

Test Report

Radio Frequency Devices – Intentional Radiators

Test Report – No.: 2224079KAU-002a-1

Date of issue: 2015-08-25

This test report is an update of a former issued test report, the changes are explained on the page „Test Results – Overview

Type: MCR708

Identical types: MCR708G / DCR708 / DCR708G

Description of the EUT: MFP RFID Reader

Serialnumber: 05D543188715 (radiated emission)
05D743157938 (conducted emission)

Manufacturer and Applicant: Inepro BV

Address: Pondweg 7
2153 PK Nieuw-Vennep
The Netherlands

Summary:

The EUT supports all RFID card technologies in the 13.56 MHz and the 125 kHz range. This report applies to the 13.56 MHz RF part.

Referring to the emission limits and the operating mode during the tests specified in this report the equipment complies with the requirements according to 47 CFR Part 15, Subpart C, Intentional radiators, section 15.225 / RSS-210, Issue 8 and RSS-GEN, Issue 4

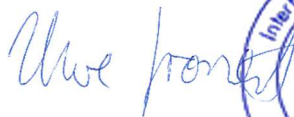
Test methods according to ANSI C63.10-2009

Test Laboratory:

Intertek Deutschland GmbH, Innovapark 20, 87600 Kaufbeuren

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This test report consists of 25 pages. All measurement results exclusively refer to the equipment, which was tested. Reproduction of this report except in its entirety is not permitted without written approval of Intertek Deutschland GmbH.

Revision History

Edition	Date	Description
1	2015-08-10	First release
2	2015-08-25	Conducted emission results added

Details about Accreditation/ Acceptance

EMC/ Radio National



The Intertek Deutschland EMC- Lab is accredited of the Deutsche Akkreditierungsstelle GmbH (DAkkS)

Registration Number: **D-PL-12085-01-01**

International



The Intertek Deutschland EMC- Lab is accepted of the Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE)

CB Test Laboratory: **TL118**



The Intertek Deutschland EMC- Lab is listed at the Federal Communications Commission (FCC)

Registration Number: **498399**



The Intertek Deutschland EMC- Lab is listed at Industry Canada

No. **8882A-1** (OATS) and **8882A-2** (3 m alternative test site)

Automotive



The Intertek Deutschland EMC- Lab is recognized technical Service of the Kraftfahrt-Bundesamt (KBA)

Registration Number: **KBA-P 00046**

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1 Equipment under test (EUT)

1.1 Description of the EUT

The MFP RFID Reader (MCR708) are card reader specially developed for a multifunctional printer (MFP). The card reader are attached to an MFP and is connected to the DocuPRO server, the document accounting software from Inepro. Users identify themselves using their card on the MFP RFID Reader, after which their print jobs are released at the MFP. This is a secure way to prevent unnecessary paper workflow falling into the hands of third parties. The MFP RFID Reader is available in different versions. The Multi supports all card technologies in the 13.56MHz and the 125kHz range. Tested was the MCR708. The MCR708G / DCR708 / DCR708G differ in terms of the housing and the housing color.

1.2 Identification of the EUT according to the manufacturer/client declaration

Type/ Model:	MCR708		
Description of the EUT:	MFP RFID Reader		
Transmitter frequency range:	125 kHz and 13.56 MHz		
Frequency agile or hopping:	☐ Yes	☒ No	
Antenna:	☒ Internal antenna	☐ External antenna	
Antenna connector:	☒ None, internal antenna	☐ Yes, type	
Type of modulation:	Transponder: AM		
Temperature range:	☐ Category I (General): -20°C to +55°C ☐ Category II (Portable equipment): -10°C to +55°C ☒ Category III (Equipment for normal indoor use): +5°C to +35°C ☐ Other:		
Power rating:	<0,5 A (power supply via USB)		
Transmitter stand by mode supported:	☒ Yes	☐ No	

1.3 Additional hardware information about the EUT

The EUT consists of the following units:

See 2.4

1.4 Peripheral equipment

Peripheral equipment is defined as equipment needed for correct operation of the EUT during the tests, but not included as a part of the testing and evaluation of the EUT.

See 2.4

1.5 Test signals

The radiated emission tests of the MCR708 were done with modulation.

1.6 Modification during the tests

No modifications have been made during the tests.

