# SFP650-12BG
# AC-DC Power Supply
## 12V Output, 650 Watts

The Bel Power Solutions SFP650-12BG is a 650 W, power factor corrected (PFC) front-end which provides a 12 VDC output for datacom and other distributed power applications. Its compact size enables mounting in both 1U and 2U height racks. High efficiencies, advanced thermal management techniques, and an internal fan increase reliability over a broad range of operating conditions. Internal ORing diodes facilitate use in hot-swap (plug)*, redundant configurations.

Status is provided with front panel LEDs, logic signals, and via the I2C management interface bus.

The SFP650-12BG meets international safety requirements and is CE marked to the Low Voltage Directive (LVD).

* Proper hot-swap (plug) operation instruction: Power supply is not intended to be inserted into the system with AC cord already applied. Alternatively, if there is an application where power supply insertion with AC cord is required; PS_ON must be toggled or AC recycled after insertion into the system to reset the power supply.

## Key Features & Benefits

- Ideal server form factor optimizes, space, efficiency, and load variations
- High efficiency maximized between 30-80% load conditions
- Unconditionally stable under any load condition
- Wide range DC-input model available (SFD550-12BG)
- Wide input voltage range (90-264 VAC) with PFC
- 1U or 2U height configurations
- Active current share with ORing FET
- I2C interface status monitoring
- Standby voltage of 3.3 VDC @ 3 A
- Overtemperature, overload, and overvoltage protection
- Status LEDs: AC OK, POWER GOOD, PS FAIL

## Applications

- Datacom
- Distributed Power Systems

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## Model Selection

| MODEL | NOMINAL OUTPUT VOLTAGE | ADJUSTMENT RANGE | MAXIMUM OUTPUT CURRENT | REGULATION | RIPPLE & NOISE @ 20 MHz BW |
|---|---|---|---|---|---|
| SFP650-12BG | 12 VDC<br>3.3 VDC (Standby) | N/A<br>N/A | 53.3 A<br>3 A | ±3 %<br>±3 % | 100 mV<br>100 mV |

## Input Specifications

| PARAMETER | CONDITIONS / DESCRIPTION | | MIN | NOM | MAX | UNITS |
|---|---|---|---|---|---|---|
| AC Input Voltage | Single-phase continuous input range. | | 90 | | 264 | VAC |
| Input Frequency | AC input. | | 47 | | 63 | Hz |
| Hold-up Time | After last AC line peak at full power. | At 115 VAC | 14 | | | ms |
| Input Current | At full-rated load. | At 90 VAC | | | 9 | Arms |
| Inrush Surge Current | Excluding Xcap. Vin = 264 VAC, T = 25 ºC | | | | 15 | Apk |
| Power Factor | Per EN61000-3-2 | | > 0.95 | | | W/VA |

## Output Specifications

| PARAMETER | CONDITIONS / DESCRIPTION | | MIN | NOM | MAX | UNITS |
|---|---|---|---|---|---|---|
| Efficiency[1] | With Vin at 115 VAC and 50% to 75% load on V1. | | 86 | | | % |
| | With Vin at 115 AC and 75% to 100% load on V1. | | 86 | | | % |
| | With Vin at 230 VAC and 50% to 75% load on V1. | | 87 | | | % |
| | With Vin at 230 VAC and 75% to 100% load on V1. | | 89 | | | % |
| Minimum Load | Minimum loading required to maintain regulation. | | 0 | | | A |
| Output Power | | | | | 650 | W |
| Overshoot | Output voltage overshoot at turn-on. | | | | < 5 | % |
| Transient Response | Maximum recovery time to within 1% of initial set point due to a 25% load change, 1A/µs. | 12V output:<br>Standby output: | | | 5<br>5 | ms<br>ms |
| | Maximum deviation: | 12V output:<br>Standby output: | | | 3<br>3 | %<br>% |
| Turn-On Delay with PS_ON signal | Time required for initial output voltage stabilization after application of AC input or ON/OFF signal. | | | | 1500 | ms |
| Output Regulation | See Model Selection table above. | | | | | |

## I²C Bus Management Interface[2]

| PARAMETER | CONDITIONS / DESCRIPTION |
|---|---|
| **Static** | Includes static information such as: part number and revision level, output rating, serial number, date code, and manufacturing location. |
| **Status** (Logic 1 or 0) | AC Input OK.<br>DC Output OK.<br>Overtemperature.<br>Overcurrent.<br>Fan OK.<br>Overvoltage Alert<br>Undervoltage Alert |
| **Real-Time Monitoring** | Output voltage (main output). LSB = 20 mV<br>Output current (main output). LSB = 100 mA |

[1] Internal fan is considered part of the load as it is driven from the 12 V output; Vaux load is set to 0 A for efficiency measurements.

