



FEATURES

- Wide input voltage range, 32~96V
- 500W Output
- Full Load Efficiency up to 88% @48Vin and 72Vin
- Parallel Connection of multiple units
- Box type package with metal base plate
- Package Dimension:
198.0x113.0x45.0mm (7.80"x4.45"x1.77")
- Operating Temperature Range - 40°C to +90°C
- Input Reverse Polarity Protection
- Input UVLO, Output OCL, Short circuit protection, OVP, OTP
- Enable on/off
- 2250VDC Isolation
- IP67 protection(With fully assembled mating connector)
- RoHs Compliant
- ISO 9001, ISO 14001 certified manufacturing facility
- IEC/EN/UL60950-1, IEC/EN/UL62368-1, CE Mark
- EMC compatible: EN12895-2015, EN55011, EN55014-2, CISPR11 ClassA

The B70SP12440 (A code without parallel function,B code with parallel function), a wide input voltage range of 32~96V, and single isolated output converter, is the latest product offering from a world leader in power systems technology and manufacturing — Delta Electronics, Inc. Such box type DCDC converter can provide 500W, 12.4V regulated DC output voltage with full load efficiency up to 88% @72Vin; The B70SP12440 offers input UVLO, output over current limit, short circuit, output over voltage, over temperature, and input reverse polarity protections. It has parallel function; and allows a wide operating temperature range of -40°C to +90°C. With creative design technology and optimization of component placement, this converter possess outstanding electrical and thermal performance, as well as high reliability under extremely harsh operating conditions. The B70SP12440 meets IP67 protection (refer to "water protection level" specification).

INPUT CHARACTERISTICS

| Item | Condition | Min. | Typ. | Max. | Unit |
|---|-----------------------|------|------|------|---------------------------|
| Continuous Input Voltage | | 32 | 48 | 96 | VDC |
| Input Under-Voltage Lockout, Turn-On Voltage Threshold | | 29 | 30 | 31 | VDC |
| Input Under-Voltage Lockout, Turn-Off Voltage Threshold | | 27 | 28 | 29 | VDC |
| Lockout Hysteresis Voltage | | 1 | 2 | 3 | VDC |
| Maximum Input Current | Vin=32V, 100% Load | | 18 | 19 | A |
| No-Load Input Current | Vin=48V | | 80 | | mA |
| | Vin=72V, 80V | | 40 | | mA |
| Off converter input current | Vin=48V, enable off | | 6 | | mA |
| Reflected input ripple current | Vin=48V, peak to peak | | | 0.2 | A |
| Max Reverse Polarity Input Voltage | | | | 96 | VDC |
| Max Inrush current | | | | 10 | A |
| Internal Input Fuse | | | | | 500V/30A Fast-acting fuse |

