



## TEST REPORT nr. R12086001

### Federal Communication Commission (FCC)

### Industry Canada (IC)

#### Test item

Description.....: UJB WIRELESS PORTABLE UNIT  
Trademark.....: HEXAGON METROLOGY  
Model/Type.....: UJB WIRELESS KIT EC code G59680500 – UJB WIRELESS KIT US code G59680600

#### Test Specification

Standard .....: FCC Rules & Regulations, Title 47 (2011) - Part 15 paragraph(s) : 207, 209, 215 and 249  
RSS-210 (2010) – Annex 2 (A2.9)

**Client's name.....:** HEXAGON METROLOGY S.p.A.

Address .....: Via Vittime di Piazza della Loggia, 6 – 10024 Moncalieri (TO) – ITALY

**Manufacturer's name.:** Same ad client

Address .....: --

#### Report

Tested by .....: A. Bertezolo - *Technician*

Approved by.....: R. Beghetto - *Laboratory Manager*

Date of issue.....: 21.01.13

Contents .....: 64 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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| <b>1. Summary</b>                                                              |                                |                |          |
|--------------------------------------------------------------------------------|--------------------------------|----------------|----------|
| Standard: FCC Rules & Regulations, Title 47<br>RSS-210 (2010) – Annex 2 (A2.9) |                                |                |          |
| Test specifications                                                            | Environmental Phenomena        | Tests sequence | Result   |
| FCC – Title 47 Part 15.203 and 15.204<br>IC – RSS-210                          | Antenna Requirement            | 1              | Complies |
| Part 15.215<br>IC – RSS-210 Annex 2 (A2.9)                                     | 20 Bandwidth                   | 2              | Complies |
| IC – RSS-210 Annex 2 (A2.9)                                                    | Occupied Bandwidth<br>(99% BW) | 3              | Complies |
| Part 15.249<br>IC – RSS-210 Annex 2 (A2.9)                                     | Peak Output Power              | 4              | Complies |
| Part 15.215<br>IC – RSS-210 Annex 2 (A2.9)                                     | Band Edge                      | 5              | Complies |
| Part 15.209<br>IC – RSS-210 Annex 2 (A2.9)                                     | Radiated Spurious              | 6              | Complies |
| Part 15.207                                                                    | Conducted Emission             | 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 and IC certification.*



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

Power supply..... : 5Vdc

Type of equipment ..... : ☒ Transmitter Unit ☒ Receiver Unit  
☒ Fixed station ☐ Portable station ☐ Mobile station

Alignment range..... : 902 – 928 MHz

Switching frequency ..... : 902 – 928 MHz

Modulation ..... : GFSK

Information on antenna..... : Embedded

### 2.1 Test Site

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

Address ..... : Via dell'Elettronica, 12/C – 36016 Thiene (VI) – ITALY

## 3. Testing and sampling

Date of receipt of test item ..... : 09.05.12

Testing start date..... : 07.06.12

Testing end date..... : 18.07.12

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

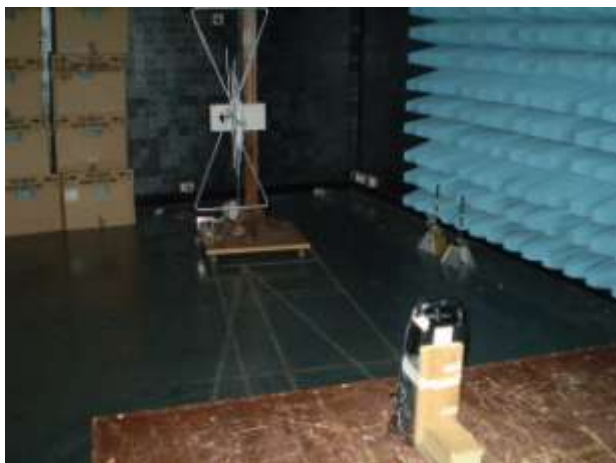
Internal identification..... : adhesive label with the product number P120496

## 4. Operative conditions

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## 5. 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 S001          | Rohde & Schwarz     | ESHS30       | EMC interference receiver | 862024/003           | January '12             | January '13                 |
| CMC S108          | Emco                | 3115         | Horn antenna              | 9811-5622            | April '10               | April '13                   |
| CMC S124          | Spin                | AMTP42-20    | Horn Antenna 18-26GHz     | 103                  | May '10                 | May '13                     |
| CMC S127          | Schaffner           | HLA6120      | Loop Antenna              | 1191                 | January '10             | January '13                 |
| CMC S129          | Rohde & Schwarz     | ESPI7        | Receiver                  | 836.914/004          | January '12             | January '13                 |
| CMC S136          | Schwarzbeck         | VULB 9163    | Broadband Antenna         | 9136-205             | May '10                 | May '13                     |
| CMC S164          | Rohde & Schwarz     | ESU26        | EMC interference receiver | 100052               | January '12             | January '13                 |
| CMC S200          | Schwarzbeck         | NSLK 8128    | V-LISN                    | 8128-273             | January '12             | January '13                 |



## 7. Measurement uncertainty

| Test                                                                | Expanded Uncertainty | note |
|---------------------------------------------------------------------|----------------------|------|
| <b>Conducted Emission</b>                                           |                      |      |
| (50Ω/50μH AMN) - (9 kHz – 150 kHz)                                  | ±3.4 dB              | 1    |
| (50Ω/50μH AMN) - (150 kHz – 30 MHz)                                 | ±2.8 dB              | 1    |
| (Voltage probe) - (150 kHz – 30 MHz)                                | ±2.8 dB              | 1    |
| (50Ω/5μH AMN) - (150 kHz – 108 MHz)                                 | ±2.4 dB              | 1    |
| <b>Discontinuous Conducted Emission</b>                             |                      |      |
| Conducted Emission (50Ω/50μH AMN) - (150 kHz – 30 MHz)              | ±2.9 dB              | 1    |
| <b>Disturbance Power (30 MHz – 300 MHz)</b>                         |                      |      |
|                                                                     | ±2.9 dB              | 1    |
| <b>Radiated Emission</b>                                            |                      |      |
| (0,150 MHz – 30 MHz)                                                | ±4.0 dB              | 1    |
| (30 MHz – 1000 MHz)                                                 | ±4.2 dB              | 1    |
| (1 GHz – 6 GHz)                                                     | ±3.4 dB              | 1    |
| <b>Electromagnetic field EMF</b>                                    |                      |      |
|                                                                     | ±15.0 %              | 1    |
| <b>Harmonic current emissions test</b>                              |                      |      |
|                                                                     | ±2.5 %               | 1    |
| <b>Voltage fluctuation and flicker test</b>                         |                      |      |
|                                                                     | ±4.1 %               | 1    |
| <b>Insertion loss test</b>                                          |                      |      |
|                                                                     | ±2.2 dB              | 1    |
| <b>Radiated electromagnetic disturbance test (loop antenna)</b>     |                      |      |
|                                                                     | ±1.7 dB              | 1    |
| <b>Radiated electromagnetic field immunity test</b>                 |                      |      |
|                                                                     | 0.7 V/m at 3V/m      | 1    |
| <b>Pulse modulated radiated electromagnetic field immunity test</b> |                      |      |
|                                                                     | 0.7 V/m at 3V/m      | 1    |
| <b>Injected currents immunity test</b>                              |                      |      |
|                                                                     | 0.5 V at 3V          | 1    |
| <b>Bulk current</b>                                                 |                      |      |
|                                                                     | 9.2 mA at 60 mA      | 1    |
| <b>Power frequency magnetic field immunity test</b>                 |                      |      |
|                                                                     | 0.3 A/m at 3 A/m     | 1    |
| <b>Electrostatic discharge immunity test</b>                        |                      |      |
|                                                                     |                      | 2    |
| <b>Electrical fast transients / burst immunity test</b>             |                      |      |
|                                                                     |                      | 2    |
| <b>Surge 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(2004-10) 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 (2011)   | --                                                                                                                                                             |
| RSS-210 Issue 8 – December 2010                    | Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment                                                                |
| ANSI C63.4                                         | American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz – 40GHz |
| Internal Procedure PM001 rev. 2.0 (Quality Manual) | Measure Procedure                                                                                                                                              |
| Internal procedure INC_M rev. 8.1 (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 6dB 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 / N.A.

Test item does meet the requirement..... : P / Pass / Complies

Test item does not meet the requirement..... : F / Fail / Does not comply

Test not performed ..... : NE / Not Executed

## 11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC\_M rev. 8.1.



## 11.1 Antenna Requirements

### Test configuration and test method

Test site

Laboratory

Auxiliary equipment

See clause 4 of this test report

### Environmental conditions

Temperature 20 °C Atmospheric pressure 101 kPa Relative humidity 40 %

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.203 and 15.204
- RSS-210
- Internal Procedure PM001
- See clause 4 of this test report

### Test Requirements

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 unique coupling to the intentional radiator shall be considered sufficient 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 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.

### Test specification

Port: Antenna.

### EUT exercising

See clause 4 of this test report

### Result

| Antenna Type | Gain    | Remarks | Results  |
|--------------|---------|---------|----------|
| Embedded     | -10 dBi | --      | Complies |

### Remarks

//////////

### Reference documents

See clause 8 of this test report

### Result

The requirements are met



## 11.2 20dB Bandwidth

### Test configuration and test method

Test site

Laboratory

Auxiliary equipment

See clause 4 of this test report

### Environmental conditions

Temperature 22 °C

Atmospheric pressure 100 kPa

Relative humidity 45 %

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.215
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

### Test specification

Port: Antenna;

### EUT exercising

See clause 4 of this test report

### Result

| Frequency<br>(MHz)                   | Graph(s)  | Bandwidth | Remark |
|--------------------------------------|-----------|-----------|--------|
| 902,750                              | G12086006 | 11,37 kHz | --     |
| 912,250                              | G12086012 | 11,21 kHz | --     |
| 923,650                              | G12086016 | 11,53 kHz | --     |
| Measurement uncertainty: $\pm 1$ kHz |           |           |        |

### Remarks

//////////

### Reference documents

See clause 8 of this test report

### Test equipment used (Id number – see clause 6 of this test report)

CMC S129

### Result

The requirements are met



### 11.3 Occupied Bandwidth (99% BW)

#### Test configuration and test method

Test site

Laboratory

Auxiliary equipment

See clause 4 of this test report

#### Environmental conditions

Temperature 20 °C

Atmospheric pressure 98 kPa

Relative humidity 46 %

#### Test set-up and execution

- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

#### Test specification

Port: Antenna;

#### EUT exercising

See clause 4 of this test report

#### Result

| Frequency<br>(MHz)                   | Graph(s)  | Bandwidth | Remark |
|--------------------------------------|-----------|-----------|--------|
| 902,750                              | G12086007 | 9,775 kHz | --     |
| 912,250                              | G12086013 | 9,775 kHz | --     |
| 923,650                              | G12086017 | 9,935 kHz | --     |
| Measurement uncertainty: $\pm 1$ kHz |           |           |        |

#### Remarks

//////////

#### Reference documents

See clause 8 of this test report

#### Test equipment used (Id number – see clause 6 of this test report)

CMC S129

#### Result

The requirements are met



## 11.4 Peak Output Power

### Test configuration and test method

Test site

Auxiliary equipment

Laboratory

See clause 4 of this test report

### Environmental conditions

Temperature 22 °C

Atmospheric pressure 99 kPa

Relative humidity 48 %

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and 15.249
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

### Test specification

Port: Antenna;

Antenna distance: 3m

### EUT exercising

See clause 4 of this test report

### Acceptance limits

| Frequency range | RF power output         |
|-----------------|-------------------------|
| 902-928 MHz     | 50mV/m (94dB $\mu$ V/m) |

### Result

| Frequency<br>(MHz)                   | Polarization | Graphs    | Measured QP<br>level (dB $\mu$ V/m) | Peak Output<br>Power (mW) | Remark |
|--------------------------------------|--------------|-----------|-------------------------------------|---------------------------|--------|
| 902,750                              | Vertical     | G12086005 | 87,33                               | 1,2                       | --     |
| 902,750                              | Horizontal   | G12086008 | 86,80                               | 1,2                       | --     |
| 912,250                              | Horizontal   | G12086010 | 83,31                               | 0,3                       | --     |
| 912,250                              | Vertical     | G12086011 | 85,52                               | 1,2                       | --     |
| 923,650                              | Vertical     | G12086014 | 87,02                               | 1,2                       | --     |
| 923,650                              | Horizontal   | G12086015 | 83,08                               | 0,3                       | --     |
| Measurement uncertainty: $\pm 3$ dBm |              |           |                                     |                           |        |



### Remarks

$$P = (E \times d)^2 / (30 \times G)$$

Where:

E = the measured maximum fundamental field strength in V/m

G = the numeric gain of the transmitting antenna: 0,1 (-10 dBi)

d = the distance in meters from which the field strength was measured (3m)

P = the power in watts

### Reference documents

See clause 8 of this test report

### Test equipment used (Id number – see clause 6 of this test report)

CMC S164

### Result

The requirements are met



## 11.5 Band Edge

### Test configuration and test method

Test site

Laboratory

Auxiliary equipment

See clause 4 of this test report

### Environmental conditions

Temperature 20 °C

Atmospheric pressure 99 kPa

Relative humidity 46 %

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.215
- Internal Procedure PM001
- See clause 4 of this test report

### Test specification

Port: Antenna;

### EUT exercising

See clause 4 of this test report

### Acceptance limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### Result

| Frequency<br>(MHz)                  | Graph(s)  | Remark |
|-------------------------------------|-----------|--------|
| 902,750                             | G12086009 | --     |
| 923,650                             | G12086018 | --     |
| Measurement uncertainty: $\pm 1$ dB |           |        |

### Remarks //

**Reference documents** See clause 8 of this test report

**Test equipment used (Id number – see clause 6 of this test report)** CMC S129

**Result** The requirements are met



## 11.6 Radiated Spurious (Transmitter)

### Test configuration and test method

Test site Semi-anechoic chamber  
Auxiliary equipment None

### Environmental conditions

Temperature 22 °C Atmospheric pressure 98 kPa Relative humidity 50 %

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

### Test specification

Port: Antenna;

For measurements below 1GHz the resolution bandwidth is set to 100kHz.

