ARTESYN DS2000SPE SERIES

2000 Watts Distributed Power System



Advanced Energy's Artesyn DS2000SPE is an ultra-high denstiy power supply providing 50W per cubic inch. The 2000 watt DS2000SPE power supply is housed in 1U high rack-mounting enclosures measuring just 3.4 x 7.7 in (86.3 x 196.5 mm). This form factor is significantly shorter than that of similarly rated earlier-generation power supplies — freeing up valuable system space — and is achieved by use of the latest power switching technology and high density component packaging techniques.

AT A GLANCE

Front-end Bulk Power

Total Output Power

2000 W continuous at high line 90 to 140 VAC & 180 to 264 VAC operation

SPECIAL FEATURES

- 2000 W output power at high line
- High power and short form factor
- 1U power supply
- High density design: 50 W/in^3
- Active power factor correction
- Inrush current control
- 80PLUS platinum efficiency
- N+1 or N+N redundant
- Active current sharing
- PMBus compliant
- Two-year warranty

COMPLIANCE

- Class A Conducted/Radiated EMI
- RoHS

SAFETY

- UL/cUL 60950 (UL Recognized)
- DEMKO+ CB Report EN60950
- EN60950
- CE Mark
- UKCA Mark

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ELECTRICAL SPECIFICATIONS

Input	
Input voltage range	180 to 264 VAC: 2000 W 90 to 140 VAC: 1000 W
Frequency	47 Hz to 63 Hz
Efficiency	94.0% peak
Max input current	11.5 Arms at 100/200 VAC
Inrush current	50 Apk
Conducted EMI	Class A
Radiated EMI	Class A
Power factor	> 0.9 beginning at 20% load
ITHD	10%
Leakage current	1.0 mA
Hold-up time	11 ms at 95% load

ORDERING INFORMATION

Model Number	Nominal Main Output	Standby Output	Airflow Direction
DS2000SPE-3	12.2 V @ 163.9 A	12 V @ 3.5 A	Standard (forward)
TBD	12.2 V @ TBD	12 V @ 3.5 A	Reverse

ELECTRICAL SPECIFICATIONS

Output			
Main DC output	MIN	NOM	MAX
Nominal setting	12.175	12.2	12.225
Total output regulation range	11.4 V		12.9 V
Dynamic load regulation range	11.4 V		12.9 V
Output ripple			180 mVp-p
Output current	5.0 A[1,2] (minimum starting load for 17% transient step)		163.9 A at high line 82 A at low line
Current sharing	Within +/-7.0 A of each other		
Capacitive loading	4,900 µF		38,000 µF
Start-up from AC to output			2,300 ms
Output rise time			100 ms
Standby DC output	MIN	NOM	MAX
Nominal setting	11.95	12	12.05
Total output regulation range	11.4 V		12.6 V
Dynamic load regulation range	11.4 V		12.6 V
Output ripple			120 mVp-p
Adjustment range		N/A	
Output current	0.0 A		3.5 A
Current sharing		N/A	
Capacitive loading	1 µF		4700 µF
Start-up from AC to output	20 ms		2000 ms
Protections			
Main Output	MIN	NOM	MAX
Overcurrent protection[3]	107%		130%
Overvoltage protection[3]	13.5 V		14.5 V
Undervoltage Protection	10.0 V		10.5 V
Overtemperature protection[4]		Yes	
Fan fault protection[4]		Yes	
Standby Output			
Overcurrent protection[4]	110%		150%
Overvoltage protection[3]	13.5 V		15.0 V
Undervoltage protection[4]	10.0 V		10.5 V

1 Minimum current for transient load response testing only. Unit is designed to operate and be within output regulation range at zero load.
2 Output voltage will stay within regulation during a 50% step load with a minimum starting load of 41A.
3 Latch mode
4 Auto-recovery

