

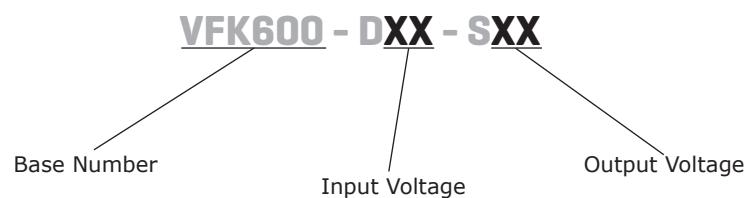
**SERIES: VFK600 | DESCRIPTION: DC-DC CONVERTER**
**FEATURES**

- 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%



| MODEL          | input<br>voltage<br>range<br>(Vdc) | output<br>voltage<br>(Vdc) | output<br>current<br>max<br>(A) | output<br>power<br>max<br>(W) | ripple<br>and noise <sup>1</sup><br>max<br>(mVp-p) | efficiency<br>typ<br>(%) |
|----------------|------------------------------------|----------------------------|---------------------------------|-------------------------------|----------------------------------------------------|--------------------------|
| VFK600-D24-S12 | 18 ~ 36                            | 12                         | 50                              | 600                           | 120                                                | 89                       |
| VFK600-D24-S24 | 18 ~ 36                            | 24                         | 25                              | 600                           | 240                                                | 91                       |
| VFK600-D24-S28 | 18 ~ 36                            | 28                         | 21.5                            | 600                           | 280                                                | 90                       |
| VFK600-D24-S32 | 18 ~ 36                            | 32                         | 19                              | 608                           | 320                                                | 91                       |
| VFK600-D24-S48 | 18 ~ 36                            | 48                         | 12.5                            | 600                           | 480                                                | 92                       |
| VFK600-D48-S12 | 36 ~ 75                            | 12                         | 50                              | 600                           | 120                                                | 90                       |
| VFK600-D48-S24 | 36 ~ 75                            | 24                         | 25                              | 600                           | 240                                                | 91                       |
| VFK600-D48-S28 | 36 ~ 75                            | 28                         | 25                              | 700                           | 280                                                | 91                       |
| VFK600-D48-S32 | 36 ~ 75                            | 32                         | 19                              | 608                           | 320                                                | 92                       |
| VFK600-D48-S48 | 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) |     |      |     |       |
|                         |                                                                                   | 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    | 199.14 x 126.75 x 39.12 (7.84 x 4.99 x 1.54 inch) |     |     |     | mm    |
| case material | steel and aluminum extrusion                      |     |     |     |       |
| weight        |                                                   |     | 1.2 |     | kg    |

