



TEST REPORT nr. R15182702

Federal Communication Commission (FCC)

Test item

Description.....: RADIOBAND RECEIVER WITH RELAY CONTACT AND AUTOTEST INTERFACE
Trademark.....: JCM TECHNOLOGIES
Model/Type.....: RB3 R916
FCC ID.....: U5Z-RB3R916

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.....: 48 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 : 902,28 MHz

915,63 MHz

927,68 MHz

Duty cycle evaluation : 2,2 ms

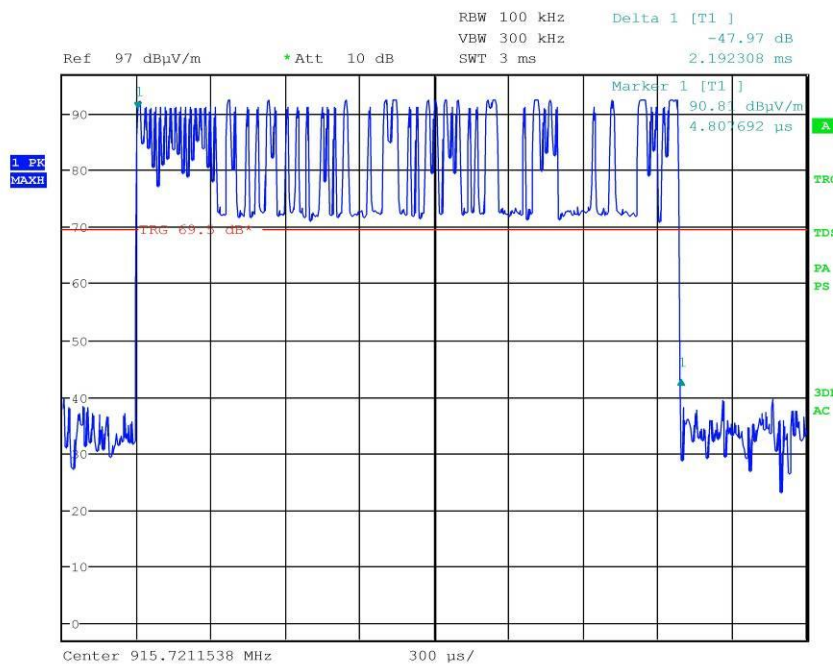
Evaluation has been performed in agreement with FCC Part 15.35c. This transmission is intended as a train of pulses of 2,2 ms ON and 97,8 ms OFF on 100 ms evaluation. No other "ON" after the first 100 ms on a single transmission. See also graph G15182735

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



G15182735

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182735
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 : 26.11.15

Testing end date : 02.12.15

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 P151025

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.

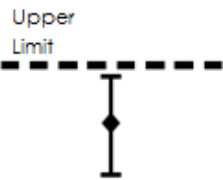
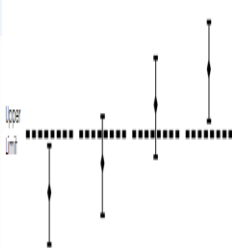
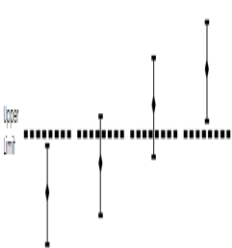


11. Results

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: 26 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

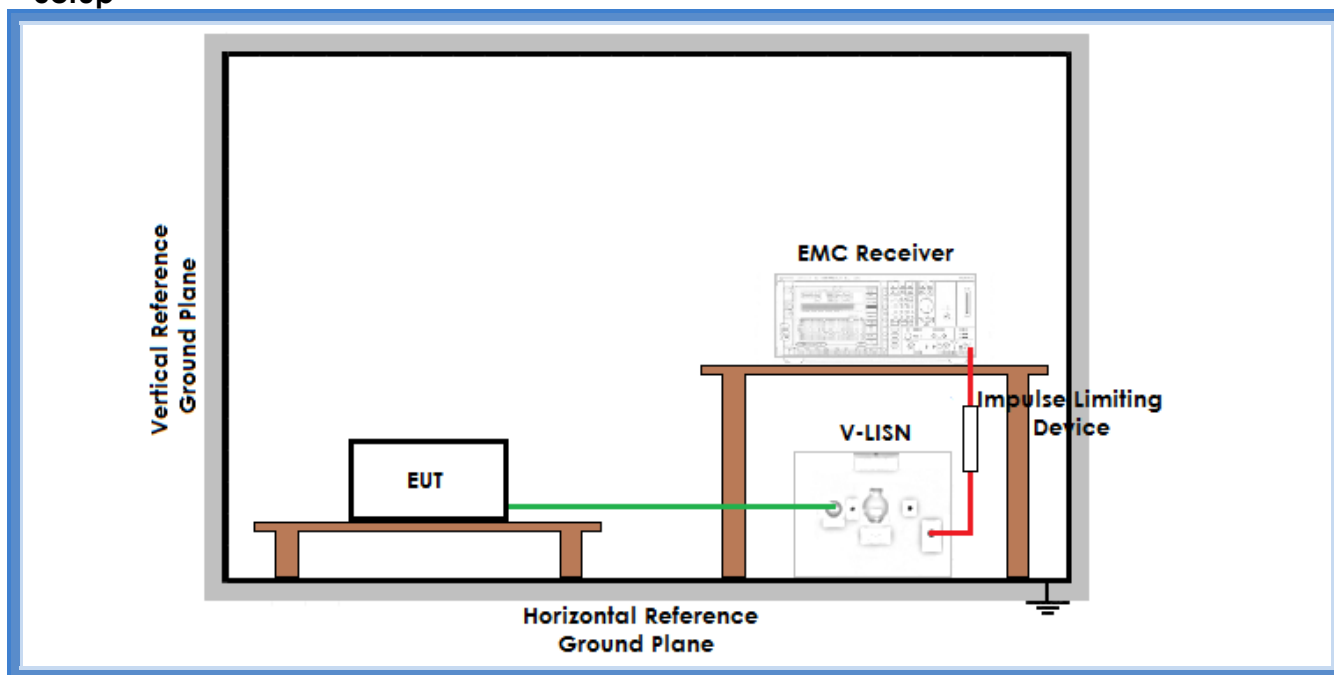
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
21	98	46

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	G15182701	--	Complies
-12 Vdc	G15182702	--	Complies
Remarks: Worst case			