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.			
		MIN	MAX
V_{IL}	Input logic level LOW		0.8 V
V_{IH}	Input logic level HIGH	2.0 V	3.6 V
I_{SOURCE}	Current that may be sourced by this pin		1.0 mA
I_{SINK}	Current that may be sunk by this pin at low state		4.0 mA
PSKILL_H			
First break/last mate active HIGH signal which enables/disables the main output.			
		MIN	MAX
V_{IL}	Input logic level LOW. This allows for the power supply to be turned on		0.8 V
V_{IH}	Input logic level HIGH. Immediately shuts down the power supply	2.0 V	3.6 V
I_{SOURCE}	Current that may be sourced by this pin		
I_{SINK}	Current that may be sunk by this pin at low state		4.0 mA
VSENSE+, VSENSE-			
VSENSE+ and VSENSE- lines are the remote sense lines for regulation. Each line will compensate for a maximum of 100 mV.			
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.			
		MIN	MAX
V_{OL}	Output logic level LOW		0.4 V
V_{OH}	Output logic level HIGH	2.4 V	3.6 V
I_{SOURCE}	Current that may be sourced by this pin		2.0 mA
I_{SINK}	Current that may be sunk by this pin at low state		4.0 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.			
		MIN	MAX
V_{OL}	Output logic level LOW		0.4 V
V_{OH}	Output logic level HIGH	2.4 V	3.6 V
I_{SOURCE}	Current that may be sourced by this pin		2.0 mA
I_{SINK}	Current that may be sunk by this pin at low state		4.0 mA

CONTROL AND STATUS SIGNALS (CONTINUED)

Output Signals			
PS_PRESENT			
Signal used to indicate to the system that a power supply is inserted in the power bay. This pin is connected to the standby return in the power supply.			
PS_INTERRUPT			
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.			
		MIN	MAX
V_{OL}	Output logic level LOW		0.8 V
V_{OH}	Output logic level HIGH	2.0 V	3.6 V
I_{SOURCE}	Current that may be sourced by this pin		2.0 mA
I_{SINK}	Current that may be sunk by this pin at low state		4.0 mA
BUS Signals			
I_{SHARE}			
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 inorder to load share.			
I_{SHARE} Voltage		Min	Max
	Voltage at 50% load, stand-alone unit	3.412	3.588
	Voltage at 100% load, stand-alone unit	6.912	7.088
SCL, SDA			
Clock, data and addressing signals defined as per I^2C requirements. It is recommended that these pins be pulled-up to a 2.0 kohm resistor to 3.3 V and a 100 pF decoupling capacitor at the system side.			
		MIN	MAX
V_L	Logic level LOW		0.8 V
V_H	Logic level HIGH	2.0 V	3.6 V

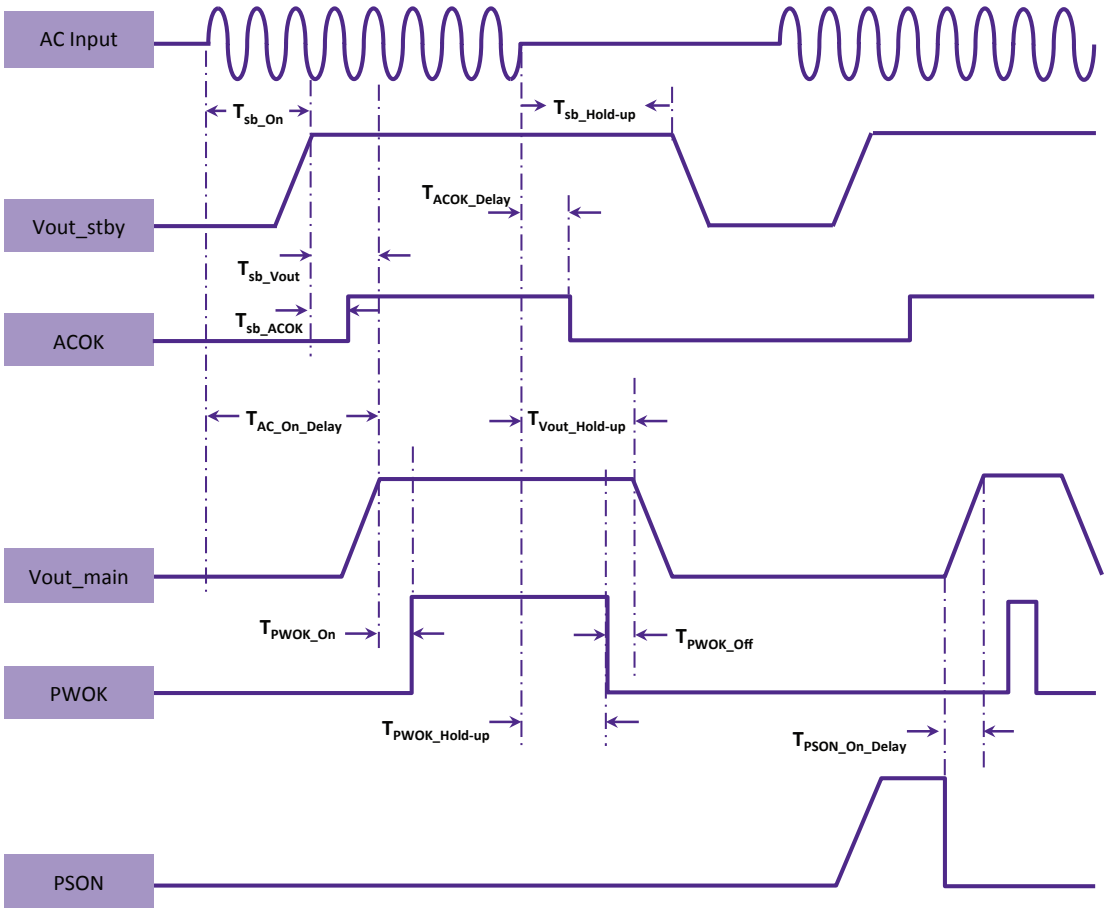
Note: All signal noise levels are below 400 mVpk-pk from 0 - 100 MHz.

