PHOENIX TESTLAB

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TEST REPORT

Test Report Reference: F081609E03

Equipment under Test: MiCard HiTag / USB RF-Cardreader

Serial Number: 2DFF5C8659CA1856

Applicant: NTware Systemprogrammierung GmbH

Manufacturer: NTware Systemprogrammierung GmbH

Test Laboratory
(CAB)
accredited by
DATech in der TGA GmbH
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. DAT-P-105/99-21,
FCC Test site registration number 90877 and
Industry Canada Test site registration IC3469A-1

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1 IDENTIFICATION

1.1 APPLICANT

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Country:	Germany
Name for contact purposes:	Mr H. Bauszus
Tel:	+49-(0)-5403-7242-220
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1.2 MANUFACTURER

Name:	NTware Systemprogrammierung GmbH
Address:	Arkadenstraße 5 49186 Bad Iburg
Country:	Germany
Name for contact purposes:	Mr H. Bauszus
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1.3 DATES

Date of receipt of test sample:	19 August 2008
Start of test:	19 August 2008
Finish of test:	29 August 2008

1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
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D-32825 Blomberg **Phone: +49 (0) 52 35 / 95 00-0**
Germany **Fax: +49 (0) 52 35 / 95 00-10**

accredited by DATech in der TGA GmbH in compliance with DIN EN ISO/IEC 17025 under Reg. No. DAT-P-105/99-21, FCC Test site registration number 90877 and Industry Canada Test site registration IC3469A-1.

Test engineer:	Raimund BLASK	Blask	4 September 2008
	Name		Date
Test report checked by:	Thomas KÜHN	T. Li	4 September 2008
	Name		Date

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1.5 RESERVATION

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1.6 NORMATIVE REFERENCES

[1] **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 9 kHz to 40 GHz.

[2] **FCC CFR 47 Part 15 (October 2007)** Radio Frequency Devices

[3] **RSS-210 Issue 7 (June 2007)** Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

[4] **RSS-Gen Issue 2 (June 2007)** General Requirements and Information for the Certification of Radiocommunication Equipment

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results are presented in the following.

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	RFID Transponder
Type designation / model name:	MiCard HiTag / USB RF-Cardreader
Serial No.:	2DFF5C8659CA1856
FCC ID:	-
Lowest internal frequency:	125 kHz
Highest internal frequency:	12 MHz
Antenna type:	Integral

Ports/Connectors

Identification	Connector		Length *
	EUT	Ancillary	
Power and data	USB-Connector	USB-Connector	1 m
-	-	-	-
-	-	-	-

*: Length during the test.

2.2 PERIPHERY DEVICES

The following equipment was used as control unit and ancillary equipment:

A laptop PC type “LifeBook S Series” was used during the tests.

2.3 SPECIAL EMC MEASURES

The following EMC measures were necessary to reach the documented results:

None.

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

For the whole frequency range a preliminary measurement in a fully anechoic chamber with a measuring distance of 3 m was carried out to determine the frequencies, which were radiated by the EUT.
The final measurements on the detected frequencies were carried out on an outdoor test site without ground plane (for the frequency range 9 kHz to 30 MHz) and on an open area test site with ground plane (for the frequency range 30 MHz to 1 GHz). No measurements were carried out above 1 GHz.

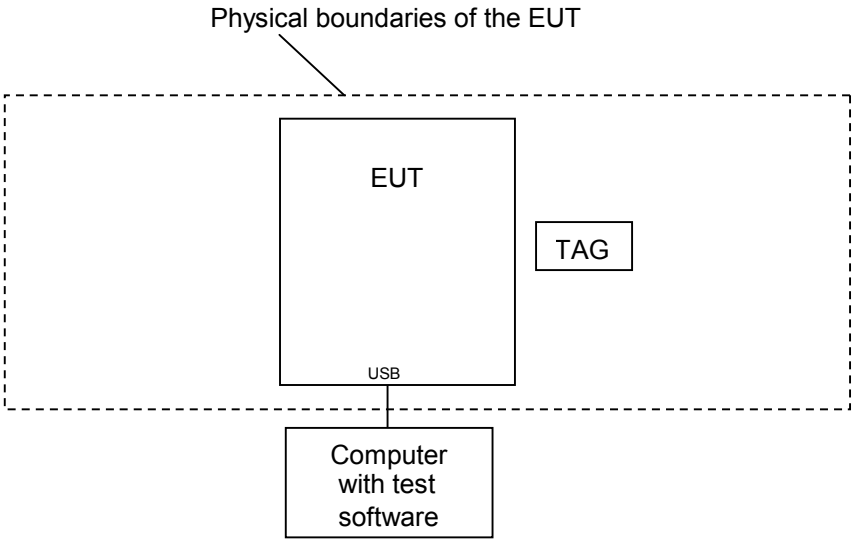
No spurious emission measurement of the receiver was carried out, because the co-located transmitter transmits continuously.

All tests were carried out with an unmodified test sample. A test-software, delivered by the applicant sets the EUT in continuous reading transponder mode and shows the transponder data on the computers display.

During the measurement the EUT was supplied by 5 V DC via an USB-Port-Connector of a Laptop-PC.

The EUT was operating in continuous reading mode. The received data was displayed at the PC-Monitor.

The physical boundaries of the EUT are shown below.