OUTPUT CHARACTERISTICS

| Item | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---------|-------|-------|------|
| Operating Output Current Range | For A code | 0 | | 40 | A |
| | For B code | 0 | | 42.5 | A |
| Output Voltage Set Point | for A code | Io=0 | 12.4 | | V |
| | | Io=40 | 12.4 | | V |
| | for B code | Io=0 | 13.25 | | V |
| | | Io=42.5 | 11.65 | | V |
| Output Voltage Ripple and Noise, | Vin=48V, Io=100%, peak to peak, 20MHz bandwidth, Co=1μF ceramic, 10μF tantalum | | 120 | 240 | mV |
| | Vin=48V, Io=100%, RMS, 20MHz bandwidth, Co=1μF ceramic, 10μF tantalum | | 35 | 70 | mV |
| | Vin=72V, 80V, Io=100%, peak to peak, 20MHz bandwidth, Co=1μF ceramic, 10μF tantalum | | 140 | 280 | mV |
| | Vin=72V, 80V, Io=100%, RMS, 20MHz bandwidth, Co=1μF ceramic, 10μF tantalum | | 45 | 90 | mV |
| Output Current Limit | | | 50 | | A |
| Current share accuracy | 42.5A for each module, ,only for B code | | 10 | 15 | % |
| Start-up time(start _up time by Vin) | Vin=48V,full load, from Vin=Turn-on Threshold to 10%Vo | | 650 | 800 | mS |
| Start-up time(start _up time by Enable) | Vin=48V,full load, from Enable=ON to 10%Vo | | 250 | 400 | mS |
| Rise time | From 10%Vo to 90%Vo | | 160 | 300 | mS |
| Output Voltage Protection | | | 17 | | V |
| Output Voltage Current Transient | Positive voltage step, 50% to 75% load dynamic, 0.1A/us slew rate | | 250 | 500 | mV |
| | Negative voltage step, 50% to 75% load dynamic, 0.1A/us slew rate | | 250 | 500 | mV |
| Maximum Output Capacitance | | | | 10000 | μF |
| Output overshoot | | | | 3 | % |
| Efficiency @ 100% Load | Vin=48V | | 88.2 | | % |
| Efficiency @ 100% Load | Vin=72V | | 88 | | % |
| Efficiency @ 60% Load | Vin=48V | | 89 | | % |
| Efficiency @ 60% Load | Vin=72V | | 88.5 | | % |

GENERAL CHARACTERISTICS

| Item | Conditions | Min. | Typ. | Max. | Unit |
|--|---|--------|------|--------|-------|
| Isolation Voltage, | Input to Output, Input to Case | | | 2250 | VDC |
| | Output to Case | | | 550 | VDC |
| Isolation Resistance, Input to Output | | 10 | | | MΩ |
| Isolation Capacitance, Input to Output | | | 5000 | | pF |
| Switching Frequency | | | 175 | | KHz |
| Operating life | Baseplate @ 40° C, include Aluminum capacitor | | | 131400 | Hours |
| MTBF | 72Vin, Baseplate @ 85°C | 121450 | | | Hours |
| Weight | | | 1300 | | g |

ENVIRONMENTAL SPECIFICATIONS

| Parameter | Conditions | Min. | Max. | Unit |
|-----------------------------|---|------|------|---|
| Storage Temperature Range | | -40 | +105 | °C |
| Operating Temperature Range | Baseplate | -40 | +90 | °C |
| Over Temperature Protection | NTC Temperature | | 118 | °C |
| Humidity (non condensing) | | | 95 | % RH |
| Thermal Shock Test | Temperature range:-40~125 °C Thermal rate: 20°C /min Dwell time : 60mins Total cycle: 300cycles | | | ISO 16750-4 |
| Submersion test | Total cycles : 10 Dwell time at Tmax : 1h Transition duration : <20s Testfluid : De-ionized water,5% NaCl Water Temperature:< 4°C Immersion Time : 5 mins | | | ISO 16750-4 |
| Water Protection Level | With fully assembled mating connector | | | IP67 |
| Vibration | Sine wave 1.Frequency (Hz) amplitude acceleration 5 – 9 HZ ±15 mm 15-200 HZ 10G 2. Sweep rate 1 Oct / min. 3. Duration 50 Cycles. | | | IEC 60068-2-6: Sine-wave vibration, test Fc |
| Mechanical Shock | 50G/11ms 3Shocks for each direction | | | IEC 60068-2-27: Shock, half sine, test Ea: |
| Bump | 40G/6ms 1000 Shocks for each direction | | | IEC 60068-2-29: Bump, test Eb: |
| Salt Spray Test | Operating /no load 1. Salt Spray Concentration:5%; 2. Test Temperature:35°C; 3. Volume of spray:1~2ml/hour/80cm ² ; 4. PH:6.5~7.2; 5. Test Time:96hours 6. Tolerance: Salt Spray Concentration (±1%); Test Temperature: ± 2°C; | | | IEC 60068-2-11:Test Ka |
| Emission | 30-1000MHz 34-45dBuV/m | | | EN12895-2015 |
| Immunity | 20V/m /27-1000MHz AM; 3V/m /1-2GHz AM; 1V/m /2-2.7GHz AM EN12895-2015, | | | EN61000-4-3 |
| ESD | Direct: ±8KV; Air: ±15KV EN12895-2015, | | | EN61000-4-2 |

NOTES

- 1 Specifications typical at Ta=+25°C, nominal input voltage and rated full load output current unless otherwise noted.
- 2 Specifications are subject to change without notice.

