

ABC401 Series

400 W AC-DC Power Supplies

The ABC401 Series of AC-DC power supplies provides up to 400 W of regulated output power through wide input voltage range 90 – 264 VAC in single outputs of 12, 24, 28, 36 or 48 VDC.

The ABC401 Series comes in five different low-profile packages, offering 12 and 5 VSB standby outputs and a full set of protection features. Available control signals include Power Good (P_OK), Remote On/Off (PS_ON) and remote sense compensation on the (+) load line.

The ABC401 Series complies with the latest international safety standards for IT equipment and displays the CE-Mark for the European Low Voltage Directive (LVD).

Key Features & Benefits

- Universal input voltage range (90 – 264 VAC)
- Active PFC, EN 61000-3-2 Class C, D compliant
- Steady 400 W output power (440 W peak)
- High efficiency (94% typical)
- Low stand by power consumption (<0.5 W)
- 12, 24, 28, 36, 48 VDC standard output voltages
- +5V stand by, 2 A and 12 V auxiliary, 1 A outputs
- Low earth/touch leakage currents (<300/100 μ A)
- Fan speed control function (Off at <50 W)
- Over temperature protection
- Input under voltage, output over voltage protections
- Over current and short circuit protection
- Remote On/Off and power good signal
- 5 available packages all fit 1U installation
- UL 60950-1 and 62368-1 compliance
- EN 55032, FCC Class B, conducted radiated emissions.
- EN 55024 immunity
- 4000 m operation without de-rating
- RoHS 3 compliant (Directive EU 2015/863)

Applications

- Video Wall Display & Entertainment
- Industrial Process Control
- Telecommunications
- Test & Measurement Equipment
- Industrial Laser applications
- 3D Printing and ATM



RoHS
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1. MODEL SELECTION

MODEL NUMBER	PACKAGE & COOLING	INPUT VOLTAGE RANGE [VAC]	NOM. OUTPUT VOLTAGE [VDC]	MAX. OUTPUT POWER [W]	MAX. OUTPUT CURRENT [A]	DIMENSIONS
ABC401-1012	Open Frame Convection / Forced Air	90 - 264	12	400	33.3	76.0 x 164.2 x 37.7 mm (2.99 x 6.46 x 1.48 in)
ABC401-1012-UC	U-Chassis Convection / Forced Air	90 - 264	12	400	33.3	84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in)
ABC401-1012-PC	Perforated Cover Convection / Forced Air	90 - 264	12	400	33.3	84.4 x 166.5 x 41.0 mm (3.32 x 6.55 x 1.61 in)
ABC401-1012-T	Vented Cover Top Fan	90 - 264	12	400	33.3	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1012-S	Enclosed Front Mounted Fan	90 - 264	12	400	33.3	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1024	Open Frame Convection / Forced Air	90 - 264	24	400	16.7	76.0 x 164.2 x 37.7 mm (2.99 x 6.46 x 1.48 in)
ABC401-1024-UC	U-Chassis Convection / Forced Air	90 - 264	24	400	16.7	84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in)
ABC401-1024-PC	Perforated Cover Convection / Forced Air	90 - 264	24	400	16.7	84.4 x 166.5 x 41.0 mm (3.32 x 6.55 x 1.61 in)
ABC401-1024-T	Vented Cover Top Fan	90 - 264	24	400	16.7	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1024-S	Enclosed Front Mounted Fan	90 - 264	24	400	16.7	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1028-UC	U-Chassis Convection / Forced Air	90 - 264	28	400	14.3	84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in)
ABC401-1036	Open Frame Convection / Forced Air	90 - 264	36	400	11.1	76.0 x 164.2 x 37.7 mm (2.99 x 6.46 x 1.48 in)
ABC401-1036-UC	U-Chassis Convection / Forced Air	90 - 264	36	400	11.1	84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in)
ABC401-1036-PC	Perforated Cover Convection / Forced Air	90 - 264	36	400	11.1	84.4 x 166.5 x 41.0 mm (3.32 x 6.55 x 1.61 in)
ABC401-1036-T	Vented Cover Top Fan	90 - 264	36	400	11.1	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1036-S	Enclosed Front Mounted Fan	90 - 264	36	400	11.1	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1048	Open Frame Convection / Forced Air	90 - 264	48	400	8.3	76.0 x 164.2 x 37.7 mm (2.99 x 6.46 x 1.48 in)
ABC401-1048-UC	U-Chassis Convection / Forced Air	90 - 264	48	400	8.3	84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in)
ABC401-1048-PC	Perforated Cover Convection / Forced Air	90 - 264	48	400	8.3	84.4 x 166.5 x 41.0 mm (3.32 x 6.55 x 1.61 in)
ABC401-1048-T	Vented Cover Top Fan	90 - 264	48	400	8.3	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)
ABC401-1048-S	Enclosed Front Mounted Fan	90 - 264	48	400	8.3	84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)

2. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
AC Input Voltage	PS starts and operates at 90 V _{AC} at all load conditions	90	100-240	264	V _{RMS}
DC Input Voltage		170	-	270	V _{DC}
Input Frequency		47	50/60	440	Hz
Input Current	RMS at 180 V _{AC} , maximum load, 50 / 60 Hz RMS at 90 V _{AC} , maximum load, 50 / 60 Hz	-	-	2.5 5.0	A
Inrush Current	265 V _{AC} , 25 °C ambient, cold start. 24, 28, 36, 48 V, no damage 12 V	-	-	- 20	A
Fusing	2x Time Lag 6.3 A, 250 V on both L and N	-	-	6.3	A
Efficiency	At 115 V _{AC}	20% rated load	90	-	%
		50 – 100 % rated load	92	-	
	At 230 V _{AC}	20% rated load	90	-	
		50 – 100 % rated load	94	-	
Input Power Consumption	Power on, 115-230 V _{RMS} , no load	-	1	1.5	W
	Stand by, 115-230 V _{RMS} , no load	-	0.4	0.5	
Power Factor	At full rated load, 115 VAC, 60 Hz and 230 VAC, 50 Hz input voltages	0.95	-	-	-
Harmonic Current Fluctuations and Flicker	Complies with EN-61000-3-2 Class C at 230 VAC 50 Hz, load >50 W. Complies with EN-61000-3-3 at nominal voltages and full load.				
Earth Leakage Current	Normal conditions, 240 V _{RMS} , 60 Hz.			300	μA