4 LIST MEASUREMENTS

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS 210, Issue 7 [3] or RSS-Gen, Issue 2 [4]	Status	Refer page
Radiated emissions	0.009 - 1,000	15.205 (a) 15.209 (a)	2.6 [3]	Passed	11 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.2 [4]	Passed	8 et seq.
99 % bandwidth	125 kHz	-	4.6.1 [4]	Passed	Annex D

5 TEST RESULTS

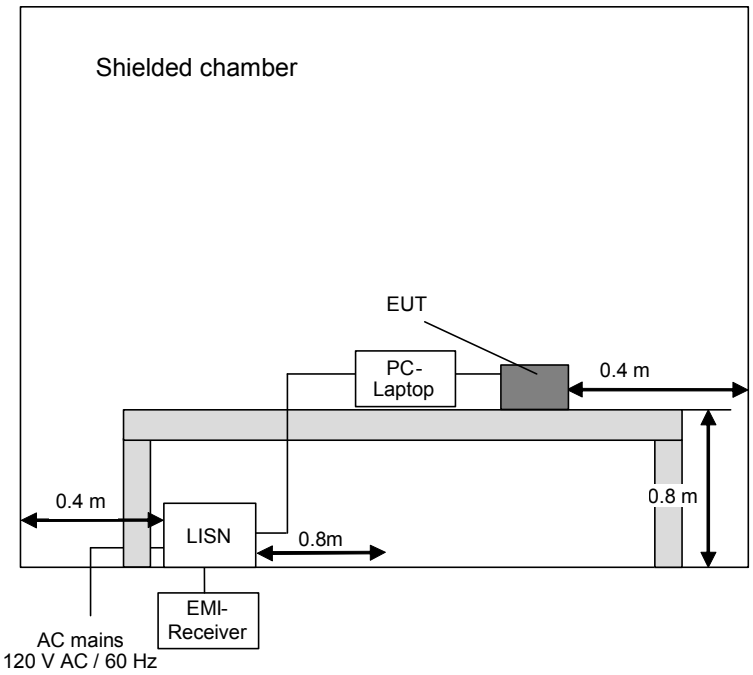
5.1 CONDUCTED EMISSION MEASUREMENT ON AC MAINS (150 kHz to 30 MHz)

5.1.1 METHOD OF MEASUREMENT (CONDUCTED EMISSION MEASUREMENT ON AC MAINS (150 kHz to 30 MHz))

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



5.1.2 TEST RESTULTS (CONDUCTED EMISSION MEASUREMENT ON AC MAINS)

Ambient temperature:	20 °C	Relative humidity:	39 %

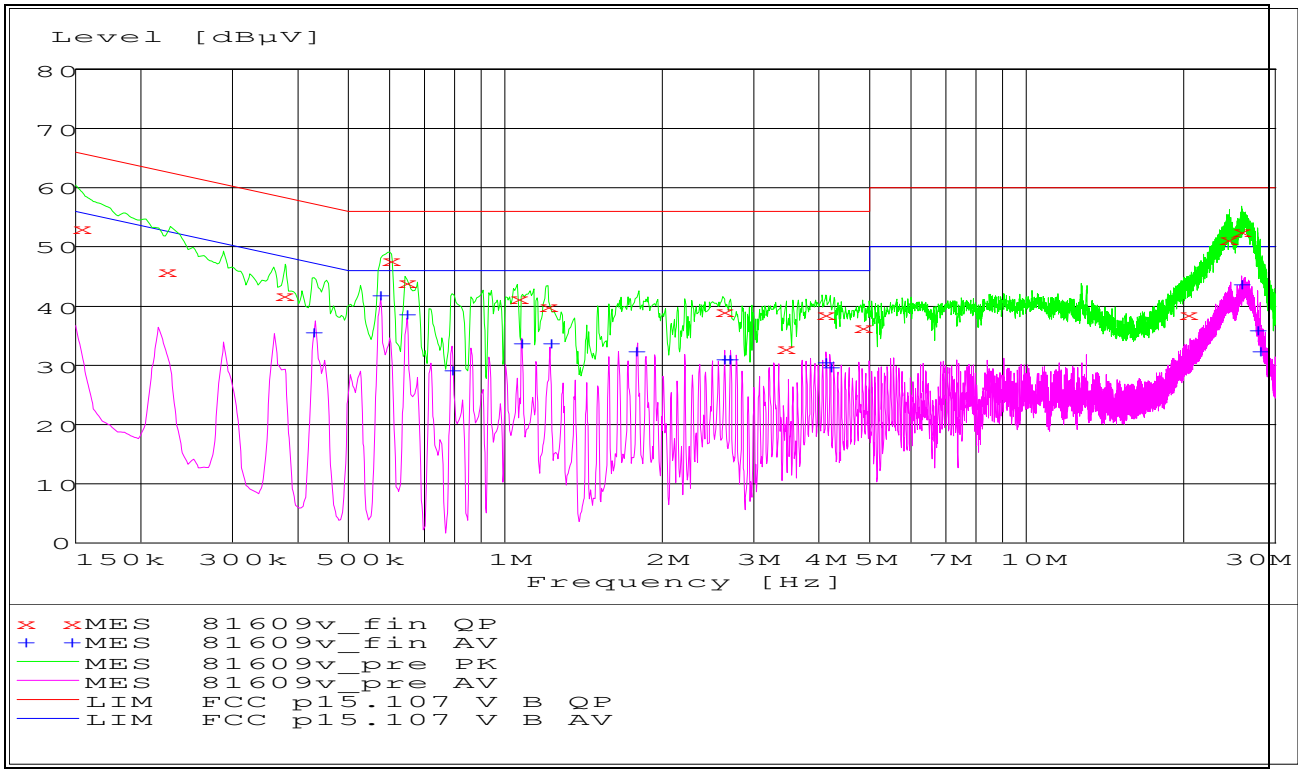
Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

Cable guide: All cables of the EUT were fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT.
All results are shown in the following.

