Test report

Customer:

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EMC test report

090251-AU01+W01

SCM Microsystems Pvt. Ltd.

RFID stick

SCL3711

EMV TESTHAUS

The test results refer exclusively to the model tested.

This report must not be copied without the written authorization by the lab.
Revision: 1.6

Deutscher Akkreditierungs Rat
DAR

DAT-P-224/95-02 / BNetzA-CAB-02/21-02/2

EMV **TESTHAUS** GmbH

Gustav-Hertz-Strasse 35
94315 Straubing
Tel.: +49 9421 56868 - 0
Fax: +49 9421 56868 - 100
Email: company@emv-testhaus.com

Accreditation:

Deutscher Akkreditierungs Rat
DAR

Registration number: DAT-P-224/95-02
CAB (EMC) registration number: BNetzA-CAB-02/21-02/2
FCC facility registration number: 221458
Test Firm Type “2.948 listed”: Valid until 26.06.2011
Test Firm Type “accredited”: Valid until 01.07.2009
MRA US-EU, FCC designation number: DE0010

Place of Inspection:

EMV **TESTHAUS** GmbH
Gustav-Hertz-Strasse 35
94315 Straubing

The technical accuracy is guaranteed through the quality management of the EMV **TESTHAUS** GmbH.

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1 Test regulation

CFR 47 Part 2: 10-2008	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: 10-2008	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)
ANSI C63.4: 12-2003	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

2 Summary of test results

FCC CFR 47 Part 15			
Section	**Test**	**Page**	**Result**
15.32 (1) (a) (i)	Radiated emission with open enclosure shall not exceed the limits specified in Section 15.109 by more than 6dB	----	Not applicable
15.107	Conducted emission at AC power line 0,150MHz to 30MHz	11	**Pass**
15.107 15.109 (g) (4) 15.107 (a)	Conducted emission at AC power line 0,150MHz to 30MHz Limits: DIN EN 55022: 2007-04	11	*Pass*
15.109 15.33 (b)	Radiated emission 30 MHz – 1000 MHz Unintentional radiations 1.705 MHz - 108 MHz	18	**Pass**
15.109 15.33 (b) 15.109 (g)	Radiated emission 30 MHz – 1000 MHz Unintentional radiations 1.705 MHz - 108 MHz Limits: DIN EN 55022: 2007-04	18	*Pass*
15.109 15.33 (b)	Radiated emission 30 MHz – 2000 MHz Unintentional radiations 108 MHz - 500 MHz		Not applicable
15.109 15.33 (b)	Radiated emission 30 MHz – 5000 MHz Unintentional radiations 500 MHz - 1000 MHz		Not applicable

3 Equipment under test

Device name:	RFID stick SCL3711
Manufacturer:	SCM Microsystems (India) Pvt. Ltd.
Serial number:	21120908G00292 (Sample 3)
FCC ID:	MBPSCL3711

3.1 Photo documentation of EUT

Picture 1: EUT front

Picture 2: EUT back

3.2 Short description of the EUT

The EUT is a RFID Reader with the operating frequency of 13.56 MHz

3.3 Operation Mode

The EUT was tested in the following operation modes:
- Reading tags continuously. For this mode a software form SCM was used.

3.4 Configuration

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

Device	**Model:**	**S/N**
RFID Reader (EUT)	SCL3711	21120908G00292
USB Cable	Standard cable form SCM 1,5m	N/A
Test Notebook		N/A

4 FCC Statement

Section 15.21 Information to user

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Section 15.105 Information to the user

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

5 Equipment modifications

To achieve compliance with the regulations, the following modifications were made by EMV **TESTHAUS** GmbH or a responsible employee of the manufacturer:

No modifications were carried out during testing.

The above modifications will be implemented in all production models of this equipment.

