



TEST REPORT nr. R15182601

Federal Communication Commission (FCC)

Test item

Description.....: RADIOBAND RECEIVER USING OSE INTERFACE FROM RBAND TO CONTROL PANEL
Trademark.....: JCM TECHNOLOGIES
Model/Type: RB3 OSE916
FCC ID.....: U5Z-RB3OSE916

Test Specification

Standard: FCC Rules & Regulations, Title 47:2014
Part 15 paragraph(s): 203, 204, 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. Bertezzo – Technician

Approved by: R. Beghetto – Laboratory Manager

Date of issue: 22.02.16

Contents.....: 46 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 47:2014
Part 15 paragraph(s): 203, 204, 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



2. Description of Equipment under test (EUT)

Power supply : 12/24 Vdc

Tests performed on 12 Vdc power supply

Serial Number : --

Type of equipment : ☒ Transmitter Unit

☒ Receiver Unit

Type of station : ☐ Fixed station

☐ Portable station

☒ Mobile station

Nominal frequency : 433,34 MHz

433,72 MHz

434,48 MHz

Duty cycle evaluation : 2,2 ms

Evaluation has been performed in agreement with FCC Part 15.35c. This transmission is intended as a train of pulses of 2,2 ms ON and 97,8 ms OFF on 100 ms evaluation. No other "ON" after the first 100 ms on a single transmission. See also graph G15182640

Delta (dB) for the performing of tests : $20\log(2,2 \text{ ms} / 100 \text{ ms}) = -33,15 \text{ dB}$



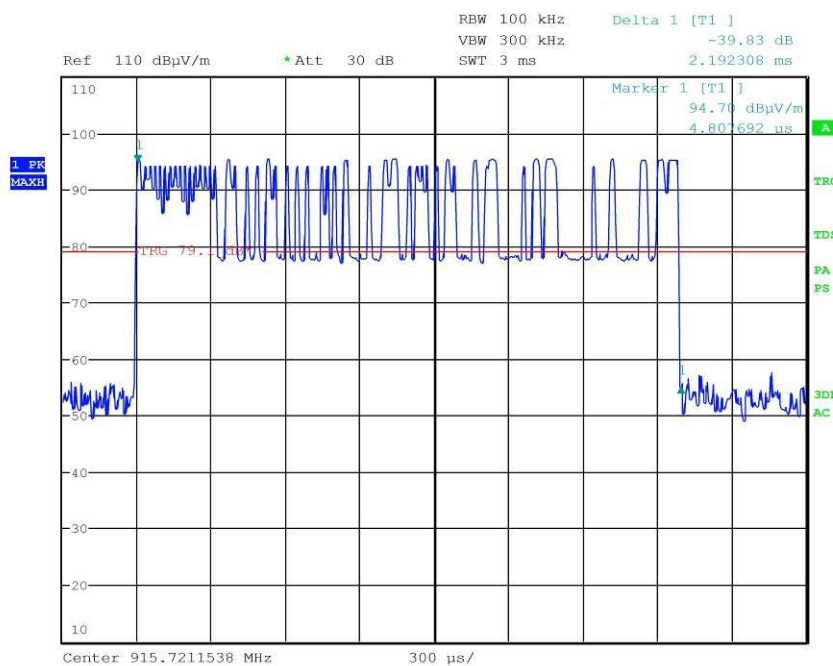
CMC
Centro Misure Compatibilità S.r.l.
Via dell'Elettronica, 12/C
36016 Thiene (VI)



LAB N° 0168

G15182640

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182640
Test Spec





2.1 Test Site

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

Address : Via dell'Elettronica, 12/C

36016 Thiene (VI) – ITALY

Test site facility's FCC registration number : 271947

3. Testing and sampling

Date of receipt of test item : 22.09.15

Testing start date : 18.11.15

Testing end date : 26.11.15

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 P151024

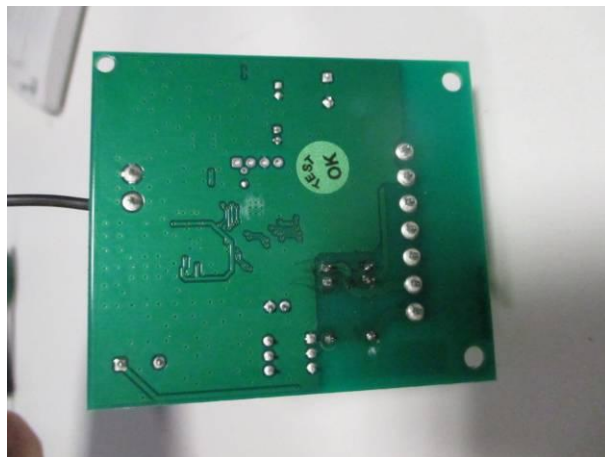
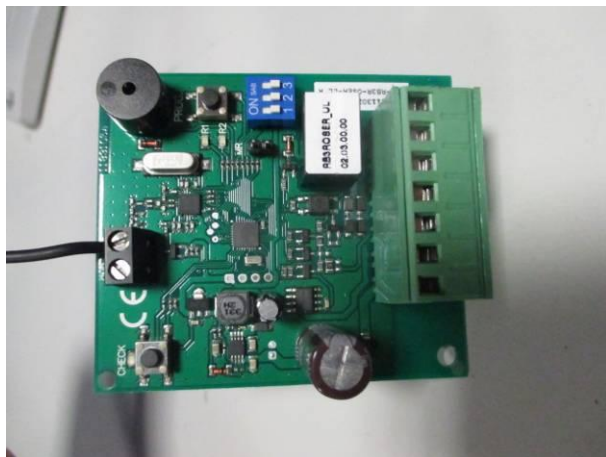
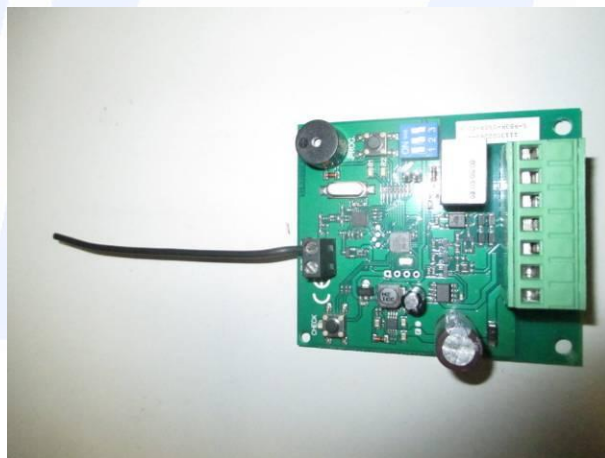
4. Operative conditions

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



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 '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

Rev_15_01 date 04/05/2015

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.

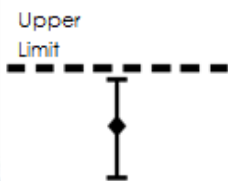
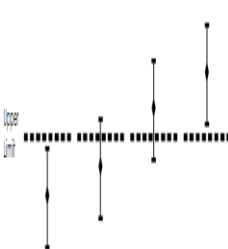
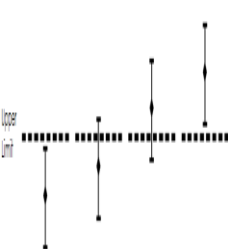


11. Results

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 Antenna requirements

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.203 and 15.204
- Internal procedure PM001
- See clause 4 of this test report
- Test date: 18 November 2015
- Technician: A. Bertezolo

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	101	45

Result

Antenna Type	External R.F. power amplifier	Gain	Remarks	Results
Wire connected to terminal	Not Present	--	--	Complies

Result: The requirements are met



11.2 Conducted emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.207
- Internal procedure PM001
- See clause 4 of this test report
- Test date: 26 November 2015
- Technician: A. Bertezolo

Test configuration and test method

Test site:
Shielded chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S010, CMC S200, CMC S206
Measurement uncertainty: See clause 7 of this test report

