



TEST REPORT nr. R13137801

Federal Communication Commission (FCC)

Test item

Description.....: Mifare Reader
Trademark.....: GLOBAL DISPLAY SOLUTIONS
Model/Type.....: BRD01794

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.....: 02.10.13

Contents: 25 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.



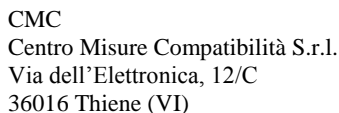
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1. Summary			
Emission: FCC Rules & Regulations, Title 47 (2012)			
Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.203 and 15.204	Antenna Requirement	6	Complies (The antenna is embedded)
Part 15.209	Radiated Emission	1	Complies
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..... : 3,3Vdc

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 : XZRBRD01794

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.....	: 11.09.13
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 P130790

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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		
(50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3.8 dB	1
(50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.4 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±3.0 dB	1
(50Ω/5μH AMN) - (150 kHz – 108 MHz)	±3.2 dB	1
DiscontinuousConducted Emission		
Conducted Emission (50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3.8 dB	1
Conducted Emission (50Ω/50μH 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 23 °C

Atmospheric pressure 99 kPa

Relative humidity 51 %

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

<i>Limits</i>	
<i>Frequency range (MHz)</i>	<i>dB(μV/m) Quasi-peak</i>
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

<i>Polarization</i>	<i>Frequency Range (MHz)</i>	<i>Graphs</i>	<i>Remarks</i>	<i>Result</i>
Vertical	30 to 1000	G13137805	--	Complies
Horizontal	30 to 1000	G13137806	--	Complies
Loop	0,009 to 30	G13137804	--	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 23 °C Atmospheric pressure 98 kPa Relative humidity 48 %

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
G13137801	45,51	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

<i>Test conditions</i>	<i>Measured frequency (MHz)</i>
<i>Temperature</i>	
50°C	13,560840
40°C	13,560840
30°C	13,560844
20°C	13,560848
10°C	13,560856
0°C	13,560852
-10°C	13,560836
-20°C	13,560820

<i>Test conditions</i>	<i>Measured frequency (MHz)</i>
<i>Power supply (V)</i>	
3,8	13,560840
3,6	13,560840
3,4	13,560840
3,2	13,560840
3,0	13,560840
2,8	13,560840



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 24 °C

Atmospheric pressure 99 kPa

Relative humidity 49 %

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>Result</i> (kHz)	Remark
13,5608	G13137803	0,48	--
Measurement uncertainty: $\pm 10\text{Hz}$			

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 22 °C Atmospheric pressure 100 kPa Relative humidity 51 %

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
-	G13137807	Complies	With a dummy load
+	G13137808	Complies	
+	G13137809	Complies	
-	G13137810	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

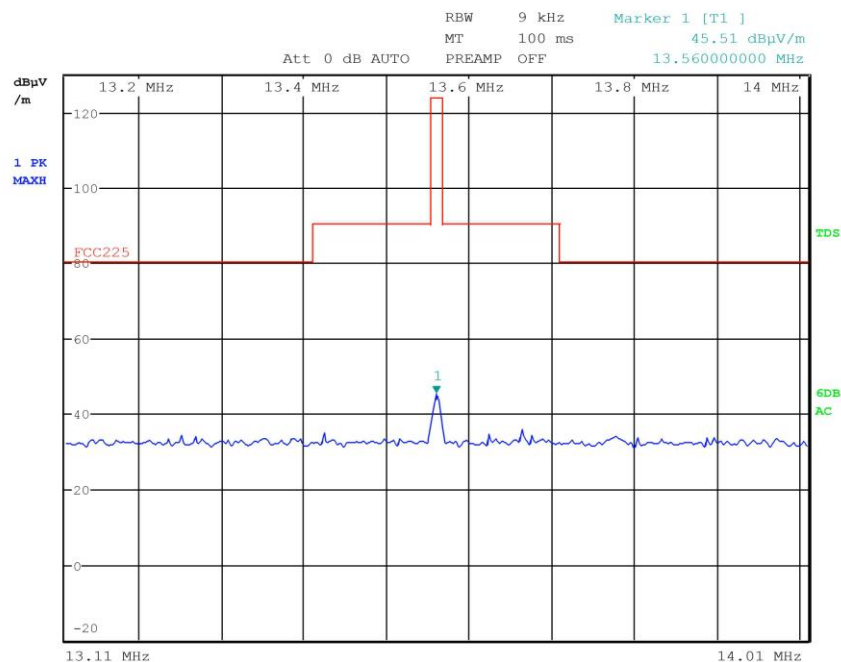
Result The requirements are met



12. Graphs and Tables

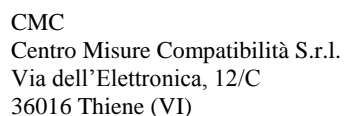
G13137801

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzolo 13137801
Test Spec
Loop



