CIRRUS LOGIC®

CL-PD6832

Advance Data Sheet

FEATURES

- Single-chip CardBus host adapter
- Direct connection to PCI bus and two PC Card sockets
- Compliant with PCI 2.1, PCMCIA 2.1, PC Card Standard, and JEIDA 4.1
- CL-PD672X–compatible register set, ExCA™-compatible
- Programmable interrupt protocol: External Hardware, PCI/Way, PCI, or PC/PCI interrupt signalling modes
- Serial interface to power-control devices
- Hardware suspend capability
- Seven fully programmable memory or I/O windows per socket
- Programmable CardBus timing (up to 33 MHz)
- Support for PCI/Way DMA (distributed DMA)
- ZV Port support for multimedia applications
- ATA disk interface support
- Supports low-voltage PC Card specification
- Socket-to-socket transfer (bus master) capability
- Programmable per-socket activity indicators
- Pin-compatible with the CL-PD6730

PCI-to-CardBus Host Adapter

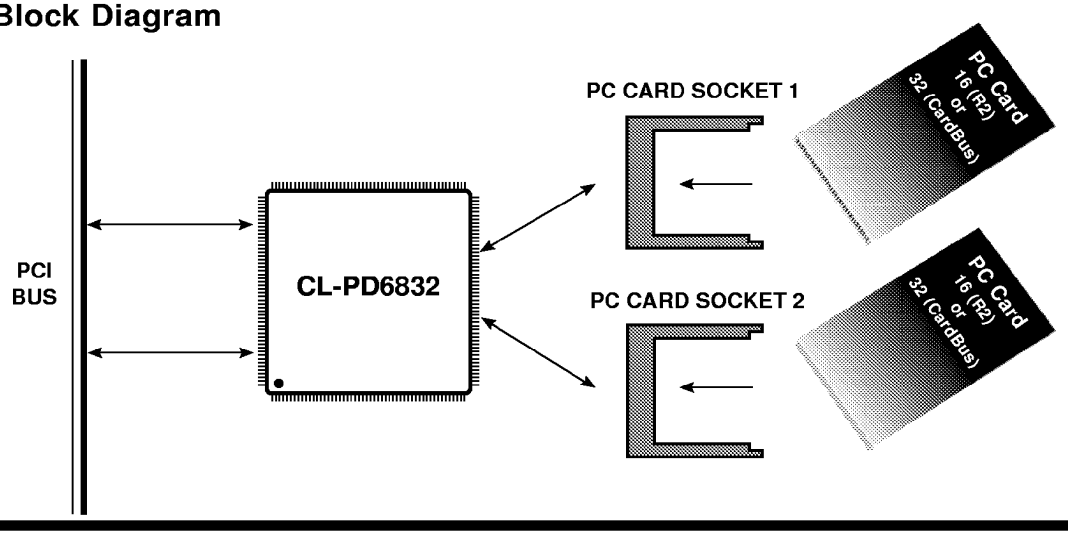
OVERVIEW

The CL-PD6832 is a single-chip CardBus host adapter solution capable of controlling two fully independent CardBus sockets. It is compliant with PCI 2.1, PCMCIA 2.1, PC Card Standard, and JEIDA 4.1. The CL-PD6832 is optimized for use in notebook and handheld computers where reduced form factor and low power consumption are critical design objectives.

To minimize system power consumption, the CL-PD6832 employs energy-efficient, mixed-voltage technology. The device also provides a Hardware Suspend mode that reduces much of the power consumption.

The CL-PD6832 allows easy translation of incoming memory commands to PC Card 16 I/O commands for processors with memory commands only. It enables these processors to use PC Card I/O devices with fully programmable windows. All CL-PD6832 control registers can either be memory- or I/O-mapped. *(cont.)*

System Block Diagram



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OVERVIEW (cont.)

PC applications typically access PC Cards through the socket/card-services software interface. The register set in the CL-PD6832 is a superset of the CL-PD672X register set, assuring full compatibility with existing socket/card-services software and PC Card applications.

