

**Wide Input Voltage Range 100 Watt Dc-Dc Converter**



**FEATURES:**

- Small DIL PACKAGE (50.8\*50.8\*13.5mm)
- 100% BURNED IN
- 2:1 WIDE INPUT RANGE
- HIGH EFFICIENCY UP TO 93%
- UL 94V-0 PACKAGE MATERIAL
- CUSTOM 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 <sup>(4)(6)</sup> Ripple & Noise	Capacitor <sup>(5)</sup> Load MAX	Efficiency <sup>(4)</sup>
	Vdc	No-Load <sup>(3)</sup> (mA TYP)	Full Load <sup>(2)</sup> (A TYP)	Vdc	Full Load (A)	mVp-p	uF TYP	%TYP
92D-24S03RNL	18-36	150	3.1	3.3	20	100	9900	89
92D-24S05RNL	18-36	250	4.6	5.0	20	100	9900	91
92D-24S12RNL	18-36	55	4.6	12	8.33	100	6800	91
92D-24S15RNL	18-36	55	4.5	15	6.67	100	3300	92
92D-48S03RNL	36-75	120	1.52	3.3	20	100	16500	90
92D-48S05RNL	36-75	170	2.35	5.0	20	100	16500	92
92D-48S12RNL	36-75	55	2.3	12	8.33	100	6800	92
92D-48S15RNL	36-75	40	2.3	15	6.67	100	3300	93

Note: 1. BELLCORE TR-NWT-000332. Case 1: 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. Maximum value at nominal input voltage. 3. Typical value at nominal input voltage and no load.

4. Typical value at nominal input voltage and full load. 5. Test by normal Vin and constant resistive load

6. The ripple & noise of output voltage is measured with 2.2u/100V MLCC.

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

8. The 92D- series can meet EN55022 Class A and class B only with external components before the input pin to the converter.

9. An external filter capacitor is required if the module has to meet EN61000-4-4,EN61000-4-5. The filter capacitor YDS suggest:

24Vin : Nippon chemi-con KY series, 330uF/50V, ESR 55mΩ. 48Vin : Nippon chemi-con KY series, 220uF/100V, ESR 48mΩ

10. When the case surface temperature of 30°C TYP, load regulation ±2% max(1/2FL TO FL),

case surface temperature of 50°C TYP, load regulation ±0.5% max(1/4FL TO FL).

11.The +SENSE should be connected to its corresponding +OUTPUT and likewise the -SENSE should be connected to its corresponding -OUTPUT.

12. TRIM calculation of the use and Resistance

Dashed line the interior of models

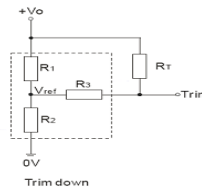
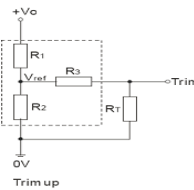
13. Heat sink is optional

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3$$

$$a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3$$

$$a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$



Input Specifications		Min	Typ	Max	Units
<b>Parameters</b>	<b>Conditions</b>				
<b>Voltage Types</b>			2:1		
<b>Filter</b>	Pi Type				
<b>Input surge voltage 100mS max</b>	24V input		50		Vdc
	48V input		100		Vdc
<b>Input reflected ripple</b>	Nominal Vin and full load		30		mA <sub>p-p</sub>
<b>Start up time</b>	Nominal Vin and constant resistive load	Power up	10		mS
		Remote ON/OFF	10		mS
<b>Start-up voltage</b>	24V input		17		Vdc
<b>Start-up voltage</b>	48V input		35		Vdc
<b>Shutdown voltage</b>	24V input		16.5		Vdc
<b>Shutdown voltage</b>	48V input		34		Vdc
<b>Protection</b>	Fuse Recommended				
<b>Remote ON/OFF (Note 7)</b>	DC-DC ON	Positive(standard) Open or(0.7V<Vr<12V) ,Negative(option) open or 0V<Vr<0.5			
	DC-DC OFF	Positive(standard) short or(0V<Vr<0.7V) ,Negative(option) 0.6V<Vr<12			
<b>Input current of Remote control pin</b>	Nominal Vin		-0.5mA ~ +1.0mA (TYP)		
<b>Remote off state input current</b>	Nominal Vin		3mA (Typ)		



