

Test Report

Customer:

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RF test report

130622-AU01+W01



Identive Technologies India Pvt., Ltd.

RF ID Reader

CLOUD 4701F



The test result refers exclusively
to the model tested.

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the written authorization by the lab.
Revision: 1.0



EMV **TESTHAUS** GmbH

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Accreditation:



Registration number: DGA-PL-224/95-03
CAB (EMC) registration number: BNetzA-CAB-02/21-02/3
FCC facility registration number: 221458
MRA US-EU, FCC designation number: DE0010

Test Laboratory:

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The technical accuracy is guaranteed through the quality management of the
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Page 2 of 32

Table of contents

1	Test regulations	5
2	Equipment under Test (EUT)	6
3	AC power line conducted emissions	8
4	Radiated emission measurement (<1 GHz)	18
5	Radiated emission measurement (<1 GHz)	29
6	Equipment calibration status	30
7	Measurement uncertainty	31
8	Summary	32



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RF ID Reader
CLOUD 4701F

130622-AU01+W01

Page 3 of 32

List of pictures

Picture 1: Outline of conducted emission test setup	9
Picture 2: Graphic - Conducted emission on mains, phase 1 (without termination).....	10
Picture 3: Table - Conducted emission on mains, phase 1 (without termination)	11
Picture 4: Graphic - Conducted emission on mains, neutral (without termination).....	12
Picture 5: Table - Conducted emission on mains, neutral (without termination)	13
Picture 6: Graphic - Conducted emission on mains, phase 1 (with 50Ohms termination)	14
Picture 7: Table - Conducted emission on mains, phase 1 (with 50 Ohms termination)	15
Picture 8: Graphic - Conducted emission on mains, neutral (with 50Ohms termination)	16
Picture 9: Table - Conducted emission on mains, neutral (with 50 Ohms termination).....	17
Picture 10: Test setup for radiated emission measurement (< 30 MHz).....	21
Picture 11: Test setup for radiated emission measurement (< 1 GHz).....	21
Picture 12: Radiated emission 9 kHz – 30 MHz @ 3m distance (13.56 MHz)	23
Picture 13: Radiated emission table 30 MHz – 1000MHz @ 3m distance, Vertical (13.56MHz)	24
Picture 14: Radiated emission table 30 MHz – 1000MHz @ 3m distance, Horizontal (13.56MHz)	25
.....	25
Picture 15: Lower – Upper band edge at 13.56 MHz @ 3m distance.....	26

List of tables

Table 1: Equipment Calibration status	30
Table 2: Measurement uncertainty	31



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 RF ID Reader
 CLOUD 4701F

1 Test regulations

CFR 47 Part 2: 10-2013	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)
CFR 47 Part 15: 10-2013	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)
ANSI C63.4: September 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.1 Summary of test results

Standard	Test result
FCC CFR 47 Part 15	Passed



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RF ID Reader
CLOUD 4701F

130622-AU01+W01

Page 5 of 32

2 Equipment under Test (EUT)

Product type: RFID reader
Model Name: CLOUD 4701F
Manufacturer: Identive GmbH
Serial number: 5504134920 0001
FCC ID: MBPCLOUD47X1F-001
Application freq. band: N/A
Frequency range: 13,56MHz
Operating frequency: 13,56MHz
Number of RF-channels: 1
Modulation: ASK
Antenna type: PCB antenna
 detachable not detachable

Power supply: External power source
nominal: 5.0 VDC (USB powered)

Temperature range: -20°C to +70°C

Remark:
The tests were performed with 120V AC / 60Hz.



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CLOUD 4701F

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Page 6 of 32

2.1 Photo documentation

For photos of the EUT, see annex B.
For photos taken during testing, see annex A.

2.2 Short description of the EUT

RFID reader 13,56MHz

2.3 Operation mode

The EUT was tested in the following operation modes:

preconfigured by manufacturer
the RFID reader will be activated via RFID card for continuous transmission.

2.4 Configuration

The following peripheral devices and interface cables were connected during the tests:

Device	Model:	S/N
RFID reader	CLOUD 4701F	5504134920 0001
Notebook with PSU	Fujitsu Lifebook A531 PSU: ADP-65JH AD	YLDS0113893

Used cables

Numbers:	Description: (type / lengths / remarks)	Serial No
1	(EUT) USB cable / 1.5m / shielded	N/A
1	(Notebook) AC cable, unshielded, 1.5m	N/A



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RF ID Reader
CLOUD 4701F

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Page 7 of 32

3 AC power line conducted emissions

according to CFR 47 Part 15, section 15.207

3.1 Test location

Description	Manufacturer	Inventory No.
Shielded chamber	Siemens - Matsushita	E00107

3.2 Test instruments

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESCS 30	Rohde & Schwarz	E00003
<input type="checkbox"/>	ESU 26	Rohde & Schwarz	W00002
<input type="checkbox"/>	ESCI	Rohde & Schwarz	E00001
<input type="checkbox"/>	ESH3 Z2	Rohde & Schwarz	E00028
<input checked="" type="checkbox"/>	ESH 2-Z5	Rohde & Schwarz	E00004
<input checked="" type="checkbox"/>	ESH 2-Z5	Rohde & Schwarz	E00005

3.3 Limits

Frequency [MHz]	Quasi-peak [dB μ V]	Average [dB μ V]
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5 – 30	60	50



