Yuan Dean Scientific CO.,LTD 93D-R3 SERIES

Wide Input Voltage Range 60 Watt Dc-Dc Converter

FEATURES:

- SMALL DIL PACKAGE 50.8*25.4*13.4mm
- UL94V-0 PACKAGE MATERIAL
- 2:1 WIDE INPUT RANGE
- HIGH EFFICIENCY UP TO 91%
- UL 94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- Remote On/Off ● RoHS COMPLIANT

RoHS Compliant

APPLICATIONS:

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

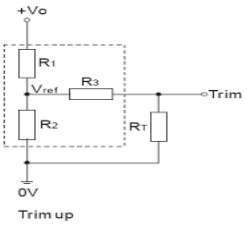
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Output[4] Ripple & Noise	Capacitor[5] Load MAX	Efficiency[4]
	Vdc	No-Load[3] (mA TYP)	Full Load[2] (mA TYP)	Vdc	Full Load (mA)	mVp-p	uF	%TYP
93D-24S03R3NL	18-36	70	2160	3.3	14000	100	16500	87
93D-24S05R3NL	18-36	90	2760	5.0	12000	100	16500	88
93D-24S12R3NL	18-36	40	2780	12	5000	100	3300	89
93D-24S15R3NL	18-36	30	2780	15	4000	100	2200	89
93D-48S03R3NL	36-75	50	1010	3.3	14000	100	16500	88
93D-48S05R3NL	36-75	60	1360	5.0	12000	100	16500	89
93D-48S12R3NL	36-75	25	1380	12	5000	100	3300	90
93D-48S15R3NL	36-75	25	1370	15	4000	100	2200	91

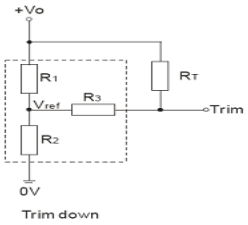
Note: 1. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40ºC. (Ground fixed and controlled environment)
MIL-STD-217F Notice2 @Ta=25 ºC, Full load (Ground, Benign, controlled environment)
2. Maximum value at nominal input voltage. 3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load. 5. Test by minimum Vin and constant resistive load.
6. The ON/OFF control pin voltage is referenced to -Input.(can use negative or positive logic)
7. Maximum output deviation is 10% inclusive of trim.
8. The 93D-R3 series can meet EN55022 Class A with parallel an external capacitor to the input pins.
Recommend: 24Vin : 6.8μF/50V 1812 MLCC. 48Vin : 4.7μF/100V*2PCS 1812 MLCC.
9. An external filter capacitor is required if the module has to meet EN61000-4-5. The filter capacitor YDS suggest:
Nippon chemi-con KY series, 220μF/100V, ESR 48mΩ
10. When the case surface temperature of 30℃ TYP, load regulation ±2% max(1/2FL TO FL),
case surface temperature of 50℃ TYP, load regulation ±0.5% max(1/4FL TO FL).
11. TRIM calculation of the use and Resistance(Dashed line the interior of models)

up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $a = \frac{Vref}{Vo'-Vref} \cdot R_1$

down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $a = \frac{Vo'-Vref}{Vref} \cdot R_2$



Trim up



Trim down

Input Specifications

Parameters	Conditions		Min	Typ	Max	Units
Voltage Types					2:1	
Filter	Pi Type					
Input surge voltage 100mS max	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		10		mS
		Remote ON/OFF		10		mS
Start-up voltage	24V input			17		Vdc
Start-up voltage	48V input			35		Vdc
Shutdown voltage	24V input			15		Vdc
Shutdown voltage	48V input			32		Vdc
Protection	Fuse Recommended					
Remote ON/OFF (Note 6)	DC-DC ON		Positive(standard) Open or(0.7V<Vr<12V) ,Negative(option) open or 0V<Vr<0.5			
(Negative logic)(Option)	DC-DC OFF		Positive(standard) short or(0V<Vr<0.7V) ,Negative(option) 0.6V<Vr<12			
Input current of Remote control pin	Nominal Vin		-0.5mA ~ +0.5mA			
Remote off state input current	Nominal Vin		3mA			