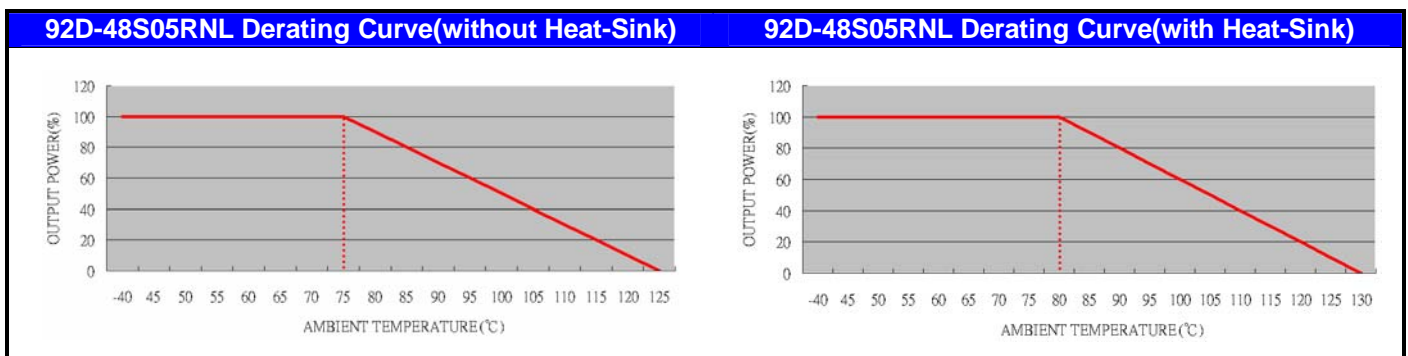
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Output Specifications (Temperature Coefficient : ±0.05%/°C)					
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	LL to HL at Full Load			±2	%
Short Circuit/ Restart	Hiccup, automatics recovery				
Over Load Protection	% of FL at nominal input		120		%
Over voltage protection Zener diode clamp	3.3V Output		3.9		V
	5.0V		6.2		V
	12V		15		V
	15V		18		V
Line Regulation	LL to HL at Full Load			±0.5	%
Load Regulation <sup>(10)</sup>	Single 25% load to Full load			±0.5	%
Minimum Load				10	%
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		10 <sup>9</sup>		Ω
Switching Frequency			300		KHz
Isolation Capacitance			2200		pF
Base material	FR4 PCB				
Potting material	Epoxy (UL94-V0)				
Isolation Voltage	For 10 seconds			1600	VDC
Design meets safety			IEC60950-1, UL60950-1, EN60950-1		
Case material			(Black)Nickel Coated With Non-Conductive Base		
Dimensions	Appearance size		50.8X 50.8 X 13.5		mm
Weight			110		g
MTBF (Note 1)	BELLCORE-TR-NWT-000332		1.010 x 10 <sup>6</sup>		hrs
	MIL-HDBK-217F		7.416 x 10 <sup>4</sup>		hrs

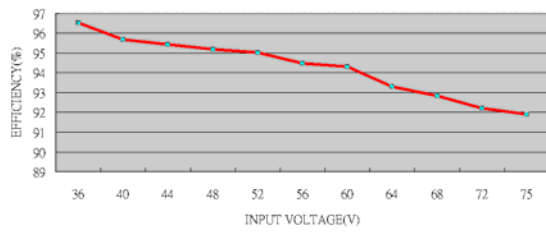
ENVIRONMENTAL SPECIFICATIONS					
Parameters	Conditions	Min	Typ	Max	Units
Operating Temperature	With heat-sink	-40		75	°C
	Without heat-sink	-40		60	°C
Maximum case temperature				110	°C
Storage Temperature		-55		125	°C
Over temperature			115		°C
Thermal impedance	Nature convection		6.7		°C/Watt
	Nature convection with heat-sink		4.7		°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 (Note 8,9)	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 (Note 8,9)	EN61000-4-4		± 2KV Perf. Criteria A		
Surge (Note 8,9)	EN61000-4-5		± 1KV Perf. Criteria A		
Conducted immunity	EN61000-4-6		10 Vr.m.s Perf. Criteria A		

