

Test report

AIE15_02

EUT: RFID Reader / Short range device
Trade name: ARE i2
Tested type: ARE i2 – 1X / RS232 with Antenna AAN X5F
FCC Identifier: Pending

Production level: 03/2008
S/N: 004 748
Responsible party: AEG Identifikationssysteme GmbH
Hörvelsinger Weg 47
89081 Ulm / Germany

Test remit: FCC Rules CFR 47 Part 15
– Subpart C Section 15.209

The standards were: kept*
 not kept*

*Remark: Validation covered by the accredited scope
 Validation not covered by the accredited scope
according: _____

Applicant: AEG Identifikationssysteme GmbH
Hörvelsinger Weg 47
89081 Ulm / Germany

EUT-
Date of arrival: 2008-03-14
Test ID: PRE11_10
Date(s) of test: 2008-03-31; 2008-04-04

Burgrieden, 2008-04-14

Released by:


Principal engineer - Christian Vogelmann

Test laboratory: EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung
Untere Wiesen 1 / 88483 Burgrieden

DAR-Registration No.: DAT-P-153/98-01
CAB-Registration No.: BnetzA-CAB-02/21-01/1
FCC-Registration No.: 90568

Hochschule Ulm
Eberhard-Finckh-Str. 11 / 89075 Ulm
The susceptibility test according EN 61000-4-3
carried out in the EMC-testing laboratory of the Hochschule Ulm

Responsible inspector: Mr. Hauser
EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contact person: Mr. Köslér
AEG Identifikationssysteme GmbH
Hörvelsinger Weg 47
89081 Ulm / Germany

EUT-

Description: RFID Reader with detachable antenna and RS 232 interface. For connecting the antenna a special plug is provided. The reader is merchandised without a power supply and is arranged for DC-supply.

Voltage supply: 9-30VDC

Frequency list: Fundamental Frequency 125kHz \pm 1kHz
Crystal frequencies: 16 MHz

Temperature range: xx

Size: Approximately 90x58x37 mm (LxWxH)

Supplied /
used equipment:

| Designation | S/N | FCC-ID | Manufacturer |
|-------------------------------------|------------------|----------|--|
| PC Dimension 4500 | xx | xx | Dell |
| Keyboard MF2 LC | S26381-K252-V120 | xx | Siemens Nixdorf Informationssysteme AG |
| Mouse CA-93-6MD | LU078901396 | DZL6QBCM | Logitech |
| Monitor PK786 | FPIJ120055414 | IJE772 | Proview |
| Power Supply | F1454A | xx | Hewlett Packard |
| Antenna AAN X5F | 000 243 | xx | AEG ID GmbH |
| Adjustable power supply DPS-4005 | 005601 | | Voltcraft |

Configuration: As-delivered condition
 Modified*
 * _____

| Cable designation | Type | Length | Remarks |
|-------------------|------------|--------|------------|
| DC Power lead | Unshielded | 150cm | xx |
| RS 232 lead | Shielded | 150cm | xx |
| Antenna lead | Unshielded | 200cm | Rigid lead |

Remarks: xx

State of revision:

| Source document | New Document | Date / Reviser | Modifications |
|-----------------|--------------|----------------|---------------|
| | | | |
| | | | |
| | | | |

Test equipment list of EMCE GmbH:

| Inv.- No. | Designation | Type | Manufacturer | S/N | Calibration: interval / valid until: |
|--------------|--------------------------|------------------------|---------------------------|-------------|--|
| 001 | Test receiver | ESS 5Hz - 1000 MHz | Rohde & Schwarz | 833776/008 | 1 year / 01/2008 |
| 002 | Probe | ESH2-Z3 | Rohde & Schwarz | - | 1 year / 08/2007 |
| 003 | LISN 1 | ESH3-Z5 | Rohde & Schwarz | 835268/007 | 1 year / 08/2007 |
| 004 | LISN 2 | ESH3-Z5 | Rohde & Schwarz | 835268/003 | 1 year / 08/2007 |
| 005 | LISN 3 | NNB 4/32T | Rolf Heine HF- Technik | 4/32T-96015 | 1 year / 07/2007 |
| 007 | Absorbing clamp | MDS 21 | Schwarzbeck | 942436 | 1 year / 08/2007 |
| 008 | Antenna 9kHz - 30MHz | HFH2-Z2 | Rohde & Schwarz | 835776/0002 | 3 years / 05/2010 |
| 009 | Antenna 30 - 300MHz | VHBA9123 / BBA9106 | Schwarzbeck | 435 | 1 year / 08/2007 |
| 010 | Antenna 250 -1200MHz | UHALP 9108A | Schwarzbeck | 108 | 1 year / 08/2007 |
| 011 | Antenna 30 - 300MHz | VHBA9123 / BBA9106 | Schwarzbeck | 0408/94 | 1 year / 08/2007 |
| 012 | Antenna 250 -1200MHz | UHALP 9108A | Schwarzbeck | 166 | 1 year / 08/2007 |
| 013 | Antenna 9kHz - 30 MHz | Loop antenna 1.5m Ø | EMCE GmbH | - | 1 year / 08/2007 |
| 014 | OATS | 3m | EMCE GmbH | - | 3 years / 09/2007 |
| 015 | OATS | 10m | EMCE GmbH | - | 1 year / 08/2007 |
| 020 | Coupling clamp | IP4A | Haefely | 082672-13 | 1 year / 08/2007 |
| 022 | ESD-Gun | NSG 435 | Schaffner | 577 | 1 year / 08/2007 |
| 024 | HF-Generator | SMY01 | Rohde & Schwarz | 844146/046 | 1 year / 08/2007 |

| Inv.- No. | Designation | Type | Manufacturer | S/N | Calibration: interval / valid until: |
|--------------|---|--|--------------------------|--------------------|--|
| 025 | Current clamp BCI | F-120-2 | FCC | 47 | 1 year / 08/2007 |
| 026 | Coupling device network | CDN 801-M3-25 | FCC | 92 | 1 year / 08/2007 |
| 030 | Coupling device network | CDN-S9 | EMCE GmbH | - | 1 year / 08/2007 |
| 031 | Coupling device network | CDN-S9 | EMCE GmbH | - | 1 year / 08/2007 |
| 032 | HF Amplifier | 75A250 | Amplifier Research | 22789 | 1 year / 08/2007 |
| 033 | Coupling device network | CDN-AF2 | EMCE GmbH | | 1 year / 08/2007 |
| 034 | Coupling device network | CDN-AF2 | EMCE GmbH | | 1 year / 08/2007 |
| 035 | 3- ϕ - Coupling network | CDN-1000 | EMC-Partner AG | CDN-1000-45 | 1 year / 08/2007 |
| 036 | Coupling device network | CDN-M5-25 | EMCE GmbH | | 1 year / 08/2007 |
| 037 | Coupling device network | CDN-S1 | EMCE GmbH | | 1 year / 08/2007 |
| 038 | Helmholtz coil | Rectangular 1x1m | EMCE GmbH | | 1 year / 08/2007 |
| 039 | Helmholtz coil | Rectangular 1x1m | EMCE GmbH | | 1 year / 08/2007 |
| 040 | Current transformer | | EMCE GmbH | | 1 year / 08/2007 |
| 041 | HZ-10 | Shielded coil | Rohde & Schwarz | 849788/020 | 3 years / 05/2010 |
| 042 | AC-Source / Analyser / Norm impedance | EMV D5000/PAS | Spitzenberger + Spies | A274700/ 0 0501 | 2 years / 09/2007 |
| xx | Test equipment according DIN EN 61000-4-3 | Full anechoic chamber 3m Test site | Siemens | xx | 1 year / 06/2008 |
| 043 | Receiver | 3DH/E Field meter ESM-100 | Maschek | 971521 | 3 years / 12/2007 |
| 044 | CDN | CN-U | EMC-Partner AG | 86 | 3 years / 09/2008 |

| Inv.- No. | Designation | Type | Manufacturer | S/N | Calibration: interval / valid until: |
|--------------|--|---------------------------|------------------------------|------------|--|
| 045 | CDN | DN-HF | EMC-Partner AG | 86 | 3 years / 09/2008 |
| 046 | CDN | DN-LF2 | EMC-Partner AG | 86 | 3 years / 09/2008 |
| 047 | CDN | DN-LF1 | EMC-Partner AG | 86 | 3 years / 09/2008 |
| 048 | ESD-/Burst-/Surge- Generator | Transient 2000 | EMC-Partner AG | 561 | 1 year / 08/2007 |
| 050 | Data Acquisition/Switch Unit | Agilent 34970A | Agilent Technologies Inc. | MY41019453 | 3 years / 11/2009 |
| 051 | 20 Channel Multiplexer | Agilent 34901A | Agilent Technologies Inc. | MY41013531 | 3 years / 11/2009 |
| 052 | Function / Arbitrary Waveform Generator | Agilent 33220A | Agilent Technologies Inc. | MY43002650 | 3 years / 11/2009 |
| 054 | Helmholtz coil | Rectangular 1.25x1.25m | EMCE GmbH | | 1 year / 08/2007 |
| 055 | Helmholtz coil | Rectangular 1.25x1.25m | EMCE GmbH | | 1 year / 08/2007 |
| 057 | Field probe | HI-6005 | Holaday | 34274 | 1 year / 04/2008 |
| 058 | Receiver | ESIB 40 | Rohde & Schwarz | 100200 | 3 years / 08/2007 |
| 060 | HF Coupling clamp | KEMA 801 | Schaffner | 20808 | 3 years / 11/2007 |

