ARTESYN DS500SDC

500 Watts

Distributed Power System



Advanced Energy's Artesyn DS500SDC-3 series bulk front end DC-DC power supply accepts a wide range -36 to –72 VDC input and provides a main 12 V output plus a 12 V standby output. It is rated at 500 watts. Housed in a 1U high rack-mounting enclosure with a short form factor that frees up system space, the DS500SDC-3 has a power density of 10.9 watts per cubic inch. This series comes in two airflow versions – dc-connector to ac-connector and vice versa. The series is also in the same form factor and has the same output configuration as the DS500SPE-3.

DATA SHEET

Front-end Bulk Power

Total Output Power:

500 W continuous

Wide Input Voltage:

-36 to -72 Vdc

PMBus

SPECIAL FEATURES

- 500 W output power
- High power and short form factor
- 1U power supply
- High-density design: 12 W/in^3
- Inrush current control
- N+1 or N+N redundant
- Active current sharing
- Full digital control
- PMBus compliant
- Compatible with Artesyn's Universal PMBus GUI
- Reverse airflow available
- Two-year warranty

COMPLIANCE

- EMI Conducted/Radiated Class A Limits

SAFETY

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

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ELECTRICAL SPECIFICATIONS

Input						
Input range	-36 to -72 Vdc					
Efficiency	90.0% peak					
Max input current	17.5 Arms					
Inrush current	55 Apk					
Conducted EMI	Class A					
Radiated EMI	Class A					
Hold-up time	1 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			120 mVp-p			120 mVp-p
Output current	2 A[1]		41.67 A	0.1 A		3.0 A
Current sharing	Within ±5% of full load rating			N/A		
Capacitive loading	2000 µF		40,000 µF	47 uF		680 µF
Startup from AC to output			2200 ms			1700 ms
Output rise time	5 ms		50 ms	2 ms		60 ms

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

Protections			
Main Output	MIN	NOM	MAX
Overcurrent protection[2]	120%		150%
Overvoltage protection[1]	13.5 V		15.0 V
Undervoltage protection	10.5 V		11.0 V
Overtemperature protection		Yes	
Fan fault protection		Yes	
Standby Output			
Overcurrent protection[3]	120%		150%
Overvoltage protection[3]	13.5 V		15.0 V
Undervoltage protection	10.0 V		11.0 V

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

ELECTRICAL SPECIFICATIONS (CONTINUED)

LED Indicators	
A single bi-color LED is used to indicate the power supply status.	
	Status LED
No DC 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	±2%		
Input current	±0.55 A fixed error	±4%	
Input power	±1.25 W at < 125 W input	±1.25%	
Output voltage	±2%		
Output current	0.3 A fixed error	±2%	
Temperature	±5 °C on the operating range		
E_{IN}	±15% from 10% to 20% load	±5%	
Fan speed	Actual RPM ±250 RPM		
PMBus	YES		
Remote ON/OFF	YES		