LED Indicators	
A single bi-color LED is used to indicate the power supply status.	
	Status LED
No AC input to PSU with external 12 V	Blinking AMBER
Main output ON	Solid GREEN
Standby mode and Power supply failure (OCP, OVP, OTP, FAN FAULT)	Blinking AMBER

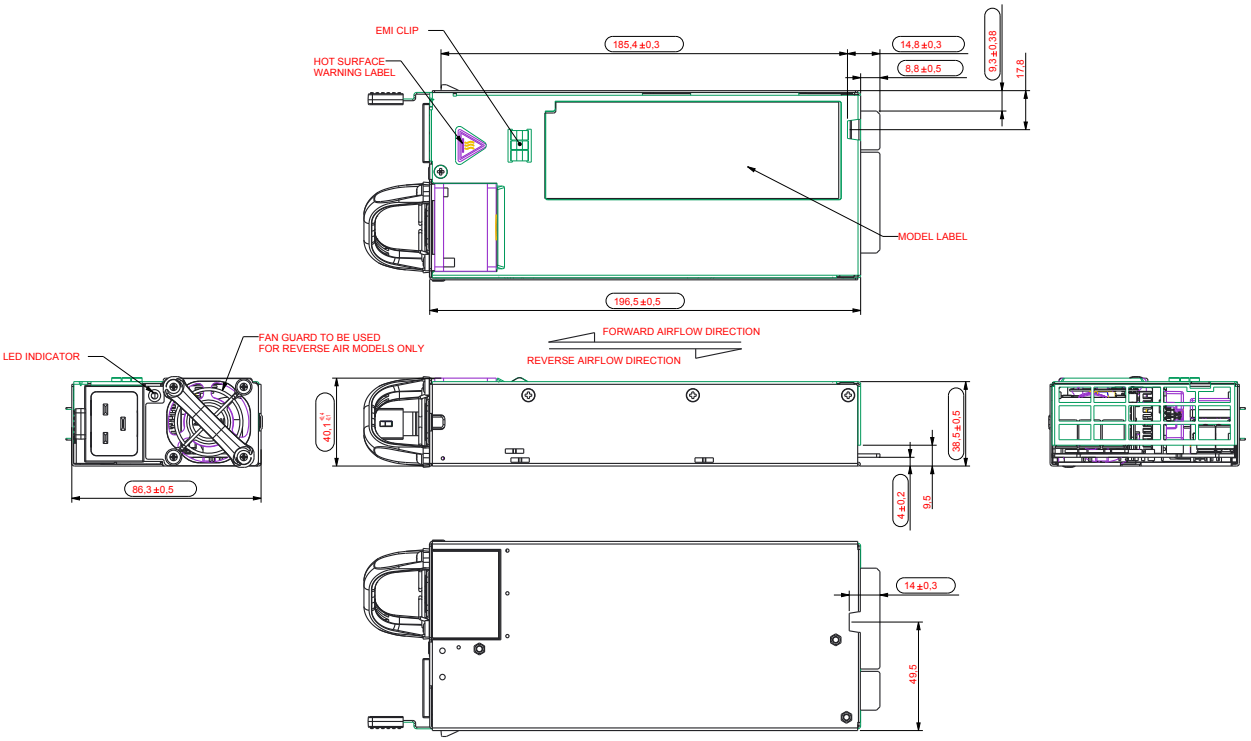
ELECTRICAL SPECIFICATIONS

Timing Specifications				
	Description	Min	Max	Unit
T_{sb_On}	Delay from AC being applied to standby output being within regulation	20	2000	ms
T_{sb_ACOK}	Delay from standby output to ACOK assertion		20	ms
T_{sb_Vout}	Delay from standby output to main output voltage being within regulation		300	ms
$T_{AC_On_Delay}$	Delay from AC being applied to main output being within regulation		2300	ms
T_{PWOK_On}	Delay from output voltages within regulation limits to PWOK asserted	100	1000	ms
T_{ACOK_Delay}	Delay from loss of AC to assertion of ACOK		7	ms
$T_{PWOK_Hold\text{-}up}$	Delay from loss of AC to deassertion of PWOK	10		ms
$T_{Vout_Hold\text{-}up}$	Delay from loss of AC to main output being within regulation	11		ms
$T_{sb_Hold\text{-}up}$	Delay from loss of AC to standby output being within regulation * Standby output loaded at 1.0 A	150		ms
$T_{PWR_GOOD_Off}$	Delay from deassertion of PWOK to output falling out of regulation	1		ms
$T_{PSON_On_Delay}$	Delay from PSON assertion to output being within regulation		350	ms
