



P-DUKE POWER

DOS16-12T · DOH16-12T Series

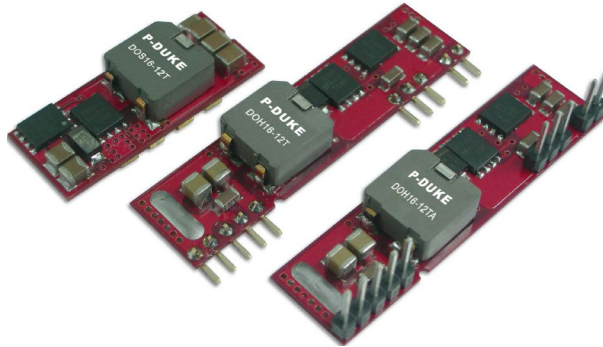
DC-DC Converter
Up to 16 Amps

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

DOS16 -

12

T

-

P

Series Name

Input
Voltage
(VDC)

Package

Remote Control
Options

DOS16: SMD TYPE
DOH16: 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 ≥ 1mΩ / ESR ≥ 10mΩ
	VDC	VDC	A	mA	%	μF
DOS16-12T	Vout(set) ≤ 3.63 Vin = 8.3 ~ 14	0.75 ~ 5	16	40 / 100	92	1000 / 5000
DOS16-12T-P						
DOH16-12T	Vout(set) > 3.63 Vin = 8.3 ~ 13.2	0.75 ~ 5	16	40 / 100	92	1000 / 5000
DOH16-12T-P						
DOH16-12TA						
DOH16-12TA-P						

INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	Vout(set) ≤ 3.63VDC	8.3	12	14	VDC
	Vout(set) > 3.63VDC	8.3	12	13.2	
Maximum input current	Vin=8.3 to 14VDC, Io=Io(max.)		10		A
Start up voltage				8.3	VDC
Shutdown voltage		6.5	7.5	8	VDC
Input filter	<p>*It's necessary to equip the external input capacitors at the input of the module.</p> <p>The capacitors should connect as close as possible to the input terminals that ensuring module stability.</p> <p>The external C_{in} is 6pcs of 47μF ceramic capacitors at least.</p>				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 1μF MLCC & a 10μF T/C			30	mVrms
				75	mVp-p
Temperature regulation	T _A = -40°C to +85°C	-0.4		+0.4	%
Dynamic load response	With a 1μF MLCC & a 10μF T/C				
	ΔIo/Δt=2.5A/μs, Vin(nom) Peak deviation		200		mV
	50% load step change Setting time(Vout<10%peak deviation)		25		μs
	With 2pcs of 150μF polymer capacitors				
Over load protection	ΔIo/Δt=2.5A/μs, Vin(nom) Peak deviation		100		mV
		50% load step change Setting time(Vout<10%peak deviation)		50	
Short circuit protection	% of Iout rated		180		%
Output voltage overshoot-startup	Continuous, automatic recovery				
	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	3.416 x 10 ⁶ hrs			

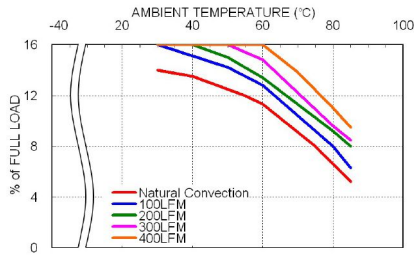
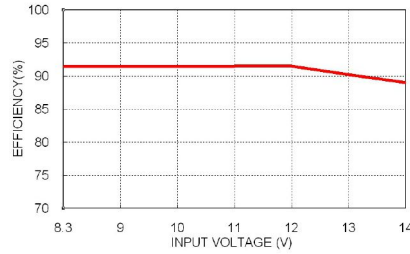
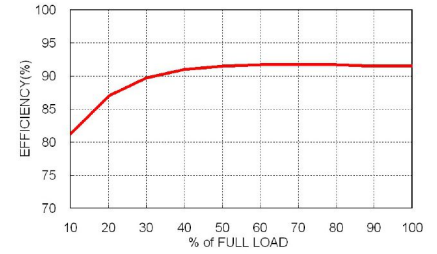
ENVIRONMENTAL SPECIFICATIONS

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			
Moisture sensitivity level(MSL)	Only for SMD type Verification according to IPC J-STD-020E	IPC J-STD-033C Level 2a			
Lead-free reflow solder process	Only for SMD type	The time above 217°C 30~60sec. Peak temperature 245°C max. Time above 240°C 10sec. max.			

