



# P-DUKE POWER

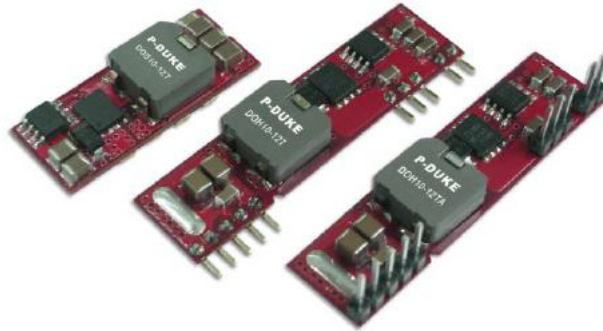
## DOS10-12T · DOH10-12T Series

DC-DC Converter  
Up to 10 Amps

**3**  
YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway



NO Min. Load Required
REMOTE ON OFF
OCP
SCP
UVP

### PART NUMBER STRUCTURE

DOS10	-	12	-	T	-	P
Series Name		Input Voltage (VDC)		Package		Remote Control Options
DOS10: SMD TYPE DOH10: SIP TYPE		12: 8.3~14		SMD TYPE SIP TYPE T: No Assembly T: Vertical Mounting SIP TA: Horizontal Mounting SIP		□: Negative Logic P: Positive Logic

**TECHNICAL SPECIFICATION** All specifications are typical at nominal input, full load and 25°C unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current Vin(nom) @ No Load 0.75VDC / 5.0VDC	Efficiency Vin(nom), 3.3VDC @ Full Load	Maximum Capacitor Load ESR $\geq$ 1m $\Omega$ / ESR $\geq$ 10m $\Omega$
	VDC	VDC	A	mA	%	$\mu$ F
DOS10-12T	Vout(set) $\leq$ 3.63 Vin = 8.3 ~ 14	0.75 ~ 5	10	40 / 100	93	1000 / 5000
DOS10-12T-P						
DOH10-12T	Vout(set) $>$ 3.63 Vin = 8.3 ~ 13.2	0.75 ~ 5	10	40 / 100	93	1000 / 5000
DOH10-12T-P						
DOH10-12TA						
DOH10-12TA-P						

## INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	Vout(set) $\leq$ 3.63VDC Vout(set) $>$ 3.63VDC	8.3	12	14	VDC
Maximum input current	Vin=8.3 to 14VDC, Io=Io(max.)		7		A
Start up voltage				8.3	VDC
Shutdown voltage		6.5	7.5	8.0	VDC
Input filter	*It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external C <sub>in</sub> is 4pcs of 47 $\mu$ F ceramic capacitors at least.				Capacitor type

## OUTPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Voltage accuracy	% of Vout(set)	-2.0		+2.0	%
Line regulation	Vin=Vin(min.) to Vin(max.) at Full Load	-0.3		+0.3	%
Load regulation	No Load to Full Load	-0.4		+0.4	%
Voltage adjustability		0.7525		5	VDC
Ripple and noise	Measured by 20MHz bandwidth, With a 1 $\mu$ F MLCC & a 10 $\mu$ F T/C			30	mVrms
				75	mVp-p
Temperature regulation	T <sub>A</sub> = -40°C to +85°C	-0.4		+0.4	%
Dynamic load response	With a 1 $\mu$ F MLCC & a 10 $\mu$ F T/C $\Delta$ Io/ $\Delta$ t=2.5A/ $\mu$ s, Vin(nom) Peak deviation 50% load step change Setting time(Vout<10%peak deviation)		200		mV
			25		$\mu$ s
	With 2pcs of 150 $\mu$ F polymer capacitors $\Delta$ Io/ $\Delta$ t=2.5A/ $\mu$ s, Vin(nom) Peak deviation 50% load step change Setting time(Vout<10%peak deviation)		100		mV
			25		$\mu$ s
Over load protection	% of Iout rated		200		%
Short circuit protection					Continuous, automatics recovery
Output voltage overshoot-startup	Vin= Vin(min.) to Vin(max.) at Full Load		1.0		%

## GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage		None			
Switching frequency		270	300	330	kHz
Safety meets		IEC/ EN/ UL62368-1			
Weight		6.0g (0.21oz)			
MTBF	MIL-HDBK-217F, Full load	3.355 x 10 <sup>6</sup> hrs			

## ENVIRONMENTAL SPECIFICATIONS

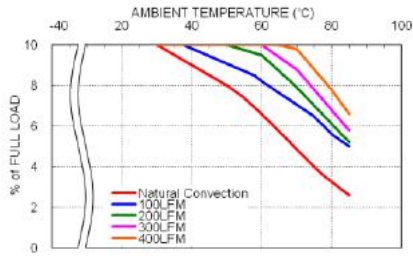
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+85	°C
Over temperature protection	Controller		125		°C
Storage temperature range		-55		+125	°C
Thermal shock		MIL-STD-810F			
Vibration		MIL-STD-810F			
Relative humidity(non-condensing)		5% to 95% RH			
Lead-free reflow solder process	Only for SMD type	IPC J-STD-020E			
Moisture sensitivity level(MSL)	Only for SMD type	IPC J-STD-033C Level 2a			

## FEATURE SPECIFICATIONS

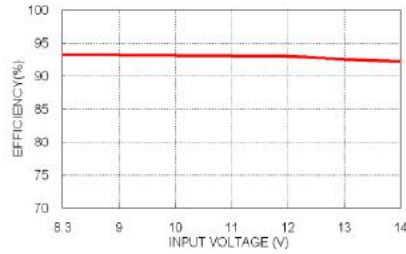
Parameter	Conditions	Min.	Typ.	Max.	Unit
Remote ON/OFF	Referred to GND pin Negative logic DC-DC ON (Standard) DC-DC OFF Positive logic DC-DC ON (Option) DC-DC OFF Input current of Ctrl pin Remote off input current  *Positive logic:ON/OFF is open collector/drain logic input Negative logic:ON/OFF pin is open collector/drain logic input with external pull –up resistor	0.01	2.0	1.0	mA mA
Remote sense range	If remote sense is not being used, +SENSE pin should connect to +Vout pin.			0.5	VDC
Rise time	Time for Vout to rise from 10% to 90%of Vout(set)			6	ms
Turn-on delay time	Case 1, Case 2  *Case 1: ON/OFF input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min.) until Vout=10% of Vout(set))  *Case 2:Input power is applied for at least one second and then the ON/OFF input is set to logic low (delay from instant at which Von/off=0.3VDC until Vout=10% of Vout(set))		3		ms

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

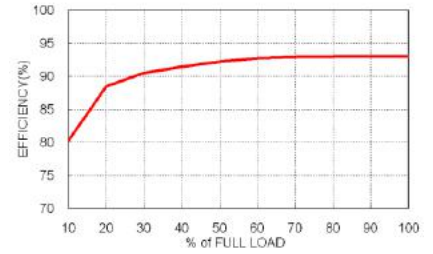
## CHARACTERISTIC CURVE



DOS10-12T, Vout=3.3V  
Derating Curve



DOS10-12T, Vout=3.3V  
Efficiency vs. Input Voltage



DOS10-12T, Vout=3.3V  
Efficiency vs. Output Load

## FUSE CONSIDERATION

This power module is not internally fused. An input line fuse must always be used.

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

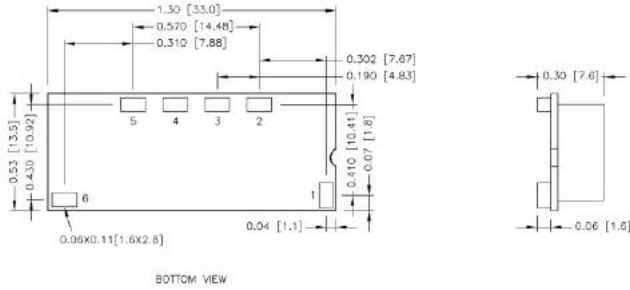
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
DOS10-12T□□□	10	Fast-Acting
DOH10-12T□□□	10	Fast-Acting

