



TEST REPORT nr. R13137501

Federal Communication Commission (FCC)

Test item

Description.....: Mifare / NFC Reader
Trademark.....: GLOBAL DISPLAY SOLUTIONS
Model/Type.....: BRD01793

Test Specification

Standard: FCC Rules & Regulations, Title 47 (2012)
Part 15 paragraph(s) : 203, 204, 207,209,215 and 225

Client's name.....: GLOBAL DISPLAY SOLUTIONS S.p.A.
Address: Via Tezze, 20/A – 36073 Cornedo Vicentino (VI) - Italy

Manufacturer's name.: Same as client
Address: --

Report

Tested by: A. Bertezzolo - *Technician*

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

Date of issue.....: 05.09.13

Contents: 25 pages

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The test results presented in this report relate only to the item tested.



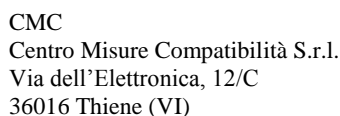
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1. Summary			
Emission: FCC Rules & Regulations, Title 47 (2011)			
Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.203 and 15.204	Antenna Requirement	6	Complies (The antenna is embedded)
Part 15.209	Radiated Emission	1	Complies
Part 15.225	Field strength within the assigned band	2	Complies
Part 15.225 (e)	Frequency tolerance	2	Complies
Part 15.215	20dB Bandwidth	5	Complies
Part 15.207	Emission of mains terminal disturbance voltage	4	Complies

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



Power supply..... : 12Vdc

Serial number..... : --

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

Working Frequency : 13,56 MHz

Information on antenna..... : Embedded

FCC ID : XZRBRD01793

Filtering and construction devices..... : None

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

Date of receipt of test item	29.07.13
Testing start date.....	29.07.13
Testing end date.....	08.08.13
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 P130788

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5. Photograph(s) of SETUP





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 S127	SCHAFFNER	HLA6120	Loop Antenna	1191	January '13	January '16
CMC S129	Rohde & Schwarz	ESPI7	Receiver	836.914/004	January '13	January '14
CMC S136	Schwarzbeck	VULB 9163	Broadband Antenna	9136-205	May '13	May '16
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '13	January '14
CMC B069	Angelantoni	CH 600C	Climatic chamber	41973	June '13	June '14
CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver	100781	January '13	January '14



7. Measurement uncertainty

Test	Expanded Uncertainty	note
Conducted Emission		
(50 Ω /50 μ H AMN) - (9 kHz – 150 kHz)	± 3.8 dB	1
(50 Ω /50 μ H AMN) - (150 kHz – 30 MHz)	± 3.4 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	± 3.0 dB	1
(50 Ω /5 μ H AMN) - (150 kHz – 108 MHz)	± 3.2 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50 Ω /50 μ H AMN) - (9 kHz – 150 kHz)	± 3.8 dB	1
Conducted Emission (50 Ω /50 μ H AMN) - (150 kHz – 30 MHz)	± 3.4 dB	1
Disturbance Power (30 MHz – 300 MHz)		
	± 3.2 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	± 4.5 dB	1
(30 MHz – 1000 MHz)	± 4.8 dB	1
(1 GHz – 6 GHz)	± 4.4 dB	1
Electromagnetic field EMF		
	± 18.8 dB	1
Harmonic current emissions test		
	± 2.4 %	1
Voltage fluctuation and flicker test		
	± 6.0 %	1
Insertion loss test		
	± 2.6 %	1
Radiated electromagnetic disturbance test (loop antenna)		
	± 2.5 %	1
Radiated electromagnetic field immunity test		
	0.9 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test		
	0.9 V/m at 3V/m	1
Injected currents immunity test		
	0.6 V at 3V	1
Bulk current		
	9 mA at 60 mA	1
Power frequency magnetic field immunity test		
	0.3 A/m at 3 A/m	1
Electrostatic discharge immunity test		
		2
Electrical fast transients / burst immunity test		
		2
Surge immunity test		
		2
Short interruption immunity test		
		2
Voltage transient emission test		
	± 5 %	1
Transient immunity test		
		2

