AstrodyneTDI
Now you have power.

75 Watt, High Density, Eighth Brick DC/DC Converter **ASD75EB series**

- Small 2.32” x 0.9” x 0.37” Size
- Constant Frequency
- High Typical Efficiency of 92% (12Vout)
- Low Output Noise
- 24 or 48VDC Nominal Input Voltage Options
- Output Over Voltage Protection
- Current Limit/Short Circuit Protection
- Adjustable Output Voltage 80-110% of Vo
- No Sink Current from Output During Shutdown
- Logic ON/OFF Control
- MTBF of 1.3Mhrs
- RoHS Compliant
- CSA Certified to IEC 60950-1 for Basic Insulation

DESCRIPTION:
The ASD75EB Series of products are open frame, high density, dc/dc converters designed for use in distributed power architectures and may, in many cases, be used as fit and function replacements for industry standard quarter brick modules with a 34% space savings. Synchronous Rectification enables these power supplies to produce up to 75W of high efficiency power in an 1/8th brick (2.32in. x 0.90in. x 0.37in.) package.

Model Number	Output Voltage	Output Amps	Input Range	Max. Iin FL	Efficiency	Max Output Power
ASD75-24S3.3EB	3.3 VDC	20	18-36 VDC	4.9A	89%, typ.	66 Watts
ASD75-24S5EB	5 VDC	15	18-36 VDC	5.5A	90.5%, typ.	75 Watts
ASD75-24S12EB	12 VDC	6.25	18-36 VDC	5.5A	91.5%, typ.	75 Watts
ASD75-48S3.3EB	3.3 VDC	20	36-75 VDC	2.5A	89%, typ.	66 Watts
ASD75-48S5EB	5 VDC	15	36-75 VDC	2.9A	91%, typ.	75 Watts
ASD75-48S12EB	12 VDC	6.25	36-75 VDC	2.9A	92%, typ.	75 Watts

ABSOLUTE MAXIMUM RATINGS (MIN TO MAX.)

Input Voltage (+In to -In)	24Vin: 18-36VDC Continuous
	48Vin: 36-75VDC Continuous
Transient Input Voltage	24Vin: 50VDC (100mS max.)
	48Vin: 100VDC (100mS max.)
Operating Temperature	-40 to 85°C (See Derate Curve)
Storage Temperature (Ambient)	125°C
Wave Solder Temperature	260°C for 10 Seconds

INPUT SPECIFICATIONS (400LFM AIRFLOW)

Input Operation Voltage:	See Model Chart on Page 1
Input Current FL (0 Vin - Vin max.)	See Model Chart on Page 1
Input Transient	$1A^2t$
Input Reflected Ripple Current	20mAp-p, typ. (Note 1)
Startup Input Voltage (Note 4)	24Vin: 16-18VDC
	48Vin: 33-36VDC
Shutoff Input Voltage	24Vin: 14-16VDC
	48Vin: 30-33VDC
Hysteresis	1V

OUTPUT SPECIFICATIONS

Output Voltage	See Model Chart on Page 1
Output Current (Io, max.)	See Model Chart on Page 1
Output Set Point (Vo,set)	+/-1.5%, Nominal Vin, FL
Total Output Voltage Range	+/- 3%
Line/Load Regulation	+/-1%
Temperature Regulation	+/-1%, -40 to 70°C
Ripple/Noise	150mV p-p max., 30mVrms (Note 2)
Dynamic Response:	(Note 3)
Peak Deviation	4% Vnom
Settling Time	200uS Vout within 1% Vnom
Over Voltage Protection	110-140% of Output, Hiccup Mode
Over Temperature Protection	105-125°C, auto recover
	(converter hot spot temperature)
External Capacitance (Electrolytic)	3.3 & 5Vout: 10 to 5000uF max.
	12Vout: 220 to 1200uF max.
Short Circuit Protection (rms)	15Arms, Hiccup, Rout ≤10M Ω
Current Limit (rms.)	105-140%, Hiccup Mode
Efficiency FL	See Model Chart on Page 1

ISOLATION SPECIFICATIONS

Input-Output	1500VDC
Input-Output Capacitance	1500pF
Isolation Resistance	10MΩ

GENERAL SPECIFICATIONS

MTBF	1.3Mhrs
Weight	0.72 oz (20.5g)
Dimensions	2.3” x 1.45” x 0.47”
	(58.4 x 36.8 x 12mm)

CONTROL SPECIFICATIONS

Input Logic Low	Voltage at 1mA current relative to
	-Vin is 1V max.
	Current at 0 volts is 1mA
Input Logic High	Enable pin voltage relative to -Vin
	is 5.5V
	Leakage current is 100uA
Turn-On Time	500mS, FL, o=90% Vo, set
Trim Adjustment Range	80-110% See **TRIM FUNCTION**
	Fig 4

NOTES

1.Measured before Input Filter, 12uH inductor

2.Scope measurement should be made using a BNC connector with 1uF and 10uF aluminum electrolytic capacitor across output. Scope set to read at 20MHz bandwidth.

