

### 500 Watts

- 250 W Convection & 500 W Forced-cooled Ratings
- 5 V Standby Output
- Universal 80 - 264 VAC Input
- IT & Medical Safety Approvals
- -40° C to +70° C Operation
- Power Fail, Remote On/Off & Remote Sense
- Class B Emissions
- 3 Year Warranty



The GCU500 is packaged in a 3.3" x 6.5" x 1.55" package and achieves EN55011/32 Level B conducted emissions compliance whilst maintaining very low earth leakage currents, making it suitable for a wide range of 1U and other industrial, IT and medical applications.

The series has single output versions from 12 V to 48 VDC, dual-fusing for compliance with IEC60601-1 and features minimal waste heat as efficiencies reach 93%. The GCU500 delivers up to 500 W of power over an operating range of -40 °C to +70 °C and offers remote on/off control and power fail signal along with 5 V standby and fan supplies.

#### Dimensions:

##### GCU500:

3.30 x 6.50 x 1.55" (83.8 x 165.1 x 39.3 mm)

##### GCU500-EF:

3.30 x 8.24 x 1.64" (83.8 x 209.3 x 41.7 mm)

### Models & Ratings

Output Voltage V1	Output Current V1		V Standby Output	V Fan Output <sup>(1)</sup>	Max Output Power	Model Number <sup>(2)</sup>
	Convection-cooled	Forced-cooled & End Fan Version <sup>(3)</sup>				
12.0 VDC	20.8 A	41.7 A	5.0 VDC/0.2 A	12.0 VDC/0.5 A	500 W	GCU500PS12
15.0 VDC	16.7 A	33.4 A	5.0 VDC/0.2 A	12.0 VDC/0.5 A	500 W	GCU500PS15
18.0 VDC	12.5 A	27.8 A	5.0 VDC/0.2 A	12.0 VDC/0.5 A	500 W	GCU500PS18
24.0 VDC	10.4 A	20.8 A	5.0 VDC/0.2 A	12.0 VDC/0.5 A	500 W	GCU500PS24
36.0 VDC	6.9 A	13.9 A	5.0 VDC/0.2 A	12.0 VDC/0.5 A	500 W	GCU500PS36
48.0 VDC	5.2 A	10.4 A	5.0 VDC/0.2 A	12.0 VDC/0.5 A	500 W	GCU500PS48

#### Notes

1. Overall Vfan tolerance 10.8-13.2 V

2. For end fan version add suffix -EF to model number.

3. Forced cooling requires 10CFM.

### Summary

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	80	115/230	264	VAC	Derate output power <90 VAC. See fig 1, 300 VAC for 5 s
No Load Input Power			1	W	115 VAC (when inhibited)
			6		230 VAC
Efficiency		92		%	230 VAC Full load
Operating Temperature	-40		+70	°C	See derating curve, fig. 9 & 10
EMC	EN55032 Level B Conducted & Radiated				
Safety Approvals	IE60950-1, IEC62638-1, EN62368-1, UL62368-1, CSA 22.2 No.6238-1, IEC60601-1, EN60601-1, ANSI/AAMI ES60601-1, CSA22.2 No.60601-1, LVD & RoHS, Equipment Protection Class I				
Weight		1.35 (612)		lb (g)	U Channel
		1.65 (748)			End Fan

### Input

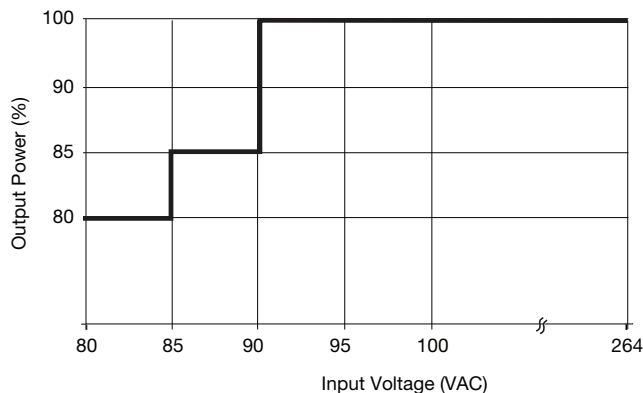
Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	80	115/230	264	VAC	Derate output power <90 VAC. See fig 1, 300 VAC for 5 s
Input Frequency	47	50/60	63	Hz	
Power Factor		>0.9			230 VAC, 100% load
Input Current - Full Load		5.2/2.7		A	115/230 VAC
Inrush Current			60	A	264 VAC cold start 25 °C
No Load Input Power			1	W	115 VAC (when inhibited)
			6		230 VAC
Earth Leakage Current			270	µA	264 VAC/60 Hz
Input Protection	F8A/250V internal fuse in both lines.				

