

## DC/DC Converter

## TEL 15WIN-HS Series, 15 Watt

- Ultra compact 15 Watt converter in DIP-16 metal casing
- Special heatsink-case design for maximized temperature capabilities
- Operating temperature range -40°C to +70°C without derating
- Wide 4:1 input voltage ranges: 9-36, 18-75 VDC
- High efficiency (up to 87%) for low thermal loss
- 6-side shielded metal case with insulated baseplate
- Built-In EN 55032 class A filter (conducted)
- Protection against short circuit
- 3-year product warranty



The TEL 15WIN-HS is a series of isolated 15 Watt converters which come in an ultra compact DIP-16 metal package with a special heatsink-case design for extended temperature capabilities. The design purpose of this series was to maximize temperature capabilities within the standard DIP-16 footprint. The TEL 15WIN-HS offers a wide 4:1 input voltage range and features a high efficiency of up to 87% which together with the integrated heatsink casing enables an operation temperature of up to +70°C at full load and up to 85°C with 50% load. The converters also have an internal input filter to comply with conducted emission standard EN 55032 class A. It's an economical solution for space critical and cost sensitive applications in instrumentation, IT and industrial electronics where operating temperature range is critical factor.

### Models

| Order Code        | Input Voltage Range          | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|-------------------|------------------------------|----------|------------------|----------|------------------|-----------------|
|                   |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TEL 15-2411WIN-HS | 9 - 36 VDC<br>(24 VDC nom.)  | 5.1 VDC  | 2'940 mA         |          |                  | 86 %            |
| TEL 15-2412WIN-HS |                              | 12 VDC   | 1'250 mA         |          |                  | 87 %            |
| TEL 15-2413WIN-HS |                              | 15 VDC   | 1'000 mA         |          |                  | 87 %            |
| TEL 15-2415WIN-HS |                              | 24 VDC   | 625 mA           |          |                  | 87 %            |
| TEL 15-2422WIN-HS |                              | +12 VDC  | 625 mA           | -12 VDC  | -625 mA          | 87 %            |
| TEL 15-2423WIN-HS |                              | +15 VDC  | 500 mA           | -15 VDC  | -500 mA          | 87 %            |
| TEL 15-4811WIN-HS | 18 - 75 VDC<br>(48 VDC nom.) | 5.1 VDC  | 2'940 mA         |          |                  | 86 %            |
| TEL 15-4812WIN-HS |                              | 12 VDC   | 1'250 mA         |          |                  | 87 %            |
| TEL 15-4813WIN-HS |                              | 15 VDC   | 1'000 mA         |          |                  | 87 %            |
| TEL 15-4815WIN-HS |                              | 24 VDC   | 625 mA           |          |                  | 87 %            |
| TEL 15-4822WIN-HS |                              | +12 VDC  | 625 mA           | -12 VDC  | -625 mA          | 87 %            |
| TEL 15-4823WIN-HS |                              | +15 VDC  | 500 mA           | -15 VDC  | -500 mA          | 87 %            |

Note - 48 Vin models: If the input will be switched electromechanically, use an external 27 µF / 200 V / KXY capacitor to reduce voltage transient.

## Input Specifications

|                        |                |                                                                                 |
|------------------------|----------------|---------------------------------------------------------------------------------|
| Input Current          | - At no load   | 24 Vin models: 10 mA typ.<br>48 Vin models: 7 mA typ.                           |
|                        | - At full load | 24 Vin models: 720 mA typ.<br>48 Vin models: 360 mA typ.                        |
| Surge Voltage          |                | 24 Vin models: 50 VDC max. (1 s max.)<br>48 Vin models: 100 VDC max. (1 s max.) |
|                        |                | 36.6 A typ. (24 Vin models)<br>34.2 A typ. (48 Vin models)                      |
| Input Inrush Current   |                |                                                                                 |
| Under Voltage Lockout  |                | 24 Vin models: 8 VDC typ.<br>48 Vin models: 16 VDC typ.                         |
| Recommended Input Fuse |                | 24 Vin models: 3'000 mA (slow blow)<br>48 Vin models: 1'500 mA (slow blow)      |
|                        |                | (The need of an external fuse has to be assessed in the final application.)     |
| Input Filter           |                | Internal Pi-Type                                                                |

