



Wide Input Voltage Range 30 Watt Dc-Dc Converter



FEATURES:

- 30W DIL PACKAGE
- 100% BURNED IN
- 2:1 WIDE INPUT RANGE
- HIGH EFFICIENCY UP TO 88%
- UL 94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- Remote On/Off ● RoHS COMPLIANT



APPLICATIONS:

- Industry Control System ● Semiconductor Equipment
- Wireless Network ● Telecom/Datacom ● Measurement

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Output Ripple & Noise	Capacitor Load MAX	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	mVp-p	uF	%TYP
96D-12S03R5NL	9-18	100	2398	3.3	7500	100	20000	86
96D-12S05R5NL	9-18	100	2841	5.0	6000	100	14400	88
96D-12S12R5NL	9-18	100	2809	12	2500	100	3000	89
96D-12S15R5NL	9-18	100	2809	15	2000	100	2000	89
96D-24S03R5NL	18-36	100	1200	3.3	7500	100	20000	86
96D-24S05R5NL	18-36	100	1420	5.0	6000	100	14400	88
96D-24S12R5NL	18-36	100	1404	12	2500	100	3000	89
96D-24S15R5NL	18-36	100	1404	15	2000	100	2000	89
96D-48S03R5NL	36-72	100	600	3.3	7500	100	20000	86
96D-48S05R5NL	36-72	100	710	5.0	6000	100	14400	88
96D-48S12R5NL	36-72	100	702	12	2500	100	3000	89
96D-48S15R5NL	36-72	100	702	15	2000	100	2000	89
96D-12D12R5NL	9-18	100	2873	±12	±1250	100	±2000	89
96D-12D15R5NL	9-18	100	2873	±15	±1000	100	±1300	89
96D-24D12R5NL	18-36	100	1437	±12	±1250	100	±2000	89
96D-24D15R5NL	18-36	100	1437	±15	±1000	100	±1300	89
96D-48D12R5NL	36-72	100	718	±12	±1250	100	±2000	89
96D-48D15R5NL	36-72	100	718	±15	±1000	100	±1300	89

Note: 1. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment)

MIL-STD-217F Notice2 @Ta=25 °C, Full load (Ground, Benign, controlled environment)

2. The ON/OFF control pin voltage is referred to -Input. (Leave open if not used.)

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Type				
Input surge voltage 100mS max	12V, 24V input		50		Vdc
	48V input		100		Vdc
Input reflected ripple current	Nominal Vin and full load		20		mAp-p
Start up time	Nominal Vin and constant resistive load	Power up	30		mS
		Remote ON/OFF	30		mS
Start-up voltage	12V input		9		Vdc
Start-up voltage	24V input		18		Vdc
Start-up voltage	48V input		36		Vdc
Shutdown voltage	12V input		8		Vdc
Shutdown voltage	24V input		17		Vdc
Shutdown voltage	48V input		35		Vdc
Protection	Fuse Recommended				
Remote ON/OFF (Note 2)	DC-DC ON			OPEN	
(Negative logic)(Option)	DC-DC OFF			Short to ground	
Input current of Remote control pin	Nominal Vin			-0.5mA ~ +0.5mA	
Remote off state input current	Nominal Vin			3mA	



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Output Specifications					
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full Load @ Vin(nom.)			±2	%
Short Circuit/ Restart Protection	Hiccup, automatics recovery				
Over Load Protection	nominal input		150		%
Over Voltage Protection (Zener Diode Clamp)	3.3V Output		3.9		
	5.0V Output		6.2		V
	12V Output		15 & ±15		
	15V Output		18 & ±18		
Line Regulation	LL to HL at Full Load			±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual, Balance Load,25% to 100% load			±1.0	%
Cross Regulation	Dual, 25% to 100% load			±5.0	%
Ripple & Noise	20MHz bandwidth			100	mVp-p
Transient response recovery time	25% load step change		250	350	us
External Trim Adj. Range			±10% of Output		
Temperature coefficient				±0.05	% / °C

General Specifications					
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Isolation Capacitance			2200		pF
Case material	Nickel coated copper with no-conductive base				
Potting material	Epoxy (UL94-V0)				
Isolation Voltage	For 10 seconds			1600	VDC
Design meets safety			IEC60950-1, UL60950-1, EN60950-1		
Dimensions	-R5NL		50.8X 25.4 X 10.6		mm
	-R5HSNL		50.8X 25.4 X 15.3		mm
Weight			36.5		g
MTBF (Note 1)	BELLCORE-TR-NWT-000332		3.163 x 10 ⁶		hrs
	MIL-HDBK-217F		4.347 x 10 ⁵		hrs

