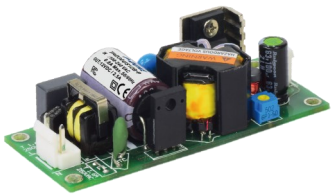
TAD30-P Series

FiDUS
power in motion...

30 Watts

- Peak power up to 40W for 5 seconds
- Chassis mount and board mount versions
- Latest industrial safety approval IEC/EN 62368-1
- -40 to 85°C Operation
- Voltage adjust up to –20% to +10%
- EN55032 Level B conducted & level A radiated
- 3 Year warranty



The TAD30-P series of compact open frame AC-DC PSUs provide up to 30W continuous power and a peak load of up to 40W for 5 seconds from a 2.74" x 1.36" package. The range is approved for use in Industrial and IT applications with IEC/EN/UL 62368-1 and is available in 3.3-53V units. The units are fully featured with voltage adjust and overload, over voltage and short circuit protection. They are available in two mechanical variants chassis mount and board mount. All units come with a Fidus 3 year warranty.

Dimensions:

Chassis Mt 3.34 x 1.36 x 0.77" (84.8 x 34.6 x 19.6mm)
Board Mt 2.74 x 1.36 x 0.95" (69.7 x 34.6 x 24.1mm)

Models & Ratings

INSTALLATION ADVICE PG 7

Model Number (1)	Output Voltage	Output Current		Output Power		Efficiency	Capacitive load
		Nominal	Peak(2)	Nominal	Peak(2)		
TAD30US3P3B-P	3.3V	6A	7.57A	20W	25W	83%	10000
TAD30US05B-P	5V	6A	8A	30W	40W	86%	12000
TAD30US7P5B-P	7.5V	4A	5.33A	30W	40W	86%	5340
TAD30US09B-P	9V	3.34A	4.44A	30W	40W	87%	3720
TAD30US12B-P	12V	2.5A	3.33A	30W	40W	88.5%	2085
TAD30US121B-P	12V	2.5A	3.33A	30W	40W	86%	2085
TAD30US15B-P	15V	2A	2.66A	30W	40W	88.5%	1350
TAD30US151B-P	15V	2A	2.66A	30W	40W	86%	1350
TAD30US18B-P	18V	1.67A	2.22A	30W	40W	87%	930
TAD30US24B-P	24V	1.25A	1.66A	30W	40W	88%	520
TAD30US28B-P	28V	1.08A	1.42A	30W	40W	88%	385
TAD30US36B-P	36V	0.84A	1.11A	30W	40W	89%	235
TAD30US48B-P	48V	0.63A	0.83A	30W	40W	90.5%	130
TAD30US53B-P	53V	0.58A	0.75A	30W	40W	90%	109

Notes

1. For class I version remove **B** above. For Molex or screw terminal input and output terminals add **M** or **T** respectively to part number after –. For example TAD30US3P3**B**-**M**P for class II 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	120-370 VDC
Operating temperature	-40		85	°C	See de-rating curves
Efficiency	83		90.5	%	See models and ratings table above
Dimensions	Chassis Mount 3.34 x 1.36 x 0.77" (84.8 x 34.6 x 19.6mm) Board Mount 2.74 x 1.36 x 0.95" (69.7 x 34.6 x 24.1mm)				
EMC	EN55032 Level B conducted and level A 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	
DC Input voltage	120		370	VDC	
Input frequency	47		63	Hz	
Power factor					EN61000-3-2 class A and D compliant
Input current	0.4		0.8	A	0.4A at 240VAC, 0.8A at 100VAC
Leakage current			100	μA	At 264VAC. BF rated
Start up time			1500	ms	
Rise time	20	40	50	ms	48-53V 50ms, 24-36V 40ms, 20ms for others
No load input power		45		mW	230VAC

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	3.3		53	VDC	See Model & Ratings table
Set point accuracy			±1	%	At full load 230VAC
Line regulation			±0.2	%	Low line to high line at full load
Load regulation	±0.5		±0.7		0-100% load. ±0.7 for 3.3 and 5V output
	±0.4		±0.6	%	10% to 90% load change. ±0.6 for 3.3 and 5V output
Voltage adjust	-10		+10	%	3.3V out
	-20		+10	%	Others
	-10		+10	%	Board mount type
Minimum load	0			%	
Noise and ripple			50	mVp-p	20mhz BW 3.3-9V out use 10pF/25V X7R MLCC, 12-36V out use 1u/50V X7R MLCC, for others use 0.1uF/100V X7R MLCC
Transient response			3	%	Recovery within 1% within 600 μs for 50-75% step at 2.5A/us
Hold up time		16		mS	At full load and 115VAC
Overload protection		165			Trip & restart. Automatic recovery
Overvoltage protection	125		140		Latch off. AC reset required,
Short circuit protection					Automatic recovery, for high current latch off