3. 25%-50%-75% load, 0.1A/uS

4. The Cold Start condition is a uniform converter temperature of -40°C after thermal stabilization. An additional 2x220uF is needed for cold startup conditions. The Hot Start condition for start up is a uniform converter temperature of 65°C after thermal stabilization.

All specifications are typical at nominal input, full load, and 25DegC unless otherwise noted

ASTRODYNE USA: 1-800-823-8082
ASTRODYNE PACIFIC: 886-2-26983458

PIN OUTS

Pin	Function	Pin	Function
1	+Vin	4	-Vout
		5	-Sense
2	Enable (on/off)	6	Trim
		7	+Sense
3	-Vin	8	+Vout

Figure 1: ASD75EB Series Pin Outs

OUTLINE DRAWING

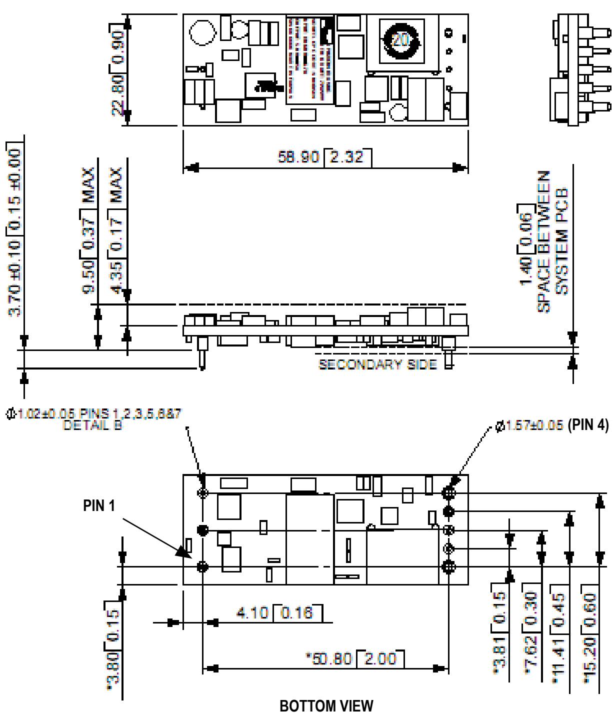


Figure 2: Mechanical Outline

OPERATING INFORMATION

Enable Pin

The Enable Pin (pin 2) enables the user to control when the converter will turn on or off. This pin is referenced to –Vin (pin 3). There are two versions available for each converter, positive logic and negative logic. For positive logic, leaving the Enable pin open or applying TTL/CMOS high voltage level turns the converter on, while pulling this pin to –Vin or drawing more than 1mA turns it off. The negative logic is just the inverse. An external semiconductor switch or mechanical switch can be used to implement this function.

Remote Sense

The remote sense pins +Sense (pin 7) and –Sense (pin 5) allows the converter to correct for voltage drops across the connections from the converter output pins +/-Vout (pins 8 and 4 respectively) to the intended load. The +/- Sense pins should be connected at the point in the board where regulation is needed. Figure 3 shows the recommended connection.

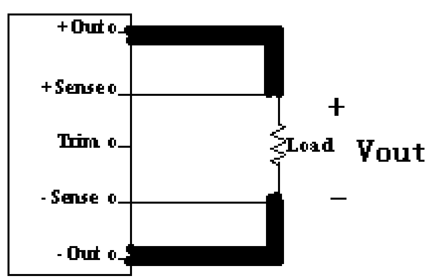
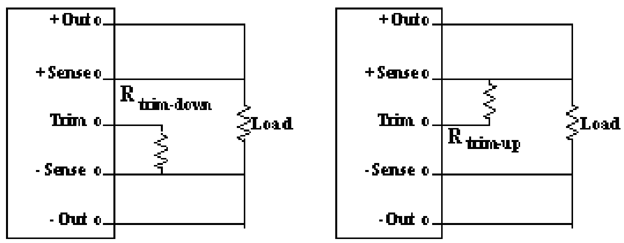


Figure 3: Remote Sense Connection

The resistive drop across the connections should be small enough since Over Voltage Protection might be triggered during high load applications. The OVP circuit senses the +/-Vout pins.

