

ICH/IFH Series



- 2:1 & 4:1 Input Ranges
- Efficiency up to 90%
- Single Output
- -40 °C to +100 °C Operating Temperature
- Continuous Short Circuit Protection
- Five-sided Metal Case
- 3 Year Warranty

Specification

Input

- | | |
|----------------------------------|--|
| Input Voltage Range | • See tables |
| Input Current (no load) | • See tables |
| Input Reverse Voltage Protection | • None |
| Input Filter | • Pi network |
| Undervoltage Lockout | • 2:1 Input Models: 12 Vin, power up 8.8 V, down 8.0 V 24 Vin, power up 17.0 V, down 16.0 V 48 Vin, power up 34.0 V, down 32.5 V 4:1 Input Models: 24 Vin, power up 8.8 V, down 8.0 V 48 Vin, power up 17.0 V, down 16.0 V |

Output

- | | |
|--------------------------|--|
| Output Voltage Trim | • $\pm 10\%$ |
| Initial Set Accuracy | • $\pm 1\%$ max (ICH100: $\pm 1.5\%$) |
| Line Regulation | • $\pm 0.2\%$ max measured from high line to low line |
| Load Regulation | • $\pm 0.2\%$ max measured from 0-100% load |
| Transient Response | • 5% max deviation, recovery to within 1% in 500 μ s, 25% step load change |
| Ripple & Noise | • 3.3 & 5 V models: 100 mV pk-pk 12 & 15 V models: 150 mV pk-pk 24, 28 & 48 V models: 1% max pk-pk ICH50/75 - 3.3 V, 5 V models: 75 mV 12 V, 15 V models: 100 mV 20 MHz bandwidth (see note 3) |
| Overvoltage Protection | • 115-140% |
| Short Circuit Protection | • ICH50/75/100W/IFH200-: Trip & restart (hiccup mode) with auto recovery ICH50W/75W/100/150 & IFH200: Current limit, auto recovery |
| Temperature Coefficient | • $\pm 0.03\%/^{\circ}\text{C}$ |
| Current Limit | • IFH200: 110-150% nominal output, all other models: 110-160% nominal output |
| Remote On/Off | • See note 1 & 2 |
| Thermal Shutdown | • ICH50/50W/75/75W/100/150: Thermal shutdown when case temperature reaches 100 °C, auto recovery when case temperature < +60 °C ICH100W/IFH200: Thermal shutdown when case temperature reaches 105 °C, auto recovery when case temperature < +90 °C |

General

- | | |
|----------------------|---|
| Efficiency | • See tables |
| Isolation Voltage | • 1500 VDC Input to Output 1500 VDC Input to Case 1500 VDC Output to Case |
| Isolation Resistance | • 10 ⁷ ohms min |
| Switching Frequency | • ICH50/75 12-24V models: 400 kHz typical ICH50/75 48V models: 300 kHz typical ICH50W/75W: 300 kHz typical ICH100/ICH150: 500 kHz typical ICH100W: 250 kHz typical IFH200: 350 kHz typical |
| Power Density | • ICH50: 18.3 W/in ³ ICH75: 27.4 W/in ³ ICH100: 36.6 W/in ³ ICH150: 54.8 W/in ³ IFH200: 34.8 W/in ³ |
| MTBF | • ≥ 790 kHrs to MIL-HDBK-217F at 25 °C, GB |

Environmental

- | | |
|----------------------------|--|
| Operating Case Temperature | • -40 °C to +100 °C, see derating curve |
| Storage Temperature | • ICH50/75: -55 °C to +105 °C ICH100/150 & IFH200: -40 °C to +105 °C |
| Shock | • 30 g pk, half sine wave for 18 ms, 3 pulses per face, all 6 faces tested on all 3 axes |
| Vibration | • 5-500 Hz at 3 g, 10 mins per axis |

EMC & Safety

- | | |
|--------------------|---|
| Emissions | • EN55022, level A conducted with external components |
| ESD Immunity | • EN61000-4-2, level 2 Perf Criteria A |
| EFT/Burst | • EN61000-4-4, level 1, Perf Criteria A |
| Surge | • EN61000-4-5, installation class 1, Perf Criteria A |
| Conducted Immunity | • EN61000-4-6, 3 V rms Perf Criteria A |
| Magnetic Field | • EN61000-4-8, 1 A/m, Perf Criteria A |
| Safety Approvals | • UL60950-1 (ICH100W not UL approved) |

