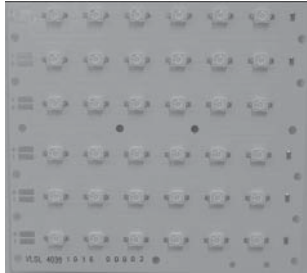


## High Brightness LED Power Module



22140



22139

### DESCRIPTION

The VLSL42xxA are metal core based high brightness LED power modules, assembled with 12, 24 or 36 HB white LEDs. The color temperature is typ. 3500 K warm white. The modules are 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:  $\pm 80^\circ$

### FEATURES

- Metal core PCB: Al > 0.75 thickness
- Single side/single layer PCB
- Shiny white surface
- 12, 24 or 36 LED's minimum 61 lm at 350 mA per LED. Max. current per LED 1 A
- Conductive top layer: Cu (min. 18  $\mu\text{m}$ )
- Isolation layer prepreg > 63  $\mu\text{m}$
- Standard solder mask material
- ESD withstand voltage: up to 2 kV according to JESD22-A114-B
- LM80 certified LEDs
- Compliant to RoHS Directive 2002/95/EC



### APPLICATIONS

- Streetlight
- Internal lighting in buildings
- Tunnel lights
- General lighting application

### PARTS TABLE

| PART      | COLOR      | LUMINOUS FLUX<br>(at $I_F = 700 \text{ mA typ.}$ ) | COLOR TEMPERATURE<br>K | TECHNOLOGY |
|-----------|------------|--|------------------------|------------|
| VLSL4212A | Warm white | $\Phi_V = 1500 \text{ lm}$                         | 3500 (typ.)            | InGaN      |
| VLSL4224A | Warm white | $\Phi_V = 3000 \text{ lm}$                         | 3500 (typ.)            | InGaN      |
| VLSL4236A | Warm white | $\Phi_V = 4500 \text{ lm}$                         | 3500 (typ.)            | InGaN      |

### ABSOLUTE MAXIMUM RATINGS ( $T_{\text{amb}} = 25^\circ\text{C}$ , unless otherwise specified) VLSL4212A, VLSL4224A, VLSL4236A

| PARAMETER                   | TEST CONDITION | SYMBOL           | VALUE        | UNIT             |
|-----------------------------|----------------|------------------|--------------|------------------|
| Forward current             | Per row        | $I_F$            | 750          | mA               |
| Power dissipation VLSL4212A | Total (max.)   | $P_{\text{tot}}$ | 35           | W                |
| Power dissipation VLSL4224A |                | $P_{\text{tot}}$ | 69           | W                |
| Power dissipation VLSL4236A |                | $P_{\text{tot}}$ | 104          | W                |
| Junction temperature        |                | $T_j$            | 120          | $^\circ\text{C}$ |
| Operating temperature range |                | $T_{\text{amb}}$ | - 40 to + 85 | $^\circ\text{C}$ |
| Storage temperature range   |                | $T_{\text{stg}}$ | - 40 to + 85 | $^\circ\text{C}$ |

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

### OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>(1)</sup> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLSL4212A, WARM WHITE

| PARAMETER   | TEST CONDITION                       | SYMBOL        | MIN. | TYP.  | MAX. | UNIT |
|---|--------------------------------------|---------------|------|-------|------|------|
| Luminous flux per row <sup>(2)</sup>                        | $I_F = 700\text{ mA}$                | $\Phi_V$      | 550  | 750   | -    | lm   |
| Luminous flux total <sup>(2)</sup>                          | $I_{board} = 2 \times 700\text{ mA}$ | $\Phi_V$      | 1100 | 1500  | -    | lm   |
| Color temperature   | $I_F = 700\text{ mA}$                | TK            | -    | 3500  | -    | K    |
| Forward voltage per row                                     | $I_F = 700\text{ mA}$                | $V_F$         | 19   | 21    | 23   | V    |
| Class A ( $V_{Fmax.} - V_{Fmin.}$ ) all rows <sup>(3)</sup> | $I_F = 700\text{ mA}$                | $\Delta V_F$  | -    | -     | 0.9  | V    |
| Temperature coefficient of $V_F$ per row                    | $I_F = 350\text{ mA}$                | $TC_{V_F}$    | -    | - 20  | -    | mV/K |
| Temperature coefficient of $\Phi_V$ per row                 | $I_F = 350\text{ mA}$                | $TC_{\Phi_V}$ | -    | - 0.4 | -    | %/K  |

#### Notes

- (1) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.1\text{ V}$ . Luminous flux is measured at a current pulse duration of 25 ms and an accuracy of  $\pm 11\%$ .  
 (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.

### OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>(1)</sup> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLSL4224A, WARM WHITE

| PARAMETER   | TEST CONDITION                       | SYMBOL        | MIN. | TYP.  | MAX. | UNIT |
|---|--------------------------------------|---------------|------|-------|------|------|
| Luminous flux per row <sup>(2)</sup>                        | $I_F = 700\text{ mA}$                | $\Phi_V$      | 550  | 750   | -    | lm   |
| Luminous flux total <sup>(2)</sup>                          | $I_{board} = 4 \times 700\text{ mA}$ | $\Phi_V$      | 2200 | 3000  | -    | lm   |
| Color temperature   | $I_F = 700\text{ mA}$                | TK            | -    | 3500  | -    | K    |
| Forward voltage per row                                     | $I_F = 700\text{ mA}$                | $V_F$         | 19   | 21    | 23   | V    |
| Class A ( $V_{Fmax.} - V_{Fmin.}$ ) all rows <sup>(3)</sup> | $I_F = 700\text{ mA}$                | $\Delta V_F$  | -    | -     | 0.9  | V    |
| Temperature coefficient of $V_F$ per row                    | $I_F = 350\text{ mA}$                | $TC_{V_F}$    | -    | - 20  | -    | mV/K |
| Temperature coefficient of $\Phi_V$ per row                 | $I_F = 350\text{ mA}$                | $TC_{\Phi_V}$ | -    | - 0.4 | -    | %/K  |

#### Notes

- (1) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.1\text{ V}$ . Luminous flux is measured at a current pulse duration of 25 ms and an accuracy of  $\pm 11\%$ .  
 (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.

### OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>(1)</sup> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLSL4236A, WARM WHITE

| PARAMETER   | TEST CONDITION                       | SYMBOL        | MIN. | TYP.  | MAX. | UNIT |
|---|--------------------------------------|---------------|------|-------|------|------|
| Luminous flux per row <sup>(2)</sup>                        | $I_F = 700\text{ mA}$                | $\Phi_V$      | 550  | 750   | -    | lm   |
| Luminous flux total <sup>(2)</sup>                          | $I_{board} = 6 \times 700\text{ mA}$ | $\Phi_V$      | 3300 | 4500  | -    | lm   |
| Color temperature   | $I_F = 700\text{ mA}$                | TK            | -    | 3500  | -    | K    |
| Forward voltage per row                                     | $I_F = 700\text{ mA}$                | $V_F$         | 19   | 21    | 23   | V    |
| Class A ( $V_{Fmax.} - V_{Fmin.}$ ) all rows <sup>(3)</sup> | $I_F = 700\text{ mA}$                | $\Delta V_F$  | -    | -     | 0.9  | V    |
| Temperature coefficient of $V_F$ per row                    | $I_F = 350\text{ mA}$                | $TC_{V_F}$    | -    | - 20  | -    | mV/K |
| Temperature coefficient of $\Phi_V$ per row                 | $I_F = 350\text{ mA}$                | $TC_{\Phi_V}$ | -    | - 0.4 | -    | %/K  |

#### Notes

- (1) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.1\text{ V}$ . Luminous flux is measured at a current pulse duration of 25 ms and an accuracy of  $\pm 11\%$ .  
 (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.