## Output Specifications

|                           |                                               |                                                                                                                             |
|---------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Voltage Set Accuracy      |                                               | ±1% max.                                                                                                                    |
| Regulation                | - Input Variation (Vmin - Vmax)               | single output models: 0.8% max.<br>dual output models: 0.8% max.                                                            |
|                           | - Load Variation (0 - 100%)                   | single output models: 1% max.<br>dual output models: 1% max. (Output 1)<br>1% max. (Output 2)                               |
|                           | - Voltage Balance<br>(symmetrical load)       | dual output models: 2% max.                                                                                                 |
|                           | - Cross Regulation<br>(25% / 100% asym. load) | dual output models: 5% max.                                                                                                 |
|                           |                                               |                                                                                                                             |
| Ripple and Noise          | - 20 MHz Bandwidth                            | 70 mVp-p typ. (w/ 2.2 µF / 50 V MLCC)                                                                                       |
| Capacitive Load           | - single output                               | 5.1 Vout models: 1'800 µF max.<br>12 Vout models: 820 µF max.<br>15 Vout models: 820 µF max.<br>24 Vout models: 270 µF max. |
|                           | - dual output                                 | 12 / -12 Vout models: 560 / 560 µF max.<br>15 / -15 Vout models: 270 / 270 µF max.                                          |
|                           |                                               |                                                                                                                             |
|                           |                                               |                                                                                                                             |
|                           |                                               |                                                                                                                             |
|                           |                                               |                                                                                                                             |
| Minimum Load              |                                               | Not required                                                                                                                |
| Temperature Coefficient   |                                               | ±0.02 %/K max.                                                                                                              |
| Start-up Time             |                                               | 40 ms max.                                                                                                                  |
| Short Circuit Protection  |                                               | Continuous, Automatic recovery (Hiccup Mode, Automatic Recovery)                                                            |
| Output Current Limitation |                                               | 110% min. of Iout max.<br>160% typ. of Iout max.                                                                            |
| Transient Response        | - Response Deviation                          | 3% typ. / 5% max. (75% to 100% Load Step)                                                                                   |
|                           | - Response Time                               | 500 µs max. (75% to 100% Load Step)                                                                                         |

## Safety Specifications

|                       |                             |                                                                                                      |
|-----------------------|-----------------------------|------------------------------------------------------------------------------------------------------|
| Standards             | - IT / Multimedia Equipment | EN 62368-1<br>IEC 62368-1<br>UL 62368-1                                                              |
|                       | - Certification Documents   | <a href="http://www.tracopower.com/overview/tel15win-hs">www.tracopower.com/overview/tel15win-hs</a> |
| Pollution Degree      |                             | PD 3                                                                                                 |
| Over Voltage Category |                             | Not mains connected                                                                                  |

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

## EMC Specifications

|                     |                             |                                                                                                                                |
|---------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| EMI (Emissions)     | - Conducted Emissions       | EN 55032 class A (internal filter)                                                                                             |
|                     | - Radiated Emissions        | EN 55032 class B (with external filter)                                                                                        |
|                     |                             | EN 55032 class A (with external filter)                                                                                        |
|                     |                             | EN 55032 class B (with external filter)                                                                                        |
|                     |                             | External filter proposal: <a href="http://www.tracopower.com/overview/tel15win-hs">www.tracopower.com/overview/tel15win-hs</a> |
| EMS (Immunity)      |                             | EN 55024 (IT Equipment)                                                                                                        |
|                     |                             | EN 55035 (Multimedia)                                                                                                          |
|                     | - Electrostatic Discharge   | Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A                                                                                |
|                     |                             | Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A                                                                            |
|                     | - RF Electromagnetic Field  | EN 61000-4-3, 20 V/m, perf. criteria A                                                                                         |
|                     | - EFT (Burst) / Surge       | EN 61000-4-4, $\pm 2$ kV, perf. criteria A                                                                                     |
|                     |                             | EN 61000-4-5, $\pm 2$ kV, perf. criteria A                                                                                     |
|                     |                             | External filter proposal: <a href="http://www.tracopower.com/overview/tel15win-hs">www.tracopower.com/overview/tel15win-hs</a> |
|                     | - Conducted RF Disturbances | EN 61000-4-6, 10 Vrms, perf. criteria A                                                                                        |
|                     | - PF Magnetic Field         | Continuous: EN 61000-4-8, 30 A/m, perf. criteria A                                                                             |
| EMC / Environmental | - Certification Documents   | <a href="http://www.tracopower.com/overview/tel15win-hs">www.tracopower.com/overview/tel15win-hs</a>                           |