Final Measurement

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



Marker 1 [T1]
BW 200 Hz
T 10 ms
REAMP OFF
44.08 dBμV/m
13.560840000 MHz

13.561 MHz 13.563 MHz 13.565 MHz 13.567 MHz

Delta 3 [T1]
-26.44 dB
-27.41 dB
-240.000000000 Hz
-240.000000000 Hz

TDS
6DB
AC

13.567 MHz

RBW 200 Hz Marker 1 [T1]
 MT 10 ms 44.08 dBuV/m
 Att 0 dB AUTO PREAMP OFF 13.560840000 MHz

dBuV/m

1 PK MAXH

Delta 2 [T1] -26.64 dB
 Delta 3 [T1] -27.41 dB
 Delta 4 [T1] -28.00 dB

FCC225

D1 24.08 dB*

13.553 MHz 13.567 MHz

6dB AC

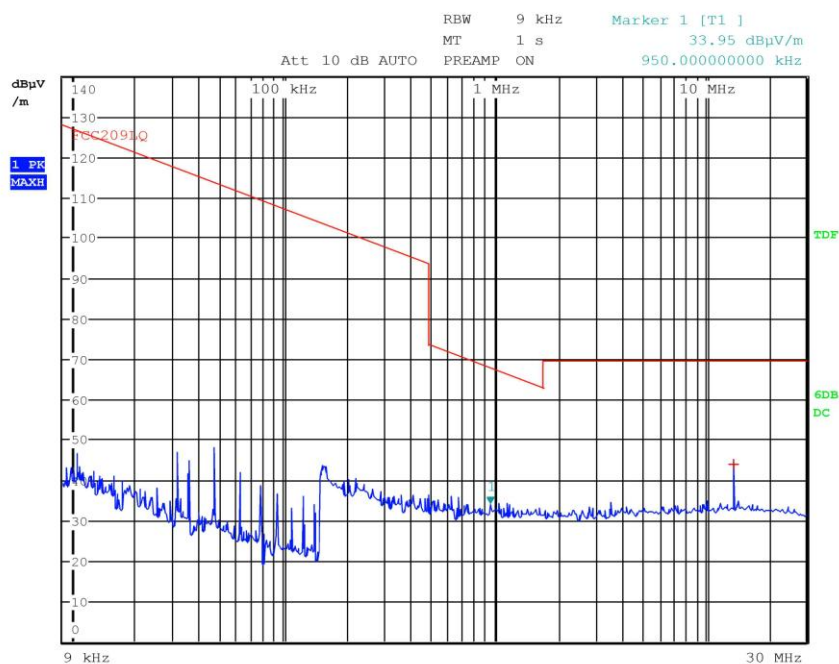
TDS

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



G13137804

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzo 13137804
Test Spec
Loop



Final Measurement

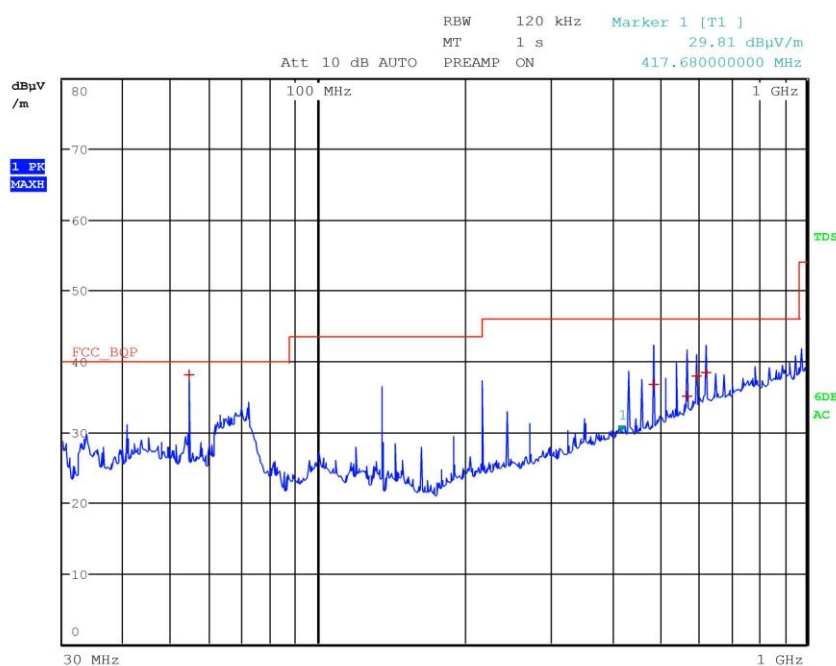
Meas Time: 1 s
Margin: 6 dB
Subranges: 1

