



# P-DUKE POWER

## DOS16-05T · DOH16-05T Series

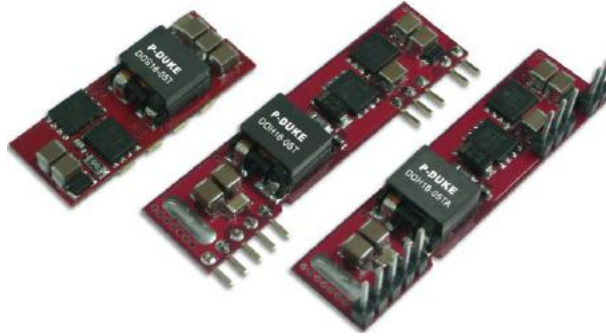
DC-DC Converter  
Up to 16 Amps

### 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** -

**05**

**T**

-

**P**

Series Name

Input  
Voltage  
(VDC)

Package

Remote Control  
Options

**DOS16:** SMD TYPE  
**DOH16:** SIP TYPE

**05:** 2.4~5.5

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 / 3.3VDC	Efficiency Vin(nom),3.3VDC @ Full Load	Maximum Capacitor Load ESR $\geq$ 1m $\Omega$ / ESR $\geq$ 10m $\Omega$
	VDC	VDC	A	mA	%	$\mu$ F
DOS16-05T						
DOS16-05T-P						
DOH16-05T	2.4 ~ 5.5	0.75 ~ 3.3	16	100 / 130	95	1000 / 5000
DOH16-05T-P	Vin(min.)=Vout(set)+0.5					
DOH16-05TA						
DOH16-05TA-P						

### INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	Vout(set) < Vin-0.5VDC	2.4	5	5.5	VDC
Maximum input current	Vin=2.4 to 5.5VDC, Io=Io(max.)		16		A
Start up voltage				2.4	VDC
Shutdown voltage		1.6	2.0	2.2	VDC
Input filter	*It is needed to add external input capacitors are required 4pcs of 150 $\mu$ F low-ESR polymer capacitors and 4pcs of 47 $\mu$ F ceramic capacitors in parallel. The capacitors should connect as close as possible to the input terminals that ensuring module stability.				Capacitor type

### OUTPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Voltage accuracy	% of Vout(set)	-2.0		+2.0	%
Line regulation	Vin=Vout(set)+0.5VDC 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		3.63	VDC
Ripple and noise	Measured by 20MHz bandwidth, with a 1 $\mu$ F MLCC & a 10 $\mu$ F T/C			15	mVrms
				50	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)		300		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)		150		mV
			100		$\mu$ s
Over load protection	% of Iout rated		180		%
Short circuit protection			Continuous, automatics recovery		
Output voltage overshoot-startup	Vin=2.4~5.5VDC 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			3.238 x 10 <sup>6</sup> hrs	

## ENVIRONMENTAL SPECIFICATIONS

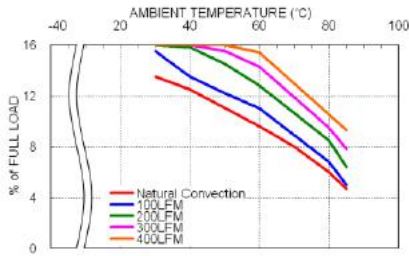
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+85	°C
Over temperature protection	Controller		125		°C
Storage temperature range		-55		+125	°C
Thermal shock				MIL-STD-810F	
Vibration				MIL-STD-810F	
Relative humidity(non-condensing)				5% to 95% RH	
Lead-free 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

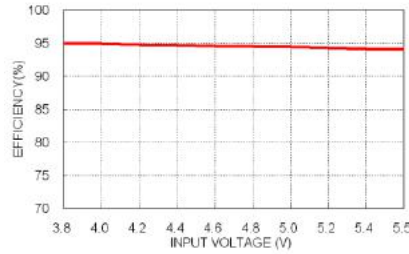
Parameter	Conditions	Min.	Typ.	Max.	Unit
Remote ON/OFF	Referred to GND pin Negative logic DC-DC ON (Standard) DC-DC OFF Positive logic DC-DC ON (Option) DC-DC OFF Input current of Ctrl pin Remote off input current  *Positive logic:ON/OFF is open collector/drain logic input Negative logic:ON/OFF pin is open collector/drain logic input with external pull –up resistor	0.01	1.5	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))		1		ms