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3. OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION		MIN	NOM	MAX	UNIT
V1 Output Voltage	0.5% set point accuracy for all voltage variants		-	12	-	V
			-	24	-	
			-	28	-	
			-	36	-	
			-	48	-	
V1 Output Power Rating	All voltages, convection cooled models,				250	W
	All voltages, fan cooled + forced air cooled (> 400 LFM) models				400	
V1 Output Current		All models, peak power (≤ 10 s)			440	A
		V1: 12 V _{DC}			33.3	
		V1: 24 V _{DC}			16.7	
		V1: 28 V _{DC}			14.3	
		V1: 36 V _{DC}			11.1	
V1 Voltage Adjustment Range		V1: 48 V _{DC}			8.3	%V1
			-	-	±5	
V1 Load-Line-Cross Regulation	V _{AC} : 90 – 264 V _{RMS}	V1 Load: 0 – 33.3 A (12 V)				%V1
		0 – 16.7 A (24 V)				
		0 – 14.3 A (28 V)				
		0 – 13.9 A (36 V)	-	-	±2	
		0 – 8.3 A (48 V)				
V1 Line Regulation	V _{AC} : 90 – 264 V _{RMS}	V2 Load: 0 – 1 A				%V1
		5V _{SB} Load: 0 – 2 A				
Transient Response (Voltage Deviation) V1, 5V _{SB}	25% load changes at 1 A/μs 12V at 2200 μF Load / I _{OUT} > 0.5 A 24 V at 1000 μF Load / I _{OUT} > 0.5 A 28 V at 1000 μF Load / I _{OUT} > 0.5 A 36 V at 820 μF Load / I _{OUT} > 0.5 A 48V at 560 μF Load / I _{OUT} > 0.5 A 5V _{SB} at 560 μF Load / I _{OUT} > 0.1 A		-	-	±0.1	%V1 %5V _{SB}
			-	-	±5	
			-	-		
			-	-		
			-	-		
V1 Ripple and Noise	All models, Peak-to-peak, 20 MHz BW. 100 nF ceramic and 10 μF tantalum caps at the load.	-	-	1	%V1	
Start-up Rise Time	90<V _{IN} <264, any load conditions.	5	-	85	ms	
Start-up Delay	V1 in regulation after PS_ON is asserted	-	-	200	ms	
	V1 in regulation after AC is applied 5V _{SB} in regulation after AC is applied	-	-	750 500		
Turn-on Overshoot	At I _L = 500 mA, V1 in regulation within 50 ms.	-	10 10 10	-	%V1 %V2 %V _{SB}	
Hold-up Time	At nominal V _{IN} , 400 W, for all models	-	16	-	ms	
	At nominal V _{IN} , 365 W, for all models	-	20	-		
	At nominal V _{IN} , 200 W, for all models	-	35	-		
Minimum Load *	All models; V1, V2 and 5 V _{SB}	0	-	-	A	
Maximum Load Capacitance	At nominal V _{IN} , 25 °C ambient	12 V	-	-	33000	μF
		24 V	-	-	16000	
		28 V	-	-	14300	
		36 V	-	-	10000	
		48 V	-	-	7000	
Temperature Drift		-1.2	-	+1.2	mV/°C	
V2 Output Voltage (*)	All models.	Load on V2: from 5 to 1000 mA Load on V1: from 0.1 to I _L rated	11.35	11.5	12.65	V
V2 Output Current (I ₂)	Convection / forced air cooling		-	-	1	A
5V _{SB} Output Voltage	3% set point accuracy		-	5	-	V
5V _{SB} Output Current (I _{5V_{SB}})	Convection cooled models		-	-	1.5	A
	Fan cooled + forced air cooled (> 400 LFM) models		-	-	2	
5V _{SB} Load-Line-Cross regulation	V _{AC} : 90 – 264 V _{RMS}	V1 Load: 0 – 33.3 A (12 V)				%5V _{SB}
		0 – 16.7 A (24 V)				
		0 – 14.3 A (28 V)				
		0 – 13.9 A (36 V)	-	-	±5	
		0 – 8.3 A (48 V)				
5V _{SB} Load-Line-Cross regulation	V _{AC} : 90 – 264 V _{RMS}	V2 Load: 0 – 1 A				%5V _{SB}
		5V _{SB} Load: 0 – 2 A				

3.1 OUTPUT POWER DE-RATING CURVES

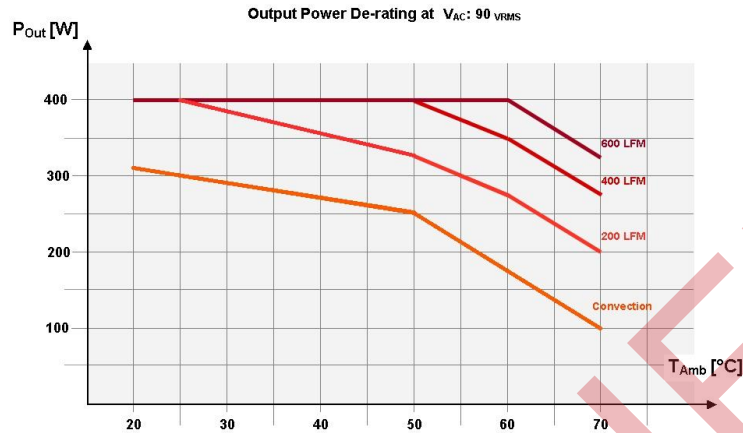


Figure 1. Power Derating Curves for Open Frame, U-Chassis and Perforated Cover Models

