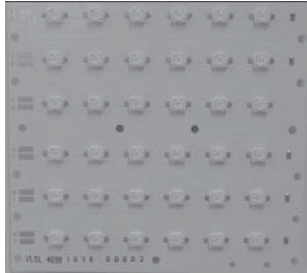


## High Brightness LED Power Module



22140



22139



### FEATURES

- Metal core PCB: Al > 0.75 thickness
- Single side/single layer PCB
- Shiny white surface
- 12, 24 or 36 LED's minimum 71 lm at 350 mA per LED. Max. current per LED 1 A
- Conductive top layer: Cu (min. 18  $\mu$ m)
- Isolation layer prepreg > 63  $\mu$ 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



**RoHS**  
COMPLIANT  
**GREEN**  
(5-2008)\*\*

### APPLICATIONS

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

### DESCRIPTION

The VLSL41xxA are metal core based high brightness LED power modules, assembled with 12, 24 or 36 HB white LEDs. The color temperature is natural white. The typical color temperature is 4000 K. 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:  $\pm 80^\circ$

### PARTS TABLE

| PART      | COLOR         | LUMINOUS FLUX<br>(at $I_F = 700$ mA typ.) | COLOR TEMPERATURE<br>K | TECHNOLOGY |
|-----------|---------------|-------------------------------------------|------------------------|------------|
| VLSL4112A | Natural white | $\Phi_V = 1600$ lm                        | typ. 4000              | InGaN      |
| VLSL4124A | Natural white | $\Phi_V = 3200$ lm                        | typ. 4000              | InGaN      |
| VLSL4136A | Natural white | $\Phi_V = 4800$ lm                        | typ. 4000              | InGaN      |

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified) VLSL4112A, VLSL4124A, VLSL4136A

| PARAMETER                   | TEST CONDITION | SYMBOL    | VALUE        | UNIT             |
|-----------------------------|----------------|-----------|--------------|------------------|
| Forward current             | Per row        | $I_F$     | 750          | mA               |
| Power dissipation VLSL4112A | Total (max.)   | $P_{tot}$ | 35           | W                |
| Power dissipation VLSL4124A |                | $P_{tot}$ | 69           | W                |
| Power dissipation VLSL4136A |                | $P_{tot}$ | 104          | W                |
| Junction temperature        |                | $T_j$     | 120          | $^\circ\text{C}$ |
| Operating temperature range |                | $T_{amb}$ | - 40 to + 85 | $^\circ\text{C}$ |
| Storage temperature range   |                | $T_{stg}$ | - 40 to + 85 | $^\circ\text{C}$ |

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc/299902](http://www.vishay.com/doc/299902)

### OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>(1)</sup> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLSL4112A, NATURAL WHITE

| PARAMETER                                   | TEST CONDITION                       | SYMBOL        | MIN. | TYP.  | MAX. | UNIT |
|---------------------------------------------|--------------------------------------|---------------|------|-------|------|------|
| Luminous flux per row <sup>(2)</sup>        | $I_F = 700\text{ mA}$                | $\Phi_V$      | 650  | 800   | -    | lm   |
| Luminous flux total <sup>(2)</sup>          | $I_{board} = 2 \times 700\text{ mA}$ | $\Phi_V$      | 1300 | 1600  | -    | lm   |
| Color temperature                           | $I_F = 700\text{ mA}$                | TK            | -    | 4000  | -    | K    |
| Forward voltage per row                     | $I_F = 700\text{ mA}$                | $V_F$         | 19   | 21    | 23   | V    |
| Temperature coefficient of $V_F$ per row    | $I_F = 350\text{ mA}$                | $TC_{VF}$     | -    | - 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.

### OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>(1)</sup> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLSL4124A, NATURAL WHITE

| PARAMETER                                   | TEST CONDITION                       | SYMBOL        | MIN. | TYP.  | MAX. | UNIT |
|---------------------------------------------|--------------------------------------|---------------|------|-------|------|------|
| Luminous flux per row <sup>(2)</sup>        | $I_F = 700\text{ mA}$                | $\Phi_V$      | 650  | 800   | -    | lm   |
| Luminous flux total <sup>(2)</sup>          | $I_{board} = 4 \times 700\text{ mA}$ | $\Phi_V$      | 2600 | 3200  | -    | lm   |
| Color temperature                           | $I_F = 700\text{ mA}$                | TK            | -    | 4000  | -    | K    |
| Forward voltage per row                     | $I_F = 700\text{ mA}$                | $V_F$         | 19   | 21    | 23   | V    |
| Temperature coefficient of $V_F$ per row    | $I_F = 350\text{ mA}$                | $TC_{VF}$     | -    | - 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.

### OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>(1)</sup> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLSL4136A, NATURAL WHITE

| PARAMETER                                   | TEST CONDITION                       | SYMBOL        | MIN. | TYP.  | MAX. | UNIT |
|---------------------------------------------|--------------------------------------|---------------|------|-------|------|------|
| Luminous flux per row <sup>(2)</sup>        | $I_F = 700\text{ mA}$                | $\Phi_V$      | 650  | 800   | -    | lm   |
| Luminous flux total <sup>(2)</sup>          | $I_{board} = 6 \times 700\text{ mA}$ | $\Phi_V$      | 3900 | 4800  | -    | lm   |
| Color temperature                           | $I_F = 700\text{ mA}$                | TK            | -    | 4000  | -    | K    |
| Forward voltage per row                     | $I_F = 700\text{ mA}$                | $V_F$         | 19   | 21    | 23   | V    |
| Temperature coefficient of $V_F$ per row    | $I_F = 350\text{ mA}$                | $TC_{VF}$     | -    | - 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.

## SPECIFICATION OF SINGLE LEDs USED FOR THE MODULES

### LUMINOUS FLUX CLASSIFICATION FOR THE SINGLE LED AT 350 mA

| GROUP    | LUMINOUS FLUX $\Phi_V$ (mIm) CORRELATION TABLE |         |
|----------|------------------------------------------------|---------|
| STANDARD | MIN.                                           | MAX.    |
| KX       | 71 000                                         | 82 000  |
| KY       | 82 000                                         | 97 000  |
| KZ       | 97 000                                         | 112 000 |



