



## TEST REPORT nr. R15131501

### Federal Communication Commission (FCC)

#### Test item

Description.....: WITTY RFID  
Trademark.....: MICROGATE  
Model/Type .....: WIT006  
FCC ID.....: 2ADEOWIT006

#### Test Specification

Standard .....: FCC Rules & Regulations, Title 47:2014  
Part 15 paragraph(s): 203, 204, 207, 209, 225 and 231

**Client's name** .....: MICROGATE S.r.l.

Address .....: Via Stradivari, 4 – 39100 Bolzano (BZ) – ITALY

**Manufacturer's name** : Same as client

Address .....: --

#### Report

Tested by .....: A. Bertezolo – Technician

Approved by .....: R. Beghetto – Laboratory Manager

Date of issue .....: 16.02.16

Contents.....: 53 pages

This test report shall not be reproduced except in full without the written approval of CMC.  
The test results presented in this report relate only to the item tested.



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## 1. Summary

Standard:

FCC Rules & Regulations, Title 47:2014  
Part 15 paragraph(s): 203, 204, 207, 209, 225 and 231

Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.203	Antenna requirements	1	Complies
Part 15.207	Conducted emissions	--	N.A. (+)
Part 15.209	Radiated emissions	2	Complies
Part 15.209 and 15.231 (a)	Fundamental and spurious emissions ( $\leq 1$ GHz)	3	Complies
Part 15.209 and 15.231	Spurious emissions ( $> 1$ GHz)	4	Complies
Part 15.225	Field strength with the assigned band	5	Complies
Part 15.225 (e)	Frequency tolerance	6	Complies
Part 15.231 (c)	Occupied channel bandwidth	7	Complies
Part 15.231 (a)	Periodic operation characteristics	8	Complies

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

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



## 2. Description of Equipment under test (EUT)

Power supply ..... : 3,7 Vdc from battery

Serial Number ..... : --

Type of equipment ..... : ☒ Transmitter Unit  
☒ Receiver Unit

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

Nominal frequency ..... : 13,56 MHz  
434,01 MHz

### 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 ..... : 12.05.15

Testing start date ..... : 27.08.15

Testing end date ..... : 22.10.15

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 P150535

## 4. Operative conditions

EUT exercising ..... : EUT in continuous transmission at maximum power



## 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 S129	Rohde & Schwarz	ESPI7	Receiver	836.914/004	January '15	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
<b>Conducted Emission</b>		
(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
<b>Discontinuous Conducted Emission</b>		
Conducted Emission (50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.0 dB	1
<b>Disturbance Power (30 MHz – 300 MHz)</b>		
	±3.7 dB	1
<b>Radiated Emission</b>		
(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
<b>Electromagnetic field EMF</b>		
	±10.5 %	1
<b>Harmonic current emissions test</b>		
	±1.8 %	1
<b>Voltage fluctuation and flicker test</b>		
	±2.6 %	1
<b>Insertion loss test</b>		
	±2.0 dB	1
<b>Radiated electromagnetic disturbance test (loop antenna)</b>		
	±2.1 dB	1
<b>Radiated electromagnetic field immunity test</b>		
	0.81 V/m at 3V/m	1
<b>Pulse modulated radiated electromagnetic field immunity test</b>		
	0.81 V/m at 3V/m	1
<b>Injected currents immunity test</b>		
	0.45 V at 3V	1
<b>Bulk current</b>		
	3.7 mA at 60 mA	1
<b>Power frequency magnetic field immunity test</b>		
	0.1 A/m at 10 A/m	1
<b>Effective radiated power (F &lt; 1GHz)</b>		
	±4.3 dB	1
<b>Effective radiated power (F &gt; 1GHz)</b>		
	±3.7 dB	1
<b>Frequency error</b>		
	< 1x10 <sup>-7</sup>	1
<b>Modulation bandwidth</b>		
	< 1x10 <sup>-7</sup>	1
<b>Conducted RF power and spurious emission</b>		
	±0.7 dB	1
<b>Adjacent channel power</b>		
	±1.2 dB	1
<b>Blocking</b>		
	±1.2 dB	1
<b>Electrostatic discharge immunity test</b>		
		2
<b>Electrical fast transients / burst immunity test</b>		
		2
<b>Surge immunity test</b>		
		2
<b>Pulse magnetic field immunity test</b>		
		2
<b>Damped oscillatory magnetic field immunity test</b>		
		2
<b>Short interruption immunity test</b>		
		2
<b>Voltage transient emission test</b>		
	±2.2 %	1
<b>Transient immunity test</b>		
		2

### Notes

#### Note 1:

The expanded uncertainty reported according to EN55016-4-2:2011 is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of p = 95%

#### Note 2:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor k = 2.



## 8. Reference documents

Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2014	--
ANSI C63.4:2009	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
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.

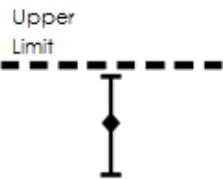
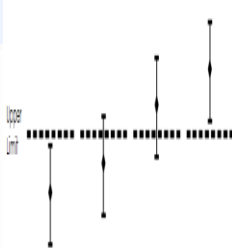
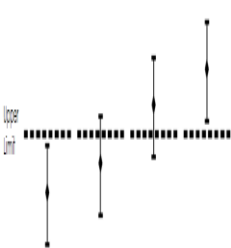
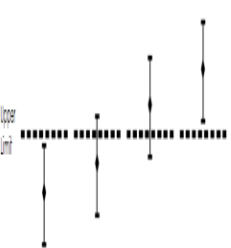


## 11. Results

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 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	Remarks	Results
Integral antenna	Not Present	--	Complies

**Result:** The requirements are met



## 11.2 Radiated emissions

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part. 15.209
- Internal procedure PM001
- See clause 4 of this test report

### Test configuration and test method

Test site:  
Semi-anechoic chamber

Auxiliary equipment:  
See clause 4 of this test report

### EUT exercising

See clause 4 of this test report

### Test equipment used

CMC S108, CMC S127, CMC S136, CMC S164  
Measurement uncertainty: See clause 7 of this test report

### Test specification

Port: Enclosure  
Frequency range: 0,009 MHz – 1000 MHz  
Antenna polarization: Horizontal (H) – Vertical (V)  
EUT – Antenna distance: 3 m

### Environmental conditions

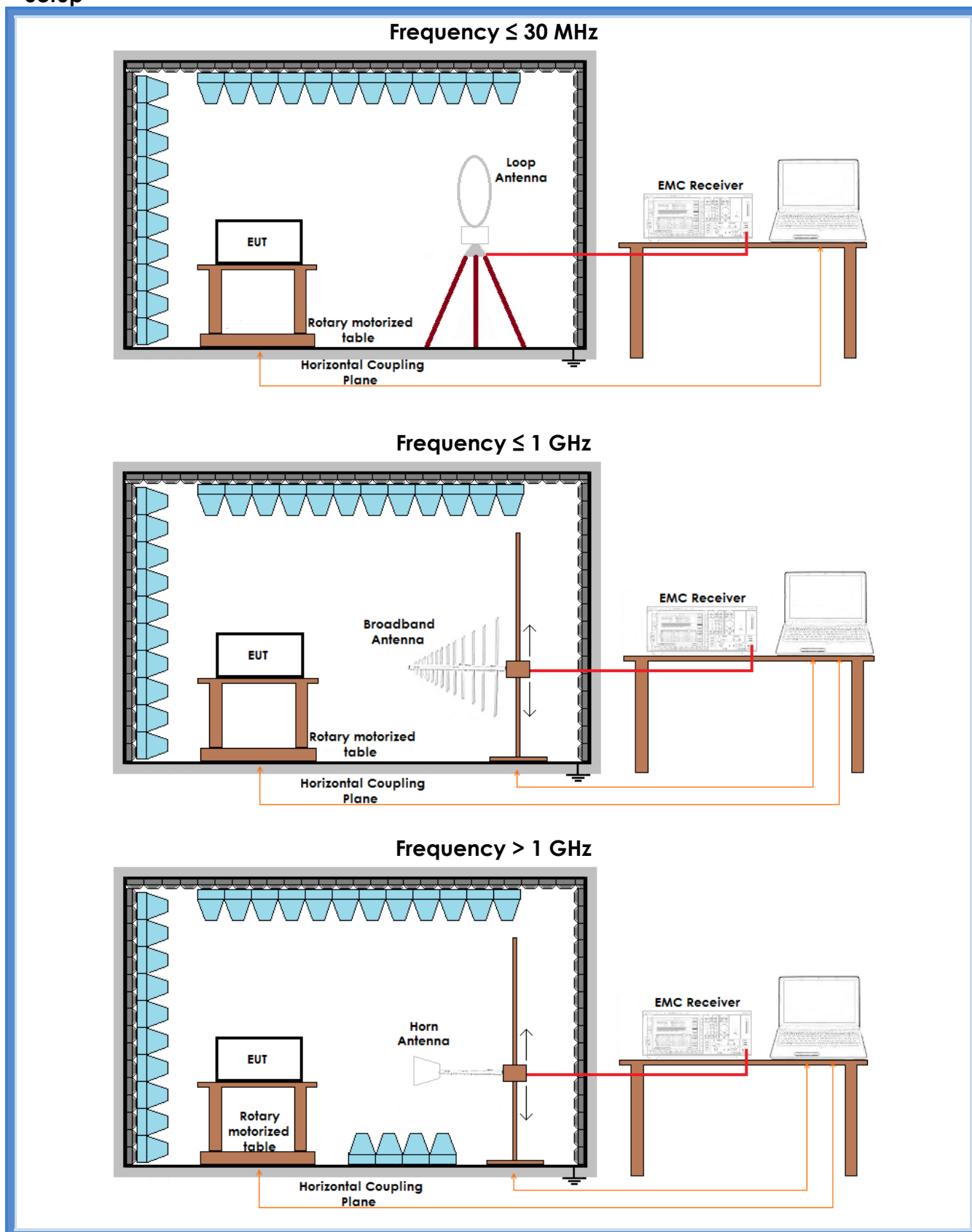
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

