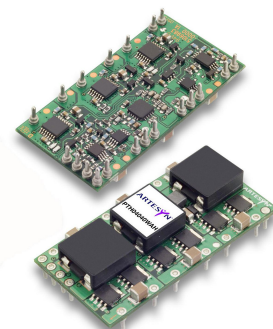


### NEW Product

- 60 A output current<sup>(7)</sup>
- 3.3/5 V input voltage (2.95 Vdc to 5.5 Vdc)
- Wide-output voltage adjust (0.8 Vdc to 2.5 Vdc)
- Auto-track™ sequencing\*
- Margin up/down controls
- Efficiencies up 93%
- Output ON/OFF inhibit
- Differential remote sense
- Programmable input Under-Voltage Lockout (UVLO)
- Point-of-Load-Alliance (POLA) compatible
- Available RoHS compliant



The PTH04040 is a next generation series of non-isolated dc-dc converters offering some of the most advanced POL features available in the industry. The primary new feature provides for sequencing between multiple modules, a function, which is becoming a necessity for powering advanced silicon including DSP's, FPGA's and ASIC's requiring controlled power-up and power-down. Other industry leading features include margin up/down controls and efficiencies up to 96%. The PTH04040 has an input voltage of 2.95 Vdc to 5.5 Vdc and offers a wide 0.8 Vdc to 2.5 Vdc output voltage range with up to 60 A output current, which allows for maximum design flexibility and a pathway for future upgrades.



2 YEAR WARRANTY

**All specifications are typical at nominal input, full load at 25 °C unless otherwise stated**  
 $C_{in} = 1000 \mu F$ ,  $C_{out} = 660 \mu F$

### SPECIFICATIONS

#### OUTPUT SPECIFICATIONS

|                                    |                                                                          |                             |
|------------------------------------|--------------------------------------------------------------------------|-----------------------------|
| Voltage adjustability              | $2.95 \leq V_i \leq 4.5 \text{ V}$<br>$4.50 \leq V_i \leq 5.5 \text{ V}$ | 0.8-1.65 Vdc<br>0.8-2.5 Vdc |
| Setpoint accuracy                  | (See Note 1)                                                             | $\pm 2.0\% V_o$             |
| Line regulation                    |                                                                          | $\pm 5 \text{ mV typ.}$     |
| Load regulation                    |                                                                          | $\pm 5 \text{ mV typ.}$     |
| Total regulation                   | (See Note 1)                                                             | $\pm 3.0\% V_o$             |
| Minimum load                       |                                                                          | 0 A                         |
| Ripple and noise                   | 20 MHz bandwidth                                                         | 15 mV typ.                  |
| Transient response<br>(See Note 4) | 100 $\mu s$ recovery time<br>Overshoot/undershoot 200 mV                 |                             |
| Margin adjustment                  | (See Note 8)                                                             | $\pm 5.0\% V_o$             |

#### INPUT SPECIFICATIONS

|                                      |                                            |                                     |
|--------------------------------------|--------------------------------------------|-------------------------------------|
| Input voltage range                  | (See Notes 3, 5)                           | 2.95-5.5 Vdc                        |
| Input standby current                |                                            | 60 mA typ.                          |
| Remote ON/OFF                        | (See Note 5)                               | Negative logic                      |
| Undervoltage lockout<br>(Pin 8 open) | (See Note 6)<br>On threshold<br>Hysteresis | 6.6-7.5 Vdc typ.<br>2.60 V<br>0.6 V |
| Track input current                  | Pin 18 (See Note 2)                        | -0.11 mA                            |

#### EMC CHARACTERISTICS

|                         |                       |
|-------------------------|-----------------------|
| Electrostatic discharge | EN61000-4-2, IEC801-2 |
| Conducted immunity      | EN61000-4-6           |
| Radiated immunity       | EN61000-4-3           |

#### GENERAL SPECIFICATIONS

|                         |                     |                                                     |
|-------------------------|---------------------|-----------------------------------------------------|
| Efficiency              | See Table on page 2 | 93% max.                                            |
| Insulation voltage      |                     | Non-isolated                                        |
| Switching frequency     |                     | 825 MHz                                             |
| Approvals and standards |                     | EN60950<br>UL/cUL60950                              |
| Material flammability   |                     | UL94V-0                                             |
| Dimensions              | (L x W x H)         | 51.94 x 26.54 x 9.07 mm<br>2.045 x 1.045 x 0.357 in |
| Weight                  |                     | 22.5 g (79 oz)                                      |
| MTBF                    | Telcordia SR-332    | 2,100,000 hours                                     |

