

LEVEL VI
EFFICIENCY
EMI & EMC



Features

- Meets DoE Efficiency Level VI Requirements
 - No load input power
 - Average Efficiency
- Up to 240W of AC-DC Power
- Universal Input 90-264Vac Input Range
- IP22 Rated Enclosure
- Meets “Heavy Industrial” Levels of EN61000 EMC Requirements
- Meets EN55011/CISPR11, FCC Part 15.109 Class B Conducted & Radiated Emissions, with 6db margin
- Approved to EN/IEC/UL60950-1, 2nd Edition, Am. 2
- E-cap life of >7 years
- 3 Year Warranty
- Optional AC Input On/Off Switch



Description

A high performance AC to DC external power supply family designed for test & measurement and industrial applications. Fully compliant with Efficiency Level VI requirements per U.S. Dept. of Energy, and also compliant to the Heavy Industrial levels of various EN61000-4-x standards for EMC. The TE240 series models also meet Class B conducted and radiated EMI per FCC Part 15, EN55022, CISPR22. Designed to allow easy integration with test and measurement equipment and other industrial applications.

Model Selection

| Model Number ⁴ | Volts | Output Current | Output Power | Ripple & Noise ¹ | Line Regulation | Load Regulation | Output Cable & Connector | Input Configuration |
|---------------------------|-------|----------------|--------------|-----------------------------|-----------------|-----------------|---------------------------------------------------------------------------------------------|------------------------------------------|
| TE240A1251F01 | 12.0V | 16.6A | 200W | 120mV pk-pk | ±1% | ±5% | 6 pin Molex Type, p/n 39-01-2060 or equivalent. See outline drawing for pinout information. | Class I Desktop, IEC60320 C14 Receptacle |
| TE240A2451F01 | 24.0V | 10.0A | 240W | 240mV pk-pk | ±1% | ±5% | | |
| TE240A2851F01 | 28.0V | 8.60A | 240W | 280mV pk-pk | ±1% | ±5% | | |
| TE240A4851F01 | 48.0V | 5.00A | 240W | 480mV pk-pk | ±1% | ±5% | | |

Notes:

1. Measured at the output connector, with noise probe directly across output and load, terminated with 0.1µF ceramic and 47µF low ESR capacitors.
2. The DC output is floating. For Input Class I models, AC GND is connected to output common (-), on models with the letter “B” inserted in the model number where the “A” is located: (TE240B1251F01).
3. All specifications are typical at nominal input, full load, at 25°C ambient unless noted.
4. Consult factory for availability of 28V output model.

General Specifications

| | | | |
|------------------------------|---------------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------|
| AC Input | 100-240Vac, ±10%, 47-63Hz, 1Ø | Turn On Time | Less than 1 sec @115Vac, full load |
| Input Current | 115Vac: 2.4A, 230Vac: 1.2A | Hold-up Time | 20mS min., at full Load, 100Vac input |
| Inrush Current | 264Vac, cold start: will not exceed 60A | Overttemperature Protection | Will shutdown upon an over-temperature condition, auto-recovery. |
| Input Fuses | F1, F2: 3.15A, 250Vac fuses (line & neutral lines) provided on all models | Overload Protection | 115 to 160% of rating, Hiccup Mode |
| Earth Leakage Current | Input-GND: <500µA@264Vac, 60Hz, NC Output-GND: <4mA@264Vac, 60Hz, NC | Short Circuit Protection | Hiccup Mode, auto recovery. |
| Efficiency | Meets US DoE Efficiency Level VI average efficiency levels | Overvoltage Protection | 110 to 130% of output voltage (max. 60V on 48V model), hiccup mode |