### 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	G15131552	13,560 MHz channel	Complies
H	30 – 1000	G15131553	13,560 MHz channel	Complies
V	30 – 1000	G15131554	13,560 MHz channel	Complies
Loop	0,009 – 30	G15131514	433,31 MHz channel	Complies
H	30 – 1000	G15131504	433,31 MHz channel	Complies
V	30 – 1000	G15131503	433,31 MHz channel	Complies
H	1000 – 6000	G15131505	433,31 MHz channel	Complies
V	1000 – 6000	G15131506	433,31 MHz channel	Complies
Loop	0,009 – 30	G15131513	434,71 MHz channel	Complies
H	30 – 1000	G15131510	434,71 MHz channel	Complies
V	30 – 1000	G15131509	434,71 MHz channel	Complies
H	1000 – 6000	G15131511	434,71 MHz channel	Complies
V	1000 – 6000	G15131512	434,71 MHz channel	Complies
Remarks: --				

### Graphs Legend

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

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

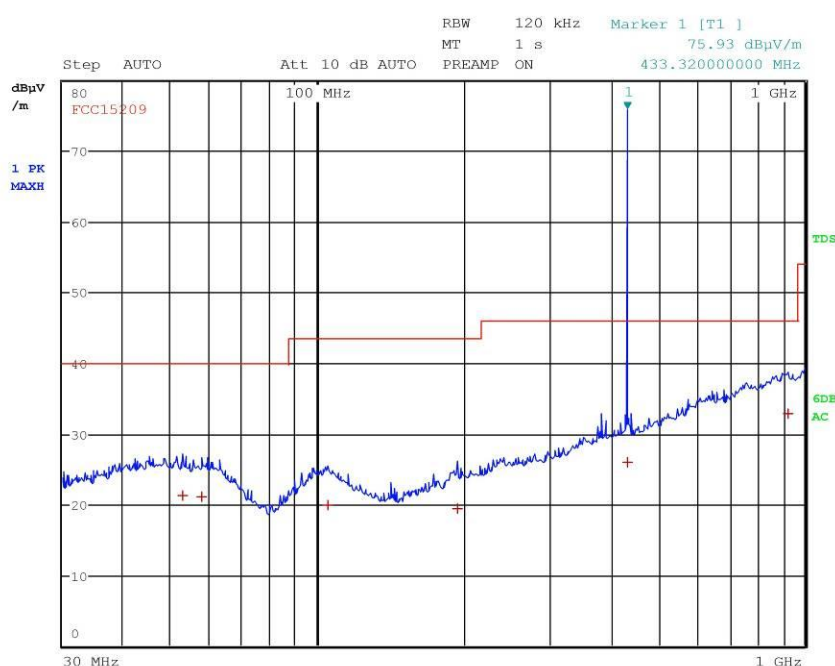




## Graphs

G15131503

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezzo 15131503  
Test Spec



## Final Measurement

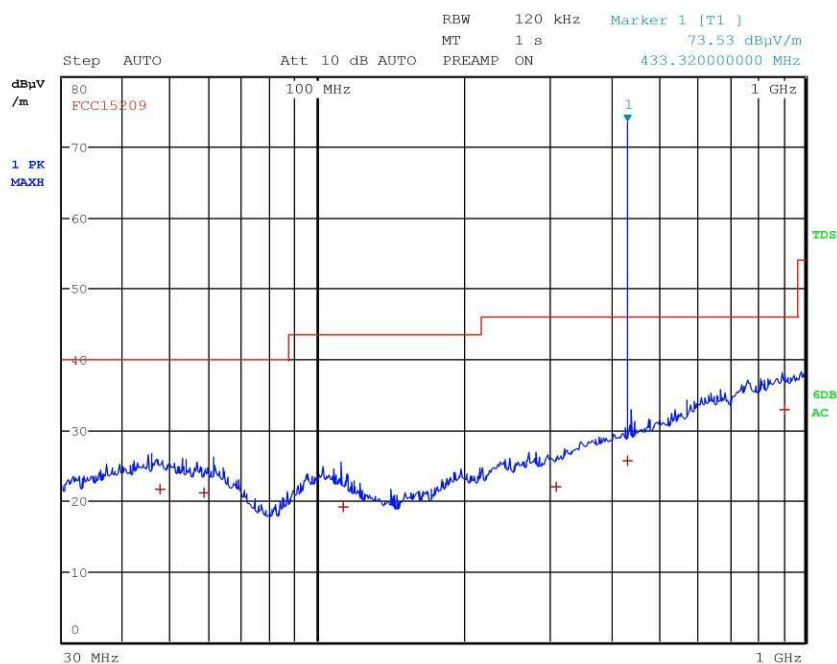
Meas Time: 1 s  
Margin: 30 dB  
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	53.00000000 MHz	21.28	Quasi Peak	-18.72
1	57.72000000 MHz	21.15	Quasi Peak	-18.85
1	105.20000000 MHz	19.96	Quasi Peak	-23.56
1	193.60000000 MHz	19.43	Quasi Peak	-24.09
1	434.00000000 MHz	25.88	Quasi Peak	-20.14
1	922.88000000 MHz	32.81	Quasi Peak	-13.21



G15131504

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131504  
Test Spec



### Final Measurement

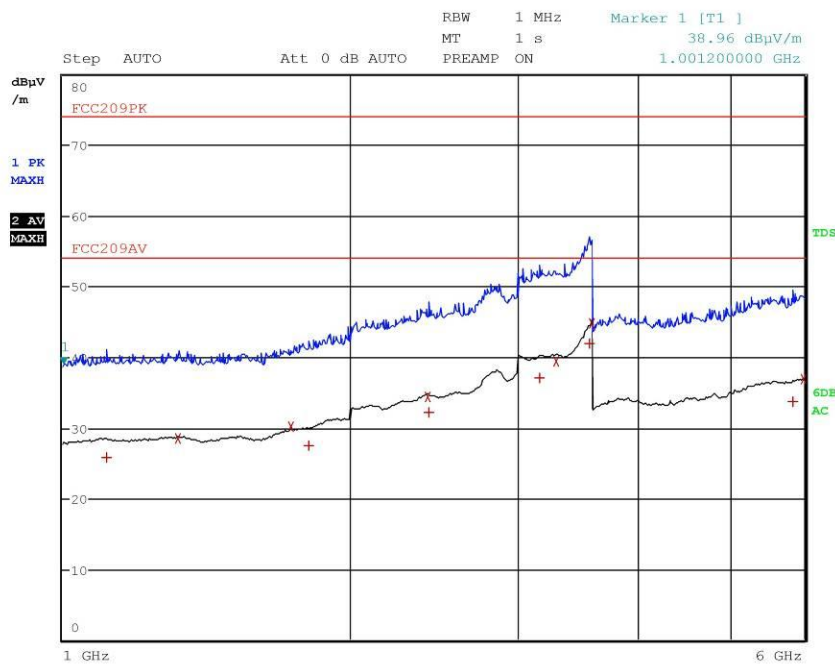
Meas Time: 1 s  
Margin: 30 dB  
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	47.520000000 MHz	21.64	Quasi Peak	-18.36
1	58.360000000 MHz	21.13	Quasi Peak	-18.87
1	112.840000000 MHz	19.08	Quasi Peak	-24.44
1	309.360000000 MHz	21.98	Quasi Peak	-24.04
1	434.000000000 MHz	25.65	Quasi Peak	-20.37
1	910.480000000 MHz	32.81	Quasi Peak	-13.21



G15131505

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131505  
Test Spec





**Meas Type** Emission  
**Equipment under Test**  
**Manufacturer**  
**OP Condition**  
**Operator** Bertezolo 15131505  
**Test Spec**

### Final Measurement

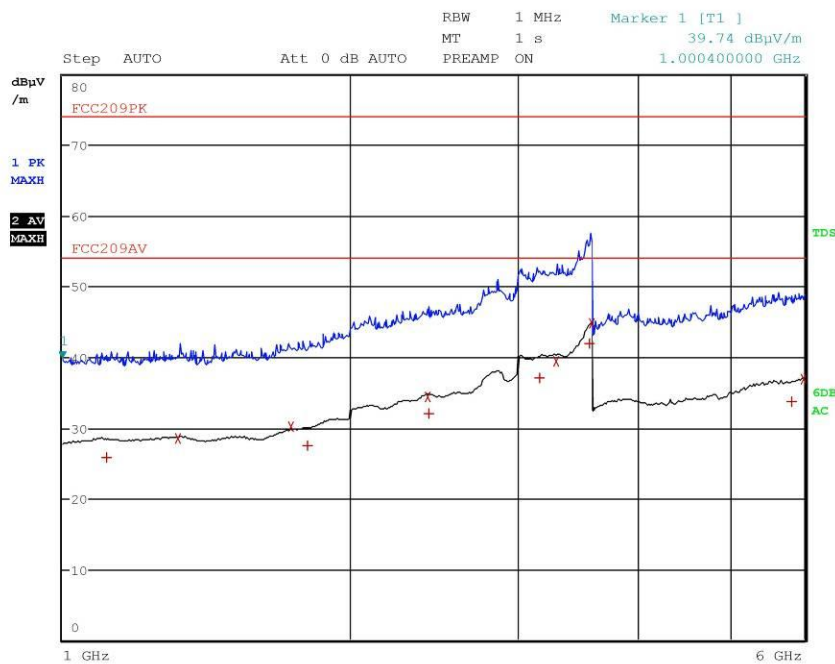
**Meas Time:** 1 s  
**Margin:** 30 dB  
**Subranges:** 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.112400000 GHz	25.86	Quasi Peak	-28.14
2	1.320000000 GHz	28.45	Average	
2	1.733200000 GHz	30.24	Average	
1	1.809200000 GHz	27.48	Quasi Peak	-26.52
2	2.416400000 GHz	34.31	Average	
1	2.419200000 GHz	32.11	Quasi Peak	-21.89
1	3.166800000 GHz	37.06	Quasi Peak	-16.94
2	3.293200000 GHz	39.44	Average	
1	3.570400000 GHz	41.88	Quasi Peak	-12.12
2	3.598000000 GHz	44.85	Average	
1	5.821600000 GHz	33.74	Quasi Peak	-20.26
2	5.980000000 GHz	36.84	Average	