Applicant Signature _____ Date_____

Typed / Printed Name _____ Position _____

6 Conducted emission test

according to CFR 47 Part 15 Subpart B Class B, Section 15.107

6.1 Conducted emission measurement from 150 kHz to 30 MHz

6.1.1 Location of measurement

Description	Manufacturer	Inventory Nr.
Shielded chamber	Siemens - Matsushita	200016

6.1.2 Measurement equipment

	Description	Manufacturer	Inventory Nr.
☑	ESCS30	Rohde & Schwarz	100072
☑	ESH3 Z2	Rohde & Schwarz	200051
☑	ESH 2-Z5 (measuring)	Rohde & Schwarz	100041
☑	ESH 2-Z5 (decoupling)	Rohde & Schwarz	100040

6.1.3 Limits

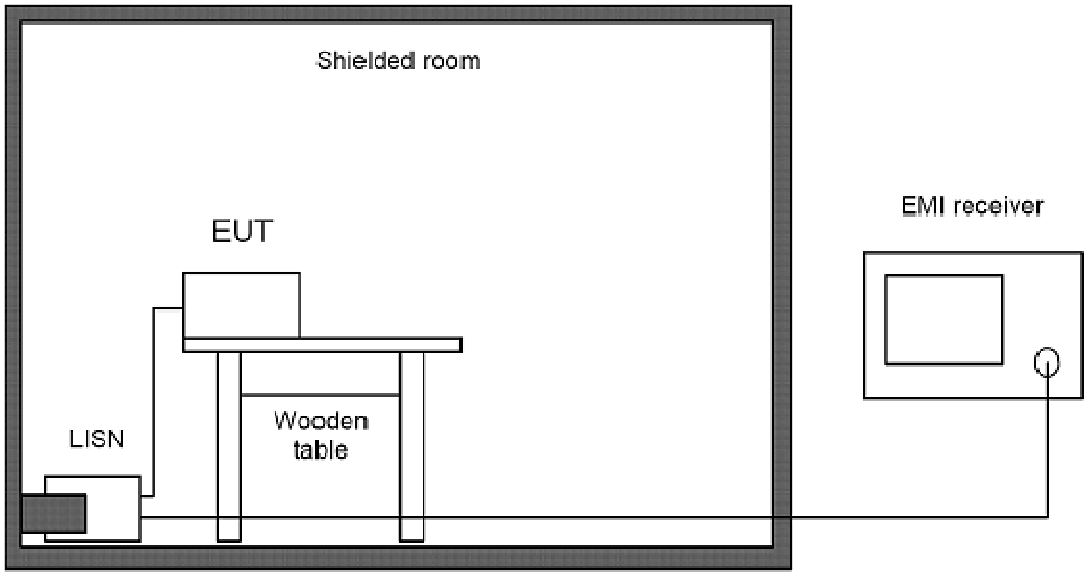
Frequency [MHz]	Quasi-peak [dBµV]	Avarage [dBµV]
0.15 – 0.5	66 - 56	56 – 46
0.5 – 5.0	56	46
5 – 30	60	50

6.1.4 Test method to demonstrate compliance

The tests of conducted emission were carried out in a shielded room using a line impedance stabilization network (LISN) 50 µH/50 ohms and an EMI test receiver. The EMI test receiver was connected to the LISN and set to a measurement bandwidth of 9 kHz in the frequency range form 0.15 MHz to 30 MHz.
The EUT was placed on a wooden table and connected to the LISN.
To accelerate the measurement the detector of the EMI test receiver was set to peak and the whole frequency range form 0.15 MHz to 30 MHz were scanned. 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. 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.

These measurements were done on all current carrying conductors.

