

## DS500SPE

500 Watts Distributed Power System

### Data Sheet

**Front-end Bulk Power**  
**Total Output Power:**  
 500 W continuous  
**Wide Input Voltage:**  
 90 to 264 Vac

### SPECIAL FEATURES

- 500 W output power
- High-power and short form factor
- 1U power supply
- Active Power Factor Correction
- EN61000-3-2 Harmonic compliance
- Inrush current control
- 80plus Platinum efficiency
- N+1 or N+N redundant
- Hot-pluggable
- Active current sharing
- Full digital control
- PMBus compliant
- Compatible with Artesyn's Universal PMBus GUI
- Reverse airflow option
- Two-year warranty

### COMPLIANCE

- Conducted/Radiated EMI Class A Limits + 6 dB margin
- EN61000-4-11

### SAFETY

- UL/cUL
- Demko +CB Report
- CE Mark
- CCC
- BSMI



### Electrical Specifications

| Input                         |                                |     |           |                   |     |           |
|-------------------------------|--------------------------------|-----|-----------|-------------------|-----|-----------|
| Input range                   | 90 - 264 Vac                   |     |           |                   |     |           |
| Frequency                     | 47 Hz to 63 Hz                 |     |           |                   |     |           |
| Efficiency                    | 94.0% peak                     |     |           |                   |     |           |
| Max Input current             | 6.6 Arms @ 90 Vac              |     |           |                   |     |           |
| Inrush current                | 38 Apk                         |     |           |                   |     |           |
| Conducted EMI                 | Class A with 6 dB margin       |     |           |                   |     |           |
| Radiated EMI                  | Class A with 6 dB margin       |     |           |                   |     |           |
| Power factor                  | >0.9 beginning at 20% load     |     |           |                   |     |           |
| ITHD                          | 10%                            |     |           |                   |     |           |
| Leakage current               | 1.75 mA                        |     |           |                   |     |           |
| Hold-up time                  | 10 ms at full load             |     |           |                   |     |           |
| Output                        |                                |     |           |                   |     |           |
|                               | Main DC Output                 |     |           | Standby DC Output |     |           |
|                               | MIN                            | NOM | MAX       | MIN               | NOM | MAX       |
| Nominal setting               | -0.20%                         | 12  | 0.20%     | -1%               | 12  | 1%        |
| Total output regulation range | 11.4 V                         |     | 12.6 V    | 11.4 V            |     | 12.6 V    |
| Dynamic load regulation range | 11.4 V                         |     | 12.6 V    | 11.4 V            |     | 12.6 V    |
| Output ripple                 |                                |     | 150 mVp-p |                   |     | 150 mVp-p |
| Output current                | 0.5 A <sup>1</sup>             |     | 41.6 A    | 0.1 A             |     | 3.0 A     |
| Current sharing               | Within ±5% of full load rating |     |           | N/A               |     |           |
| Capacitive loading            | 700 uF                         |     | 5,000 uF  | 47 uF             |     | 680 uF    |
| Start-up from AC to output    |                                |     | 2200 ms   |                   |     | 1700 ms   |
| Output rise time              | 5 ms                           |     | 50 ms     | 2 ms              |     | 60 ms     |

<sup>1</sup> Minimum current for transient load response testing only. Unit is designed to operate and be within output regulation range at zero load.

## Electrical Specifications

### Protections

| Main Output                          | MIN    | NOM | MAX    |
|--------------------------------------|--------|-----|--------|
| Over-current protection <sup>2</sup> | 120%   |     | 150%   |
| Over-voltage protection <sup>1</sup> | 13.5 V |     | 15.0 V |
| Under-voltage protection             | 10.5 V |     | 11.0 V |
| Over-temperature protection          |        | Yes |        |
| Fan fault protection                 |        | Yes |        |
| Standby Output                       |        |     |        |
| Over-current protection <sup>3</sup> | 120%   |     | 150%   |
| Over-voltage protection <sup>3</sup> | 13.5 V |     | 15.0 V |
| Under-voltage protection             | 10.0 V |     | 11.0 V |