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

## MECHANICAL DRAWING

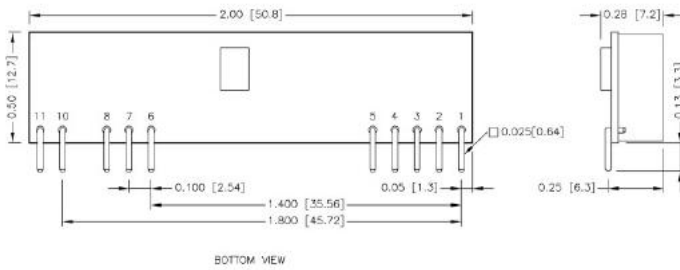
### DOS10-12T



### PIN CONNECTION

PIN	DEFINE
1	Ctrl
2	+Sense
3	Trim
4	+Vout
5	GND
6	+Vin

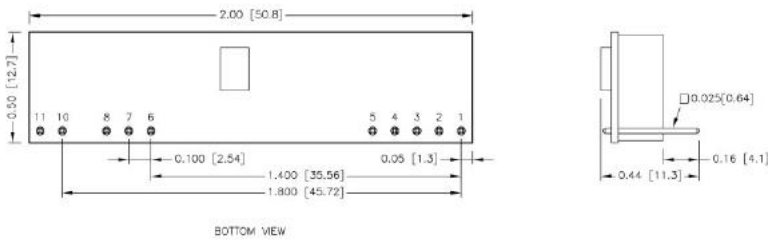
### DOH10-12T



### PIN CONNECTION

PIN	DEFINE
1	+Vout
2	+Vout
3	+Sense
4	+Vout
5	GND
6	GND
7	+Vin
8	+Vin
10	Trim
11	Ctrl

### DOH10-12TA



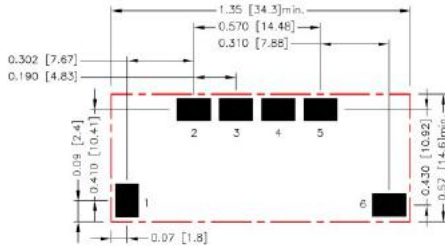
### PIN CONNECTION

PIN	DEFINE
1	+Vout
2	+Vout
3	+Sense
4	+Vout
5	GND
6	GND
7	+Vin
8	+Vin
10	Trim
11	Ctrl

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]  
x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

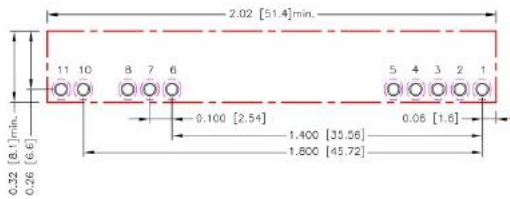
## RECOMMENDED PAD LAYOUT

### DOS10-12T



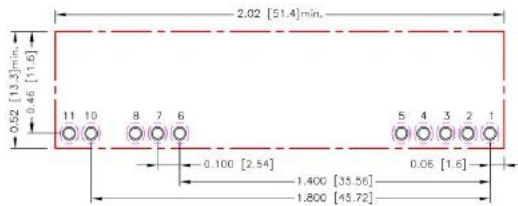
All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Top view pad 1.2.3.4.5.6: 0.150x0.102[3.80x2.60]

### DOH10-12T



All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Through hole 1.2.3.4.5.6.7.8.10.11:  $\Phi$ 0.047[1.20]  
 Top view pad 1.2.3.4.5.6.7.8.10.11:  $\Phi$ 0.059[1.50]  
 Bottom view pad 1.2.3.4.5.6.7.8.10.11:  
 Groove R0.040[1.02]L-0.094[2.40]

### DOH10-12TA



All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Through hole 1.2.3.4.5.6.7.8.10.11:  $\Phi$ 0.047[1.20]  
 Top view pad 1.2.3.4.5.6.7.8.10.11:  $\Phi$ 0.059[1.50]  
 Bottom view pad 1.2.3.4.5.6.7.8.10.11:  
 Groove R0.040[1.02]L-0.094[2.40]

## THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments; however, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the point as the figure below.

