



## Features

- RoHS lead solder exemption compliant
- Industry standard half-brick
- Low-cost design
- Open-frame packaging
- 100 °C baseplate operation
- 24 V and 48 V inputs
- Optional enable logic
- 1500 V isolation

## Description

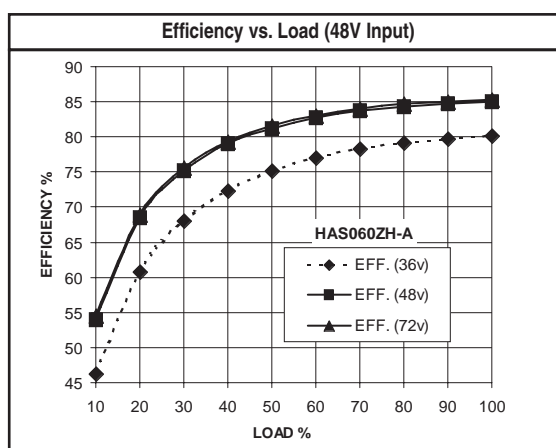
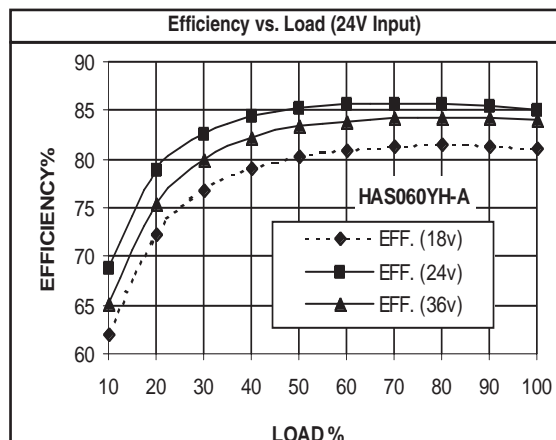
HAS dc-dc converters are low-cost, industry standard, half-brick converters. The HAS features 2:1 input voltage, excellent efficiency, and open-frame packaging technology. The HAS operates over a range of -40 °C to 100 °C and has a built-in input pi filter that helps to ensure low noise operation. Available in several input and output combinations, the HAS is designed for industrial, telecom, and networking applications.

## Technical Specifications

Input	
Voltage Range	
24 VDC Nominal	18 - 36 VDC
48 VDC Nominal	36 - 72 VDC
Reflected Ripple	25 mA
Input Reverse Voltage Protection	Shunt Diode

Output	
Setpoint Accuracy	±1%
Line Regulation $V_{in}$ Min. - $V_{in}$ Max., $I_{out}$ Rated	±0.2% $V_{out}$
Load Regulation $I_{out}$ Min. - $I_{out}$ Max., $V_{in}$ Nom.	±0.2% $V_{out}$
Remote Sense Headroom	0.5 VDC
Minimum Output Current	10 % $I_{out}$ Rated
Dynamic Regulation, Loadstep	25% $I_{out}$
Pk Deviation	4% $V_{out}$
Settling Time	500 $\mu$ s
Voltage Trim Range	±10%
Short Circuit / Overcurrent Protection	Hiccup
Current Limit Threshold Range, % of $I_{out}$ Rated	110 - 140%
OVP Trip Range	115 - 140% $V_{out}$ Nom.
Remote Shutdown Reference	$V_{in}$ Negative
Shutdown Pin Current, Sourced at Off	10 mA Max.

General	
Turn-On Time	10 ms
Remote Shutdown	Positive or Negative Logic
Switching Frequency	500 kHz
Isolation	
Input - Output	1500 VDC
Input - Case	1050 VDC
Output - Case	500 VDC
Temperature Coefficient	0.03%/°C
Case Temperature	
Operating Range	-40 To +100 °C
Storage Range	-40 To +125 °C
Thermal Shutdown Range	105 To 115 °C
Humidity Max., Non-Condensing	95%
Vibration, 3 Axes, 5 Min Each	5 g, 10 - 55 Hz
MTBF† (Bellcore TR-NWT-000332)	$2.5 \times 10^6$ h
Safety	UL, cUL, TUV
Weight (approx.)	1.4 oz



## Notes

† MTBF predictions may vary slightly from model to model.  
 Specifications typically at 25 °C, normal line, and full load, unless otherwise stated.  
 Soldering Conditions: I/O pins, 260 °C, ten seconds; fully compatible with commercial wave-soldering equipment.  
 Safety: Agency approvals may vary from model to model. Please consult factory for specific model information.  
 Units are water-washable and fully compatible with commercial spray or immersion post wave-solder washing equipment.

