

**SERIES:** VLD25-SMT | **DESCRIPTION:** LED DRIVER

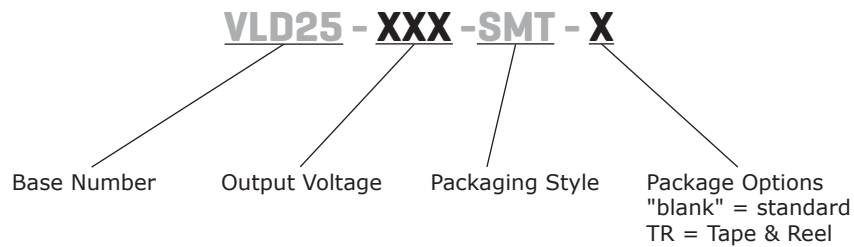
**FEATURES**

- power LED driver
- wide input and output voltage range
- SMT package
- constant current output
- PWM dimming and analogue dimming
- short circuit protection
- analog dimming
- high efficiency up to 96%



| MODEL         | input voltage range (Vdc) | output voltage range (Vdc) | output current range (mA) | ripple and noise max (mVp-p) | dimming control | efficiency typ (%) |
|---------------|---------------------------|----------------------------|---------------------------|------------------------------|-----------------|--------------------|
|               |                           |                            |                           |                              |                 |                    |
| VLD25-300-SMT | 5.5 ~ 48                  | 3.3 ~ 36                   | 0 ~ 300                   | 120                          | PWM+analog      | 96                 |
| VLD25-350-SMT | 5.5 ~ 48                  | 3.3 ~ 36                   | 0 ~ 350                   | 120                          | PWM+analog      | 96                 |
| VLD25-500-SMT | 5.5 ~ 48                  | 3.3 ~ 36                   | 0 ~ 500                   | 120                          | PWM+analog      | 96                 |
| VLD25-600-SMT | 5.5 ~ 48                  | 3.3 ~ 36                   | 0 ~ 600                   | 120                          | PWM+analog      | 96                 |
| VLD25-700-SMT | 5.5 ~ 48                  | 3.3 ~ 36                   | 0 ~ 700                   | 120                          | PWM+analog      | 96                 |

**PART NUMBER KEY**



## INPUT

| parameter                           | conditions/description                                      | min         | typ         | max   | units         |
|-------------------------------------|---|-------------|-------------|---|---------------|
| operating input voltage             | absolute max before device failure<br>operating input range | 5<br>5.5    | 24          | 55<br>48  | Vdc<br>Vdc    |
| quiescent input current in off mode | $V_{in} = 24\text{ V}$ , $V_r < 0.6\text{ V}$               |             | 400         |   | $\mu\text{A}$ |
| filter                              | capacitor   |             | 1           |   | $\mu\text{F}$ |
| remote on/off                       | dc-dc ON ( $V_r$ on pin 7)<br>dc-dc OFF                     |             |             | open or $2.8\text{ V} < V_r < 6\text{ V}$<br>$V_r < 0.6\text{ V}$ |               |
| remote pin current                  | $V_r = 5\text{ V}$  |             |             | 1   | mA            |
| PWM frequency                       |   |             |             | 0.2   | kHz           |
| input voltage - analog dimming      | $V_{in} = 5.5 \sim 4.8\text{ V}$                            | 0           |             | 15  | V             |
| control voltage - analog dimming    | full on<br>full off   | 0.15<br>4.3 | 0.20<br>4.5 | 0.25<br>4.7   | V<br>V        |
| driving current - analog dimming    | $V_r = 5\text{ V}$  |             |             | 0.6   | A             |

## OUTPUT

| parameter                             | conditions/description   | min | typ     | max         | units               |
|---------------------------------------|--|-----|---------|-------------|---------------------|
| voltage range                         | $V_{in} = 48\text{ V}$ , $V_o = 3.3\text{ V} \sim 36\text{ V}$ | 3.3 |         | 36          | Vdc                 |
| voltage drop                          | $V_{in} = 5.5 \sim 48\text{ V}$ , 1 ~ 10 LED                   | 2   |         | 4           | Vdc                 |
| current accuracy                      |  |     | $\pm 2$ | $\pm 3$     | %                   |
| output current range - analog dimming | $V_{in} = 5.5 \sim 48\text{ V}$ , 1 ~ 10 LED                   | 0   |         | 100         | %                   |
| current stability                     | $V_{in} = 48\text{ V}$ , $V_o = 3.3\text{ V} \sim 36\text{ V}$ |     |         | $\pm 1$     | %                   |
| temperature coefficient               | $-40 \sim 71^\circ\text{C}$ ambient                            |     |         | $\pm 0.015$ | %/ $^\circ\text{C}$ |
| capacitive load                       |  |     |         | 1,000       | $\mu\text{F}$       |

