Registration No. DAT-P-207/05

# EMC – TEST REPORT

| Test Report No. : E32768-01-00NM | 15. July 2008<br>Date of issue |
|---|---|

**Type / Model Name** : GENOS DTk 14 SG

**Product Description** : Digital tachograph

**Applicant** : LIKA Teknoloji Bilisim Elektronik Sanayi ve Ticaret A.S.

Address : Anadolu Bulcari 2. Cadde
A.T.B. Is Merkezi No. 236 Macunköy
YENIMAHALLE-ANKARA, TUKREY

**Manufacturer** : LIKA Teknoloji Bilisim Elektronik Sanayi ve Ticaret A.S.

Address : Anadolu Bulcari 2. Cadde
A.T.B. Is Merkezi No. 236 Macunköy
YENIMAHALLE-ANKARA, TUKREY

| **Test Result** according to the standards listed in clause 1 test standards: | **POSITIVE** |
|---|---|

Deutscher Akkreditierungs Rat
DAR
DAT-P-207/05-00





mikes-testingpartners gmbh
Ohmstrasse 2-4 · 94342 Strasskirchen
Tel.:+49(0)9424-94810 · Fax:+49(0)9424-9481240

# Contents

# 1 TEST STANDARDS

The tests were performed according to following standards:

| | | |
|---|---|---|
| ☐ | EN 13309 | : 2000 |
| ☐ | EN 1789 | : 1999 |
| ☐ | EN 50148 | : 1995 |
| ☐ | EN ISO 14982 | : 1998 |
| ☐ | EVOBus | : 2000 |
| ☐ | GMW3097 | : 2006 |
| ☐ | GMW3100 | : 2001 |
| ☐ | GS 95002 | : 2004 |
| ☐ | ISO 13766 | : 2006 |
| ☐ | JCB 7800/0107 | : 2001 |
| ☐ | M 3285 | : 2001 |
| ☐ | MBN 22100-2 | : 2001 |
| ☐ | TL 965 | : 2006 |
| ☐ | TL 820 66 | : 2006 |
| ☐ | TL 821 66 | : 2004 |
| ☒ | 72/245/EC | : 1972 |
| ☒ | 2004/104/EC | : 2004 |
| ☒ | 2006/28/EC | : 2006 |
| ☐ | 2006/120/EC | : 2006 |
| ☐ | applicant specific | |
| | | |
| ☐ | CISPR 12 | : 2001 |
| ☒ | CISPR 25 | : 2002 |
| ☐ | EN 55025 | : 2003 |
| | | |
| ☐ | ISO 11451-1 | : 2005 |
| ☐ | ISO 11451-2 | : 2005 |
| ☐ | DIN ISO 11451-3 | : 2000 |
| ☐ | ISO 11451-4 | : 1995 |
| ☐ | ISO 11452-1 | : 2005 |
| ☒ | ISO 11452-2 | : 2004 |
| ☐ | ISO 11452-3 | : 2001 |
| ☒ | ISO 11452-4 | : 2005 |
| ☐ | ISO 11452-5 | : 2002 |
| ☐ | DIN 40839 Part 4 | : 1990 |
| | | |
| ☐ | DIN 40839 Part 1 | : 1992 |
| ☐ | DIN 40839 Part 3 | : 1991 |
| ☒ | ISO 7637 Part 2 | : 2004 |
| ☐ | ISO 7637 Part 3 | : 1999 |
| | | |
| ☐ | ISO 10605 | : 2001 |

# 2 SUMMARY

## 2.1 General remarks

None

## 2.2 Summary for all EMC tests

| Type of test | | Test result | |
|---|---|---|---|
| EMC emission: | | | |
| AES | Transient emission test | Fulfilled | |
| ARE | Radiated emissions – ALSE | Fulfilled | |
| | | | |
| | | | |
| Immunity: | | | Performance criteria |
| APU | Transient immunity test (24V power line) | Fulfilled | A/B/C |
| ARI | Radiated electromagnetic energy – absorber lined chamber | Fulfilled | A |
| ARI | Radiated electromagnetic energy – bulk current injection | Fulfilled | A |
| | | | |
| | | | |

