

Date 18.02.2014

1(3)Index no. TRAFI/1877/05.03.42/2014

#### COMMUNICATION



concerning:

#### APPROVAL GRANTED **APPROVAL EXTENDED APPROVAL REFUSED APPROVAL WITHDRAWN** PRODUCTION DEFINITELY DISCONTINUED

of a type of electrical/electronic sub-assembly with regard to Regulation No. 10 as amended by the 04 series of amendments.

| Approv | val No. <b>040072</b>   | Extension No  |
|--------|---|---|
| 1.     | Make (trade name of manufacturer):  | Hella or Talmu  |
| 2.     | Type and general commercial description(s):   | 345600; rectangular signal light<br>Versions: 345603-00, 345603-01,<br>345603-02, 345603-03, 345603-04 and<br>345603-05 |
| 3.     | Means of identification of type, if marked on<br>the vehicle/component/separate technical unit:                         | Type marked on the housing of the product.  |
| 3.1.   | Location of that marking:   | At the back of the housing.   |
| 4.     | Category of vehicle:  | not applicable  |
| 5.     | Name and address of manufacturer:   | Hella Lighting Finland Oy<br>Inkereentie 566<br>FI-24280 Salo, FINLAND  |
| 6.     | In the case of components and separate<br>technical units, location and method of<br>affixing of the ECE approval-mark: | Engraved on the casing of the light.  |
| 7.     | Address(es) of assembly plant(s):   | See item 5.   |
| 8.     | Additional information (where applicable):  | - Sakerhets   |

PB 320, 00101 Helsingfors Tfn 029 534 5000 Fax 029 534 5095

|     | Trafi  | Date<br>18.02.2014 | Index no.<br>TRAFI/1877/05  | 2(3)<br>5.03.42/2014 |
|-----|--|--------------------|---|----------------------|
| 9.  | Technical service responsible for the tests: | carrying out       | SGS Fimko Oy<br>Särkiniementie 3<br>P.O. Box 30<br>FI-00210 Helsinki<br>FINLAND |                      |
| 10. | Date of test report:                         |                    | 20.12.2013  |                      |
| 11. | No. of test report:                          |                    | 274416-2  |                      |
| 12. | Remarks (if any):                            |                    | -   |                      |
| 13. | Place:                                       |                    | Helsinki  |                      |
| 14. | Date:  |                    | 18.02.2014  |                      |
| 15. | Signature:                                   |                    |   |                      |

Mantes file .

Marko Sinerkari Head of Unit

- 16. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.
  - Information document Doc No. Hella-e-46, 2.12.2013, 7 pages
  - Schematic circuit diagram, 1 page
  - Mechanical drawing 10001113547, 1 page
  - Component layout drawing 345603\_xx.v05, 18.12.2013, 1 page
  - Component list, 6 pages
  - Test report 274416-2, 20.12.2013, 16 pages
- 17. Reasons for extension:

not applicable





Fax 029 534 5095



Date 18.02.2014

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#### Appendix to type-approval communication form No. 040072 concerning the type-approval of an electrical/electronic sub-assembly under Regulation No. 10 as amended by the 04 series of amendments.

| 1.     | Additional information   |   |
|--------|--|---|
| 1.1.   | Electrical system rated voltage:   | 12 V / 24 V <del>pos</del> /neg ground                      |
| 1.2.   | This ESA can be used on any vehicle type with the following restrictions:  |   |
| 1.2.1. | Installation conditions, if any:   | -   |
| 1.3.   | This ESA can only be used on the following vehicle types:  | not applicable  |
| 1.3.1. | Installation conditions, if any:   | -   |
| 1.4.   | The specific test method(s) used and the frequency ranges covered to determine immunity were: (Please specify precise method used from Annex 9): | Absorber chamber test:<br>ISO 11452-2:2004, 20–2000 MHz     |
| 1.5.   | Laboratory accredited to ISO 17025 and<br>recognized by the Approval Authority<br>responsible for carrying out the tests:                        | SGS Fimko Oy<br>P.O. Box 30<br>FI-00210 Helsinki<br>FINLAND |

2. Remarks:



10 R - 04 0072

PB 320, 00101 Helsingfors Tfn 029 534 5000 Fax 029 534 5095

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## Information document of 345.600 relating to EC type approval of an electric/electronic subassembly with respect to electromagnetic compatibility E Regulation No. 10 – Rev.4 – Amend.1





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| 0.8 | Address(es) of assembly plant(s)   |
| 1.  | This ESA shall be approved as a component/STU3                                       |
| 2.  | Any restrictions of use and conditions for fitting                                   |

#### **APPENDIX 1**





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#### 0. General

0.1 Make (trade name of manufacturer):

Hella or Talmu

#### 0.2 Type:

345600 Rectangular SMLR

#### 0.3 Means of identification of type, if marked on the component/separate technical unit

There is a type marking on the housing of product.