Scope:

| | | |
|---|---|----|
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1 EMC-Test(s)

1.1 EMI Report FCC Rules 47 CFR Part 15 – Subpart C – Technical standards

1.1.1 Terminal voltage according 47 CFR Part 15 – Subpart C

- Full compliance
- Precompliance
- Test not requested
- Test not carried out*

* _____

Test location

| <input checked="" type="checkbox"/> | Inv.-No. | Designation | Type (LxWxH) | Manufacturer | Location |
|-------------------------------------|----------|--------------------------|-----------------------------|--------------------------------|--|
| <input checked="" type="checkbox"/> | 504 | Shielded room #1 | 6.4 x 4.0 x 2.3m | Frankonia EMV-Messsysteme GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| <input type="checkbox"/> | 588 | Shielded room #2 | 8.3/5.8 x 5.5/2.9 x 3.4m | EMC-Technik & Consulting GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| <input type="checkbox"/> | 584 | Shielded room #3 | 3.6 x 3.6 x 2.5m | Siemens AG | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| <input type="checkbox"/> | 061 | Semi anechoic chamber #1 | 4.0 x 4.0 x 3.5m | EMC-Technik & Consulting GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| <input type="checkbox"/> | 062 | Semi anechoic chamber #2 | 13.5 x 6.1 x 5.5m | EMC-Technik & Consulting GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| <input type="checkbox"/> | | Alternative test site | | | |

1.1.1.1 Test set up

According 47 CFR Part 15 – Subpart C



Used test equipment

| <input checked="" type="checkbox"/> | Inv.-No. | Designation | Type | Manufacturer | S/N |
|-------------------------------------|----------|--|-----------------------|--------------------------|-----------------|
| <input checked="" type="checkbox"/> | 001 | Test receiver | ESS 5Hz - 1000 MHz | Rohde & Schwarz | 833776/008 |
| | 002 | Probe | ESH2-Z3 | Rohde & Schwarz | - |
| <input checked="" type="checkbox"/> | 003 | LISN 1 | ESH3-Z5 | Rohde & Schwarz | 835268/007 |
| <input checked="" type="checkbox"/> | 004 | LISN 2 | ESH3-Z5 | Rohde & Schwarz | 835268/003 |
| | 005 | LISN 3 | NNB 4/32T | Rolf Heine HF-Technik | 4/32T-96015 |
| | 006 | LISN | NNBM 8125 | Schwarzbeck | 8125371 |
| | 007 | Absorbing clamp | MDS 21 | Schwarzbeck | 942436 |
| <input checked="" type="checkbox"/> | 042 | AC-Source / Analyser / Norm impedance | EMV D5000/PAS | Spitzenberger + Spies | A274700/ 0 0501 |
| | 058 | Test receiver | ESIB 40 | Rohde & Schwarz | 100200 |
| | 060 | HF coupling clamp | KEMA 801 | Schaffner | 20808 |

All used test equipment are checked resp. calibrated periodically.

Test equipment was checked and complied to the requirements

Test / Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the terminal voltage with an extended coverage factor of $k=2$:

| Frequency | Measurement uncertainty |
|----------------|-------------------------|
| 9kHz – 150kHz | 4.0dB |
| 150kHz – 30MHz | 3.6dB |

1.1.1.2 Test

Regulation

FCC Rules 47 CFR Part 15 – Subpart C

9kHz - 30MHz

150kHz - 30MHz

Limits:

Class B

Class A

Section 15.207

Operation mode

EUT arrangement:

Tabletop

Floor standing

Power supply:

230V/50Hz

115V/60Hz

| Port # | Leads | Remarks |
|--------|---------------------------------|---------|
| #1 | AC power line – ARE i2 | L1/N |
| #2 | AC power line – PC + Monitor | L1/N/PE |
| #3 | | |

Continuous operation of the system. The ARE i2 was supplied with the HP F1454A power supply. The tag was placed in half reading range of the antenna. A continuous reading of the tag was exercised with a terminal program running on the PC-System.

Environmental conditions

Temperature: 15 - 35 °C
Humidity: 30 - 60 %
Air pressure: 860 - 1060 hPa

Environmental conditions during the test: kept
 not kept

Test - / Measurement procedure

Measurements are made with a receiver according CISPR guidelines. The required frequency range is scanned in an automatically operation. If the emanation is closer than 6dB to the limits or more, the receiver will stop and measure the exact value with quasipeak or average detector. The frequency, the maximum reading and the limit will be printed out.

Test result

Limits for continuous disturbances: kept
 not kept

Evidence of conformity,
evaluated statistically with __ devices: kept
 not kept
 not carried out

Remarks: xx

Protocol scope

Readings - continuous emanation
 Diagram - continuous emanation

EMCE GmbH Ing_buero fuer EMV_Pruefungen

Conducted emission - Terminal voltage

31. Mar 08 16:10

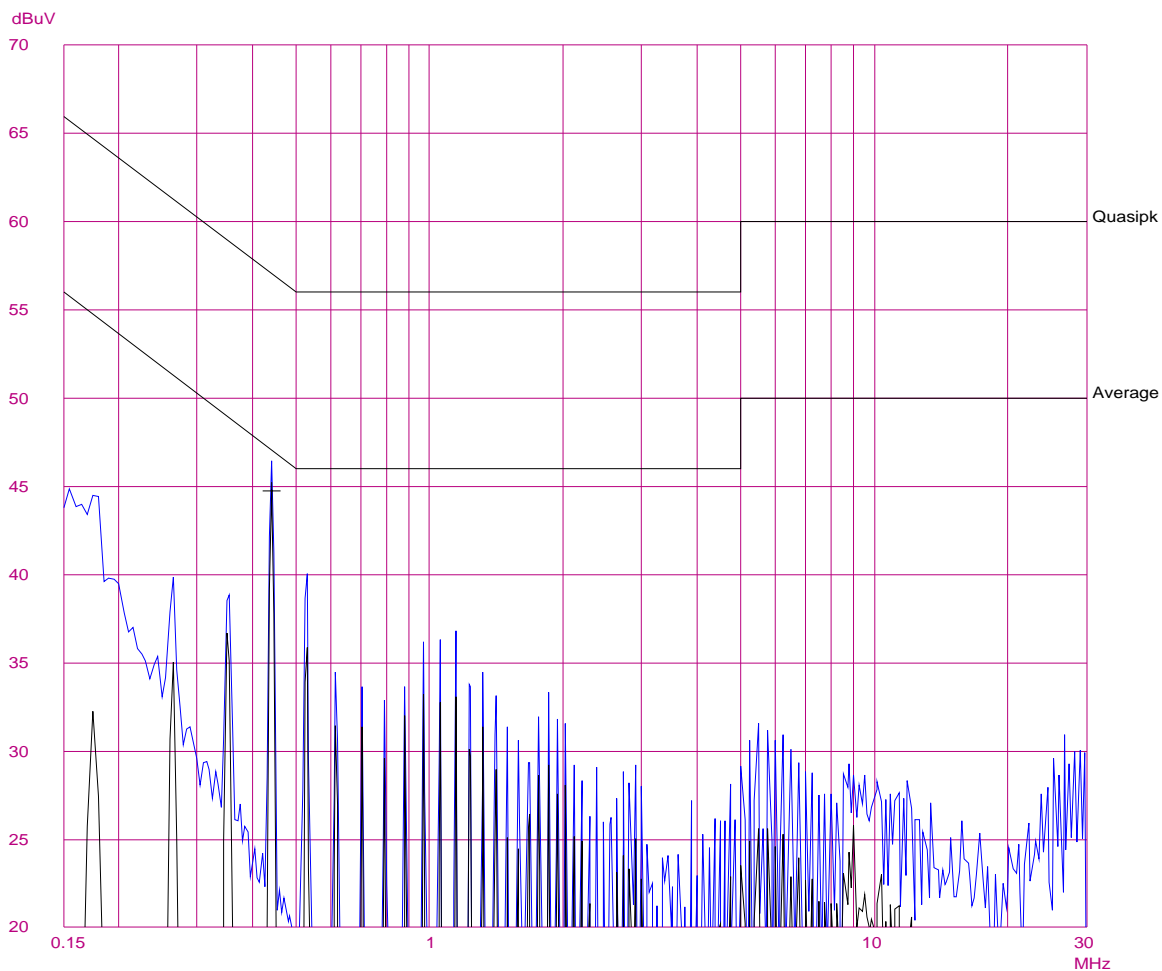
EUT: A1RS232 / AANX5F
 Manuf: AEG ID GmbH
 Op Cond: 115V/60Hz, half reading range
 Operator: Mr. Hauser
 Test Spec: 47 CFR Part 15 Subpart C
 Comment: Test_ID EUT PRE11_10
 AEI14_55, Port L1 - ARE i2

