P-DUKE POWER

P-DUKE®

3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT

Automation **Datacom** **IPC**

Industry **Measurement** **Telecom**

Automobile **Boat** **Charger**

Medical **PV** **Railway**

CE

NO Min. Load Required | CURRENT SHARE | REMOTE ON OFF | Output Voltage TRACKing | OCP | SCP | UVP
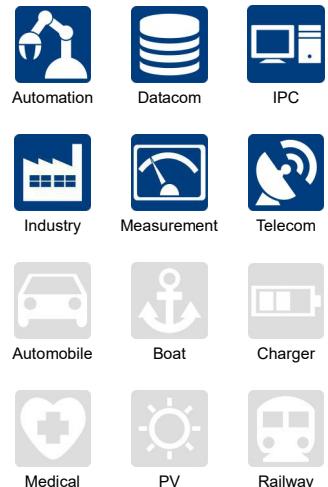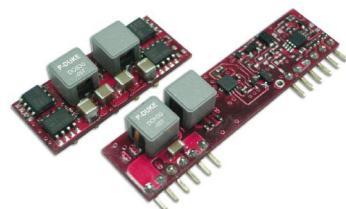
PART NUMBER STRUCTURE

DOS30 - **05** **T** - **P** **S** **L**

Series Name	Input Voltage (VDC)	No Assembly	Remote On/Off Options	Load Share Options	Assembly Options
DOS30: SMD TYPE **DOH30**: SIP TYPE	**05**: 4.5~5.5 **12**: 6~14		☐: Negative Logic **P**: Positive Logic	☐: None **S**: Current Share	☐: None **E**: Extra GND pin 2 extra GND pins only for SMD TYPE **L**: Long Pins 5.08mm±0.25mm only for SIP TYPE

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

Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current Vin(nom), 3.3VDC @No Load	Efficiency Vin(nom),3.3V DC@Full Load	Maximum Capacitor Load ESR≧1mΩ / ESR≧10mΩ
	VDC	VDC	A	mA	%	µF
DOS30-05T	4.5 ~ 5.5 Vin(min.)=Vout(set)+1.5	0.8 ~ 3.63	30	180	93	2000 / 10000
DOH30-05T	4.5 ~ 5.5 Vin(min.)=Vout(set)+1.5	0.8 ~ 3.63	30	180	93	2000 / 10000
DOS30-12T	6 ~ 14 Vin(min.)=Vout(set)+2.4	0.8 ≦Vout≦ 2.75 / 2.75 <Vout≦ 3.63	30 / 20	200	92	2000 / 10000
DOH30-12T	6 ~ 14 Vin(min.)=Vout(set)+2.4	0.8 ≦Vout≦ 2.75 / 2.75 <Vout≦ 5.5	30 / 25	200	92	2000 / 10000

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	5Vin(nom)	Vin(min.)=Vout(set)+1.5VDC	4.5	5	5.5	VDC
	12Vin(nom)	Vin(min.)=Vout(set)+2.4VDC	6	12	14	
Start up voltage	5Vin(nom)				4.5	VDC
	12Vin(nom)				6	
Shutdown voltage	5Vin(nom)		3	4	4.4	VDC
	12Vin(nom)		4	4.5	5.5	
Input filter				Capacitor type		
	*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 Cin is 6pcs of 47µF ceramic capacitors at least.					

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy		% of Vout(set)	-1.5		+1.5	%
Line regulation	Vin=Vin(min.) to Vin(max.) at Full Load	% of Vout(set)	-0.1		+0.1	%
Load regulation	No Load to Full Load	% of Vout(set)	-0.4		+0.4	%
Voltage adjustability		DOH30-12T	0.8		5.5	VDC
		Others	0.8		3.63	
Ripple and noise	Measured by 20MHz bandwidth, With a 1µF MLCC & a 10µF T/C			75		mVp-p
Temperature regulation	T_A= -40℃ to +85℃		-0.5		+0.5	%
Dynamic load response	With a 1µF MLCC & a 10µF T/C					
	△Io/△t=5A/µs ,Vin(nom)	Peak deviation		350		mV
	50% load step change	Setting time(Vout<10%peak deviation)		25		µs
	With 2pcs of 150µF polymer capacitors					
	△Io/△t=5A/µs ,Vin(nom)	Peak deviation		250		mV
	50% load step change	Setting time(Vout<10%peak deviation)		40		µs
Over load protection	% of Iout rated				150	%
Short circuit protection			Continuous, automatics recovery			
Output voltage overshoot-startup	Vin=Vin(min.) to Vin(max.) at Full Load	% of Vout(set)			3.0	%

GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage				None		
Switching frequency			261	300	339	kHz
Safety meets				IEC/ EN/ UL62368-1		
Weight		DOS30			6.0g (0.21oz)	
		DOH30			7.0g (0.25oz)	
MTBF	MIL-HDBK-217F, Full load				1.258 x 10^6 hrs	

ENVIRONMENTAL SPECIFICATIONS

| Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+85	℃
Over temperature protection			125		℃
Storage temperature range		-55		+125	℃
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℃ 30~60sec. Peak temperature 245℃ max. Time above 240℃ 10sec. max.	

