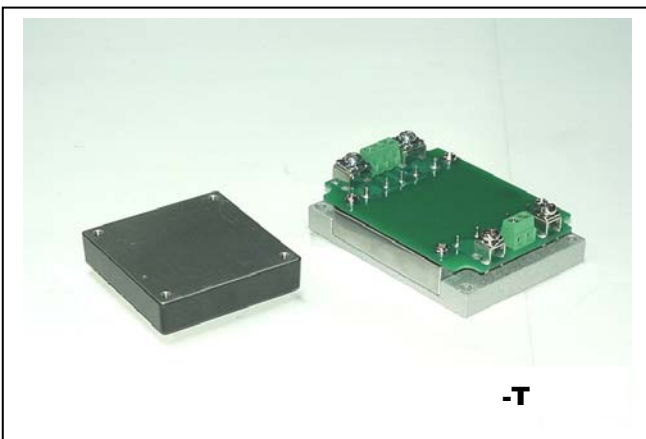


# HAE100 SERIES

DC / DC Single Output: 100 Watts



## Features

- 2:1 Input range option 18 ~36V & 36 ~75V
- Single output, up to 20A
- Industry Standard Half-Brick package
- High efficiency up to 93%
- Regulated output & Short circuit protection
- 2250V isolation
- Five sided continuous copper shield
- Remote ON / OFF, Negative or Positive Logic
- High operating temperature +84°C
- Zero load operation
- Output voltage trim
- Terminal block option –T
- A range of heatsink options

## Specifications:

<b>Input Voltage</b>	<b>24VDC</b> ( 18 ~ 36 ) <b>48VDC</b> ( 36 ~ 75 )
<b>Input Filter</b>	Pi type
<b>Start-up Voltage</b>	24V input: 17.5V typ. 48V input: 35.5V typ.
<b>Input Surge Voltage.</b> ( 100mS )	24V: 50VDC. 48V: 100VDC
<b>Input Reverse Voltage Protection</b>	External input fuse required
<b>Start Up time</b>	Typically 25mS constant resistive load
<b>Remote ON/OFF</b> Negative Logic - Standard	DC-DC ON Short or $0V < V_r < 1.2V$ DC-DC OFF Open or $3.0V < V_r < 12V$
( Positive Logic - Option )	DC-DC ON Open or $3.0V < V_r < 12V$ DC-DC OFF Short or $0V < V_r < 1.2V$
	Input current of remote control pin: 0.5mA Remote off state input current: 3mA
<b>Output power</b>	100 watts
<b>Voltage Accuracy</b>	±1.0%
<b>Voltage Trim</b>	+10% to -20% External voltage trim
<b>Minim Load</b>	Zero
<b>Line Regulation</b>	See table
<b>Load Regulation</b>	See table
<b>Remote Sense</b>	10% of Vout nominal ( Note 8 )
<b>Ripple &amp; noise</b>	See table. 20MHZ bandwidth
<b>Temp. Coefficient</b>	±0.02% / °C
<b>Transient Response</b>	200uS ( 25% load step change )
<b>Over Voltage Protection</b>	Set at 110 ~130% of Voltage output nominal
<b>Overload Protection</b>	Set at 110 ~ 140% of output load
<b>Short Circuit protection</b>	Continuous hiccup mode

<b>Efficiency</b>	Model dependant 92 ~ 93%
<b>Isolation</b>	Input – Output: 2250VDC Input / Output – Case: 1600VDC
<b>Isolation Cap.</b>	2500pF
<b>Switching Freq.</b>	300KHz
<b>Safety</b>	Designed to meet EN60950-1, UL60950-1
<b>Case Material</b>	Metal
<b>Base Material</b>	FR4 PCB
<b>Potting</b>	Epoxy UL94-V0
<b>Dimensions</b>	61 X 57.9 X 12.7mm
<b>Weight</b>	97g
<b>MTBF</b>	7.416 x 10 <sup>4</sup> Hrs
<b>Operating Temp</b>	-40°C to +45°C ( without derating ) +45°C to +79°C ( with derating ) See derating graphs
<b>Case Temp</b>	+105°C maximum case temperature
<b>Over Temp. Protection</b>	Shutdown approx 115°C case temperature
<b>Thermal Impedance</b>	6.7°C / watt without heatsink 5.4°C / watt with 0.24" height optional heatsink 4.7°C / watt with 0.45" height optional heatsink
<b>Thermal shock</b>	MIL-STD-810F
<b>Vibration</b>	MIL-STD-810F
<b>Humidity</b>	5-95% RH
<b>EMC</b>	EN55022 Class A ( see note 12 )
<b>ESD</b>	EN61000-4-2
<b>Radiated Immunity</b>	EN61000-4-3
<b>Fast Transients</b>	EN61000-4-4
<b>Surge</b>	EN61000-4-5
<b>Conducted Immunity</b>	EN61000-4-6