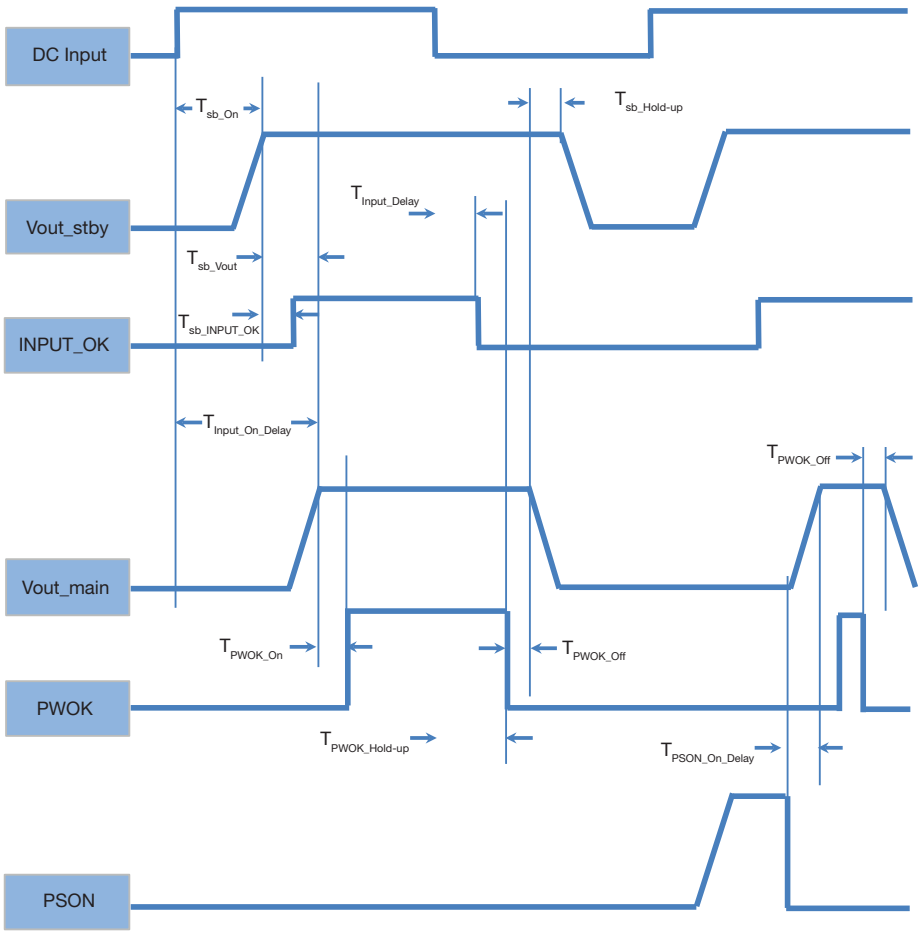
Timing Specifications				
	Description	Min	Max	Unit
T_{sb_On}	Delay from DC input being applied to standby output being within regulation	20	1700	ms
$T_{sb_INPUT_OK}$	Delay from standby output to INPUT_OK assertion	See note below	20	ms
T_{sb_Vout}	Delay from standby output to main output voltage being within regulation		300	ms
$T_{INPUT_On_Delay}$	Delay from DC input being applied to main output being within regulation		2200	ms
$T_{PWR_GOOD_On}$	Delay from output voltages within regulation limits to PWOK asserted	100	1000	ms
$T_{INPUT_OK_Delay}$	Delay from loss of DC input to assertion of INPUT_OK		6	ms
$T_{PWR_GOOD_Hold\text{-}up}$	Delay from loss of DC input to deassertion of PWOK	0.1	0.2	ms
$T_{Vout_Hold\text{-}up}$	Delay from loss of DC input to main output being within regulation	1		ms
$T_{sb_Hold\text{-}up}$	Delay from loss of DC input to standby output being within regulation	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	

Note: $T_{sb_hold\text{-}up}$: tested at 1A load on standby output, and 0A load on main output.
$T_{sb_INPUT_OK}$: INPUT_OK can assert earlier than the standby output

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	DS500SDC-3: 500 W from 0 °C to 50 °C DS500SDC-3-001: 500 W from 0 °C to 40 °C
Operating altitude	up to 10,000 feet with derating
Operating relative humidity	10% to 80% non-condensing
Non-operating temperature	-40 °C 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 shock/vibration
ROHS compliance	YES
MTBF	1,000,000 hours per Telcordia Issue 3, Method 1, Case 3 at 50 °C at full load.
Operating life	Minimum of 5 years
Reliability	All electronic component derating analysis is done at maximum ambient, 80% of maximum rated load, nominal input line voltage.

TIMING DIAGRAM



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
Output Signals			
INPUT_OK			
Signal used to indicate the presence of DC input to the power supply. A logic level HIGH will indicate that the DC input to the power supply is within the operating range while a logic level LOW will indicate that DC input 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 DC 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

CONTROL AND STATUS SIGNALS (CONTINUED)

Output Signals			
PS_PRESENT_L			
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 inorder 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	Input logic level LOW	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^2C 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

