

# DHF060 Series | ITE & Medical Safety

## 60W/90W Peak

- 2.0" x 3.17" x 0.95" compact size
- Flexible installation for Class I/II
- 5,000 m operating altitude
- -40°C to 70°C convection cooling operation
- Up to 12,000uF loading start-up
- Level VI compliant eco-friendly design



GREEN POWER

## Description

The **DHF060 Series** is a 60W, open-frame, Level VI compliant power supply that is a compact 2.0" x 3.17" x 0.95" in size. In addition to being an eco-friendly design, the series has an expanded, -40°C to +70°C, operating temperature range and is rated to an operating altitude of 5,000 m. The series has a 90W peak-power rating making it ideal for motor-starting/in-rush currents for ITE and Medical equipment, including MOOP and 2xMOPP, applications.

## Specifications

### Input

Input Voltage	• 90 VAC to 264 VAC
Input Frequency	• 47 Hz to 63 Hz
Inrush Current	• 30/60A at 115/230 VAC, cold start, 25°C
Input Protection	• Internal T3.15A / 250 VAC fuse in line
No Load Input Power	• < 0.5W (< 2W for "A" version)
Input Current	• 3A <sub>rms</sub> max/115 VAC, 1.5 A <sub>rms</sub> max/230VAC

### Output

Output Voltage	• See tables on page 2
Initial Set Accuracy	• See tables on page 2
Minimum Load	• No minimum load required
Start Up Rise Time	• 2 ms typical
Hold Up Time	• 16 ms typical
Line Regulation	• ±0.5% typical
Load Regulation	• ±1.0% typical
Ripple & Noise	• < 1% pk-pk typical, 20MHz Bandwidth
Over-voltage Protection	• latch off
Over-load Protection	• auto recovery
Short Circuit Protection	• auto recovery

### Environmental

Operating Temperature	• -40°C to 70°C derating: 2.5% / °C > 50°C
Cooling	• 60W, free air convection 80W, 18CFM forced air
Operating Humidity	• 5-95% RH, non-condensing
Storage Temperature	• -40°C to +85°C
Altitude	• 0 to 5000 m

### General

Efficiency	• > 82% ("A" version: >80%) typical
Energy Saving	• Energy Star, Level V, std. (non "A" version)
Isolation	• 4000 VAC Input to Output, 2xMOPP 1500 VAC Input to Ground, 1xMOPP 1500 VDC Output to Ground, 1xMOPP
Isolation Resistance	• 50 MΩ
Switching Frequency	• 120 kHz typical
MTBF	• >TBD kWhrs to MIL-HDBK-217F at 50°C

### EMC & Safety

Safety Approvals:	• UL/CSA/EN 60950-1, 2nd edition (ITE) • ANSI/AMMI/CSA/EN 60601-1, 3rd edition • CE Mark and CB report
Harmonic Currents	• EN 61000-3-2 class A
EMI	• EN 55022/CISPR 22 class B, EN 61000-3-3
ESD Immunity	• EN 61000-4-2, 6kV/contact, 8kV/air
Radiated Immunity	• EN 61000-4-3, 10V/m with 80% AM
EFT Burst	• EN 61000-4-4, 2kV
Surge	• EN 61000-4-5, 2kV/L-L, 4kV/L-G
Conducted Immunity	• EN 61000-4-6, 10V with 80% AM
Magnetic Fields	• E61000-4-8, 10A/m
Dips & Interruptions	• EN 61000-4-11, 100% dips 10ms, 100% dips 20ms, 30% dips 500ms, 60% dips 200ms, 100% dips 5000ms

### Warranty

Manufacturer's Warranty	• 10 years. Call Tri-Mag or go to <a href="http://www.Tri-Mag.com">www.Tri-Mag.com</a> for details.
-------------------------	---

# DHF060 Series | ITE & Medical Safety

## Output Specifications

Model No.	Output Rail	Load				Initial Accuracy	Step Efficiency			Avg. Eff.
		Min	Rated	Max	Peak		@20% Load	@50% Load	@100% Load	
DHF060-7 DHF060-7A	+12V	0A	5A	6A	8A	+11.9V~+12.1V	88% 83%	89% 87%	86% 85%	87% 85%
DHF060-8 DHF060-8A	+15V	0A	4A	4.8A	6.1A	+14.9V~+15.1V	88% 83%	89% 87%	86% 85%	86% 80%
DHF060-9 DHF060-9A	+24V	0A	2.5A	3A	4A	+23.8V~+24.2V	88% 83%	89% 87%	86% 85%	86% 80%
DHF060-14 DHF060-14A	+48V	0A	1.3A	1.5A	2A	+47.6V~+48.4V	88% 83%	89% 87%	86% 85%	86% 80%

### Notes

- Output Load:**  
Convection cooling: 60W, forced-air cooling: 72W max
- Peak Load Duration:**  
96W peak rating for durations up to 5 secs. Ideal for motor-starting/in-rush conditions.
- Engineering Specification:**  
Contact Tri-Mag for full engineering specification for the specific part number used in your design application.
- Standby Power Consumption with System:**  
This is required by ENERGY STAR in U.S. and ErP regulation in Europe for appliances such as computers and displays. The latest requirement is measured input power to be less than 0.5W with system.
- Audible Noise:**  
For the DHF030-x energy saving series, achieving level VI (<0.3W) standby power consumption is accomplished through burst mode operation of the controller. The burst operation frequency is dependent on load conditions and is approx. 114Hz, within the audible frequency range.
- Step Efficiency and Average Efficiency:**  
Test conditions in step efficiency are referred to 3.2.2 IPS (Internal Power Supply) of the ENERGY STAR program requirements for computers. ENERGY STAR required for efficiency @ 20%, 50%, 100% load is 82%, 85%, 86%; average efficiency is the average of step efficiency.
- Model Ordering Table:**

Safety/Application	w/o Audible Noise	Energy Saving
ITE & Medical	DHF060-xA	DHF060-x

## Mechanical Specifications

### Notes

- Mechanical drawing dimensions shown in mm. Tolerance:  $\pm 0.4$ mm.
- Size: 50.8 x 80.5 x 24.0 Max. (mm)  
2.0 x 3.17 x 0.95 Max. (inches)  
Net weight: 114 g approx./unit
- Connectors: AC input: JST B2P3-VH or equivalent  
DC output: JST B4P-VH or equivalent
- Output Pin assignment:

TB2 Pin No.	1	2	3	4
Connection	V <sub>out</sub>	V <sub>out</sub>	GND	GND

- RoHS compliant