Trim

The Trim pin (pin 6) allows the user to adjust the output voltage across the sense pins from the initial value. Trimming the output voltage requires the user to connect a resistor between Trim and + Vout for output voltage trim up, or connect a resistor between Trim and – Vout for output voltage trim down. The functions for trim up, trim down and the circuit implementation is shown in the figure 4.



Trim Down   Trim Up

$R_{trim\text{-}down} = (511 / \Delta\ \%) - 10.22$ kOhms

$R_{trim\text{-}up} = (5.11Vout|100 + \Delta\% \ | / 1.225\Delta\%) - (511/\Delta\%) - 10.22$ kohms

Where:

$\Delta\% = [(V_{nominal} - V_{desired})/V_{nominal}] \times 100\%$

Figure 4: TRIM Function

There is an upper limit to the trim up since the OVP level is fixed. Trimming the output voltage too high may trigger the OVP circuit during higher load applications or during transients.

Current Limit Protection

The ASD75EB series modules include over current protection that allows them to withstand prolonged overloads or short circuit conditions on the output without over heating. The ASD75EB series employs hiccup mode protection such that the output shuts down during these conditions, waits for a predetermined time (~500mS), and tries to restart. If the overload condition is still present, the converter will stop trying to increase the output voltage and repeat the cycle.

Over Voltage Protection

The ASD75EB series modules have output over voltage protection. In the event of an over voltage condition in the output pins, the converter will shut down immediately. Similar to hiccup mode, it will make continuous attempts to start up until the over voltage is gone and resume normal operation automatically

Input Under-Voltage Lockout

The ASD75EB series is designed to turn off when the input voltage is too low. This is done to avoid stressing the input side circuitry of the primary circuit. The lockout is a comparator with hysteresis, thus avoiding the converter jumping from on-off condition when crossing the UVLO threshold.

Over Temperature Protection

The ASD75EB series modules are protected from thermal overload by an internal over temperature protection IC. When the PCB temperature sense point reaches 125°C, the converter will shut down immediately. The converter will attempt to restart when the temperature has dropped at least 10°C below the Over Temperature threshold.

Thermal Considerations

The ASD75EB series are designed to operate in a wide range of thermal environments. However, enough cooling should be provided to ensure reliable performance. Heat is removed from the converter in 3 ways: conduction, convection and radiation.

Improved cooling by convection can be done by increasing the airflow through the module. The available load current for a given ambient air temperature is in the de-rating curves section. The test is done using the test fixture shown in figure 5.