Title: Mains terminal disturbance voltage measurement with protective ground conductor simulation
EUT: MiCard Reader
Manufacturer: NT-ware
Operating Condition: 120 V / 60 Hz
Test site: PHOENIX TESTLAB Blomberg M4
Operator: R. Blask
Test Specification: 120V 60 Hz

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by x and the average measured points by +.



Data record name: 81609v of 21.08.2008

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.153150	53.10	1.9	65.8	12.7	L1	FLO
0.223980	46.20	1.0	62.7	16.5	N	FLO
0.376800	41.90	0.9	58.3	16.5	N	FLO
0.602070	48.00	0.8	56.0	8.0	N	FLO
0.644640	44.10	0.8	56.0	11.9	N	FLO
1.056120	41.50	0.8	56.0	14.5	N	FLO
1.207950	40.30	0.7	56.0	15.8	L1	FLO
2.626260	39.40	0.7	56.0	16.6	L1	FLO
3.460650	33.00	0.9	56.0	23.0	N	FLO
4.127280	38.80	0.8	56.0	17.2	L1	FLO
4.852230	36.40	0.9	56.0	19.6	N	FLO
20.445990	38.90	2.4	60.0	21.1	L1	FLO
24.499950	51.50	2.8	60.0	8.5	N	FLO
25.850220	52.90	2.9	60.0	7.1	N	FLO

Data record name: 81609v_fin QP of 21.08.2008

Result measured with the average detector:

(These values are marked in the above diagram by +)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.429720	35.50	0.9	47.3	11.7	L1	FLO
0.573000	42.00	0.8	46.0	4.0	L1	FLO
0.644190	38.70	0.8	46.0	7.3	N	FLO
0.788640	29.50	0.8	46.0	16.6	N	FLO
1.073940	33.70	0.8	46.0	12.3	N	FLO
1.215870	34.00	0.7	46.0	12.0	L1	FLO
1.789620	32.40	0.7	46.0	13.7	L1	FLO
2.631210	31.30	0.7	46.0	14.7	L1	FLO
2.701680	31.20	0.8	46.0	14.8	L1	FLO
4.123950	30.70	0.8	46.0	15.3	L1	FLO
4.195500	29.90	0.8	46.0	16.1	L1	FLO
25.847790	43.80	2.9	50.0	6.2	N	FLO
27.771540	36.20	3.0	50.0	13.8	N	FLO
28.082040	32.30	3.1	50.0	17.7	N	FLO

Data record name: 81609v_fin AV of 21.08.2008

Test: Passed

TEST EQUIPMENT USED:

1 - 3, 5, 6

5.2 RADIATED EMISSIONS

5.2.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the middle and upper and lower edge of the assigned frequency band. For this reason the hopping function of the EUT has to be disenabled.

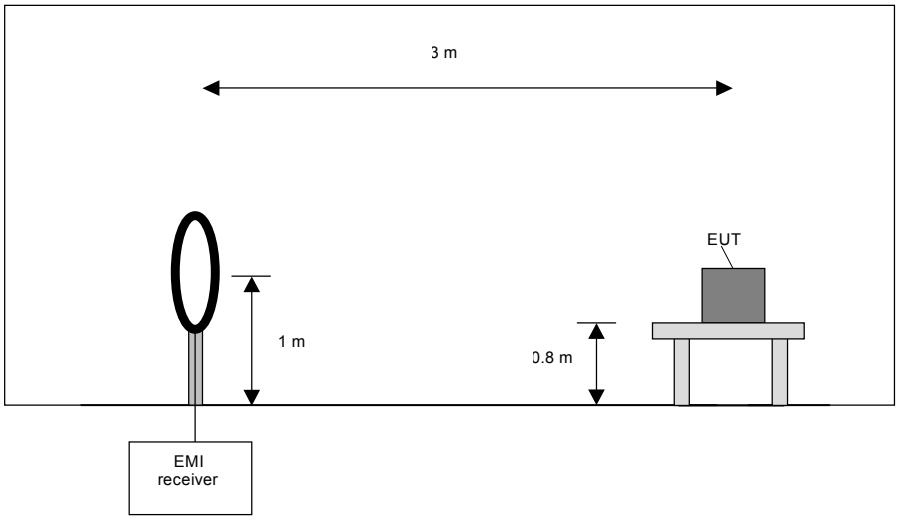
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2) Manipulate the system cables within the range to produce the maximum level of emission.
3) Rotate the EUT by 360 ° to maximize the detected signals.
4) Make a hardcopy of the spectrum.
5) Measure the frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7) Rotate the measuring antenna and repeat steps 1) to 5).

