SHM50 Series

FiDUS
power in motion...

50 Watts

- Power dense 50W in 1 x 4”
- Latest Medical safety approvals
- Latest 4th Ed. EMC IEC60601-1-2 (2014)
- EN55011 Level B conducted & radiated
- No Load Power Consumption <0.15W
- Class II
- 5 Year warranty

Medical

The SHM50 series offers 50W in a dense, 1 x 4” open frame package. The units are designed for use in medical applications, are very efficient and have low emissions, meeting EN55011 Level B. They have a wide temperature range from –10 to +70°C and offer low no load power consumption of <0.15W. Outputs are available from 5V to 48V and all models come with a FiDUS 5 year warranty.

Dimensions:

4 x 1 x 1.28” (101.6 x 25.4 x 32.6mm)

Models & Ratings

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Model Number	Output Power	Output voltage	Output Current	Efficiency
SHM5005	30W	5V	6A	79%
SHM5007	40W	7V	5.71A	80%
SHM5009	45W	9V	5A	85%
SHM5012	50W	12V	4.16A	87%
SHM5015	50W	15V	3.33A	87%
SHM5019	50W	19V	2.63A	88%
SHM5024	50W	24V	2.08A	88%
SHM5028	50W	28V	1.78A	88%
SHM5036	50W	36V	1.38A	88%
SHM5048	50W	48V	1.04A	88%

Notes

1. Looms kits available, see ‘Installation Advice pg5

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	80		275	VAC	Derate linearly from 100% load at 90VAC to 80% load at 80VAC
Operating temperature	-10		70	°C	Derate linearly from 100% power at 40°C to 50% power at 70°C.
Efficiency	79		88	%	
Dimensions	4 x 1 x 1.28” (101.6 x 25.4 x 32.6mm)				
EMC	EN55011 Level B conducted and radiated. EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated. IEC60601-1-2 (4th Edition)				
Safety	IEC60601-1 3.1 edition, ES60601-1:2005 (R2012), CSA-C22.2 No. 60601-1:14, EN60601-1:2006/A1:2013				

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Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	80		275	VAC	Derate linearly from 100% load at 90VAC to 80% load at 80VAC
Input frequency	47		63	Hz	
Power factor					EN61000-3-2 class A compliant
Input current (rms)			1.2	A	Low line. At 100VAC
			0.7		High line. At 240VAC
Inrush current			40	A	100VAC cold start at 25°C
			80		240VAC cold start at 25°C
No load input power			0.1	W	5-9V output models
			0.15		12-54V output models

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	5		48	VDC	See Model & Ratings table
Set point accuracy		5		%	
Line regulation			±1	%	Full load, Vin=100 to 120VAC or 200 to 240VAC
Minimum load	0			%	
Transient response			4	ms	Full load to half load, Vin=110VAC
Ripple & Noise		1		%	All models measured with 0.47uF capacitor and 20 MHz bandwidth at full load .
Hold up time		12		ms	
Overload protection	110		150	%	
Short circuit protection					Trip and restart. Automatic recovery

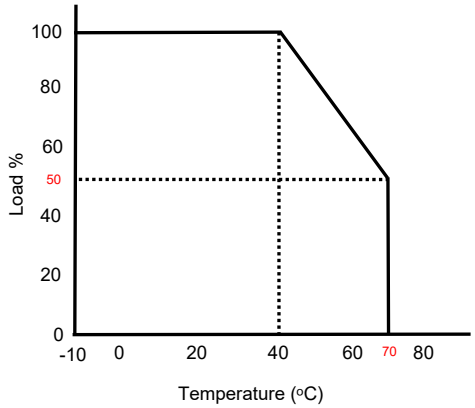
General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	79		88	%	
Isolation: Input to Output	4000			VAC	
Input to Ground	1500			VAC	
Output to Ground	1500			VAC	
Power density			9.8	W/In^3	
MTBF		100		KHrs	As per MIL-HDBK-217F, 25°C GB
Weight		75		g	
Start up time		2		S	At full load

Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-10		70	°C	Derate linearly from 100% power at 40°C to 50% power at 70°C
Storage temperature	-40		85	°C	
Cooling					Convection cooled
Temperature coefficient			±0.04	%/°C	
Humidity	0		95	% RH	Non condensing
Vibration		5		G	10-500Hz, 10min/1cycle, 60min X,Y,Z
Operating Altitude			3000	m	All condition

Derating curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55011	B		
Radiated	EN55011	B		
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			

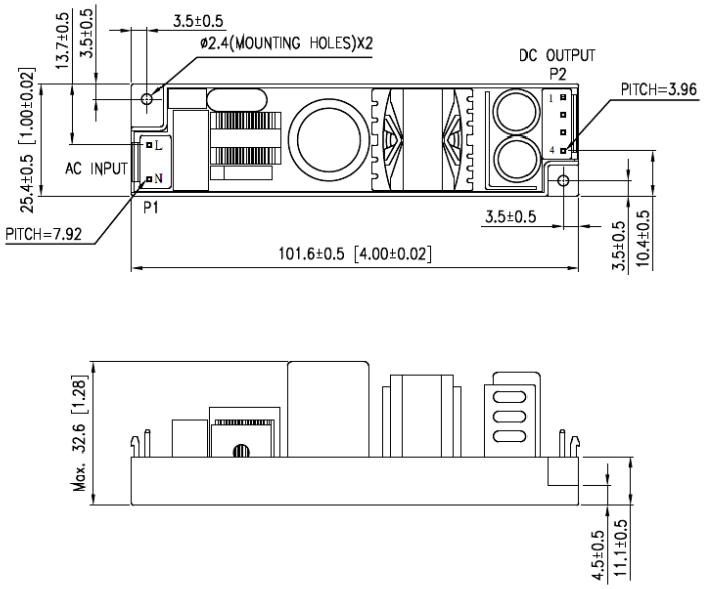
EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	±15kV air, ±8kV contact,
Radiated	EN61000-4-3	2	A	3V/m 80% AM (1KHz) 80-2700MHz
EFT	EN61000-4-4	3	A	±2KV (100V and 240V 50Hz)
Surges	EN61000-4-5	Installation Class 3	A	±2KV (100V and 240V 50Hz)
Conducted	EN61000-4-6	3/6Vrms	A	80% AM (1KHz)
Magnetic Fields	EN61000-4-8	30A/m	A	50/60Hz 1 min
Voltage Dips	EN61000-4-11	100% for 0.5 cycles, 60% 5 cycles, 30% for 25/30 cycles, interrupt 250/300 cycles and 1 sec - performance criteria A,A,A,A.		

Safety Approvals

	Safety standard	Notes & Conditions
UL	ES60601-1:2005 (R2012), CSA-C22.2 No 60601-1:14	
CB	IEC60601-1 3.1 edition	
TUV	EN60601-1:2006/A1:2013	
CE		2011/65/EU RoHS Directive and 2014/35/EU Low voltage directive
Means of patient protection	Input to Output: 2 x MOPP Input to Ground: 1 x MOPP Output to Ground: 1 x MOPP	
Equipment protection class		Class II

Mechanical Details



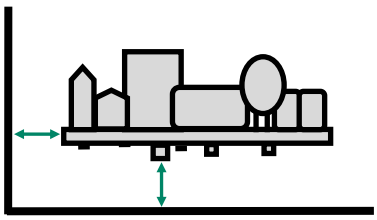
Pin Connections	
Pin	Function
1	-Vout
2	-Vout
3	+Vout
4	+Vout