Notes

Note 1:

The expanded uncertainty reported 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. eference documents

Reference no.	Description
FCC Rules and Regulation Title 47 part 15	--
ANSI C63.4: 2003	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 Radiated Emission

Test configuration and test method

Test site Semi-Anechoic Chamber
Auxiliary equipment See clause 4 of this test report

Environmental conditions

Temperature 20 °C Atmospheric pressure 97 kPa Relative humidity 48 %

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 specification

Port: Enclosure - Antenna distance: 3m – Frequency range: 30-1000 MHz

EUT exercising

See clause 4 of this test report

Acceptance limits

Limits	
Frequency range (MHz)	$dB(\mu V/m)$ Quasi-peak
0,009 to 0,490	128,51 to 93,79
0,490 to 1,705	73,79 to 62,96
1,705 to 30	69,5
30 to 88	40
88 to 216	43,5
216 to 960	46
Above 960	54

Result

Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
Horizontal	30 to 1000	G13037501	--	Complies
Vertical	30 to 1000	G13037502	--	Complies
Loop	0,009 to 30	G13037503	--	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

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 S127, CMC S136, CMC S164

Measurement uncertainty: See clause 7 of this test report

Result

The requirements are met





11.2 Field strength within the assigned band

Test configuration and test method

Test site Semi-anechoic chamber
Auxiliary equipment See clause 4 of this test report

Environmental conditions

Temperature 20 °C Atmospheric pressure 98 kPa Relative humidity 50 %

Test set-up and execution

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

Test specification

Test distance: 3m – Frequency Range: 13,553 to 13,567MHz – if bandwidth: 1kHz

EUT exercising

See clause 4 of this test report

Acceptance limits

Limits (with antenna distance 3m)	
Frequency range (MHz)	dB(μV/m) Quasi-peak
13,553 to 13,567	124
13,410 to 13,553 and 13,567 to 13,710	90,5
13,110 to 13,410 and 13,710 to 14,010	80,5

Result

Graphs	Transmitter field strength Level (dBμV/m)	BW (kHz)	Result
G13031304	61,32	9	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 S127, CMC S164

Result

The requirements are met



11.3 Frequency tolerance

Test configuration and test method

Test site

Climatic chamber

Auxiliary equipment

See clause 4 of this test report

Environmental conditions

Temperature 20 °C

Atmospheric pressure 98 kPa

Relative humidity 50 %

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 specification

Frequency range: 13,553 to 13,567MHz

EUT exercising

See clause 4 of this test report

Acceptance limits

Limits for radiated disturbances $\pm 0,01\%$ (13,558644 – 13,561356 MHz)

Result

Test conditions	Measured frequency (MHz)
Temperature	
50°C	13,560870
40°C	13,560832
30°C	13,560840
20°C	13,560858
10°C	13,560868
0°C	13,560884
-10°C	13,560884
-20°C	13,560872

Test conditions	Measured frequency (MHz)
Power supply (V)	
13,8	13,560854
13,0	13,560852
12,0	13,560852
11,0	13,560852
10,2	13,560852



Remarks

//////////

Reference documents

See clause 8 of this test report

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

CMC B069, CMC S164

Result

The requirements are met





11.4 20dB Bandwidth

Test configuration and test method

Test site

Laboratory

Auxiliary equipment

See clause 4 of this test report

Environmental conditions

Temperature 21 °C

Atmospheric pressure 99 kPa

Relative humidity 45 %

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

Result

<i>Frequency</i> (MHz)	Graph(s)	<i>Bandwidth</i> (kHz)	Remark
13,5610	G130515A11	60,37	--
Measurement uncertainty: ± 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



11.5 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	Result	Remarks
N	G13137507	Complies	--
L1	G13137508	Complies	
N	G13137509	Complies	With a dummy load
L1	G13137510	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 S206