[2] Reference "I²C Management Interface" and "EEPROM Table of Contents" documents for SFP650-12BG (consult factory).

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## Interface Signals & Internal Protection[3]

| PARAMETER | CONDITIONS/DESCRIPTION | | MIN | NOM | MAX | UNITS |
|---|---|---|---|---|---|---|
| Overvoltage Protection | Latch-style overvoltage protection. | | | | 15<br>4.3 | V |
| Overcurrent Protection | Current limit (Latching Mode). | 12V output:<br>Standby output: | 56.0<br>3.2 | | 69.3<br>6 | A |
| Short-Circuit Protection | Latching Mode. | | | | | |
| Overtemperature/ Fan Failure Warning | 12 V output will shut down in the event of an overtemperature condition or blocked fan rotor.<br>OT setpoint is 62 ±3 ºC.<br>Supply's fan and Vaux are active.<br>Power supply will recover when OT condition is removed.<br>Amber OT LED will turn ON to indicate fault condition. | | | | | |
| PS_KILL | Output enable. Pulled low on conjunction with PS_ON being pulled low allows V1 to be activated. PSKILL will cause the PSU to latch off the 12 V rail, the latch can be cleared by recycling PSON or recycling the AC supply. | | | | | |
| +12V Current Share | 0 to 8V signal used for active current sharing. | | | | | |
| Write Protect | For factory use only. | | | | | |
| PS A0 | $I^2C$ Address. | | | | | |
| SDA | $I^2C$ Data line (3.3 V). | | | | | |
| SCL | $I^2C$ Clock line (3.3 V). | | | | | |
| Tach | Two pulses per fan revolution. | | | | | |
| AC_OK/H | High signal indicates AC is within PSU limits. | | | | | |
| Present/L | 100 Ohm resistor internally connected to RTN allowing the PSU to be detected on insertion. | | | | | |
| Alert/L | Low signal indicates PSU fan is running below speed or an overtemperature limit was exceeded. | | | | | |
| PWROK/H | High signal indicates both outputs are within regulation limits. | | | | | |

## Safety, Regulatory and EMI Specifications

| PARAMETER | CONDITIONS / DESCRIPTION | | MIN | NOM | MAX | UNITS |
|---|---|---|---|---|---|---|
| Agency Approvals | Approved to the latest edition of the following standards:<br>UL/CSA60950-1, IEC60950-1 and EN60950-1.<br>CE Mark for LVD | | | | | |
| Electromagnetic Interference | FCC CFR title 47 Part 15 Sub-Part B,<br>EN55022/CISPR 22. | Conducted:<br>Radiated: | A<br>A | | | Class |
| Harmonics | Per IEC61000-3-2. | | A | | | Class |
| Voltage Fluctuation and Flicker | Per IEC61000-3-3. | | Pass | | | |
| ESD Susceptibility | Per EN 61000-4-2, Level 4<br>Performance criteria A | Contact Discharge:<br>Air Discharge: | ±8<br>±15 | | | kV |
| Radiated Susceptibility | Per EN 61000-4-3, Level 3., Performance criteria A | | 10 | | | V/M |
| EFT/Burst | Per EN 61000-4-4, Level 4<br>Performance criteria A | | ±4 | | | kV |
| Input Transient Protection | Per EN 61000-4-5, Class 3<br>Performance criteria A | Line-to-Line:<br>Line-to-Ground: | 1<br>2 | | | kV |
| RF Conducted Disturbances | Per EN 61000-4-6, Level 2., Performance criteria A | | 3 | | | V |
| Voltage Interruptions | Per EN 61000-4-11, performance criterion B 30%.<br>Per EN 61000-4-11, performance criterion C 60%.<br>Per EN 61000-4-11, performance criterion C 95%. | | 10<br>100<br>5 | | | ms<br>ms<br>sec |
| Voltage Sag Immunity | Per SEMI F47-0999 > 100 VAC.<br>No output voltage interruption. | | | | | |
| Leakage Current | Per EN60950. | At 240 VAC: | | | 1.75 | mA |

[3] Refer to product specification for internal pull up impedances and timing of these signals.