For measurements above 1GHz the resolution bandwidth is set to 1MHz.

### EUT exercising

See clause 4 of this test report

### Acceptance limits

In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in cl. 15.205(a), must also comply with the radiated emission limits specified in cl. 15.209(a) (see cl.15.205(c)).

### Result

| Channel | Polarization | Frequency Range (MHz) | Graph(s) (peak measurements) | Remarks | Result   |
|---------|--------------|-----------------------|------------------------------|---------|----------|
| 902,750 | Vertical     | 30 – 1000             | G12086024                    | --      | Complies |
| 902,750 | Horizontal   | 30 – 1000             | G12086023                    | --      | Complies |
| 912,250 | Vertical     | 30 – 1000             | G12086021                    | --      | Complies |
| 912,250 | Horizontal   | 30 – 1000             | G12086022                    | --      | Complies |
| 923,650 | Vertical     | 30 – 1000             | G12086020                    | --      | Complies |
| 923,650 | Horizontal   | 30 – 1000             | G12086019                    | --      | Complies |





| Channel | Polarization | Frequency Range (GHz) | Graph(s) (peak measurements) | Remarks | Result   |
|---------|--------------|-----------------------|------------------------------|---------|----------|
| 902,750 | Vertical     | 1 – 10                | G12086025                    | --      | Complies |
| 902,750 | Horizontal   | 1 – 10                | G12086026                    | --      | Complies |
| 912,250 | Vertical     | 1 – 10                | G12086028                    | --      | Complies |
| 912,250 | Horizontal   | 1 – 10                | G12086027                    | --      | Complies |
| 923,650 | Vertical     | 1 – 10                | G12086029                    | --      | Complies |
| 923,650 | Horizontal   | 1 – 10                | G12086030                    | --      | Complies |

| Channel | Polarization | Frequency Range | Graph(s) (peak measurements) | Remarks | Result   |
|---------|--------------|-----------------|------------------------------|---------|----------|
| 902,750 | Loop Antenna | 9kHz – 30MHz    | G12086033                    | --      | Complies |
| 912,250 | Loop Antenna | 9kHz – 30MHz    | G12086032                    | --      | Complies |
| 923,650 | Loop Antenna | 9kHz – 30MHz    | G12086031                    | --      | Complies |



| Nr.<br>Harmonics              | AV level (dBμV/m) |                               |             |                               |             |                               | AV Limits<br>(dBμV/m) | Remark |
|-------------------------------|-------------------|-------------------------------|-------------|-------------------------------|-------------|-------------------------------|-----------------------|--------|
|                               | 902,750MHz        |                               | 912,250 MHz |                               | 923,650 MHz |                               |                       |        |
|                               | Frequency         | (dBμV/m)                      | Frequency   | (dBμV/m)                      | Frequency   | (dBμV/m)                      |                       |        |
| II Harmonic                   | 1805,6737         | 40,5                          | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| III Harmonic                  | 2708,2461         | 46,5                          | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| IV Harmonic                   | 3611,0429         | 49,2                          | 3649,0753   | 48,2                          | 3694,4831   | 48,7                          | 54,00                 | --     |
| V Harmonic                    | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| VI Harmonic                   | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| VII Harmonic                  | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| VIII Harmonic                 | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| IX Harmonic                   | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| X Harmonic                    | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 54,00                 | --     |
| Measurement Uncertainty: ±4dB |                   |                               |             |                               |             |                               |                       |        |

| Nr.<br>Harmonics              | PK level (dBμV/m) |                               |             |                               |             |                               | PK Limits<br>(dBμV/m) | Remark |
|-------------------------------|-------------------|-------------------------------|-------------|-------------------------------|-------------|-------------------------------|-----------------------|--------|
|                               | 902,750MHz        |                               | 912,250 MHz |                               | 923,650 MHz |                               |                       |        |
|                               | Frequency         | (dBμV/m)                      | Frequency   | (dBμV/m)                      | Frequency   | (dBμV/m)                      |                       |        |
| II Harmonic                   | 1805,6737         | 45,7                          | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| III Harmonic                  | 2708,2461         | 52,1                          | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| IV Harmonic                   | 3611,0429         | 53,1                          | 3649,0753   | 53,5                          | 3694,4831   | 583,4                         | 74,00                 | --     |
| V Harmonic                    | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| VI Harmonic                   | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| VII Harmonic                  | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| VIII Harmonic                 | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| IX Harmonic                   | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| X Harmonic                    | --                | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | --          | More than 15dB<br>below limit | 74,00                 | --     |
| Measurement Uncertainty: ±4dB |                   |                               |             |                               |             |                               |                       |        |



### Remarks

EUT was tested in 3 orthogonal planes. In results table are reported the worst case.

### Reference documents

See clause 8 of this test report

### Test equipment used (Id number – see clause 6 of this test report)

CMC S108, CMC S124, CMC S136, CMC S164

Measurement uncertainty: See clause 7 of this test report

### Result

The requirements are met





## 11.7 Radiated Spurious (Receiver)

### Test configuration and test method

Test site

Semi-anechoic chamber

Auxiliary equipment

See clause 4 of this test report

### Environmental conditions

Temperature 22 °C

Atmospheric pressure 99 kPa

Relative humidity 50 %

### Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

### Test specification

Port: Antenna;

### EUT exercising

See clause 4 of this test report

### Acceptance limits

In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in cl. 15.205(a), must also comply with the radiated emission limits specified in cl. 15.209(a) (see cl.15.205(c)).

### Result

| Channel | Polarization | Frequency Range (GHz) | Graph(s) (peak measurements) | Remarks | Result   |
|---------|--------------|-----------------------|------------------------------|---------|----------|
| 902,750 | Vertical     | 30 – 1000             | G12086043                    | --      | Complies |
| 902,750 | Horizontal   | 30 – 1000             | G12086044                    | --      | Complies |
| 912,250 | Vertical     | 30 – 1000             | G12086046                    | --      | Complies |
| 912,250 | Horizontal   | 30 – 1000             | G12086045                    | --      | Complies |
| 923,650 | Vertical     | 30 – 1000             | G12086047                    | --      | Complies |
| 923,650 | Horizontal   | 30 – 1000             | G12086048                    | --      | Complies |
| 902,750 | Vertical     | 1000 – 6000           | G12086034                    | --      | Complies |
| 902,750 | Horizontal   | 1000 – 6000           | G12086035                    | --      | Complies |
| 912,250 | Vertical     | 1000 – 6000           | G12086037                    | --      | Complies |
| 912,250 | Horizontal   | 1000 – 6000           | G12086036                    | --      | Complies |
| 923,650 | Vertical     | 1000 – 6000           | G12086038                    | --      | Complies |
| 923,650 | Horizontal   | 1000 – 6000           | G12086039                    | --      | Complies |

### Remarks

EUT was tested in 3 orthogonal planes. In results table are reported the worst case.

### Reference documents

See clause 8 of this test report

### Test equipment used (Id number – see clause 6 of this test report)

CMC S108, CMC S124, CMC S127, CMC S136, CMC S164

Measurement uncertainty: See clause 7 of this test report

### Result

The requirements are met



## 11.8 Emission of mains terminal disturbance voltage (continuous disturbance)

### Test configuration and test method

Test site

Laboratory

Auxiliary equipment

See clause 4 of this test report

### Environmental conditions

Temperature 20 °C

Atmospheric pressure 99 kPa

Relative humidity 45 %

### 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 specification

Port: AC mains

### EUT exercising

See clause 4 of this test report

### Acceptance limits

| Limits                |                          |                       |
|-----------------------|--------------------------|-----------------------|
| Frequency range (MHz) | <i>dB(μV) Quasi-peak</i> | <i>dB(μV) Average</i> |
| 0,15 to 0,50          | 66 to 56                 | 56 to 46              |
| 0,50 to 5             | 56                       | 46                    |
| 5 to 30               | 60                       | 50                    |

### Result

| Line | Graphs    | Remarks | Result   |
|------|-----------|---------|----------|
| N    | G12086049 | --      | Complies |
| L1   | G12086050 | --      | Complies |

#### Graphs Legend

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

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

### Remarks

//////////

### Reference documents

See clause 8 of this test report

### Test equipment used (Id number – see clause 6 of this test report)

CMC S001, CMC S200

Measurement uncertainty: See clause 7 of this test report

### Result

The requirements are met



## 12. Graphs and Tables

G12086005

Meas Type

Equipment under Test

Manufacturer

OP Condition

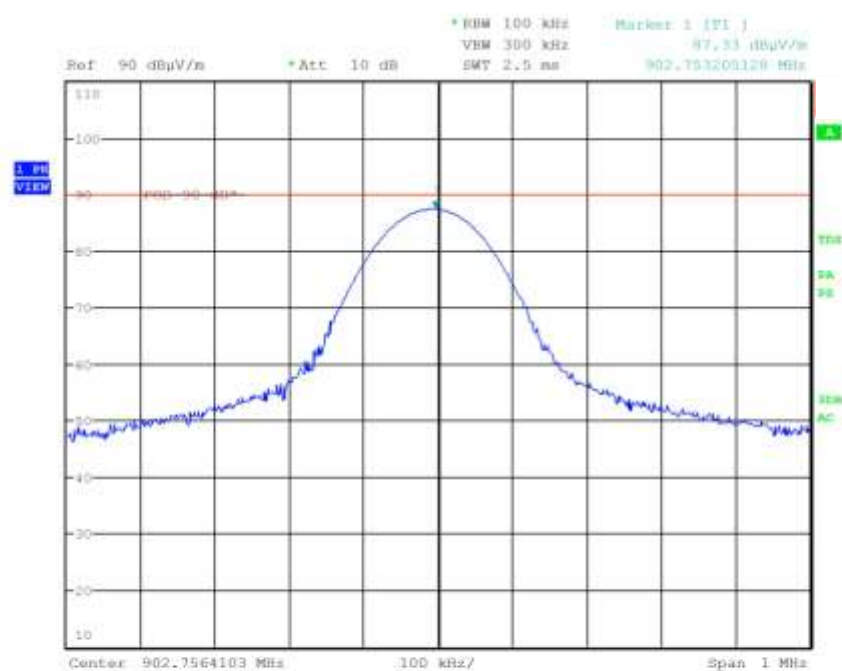
TX Freq min

Operator

Bertezzo 12086005

Test Spec

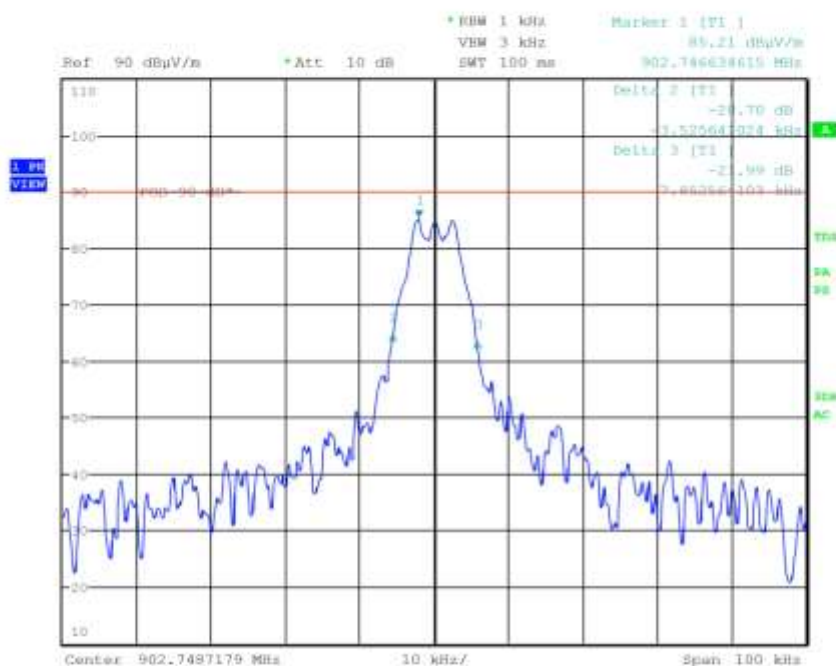
Vert.