# HAE100 SERIES

DC / DC Single Output: 100 Watts

Model Number	Input Range	Output Voltage	Output Current		Line Regulation	Load Regulation	Output <sup>(4) (5)</sup> Ripple & Noise	Input Current		Eff <sup>(4)</sup> (%)
			Min. load	Full load				No Load <sup>(3)</sup>	Full Load <sup>(2)</sup>	
HAE100-24S05	18 – 36 V	5 V	0mA	20 A	10mV	15mV	75mVp-p	185mA	4.554 A	93
HAE100-24S12	18 – 36 V	12 V	0mA	8.4 A	24mV	30mV	100mVp-p	185mA	4.590A	93
HAE100-24S15	18 – 36 V	15 V	0mA	6.7 A	30mV	38mV	100mVp-p	185mA	4.577 A	93
HAE100-24S24	18 – 36 V	24 V	0mA	4.2 A	48mV	48mV	200mVp-p	85mA	4.641A	92
HAE100-24S28	18 – 36 V	28 V	0mA	3.6 A	56mV	56mV	200mVp-p	85mA	4.641A	92
HAE100-24S48	18 – 36 V	48 V	0mA	2.1 A	96mV	72mV	300mVp-p	85mA	4.641A	92
HAE100-48S05	36 – 75 V	5 V	0mA	20 A	10mV	15mV	75mVp-p	90mA	2.277 A	93
HAE100-48S12	36 – 75 V	12 V	0mA	8.4 A	24mV	30mV	100mVp-p	90mA	2.295A	93
HAE100-48S15	36 – 75 V	15 V	0mA	6.7 A	30mV	38mV	100mVp-p	90mA	2.288 A	93
HAE100-48S24	36 – 75 V	24 V	0mA	4.2 A	48mV	48mV	200mVp-p	40mA	2.320A	92
HAE100-48S28	36 – 75 V	28 V	0mA	3.6 A	56mV	56mV	200mVp-p	40mA	2.320A	92
HAE100-48S48	36 – 75 V	48 V	0mA	2.1 A	96mV	72mV	300mVp-p	40mA	2.320A	92

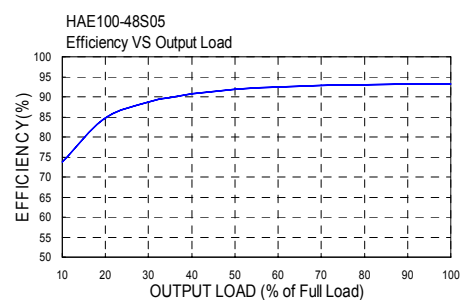
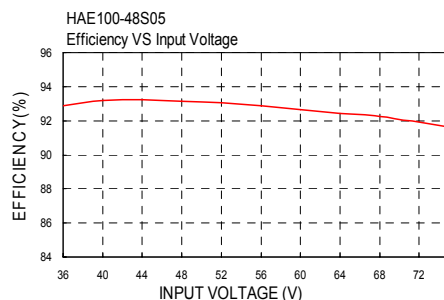
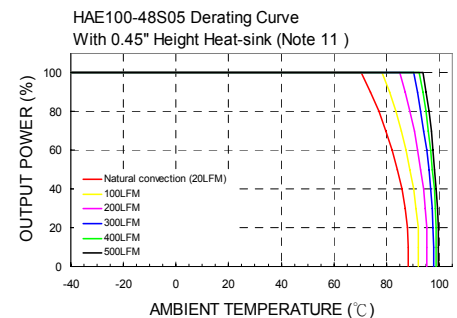
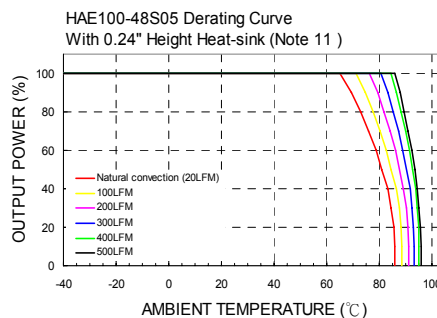
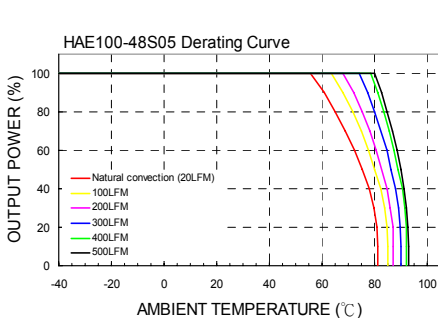
Note

- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C.  
MIL-HDBK-217F Notice2 @Ta=25°C, Full load(Ground, Benign, controlled environment).
- Maximum value at nominal input voltage and full load.
- Typical value at nominal input voltage and no load.
- Typical value at nominal input voltage and full load.
- The ripple and noise of output voltage 48V is measured with a 2.2µF/100V X7R MLCC;  
The ripple and noise of other output voltage is measured with a 4.7µF/50V X7R MLCC.
- The remote ON/OFF control pin voltage is referenced to -Vin. The positive logic and pin length (DIM.) are optional.  
To order positive logic ON-OFF control add the suffix -P (Ex: HAE100-48S05-P).
- Output voltage is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting a single resistor between TRIM and +SENSE pins for trim up or between TRIM and -SENSE pins for trim down. To calculate the value of the resistor Ru and Rd for a particular output voltage uses the following equation:

$$R_U = \left( \frac{V_{OUT}(100 + \Delta\%)}{1.225\Delta\%} - \frac{(100 + 2\Delta\%)}{\Delta\%} \right) K\Omega$$

