

## DESCRIPTION

This series is a compact 2x4 inches, open PCB constructed AC-DC switching power supplies & PSU are capable of delivering 37.5-64 watts of continuous output power at convection cooling.

## FEATURES

- BF class insulation
- Compact size 2" x 4" x 1.18"
- EN55011 /55022 level B emissions
- Low earth leakage current 150uA
- OVP, OCP, OTP protection
- Efficiency 88% typical for single output models
- Single, dual and triple outputs serial models

## INPUT SPECIFICATIONS

Input voltage:	90-264 VAC
Input frequency:	47-63 Hz
Input current:	1.3 A (rms) for 100 VAC 0.7 A (rms) for 240 VAC
Earth leakage current:	150 $\mu$ A max. @ 264 VAC, 63 Hz

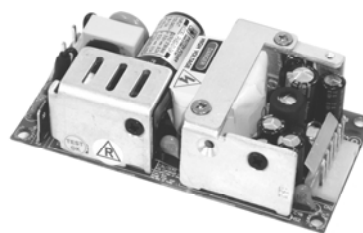
## OUTPUT SPECIFICATIONS

Output voltage/current:	See rating chart.
Maximum output power:	See rating chart.
Ripple and noise:	100 mV peak to peak on 3.3 V & 5.0 V models, 1% peak to peak on other models
Protection:	
OVP	output #1 only, Latch off
OCP & Shorted	Auto recovery
OTP	Latch off
Temperature coefficient:	All outputs $\pm 0.04\%$ / $^{\circ}$ C maximum
Transient response:	Maximum excursion of 4% or better on all models, recovering to 1% of final value within 500 $\mu$ s after a 25% step load change

## ENVIRONMENTAL SPECIFICATIONS

Operating temperature:	0 $^{\circ}$ C to +70 $^{\circ}$ C
Storage temperature:	-20 $^{\circ}$ C to +85 $^{\circ}$ C
Relative humidity:	5% to 95% non-condensing
Derating:	Derate from 100% at +50 $^{\circ}$ C linearly to 50% at +70 $^{\circ}$ C,

## FSP060 M1 SERIES



RoHS



## SAFETY STANDARD APPROVALS



UL 60601-1, CSA C22.2 No. 601.1  
File No. E178020



TÜV EN 60601-1

## GENERAL SPECIFICATIONS

Switching frequency:	62 K $\pm 5$ KHz
Efficiency:	80-88% typical except FSP060-3K13M1 and FSP060-3K15M1 at 75% typical
Hold-up time:	12 ms minimum at 110 VAC
Line regulation:	$\pm 0.5\%$ maximum at full load
Inrush current:	30 A @ 115 VAC, or 60 A @ 230 VAC, at 25 $^{\circ}$ C cold start
Withstand voltage:	4000 VAC from input to output (2 MOPP) 1500 VAC from input to ground (1 MOPP) 1500 VAC from output to ground
MTBF:	250,000 hours at full load at 25 $^{\circ}$ C ambient, calculated per MIL-HDBK-217F
EMC Performance	
EN55011 /EN55022:	Class B conducted, class B radiated
FCC:	Class B conducted, class B radiated
VCCI:	Class B conducted, class B radiated
EN61000-3-2:	Harmonic distortion, class A and D
EN61000-3-3:	Line flicker
EN61000-4-2:	ESD, $\pm 8$ KV air and $\pm 6$ KV contact
EN61000-4-3:	Radiated immunity, 3 V/m
EN61000-4-4:	Fast transient/burst, $\pm 2$ KV
EN61000-4-5:	Surge, $\pm 1$ KV diff., $\pm 2$ KV com
EN61000-4-6:	Conducted immunity, 3 Vrms
EN61000-4-8:	Magnetic field immunity, 3 A/m
EN61000-4-11:	Voltage dip immunity, 30% reduction for 500 ms, 60% reduction for 100 ms, >95% reduction for 10 ms