G12086006

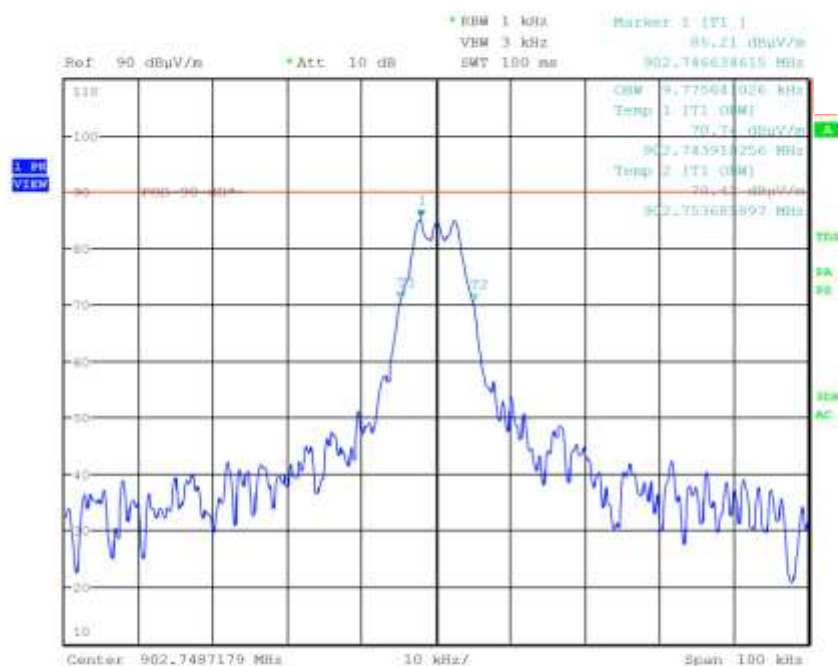
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezzo 12086006  
Test Spec





G12086007

Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezolo 12086007  
Test Spec

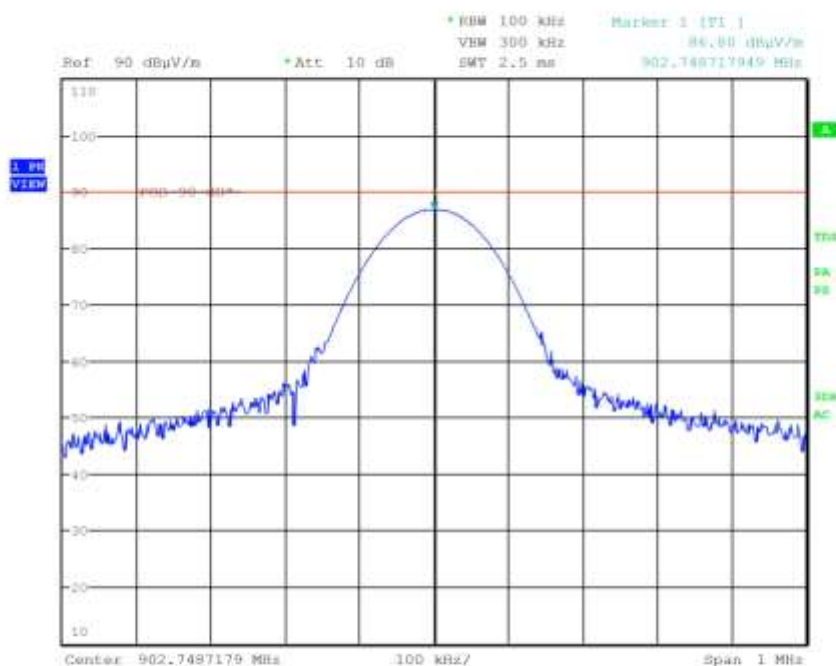






G12086008

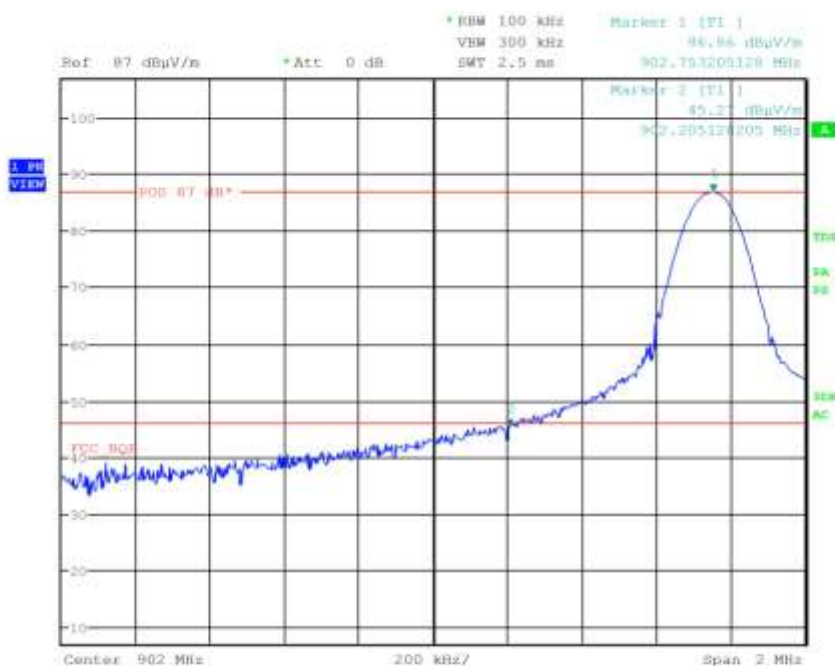
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezzo 12086008  
Test Spec  
Horiz





G12086009

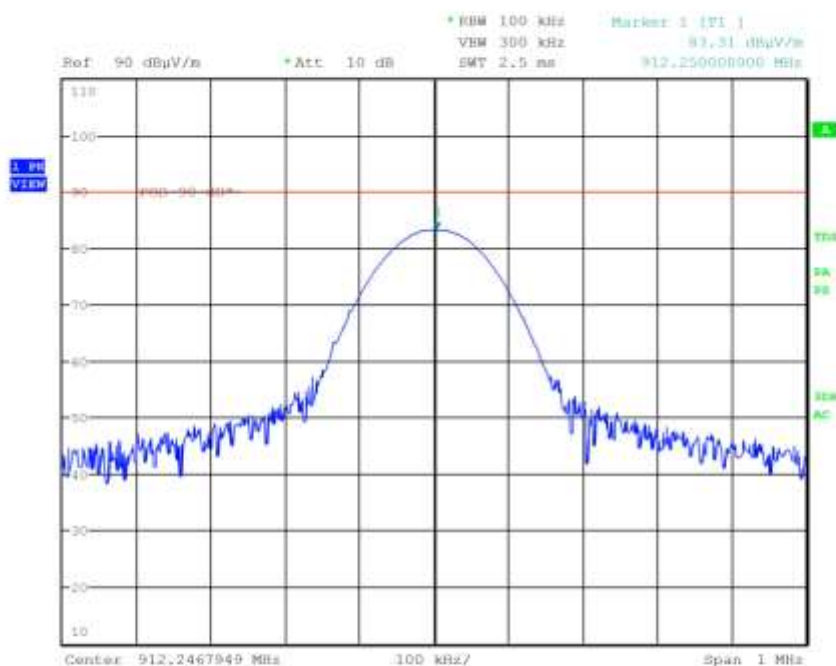
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezolo 12086009  
Test Spec





G12086010

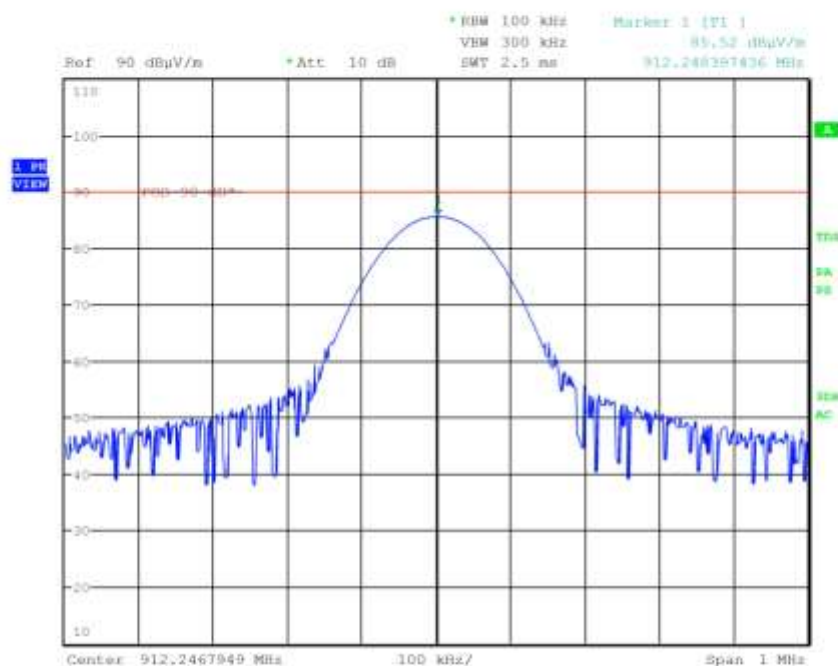
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezolo 12086010  
Test Spec  
Horiz





G12086011

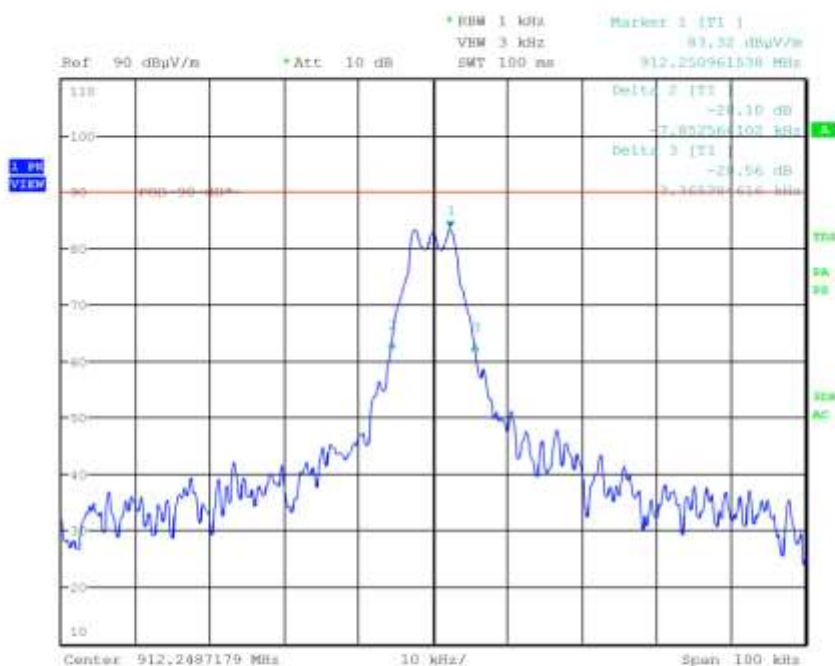
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezzo 12086011  
Test Spec  
Vert





G12086012

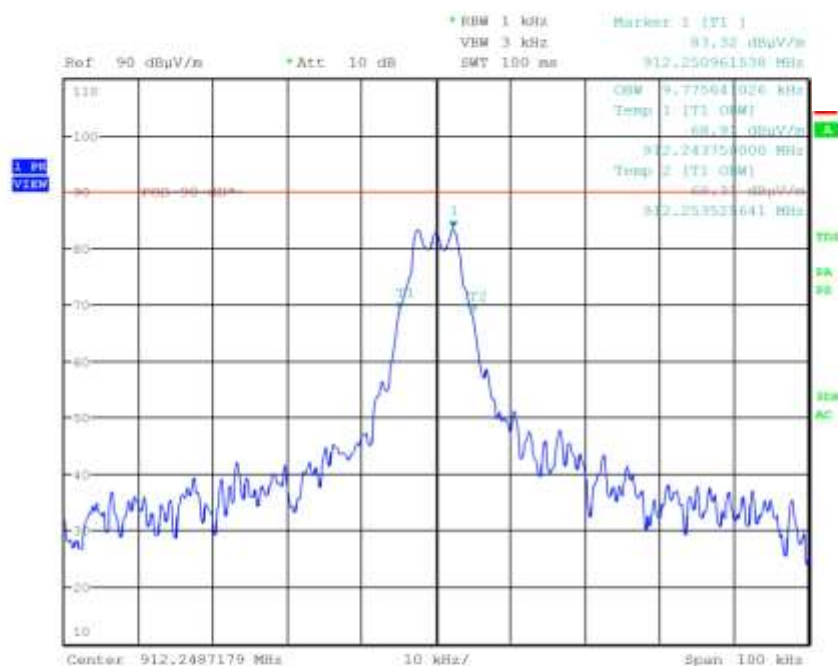
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezzo 12086012  
Test Spec





G12086013

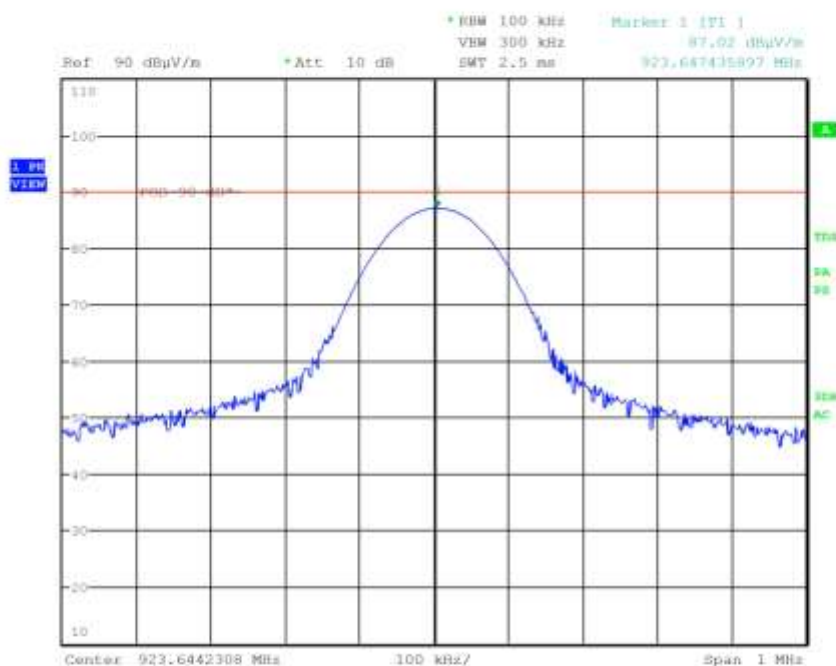
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezolo 12086013  
Test Spec





G12086014

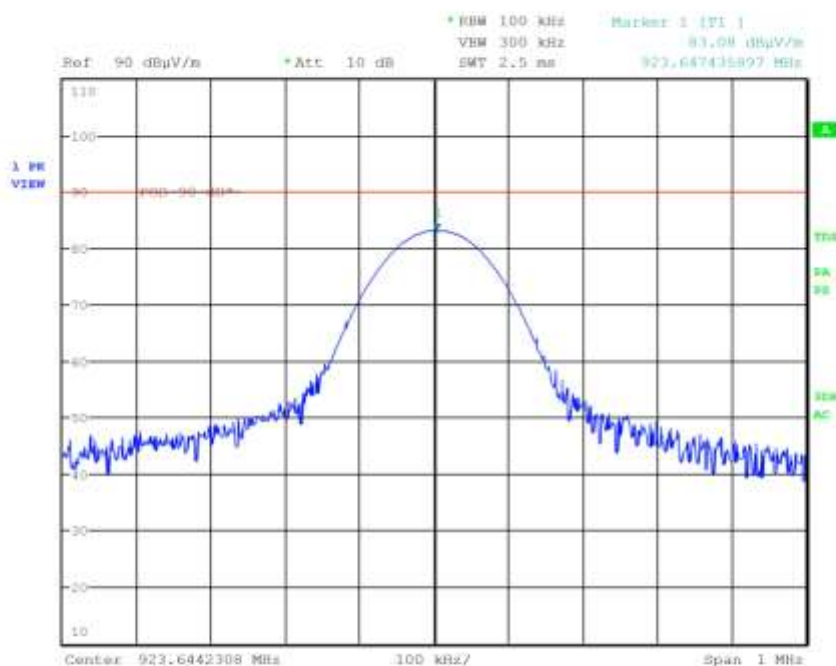
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086014  
Test Spec  
Vert





