

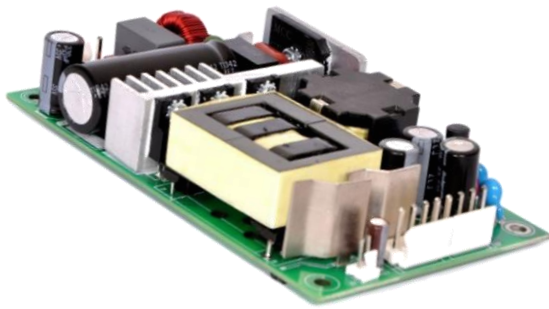
# MBC350 Series

## Low Profile Open Frame Power Supplies Medical

The MBC350 Series of open frame medical power supplies feature a wide universal AC input range of 90 – 264 VAC, offering 350 W of output power in a compact 3 x 5 x 1 inch footprint, with a variety of isolated single output voltages.

The MBC series is designed and approved to the latest Medical standards (EN/IEC 60601-1), providing 2 x MOPP isolation for Class I & Class II applications.

These power supplies are ideal for medical, telecom, datacom, industrial equipment and other applications.



### Key Features & Benefits

- 3 x 5 x 1 Inch Form Factor
- 350 W with Forced Air Cooling & 200 W with Convection Cooling
- Approved to EN/IEC 60601-1
- Efficiencies up to 94%
- -40 to 70°C Operating Temperature
- 12 V / 0.5 A Fan Output, Thermal Shut-Down Feature
- 2.56 Million Hours, Telcordia -SR332-Issue 3 MTBF
- Standby Power < 0.5 W
- Medical (BF) Safety Approvals
- RoHS Compliant

### Applications

- Diagnostic
- Drug Pump
- Dialysis
- Home Health Care
- Monitoring
- Portable Equipment



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## 1. MODEL SELECTION

MODEL NUMBER	DESCRIPTION	VOLTAGE	MAX. LOAD (CONVECTION)	MAX. LOAD (375 LFM)	MIN. LOAD	RIPPLE & NOISE <sup>1</sup>
MBC350-1T12L	Screw Terminal	12 V	15 A	25 A	0.0 A	1%
MBC350-1012L	Molex Connector			18.75 A		
MBC350-1T15L	Screw Terminal	15 V	12 A	21.67 A	0.0 A	1%
MBC350-1015L	Molex Connector			18. A		
MBC350-1T24L	Screw Terminal	24 V	8.33 A	14.60 A	0.0 A	1%
MBC350-1024L	Molex Connector					
MBC350-1T30L	Screw Terminal	30 V	6.67 A	11.67 A	0.0 A	1%
MBC350-1030L	Molex Connector					
MBC350-1T48L	Screw Terminal	48 V	4.17 A	7.30 A	0.0 A	1%
MBC350-1048L	Molex Connector					
MBC350-1T58L	Screw Terminal	58 V	3.45 A	6.04 A	0.0 A	1%
MBC350-1058L	Molex Connector					
COVER-350-XBC <sup>2</sup>	metal cover kit accessory					

Thermal shutdown feature: The power supply goes in hiccup mode when the temperature of PCB exceeds 110 °C (+/-10 °C).

## 2. INPUT SPECIFICATIONS

Specifications are for nominal input voltage, 25°C unless otherwise stated.

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Input Voltage	Universal (Derate from 100% at 100 VAC to 90% at 90 VAC)	90-264 VAC / 390 VDC
Input Frequency		47 - 63 Hz
Input Current	115 VAC: 230 VAC:	3.6 A max. 1.8 A max.
No Load Power	Typical	>0.5 W
Inrush Current	115 VAC: 230 VAC: 264 VAC:	25 A 45 A 75 A
Leakage Current	Typical Touch Current	300 uA <100 uA
Power Factor	Full Load	>0.95
Switching Frequency	PFC: PWM:	70 - 130 KHz 50 - 80 KHz

<sup>1</sup> Ripple is peak to peak with 20 MHz bandwidth and 10 µF (Tantalum capacitor) in parallel with a 0.1 µF capacitor at rated line voltage and load ranges.

