

LEVEL VI
EFFICIENCY
EMI & EMC



 **RoHS**

LPS

VI

CE

Features

- Meets DoE Efficiency Level VI Requirements
 - No load input power
 - Average Efficiency
- Up to 12W of AC-DC Power
- Universal Input 90-264Vac Input Range
 - Desktop and Wall-Plug versions
- Meets “Heavy Industrial” Levels of EN61000 EMC Requirements
- Meets EN55022/CISPR22, FCC Part 15.109 Class B Conducted & Radiated Emissions, with 6db margin
- Approved to EN/IEC/UL60950-1, 2nd Ed., Am.2
- E-cap life of >10 years
- >1,000,000 Hours MTBF
- 3 Year Warranty
- IP22 Rated Enclosure



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 TE10A 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	Volts	Output Current	Output Power	Ripple & Noise ¹	Line Regulation	Load Regulation	Output Connector	Input Configuration
TE10A0503F01	5.0V	2.0A	10W	75mV pk-pk	±1%	±5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, center positive	Class I Desktop, IEC60320 C14 Receptacle
TE10A0603F01	5.9V	1.6A	10W	75mV pk-pk	±1%	±5%		
TE10A0703F01	7.5V	1.3A	10W	75mV pk-pk	±1%	±5%		
TE10A1203F01	12.0V	1.0A	12W	120mV pk-pk	±1%	±5%		
TE10A2403F01	24.0V	0.5A	12W	240mV pk-pk	±1%	±5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, center positive	Class II Desktop, IEC60320 C8 Receptacle
TE10A0503N01	5.0V	2.0A	10W	75mV pk-pk	±1%	±5%		
TE10A0603N01	5.9V	1.6A	10W	75mV pk-pk	±1%	±5%		
TE10A0703N01	7.5V	1.3A	10W	75mV pk-pk	±1%	±5%		
TE10A1203N01	12.0V	1.0A	12W	120mV pk-pk	±1%	±5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, center positive	Class II Desktop, IEC60320 C18 Receptacle
TE10A2403N01	24.0V	0.5A	12W	240mV pk-pk	±1%	±5%		
TE10A0503Q01	5.0V	2.0A	10W	75mV pk-pk	±1%	±5%		
TE10A0603Q01	5.9V	1.6A	10W	75mV pk-pk	±1%	±5%		
TE10A0703Q01	7.5V	1.3A	10W	75mV pk-pk	±1%	±5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, center positive	Class II Wall-Plug, Interchangeable Blades (North American Blade included) ²
TE10A1203Q01	12.0V	1.0A	12W	120mV pk-pk	±1%	±5%		
TE10A2403Q01	24.0V	0.5A	12W	240mV pk-pk	±1%	±5%		
TE10A0503B01	5.0V	2.0A	10W	75mV pk-pk	±1%	±5%		
TE10A0603B01	5.9V	1.6A	10W	75mV pk-pk	±1%	±5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, center positive	Class II Wall-Plug, Fixed North American Blades ³
TE10A0703B01	7.5V	1.3A	10W	75mV pk-pk	±1%	±5%		
TE10A1203B01	12.0V	1.0A	12W	120mV pk-pk	±1%	±5%		
TE10A2403B01	24.0V	0.5A	12W	240mV pk-pk	±1%	±5%		
TE10A0503C01	5.0V	2.0A	10W	75mV pk-pk	±1%	±5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, center positive	
TE10A0603C01	5.9V	1.6A	10W	75mV pk-pk	±1%	±5%		
TE10A0703C01	7.5V	1.3A	10W	75mV pk-pk	±1%	±5%		
TE10A1203C01	12.0V	1.0A	12W	120mV pk-pk	±1%	±5%		
TE10A2403C01	24.0V	0.5A	12W	240mV 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 10µF low ESR capacitors. For 5V and 6V models, values listed are typical, 100mV pk-pk maximum with 0.1µF ceramic and 47µF low ESR capacitors used at measurement point.
2. Order blade kit KT-1027K for other blades (EU, UK, Australia)
3. For EU fixed blades, replace “C” in the model number with “M”, for UK blades, replace “C” with “G”, for Australia blades, replace “C” with “H”.
4. For Input Class I models: For AC GND connected to output common (-), insert a “B” in the part number where the “A” is located (TE10B0503F01).
5. All specifications are typical at nominal input, full load, at 25°C ambient unless noted.

