JASPER ELECTRONICS


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# JBPA-C150-120 Series

## Single Output 150W

***JBPA SERIES FRONT VIEW***

*Available with AC input through IEC connector on Frontal Panel (on the left) or the rear through the input/output connector (on the right).*

## GENERAL OVERVIEW

The JBPA-C150-120 is a highly reliable cPCI Serial Power supply used for CompactPCI Serial Systems. It's capable of delivering up to 150W with 10CFM forced-cooled. With a full range input of 90- 264VAC, this power supply module achieves the highest performance and efficiency by incorporating LLC half bridge typology and synchronous rectification. The JBPA-C150 -120 also includes PMBusTM interface to monitor and control all essential functions of the power supply module. Custom controls available.

### SPECIAL FEATURES:

- High efficiency up to 89.0%
- 150W Forced-cooled with a minimum of 10 CFM
- Active Power Factor Correction
- Wide input voltage range: 90 – 264VAC
- Redundant operation
- Hot insertion/removal (hot plug)
- Single wire current sharing
- I2C interface PMBusTM compatible for control, programming and monitoring
- Remote firmware upgrade capable
- Fully secure(OTP, OVP, OCP, SCP)
- LEDs Status :OK, Fault
- Pwr_Fail, PS ON,
- CE Compliant
- RoHS Compliant
- Three Year Warranty
- Custom modifications available

### SAFETY

- CE Certification

### APPLICATIONS

- CompactPCI Serial Systems

ISO9001:2015

## TECHNICAL SPECIFICATIONS

| INPUT | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| $V_{i\,nom}$ | Nominal Input Voltage | | 100 | | 240 | VAC |
| $V_i$ | Input Voltage Ranges | Normal Operating ($V_{min}$ to $V_{max}$) | 90 | | 264 | VAC |
| $I_i$ | Max Input Current | $V_{in}$ =90VAC/60HZ, Full Load | | | 2.1 | $A_{rms}$ |
| $I_{i\,p}$ | Inrush Current | $264V_{rms}$, $T_{amb}$ = 25°C | | | 32 | $A_p$ |
| | Leakage Current | | | | 0.54 | mA |
| $F_i$ | Input Frequency | | 47 | 50/60 | 63 | Hz |
| PF | Power Factor | $V_{in}$ =230V/50Hz, Full Load | | 0.97 | | W/VA |
| $V_{i\,on}$ | Turn-On Voltage | Ramping Up | 88 | | 89 | VAC |
| $V_{i\,off}$ | Turn-Off Voltage | Ramping Down | 79 | | 83 | VAC |
| $Power_i$ | Input Power | $V_{in}$= 90VAC-264VAC | | | 192 | W |
| | | $V_{in}$ =240V, 12V 3.75/A, 12V /1.25A ,$T_A$ =25°C | | >82 | | |
| η | Efficiency without Fan | $V_{in}$ =240V, 12V /6.25A, 12V /2.0A ,$T_A$ =25°C | | >85 | | % |
| | | $V_{in}$ =240V, 12V /12.5A, 12V /2.5A ,$T_A$ =25°C | | >89 | | |
| $T_{hold}$ | Hold-up Time | | 30 | | | ms |

**Specifications subject to change without notice.*

### 1.1 INPUT FUSE

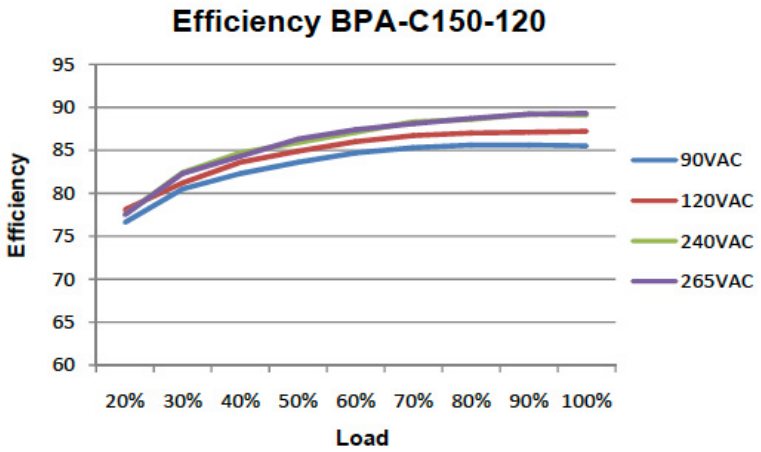
An internal 3.15A input fuse, in series with the input line, protects against severe defects.

### 1.2 INRUSH CURRENT

When the power supply module is connected to the main input, it exhibits a low and short peak current due to an X-capacitances initial charge. The internal bulk capacitor is charged through a controlled NTC circuit which will limit the inrush current.

### 1.3 INPUT FACTOR CORRECTION

Power factor correction (PFC) is achieved by controlling the input current waveform synchronous with the input voltage and this provides outstanding PFC results over wide input voltage and load ranges.



