

**PART NUMBER:** PTK15**DESCRIPTION:** dc-dc converter**features**

- industry standard pin out
- wide 4:1 input range
- fully isolated
- output voltage trimmable
- output on/off control
- over-current protection
- over-voltage protection
- six-sided EMI shielding
- constant switching frequency
- high efficiency
- compact size 2.0"x2.0"x0.4"
- 3 year warranty



| MODEL <sup>1</sup> | output power (max) | input voltage | output voltage | output current (max) | ripple & noise <sup>2</sup> mV P-P | efficiency (typ.) |
|--------------------|--------------------|---------------|----------------|----------------------|------------------------------------|-------------------|
| PTK15-Q24-S3       | 13.2W              | 10-36VDC      | 3.3VDC         | 4.0A                 | 75                                 | 80%               |
| PTK15-Q24-S5       | 15.0W              | 10-36VDC      | 5VDC           | 3.0A                 | 75                                 | 85%               |
| PTK15-Q24-S12      | 15.0W              | 10-36VDC      | 12VDC          | 1.25A                | 120                                | 86%               |
| PTK15-Q24-S15      | 15.0W              | 10-36VDC      | 15VDC          | 1.0A                 | 150                                | 84%               |
| PTK15-Q24-D5       | 15.0W              | 10-36VDC      | ±5VDC          | 1.5A                 | 50/50                              | 85%               |
| PTK15-Q24-D12      | 15.0W              | 10-36VDC      | ±12VDC         | 0.625A               | 120/120                            | 87%               |
| PTK15-Q24-D15      | 15.0W              | 10-36VDC      | ±15VDC         | 0.5A                 | 150/150                            | 87%               |
| PTK15-Q24-T312     | 12.39W             | 10-36VDC      | 3.3VDC/±12VDC  | 2.0A/0.31A           | 50/120/120                         | 83%               |
| PTK15-Q24-T512     | 15.0W              | 10-36VDC      | 5VDC/±12VDC    | 1.5A/0.31A           | 50/120/120                         | 84%               |
| PTK15-Q24-T315     | 12.45W             | 10-36VDC      | 3.3VDC/±15VDC  | 2.0A/0.25A           | 50/150/150                         | 83%               |
| PTK15-Q24-T515     | 15.0W              | 10-36VDC      | 5VDC/±15VDC    | 1.5A/0.25A           | 50/150/150                         | 84%               |
| PTK15-Q48-S3       | 13.2W              | 20-72VDC      | 3.3VDC         | 4.0A                 | 75                                 | 80%               |
| PTK15-Q48-S5       | 15.0W              | 20-72VDC      | 5VDC           | 3.0A                 | 75                                 | 85%               |
| PTK15-Q48-S12      | 15.0W              | 20-72VDC      | 12VDC          | 1.25A                | 120                                | 87%               |
| PTK15-Q48-S15      | 15.0W              | 20-72VDC      | 15VDC          | 1.0A                 | 150                                | 87%               |
| PTK15-Q48-D5       | 15.0W              | 20-72VDC      | ±5VDC          | 1.5A                 | 50/50                              | 85%               |
| PTK15-Q48-D12      | 15.0W              | 20-72VDC      | ±12VDC         | 0.625A               | 120/120                            | 86%               |
| PTK15-Q48-D15      | 15.0W              | 20-72VDC      | ±15VDC         | 0.5A                 | 150/150                            | 87%               |
| PTK15-Q48-T312     | 12.39W             | 20-72VDC      | 3.3VDC/±12VDC  | 2.0A/0.31A           | 50/120/120                         | 83%               |
| PTK15-Q48-T512     | 15.0W              | 20-72VDC      | 5VDC/±12VDC    | 1.5A/0.31A           | 50/120/120                         | 84%               |
| PTK15-Q48-T315     | 12.45W             | 20-72VDC      | 3.3VDC/±15VDC  | 2.0A/0.25A           | 50/150/150                         | 83%               |
| PTK15-Q48-T515     | 15.0W              | 20-72VDC      | 5VDC/±15VDC    | 1.5A/0.25A           | 50/150/150                         | 84%               |

**NOTE:** 1. All models are also available in an extended temperature range of -40°C~85°C. For these models, append "M" to the model number, e.g. PTK15-Q48-S5M.

