

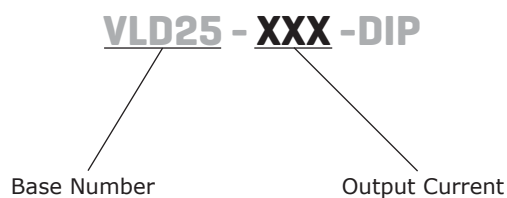

**SERIES:** VLD25-DIP | **DESCRIPTION:** LED DRIVER

**FEATURES**

- power LED driver
- wide input and output voltage range
- DIP package
- constant current output
- PWM dimming and analog dimming
- short circuit protection
- high efficiency up to 95%



| 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-DIP             | 5.5 ~ 46                   | 3.3 ~ 36                  | 0 ~ 300                      | 120             | PWM+analog         |
| VLD25-350-DIP | 5.5 ~ 46                  | 3.3 ~ 36                   | 0 ~ 350                   | 120                          | PWM+analog      | 95                 |
| VLD25-500-DIP | 5.5 ~ 46                  | 3.3 ~ 36                   | 0 ~ 500                   | 120                          | PWM+analog      | 95                 |
| VLD25-600-DIP | 5.5 ~ 46                  | 3.3 ~ 36                   | 0 ~ 600                   | 120                          | PWM+analog      | 95                 |
| VLD25-700-DIP | 5.5 ~ 46                  | 3.3 ~ 36                   | 0 ~ 700                   | 120                          | PWM+analog      | 95                 |

**PART NUMBER KEY**


## INPUT

| parameter                           | conditions/description             | min  | typ                                   | max  | units |
|-------------------------------------|------------------------------------|------|---------------------------------------|------|-------|
| operating input voltage             | absolute max before device failure | 5    |                                       | 55   | Vdc   |
|                                     | operating input range              | 5.5  | 24                                    | 46   | Vdc   |
| quiescent input current in off mode | Vin = 24 V, Vc < 0.6 V             |      | 400                                   |      | µA    |
| filter                              | capacitor                          |      | 1                                     |      | µF    |
| remote on/off                       | dc-dc ON<br>dc-dc OFF              |      | open or 2.8 V < Vc < 6V<br>Vc < 0.6 V |      |       |
| remote pin current                  | Vc = 5V                            |      |                                       | 1    | mA    |
| PWM frequency                       |                                    |      |                                       | 0.2  | kHz   |
| input voltage - analog dimming      | Vin = 5.5 ~ 4.6 V                  | 0    |                                       | 15   | V     |
| control voltage - analog dimming    | full on                            | 0.15 | 0.20                                  | 0.25 | V     |
|                                     | full off                           | 4.3  | 4.5                                   | 4.7  | V     |
| driving current - analog dimming    | Vc = 5 V                           |      |                                       | 0.2  | A     |

## OUTPUT

| parameter                             | conditions/description        | min | typ | max    | units |
|---------------------------------------|-------------------------------|-----|-----|--------|-------|
| voltage range                         | Vin = 46 V, Vo = 3.3 V ~ 36 V | 3.3 |     | 36     | Vdc   |
| voltage drop                          | Vin = 5.5 ~ 46 V, 1 ~ 10 LED  | 2   | 3   | 4      | Vdc   |
| current accuracy                      | 300~600 mA                    |     | ±3  | ±5     | %     |
|                                       | 700 mA                        |     | ±5  | ±7     | %     |
| output current range - analog dimming | Vin = 5.5 ~ 46 V, 1 ~ 10 LED  | 0   |     | 100    | %     |
| current stability                     | Vin = 46 V, Vo = 3.3 V ~ 36 V |     |     | ±1     | %     |
| temperature coefficient               | -40 ~ 71°C ambient            |     |     | ±0.015 | %/°C  |
| capacitive load                       |                               |     |     | 1,000  | µF    |

## PROTECTIONS

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

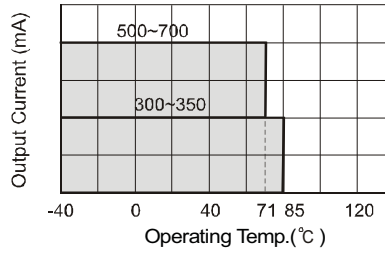
## SAFETY AND COMPLIANCE

| parameter      | conditions/description   | min | typ | max | units |
|----------------|--|-----|-----|-----|-------|
| EMI/EMC        | EN 55015 power port, CISPR22 Class B, 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             | -40 |     | 85  | °C    |
|                          | 500/600/700 mA         | -40 |     | 71  | °C    |
| storage temperature      |                        | -55 |     | 125 | °C    |
| maximum case temperature |                        |     |     | 100 | °C    |