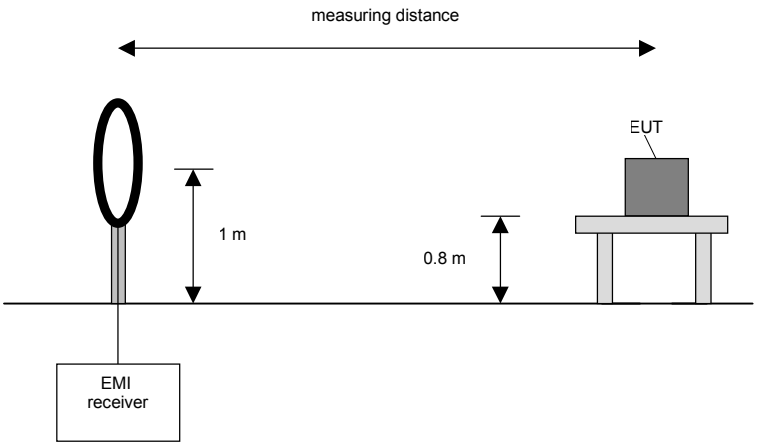
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the during the preliminary measurement detected frequencies the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Final measurement procedure:

The following procedure will be used:

1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
3) Rotate the measuring antenna to find the maximum and note the value.
4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

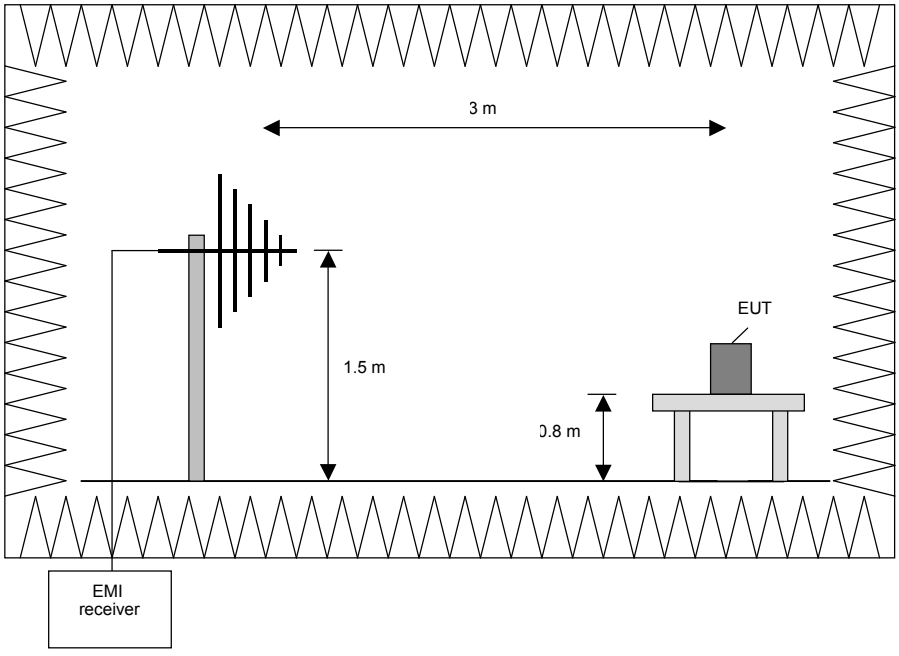
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

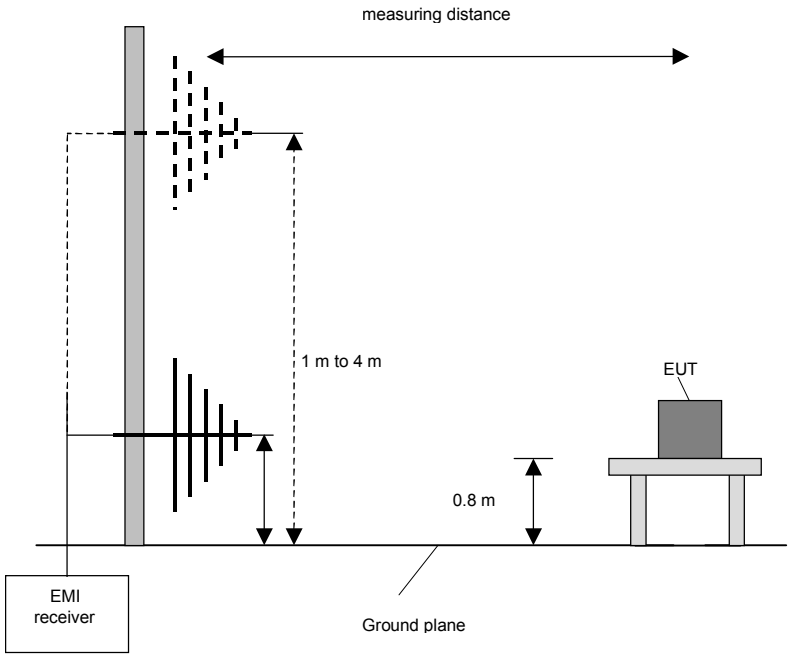
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
4) Repeat 1) to 3) for the other orthogonal antenna polarization.
5) Move the antenna and the turntable to the position where the maximum value is detected.
6) Measure while moving the antenna slowly +/- 1 m.
7) Set the antenna to the position where the maximum value is found.
8) Measure while moving the turntable +/- 45 °.
9) Set the turntable to the azimuth where the maximum value is found.
10) Measure with Final detector (QP and AV) and note the value.
11) Repeat 5) to 10) for each frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 110 GHz)

