

MFLS250 Series

FiDUS
power in motion...

250 Watts

- 250W convection cooled 350W forced convection
- 4.5 x 2.5" footprint with 3 x 5" or 2 x 4" mount options
- IEC/EN/ES 60601-1 and '60601-1-2 for BF medical applications
- Optional: Current share, Ctrl, 5V SB, PGPF
- Cover kit, U and L mechanics available
- 3 Year warranty



Dimensions:

Open frame: 4.5 x 2.5 x 1.5" (114.3 x 63.5 x 40mm)
See details for various mechanical options from pg4 onwards

The MFLS250 series of power dense open frame AC-DC power modules offer up to 250W convection cooled and 350W fan cooled in a 2 x 4" or 3 x 5" mount. The 1.5" low profile product is available with JST or screw terminal output and offers an onboard 12V fan output and optional 5V 0.5A stand by, remote on off and current share for parallel operation. All come with a FiDUS 3 year warranty.

Models & Ratings

INSTALLATION ADVICE PG5

Model Number ⁽¹⁾	Description	Output Voltage	Output Current ⁽²⁾		Ripple ⁽³⁾
			Max load Convection	Max load 375LFM	
MFLS250-1012	Screw Terminal	12V	16.60A	25.00A	2%
MFLS250-1312	JST Connector	12V	16.60A	18.00A	2%
MFLS250-1015	Screw Terminal	15V	13.30A	20.00A	2%
MFLS250-1315	JST Connector	15V	13.30A	18.00A	2%
MFLS250-1024	Screw Terminal	24V	10.41A	14.50A	1%
MFLS250-1324	JST Connector	24V	10.41A	14.50A	1%
MFLS250-1030	Screw Terminal	30V	8.30A	11.60A	1%
MFLS250-1330	JST Connector	30V	8.30A	11.60A	1%
MFLS250-1048	Screw Terminal	48V	5.20A	7.20A	1%
MFLS250-1348	JST Connector	48V	5.20A	7.20A	1%
MFLS250-1058	Screw Terminal	58V	4.30A	6.0A	1%
MFLS250-1358	JST Connector	58V	4.30A	6.0A	1%

Notes

- For 3x5" mounting option add -B. For current share and remote on off please contact sales
- Combined output power; main output, fan output and standby power
- Noise and ripple measured with 20MHz BW 10uF tantalum and 0.1uF electrolytic cap, ripple may be more than above at approximately <30% load conditions
- Specifications at nominal input 25°C
- Cover kit available FLS250-CK. Cover kit, L bracket and U bracket derates unit to 70%
- Loom kits available. See 'Installation Advice' on pg5

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	85		264	VAC	Derate from 100% at 100VAC to 80% at 85VAC
Operating temperature	-40		70	°C	See derating curve p3.
Efficiency	92-94% at 230VAC				
Dimensions	From 4.5 x 2.5 x 1.5" (114.3 x 63.5 x 40mm)				
EMC	EN55011 Level B conducted and A radiated EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated, EN60601-1-2 medical immunity 4th edition.				
Safety	IEC/EN/ES 60601-1, CE				

MFLS250 Series

Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	85		264	VAC	Derate from 100% at 100VAC to 80% at 85VAC
	120		370	VDC	
Input frequency	47		63	Hz	
Power factor	0.95				EN61000-3-2 class A compliant
Input current (rms)			6.3	A	At 115VAC
Inrush current	25	45	75	A	115/230/264VAC respectively cold start at 25°C
No load input power			1	W	

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	12		58	VDC	See Model & Ratings table
Output Voltage Adjust		±3		%	
Set point accuracy			±1	%	
Line regulation			±0.5	%	
Load regulation			±0.5	%	
Minimum load	0			%	
Transient response			4	%	25% step change, 0.1A/uS slew 50% duty 50hz in <5ms
Ripple & Noise	1		2	%	All models measured with 0.1uF ceramic and 10uF electrolytic capacitor. 20 MHz bandwidth at rated VAC. See models and ratings table pg 1
Hold up time		8		mS	10mS at 230VAC
Overload protection	110			%	Automatic recovery
Short circuit protection					Trip and restart. Automatic recovery
Overvoltage protection	110		140	%	
Leakage current		300		uA	
Touch current	100			uA	

