



**THE DATASHEET OF
ICH5024S12**



ICH 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: Trip & restart (hiccup mode) with auto recovery
ICH50W/75W/100/150: Current limit, auto recovery |
| Temperature Coefficient | • $\pm 0.03\%/^{\circ}\text{C}$ |
| Current Limit | • 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:
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 |
| 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 |
| 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: -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 | • EN55032, 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, CE & UKCA meets all applicable directives & legislation. |

Models and Ratings

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
	48.0 V	1.04 A	50 mA	1238 mA	84%	ICH5048WS48

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
	48.0 V	1.56 A	50 mA	1860 mA	84%	ICH7548WS48

Models & Ratings

Input Voltage	Output Voltage	Output Current	Input Current ⁽⁴⁾		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 ⁽⁴⁾		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

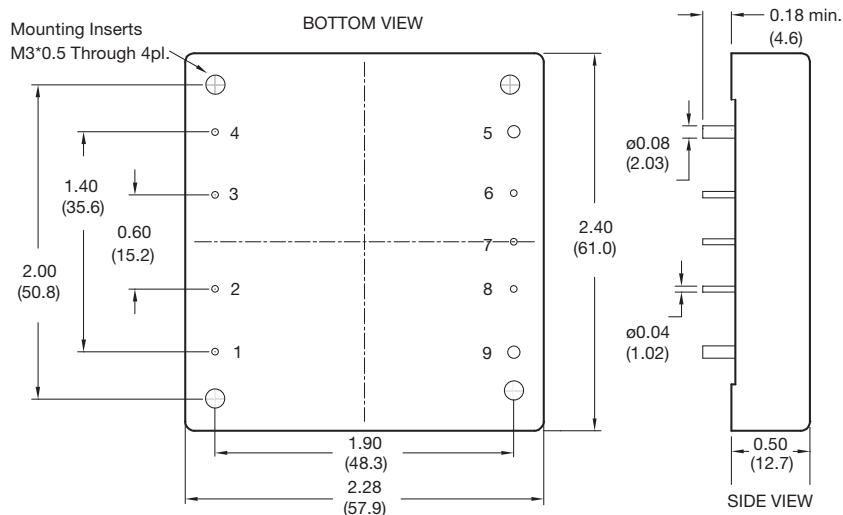
Input Voltage	Output Voltage	Output Current	Input Current ⁽⁴⁾		Efficiency	Model Number ⁽²⁾
			No Load	Full Load		
36-75 VDC (48 V nominal)	3.3 V	30.00 A	25 mA	2.60 A	79%	ICH15048S3V3
	5.0 V	30.00 A	25 mA	3.70 A	83%	ICH15048S05
	12.0 V	12.50 A	25 mA	3.60 A	85%	ICH15048S12
	15.0 V	10.00 A	25 mA	3.60 A	85%	ICH15048S15
	24.0 V	6.25 A	25 mA	3.60 A	85%	ICH15048S24

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 μ F tantalum capacitor and 0.1 μ F 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



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

Notes

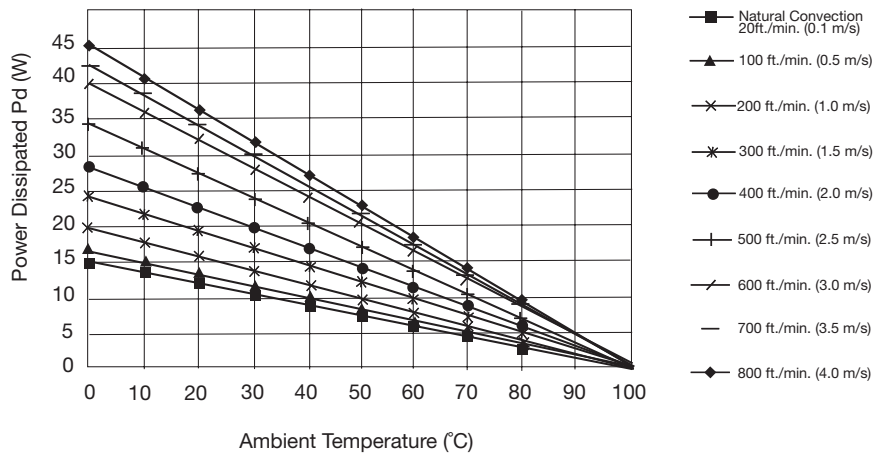
- All dimensions are in inches (mm)
- Weight: ICH50: 0.194 lbs (88 g)
ICH50W: 0.207 lbs (94 g)
ICH75: 0.202 lbs (92 g)
ICH75W: 0.207 lbs (94 g)
ICH100: 0.209 lbs (95 g)
ICH150: 0.220 lbs (100 g)
- Case tolerance: ± 0.02 (± 0.50)
- Pin diameter tolerance: ± 0.002 (± 0.05), ± 0.004 (± 0.1)
- Case Material: Aluminium
- Pin pitch tolerance: ± 0.01 (± 0.25)

THERMAL RESISTANCE vs AIR FLOW	
Air Flow Rate	Typical Rca
Natural Convection 20 ft./min (0.1 m/s)	7.12 °C/W
100 ft./min (0.5 m/s)	6.21 °C/W
200 ft./min (1.0 m/s)	5.17 °C/W
300 ft./min (1.5 m/s)	4.29 °C/W
400 ft./min (2.0 m/s)	3.64 °C/W
500 ft./min (2.5 m/s)	2.96 °C/W
600 ft./min (3.0 m/s)	2.53 °C/W
700 ft./min (3.5 m/s)	2.37 °C/W
800 ft./min (4.0 m/s)	2.19 °C/W

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

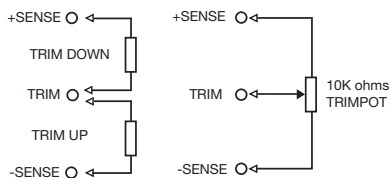
Maximum Power Dissipation vs Ambient Temperature and Air Flow (without Heatsink)

ICH50-150S



Application Notes

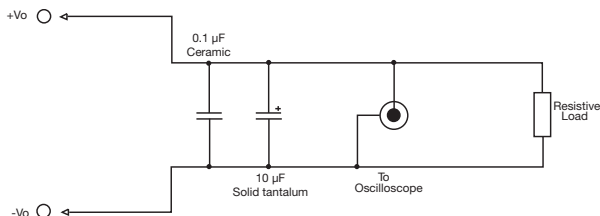
External Output Trimming



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.

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 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

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