### COLOR RANGE AND COLOR BINNING

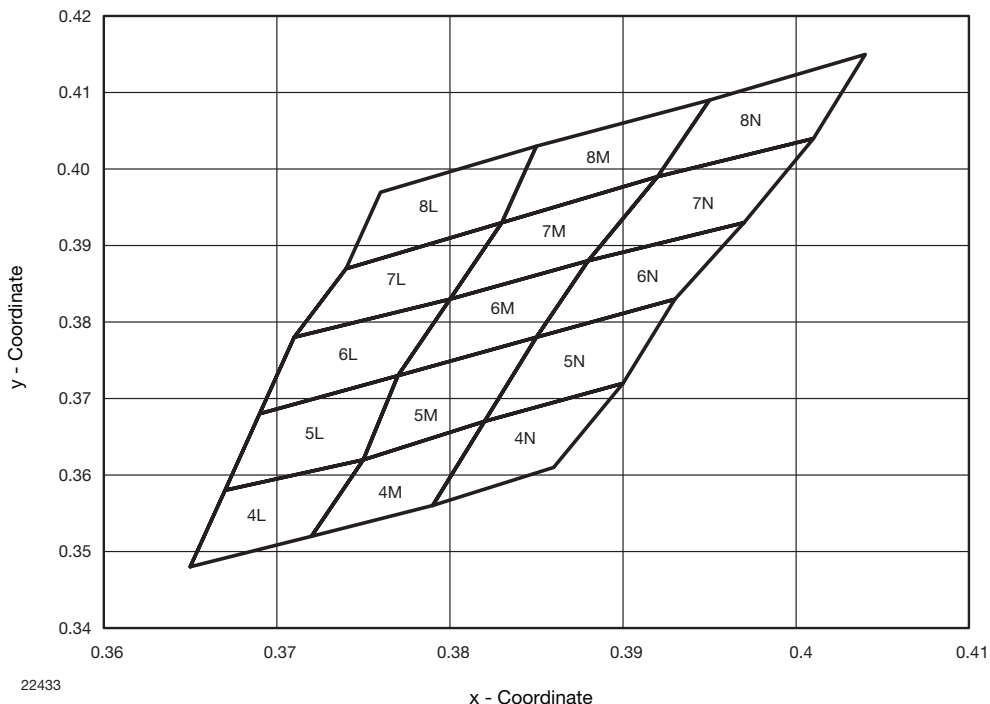


Fig. 1 - Chromaticity Coordinates of Colorgroups

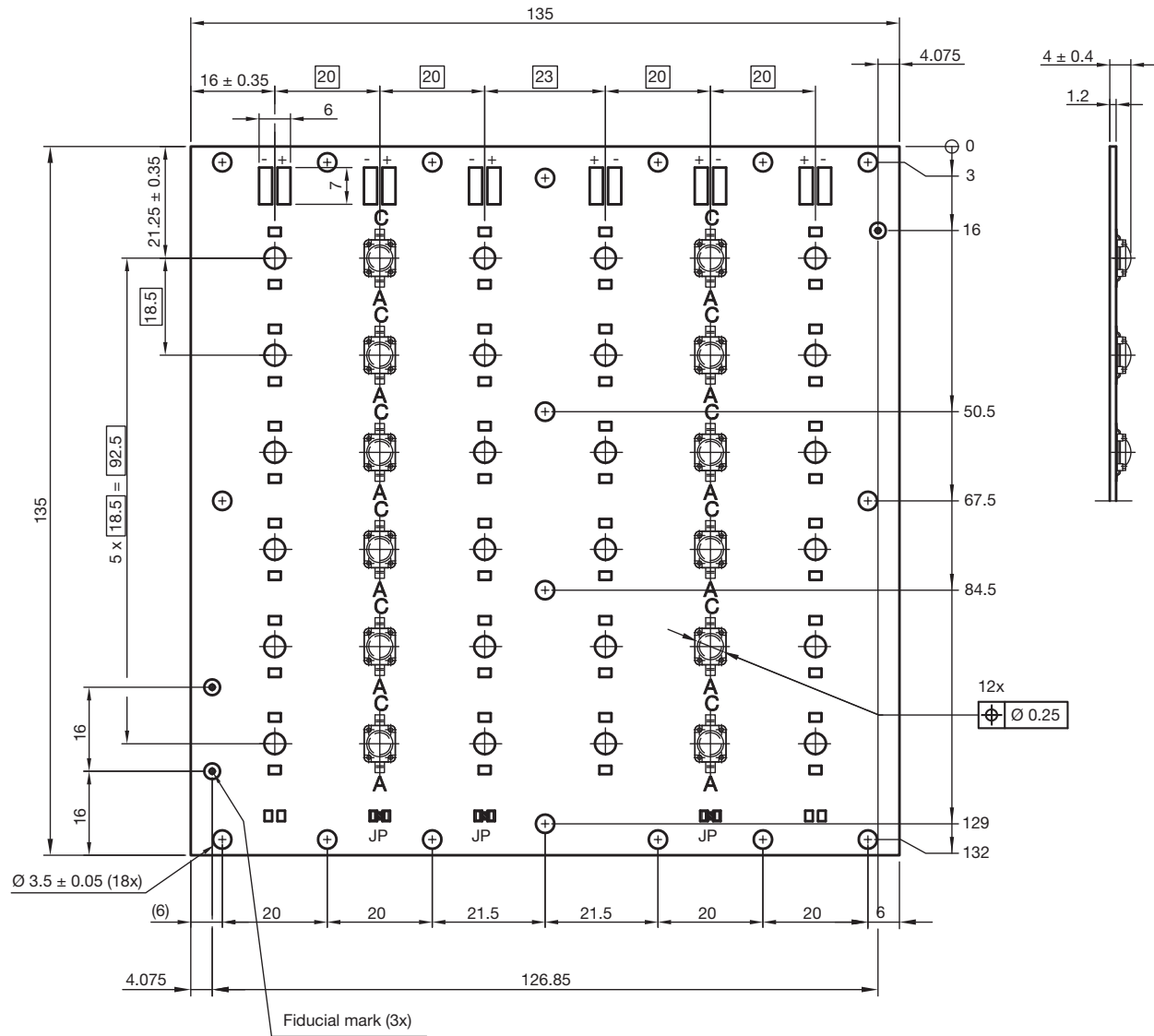
| CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED |       |       |  |       |       |       |  |       |       |       |  |
|---------------------------------------------------|-------|-------|--|-------|-------|-------|--|-------|-------|-------|--|
| GROUP                                             | X     | Y     |  | GROUP | X     | Y     |  | GROUP | X     | Y     |  |
| 4L                                                | 0.365 | 0.348 |  | 4M    | 0.372 | 0.352 |  | 4N    | 0.379 | 0.356 |  |
|                                                   | 0.367 | 0.358 |  |       | 0.375 | 0.362 |  |       | 0.382 | 0.367 |  |
|                                                   | 0.375 | 0.362 |  |       | 0.382 | 0.367 |  |       | 0.390 | 0.372 |  |
|                                                   | 0.372 | 0.352 |  |       | 0.379 | 0.356 |  |       | 0.386 | 0.361 |  |
| 5L                                                | 0.367 | 0.358 |  |       | 0.375 | 0.362 |  | 5N    | 0.382 | 0.367 |  |
|                                                   | 0.369 | 0.368 |  | 5M    | 0.377 | 0.373 |  |       | 0.385 | 0.378 |  |
|                                                   | 0.377 | 0.373 |  |       | 0.385 | 0.378 |  |       | 0.393 | 0.383 |  |
|                                                   | 0.375 | 0.362 |  |       | 0.382 | 0.367 |  |       | 0.390 | 0.372 |  |