## SPECIFICATION OF SINGLE LEDs USED FOR THE MODULES

| LUMINOUS FLUX CLASSIFICATION FOR THE SINGLE LED AT 350 mA |  |         |
|---|--|---------|
| GROUP STANDARD  | LUMINOUS FLUX $\Phi_V$ (mIm) CORRELATION TABLE |         |
|   | MIN.   | MAX.    |
| JZ  | 61 000   | 71 000  |
| KX  | 71 000   | 82 000  |
| KY  | 82 000   | 97 000  |
| KZ  | 97 000   | 112 000 |

## COLOR RANGE AND COLOR BINNING

VLSL4212A, VLSL4224A, VLSL4236A; color groups

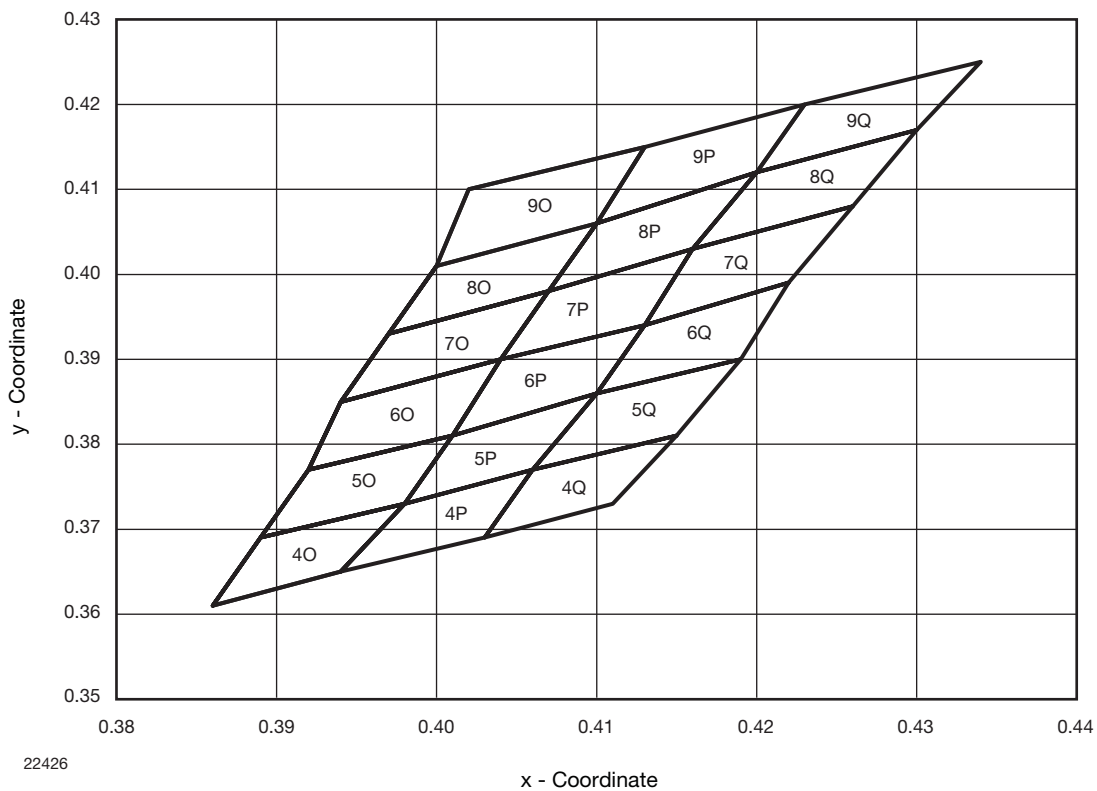


Fig. 1 - Chromaticity Coordinates of Colorgroups



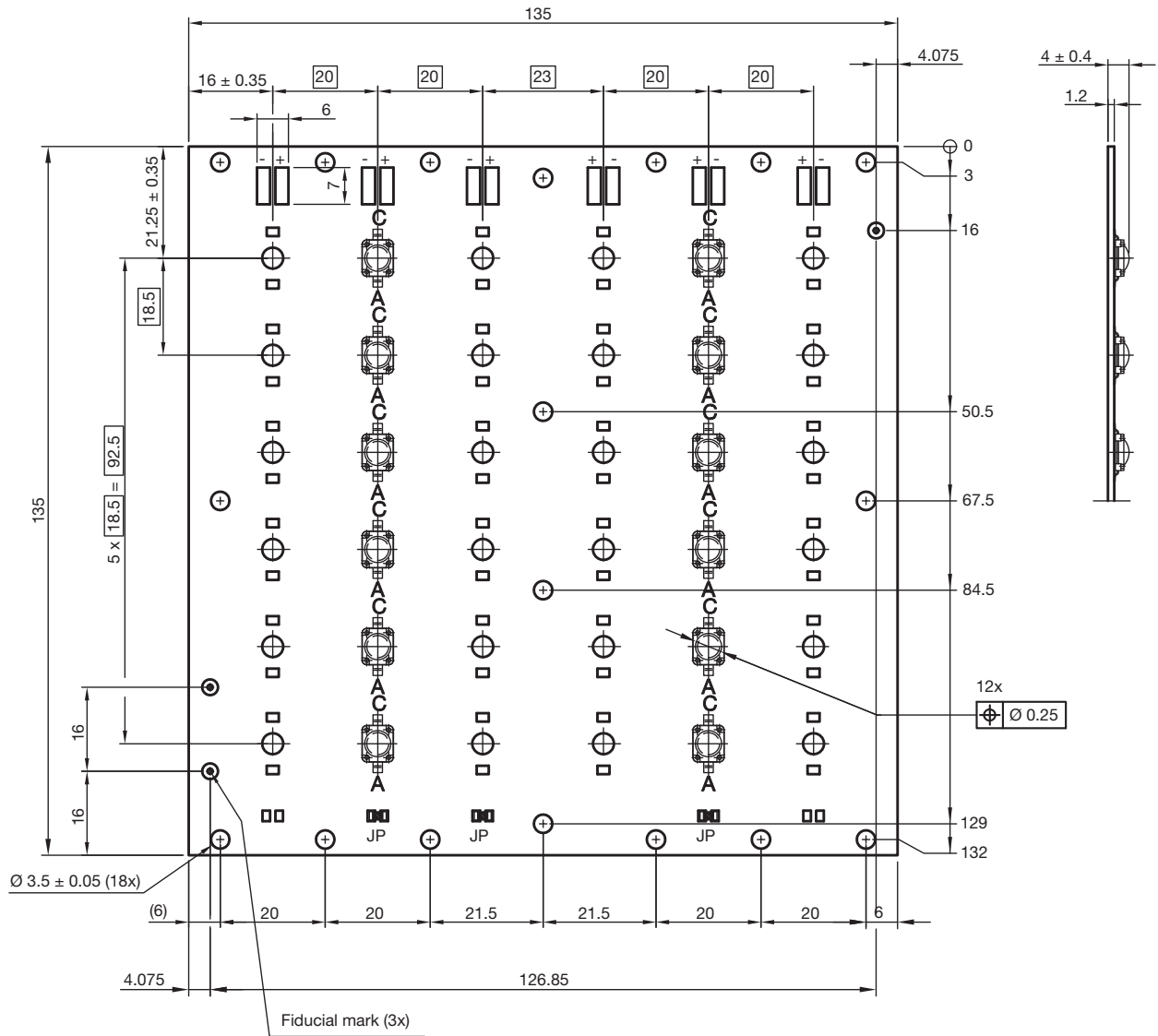
| CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED |       |       |  |       |       |       |  |       |       |       |
|---|-------|-------|--|-------|-------|-------|--|-------|-------|-------|
| GROUP   | X     | Y     |  | GROUP | X     | Y     |  | GROUP | X     | Y     |