G15131506

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131506  
Test Spec





**Meas Type** Emission  
**Equipment under Test**  
**Manufacturer**  
**OP Condition**  
**Operator** Bertezolo 15131506  
**Test Spec**

### Final Measurement

**Meas Time:** 1 s  
**Margin:** 30 dB  
**Subranges:** 12

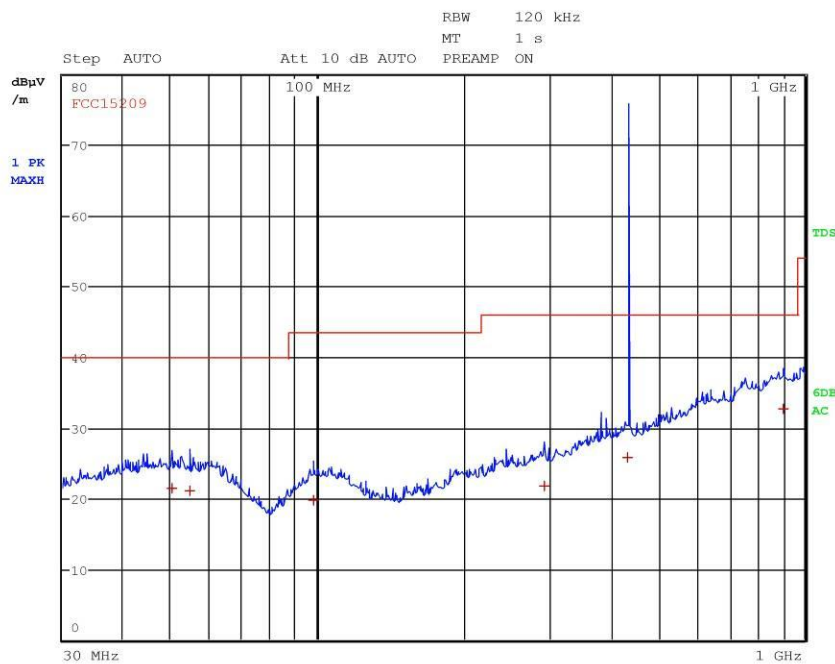
Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.112400000 GHz	25.88	Quasi Peak	-28.12
2	1.320000000 GHz	28.45	Average	
2	1.733200000 GHz	30.24	Average	
1	1.809200000 GHz	27.44	Quasi Peak	-26.56
2	2.416400000 GHz	34.32	Average	
1	2.419200000 GHz	32.09	Quasi Peak	-21.91
1	3.166800000 GHz	37.02	Quasi Peak	-16.98
2	3.293200000 GHz	39.45	Average	
1	3.570400000 GHz	41.91	Quasi Peak	-12.09
2	3.598000000 GHz	44.84	Average	
1	5.821600000 GHz	33.71	Quasi Peak	-20.29
2	5.980000000 GHz	36.86	Average	





G15131509

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezzo 15131509  
Test Spec



### Final Measurement

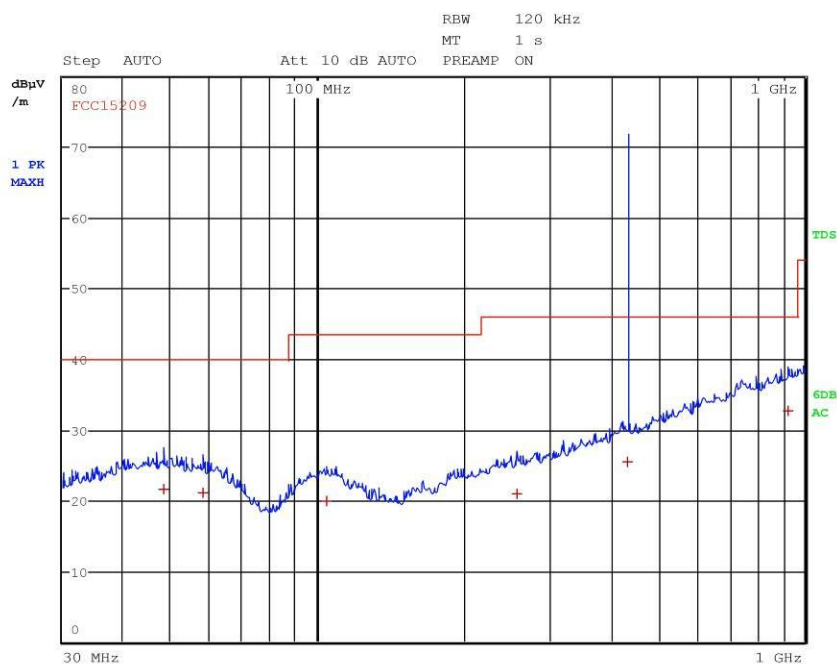
Meas Time: 1 s  
Margin: 30 dB  
Subranges: 6

Trace	Frequency	Level (dB $\mu$ V/m)	Detector	Delta Limit/dB
1	50.200000000 MHz	21.45	Quasi Peak	-18.55
1	54.800000000 MHz	21.16	Quasi Peak	-18.84
1	98.120000000 MHz	19.71	Quasi Peak	-23.81
1	292.520000000 MHz	21.69	Quasi Peak	-24.33
1	433.000000000 MHz	25.76	Quasi Peak	-20.26
1	901.320000000 MHz	32.74	Quasi Peak	-13.28



G15131510

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131510  
Test Spec



### Final Measurement

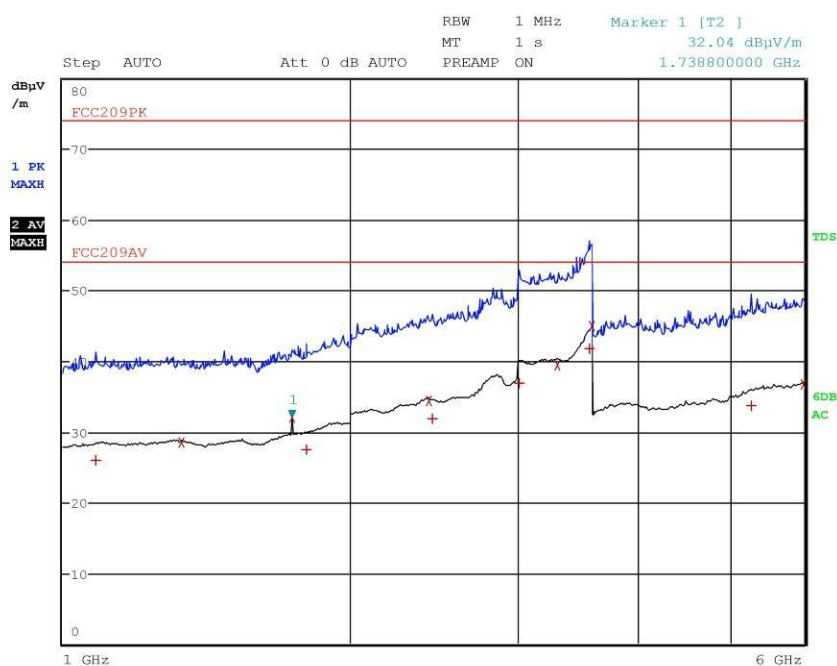
Meas Time: 1 s  
Margin: 30 dB  
Subranges: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	48.440000000 MHz	21.61	Quasi Peak	-18.39
1	58.120000000 MHz	21.15	Quasi Peak	-18.85
1	104.600000000 MHz	19.99	Quasi Peak	-23.53
1	257.120000000 MHz	20.99	Quasi Peak	-25.03
1	433.000000000 MHz	25.47	Quasi Peak	-20.55
1	922.640000000 MHz	32.76	Quasi Peak	-13.26



G15131511

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131511  
Test Spec





Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131511  
Test Spec

### Final Measurement

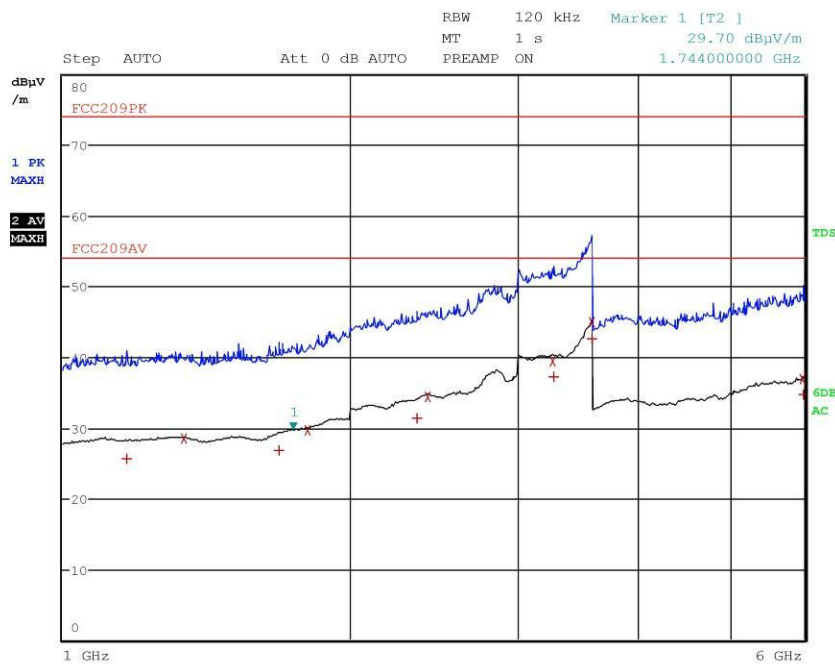
Meas Time: 1 s  
Margin: 30 dB  
Subranges: 12