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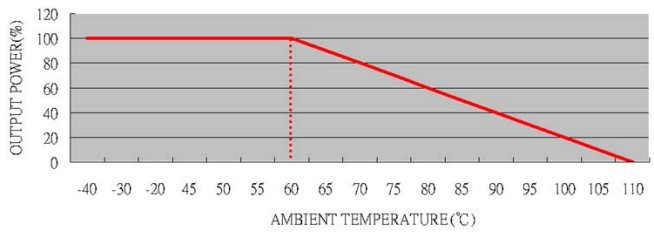
Output Specifications (Temperature Coefficient : ±0.02%/℃)					
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load and nominal Vin			±2	%
Short Circuit/ Restart	Hiccup, automatics recovery				
Over Load Protection	% of FL at nominal input	110	130		%
Over voltage protection Zener diode clamp	3.3V Output		5.0		V
	5.0V Output		6.0		V
	12V Output		15		V
	15V Output		18		V
Line Regulation	LL to HL at Full Load			±0.5	%
Load Regulation(10)	1/4 FL to Full load			±0.5	%
					%
Minimum Load				20	%
Ripple & Noise	20MHz bandwidth			100	mVp-p
Transient response recovery time	25% load step change		250		us
External Trim Adj. Range	±10% of Output Voltage				
Temperature coefficient				±0.02	% / ℃

General Specifications					
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
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 25.4 X 13.5			mm
Weight			48.6		g
MTBF (Note 1)	BELLCORE-TR-NWT-000332	1.093x 10^6			hrs
	MIL-HDBK-217F	1.096 x 10^5			hrs

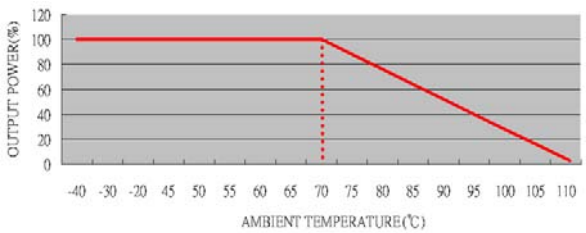
ENVIRONMENTAL SPECIFICATIONS					
Parameters	Conditions	Min	Typ	Max	Units
Operating Temperature		-40		85	℃
Maximum case temperature				110	℃
Storage Temperature		-55		125	℃
Over temperature			120		℃
Thermal impedance(Note 7)	Nature convection		10.5		°C/Watt
	Nature convection with heat-sink		8.4		°C/Watt
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)	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 9)	EN61000-4-4	± 2KV Perf. Criteria A			
Surge (Note 9)	EN61000-4-5	± 1KV Perf. Criteria A			
Conducted immunity	EN61000-4-6	10 Vr.m.s Perf. Criteria A			

93D-48S05R3NL Derating Curve(without Heat-Sink)



93D-48S05R3NL DERATING CURVE WITH HEATSINK



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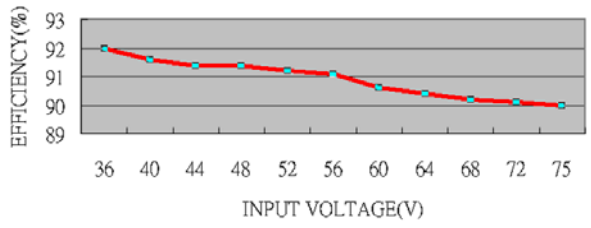
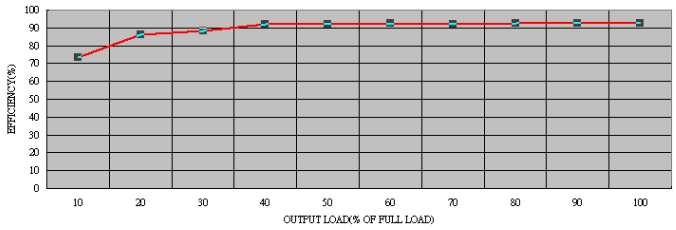
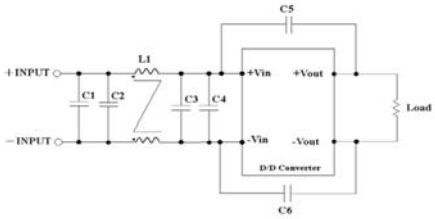
93D-48S05R3NL Efficiency VS Input voltage



