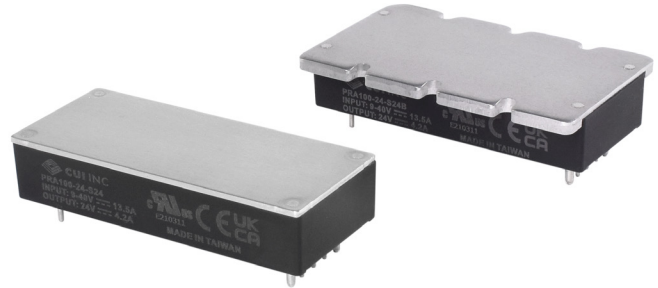


## SERIES: PRA100 | DESCRIPTION: DC-DC CONVERTER

### FEATURES

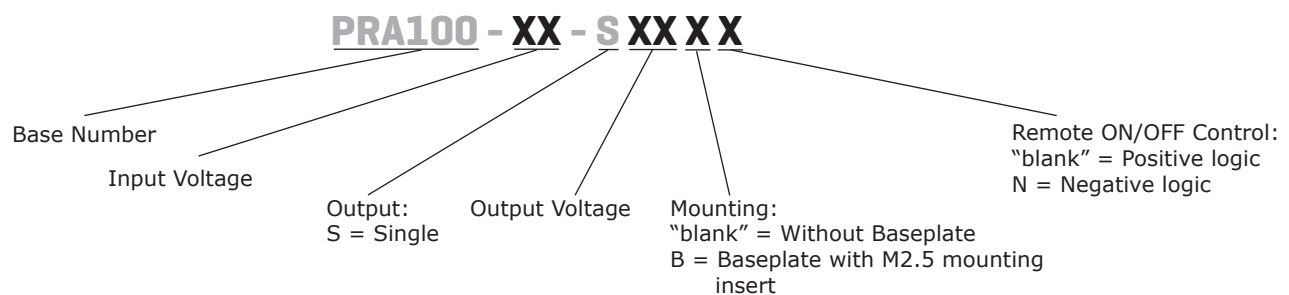
- 100 W isolated output
- 4:1 input range (9~40 and 16.5~74 Vdc)
- industry standard 1/8 brick package
- -40 ~ 105 °C operating temperature with derating
- 3,000 Vdc isolation
- over current, over temperature, over voltage, short circuit, and input UVLO protections
- UL/EN/IEC 62368 certified
- optional baseplate



| MODEL         | input voltage |             | output voltage | output current | output power | ripple & noise <sup>1</sup> | efficiency <sup>2</sup> |
|---------------|---------------|-------------|----------------|----------------|--------------|-----------------------------|-------------------------|
|               | typ (Vdc)     | range (Vdc) | (Vdc)          | max (A)        | max (W)      | max (mVp-p)                 | typ (%)                 |
| PRA100-24-S5  | 24            | 9 ~ 40      | 5              | 20.0           | 100          | 100                         | 92.0                    |
| PRA100-24-S12 | 24            | 9 ~ 40      | 12             | 8.3            | 100          | 150                         | 92.5                    |
| PRA100-24-S24 | 24            | 9 ~ 40      | 24             | 4.2            | 100          | 240                         | 90.5                    |
| PRA100-24-S48 | 24            | 9 ~ 40      | 48             | 2.1            | 100          | 480                         | 90.5                    |
| PRA100-24-S54 | 24            | 9 ~ 40      | 54             | 1.85           | 100          | 480                         | 91.0                    |
| PRA100-48-S5  | 48            | 16.5 ~ 74   | 5              | 20.0           | 100          | 100                         | 93.5                    |
| PRA100-48-S12 | 48            | 16.5 ~ 74   | 12             | 8.3            | 100          | 150                         | 93.0                    |
| PRA100-48-S24 | 48            | 16.5 ~ 74   | 24             | 4.2            | 100          | 240                         | 91.0                    |
| PRA100-48-S48 | 48            | 16.5 ~ 74   | 48             | 2.1            | 100          | 480                         | 91.0                    |
| PRA100-48-S54 | 48            | 16.5 ~ 74   | 54             | 1.85           | 100          | 480                         | 91.5                    |

Notes: 1. Peak to peak, 5 Hz ~ 20 MHz bandwidth, full load, 10 µF polymer and 1.0 µF ceramic capacitors.  
2. At 12 Vdc for 24 Vin, 24 Vdc for 48 Vin.  
3. All specifications are typical at nominal input, full load at 25°C, unless otherwise noted.

### PART NUMBER KEY



## INPUT

| parameter                   | conditions/description               |                                                                                                            | min  | typ  | max  | units            |
|-----------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------|------|------|------|------------------|
| operating input voltage     | 24 input voltage models              |                                                                                                            | 9.0  | 24   | 40   | Vdc              |
|                             | 48 input voltage models              |                                                                                                            | 16.5 | 48   | 74   | Vdc              |
| surge voltage               | 24 input voltage models              |                                                                                                            |      |      | 50   | Vdc              |
|                             | 48 input voltage models              |                                                                                                            |      |      | 100  | Vdc              |
| input undervoltage lockout  | turn-on voltage threshold            | 24 input voltage models                                                                                    | 8.0  | 8.5  | 8.8  | Vdc              |
|                             |                                      | 48 input voltage models                                                                                    | 15.7 | 16.0 | 16.3 | Vdc              |
|                             | turn-on voltage threshold            | 24 input voltage models                                                                                    | 7.7  | 8.0  | 8.3  | Vdc              |
|                             |                                      | 48 input voltage models                                                                                    | 14.7 | 15.0 | 15.3 | Vdc              |
| lockout hysteresis voltage  | 24 input voltage models              |                                                                                                            |      | 0.6  |      | Vdc              |
|                             | 48 input voltage models              |                                                                                                            |      | 1.0  |      | Vdc              |
| maximum input current       | at 9 Vdc input, full load            | 24 input voltage models                                                                                    |      | 13.5 |      | A                |
|                             | at 16.5 Vdc input full load          | 48 input voltage models                                                                                    |      | 6.8  |      | A                |
| no load current             | 24 input voltage models              |                                                                                                            |      | 125  |      | mA               |
|                             | 48 input voltage models              |                                                                                                            |      | 80   |      | mA               |
| input filter                | Pi filter                            |                                                                                                            |      |      |      |                  |
| inrush current              | as per ETS300 132-2                  |                                                                                                            |      |      | 0.1  | A <sup>2</sup> s |
| reflected ripple current    | P-P thru 12μH inductor, 5Hz to 20MHz |                                                                                                            |      | 30   |      | mA               |
| remote on/off               | positive logic                       | module off: CTRL pin pulled low to GND (0~1.2 Vdc)<br>module on: CTRL pin open or pulled high (3.5~75 Vdc) |      |      |      |                  |
|                             | negative logic                       | module off: CTRL pin open or pulled high (3.5~75 Vdc)<br>module on: CTRL pin pulled low to GND (0~1.2 Vdc) |      |      |      |                  |
| on/off current <sup>4</sup> | Ion/off at Von/off=0V                |                                                                                                            |      | 0.3  | 1    | mA               |

Notes: 4. Applies to positive and negative logic.

