

# Test report

## AIR49\_01

Product / EUT: *Communication module*  
Type designation: *ACM 9*  
Tested type: *ACM 9 Profinet*

EUT authorization:  Certification  SDoc  
FCC ID: V7IACM9PN

Production level: *Pilot series*  
S/N: *0000122*

Manufacturer: *AEG Identifikationssysteme GmbH*  
*Hörvelsinger Weg 47*  
*89081 Ulm / Germany*

Test remit: FCC Rules 47 CFR Part 15 – Subpart B – Unintentional radiators  
in accordance with the procedures given in  
ANSI C63.4-2014

The standards were:  kept\*  
 not kept\*

\*Remark:  Validation covered by the accredited scope  
 Validation not covered by the accredited scope  
according: \_\_\_\_\_  
 Validation of the EMC-requirements partly proceeded

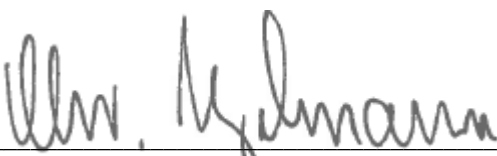


**Applicant:** AEG Identifikationssysteme GmbH  
Hörvelsinger Weg 47  
89081 Ulm / Germany

**EUT-  
Date of arrival:** 11/06/2020  
**Test ID:** PRR45\_13  
**Date(s) of test:** 11/06/2020 – 11/22/2020

Burgrieden, 12/10/2020

Released by:



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Principal Engineer - Christian Vogelmann

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

DAkKS-Registration No: D-PL-12122-01-01  
D-PL-12122-01-02  
CAB-Registration No.: BnetzA-CAB-02/21-01/1  
FCC-Registration No.: 239304

**Accredited by:**  
Bundesnetzagentur



BNetzA-CAB-02/21-01

Deutsche Akkreditierungsstelle GmbH



**Responsible inspector:** Mr. S. Vogelmann  
 EMCE GmbH  
 Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

**Contact person:** Mr. Kössler / AEG Identifikationssysteme GmbH

**EUT**

**Sampling:** The device was selected and provided by the customer.

**Description:** Industrial communication module with Profinet Interface. The device provides 2 industrial Ethernet ports, 4 serial ports dedicated to AREi9 reader family, 4 digital inputs and 4 digital outputs, both linked to their respective reader port. The auxiliary port provides power as well a serial system interface

**Voltage supply:** 120 V / 60 Hz

**Frequency list:** Maximum clock frequency 25 MHz

**Temperature range:** *n/a*

**Size:** *(LxWxH) / mm - 110 x 100 x 25*

**Supplied / used equipment:**

| Designation                   | Type             | Manufacturer | S/N     |
|-------------------------------|------------------|--------------|---------|
| Notebook                      | T580             | Lenovo       | ID 125  |
| Notebook power supply unit    | ADL65YDC3A       | Lenovo       | ID 125  |
| RFID-Reader1 with transponder | ARE i9 – HF      | AEG ID       | 0000135 |
| RFID Reader2 with transponder | ARE i9 – LF      | AEG ID       | 0000143 |
| Power supply unit EUT         | ML 70.100        | Puls GmbH    | n/a     |
| Power supply unit Master      | ML 70.100        | Puls GmbH    | n/a     |
| Profinet Master               | NHST-T100-EN/PNM | Hilscher     | 27307   |

Configuration:

As-delivered condition\*  
Modified\*

\* \_\_\_\_\_

| Cable designation                        | Type   | Length | Remarks  |
|--|--------|--------|----------|
| AC power supply line EUT                 | 3-core | 1.8 m  |          |
| DC power supply line EUT                 | 2-core | 1.2 m  |          |
| AC power supply line notebook            | 3-core | 1.5 m  |          |
| DC power supply line notebook            | 2-core | 1.8 m  |          |
| AC power supply line for Profinet Master | 3-core | 2.4 m  |          |
| DC power supply line for Profinet Master | 2-core | 1.0 m  |          |
| RFID cable to ARE i9 HF                  | 5-core | 1.6 m  | Shielded |
| RFID cable to ARE i9 LF                  | 5-core | 1.6 m  | Shielded |
| Cable for digital inputs                 | 8-core | 1.6 m  | Shielded |
| Cable for digital outputs                | 8-core | 1.6 m  | Shielded |

Remarks:

n/a

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 |
|----------|---|--|-----------------|-------------|------------------------------------|
| 003      | LISN 1  | ESH3-Z5  | Rohde & Schwarz | 835268/007  | 1 Year(s)/<br>2021-03-10           |
| 004      | LISN 2  | ESH3-Z5  | Rohde & Schwarz | 835268/003  | 1 Year(s)/<br>2021-02-28           |
| 006      | LISN  | NNBM 8125  | Schwarzbeck     | 8125371     | 1 Year(s)/<br>2021-02-28           |
| 007      | Absorbing clamp                                       | MDS 21   | Schwarzbeck     | 942436      | 1 Year(s)/<br>2021-02-23           |
| 008      | Loop antenna<br>9kHz-30MHz                            | HFH2-Z2  | Rohde & Schwarz | 835776/0002 | 3 Year(s)/<br>2022-11-20           |
| 009      | Antenna<br>30-300MHz                                  | VHBA9123 /<br>BBA9106                            | Schwarzbeck     | 435         | 3 Year(s)/<br>2021-12-05           |
| 010      | Antenna<br>250-1200MHz                                | UHALP 9108A                                      | Schwarzbeck     | 108         | 3 Year(s)/<br>2022-11-25           |
| 011      | Antenna<br>30-300MHz                                  | VHBA9123 /<br>BBA9106                            | Schwarzbeck     | 0403/94     | 3 Year(s)/<br>2022-11-25           |
| 012      | Antenna<br>250-1200MHz                                | UHALP 9108A                                      | Schwarzbeck     | 166         | 3 Year(s)/<br>2021-12-05           |
| 013      | Antenna<br>9 kHz-30 MHz                               | Ø 1.5 m  | EMCE GmbH       |             | 1 Year(s)/<br>2021-10-31           |
| 014      | OATS  | Test site 3 m<br>referred to ANSI<br>C63.4-2014  | EMCE GmbH       |             | 3 Year(s)/<br>2021-08-31           |
| 015      | OATS  | Test site 10 m<br>referred to ANSI<br>C63.4-2014 | EMCE GmbH       |             | 3 Year(s)/<br>2021-04-21           |
| 020      | Coupling clamp  | IP4A   | Haefely         | 082672-13   | 1 Year(s)/<br>2021-10-31           |
| 024      | RF-Generator  | SMY01  | Rohde & Schwarz | 844146/046  | 2 Year(s)/<br>2022-08-21           |
| 025      | Current clamp BCI                                     | F-120-2  | FCC             | 47          | 1 Year(s)/<br>2021-08-31           |
| 026      | Coupling-/<br>Decoupling Network<br>M3                | CDN 801-M3-25                                    | FCC             | 92          | 1 Year(s)/<br>2021-07-31           |
| 030      | Coupling-/<br>Decoupling Network<br>S1 - 9-pol. D-Sub | CDN 801-S1/<br>9pol. DSUB                        | EMCE GmbH       |             | 1 Year(s)/<br>2021-07-31           |
| 031      | Coupling-/<br>Decoupling Network<br>S1 - 9-pol. D-Sub | CDN 801-S1/<br>9pol. DSUB                        | EMCE GmbH       |             | 1 Year(s)/<br>2021-07-31           |

| Inv.-No. | Designation                             | Type  | Manufacturer                  | S/N                      | Calibration: Interval /valid until |
|----------|---|---|-------------------------------|--------------------------|------------------------------------|
| 032      | RF Power Amplifier                      | 75A250  | Amplifier Research            | 22789                    | 2 Year(s)/<br>2023-08-31           |
| 034      | Coupling-/ Decoupling Network AF2       | CDN-AF2   | EMCE GmbH                     |                          | 1 Year(s)/<br>2021-07-31           |
| 038      | Helmholtz coil                          | 1 m x 1 m                                       | EMCE GmbH                     |                          | 1 Year(s)/<br>2021-09-30           |
| 039      | Helmholtz coil                          | 1 m x 1 m                                       | EMCE GmbH                     |                          | 1 Year(s)/<br>2021-09-30           |
| 040      | Current transformer                     |   | EMCE GmbH                     |                          | 1 Year(s)/<br>2021-09-30           |
| 041      | Loop antenna shielded                   | HZ-10<br>0816.2511.02                           | Rohde & Schwarz               | 849788/0020              | 3 Year(s)/<br>2022-12-02           |
| 042-2    | AC-Source                               | EMV D<br>5000/PAS/SyCore                        | Spitzenberger & Spies         | A274700 /<br>00501       | 3 Year(s)/<br>2022-10-30           |
| 042-1    | Analyser Reference System               | ARS 16/3  | Spitzenberger & Spies         | A274707 /<br>00501       | 3 Year(s)/<br>2021-11-07           |
| 043      | Receiver                                | 3DH/E Fieldmeter<br>ESM-100                     | Maschek                       | 971521                   | 3 Year(s)/<br>2023-08-13           |
| 044      | CDN                                     | CN-U  | EMC-Partner                   | 86                       | 1 Year(s)/<br>2021-09-30           |
| 045      | CDN                                     | DN-HF   | EMC-Partner                   | 86                       | 1 Year(s)/<br>2021-09-30           |
| 046      | CDN                                     | DN-LF2  | EMC-Partner                   | 86                       | 1 Year(s)/<br>2021-09-30           |
| 047      | CDN                                     | DN-LF1  | EMC-Partner                   | 86                       | 1 Year(s)/<br>2021-09-30           |
| 050      | Data Acquisition/<br>Switch Unit        | Agilent 34970A                                  | Agilent Technologies          | MY41019453               | 3 Year(s)/<br>2023-02-06           |
| 051      | 20 Channel Multiplexer                  | Agilent 34901A                                  | Agilent Technologies          | MY41013531               | 3 Year(s)/<br>2023-02-06           |
| 054      | Helmholtz coil                          | 1.25 m x 1.25 m                                 | EMCE GmbH                     |                          | 1 Year(s)/<br>2021-09-30           |
| 055      | Helmholtz coil                          | 1.25 m x 1.25 m                                 | EMCE GmbH                     |                          | 1 Year(s)/<br>2021-09-30           |
| 058      | Receiver                                | ESIB 40   | Rohde & Schwarz               | 100200/<br>Firmware 4.35 | 1 Year(s)/<br>2021-05-31           |
| 059      | Log.-per. antenna                       | HL050   | Rohde & Schwarz               | 100006                   | 3 Year(s)/<br>2022-08-13           |
| 062-2    | Semi-Anechoic Chamber<br>13.5x6.1x5.5 m | 30 - 1000 MHz<br>referred to ANSI<br>C63.4-2014 | EMC-Technik & Consulting GmbH |                          | 3 Year(s)/<br>2021-01-04           |