## DERATING CURVE



## MECHANICAL

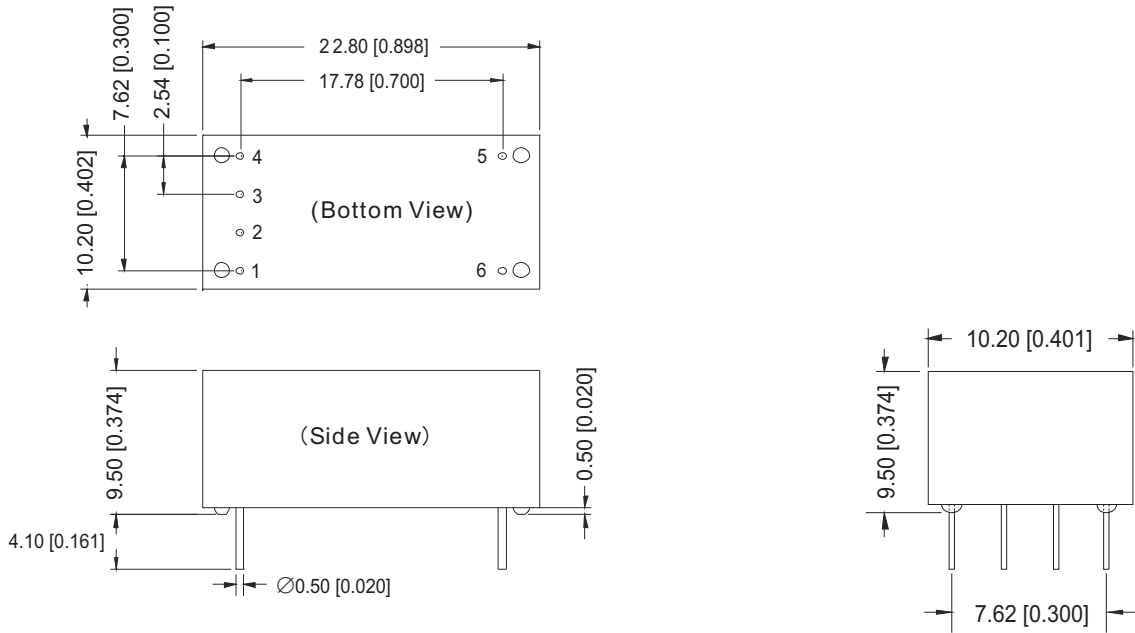
| parameter     | conditions/description                                | min | typ | max | units |
|---------------|---|-----|-----|-----|-------|
| dimensions    | 0.898 x 0.402 x 0.535 inch (22.80 x 10.20 x 13.60 mm) |     |     |     |       |
| case material | epoxy resin (UL94-V0)                                 |     |     |     |       |
| weight        |   |     | 4.3 |     | g     |

## MECHANICAL DRAWING

unit: mm(inch)

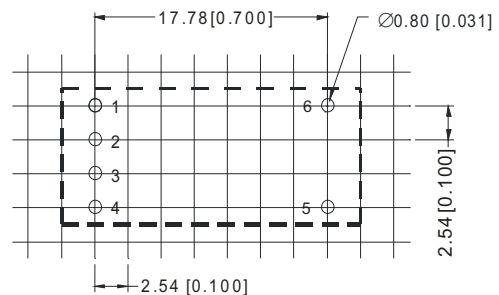
Pin tolerances: ±0.10mm(±0.039inch)

General tolerances: ±0.25mm(±0.010inch)



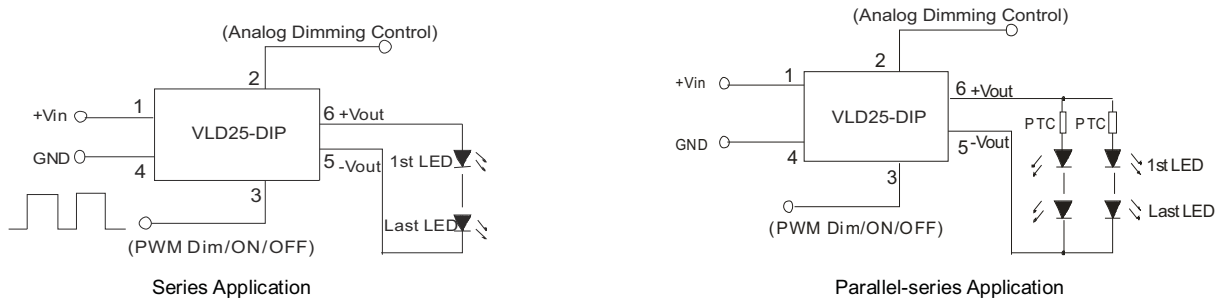
| PIN CONNECTIONS |                |
|-----------------|----------------|
| Pin             | Function       |
| 1               | Vin            |
| 2               | analog dimming |
| 3               | ON/OFF/PWM     |
| 4               | GND            |
| 5               | -Vout          |
| 6               | +Vout          |

