



# TRE15 SERIES 15 WATT AC-DC I.T.E SWITCHING ADAPTER

## Features

- Universal Input Range 90~264Vac
- High Efficiency up to 86%
- Class II
- No Load Power Consumption < 75mW
- Approval IEC/EN/UL 62368-1
- Approval EN55032 and CISPR/FCC Class B
- Operating Altitude 5000m
- Over Voltage Protection
- Continuous Short Circuit Protection
- Meets CoC Tier 2 & DoE Level VI



| MODEL NUMBER | OUTPUT VOLTAGE | OUTPUT CURRENT | VOLTAGE ACCURACY NOTE1 | RIPPLE& NOISE NOTE2 | LINE REGULATION NOTE3 | LOAD REGULATION NOTE4 | %EFF. (Typ.) NOTE5 |
|--------------|----------------|----------------|------------------------|---------------------|-----------------------|-----------------------|--------------------|
| TRE15050     | 5 V            | 2 A            | ±2%                    | 50 mV               | ±1%                   | ±4%                   | 79%                |
| TRE15090     | 9 V            | 1.4 A          | ±2%                    | 90 mV               | ±1%                   | ±2%                   | 84%                |
| TRE15120     | 12 V           | 1 A            | ±2%                    | 100 mV              | ±1%                   | ±2%                   | 83%                |
| TRE15150     | 15 V           | 1 A            | ±2%                    | 100 mV              | ±1%                   | ±2%                   | 85%                |
| TRE15240     | 24 V           | 0.63 A         | ±2%                    | 100 mV              | ±1%                   | ±2%                   | 86%                |

Note:

1. Voltage accuracy is set at 60% full load.
2. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz BW.
3. Line regulation is measured from 100V<sub>ac</sub> to 240V<sub>ac</sub> with 100% full load.
4. Load regulation is measured from 60% to 100% full load and from 60% to 20% full load (60%±40% full load).
5. Typical efficiency at 230 V<sub>ac</sub> and 75% full load at 25°C.

## PART NUMBER

| Series                  | Output Voltage                                              | AC Plug Type                                        | DC Plug Type | Cable Type          | Cable Length                                                                                                                                                                              |
|-------------------------|-------------------------------------------------------------|-----------------------------------------------------|--------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TRE15                   | XXX                                                         | -X                                                  | -XX          | X                   | XX                                                                                                                                                                                        |
| 15W<br>I.T.E<br>Adapter | 050 : 5V<br>090 : 9V<br>120 : 12V<br>150 : 15V<br>240 : 24V | A: USA 2 Pin<br>E: Europe 2 Pin<br>U: British 3 Pin | See Page 5   | G : UL1571 with OVP | 01 : 720mm<br>02 : 1220mm<br>03 : 1800mm<br>11 : 720mm with Ferrite Core<br>12 : 1220mm with Ferrite Core<br>13 : 1800mm with Ferrite Core<br><a href="#">See page 5 for restrictions</a> |

Part Number Example:

**TRE15120-A-01G03**, 12V<sub>dc</sub> Output, AC Plug Type, DC Jack Type, Cable Length 1800mm



# TRE15 Series

## TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                  | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units           |
|----------------------------|----------------------|--------|------|------|------|-----------------|
| Input Voltage              |                      | All    | 90   |      | 264  | V <sub>ac</sub> |
| Operating Case Temperature | See Derating Curve   | All    | -20  |      | 60   | °C              |
| Storage Temperature        |                      | All    | -20  |      | 85   | °C              |
| Operating Altitude         |                      | All    |      |      | 5000 | m               |

### INPUT CHARACTERISTICS

| PARAMETER               | NOTES and CONDITIONS                                     | Device | Min. | Typ. | Max. | Units           |
|-------------------------|----------------------------------------------------------|--------|------|------|------|-----------------|
| Operating Voltage Range |                                                          | All    | 100  |      | 240  | V <sub>ac</sub> |
| Input Frequency Range   |                                                          | All    | 47   |      | 63   | Hz              |
| Maximum Input Current   | 100% Full load, V <sub>in</sub> =100V <sub>ac</sub>      | All    |      |      | 0.5  | A               |
| Leakage Current         |                                                          | All    |      |      | 250  | uA              |
| Inrush Current          | V <sub>in</sub> =240V <sub>ac</sub> , Cold start at 25°C | All    |      |      | 50   | A               |