| Inv.-No. | Designation                               | Type   | Manufacturer                              | S/N           | Calibration: Interval /valid until |
|----------|---|--|---|---------------|------------------------------------|
| 062-1    | Semi-Anechoic Chamber<br>13.5x6.1x5.5 m   | 1 - 18 GHz<br>referred to<br>CISPR16 1-4:<br>2010-04 Ed. 3 | EMC-Technik &<br>Consulting GmbH          |               | 3 Year(s)/<br>2021-05-21           |
| 067      | LISN                                      | ESH2-Z5  | Rohde & Schwarz                           | 872460/043    | 1 Year(s)/<br>2021-02-03           |
| 068      | LISN                                      | ESH2-Z5  | Rohde & Schwarz                           | 872460/042    | 1 Year(s)/<br>2021-02-17           |
| 070      | Pulse limiter +<br>10 dB Attenuator       | ESH3-Z2  | Rohde & Schwarz                           | n/a           | 1 Year(s)/<br>2021-08-31           |
| 073      | Absorbing clamp                           | MDS21  | Schwarzbeck                               | 881757        | 1 Year(s)/<br>2021-01-23           |
| 074      | Synthesizer<br>signal generator           | SMX  | Rohde & Schwarz                           | 5SM02675      | 2 Year(s)/<br>2021-11-19           |
| 115      | Strip line 50 Ohm                         |  | EMCE GmbH                                 |               | 1 Year(s)/<br>2021-01-31           |
| 116      | Vertical rod<br>antenna                   | VAMP 9243  | Schwarzbeck                               | 9243-205      | 3 Year(s)/<br>2023-02-19           |
| 117      | LISN                                      | ESH3-Z6  | Rohde & Schwarz                           | 100521        | 1 Year(s)/<br>2021-02-28           |
| 118      | Current Probe                             | F-52   | Fischer Customs<br>Communication,<br>Inc. | 08398         | 1 Year(s)/<br>2021-08-31           |
| 119      | 10V Insertion<br>Unit 50 Ohm              | URV5-Z2  | Rohde & Schwarz                           | 100911        | 2 Year(s)/<br>2021-07-31           |
| 122      | Power Meter                               | NRVS   | Rohde & Schwarz                           | 833430 / 0017 | 2 Year(s)/<br>2021-08-28           |
| 123      | Directional coupler                       | BDC 0100-<br>50/500  | BONN Elektronik                           | 087261        | 1 Year(s)/<br>2021-08-31           |
| 127      | Function/ Arbitrary<br>Waveform Generator | Agilent 33220A   | Agilent<br>Technologies                   | MY44026679    | 3 Year(s)/<br>2022-02-28           |
| 128      | Signal Generator                          | SMF100A  | Rohde & Schwarz                           | 100137        | 2 Year(s)/<br>2021-01-07           |
| 129      | ESD-Gun                                   | ESD30N   | EM TEST GmbH                              | V1012106114   | 3 Year(s)/<br>2023-03-30           |
| 131      | Coupling network                          | M3/AC  | Dr. Hubert GmbH                           | A3052006      | 1 Year(s)/<br>2021-07-31           |
| 132      | LF-Amplifier                              | A1110-05   | Dr. Hubert GmbH                           | 111A1110      | 2 Year(s)/<br>2021-11-30           |
| 134      | 10 V Insertion<br>Unit 50 Ohm             | URV5-Z2  | Rohde & Schwarz                           | 101025        | 2 Year(s)/<br>2021-11-15           |
| 136      | Directional coupler                       | BDC<br>0842-40/200   | Bonn Elektronik                           | 108082        | 1 Year(s)/<br>2021-08-31           |

| Inv.-No. | Designation                                       | Type           | Manufacturer         | S/N                                 | Calibration: Interval /valid until |
|----------|---|----------------|----------------------|-------------------------------------|------------------------------------|
| 137      | Power Amplifier                                   | CBA3G-100      | Teseq GmbH           | T43943                              | 2 Year(s)/<br>2022-11-30           |
| 140      | Burst/Surge-Generator                             | Transient 3000 | EMC-Partner          | TRA3000<br>104033                   | 2 Year(s)/<br>2021-11-30           |
| 142      | Coupling / Decoupling Network for Burst and Surge | CNI 503 B7.4   | EM TEST GmbH         | V1125109869                         | 2 Year(s)/<br>2021-10-29           |
| 143      | Ultra-Compact Simulator                           | UCS 500 N7     | EM TEST AG           | V1125109868                         | 2 Year(s)/<br>2021-10-28           |
| 147      | 10-V-insertion unit 50 Ohm                        | URV5-Z2        | Rohde & Schwarz      | 101049                              | 2 Year(s)/<br>2022-02-25           |
| 151      | DSO Infiniium 2500 MHz                            | DSO9254A       | Agilent Technologies | MY52090137                          | 2 Year(s)/<br>2022-03-06           |
| 154      | Capacitive voltage clamp                          | CDN 500        | Teseq GmbH           | 656                                 | 3 Year(s)/<br>2021-06-26           |
| 157      | Power Amplifier                                   | CBA1G-1000     | Teseq GmbH           | T44166                              | 2 Year(s)/<br>2021-05-07           |
| 159      | Function/Arbitrary Waveform Generator             | Agilent 33220A | Agilent Technologies | MY44058563                          | 3 Year(s)/<br>2022-04-30           |
| 163      | Power Sensor                                      | NRV-Z4         | Rohde & Schwarz      | 100575                              | 2 Year(s)/<br>2022-04-08           |
| 174      | LISN  | ESH3-Z6        | Rohde & Schwarz      | 101003                              | 1 Year(s)/<br>2021-02-28           |
| 175      | EMI Test receiver                                 | ESR7           | Rohde & Schwarz      | 101108<br>Firmware:<br>FW V3.46 SP3 | 1 Year(s)/<br>2021-10-30           |
| 178      | V-LISN 5 $\mu$ H                                  | NNHV 8123-400  | Schwarzbeck          | 018                                 | 2 Year(s)/<br>2021-01-31           |
| 184      | V-LISN 5 $\mu$ H                                  | NNHV8123-400   | Schwarzbeck          | 019                                 | 1 Year(s)/<br>2021-01-31           |
| 186      | Signal Generator 9kHz - 3.3GHz                    | SML03          | Rohde & Schwarz      | 836927/005                          | 2 Year(s)/<br>2022-10-31           |
| 187      | Arbitrary Generator                               | AutoWave       | EM Test GmbH         | P1450145409                         | 3 Year(s)/<br>2022-10-24           |
| 190      | Coupling-/ Decoupling Network M1                  | CDN M132       | Ametek               | 40493                               | 1 Year(s)/<br>2021-07-31           |
| 191      | Coupling-/ Decoupling Network M2                  | CDN M232S      | Ametek               | 37701                               | 1 Year(s)/<br>2021-07-31           |
| 192      | Coupling-/ Decoupling Network M3                  | CDN M332       | Ametek               | 37749                               | 1 Year(s)/<br>2021-07-31           |



| Inv.-No. | Designation                                    | Type                   | Manufacturer    | S/N         | Calibration: Interval /valid until |
|----------|--|------------------------|-----------------|-------------|------------------------------------|
| 193      | Coupling-/Decoupling Network M3                | CDN M332               | Ametek          | 37750       | 1 Year(s)/2021-07-31               |
| 194      | Coupling-/Decoupling Network M4                | CDN M432               | Ametek          | 39127       | 1 Year(s)/2021-07-31               |
| 195      | Coupling-/Decoupling Network M5                | CDN M532               | Ametek          | 40558       | 1 Year(s)/2021-07-31               |
| 196      | Coupling-/Decoupling Network AF2               | CDN A201A              | Ametek          | 40613       | 1 Year(s)/2021-07-31               |
| 197      | Coupling-/Decoupling Network AF2               | CDN A201A              | Ametek          | 40614       | 1 Year(s)/2021-07-31               |
| 198      | Coupling-/Decoupling Network S1 - 9-pol. D-Sub | CDN S900               | Ametek          | 40033       | 1 Year(s)/2021-07-31               |
| 199      | Coupling-/Decoupling Network S1 - RJ45         | CDN ST08A              | Ametek          | 39792       | 1 Year(s)/2021-07-31               |
| 200      | Coupling-/Decoupling Network S1 - RJ45         | CDN ST08A              | Ametek          | 39794       | 1 Year(s)/2021-07-31               |
| 201      | Coupling-/Decoupling Network S1 - USB          | CDN USB/p              | Ametek          | 40162       | 1 Year(s)/2021-07-31               |
| 202      | Coupling-/Decoupling Network S1 - USB 3.0      | CDN USB3.0             | Ametek          | 40536       | 1 Year(s)/2021-07-31               |
| 204      | Coupling-/Decoupling Network S1 - 9-pol. D-Sub | CDN S900               | Ametek          | 40034       | 1 Year(s)/2021-07-31               |
| 208      | RF Power Meter                                 | NRVD                   | Rohde & Schwarz | 832378/056  | 2 Year(s)/2022-05-14               |
| 211      | Broadband Amplifier                            | BBA150 800 - 3000 MHz  | Rohde & Schwarz | 102104      | 1 Year(s)/2021-09-30               |
| 212      | Broadband Amplifier                            | BBA150 2500 - 6000 MHz | Rohde & Schwarz | 102105      | 1 Year(s)/2021-09-30               |
| 214      | Load Dump Simulator                            | LD 200N                | em test         | P1551169024 | 3 Year(s)/2022-10-22               |
| 215      | Ultra-Compact Simulator for automotives        | UCS200N100             | em test         | P1607171950 | 3 Year(s)/2022-10-23               |

| Inv.-No. | Designation                                | Type                | Manufacturer                | S/N         | Calibration: Interval /valid until |
|----------|--|---------------------|-----------------------------|-------------|------------------------------------|
| 216      | Voltage Drop Simulator                     | VDS 200Q100.1       | em test                     | P1612177896 | 3 Year(s)/<br>2022-10-16           |
| 217      | Automotive Power Fail Module               | PFM 200N100.1       | em test                     | P1606171835 | 3 Year(s)/<br>2022-10-24           |
| 222      | Broadband Preamplifier 0.5-18GHz           | BBV 9718            | Schwarzbeck                 | 9718-316    | 1 Year(s)/<br>2021-05-31           |
| 223      | Broadband Preamplifier 12-28GHz            | BBV 9719            | Schwarzbeck                 | 9719-024    | 1 Year(s)/<br>2021-05-31           |
| 224      | SMB100A Signal Generator                   | SMB100A             | Rohde & Schwarz             | 108055      | 3 Year(s)/<br>2023-01-20           |
| 225      | Electric and Magnetic Field Probe-Analyzer | EHP-200A            | Narda S.T.S. / PMM          | 170WX70205  | 3 Year(s)/<br>2022-02-28           |
| 227      | Field Probe HI-6006                        | HI-6006             | ETS-Lindgren                | 00213536    | 1 Year(s)/<br>2021-07-09           |
| 228      | Coupling device network AF4                | CDN AF4-32          | EMCE GmbH                   |             | 1 Year(s)/<br>2021-07-31           |
| 229      | Test receiver                              | ESS 5 Hz - 1000 MHz | Rohde & Schwarz             | 845420/0005 | 1 Year(s)/<br>2020-12-13           |
| 230      | FSV40 Signal Analyzer 40 GHz               | FSV40               | Rohde & Schwarz             | 101717      | 2 Year(s)/<br>2022-01-16           |
| 231      | Vector Signal Generator SMBV100A           | SMBV100A            | Rohde & Schwarz             | 262891      | 3 Year(s)/<br>2023-10-02           |
| 233      | OSP-B157W 8 PORT                           | OSP-B157W8          | Rohde & Schwarz             | 100925      | 2 Year(s)/<br>2022-01-17           |
| 235      | ESD-Gun                                    | NSG 435             | Teseq                       | 7275        | 1 Year(s)/<br>2021-09-04           |
| 236      | Broad-Band Horn Antenna 0.5-6 GHz          | BBHA 9120 E         | Schwarzbeck                 | 00831       | 5 Year(s)/<br>2024-02-13           |
| 237      | Exposure Level Tester                      | ELT-400             | Narda Safety Test Solutions | O-0028      | 3 Year(s)/<br>2023-02-06           |
| 239      | Broadband Horn Antenna 15-40 GHz           | BBHA 9170           | Schwarzbeck                 | 00932       | 5 Year(s)/<br>2024-05-23           |
| 240      | Broadband Preamplifier 18-40 GHz           | BBV 9721            | Schwarzbeck                 | 54          | 1 Year(s)/<br>2021-04-30           |
| 241      | Coupling Network M2                        | CN M232-300-DC      | Teseq                       | 52495       | 1 Year(s)/<br>2021-07-31           |
| 242      | Coupling Network M4                        | CN M432-AC          | Teseq                       | 53779       | 1 Year(s)/<br>2021-07-31           |
| 243      | Coupling Network M2                        | CN M232-AC          | Teseq                       | 50442       | 1 Year(s)/<br>2021-07-31           |