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		1.0	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

 DOS16-12T, Vout=3.3V
 Derating Curve

 DOS16-12T, Vout=3.3V
 Efficiency vs. Input Voltage

 DOS16-12T, 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.

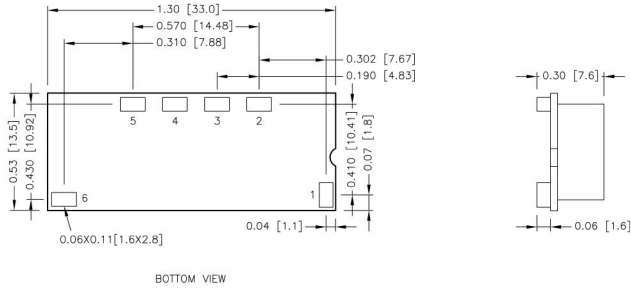
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
DOS16-12T□□□	15	Fast-Acting
DOH16-12T□□□	15	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

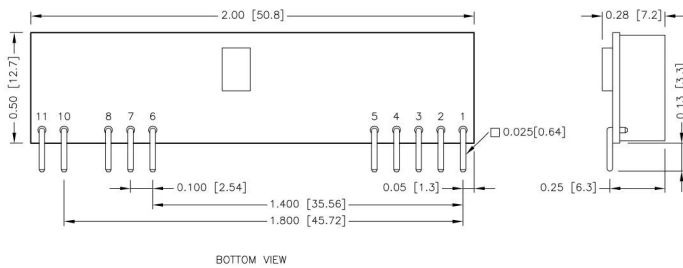
DOS16-12T



PIN CONNECTION

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

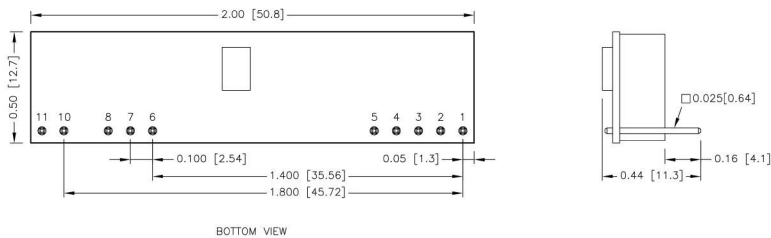
DOH16-12T



PIN CONNECTION

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

DOH16-12TA



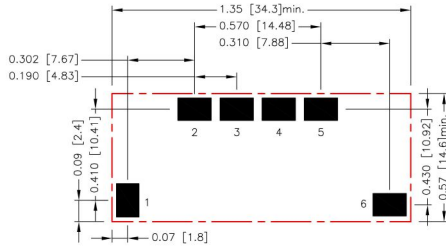
PIN CONNECTION

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.xx±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

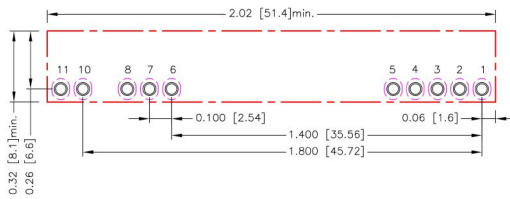
RECOMMENDED PAD LAYOUT

DOS16-12T



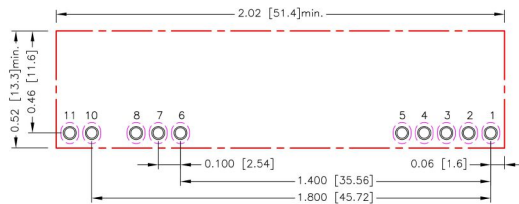
All dimensions in inch[mm]
 Pad size(lead free recommended)
 Top view pad 1.2.3.4.5.6: 0.150x0.102[3.80x2.60]