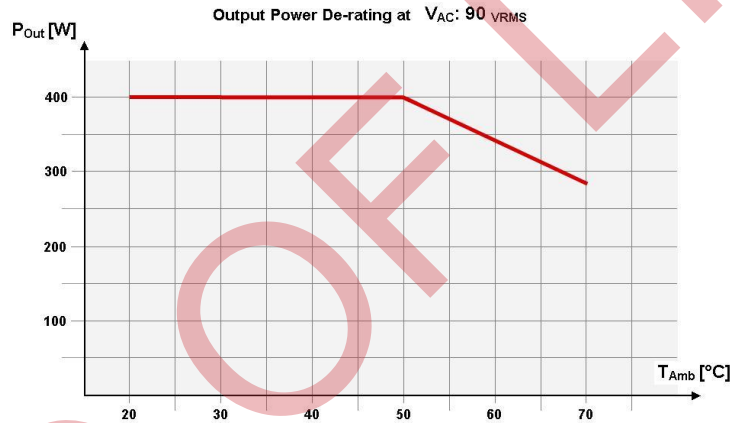
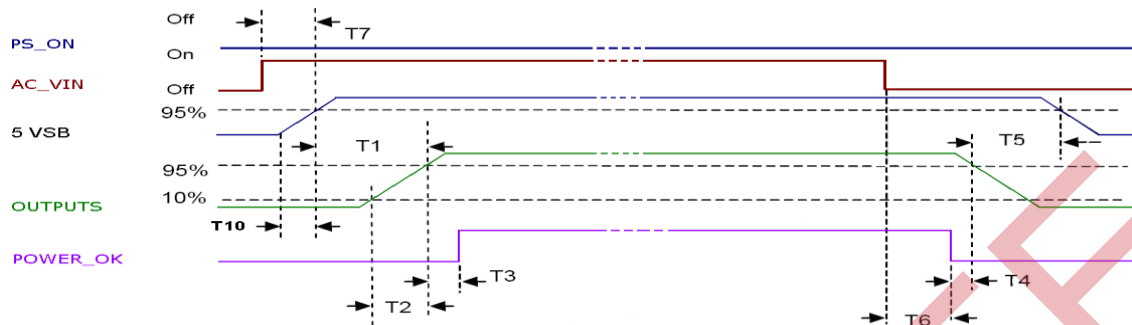


Figure 2. Power Derating Curves for Top Fan and Front Mounted Fan Models

4. SIGNALS, CONTROLS & TIMING SPECIFICATIONS

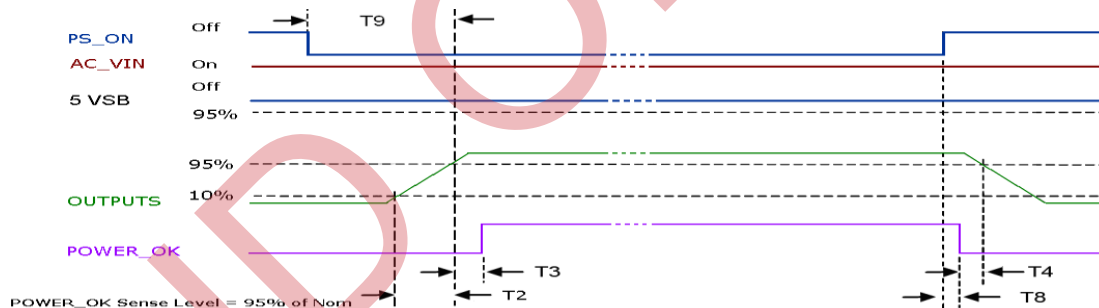
Base signals and controls are accessible from signal connector P204.

SIGNAL	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
PS_ON	Active low, +5 V TTL signal compatible. Input low voltage	0	-	2.0	V
	Input high voltage ($I_{IN} = 200 \mu\text{A}$)	3.0	-	-	V
	V1 and V2 disabled when PS_ON is open				
	5 V_{SB} not affected by PS_ON				
P_OK	V1 and V2 enabled with PS_ON connected to RTN				
	+5 V TTL compatible				
	Logic level low (<10 mA sinking)	-	-	0.7	V
	Logic level high (100 μA sourcing)	2.4	-	5	V
	Low to high time after V1 in regulation	0.05	-	0.1	s
5 V_{SB} output	Power down warning time	1	-	-	ms
	Active and in regulation after a $90 < V_{AC} < 264$ is applied	-	-	200	ms
	5 V_{SB} not affected by PS_ON				



Above waveforms are expected with AC Input ON/OFF:

Standby on - Main outputs on	$50 \text{ ms} \leq T1 \leq 250 \text{ ms}$
Main output Rise Time	$5 \text{ ms} \leq T2 \leq 85 \text{ ms}$
5 VSB rise time	$4 \text{ ms} \leq T10 \leq 20 \text{ ms}$
Main outputs On - P_OK delay	$40 \text{ ms} \leq T3 \leq 100 \text{ ms}$
Power down warning ¹	$T4 \geq 1 \text{ ms}$
Main Output off - Standby off ²	$T5 \geq 1.2 \text{ s}$
Hold-up time (AC off - P_OK low)	$T6 \geq 15 \text{ ms (115/ 230 VAC)}$
AC_ON - Standby turn on time	$T7 \leq 500 \text{ ms}$



Above waveforms are expected with PS_ON Signal ON/OFF state change:

Main Output Rise Time	$5 \text{ ms} \leq T2 \leq 85 \text{ ms}$
Main Outputs on - P_OK delay	$50 \text{ ms} \leq T3 \leq 100 \text{ ms}$
Power down warning ¹	$1 \text{ ms} \leq T4 \leq 5 \text{ ms}$
PS_ON - Main Output (off) Timing	$T8 \leq 1 \text{ ms}$
PS_ON - Main Output (on) Timin	$T9 \leq 200 \text{ ms}$

¹ T4 parameter measurement setup will assume at least 10% of the maximum load on each output.

