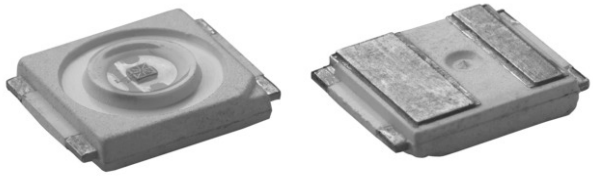
# High Brightness LED Power Module



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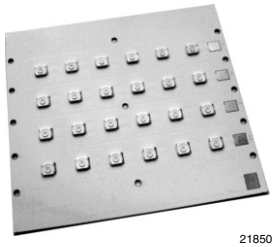

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## FEATURES

- Metal core PCB: Cu based
- Single side/single layer PCB
- Shiny white surface
- 24 LED's minimum 76 lm at 350 mA
- Conductive top layer: Cu
- Isolation layer prepreg type R1566
- ESD withstand voltage: up to 2 kV according to JESD22-A114-B
- Compliant to RoHS directive 2002/95/EC

Pb-free
RoHS COMPLIANT
GREEN (5-2008)**

## APPLICATIONS

- Indoor and outdoor applications
- Internal lighting in buildings
- Tunnel lights
- General lighting application
- Backlighting clusters for advertising boards
- Spotlight illumination for off-road vehicles

## DESCRIPTION

VLSL31 is a metal core based high brightness LED power module, assembled with 24 HB white LEDs. VLSL31 is natural white with a color temperature of 3800 K to 5000 K. The module is designed for flexible use due to the option for using special reflectors to adjust the emission characteristics.

## PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: LED module
- Product series: power
- Angle of half intensity: ± 60°

**PARTS TABLE**

| PART | COLOR | LUMINOUS FLUX (at $I_F$ = 350 mA typ.) | COLOR TEMPERATURE K | TECHNOLOGY |
|---|---|---|---|---|
| VLSL31 | Natural white | $\Phi_V$ = 1900 lm | 3800 to 5000 | InGaN |

**ABSOLUTE MAXIMUM RATINGS (1)** ($T_{amb}$ = 25 °C, unless otherwise specified) **VLSL31**

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Forward current | Per row | $I_F$ | 350 | mA |
| Power dissipation | Total | $P_{tot}$ | 33 600 | mW |
| Junction temperature | | $T_j$ | 120 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 85 | °C |
| Storage temperature range | | $T_{stg}$ | - 40 to + 85 | °C |
| Decomposition temperature of PCB (for cable assembly) | 3 x 10 s | $T_D$ | 350 | °C |

** Please see document "Vishay Material Category Policy": www.vishay.com/doc?99902

| OPTICAL AND ELECTRICAL CHARACTERISTICS (1) ($T_{amb}$ = 25 °C, unless otherwise specified) VLSL31, NATURAL WHITE | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous flux per row (2) | $I_F$ = 350 mA | $\Phi_V$ | 400 | 450 | - | lm |
| Luminous flux total (2) | $I_{board}$ = 4 x 350 mA | $\Phi_V$ | 1600 | 1900 | - | lm |
| Color temperature | $I_F$ = 350 mA | TK | 3800 | - | 5000 | K |
| Forward voltage per row | $I_F$ = 350 mA | $V_F$ | 18 | 20 | 24 | V |
| Class A ($V_{Fmax.}$ - $V_{Fmin.}$) all rows (3) | $I_F$ = 350 mA | $\Delta V_F$ | 0 | - | 0.2 | V |
| Class B ($V_{Fmax.}$ - $V_{Fmin.}$) all rows (3) | $I_F$ = 350 mA | $\Delta V_F$ | 0.2 | - | 0.4 | V |
| Class C ($V_{Fmax.}$ - $V_{Fmin.}$) all rows (3) | $I_F$ = 350 mA | $\Delta V_F$ | 0.4 | - | 0.6 | V |
| Temperature coefficient of $V_F$ per row | $I_F$ = 350 mA | $TC_{VF}$ | - | - 108 | - | mV/K |
| Temperature coefficient of $\Phi_V$ | $I_F$ = 350 mA | $TC\Phi_V$ | - | - 0.4 | - | %/K |
| Temperature coefficient of color temperature | $I_F$ = 350 mA | $TC_{TK}$ | - | 17 | - | K/K |
| Thermal resistance junction-to-board (4) | | $R_{thJB\ total}$ | | 1 | - | K/W |
| Isolation voltage | | $V_{AC}$ | 1000 | - | - | V |
| | | $V_{DC}$ | 1500 | - | - | V |

**Notes**

(1) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of ± 0.1 V. Luminous flux is measured at a current pulse duration of 25 ms and an accuracy of ± 11 %.