ELECTRICAL CURVES

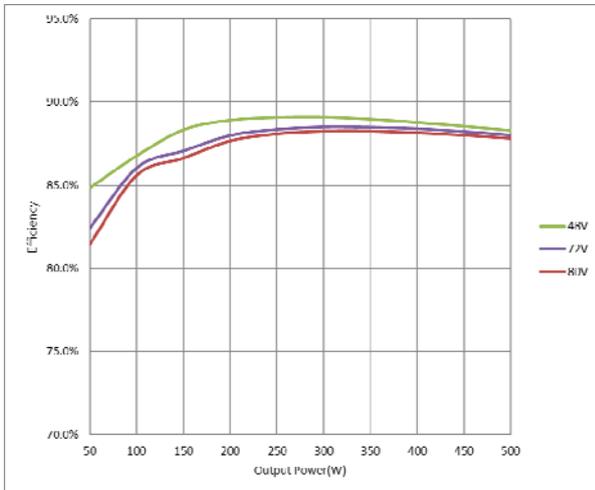


Figure 1: Efficiency vs. Output Power
@ Vin=48V,72V,80V

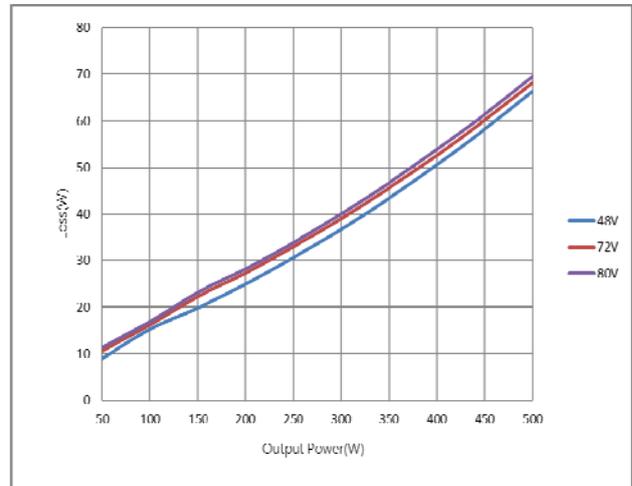


Figure 2: Loss vs. Output Power
@ Vin=48V,72V,80V

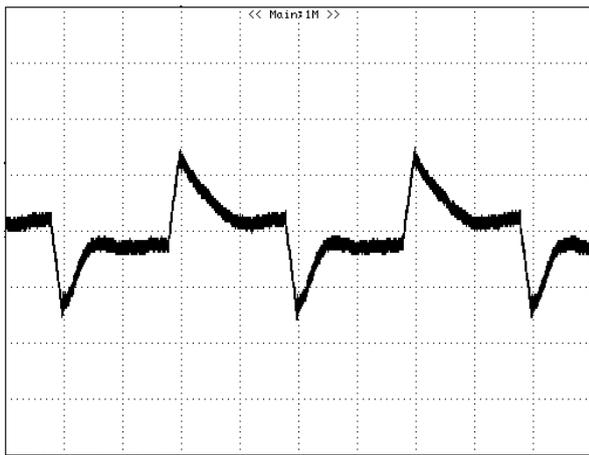


Figure 3: Dynamic response to load step 50% to 75%
with 0.1A/uS slew rate at 72Vin
CH1:VOUT, 100mV/div, 500uS/div