## PROTECTIONS

| parameter                | conditions/description        | min | typ | max | units |
|--------------------------|-------------------------------|-----|-----|-----|-------|
| short circuit protection | continuous automatic recovery |     |     |     |       |

## SAFETY AND COMPLIANCE

| parameter      | conditions/description  |
|----------------|---|
| EMI/EMC        | EN 55015 power port, EN 55015, IEC/EN 61000-4-(2, 3, 4, 5, 6) |
| RoHS compliant | yes   |

## ENVIRONMENTAL

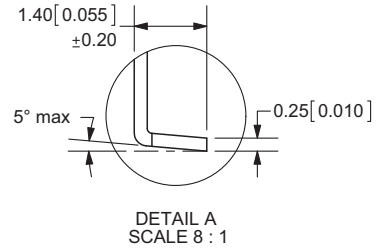
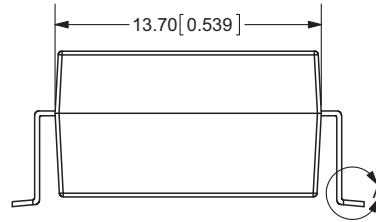
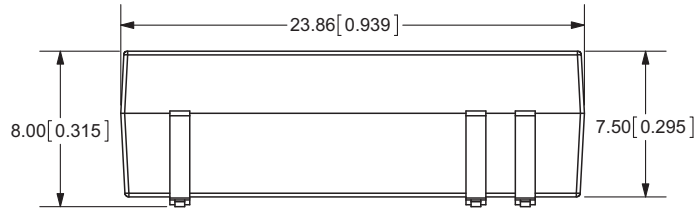
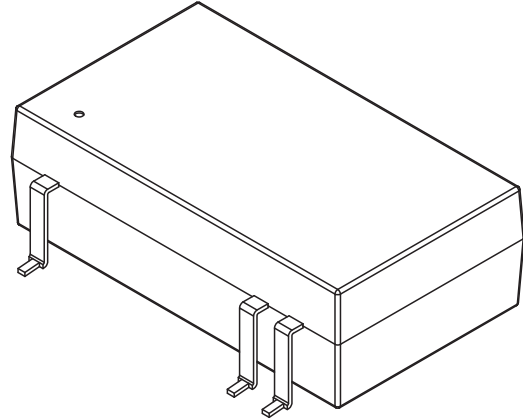
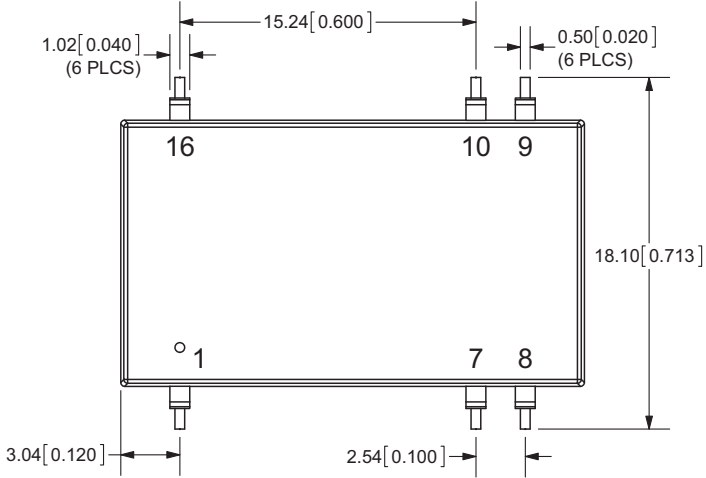
| parameter                | conditions/description       | min        | typ | max      | units                                |
|--------------------------|------------------------------|------------|-----|----------|--------------------------------------|
| operating temperature    | 300/350 mA<br>500/600/700 mA | -40<br>-40 |     | 85<br>71 | $^\circ\text{C}$<br>$^\circ\text{C}$ |
| storage temperature      |                              | -55        |     | 125      | $^\circ\text{C}$                     |
| maximum case temperature |                              |            |     | 100      | $^\circ\text{C}$                     |

## MECHANICAL

| parameter     | conditions/description                          | min | typ | max | units |
|---------------|---|-----|-----|-----|-------|
| dimensions    | 0.94 x 0.71 x 0.31 inch (23.86 x 18.1 x 8.0 mm) |     |     |     |       |
| case material | epoxy resin (UL94-V0)                           |     |     |     |       |
| weight        |   |     | 6   |     | g     |

