



P-DUKE POWER

DOS06-05T · DOH06-05T Series

DC-DC Converter
Up to 6 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

DOS06 -

05

T

-

P

Series Name

Input
Voltage
(VDC)

Package

Remote Control
Options

DOS06: SMD TYPE
DOH06: 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 Ω / ESR \geq 10m Ω |
|--------------|-------------------------|----------------|----------------------------|---|--|---|
| | VDC | VDC | A | mA | % | μ F |
| DOS06-05T | | | | | | |
| DOS06-05T-P | | | | | | |
| DOH06-05T | 2.4 ~ 5.5 | 0.75 ~ 3.3 | 6 | 20 / 45 | 94 | 1000 / 3000 |
| DOH06-05T-P | Vin(min.)=Vout(set)+0.5 | | | | | |
| DOH06-05TA | | | | | | |
| DOH06-05TA-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=Vin(min.), Vout(set)=3.3VDC, Io=Io(max.) | | | | 6 | 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 2pcs of 150 μ F low-ESR polymer capacitors and 2pcs of 47 μ 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 μ F MLCC & a 10 μ F T/C | | | | 20 | mVrms |
| | | | | | 50 | mVp-p |
| Temperature regulation | T _A = -40°C to +85°C | -0.4 | | +0.4 | % | |
| Dynamic load response | With a 1 μ F MLCC & a 10 μ F T/C Δ Io/ Δ t=2.5A/ μ s, Vin(nom) Peak deviation 50% load step change Setting time(Vout<10%peak deviation) | | | | 130 | mV |
| | | | | | 25 | μ s |
| | With 2pcs of 150 μ F polymer capacitors Δ Io/ Δ t=2.5A/ μ s, Vin(nom) Peak deviation 50% load step change Setting time(Vout<10%peak deviation) | | | | 50 | mV |
| | | | | | 50 | μ s |
| Over load protection | % of Iout rated | | | | 220 | % |
| Short circuit protection | | | | | Continuous, automatic 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 | | | | | 2.8g (0.1oz) | |
| MTBF | MIL-HDBK-217F, Full load | | | | 9.398 x 10 ⁶ hrs | |

ENVIRONMENTAL SPECIFICATIONS

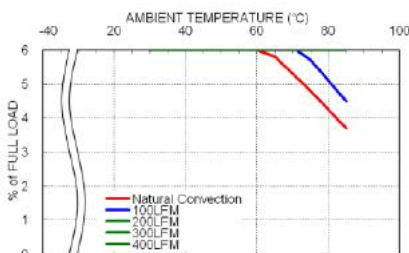
| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|-------------------|------|------|-----------|----------------------------|
| Operating ambient temperature | With derating | -40 | | +85 | °C |
| Over temperature protection | Controller | | 135 | | °C |
| Storage 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

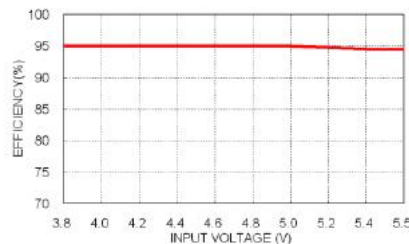
| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------------|--|------|------|------|----------|
| Remote ON/OFF | Referred to GND pin Negative logic DC-DC ON (Standard) Positive logic DC-DC ON (Option) Input current of Ctrl pin Remote off input current | 0.01 | 0.6 | 1.0 | mA mA |
| | *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 | | | | |
| 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.

