ARTESYN HPS3000 SERIES

3000 Watts

Advanced Energy's Artesyn HPS3000 series bulk front end AC-DC power supply accepts a wide range 90 to 264 VAC input and provides a main 48 V output plus a 5 V standby output. It has a full load efficiency of more than 90% and is rated at 3,000 watts when operating from a nominal 200 VAC input. Housed in a 1U x 4.2 inch form factor enclosure, the power supply has a power density of 40 watts per cubic in; four units can fit on a standard 19 in rack shelf, to provide a total of 12 kilowatts.

AT A GLANCE

Distributed Power Bulk Front-End

Single Output

SPECIAL FEATURES

- 3000 W output power
- 40 W/cu-in
- Optional customer provided air
- 1U x 3U form factor
- N+1 redundant
- Internal OR-ing
- 5 V housekeeping
- High efficiency 89% @ 200 VAC, 100% load
- Variable speed “smart fans”
- Two years warranty

SAFETY

- UL/cUL 62368
- CSA 62368
- Nemko TUV
- CB Report
- UKCA Mark

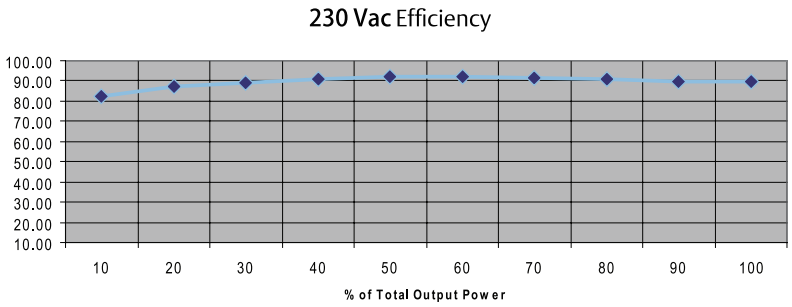
COMPLIANCE

- EMI Class A - EN55032
- EN61000 Immunity

ELECTRICAL SPECIFICATIONS

Input		
Input range (operating)	180 to 264 VAC 90 to 140 VAC	
Nominal input	200 VAC 110 VAC	Input through Card Edge Connection on same end as DC output
Frequency	47 to 63 Hz	
Input fusing	Internal 25 A fuses	Both lines fused
Inrush current	≤40 A peak	Either hot or cold start
Power factor	0.97 typical	Meets EN61000-3-2
Harmonics	Meets IEC 61000-3-2 requirements	@ 50% load
Input current	19 A max input current	
Holdup time	10 ms minimum	At full rated load
Leakage current	1.4 mA	At 240 VAC
Power line transient	MOV directly after the fuse	

Note: HPS3000-9-001 variant available for applications with higher airflow requirements



ELECTRICAL SPECIFICATIONS (CONTINUED)

Output		
Output rating	48 V @ 62.0 A 5 VSB @ 3.0 A	180 to 264 VAC
	48 V @ 29.4 A 5 VSB @ 3.0 A	90 to 140 VAC
Set point	48 V	Programmable 96-117% through I^2C serial bus
Total regulation range	48 V ± 5% 5 VSB ± 4%	Line/load/transient when measured at output connection
Rated load	3000 W maximum @ 200 VAC Input 1500 W maximum @ 110 VAC Input	No derating over operating temp range
Minimum load	48 V @ 0.0 A 5 VSB @ 0.0 A	No loss of regulation
Output noise	480 mV max P-P 100 mV max P-P	48 V output 5 VSB output Measured with a 0.1 µF Ceramic and 10 µF Tantalum capacitor on any input
Output voltage overshoot	± 5% maximum	Nominal Voltage Setting
Transient response	5% maximum deviation	50% load step @ 1 A/us Step load valid between 10% to 100% of output rating.
Max units in parallel	Up to 4	Total power in 1U 19” rack is 12 KW
Short circuit protection	120% to 130% of rated output	Output to return
Forced load sharing	Within ± 6.25 A of all shared outputs	Digital sharing control
Overcurrent protection (OCP)	120% to 130% 110% to 140%	48 V output 5 VSB output
Overvoltage protection (OVP)	110% to 133% 110% to 125%	48 V output 5 VSB output
Overtemperature protection	10 to 15 deg C above safe operating area	Both PFC and output converter monitored 5 VSB will operate under overtemperature condition. Built in hysteresis

