



PowerCassette®: I²C SERIAL BUS INTERFACE FOR PCMQ24/TPCMQ24 Status Indication of system critical power supply parameters

FEATURES

- Industry Standard Communication Interface
- Inventory Control Information
- Status Indication
- Management of System Load
- Imminent Failure Warning
- Fully Integrated with Standard PSU Package

SAFETY STANDARDS

- UL60950-1
- CSA22.2 No.950-1
- EN60950-1

**PCMQ24 Series
(Chassis Mount)**

**TPCMQ24 Series
(Hot-Swap)**



1U HIGH
1.6" x 5" x 10"
(41 x 127 x 254 mm)

www.unipowercorp.com

DESCRIPTION

The I²C interface that is incorporated into the PowerCassette® includes facilities to monitor various operating parameters within the unit and transmit these to a host computer on demand over an industry standard I²C Serial bus.

Three forms of data are available. These allow the user to monitor the actual status of an individual unit, manage system loading through measurement of the actual load on the output and also control inventory through an inbuilt EEPROM containing specific data about each individual unit.

The implementation of I²C that has been utilized in PowerCassette® is a subset of more complete implementations such as IPMI. This data-sheet is intended as a supplement to the data sheet for the PowerCassette® family itself and should provide enough information for the system designer to make decisions on how to utilize the available information within this overall system philosophy.

I²C DEVICES EMPLOYED

PCF8574

This device is an 8-bit digital register manufactured by Philips.

PCF8591

This device is a Quad A/D converter manufactured by Philips.

24C02

This device is a 256 byte EEPROM manufactured by ST

MAX6633

This is a 12-bit temperature measurement device manufactured by Maxim.

For detailed information about the operation of these devices please consult the original manufacturers' data-sheets.

SPECIFICATIONS, PowerCassette[®]: I²C SERIAL BUS INTERFACE FOR PCMQ24/TPCMQ24

ELECTRICAL INTERFACE

Addressing (GA0, GA1 and GA2)

Three external address lines are employed allowing up to eight PowerCassette modules to be addressed on a single I²C bus. Module addressing is achieved through hard-wiring the address lines to -Sense or the +5V auxiliary supply via a 100-ohm 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.

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 | A "1" provides warning of input supply failure. |
| 1 | Output Power Good | 0 | Vout is within specified limits. |
| 2 | Temperature Warning | 0 | A "1" means temperature exceeds normal operating limit. |
| 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 | - | 1 | Not used |
| 7 | Shutdown Alarm | 1 | A "0" indicates shutdown due to; thermal limit, OVP or inhibit. |

PCF8574 slave address

| BIT | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-------|---|---|---|---|----|----|----|-----|
| VALUE | 0 | 1 | 0 | 0 | A2 | A1 | A0 | R/W |

Note: If a zero is written to bit 7 in a data byte, the unit will be inhibited. The default state is enabled.

EEPROM Functions

The EEPROM is a 2048 bit (256 byte) device which is preprogrammed 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 |
| 96-255 | 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 | A2 | 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: U1 | | | |
|------------|-----------|-----|----------|
| A/D | FUNCTION | A/D | FUNCTION |
| 1 | V voltage | 3 | not used |
| 2 | V current | 4 | not used |

Slave addresses

| BIT | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Device |
|-------|---|---|---|---|----|----|----|-----|--------|
| VALUE | 1 | 0 | 0 | 1 | A2 | A1 | A0 | R/W | U1 |

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 a scaling factor 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:

| Output Voltage | Scaling | Tolerance | |
|----------------|---------|-----------|----------------------------|
| 48V | 0.24 | ±2% | V Measure (U1 A/D Chan. 1) |
| 54.4V | 0.272 | ±2% | |
| 48V | 0.104 | ±10%* | I Measure (U1 A/D Chan. 2) |
| 54.4V | 0.092 | ±10%* | |

* of full scale

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 | 0 |
|-------|---|---|---|---|----|----|----|---|
| VALUE | 1 | 0 | 0 | 0 | A2 | A1 | A0 | 0 |