TAD50 Series

FiDUS
power in motion...

50 Watts

- Peak power up to 70W for 5 seconds
- Class I or II options
- OVC III option
- -40 to 85°C Operation
- Output voltage adjust
- EN55032 Level B conducted & radiated
- 3 Year warranty

The TAD50 series of compact open frame AC-DC PSUs provide up to 50W continuous power and a peak load of up to 70W for 5 seconds from a 3" x 1.5" package. The range is approved for use in Industrial and IT applications with IEC/EN/UL 62368-1 and is available in 5-53V units. The units are fully featured with voltage adjust and overload, over voltage and short circuit protection. The units are available in both class I or II, OVC III option, JST, Molex or screw terminal output and DC input variants. All units come with a FiDUS 3 year warranty.

Dimensions:

3 x 1.5 1.18" (76.2 x 38.1 x 27.5mm)

Models & Ratings

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Model Number [1]	Output Voltage	Output Current		Output Power		Efficiency	Capacitive Load
		Nominal	Peak[2]	Nominal	Peak[2]		
TAD50US05**B-J**	5V	8A	10A	40W	56W	90.5%	16000
TAD50US7P5**B-J**	7.5V	6.67A	8.66A	50W	65W	90.5%	8900
TAD50US09**B-J**	9V	5.56A	7.77A	50W	70W	90.5%	6200
TAD50US12**B-J**	12V	4.17A	5.83A	50W	70W	92.5%	3500
TAD50US15**B-J**	15V	3.34A	4.66A	50W	70W	92.5%	2300
TAD50US18**B-J**	18V	2.78A	3.88A	50W	70W	92.5%	1600
TAD50US24**B-J**	24V	2.085A	2.91A	50W	70W	92.5%	870
TAD50US36**B-J**	36V	1.39A	1.94A	50W	70W	91.5%	390
TAD50US48**B-J**	48V	1.045A	1.45A	50W	70W	91.5%	220
TAD50US53**B-J**	53V	0.95A	1.32A	50W	70W	91.5%	180

Notes

1. For class I version change **B** above for **A**. For Molex or screw terminal input and output terminals change **J** for **M** or **T** respectively to part number after –. For example TAD50US05**A**-M for class I Molex input & output terminals.

2. If peak profile loading is used, average power draw must be below 70% of nominal. Peak load can not be longer than 5 sec (duty of 20%)

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	85		264	VAC	120-370V DC
Operating temperature	-40		85	°C	See de-rating curves
Efficiency	90.5		92.5	%	See models and ratings table above
Dimensions	3 x 1.5 1.18" (76.2 x 38.1 x 27.5mm)				
EMC	EN 55032 Level B conducted and radiated. EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated.				
Safety	IEC/EN/UL 62368-1				

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Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input voltage	85		264	VAC	See de-rating curve
DC Input voltage	120		370	VDC	
Input frequency	47		63	Hz	
Power factor					EN61000-3-2 class A
Input current	0.8		1.4	A	0.8A at 240VAC, 1.4A at 100VAC
Leakage current		150		uA	At 264VAC.
Start up time			1000	mS	
Rise time		15		mS	
No load input power	50		100	mW	50mW for 5-15W and 100mW for others

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	5		53	VDC	See Model & Ratings table
Set point accuracy			±1	%	Full load 230VAC
Line regulation	±0.5		±0.7	%	Low line to high line at full load. ±0.7 for 5V only
Load regulation	±0.5		±0.7		0-100% load. ±0.7 for 5V output
	±0.4		±0.6	%	10% to 90% load change. ±0.6 for 5V output
Voltage adjust	-20		+10	%	±10% for 5-9V versions
Minimum load	0			%	
Noise and ripple	75		100	mVp-p	20mhz BW 5-18V out use 10pF/25V X7R MLCC, 24-36V out use 1uF/50V X7R MLCC, for others use 0.1uF/100V X7R MLCC
Transient response			3	%	Recovery within 1% within 300 µs for 50-75% step at 2.5A/us
Hold up time		12		mS	At full load and 115VAC
Overload protection		165			Trip & restart. Automatic recovery
Overvoltage protection	115		135		Latch off. AC reset required,
Short circuit protection					Automatic recovery

EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55032	B		
Radiated	EN55032	B		Extra components may be required for Class I install
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			

EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	3	A	±6kV contact, ±8kV air
Radiated	EN61000-4-3	4	A	20V/m
EFT	EN61000-4-4	3	A	±2KV
Surges	EN61000-4-5	Installation Class 2	A	±1KV line—neutral, L/N to PE ±2KV
Conducted	EN61000-4-6	3	A	20Vrms
PFMF	EN61000-4-8	3	A	10A/rm
Dips and interruptions	EN61000-4-11			

Safety Approvals

	Safety standard	Notes & Conditions
UL	UL 62368-1	UL: E193009
CB	IEC 62368-1	
TUV	EN 62368-1	
CE		2014/35/EU Low voltage directive
Equipment protection class		Class I or II

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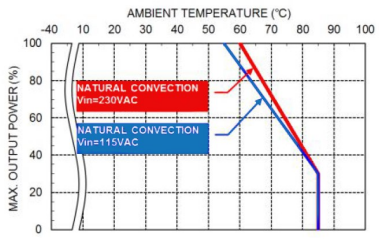
General