#### ENVIRONMENTAL SPECIFICATIONS

|                       |                                                 |                                       |
|-----------------------|-------------------------------------------------|---------------------------------------|
| Thermal performance   | Operating ambient, temperature<br>Non-operating | -40 °C to +85 °C<br>-40 °C to +125 °C |
| MSL ('Z' suffix only) | JEDEC J-STD-020C                                | Level 3                               |

#### PROTECTION

|             |            |               |
|-------------|------------|---------------|
| Overcurrent | Auto reset | 90 A          |
| Thermal     |            | Auto recovery |

#### International Safety Standard Approvals



UL/cUL CAN/CSA-C22.2 No. 60950  
File No. E174104

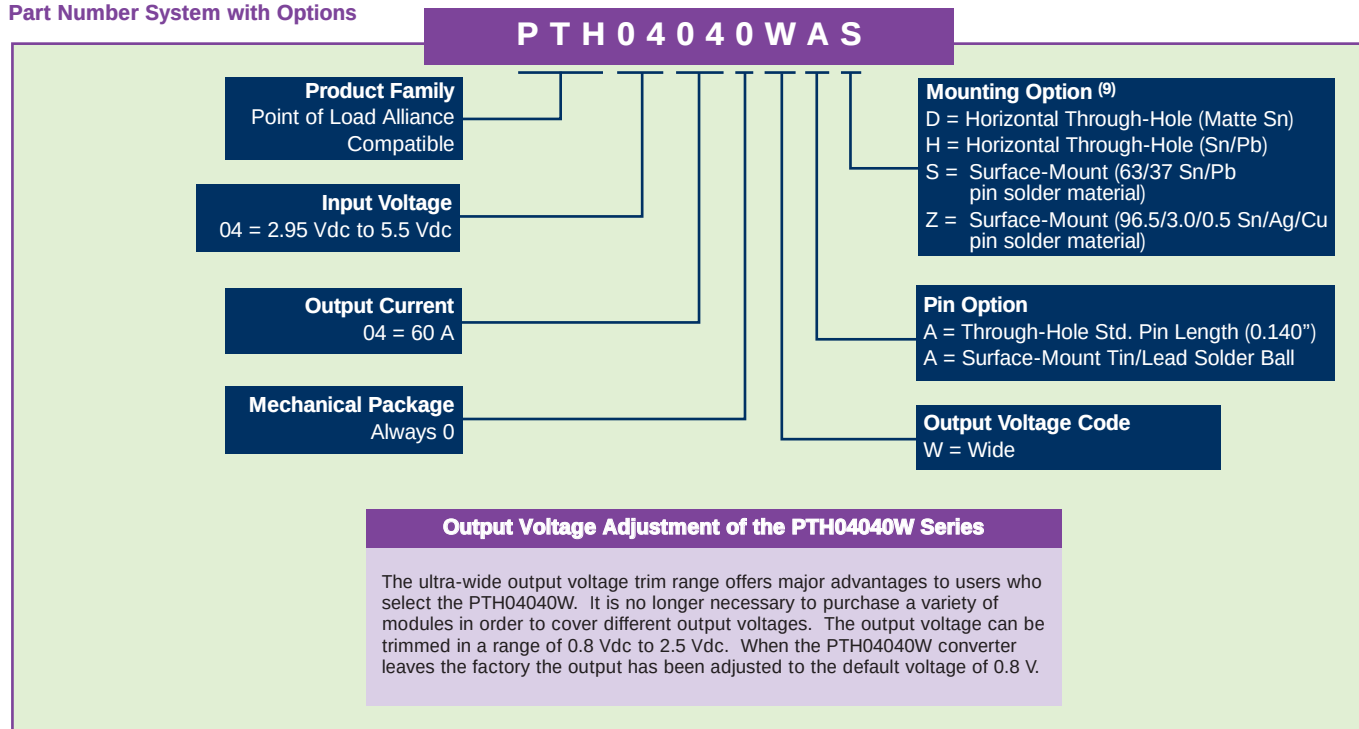


TÜV Product Service (EN60950) Certificate No. B 04 06 38572 044  
CB Report and Certificate to IEC60950, Certificate No. US/8292/UL