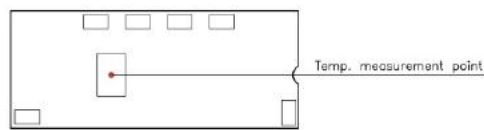
The temperature at this location should not exceed 115°C.

When operating, adequate cooling must be provided to maintain the test point temperature at or below 115°C.

Although the maximum point temperature of the power modules is 115°C, you can limit this Temperature to a lower value for extremely high reliability.

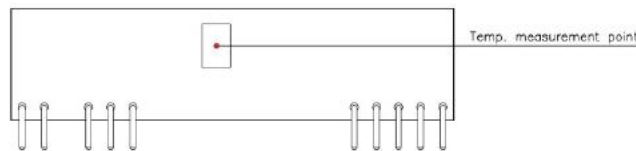
- Thermal test condition with vertical direction by natural convection (20LFM).

### DOS10-12T



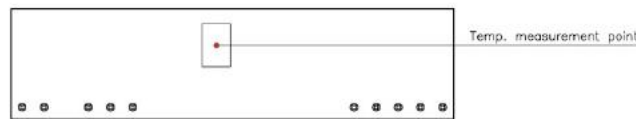
BOTTOM VIEW

### DOH10-12T



BOTTOM VIEW

### DOH10-12TA

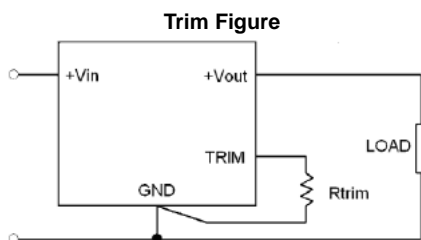


BOTTOM VIEW

## OUTPUT VOLTAGE PROGRAMMING

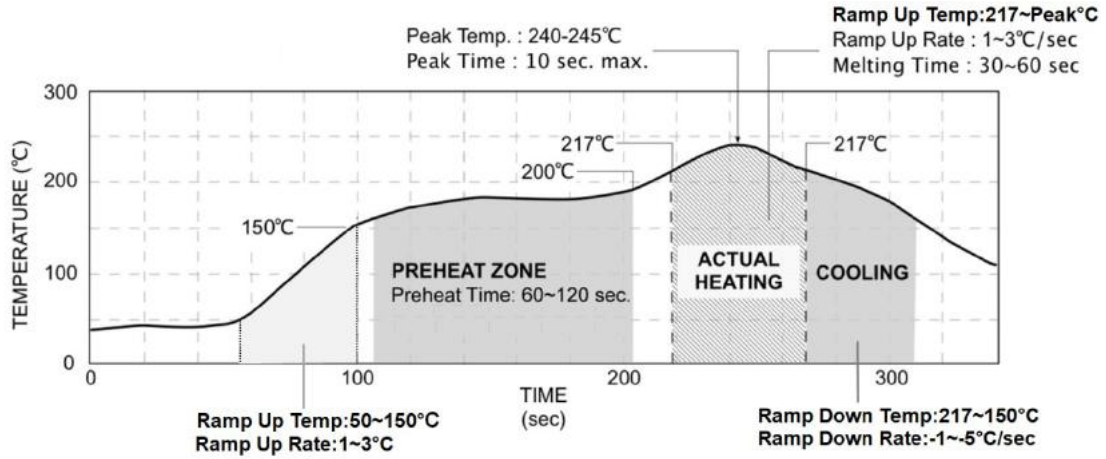
Output voltage programmable from 0.7525V to 5V by connecting a single resistor (shown as Trim Table) between the Trim and GND pins of the module. To calculate the value of the resistor Rtrim for a particular output voltage Vout, use the following equation:

■ Rtrim Equation : 
$$R_{trim} = \left[ \frac{10500}{V_{out} - 0.7525} - 1000 \right] \Omega$$



Trim Table	
Vout(set) (VDC)	Rtrim (kΩ)
0.7525	Open
1.2	22.46
1.5	13.05
1.8	9.024
2.5	5.009
3.3	3.122
5	1.472

**LEAD FREE REFLOW PROFILE For SMD Type**



\*The curves define the maximum peak reflow temperature permissible measured on pin1 or Vin pin.