2. Ripple & noise measured with a 20MHz bandwidth, off a 10uF electrolytic and a 0.1uF ceramic cap in parallel at the output.

**PART NUMBER:** PTK15**DESCRIPTION:** dc-dc converter**INPUT**

| parameter             | conditions/description      | min  | nom     | max  | units |
|-----------------------|-----------------------------|------|---------|------|-------|
| input voltage range   |                             | 10   | 24      | 36   | VDC   |
|                       |                             | 20   | 48      | 72   | VDC   |
| remote on/off control | output turn-on <sup>3</sup> | 2.5V | (open)  | 5.5V |       |
|                       | output turn-off             | 0V   | (short) | 0.8V |       |
| switching frequency   | constant                    |      | 250     |      | KHz   |

**NOTE:** 3 output defaults to "on" when there is no connection to the "CNT" pin.**OUTPUT**

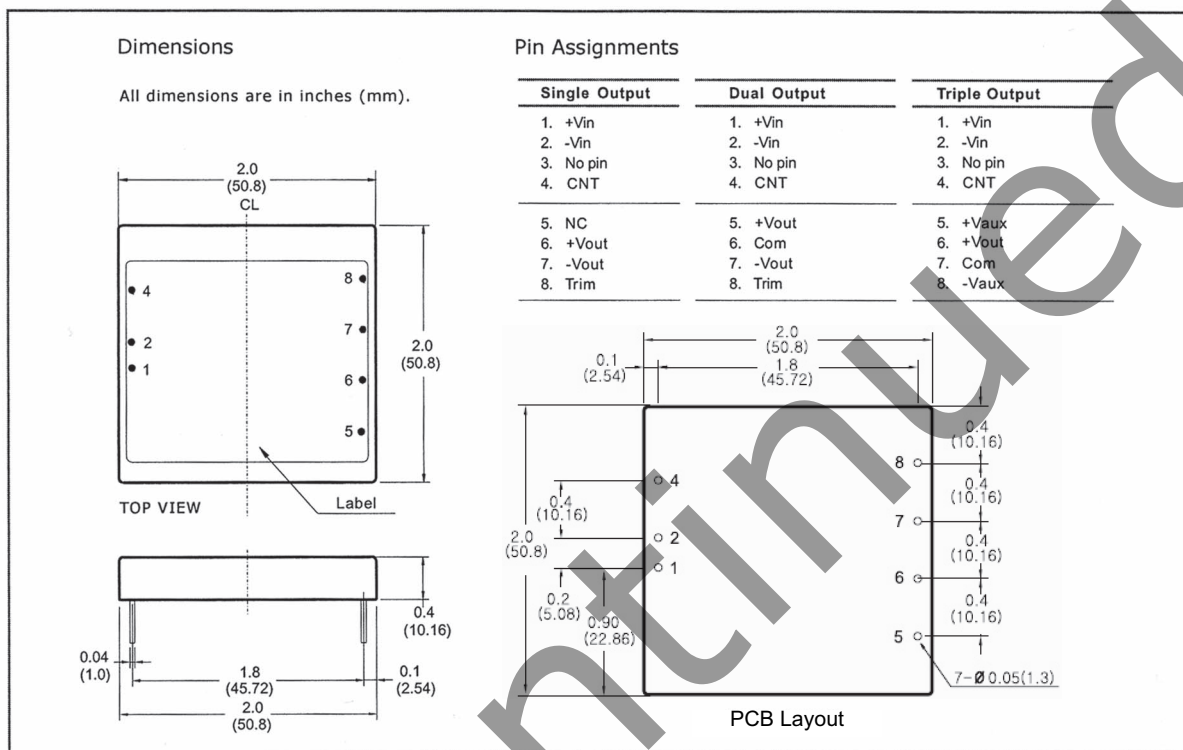
| parameter                                  | conditions/description                                                                                                                       | min    | nom | max    | units |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|--------|-------|
| output trim range                          | with external trim resistors                                                                                                                 | -5%    |     | +5%    |       |
| set point accuracy                         | single output                                                                                                                                | -2%    |     | +2%    |       |
|                                            | dual output                                                                                                                                  | -3%    |     | +3%    |       |
| line regulation<br>(low line to high line) | single output models                                                                                                                         | -0.25% |     | +0.25% |       |
|                                            | dual output models                                                                                                                           | -2.5%  |     | +2.5%  |       |
|                                            | triple: main output (Vout)                                                                                                                   | -0.25% |     | +0.25% |       |
|                                            | auxiliary outputs (+Vaux / -Vaux)                                                                                                            | -5%    |     | +5%    |       |
| load regulation                            | single output models- no load to full load                                                                                                   | -0.25% |     | +0.25% |       |
|                                            | dual output models- balanced loads                                                                                                           | -2.5%  |     | +2.5%  |       |
|                                            | triple: main output (Vout)                                                                                                                   | -0.25% |     | +0.25% |       |
|                                            | auxiliary outputs (+Vaux / -Vaux)- with 10% load on Vout and balanced loads on +Vaux and -Vaux                                               | -5%    |     | +5%    |       |
| minimum load                               | converters will not be damaged if loading conditions are less than minimum specified loads, but regulation specs may not be met <sup>4</sup> |        |     |        |       |
| ripple and noise                           | see chart                                                                                                                                    |        |     |        |       |

