

TEST REPORT

Test Report Reference: F091052E3

Equipment under Test: MiCard V2 HITag / USB RF-Cardreader Version 1.00

FCC ID: WG7MICARDHT02

IC: -

Serial Number: A7FE5D3D224C4552

Applicant: NT-ware Systemprogrammierung GmbH

Manufacturer: NT-ware 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**

TEST REPORT REFERENCE: F091052E3

Contents:	Page
1 IDENTIFICATION	3
1.1 APPLICANT	3
1.2 MANUFACTURER	3
1.3 DATES	3
1.4 TEST LABORATORY	4
1.5 RESERVATION	4
1.6 NORMATIVE REFERENCES	4
1.7 TEST RESULTS	4
2 TECHNICAL DATA OF EQUIPMENT	5
2.1 DEVICE UNDER TEST	5
2.2 PERIPHERY DEVICES	5
2.3 SPECIAL EMC MEASURES	5
3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES	6
4 LIST MEASUREMENTS	7
5 TEST RESULTS	8
5.1 CONDUCTED EMISSION MEASUREMENT ON AC MAINS (150 kHz to 30 MHz)	8
5.1.1 METHOD OF MEASUREMENT (CONDUCTED EMISSION MEASUREMENT ON AC MAINS (150 kHz to 30 MHz))	8
5.1.2 TEST RESULTS (CONDUCTED EMISSION MEASUREMENT ON AC MAINS)	9
5.2 RADIATED EMISSIONS	11
5.2.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)	11
5.2.2 PRELIMINARY RADIATED EMISSION TEST (9 kHz to 1 GHz)	18
5.2.3 FINAL RADIATED EMISSION TEST (9 kHz to 30 MHz)	22
5.2.4 FINAL RADIATED EMISSION TEST (30 MHz to 1 GHz)	23
6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	25
7 LIST OF ANNEXES	27

TEST REPORT REFERENCE: F091052E3

1 IDENTIFICATION

1.1 APPLICANT

Name:	NTware Systemprogrammierung GmbH
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Country:	Germany
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Fax:	+49-(0)-5403-780103
e-mail address:	hbauszus@nt-ware.com

1.2 MANUFACTURER

Name:	NTware Systemprogrammierung GmbH
Address:	Niedersachsenstraße 6 49186 Bad Iburg
Country:	Germany
Name for contact purposes:	Mr H. Bauszus
Tel:	+49-(0)-5403-7243-220
Fax:	+49-(0)-5403-780103
e-mail address:	hbauszus@nt-ware.com

1.3 DATES



Date of receipt of test sample:	22 April 2009
Start of test:	22 April 2009
Finish of test:	28 April 2009

TEST REPORT REFERENCE: F091052E3

1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
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		08 June 2009
	Name		Date
Test report checked by:	Bernd STEINER		09 June 2009
	Name		Date

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Tel. 0 52 35 / 95 00-0
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1.5 RESERVATION

This test report is only valid in its original form.

Any reproduction of its contents without written permission of the accredited test laboratory PHOENIX TESTLAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT REFERENCE.

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
- [5] **ICES-003 Issue 4 (February 2004)** Spectrum Management and Telecommunication Policy
Interference Causing Equipment Standard – Digital Apparatus

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.

TEST REPORT REFERENCE: F091052E3

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	USB RF-Cardreader device for copy systems
Type designation / model name:	MiCard V2 HiTag
Serial No.:	A7FE5D3D224C4552
FCC ID:	WG7MICARDHT02
IC:	None
Lowest internal frequency:	125 kHz
Highest internal frequency:	96 MHz
Antenna type:	Integral

Ports/Connectors

Ports/Connectors

Cable	Length	Shielding	Connector
USB cable	1.80 m	Yes	USB Type A
USB cable	0.30 m	Yes	USB Type A
-	-	-	-

2.2 PERIPHERY DEVICES

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

- A Laptop PC type Fujitsu Siemens Lifebook S Series with a test software was used.

2.3 SPECIAL EMC MEASURES

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

None

TEST REPORT REFERENCE: F091052E3

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

All tests were carried out with an unmodified test sample, which operates with a test-software. This software sets the EUT in continuous reading transponder mode and displays the transponder data on the computers display.

The conducted emission measurement on the power supply line was carried out on the AC/DC adapter of the used laptop PC, because the EUT will be supplied always via a PC or an USB hub. The AC/DC adapter was powered by an AC-mains network with 120 V AC / 60 Hz.

During all tests the TAG information was permanently checked with the help of the test-software. The TAG information was displayed on the PC display and was checked manually by the test engineer.

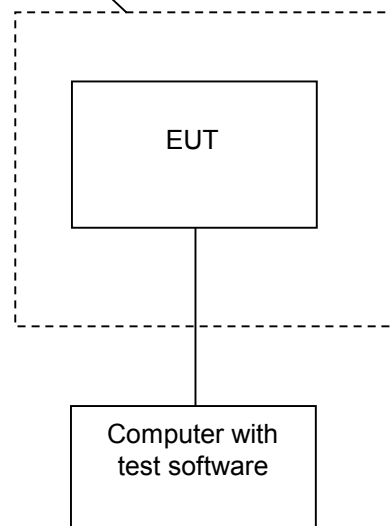
No spurious emission measurement of the receiver was carried out, because the co located transmitter transmits continuously.