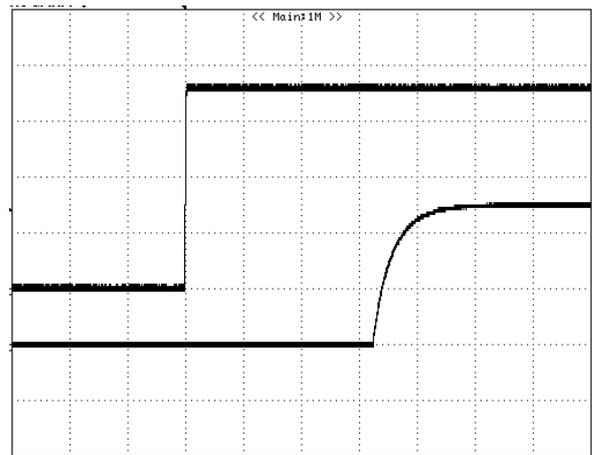


Figure 4: Vout start up with Vin on at 72Vin, 100% lout,
TOP:VIN, 20V/div, 200mS/div
BOTTOM: VOUT, 5V/div, 200mS/div

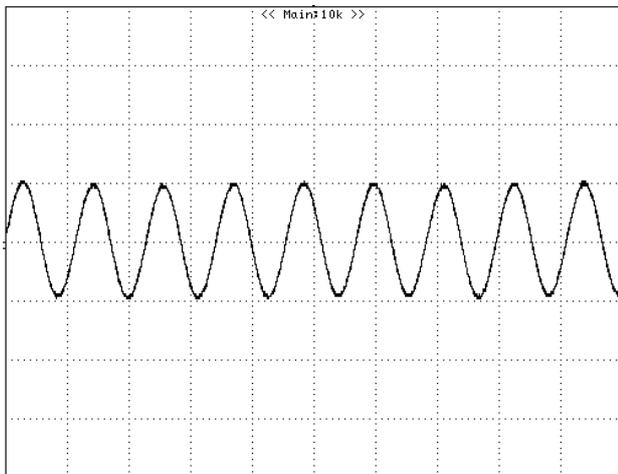


Figure 5: Output ripple & noise at 72Vin, 100% lout
CH1:VOUT, 10mV/div, 5uS/div

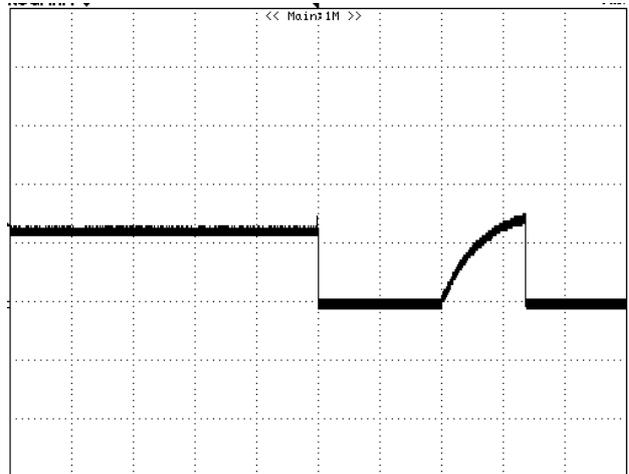


Figure 6: Output over voltage protection at 72Vin, 100% lout
CH1:VOUT, 10V/div, 100mS/div

ELECTRICAL CURVES (continuous)