**NOTE:** 4 single output: no min. load required, dual: 10%, triple: balanced loads.**PROTECTION**

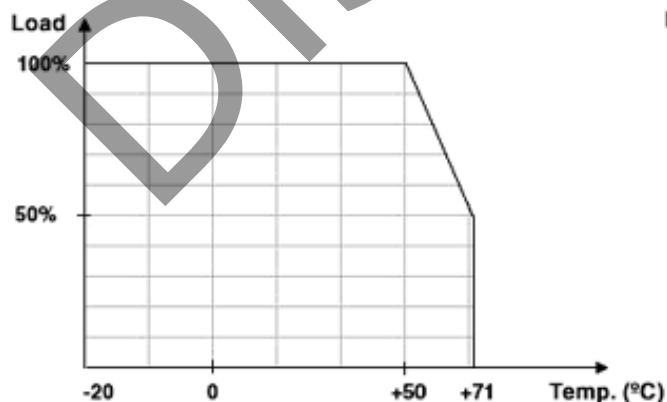
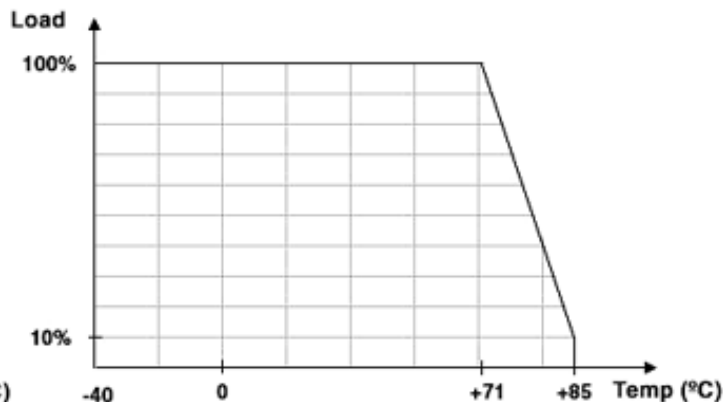
| parameter    | conditions/description                | min  | nom | max  | units |
|--------------|---------------------------------------|------|-----|------|-------|
| over-current | continuous auto recovery <sup>5</sup> | 105% |     | 135% |       |
| over-voltage | internally zener clamped <sup>5</sup> | 110% |     | 140% |       |