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | | |
|-------------|------|------|-------------------|----------|--------|-------|--------|----------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 30M | 5k | 10k | PK+AV | 20ms | AUTO | LN | OFF 60dB |

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB

| Transducer No. | Start | Stop | Name |
|----------------|-------|-------|----------|
| 2 | 1Hz | 1000M | Kabel_6m |



EMCE GmbH Ing_buero fuer EMV_Pruefungen

Conducted emission - Terminal voltage

31. Mar 08 16:10

EUT: A1RS232 / AANX5F
 Manuf: AEG ID GmbH
 Op Cond: 115V/60Hz, half reading range
 Operator: Mr. Hauser
 Test Spec: 47 CFR Part 15 Subpart C
 Comment: Test_ID EUT PRE11_10
 AEI14_55, Port L1 - ARE i2

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | | |
|-------------|------|------|-------------------|----------|--------|-------|--------|-------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 30M | 5k | 10k | PK+AV | 20ms | AUTO | LN OFF | 60dB |

Final Measurement Results:

| Frequency | QP Level | QP Limit |
|-----------|----------|----------|
| MHz | dBuV | dBuV |

no Results

| Frequency | AV Level | AV Limit |
|-----------|----------|----------|
| MHz | dBuV | dBuV |

| | | |
|---------|------|------|
| 0.44000 | 44.7 | 47.0 |
|---------|------|------|

* limit exceeded

EMCE GmbH Ing_buero fuer EMV_Pruefungen

Conducted emission - Terminal voltage

31. Mar 08 16:20

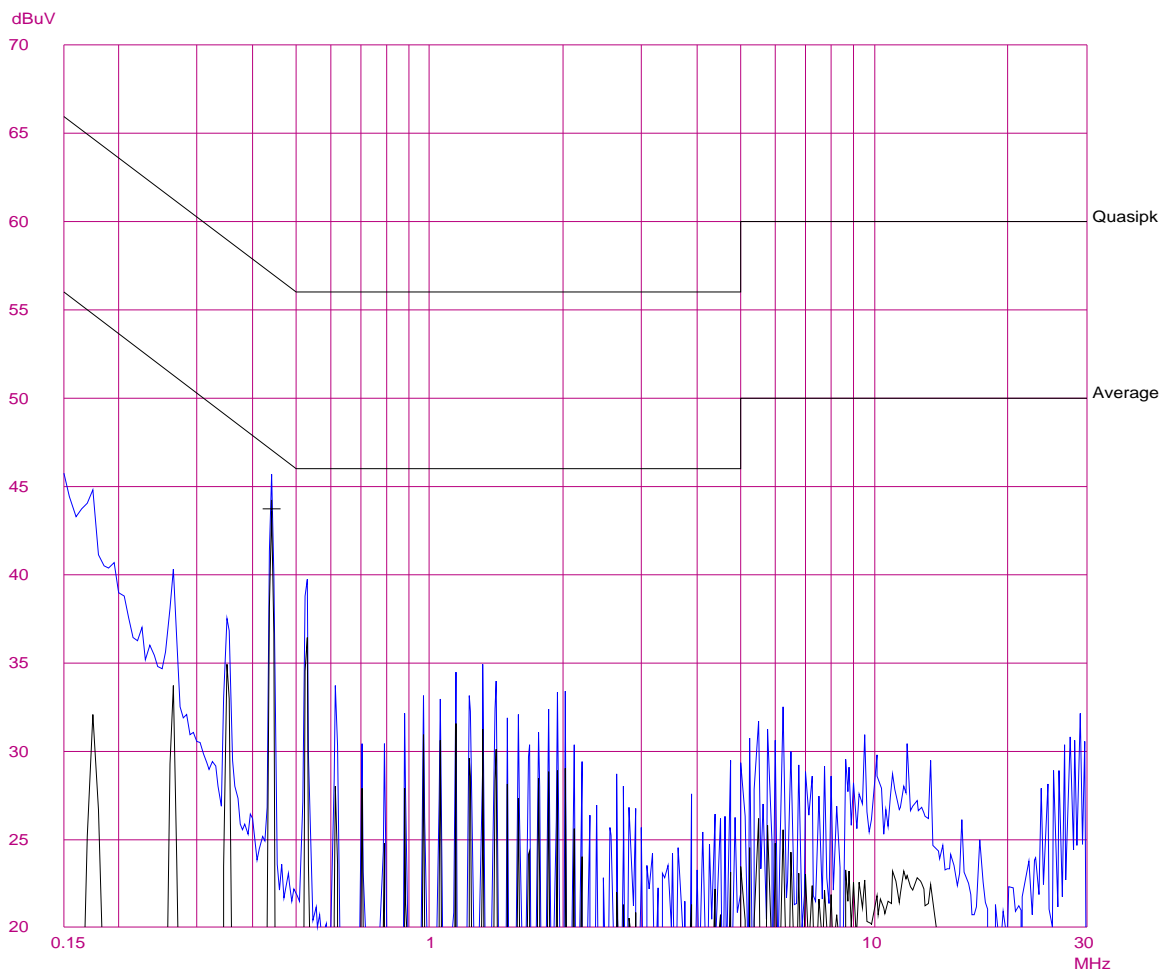
EUT: A1RS232 / AANX5F
 Manuf: AEG ID GmbH
 Op Cond: 115V/60Hz, half reading range
 Operator: Mr. Hauser
 Test Spec: 47 CFR Part 15 Subpart C
 Comment: Test_ID EUT PRE11_10
 AEI14_56, Port N - ARE i2

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | | |
|-------------|------|------|-------------------|----------|--------|-------|--------|----------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 30M | 5k | 10k | PK+AV | 20ms | AUTO | LN | OFF 60dB |

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB

| Transducer No. | Start | Stop | Name |
|----------------|-------|-------|----------|
| 2 | 1Hz | 1000M | Kabel_6m |



EMCE GmbH Ing_buero fuer EMV_Pruefungen Conducted emission - Terminal voltage

31. Mar 08 16:20

EUT: A1RS232 / AANX5F
Manuf: AEG ID GmbH
Op Cond: 115V/60Hz, half reading range
Operator: Mr. Hauser
Test Spec: 47 CFR Part 15 Subpart C
Comment: Test_ID EUT PRE11_10
AEI14_56, Port N - ARE i2

Scan Settings (1 Range)

```
|----- Frequencies -----||----- Receiver Settings -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
150k 30M 5k 10k PK+AV 20ms AUTO LN OFF 60dB
```

Final Measurement Results:

| Frequency | QP Level | QP Limit |
|-----------|----------|----------|
| MHz | dBuV | dBuV |

no Results

| Frequency | AV Level | AV Limit |
|-----------|----------|----------|
| MHz | dBuV | dBuV |

| | | |
|---------|------|------|
| 0.44000 | 43.7 | 47.0 |
|---------|------|------|