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	12		48	VDC	See Models and Ratings table
Initial Set Accuracy			$\pm 1^{(V1)}$ & $\pm 3^{(VStby)}$	%	50% load, 115/230 VAC
Output Voltage Adjustment - V1	$\pm 2$			%	Via potentiometer. See mech. details, Vfan will track
Minimum Load	0			A	No minimum load required
Start Up Delay		1	2	s	115/230 VAC full load
Hold Up Time	10			ms	115/230 VAC full load
Drift			$\pm 0.2$	%	After 20 min warm up
Line Regulation			$\pm 0.5$	%	90-264 VAC
Load Regulation			$\pm 0.5$	%	0-100% load
Transient Response			4	%	Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step
Over/Undershoot			5	%	Turn On/Turn Off
Ripple & Noise - V1 & V Standby			1	% pk-pk	20 MHz bandwidth
Overvoltage Protection - V1	110		140	%	Vnom DC. Output 1, recycle input to reset
Overload Protection	110		150	% I nom	V1 - Trip and Restart / Hiccup mode
	0.8		1.2	A	VStandby - Trip and Restart / Hiccup mode VFan - Resetting. Fuse rated at 1.3 A at 25 °C
Short Circuit Protection					Continuous, no damage
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection				°C	Measured internally, auto resetting
Remote Sense	Compensates for 0.25V per lead, 0.5V total.				

### Input Voltage Derating Curve

Figure 1



### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		92		%	230 VAC Full load
Isolation: Input to Output Input to Ground Output to Ground	4000			VAC	2 x MOPP
	1500			VAC	1 x MOPP
	500			VDC	
Switching Frequency	50		500	kHz	PFC Converter
	65		150		Main Converter
Power Density			15	W/in <sup>3</sup>	
Mean Time Between Failure		370		kHrs	MIL-HDBK-217F, Notice 2 +25 °C GB
Weight		1.35 (612)		lb (g)	U Channel
		1.65 (748)			End Fan