#### 0.3.1 Location of that marking

Type marking is located at the back of the housing.

#### 0.5 Name and address of manufacturer:

Hella Lighting Finland Oy Inkereentie 566 FI-24280 Salo FINLAND

#### 0.7 Location and method of affixing of the EC approval mark

The "E-mark" symbol will be engraved on the casing of the rectangular SMLR.

#### 0.8 Address(es) of assembly plant(s):

Hella Lighting Finland Oy Inkereentie 566 FI-24280 Salo FINLAND

#### 1. This ESA shall be approved as a component

#### 2. Any restrictions of use and conditions for fitting:

Rectangular SMLR is intended for signal lighting of the vehicles

#### 3. Electrical system rated voltage:

The input voltage is 12V.





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#### Appendix 1

#### Description of the ESA

Rectangular SMLR is signal light for vehicle use.

Table 1. Contents of ESA

There is three color versions and two voltage versions of the product 345 600-xxx. On the next table is all PCB versions for 345 600.

| Туре      | Description               |
|-----------|---------------------------|
| 345603-00 | PCB for SMLR 12V (Yellow) |
| 345603-01 | PCB for SMLR 24V (Yellow) |
| 345603-02 | PCB for SR 12V (Red)      |
| 345603-03 | PCB for SR 24V (Red)      |
| 345603-04 | PCB for POR 12V (White)   |
| 345603-05 | PCB for POR 24V (White)   |

Rated input voltage:

• 12 Vdc Or 24Vdc

#### Rated power:

• 0,5W at 12 V DC / 1W at 24 V DC





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Picture 1. Rectangular SMLR (345.600)



Picture 2. Rectangular SMLR (345.600)





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Picture 3. Front side of the printed circuit board of rectangular SMLR (345.600)



Picture 4. Backside of the printed circuit board () of Flexible Rectangular SMLR (345.600)



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#### Electronic block diagram

Block diagram of Rectangular SMLR is attached.

#### Schematic circuit diagram

Schematic circuit diagram of Rectangular SMLR is attached.

#### **Component location picture**

Component location picture of printed circuit board of Rectangular SMLR is attached.

#### **Component list**

Component list of Rectangular SMLR is attached.







