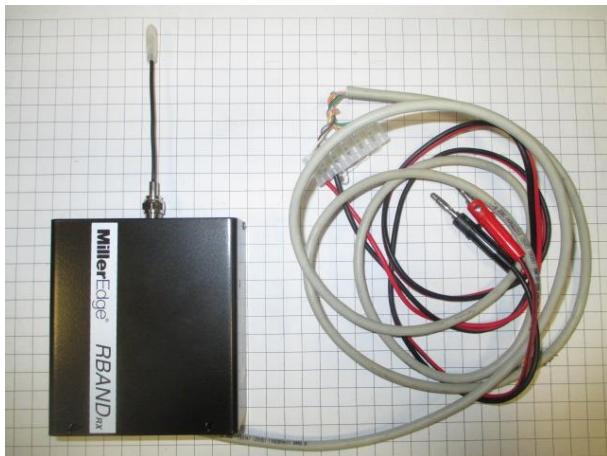


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5. Photograph(s) of EUT

5.1 Photograph(s) of EUT



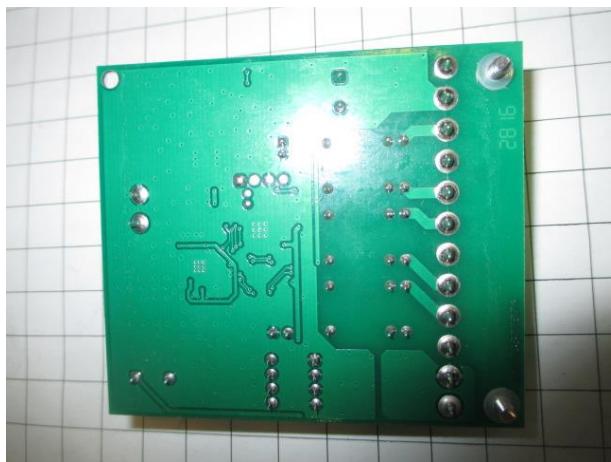


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6. Equipment list

Id. number	Manufacturer	Model	Description	Serial number	Last calibration	Due date calibration
CMC S010	Rohde & Schwarz	ESH3-Z2	Pulse limiter device	--	January 13 th '17	January '18
CMC S108	EMCO	3115	Horn Antenna	9811-5622	June 21 st '16	June '19
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January 10 th '17	January '18
CMC S190	Spin	AMDR-10180	Horn Antenna (1-18 GHz)	01-309-09	N.C.R.	N.C.R.
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January 11 th '17	January '18
CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver	100781	January 10 th '17	January '18
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January 10 th '17	January '18
CMC S260	CMC	Wfr_N	Shielded Cable	Wfr_ant10-1	November '16	November '17
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '16	November '17
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '16	November '17
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '16	November '17
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '16	November '17
CMC S271	Schwarzbeck	BBA 9106 + VHBB 9124	Biconical Antenna (30-300MHz)	831	June 21 st , '16	June '19
CMC S287	Schwarzbeck	VUSLP 9111B	Log-periodic Antenna (200 MHz-3Ghz)	9111B-203	June 21 st , '16	June '19
CMC S288	CMC	W_sma_white	Joint Shielded Cable	W_001	November '16	November '17



7. Measurement uncertainty

Test	Test Setup	Expanded uncertainty		Note
Conducted emission CISPR 16 LISN 50uH 0,009-0,0150MHz	PE001_01	3,4	dB	1
Conducted emission CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_01	2,8	dB	1
Conducted emission CISPR 16 Voltage Probe 0,15-30MHz	PE001_02	2,6	dB	1
Conducted emission CISPR 16 Current Probe 0,15-30MHz	PE001_03	2,2	dB	1
Conducted emission CISPR 16 ISN 0,15-30MHz	PE001_04	4,5	dB	1
Clic CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_05	2,8	dB	1
Disturbance Power 30-300 MHz	PE002_01	3,4	dB	1
Radiated Emission LAS 0,15-30MHz	PE003_01	1,5	dB	1
Radiated Emission CISPR 16 Loop Ant. 0,15-30MHz	PE004_01	3,8	dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300MHz	PE004_02	3,3	dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000MHz	PE004_03	3,2	dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18GHz	PE004_04	3,6	dB	1
Human Exposure to electromagnetic fields	PE005_01	10,5	%	1
Harmonic current emissions test	PE006_01	10 mA	+	1,6 %
Voltage fluctuation and flicker test	PE007_01			3,9 %
Radiated Immunity 80MHz-6GHz	PE102_XX	2,1	dB	0,81 V/m a 3V/m
Conducted Immunity 0,15-230MHz	PE105_XX	1,2	dB	0,44 V a 3V
AC Magnetic field	PE106_01	1,55	%	0,15 A/m a 10A/m
Pulse Magnetic field	PE107_01	6,22	%	18,6 A/m a 300A/m
Dumped Magnetic field	PE108_01	6,22	%	1,86 A/m a 30A/m
Common mode conducted immunity	PE112_01	2,12	%	0,21 V a 10V



Test	Test Setup	Expanded uncertainty	Note
Power/Spurious 9kHz-30MHz	PR001_01	3,8 dB	1
Power/Spurious ERP 30-1000MHz d=10m	PR001_02+03	4,3 dB	1
Misura della potenza EiRP 1-18GHz d=3m	PR001_04	4,3 dB	1
Misura della potenza EiRP 18-40GHz d=3m	PR001_05	5,5 dB	1
Frequency error	PR002_01+02	< 1x10-7	1
Timing zero span (1001pts.)	PR002_01+02	0,2 % SWT	1
Modulation bandwidth	PR002_01+02	< 1x10-7	1
Conducted RF power and spurious emission	PR002_01+02	1,2 dB	1
Adjacent channel power	PR002_01+02	1,2 dB	1
Blocking	PR002_01+02	1,2 dB	1

Test	Test Setup	Expanded uncertainty	Note
Electrostatic discharge immunity test	PE101_0X		2
Electrical fast transients / burst immunity test	PE103_0X		2
Surge immunity test	PE104_0X		2
Short interruption immunity test	PE109_01		2

Rev_17_01 date 20/03/2017

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



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8. Reference documents

Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2016	--
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Internal Procedure PM001 rev. 3.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 9.0 (Quality Manual)	Measurement uncertainty calculation



9. Deviation from test specification

None

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.

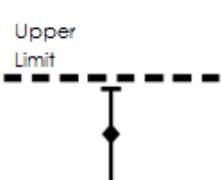
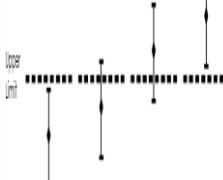
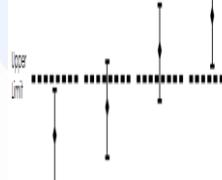


11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 9.0.

Judgement of compliance:

Case 1	Case 2	Case 3	Case 4
 <p>The sample complies with the requirement.</p> <p>The measurement result is within the specification limit when the measurement uncertainty is taken into account.</p>	 <p>The sample complies with the requirement.</p> <p>It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.</p>	 <p>The sample does not comply with the requirement.</p> <p>It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty also the measurement result is upper the limit.</p>	 <p>The sample does not comply with the requirement.</p> <p>The measurement result is outside the specification limit when the measurement uncertainty is taken into account.</p>

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
- Internal procedure PM001
- See clause 4 of this test report
- Test date: January 10th, 2017
- Technician: A. Bertezzolo

EUT exercising

See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
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	101	45

Result

Antenna Type	Gain	Remarks	Results
External dedicated antenna	--	Intentional radiators that must be professionally installed	Complies

Result: The requirements are met



11.2 Conducted emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.207
- ANSI C63.10 cl. 6.2
- Internal procedure PM001
- See clause 4 of this test report
- Test date: March 16th, 2017
- Technician: A. Bertezzolo

EUT exercising

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

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

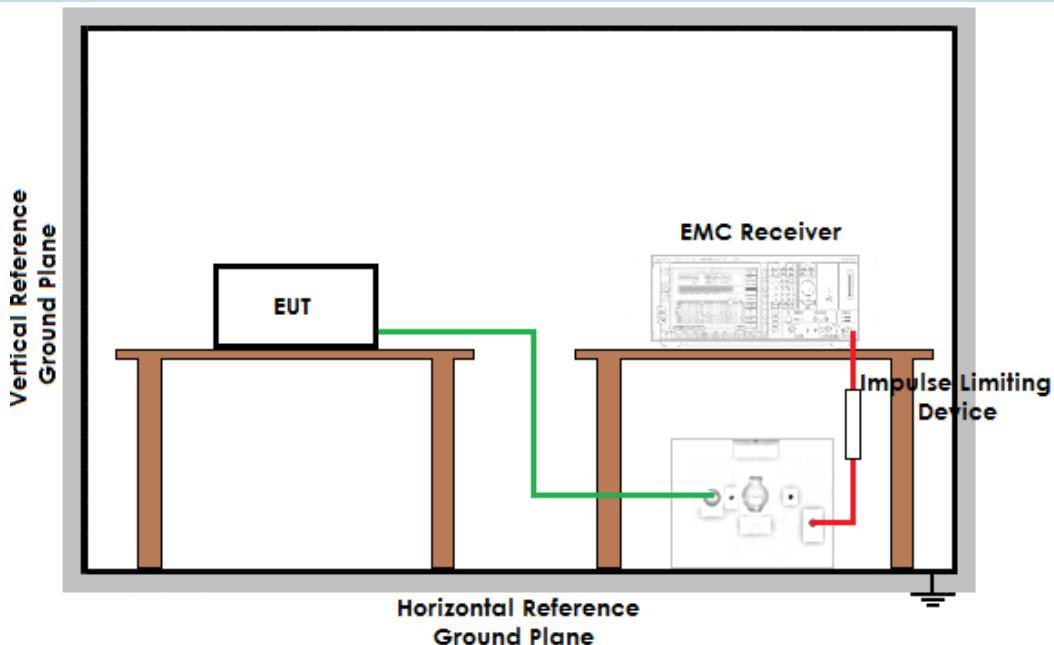
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	45

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	G17038522	--	Complies
L1	G17038523	--	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



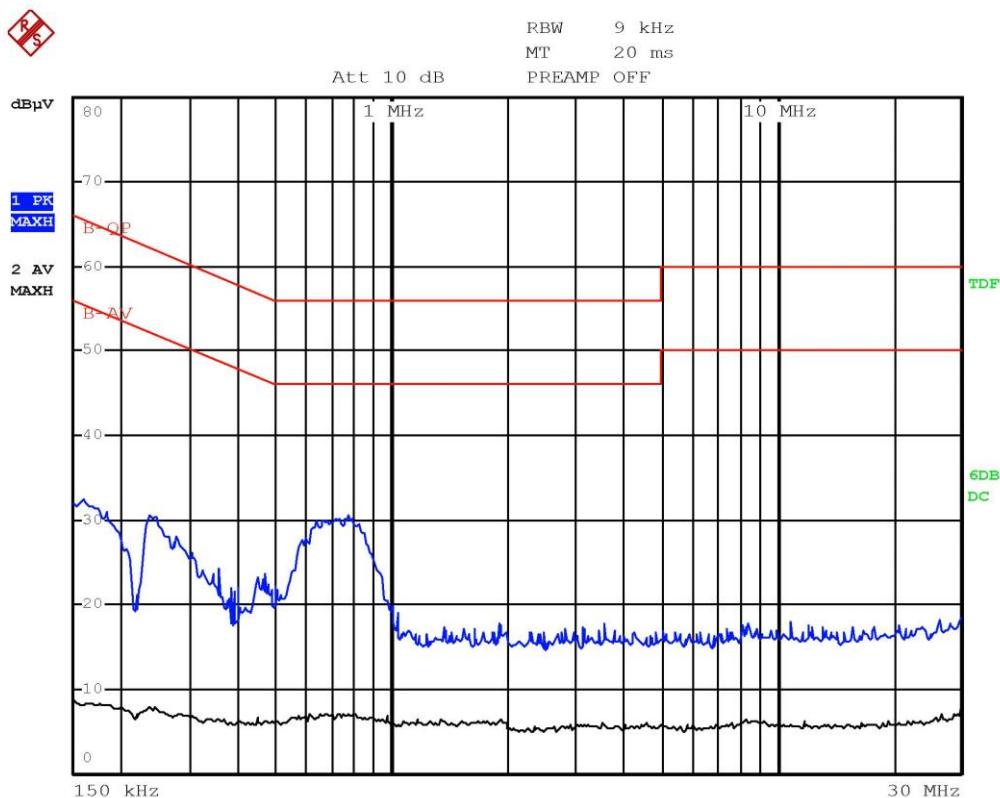
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Graphs



