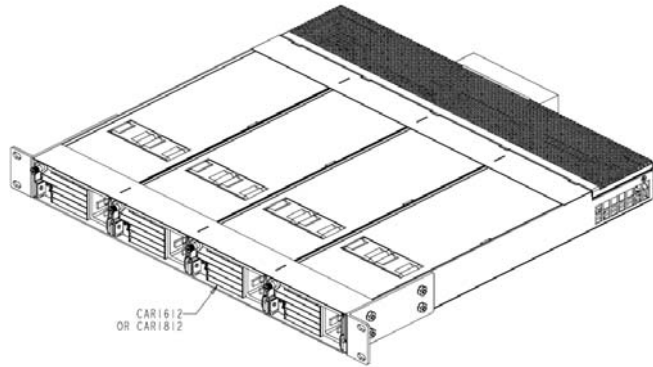


ACE184 Series Power Shelf

Main Output: 600A; Standby output: 8A



Applications

- 12Vdc distributed power architectures
- Mid-End Servers
- Blade Servers
- Network Equipment
- Network Attached Storage
- Storage Area Networks
- Routers/Switches
- Enterprise Networks
- Advanced workstations

Description

The ACE184 series of Power Shelves are designed for the Datacom and Server market segments. These shelves are designed to minimize installation and maintenance time with easy access warm-swap insertion, accommodating, up to 4 modules, rectifiers or converters, with output voltages as high as 60Vdc, in a 19" wide enclosure compliant to ETS300 rack mounting standards. All the necessary interfacing for output and signaling needs are provided. The signaling pins of each module are separately brought out for maximum flexibility.

Features

- Fits in a 19" wide rack system
- Designed for ETS300 rack mounting.
- Supported by a retracted side 'runner'
- 1U high
- Accommodates hot swap capability
- Accepts up to 4 modules
- Proved in with the CAR1812 and CAR1612 rectifiers
- Active current sharing
- Hot insertion/removal (hot plug)
- UL, CSA and VDE certified
- EMI: class A FCC docket 20780 part 15, EN55022
- System meets EN6100 immunity and transient standards
- Shock & vibration: IPC-9592A, Class II

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Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Device	Symbol	Min	Max	Unit
Operating Ambient Temperature	All	TA	-10	70	°C
Storage Temperature	All	Tstg	-40	85	°C

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions.

Parameter	Device	Symbol	Min	Typ	Max	Unit
OUTPUT						
Main output	All	I_{out}	0		600	A_{dc}
Standby Output	All	I_{out}	0		8	A_{dc}
Isolation ¹ Output - Ground	All				500	V_{dc}

Port	Phenomena	test	criteria	Reference standard
Enclosure	ESD (immunity)	8 kVair 4 kVcontact	A	EN 61000-4-2

¹ Isolation in the context of this data sheet documents the capability of the shelf. Actual isolation capability may be further reduced by the isolation capability of the utilized modules. Consult the module data sheet for actual capability.

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Status and Control

Some features, such as programming of the output voltage, may be controlled both by hardware and firmware.

Unless otherwise noted, control of the output voltage via the signal pin (Vprog) is 'active' and overrides as long as the signal voltage is $\leq 3\text{Vdc}$. A firmware initiated command, attempting to change the output voltage will be ignored as long as the signal voltage (Vprog) is $\leq 3\text{Vdc}$

Details of analog controls are provided in this data sheet under Signal Definitions. GE Energy will provide separate application notes for the I2C protocol (Document #97FS2855). Contact your local GE Energy sales representative for details.

Note that most control and capability functions

Signal Definitions

All signals and outputs are referenced to Output return. These include 'Vstb return' and 'Signal return'.

Input Signals

Note: Refer to the individual rectifier data sheets for supported features.

Voltage programming (Vprog): An analog voltage on this signal can vary the output voltage of all modules.