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

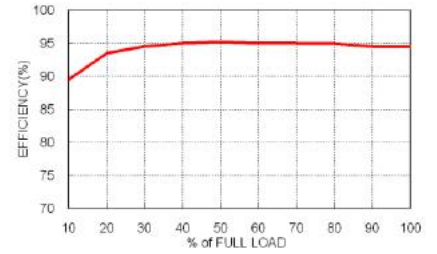
## CHARACTERISTIC CURVE



DOS16-05T, Vout=3.3V  
Derating Curve



DOS16-05T, Vout=3.3V  
Efficiency vs. Input Voltage



DOS16-05T, 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.

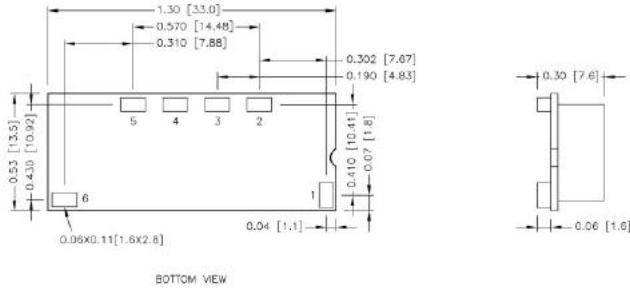
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
DOS16-05T□□□	25	Fast-Acting
DOH16-05T□□□	25	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

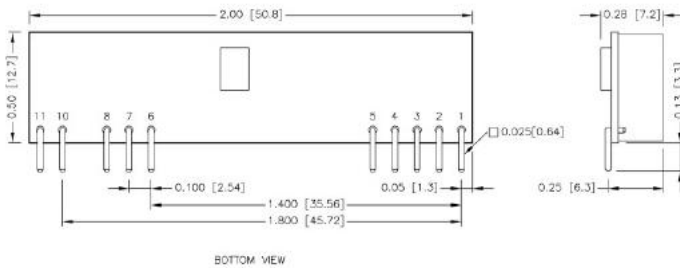
### DOS16-05T



### PIN CONNECTION

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

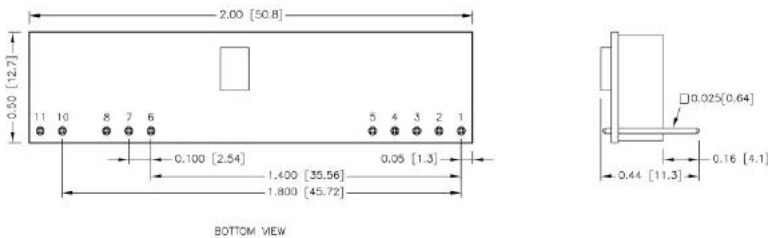
### DOH16-05T



### PIN CONNECTION

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

### DOH16-05TA



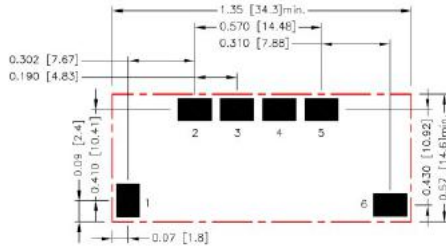
### PIN CONNECTION

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]

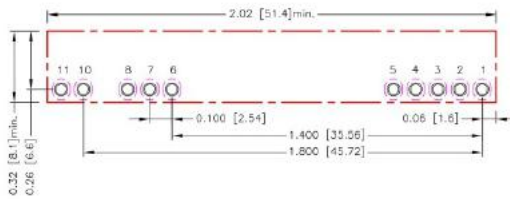
## RECOMMENDED PAD LAYOUT

### DOS16-05T



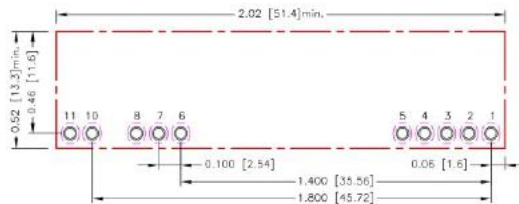
All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Top view pad 1.2.3.4.5.6: 0.150x0.102[3.80x2.60]

### DOH16-05T



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]

### DOH16-05TA



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.