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	13.56200000 MHz	44.11	Quasi Peak	-25.39



G13137805

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzo 13137805
Test Spec
Vert



Final Measurement

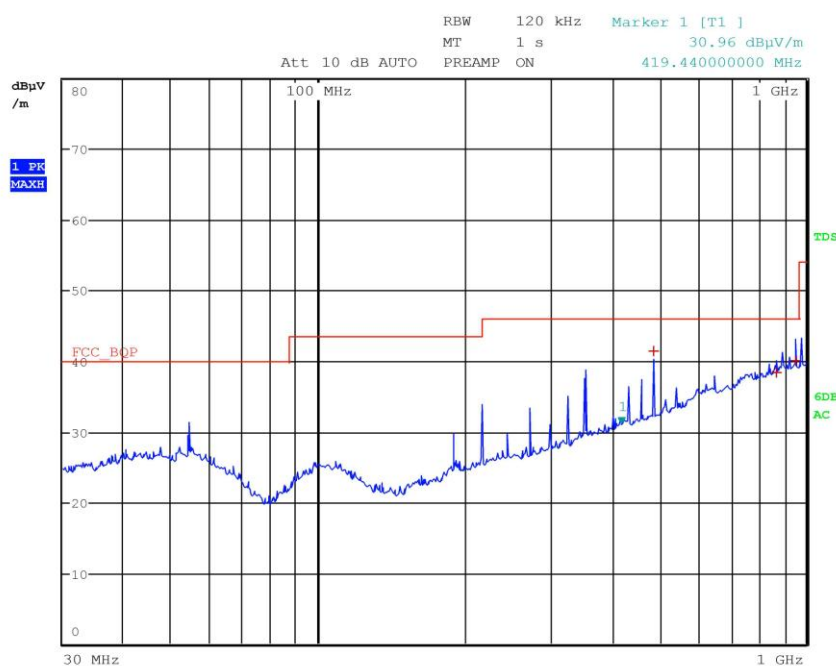
Meas Time: 1 s
Margin: 6 dB
Subranges: 5

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	54.240000000 MHz	38.02	Quasi Peak	-1.98
1	488.200000000 MHz	36.68	Quasi Peak	-9.34
1	569.560000000 MHz	35.02	Quasi Peak	-11.00
1	596.680000000 MHz	37.82	Quasi Peak	-8.20
1	623.800000000 MHz	38.41	Quasi Peak	-7.61



G13137806

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition In lettura chiavetta
Operator Bertezzo 13137806
Test Spec
Horiz



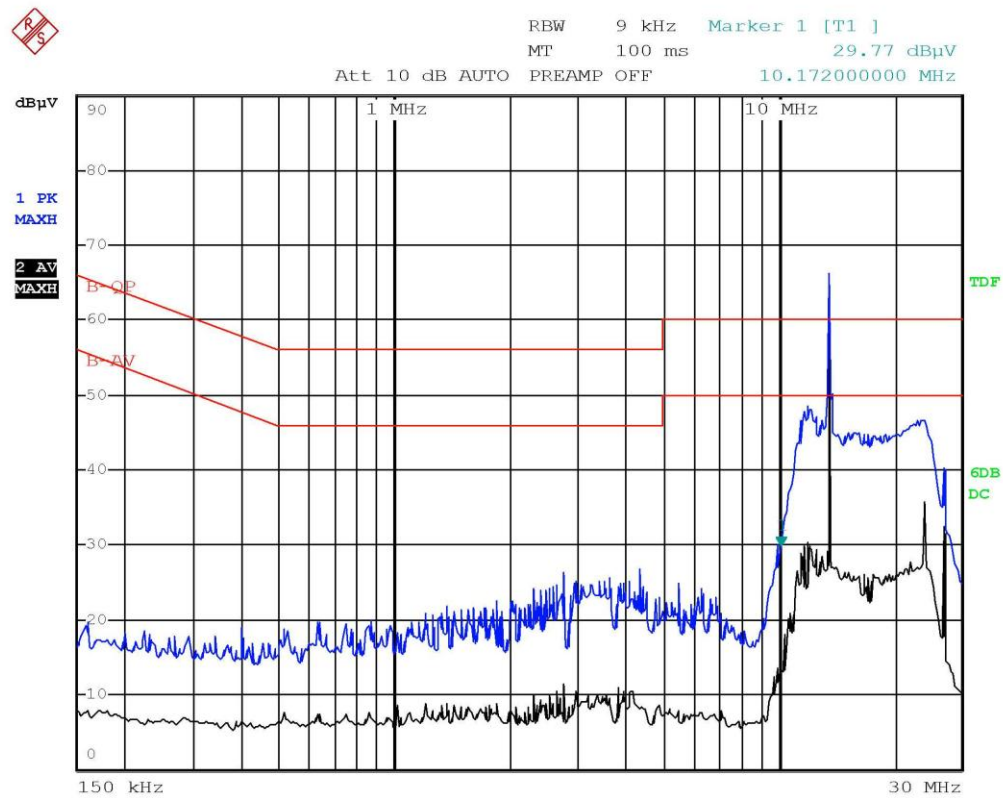
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 3

