



P-DUKE POWER

NSR01 Series

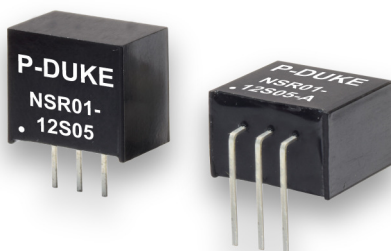
DC-DC Converter
Up to 15 Watts

3

YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway

CE

NON
-isolation

LOW
Standby
Power

NO
Min. Load
Required

OCP

OTP

SCP

PART NUMBER STRUCTURE

NSR01	-	12	S	05	-	A
Series Name		Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)		Mounting Options
		See table	S:Single	See table		□:Vertical Mounting A:Horizontal Mounting

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C unless otherwise noted
POSITIVE OUTPUT APPLICATION

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load A	Input Current @ No Load mA	Efficiency		Maximum Capacitor Load μF
					Min. Vin	Max. Vin	
					%		
NSR01-12S1P2	4.6 ~ 36	1.2	1	1.0	73.0	62.0	470
NSR01-12S1P5	4.6 ~ 36	1.5		1.0	77.0	66.5	
NSR01-12S1P8	4.6 ~ 36	1.8		1.0	80.5	70.0	
NSR01-12S2P5	4.6 ~ 36	2.5		1.0	83.5	75.5	
NSR01-12S3P0	4.6 ~ 36	3.0		1.5	86.5	78.5	
NSR01-12S3P3	4.6 ~ 36	3.3		1.5	87.5	79.5	
NSR01-12S05	6.5 ~ 36	5.0		2.5	91.5	83.0	
NSR01-12S6P5	8.0 ~ 36	6.5		3.0	93.0	86.0	
NSR01-12S09	10.5 ~ 36	9.0		3.5	94.5	88.5	
NSR01-24S12	13.5 ~ 36	12		2.5	95.0	91.5	
NSR01-24S15	16.5 ~ 36	15		3.5	95.5	92.5	

NEGATIVE OUTPUT APPLICATION

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load A	Input Current @ No Load mA	Efficiency		Maximum Capacitor Load μF
					Min. Vin	Max. Vin	
					%		
NSR01-12S1P2	4.6 ~ 32	-1.2	-0.6	1.0	62.0	61.0	470
NSR01-12S1P5	4.6 ~ 32	-1.5	-0.6	1.0	69.5	64.5	
NSR01-12S1P8	4.6 ~ 32	-1.8	-0.6	1.0	72.0	67.5	
NSR01-12S2P5	4.6 ~ 32	-2.5	-0.6	1.0	72.0	74.0	
NSR01-12S3P0	4.6 ~ 32	-3.0	-0.6	2.0	73.0	76.5	
NSR01-12S3P3	4.6 ~ 32	-3.3	-0.6	2.0	74.0	77.5	
NSR01-12S05	4.6 ~ 31	-5.0	-0.4	3.0	79.5	78.5	
NSR01-12S6P5	7.0 ~ 29	-6.5	-0.3	4.0	84.5	80.0	
NSR01-12S09	7.0 ~ 27	-9.0	-0.3	7.0	85.0	82.0	
NSR01-24S12	7.0 ~ 24	-12	-0.3	8.0	85.0	85.5	
NSR01-24S15	7.0 ~ 21	-15	-0.2	10	85.5	84.5	

INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	Positive application	4.6		36	VDC
	Negative application	4.6		32	
Start up time	Constant resistive load		5		ms
Rise time	Time for Vout rises from 10% to 90% of Vout		3.5		ms
Input filter			Capacitor type		
Input reflected ripple current			100		mAp-p