### Efficiency Vs Load

Figure 2  
12 V Models

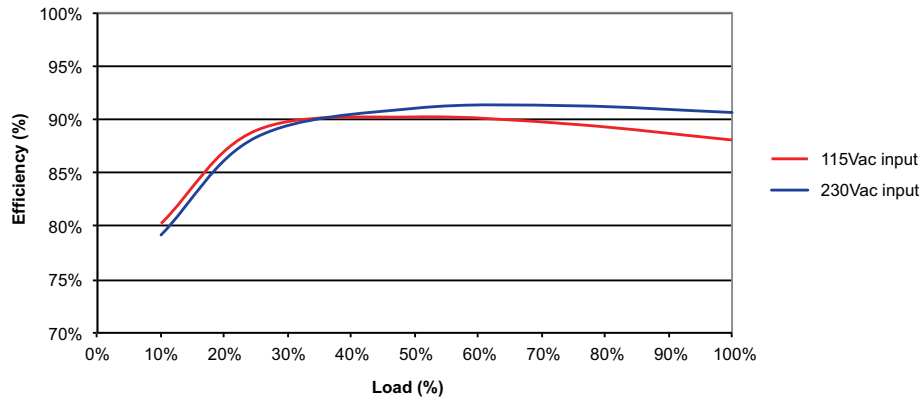


Figure 3  
24 V Models

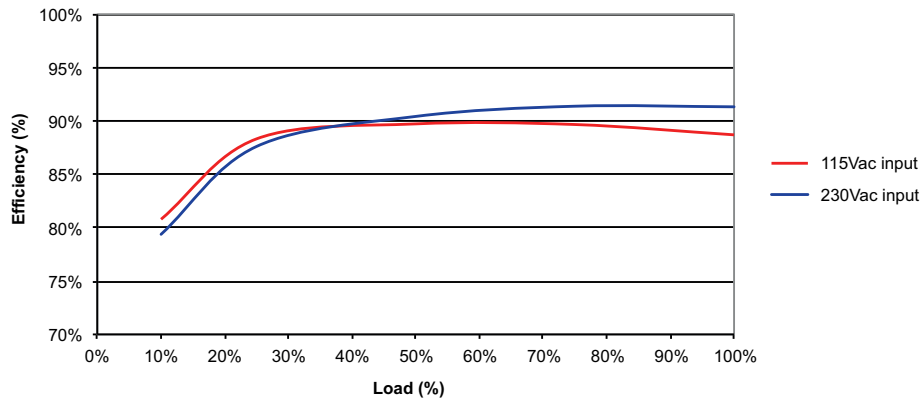
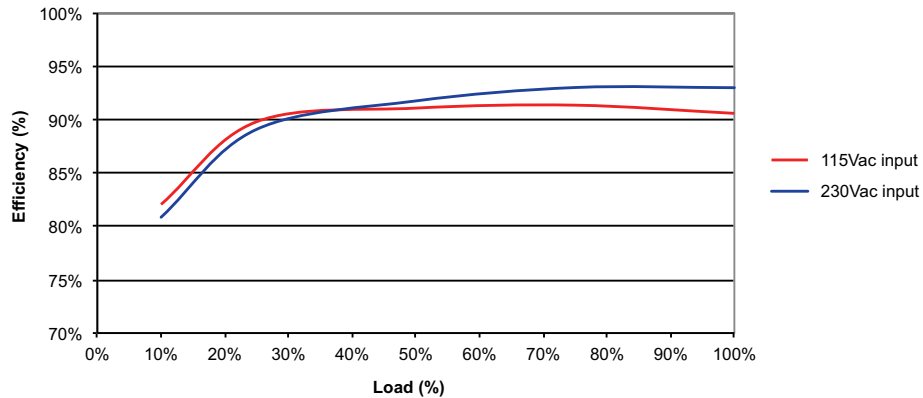


Figure 4  
48 V Models

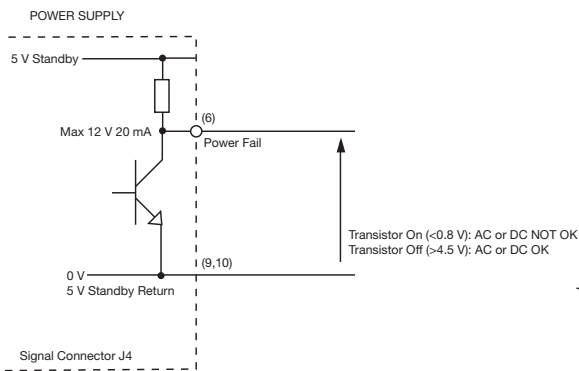


### Signals & Controls

Characteristic		Notes & Conditions
Power Fail		TTL Compatible, pin 6 Provides $\geq 5$ ms warning of loss of output from AC failure.
Standby Supply		5 VDC/0.2 A referenced to -Vout supply present when AC applied.
Remote On/Off	Inhibit	The inhibit lo, should be pulled below 0.4 V to switch V1 & Vfan off. Open circuit or $>4$ V to switch on (see fig. 7)
	Enable	With the inhibit lo (pin 4) pulled low as detailed above, connecting inhibit HI to inhibit LO will enable V1 & V fan output. (see fig. 8)
Remote Sense		Compensates for 0.25V per lead, 0.5V total

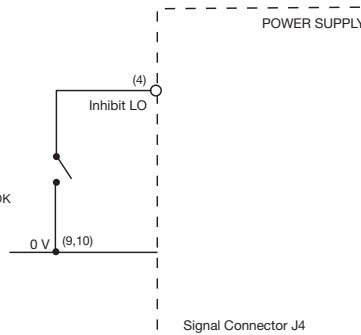
#### Power Fail

Figure 6



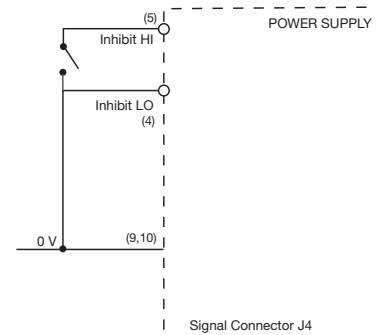
#### Remote On/Off (Inhibit)