General

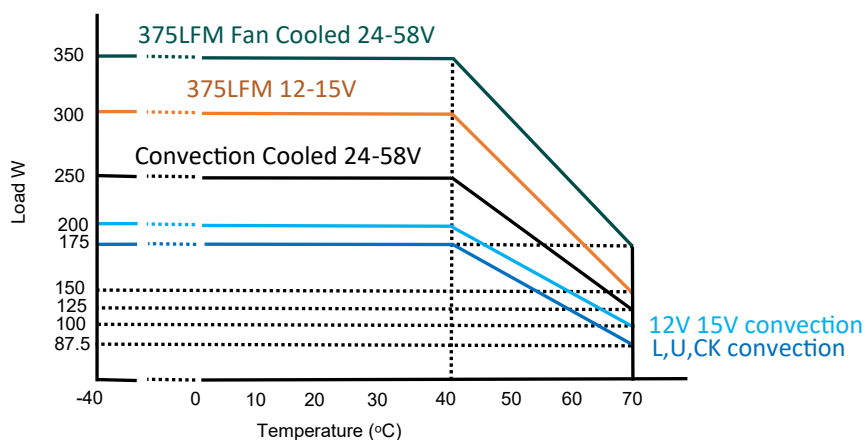
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	92		94	%	At 230VAC
Isolation: Input to Output	4380			VAC	2 MOPP
Input to Ground	1690			VAC	
Output to Ground	1500			VAC	Suitable for BF applications
Switching frequency	50		80	kHz	For power switching. PFC switching: 70-130kHz
Power density			20.74	W/in ³	
MTBF	>2.56			MHrs	As per Telcordia-SR332- issue 3
Weight		400		g	Approximation

Environmental

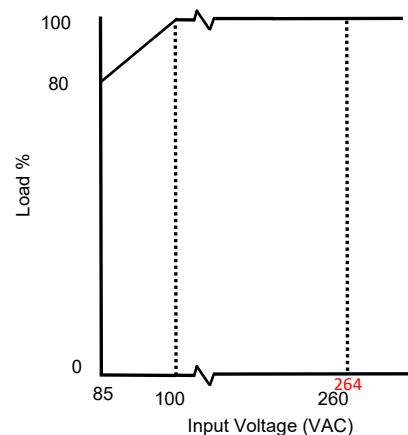
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		70	°C	Please see derating curve on page 3. Spec deviation – 40 to 0°C
Storage temperature	-40		85	°C	
Cooling					Convection cooled / fan cooled 13CFM
Altitude			16000	ft	
Humidity	5		95	% RH	Non condensing

MFLS250 Series

Temperature Derating Curve



AC Input Derating Curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55011	B		
Radiated	EN55011	A		B With ferrite ring core K5B RC 25x12x15-M on input 5 turns recommended
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			Compliant

EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	±8kV contact, ±15kV air.
Radiated	EN61000-4-3	3	A	10V/m 80MHz-2.7GHz sine wave 80% AM 1kHz
EFT	EN61000-4-4	3	A	2kV Power, 1kV I/O 5kHz
Surges	EN61000-4-5	Installation Class 3	A	1kV Live-Neutral, 2kV Live/Neutral—Earth
Conducted	EN61000-4-6	3	A	10V, 0.15 to 80MHz sine wave 80AM 1kHz
Magnetic Fields	EN61000-4-8	4	A	30A/m
Voltage Dips and Interruptions	EN61000-4-11		A,B	

Safety Approvals

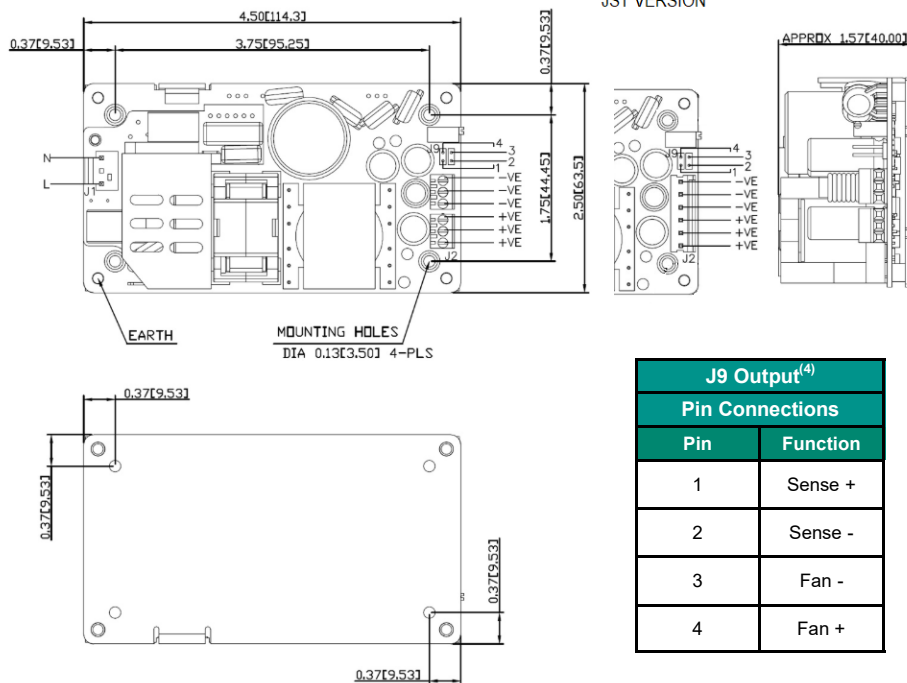
	Safety standard	Notes & Conditions
UL/CSA	ES60601-1	
CB	IEC60601-1	
Nemko	EN60601-1	
CE		MDR / LVD
Equipment protection class		Class I

