# ARTESYN PTH12060

12 Vin Single Output




Advanced Energy's Artesyn PTH12060 series of non-isolated DC-DC converters complies with the Point-of-Load Alliance (POLA) standard. The converters offer some of the most advanced POL functions in the industry, including Auto-Track™ sequencing for controlled power-up/power-down of complex semiconductor devices such as DSPs, FPGAs and ASICs, and voltage margining. Standard features include pre-bias startup, input undervoltage lockout, remote On/Off and auto resetting short-circuit protection.

There are two models in the PTH12060 series of converters, both of which have an input voltage range of 10.8 to 13.2 Vdc. One model offers an output voltage that can be trimmed from 0.8 to 1.8 Vdc, the other has an output that can be trimmed from 1.2 to 5.5 Vdc, enabling a broad diversity of semiconductor power needs to be satisfied. The 0.8 to 1.8 V output converter offers up to 88% efficiency while the higher output voltage model can achieve up to 94%. Both converters are rated at 55 watts output power and can deliver up to 10 amps. Available in through-hole horizontal mount and surface-mount versions, they have a small 0.62 x 0.99 inch (15.7 x 25.3 mm) footprint and an installed height of just 0.35 inch (9 mm).

DATA SHEET

**Total Power:**

55 Watts

**# of Outputs:**

Single

RoHS 6/6 COMPLIANT

*Auto-track is a trademark of Texas Instruments.

## SPECIAL FEATURES

- 10 A output current
- 12 V input voltage
- Wide-output voltage adjust:
  1.2 - 5.5 Vdc for suffix 'W'
  0.8 - 1.8 Vdc for suffix 'L'
- Auto-track™ sequencing*
- Margin up/down controls
- Efficiencies up to 94%
- Output ON/OFF inhibit
- Output voltage sense
- Point-of-Load-Alliance (POLA) compatible
- RoHS compliant
- Two year warranty

## SAFETY

- UL/cUL CAN/CSA-C22.2 No. 60950-1-03/UL 60950-1, 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

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## ELECTRICAL SPECIFICATIONS

| | | |
|---|---|---|
| **Input** | | |
| Input voltage range | (See Note 3) | 10.8 - 13.2 Vdc |
| Input current | No load | 10 mA typical |
| Remote ON/OFF | (See Note 1) | Positive logic |
| Start-up time | | 1 V/ms |
| Undervoltage lockout | | 9.0 - 9.5 V typical |
| Track input voltage | Pin 8 (See Notes 6 ) | ±0.3 Vin |
| **Output** | | |
| Voltage adjustability | (See Note 4) | 1.2 - 5.5 Vdc (Suffix 'W')<br>0.8 - 1.8 Vdc (Suffix 'L') |
| Setpoint accuracy | | ±2.0% Vo |
| Line regulation | | ±10 mV typical |
| Load regulation | | ±12 mV typical |
| Total regulation | | ±3.0% Vo |
| Minimum load | | 0 A |
| Ripple and noise<br>20 MHz bandwidth | Suffix 'W': Vo 2.5 V<br>Vo > 2.5 V<br>Suffix'L': Vo 1.0 V<br>Vo > 1.0 V | 25 mV pk-pk<br>1% Vo<br>20 mV pk-pk<br>30 mV pk-pk |
| Temperature co-efficient | -40 °C to +85 °C | ±0.5% Vo |
| Transient response | (See Note 5) | 70 µs recovery time<br>Overshoot/undershoot 100 mV |
| Margin adjustment | | ±5.0% Vo |

All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.
Cin = 560 µF, Cout = 0 µF.

## GENERAL SPECIFICATIONS

| | | |
|---|---|---|
| Efficiency | | See Efficiency Table |
| Insulation voltage | | Non-isolated |
| Switching frequency | Over Vin and Io ranges | Suffix 'W': 350 kHz typical<br>Suffix 'L': 250 kHz typical |
| Approvals and standards | | EN60950, UL/cUL60950 |
| Material flammability | | UL94V-0 |
| Dimensions | L x W x H | 25.27 x 15.75 x 9.00 mm<br>0.995 x 0.620 x 0.354 in |
| Weight | | 5 g (0.18 oz) |
| MTBF | Telcordia SR-332 | 7,092,000 hours |

## EMC CHARACTERISTICS

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

## ENVIRONMENTAL SPECIFICATIONS

| | | |
|---|---|---|
| Thermal performance (See Note 2) | Operating ambient temperature<br>Non-operating temperature | -40 °C to +85 °C<br>-40 °C to +125 °C |
| MSL ('Z' suffix only) | JEDEC J-STD-020C | Level 3 |
| Protection | | |
| Short-circuit | Auto reset | 20 A typical |

