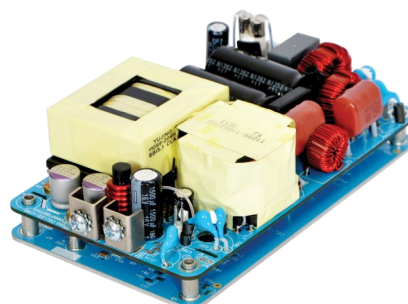


MWLC550 Series

FIDUS
power in motion...

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

- 30V and 58V unit also available, please contact sales
- Combined output power is the main unit DC output + fan output (12V 0.5A)
- Conduction rating defined using 7 x 4" 3mm aluminium plate and 15mm clearance above be unit
- At 100% load, 25°C and 230VAC
- For class I versions please contact sales
- 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 | |

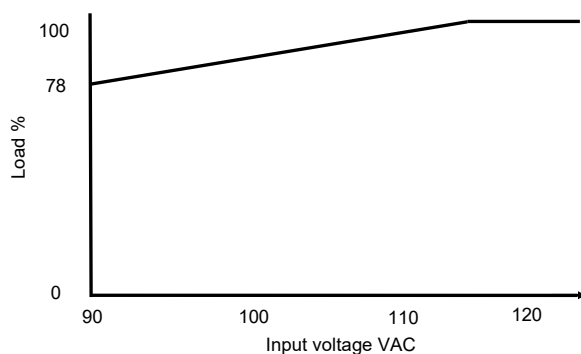
| General | | | | | |
|----------------------------|------------------------------------|---------|---------|-------------------|---|
| Parameter | Minimum | Typical | Maximum | Units | Notes & Conditions |
| Efficiency | Please see ratings table on page 1 | | | | |
| Isolation: Input to Output | 4000 | | | 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/In 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 |

MWLC550 Series

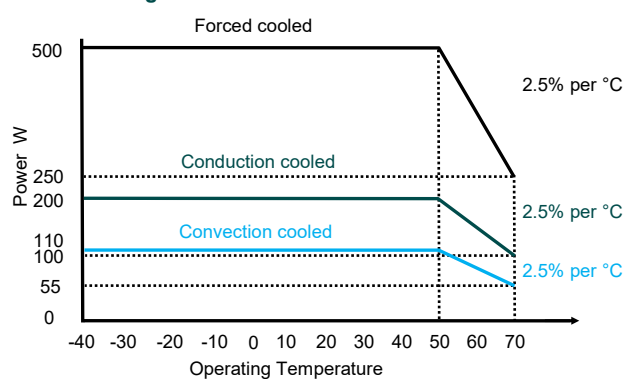
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AC Input Derating Curve

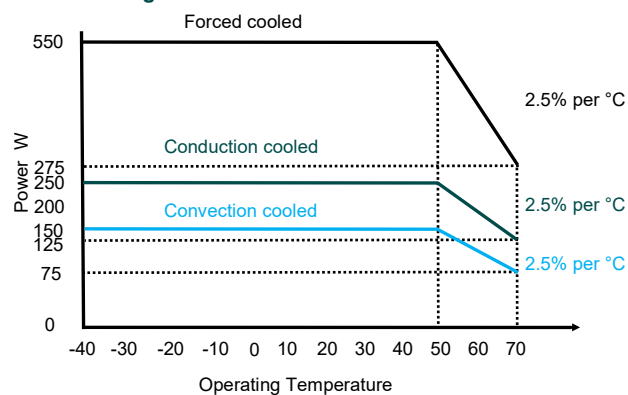


Derate power linearly at lower supply voltages at 0.88% per VAC from 115VAC to 90VAC