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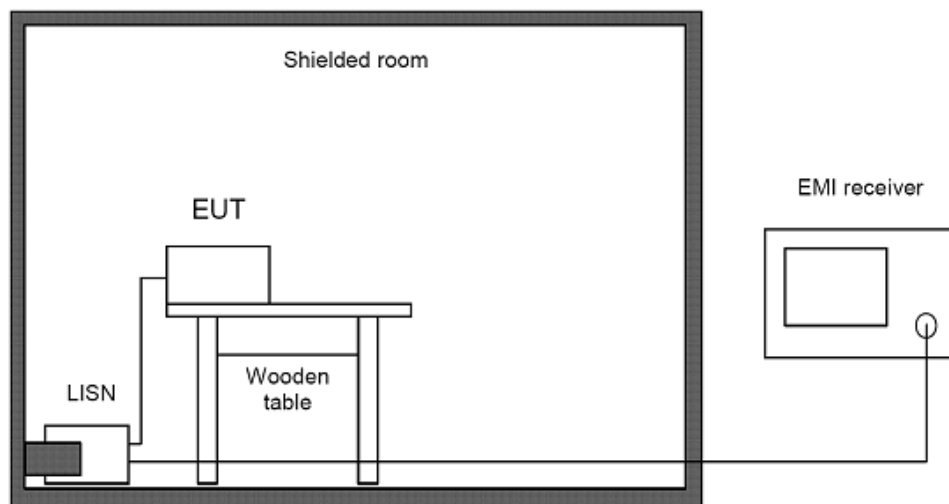
Page 8 of 32

3.4 Test procedure

1. The tests of conducted emission were carried out in a shielded room using a line impedance stabilization network (LISN) 50 μ H/50 Ohms and an EMI test receiver.
2. The EMI test receiver was connected to the LISN and set to a measurement bandwidth of 9 kHz in the frequency range from 0.15 MHz to 30 MHz.
3. The EUT was placed on a wooden table and connected to the LISN.
4. To accelerate the measurement the detector of the EMI test receiver was set to peak and the whole frequency range from 0.15 MHz to 30 MHz were scanned.
5. After that all peaks values with fewer margins than 10 dB to quasi-peak limit or exceeding the limit were marked and re-measured with quasi-peak detector.
6. If after that all values are under the average limit no addition measurement is necessary. In case there are still values between quasi-peak and average limit than these values were re-measured again with an average detector.
7. These measurements were done on all current carrying conductors.

According to ANSI C63.4, section 13.1.3.1 testing of intentional radiators with detachable antennas shall be done with a dummy load otherwise the tests should be done with connected antenna and if adjustable fully extended.

3.5 Test setup

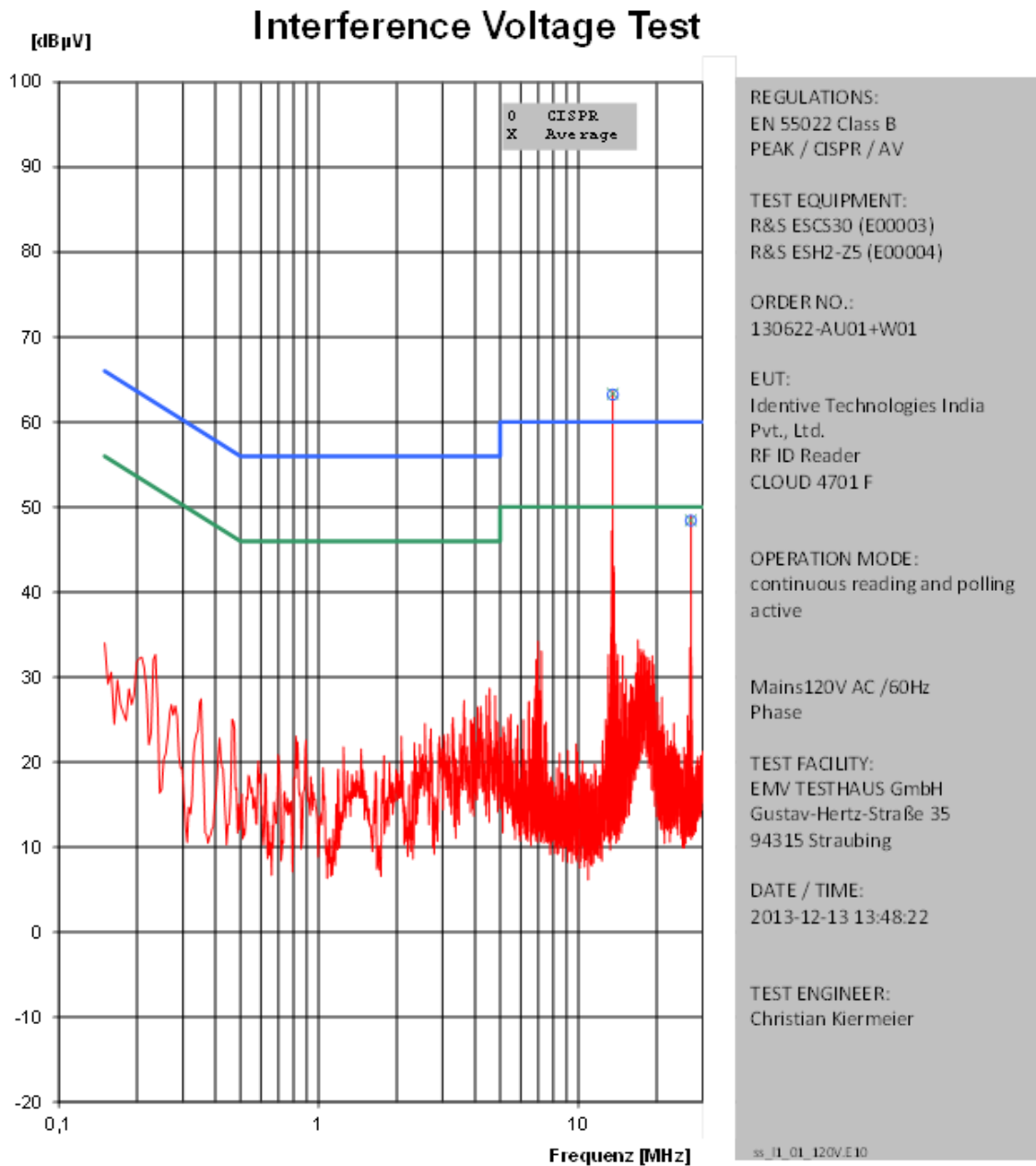


Picture 1: Outline of conducted emission test setup

Comments: All peripheral devices were additionally decoupled by means of a line stabilization network.

