

**PART NUMBER:** PK25

**DESCRIPTION:** dc-dc converter

**features**

- industry standard pin out
- wide 2:1 input range
- fully isolated
- output voltage trimmable
- low ripple & noise
- over-current protection
- over-voltage protection
- output on/off control
- HI-POT tested
- constant switching frequency
- high efficiency
- compact size 2.56"x2.0"x0.375"
- 3 year warranty



MODEL <sup>1</sup>	output power (max)	input voltage	output voltage	output current (min)	output current (max)	ripple & noise <sup>2</sup> mV P-P	efficiency (typ.)
PK25-D5-S3.3	10.6W	4.5-9VDC	3.3VDC	0A	3.2A	75	73%
PK25-D5-S5	16.0W	4.5-9VDC	5VDC	0A	3.2A	75	75%
PK25-D5-S12	20.4W	4.5-9VDC	12VDC	0A	1.7A	120	77%
PK25-D5-S15	21.0W	4.5-9VDC	15VDC	0A	1.4A	150	77%
PK25-D5-D5	16.0W	4.5-9VDC	±5VDC	0A	1.6A	100/100	75%
PK25-D5-D12	20.4W	4.5-9VDC	±12VDC	0A	0.85A	120/120	77%
PK25-D5-D15	21.0W	4.5-9VDC	±15VDC	0A	0.7A	150/150	77%
PK25-D12-S3.3	13.2W	8-16.5VD	3.3VDC	0A	4.0A	75	83%
PK25-D12-S5	20.0W	9-18VDC	5VDC	0A	4.0A	75	85%
PK25-D12-S12	25.2W	9-18VDC	12VDC	0A	2.1A	120	89%
PK25-D12-S15	25.5W	9-18VDC	15VDC	0A	1.7A	150	89%
PK25-D12-D5	20.0W	9-18VDC	±5VDC	0A	2.0A	100/100	80%
PK25-D12-D12	25.2W	9-18VDC	±12VDC	0A	1.05A	120/120	86%
PK25-D12-D15	25.5W	9-18VDC	±15VDC	0A	0.85A	150/150	86%
PK25-D24-S3.3	13.2W	18-36VDC	3.3VDC	0A	4.0A	75	83%
PK25-D24-S5	20.0W	18-36VDC	5VDC	0A	4.0A	75	85%
PK25-D24-S12	25.2W	18-36VDC	12VDC	0A	2.1A	120	89%
PK25-D24-S15	25.5W	18-36VDC	15VDC	0A	1.7A	150	90%
PK25-D24-D5	20.0W	18-36VDC	±5VDC	0A	2.0A	100/100	82%
PK25-D24-D12	25.2W	18-36VDC	±12VDC	0A	1.05A	120/120	86%
PK25-D24-D15	25.5W	18-36VDC	±15VDC	0A	0.85A	150/150	86%
PK25-D48-S3.3	13.2W	32-72VDC	3.3VDC	0A	4.0A	75	83%
PK25-D48-S5	20.0W	32-72VDC	5VDC	0A	4.0A	75	85%
PK25-D48-S12	25.2W	32-72VDC	12VDC	0A	2.1A	120	90%
PK25-D48-S15	25.5W	32-72VDC	15VDC	0A	1.7A	150	90%
PK25-D48-D5	20.0W	32-72VDC	±5VDC	0A	2.0A	100/100	82%
PK25-D48-D12	25.2W	32-72VDC	±12VDC	0A	1.05A	120/120	86%
PK25-D48-D15	25.5W	32-72VDC	±15VDC	0A	0.85A	150/150	86%

**NOTE:** 1. All models (excluding the 5 V dc input, D5) are also available in an extended temperature range of -40°C~85°C. For these models, append "M" to the model number, e.g. PK25-D12-S3.3M.

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		4.5	5	9	VDC
		9	12	18	VDC
		18	24	36	VDC
		36	48	72	VDC
switching frequency	constant		300		KHz

**OUTPUT**

parameter	conditions/description	min	nom	max	units
set point accuracy		-2%		+2%	
line regulation	all models	-0.5%		+0.5%	
load regulation	single output models	-1.0%		+1.0%	
	dual output models (10% min. load)	-2.5%		+2.5%	
minimum load		0.0			Amps
ripple and noise	20 MHz bandwidth			1.0% Vout	mVpp

**PROTECTION**

parameter	conditions/description	min	nom	max	units
over-current	continuous auto recovery <sup>3</sup>	105%		135%	
over-voltage	internally zener clamped <sup>3</sup>	110%		140%	

