TCF250 Series

FiDUS
power in motion...

250 Watts

- Power dense 250W in 2 x 4 x 1.26”
- IT & Medical safety approvals
- Multiple output connection types available
- Dual output available any voltage from 5-48V 4-0.41A
- -20 to +70°C Operation
- 3 Year warranty

The TCF250 series offers 250W in a dense, 2” x 4” in a multiple mechanical package; open frame, U channel, covered and fan. The units are designed for use in both medical and IT applications, are very efficient and have low emissions, meeting EN55032/11 Level B. They have a wide temperature range from –20 to +70°C. Outputs are available from 12 to 48V for V1 and optional dual output of any voltage between 5 to 48VDC from0.41 to 4A. All models come with a FiDUS 3 year warranty.

Dimensions:
4.09 x 2.1 x 1.26” (104 x 54 x 32mm)
4.15 x 2.28 x 1.5” (105.4 x 58.2 x 40mm)
4.15 x 2.28 x 1.63” (105.4 x 58.2 x 41.5mm)
4.15 x 2.28 x 2.39” (105.4 x 58.2 x 60.6mm)

Models & Ratings

INSTALLATION ADVICE PG5

Model Number[1]	V1 Output Voltage	V2 Output Voltage	V2 Output Current	V2 Output Power[2]	Output Current			Output Power		
					Convection <120VAC	Convection >200VAC	18 CFM	Convection <120VAC	Convection >200VAC	18 CFM
TCF25012S	12V	-	-	-	12.5A	14.16A	20.83A	150W	170W	250W
TCF25024S	24V	-	-	-	6.25A	7.08A	10.41A			
TCF25048S	48V	-	-	-	3.12A	3.54A	5.2A			
TCF25012S-U	12V	-	-	-	13.33A	15.83A	20.83A	160W	190W	250W
TCF25024S-U	24V	-	-	-	6.66A	7.91A	10.41A			
TCF25048S-U	48V	-	-	-	3.33A	3.95A	5.2A			
TCF25012S-C	12V	-	-	-	13.33A	15.83A	20.83A	160W	190W	250W
TCF25024S-C	24V	-	-	-	6.66A	7.91A	10.41A			
TCF25048S-C	48V	-	-	-	3.33A	3.95A	5.2A			
TCF25012S-F	12V	-	-	-	-	-	20.83A	-	-	250W
TCF25024S-F	24V	-	-	-	-	-	10.41A			
TCF25048S-F	48V	-	-	-	-	-	5.2A			
TCF25012XXS	12V	+5 to 48V	4 to 0.41A	20W				150W	170W	250W
TCF25024XXS	24V	+5 to 48V	4 to 0.41A	20W						
TCF25048XXS	48V	+5 to 48V	4 to 0.41A	20W						
TCF25012XXS-U	12V	+5 to 48V	4 to 0.41A	20W				160W	190W	250W
TCF25024XXS-U	24V	+5 to 48V	4 to 0.41A	20W						
TCF25048XXS-U	48V	+5 to 48V	4 to 0.41A	20W						
TCF25012XXS-C	12V	+5 to 48V	4 to 0.41A	20W				160W	190W	250W
TCF25024XXS-C	24V	+5 to 48V	4 to 0.41A	20W						
TCF25048XXS-C	48V	+5 to 48V	4 to 0.41A	20W						

Notes

1. Single output models have 12V 0.25A fan rail (10-12V). For JST output variant change S for J. Example TCF25012J. For mini fit output change S for M. Example TCF25012M. For Euro screw terminal output change S for E. Example TCF25012E. For dual output models replace XX above for desired voltage between 5 and 48V (no 12V fan rail on dual output). –U, -C, -F are U channel, covered and fan variants respectively.

2. At low line convection cooled V2 power derated to 15W

TCF250 Series

FiDUS power in motion...