² T5 parameter measurement setup will assume at least 50% of the maximum load on main output.

5. PROTECTION SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Input Under Voltage Lockout	Auto recovery, Hiccup Mode	60	75	-	V _{AC}
Input Fuse	2x Time Lag 6.3 A, 250 V on L1 and L2	-	-	6.3	A
Over Current	At nominal input voltages. V1: Hiccup mode, auto-recovering. V2: PTC limiting, auto-recovering. 5 V _{SB} : Hiccup mode, auto-recovering.	110	-	150	%I _{MAX}
Short Circuit	At nominal input voltages. V1: Hiccup mode, auto-recovering. V2: PTC limiting, auto-recovering. 5 V _{SB} : Hiccup mode, auto-recovering.	-	-	-	
Over Voltage	12 V 24 V 28 V 36 V 48 V 5 V _{SB}	110	-	136	%V _{NOM}
	Unit shut down and latch off				
Over Temperature (on primary stage)	Shut down, latch off.	-	-	-	
Over Temperature (on secondary side)	Hiccup mode, auto-recovering.	-	-	-	
Isolation Primary-to- Secondary	Reinforced	4000	-	-	V _{AC}
Isolation Input-to-PE	Basic	1500	-	-	V _{AC}
Isolation V1-to-V2		100	-	-	V _{DC}
Isolation Output-to-PE	Basic	1500	-	-	V _{AC}

6. ENVIRONMENTAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Operating Temperature Range	No de-rating up to 50 °C PS starts up at -30 °C	-20	-	50	°C
De-rated Operating Temperature Range	Natural convection cooling: Linearly de-rate from 250 W at 50 °C, to 100 W at 70 °C Forced air cooling: Linearly de-rate from 400 W at 50 °C, to 280 W at 70 °C. See graphs below.	-	-	70	°C
Storage Temperature Range		-40	-	85	°C
Humidity	RH, Non-condensing Operating Non-operating	-	-	90 95	% %
Operating Altitude		-	-	4000	m
Shock	EN 60068-2-27 Operating: Half sine, 30 g, 18 ms, 3 axes, 6x each (3 positive and 3 negative). Non-Operating: Half sine, 50 g, 11 ms, 3 axes, 6x each (3 positive and 3 negative).				
Vibration	EN 60068-2-64 Operating: Sine, 10 – 500 Hz, 1 g, 3 axes, 1 oct/min., 60 min. Random, 5 – 500 Hz, 0.02 g ² /Hz, 1 g _{RMS} , 3 axes, 30 min. Non-Operating: 5 – 500 Hz, 2.46 g _{RMS} (0.0122 g ² /Hz), 3 axes, 30 min.				
MTBF	Full Load, 120 V _{AC} , 40 °C ambient 80% Duty cycle, Telcordia SR-332 Issue 2	400000	-	-	Hours
Useful Life	Low line range, 200 W, 40 °C ambient, natural convention.	-	4	-	Years
Thermal Considerations	The output power de-rating curves are herein provided. These curves can be used as a guideline to assess the limit in performance of a power supply once installed in a system providing controlled air flow at a certain input voltage and ambient temperature.				

7. ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

PARAMETER	DESCRIPTION / CONDITION	STANDARD	PERFORMANCE CLASS
Conducted	115 V _{RMS} , 230 V _{RMS} . Maximum load 4 dB minimum margin	EN 55032 (ITE)	B
Radiated	At 10 m distance	EN 55032 (ITE)	B
Line Voltage Fluctuation and Flicker	At 20%, 50% and 100% maximum load Nominal input voltages	EN 61000-3-3	
Harmonic Current Emission	Nominal input voltages Output load > 50 W	EN 61000-3-2	C

8. ELECTROMAGNETIC COMPATIBILITY (EMC) – IMMUNITY

PARAMETER	DESCRIPTION / CONDITION	STANDARD	TEST LEVEL	CRITERIA
	Reference standards for ITE equipment	EN 55024		
ESD	15 kV air discharge, 8 kV contact, at any point of the system.	EN 61000-4-2	4	A
Radiated Field	3 V/m, 80-1000 MHz, 1 KHz 80% AM. Dwell time is 3 sec for 2 Hz modulation Dwell time is 1 sec for 1KHz modulation	EN 61000-4-3	3	A
Electric Fast Transient	±2 kV on AC power port for 1 minute; ±1 kV on signal/control lines	EN 61000-4-4	3	A
Surge	±2 kV line to line; ± 4 kV line to earth on AC power port	EN 61000-4-5	4	A
Conducted RF Immunity	3 V _{RMS} , 0,15-80 MHz, 1 KHz/2 Hz 80% AM	EN 61000-4-6	3	A
Dips and Interruptions	100 - 240V _{AC} Drop-out to 5% for 0.5 cycles (10 ms) Dip to 70% for 25 cycles (500 ms) Interruptions > 95% for 5 s	EN61000-4-11 EN61000-4-11 EN61000-4-11		A A B