G12086015

Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezzo 12086015  
Test Spec  
Horiz

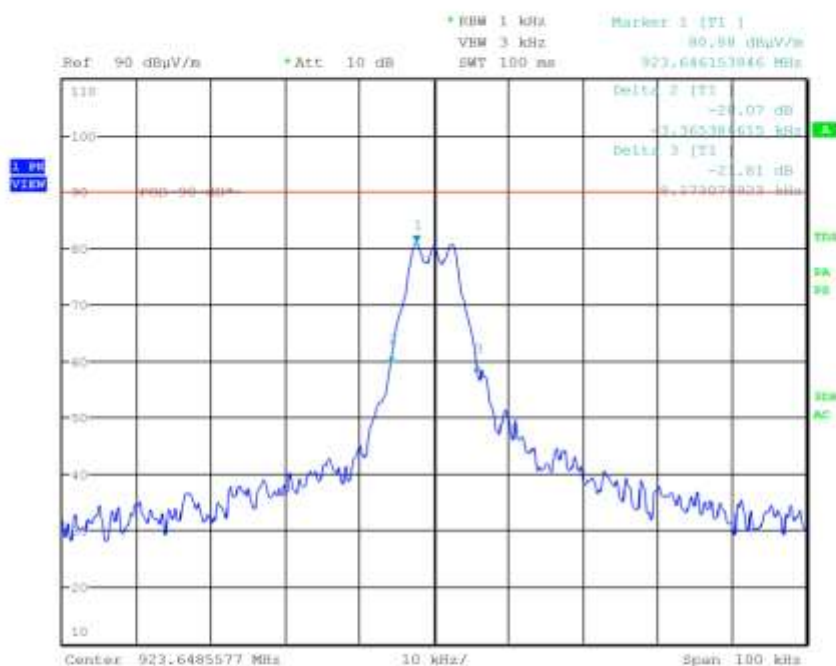






G12086016

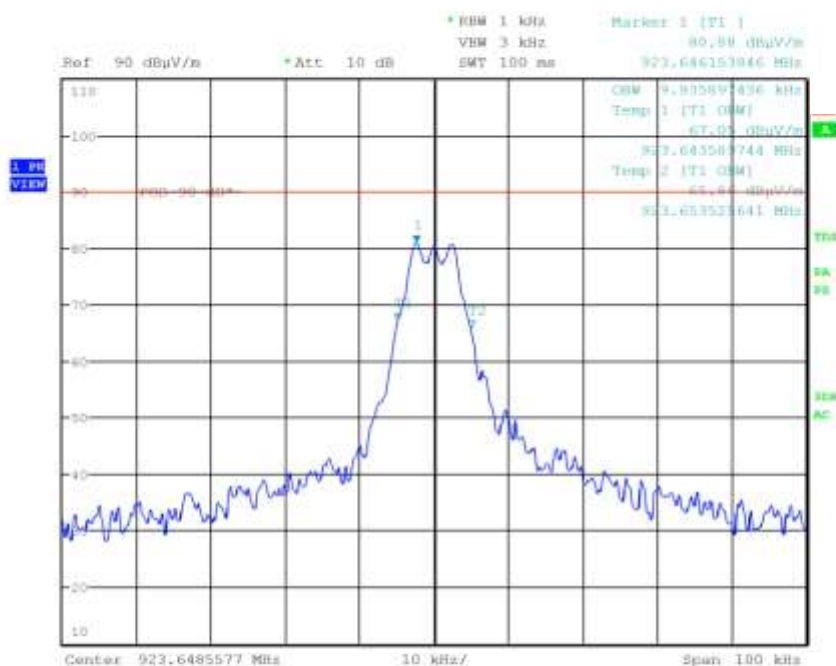
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezzo 12086016  
Test Spec





G12086017

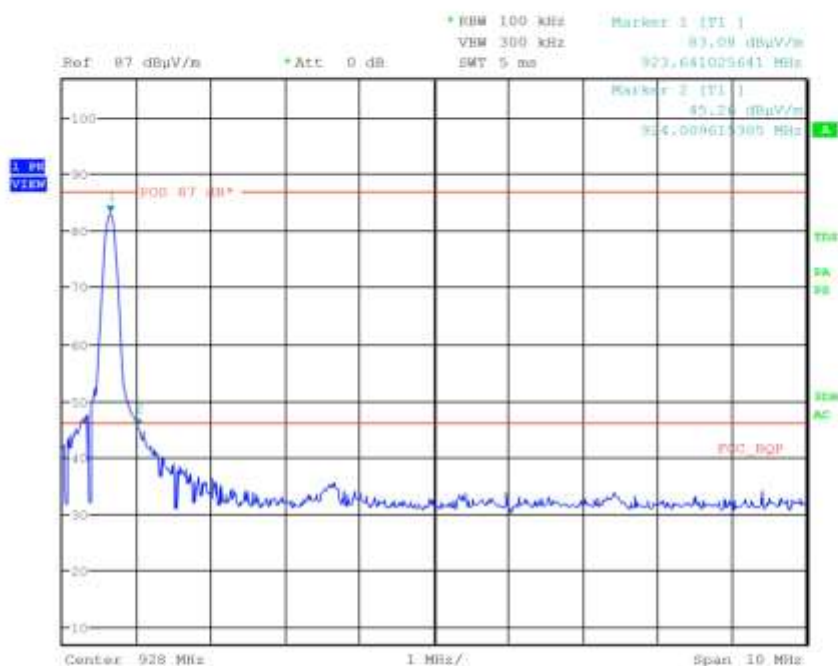
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086017  
Test Spec





G12086018

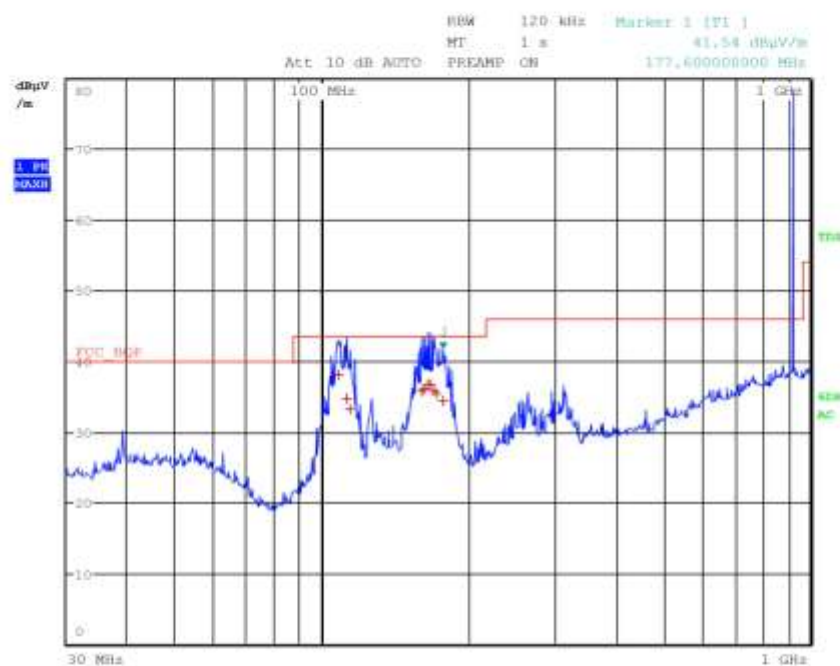
Meas Type  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086018  
Test Spec





G12086019

Meas Type Emission 30-1000MHz  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086019  
Test Spec  
Horiz



### Final Measurement

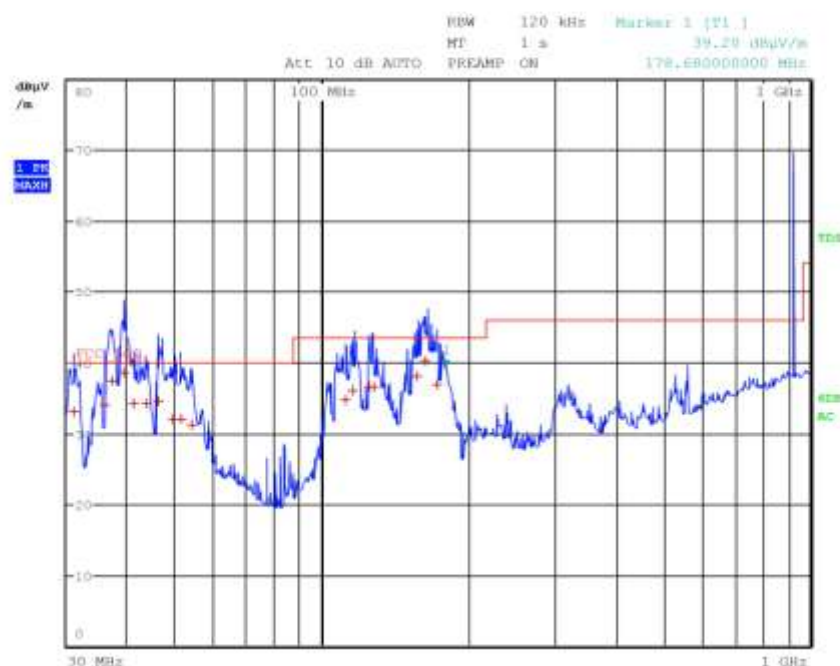
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 10

| Trace | Frequency        | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|------------------|----------------|------------|----------------|
| 1     | 108.08000000 MHz | 38.02          | Quasi Peak | -5.50          |
| 1     | 112.36000000 MHz | 34.64          | Quasi Peak | -8.88          |
| 1     | 114.48000000 MHz | 33.14          | Quasi Peak | -10.39         |
| 1     | 159.76000000 MHz | 35.70          | Quasi Peak | -7.82          |
| 1     | 161.76000000 MHz | 36.02          | Quasi Peak | -7.50          |
| 1     | 164.32000000 MHz | 36.71          | Quasi Peak | -6.81          |
| 1     | 166.76000000 MHz | 36.67          | Quasi Peak | -6.85          |
| 1     | 169.32000000 MHz | 35.87          | Quasi Peak | -7.65          |
| 1     | 171.48000000 MHz | 35.45          | Quasi Peak | -8.07          |
| 1     | 177.60000000 MHz | 34.33          | Quasi Peak | -9.19          |



G12086020

Meas Type Emission 30-1000MHz  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086020  
Test Spec  
Vert



### Final Measurement

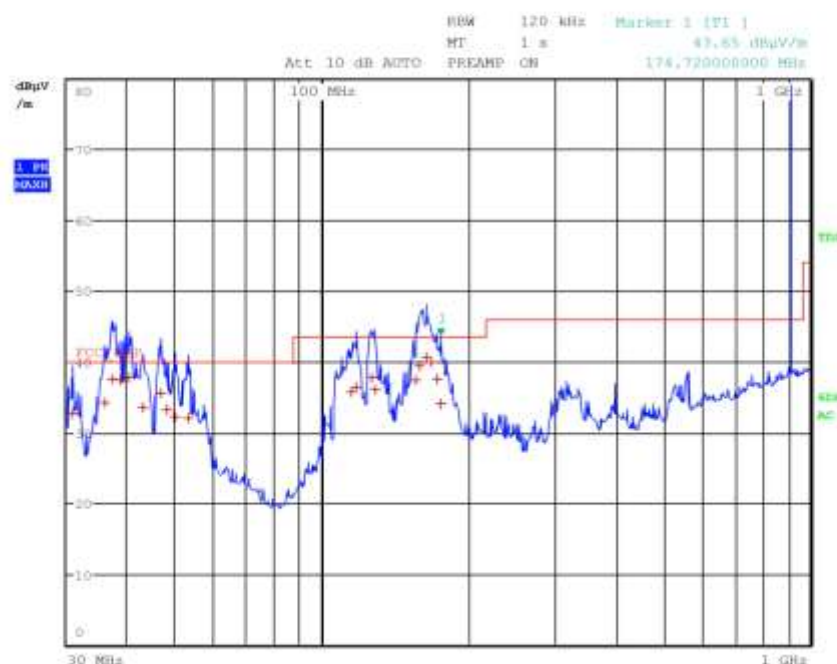
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 17

| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 31.000000000 MHz  | 33.05          | Quasi Peak | -6.95          |
| 1     | 35.880000000 MHz  | 34.01          | Quasi Peak | -5.99          |
| 1     | 37.080000000 MHz  | 37.47          | Quasi Peak | -2.53          |
| 1     | 39.240000000 MHz  | 38.54          | Quasi Peak | -1.46          |
| 1     | 41.080000000 MHz  | 34.20          | Quasi Peak | -5.80          |
| 1     | 43.640000000 MHz  | 34.20          | Quasi Peak | -5.80          |
| 1     | 46.160000000 MHz  | 34.61          | Quasi Peak | -5.39          |
| 1     | 49.360000000 MHz  | 32.07          | Quasi Peak | -7.93          |
| 1     | 51.360000000 MHz  | 31.94          | Quasi Peak | -8.06          |
| 1     | 54.200000000 MHz  | 31.16          | Quasi Peak | -8.84          |
| 1     | 111.920000000 MHz | 34.75          | Quasi Peak | -8.77          |
| 1     | 115.520000000 MHz | 36.02          | Quasi Peak | -7.50          |
| 1     | 124.840000000 MHz | 36.64          | Quasi Peak | -6.88          |
| 1     | 127.560000000 MHz | 36.60          | Quasi Peak | -6.92          |
| 1     | 156.680000000 MHz | 38.09          | Quasi Peak | -5.43          |
| 1     | 163.000000000 MHz | 40.33          | Quasi Peak | -3.19          |
| 1     | 172.320000000 MHz | 36.94          | Quasi Peak | -6.59          |



G12086021

Meas Type Emission 30-1000MHz  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezolo 12086021  
Test Spec  
Vert