| 11 12 |   |                     | Handhahung.      | vorschriften       | Elektrostatisch    | gefachrdete<br>Bauelemente |            | ATTENTION               | OBSERVE PRECAUTIONS<br>FOR RANDLING | DEVICES       |          |                                    |                          | N ISO 8015  | ten                                     | 2 to be considered                      |                |                                  |                                 | -                  |                                 |                  |                | -       |                    | 194860 2013-09-11 MLF/Sipiol1 | AenderKr. Datum K-Gr./Name<br>EGO-No. Date Depart./Name                 |   | deise d  | www.cnt 2,460 G                        | is document has to be treated confidentially. Its contents<br>a most to be passed on, duplicated, explorted or disclosed<br>thout are repress perfession. All rights reserved, sepecially<br>s right to apply for protective rights.                                    | ANNA AND Hella Lighting                    | Finland                                  | Ordening No. Waterial-Nr.<br>Ordering No. Waterial No.<br>345,503-000 AA | Dokument-Mr- 10001113547 Version | Dokument: Rella-Zeichnung<br>Inhait: Rella-Zeichnung<br>Document walla brawiaan | santants: interne Bew. ()<br>Status: 25 interne Bew. () | A2 Detailing  |
|-------|---|---------------------|------------------|--------------------|--------------------|----------------------------|------------|-------------------------|-------------------------------------|---------------|----------|------------------------------------|--------------------------|---|---|---|----------------|----------------------------------|---------------------------------|--------------------|---------------------------------|------------------|----------------|---------|--------------------|-------------------------------|---|---|--|--|---|--|--|--|----------------------------------|---|---|---|
| 9 10  |   |                     |                  |                    |                    |                            |            | esistors                |                                     |               |          |                                    |                          | Tolerierung nach DIN EN ISO 8015<br>Tolerance definition according to DIM F | Umweltnorm Hella-N20100-02 ist zu beach | Hella Environmental Standard No 20100-0 |                |                                  | · · ·                           |                    | · · ·                           | · · ·            | · · ·          | · · ·   | · · ·              | X X X                         | 20150 A-1601 war Blatt Feld Accession Accessor<br>Beschedarts Fage 2000 | Prustverschrift Oberflaeche<br>Test Spacification Surface | Werkstoff<br>Waterial<br>XXXxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx | Allgemeintolefaaz<br>General Tolerance | Disses Dataman Lin vertration to abarated in 26 Marcapha marka<br>Vertratificturgan, Nevertung and Ritterlang scients Inakle are all and<br>unaren ausfediciona Mendatigang patratets. Alla Reafts verhahiten, ar<br>subsessafere fir den Fall der Schutzerehtsammlang. | Wasztab 1.1 Terig<br>Scala 2013-09-11 Hard | XXXXX C 1 0 1 1000 1000 1000 1000 1000 1 | Benennung  | Title                            | PCB-GR  | Esturations:<br>fisturations:<br>fisturations:          | 8 736: 001 01:001 01:00 001 001 002 001 002 001 002 001 002 001 002 001 002 002 |
| 3     |   |                     |                  |                    |                    |                            | (          | 3 vias must be behind r |                                     |               |          | 17 ±0.1 V-groove etc. cutting      | allowed to exceed +0,5mm | 24.5-24.5   | e e Meander pattern                     | P 200 2                                 |                |                                  | Solution arking (2 last digits) |                    | aus machined locating positions | accuracy +-0,1mm |                | r.0±    |                    |                               |   |   |  |  |   |  | RES_MELF0207 See tables 2                | ectifier . 724 447-00 1  | 0 LY ETSF 791 580-03 2           | FR4 345 603-10 1  |   |   |
| 4     |   |                     |                  |                    |                    |                            |            |                         |                                     |               | <u> </u> |                                    |                          |   | 6 V-groove etc. cutting                 | 3 allowed to exceed +0,5mm              | 01.            |                                  |                                 | 2                  | t burnenting be                 | 6                |                | .]      |                    |                               |   |   |  |  | enti  | TVa  | Siller 4 Resistor                        | SE Bridge connected re   | 2 Power topled GR SMC            | 1 PCB   | Nr. Leiterplatte  | 4   5 6 6   |
| 3     | Abarten-Werkmale<br>features of versions                            |                     |                  |                    |                    |                            | Hella No.  | 791580-03               | 791538-00                           | 791697-02     |          | R/Ohm Hella No.<br>1000 790.028-01 | 953 790.203-95           | 825 790.203-89<br>750 790.203-85  | 604 790.203-76                          | 562 790.203-73<br>475 790.203-66        | 453 790.203-64 | 374 790.203-56<br>340 790.203-51 | 309 790.203-48                  | 267 790.203-42     | 221 790.203-34                  | 196 790.203-29   | 133 790.203-13 |         |                    |                               |   |   | · * Liike  | Contraction of the second              |   |  |  | Net  | irasto * Joy                     |   |   | 3   |
|       | 12V, yellow topleds   | 24V, yellow topleds | 12V, red topleds | 12V, white topleds | 24V, white topleds |                            | LED TYPE   | LYETSF                  | LAETSF                              | LW ETSG       |          | PL R2                              | 100 133                  | 221 133   | 196 243                                 | 340 374                                 | 453 453        | 562 562 133                      | 133 133                         | 221 133<br>196 243 | 267 309                         | 340 374          | 562 562        | 100 196 | 196 196<br>243 243 | 309 309                       | 475 475<br>604 604  | 750 825   | 000 953  |  |   | tert                                       | P  | _ ∩  | 1 (                              | 07  | 2   |   |
| 1 2   | rhandene Abarten<br>iisting versions DIN A/Rev.<br>345.603-00 A2/AA | 345.603-01 -        | 345.603-03       | 345.603-04 -       | 345.603-05         |                            | LED COLOUR | Yellow                  | Red                                 | White         | -        | pcb LED<br>no. Catego              | -00 AB                   | 88  | CA                                      | -01 AB<br>BA                            | BB             | -02 AB                           | BA                              | 88                 | -03 AB                          | BA               | CA             | -04 AB  | BB                 | CA                            | -05 AB<br>BA  |   | CA   | 17                                     | ノ   | 10   | К  | - Uʻ   | +(                               | / U   | 2   | 2   |
|       | 40<br>40  |                     | <pre></pre>      |                    |                    |                            | <br>       | 1                       | Ţ                                   | $\overline{}$ | 0        | >                                  |                          |   |   | Q                                       |                |                                  |                                 |                    | ш                               |                  |                |         |                    | Ŀ                             |   |   |  |  | 9   |  |  |  | :                                | E   |   |   |