Figure 7



#### Remote On/Off (Enable)

Figure 8



### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+70	°C	See derating curve, fig. 9 & 10
Storage Temperature	-40		+85	°C	
Cooling	10			CFM	Forced Cooled $>180$ W
Humidity	5		95	%RH	Non-condensing
Operating Altitude			4000/5000	m	Medical/ITE
Transport Altitude			10000	m	
Shock					$\pm 3 \times 30g$ shocks in each plane, total 18 shocks. $30g = 11ms (+/-0.5msec)$ , half sine. Conforms to EN60068-2-27 & EN60068-2-47
Vibration					Single axis 10 - 500 Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6

#### Thermal Derating Curve

Figure 9 - Convection-cooled

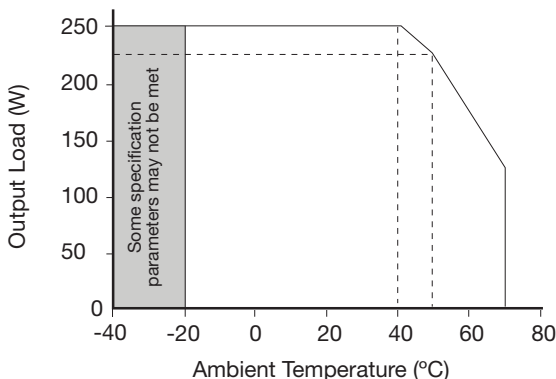
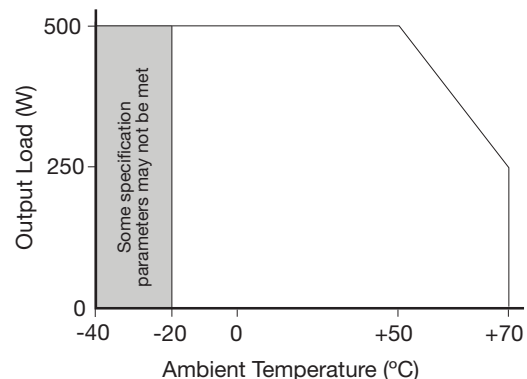


Figure 10 - Forced-cooled 10 CFM & -EF versions



### EMC: Emissions

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Conducted	EN55011/32	Class B		
Radiated	EN55011/32	Class A		Class B with 2T on Fair-Rite 2643800502 on output cable
Harmonic Currents	EN61000-3-2	Class A		
Voltage Flicker	EN61000-3-3			

### EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Low Voltage PSU EMC	EN61204-3	High severity level	as below	
Harmonic Current	EN61000-3-2	Class A		All models
		Class C		> 270 W
Radiated	EN61000-4-3	3	A	
EFT	EN61000-4-4	3	A	
Surges	EN61000-4-5	Installation class 3	A	
Conducted	EN61000-4-6	3	A	
Dips and Interruptions	EN61000-4-11 (100 VAC)	Dip 100% (0 VAC), 8.4ms	A	
		Dip 100% (0 VAC), 16.7ms	B	
		Dip 60% (40 VAC), 200ms	B	
		Dip 30% (70 VAC), 500ms	B	
		Dip 20% (80 VAC), 5000ms	B	
		Int 100% (0 VAC), 5000ms	B	
	EN61000-4-11 (240 VAC)	Dip 100% (0 VAC), 10ms	A	
		Dip 100% (0 VAC), 20ms	B	
		Dip 60% (96 VAC), 200ms	B	
		Dip 30% (168 VAC), 500ms	B	
		Dip 20% (192 VAC), 5000ms	B	
		Int 100% (0 VAC), 5000ms	B	
	EN60601-1-2 (100 VAC)	Dip 100% (0 VAC), 10ms	A	
		Dip 60% (40 VAC), 100ms	A	<180 W
		Dip 30% (70 VAC), 500ms	A	
		Int 100% (0 VAC), 5000ms	B	
	EN60601-1-2 (240 VAC)	Dip 100% (0 VAC), 10ms	A	
		Dip 60% (96 VAC), 100ms	A	
		Dip 30% (168 VAC), 500ms	A	
		Int 100% (0 VAC), 5000ms	B	
SEMI F47 (100 VAC)		Dip 33% (70 VAC), 500ms	A	