<sup>1</sup> Latch mode<sup>2</sup> Autorecovery if the overcurrent is less than 120% and last only for <500 ms<sup>3</sup> Standby protection is auto-recovery

## Ordering Information

| Model Number   | Nominal Main Output | Standby Output | Airflow Direction  |
|----------------|---------------------|----------------|--------------------|
| DS500SPE-3     | 12 V @ 41.6 A       | 12 V @ 3 A     | Standard (forward) |
| DS500SPE-3-001 | 12 V @ 41.6 A       | 12 V @ 3 A     | Reverse            |

## Control and Status Signals

### Input Signals

#### PSON\_L

Active LOW signal which enables/disables the main output. Pulling this signal LOW will turn-on the main output. Recommended pull-up resistor to 12 VSB is 8.2 k with a 3.0 k pull-down to ground. A 100 pF decoupling capacitor is also recommended.

|              |   | MIN   | MAX    |
|--------------|---|-------|--------|
| $V_{IL}$     | Input logic level LOW                             |       | 0.8 V  |
| $V_{IH}$     | Input logic level HIGH                            | 2.0 V | 5.0 V  |
| $I_{SOURCE}$ | Current that may be sourced by this pin           |       | 2 mA   |
| $I_{SINK}$   | Current that may be sunk by this pin at low state |       | 0.5 mA |

#### PSKILL\_L

First break/last mate active LOW signal which enables/disables the main output. This signal will have to be pulled to ground at the system side with a 220 ohm resistor. A 100 pF decoupling capacitor is also recommended.

|              |   | MIN   | MAX    |
|--------------|---|-------|--------|
| $V_{IL}$     | Input logic level LOW                             |       | 0.8 V  |
| $V_{IH}$     | Input logic level HIGH                            | 2.0 V | 5.0 V  |
| $I_{SOURCE}$ | Current that may be sourced by this pin           |       | 2 mA   |
| $I_{SINK}$   | Current that may be sunk by this pin at low state |       | 0.5 mA |

## Control and Status Signals

### Output Signals

#### ACOK

Signal used to indicate the presence of AC input to the power supply. A logic level HIGH will indicate that the AC input to the power supply is within the operating range while a logic level LOW will indicate that AC has been lost.

This is an open collector/drain output. This pin is pulled high by a 1.0 kohm resistor connected to 3.3 V inside the power supply. It is recommended that this pin be connected to a 100 pF decoupling capacitor and pulled down by a 100 kohm resistor.

|              |   | MIN   | MAX    |
|--------------|---|-------|--------|
| $V_{IL}$     | Input logic level LOW                             |       | 0.6 V  |
| $V_{IH}$     | Input logic level HIGH                            | 2.0 V | 5.0 V  |
| $I_{SOURCE}$ | Current that may be sourced by this pin           |       | 3.3 mA |
| $I_{SINK}$   | Current that may be sunk by this pin at low state |       | 0.7 mA |

#### PWR\_GOOD/PWOK

Signal used to indicate that main output voltage is within regulation range. The PWR\_GOOD signal will be driven HIGH when the output voltage is valid and will be driven LOW when the output falls below the under-voltage threshold.

This signal also gives an advance warning when there is an impending power loss due to loss of AC input or system shutdown request. More details in the Timing Section.

This is an open collector/drain output. This pin is pulled high by a 1.0 kohm resistor connected to 3.3 V inside the power supply. It is recommended that this pin be connected to a 100 pF decoupling capacitor and pulled down by a 10 kohm resistor.

|              |   | MIN   | MAX    |
|--------------|---|-------|--------|
| $V_{IL}$     | Input logic level LOW                             |       | 0.8 V  |
| $V_{IH}$     | Input logic level HIGH                            | 2.0 V | 5.0 V  |
| $I_{SOURCE}$ | Current that may be sourced by this pin           |       | 3.3 mA |
| $I_{SINK}$   | Current that may be sunk by this pin at low state |       | 0.7 mA |

#### PS\_PRESENT

Signal used to indicate to the system that a power supply is inserted in the power bay. This pin is shorted to the standby return in the power supply. Recommended pull-up resistor to 12 VSB is 8.2 k with a 3.0 k pull-down to ground. A 100 pF decoupling capacitor is also recommended.