### Final Measurement

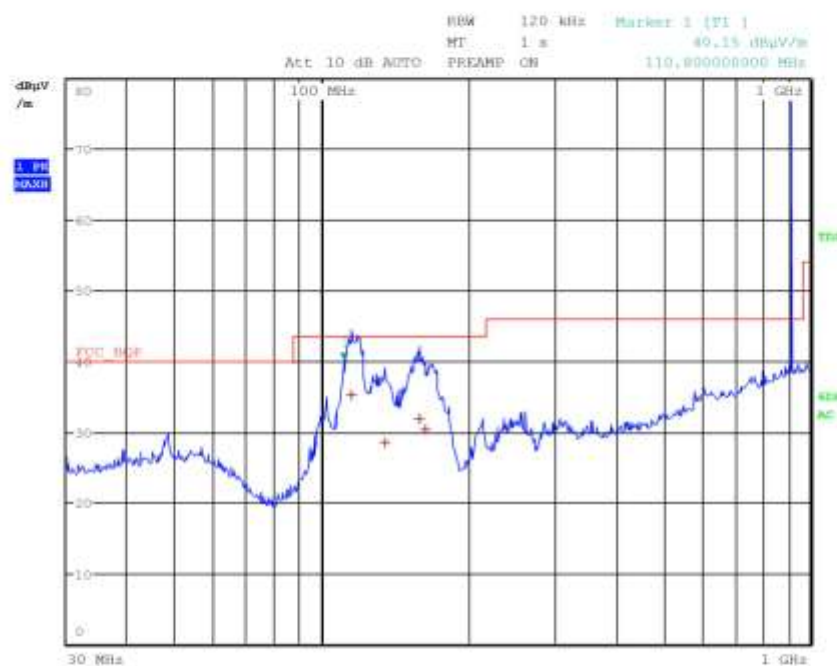
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 20

| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 30.760000000 MHz  | 32.65          | Quasi Peak | -7.35          |
| 1     | 35.920000000 MHz  | 34.17          | Quasi Peak | -5.83          |
| 1     | 37.040000000 MHz  | 37.55          | Quasi Peak | -2.45          |
| 1     | 38.640000000 MHz  | 37.47          | Quasi Peak | -2.53          |
| 1     | 40.080000000 MHz  | 37.70          | Quasi Peak | -2.30          |
| 1     | 43.000000000 MHz  | 33.60          | Quasi Peak | -6.40          |
| 1     | 46.640000000 MHz  | 35.54          | Quasi Peak | -4.46          |
| 1     | 48.160000000 MHz  | 33.17          | Quasi Peak | -6.83          |
| 1     | 49.960000000 MHz  | 32.13          | Quasi Peak | -7.87          |
| 1     | 53.200000000 MHz  | 31.93          | Quasi Peak | -8.07          |
| 1     | 115.000000000 MHz | 35.67          | Quasi Peak | -7.86          |
| 1     | 117.680000000 MHz | 36.44          | Quasi Peak | -7.08          |
| 1     | 126.400000000 MHz | 37.80          | Quasi Peak | -5.72          |
| 1     | 128.240000000 MHz | 36.05          | Quasi Peak | -7.47          |
| 1     | 156.040000000 MHz | 37.34          | Quasi Peak | -6.18          |
| 1     | 158.600000000 MHz | 39.46          | Quasi Peak | -4.06          |
| 1     | 163.560000000 MHz | 40.63          | Quasi Peak | -2.89          |
| 1     | 166.960000000 MHz | 39.85          | Quasi Peak | -3.67          |
| 1     | 171.800000000 MHz | 37.52          | Quasi Peak | -6.00          |
| 1     | 174.720000000 MHz | 33.97          | Quasi Peak | -9.55          |



G12086022

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezzo 12086022  
Test Spec  
Horiz



### Final Measurement

Meas Time: 1 s  
Margin: 6 dB  
Subranges: 4

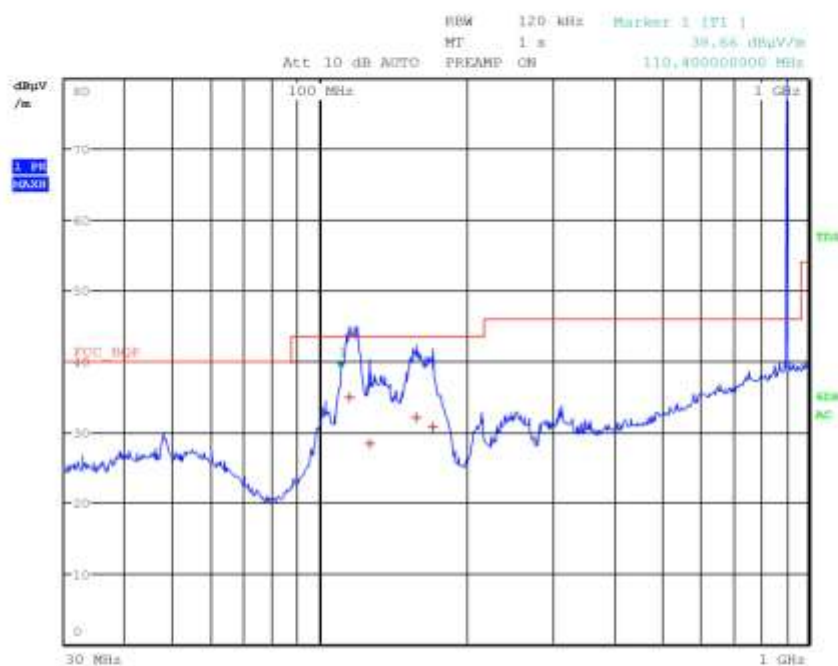
| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 115.080000000 MHz | 35.29          | Quasi Peak | -8.23          |
| 1     | 134.720000000 MHz | 28.41          | Quasi Peak | -15.11         |
| 1     | 158.520000000 MHz | 31.86          | Quasi Peak | -11.66         |
| 1     | 162.640000000 MHz | 30.36          | Quasi Peak | -13.16         |





G12086023

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezzo 12086023  
Test Spec  
Horiz



### Final Measurement

Meas Time: 1 s  
Margin: 6 dB  
Subranges: 4

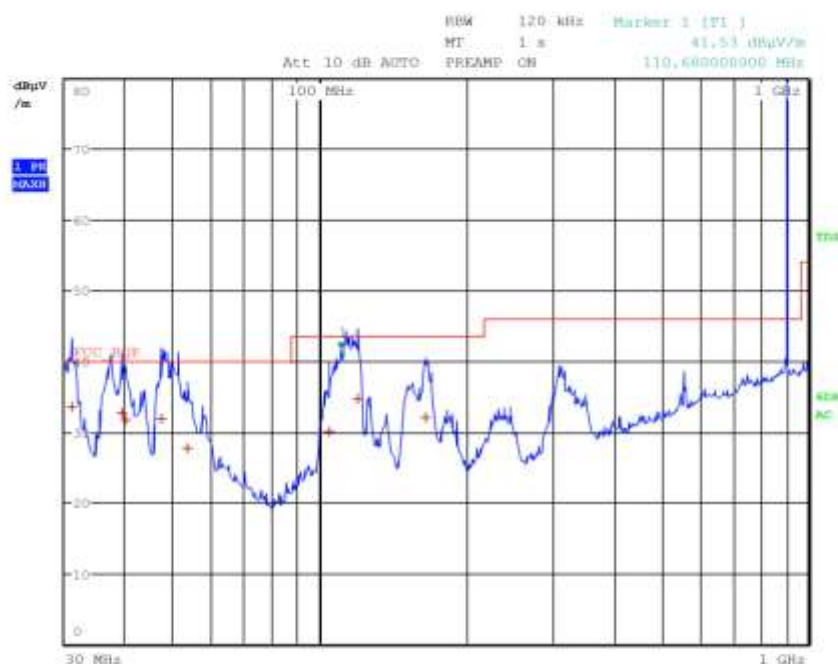
| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 114.760000000 MHz | 34.90          | Quasi Peak | -8.62          |
| 1     | 126.520000000 MHz | 28.39          | Quasi Peak | -15.13         |
| 1     | 157.480000000 MHz | 32.09          | Quasi Peak | -11.43         |
| 1     | 170.080000000 MHz | 30.69          | Quasi Peak | -12.84         |





G12086024

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezzo 12086024  
Test Spec  
Vert



### Final Measurement

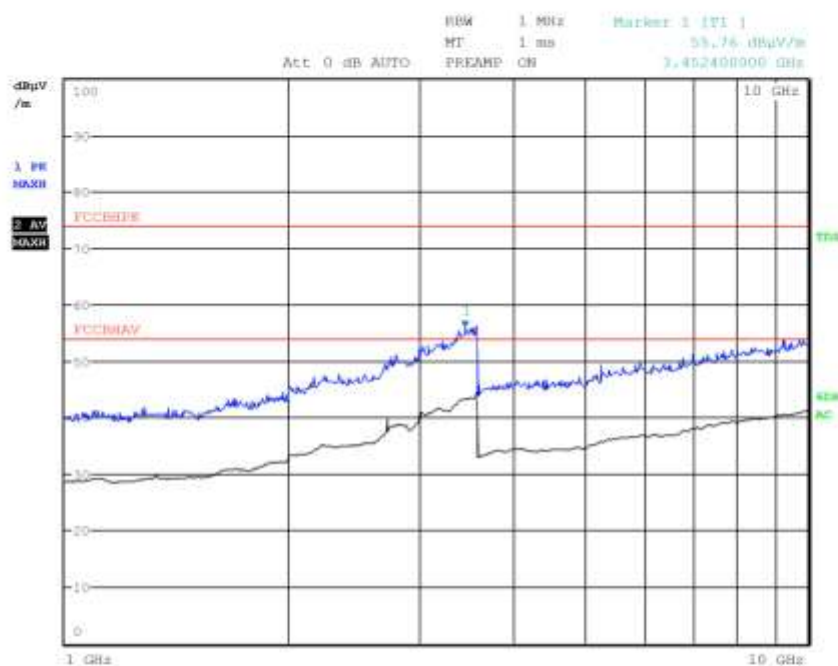
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 8

| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 30.960000000 MHz  | 33.48          | Quasi Peak | -6.52          |
| 1     | 39.280000000 MHz  | 32.62          | Quasi Peak | -7.38          |
| 1     | 39.920000000 MHz  | 31.66          | Quasi Peak | -8.34          |
| 1     | 47.320000000 MHz  | 31.92          | Quasi Peak | -8.08          |
| 1     | 53.520000000 MHz  | 27.62          | Quasi Peak | -12.38         |
| 1     | 104.680000000 MHz | 29.94          | Quasi Peak | -13.58         |
| 1     | 119.200000000 MHz | 34.62          | Quasi Peak | -8.90          |
| 1     | 164.680000000 MHz | 32.09          | Quasi Peak | -11.43         |



G12086025

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezzo 12086025  
Test Spec  
Vert



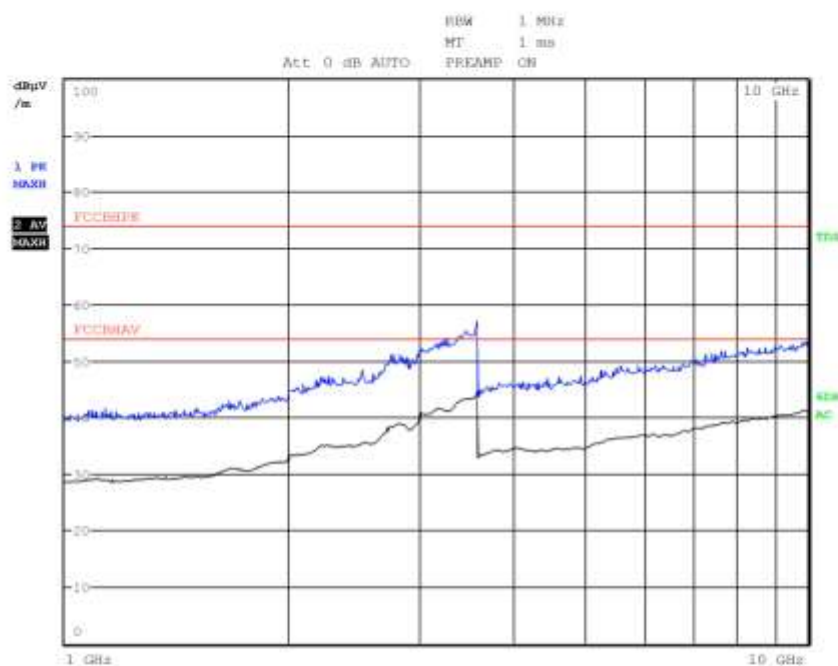
#### Final Measurement

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



G12086026

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezolo 12086026  
Test Spec  
Horiz



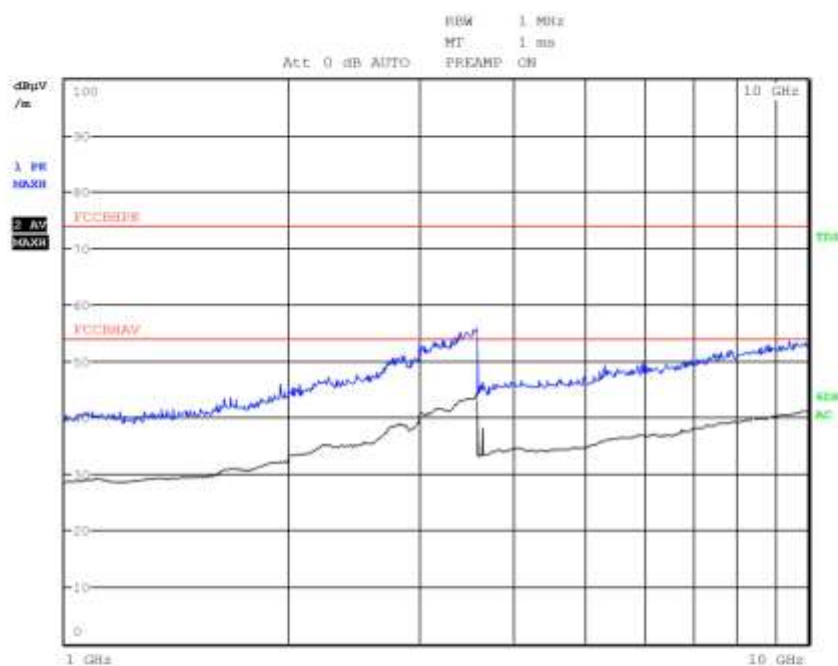
#### Final Measurement

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



G12086027

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezolo 12086027  
Test Spec  
Horiz