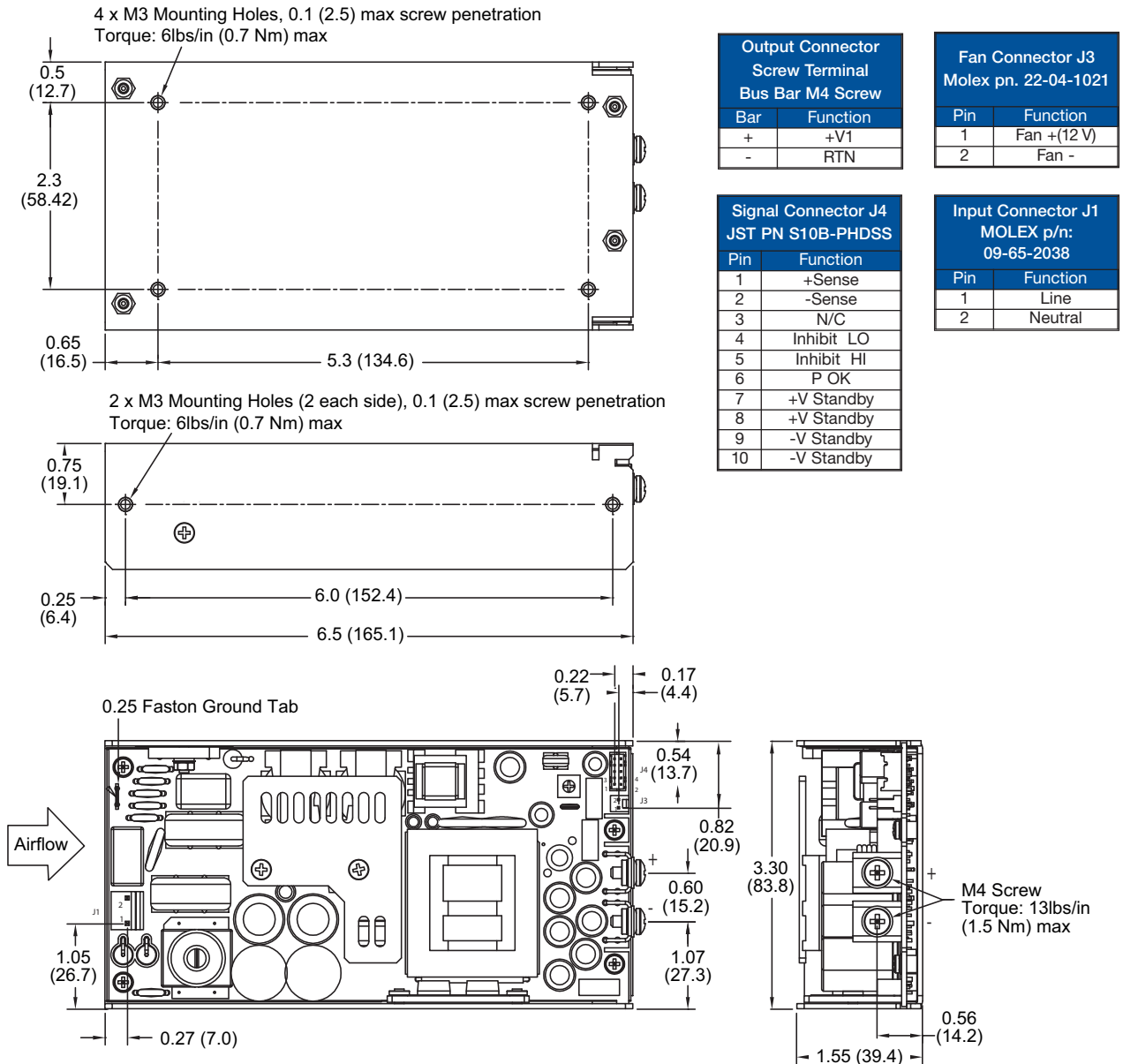
### Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC62368-1 Ed 2	Information Technology
	IEC60950-1	Information Technology
	IEC60601-1 Ed 3 Including Risk Management	Medical
UL	UL62368-1, CSA 22.2, No.62368-1	Information Technology
	ANSI/AAMI ES60601-1:2005 & CSA C22.2, No.60601-1:08	Medical
TUV	EN62368-1	Information Technology
	EN60601-1/2006	Medical
CE	LVD & RoHS	
Equipment Protection Class	Class I	

