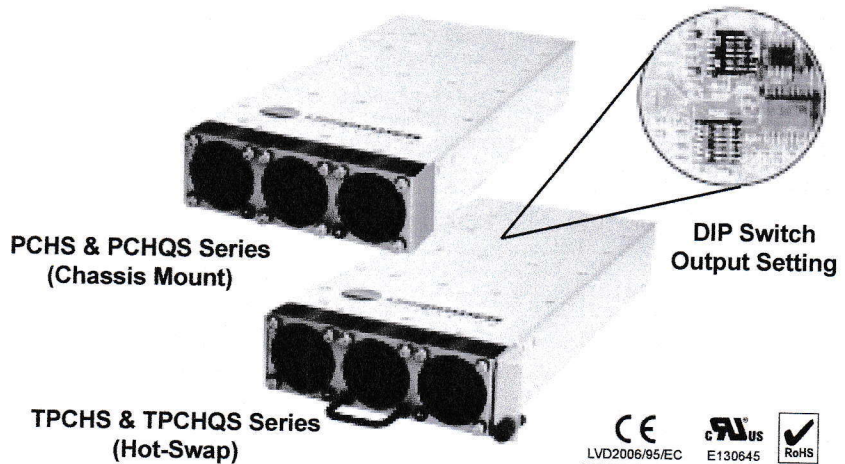


QUICK-SET PowerCassette®: MULTI-OUTPUT SWITCHER

1U High, Up to 6 Outputs at 600 Watts, AC or DC Input
Outputs Instantly Set at Factory

FEATURES

- Outputs Set by DIP Switches
- Advanced "CellularPower"™ Architecture
- Up to 5 Outputs Plus 5V, 1/4A Standby
- 476 Different Models
- Hot-Swap or Chassis Mount Versions
- 1.8 to 12VDC Outputs
- AC or DC Input
- I²C Serial Data Bus Option
- Integral LED Status Indicators
- 6.8 Watts/Cubic Inch Power Density
- Power Factor Corrected (AC Input)
- Low Profile: 1.6 Inches High (1U)
- Hot-Swappable Connector
- Staged Pin Lengths
- ORing Diodes on All Outputs
- Active Current Sharing on V1, V2 & V3
- Universal 85 to 264VAC Input
- Class B EMI Input Filter
- Wide Range 36 to 72 VDC Input
- DC Input Reverse Polarity Protected
- Optimized Thermal Management
- No Minimum Load, Any Output
- Control & Monitoring Features



TWO-YEAR WARRANTY

SAFETY CERTIFICATIONS

AGENCY	STANDARD
UL	UL1950
CUL	CSA22.2, No. 950
DEMKO	EN60950

Patents Issued & Pending

ORDERING GUIDE

SERIES	AC or DC INPUT	V1 OUTPUT	I²C OUTPUT	V1 to V5 OUTPUTS
PCH = Chassis Mount TPCH = Hot Swap	Q = DC B* = AC	29332-S = 1.8-5V Out	Z = I²C B* = No I²C	Use 5 Letters From Tables: -XXXXX (Pages 3 & 4)

NOTE: B* means "leave blank" (no letter)

Example: Model TPCH29332-S-DBFGE is a Hot-Swap version with AC input, no I²C,
V1 = 5V/70A, V2 = 2.5V/50A, V3 = 12V/10A, V4 = -12V/3A and V5 = -5V/3A

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SPECIFICATIONS, PowerCassette®: I2C SERIAL BUS INTERFACE

ELECTRICAL INTERFACE

Addressing (GA0 and GA1)

Two external address lines are employed allowing up to four PowerCassette modules to be addressed on a single I2C bus. Module addressing is achieved through hard-wiring the address lines to 0V or the 5V auxiliary supply via a 100R resistor on the system back-plane. In this way it is the location or position of the module rather than any particular module that is identified by an individual address.

Serial Clock (SCLK)

This line is clocked by the processor which controls the I2C serial bus. It should be tied to +5V via a pull-up resistor in the range 3k to 10k.

Serial Data (SDA)

This line is a bidirectional data line. It should be tied to +5V via a pull-up resistor in the range 3k to 10k.

Interrupt

This line provides an interrupt to the processor in the event of a change of status of the digital register.

BUS speed

The I2C interface as used in PowerCassette is designed to run with a serial clock speed 100kHz.

