

### Features

- ◆ 2" x 1" metal package
- ◆ Ultra wide 4:1 input voltage range  
9–36, 18–75, 43–160 VDC
- ◆ EN 50155 approval for railway applications
- ◆ Thermal shock and vibration resistant according EN 61373
- ◆ High efficiency up to 92%
- ◆ No minimum load required
- ◆ Operating temperature range  
–40°C to +85°C
- ◆ Under voltage lock-out circuit
- ◆ Remote On/Off
- ◆ Output voltage adjustable
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty



The TEN 40WIR series is a family of high performance 40 Watt dc/dc converter modules featuring ultra wide 4:1 input voltage ranges in a 2" x 1" package with industry-standard footprint. Input voltages up to 160 VDC, excellent EMC characteristics and EN 50155 approval make this product the best choice for many demanding applications in railroad and transportation systems. Further standard features include remote On/Off, over voltage protection, under voltage lockout and short circuit protection. Low input current characteristics at minimal load make these converters also the ideal solution for battery-operated systems. Typical applications are in wireless networks, telecom/datacom, industry control systems and measurement equipments.

### Models

| Order code                                                                                                                                   | Input voltage range                      | Output voltage                                                                              | Output current max.                                                                      | Efficiency typ.                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| TEN 40-2410WIR<br>TEN 40-2411WIR<br>TEN 40-2412WIR<br>TEN 40-2413WIR<br>TEN 40-2415WIR<br>TEN 40-2422WIR<br>TEN 40-2423WIR<br>TEN 40-2425WIR | <b>9 – 36 VDC</b><br>(24 VDC nominal)    | 3.3 VDC<br>5.0 VDC<br>12 VDC<br>15 VDC<br>24 VDC<br>±12 VDC<br>±15 VDC<br>±24 VDC (48 VDC)* | 10'000 mA<br>8000 mA<br>3333 mA<br>2666 mA<br>1666 mA<br>±1666 mA<br>±1333 mA<br>±833 mA | 90 %<br>91 %<br>91 %<br>91 %<br>91 %<br>90 %<br>90 %<br>91 % |
| TEN 40-4810WIR<br>TEN 40-4811WIR<br>TEN 40-4812WIR<br>TEN 40-4813WIR<br>TEN 40-4815WIR<br>TEN 40-4822WIR<br>TEN 40-4823WIR<br>TEN 40-4825WIR | <b>18 – 75 VDC</b><br>(48 VDC nominal)   | 3.3 VDC<br>5.0 VDC<br>12 VDC<br>15 VDC<br>24 VDC<br>±12 VDC<br>±15 VDC<br>±24 VDC (48 VDC)* | 10'000 mA<br>8000 mA<br>3333 mA<br>2666 mA<br>1666 mA<br>±1666 mA<br>±1333 mA<br>±833 mA | 90 %<br>91 %<br>92 %<br>92 %<br>91 %<br>90 %<br>90 %<br>91 % |
| TEN 40-7210WIR<br>TEN 40-7211WIR<br>TEN 40-7212WIR<br>TEN 40-7213WIR<br>TEN 40-7215WIR<br>TEN 40-7222WIR<br>TEN 40-7223WIR<br>TEN 40-7225WIR | <b>43 – 160 VDC</b><br>(110 VDC nominal) | 3.3 VDC<br>5.0 VDC<br>12 VDC<br>15 VDC<br>24 VDC<br>±12 VDC<br>±15 VDC<br>±24 VDC (48 VDC)* | 10'000 mA<br>8000 mA<br>3333 mA<br>2666 mA<br>1666 mA<br>±1666 mA<br>±1333 mA<br>±833 mA | 88 %<br>89 %<br>90 %<br>90 %<br>90 %<br>89 %<br>89 %<br>81 % |

\* The outputs can also be used in serial circuit for single 48 VDC operation. Free-wheeling diodes are not necessary but recommended for increased performance for start-up with inductive/capacitive load and at dynamic load operation.