2 Test specifications

2.1 Standards

47 CFR Part 15, Subpart C, Intentional radiators, section 15.207 and section 15.225 /
RSS-210, Issue 8 and RSS-GEN, Issue 4

Test methods in:

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

2.2 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

2.3 Test site

Measurements were performed at:

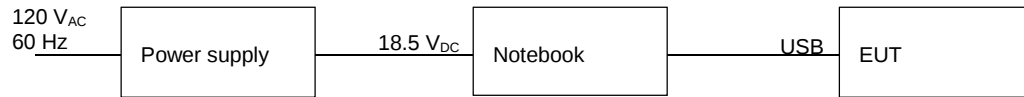
Intertek Deutschland GmbH, Innovapark 20, 87600 Kaufbeuren

Test sites:

Measurement Chamber	Type of chamber	IC Site filing #
OATS	10m	8882A-1
ANECHOIC CHAMBER 1	Semi-anechoic 3m	8882A-2

2.4 Test set-up

This is the principle block diagram.



2.5 Test conditions

The radiated emission tests of the MCR708 were done with modulation.

If not additionally specified, the tests were performed under the following environmental conditions:

Parameter	Normal
Supplying voltage via USB port	5 V _{DC}
Nominal voltage range	5 V _{DC}
Permitted input voltage:	5 V _{DC}

3 Test summary

The results in this report apply only to the tested sample:

Test	Result	Section in report	Note
Standard test methods			
AC power-line conducted tests	Pass	9	
Radiated test below 30 MHz	Pass	4, 5	
Radiated emissions measurements from 30 to 1000 MHz	Pass	6	
Determination of radiated and antenna conducted emissions above 1 GHz	NA		
Frequency Stability Test	Pass	7	
Occupied bandwidth test	Pass	8	
Output Power average symbol envelope power	NA		
Power Spectral Density < 40 GHz	NA		
Power Spectral Density > 40 GHz	NA		
In-situ measurements	NA		
Polar plot, main lobe and variation on radiated emissions test	NA		
Device-specific tests			
Measurement of cable locating equipment	NA		
Determining of cordless telephone handset security code	NA		
Determination of total input power	NA		
Procedure determining compliance for periodic operation [15.231, 15.240(b)]	NA		
Determining the average value of pulsed emissions per 15.35(c)	NA		
Comparison of limits per 15.231(b)(3)	NA		
Procedure to determine compliance of frequency pairing for 47 CFR 15.233(b)(2)	NA		
Determination of frequency hopping compliance per 47 CFR 15.247	NA		
Determination of digital modulation compliance per 47 CFR 15.247	NA		
Determination of peak conducted output unlicensed wireless device power [15.247(b), 15.255]	NA		
Determination of maximum conducted output power (15.247, 15-E)	NA		
Determination of MIMO compliance (2nd edition)	NA		
Determination of Smart antenna compliance (2nd edition)	NA		
Determination of antenna gains, including those emitting in multiple directions (15.247)	NA		
Determination of compliance with RF exposure limits	NA		
Millimeter wave test procedures for systems operating at 54GHz and greater	NA		
Determination of EIRP (15-F)	NA		
Determination Transmitter Etiquette FCC Part 15.255	NA		
Determination of Dynamic Frequency Selection (DFS) including Channel Move Time and In Service Monitoring	NA		
Determination of channel availability	NA		
Determination of Dynamic Frequency Selection including Channel Move Time	NA		
Determination of transmitter power control (TPC) (15-E)	NA		
Peak excursion measurement for UNII devices	NA		
Determination of UWB bandwidth	NA		
Determination of the center frequency, f _C , and highest radiated emissions, f _M (15-F)	NA		

NT = Not Tested, by request of the Client

NA = Not Applicable

Inepro BV

MCR708

2224079KAU-002a-1/ 2015-08-25

R_FCC_IC-Radio_14-11

4 Field strength 13.110 MHz – 14.010 MHz (Emission Mask)

Date of test:	2015-06-29	Test location:	Anechoic chamber 1
EUT Serial:	05D543188715	Ambient temp.	23.7 °C
Tested by:	UGR	Relative humidity	45 %
Test result:	Pass	Margin:	> 50 dB

4.1 Requirement

Reference: FCC §15.225 (a) – (c) and IC RSS-210, Issue 8, section A2.6

Methods of measurement: ANSI C63.10, Clause 6.4 and RSS-Gen 6.13 / 8.9

The limits below 30 MHz are given for different measurement distances. The limits below 30 MHz are converted to 3 m by using the extrapolation factor 40 dB/decade (according to §15.31).