3.6 Test results

Temperature:	21°C	Humidity:	41%
Tested by:	Christian Kiermeier	Test date:	2013-12-13



Picture 2: Graphic - Conducted emission on mains, phase 1 (without termination)



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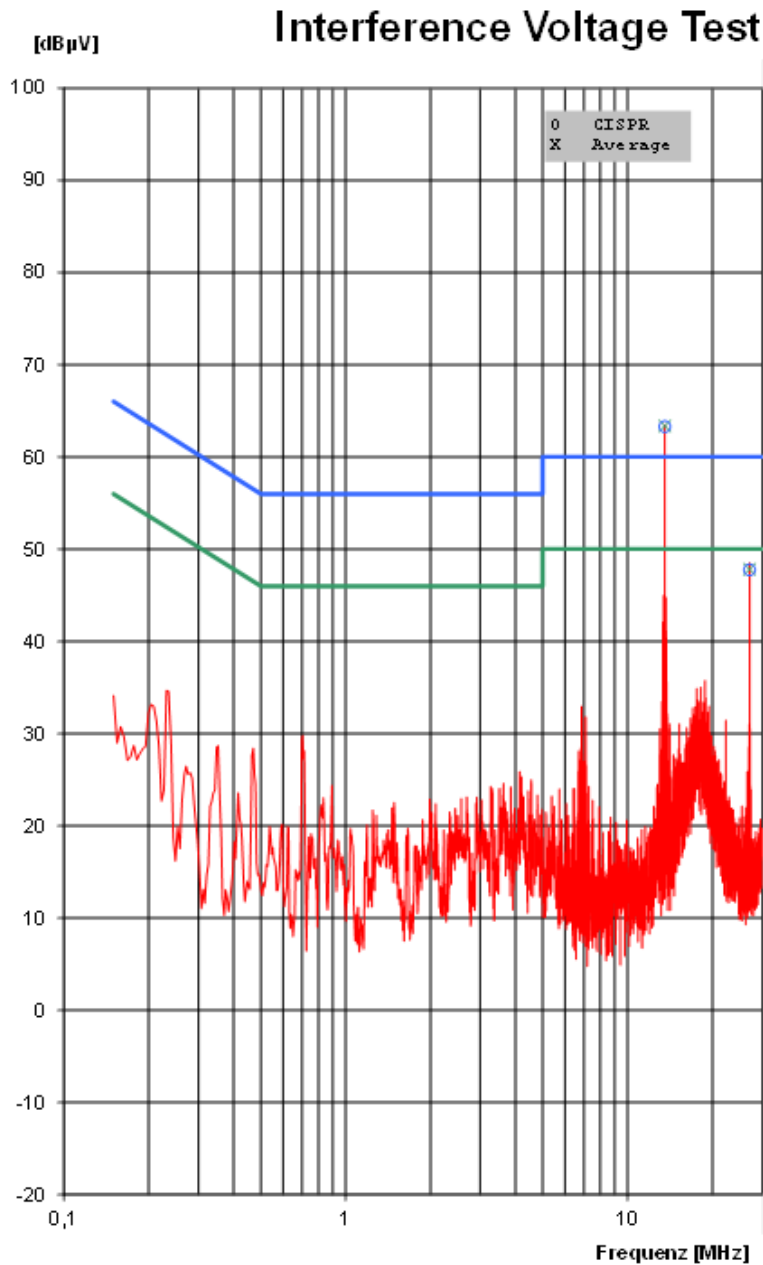
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Interference Voltage Test

Freq. [MHz]	U_CISPR [dBμV]	Limit [dBμV]	delta_U [dB]	U_AV [dBμV]	Limit [dBμV]	delta_U [dB]	Corr. [dB]	Remark
13,56	63,2	60,0	-3,2	63,3	50,0	-13,3	0,0	
27,12	48,4	60,0	11,6	48,4	50,0	1,6	0,0	

Picture 3: Table - Conducted emission on mains, phase 1 (without termination)





REGULATIONS:
EN 55022 Class B
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
130622-AU01+W01

EUT:
Identive Technologies India
Pvt., Ltd.
RF ID Reader
CLOUD 4701 F

OPERATION MODE:
continuous reading and polling
active

Mains 230V AC /50Hz
Neutral

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2013-12-13 13:49:35

TEST ENGINEER:
Christian Kiermeier

ss_n_01_120V_E10

Picture 4: Graphic - Conducted emission on mains, neutral (without termination)



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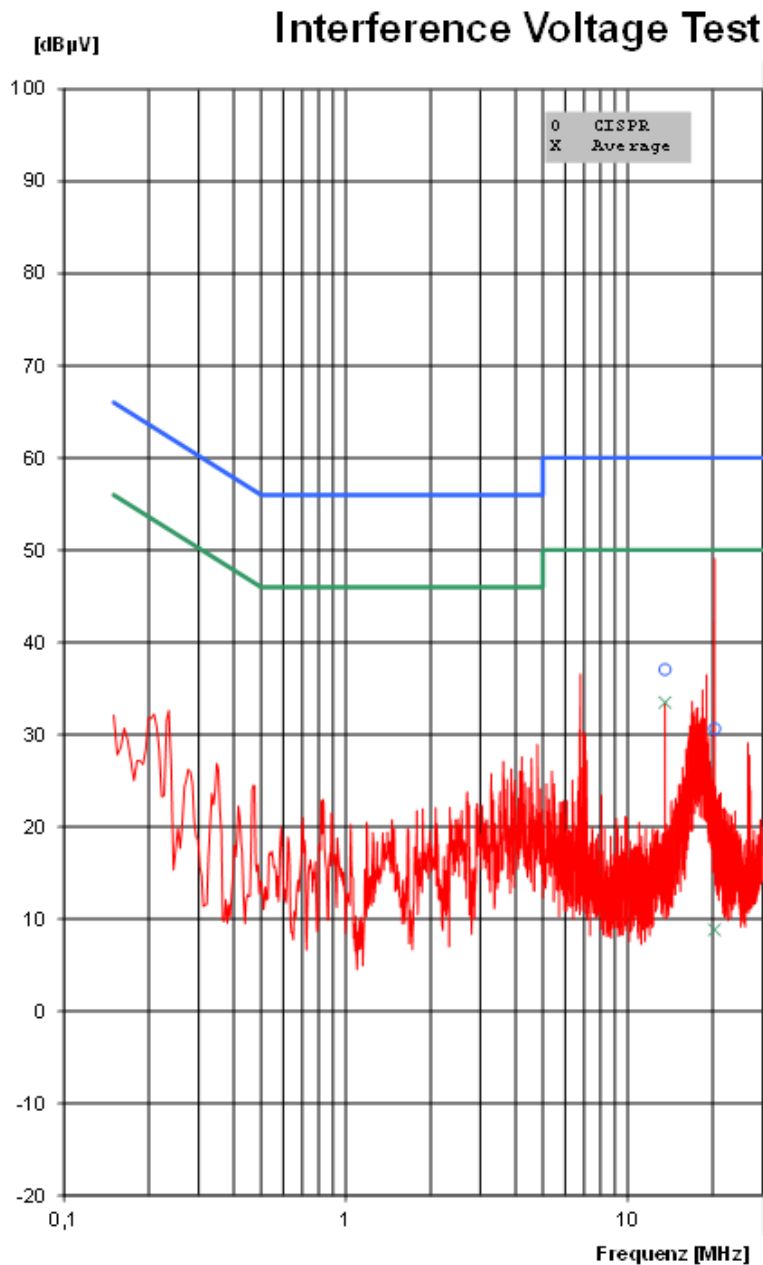
Page 12 of 32

