

**SERIES:** VFK600-DIN | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

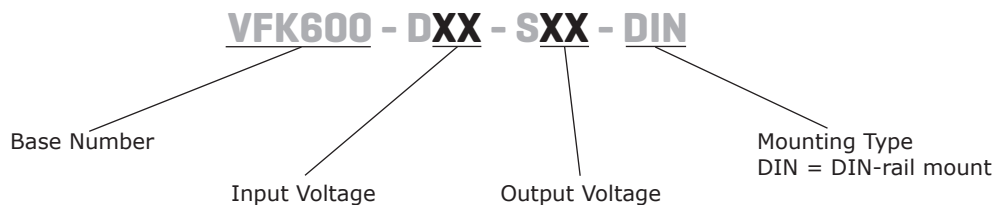
- up to 700 W isolated output
- rugged metal enclosure with integrated heat sink
- 2:1 input range (18~36 Vdc, 36~75 Vdc)
- single output from 12~48 Vdc
- 1,500 Vdc isolation
- over current, over temperature, over voltage, and short circuit protections
- remote on/off
- N+1 current sharing
- efficiency up to 92%
- comes with DIN-rail mount



| MODEL              | input voltage range | output voltage | output current | output power | ripple and noise <sup>1</sup> | efficiency |
|--------------------|---------------------|----------------|----------------|--------------|-------------------------------|------------|
|                    | (Vdc)               | (Vdc)          | max (A)        | max (W)      | max (mVp-p)                   | typ (%)    |
| VFK600-D24-S12-DIN | 18 ~ 36             | 12             | 50             | 600          | 120                           | 89         |
| VFK600-D24-S24-DIN | 18 ~ 36             | 24             | 25             | 600          | 240                           | 91         |
| VFK600-D24-S28-DIN | 18 ~ 36             | 28             | 21.5           | 600          | 280                           | 90         |
| VFK600-D24-S32-DIN | 18 ~ 36             | 32             | 19             | 608          | 320                           | 91         |
| VFK600-D24-S48-DIN | 18 ~ 36             | 48             | 12.5           | 600          | 480                           | 92         |
| VFK600-D48-S12-DIN | 36 ~ 75             | 12             | 50             | 600          | 120                           | 90         |
| VFK600-D48-S24-DIN | 36 ~ 75             | 24             | 25             | 600          | 240                           | 91         |
| VFK600-D48-S28-DIN | 36 ~ 75             | 28             | 25             | 700          | 280                           | 91         |
| VFK600-D48-S32-DIN | 36 ~ 75             | 32             | 19             | 608          | 320                           | 92         |
| VFK600-D48-S48-DIN | 36 ~ 75             | 48             | 12.5           | 600          | 480                           | 92         |

Notes: 1. Ripple and noise are measured at full load, 20 MHz BW with 10µF tantalum capacitor and 1µF ceramic capacitor across output

**PART NUMBER KEY**



## INPUT

| parameter               | conditions/description  | min   | typ  | max | units |     |
|-------------------------|---|---|------|-----|-------|-----|
| operating input voltage | 24 Vdc input models   | 18  | 24   | 36  | Vdc   |     |
|                         | 48 Vdc input models   | 36  | 48   | 75  | Vdc   |     |
| input current           | 24 Vdc input models, Vin = 18 Vdc, full load                                      |   | 37.7 |     | A     |     |
|                         | 48 Vdc input models, Vin = 36 Vdc, full load                                      |   | 21.7 |     | A     |     |
| under voltage shutdown  | 24 Vdc input  | power up  | 16   | 17  | 18    | Vdc |
|                         |   | power down  | 15   | 16  | 17    | Vdc |
|                         | 48 Vdc input  | power up  | 34   | 35  | 36    | Vdc |
|                         |   | power down  | 32   | 33  | 34    | Vdc |
| over voltage shutdown   | 24 Vdc input  | power up  |      | 38  | Vdc   |     |
|                         |   | power down  |      | 40  | Vdc   |     |
|                         | 48 Vdc input  | power up  |      | 77  | Vdc   |     |
|                         |   | power down  |      | 80  | Vdc   |     |
| CTRL <sup>1</sup>       | positive logic  | models ON (3.5~7.5 Vdc or open circuit)<br>models OFF (0~0.7 Vdc) |      |     |       |     |
| input fuse              | 60 A time delay fuse for 24 Vin models,<br>30 A time delay fuse for 48 Vin models |   |      |     |       |     |
| filter                  | pi filter   |   |      |     |       |     |

Note: 1. Open collector refer to -Vin.