Trace	Frequency	Level (dB $\mu$ V/m)	Detector	Delta Limit/dB
1	1.082800000 GHz	25.89	Quasi Peak	-28.11
2	1.333200000 GHz	28.43	Average	
2	1.738800000 GHz	31.96	Average	
1	1.800800000 GHz	27.43	Quasi Peak	-26.57
2	2.419600000 GHz	34.33	Average	
1	2.438800000 GHz	31.92	Quasi Peak	-22.08
1	3.008800000 GHz	36.97	Quasi Peak	-17.03
2	3.300400000 GHz	39.48	Average	
1	3.565600000 GHz	41.72	Quasi Peak	-12.28
2	3.599600000 GHz	44.88	Average	
1	5.267200000 GHz	33.68	Quasi Peak	-20.32
2	5.982000000 GHz	36.68	Average	



G15131512

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131512  
Test Spec





Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131512  
Test Spec

### Final Measurement

Meas Time: 1 s  
Margin: 30 dB  
Subranges: 12

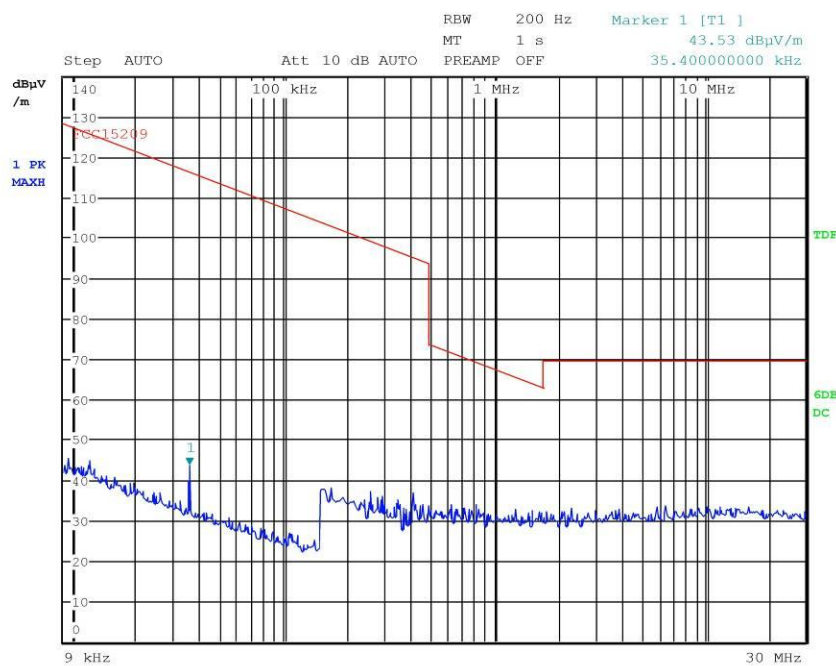
Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.168000000 GHz	25.70	Quasi Peak	-28.30
2	1.338800000 GHz	28.43	Average	
1	1.686800000 GHz	26.75	Quasi Peak	-27.25
2	1.807200000 GHz	29.75	Average	
1	2.352800000 GHz	31.28	Quasi Peak	-22.72
2	2.413200000 GHz	34.32	Average	
2	3.263200000 GHz	39.43	Average	
1	3.270800000 GHz	37.25	Quasi Peak	-16.75
1	3.597200000 GHz	42.59	Quasi Peak	-11.41
2	3.599600000 GHz	44.89	Average	
2	5.968800000 GHz	36.85	Average	
1	5.989600000 GHz	34.73	Quasi Peak	-19.27