## ORDERING INFORMATION

| Model Number[9] | Output Power (Max.) | Input Voltage | Output Voltage | Output Current (Min.) | Output Current (Max.) | Efficiency (Typical) | Regulation | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Line | Load |
| PTH12060L | 55 W | 10.8 - 13.2 Vdc | 0.8 - 1.8 Vdc | 0 A | 10 A | 88% | ±10 mV | ±12 mV |
| PTH12060W | 55 W | 10.8 - 13.2 Vdc | 1.2 - 5.5 Vdc | 0 A | 10 A | 94% | ±10 mV | ±12 mV |

## PART NUMBER SYSTEM WITH OPTIONS

| Product Family | Input Voltage | Output Current | Mechanical Package | Output Voltage Code | Pin Option [8] | Mounting Options | Pin Option |
|---|---|---|---|---|---|---|---|
| PTH | 12 | 06 | 0 | W | A | S | T |
| Point-of-Load Alliance compatible | 12 = 12 V | 06 = 10 A | Always 0 | W = Wide<br>L = Low Voltage | | D = Horizontal through-hole (RoHS 6/6)<br>Z = Surface-mount solder ball (RoHS 6/6) | No Suffix = Trays<br>T = Tape and Reel[8] |

## OUTPUT VOLTAGE ADJUSTMENT

The ultra-wide output voltage trim range offers major advantages to users who select the PTH12060. It is no longer necessary to purchase a variety of modules in order to cover different output voltages. The output voltage can be trimmed in a range of 1.2 Vdc to 5.5 Vdc for suffix 'W' and 0.8 Vdc to 1.8 Vdc for suffix 'L'. When the PTH12060 converter leaves the factory the output has been adjusted to the default voltage of 1.2 V for the PTH12060W and 0.8 V for the PTH12060L.

| **Efficiency Table: PTH12060W (Io = 8 A)** | |
|---|---|
| Output Voltage | Efficiency |
| Vo = 5.0 V | 94% |
| Vo = 3.3 V | 92% |
| Vo = 2.5 V | 90% |
| Vo = 2.0V | 88% |
| Vo = 1.8 V | 87% |
| Vo = 1.5 V | 85% |
| Vo = 1.2 V | 83% |
| **Efficiency Table: PTH12060L (Io = 8 A)** | |
| Output Voltage | Efficiency |
| Vo = 1.8 V | 88% |
| Vo = 1.5 V | 87% |
| Vo = 1.2 V | 84% |
| Vo = 1.0 V | 82% |
| Vo = 0.8 V | 79% |

Notes:
1. Remote ON/OFF. Positive Logic
   ON: Pin 3 open; or V > Vin - 0.5 V
   OFF: Pin 3 GND; or V < 0.8 V (min - 0.2 V).
2. See Figures 1, 2 and 3 for safe operating curves of PTH12060W and Figures 6, 7 and 8 for safe operating curves of PTH12060L.
3. A 560 µF electrolytic input capacitor is required for proper operation. The capacitor must be rated for a minimum of 800 mA rms of ripple current.
4. An external output capacitor is not required for basic operation. Adding 330 µF of distributed capacitance at the load will improve the transient response.
5. 1 A/µs load step, 50 to 100% Iomax, Cout = 330 µF.
6. If utilized Vout will track applied voltage by ±0.3 V (up to Vo set point).
7. Tape and reel packaging only available on the surface-mount versions.
8. The pk-pk output ripple voltage is measured with an external 10 µF ceramic capacitor. See Figures 5 and 8 for Standard application schematic.
9. 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 to find a suitable alternative.

## PTH12060W CHARACTERISTIC DATA

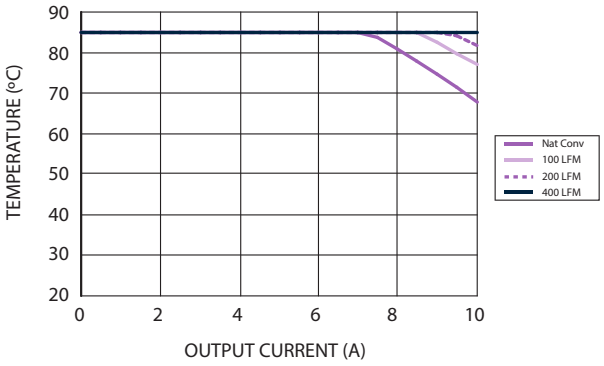



Figure 1 - Safe Operating Area
Vin = 12 V, Output Voltage = 5 V (See Note A)

