

MWLC550 Series

550 Watts

- 150W Convection / 250W Conduction / 550W Fan cooled
- Latest medical approvals IEC60601-1 3rd Ed, EN60601-1-2 4th Ed & BF rated
- -40 to 70°C ambient operating temperature
- Unit can be mounted in any orientation without derating
- 5 x 3" footprint in low profile 1.5" form factor
- EN55011 Level B conducted & radiated
- 3 Year warranty



Dimensions:

5 x 3 x 1.5" (127 x 76.2 x 38.1mm)

The MWLC550 series of low profile, open frame AC-DC power modules offer up to 150W convection, 250W conduction and 550W fan cooled in a low profile 1.5", 5" x 3" package. The conduction plate is designed to efficiently dissipate heat from the hot components keeping enclosure ambient to a minimum. The units have all the latest medical approvals and wide operating ambient temperature of -40 to 70°C, in a range of voltages from 12V to 58V. The units all come with a Fidus 3 year warranty.

Models & Ratings

INSTALLATION ADVICE PG5

Model Number ⁽¹⁾	Output Power ⁽²⁾	Output voltage	Output Current			Efficiency ⁽⁴⁾
			Convection	Conduction ⁽³⁾	400LFM Fan cooled	
MWLC550-1012	500W	12V	9.17A	16.67A	41.67A	90%
MWLC550-1015	500W	15V	7.33A	13.33A	33.33A	90%
MWLC550-1024	550W	24V	6.25A	10.42A	22.92A	91%
MWLC550-1048	550W	48V	3.13A	5.21A	11.46A	92%

Notes

1. 30V and 58V unit also available, please contact sales
2. Combined output power is the main unit DC output + fan output (12V 0.5A)
3. Conduction rating defined using 7 x 4" 3mm aluminium plate and 15mm clearance above be unit
4. At 100% load, 25°C and 230VAC
5. For class I versions please contact sales
6. Unit can be mounted in any orientation without derating

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	90		264	VAC	Derate from 100% at 115VAC to 78% at 90VAC
Operating temperature	-40		70	°C	See derating curve p3. Ripple can be 10% or more between -40 and 0°C, start-up guaranteed.
Efficiency	See ratings table above				
Dimensions	5 x 3 x 1.5" (127 x 76.2 x 38.1mm)				
EMC	EN55011 Level B conducted and radiated EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated, EN60601-1-2 4th Ed.				
Safety	IEC60601-1 3rd Ed, EN60601-1: 2006 A1, UL/CAN: ANSI/AAMI ES60601-1 (AMD2 2010), CSA 22.2 No 60601-1:14, CE				

MWLC550 Series

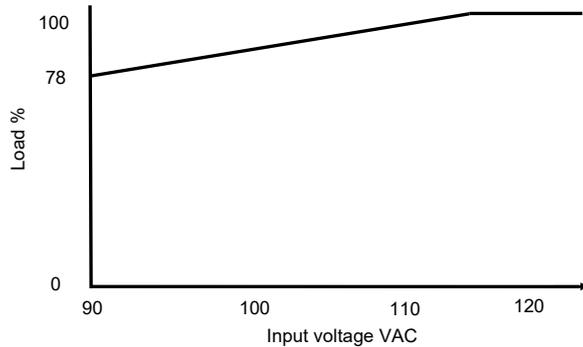
Input					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	90		264	VAC	Derate from 100% at 115VAC to 78% at 90VAC
Input frequency	47		63	Hz	
Power factor	0.95				EN61000-3-2 class D compliant, at full load
Input current (rms)			6	A	At 115VAC
			3		At 230VAC
Inrush current			25	A	115VAC cold start at 25°C
			45		230VAC cold start at 25°C
No load input power			<0.5 / 0.7	W	<0.7W at 230VAC and <0.5W at 115VAC

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			±1	%	
Minimum load	0			%	
Transient response			5	%	50-100% 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 line and full load.2% for 12V and 15V models
Hold up time		>16/55/30		mS	16ms forced convection load, 55ms convection load & 30ms conduction load.
Overload protection	110			%	Trip and restart. Automatic recovery
Short circuit protection					Trip and restart. Automatic recovery
Overvoltage protection	110		140	%	Trip and restart. Automatic recovery
Thermal protection	100	110	120	°C	Hiccup mode once substrate PCB exceeds limit
Leakage current	200		400	uA	<200uA at 115VAC and <400uA at 230VAC
Touch current	100			uA	

