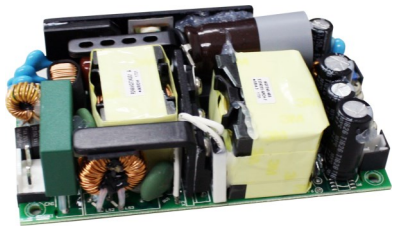
AKM240 Series

FiDUS
power in motion...

240Watts

- Class leading power density
- Latest medical approvals IEC60601-1 3rd Ed and IEC60601-1-2 2014
- IT and Industrial approvals UL/IEC/EN60950-1
- 160W Convection cooled / 240W Fan cooled
- Suitable for BF applications
- EN55032 Level B conducted & radiated
- 3 Year warranty



The AKM240 series of power dense, open frame AC-DC power modules offer 160W convection cooled and 240W fan cooled in a 2 x 4" package. The units are universal AC input and can be installed either as a class I or II system. They have low no load (<0.5W) power consumption and excellent efficiency upto 94%.They have a wide operating temperature of –30 to 70°C and are available in output models from 12-48V. All come with a FiDUS 3 year warranty.

Dimensions:

4.1 x 2.05 x 1.087" (103.9 x 52 x 27.6mm)

Models & Ratings

INSTALLATION ADVICE PG5

Model Number[1]	Output voltage	Output Current		Efficiency[2]	Capacitive load
		Convection	10CFM Fan		
AKM24012	12V	13.30A	20.00A	92.5%	8000uF
AKM24015	15V	10.66A	16.00A	92.5%	2000uF
AKM24024	24V	6.66A	10.00A	93%	3000uF
AKM24048	48V	3.33A	5.00A	94%	470uF

Notes

1. For covered version add –C for U channel add –U, for JST version add -J
2. At 230VAC max load
3. Loom kits available. See 'Installation Advice' on pg5

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	90		264	VAC	Derate from 100% at 115VAC to 80% at 90VAC
Operating temperature	-30		70	°C	Derate from 240W at –20°C to 190W at –30°C. Derate from 240W at 50°C to 140W at 70°C. For convection derate from 160W at 50°C to 80W at 70° C See derating curve p3.
Efficiency	See ratings table above				
Dimensions	4.1 x 2.05 x 1.087" (103.9 x 52 x 27.6mm). Industry standard 2 x 4" fixing holes.				
EMC	EN55032 Level B conducted and radiated EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated.				
Safety	IEC60601-1 3rd Ed A1 2012, EN60601-1 A12 2014, ANSI/AAMI ES60601-1 , CSA22.2 No 60601-1:14, CE, UL/EN/IEC60950-1				

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Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	90		264	VAC	Derate from 100% at 115VAC to 80% at 90VAC
Input frequency	47		63	Hz	
Power factor	0.9				EN61000-3-2 class D compliant, at full load
Input current (rms)			3	A	At 115VAC
			1.5		At 230VAC
Inrush current			45	A	115VAC cold start at 25°C
			90		230VAC cold start at 25°C
No load input power			0.5	W	

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	12		48	VDC	See Model & Ratings table
Output Voltage Adjust		±4		%	
Set point accuracy			±2	%	
Line regulation			±1	%	
Load regulation			±1	%	0% to 100%
Minimum load	0			%	
Ripple & Noise			1	%	All models measured with 0.1uF ceramic and 47uF electrolytic capacitor. 20 MHz bandwidth. At rated line
Hold up time	10			mS	At 115VAC to 90% Vout
Overload protection	105		180	%	
Short circuit protection					Trip and restart. Automatic recovery
Overvoltage protection	115		135	%	Latching, requires manual power reset.
Touch current			100	uA	At 264VAC

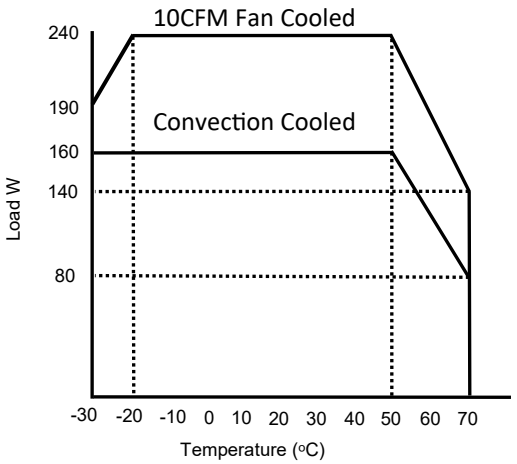
General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Isolation: Input to output	4000			VAC	Or 5656VDC
Input to ground	2000			VAC	Or 2828VDC
Output to ground	1500			VAC	Or 2121VDC
Power density			26.28	W/In^3	
MTBF	250			KHrs	As per MIL-HDBK-217F
Weight		234		g	

