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: **T:** No Assembly SIP TYPE: **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℃ unless otherwise noted

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load A	Input Current Vin(nom) @ No Load 0.75VDC / 3.3VDC mA	Efficiency Vin(nom),3.3VDC @Full Load %	Maximum Capacitor Load ESR≧1mΩ / ESR≧10mΩ µF
DOS06-05T DOS06-05T-P DOH06-05T DOH06-05T-P DOH06-05TA DOH06-05TA-P	2.4 ~ 5.5 Vin(min.)=Vout(set)+0.5	0.75 ~ 3.3	6	20 / 45	94	1000 / 3000

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 150µF low-ESR polymer capacitors and 2pcs of 47µF 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	% of Vout(set)	-0.3		+0.3	%
Load regulation	No Load to Full Load	% of Vout(set)	-0.4		+0.4	%
Voltage adjustability			0.7525		3.63	VDC
Ripple and noise	Measured by 20MHz bandwidth, with a 1µF MLCC & a 10µF T/C				20 50	mVrms mVp-p
Temperature regulation	T_A= -40℃ to +85℃		-0.4		+0.4	%
Dynamic load response	With a 1µF MLCC & a 10µF T/C					
	ΔIo/Δt=2.5A/µs,Vin(nom)	Peak deviation		130		mV
	50% load step change	Setting time(Vout<10%peak deviation)		25		µs
	With 2pcs of 150µF polymer capacitors					
	ΔIo/Δt=2.5A/µs,Vin(nom)	Peak deviation		50		mV
	50% load step change	Setting time(Vout<10%peak deviation)		50		µs
Over load protection	% of Iout rated			220		%
Short circuit protection				Continuous, automatics recovery		
Output voltage overshoot-startup	Vin=2.4~5.5VDC at Full Load	% of Vout(set)		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

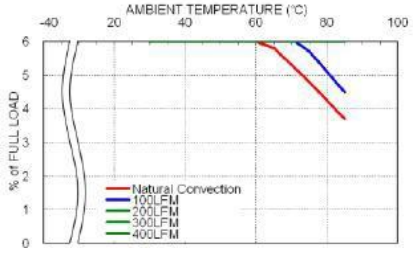
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+85	℃
Over temperature protection	Controller		135		℃
Storage temperature range		-55		+125	℃
Thermal shock				MIL-STD-810F	
Vibration				MIL-STD-810F	
Relative humidity(non-condensing)				5% to 95% RH	
Lead-free 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

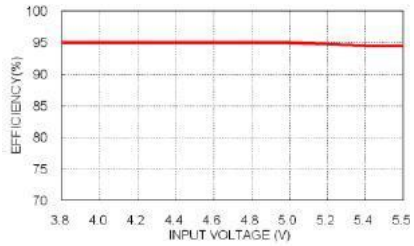
Parameter	Conditions			Min.	Typ.	Max.	Unit
Remote ON/OFF	Referred to GND pin	Negative logic (Standard)	DC-DC ON		Open or 0 ~ 0.3VDC		
			DC-DC OFF		1.5VDC ~ Vin(max.)		
		Positive logic (Option)	DC-DC ON		Open or Vin ~Vin(max.)		
			DC-DC OFF		0 ~ 0.3VDC		
		Input current of Ctrl pin		0.01		1.0	mA
		Remote off input current			0.6		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.

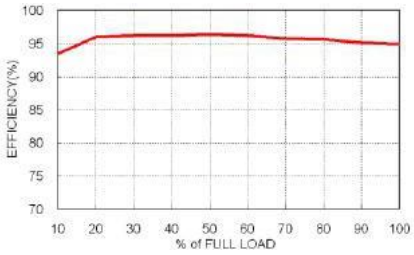
CHARACTERISTIC CURVE



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

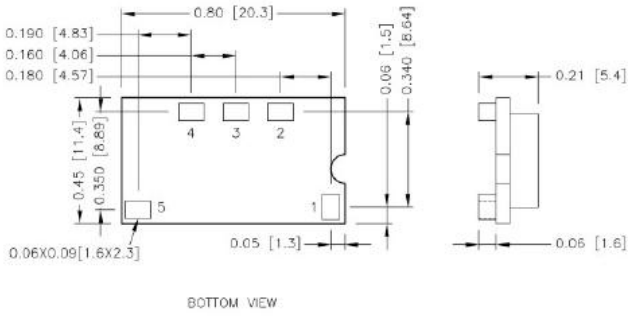
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing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

