

MAIN FEATURES

- Universal input voltage range (90 264 V_{AC})
- 160 W rated power (100 W natural convection cooling)
- Compact standard form factor (2 x 4 x 1 in)
- High efficiency (91% typical)
- 12, 24 or 48 V_{DC} standard output voltages
- Active PFC, EN61000-3-2 (Class C, >50% load).
- Low earth leakage current (<200 µA)
- Over temperature protection
- Over voltage protection
- Over Current and short circuit protection
- Auxiliary 12 V_{DC}, 0.5 A output.
- 4000 m altitude operation
- IEC/EN 62368-1 compliance
- RoHS 3 compliant (Directive 2015/863/EU)







DESCRIPTION

The SFA160 are high efficiency, small form factor, single output AC-DC, series of power supplies for use in industrial and information technology applications.

The series provide a steady 160 W of regulated DC power from an open-frame 2 x 4 x 1" standard form factor which makes easier its integration into space constrained systems.

By converting energy at 91% typical efficiency, the series generate a low amount of heat facilitating thermal management. The series come in 12, 24 or 48 V_{DC} standard output voltages and offers an auxiliary 12 V_{DC} , 0.5 A output. It can deliver full output power from -20 to 50 °C at 500 LFM airflow and can be operated up to 70 °C derating output power. When natural convection cooled, the 12, 24, 48 V_{DC} variants can deliver a steady 100 W up to 50 °C ambient.

The SFA160 series can be operated up to 4000 m without de-rating thanks to PCB Creepages and clearances greater than 8 mm. Protection features include, fuses on both AC lines, output over-current, output short-circuit, output over-voltage and over-temperature.

The SFA160 series comply with the IEC/EN 62368-1 safety standards for Audio Video and information technology equipment. It meets the EN 55032 EMC limits of Class B for conducted emissions as well as the IEC/EN 61000-3 for harmonic content and EN 55024 for EMC immunity.

MARKET SEGMENTS AND APPLICATIONS

- Networking and Communication Equipment
- DSL, Wi-Fi and Wi-Max Base-stations

- LED Industrial Displays, Monitors
- Automation, Drives, Industrial Controls



MODEL CODING AND OUTPUT RATINGS

Model Number	V1 [V]	I1 ¹ Convection [A]	I1 ¹ Forced air [A]	V1² Ripple [mV]	V2 [V]	l2 ¹ Rated [A]	V2² Ripple [mV]
SFA160-US12	12	8.3	13.3	120	12	0.5	240
SFA160-US24	24	4.1	6.6	240	12	0.5	240
SFA160-US48	48	2.1	3.3	480	12	0.5	240

¹ The combined output power of V1 and V2 must not exceed 100 W at natural convection cooling and 160 W when forced air cooled at 500 LFM, up to 50 °C ambient. In both convection or forced air cooling de-rating applies above 50 °C ambient (see output power – ambient temperature graphs below).

² Peak-to-Peak measured at 20 MHz Bandwidth.

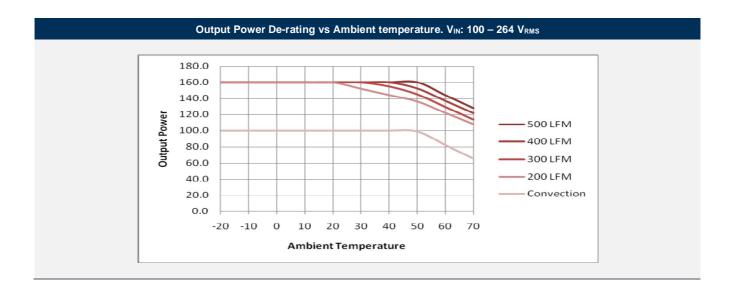
INPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
AC Input Voltage	PS starts and operates at 90 V_{AC} at all load conditions	90	100/240	264	V _{AC}
Input Frequency		47	50/60	63	Hz
DC Input Voltage		170	-	300	V_{DC}
Input Current	RMS at 90 V _{AC} , maximum load	-	-	2.3	А
Inrush Current (peak)	No damage at 230 V _{AC} , cold start/hot start.				
Fusing	2.5 A, Time Lag, 250 V on L and N	-	2.5	-	А
Efficiency	115 V _{AC} , full load	-	90	-	%
Efficiency	230 V _{AC} , full load	-	91	-	%
No load Power Consumption	115 V _{AC}	-	2.5	-	W
No load Power consumption	230 V _{AC}	-	2.3	-	
	At full rated load,				
Power Factor	115 V _{AC} , 60 Hz	0.98	-	-	
	230 V _{AC} , 50 Hz	0.89	-	-	
Harmonic Current	Complies with EN-61000-3-2. Class D at 230 V_{AC} 50 Hz, Class C at > 50% rated load.				
Fluctuations and Flicker	Complies with EN-61000-3-3 at nominal voltages and full load.				
Earth Leakage Current	$264 V_{AC}$, $60 Hz$, normal condition	-	-	200	μA

OUTPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
V1 Set Point Accuracy			±1	-	%
V1 Output Power Rating	Natural convection	-	-	100	W
	500 LFM forced air	-	-	160	vv
V2 Output Voltage	15% accuracy	10.2	12	13.8	V
V2 Output Current		-	-	0.5	А
V1 Voltage Adjustment Range		-	-	±5	%V1
	V _{AC} : nominal voltages				
Load Regulation	V1 Load: 0 – 100% rated	-	-	±1	%V1
	V2 Load: 0 – 0.5 A	-	-	±5	%V2
	V _{AC} : 90 – 264 V _{RMS}				
Load-Line Cross Regulation	V1: 0 – 100% load (V2 at 50% load)	-	-	±1	%V1
	V2: 0 – 0.5 A load (V1 at 50% load)	-	-	±15	%V2
V1 Line Regulation	V _{AC} : 90 – 264 V _{RMS}	-	-	±0.1	%V1
V1 Transient Response	50% load changes at 0.1 A/µs		_	10	%V1
(Voltage Deviation)	Recovery to regulation band within 1 ms	-	-	10	70 V I
V1 Ripple and Noise	Peak-to-peak, 20 MHz BW.	-	-	1	%V1
Start-up Rise Time	90 <v<sub>IN<264, any load conditions.</v<sub>	0.2	-	5	ms
Start-up Delay	V1 in regulation after AC is applied	-	-	1000	ms
Turn-on Overshoot		-	10	-	%V1
Hold-up Time	At nominal V _{IN} , rated load, all models	16	-	-	ms
Minimum Load	V1, V2	0	-	-	А
Temperature Drift		-	±0.25	-	mV/°C





PROTECTION FEATURES

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
Input Under Voltage Lockout	No damage, auto recovery	60	75	-	V _{AC}
Input Fuse	Time Lag 2.5 A, 250 V on L and N				
Over Current	Hiccup mode, auto-recovery	110	-	150	%I1 _{MAX}
Short Circuit	Hiccup mode, auto-recovery				
Over Voltage	Shut down, latch off mode	110	-	130	%V _{NOM}
Over Temperature	Shut-down, auto-recovery				
	I-to-O, Reinforced	4000	-	-	V _{AC}
Isolation	V1-to-V2	100	-	-	V _{AC}
ISUIALIUII	I-to-PE	1500	-	-	V _{AC}
	O-to-PE, functional	500	-	-	V _{DC}
Creepage and Clearance		8	-	-	mm

ENVIRONMENTAL SPECIFICATIONS

Specification	Test Conditions / Notes	Min	Nominal	Мах	Units
Operating Temperature (*)	No de-rating up to 50°C, 50% load at 70°C Linearly de-rate above 50 °C	-20	-	70	°C
Storage Temperature Range		-40	-	80	°C
Cooling	See de-rating curves below	200	-	500	LFM
Relative Humidity	Non-condensing	-	-	95	%
Operating Altitude		-	-	4000	m
Shock	Operating: 10 g, 11 ms, half sine, one shock input in each axes				
Vibration	Operating, sinusoidal: 0.5 g peak-to-peak, 10-30	0 Hz, 3 axes			
MTBF	>200.000 hours at 75% Full Load, Nominal VAC, 2	25 °C ambien	t MIL-HDBK-217-	E-1	



ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

Phenomenon	Conditions / Notes	Standard	Equipment/Performance Class
Conducted	115 V_{RMS} , 230 V_{RMS} . Maximum load.	EN 55032 EN 60601-1-2	В
Radiated	At 10 m distance	EN 55032	А
Line Voltage Fluctuation and Flicker	At 20%, 50% and 100% maximum load. Nominal input voltages.	EN 61000-3-3	
Harmonic Current Emission	Nominal input voltages. All load conditions.	EN 61000-3-2	D