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				
	Vertical mounting	1.5Vout		+0.6	%
	Others	-0.4		+0.4	
	Horizontal mounting	1.5Vout, 1.8Vout		+1.2	
	Others	-0.4		+0.4	
Ripple and noise	Measured by 20MHz bandwidth		50 75		mVp-p
Temperature coefficient		-0.015		+0.015	%/°C
Dynamic load response	50% load step change	Peak deviation	150		mV
			250		µs
Output start-up overshoot				+1	%
Over load protection			2		A
Short circuit protection		Continuous, automatic recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Switching frequency	Vout ≤ 3.3VDC Vout ≥ 5.0VDC	240 464	300 580	360 696	kHz
Safety meets		IEC /UL/ EN60950-1			
Case material		Non-conducted black plastic			
Potting material		Silicone (UL94 V-0)			
Weight		1.9g (0.067oz)			
MTBF	MIL-HDBK-217F, Full load	2.009×10 ⁷ hrs			

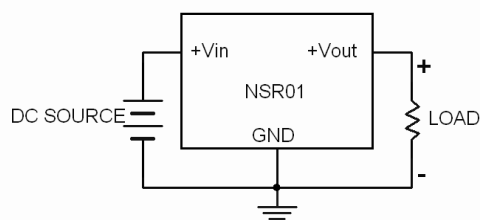
ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+100	°C
Over temperature protection	Internal IC junction		+170		°C
Storage temperature range		-55		+125	°C
Thermal shock				MIL-STD-810F	
Shock				MIL-STD-810F	
Vibration				MIL-STD-810F	
Relative humidity				5% to 95% RH	

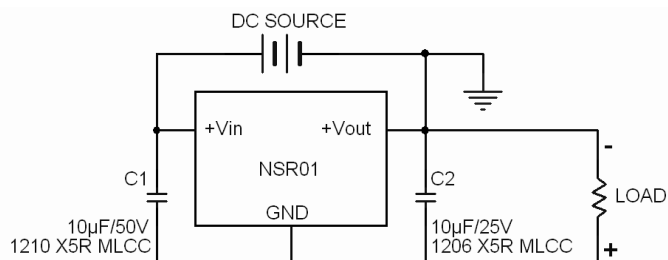
CAUTION: This power module is not internally fused. An input line fuse must always be used.

APPLICATION CIRCUIT

Positive application

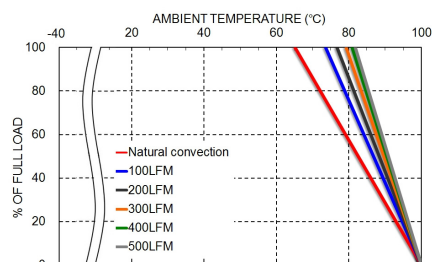


Negative application

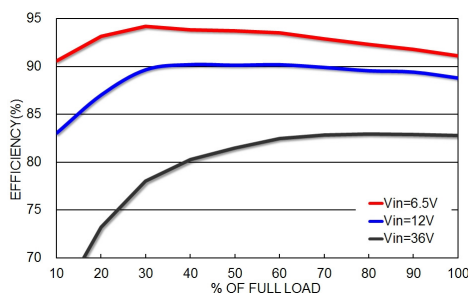


C1 and C2 are required that should be fitted close to the converter's pins. Maximum capacitive load including C2 is 470µF.

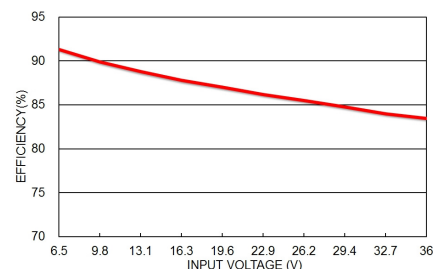
CHARACTERISTIC CURVE



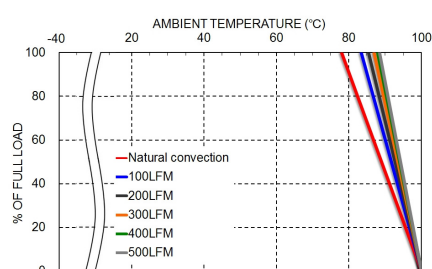
NSR01-12S05; Derating Curve
Positive application