Models and Ratings

ICH/IFH Series **XP**

| Input Voltage | Output Voltage | Output Current | Input Current ⁽⁴⁾ | | Efficiency | Model Number ^(2,5) |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-------------------------------|
| | | | No Load | Full Load | | |
| 9-18 VDC (12 V nominal) | 3.3 V | 10.00 A | 50 mA | 3525 mA | 78% | ICH5012S3V3 |
| | 5.0 V | 10.00 A | 50 mA | 5145 mA | 81% | ICH5012S05 |
| | 12.0 V | 4.16 A | 50 mA | 4950 mA | 84% | ICH5012S12 |
| | 15.0 V | 3.33 A | 50 mA | 4950 mA | 84% | ICH5012S15 |
| | 24.0 V | 2.08 A | 50 mA | 4950 mA | 84% | ICH5012S24 |
| 18-36 VDC (24 V nominal) | 3.3 V | 10.00 A | 50 mA | 1740 mA | 79% | ICH5024S3V3 |
| | 5.0 V | 10.00 A | 50 mA | 2540 mA | 82% | ICH5024S05 |
| | 12.0 V | 4.16 A | 50 mA | 2450 mA | 85% | ICH5024S12 |
| | 15.0 V | 3.33 A | 50 mA | 2450 mA | 85% | ICH5024S15 |
| | 24.0 V | 2.08 A | 50 mA | 2419 mA | 86% | ICH5024S24 |
| 36-75 VDC (48 V nominal) | 3.3 V | 10.00 A | 50 mA | 870 mA | 79% | ICH5048S3V3 |
| | 5.0 V | 10.00 A | 50 mA | 1250 mA | 83% | ICH5048S05 |
| | 12.0 V | 4.16 A | 50 mA | 1220 mA | 85% | ICH5048S12 |
| | 15.0 V | 3.33 A | 50 mA | 1220 mA | 85% | ICH5048S15 |
| | 24.0 V | 2.08 A | 50 mA | 1209 mA | 86% | ICH5048S24 |

| Input Voltage | Output Voltage | Output Current | Input Current ⁽⁴⁾ | | Efficiency | Model Number ⁽²⁾ |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-----------------------------|
| | | | No Load | Full Load | | |
| 9-36 VDC (24 V nominal) | 3.3 V | 10.00 A | 50 mA | 1785 mA | 77% | ICH5024WS3V3 |
| | 5.0 V | 10.00 A | 50 mA | 2570 mA | 81% | ICH5024WS05 |
| | 12.0 V | 4.16 A | 50 mA | 2510 mA | 83% | ICH5024WS12 |
| | 15.0 V | 3.33 A | 50 mA | 2510 mA | 83% | ICH5024WS15 |
| | 24.0 V | 2.08 A | 50 mA | 2510 mA | 83% | ICH5024WS24 |
| 18-75 VDC (48 V nominal) | 3.3 V | 10.00 A | 50 mA | 880 mA | 78% | ICH5048WS3V3 |
| | 5.0 V | 10.00 A | 50 mA | 1270 mA | 82% | ICH5048WS05 |
| | 12.0 V | 4.16 A | 50 mA | 1240 mA | 84% | ICH5048WS12 |
| | 15.0 V | 3.33 A | 50 mA | 1240 mA | 84% | ICH5048WS15 |
| | 24.0 V | 2.08 A | 50 mA | 1240 mA | 84% | ICH5048WS24 |

| Input Voltage | Output Voltage | Output Current | Input Current ⁽⁴⁾ | | Efficiency | Model Number ^(2,5) |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-------------------------------|
| | | | No Load | Full Load | | |
| 9-18 VDC (12 V nominal) | 3.3 V | 15.00 A | 50 mA | 5290 mA | 78% | ICH7512S3V3 |
| | 5.0 V | 15.00 A | 50 mA | 7715 mA | 81% | ICH7512S05 |
| | 12.0 V | 6.25 A | 50 mA | 7440 mA | 84% | ICH7512S12 |
| | 15.0 V | 5.00 A | 50 mA | 7440 mA | 84% | ICH7512S15 |
| | 24.0 V | 3.13 A | 50 mA | 7440 mA | 84% | ICH7512S24 |
| 18-36 VDC (24 V nominal) | 3.3 V | 15.00 A | 50 mA | 2610 mA | 79% | ICH7524S3V3 |
| | 5.0 V | 15.00 A | 50 mA | 3810 mA | 82% | ICH7524S05 |
| | 12.0 V | 6.25 A | 50 mA | 3675 mA | 85% | ICH7524S12 |
| | 15.0 V | 5.00 A | 50 mA | 3675 mA | 85% | ICH7524S15 |
| | 24.0 V | 3.13 A | 50 mA | 3640 mA | 86% | ICH7524S24 |
| 36-75 VDC (48 V nominal) | 3.3 V | 15.00 A | 50 mA | 1305 mA | 79% | ICH7548S3V3 |
| | 5.0 V | 15.00 A | 50 mA | 1883 mA | 83% | ICH7548S05 |
| | 12.0 V | 6.25 A | 50 mA | 1838 mA | 85% | ICH7548S12 |
| | 15.0 V | 5.00 A | 50 mA | 1838 mA | 85% | ICH7548S15 |
| | 24.0 V | 3.13 A | 50 mA | 1820 mA | 86% | ICH7548S24 |

