PTU2000-12-074NA

2000 W AC-DC Power Supply

PTU2000-12-074NA is a 2000 W AC to DC, power-factor-corrected (PFC) power supply that converts standard AC power into a main output of +12 VDC.

PTU2000-12-074NA utilizes full digital control architecture for greater efficiency, control and functionality.

Key Features & Benefits

- Best-in-class, 80 PLUS “Platinum” efficiency
- Auto-selected input voltage ranges:
  90 – 140 VAC, 180 – 264 VAC
- AC input with power factor correction
- 2000 W continuous output power capability
- Always-On 12 V / 3 A standby output
- Air flow direction is Port side intake and Fan side exhaust
- Hot-plug capable
- Parallel operation with active current sharing
- Full digital controls for improved performance
- High density design: 40 W/in^3
- Small form factor: 140 x 73.5 x 80 mm (5.51 x 2.89 x 3.15 in)
- Power Management Bus communications protocol for control, programming and monitoring
- Status LED with fault signalling

RoHS Compliant

Applications

- Networking Switches
- Servers & Routers
- Telecommunications

Please read our datasheet & drawing disclaimer here.

1. SPECIFICATIONS

NAME	SPECIFICATION
Input Connector	C22 (according IEC 60320-2-2)
Air Flow Direction	Port Side Intake and Fan side exhaust (N)
Nominal Input Voltage	100 – 127 VAC; 200 – 240 VAC
Output Currents	Io1 = 167 A; Io2 = 3 A
Fan	Two Shielded High-Speed Dual Ball Axial Fans: max 25000 RPM
Acoustic Noise [Sound Power]	65LwA dB at 11000 RPM
MTBF	> 850000 h at 25°C predicted; > 700000 h at 30°C predicted; Calculation according Telcordia SR-332, issue 3, GB (Ground Benign);
DMTBF	200000 h; tested with 30 units; confidence level 90%; 300000 h; tested with 30 units; confidence level > 60%; tested ambient temperature 50°C;
Capacitor Life Time Expectancy	> 10 years at 80% nom load / Vi = 230 VAC / 40°C ambient temperature > 3 years at 100% nom load / Vi = 180 VAC / 50°C ambient temperature
Altitude	10000 ft at 715 W (55% load, long term); 50°C; Low Line 6 000 ft at 1300 W (100% load, short term); 50°C; Low Line 10000 ft at 1100 W (55% load, long term); 50°C; High Line 6000 ft at 2000 W (100% load, short term); 50°C; High Line
Humidity	Operating (non-condensing): 5 to 85% Non-Operating: (non-condensing): 5 to 90%
EEPROM	64 kbit, Addressing over A0, A1 and A2
Ride Through	Criterion A for: • With a single power supply, V_{IN} = 200 VAC, drop 30 % (to 140 VAC) for 500 ms in configuration at 2000 W load (Io1 = 167 A, Io2 = 3 A). • With V_{IN} = 200 VAC, drop 100% (to 0 VAC) for 20 ms in 1+1 configuration at 2000 W load on both outputs (Io1 = 167 A, Io2 = 3 A). • With V_{IN} = 100 VAC, drop 100% (to 0 VAC) for 20 ms in 1+1 configuration at 1300 W load on both outputs (Io1 = 103 A, Io2 = 3 A).
Demonstrated Reliability	300.000 h (RDT)
EMC	• Radiated Emissions EN55022/CISPR 22; Class A • Conducted Emissions EN55022/CISPR 22; Class A • EN61000-3-2 Harmonics Class A • EN61000-3-3 Voltage Fluctuations and Flicker • EN/IEC61000-4-2 ESD; 8 KV Contact, 15 KV Air • IEC61000-4-3 Radiated Immunity, 10V/m IEC61000-4-4 EFT (5 kHz and 100 kHz repetition rates) 2 KV • IEC61000-4-5 Surge; 2KV CM (12R) and 2KV DM (2R) • IEC61000-4-6 Conducted Immunity, 10 Vrms • IEC61000-4-11 Voltage dips, short interruptions and voltage variations immunity tests • EN61000-4-12 Ring Wave Test; 2KV CM (12R), 2KV DM (12R)
Safety	• CSA 62368-1-14 and UL 62368-1 2nd ed • EN 62368-1:2014 • CB Scheme Test report NEMKO • EAC (Russia) • BSMI (Taiwan) • CQC (China) • CE marking