\*Auto-track™ is a trade mark of Texas Instruments

| OUTPUT POWER (MAX.) | INPUT VOLTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT (MIN.) | OUTPUT CURRENT (MAX.) (7) | EFFICIENCY (MAX.) | REGULATION |       | MODEL NUMBER (9,10) |
|---------------------|---------------|----------------|-----------------------|---------------------------|-------------------|------------|-------|---------------------|
|                     |               |                |                       |                           |                   | LINE       | LOAD  |                     |
| 150 W               | 2.95-5.5 Vdc  | 0.8-2.5 Vdc    | 0 A                   | 60 A                      | 93%               | ±5 mV      | ±5 mV | PTH04040W           |

## Part Number System with Options

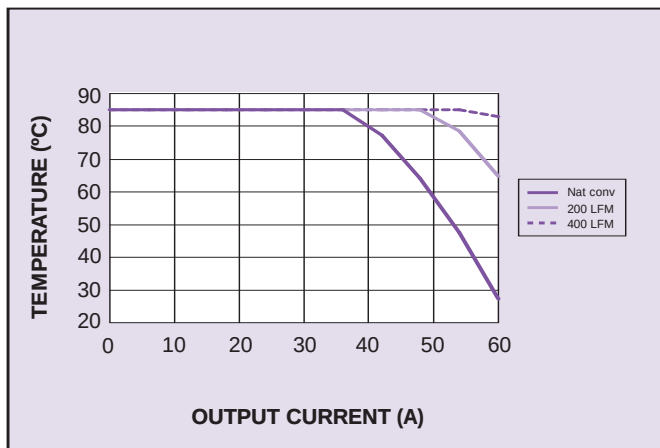


## Notes

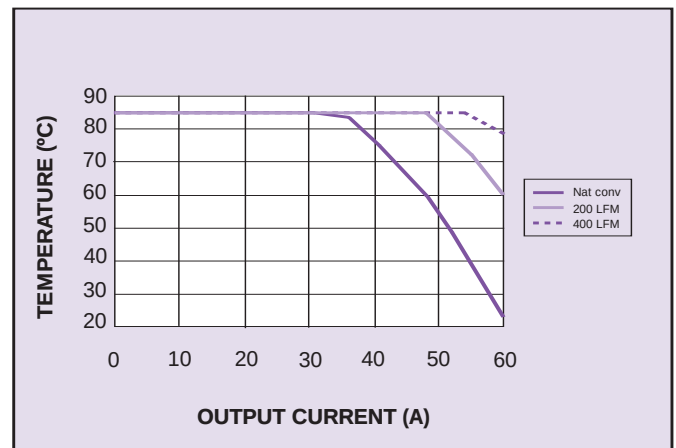
- The set-point voltage tolerance is affected by the tolerance and stability of  $R_{SET}$ . The stated limit is unconditionally met if  $R_{SET}$  has a tolerance of 1% with 100 ppm/°C or better temperature stability.
- This control pin has an internal pull-up to  $V_{in}$  nominal. If it is left open-circuit the module will operate when input power is applied. A small low-leakage (<100 nA) MOSFET is recommended for control. For further information, consult Application Note 192.
- A 1000  $\mu$ F input capacitor is required for proper operation. The capacitor must be rated for a minimum of 400 mA rms of ripple current.
- This is with a 1 A/ $\mu$ s loadstep, 50 to 100%  $I_{Omax}$ .  $C_O = 660 \mu$ F.
- The minimum input voltage is 2.95 V or  $1.34 \times V_O$ , whichever is greater.
- These are default voltages. They may be adjusted using the 'UVLO Prog.' control input. Consult Application Note 192 for further details.
- See Figures 1 and 2 for safe operating curves. All power pins must be used.
- A small low-leakage (<100 nA) MOSFET is recommended to control this pin. The open-circuit voltage is less than 1 Vdc.
- To order Pb-free (RoHS compatible) surface-mount parts replace the mounting option 'S' with 'Z', e.g. PTH04040WAZ. To order Pb-free (RoHS compatible) through-hole parts replace the mounting option 'H' with 'D', e.g. PTH04040WAD.
- NOTICE: Some models do not support all options. Please contact your local Artesyn representative or use the on-line model number search tool at <http://www.artesyn.com/powergroup/products.htm> to find a suitable alternative.