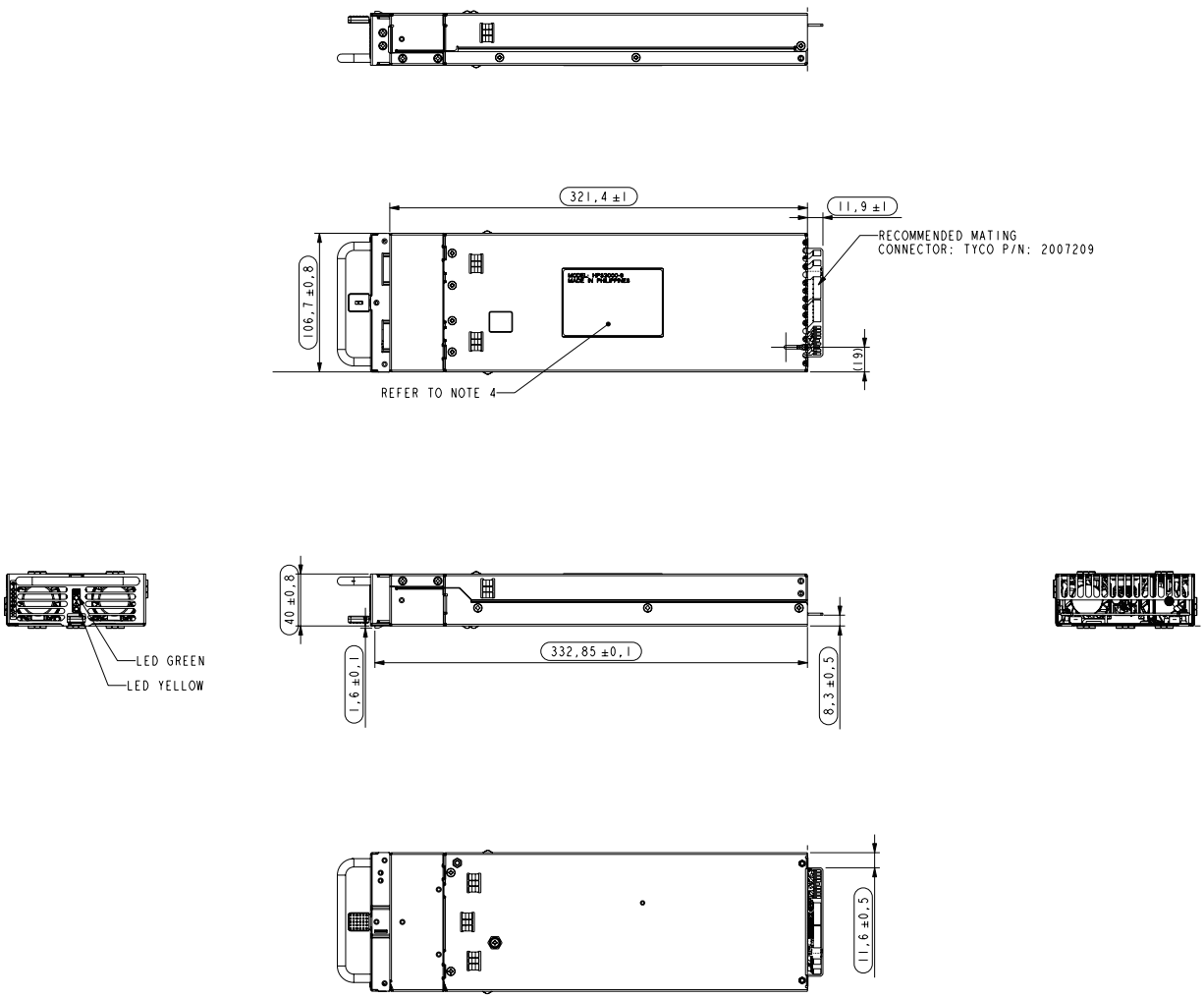
ENVIRONMENTAL SPECIFICATIONS

Vibration/Shock	Non-operational 5G Sine sweep from 5 Hz to 500 Hz, dwelling at resonant frequencies for 1 hour each
Operating temperature	-10°C to +40°C
Storage temperature	-40°C to +85°C
Cooling	External fans with fan fail and fan speed control
Operating relative humidity	5% to 95% non-condensing
Storage relative humidity	5% to 95% non-condensing
Operating altitude	Up to 10,000 feet above sea level
Storage altitude	Up to 30,000 feet above sea level
RoHS compliant	Yes