Bertezzolo 17038522



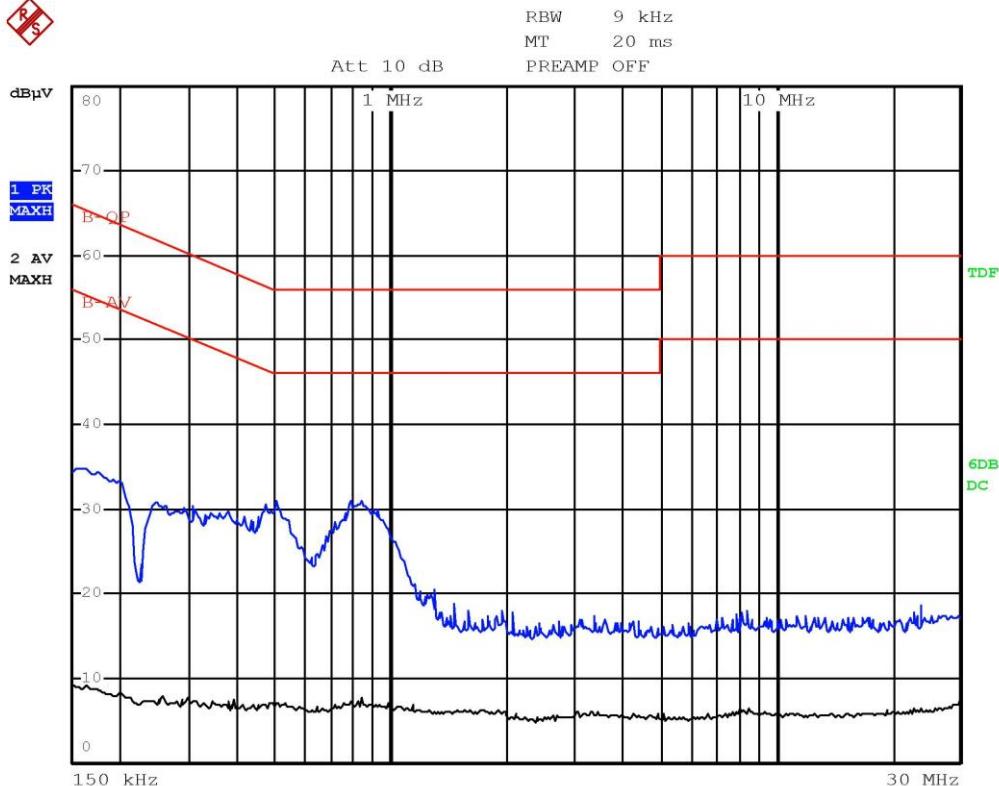
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R/S



Bertezzolo 17038523

Result: The requirements are met



11.3 Radiated emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part. 15.209
- ANSI C63.10 cl. 6.3, 6.4, 6.5 and 6.6
- Internal procedure PM001
- See clause 4 of this test report
- Test date: May 16th, 2017
- Technician: A. Bertezzolo

EUT exercising

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

Test equipment used

CMC S010, CMC S108, CMC S164, CMC S200,
CMC S271, CMC S287
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:

10 m for frequencies ≤ 1000 MHz

3 m for frequencies > 1000 MHz

EUT height about the floor:

80 cm for frequencies ≤ 1000 MHz

1,5 m for frequencies > 1000 MHz

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45



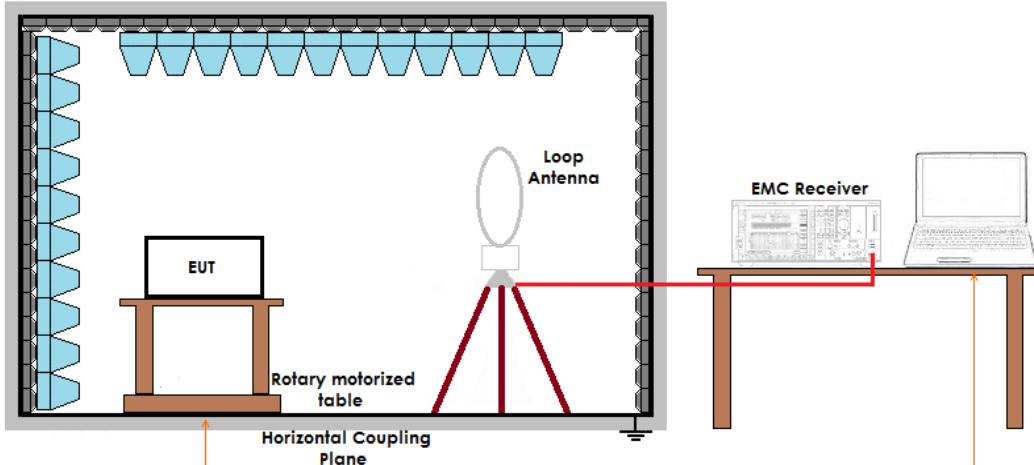
Acceptance limits

Frequency range (MHz)	Test distance (m)	Limits [dB(μ V/m)]	
		Linear average detector [dB(μ V/m)]	Peak detector [dB(μ V/m)]
0,009 to 0,490	300	48,5 to 13,8	
0,490 to 1,705	30	33,8 to 22,9	
1,705 to 30	30	29,5	
30 to 88	3	40	
88 to 216	3	43,5	
216 to 960	3	46,0	
Above 960	3	53,9	
	Test distance (m)	Linear average detector [dB(μ V/m)]	Peak detector [dB(μ V/m)]
Above 1000	3	53,9	73,9

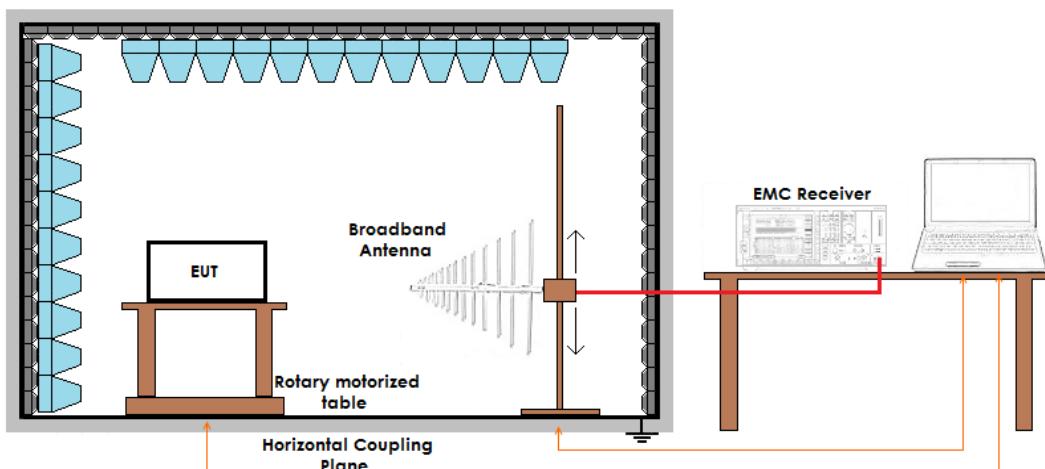
Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Setup

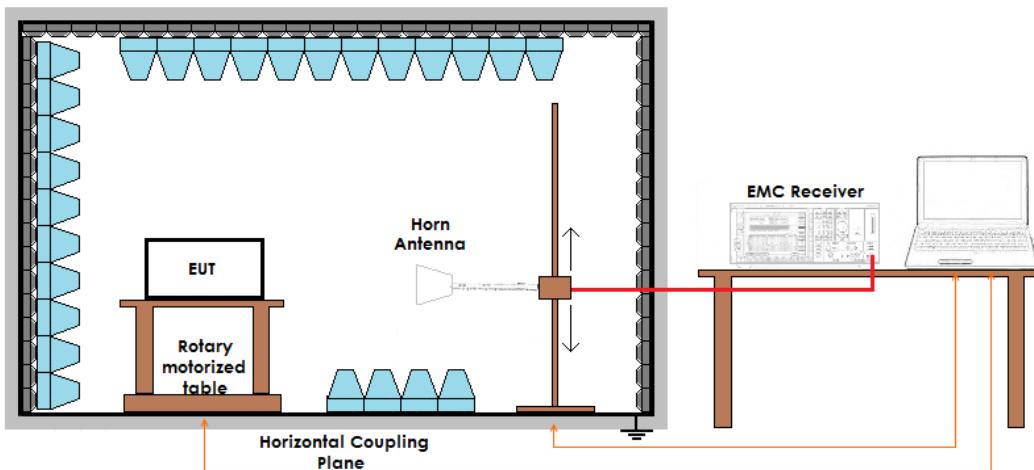
Frequency \leq 30 MHz



Frequency \leq 1 GHz



Frequency $>$ 1 GHz





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Result

Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
Loop	0,009 – 30	G17083001	Worst case	Complies
H	30 – 300	G17083002	Worst case	Complies
V	30 – 300	G17083003	Worst case	Complies
V	300 – 1000	G17083004	902,30 MHz	Complies
H	300 – 1000	G17083005	902,30 MHz	Complies
H	300 – 1000	G17083006	915,65 MHz	Complies
V	300 – 1000	G17083007	915,65 MHz	Complies
V	300 – 1000	G17083008	927,70 MHz	Complies
H	300 – 1000	G17083009	927,70 MHz	Complies
H	1000 – 10000	G17083016	902,30 MHz	Complies
H	1000 – 10000	G17083017	915,65 MHz	Complies
H	1000 – 10000	G17083018	927,70 MHz	Complies
V	1000 – 10000	G17083019	927,70 MHz	Complies
V	1000 – 10000	G17083020	902,30 MHz	Complies
V	1000 – 10000	G17083021	915,65 MHz	Complies
Remarks:	Measurements at frequencies lower than 1000 MHz have been performed with an EUT – antenna distance of 10 m. Measured values have been corrected with FCC 3A10 factor.			
	Peaks above the limits are caused by the nominal transmitting frequencies. Final measurements have been performed only for values with margin lower than 30 dB from limit			

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



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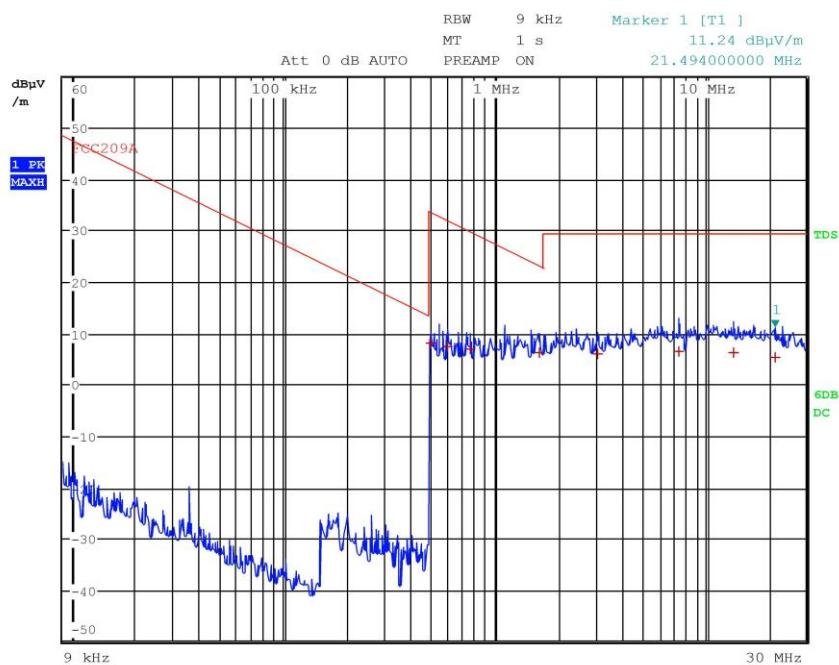