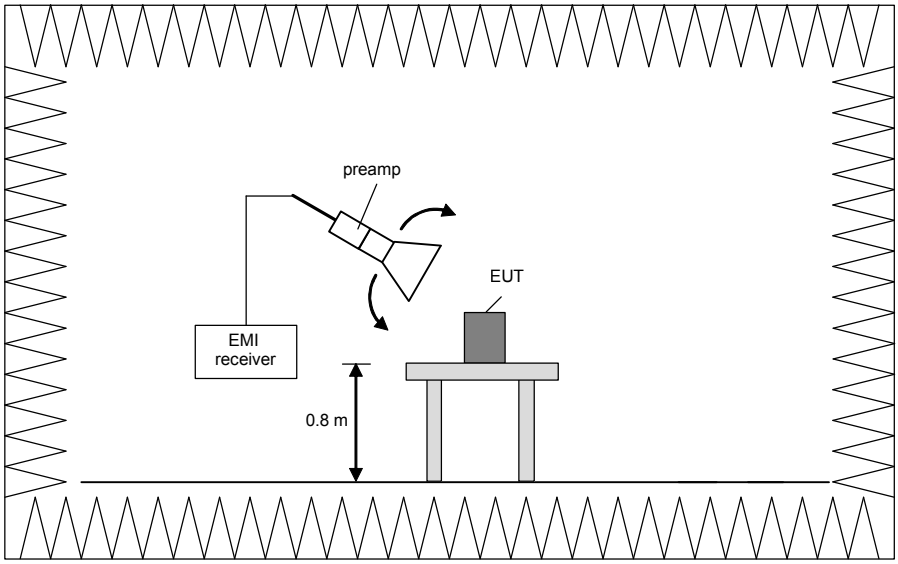
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

Preliminary measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz

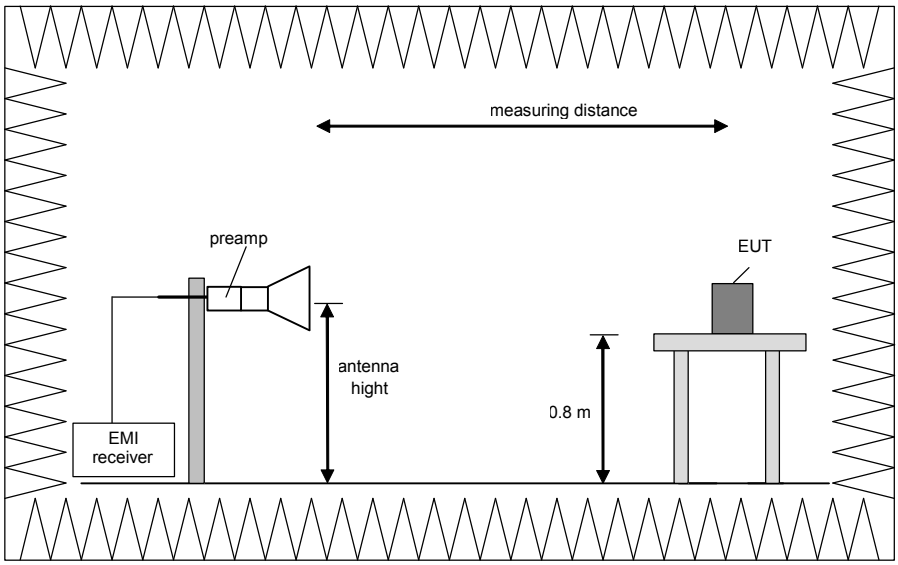


Final measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 GHz.
The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
2) Change the antenna polarisation and repeat 1) with vertical polarisation.
3) Make a hardcopy of the spectrum.
4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
5) Change the analyser mode to Clear / Write and found the cone of emission.
6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

Step 1) to 6) are defined as preliminary measurement.

5.2.2 PRELIMINARY RADIATED EMISSION TEST (9 kHz to 1 GHz)

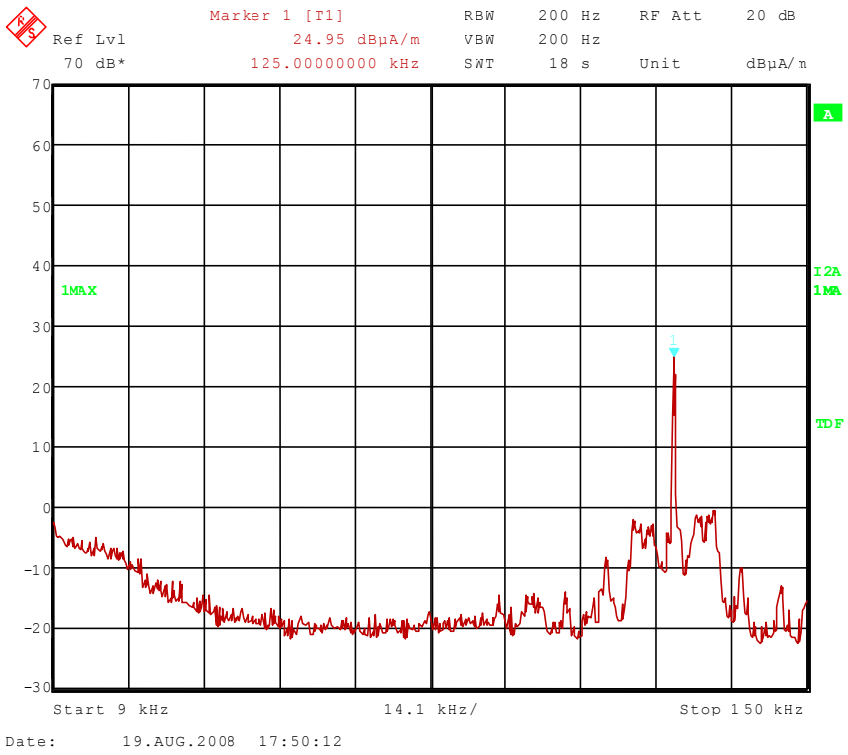
Ambient temperature:	20 °C	Relative humidity:	50 %