MODULE INFORMATION

(All units in mm)

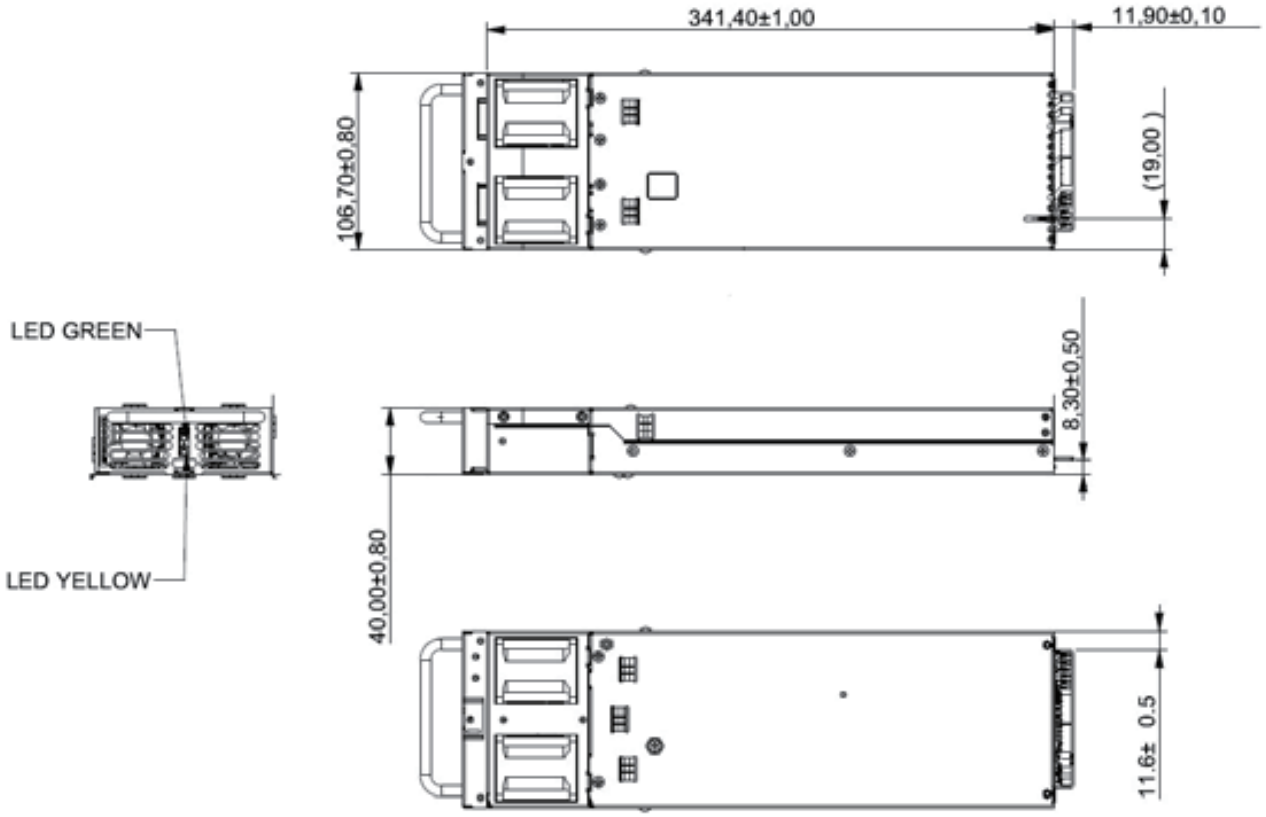
HPS3000-9



MODULE INFORMATION

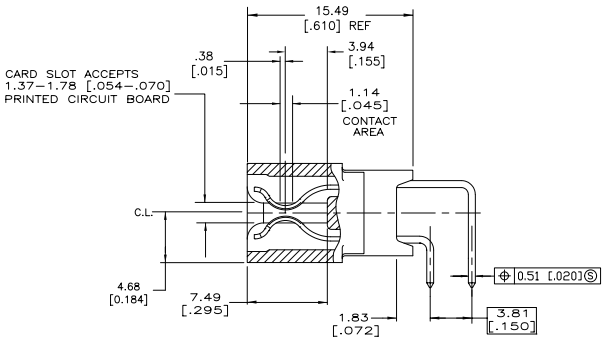
(All units in mm)