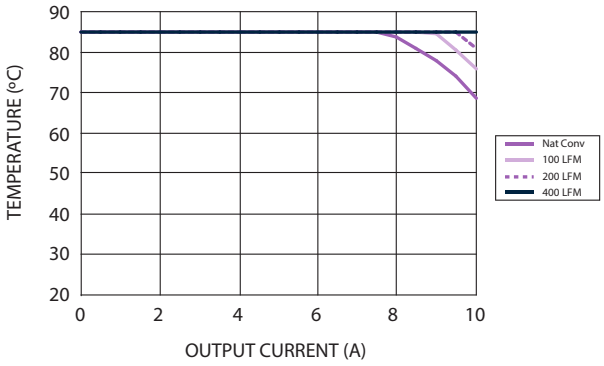



Figure 2 - Safe Operating Area
Vin = 12 V, Output Voltage = 3.3 V (See Note A)

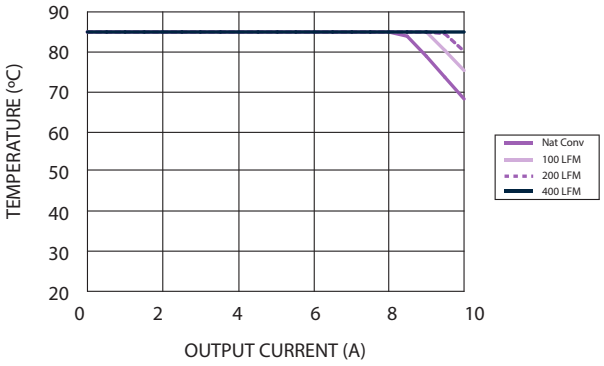



Figure 3 - Safe Operating Area
Vin = 12 V, Output Voltage = 1.8 V (See Note A)

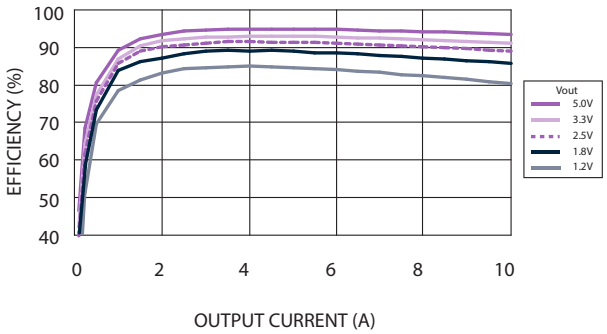



Figure 4 - Efficiency vs Load Current
Vin = 12 V (See Note B)

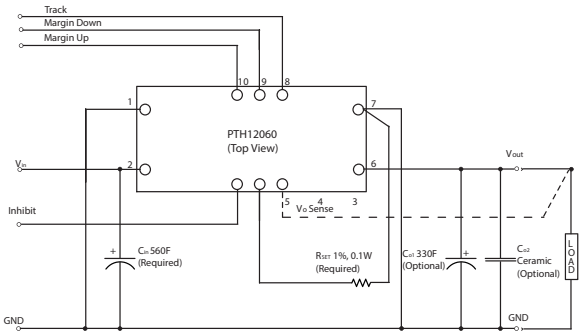



Figure 5 - Standard Application - All Models

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.

## PTH12060L CHARACTERISTIC DATA

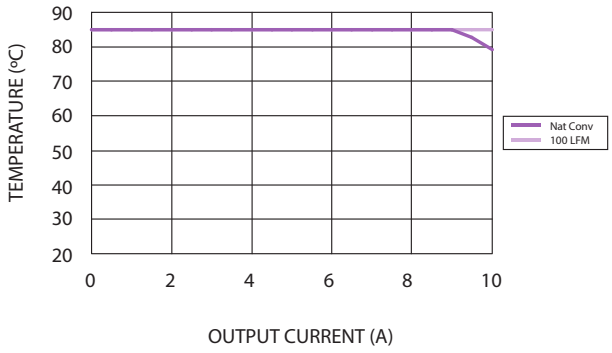



Figure 6 - Safe Operating Area
Vin = 12 V, Output Voltage = 1.8 V (See Note A)

