V-INFINITY
a division of CUI INC


**date** 06/2009

**PART NUMBER:** PTK25 **DESCRIPTION:** dc-dc converter

**features**
- **industry standard pin out**
- **wide 2:1 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”**
- **-40°C~85°C models available**
- **3 year warranty**

RoHS

| MODEL [1] | output power (max) | input voltage | output voltage | output current (max) | ripple & noise [2] mV P-P | efficiency (typ.) |
|---|---|---|---|---|---|---|
| PTK25-D24-S3 | 19.8W | 18-36VDC | 3.3VDC | 6.0A | 100 | 80% |
| PTK25-D24-S5 | 25.0W | 18-36VDC | 5VDC | 5.0A | 100 | 85% |
| PTK25-D24-S12 | 24.0W | 18-36VDC | 12VDC | 2.0A | 120 | 89% |
| PTK25-D24-S15 | 24.0W | 18-36VDC | 15VDC | 1.6A | 150 | 89% |
| PTK25-D24-D5 | 25.0W | 18-36VDC | ±5VDC | 2.5A | 75/75 | 84% |
| PTK25-D24-D12 | 24.0W | 18-36VDC | ±12VDC | 1.0A | 120/120 | 88% |
| PTK25-D24-D15 | 24.0W | 18-36VDC | ±15VDC | 0.8A | 150/150 | 87% |
| PTK25-D24-T312 | 19.95W | 18-36VDC | 3.3VDC/±12VDC | 3.5A/0.35A | 75/120/120 | 83% |
| PTK25-D24-T512 | 25.9W | 18-36VDC | 5VDC/±12VDC | 3.5A/0.35A | 75/120/120 | 84% |
| PTK25-D24-T315 | 19.95W | 18-36VDC | 3.3VDC/±15VDC | 3.5A/0.28A | 75/150/150 | 83% |
| PTK25-D24-T515 | 25.0W | 18-36VDC | 5VDC/±15VDC | 3.5A/0.25A | 75/150/150 | 84% |
| PTK25-D48-S3 | 19.8W | 36-72VDC | 3.3VDC | 6.0A | 100 | 81% |
| PTK25-D48-S5 | 25.0W | 36-72VDC | 5VDC | 5.0A | 100 | 85% |
| PTK25-D48-S12 | 24.0W | 36-72VDC | 12VDC | 2.0A | 120 | 89% |
| PTK25-D48-S15 | 24.0W | 36-72VDC | 15VDC | 1.6A | 150 | 89% |
| PTK25-D48-D5 | 25.0W | 36-72VDC | ±5VDC | 2.5A | 75/75 | 84% |
| PTK25-D48-D12 | 24.0W | 36-72VDC | ±12VDC | 1.0A | 120/120 | 88% |
| PTK25-D48-D15 | 24.0W | 36-72VDC | ±15VDC | 0.8A | 150/150 | 87% |
| PTK25-D48-T312 | 19.95W | 36-72VDC | 3.3VDC/±12VDC | 3.5A/0.35A | 75/120/120 | 83% |
| PTK25-D48-T512 | 25.9W | 36-72VDC | 5VDC/±12VDC | 3.5A/0.35A | 75/120/120 | 84% |
| PTK25-D48-T315 | 19.95W | 36-72VDC | 3.3VDC/±15VDC | 3.5A/0.28A | 75/150/150 | 83% |
| PTK25-D48-T515 | 25.0W | 36-72VDC | 5VDC/±15VDC | 3.5A/0.25A | 75/150/150 | 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. PTK25-Q48-S5M.