## 2.3 Final assessment

Date of receipt of test sample : acc. to storage records

Testing commenced on : 14. July 2008

Testing concluded on : 15. July 2008

Checked by:

Thomas Weise
Ich bestätige die Richtigkeit und Integrität dieses Dokuments
2008.07.15 16:53:29 +02'00'

Thomas Weise
Dipl.-Ing.(FH)
Laboratory Manager

Tested by:

Nicole Mikes
Ich bin der Verfasser dieses Dokuments
2008.07.15 16:05:18 +02'00'

Nicole Mikes
Dipl.-Ing.(FH)

# 3 EQUIPMENT UNDER TEST

## 3.1 Photo documentation of the EuT

## 3.2 Power supply system utilised

Power supply voltage : 24 $V_{DC}$

## 3.3 Short description of the Equipment under Test (EuT)

The Equipment under Test is a digital tachograph for the use in vehicles.

Number of tested samples: 1
Serial number: Test sample 1

## EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- speed 75 km/h: generated by a function generator

## EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

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

- Function generator Model : Agilent
- _____ Model : _____
- _____ Model : _____

- customer specific cables
  - $V_{Batt}$
  - GND
  - Pulse In

## 3.4 Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

### Definition related to the performance level:

☒ based on the used product standard
☐ based on the declaration of the manufacturer, requestor or purchaser

**Criterion A:**
Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

All functions of a device/system perform as designed during and after exposure to disturbance. No changes to the speed occurs.

**Criterion B:**
Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

All functions of a device/system perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A. The speed changes minimal, the display may flicker.

**Criterion C:**
Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

One or more functions of a device/system do not perform as designed during exposure but return automatically to normal operation after exposure is removed. During the test the device switches off, but returns automatically to the selected operation mode after exposure is removed.

**Criterion D:**
Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data:

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# 4 TEST ENVIRONMENT

## 4.1 Address of the test laboratory

**mikes-testingpartners gmbh**
**Ohmstrasse 2-4**
**94342 Strasskirchen**
**Germany**

## 4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature: | 15-35 ° C |
| Humidity: | 30-60 % |
| Atmospheric pressure: | 86-106 kPa |

## 4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

# 5 TEST CONDITIONS AND RESULTS

## 5.1 Transient emission test

For test instruments and accessories used see section 6 Part **AES**.

### 5.1.1 Description of the test location

Test location: AREA 5

### 5.1.2 Photo documentation of the test set-up

### 5.1.3 Test result

The requirements are **FULFILLED.**

**Remarks:** Test date: 15.07.2008, NM

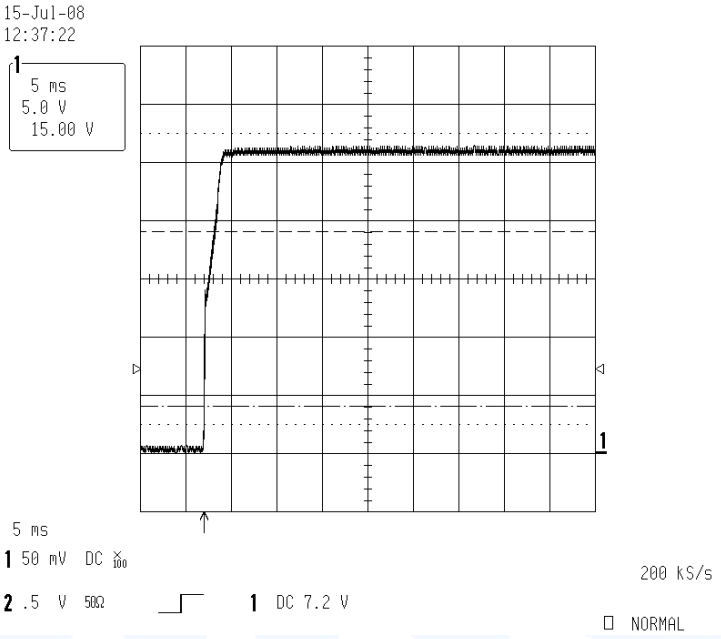
The limits are met.