| 6L                                                | 0.369 | 0.368 |  | 6M    | 0.377 | 0.373 |  | 6N    | 0.385 | 0.378 |  |
|                                                   | 0.371 | 0.378 |  |       | 0.380 | 0.383 |  |       | 0.388 | 0.388 |  |
|                                                   | 0.380 | 0.383 |  |       | 0.388 | 0.388 |  |       | 0.397 | 0.393 |  |
|                                                   | 0.377 | 0.373 |  |       | 0.385 | 0.378 |  |       | 0.393 | 0.383 |  |
| 7L                                                | 0.371 | 0.378 |  | 7M    | 0.380 | 0.383 |  | 7N    | 0.388 | 0.388 |  |
|                                                   | 0.374 | 0.387 |  |       | 0.383 | 0.393 |  |       | 0.392 | 0.399 |  |
|                                                   | 0.383 | 0.393 |  |       | 0.392 | 0.399 |  |       | 0.401 | 0.404 |  |
|                                                   | 0.380 | 0.383 |  |       | 0.388 | 0.388 |  |       | 0.397 | 0.393 |  |
| 8L                                                | 0.374 | 0.387 |  | 8M    | 0.383 | 0.393 |  | 8N    | 0.392 | 0.399 |  |
|                                                   | 0.376 | 0.397 |  |       | 0.385 | 0.403 |  |       | 0.395 | 0.409 |  |
|                                                   | 0.385 | 0.403 |  |       | 0.395 | 0.409 |  |       | 0.404 | 0.415 |  |
|                                                   | 0.383 | 0.393 |  |       | 0.392 | 0.399 |  |       | 0.401 | 0.404 |  |