| 345603-00<br>Yellow | 12V |     |           |              |              |             |            |
|---------------------|-----|-----|-----------|--------------|--------------|-------------|------------|
| Item                |     | Qty | Reference | Part Name    | Manufacturer | Description | Hella nro  |
| 1                   |     | 2   | D1 D3     | LY ETSF      |              | •           | 791580-03  |
| 2                   |     | 2   | R1-2      | RES_MELF0207 | See table    |             |            |
| 3                   |     | 1   | D2        | S1ZB60       |              |             | 724 447-00 |

| LYE 6SF | R1  | R2  |
|---------|-----|-----|
| AB      | 100 | 133 |
| BA      | 133 | 133 |
| BB      | 221 | 133 |
| CA      | 196 | 243 |





| 345603-01<br>Yellow | 24V |    |           |              |              |             |            |
|---------------------|-----|----|-----------|--------------|--------------|-------------|------------|
| Item                | Q   | ty | Reference | Part Name    | Manufacturer | Description | Hella nro  |
| 1                   | 2   | 2  | D1 D3     | LYE TSF      |              | ·           | 791.580-03 |
| 2                   | 2   | 2  | R1-2      | RES_MELF0207 | See table    |             |            |
| 3                   | 1   | l  | D2        | S1ZB60       |              |             | 724 447-00 |

| LYE 6SF | R1  | R2  |
|---------|-----|-----|
| AB      | 267 | 309 |
| BA      | 340 | 374 |
| BB      | 453 | 453 |
| CA      | 562 | 562 |





345603-02

| 12V |                           |   |   |   |
|-----|---------------------------|---|---|---|
| Qty | Reference                 | Part Name   | Manufacturer Description  | Hella nro   |
| 1   | 2 D1 D3                   | LAE TSF   |   | 791538-00   |
| 2   | 2 R1-2                    | RES_MELF0207  | See table   |   |
| 3   | 1 D2                      | S1ZB60  |   | 724 447-00  |
|     | 12V<br>Qty<br>1<br>2<br>3 | 12V Reference   Qty Reference   1 2 D1 D3   2 2 R1-2   3 1 D2 | 12V Reference Part Name   1 2 D1 D3 LAE TSF   2 2 R1-2 RES_MELF0207   3 1 D2 S1ZB60 | 12VQtyReferencePart NameManufacturerDescription12 D1 D3LAE TSF22 R1-2RES_MELF0207See table31 D2S1ZB60 |

| LAE 6SF | R1  | R2  |
|---------|-----|-----|
| AB      | 100 | 133 |
| BA      | 133 | 133 |
| BB      | 221 | 133 |
| CA      | 196 | 243 |





| 345603-03 |     |           |              |              |             |            |
|-----------|-----|-----------|--------------|--------------|-------------|------------|
| Red       | 24V |           |              |              |             |            |
| Item      | Qty | Reference | Part Name    | Manufacturer | Description | Hella nro  |
|           | 1   | 2 D1 D3   | LAE TSF      |              | -           | 791538-00  |
|           | 2   | 2 R1-2    | RES_MELF0207 | See table    |             |            |
|           | 3   | 1 D2      | S1ZB60       |              |             | 724 447-00 |