## Model Selection

MODEL	INPUT VOLTAGE (VOLTS)	INPUT VOLTAGE RANGE (VOLTS)	MAXIMUM INPUT CURRENT (AMPS)*	OUTPUT VOLTAGE (VOLTS)	RATED OUTPUT CURRENT (AMPS)	RIPPLE & NOISE pk-pk (mV)	TYPICAL EFFICIENCY**
<b>HAS050YG-A</b>	24	18-36	3.5	5	10	150	81%
<b>HAS050YH-A</b>	24	18-36	3.4	12	4.2	100	84%
<b>HAS060ZH-A</b>	48	36-75	2	12	5	150	85%

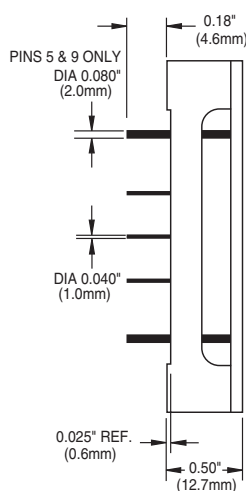
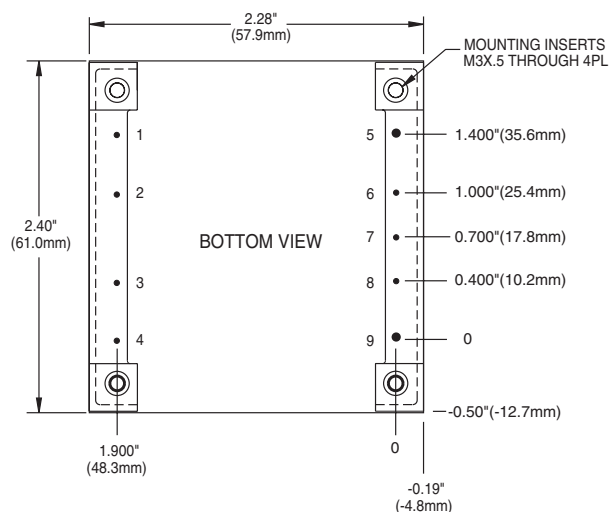
### NOTES:

\* Maximum input current at minimum input voltage, maximum rated output power.

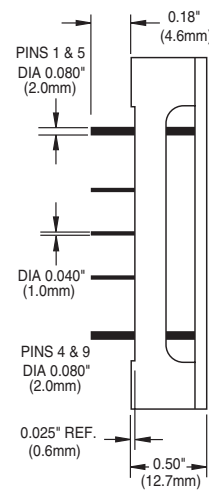
\*\* At nominal  $V_{in}$ , rated output.

Model numbers highlighted in yellow or shaded are not recommended for new designs.

## Mechanical Drawing



Note:  
These pin sizes are unique to model HAS050YH-AN only.



Thermal Impedance	
Natural Convection	7.9 °C/W
100 LFM	6.8 °C/W
200 LFM	4.9 °C/W
300 LFM	3.6 °C/W
400 LFM	3.0 °C/W

Note:  
Thermal impedance data is dependent on many environmental factors. The exact thermal performance should be validated for specific application.

Pin	Function
1	-V <sub>in</sub>
2	Case
3	On/Off
4	+V <sub>in</sub>
5	-V <sub>out</sub>
6	-Sense
7	Trim
8	+Sense
9	+V <sub>out</sub>

Tolerances	
Inches:	(Millimeters)
.XX ± 0.020	.X ± 0.5
.XXX ± 0.010	.XX ± 0.25
Pin:	± 0.002 ± 0.05
(Dimensions as listed unless otherwise specified.)	

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