DOH16-12T



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]

DOH16-12TA



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]

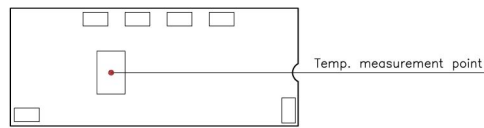
THERMAL CONSIDERATIONS

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.

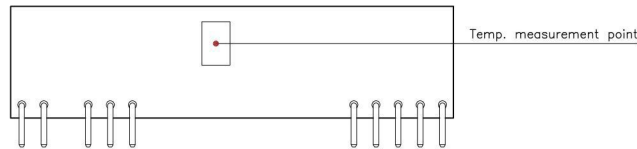
- Thermal test condition with vertical direction by natural convection (20LFM).

DOS16-12T



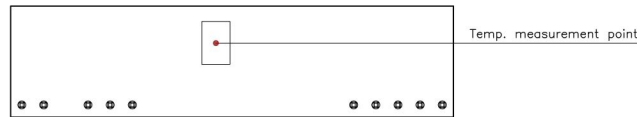
BOTTOM VIEW

DOH16-12T



BOTTOM VIEW

DOH16-12TA

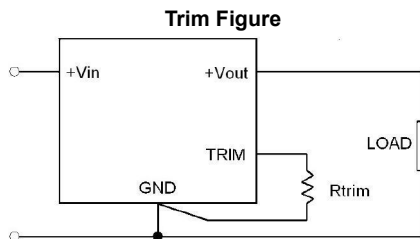


BOTTOM VIEW

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:

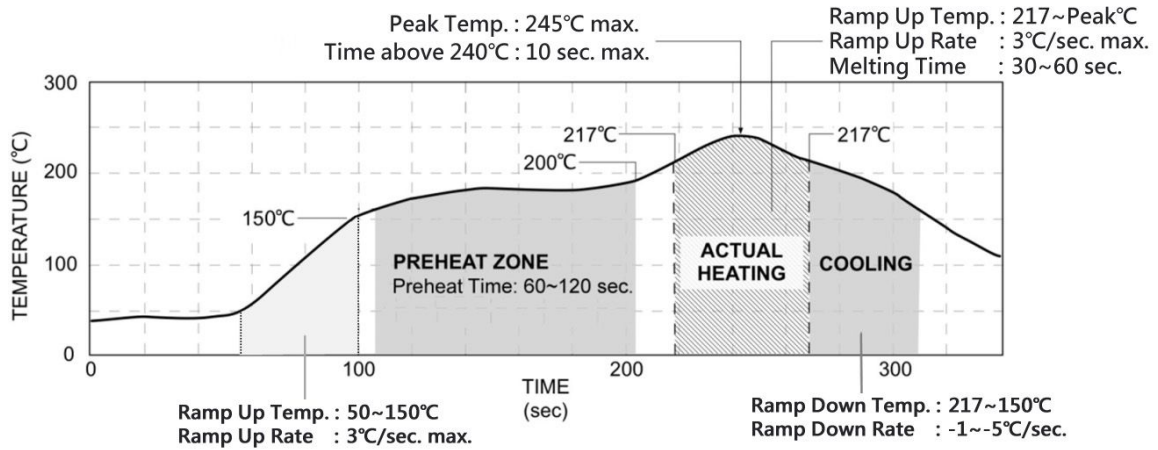
■ **Rtrim Equation :**
$$R_{trim} = \left[\frac{10500}{V_{out} - 0.7525} - 1000 \right] \Omega$$



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.