Measurement uncertainty: See clause 7 of this test report

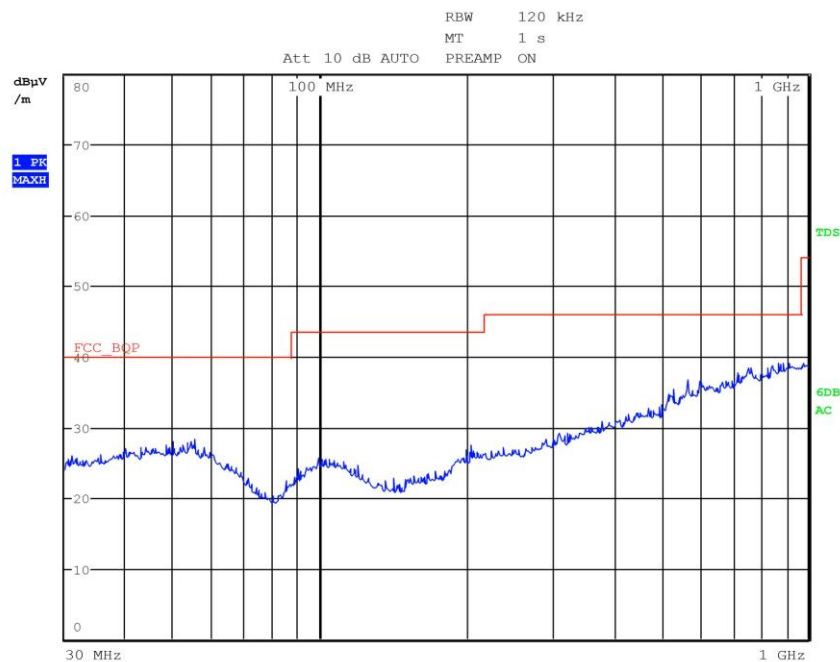
Result The requirements are met



12. Graphs and Tables

G13137501

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzolo 13137501
Test Spec
Horiz