Power Derating Curve 12 & 15V

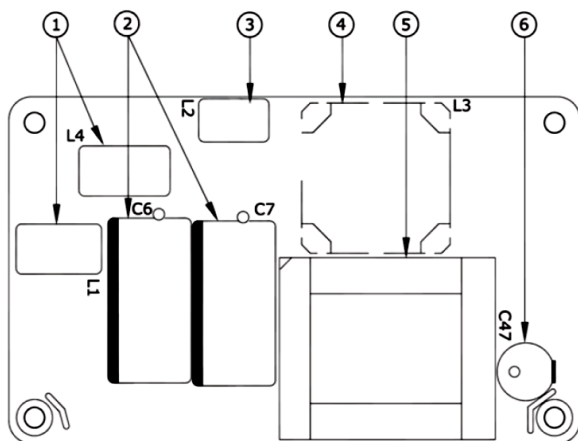


Power Derating Curve 24V & above

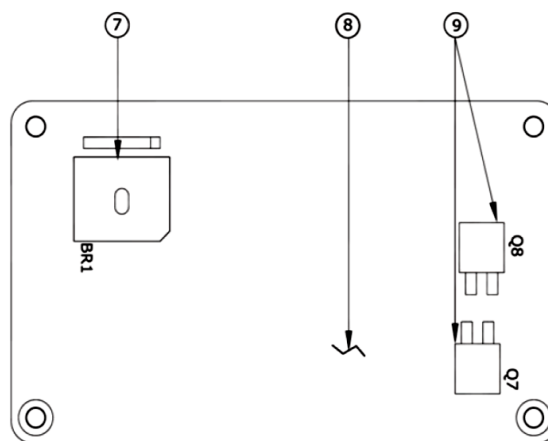


Component max thermal limits

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 | 9 | Output rectifiers | 110 |
| 5 | Output transformer | 125 (12V/15V) 110 (24V & above) | | | |

MWLC550 Series

FiDUS
power in motion...

EMC: Emissions

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

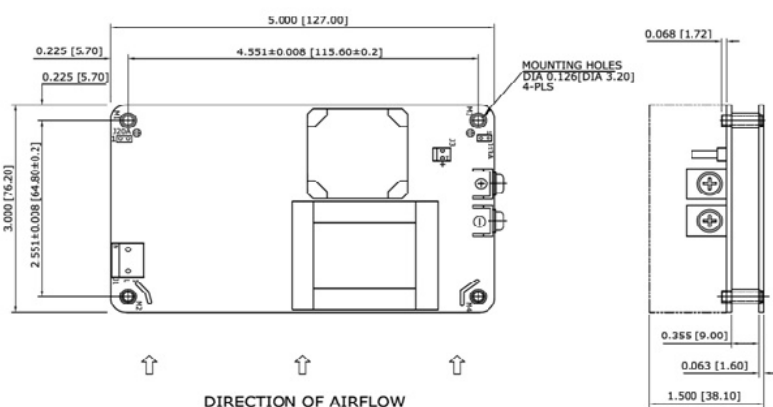
EMC: Immunity

| | 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

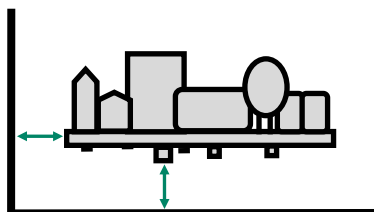
| Pin | Function |
|-----|----------|
| 1 | Fan + |
| 2 | Fan - |

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.

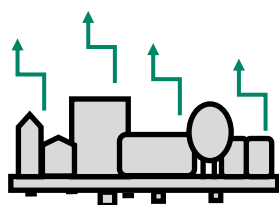
For **Class I** installations there should be 3-4mm between any part of the PSU and any earthed metal part of the enclosure. 3mm is acceptable for IT applications, 4mm required for medical applications. In Class I installations the PSU earth point must be connected to system safety ground.

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

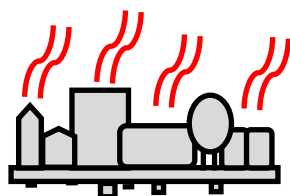


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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

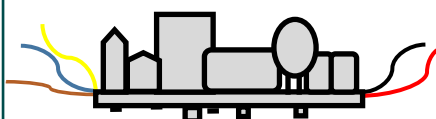


Thermal management is an important consideration when thinking about equipment service life. Electrolytic capacitors within the PSU wear with time and are typically the first end-of-life failure. Keeping the operation temperature of key components within the PSU, such as the electrolytic capacitors, 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 | |