Table 1. PTU2000-12-074NA Specifications

2. LABEL AND MAKINGS

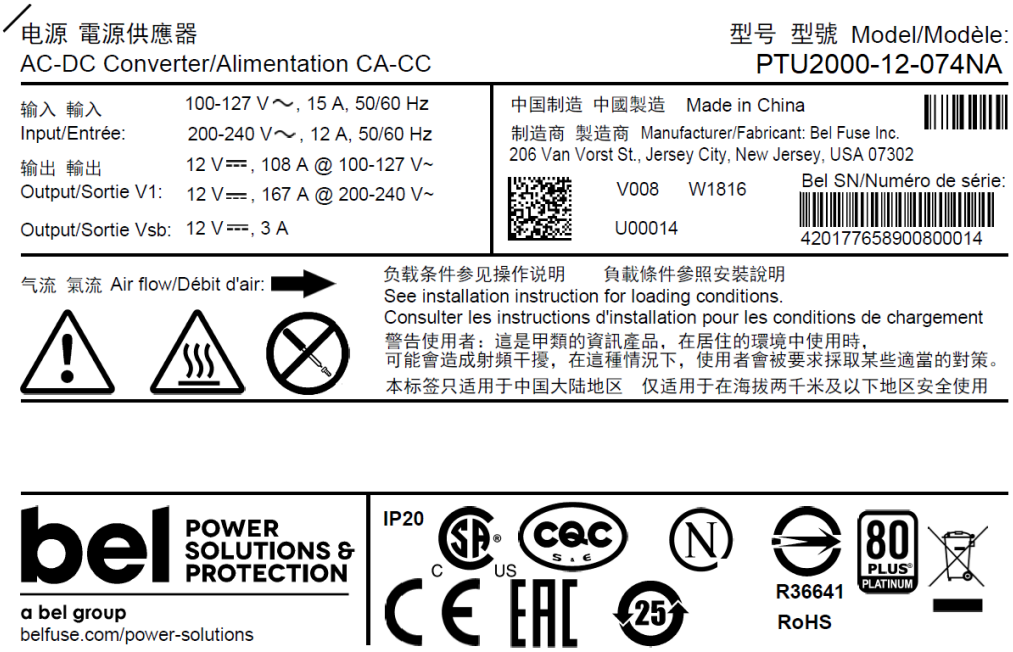

Figure 1. PTU2000-12-074NA Label Details

3. ADDRESS SELECTION

The address for I²C communication can be configured by pulling address input pins A2, A1 and A0 either to GND (Logic Low) or leave them open (Logic High).

A2	A1	A0	I2C Address[1]	
			Controller	EEPROM
0	0	0	0xB0	0xA0
0	0	1	0xB2	0xA2
0	1	0	0xB4	0xA4
0	1	1	0xB6	0xA6
1	0	0	0xB8	0xA8
1	0	1	0xBA	0xAA
1	1	0	0xBC	0xAC
1	1	1	0xBE	0xAE

Table 2. Address and Protocol Encoding

[1] The LSB of the address byte is the R/W bit

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4. TEMPERATURE AND FAN CONTROL

4.1. FAN CONTROL

To achieve best cooling results, sufficient airflow through the supply must be ensured. Do not block or obstruct the airflow at the rear of the supply by placing large objects directly at the output connector. The PTU2000-12-074NA is provided with rear to front airflow, which means the air enters through the DC-output of the supply and leaves at the AC-inlet as shown in *Figure 2*. The PTU2000-12-074NA supply has been designed for horizontal operation.

