

## 200HI and 300HI Series

Distributed By:  
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IEC950



### Features:

- 3000V Pk-Pk Input/Output Isolation
- 24 Pin DIP Compatible Package
- 7.5W/In<sup>3</sup> Power Density
- Input (Pi) Filter
- UL 1950 Approved
- CSA 22.2 Approved
- VDE / EN 60950 Approved
- >1,500,000 Hrs. MTBF Per MIL-HDBK-217F

## General Description

The 200HI and 300HI series are a family of miniature 2W and 3W, high isolation, DC/DC converters. High performance features include 3000V peak-to-peak input/output isolation, tight line/load regulation and continuous short circuit protection with automatic restart. 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 (File No. LR89494), and VDE/EN 60950. Thirty models operate from power busses of 5, 12, 18, 24, 28 or 48 VDC and provide single or dual outputs of 5, 12, 15,  $\pm 12$  or  $\pm 15$  VDC. Standard features include an internal  $\pi$  (Pi) filter to reduce reflected ripple current, efficiency as high as 60% and low noise operation (20 mV Pk-Pk). The Mean Time Between Failure (MTBF) per MIL-HDBK-217F is over 1,500,000 hours (+25°C, ground benign).

All units are packaged in a miniature 24 pin DIP compatible 1.25 x 0.8 x 0.4 inch non-conductive case. This compact packaging yields a power density as high as 7.5W/In<sup>3</sup>. 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 .....	$\pi$ (Pi) Network
Reflected Ripple Current .....	See Model Selection Guide
Fault Mode Current .....	150% of FL Current
Reverse Polarity Input Current .....	5A Max.

### Output Specifications:

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

### General Specifications:

Efficiency .....	See Model Selection Guide
Isolation Voltage (1 min.) .....	3000V Pk-Pk
Isolation Resistance .....	10 <sup>9</sup> $\Omega$
Isolation Capacitance .....	70 pF
CM Current Noise (20 MHz BW) .....	<1.5 mA Pk-Pk
Switching Frequency .....	Up to 1 MHz

### Environmental Specifications:

Operating Temperature Range (Ambient) .....	-30°C to +75°C
Storage Temperature Range .....	-40°C to +125°C
Derating .....	None Required
Humidity .....	Up to 95%, Non-Condensing
Cooling <sup>(4)</sup> .....	Free-air Convection

### Physical Characteristics:

Size .....	1.25 x 0.8 x 0.4 inches (32 x 20 x 10.2 mm)
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

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. These converters operate as complete modules with no need for external components. However, in some noise sensitive analog applications it is recommended that a 15  $\mu\text{F}$  - 25V tantalum electrolytic capacitor be placed in parallel with a 0.1  $\mu\text{F}$  ceramic capacitor as close to the load as possible. This will reduce the converter output ripple to approximately 5 mV Pk-Pk.
4. These converters have a case ambient thermal resistance of 15°C/Watt under nominal line and load conditions (this figure will vary with line/load). All operating temperature specifications are given for ambient air with free-air convection cooling. 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. Operating the 200/300HI series in still air above +40°C will activate the internal thermal protection circuit. There are techniques for applying these converters in still air or extending the operating ambient temperature range. These include:

- A. Use of heat sinking
- B. Mounting the converter on a metal plate or ground plane
- C. Use of forced air cooling

An adequate heat sink or forced air flow of at least 400 linear feet per minute (LFM) will extend the operating range to +85°C.



**3000V Pk-Pk INPUT/OUTPUT ISOLATION**  
**UL 1950 and CSA 22.2 APPROVED**  
**2W and 3W DC/DC CONVERTERS**

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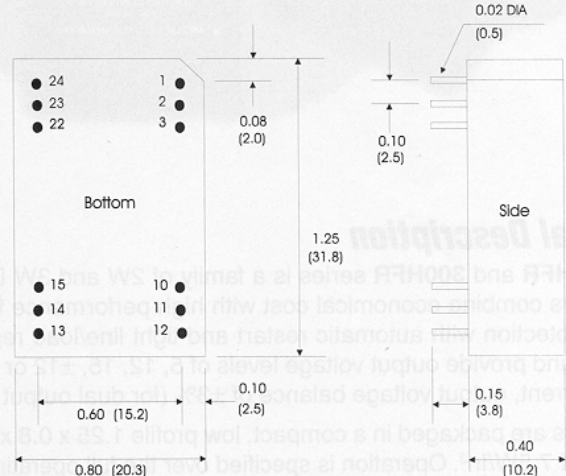
**200HI and 300HI Series**