# VLSL4112A, VLSL4124A, VLSL4136A

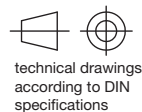
Vishay Semiconductors High Brightness LED Power Module



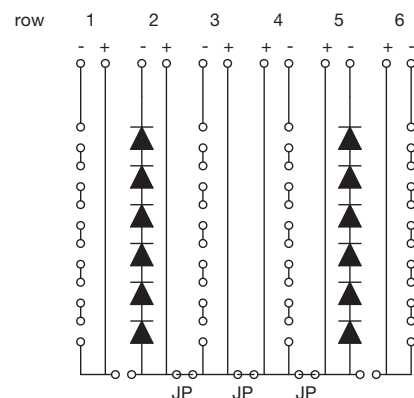
## PCB BASIC DESIGN VLSL4112A Dimensions in millimeters



Not indicated tolerances  $\pm 0.15$

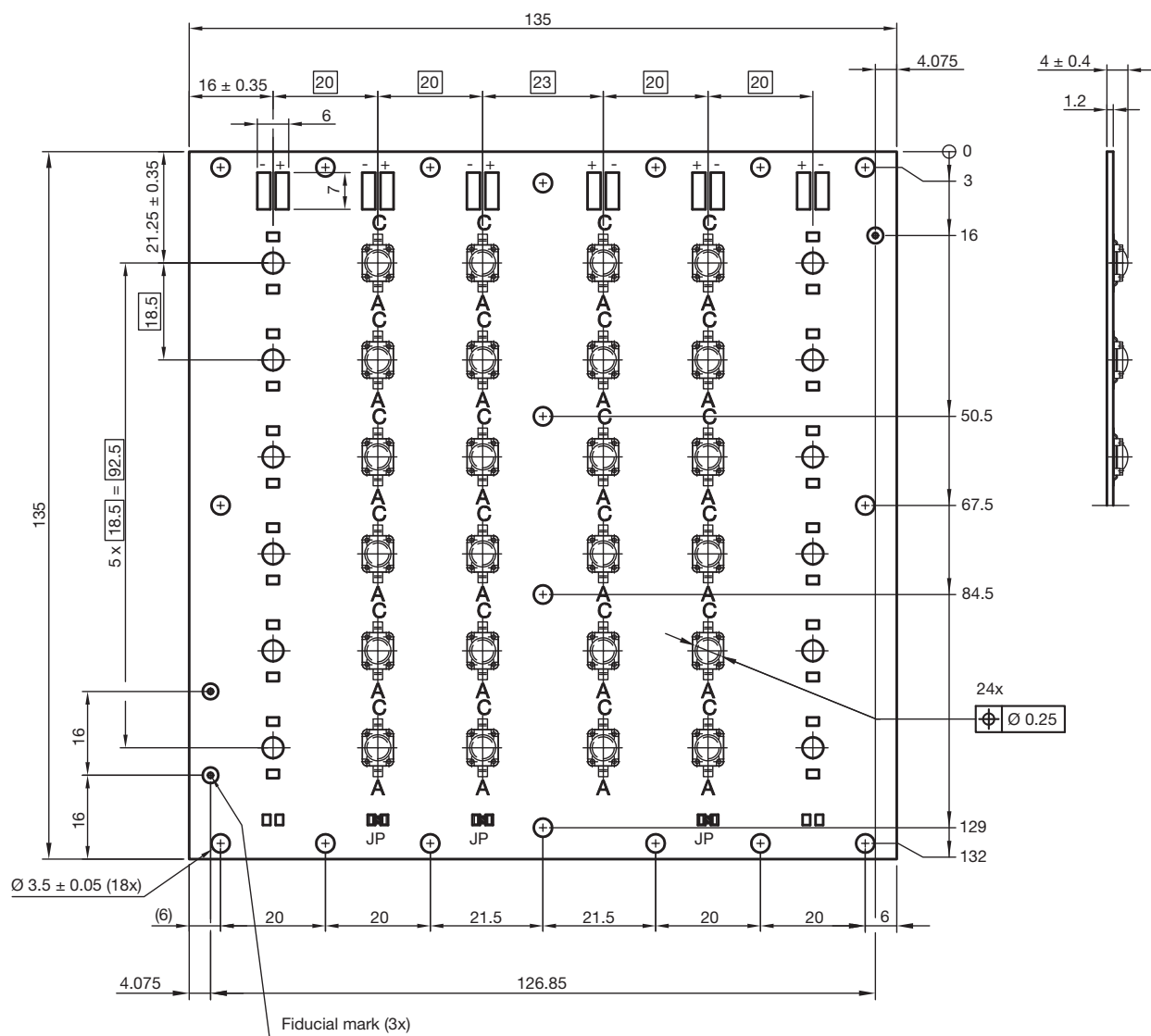


Drawing-No.: 9.920-6726.03-4  
Issue:1; 11.05.10  
22137

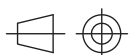