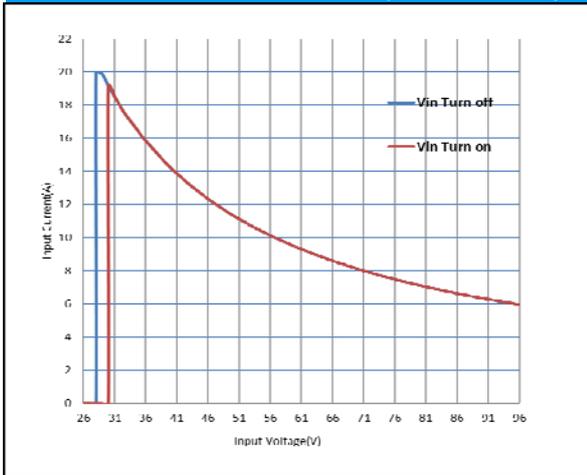


Figure 7: Input current vs. Input voltage @Full load

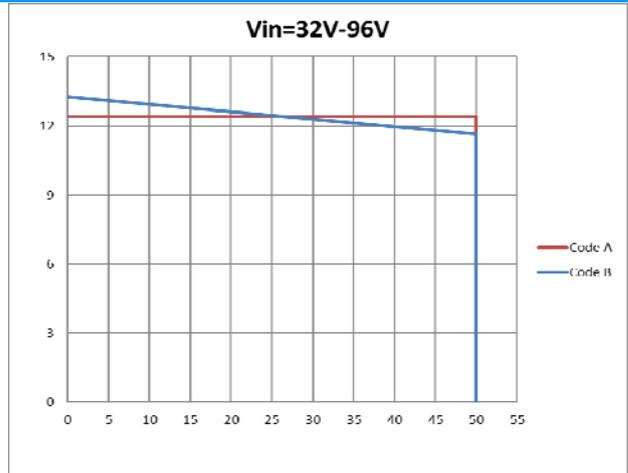


Figure 8: Output voltage vs. Output current OCL Performance

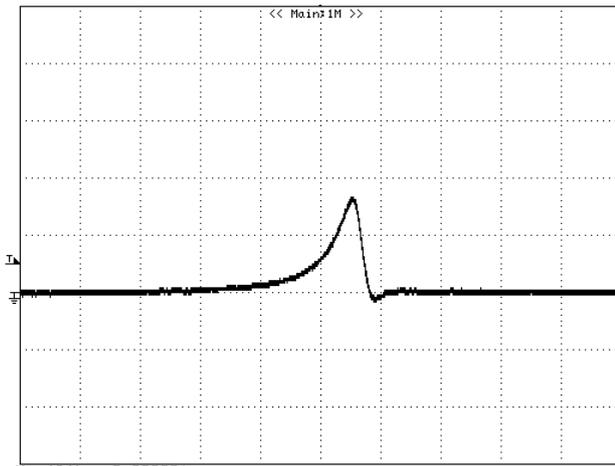


Figure 9: Inrush current @ Vin=72V
CH1: 1in, 2A/div, 200nS/div; Max current 3.4A

Output Over-Current Limit and Short Protection

The modules include internal output over-current limit (OCL) and short circuit protection (SCP) circuits, the OCL set point is lower than that of the SCP; The response of SCP circuit is much fast than that of the OCL circuit. The slowly increase of the output current will let module enter OCL protection when the current exceeds the OCL set point, while the fast increase of the output current will let module enter SCP when the current exceeds the SCP set point.

When the modules enter OCL protection, the output voltage will decrease while the output current is kept constant, the output voltage will soft start to set point when the overload condition is removed.

The module will enter hiccup mode when it triggers the SCP set point. The module will try to restart after shutdown. If the overload condition still exists, the module will shut down again. This restart trial will continue until the overload condition is removed.

Output Over-Voltage Protection

The power module includes an internal output over-voltage protection(OVP) circuit, which monitors the voltage on the output terminals. If this voltage exceeds the OVP set point, the module will shut down, and then restart after a fixed delay time (hiccup mode), please refer to figure6 for detail.

Over-Temperature Protection

The over-temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the preset temperature threshold the module will shut down, and all components will not exceed their absolute maximum temperature ratings. The module will restart after the temperature is within specification.

Remote On/Off

B70SP12440A/B has Enable control function. This Enable PIN is designed on the primary side of converter, the converter will turn on when the Enable PIN connected to VIN+ or floating, and turn off when the Enable PIN connected to VIN-.