Means of Protection		Category
Primary to Secondary	2 x MOPP (Means of Patient Protection)	IEC60601-1 Ed 3
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	N/A	

### Mechanical Details

#### GCU500PS12-PS18 U-Channel

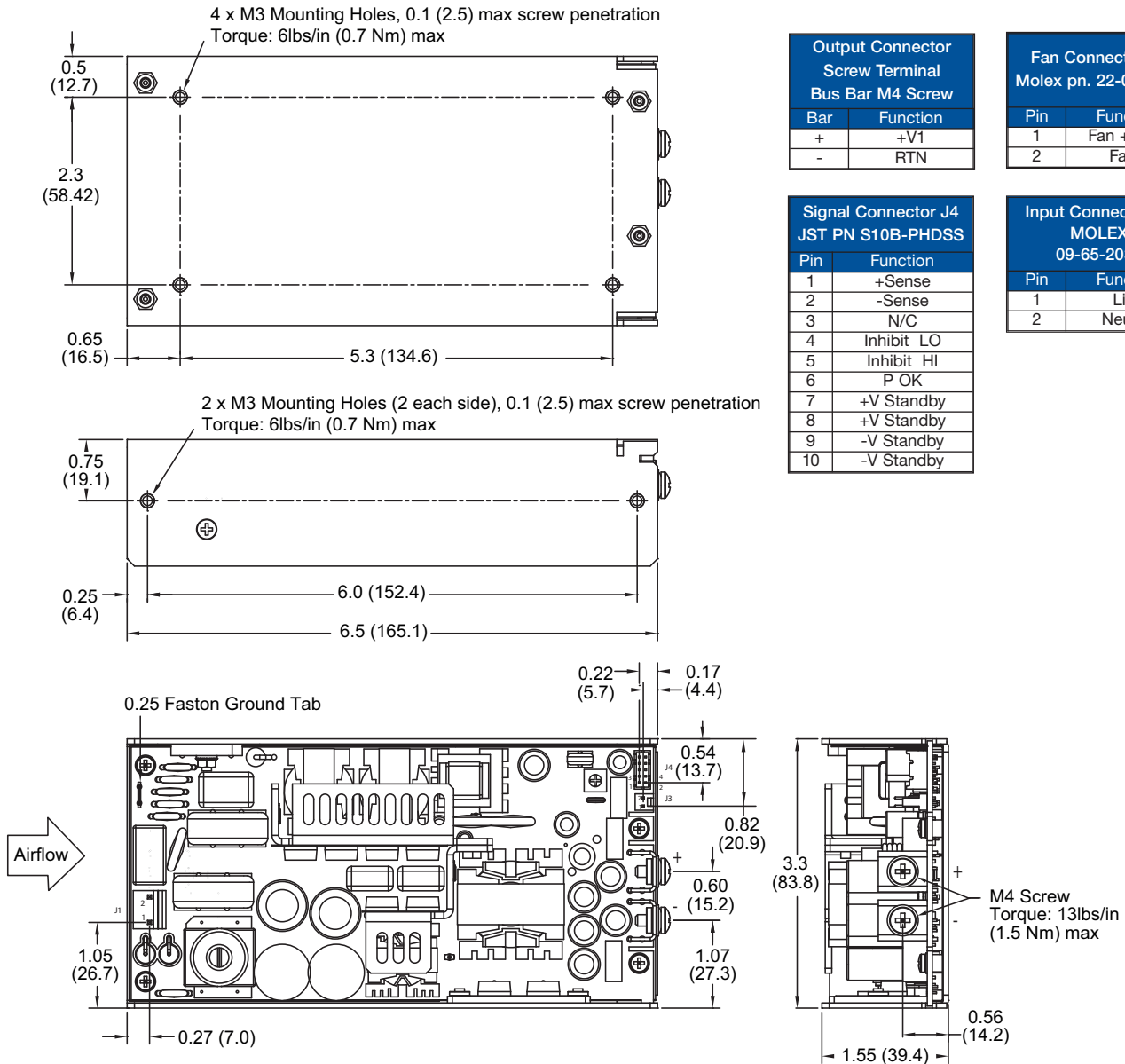


#### Notes

- All dimensions in inches (mm).
- Tolerance .xx =  $\pm 0.02$  (0.50); .xxx =  $\pm 0.01$  (0.25)
- J1 mates with MOLEX housing PN 09-50-1031 and with MOLEX series 5194 crimp terminals. J4 mates with JST housing pn PHDR-10VS and with JST SPHD-001T-P0.5 crimp terminals. J3 mates with MOLEX housing pn 22-01-1024 and with MOLEX series 5103 crimp terminals.

