P-DUKE POWER

HSRP6 Series

Non-Isolation DC-DC Converter

3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT



Automobile | Automation | Datacom

IPC | Industry | Measurement

Telecom | Boat | Charger

Medical | PV | Railway

CE

NON -isolation | NO Min. Load Required | OCP | OTP | SCP

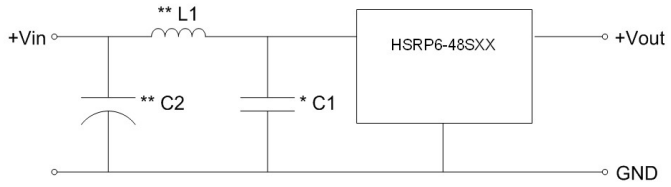
PART NUMBER STRUCTURE

HSRP6	-	48	S	05	-	A
Series Name		**Input Voltage (VDC)**	**Output Quantity**	**Output Voltage (VDC)**		**Mounting Options**
		* See table as below	**S:**Single	**3P3:**3.3 **05:**5 **6P5:**6.5 **09:**9 **12:**12 **15:**15 **24:**24		**□:** Vertical Mounting **A:** Horizontal Mounting

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 @ No Load	Efficiency		Maximum Capacitor Load
					24Vin	48Vin	
	VDC	VDC	mA	mA	%	%	μF
HSRP6-48S3P3	9 ~ 72	3.3	600	3	85.0	81.0	1920
HSRP6-48S05	9 ~ 72	5	600	3	89.0	85.0	1260
HSRP6-48S6P5	9 ~ 72	6.5	600	3	90.5	87.5	960
HSRP6-48S09	14 ~ 72	9	600	3	92.0	89.0	700
HSRP6-48S12	17 ~ 72	12	600	3	92.5	91.0	530
HSRP6-48S15	20 ~ 72	15	600	3	94.0	92.0	420
HSRP6-48S24	33 ~ 72	24	400	3	—	93.5	330

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		HSRP6-48S3P3	9	48	72	
		HSRP6-48S05	9	48	72	
		HSRP6-48S6P5	9	48	72	
		HSRP6-48S09	14	48	72	VDC
		HSRP6-48S12	17	48	72	
		HSRP6-48S15	20	48	72	
		HSRP6-48S24	33	48	72	
Start up time	Constant resistive load With maximum capacitor	Power up Vout≦15VDC Vout＝24VDC		25 50		ms
Input filter				Capacitor type		

* It's recommended to equip the external input capacitors at the input of the module.Typical value is 2.2μF/100V.

** If the input will be switched electromechanically, the input should install an external C2 and L1 to avoid voltage transient.

C1	2.2μF/100V
C2	33μF/100V E/C
L1	4.7μH

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-2.5		+2.5	%
Line regulation	Low Line to High Line at Full Load		-0.9		+0.9	%
Load regulation	10% to 100% of Full Load		-0.6		+0.6	%
Ripple and noise	Measured by 20MHz bandwidth					
		Vout≦15VDC		50		mVp-p
		Vout＝24VDC		75		
Temperature coefficient			-0.02		+0.02	%/℃
Dynamic load response	50% load step change	Peak deviation		90	180	mV
		Recovery time		150	250	us
Over load protection	% of Iout rated			200		%
Short circuit protection				Continuous, automatics recovery		

GENERAL SPECIFICATIONS

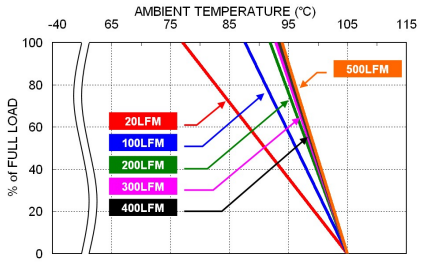
Parameter	Conditions		Min.	Typ.	Max.	Unit
Switching frequency	Nominal input, Full Load	48S3P3	117	180	243	
		48S05	130	200	270	
		48S6P5	130	200	270	
		48S09	195	300	405	kHz
		48S12	247	380	513	
		48S15	293	450	608	
		48S24	416	640	864	
Safety meets					IEC/ EN/ UL62368-1	
Case material					Non-conducted black plastic	
Potting material					Epoxy (UL94 V-0)	
Weight					3.0g (0.106oz)	
MTBF	MIL-HDBK-217F, Full load				1.816 x 10^7 hrs	