6.1.5 Test setup



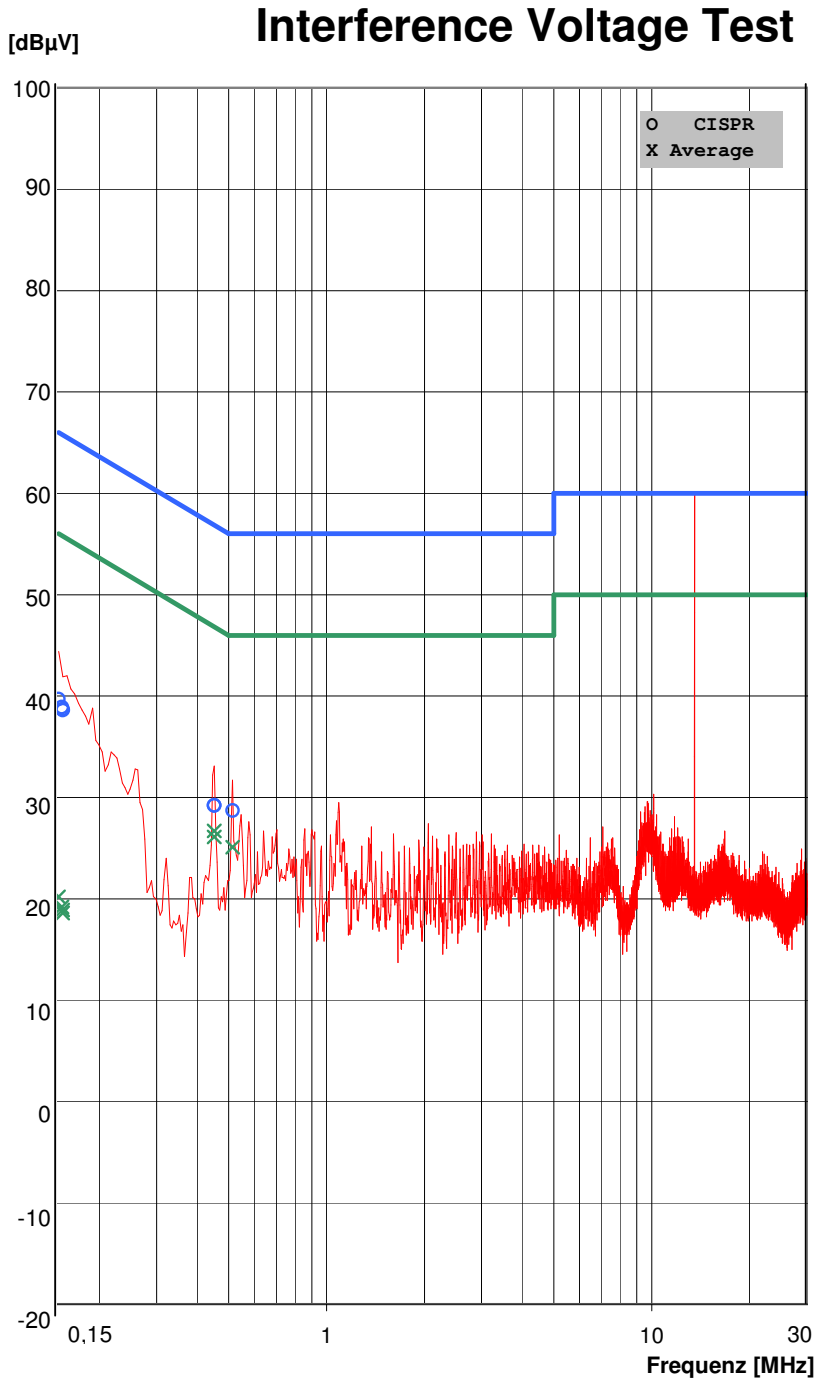
Picture 3: Outline of conducted emission test setup

Expanded Uncertainty (9 kHz to 150 kHz): $U_{(y)}$ = (y ± 4.024) dBµV; k=2.00 y = Indicated value

Expanded Uncertainty (150 kHz to 30 MHz): $U_{(y)}$ = (y ± 3.604) dBµV; k=2.00 y = Indicated value

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

6.2 Test result



REGULATIONS:
CISPR 22
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESH3 (10 0 002)
R&S ESH2-Z5 (10 0 040)
R&S Pulse Limiter (20 0 051)

ORDER NO.:
090251-AU01+W01

EUT:
SCM Microsystems (India) Pvt. Ltd.
RFID Product
SCL3711
21120908G00289

OPERATION MODE:
transmission active
EUT connected to a notebook
test software from SCM
Mains 120 V AC / 60Hz
Phase