#### PS\_INTERRUPT\_L

Active low signal used by the power supply to indicate to the system that a change in power supply status has occurred. This event can be triggered by faults such as OVP, OCP, OTP, and fan fault. This signal can be cleared by a CLEAR\_FAULT command. Recommended pull-up resistor to 12 VSB is 8.2 k with a 3.0 k pull-down to ground. A 100 pF decoupling capacitor is also recommended.

|              |   | MIN   | MAX   |
|--------------|---|-------|-------|
| $V_{IL}$     | Input logic level LOW                             |       | 0.8 V |
| $V_{IH}$     | Input logic level HIGH                            | 2.0 V | 5.0 V |
| $I_{SOURCE}$ | Current that may be sourced by this pin           |       | 4 mA  |
| $I_{SINK}$   | Current that may be sunk by this pin at low state |       | 4 mA  |

### BUS Signals

#### ISHARE

Bus signal used by the power supply for active current sharing. All power supplies configured in the system for n+n sharing will refer to this bus voltage in order to load share.

| Voltage Range       | The range of this signal for active sharing will be up to 8.0 V, which corresponds to the maximum output current. |      |        |
|---------------------|---|------|--------|
|                     |   | MIN  | MAX    |
| $I_{SHARE}$ Voltage | Vshare at 100% load, stand-alone unit   | 7.75 | 8.25   |
|                     | Voltage at 50% load, stand-alone unit   | 3.85 | 4.15   |
|                     | Voltage at 0% load, stand-alone unit  | 0    | 0.3    |
| $I_{SOURCE}$        | Current that may be sourced by this pin   |      | 160 mA |

#### SCL, SDA

Clock and data signals defined as per I<sup>2</sup>C requirements. It is recommended that these pins be pulled-up to a 2.2 kohm resistor to 3.3 V and a 100 pF decoupling capacitor at the system side.

|    |                        |       |       |
|----|------------------------|-------|-------|
| VL | Input logic level LOW  |       | 0.8 V |
| VH | Input logic level HIGH | 2.0 V | 5.0 V |

**Note:** All signal noise levels are below 400 mVpk-pk from 0 - 100 MHz.

**I<sup>2</sup>C Addressing Table: Not applicable.** This power supply has a fixed I<sup>2</sup>C address. In order to support multiple addresses, the system will have to utilize a switcher or an I<sup>2</sup>C expander.

## Electrical Specifications

### LED Indicators

A single bi-color LED is used to indicate the power supply status.

|   | Status LED     |
|---|----------------|
| No AC input to PSU  | Off            |
| Main output ON  | Solid GREEN    |
| Standby mode or Power supply failure (OCP, OVP, OTP, FAN FAULT) | Blinking AMBER |

### Firmware Reporting And Monitoring

|                 | Accuracy Range               |           |            |
|-----------------|------------------------------|-----------|------------|
| Output loading  | 5 to 20%                     | 20 to 50% | 50 to 100% |
| Input voltage   | ±5%                          |           |            |
| Input current   | ±0.55 A fixed error          | ±4%       |            |
| Input power     | ±6.25 W at <125 W input      | ±5%       |            |
| Output voltage  | ±2%                          |           |            |
| Output current  | 1.5 A fixed error            | ±3%       |            |
| Temperature     | ±5 °C on the operating range |           |            |
| E <sub>IN</sub> | ±15% from 10% to 20% load    | ±5%       |            |
| Fan speed       | Actual RPM ±250 RPM          |           |            |

