P-DUKE POWER

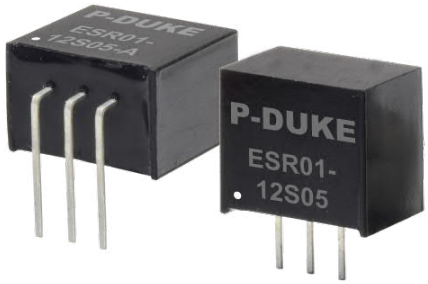
ESR01 Series

Non-Isolation DC-DC Converter

3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT



Automation | Datacom | IPC

Industry | Measurement | Telecom

Automobile | Boat | Charger

Medical | PV | Railway

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

PART NUMBER STRUCTURE

ESR01 - 12 S 05 - A

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Mounting Options
	12:4.7~36 **24:**12~36 * See table as below	**S:**Single	**3P3:**3.3 **05:**5 **6P5:**6.5 **09:**9 **12:**12 **15:**15	**□:** 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	Efficiency	Maximum Capacitor Load
	VDC	VDC	A	%	μF
ESR01-12S3P3	4.7 ~ 36	3.3	1	91	470
ESR01-12S05	7 ~ 36	5.0		93	
ESR01-12S6P5	9 ~ 36	6.5		93	
ESR01-24S09	12 ~ 36	9.0		93	
ESR01-24S12	15 ~ 36	12		94	
ESR01-24S15	18 ~ 36	15		95	

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		ESR01-12S3P3	4.7	12	36	VDC
		ESR01-12S05	7	12	36	
		ESR01-12S6P5	9	12	36	
		ESR01-24S09	12	24	36	
		ESR01-24S12	15	24	36	
		ESR01-24S15	18	24	36	
Input filter			Capacitor type			

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-2.0		+2.0	%
Line regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load regulation	10% to 100% of Full Load		-0.4		+0.4	%
Ripple and noise	Measured by 20MHz bandwidth					
		Vout≦6.5VDC		50		mVp-p
		Vout≧9.0VDC		75		
Temperature coefficient			-0.02		+0.02	%/℃
Dynamic load response	50% load step change	Peak deviation		150	250	mV
		Recovery time		150		μs
Output start-up overshoot					+1	%
Short circuit protection			Continuous, automatics recovery			

GENERAL SPECIFICATIONS

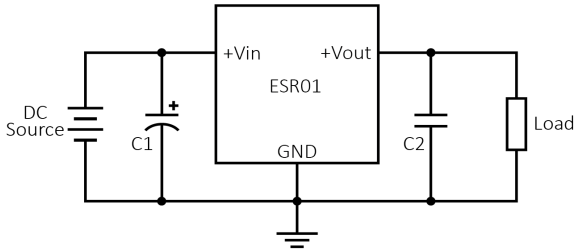
Parameter	Conditions	Min.	Typ.	Max.	Unit
Switching frequency		320	410	500	kHz
Safety meets				IEC/ EN/ UL62368-1	
Case material				Non-conducted black plastic	
Potting material				Silicone (UL94 V-0)	
Weight				1.9g (0.067oz)	
MTBF	MIL-HDBK-217F, Full load			2.571×10^7 hrs	

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+100	℃
Over temperature protection	Internal IC junction		150		℃
Storage temperature range		-55		+125	℃
Thermal 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.

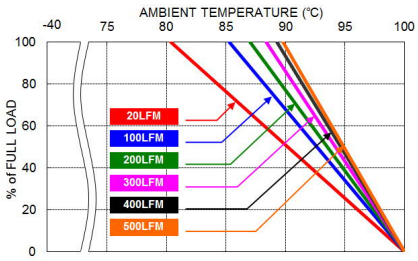
APPLICATION CIRCUIT



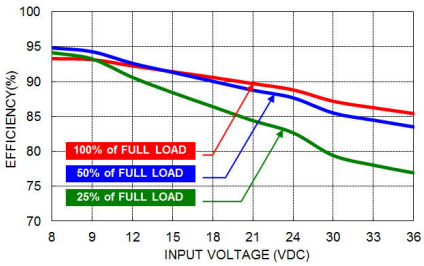
Model	ESR01-12S3P3	ESR01-12S05	ESR01-12S6P5	ESR01-24S09	ESR01-24S12	ESR01-24S15
C1*	22μF/50V	22μF/50V	22μF/50V	22μF/50V	22μF/50V	22μF/50V
C2	Vertical mounting: N/A Horizontal mounting, suffix -A: 10μF/ 35V/ X7R/ MLCC					

*The capacitor absorbs input surge voltage, protecting the module from damage if the input voltage exceeds 32V.