EFFICIENCY TABLE ( $I_O = 45A$ )  $V_{in} = 5 V$

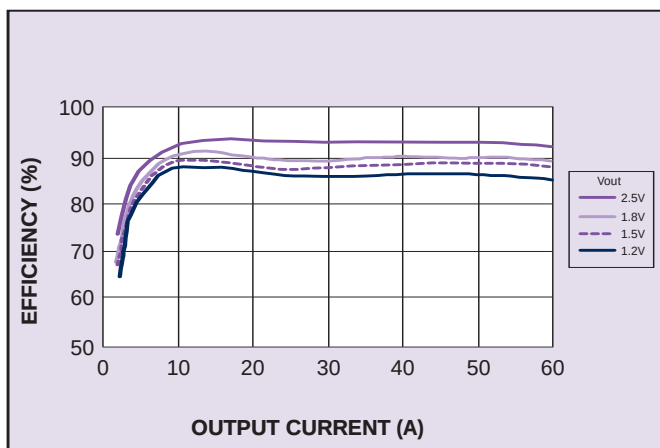
| OUTPUT VOLTAGE | EFFICIENCY |
|----------------|------------|
| $V_O = 2.5 V$  | 93%        |
| $V_O = 1.8 V$  | 90%        |
| $V_O = 1.5 V$  | 88%        |
| $V_O = 1.2 V$  | 86%        |



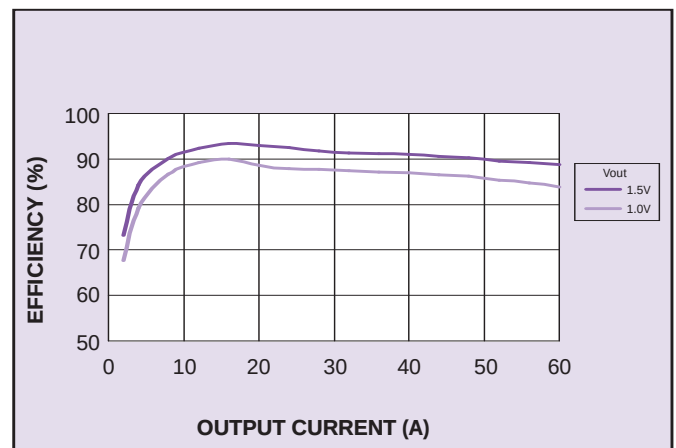
**Figure 1 - Safe Operating Area**  
**V<sub>in</sub> = 3.3 V (See Note A)**



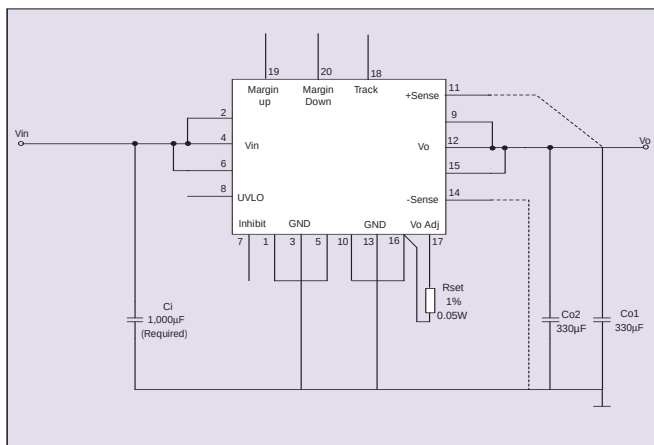
**Figure 2 - Safe Operating Area**  
**V<sub>in</sub> = 5 V (See Note A)**



**Figure 3 - Efficiency vs Load Current**  
**V<sub>in</sub> = 5 V (See Note B)**



**Figure 4 - Efficiency vs Load Current**  
**V<sub>in</sub> = 3.3 V (See Note B)**



### Figure 5 - Standard Application

## Notes

- A** SOA curves represent the conditions at which internal components are within the Artesyn derating guidelines.
- B** Characteristic data has been developed from actual products tested at 25 °C. This data is considered typical data for the converter.