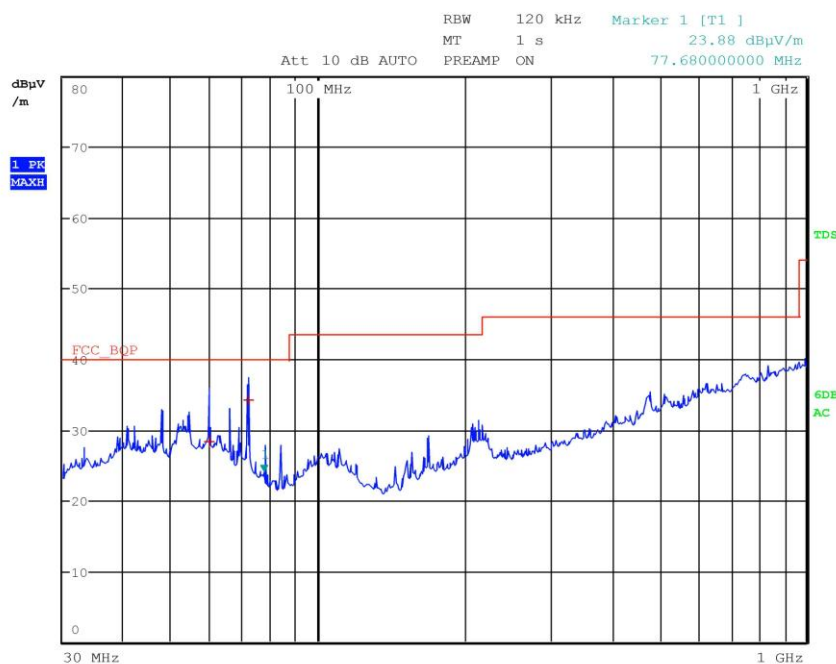
Final Measurement

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



G13137502

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzo 13137502
Test Spec
Vert



Final Measurement

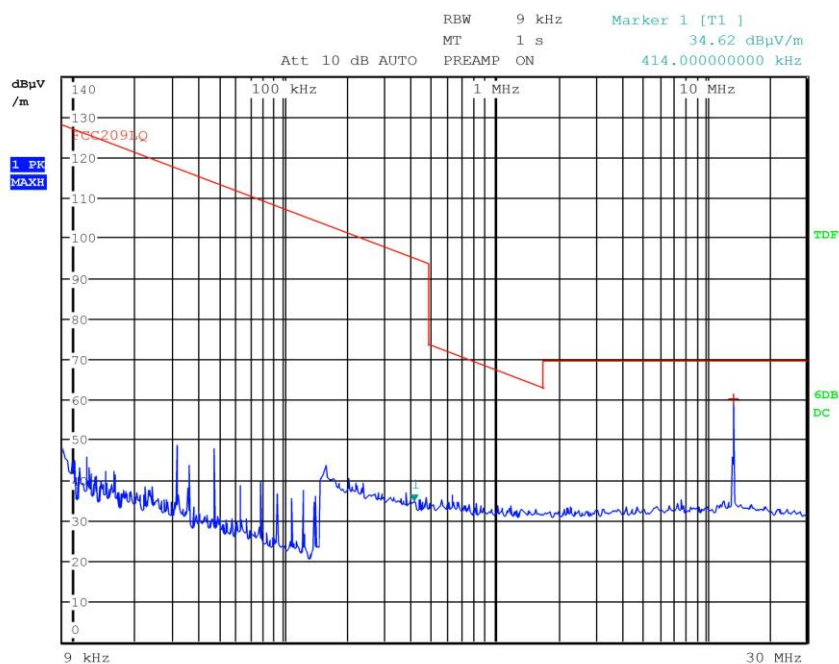
Meas Time: 1 s
Margin: 6 dB
Subranges: 2

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	59.880000000 MHz	28.34	Quasi Peak	-11.66
1	72.000000000 MHz	34.14	Quasi Peak	-5.86



G13137503

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzo 13137503
Test Spec
Loop



Final Measurement

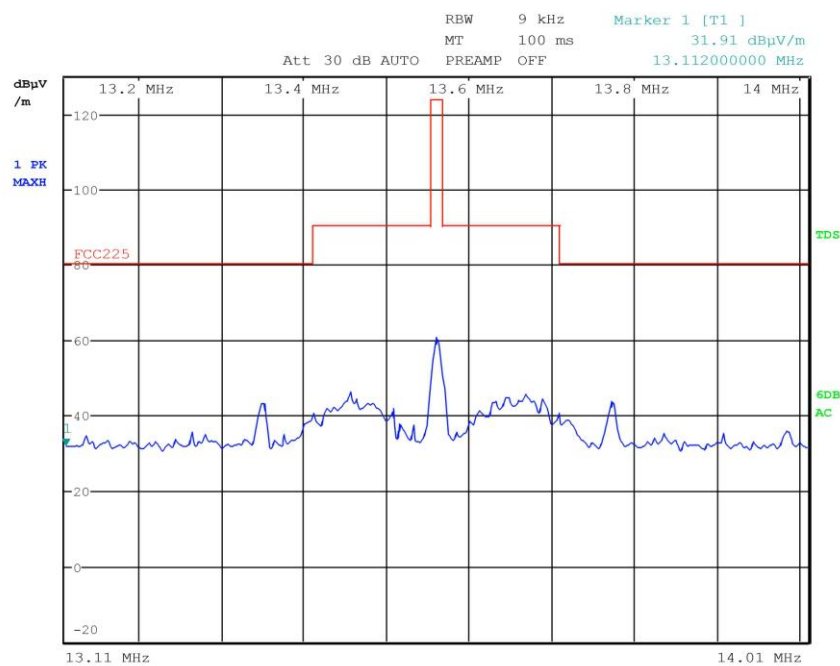
Meas Time: 1 s
Margin: 6 dB
Subranges: 1

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	13.562000000 MHz	60.23	Quasi Peak	-9.27



G13137504

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezolo 13137504
Test Spec
Loop



