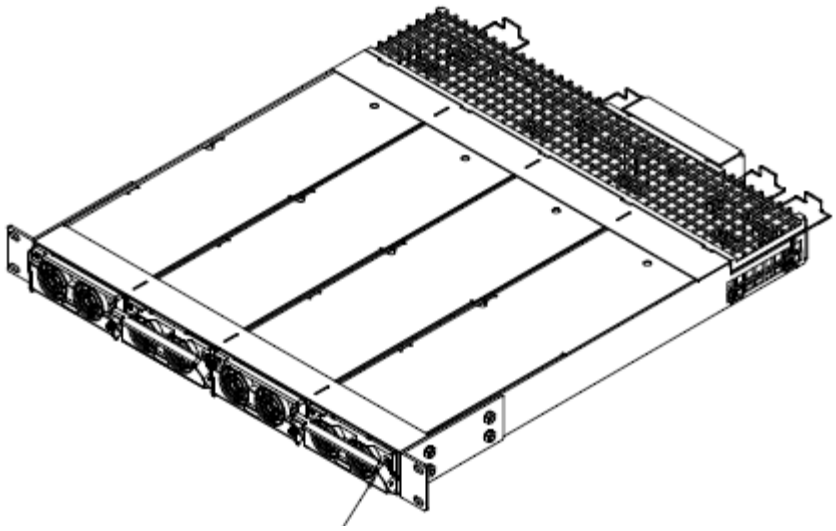
ACE204 SERIES

1U 8,000W (6,000W N+1)

24V Front End/ Rectifier Power Shelf System Specification

Rev. PrC
Date: November 19, 2009



1. Introduction

The Lineage Power **ACE204**, 1U (front end and rectifier) Power Shelf system series is designed for the Industrial, Wireless Base Station, and RF Amplifier market segment. The racking system is designed to minimize installation and maintenance time with easy access hot-swap insertion to allow power module exchange under live power operation.

The standard ACE204 shelf has four (4) separate input feeds with individual IEC320 AC input feed connectors (180- 264VAC source) and delivers regulated 24V output via M6 studs. The signals and alarms are provided via 60 pin IDC header connector located on the rear panel of the shelf. The mechanical design is packaged in a 1U, 19" and is specifically designed to meet EIA standard packing dimensions (17.50 without mounting ears) rack mount mechanical configuration. The power shelf can accommodate up to four (4) CAR2024FP, 2000W power modules for a total of 8,000W non-redundant or 6,000W redundant, N+1 configurations. Multiple power shelves can be connected in parallel for higher power applications.

2. Design Features

- **6 kW Redundant N+1 (8kW Total Power)**
- **Fits in 19" 1U high rack systems**
- **Alarms Controls and Indicators**
- **Power Factor Correction**
- **Hot swap redundant parallel operation**
- **Typical Efficiency over 90% (rectifier)**
- **EMI Class B at shelf level**

3. Electrical Specifications

Input Specifications

Input: 90-264Vac
High line operation @ 2000W 180-264Vac
Low line operation @ 1200W 90-132Vac

Fusing: Each front-end/rectifier module has (1) 20A, 250VAC fuse (line) type 3AB Axial.

Lightning/Surge protection: ANSI/IEEE C62.41-1 and IEC 1000-4-5

Conducted EMI: FCC level B, CISPR 22, class B at system level.

Efficiency: 90% typical at nominal full load 230VAC,.

Hold-up time: 15ms at 2000W (typical) **per** module

Output specifications

Output Voltages: +24Vout (main)
+3.3V Vsb out1 @ 1A (5V Optional)

Power: 8,000W (6,000W, N+1)

CAR2024FP Output range: +21V to +29Vdc

The power shelf output voltage can be remotely programmed with analog input signal voltage (see module specification for details)

Note: Each front-end/rectifier module has an individual factory voltage adjustment pot. This pot is used for a factory output pre-setting. When the modules are operating in the power shelf, they are connected in parallel configuration with the Ishare signal forcing the power supply modules to balance their individual output currents in line with the total system.

Line/Load Regulation: ≤ ±2% for all combinations of line, load, and temperature

Ripple and Noise: ≤ ±1% p/p with 20 MHz bandwidth using 0.1uf ceramic and 10uf electrolytic capacitors at the output

Minimum Load: Not required

Protections: Internal fuses, over voltage, over current

[1] NOTE: The Vsb output is referenced to the Vout Return

4. Output Protections

Over voltage protection: Each front-end module has built in Over-Voltage protection

Current Limit: The power supply modules have a constant current type current limit protection against shorts and/or overload conditions.

Over temperature protection: Each module incorporates a thermal shutdown circuit that will shut down the module if an over-temperature develops (approx. 95 degree C. The module will restart automatically when the temperature returns to normal operating level).