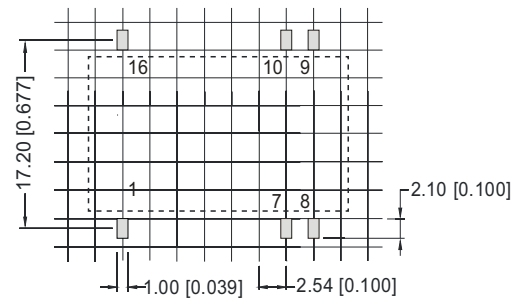
## MECHANICAL DRAWING

unit: mm(inch)  
 Pin tolerances:  $\pm 0.10\text{mm}(\pm 0.039\text{inch})$   
 General tolerances:  $\pm 0.25\text{mm}(\pm 0.010\text{inch})$



| PIN CONNECTIONS |                |
|-----------------|----------------|
| Pin             | Function       |
| 1               | GND            |
| 7               | ON/OFF/PWM     |
| 8               | -Vout          |
| 9               | +Vout          |
| 10              | analog dimming |
| 16              | Vin            |

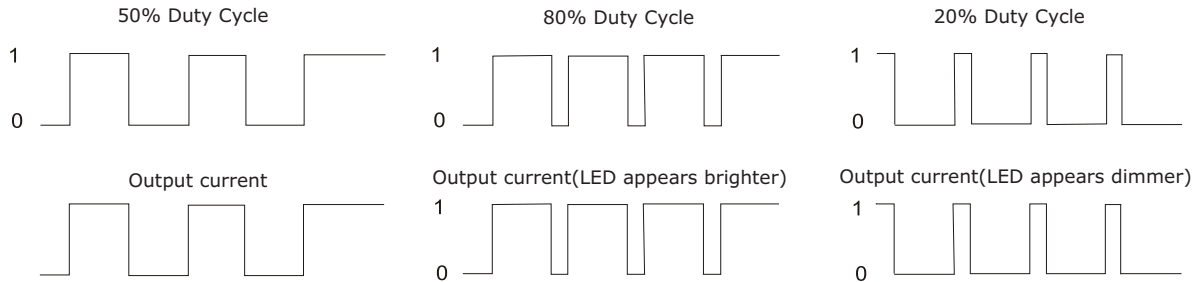
## RECOMMENDED FOOTPRINT (TOP VIEW)



grid: 2.54 x 2.54 mm

## APPLICATION NOTES

### 1. Digital Dimming Control



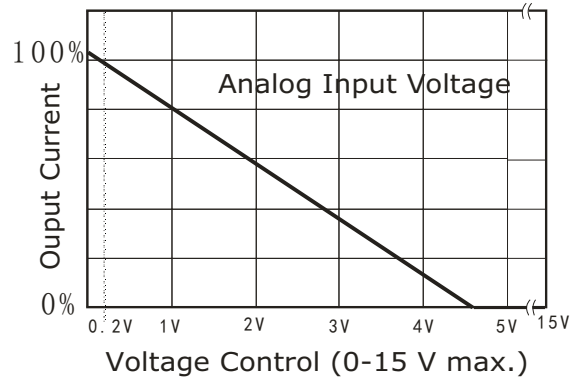
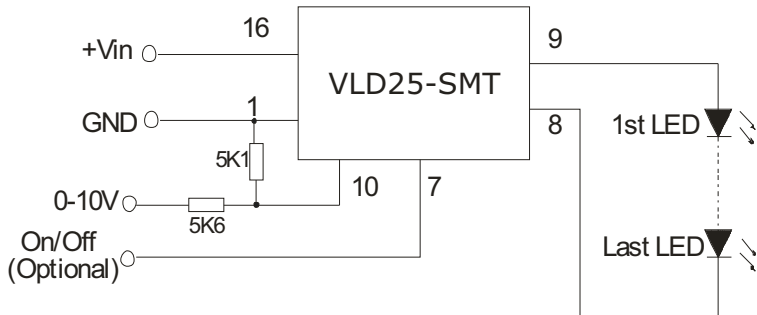
For the rated frequency PWM dimming, the output current of driver matters to the pulse width of the PWM signal, and the numerate please refer to the following formula:

$$I_{o,set} = \frac{(DT-0.6)}{T} I_{o,nom}$$

$I_{o,set}$  refers to the expected output current value.  
 $I_{o,nom}$  refers to the rated output current  
 $D$  refers to the pulse width of the PWM signal  
 $T$  refers to the cycle of the PWM signal