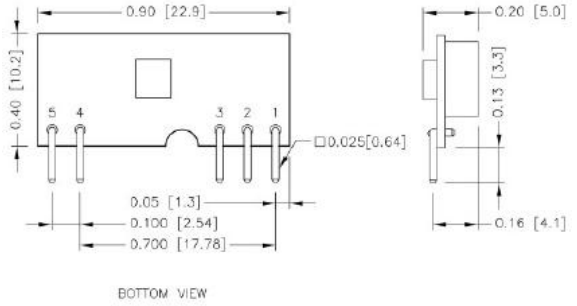
DOS06-05T



PIN CONNECTION

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

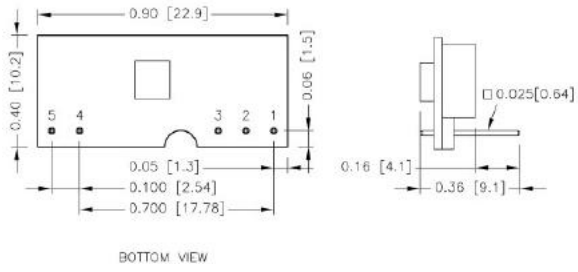
DOH06-05T



PIN CONNECTION

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

DOH06-05TA



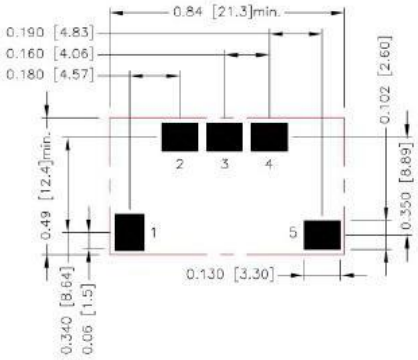
PIN CONNECTION

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

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]

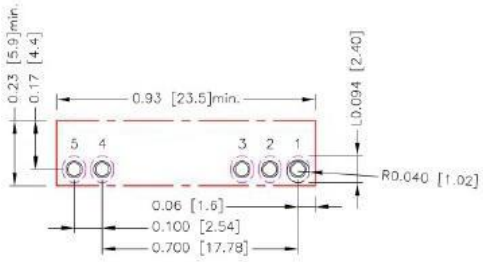
RECOMMENDED PAD LAYOUT

DOS06-05T



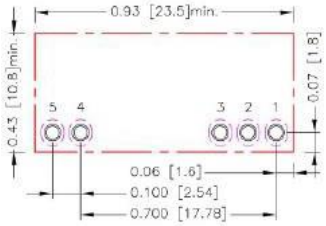
All dimensions in inch[mm]
Pad size(lead free recommended)
Top view pad1.2.3.4.5:0.130x0.102[3.30x2.60]

DOH06-05T



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.4.5: Φ0.047[1.20]
Top view pad 1.2.3.4.5: Φ0.059[1.50]
Bottom view pad 1.2.3.4.5:
Groove R0.040[1.02]L-0.094[2.40]

DOH06-05TA



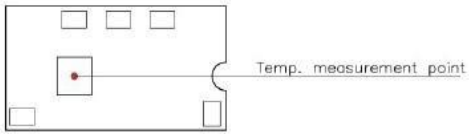
All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.4.5: Φ0.047[1.20]
Top view pad 1.2.3.4.5: Φ0.059[1.50]
Bottom view pad 1.2.3.4.5:
Groove R0.040[1.02]L-0.094[2.40]

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

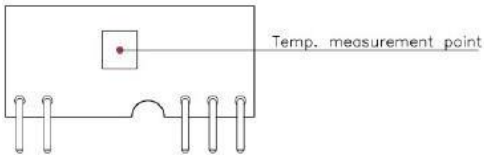
■ Thermal test condition with vertical direction by natural convection (20LFM).

DOS06-05T



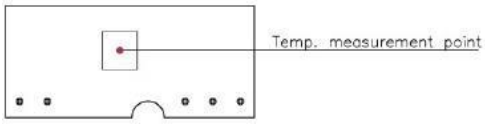
BOTTOM VIEW

DOH06-05T



BOTTOM VIEW

DOH06-05TA



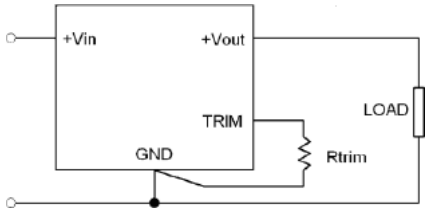
BOTTOM VIEW

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 :** $Rtrim = \left[\frac{21070}{Vout - 0.7525} - 5110\right] \Omega$

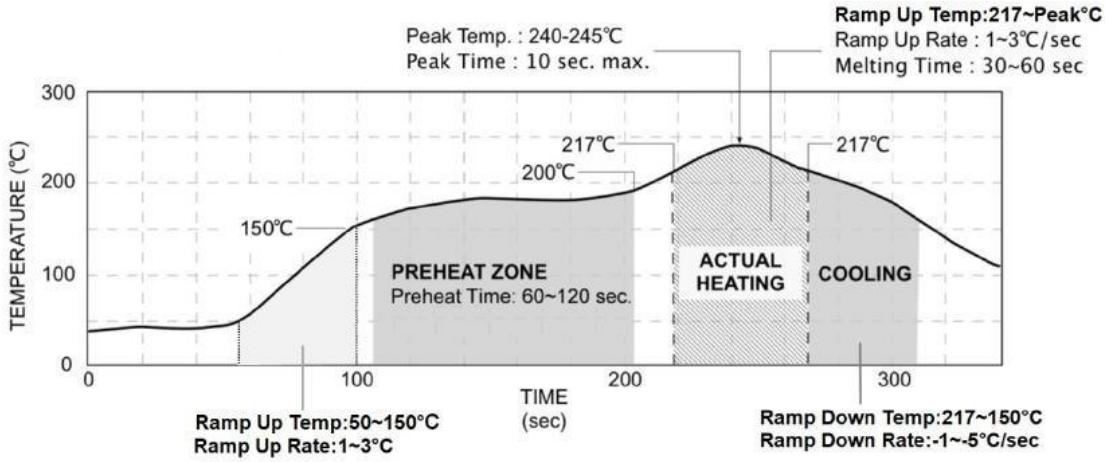
Trim Figure



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.