5. Control and Monitoring

All analog signals are referenced to the -Vout Return (+24Vdc rack). The alarm return must be isolated alarm return or chassis ground (For specific signal protocol please contact factory)

The system shall support digital control and monitoring thru I2C and PMBUS.

Output Voltage Programming: An external analog input signal voltage determines the output voltage.

Output Current Monitoring: This signal is an analog output voltage signal proportional to the output current (0.1V/A ±500mV), referenced to the 5Vst Rtn.

Load Share/Paralleling: Analog signal. Single wire connection. I-share bus voltage at full load is 1.03V. Each module will load share within ±5% of full load.

Remote Power ON-OFF: TTL compatible signal. Open collector (High) for normal operation. Sink current is 20mA. Max collector voltage: 20Vdc.

Logic 1 (TTL High) or open enables unit (ON)
Logic 0 (TTL Low) or short to return shuts unit down (OFF).
Note: Cycling this signal resets the over-voltage protection memory.

AC OK: Independent TTL compatible signal. Open collector (High) for normal operation. Sink current is 20mA. Max collector voltage is 20Vdc. AC OK indicates that AC is applied within the specified input range for the module.

DC OK: Independent TTL compatible. Open collector (High) for normal operation. Sink current is 20mA. Max collector voltage: 20Vdc.

Over Temperature Warning: Independent TTL compatible. Open collector (High) for normal operation. Sink current: 20mA. Max collector voltage is 20Vdc. In the event of an over temperature condition, the individual front-end modules protect themselves by providing a LOW warning signal at high temperature for 10 seconds (typical) and then shutting off. Re-start is automatic after the temperature reaches its normal operating levels.

Fault Signal: Independent TTL compatible Open collector (High) for normal operation. Sink current is 20mA. Max collector voltage is 20Vdc. This alarm is an opto-isolated open collector signal referenced to +Vout Return or chassis ground. The signal indicates that a failure has been detected in the unit (OTP, OVP, and AC).

Alarm Return Signal: All signals are referenced to the -Vout Return. Same comment as the previous page.

Missing Module: This is a digital signal delivered when the rectifier is present (active low, connect to return signal).

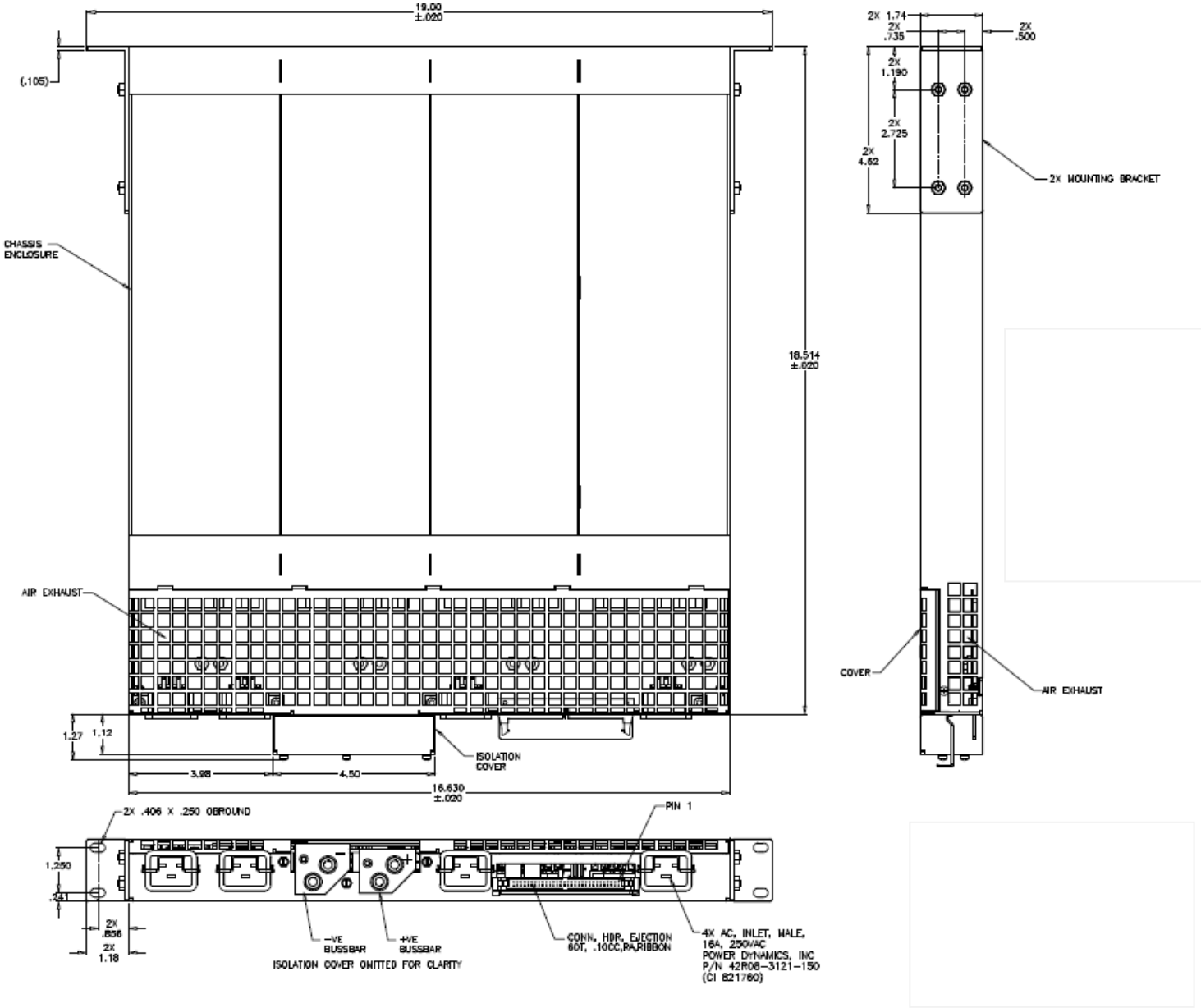
Hot Swap: Any of the CAR2024FP modules can be removed or inserted into the power shelf without disturbing the function of the other modules in the system. The modules will automatically load share (single wire current share) upon insertion or removal of any rectifier module.