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

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General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	83		90.5	%	See models & Ratings table
Isolation: Input to Output	3000			VAC	
Isolation resistance	1000			MΩ	500VDC
Power density			8.47	W/In^3	
Switching frequency	30	45	60	kHz	Full load
MTBF		3.341		Khrs	MIL-HDBK-217F 25°C
Weight	58		60.5	g	58g for board mount

EMC: Emissions

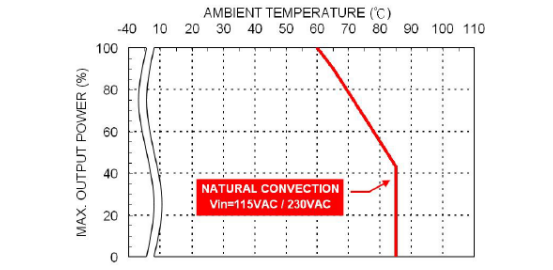
	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55032	B		
Radiated	EN55032	B		
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			

EMC: Immunity

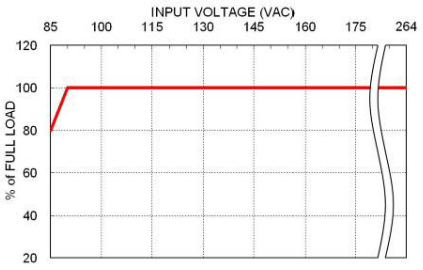
	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	±8kV contact, ±15kV air
Radiated	EN61000-4-3	4	A	20V/m
EFT	EN61000-4-4	3	A	±2KV
Surges	EN61000-4-5	Installation Class 2	A	±1kV line—neutral,
Conducted	EN61000-4-6	3	A	20Vrms
PFMF	EN61000-4-8	3	A	30A/rm
Dips and interruptions	EN61000-4-11			

Safety Approvals

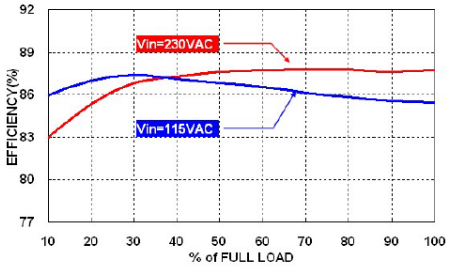
	Safety standard	Notes & Conditions
UL	UL 62368-1	UL: E193009
CB	IEC 62368-1	
TUV	EN 62368-1	
CE		2014/35/EU Low voltage directive
Equipment protection class		Class I or II



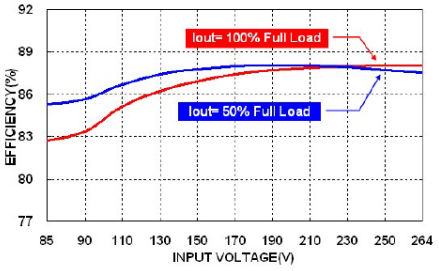
TAD30US24B-P Derating Curve vs. Ambient Temperature