* limit exceeded

EMCE GmbH Ing_buero fuer EMV_Pruefungen

Conducted emission - Terminal voltage

31. Mar 08 16:30

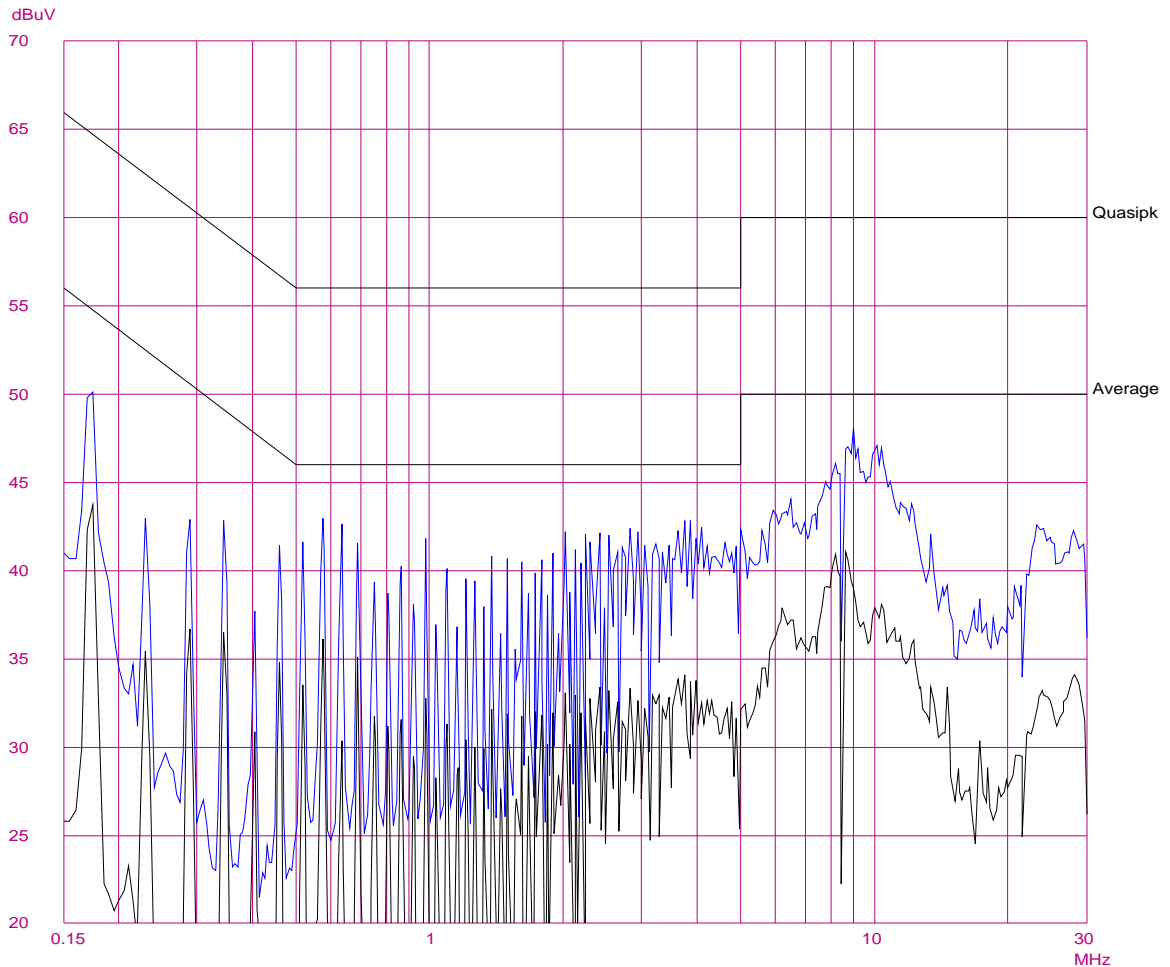
EUT: A1RS232 / AANX5F
 Manuf: AEG ID GmbH
 Op Cond: 115V/60Hz, half reading range
 Operator: Mr. Hauser
 Test Spec: 47 CFR Part 15 Subpart C
 Comment: Test_ID EUT PRE11_10
 AEI14_57, Port L1 - PC+Monitor

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | | |
|-------------|------|------|-------------------|----------|--------|-------|--------|----------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 30M | 5k | 10k | PK+AV | 20ms | AUTO | LN | OFF 60dB |

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB

| Transducer No. | Start | Stop | Name |
|----------------|-------|-------|----------|
| 2 | 1Hz | 1000M | Kabel_6m |



EMCE GmbH Ing_buero fuer EMV_Pruefungen Conducted emission - Terminal voltage

31. Mar 08 16:30

EUT: A1RS232 / AANX5F
Manuf: AEG ID GmbH
Op Cond: 115V/60Hz, half reading range
Operator: Mr. Hauser
Test Spec: 47 CFR Part 15 Subpart C
Comment: Test_ID EUT PRE11_10
AEI14_57, Port L1 - PC+Monitor

Scan Settings (1 Range)

```
|----- Frequencies -----||----- Receiver Settings -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
150k 30M 5k 10k PK+AV 20ms AUTO LN OFF 60dB
```

Final Measurement Results:

no Results

EMCE GmbH Ing_buero fuer EMV_Pruefungen

Conducted emission - Terminal voltage

31. Mar 08 16:39

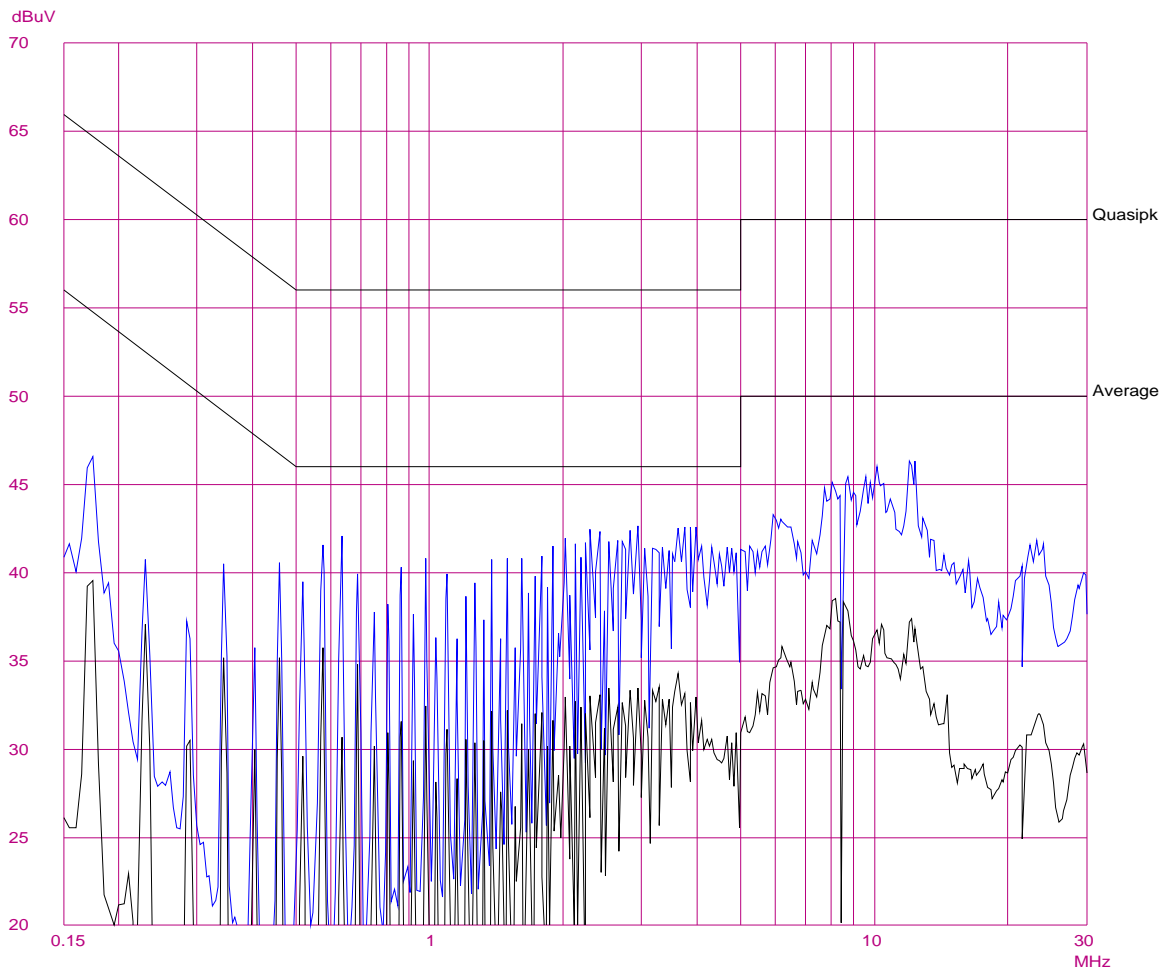
EUT: A1RS232 / AANX5F
 Manuf: AEG ID GmbH
 Op Cond: 115V/60Hz, half reading range
 Operator: Mr. Hauser
 Test Spec: 47 CFR Part 15 Subpart C
 Comment: Test_ID EUT PRE11_10
 AEI14_58, Port N - PC+Monitor