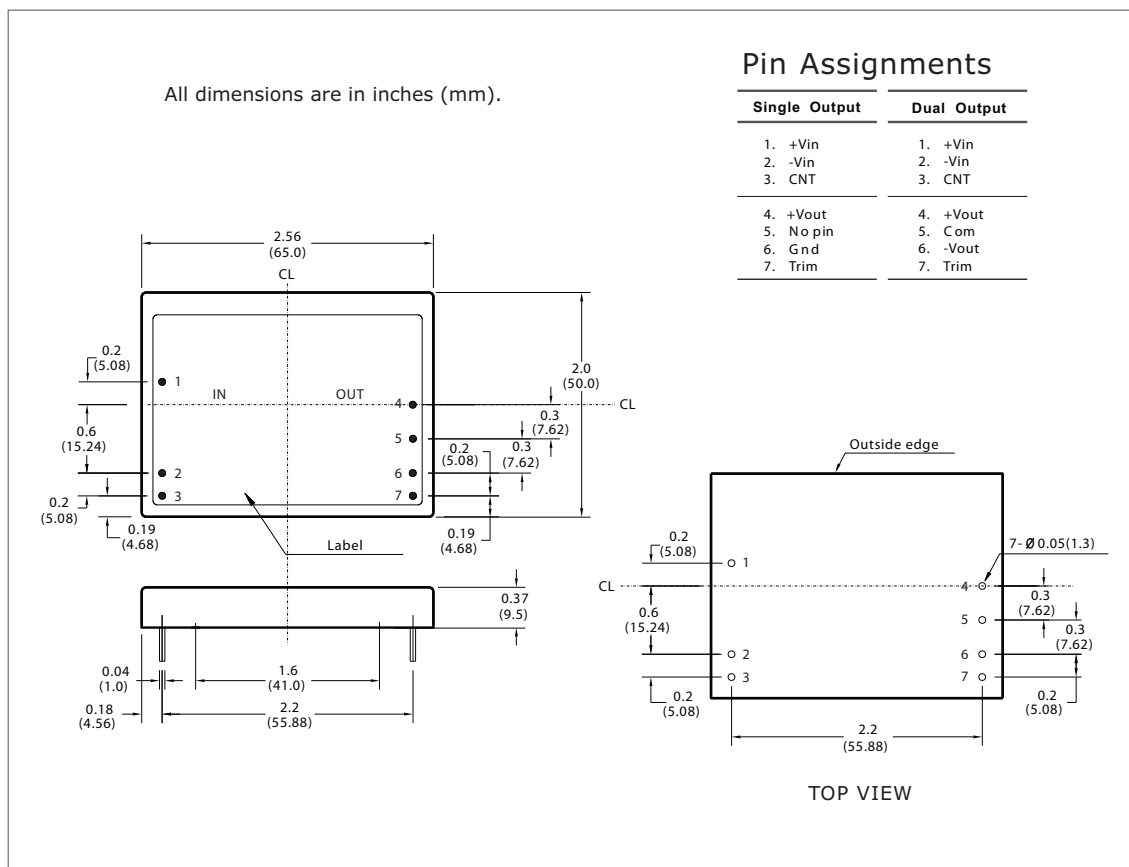
**NOTE:** 3 continuous operation in a protected state may compromise long-term reliability.

**GENERAL**

parameter	conditions/description	min	nom	max	units
efficiency	typical at full load	80%		89%	
dielectric withstand	input/case, input/output, output/case	500			VAC
insulation resistance	at 500 VDC	100M			Ohms
agency standards	approved to UL1950, EN60950, CISPR22, CE				
case material			STS		
material flammability			94 V-0		
weight			65		grams
			(2.29)		(ounces)
MTBF	MIL-HDBK-217F		470k		hours
operating temperature	regular models	-20		+71	°C
	extended temperature models	-40		+85	°C
storage temperature		-40		+105	°C
humidity	operating (non-condensing)	20%		90%	RH
washability	not intended for aqueous wash				