| 4O  | 0.386 | 0.361 |  | 4P    | 0.394 | 0.365 |  | 4Q    | 0.403 | 0.369 |
|   | 0.389 | 0.369 |  |       | 0.398 | 0.373 |  |       | 0.406 | 0.377 |
|   | 0.398 | 0.373 |  |       | 0.406 | 0.377 |  |       | 0.415 | 0.381 |
|   | 0.394 | 0.365 |  |       | 0.403 | 0.369 |  |       | 0.411 | 0.373 |
| 5O  | 0.389 | 0.369 |  | 5P    | 0.398 | 0.373 |  | 5Q    | 0.406 | 0.377 |
|   | 0.392 | 0.377 |  |       | 0.401 | 0.381 |  |       | 0.410 | 0.386 |
|   | 0.401 | 0.381 |  |       | 0.410 | 0.386 |  |       | 0.419 | 0.390 |
|   | 0.398 | 0.373 |  |       | 0.406 | 0.377 |  |       | 0.415 | 0.381 |
| 6O  | 0.392 | 0.377 |  | 6P    | 0.401 | 0.381 |  | 6Q    | 0.410 | 0.386 |
|   | 0.394 | 0.385 |  |       | 0.404 | 0.390 |  |       | 0.413 | 0.394 |
|   | 0.404 | 0.390 |  |       | 0.413 | 0.394 |  |       | 0.422 | 0.399 |
|   | 0.401 | 0.381 |  |       | 0.410 | 0.386 |  |       | 0.419 | 0.390 |