### OUTPUT CHARACTERISTICS

| PARAMETER                      | NOTES and CONDITIONS                                                                                                                                        | Device   | Min.  | Typ. | Max.  | Units           |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|------|-------|-----------------|
| Output Voltage Set Point       | V <sub>in</sub> =115V <sub>ac</sub> and 230V <sub>ac</sub> , I <sub>o</sub> =60% Full load<br>T <sub>c</sub> =25°C                                          | TRE15050 | 4.9   | 5    | 5.1   | V <sub>dc</sub> |
|                                |                                                                                                                                                             | TRE15090 | 8.82  | 9    | 9.18  |                 |
|                                |                                                                                                                                                             | TRE15120 | 11.76 | 12   | 12.24 |                 |
|                                |                                                                                                                                                             | TRE15150 | 14.7  | 15   | 15.30 |                 |
|                                |                                                                                                                                                             | TRE15240 | 23.52 | 24   | 24.48 |                 |
| Operating Output Current Range | V <sub>in</sub> =115V <sub>ac</sub> and 230V <sub>ac</sub> , T <sub>c</sub> =25°C                                                                           | TRE15050 |       |      | 2     | A               |
|                                |                                                                                                                                                             | TRE15090 |       |      | 1.4   |                 |
|                                |                                                                                                                                                             | TRE15120 |       |      | 1     |                 |
|                                |                                                                                                                                                             | TRE15150 |       |      | 1     |                 |
|                                |                                                                                                                                                             | TRE15240 |       |      | 0.63  |                 |
| Holdup Time                    | V <sub>in</sub> =115V <sub>ac</sub>                                                                                                                         | All      |       | 10   |       | ms              |
| Output Voltage Regulation      |                                                                                                                                                             |          |       |      |       |                 |
| Load Regulation                | 60%±40% Full load change                                                                                                                                    | TRE15050 |       |      | ±4.0  | %               |
|                                |                                                                                                                                                             | TRE15090 |       |      | ±2.0  |                 |
|                                |                                                                                                                                                             | TRE15120 |       |      | ±2.0  |                 |
|                                |                                                                                                                                                             | TRE15150 |       |      | ±2.0  |                 |
|                                |                                                                                                                                                             | TRE15240 |       |      | ±2.0  |                 |
| Line Regulation                | V <sub>in</sub> =100V <sub>ac</sub> to 240V <sub>ac</sub>                                                                                                   | All      |       |      | ±1.0  | %               |
| Over Voltage Protection        | IC component to clamp (auto recovery)                                                                                                                       | TRE15050 |       |      | 7.14  | V <sub>dc</sub> |
|                                |                                                                                                                                                             | TRE15090 |       |      | 12.1  |                 |
|                                |                                                                                                                                                             | TRE15120 |       |      | 15.8  |                 |
|                                |                                                                                                                                                             | TRE15150 |       |      | 19.5  |                 |
|                                |                                                                                                                                                             | TRE15240 |       |      | 28.4  |                 |
| Over Current Protection        | Auto recovery                                                                                                                                               | All      | 110   |      | 160   | %               |
| Short Circuit Protection       | Auto recovery                                                                                                                                               | All      |       |      |       |                 |
| Output Ripple and Noise        | 1. Add a 0.1uF ceramic capacitor and a 10uF aluminum electrolytic capacitor to output<br>2. Oscilloscope is 20MHz band width<br>3. Ambient temperature=25°C | TRE15050 |       |      | 50    | mV              |
|                                |                                                                                                                                                             | TRE15090 |       |      | 90    |                 |
|                                |                                                                                                                                                             | TRE15120 |       |      | 100   |                 |
|                                |                                                                                                                                                             | TRE15150 |       |      | 100   |                 |
|                                |                                                                                                                                                             | TRE15240 |       |      | 100   |                 |