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBμV]	Limit [dBμV]	delta_U [dB]	U_AV [dBμV]	Limit [dBμV]	delta_U [dB]	Corr. [dB]	Remark
13,56	63,3	60,0	-3,3	63,3	50,0	-13,3	0,0	
27,12	47,8	60,0	12,3	47,8	50,0	2,2	0,0	

Picture 5: Table - Conducted emission on mains, neutral (without termination)





REGULATIONS:
 EN 55022 Class B
 PEAK / CISPR / AV

TEST EQUIPMENT:
 R&S ESCS30 (E00003)
 R&S ESH2-Z5 (E00004)

ORDER NO.:
 130622-AU01+W01

EUT:
 Identive Technologies India
 Pvt., Ltd.
 RF ID Reader
 CLOUD 4701 F

OPERATION MODE:
 continuous reading and polling
 active
 terminated with 50ohms

**Mains 120V AC /60Hz
 Phase**

TEST FACILITY:
 EMV TESTHAUS GmbH
 Gustav-Hertz-Straße 35
 94315 Straubing

DATE / TIME:
 2013-12-13 13:48:22

TEST ENGINEER:
 Christian Kiermeier

ss_01_02_120V_E10

Picture 6: Graphic - Conducted emission on mains, phase 1 (with 50Ohms termination)



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130622-AU01+W01

Page 14 of 32

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
13,56	37,1	60,0	23,0	33,5	50,0	16,5	0,0	
20,34	30,6	60,0	29,4	8,8	50,0	41,2	0,0	

Picture 7: Table - Conducted emission on mains, phase 1 (with 50 Ohms termination)

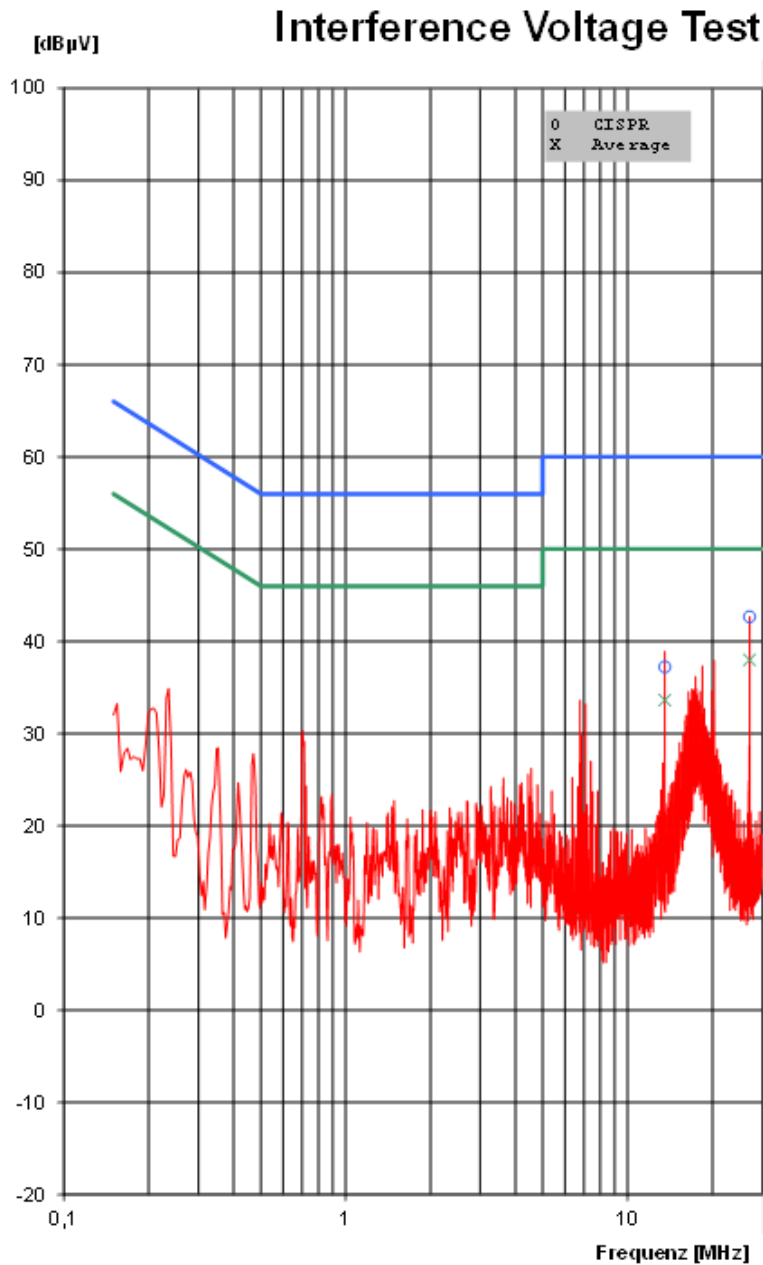


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Page 15 of 32



REGULATIONS:
EN 55022 Class B
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESCS30 (E00003)
R&S ESH2-Z5 (E00004)