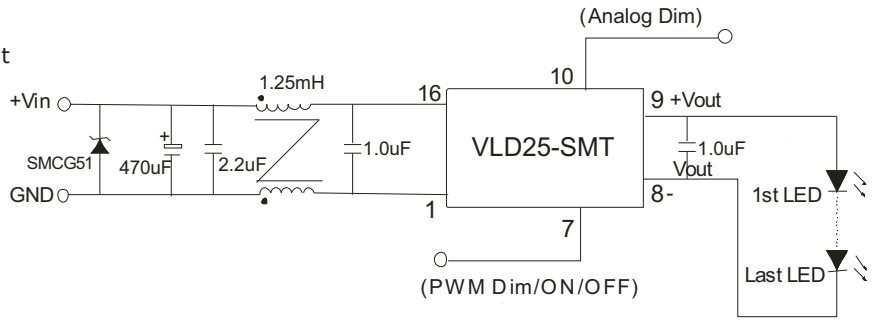
Note: The formula only supplies as a reference, and the output current may be a little deviation with different load. The  $T_{on(min)}$  of PWM signal must be greater than 0.7ms, or the driver can't be operated normally. It is natural for the driver to generate an audibly noise in dimming process, because the frequency of the control circuit is within human audibly range (20Hz~20kHz). In order to avoid the human eye can observe the LED flashes, the PWM dimming frequency is recommended to set above 100Hz.

### 2. Analog Dimming Control and Application Example

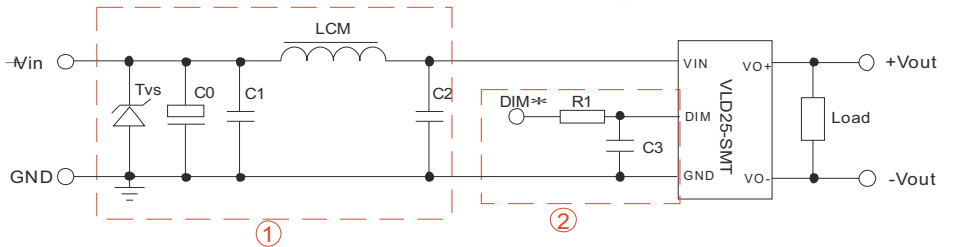


### 3. EMC Recommended Circuit

EMI/RFI conducted EN55022 recommended circuit



EMI/EMC recommended circuit

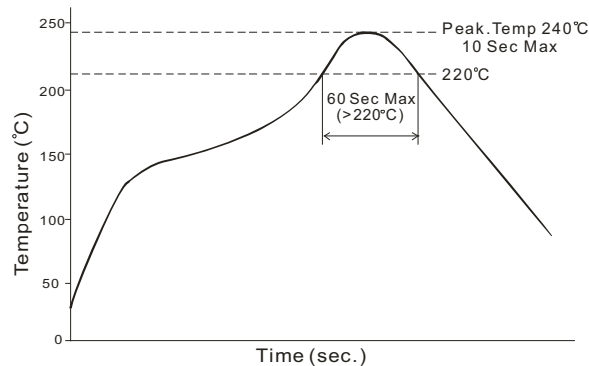


- Notes: 1. DIM pin is the module's PWM dimming pin  
2. While adding circuit, it may extend the PWM dimming output reaction time

| EMI/EMC STANDARD |                    |            |               |                             |
|------------------|--------------------|------------|---------------|-----------------------------|
| ITEM             | STANDARD           | LEVEL      | PREDICATE     | REMARK                      |
| EMI conducted    | EN 55015           | power port | qualification | add external circuit 1      |
| ESD              | IEC 61000-4-2:2001 | level 2    | B             | +4kV add external circuit 2 |
| Surge            | IEC 61000-4-5:2004 | level 2    | B             | +1kV add external circuit 1 |
| EFT              | IEC 61000-4-4:2004 | level 2    | B             | +1kV add external circuit 1 |

| RECOMMENDED PARAMETERS |  |
|------------------------|--|
| COMPONENTS             | SPECIFICATIONS   |
| Tvs                    | SMCJ48A, 1500 W (Bringtking)                                       |
| LCM                    | 6.8 $\mu$ H CD43 (CEAIYA)  |
| C0                     | 470 $\mu$ F / 50 V (CapXon)  |
| C1                     | 4.7 $\mu$ F / 50 V 1210 (TORCH)                                    |
| C2                     | 2.2 $\mu$ F / 50 V 1210 (TORCH)                                    |
| C3                     | 470 PF / 100 V 0805 (TORCH)  |
| R1                     | 680 $\Omega$ 0805 (can be replaced by inductance or magnetic bead) |

### 4. Recommended Reflow Soldering Profile



## REVISION HISTORY

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| rev. | description                 | date       |
|------|-----------------------------|------------|
| 1.0  | initial release             | 02/20/2012 |
| 1.01 | V-Infinity branding removed | 09/07/2012 |
| 1.02 | added TR package option     | 11/01/2012 |

The revision history provided is for informational purposes only and is believed to be accurate.



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