| Inv.-No. | Designation                        | Type                       | Manufacturer    | S/N         | Calibration: Interval /valid until |
|----------|------------------------------------|----------------------------|-----------------|-------------|------------------------------------|
| 244      | Coupling Network M3                | CN M332-AC                 | Teseq           | 53480       | 1 Year(s)/<br>2021-07-31           |
| 245      | Coupling Network M4                | CN A401-M                  | Teseq           | 53736       | 1 Year(s)/<br>2021-07-31           |
| 246      | Coupling Network T8                | CN T8-AC                   | Teseq           | 53835       | 1 Year(s)/<br>2021-07-31           |
| 247      | Coupling Network T8                | CN T8-DC                   | Teseq           | 53849       | 1 Year(s)/<br>2021-07-31           |
| 248      | Coupling Network T4                | CN T444-AC                 | Teseq           | 53832       | 1 Year(s)/<br>2021-07-31           |
| 249      | Coupling Network T4                | CN T444-DC                 | Teseq           | 51260       | 1 Year(s)/<br>2021-07-31           |
| 250      | Coupling Network M5                | CN M532-AC                 | Teseq           | 540086      | 1 Year(s)/<br>2021-07-31           |
| 251      | Isolation Transformer              | ITF 22                     | Teseq           | 540068      |                                    |
| 253      | Broadband Preamplifier 20-1000 MHz | ESV-Z3                     | Rohde & Schwarz | 881 909/030 | 1 Year(s)/<br>2021-05-31           |
| 254      | Power Sensor                       | NRP6AN                     | Rohde & Schwarz | 101326      | 2 Year(s)/<br>2021-05-31           |
| 255      | Coupling Network AF2               | CN A201-M                  | Teseq           | 52135       | 1 Year(s)/<br>2021-07-31           |
| 257      | Pulse limiter + 10 dB Attenuator   | ESH3-Z2                    | Rohde & Schwarz | 102769      | 1 Year(s)/<br>2021-08-31           |
| 259      | SMB100B Signal Generator           | SMB100B 8 kHz - 6 GHz      | Rohde & Schwarz | 101679      | 3 Year(s)/<br>2022-11-01           |
| 262      | EM Clamp                           | KEMZ 801A                  | Teseq           | 78033       | 1 Year(s)/<br>2021-01-22           |
| 718      | EMC-Software                       | BAT-EMC<br>Vers. 3.18.0.19 | Nexio           | n/a         |                                    |
| 997      | EMC Software                       | EMC32<br>Vers. 10.60.15    | Rohde & Schwarz | n/a         |                                    |
| 1046     | Environmental Simulation Chamber   | MKF 115 (E3.1)             | Binder GmbH     | 12-02215    | 3 Year(s)/<br>2023-03-19           |
| 1212     | EMC Software                       | WMS32<br>Vers. 10.60.15    | Rohde & Schwarz | n/a         |                                    |



# Scope:

- 1 EMC-Test(s) ..... 13
  - 1.1 Emission according 47 CFR Part 15 Subpart B - 11/05/2020..... 13
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# 1 EMC-Test(s)

## 1.1 Emission according 47 CFR Part 15 Subpart B - 11/05/2020

### 1.1.1 Terminal voltage according 47 CFR Part 15 Subpart B - 11/05/2020

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

\*

#### Test location

| <input checked="" type="checkbox"/> | Inv.-No. | Designation                          | Type<br>(L x W x H)                          | Manufacturer                     | Location   |
|-------------------------------------|----------|--------------------------------------|--|----------------------------------|--|
|                                     | 588      | Shielded room # 2                    | 8.3/5.8 x 5.5/2.9<br>x 3.4 m                 | EMC-Technik &<br>Consulting GmbH | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 584      | Shielded room # 3                    | 3.6 x 3.6 x 2.5 m                            | Siemens AG                       | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 678      | Shielded room # 4                    | 4.0 x 4.0 x 3.5 m                            | EMC-Technik &<br>Consulting GmbH | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
| <input checked="" type="checkbox"/> | 1319     | Shielded room # 5                    | 6.3 x 5.8 x 3.8 m                            | Albatross Projects<br>GmbH       | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 062      | Semi anechoic chamber<br># 2         | 13.5 x 6.1 x 5.5 m                           | EMC-Technik &<br>Consulting GmbH | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 679      | Full anechoic chamber<br># 3         | 8.8 x 4.6 x 4.2 m                            | Albatross Projects<br>GmbH       | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 014      | Open area test site                  | 10 m   | EMCE GmbH                        | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 015      | Open area test site                  | 3 m  | EMCE GmbH                        | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 042      | Voltage-/current source<br>test site | 0-382 VDC<br>0-270 VAC<br>1 x 10 kW/3 x 5 kW | Spitzenberger + Spies            | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | n/a      | Alternative test site                | n/a  | n/a                              | n/a  |



#### 1.1.1.1 Test set up

According ANSI C63.4-2014

Photo(s) showing the interconnection of the major function units



## Used test equipment

| <input checked="" type="checkbox"/> | Inv.-No. | Designation                              | Type                   | Manufacturer             | S/N             |
|-------------------------------------|----------|--|------------------------|--------------------------|-----------------|
|                                     | 001      | Test receiver                            | ESS<br>5 Hz – 1000 MHz | Rohde & Schwarz          | 833776/008      |
|                                     | 002      | Probe                                    | ESH2-Z3                | Rohde & Schwarz          | n/a             |
| <input checked="" type="checkbox"/> | 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         |
|                                     | 025      | Current clamp BCI                        | F-120-2                | FCC                      | 47              |
|                                     | 026      | Coupling device network                  | CDN 801-M3-25          | FCC                      | 92              |
|                                     | 030      | Coupling device network                  | CDN-S9                 | EMCE GmbH                | n/a             |
|                                     | 031      | Coupling device network                  | CDN-S9                 | EMCE GmbH                | n/a             |
|                                     | 036      | Coupling device network                  | CDN-M5-25              | EMCE GmbH                | n/a             |
|                                     | 037      | Coupling device network                  | CDN-S1                 | EMCE GmbH                | n/a             |
| <input checked="" type="checkbox"/> | 042      | AC-Source / Analyser /<br>Norm impedance | EMV D5000/PAS          | Spitzenberger<br>+ Spies | A274700/ 0 0501 |
|                                     | 058      | Test receiver                            | ESIB 40                | Rohde & Schwarz          | 100200          |
| <input checked="" type="checkbox"/> | 067      | LISN 5                                   | ESH2-Z5                | Rohde & Schwarz          | 0872460/043     |
|                                     | 068      | LISN 4                                   | ESH2-Z5                | Rohde & Schwarz          | 0872460/042     |
| <input checked="" type="checkbox"/> | 070      | Pulse limiter /<br>10 dB attenuator      | ESH3-Z2                | Rohde & Schwarz          | 357.8810.52     |
|                                     | 073      | Absorbing clamp                          | MDS 21                 | Schwarzbeck              | 881757          |
| <input checked="" type="checkbox"/> | 229      | Test receiver                            | ESS<br>5 Hz – 1000 MHz | Rohde & Schwarz          | 845420/0005     |
| <input checked="" type="checkbox"/> | 997      | Software                                 | EMC32                  | Rohde & Schwarz          | n/a             |

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 |
|------------------|-------------------------|
| 9 kHz – 150 kHz  | 4.0 dB                  |
| 150 kHz – 30 MHz | 3.6 dB                  |

1.1.1.2 Test

**Regulation**

47 CFR Part 15 Subpart B – 11/05/2020

Section 15.107:  150 kHz – 30 MHz

Mains supply Limits:  Class B  Class A

**Rationale for selecting the EUT test set up**

Equipment units: Minimized configuration of the EUT with the essential peripherals. One port was occupied by each connector type:

- Digital input
- Digital output
- RFID-Reader LF
- RFID-Reader HF
- Profinet Master
- Power supply

A Notebook system was used as an auxiliary equipment.

Cabling – Test port:

- Standard cables  
 Special cables provided by the manufacturer

| Port # | Designation              | Remarks |
|--------|--------------------------|---------|
| # 1    | AC power line - EUT      | L1/N/PE |
| # 2    | AC power line - Master   | L1/N/PE |
| # 3    | AC power line - Notebook | L1/N/PE |

**Operation mode**

EUT arrangement:  Tabletop  Floor standing  
 Power supply:  120 V/60 Hz  240 V/60 Hz

Continuous operation of the EUT in test mode state. An automated test program sent a request from the Notebook via the Profinet master to the industrial communication module. The receipt of this request was confirmed with a message.



For this purpose a counter was incremented and evaluated. A serial data connection existed between the communication module and the connected readers.

Artificial hand  None  Handle  
 Other(s): \_\_

**Environmental conditions**

Temperature [10 – 40 °C]: 22° C  
 Relative humidity [10 – 90 %]: 48 %

Environmental conditions during the test:  kept  not kept

**Test - / Measurement procedure**

Measurements are made with a receiver according CISPR 16 guidelines. A pulse limiter and a 10 dB attenuator at the receiver input is used to protect the receiver. The required frequency range is scanned in an automatically operation. When the EUT is arranged the frequency range is monitored. The setup of the equipment and the cables are manipulated within the range to produce the highest emission. Frequency steps of < 0.5 x receiver bandwidth and peak / average detectors are used. If the conducted emission is closer than 20 dB to the limits or exceeds, the receiver will retest the emission with quasipeak or average detector. The identified frequency and amplitude of the six highest conducted emissions relative to the limit lines are listed for each current-carrying conductor. If less than six emission frequencies are within the 20 dB of the limit, the noise level of the measuring instrument at representative frequencies are reported.