## MECHANICAL DRAWING

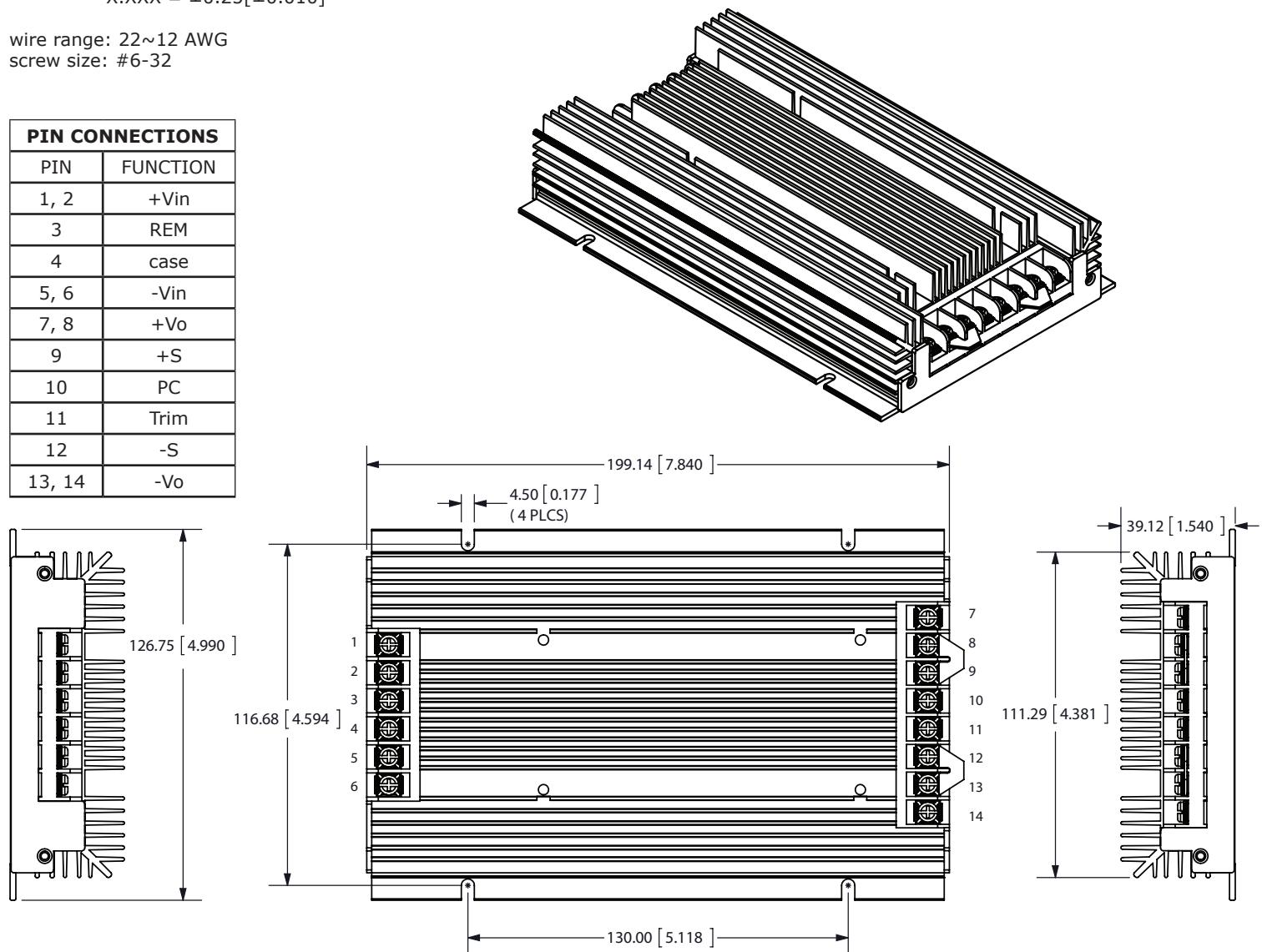
units: mm[inch]