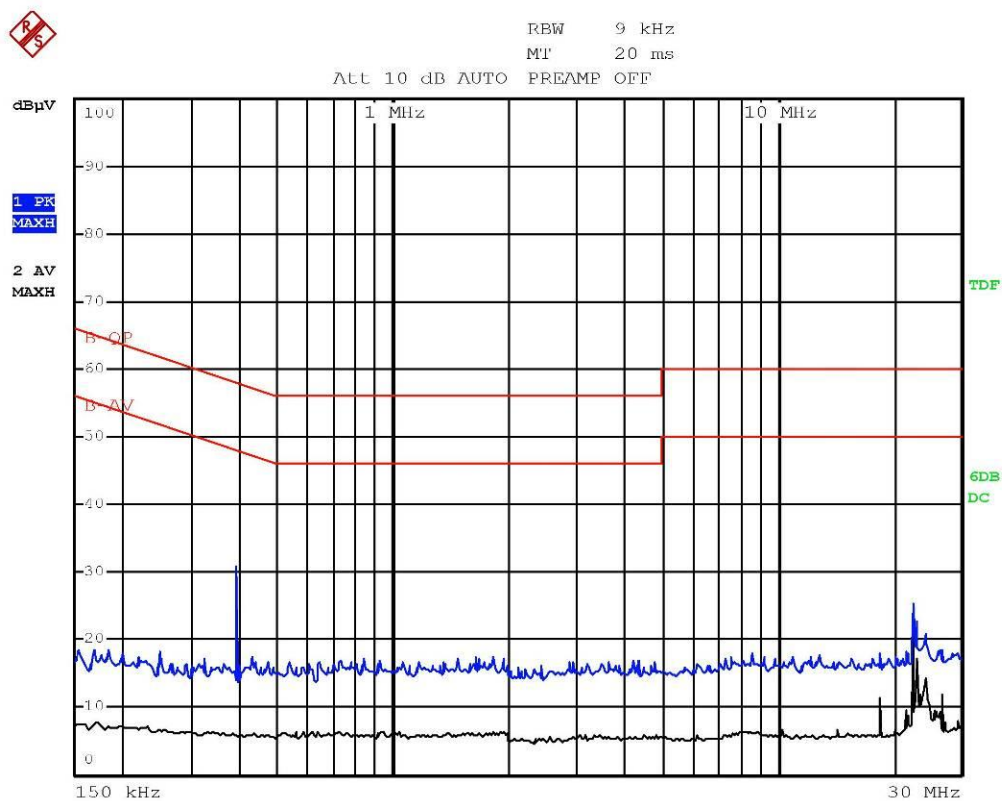
Graphs Legend

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

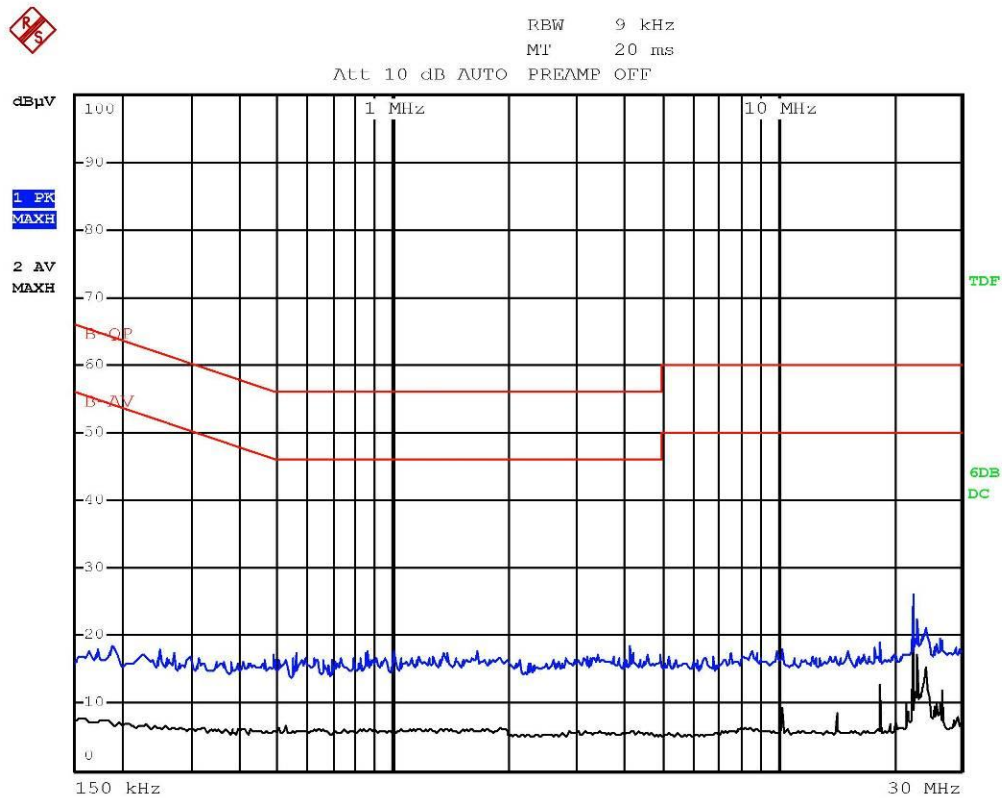
G15182701



Bertezzo 15182701



G15182702



Bertezzolo 15182702

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: 26 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

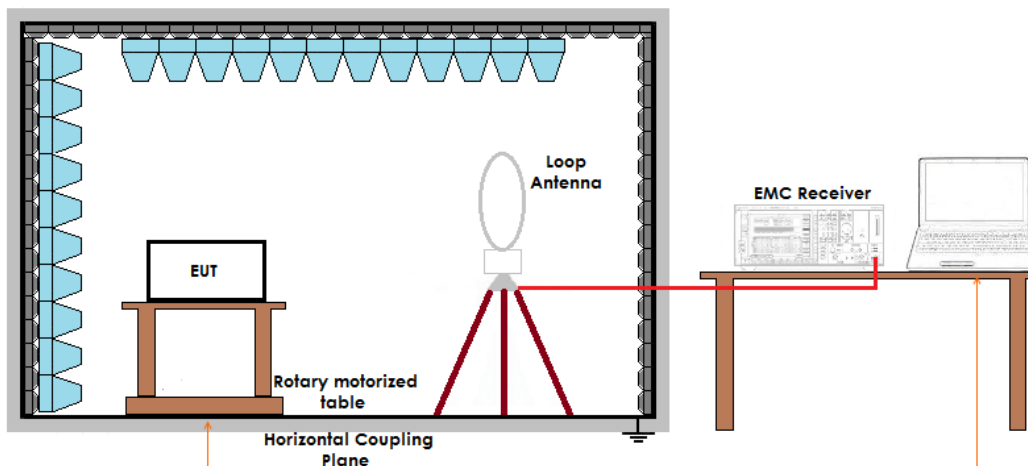
Acceptance limits

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

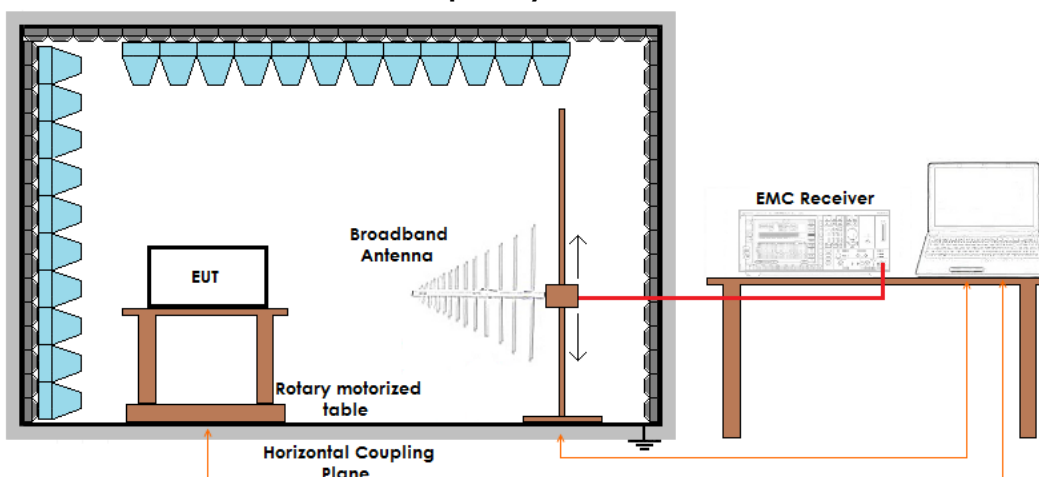
Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Setup

