

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	Overtemperature 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%. >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)	Temperature Derating	See Derating Curves
E-Cap Life		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 5000mS (250/300 cycles), Criteria B --60% dip for 100mS, Criteria B --30% dip for 500mS, Criteria A

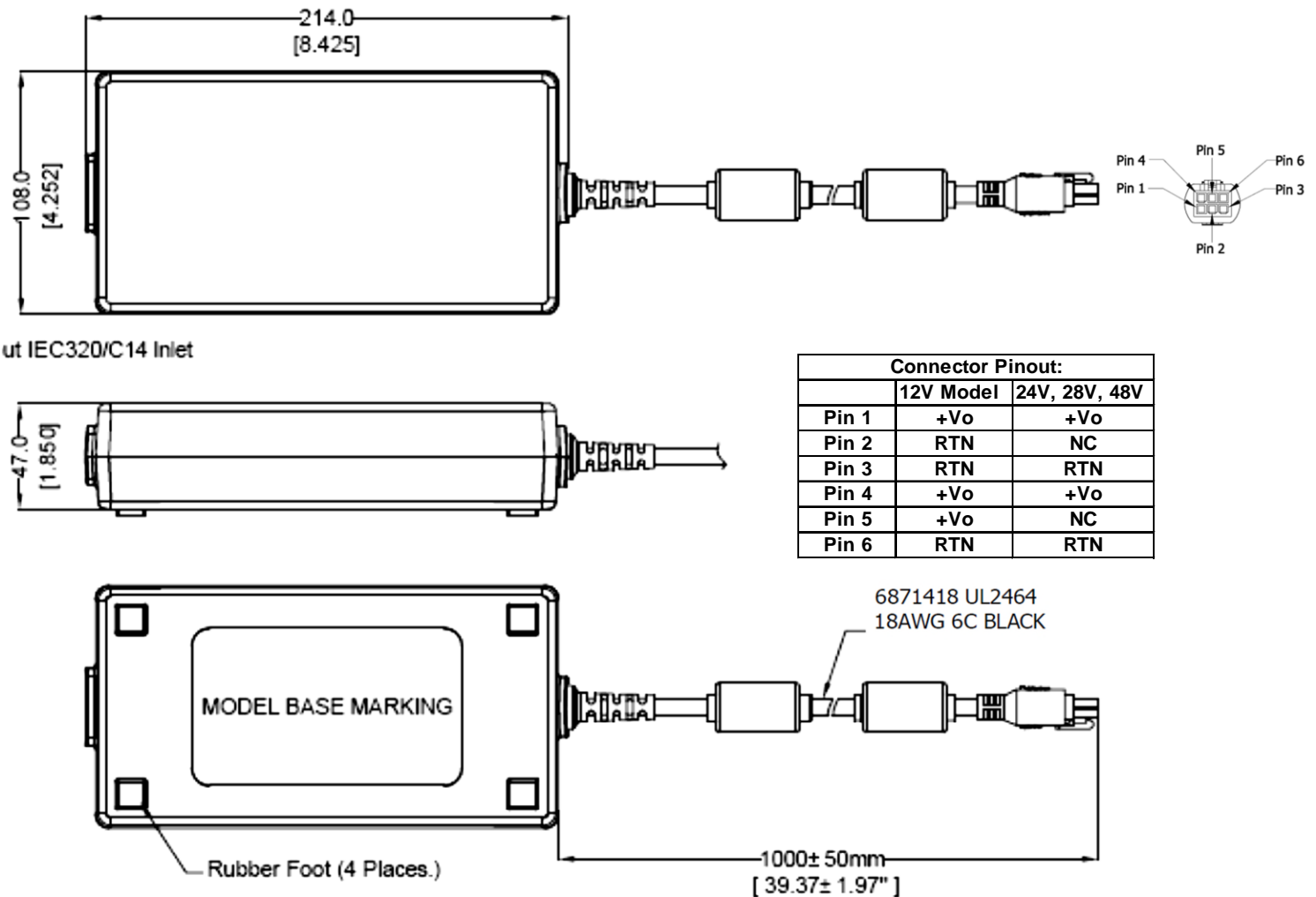
EMI/EMC Compliance (continued)

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:






Notes:

- 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 – TE240A1251F01. Class I input models only.
- All dimensions in mm.
- 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.