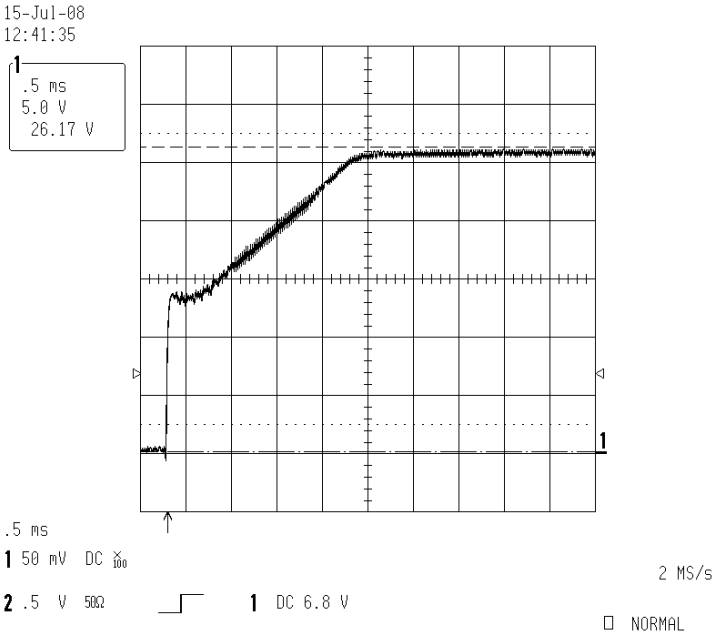
### 5.1.4 Test protocol

Operation mode: speed 75 km/h
Remarks: none
Date: 15.07.2008
Tested by: Nicole Mikes