General Specifications (continued)

| | | | |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Power | 240W continuous – See models chart for specific voltage model ratings. | Isolation | Input-Output: 4000Vac Input-Ground: 1500Vac Output-Ground: 500Vac |
| No Load Input Power | <0.210W per DoE Efficiency Level VI Requirements | Safety Standards | EN/CSA/UL/IEC 60950-1, 2nd Edition, Am 2 |
| Ripple and Noise | See models chart on pg 1. | Operating Temperature | -20°C to +70°C. Derate above 40°C. Start Up at -30°C, full load, (warmup period before all parameters are within published specifications). Case Temperatures are within regulatory guidelines. Care should be taken to avoid prolonged contact with skin or other heat sensitive surfaces. |
| Output Voltage | See models chart on pg 1. | Case Temperature | |
| Transient Response | 500μs response time for return to within 0.5% of final value for any 50% load step over the range of 5% to 100% of rated load, $\Delta i/\Delta t < 0.2A/\mu s$. Max. voltage deviation is +/-3.5%. | Temperature Derating | See Derating Curves |
| E-Cap Life | >7 year life based on calculations at 115Vac/60Hz & 230Vac/50Hz, ambient 25°C at 24 hrs per day, 365 days/year, 6 power up cycles per day. (80% load on 12V model at 115Vac) | MTBF | >250,000 hours, full load, 110 & 220Vac input, 25°C amb., per Telcordia 332 Issue 6. |
| Weight | 700g | Storage Temperature | -40°C to +85°C |
| Safety Drop Test | 1.4m from table top to wooden platform, 6 faces. | Altitude | Operating: to 5000m (derate to TBD temp. above 3000m). Non-operating: -500 to 40,000 ft. |
| Dimensions | W: 2.65" x L: 8.3" x H: 1.7" W: 67.4mm x L: 212.4mm x H: 45mm | Relative Humidity | 5% to 95%, non-condensing |
| Vibration | Operating: 0.003g/Hz, 1.5grms overall, 3 axes, 10 min/axis, 1-500Hz. Non-Oper.: random waveform, 3 minutes per axis, 3 axes and Sine waveform, Vib. frequency/acceleration: 10-500Hz/1g, sweep rate of 1 octave / minutes, Vibration time of 10 sweeps / axes, 3 axes | Shock | Operating: Half-sine, 20gpk, 10mS, 3 axes, 6 shocks total Non-Operating: Half-sine waveform, impact acceleration of 50G, Pulse duration of 6 mS, Number of shocks: 3 for each of the three axis |

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

EMI/EMC Compliance

| | |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conducted Emissions: | EN55011/CISPR22 Class B, FCC Part 15.107, Class B: 6db margin typ, at 115 and 230Vac |
| Radiated Emissions: | EN55022/CISPR22 Class B, FCC Part 15.109, Class B: 3db margin typ, at 115 and 230Vac |
| Common Mode Noise: | High Frequency (100kHz-20MHz): <20mA pk-pk Low Frequency (50-120Hz): <5Vrms |
| Electro-Static Discharge (ESD) Immunity on Power ports: | EN55024/IEC61000-4-2, Level 4: +/- 8kV contact, +/- 15kV air, Criteria A |
| Radiated RF EM Fields Susceptibility | EN55022/EN61000-4-3, 10V/m, 80MHz-2.7GHz, 80% AM at 1kHz |
| Electrical Fast Transients (EFT) /Bursts: | EN55024/IEC61000-4-4, Level 4, +/- 4kV, 100Khz rep rate, 40A, Criteria A |
| Surges, Line to Line (Diff Mode) and Line to GND (CMN Mode) | EN55024/IEC61000-4-5, Level 4, +/-2kV DM, +/-4kV CM, Criteria A |
| Conducted Disturbances induced by RF Fields | EN55022/IEC61000-4-6, 10Vrms – Level 3, in ISM and amateur radio bands between 0.15Mhz and 80Mhz, 80% AM at 1KHz |
| Rated Power frequency magnetic fields | EN55024/IEC1000-4-8, Level 4: 30A/m, 50/60 Hz |
| Voltage Interruptions, Dips, Sags & Surges | EN55024/IEC61000-4-11: --100% dip for 20mS, Criteria A --100% dip for 500mS (250/300 cycles), Criteria B --60% dip for 100mS, Criteria B --30% dip for 500mS, Criteria A |

EMI/EMC Compliance (continued)