| Input Voltage | Output Voltage | Output Current | Input Current ⁽⁴⁾ | | Efficiency | Model Number ⁽²⁾ |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-----------------------------|
| | | | No Load | Full Load | | |
| 9-36 VDC (24 V nominal) | 3.3 V | 15.00 A | 50 mA | 2611 mA | 79% | ICH7524WS3V3 |
| | 5.0 V | 15.00 A | 50 mA | 3811 mA | 82% | ICH7524WS05 |
| | 12.0 V | 6.25 A | 50 mA | 3765 mA | 83% | ICH7524WS12 |
| | 15.0 V | 5.00 A | 50 mA | 3720 mA | 84% | ICH7524WS15 |
| | 24.0 V | 3.12 A | 50 mA | 3720 mA | 84% | ICH7524WS24 |
| 18-75 VDC (24 V nominal) | 3.3 V | 15.00 A | 50 mA | 1289 mA | 80% | ICH7548WS3V3 |
| | 5.0 V | 15.00 A | 50 mA | 1883 mA | 83% | ICH7548WS05 |
| | 12.0 V | 6.25 A | 50 mA | 1860 mA | 84% | ICH7548WS12 |
| | 15.0 V | 5.00 A | 50 mA | 1838 mA | 85% | ICH7548WS15 |
| | 24.0 V | 3.12 A | 50 mA | 1835 mA | 85% | ICH7548WS24 |

| Input Voltage | Output Voltage | Output Current | Input Current ⁽¹⁾ | | Efficiency | Model Number ⁽²⁾ |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-----------------------------|
| | | | No Load | Full Load | | |
| 18-36 VDC (24 V nominal) | 3.3 V | 20.00 A | 50 mA | 3480 mA | 79% | ICH10024S3V3 |
| | 5.0 V | 20.00 A | 50 mA | 5020 mA | 83% | ICH10024S05 |
| | 12.0 V | 8.30 A | 50 mA | 4880 mA | 85% | ICH10024S12 |
| | 15.0 V | 6.70 A | 50 mA | 4925 mA | 85% | ICH10024S15 |
| | 24.0 V | 4.17 A | 50 mA | 4905 mA | 85% | ICH10024S24 |
| 36-75 VDC (48 V nominal) | 3.3 V | 20.00 A | 50 mA | 1720 mA | 80% | ICH10048S3V3 |
| | 5.0 V | 20.00 A | 50 mA | 2480 mA | 84% | ICH10048S05 |
| | 12.0 V | 8.30 A | 50 mA | 2442 mA | 85% | ICH10048S12 |
| | 15.0 V | 6.70 A | 50 mA | 2463 mA | 85% | ICH10048S15 |
| | 24.0 V | 4.17 A | 50 mA | 2463 mA | 85% | ICH10048S24 |

| Input Voltage | Output Voltage | Output Current | Input Current ⁽¹⁾ | | Efficiency | Model Number ⁽²⁾ |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-----------------------------|
| | | | No Load | Full Load | | |
| 9-36 VDC (24 V nominal) | 3.3 V | 20.00 A | 35 mA | 3374 mA | 81% | ICH10024WS3V3 |
| | 5.0 V | 20.00 A | 35 mA | 4990 mA | 83% | ICH10024WS05 |
| | 12.0 V | 8.30 A | 35 mA | 4902 mA | 85% | ICH10024WS12 |
| | 15.0 V | 6.70 A | 35 mA | 4817 mA | 86% | ICH10024WS15 |
| | 24.0 V | 4.17 A | 35 mA | 4849 mA | 86% | ICH10024WS24 |
| 18-75 VDC (48 V nominal) | 3.3 V | 20.00 A | 30 mA | 1708 mA | 80% | ICH10048WS3V3 |
| | 5.0 V | 20.00 A | 30 mA | 2422 mA | 86% | ICH10048WS05 |
| | 12.0 V | 8.30 A | 30 mA | 2408 mA | 86% | ICH10048WS12 |
| | 15.0 V | 6.70 A | 30 mA | 2381 mA | 87% | ICH10048WS15 |
| | 24.0 V | 4.17 A | 30 mA | 2367 mA | 88% | ICH10048WS24 |