## OUTPUT

| parameter               | conditions/description               | min | typ   | max    | units |
|-------------------------|--------------------------------------|-----|-------|--------|-------|
| maximum capacitive load | 12 V output models                   | 470 |       | 10,000 | μF    |
|                         | 24~48 V output models                | 470 |       | 5,000  | μF    |
| line regulation         | measured from low line to high line  |     |       | ±0.2   | %     |
| load regulation         | measured from zero load to full load |     |       | ±0.5   | %     |
| voltage accuracy        |                                      |     |       | ±1.5   | %     |
| load share accuracy     | 50~100% load                         |     | ±10   |        | %     |
| adjustability           |                                      | 60  |       | 110    | %     |
| switching frequency     | 48 V input, 12/28/32 V output models |     | 300   |        | kHz   |
|                         | all other models                     |     | 250   |        | kHz   |
| transient response      | 25% step load change                 |     |       | 500    | μs    |
| temperature coefficient |                                      |     | ±0.03 |        | %/°C  |

## PROTECTIONS

| parameter                   | conditions/description   | min | typ | max | units |
|-----------------------------|--------------------------|-----|-----|-----|-------|
| short circuit protection    | continuous               |     |     |     |       |
| over current protection     | % nominal output current | 110 |     | 150 | %     |
| over voltage protection     | %Vo                      | 115 |     | 140 | %     |
| over temperature protection | shutdown                 |     | 110 |     | °C    |

## SAFETY AND COMPLIANCE

| parameter            | conditions/description  | min   | typ | max | units |
|----------------------|---|-------|-----|-----|-------|
| isolation voltage    | for 1 minute: input to output; input to case;<br>output to case | 1,500 |     |     | Vdc   |
| isolation resistance |   | 10    |     |     | MΩ    |
| RoHS                 | 2011/65/EU (CE)   |       |     |     |       |

## ENVIRONMENTAL

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves    | -40 |     | 85  | °C    |
| storage temperature   |                        | -55 |     | 105 | °C    |

## MECHANICAL

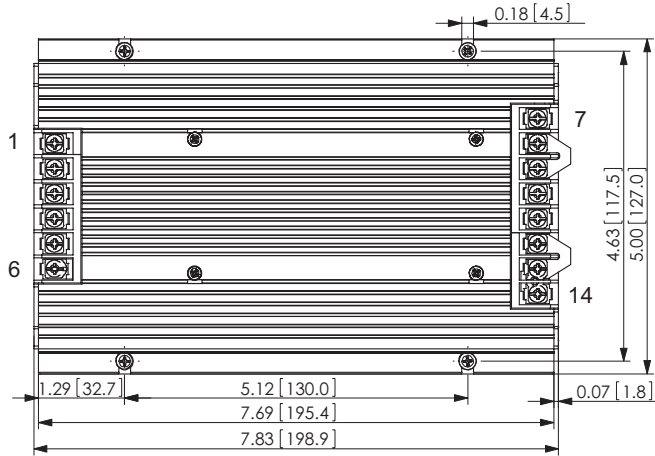
| parameter     | conditions/description                       | min | typ  | max | units |
|---------------|--|-----|------|-----|-------|
| dimensions    | 7.83 x 5.00 x 2.11 (199.0 x 127.0 x 53.6 mm) |     |      |     | inch  |
| case material | steel and aluminum extrusion                 |     |      |     |       |
| weight        |  |     | 1.53 |     | kg    |

## MECHANICAL DRAWING

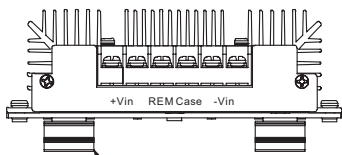
units: mm[inch]  
 tolerance: X.XX = ±0.02[±0.5]  
 X.XXX = ±0.010[±0.25]

wire range: 22~12 AWG  
 screw size: #6-32  
 mounts to TS35 rails

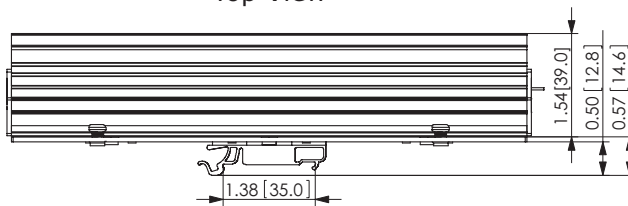
| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | FUNCTION |
| 1, 2            | +Vin     |
| 3               | REM      |
| 4               | case     |
| 5, 6            | -Vin     |
| 7, 8            | +Vo      |
| 9               | +S       |
| 10              | PC       |
| 11              | Trim     |
| 12              | -S       |
| 13, 14          | -Vo      |