MFLS250 Series

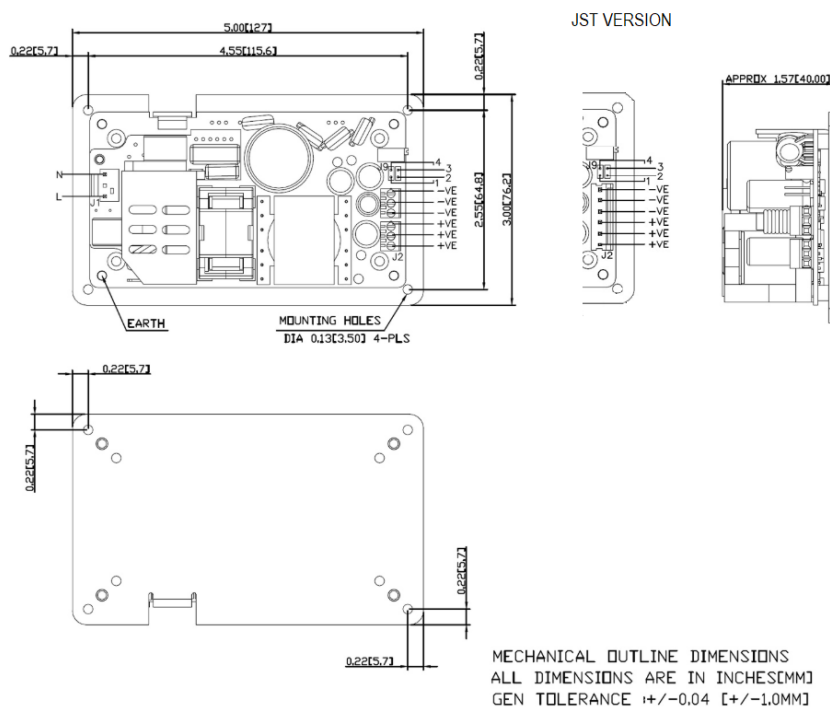
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Mechanical Details

MFLS250-XXXX



MFLS250-XXXX-B



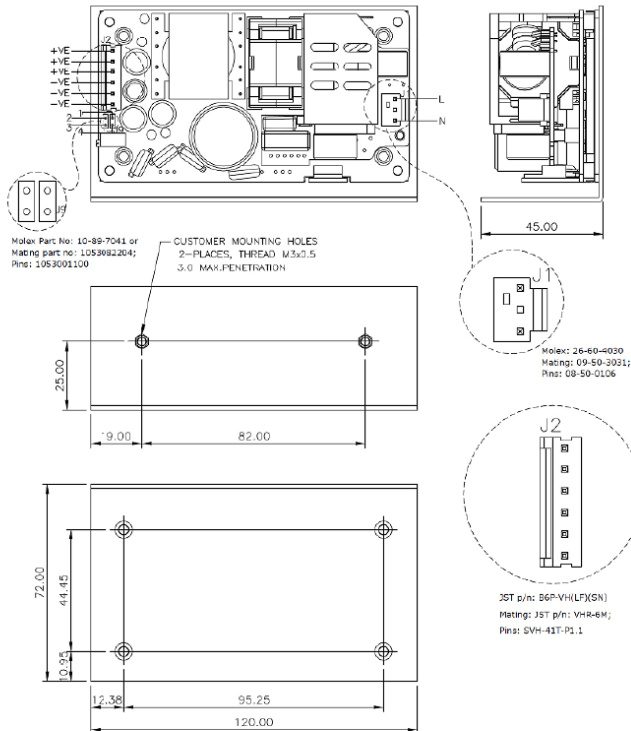
Notes

1. All dimension shown in Inches [mm]
2. J1: Input connector details: Molex: 26-60-4030 mating part: Molex: 09-50-3031 or equivalent
3. J2: Output connector details: JST B6P-VL mating part JST: VHR-6M or equivalent
4. J9: Output connector details: Molex: 10-89-7041, mates with molex 1053082204
5. J(310) multi function connector (on special option only) 2.54mm pitch mates with CONN RCPT HSN 5POS CST-100 II p/n 1375820-5