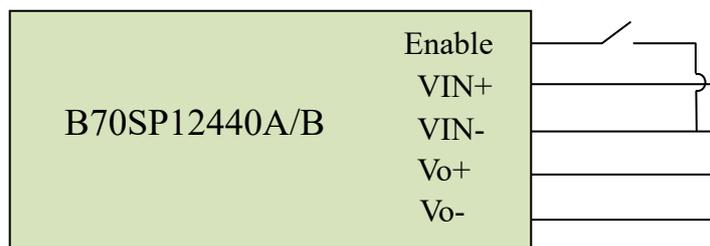


Figure 10: suggested Enable connection

Input Reverse Voltage Protection

The input reverse voltage protection is provided by an diode on the input line, the standoff voltage for the reverse protection shall be no less than -96V.

Parallel connection of multiple units(only for B code)

Two units parallel operation is verified, please contact Delta if more than two units need to be paralleled. While paralleling multiple units, the impedance of the cables from unit to junction point of each unit should be within $\pm 5\%$ of each other. Before all the parallel module finished start up, the total load current should be lower than the rated current of 1 module.

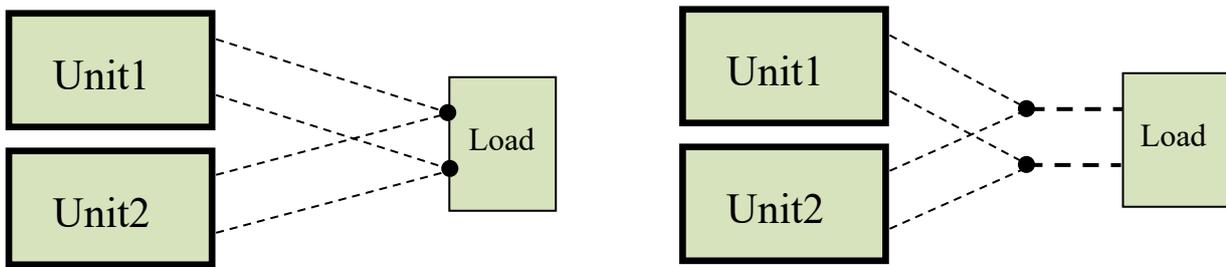


Figure 11: suggested parallel connections

THERMAL CONSIDERATION

The thermal curve is based on the test setup shown as figure12. The module is mounted on an liquid cooling plate and cooled by cooling liquid(It can also be air cooling with heatsink at client side).

Figure13 shows the location to monitor the temperature of the module's baseplate. The baseplate temperature in thermal curve is a reference for customer to make thermal evaluation and make sure the module is operated under allowable temperature. (Thermal curves shown in Figure14 are based on different input voltage).