## TECHNICAL SPECIFICATIONS

| OUTPUT | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| Main Output $V_1$ | | | | | | |
| $V_{i\,nom}$ | Nominal Output Voltage | 0.5 *$I_{nom}$ ,$T_{amb}$ =25°C | | 12.1 | | Vdc |
| $V_{1\,set}$ | Output Setpoint Accuracy | 0.5 *$I_{nom}$ ,$T_{amb}$ =25°C | -0.01 | | 0.01 | $V_1$ |
| $P_{1\,nom}$ | Nominal Output Power | $V_1$ =12 $V_{DC}$ | | | 150 | W |
| $I_{1\,nom}$ | Nominal Output Current | $V_1$ =12 $V_{DC}$ | | 12.5 | | $A_{DC}$ |
| $V_{1pp}$ | Output Ripple Voltage | $V_{1\,nom}$, $I_{1\,nom}$,20MHz BW | | 30 | | $MV_{pp}$ |
| $Dv_{1\,Load}$ | Load Regulation | $V_i$ =$V_{i\,nom}$, 0 - 100% $I_{1\,nom}$ | 0.02 | | 0.02 | %V |
| $Dv_{1\,Line}$ | Line Regulation | $V_i$ =$V_{i\,min}$.....$V_{i\,max}$ | -0.01 | | 0.01 | %V |
| $Dv_{1\,tot}$ | Total Regulation | $V_{i\,min}$ to $V_{i\,max}$, 0 to 100% $I_{1\,nom}$, $T_{a\,min}$ to $T_{a\,max}$ | -0.1 | | 0.1 | $\%V_1$ |
| $DI_{share}$ | Current Sharing | | -5 | | 5 | %A |
| $DI_{share}$ | Current Sharing | | -5 | | 5 | %A |
| $Dv_{dyn}$ | Dynamic Load Regulation | $I_{out}$ :10%--60% of full load;50--100% of full load | | 1 | 2 | %V |
| $T_{rec}$ | Recovery Time | $dI_1/dt$ =1A/µs, recovery within 1% of $V_{1\,nom}$ | | | 2 | ms |
| $t_{AC\,V1}$ | Start-Up TIme from AC | Varies with Input Line | | | 3 | sec |
| $tV_{1\,rise}$ | Rise Time | $V_1$=10%.....90% $V1_{nom}$ | | 28 | | ms |
| $C_{Load}$ | Capacitive Loading | $T_{amb}$ =25°C | | 36000 | | µF |
| Standby Output $V_{SB}$ | | | | | | |
| $V_{SB\,nom}$ | Nominal Output Voltage | 0.5 · $I1_{nom,}$ $T_{amb}$ =25°C | | 5.2 | | Vdc |
| $V_{SB\,set}$ | Output Setpoint Accuracy | 0.5 · $I1_{nom,}$ $T_{amb}$ =25°C | -.05 | | .05 | $V_{SB}$ |
| $P_{SB\,nom}$ | Nominal Output Power | $V_{SB}$ = 12 $_{VDC}$ | | 12.5 | | W |
| $I_{SB\,nom}$ | Nominal Output Current | $V_{SB}$ = 12 $_{VDC}$ | | 2.5 | | $A_{DC}$ |
| $V_{SB\,pp}$ | Output Ripple Voltage | $V_{SB,}$ $I_{SB,}$ 20MHz BW, $T_{amb}$= 25°C | | 60 | | $mV_{pp}$ |
| $dV_{SB\,tot}$ | Total Regulation | $V_{i\,min}$ to $V_{i\,max}$, 0 to 100% $I_{1\,nom}$, $T_{a\,min}$ to $T_{a\,max}$ | -6 | | 6 | $\%V_{SB}$ |
| $dV_{SB}$ | Droop | 0 - 100% $I_{SB\,nom}$ | 5.2 | | 4.8 | V |
| $dV_{SBdyn}$ | Dynamic Load Regulation | $\Delta I_{SB}$ = 50%,$I_{SB\,nom,}$ $I_{SB\,5}$.....100% $I_{SB\,nom,}$ | -0.1 | | 0.1 | $\%V_{SB}$ |
| $T_{rec}$ | Recovery Time | $dI_1/dt$ =1A/µs,recovery within 1% of $V_{SB\,nom}$ | | 200 | | µs |
| $t_{AC\,VSB}$ | Start-Up TIme from AC | Varies with Input Line | | | 1 | sec |
| $tV_{SB\,rise}$ | Rise Time | $V_{SB}$ = 10% ……90%VSB nom | | 10 | | ms |
| $C_{Load}$ | Capacitive Loading | $T_{amb}$ =25°C | | 10000 | | µF |

**Specifications subject to change without notice.*

## 2.1. OUTPUT VOLTAGE RIPPLE

Ripple and noise are measured with 0.1µF of ceramic capacitance and 10 µF of tantalum capacitance on each of the outputs

| PROTECTION | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| $F_1$ | Input Fuse | Not User Accessible | | 3.15 | | A |
| $V_{1\ OV}$ | Over Voltage Threshold $V_1$ | | 14.5 | | 15.6 | Vdc |
| $t_{OV\ V1}$ | Over Voltage Latch Off Time $V_1$ | | | | 200 | ms |
| $V_{SB\ OV}$ | Over Voltage Threshold $V_{SB}$ | | 7 | | 8 | Vsb |
| $t_{OV\ VSB}$ | Over Voltage Latch Off Time $V_{SB}$ | | | | 1 | ms |
| $I_{V1\ lim}$ | Current Limit | Auto Recovery | | 13.3 | | A |
| $V_{1SC\ Max}$ | Short Circuit Current $V_1$ | $V_1$ < 3V | | | 250 | A |
| $t_{v1\ SC\ off}$ | Short Circuit Time | Time when in Short Circuit | | | 160 | us |
| $T_{SD}$ | Over Temperature Protection | Internal Temperature | | 105 | 120 | °C |
| | Recovery Temperature | | | 70 | | °C |
| $I_{VSB\ lim}$ | Standby Current Limit | Auto Recovery | | 4.3 | | A |

**Specifications subject to change without notice.*

## 3.1 OVERVOLTAGE PROTECTION

The power supply module will shut down if the output voltage exceeds the over voltage threshold. The power supply module must be manually repowered by recycling AC Source, by toggle PS_ON, or PmbusTM operation command.