### Mechanical Details

#### GCU500PS24-PS48 U-Channel



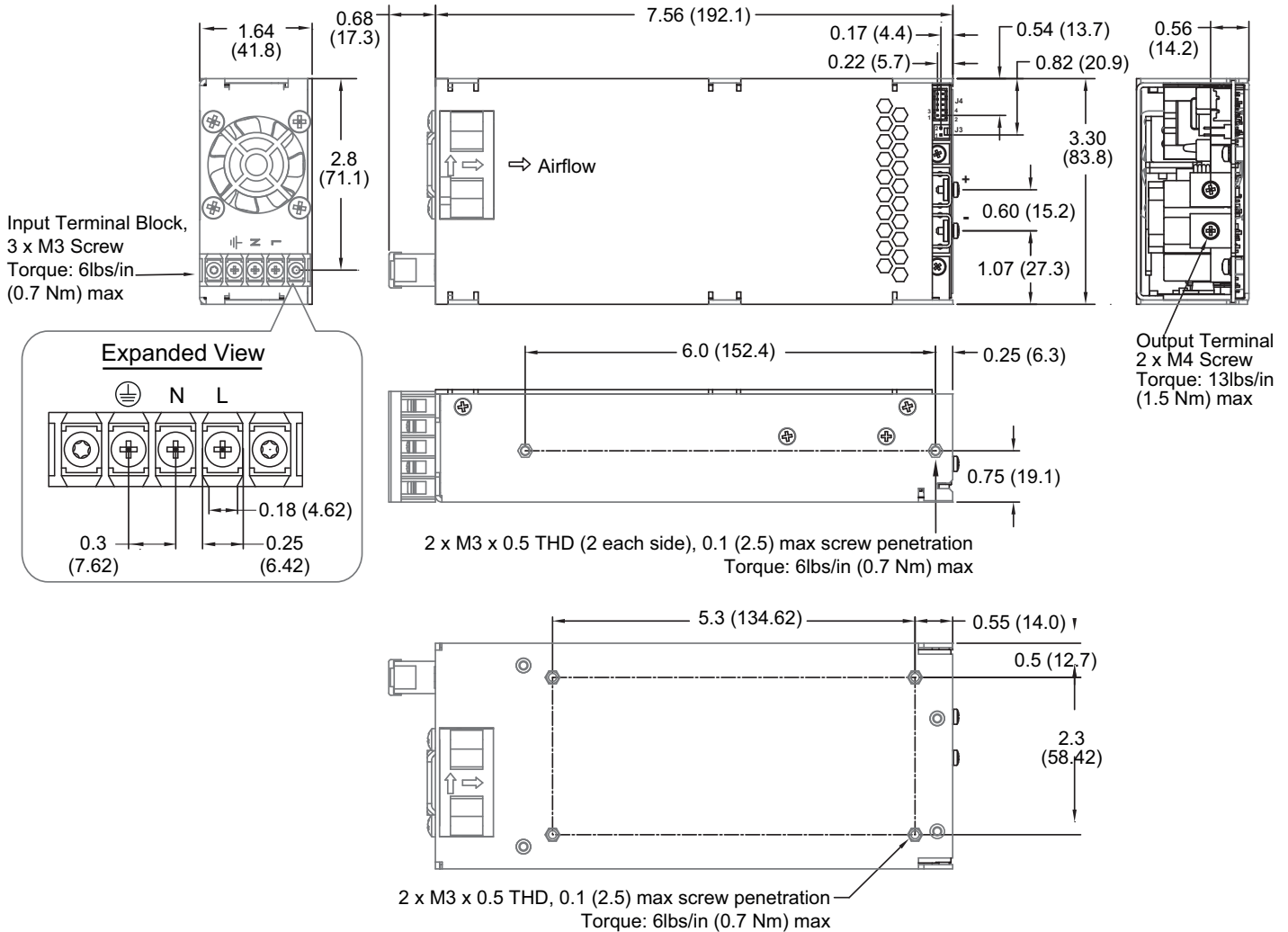
#### Notes

1. All dimensions in inches (mm).
2. Tolerance .xx = ±0.02 (0.50); .xxx = ±0.01 (0.25)

3. J1 mates with MOLEX housing PN 09-50-1031 and with MOLEX series 5194 crimp terminals. J4 mates with JST housing pn PHDR-10VS and with JST SPHD-001T-P0.5 crimp terminals. J3 mates with MOLEX housing pn 22-01-1024 and with MOLEX series 5103 crimp terminals.

### Mechanical Details

#### End-Fan



Input Terminal Block Dinkle P/N DT-2C-A02W-03	
Function	
L	Line
N	Neutral
⊕	Ground

Output Connector Screw Terminal Bus Bar M4 Screw	
Bar	Function
+	+V1
-	RTN

Signal Connector J4 JST PN S10B-PHDSS	
Pin	Function
1	+Sense
2	-Sense
3	N/C
4	Inhibit LO
5	Inhibit HIS
6	P OK
7	+V Standby
8	+V Standby
9	-V Standby
10	-V Standby

#### Notes

1. All dimensions in inches (mm).
2. Tolerance .xx = ±0.02 (0.50); .xxx = ±0.01 (0.25)

3. J4 mates with JST housing pn PHDR-10VS and with JST SPHD-001T-P0.5 crimp terminals.