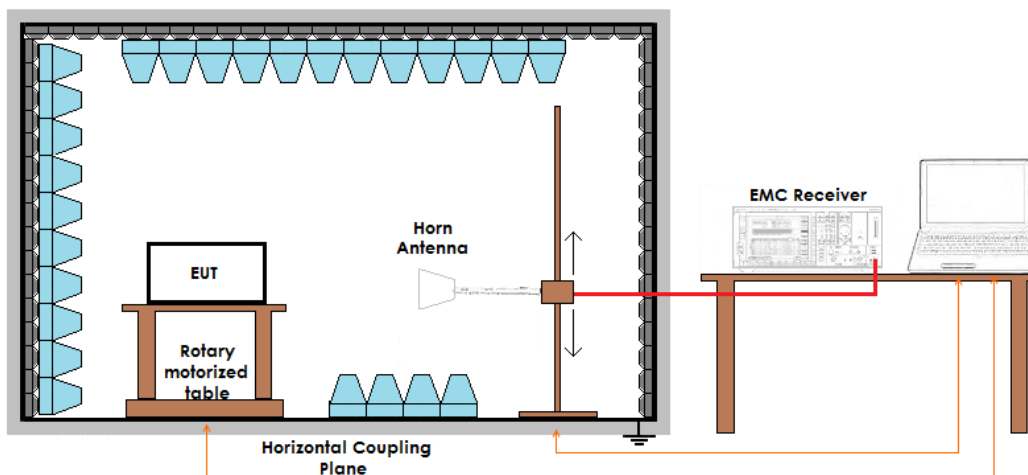
Frequency ≤ 30 MHz



Frequency ≤ 1 GHz



Frequency > 1 GHz





Result

Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
Loop	0,009 – 30	G15182736	Worst case	Complies
V	30 – 1000	G15182722	902 MHz frequency	Complies
H	30 – 1000	G15182723	902 MHz frequency	Complies
V	30 – 1000	G15182725	915 MHz frequency	Complies
H	30 – 1000	G15182724	915 MHz frequency	Complies
V	30 – 1000	G15182732	927 MHz frequency	Complies
H	30 – 1000	G15182733	927 MHz frequency	Complies
V	1000 – 10000	G15182738	Worst case	Complies
H	1000 – 10000	G15182737	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 +

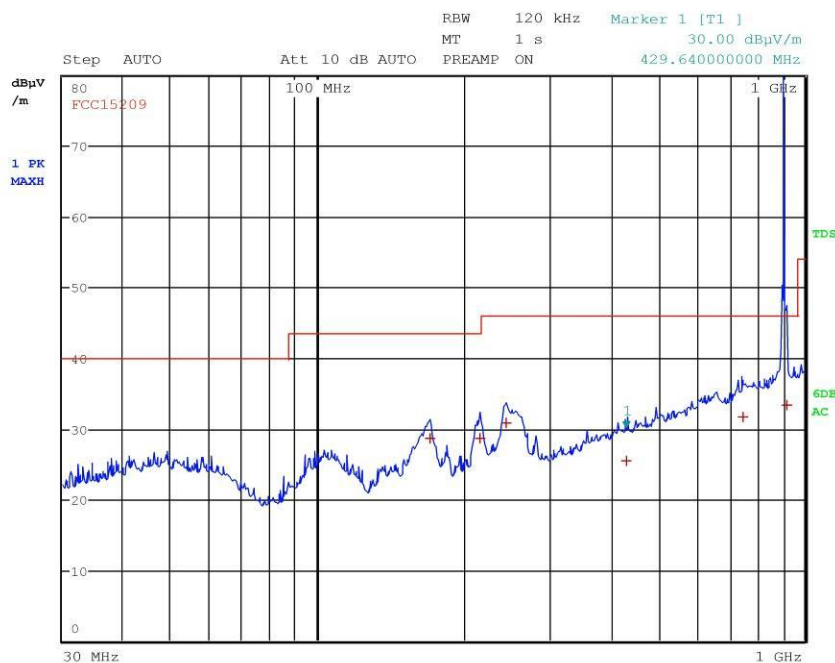
AV: Average; AV [1s] (average at 1 second) values are marked with a x



Graphs

G15182722

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182722
Test Spec



Final Measurement

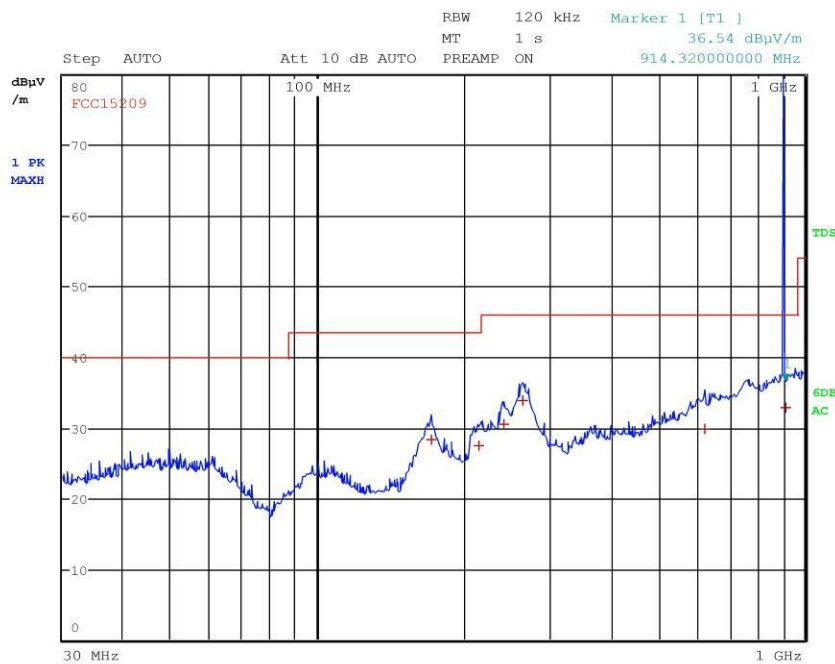
Meas Time: 1 s
Margin: 6 dB
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	170.04000000 MHz	28.61	Quasi Peak	-14.91
1	215.24000000 MHz	28.65	Quasi Peak	-14.87
1	243.72000000 MHz	30.82	Quasi Peak	-15.20
1	429.64000000 MHz	25.52	Quasi Peak	-20.50
1	744.84000000 MHz	31.72	Quasi Peak	-14.30
1	920.88000000 MHz	33.45	Quasi Peak	-12.57



G15182723

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182723
Test Spec



Final Measurement

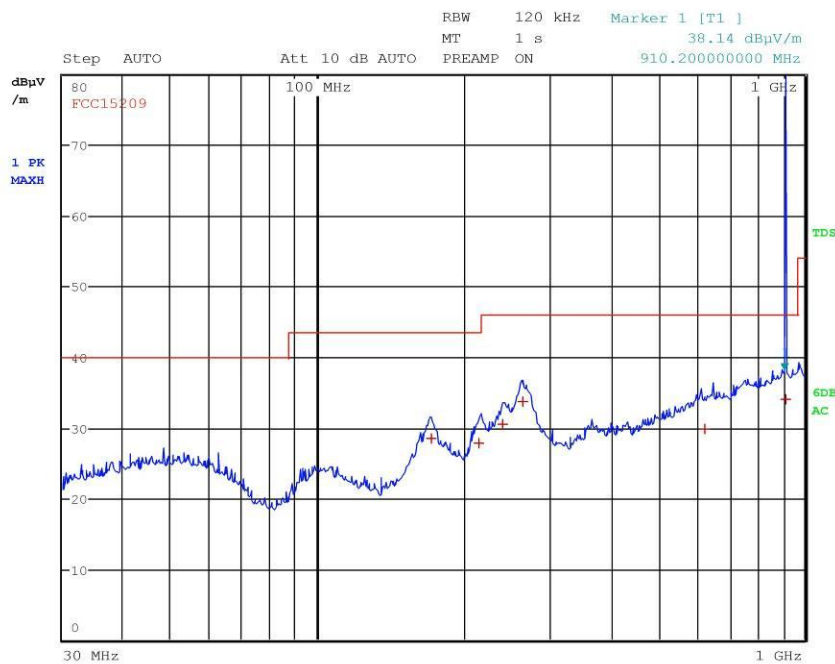
Meas Time: 1 s
Margin: 6 dB
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	171.520000000 MHz	28.38	Quasi Peak	-15.14
1	214.960000000 MHz	27.52	Quasi Peak	-16.00
1	240.920000000 MHz	30.50	Quasi Peak	-15.52
1	263.440000000 MHz	33.80	Quasi Peak	-12.22
1	625.360000000 MHz	29.76	Quasi Peak	-16.26
1	914.320000000 MHz	32.81	Quasi Peak	-13.21