**NOTE:** 5 continuous operation in a protected state may compromise long-term reliability.**GENERAL**

| parameter             | conditions/description                                                              | min  | nom          | max  | units             |
|-----------------------|-------------------------------------------------------------------------------------|------|--------------|------|-------------------|
| efficiency            | typical at full load                                                                | 78%  |              | 83%  |                   |
| isolation voltage     | input/case, input/output, output/case                                               | 500  |              |      | VAC               |
| insulation resistance | at 500 VDC                                                                          | 100M |              |      | Ohms              |
| agency standards      | approved to UL60950(E222889), CSA C22.2 No. 60950, TUV EN60950 (single output only) |      |              |      |                   |
| case material         | Zn                                                                                  |      |              |      |                   |
| material flammability | 94 V-0                                                                              |      |              |      |                   |
| weight                |                                                                                     |      | 75<br>(2.65) |      | grams<br>(ounces) |
| MTBF                  | MIL-HDBK-217F                                                                       |      | 470k         |      | hours             |
| operating temperature | regular models - see derating curve.                                                | -20  |              | +71  | °C                |
|                       | extended temperature models                                                         | -40  |              | +85  | °C                |
| storage temperature   |                                                                                     | -40  |              | +105 | °C                |
| humidity              | operating (non-condensing)                                                          | 5%   |              | 95%  | RH                |
| washability           | not intended for aqueous wash                                                       |      |              |      |                   |

**PART NUMBER:** PTK15**DESCRIPTION:** dc-dc converter**DIMENSIONS (mm)****PIN DEFINITIONS**

|        |                                                              |
|--------|--------------------------------------------------------------|
| +Vin:  | Input positive terminal                                      |
| -Vin:  | Input negative terminal                                      |
| CNT:   | Remote On/Off control of output voltage. Referenced to -Vin  |
| +Vout: | Main output positive terminal                                |
| -Vout: | Output negative terminal                                     |
| +Vaux: | Positive auxiliary output                                    |
| -Vaux: | Negative auxiliary output                                    |
| Com:   | Common node for dual- or triple-output models                |
| Trim:  | For trimming output voltage on single- or dual-output models |

**DERATING CURVES****Regular Version****M Version**

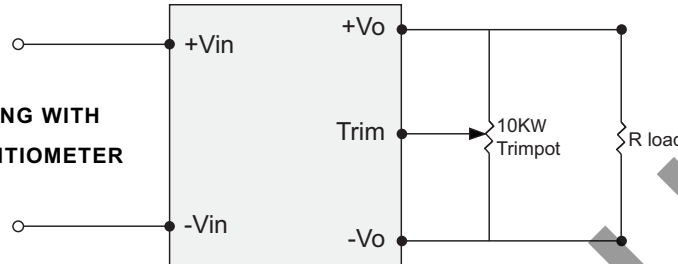
**PART NUMBER:** PTK15**DESCRIPTION:** dc-dc converter

## APPLICATION NOTES

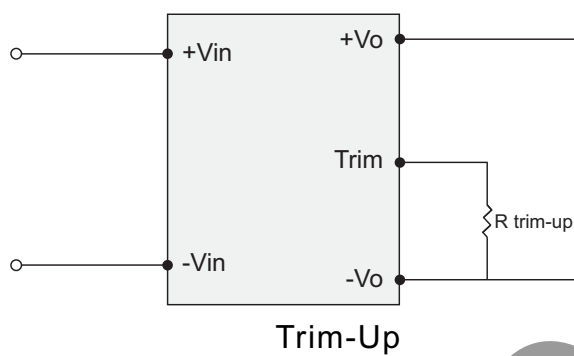
### 1. OUTPUT TRIMMING

The output voltages are preset to nominal values as indicated by the models table at the factory. If desired, the output voltage may optionally be trimmed to a different value ( $\pm 5\%$ ) with external resistors and/or potentiometer as shown below.