ORDER NO.:
130622-AU01+W01

EUT:
Identive Technologies India
Pvt., Ltd.
RF ID Reader
CLOUD 4701 F

OPERATION MODE:
continuous reading and polling
active
terminated with 50ohms

Mains 120V AC /60Hz
Neutral

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2013-12-13 13:49:35

TEST ENGINEER:
Christian Kiermeier

ss_n_02_120V_E10

Picture 8: Graphic - Conducted emission on mains, neutral (with 50Ohms termination)



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CLOUD 4701F

130622-AU01+W01

Page 16 of 32

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
13,56	37,2	60,0	22,8	33,6	50,0	16,4	0,0	
27,12	42,7	60,0	17,3	38,0	50,0	12,0	0,0	

Picture 9: Table - Conducted emission on mains, neutral (with 50 Ohms termination)



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 CLOUD 4701F

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Page 17 of 32

4 Radiated emission measurement (<1 GHz)

according to CFR 47 Part 15, section 15.205(a), 15.209(a), 15.225(a, e)

4.1 Test Location

- Scan with peak detector in 3 m CDC.
- Final CISPR measurement with quasi peak detector on 3 m open area test site.

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open site area	EMV TESTHAUS GmbH	E00354

4.2 Test instruments

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESCS 30 (FF)	Rohde & Schwarz	E00003
<input type="checkbox"/>	ESU 26	Rohde & Schwarz	W00002
<input checked="" type="checkbox"/>	ESCI (CDC)	Rohde & Schwarz	E00001
<input checked="" type="checkbox"/>	VULB 9163 (FF)	Schwarzbeck	E00013
<input checked="" type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011
<input type="checkbox"/>	HFH2-Z2	Rohde & Schwarz	E00060
<input checked="" type="checkbox"/>	Feedline OATS	Huber & Suhner	200024



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RF ID Reader
CLOUD 4701F

130622-AU01+W01

Page 18 of 32

4.3 Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency [MHz]	Field strength Fs [μ V/m]	Field strength [dB μ V/m]	Measurement distance d [m]
0.009 – 0.490	266.6 – 4.9	48.5 – 13.8	300
0.490 – 1.705	48.98 – 14.08	33.8 – 22.97	30
1.705 – 30.0	30	29.54	30
30 – 88	100	40	3
88 – 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

In case the emission fall within the restricted band specified on 15.225 limit in the table below has to be followed.

Frequency [MHz]	Field strength Fs [μ V/m]	Field strength [dB μ V/m]	Measurement distance d [m]
13.553 – 13.567	15848	84	30
13.401 – 13.553	334	50.47	30
13.567 – 13.710	334	50.47	30



4.4 Test procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The receiving antenna was placed 3 meters from the turntable. The test setup was placed inside a compact diagnostic chamber.
2. Power on the EUT and all peripherals.
3. The broadband antenna was set to vertical polarization.
4. The EMI receiver performed a scan from 30MHz to 1000MHz with the detector set to peak and the measurement bandwidth to 120 kHz.
5. The turn table was rotated to 6 different positions ($360^\circ / 6$) and the antenna polarization was changed to horizontal.
6. Repeat the test procedure at step 4 and 5.
7. The test setup was then placed in an OATS at 3 m distance and all peak values over or with less distance to limit then 6dB were marked and re-measured with a quasi-peak detector.
8. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
9. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization. The highest value was recorded.
10. For emissions below 30MHz, measurement were done with a loop antenna. The recorded data were measured in QP mode off he receiver. Antenna height was not changed during this test.



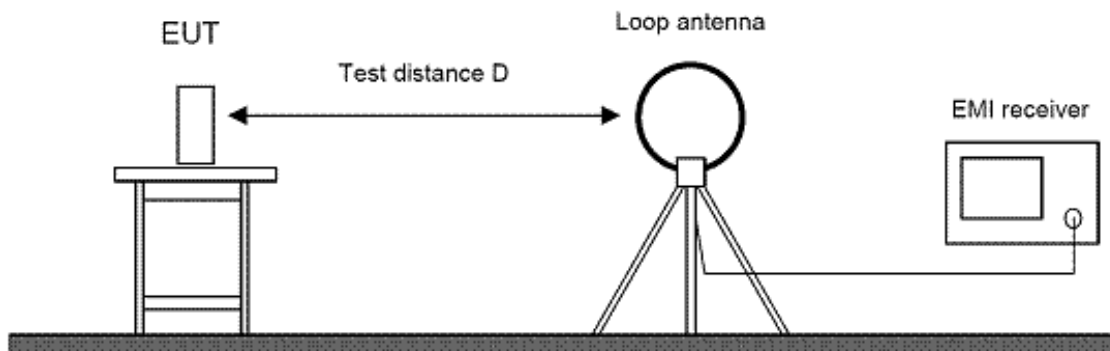
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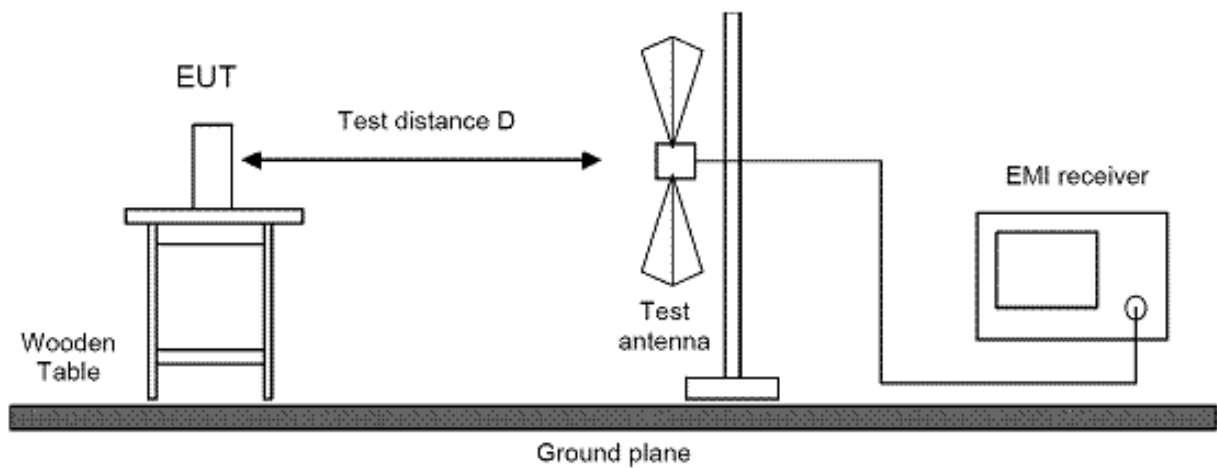
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Page 20 of 32