G15131513

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131513  
Test Spec



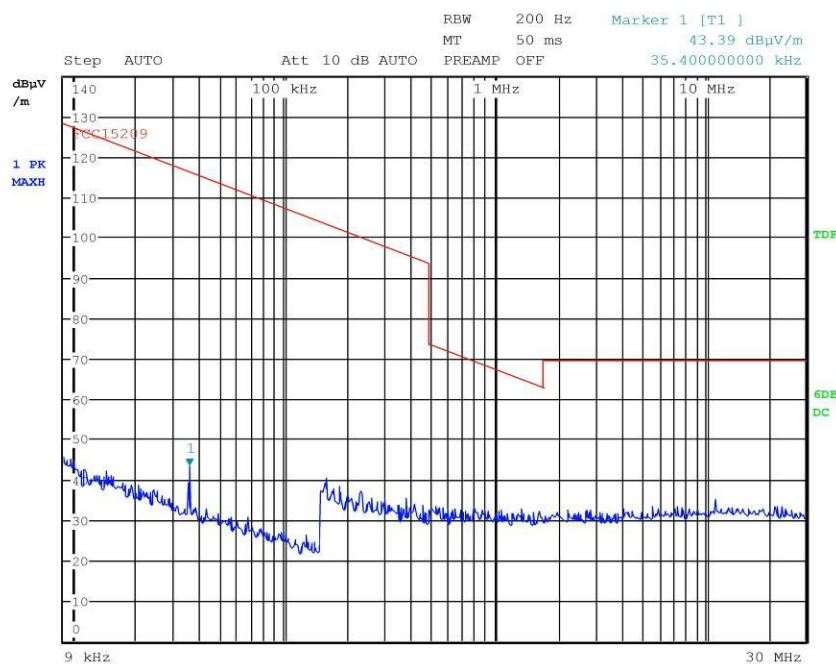
### Final Measurement

Meas Time: 1 s  
Margin: 30 dB  
Subranges: 0



G15131514

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131514  
Test Spec



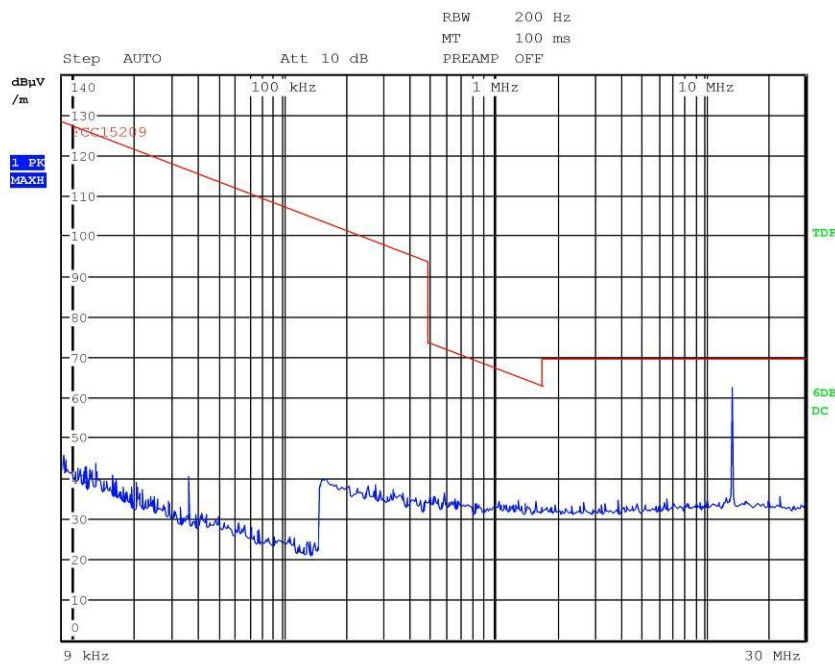
### Final Measurement

Meas Time: 1 s  
Margin: 30 dB  
Subranges: 0



G15131552

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131552  
Test Spec



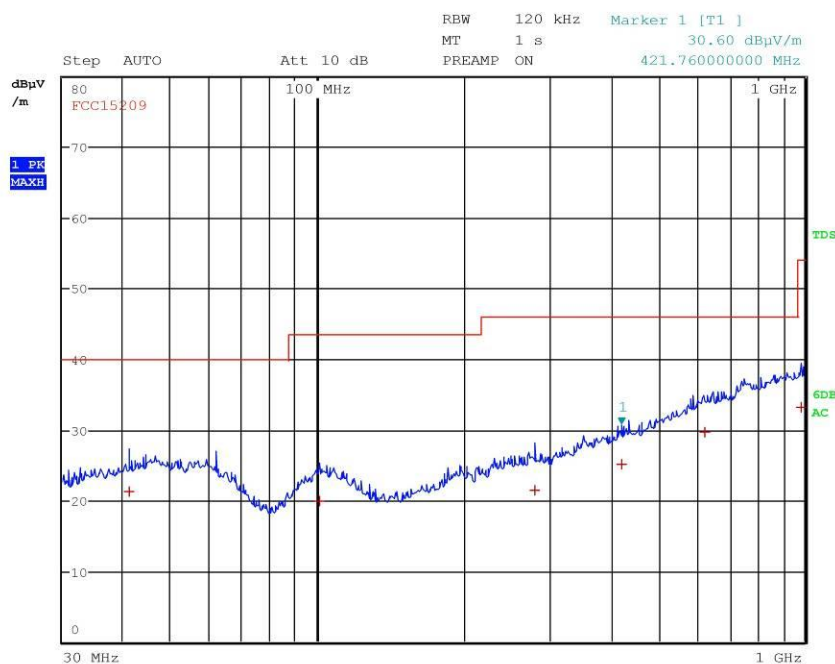
### Final Measurement

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



G15131553

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131553  
Test Spec



### Final Measurement

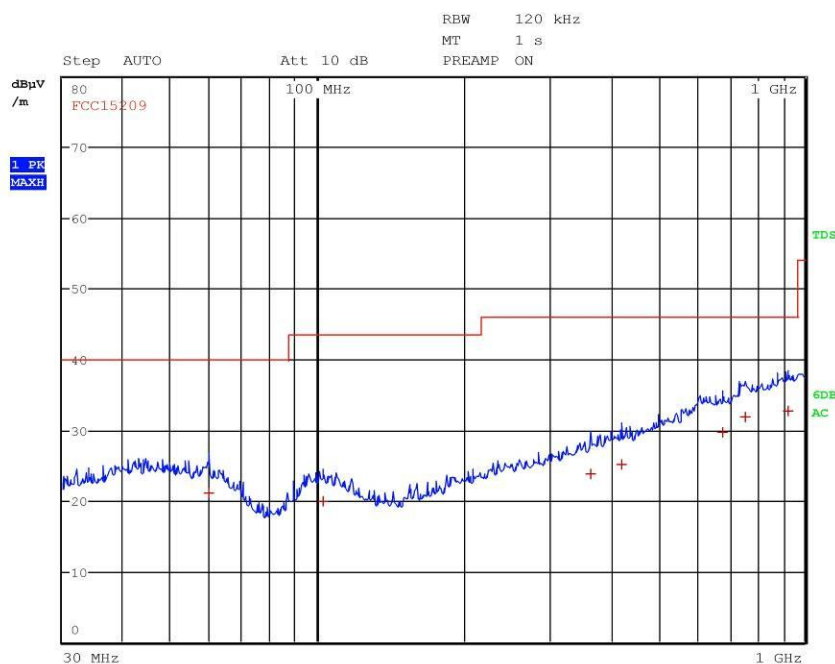
Meas Time: 1 s  
Margin: 20 dB  
Peaks: 6

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	40.960000000 MHz	21.21	Quasi Peak	-18.79
1	100.800000000 MHz	19.97	Quasi Peak	-23.55
1	279.120000000 MHz	21.44	Quasi Peak	-24.58
1	421.760000000 MHz	25.13	Quasi Peak	-20.89
1	623.800000000 MHz	29.65	Quasi Peak	-16.37
1	984.600000000 MHz	33.17	Quasi Peak	-20.81



G15131554

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131554  
Test Spec



### Final Measurement

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

Trace	Frequency	Level (dB $\mu$ V/m)	Detector	Delta Limit/dB
1	59.840000000 MHz	21.10	Quasi Peak	-18.90
1	102.400000000 MHz	19.99	Quasi Peak	-23.53
1	363.840000000 MHz	23.82	Quasi Peak	-22.20
1	419.880000000 MHz	25.11	Quasi Peak	-20.91
1	680.160000000 MHz	29.74	Quasi Peak	-16.28
1	757.120000000 MHz	31.89	Quasi Peak	-14.13
1	921.760000000 MHz	32.73	Quasi Peak	-13.29

**Result:** The requirements are met



### 11.3 Fundamental and Spurious Emission ( $\leq 1$ GHz)

#### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and Part 15.231 (a)
- Internal procedure PM001
- See clause 4 of this test report

#### Test configuration and test method

Test site:  
Semi-anechoic chamber

Auxiliary equipment:  
See clause 4 of this test report

#### EUT exercising

See clause 4 of this test report

#### Test equipment used

CMC 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 (%)
20	100	45

#### Acceptance limits

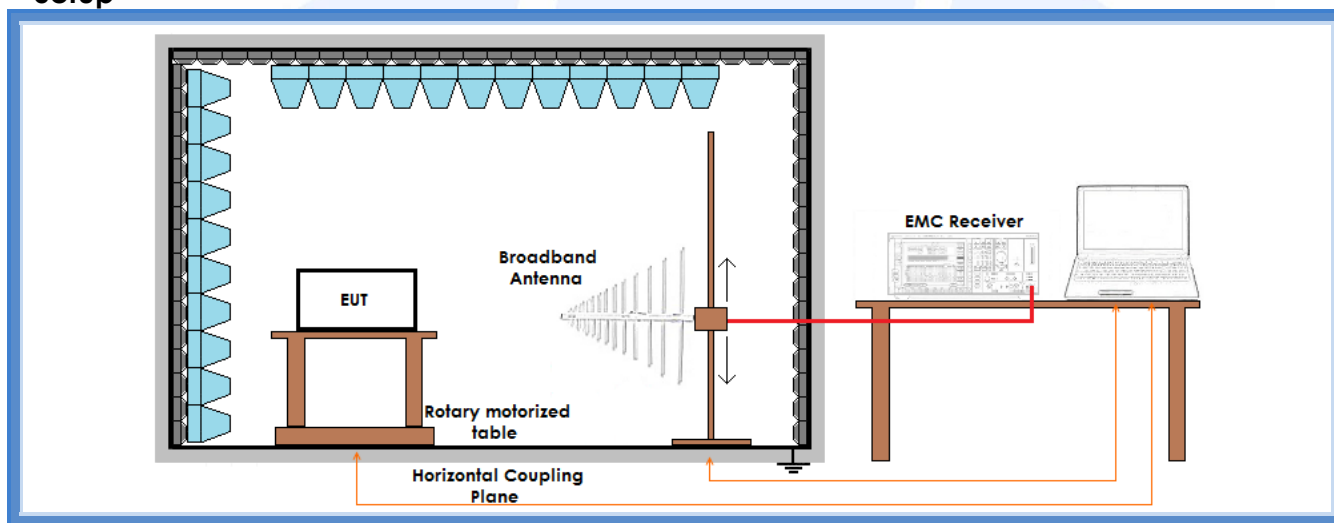
FCC Part 15.231 (b)		
Fundamental frequency (MHz)	Field strength of fundamental [dB( $\mu$ V/m)]	Field strength of spurious emissions [dB( $\mu$ V/m)]
40,66 to 40,70	67,04	47,04
70 to 130	61,94	41,94
130 to 174	61,94 to 71,48	41,94 to 51,48
174 to 260	71,48	51,48
260 to 470	71,48 to 81,94	51,48 to 61,94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



### FCC Part 15.231 (e)

Fundamental frequency (MHz)	Field strength of fundamental [dB(μV/m)]	Field strength of spurious emissions [dB(μV/m)]
40,66 to 40,70	60	40
70 to 130	53,98	33,98
130 to 174	53,98 to 63,52	33,98 to 43,52
174 to 260	63,52	43,52
260 to 470	63,52 to 73,98	43,52 to 53,98
Above 470	73,98	53,98

### Setup



### Graphs:

G15131501 and G15131507

### Result – Field strength of fundamental

Channel	f (MHz)	Limits (dBμV/m)	Level (dBμV/m)	Results
CH 1	433,31	80,79	76,05	Complies
CH 8	434,71	80,84	75,97	Complies

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

### Result – Field strength of spurious emissions

Channel	f (MHz)	Limits (dBμV/m)	Level (dBμV/m)	Results
CH 1	866,62	60,79	More than 20 dB below limit	Complies
CH 8	869,42	60,84	More than 20 dB below limit	Complies

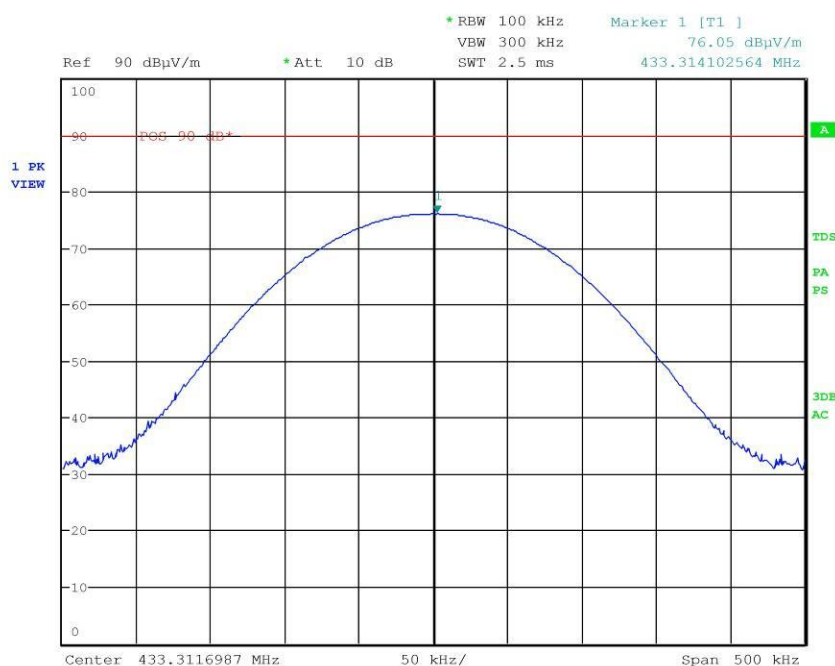
**Remarks:** EUT was tested in 3 orthogonal planes. The results in this table show the highest value.