ELECTROMAGNETIC COMPATIBILITY (EMC) – IMMUNITY

Phenomenon	Conditions / Notes	Standard	Test Level	Performance criteria
	Reference standards for ITE	EN 55024		
ESD	15 kV air discharge, 8 kV contact, at any point of the system.	EN 61000-4-2	4	А
Radiated Field	3 V/m, 80-1000 MHz, 80% AM, 3 m distance	EN 61000-4-3	3	А
Electric Fast Transient	±2 kV on AC power port ±1 kV on signal/control lines	EN 61000-4-4	3	А
Surge	±1 kV line-to-line ±2 KV line to earth	EN 61000-4-5	3	А
Conducted RF Immunity Magnetic Field Immunity	±0.5 kV for outdoor cables 3 V _{RMS} , 0,15-80 MHz, 80% AM 50 and 60 Hz, 3 A/m	EN 61000-4-6	3	А
Dips and Interruptions	Dip to 40% for 5 cycles (100 ms) Dip to 70% for 25 cycles (500 ms) Drop-out to 5% for 10 ms Interrupts > 95% for 5 s	EN61000-4-11 EN61000-4-11 EN61000-4-11 EN61000-4-11		B B B B

SAFETY AGENCIES APPROVALS

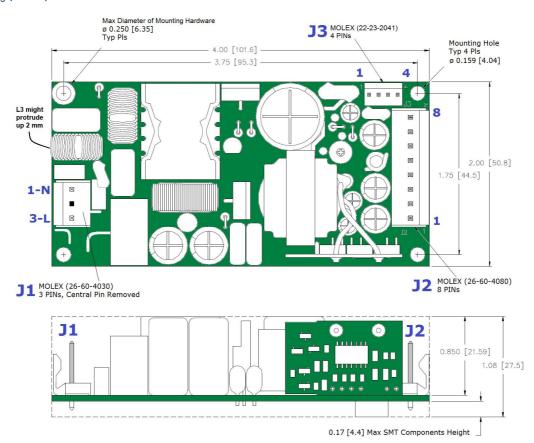
Certification Body	Safety standards and file numbers	Agency files references
UL / CSA	UL 60950-1 & CAN/CSA C22.2 No. 60950-1-07, UL 62368-1	Ask Enedo for reference
CB Certification	IEC 60950-1, IEC 62368-1	Ask Enedo for reference
CE	Low Voltage Directive (LVD) 2014/35/EU Electromagnetic Compatibility (EMC) 2014/30/EU RoHS 3 Directive 2015/863/EU	



OUTLINE DRAWING, CONNECTIONS AND OUTPUT POWER DE-RATING

Overall dimensions: 50.8 x 101.6 x 27.5 mm (2.00 x 4.00 x 1.08 in)

Weight: 160 g (0.35 lb)



Forced air cooling: Air flow direction, longitudinal or transverse, must be coplanar to the PCB no matter its orientation.

Connector	Manufacturer and Part Number	Pin Assignment
AC Input Connector J1	Molex 26-60-4030 or equivalent	1: AC Line 1; 2: Not present; 3: AC Line 2
11 Mating Connector	Molex 09-93-0300 (Crimp Terminal Housing)	
J1 Mating Connector	Molex 08-50-0105 (Crimp Terminal, 18-24 AWG)	
Output Connector J2	Molex 26-60-4080 or equivalent	1 ÷ 4: V1 RTN; 5 ÷ 8: +V1
J2 Mating Connector	Molex 09-91-0800 (Crimp Terminal Housing) Molex 08-50-0105 (Crimp Terminal, 18-24 AWG)	
Auxiliary Connector J3	Molex 22-23-2041 or equivalent	1, 2: V2 RTN; 3, 4: +V2
12 Mating Connector	Molex 22-01-2047 (Crimp Terminal Housing)	
J3 Mating Connector	Molex 08-50-0113 (Crimp Terminal, 22-24 AWG)	

Specifications appearing in ENEDO's catalogues and brochures as well as any oral statements are not binding. All descriptions, drawings and other particulars (including dimensions, materials and performance data) given by ENEDO are as accurate as possible but, being given for general information, and are not binding on ENEDO. ENEDO makes thus no representation or warranty as to the accuracy of such material. We assume no liability other than as agreed in the terms of the individual contracts and we reserve the right to make technical modifications in the course of our product development. Our product information solely describes our goods and services and is in no way to be construed or interpreted as a quality or condition guarantee. The aforesaid shall not relieve the customer of its obligation to verify the suitability of our Products for their products and applications. ENEDO assumes no liability from the use of its products outside of specifications. No license is granted to any intellectual property rights by this document.