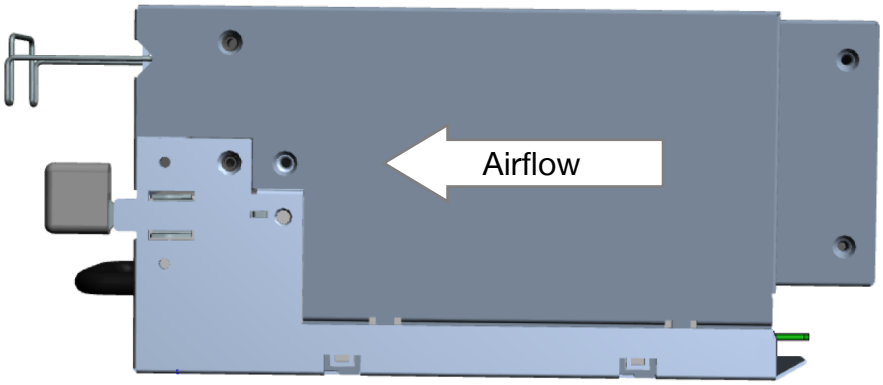

Figure 2. Airflow Direction

The PTU2000-12-074NA provides access via I2C to the measured temperatures of in total 8 sensors within the power supply, see *Table 3*. The microprocessor is monitoring these temperatures and if warning threshold of one of these sensors is reached it will set fan to maximum speed. If temperatures continue to rise above shut down threshold the main output V_1 (or V_{SB} if auxiliary converter is affected) will be disabled. At the same time the warning or fault condition is signalized accordingly through LED, PWOK_H and SMBALERT_L.

TEMPERATURE SENSOR	DESCRIPTION / CONDITION	POWER MANAGEMENT BUS REGISTER	WARNING THRESHOLD	SHUT DOWN THRESHOLD
Inlet Air Temperature	Sensor located on control board close to DC end of power supply	8Dh	77	80
Synchronous Rectifier	Sensor located on secondary side of DC/DC stage	8Eh	100	110
Primary Heat Sink	Sensor located on primary heat sink	8Fh	100	110
Output Oring Element	Sensor located close to output	D2h	100	110
Auxiliary Converter	Sensor located on secondary side on auxiliary rectifier	D3h	100	110
Bridge Rectifier	Sensor located on heat sink for AC rectifier	D4h	100	110

Table 3. Temperature Sensors

5. OUTPUT POWER AND DERATING

Recommended maximum power and back pressure (always set at max fan speed) values are listed below:

NOMINAL INPUT VOLTAGE	MAX INLET TEMPERATURE	MAX OUTPUT POWER	BACKPRESSURE	COMMENTS
200 – 240 VAC	50 °C	2000 W	425 Pa	Short term condition, 13000 ft (4000 m)
	50 °C	1100 W	500 Pa	Long term condition, 13000 ft (4000 m)
	65 °C	1100 W	600 Pa	Short term condition, 6000 ft (1800 m)
100 – 127 VAC	50 °C	1300 W	435 Pa	Short term condition, 13000 ft (4000 m)
	50 °C	715 W	500 Pa	Long term condition, 13000 ft (4000 m)
	65 °C	715 W	600 Pa	Short term condition, 6000 ft (1800 m)

Table 4. Output Power and Derating Requirements

Short term condition is defined as a period of not more than 96 h. Component deratings in short term conditions do not have to be met.