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)	Field strength (dBμV/m)	Measurement distance (m)
13.110 - 13.410	106	40.5	30	80.5	3
13.410 - 13.553	334	50.5	30	90.5	3
13.553 - 13.567	15848	84.0	30	124.0	3
13.567 - 13.710	334	50.5	30	90.5	3
13.710 - 14.010	106	40.5	30	80.5	3

4.2 Test setup details

Compliance with the spectrum mask is tested using a spectrum analyzer with resolution bandwidth set to a 1 kHz for the band 13.553 to 13.567 MHz and to 10 kHz outside this band. The video bandwidth shall be at least three times greater than the resolution bandwidth.

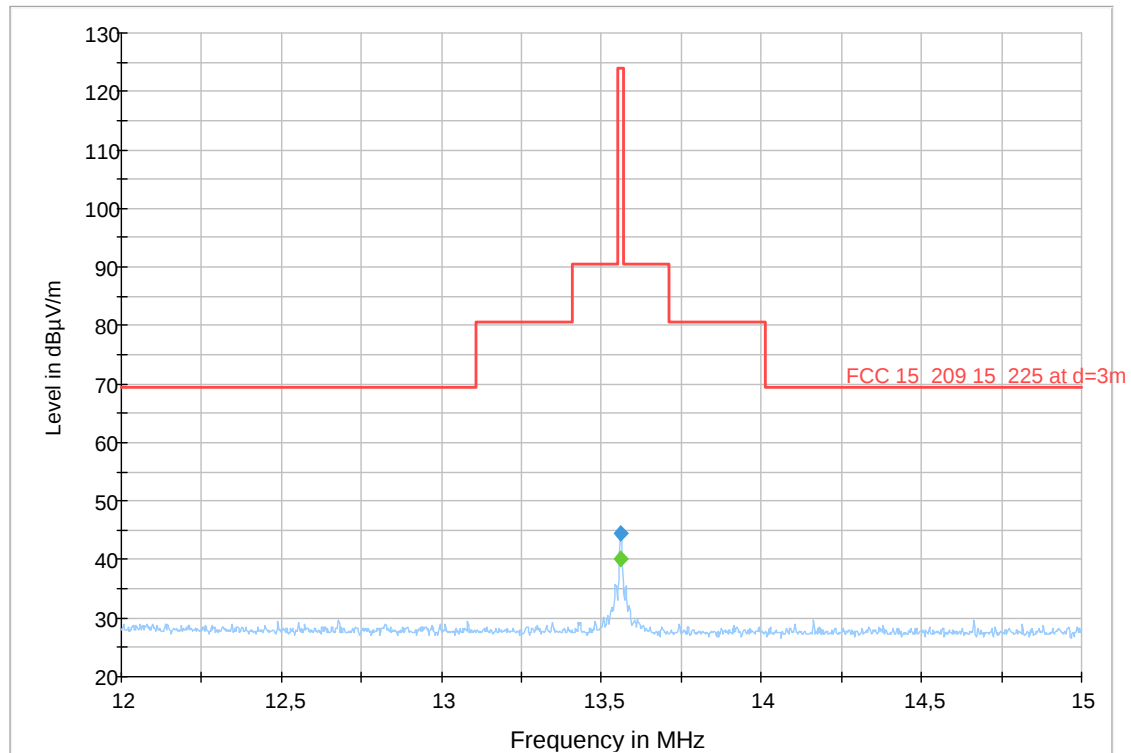
The test was carried out automatically by the test receiver.

The EUT is a table-top EUT and was standing on a table made of Styrodur with a Pertinax plate on top and the dimensions 1.6 m x 1.0 m x 0.8 m (Length x Width x Height).