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## Environmental Specifications

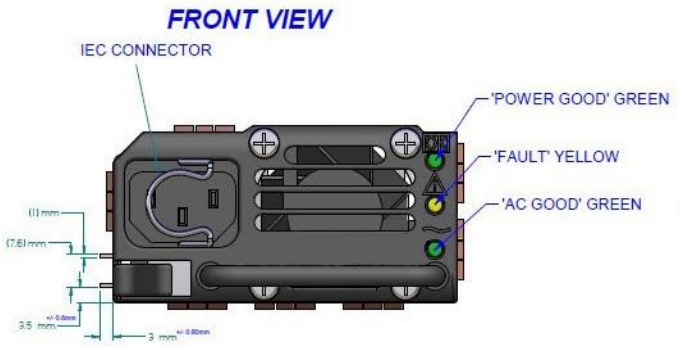
| PARAMETER | CONDITIONS / DESCRIPTION | | MIN | NOM | MAX | UNITS |
|---|---|---|---|---|---|---|
| Altitude | Operating.<br>Non-Operating. | | | | 10K<br>40K | ASL ft |
| Operating Temperature | Internal DC fan for cooling. | At 100% load: | 0 | | 50 | ºC |
| Storage Temperature | | | -40 | | 85 | ºC |
| Temperature Coefficient | 0 ºC to 45 ºC (after 15-minute warm-up). | | | | 0.02 | %/ºC |
| Relative Humidity | Non-condensing. | | | | 95 | %RH |
| Shock | Operating: half-sine, 11 ms, 3-axis. | | | | ±10 | Gpk |
| Vibration | Operating: swept sine 5-500 Hz.<br>Non-operating: random 10-2000 Hz. | | | | 2<br>6.15 | Gpk<br>Grms |
| Reliability MTBF | (Calculated) MILHDBK 217F Ground Benign.<br>Demonstrated.<br>Useful Life | | 100 000<br>200 000<br>10 | | | hrs<br>hrs<br>yrs |

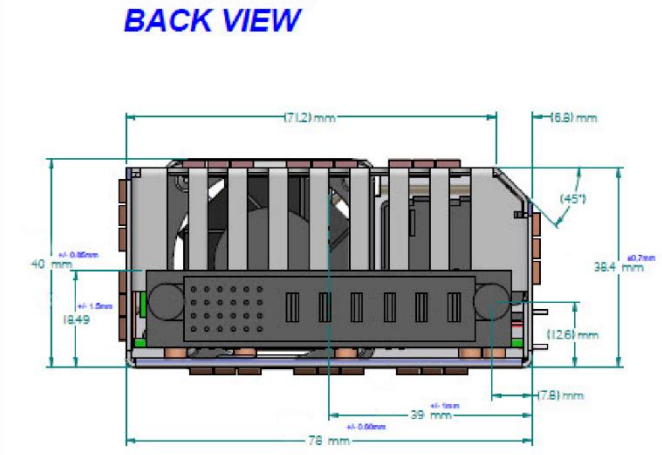
## LED Indicators

| Indicator | LED Color |
|---|---|
| Power Good | GREEN |
| AC OK | GREEN |
| PS FAIL | AMBER |

## Mechanical Specifications

| PARAMETER | CONDITIONS / DESCRIPTION |
|---|---|
| Dimensions | 78 x 40 x 337.4 mm |
| Weight | 1.46 kg (3.22 lb) |