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

DATE / TIME:
2009-04-29
19 °C 56 %H 97 kPa

TEST ENGINEER:
Marco Janker

090251 ss L1 USB 01 no 13MHz.E10

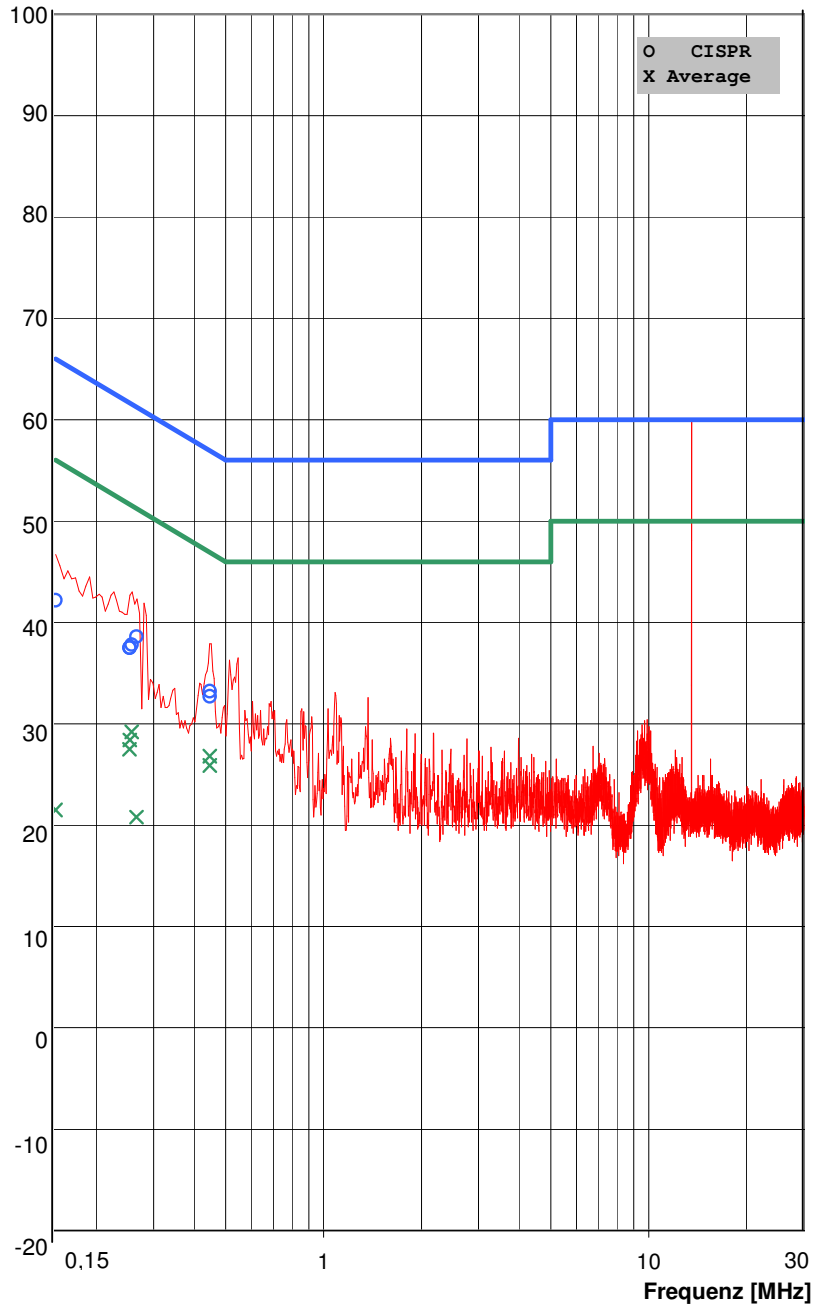
Picture 4: Conducted emission on mains, phase 1

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark 090251 ss L1 USB 01 no 13MHz.E10
0,15	39,7	66,0	26,3	20,2	56,0	35,8	0,0	
0,15	38,6	65,8	27,2	18,6	55,8	37,2	0,0	
0,15	38,7	65,8	27,1	18,9	55,8	36,9	0,0	
0,15	38,9	65,8	26,9	19,2	55,8	36,6	0,0	
0,45	29,2	56,8	27,6	26,1	46,8	20,7	0,0	
0,45	29,2	56,8	27,6	26,7	46,8	20,1	0,0	
0,51	28,7	56,0	27,3	25,1	46,0	20,9	0,0	

Picture 5: Conducted emission on mains, phase 1

Interference Voltage Test



REGULATIONS:
CIPSR 22
PEAK / CISPR / AV

TEST EQUIPMENT:
R&S ESH3 (10 0 002)
R&S ESH2-Z5 (10 0 040)
R&S Pulse Limiter (20 0 051)

ORDER NO.:
090251-AU01+W01

EUT:
SCM Microsystems (India) Pvt. Ltd.
RFID Product
SCL3711
21120908G00289

OPERATION MODE:
transmission active
EUT connected to a notebook
test software from SCM
Mains 120 V AC / 60Hz
Neutral