## OUTPUT

| parameter                   | conditions/description             |                                  | min | typ | max    | units |
|-----------------------------|------------------------------------|----------------------------------|-----|-----|--------|-------|
| maximum capacitive load     | 5 Vdc output models                |                                  |     |     | 20,000 | μF    |
|                             | 12 Vdc output models               |                                  |     |     | 8,300  | μF    |
|                             | 24 Vdc output models               |                                  |     |     | 4,200  | μF    |
|                             | 48 & 54 Vdc output models          |                                  |     |     | 1,000  | μF    |
| voltage accuracy            | at 24/48 Vdc input, full load      |                                  |     | ±1  |        | %     |
| line regulation             | low line to high line at full load |                                  |     |     | ±0.2   | %     |
| load regulation             | 0% ~ 100% load                     |                                  |     |     | ±0.2   | %     |
| start-up time               | from on/off control                | Von/off to 10% Vo_set, remote on |     | 30  |        | ms    |
|                             | from input                         | Vin_min to 10% Vo_set, power up  |     | 30  |        | ms    |
| rise time                   | 10% Vo_set to 90% Vo_set           |                                  |     | 30  |        | ms    |
| trim range                  | Po≤max. rated power, Io≤Io_max     |                                  |     |     |        |       |
|                             | 5 Vdc output model                 |                                  | -20 |     | 10     | %     |
|                             | 12 Vdc output model                |                                  | -20 |     | 20     | %     |
|                             | 24 Vdc output model                |                                  | -20 |     | 20     | %     |
|                             | 48 Vdc output model                |                                  | -20 |     | 10     | %     |
|                             | 54 Vdc output model                |                                  | -20 |     | 5      | %     |
| operating frequency         | pulse width modulation (PWM) fixed |                                  | 270 | 300 | 330    | kHz   |
| transient voltage deviation | 75% ~ 100% load step change        |                                  |     |     | ±5     | %     |
| transient recovery time     | 75% ~ 100% load step change        |                                  |     |     | 250    | μs    |
| input current when off      | shutdown input idle current        |                                  |     | 5   | 10     | mA    |
| temperature coefficient     | 40°C ~ 105°C                       |                                  |     |     | ±0.02  | %/°C  |

## PROTECTIONS

| parameter                 | conditions/description           | min | typ | max | units |
|---------------------------|----------------------------------|-----|-----|-----|-------|
| over voltage protection   | 5 Vdc output models              | 112 |     | 130 | %     |
|                           | 12 Vdc output models             | 122 |     | 135 | %     |
|                           | 24 Vdc output models             | 122 |     | 135 | %     |
|                           | 48 Vdc output models             | 112 |     | 130 | %     |
|                           | 54 Vdc output models             | 106 |     | 115 | %     |
| over current protection   | auto recovery, hiccup            | 110 | 125 | 160 | %     |
| short circuit protection  | continuous, auto recovery        |     |     |     |       |
| over temperature shutdown | at the case center, non latching |     | 110 |     | °C    |
| over temperature recovery | at the case center, non latching |     | 100 |     | °C    |

## SAFETY AND COMPLIANCE

| parameter                    | conditions/description                                                            | min | typ       | max   | units |
|------------------------------|-----------------------------------------------------------------------------------|-----|-----------|-------|-------|
| isolation voltage            | input to output, for 1 minute                                                     |     |           | 3,000 | Vdc   |
|                              | input to case, for 1 minute                                                       |     |           | 1,600 | Vdc   |
|                              | output to case, for 1 minute                                                      |     |           | 1,600 | Vdc   |
| isolation capacitance        | input to output                                                                   |     | 1,000     |       | pF    |
|                              | input to case                                                                     |     | -         |       |       |
|                              | output to case                                                                    |     | -         |       |       |
| leakage current <sup>5</sup> | positive logic, Von/off = 15 V                                                    |     |           | 30    | µA    |
| safety approvals             | certified to 62368-1: EN, IEC                                                     |     |           |       |       |
| EMI                          | EN 55032, Class A (with external input filter)                                    |     |           |       |       |
| ESD <sup>6</sup>             | EN 61000-4-2 Level 3: Air ±8 kV, Contact ± 6kV, Perf. Criteria A                  |     |           |       |       |
| EFT/burst <sup>6</sup>       | EN 61000-4-4 Level 3: On power input port, ±2 kV, Perf. Criteria A                |     |           |       |       |
| surge <sup>6</sup>           | EN 61000-4-5 Level 4: Line to earth, ±4 kV, Line to line, ±2 kV, Perf. Criteria A |     |           |       |       |
| conducted immunity           | EN 61000-4-6 Level 3: 0.15~80 MHz, 10 V, Perf. Criteria A                         |     |           |       |       |
| shock / vibration            | MIL-STD-810F/EN 61373                                                             |     |           |       |       |
| thermal shock                | MIL-STD-810F                                                                      |     |           |       |       |
| fire and smoke               | complies with EN 45545-2                                                          |     |           |       |       |
| MTBF                         | MIL-HDBK-217F Notice 1, GB, at 25°C                                               |     |           |       |       |
|                              | 5 & 12 Vdc output voltage model                                                   |     | 1,000,000 |       | hours |
|                              | all other output models                                                           |     | 980,000   |       | hours |
| RoHS                         | yes                                                                               |     |           |       |       |

Notes: 5. Applies to positive and negative logic.  
6. External capacitor required.

ENVIRONMENTAL

| parameter                     | conditions/description                     | min | typ             | max | units  |
|-------------------------------|--------------------------------------------|-----|-----------------|-----|--------|
| ambient operating temperature | at center of the case (see derating curve) | -40 |                 | 105 | °C     |
| storage temperature           |                                            | -55 |                 | 125 | °C     |
| maximum case temperature      |                                            |     |                 | 110 | °C     |
| humidity                      | non-condensing                             | 0   |                 | 95  | %      |
| altitude                      | operating<br>transport                     |     | 5,000<br>12,000 |     | m<br>m |

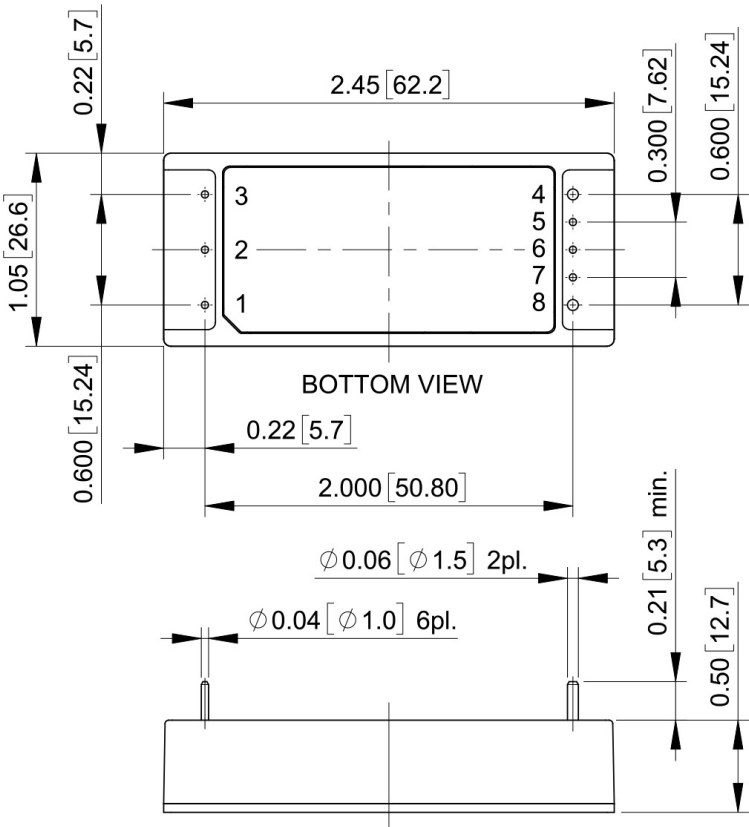
MECHANICAL

| parameter           | conditions/description                                                                                                      | min | typ | max | units        |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|--------------|
| dimensions          | without baseplate: 2.45 x 1.05 x 0.50 [62.2 x 26.6 x 12.7 mm]<br>with baseplate: 2.45 x 1.45 x 0.50 [62.2 x 36.8 x 12.7 mm] |     |     |     | inch<br>inch |
| weight              |                                                                                                                             |     | 49  |     | g            |
| case material       | plastic, DAP, UL 94V-0                                                                                                      |     |     |     |              |
| base plate material | FR4                                                                                                                         |     |     |     |              |
| potting material    | UL94V-0                                                                                                                     |     |     |     |              |
| pin material        | base: copper<br>plating: nickel with matte tin                                                                              |     |     |     |              |

