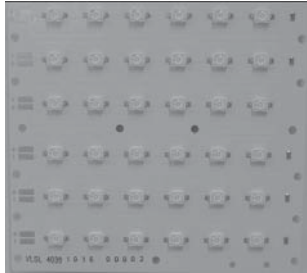


## High Brightness LED Power Module



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:  $\pm 80^\circ$

PARTS TABLE				
PART	COLOR	LUMINOUS FLUX (at $I_F = 700$ mA typ.)	COLOR TEMPERATURE K	TECHNOLOGY
VLSL4212A	Warm white	$\Phi_V = 1500$ lm	3500 (typ.)	InGaN
VLSL4224A	Warm white	$\Phi_V = 3000$ lm	3500 (typ.)	InGaN
VLSL4236A	Warm white	$\Phi_V = 4500$ lm	3500 (typ.)	InGaN

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , 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.)	$P_{tot}$	35	W
Power dissipation VLSL4224A		$P_{tot}$	69	W
Power dissipation VLSL4236A		$P_{tot}$	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?99902](http://www.vishay.com/doc?99902)

### 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

### 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

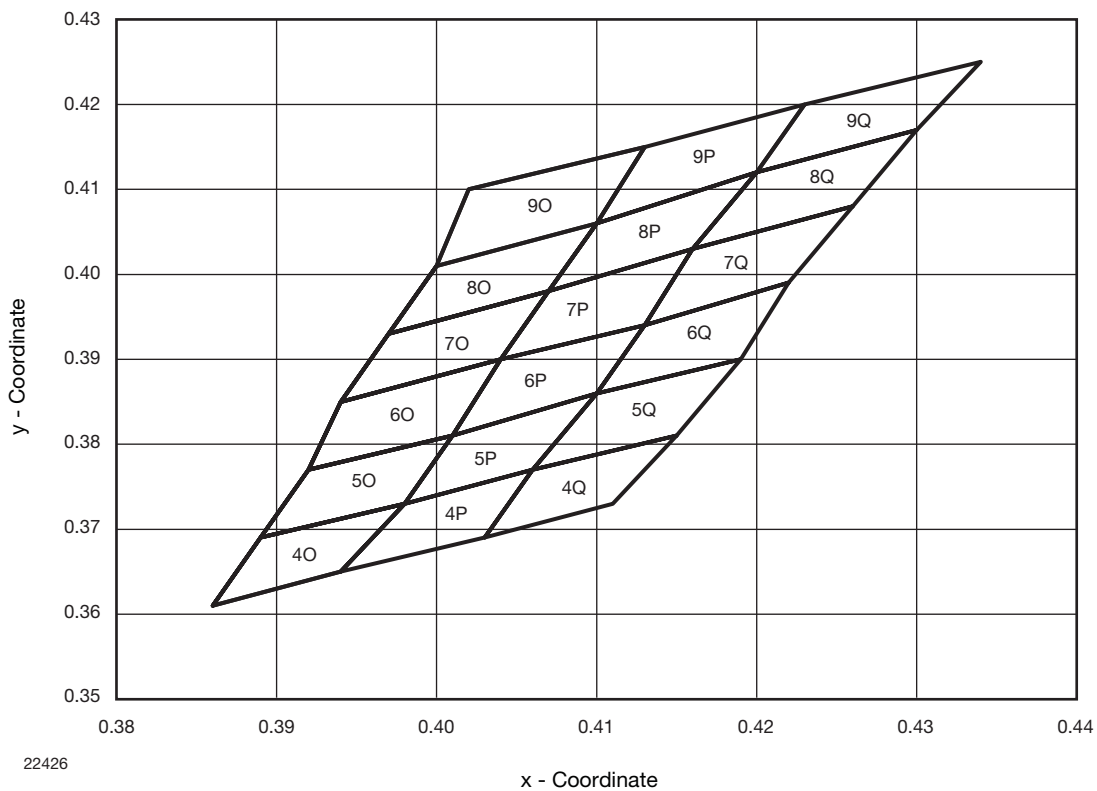


Fig. 1 - Chromaticity Coordinates of Colorgroups



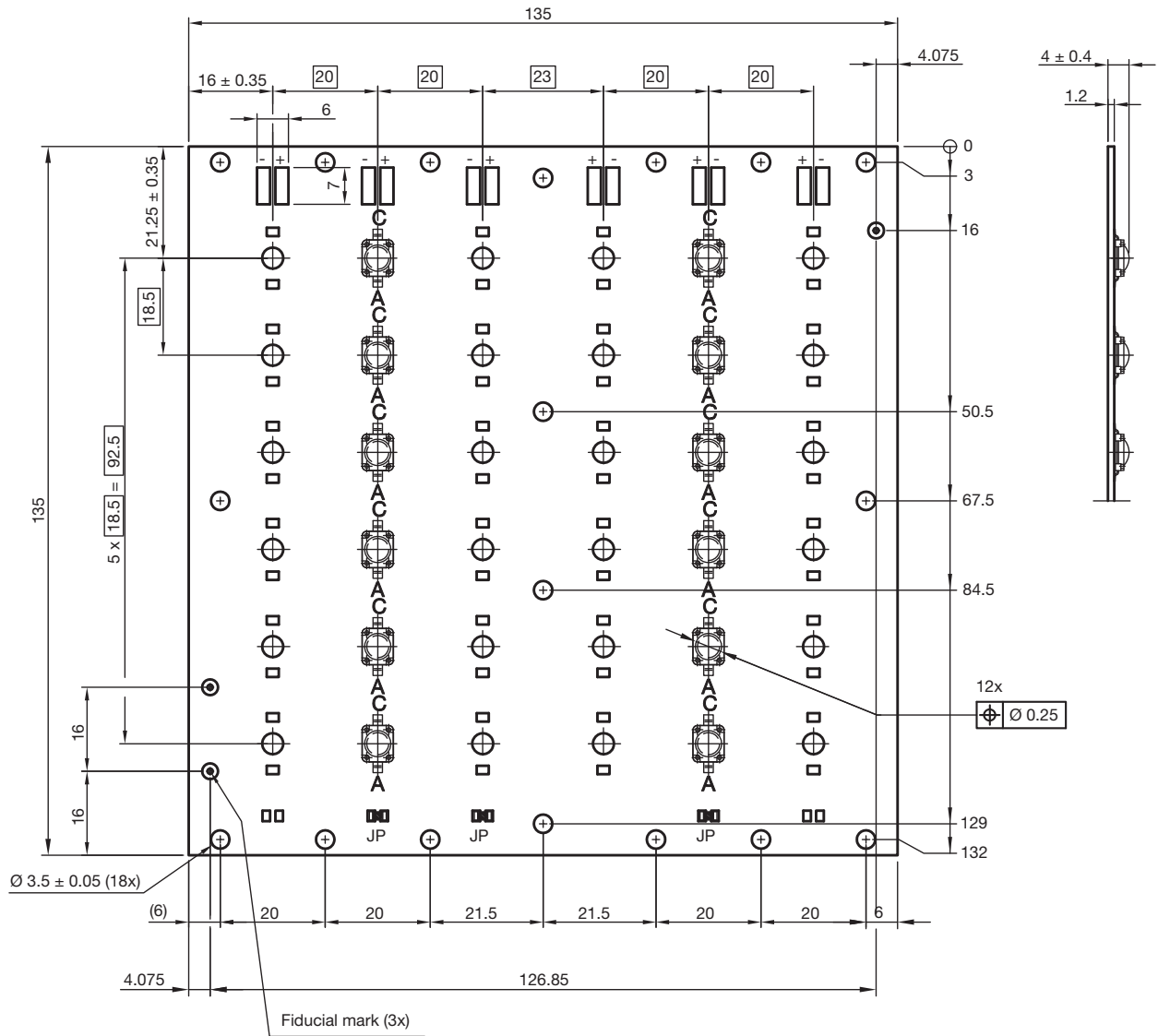
CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED										
GROUP	X	Y		GROUP	X	Y		GROUP	X	Y
4O	0.386	0.361		4P	0.394	0.365		4Q	0.403	0.369
	0.389	0.369			0.398	0.373			0.406	0.377
	0.398	0.373			0.406	0.377			0.415	0.381
	0.394	0.365			0.403	0.369			0.411	0.373
5O	0.389	0.369		5P	0.398	0.373		5Q	0.406	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