G15182724

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182724
Test Spec



Final Measurement

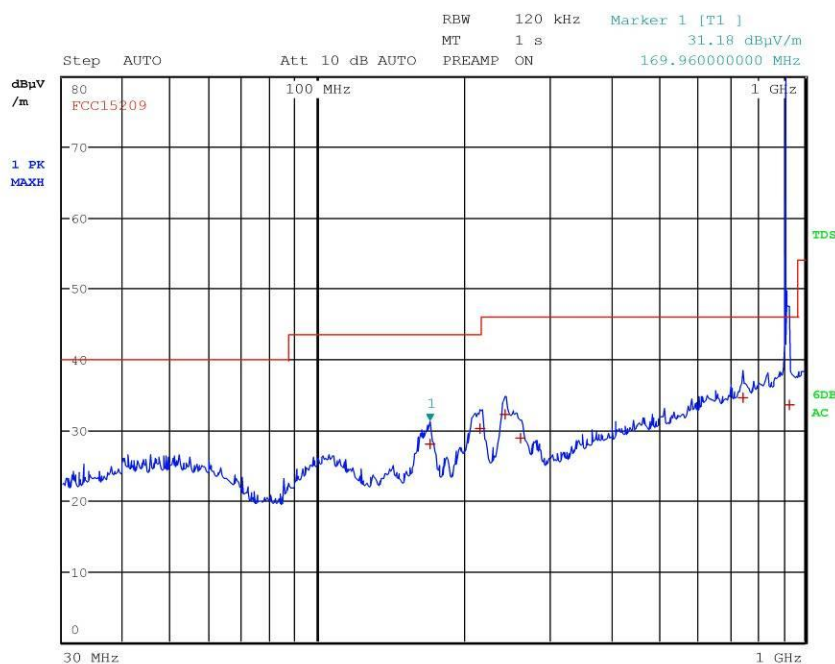
Meas Time: 1 s
Margin: 6 dB
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	171.520000000 MHz	28.50	Quasi Peak	-15.02
1	214.960000000 MHz	27.88	Quasi Peak	-15.64
1	240.920000000 MHz	30.46	Quasi Peak	-15.56
1	263.440000000 MHz	33.77	Quasi Peak	-12.25
1	625.360000000 MHz	29.80	Quasi Peak	-16.22
1	914.320000000 MHz	33.96	Quasi Peak	-12.06



G15182725

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182725
Test Spec



Final Measurement

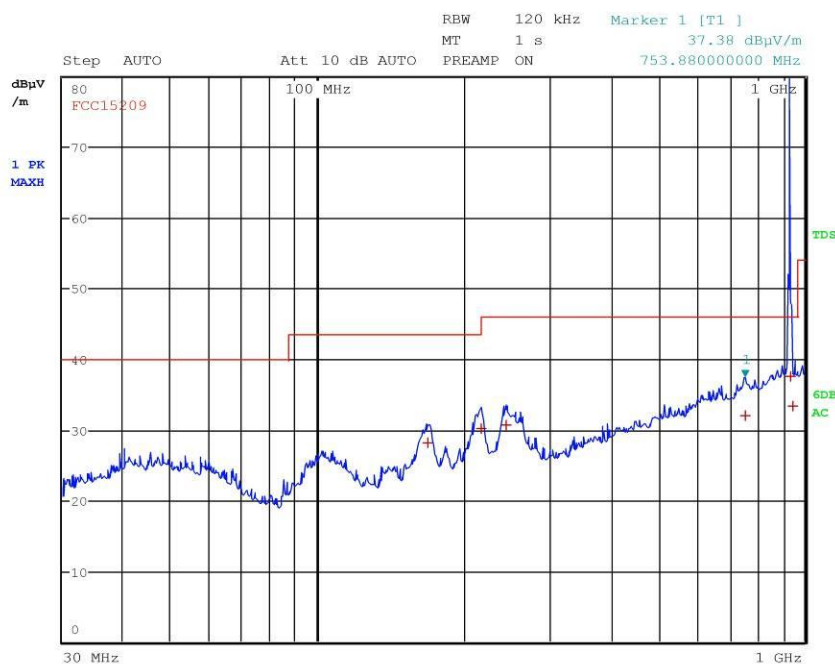
Meas Time: 1 s
Margin: 6 dB
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	169.960000000 MHz	27.95	Quasi Peak	-15.57
1	215.240000000 MHz	30.20	Quasi Peak	-13.32
1	243.120000000 MHz	32.11	Quasi Peak	-13.91
1	260.760000000 MHz	28.87	Quasi Peak	-17.15
1	746.600000000 MHz	34.50	Quasi Peak	-11.52
1	928.280000000 MHz	33.57	Quasi Peak	-12.45



G15182732

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182732
Test Spec



Final Measurement

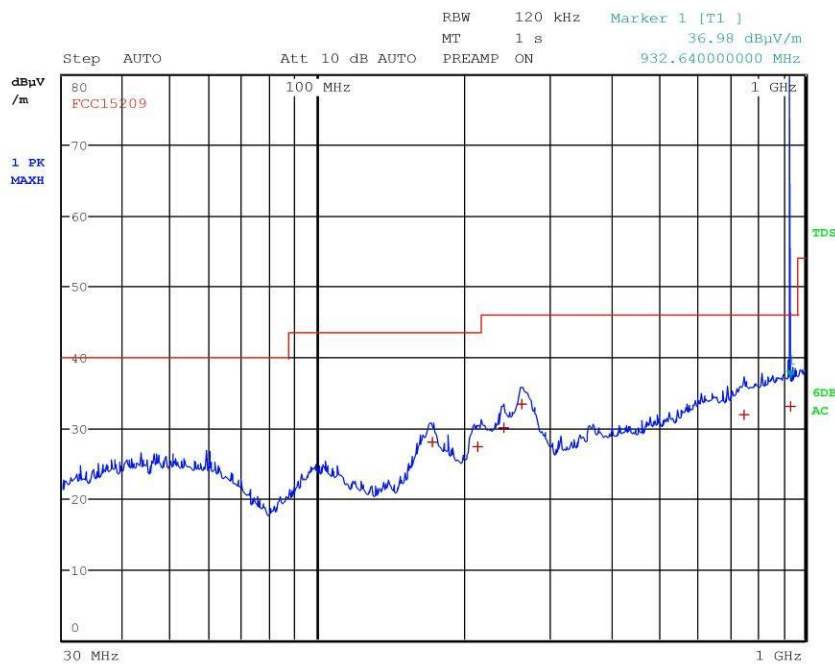
Meas Time: 1 s
Margin: 6 dB
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	168.560000000 MHz	28.13	Quasi Peak	-15.39
1	216.600000000 MHz	30.24	Quasi Peak	-15.78
1	243.600000000 MHz	30.71	Quasi Peak	-15.31
1	753.880000000 MHz	32.04	Quasi Peak	-13.98
1	932.440000000 MHz	37.61	Quasi Peak	-8.41
1	944.920000000 MHz	33.41	Quasi Peak	-12.61



G15182733

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182733
Test Spec



Final Measurement

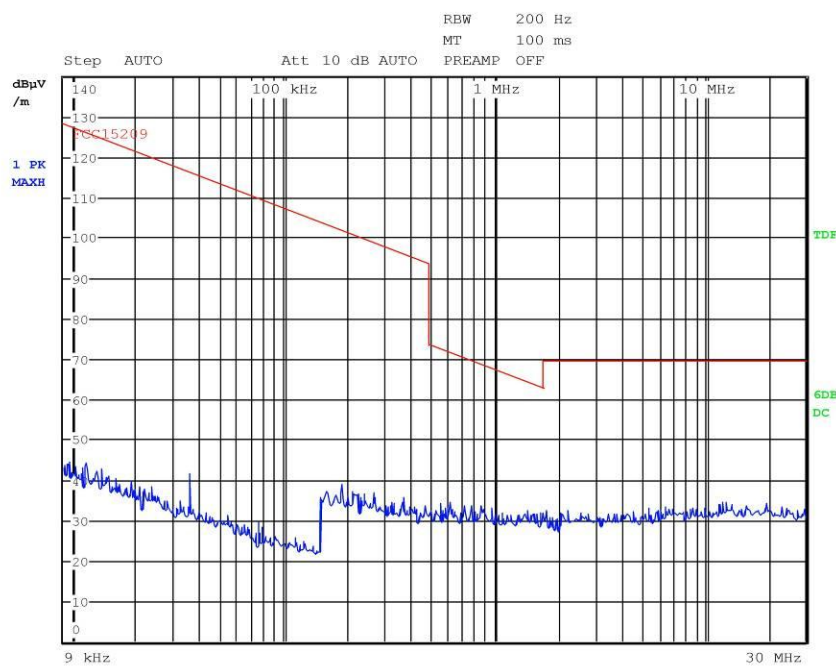
Meas Time: 1 s
Margin: 6 dB
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	172.360000000 MHz	27.93	Quasi Peak	-15.59
1	213.360000000 MHz	27.24	Quasi Peak	-16.28
1	240.960000000 MHz	30.07	Quasi Peak	-15.95
1	262.440000000 MHz	33.39	Quasi Peak	-12.63
1	752.160000000 MHz	31.89	Quasi Peak	-14.13
1	932.640000000 MHz	32.99	Quasi Peak	-13.03