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | | |
|-------------|------|------|-------------------|----------|--------|-------|--------|-------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 30M | 5k | 10k | PK+AV | 20ms | AUTO | LN OFF | 60dB |

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB

| Transducer No. | Start | Stop | Name |
|----------------|-------|-------|----------|
| 2 | 1Hz | 1000M | Kabel_6m |



EMCE GmbH Ing_buero fuer EMV_Pruefungen Conducted emission - Terminal voltage

31. Mar 08 16:39

EUT: A1RS232 / AANX5F
Manuf: AEG ID GmbH
Op Cond: 115V/60Hz, half reading range
Operator: Mr. Hauser
Test Spec: 47 CFR Part 15 Subpart C
Comment: Test_ID EUT PRE11_10
AEI14_58, Port N - PC+Monitor

Scan Settings (1 Range)

```
|----- Frequencies -----||----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge
150k 30M 5k 10k PK+AV 20ms AUTO LN OFF 60dB
```

Final Measurement Results:

no Results

1.1.2 Radio disturbances according 47 CFR Part 15 – Subpart C

- Full compliance
 Precompliance
 Test not requested
 Test not carried out*

* _____

Test location

| <input checked="" type="checkbox"/> | Inv.-No. | Designation | Type (LxBxH) | Manufacturer | Location |
|-------------------------------------|----------|--------------------------|--------------------------|--------------------------------|---|
| | 504 | Shielded room #1 | 6.4 x 4.0 x 2.3m | Frankonia EMV-Messsysteme GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | 588 | Shielded room #2 | 8.3/5.8 x 5.5/2.9 x 3.4m | EMC-Technik & Consulting GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | 584 | Shielded room #3 | 3.6 x 3.6 x 2.5m | Siemens AG | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | 061 | Semi anechoic chamber #1 | 4.0 x 4.0 x 3.5m | EMC-Technik & Consulting GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | 062 | Semi anechoic chamber #2 | 13.5 x 6.1 x 5.5m | EMC-Technik & Consulting GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | 807 | Semi anechoic chamber #3 | 7.6 x 4.6 x 3.6m | Siemens AG | Hochschule Ulm Eberhard-Finck-Str. 11 89075 Ulm |
| <input checked="" type="checkbox"/> | 014 | OATS | 3m – Test distance | EMCE GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| <input checked="" type="checkbox"/> | 015 | OATS | 10m – Test distance | EMCE GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | 066 | OATS | 30m – Test distance | EMCE GmbH | EMCE GmbH Untere Wiesen 1 88483 Burgrieden |
| | | Alternative test site | | | |

1.1.2.1 Test set up

According 47 CFR Part 15 – Subpart C





Used test equipment

| <input checked="" type="checkbox"/> | Inv.-No. | Designation | Type | Manufacturer | S/N |
|-------------------------------------|----------|--|-----------------------|--------------------------|-----------------|
| <input checked="" type="checkbox"/> | 001 | Test receiver | ESS 5Hz - 1000 MHz | Rohde & Schwarz | 833776/008 |
| | 003 | LISN 1 | ESH3-Z5 | Rohde & Schwarz | 835268/007 |
| | 004 | LISN 2 | ESH3-Z5 | Rohde & Schwarz | 835268/003 |
| | 005 | LISN 3 | NNB 4/32T | Rolf Heine HF-Technik | 4/32T-96015 |
| | 006 | LISN | NNBM 8125 | Schwarzbeck | 8125371 |
| | 007 | Absorbing clamp | MDS 21 | Schwarzbeck | 942436 |
| <input checked="" type="checkbox"/> | 008 | Antenna 9kHz - 30MHz | HFH2-Z2 | Rohde & Schwarz | 835776/0002 |
| | 009 | Antenna 30 - 300MHz | VHBA9123 / BBA9106 | Schwarzbeck | 435 |
| | 010 | Antenna 250 -1200MHz | UHALP 9108A | Schwarzbeck | 108 |
| | 011 | Antenna 30 - 300MHz | VHBA9123 / BBA9106 | Schwarzbeck | 0408/94 |
| | 012 | Antenna 250 -1200MHz | UHALP 9108A | Schwarzbeck | 166 |
| | 013 | Antenna 9kHz - 30 MHz | Loop antenna 1.5m Ø | EMCE GmbH | - |
| | 041 | HZ-10 | Shielded coil | Rohde & Schwarz | 849788/020 |
| <input checked="" type="checkbox"/> | 042 | AC-Source / Analyser / Norm impedance | EMV D5000/PAS | Spitzenberger + Spies | A274700/ 0 0501 |
| | 058 | Test receiver | ESIB 40 | Rohde & Schwarz | 100200 |
| | 059 | Logper. Antenna | HLO50 | Rohde & Schwarz | 100006 |
| | 060 | HF coupling clamp | KEMA 801 | Schaffner | 20808 |
| | 063 | Logper. Antenna | HLO23 A2 | Rohde & Schwarz | |

All used test equipment are checked resp. calibrated periodically.

Test equipment was checked and complied to the requirements

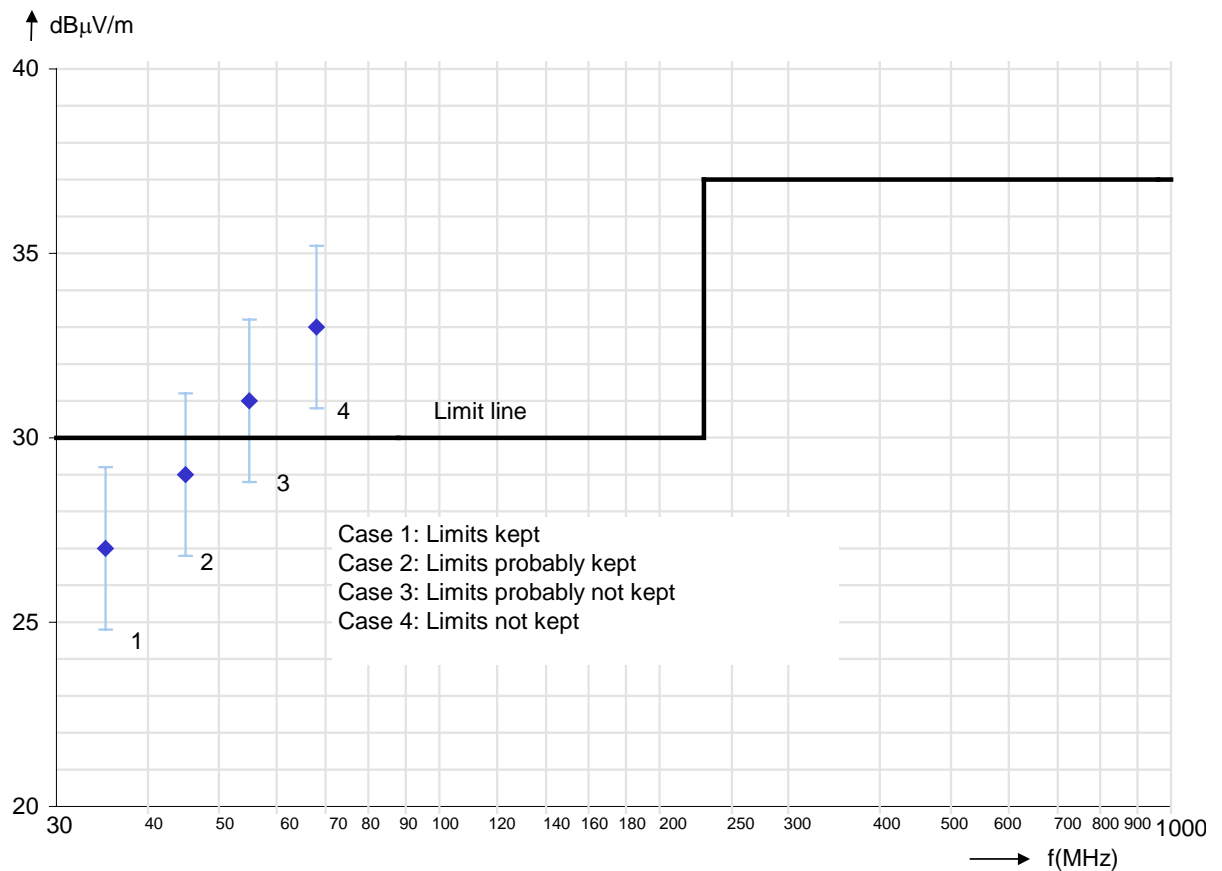
Test / Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the radiated emission with an extended coverage factor of $k=2$