The power supply modules are equipped with internal Or-ring mosfets in the +24Vdc leg and designed for hot swap operation.

LED's Indicators: AC OK (Green), DC OK (Green), Fault (Red)

6. Mechanical

Overall system dimensions: **1.74" H x 16.63"W x 18.51"D;** see mechanical outline drawing below.



Mounting

The power system is designed for ETS300 19" rack mounting. The ACE204 rack will be supported via a retracted side "runner" such that will secure the shelf from front and rear ear mounts – as to meet NEBS 3 shock and vibration.

Figure 1

Figure 2

Note: The air inlet should not be blocked – the airflow is from front to rear.

Power Module installation and Removal

The power modules have no fixed position within the ACE204 power shelf (they may be used in any position). After insertion, the power modules are automatically secured to the power shelf. Removal of the module can be easily accomplished by pulling the module out. A tool, such as screw driver is not required.

Each power supply module is connected to the ACE204 power shelf by means of a multi-pin connector which handles control signals as well as high current 24Vdc bus and AC input signals through the back plane of the power shelf. The power supply modules are hot pluggable via the connector located on the rear of the module.

The Power modules are automatically locked when inserted into the shelf. Access to the end user is provided on the rear of the rack were AC is provided via four (4) separate feeds terminating with IEC 320 type connectors. The 24V is accessed via a pair of terminal studs mounted on the bus bars; all the control signals are provided via a 60 pin connector.

7. Terminations:

Input AC Connection – IEC 320 C20 Connector

Protective Earth Connection - Inside IEC320

Output Connections

The outputs are internally connected in parallel and brought out to the rear panel via a set of M6 studs .

DC outputs needs 2 M6 holes lugs, with 5/8 inch spacing between the centers of the holes.
The lugs fixations are oblique, so the wires leave toward upper or lower side. An insulation cover is provided with the power shelf. The cover can be mounted in 2 ways following the direction of the wires.

I/O Signals: Via 60 pin IDC Header P/N Amp 1-5499786-1 which has a IDC Socket AMP connector P/N 1-746285-1