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	90		264	VAC	Please see derating curve
Operating temperature	-20		70	°C	Refer to derating curve pg3
Dimensions	Open frame 4.09 x 2.1 x 1.26" (104 x 54 x 32mm), U channel 4.15 x 2.28 x 1.5" (105.4 x 58.2 x 40mm), Covered 4.15 x 2.28 x 1.63" (105.4 x 58.2 x 41.5mm), Fan 4.15 x 2.28 x 2.39" (105.4 x 58.2 x 60.6mm)				
Efficiency	92% typical at full load 230VAC				
EMC	EN55011/32 Level B conducted and radiated. EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated. Medical EN60601-1-2 immunity				
Safety	IEC60601-1 3.1 edition, UL60601-1 3rd edition, CSA-C22.2 No. 60601-1 3rd edition, EN60601-1 3rd edition IEC/EN/UL/cUL62368-1				

Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	90		264	VAC	Please see derating curve
Input frequency	47		63	Hz	
Power factor	0.9		0.95		0.95 @ 115VAC. EN61000-3-2 class A compliant
Input current (rms)			2.8	A	At 115VAC
			1.4		At 230VAC max
Inrush current			<50	A	115VAC cold start at 25°C
			<100		230VAC cold start at 25°C

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	12		48	VDC	See Model & Ratings table
Minimum load	0			%	
Hold up time		>10		ms	At full load, 115VAC
Overload protection	105		150	%	
Short circuit protection					Trip and restart. Automatic recovery
Overvoltage protection					Shutdown and latch off. AC recycle to reset.

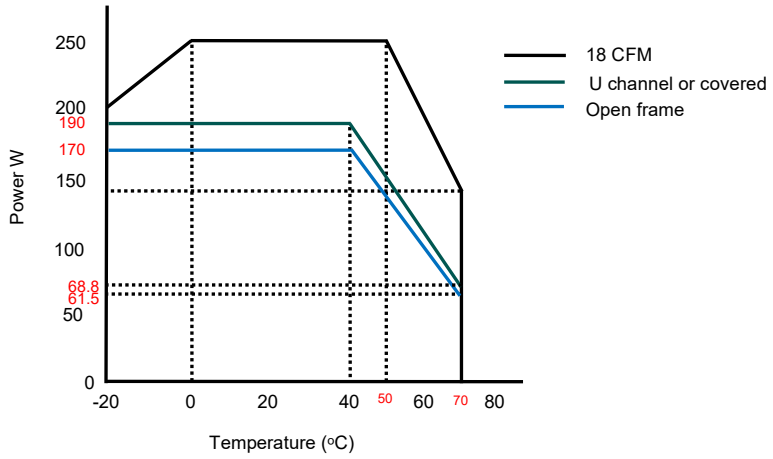
General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	92% typical at 230VAC				
Isolation: Input to Output	4000			VAC	2 x MOPP
Input to Ground	1500			VAC	
Output to Ground	1500			VAC	BF rated
Power density			23.1	W/In^3	
MTBF		>200		KHrs	As per Telcordia (Bellcore TR332) 25°C
Weight	225		345	g	U channel 315g, covered 335g

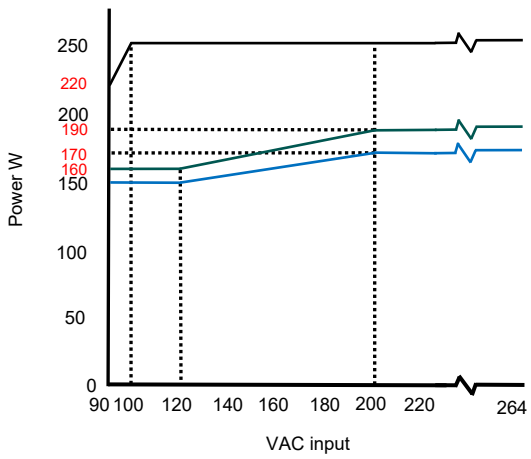
Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-20		70	°C	See derating curve pg3
Storage temperature	-20		85	°C	
Cooling					Convection cooled / 10CFM
Humidity	10		95	% RH	Non condensing