# TRE15 Series

| PARAMETER        | NOTES and CONDITIONS                                                                                     | Device   | Min. | Typ. | Max. | Units   |
|------------------|----------------------------------------------------------------------------------------------------------|----------|------|------|------|---------|
| Load Capacitance | 1. $V_{in}=115V_{ac}$ and $230V_{ac}$<br>2. Output is max. load<br>3. Ambient temperature= $25^{\circ}C$ | TRE15050 |      |      | 2000 | $\mu F$ |
|                  |                                                                                                          | TRE15090 |      |      | 1500 |         |
|                  |                                                                                                          | TRE15120 |      |      | 1000 |         |
|                  |                                                                                                          | TRE15150 |      |      | 1000 |         |
|                  |                                                                                                          | TRE15240 |      |      | 660  |         |
| Efficiency       | 1. $V_{in}=230V_{ac}$<br>2. Output is 75% full load<br>3. Ambient temperature= $25^{\circ}C$             | TRE15050 |      | 79   |      | %       |
|                  |                                                                                                          | TRE15090 |      | 84   |      |         |
|                  |                                                                                                          | TRE15120 |      | 83   |      |         |
|                  |                                                                                                          | TRE15150 |      | 85   |      |         |
|                  |                                                                                                          | TRE15240 |      | 86   |      |         |

## ISOLATION CHARACTERISTICS

| PARAMETER            | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units     |
|----------------------|----------------------|--------|------|------|------|-----------|
| Input to Output      | 1 minute             | All    |      |      | 3000 | $V_{ac}$  |
| Isolation Resistance | Input to output      | All    | 100  |      |      | $M\Omega$ |

## FEATURE CHARACTERISTICS

| PARAMETER           | NOTES and CONDITIONS             | Device | Min. | Typ. | Max. | Units |
|---------------------|----------------------------------|--------|------|------|------|-------|
| Switching Frequency | $V_{in}=115V_{ac}$ , $I_o=100\%$ | All    |      | 85   |      | kHz   |
|                     | $V_{in}=230V_{ac}$ , $I_o=100\%$ |        |      | 65   |      |       |