## Input Specifications

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input current (no load)                    | 24 Vin models: 15 mA typ.<br>48 Vin models: 10 mA typ.<br>110 Vin models: 6 mA typ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Start-up voltage                           | 24 Vin models: < 9.0 VDC<br>48 Vin models: < 18 VDC<br>110 Vin models: < 43 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Under voltage shut down (lock-out circuit) | 24 Vin models: 8.0 VDC typ.<br>48 Vin models: 16 VDC typ.<br>110 Vin models: 40 VDC typ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Surge voltage (1 sec.)                     | 24 Vin models: 50 V max.<br>48 Vin models: 100 V max.<br>110 Vin models: 170 V max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Reflected ripple current                   | 20 mAp-p typ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Conducted noise                            | EN 55022 class A with external components<br>– see application note document<br><a href="http://www.tracopower.com/overview/ten40wir">www.tracopower.com/overview/ten40wir</a>                                                                                                                                                                                                                                                                                                                                                                              |
| EMC immunity                               | EN 50155, EN 50121-3-2<br>– ESD (electrostatic discharge) EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A<br>– Radiated immunity EN 61000-4-3, 20 V/m, perf. criteria A<br>– Fast transient / surge (with external input capacitor) EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 2$ kV perf. criteria A<br>24 & 48 Vin models: Nippon chemi-con KY 220 $\mu$ F, 100 V, ESR 48 mOhm<br>110 Vin models: Ruby-con BXF 68 $\mu$ F, 200 V, 3pcs in parallel.<br>– Conducted immunity EN 61000-4-6, 10 V, perf. criteria A |

## Output Specifications

|                                                                         |                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage set accuracy                                                    | $\pm 1$ %                                                                                                                                                                                                        |
| Voltage adjustment range (single output models only)                    | 15 & 24 VDC models: +20 %, -10 %<br>other models: $\pm 10$ %                                                                                                                                                     |
| Regulation                                                              | – Input variation Vin min. to Vin max. 0.2 % max.<br>– Load variation 0 – 100 % single output models: 0.5 % max.<br>dual output models: 1 % max. (balanced load)<br>5 % max. (load cross variation 25 % / 100 %) |
| Minimum load                                                            | not required                                                                                                                                                                                                     |
| Temperature coefficient                                                 | $\pm 0.02$ %/K                                                                                                                                                                                                   |
| Ripple and noise (20 MHz bandwidth, measured with 1 $\mu$ F/ 50 V MLCC) | 3.3 & 5.0 VDC models: 75 mVp-p max.<br>24 VDC models: 150 mVp-p max.<br>other models: 100 mVp-p max.                                                                                                             |
| Start up time                                                           | – Power On 60 ms typ.<br>(constant resistive load) – Remote On 60 ms typ.                                                                                                                                        |
| Transient response (25% load step change)                               | 250 $\mu$ s typ.                                                                                                                                                                                                 |
| Short circuit protection                                                | indefinite (automatic recovery)                                                                                                                                                                                  |
| Over load protection                                                    | 150 % of lout max. typ.                                                                                                                                                                                          |
| Over voltage protection (only single output models)                     | 3.3 VDC models: 3.9 V<br>5 VDC models: 6.2 V<br>12 VDC models: 15 V<br>15 VDC models: 20 V<br>24 VDC models: 31 V                                                                                                |

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## Output Specifications

|                               |                 |                       |
|-------------------------------|-----------------|-----------------------|
| Capacitive load (max. values) | 3.3 VDC models: | 26'600 µF             |
|                               | 5.0 VDC models: | 20'000 µF             |
|                               | 12 VDC models:  | 3900 µF               |
|                               | 15 VDC models:  | 2600 µF               |
|                               | 24 VDC models:  | 1300 µF               |
|                               | ±12 VDC models: | 2600 µF (each output) |
|                               | ±15 VDC models: | 1600 µF (each output) |
|                               | ±24 VDC models: | 650 µF (each output)  |