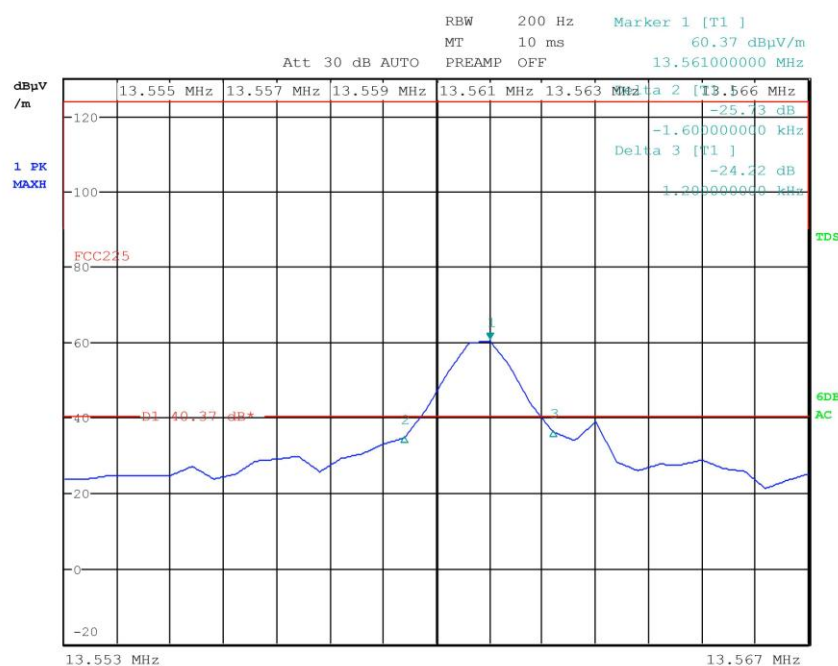
Final Measurement

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



G13137506

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezolo 13137506
Test Spec
Loop