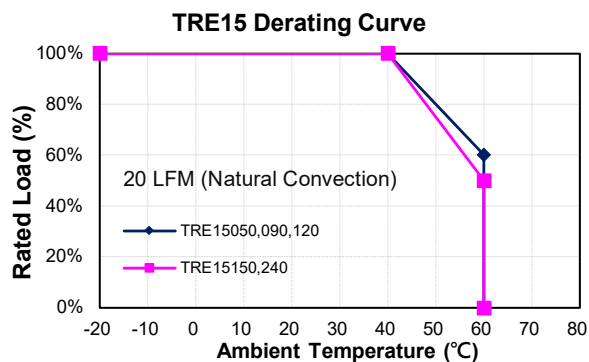
## GENERAL SPECIFICATIONS

| PARAMETER                                        | NOTES and CONDITIONS                                                                                                                                | Device | Min.                                               | Typ. | Max. | Units      |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------------|------|------|------------|
| MTBF                                             | $I_o=100\%$ ; $T_a=25^{\circ}C$ per MIL-HDBK-217F                                                                                                   | All    | 530                                                |      |      | k hours    |
| Humidity                                         | Non-condensing                                                                                                                                      | All    |                                                    |      | 93   | % RH       |
| Shock                                            | Meet MIL-STD-810F Table 516.5, Table 516.5-I 10ms, each axis 3 times ( $\pm X$ , $\pm Y$ , $\pm Z$ axis)                                            | All    |                                                    | 75   |      | g          |
| Vibration                                        | Meet MIL-STD-810F Table 514.5C-VIII, 15~2000Hz, X、Y、Z axis, 1 hour (each axis), Total 3 hrs.                                                        | All    |                                                    | 4    |      | g          |
| Weight                                           |                                                                                                                                                     | All    |                                                    | 100  |      | g          |
| Dimensions                                       |                                                                                                                                                     | All    | 2.795x1.906x1.299 inches<br>(71.00x48.40x33.00 mm) |      |      |            |
| Safety                                           | Class II, IEC/EN/UL 62368-1                                                                                                                         |        |                                                    |      |      | Ed.3.0     |
| EMC Emission                                     | EN 55032:2015+A1:2020, EN 61204-3:2018, EN 61000-6-3:2021, EN 61000-3-2:2019<br>EN 61000-3-3:2013+A1:2019, FCC CFR Title 47 Part 15 Subpart B: 2016 |        |                                                    |      |      | Class B    |
| Conducted Disturbance                            | EN 55032:2015+A1:2020, EN 61204-3:2018, EN 61000-6-3:2021                                                                                           |        |                                                    |      |      | Class B    |
| Radiated Disturbance                             | EN 55032:2015+A1:2020, EN 61204-3:2018, EN 61000-6-3:2021                                                                                           |        |                                                    |      |      | Class B    |
| Power Harmonics                                  | EN 61000-3-2:2019                                                                                                                                   |        |                                                    |      |      |            |
| Voltage Fluctuations                             | EN 61000-3-3:2013+A1:2019                                                                                                                           |        |                                                    |      |      |            |
| EMC Immunity                                     | EN 55035:2017+A11:2020, EN 61204-3:2018, EN 61000-6-1:2019                                                                                          |        |                                                    |      |      |            |
| Electrostatic Discharge (ESD)                    | IEC 61000-4-2 Ed. 2.0: 2008, Air Discharge: $\pm 8kV$ , Contact Discharge: $\pm 4kV$                                                                |        |                                                    |      |      | Criteria A |
| Radio-Frequency, Continuous Radiated Disturbance | IEC 61000-4-3 Ed. 4.0: 2020                                                                                                                         |        |                                                    |      |      | Criteria A |
| Electrical Fast Transient (EFT)                  | IEC 61000-4-4 Ed. 3.0: 2012, $\pm 1kV$                                                                                                              |        |                                                    |      |      | Criteria A |
| Surge                                            | IEC 61000-4-5 Ed. 3.1: 2017, L-N: $\pm 1kV$                                                                                                         |        |                                                    |      |      | Criteria A |
| Conducted disturbances, induced by RF fields     | IEC 61000-4-6 Ed. 4.0: 2013                                                                                                                         |        |                                                    |      |      | Criteria A |
| Power frequency magnetic field                   | IEC 61000-4-8 Ed. 2.0: 2009                                                                                                                         |        |                                                    |      |      | Criteria A |
| Voltage dips                                     | IEC 61000-4-11 Ed. 3.0: 2020, Dips: 30% Reduction, Dips: >95% Reduction                                                                             |        |                                                    |      |      | Criteria A |
| Voltage interruptions                            | IEC 61000-4-11 Ed. 3.0: 2020, >95% reduction                                                                                                        |        |                                                    |      |      | Criteria B |
| Application Note Link                            | <a href="#">TRE15 Series App Notes</a>                                                                                                              |        |                                                    |      |      |            |

