P-DUKE POWER

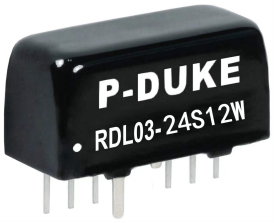
RDL03W Series

DC-DC Converter
Up to 3 Watts

3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT



Railway | Automation | Datacom

IPC | Industry | Measurement

Telecom | Automobile | Boat

Charger | Medical | PV

3000 VDC Isolation Voltage

4 : 1 Wide Input Range

LOW Standby Power

NO Min. Load Required

REMOTE ON OFF

OCP

SCP

PART NUMBER STRUCTURE

RDL03 - 48 S 05 W - M3

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Ambient Temperature Options
	24:9~36 **48:**18~75 **110:**43~160	**S:**Single	**3P3:**3.3 **05:**5 **09:**9 **12:**12 **15:**15 **24:**24	4:1	□:-40~+100℃ **M3:**-55~+100℃
		D: Dual	**05:**±5 **12:**±12 **15:**±15		

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
	VDC	VDC	mA	mA	%	μF
RDL03-24S3P3W	9 ~ 36	3.3	700	4	76	1100
RDL03-24S05W	9 ~ 36	5	600	4	81	550
RDL03-24S09W	9 ~ 36	9	333	4	81	340
RDL03-24S12W	9 ~ 36	12	250	4	83	240
RDL03-24S15W	9 ~ 36	15	200	4	83	240
RDL03-24S24W	9 ~ 36	24	125	4	82	90
RDL03-24D05W	9 ~ 36	±5	±300	6	80	±340
RDL03-24D12W	9 ~ 36	±12	±125	6	82	±170
RDL03-24D15W	9 ~ 36	±15	±100	8	82	±90
RDL03-48S3P3W	18 ~ 75	3.3	700	4	75	1100
RDL03-48S05W	18 ~ 75	5	600	4	81	550
RDL03-48S09W	18 ~ 75	9	333	4	81	340
RDL03-48S12W	18 ~ 75	12	250	4	82	240
RDL03-48S15W	18 ~ 75	15	200	4	82	240
RDL03-48S24W	18 ~ 75	24	125	4	82	90
RDL03-48D05W	18 ~ 75	±5	±300	6	80	±340
RDL03-48D12W	18 ~ 75	±12	±125	6	82	±170
RDL03-48D15W	18 ~ 75	±15	±100	8	82	±90
RDL03-110S3P3W	43 ~ 160	3.3	700	2	76	1100
RDL03-110S05W	43 ~ 160	5	600	2	80	550
RDL03-110S09W	43 ~ 160	9	333	2	81	340
RDL03-110S12W	43 ~ 160	12	250	2	82	240
RDL03-110S15W	43 ~ 160	15	200	2	83	240
RDL03-110S24W	43 ~ 160	24	125	2	83	90
RDL03-110D05W	43 ~ 160	±5	±300	2	80	±340
RDL03-110D12W	43 ~ 160	±12	±125	2	83	±170
RDL03-110D15W	43 ~ 160	±15	±100	2	81	±90

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		24Vin(nom)	9	24	36	VDC
		48Vin(nom)	18	48	75	
		110Vin(nom)	43	110	160	
Start up time	Constant resistive load	Power up		50	75	ms
		Remote ON/OFF		50	75	
Input surge voltage	1 second, max.	24Vin(nom)			50	VDC
		48Vin(nom)			100	
		110Vin(nom)			185	
Input filter				Capacitor type		
Remote ON/OFF	Referred to –Vin pin	DC-DC ON		Open or 0 ~ 0.5VDC		
		DC-DC OFF		3 ~ 12VDC		
		Input current of Ctrl pin	2		4	mA
		Remote off input current		2.5		mA

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load regulation	No Load to Full Load	Single Dual	-0.5 -1.0		+0.5 +1.0	%
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	Measured by 20MHz bandwidth With a 1μF/50V X7R MLCC			50	75	mVp-p
Temperature coefficient			-0.02		+0.02	%/℃
Transient response recovery time	25% load step change			250		μs
Over load protection	% of Iout rated; Hiccup mode			180		%
Short circuit protection			Continuous, automatics recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output Input (Output) to Case	3000 1500			VDC
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					100	pF
Switching frequency		110Vin Others	270 360	300 400	330 440	kHz
Safety approvals	IEC/ EN/ UL62368-1				UL:E193009 CB:UL(Demko)	
Standard approvals	EN50155 EN45545-2					
Case material						Copper
Base material						None
Potting material						Silicone (UL94 V-0)
Weight						5.9g (0.21oz)
MTBF	MIL-HDBK-217F, Full load					5.535 x 10^6 hrs

ENVIRONMENTAL SPECIFICATIONS

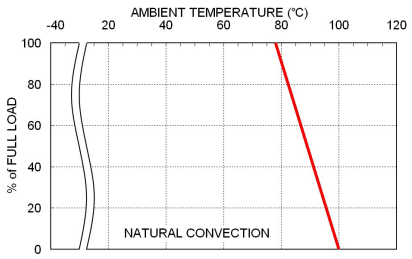
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating case temperature	 M3 version	With derating With derating	-40 -55		+100 +100	℃
Maximum case temperature					100	℃
Storage temperature range			-55		+125	℃
Thermal shock						MIL-STD-810F
Shock						EN61373, MIL-STD-810F
Vibration						EN61373, MIL-STD-810F
Relative humidity						5% to 95% RH