General					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	Please see ratings table on page 1				
Isolation: Input to Output	4000			VAC	
Input to Ground	1500			VAC	
Switching frequency	68		80	KHz	For power switching. PFC switching: 70-130KHz
Power density	22.22		24.44	W/ln ³	22.22 for 12V and 15V, 24.44 for other models
MTBF	>3			MHrs	As per Telcordia-SR332- issue 3
Weight		430		g	

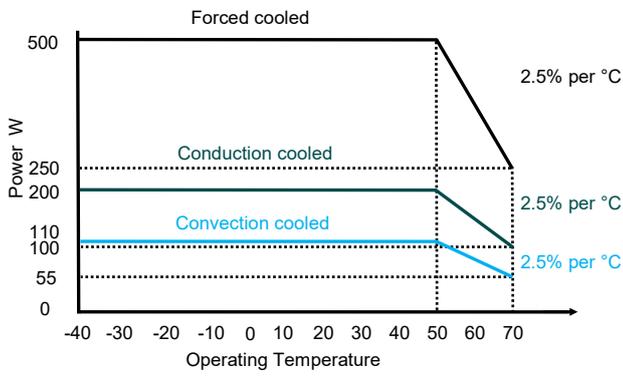
Environmental					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		70	°C	Please see derating curve on page 3
Storage temperature	-40		85	°C	
Cooling					Convection cooled / fan cooled 400LFM
Altitude	16000		40000	ft	16000ft operating 40000ft non operating
Humidity	5		95	% RH	Non condensing

AC Input Derating Curve

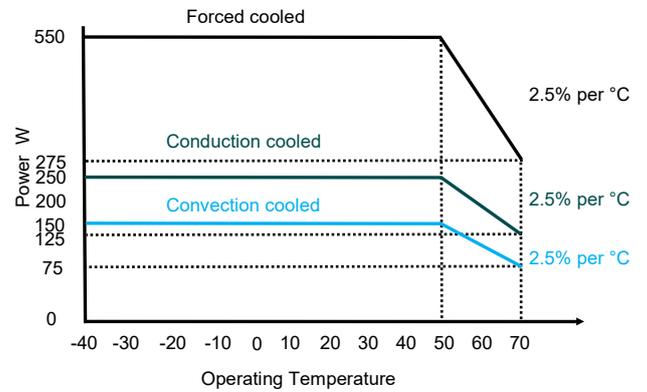


Derate power linearly at lower supply voltages at 0.88% per VAC from 115VAC to 90VAC

Power Derating Curve 12 & 15V

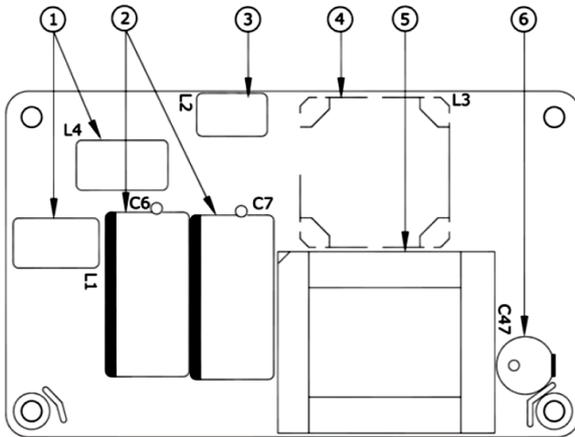


Power Derating Curve 24V & above

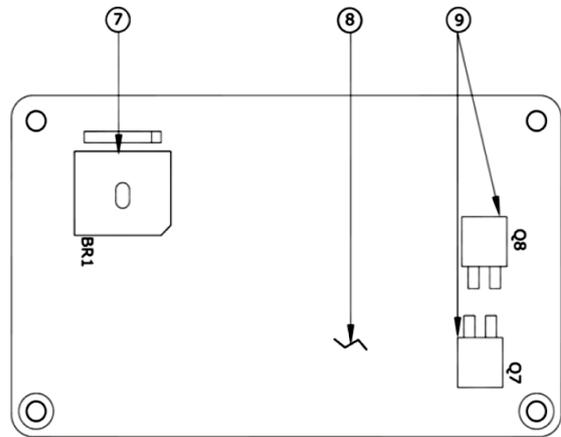


Component max thermal limits

For reliable operation ensure that the maximum component temperatures are not exceeded. Unit can be mounted in any orientation.