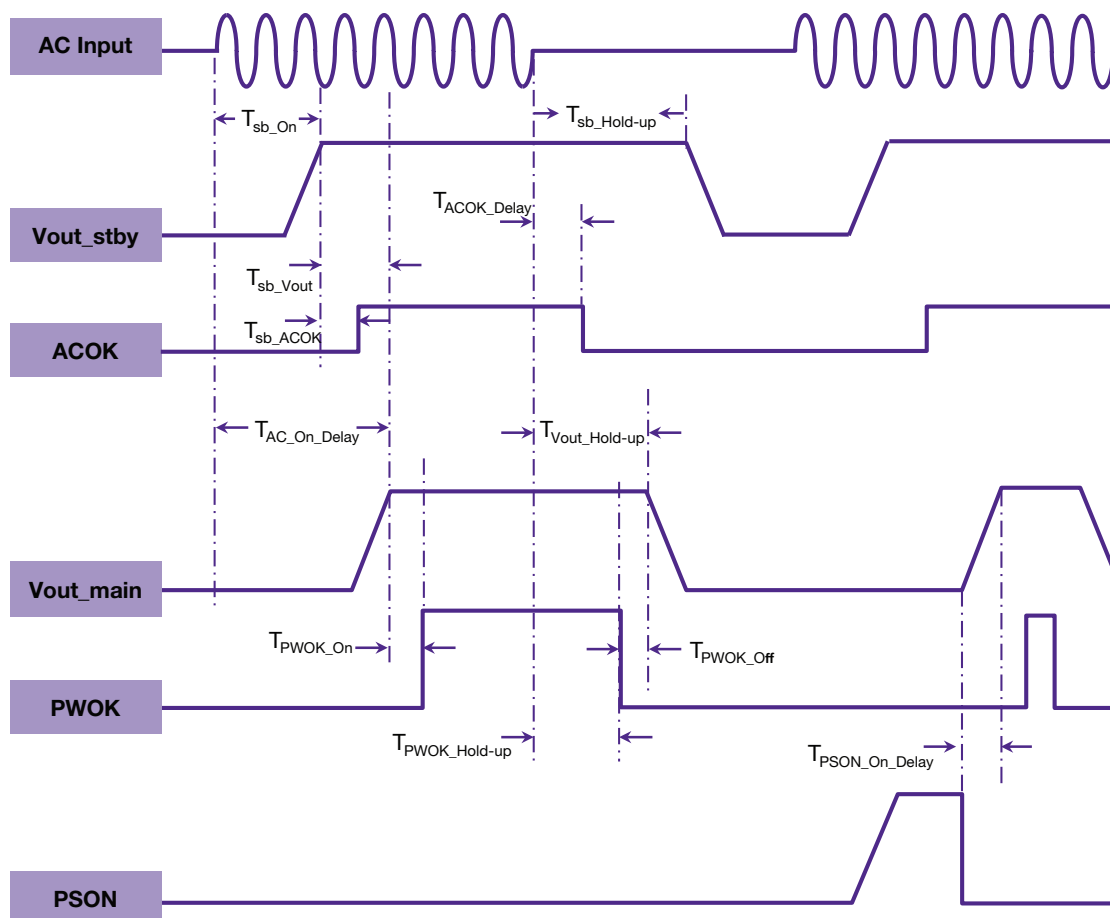
|               |     |
|---------------|-----|
| PMBus         | YES |
| Remote ON/OFF | YES |

### Timing Specifications

|                               | Description  | Min            | Max  | Unit |
|-------------------------------|--|----------------|------|------|
| T <sub>sb_On</sub>            | Delay from AC being applied to standby output being within regulation    | 20             | 2000 | ms   |
| T <sub>sb_ACOK</sub>          | Delay from standby output to ACOK assertion                              | See note below | 20   | ms   |
| T <sub>sb_Vout</sub>          | Delay from standby output to main output voltage being within regulation |                | 300  | ms   |
| T <sub>AC_On_Delay</sub>      | Delay from AC being applied to main output being within regulation       |                | 2300 | ms   |
| T <sub>PWR_GOOD_On</sub>      | Delay from output voltages within regulation limits to PWOK asserted     | 100            | 1000 | ms   |
| T <sub>ACOK_Delay</sub>       | Delay from loss of AC to assertion of ACOK                               |                | 7    | ms   |
| T <sub>PWR_GOOD_Hold-up</sub> | Delay from loss of AC to deassertion of PWOK                             | 10             |      | ms   |
| T <sub>Vout_Hold-up</sub>     | Delay from loss of AC to main output being within regulation             | 11             |      | ms   |
| T <sub>sb_Hold-up</sub>       | Delay from loss of AC to standby output being within regulation          | 150            |      | ms   |
| T <sub>PWR_GOOD_Off</sub>     | Delay from deassertion of PWOK to output falling out of regulation       | 1              |      | ms   |
| T <sub>PSON_On_Delay</sub>    | Delay from PSION assertion to output being within regulation             |                | 350  | ms   |
| T <sub>PWOK_Low</sub>         | Duration of PWOK being in deasserted state during an ON/OFF cycle of PSU | N/A            | N/A  |      |