## Graphs

G15131501

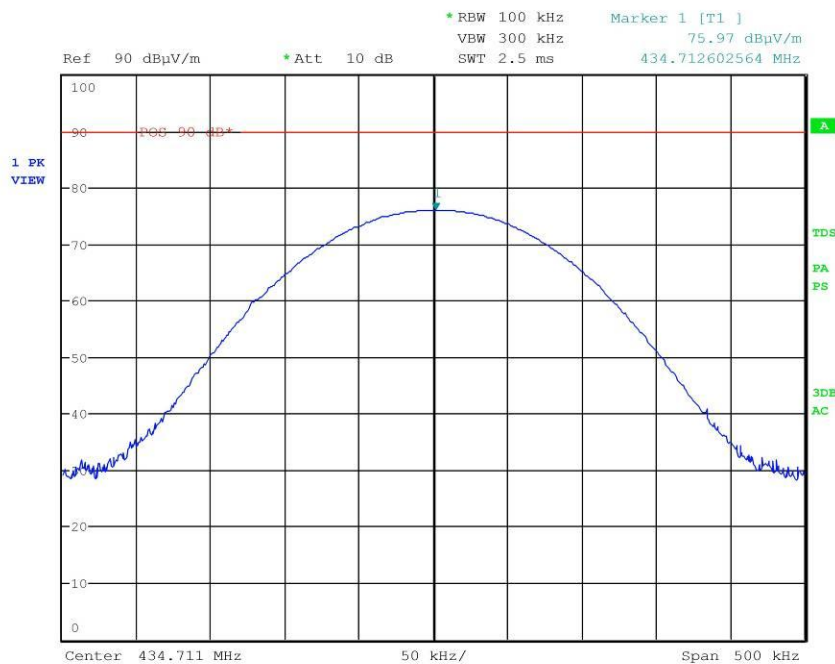
Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezzo 15131501  
Test Spec





G15131507

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezzo 15131507  
Test Spec



**Result:** The requirements are met



## 11.4 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 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

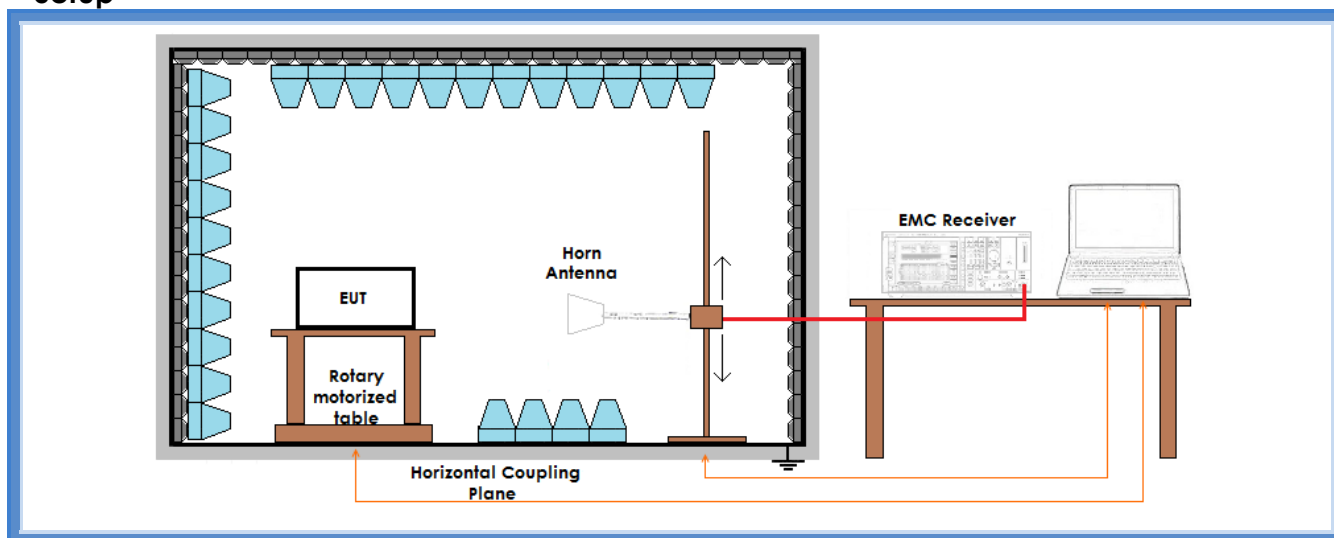
### Environmental conditions

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

### Acceptance limits

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

## Setup



## Result – AV detector

Channel CH 1 (lowest channel)			
Harmonic	Limits (dB $\mu$ V/m)	Level (dB $\mu$ V/m)	Results
III	54	More than 20 dB below limit	Complies
IV	54	More than 20 dB below limit	Complies
V	54	More than 20 dB below limit	Complies
VI	54	More than 20 dB below limit	Complies
VII	54	More than 20 dB below limit	Complies
VIII	54	More than 20 dB below limit	Complies
IX	54	More than 20 dB below limit	Complies
X	54	More than 20 dB below limit	Complies
<b>Remarks:</b> EUT was tested in 3 orthogonal planes. The results in this table show the highest values			



<b>Channel CH 8 (highest channel)</b>			
Harmonic	Limits (dB $\mu$ V/m)	Level (dB $\mu$ V/m)	Results
III	54	More than 20 dB below limit	Complies
IV	54	More than 20 dB below limit	Complies
V	54	More than 20 dB below limit	Complies
VI	54	More than 20 dB below limit	Complies
VII	54	More than 20 dB below limit	Complies
VIII	54	More than 20 dB below limit	Complies
IX	54	More than 20 dB below limit	Complies
X	54	More than 20 dB below limit	Complies
<b>Remarks:</b> EUT was tested in 3 orthogonal planes. The results in this table show the highest values			

#### Result – Peak detector

<b>Channel CH 1 (lowest channel)</b>			
Harmonic	Limits (dB $\mu$ V/m)	Level (dB $\mu$ V/m)	Results
III	74	More than 20 dB below limit	Complies
IV	74	More than 20 dB below limit	Complies
V	74	More than 20 dB below limit	Complies
VI	74	More than 20 dB below limit	Complies
VII	74	More than 20 dB below limit	Complies
VIII	74	More than 20 dB below limit	Complies
IX	74	More than 20 dB below limit	Complies
X	74	More than 20 dB below limit	Complies
<b>Remarks:</b> EUT was tested in 3 orthogonal planes. The results in this table show the highest values			



Channel CH 8 (highest channel)			
Harmonic	Limits (dB $\mu$ V/m)	Level (dB $\mu$ V/m)	Results
III	74	More than 20 dB below limit	Complies
IV	74	More than 20 dB below limit	Complies
V	74	More than 20 dB below limit	Complies
VI	74	More than 20 dB below limit	Complies
VII	74	More than 20 dB below limit	Complies
VIII	74	More than 20 dB below limit	Complies
IX	74	More than 20 dB below limit	Complies
X	74	More than 20 dB below limit	Complies
Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values			

**Result:** The requirements are met





## 11.5 Field strength within the assigned band

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and Part 15.225
- Internal procedure PM001
- See clause 4 of this test report

### Test configuration and test method

Test site:  
Semi-anechoic chamber

Auxiliary equipment:  
See clause 4 of this test report

### EUT exercising

See clause 4 of this test report

### Test equipment used

CMC S127, CMC S164  
Measurement uncertainty: See clause 7 of this test report

### Test specification

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

### Environmental conditions

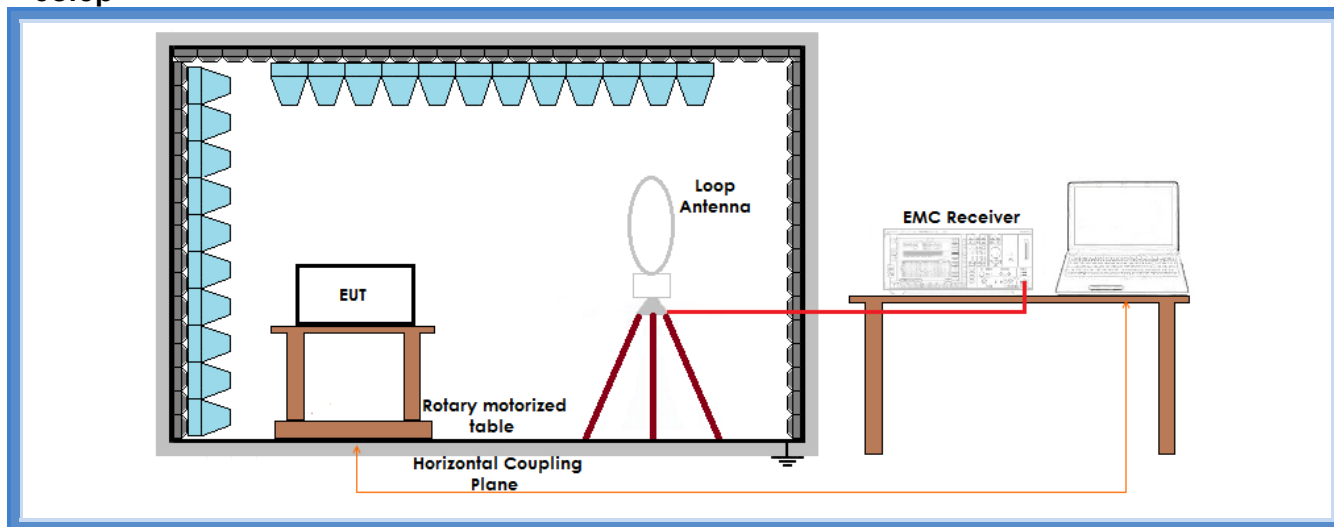
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

### Acceptance limits

Limits (with antenna distance 3 m)		
cl.	Frequency range (MHz)	dB(μV/m) Quasi-peak
15.225 (a)	13,553 to 13,567	124
15.225 (b)	13,410 to 13,553 and 13,567 to 13,710	90,5
15.225 (c)	13,110 to 13,410 and 13,710 to 14,010	80,5
15.225 (d)	outside of the 13,110 – 14,010 MHz band	FCC 15.209