| 7O  | 0.394 | 0.385 |  | 7P    | 0.404 | 0.390 |  | 7Q    | 0.413 | 0.394 |
|   | 0.397 | 0.393 |  |       | 0.407 | 0.398 |  |       | 0.416 | 0.403 |
|   | 0.407 | 0.398 |  |       | 0.416 | 0.403 |  |       | 0.426 | 0.408 |
|   | 0.404 | 0.390 |  |       | 0.413 | 0.394 |  |       | 0.422 | 0.399 |
| 8O  | 0.397 | 0.393 |  | 8P    | 0.407 | 0.398 |  | 8Q    | 0.416 | 0.403 |
|   | 0.400 | 0.401 |  |       | 0.410 | 0.406 |  |       | 0.420 | 0.412 |
|   | 0.410 | 0.406 |  |       | 0.420 | 0.412 |  |       | 0.430 | 0.417 |
|   | 0.407 | 0.398 |  |       | 0.416 | 0.403 |  |       | 0.426 | 0.408 |
| 9O  | 0.400 | 0.401 |  | 9P    | 0.410 | 0.406 |  | 9Q    | 0.420 | 0.412 |
|   | 0.402 | 0.410 |  |       | 0.413 | 0.415 |  |       | 0.423 | 0.420 |
|   | 0.413 | 0.415 |  |       | 0.423 | 0.420 |  |       | 0.434 | 0.425 |
|   | 0.410 | 0.406 |  |       | 0.420 | 0.412 |  |       | 0.430 | 0.417 |