## OUTPUT VOLTAGE/CURRENT RATING CHART

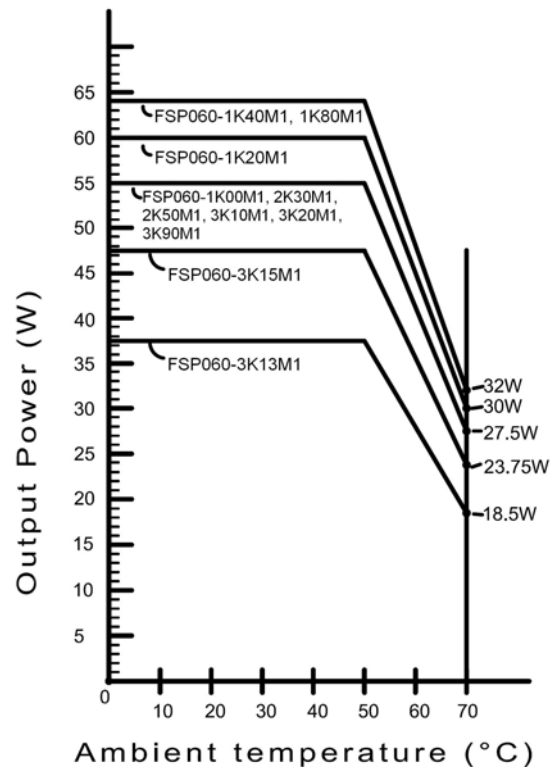
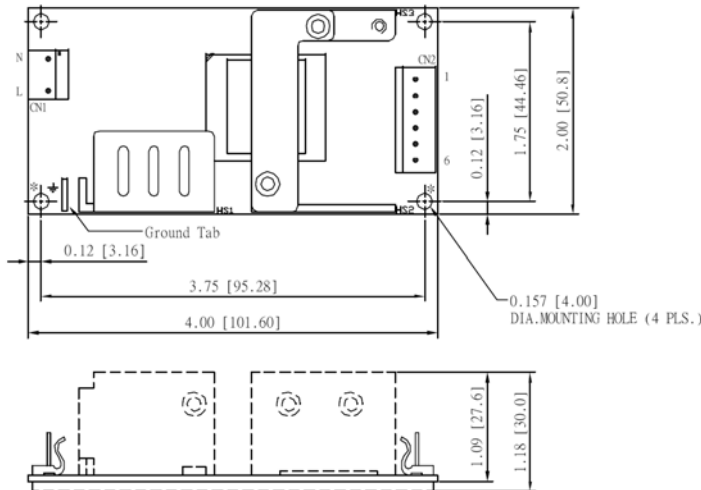
Model	Output #1					Output #2				Output #3				Max. Output Power
	V1	Min. Current	Max. Current at convection	Max. Current at 5 CFM <sup>(1)</sup>	Tol.	V2	Min. Current	Max. Current	Tol.	V3	Min. Current	Max. Current	Tol.	
FSP060-1K00M1	5 V	0 A	11.0 A	(N/A)	±2%	(N/A)				(N/A)				55 W
FSP060-1K20M1	12 V	0 A	5.0 A	(N/A)	±2%	(N/A)				(N/A)				60 W
FSP060-1K30M1	15 V	0 A	4.3 A	(N/A)	±2%	(N/A)				(N/A)				64 W
FSP060-1K40M1	24 V	0 A	2.7 A	(N/A)	±2%	(N/A)				(N/A)				64 W
FSP060-1K80M1	48 V	0 A	1.35 A	(N/A)	±2%	(N/A)				(N/A)				64 W
FSP060-2K30M1	+5 V	0.5 A	6.0 A	8.0 A	±3%	+12 V	0.1 A	3.0 A	±5%	(N/A)				55 W
FSP060-2K50M1	+5 V	0.5 A	6.0 A	8.0 A	±3%	+24 V	0.1 A	1.5 A	±5%	(N/A)				55 W
FSP060-3K10M1	+5 V	0.5 A	6.0 A	8.0 A	±3%	+12 V	0.1 A	3.0 A	±5%	-12 V	0 A	0.5 A	±4%	55 W
FSP060-3K13M1	+3.3 V	0.8 A	6.0 A	8.0 A	±3%	+5.2 V	0.1 A	3.0 A	±5%	+12 V	0 A	0.5 A	±4%	37.5 W
FSP060-3K15M1	+5 V	0.5 A	6.0 A	8.0 A	±3%	+3.3 V	0 A	1.5 A	±5%	+12 V	0 A	0.5 A	±4%	37.5 W <sup>(3)</sup>
FSP060-3K20M1	+5 V	0.5 A	6.0 A	8.0 A	±3%	+15 V	0.1 A	2.4 A	±5%	-15 V	0 A	0.5 A	±4%	55 W
FSP060-3K90M1	+5 V	0.5 A	6.0 A	8.0 A	±3%	+24 V	0.1 A	1.5 A	±5%	-12 V	0 A	0.5 A	±4%	55 W

### NOTES:

1. Safety approvals are for PCB form only. Please have suffix "-C" if cover fitted is ordering. Ex: FSP060-1K00M1-C
2. Maximum current of output #1 of multi-output models can be 8 A at 5 CFM forced air provided by user.
3. It's rated at 37.5W maximum at convection cooling or 47.5W maximum at 5 CFM forced air provided by user
4. The output voltages of a multiple output model may go outside of the stated tolerance when an output load current is out of stated limits. All models may be operated at no-load without damage.
5. Ripple and noise is maximum peak-to-peak voltage value measured at output within 20 MHz bandwidth, at rated line voltage and output load ranges, and with a 10 μF tantalum capacitor in parallel with a 0.1 μF ceramic capacitor across the output.

## MECHANICAL SPECIFICATIONS

## OUTPUT POWER DERATING CURVE



### NOTES:

1. Dimensions shown in inches [mm], Tolerance 0.02 [0.5] maximum
2. Connector CN1: Molex header 09-65-2038 or equivalent, mating with Molex housing 09-50-1031 or equivalent.
3. Connector CN2: Molex header 09-65-2068 or equivalent, mating with Molex housing 09-50-1061 or equivalent.
4. Ground tab is 0.25 [6.35] x 0.032 [0.8] fast-on connector.
5. To ensure compliance with level B emissions, connect the two "\*" marked mounting holes with metallic standoffs to chassis.
6. Weight: 205 grams (0.45 lbs.) approx.

## CONNECTOR PIN CHART

Connector	CN1		CN2					
	N	L	1	2	3	4	5	6
Single Output	Neutral	Line	+V1	+V1	V1 Return		N.C.	N.C.
Dual Outputs	Neutral	Line	+V1	+V1	Common Return		N.C.	+V2
Triple Outputs	Neutral	Line	+V1	+V1	Common Return		+V3	+V2