



## FEATURES

- RoHS compliant
- 1600W (220Vac), 1200W (110Vac) Output Power
- 48V Main output, 3.3V, 5V or 12V standby output
- 1U sized; dimensions 12" x 4.75" x 1.6"
- 17.5 Watts per cubic inch density
- N+1 redundancy capable, including hot-docking
- Active current sharing on main output
- Over-voltage, over-current, over-temperature protection
- Internal cooling fans
- I<sup>2</sup>C Bus interface with status indicators
- Optional 1U x 19" power-shelf

## DESCRIPTION

The D1U-W-1600 is a 1600 Watt, power-factor-corrected (PFC) front-end power supply for hot-swapping redundant systems. The main output is 48V and standby output of either 12V, 5V or 3.3V. Packaged in 1U low profile, it is designed to deliver reliable bulk power to servers, workstations, storage systems or any 48V distributed power architecture systems requiring high power density. The highly efficient electrical and thermal design with internal cooling fans supports reliable operation conditions. The D1U-W-1600 is designed to auto-recover from over-current and over-temperature faults. Status information is provided with front panel LEDs, logic signals and I<sup>2</sup>C management interface. Three units can be packaged into an optional 19" 1U power shelf to provide up to 4.8kW of power.

## SELECTION GUIDE

Model Number	Power Output High Line AC	Power Output Low Line AC	Main Output	Standby Output	Airflow
D1U-W-1600-48-HC2C	1600W	1200W	48V	3.3V	Back to front
D1U-W-1600-48-HA2C	1600W	1200W	48V	5V	Back to front
D1U-W-1600-48-HB2C	1600W	1200W	48V	12V	Back to front
D1U-W-1600-48-HC1C	1600W	1200W	48V	3.3V	Front to back
D1U-W-1600-48-HA1C	1600W	1200W	48V	5V	Front to back
D1U-W-1600-48-HB1C	1600W	1200W	48V	12V	Front to back

## INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Input Voltage Operating Range		90		264	Vac
Input Frequency		47	55	63	Hz
Turn-on Input Voltage	Ramp up	78.5		86.5	Vac
Turn-off Input Voltage	Ramp down	70.5		78	
Maximum Input Current				15	Arms
Inrush Current				90	Apk

## OUTPUT VOLTAGE CHARACTERISTICS

Output Voltage	Parameter	Conditions	MIN.	TYP.	MAX.	Units
48V	Voltage Set Point Accuracy			48		Vdc
	Line and Load Regulation		46.54		49.44	
	Ripple Voltage & Noise <sup>1</sup>	20MHz Bandwidth			480	mV p-p
	Output Current		2		33	A
3.3Vsb	Voltage Set Point Accuracy			3.3		Vdc
	Line and Load Regulation		3.2		3.4	
	Ripple Voltage & Noise <sup>1</sup>				50	mV p-p
	Operating Range		0		4.5	A
5Vsb	Voltage Set Point Accuracy			5		Vdc
	Line and Load Regulation		4.85		5.15	
	Ripple Voltage & Noise <sup>1</sup>				50	mV p-p
	Operating Range		0		4	A
12Vsb	Voltage Set Point Accuracy			12		Vdc
	Line and Load Regulation		11.2		12.4	
	Ripple Voltage & Noise <sup>1</sup>				120	mV p-p
	Operating Range		0		1.7	A

## OUTPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Remote Sense			240		mV
Efficiency	220Vac		90.6		%
Start-up Time	AC ramp up		1.5		s
	PS_On activated		150		ms
Transient Response	48V Ramp 1A/μs			±2700	mV
	12Vsb Ramp 1A/μs			±600	
	5Vsb Ramp 1A/μs			±250	
	3.3Vsb Ramp 1A/μs			±165	
Current sharing accuracy (up to 3 in parallel)	At 100% load			±10	%
Hold-up Time		20			ms

<sup>1</sup> Ripple and noise are measured with 0.1 uF of ceramic capacitance and 10 uF of tantalum capacitance on each of the power supply outputs. The output noise requirements apply over a 0 Hz to 20 MHz bandwidth. A short coaxial cable with 50ohm scope termination is used.



GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Storage Temperature Range	Non-condensing	-40		125	°C
Operating Temperature Range		0		50	
Operating Humidity	Non-condensing	10		90	%
Storage Humidity		5		90	
Shock	30G non operating				
Sinusoidal Vibration	0.5G, 5 – 500 Hz				
MTBF	Calculated per Bellcore at Ta=30°C	200			Khrs
	Demonstrated	200			Khrs
Safety Approvals	c-CSA-us (CSA 60950-1-03/UL 60950-1, First Edition)				

PROTECTION CHARACTERISTICS						
Output Voltage	Parameter	Conditions	MIN.	TYP.	MAX.	Units
48V	Over-temperature	Auto-restart	55		65	°C
	Over Voltage	Latching	54		59	V
	Over Current	Latching	37		42	A
12Vsb	Over Voltage	Latching	13		14	V
	Over Current	Latching	2.5		3	A
3.3Vsb	Over Voltage	Latching	3.57		4.02	V
	Over Current	Latching	6.5		8	A
5Vsb	Over Voltage	Latching	5.6		6	V
	Over Current	Latching	4.4		6	A

ISOLATION CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Insulation Safety Rating / Test Voltage	Input to Output - Reinforced	3000			Vrms
	Input to Chassis - Basic	1500			Vrms
Isolation	Output to Chassis				
	Output to Output				
Material Flammability	UL 94V-0				

CONTROL SIGNALS		
Status	Conditions	Description
LED	Off	No AC input to all PS
	Flashing Yellow	Power Supply Failure
	Flashing Green	Main Output Absent
	Green	Power Supply Good

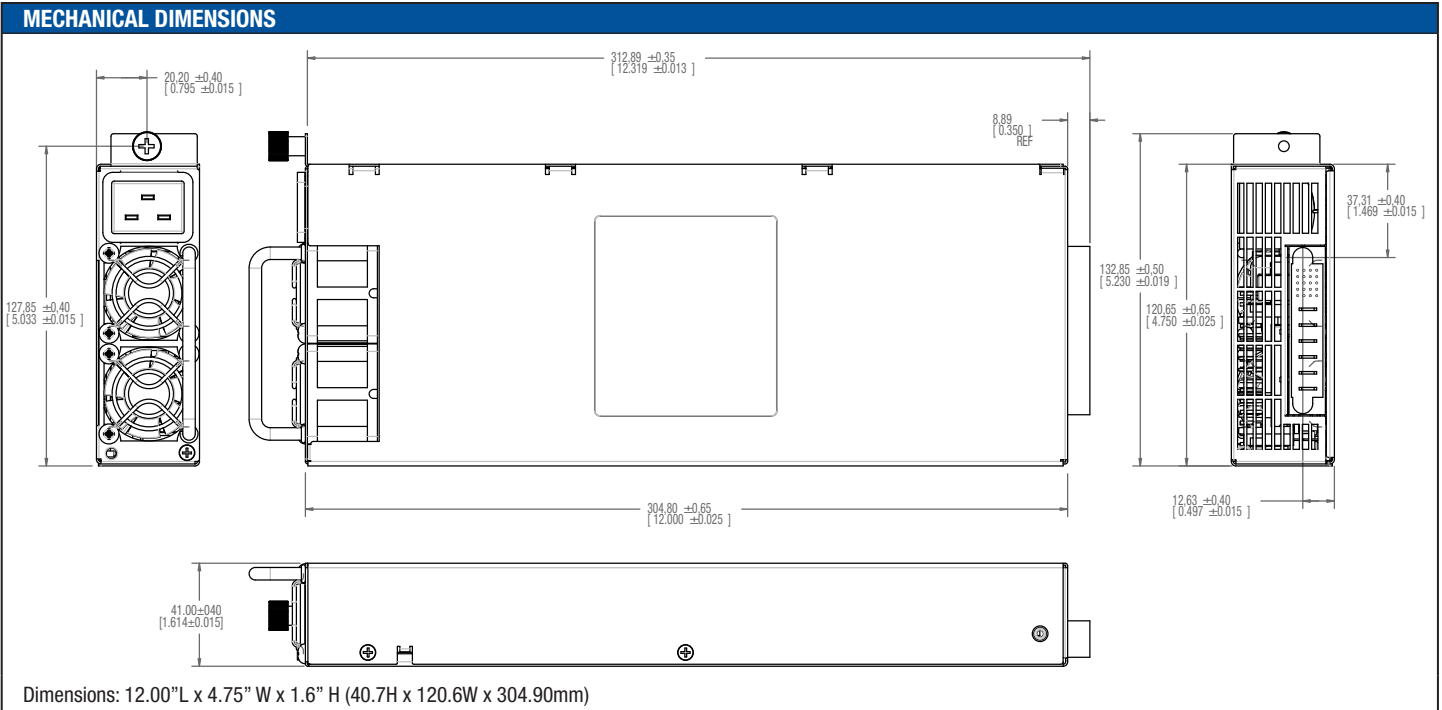
EMISSIONS AND IMMUNITY		
Characteristic	Description	Criteria
Harmonics	IEC/EN 61000-3-2	
Voltage Fluctuation and Flicker	IEC/EN 61000-3-3	
Emission Conducted	FCC 47 CFR Parts 15/CISPR 22/EN55022	Class A, 6dB margin
Emission Radiated	FCC 47 CFR Parts 15/CISPR 22/EN55022	Class A, 6dB margin
ESD	IEC/EN 61000-4-2	4kV contact discharge
		8kV operational air discharge
		15kV non-operational air discharge
Electromagnetic Field	IEC/EN 61000-4-3	
Electrical Fast Transients/Burst	IEC/EN 61000-4-4	
Surge	IEC/EN 61000-4-5	1kV/2kV, Performance Criteria B
RF Conducted Immunity	IEC/EN 61000-4-6	3 Vac, 80% AM, 1kHz, Performance Criteria A
Magnetic Immunity	IEC/EN 61000-4-8	3 A/m
Voltage dips, interruptions	IEC/EN 61000-4-11	