The CL-PD6832 provides a fully buffered PC Card interface, requiring no external logic for buffering signals to and from the interface. Power consumption is controlled by limiting signal transitions on the PC CardBus.

ADVANTAGES

Notebook Computer Design Priorities	Supporting Features
■ Small form factor	❒ Single-chip solution ❒ No external buffers for host or socket interfacing ❒ Efficient board layout
■ Minimum power consumption	❒ Hardware suspend capability ❒ Mixed-voltage operation
■ High performance	❒ Programmable timing supports more cards, faster reads and writes ❒ Bus mastering on PCI bus
■ Flexibility	❒ Programmable interrupt protocol: External Hardware, PCI/Way, PCI, or PC/PCI interrupt signalling modes ❒ Supports serial interface to power control devices
■ Compatibility	❒ Compliant with PC Card Standard, PCMCIA 2.1, and JEIDA 4.1 ❒ Compliant with PCI 2.1 ❒ CL-PD672X–compatible register set, ExCA™-compatible

Table of Contents

1. CONVENTIONS

Register and Bit Conventions

In this document, the names of the CL-PD6832 internal registers are boldface (for example, **Chip Revision** and **Power Control** are register names). The names of bit fields are written with initial uppercase letters (for example, Card Power On and Battery Voltage Detect are bit field names).

Bits within words and words within various memory spaces are generally numbered with *0* (zero) as the least-significant bit or word. For example, the least-significant bit of a byte is bit 0, and the most-significant bit is bit 7.

In addition, number ranges for bit fields and words are presented with the most-significant value first. Thus, when discussing a bit field within a register, the bit number of the most-significant bit is written first, followed by a colon (:), and then the bit number of the least-significant bit (for example, bits 7:0).

Abbreviations and Acronyms

The following table lists abbreviations and acronyms used in this document.

Acronym or Abbreviation	Definition
AC	alternating current
ACPI	advanced configuration and power interface
ATA	AT-attachment
CIS	card information structure
DAC	digital-to-analog converter
DC	direct current
DMA	direct memory access
EEPROM	electrically erasable/programmable read-only memory
EEROM	electrically erasable read-only memory
GPIO	general-purpose I/O
IDE	integrated device electronics
IRQ	interrupt request
ISA	industry standard architecture
JEIDA	Japanese Electronic Industry Development Association
LQFP	low-profile quad flat pack

Acronym or Abbreviation	Definition *(cont.)*
LSB	least-significant bit
MQFP	metric quad flat pack
MSB	most-significant bit
MUX	multiplexer
PCI	peripheral component interconnect
PCM	pulse coded modulation
PCMCIA	Personal Computer Memory Card International Association
PME	power management enable
R2	Release 2 (PC Card 16)
RFU	reserved for future use
RU	read update
SIC	serial interrupt controller
SMBus™	system management bus
TC	terminal count
VGA	video graphics array
ZV	zoomed video

Measurement Abbreviations

Symbol	Units of Measure
°C	degree Celsius
Gbyte	gigabyte (2^{30} or 1,073,741,824 bytes)
Hz	hertz (cycles per second)
Kbyte	kilobyte (2^{10} or 1,024 bytes)
kHz	kilohertz (1,000 hertz)
Mbyte	megabyte (2^{20} or 1,048,576 bytes)
MHz	megahertz (1,000,000 hertz)
µA	microampere
µs	microsecond (1,000 nanoseconds)
mA	milliampere
ms	millisecond (1,000 microseconds)
ns	nanosecond
pF	picofarad
V	volt

Numbers

Hexadecimal numbers are presented with all letters in uppercase and a lowercase h appended. For example, *14h* and *03CAh* are hexadecimal numbers.

Binary numbers are enclosed in single quotation marks when in text. For example, *'11'* is a binary number.

Numbers not indicated by an *h* or single quotation marks are decimal.

The use of 'tbd' indicates values that are 'to be determined', 'n/a' designates 'not available', and 'n/c' indicates a pin that is a 'no connect'.