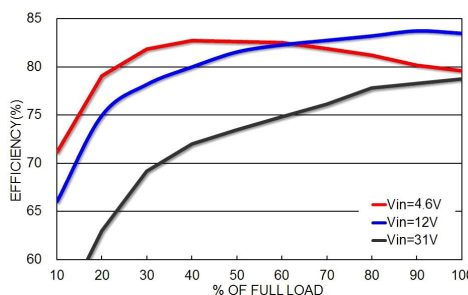
NSR01-12S05; Efficiency vs. load
Positive application



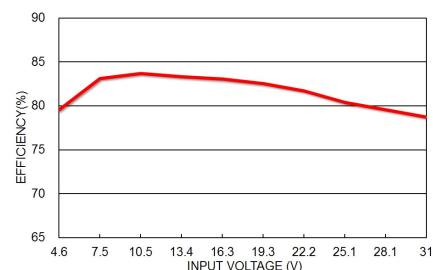
NSR01-12S05; Efficiency vs. line
Positive application



NSR01-12S05; Derating Curve
Negative application



NSR01-12S05; Efficiency vs. load
Negative application



NSR01-12S05; Efficiency vs. line
Negative application

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.

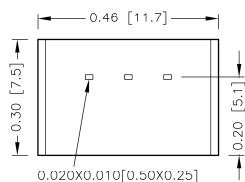
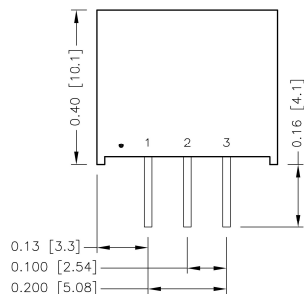
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
NSR01-□□S□□	2.0	Slow-Blow

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

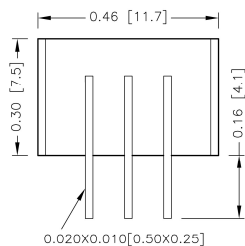
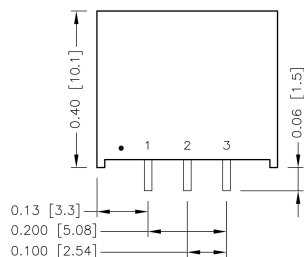
MECHANICAL DRAWING

Standard type: Vertical mounting



BOTTOM VIEW

Suffix-A: Horizontal mounting



BOTTOM VIEW

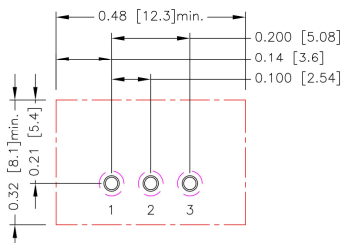
PIN CONNECTION

PIN	DEFINE
1	+Vin
2	GND
3	+Vout

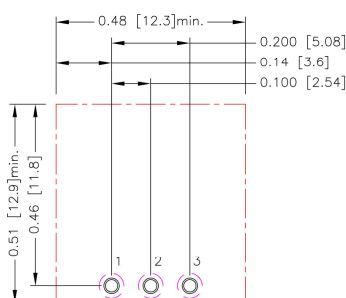
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin pitch tolerance ±0.01 [0.25]
4. Pin dimension tolerance ±0.004 [0.10]

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: $\varnothing 0.031[0.80]$
 Top view pad 1.2.3: $\varnothing 0.039[1.00]$
 Bottom view pad 1.2.3: $\varnothing 0.063[1.60]$

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.

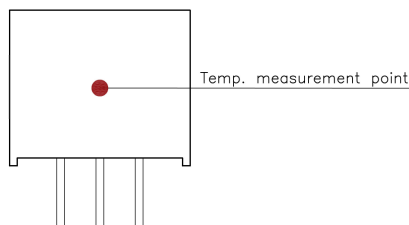
The temperature at this location should not exceed 100°C.

When Operating, adequate cooling must be provided to maintain the test point temperature at or below 100°C.

Although the maximum point Temperature of the power modules is 100°C, you can limit this Temperature to a lower value for extremely high reliability.

The unit will shutdown if the internal IC junction exceeds 170°C (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).



BACK VIEW