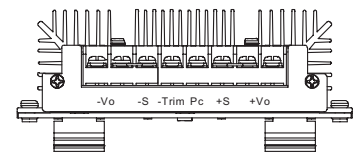
Top View



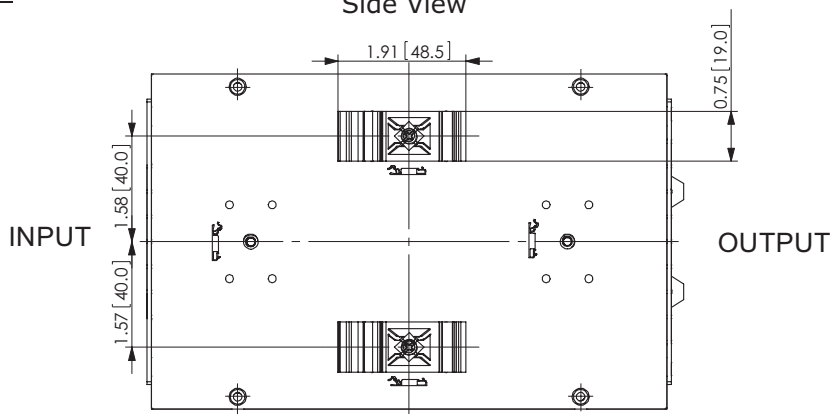
Front View



Side View



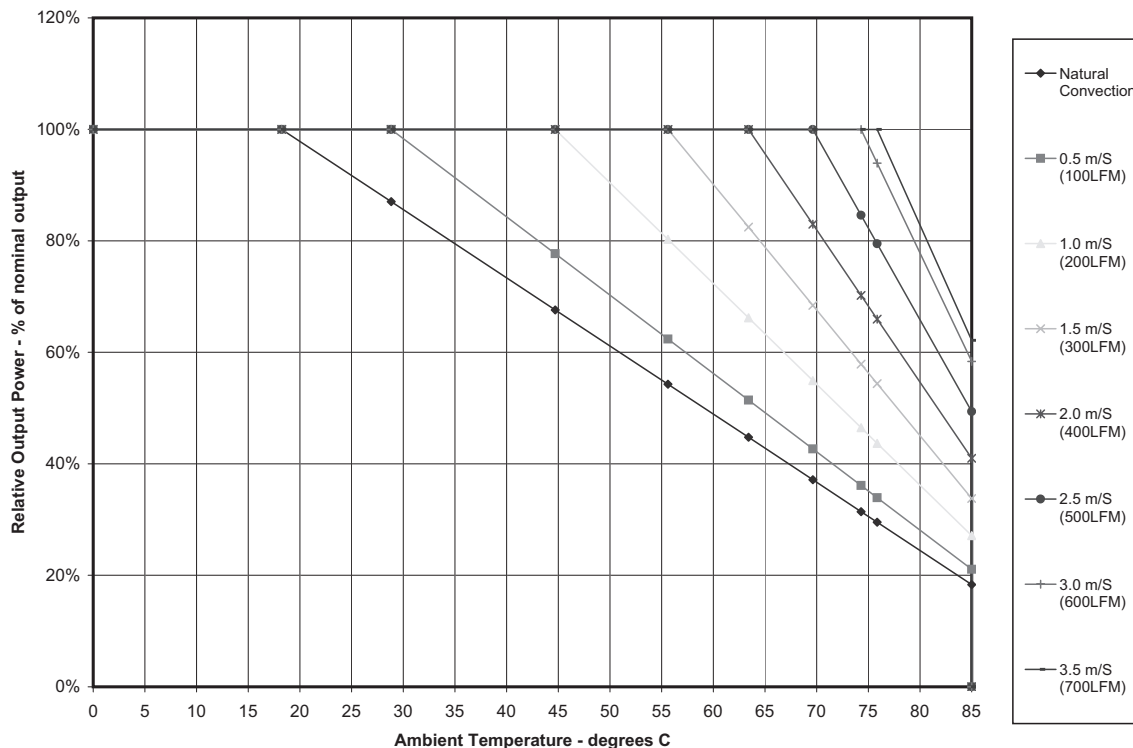
Back View



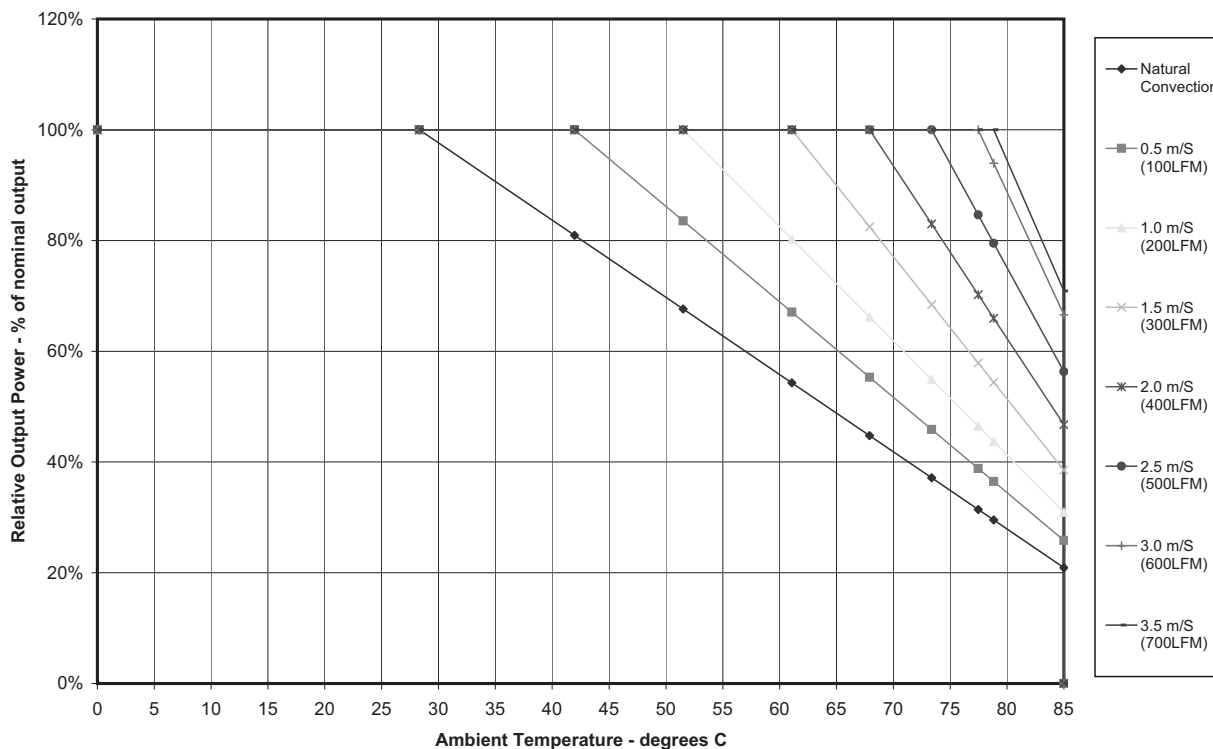
Bottom View

## DERATING CURVES

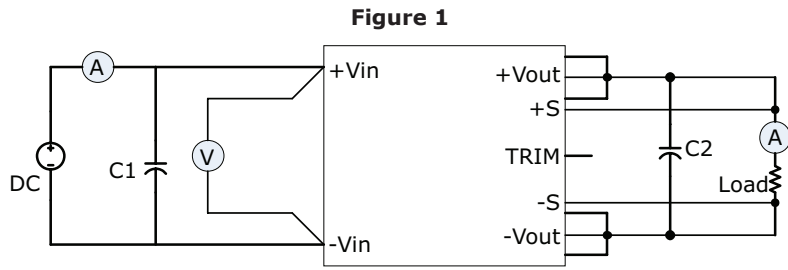
VFK600-DIN Power Derating Curves At Nominal Input  
(Includes 24 V input, 12/24/28 V output models and VFK600-D48-S12-DIN)



VFK600-DIN Power Derating Curves At Nominal Input  
(Includes 24 V input, 32/48 V output models and 48 V input, 24/28/32/48 V output models)