The reported test results are calculated with the following formula:

$$\text{Result (dB}\mu\text{V)} = \text{Reading (dB}\mu\text{V)} + \text{ATF (dB)} + \text{CF (dB)}$$

ATF = Correction factor for the pulse limiter/10 dB attenuator

CF = Correction factor for the cable loss

**Test result**

Class B limits for conducted emissions:  kept  not kept  not relevant



Class A limits for conducted emissions:

- kept
- not kept
- not relevant

| Remarks: n/a

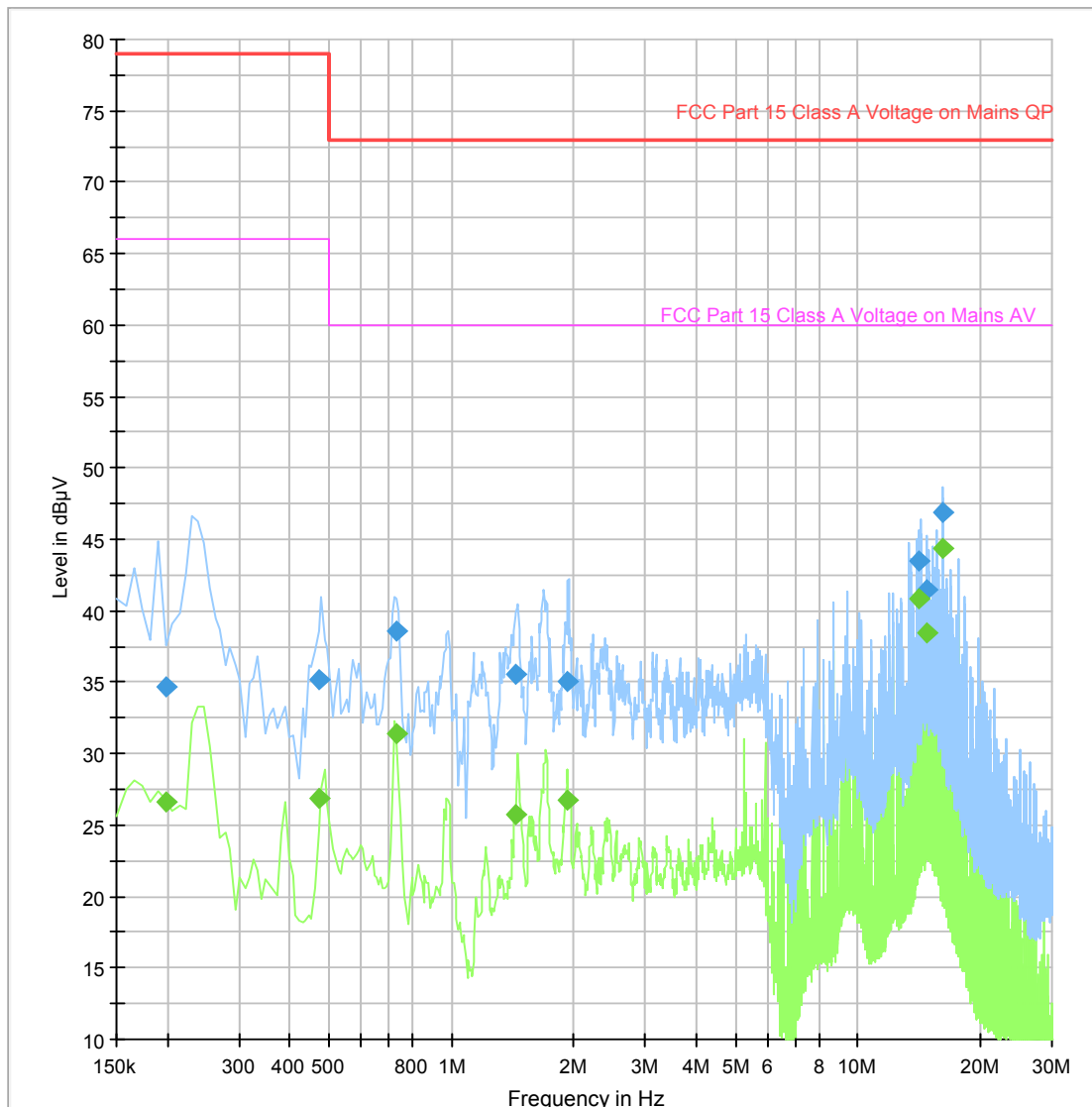
### Protocol scope

- Readings – conducted disturbances
- Diagrams – conducted disturbances



### EUT Information

|                        |  |
|------------------------|--|
| EUT Name:              | ACM9 Profinet                                |
| Test_ID: / SN:         | PRR45_13                                     |
| Customer:              | AEG ID GmbH                                  |
| Operational condition: | Cont. operation in automated test mode       |
| Test specification:    | 47 CFR Part 15 Subpart B – Class A           |
| LISN port:             | N  |
| Operator:              | S. Vogelmann                                 |
| File #:                | AIR46_21                                     |
| Comment #1:            | 120 V / 60 Hz                                |
| Comment #2:            | AC power line - Power supply unit of the EUT |



|   |   |
|---|---|
| Preview Result 2-AVG                    | Preview Result 1-PK+                    |
| FCC Part 15 Class A Voltage on Mains QP | FCC Part 15 Class A Voltage on Mains AV |
| Final_Result QPK                        | Final_Result AVG                        |

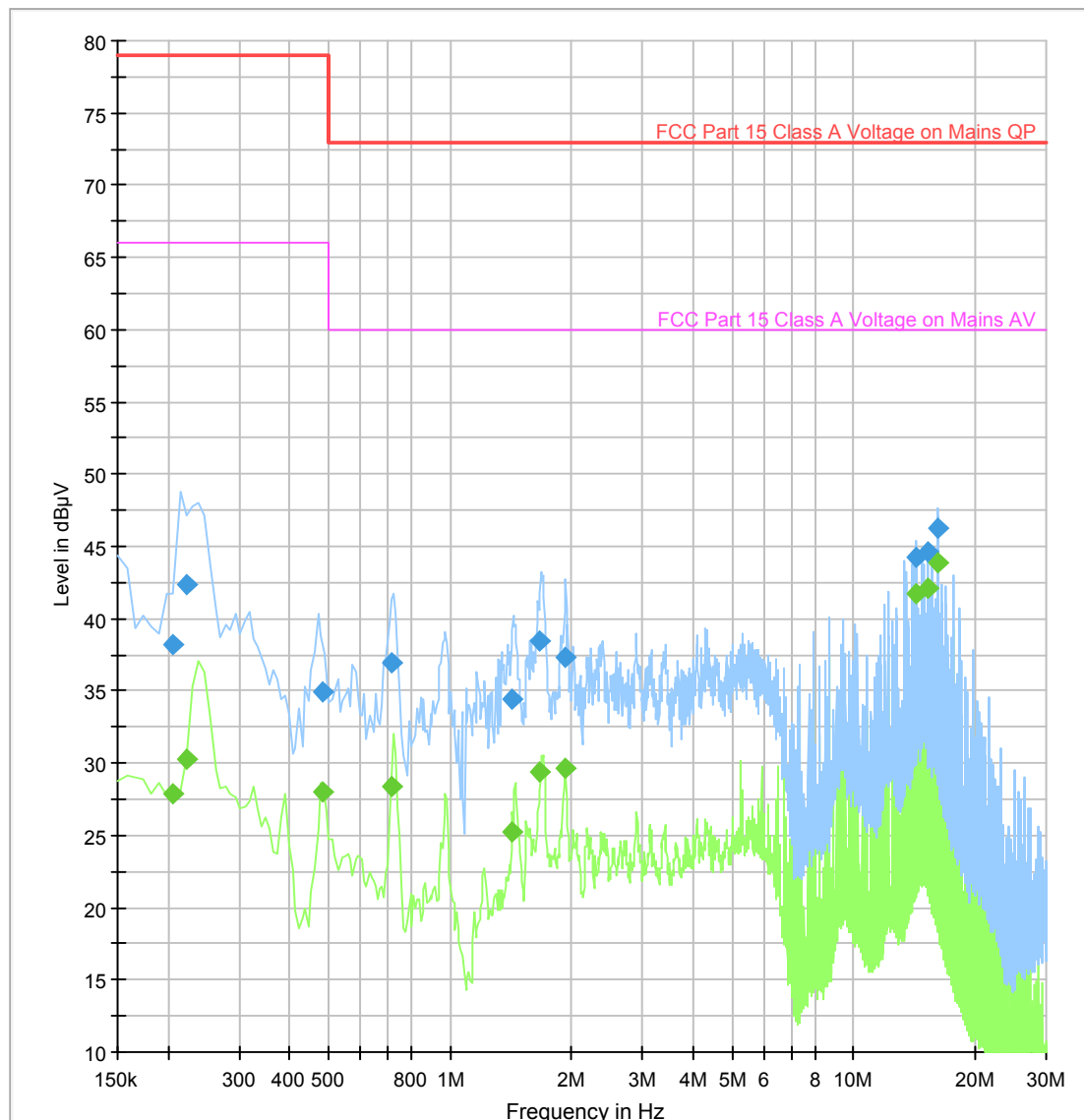


## Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.198000        | 34.66            | ---            | 79.00        | 44.34       | 5000.0          | 10.000          | N    | 9.9        |
| 0.198000        | ---              | 26.59          | 66.00        | 39.41       | 5000.0          | 10.000          | N    | 9.9        |
| 0.474000        | 35.13            | ---            | 79.00        | 43.87       | 5000.0          | 10.000          | N    | 9.9        |
| 0.474000        | ---              | 26.83          | 66.00        | 39.17       | 5000.0          | 10.000          | N    | 9.9        |
| 0.730000        | 38.55            | ---            | 73.00        | 34.45       | 5000.0          | 10.000          | N    | 9.9        |
| 0.730000        | ---              | 31.36          | 60.00        | 28.64       | 5000.0          | 10.000          | N    | 9.9        |
| 1.434000        | 35.50            | ---            | 73.00        | 37.50       | 5000.0          | 10.000          | N    | 10.0       |
| 1.434000        | ---              | 25.73          | 60.00        | 34.27       | 5000.0          | 10.000          | N    | 10.0       |
| 1.938000        | 35.11            | ---            | 73.00        | 37.89       | 5000.0          | 10.000          | N    | 10.0       |
| 1.938000        | ---              | 26.70          | 60.00        | 33.30       | 5000.0          | 10.000          | N    | 10.0       |
| 14.154000       | 43.51            | ---            | 73.00        | 29.49       | 5000.0          | 10.000          | N    | 10.2       |
| 14.154000       | ---              | 40.87          | 60.00        | 19.13       | 5000.0          | 10.000          | N    | 10.2       |
| 14.762000       | 41.44            | ---            | 73.00        | 31.56       | 5000.0          | 10.000          | N    | 10.2       |
| 14.762000       | ---              | 38.42          | 60.00        | 21.58       | 5000.0          | 10.000          | N    | 10.2       |
| 16.226000       | 46.89            | ---            | 73.00        | 26.11       | 5000.0          | 10.000          | N    | 10.2       |
| 16.226000       | ---              | 44.39          | 60.00        | 15.61       | 5000.0          | 10.000          | N    | 10.2       |

## EUT Information

|                        |  |
|------------------------|--|
| EUT Name:              | ACM9 Profinet                                |
| Test_ID: / SN:         | PRR45_13                                     |
| Customer:              | AEG ID GmbH                                  |
| Operational condition: | Cont. operation in automated test mode       |
| Test specification:    | 47 CFR Part 15 Subpart B – Class A           |
| LISN port              | L1   |
| Operator:              | S. Vogelmann                                 |
| File #:                | AIR46_22                                     |
| Comment #1:            | 120 V / 60 Hz                                |
| Comment #2:            | AC power line – Power supply unit of the EUT |