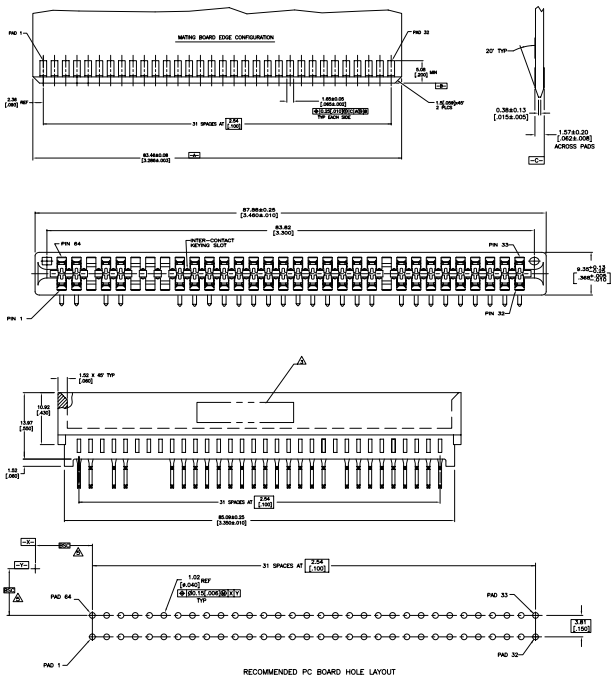
HPS3000-9-001



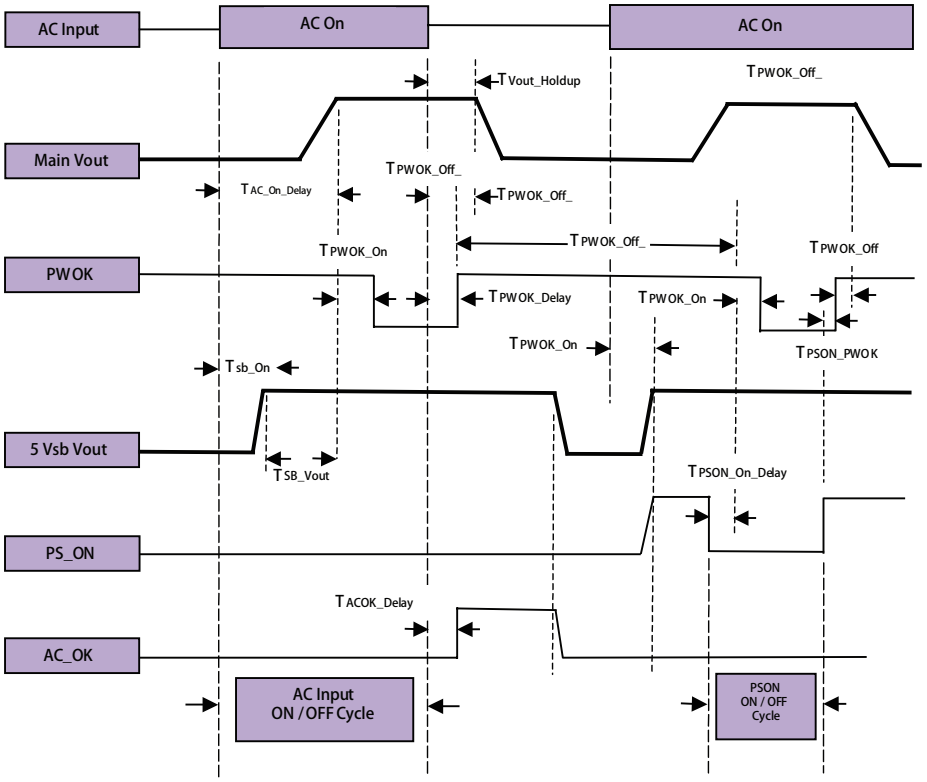
PIN ASSIGNMENTS

Bottom							
Pin							
1	AC LINE	9	+48 VDC out	17	+48 VDC RTN	25	Reserved
2	AC LINE	10	+48 VDC out	18	+48 VDC RTN	26	PRESENT#
3	n.c.	11	+48 VDC out	19	+48 VDC RTN	27	DCOK/PWOK#
4	AC NEUTRAL	12	+48 VDC out	20	+48 VDC RTN	28	SDA
5	AC NEUTRAL	13	+48 VDC out	21	+48 VDC RTN	29	HVCC
6	n.c.	14	+48 VDC out	22	+48 VDC RTN	30	PSON#
7	n.c.	15	+48 VDC out	23	n.c.	31	#ALERT
8	n.c.	16	+48 VDC RTN	24	V_STBY	32	ISHARE
Top							
Pin							
64	AC LINE	56	+48 VDC out	48	+48 VDC RTN	40	Reserved
63	AC LINE	55	+48 VDC out	47	+48 VDC RTN	39	ACOK#
62	n.c.	54	+48 VDC out	46	+48 VDC RTN	38	SMBUS_ALERT_OUT
61	AC NEUTRAL	53	+48 VDC out	45	+48 VDC RTN	37	SCL
60	AC NEUTRAL	52	+48 VDC out	44	+48 VDC RTN	36	A2
59	n.c.	51	+48 VDC out	43	+48 VDC RTN	35	PSKILL
58	n.c.	50	+48 VDC out	42	n.c.	34	A1
57	n.c.	49	+48 VDC RTN	41	SYS_GND	33	A0





TIMING DIAGRAM



TIMING SIGNAL DEFINITIONS

Turn ON/OFF Timing				
Item	Description	Min	Max	Units
Tvout_rise	48 V output rise time	5	300	msec
Tsb_on_delay	Delay from AC being applied to 5 VSB being within regulation.		1500	msec
Tac_on_delay	Delay from AC being applied to all output voltages being within regulation.		2000	msec
Tvout_holdup	Time all output voltages, including 5 VSB, stay within regulation after loss of AC.	10		msec
Tpwok_holdup	Delay from loss of AC to de-assertion of PWOK	5		msec