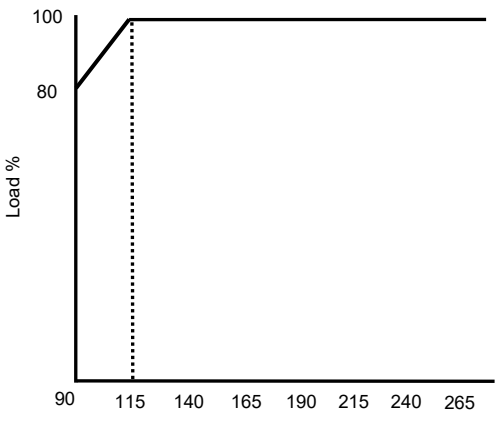
Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-30		70	°C	Derate from 240W at –20°C to 190W at –30°C. derate from 240W at 50°C to 140W at 70°C. For convection derate from 160W at 50°C to 80W at 70°C See derating curve p3.
Storage temperature	-30		85	°C	
Temperature coefficient		±0.05		%/°C	
Altitude			5000	M	
Humidity	20		90	% RH	Non condensing
Pressure	56		106	KPa	

Power Derating Curve



AC Input Derating Curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55032	B		CISPR22-B, FCC PART15-B
Radiated	EN55032	B		Class A for Class II.
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			

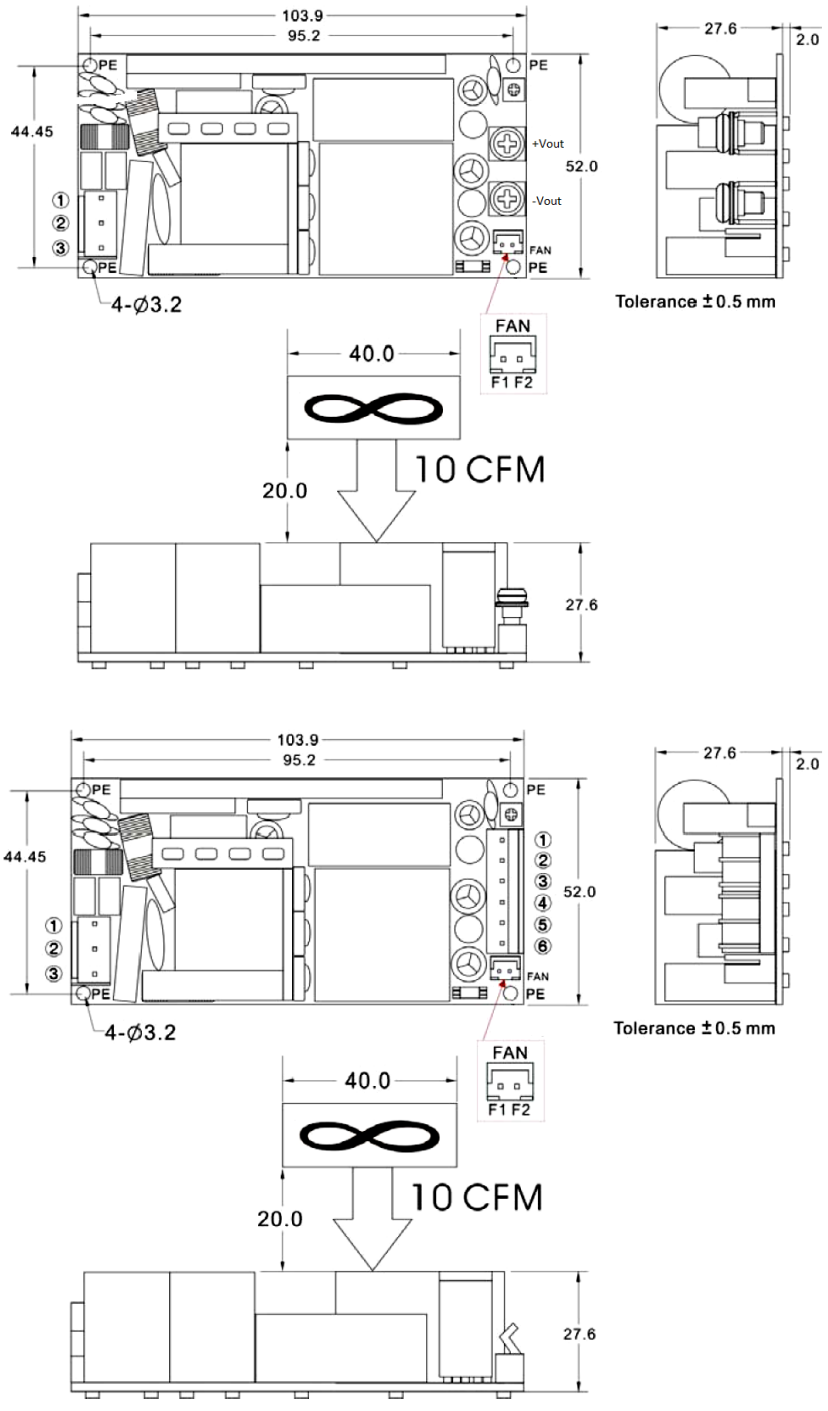
EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	15KV Air, 8KV contact
Radiated	EN61000-4-3	3	A	10V/m
EFT	EN61000-4-4	3	A	2KV
Surges	EN61000-4-5	Installation Class 3	A	1KV Live-Neutral, 2KV Live/Neutral—Earth
Conducted	EN61000-4-6	2	A	3Vrms. 6Vrms in ISM bands
Magnetic Fields	EN61000-4-8	4	A	30A/m
Voltage Dips and Interruptions	EN61000-4-11	>95% 0.5 cycles, 30% 25 cycles, >95% 250 cycles: 110V: A,B,B 240V:A,A,B		