FEATURE SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Sequencing delay time	Delay from Vin,min. to application of voltage on SEQ pin		10			ms
Tracking accuracy ∣ VSEQ -Vout∣	Vin(min.) to Vin(max.), Iout(min.) to Iout(max.), VSEQ < Vout					
	Power-up (2V/ms)			100		mV
	Power-down (1V/ms)			200		mV
Active load share (option)	% of Iout rated	Accuracy		10		%
		Number of units in parallel			5	pcs
	*Selecting current share function that the regulations may not meet listed specification.					
Remote ON/OFF	Referred to GND pin	Negative logic DC-DC ON		Open or -0.3 ~ 1.2VDC		
		(Standard) DC-DC OFF		3.0VDC ~ Vin(max.)		
		Positive logic DC-DC ON		Open or 3.0VDC ~ Vin(max.)		
		(Option) DC-DC OFF		-0.3 ~ 1.2VDC		
		Input current of Ctrl pin			0.2	mA
		Remote off input current			3.3	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)				10	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)) | | | 2.5 | | ms |

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

CHARACTERISTIC CURVE
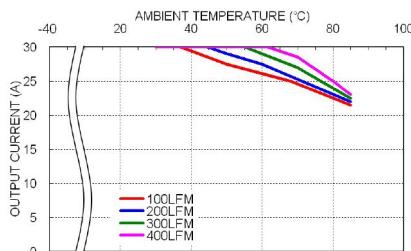
DOS30-05T, Vout=3.3V Derating Curve

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
DOS30-05T□□、DOH30-05T□□	35	Fast-Acting
DOS30-12T□□、DOH30-12T□□	30	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

DOS30

BOTTOM VIEW
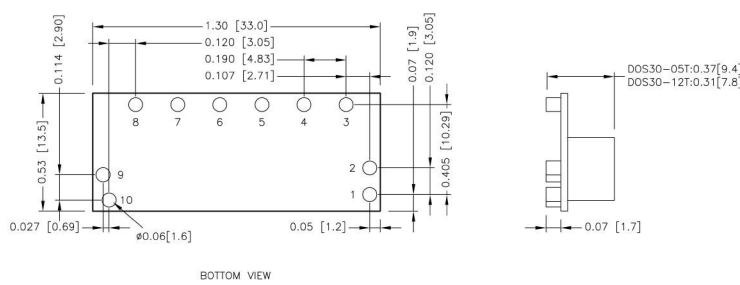
PIN CONNECTION

PIN	DEFINE
1	Ctrl
2	GND (option)
3	Share (option)
4	+Sense
5	Trim
6	+Vout
7	GND
8	Seq
9	GND (option)
10	+Vin

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]

DOH30

BOTTOM VIEW
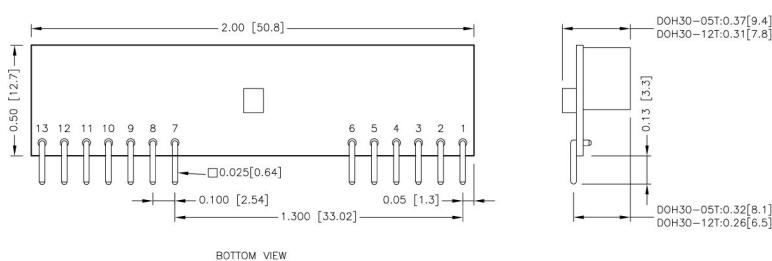
PIN CONNECTION

PIN	DEFINE
1	+Vout
2	+Vout
3	+Sense
4	+Vout
5	GND
6	GND
7	Share (option)
8	GND
9	+Vin
10	+Vin
11	Seq
12	Trim
13	Ctrl

RECOMMENDED PAD LAYOUT

DOS30
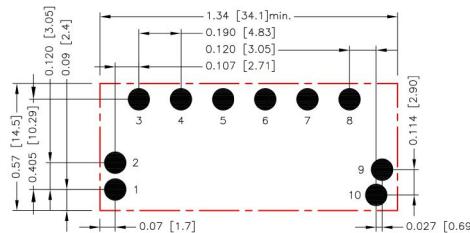
All dimensions in inch[mm]
Pad size(lead free recommended)
Top view pad1.2.3.4.5.6.7.8.9.10: Φ0.097 [2.47]

