



- ▶ 24 Pin DIP Package
- ▶ 7.5W/In³ Power Density
- ▶ 48 Models
- ▶ Continuous Short Circuit Protection
- ▶ UL 1950 Approved, File No. E140645
- ▶ CSA 22.2 Approved, File No. LR89494
- ▶ 72 Hour Burn-In (100% of Production)

50, 100, 200 & 300 Series

General Description

The 50, 100, 200 and 300 series is a family of compact, high performance 0.5 to 3W DC/DC converters. High performance features include 500 VDC input/output isolation, continuous short circuit protection with automatic restart and tight line/load regulation. All models in the series are fully approved to the latest revisions of UL 1950 and CSA 22.2. Forty seven models operate from power busses of 5, 12, 18, 24, 28 or 48 VDC and provide output voltage levels of 5, 12, 15, ± 12 or ± 15 VDC. Standard features include an internal π filter to reduce reflected ripple current, output voltage balance of $\pm 3\%$ (for dual output units) and low noise operation.

All units are packaged in a compact 1.25 x 0.80 x 0.40 inch case that is 24 pin DIP compatible. This miniature size yields a power density of 7.5W/in³. Operation is specified over the full operating temperature range of -30°C to +71°C. Cooling is by free-air convection.

Electrical Specifications

Input Specifications:

Input Voltage Range	See Table 1
Input Filter	π (Pi) Network
Reflected Ripple Current	See Model Selection Guide
Fault Mode Current	150% of FL Current
Inrush Current	15A pk for 100 μ Sec
Reverse Polarity Input Current	5A Max.

Output Specifications:

Output Voltage and Current ⁽¹⁾	See Model Selection Guide
Output Voltage Accuracy	$\pm 5\%$, Max.
Voltage Balance (Dual Outputs)	$\pm 3\%$, Max.
Ripple & Noise (20 MHz BW) ⁽²⁾	15 mVpk-Pk, Max.
Line Regulation	$\pm 0.3\%$, Max.
Load Regulation	$\pm 0.3\%$, Max.
Overshoot (10% to 90% of load)	0.1%
Temperature Coefficient @ FL	$\pm 0.01\%/^{\circ}$ C
Warm-up Drift @ FL (30 min.)	$\pm 0.2\%$
Short Circuit Protection	Continuous
Short Circuit Restart	Automatic

General Specifications:

Efficiency	See Model Selection Guide
Isolation Voltage, Case B (1 min.)	500 VDC, Min.
Case B1 (1min.)	1000 VDC
Isolation Resistance	$10^9\Omega$
Isolation Capacitance	80 pF
CM Current Noise (20 MHz BW)	<1.5 mA Pk-Pk
Switching Frequency	Up to 1 MHz

Environmental Specifications:

Operating Temperature Range (Ambient) ⁽³⁾	-30°C to +75°C
Storage Temperature Range	-40°C to +125°C
Derating	See Figure 1
Cooling ⁽⁴⁾	Free-air Convection

Physical Characteristics:

Size	1.25 x 0.80 x 0.40 inches (31.8 x 20.3 x 10.2mm)
Weight	0.5 Oz (14g)
Case Material	Phenolic, Non-conductive

Reliability Specifications:

MTBF; Ground Benign @ +25°C Ambient	>1,500,000 Hours
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Specifications typical @+25°C with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications subject to change without notice.

Specification Notes

- Total output power should not exceed the specified output ratings for any particular model.
- These units operate as complete converters with no need for external components. However, in some noise sensitive analog applications it is recommended that a 15 μ F - 25V tantalum capacitor be placed in parallel with a 0.1 μ F ceramic capacitor as close to the load as possible. This will reduce the converter output ripple to approximately 5 mVpk-pk.
- These converters have a case ambient thermal resistance of 15°C/W (@ nominal line and full load) which is a function of line and load conditions. The maximum case temperature before thermal shutdown is 96°C.

For operation in still air above 66°C, a heat sink may be used to prevent the activation of the internal thermal protection circuitry. An adequate heat sink or a minimum air flow of 400 LFM will extend the operating temperature to +85°C.

- Free-air convection cooling requires that the application be prop-

erly ventilated. Using a converter in a sealed application, or one in which air movement is severely restricted, could cause thermal runaway. The use of a ground plane under the converter is recommended for heat sinking and to reduce EMI.

- * For information on the standard conditions and methods used or approved by CDI to test DC/DC converter parameters, see the application note "Testing DC/DC converters" on page 92.

Table 1 - Input Voltage Range vs Output Load

Nominal Input (VDC)	Input Voltage Range (VDC) at:			
	20% Load	40% Load	60% Load	100% Load
5	4.30 - 6.00	4.40 - 5.70	4.55 - 5.60	4.65 - 5.25
12	10.3 - 15.0	10.4 - 14.6	10.6 - 13.6	10.9 - 13.2
18	15.5 - 22.5	15.7 - 21.6	15.8 - 20.4	16.4 - 19.8
24	20.4 - 30.0	20.6 - 29.0	21.0 - 27.0	21.6 - 26.4
28	24.2 - 36.0	24.5 - 34.0	24.9 - 31.8	25.2 - 30.8
48	41.3 - 60.0	42.0 - 58.0	42.3 - 54.4	43.2 - 52.8

Typical Applications:

- ▶ Data Communications Equipment
- ▶ Mobile/Battery Driven Equipment
- ▶ Distributed Power Networks
- ▶ Telecommunications Equipment
- ▶ Data Acquisition Subsystems