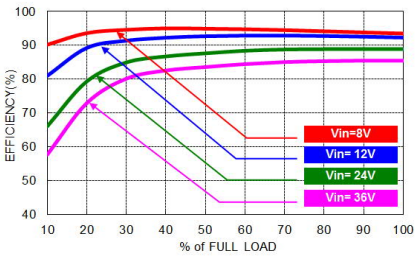
CHARACTERISTIC CURVE



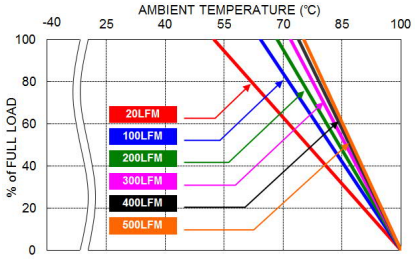
ESR01-12S05 Derating Curve
LOW VIN



ESR01-12S05 Efficiency vs. Input Voltage



ESR01-12S05 Efficiency vs. Output Load



ESR01-12S05 Derating Curve
High VIN

FUSE CONSIDERATION

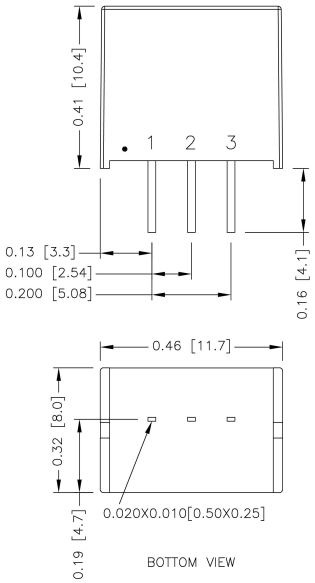
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing 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
ESR01-12S3P3、ESR01-12S6P5、ESR01-24S09	1.25	Slow-Blow
ESR01-12S05、ESR01-24S12、ESR01-24S15	1.6	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 type: Vertical mounting

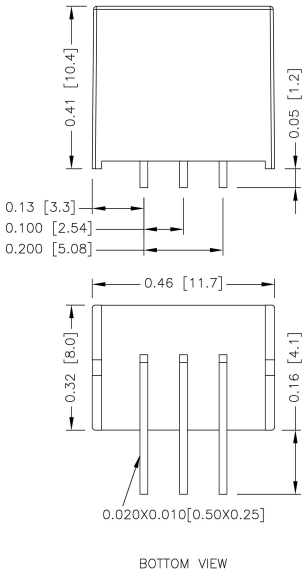


PIN CONNECTION

PIN	DEFINE
1	+Vin
2	GND
3	+Vout

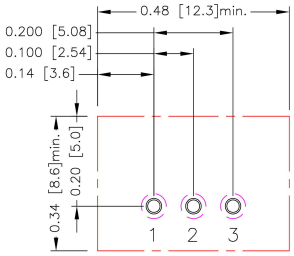
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

Suffix-A: Horizontal mounting

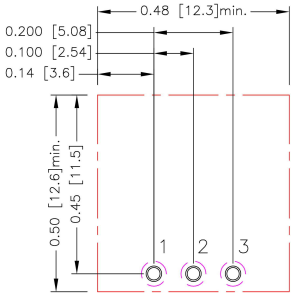


RECOMMENDED PAD LAYOUT

Standard type: Vertical mounting



Suffix-A: Horizontal mounting



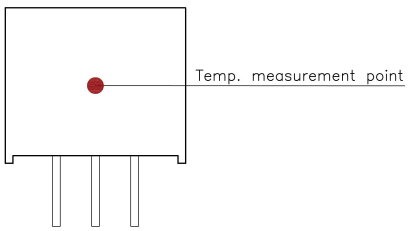
All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3: ∅0.031[0.80]
Top view pad 1.2.3: ∅0.039[1.00]
Bottom view pad 1.2.3: ∅0.063[1.60]

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 100℃.
When operating, adequate cooling must be provided to maintain the test point temperature at or below 100℃.
Although the maximum point temperature of the power modules is 100℃, you can limit this temperature to a lower value for extremely high reliability.

The unit will shutdown if the internal IC junction exceeds 150℃ (typical), but the thermal shutdown is not intended as a guarantee that the unit will survive temperature beyond its rating. The module will automatically restart after it cools down.

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



BACK VIEW

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