## TEST CONFIGURATION



**Table 1**

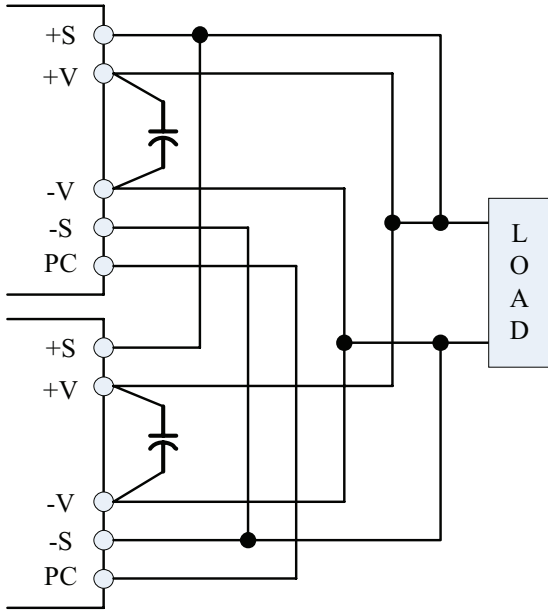
| Recommended External components |                   |
|---------------------------------|-------------------|
| C1                              | 220 $\mu$ F/100 V |
| C2                              | 470 $\mu$ F/100 V |

## APPLICATION NOTES

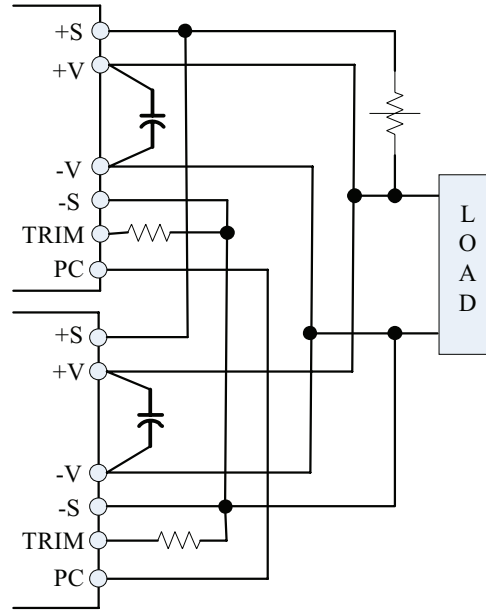
### 1. Parallel Operation

The VFK600-DIN series are designed for parallel operation. When in parallel the load current can be shared equally between the two modules by connecting their PC pins. The VFK600-DIN can be setup in two different modes to achieve parallel operation. The standard parallel operation is suitable when load cannot be handled by a single unit, whereas the N+1 redundant operation is suitable for loads when backup power is required.