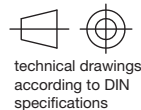
# VLSL4212A, VLSL4224A, VLSL4236A

High Brightness LED Power Module Vishay Semiconductors

## PCB BASIC DESIGN VLSL4212A Dimensions in millimeters

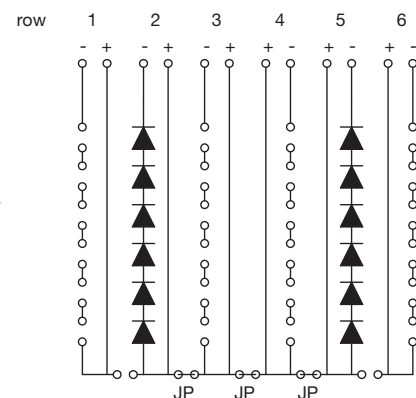


Not indicated tolerances ± 0.15



technical drawings according to DIN specifications

Drawing-No.: 9.920-6726.03-4  
Issue:1; 11.05.10  
22137



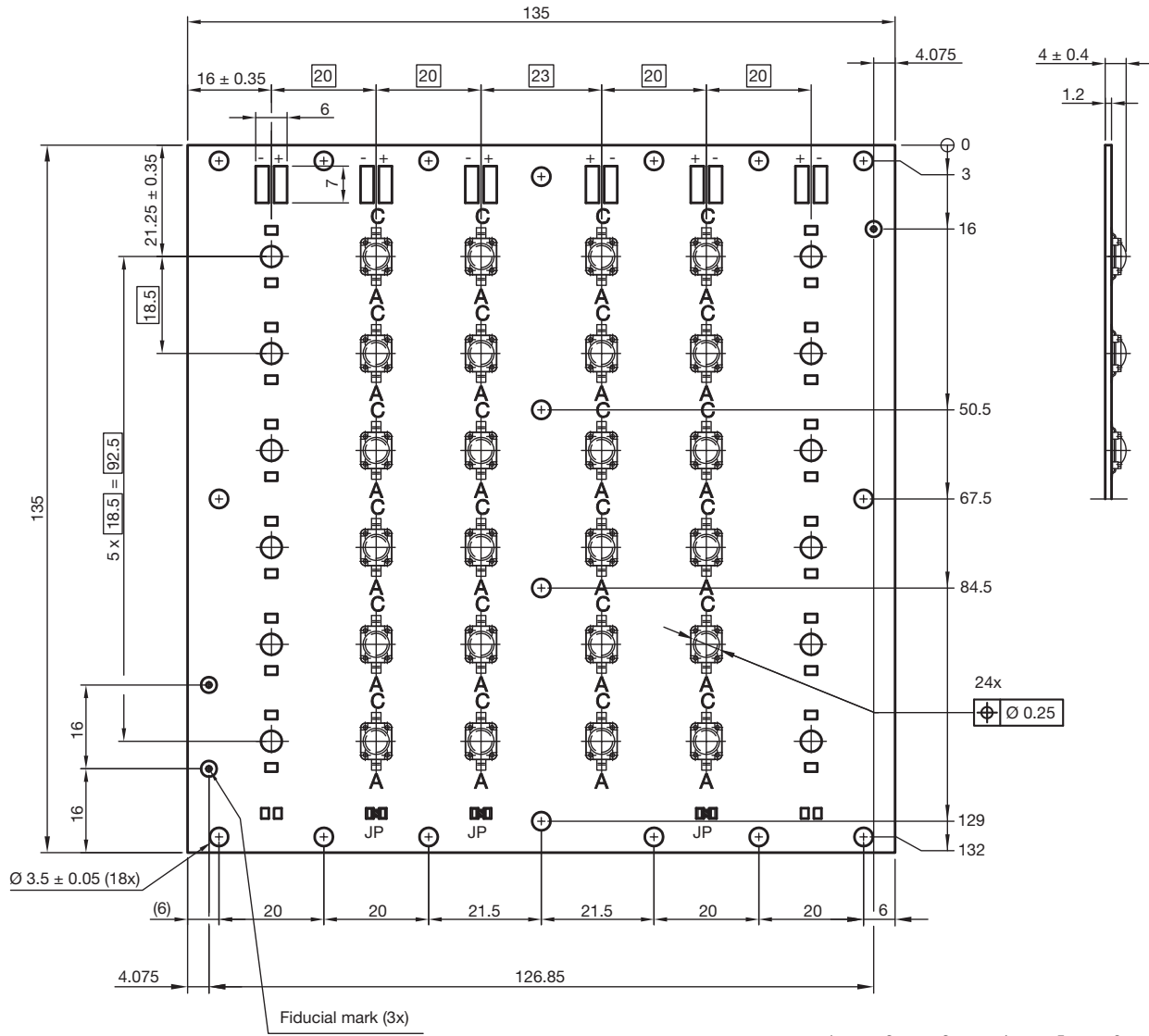
Assembled with all jumpers. Jumpers can be removed according driver design

# VLSL4212A, VLSL4224A, VLSL4236A

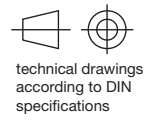


Vishay Semiconductors High Brightness LED Power Module

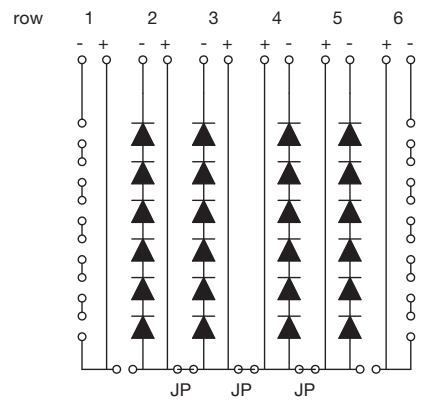
## PCB BASIC DESIGN VLSL4224A Dimensions in millimeters