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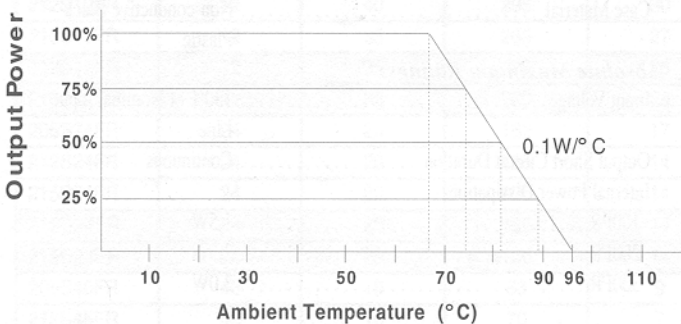
50, 100, 200 and 300 Series
SAFETY APPROVED, HIGH DENSITY
24 PIN DIP COMPATIBLE
1/2W to 3W DC/DC CONVERTERS

Model Selection Guide

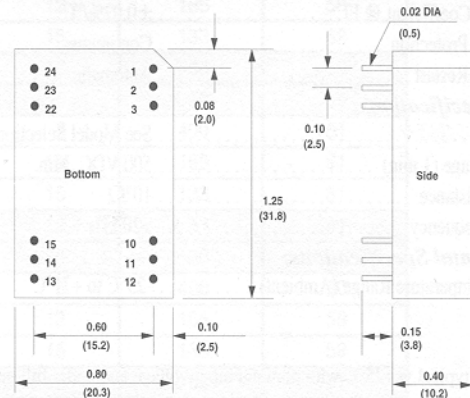
Model Number	Input			Reflected Ripple (mA P-P)	Output		Efficiency @FL (%)	Case Style
	Nominal Voltage (VDC)	Current (mA)			Voltage (VDC)	Current (mA)		
		No-Load	Full-Load					
55S5	5	130	310	10	5	100	32	B
105S5	5	120	500	10	5	200	40	B
112S5	5	120	600	10	12	100	40	B
115S5	5	150	690	10	15	100	43	B
112S12	12	50	200	5	12	100	50	B
115S12	12	45	220	5	15	100	56	B
112S18	18	40	140	5	12	100	48	B
115S18	18	40	140	5	15	100	59	B
112S24	24	35	100	5	12	100	50	B
115S24	24	35	125	5	15	100	50	B
112S28	28	35	83	5	12	100	52	B
115S28	28	35	102	5	15	100	52	B
112S48	48	32	48	5	12	100	52	B
115S48	48	32	60	5	15	100	52	B
105D5	5	100	435	20	±5	±100	46	B
105D24	24	35	87	5	±5	±100	48	B
105D48	48	32	42	5	±5	±100	50	B
205S5	5	100	800	20	5	400	50	B
212S5	5	100	960	20	12	200	50	B
215S5	5	100	1200	20	15	200	50	B
205S12	12	35	310	10	5	400	52	B
205S18	18	35	220	10	5	400	52	B
205S24	24	35	157	10	5	400	52	B

Model Number	Input			Reflected Ripple (mA P-P)	Output		Efficiency @FL (%)	Case Style
	Nominal Voltage (VDC)	Current (mA)			Voltage (VDC)	Current (mA)		
		No-Load	Full-Load					
205S28	28	35	140	8	5	400	52	B
205S48	48	32	80	10	5	400	52	B
212S12	12	50	360	10	12	200	55	B
212S18	18	40	250	8	12	200	55	B
212S24	24	35	180	5	12	200	55	B
212S28	28	35	145	5	12	200	58	B
212S48	48	32	88	5	12	200	56	B
212D5	5	100	900	20	±12	±100	53	B or B1
215D5	5	160	750	20	±15	±75	60	B or B1
212D12	12	50	300	10	±12	±100	66	B or B1
315D12	12	50	420	10	±15	±100	60	B or B1
212D18	18	40	250	8	±12	±100	53	B or B1
315S12	12	50	400	10	15	200	55	B
315S18	18	40	280	8	15	200	56	B
315S24	24	35	210	5	15	200	59	B
315S28	28	35	170	5	15	200	60	B
315S48	48	32	100	5	15	200	60	B
315D18	18	40	280	8	±15	±100	59	B or B1
212D24	24	35	180	5	±12	±100	55	B or B1
315D24	24	35	210	5	±15	±100	59	B or B1
212D28	28	35	145	5	±12	±100	58	B or B1
315D28	28	35	170	5	±15	±100	60	B or B1
212D48	48	35	88	5	±12	±100	56	B or B1
315D48	48	32	100	5	±15	±100	60	B or B1

Fig. 1. Output Derating Curve



Mechanical Configuration, Case B and B1



Ordering information

- Case B pinning is standard, and these models do not require a suffix.
- Case B1 pinning is alternate. These models require a "B1" suffix when ordering. i.e. 212D18-B1

Pin-out (Case B)

Pin	Single Output	Dual Output
1	+V Input	+V Input
2	N/C	-V Output
3	N/C	Common
10	-V Output	Common
11	+V Output	+V Output
12	-V Input	-V Input

Pin-out (Case B) cont.

Pin	Single Output	Dual Output
13	-V Input	-V Input
14	+V Output	+V Output
15	-V Output	Common
22	N/C	Common
23	N/C	-V Output
24	+V Input	+V Input

Pin-out (B1 Case)

Pin	Dual
1,2,3	+V Input
22,23,24	-V Input
15	+V Output
13	-V Output
10,11	±V Common
12,14	N/C

Note: All dimensions are typical in inches (mm).

Tolerance: X.XX = ±0.02, (±0.5)
 X.XXX = ±0.010, (±0.25)

N/C = No Connection