

## DESCRIPTION

The SFA160 is a series of high efficiency, small form factor and single output AC-DC power supplies.

Offering 160 W of regulated DC power from in an industry standard 2x4x1 in open-frame form factor, the SFA160 series consumes 46% less space in a system, enabling designers to offer smaller systems or to integrate more advanced features into their system without compromising on system size.

By converting energy at >90% efficiency, the SFA160 generates less heat facilitating higher reliability and space saving designs.

The SFA160 series is available in four different high power output voltages at 5, 12, 24 and 48 V and is equipped with an auxiliary low power 12 V output, which can be used as the supply voltage for an external fan.



2 YEAR WARRANTY

## KEY FEATURES

160 W, PFC Power Supply  
Very small form factor of 2 x 4 x 1 in  
Extremely high efficiency > 90% (typ.)  
5, 12, 24 and 48 V standard output variants

Universal Input Voltage Range  
OVP and Short Circuit Protection  
Over Temperature Protection  
Auxiliary Fan + 12V Output  
RoHS-6 Compliant (Directive 2002/95/EC)

## TARGET APPLICATIONS

Networking and Communications Equipment  
DSL, Wi-Fi and WiMax Base-stations  
Video and Broadcast Equipment  
Audio, Music and Radio Industries

Industrial Computers  
Industrial Displays, Monitors  
Automation, Drives, Industrial Controls  
Test/Measurement Equipment

## MODELS AND OUTPUT SPECIFICATIONS

Model	V1	I1 Current <sup>1</sup> Convection	I1 Current <sup>2,3</sup> Fan Cooled	V1 Ripple <sup>4</sup> Pk-Pk	V2	I2 Current <sup>1</sup> Convection	I2 Current <sup>2,3</sup> Fan Cooled
SFA160-US05	5 V	14 A	20,6 A	50 mV	12 V	0.5 A	0.5 A
SFA160-US12	12 V	8,3 A	13,3 A	120 mV	12 V	0.5 A	0.5 A
SFA160-US24	24 V	4,2 A	6,66 A	240 mV	12 V	0.5 A	0.5 A
SFA160-US48	48 V	2,1 A	3,33 A	480 mV	12 V	0.5 A	0.5 A

<sup>1</sup> The combined output power of V1 and V2 must not exceed 70W for 5V model or 100W for 12, 24 and 48V models when convection cooled.

<sup>2</sup> The combined output power of V1 and V2 must not exceed 100W for 5V model or 160W for 12, 24 and 48V at 400LFM.

<sup>3</sup> The fan is rated at 200LFM for the 5V unit and 500LFM for 12, 24 and 48V units.

<sup>4</sup> Measured at 20MHz Bandwidth.

## INPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Minimum	Nominal	Maximum	Units
AC Input Voltage		90	115/230	264	V <sub>AC</sub>
DC Input Voltage		170		370	V <sub>DC</sub>
Input Frequency		47		63	Hz
Input Current	100/200 V <sub>AC</sub>			2.5/1.25	A
Inrush Current	230 V <sub>AC</sub> Cold start, No Damage				A
Efficiency	Rated at full load, Nominal V <sub>IN</sub>				
	5 V Unit		85%		
	12, 24, 48 V Units		90%		
Power Factor	90 V <sub>AC</sub>		0.98		
Harmonic Current Limit	Complies with EN-61000-3-2		D		
Earth Leakage Current	264 V <sub>RMS</sub> , 60 Hz			250	μA

## OUTPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Minimum	Nominal	Maximum	Units
Output Voltage V1	5 V	4.95	5	5.05	V
	12 V	11.88	12	12.12	V
	24 V	23.76	24	24.24	V
	48 V	47.52	48	48.48	V
Output Power V1	5 V Unit			70	W
Convection Rating	12, 24, 48 V Units			100	W
Output Power V1	5 V Unit			100	W
500 LFM Fan Rating	12, 24, 48 V Units			160	W
Output Voltage V2	All Models			12	V
Output Current V2	All Models, from convection to 500LFM cooling			0.5	A
Voltage Set Point Accuracy	Main Output (V1)			± 1%	
Voltage Adjustment Range	Main Output (V1)			± 5%	
Line regulation	90 – 264 V <sub>AC</sub> (V1)			± 0,1%	
Load Regulation	V1			± 1%	
	V2 at 50% Load			± 20%	
Cross Regulation	V1: Test at 50% Full Load on V1 and 0-100% Load Swing on V2			± 1%	
Cross Regulation	V2: Test at 50% Full Load on V2 and 0-100% Load Swing on V1			± 15%	
Transient Response (Voltage Deviation)	50% Load Changes at 0.1A/μs 5V at 2000μF Load / I <sub>out</sub> > 1A 12V at 1000μF Load / I <sub>out</sub> > 1A 24V at 470μF Load / I <sub>out</sub> > 0.5A 48V at 220μF Load / I <sub>out</sub> > 0.5A			± 5%	
Ripple & Noise	Peak-to-peak 20MHz Bandwidth			1%	
Rise Time	230 V <sub>AC</sub> at Minimum Load	0,2		20	ms
Start-up Delay				1000	ms
Turn-on Overshoot	Percentage of V1		10%		
	Percentage of V2		30%		
Hold-up Time	At Full Load	16			ms
Minimum Load		0			A
Temperature Drift		-0,25		+0,25	mV/°C