| Input Voltage | Output Voltage | Output Current | Input Current ⁽¹⁾ | | Efficiency | Model Number ⁽²⁾ |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-----------------------------|
| | | | No Load | Full Load | | |
| 36-75 VDC (48 V nominal) | 3.3 V | 30.00 A | 25 mA | 2.60 A | 79% | ICH15048S3V3 |
| | 5.0 V | 30.00 A | 25 mA | 3.70 A | 83% | ICH15048S05 |
| | 12.0 V | 12.50 A | 25 mA | 3.60 A | 85% | ICH15048S12 |
| | 15.0 V | 10.00 A | 25 mA | 3.60 A | 85% | ICH15048S15 |
| | 24.0 V | 6.25 A | 25 mA | 3.60 A | 85% | ICH15048S24 |

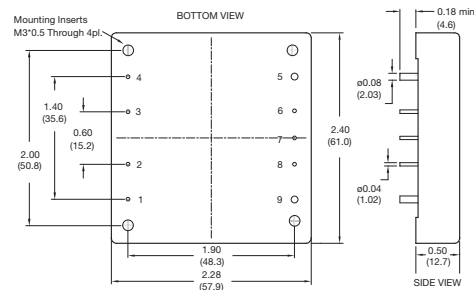
| Input Voltage | Output Voltage | Output Current | Input Current ⁽¹⁾ | | Efficiency | Model Number ⁽²⁾ |
|-----------------------------|----------------|----------------|------------------------------|-----------|------------|-----------------------------|
| | | | No Load | Full Load | | |
| 36-75 VDC (48 V nominal) | 3.3 V | 40.00 A | 25 mA | 3.5 A | 79% | IFH20048S3V3 |
| | 5.0 V | 40.00 A | 25 mA | 5.0 A | 83% | IFH20048S05 |
| | 12.0 V | 17.00 A | 25 mA | 5.0 A | 85% | IFH20048S12 |
| | 15.0 V | 13.30 A | 25 mA | 5.0 A | 85% | IFH20048S15 |
| | 24.0 V | 8.33 A | 25 mA | 5.0 A | 85% | IFH20048S24 |
| | 28.0 V | 7.14 A | 25 mA | 4.7 A | 89% | IFH20048S28 |
| | 48.0 V | 4.20 A | 25 mA | 4.7 A | 90% | IFH20048S48 |

Notes

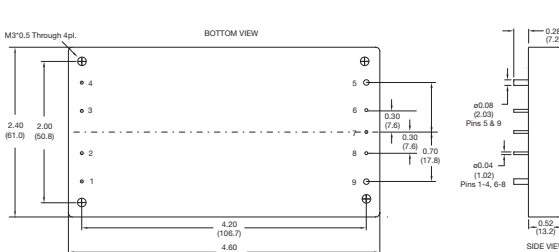
- Logic compatibility: Module On = Open circuit (or >3.5 VDC for ICH100 W models). Module Off = <0.8 VDC (<1.8 VDC for ICH100 W models).
- Add suffix 'N' to the model number to receive the unit with negative logic Remote On/Off.
- Ripple & noise is measured with a 10 µF tantalum capacitor and 0.1 µF ceramic capacitor across output.
- Input current specified at 24 V for 18-36 & 9-36 VDC and 48 V for 36-75 & 18-75 VDC models.
- For dual output models available, contact sales.

Mechanical Details

ICH50 to ICH150



IFH200



| PIN CONNECTIONS | |
|-----------------|----------|
| Pin | Function |
| 1 | +Vin |
| 2 | On/Off |
| 3 | Case* |
| 4 | -Vin |
| 5 | -Vout |
| 6 | -Sense |
| 7 | Trim |
| 8 | +Sense |
| 9 | +Vout |

* IFH200: N.C.