DOH30
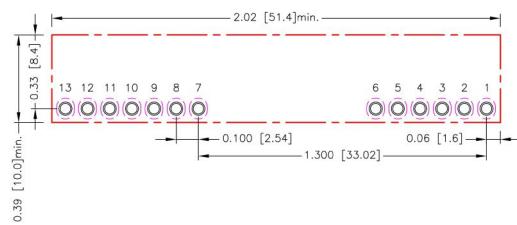
All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.4.5.6.7.8.9.10.11.12.13: Φ0.047[1.20]
Top view pad 1.2.3.4.5.6.7.8.9.10.11.12.13: Φ0.059[1.50]
Bottom view pad 1.2.3.4.5.6.7.8.9.10.11.12.13:
Groove R0.040[1.02]L-0.094[2.40]

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 115℃.
When operating, adequate cooling must be provided to maintain the test point temperature at or below 115℃.
Although the maximum point temperature of the power modules is 115℃, you can limit this temperature to a lower value for extremely high reliability.

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

DOS30

Temperature measuring point

TOP VIEW

DOH30

Temperature measuring point
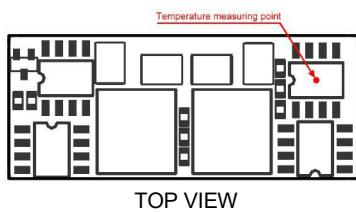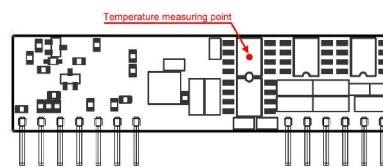
BOTTOM VIEW

OUTPUT VOLTAGE PROGRAMMING

Output voltage programmable from 0.8V to 5.0V 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 :** $Rtrim = \left[\dfrac{1200}{Vout - 0.80} - 100\right] \Omega$

Trim Figure
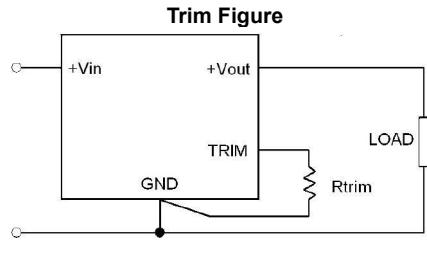
Trim Table

Vout(set) (VDC)	Rtrim (Ω)
0.8	Open
1.2	2900
1.5	1614
1.8	1100
2.5	605
3.3	380
5.0	185

LEAD FREE REFLOW PROFILE   For SMD Type

Peak Temp. : 245℃ max.
Time above 240℃ : 10 sec. max.

Ramp Up Temp. : 217~Peak℃
Ramp Up Rate : 3℃/sec. max.
Melting Time : 30~60 sec.

PREHEAT ZONE
Preheat Time: 60~120 sec.

ACTUAL HEATING   **COOLING**

Ramp Up Temp. : 50~150℃
Ramp Up Rate : 3℃/sec. max.

Ramp Down Temp. : 217~150℃
Ramp Down Rate : -1~-5℃/sec.
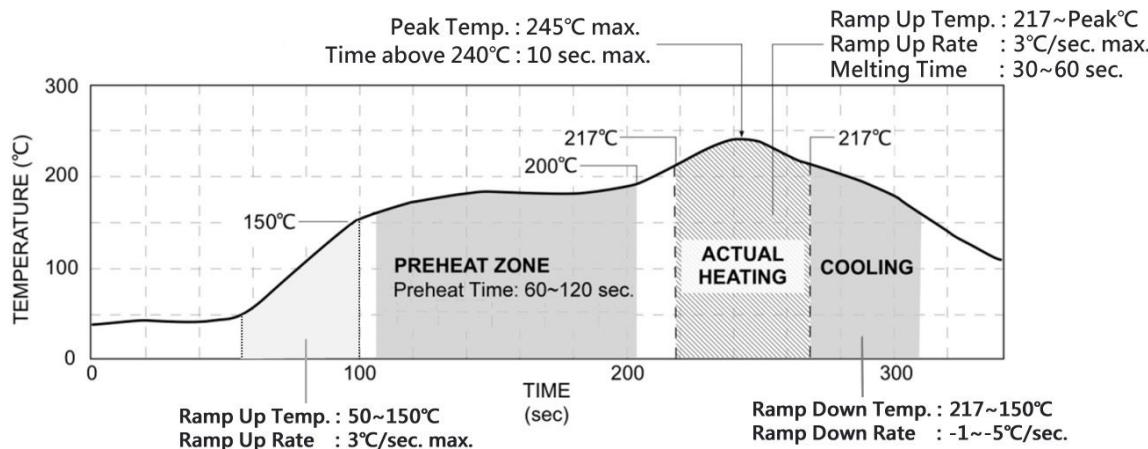
*The curves define the maximum peak reflow temperature permissible measured on pin1 or Vin pin.