



**THE DATASHEET OF  
ICH5048S24**



## 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 $\mu$ 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 $< +60^{\circ}\text{C}$ ICH100W: Thermal shutdown when case temperature reaches 105 °C, auto recovery when case temperature $< +90^{\circ}\text{C}$

### 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 <sup>3</sup> ICH75: 27.4 W/in <sup>3</sup> ICH100: 36.6 W/in <sup>3</sup> ICH150: 54.8 W/in <sup>3</sup>
MTBF	• $\geq 790$ 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 <sup>(4)</sup>		Efficiency	Model Number <sup>(2,5)</sup>
			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 <sup>(4)</sup>		Efficiency	Model Number <sup>(2)</sup>
			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 <sup>(4)</sup>		Efficiency	Model Number <sup>(2,5)</sup>
			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 <sup>(4)</sup>		Efficiency	Model Number <sup>(2)</sup>
			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 <sup>(4)</sup>		Efficiency	Model Number <sup>(2)</sup>
			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 <sup>(4)</sup>		Efficiency	Model Number <sup>(2)</sup>
			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

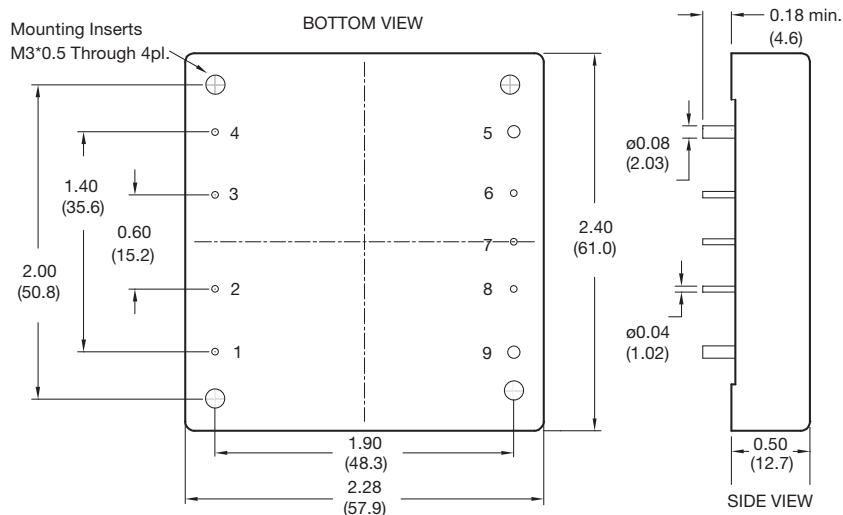
Input Voltage	Output Voltage	Output Current	Input Current <sup>(4)</sup>		Efficiency	Model Number <sup>(2)</sup>
			No Load	Full Load		
36-75 VDC (48 V nominal)	3.3 V	30.00 A	25 mA	2.60 A	79%	ICH15048S3V3
	5.0 V	30.00 A	25 mA	3.70 A	83%	ICH15048S05
	12.0 V	12.50 A	25 mA	3.60 A	85%	ICH15048S12
	15.0 V	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  $\mu$ F tantalum capacitor and 0.1  $\mu$ 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

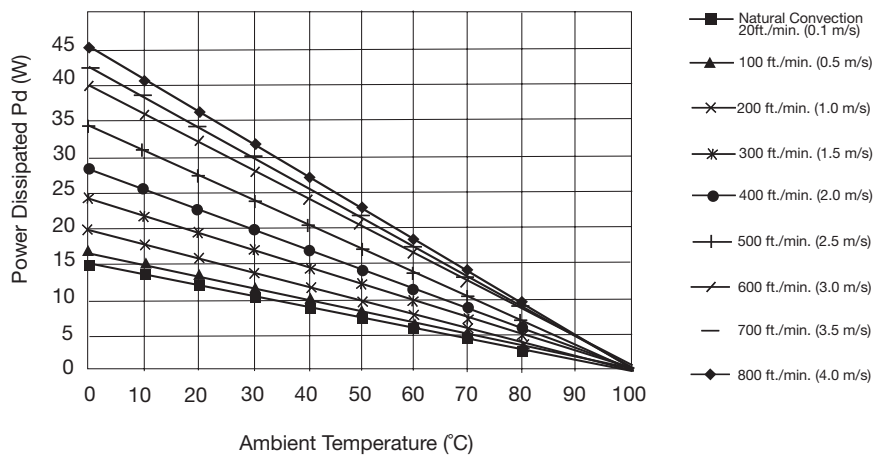
- All dimensions are in inches (mm)
- Weight: ICH50: 0.194 lbs (88 g)  
ICH50W: 0.207 lbs (94 g)  
ICH75: 0.202 lbs (92 g)  
ICH75W: 0.207 lbs (94 g)  
ICH100: 0.209 lbs (95 g)  
ICH150: 0.220 lbs (100 g)
- Case tolerance:  $\pm 0.02$  ( $\pm 0.50$ )
- Pin diameter tolerance:  $\pm 0.002$  ( $\pm 0.05$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

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

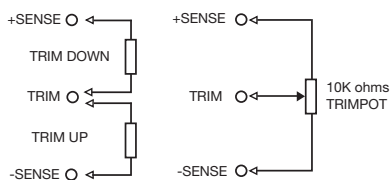
Maximum Power Dissipation vs Ambient Temperature and Air Flow (without Heatsink)

ICH50-150S



Application Notes

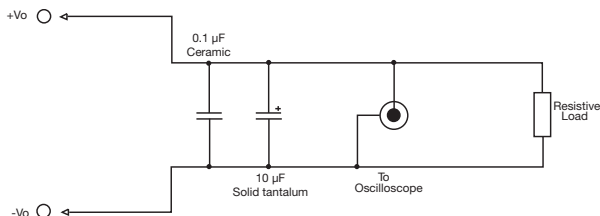
External Output Trimming



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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