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

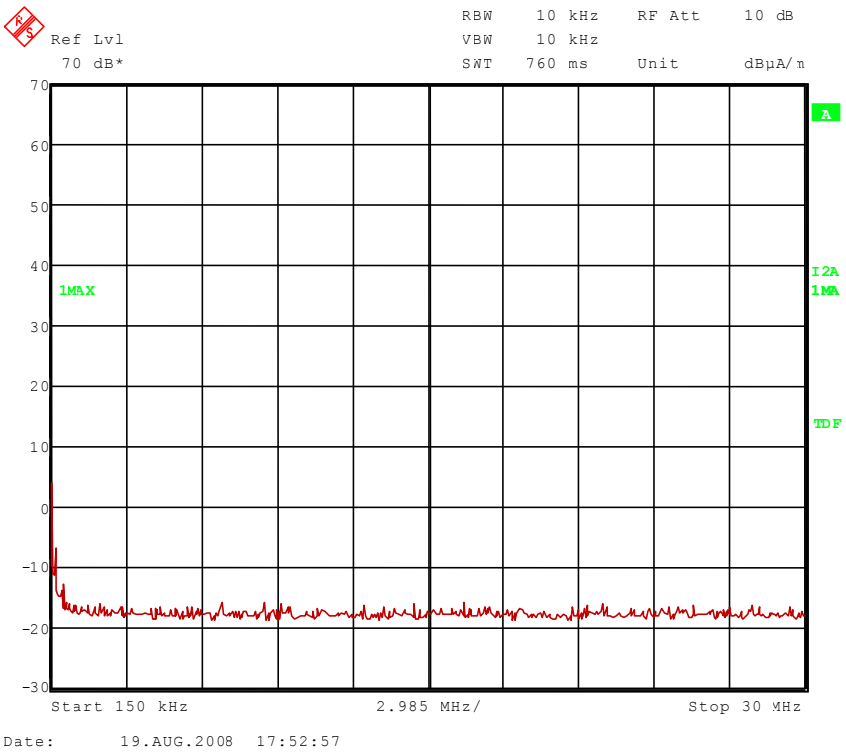
Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT.
All results are shown in the following.

Supply voltage: The EUT was supplied with 120 V AC, because no difference was noticeable with supply voltages from 115 V AC to 125 V AC.



81609h1.wmf: 9 kHz to 150 kHz



81609h2.wmf: 150 kHz to 30 MHz

The following emissions were found according to FCC 47 CFR Part 15 section 15.209 (a).