Result: passed

| Pulse type | Limit [V] | Result [V] |
|---|---|---|
| Positive | + 150 | 0 |

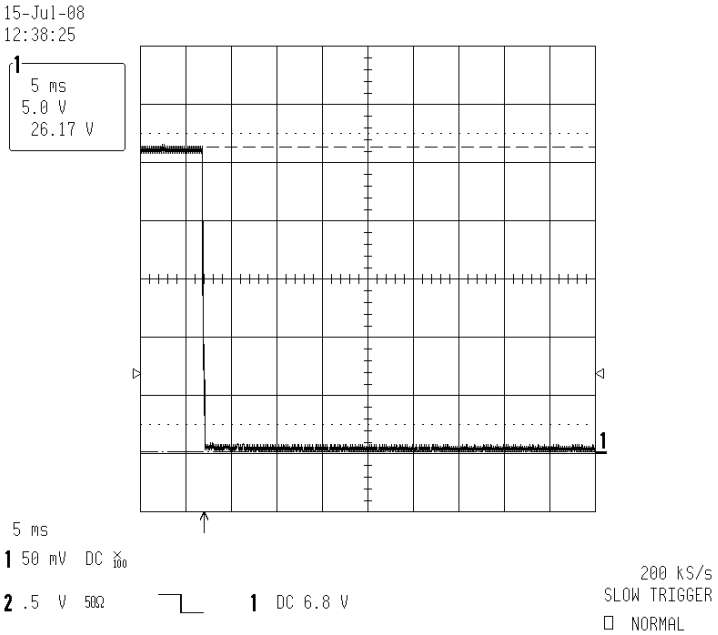


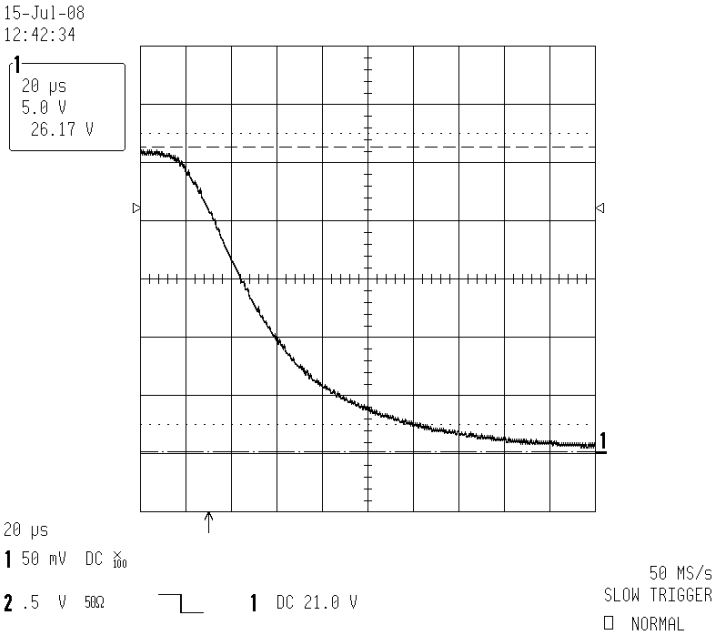



Operation mode: speed 75 km/h
Remarks: none
Date: 15.07.2008
Tested by: Nicole Mikes

Result: passed

| Pulse type | Limit [V] | Result [V] |
|---|---|---|
| Negative | - 450 | 0 |



## 5.2 Transient immunity test (24V power line)

For test instruments and accessories used see section 6 Part **APU**.

### 5.2.1 Description of the test location

Test location: AREA 5

### 5.2.2 Photo documentation of the test set-up

### 5.2.3 Test specification

| | | |
|---|---|---|
| Pulse 1: | Level: | III |
| | Test level: | - 450 V |
| | Number of pulses: | 5000 |
| Pulse 2a: | Level: | III |
| | Test level: | + 37 V |
| | Number of pulses: | 5000 |
| Pulse 2b: | Level: | III |
| | Test level: | + 20 V |
| | Number of pulses: | 10 |
| Pulse 3a: | Level: | III |
| | Test level: | - 150 V |
| | Coupling duration: | 1 h |

| | | |
|---|---|---|
| Pulse 3b: | Level: | III |
| | Test level: | + 150 V |
| | Coupling duration: | 1 h |
| Pulse 4: | Level: | III |
| | Test level: | - 12 V |
| | Number of pulses: | 1 |

### 5.2.4 Coupling points

Cable description: DC power line

Screening: screened
Status: active
Signal transmission: analogue
Length: 0.5 m

### 5.2.5 Test result

| | Remarks | Performance Criterion |
|---|---|---|
| Pulse 1 | During the pulses a short flicker occurs on the display, the speed changes ± 2 km/h. After the test the DUT returns automatically to the selected operation mode. | **B** |
| Pulse 2a | No deviation was detected during the test to the selected operation mode. | **A** |
| Pulse 2b | During the pulses the device switches off. After the test the DUT returns automatically to the selected operation mode. | **C** |
| Pulse 3a | No deviation was detected during the test to the selected operation mode. | **A** |
| Pulse 3b | No deviation was detected during the test to the selected operation mode. | **A** |
| Pulse 4 | No deviation was detected during the test to the selected operation mode. | **A** |

The requirements are **FULFILLED.** Performance Criterion: **A/B/C**

**Remarks:** Test date: 15.07.2008, NM

## 5.3 Radiated emissions – ALSE

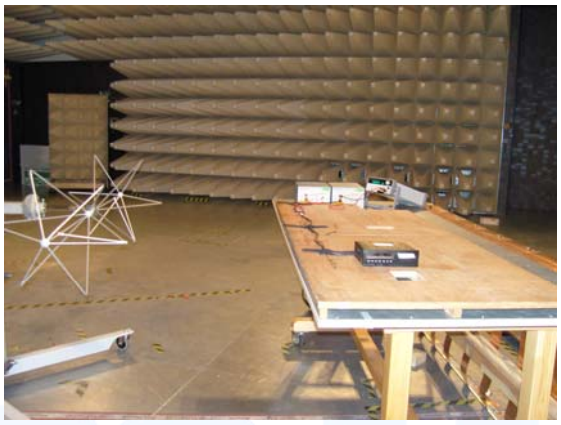
For test instruments and accessories used see section 6 Part **ARE**.