6. TIMING DIAGRAM

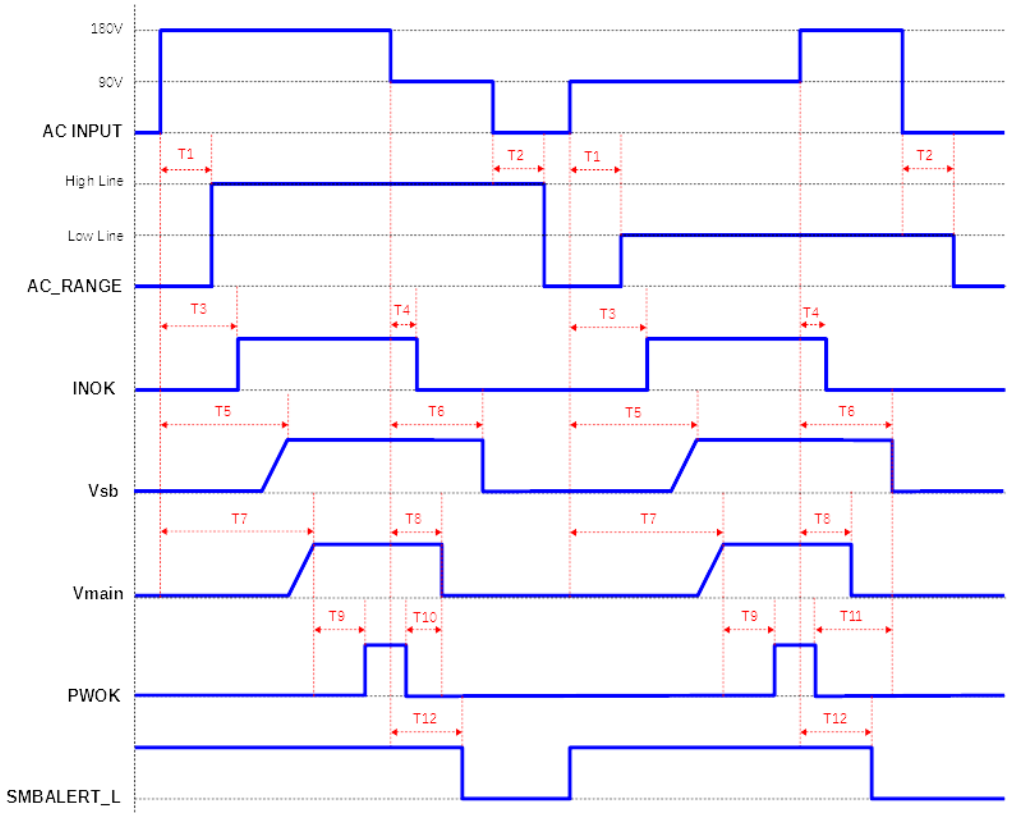

Figure 3. Timing Diagram

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
T1 (Tac_range_lock)	AC INPUT application to Vmain in regulation	-	1000		ms
T2 (Tac_range_reset)	AC INPUT removal to AC_RANGE reset (AC INPUT <= 50V)	2000	-		ms
T3 (Tinok_on)	AC INPUT application to INOK assert	-	-	2500	ms
T4 (Tinok_off)	AC INPUT application to INOK assert	3	-	5	ms
T5 (Tvsb_on_delay)	AC INPUT application to Vsb in regulation	-	-	3500	ms
T6 (Tvsb_holdup)	AC INPUT removal to Vsb out of regulation	80	-	-	ms
T7 (Tvmain_on_delay)	AC INPUT application AC_RANGE lock	-	-	300	ms
T8 (Tvmain_holdup)	AC INPUT removal to AC_RANGE reset Note: AC INPUT must be 50 V or less	1000	-	-	ms
T9 (Tpwok_on)	AC INPUT application to Vmain in regulation	100	-	4000	ms
T10 (Tpwok_warn_vmain)	PWOK de-assert to Vmain out of regulation	1	-	-	ms
T11 (Tpwok_warn_vsb)	PWOK de-assert to Vsb out of regulation	20	-	-	ms
T12 (Tinok_smbalert)	AC INPUT removal to SMBALERT_L assert	-	-	25	ms
Tvsb_rise	Vsb rise time (10% - 90%)	1	-	50	ms
Tvmain_rise	Vmain rise time (10% - 90%)	1	-	50	ms
Tpson_on	PSON_L active to Vmain in regulation	5	-	400	ms

Table 5. Timing Table

NOTE: T6 (Tacok_off) on the PTU2000-12-074NA is not relevant due the IN_OK signal pin (S9) is here used for Address A2.

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7. MECHANICAL SPECIFICATIONS

PARAMETER		DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
	Dimensions	Width		73.5		mm
		Heigth		80.0		mm
		Depth 1 Depth 2 (with 2 fan)		140 168		mm mm
m	Weight			1.3		kg
	Sheet metal	JIS G3302 SGCC Hot-dip zinc coated steel, 0.8 mm thick, Z12 coating, non-chromated				

Table 6. Mechanical Specifications

7.1. OUTLINE PTU2000-12-074NA

Dimensions in mm, tolerances acc. ISO 2768 ()-H, unless otherwise stated: 0.5-30: ±0.2; 30-120: ±0.3; 120-400: ±0.5