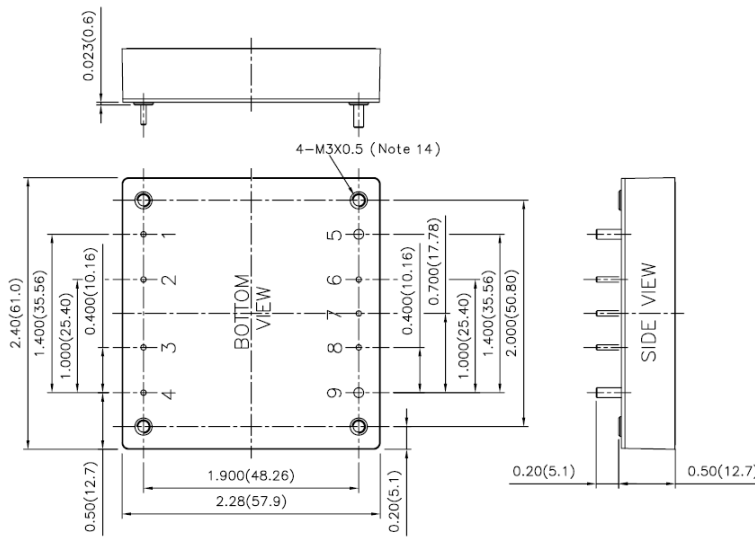
$$R_D = \left( \frac{100}{\Delta\%} - 2 \right) K\Omega$$

- Maximum output deviation is +10% inclusive of remote sense. If remote sense is not being used, the +SENSE should be connected to its corresponding +OUTPUT and likewise the -SENSE should be connected to its corresponding -OUTPUT.
- Internal fusing is not included, so we suggest to use an input line fuse.
- Test condition with vertical direction by natural convection (20LFM).
- Heat-sink is optional and P/N: 7G-0021A-F, 7G-0022A-F, 7G-0023A-F, 7G-0024A-F.
- The HAE100 series meets EN55022 Class A only with external components connected before the input pin to the converter.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.  
The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220µF /100V, ESR 48mΩ.
- CASE GROUNDING : When you connect the case pin and the four screw bolts to ground, the EMI could be better reduced.



# HAE100 SERIES

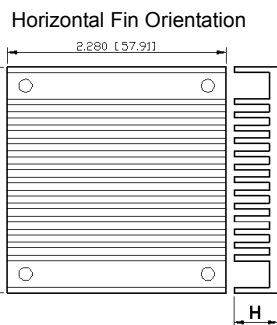
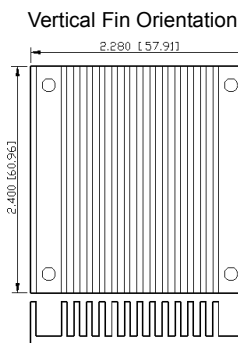
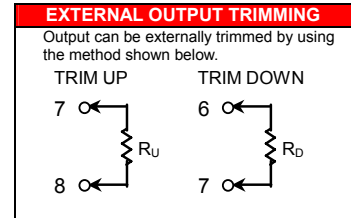
DC / DC Single Output: 100 Watts



Pin 1,2,3,4,6,7,8. DIA. 0.040 (1.02mm)  
 Pin 5,9. DIA. 0.080 (2.03mm)  
 All dimensions in inches (mm)  
 Tolerance : x.xx±0.02 (x.xx±0.5)  
 x.xxx±0.01 (x.xx±0.25)  
 Pin pitch tolerance ±0.01 (0.25)  
 Pin dimension tolerance ±0.004(0.1)

PRODUCT OPTIONS TABLE	
Option	Suffix
Negative remote ON/OFF logic 0.20" pin length (standard)	-
Negative remote ON/OFF logic 0.145" pin length	-L
Negative remote ON/OFF logic 0.11" pin length	-K
Positive remote ON/OFF logic 0.20" pin length	-P
Positive remote ON/OFF logic 0.145" pin length	-S
Positive remote ON/OFF logic 0.11" pin length	-M

PIN CONNECTION		
PIN	Define	Diameter
1	- INPUT	0.04 Inches
2	CASE	0.04 Inches
3	CTRL	0.04 Inches
4	+ INPUT	0.04 Inches
5	- OUTPUT	0.08 Inches
6	- SENSE	0.04 Inches
7	TRIM	0.04 Inches
8	+ SENSE	0.04 Inches
9	+ OUTPUT	0.08 Inches



FIN ORIENTATION		P / N
Vertical	H=0.240(6.10)	7G-0023A-F
	H=0.450(11.43)	7G-0021A-F
Horizontal	H=0.240(6.10)	7G-0022A-F
	H=0.450(11.43)	7G-0024A-F

## Option : Terminal Block (Suffix-T)