Test specification

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

Environmental conditions

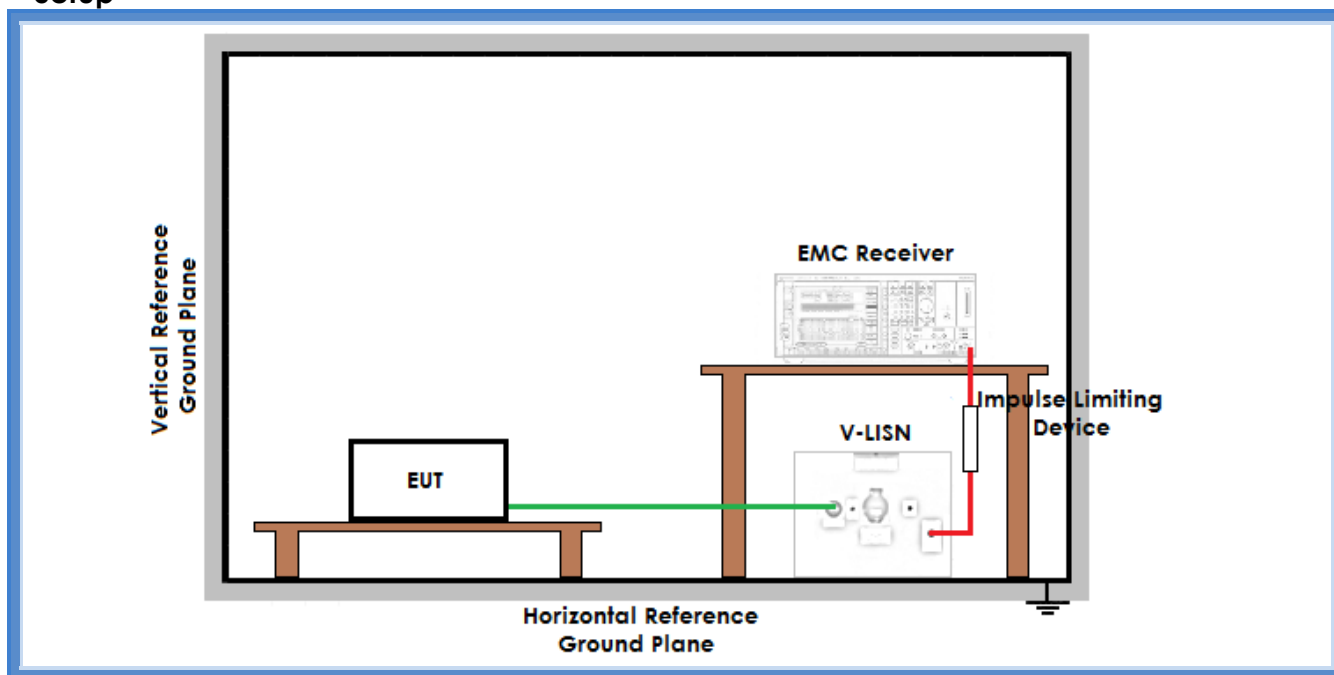
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
21	98	46

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
+12 Vdc	G15182638	--	Complies
-12 Vdc	G15182639	--	Complies
Remarks: Worst case			

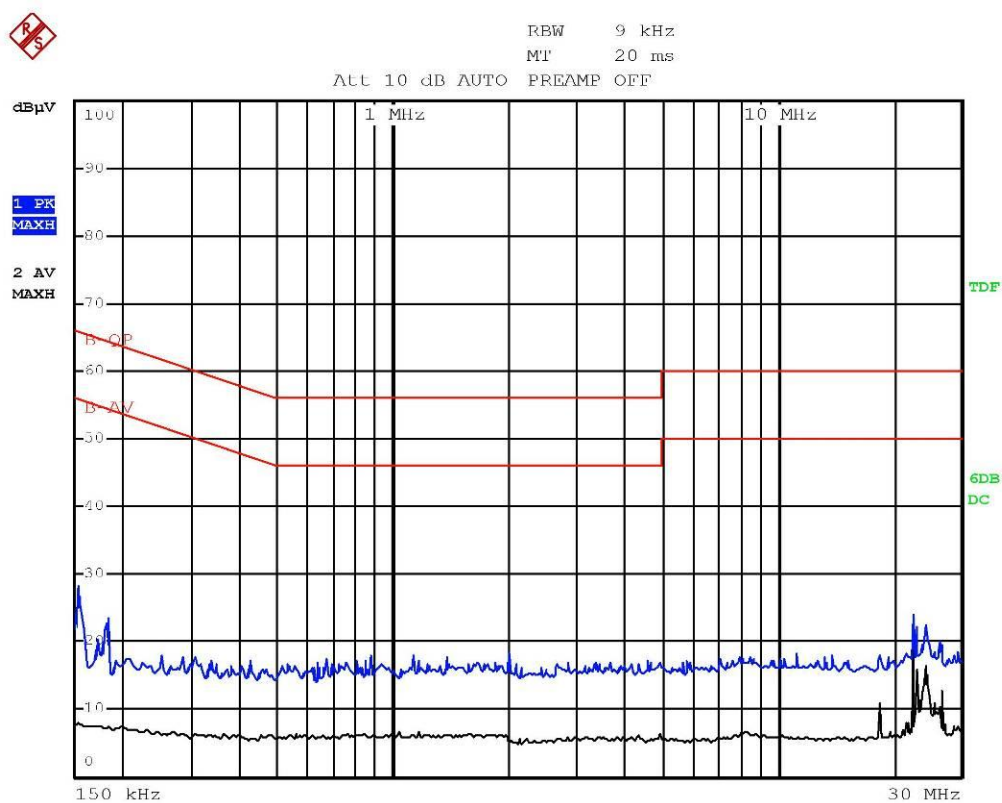
Graphs Legend

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

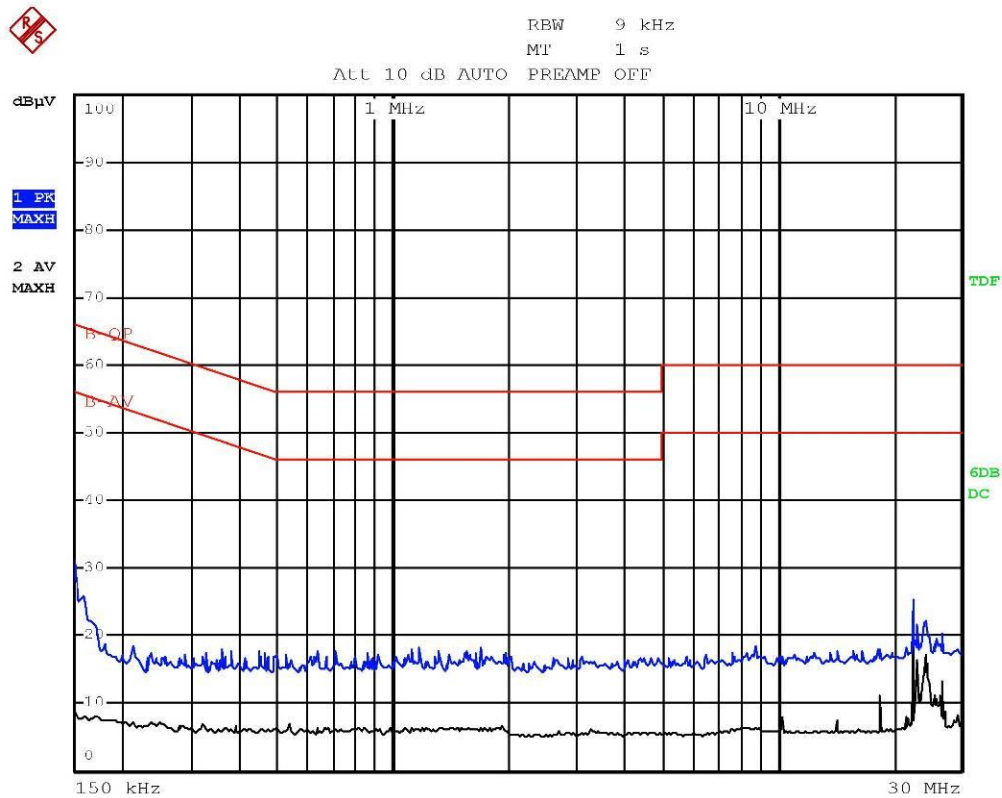
G15182638



Bertezzolo 15182638



G15182639



Bertezzo 15182639

Result: The requirements are met



11.3 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 date: 18 November 2015
- Technician: A. Bertezolo