Notes

1. All dimensions shown in millimetres (inches)

Installation Advice

Safety

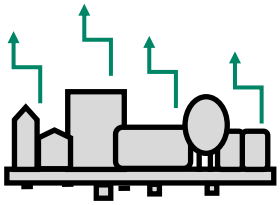


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

For **Class I** installations there should be 3-4mm between any part of the PSU and any earthed metal part of the enclosure. 3mm is acceptable for IT applications, 4mm required for medical applications. In Class I installations the PSU earth point must be connected to system safety ground.
For **Class II** installations distances may need to be increased if being installed into a surrounding metal enclosure.
Ensure consideration of components on the underside of the PCB or low lying spills when measuring clearance distances between the PSU and the end-equipment. Also top surface especially in tight enclosures such as 1U boxes. An insulation material can be used between PSU and metal if smaller gap required.

FiDUS recommends installing the PSU on 6mm stand offs typically, but check the distances.

EMC

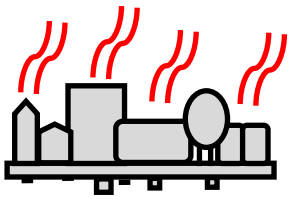


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that can be done to optimise EMC performance either as best practice, or if you are struggling for compliance:

1) Connect all marked EMI ground points to earth. Often these are combined with the safety earth point (in class I installations), but on some power supplies there may be additional earth tags or mounting points.
2) Minimise the length of input/output wiring where possible and try to maintain max distance of the conductors from the PSU, to prevent noise pick up. Avoid bundling input and output cables together. A common component to avoid placing wiring near is the PFC inductor in power factor corrected power supplies.
3) Apply additional filtering before the PSU input (ensure consideration of which frequencies there are issues with before selecting a filter).
4) When using an open frame PSU, mount the supply on a metal plate and connect EMI mounting points.
5) In multi circuit systems, decouple the circuits locally.
6) Ferrites added between the PSU and system input connector and/or the DC output cables can help in reducing radiated noise issues in systems. If seen, issues are commonly in the 30-150MHz area.

For more detailed assistance, if you still have any concerns with compliance, please get in contact with our Engineering department who are on hand to assist with any queries.

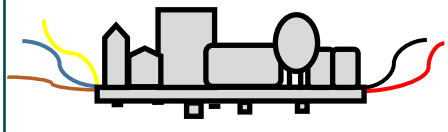
Thermal



Thermal management is an important consideration when thinking about equipment service life. Electrolytic capacitors within the PSU wear with time and are typically the first end-of-life failure. Keeping the operation temperature of key components within the PSU, such as the electrolytic capacitors, as low as possible is paramount. As a general rule, for every 10°C drop in the operating temperature of the electrolytic capacitators you double their lifetime, and thus the lifetime of the power supply. When looking at thermal performance it is helpful to test under a worst-case set of conditions, to ensure component temperatures are in an acceptable range for the required service life. Then consider the impact of operational time, load and temperature profile to estimate a more realistic lifetime for your PSU.

Also, many FiDUS power supplies offer a *Peak Power* rating to provide for customers with pulsing loads. When using a peak power capability customers must consider:
1) Peak duration rating: the maximum length of time the peak can be drawn for
2) Duty cycle: the frequency with which the peak can be drawn. (e.g. 10% duty cycle, 1 second on:9 seconds off)
3) Average power value: datasheets will state the maximum average power acceptable with peak power PSUs.
If any of these elements are exceeded the supply may overheat, with performance and lifetime suffering as a result.

Connectivity



All FiDUS Power engineering samples requested will arrive with a free of charge loom kit for ease of testing.

The loom kit connects to the input/output terminals of the PSU and provides the customer with bare wire ends to connect with.

The loom kits can also prove advantageous for ease of installation in production. Please contact sales if you are interested in including the loom kit in your quotation.
Alternatively the input/output connector and mating part details can be found in the attached table.

	Part Number	Mating Part Number
Input	B3P-VH	JST VHR3N
Output	B4P-VH	JST VHR4N
Loom Kit	SHM50 LK	