



APPLICATIONS

- Wireless Network
- Telecom/ Datacom
- Industry Control System
- Distributed Power Architectures
- Semiconductor Equipment

FEATURES

- OUTPUT CURRENT UP TO 20A
- 2:1 WIDE INPUT VOLTAGE RANGE
- HIGH EFFICIENCY UP TO 93%
- NO MINIMUM LOAD
- SOFT-START
- ADJUSTABLE OUTPUT VOLTAGE
- UNDER-VOLTAGE LOCKOUT
- INPUT REVERSE PROTECTION
- INDUSTRY STANDARD HALF-BRICK FOOTPRINT
- SIX-SIDED CONTINUOUS SHIELD
- INPUT TO OUTPUT BASIC INSULATION
- BUS TERMINAL BLOCK OPTION

OPTIONS

- Positive logic remote ON/OFF
- Pin length
- Terminal block
- Heat-sink

DESCRIPTION

HAE100-SERIES DC/DC converters provide up to 100 watts of output power in an industry standard half-brick package and footprint. All models feature a wide input range, adjustable output voltage and a 20A current rating.

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C otherwise noted

OUTPUT SPECIFICATIONS			
Output power		100Watts, max.	
Voltage accuracy	Full load and Vin, nom.		±1%
Voltage adjustability (Note 7)			+10%, -20%
Minimum load			0%
Line regulation	LL to HL at FL		See table
Load regulation	No Load to Full Load		See table
Remote sense (Note 8)			10% of Vout, nom.
Ripple and noise	20MHz bandwidth		See table
Temperature coefficient			±0.02%/ °C, max.
Transient response recovery time	25% load step change		200µS
Over voltage protection threshold	(Hiccup)	115% ~ 130% of Vout, nom.	
Over current protection threshold		110% ~ 140% of Iout Rated	
Short circuit protection		Hiccup, automatics recovery	
INPUT SPECIFICATIONS			
Input voltage range	24V nominal input	18 – 36VDC	
	48V nominal input	36 – 75VDC	
Start-up voltage	24V nominal input	17.5V, typ.	
	48V nominal input	35.5V, typ.	
Shutdown voltage	24V nominal input	16V, typ.	
	48V nominal input	34V, typ.	
Input filter			Pi type
Input surge voltage 100mS max	24V nominal input	50VDC	
	48V nominal input	100VDC	
Input reverse protection (Note 9)			Parallel diode
Start up time	Pin, nom and constant resistive load	Power up	25mS, typ.
		Remote ON/OFF	25mS, typ.
Remote ON/OFF (Note 6) (Negative logic) (Standard)	DC-DC ON	Short or 0V < Vr < 1.2V	
	DC-DC OFF	Open or 3V < Vr < 12V	
(Positive logic) (Option)	DC-DC ON	Open or 3V < Vr < 12V	
	DC-DC OFF	Short or 0V < Vr < 1.2V	
Input current of Remote control pin	Vin(nom.)		-0.5mA ~ 1mA
Remote off input current	Vin(nom.)		3mA