4.3 Test data

Overview sweeps performed with peak detectors

FCC 15.209 9kHz-30MHz



Frequency MHz	Disturbance Level dBμV/m	RBW kHz	Detector	Limit dBμV/m	Margin dB
13.56	44.4	100	Peak	124	79.6

4.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver, 10 Hz- 7 GHz	Rohde & Schwarz	ESR 7	PM KF 2441	2015-06
Loop antenna, 9 kHz- 30 MHz	Rohde & Schwarz	HFH2-Z2	PM KF 1401	2016-03

5 Radiated test below 30 MHz

Date of test:	2015-06-29	Test location:	Anechoic chamber 1
EUT Serial:	05D543188715	Ambient temp.	23.7 °C
Tested by:	UGR	Relative humidity	45 %
Test result:	Pass	Margin:	>30 dB

5.1 Requirement

Reference: FCC §15.225 (d)/ §15.209 and IC RSS-210, Issue 8, section A2.6

Methods of measurement: ANSI C63.10, Clause 6.4 and RSS-Gen 6.13 / 8.9

The limits below 30 MHz are given for different measurement distances. The limits below 30 MHz are converted to 3 m by using the extrapolation factor 40 dB/decade (according to §15.31)

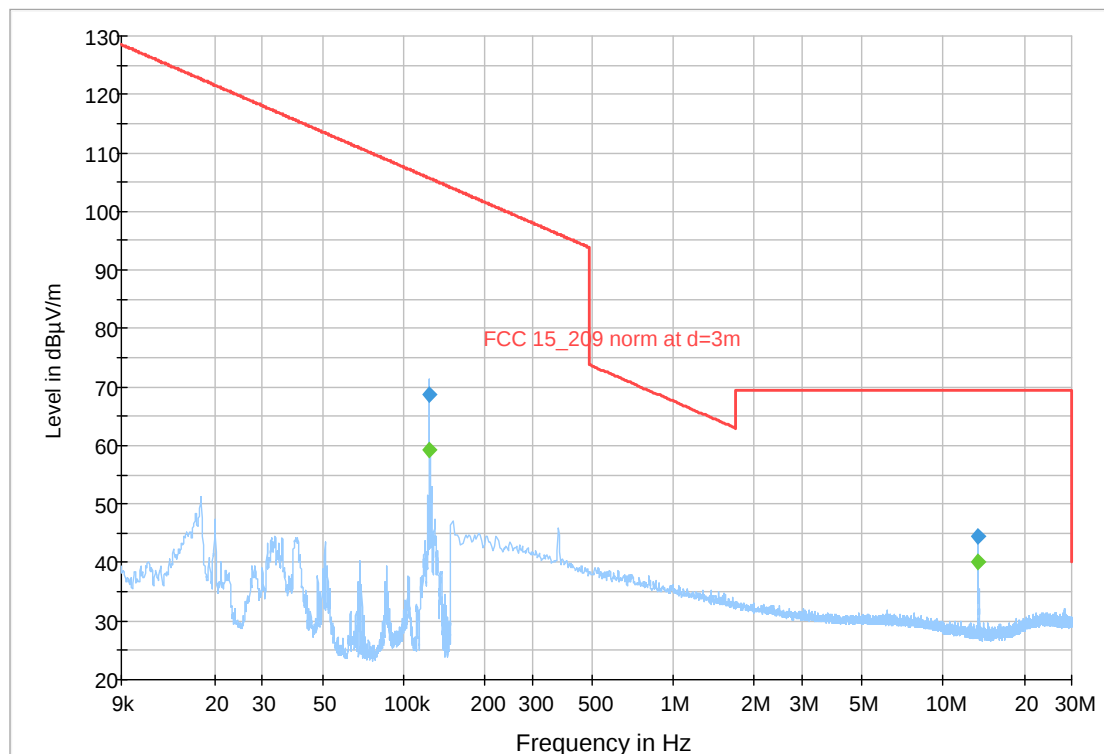
Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	$67.6 - 20 \cdot \log(F(\text{kHz}))$	300
0.490 - 1.705	24000/F(kHz)	$87.6 - 20 \cdot \log(F(\text{kHz}))$	30
1.705 - 13.110	30	29.5	30
14.010 - 30.000	30	29.5	30
Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.			