General Specifications

AC Input	100-240Vac, $\pm 10\%$, 47-63Hz, 1 ϕ	Turn On Time	Less than 700mS @115Vac, full load
Input Current	115Vac: 0.45A, 230Vac: 0.28A	Hold-up Time	20mS min., at full Load, 100Vac input
Inrush Current	264Vac, cold start: will not exceed 40A	Overtemperature Protection	Will shutdown upon an overtemperature condition, auto-recovery.
Input Fuses	F1, F2: 3.15A, 250Vac fuses (line & neutral lines) provided on all models	Overload Protection	130 to 180% of rating, Hiccup Mode
Earth Leakage Current	Input-GND: <500 μ A@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	130 to 150% of output voltage, hiccup mode
Output Power	10 to 12W continuous – See models chart for specific voltage model ratings.	Isolation	Input-Output: 4000Vac Input-Ground: 1500Vac Output-Ground: 1500Vac
No Load Input Power	<0.1W 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 Start Up at -40°C, full load, (warmup period before all parameters are within published specifications).
Output Voltage	See models chart on pg 1.	Temperature Derating	See Derating Chart
Transient Response	500 μ S 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 $\pm 3.5\%$.	Storage Temperature	-40°C to +85°C
Regulation	See models chart on pg 1.	Altitude	Operating: to 5000m. Non-operating: -500 to 40,000 ft.
Drop Test	1.4m from table top to wooden platform, 6 faces.	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 100G, Pulse duration of 6 mS, Number of shocks: 3 for each of the three axis
Dimensions	See outline drawings	MTBF	>1,000,000 hours, full load, 110 & 220Vac input, 25°C amb., per Telcordia 332 Issue 6, Stress Method.
Weight	110g	E-Cap Life	>10 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.

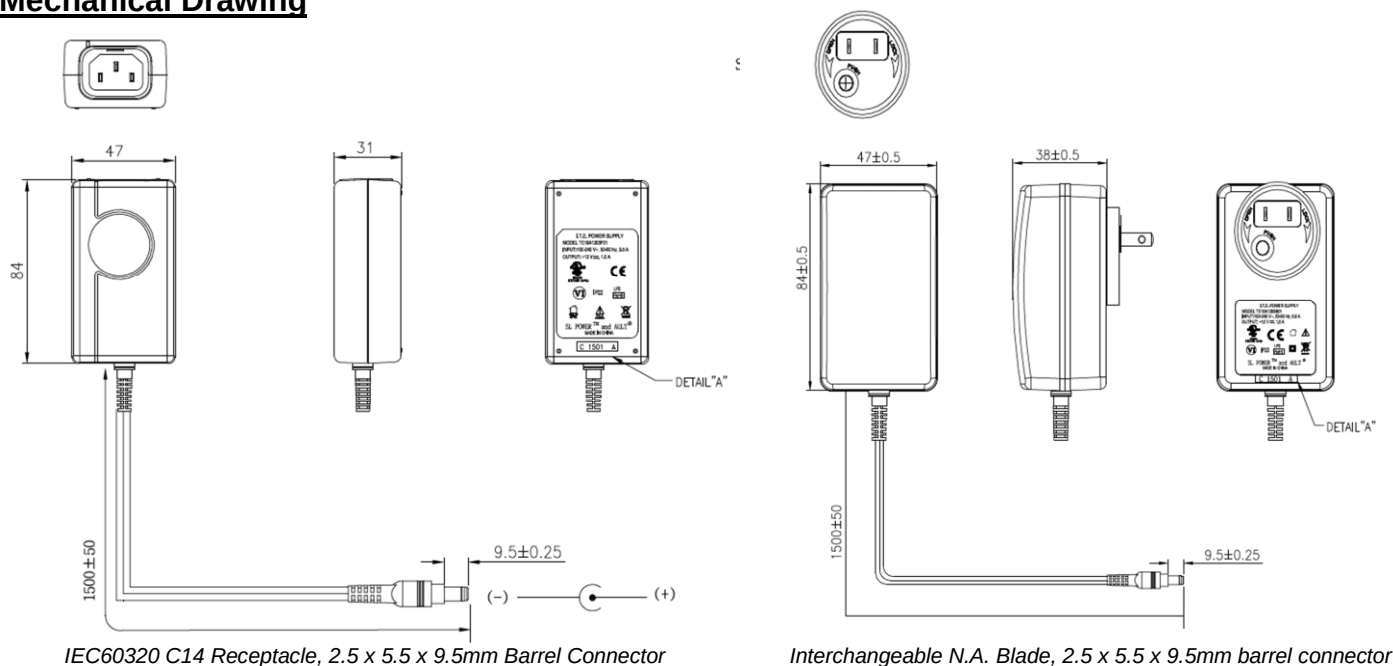
All specifications are typical at nominal input, full load, at 25°C ambient unless noted.