All tests were carried out with the 1.8m USB-Cable (worst case).

During the tests, the EUT was labelled with a FCC-label.

The physical boundaries of the EUT are shown below.

Physical boundaries of the EUT



TEST REPORT REFERENCE: F091052E3

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.
Radiated emissions	0.009-1,000	15.109(a)	ICES 003 [5]	Passed	11 et seq.
Conducted emissions on supply line	0.15 - 30	15.107 (a)	ICES 003 [5]	Passed	8 et seq.
99 % bandwidth	125 kHz	-	4.6.1 [4]	Passed	Annex D

TEST REPORT REFERENCE: F091052E3

5 TEST RESULTS

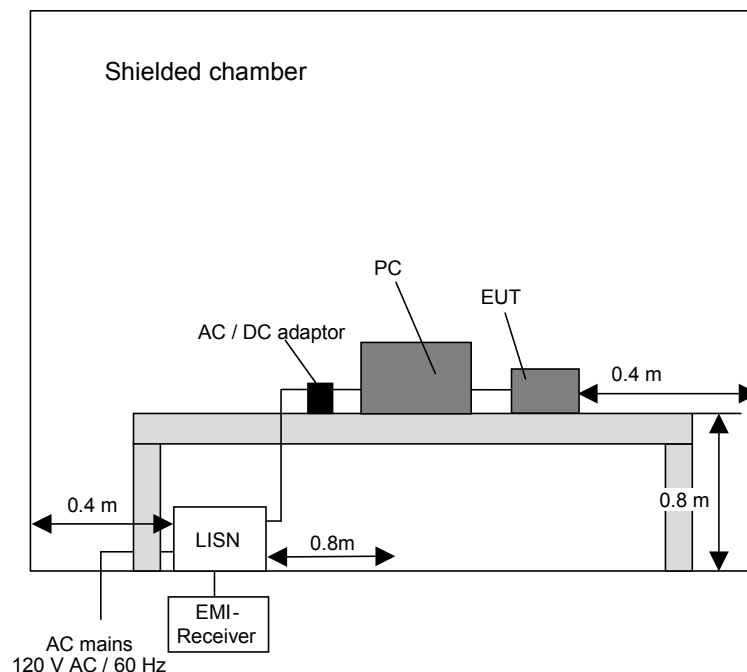
5.1 CONDUCTED EMISSION MEASUREMENT ON AC MAINS (150 kHz to 30 MHz)

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



TEST REPORT REFERENCE: F091052E3

5.1.2 TEST RESULTS (CONDUCTED EMISSION MEASUREMENT ON AC MAINS)

Ambient temperature:	20 °C	Relative humidity:	45 %
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Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

Cable guide: The cable of the EUT was 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 (awaiting a TAG). All results are shown in the following.

Power supply: During this test the EUT was powered by the laptop PC.

Title: Mains terminal disturbance voltage measurement with protective ground conductor simulation