Thermal derating curve >200VAC



AC input derating curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55032/11	B		
Radiated	EN55032/11	B		
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			

EMC: Immunity

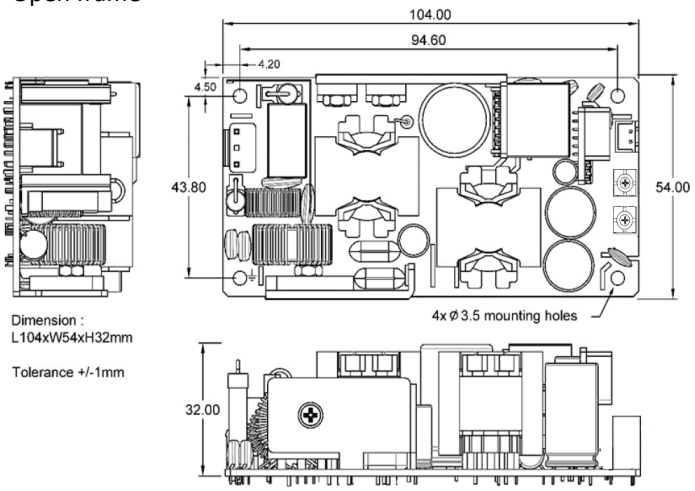
	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	
Radiated	EN61000-4-3	3V/m	A	
EFT	EN61000-4-4	3	A	
Surges	EN61000-4-5	Installation Class 3	A	
Conducted	EN61000-4-6	3Vrms	A	
Magnetic Fields	EN61000-4-8	3	A	10A/m

Safety Approvals

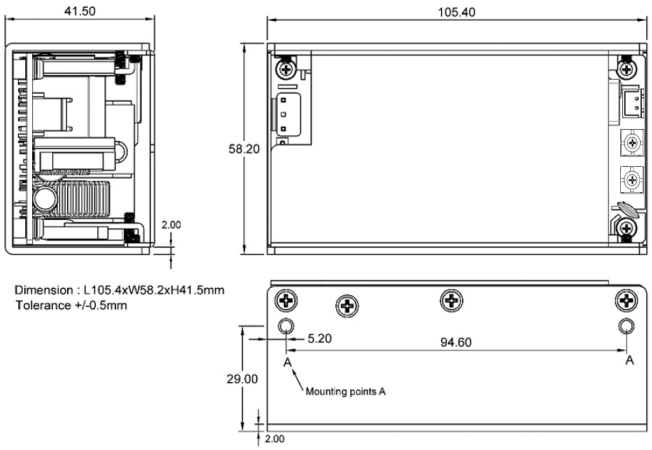
	Safety standard	Notes & Conditions
UL	UL62368-1, ES60601-1 3rd edition, CSA-C22.2 NO.60950-1	
CB	IEC62368-1, IEC60601-1 3.1 edition	
TUV	EN62368-1, EN60601-1 3rd edition	
CE		2015/863/EU RoHS Directive and 2006/95/EC Low voltage directive
Means of patient protection	Input to Output: 2 x MOPP Input to Ground: 1 x MOPP Output to Ground: 1 x MOPP	
Equipment protection class		Class I