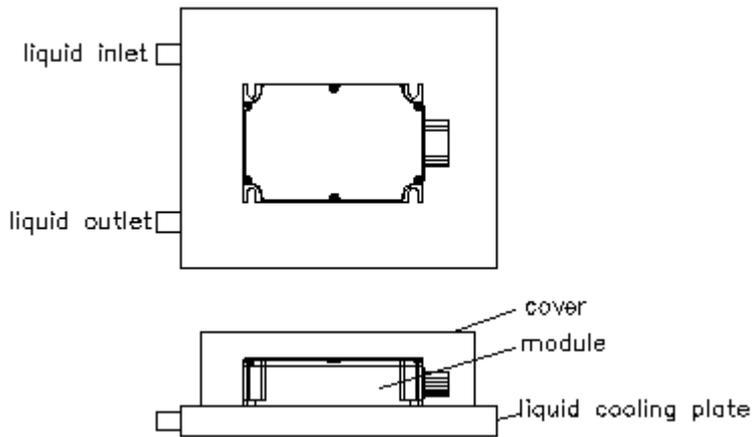


Figure 12 Test setup

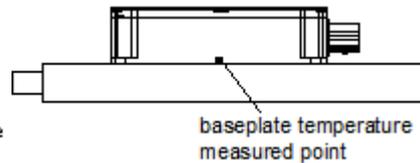


Figure 13 Temperature measured point

THERMAL CURVE

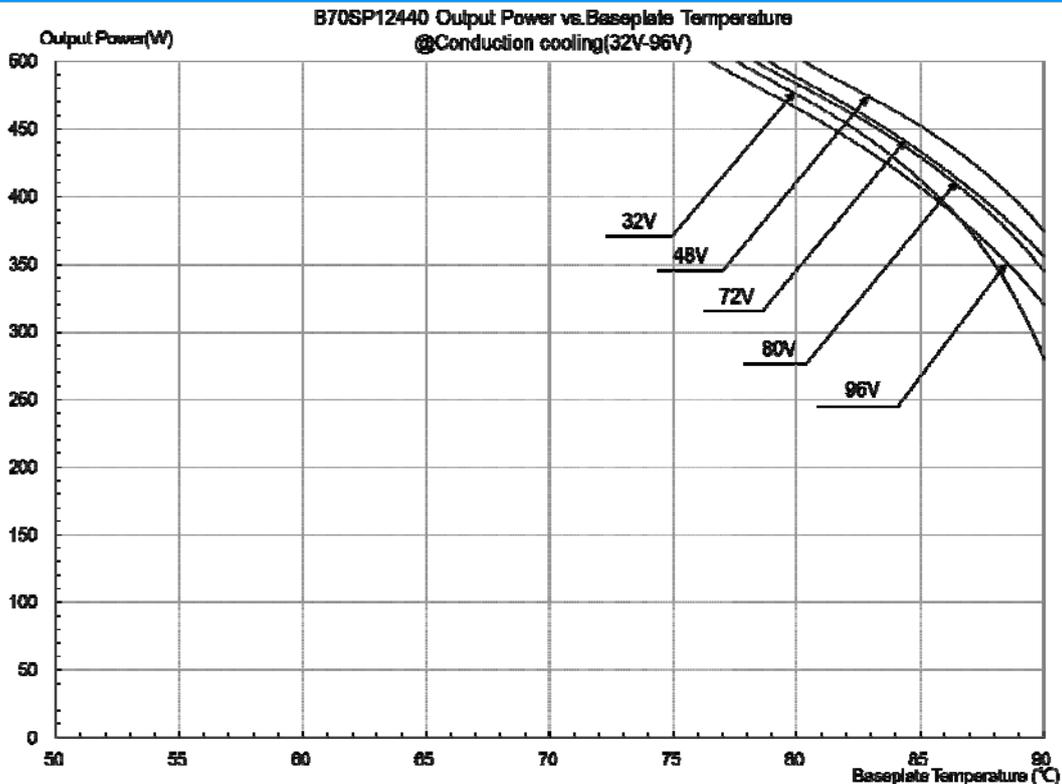
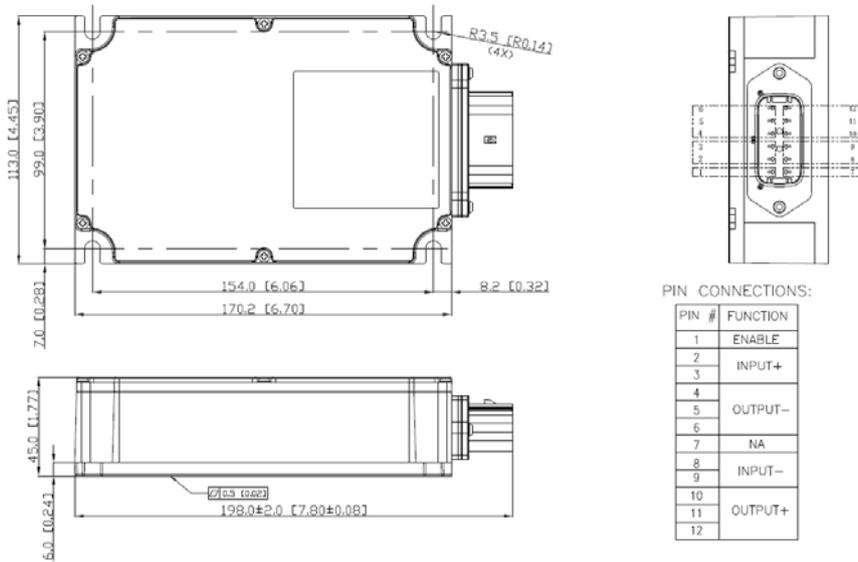