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

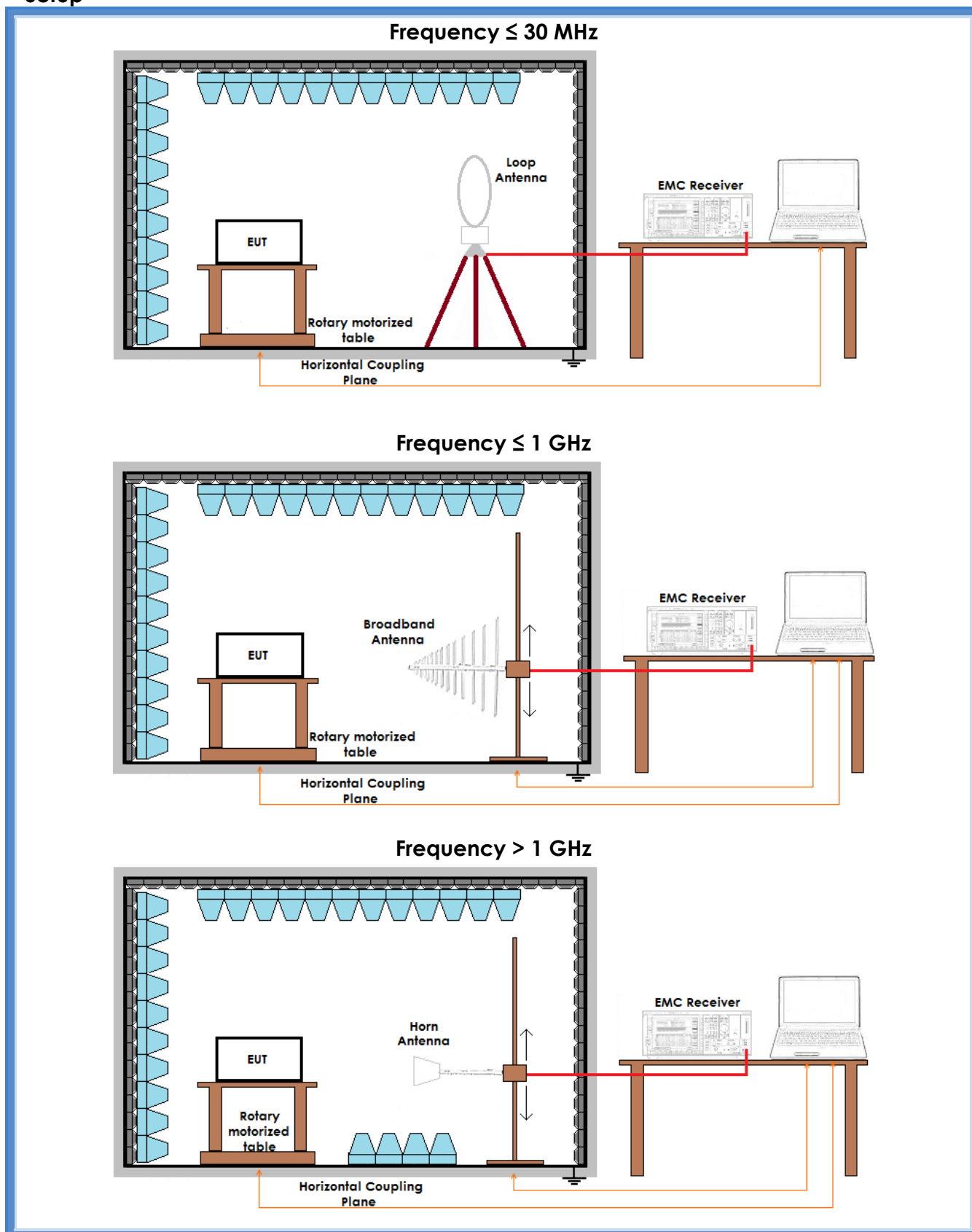
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

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	G15182637	Worst case	Complies
V	30 – 1000	G15182619	433,3 MHz frequency	Complies
H	30 – 1000	G15182620	433,3 MHz frequency	Complies
V	30 – 1000	G15182624	433,7 MHz frequency	Complies
H	30 – 1000	G15182625	433,7 MHz frequency	Complies
V	30 – 1000	G15182629	434,5 MHz frequency	Complies
H	30 – 1000	G15182630	434,5 MHz frequency	Complies
V	1000 – 5000	G15182631	Worst case	Complies
H	1000 – 5000	G15182632	Worst case	Complies
Remarks: EUT in transmission. Peaks above the limits are caused by the nominal transmitting frequency				

Graphs Legend

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

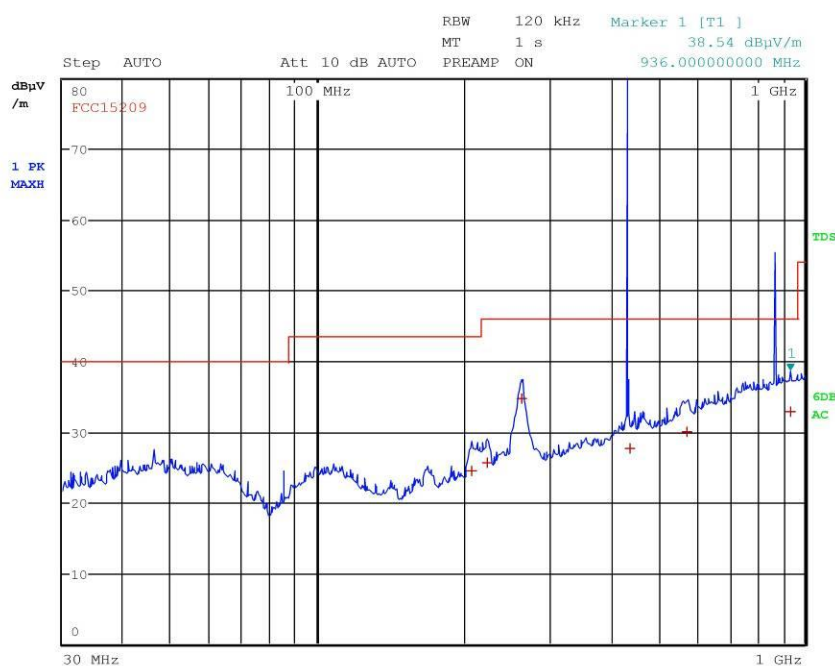
AV: Average; AV [1s] (average at 1 second) values are marked with a x



Graphs

G15182619

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182619
Test Spec



Final Measurement

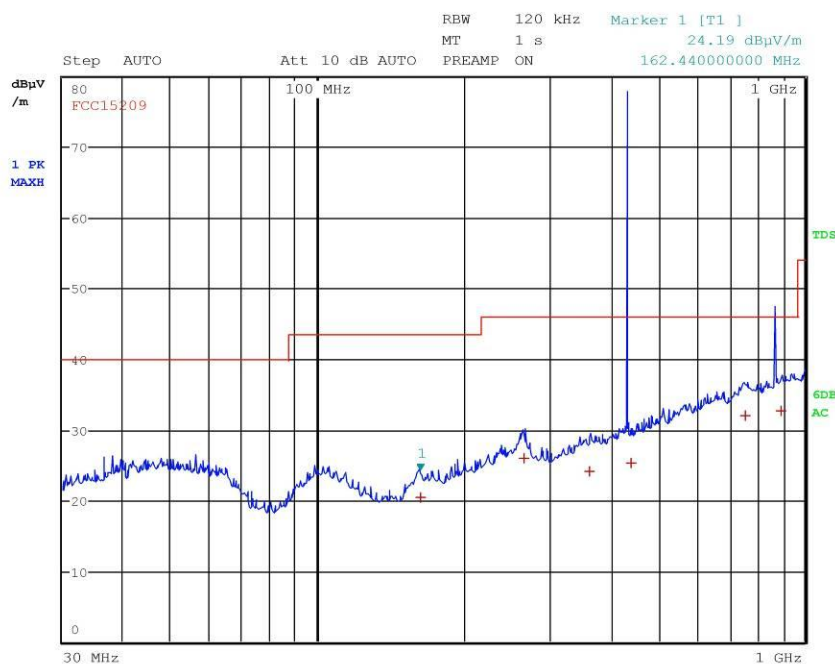
Meas Time: 1 s
Margin: 6 dB
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	207.080000000 MHz	24.44	Quasi Peak	-19.08
1	223.360000000 MHz	25.66	Quasi Peak	-20.36
1	262.560000000 MHz	34.72	Quasi Peak	-11.30
1	437.120000000 MHz	27.63	Quasi Peak	-18.39
1	573.520000000 MHz	29.99	Quasi Peak	-16.03
1	936.000000000 MHz	32.78	Quasi Peak	-13.24