G15182736

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182736
Test Spec



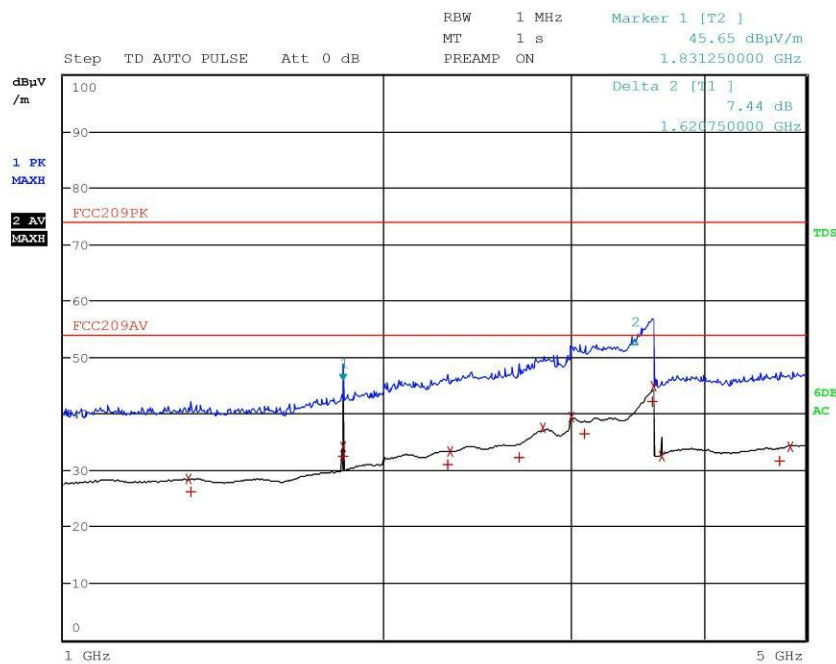
Final Measurement

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



G15182737

Meas Type Emission 1000-5000MHz
Equipment under Test
Manufacturer
OP Condition TX 915.6 MHz
Operator Panozzo 15182737
Test Spec
Horiz





Meas Type Emission 1000-5000MHz

Equipment under Test

Manufacturer

OP Condition TX 915.6 MHz

Operator Panozzo 15182737

Test Spec

Horiz

Final Measurement

Meas Time: 1 s

Margin: 6 dB

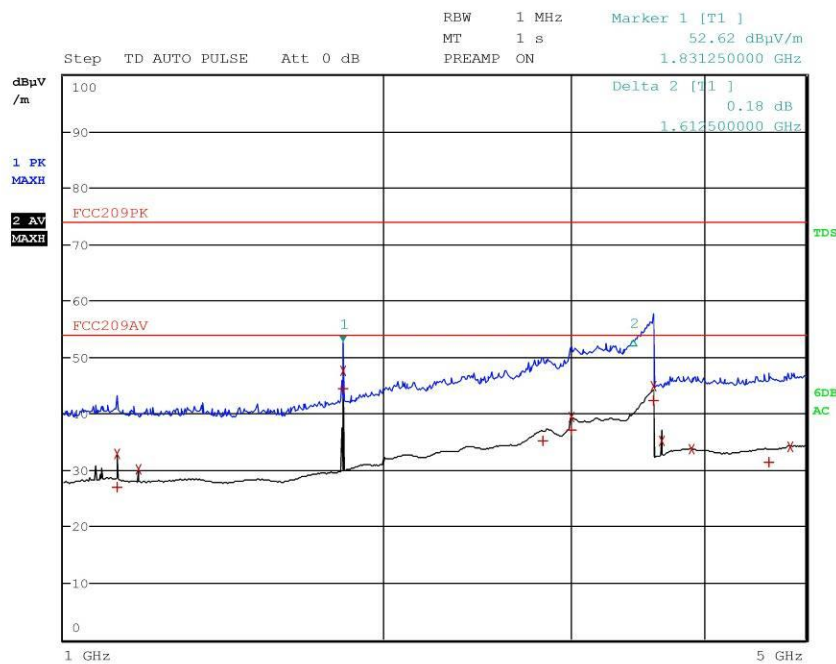
Peaks: 15

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
2	1.310750000 GHz	28.48	Average	
1	1.316750000 GHz	26.15	Quasi Peak	-27.85
1	1.831250000 GHz	32.56	Quasi Peak	-21.44
2	1.831250000 GHz	34.05	Average	
1	2.303000000 GHz	31.09	Quasi Peak	-22.91
2	2.313500000 GHz	33.32	Average	
1	2.687500000 GHz	32.27	Quasi Peak	-21.73
2	2.823750000 GHz	37.56	Average	
2	3.007750000 GHz	39.34	Average	
1	3.094250000 GHz	36.51	Quasi Peak	-17.49
1	3.583000000 GHz	42.15	Quasi Peak	-11.85
2	3.598000000 GHz	44.82	Average	
2	3.662500000 GHz	32.46	Average	
1	4.722750000 GHz	31.64	Quasi Peak	-22.36
2	4.829000000 GHz	34.18	Average	



G15182738

Meas Type Emission 1000-5000MHz
Equipment under Test
Manufacturer
OP Condition TX 915.6 MHz
Operator Panozzo 15182738
Test Spec
Vert.





Meas Type Emission 1000-5000MHz
Equipment under Test
Manufacturer
OP Condition TX 915.6 MHz
Operator Panozzo 15182738
Test Spec
Vert.

Final Measurement

Meas Time: 1 s
Margin: 6 dB
Peaks: 14

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
2	1.123500000 GHz	32.91	Average	
1	1.123750000 GHz	26.94	Quasi Peak	-27.06
2	1.175500000 GHz	30.22	Average	
1	1.831250000 GHz	44.33	Quasi Peak	-9.67
2	1.831250000 GHz	47.67	Average	
1	2.825500000 GHz	35.21	Quasi Peak	-18.79
1	3.004750000 GHz	37.09	Quasi Peak	-16.91
2	3.008750000 GHz	39.30	Average	
1	3.595750000 GHz	42.39	Quasi Peak	-11.61
2	3.598500000 GHz	44.83	Average	
2	3.662500000 GHz	35.11	Average	
2	3.901750000 GHz	33.76	Average	
1	4.616000000 GHz	31.36	Quasi Peak	-22.64
2	4.828750000 GHz	34.16	Average	

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: 26 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