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Graphs

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083001
Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	494.000000000 kHz	8.13	Quasi Peak	-25.60
1	598.000000000 kHz	7.53	Quasi Peak	-24.54
1	762.000000000 kHz	7.00	Quasi Peak	-22.96
1	1.634000000 MHz	6.28	Quasi Peak	-17.06
1	3.086000000 MHz	6.08	Quasi Peak	-23.43
1	7.494000000 MHz	6.60	Quasi Peak	-22.87
1	13.610000000 MHz	6.32	Quasi Peak	-23.12
1	21.494000000 MHz	5.41	Quasi Peak	-24.00



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Meas Type Emission

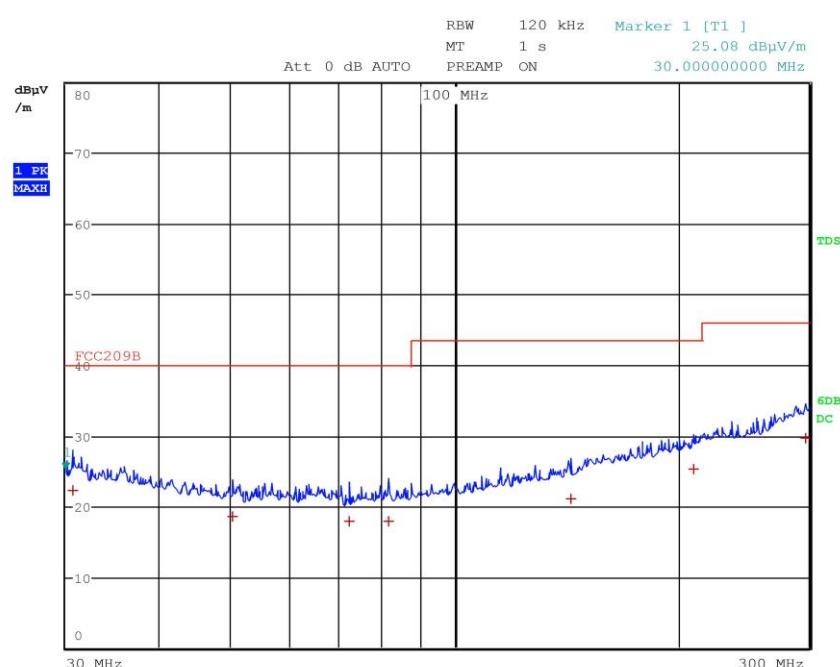
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083002

Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	30.600000000 MHz	22.30	Quasi Peak	-17.70
1	50.320000000 MHz	18.63	Quasi Peak	-21.37
1	72.040000000 MHz	17.82	Quasi Peak	-22.18
1	81.400000000 MHz	17.85	Quasi Peak	-22.15
1	143.320000000 MHz	21.09	Quasi Peak	-22.43
1	209.920000000 MHz	25.25	Quasi Peak	-18.27
1	297.160000000 MHz	29.59	Quasi Peak	-16.43



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Meas Type Emission

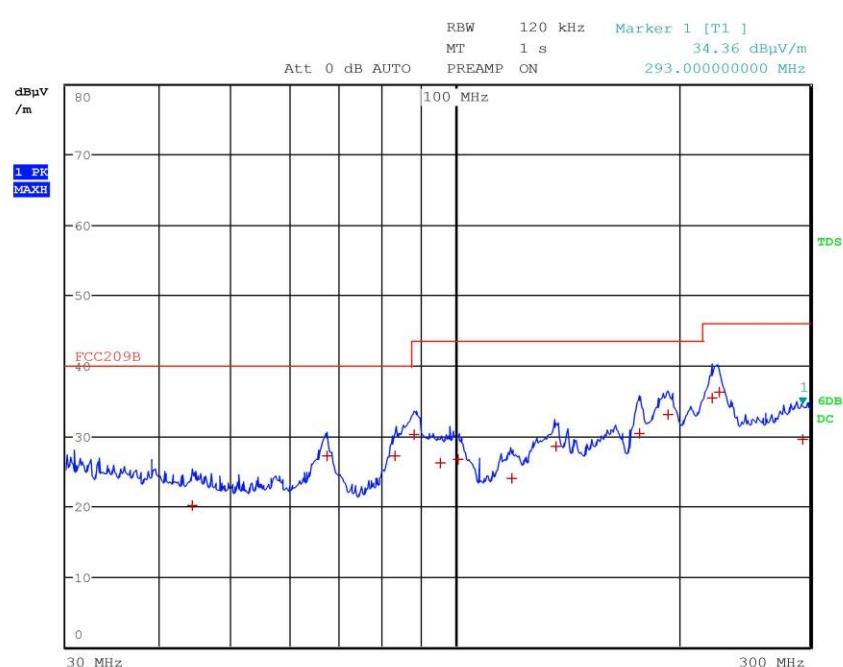
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083003

Test Spec





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Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083003
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 13

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	44.320000000 MHz	20.15	Quasi Peak	-19.85
1	67.240000000 MHz	27.15	Quasi Peak	-12.85
1	82.880000000 MHz	27.16	Quasi Peak	-12.84
1	88.120000000 MHz	30.20	Quasi Peak	-13.32
1	95.600000000 MHz	26.12	Quasi Peak	-17.40
1	101.120000000 MHz	26.65	Quasi Peak	-16.87
1	119.280000000 MHz	23.87	Quasi Peak	-19.65
1	136.440000000 MHz	28.53	Quasi Peak	-14.99
1	177.200000000 MHz	30.33	Quasi Peak	-13.19
1	193.560000000 MHz	32.95	Quasi Peak	-10.57
1	221.240000000 MHz	35.41	Quasi Peak	-10.61
1	226.480000000 MHz	36.22	Quasi Peak	-9.80
1	293.000000000 MHz	29.58	Quasi Peak	-16.44



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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission

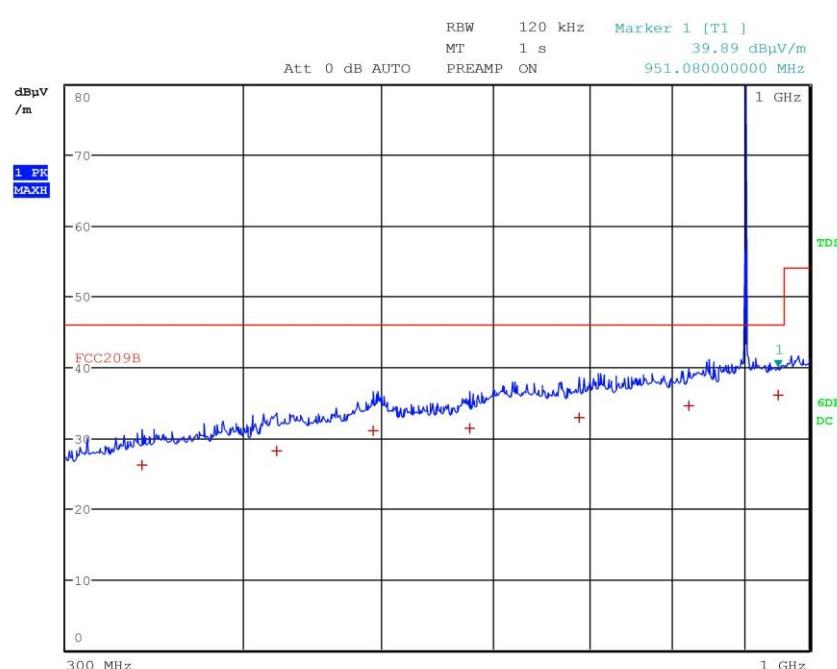
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083004

Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	339.640000000 MHz	26.09	Quasi Peak	-19.93
1	421.840000000 MHz	28.15	Quasi Peak	-17.87
1	493.760000000 MHz	31.06	Quasi Peak	-14.96
1	577.160000000 MHz	31.37	Quasi Peak	-14.65
1	688.440000000 MHz	32.86	Quasi Peak	-13.16
1	822.480000000 MHz	34.50	Quasi Peak	-11.52
1	951.080000000 MHz	36.04	Quasi Peak	-9.98



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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission

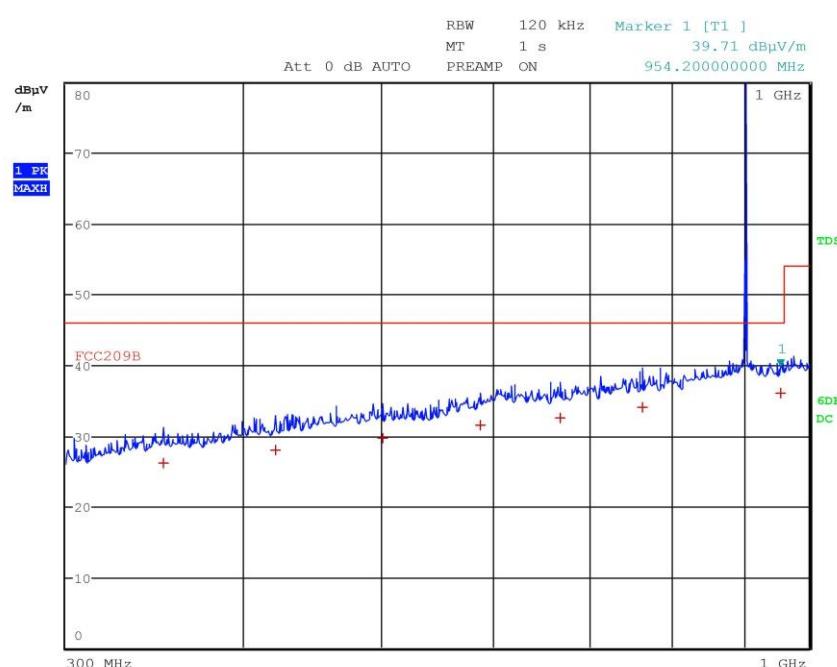
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083005

Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	351.400000000 MHz	26.17	Quasi Peak	-19.85
1	421.080000000 MHz	27.92	Quasi Peak	-18.10
1	501.000000000 MHz	29.74	Quasi Peak	-16.28
1	586.960000000 MHz	31.53	Quasi Peak	-14.49
1	668.320000000 MHz	32.55	Quasi Peak	-13.47
1	762.720000000 MHz	34.03	Quasi Peak	-11.99
1	954.200000000 MHz	36.06	Quasi Peak	-9.96



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LAB N° 0168

Meas Type Emission

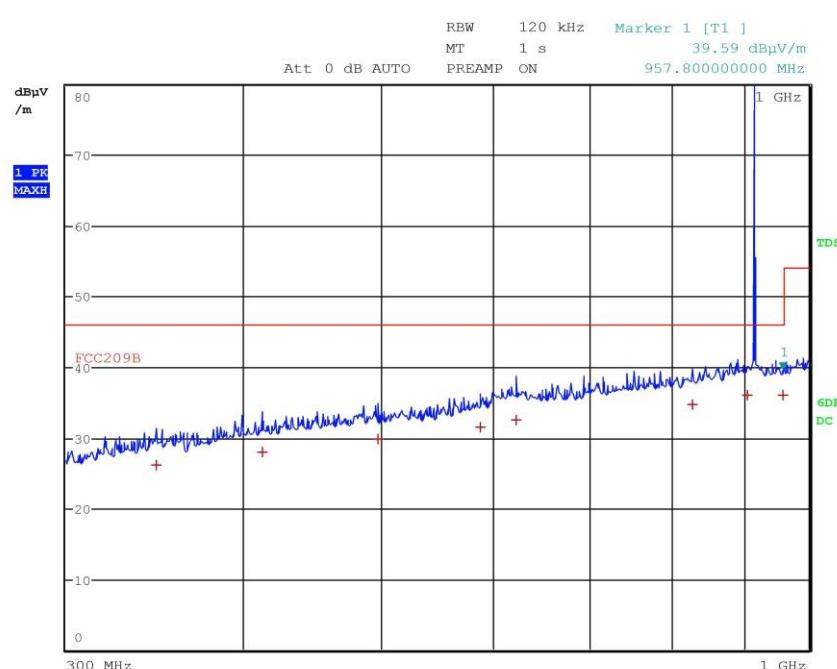
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083006

Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	347.520000000 MHz	26.06	Quasi Peak	-19.96
1	412.040000000 MHz	27.90	Quasi Peak	-18.12
1	497.240000000 MHz	29.80	Quasi Peak	-16.22
1	586.680000000 MHz	31.50	Quasi Peak	-14.52
1	622.000000000 MHz	32.59	Quasi Peak	-13.43
1	827.240000000 MHz	34.73	Quasi Peak	-11.29
1	904.480000000 MHz	36.05	Quasi Peak	-9.97
1	957.800000000 MHz	36.11	Quasi Peak	-9.91



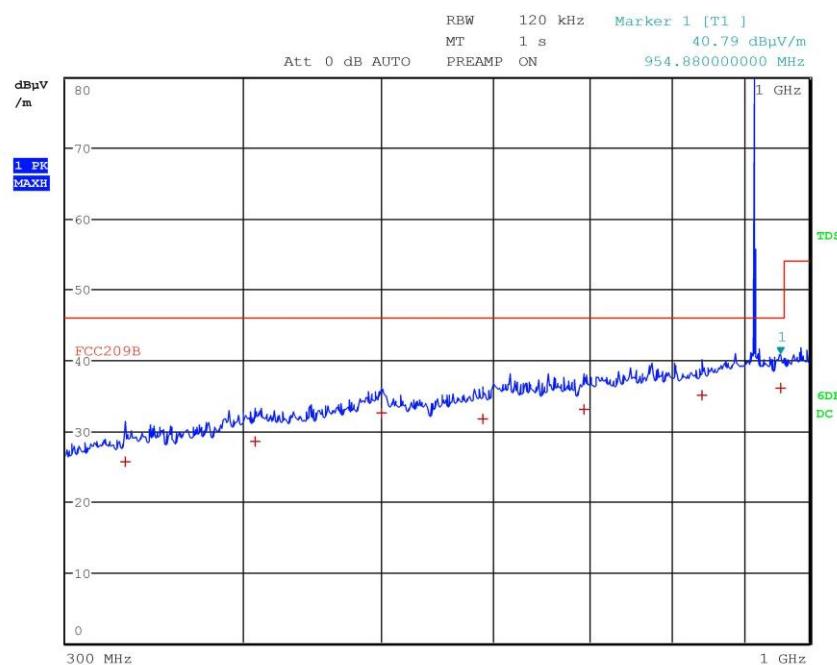
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ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083007
Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	330.400000000 MHz	25.68	Quasi Peak	-20.34
1	407.480000000 MHz	28.56	Quasi Peak	-17.46
1	500.680000000 MHz	32.44	Quasi Peak	-13.58
1	589.760000000 MHz	31.75	Quasi Peak	-14.27
1	693.880000000 MHz	33.02	Quasi Peak	-13.00
1	839.800000000 MHz	35.00	Quasi Peak	-11.02
1	954.880000000 MHz	36.08	Quasi Peak	-9.94



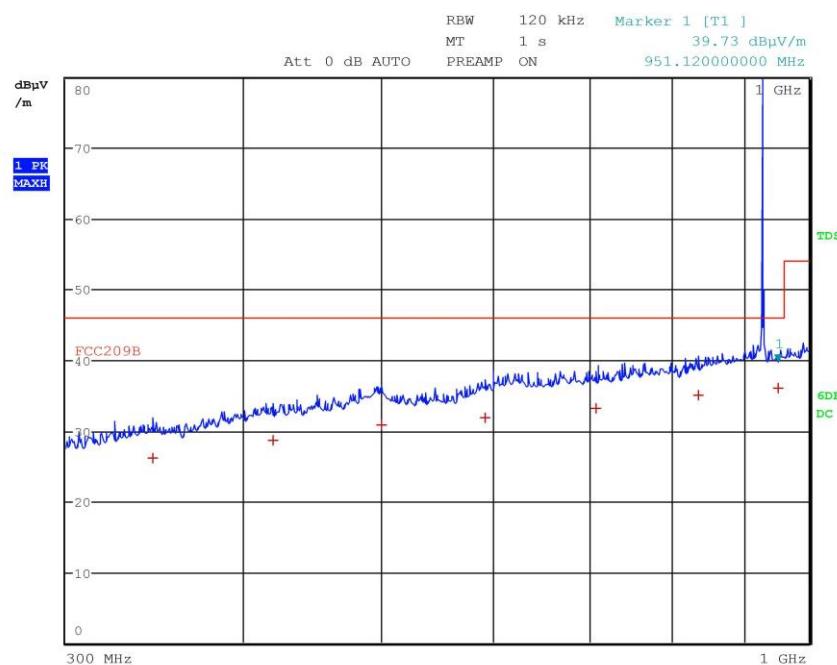
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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083008
Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	345.040000000 MHz	26.19	Quasi Peak	-19.83
1	420.040000000 MHz	28.62	Quasi Peak	-17.40
1	500.240000000 MHz	30.90	Quasi Peak	-15.12
1	591.400000000 MHz	31.84	Quasi Peak	-14.18
1	707.440000000 MHz	33.24	Quasi Peak	-12.78
1	835.960000000 MHz	34.99	Quasi Peak	-11.03
1	951.120000000 MHz	36.00	Quasi Peak	-10.02



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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission

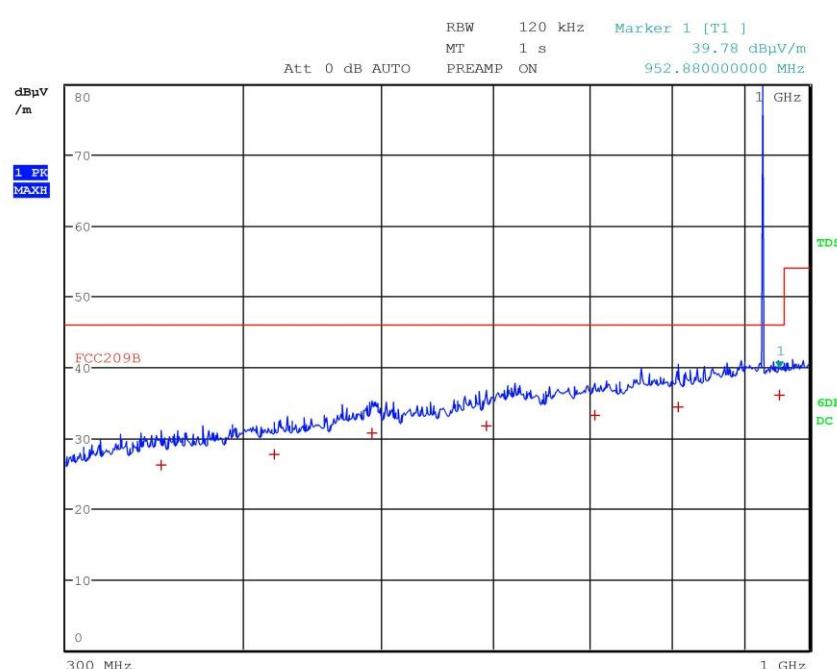
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083009

Test Spec



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	349.760000000 MHz	26.11	Quasi Peak	-19.91
1	420.720000000 MHz	27.65	Quasi Peak	-18.37
1	492.360000000 MHz	30.74	Quasi Peak	-15.28
1	592.720000000 MHz	31.68	Quasi Peak	-14.34
1	706.320000000 MHz	33.18	Quasi Peak	-12.84
1	807.960000000 MHz	34.33	Quasi Peak	-11.69
1	952.880000000 MHz	36.05	Quasi Peak	-9.97



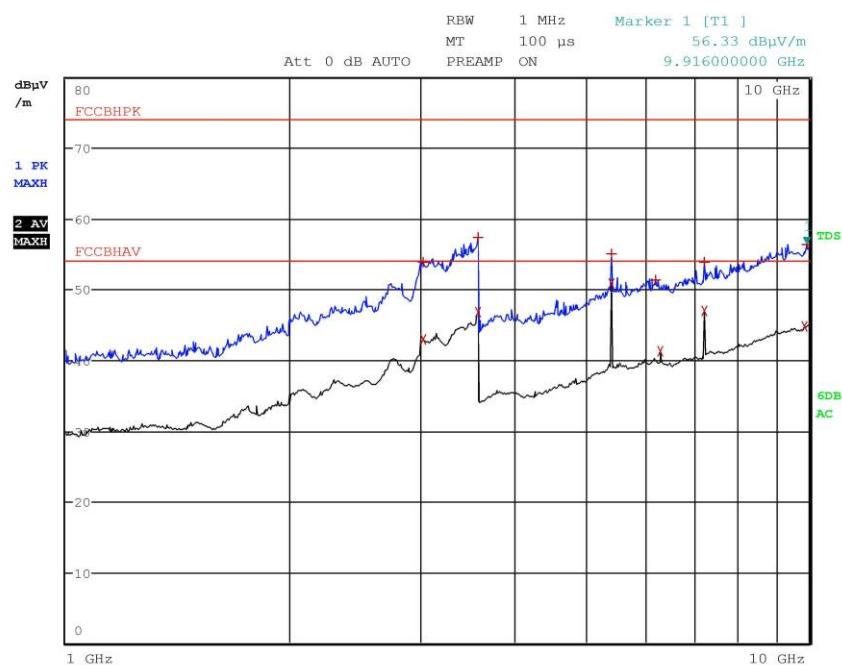
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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083016
Test Spec





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L'ENTE ITALIANO DI ACCREDITAMENTO

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Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083016
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 12

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
2	3.022400000 GHz	43.02	Average	-10.96
1	3.025600000 GHz	53.90	Max Peak	-20.08
1	3.592800000 GHz	57.41	Max Peak	-16.57
2	3.594000000 GHz	46.82	Average	-7.16
2	5.413600000 GHz	50.84	Average	-3.14
1	5.414000000 GHz	55.07	Max Peak	-18.91
1	6.207200000 GHz	51.27	Max Peak	-22.71
2	6.316000000 GHz	41.18	Average	-12.80
1	7.218400000 GHz	53.86	Max Peak	-20.12
2	7.218400000 GHz	47.04	Average	-6.94
2	9.864400000 GHz	44.72	Average	-9.26
1	9.916000000 GHz	56.33	Max Peak	-17.65



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Meas Type Emission

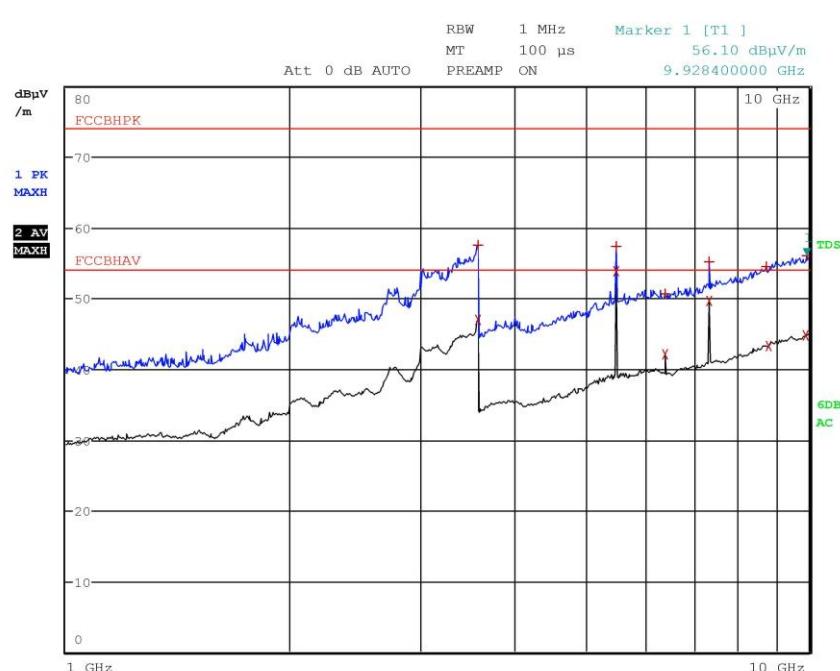
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083017