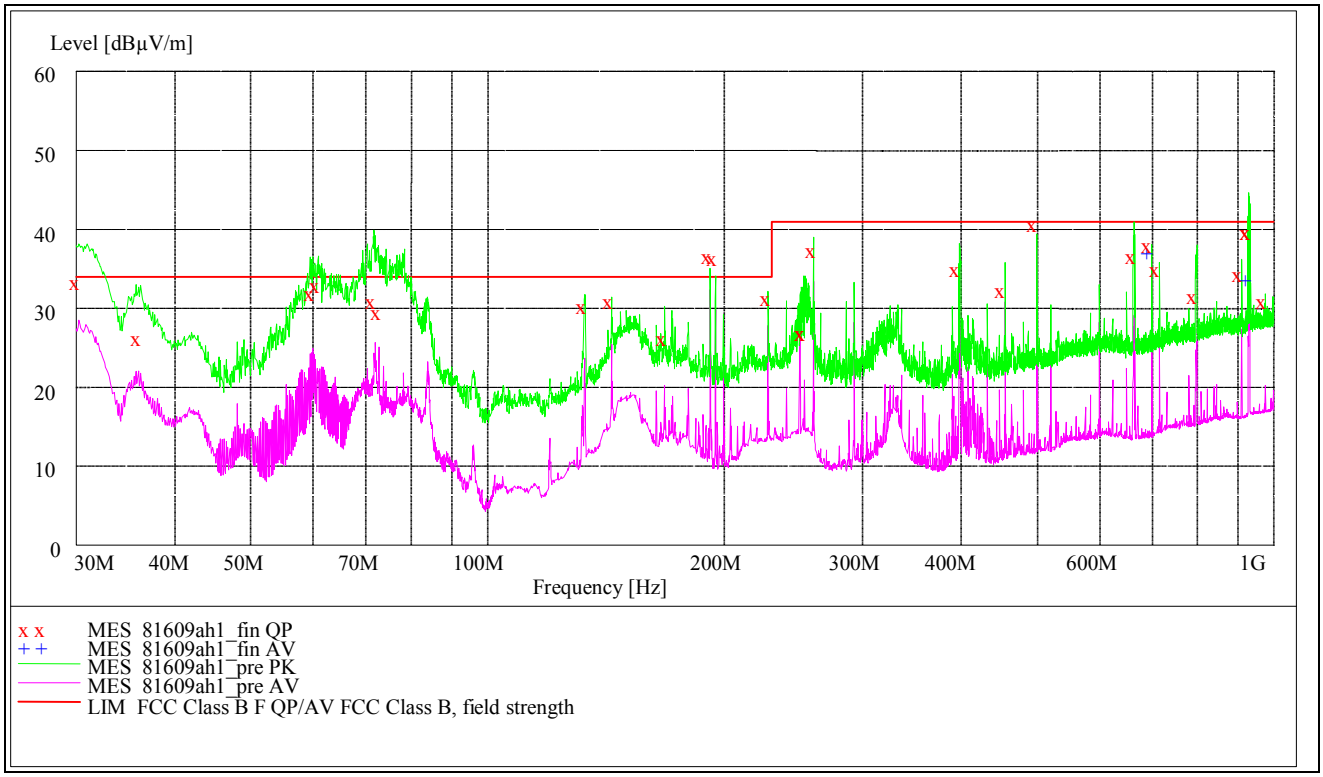
125.000 kHz

These frequencies have to be measured on the outdoor test site. The results were presented in the following.

TEST EQUIPMENT USED THE TEST:

29, 31 – 35, 43, 56

Title:	Emissionmeasurement according EN55022 EMI Test receiver ESI Rohde & Schwarz
EUT:	MiCard HiTag
Manufacturer:	NT-ware
Operating Condition:	Normal operation mode
Test site:	fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator:	R. Blask
Test Specification:	120 V / 60 Hz at PC power-supply



Data record name: 81609ah1

The following frequencies were found during the preliminary radiated emission test:

30.228 MHz, 59.964 MHz, 60.984 MHz, 71.760 MHz, 132.924 MHz, 144.012 MHz, 192.012 MHz, 195.024 MHz, 227.520 MHz, 252.568 MHz, 398.608 MHz, 499.252 MHz, 698.968 MHz, 715.048 MHz, 929.464 MHz, 932.212 MHz

These frequencies have to be measured on the open area test site. The results were presented in the following.

5.2.3 FINAL RADIATED EMISSION TEST (9 kHz to 30 MHz)

Ambient temperature:	19 °C	Relative humidity:	55 %

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m and 10 m.

Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT.
All results are shown in the following.

Supply voltage: The EUT was supplied with 120 V AC via the Laptop PC.

Test results: The test results were calculated with the following formula:

Result [dBµV/m] = reading [dBµV] + antenna factor [dB/m]

Results with measuring distance of 3 m						
Frequency kHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor * dB/m
125.000	98.5	105.6	7.1	AV	78.5	20.0
Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor * dB/m
125.000	76.0	85.6	9.6	AV	56.0	20.0
Measurement uncertainty			+2.2 dB / -3.6 dB			

*: Cable loss included

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

56, 57

5.2.4 FINAL RADIATED EMISSION TEST (30 MHz to 1 GHz)

Ambient temperature:	20 °C	Relative humidity:	50 %

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

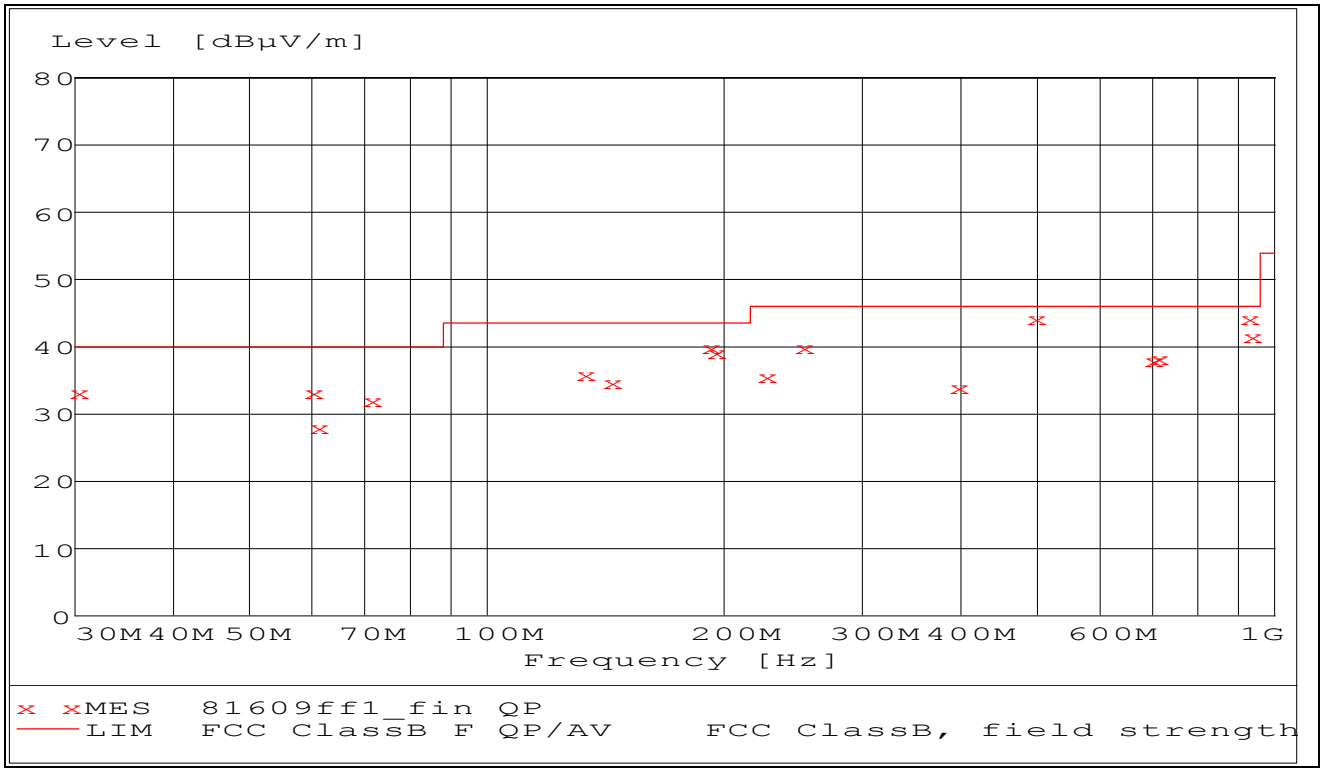
Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT.
All results are shown in the following.