## 3.2 OVERLOAD PROTECTION

The overload protection feature will reduce the output voltage to a safe dissipation level when the output power rating exceeds 110% of a maximum rated power. The unit will automatically return to regulation upon removal of the overload.

## 3.3 SHORT-CIRCUIT PROTECTION

The unit will withstand a continuous short without damage. It will automatically return to regulation upon removal of the short.

## 3.4 OVER TEMPERATURE PROTECTION

The power supply module will shut down if temperature exceeds the over temperature threshold (internal temperature). The power supply module will restart when temperature falls below recovery temperature threshold. The power supply module can also be manually repowered by recycling AC Source, by toggle PS_ON, or PmbusTM operation command.

| SAFETY/ APPROVAL | | | | |
|---|---|---|---|---|
| **Parameter** | **Description/ Condition** | **Min** | **Max** | **Units** |
| Agency Approvals | Approved to the latest edition of the following standards:<br>CE Certified | Approved By independent Body | | |
| Isolation Strength | Input(L/N) to case (PE)<br>Input (L/N) to output<br>Output to case (PE) | 1500<br>3000<br>500 | Basic<br>Reinforced<br>Functional | Vrms<br>Vrms<br>VDC |
| Electrical Strength Test | Input to Case<br>Input to Output | 2121<br>4242 | | VDC<br>VDC |

| ELECTROMAGNETIC COMPATIBILITY | | |
|---|---|---|
| **Parameter** | **Description/ Condition** | **Criterion** |
| ESD Contact Discharge | IEC/EN61000-4-2, Level 2 ±4kV | A |
| ESD Air Discharge | IEC/EN61000-4-2, Level 3 ±8kV | A |
| Radiated Electromagnetic Field | IEC/EN61000-4-3,Level 2 (3V/m) 80MHz-100MHz,1.4GHz – 2.0GHz<br>IEC/EN61000-4-3,Level 1 (1V/m) 2.0-2.7GHz | A<br>A |
| Electrical Fast Transients/ Burst | IEC/EN61000-4-4,Level2 AC port ±1kV,1 minute | A |
| Surge | IEC/EN61000-4-5,<br>Level 2 AC port ±1kV,20sec CM<br>Level 3 AC port ±2kV,20sec CM | <br>A<br>A |
| RF Conducted Immunity | IEC/EN 61000-4-6,Level 2, 3 V,CW,0.15 … 80MHz<br>Amplitude Modulation 1kHz/80% | A |
| Magnetic Field Immunity | IEC/EN 61000-4-8,Level 2 3A/m | A |
| Voltage Dips and Interruptions | IEC/EN61000-4-11<br>1.0% residual voltage, 0.5 cycle<br>2.0% residual voltage, 1 cycle<br>3.40% residual voltage, 5 cycles<br>4.70% residual voltage, 0.5 cycle<br>5.70% residual voltage, 25 cycles/50Hz<br>6.0% residual voltage, 250 cycles/50Hz | <br>A<br>A<br>B<br>A<br>B<br>B |

**Specifications subject to change without notice.*

| EMISSION | | |
|---|---|---|
| **Parameter** | **Description/ Condition** | **Criterion** |
| Conducted Emissions | EN 55022 / EN 55016-2-1 conducted | Class B |
| Radiated Emission | EN 55022 / EN 55016-2-3 conducted | Class B |
| Harmonics Emission | IEC61000-3-2,Vin =230VAC/50Hz,100% Load | Class D |
| AC Flicker | IEC61000-3-3,Vin=230VAC/50Hz,100% Load,<20Arms | Pass |

**Specifications subject to change without notice.*

| ENVIRONMENTAL | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| $T_A$ | Ambient Temperature | $V_{i\,min}$ to $V_{i\,max,I1\,nom,ISB\,nom}$ | -40 | | 70 | °C |
| $T_S$ | Storage Temperature | Non-Operational | -40 | | 85 | °C |
| | Altitude | Operational, Above Sea Level | | 5000<br>16400 | | Meter<br>Feet |
| RH | Humidity | Non-Condensing | 5 | | 95 | % |
| | Shock and Vibration Acceleration | EN 61373:2010 Category 1 Class B | | | | |

**Specifications subject to change without notice.*

$T_A$ -40°C up to +70°C without derating with forced cooling.