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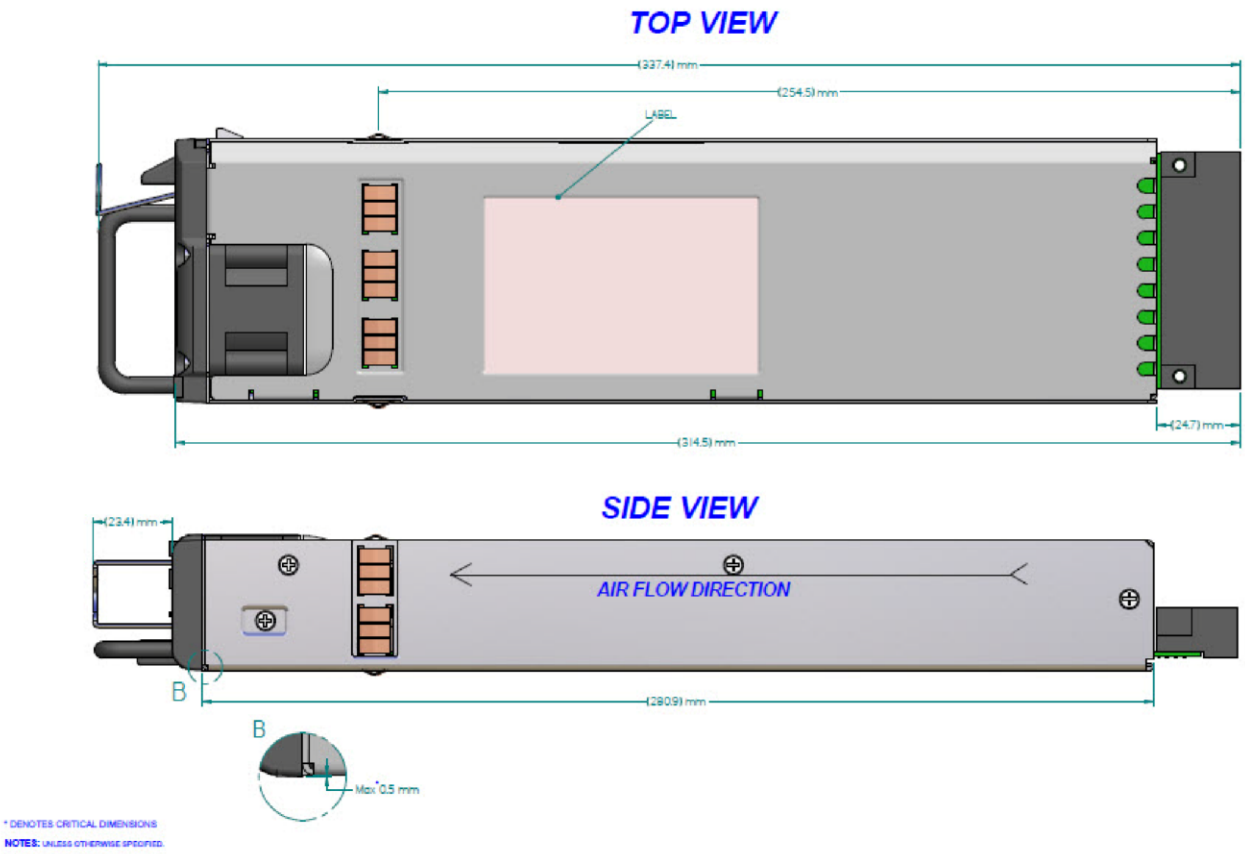


## Connector Information

| | | |
|---|---|---|
| **Power Supply:** | Input - IEC 320 input (Male) standard line cord connection<br>Output - P/N FCI 51721-10002406AA or equivalent | |
| **Mating Connections:** | Input - IEC 320 output (Socket) Standard line cord (15A)<br>Output - P/N: FCI 51741-10002406CC | |
| **Input IEC Connector:** | **Input** | **Location** |
| | Chassis (Safety) Ground | Ground |
| | Line 1 (Line) | L |
| | Line 2 (Neutral) | N |