9. SAFETY AGENCIES APPROVALS

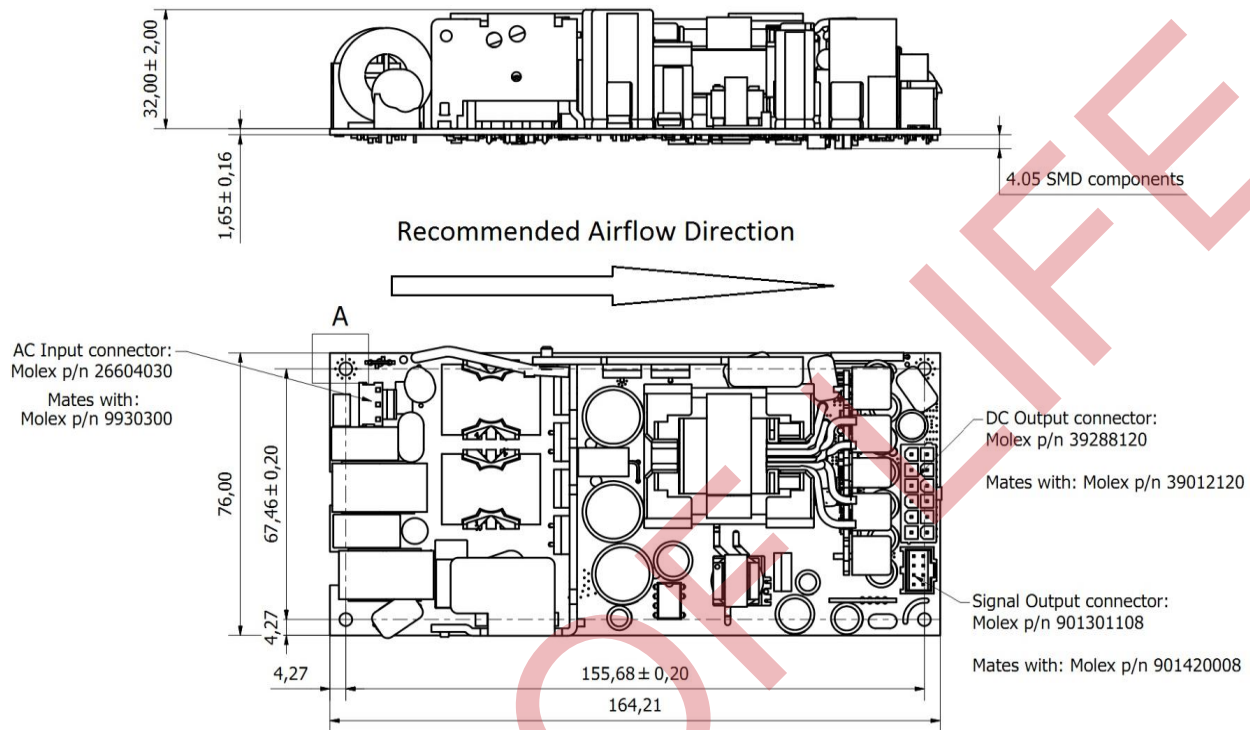
CERTIFICATION BODY	SAFETY STANDARDS	CATEGORY
CSA/UL	CSA C22.2 No. 60950-1, UL 60950-1 and UL 62368-1	Audio Video and IT equipment
IEC IECEE CB Certification	IEC/EN 62368-1	Audio Video and IT equipment
CE	Directive 2014/35/EU: Electrical Safety: Low Voltage electrical equipment (LVD) Directive 2014/30/EU: Electromagnetic Compatibility (EMC) Directive EU 2015/863: RoHS 3	Audio Video and IT equipment

10. MECHANICAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION
Weight	410 g (0.90 lb) 525 g (1.16 lb) – UC model 575 g (1.43 lb) – PC model 670 g (1.48 lb) – T model 525 g (1.16 lb) – S model
Overall Dimensions	76.0 x 164.2 x 37.7 mm (2.99 x 6.46 x 1.48 in) 84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in) – UC model 84.4 x 170.5 x 41.0 mm (3.32 x 6.71 x 1.61 in) – PC model 84.4 x 166.5 x 41.0 mm (3.32 x 6.55 x 1.61 in) – T model 84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in) – S model