| SIGNALS AND CONTROLS | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| *PS_ON/Enable* | | | | | |
| $V_{IL}$ Input Low Level Voltage | | 0 | | 0.8 | V |
| $V_{IH}$ Input High Level Voltage | | 2.4 | | 3.3 | V |
| $R_{puPS\_ON}$ Internal Pull Up Resistor on PS_ON | | | 2 | | kΩ |
| $R_{puEnable}$ Internal Pull Up Resistor on Enable | | | 2 | | kΩ |
| *Pwr_Fail/PSPresent* | | | | | |
| $V_{IL}$ Input Low Level Voltage | | 0 | | 0.8 | V |
| $V_{IH}$ Input High Level Voltage | | 2.4 | | 5.3 | V |
| $V_{IL,H}$ Maximum Input Sink or Source Current | | 0 | | 0 | mA |
| $R_{puPwr\_Fail}$ Internal Pull Up Resistor on Pwr_Fail | | | 1 | | kΩ |
| *SCL/SDA* | | | | | |
| $V_{IL}$ Input Low Level Voltage | | 0 | | 0.8 | V |
| $V_{IH}$ Input High Level Voltage | | 2.4 | | 3.3 | V |
| $V_{IL,H}$ Maximum Input Sink or Source Current | | | | 0.25 | mA |
| $R_{puSCL}$ Internal Pull Up Resistor on SCL | | | 6.8 | | kΩ |
| $R_{puSDA}$ Internal Pull Up Resistor on SDA | | | 6.8 | | kΩ |
| *A0/A1/A2* | | | | | |
| $V_{IL}$ Input Low Level Voltage | | 0 | | 0.8 | V |
| $V_{IH}$ Input High Level Voltage | | 2.4 | | 3.3 | V |
| $R_{puA0}$ Internal Pull Up Resistor on A0 | | | 4.7 | | kΩ |
| $R_{puA1}$ Internal Pull Up Resistor on A1 | | | 4.7 | | kΩ |
| $R_{puA2}$ Internal Pull Up Resistor on A2 | | | 4.7 | | kΩ |
| *PSPresent* | | | | | |
| $R_{puPS\_Pre}$ Internal Resistor to COM | | | 100 | | Ω |

**Specifications subject to change without notice.*

## 7.2 PS_ON

The PS_ON signal is used to remotely enable/disable the main output V1. This active-low pin is also used to clear any latched fault condition.

## 7.3 PS_PRESENT

The PS_Present signal is internally connected to COM. This active-low signal is used to indicate to a power distribution unit controller that the power supply module is fully engaged.

## 7.4 PWR_FAIL

The Pwr_Fail is an active-high signal that indicates whether both VSB and V1 outputs are within regulation and AC input voltage is above 80VAC. This pin is active-low when V1 and VSB are not within regulation or when the ac voltage falls outside the requirements for more than 8ms.

## 7.5 CURRENT SHARE (12VCS)

When used in a redundant configuration, all the current share pins need to be interconnected in order to activate the sharing function. If a supply has an internal fault or is not turned on, the current share line will automatically disengage from the bus.

If current share is not required the current share pin can be left open.

## 7.6 REMOTE SENSE (+VS AND −VS)

The main output incorporates sense lines to compensate for voltage drop across the load line.

1. (+) Sense connects to the positive rail of the equipment used. Maximum voltage drop of 200mV.
2. (-) Sense connects to the negative rail of the equipment used. Maximum voltage drop of 200mV.

If remote sense is not required the (+) Sense and (-) Sense pins can be left open.

| FRONT LED | | | |
|---|---|---|---|
| **Power Supply Condition** | **Green LED** | **Yellow LED** | **Pwr_Fail** |
| Normal Operation | On | Off | High |
| Standby Mode | Blink | Off | Low |
| *PSU Faults Condition* | | | |
| Input UnderVoltage | Off | Blink | Low |
| Over Temperature | Off | On | Low |
| Output OverVoltage | Off | On | Low |
| *PSU Warning Condition* | | | |
| Over Temperature | Off | Blink | High |
| Input Under Voltage | Off | Blink | Low |
| Output OverVoltage | On | Blink | High |

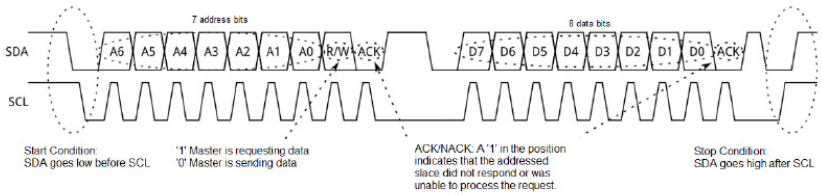
**Specifications subject to change without notice.*

See Page 4 (3.Protections) for fault Threshold.
For Faults the power supply module must be manually repowered by recycling AC Source, by toggle PS_ON, or Pmbus™ operation command.

| WARNINGS | | | | |
|---|---|---|---|---|
| **PSU Warning Triggers** | **Min** | **Nom** | **Max** | **Units** |
| Over Temperature | | 85 | | °C |
| Input UnderVoltage | | <80 | | VAC |
| Output OverVoltage | | 12.9 | | VDC |

## 7.8 SDA &SCL

The I2C bus consist of a Serial Clock (SCL) and a Serial Data Line (SDA). Both signals lines are pull up internally to 3.3V bus via 6.8k ohm resistors, if customer requires stronger pull up resistors, it is possible to install additional pull up resistors in the customer's backplane.