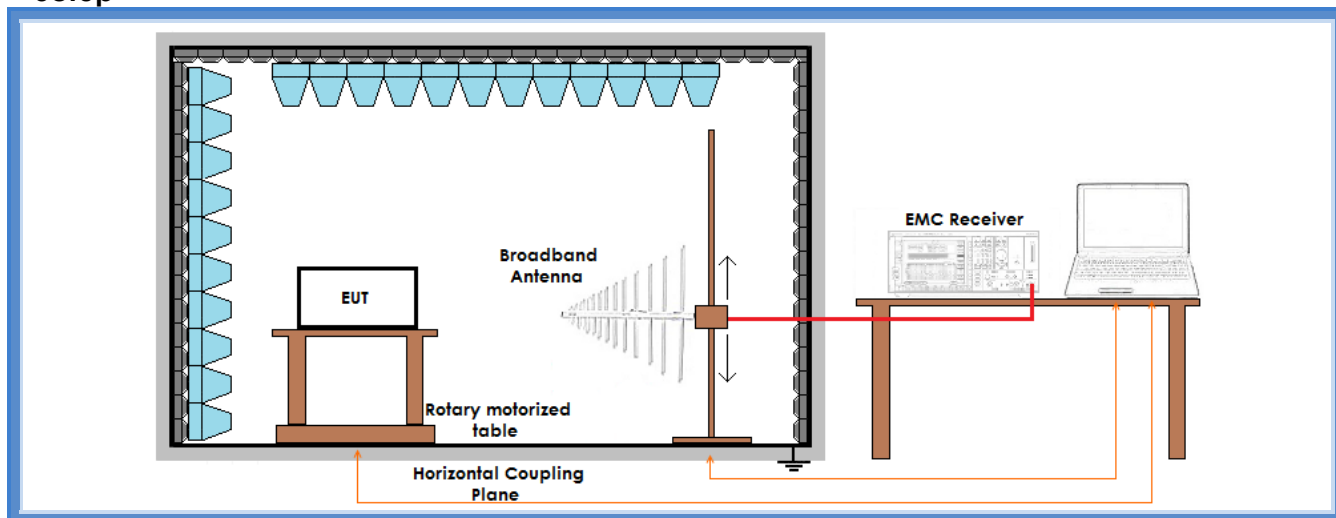
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

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
902,28	G15182719	81,94	100,04	-33,15	66,89	Complies
915,63	G15182726	81,94	99,53	-33,15	66,38	Complies
927,68	G15182729	81,94	101,21	-33,15	68,06	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:

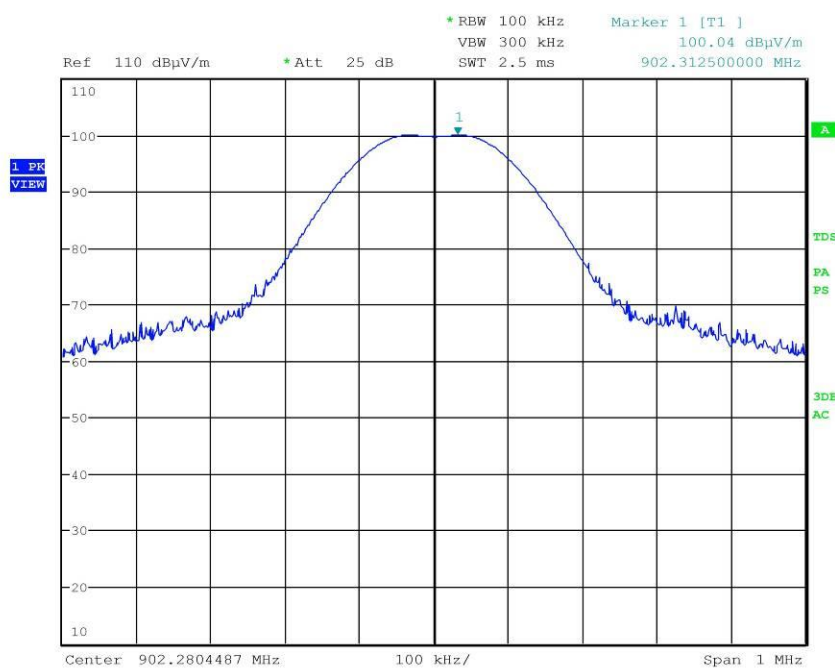
Duty cycle = $20\log(2,2 \text{ ms} / 100 \text{ ms}) = -33,15 \text{ dB}$, see also the duty cycle evaluation of cl. 2 of this Test Report



Graphs

G15182719

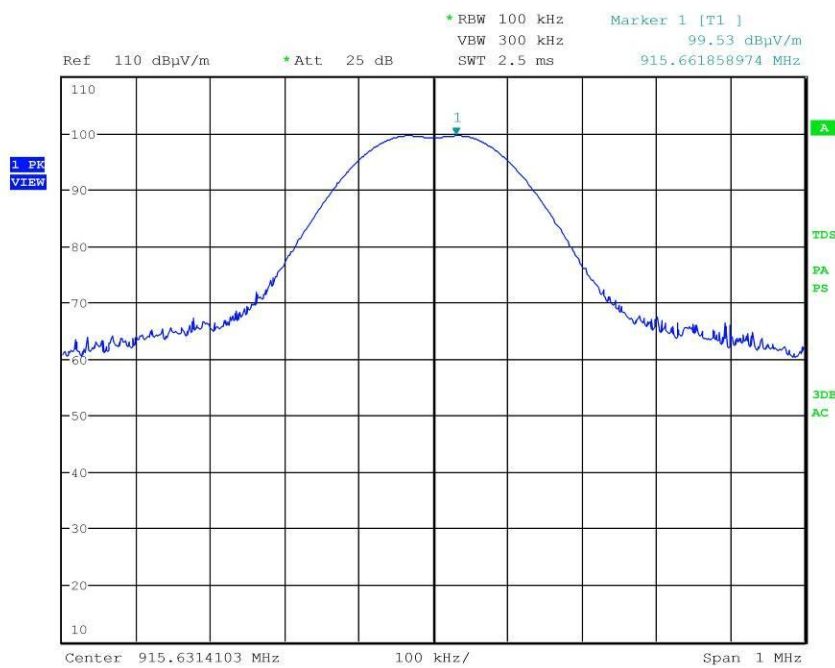
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182719
Test Spec





G15182726

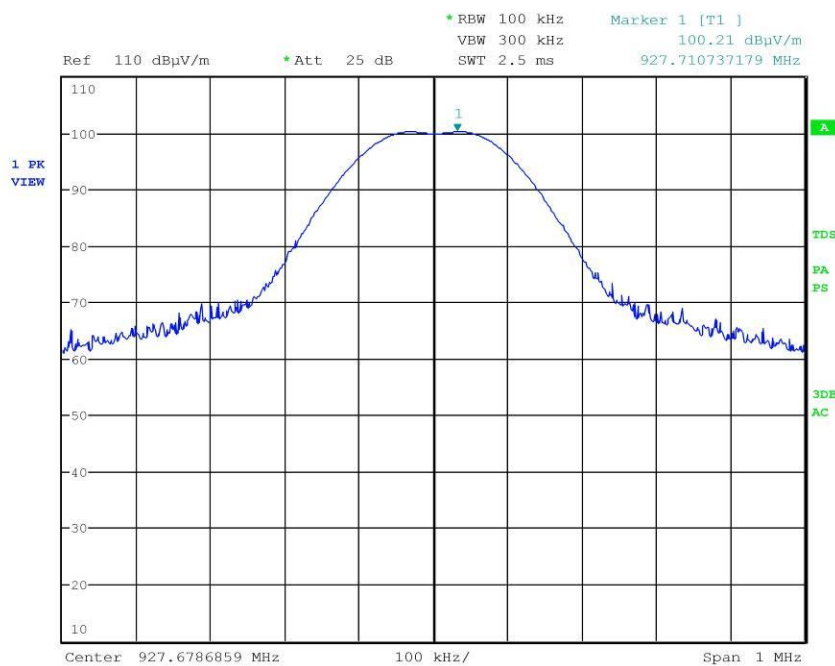
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182726
Test Spec





G15182729

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182729
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: 02 December 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