**Model Selection Guide - 200HI and 300HI Series**

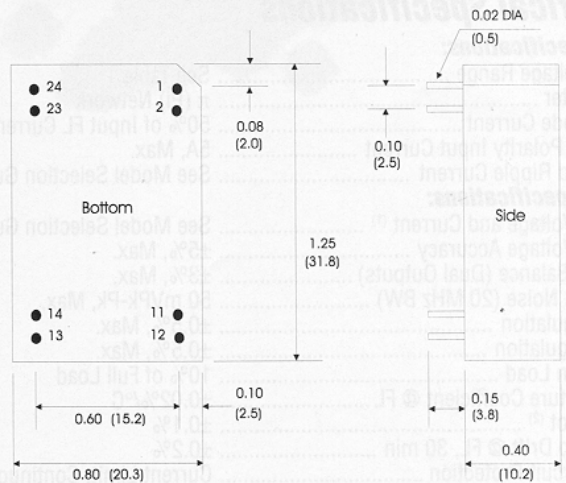
Model Number	Input			Output		Efficiency @FL (%)	Case Style	
	Nominal Voltage (VDC)	Current (mA) No-Load	Current (mA) Full-Load	Reflected Ripple (mA P-P)	Voltage (VDC)			Current (mA)
205S5HI	5	100	780	20	5	400	57	B1 or B2
212S5HI	5	100	960	20	12	200	50	B1 or B2
315S5HI	5	100	1100	20	15	200	54	B1 or B2
212D5HI	5	110	760	20	±12	±100	52	B1
215D5HI	5	130	750	20	±15	±75	53	B1
205S12HI	12	60	310	10	5	400	52	B1 or B2
212S12HI	12	35	364	10	12	200	55	B1 or B2
315S12HI	12	50	380	10	15	200	65	B1 or B2
212D12HI	12	60	330	10	±12	±100	50	B1
315D12HI	12	50	400	10	±15	±100	55	B1
205S18HI	18	35	220	10	5	400	52	B1
212S18HI	18	35	243	10	12	200	55	B1
315S18HI	18	35	303	10	15	200	55	B1
212D18HI	18	40	250	8	±12	±100	53	B1
315D18HI	18	40	280	8	±15	±100	59	B1
205S24HI	24	20	160	10	5	400	52	B1 or B2
212S24HI	24	35	182	10	12	200	55	B1 or B2
315S24HI	24	35	227	10	15	200	55	B1 or B2
212D24HI	24	35	180	5	±12	±100	55	B1
315D24HI	24	35	210	5	±15	±100	59	B1
205S28HI	28	35	135	8	5	400	52	B1 or B2
212S28HI	28	35	156	10	12	200	55	B1 or B2
315S28HI	28	20	175	10	15	200	61	B1 or B2
212D28HI	28	35	145	5	±12	±100	58	B1
315D28HI	28	35	170	5	±15	±100	60	B1
205S48HI	48	32	80	10	5	400	52	B1 or B2
212S48HI	48	35	90	10	12	200	55	B1 or B2
315S48HI	48	35	113	10	15	200	55	B1 or B2
212D48HI	48	32	88	5	±12	±100	56	B1
315D48HI	48	32	100	5	±15	±100	60	B1

**Mechanical Configuration - 200HI and 300HI Series**

**CASE B1**



**ALTERNATE CASE B2**



**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

**Ordering information**

- Case B1 pinning is standard, and these models do not require a suffix.
- Case B2 pinning is alternate. These models require a "2" suffix when ordering. i.e. 205S48HI2

**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.

**Pin-Out (Case B1)**

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

**Pin-Out (Case B2)**

Pin	Single Output
1, 2	+V Input
23, 24	-V Input
13, 14	-V Output
11, 12	+V Output

Note: All dimensions are typical in inches (mm).  
 Tolerance: X.XX ± 0.02 (± 0.05)  
 X.XXX ± 0.010, (± 0.25)  
 N/C = No Connection

For Easy Ordering Use