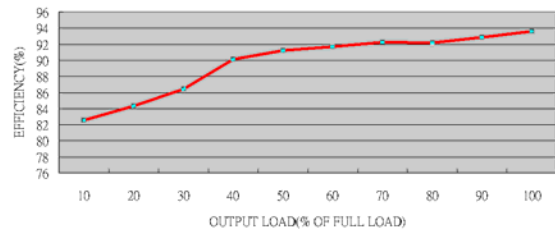


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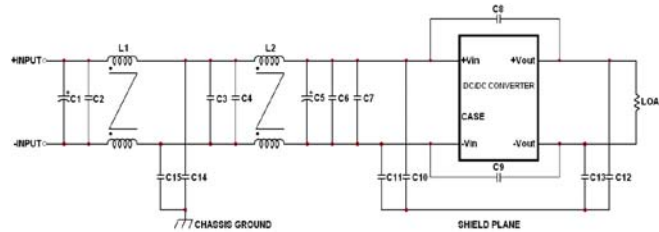
**92D-48S05RNL Efficiency VS Input voltage**



**92D-48S05RNL Efficiency VS Output Load**



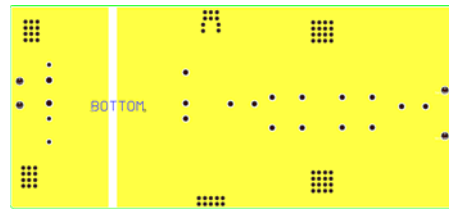
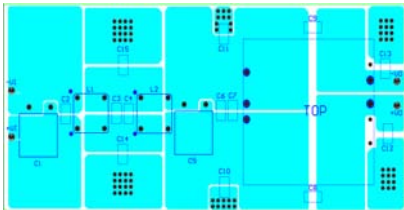
**Recommended Filter for EN55022 Class A Compliance**



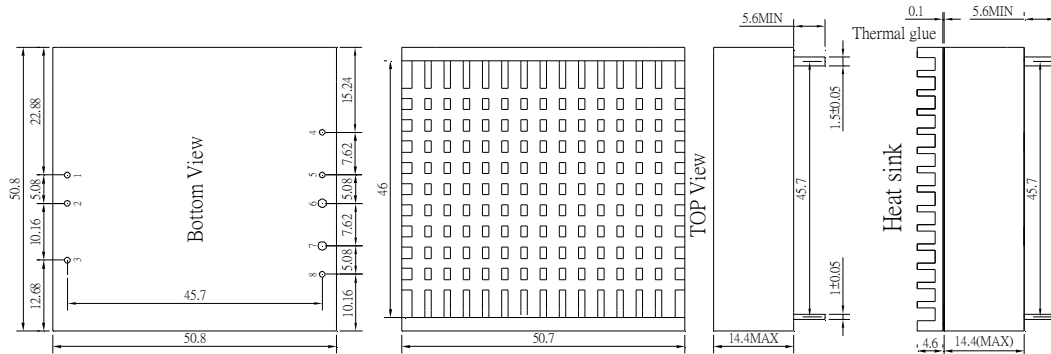
The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

	C1,C5	C2,C3,C4,C6,C7	C8	C9	C10,C11,C12,C13	C14,C15	L1	L2
	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
92D-24SXX	100uF/50V	4.7uF/50V 1812 MLCC	1000pF/3KV 1808 MLCC	1000pF/3KV 1808 MLCC	10nF/2KV 1812 MLCC	1000pF/3KV 1808 MLCC	Common Choke 305uH	Common Choke 305uH
92D-48SXX	100uF/100V	2.2uF/100V 1812 MLCC	1000pF/3KV 1808 MLCC	1000pF/3KV 1808 MLCC	10nF/2KV 1812 MLCC	1000pF/3KV 1808 MLCC	Common Choke 1400uH	Common Choke 156uH

**Recommended EN55022 Class A Filter Circuit Layout**



**Markings and dimensions**



UNIT: mm XX.X±0.5 XX.XX±0.25 Pin1,2,3,4,5,8 Size is Tolerance 1.0Φ±0.05mm

(Heat sink is optional) Pin6,7 Size is Tolerance 1.5Φ ±0.05mm

**PIN Connection**

PIN	1	2	3	4	5	6	7	8
SINGLE	+Vin	-Vin	Ctrl	-VS	+VS	+VO	-VO	TRIM