EMC SPECIFICATIONS

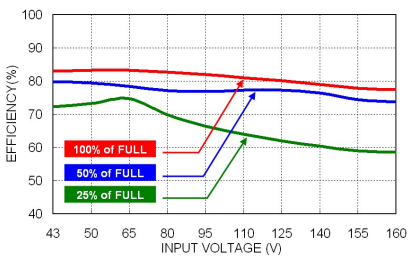
Parameter	Conditions		Level
EMI	EN55032, EN50121-3-2	With external components	Class A, Class B
EMS	EN55024, EN50121-3-2		
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV	Perf. Criteria A
	RDL03-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.	
	RDL03-48□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.	
	RDL03-110□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150μF/200V) and a TVS (SMB250A, 250V, 600Watt peak pulse power) to connect in parallel.	
Surge	EN61000-4-5	±2kV	Perf. Criteria A
	RDL03-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.	
	RDL03-48□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.	
	RDL03-110□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150μF/200V) and a TVS (SMB250A, 250V, 600Watt peak pulse power) to connect in parallel.	
Conducted immunity	EN61000-4-6	10Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

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

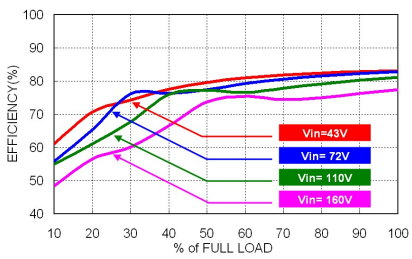
CHARACTERISTIC CURVE



RDL03-110S05W Derating Curve



RDL03-110S05W Efficiency vs. Input Voltage



RDL03-110S05W Efficiency vs. Output Load

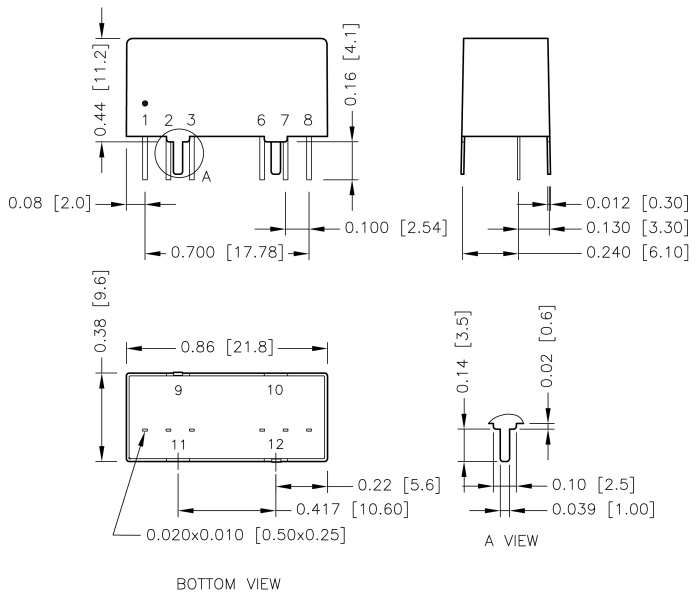
FUSE CONSIDERATION

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
RDL03-24□□□W	0.8	Slow-Blow
RDL03-48□□□W	0.5	Slow-Blow
RDL03-110□□□W	0.16	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



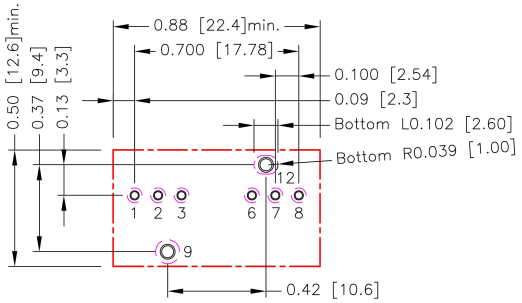
PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout
9	Case	Case
10	Stand off	Stand off
11	Stand off	Stand off
12	Case	Case

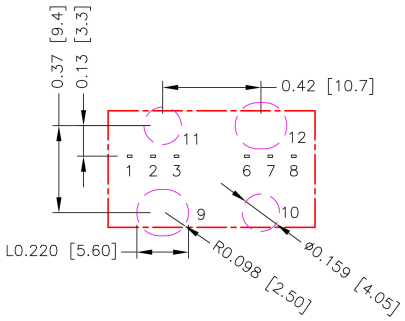
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

* Case pins should not be connected to any circuit.

RECOMMENDED PAD LAYOUT



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.6.7.8: Φ0.031[0.80]
Through hole 9.12: Φ0.051[1.30]
Top view pad 1.2.3.6.7.8: Φ0.039[1.00]
Top view pad 9.12: Φ0.064[1.63]
Bottom view pad 1.2.3.6.7.8: Φ0.063[1.60]
Bottom view pad 9: Φ0.102[2.60]
Bottom view pad 12:Groove R0.039[1.00]L0.102[2.60]



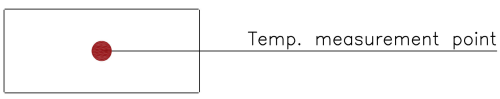
Area 9.10.11.12 don't layout
Area 10.11 size: Φ0.159[4.05]
Area 9.12 size:Groove R0.098[2.50]L0.220[5.60]
The layout distance between Pin3 and Pin6 is at least 3mm

* We recommend putting PCB trace on bottom side.

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.

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



TOP VIEW

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