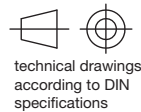
# VLSL4212A, VLSL4224A, VLSL4236A

High Brightness LED Power Module Vishay Semiconductors

## PCB BASIC DESIGN VLSL4212A Dimensions in millimeters

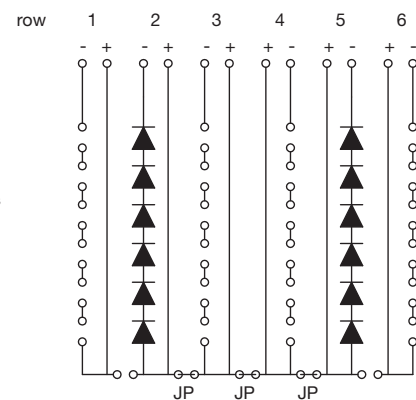


Not indicated tolerances ± 0.15



technical drawings according to DIN specifications

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



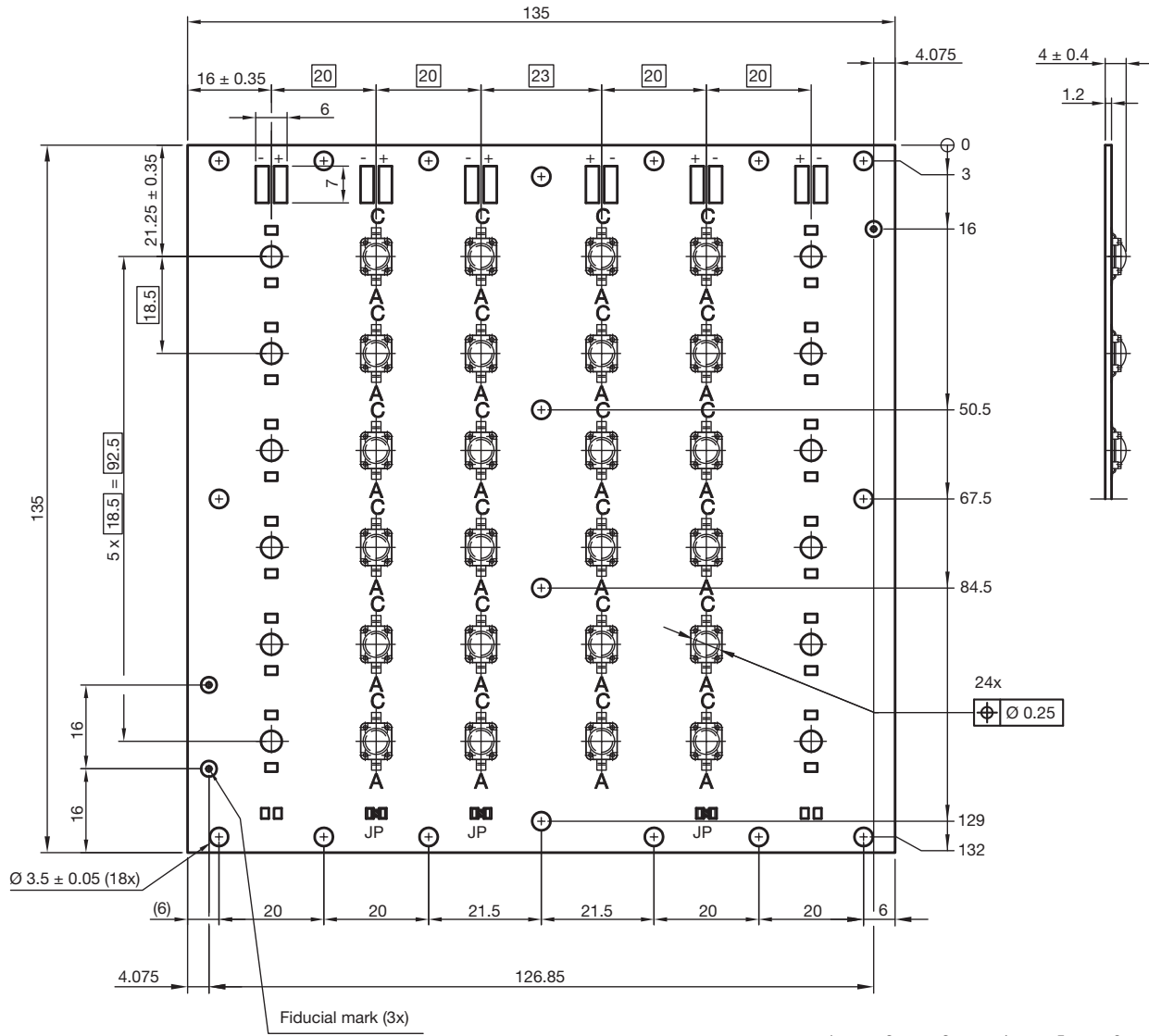
Assembled with all jumpers. Jumpers can be removed according driver design