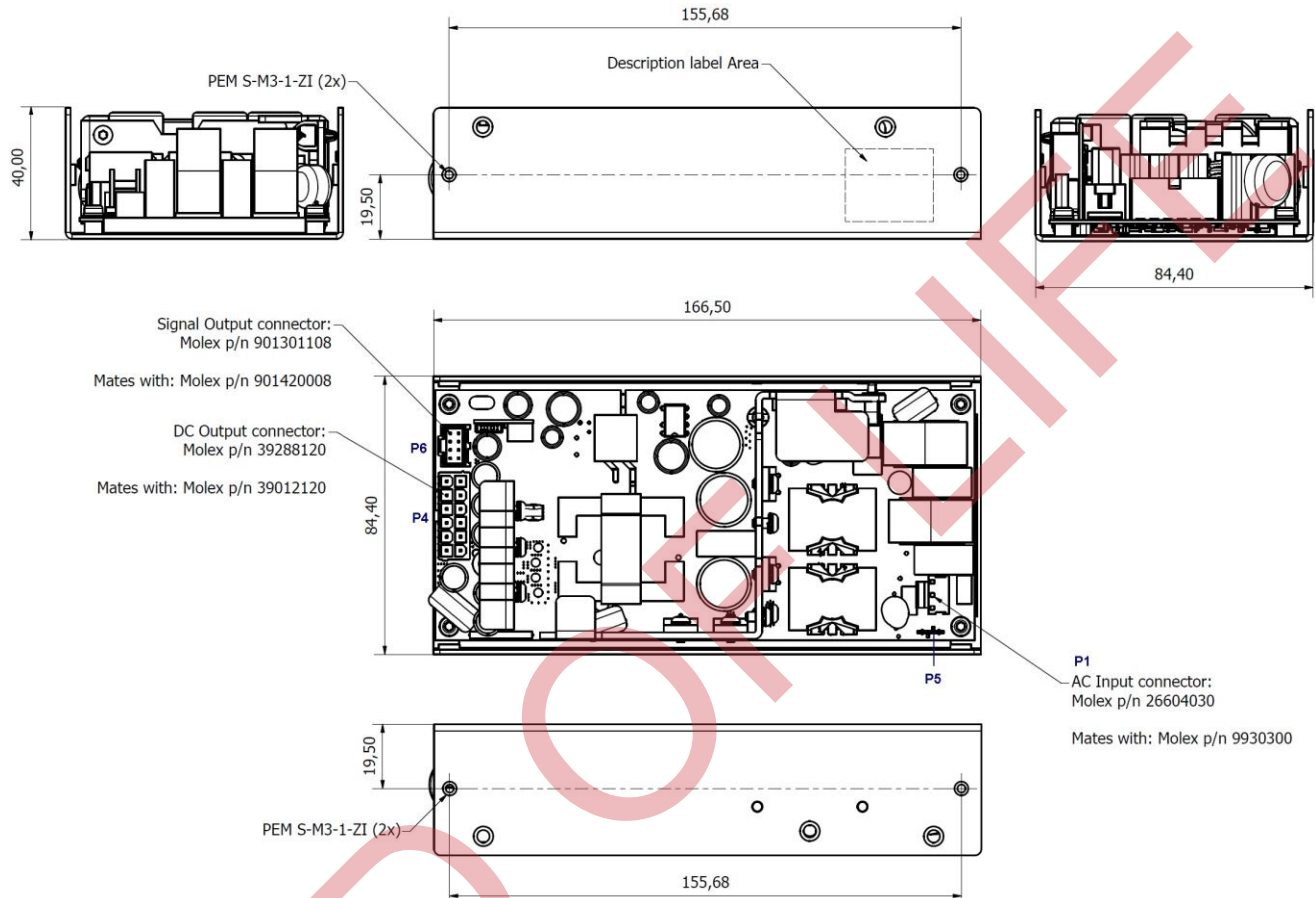
10.1 OUTLINE DRAWING & CONNECTIONS – OPEN FRAME MODEL

Overall Dimensions: 76.0 x 164.2 x 37.7 mm (2.99 x 6.46 x 1.48 in)
Weight: 410 g (0.90 lb)



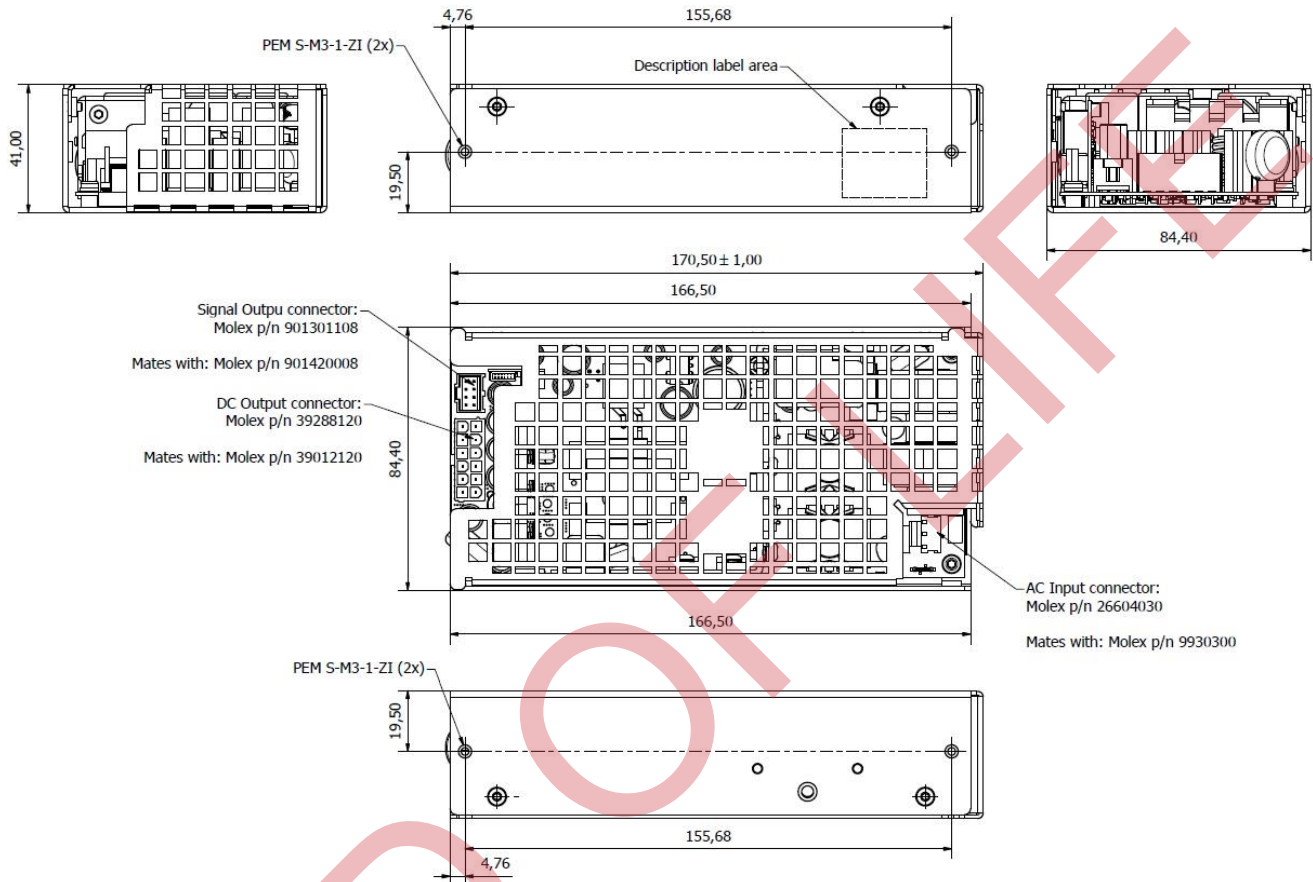
10.2 OUTLINE DRAWING & CONNECTIONS – U-CHASSIS MODEL (-UC)