EUT: MiCard V2 HiTAG

Manufacturer: NTware

Operating Condition: Normal operation

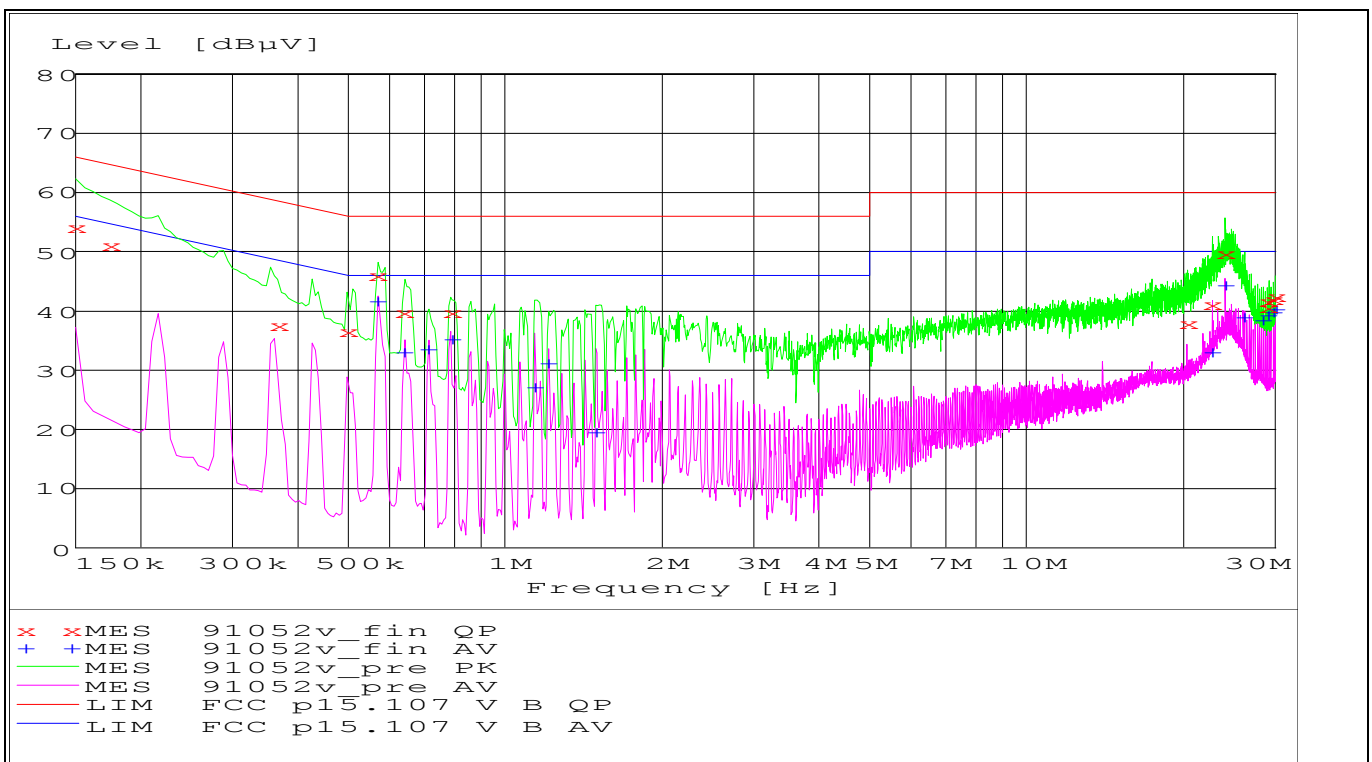
Test site: PHOENIX TESTLAB Blomberg M4

Operator: R. Blask

Test Specification: 120 V AC / 60 Hz

Comment: With "Testrechner 1"

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: 91052v

TEST REPORT REFERENCE: F091052E3

Result measured with the quasipeak detector:

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

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.150000	54.50	2.1	66.0	11.5	L1	FLO
0.174000	51.20	1.2	64.8	13.5	L1	FLO
0.366000	37.80	0.8	58.6	20.8	N	FLO
0.498000	36.70	0.8	56.0	19.3	N	FLO
0.570000	46.10	0.8	56.0	9.9	N	FLO
0.642000	39.90	0.8	56.0	16.1	L1	FLO
0.786000	39.90	0.8	56.0	16.1	N	FLO
20.310000	38.20	2.3	60.0	21.8	N	FLO
22.788000	41.10	2.7	60.0	18.9	L1	FLO
24.000000	49.80	2.8	60.0	10.2	N	FLO
28.998000	40.90	3.3	60.0	19.1	L1	FLO
29.250000	42.00	3.3	60.0	18.0	N	FLO
29.748000	42.30	3.3	60.0	17.7	N	FLO
30.000000	42.60	3.2	60.0	17.4	N	FLO

Data record name: 91052v_fin QP

Result measured with the average detector:

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

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.570000	41.70	0.8	46.0	4.3	N	FLO
0.642000	33.30	0.8	46.0	12.7	L1	FLO
0.714000	33.70	0.8	46.0	12.3	N	FLO
0.786000	35.30	0.8	46.0	10.7	N	FLO
1.140000	27.40	0.7	46.0	18.6	N	FLO
1.212000	31.30	0.7	46.0	14.7	L1	FLO
1.494000	19.50	0.7	46.0	26.6	N	FLO
22.800000	33.20	2.7	50.0	16.8	L1	FLO
24.000000	44.40	2.8	50.0	5.6	L1	FLO
26.250000	38.90	2.9	50.0	11.1	L1	FLO
28.500000	38.40	3.2	50.0	11.6	N	FLO
29.250000	39.60	3.3	50.0	10.4	L1	FLO
29.748000	39.80	3.3	50.0	10.2	L1	FLO
30.000000	40.20	3.2	50.0	9.8	N	FLO

Data record name: 91052v_fin AV

Test: Passed

TEST EQUIPMENT USED:

1 - 3, 5, 6

TEST REPORT REFERENCE: F091052E3

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 site 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 site 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 110 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.

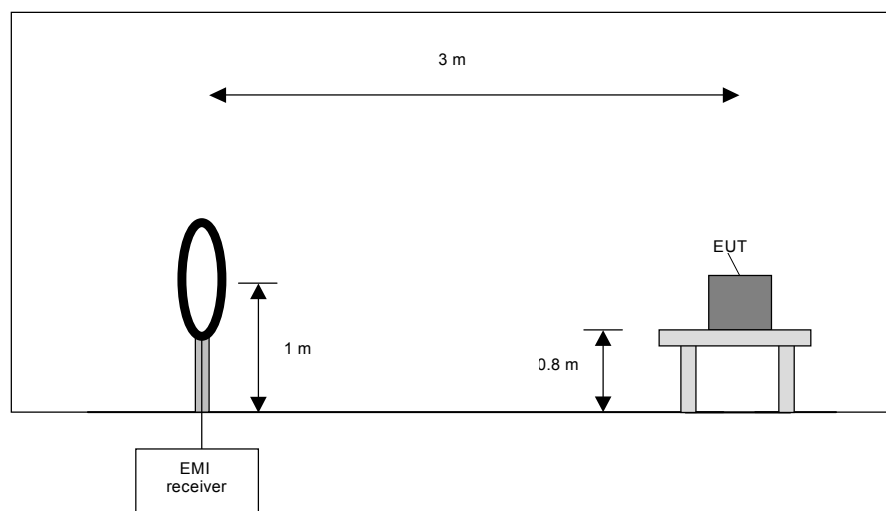
Preliminary measurement (9 kHz to 30 MHz):

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



TEST REPORT REFERENCE: F091052E3

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).