GENERAL SPECIFICATIONS			
Efficiency			See table
Isolation voltage	Input to Output (Basic insulation)		2250VDC, min.
	Input (Output) to Case		1600VDC, min.
Isolation resistance			10 ⁹ ohms, min.
Isolation capacitance			2500pF, max.
Switching frequency			300KHz, typ.
Design meet safety standard		IEC60950-1, UL60950-1, EN60950-1	
Case material			Metal
Base material			FR4 PCB
Potting material			Silicon (UL94-V0)
Dimensions			2.40 X 2.28 X 0.50 Inches (61.0×57.9×12.7 mm)
Weight			97g (3.42oz)
MTBF (Note 1)	BELLCORE TR-NWT-000332		1.010 x 10 ⁸ hrs
	MIL-HDBK-217F		7.416 x 10 ⁴ hrs
ENVIRONMENTAL SPECIFICATIONS			
Operating ambient temperature (Note10)	Without Heat-sink	-40°C ~ +45°C (without derating)	
		+45°C ~ +79°C (with derating)	
	With Heat-sink (0.24" Height)	-40°C ~ +55°C (without derating)	
		+55°C ~ +84°C (with derating)	
Maximum case temperature			105°C
Over temperature protection			115°C
Storage temperature range			-55°C to +125°C
Thermal impedance (Note 11)	without Heat-sink		6.7°C/watt
	with 0.24" Height Heat-sink		5.4°C/watt
	with 0.45" Height Heat-sink		4.7°C/watt
Thermal shock			MIL-STD-810F
Vibration			MIL-STD-810F
Relative humidity			5% to 95% RH
EMC CHARACTERISTICS			
EMI (Note 12)	EN55022		Class A
ESD	EN61000-4-2	Air Contact	± 8KV Perf. Criteria A
			± 6KV Perf. Criteria A
Radiated immunity	EN61000-4-3		10 V/m Perf. Criteria A
Fast transient (Note 13)	EN61000-4-4		± 2KV Perf. Criteria A
Surge (Note 13)	EN61000-4-5		± 1KV Perf. Criteria A
Conducted immunity	EN61000-4-6		10 Vr.m.s Perf. Criteria A