## PROTECTION FEATURES, SAFETY APPROVALS

Specification	Test Conditions / Notes	Minimum	Nominal	Maximum	Units
<b>Input Fuse</b>	Line and Neutral		2.5		A
<b>Over Current Protection</b>	Auto Recovery, Hiccup Mode	110		150%	I <sub>max</sub>
<b>Over Voltage Protection</b>	Under fault conditions, the maximum voltage			130%	V <sub>1max</sub>
<b>Short Circuit Protection</b>	Auto Recovery, Hiccup Mode				
<b>Over Temperature Protection</b>	Shutdown with Auto Recovery				
<b>Isolation Input/ Output</b>		4000			V <sub>AC</sub>
<b>Isolation Input/ Ground</b>		1500			V <sub>AC</sub>
<b>Isolation V1/ V2</b>		100			V <sub>DC</sub>
<b>Isolation Output/ Ground</b>		500			V <sub>AC</sub>
<b>Safety Approvals</b>	cCSA <sub>US</sub> , Nemko, CB Certificate				
<b>Safety Standards</b>	IEC, UL, EN60950-1; (2 <sup>nd</sup> Edition) CSAC22.2 No.60950-1-03				
<b>Agency File Numbers</b>	CSA: 2022889 Nemko: P11213778 CB: No 62105 CB Report: 160679				

## ELECTRO-MAGNETIC COMPATABILITY EMC

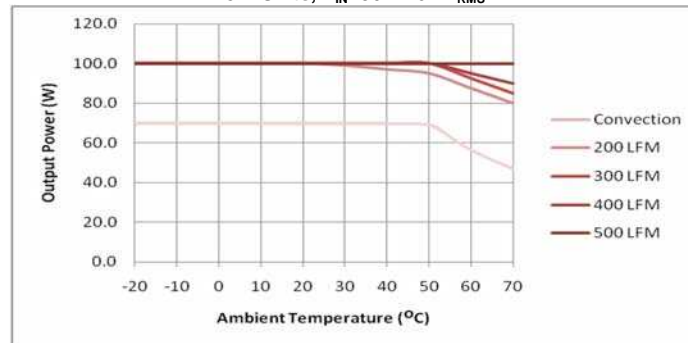
Specification	Test Conditions / Notes	Standard	Performance criteria
<b>Conducted EMI</b>	Class B	EN 55022	B
<b>Radiated EMI</b>	At 10m distance	EN 55022	A
<b>Line Voltage Fluctuation / Flicker</b>	At 20%, 50% and 100% Maximum Load	EN 61000-3-3	A
<b>ESD</b>	15kV air discharge, 8kV contact at any point of System Level 4	EN 61000-4-2	A
<b>Harmonic Current Emission</b>	All Load Conditions	EN 61000-3-2	D
<b>Radiated Field</b>	3V/m, 80-2500MHz, 1KHz/2Hz 80% AM modulation. Dwell time is 3 sec for 2 Hz modulation Dwell time is 1 sec for 1KHz modulation	EN 61000-4-3	A
<b>EFT Surge</b>	2KV on AC and DC 5KHz repetition 1KV on I/O 2KV CM, 1KV DM (5min surges at each phase angle)	EN 61000-4-4 EN 61000-4-5	A A
<b>Conducted RF Immunity</b>	3 V <sub>RMS</sub> , 0.15-80 MHz, 1 KHz/2 Hz 80% AM modulation	EN 61000-4-6	A
<b>Magnetic Field Immunity</b>	50 and 60 Hz, 3A/m	EN 61000-4-8	A
<b>Dips and Interruptions</b>	Dip to 40% for 5 cycles (100ms) Dip to 70% for 25 cycles (500ms) Drop-out to 5% for 10 ms Interrupts > 95% for 5 s	EN 61000-4-11 EN 61000-4-11 EN 61000-4-11 EN 61000-4-11	B B B C

## ENVIRONMENTAL SPECIFICATIONS

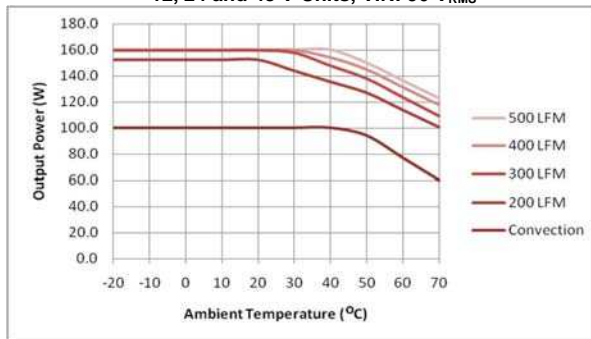
Specification	Test Conditions / Notes	Min	Nominal	Max	Units
<b>Operating Temperature Range</b>	No de-rating up to 50 °C	-20		50	°C
<b>De-rated Operating Temperature Range</b>	Linearly de-rate from full load at 50 °C to half load at 70 °C			70	°C
<b>Storage Temperature Range</b>		-40		85	°C
<b>Humidity</b>	RH, Non-condensing Operating			90	%
	Non-operating			95	%
<b>Operating Altitude</b>				3000	m
<b>Shock</b>	Operating: Half-sine 11ms, 2 shock on each axis			10	G
	Non-operating: Half-sine 2ms, 2 shock on each axis			140	G
<b>Vibration</b>	Operating: 5-500Hz, 3 axis			2	G
<b>MTBF</b>	75% Full Load, Nominal $V_{IN}$ , 25°C, MIL-HDBK-217-E-1	235000			Hours
<b>Cooling</b>	See Graph and Application Notes	Convection		500	LFM