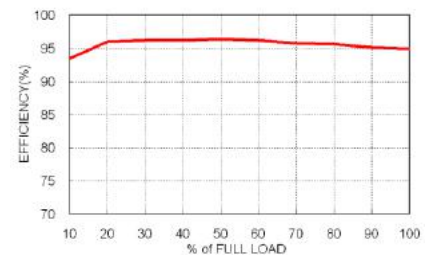
CHARACTERISTIC CURVE



DOS06-05T, Vout=3.3V
Derating Curve



DOS06-05T, Vout=3.3V
Efficiency vs. Input Voltage



DOS06-05T, Vout=3.3V
Efficiency vs. Output Load

FUSE CONSIDERATION

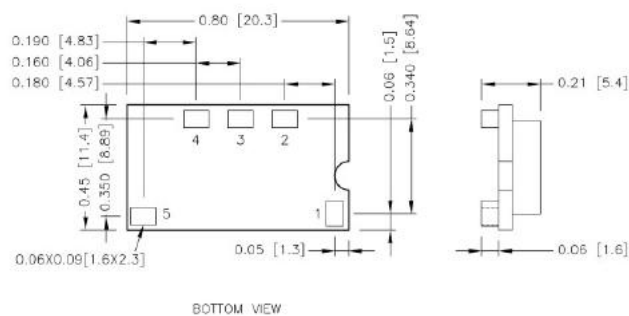
This power module is not internally fused. An input line fuse must always be used. This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. To maximum flexibility, internal fusing 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 |
|---------------|-----------------|-------------|
| DOS06-05T□□□□ | 8 | Fast-Acting |
| DOH06-05T□□□□ | 8 | 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

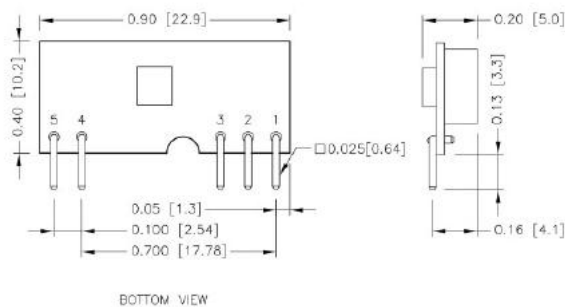
DOS06-05T



PIN CONNECTION

| PIN | DEFINE |
|-----|--------|
| 1 | Ctrl |
| 2 | +Vout |
| 3 | Trim |
| 4 | GND |
| 5 | +Vin |

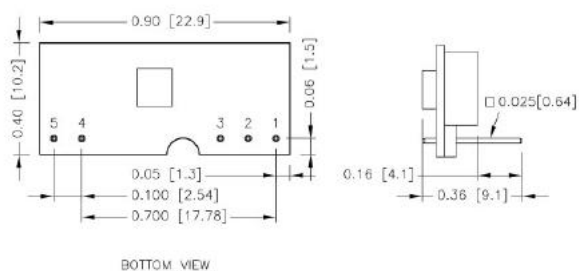
DOH06-05T



PIN CONNECTION

| PIN | DEFINE |
|-----|--------|
| 1 | +Vout |
| 2 | Trim |
| 3 | GND |
| 4 | +Vin |
| 5 | Ctrl |

DOH06-05TA



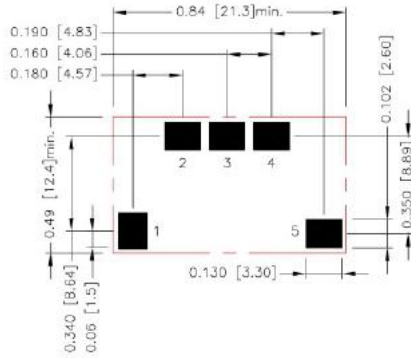
PIN CONNECTION

| PIN | DEFINE |
|-----|--------|
| 1 | +Vout |
| 2 | Trim |
| 3 | GND |
| 4 | +Vin |
| 5 | Ctrl |

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

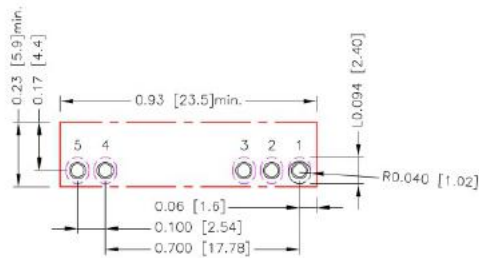
RECOMMENDED PAD LAYOUT

DOS06-05T



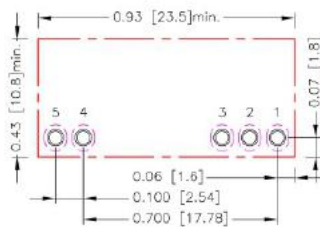
All dimensions in inch[mm]
 Pad size(lead free recommended)
 Top view pad 1.2.3.4.5: 0.130x0.102[3.30x2.60]