Mechanical Details

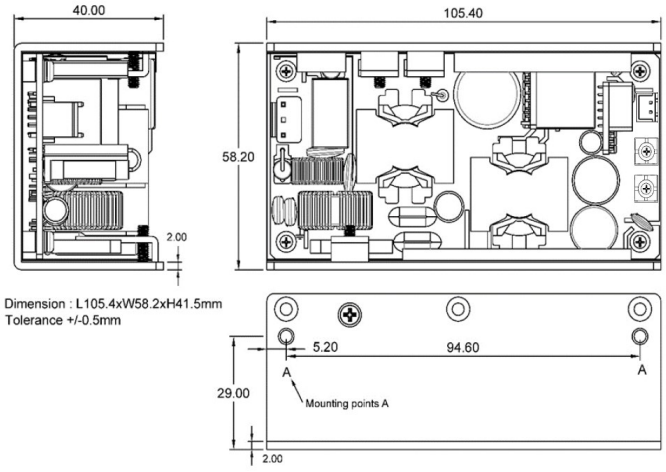
Open frame



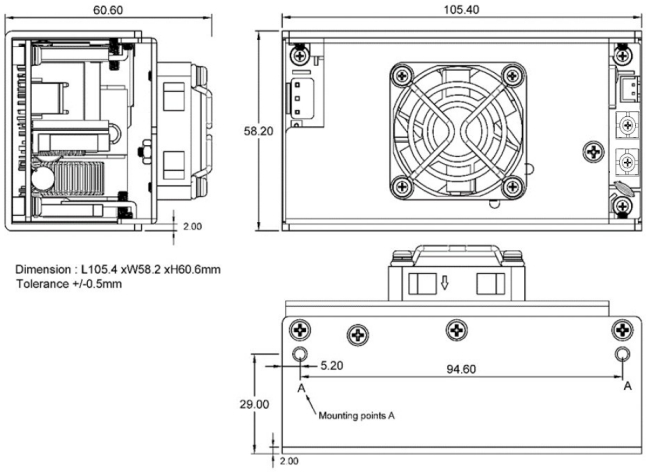
Enclosed



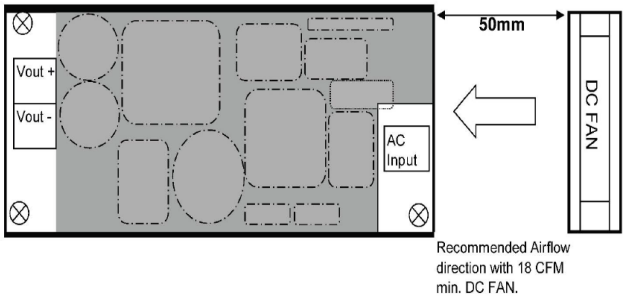
U Channel



Fan



Recommended air flow

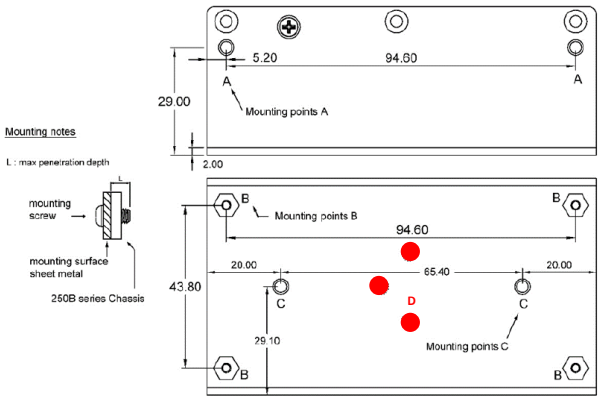


Notes

1. All dimensions shown in millimetres (mm)
2. CN1: Input header: JST B3P-VH-B pitch: 7.92mm
mating part: JST VHR-3N

Mechanical Details

Standard mounting holes



Notes

A: M3x0.5 thread, penetration depth L 5mm 1-2Kgf-cm

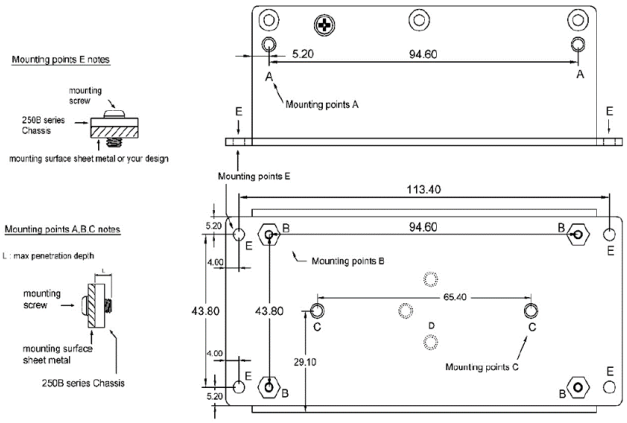
B: M3x0.5 thread, penetration depth L 2.5mm 1-2Kgf-cm