MECHANICAL DRAWING

**Without baseplate:**  
units: inch [mm]  
general tolerance: inches: x.xx = ±0.02, x.xxx = ±0.010  
mm: x.x = ±0.5, x.xx = ±0.25  
pin size: Ø0.4±0.004 inch[Ø1.0±0.1mm]  
pin size: Ø0.6±0.004 inch[Ø1.5±0.1mm]

| Pin Out |          |
|---------|----------|
| PIN     | Function |
| 1       | +Vin     |
| 2       | on/off   |
| 3       | -Vin     |
| 4       | -Vout    |
| 5       | -Sense   |
| 6       | Trim     |
| 7       | +Sense   |
| 8       | +Vout    |

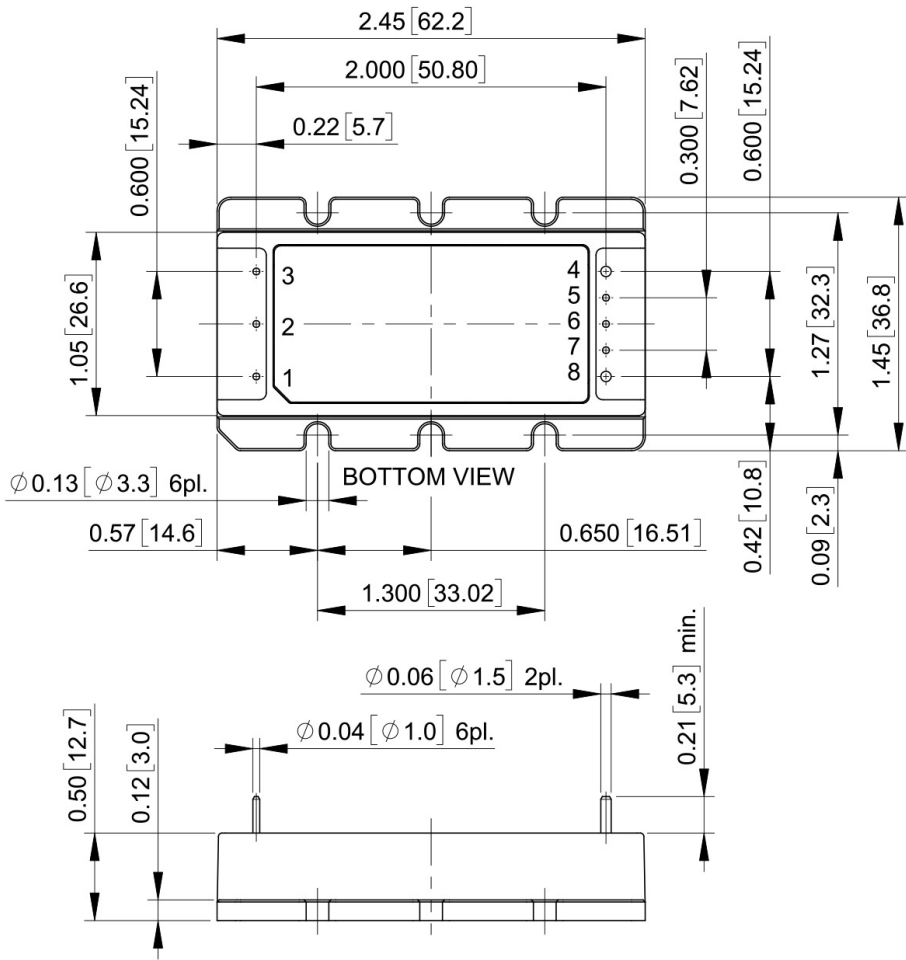




MECHANICAL DRAWING

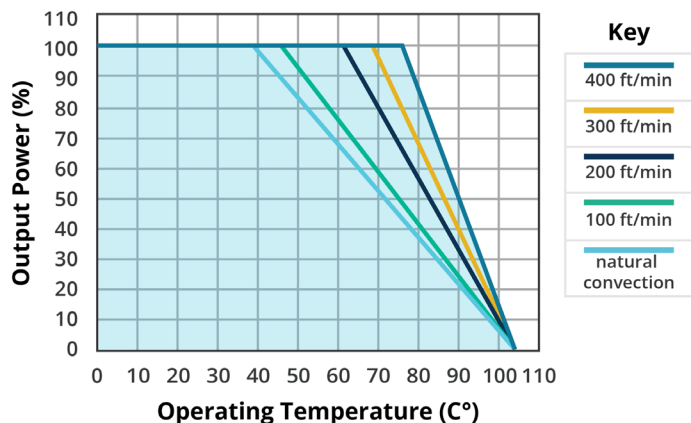
With baseplate:  
units: inch [mm]  
general tolerance: inches: x.xx = ±0.02, x.xxx = ±0.010  
mm: x.x = ±0.5, x.xx = ±0.25  
pin size: Ø0.4±0.004 inch[Ø1.0±0.1mm]  
pin size: Ø0.6±0.004 inch[Ø1.5±0.1mm]

| Pin Out |          |
|---------|----------|
| PIN     | Function |
| 1       | +Vin     |
| 2       | on/off   |
| 3       | -Vin     |
| 4       | -Vout    |
| 5       | -Sense   |
| 6       | Trim     |
| 7       | +Sense   |
| 8       | +Vout    |

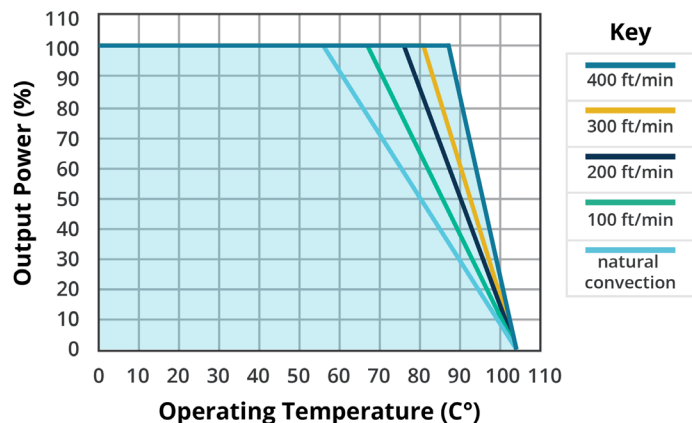


## DERATING CURVES

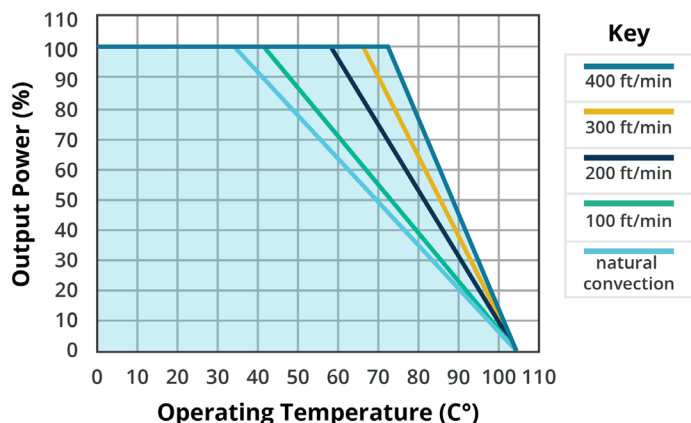
**TEMPERATURE DERATING CURVE**  
**PRA100-24-S5/54**  
( $V_{in} = 24\text{ V}$ )