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

DATE / TIME:
2009-04-29
19 °C 56 %H 97 kPa

TEST ENGINEER:
Marco Janker

090251 ss N USB 01 no 13MHz.E10

Picture 6: Conducted emission on mains, neutral

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark 090251 ss N USB 01 no 13MHz.E10
0,15	42,2	66,0	23,8	21,5	56,0	34,5	0,0	
0,25	37,5	61,6	24,1	28,4	51,6	23,2	0,0	
0,25	37,5	61,7	24,2	27,5	51,7	24,2	0,0	
0,26	37,8	61,5	23,7	29,2	51,5	22,3	0,0	
0,27	38,6	61,3	22,7	20,8	51,3	30,5	0,0	
0,45	33,2	56,9	23,7	26,8	46,9	20,1	0,0	
0,45	32,7	56,9	24,2	25,9	46,9	21,0	0,0	

Picture 7: Conducted emission on mains, neutral

7 Radiated emission test

according to CFR 47 Part 15 Subpart B Class B, Section 15.109

7.1 Radiated emission measurement from 30 MHz to 1000 MHz

7.1.1 Location of measurement

☑ Scan with peak detector in 3 m CDC which is correlated to the 10 m open site area.

☑ Final CISPR measurement with quasi peak detector on 10 m open site area.

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	100089
Open site area	EMV **TESTHAUS** GmbH	200017

7.1.2 Measurement equipment

	Description	Manufacturer	Inventory No.
☑	ESCS 30 (FF)	Rohde & Schwarz	100072
☐	ESCI (CDC)	Rohde & Schwarz	100132
☑	Feedline OATS	Huber & Suhner	200024
☑	VULB 9163 (FF)	Schwarzbeck	100077
☑	VULB 9163 (FF)	Schwarzbeck	100077
☐	VULB 9163	Schwarzbeck	100134
☐	MDS 21	Rohde & Schwarz	100018
☐	MDS 20	Rohde & Schwarz	300048

7.1.3 Limits

Frequency [MHz]	Field strength Fs [µV/m]	Field strength [dBµV/m]	Measurement distance d [m]
30 – 88	**100**	**40**	**3**
88 – 216	**150**	**43.5**	**3**
216 - 960	**200**	**46**	**3**
Above 960	**500**	**54**	**3**

To calculate the limit for 10m measurement distance the following calculation was used.

$$L_{dm} = L_d + (-20\frac{dB}{dec} * (\log(dm) - \log(d))$$

L_{dm} = Limit at the new distance

L_d = Limit according ANSI 63.4
d = Distance according to ANSI 63.4
dm = New distance for limit

$$L_{dm} = 40\frac{dB\mu V}{m} + (-20\frac{dB}{dec} * (\log(10m) - \log(3m)) = 30dB$$ for 30MHz to 88MHz

$$L_{dm} = 43{,}5\frac{dB\mu V}{m} + (-20\frac{dB}{dec} * (\log(10m) - \log(3m)) = 33.5dB$$ for 88MHz to 216MHz

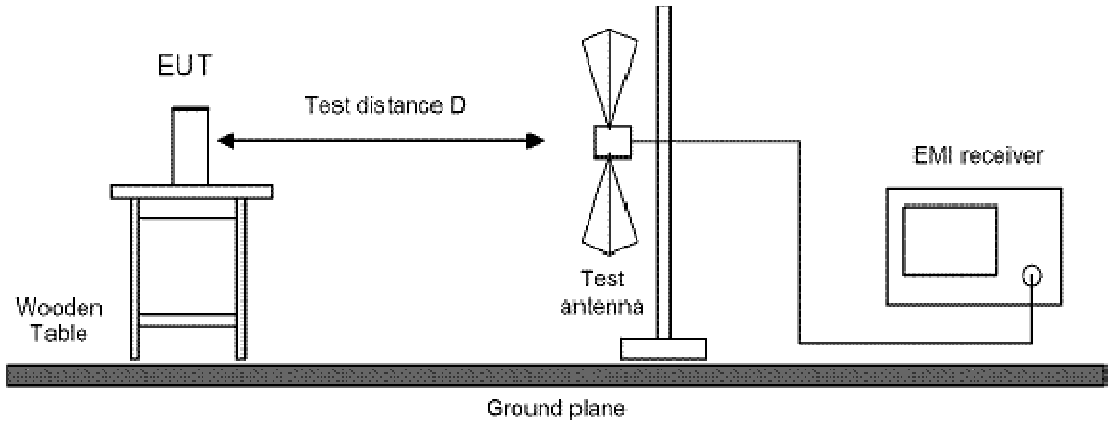
$$L_{dm} = 46\frac{dB\mu V}{m} + (-20\frac{dB}{dec} * (\log(10m) - \log(3m)) = 36dB$$ for 216MHz to 960MHz

$$L_{dm} = 54\frac{dB\mu V}{m} + (-20\frac{dB}{dec} * (\log(10m) - \log(3m)) = 44dB$$ above 960MHz