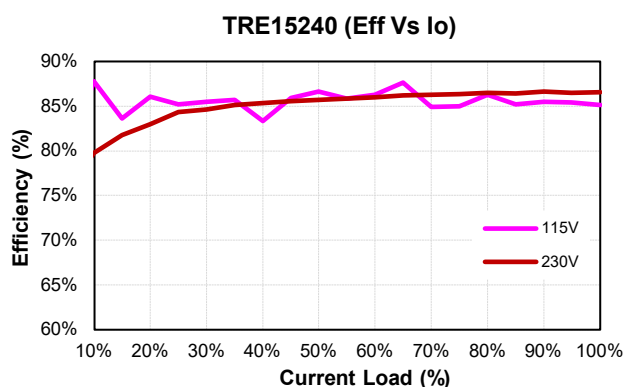
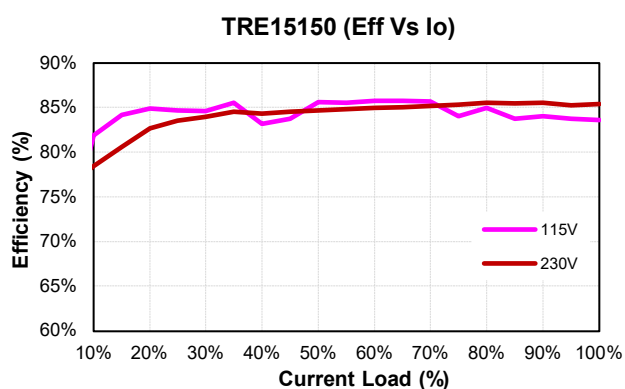
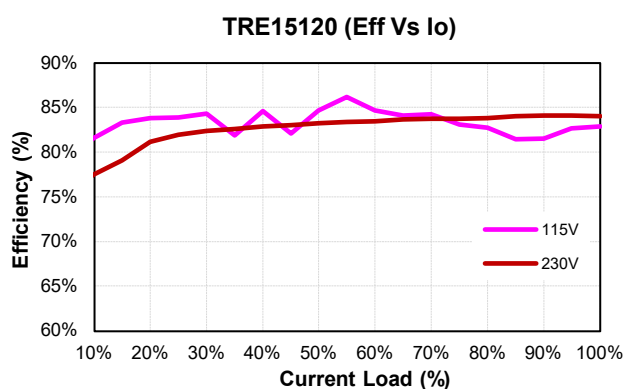
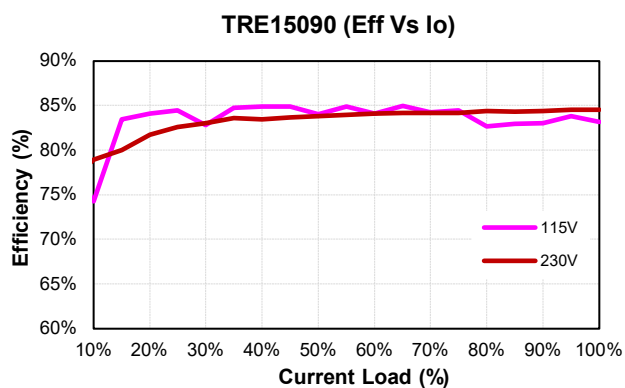
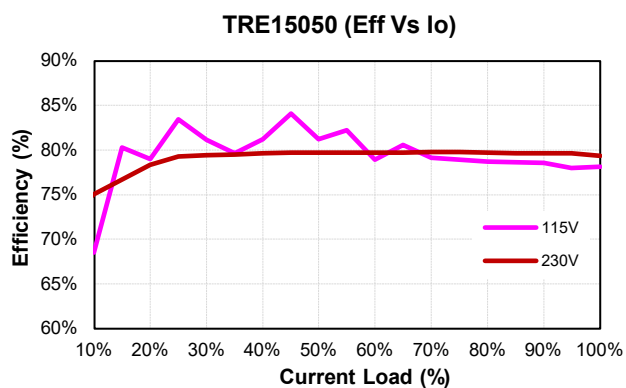