Test Spec





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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083017
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 12

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
2	3.598400000 GHz	47.04	Average	-6.94
1	3.599600000 GHz	57.54	Max Peak	-16.44
1	5.493600000 GHz	57.38	Max Peak	-16.60
2	5.494000000 GHz	53.78	Average	-0.20
2	6.409600000 GHz	42.05	Average	-11.93
1	6.410000000 GHz	50.69	Max Peak	-23.29
1	7.325200000 GHz	55.26	Max Peak	-18.72
2	7.325200000 GHz	49.63	Average	-4.35
1	8.767200000 GHz	54.50	Max Peak	-19.48
2	8.828400000 GHz	43.20	Average	-10.78
2	9.906000000 GHz	44.86	Average	-9.12
1	9.928400000 GHz	56.10	Max Peak	-17.88



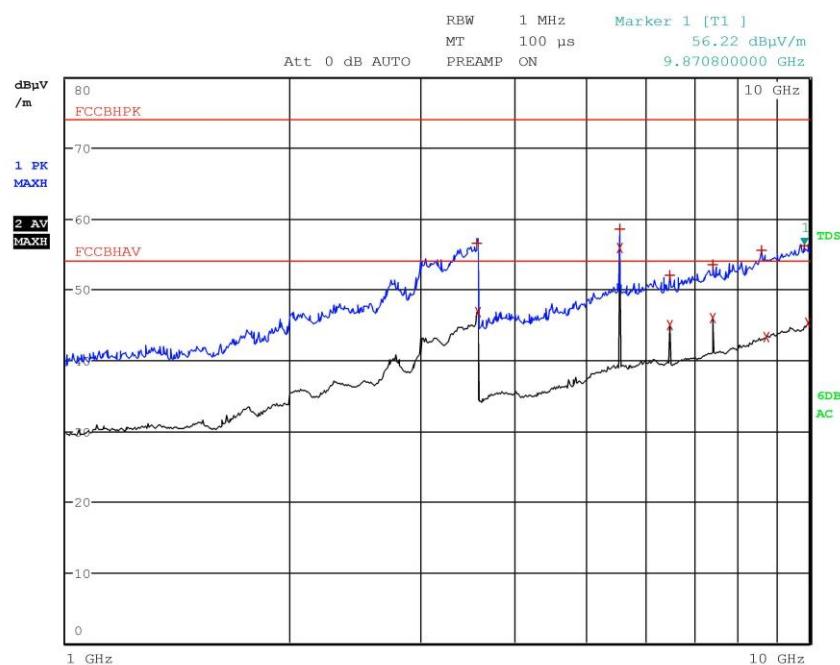
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L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083018
Test Spec





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ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083018
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 12

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	3.575200000 GHz	56.51	Max Peak	-17.47
2	3.599600000 GHz	46.72	Average	-7.26
1	5.566000000 GHz	58.65	Max Peak	-15.33
2	5.566000000 GHz	55.83	Average	1.85
2	6.493600000 GHz	44.90	Average	-9.08
1	6.494000000 GHz	52.01	Max Peak	-21.97
1	7.421200000 GHz	53.57	Max Peak	-20.41
2	7.421600000 GHz	45.96	Average	-8.02
1	8.636000000 GHz	55.47	Max Peak	-18.51
2	8.750000000 GHz	43.36	Average	-10.62
1	9.870800000 GHz	56.22	Max Peak	-17.76
2	9.950000000 GHz	45.37	Average	-8.61



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Meas Type Emission

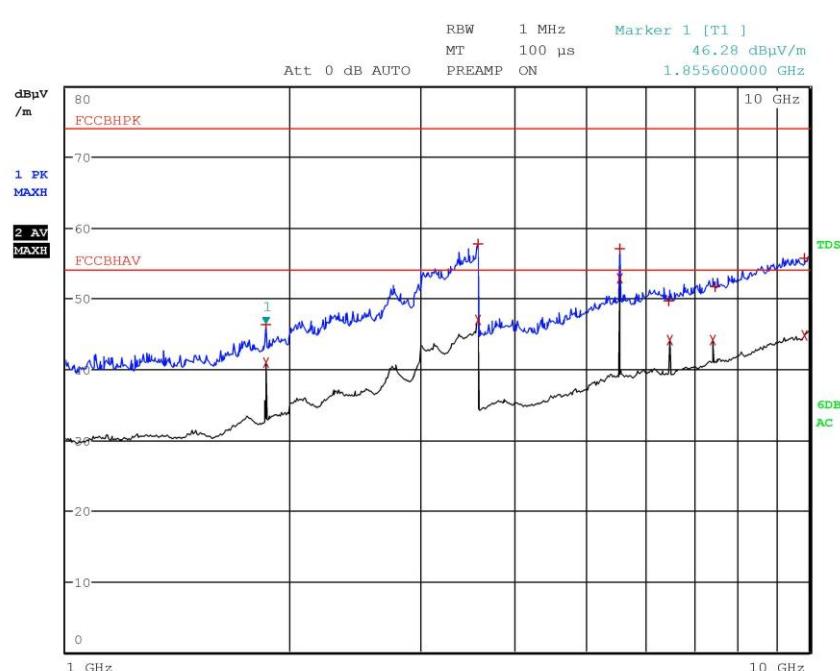
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083019

Test Spec





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LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083019
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 12

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
2	1.855200000 GHz	40.85	Average	-13.13
1	1.855600000 GHz	46.28	Max Peak	-27.70
1	3.584800000 GHz	57.66	Max Peak	-16.32
2	3.599200000 GHz	46.90	Average	-7.08
2	5.566000000 GHz	52.89	Average	-1.09
1	5.566000000 GHz	57.04	Max Peak	-16.94
1	6.469200000 GHz	49.62	Max Peak	-24.36
2	6.494000000 GHz	44.14	Average	-9.84
2	7.421600000 GHz	44.10	Average	-9.88
1	7.472400000 GHz	51.65	Max Peak	-22.33
1	9.838800000 GHz	55.64	Max Peak	-18.34
2	9.869600000 GHz	44.87	Average	-9.11



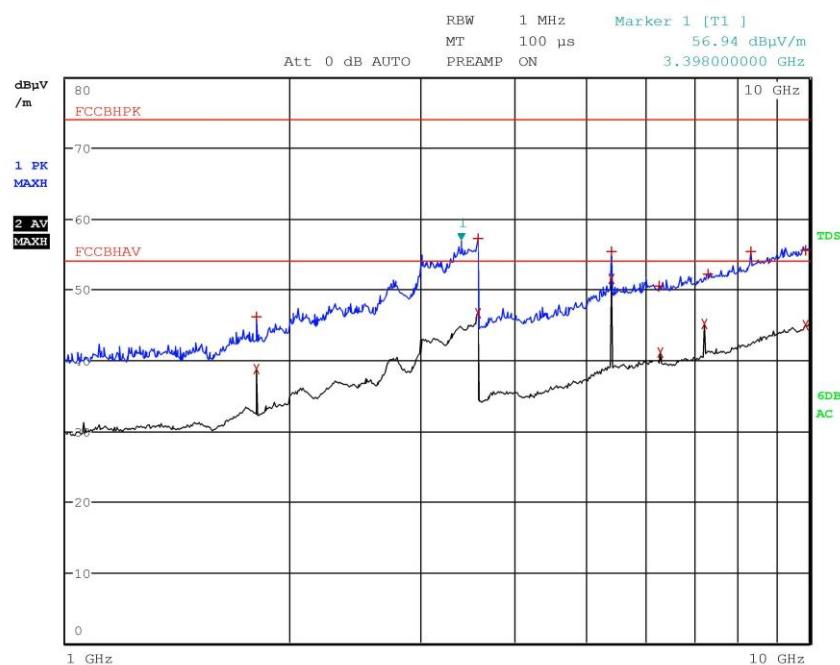
CMC
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LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083020
Test Spec





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Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083020
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 13

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
1	1.804400000 GHz	46.18	Max Peak	-27.80
2	1.804800000 GHz	38.73	Average	-15.25
2	3.598800000 GHz	46.58	Average	-7.40
1	3.599200000 GHz	57.23	Max Peak	-16.75
2	5.413600000 GHz	51.48	Average	-2.50
1	5.414000000 GHz	55.44	Max Peak	-18.54
1	6.281200000 GHz	50.44	Max Peak	-23.54
2	6.316000000 GHz	41.11	Average	-12.87
2	7.218400000 GHz	45.19	Average	-8.79
1	7.299600000 GHz	52.26	Max Peak	-21.72
1	8.348800000 GHz	55.33	Max Peak	-18.65
1	9.888800000 GHz	55.62	Max Peak	-18.36
2	9.907200000 GHz	44.88	Average	-9.10



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LAB N° 0168

Meas Type Emission

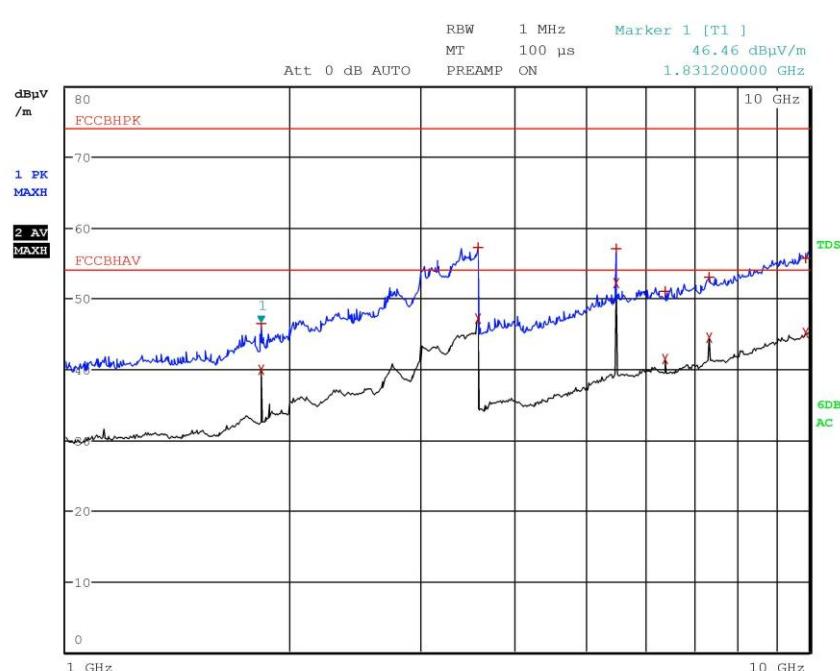
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083021

Test Spec





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ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083021
Test Spec

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 12

Trace	Frequency	Level (dB μ V/m)	Detector	Delta Limit/dB
2	1.831200000 GHz	39.87	Average	-14.11
1	1.831200000 GHz	46.46	Max Peak	-27.52
1	3.596800000 GHz	57.23	Max Peak	-16.75
2	3.600000000 GHz	47.19	Average	-6.79
1	5.493600000 GHz	57.12	Max Peak	-16.86
2	5.494000000 GHz	52.13	Average	-1.85
1	6.389600000 GHz	50.95	Max Peak	-23.03
2	6.409600000 GHz	41.39	Average	-12.59
1	7.325200000 GHz	53.02	Max Peak	-20.96
2	7.325200000 GHz	44.41	Average	-9.57
1	9.872400000 GHz	55.73	Max Peak	-18.25
2	9.882800000 GHz	45.05	Average	-8.93