In addition, an uppercase *X* is used within numbers to indicate digits ignored by the CL-PD6832 within the current context. For example, '*101XX01*' is a binary number with bits 3:2 ignored.

2. PIN INFORMATION

The CL-PD6832 is available in a 208-pin MQFP (metric quad flat pack) or LQFP (low-profile quad flat pack) package. (MQFP was formerly known as PQFP, and the LQFP was formerly know as VQFP.)

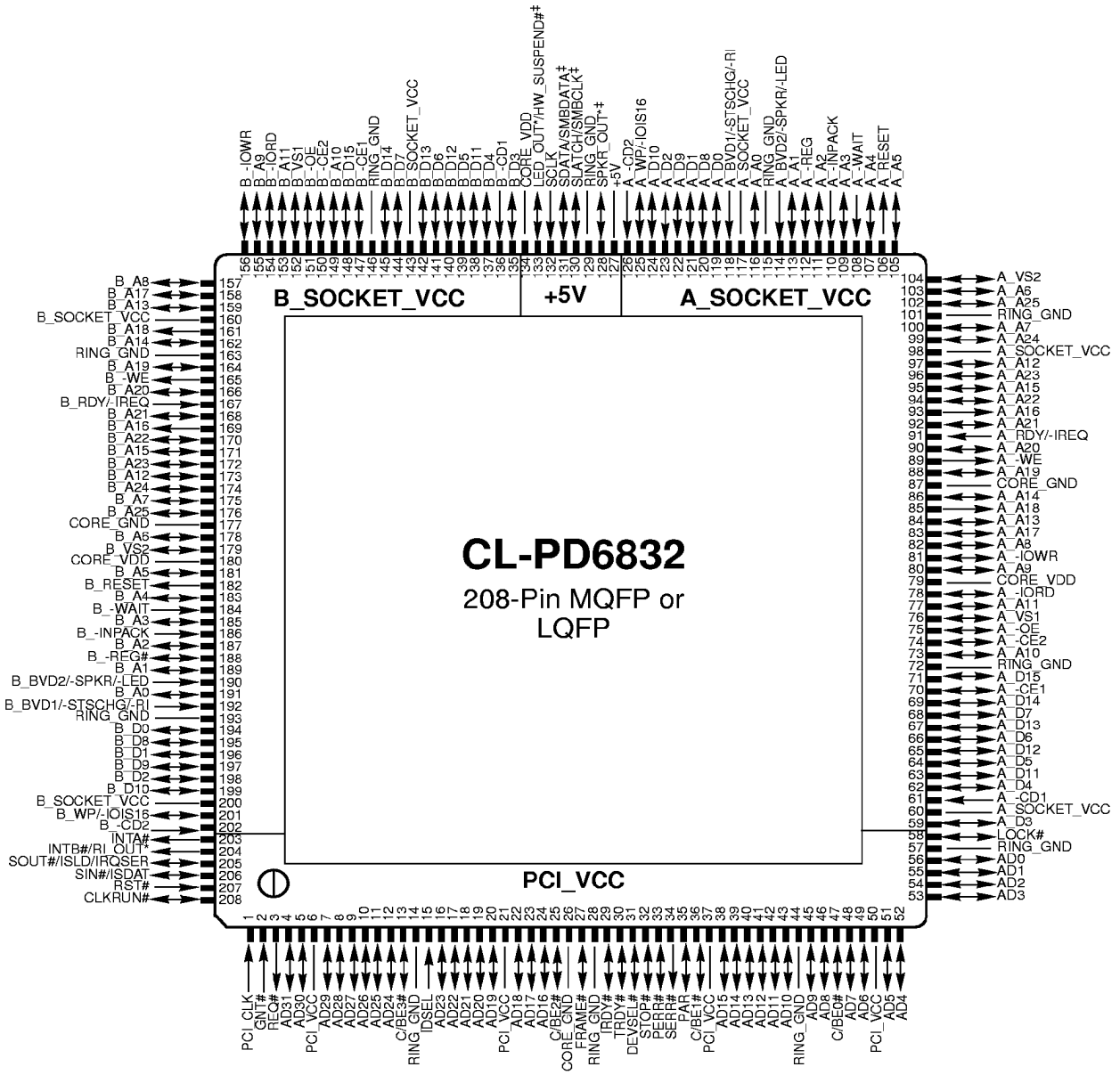
The CL-PD6832 interface pins can be divided into four groups:

- PCI bus interface pins
- PC Card socket interface pins (two sets)
- Power control and general interface pins
- Power and ground pins

Refer to Figures 2-1 and 2-2 for the CL-PD6832 pin diagrams. Table 2-1 through Table 2-4 (starting on page 13) show the pin assignments and descriptions for the four groups of interface pins.

Tables A-1 and A-2 on page 180 show the PC Card 16 (R2) and PC Card 32 (CardBus) compatible pins in numerical order. Tables A-3 and A-4 on page 182 show the PC Card 16 (R2) and PC Card 32 (CardBus) compatible pins in alphabetical order.

2.1 Pin Diagrams



NOTE: A double-dagger superscript (‡) at the end of the pin name indicates signals that are used for power-on configuration switches.

Figure 2-1. Pin Diagram for PC Card 16 (R2)

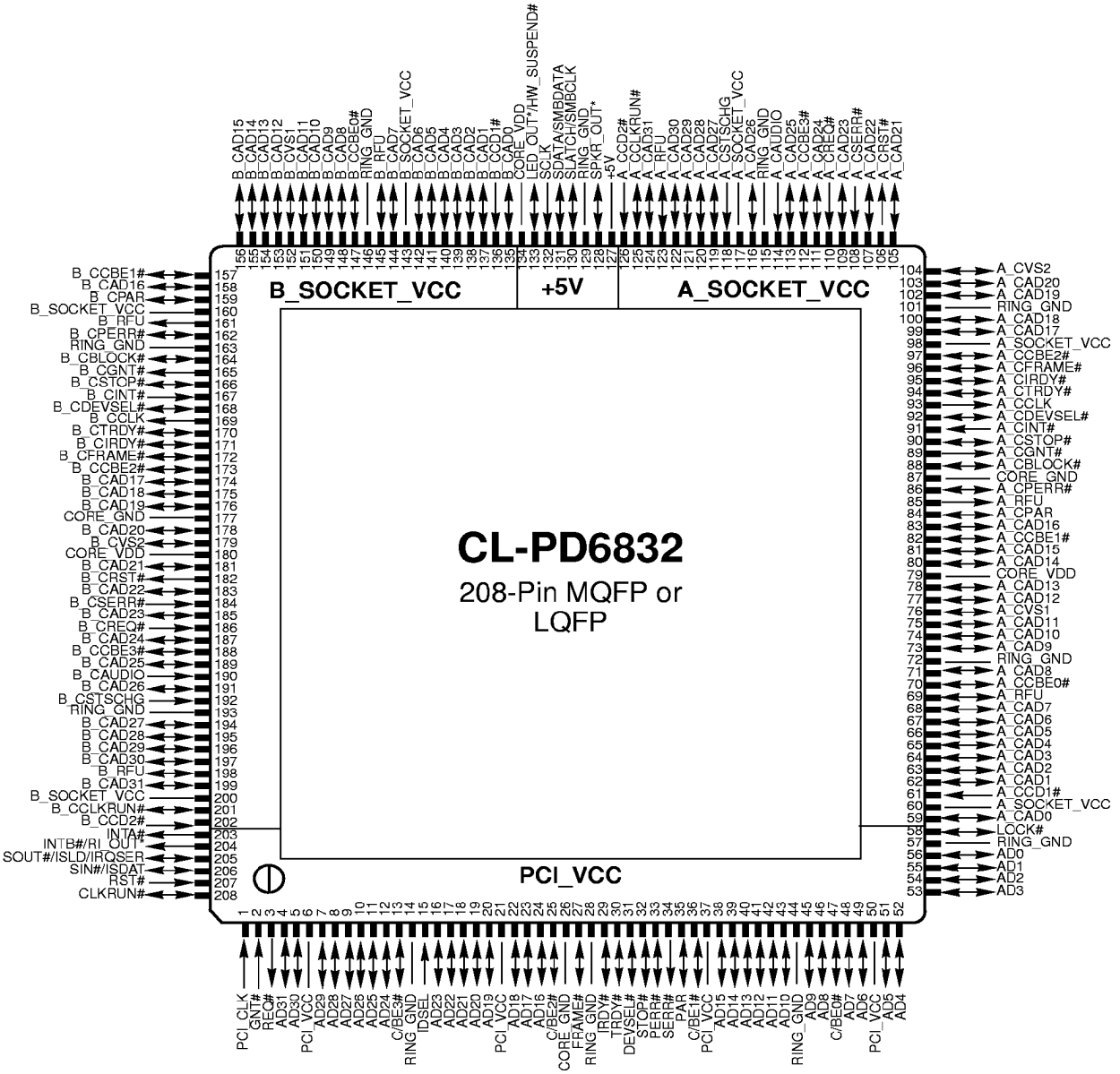


Figure 2-2. Pin Diagram for PC Card 32 (CardBus)

2.2 Pin Description Conventions

The following conventions apply to the pin description tables in Section 2.3:

- A pound sign (#) at the end of a pin name indicates an active-low signal for the PCI bus, CardBus, and PCMCIA bus.
- A dash (-) at the beginning of a pin name indicates an active-low signal for the PCMCIA bus.
- An asterisk (*) at the end of a pin name indicates an active-low signal that is a general interface for the CL-PD6832.
- A double-dagger superscript (‡) at the end of the pin name indicates signals that are used for power-on configuration switches.
- A pin name ending in bracketed digits separated by a colon [n:n] indicates a multi-pin bus.
- The pin number (Pin Number) column indicates the package pin that carries the listed signal. Note that multi-pin buses are listed with the first pin number corresponding to the most-significant bit of the bus. For example, if pin numbers 4, 5, 7–12, 16–20, 22–24, 38–43, 45–46, 48–49, and 51–56 are associated with PCI Bus Address Input and Data Input/Output pins AD[31:0], then:
  - AD31 is pin 4
  - AD1 is pin 55
  - AD0 is pin 56
- The quantity (Qty.) column indicates the number of pins used (per socket where applicable).
- The I/O-type code (I/O) column indicates the input and output configurations of the pins on the CL-PD6832. The possible types are defined in the table below.
- The power-type code (Pwr.) column indicates the output drive power source for an output pin or the pull-up power source for an input pin on the CL-PD6832. The possible types are defined in the table below.

I/O Type	Description
I	Input pin
I-PU	Input pin with internal pull-up resistor
O	Constant-driven output pin
I/O	Input/output pin
O-OD	Open-drain output pin
O-TS	Tristate output pin
GND	Ground pin
PWR	Power pin

Power Type	Output or Pull-up Power Source
1	+5V: powered from a 5-volt power supply (in most systems; see the description of +5V pin on page 23)
2	A_SOCKET_VCC: powered from the Socket A V_{CC} supply connecting to PC Card pins 17 and 51 of Socket A
3	B_SOCKET_VCC: powered from the Socket B V_{CC} supply connecting to PC Card pins 17 and 51 of Socket B
4	PCI_VCC: powered from the PCI bus power supply
5	CORE_VDD: powered from a 3.3-volt power supply

NOTE: All pin inputs are referenced to CORE_VDD, independent of their output supply voltage.

- The drive-type (Drive) column describes the output drive-type of the pin (see DC specifications in Chapter 15 for more information). Note that the drive type listed for an input-only (I) pin is not applicable (–).

2.3 Pin Descriptions

NOTE: All pins are in tristate immediately following the RST#.