| LAE 6SF | R1  | R2  |
|---------|-----|-----|
| AB      | 267 | 309 |
| BA      | 340 | 374 |
| BB      | 453 | 453 |
| CA      | 562 | 562 |





| 345603-04<br>White | 12V |           |              |                |             |            |
|--------------------|-----|-----------|--------------|----------------|-------------|------------|
| Item               | Qty | Reference | Part Name    | Manufacturer D | Description | Hella nro  |
|                    | 1   | 2 D1 D3   | LWETSG       |                |             | 791697-02  |
|                    | 2   | 2 R1-2    | RES_MELF0207 | See table      |             |            |
| 3                  | 3   | 1 D2      | S1ZB60       |                |             | 724 447-00 |

| LCW 6SG | R1  | R2  |
|---------|-----|-----|
| AB      | 100 | 196 |
| BA      | 196 | 196 |
| BB      | 243 | 243 |
| CA      | 309 | 309 |





345603-05

| White | 24V |           |              |              |             |            |
|-------|-----|-----------|--------------|--------------|-------------|------------|
| Item  | Qty | Reference | Part Name    | Manufacturer | Description | Hella nro  |
|       | 1   | 2 D1 D3   | LW ETSG      |              |             | 791697-02  |
|       | 2   | 2 R1-2    | RES_MELF0207 | See table    |             |            |
|       | 3   | 1 D2      | S1ZB60       |              |             | 724 447-00 |

| LCW 6SG | R1  | R2  |
|---------|-----|-----|
| AB      | 475 | 475 |
| BA      | 604 | 604 |
| BB      | 750 | 825 |
| CA      | 1k  | 953 |







## Electromagnetic Compatibility EMC TEST REPORT 274416-2



SGS Fimko Oy Särkiniementie 3 P.O.Box 30, FI-00210 Helsinki Finland t +358 9 6963 361 f +358 9 692 5474 www.sgsfimko.fi

Member of SGS Group (Société Générale de Surveillance)



## **Test Report**

Electromagnetic Compatibility (EMC)

Equipment Under Test (EUT):

Type:

Manufacturer:

345600 Rectangular SMLR

Signal light for vehicle use

Hella Lighting Finland Oy Inkereentie 566 FI-24280 SALO FINLAND



Customer:

Hella Lighting Finland Oy Inkereentie 566 FI-24280 SALO FINLAND

TL-0005

## The Customer wants to comply with the UN Regulation No.10 Revision 4.

It is agreed that SGS Fimko will perform measurements according to UN Regulation No.10. Revision 4.

Date:

20 December 2013

Issued by:

Rauno Repo Testing Engineer Date:

Checked by:

10 R - 04 0072 Arto Kasa 17 Testing En neer

20 December 2013

turvallisuus

säkerhets



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#### **Equipment Under Test**

Signal light for vehicle use

Type: 345600 Rectangular SMLR

There are three colour versions and two voltage versions of the product 345 600-xxx.

#### **Power requirements**

Rated power:

- 0.5 W at 12V DC
- 1 W at 24V DC

Rated input voltage 12V or 24 V

#### Mechanical Size of the EUT

| Height:   | 21 mm       | Width:   | 49 mm | Depth: | 4 mm            |
|-----------|-------------|----------|-------|--------|-----------------|
| Cable le  | ngths and t | types    |       |        |                 |
| Cable:    |             | Length   | :     | Туре:  |                 |
| DC –input | t cable     | 0.5 or 1 | .5 m  | Unshie | elded (2 wires) |
| Periphe   | rals        |          |       |        |                 |

Battery 12 V and 24 V.







#### Disclaimer

This test report is issued under SGS Fimko general terms of delivery (available on request and accessible at <u>www.fi.sgs.com</u>). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. Unless otherwise stated: (a) the results shown in this document refer only to the sample(s) tested and (b) such sample(s) are retained for three months. This document cannot be reproduced except in full, without prior approval of SGS Fimko.

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## SGS

#### Performance Criteria A for Immunity Testing

All functions of a EUT perform as designed during and after exposure to disturbance.

#### Performance Criteria B for Immunity Testing

All functions of EUT perform as designed during and after 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

#### Performance Criteria C for Immunity Testing

One or more functions of EUT do not perform as designed during exposure but return automatically to normal operation after exposure is removed.

#### Performance Criteria D for Immunity Testing

One or more functions of EUT do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple "operator/use" action.

