SL POWER GE65E SERIES

65 Watts Single Output
External Power Adapters

Medical

Advanced Energy's SL Power GE65E series AC-DC power adapters feature medical safety approvals. It is approved to EN/IEC/UL 60601-1 3.2 edition, and EN/IEC/UL 60601-1-11:2010 for Home Healthcare applications. The EMC is designed to UL/EN/IEC 60601-1-2, 4th edition. It delivers up to 65 W output, and meets Department of Energy Level VII* (Level VI for 5 V model) efficiency standards.

SPECIAL FEATURES

- Suitable for medical equipment up to call BF - 90 µA input to output, optional 10 µA
- IP54 and option IP67
- 2 x MOPP input to output isolation
- Smooth strain reliefs to allow for easy cleaning
- Over voltage, over current, over temperature and short circuit protection
- DoE efficiency level VII* (except 5 V)
- Up to 5000 m operating altitude
- Available in desktop versions
- AC inlet IEC60320 C8 (class II) or C14 (class I) plugs
- Optional LED indicator
- Rated as Limited Power Source (LPS)
- RoHS, REACH compliant
- 3 years warranty

SAFETY

- **UL/CSA:** UL 60601-1 3.2 edition
- **EN/Demko:** EN 60601-1 3.2 edition
- **CB/IEC:** IEC 60601-1 3.2 edition

AT A GLANCE

Total Power

65 Watts

Input Voltage

80 to 264 VAC

of Outputs

Single

* - Level VII pending

ELECTRICAL SPECIFICATIONS

Input Specification					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Input Voltage	Derating below 90 VAC acceptable	80	-	264	VAC
Input Frequency	Evaluate effects 400 Hz operation	47	-	63	Hz
Input Current	Low line and full load	-	-	1.5	A
Inrush Current	264 VAC cold start at 25°C within 1/2 cycle	-	-	60	A
Input Fuse	250 VAC fuses in both line and neutral	-	3.15	-	A
Leakage Current	Input to Earth, 264 VAC/60 Hz, NC	-	-	300	µA
	Output to Earth, 264 VAC/60 Hz, NC	-	-	4	mA
	Input to Output[1], 264 VAC/60 Hz, NC	-	-	90	µA
Insulation Safety Rating	Input to Ground	-	1 MOPP	-	-
	Input to Output	-	2 MOPP	-	-
	Output to Ground[2]	-	1 MOPP	-	-
Electric Strength Test Voltage (HIPOT)	Input to Ground	1500	-	-	VAC
	Input to Output	4000	-	-	VAC
	Output to Ground[2]	1500	-	-	VAC

Note:
1. Optional for class I input < 10 µA, 264 VAC/60 Hz, NC
2. Output to ground isolation is void if the input ground is connected to output common (optional).

Output Specification					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Transient Response	50% load step over the range of 5% to 100% of rated load, Δi/Δt < 0.2 A/µs: voltage deviation	-	-	±3.5%	%
	50% load step over the range of 5% to 100% of rated load, Δi/Δt < 0.2 A/µs, return to within 0.5% of final value: response time	-	-	500	µs
Overshoot	At turn-on, under all conditions	-	-	2	%
	At turn-off, under all conditions	-	-	1	%
Rise Time	10% Vout to Vout in regulation, 90 VAC input at both 0% and 100% load	-	-	100	ms
Turn-OnTime	115 VAC input at 100% load	-	-	700	ms
Hold-Up Time	100 VAC at full load, Vout reduces to 90% of original value before the AC drop out, per IEC 60601-1-2 4th edition specification	16	-	-	ms
Over Load Protection	Hiccup mode, auto-recovery	130	-	180	%
Short Circuit Protection	Hiccup mode, auto-recovery	-	-	-	-
Over Voltage Protection	Hiccup mode, 115/230 VAC input, 25°C ambient temperature	115	-	155	%
Over Temperature Protection	Shutdown, auto-recovery	-	-	-	-