### 5.3.1 Description of the test location

Test stand: **ARE(A1)** Test location: Anechoic Chamber A1

Test distance: 1 metre

### 5.3.2 Photo documentation of the test set-up



### 5.3.3 Test result

Frequency range: 30 MHz - 1000 MHz

Min. limit margin broad band > 5 dB

Min. limit margin narrow band > 5 dB

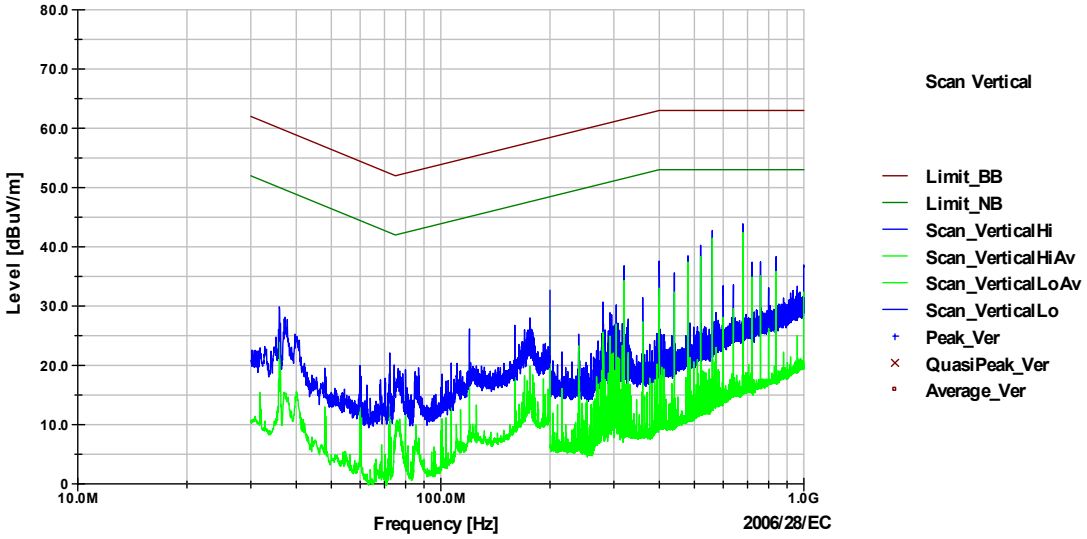
The requirements are **FULFILLED.**

**Remarks:** Test date: 14.07.2008, WB

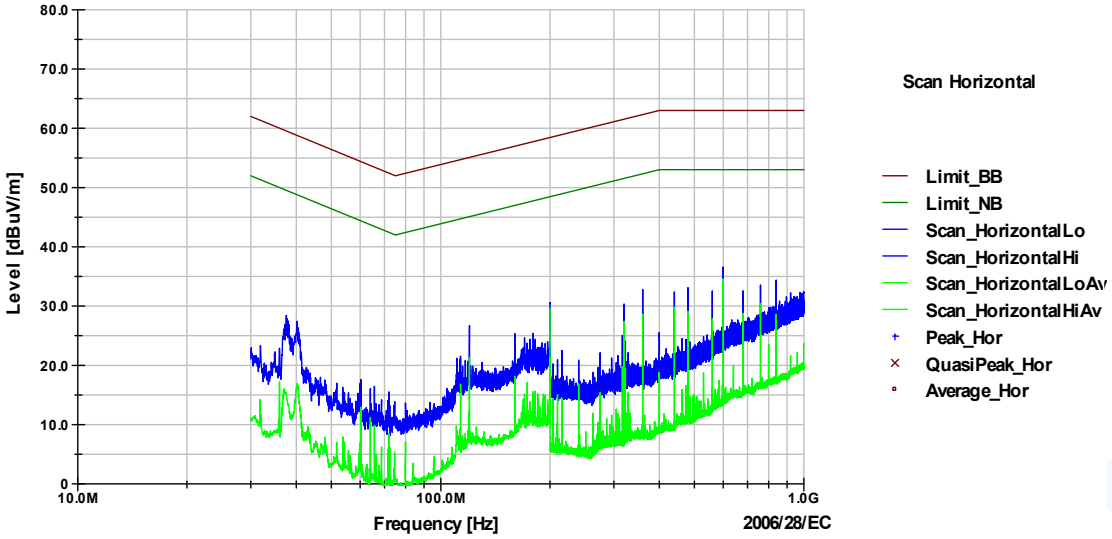
The limits are met.