MFLS250 Series

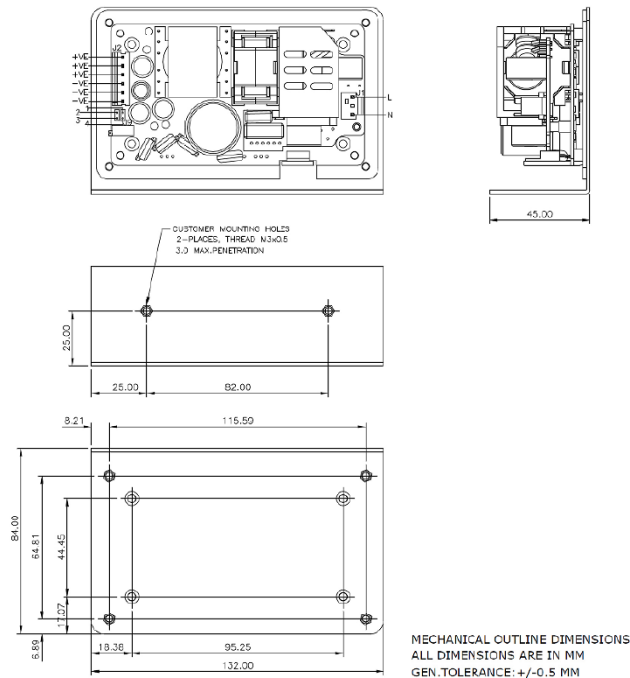
Mechanical Details

MFLS250-XXXX-L



J9 Output ⁽⁴⁾	
Pin Connections	
Pin	Function
1	Sense +
2	Sense -
3	Fan -
4	Fan +

MFLS250-XXXX-BL



Notes

- All dimension shown in Inches [mm]
- J1: Input connector details: Molex: 26-60-4030
mating part: Molex: 09-50-3031 or equivalent
- J2: Output connector details: JST B6P-VL mating
part JST: VHR-6M or equivalent
- J9: Output connector details: Molex: 10-89-7041, mates with molex 1053082204
- J(310) multi function connector (on special option only) 2.54mm pitch mates
with CONN RCPT HSNG 5POS CST-100 II p/n 1375820-5

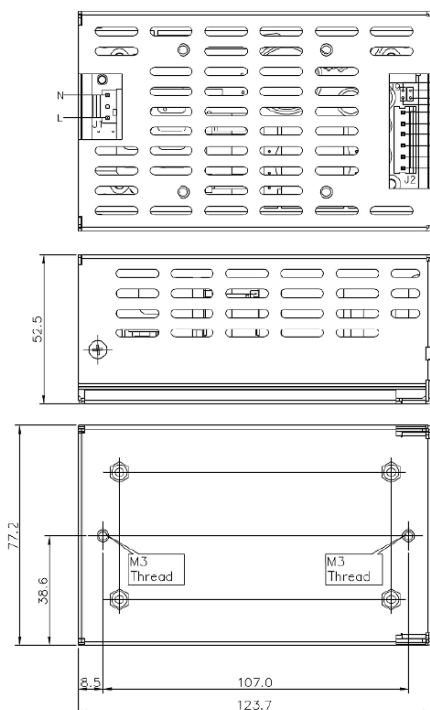
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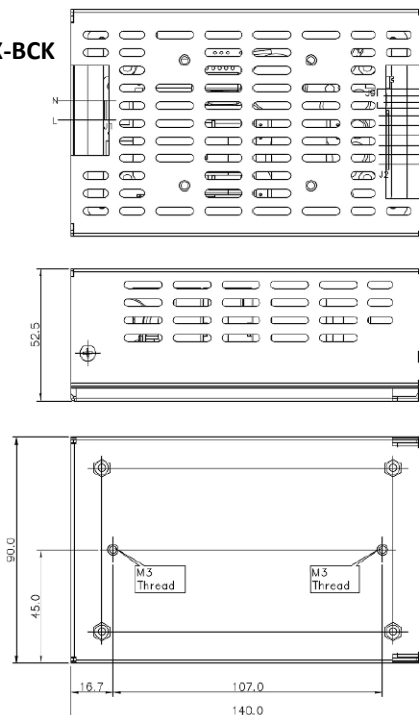
Mechanical Details