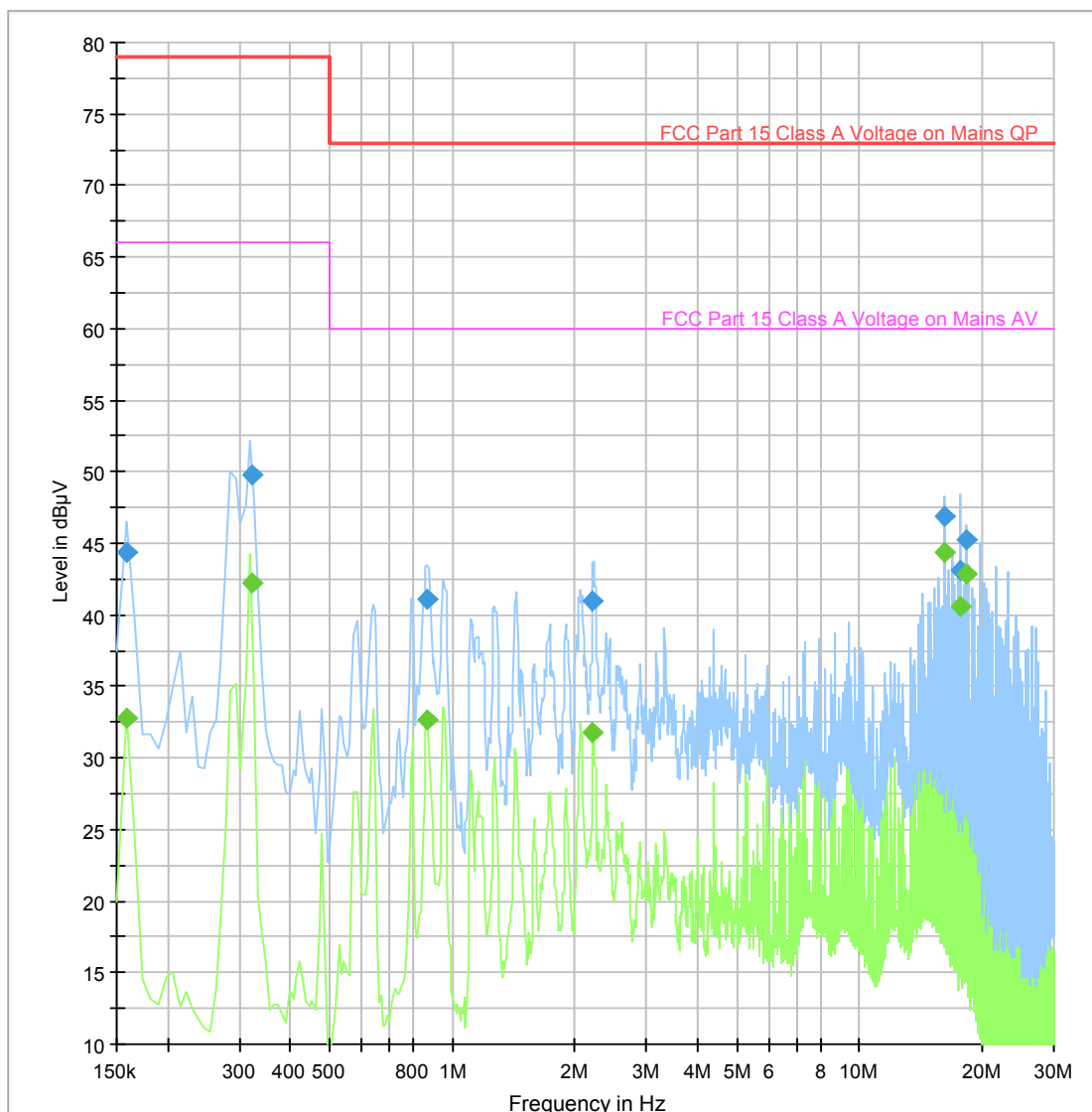
|   |   |
|---|---|
|  Preview Result 2-AVG                    |  Preview Result 1-PK+                    |
|  FCC Part 15 Class A Voltage on Mains QP |  FCC Part 15 Class A Voltage on Mains AV |
|  Final_Result QPK                        |  Final_Result AVG                        |

## Final Result

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Average (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------------|----------------------|--------------------|-------------|-----------------|-----------------|------|------------|
| 0.206000        | ---                    | 27.85                | 66.00              | 38.15       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.206000        | 38.25                  | ---                  | 79.00              | 40.75       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.222000        | ---                    | 30.25                | 66.00              | 35.75       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.222000        | 42.33                  | ---                  | 79.00              | 36.67       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.482000        | 34.95                  | ---                  | 79.00              | 44.05       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.482000        | ---                    | 27.99                | 66.00              | 38.01       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.714000        | 37.00                  | ---                  | 73.00              | 36.00       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.714000        | ---                    | 28.42                | 60.00              | 31.58       | 5000.0          | 10.000          | L1   | 9.9        |
| 1.426000        | 34.47                  | ---                  | 73.00              | 38.53       | 5000.0          | 10.000          | L1   | 10.0       |
| 1.426000        | ---                    | 25.24                | 60.00              | 34.76       | 5000.0          | 10.000          | L1   | 10.0       |
| 1.674000        | 38.49                  | ---                  | 73.00              | 34.51       | 5000.0          | 10.000          | L1   | 10.0       |
| 1.674000        | ---                    | 29.33                | 60.00              | 30.67       | 5000.0          | 10.000          | L1   | 10.0       |
| 1.922000        | 37.35                  | ---                  | 73.00              | 35.65       | 5000.0          | 10.000          | L1   | 10.0       |
| 1.922000        | ---                    | 29.61                | 60.00              | 30.39       | 5000.0          | 10.000          | L1   | 10.0       |
| 14.274000       | 44.25                  | ---                  | 73.00              | 28.75       | 5000.0          | 10.000          | L1   | 10.2       |
| 14.274000       | ---                    | 41.68                | 60.00              | 18.32       | 5000.0          | 10.000          | L1   | 10.2       |
| 15.250000       | 44.65                  | ---                  | 73.00              | 28.35       | 5000.0          | 10.000          | L1   | 10.2       |
| 15.250000       | ---                    | 42.11                | 60.00              | 17.89       | 5000.0          | 10.000          | L1   | 10.2       |
| 16.226000       | 46.30                  | ---                  | 73.00              | 26.70       | 5000.0          | 10.000          | L1   | 10.2       |
| 16.226000       | ---                    | 43.88                | 60.00              | 16.12       | 5000.0          | 10.000          | L1   | 10.2       |

## EUT Information

|                        |  |
|------------------------|--|
| EUT Name:              | ACM9 Profinet  |
| Test_ID: / SN:         | PRR45_13   |
| Customer:              | AEG ID GmbH  |
| Operational condition: | Cont. operation in automated test mode                   |
| Test specification:    | 47 CFR Part 15 Subpart B                                 |
| LISN port              | L1   |
| Operator:              | S. Vogelmann   |
| File #:                | AIR46_23   |
| Comment #1:            | 120 V / 60 Hz  |
| Comment #2:            | AC power line – Power supply unit of the Profinet Master |



|   |   |
|---|---|
|  Preview Result 2-AVG                    |  Preview Result 1-PK+                    |
|  FCC Part 15 Class A Voltage on Mains QP |  FCC Part 15 Class A Voltage on Mains AV |
|  Final_Result QPK                        |  Final_Result AVG                        |



## Final Result

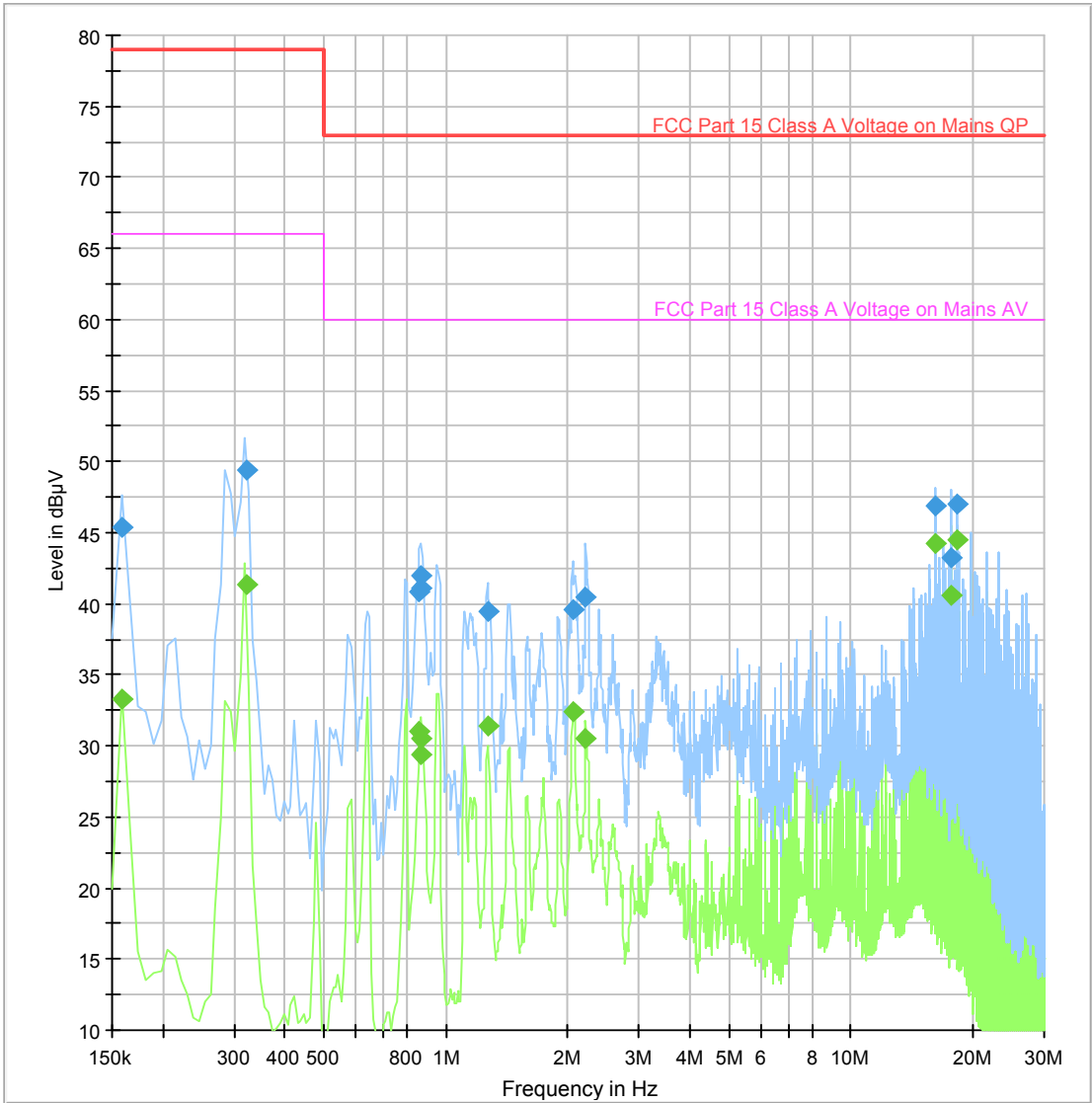
| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.158000        | 44.39            | ---            | 79.00        | 34.61       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.158000        | ---              | 32.77          | 66.00        | 33.23       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.322000        | 49.78            | ---            | 79.00        | 29.22       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.322000        | ---              | 42.20          | 66.00        | 23.80       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.866000        | 41.15            | ---            | 73.00        | 31.85       | 5000.0          | 10.000          | L1   | 10.0       |
| 0.866000        | ---              | 32.71          | 60.00        | 27.29       | 5000.0          | 10.000          | L1   | 10.0       |
| 2.218000        | 40.94            | ---            | 73.00        | 32.06       | 5000.0          | 10.000          | L1   | 10.0       |
| 2.218000        | ---              | 31.79          | 60.00        | 28.21       | 5000.0          | 10.000          | L1   | 10.0       |
| 16.226000       | 46.95            | ---            | 73.00        | 26.05       | 5000.0          | 10.000          | L1   | 10.2       |
| 16.226000       | ---              | 44.39          | 60.00        | 15.61       | 5000.0          | 10.000          | L1   | 10.2       |
| 17.690000       | 43.13            | ---            | 73.00        | 29.87       | 5000.0          | 10.000          | L1   | 10.2       |
| 17.690000       | ---              | 40.54          | 60.00        | 19.46       | 5000.0          | 10.000          | L1   | 10.2       |
| 18.306000       | 45.31            | ---            | 73.00        | 27.69       | 5000.0          | 10.000          | L1   | 10.2       |
| 18.306000       | ---              | 42.82          | 60.00        | 17.18       | 5000.0          | 10.000          | L1   | 10.2       |





### EUT Information

|                        |  |
|------------------------|--|
| EUT Name:              | ACM9 Profinet  |
| Test_ID: / SN:         | PRR45_13   |
| Customer:              | AEG ID GmbH  |
| Operational condition: | Cont. operation in automated test mode                   |
| Test specification:    | 47 CFR Part 15 Subpart B – Class A                       |
| LISN port:             | N  |
| Operator:              | S. Vogelmann   |
| File #:                | AIR46_24   |
| Comment #1:            | 120 V / 60 Hz  |
| Comment #2:            | AC power line – Power supply unit of the Profinet Master |