Overall Dimensions: 84.4 x 166.5 x 40.0 mm (3.32 x 6.55 x 1.57 in)
 Weight: 525 g (1.16 lb)



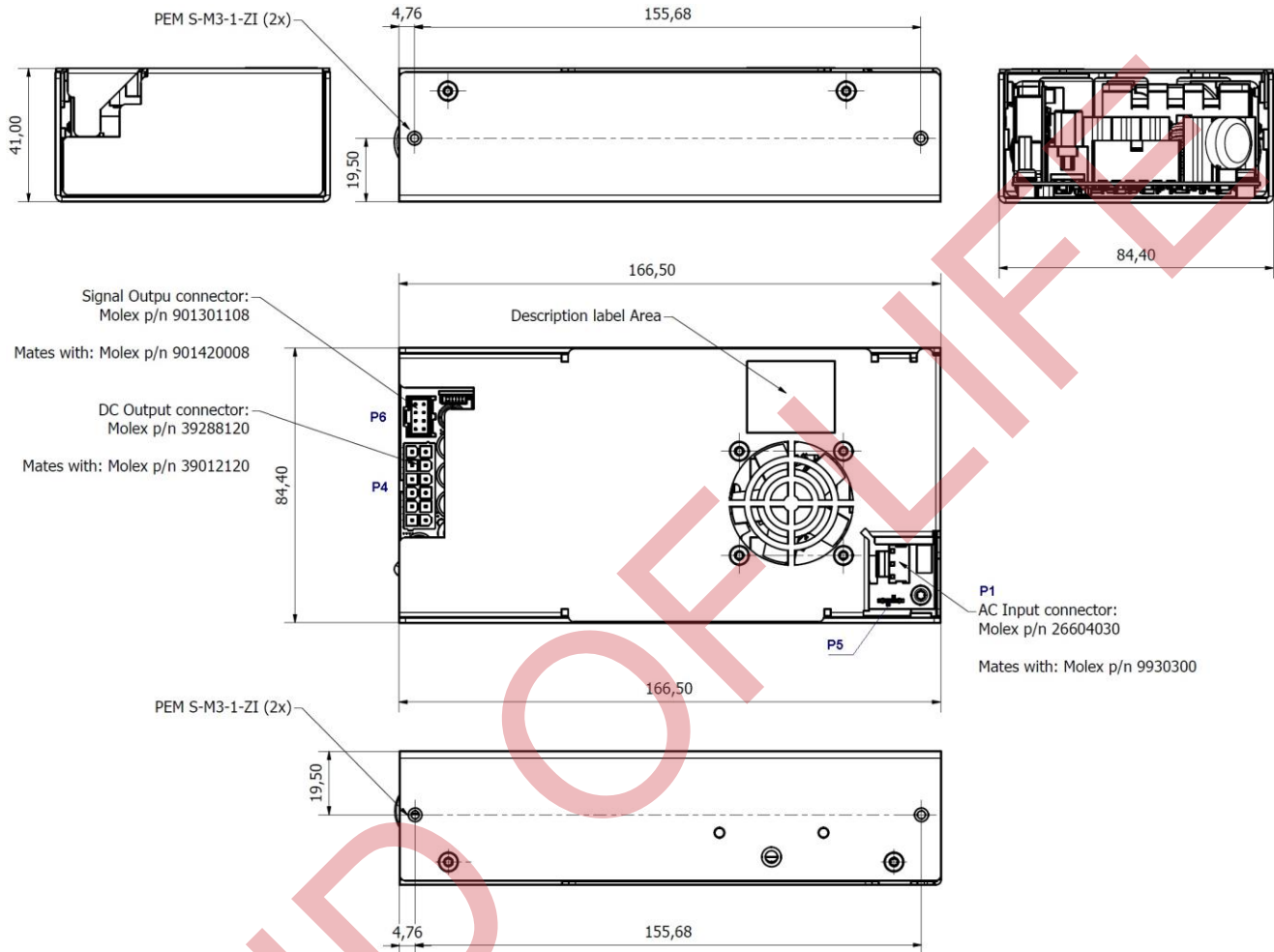
10.3 OUTLINE DRAWING & CONNECTIONS – PERFORATED MODEL (-PC)

Overall Dimensions: 84.4 x 170.5 x 41.0 mm (3.32 x 6.71 x 1.61 in)
Weight: 575 g (1.43 lb)