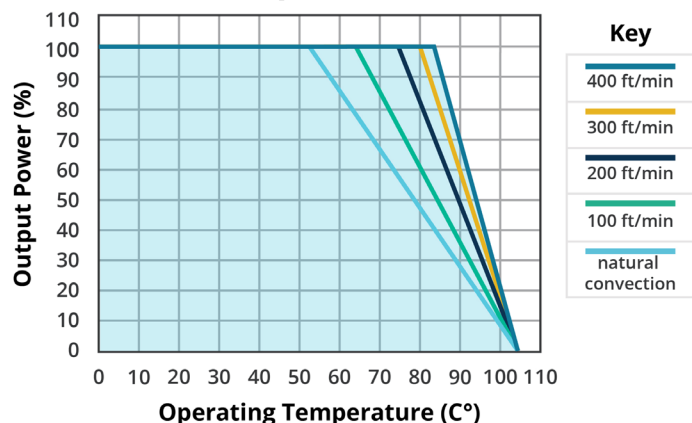
**TEMPERATURE DERATING CURVE**  
**PRA100-24-S5B/54**  
(with baseplate,  $V_{in} = 24\text{ V}$ )



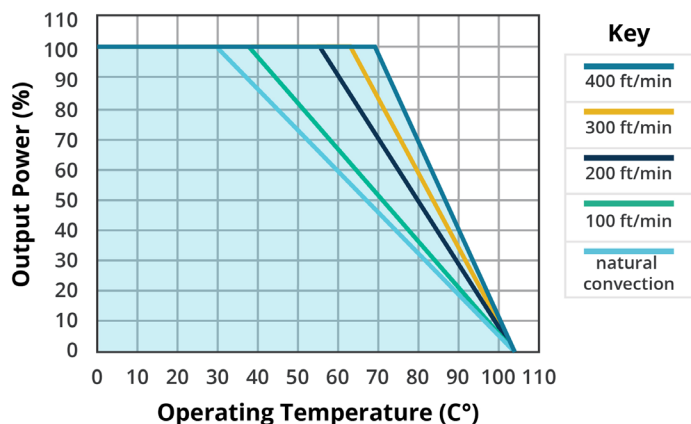
**TEMPERATURE DERATING CURVE**  
**PRA100-24-S12/48**  
( $V_{in} = 24\text{ V}$ )



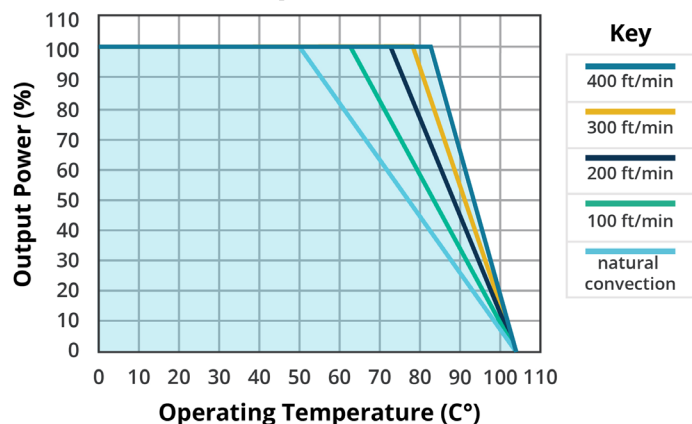
**TEMPERATURE DERATING CURVE**  
**PRA100-24-S12B/48**  
(with baseplate,  $V_{in} = 24\text{ V}$ )



**TEMPERATURE DERATING CURVE**  
**PRA100-24-S24**  
( $V_{in} = 24\text{ V}$ )

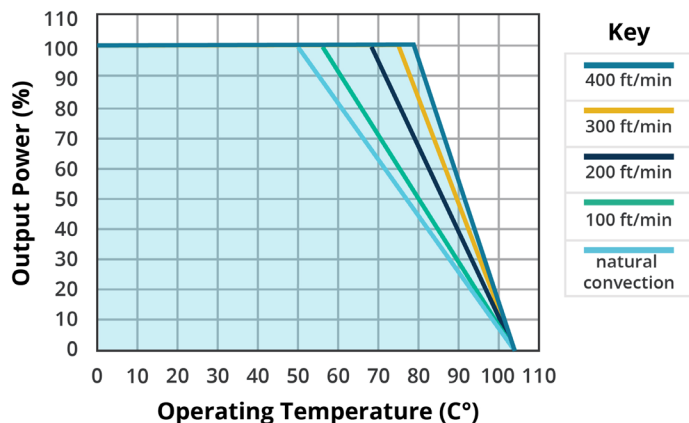


**TEMPERATURE DERATING CURVE**  
**PRA100-24-S24B**  
(with baseplate,  $V_{in} = 24\text{ V}$ )

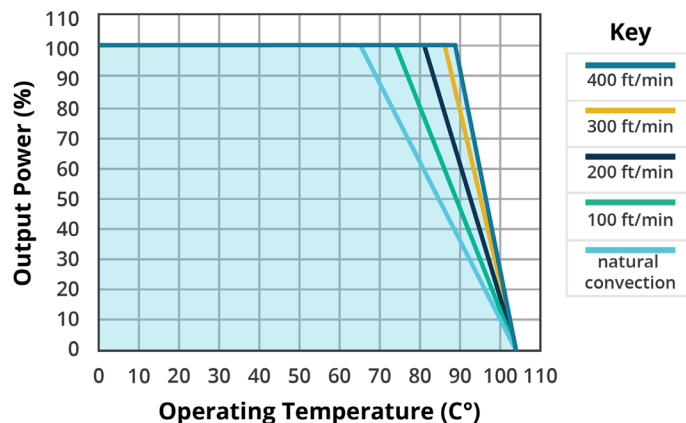


## DERATING CURVES (CONTINUED)

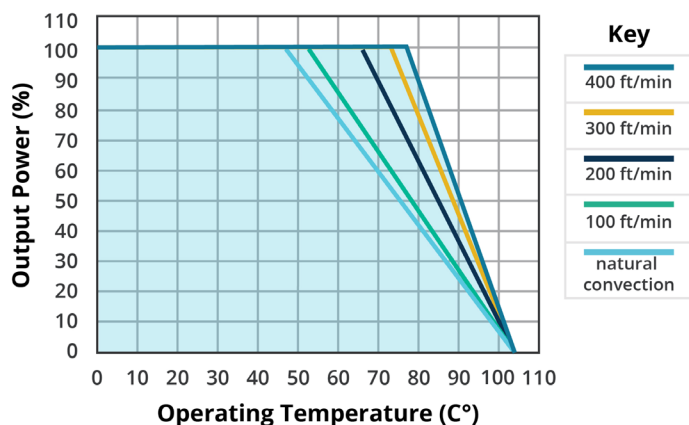
**TEMPERATURE DERATING CURVE**  
**PRA100-48-S5**  
( $V_{in} = 48\text{ V}$ )



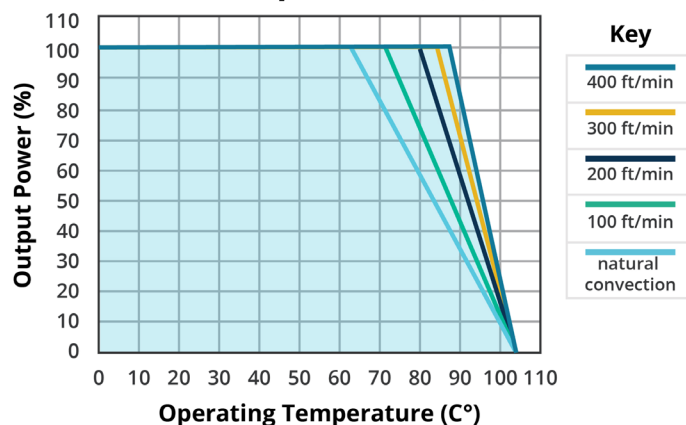
**TEMPERATURE DERATING CURVE**  
**PRA100-48-S5B**  
(with baseplate,  $V_{in} = 48\text{ V}$ )