## General Specifications

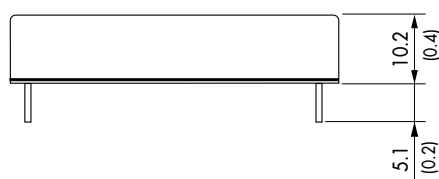
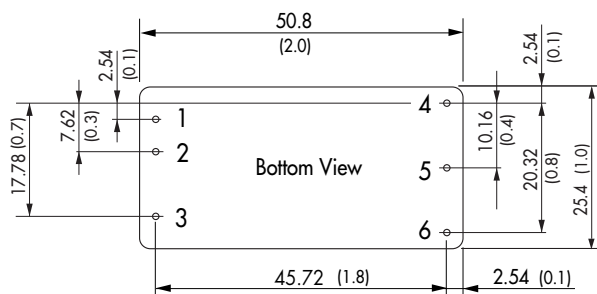
|                                                                       |                                                |                                                                                                |
|-----------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------|
| Temperature ranges                                                    | – Operating                                    | –40°C to +85°C (with derating)                                                                 |
|                                                                       | – Casing temperature                           | +105°C max.                                                                                    |
|                                                                       | – Storage                                      | –55°C to +125°C                                                                                |
| Power derating                                                        | – Natural convection                           | 2.5 %/K above +60°C                                                                            |
|                                                                       | – Natural convection with heat sink (optional) | 2.8 %/K above +65°C                                                                            |
| Thermal impedance                                                     | – Natural convection                           | 10.8 K/W                                                                                       |
|                                                                       | – Natural convection with heat sink (optional) | 10.3 K/W                                                                                       |
| Humidity (non condensing)                                             |                                                | 5 – 95 % rel. H                                                                                |
| Isolation voltage (60 sec.)                                           | – Input / Output                               | 1600 VDC                                                                                       |
| Isolation resistance                                                  | – Input / Output                               | >10'000 M Ohm                                                                                  |
| Isolation capacitance                                                 | – Input / Output                               | 1'500 pF max.                                                                                  |
| Switching frequency                                                   |                                                | 250 kHz typ. (pulse width modulation PWM)                                                      |
| Thermal shock, mechanical shock & vibration                           |                                                | EN 50155, EN 61373                                                                             |
| Safety approvals                                                      | – UL                                           | UL/cUL 60950-1                                                                                 |
|                                                                       | – CB test certificate                          | IEC/EN 60950-1                                                                                 |
|                                                                       | – certification documents                      | <a href="http://www.tracopower.com/overview/ten40wir">www.tracopower.com/overview/ten40wir</a> |
| Remote On/Off                                                         | – On:                                          | 3.0 ... 12 VDC or open circuit                                                                 |
|                                                                       | – Off:                                         | 0 ... 1.2 VDC or short circuit pin 3 and pin 2                                                 |
|                                                                       | – Off idle current:                            | 3.0 mA                                                                                         |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) |                                                | 900'000 h                                                                                      |
| Environmental compliance                                              | – Reach document                               | <a href="http://www.tracopower.com/overview/ten40wir">www.tracopower.com/overview/ten40wir</a> |
|                                                                       | – RoHS                                         | RoHS directive 2011/65/EU                                                                      |

## Physical Specifications

|                       |                          |
|-----------------------|--------------------------|
| Casing material       | copper                   |
| Baseplate material    | non conductive FR4       |
| Potting material      | silicone (UL94V-0 rated) |
| Weight                | 21.5 g (0.76oz)          |
| Soldering temperature | max. +265°C / 10 sec.    |

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## Outline Dimensions



| Pin-Out |               |            |
|---------|---------------|------------|
| Pin     | Single        | Dual       |
| 1       | +Vin (Vcc)    | +Vin (Vcc) |
| 2       | -Vin (GND)    | -Vin (GND) |
| 3       | Remote On/Off |            |
| 4       | +Vout         | +Vout      |
| 5       | -Vout         | Common     |
| 6       | trim          | -Vout      |

Dimensions in [mm], (I) = Inch  
Pin diameter:  $1.0 \pm 0.1$  ( $0.04 \pm 0.004$ )  
Pin pitch tolerances:  $\pm 0.25$  ( $\pm 0.01$ )  
Case tolerances:  $\pm 0.5$  ( $\pm 0.02$ )

3D drawings and application note at: [www.tracopower.com/overview/ten40wir](http://www.tracopower.com/overview/ten40wir)

## Heat-Sink (Option)

**Order code:** TEN-HS1

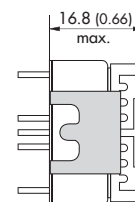
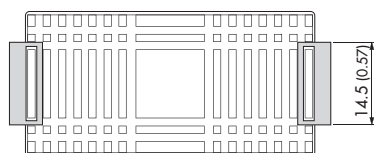
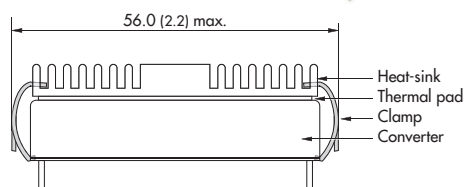
(cont.: heat-sink, thermal pad, 2 clamps)

**Material:** Aluminum

**Finish:** Anodic treatment (black)

**Weight:** 17 g (0.60oz) without converter

Thermal impedance after assembling: 10.3 K/W



**Note:**

Before attaching the heatsink, the product label on converter has to be removed for optimal performance.

For volume orders we can supply the converters with heatsink already mounted. Please contact us for a relative quotation.

Dimensions in mm, (I) = Inch

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)