| Frequency | Measurement uncertainty |
|----------------|-------------------------|
| 9kHz – 30MHz | on request |
| 30MHz – 300MHz | 4.4dB |
| 300MHz – 1GHz | 3.4dB |
| 1GHz – 18GHz | on request |

Annotation of the diagram



1.1.2.2 Test – intentional radiator

Regulation

47 CFR Part 15 – Subpart C

- | | |
|--|--|
| <input checked="" type="checkbox"/> 9kHz - 30MHz | <input type="checkbox"/> 150kHz – 1GHz |
| <input type="checkbox"/> 30MHz - 1000MHz | <input type="checkbox"/> 1 – 18GHz |

Limits: Section 15.209 __

Antennena distance: 3m 5m
 10m 30m

Operation mode

EUT arrangement: Tabletop Floor standing
Power supply: 230V/50Hz 115V/60Hz

Continuous operation of the system while the DC-supply for the device was set to 9VDC and 30VDC. The ARE i2 was supplied with a adjustable power supply. The tag was placed in half reading range of the antenna. A continuous reading of the tag was exercised with a terminal program running on the PC-System.

Environmental conditions

Temperature: 15 - 35 °C
Humidity: 30 - 60 %
Air pressure: 860 - 1060 hPa

Environmental conditions during the test: were kept
 were not kept

Test - / Measurement procedure

The test was performed at an antenna to EUT distance of 10m. Measurements were made with a CISPR receiver with quasi-peak. The average detector is used in the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. For pulse modulated devices with a pulse repetition frequency of 20Hz or less, peak detector is used (15.35a Note). The frequency, the measured value, antenna information and the limit will be printed out. At frequencies below 30MHz, measurements may be performed at a distance other than what is specified in the regulation. The results were extrapolated to the specified distance by using the square of an inverse linear distance extrapolation factor (40dB/decade). For intentional radiators the supply voltage range is varied between 85% and 115% of the nominal rated voltage.

Test result

Limits for radiated disturbances: kept
 not kept

The level of any unwanted emissions from an intentional radiator shall not exceed the level of the fundamental wave: kept
 not kept

Remarks: There were no impact from the DC power supply of the device to the radiated level.

Protocol scope

- Readings - Antenna horizontal polarized.
- Diagram - Antenna horizontal polarized.
- Readings - Antenna vertical polarized.
- Diagram - Antenna vertical polarized.
- Bandwidth plot – Frequency response vs. supply voltage 9VDC/30VDC
- Precompliance measurement(s).

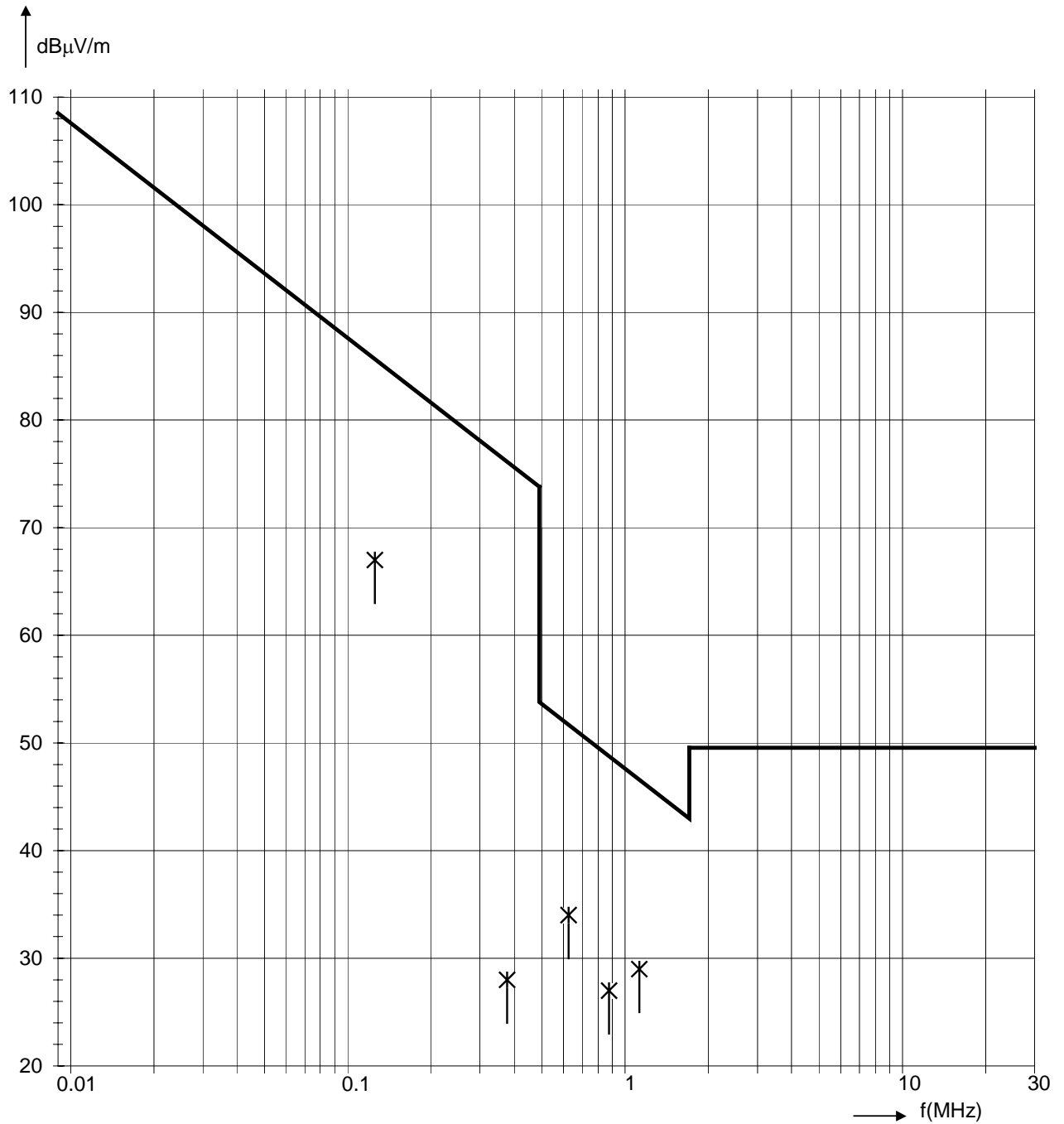
Readings - Antenna vertical polarized, Antenna loop center height 1m

| Frequency | Reading | Limit | Margin | Ant.- | Ant.- | Detector | Receiver |
|-----------|------------|--------------|--------|----------|--------|----------|----------|
| | U | | | Distance | Polar. | Peak / | 6dB BW |
| MHz | dB μ V | dB μ V/m | dB | m | H/V | QP / AV | kHz |
| 0.12503 | 67.0 | 85.7 | 18.7 | 10.0 | V | Peak | 0.2 |
| 0.37509 | 28.0 | 76.1 | 48.1 | 10.0 | V | Peak | 10 |
| 0.62515 | 34.0 | 51.7 | 17.7 | 10.0 | V | Peak | 10 |
| 0.87521 | 27.0 | 48.8 | 21.8 | 10.0 | V | Peak | 10 |
| 1.12527 | 29.0 | 46.6 | 17.6 | 10.0 | V | Peak | 10 |