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**DIMENSIONS (mm)**


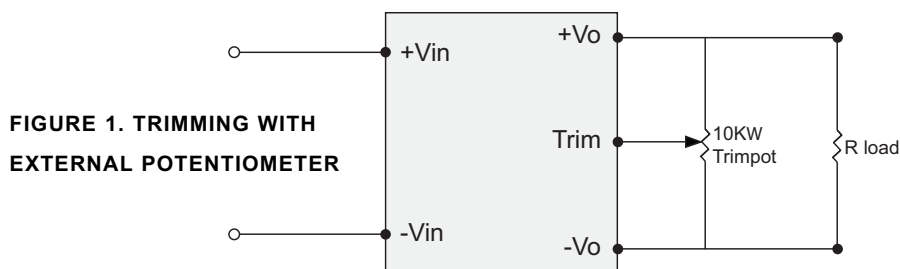
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## APPLICATION NOTES

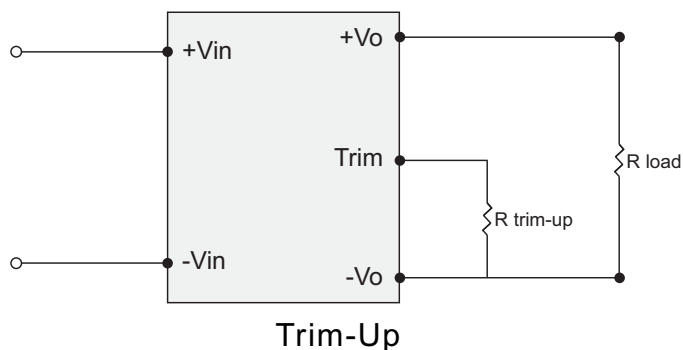
### 1. OUTPUT TRIMMING

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**

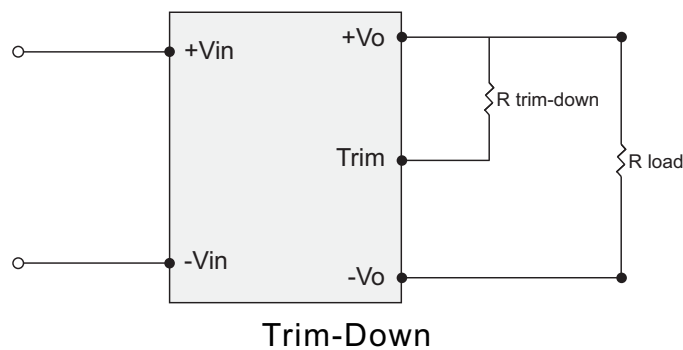
$$R_{trim\_up} = \frac{V_r \cdot R_1 \cdot R_2}{R_2 \cdot (V_o - V_r) - V_r \cdot R_1}$$

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 PK25-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 PK25-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**

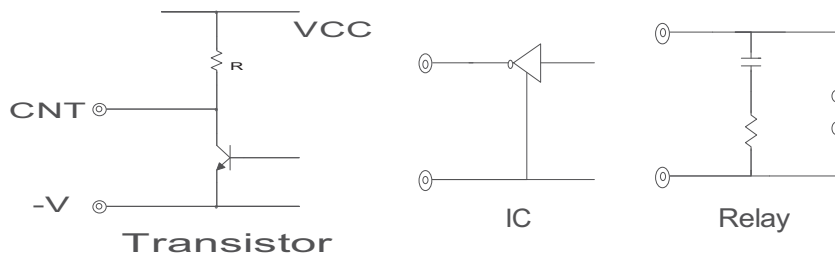
Model	R1 (K $\Omega$ )	R2 (K $\Omega$ )	Vr (V)
PK25-DXX-S3.3	4.12	2.49	1.25
PK25-DXX-S5	2.43	2.43	2.5
PK25-DXX-S12	9.31	2.43	2.5
PK25-DXX-S15	12.7	2.49	2.5
PK25-DXX-D5	7.5	2.49	2.5
PK25-DXX-D12	21	2.43	2.5
PK25-DXX-D15	26.7	2.43	2.5
*PK25-D5-S3.3	0.787	2.43	2.5

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**2. ON/OFF CONTROL (CNT)**

The ground terminal of remote ON/OFF circuit is connected with -V input terminal. Between CNT and -V input: output voltage is ON at "low" level or short circuit (0~1.2 V). Between CNT and -V input: output voltage is OFF at "high" level or open circuit (2.4~5.5 V).

**FIGURE 4. CONNECTION EXAMPLE**


When CNT terminal is "low" level, fan out current is 1 mA typical. When Vcc is applied, use  $5\text{ V} \leq V_{cc} \leq 24\text{ V}$ . When remote ON/OFF function is not used, please short between CNT and -V input.

CNT level for INPUT -V	OUTPUT
L(Less than 1.2V) OR Short	ON
HL(More than 2.4V) OR Open	OFF