(2) Calculated based on single LED unit.

(3) $V_F$ classes are marked at the LED cluster and represent the technical classification only. The single groups cannot be specifically ordered.

(4) Based on theoretical calculation.

## SPECIFICATION OF SINGLE LEDs USED FOR THE MODULES

- VLSL31: LED: VLMW711T3U2US (81161 rev. 1; 03/26/2009)

| LUMINOUS FLUX CLASSIFICATION FOR THE SINGLE LED | | |
|---|---|---|
| **GROUP** | **LUMINOUS FLUX $\Phi_V$ (lm) CORRELATION TABLE** | |
| **STANDARD** | **MIN.** | **MAX.** |
| T3 | 76.5 | 87.4 |
| U2 | 87.4 | 99.4 |
| U3 | 99.4 | 113.6 |

## COLOR RANGE AND COLOR BINNING

VLSL31: 3800 K to 5000 K group U to S

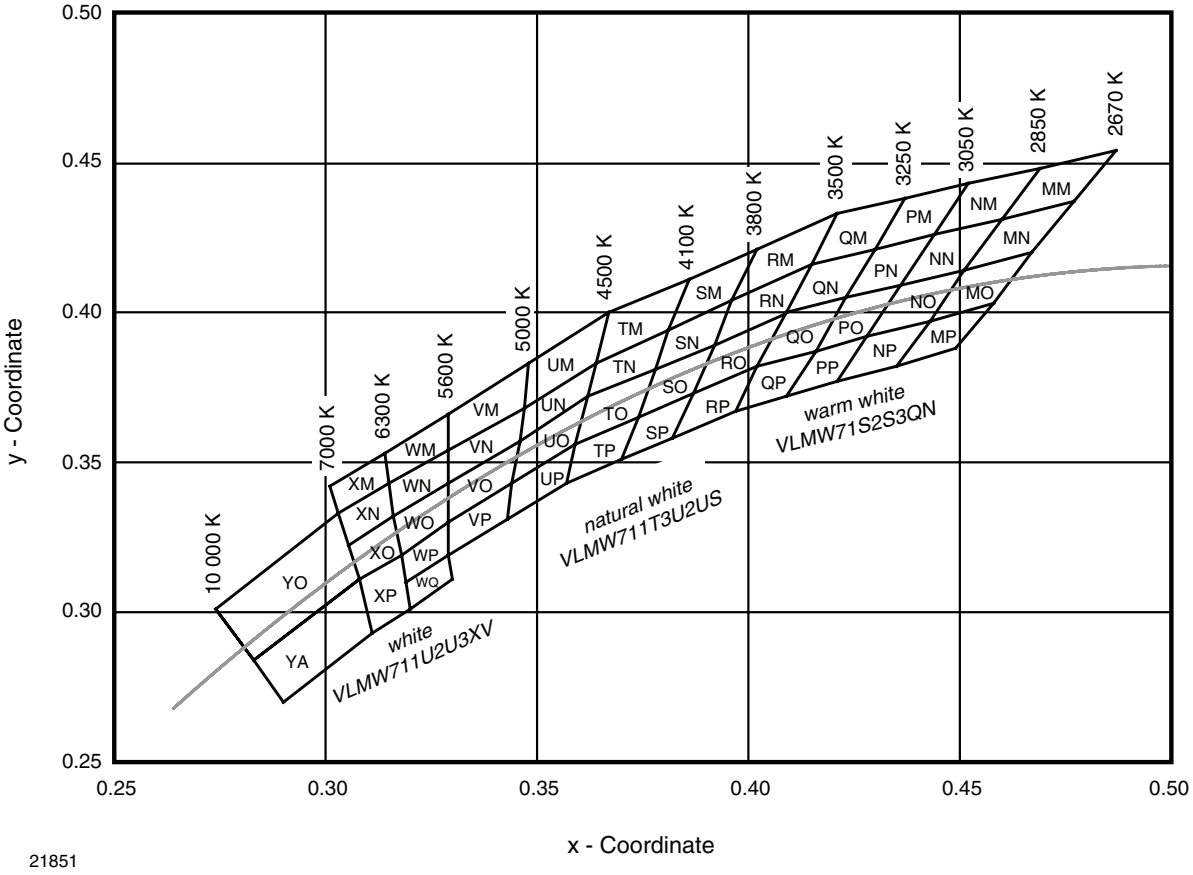
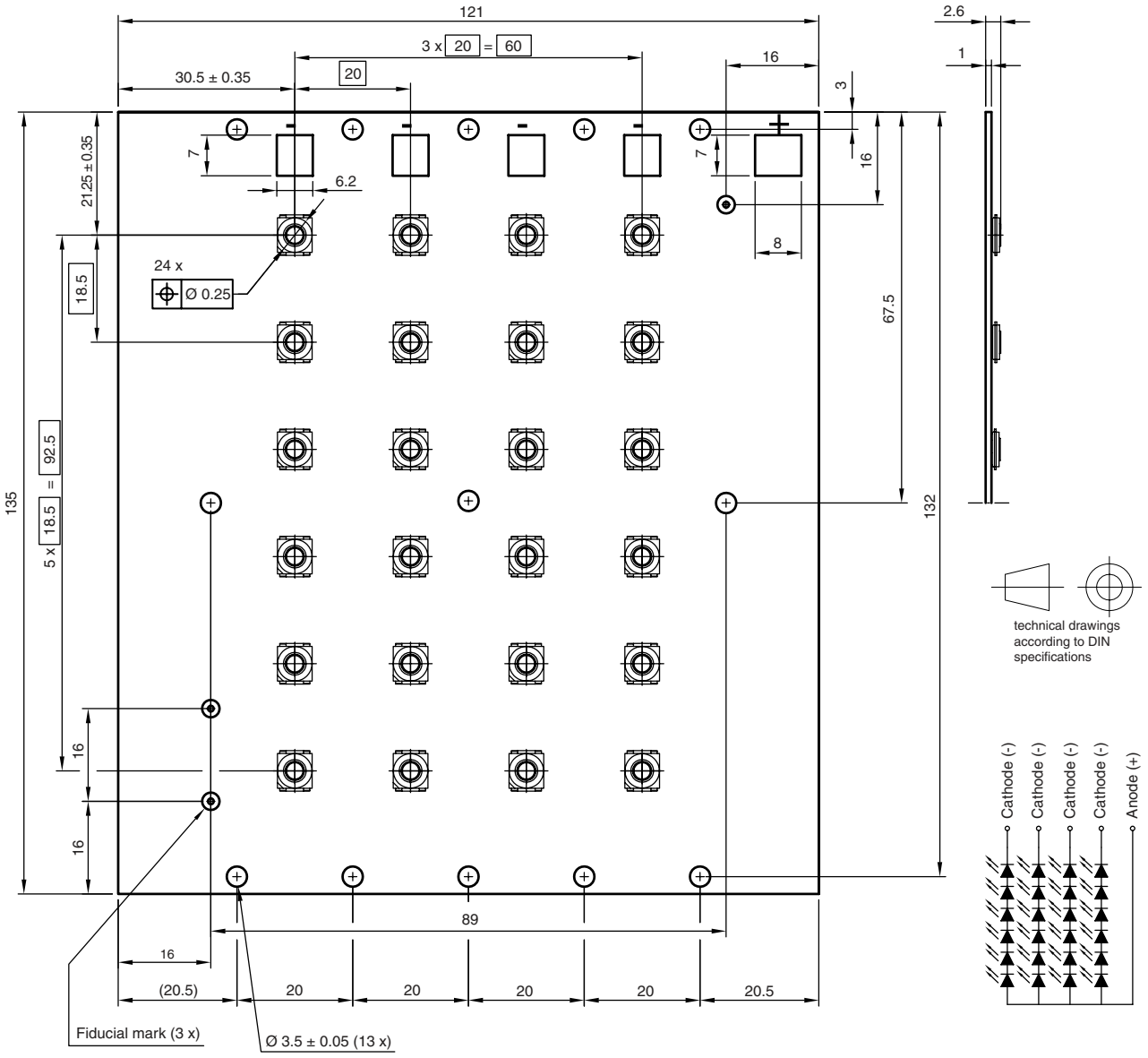