ORDERING INFORMATION - GE65E SERIES

Model Number[1]	Output Voltage (Nom)	Maximum Load[2]	Maximum Power	Ripple & Noise[3]	Line Regulation	Load Regulation[4]	Output Connection[5,6]
GE65E0551F01	5 V	7.00 A	35 W	100 mV pk-pk	± 1%	± 5%	# 51 CONN STANDARD 6 Pin Molex Type
GE65E0951F01	9 V	6.00 A	54 W	100 mV pk-pk	± 1%	± 5%	
GE65E1203F01	12 V	5.42 A	65 W	120 mV pk-pk	± 1%	± 5%	# 3 CONN STANDARD 2.5 x 5.5 x 9.5mm Straight Barrel Type, Center Positive
GE65E1503F01	15 V	4.33 A	65 W	150 mV pk-pk	± 1%	± 5%	
GE65E1803F01	18 V	3.61 A	65 W	180 mV pk-pk	± 1%	± 5%	
GE65E2403F01	24 V	2.71 A	65 W	240 mV pk-pk	± 1%	± 5%	
GE65E4803F01	48 V	1.35 A	65 W	300 mV pk-pk	± 1%	± 5%	
GE65E0551N01	5 V	7.00 A	35 W	100 mV pk-pk	± 1%	± 5%	# 51 CONN STANDARD 6 Pin Molex Type
GE65E0951N01	9 V	6.00 A	54 W	100 mV pk-pk	± 1%	± 5%	
GE65E1203N01	12 V	5.42 A	65 W	120 mV pk-pk	± 1%	± 5%	# 3 CONN STANDARD 2.5 x 5.5 x 9.5mm Straight Barrel Type, Center Positive
GE65E1503N01	15 V	4.33 A	65 W	150 mV pk-pk	± 1%	± 5%	
GE65E1803N01	18 V	3.61 A	65 W	180 mV pk-pk	± 1%	± 5%	
GE65E2403N01	24 V	2.71 A	65 W	240 mV pk-pk	± 1%	± 5%	
GE65E4803N01	48 V	1.35 A	65 W	300 mV pk-pk	± 1%	± 5%	

Note:
1. Model numbers listed include the standard output connector for the particular model, the "F" (C14) input receptacle is for class I input, "N" (C8) input receptacle is for class II. For Input Class I models: for AC GND connected to output common (-), insert a "B" in the part number where the "E" is located (GE65B1203F01).
2. No minimum load requirement.
3. Measured at 25°C using 6 inch twisted pair wires with noise probe directly across output connector terminals, and load terminated with 0.1µF ceramic and 10µF low ESR capacitors. 20 MHz Bandwidth, differential mode. For 5V models, values listed are typical, 100 mV pk-pk maximum.
4. Load Regulation is measured at the output connector at the end of the cable.
5. Output cable: #18AWG, UL2464, 1.5m, 4cond. These wire gauge for cables might be changed to higher size if needed to meet specifications.
6. Other options available, see connector options table.

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions/Description	Min	Nom	Max	Units
Operating Temperature	Derated output power linearly from 40 to 70°C	-20	-	+70	°C
Storage Temperature	-	-40	-	+85	°C
Relative Humidity	Non-condensing	5	-	95	%RH
Operating Altitude	-	-500	-	5,000	m
Storage Altitude	-	-500	-	40,000	feet
Cooling	Convection				
IP Rating	IP54, option to meet IP67				
Transportation Vibration	Random vibration per MIL-STD-810E, Method 514.4, Cat. 1, Figure 514.4-1, 1 hr in each of three axes				
Drop Test	1.4 m from table top to wooden platform. 6 faces, 30 drops minumum (this is optional)				
Audible Noise	< 28dbA from 1 m				