TOP PCB



BOTTOM PCB

#	Description	Max temp °C	#	Description	Max temp °C
1	Common mode chokes	95	6	Output capacitor	90
2	Bulk capacitors	90	7	Bridge rectifier	120
3	Differential chokes	110	8	Aluminium clad PCB	105
4	Boost choke	110			
5	Output transformer	125 (12V/15V) 110 (24V & above)	9	Output rectifiers	110

EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55011	B		CISPR22-B, FCC PART15-B
Radiated	EN55011	B		With ferrite ring core K5B RC 25x12x15-M on input
Harmonic current	EN61000-3-2	Class D		
Voltage flicker	EN61000-3-3			

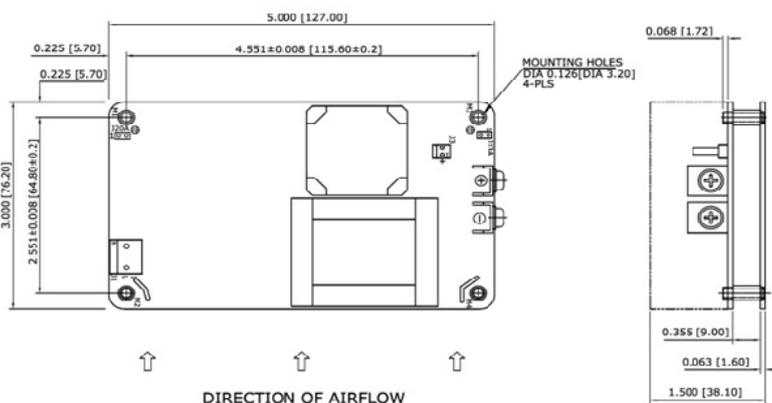
EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	±8KV contact, ±15KV air.
Radiated	EN61000-4-3	3	A	10V/m 80MHz-2.7GHz sine wave 80% AM 1KHz
EFT	EN61000-4-4	3	A	2KV Power, 1KV I/O 5KHz (Ed4)
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 50Hz
Voltage Dips and Interruptions	EN61000-4-11		B	

Safety Approvals

	Safety standard	Notes & Conditions
UL/CSA	ANSI/AAMI ES60601-1 (3rd ed), CSA 22.2 No 60601-1:14	UL file E173812
CB	IEC 60601-1 3rd Ed	Class II CB Test cert NO 93054
Nemko	EN 60601-1: 2006 A1	Class II Nemko No P16221240,
CE		2011/65/EU RoHS Directive and 2014/35/EU Low voltage directive
Equipment protection class		Class II (please contact sales for class I versions)

Mechanical Details



J1: Input Connector ⁽²⁾	
Pin Connections	
Pin	Function
1	AC Line
2	AC Neutral

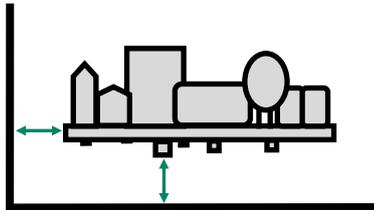
J3: Fan Connector ⁽³⁾	
Pin Connections	
Pin	Function
1	Fan +
2	Fan -

Notes

- All dimensions shown in Inches [mm] ±0.04" [±1.0]
- J1: Input connector details: JST: B3P-VH-B(LF)(SN) mating part: JST: VHR-3M or equivalent
- J3: Fan connector details: AMP: 640456-2 mating part 640440-2
- DC output terminals 6-32 inches screw Pan HD. Designed to accept ring tongue AMP 8-31886-1 –max current 11A. AWG16 cable can be used

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.

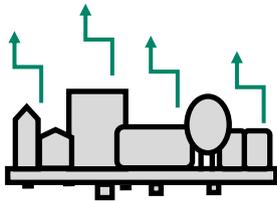
For **Class I** installations there should be 3-4mm between any part of the PSU and any earthed metal part of the enclosure. 3mm is acceptable for IT applications, 4mm required for medical applications. In Class I installations the PSU earth point must be connected to system safety ground.

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

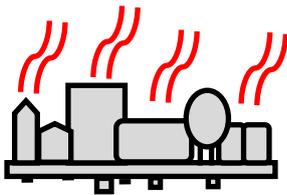


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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

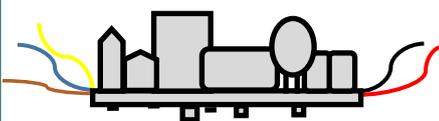


Thermal management is an important consideration when thinking about equipment service life. Electrolytic capacitors within the PSU wear with time and are typically the first end-of-life failure. Keeping the operation temperature of key components within the PSU, such as the electrolytic capacitors, 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	JST: B3P-VH	JST: VHR-3M
Output	6-32 screw terminal	
Loom Kit	N/A	