5.2 Test setup details

see 4.2

5.3 Test data

FCC 15.209 9kHz-30MHz



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
0.125000	68.8	5000.0	0.200	100.0	H	150.0	20.5	36.9	105.7
13.560000	44.4	5000.0	9.000	100.0	H	130.0	20.1	---	---

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
0.125000	
13.560000	Carrier of the RFID transmitter

Final Result 2

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
0.125000	59.3	5000.0	0.200	100.0	H	150.0	20.5	
13.560000	40.1	5000.0	9.000	100.0	H	130.0	20.1	

5.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver, 10 Hz- 7 GHz	Rohde & Schwarz	ESR 7	PM KF 2441	2015-06
Loop antenna, 9 kHz- 30 MHz	Rohde & Schwarz	HFH2-Z2	PM KF 1401	2016-03

6 Radiated emissions measurements from 30 MHz to 1000 MHz

2015-06-29	2015-06-25	Test location:	Anechoic chamber 1
EUT Serial:	05D543188715	Ambient temp.	23.8 °C
Tested by:	UGR	Relative humidity	35 %
Test result:	Pass	Margin:	2.9 dB

6.1 Requirement

Reference: FCC §15.225 (d)/ §15.209 and IC RSS-210, Issue 8, section A2.6

Methods of measurement: ANSI C63.10, Clause 6.5 and RSS-Gen 6.13 / 8.9

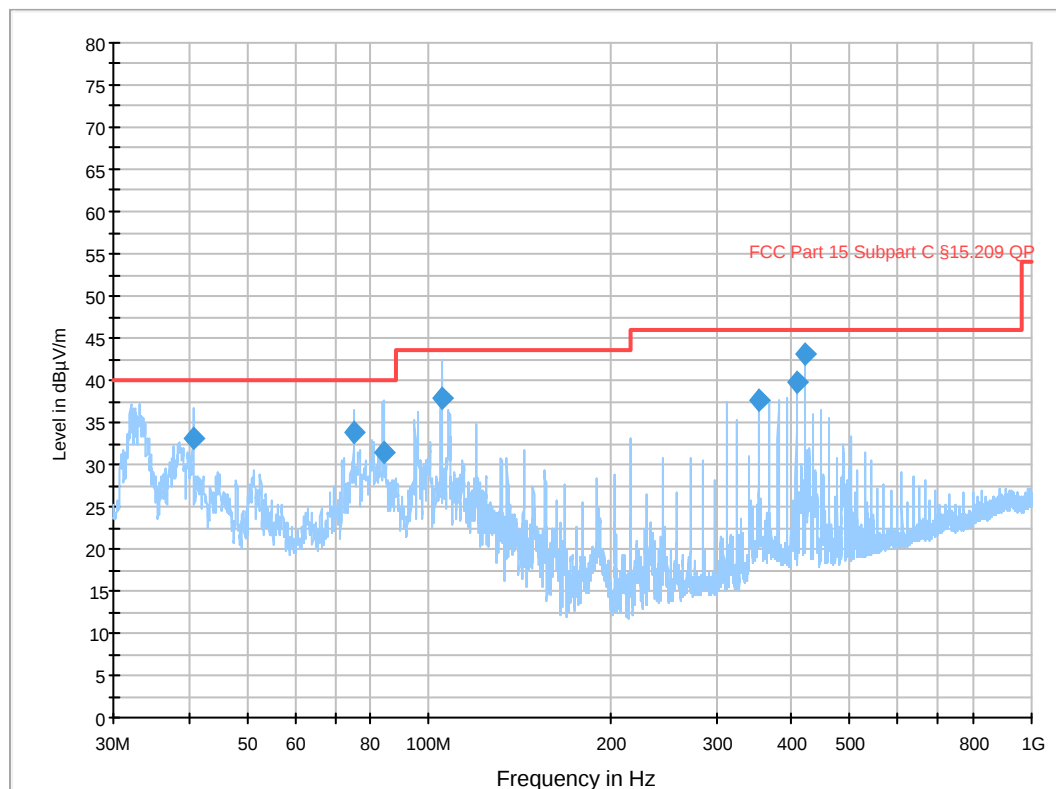
Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
30 – 88	100	40.0	3
88 – 216	150	43.5	3
216 – 960	200	46.0	3
Above 960	500	54.0	3

6.2 Test setup details

The EUT is a table-top EUT and was standing on a table made of Styrodur with a Pertinax plate on top and the dimensions 1.6 m x 1.0 m x 0.8 m (Length x Width x Height).

6.3 Test data

Overview sweeps performed with peak detectors and final measurement with quasi-peak detectors.