## COOLING, POWER DE-RATING CURVES

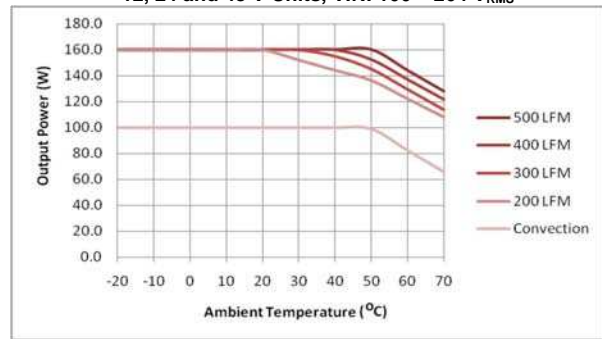
5 V Units,  $V_{IN}$ : 90 – 264  $V_{RMS}$



12, 24 and 48 V Units,  $V_{IN}$ : 90  $V_{RMS}$

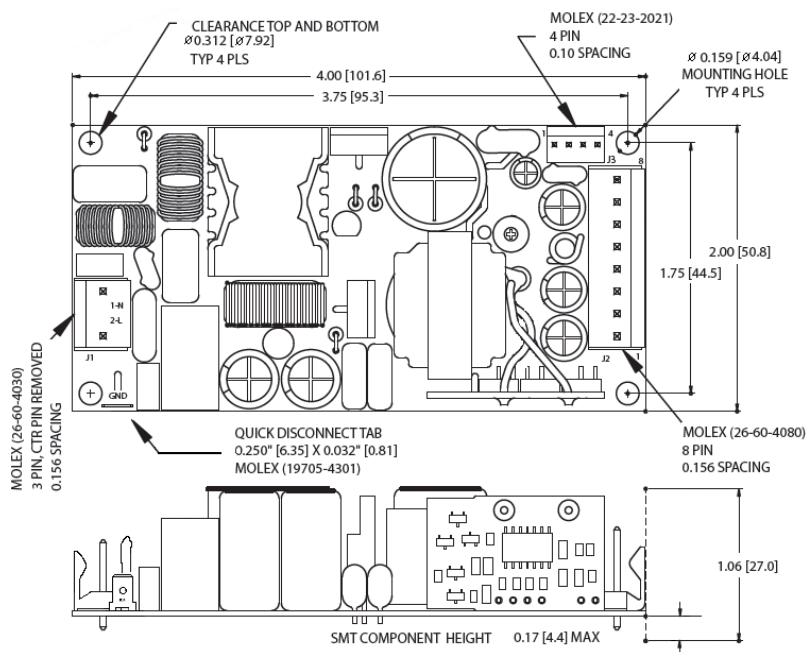


12, 24 and 48 V Units,  $V_{IN}$ : 100 – 264  $V_{RMS}$



## MECHANICAL SPECIFICATION

Connector	Manufacturer and Part Number
<b>Input Connector J1</b>	Molex 26-60-4030 or equivalent
<b>J1 Mating Connector</b>	Molex 09-91-0300 (Crimp Terminal Housing) Molex 08-50-0105 (Crimp Terminal, 18-24 AWG)
<b>Ground Connector GND</b>	Molex 19705-4301 or equivalent
<b>Ground Mating Connector</b>	Molex 0190030001 or equivalent
<b>Output Connector J2</b>	Molex 26-60-4080 or equivalent
<b>J2 Mating Connector</b>	Molex 09-91-0800 (Crimp Terminal Housing) Molex 08-50-0105 (Crimp Terminal, 18-24 AWG)
<b>Output Connector J3</b>	Molex 22-23-2041 or equivalent
<b>J3 Mating Connector</b>	Molex 22-01-2047 (Crimp Terminal Housing) Molex 08-50-0113 (Crimp Terminal, 22-30 AWG)



### Input Connector J1

Pin Number	Pin Function
1	AC Neutral
2	AC Line

### Input Ground Connector GND

GND	AC Ground
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### Output Connector J2

Pin Number	Pin Function
1	DC Return
2	DC Return
3	DC Return
4	DC Return
5	V1
6	V1
7	V1
8	V1

### Output Connector J3

Pin Number	Pin Function
1	Ground
2	Ground
3	12V (Fan)
4	12V (Fan)

Recommended Air Flow Direction

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