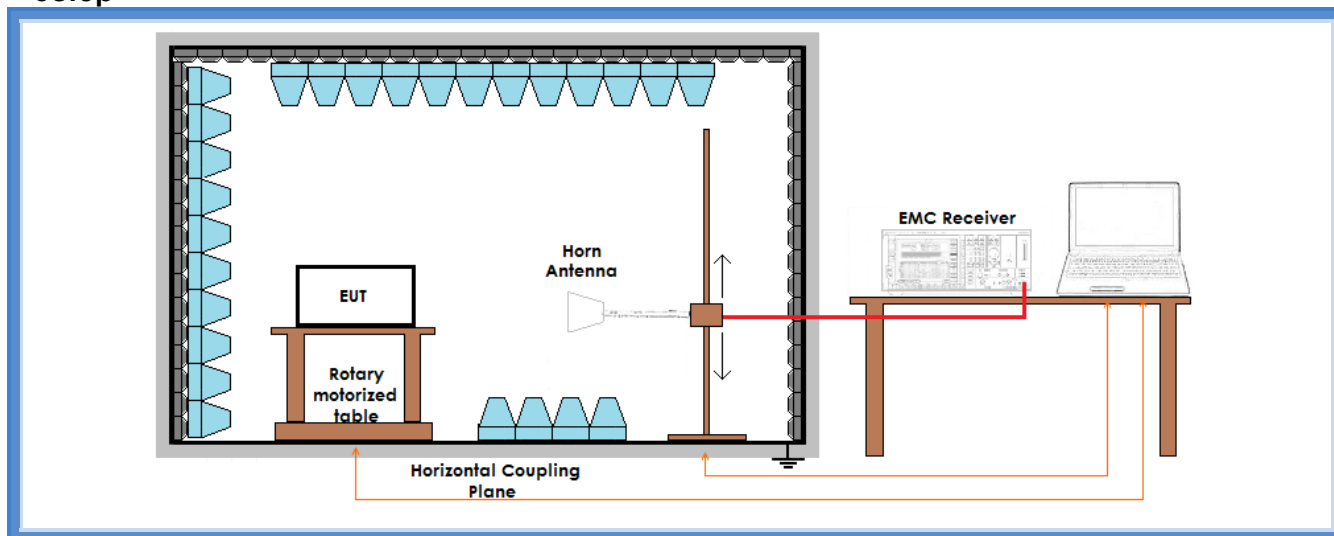
Environmental conditions

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
902,28	1804,4	61,94	51,60	-33,15	18,45	Complies
902,28	2706,6	54,00	47,80	-33,15	14,65	Complies
902,28	5413,2	54,00	64,20	-33,15	31,05	Complies
902,28	6315,4	61,94	54,90	-33,15	21,75	Complies
902,28	7217,6	61,94	52,30	-33,15	19,15	Complies
915,63	1831,2	61,94	54,60	-33,15	21,45	Complies
915,63	2746,8	54,00	48,70	-33,15	15,55	Complies
915,63	5493,6	61,94	64,40	-33,15	31,25	Complies
915,63	6409,2	61,94	58,30	-33,15	25,15	Complies
915,63	7324,8	54,00	51,60	-33,15	18,45	Complies
927,68	1855,2	61,94	55,40	-33,15	22,25	Complies
927,68	2782,8	54,00	48,70	-33,15	15,55	Complies
927,68	5565,6	61,94	61,70	-33,15	28,55	Complies
927,68	6493,2	61,94	58,30	-33,15	25,15	Complies
927,68	7420,8	54,00	51,10	-33,15	17,95	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
902,28	1804,4	74,00	53,10	-33,15	19,95	Complies
902,28	2706,6	74,00	52,10	-33,15	18,95	Complies
902,28	5413,2	74,00	65,80	-33,15	32,65	Complies
902,28	6315,4	74,00	58,70	-33,15	25,55	Complies
902,28	7217,6	74,00	58,30	-33,15	25,15	Complies
915,63	1831,2	74,00	55,90	-33,15	22,75	Complies
915,63	2746,8	74,00	52,90	-33,15	19,75	Complies
915,63	5493,6	74,00	66,00	-33,15	32,85	Complies
915,63	6409,2	74,00	61,30	-33,15	28,15	Complies
915,63	7324,8	74,00	57,70	-33,15	24,55	Complies
927,68	1855,2	74,00	56,70	-33,15	23,55	Complies
927,68	2782,8	74,00	52,90	-33,15	19,75	Complies
927,68	5565,6	74,00	63,60	-33,15	30,45	Complies
927,68	6493,2	74,00	61,40	-33,15	28,25	Complies
927,68	7420,8	74,00	57,90	-33,15	24,75	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

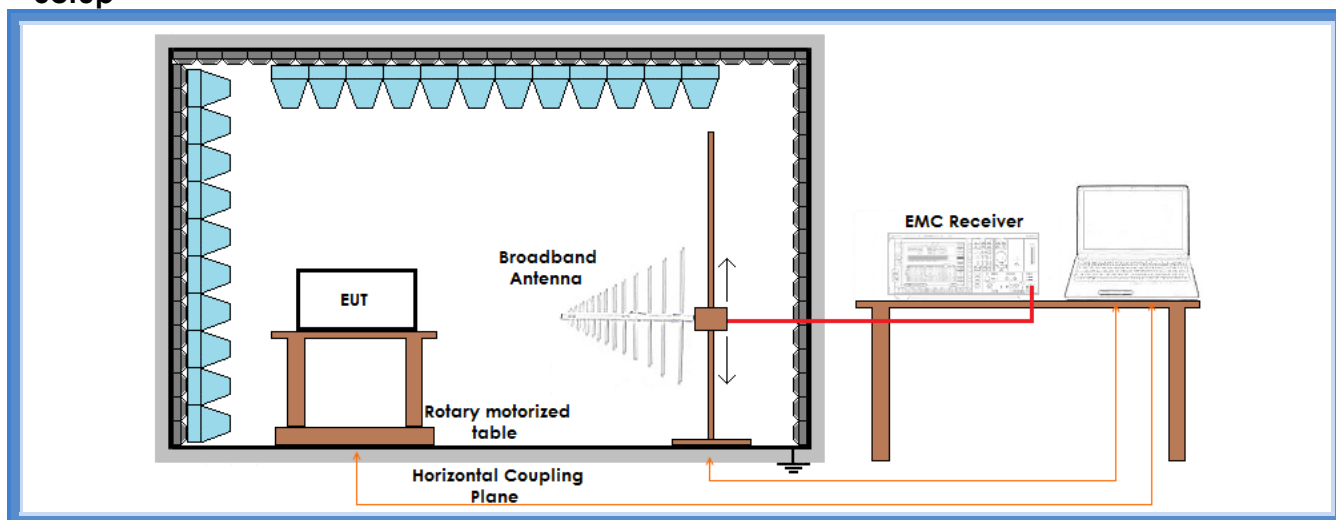
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	45

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

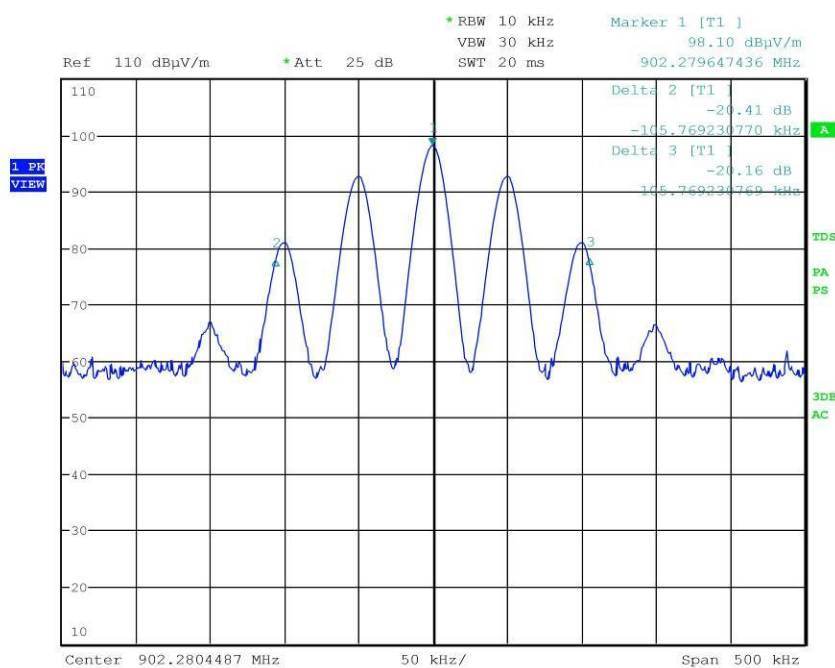
Frequency (MHz)	Limit (kHz)	20 dB bandwidth (kHz)	Graphs	Results
902,28	4511,40	211,538	G15182720	Complies
915,63	4578,15	212,339	G15182727	Complies
927,68	4638,40	212,339	G15182730	Complies