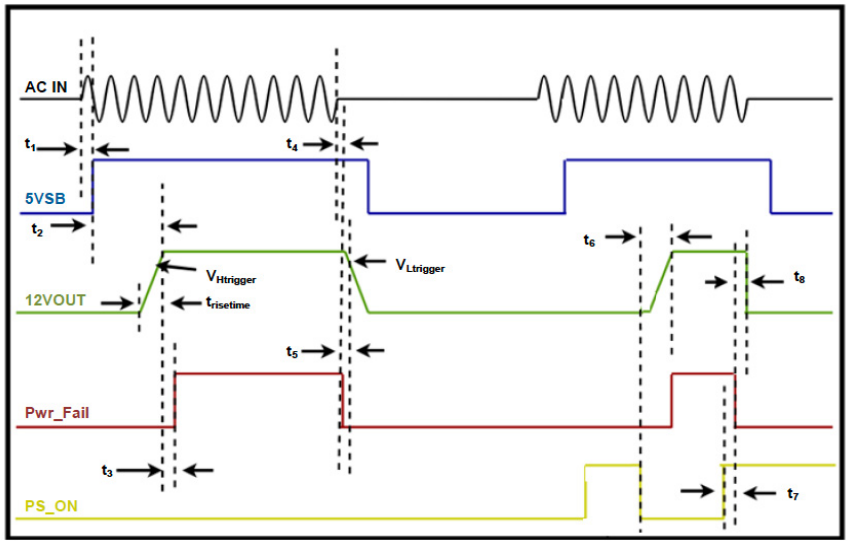

## 7.9 ADDRESS SELECT (A0, A1, A2)

These digital input lines are used to set the address of the power supply module. These addresses are used to differentiate between multiple power supply modules utilize in a redundant mode within the same system.

| PSU ADDRESS TABLE (ADDRESS BIT SETTINGS) | | | | | |
|---|---|---|---|---|---|
| **A0, A1, & A2** | **PSU Address Value** | **A2** | **A1** | **A0** | **Recognize Address** |
| 00h | B0h | 0 | 0 | 0 | Yes |
| 01h | B2h | 0 | 0 | 1 | Yes |
| 02h | B4h | 0 | 1 | 0 | Yes |
| 03h | B6h | 0 | 1 | 1 | Yes |
| 04h | B8h | 1 | 0 | 0 | Yes |
| 05h | BAh | 1 | 0 | 1 | Yes |
| 06h | BCh | 1 | 1 | 0 | Yes |
| 07h | BEh | 1 | 1 | 1 | Yes |

**Specifications subject to change without notice.*

| PMBUS™ MONITORING | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| $V_{i\,mon}$ | Input RMS Voltage | $V_{i\,min} \le V_i \le V_{i\,max}$ | -3.5 | | 3.5 | % |
| $I_{i\,mon}$ | Input RMS Current | | -2 | | 2 | % |
| $P_{i\,mon}$ | True Input Power | | -4 | | 4 | % |
| $V_{1\,mon}$ | V1 Voltage | | -0.5 | | 0.5 | % |
| $I_{1\,mon}$ | V1 Current | | -2 | | -2 | % |
| $P_{0\,mon}$ | Total Output Power | | -1.5 | | -1.5 | % |
| $V_{SB\,mon}$ | Standby Voltage | | -1 | | 1 | % |
| $I_{SB\,mon}$ | Standby Current | | -2 | | 2 | % |
| $t_1$ | Temperature1 | Ambient Inside tthe Module | -2 | | 2 | ℃ |
| $t_2$ | Temperature2 | Internal Secondary Components' Temperature | -2 | | *2* | ℃ |



| TIMING GRAPH | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Description/ Condition** | **Min** | **Nom** | **Max** | **Units** |
| $t_{risetime}$ 12VOUT,0V to 12V | | - | 28 | - | ms |
| $V_{Htrigger}$ Pwr_Fail(high) | Varies Due to Load | 11.4 | | 11.8 | V |
| $V_{Ltrigger}$ Pwr_Fail(low) | Varies Due to Load | 10.8 | | 11.4 | V |
| *Turn-On* | | | | | |
| $t_1$ AC IN — 5 VSB | Varies Due to Line and Load | 600 | | 800 | ms |
| $t_2$ 5 VSB — 12VOUT | | - | 1 | - | s |
| $t_3$ 12VOUT — Pwr_Fail(H) | | - | 400 | 600 | ms |
| $t_6$ PS_ON(low) — 12VOUT | PS_ON Turn-ON | - | 400 | 550 | ms |
| *Turn-Off* | | | | | |
| $t_4$ AC INPUT — Pwr_Fail | AC_IN Turn-Off | 6 | | - | ms |
| $t_5$ Pwr_Fail— 12VOUT | AC_IN Turn-Off | 20 | - | - | ms |
| $t_8$ PS_ON(high) — Pwr_Fail | PS_ON Turn-Off | - | 400 | - | ms |
| $t_7$ Pwr_Fail— 12VOUT | PS_ON Turn-Off | 600 | - | - | µs |