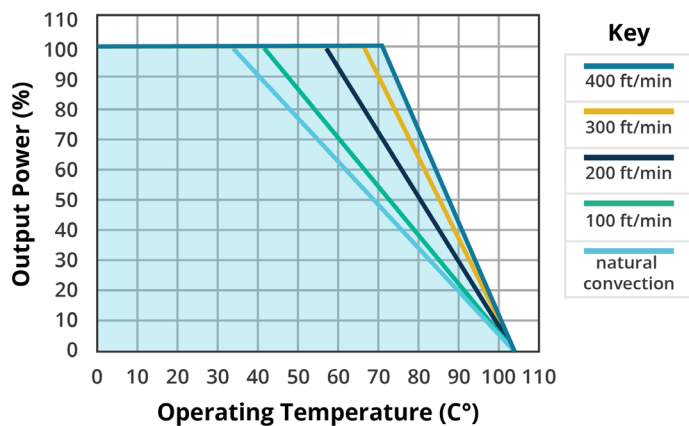
**TEMPERATURE DERATING CURVE**  
**PRA100-48-S12**  
( $V_{in} = 48\text{ V}$ )



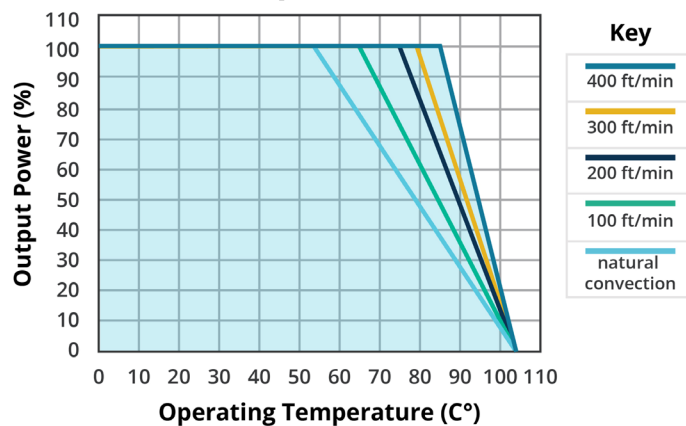
**TEMPERATURE DERATING CURVE**  
**PRA100-48-S12B**  
(with baseplate,  $V_{in} = 48\text{ V}$ )



**TEMPERATURE DERATING CURVE**  
**PRA100-48-S24**  
( $V_{in} = 48\text{ V}$ )

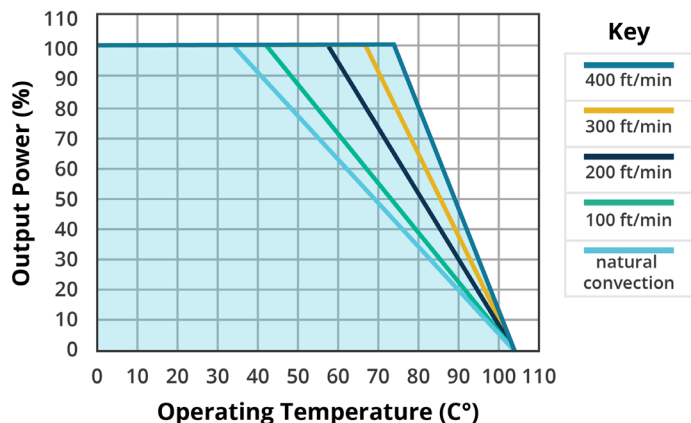


**TEMPERATURE DERATING CURVE**  
**PRA100-48-S24B**  
(with baseplate,  $V_{in} = 48\text{ V}$ )

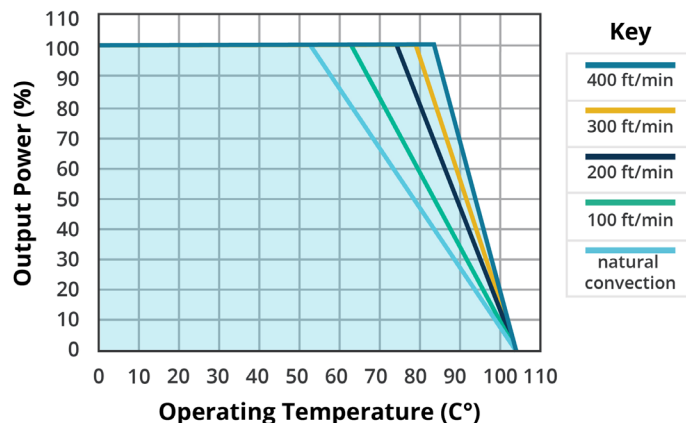


## DERATING CURVES (CONTINUED)

**TEMPERATURE DERATING CURVE**  
**PRA100-48-S48/54**  
( $V_{in} = 48\text{ V}$ )

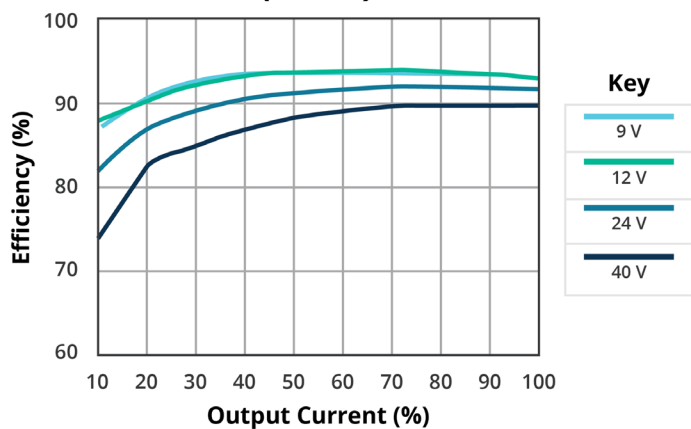


**TEMPERATURE DERATING CURVE**  
**PRA100-48-S48B/54**  
(with baseplate,  $V_{in} = 48\text{ V}$ )

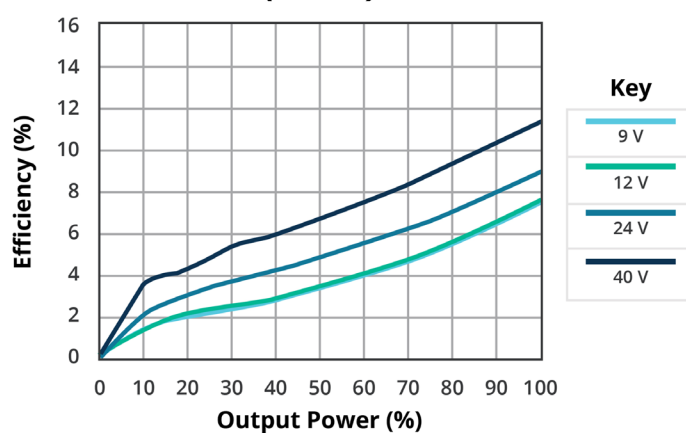


## EFFICIENCY CURVES

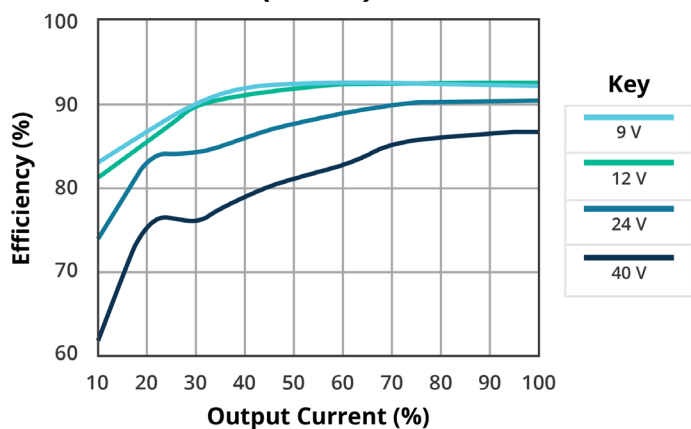
**EFFICIENCY VS OUTPUT LOAD**  
**PRA100-24-S5**  
(at 25°C)