## Setup



## Result

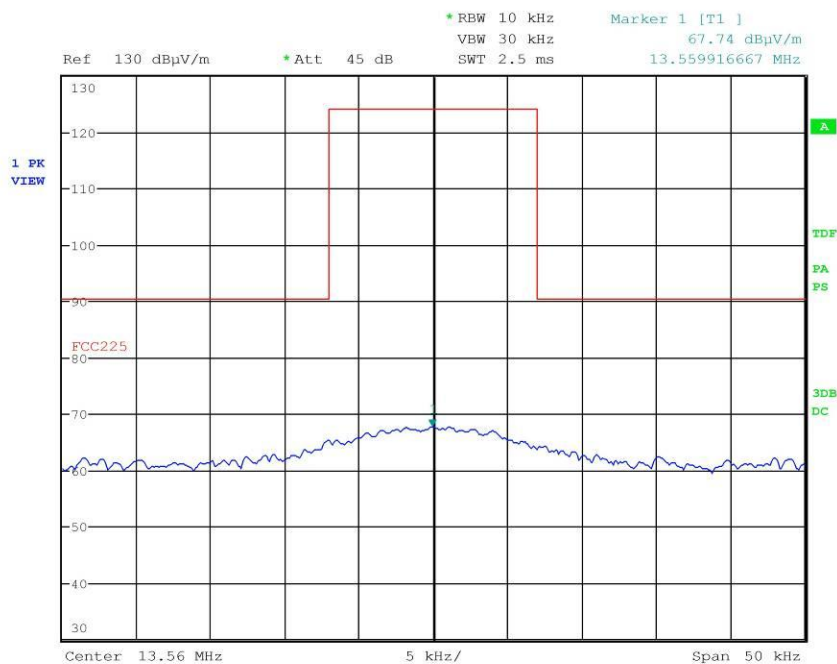
Graphs	Limits (dB $\mu$ V/m)	Level (dB $\mu$ V/m)	Results
G15131550	123,99	67,74	Complies
G15131551			

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



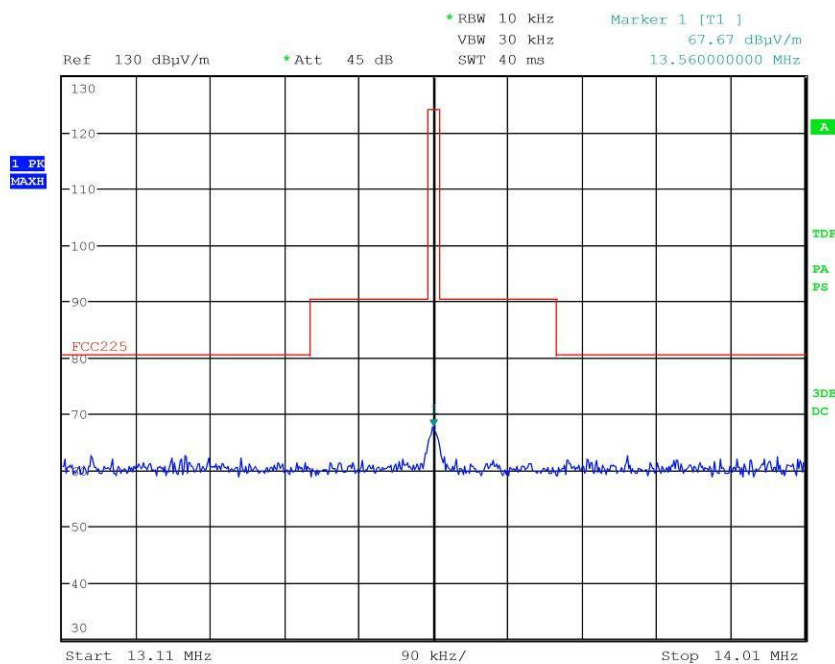
## Graphs

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezolo 15131550  
Test Spec





Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezzo 15131551  
Test Spec



**Result:** The requirements are met



## 11.6 Frequency tolerance

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.225 (e)
- Internal procedure PM001
- See clause 4 of this test report

### Test configuration and test method

Test site:  
Climatic chamber

Auxiliary equipment:  
See clause 4 of this test report

### EUT exercising

See clause 4 of this test report

### Test equipment used

CMC B026, CMC S164  
Measurement uncertainty: See clause 7 of this test report

### Test specification

Port: Enclosure  
EUT – Antenna distance: 3 m

### Environmental conditions

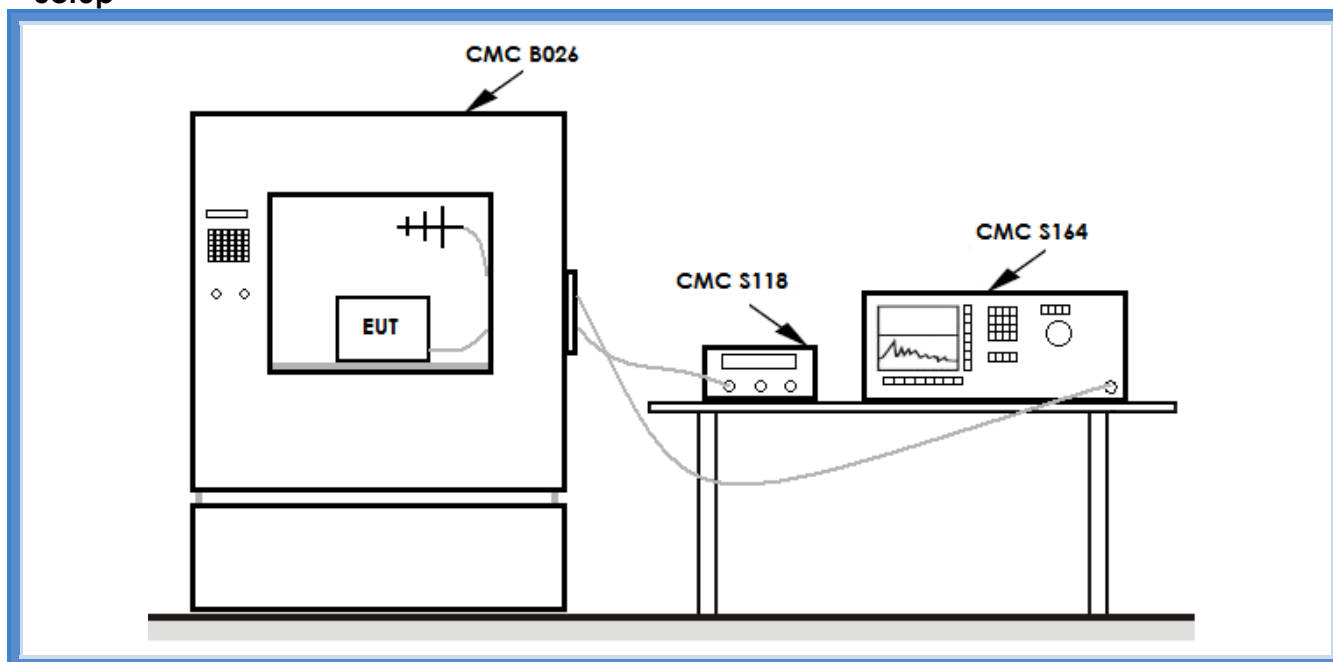
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
23	100	55

### Acceptance limits:

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0,01\%$  of the operating frequency ( $\pm 1,36$  kHz)



## Setup



## Result

Test conditions		Measured frequency
Temperature (°C)	Voltage level (V)	(MHz)
-20	Normal supply voltage	13,5601760
-10	Normal supply voltage	13,5601708
0	Normal supply voltage	13,5601368
10	Normal supply voltage	13,5601108
20	Normal supply voltage	13,5601079
30	Normal supply voltage	13,5600832
40	Normal supply voltage	13,5600832
50	Normal supply voltage	13,5600948

Test conditions			Measured frequency
Temperature (°C)	Voltage level (%)	Voltage level (V)	(MHz)
20	85	3,140	*
20	90	3,330	*
20	95	3,515	13,5601084
20	100	3,700	13,5601084
20	105	3,885	13,5601088
20	110	4,070	13,5601096
20	115	4,255	13,5601108

\*: EUT switched OFF

**Result:** The requirements are met



## 11.7 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 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	101	55

