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500 Se



IEC950

Key Features:

- **Compact, 0.35 Inch Profile Package**
- **-30°C to +75°C Operating Temperature Range**
- **± 0.03% Line/Load Regulation**
- **Full Input/Output Protection**
- **UL 1950 Approved**
- **CSA 22.2-950 Approved**
- **VDE / EN 60950 Approved**
- **>1,000,000 Hours MTBF**

General Description

The **500** series is a family of compact, high performance, high reliability 5W DC/DC converters. High performance features include 1400 VDC input/output isolation, continuous short circuit protection with automatic restart and a maximum line/load regulation of only ± 0.03%. All models meet the requirements of IEC 950, and are fully approved to the latest revisions of UL 1950 (File No. E140645), CSA 22.2-950 File (No. LR89494), and VDE / EN 60950. Thirty six models operate from power busses of 5, 12, 18, 24, 28 or 48 VDC and provide single or dual outputs of 5, 12, 15, ±5, ±12 or ±15 VDC. Standard features include an internal π (Pi) filter to reduce reflected ripple current, efficiency as high as 85% and low noise operation (20 mV Pk-Pk).

All units are packaged in a miniature 1 x 2 x 0.35 inch metal case. This compact packaging yields a power density as high as 7.1W/In³. Six-sided continuous shielding virtually eliminates radiated EMI/RFI. Operation is specified over the full operating temperature range of -30°C to +75°C with no derating required. 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 Input Current
Reverse Polarity Input Current.	5A, Max.

Output Specifications:

Output Voltage and Current [1]	See Model Selection Guide
Output Voltage Accuracy	±1%, Max.
Voltage Balance (Dual Outputs) [2]	±50 mV, Max.
Ripple & Noise (20 MHz BW) [3]	20 mV Pk-Pk, Max.
Line Regulation	±0.03%, Max.
Load Regulation	±0.03%, Max.
Minimum Load	10% of Full Load
Transient Response	50 µSec., Max.
Temperature Coefficient	±0.02%/°C, Max.
Temp. Coefficient Balance (Dual Outputs)	±0.003%/°C
Warm-up Drift @ FL (Incl. TC)	±1.0%, Max.
Short Circuit Current Limit	I_{out} + 75%
Short Circuit Protection.	Continuous
Short Circuit Restart	Automatic

General Specifications:

Efficiency	See Model Selection Guide
Isolation Voltage (1 min.)	1400 VDC, Min.
Isolation Resistance	$10^9\Omega$
Isolation Capacitance	70 pF
CM Current Noise (20 MHz BW)	<1.0 mA Pk-Pk
Switching Frequency	150 kHz

Environmental Specifications:

Operating Temperature Range (Ambient)	-30°C to +75°C
Storage Temperature Range	-50°C to +125°C
Humidity	Up to 95%, Non-Condensing
Derating	None Required
Cooling [4]	Free-air Convection

Physical Characteristics:

Size	1 x 2 x 0.35 inches (25.5 x 51.0 x 8.96 mm)
Weight.	1.5 Oz (39.25g)
Case Material	Metal, Black Coated
Shielding Connection, Single Output	To Negative Output
Dual Output	To Output Common

Reliability Specifications:

MTBF [5]	>1,000,000 Hours

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

1. Total output power should not exceed the specified output ratings for any particular model.
2. Dual output units may be operated with unbalanced loads. Please contact the factory for information on the maximum power limits for individual outputs on specific models (again care must be taken not to exceed the overall power rating of a module). Operating outputs in an unbalanced state may affect some specifications such as output accuracy. For more information on applying a specific model, please contact the factory.
3. The **500 Series** operate as complete modules with no need for external components. However, in some noise sensitive analog applications it is recommended that a 15 µF - 25V tantalum electrolytic capacitor be placed in parallel with a 0.1 µF ceramic capacitor as close to the load as possible. This will reduce the converter output ripple to approximately 5 mV pk- pk.
4. Free-air convection cooling requires that the application be properly ventilated. Using a converter in a sealed application, or one in which air movement is severely restricted, could cause thermal runaway.
5. MTBF is calculated at ground benign, +25°C ambient, per MIL-HDBK-217F.

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

Note:

For information on the standard conditions and methods used or approved by **CDI** to test DC/DC converter parameters, see the application note "DC/DC Converter Test Methods" on page 104.