Tpson_on_delay	Delay from PSON# active to output voltages within regulation limits.	5	400	msec
Tpson_pwok	Delay from PSON# de-active to PWOK being de-asserted.		50	msec
Tacok_delay	Delay from loss of AC input to de-assertion of ACOK#.	10		msec
Tpwok_on	Delay from output voltages within regulation limits to PWOK asserted at turn on.	100	1000	msec
Tpwok_off	Delay from PWOK de-asserted to 48 V dropping out of regulation limits.	1	1000	msec
Tpwok_low	Duration of PWOK being in the de-asserted state during an off/on cycle using AC or the PSON# signal.	100		msec
Tsb_vout	Delay from 5 VSB being in regulation to 48 V being in regulation at AC turn on.	50	2000	msec

SIGNALS AND CONTROLS - ALL MODELS

PSON#		
The PSON# signal is required to remotely turn on/off the power supply. PSON# is an active low signal that turns on the 48 V power rail. When this signal is not pulled low by the system, or left open, the 48 V output turns off. The 5 VSB output remains on. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply. The power supply fan(s) shall operate at the lowest speed.		
PSON# Signal Characteristic		
Signal Type	Accepts an open collector/drain input from the system. Pulled-up to the 5 VSB located in power supply.	
PSON# = Low	ON	
PSON# = Open	OFF	
	MIN	MAX
Logic level low (power supply ON)	0 V	0.4 V
Logic level high (power supply OFF)	2.40 V	3.40 V
Source current, Vpson = low	--	4 mA
Power up delay: Tpson_on_delay	5 msec	400 msec