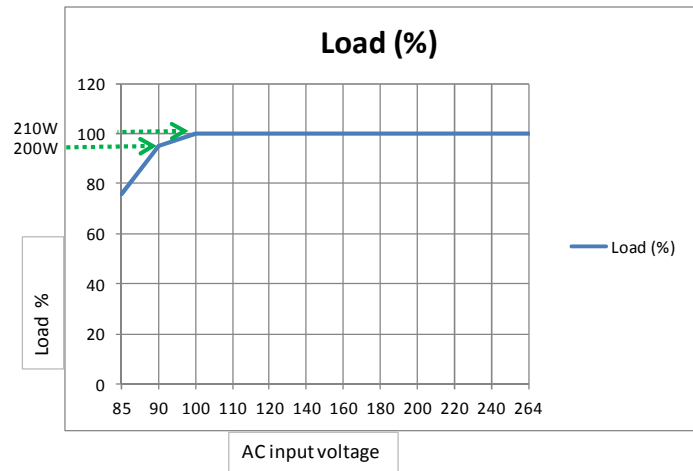
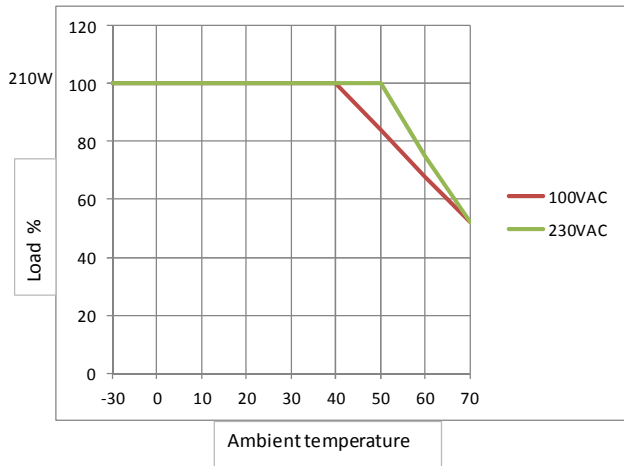
Connector No.	Description	
12	5 pin DIN-180 male connector (Pins 3, 5 = (+), pins 1, 2, 4 = (-))	
22	6 pin DIN male connector (Pins 1, 2 = (+), pins 4, 5 = (-))	
23	8 pin DIN male connector (Pins 3, 7 = (+), pins 1, 4, 6, 8 = (-), shell = FG))	
65	Stripped and Tinned Leads	
48	3 pin Snap n Lock, Kycon 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:

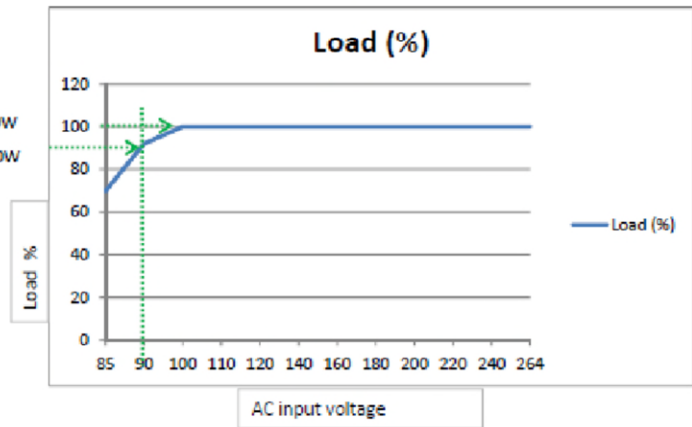
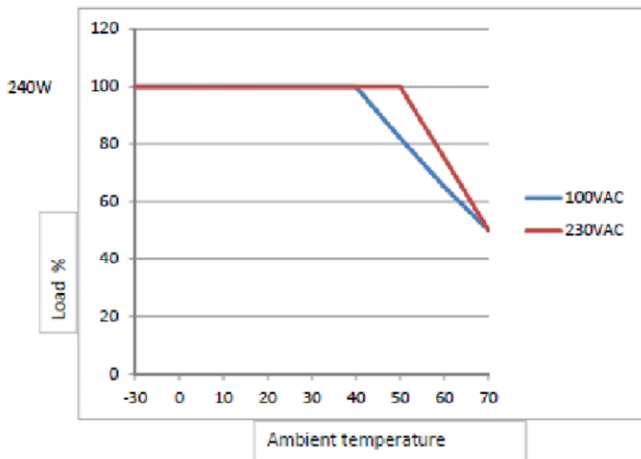
Single-Voltage External AC-DC Power Supply, Basic-Voltage		
Nameplate Output Power (P _{out})	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
P _{out} ≤ 1 W	≥ 0.5 × P _{out} + 0.16	≤ 0.100
1 W < P _{out} ≤ 49 W	≥ 0.071 × ln(P _{out}) - 0.0014 × P _{out} + 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

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