If 12V output CAR1812 or CAR1612 rectifiers are used, the output can vary $\pm 10\%$ from 10.8Vdc to 13.2Vdc. The equation of this signal is:

$$V_{out} = 10.8 + (V_{prog} * 0.96) \quad 0 < V_{prog} < 2.5$$

If $2.5 < V_{prog} < 3$, the output is 13.2V. If $V_{prog} > 3\text{V}$ or left open the programming signal is ignored and the unit output is set at the setpoint of 12Vdc.

This signal is paralleled among the power supplies.

Load share (Ishare): This is a single wire analog signal that is generated and acted upon automatically by power supplies connected in parallel. The Ishare pins are tied together among the power supplies in the shelf. No resistors or capacitors should get connected to this pin.

Remote ON/OFF: Controls the presence of the main output voltage. This is an open collector, TTL level control signal. This signal needs to be pulled HI externally through a resistor. Maximum collector voltage is 12Vdc and the maximum sink current is 1mA. A Logic 1 (TTL HI level) turns ON the main output, while a Logic 0 (TTL LO level) turns OFF the main output.

This signal is not overwritten by the firmware ON/OFF instruction. The default firmware setting is ON. An OFF command either through this signal or firmware would turn OFF the power supply.

The default state re-initializes if bias power is interrupted to the processor.

These signals are brought out independently for each power supply.

Enable (ON/OFF): This is a short signal pin that controls the presence of the main output. This pin should be connected to 'output return' on the system side of the output connector. The purpose of this pin is to ensure that the output turns ON after engagement of the power blades and turns OFF prior to disengagement of the power blades.

These signals are brought out independently for each power supply.

Write protect (WP): This signal protects the contents of the EEPROM from accidental over writing. When left open the EEPROM is write protected. A LO (TTL compatible) permits writing to the EEPROM. This signal is pulled HI internally by the power supply. Note: only for factory programming.

This signal is interconnected among the power supplies

Output signals

Output current monitor (Imon): A voltage level proportional to the delivered output current is present on this pin. The signal level is $150\text{A} = 3\text{V}$ when the CAR182 or CAR1612 rectifiers are used.

These signals are brought out independently for each power supply.

INPUT OK: A TTL compatible status signal representing whether the input voltage is within the anticipated range. This signal needs to be pulled HI externally through a resistor.

These signals are brought out independently for each power supply.

DC OK: A TTL compatible status signal representing whether the output voltage is present. This signal needs to be pulled HI externally through a resistor.

These signals are brought out independently for each power supply.

Over temp warning: A TTL compatible status signal representing whether an over temperature exists. This signal needs to be pulled HI externally through a resistor.

These signals are brought out independently for each power supply.

If an over temperature should occur, this signal would pull LO for approximately 10 seconds prior to shutting down the power supply. The unit would restart if internal temperatures recover within normal operational levels. At that time the signal reverts back to its open collector (HI) state.

Fault: A TTL compatible status signal representing whether a Fault occurred. This signal needs to be pulled HI externally through a resistor.

These signals are brought out independently for each power supply.

This signal activates for OTP, OVP, OCP, AC fault or No output.

Module Present: This pin is connected to 'output return' within the power supply. Its intent is to indicate to the system that a power supply is present. This signal may need to be pulled HI externally through a resistor.

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These signals are brought out independently for each power supply.

Interrupt (SMBAlert): A TTL compatible status signal, representing the SMBusAlert# feature of the PMBus compatible I²C protocol in the power supply. This signal needs to be pulled HI externally through a resistor. Maximum sink current ≤ 4mA and the pull up resistor should be tied to 3.3Vdc. Open collector (HI) on this signal indicates that no Interrupt has been triggered.

This signal is paralleled among the power supplies.

Serial Bus Communications

The I²C interface facilitates the monitoring and control of various operating parameters within the unit and transmits these on demand over an industry standard I²C Serial bus.

All signals are referenced to 'Signal Return'.