MFLS250-XXXX-CK

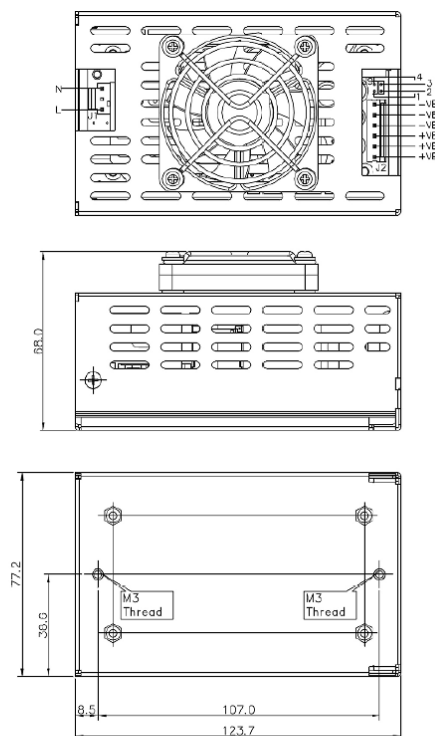
J9 Output ⁽⁴⁾	
Pin Connections	
Pin	Function
1	Sense +
2	Sense -
3	Fan -
4	Fan +



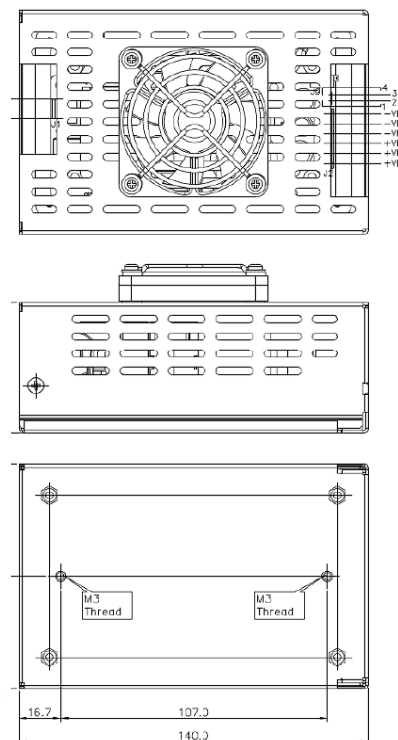
MFLS250-XXXX-BCK



MFLS250-XXXX-F



MFLS250-XXXX-BF



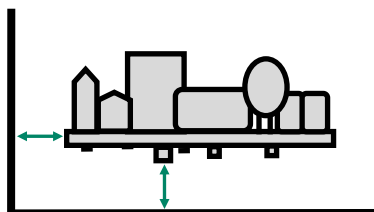
MECHANICAL OUTLINE DIMENSIONS
ALL DIMENSIONS ARE IN MM
GEN.TOLERANCE: ± 0.5 MM

Notes

1. All dimension shown in Inches [mm]
2. J1: Input connector details: Molex: 26-60-4030 mating part: Molex: 09-50-3031 or equivalent
3. J2: Output connector details: JST B6P-VL mating part JST: VHR-6M or equivalent
4. J9: Output connector details: Molex: 10-89-7041, mates with molex 1053082204
5. J(310) multi function connector (on special option only) 2.54mm pitch mates with CONN RCPT HSNQ 5POS CST-100 II p/n 1375820-5

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.

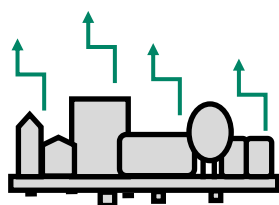
For **Class I** installations there should be 3-4mm between any part of the PSU and any earthed metal part of the enclosure. 3mm is acceptable for IT applications, 4mm required for medical applications. In Class I installations the PSU earth point must be connected to system safety ground.

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

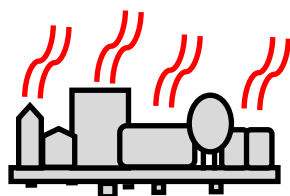


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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

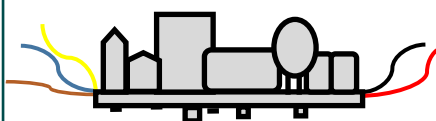


Thermal management is an important consideration when thinking about equipment service life. Electrolytic capacitors within the PSU wear with time and are typically the first end-of-life failure. Keeping the operation temperature of key components within the PSU, such as the electrolytic capacitors, as low as possible is paramount. As a general rule, for every 10°C drop in the operating temperature of the electrolytic capacitors 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	Molex: 26-60-4030	Molex: 09-50-3031
Output	JST B6P-VL	VHR-6M
Loom Kit	FLS-LK	