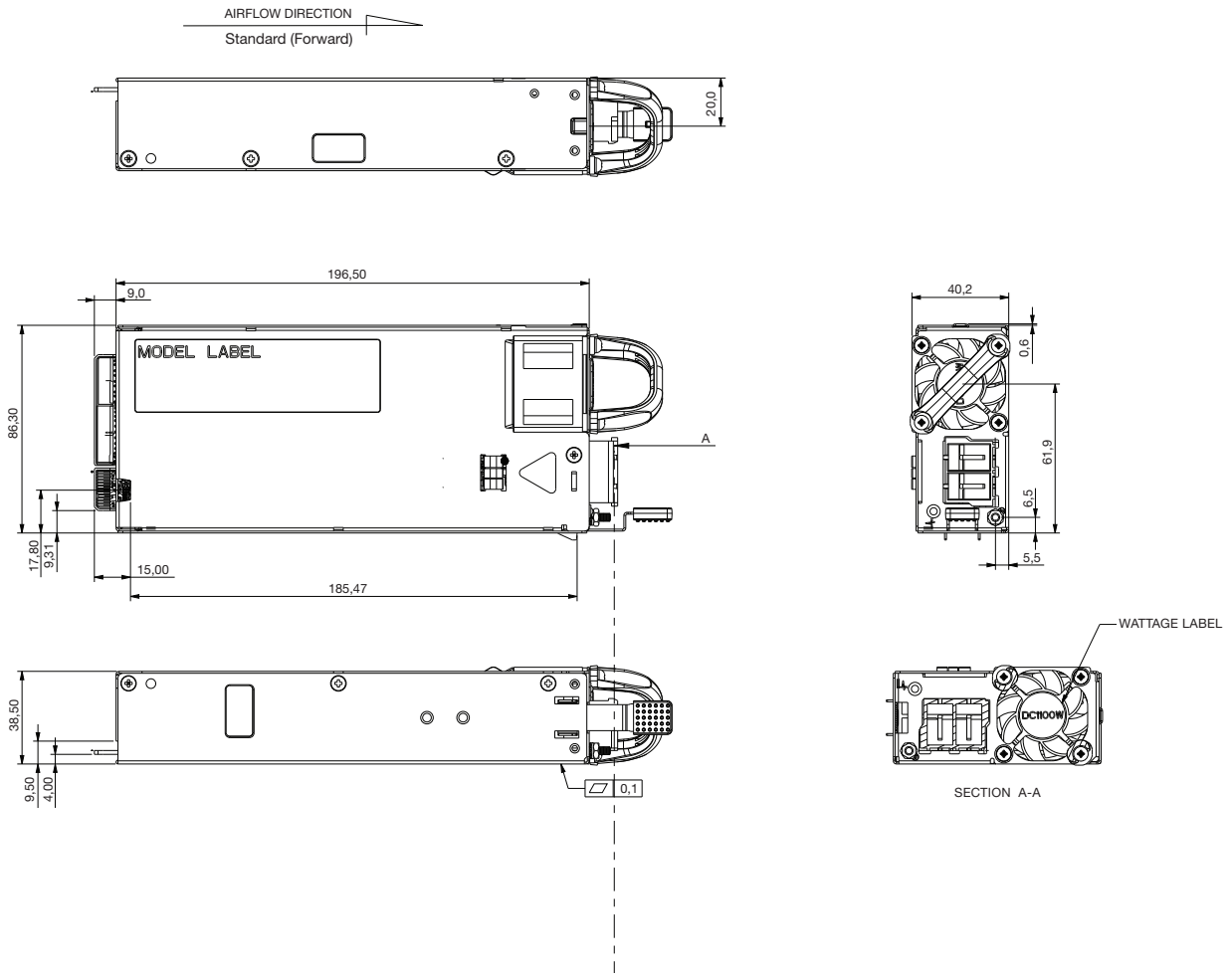
Note: All signal noise levels are below 400 mVpk-pk from 0 - 100 MHz.
I^2C Addressing Table: Not applicable. This power supply has a fixed I^2C address. In order to support multiple addresses, the system will have to utilize a switcher or an I^2C expander.

ORDERING INFORMATION

Model Number	Nominal Main Output	Standby Output	Airflow Direction
DS500SDC-3	12 V	12 V @ 3A	Std (forward)
DS500SDC-3-001	12 V	12 V @ 3A	Reverse[1]

1 Derating may apply

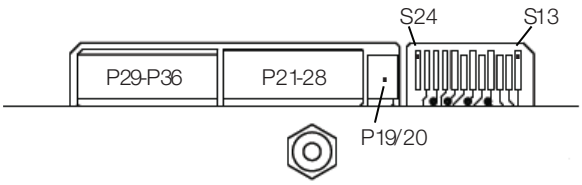
MECHANICAL DRAWING



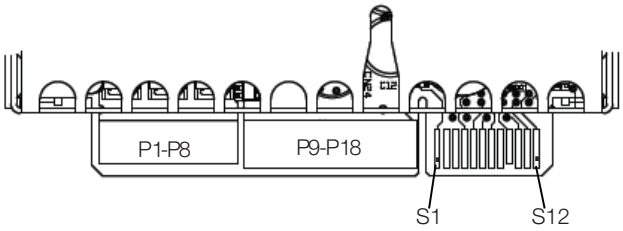
CONNECTOR DEFINITIONS

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

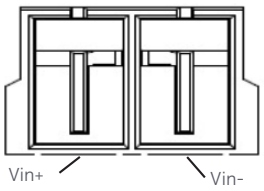
Power Supply Output Card Edge (Bottom Side)



Power Supply Output Card Edge (Top Side)



Input Connector (System Side)	Molex 394210002
PSU Side Connector Part Number	Molex 394250002



OUTPUT CONNECTOR PIN CONFIGURATION

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

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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For international contact information,
visit advancedenergy.com.

powersales@aei.com (Sales Support)
productsupport.ep@aei.com (Technical Support)
+1 888 412 7832

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ENG-DS500SDC-235-01 12.10