Device addressing: The microcontroller (MCU) and the EEPROM have the following addresses:

Device	Address	Address Bit Assignments (Most to Least Significant)							
MCU	0xBx	1	0	1	1	A2	A1	A0	R/W
EEPROM	0xAx	1	0	1	0	A2	A1	A0	R/W

Address lines (A1, A0): These signal pins allow up to four (4) modules to be addressed on a single I²C bus. The pins are configured automatically in the shelf. Rectifier addressing increments from left to right as viewed from the front.

Address line (A2): This bit sets the address of the shelf. The bit setting depends on the rear accessible dip switch and pin 51 of the signal connector. In order to set the address HI ('1'), the dip switch needs to be set to Mark 1 and the signal pin needs to be left open. Setting the dip switch to Mark 0 or grounding pin 51 will configure the shelf to address bit 0 (LO).

Serial Clock (SCL): The clock pulses on this line are generated by the host that initiates communications across the I²C Serial bus. This signal is pulled up internally to 3.3V [5V²] by a 10kΩ resistor. The end user should add additional pull up resistance as necessary to ensure that rise and fall time timing and the maximum sink current is in compliance to the I²C specifications.

This signal is paralleled among the power supplies.

Serial Data (SDA): This line is a bi-directional data line. This signal is pulled up internally to 3.3V [5V] by a 10kΩ resistor. The end user should add additional pull up resistance as necessary to ensure that rise and fall time timing and the maximum sink current is in compliance to the I²C specifications.

This signal is paralleled among the power supplies.

EEPROM

The microcontroller has 96 bytes of EEPROM memory available for the system host.

Another separate EEPROM IC will provide another 128 bytes of memory with write protect feature. Minimum information to be included in this separate EEPROM: model number, revision, date code, serial number etc.

See the communications protocol for further information.

Communications Protocol

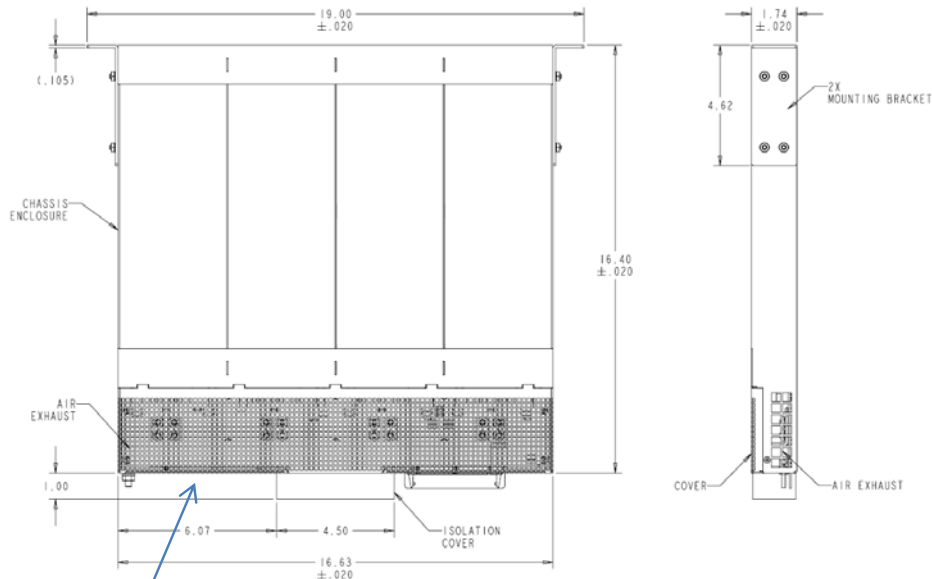
The I²C protocol is described in detail by the **I²C and PMBus Serial Communications Protocol for the CAR Family of Power Supplies** application note.(Document # 97FS2855)