EMC/EMI COMPLIANCE

IEC/EN 60601-1-2, 4th Edition, IEC/EN 61000		
Parameter	**Conditions/Description**	**Criteria**
Radiated Emissions[1]	EN 55032/CISPR11 Class B, FCC Part 15.109, Class B: 3db margin typical at 115/230 VAC, at 10%, 50%, 100% load steps	Compliant
Conducted Emissions[2]	EN 55032/CISPR11 Class B, FCC Part 15.107, Class B: 6db margin typical at 115/230 VAC, at 10%, 50%, 100% load steps	Compliant
Common Mode Noise	High frequency (100 KHz to 20 MHz), 40 mA pk-pk	Compliant
Harmonic Current Emissions	EN 55022/IEC 61000-3-2, Class A	Compliant
Flicker	IEC 61000-3-3	Compliant
ESD Immunity on Power Ports	EN 55024/IEC 61000-4-2, level 4: ±8 kV contact, ±15 kV air (Per IEC 60601-1-2 4th edition, Table 4)	A
Radiated RF EM Fields Susceptibility	EN 55022/EN 61000-4-3, 10V/m, 80 MHz to 2.7 GHz, 80% AM at 1 kHz (Per IEC 60601-1-2 4th edition, Table 4)	A
Electrical Fast Transients (EFT) /Bursts	EN 55024/IEC 61000-4-4, Level 4, ±4.4 kV, 100 KHz rep rate, 40 A (Also meets IEC 60601-1-2, 4th edition standard, Table 5)	A
Surges, Line to Line (Diff) and Line to GND (CMN Mode)	EN 55024/IEC 61000-4-5, Level 4, ±2 kV DM, ±4 kV CM (Also meets IEC 60601-1-2, 4th edition standard, Table 5)	A
Conducted Disturbances Induced by RF Fields	EN 55022/IEC 61000-4-6, 3+20% V/m, Level 4, 0.15 MHz to 80 MHz and 10+20% V/ m) in ISM and amateur radio bands between 0.15 MHz and 80 MHz, 80% AM at 1 KHz (Also meets IEC 60601-1-2, 4th edition standard, Table 5)	A
Rated Power Frequency Magnetic Fields d) e)	EN55024/IEC1000-4-8, Level 4: 30 A/m (.378 Gauss, which is an induced voltage of 0.15 mV g) 50/60 Hz (Per IEC 60601-1-2 4th edition. Table 4)	A
Voltage Interruptions, Dips, Sags & Surges a) f) i) o) p)	EN 55024, IEC/EN 61000-4-11: 100% dip for 10 ms, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees 100% dip for 20 ms at 0 deg 100% dip for 16 ms at 0 deg 100% dip for 5000 ms (250/300 cycles) para. h) 60% dip for 100 ms 30% dip for 500 ms, 25/30 cycles para. h), at 0 degrees for 500 ms	 A B A B B A
RingWave	IEC 61000-4-12, Level 3: 2 kV+10% Common Mode, 1 kV+10 DM	Compliant
Voltage Fluctuations	IEC 61000-4-14, Class 3	Compliant
Proximity Fields from RF Wireless Communications Equipment	Per IEC 60601-1-2 4th edition. Table 4	Compliant
Low-Frequency Magnetic Fields	Per IEC 60601-1-2 4th edition. Table 4	Compliant

Note: 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

Enclosure Port Immunity for RF Wireless Communications Equipment				
Service a)	**Band a) (MHz)**	**Test Frequency b) (MHz)**	**Pulse Modulation e) / duty cycle f)**	**Note**
TETRA 400	380 to 390	385	18 Hz / 1:1	The enclosure port of ME equipment or system is tested as this table using the methods in IEC61000-4-3 unless the manufacture can ensure that RF wireless communications equipment will not be used at a distance of 3 m or less from ME equipment or system. In this case the equipment or system is exempt from this subclause.
GMRS 460 FRS 460	430 to 470	3450	18 Hz / 1:1	
GSM 800/900 TETRA 800 IDEN 820 CDMA 850	800 to 940	810, 870, 930	18 Hz / 1:1	
GSM 1800 CDMA 1900 GSM 1900 DECT	1700 to 1910	1720, 1805, 1890	217 Hz / 1:1	
UMTS	1910 to 1990	1950	217 Hz / 1:1	
Bluebooth WLAN 802.11 b/g/n RFID 2450	2400 to 2500	2450	217 Hz / 1:1	
WLAN 802.11 a/n DECT	5100 to 5800	5170, 5450, 5730	217 Hz / 1:1	