G15182620

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182620
Test Spec



Final Measurement

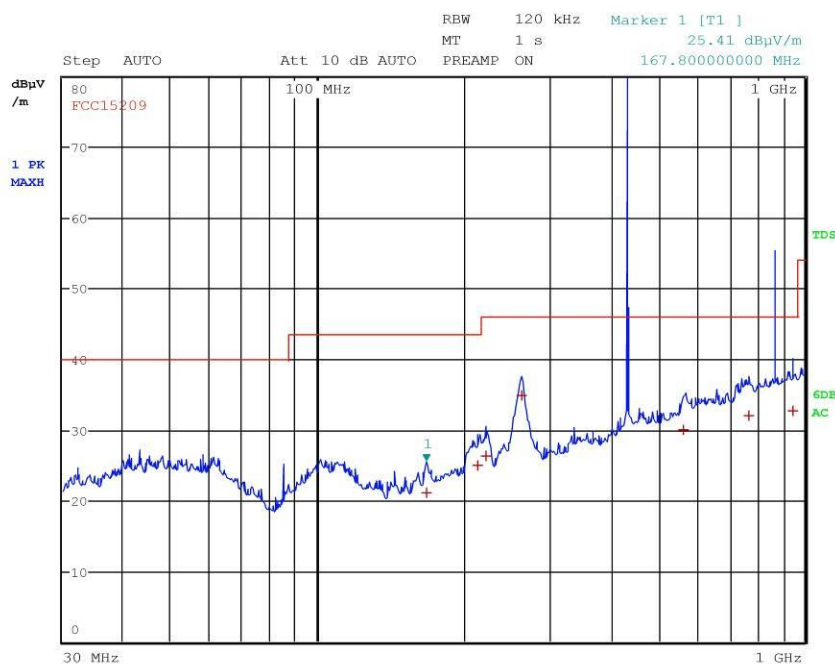
Meas Time: 1 s
Margin: 6 dB
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	162.44000000 MHz	20.34	Quasi Peak	-23.18
1	265.64000000 MHz	25.95	Quasi Peak	-20.07
1	361.76000000 MHz	24.07	Quasi Peak	-21.95
1	440.44000000 MHz	25.21	Quasi Peak	-20.81
1	754.96000000 MHz	31.94	Quasi Peak	-14.08
1	895.48000000 MHz	32.66	Quasi Peak	-13.36



G15182624

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182624
Test Spec



Final Measurement

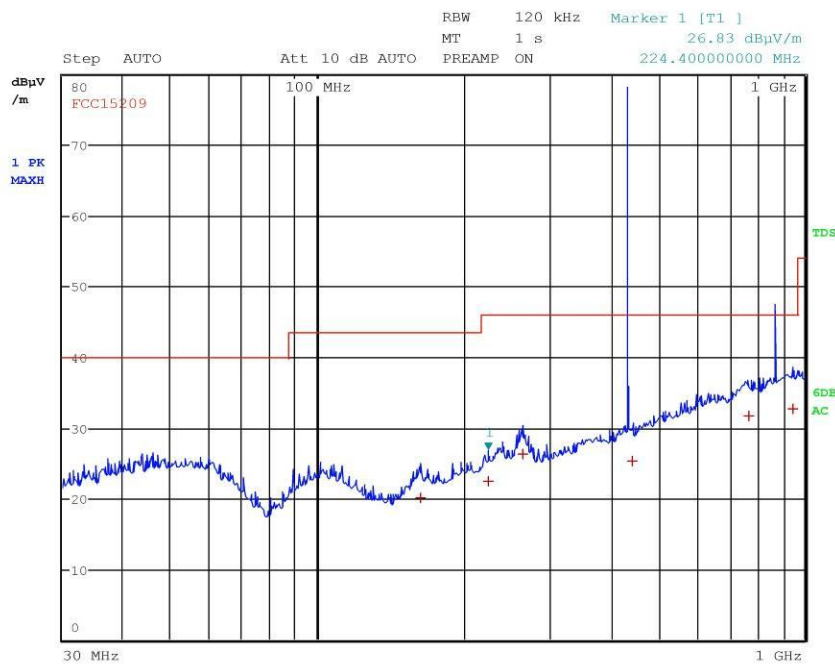
Meas Time: 1 s
Margin: 6 dB
Subranges: 7

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	167.800000000 MHz	21.15	Quasi Peak	-22.37
1	213.720000000 MHz	24.90	Quasi Peak	-18.62
1	222.240000000 MHz	26.34	Quasi Peak	-19.68
1	262.160000000 MHz	34.92	Quasi Peak	-11.10
1	564.040000000 MHz	30.00	Quasi Peak	-16.02
1	769.200000000 MHz	31.94	Quasi Peak	-14.08
1	944.200000000 MHz	32.74	Quasi Peak	-13.28



G15182625

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182625
Test Spec



Final Measurement

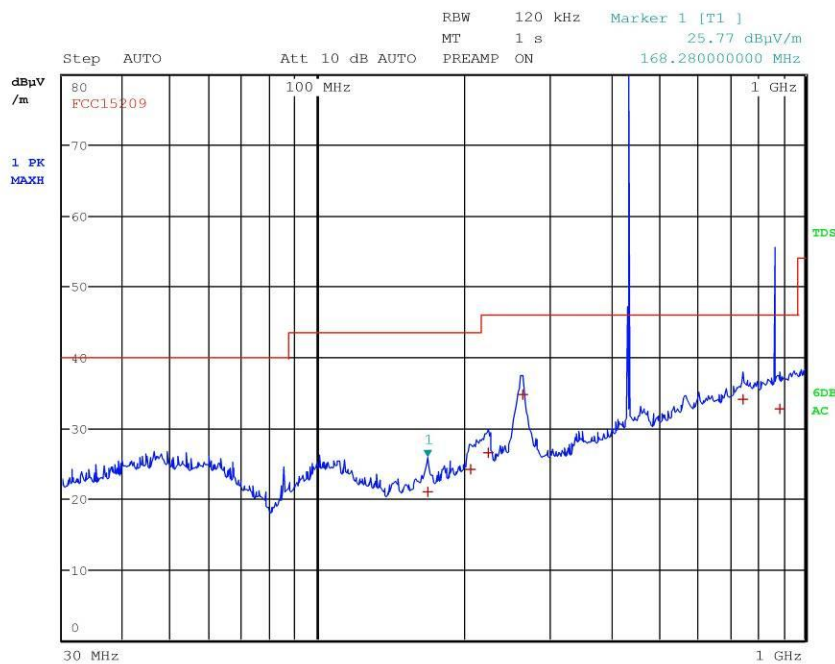
Meas Time: 1 s
Margin: 6 dB
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	163.080000000 MHz	20.14	Quasi Peak	-23.38
1	224.400000000 MHz	22.45	Quasi Peak	-23.57
1	264.160000000 MHz	26.35	Quasi Peak	-19.67
1	442.320000000 MHz	25.24	Quasi Peak	-20.78
1	767.160000000 MHz	31.69	Quasi Peak	-14.33
1	944.880000000 MHz	32.64	Quasi Peak	-13.38



G15182629

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182629
Test Spec



Final Measurement

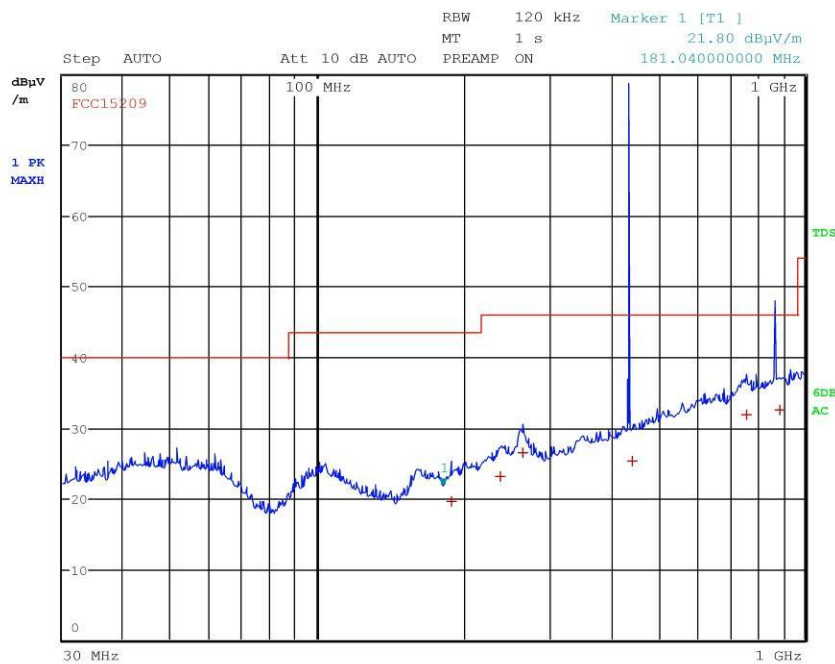
Meas Time: 1 s
Margin: 6 dB
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	168.280000000 MHz	20.89	Quasi Peak	-22.63
1	205.560000000 MHz	24.17	Quasi Peak	-19.35
1	223.920000000 MHz	26.39	Quasi Peak	-19.63
1	263.400000000 MHz	34.73	Quasi Peak	-11.29
1	746.520000000 MHz	33.96	Quasi Peak	-12.06
1	890.480000000 MHz	32.61	Quasi Peak	-13.41