tolerance: X.XX =  $\pm 0.5[\pm 0.02]$ X.XXX =  $\pm 0.25[\pm 0.010]$ 

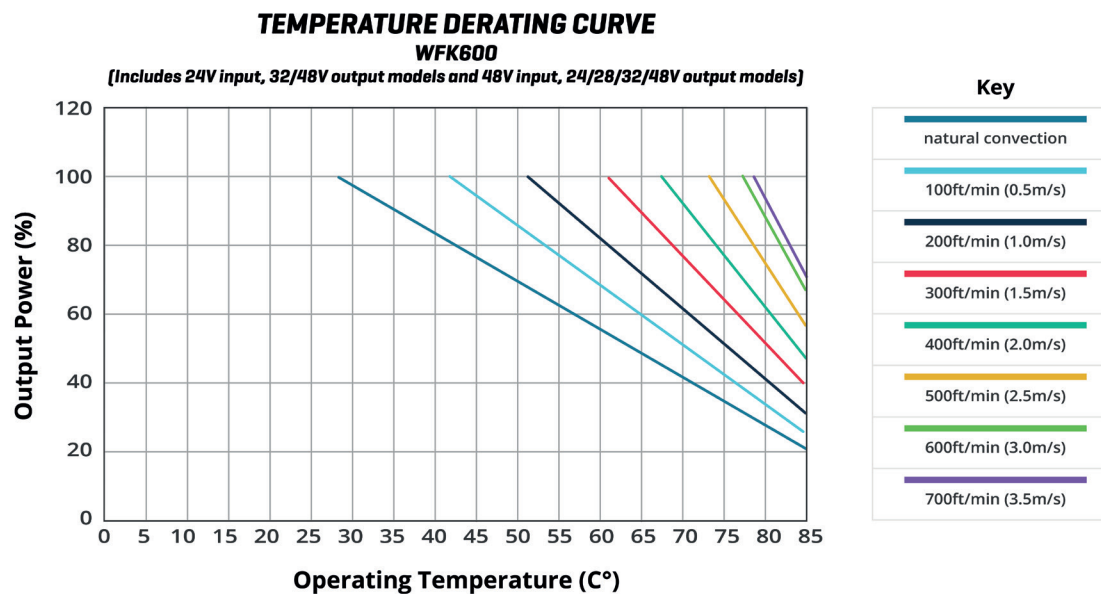
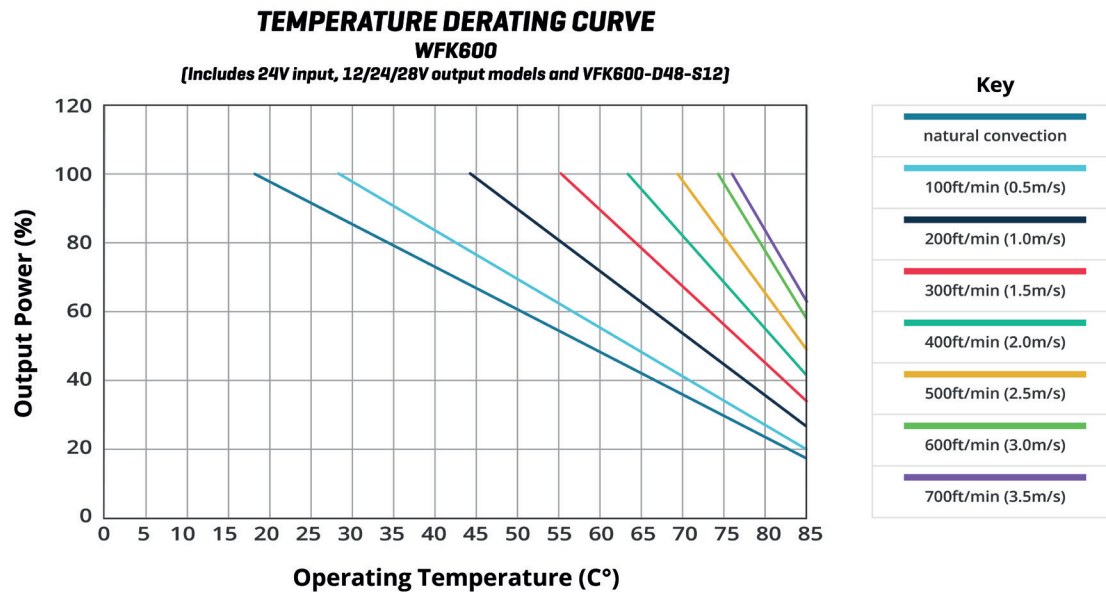
wire range: 22~12 AWG

screw size: #6-32

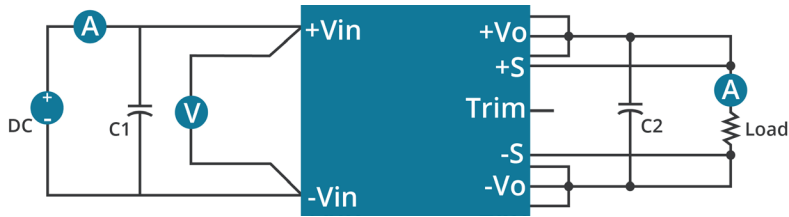
| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | FUNCTION |
| 1, 2            | +Vin     |
| 3               | REM      |
| 4               | case     |
| 5, 6            | -Vin     |
| 7, 8            | +Vo      |
| 9               | +S       |
| 10              | PC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