Figure 14: Output Power vs. baseplate temperature

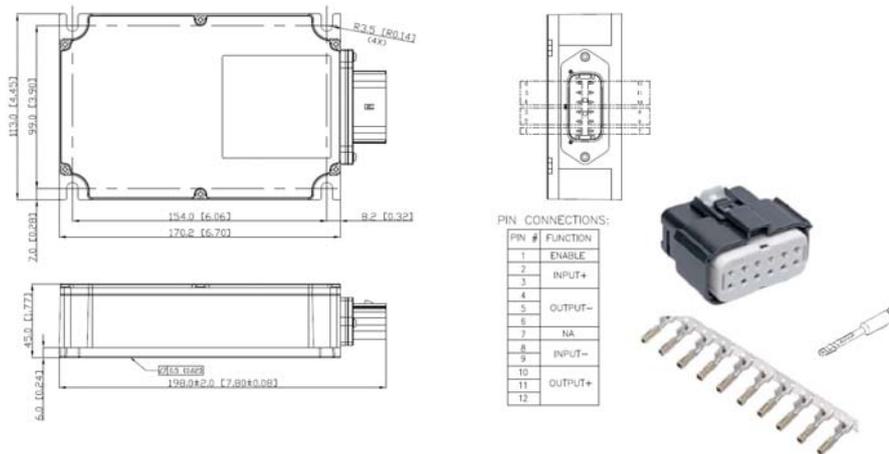
MECHANICAL DRAWING

Mechanical Dimensions



B70SP12440A/B

- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.010)
- Connector:
MOLEX P/N : 19429-0047
(mating connector:
housing :molex 0194180027 X1
terminal: 0194200001 X11
plug :194170119 X1
Pin7 need fill with plug)



B70SP12440AC/BC

- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.010)
- Connector:
MOLEX P/N : 19429-0047
(mating connector:
housing :molex 0194180027 X1
terminal: 0194200001 X11
plug :194170119 X1
Pin7 need fill with plug)

PHYSICAL OUTLINE

| | |
|---------------|--|
| Case Size | : 198.0x113.0x45.0mm (7.80"x4.45"x1.77") |
| Case Material | : ADC12 |



| PART NUMBERING SYSTEM | | | | | | | | |
|-----------------------|---------------|-------------------|----------------|----------------|----------------|-------------|---------------------------|-----------------------|
| B | 70 | S | P | 124 | 40 | A | | C |
| Form Factor | Input Voltage | Number of Outputs | Product Series | Output Voltage | Output Current | Option Code | | Option Fitting |
| B - Box | 70 - 32V~96V | S - Single | P - High Power | 124 - 12.4V | 40 - 40A | | | Connector Kit |
| | | | | | | A | Without parallel function | With mating connector |
| | | | | | | B | With parallel function | With mating connector |

| RECOMMENDED PART NUMBER | | | | |
|-------------------------|---------|--------|-------|----------------------|
| Input Voltage Range | Input | Output | | EFF @72VIN 100% LOAD |
| B70SP12440(A/AC) | 32V~96V | 12.4V | 40A | 88% |
| B70SP12440(B/BC) | 32V~96V | 11.65V | 42.5A | 88% |

CONTACT: www.deltaww.com/dcdc

Email: dcdc@deltaww.com

USA:

Telephone:
East Coast: 978-656-3993
West Coast: 510-668-5100
Fax: (978) 656 3964

Europe:

Phone: +31-20-655-0967
Fax: +31-20-655-0999

Asia & the rest of world:

Telephone: +886 3 4526107
ext 6220~6224
Fax: +886 3 4513485

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