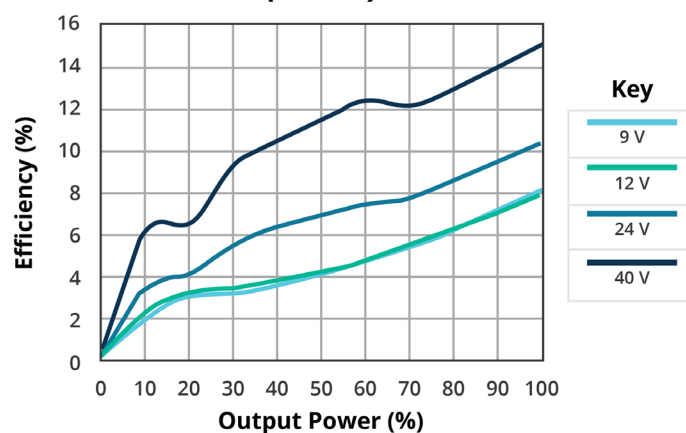
**POWER DISSIPATION VS OUTPUT POWER**  
**PRA100-24-S5**  
(at 25°C)



**EFFICIENCY VS OUTPUT LOAD**  
**PRA100-24-S12**  
(at 25°C)

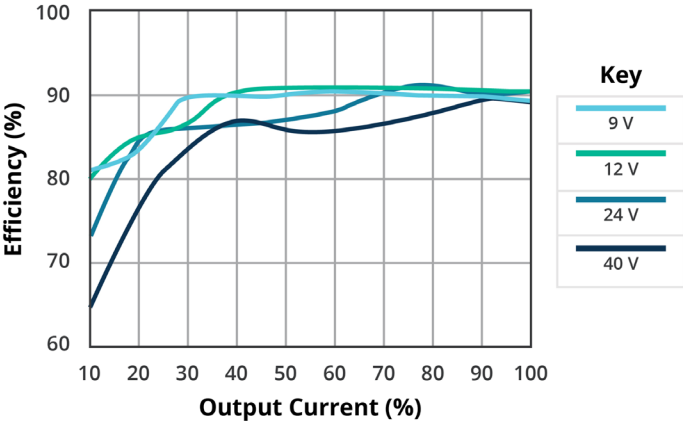


**POWER DISSIPATION VS OUTPUT POWER**  
**PRA100-24-S12**  
(at 25°C)

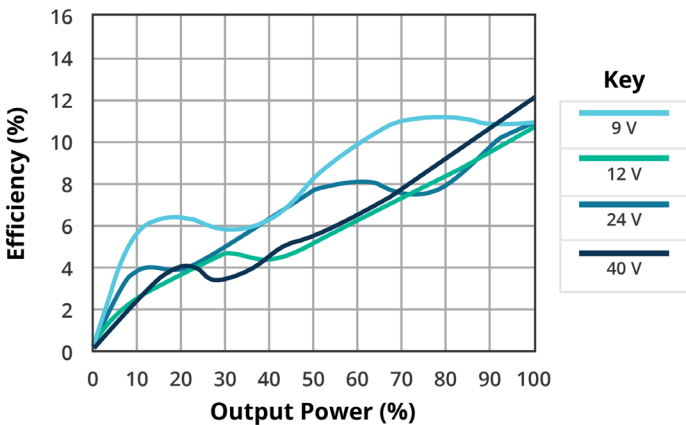


EFFICIENCY CURVES (CONTINUED)

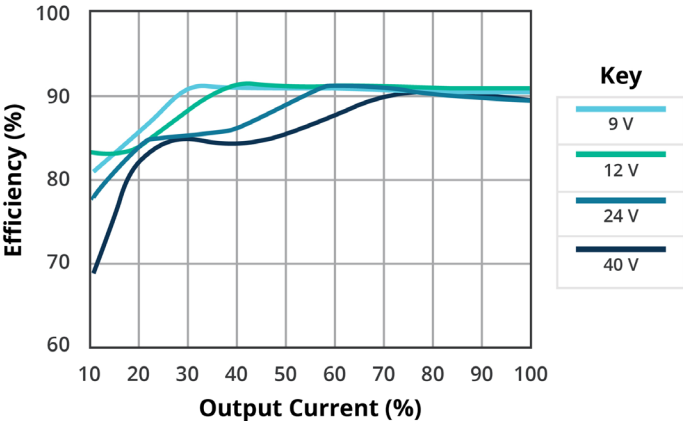
EFFICIENCY VS OUTPUT LOAD  
PRA100-24-S24  
(at 25°C)



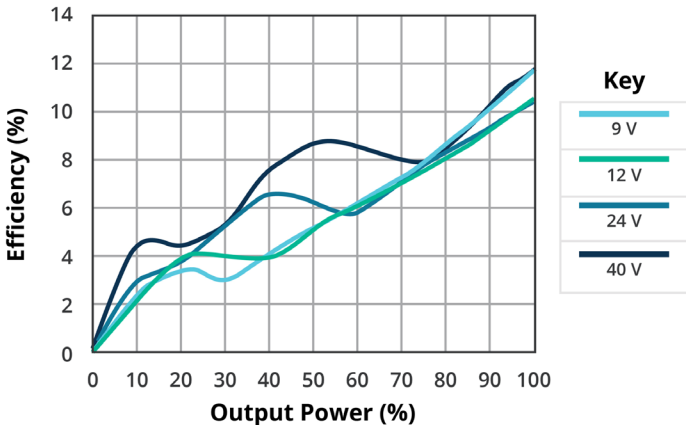
POWER DISSIPATION VS OUTPUT POWER  
PRA100-24-S24  
(at 25°C)



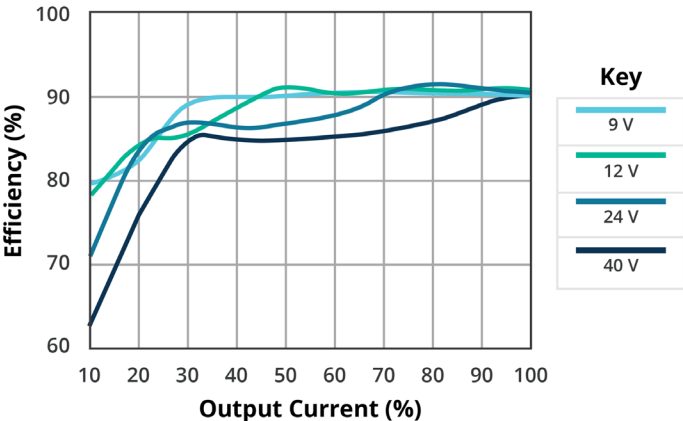
EFFICIENCY VS OUTPUT LOAD  
PRA100-24-S48  
(at 25°C)



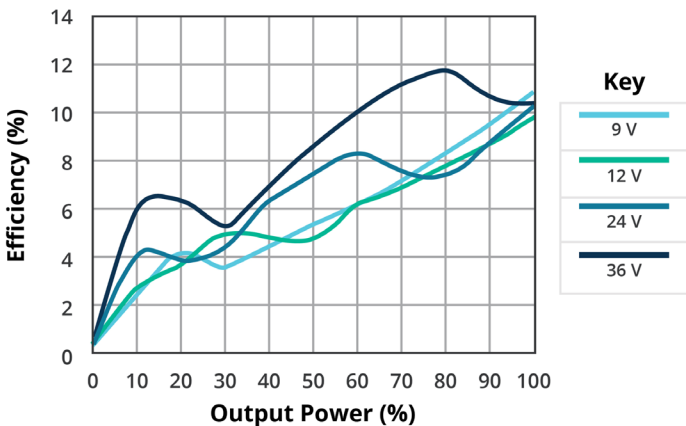
POWER DISSIPATION VS OUTPUT POWER  
PRA100-24-S48  
(at 25°C)