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
40.680000	33.1	1000.0	120.000	100.0	V	20.0	15.6	6.9	40.0
75.000000	33.7	3.0	120.000	120.0	V	190.0	9.8	6.3	40.0
84.030000	31.4	1000.0	120.000	110.0	V	180.0	10.6	8.6	40.0
105.000000	37.8	1000.0	120.000	100.0	V	20.0	11.7	5.7	43.5
352.560000	37.5	1000.0	120.000	120.0	H	93.0	14.3	8.5	46.0
406.800000	39.8	1000.0	120.000	120.0	H	250.0	15.6	6.2	46.0
420.360000	43.1	1000.0	120.000	120.0	H	112.0	16.1	2.9	46.0

6.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver, 10 Hz- 7 GHz	Rohde & Schwarz	ESR 7	PM KF 2441	2015-06
Antenna, 30-3000 MHz	Rohde & Schwarz	HL 562	PM KF 1123	2016-01

7 Frequency stability measurements

Date of test:	2015-07-06	Test location:	Test place 4
EUT Serial:	05D543188715	Ambient temp.	25.2 °C
Tested by:	UGR	Relative humidity	64 %
Test result:	Pass		

7.1 Requirement

Reference: FCC §15.225 (e) and IC RSS-210, Issue 8, section A2.6/ RSS-Gen Issue 4, section 6.12
Methods of measurement: ANSI C63.10, Clause 6.5

Limit:	The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % (± 100 ppm) of the carrier frequency under nominal conditions.
Temperature range:	-30°C to +50°C (at normal supply voltage)
Voltage range:	5 V (nominal voltage of power supply via USB)

7.2 Test data

Temperature °C	Carrier MHz	Power supplied via USB	
		Frequency deviation	
		kHz	%
-30	13.56001937	19	0.00014%
-20	13.56002219	22	0.00016%
-10	13.56000672	7	0.00005%
0	13.55998016	-20	-0.00015%
20	13.55995656	-43	-0.00032%
30	13.55992781	-72	-0.00053%
40	13.55991625	-84	-0.00062%
50	13.55992688	-73	-0.00054%
55	13.56001937	19	0.00014%

At a temperature of 40°C the carrier level was reduced for 0.6 dB (minimum value).
At -20°C the carrier level was increased for 0.3 dB (maximum value).

7.3 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser, 10Hz- 40 GHz	Rohde & Schwarz	FSV 40	PM KF 2783	2015-09
Magnetic Field Pickup Coil	Rohde & Schwarz	HZ10	PM KF 0965	2016-10
Temperature chamber	Heraeus-Vötsch	HT4010	PM KF 1402	2016-02

8 Occupied Bandwidth

Date of test:	2015-07-06	Test location:	Test place 4
EUT Serial:	05D543188715	Ambient temp.	25.2 °C
Tested by:	UGR	Relative humidity	64 %
Test result:	Pass		