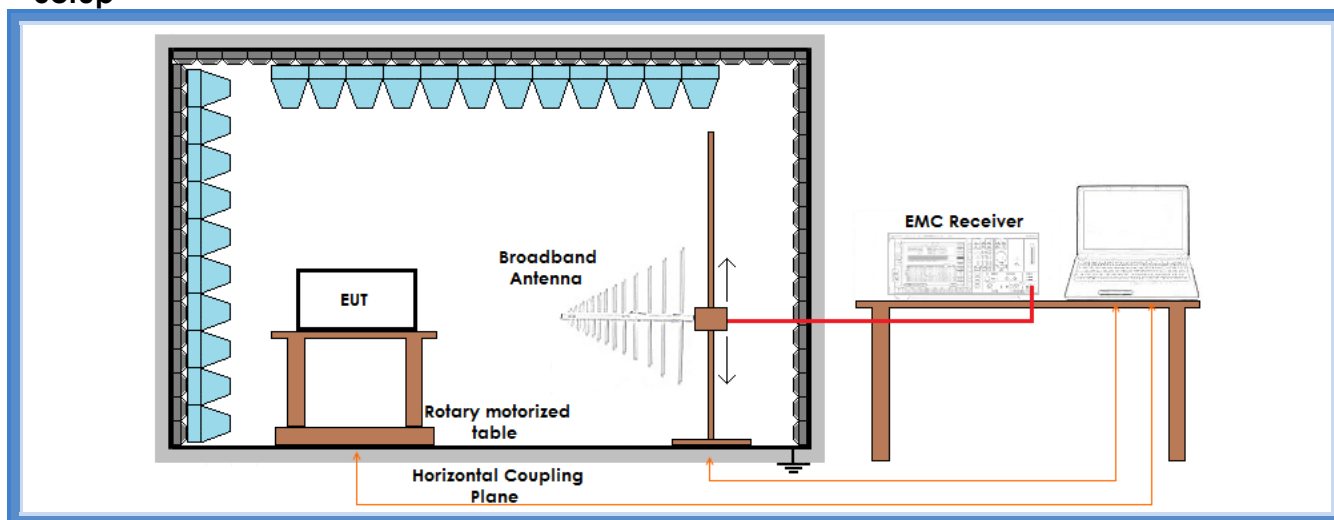
### Acceptance limits

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

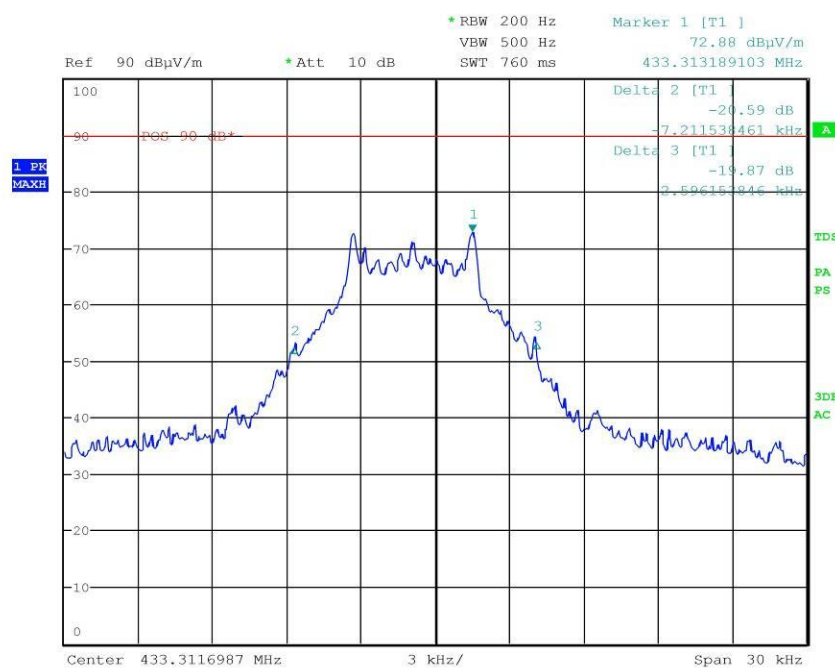
Channel	$f$ (MHz)	Limit (kHz)	20 dB bandwidth (kHz)	Graphs	Results
CH 1	433,31	1083,275	9,807	G15131502	Complies
CH 8	434,71	1086,775	10,335	G15131508	Complies



## Graphs

G15131502

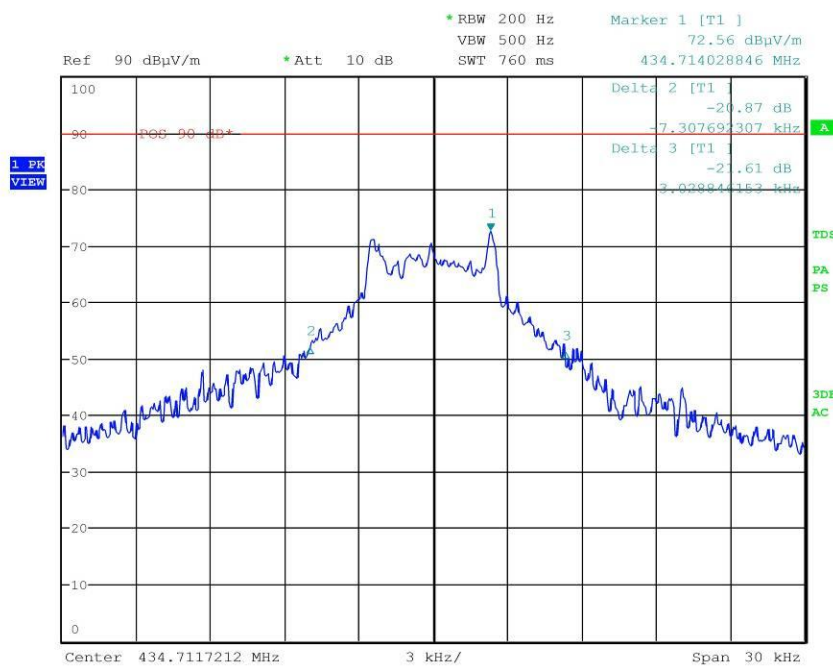
**Meas Type** Emission  
**Equipment under Test**  
**Manufacturer**  
**OP Condition**  
**Operator** Bertezzo 15131502  
**Test Spec**





G15131508

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition  
Operator Bertezzo 15131508  
Test Spec



**Result:** The requirements are met



## 11.8 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 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  
Measurement uncertainty: See clause 7 of this test report

### Test specification

- ☒ Manually operated transmitter
- ☐ Transmitter activated automatically

The provisions of this section are restricted to periodic operation within the band 40,66–40,70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation

### Environmental conditions

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



## Result

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

Channel	Frequency (MHz)	Transmitter deactivation time	Graphs
CH 1	433,31	1,203 s	G15131519
CH 8	434,71	1,205 s	G15131518

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

**Result:** The EUT does not employ periodic transmission.

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.

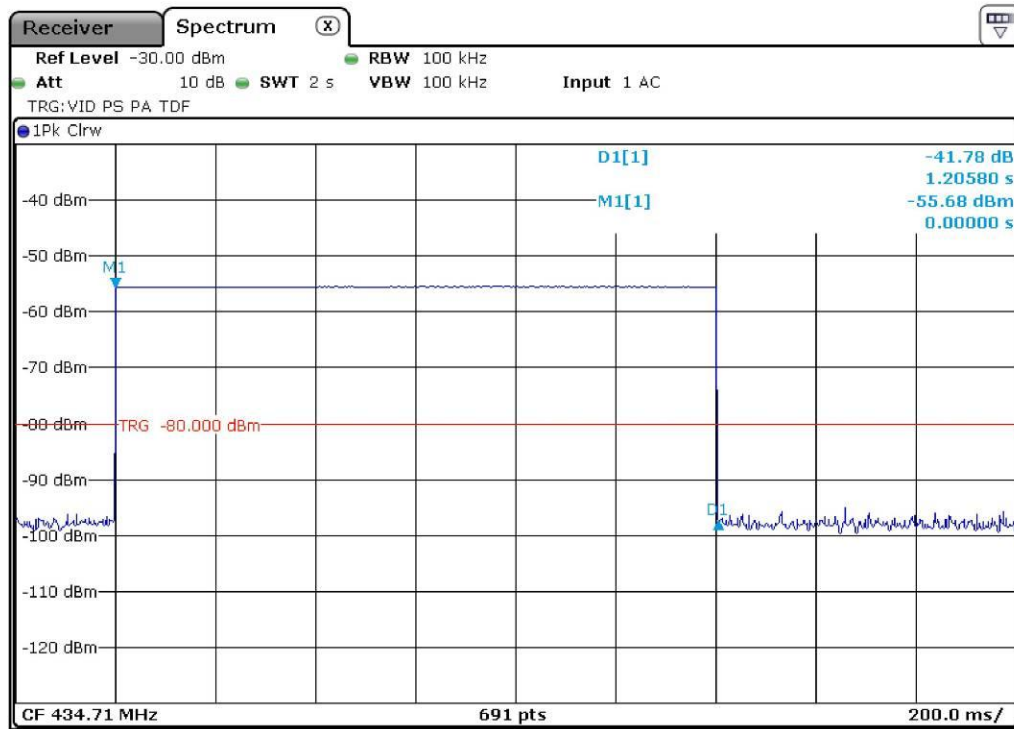
15.231 (a5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch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

**Result:** N.A.



## Graphs

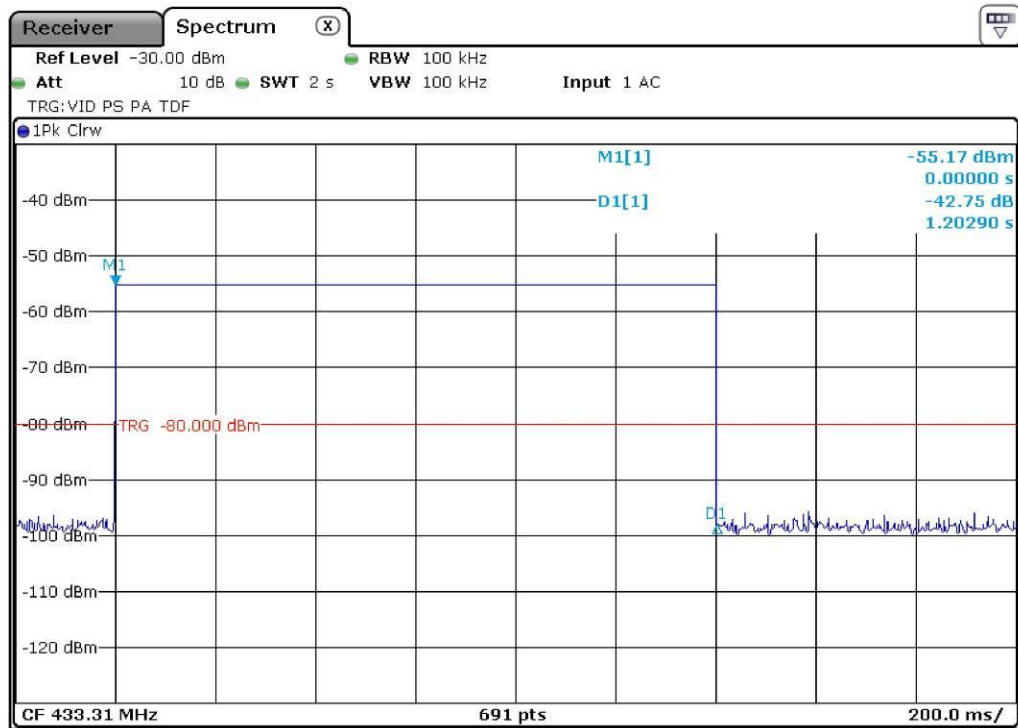
G15131518



Bertezzo 15131518



G15131519



Bertezzo 15131519

**Result:** The requirements are met