Result: The requirements are met



11.4 Fundamental and Spurious Emission ($\leq 1 \text{ GHz}$)

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and Part 15.231(b)
- Internal procedure PM001
- See clause 4 of this test report
- Test date: May 16th, 2017
- Technician: A. Bertezzolo

EUT exercising

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

Test specification

Port: Enclosure

Antenna polarization: Horizontal (H) – Vertical (V)

EUT – Antenna distance: 10 m

EUT height about the floor: 80 cm

Detector CISPR quasi-peak

Test equipment used

CMC S164, CMC S287
Measurement uncertainty: See clause 7 of this test report

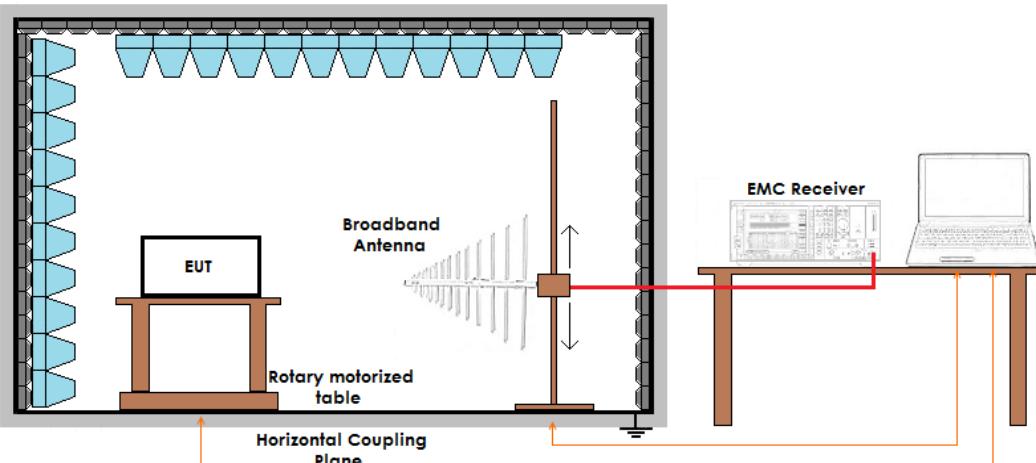
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

Acceptance limits

FCC Part 15.231 (b)		
Fundamental frequency (MHz)	Field strength of fundamental [dB($\mu\text{V}/\text{m}$)]	Field strength of spurious emissions [dB($\mu\text{V}/\text{m}$)]
40,66 to 40,70	67,04	47,04
70 to 130	61,94	41,94
130 to 174	61,94 to 71,48	41,94 to 51,48
174 to 260	71,48	51,48
260 to 470	71,48 to 81,94	51,48 to 61,94
Above 470	81,94	61,94

Setup



Result – Field strength of fundamental

Frequency (MHz)	Graphs	Limits (dB μ V/m)	3 m referred peak level (dB μ V/m)	Duty cycle (dB)	Level (dB μ V/m)	Results
902,30	G17083012	81,94	106,40	-33,2	73,20	Complies
915,65	G17083014	81,94	106,13	-33,2	72,90	Complies
927,70	G17083010	81,94	105,31	-33,2	72,10	Complies

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

Duty cycle value has been obtained using the following formula:

Duty cycle = $20\log(2,19 \text{ ms} / 100 \text{ ms}) = -33,2 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report

Result – Field strength of spurious emissions

Frequency band (MHz)	Frequency (MHz)	Limits (dB μ V/m)	Peak level (dB μ V/m)	Duty cycle (dB)	Level (dB μ V/m)	Results
902,30	< 1000	61,94	More than 20 dB below limit	-33,2	More than 20 dB below limit	Complies
915,65	< 1000	61,94	More than 20 dB below limit	-33,2	More than 20 dB below limit	Complies
927,70	< 1000	61,94	More than 20 dB below limit	-33,2	More than 20 dB below limit	Complies

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

Duty cycle value has been obtained using the following formula:

Duty cycle = $20\log(2,19 \text{ ms} / 100 \text{ ms}) = -33,2 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report



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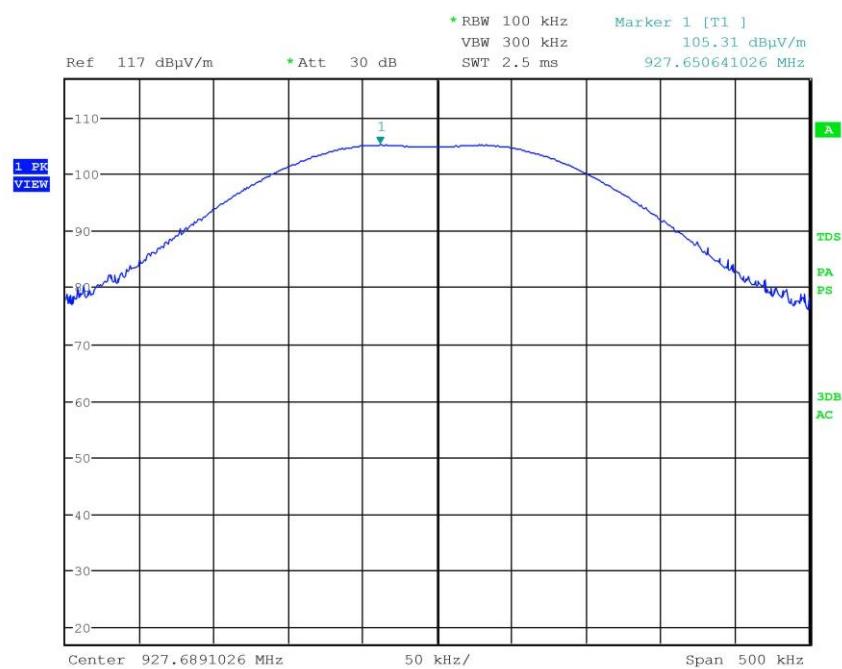


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LAB N° 0168

Graphs

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17083010
Test Spec





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LAB N° 0168

Meas Type Emission

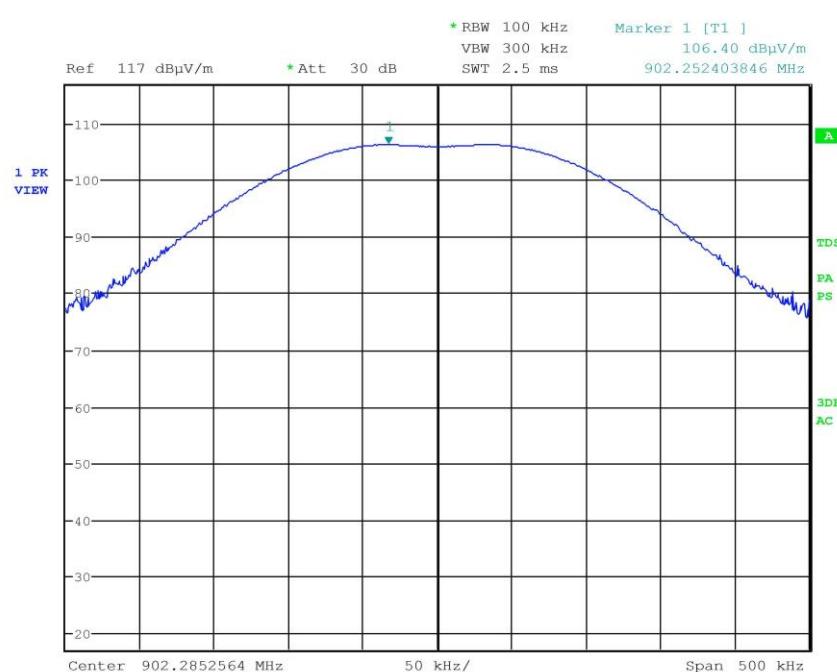
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083012

Test Spec





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Via della Fisica, 20
36016 Thiene (VI)



ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0168

Meas Type Emission

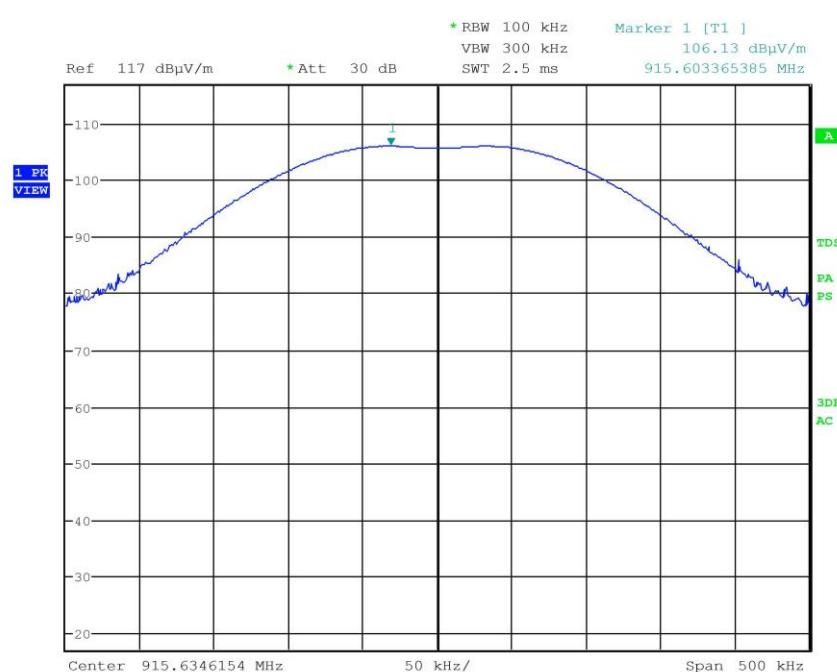
Equipment under Test

Manufacturer

OP Condition

Operator Bertezzolo 17083014

Test Spec



Result: The requirements are met



11.5 Spurious Emission (> 1 GHz)

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and Part 15.231
- ANSI C63.10 cl. 6.3.1
- Internal procedure PM001
- See clause 4 of this test report
- Test date: May 16th, 2017
- Technician: A. Bertezzolo

EUT exercising

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

Test equipment used

CMC S164, CMC S190
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure

Antenna polarization: Horizontal (H) – Vertical (V)

EUT – Antenna distance: 3 m

EUT height about the floor: 1,5 m

Detector AV + Peak

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

Acceptance limits

Acceptance limits for emissions in restricted frequency bands		
Frequency (MHz)	AV limits [dB(µV/m)]	Peak limits [dB(µV/m)]
> 1000	54	74

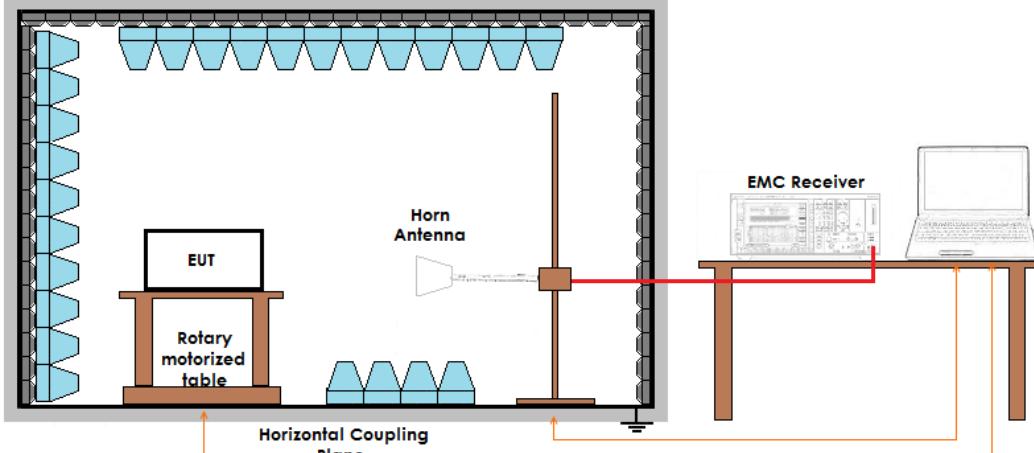
Acceptance limits for emissions in non-restricted frequency bands		
Frequency (MHz)	AV limits [dB(µV/m)]	Peak limits [dB(µV/m)]
> 1000	51,48	71,48