G15182630

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182630
Test Spec



Final Measurement

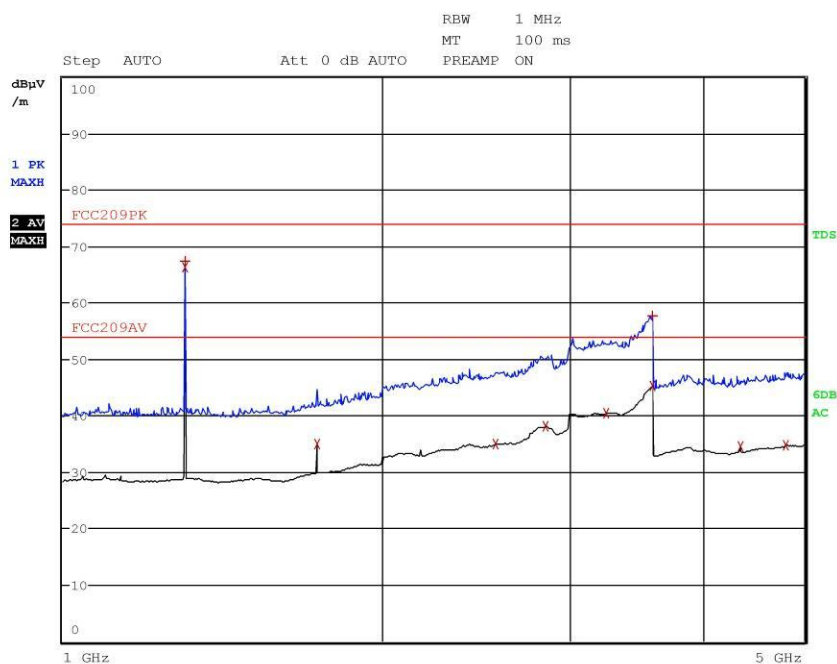
Meas Time: 1 s
Margin: 6 dB
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	188.120000000 MHz	19.63	Quasi Peak	-23.89
1	237.280000000 MHz	23.14	Quasi Peak	-22.88
1	263.240000000 MHz	26.44	Quasi Peak	-19.58
1	443.760000000 MHz	25.28	Quasi Peak	-20.74
1	758.320000000 MHz	31.87	Quasi Peak	-14.15
1	890.160000000 MHz	32.58	Quasi Peak	-13.44



G15182631

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Gandini 15182631
Test Spec
Vert



Final Measurement

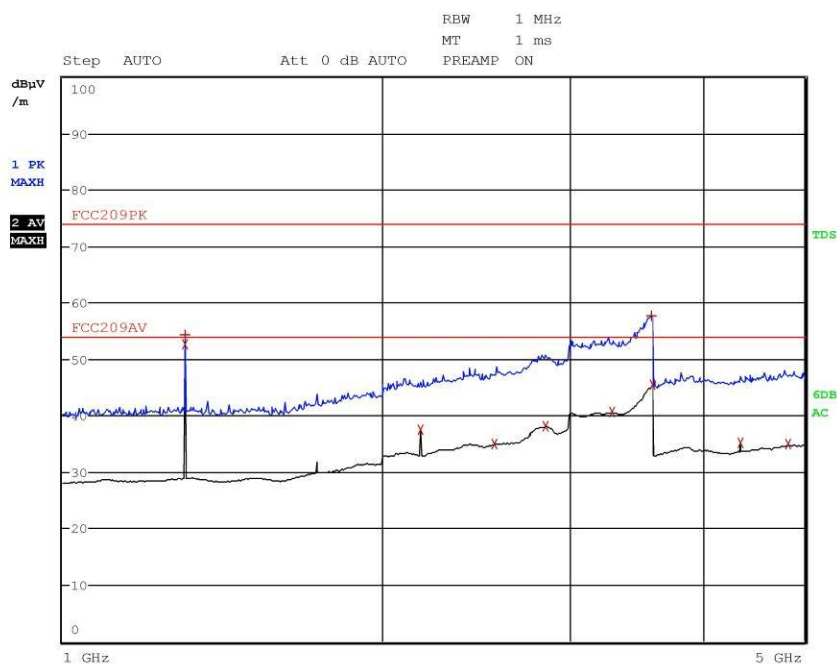
Meas Time: 1 s
Margin: 20 dB
Subranges: 10

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	1.303600000 GHz	67.30	Max Peak	-6.70
2	1.303600000 GHz	66.31	Average	12.31
2	1.738000000 GHz	35.05	Average	-18.95
2	2.556400000 GHz	34.93	Average	-19.07
2	2.847600000 GHz	38.14	Average	-15.86
2	3.250400000 GHz	40.45	Average	-13.55
1	3.589200000 GHz	57.68	Max Peak	-16.32
2	3.599600000 GHz	45.21	Average	-8.79
2	4.344800000 GHz	34.64	Average	-19.36
2	4.801200000 GHz	34.84	Average	-19.16



G15182632

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Gandini 15182632
Test Spec
Horiz



Final Measurement

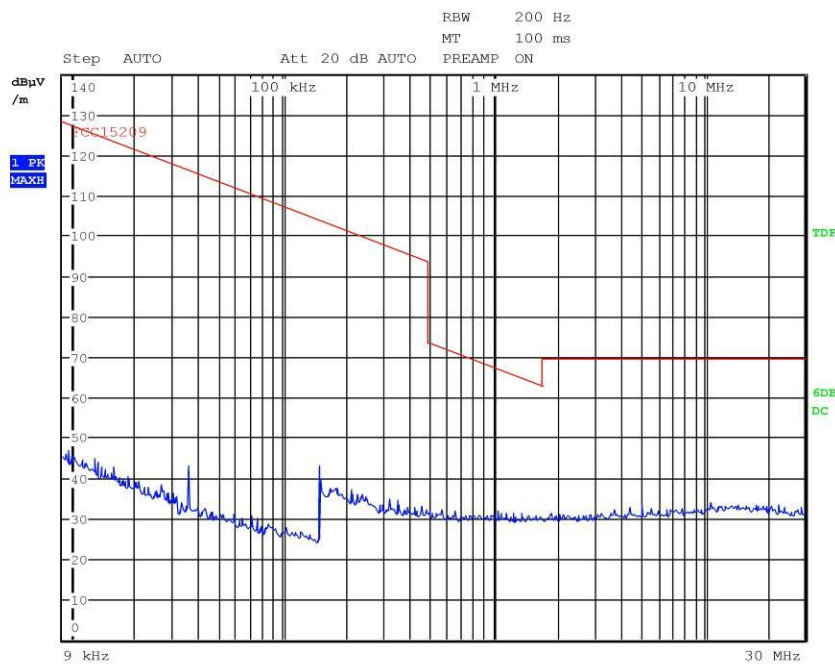
Meas Time: 1 s
Margin: 20 dB
Subranges: 10

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	1.303600000 GHz	54.40	Max Peak	-19.60
2	1.303600000 GHz	52.63	Average	-1.37
2	2.172400000 GHz	37.41	Average	-16.59
2	2.551200000 GHz	35.01	Average	-18.99
2	2.849600000 GHz	38.11	Average	-15.89
2	3.294800000 GHz	40.55	Average	-13.45
1	3.584400000 GHz	57.75	Max Peak	-16.25
2	3.598400000 GHz	45.38	Average	-8.62
2	4.344800000 GHz	35.19	Average	-18.81
2	4.823600000 GHz	35.03	Average	-18.97



G15182637

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Gandini 15182637
Test Spec
Loop



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 0

Result: The requirements are met



11.4 Fundamental and Spurious Emission (≤ 1 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: 18 November 2015
- Technician: A. Bertezolo

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 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 CISPR quasi-peak