## General Specifications

|                           |                                 |                                                                                                                                   |
|---------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Relative Humidity         |                                 | 95% max. (non condensing)                                                                                                         |
| Temperature Ranges        | - Operating Temperature         | -40°C to +85°C                                                                                                                    |
|                           | - Case Temperature              | +110°C max.                                                                                                                       |
|                           | - Storage Temperature           | -50°C to +125°C                                                                                                                   |
| Power Derating            | - High Temperature              | 1 %/K above 70°C (average)                                                                                                        |
|                           |                                 | See application note: <a href="http://www.tracopower.com/overview/tel15win-hs">www.tracopower.com/overview/tel15win-hs</a>        |
| Cooling System            |                                 | Natural convection (20 LFM)                                                                                                       |
| Altitude During Operation |                                 | 6'000 m max.                                                                                                                      |
| Regulator Topology        |                                 | Flyback Converter                                                                                                                 |
| Switching Frequency       |                                 | 420 - 540 kHz (PWM)                                                                                                               |
| Insulation System         |                                 | Functional Insulation                                                                                                             |
| Isolation Test Voltage    | - Input to Output, 60 s         | 1'500 VDC                                                                                                                         |
|                           | - Input to Output, 1 s          | 1'800 VDC                                                                                                                         |
|                           | - Input to Case, 60 s           | 1'000 VDC                                                                                                                         |
|                           | - Output to Case, 60 s          | 1'000 VDC                                                                                                                         |
| Isolation Resistance      | - Input to Output, 500 VDC      | 1'000 M $\Omega$ min.                                                                                                             |
| Isolation Capacitance     | - Input to Output, 100 kHz, 1 V | 2'200 pF max.                                                                                                                     |
| Reliability               | - Calculated MTBF               | 2'000'000 h (MIL-HDBK-217F, ground benign)                                                                                        |
| Washing Process           |                                 | According to Cleaning Guideline<br><a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a> |
| Environment               | - Vibration                     | 2.4 g, 3 axis, random waveform, 30 min                                                                                            |
|                           | - Mechanical Shock              | 30 g, 3 axis, half sine, 11 ms                                                                                                    |
|                           | - Thermal Shock                 | IPC-9592B                                                                                                                         |
| Housing Material          |                                 | Aluminum                                                                                                                          |
| Potting Material          |                                 | Silicone (UL 94 V-0 rated)                                                                                                        |
| Pin Material              |                                 | Copper Alloy (C6801)                                                                                                              |
| Pin Foundation Plating    |                                 | Nickel (2 - 4 $\mu$ m)                                                                                                            |
| Pin Surface Plating       |                                 | Tin (3 - 5 $\mu$ m), matte                                                                                                        |
| Housing Type              |                                 | Metal Case                                                                                                                        |
| Mounting Type             |                                 | PCB Mount                                                                                                                         |
| Connection Type           |                                 | THD (Through-Hole Device)                                                                                                         |
| Footprint Type            |                                 | DIP16                                                                                                                             |
| Soldering Profile         |                                 | Lead-Free Wave Soldering<br>260°C / 10 s max.                                                                                     |
| Weight                    |                                 | 14.2 g                                                                                                                            |
| Thermal Impedance         | - Case to Ambient               | 18.4 K/W typ.                                                                                                                     |

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

## Environmental Compliance - REACH Declaration

- RoHS Declaration

- SCIP Reference Number

[www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)

REACH SVHC list compliant

REACH Annex XVII compliant

[www.tracopower.com/info/rohs-declaration.pdf](http://www.tracopower.com/info/rohs-declaration.pdf)

Exemptions: 7(a)

(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)

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## Additional Information

Supporting Documents

[www.tracopower.com/overview/tel15win-hs](http://www.tracopower.com/overview/tel15win-hs)

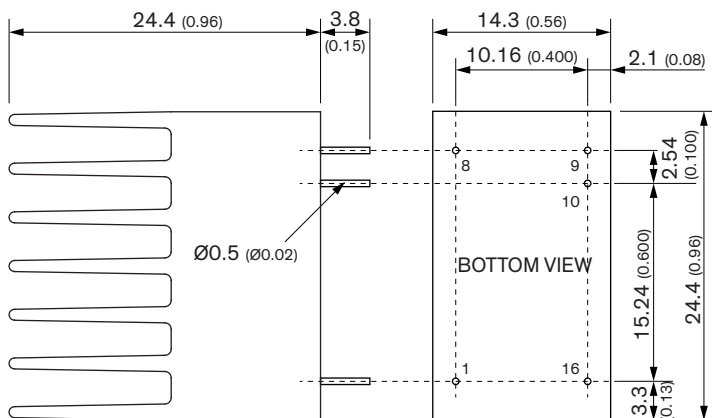
## Frequently Asked Questions

[www.tracopower.com/glossary-faq](http://www.tracopower.com/glossary-faq)

## Glossary

[www.tracopower.com/info/glossary.pdf](http://www.tracopower.com/info/glossary.pdf)

## Outline Dimensions



Dimensions in mm (inch)

Tolerances: X.X ±0.5 (X.XX ±0.02)

X.XX ±0.25 (X.XXX ±0.01)

Pin diameter tolerances:  $X.X \pm 0.05$  ( $X.XX \pm 0.002$ )

| Pinout |        |        |
|--------|--------|--------|
| Pin    | Single | Dual   |
| 1      | -Vin   |        |
| 8      | NC     | Common |
| 9      | +Vout  |        |
| 10     | -Vout  |        |
| 16     | +Vin   |        |

NC: Not connected

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