#### **EUT Test Conditions during EMC-Testing**

During the testing the EUT was in continuous operation. Every function of the EUT was connected (at on state) during the testing. At the Radiated Emission and Radiated Field Immunity tests the DC-supply (Battery) was fed through the LISN (50  $\mu$ H/ 50  $\Omega$ ). The performance of the EUT was monitored visually during the testing.







## Photographs of the EUT



Photograph 1. The EUT.



Photograph 2. The EUT and the radiated emission and radiated field immunity test setup.

#### **Test Conditions**





Photograph 3. The EUT and the test set-up for transient immunity test.







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#### **Test Suite**

| Measurement/Test             | Reference standard | Test site | Result           |
|------------------------------|--------------------|-----------|------------------|
| Conducted Emissions          | ISO 7637-2: 2004   |           | N/A <sup>*</sup> |
| Radiated Emissions           | CISPR 25: 2002     | 5m        | PASS             |
| Radiated RF-field Immunity   | ISO 11452-2:2004   | 5m        | PASS             |
| Conducted Transient Immunity | ISO 7637-2: 2004   |           | PASS             |

\* ESA which is not switched, contain no switches or do not include inductive loads need not be tested for conducted emission.

| Testing location:           |  |                       |
|-----------------------------|--|-----------------------|
| CB Testing Laboratory:      |  |                       |
|                             |  | wirvell:              |
| Testing Location / address: | SGS Fimko Ltd<br>Särkiniementie 3<br>FI-00210, HELSINKI<br>FINLAND | TIN * TIN             |
| Testing Location / address: | SGS Fimko Ltd<br>Karakaarenkuja 4<br>FI-02610, ESPOO<br>FINLAND    | A sikerhetsver        |
|                             |  | (E 17) 10 R - 04 0072 |



#### **Radiated Emissions**

| Product family standard:<br>Tested by:<br>Date:<br>Temperature:<br>Humidity:<br>Barometric pressure:<br>Measurement uncertainty: | CISPR 25<br>RRE<br>16 December 2013<br>20 °C<br>22 % RH<br>1012 hPa<br>± 5.1 dB (30 - 200 MHz)<br>± 4.2 dB (0.2 -1 GHz) | Level of confidence 95 % (k = 2). |
|--|---|-----------------------------------|
| Limit:   | UN Reg. No.10 Rev. 4.   |                                   |
| Test result:   | PASS  |                                   |

#### Test plan

The radiated emission measurements were done within a semi-anechoic chamber. The distance between the test harness and the antenna was 1.0 m. The antenna was set at the fixed height of 1.10 m and both horizontal and vertical antenna polarisations were measured. DC-supply (Battery) was fed through the LISN (50  $\mu$ H/50  $\Omega$ ).

The EUT and test harness was placed 50 mm above the metal ground plane which is placed on a wooden table 1.0 m above the floor of the test chamber.

First preliminary measurement was performed with Peak- and Average detectors. After finishing preliminary measurement, final measurement was made with Quasipeak- and Average detectors, if there are peaks over the relevant limit line (limits for broadband and narrowband emission).





**Radiated Emissions** 

#### Radiated Emission Results In The Frequency Range 30 MHz - 1000 MHz



UN 10 Rev.4 Electric Field Strength

Figure 1. The measured results with peak- and average detectors (12 V DC).

No final measurements were made because the peak and average interference levels were below the limits more than 10 dB.



#### **Radiated Emissions**

#### UN 10 Rev.4 Electric Field Strength



Figure 2. The measured results with peak- and average detectors (24 V DC).

No final measurements were made because the peak and average interference levels were below the limits more than 10 dB.







**Radiated RF-field Immunity** 

0072

#### **Radiated RF-field Immunity**

| Reference document:   | ISO 11452-2:2004 |
|-----------------------|------------------|
| Tested by:            | RRE              |
| Date:                 | 16 December 2013 |
| Temperature:          | 20 °C            |
| Humidity:             | 22 % RH          |
| Barometric pressure:  | 1012 hPa         |
| Performance criteria: | А                |
| Test result:          | PASS             |

#### Test plan

Test was done in an anechoic chamber. The ESA was placed 50 mm above the metal ground plane which was placed on a wooden table 1.0 m above the floor of the test chamber. The distance between the test harness and the measuring antenna was 1.0 m. Only vertical antenna position was tested. Tests were performed with 12 V DC and 24 V DC test voltages.