ENVIRONMENTAL SPECIFICATIONS

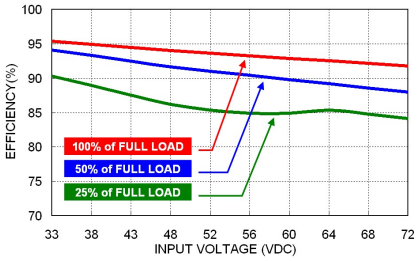
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+105	℃
Maximum case temperature				105	℃
Over temperature protection	Internal IC junction		165		℃
Storage temperature range		-55		+125	℃
Thermal shock				MIL-STD-810F	
Shock				MIL-STD-810F	
Vibration				MIL-STD-810F	
Relative humidity				5% to 95% RH	

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

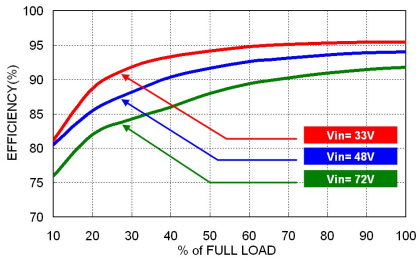
CHARACTERISTIC CURVE



HSRP6-48S24 Derating Curve



HSRP6-48S24 Efficiency vs. Input Voltage



HSRP6-48S24 Efficiency vs. Output Load

FUSE CONSIDERATION

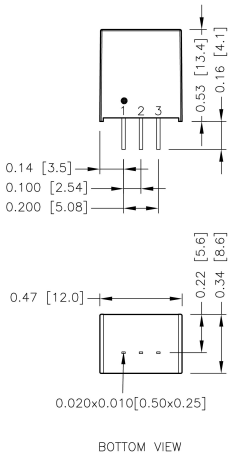
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing 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
HSRP6-48S3P3、HSRP6-48S05、HSRP6-48S24	0.8	Slow-Blow
HSRP6-48S6P5、HSRP6-48S09、HSRP6-48S12、HSRP6-48S15	1.0	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

MECHANICAL DRAWING

Standard: Vertical mounting

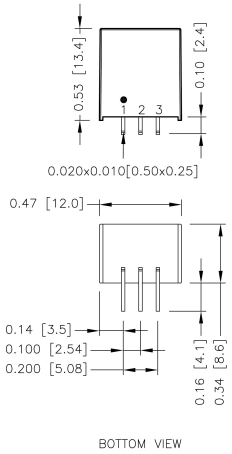


PIN CONNECTION

PIN	DEFINITION
1	+Vin
2	GND
3	+Vout

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

Suffix-A: Horizontal mounting



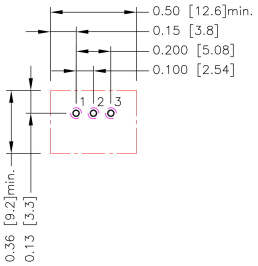
PIN CONNECTION

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1	+Vin
2	GND
3	+Vout

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

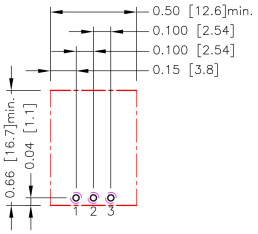
RECOMMENDED PAD LAYOUT

Standard:



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3:∅0.031[0.80]
Top view pad 1.2.3:∅0.039[1.00]
Bottom view pad 1.2.3:∅0.063[1.60]

Suffix-A:



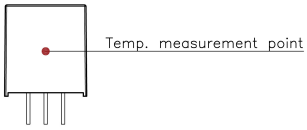
All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3:∅0.031[0.80]
Top view pad 1.2.3:∅0.039[1.00]
Bottom view pad 1.2.3: ∅0.063[1.60]

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 “Maximum case temperature”.
When Operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”.
You can limit this Temperature to a lower value for extremely high reliability.

The unit will shutdown if the internal IC junction exceeds 165℃ (typical), but the thermal shutdown is not intended as a guarantee that the unit will survive temperature beyond its rating. The module will automatically restarts after it cools down.

■ Thermal test condition with vertical direction by natural convection (20LFM) and mounted on a PCB with 1oz copper and 0.8mm thickness.



FRONT VIEW

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