T_{PWOK_Low}	Duration of PWOK being in deasserted state during an ON/OFF cycle of PSU	N/A	N/A	

TIMING DIAGRAM



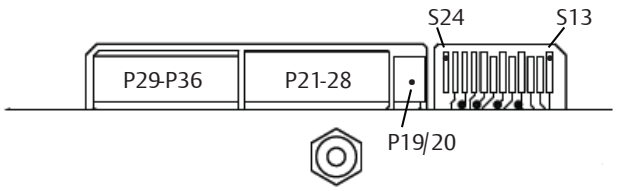
MECHANICAL OUTLINE



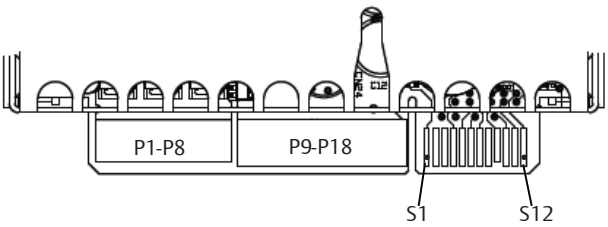
CONNECTOR DEFINITIONS

Output Connector Part Number	Card-edge
Mating Connector Part Number	FCI 10107844-002LF or any 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	A1	S14	PSKILL_H
S3	A0	S15	RESERVED
S4	PWR_GOOD (PWOK)	S16	RETURN
S5	ACOK (AC Input Present)	S17	SDA
S6	RETURN	S18	RETURN
S7	I_SHARE	S19	SCL
S8	RESERVED	S20	RETURN
S9	PS_INTERRUPT_L / ALERT	S21	REMOTE SENSE -
S10	RETURN	S22	RETURN
S11	RESERVED	S23	REMOTE SENSE +
S12	RESERVED	S24	A2
P1-P8	+12VOUT	P19-P20	+VSB
P9-P18	RETURN	P21-P28	RETURN
		P29-P36	+12VOUT

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	0 to 50°C, allowable up to 60°C at derated output of 2.6%/°C above 50°C
Operating altitude	16,400 ft with derated power
Operating relative humidity	Up to 95% non-condensing
Non-operating temperature	-40 to +70°C
Non-operating relative humidity	Up to 95% non-condensing
Non-operating altitude	up to 50,000 feet
Vibration and shock	Standard operating and non-operating random shock and vibration
ROHS compliance	Yes
MTBF	900 khours Telcordia Issue 3
Operating life	Minimum of 5 years

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

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