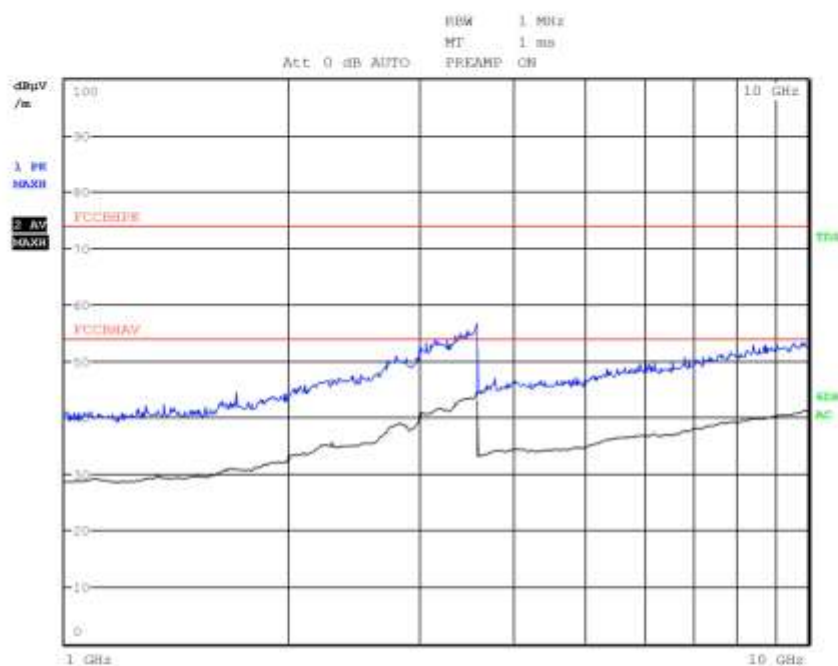
#### Final Measurement

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



G12086028

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezolo 12086028  
Test Spec  
Vert



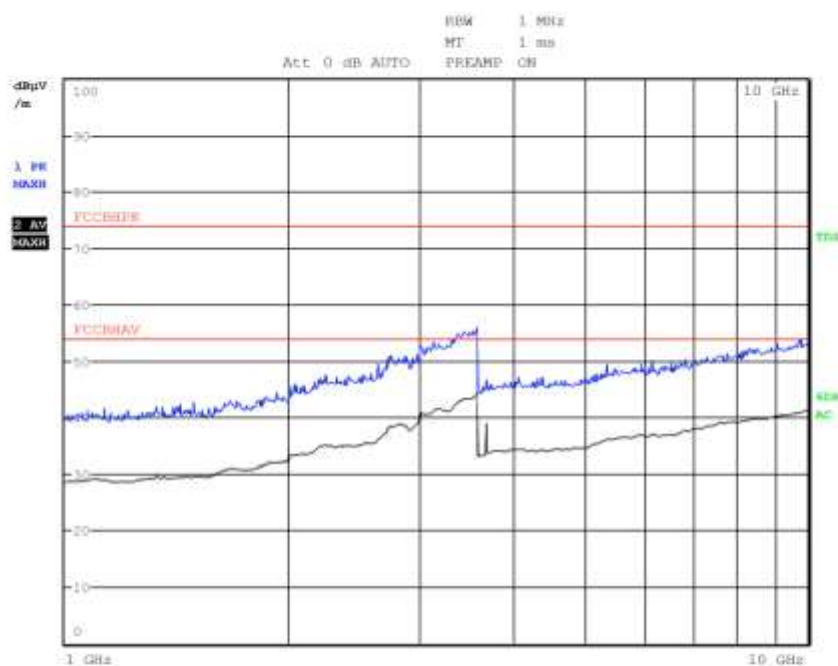
#### Final Measurement

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



G12086029

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086029  
Test Spec  
Vert



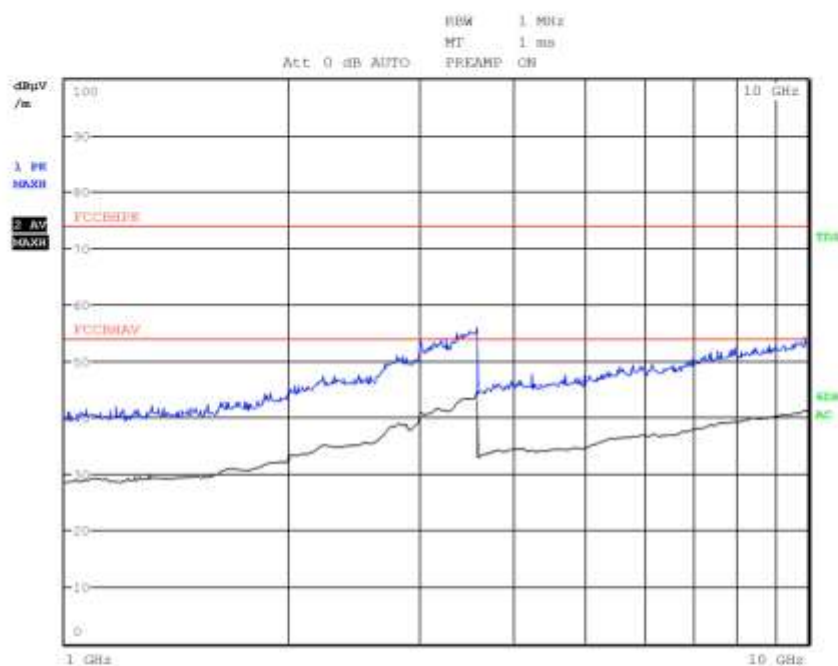
#### Final Measurement

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



G12086030

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086030  
Test Spec  
Horiz



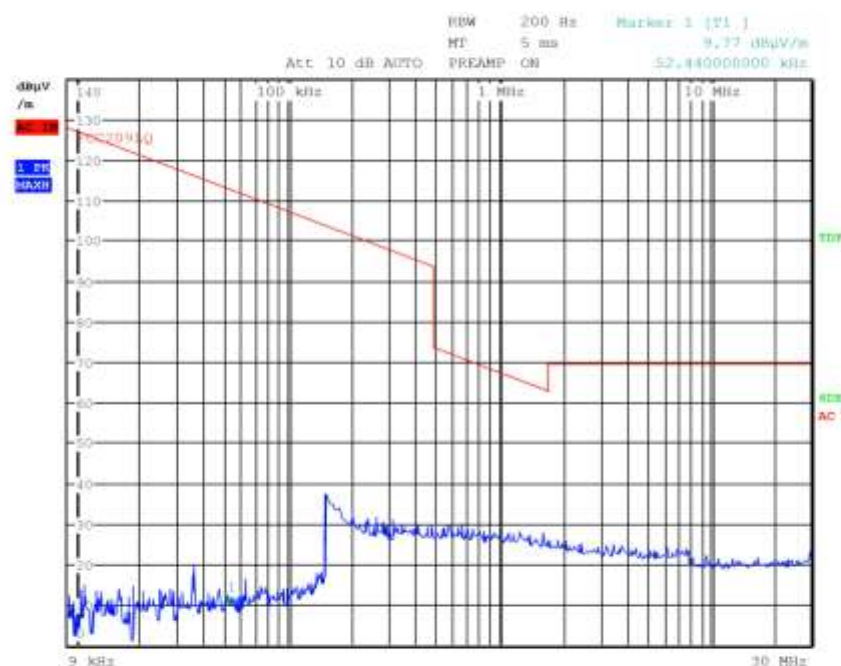
#### Final Measurement

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



G12086031

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq max  
Operator Bertezolo 12086031  
Test Spec  
Loop



#### Final Measurement

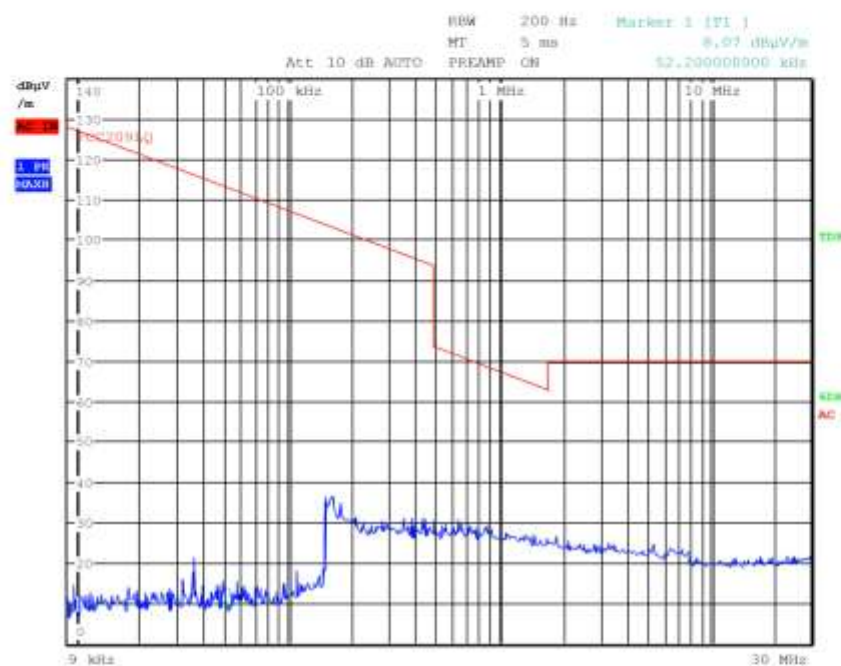
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 0





G12086032

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq med  
Operator Bertezolo 12086032  
Test Spec  
Loop



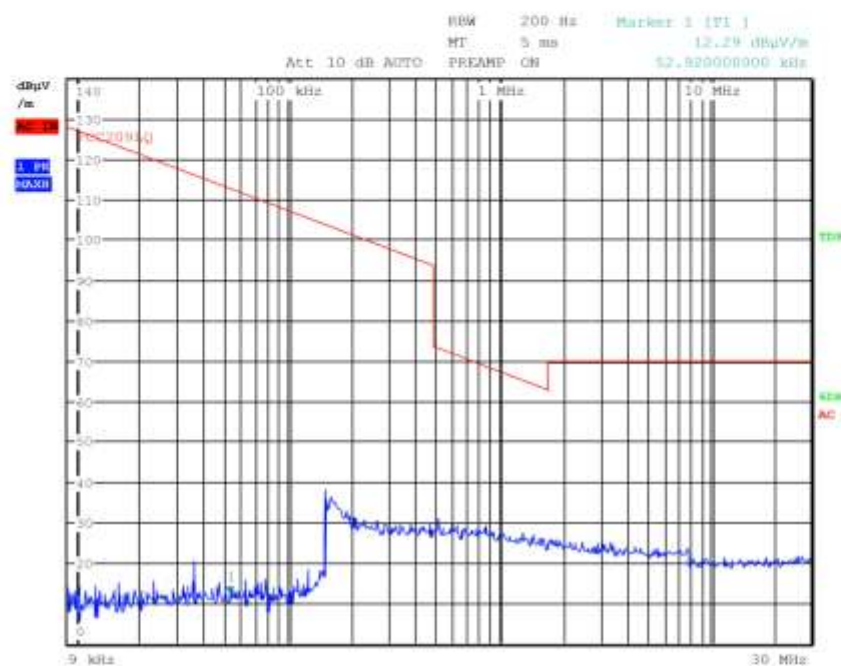
#### Final Measurement

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



G12086033

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition TX Freq min  
Operator Bertezolo 12086033  
Test Spec  
Loop



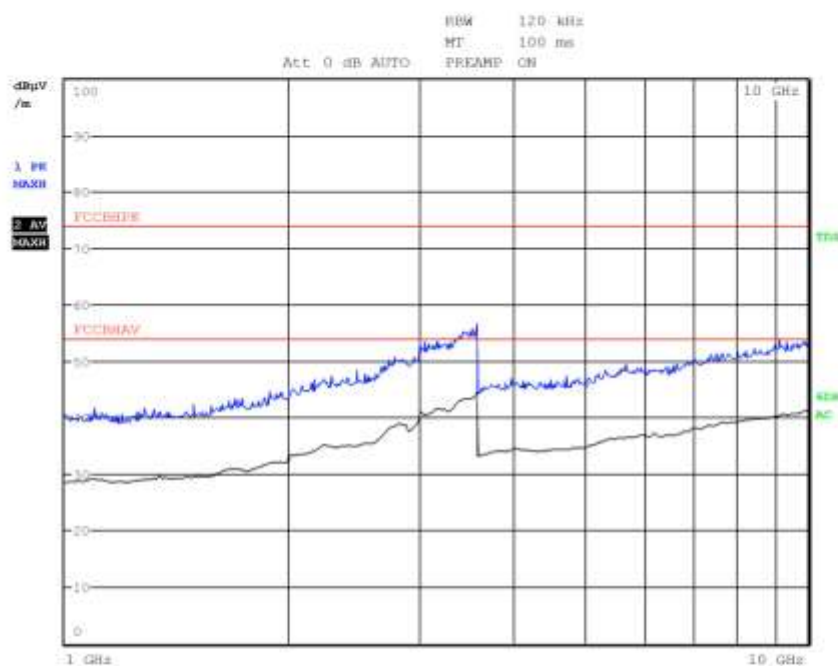
### Final Measurement

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



G12086034

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq min  
Operator Bertezolo 12086034  
Test Spec  
Vert