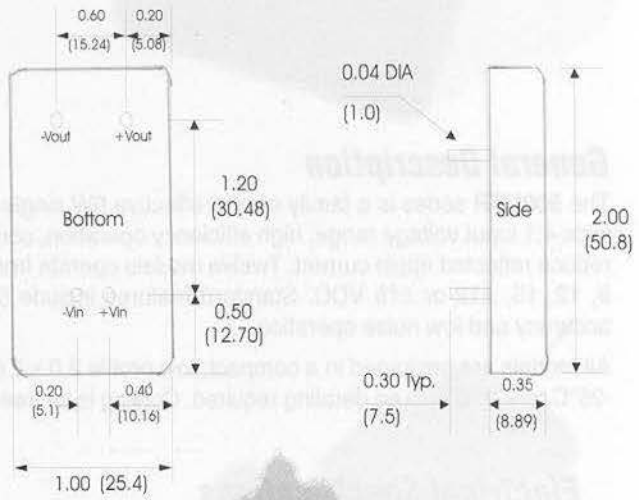
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Model Selection Guide

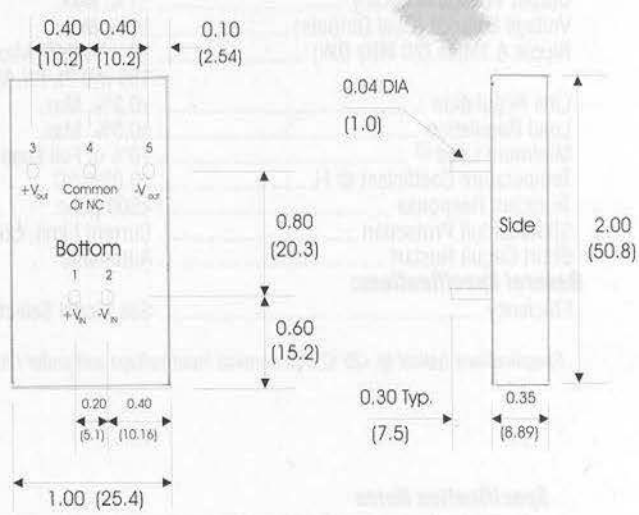
Model Number	Input				Output		Efficiency @FL (%)	Case Style
	Nominal Voltage (VDC)	Current (mA)		Reflected Ripple (mA P-P)	Voltage (VDC)	Current (mA)		
		No-Load	Full-Load					
505S5	5	60	1550	80	5	1000	64	D or D1
512S5	5	110	1430	80	12	420	70	D or D1
515S5	5	100	1480	80	15	340	67	D or D1
505D5	5	112	1790	80	±5	±500	56	D
512D5	5	140	1550	80	±12	±210	65	D
515D5	5	170	1500	80	±15	±170	66	D
505S12	12	35	680	40	5	1000	61	D or D1
512S12	12	35	630	40	12	420	66	D or D1
515S12	12	50	590	40	15	340	70	D or D1
505D12	12	50	670	40	±5	±500	62	D
512D12	12	50	650	40	±12	±210	64	D
515D12	12	70	600	40	±15	±170	70	D
505S18	18	30	450	35	5	1000	62	D or D1
512S18	18	30	391	35	12	420	71	D or D1
515S18	18	36	375	35	15	340	74	D or D1
505D18	18	30	447	35	±5	±500	62	D
512D18	18	30	391	35	±12	±210	71	D
515D18	18	50	400	35	±15	±170	69	D
505S24	24	15	310	20	5	1000	60	D or D1
512S24	24	15	292	20	12	420	71	D or D1
515S24	24	21	243	20	15	340	85	D or D1
505D24	24	22	325	20	±5	±500	64	D
512D24	24	21	292	20	±12	±210	72	D
515D24	24	30	270	20	±15	±170	77	D
505S28	28	20	290	20	5	1000	61	D or D1
512S28	28	20	250	20	12	420	71	D or D1
515S28	28	20	228	20	15	340	78	D or D1
505D28	28	16	300	20	±5	±500	60	D
512D28	28	16	238	20	±12	±210	75	D
515D28	28	20	250	20	±15	±170	71	D
505S48	48	20	160	15	5	1000	68	D or D1
512S48	48	10	133	15	12	420	78	D or D1
515S48	48	15	130	15	15	340	80	D or D1
505D48	48	10	165	15	±5	±500	63	D
512D48	48	12	150	15	±12	±210	70	D
515D48	48	20	150	15	±15	±170	69	D

Mechanical Configurations:

Case D1



Case D



Ordering information

1. Case **D** pinning is standard, and these models do not require a suffix.
2. Case **D1** pinning is alternate. These models require a "**D1**" suffix when ordering. i.e. **505S48-D1**

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

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