<sup>2</sup> When used in Cover Kit, de-rate output power to 70 % under all operating conditions

### 3. OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Output Power <sup>3</sup>	With 375 LFM: Convection:	350 W 200 W
Efficiency	48 V, 58 V: 24 V, 30 V: 12 V, 15 V:	94% 93% 92%
Hold-up Time	Full Load: Convection Load:	8 ms typical 14 ms typical
Line Regulation		+/-0.5%
Load Regulation		+/-1%
Transient Response	50-100% step load change, at 0.1A/uS slew rate, 50% duty cycle, 50 Hz = 5% ,	recovery time < 5 ms
Voltage Adjustment		+/-3%
Rise Time	Typical	55 ms
Set Point Tolerance <sup>4</sup>		+/-1%
Over Current Protection	Hiccup mode / Auto Recovery	>110%
Over Voltage Protection	Hiccup mode / Auto Recovery	110 to 140%
Short Circuit Protection	Hiccup mode / Auto Recovery	

### 4. EMC SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Conducted Emissions	EN 55011-B, CISPR22-B, FCC PART15-B	Pass
Radiated Emissions	EN 55011 A; with external core (King core K5B RC 25x12x15-M in input cable)	Pass Level B
Input Current Harmonics	EN 61000-3-2	Class D
Voltage Fluctuation and Flicker	EN 61000-3-3	Pass
ESD Immunity	EN 61000-4-2	Level 4, Criterion A
Radiated Field Immunity	EN 61000-4-3	Level 3, Criterion A
Electrical Fast Transient Immunity	EN 61000-4-4	Level 3, Criterion A
Surge Immunity	EN 61000-4-5	Level 3, Criterion A
Conducted Immunity	EN 61000-4-6	Level 3, Criterion A
Magnetic Field Immunity	EN 61000-4-8	Level 4, Criterion A
Voltage Dips, Interruptions	EN 61000-4-11	Criterion B

### 5. SAFETY SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Isolation Voltage	Input to Output: (For medical applications)	4000 VAC
	Input to GND: (Not Applicable For Class II Option)	1500 VAC
	Output to GND: for type BF	1500 VAC
	for type B (N/A For Class II Option)	500 VAC
Protection Level	Primary to Secondary:	2 MOPP
	Primary to Earth:	1 MOPP
	Secondary to Earth:	1 MOPP
Safety Standard(s)	Approved to the latest edition of the following standards: CSA/UL60601-1, EN60601-1 and IEC60601-1.	
Agency Approvals	Nemko, UL, C-UL	
CE mark	Complies with LVD Directive	

<sup>3</sup> Combined output power of main output, fan supply shall not exceed max. power rating.

<sup>4</sup> Fan supply output voltage tolerance including set point accuracy, line & load regulation is +/-10% and ripple & noise is less than 10%.

## 6. ENVIRONMENTAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Operating Temperature <sup>5</sup>	Startup guaranteed, with spec deviation, see Fig. 1	-40 to +70°C -40 to 0°C
Storage Temperature		-40 to 85° C
Cooling	With 375 LFM forced air cooling at 100 to 264 VAC: With natural convection cooling at 100 to 264 VAC:	350 W 200 W
Altitude	Operating: Non-operating:	16,000 ft. 40,000 ft.
Humidity	Non Condensing	5% to 95%
Reliability	MTBF according to Telcordia - SR332-Issue 3	2.56 million hours

## 7. CONNECTOR & PIN DESCRIPTION

CONNECTOR	PIN	DESCRIPTION / CONDITION	MANUFACTURER / PN
AC Input Connector	J1	Pin 1 AC Line Pin 2 Not Fitted Pin 3 AC Neutral	Molex: 26-60-4030 Mating: 09-50-3031; Pins: 08-50-0106
DC Output Connector	J2	Screw Terminal (Option 1) Molex Connector (Option 2) Pin 1 V1 +VE Pin 2 V1 - VE Pin 1,2,3,4 V1 +VE Pin 5,6,7,8 V1 - VE	6-32 inches Screw Pan HD Mating: 16 AWG wire crimped to Ring Tongue Terminal AMP: 8-31886-1 Molex: 26-60-4080 Mating: 09-50-3081; Pins: 08-50-0106
Aux (Fan) Output	J3	Pin 1 FAN +VE Pin 2 FAN -VE	AMP :640456-2 Mating: 640440-2
Earth	J4		Molex: 19705-4301 Mating: 19003-0001

## 8. MECHANICAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION
Weight	300 g
Dimensions	76.2 x 127.0 x 25.4 mm (3 x 5 x 1 inch)

<sup>5</sup> Output ripple can be more than 10% of the output voltage.