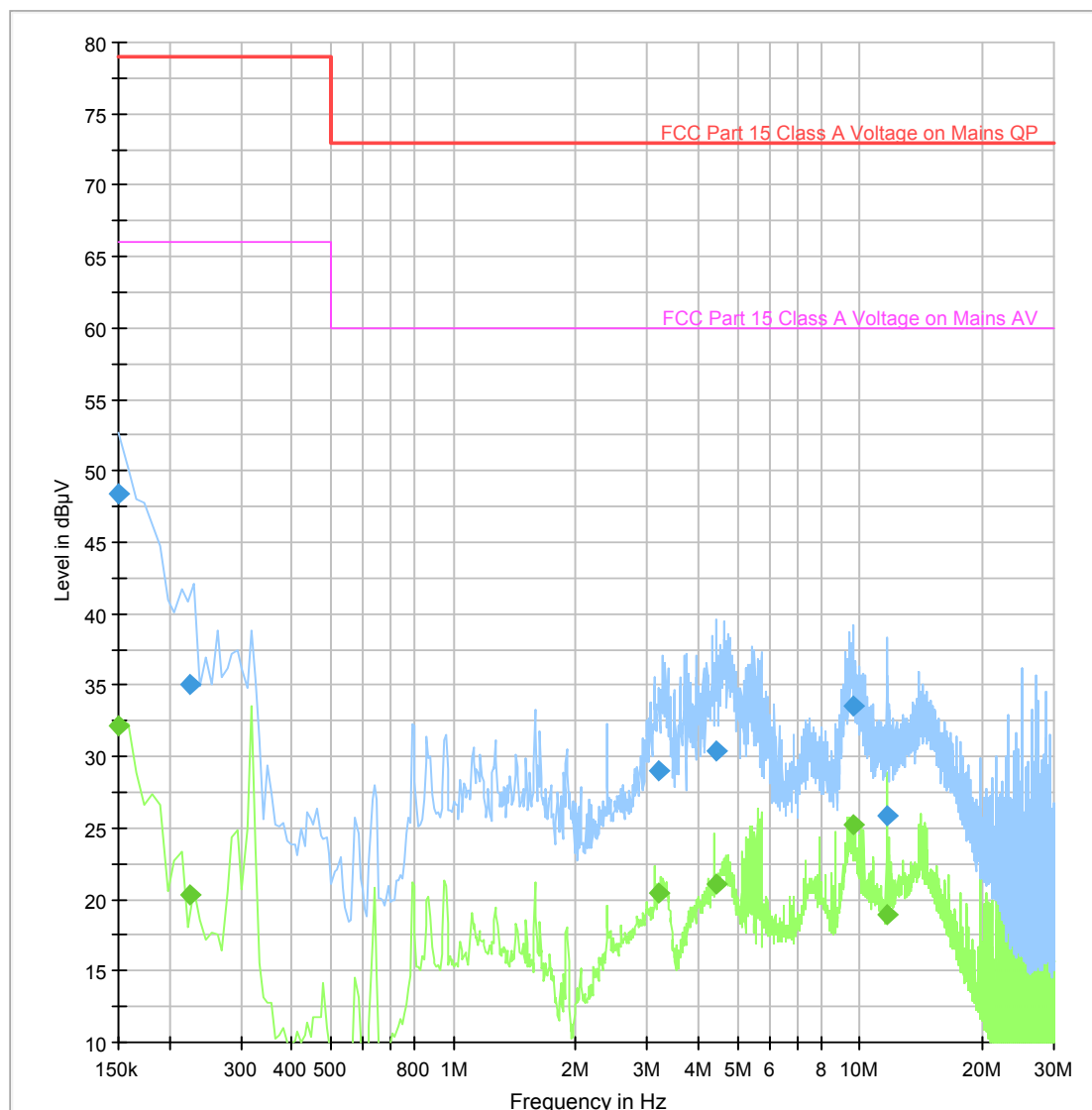
|   |   |
|---|---|
| Preview Result 2-AVG                    | Preview Result 1-PK+                    |
| FCC Part 15 Class A Voltage on Mains QP | FCC Part 15 Class A Voltage on Mains AV |
| Final_Result QPK                        | Final_Result AVG                        |

## Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.158000        | 45.42            | ---            | 79.00        | 33.58       | 5000.0          | 10.000          | N    | 9.9        |
| 0.158000        | ---              | 33.27          | 66.00        | 32.73       | 5000.0          | 10.000          | N    | 9.9        |
| 0.322000        | 49.45            | ---            | 79.00        | 29.55       | 5000.0          | 10.000          | N    | 9.9        |
| 0.322000        | ---              | 41.36          | 66.00        | 24.64       | 5000.0          | 10.000          | N    | 9.9        |
| 0.858000        | 40.83            | ---            | 73.00        | 32.17       | 5000.0          | 10.000          | N    | 10.0       |
| 0.858000        | ---              | 31.08          | 60.00        | 28.92       | 5000.0          | 10.000          | N    | 10.0       |
| 0.866000        | ---              | 30.50          | 60.00        | 29.50       | 5000.0          | 10.000          | N    | 10.0       |
| 0.866000        | 41.98            | ---            | 73.00        | 31.02       | 5000.0          | 10.000          | N    | 10.0       |
| 0.870000        | ---              | 29.38          | 60.00        | 30.62       | 5000.0          | 10.000          | N    | 10.0       |
| 0.870000        | 41.13            | ---            | 73.00        | 31.87       | 5000.0          | 10.000          | N    | 10.0       |
| 1.274000        | 39.40            | ---            | 73.00        | 33.60       | 5000.0          | 10.000          | N    | 10.0       |
| 1.274000        | ---              | 31.41          | 60.00        | 28.59       | 5000.0          | 10.000          | N    | 10.0       |
| 2.066000        | 39.54            | ---            | 73.00        | 33.46       | 5000.0          | 10.000          | N    | 10.0       |
| 2.066000        | ---              | 32.47          | 60.00        | 27.53       | 5000.0          | 10.000          | N    | 10.0       |
| 2.210000        | 40.53            | ---            | 73.00        | 32.47       | 5000.0          | 10.000          | N    | 10.0       |
| 2.210000        | ---              | 30.56          | 60.00        | 29.44       | 5000.0          | 10.000          | N    | 10.0       |
| 16.226000       | 46.91            | ---            | 73.00        | 26.09       | 5000.0          | 10.000          | N    | 10.2       |
| 16.226000       | ---              | 44.30          | 60.00        | 15.70       | 5000.0          | 10.000          | N    | 10.2       |
| 17.690000       | 43.19            | ---            | 73.00        | 29.81       | 5000.0          | 10.000          | N    | 10.2       |
| 17.690000       | ---              | 40.61          | 60.00        | 19.39       | 5000.0          | 10.000          | N    | 10.2       |
| 18.242000       | 47.05            | ---            | 73.00        | 25.95       | 5000.0          | 10.000          | N    | 10.2       |
| 18.242000       | ---              | 44.55          | 60.00        | 15.45       | 5000.0          | 10.000          | N    | 10.2       |

## EUT Information

|                        |   |
|------------------------|---|
| EUT Name:              | ACM9 Profinet                                     |
| Test_ID: / SN:         | PRR45_13  |
| Customer:              | AEG ID GmbH                                       |
| Operational condition: | Cont. operation in automated test mode            |
| Test specification:    | 47 CFR Part 15 Subpart B – Class A                |
| LISN port              | N   |
| Operator:              | S. Vogelmann                                      |
| File #:                | AIR46_25  |
| Comment #1:            | 120 V / 60 Hz                                     |
| Comment #2:            | AC power line – Power supply unit of the notebook |



|   |   |
|---|---|
|  Preview Result 2-AVG                    |  Preview Result 1-PK+                    |
|  FCC Part 15 Class A Voltage on Mains QP |  FCC Part 15 Class A Voltage on Mains AV |
|  Final_Result QPK                        |  Final_Result AVG                        |

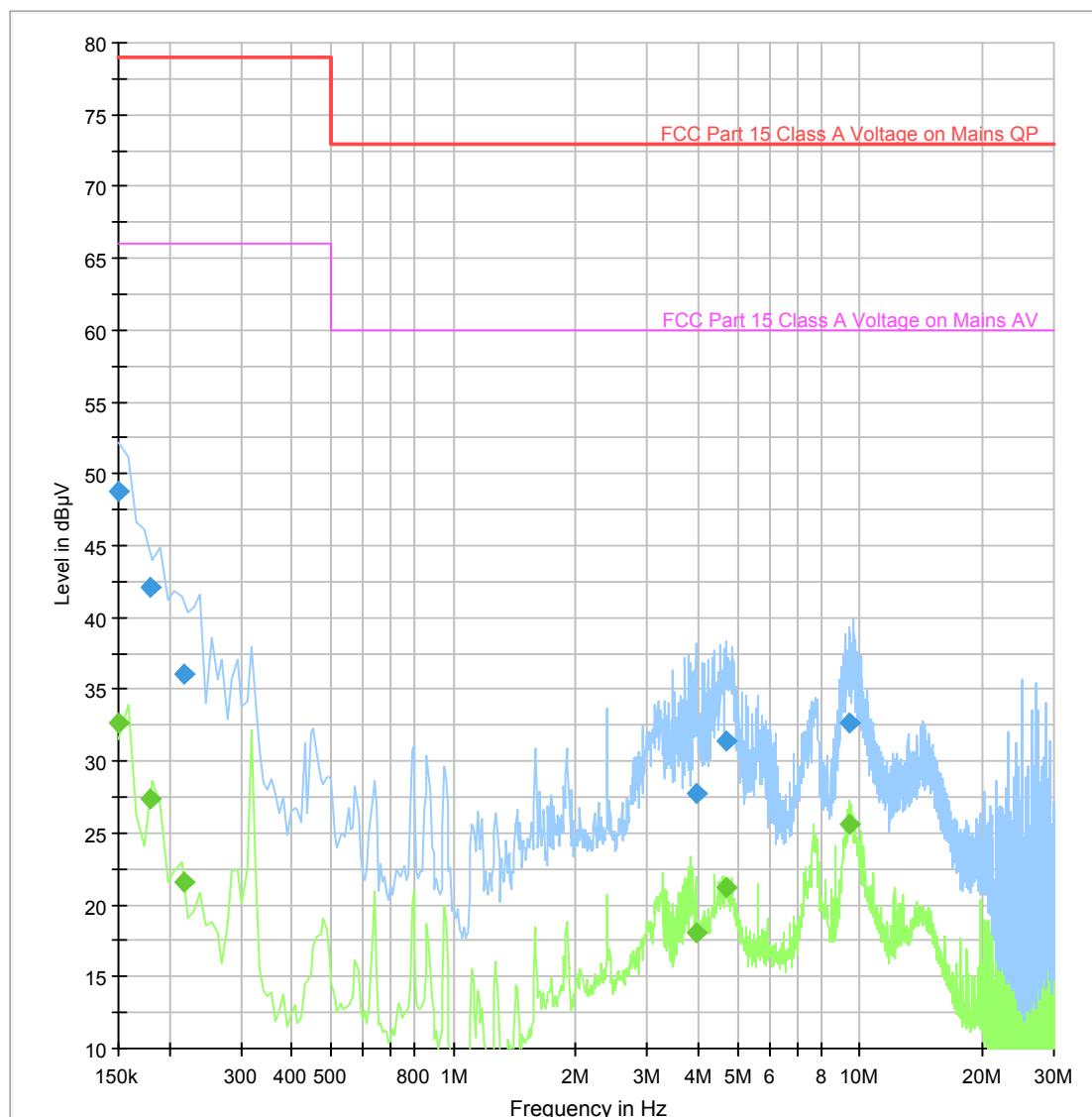


## Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.150000        | 48.44            | ---            | 79.00        | 30.56       | 5000.0          | 10.000          | N    | 9.9        |
| 0.150000        | ---              | 32.11          | 66.00        | 33.89       | 5000.0          | 10.000          | N    | 9.9        |
| 0.226000        | 35.08            | ---            | 79.00        | 43.92       | 5000.0          | 10.000          | N    | 9.9        |
| 0.226000        | ---              | 20.36          | 66.00        | 45.64       | 5000.0          | 10.000          | N    | 9.9        |
| 3.186000        | 29.05            | ---            | 73.00        | 43.95       | 5000.0          | 10.000          | N    | 10.0       |
| 3.186000        | ---              | 20.40          | 60.00        | 39.60       | 5000.0          | 10.000          | N    | 10.0       |
| 4.426000        | 30.38            | ---            | 73.00        | 42.62       | 5000.0          | 10.000          | N    | 10.0       |
| 4.426000        | ---              | 21.12          | 60.00        | 38.88       | 5000.0          | 10.000          | N    | 10.0       |
| 9.610000        | 33.50            | ---            | 73.00        | 39.50       | 5000.0          | 10.000          | N    | 10.2       |
| 9.610000        | ---              | 25.21          | 60.00        | 34.79       | 5000.0          | 10.000          | N    | 10.2       |
| 11.626000       | 25.88            | ---            | 73.00        | 47.12       | 5000.0          | 10.000          | N    | 10.2       |
| 11.626000       | ---              | 18.92          | 60.00        | 41.08       | 5000.0          | 10.000          | N    | 10.2       |