8.1 Requirement

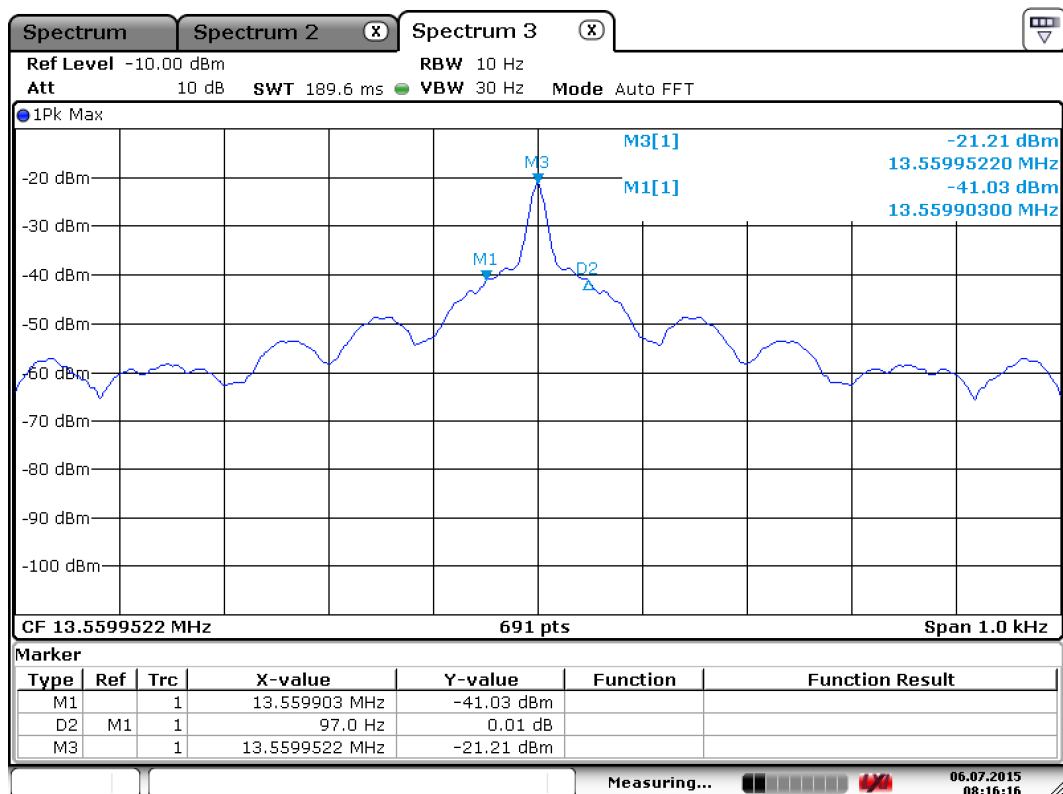
Reference: RSS-Gen, Issue 4, 6.6

8.2 Test setup details

The test setup was identical to the test setup at the radiated tests below 30 MHz.

8.3 Test data

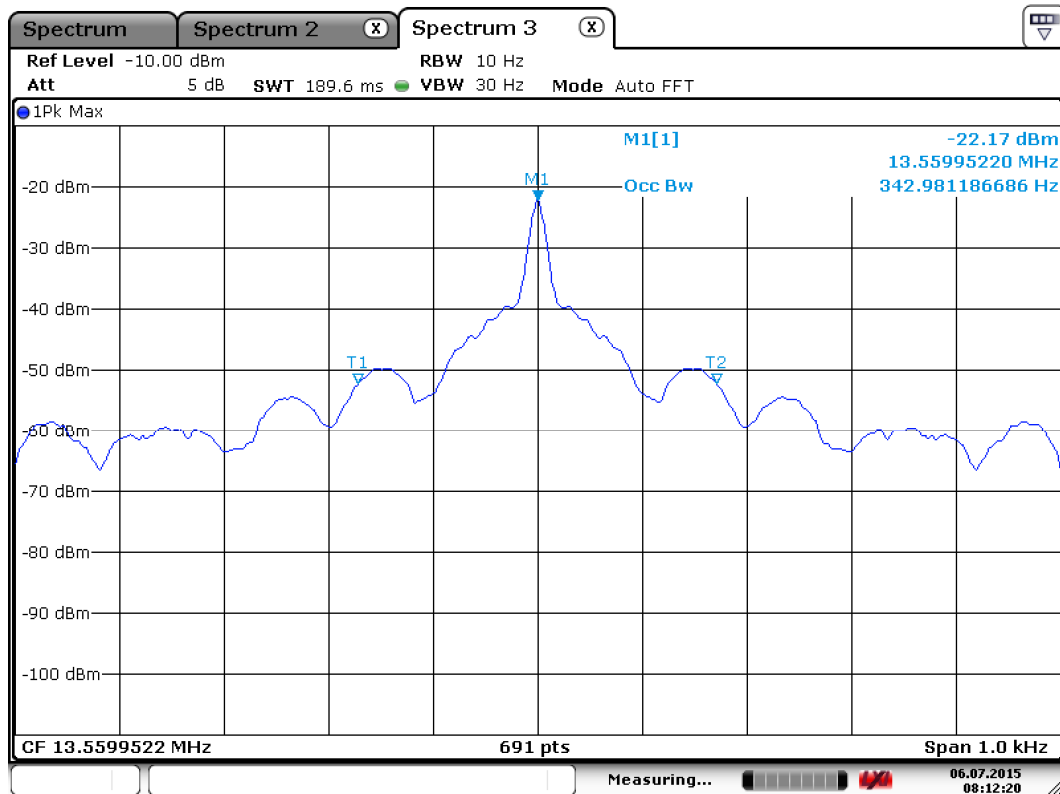
Occupied bandwidth (20 dB)



Date: 6.JUL.2015 08:16:16

Test result: The occupied bandwidth is 97 Hz

Occupied bandwidth (99%)



Date: 6.JUL.2015 08:12:20

Test result: The occupied bandwidth is 343Hz

8.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyzer, 10 Hz- 40 GHz	Rohde & Schwarz	FSV 40	PM KF 2783	2015-09
Magnetic Field Pickup Coil	Rohde & Schwarz	HZ10	PM KF 0965	2016-10

9 Conducted emission 150 kHz - 30 MHz

Normative references

Limits according to:	FCC §15.207
Methods of measurement according to:	ANSI C63.10, Clause 6.4

Test requirement

Frequency range	150kHz - 30 MHz
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Place of measurement

- ☒ Shielded cabin Siemens Matsushita CER Nr. C62128-A501-A945-1-0006
☐ Horizontal, vertical plane of reference

Test Procedure

The test was carried out automatically by the test receiver.