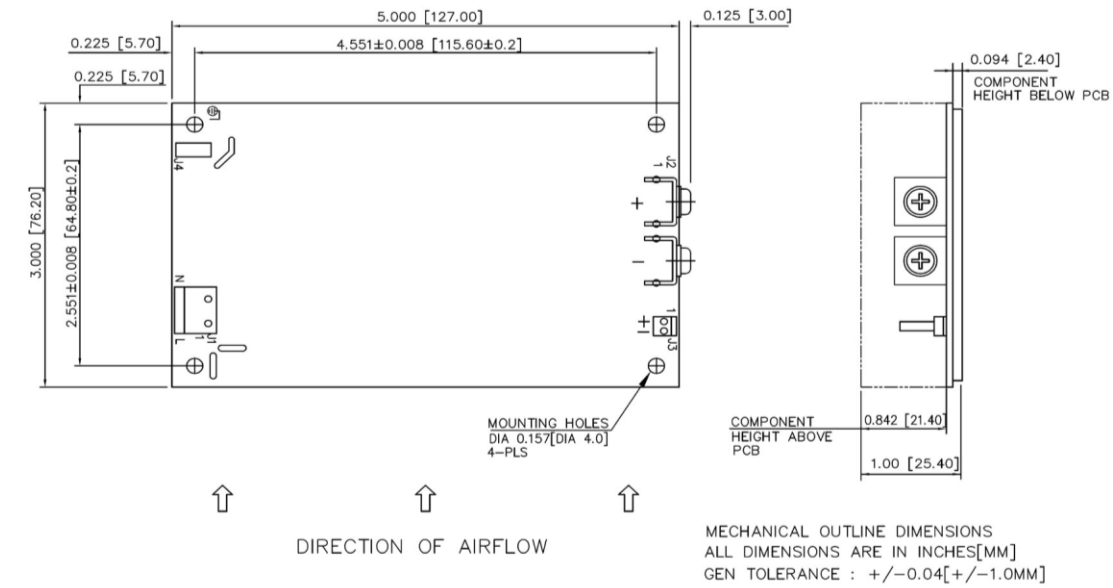


Figure 2. Mechanical Drawing - Screw Terminal (Option 1)