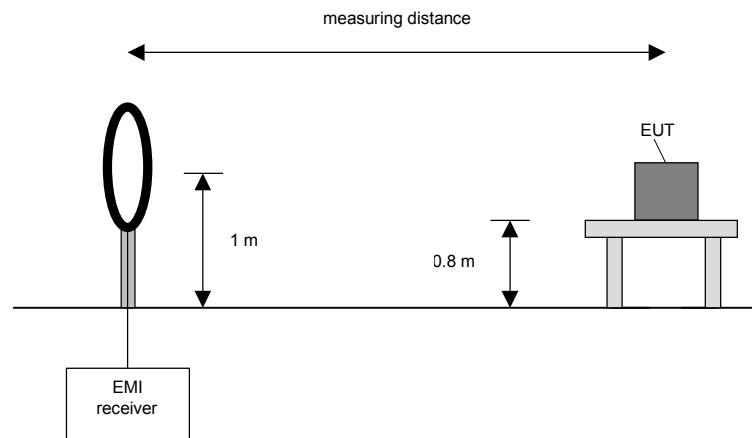
Final measurement (9 kHz to 30 MHz):

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



TEST REPORT REFERENCE: F091052E3

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).

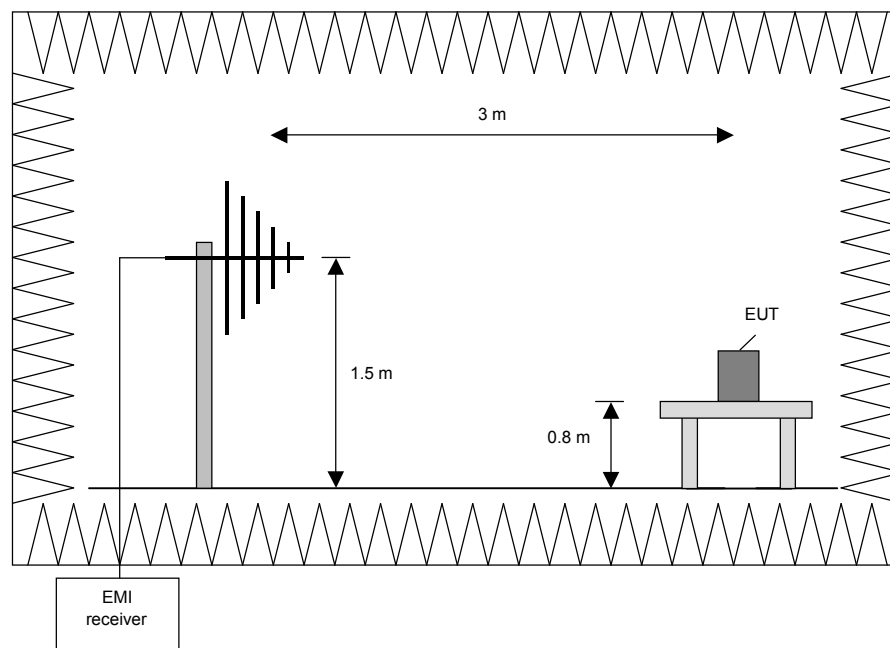
Preliminary measurement (30 MHz to 1 GHz)

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



TEST REPORT REFERENCE: F091052E3

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:

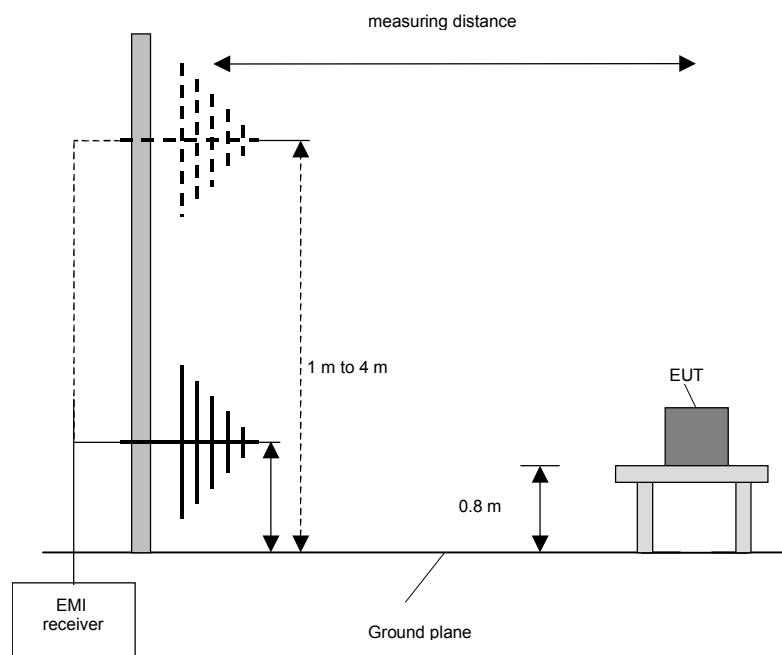
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the 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



TEST REPORT REFERENCE: F091052E3

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].