Derating Curve vs. Input Voltage



TAD30US24B-P Efficiency vs. Output Load

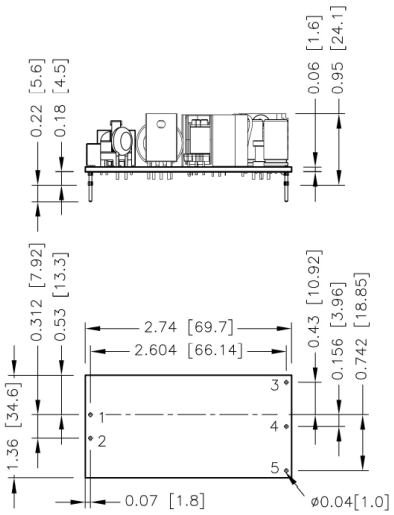


TAD30US24B-P Efficiency vs. Input Voltage

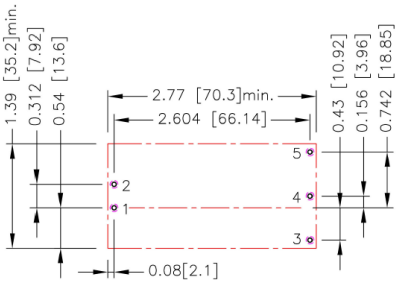
TAD30-P Series

Mechanical Details

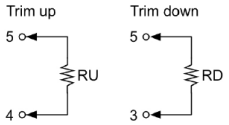
Board mount



Layout



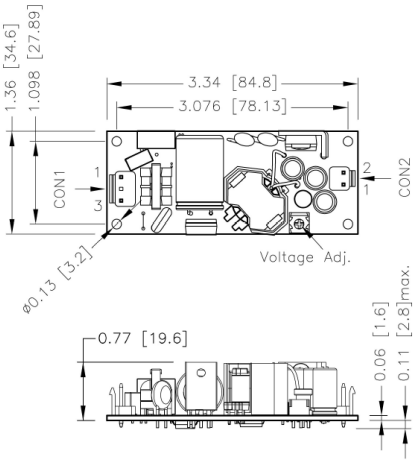
Pin Connections - Input (CON)[4]	
Pin	Function
1	Neutral
2	Line
3	+Vout
4	-Vout
5	Trim



Notes

1. All dimensions in inch [mm]
2. Tolerance: 2DP ±0.02" [1DP ±0.5mm], 3DP ±0.01 [2DP ±0.25mm], Pin dimension ±0.004[0.1]
3. Through hole 1.2.3.4.5:Ø0.051[1.3]
4. Top view pad 1.2.3.4.5:Ø0.064[1.63]
5. Bottom view pad 1.2.3.4.5:Ø0.102[2.6]

Chassis mount



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

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

Notes

1. Mates with JST VHR-3N, Molex version mates with 09-50-8031, screw terminal accepts 26-16AWG
2. Mates with JST VHR 2N, Molex version mated with 09-50-8021, screw terminal accepts 26-16AWG
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], Pin dimension ±0.004[0.1]

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Application note:

The voltage output can be trimmed up and down using the appropriate resistor rated at 1/16 of rated power. To trim up connect resistor between trim and –Vout, to trim down connect to +Vout

Trim up equation

$$R_U = \left[\frac{G \times L}{(V_{o,up} - L - K)} - H \right] \Omega$$

Trim down equation

$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

Trim constants				
Model	G	H	K	L
TAD30US3P3B-P	5100	2050	0.8	2.5
TAD30US05B-P	7500	2000	2..5	2.5
TAD30US7P5B-P	22000	2000	5	2.5
TAD30US09B-P	33000	2000	6.5	2.5
TAD30US12B-P	51000	2000	9.5	2.5
TAD30US15B-P	68000	2000	12.5	2.5
TAD30US18B-P	91000	2000	15.5	2.5
TAD30US24B-P	130000	2000	21.5	2.5
TAD30US28B-P	160000	2000	25.5	2.5
TAD30US36B-P	220000	2000	33.5	2.5
TAD30US48B-P	620000	2000	45.5	2.5
TAD30US53B-P	680000	2000	50.5	2.5

3.3V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970	Volts
Rtrim-down	116.486	54.668	34.062	23.759	17.577	13.456	10.512	8.305	6.587	5.214	KOhms

5V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.950	Volts
Rtrim-down	365.5	178	115.5	84.25	65.5	53	44.071	37.375	32.167	365.5	KOhms

7.5V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	7.425	7.35	7.275	7.2	7.125	7.05	6.975	6.9	6.825	6.75	Volts
Rtrim-down	1442.667	709.333	464.889	342.667	269.333	220.444	185.524	159.333	138.963	122.667	KOhms

9V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	8.91	8.82	8.73	8.64	8.55	8.46	8.37	8.28	8.19	8.1	Volts
Rtrim-down	2348.333	1156.667	759.444	560.833	441.667	362.222	305.476	262.917	229.815	203.333	KOhms

12V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800	Volts
Rtrim-down	3984.5	1965.667	1292.833	956.375	754.5	619.917	523.786	451.688	395.611	350.75	KOhms

15V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500	Volts
Rtrim-down	5596.667	2763.333	1818.889	1346.667	1063.333	874.444	739.524	638.333	559.630	496.667	KOhms

18V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	17.82	17.64	17.46	17.28	17.1	16.92	16.74	16.56	16.38	16.2	Volts
Rtrim-down	7743.111	3825.056	2519.037	1866.028	1474.222	1213.019	1026.444	886.514	777.679	690.611	KOhms

24V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	23.76	23.52	23.28	23.04	22.8	22.56	22.32	22.08	21.84	21.6	Volts
Rtrim-down	11513.833	5690.917	3749.944	2779.458	2197.167	1808.972	1531.69	1323.729	1161.981	1032.583	KOhms

28V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	27.72	27.44	27.16	26.88	26.6	26.32	26.04	25.76	25.48	25.2	Volts
Rtrim-down	14409.429	7123.714	4695.143	3480.857	2752.286	2266.571	1919.633	1659.429	1457.048	1295.143	KOhms