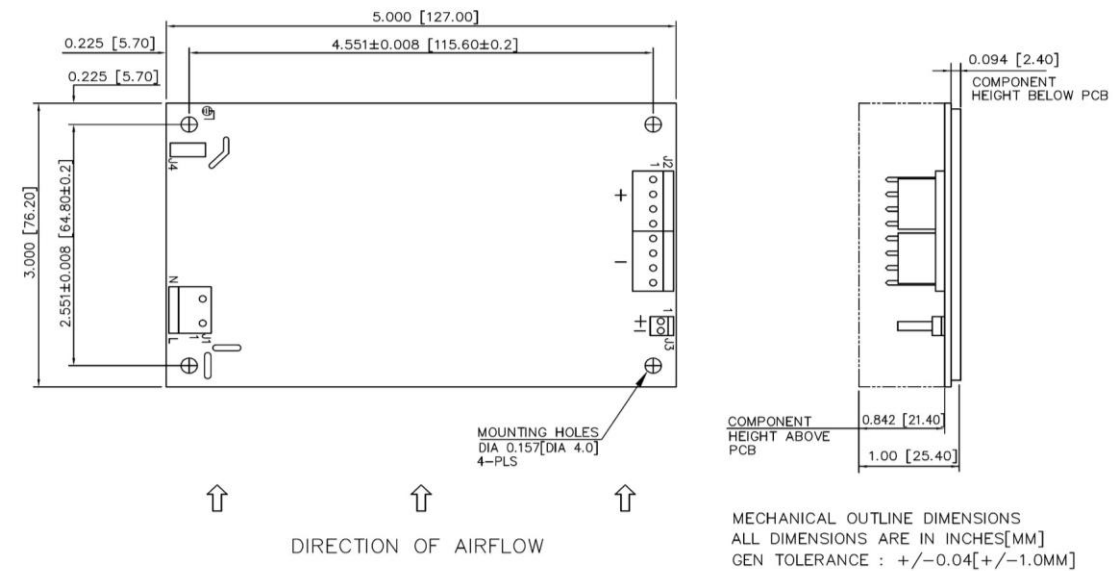


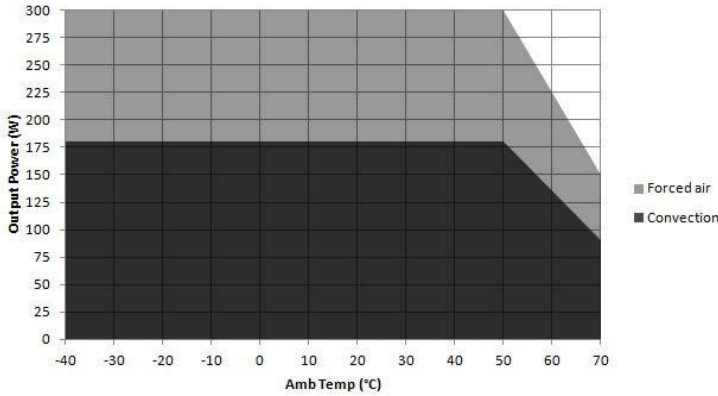
Figure 3. Mechanical Drawing - Molex Header (Option 2)

**NOTES:** In case the PCB is mounted in a metal enclosure, using metal hardware ensure the following:

- 1 Stand off, used to mount PCB has OD of 5.4 mm max.
- 2 Screws, used to fix PCB on stand off, have head dia of 6.0 mm max.
- 3 Washer, if used, to have dia of 6.5 mm max.

## DERATING CURVES

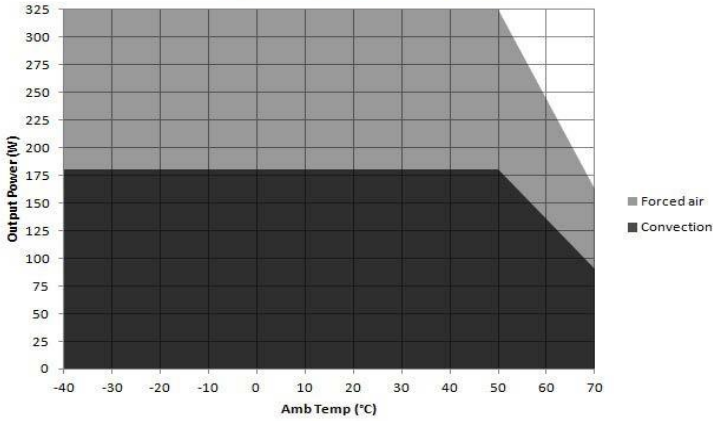
Power de-rating : 12V output



Convection load: 180 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 300 W up to 50°C  
De-rate above 50 °C @ 2.5% per °C

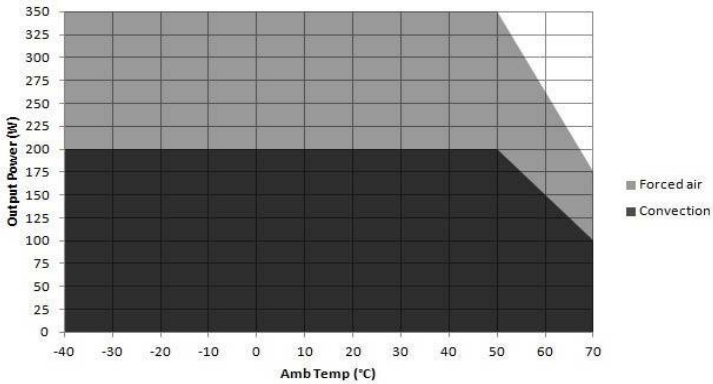
Power de-rating : 15V output



Convection load: 180 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 325 W up to 50°C  
De-rate above 50 °C @ 2.5% per °C

Power de-rating : 24V, 30V, 48V, 58V



Convection load: 200 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 350 W up to 50°C  
De-rate above 50 °C @ 2.5% per °C

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