10.2 OUTLINE DRAWING & CONNECTIONS – VENTED COVER MODEL (-T)

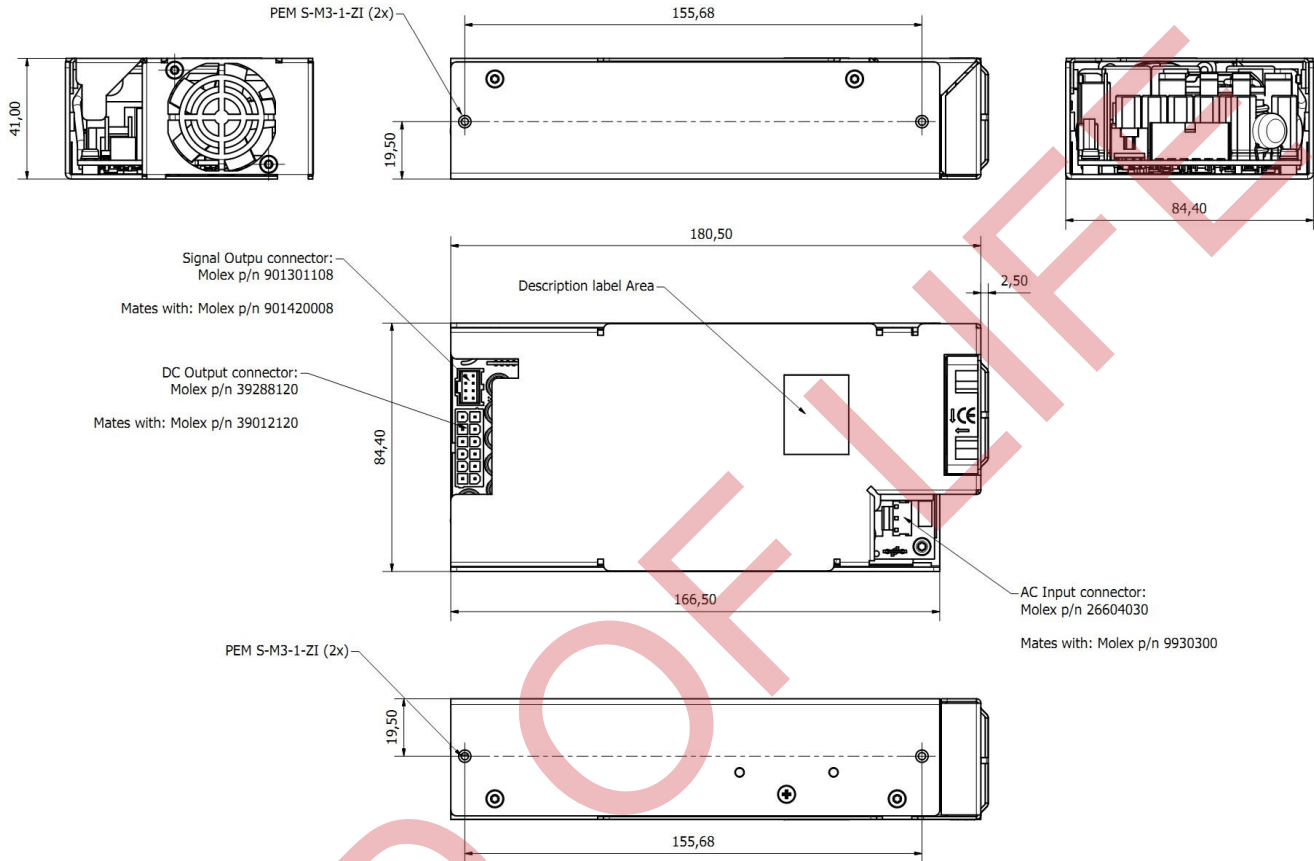
Overall Dimensions: 84.4 x 166.5 x 41.0 mm (3.32 x 6.55 x 1.61 in)
Weight: 670 g (1.48 lb)



10.2 OUTLINE DRAWING & CONNECTIONS – FRONT FAN MODEL (-S)

Overall Dimensions: 84.4 x 183.0 x 41.0 mm (3.32 x 7.20 x 1.61 in)

Weight: 625 g (1.416lb)



11. CONNECTIONS AND PIN DESCRIPTION

AC INPUT CONNECTOR – P1

Molex 26-60-4030 or equivalent

Mating Connector:
Molex 09-93-0300 (Crimp Terminal Housing)
Molex 08-50-0105 (Crimp Terminal, 18-24 AWG)

PROTECTION EARTH CONNECTOR - P5

Tyco 63849-1 equivalent

Mating Connector:
Any tin finished 6.35 x 0.81 mm receptacle

DC OUTPUT CONNECTOR – P4

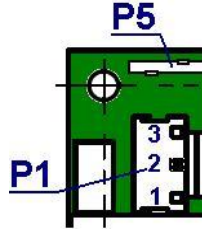
Molex 39-28-8120 or equivalent

Mating Connector:
Molex 39-01-2120 (Crimp Terminal Housing)
Molex 39-00-0039 (Crimp Terminal, 18-24 AWG)

SIGNAL CONNECTOR – P6

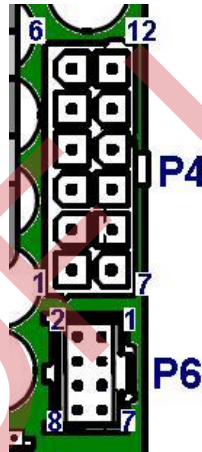
Molex 90130-1108 or equivalent

Mating Connector:
Molex 90142-0008 (Crimp Terminal Housing)
Molex 90119-0109 (Crimp Terminal, 22-24 AWG)



PIN REF.	FUNCTION
1	Line 1
2	Not Present
3	Line 2

PIN REF.	FUNCTION
GDN	AC Ground



PIN REF.	FUNCTION
1 – 6	V1
7 – 12	DC Return

PIN REF.	FUNCTION
1	+5V _{SB}
2	P_OK
3	-V2
4	PS_ON
5	RS+
6	RTN
7	+V2
8	RTN

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.