² Module configured with 5V standby output

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Outline Drawing

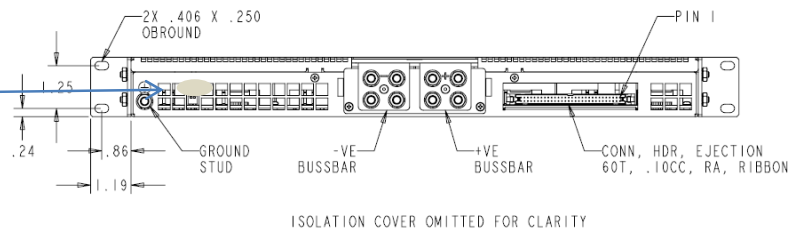


Perforated areas need to be exposed for cooling purposes



Dip switch for Shelf Address:

- Mark 0 – 'A2 pin set to 0'
- Mark 1 – 'A2 pin set to 1' (if Pin51 is not grounded)



Output Power Terminations

The outputs of the four power supplies are internally connected in parallel and brought out on the rear panel via four sets of M6 studs with 5/8 inch center spacing, accommodating industry standard lugs. The lug terminations can exit the shelf either above or below the shelf, or to the rear when right angle lugs are utilized. An insulation cover is provided over the lug terminations and it can be rotated to accommodate the cables exiting either upward or downward.

The maximum output current capacity of the lug/wire combination should be sized to carry 300 amperes per set when two lugs are utilized.



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Connector Pin Assignments

Signal Connector: shelf end: Tyco AMP P/N 1-5499786-1
Mate: Tyco AMP P/N 1-1658621-1

Pin	Signal	Function	Pin	Signal	Function	Pin	Signal	Function
1	INPUT OK 1	INPUT OK 1	21	On / Off 3	Remote On / Off 3	41	N.C.	
2	DC OK 1	DC OK 1	22	Imon 3	Current readout 3	42	I_share	Current sharing
3	Mod present 1	Module present 1	23	N.C.		43	V_prog	Voltage Setting
4	Temp OK 1	Temp OK 1	24	Fault 3	Fault 3	44	INT	I ² C interrupt
5	On / Off 1	Remote On / Off 1	25	INPUT OK 4	INPUT OK 4	45	SCL	I ² C clock line
6	Imon 1	Current readout 1	26	DC OK 4	DC OK 4	46	SDA	I ² C data line
7	N.C.		27	Mod present 4	Module present 4	47	WP	Write Protect
8	Fault 1	Fault 1	28	Temp OK 4	Temp OK 4	48	RS +	Positive sense
9	INPUT OK 2	INPUT OK 2	29	On / Off 4	Remote On / Off 4	49	RS -	Negative sense
10	DC OK 2	DC OK 2	30	Imon 4	Current readout 4	50	RTN	Signal return
11	Mod present 2	Module present 2	31	N.C.		51	Shelf Address	A2 pin
12	Temp OK 2	Temp OK 2	32	Fault 4	Fault 4	52	Vsb	standby output
13	On / Off 2	Remote On / Off 2	33	N.C.		53	Vsb	standby output
14	Imon 2	Current readout 2	34	N.C.		54	Vsb	standby output
15	N.C.		35	N.C.		55	Vsb	standby output
16	Fault 2	Fault 2	36	N.C.		56	N.C.	
17	INPUT OK 3	INPUT OK 3	37	N.C.		57	Vsb_rtn	standby return
18	DC OK 3	DC OK 3	38	N.C.		58	Vsb_rtn	standby return
19	Mod present 3	Module present 3	39	N.C.		59	Vsb_rtn	standby return
20	Temp OK 3	Temp OK 3	40	N.C.		60	Vsb_rtn	standby return

Ordering Information

Please contact your GE Energy Sales Representative for pricing, availability and optional features.

PRODUCT	DESCRIPTION	PART NUMBER
600A Shelf	Power Shelf capable of delivering 600A of main output and 8A of Standby power	ACE184RUW12XZ01A

Contact Us

For more information, call us at

USA/Canada:

+1 888 546 3243, or +1 972 244 9288

Asia-Pacific:

+86.021.54279977*808

Europe, Middle-East and Africa:

+49.89.878067-280

India:

+91.80.28411633

www.ge.com/powerelectronics