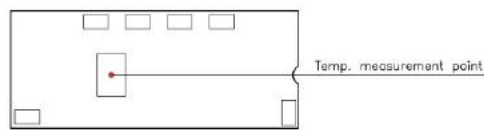
The temperature at this location should not exceed 115°C.

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.

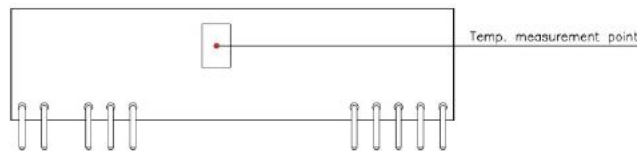
- Thermal test condition with vertical direction by natural convection (20LFM).

### DOS16-05T



BOTTOM VIEW

### DOH16-05T



BOTTOM VIEW

### DOH16-05TA

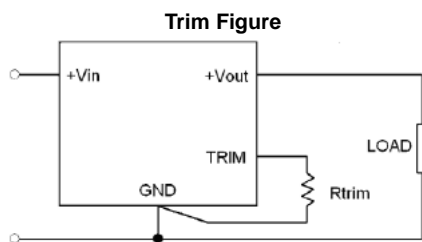


BOTTOM VIEW

## OUTPUT VOLTAGE PROGRAMMING

Output voltage programmable from 0.75V to 3.3V 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:

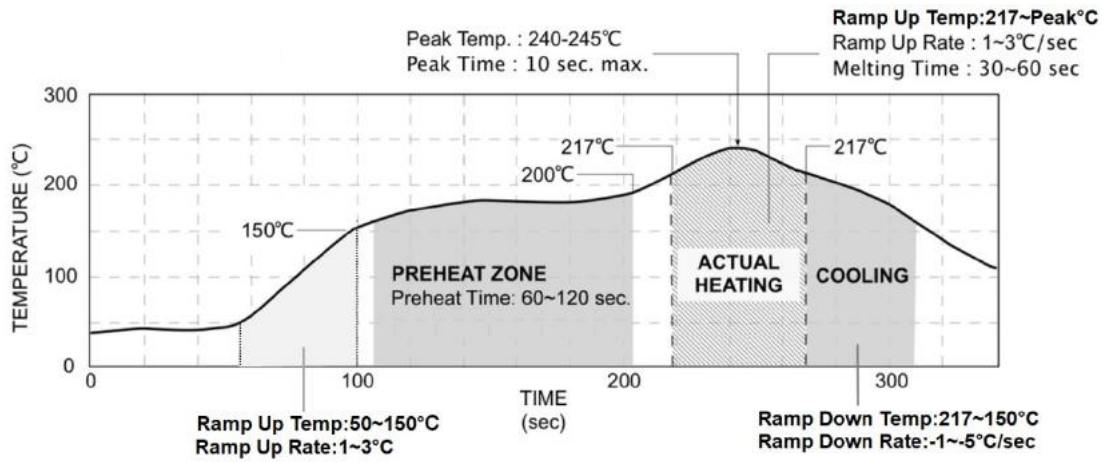
■ **Rtrim Equation** :  $R_{trim} = \left[ \frac{21070}{V_{out} - 0.7525} - 5110 \right] \Omega$



Trim Table

Vout(set) (VDC)	Rtrim (kΩ)
0.7525	Open
1.2	41.973
1.5	23.077
1.8	15.004
2.5	6.974
3.3	3.160

**LEAD FREE REFLOW PROFILE For SMD Type**



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