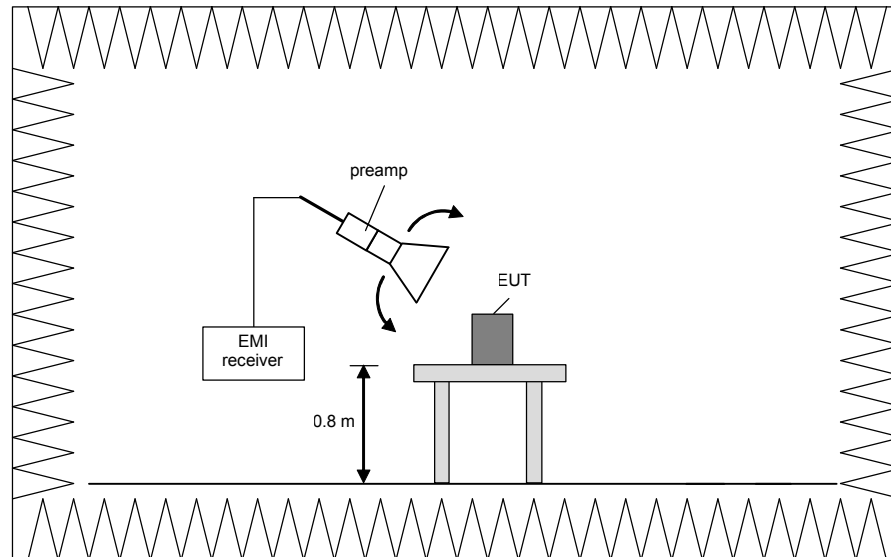
Preliminary measurement (1 GHz to 110 GHz)

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

TEST REPORT REFERENCE: F091052E3



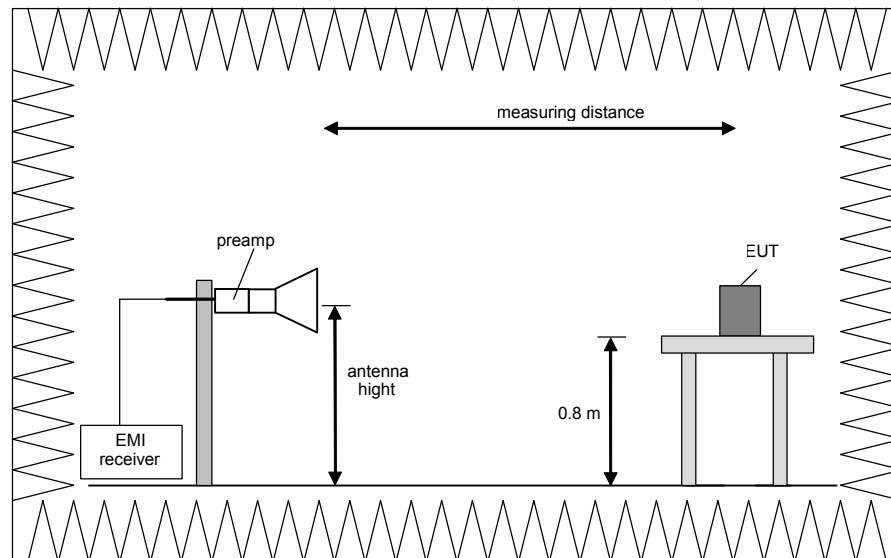
Final measurement (1 GHz to 110 GHz)

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

TEST REPORT REFERENCE: F091052E3



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.

TEST REPORT REFERENCE: F091052E3

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

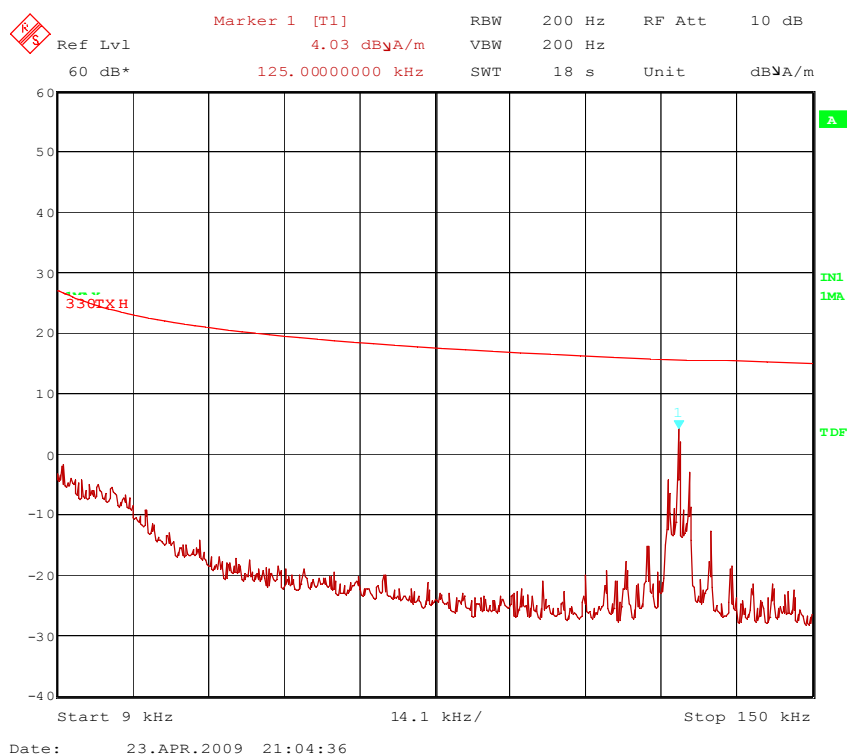
Ambient temperature:	20 °C	Relative humidity:	45 %
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Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