The EUT is a table-top EUT and was standing on a wooden table with the dimensions 1,5 m x 1,0 m x 0,8 m (Length x Width x Height).

Test result:

Test requirements ☒ **passed** ☐ **passed with modification** ☐ **not passed**

Comment

The conducted emissions between 150 kHz and 30 MHz are below the limits.

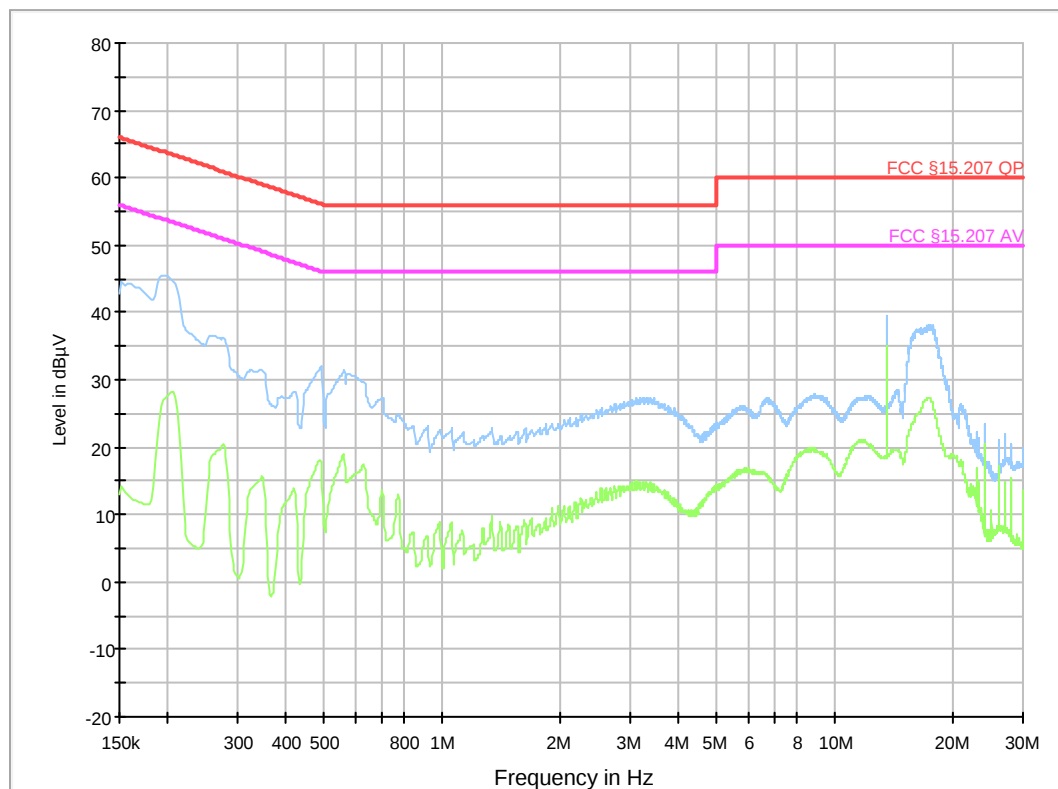
These data represent worst case emissions.

Measurement results - Conducted emission:

EMC32 Emission Report

Common Information

Test Description:	Radiated Spurious Emission
Tested Device	MCR708 (SNR: 05D743157938) / EUT with load in place of 13.56 MHz antenna
Test Standard:	FCC §15.207
Operating Conditions:	Normal operation
Operator Name:	UGR
Project Number:	24079
Test Date:	2015-08-25



10 Photos of the EUT

10.1 MCR708



Photo of the rating plate



Front side

10.2 MCR708G



Front side

10.3DCR708



Front side

10.4DCR708G



Front side

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