

**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



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 output.

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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 <sup>3</sup>	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 (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%	
load regulation	auxillary outputs (+Vaux / -Vaux)	-5%		+5%	
	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 <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%	

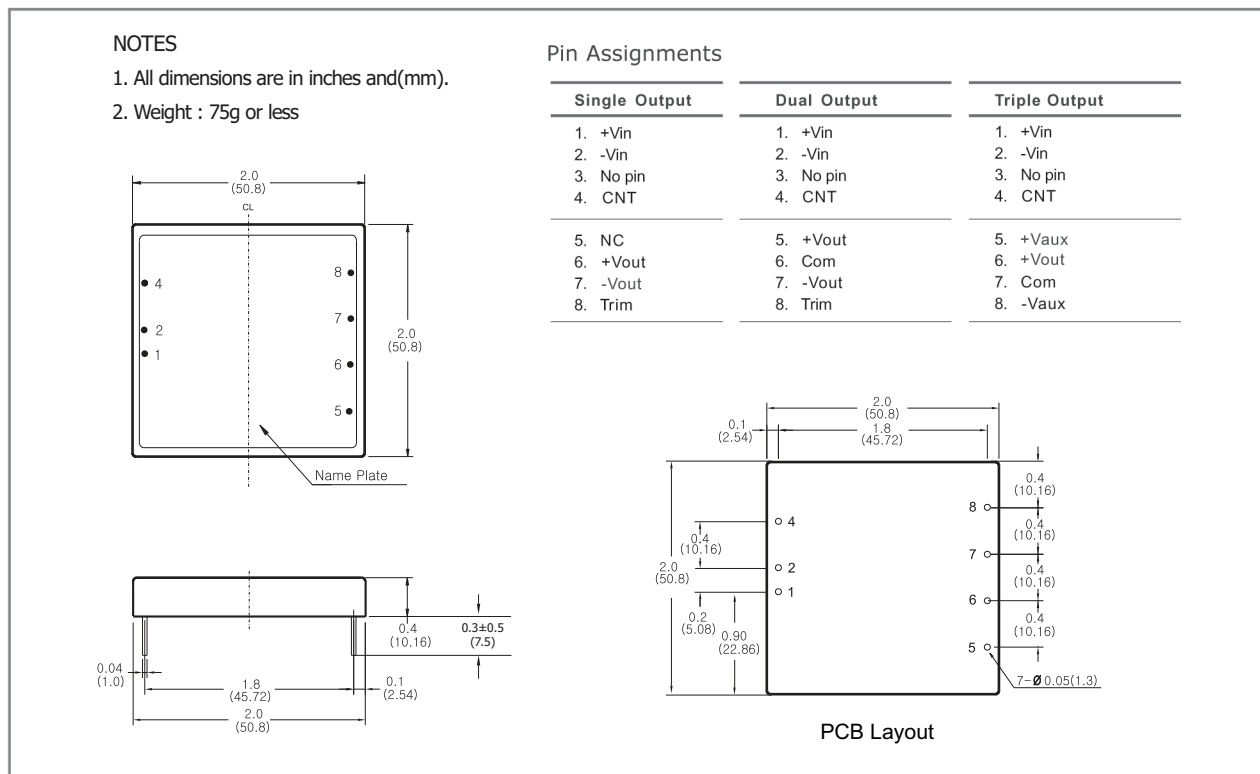
**NOTE:** 5 continuous operation in a protected state may compromise long-term reliability.