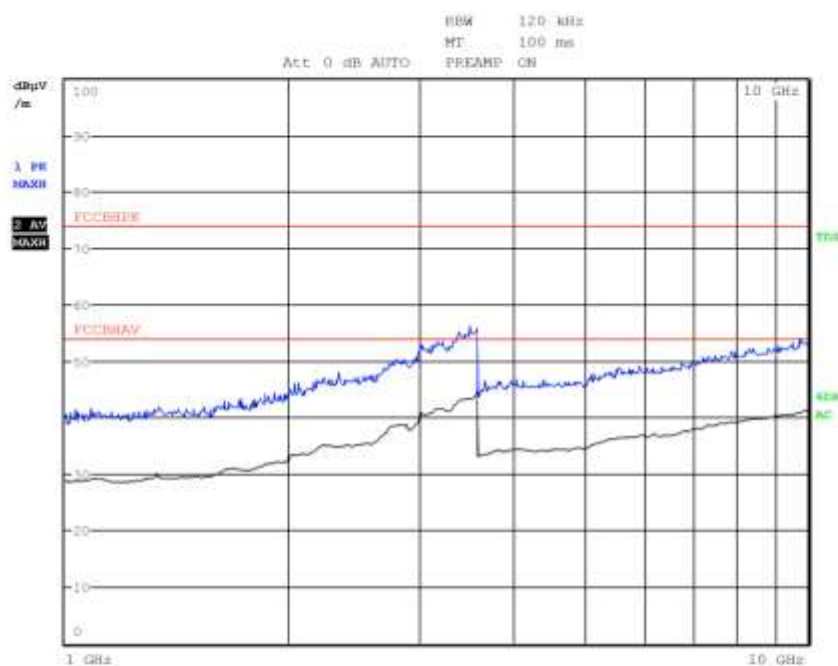
#### Final Measurement

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



G12086035

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq min  
Operator Bertezolo 12086035  
Test Spec  
Horiz



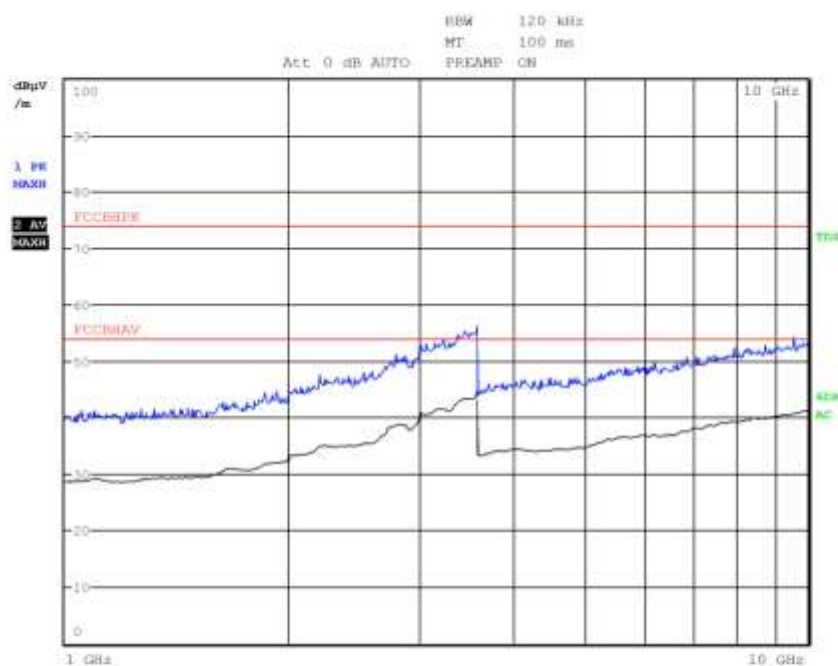
#### Final Measurement

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



G12086036

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq med  
Operator Bertezolo 12086036  
Test Spec  
Horiz



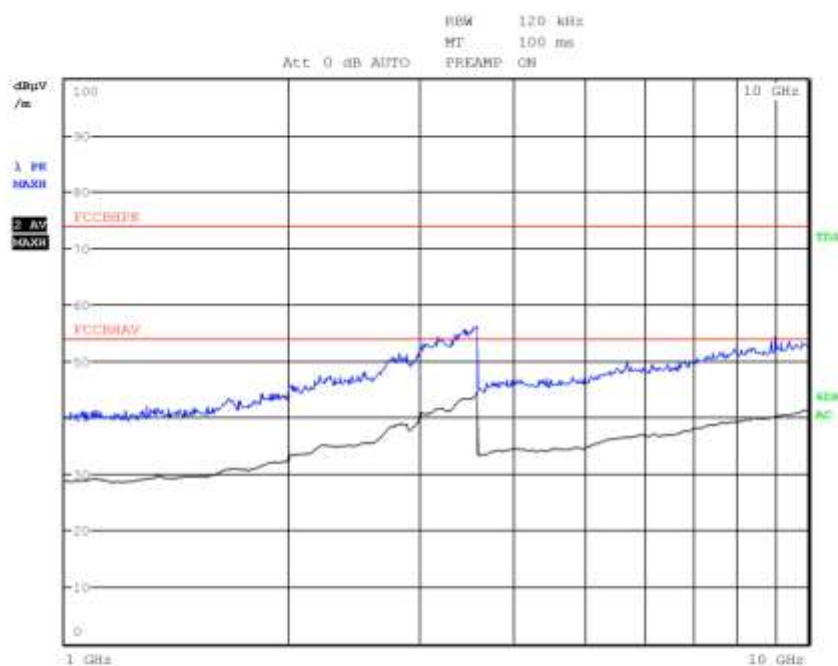
### Final Measurement

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



G12086037

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq med  
Operator Bertezolo 12086037  
Test Spec  
Vert



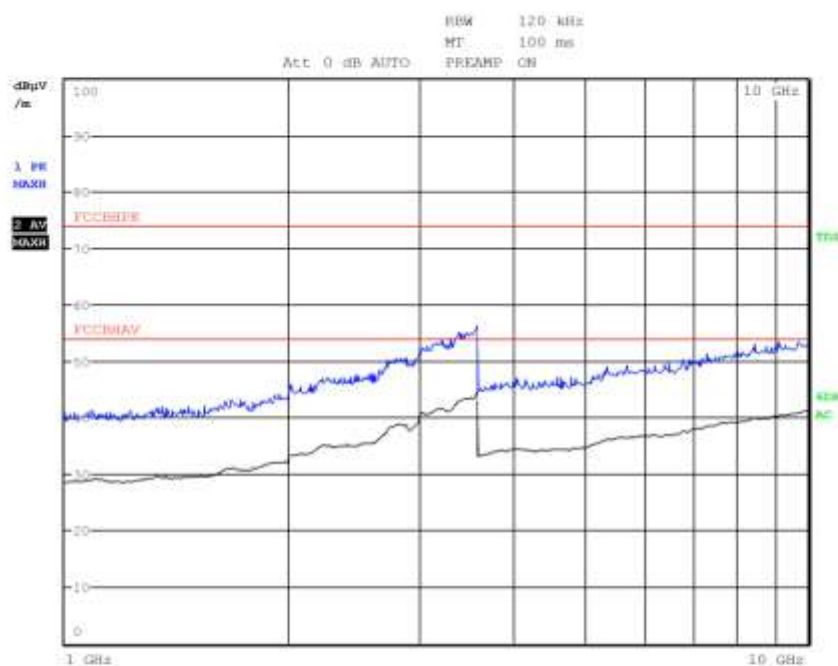
#### Final Measurement

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



G12086038

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq max  
Operator Bertezolo 12086038  
Test Spec  
Vert



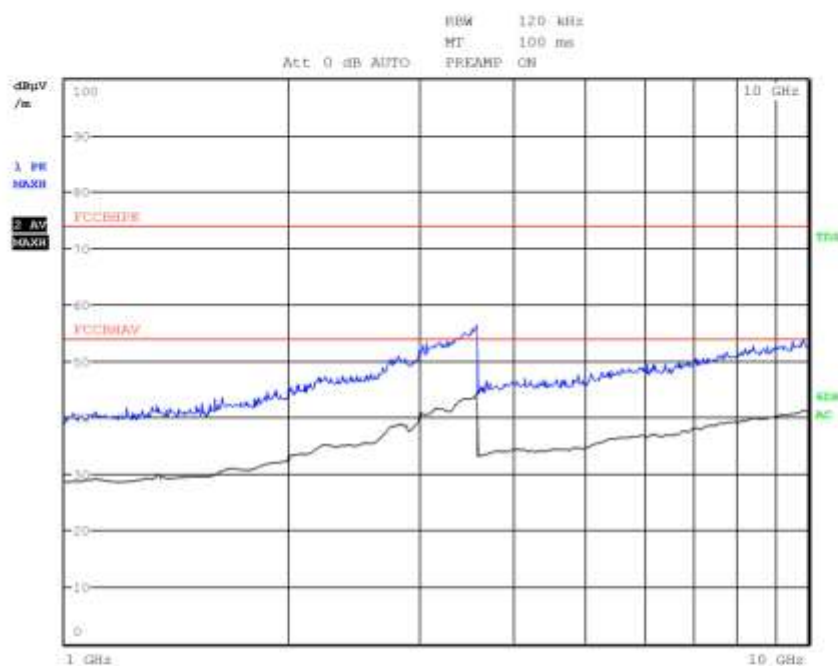
#### Final Measurement

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



G12086039

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq max  
Operator Bertezolo 12086039  
Test Spec  
Horiz



#### Final Measurement

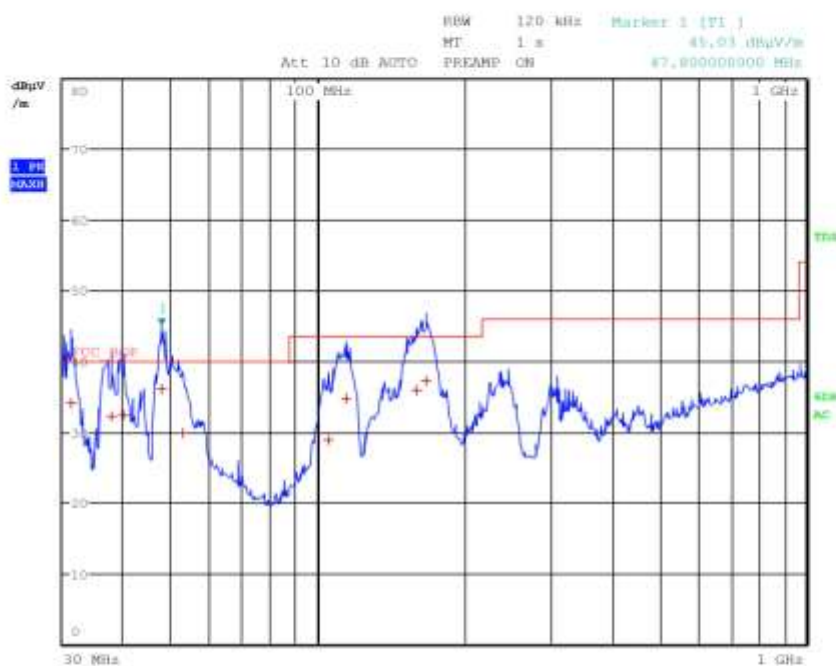
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 0





G12086043

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq min  
Operator Bertezolo 12086043  
Test Spec  
Vert



### Final Measurement

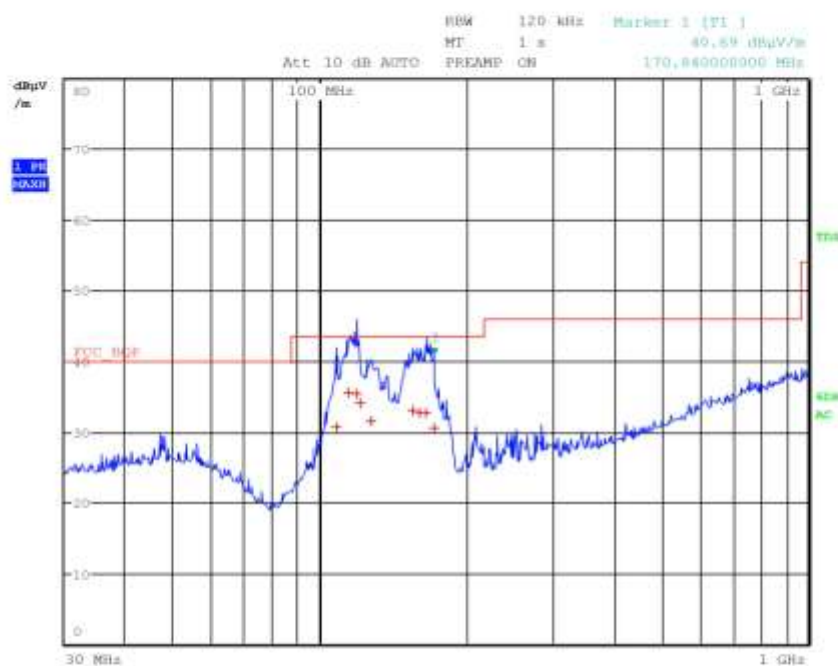
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 9

| Trace | Frequency         | Level (dBuV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 31.240000000 MHz  | 34.01          | Quasi Peak | -5.99          |
| 1     | 37.640000000 MHz  | 32.17          | Quasi Peak | -7.83          |
| 1     | 39.880000000 MHz  | 32.35          | Quasi Peak | -7.65          |
| 1     | 47.800000000 MHz  | 36.03          | Quasi Peak | -3.97          |
| 1     | 52.920000000 MHz  | 29.86          | Quasi Peak | -10.14         |
| 1     | 105.240000000 MHz | 28.83          | Quasi Peak | -14.69         |
| 1     | 114.000000000 MHz | 34.72          | Quasi Peak | -8.80          |
| 1     | 159.080000000 MHz | 35.93          | Quasi Peak | -7.59          |
| 1     | 166.440000000 MHz | 37.21          | Quasi Peak | -6.31          |



G12086044

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq min  
Operator Bertezolo 12086044  
Test Spec  
Horiz