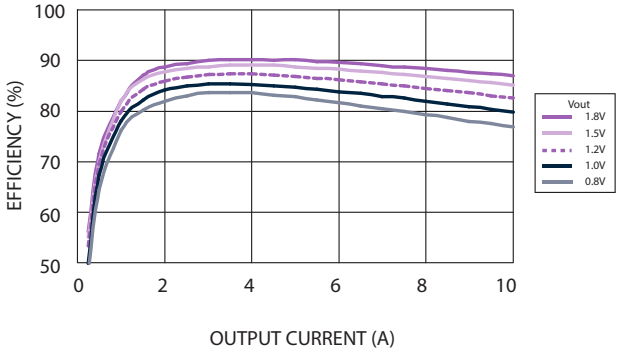



Figure 7 - Efficiency vs Load Current
Vin = 12 V (See Note B)

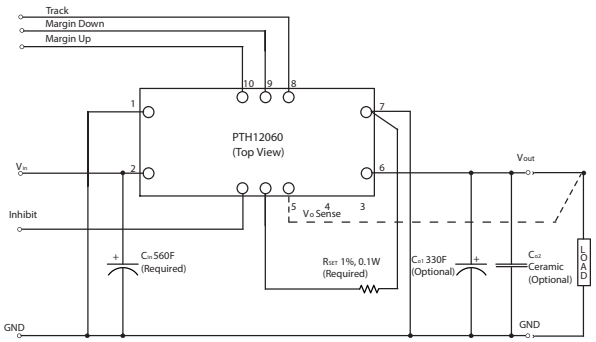
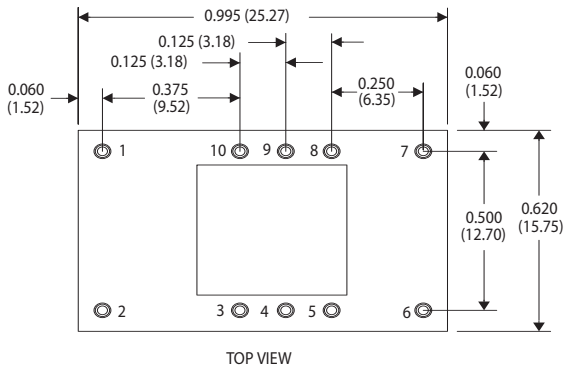


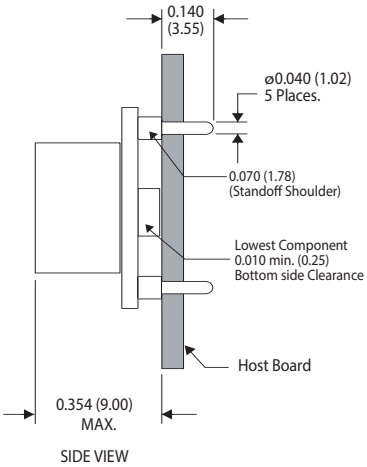

Figure 8 - Standard Application - All Models

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.

## MECHANICAL DRAWINGS

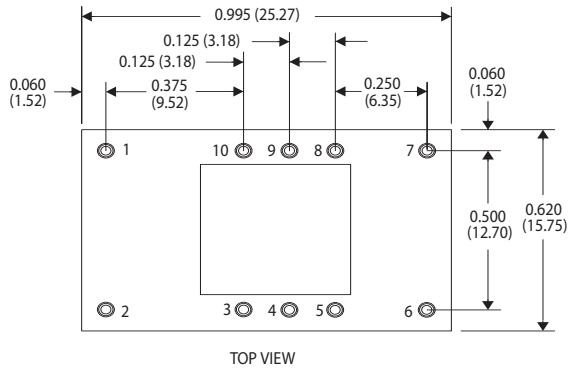
### Plated through-hole

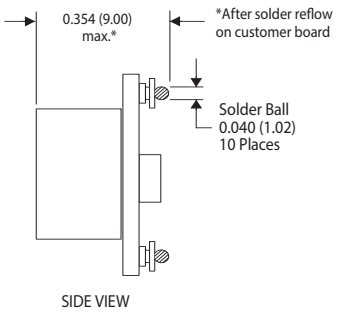



Dimensions in Inches (mm)
Tolerances (unless otherwise specified)
2 Places 0.030 (0.76)
3 Places 0.010 (0.25)

### Surface-mount




Dimensions in Inches (mm)
Tolerances (unless otherwise specified)
2 Places 0.030 (0.76)
3 Places 0.010 (0.25)

| Pin Assignments | |
|---|---|
| Pin | Function |
| 1 | Ground |
| 2 | Vin |
| 3 | Inhibit* |
| 4 | Vo adjust |
| 5 | Vo sense |
| 6 | Vout |
| 7 | Ground |
| 8 | Track |
| 9 | Margin down* |
| 10 | Margin up* |
| *Denotes negative logic:<br>Open = Normal operation<br>Ground = Function active | |

## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE

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