### 5.3.4 Test protocol

| | | |
|---|---|---|
| antenna position: | front | Result: passed |
| antenna polarisation: | vertical | |
| Operation mode: | speed 75 km/h | |
| Remarks: | none | |
| Date: | 14.07.2008 | |
| Tested by: | Walter G. Bosin | |



| | | |
|---|---|---|
| antenna position: | front | Result: passed |
| antenna polarisation: | horizontal | |
| Operation mode: | speed 75 km/h | |
| Remarks: | none | |
| Date: | 14.07.2008 | |
| Tested by: | Walter G. Bosin | |



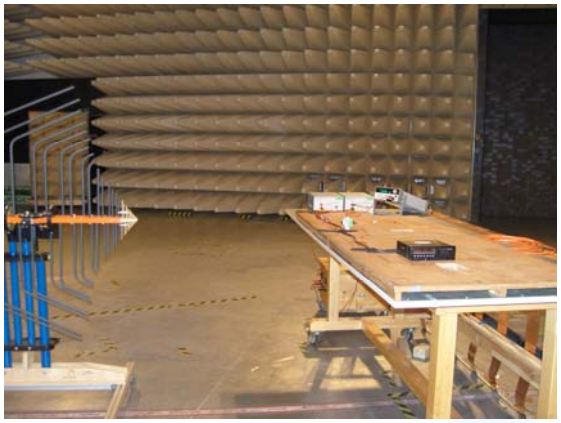
## 5.4 Radiated electromagnetic energy – absorber lined chamber

For test instruments and accessories used see section 6 Part **ARI**.

### 5.4.1 Description of the test location

Test stand: **ARI(A1)** Test location: Anechoic Chamber A1

### 5.4.2 Photo documentation of the test set-up



### 5.4.3 Test specification

| | |
|---|---|
| Frequency range: | 80 – 2000 MHz |
| Field strength: | 30 V/m |
| EuT - antenna distance: | 1 m |
| Modulation: | AM: 80 % / sinusoidal: 1000Hz (80 – 800 MHz)<br>PM / square wave: 217 Hz / $t_{on}$ = 577 µs (800 – 2000 MHz) |
| Frequency step: | 1 MHz from 80 - 200 MHz<br>2 MHz from 200 - 400 MHz<br>5 MHz from 400 - 1000 MHz<br>25 MHz from 1000 – 2000 MHz |
| Dwell time: | 2 sec. |
| Antenna polarisation: | - vertical |

### 5.4.4 Test result

The requirements are **FULFILLED.** Performance Criterion: **A**

**Remarks:** Test date: 14.07.2008, NM

The ESA didn't show any malfunction which would cause any degradation of performance which could cause confusion to other road users or any degradation in the driver's direct control of a vehicle fitted with the ESA.