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	488.20000000 MHz	41.35	Quasi Peak	-4.67
1	867.92000000 MHz	38.40	Quasi Peak	-7.62
1	949.24000000 MHz	40.05	Quasi Peak	-5.97



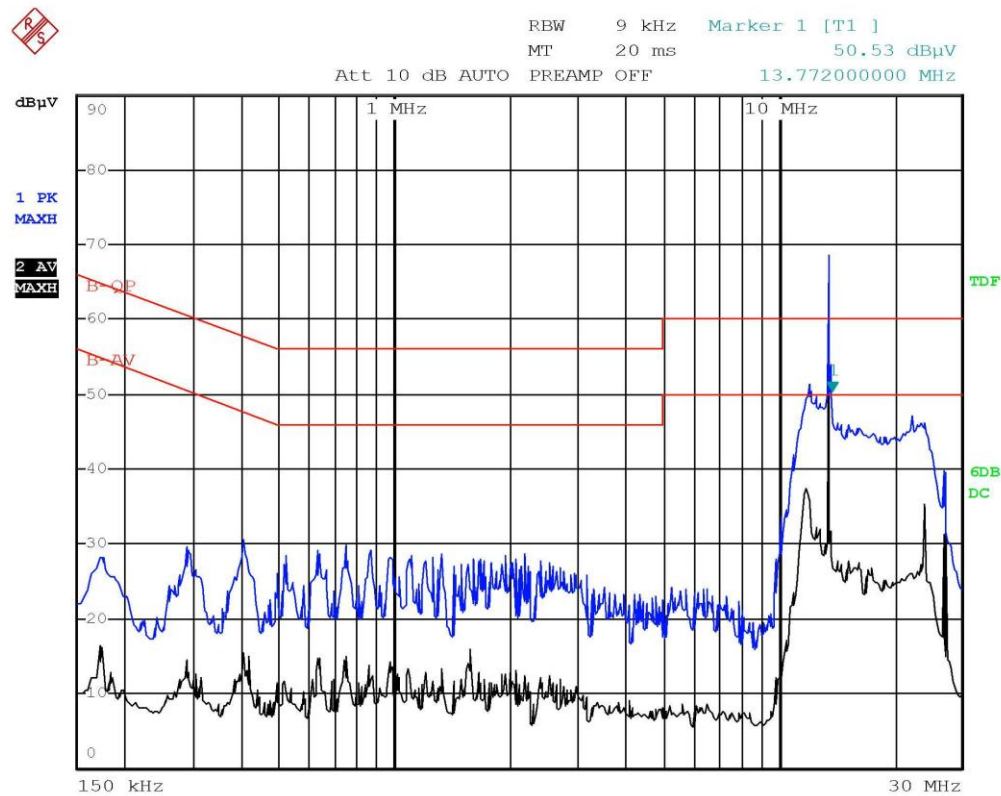
G13137807



Bertezzo 13137807 Line - in TX