RELIABILITY

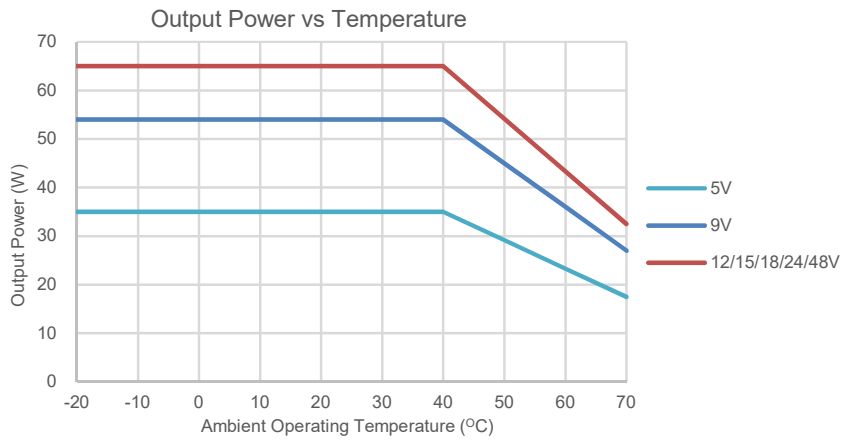
Parameter	Conditions/Description
MTBF	> 250,000 hours Telcordia 332, Issue 6 at 110 VAC & 220 VAC, 25°C ambient temperature
E-Cap Lifetime	All specified E-Caps life > 7 year, calculated at 25°C ambient temperature 115 VAC / 60Hz & 230 VAC / 50Hz, 24 hrs per day, 261 days / year, 6 power up cycles per day
Life Cycle AC Power On / Off Test	> 10,000 cycles for each of the following: 230 VAC input with 100% load at 0.5 s on, 59.5 s off 100 VAC input with 100% load at 10 s on, 50 s off
IPC 610	Class 3

EFFICIENCY LEVEL VII SPECIFICATIONS

Single-Voltage External AC-DC Power Supply, Basic-Voltage		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode (in decimal)**	**Maximum Power in No-Load Mode (W)**
0 to ≤ 1 W	≥ 0.5 x P_{no} + 0.169	≤ 0.075
> 1 to ≤ 49 W	≥ 0.071 x ln(P_{no}) -0.00115 x P_{no} + 0.67	≤ 0.075
> 49 to ≤ 250 W	≥ 0.890	≤ 0.150
> 250 W	≥ 0.890	≤ 0.150

Single-Voltage External AC-DC Power Supply, Low-Voltage		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode (in decimal)**	**Maximum Power in No-Load Mode (W)**
0 to ≤ 1 W	≥ 0.517 x P_{no} + 0.091	≤ 0.075
> 1 to ≤ 49 W	≥ 0.0834 x ln(P_{no}) -0.0011 x P_{no} + 0.609	≤ 0.075
> 49 to ≤ 250 W	≥ 0.880	≤ 0.150
> 250 W	≥ 0.880	≤ 0.150

DERATING CURVE



MECHANICAL SPECIFICATIONS

Parameter	Conditions/Description
Dimensions	102 x 60 x 33 mm
Enclosure	94V-0 black polycarbonate
LED Indicator[1]	Green on indicator visible on the top cover to indicate the presence of DC output.
Mounting Feet	The base will include molded in dimples to serve as mounting feet.
Cosmetics	Surface should be free of scratches, blemishes
Input Configuration	Desktop: IEC C14 or C8 receptacle
Output Connectors	2.5 x 5.5 x 9.5 mm straight barrel type (#3) standard 6pin minifit for 5 V and 9 V output (#51)
Output Cables	Black. Strain reliefs should be “smooth” to allow easy cleaning by users. Bend test (20,000 cycles, 70 deg bend, 300g weight) to be applied to all cables.

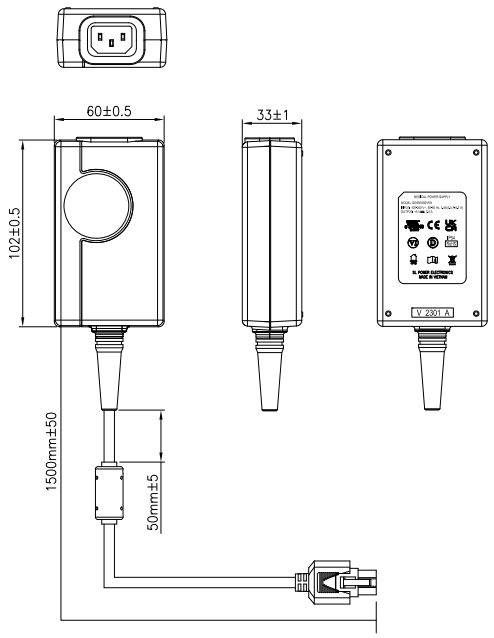
Note 1: LED indicator is an option, not applied for standard models.