| PMBUS™ FUNCTIONALITY SUPPORTED BY PSU(PMBUS™ INFO) | | | | | |
|---|---|---|---|---|---|
| **Address** | **Commands** | **Description** | **Supported** | **Transaction Type** | **Byte_Size** |
| 00h | Page | Use to select which output gets reported via Read_VOUT, Read_IOUT & Read_POUT commands, for PSU's with multiple outputs | Y | Read/Write | 2-bytes |
| 01h | Operation_ON_OFF | Used to enable or disable the output of the PSU depending value of the second byte that follows | Y | Read/Write | 2-bytes |
| 03h | Clear_Fault | Used to clear all status registers and error flags. This command also affects the SMB_ALERT signal | Y | Write Only | 1-byte |
| 19h | Capability | Used by the end user system to query the PSU, to determine if it supports certain features, or not. Features such packet error checking, SMB_ALERT and the max SMBUS clock rate | Y | Read Only | 1-byte |
| 79h | Status_Word | Used to retrieve and report two bytes containing a summary of faults conditions. All bits in this register should read as zero when the PSU is operating normally. This register acts as on index to all the other status registers | Y | Read/Write | 2-bytes |
| 7Ah | Status_VOut | Used to retrieve and report the status of the output voltages. It reports information such as output undervoltage, output over-voltage, output under voltage-warning | Y | Read/Write | 1-byte |
| 7Eh | Status_CML | Used to retrieve and report the status of the I2C or SMBUS communication bus; error such as packet error checking (PEC), receive an unsupported command etc… | Y | Read/Write | 1-byte |
| 88h | Read_VIN | Used to retrieve a two bytes value in Little Endian format representing the active input voltage of the device in a linear format (VIN = Y*2^n ), where n is the exponent in two's compliment represented by the five most significant bits of the upper byte. Y is the mantissa represented the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 89h | Read_IIN | Used to retrieve a two bytes value in Little Endian format representing the active input current of the device in a linear format (IIN = Y*2^n ), where n is the exponent in two's compliment represented by the five most significant bits of the upper byte. Y is the mantissa represented the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |

| PMBUS™ FUNCTIONALITY SUPPORTED BY PSU(PMBUS™ INFO) | | | | | |
|---|---|---|---|---|---|
| **Address** | **Commands** | **Description** | **Supported** | **Transaction Type** | **Byte_Size** |
| 8Bh | Read_VOUT | Used to retrieve a two bytes value in Little Endian format representing the active output voltage of the device in a linear format (VOUT = Y*2^n ), where n is the exponent in two's compliment represented by the five most significant bits of the upper byte. Y is the mantissa represented the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 8Ch | Read_IOUT | Used to retrieve a two bytes value in Little Endian format representing the active output current of the device in a linear format (I_OUT = Y*2^n ), where n is the exponent in two's compliment represented by the five most significant bits of the upper byte. Y is the mantissa represented the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 8Dh | Read_Temperature_1 | Used to retrieve a two bytes value in Little Endian format representing the air intake ambient temperature of the device in a linear format (Temp_1 = Y*2^n ), where n is the exponent in two's compliment format, represented by the five most significant bits of the upper byte. Y is the mantissa represented by the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 8Eh | Read_Temperature_2 | Used to retrieve a two bytes value in Little Endian format representing the air exhaust ambient temperature of the device in a linear format (Temp_2 = Y*2^n ), where n is the exponent in two's compliment format, represented by the five most significant bits of the upper byte. Y is the mantissa represented by the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 96h | Read_POUT | Used to retrieve a two bytes value in Little Endian format representing the active output power of the device in a linear format (POUT = Y*2^n ), where n is the exponent in two's compliment format, represented by the five most significant bits of the upper byte. Y is the mantissa represented by the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 97h | Read_PIN | Used to retrieve a two bytes value in Little Endian format representing the active input power of the device in a linear format (PIN = Y*2^n), where n is the exponent in two's compliment represented by the five most significant bits of the upper byte. Y is the mantissa represented by the eleven lower bits of the two byte word | Y | Read Only | 2-bytes |
| 98h | PMBUS™ - Revision | Used to set and retrieve the version of the PMBUS™ specification, with which the PSU is in compliance | Y | Read/Write | 1-byte |
| 9Ah | MFR_Model | Used to set and retrieve the manufacturer's model number assign to the device | Y | Read/Write | Variable plus 1-byte count |
| 9Bh | MFR_Revision | Used to retrieve a two bytes value in Little Endian format representing the active input current of the device in a linear format (IIN = Y*2^n ), where n is the exponent in two's compliment represented by the five most significant bits of the upper byte. Y is the mantissa represented the eleven lower bits of the two byte word | Y | Read/Write | 1-byte |
| 9Ch | MFR_location | Used to set and retrieve the location of manufacturing of the device | Y | Read/Write | Variable plus 1-byte count |

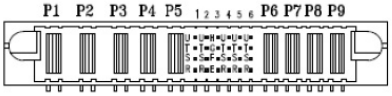
| PMBUS™ FUNCTIONALITY SUPPORTED BY PSU(PMBUS™ INFO) | | | | | |
|---|---|---|---|---|---|
| **Address** | **Commands** | **Description** | **Supported** | **Transaction Type** | **Byte_Size** |
| 9Dh | MFR_Date | Used to set and retrieve the date of manufacturing of the device | Y | Read/Write | 4-bytes plus 1-byte count |
| 9Eh | MFR_Serial | Used to set and retrieve the value of the manufacturer's serial number assigned to the device | Y | Read/Write | Variable plus 1-byte count |
| A0h | MFR_VIN_MIN | Used to retrieve the value of the minimum rated input voltage that the PSU can be operated | Y | Read Only | 2-bytes |
| A1h | MFR_VIN_MAX | Used to retrieve the value of the maximum rated input voltage that the PSU can be operated safely | Y | Read Only | 2-bytes |
| A2h | MFR_IIN_MIN | Used to retrieve the value of the maximum rated input current in Amps, that the PSU can be operated | Y | Read Only | 2-bytes |
| A3h | MFR_PIN_MAX | Used to retrieve the value of the maximum rated output power in Watts, that the PSU can be operated | Y | Read Only | 2-bytes |
| A4h | MFR_VOUT_MIN | Used to retrieve the value of the minimum rated output voltage that the PSU can provide | Y | Read Only | 2-bytes |
| A5h | MFR_VOUT_MAX | Used to retrieve the value of the maximum rated output voltage that the PSU can provide | Y | Read Only | 2-bytes |
| A6h | MFR_IOUT_MIN | Used to retrieve the value of the maximum rated output current in Amps, that the PSU is expected to provide | Y | Read Only | 2-bytes |
| A7h | MFR_POUT_MAX | Used to retrieve the value of the maximum rated output power in Watts, that the PSU is expected provide | Y | Read Only | 2-bytes |
| A8h | MFR_TAMBIENT_MAX | Used to retrieve the value of the maximum ambient temperature that the PSU can be operated, in degrees Celsius | Y | Read Only | 2-bytes |
| A9h | MFR_TAMBIENT_MIN | Used to retrieve the value of the minimum ambient temperature that the PSU can be operated, in degrees Celsius | Y | Read Only | 2-bytes |