#### **Test results**

| Frequency range:<br>Antenna height:<br>Modulation:<br>Test level:<br>Step size:<br>Dwell time:<br>Test remarks: | 20 - 80 MHz<br>145 cm<br>80% AM with 1 kHz modulation frequency<br>30 V/m<br>5 % logarithmic<br>3 s<br>No loss of function was observed         |                                   |
|---|---|-----------------------------------|
| Frequency range:<br>Antenna height:<br>Modulation:<br>Test level:<br>Step:<br>Dwell time:<br>Test remarks:      | 80 - 400 MHz<br>125 cm<br>80% AM with 1 kHz modulation frequency<br>30 V/m<br>5 % logarithmic<br>3 s<br>No loss of function was observed        |                                   |
| Frequency range:<br>Antenna height:<br>Modulation:<br>Test level:<br>Step:<br>Dwell time:<br>Test remarks:      | 400 - 800 MHz<br>125 cm<br>80% AM with 1 kHz modulation frequency<br>30 V/m<br>2 % logarithmic<br>3 s<br>No loss of function was observed       | zeen turvallisuus                 |
| Frequency range:<br>Antenna height:<br>Modulation:<br>Test level:<br>Step:<br>Dwell time:<br>Test remarks:      | 800 - 1000 MHz<br>125 cm<br>PM modulation, t on 577 us, period 4600 us<br>30 V/m<br>2 % logarithmic<br>3 s<br>No loss of function was observed  | sto * 70<br>* Tracitsäkerhetsvert |
| Frequency range:<br>Antenna height:<br>Modulation:<br>Test level:<br>Step:<br>Dwell time:<br>Test remarks:      | 1000 - 2000 MHz<br>115 cm<br>PM modulation, t on 577 us, period 4600 us<br>30 V/m<br>2 % logarithmic<br>3 s<br>No loss of function was observed | (E 17) 10 R - 04 (                |



#### **Conducted Transient Immunity**

## **Conducted Transient Immunity**

| Reference documen<br>Tested by:<br>Date:<br>Humidity:<br>Temperature:<br>Barometric pressure | t: ISO 7637-2<br>RRE<br>17 - 20 December 2<br>22 °C<br>24 - 28 % RH<br>e: 1003 - 1012 hPa | 2013   |
|--|---|--|
| Test result:   | PASS  |  |
| Test plan  |   |  |
| Tests are done to DC-  | power port with 12 V DC   | and 24 V DC voltages.                                      |
| Tests with 12 V DC   |   |  |
| Pulse 1  | Test level:   | - 75 V   |
|  | Number of pulses:   | 5000   |
|  | Burst cycle:  | 1 s  |
|  | Test remarks:   | No loss of function was observed after the test.           |
|  | Performance criteria:   | C  |
| Pulse 2a:  | Test level:   | + 37 V   |
|  | Number of pulses:   | 5000   |
|  | Burst cycle:  | 200 ms   |
|  | Test remarks:   | No loss of function was observed during or after the test. |
|  | Performance criteria:   | В  |
| Pulse 2b:  | Test level:   | +10 V  |
|  | Number of pulses:   | 10   |
|  | Burst cycle:  | 1000 ms  |
|  | Test remarks:   | No loss of function was observed after the test.           |
|  | Performance criteria:   | C  |
| <u>Pulse 3a</u> :  | Test level:   | - 150 V  |
|  | Coupling duration:  | 60 min   |
|  | Burst cycle:  | 90 ms  |
|  | Test remarks:   | No loss of function was observed during on after the test. |
|  | Performance criteria:   | A  |
| Pulse 3b:  | Test level:   | + 75 V   |
|  | Coupling duration:  | 60 min   |
|  | Burst cycle:  | 90 ms  |
|  | Test remarks:   | No loss of function was observed during or after the test. |
|  | Performance criteria:   | A  |
| Pulse 4:   | Test level:   | - 6 V <b>F</b> 17 10 R - 04 0072                           |
|  | Number of pulses:   |  |
|  | Test remarks:   | No loss of function was observed after the test.           |
|  | Performance criteria:   | C  |