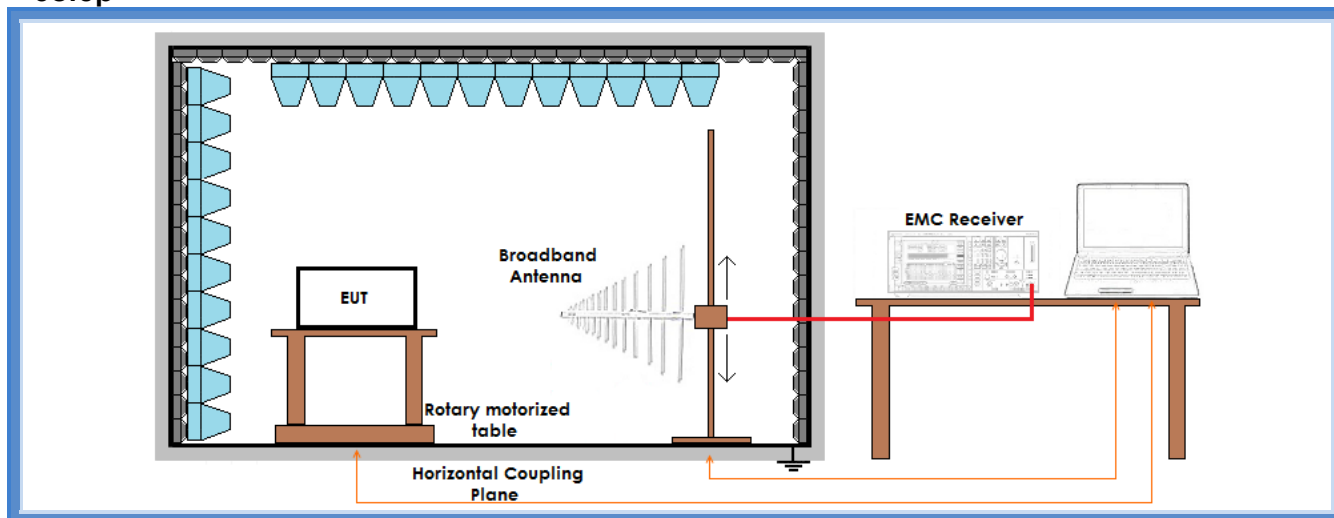
Environmental conditions

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(μ V/m)]	Field strength of spurious emissions [dB(μ V/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)	Peak level (dB μ V/m)	Duty cycle (dB)	Level (dB μ V/m)	Results
433,34	G15182616	80,81	89,45	-33,15	56,30	Complies
433,72	G15182621	80,82	89,60	-33,15	56,45	Complies
434,48	G15182626	80,84	89,81	-33,15	56,66	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 = $20\log(2,2 \text{ ms} / 100 \text{ ms}) = -33,15 \text{ dB}$, 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
433,34	869,030	60,81	62,1	-33,15	28,95	Complies
433,72	866,610	60,82	60,2	-33,15	27,05	Complies
434,48	867,371	60,84	59,8	-33,15	26,65	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:

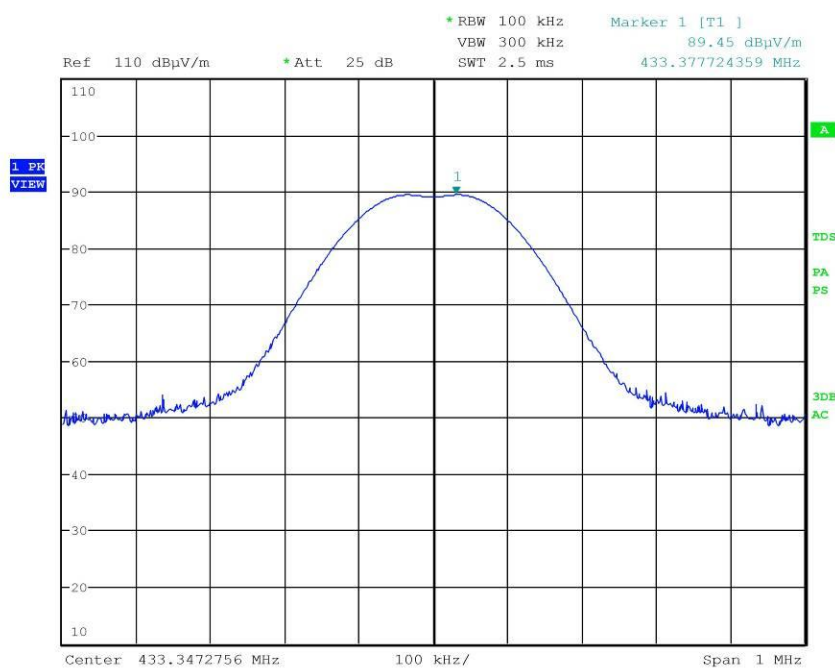
Duty cycle = $20\log(2,1 \text{ ms} / 100 \text{ ms}) = -33,56 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report



Graphs

G15182616

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182616
Test Spec





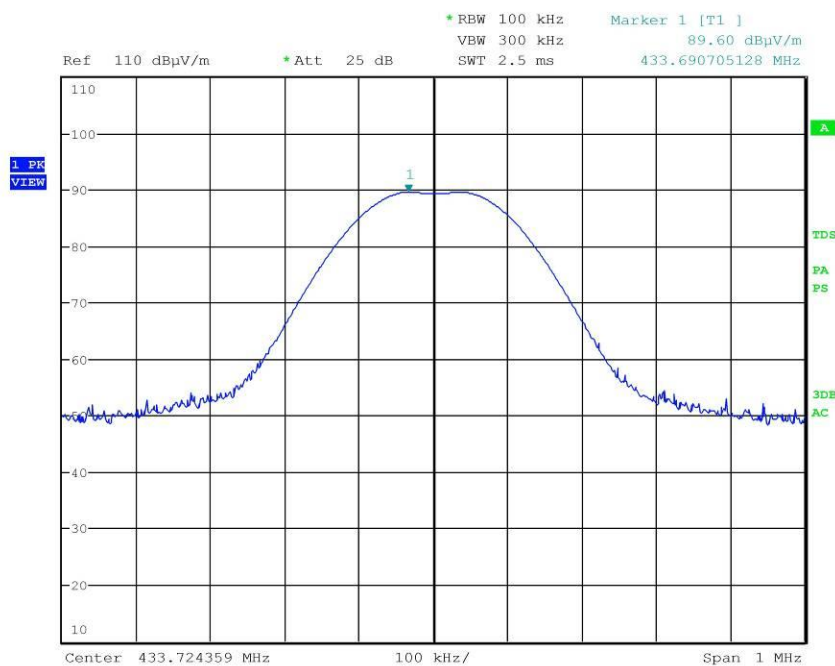
CMC
Centro Misure Compatibilità S.r.l.
Via dell'Elettronica, 12/C
36016 Thiene (VI)



LAB N° 0168

G15182621

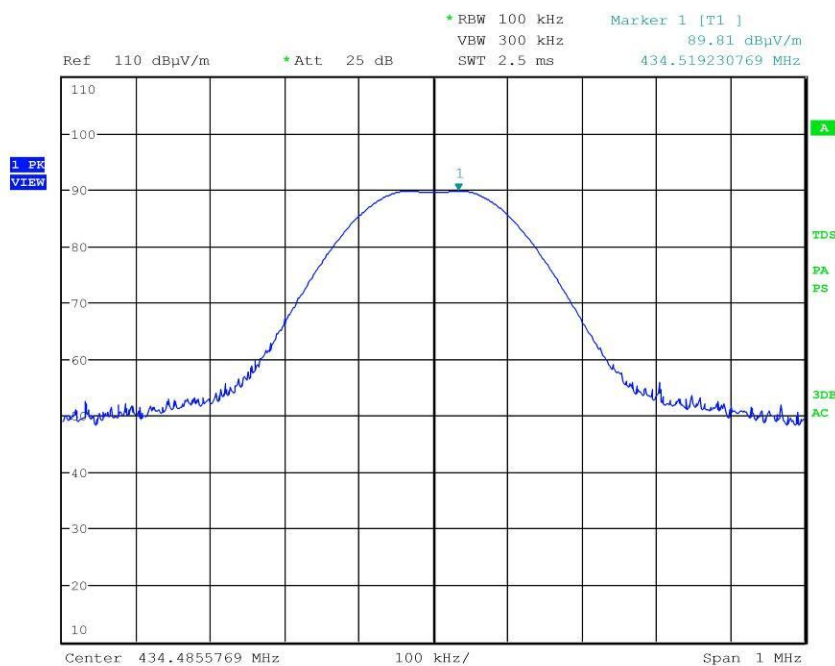
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182621
Test Spec





G15182626

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182626
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
- Internal procedure PM001
- See clause 4 of this test report
- Test date: 23 November 2015
- Technician: A. Bertezolo

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 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