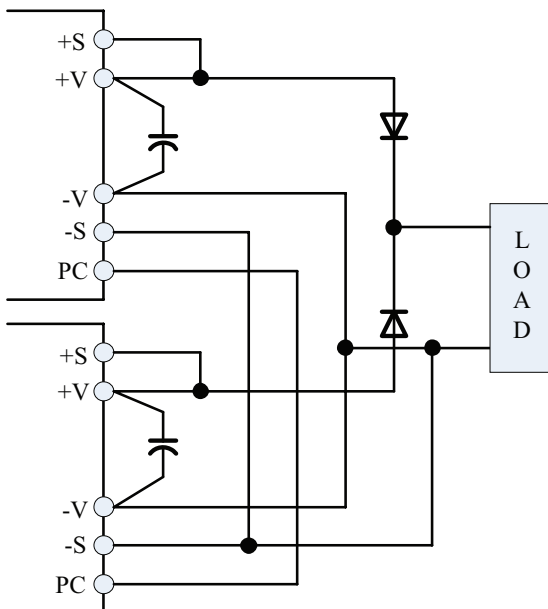
### STANDARD PARALLEL CONNECTION



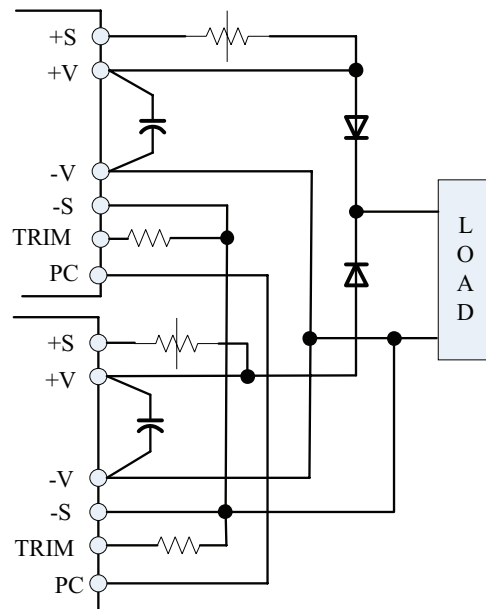
### PARALLEL CONNECTION WITH PROGRAMMED AND ADJUSTABLE OUTPUT



### N+1 REDUNDANT CONNECTION



### N+1 REDUNDANT CONNECTION WITH PROGRAMMED OUTPUT AND ADJUSTABLE OUTPUT VOLTAGE

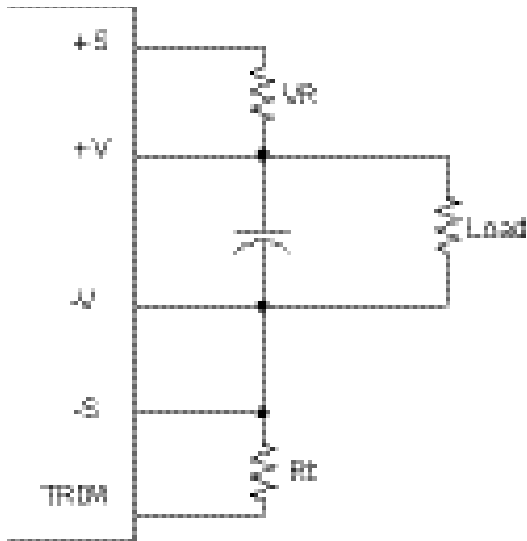


## APPLICATION NOTES (CONTINUED)

### 2. Output Voltage Trimming

Leave open if not used.

**Figure 2**  
External Resistors



#### Trim-Up/Trim-Down Formulas

$$V_f = \frac{1.24 \times \left( \frac{R_t \times 33}{R_t + 33} \right)}{7.68 + \left( \frac{R_t \times 33}{R_t + 33} \right)}$$

$$V_{out} = (V_o + V_R) \times V_f$$

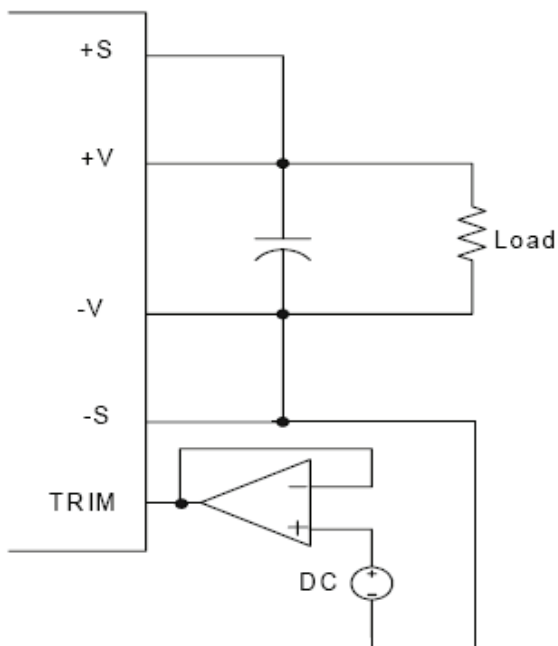
Note:  $R_t = 6.8 \text{ K}\Omega$

$V_o$  is the nominal output voltage

$V_{OUT}$  is the desired output voltage (up or down)

$V_R$  is the trim resistor in  $\text{K}\Omega$

**Figure 3**  
External DC Voltage



#### Trim-Up/Trim-Down Formulas

$$V_{out} = V_T \times V_o$$

Note:  $V_T$  is the trim terminal voltage

$V_o$  is the nominal output voltage

$V_{OUT}$  is the desired output voltage (up or down)

Note: 1. All specifications measured at nominal line, full load, and 25°C unless otherwise specified.

## REVISION HISTORY

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| <b>rev.</b> | <b>description</b>     | <b>date</b> |
|-------------|------------------------|-------------|
| 1.0         | initial release        | 12/17/2013  |
| 1.01        | changed DIN-rail mount | 06/16/2014  |

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



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