## DERATING CURVES



## TEST CONFIGURATION

**Figure 1****Table 1**

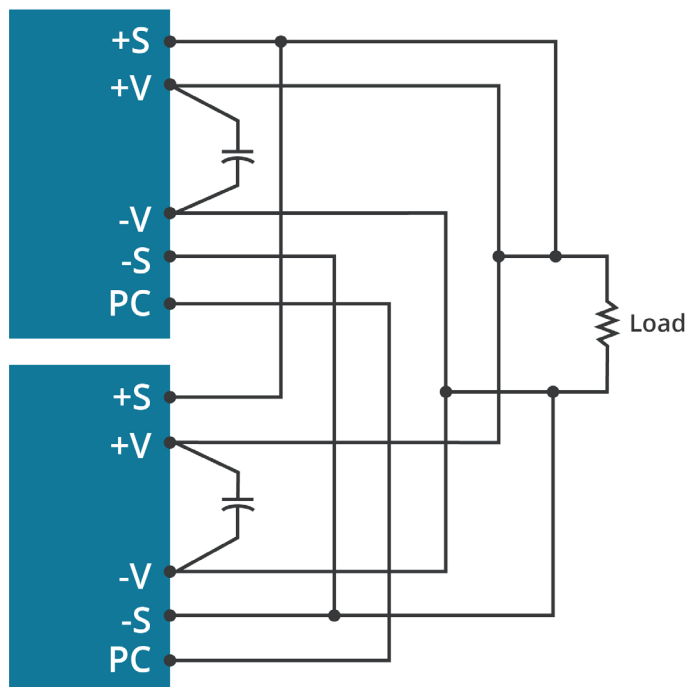
| Recommended External components |                   |
|---------------------------------|-------------------|
| C1                              | 220 $\mu$ F/100 V |
| C2                              | 470 $\mu$ F/100 V |

## APPLICATION NOTES

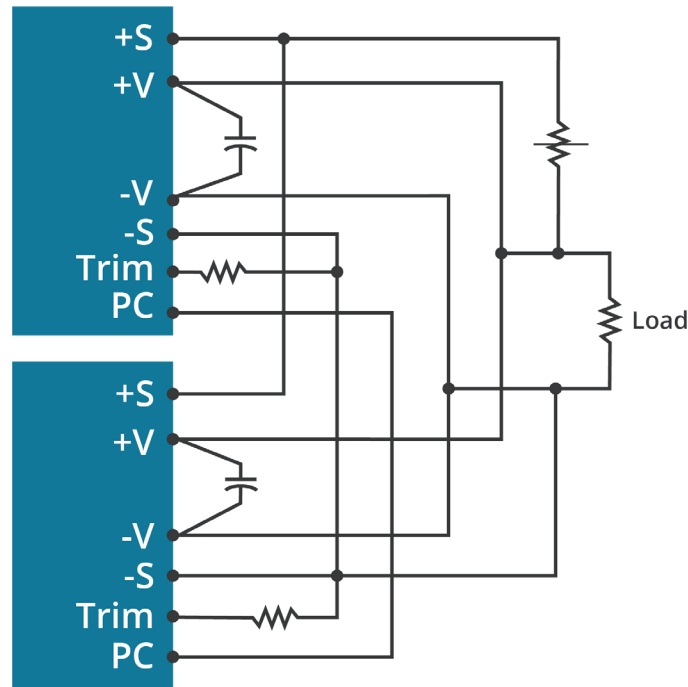
### 1. Parallel Operation

The VFK600 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 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.