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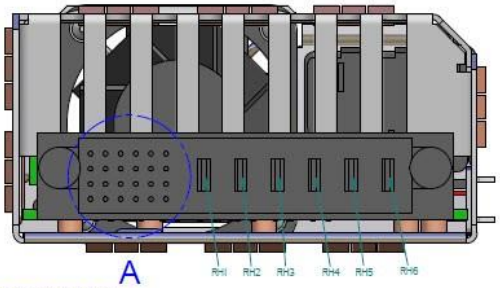
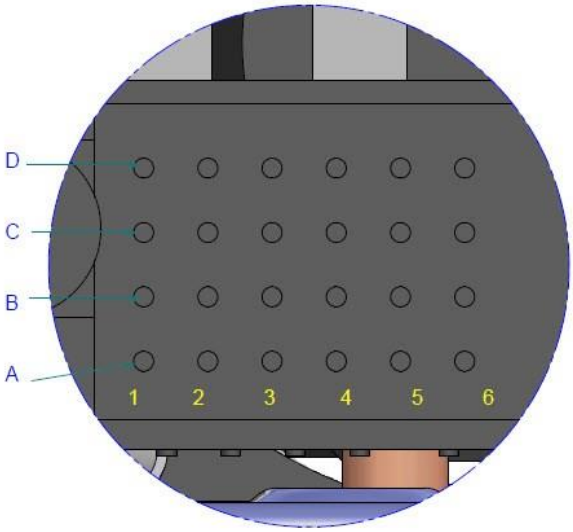
*Output Connector Details*




DETAIL A

OUTPUT CONNECTOR:

FCI ( POWER BLADE )
51721-10002406AC OR EQUIVALENT

WILL MATE WITH SYSTEM BOARD CONNECTOR:

| | |
|---|---|
| FCI ( POWER BLADE )<br>5174-10002406AA<br>5174-10002406BA<br>5174-10002406CB | STRAIGHT IN CONNECTOR |
| FCI ( POWER BLADE )<br>51761-10002406AA<br>51761-10002406BA<br>51761-10002406CB | RIGHT ANGLE CONNECTOR |

| PIN | SIGNAL NAME |
|---|---|
| RH1 | +12V Return |
| Rh2 | +12v Return |
| Rh3 | +12v Return |
| Rh4 | +12v |
| Rh5 | +12v |
| Rh6 | +12v |
| A1 | PS KILL |
| A2 | +12v Current Share |
| A3 | RETURN |
| A4 | EEPROM-WP |
| A5 | PS A0 |
| A6 | +3.3V SB |
| B1 | RETURN |
| B2 | Spare |
| B3 | RETURN |
| B4 | +3.3v SB |
| B5 | SDA |
| B6 | PSON/L |
| C1 | RETURN |
| C2 | Tach 1 |
| C3 | RETURN |
| C4 | +3.3v SB |
| C5 | SCL |
| C6 | ACOK/L |
| D1 | Present/L |
| D2 | Spare |
| D3 | RETURN |
| D4 | +3.3V SB |
| D5 | Alert/L |
| D6 | PWROK/H |

NOTES: UNLESS OTHERWISE SPECIFIED.

WILL MATE WITH SYSTEM BOARD CONNECTOR:

| | |
|---|---|
| FCI ( POWER BLADE )<br>5174-10002406AA<br>5174-10002406BA<br>5174-10002406CB | STRAIGHT IN CONNECTOR |
| FCI ( POWER BLADE )<br>51761-10002406AA<br>51761-10002406BA<br>51761-10002406CB | RIGHT ANGLE CONNECTOR |

FCI 51761-10002406
FCI 5174-10002406 A A
B A
C B

"A" = .135 +/-.010 (3.43 +/- 0.25 ) SOLDER TO BOARD.

"B" = .090 +.005 / -.010 (2.29 +0.13 / -0.25 ) SOLDER TO BOARD

"C" = .154 +/-.010 ( 3.91 +/-0.25 ) PRESS FIT TO BOARD

"A" = BOARD LOCK (REQUIRES .098 +.002/-.001
(2.49 +0.05/ -0.03 ) THRU HOLE IN PCB
MOUNTING FOOT HEIGHT: .220 (5.59 )
* * NOT AVAILABLE FOR PRESS FIT * *

"B" = .150 ( 3.81 ) THRU HOLE (REQUIRES .158 +/- 0.003
( 4.01 +/- 0.08 ) THRU HOLE IN PCB ).
MOUNTING FOOT HEIGHT .160 (4.06 )
* * ALLWAYS FOR PRESS FIT * *

## 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.

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