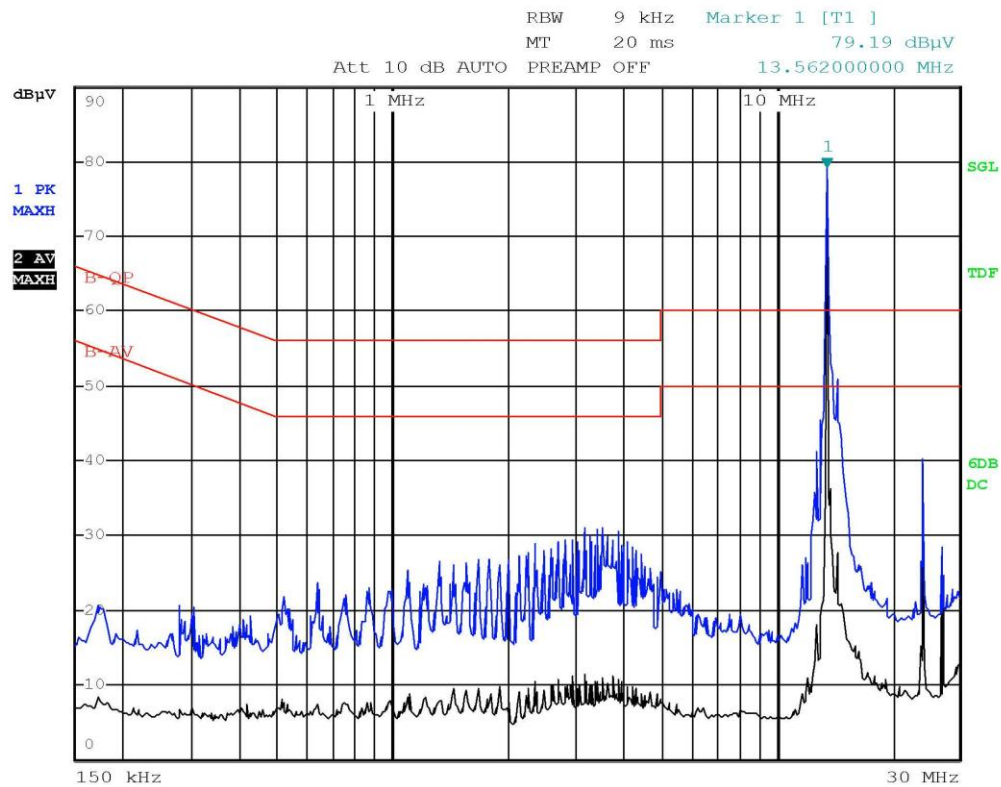


Final Measurement

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



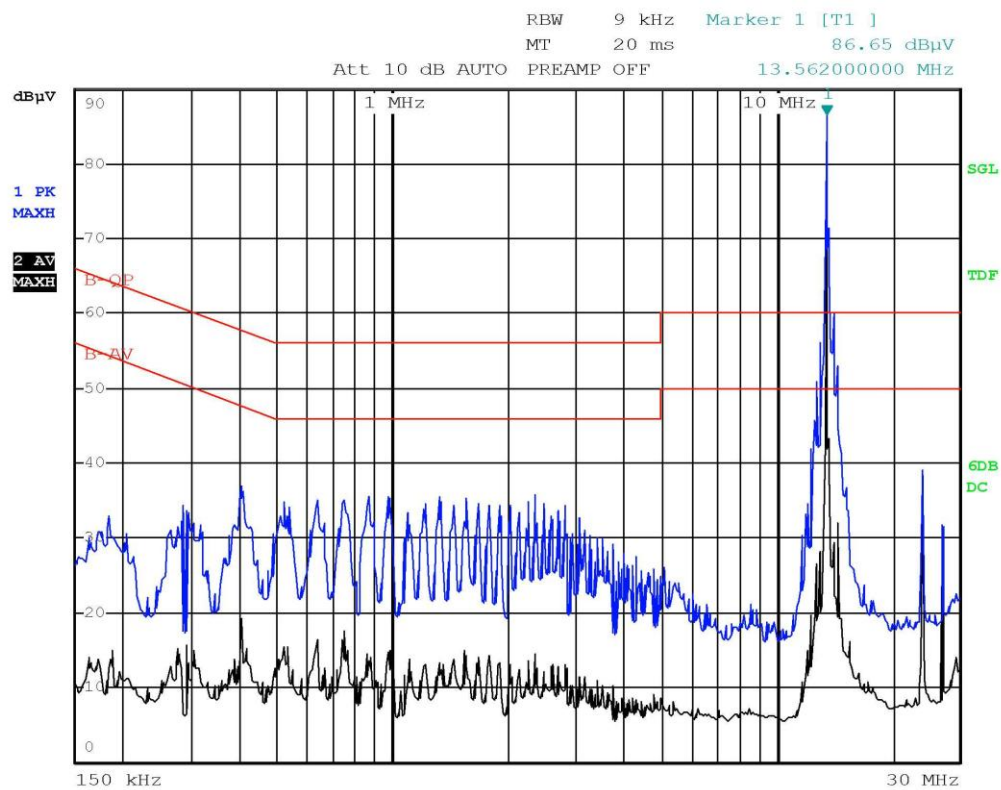
G13137507



Bertezzo 13137507 Line N