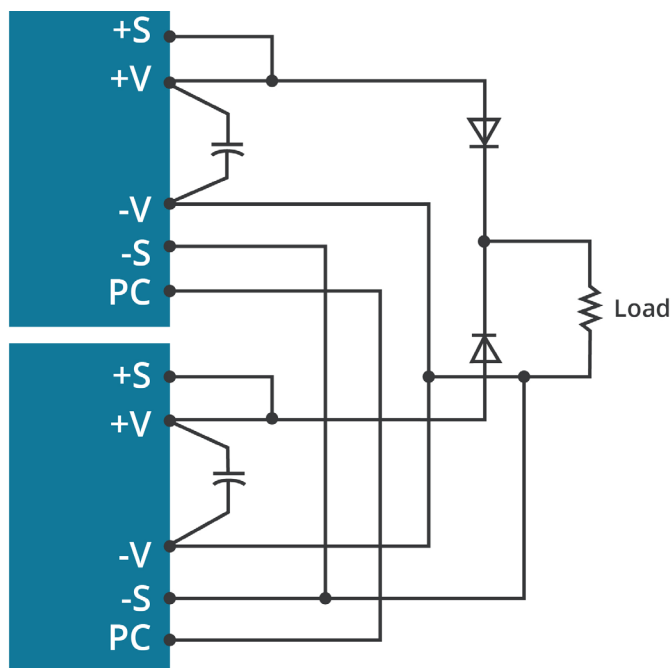
#### STANDARD PARALLEL CONNECTION



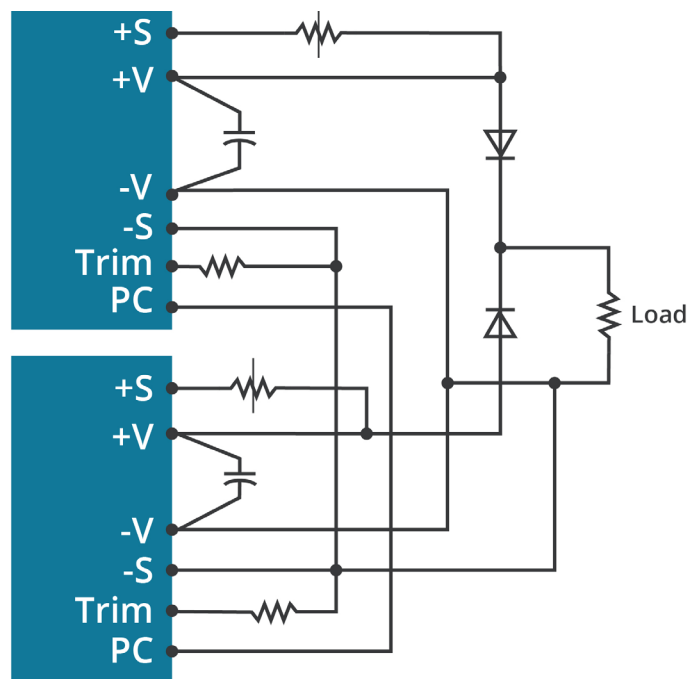
#### PARALLEL CONNECTION WITH PROGRAMMED AND ADJUSTABLE OUTPUT



#### N+1 REDUNDANT CONNECTION



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



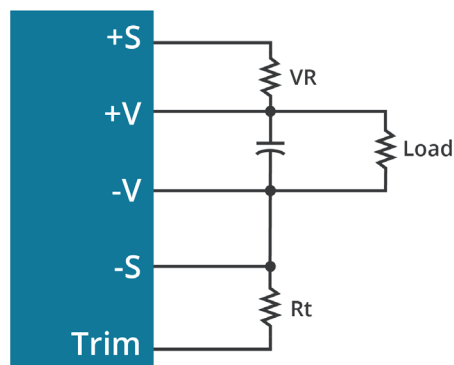
## APPLICATION NOTES (CONTINUED)

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

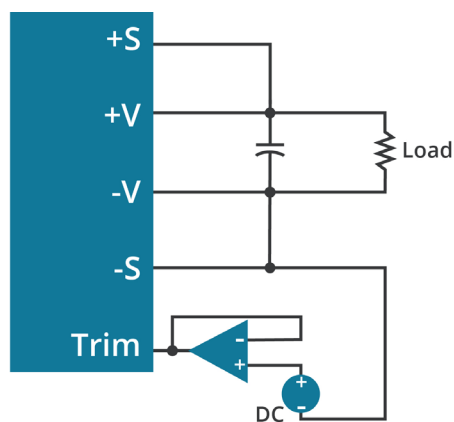
$V_o$  is the nominal output voltage

$V_{out}$  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)

## REVISION HISTORY

| rev. | description                                       | date       |
|------|---------------------------------------------------|------------|
| 1.0  | initial release                                   | 11/04/2011 |
| 1.01 | derating curves added                             | 03/12/2012 |
| 1.02 | V-Infinity branding removed                       | 08/07/2012 |
| 1.03 | updated spec                                      | 03/13/2013 |
| 1.04 | added parallel operation and trimming information | 12/17/2013 |
| 1.05 | company logo updated                              | 02/15/2021 |
| 1.06 | derating curve and circuit figures updated        | 09/13/2021 |

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



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