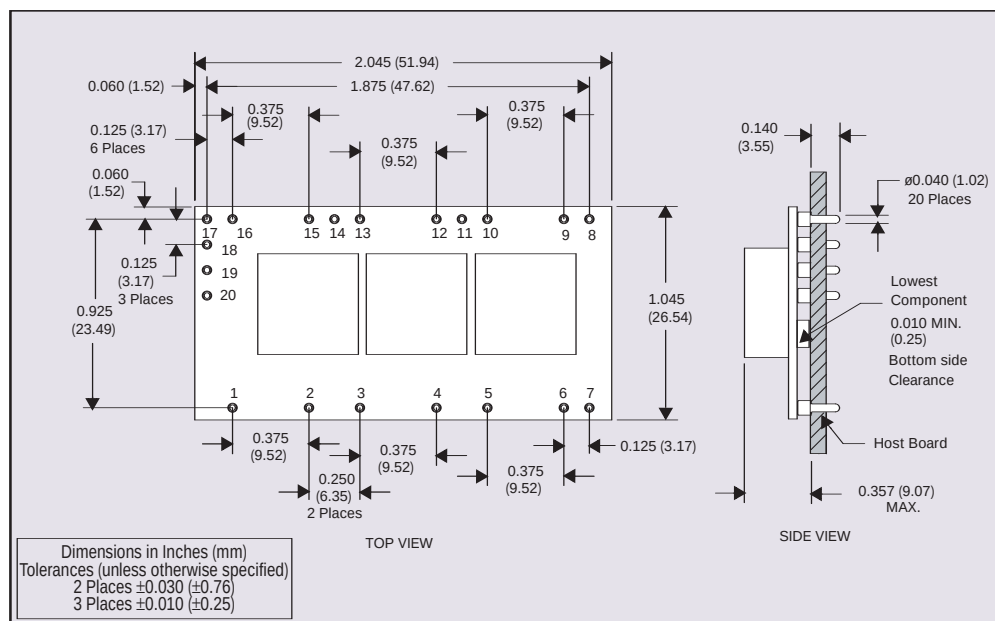


Figure 6 - Plated Through-Hole Mechanical Drawing

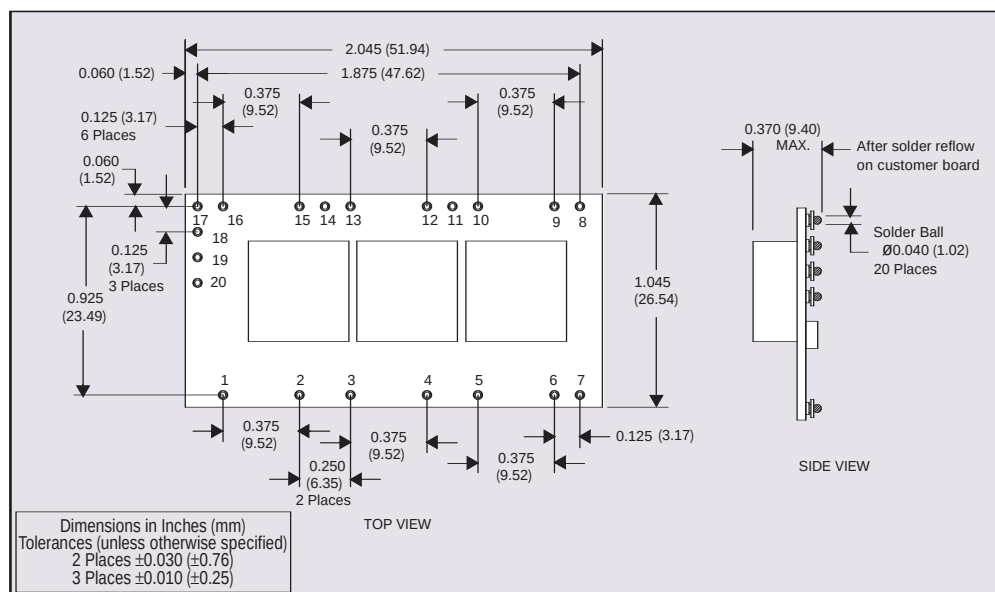


Figure 7 - Surface-Mount Mechanical Drawing

| PIN CONNECTIONS |                  |
|-----------------|------------------|
| PIN NO.         | FUNCTION         |
| 1               | Ground           |
| 2               | Vin              |
| 3               | Ground           |
| 4               | Vin              |
| 5               | Ground           |
| 6               | Vin              |
| 7               | Inhibit*         |
| 8               | UVLO Programming |
| 9               | Vout             |
| 10              | Ground           |
| 11              | Vs+              |
| 12              | Vout             |
| 13              | Ground           |
| 14              | Vs-              |
| 15              | Vout             |
| 16              | Ground           |
| 17              | Adjust           |
| 18              | Track            |
| 19              | Margin Up*       |
| 20              | Margin Down*     |

\*Denotes negative logic:  
Open = Normal operation  
Ground = Function active

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