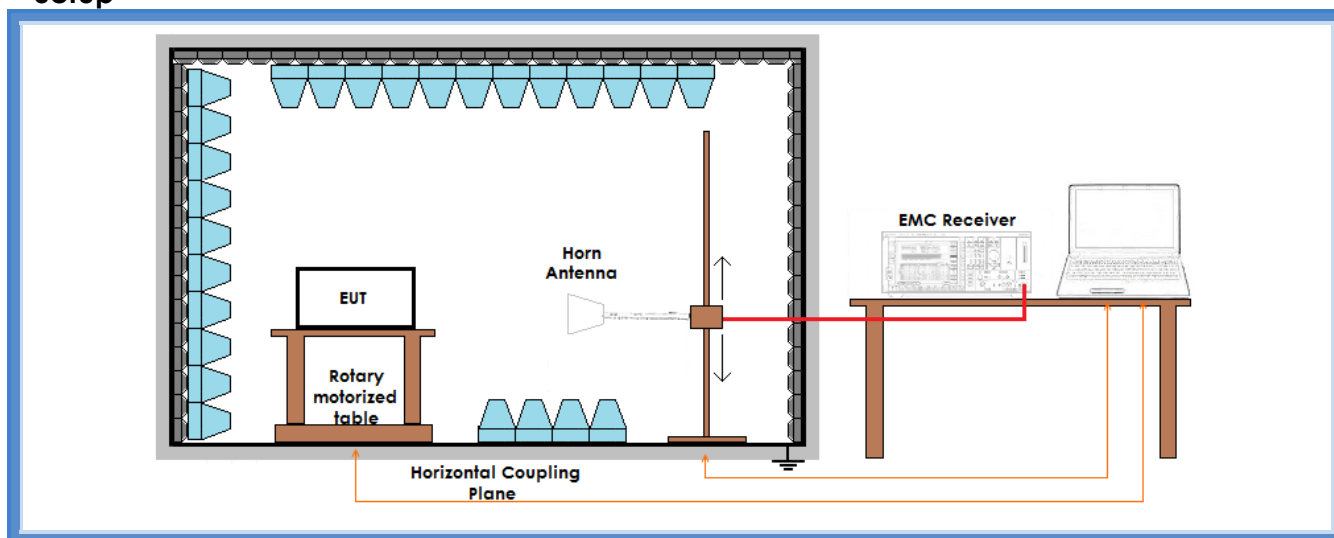
Environmental conditions

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

Acceptance limits

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

Setup



Result – AV detector

Frequency band (MHz)	Frequency (MHz)	Limits (dBμV/m)	Measured Level (dBμV/m)	Duty cycle (dB)	Level (dBμV/m)	Results
433,34	1299,9	60,81	67,30	-33,15	34,15	Complies
433,34	1733,2	60,81	41,70	-33,15	8,55	Complies
433,34	2166,5	60,81	43,60	-33,15	10,45	Complies
433,72	1301,1*	54,00	66,80	-33,15	33,65	Complies
433,72	1734,8	60,82	42,00	-33,15	8,85	Complies
433,72	2168,5	60,82	43,20	-33,15	10,05	Complies
434,48	1303,5*	54,00	68,40	-33,15	35,25	Complies
434,48	1738,0	60,84	40,50	-33,15	7,35	Complies
434,48	2172,5	60,84	41,60	-33,15	8,45	Complies

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

*: these frequencies are inside a restricted band

Duty cycle value has been obtained using the following formula:

Duty cycle = $20 \log (2,2 \text{ ms} / 100 \text{ ms}) = -33,15 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report



Result – Peak detector

Frequency band (MHz)	Frequency (MHz)	Limits (dBμV/m)	Measured Level (dBμV/m)	Duty cycle (dB)	Level (dBμV/m)	Results
433,34	1299,9	74,00	67,60	-33,15	34,45	Complies
433,34	1733,2	74,00	46,80	-33,15	13,65	Complies
433,34	2166,5	74,00	48,70	-33,15	15,55	Complies
433,72	1301,1*	74,00	67,00	-33,15	33,85	Complies
433,72	1734,8	74,00	46,20	-33,15	13,05	Complies
433,72	2168,5	74,00	48,30	-33,15	15,15	Complies
434,48	1303,5*	74,00	68,50	-33,15	35,35	Complies
434,48	1738,0	74,00	44,30	-33,15	11,15	Complies
434,48	2172,5	74,00	45,50	-33,15	12,35	Complies

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

*: these frequencies are inside a restricted band

Duty cycle value has been obtained using the following formula:

Duty cycle = $20 \log (2,2 \text{ ms} / 100 \text{ ms}) = -33,15 \text{ dB}$, 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)
- Internal procedure PM001
- See clause 4 of this test report
- Test date: 18 November 2015
- Technician: A. Bertezolo

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 S136, CMC S164
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

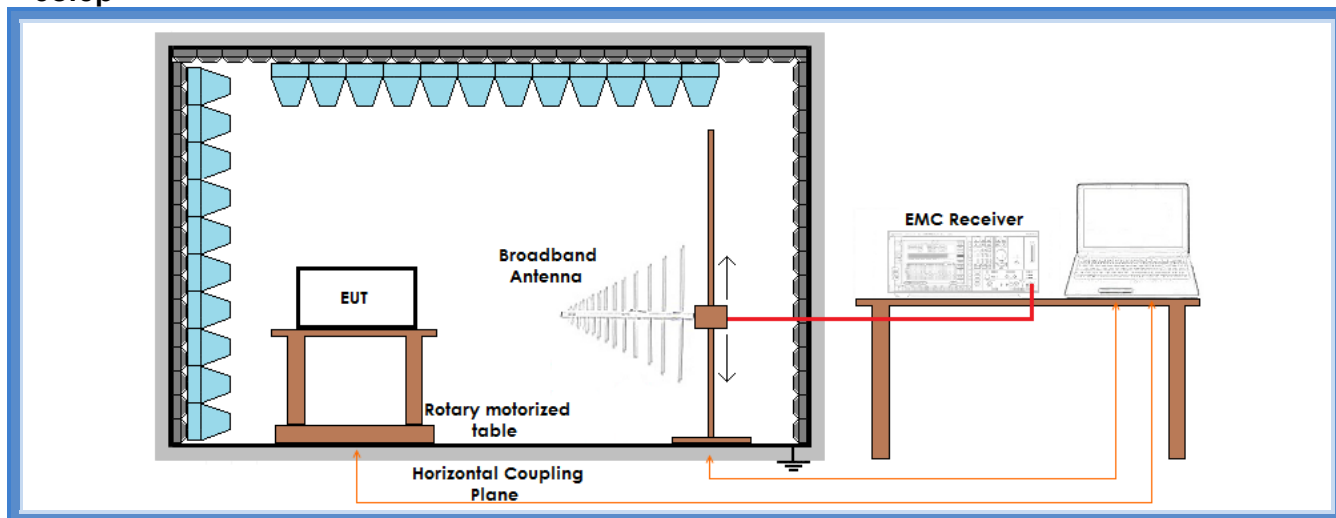
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

Acceptance limits

Limits	
Devices operating above 70 MHz and below 900 MHz	Devices operating above 900 MHz
0,25% of the center frequency	0,5% of the center frequency



Setup



Result

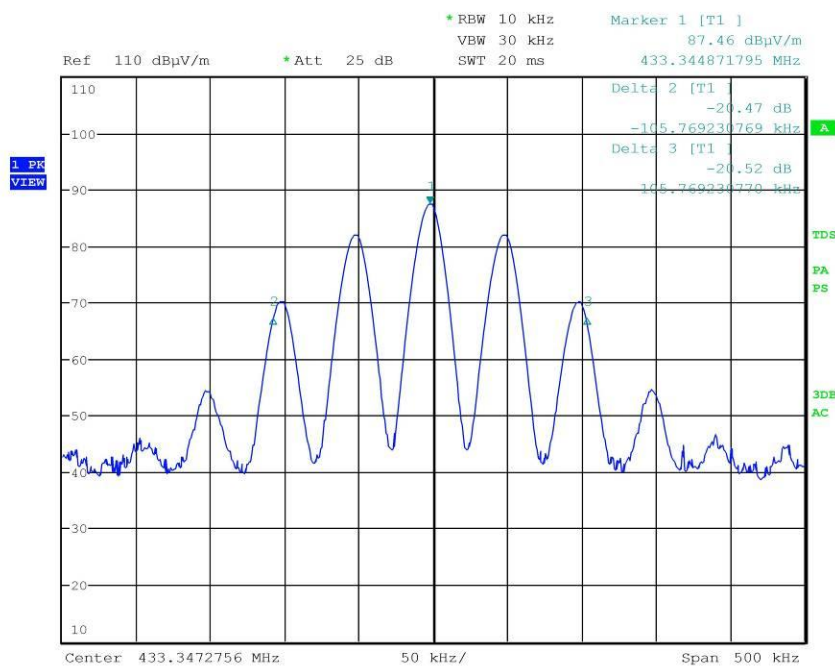
Frequency (MHz)	Limit (kHz)	20 dB bandwidth (kHz)	Graphs	Results
433,34	1083,35	211,538	G15182617	Complies
433,72	1084,30	211,538	G15182622	Complies
434,48	1086,20	210,736	G15182627	Complies