Notes

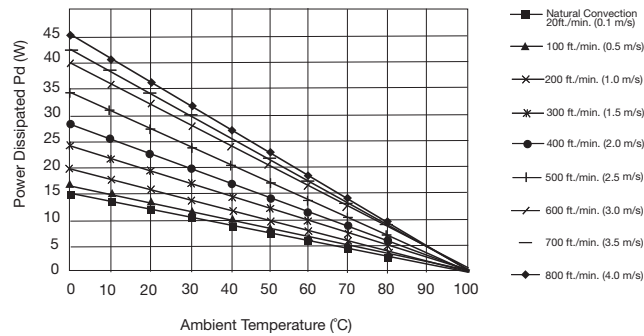
- All dimensions are in inches (mm)
- Weight: ICH50: 0.194 lbs (88 g)
 ICH50W: 0.207 lbs (94 g)
 ICH75: 0.202 lbs (92 g)
 ICH75W: 0.207 lbs (94 g)
 ICH100: 0.209 lbs (95 g)
 ICH150: 0.220 lbs (100 g)
 IFH200: 0.425 lbs (193 g)
- Case tolerance: ±0.02 (±0.50)
- Pin diameter tolerance: ICH series ±0.002 (±0.05), ±0.004 (±0.1),
 IFH series ±0.006 (±0.15)
- Case Material: ICH50/75/100/150 - Aluminium
 IFH200 - Aluminium baseplate with plastic case
- Pin pitch tolerance: ±0.01 (±0.25)

| THERMAL RESISTANCE vs AIR FLOW | | |
|---|-----------------|-----------------|
| Air Flow Rate | ICH Typical Rca | IFH Typical Rca |
| Natural Convection 20 ft./min (0.1 m/s) | 7.12 °C/W | 3.82 °C/W |
| 100 ft./min (0.5 m/s) | 6.21 °C/W | 3.23 °C/W |
| 200 ft./min (1.0 m/s) | 5.17 °C/W | 2.71 °C/W |
| 300 ft./min (1.5 m/s) | 4.29 °C/W | 2.28 °C/W |
| 400 ft./min (2.0 m/s) | 3.64 °C/W | 1.92 °C/W |
| 500 ft./min (2.5 m/s) | 2.96 °C/W | 1.68 °C/W |
| 600 ft./min (3.0 m/s) | 2.53 °C/W | 1.50 °C/W |
| 700 ft./min (3.5 m/s) | 2.37 °C/W | 1.35 °C/W |
| 800 ft./min (4.0 m/s) | 2.19 °C/W | 1.23 °C/W |

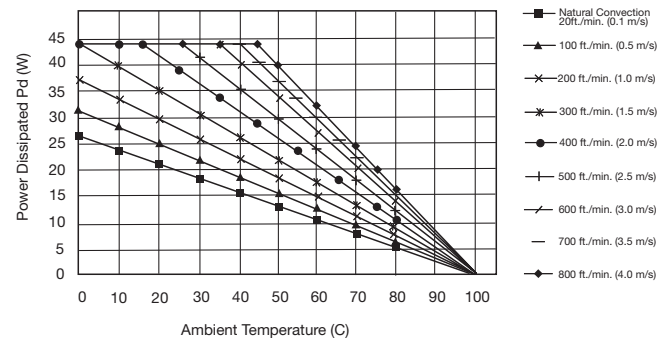
Temperature Rise = Pd x Rca, Where Pd = Pin - Pout or Pout (1-η) / η, Where η= efficiency

Maximum Power Dissipation vs Ambient Temperature and Air Flow (without Heatsink)

ICH50-150S

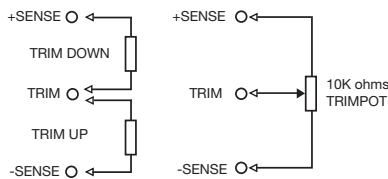


IFH200S



Application Notes

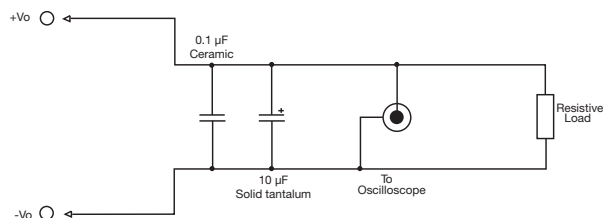
External Output Trimming



| LOGIC TABLE | | |
|-------------------------|----------------|---------------------|
| Logic State (Pin 2) | Positive Logic | Negative Logic (-N) |
| Logic Low Switch Closed | Module Off | Module On |
| Logic High Switch Open | Module On | Module Off |

Output may be trimmed by ±10% (±5% for dual output models) with a fixed resistor or an external trimpot as shown. Contact sales for details.

Output Noise



Output noise is measured with a 10 µF tantalum capacitor and 0.1 µF ceramic capacitor across output. Oscilloscope limited to 20 MHz bandwidth