The restricted frequency bands are listed in the following table

MHz	MHz	MHz	GHz
0,090 – 0,110	16,42 – 16,423	399,9 – 410	4,5 – 5,15
0,495 – 0,505	16,69475 – 16,69525	608 – 614	5,35 – 5,46
2,1735 – 2,1905	16,80425 – 16,80475	960 – 1240	7,25 – 7,75
4,125 – 4,128	25,5 – 25,67	1300 – 1427	8,025 – 8,5
4,17725 – 4,17775	37,5 – 38,25	1435 – 1626,5	9,0 – 9,2
4,20725 – 4,20775	73 – 74,6	1645,5 – 1646,5	9,3 – 9,5
6,215 – 6,218	74,8 – 75,2	1660 – 1710	10,6 – 12,7
6,26775 – 6,26825	108 – 121,94	1718,8 – 1722,2	13,25 – 13,4
6,31175 – 6,31225	123 – 138	2200 – 2300	14,47 – 14,5
8,291 – 8,294	149,9 – 150,05	2310 – 2390	15,35 – 16,2
8,362 – 8,366	156,52475 – 156,52525	2483,5 – 2500	17,7 – 21,4
8,37625 – 8,38675	156,7 – 156,9	2690 – 2900	22,01 – 23,12
8,41425 – 8,41475	162,0125 – 167,17	3260 – 3267	23,6 – 24,0
12,29 – 12,293	167,72 – 173,2	3332 – 3339	31,2 – 31,8
12,51975 – 12,52025	240 – 285	3345,8 – 3358	36,43 – 36,5
12,57675 – 12,57725	322 – 335,4	3600 – 4400	Above 38,6
13,36 – 13,41			

Setup





Result – AV detector

Frequency band (MHz)	Frequency (MHz)	Limits (dB μ V/m)	Measured Level (dB μ V/m)	Duty cycle (dB)	Level (dB μ V/m)	Results
902,30	1804,00	51,48	38,70	-33,2	5,50	Complies
902,30	3022,00	51,48	43,00	-33,2	9,80	Complies
902,30	3594,00	51,48	46,80	-33,2	13,60	Complies
902,30	5413,00	54,00	51,50	-33,2	18,30	Complies
902,30	6316,00	51,48	41,20	-33,2	8,00	Complies
902,30	7218,00	51,48	47,00	-33,2	13,80	Complies
902,30	9888,00	51,48	44,90	-33,2	11,70	Complies
915,65	1831,00	51,48	39,90	-33,2	6,70	Complies
915,65	3596,00	51,48	47,20	-33,2	14,00	Complies
915,65	5493,00	51,48	53,80	-33,2	20,60	Complies
915,65	6409,00	51,48	42,10	-33,2	8,90	Complies
915,65	7325,00	54,00	44,10	-33,2	10,90	Complies
915,65	8828,00	51,48	43,20	-33,2	10,00	Complies
915,65	9872,00	51,48	45,10	-33,2	11,90	Complies
927,70	1855,00	51,48	40,90	-33,2	7,70	Complies
927,70	3584,00	51,48	46,90	-33,2	13,70	Complies
927,70	5566,00	51,48	55,80	-33,2	22,60	Complies
927,70	6493,00	51,48	44,90	-33,2	11,70	Complies
927,70	7421,00	54,00	46,00	-33,2	12,80	Complies
927,70	8636,00	51,48	43,40	-33,2	10,20	Complies
927,70	9870,00	51,48	45,40	-33,2	12,20	Complies

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

Duty cycle value has been obtained using the following formula:

Duty cycle = $20\log(2,19 \text{ ms} / 100 \text{ ms}) = -33,2 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report



Result – Peak detector

Frequency band (MHz)	Frequency (MHz)	Limits (dB μ V/m)	Measured Level (dB μ V/m)	Duty cycle (dB)	Level (dB μ V/m)	Results
902,30	1804,00	71,48	46,20	-33,2	13,00	Complies
902,30	3022,00	71,48	53,90	-33,2	20,70	Complies
902,30	3594,00	71,48	57,40	-33,2	24,20	Complies
902,30	5413,00	74,00	55,40	-33,2	22,20	Complies
902,30	6316,00	71,48	51,30	-33,2	18,10	Complies
902,30	7218,00	71,48	53,90	-33,2	20,70	Complies
902,30	9888,00	71,48	55,60	-33,2	22,40	Complies
915,65	1831,00	71,48	46,50	-33,2	13,30	Complies
915,65	3596,00	71,48	57,30	-33,2	24,10	Complies
915,65	5493,00	71,48	57,40	-33,2	24,20	Complies
915,65	6409,00	71,48	50,70	-33,2	17,50	Complies
915,65	7325,00	74,00	53,00	-33,2	19,80	Complies
915,65	8828,00	71,48	54,50	-33,2	21,30	Complies
915,65	9872,00	71,48	55,70	-33,2	22,50	Complies
927,70	1855,00	71,48	56,30	-33,2	23,10	Complies
927,70	3584,00	71,48	57,70	-33,2	24,50	Complies
927,70	5566,00	71,48	58,70	-33,2	25,50	Complies
927,70	6493,00	71,48	52,00	-33,2	18,80	Complies
927,70	7421,00	74,00	53,60	-33,2	20,40	Complies
927,70	8636,00	71,48	55,50	-33,2	22,30	Complies
927,70	9870,00	71,48	56,20	-33,2	23,00	Complies

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

Duty cycle value has been obtained using the following formula:

Duty cycle = $20\log(2,19 \text{ ms} / 100 \text{ ms}) = -33,2 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report

Result: The requirements are met



11.6 Occupied channel bandwidth

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.231 (c)
- ANSI C63.10 cl. 6.9
- Internal procedure PM001
- See clause 4 of this test report
- Test date: June 20th, 2017
- Technician: A. Bertezzolo

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 S227, CMC S287
Measurement uncertainty: See clause 7 of this test report

Test specification

The bandwidth of the emission shall be no wider than 0,25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0,5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier

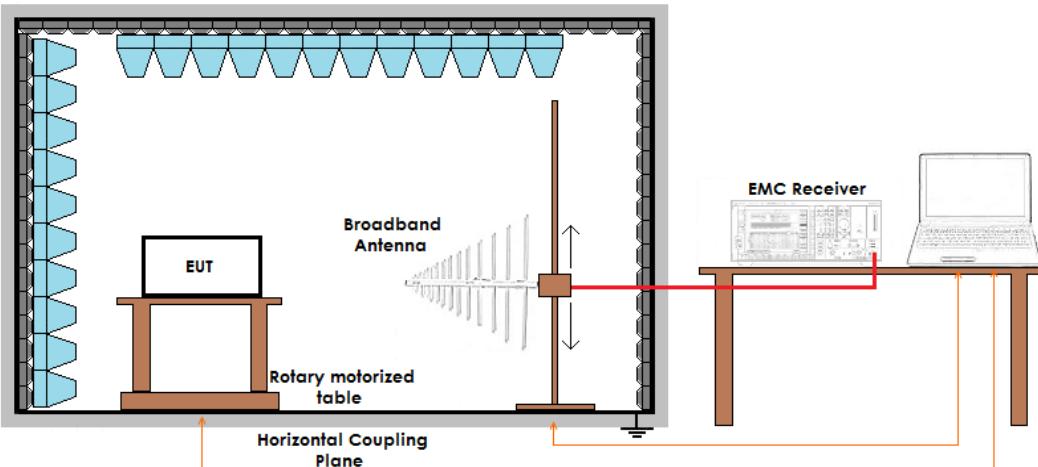
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

Acceptance limits

Devices operating above 70 MHz and below 900 MHz	Limits	
	Devices operating above 900 MHz	0,25% of the center frequency
		0,25% of the center frequency

Setup



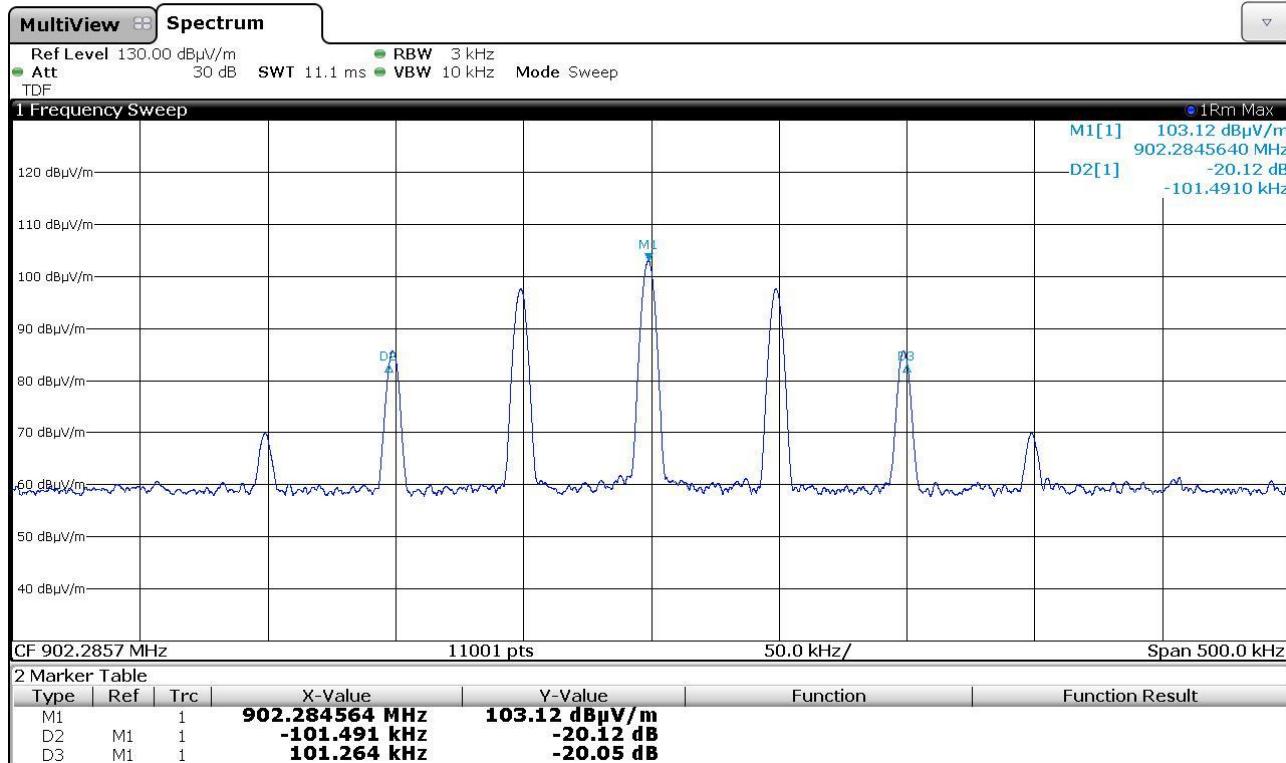
Result

Frequency (MHz)	Limit (kHz)	20 dB bandwidth (kHz)	Graphs	Results
902,30	4511	202,755	G17083050	Complies
915,65	4578	202,708	G17083051	Complies
927,70	4638	202,845	G17083052	Complies