7.1.4 Test method to demonstrate compliance

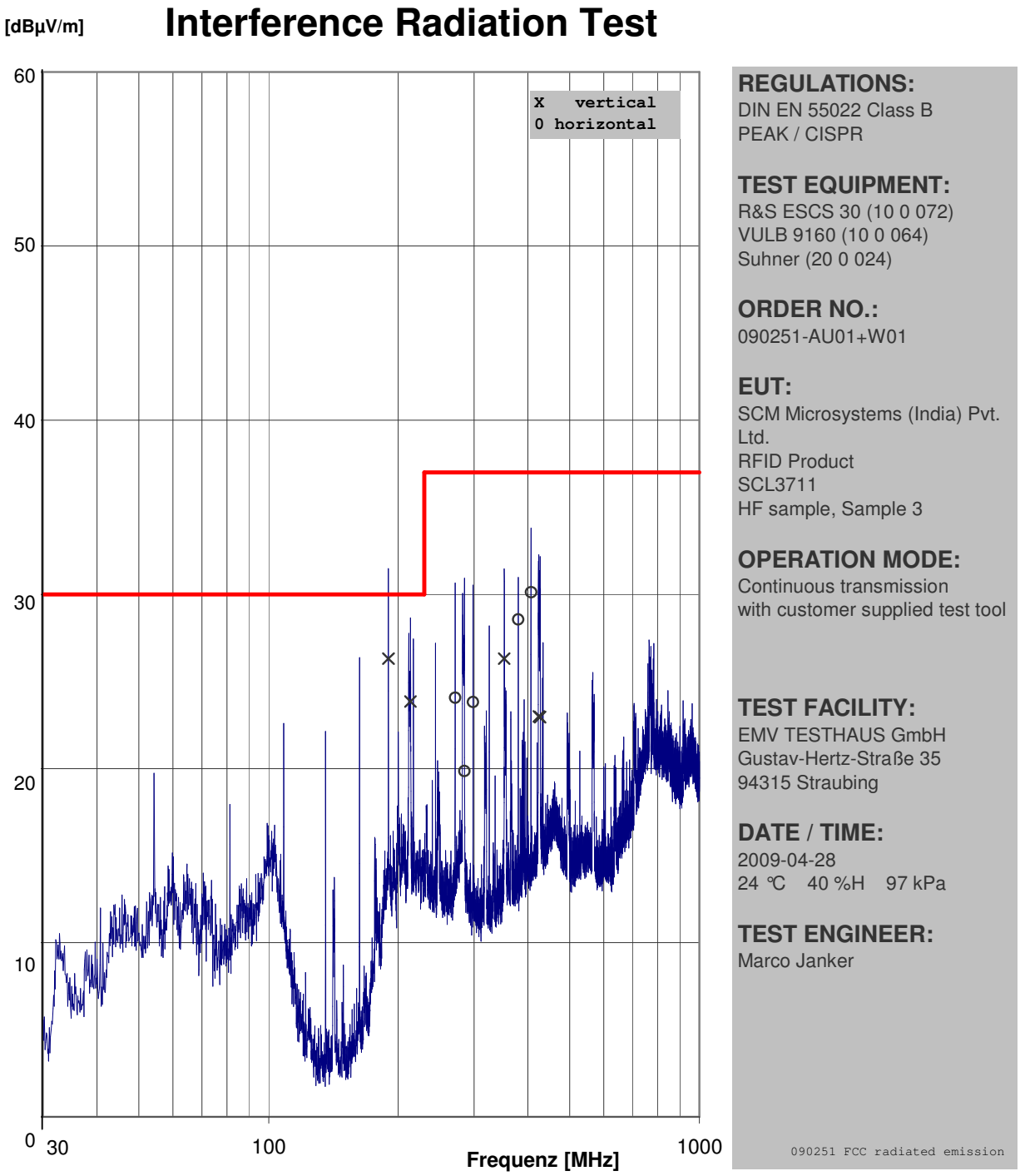
An EMI test receiver was used and connected to a broadband antenna. The EUT was placed on a wooden table in a distance of 3 m inside a compact diagnostic chamber. This chamber is a fully anechoic chamber and correlated to our 10m open site. Therefore the 10m limit was applicable for the pre-scan inside this chamber.
The broadband antenna was placed in vertical polarization and the EMI receiver performed a scan from 30 MHz to 1000 MHz with the detector set to peak and the measurement bandwidth to 120 kHz.
This procedure was repeated at 6 different positions of the EUT by rotating turn table. After that die polarization switched to horizontal and repeated this procedure. After all 12 scans the results of the two polarizations were combined.
All peak values over or with less distance to limit then 6 dB were marked and re-measured with a quasi-peak detector with the following method on a 10 m open area test site.
The turn table was turned 360° to find the position of maximum field strength. After reaching this position the antenna was moved form 1 m to 4 m height to find the maximum value. This value was recorded.