4.5 Test setup



Picture 10: Test setup for radiated emission measurement (< 30 MHz)



Picture 11: Test setup for radiated emission measurement (< 1 GHz)

4.6 Test deviation

There is no deviation with the original standard.

4.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

4.8 Test results

Transmit mode

Temperature:	21°C	Humidity:	40%
Tested by:	M. Müller	Test date:	2013-12-17

Radiated Emission Measurement 9 kHz – 30 MHz

Test procedure

The EUT was placed in a full anechoic chamber and the spurious emissions testing was performed in accordance with ANSI C63.4, FCC Part 15, Subpart C. The measurement distance was 3 m.

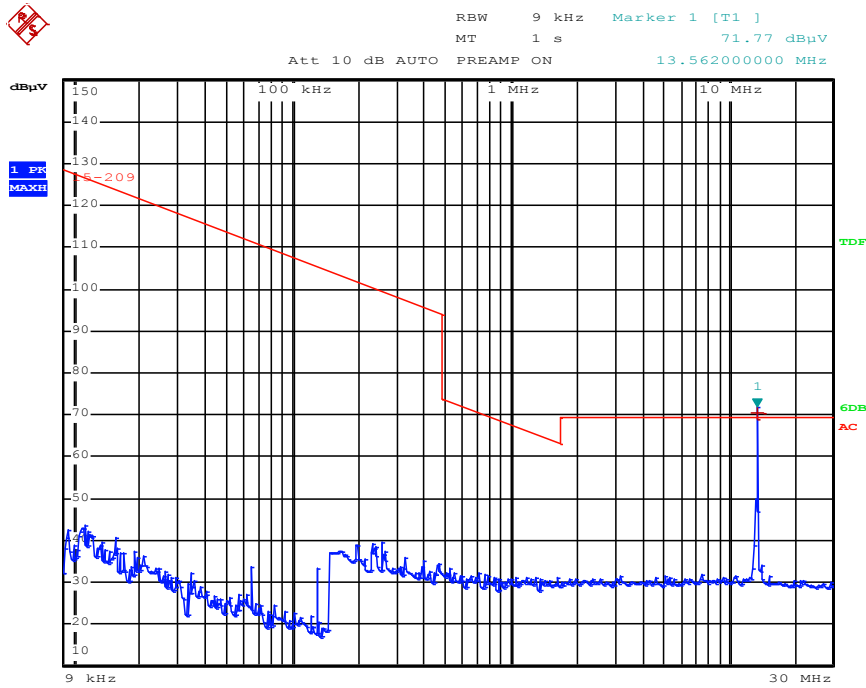


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Page 22 of 32



Picture 12: Radiated emission 9 kHz – 30 MHz @ 3m distance (13.56 MHz)

Frequency (MHz)	Reading (dBµV/m)	Detector	Recalculation factor (dB/decade)	Field strength (dBµV/m)	Limit (dBµV/m)	Margin	Result
13.56	71.77	QP	40	31,77	84	-52,23	PASS

Note:

Measured value = 71.77 dBµV/m @ 3 m

Recalculation factor = 40 dB / decade

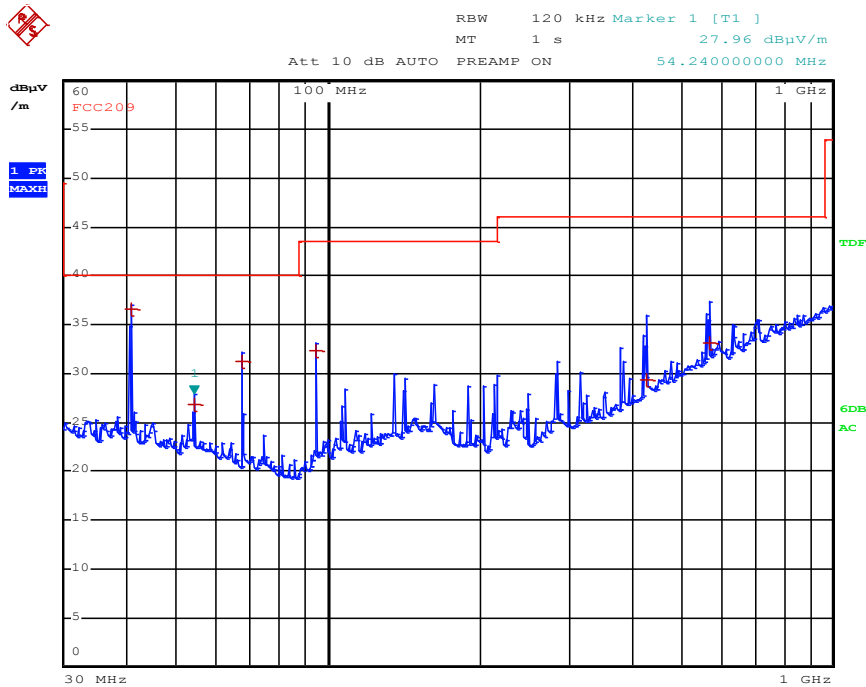
Recalculated value = 71.77 dBµV/m @ 3 m - 40 dB = **31.7 dBµV/m @ 30 m**