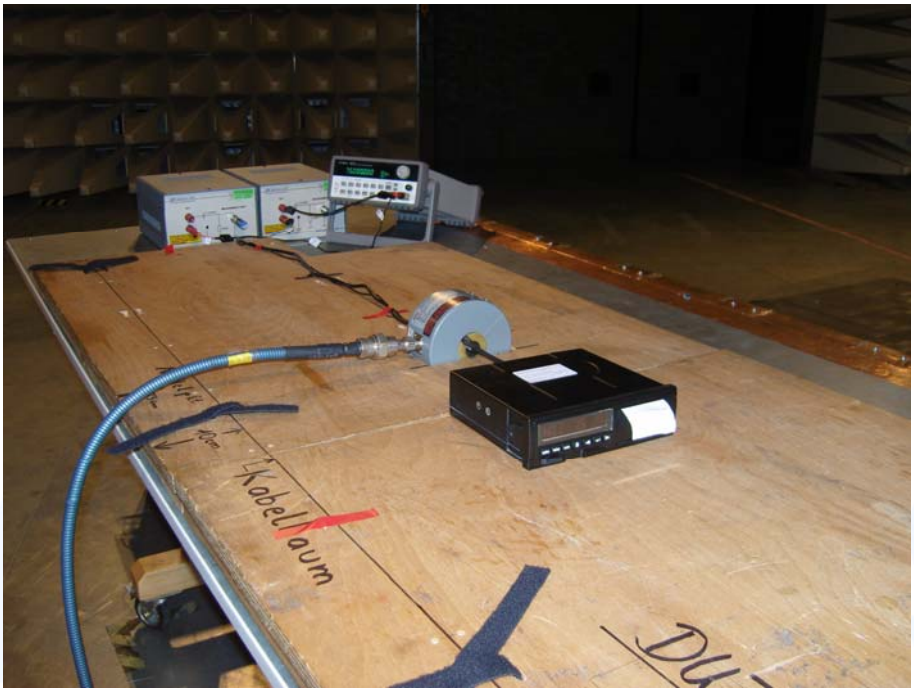
## 5.5 Radiated electromagnetic energy – bulk current injection

For test instruments and accessories used see section 6 Part **ARI**.

### 5.5.1 Description of the test location

Test location: Anechoic Chamber A1

### 5.5.2 Photo documentation of the test set-up




### 5.5.3 Test specification

| | |
|---|---|
| Frequency range: | 20 – 80 MHz |
| Current: | 60 mA |
| Modulation: | AM: 80 % / sinusoidal: 1000Hz |
| Frequency step: | 1 MHz from 20 - 80 MHz |
| Dwell time: | 2 sec. |

### 5.5.4 Coupling points

Cable description: Cable harness

Screening: unscreened/screened
Status: active
Signal transmission: analogue/digital
Length: 1 m

### 5.5.5 Test result

The requirements are **FULFILLED.** Performance Criterion: **A**

**Remarks:** Test date: 14.07.2008, NM

The ESA didn't show any malfunction which would cause any degradation of performance which could cause confusion to other road users or any degradation in the driver's direct control of a vehicle fitted with the ESA.