OPERATION AND FUNCTIONS

Digital Functions

Digital status functions are provided by a PCF8574 8-bit I/O port device. When this device is read by the serial bus controller a single 8-bit word provides the following information:

BIT	FUNCTION	GOOD STATE	MEANING
0	Input Power Fail	0	Provides 10ms warning of input supply failure. ¹
1	Output Power Good	1	V1, 2 and 3 are within specified limits.
2	Temperature Warning	1	Internal temperature exceeds 60°C.
3	Fan #1 Good	1	Fan running at >80% nominal speed.
4	Fan #2 Good	1	Fan running at >80% nominal speed.
5	Fan#3 Good	1	Fan running at >80% nominal speed.
6	Not Used	1	Logic 1 as default.
7	Temperature Alarm	1	Internal temperature exceeds 70°C; unit switched off.

Note 1: AC input versions only. Requires use of Interrupt line to provide warning time specified.

PCF8574 slave address

BIT	7	6	5	4	3	2	1	0
VALUE	0	1	0	0	0	A1	A0	R/W

Note: The PCF8574 must only be used in the READ mode.

EEPROM Functions

The EEPROM is a 2048 bit (256 byte) device which is pre-programmed at the factory with the following data:

ADDRESS RANGE	DATA
0-15	Model Number
16-31	Manufacturing Part Number
32-47	Serial Number
48-63	Modification Level
64-79	Manufacturer
80-95	Country of Manufacture
96-111	Configuration
112-255	Not used

Note:
Data is organized such that each field of data can be accessed by a page read (16 bytes).

EEPROM slave address

BIT	7	6	5	4	3	2	1	0
VALUE	1	0	1	0	0	A1	A0	R/W

Note: Customers may specify to special order other data which they may require.

Analogue Functions

Analogue status functions are provided by two PCF8591 4-channel 8-bit A/D converter devices. When these devices are read by the serial bus controller a single 8-bit word provides the following information:

Device: U208				Device: U215			
A/D	FUNCTION	A/D	FUNCTION	A/D	FUNCTION	A/D	FUNCTION
1	V1 voltage	3	V3 voltage	1	V1 current	3	V3 current
2	V2 voltage	4	not used	2	V2 current	4	not used

Slave address

BIT	7	6	5	4	3	2	1	0	Device
VALUE	1	0	0	1	1	A1	A0	R/W	U208
VALUE	1	0	0	1	0	A1	A0	R/W	U215

The PCF8591 devices initially require a control byte (04 Hex) to be written to the configuration register. This control byte sets the device so that on each successive read the data from the next A/D is read. Note that on each read a conversion is started for a particular channel and the result will be read from the previous channel, thus the first result from a sequence of reads should always be discarded.

A/D converter scaling

To obtain a correct voltage or current measurement it is necessary to employ both scaling and offset factors in the controlling software. Note that all voltage measurements are made inside the PSU module, before the 'ORing' diodes, and are typically 0.5V higher than the actual module output voltage.

The following calculation should be employed:

Value = (byte read x scaling factor) + offset

Output Voltage	Scaling Factor	Tolerance	Output Measured
1.8V	0.012	±2%	V1, V2 Voltage
2.5V	0.0147	±2%	V2 Voltage Only
3.3V	0.015	±2%	V1, V2, V3 Voltage
5.0V	0.023	±2%	V1, V2, V3 Voltage
12.0V	0.0547	±2%	V3 Voltage
1.8 to 5V	0.35	10%*	V1, V2 Current
12V	0.05	10%*	V3 Current

Temperature Measurement Functions

The internal temperature of the unit is measured using a MAX6633. This device provides a 12-bit measurement at a resolution of 0.0625°C

MAX6633 slave address

BIT	7	6	5	4	3	2	1
VALUE	1	0	0	0	0	A1	A0

Note: The MAX6633 must only be used in the READ mode.

APPLICATION NOTES

1. Maximum power must not exceed the following: 500 watts for V1 and V2 combined, 171 watts for V3, V4 and V5 combined, or 600W for total unit.
2. For units with V1 over 70 amps, that output actually consists of the V1 and V2 outputs in parallel. In this mode the V1 and V2 output pins must be connected to one another and the V1 and V2 current share pins connected to each other. The V1 plus sense and minus sense pins must be connected to the V2 plus sense and minus sense pins, respectively. All connections are external to unit.
3. For outputs of 2.5V or lower, the peak-to-peak ripple and noise is specified at 2% maximum.
4. The DC Power Good signal monitors the V1, V2 and V3 outputs only.
5. **DESCRIPTION and INTERCONNECTION OF LOGIC SIGNALS.** ENABLE, DC POWER GOOD, AC POWER FAIL, OVERTEMP WARNING and INHIBIT pin connections come from the equivalent of an open collector circuit with an internal pull up 10K resistor to +5V.