Graphs

G15182617

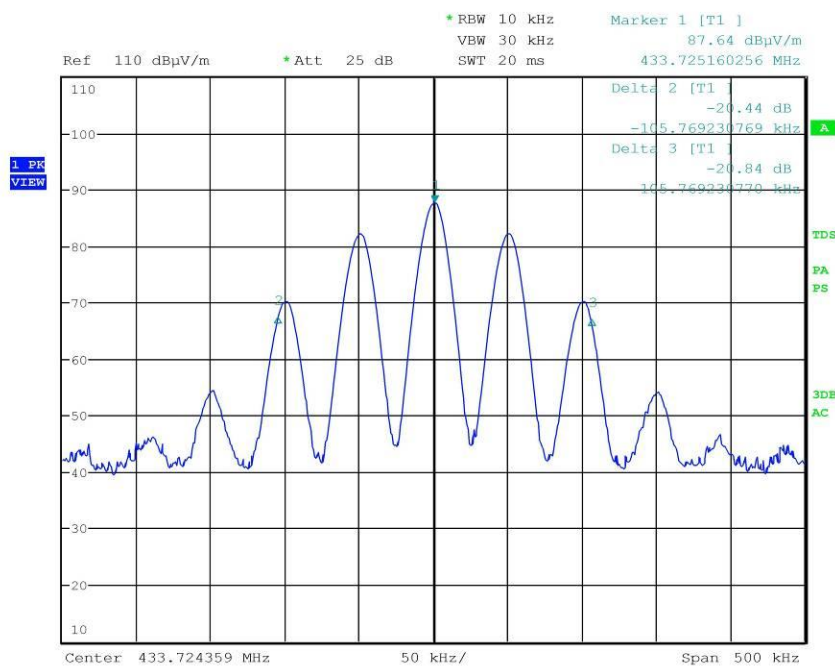
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182617
Test Spec





G15182622

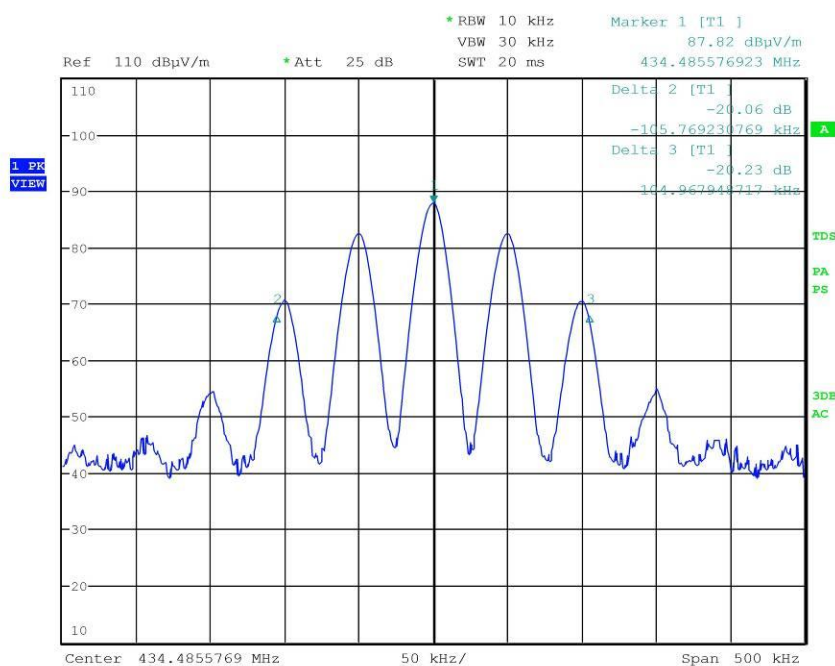
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182622
Test Spec





G15182627

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182627
Test Spec



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: 26 November 2015
- Technician: A. Bertezzo

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 S164
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



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	Transmission time during 1 hour	Number of transmissions during 1 hour	Graphs	Results
Automatic transmission	396 ms (maximum allowed 2 s)	5 (maximum allowed 180)	G15182640 and G15182641	Complies

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

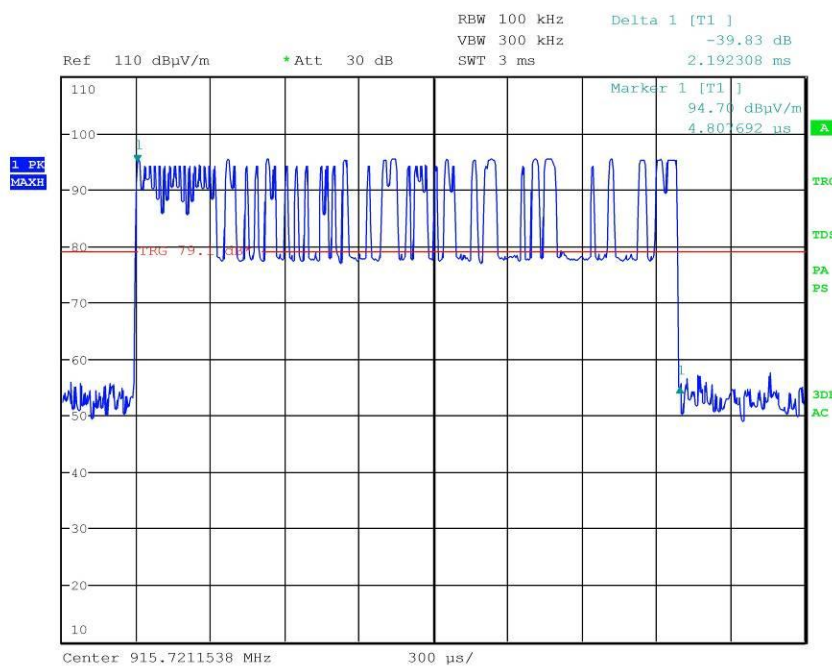
Result: N.A.



Graphs

G15182640

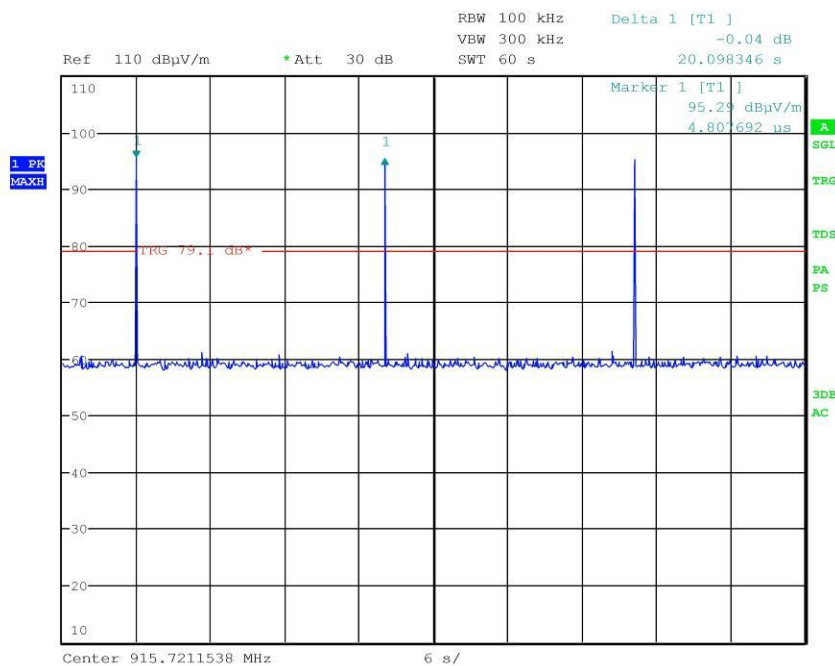
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182640
Test Spec





G15182641

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182641
Test Spec



Result: The requirements are met

ANNEX 1 of document nr. R15182601

Tests setup photographs for Test Report nr. R15182601