### Thermal Considerations

In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table below must not be exceeded. Temperature should be monitored using K type thermocouples placed on the hottest part of the component (out of direct air flow). See below for component locations.

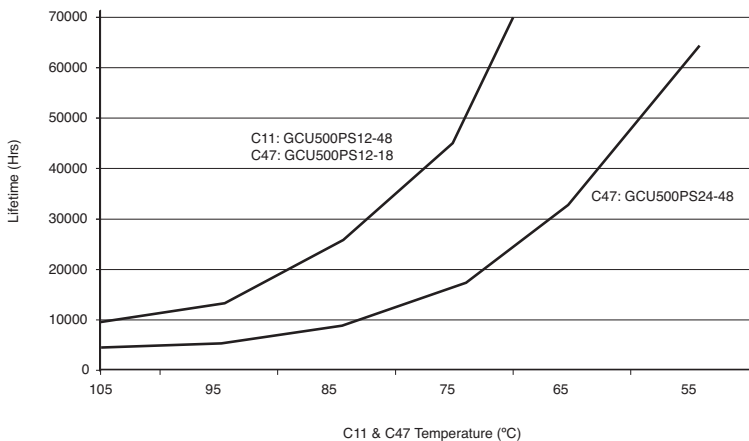
Temperature Measurements (At Maximum Ambient)	
Component	Max Temperature °C
T1 Coil	120°C
L3 Coil	120°C
Heatsink	110°C
C11	105°C
C47	105°C

### Service Life

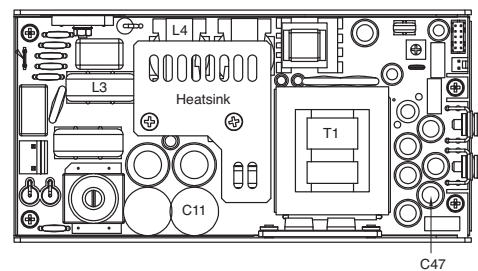
The estimated service life of the GCU500 is determined by the cooling arrangements and load conditions experienced in the end application. Due to the uncertain nature of the end application this estimated service life is based on the actual measured temperature of a key capacitor within the product when installed by the end application,

The graph below expresses the estimated lifetime of a given component temperature and assumes continuous operation at this temperature.

### Estimated Service Life vs Component Temperature



#### GCU500PS12-18



#### GCU500PS24-48