## RECOMMENDED FOOTPRINT (TOP VIEW)



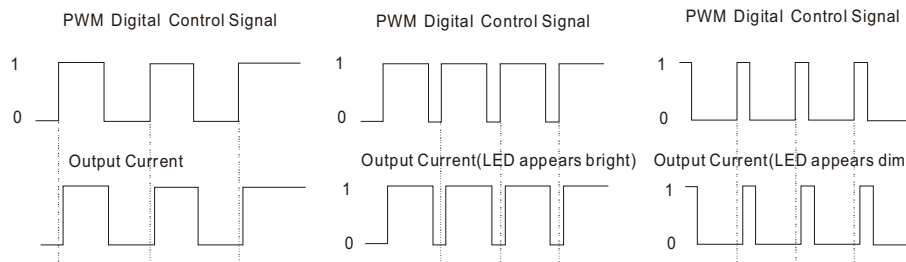
## APPLICATION NOTES

### 1. Typical Application Circuits



To protect the LED(s), you could connect a PTC to input of all channels as shown in application circuit.  
 Note: Negative output terminal should not connected to GND. Module may be damaged.

### 2. Digital Dimming Control



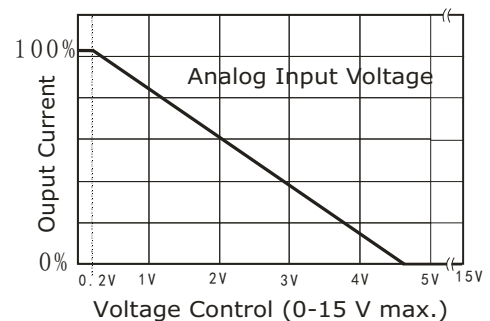
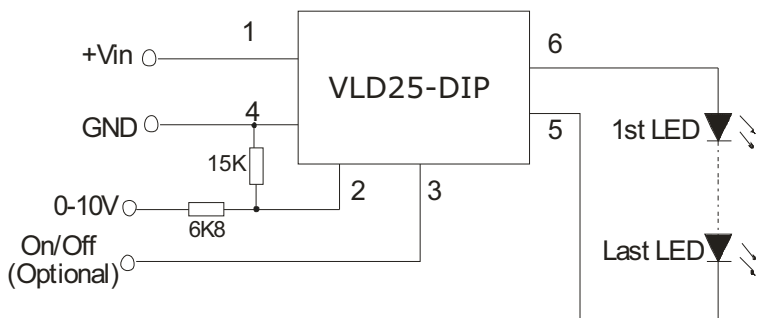
Formula for output current:

$$I_{o,set} = \frac{(DT-0.8)}{T} I_{o,norm}$$

$I_{o,set}$  refers to the expected output current value.  
 $I_{o,norm}$  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

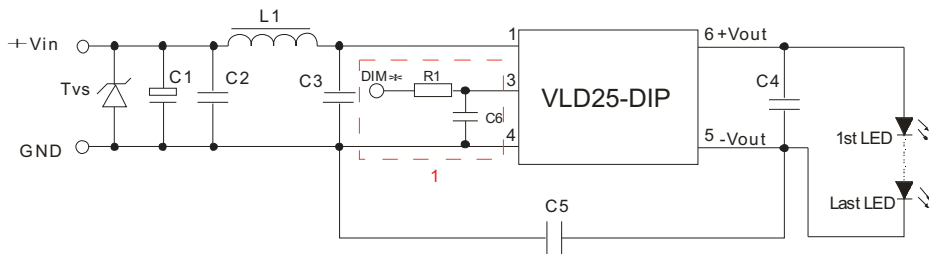
Note: This formula is only supplied as a reference and the output current may be deviated from for different load conditions. The Ton(min) of PWM signal must be greater than 0.8ms, otherwise the driver cannot be operated normally. It is natural for the driver to generate audible noise during dimming process because the frequency of the control circuit is within human audible range (20Hz~20kHz). In order to make the LED flashes not visible to human eye, the PWM dimming frequency is recommended to be set above 100Hz. PWM curve (Vin=24 V, 5 LEDs)

### 3. Analog Dimming Control and Application Example



4. EMC Recommended Circuit

EMI/EMC recommended circuit



| RECOMMENDED PARAMETERS |   |
|------------------------|---|
| COMPONENTS             | SPECIFICATIONS  |
| Tvs                    | SMC51A, 1500 W (ON)   |
| L1                     | CD53-82 $\mu$ H (CEAIYA)  |
| C1                     | 470 $\mu$ F/100V (NCC)  |
| C2                     | 225K/50V 1210 X7R (TORCH)   |
| C3                     | 104K/50V 0805 X7R (TORCH)   |
| C4                     | 105K/50V 0805 X7R (TORCH)   |
| C5                     | 102K/2000V 1210 (TDK)   |
| C6                     | 470pF/100V 0805 (TORCH)   |
| R1                     | 680 $\Omega$ 0805<br>(can be replaced by inductance or magnetic bead) |

## REVISION HISTORY

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| rev. | description         | date       |
|------|---------------------|------------|
| 1.0  | initial release     | 10/15/2012 |
| 1.01 | misc. updates       | 11/02/2012 |
| 1.02 | added product photo | 11/28/2012 |

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

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