Control Signal Connector Pin-out

Pin	Signal	Function	Pin	Signal	Function	Pin	Signal	Function
1	***AC OK 1***	*AC input within range*	21	***On / Off 3***	*On / Off 3*	41	***N.C.***	*N.C.*
2	***DC OK 1***	*Output voltage OK signal*	22	***Imon 3***	*Imon 3*	42	***I_share***	*Current sharing signal*
3	***Module present 1***	*Module present signal*	23	***N.C.***	***N.C.***	43	***V_prog***	*Programming voltage*
4	***Temp OK 1***	*Temperature within range*	24	***Fault 3***	*Fault 3*	44	***INT***	*I²C interrupt signal*
5	***On / Off 1***	*Remote On / Off*	25	***AC OK 4***	*AC OK 4*	45	***SCL***	*I²C clock line*
6	***Imon 1***	*Current readout*	26	***DC OK 4***	*DC OK 4*	46	***SDA***	*I²C data line*
7	***N.C.***	***N.C.***	27	***Module present 4***	*Module present 4*	47	***WP***	*Write Protected*
8	***Fault 1***	*Converter fault*	28	***Temp OK 4***	*Temp OK 4*	48	***RS +***	*Positive sense*
9	***AC OK 2***	*AC input within range*	29	***On / Off 4***	*On / Off 4*	49	***RS -***	*Negative sense*
10	***DC OK 2***	*Output voltage OK signal*	30	***Imon 4***	*Imon 4*	50	***RTN***	*Signal return*
11	***Module present 2***	*Module present signal*	31	***N.C.***	***N.C.***	51	***N.C.***	***N.C.***
12	***Temp OK 2***	*Temperature within range*	32	***Fault 4***	*Fault 4*	52	***3.3 Vsb***	*3.3V standby voltage*
13	***On / Off 2***	*Remote On / Off*	33	***N.C.***	***N.C.***	53	***3.3 Vsb***	*3.3V standby voltage*
14	***Imon 2***	*Imon 2*	34	***N.C.***	***N.C.***	54	***3.3 Vsb***	*3.3V standby voltage*
15	***N.C.***	***N.C.***	35	***N.C.***	***N.C.***	55	***3.3 Vsb***	*3.3V standby voltage*
16	***Fault 2***	*Fault 2*	36	***N.C.***	***N.C.***	56	***N.C.***	
17	***AC OK 3***	*AC OK 3*	37	***N.C.***	***N.C.***	57	***3.3 Vsb_rtn***	*3.3V standby voltage return*
18	***DC OK 3***	*DC OK 3*	38	***N.C.***	***N.C.***	58	***3.3 Vsb_rtn***	*3.3V standby voltage return*
19	***Module present 3***	*Module present 3*	39	***N.C.***	***N.C.***	59	***3.3 Vsb_rtn***	*3.3V standby voltage return*
20	***Temp OK 3***	*Temp OK 3*	40	***N.C.***	***N.C.***	60	***3.3 Vsb_rtn***	*3.3V standby voltage return*

8. Agency compliance

IEC 60950
EN60950
UL60950
CSA-22.2 #60950

EMC Specifications

Port	Phenomenon	Frequency-range	Limits	Reference standard
AC input	Conducted	0.15 - 30MHz	B	EN 55022
Enclosure	Radiated	30 – 230MHz 230 – 1000MHz	B	EN 55022

EMC-immunity

Port	Phenomena	test	criteria	ref.standard
Enclosure	ESD (immunity)	8 kVair 4 kVcontact	B	EN 61000-4-2

Comments: Burst, Surge, and RF conducted immunity on signal lines not applicable as cables should be shorter than 3m

Input Fuse

Each power supply module has two 20A fuses, type 3AB axial in the input. The power shelf has no internal fusing. It's recommended to provide external fuses or circuit breakers. Maximum 15A per input.

Isolation (electrical strength)

Input – Ground: 1500Vac
Output – Ground: 500Vdc
Input – Output: 3000Vac

Grounding

Input: Class I. Protective ground must be connected to a protective conductor.
Output: The negative output may be grounded.

9. Environmental

Temperature
Operating ambient: -10°C to 70°C
Active de-rating between: >50°C, @ 2.5% W/ºC
Storage: -40°C to +85°C

Cooling:
Power modules have built-in fan. The horizontal airflow is front to back. For ventilation requirements, a spacing of at least 20mm must be provided behind the power shelf, and ventilation openings should be kept free of any obstruction.

Humidity:
Operating relative humidity: 30 to 95 % non-condensing
Storage: 10 to 95 % non condensing

Altitude – Pressure Drop
Operating (up to 2250m): 700 – 1100mbar
Non-operating: 300 – 1100mbar

Vibration/Shock
Shock & Vibration: NEBS GR-63-CORE Level 3
Frequency Range: 20 – 2000Hz
Time duration:Minimum of 30 minutes
Acceleration: 6Grms
Telcordia GR-63-CORE, GR-487-CORE (NEBS shock and vibration, Seismic Zone 4)

10. MTBF

100,000 hrs at full load and 50°C per Bellcore RPP
200,000 hrs at full load and 50°C – demonstrated

11. Revision Change History

Revision	Date	Changes
PrA	10/21/09	First Draft – modified from ACR254, X02, September 22, 2008
PrB	11/09/09	Changes following Engineering Review: Formatting changes Update typical efficiency to 90% to match CAR2024FP Change Operating Ambient Range to correct lower limit with derating Update Line/Load/Temperature regulation to 2% to match CAR2024FP Update Output Current Monitoring to 0.1 V/A ±250mV to match CAR2024FP Update Output to Ground Isolation to match CAR2024FP Update Outline Diagram to correct ACE254 errors
PrC	11/19/09	Changes to match CAR2024FP Change Imon tolerance to ±500 mV Change Ishare voltage to 1.03V at full load Delete incoming AC connector picture

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