# SGS

#### **Conducted Transient Immunity**

| Tests with 24 V DC |                       |  |
|--------------------|-----------------------|--|
| <u>Pulse 1</u>     | Test level:           | - 600 V  |
|                    | Number of pulses:     | 5000   |
|                    | Burst cycle:          | 1 s  |
|                    | Test remarks:         | No loss of function was observed after the test.           |
|                    | Performance criteria: | C  |
| <u>Pulse 2a</u> :  | Test level:           | + 50 V   |
|                    | Number of pulses:     | 5000   |
|                    | Burst cycle:          | 200 ms   |
|                    | Test remarks:         | No loss of function was observed during or after the test. |
|                    | Performance criteria: | В  |
| Pulse 2b:          | Test level:           | + 20 V   |
|                    | Number of pulses:     | 10   |
|                    | Burst cycle:          | 500 ms   |
|                    | Test remarks:         | No loss of function was observed after the test.           |
|                    | Performance criteria: | C  |
| <u>Pulse 3a</u> :  | Test level:           | - 150 V  |
|                    | Coupling duration:    | 60 min   |
|                    | Burst cycle:          | 90 ms  |
|                    | Test remarks:         | No loss of function was observed during or after the test. |
|                    | Performance criteria: | A  |
| <u>Pulse 3b</u> :  | Test level:           | + 150 V  |
|                    | Coupling duration:    | 60 min   |
|                    | Burst cycle:          | 90 ms  |
|                    | Test remarks:         | No loss of function was observed during or after the test. |
|                    | Performance criteria: | A  |
| <u>Pulse 4</u> :   | Test level:           | - 12 V   |
|                    | Number of pulses:     | 1  |
|                    | Test remarks:         | No loss of function was observed after the test.           |
|                    | Performance criteria: | C  |





### Radiated Emissions and Radiated Field Immunity Test

| Manufacturer   | Туре  | Serial no                                  | Inv. no                          |  |
|--|---|--|----------------------------------|--|
| ROHDE & SCHWARZ  |   |  |                                  |  |
| EMI Test receiver<br>Test software<br>Antenna (80-1000 MHz)                        | ESU26<br>EMC32<br>HL 023 A1                     | 1302.6005.26<br>-<br>354135/016            | -<br>-<br>8015                   |  |
| SCHWARZBECK  |   |  |                                  |  |
| Antenna (emissions)  | VULB 9168                                       | 9168-503                                   | 8911                             |  |
| AMPLIFIER RESEARCH   |   |  |                                  |  |
| Amplifier<br>Amplifier<br>Antenna (1-2 GHz)<br>Amplifier 60W                       | 200W1000M2A<br>500A100M1<br>AT4002<br>60S1G3    | -<br>19672<br>20738<br>313200              | 5027<br>5026<br>8014<br>7915     |  |
| ЕМСО   |   |  |                                  |  |
| Antenna (26-80 MHz)<br>LISN (50 μH/ 50 Ω)  | 3109XLP<br>3825/2                               | 9609-3036<br>9501-2289                     | 5014<br>8388                     |  |
| DEISEL   |   |  |                                  |  |
| Antenna mast   | MA 240  | 240/455                                    | 7896                             |  |
| COMTEST  |   |  |                                  |  |
| Controller   | HD 100  | 100/457                                    | -                                |  |
| AGILENT TECHNOLOGIES   |   |  |                                  |  |
| PSG Signal Generator   | E8257C  | MY43320718                                 | 7292                             |  |
| BOONTON ELECTRONICS CORP.  |   |  |                                  |  |
| Power meter<br>Power sensor  | 4300<br>51013-4E                                | 87105ED<br>29017                           | 4962<br>5030<br>turvallisuus     |  |
| Conducted Transient Immunity   |   |  |                                  |  |
| EM Test  |   | Tan  | Les Les                          |  |
| Voltage drop simulator<br>Burst generator<br>Micropulse generator<br>Test software | VDS 200B<br>EFT 200 A / B<br>MPG 200B<br>ISMISO | 0301-02<br>0301-05<br>1000-16<br>Ver. 3.62 | 5284 ets 10<br>5285<br>5286<br>- |  |
|  |   | <b>(</b> E 17)                             | 10 R - 04 0072                   |  |