DOH06-05T



All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.4.5: $\Phi 0.047$ [1.20]
 Top view pad 1.2.3.4.5: $\Phi 0.059$ [1.50]
 Bottom view pad 1.2.3.4.5:
 Groove R0.040[1.02]L-0.094[2.40]

DOH06-05TA



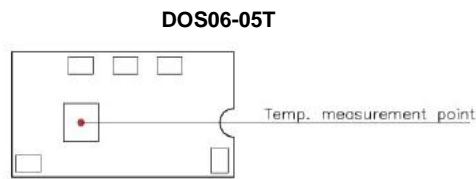
All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.4.5: $\Phi 0.047$ [1.20]
 Top view pad 1.2.3.4.5: $\Phi 0.059$ [1.50]
 Bottom view pad 1.2.3.4.5:
 Groove R0.040[1.02]L-0.094[2.40]

THERMAL CONSIDERATIONS

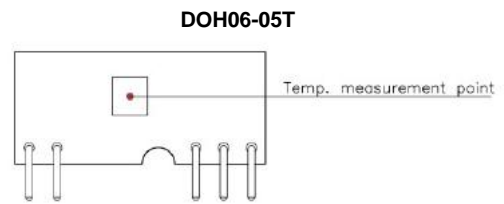
The power module operates in a variety of thermal environments; however, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the point as the figure below. The temperature at this location should not exceed 125°C.

When operating, adequate cooling must be provided to maintain the test point temperature at or below 125°C. Although the maximum point temperature of the power modules is 125°C, you can limit this Temperature to a lower value for extremely high reliability.

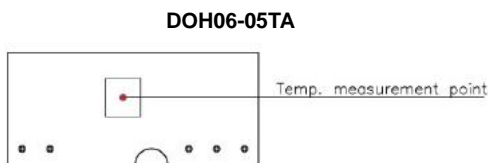
- Thermal test condition with vertical direction by natural convection (20LFM).



BOTTOM VIEW



BOTTOM VIEW

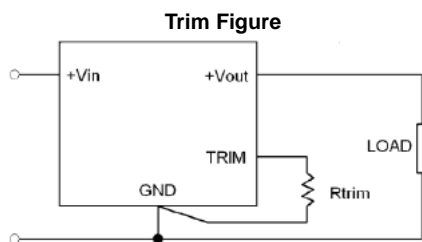


BOTTOM VIEW

OUTPUT VOLTAGE PROGRAMMING

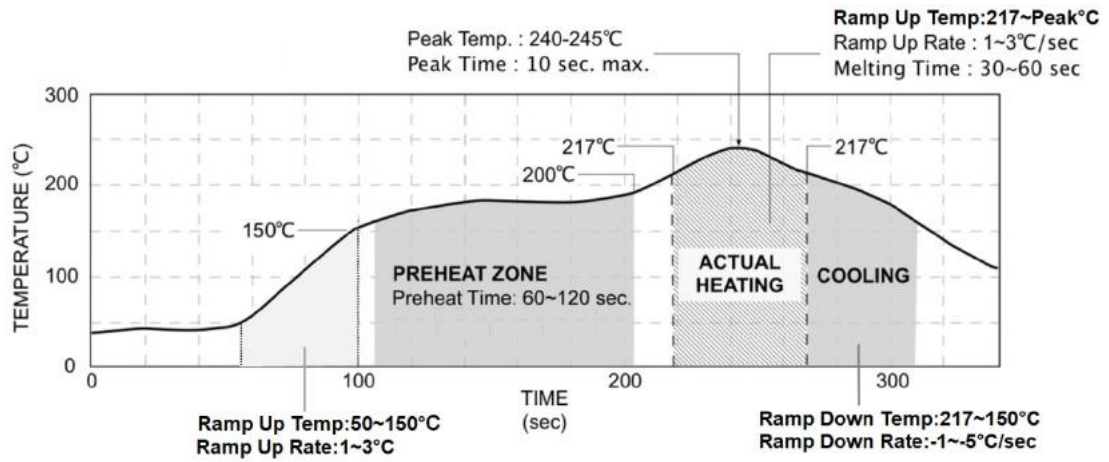
Output voltage programmable from 0.75V to 3.3V by connecting a single resistor (shown as Trim Table) between the Trim and GND pins of the module. To calculate the value of the resistor Rtrim for a particular output voltage Vout, use the following equation:

■ **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.