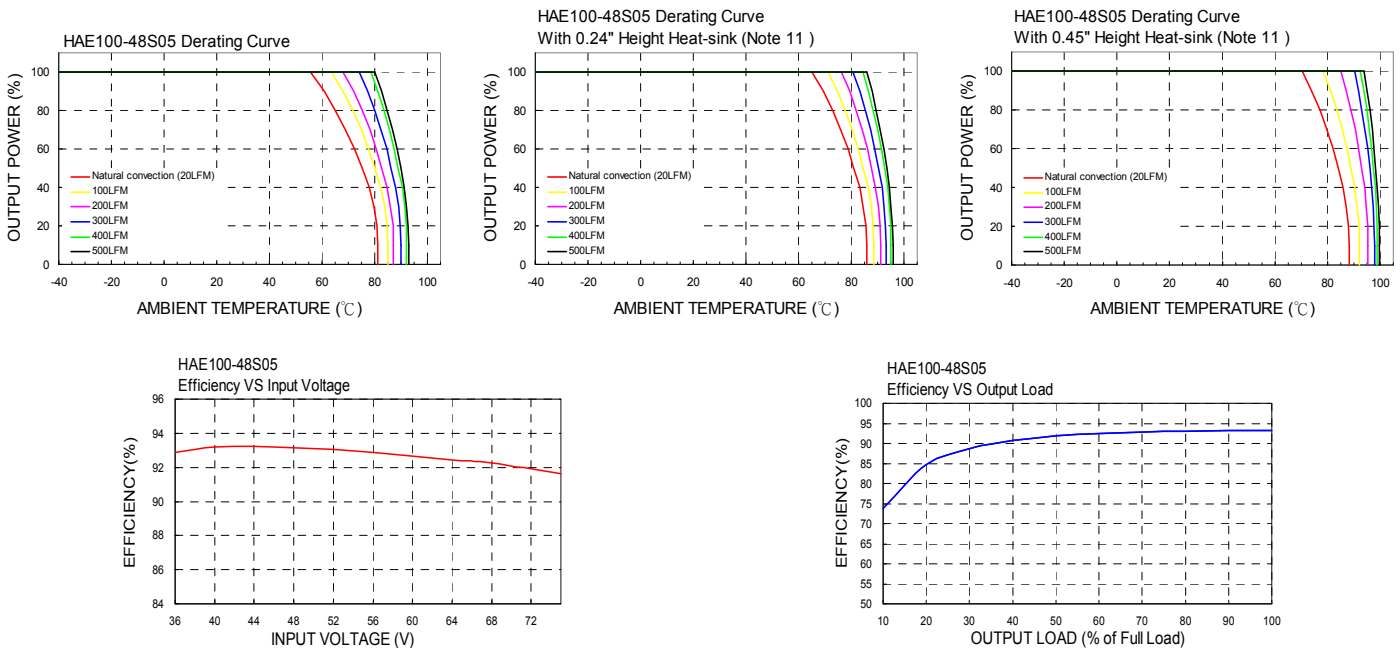


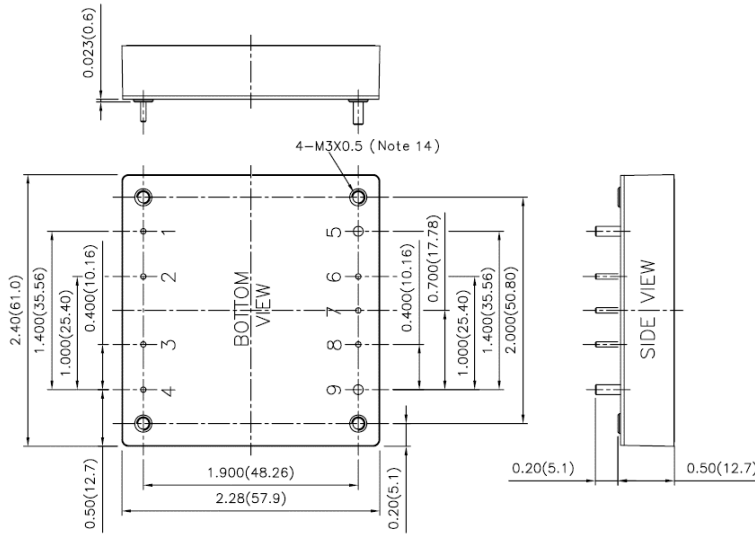
Model Number	Input Range	Output Voltage	Output Current		Line Regulation	Load Regulation	Output ⁽⁴⁾⁽⁵⁾ Ripple & Noise	Input Current		Eff ⁽⁴⁾ (%)
			Min. load	Full load				No Load ⁽³⁾	Full Load ⁽²⁾	
HAE100-24S05	18 – 36 VDC	5 VDC	0mA	20 A	10mV	15mV	75mVp-p	185mA	4.554 A	93
HAE100-24S12	18 – 36 VDC	12 VDC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

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

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

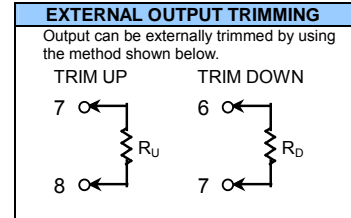




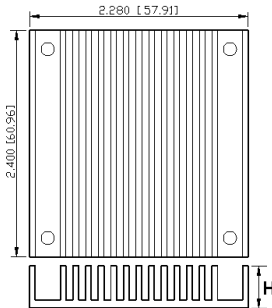
Pin 1,2,3,4,6,7,8. DIA. 0.040 (1.02mm)
Pin 5,9. DIA. 0.080 (2.03mm)
All dimensions in inches (mm)
Tolerance :x.xx±0.02 (x.x±0.5)
 x.xxx±0.01 (x.xxx±0.25)
Pin pitch tolerance ±0.01 (0.25)
Pin dimension tolerance ±0.004(0.1)

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

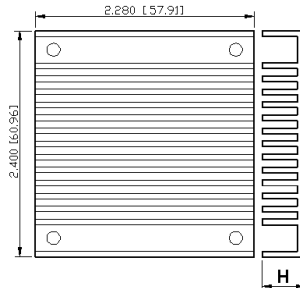
PIN CONNECTION		
PIN	Define	Diameter
1	- INPUT	0.04 Inches
2	CASE	0.04 Inches
3	CTRL	0.04 Inches
4	+ INPUT	0.04 Inches
5	- OUTPUT	0.08 Inches
6	- SENSE	0.04 Inches
7	TRIM	0.04 Inches
8	+ SENSE	0.04 Inches
9	+ OUTPUT	0.08 Inches



Vertical Fin Orientation



Horizontal Fin Orientation



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)