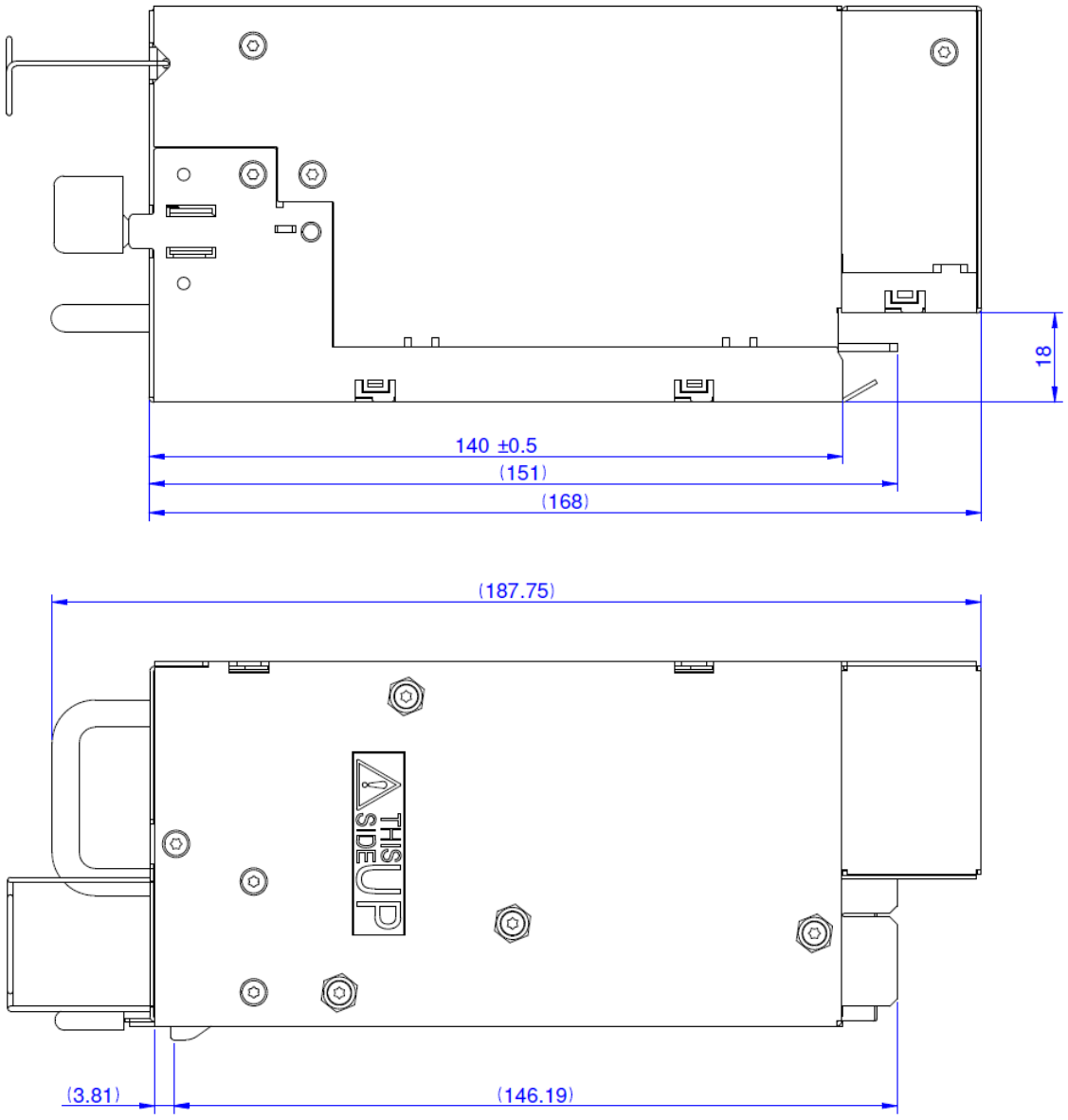

Figure 4. Top and Side View

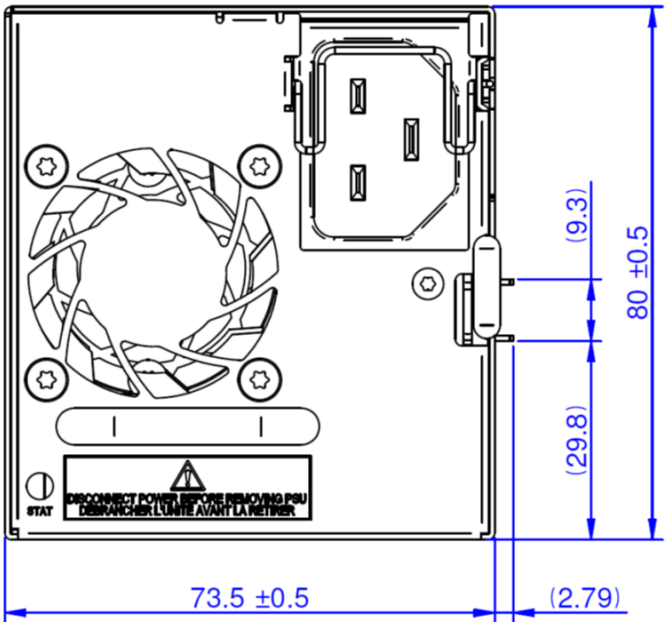

Figure 5. Front View

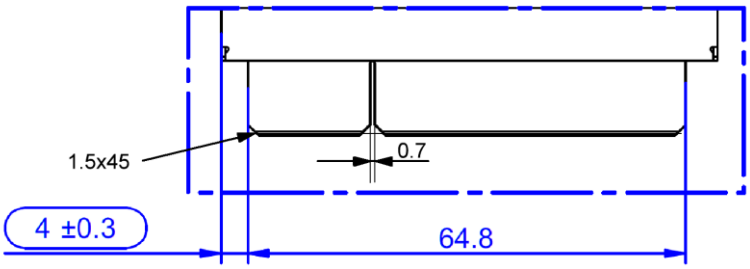