Diagram - Antenna vertical polarized

Limits according FCC Rules CFR 47 Part 15 – Subpart C

☒ Section 15.209 and 15.31 f(2)



EMCE GmbH Ing_buero fuer EMV_Pruefungen

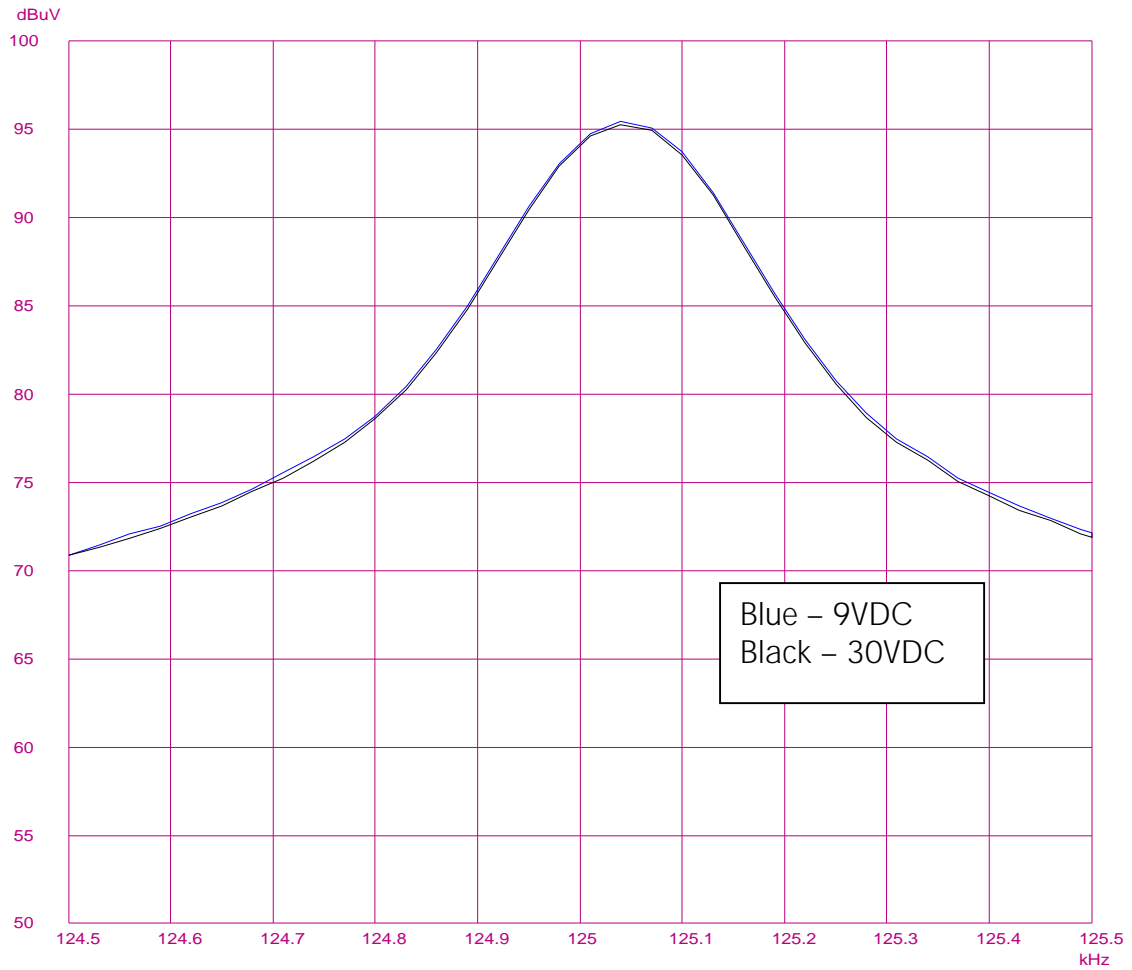
Frequency response

31. Mar 08 13:42

EUT: A1RS232 / AANX5F
 Manuf: AEG ID GmbH
 Op Cond: Half reading distance
 Operator: Mr. Hauser
 Test Spec: Frequency response vs. supply voltage
 Comment: Test_ID EUT PRE11_10
 AIE14_43, 9VDC/30VDC supply voltage

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | | |
|-------------|--------|------|-------------------|----------|--------|-------|--------|---------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 124.5k | 125.5k | 30Hz | 200Hz | PK | 100ms | AUTO | LN | ON 60dB |



1.1.2.3 Test – unintentional radiation

Regulation

47 CFR Part 15 – Subpart C

- | | | |
|---------------------|---|--|
| | <input type="checkbox"/> 9kHz - 30MHz | <input type="checkbox"/> 150kHz – 1GHz |
| | <input checked="" type="checkbox"/> 30MHz - 1000MHz | <input type="checkbox"/> 1 – 18GHz |
| Limits: | <input checked="" type="checkbox"/> Section 15.209 | <input type="checkbox"/> __ |
| Antennena distance: | <input checked="" type="checkbox"/> 3m | <input type="checkbox"/> 5m |
| | <input type="checkbox"/> 10m | <input type="checkbox"/> 30m |

Operation mode

- | | | |
|------------------|--|---|
| EUT arrangement: | <input checked="" type="checkbox"/> Tabletop | <input type="checkbox"/> Floor standing |
| Power supply: | <input type="checkbox"/> 230V/50Hz | <input checked="" type="checkbox"/> 115V/60Hz |

Continuous operation of the system. The ARE i2 was supplied with the HP F1454A power supply. The tag was placed in half reading range of the antenna. A continuous reading of the tag was exercised with a terminal program running on the PC-System.

Environmental conditions

Temperature: 15 - 35 °C
Humidity: 30 - 60 %
Air pressure: 860 - 1060 hPa

Environmental conditions during the test: were kept
 were not kept

Test - / Measurement procedure

The test was performed at an antenna to EUT distance of 10m. Measurements were made with a CISPR receiver with quasi-peak. The average detector is used in the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. For pulse modulated devices with a pulse repetition frequency of 20Hz or less, peak detector is used (15.35a Note). The frequency, the measured value, antenna information and the limit will be printed out.

Test result

Limits for radiated disturbances: kept
 not kept

Remarks: Radio disturbances below the limit line with a margin > 10dB to the limit are generally not listed.