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

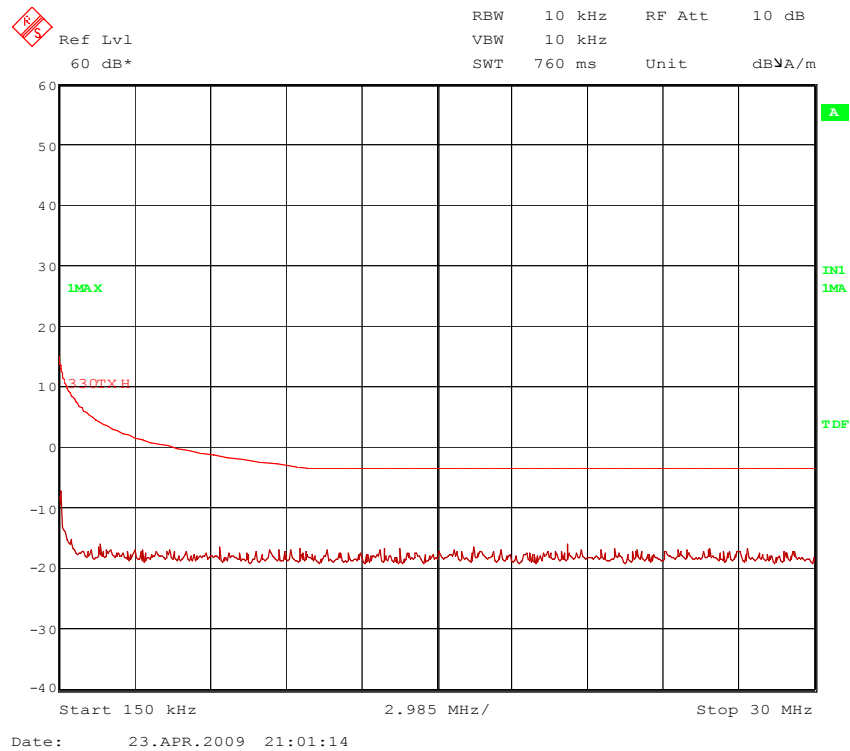
Test record: The test was carried out in normal operation mode of the EUT (awaiting a TAG). All results are shown in the following.

Power supply: During this test the EUT was powered by the laptop PC from an AC-mains network with 120 V AC / 60 Hz.



91052tx1.wmf: Spurious emissions from 9 kHz to 150 kHz

TEST REPORT REFERENCE: F091052E3



91052tx2.wmf: Spurious emissions from 150 kHz to 30 MHz

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

125.000 kHz (wanted frequency)

This frequency has to be measured on the outdoor test site. The results were presented in the following.

