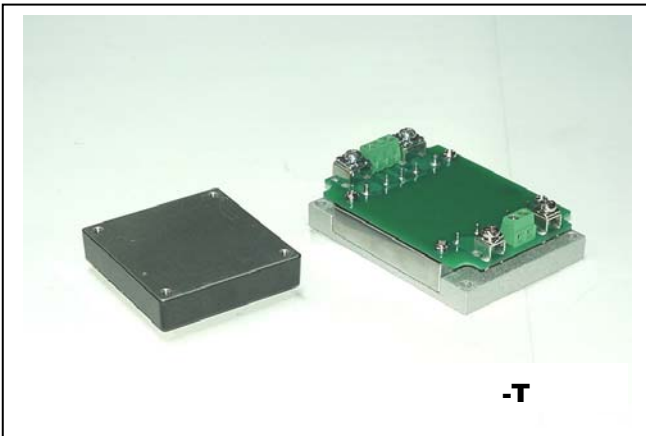


HAE100 SERIES

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:

| | |
|---|---|
| Input Voltage | 24VDC (18 ~ 36) 48VDC (36 ~ 75) |
| Input Filter | Pi type |
| Start-up Voltage | 24V input: 17.5V typ. 48V input: 35.5V typ. |
| Input Surge Voltage. (100mS) | 24V: 50VDC. 48V: 100VDC |
| Input Reverse Voltage Protection | External input fuse required |
| Start Up time | Typically 25mS constant resistive load |
| Remote ON/OFF 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 |
| Output power | 100 watts |
| Voltage Accuracy | ±1.0% |
| Voltage Trim | +10% to -20% External voltage trim |
| Minim Load | Zero |
| Line Regulation | See table |
| Load Regulation | See table |
| Remote Sense | 10% of Vout nominal (Note 8) |
| Ripple & noise | See table. 20MHZ bandwidth |
| Temp. Coefficient | ±0.02% / °C |
| Transient Response | 200uS (25% load step change) |
| Over Voltage Protection | Set at 110 ~130% of Voltage output nominal |
| Overload Protection | Set at 110 ~ 140% of output load |
| Short Circuit protection | Continuous hiccup mode |

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

HAE100 SERIES

DC / DC Single Output: 100 Watts

| Model Number | Input Range | Output Voltage | Output Current | | Line Regulation | Load Regulation | Output ^{(4) (5)} Ripple & Noise | Input Current | | Eff ⁽⁴⁾ (%) |
|--------------|-------------|----------------|----------------|-----------|-----------------|-----------------|---|------------------------|--------------------------|---------------------------|
| | | | Min. load | Full load | | | | No Load ⁽³⁾ | Full Load ⁽²⁾ | |
| 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 |

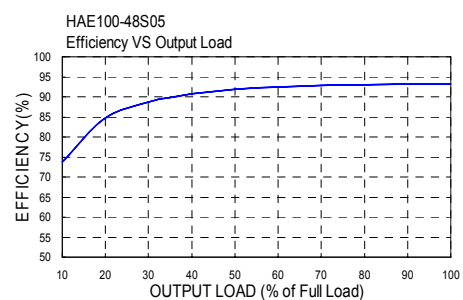
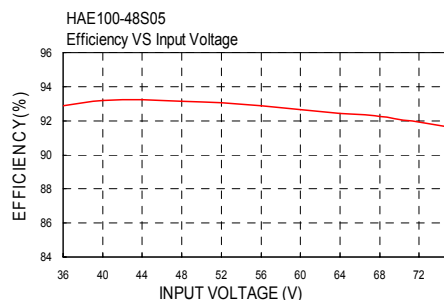
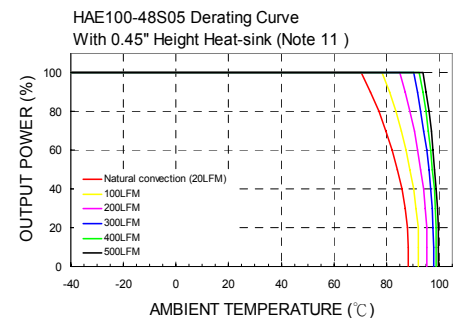
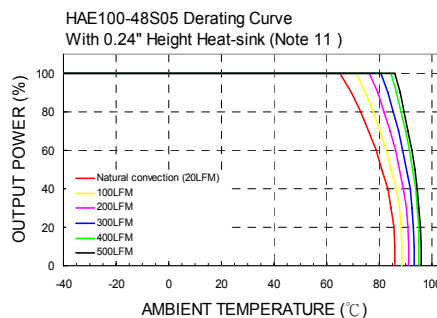
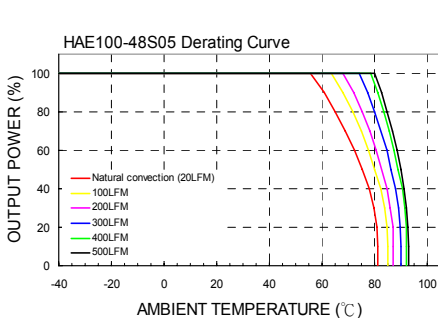
Note

- 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:

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

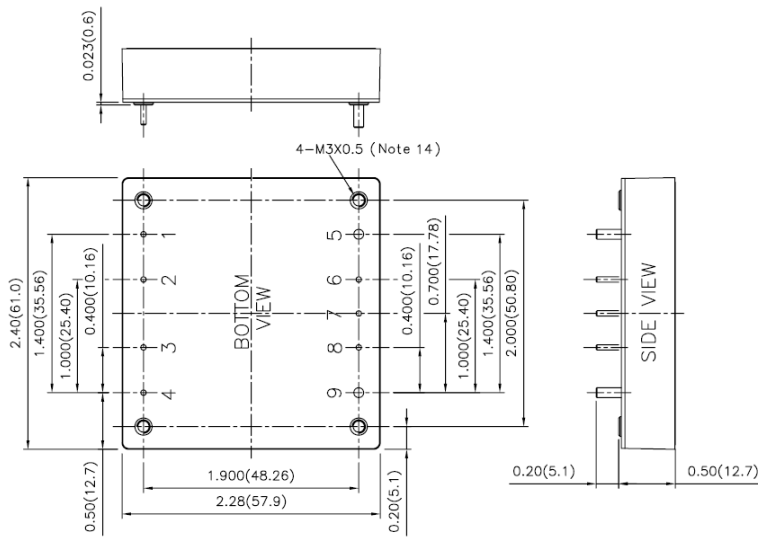
$$R_D = \left(\frac{100}{\Delta\%} - 2 \right) K\Omega$$

- 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

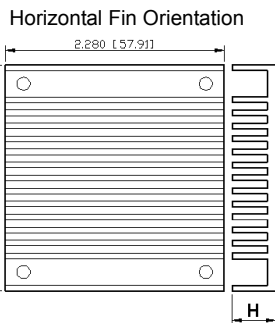
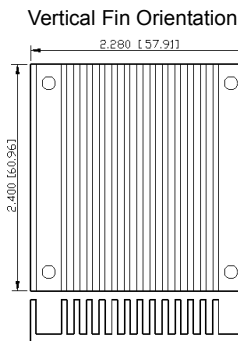
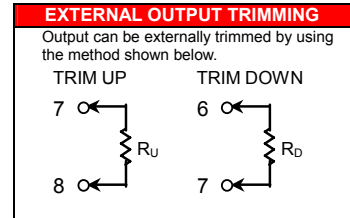
DC / DC Single Output: 100 Watts



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)