## 8.1 CONNECTORS

Input/Output ----- FCI51939-667

Input (Optional) ---- IEC C14

Note: If IEC C14 is selected the P1 and P2 pins are left open.




Note: H3, G3, E3 and F3 are short pins
NU=Not Used

| P1 | P2 | P3 | P4 | P5 | U1 | U2 | H3 | U4 | U5 | U6 | P6 | P7 | P8 | P9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | NU | Pwr_Fail | PSPresent | COM | Deg | 5Vstby | COM | COM | 12V Out | 12V Out |
| | | | | | T1 | T2 | G3 | T4 | T5 | T6 | | | | |
| | | | | | NU | NU | COM | A0 | 5Vstby | 5Vstby | | | | |
| Line | Neutral | GND | NU | NU | S1 | S2 | F3 | S4 | S5 | S6 | | | | |
| | | | | | NU | 12VCS | PSON | A1 | SCL | COM | | | | |
| | | | | | R1 | R2 | E3 | R4 | R5 | R6 | | | | |
| | | | | | NU | (-)VS | (+)VS | A2 | SDA | Enable | | | | |

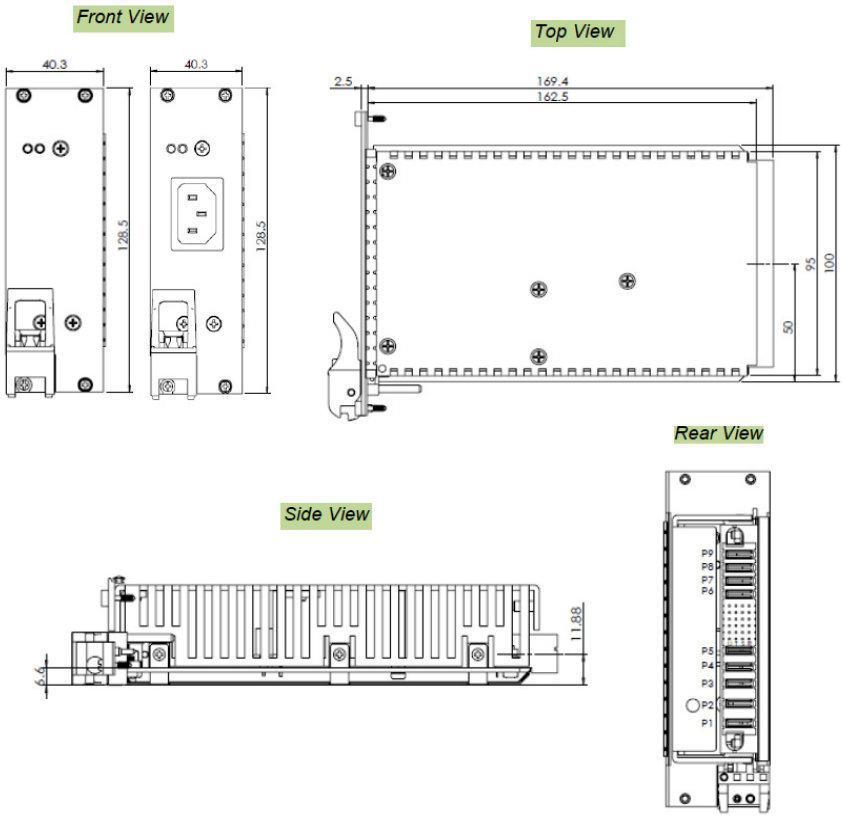
| PINS | PIN TYPE | ASSIGNMENT | DESCRIPTION/ FUNCTION |
|---|---|---|---|
| **Control** | | | |
| E3 | Signal | 12VS(+) | (+) Sense - If remote sense is required this pin must be connected to the +12V load on the system backplane. This pin can be left open if remote sense is not required |
| R2 | Signal | 12VS(-) | (-) Sense - If remote sense is required this pin must be connected to the 12V return on the system backplane. This pin can be left open if remote sense is not required |
| S2 | Signal | 12VCS | Current Share - This pin must be connected to the 12V current share of the redundant power supplies on the system backplane. This pin can be left open if current share is not required |
| T5, T6, U6 | Signal House Keeping | 5VSB | 5V Stand by - This is the 5V standby output voltage pin |
| H3 | Signal | PS Present | Power Supply Present - This signal is connected to the common internally. This signal is used to identify that the power supply module is fully plugged into the system backplane |
| F3 | Signal | PS_ON | Power Supply On - This is the power supply module control pin. This pin must be directly connected to common or controlled by a transistor connected to common on the system backplane |
| G3, U4, S6 | Signal | COM | Common - This is the common return pin for the power supply module |
| U2 | Signal Open Collector | Pwr_Fail | Pwr_Fail - This pin is used to monitor the output voltage. The signal on this pin will go high ≈ 500mSecs after the 12V output has reached regulation (above 11.4V) and when the AC input voltage is above 88VAC. This signal will go low when the output voltage drops out of regulation (11.4V-11.8V) and when the AC input voltage drops below 88VAC. This pin must be connected to an external voltage via pull up resistor on the system backplane 20V max 10mA max |
| U5 | Signal Open Collector | Deg | Fault/Warning - An open collector signal is provided to indicate any fault or warning for over temperature |
| R6 | Signal | Enable | When driven high, main output is disabled. When Low, power supply main output state is as controlled by PS_ON |
| R5 | Signal | SDA | Communication Data pin internal pulled up by a 6.8k Ω resistor |
| S55 | Signal | SCL | Communication Clock pin internal pulled up by a 6.8k Ω resistor |
| T4 | Signal | A0 | Address Pin-This pin operates at 3.3V internal pulled up by a 4.7k Ω resistor |
| S4 | Signal | A1 | Address Pin-This pin operates at 3.3V internal pulled up by a 4.7k Ω resistor |
| R4 | Signal | A2 | Address Pin-This pin operates at 3.3V internal pulled up by a 4.7k Ω resistor. |