Not indicated tolerances ± 0.15



Drawing-No.: 9.920-6726.02-4  
 Issue:1; 11.05.10  
 22136



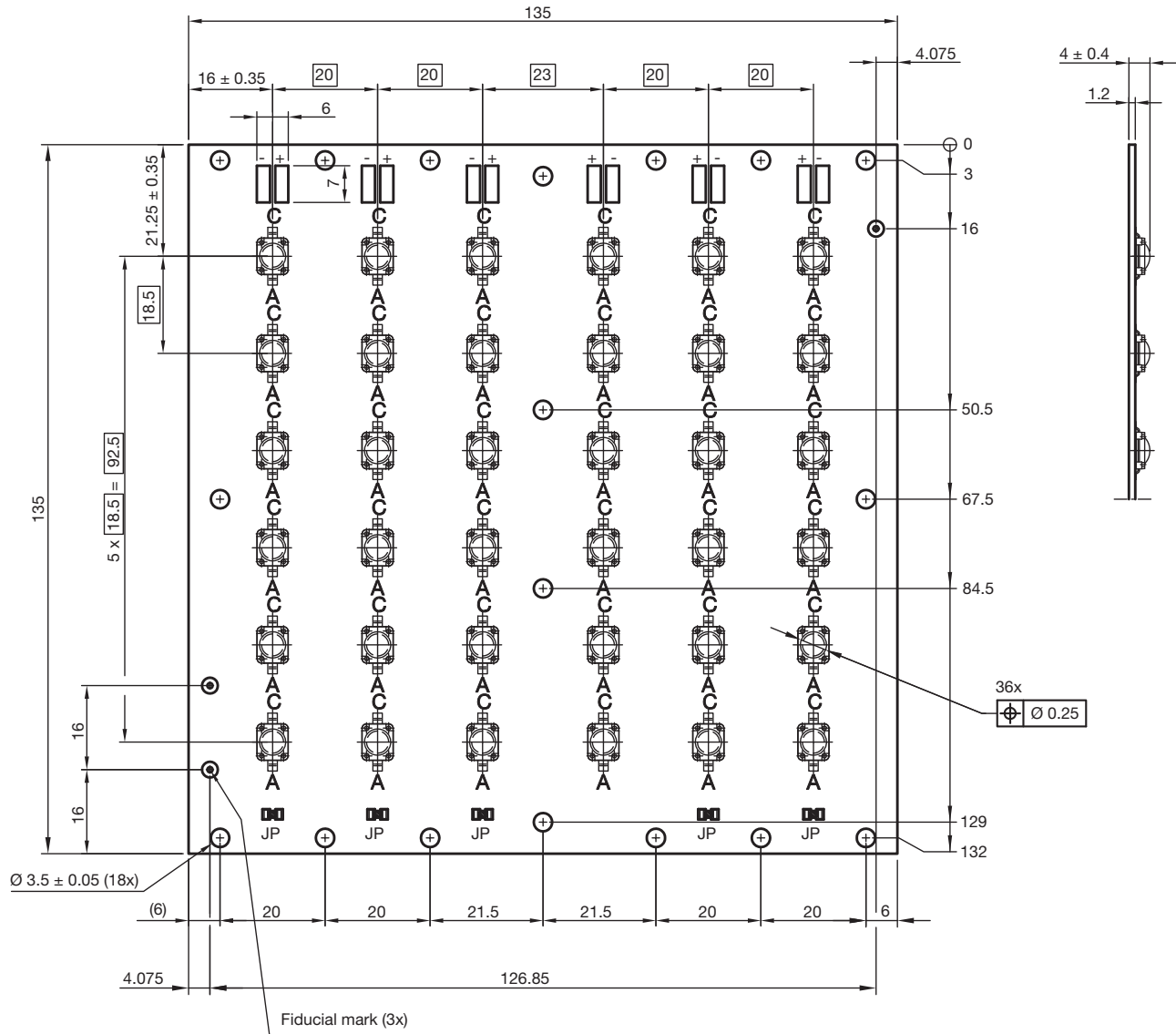
Assembled with all jumpers. Jumpers can be removed according driver design