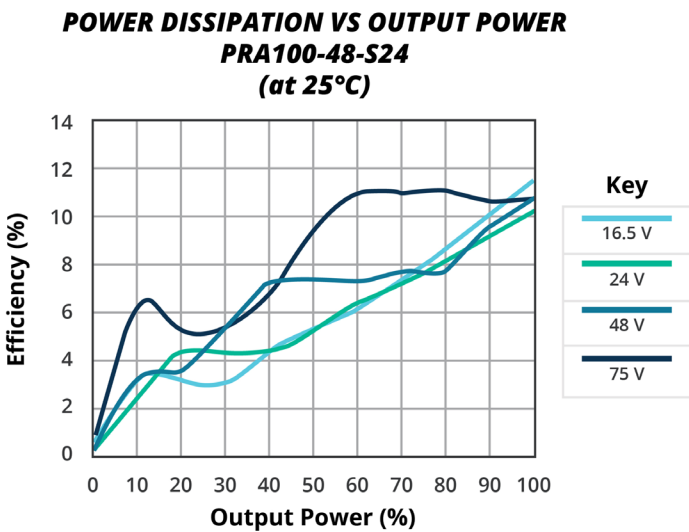
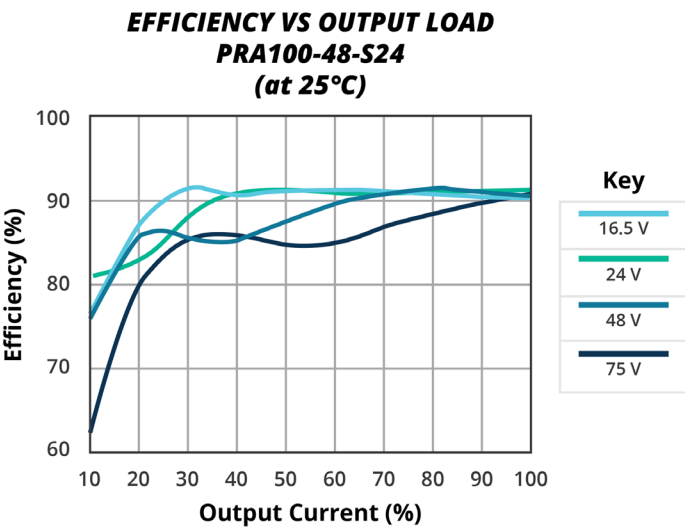
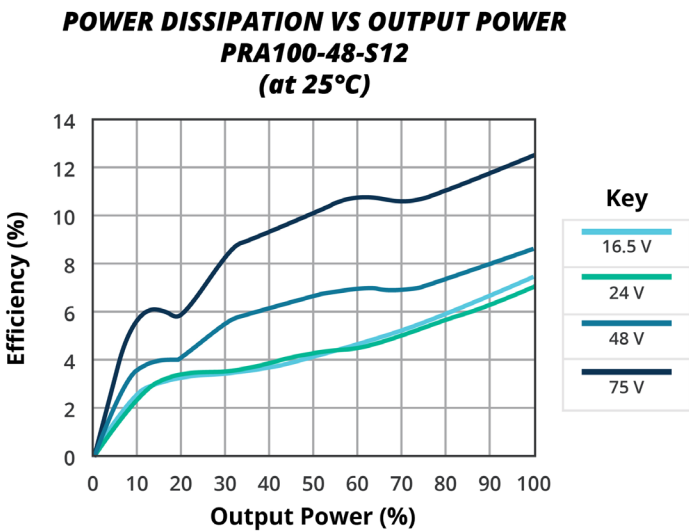
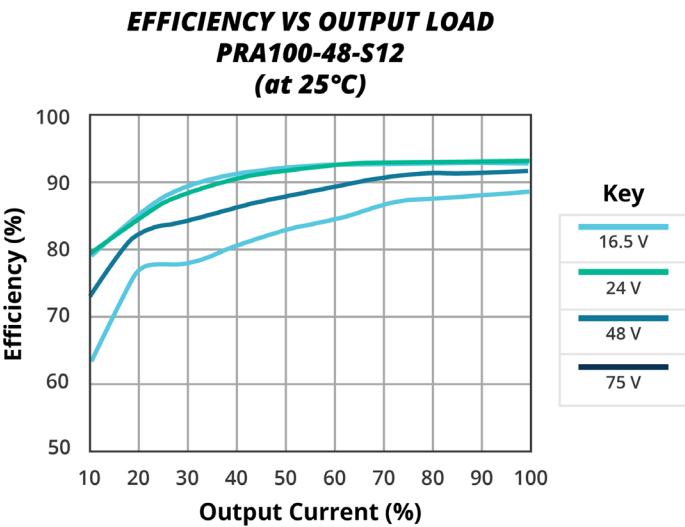
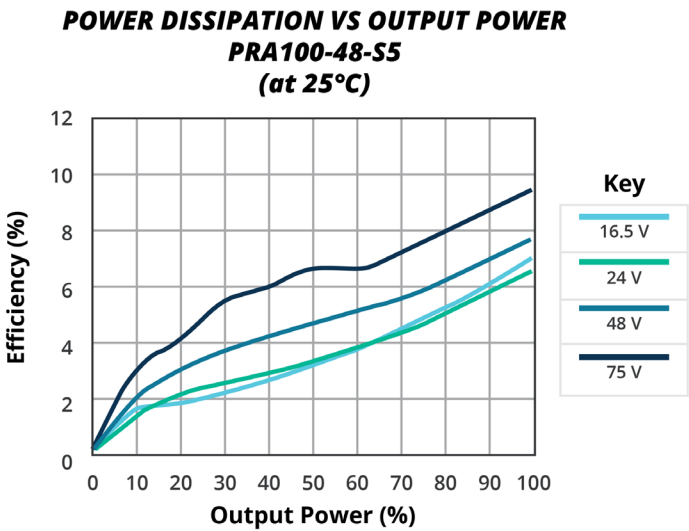
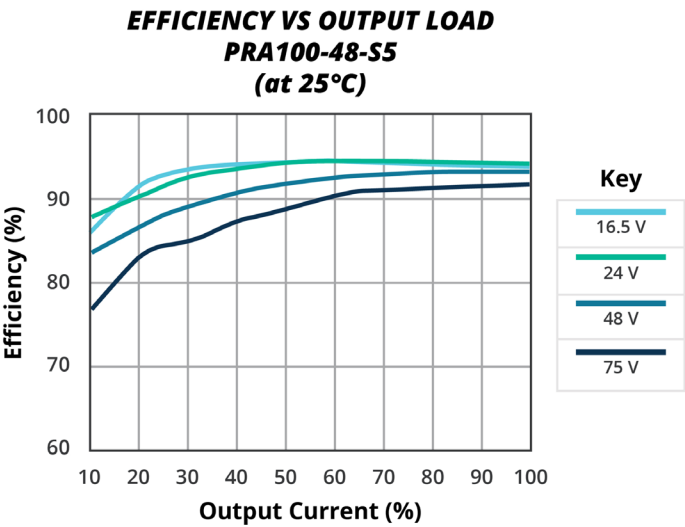
EFFICIENCY VS OUTPUT LOAD  
PRA100-24-S54  
(at 25°C)



POWER DISSIPATION VS OUTPUT POWER  
PRA100-24-S54  
(at 25°C)