UNIT PACKAGING SPECIFICATIONS

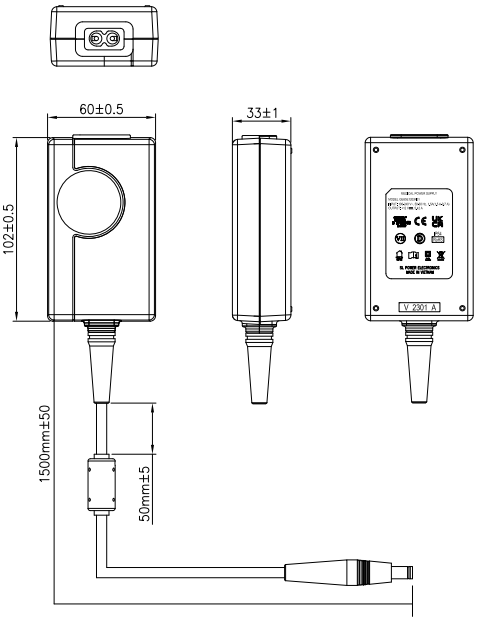
Parameter	Conditions/Description
Individual Unit Packing	Units can be packed in egg crate type cartons for production quantities. Individual product shipments should include an individual unit box that meets ASTM4169.
Master Carton Shipping Box	30 units per master carton. Master carton meets ASTM4169. Made with recyclable material. Only anti-static packing material may be used inside the box. Exterior box sealing tape shall be anti-static type.
Individual Carton Packing Box (when used)	Individual carton (if used) must be labeled with RoHS sticker and individual label showing unit serial number, bar code, manufacturing date, and manufacturing part number country of origin.

MECHANICAL DRAWINGS

C14 Type F Input

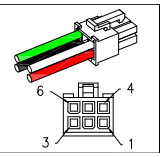


C8 Type N Input



#51 Output Connector

LEADWIRE HOOK-UP		
PIN #	FUNCTION	COLOR
1	+V	RED
2	NC	-
3	COMMON	BLACK
4	+V	WHITE
5	NC	-
6	COMMON	GREEN



#03 Output Connector

	FUNC	COLOR
CENTER	+	WHITE
SHELL	-	BLACK

Tolerances Unless Noted Otherwise
.x ±0.5
.xx ±0.25
.xxx ±0.125
Angles ±0.5°

CONNECTOR INFORMATION

Standard models include a 2.5mm x 5.5mm x 9.5mm straight barrel type connector (Ault #3), center positive (6-pin Molex type - #51 – on 5V models). 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 9.5 mm straight barrel plug - Center positive 	45	2.5 x 5.5 x 9.5 mm straight barrel plug, locking - Center positive 
03	2.5 x 5.5 x 9.5 mm straight barrel plug - Center positive (Standard models) 	48	3-pin Snap n Lock, Kycon Kpp - 3P or equivalent (Pin 1 = (+); pin 2 = (-)) 
12	5-pin DIN - 180 male connector (Pins 3,5 = (+); pins 1,2,4 = (-)) 	49	4-pin Snap n Lock, Kycon Kpp - 4P or equivalent (Pins 1,3 = (+); pins 2,4 = (-)) 
22	6-pin DIN male connector (Pins 1,2 = (+); pins 4,5 = (-)) 	51	6-pin Minifit - Molex 39-01-2060 or equivalent (Pins 1,4 = (+); pins 3,6 = (-)) 
23	8-pin DIN male connector (Pins 3,7 = (+); pins 1,4,6,8 = (-); shell = FG) 	65	Stripped and tinned leads 
32	9-pin “D” type, female (Pin 8 = (+); pin 5 = (-); all others = NC) 	70	2.1 x 5.5 x 11 mm right angle barrel plug (High retention) - Center positive 
33	2.5 x 5.5 x 12.5 mm straight barrel plug - Center positive 	71	2.5 x 5.5 x 11 mm right angle barrel plug (High retention) - Center positive 
40	2.1 x 5.5 x 9.5 mm right angle barrel plug - (High retention) - Center positive 	72	2.1 x 5.5 x 9.5 mm straight barrel plug (High retention, no spark) - Center positive 
41	2.5 x 5.5 x 9.5 mm right angle barrel plug - (High retention) - Center positive 	73	2.5 x 5.5 x 9.5 mm straight barrel plug (High retention, no spark) - Center positive 
42	2.1 x 5.5 x 11 mm straight barrel plug - (High retention) - Center positive 	74	EIAJ#5 style connector - Central positive 
43	2.5 x 5.5 x 11 mm straight barrel plug - (High retention) - Center positive 	96	USB Type C 
44	2.1 x 5.5 x 9.5 mm straight barrel plug, locking - Center positive 	99	Micro USB 

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE | TRUST

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