Graphs

G15182720

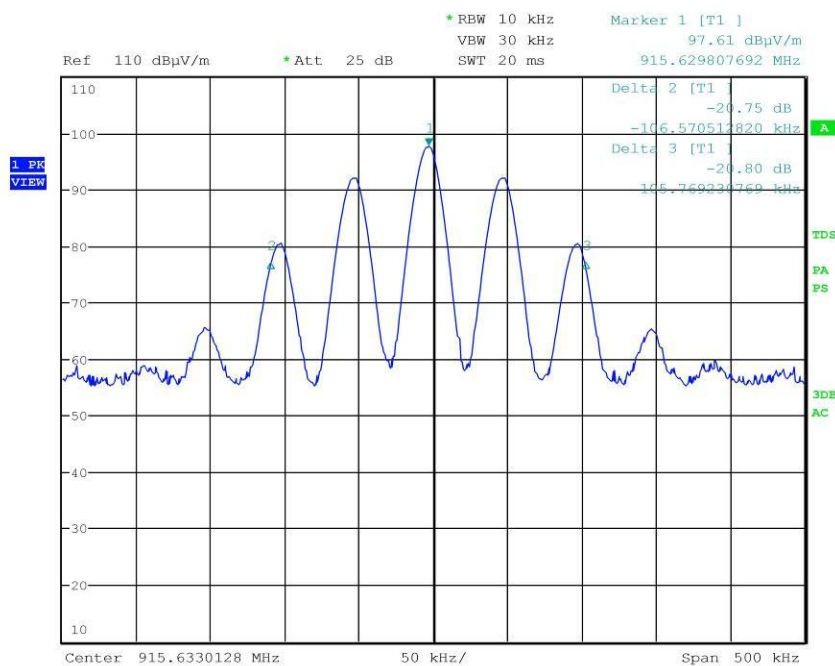
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182720
Test Spec





G15182727

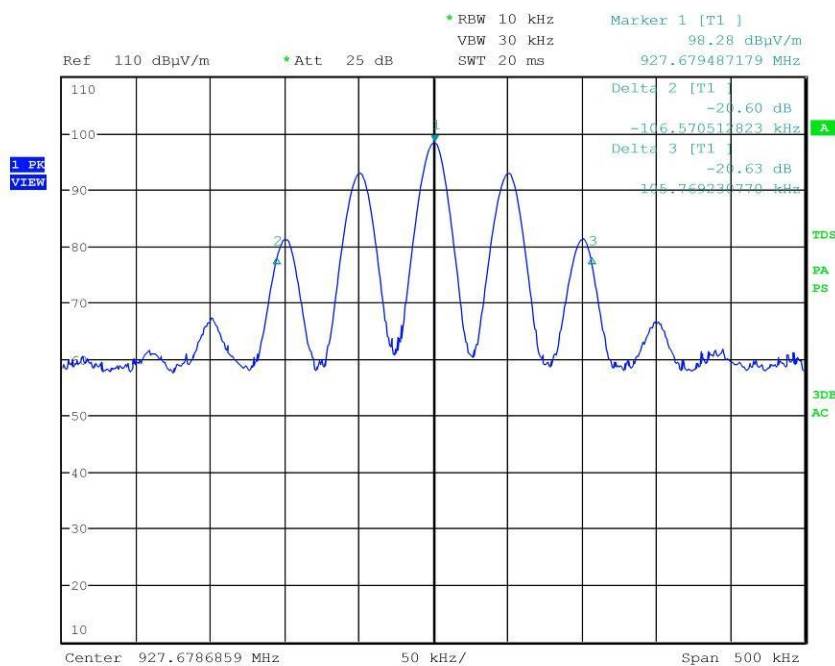
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182727
Test Spec





G15182730

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182730
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: 02 December 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)	G15182734 and G15182735	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

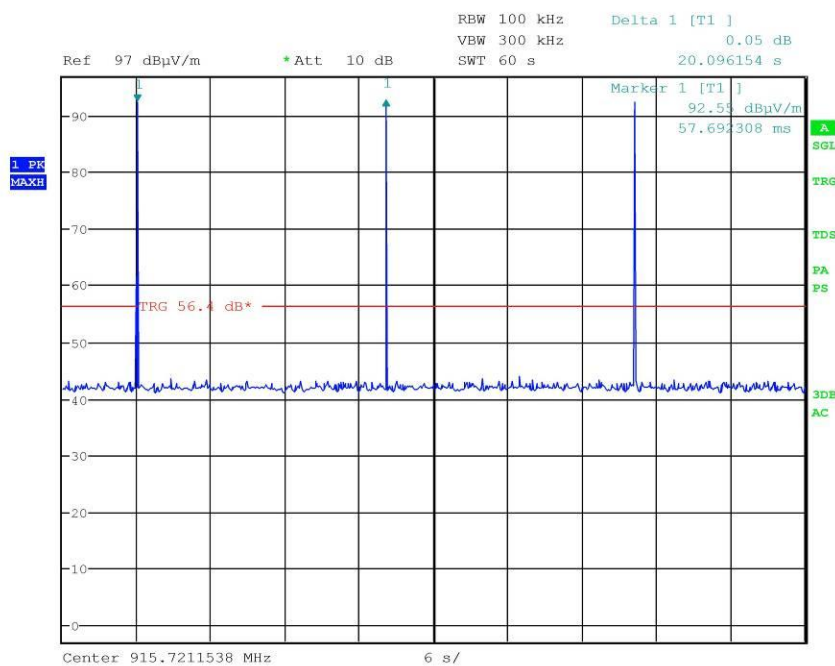
Result: N.A.



Graphs

G15182734

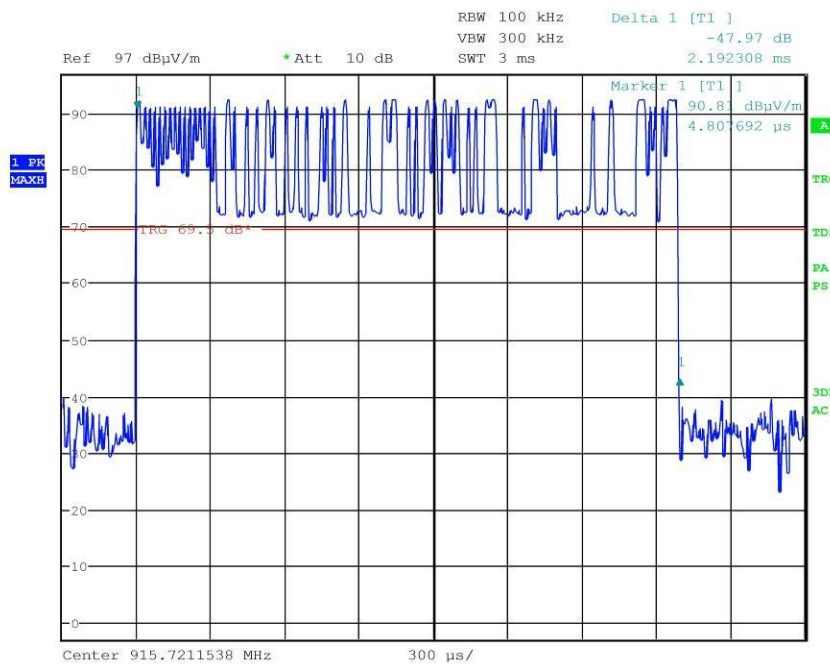
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzo 15182734
Test Spec





G15182735

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition
Operator Bertezolo 15182735
Test Spec



Result: The requirements are met

ANNEX 1 of document nr. R15182702

Tests setup photographs for Test Report nr. R15182701