**FIGURE 1. TRIMMING WITH EXTERNAL POTENTIOMETER**



To trim the output voltage with fixed resistors, the output voltage can be calculated as follows.



**FIGURE 2: TRIM-UP VOLTAGE SETUP**

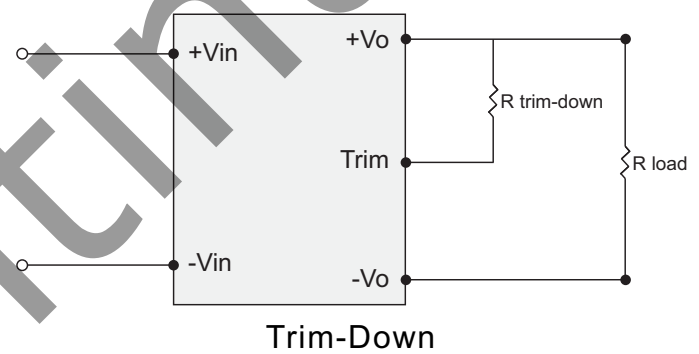
$$R_{trim\_up} = \frac{V_r \cdot R_1 \cdot R_2}{R_2 \cdot (V_o - V_r) - V_r \cdot R_1}$$

The value of  $R_{trim\_up}$  is defined as:

Where:  $R_{trim\_up}$  is the external resistor in  $K\Omega$ .  $V_o$  is the desired output voltage.  $R_1$  and  $R_2$  and  $V_r$  are internal to the unit and are defined in Table 1. For example to trim up the PTK15-D5-D12 up by 5% to 25.2 V,  $R_{trim\_up}$  is calculated as follows:

$$V_o = 25.2 / R_1 = 21 K\Omega / R_2 = 2.43 K\Omega / V_r = 2.5$$

$$R_{trim\_up} = \frac{2.5 \cdot 21 \cdot 2.43}{2.43 \cdot (25.2 - 2.5) - 2.5 \cdot 21} = 47.94 K\Omega$$



**FIGURE 3: TRIM-DOWN VOLTAGE SETUP**

$$R_{trim\_down} = \frac{(V_o - V_r) \cdot R_1 \cdot R_2}{V_r \cdot R_1 - (V_o - V_r) \cdot R_2}$$

The value of  $R_{trim\_down}$  is defined as:

Where:  $R_{trim\_down}$  is the external resistor in  $K\Omega$ .  $V_o$  is the desired output voltage.  $R_1$  and  $R_2$  and  $V_r$  are internal to the unit and are defined in Table 1. For example to trim down the PTK15-D5-D12 down by 5% to 22.8 V,  $R_{trim\_down}$  is calculated as follows:

$$V_o = 22.8 / R_1 = 21 K\Omega / R_2 = 2.43 K\Omega / V_r = 2.5$$

$$R_{trim\_down} = \frac{(22.8 - 2.5) \cdot 21 \cdot 2.43}{2.5 - 2.1 (22.8 - 2.5) \cdot 2.43} = 326.68 K\Omega$$

**Table 1**

| Model          | R1 (K $\Omega$ ) | R2 (K $\Omega$ ) | Vr (V) |
|----------------|------------------|------------------|--------|
| PTK15-QXX-S3.3 | 1.13             | 0.68             | 1.25   |
| PTK15-QXX-S5   | 2.43             | 2.43             | 2.5    |
| PTK15-QXX-S12  | 9.31             | 2.43             | 2.5    |
| PTK15-QXX-S15  | 12.7             | 2.4              | 2.5    |
| PTK15-QXX-D5   | 7.32             | 2.43             | 2.5    |
| PTK15-QXX-D12  | 21               | 2.43             | 2.5    |
| PTK15-QXX-D15  | 26.7             | 2.43             | 2.5    |