## CHARACTERISTIC CURVE

### Power Derating Curve



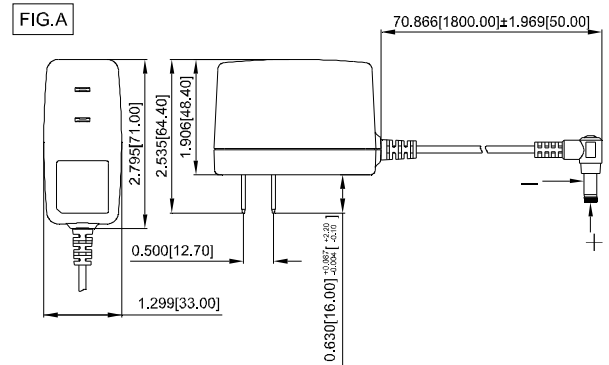
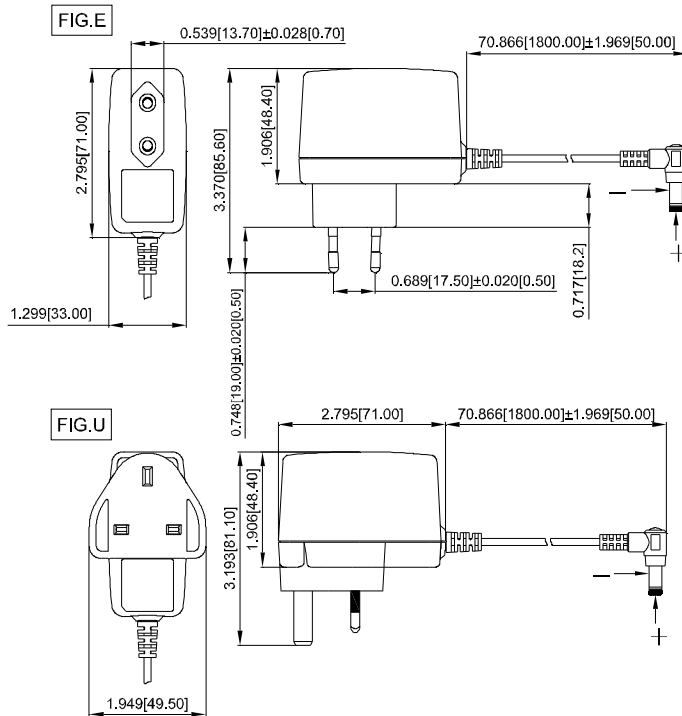
### Performance Data





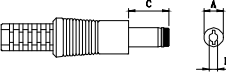
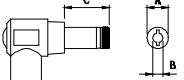
# TRE15 Series

## MECHANICAL SPECIFICATION



All Dimensions are in inches[mm]  
Tolerance:Inches:X.XXX±0.02  
Millimeters:X.XX±0.5

## STANDARD OUTPUT PLUG

| DC Plug Type                                                                                                             | Cable Number<br>-XXXXX | A          | B          | C         | Cable Type | Cable Length           | Cable AWG                                                           |
|--------------------------------------------------------------------------------------------------------------------------|------------------------|------------|------------|-----------|------------|------------------------|---------------------------------------------------------------------|
|                                                                                                                          |                        | OD<br>(mm) | ID<br>(mm) | L<br>(mm) |            |                        |                                                                     |
| <br>Straight/Inner+Outer-<br>+ ● -    | 11G03                  | Φ5.5       | Φ2.1       | 12        | UL1571     | 1800mm<br>without Core | 20AWG for Vo: 5V<br>18AWG for Vo: 9V<br>24AWG for Vo: 12V, 15V, 24V |
|                                                                                                                          | 12G03                  | Φ5.5       | Φ2.5       | 12        |            |                        |                                                                     |
|                                                                                                                          | 23G03                  | Φ5.5       | Φ2.1       | 9.5       |            |                        |                                                                     |
|                                                                                                                          | 26G03                  | Φ5.5       | Φ2.5       | 9.5       |            |                        |                                                                     |
| <br>Right Angle/Inner+Outer-<br>+ ● - | 01G03                  | Φ5.5       | Φ2.1       | 12        |            |                        |                                                                     |
|                                                                                                                          | 02G03                  | Φ5.5       | Φ2.5       | 12        |            |                        |                                                                     |
|                                                                                                                          | 21G03                  | Φ5.5       | Φ2.5       | 9.5       |            |                        |                                                                     |
|                                                                                                                          | 24G03                  | Φ5.5       | Φ2.1       | 9.5       |            |                        |                                                                     |

※Other DC Plug Type please refer to the link: <https://www.cincon.com/productdownload/TRE15-cable-DC-Plug.pdf>

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[24G12-Level-VI](#) [TRE15120-A-11G11-Level-VI](#) [TRE15240-A-26G11-Level-VI](#)