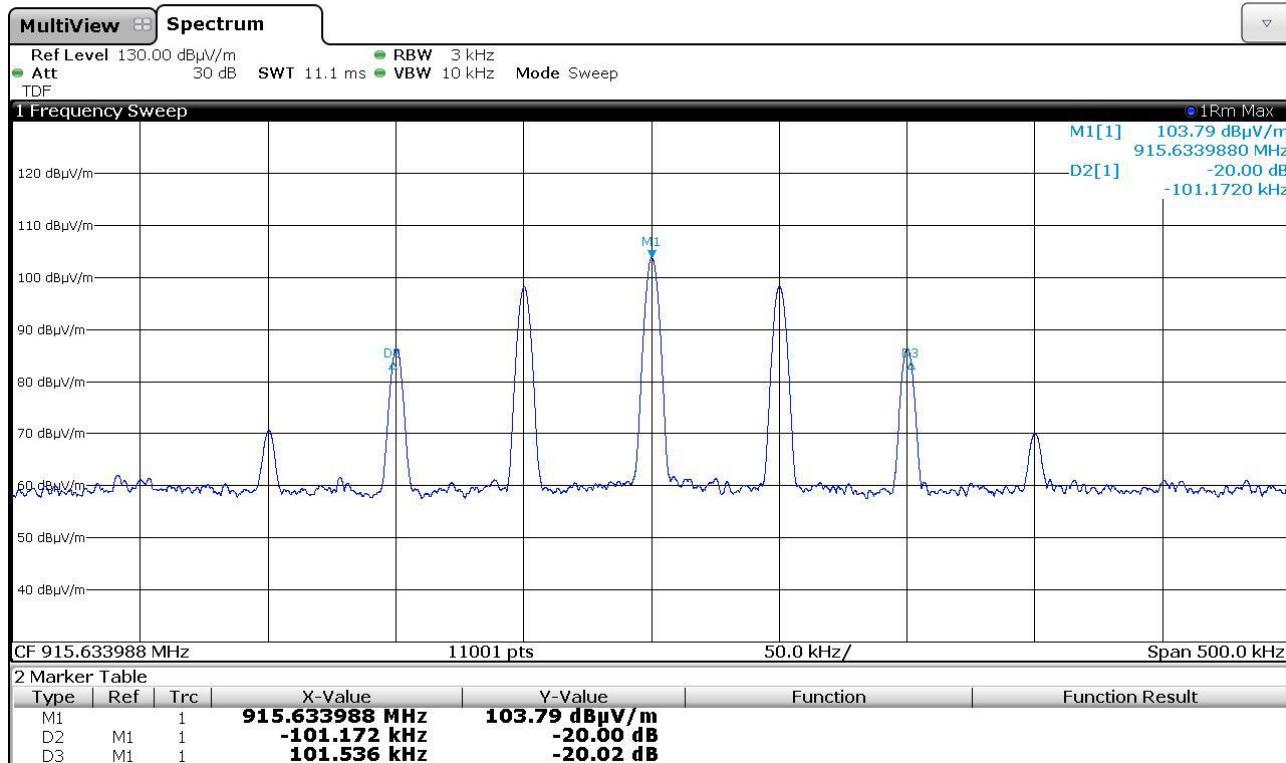


Graphs

Bertezzolo 17083050



Bertezzolo 17083051





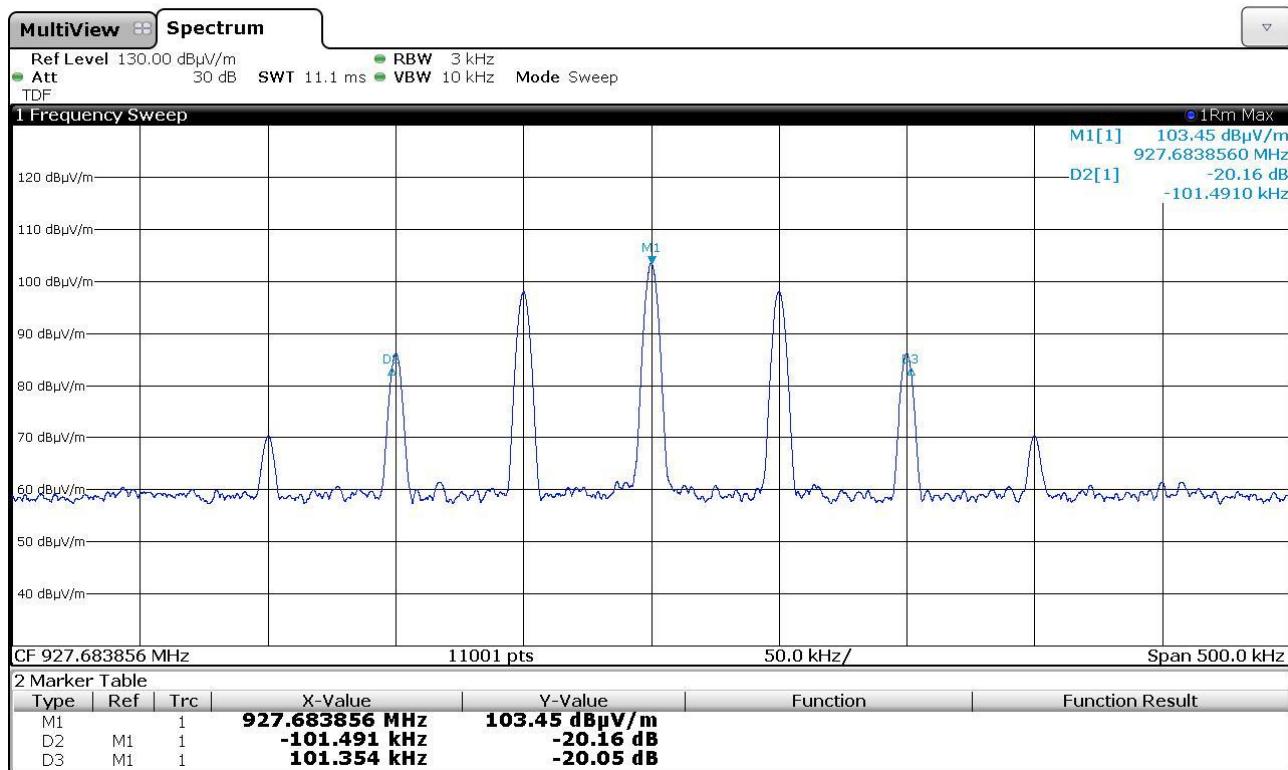
CMC
Centro Misure Compatibilità S.r.l.
Via della Fisica, 20
36016 Thiene (VI)



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Bertezzolo 17083052



Result: The requirements are met



11.7 Periodic Operation Characteristics

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.231 (a)
- Internal procedure PM001
- See clause 4 of this test report
- Test date: May 17th, 2017
- Technician: A. Bertezzolo

EUT exercising

See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

Test equipment used

CMC S227, CMC S287
Measurement uncertainty: See clause 7 of this test report

Test specification

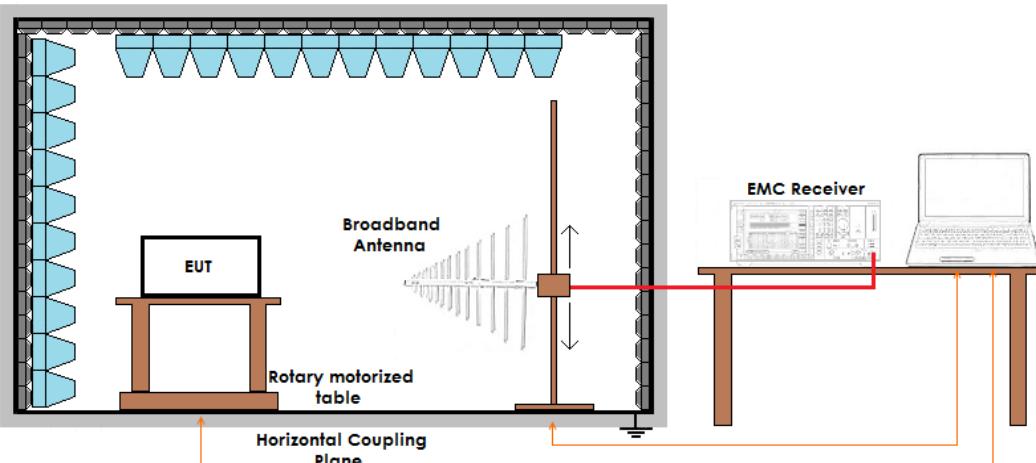
- Manually operated transmitter
 Transmitter activated automatically

Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

Setup



15.231(a1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released

Result: N.A.

15.231(a2) A transmitter activated automatically shall cease transmission within 5 seconds after activation

Result: N.A.

15.231(a3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour

Parameter	Dwell time (ms)	Silent period between transmissions (s)	Number of transmissions during 1 hour	Total duration of transmissions (max 2 s per h)	Results
Automatic transmission	2,19	20,1	179	$179 \times 2,19 \text{ ms} = 392,01 \text{ ms}$	Complies
Graphs	G17083023	G17083022	--	--	--

15.231(a4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

Result: N.A.



15.231(a5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data

Result: N.A.

Graphs

Bertezzolo 17083022





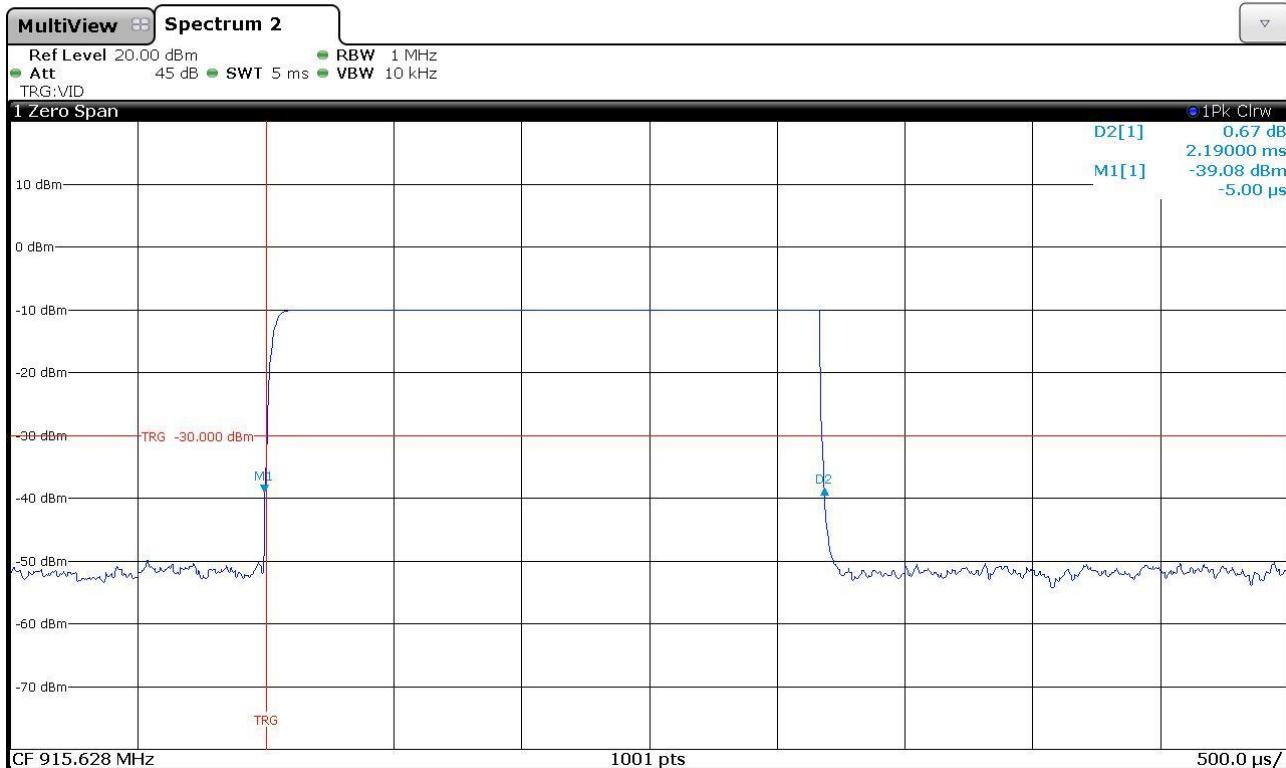
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Result: The requirements are met