## EUT Information

|                        |   |
|------------------------|---|
| EUT Name:              | ACM9 Profinet                                     |
| Test_ID: / SN:         | PRR45_13  |
| Customer:              | AEG ID GmbH                                       |
| Operational condition: | Cont. operation in automated test mode            |
| Test specification:    | 47 CFR Part 15 Subpart B – Class A                |
| LISN port              | L1  |
| Operator:              | S. Vogelmann                                      |
| File #:                | AIR46_26  |
| Comment #1:            | 120 V / 60 Hz                                     |
| Comment #2:            | AC power line – Power supply unit of the notebook |



|   |   |
|---|---|
|  Preview Result 2-AVG                    |  Preview Result 1-PK+                    |
|  FCC Part 15 Class A Voltage on Mains QP |  FCC Part 15 Class A Voltage on Mains AV |
|  Final_Result QPK                        |  Final_Result AVG                        |



## Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.150000        | 48.76            | ---            | 79.00        | 30.24       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.150000        | ---              | 32.60          | 66.00        | 33.40       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.180010        | 42.13            | ---            | 79.00        | 36.87       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.180010        | ---              | 27.42          | 66.00        | 38.58       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.218000        | 36.10            | ---            | 79.00        | 42.90       | 5000.0          | 10.000          | L1   | 9.9        |
| 0.218000        | ---              | 21.64          | 66.00        | 44.36       | 5000.0          | 10.000          | L1   | 9.9        |
| 3.978000        | 27.75            | ---            | 73.00        | 45.25       | 5000.0          | 10.000          | L1   | 10.0       |
| 3.978000        | ---              | 18.02          | 60.00        | 41.98       | 5000.0          | 10.000          | L1   | 10.0       |
| 4.714000        | 31.38            | ---            | 73.00        | 41.62       | 5000.0          | 10.000          | L1   | 10.0       |
| 4.714000        | ---              | 21.15          | 60.00        | 38.85       | 5000.0          | 10.000          | L1   | 10.0       |
| 9.442000        | 32.66            | ---            | 73.00        | 40.34       | 5000.0          | 10.000          | L1   | 10.2       |
| 9.442000        | ---              | 25.64          | 60.00        | 34.36       | 5000.0          | 10.000          | L1   | 10.2       |

1.1.2 Radio disturbances according  
47 CFR Part 15 Subpart B - 11/05/2020

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

\* \_\_\_\_\_

Test location

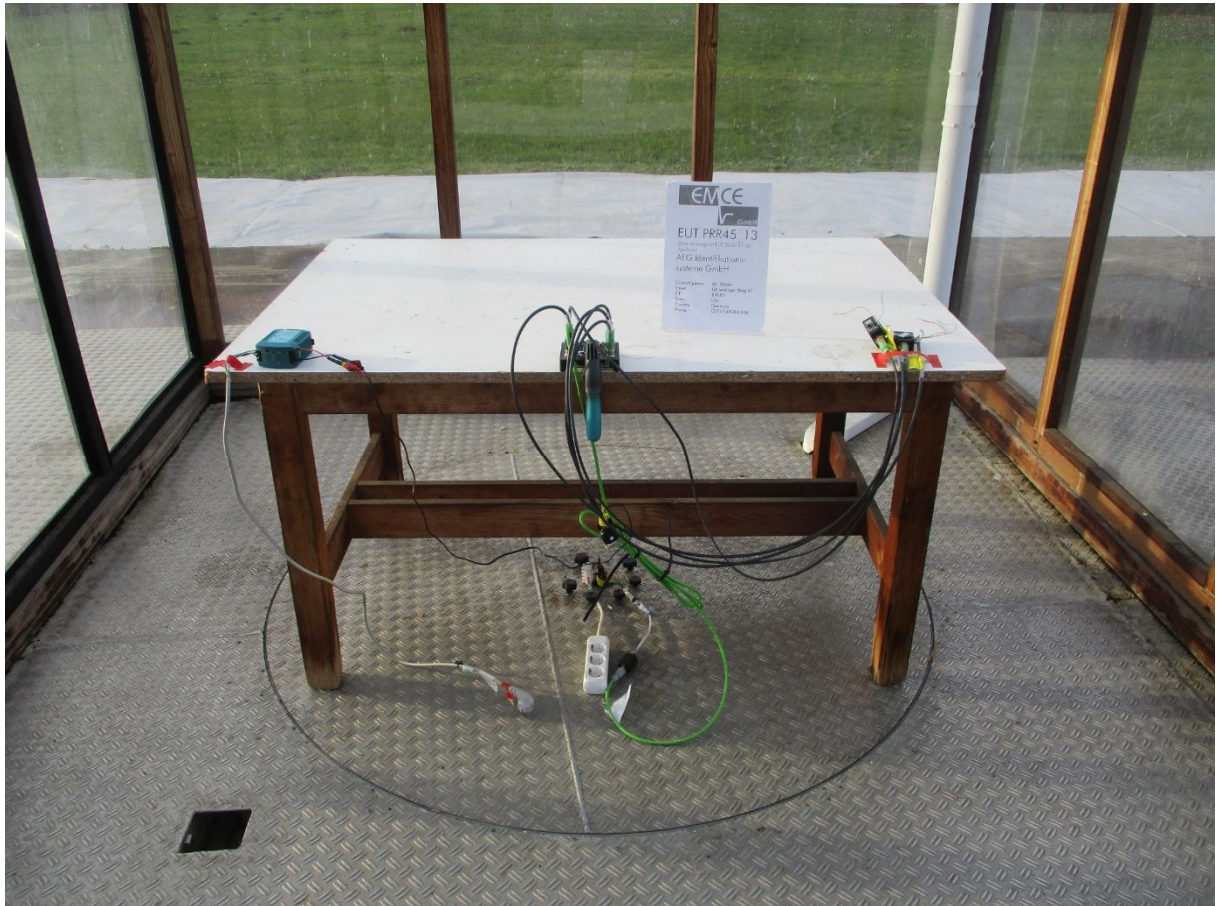
| <input checked="" type="checkbox"/> | Inv.-No. | Designation                          | Type<br>(L x W x H)                            | Manufacturer                     | Location   |
|-------------------------------------|----------|--------------------------------------|--|----------------------------------|--|
|                                     | 588      | Shielded room # 2                    | 8.3/5.8 x 5.5/2.9<br>x 3.4 m                   | EMC-Technik &<br>Consulting GmbH | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 584      | Shielded room # 3                    | 3.6 x 3.6 x 2.5 m                              | Siemens AG                       | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 678      | Shielded room # 4                    | 4.0 x 4.0 x 3.5 m                              | EMC-Technik &<br>Consulting GmbH | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 062      | Semi anechoic chamber<br># 2         | 13.5 x 6.1 x 5.5 m                             | EMC-Technik &<br>Consulting GmbH | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 679      | Full anechoic chamber<br># 3         | 8.8 x 4.6 x 4.2 m                              | Albatross Projects<br>GmbH       | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 014      | Open area test site                  | 10 m   | EMCE GmbH                        | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
| <input checked="" type="checkbox"/> | 015      | Open area test site                  | 3 m  | EMCE GmbH                        | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | 042      | Voltage-/current source<br>test site | 0-382 VDC<br>0-270 VAC<br>1 x 10 kW / 3 x 5 kW | Spitzenberger + Spies            | EMCE GmbH<br>Untere Wiesen 1<br>88483 Burgrieden |
|                                     | n/a      | Alternative test site                | n/a  | n/a                              | n/a  |



### 1.1.2.1 Test set up

According ANSI C63.4-2014

Photo(s) showing the interconnection of the major function units





### Used test equipment

| <input type="checkbox"/>            | Inv.-No. | Designation                              | Type                    | Manufacturer             | S/N             |
|-------------------------------------|----------|--|-------------------------|--------------------------|-----------------|
|                                     | 001      | Test receiver                            | ESS<br>5 Hz – 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          |
|                                     | 008      | Antenna<br>9 kHz – 30 MHz                | HFH2-Z2                 | Rohde & Schwarz          | 835776/0002     |
| <input checked="" type="checkbox"/> | 009      | Antenna<br>30 – 300 MHz                  | VHBA9123 /<br>BBA9106   | Schwarzbeck              | 435             |
|                                     | 010      | Antenna<br>250 – 1200 MHz                | UHALP 9108A             | Schwarzbeck              | 108             |
|                                     | 011      | Antenna<br>30 – 300 MHz                  | VHBA9123 /<br>BBA9106   | Schwarzbeck              | 0408/94         |
| <input checked="" type="checkbox"/> | 012      | Antenna<br>250 – 1200 MHz                | UHALP 9108A             | Schwarzbeck              | 166             |
|                                     | 013      | Antenna<br>9 kHz – 30 MHz                | Loop antenna 1.5 m<br>∅ | EMCE GmbH                | n/a             |
|                                     | 025      | Current clamp BCI                        | F-120-2                 | FCC                      | 47              |
|                                     | 041      | HZ-10                                    | Shielded coil           | Rohde & Schwarz          | 849788/020      |
| <input checked="" type="checkbox"/> | 042      | AC-Source / Analyser /<br>Norm impedance | EMV D5000/PAS           | Spitzenberger<br>+ Spies | A274700/ 0 0501 |
|                                     | 058      | Test receiver                            | ESIB 40                 | Rohde & Schwarz          | 100200          |
|                                     | 059      | Logper. Antenna                          | HL050                   | Rohde & Schwarz          | 100006          |
|                                     | 060      | HF coupling clamp                        | KEMA 801                | Schaffner                | 20808           |
|                                     | 067      | LISN 5                                   | ESH2-Z5                 | Rohde & Schwarz          | 0872460/043     |
|                                     | 068      | LISN 4                                   | ESH2-Z5                 | Rohde & Schwarz          | 0872460/042     |
|                                     | 073      | Absorbing clamp                          | MDS 21                  | Schwarzbeck              | 881757          |
|                                     | 116      | Vertical rod antenna                     | VAMP 9243               | Schwarzbeck              | 9243-205        |
| <input checked="" type="checkbox"/> | 229      | Test receiver                            | ESS<br>5 Hz – 1000 MHz  | Rohde & Schwarz          | 845420/0005     |
| <input checked="" type="checkbox"/> | 997      | Software                                 | EMC32                   | Rohde & Schwarz          | n/a             |