## GENERAL

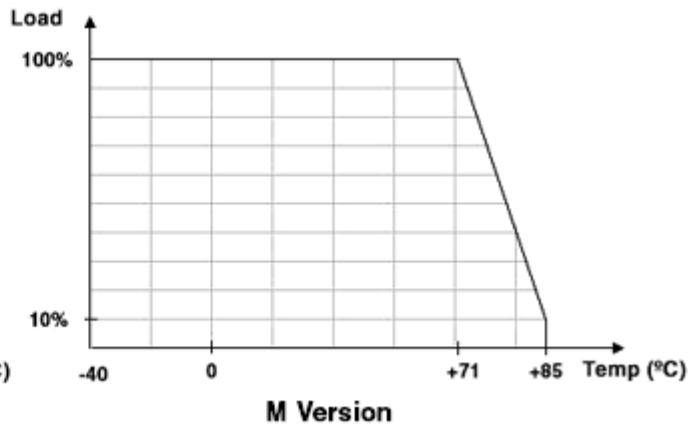
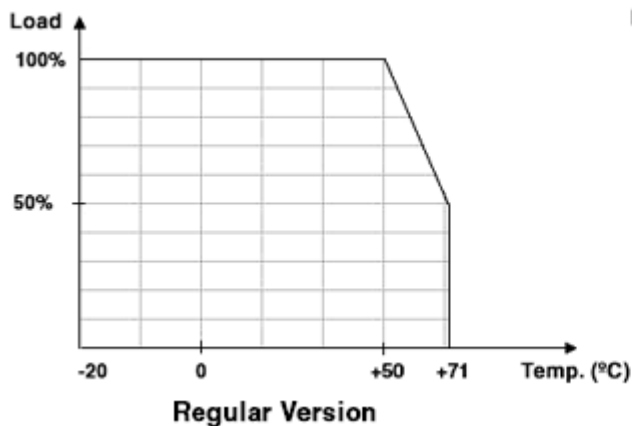
parameter	conditions/description	min	nom	max	units
efficiency	typical at full load	77%		83%	
isolation voltage	input/case, input/output, output/case	500			VAC
insulation resistance	at 500 VDC	100M			Ohms
agency standards	approved to UL60950(E222889), CSA C22.2 No. 60950, TUV EN60950 (single output only)				
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				

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**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**


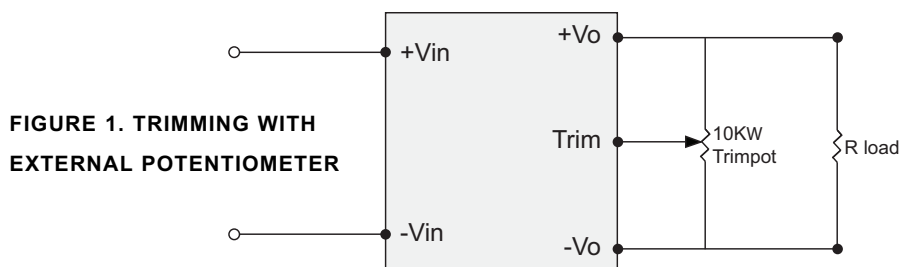
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## APPLICATION NOTES

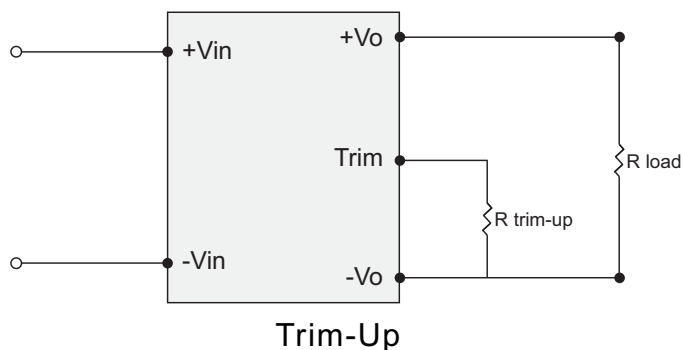
### 1. OUTPUT TRIMMING

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.



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

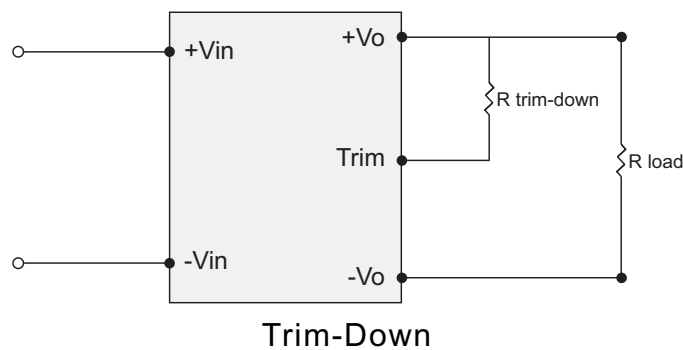
$$R_{trim\_up} = \frac{V_r \cdot R_1 \cdot R_2}{R_2 \cdot (V_o - V_r) - V_r \cdot R_1}$$

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:

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

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



**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