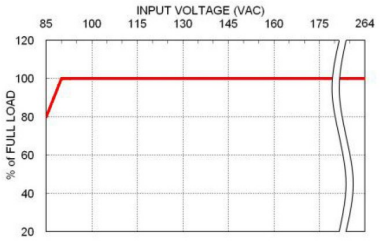
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	90.5		92.5	%	See models & Ratings table
Isolation: Input to Output	3000			VAC	Input to functional ground 2000VAC
Isolation resistance	1000			MΩ	500VDC
Power density			11.52	W/In^3	
Switching frequency (full load)	70		135	kHz	5V 70-95kHz 7.5V 95-120kHz Others 110-135kHz
MTBF		1.487		Mhrs	MIL-HDBK-217F 25°C
Weight		78		g	

Environmental

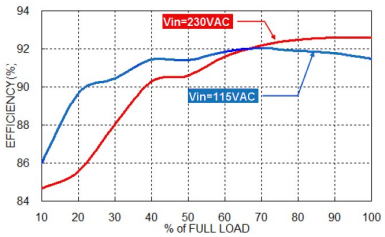
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		85	°C	See derating curves
Storage temperature	-40		85	°C	
Temperature coefficient			±0.02	%/°C	
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000	M	
Vibration					IEC60068-2-6
Shock					IEC60068-2-27



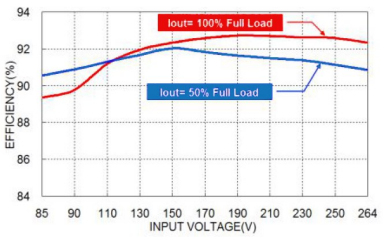
Derating Curve vs. Ambient Temperature



Derating Curve vs. Input Voltage



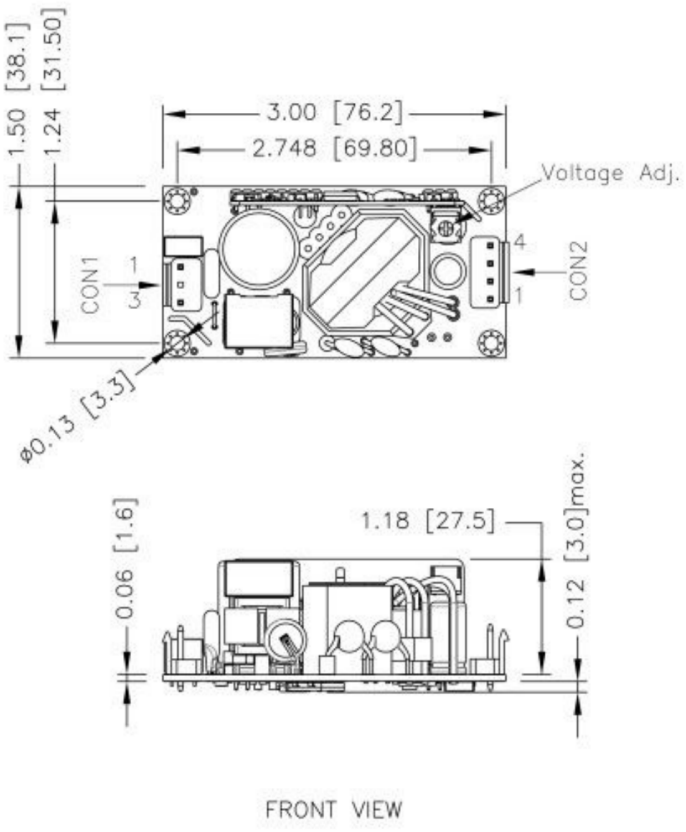
TAD50US12 Efficiency VS Output Load



TAD50US12 Efficiency vs. Input Voltage

Mechanical Details

TAD OPEN FRAME



Pin Connections Input (CON1)[1]	
Pin	Function
1	Line
3	Neutral

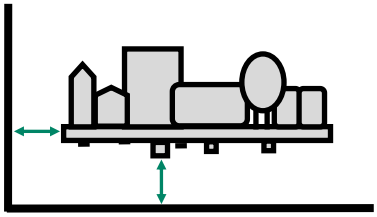
Pin Connections Output (CON2)[2]	
Pin	Function
1	-Vout
2	-Vout
3	+Vout
4	+Vout

Notes

1. Mates with JST VHR-3N, Molex version mates with 09-50-8031, screw terminal accepts 26-16AWG (max 5kgf-cm / 0.49N-m)
2. Mates with JST VHR 4N, Molex version mated with 09-50-8041, screw terminal accepts 26-16AWG (max 5kgf-cm / 0.49N-m)
3. Any mounting hole can be used for PE connection
4. All dimensions in inch [mm]
5. Tolerance: 2DP ±0.02" [1DP ±0.5mm], 3DP ±0.01 [2DP ±0.25mm]

Installation Advice

Safety

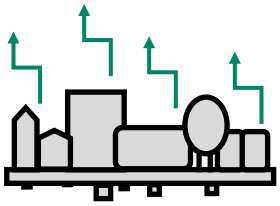


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

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

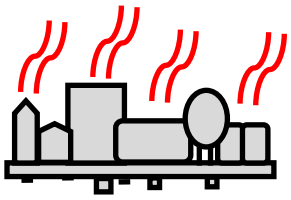


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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