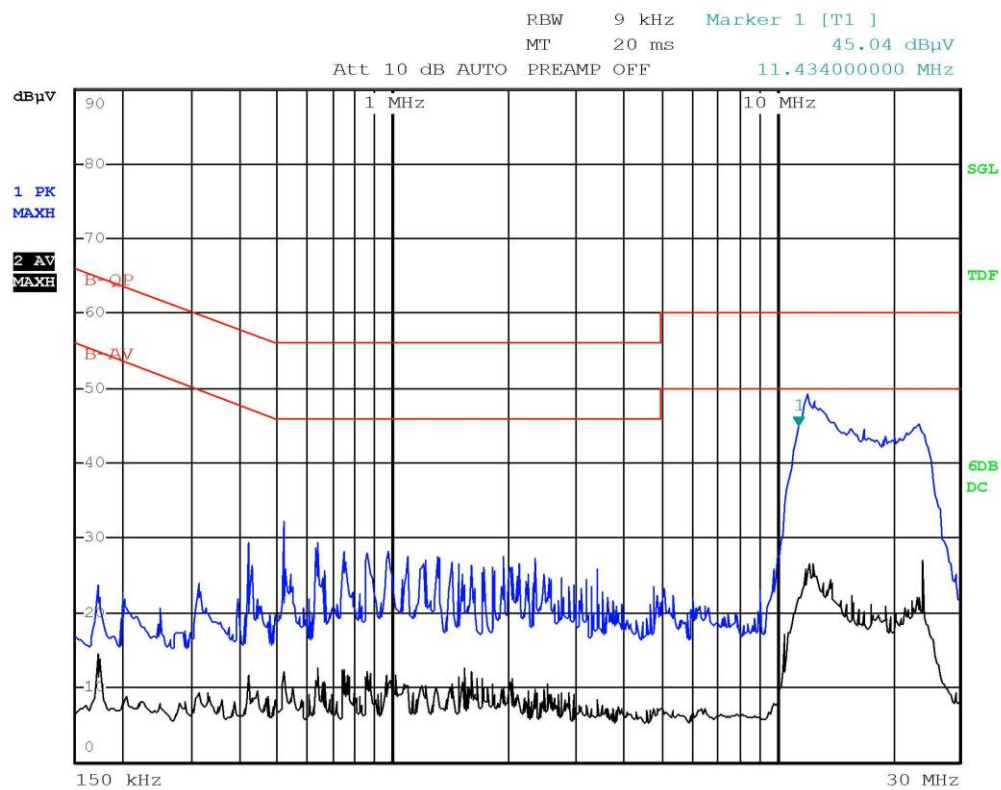
G13137808



Bertezzo 13137808 Line + in TX



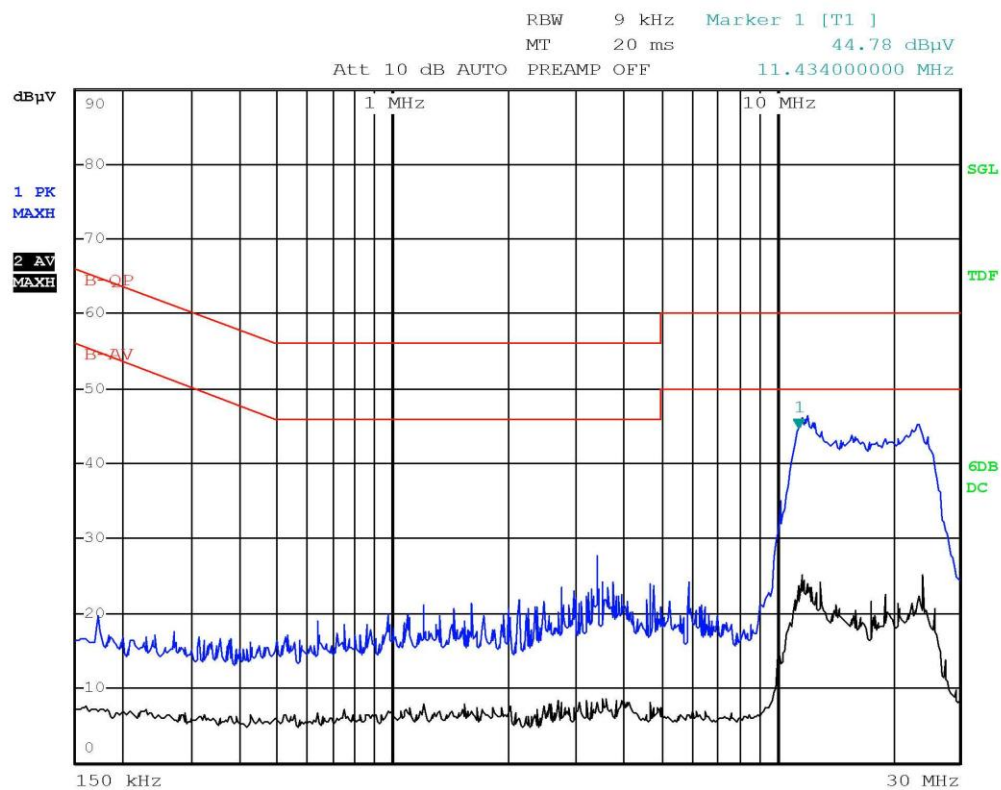
G13137809



Bertezzo 13137809 Line + in TX Dummy load



G13137810



Bertezzolo 13137810 Line - in TX Dummy load