SIGNALS AND CONTROLS - ALL MODELS (CONTINUED)

PWOK# (Power Good)		
PWOK# is a power good signal and will be pulled LOW by the power supply to indicate that both the outputs are above the regulation limits of the power supply. When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a HIGH state. The start of the PWOK# delay time shall be inhibited as long as the 48 V output is in current limit or the 5 VSB output is below the regulation limit.		
PSON# Signal Characteristic		
Signal Type	Open collector/drain output from power supply. Pullup to 5 VSB external to the power supply.	
PWOK = High	ON	
PWOK = LOW	OFF	
	MIN	MAX
Logic level low voltage, Isink = 4mA	0 V	0.8 V
Logic level high voltage, Isource = 200µA	2.0 V	4.80 V
Sink current, PWOK = low		4 mA
Source current, PWOK = high		2 mA
PWOK delay: $T_{pwok\ on}$	100 msec	1000 msec
PWOK rise and fall time		100 µsec
Power down delay: $T_{pwok\ off}$	1 msec	1000 msec

Power Supply Present Indicator (PRESENT#)		
The PRESENT# signal is primarily used to provide a mechanism by which the host system can sense the number of power supplies physically present (operational or not). This pin is connected to the standby ground in the power supply.		
AC INPUT Present Indicator (ACOK#)		
The AC OK# signal is used to indicate presence of AC input to the power supply. This signal shall be connected to 5 VSB through a resistor on the host system side. A logic “Low” level on this signal shall indicate AC input to the power supply is present. A Logic “High” on this signal shall indicate a loss of AC input to the power supply.		
ACOK# Signal Characteristics		
Signal Type	Pull-up to 5 VSB through a resistor in the host system.	
PRESENT# = Low	Present	
PRESENT# = High	Not present	
	MIN	MAX
Logic level low voltage, Ising = 4 mA	0 V	0.8 V
Logic level high voltage, Isink = 50 µA	2.0 V	4.80 V
Sink current, PRESENT# = Low		4 mA
Source current, PRESENT# = High		50 µA

SIGNALS AND CONTROLS - ALL MODELS (CONTINUED)

LED INDICATORS

There will be a green POWER LED (PWR) to indicate that AC is applied to the PSU and standby voltage is available when blinking. This same LED should go solid when the 48 V output is enabled and operational.
There will be an Amber Power Supply Fail LED (FAIL) to indicate that the power supply has failed and a replacement of the unit is necessary. Faults including UVP, OVP, OTP, or Fan Fail when PSON# is asserted "Logic Low" shall cause the amber LED to turn on. The LED can be turned off by recycling PSON# signal or by an AC power interruption more than 1 second. The LED shall be off when PSON# is not asserted "Logic Low". Refer to table 13 for conditions of the LED's:

LED Indicators		
Power Supply Condition	Power LED (GREEN)	Fail LED (AMBER)
No AC power to PSU	OFF	OFF
AC present / Standby Output On	Blinking	OFF
Power supply 48 V output ON and OK	ON	OFF
Power supply failure (includes overvoltage, overtemperature)	OFF	ON
Current limit	ON	Blinking

MTBF

The power supply has a minimum MTBF of 270K hours using the Telcordia specification @ 25°C and 135K hours @ 40°C, ambient, at full load. With the power supply installed in a system in a 25°C ambient environment and operating at full load, capacitor life shall be 10 years, minimum for ALL electrolytic capacitors contained within this power supply.

Quality Assurance

Full QAV testing shall be conducted in accordance with Artesyn Embedded Power Standards with reports available upon request.

Warranty

Artesyn Embedded Power shall warrant the power supply to be free of defects in materials and workmanship for a minimum period of two years from the date of shipment, when operated within specifications. The warranty shall be fully transferable to the end owner of the equipment powered by the supply.

ORDERING INFORMATION

Model Number	Main Output	Main Output Current	Standby Output	Standby Current
HPS3000-9	48 VDC	62.5 A	5.0 V	3.0 A
HPS3000-9-001	48 VDC	62.5 A	5.0 V	3.0 A

Note: HPS3000-9-001 version is recommended for applications where higher airflow is required.

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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