EMI/EMC Compliance

Conducted Emissions:	EN55022/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): <40mA pk-pk
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, +/- 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, 3.6V/m – Level 4, 0.15 to 80Mhz; and 12V/m) 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: 30 A/m, 50/60 Hz
Voltage Interruptions, Dips, Sags & Surges	EN55024/IECEN61000-4-11: --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
Harmonic Current Emissions	EN55011/EN61000-3-2, Class A
Flicker Test	EN61000-3-3

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

Mechanical Drawing



Notes:

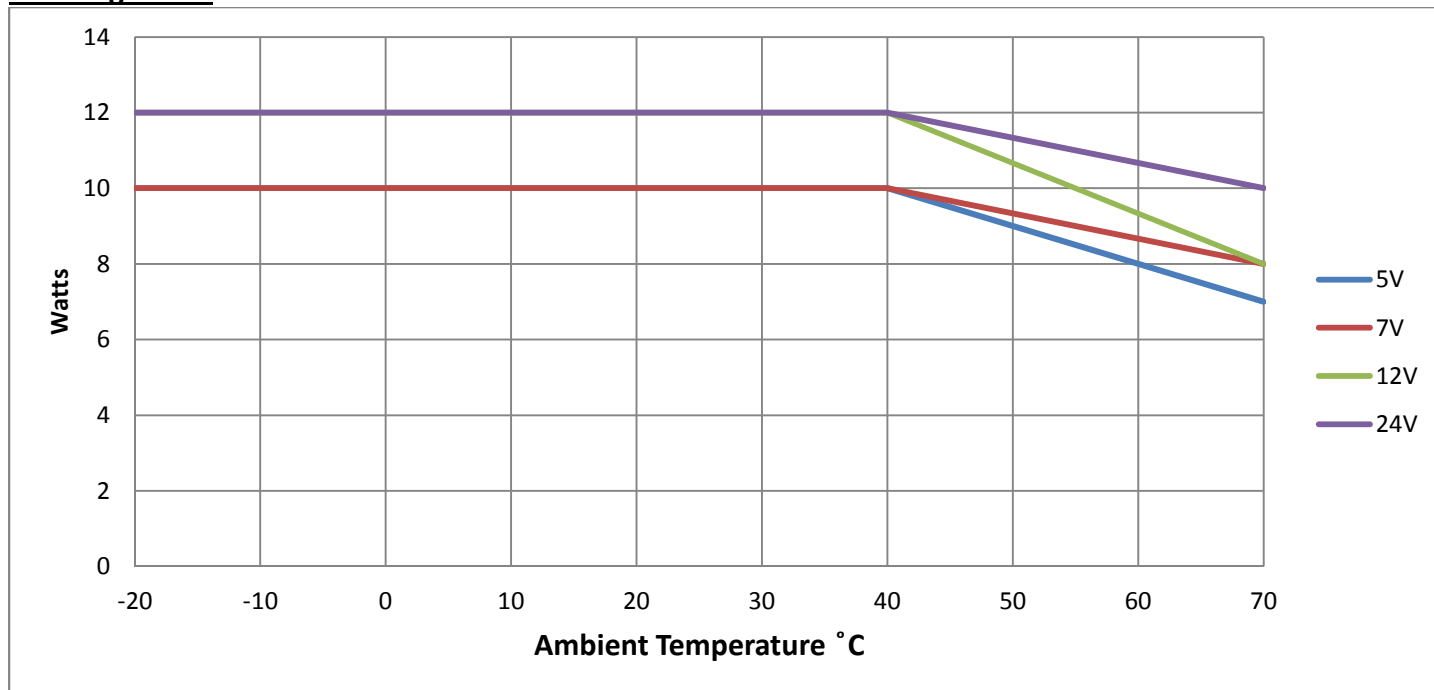
1. Weight: 110g.
2. All dimensions in mm.
3. Interchangeable blade models come with North American blade fitted. For other blades (EU, UK, Aust.) order blade kit KT1027K.
4. The unit should not be covered or enclosed to protect against excessive case temperature rise.