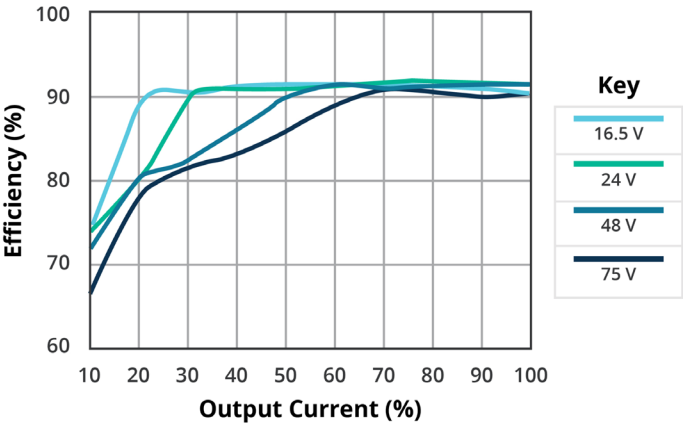


EFFICIENCY CURVES (CONTINUED)

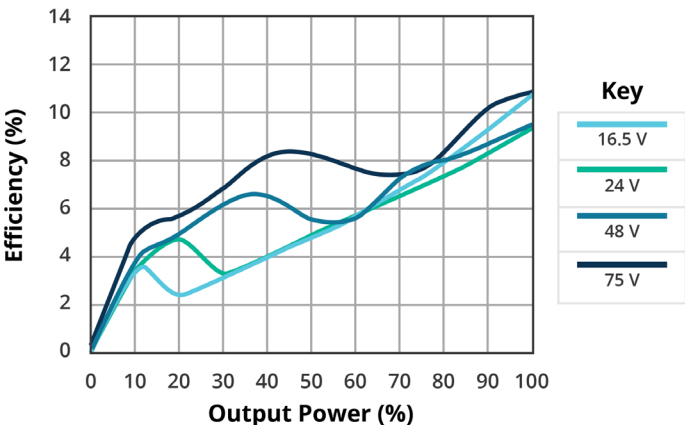


EFFICIENCY CURVES (CONTINUED)

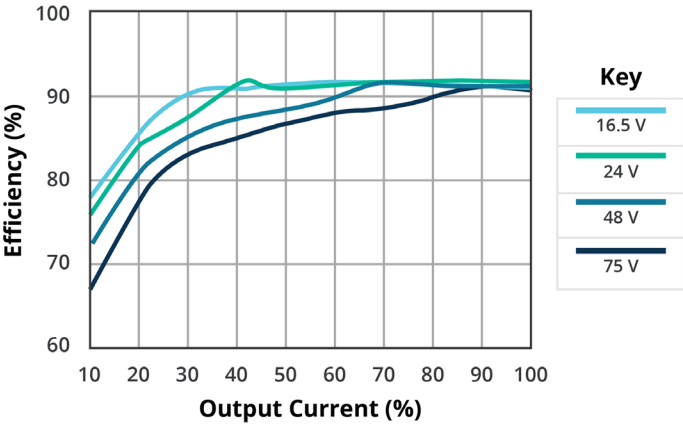
EFFICIENCY VS OUTPUT LOAD  
PRA100-48-S48  
(at 25°C)



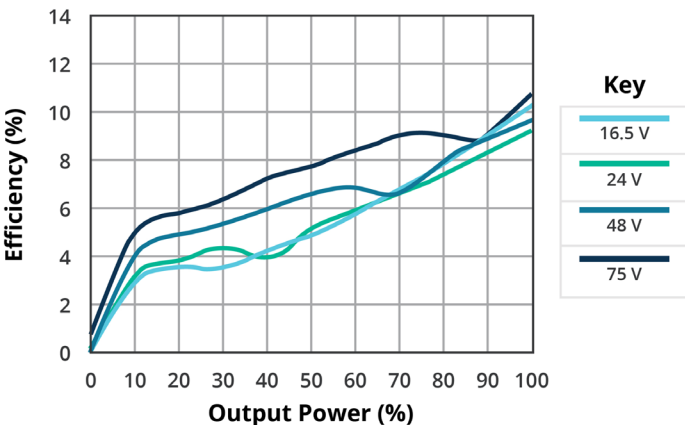
POWER DISSIPATION VS OUTPUT POWER  
PRA100-48-S48  
(at 25°C)



EFFICIENCY VS OUTPUT LOAD  
PRA100-48-S54  
(at 25°C)



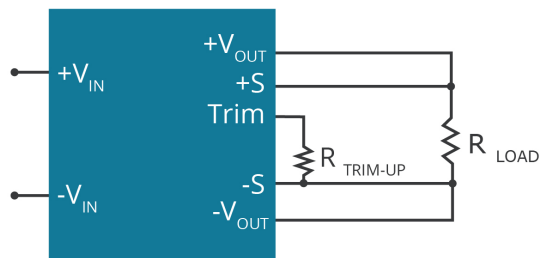
POWER DISSIPATION VS OUTPUT POWER  
PRA100-48-S54  
(at 25°C)



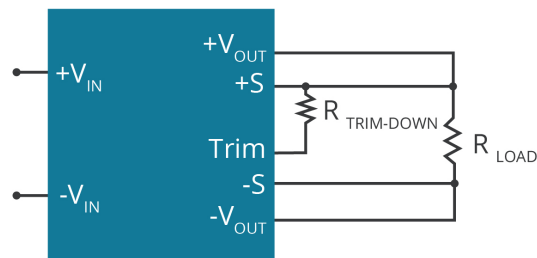


## APPLICATION NOTES

### Trim up



### Trim down



$$R_{\text{TRIM}} = \left[ \frac{V_R \times R_1 \times (R_2 + R_3)}{R_2 \times (V_{\text{OUT}} - V_{\text{OUT, NOM}})} \right] - R_{\text{TRIM}} \text{ (K } \Omega \text{)}$$

Formula for Trim up

$$R_{\text{TRIM}} = R_1 \times \left[ \frac{V_R \times R_1}{R_2 \times (V_{\text{OUT, NOM}} - V_{\text{OUT}})} - 1 \right] - R_{\text{TRIM}} \text{ (K } \Omega \text{)}$$

Formula for Trim down

**Table 1**

| $V_{\text{NOM}}$ | $R_1$          | $R_2$         | $R_3$         | $R_{\text{TRIM}}$ | $V_{\text{REF}}$ |
|------------------|----------------|---------------|---------------|-------------------|------------------|
| (Vdc)            | (k $\Omega$ )  | (k $\Omega$ ) | (k $\Omega$ ) | (k $\Omega$ )     | (V)              |
| 5                | see note below |               |               | 1.5               | 2.5              |
| 12               | 6.8            | 2.37          | 2.2           | 10.0              | 2.5              |
| 24               | 15.0           | 2.42          | 5.9           | 20.0              | 2.5              |
| 48               | 28.7           | 2.40          | 15.0          | 43.2              | 2.5              |
| 54               | 36.0           | 2.42          | 14.0          | 51.0              | 2.5              |

Note: Value for  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_{\text{TRIM}}$  and  $V_{\text{REF}}$  refer to Table 1 (fixed internal values).

$R_{\text{TRIM}}$ : Trim resistance

$V_{\text{NOM}}$ : Nominal output voltage

$V_{\text{OUT}}$ : Target output voltage

Calculation for 5V output model:

$$R_{\text{trimdown}} = \left[ \frac{1.8 \times V_r - 1.8 \times (V_o - V_{o,nom})}{(V_{o,nom} - V_o)} \right] - R_t \text{ (K } \Omega \text{)}$$

$$R_{\text{trimup}} = \left[ \frac{0.6 \times V_r - 0.6 \times (V_o - V_{o,nom})}{(V_o - V_{o,nom})} \right] - R_t \text{ (K } \Omega \text{)}$$



REVISION HISTORY

| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 05/27/2025 |

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



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