Safety Approvals

	Safety standard	Notes & Conditions
UL/CSA	ES 60601-1 2nd Ed., CAN/ CSA 22.2 No 60601-1 UL60950-1, CAN/CSA 22.2 60950-1:07	
CB	IEC60601-1 3rd Ed A1 2012, IEC60950-1 A2 2013	
CE	EN60601-1 A12 2014, EN60950-1 A2 2013	2011/65/EU RoHS Directive and 2014/35/EU Low voltage directive
Equipment protection class		Class I or II

Mechanical Details



J1: Input Connector[2]	
Pin Connections	
Pin	Function
1	AC Neutral
2	NC
3	AC Line

J2: Output Connector[3]	
Pin Connections	
Pin	Function
1	+Vout
2	+Vout
3	+Vout
4	-Vout
5	-Vout
6	-Vout

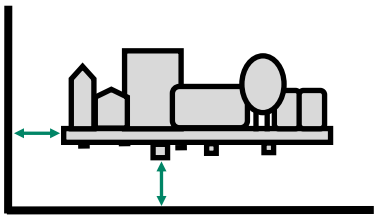
J3: Fan Connector[4]	
Pin Connections	
Pin	Function
F1	Fan +
F2	Fan -

Notes

1. All dimensions shown in mm
2. J1: Input connector details: JST B3P-VH mates with VHR-3N housing
3. J2: Output connector details: Screw terminal
   For JST version JST B6P-VH. Mates with VHR-6N
4. Fan output 12V 0.5A

Installation Advice

Safety

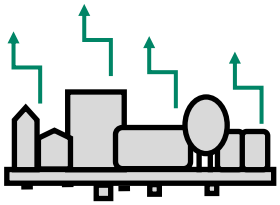


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

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

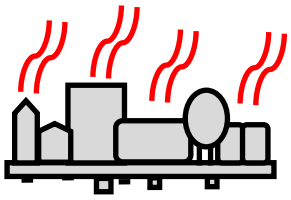


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that 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.

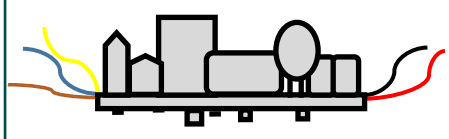
Thermal



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	VHR-3N
Output	Screw terminal	N//A
Loom Kit	AKM240-LK	