# VLSL4212A, VLSL4224A, VLSL4236A

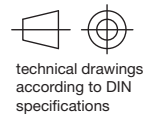


Vishay Semiconductors High Brightness LED Power Module

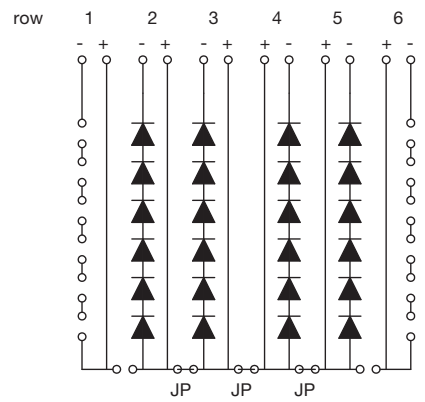
## PCB BASIC DESIGN VLSL4224A Dimensions in millimeters



Not indicated tolerances ± 0.15



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



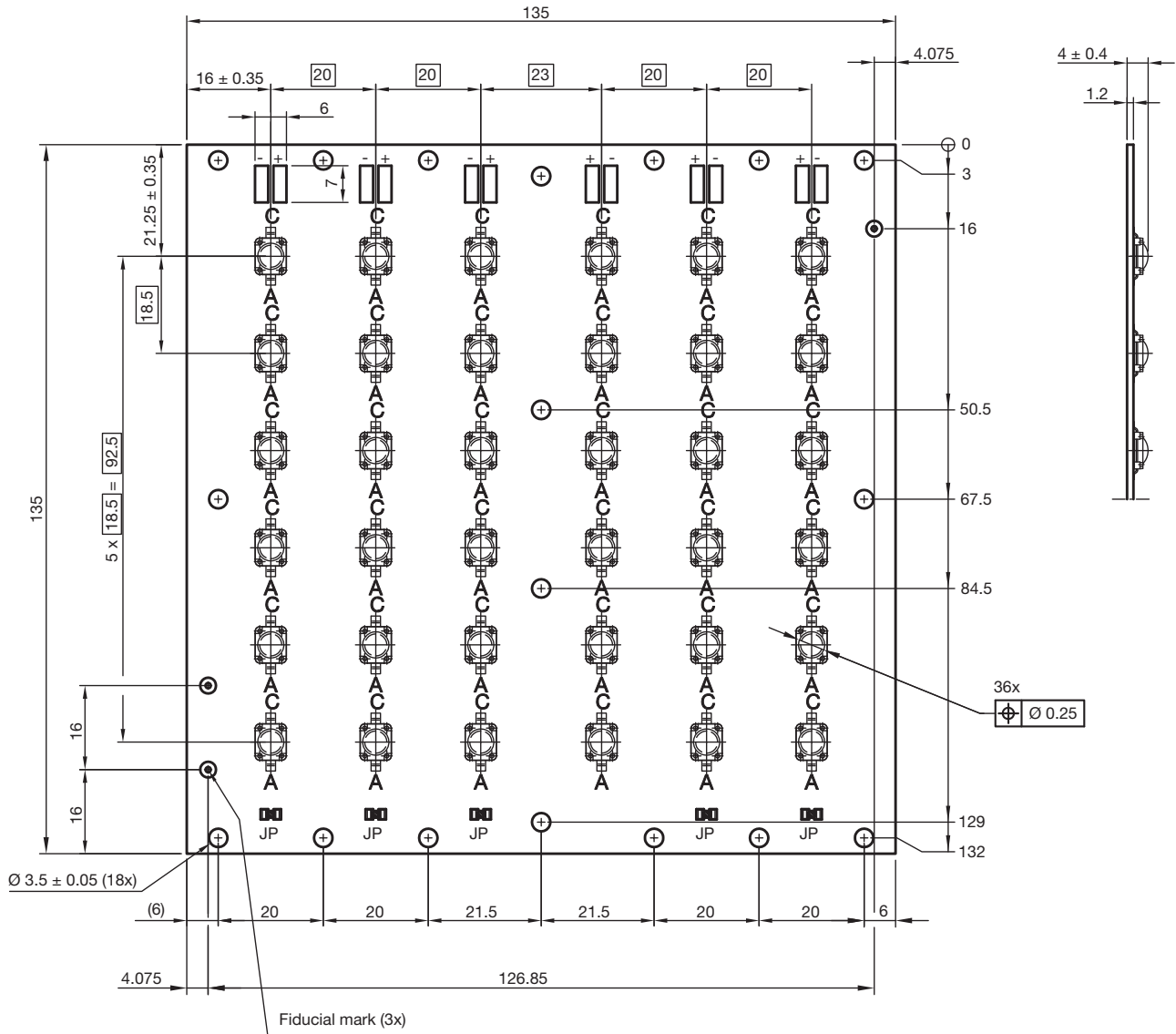
Assembled with all jumpers. Jumpers can be removed according driver design