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

Discontinued

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## INPUT

| parameter | conditions/description | min | nom | max | units |
|---|---|---|---|---|---|
| input voltage range | | 18 | 24 | 36 | VDC |
| | | 36 | 48 | 72 | VDC |
| remote on/off control | output turn-on[3] | 2.5V | (open) | 5.5V | |
| | output turn-off | 0V | (short) | 0.8V | |
| switching frequency | constant | | 300 | | 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 | single output models | -0.25% | | +0.25% | |
| (low line to high line) | dual output models | -2.5% | | +2.5% | |
| | triple: main output (Vout) | -0.25% | | +0.25% | |
| | auxillary 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% | |
| | auxillary 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[4] | | | | |
| 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 [5] | 105% | | 135% | |
| over-voltage | internally zener clamped [5] | 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 | 77% | | 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 | | | 80 (2.82) | | grams (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 | | | | |

Discontinued

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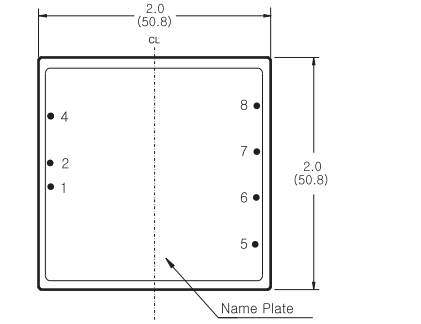
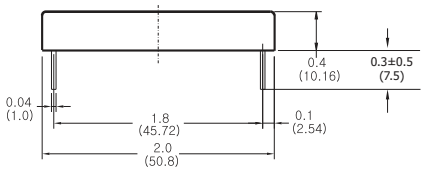
## DIMENSIONS (mm)

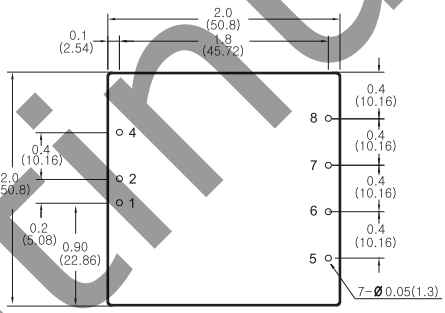
NOTES
1. All dimensions are in inches and(mm).
2. Weight : 75g or less




Pin Assignments

| Single Output | Dual Output | Triple Output |
|---|---|---|
| 1. +Vin | 1. +Vin | 1. +Vin |
| 2. -Vin | 2. -Vin | 2. -Vin |
| 3. No pin | 3. No pin | 3. No pin |
| 4. CNT | 4. CNT | 4. CNT |
| 5. NC | 5. +Vout | 5. +Vaux |
| 6. +Vout | 6. Com | 6. +Vout |
| 7. -Vout | 7. -Vout | 7. Com |
| 8. Trim | 8. Trim | 8. -Vaux |

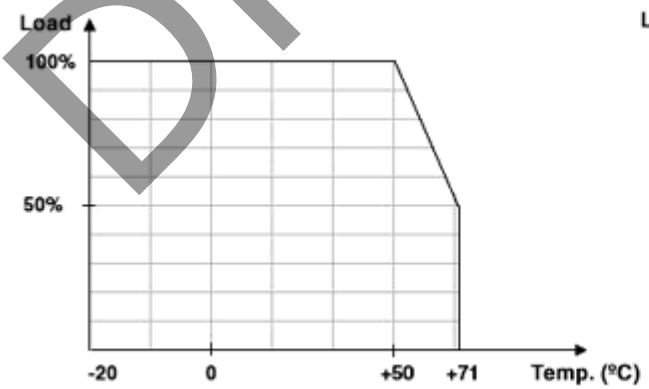



PCB Layout

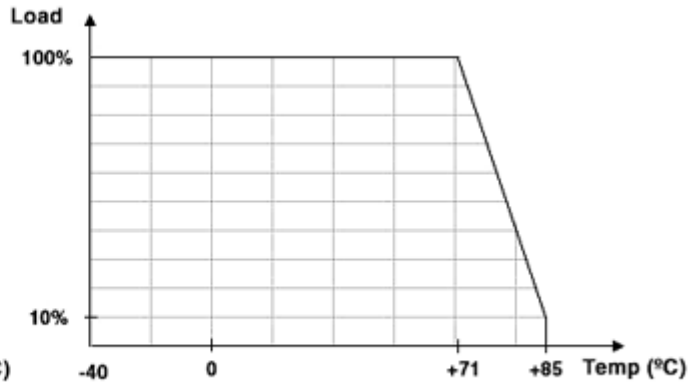
## PIN DEFINITIONS

| | |
|---|---|
| +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

Discontinued

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## 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 (+/- 10%) with external resistors and/or potentiometer as shown below.