Figure 6. Card Edge PCB

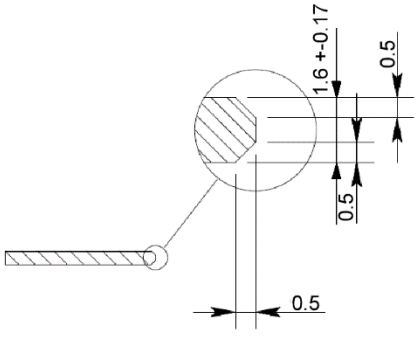

Figure 7. Card Edge PCB

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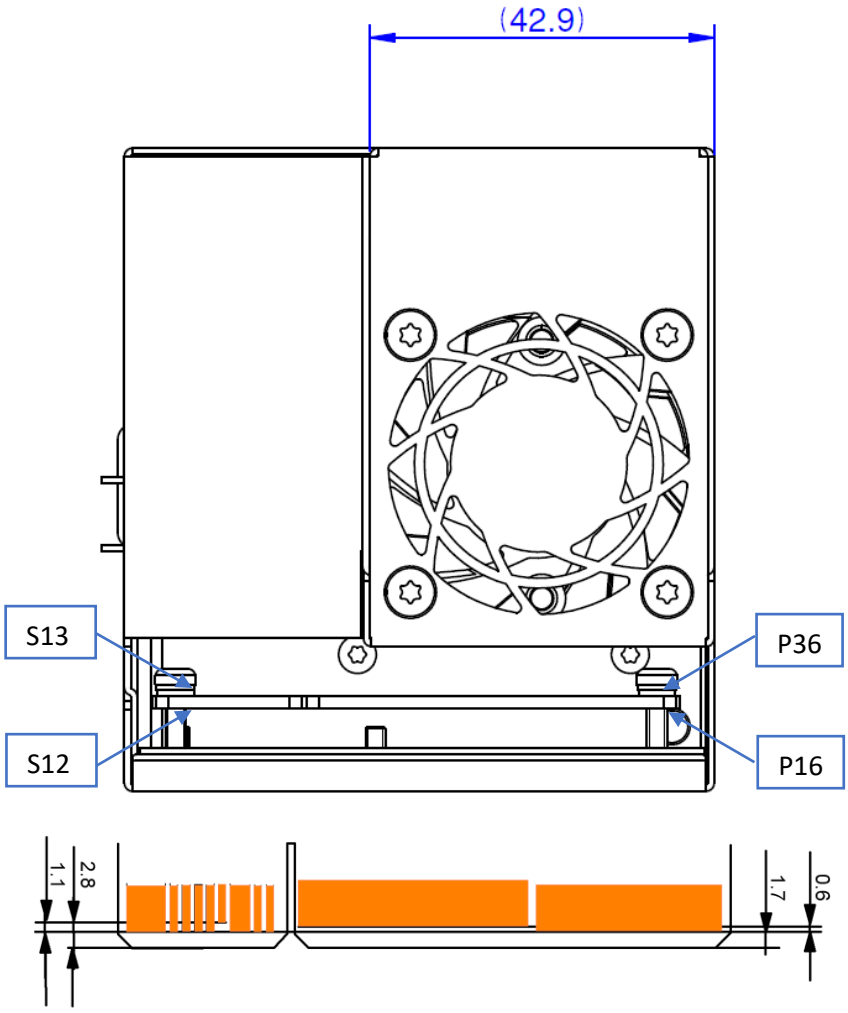