Protocol scope

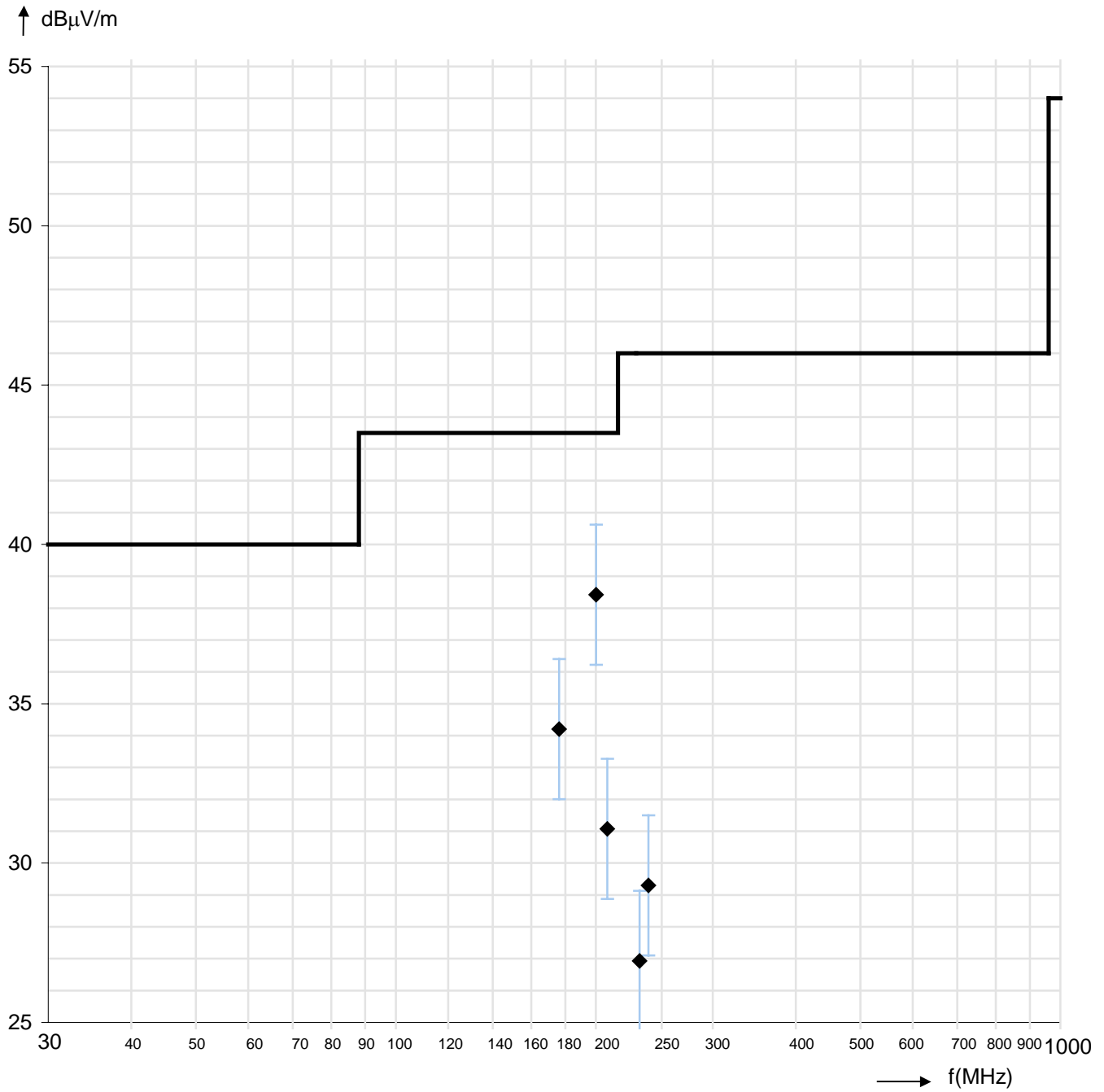
- Readings - Antenna horizontal polarised
- Diagram radio disturbances - Antenna horizontal polarised
- Readings - Antenna vertical polarised
- Diagram radio disturbances - Antenna vertical polarised
- Precompliance measurement(s) in the shielded room

Readings - Antenna horizontal polarised

| Frequency | Readings | + AF Antenna correction factor | + KF Cable correction factor | Field strength | Limit | Margin | Antenna- Height | Antenna- Polarisation |
|-----------|------------|--------------------------------------|------------------------------------|----------------|--------------|--------|--------------------|--------------------------|
| MHz | dB μ V | dB/m | dB | dB μ V/m | dB μ V/m | dB | m | hor./ver. |
| 176.060 | 17.6 | 13.8 | 2.8 | 34.2 | 43.5 | 9.3 | 1.8 | H |
| 200.180 | 20.4 | 15.0 | 3.0 | 38.4 | 43.5 | 5.1 | 1.5 | H |

Diagram radio disturbances – Antenna horizontal polarised

Limits: Section 15.209

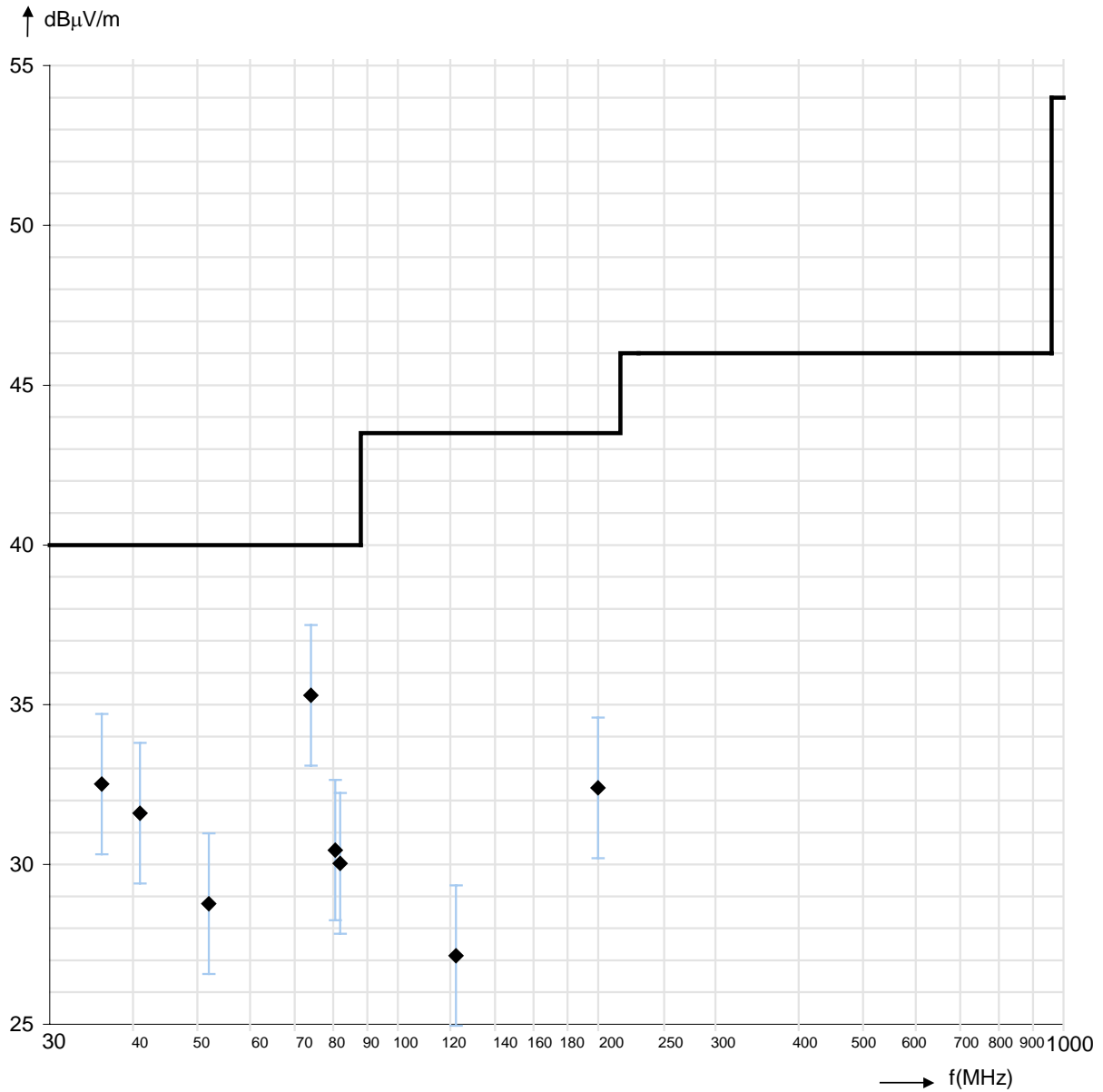


Readings - Antenna vertical polarised

| Frequency | Readings | + AF Antenna correction factor | + KF Cable correction factor | Field strength | Limit | Margin | Antenna- Height | Antenna- Polarisation |
|-----------|------------|--------------------------------------|------------------------------------|----------------|--------------|--------|--------------------|--------------------------|
| MHz | dB μ V | dB/m | dB | dB μ V/m | dB μ V/m | dB | m | hor./ver. |
| 35.900 | 21.3 | 10.1 | 1.1 | 32.5 | 40.0 | 7.5 | 1.0 | H |
| 41.000 | 21.6 | 8.8 | 1.2 | 31.6 | 40.0 | 8.4 | 1.0 | H |
| 74.000 | 24.9 | 8.7 | 1.7 | 35.3 | 40.0 | 4.7 | 1.0 | H |
| 80.490 | 19.7 | 9.0 | 1.8 | 30.5 | 40.0 | 9.5 | 1.0 | H |

Diagram radio disturbances – Antenna horizontal polarised

Limits: Section 15.209



2 Summary

| Regulation | Class / Test level | Result | Remark(s) |
|---------------------------------------|--------------------|-------------|----------------------------------|
| FCC Rules CFR 47 Part 15 Subpart C | | | |
| Terminal voltage 0.15-30MHz | Section 15.207 | Limits kept | |
| Radiated emissions 0.009-30MHz | Section 15.209 | Limits kept | Intentional / unwanted emissions |
| Radiated emissions 30-1000MHz | Section 15.209 | Limits kept | Unintentional emissions |

Burgrieden, 2008-04-16

Report generated by:

Hauser

Responsible Tester – Peter Hauser