Fig. 1 - Chromaticity Coordinates of Colorgroups

## PCB BASIC DESIGN Dimensions in millimeters




Not indicated tolerances ± 0.15 mm

Drawing-No.: 9.920-6715.01-4
Issue: 1; 28.09.09
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Board design with 4 parallel LED rows (4 cathode pads and common anode pad)

## PCB CHARACTERISTICS

- Metal core PCB with typical Cu thickness of 800 µm
- Prepreg type R1566 typical 127 µm
- Conductive pattern Cu typical 25 µm
- Total board thickness: 1 mm ± 15 %
- Warpage max. 0.75 % of board dimension
- Solder resist on top side
- Shiny white surface
- Galvanic of solder pads and backside pure matte Sn (≥ 0.8 µm), board edges and hole walls immersion plated
- Assembled with 24 VLMW711xxx LED's. LED position accuracy ± 0.125 mm from middle axis, horizontal tilt max. 2°

## EMISSION CHARACTERISTIC

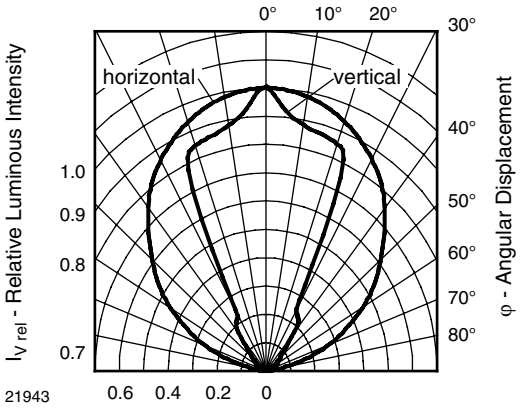



Fig. 2 - Rel. Luminous Intensity vs. Angular Displacement

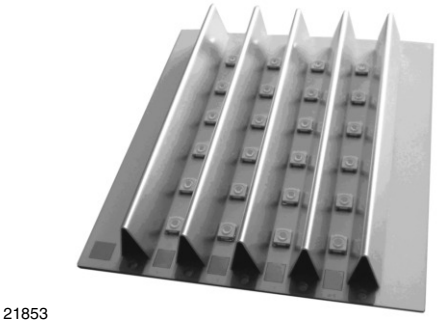



Fig. 3 - Emission characteristic with reflectors (for info only)

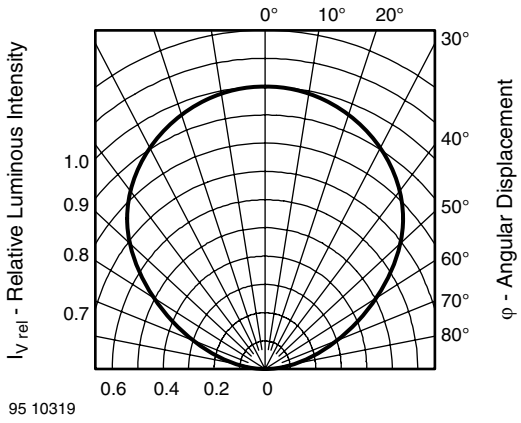
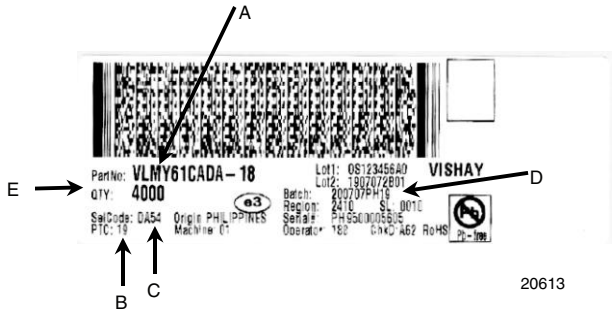



Fig. 4 - Rel. Luminous Intensity vs. Angular Displacement

## BAR CODE PRODUCT LABEL




A. Type of component

B. Manufacturing plant

C. SEL - selection code (bin):
e.g.: X = code for $V_F$ class (A, B, C)

D. Batch:
200707 = year 2007, week 07
PH19 = plant code

E. Total quantity

**Note**

- 4 PCB's per box, minimum order quantity 24

# Disclaimer

All product specifications and data are subject to change without notice.

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