ENABLE. This pin must be shorted to ground in order for outputs to function. The connection may also be achieved by means of an external open collector or open FET drain circuit, i. e., when the external transistor is turned on, the power supply is enabled. This is the inverse of the Inhibit function below.

OUTPUT POWER GOOD. Provides Logic High signal when V1, V2 and V3 reach a prescribed level.

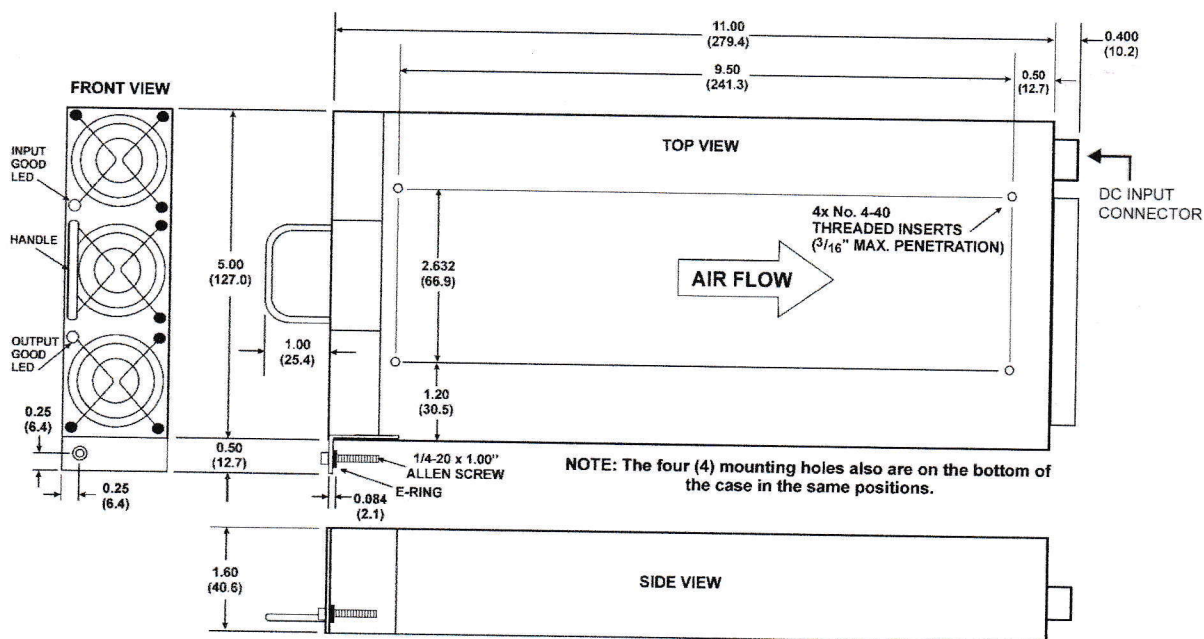
INPUT POWER FAIL. Provides a Logic High signal pulse when the AC line voltage ceases. Pulse occurs a minimum of 4 milliseconds before outputs go out of regulation. Pulse duration is 4 milliseconds up to tens of milliseconds, depending on load. Signal is Logic High rather than low (typical in non-redundant power supplies) so that there is no signal ambiguity when redundant power supplies are operated from different AC phases.

OVERTEMP. WARNING. Provides a Logic Low signal when exit air temperature approaches an unacceptable level.

GLOBAL INHIBIT. Shuts down the outputs but not the standby supply or the fans. As with the Enable pin above, it is achieved by shorting the pin to ground or turning on an external transistor. Should be connected through a 10K ohm resistor to +5V Standby Output. Acts as the inverse of the Enable pin.

6. **CONNECTING ALL OUTPUT SIGNALS TOGETHER FOR UNITS IN AN N+1 RACK:** Normally signals are used for identifying status of each module in paralleled unit configuration. If it is desired to connect all the signals together to treat the complete rack as a single power supply, the following (or equivalent) must be done. The Input Power Fail, Output Power Good and Overtemp. Warning signals of each module are each connected to the anode of a BAV99 diode, the other side of which goes to the base of a 2N2222A. The collectors of all the Input Power Fail transistors are connected to form a single Input Power Fail chassis signal. The same is done for the Output Power Good and Overtemp. Warning signals. The resultant system warning signals then give a Logic Low for Input Power Fail and a Logic High for Output Power Good and Overtemperature Warning.

7. MTBF. 200,000 hours at 35°C using Bellcore method.



ALL DIMENSIONS IN INCHES (mm).
All specifications subject to change without notice.