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      |
|------------------|------------------------------|
| 9 kHz – 30 MHz   | on request                   |
| 30 MHz – 300 MHz | 4.3 dB (valid for 10 m-OATS) |
| 300 MHz – 1 GHz  | 4.4 dB (valid for 10 m-OATS) |
| 30 MHz – 300 MHz | 4.4 dB (valid for 3 m-OATS)  |
| 300 MHz – 1 GHz  | 5.8 dB (valid for 3 m-OATS)  |
| 1 GHz – 18 GHz   | on request                   |



### 1.1.2.2 Test

#### Regulation

47 CFR Part 15 Subpart B – 11/05/2020

Highest frequency generated or used in the device or on which the device operates or tunes:

- < 1.705 MHz
- 1.705 – 108 MHz
- 108 – 500 MHz
- 500 – 1000 MHz
- > 1000 MHz

Upper frequency of measurement:

- 30 MHz
- 1000 MHz
- 2000 MHz
- 5000 MHz
- 5. harmonic of the highest frequency or 40 GHz, whichever is lower

Frequency range:

- 9 kHz – 30 MHz
- 30 MHz – 1000 MHz
- 150 kHz – 1 GHz
- 1 – 18 GHz

Limits:

- Class B
- Class A

Test distance:

- 3 m
- 10 m
- 5 m
- 30 m

#### Rationale for selecting the EUT test set up

Equipment units:

Minimized configuration of the EUT with the essential peripherals. One port was occupied by each connector type:

- Digital input
- Digital output
- RFID-Reader LF
- RFID-Reader HF
- Profinet Master
- Power supply

A Notebook system was used as an auxiliary equipment.

## Operation mode

EUT arrangement:  Tabletop  Floor standing  
 Power supply:  120 V/60 Hz  240 V/60 Hz

Continuous operation of the EUT in test mode state. An automated test program sent a request from the Notebook via the Profinet master to the industrial communication module. The receipt of this request was confirmed with a message. For this purpose a counter was incremented and evaluated. A serial data connection existed between the communication module and the connected readers.

Artificial hand  None  Handle  
 Other(s): \_\_

## Environmental conditions

Temperature [10 – 40 °C]: 13° C  
 Relative humidity [10 – 90 %]: 64 %  
 Environmental conditions during the test:  kept  not kept

## Test - / Measurement procedure

Tabletop devices will be arranged on a non-conduction wooden table with a size of 1.0 x 1.5 x 0.8 m (L x W x H). Handheld, body-worn or ceiling mounted equipment are investigated in 3 orthogonal axes orientations to determine the maximum emission level. Floor-standing devices will be placed directly on the grounded metal turntable / reference ground plane.

At a first test run in a semi-anechoic chamber the required frequency range will be measured in an automatically operation. The receiver is set to analyser mode and the frequency ranges are swept sequential depending on the antenna. When the EUT is arranged the frequency range is monitored while the power cables are faced to the antenna. The setup of the equipment and the cables are manipulated within the range to produce the highest emission. For the measurement the turntable is continuously rotated from 0° - 360° and reverse, also if requested the antenna height is changed after every cycle by 0.5 m steps. The antenna position is then increased from 1.0 m to 4.0 m in 0.5 m steps with vertical polarization and reverse with horizontal polarization. During one cycle the frequency range is continuously swept with peak detector and Max-hold function. If necessary an additional average detector is used. For every discrete antenna polarization over all cycles the



maximum peak values are recorded with frequency, level, turntable position and antenna height. Significant peaks or clock frequencies are marked and re-measured with increased accuracy. The records are used to determine the exact frequency and to optimise the emission level. At the predefined position the turntable position is fine adjusted in the range of  $\pm 20^\circ$  and subsequent the antenna height is varied by  $\pm 0.3$  m. At the maximized position the emission is measured with quasipeak or average detector and listed.

At a second test run an open area test site measurement will be performed with selected frequencies determined by the test procedure before. For every selected frequency the level is re-maximized and the EUT is rotated by  $360^\circ$  at an antenna height of 1.0m for vertical antenna polarization and 2.0 m for horizontal antenna polarization. At the azimuth position of the EUT for the highest emission the antenna height is varied within 1.0 m and 4.0 m up to the maximum. To maximize the emission level at the determined position the turntable azimuth is fine adjusted by  $\pm 45^\circ$  and the antenna height by  $\pm 0.3$  m.

Final measurement is made with a receiver according CISPR 16 guidelines with quasipeak and average detector.

The identified frequency and amplitude of the six highest radiated emissions relative to the limit lines are listed. If less than six emission frequencies are within the 20 dB of the limit, the noise level of the measuring instrument at representative frequencies are reported.

The reported test results are calculated with the following formula:

$$\text{Result (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)}$$

- AF = Correction factor for the antenna
- CF = Correction factor for the cable loss

**Test result**

Class B limits for radiated emissions:  kept  
 not kept  
 not relevant

Class A limits for radiated emissions:  kept  
 not kept  
 not relevant

Remarks: n/a



### Protocol scope

- Readings - radiated emissions
- Diagrams - radiated emissions
- Precompliance measurement(s)

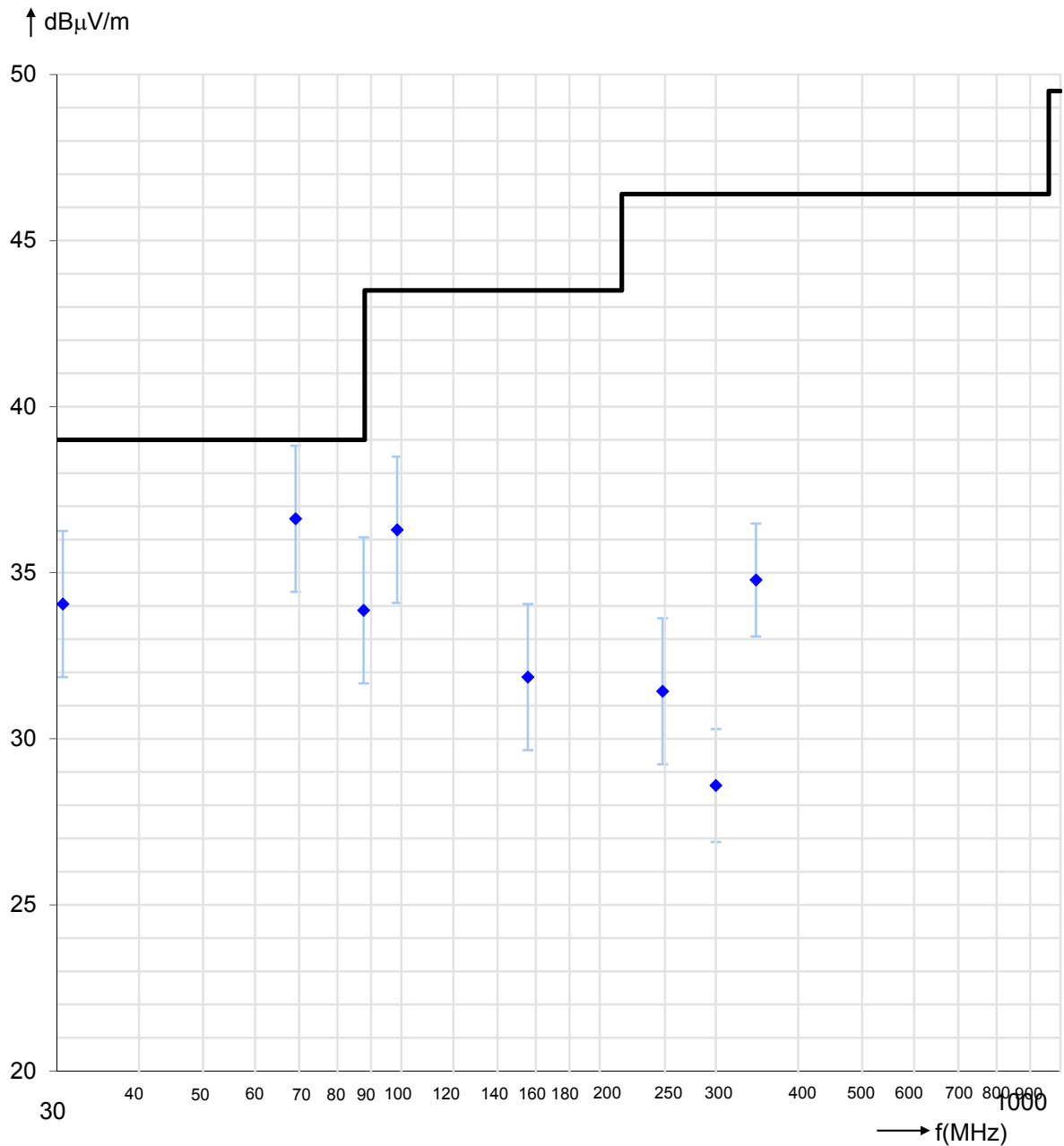
Readings

| <input checked="" type="checkbox"/> Quasipeak-Detector<br>Bandwidth: 120 kHz |            |                                      |                                    |                |              |        |                    |                          |                         |
|--|------------|--------------------------------------|------------------------------------|----------------|--------------|--------|--------------------|--------------------------|-------------------------|
| Frequency  | Readings   | + AF<br>Antenna correction<br>factor | + CF<br>Cable correction<br>factor | Field strength | Limit        | Margin | Antenna-<br>Height | Antenna-<br>Polarization | Turn Table-<br>Position |
| MHz  | dB $\mu$ V | dB/m                                 | dB                                 | dB $\mu$ V/m   | dB $\mu$ V/m | dB     | m                  | hor./ver.                | Degree                  |
| 30.644   | 21.5       | 11.8                                 | 0.8                                | 34.1           | 39.0         | 4.9    | 1.2                | V                        | 115                     |
| 69.116   | 27.2       | 8.2                                  | 1.2                                | 36.6           | 39.0         | 2.4    | 1.2                | V                        | 75                      |
| 87.648   | 23.5       | 9.0                                  | 1.3                                | 33.9           | 39.0         | 5.1    | 1.2                | V                        | 115                     |
| 98.516   | 25.4       | 9.5                                  | 1.4                                | 36.3           | 43.5         | 7.2    | 1.5                | V                        | 130                     |
| 155.572  | 17.4       | 12.6                                 | 1.8                                | 31.9           | 43.5         | 11.6   | 1.3                | V                        | 0                       |
| 249.084  | 12.1       | 17.0                                 | 2.4                                | 31.4           | 46.4         | 15.0   | 1.5                | V                        | 180                     |
| 300.012  | 11.8       | 14.2                                 | 2.6                                | 28.6           | 46.4         | 17.8   | 1.0                | V                        | 0                       |
| 345.096  | 17.5       | 14.5                                 | 2.8                                | 34.8           | 46.4         | 11.6   | 1.1                | V                        | 0                       |



Diagram radio disturbances – Antenna vertical / horizontal polarized

Limits:  Class B  Class A







## 2 Summary

| Regulation                            | Class / Test level | Result      | Remark(s) |
|---------------------------------------|--------------------|-------------|-----------|
| FCC Rules 47 CFR Part 15<br>Subpart B |                    |             |           |
| Terminal voltage<br>[0.15-30MHz]      | Class A            | Limits kept |           |
| Radiated emissions<br>[30-1000MHz]    | Class A            | Limits kept |           |

Burgrieden, 12/10/2020

Responsible inspector:

Project manager – Steffen Vogelmann

- End of Test Report -