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Radiated Emission Measurement 30 MHz – 1000 MHz



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	40.68 MHz	36.61	-3.38
1 Quasi Peak	54.24 MHz	26.81	-13.18
1 Quasi Peak	67.8 MHz	31.26	-8.73
1 Quasi Peak	94.92 MHz	32.34	-11.15
1 Quasi Peak	427.16 MHz	29.38	-16.62
1 Quasi Peak	569.56 MHz	33.17	-12.83

Picture 13: Radiated emission table 30 MHz – 1000MHz @ 3m distance, Vertical (13.56MHz)

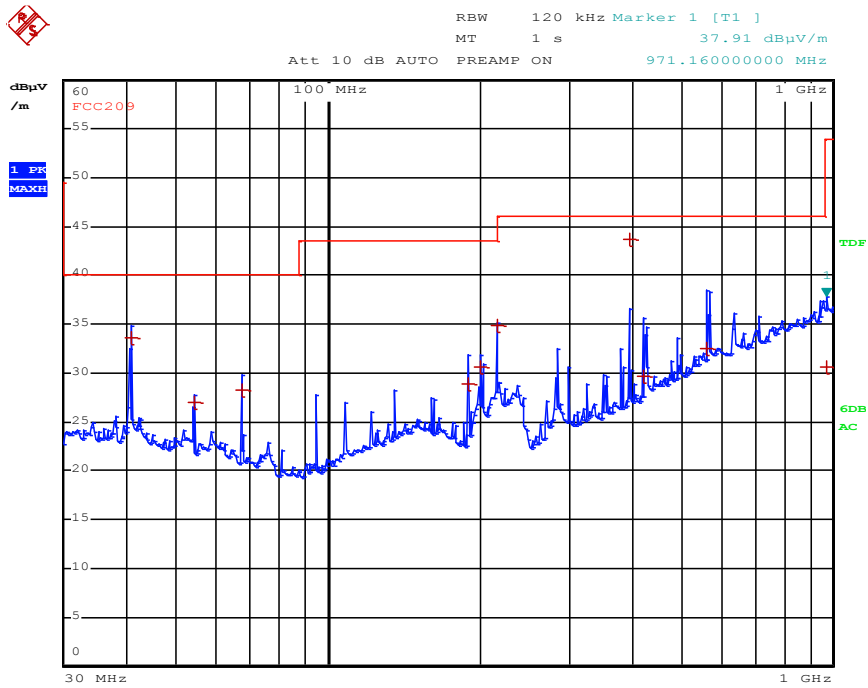


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Page 24 of 32



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC209		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	40.68 MHz	33.58	-6.41
1 Quasi Peak	54.24 MHz	26.94	-13.05
1 Quasi Peak	67.8 MHz	28.32	-11.67
1 Quasi Peak	189.88 MHz	28.95	-14.54
1 Quasi Peak	200 MHz	30.67	-12.82
1 Quasi Peak	216.96 MHz	34.91	-11.08
1 Quasi Peak	397.48 MHz	43.63	-2.36
1 Quasi Peak	423.12 MHz	29.73	-16.26
1 Quasi Peak	564.08 MHz	32.58	-13.41
1 Quasi Peak	971.16 MHz	30.60	-23.39

Picture 14: Radiated emission table 30 MHz – 1000MHz @ 3m distance, Horizontal (13.56MHz)



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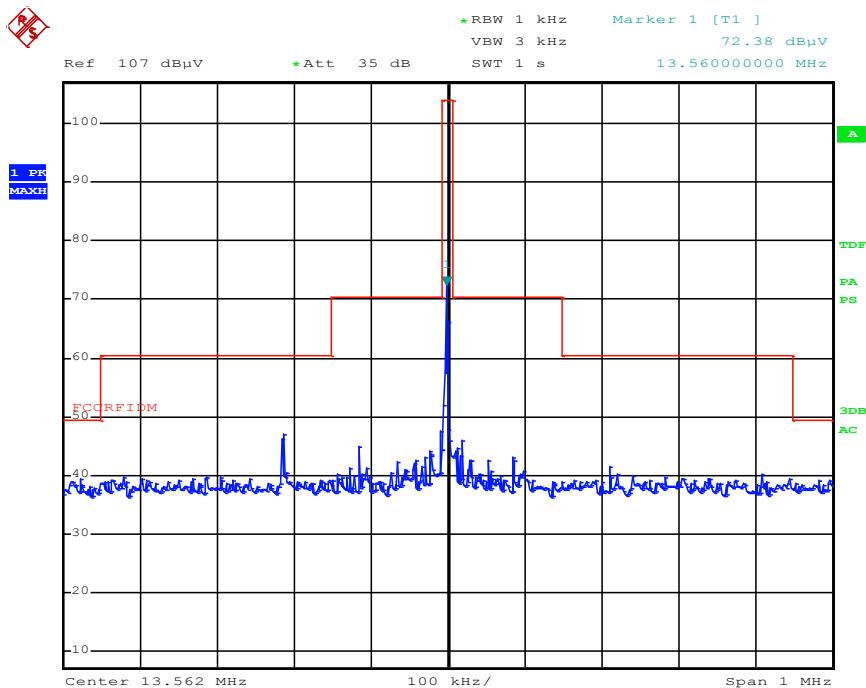
Emission Bandwidth

Test procedure

The EUT was placed in a full anechoic chamber and the emission bandwidth testing was performed in accordance with ANSI C63.4, FCC Part 15.225, Subpart C. The measurement distance was 3 m. The intentional radiator frequency and band edge frequencies involves quasi-peak detection were then maximized. Maximizing a frequency involves find the angle of the highest emission level by rotating the EUT 360 degrees. The antenna, which was fixed at 1 meter height, was rotated until the highest emission levels found.