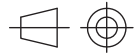
# VLSL4212A, VLSL4224A, VLSL4236A

High Brightness LED Power Module Vishay Semiconductors

## PCB BASIC DESIGN VLSL4236A Dimensions in millimeters



Not indicated tolerances ± 0.15

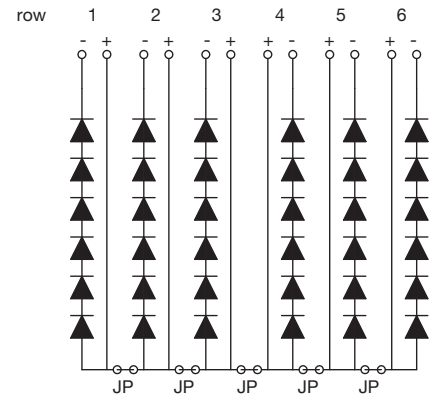


technical drawings according to DIN specifications

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

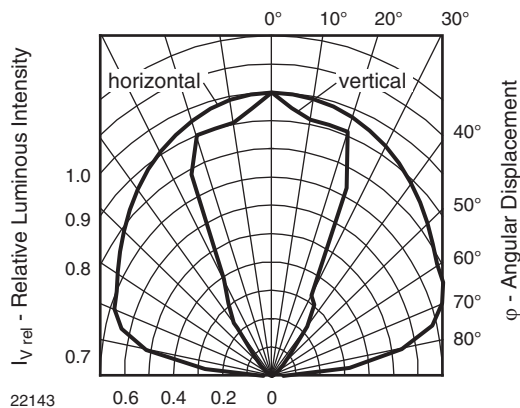
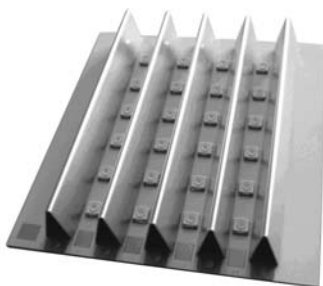


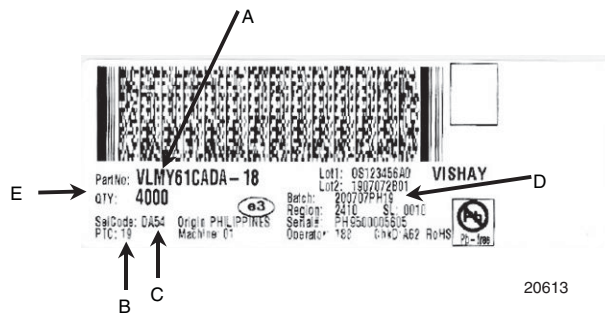
Fig. 2 - Rel. Luminous Intensity vs. Angular Displacement



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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