Figure 8. Card Edge PCB

7.2. OUTPUT CONNECTOR PIN ALLOCATION

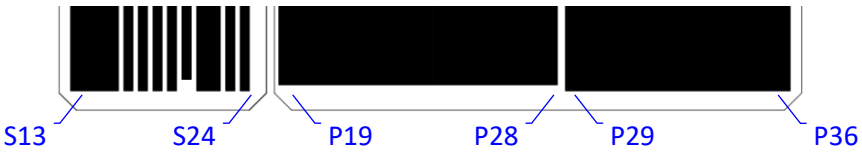

Figure 9. Card Edge PCB Top View

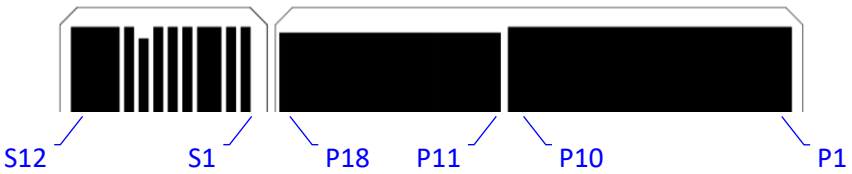

Figure 10. Card Edge PCB Bottom View

8. CONNECTORS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Input connector	IEC 60320-C22				
AC Cord Requirement	Wire size	16			AWG
Output Connector	36 Power- + 24 Signal-Pins PCB card edge				
Mating Output Connector	Manufacturer: Amphenol Manufacturer P/N: 10130248-005LF Bel Power Solutions P/N: ZES.00678				

8.1. OUTPUT CONNECTOR PIN ASSIGNMENT

PIN	SIGNAL NAME	DESCRIPTION	MATING SEQUENCE
P1 ~ P10 P29 ~ P36	GND GND	Power and signal ground (return)	1
P11 ~ P18 P19 ~ P28	V1 V1	+12 VDC main output	2
S1 S2	A0 A1	I^2C address selection input	1 1
S3, S4	VSB	+12 V Standby positive output	1
S5	NC	NC	1
S6	ISHARE	Analog current share bus	1
S7	Reserved	For future use, do not connect	1
S8	PRESENT_L	Power supply seated, active-low	3
S9	A2	I^2C address selection input	2
S10 ~ S15	GND	Power and signal ground (return)	1
S16	PWOK	Power OK signal output, active-high	1
S17	V1_SENSE	Main output positive sense	1
S18	V1_SENSE_R	Main output negative sense	1
S19	SMB_ALERT_L	SMB Alert signal output, active-low	1
S20	PSON_L	Power supply on input, active-low	3
S21, S22	VSB	+12 V Standby positive output (as pins S3, S4)	1
S23	SCL	I^2C clock signal line	1
S24	SDA	I^2C data signal line	1

Table 7. Output Connector Pin Assignments

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

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