Assembled with all jumpers. Jumpers can be removed according driver design

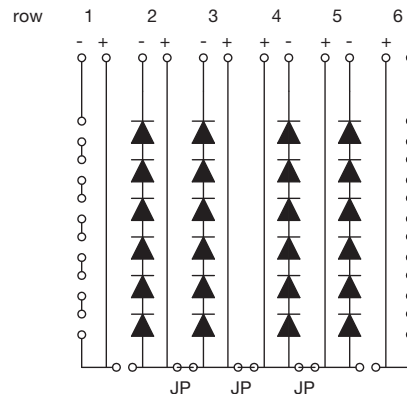
### PCB BASIC DESIGN VL4124A Dimensions in millimeters



Not indicated tolerances  $\pm 0.15$



technical drawings  
according to DIN  
specifications



Drawing-No.: 9.920-6726.02-4

Issue:1; 11.05.10

22136

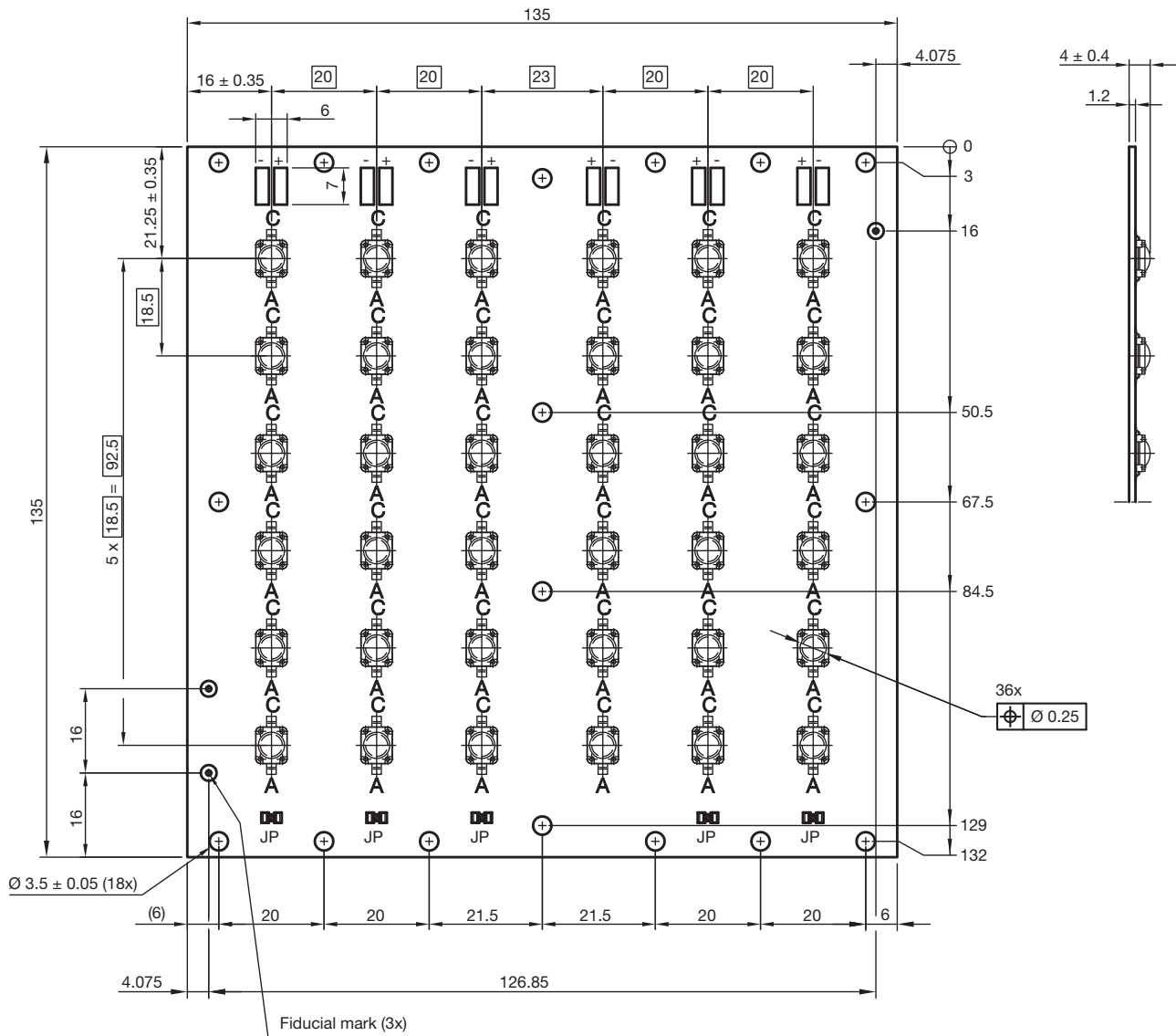
Assembled with all jumpers. Jumpers can be removed according driver design