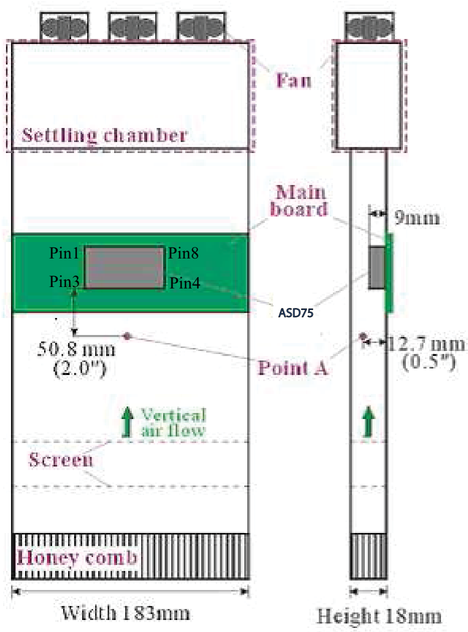


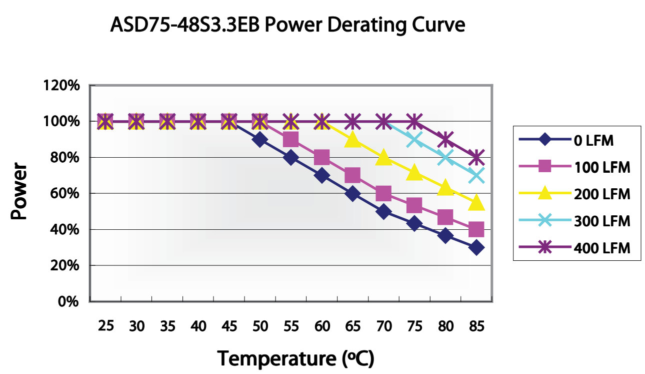
Figure 5: Thermal Text Fixture

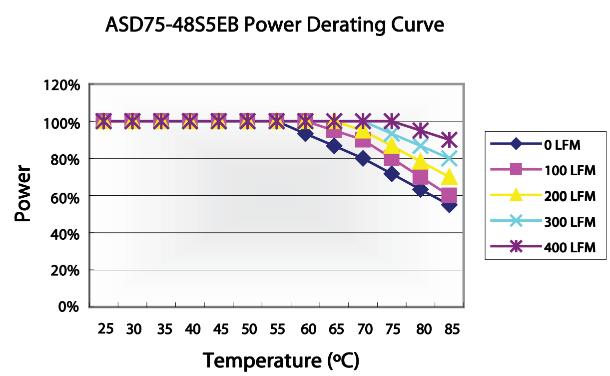
Proper cooling can be verified by monitoring the temperature of the critical components of the power stage. Each of the selected critical components was monitored by using thermocouple. The generation of the thermal de-rating curves involves extensive thermal testing at different combinations of input voltage, ambient air temperature, load current and airflow with the given test fixture.

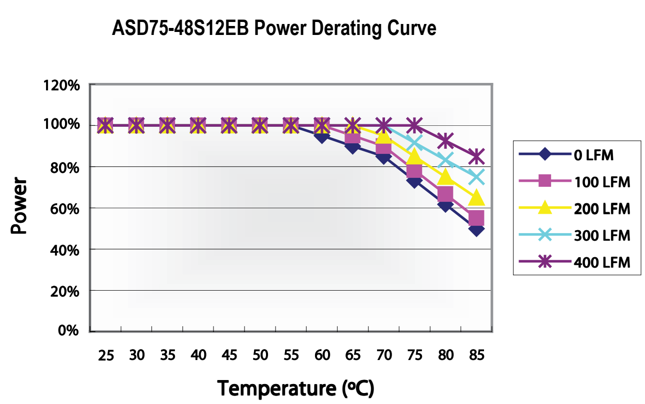
However, the final temperature of the module in the final system will depend again on several factors, including host PCB size, number of layers, and copper weight, airflow direction and turbulence, operating ambient temperatures, etc… It is highly recommended to verify the thermal performance of the converter when included in the end system.

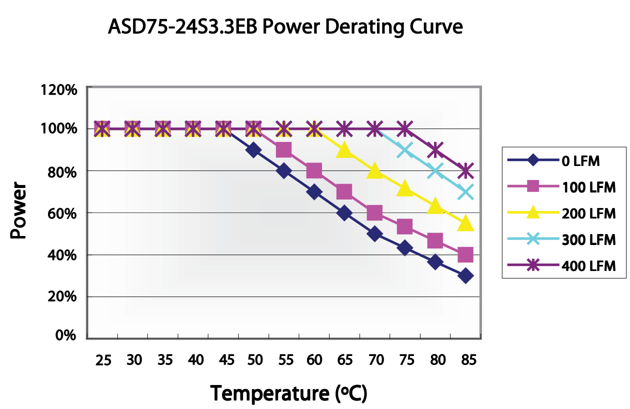
Thermal Characteristic

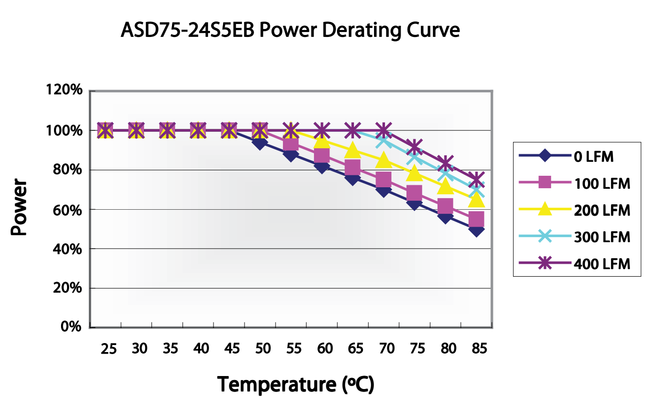
Test done using Thermal Set-up of Figure 5; Vin = Vin_{nom}

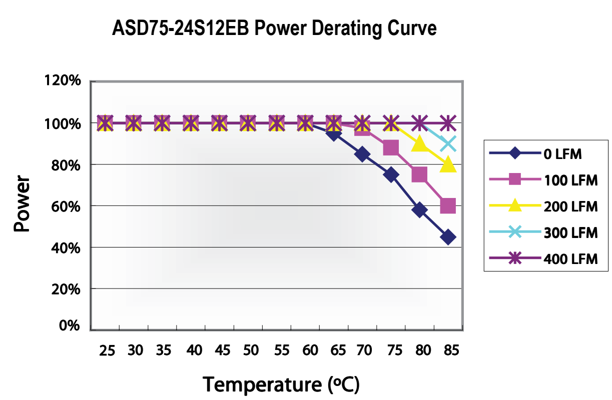












Efficiency Curves

Ta=25°C, airflow rate = 400LFM