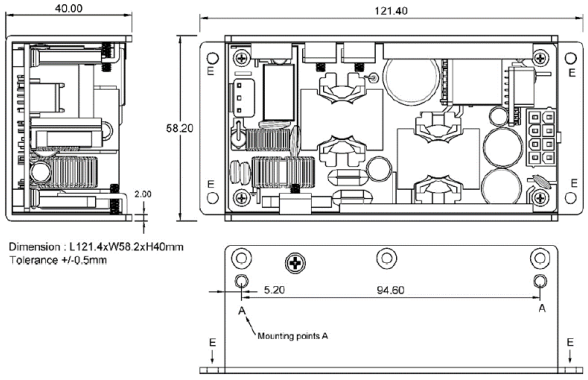
C: M3x0.5 thread, penetration depth L 3mm 1-2Kgf-cm

D: OPTIONAL M3x0.5 thread for DIN rail (contact sales)

E: Fixing holes Ø3.5mm for M3 2-3Kgf-cm

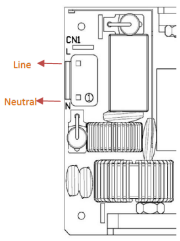
Optional “ear” mounting holes (contact sales)



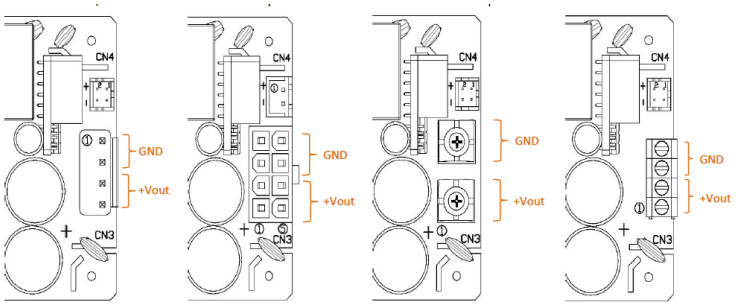


Connections

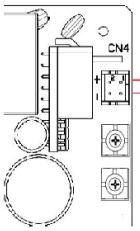
CN1 input



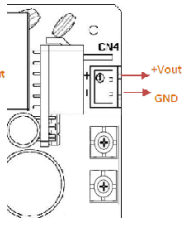
CN3 DC output options



CN4 Dual output



CN4 Standard Fan output



Notes

1. All dimensions shown in millimetres (mm)

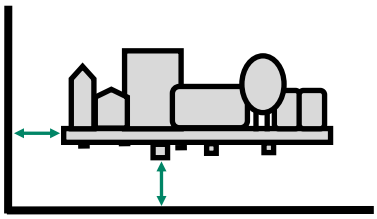
2. CN1: Input header: JST B3P-VH-B pitch: 7.92mm
mating part: JST VHR-3N

3. CN3: Output header: JST B4P-VH-B pitch: 3.96mm mating part: JST VHR-4N
Molex Mini fit 39281083 mates with 39012085
Screw terminal M3.5
Euro terminal 0.2-1.5mm2 (24-16AWG)

4. CN4: Dual output Hirose DF11-4DP mates with DF11-4DS
Standard single fan output JST B2B-XH-A mates with XHP-2

Installation Advice

Safety

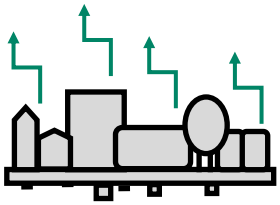


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

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

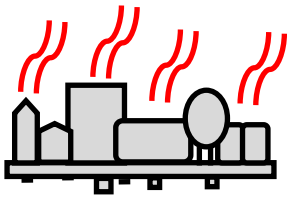


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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