# VLSSL4112A, VLSSL4124A, VLSSL4136A

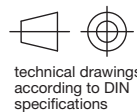
Vishay Semiconductors High Brightness LED Power Module



## PCB BASIC DESIGN VLSSL4136A Dimensions in millimeters



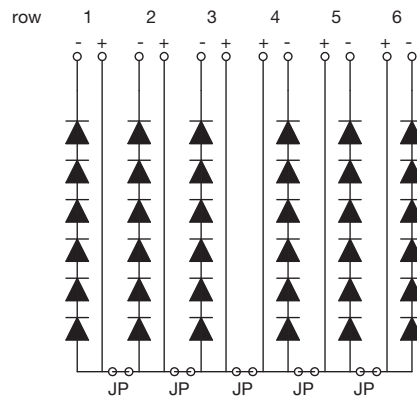
Not indicated tolerances  $\pm 0.15$



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 LED's.  
LED position accuracy  $\pm 0.125 \text{ mm}$  from middle axis,  
horizontal tilt max.  $2^\circ$

### EMISSION CHARACTERISTIC

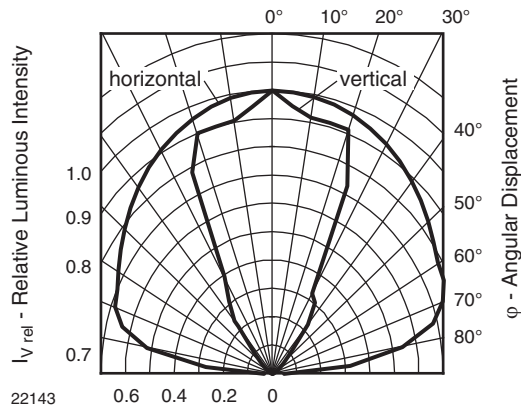


Fig. 2 - Rel. Luminous Intensity vs. Angular Displacement

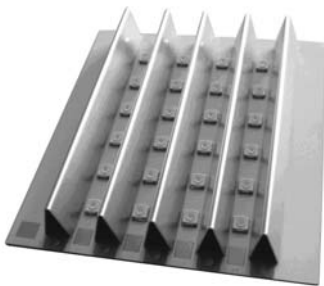
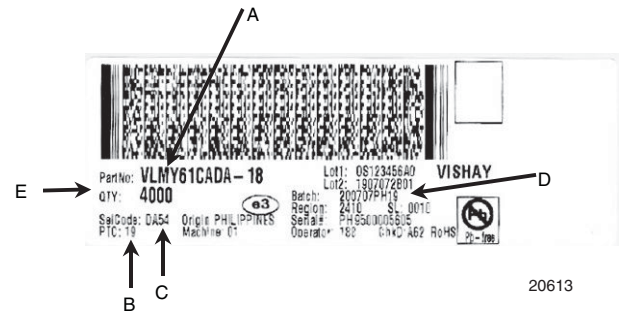


Fig. 3 - Sample Board with Reflectors (for Info only)

### 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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