| MECHANICAL | | | |
|---|---|---|---|
| **Parameter** | **Description/ Condition** | **Nom** | **Units** |
| | Width | 169.4(6.67) | |
| Dimension | Height | 128.5(5.06) | mm(in) |
| | Depth | 40.3(1.59) | |
| Weight | | 0.8(1.5) | Kg(lbs) |

## MODELS AND RATINGS

| MODEL # | ASSIGNMENT | VOLTAGES | MINIMUM | MAXIMUM |
|---|---|---|---|---|
| **JBPA-C150-120** | VO1 | 12V | 0A | 12.5A |
| | VO2 | 5VSB | 0A | 2.5A |

## TECHNICAL DRAWING



Jasper Electronics

# INNOVATIVE SPECIALTY DC POWER SYSTEMS

## *Standard and Custom Power Supplies from 5W to 10KW*

### TRAFFIC CONTROL POWER SUPPLIES

- 70-400+ Watts / 120 and 220 VAC Models Available
- CALTRANS TEES, NYSDOT, CDOT, GDOT Compliant for 332, 334, 336, 342, 344, and 346 Series cabinets
- RoHS and NEMA Compliant
- Custom labeling and barcoding available
- Ruggedization against shock / vibration / humidity available

### CUSTOM POWER DISTRIBUTION ASSEMBLIES (PDAs)

- Compliant with TEES 2020
- 1U smaller than the PDA2-LX and PDA3-LX
- User accessible slots as specified
- Custom labeling and barcoding available
- Ruggedization against shock / vibration / humidity available

### COMPACT PCI

- AC or DC input, 175W - 500W DC output, active PFC
- 3U x 8HP, 6U x 8HP sizes
- PICMG 2.11 compliant, UL/CSA, NEMKO/TUV/CE certified, ROHS compliant
- Ruggedization against shock/ vibration/ humidity optional

**Primary Applications: Industrial Computing, Military, Satellite Comm, Test, Transportation, Telecom, Aerospace**

### SPECIALTY HOT-SWAPPABLE POWER SUPPLIES

- 200-1500W, Universal Input, 5-54VDC Output
- Hot Swap. N+1, 90+% Efficiency
- 1U Form Factors
- 30+ Variations for Various Applications Including Nuclear
- Ruggedization against shock/ vibration/ humidity optional

**Primary Applications: Medical Equipment, Military, Test, Automotive, Computing, Audio, Sensitive Electronics**

### RACK POWER SYSTEMS

- 200W-1500W, 2-8 slots, single or mixed output voltages, up to 10KW total
- Single, dual, or individual unit AC or DC input
- Internally or externally redundant DC outputs
- Standard 19" and 23" size or user-specified configurations also available
- Ruggedization against shock/ vibration/ humidity optional

**Primary Applications: Medical Equipment, Military, Test, Automotive, Computing, Audio, Sensitive Electronics**

### CUSTOMS & MODIFIED STANDARDS

- 75W-2KW
- Single to 7 outputs
- Designed and built to custom or semi-custom specifications
- Ruggedization against shock/ vibration/ humidity optional
- Custom electrical specs, chassis, paint, labeling, connectors, interface all available

**Primary Applications: Medical Equipment, Military, Test, Automotive, Computing, Audio, Sensitive Electronics**

### LOW NOISE CONVECTION / CONDUCTION COOLED POWER SUPPLIES

- 200W-500W, 90—264VAC full range input with 12-54 VDC Output
- Wide operating temperature range / high efficiency
- Small form factors
- Ruggedization against shock/ vibration/ humidity optional

**Primary Applications: Medical Equipment, Military, IT, Sensitive Electronics**

### MEDICAL ADAPTERS

- 6W-250W, Efficiency levels V & VI
- Desktop, Wall-mount, and Interchangeable AC plug types
- Large selection of output connectors – additional cable lengths available
- UL60601 (medical) approved adapters available
- Ruggedization against shock/ vibration/ humidity optional

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