7.1.5 Test setup



Picture 8: Outline of radiated emission test setup

7.2 Test result



Picture 9: Radiated emission 30 MHz – 1000MHz

Interference Radiation Test

Freq. [MHz]	U_Rec [dBµV/m]	Limit [dBµV/m]	Corr. [dB]	U_Ant. [dBµV]	delta_U [dB]	Turn-table	Antenna	Pol.	Remark 090251 FCC radiated emission
189,80	26,3	30,0	12,3	14,0	3,7	163°	110 cm	V	
213,50	23,9	30,0	12,0	11,9	6,2	290°	110 cm	V	
271,20	24,1	37,0	14,4	9,7	12,9	14°	250 cm	H	
284,70	19,9	37,0	14,9	5,0	17,2	95°	250 cm	H	
298,30	23,8	37,0	15,3	8,6	13,2	183°	250 cm	H	
352,50	26,3	37,0	16,7	9,6	10,7	242°	110 cm	V	
379,70	28,6	37,0	17,5	11,1	8,4	25°	250 cm	H	
406,80	30,1	37,0	18,2	11,9	6,9	0°	250 cm	H	
423,80	23,0	37,0	18,8	4,2	14,0	4°	110 cm	V	
426,80	23,0	37,0	18,9	4,1	14,1	0°	110 cm	V	

Picture 10: Radiated emission 30 MHz – 1000MHz (Table)

Expanded uncertainty (30 MHz to 300 MHz): $E_{(y)}$ = (y ± 4.994) dBµV/m; k=2.00 y = Indicated value

Expanded uncertainty (300 MHz to 1000 MHz): $E_{(y)}$ = (y ± 5.276) dBµV/m; k=2.00 y = Indicated value

Comments:

8 Equipment Calibration Status

Inventory Number	Model Number	Manufacturer	Last calibration	Next calibration	Cycle of calibration
100132	ESCI	Rohde & Schwarz	June 07	June 09	2 Years
100005	HFH2-Z2	Rohde & Schwarz	July 07	July 09	2 Years
100002	ESH 3	Rohde & Schwarz	Oct. 07	Oct. 08	1 Year
200051	ESH3 Z2	Rohde & Schwarz	Oct. 07	Oct. 08	1 Year
100040	ESH 2-Z5	Rohde & Schwarz	Oct. 07	Oct. 09	2 Years
100041	ESH 2-Z5	Rohde & Schwarz	Aug. 08	Aug. 10	2 Years
100072	ESCS 30	Rohde & Schwarz	July 08	July 09	1 Year
100001	ESVP	Rohde & Schwarz	Sep. 07	Sep. 08	1 Year
100077	VULB 9163	Schwarzbeck	April 08	April 10	2 Years
100064	VULB 9160	Schwarzbeck	March 07	March 09	2 Years
110040	VC^{3}4034	Vötsch	June 08	June 10	2 Years
110023	VC4100	Vötsch	January 07	January 09	2 Years
100080	Multimeter	Metra Hit 29S	Mai 08	Mai 09	1 Year

9 Summary

Result according to the marked specifications:

☑ PASS

The EUT does fulfill the general approval requirements mentioned.

☐ FAIL

The EUT does not fulfill the general approval requirements mentioned.

Place, Date: Straubing, May 20, 2009

Marco Janker
EMI / EMC Test Engineer

Rudolf Klein
GM / EMV TESTHAUS GmbH

The equipment shall be retested to demonstrate continued compliance with the applicable requirements if any modifications or changes that could adversely affect the emanation characteristics of the equipment are made.
The responsible party bears responsibility for the continued compliance of subsequently produced equipment.

Official of responsible party