### Final Measurement

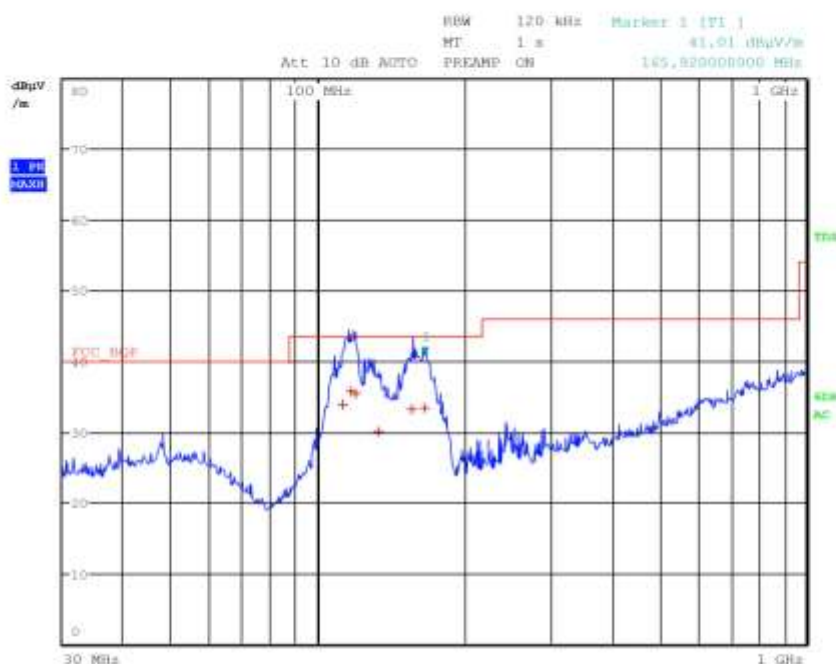
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 9

| Trace | Frequency        | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|------------------|----------------|------------|----------------|
| 1     | 107.80000000 MHz | 30.67          | Quasi Peak | -12.85         |
| 1     | 114.28000000 MHz | 35.48          | Quasi Peak | -8.04          |
| 1     | 118.64000000 MHz | 35.39          | Quasi Peak | -8.14          |
| 1     | 120.56000000 MHz | 34.02          | Quasi Peak | -9.51          |
| 1     | 127.36000000 MHz | 31.50          | Quasi Peak | -12.02         |
| 1     | 155.12000000 MHz | 32.98          | Quasi Peak | -10.54         |
| 1     | 159.76000000 MHz | 32.61          | Quasi Peak | -10.91         |
| 1     | 164.44000000 MHz | 32.76          | Quasi Peak | -10.76         |
| 1     | 170.84000000 MHz | 30.53          | Quasi Peak | -12.99         |



G12086045

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq med  
Operator Bertezolo 12086045  
Test Spec  
Horiz



### Final Measurement

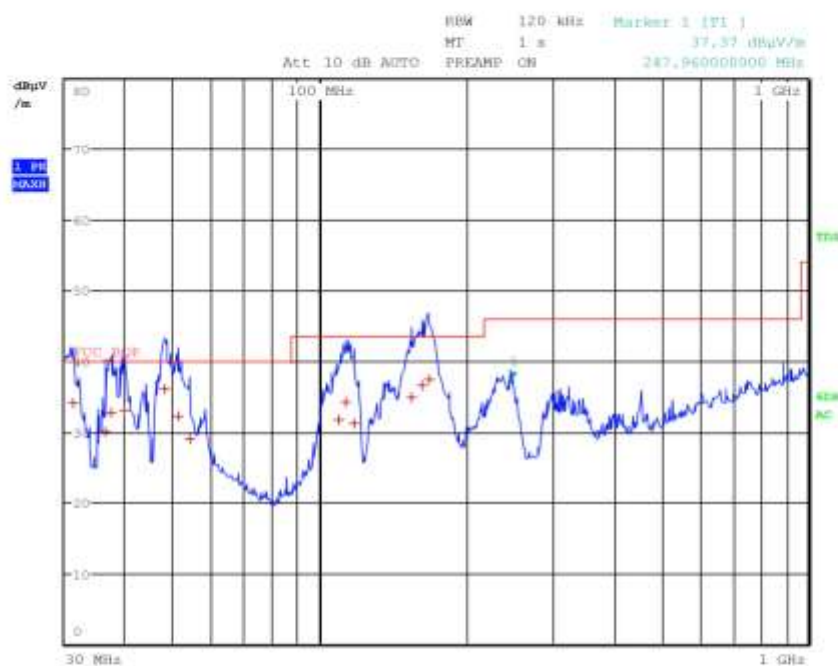
Meas Time: 1 s  
Margin: 6 dB  
Subranges: 6

| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 112.640000000 MHz | 33.89          | Quasi Peak | -9.63          |
| 1     | 116.360000000 MHz | 35.76          | Quasi Peak | -7.76          |
| 1     | 119.320000000 MHz | 35.30          | Quasi Peak | -8.22          |
| 1     | 132.560000000 MHz | 29.93          | Quasi Peak | -13.59         |
| 1     | 156.040000000 MHz | 33.16          | Quasi Peak | -10.36         |
| 1     | 165.320000000 MHz | 33.32          | Quasi Peak | -10.20         |



G12086046

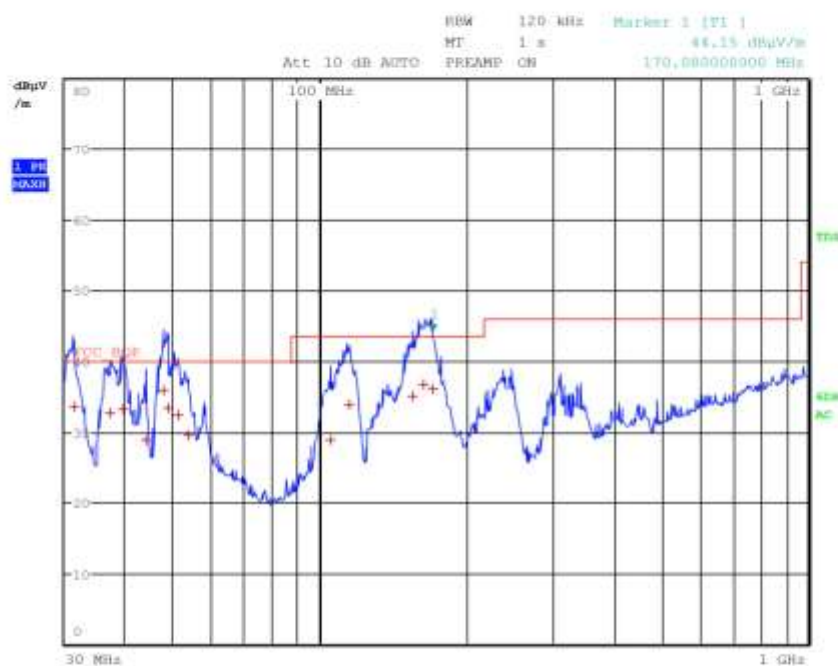
Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq med  
Operator Bertezolo 12086046  
Test Spec  
Vert





G12086047

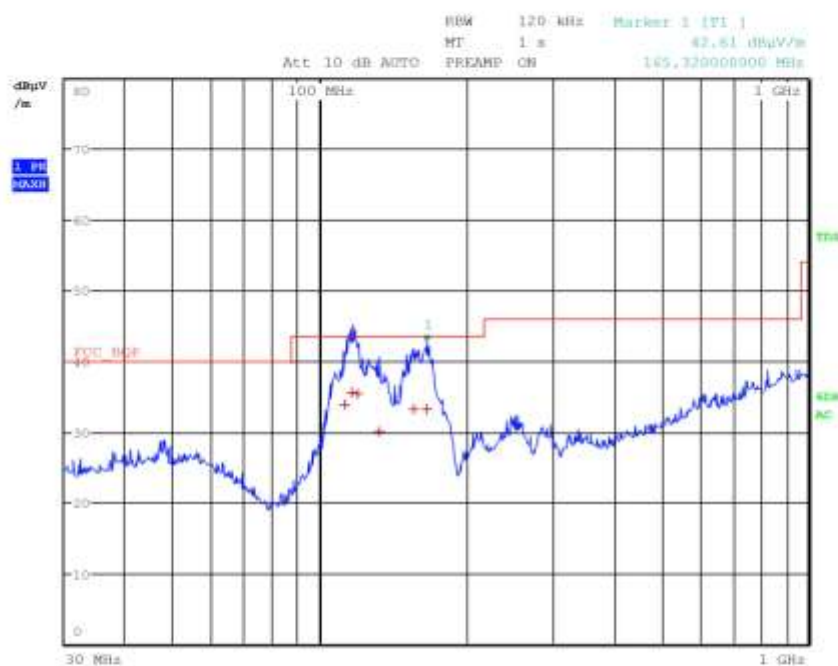
Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq max  
Operator Bertezzo 12086047  
Test Spec  
Vert





G12086048

Meas Type Emission  
Equipment under Test  
Manufacturer  
OP Condition RX Freq max  
Operator Bertezzo 12086048  
Test Spec  
Horiz



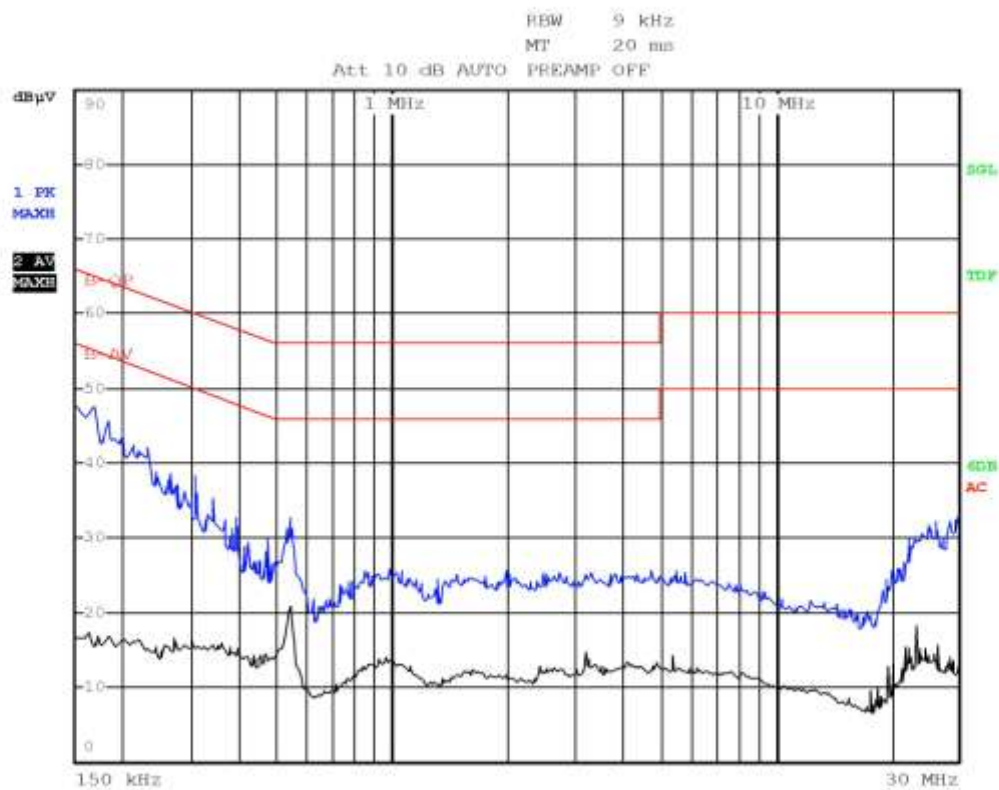
### Final Measurement

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

| Trace | Frequency         | Level (dBμV/m) | Detector   | Delta Limit/dB |
|-------|-------------------|----------------|------------|----------------|
| 1     | 112.640000000 MHz | 33.80          | Quasi Peak | -9.72          |
| 1     | 116.360000000 MHz | 35.52          | Quasi Peak | -8.00          |
| 1     | 119.320000000 MHz | 35.43          | Quasi Peak | -8.09          |
| 1     | 132.560000000 MHz | 30.01          | Quasi Peak | -13.51         |
| 1     | 156.040000000 MHz | 33.19          | Quasi Peak | -10.33         |
| 1     | 165.320000000 MHz | 33.12          | Quasi Peak | -10.40         |



G12086049

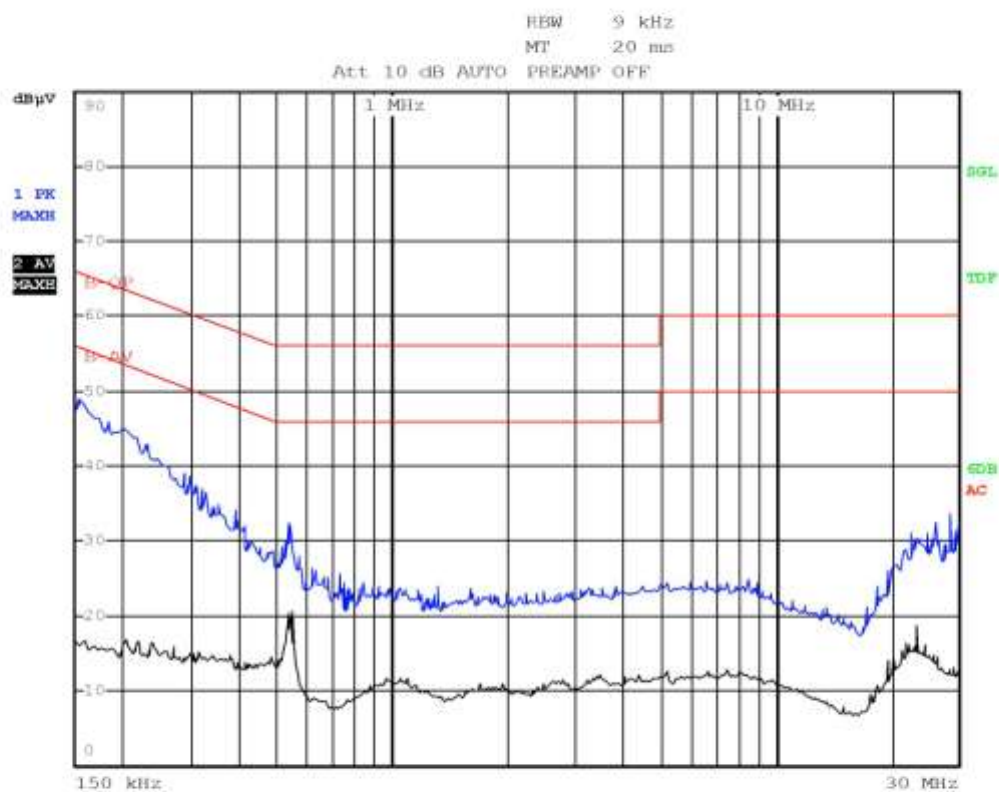


Bertezzolo 12086049 Line N in TX





G12086050



Bertezzolo 12086050 Line L in TX