Supply voltage: The EUT was supplied with 120 V / 60 Hz via the Laptop PC.

Title: Final measurement on 3m open area test site according to CFR47 Part 15.109
EUT: MiCard Reader
Manufacturer: NT-ware
Operating Condition: Normal operation mode
Test site: PHOENIX TEST-LAB BLOMBERG; open area test site M6
Operator: R. Blask
Test Specification: 120 V / 60 Hz (at PC power-supply)

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above mentioned standard. The measured points marked with x are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 81609ff1 of 21.08.2008

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Spurious emissions outside restricted bands									
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
30.228	33.10	40.0	6.9	13.0	19.5	0.6	100.0	278.00	Vertikal
59.964	33.30	40.0	6.7	26.1	6.3	0.9	125.0	137.00	Vertikal
60.984	28.00	40.0	1.0	20.9	6.2	0.9	169.0	317.00	Vertikal
71.760	32.20	40.0	7.8	24.5	6.8	0.9	231.0	355.00	Vertikal
144.012	34.80	43.5	8.7	21.7	11.8	1.3	100.0	270.00	Vertikal
192.012	40.20	43.5	3.3	29.7	9.0	1.5	147.0	45.00	Horizontal
195.024	39.10	43.5	4.4	28.7	8.9	1.5	100.0	225.00	Vertikal
227.520	35.70	46.0	10.3	23.9	10.2	1.6	100.0	90.00	Vertikal
398.608	34.10	46.0	11.9	16.3	15.6	2.2	175.0	218.00	Horizontal
499.252	44.30	46.0	1.7	24.4	17.4	2.5	191.0	314.00	Horizontal
698.968	38.20	46.0	7.8	15.2	20.0	3.0	164.0	71.00	Horizontal
715.048	38.30	46.0	7.7	14.5	20.8	3.0	181.0	310.00	Vertikal
929.464	44.20	46.0	1.8	17.3	23.5	3.4	125.0	225.00	Vertikal
932.212	41.50	46.0	4.5	14.5	23.6	3.4	147.0	270.00	Vertikal
Spurious emissions in restricted bands									
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
132.924	36.00	43.5	7.5	22.7	12.0	1.3	325.0	71.00	Vertikal
252.568	40.20	46.0	5.8	26.0	12.4	1.8	147.0	134.00	Horizontal
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

Result [dBµV/m] = reading [dBµV] + cable loss [dB] + antenna factor [dB/m]

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

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6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088	Weekly verification (system cal.)	
2	Measuring receiver	ESAI	Rohde & Schwarz	831953/001 833181/018	480025 480026	02/27/2008	02/2010
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	01/09/2008	01/2009
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097	Weekly verification (system cal.)	
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111	-	-
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESCS30	Rohde & Schwarz	828985/014	480270	02/27/2008	02/2010
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 A	Chase	1643	480147	08/01/2007	08/2012
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/25/2008	02/2010
32	Controller	HD100	Deisel	100/670	480326	-	-
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	-
34	Antenna support	AS615P	Deisel	615/310	480187	-	-
35	Antenna	CBL6112 B	Chase	2688	480328	10/11/2005	10/2010
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141	Weekly verification (system cal.)	
54	Power supply	TOE 8852	Toellner	51712	480233	11/27/2006	11/2008
56	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	03/15/2006	03/2011
57	EMI test receiver	ESPC	Rohde & Schwarz	843756/006	480150	02/28/2008	02/2010
58	Loop Antenna ∅ = 110 mm	-	Phoenix Test-Lab	-	410084	Weekly verification	
59	RF-cable No. 10	RG223	Phoenix-Test-Lab	-	410102	Weekly verification	

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	Test set-up final radiated emission (E-Field)	81609emi1.jpg
ANNEX B	**EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**2 pages**
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ANNEX D	**ADDITIONAL MEASURMENT RESULTS FOR INDUSTY CANADA**:	**2 pages**