Connector Information

Standard models include a 2.5 x 5.5 x 9.5mm straight barrel type connector (Ault #3), center positive. Other standard options are listed below. The "03" in the standard model number is replaced by the applicable digits below:

Connector No.	Description		Connector No.	Description	
02	2.1 x 5.5 x 9.5mm straight barrel plug - Center Positive		44	2.1 x 5.5 x 9.5mm straight barrel plug, locking - Center Positive	
03	2.5 x 5.5 x 9.5mm straight barrel plug - Center Positive (Standard Models)		45	2.5 x 5.5 x 9.5mm straight barrel plug, locking - Center Positive	
12	5 pin DIN-180 male connector (Pins 3, 5 = (+), pins 1, 2, 4 = (-))		48	3 pin Snap n Lock, Kycon Kpp-3P or equivalent (Pin 1 = (+), pin 2 = (-))	
22	6 pin DIN male connector (Pins 1, 2 = (+), pins 4, 5 = (-))		49	4 pin Snap n Lock, Kycon Kpp-4P or equivalent (Pins 1, 3 = (+), pins 2, 4 = (-))	
23	8 pin DIN male connector (Pins 3, 7 = (+), pins 1, 4, 6, 8 = (-), shell = FG))		51	6 pin Minifit - Molex 39-01-2060 or equivalent (Pins 1, 4 = (+), pins 3, 6 = (-))	
32	9 pin "D" type, female (Pin 8 = (+), pin 5 = (-), all others = NC)		65	Stripped and Tinned Leads	
33	2.5 x 5.5 x 12.5mm straight barrel plug - Center Positive		70	2.1 x 5.5 x 11mm right angle barrel plug (high retention) - Center Positive	
40	2.1 x 5.5 x 9.5mm right angle barrel plug (high retention) - Center Positive		71	2.5 x 5.5 x 11mm right angle barrel plug (high retention) - Center Positive	
41	2.5 x 5.5 x 9.5mm right angle barrel plug (high retention) - Center Positive		72	2.1 x 5.5 x 9.5mm straight barrel plug (high retention, no spark) - Center Positive	
42	2.1 x 5.5 x 11mm straight barrel plug (high retention) - Center Positive		73	2.5 x 5.5 x 9.5mm straight barrel plug (high retention, no spark) - Center Positive	
43	2.5 x 5.5 x 11mm straight barrel plug (high retention) - Center Positive		74	EIAJ#5 style connector - Center Positive	

Derating Chart:



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]
$P_{out} \leq 1 \text{ W}$	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.100
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.100
$49 \text{ W} < P_{out} \leq 250 \text{ W}$	≥ 0.880	≤ 0.210
$P_{out} > 250 \text{ W}$	≥ 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]
$P_{out} \leq 1 \text{ W}$	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.100
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.100
$49 \text{ W} < P_{out} \leq 250 \text{ W}$	≥ 0.870	≤ 0.210
$P_{out} > 250 \text{ W}$	≥ 0.875	≤ 0.500

TE10 Series,
Output Voltage
 $\geq 6\text{V}$

TE10 Series,
Output Voltage
 $\leq 5.9\text{V}$

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