**Note:** T<sub>vout\_hold-up</sub>; tested at 1A load on standby output  
T<sub>sb\_ACOK</sub>; ACOK can assert earlier than the standby output

## Timing Diagram

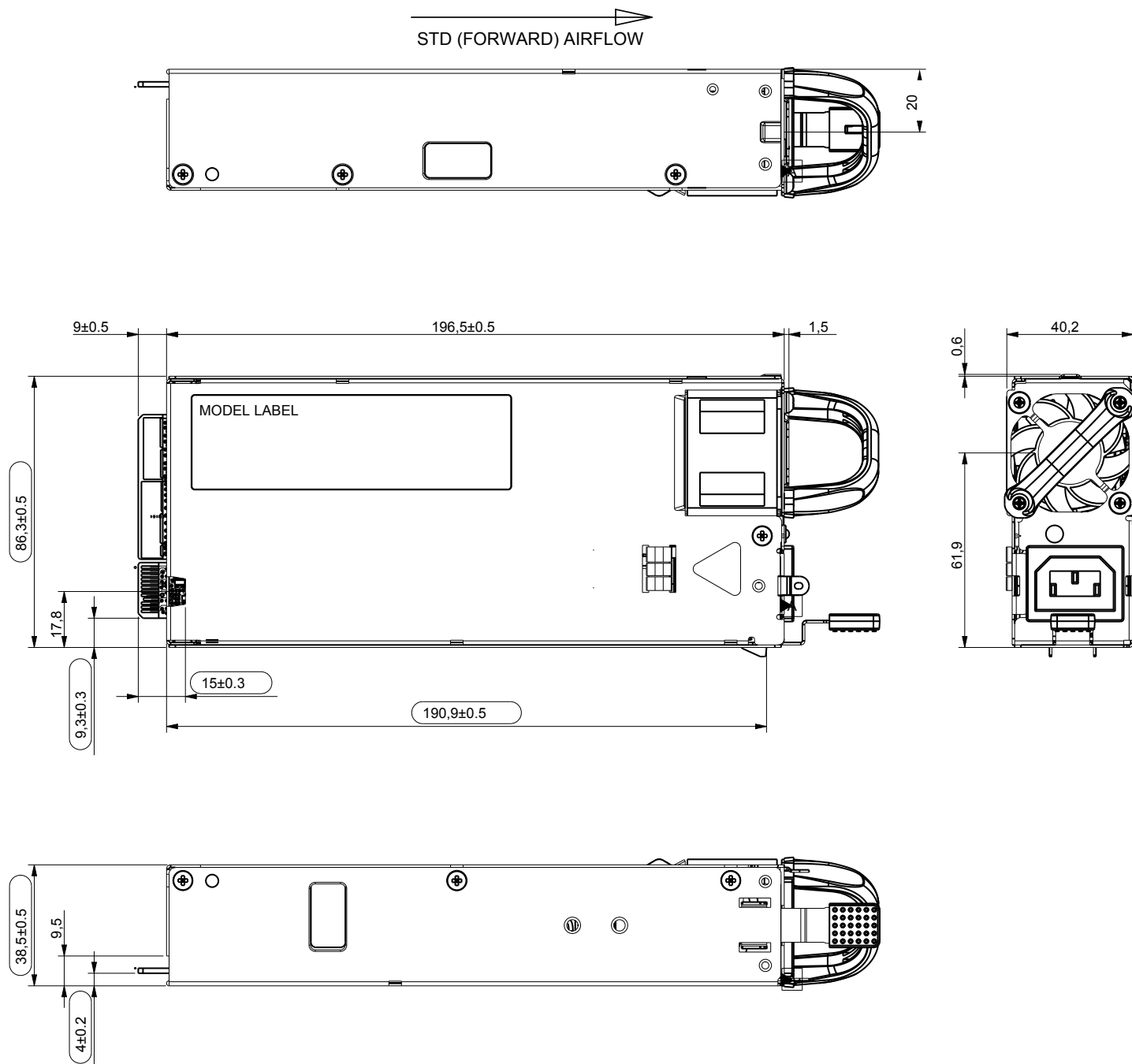


## Environmental Specifications

|                                 |  |
|---------------------------------|--|
| Operating temperature           | 0 to 50 °C, withstand operation up to 60 °C at 300 W output power without damage   |
| Operating altitude              | up to 10,000 feet at 35°C, 500W  |
| Operating relative humidity     | 20% to 95% non-condensing  |
| Non-operating temperature       | -40 to +70 °C  |
| Non-operating relative humidity | 10% to 95% non-condensing  |
| Non-operating altitude          | up to 50,000 feet  |
| Vibration and shock             | Standard operating/non-operating random shock and vibration  |
| ROHS compliance                 | Yes  |
| MTBF                            | 200,000 hours per Telcordia Issue 2, Method 1, Case 3 at 25 °C ambient at full load.   |
| Operating life                  | Minimum of 5 years at typical conditions   |
| Reliability                     | All electronic component derating analysis and capacitor life calculation is done at maximum ambient, 80% of maximum rated load, nominal input line voltage. |



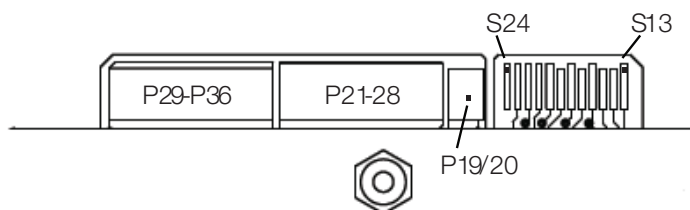
## Mechanical Outline



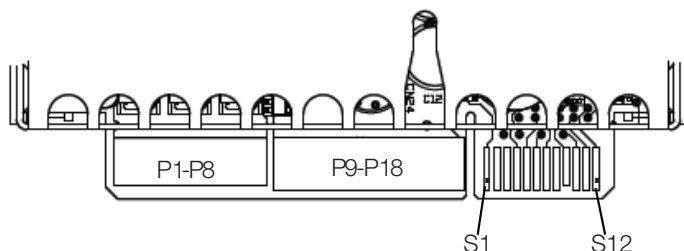
## Connector Definitions

|                              |                                  |