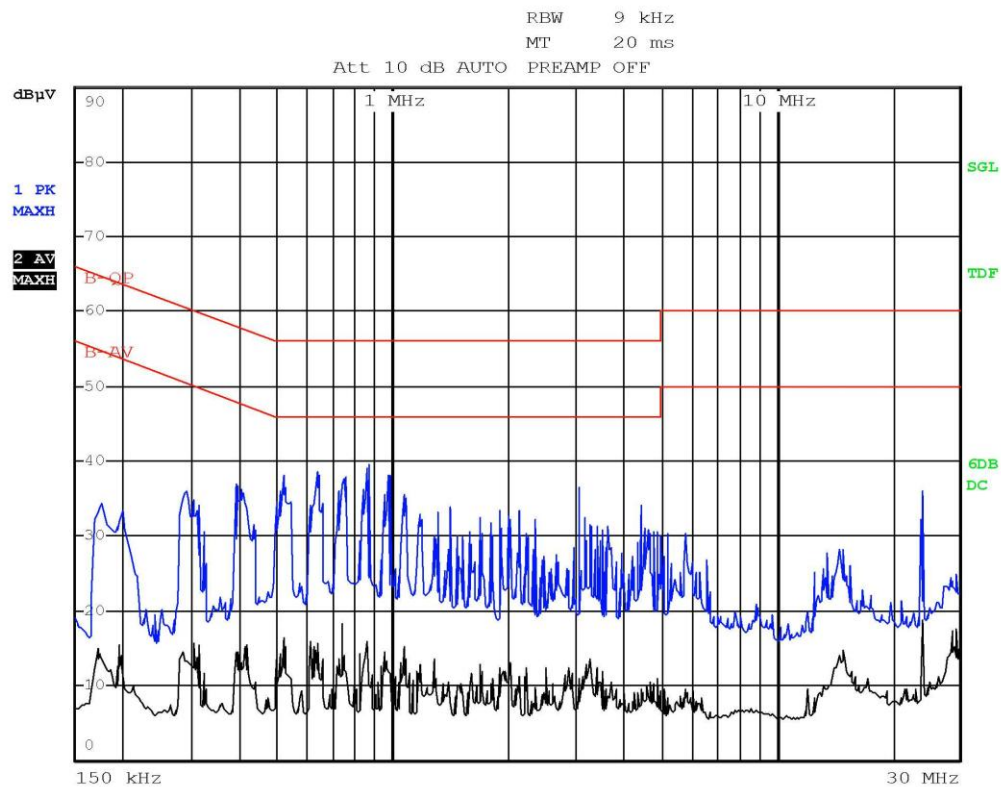
G13137508



Bertezzo 13137508 Line L



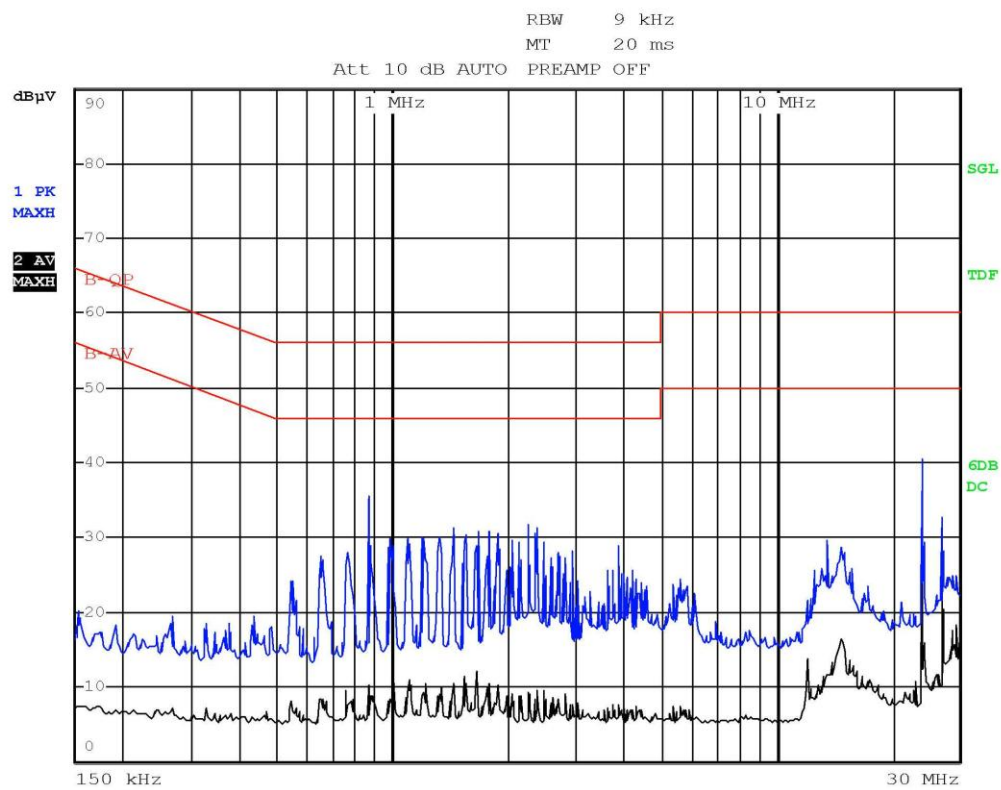
G13137509



Bertezzo 13137509 Line N dummy ant



G13137510



Bertezzo 13137510 Line L dummy ant