TEST REPORT REFERENCE: F091052E3

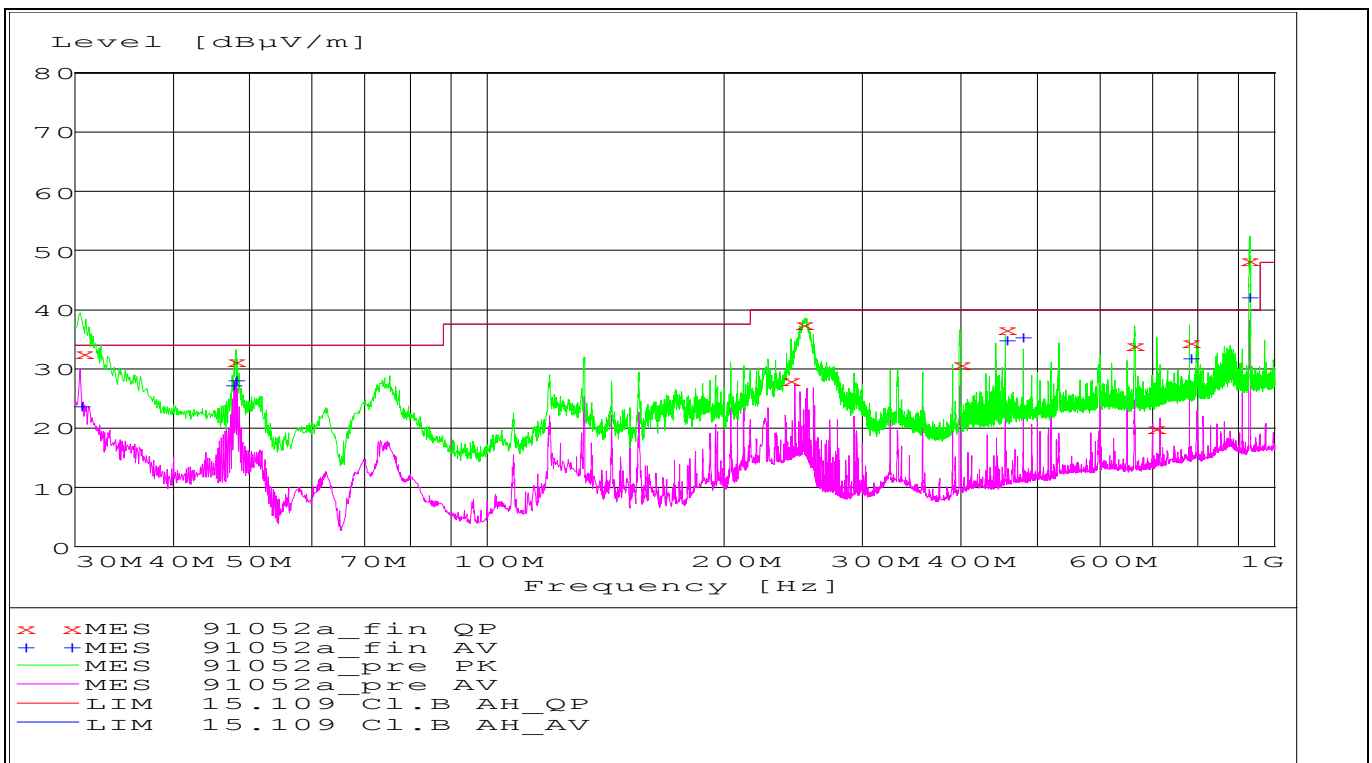
Title: Preliminary emission measurement
according CFR 47 Part15.109
EUT: MiCard V2 HiTAG
Manufacturer: NTware
Operating Condition: Normal operation mode
Test site: fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator: With "Testrechner 1"
Test Specification: 120V/60Hz

The limit line and measurement curve shown in the diagram below refer to the preliminary measurements. Here, it must be noted that because of the reduced measuring distance and because of the floor absorbers, the measured values do not comply with the values of the above mentioned standard; they only serve as orientation in determining which frequencies must be measured on the open area test site.

The limit line is achieved with the applied standard by converting to a 3m measurement distance (+10 dB) and the correction for the free space in which in the "worst case" the reflected floor wave is missing entirely (-6dB). Therefore 4dB is added to the limit line of the standard concerned.

The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions.

The top measured curve represents the peak measurement. The measured points marked with x are frequency points for which later measurements with a quasi-peak detector were carried out. These values are indicated in the following table. The bottom measured curve represents average values, which are only required for control purposes.



Data record name: 91052a

TEST REPORT REFERENCE: F091052E3

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

30.696 MHz, 48.000 MHz, 455.052 MHz, 664.140 MHz, 780.048 MHz, 930.312 MHz

The following frequency was found inside the restricted bands:

243.576 MHz

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

TEST EQUIPMENT USED THE TEST:

29, 31 – 33, 43, 54, 56

TEST REPORT REFERENCE: F091052E3

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

Ambient temperature:	15 °C	Relative humidity:	56 %
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- 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, 10 m and 30 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 (without reading a TAG). 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.
- Test results: The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{antenna factor [dB/m]}$$

Results with measuring distance of 3 m						
Frequency	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector	Readings dB μ V	Antenna factor * dB/m
125.000	61.0	105.6	44.6	QP	41.0	20.0
Results with measuring distance of 10 m						
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector	Readings dB μ V	Antenna factor * dB/m
125.000	Signal was below the noise floor of the measuring system					
Measurement uncertainty			+2.2 dB / -3.6 dB			

*: Cable loss included

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

56 – 57

TEST REPORT REFERENCE: F091052E3

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

Ambient temperature:	20 °C	Relative humidity:	37 %
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Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