Test result

Temperature:	20°C	Humidity:	40%
Tested by:	M. Müller	Test date:	2013-12-17



Picture 15: Lower – Upper band edge at 13.56 MHz @ 3m distance



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Page 26 of 32

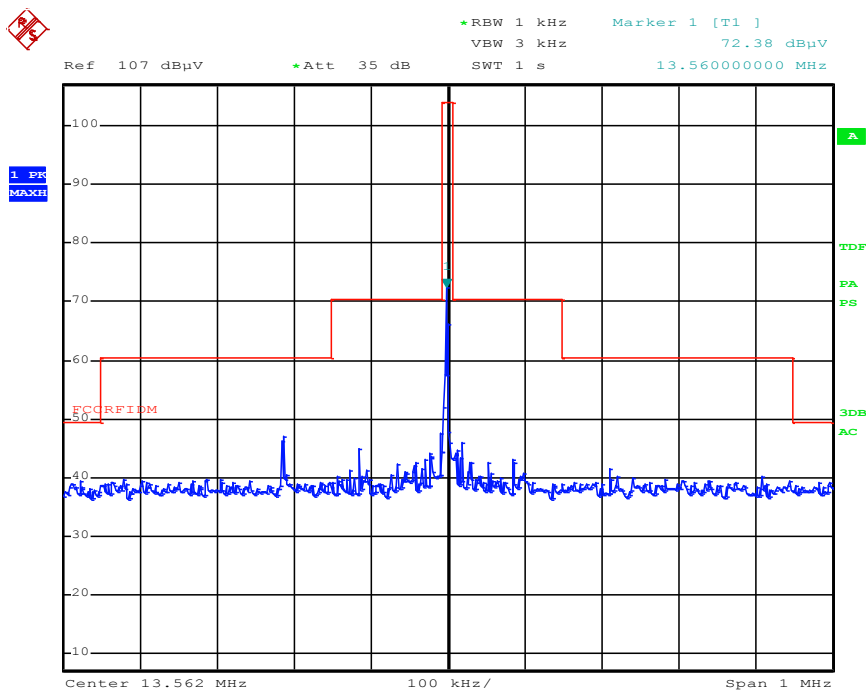
Frequency Stability

Test procedure

The EUT was placed in a climatic chamber and the emission bandwidth testing was performed in accordance with ANSI C63.4, FCC Part 15.225, Subpart C The Frequency Stability was measured using the radiated signals from the EUT so that the measurement equipment would not load the radio frequency circuits. A frequency counter was used for the frequency stability measurements. A close field probe was attached to the counter and placed near the antenna of the reader for measurement. The Reader was put into a continuous output mode through instructions from the host computer. The frequency was measured while the input DC Power to the intentional radiator was varied over the required input range.

Test result

Temperature:	20°C	Humidity:	40%
Tested by:	M. Müller	Test date:	2013-12-17



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 CLOUD 4701F

Temperature: 20° C		
Carrier Frequency	Voltage range	Frequency change
13,56 MHz	Nominal: 5 V DC	--
13,56 MHz	4.25 V DC (85%)	< 0.01 %
13,56 MHz	5.75 V DC (115%)	< 0.01 %

Voltage 5 V DC:		
Carrier Frequency	Temperature range	Frequency change
13,56 MHz	-20 °C	< 0.01 %
13,56 MHz	-10 °C	< 0.01 %
13,56 MHz	0 °C	< 0.01 %
13,56 MHz	10 °C	< 0.01 %
13,56 MHz	20 °C	---
13,56 MHz	30 °C	< 0.01 %
13,56 MHz	40 °C	< 0.01 %
13,56 MHz	50°C	< 0.01 %



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130622-AU01+W01

Page 28 of 32

5 Radiated emission measurement (<1 GHz)

according to CFR 47 Part 15, section 15.205(a), 15.209(a)

Remark:

This measurement is not applicable because there are no internal frequencies higher than 108 MHz!



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RF ID Reader
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Page 29 of 32

6 Equipment calibration status

Inventory Number	Equipment type	Model Number	Manufacturer	Last calibration	Next calibration	Cycle of calibration
W00002	Test receiver	ESU26	Rohde & Schwarz	Jan 12	Jan 14	2 Years
E00001	Test receiver	ESCI	Rohde & Schwarz	Dec 13	Dec 15	2 Years
E00003	Test receiver	ESCS 30	Rohde & Schwarz	Feb 13	Feb 14	1 Year
E00004	NNB	ESH 2-Z5	Rohde & Schwarz	Mar. 13	Mar. 15	2 Years
E00005	NNB	ESH 2-Z5	Rohde & Schwarz	Jan 14	Jan 16	2 Years
E00060	Antenna	HFH2-Z2	Rohde & Schwarz	Dec 13	Dec 15	2 Years
E00013	Antenna	VULB 9163	Schwarzbeck	Sep. 13	Sep. 14	1 Years

Table 1: Equipment Calibration status



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130622-AU01+W01

Page 30 of 32

7 Measurement uncertainty

Description	Max. deviation	k=
Conducted emission AMN (9kHz to 30 MHz)	± 4,0 dB	2
Radiated emission open field (30 MHz to 1 GHz)	± 4,5 dB	2
Radiated emission absorber chamber (> 1000 MHz)	± 5,4 dB	2

Table 2: Measurement uncertainty

Comment: The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k. If k=2 the value of the measurements lies within the assigned range of values with a probability of 95 %.



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Identive Technologies India Pvt., Ltd.
RF ID Reader
CLOUD 4701F

130622-AU01+W01

Page 31 of 32

8 Summary

The EMC Regulations according to the marked specifications are

KEPT

The EUT does fulfill the general approval requirements mentioned.

NOT KEPT

The EUT does not fulfill the general approval requirements mentioned.

Place, Date: Straubing, January 13, 2014



Martin Müller
EMC Test Engineer



Christian Kiermeier
General Manager / EMV **TESTHAUS** GmbH



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RF ID Reader
CLOUD 4701F

130622-AU01+W01

Page 32 of 32