93DW-48S05R3NL Efficiency VS Output Load



Recommended Filter for EN55022 Class B Compliance



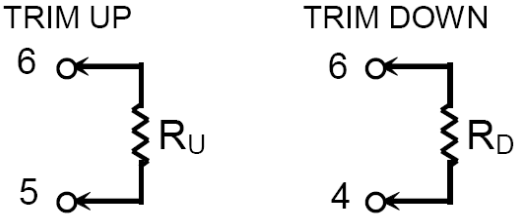
Recommended Filter for EN55022 Class B Compliance

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

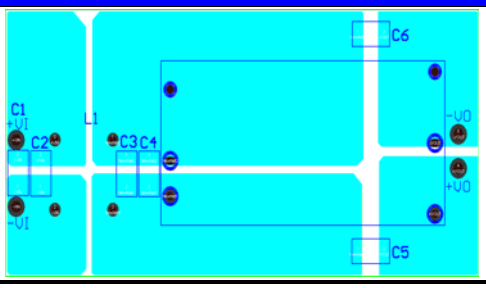
	C1	C2	C3	C4	C5&C6	L1
93D-24XX	4.7uF/50V 1812MLCC	N/A	4.7uF/50V 1812MLCC	N/A	1000pF/2KV MLCC	450uH Common Choke PMT-048
93D-48XX	4.7uF/100V 1812MLCC	N/A	4.7uF/100V 1812MLCC	N/A	1000pF/2KV MLCC	830uH Common Choke PMT-053

EXTERNAL OUTPUT TRIMMING

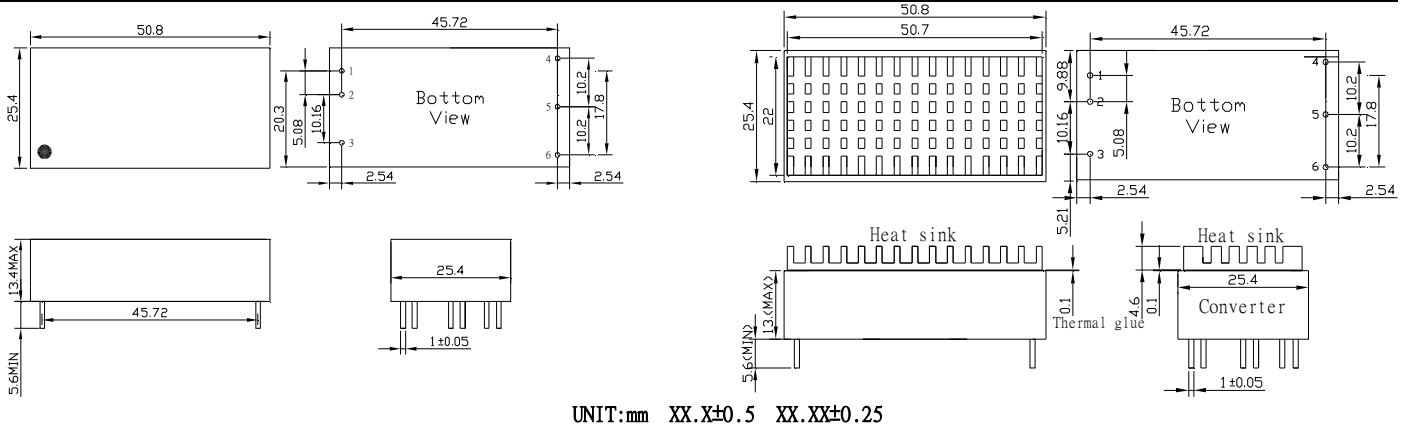
Output can be externally trimmed by using the method shown below.



Recommended EN55022 Class B Filter Circuit Layout



Markings and dimensions



UNIT:mm XX.X±0.5 XX.XX±0.25

PIN Connection

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