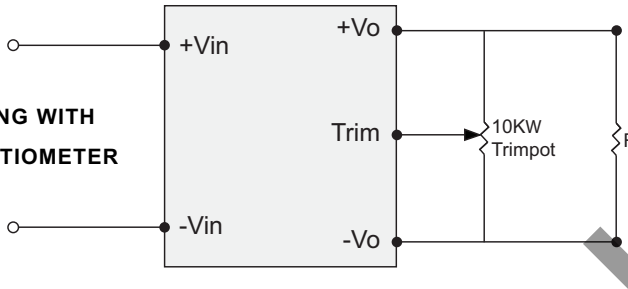
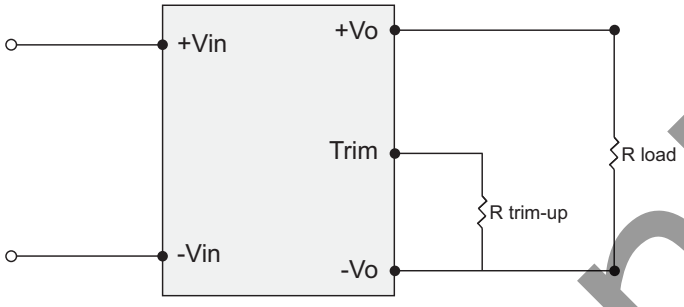



**FIGURE 1. TRIMMING WITH EXTERNAL POTENTIOMETER**

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




Trim-Up

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

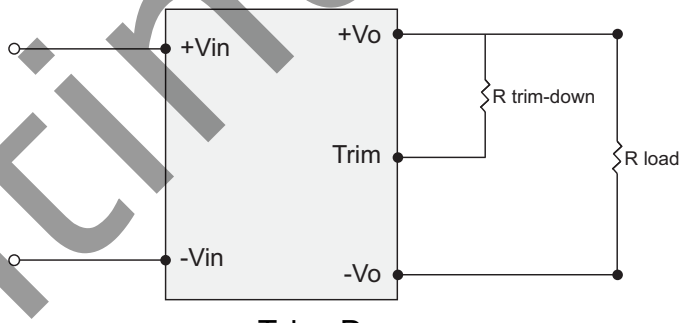
$$R_{trim_up} = \frac{V_r \cdot R_1 \cdot R_2}{R_2 \cdot (V_o - V_r) - V_r \cdot R_1}$$

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 PTK25-D5-D12 up by 5% to 25.2 V, $R_{trim-up}$ is calculated as follows:

$V_o = 25.2 \,/\, R_1 = 21\ \text{K}\Omega \,/\, R_2 = 2.43\ \text{K}\Omega \,/\, V_r = 2.5$

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




Trim-Down

**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 PTK25-D5-D12 down by 5% to 22.8 V, $R_{trim-down}$ is calculated as follows:

$V_o = 22.8 \,/\, R_1 = 21\ \text{K}\Omega \,/\, R_2 = 2.43\ \text{K}\Omega \,/\, V_r = 2.5$

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

Table 1

| Model | R1 (KΩ) | R2 (KΩ) | Vr (V) |
|---|---|---|---|
| PTK25-DXX-S3.3 | 1.13 | 0.68 | 1.25 |
| PTK25-DXX-S5 | 2.43 | 2.43 | 2.5 |
| PTK25-DXX-S12 | 9.31 | 2.43 | 2.5 |
| PTK25-DXX-S15 | 12.1 | 2.4 | 2.5 |
| PTK25-DXX-D5 | 7.32 | 2.43 | 2.5 |
| PTK25-DXX-D12 | 21 | 2.43 | 2.5 |
| PTK25-DXX-D15 | 26.7 | 2.43 | 2.5 |

Discontinued