## OUTPUT CONNECTOR AND SIGNAL SPECIFICATION

DC and Signal Connector: Tyco Part # 1-6450332-7, or FCI PowerBlade # 51732-028

P1	P2	P3	P4	P5	P6	x1	x2	x3	x4	x5	
V <sub>OUT</sub>	V <sub>OUT</sub>	V <sub>OUT</sub>	V <sub>RTN</sub>	V <sub>RTN</sub>	V <sub>RTN</sub>	AC_OK	P_GOOD	V <sub>SB</sub> +OUT	V <sub>SB</sub> RETURN	V <sub>SB</sub> RETURN	D
						PS_ON	V <sub>SB</sub> +OUT	V <sub>SB</sub> +OUT	V <sub>SB</sub> RETURN	V <sub>SB</sub> RETURN	C
						I_SHARE	I <sup>2</sup> C ADDR0	I <sup>2</sup> C ADDR1	I <sup>2</sup> C ADDR2	PS_PRESENT	B
						PS_KILL	V <sub>OUT</sub> SENSE+	V <sub>OUT</sub> SENSE-	I <sup>2</sup> C DATA	I <sup>2</sup> C CLOCK	A

Pin Assignment	Signal Name	Description	High Level Low Level	I Max
P1, P2, P3	V <sub>OUT</sub>	Main output voltage		
P4, P5, P6	V <sub>RTN</sub>	Main output voltage, return		
A2	V Sense +	V <sub>OUT</sub> remote sense, positive node input		
A3	V Sense -	V <sub>OUT</sub> remote sense, negative node input		
C2, C3, D3	V <sub>SB</sub>	Standby voltage output		
C4, C5, D4, D5	V <sub>SB</sub> Return	Standby voltage, return		
B1	I_Share	Active load sharing bus	0 – 8V	-4 mA / +5 mA
D1	AC_OK	Input AC Voltage “OK” signal output (Internal pull up is 10kΩ to Vsb for the 3.3V/5V aux. models and 10kΩ to 5V for the 12V aux. model)	>2.4V (active, OK) <0.4V	-2 mA +4 mA
D2	P_Good	Power good signal output (Internal pull up is 10kΩ to Vsb for the 3.3V/5V aux. models and 10kΩ to 5V for the 12V aux. model)	>2.4V (active, Good) <0.4V	-2 mA +4 mA
A1	PS_Kill	Floating pin will turn off P/S.	Vsb	TBD mA
B5	PS_Present	Internally tied to Vsb return	0 V	
C1	PS_On	Internal 1K ohm pull-up to Vsb, (accepts open collector/drain drive)	>2.1V (open, or Vsb) <0.7V (active, PS:On)	-1 mA -4 mA
A4	I <sup>2</sup> C Data	I <sup>2</sup> C serial data bus	Vsb	
A5	I <sup>2</sup> C Clock	I <sup>2</sup> C serial clock bus	Vsb	
B2	I <sup>2</sup> C Adr0	Address input 0, internal pull-up to Vsb	>2.1V, < Vsb <0.8V	±1 mA
B3	I <sup>2</sup> C Adr1	Address input 1, internal pull-up to Vsb	>2.1V, <Vsb <0.8V	±1 mA
B4	I <sup>2</sup> C Adr2	Address input 2, internal pull-up to Vsb	>2.1V, <Vsb <0.8V	±1 mA



**D1U MATING CONNECTORS**

48V D1U mating connector				
	Press Fit		Solder <sup>2</sup>	
	Straight	Right Angle	Straight	Right Angle
C&D	N/A	Pending	N/A	36-0430032-0
FCI	51742-10602000CALF	51762-10602000CBLF	51742-10602000AALF	51762-10602000ABLF
Tyco	TBD	TBD	TBD	TBD

<sup>2</sup> Solder connector recommended for board thickness of <0.090

**OPTIONAL ACCESSORIES**

Description	Part Number
48V D1U Output Connector Card	D1U-48-CONC