|------------------------------|----------------------------------|
| Output Connector Part Number | Card-edge                        |
| Mating Connector Part Number | FCI 10107844-002LF or equivalent |

Power Supply Output Card Edge (Bottom Side)



Power Supply Output Card Edge (Top Side)



## Output Connector Pin Configuration

|        |                         |         |               |
|--------|-------------------------|---------|---------------|
| S1     | PS PRESENT              | S13     | PS_ON_L       |
| S2     | Reserved                | S14     | PS_KILL_L     |
| S3     | Reserved                | S15     | Reserved      |
| S4     | Pwr_Good (PWOK)         | S16     | RETURN        |
| S5     | ACOK (AC Input Present) | S17     | SDA           |
| S6     | RETURN                  | S18     | RETURN        |
| S7     | ISHARE                  | S19     | SCL           |
| S8     | RESERVE                 | S20     | RETURN        |
| S9     | PS INTERRUPT_L          | S21     | REMOTE SENSE- |
| S10    | RETURN                  | S22     | RETURN        |
| S11    | Reserved                | S23     | REMOTE SENSE+ |
| S12    | Reserved                | S24     | RESERVE       |
| P1-P8  | Vo                      | P19-P20 | VSB           |
| P9-P18 | RTN                     | P21-P28 | RTN           |
|        |                         | P29-P36 | Vo            |

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