Harmonic Current Emissions

EN55011/EN61000-3-2, Class A

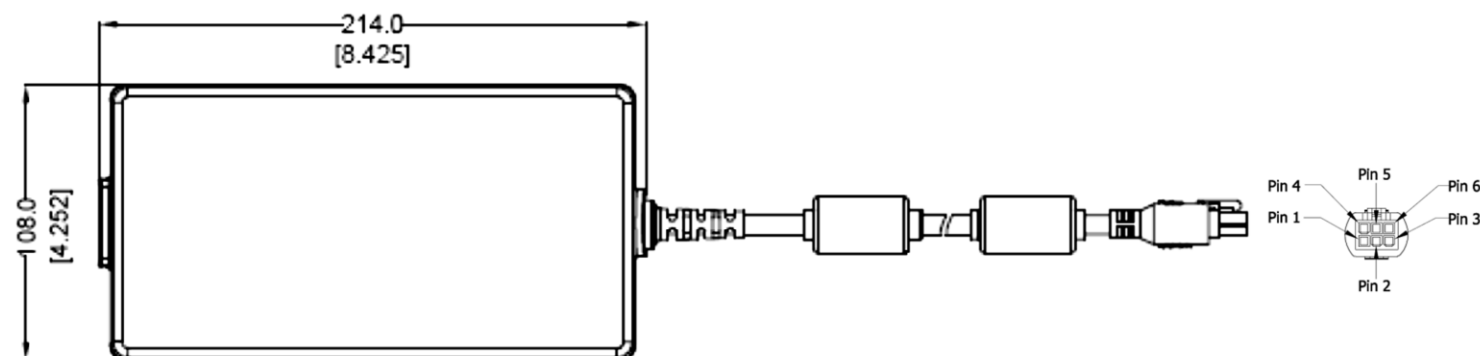
Flicker Test

EN61000-3-3

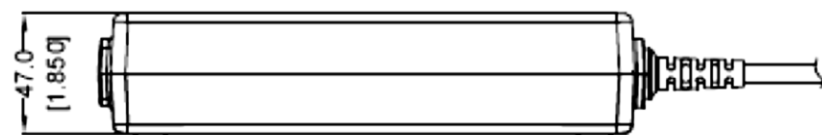
Notes: Performance criteria are based on EN55024. According to the standards, performance criteria are defined as following:

- A – Normal performance during and after the test
- B – Temporary degradation, self-recoverable
- C – Temporary degradation, operator intervention required to recover the operation
- D – Permanent damage

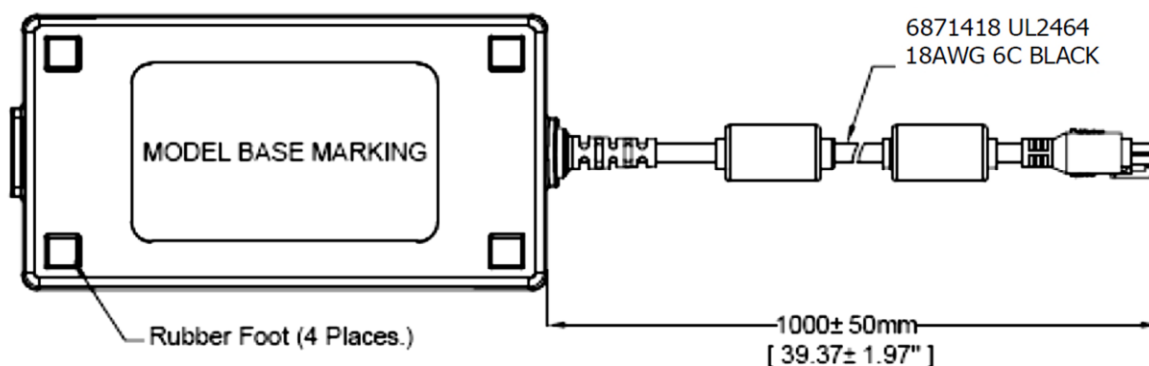
Mechanical Drawing:



ut IEC320/C14 Inlet



| Connector Pinout: | | |
|-------------------|-----------|---------------|
| | 12V Model | 24V, 28V, 48V |
| Pin 1 | +Vo | +Vo |
| Pin 2 | RTN | NC |
| Pin 3 | RTN | RTN |
| Pin 4 | +Vo | +Vo |
| Pin 5 | +Vo | NC |
| Pin 6 | RTN | RTN |






Notes:

- 1) The DC output is floating (ungrounded). For grounded output option (DC Return (-) to AC GND), change the letter "A" to "B" in the model number – TE240B1251F01. Class I input models only.
- 2) All dimensions in mm.
- 3) The unit should not be covered or enclosed to protect against excessive case temperature rise.