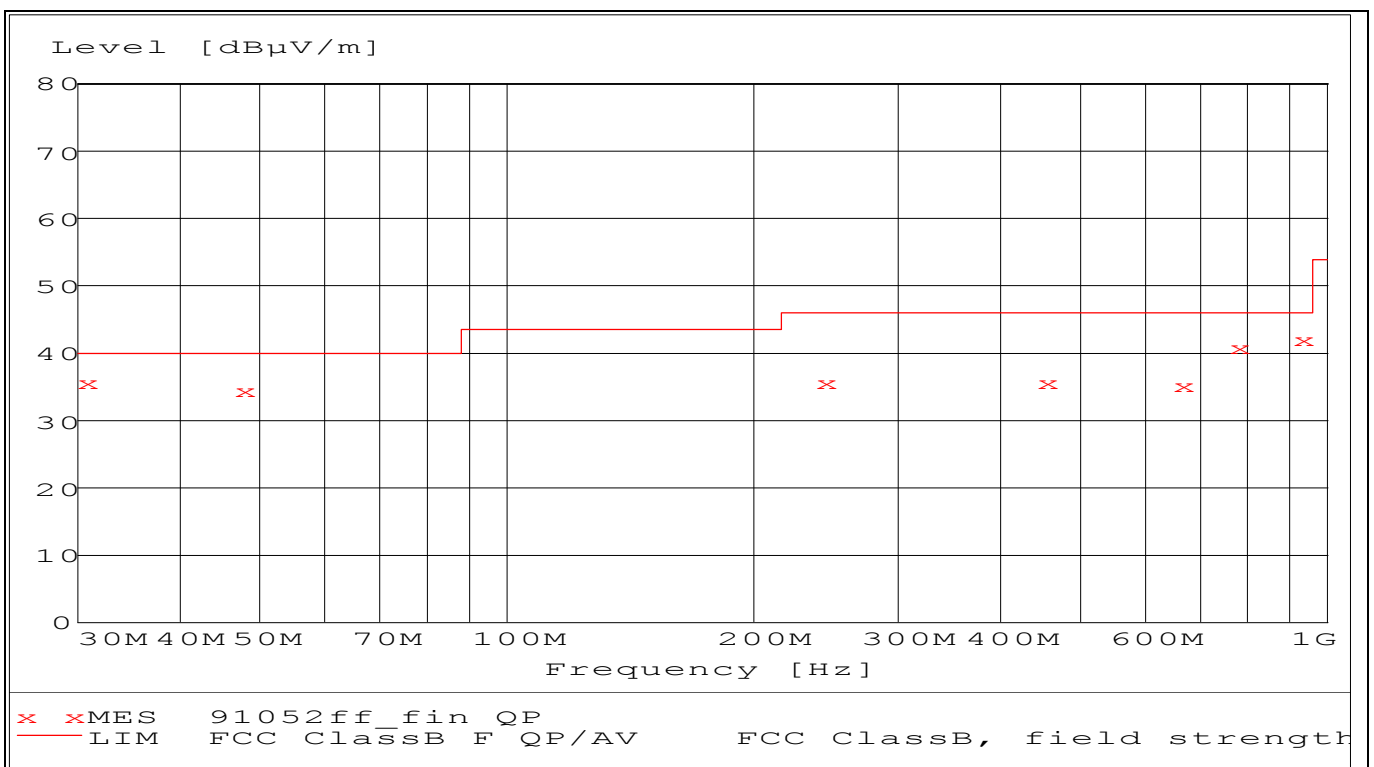
Cable guide: The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

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

Power supply: During this test the EUT was powered by the laptop PC from an AC-mains network with 120 V AC / 60 Hz.

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

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$



Data record name: 91052ff

TEST REPORT REFERENCE: F091052E3

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.

Result measured with the quasipeak detector:

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

Spurious emissions in restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBμV/m	dBμV/m	dB	dBμV	dB/m	dB	cm	deg	
243.576	35.9	46.0	10.1	18.3	13.1	2.1	150.0	293	Horizontal
Spurious emissions outside restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBμV/m	dBμV/m	dB	dBμV	dB/m	dB	cm	deg	
30.696	35.9	40.0	4.1	16.8	18.0	1.1	100	113	Vertical
48.000	34.7	40.0	5.3	24.0	9.5	1.2	100	203	Vertical
455.052	35.8	46.0	10.2	14.4	19.3	2.1	150	68	Horizontal
664.140	35.5	46.0	10.5	10.3	22.3	2.9	100	23	Vertical
780.048	41.0	46.0	5.0	14.4	23.4	3.2	100	337	Horizontal
930.312	42.1	46.0	3.9	12.9	25.7	3.5	150	112	Vertical
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:

14 – 20

TEST REPORT REFERENCE: F091052E3

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

TEST REPORT REFERENCE: F091052E3

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	02/26/2008	02/2010
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	06/2008	06/2009
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.)	
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 Ø = 225 mm	-	Phoenix Test-Lab	-	410085	Weekly verification	
59	RF-cable No. 10	RG223	Phoenix-Test-Lab	-	410102	Weekly verification	

TEST REPORT REFERENCE: F091052E3

7 LIST OF ANNEXES

ANNEX A	PHOTOGRAPHS OF THE TEST SET-UPS:	5 pages
	Test set-up preliminary radiated emissions (H-Field)	91052emi_fcc4.jpg
	Test set-up preliminary radiated emissions (E-Field)	91052emi_fcc9.jpg
	Test set-up final radiated emissions (E-Field)	91052emi_fcc8.jpg
	Test set-up outdoor test site	91052emi_fcc3.jpg
	Test set-up conducted emissions	91052emi_c1.jpg
ANNEX B	EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	2 pages
	MiCard V2 HiTag, 3-D view	91052eut1.jpg
	MiCard V2 HiTag, rear view	91052eut2.jpg
ANNEX C	INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	2 pages
	MiCard V2 HiTag, PCB top view	91052eut4.jpg
	MiCard V2 HiTag, PCB rear view	91052eut7.jpg
ANNEX D	ADDITIONAL MEASUREMENT RESULTS FOR INDUSTRY CANADA:	2 pages