# 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

| Test ID | Model / Type | Kind of Equipment | Manufacturer | Equipment No. |
|---|---|---|---|---|
| AES | 9350 | Storage Oscilloscope | LeCroy Europe GmbH | 02-02/13-05-002 |
| | NNB-5 µH / 100 A-115 V | LISN | SBF electronic | 02-02/20-05-006 |
| | 100x | Tastkopf Oscilloscope | Conrad Elektronic GmbH | 02-02/50-05-239 |
| | ES35/300V3S | Electronic Switch | SBF electronic | 02-02/50-07-027 |
| | 10 Ohm 100 W | Widerstandsbox / AES | mikes-testingpartners gmbh | 02-02/50-08-004 |
| APU | FG5620 | Function Generator | WEETECH GmbH | 02-02/05-07-002 |
| | TC5650 | Transf. Conducted Coupler | WEETECH GmbH | 02-02/05-07-003 |
| | FT 5530 | Burst Generator | WEETECH GmbH | 02-02/09-07-001 |
| | LD 5505 | Load Dump Generator | WEETECH GmbH | 02-02/09-07-002 |
| | MT5511 | Micro Transient Generator | WEETECH GmbH | 02-02/09-07-003 |
| | PA 5640 | Power Amplifier | WEETECH GmbH | 02-02/17-07-002 |
| | DS5630 | DC Switch | WEETECH GmbH | 02-02/50-07-020 |
| ARE | ESCI | EMI Test Receiver | Rohde & Schwarz München | 02-02/03-05-004 |
| | NNB-5 µH / 100 A-115 V | LISN | SBF electronic | 02-02/20-05-006 |
| | NNB-5 µH / 100 A-115 V | LISN | SBF electronic | 02-02/20-05-008 |
| | BBA 9106 / VHA 9103 | Biconical Antenna | Schwarzbeck Mess-Elektronik | 02-02/24-05-001 |
| | VULB 9165 | Trilog-Broadband Antenna | Schwarzbeck Mess-Elektronik | 02-02/24-05-017 |
| | N-11000-NW | RF Cable | mikes-testingpartners gmbh | 02-02/50-05-188 |
| | N-3000-N | RF Cable | mikes-testingpartners gmbh | 02-02/50-05-192 |
| | Sucofeed 1/2 | RF Cable | Huber + Suhner | 02-02/50-06-033 |
| | Automotive Ground Plane | Automotive Ground Plane | mikes-testingpartners gmbh | 02-02/50-06-049 |
| ARI | SME 03 | Signal Generator | Rohde & Schwarz München | 02-02/05-05-010 |
| | NRVD | Dual Channel Power Meter | Rohde & Schwarz München | 02-02/07-05-019 |
| | URV 5 - Z 2 | RF Probe 10 V | Rohde & Schwarz München | 02-02/07-05-021 |
| | URV 5 - Z 2 | RF Probe 10 V | Rohde & Schwarz München | 02-02/07-05-022 |
| | 1000W1000C | RF Amplifier | Amplifier Research | 02-02/17-05-011 |
| | 500A100A | RF Amplifier | Amplifier Research | 02-02/17-05-012 |
| | 100S1G4 | RF Amplifier | Amplifier Research | 02-02/17-05-018 |
| | NNB-5 µH / 100 A-115 V | LISN | SBF electronic | 02-02/20-05-006 |
| | NNB-5 µH / 100 A-115 V | LISN | SBF electronic | 02-02/20-05-008 |
| | F-120-9 | RF Clamp | FCC Fischer Custom Comm. | 02-02/22-05-014 |
| | AT 5080 | Log. Per. Antenna | Amplifier Research | 02-02/24-05-024 |
| | CTR-1001A | RadiSense/E-Field Sensor | DARE | 02-02/50-05-034 |
| | DC62080AM1 | Coupler | Amplifier Research | 02-02/50-05-101 |
| | 7/16-1500-7/16 | RF Cable | mikes-testingpartners gmbh | 02-02/50-05-102 |
| | 50 Ohm / 10 dB | Attenuator | Huber + Suhner | 02-02/50-05-106 |
| | 7/16-6000-7/16 | RF Cable | Rosenberger HF-Technik | 02-02/50-05-109 |
| | DC7144A | Coupler | Amplifier Research | 02-02/50-05-158 |
| | DC2600A | Coupler | Amplifier Research | 02-02/50-05-159 |
| | NW-2000-NW | RF Cable | mikes-testingpartners gmbh | 02-02/50-05-193 |
| | N-2000-N | RF Cable | mikes-testingpartners gmbh | 02-02/50-06-045 |
| | N-2000-N | RF Cable | mikes-testingpartners gmbh | 02-02/50-06-046 |
| | Automotive Ground Plane | Automotive Ground Plane | mikes-testingpartners gmbh | 02-02/50-06-049 |
| | Relaismatrix | Relaismatrix | mikes-testingpartners gmbh | 02-02/50-06-050 |
| | NW-5000-NW | RF Cable | mikes-testingpartners gmbh | 02-02/50-07-024 |
| | NW-2000-NW | RF Cable | mikes-testingpartners gmbh | 02-02/50-07-025 |
| | NW-3500-NW | RF Cable | mikes-testingpartners gmbh | 02-02/50-07-026 |