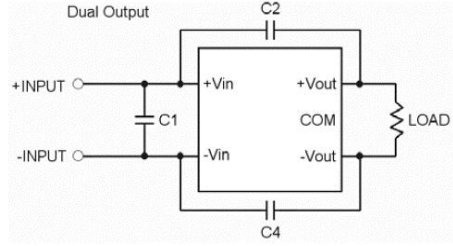
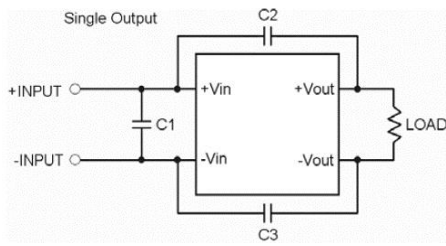
ENVIRONMENTAL SPECIFICATIONS					
Parameters	Conditions	Min	Typ	Max	Units
Operating Temperature		-40		85	°C
Maximum case temperature				115	°C
Storage Temperature		-55		125	°C
Over temperature			115		°C
Thermal impedance	Convection		12		°C/Watt
	Convection with heat-sink		10		°C/Watt
Thermal shock			MIL-STD-810F		
Vibration			MIL-STD-810F		
Relative humidity			5% to 95% RH		

EMC CHARACTERISTICS					
Parameters	Conditions	Min	Typ	Max	Units
EMI	EN55022		Class A		
ESD	EN61000-4-2		Air ±8KV Perf. Criteria A		
			Contact ±6KV Perf. Criteria A		
Radiated immunity	EN61000-4-3		10 V/m Perf. Criteria A		
Fast transient	EN61000-4-4		± 2KV Perf. Criteria A		
Surge	EN61000-4-5		± 1KV Perf. Criteria A		
Conducted immunity	EN61000-4-6		10 Vrms Perf. Criteria A		

Derating Curve(without Heat-Sink)	Remote On/Off Note	Part Number
<p>Convention Cooling</p>	<p>When pin3 short to pin2,D/D ON=>OFF When pin3 leave open,D/D=>ON</p>	<p>96D - 24 S 05 R 5 NL</p> <p>A B C D E F G</p> <p>A : Series B : Input Voltage C : Single Output(S),DUAL(D) D : Output Voltage E : Regulated(R) F : Package G : RoHs Version</p>
	<p>control Voltage</p> <p>to pin3 (on/off control) NPN to pin2(-V)</p>	

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Recommended Filter for EN55022 Class A Compliance

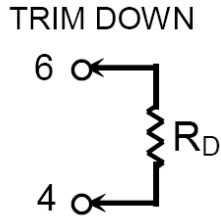
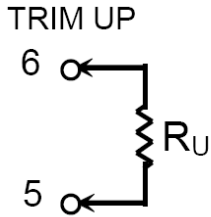


The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

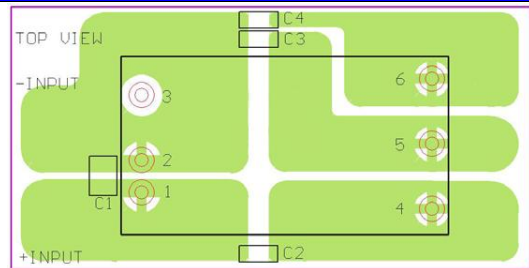
Single Output	C1	C2/C3
-24S	4.7 μ F/50V 1812 MLCC	1000pF/2KV 1808 MLCC
-48S	2.2 μ F/100V 1812 MLCC	1000pF/2KV 1808 MLCC
Dual Output	C1	C2/C4
-24D	4.7 μ F/50V 1812 MLCC	1000pF/2KV 1808 MLCC
-48D	2.2 μ F/100V 1812 MLCC	1000pF/2KV 1808 MLCC

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

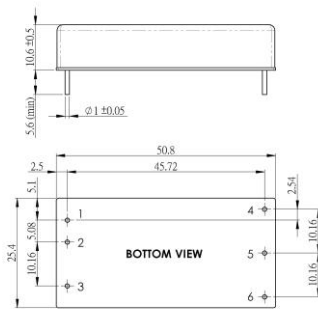


Recommended EN55022 Class A Filter Circuit Layout



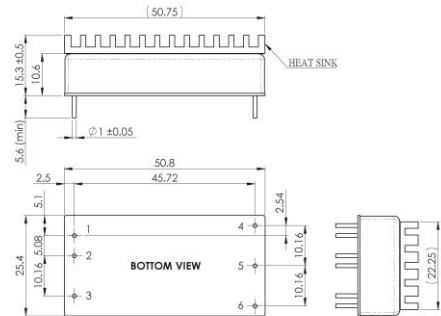
Markings and dimensions

-R5NL



Unit : mm
Tolerance : XX.X ± 0.5 · XX.XX ± 0.25

-R5HSNL



Unit : mm
Tolerance : XX.X ± 0.5 · XX.XX ± 0.25

PIN Connection

PIN	1	2	3	4	5	6
SINGLE	+Vin	-Vin	Ctrl	+Vout	-Vout	Trim
DUAL	+Vin	-Vin	Ctrl	+Vout	COM	-Vout