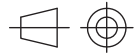
# VLSL4212A, VLSL4224A, VLSL4236A

High Brightness LED Power Module Vishay Semiconductors

## PCB BASIC DESIGN VLSL4236A Dimensions in millimeters



Not indicated tolerances ± 0.15

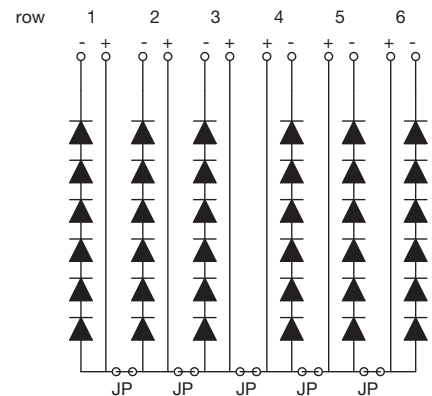


technical drawings according to DIN specifications

Drawing-No.: 9.920-6726.01-4

Issue:1; 11.05.10

22135



Assembled with all jumpers. Jumpers can be removed according driver design

### PCB CHARACTERISTICS

- Metal core PCB with typical Al thickness of 800  $\mu\text{m}$
- Prepreg thickness typical 127  $\mu\text{m}$
- Conductive pattern Cu typical 25  $\mu\text{m}$
- Total board thickness: 1 mm  $\pm$  15 %
- Warpage max. 0.75 % of board dimension
- Solder resist on top side
- Shiny white surface
- Galvanic of solder pads pure matte Sn ( $\geq$  0.8  $\mu\text{m}$ ), immersion plated
- Assembled with 12, 24 or 36 VLMW91xxx LED's. LED position accuracy  $\pm$  0.125 mm from middle axis, horizontal tilt max. 2°

### EMISSION CHARACTERISTIC

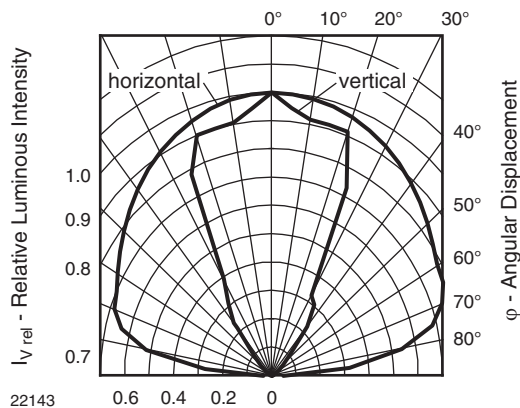
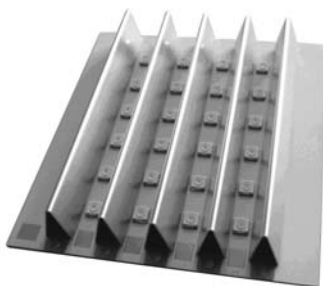


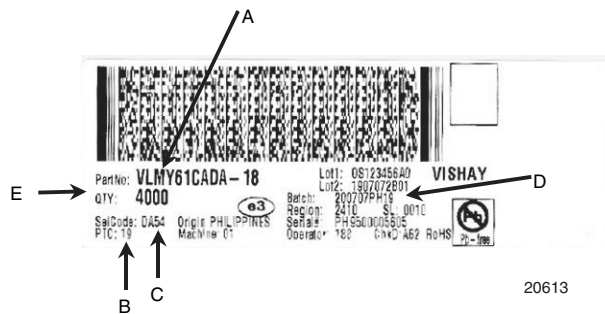
Fig. 2 - Rel. Luminous Intensity vs. Angular Displacement



21853

Fig. 3 - Sample Board with Reflectors (for Info only)

### BAR CODE PRODUCT LABEL



- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):  
e.g.: code for  $V_F$  class (A, B, C)
- D. Batch:  
200707 = year 2007, week 07  
PH19 = plant code
- E. Total quantity





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