Input Configurations:

Check with SL Power for availability of class II input models.

| AC Input Receptacle Options | | |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Desktop | | |
|  |  |  |
| IEC320 - C14 Class I Grounded (F) | IEC320 - C18 Class II Ungrounded (Q) | IEC320 - C8 Class II "Shaver" (N) |

Output Connector Options:

Check with SL Power for suitability of specific connectors with certain models. Other connector options or different pinouts will require a modified model.

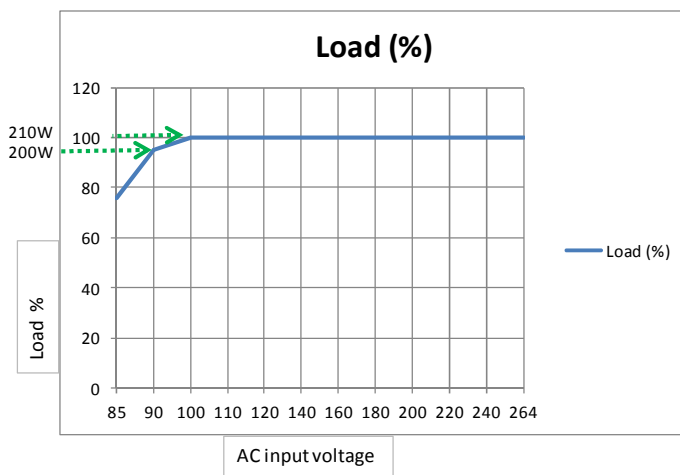
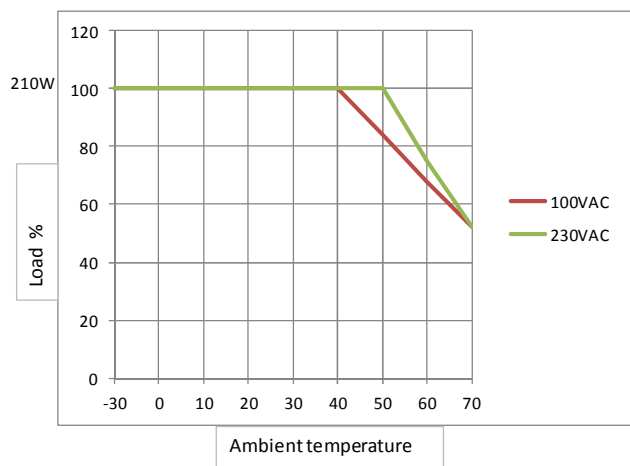
| Connector No. | Description | |
|---------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 12 | 5 pin DIN-180 male connector (Pins 3, 5 = (+), pins 1, 2, 4 = (-)) |  |
| 22 | 6 pin DIN male connector (Pins 1, 2 = (+), pins 4, 5 = (-)) |  |
| 23 | 8 pin DIN male connector (Pins 3, 7 = (+), pins 1, 4, 6, 8 = (-), shell = FG)) |  |
| 65 | Stripped and Tinned Leads |  |
| 48 | 3 pin Snap n Lock, Kycon Kpp-3P or equivalent (Pin 1 = (+), pin 2 = (-)) |  |
| 49 | 4 pin Snap n Lock, Kycon Kpp-4P or equivalent (Pins 1, 3 = (+), pins 2, 4 = (-)) |  |
| 51 | 6 pin Minifit - Molex 39-01-2060 or equivalent (Pins 1, 4 = (+), pins 3, 6 = (-)) (STANDARD) |  |

Efficiency Level VI Information:

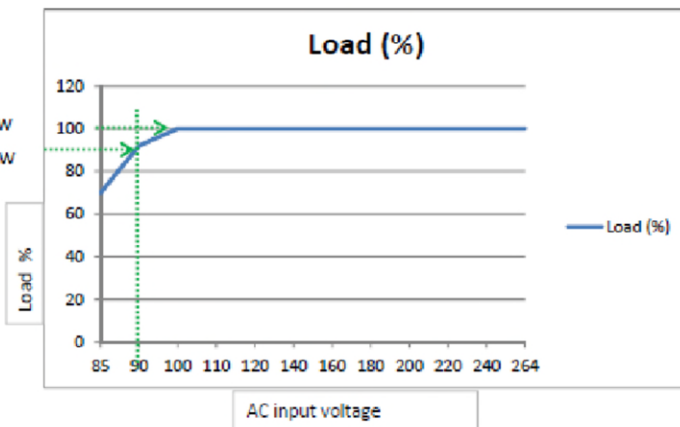
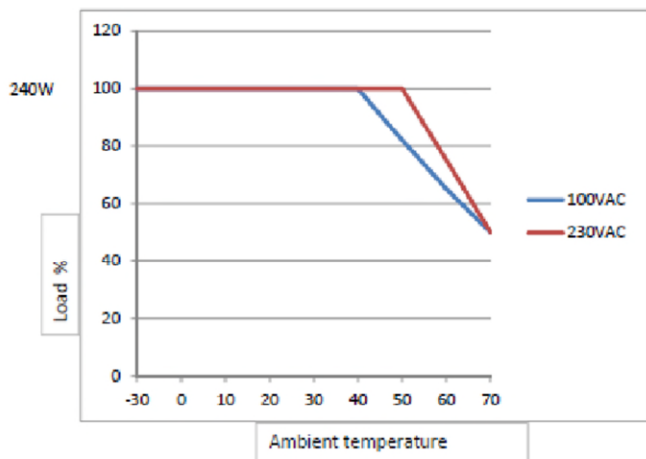
| Single-Voltage External AC-DC Power Supply, Basic-Voltage | | |
|-----------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------|
| Nameplate Output Power (P _{out}) | Minimum Average Efficiency in Active Mode (expressed as a decimal) | Maximum Power in No-Load Mode [W] |
| P _{out} ≤ 1 W | ≥ 0.5 × P _{out} + 0.16 | ≤ 0.100 |
| 1 W < P _{out} ≤ 49 W | ≥ 0.071 × ln(P _{out}) - 0.0014 × P _{out} + 0.67 | ≤ 0.100 |
| 49 W < P _{out} ≤ 250 W | ≥ 0.880 | ≤ 0.210 |
| P _{out} > 250 W | ≥ 0.875 | ≤ 0.500 |
| Single-Voltage External AC-DC Power Supply, Low-Voltage | | |
| Nameplate Output Power (P _{out}) | Minimum Average Efficiency in Active Mode (expressed as a decimal) | Maximum Power in No-Load Mode [W] |
| P _{out} ≤ 1 W | ≥ 0.517 × P _{out} + 0.087 | ≤ 0.100 |
| 1 W < P _{out} ≤ 49 W | ≥ 0.0834 × ln(P _{out}) - 0.0014 × P _{out} + 0.609 | ≤ 0.100 |
| 49 W < P _{out} ≤ 250 W | ≥ 0.870 | ≤ 0.210 |
| P _{out} > 250 W | ≥ 0.875 | ≤ 0.500 |

TE240 Series

Performance Curves



12V Model Derating Curves



24V thru 48V Derating Curves

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

SL Power:

| | | | | | |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <u>TE240A4851F01</u> | <u>TE240A1251F01</u> | <u>TE240A2451F01</u> | <u>TE240A1251N01</u> | <u>TE240A4851N01</u> | <u>TE240A1251Q01</u> |
| <u>TE240A2851N01</u> | <u>TE240A2451Q01</u> | <u>TE240A2851Q01</u> | <u>TE240A4851Q01</u> | <u>TE240A2451N01</u> | <u>TE240A2851F01</u> |
| <u>TE240A1551Q01</u> | <u>TE240A1551N01</u> | | | | |