36V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	35.64	35.28	34.92	34.56	34.2	33.84	33.48	33.12	32.76	32.4	Volts
Rtrim-down	20250.222	10014.111	6602.074	4896.056	3872.444	3190.037	2702.603	2337.028	2052.691	1825.222	KOhms

48V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	47.52	47.04	46.56	46.08	45.6	45.12	44.64	44.16	43.68	43.2	Volts
Rtrim-down	58148.833	28763.417	18968.278	14070.708	11132.167	9173.139	7773.833	6724.354	5908.093	5255.083	KOhms

53V output											
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	52.47	51.94	51.41	50.88	50.35	49.82	49.29	48.76	48.23	47.7	Volts
Rtrim-down	64110.453	31714.226	20915.484	15516.113	12276.491	10116.742	8574.065	7417.057	6517.161	5797.245	KOhms

3.3V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.63	Volts
Rtrim-up	384.314	191.132	126.738	94.541	75.223	62.344	53.145	46.245	40.879	36.586	KOhms

5V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	5.05	5.1	5.15	5.2	5.25	5.3	5.35	5.4	5.45	5.5	Volts
Rtrim-up	373	185.5	123	91.75	73	60.5	51.571	44.875	39.667	35.5	KOhms

7.5V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	7.575	7.65	7.725	7.8	7.875	7.95	8.025	8.1	8.175	8.25	Volts
Rtrim-up	731.333	364.667	242.444	181.333	144.667	120.222	102.762	89.667	79.481	71.333	KOhms

9V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	9.09	9.18	9.27	9.36	9.45	9.54	9.63	9.72	9.81	9.9	Volts
Rtrim-up	914.667	456.333	303.556	227.167	181.333	150.778	128.952	112.583	99.852	89.667	KOhms

12V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2	Volts
Rtrim-up	1060.5	529.25	352.167	263.625	210.5	175.083	149.786	130.813	116.056	104.25	KOhms

15V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	15.15	15.30	15.45	15.6	15.75	15.9	16.05	16.2	163.5	16.5	Volts
Rtrim-up	1131.333	564.667	375.778	281.333	224.667	186.889	159.905	139.667	123.926	111.333	KOhms

18V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	18.18	18.36	18.54	18.72	18.9	19.08	19.26	19.44	19.62	19.8	Volts
Rtrim-up	1261.889	629.944	419.296	313.972	250.778	208.648	178.556	155.986	138.432	124.389	KOhms

24V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	24.24	24.48	24.72	24.96	25.2	25.44	25.68	25.92	26.16	26.4	Volts
Rtrim-up	1352.167	675.083	449.389	336.542	268.833	223.694	191.452	167.271	148.463	133.417	KOhms

28V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	28.28	28.56	28.84	29.12	29.4	29.68	29.96	30.24	30.52	30.8	Volts
Rtrim-up	1426.571	712.286	474.19	355.143	283.714	236.095	202.082	176.571	156.73	140.857	KOhms

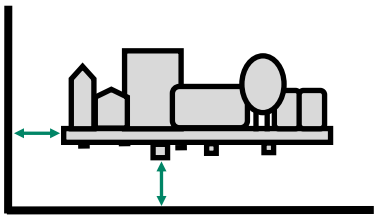
36V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	36.36	36.72	37.08	37.44	37.8	38.16	38.52	38.88	39.24	39.6	Volts
Rtrim-up	1525.778	761.889	507.259	379.944	303.556	252.63	216.254	188.972	167.753	150.778	KOhms

48V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	48.48	48.96	49.44	49.92	50.4	50.88	51.36	51.84	52.32	52.8	Volts
Rtrim-up	3227.167	1612.583	1074.389	805.292	643.833	536.194	459.31	401.646	356.796	320.917	KOhms

53V output											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	53.53	54.06	54.59	55.12	55.65	56.18	56.71	57.24	57.77	58.3	Volts
Rtrim-up	3205.547	1601.774	1067.182	799.887	639.509	532.591	456.221	398.943	354.394	318.755	KOhms

Installation Advice

Safety

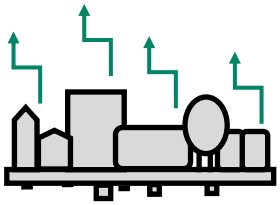


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

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

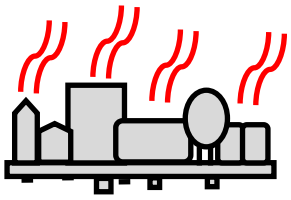


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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