Table 2-1. PCI Bus Interface Pins

Pin Name	Description	Pin Number	Qty.	I/O	Pwr.	Drive
AD[31:0]	**PCI Bus Address / Data Input/Outputs:** These pins connect to PCI bus signals AD[31:0].	4–5, 7–12, 16–20, 22–24, 38–43, 45–46, 48–49, 51–56	32	I/O	4	PCI Spec.
C/BE[3:0]#	**PCI Bus Command / Byte Enables:** The command signalling and byte enables are multiplexed on the same pins. During the address phase of a transaction, C/BE[3:0]# are interpreted as the bus commands. During the data phase, C/BE[3:0]# are interpreted as byte enables. The byte enables are valid for the entirety of each data phase, and they indicate which bytes in the 32-bit data path carry meaningful data for the current data phase.	13, 25, 36, 47	4	I/O	4	PCI Spec.
FRAME#	**Cycle Frame:** This signal driven by current master indicates that a bus transaction is beginning. While FRAME# is asserted, data transfers continue. When FRAME# is deasserted, the transaction is in its final phase.	27	1	I/O	4	PCI Spec.
IRDY#	**Initiator Ready:** This signal indicates the initiating agent's ability to complete the current data phase of the transaction. IRDY# is used in conjunction with TRDY#.	29	1	I/O	4	PCI Spec.
TRDY#	**Target Ready:** This signal indicates the target agent's ability to complete the current data phase of the transaction. TRDY# is used in conjunction with IRDY#.	30	1	I/O	4	PCI Spec.
STOP#	**Stop:** This signal indicates the current target is requesting the master to stop the current transaction.	32	1	I/O	4	PCI Spec.
LOCK#	**Lock Transaction:** This signal is used by a PCI master to perform a locked transaction to a target memory. LOCK# is used to prevent more than one master from using a particular system resource.	58	1	I/O	4	PCI Spec
IDSEL	**Initialization Device Select:** This input is used as a chip select during configuration read and write transactions. This is a point-to-point signal. The CL-PD6832 must be connected to its own unique IDSEL line (from the PCI bus arbiter or one of the most-significant AD bus pins).	15	1	I	–	–
DEVSEL#	**Device Select:** When actively driven, this signal indicates that the CL-PD6832 has decoded its own PCI address as the target of the current access. As an input, indicates whether any device on the bus has been selected.	31	1	I/O	4	PCI Spec.

Table 2-1. PCI Bus Interface Pins *(cont.)*

Pin Name	Description	Pin Number	Qty.	I/O	Pwr.	Drive
PERR#	**Parity Error:** The CL-PD6832 drives this output active (low) if it detects a data parity error during a write phase.	33	1	I/O	4	PCI Spec.
SERR#	**System Error:** This output is pulsed by the CL-PD6832 to indicate an address parity error.	34	1	O-OD	4	PCI Spec.
PAR	**Parity:** This pin is sampled in the clock cycle after completion of each corresponding address or write data phase. For read operations, this pin is driven from the cycle after TRDY# is asserted until the cycle after completion of each data phase. It ensures even parity across AD[31:0] and C/BE[3:0]#.	35	1	I/O	4	PCI Spec.
PCI_CLK	**PCI Clock:** This input provides timing for all transactions on the PCI bus to and from the CL-PD6832. All PCI bus interface signals described in this table (Table 2-1), except RST#, INTA#, and INTB# are sampled on the rising edge of PCI_CLK; and all the CL-PD6832 PCI bus interface timing parameters are defined with respect to this edge. This input can be operated at frequencies from 0 to 33 MHz.	1	1	I	–	–
RST#	**Device Reset:** This input is used to initialize all registers and internal logic to their reset states and place *all* the CL-PD6832 pins in a high-impedance state.	207	1	I	–	–
INTA#	**PCI Bus Interrupt A:** This output indicates a programmable interrupt request generated from any of a number of card actions. Although there is no specific mapping requirement for connecting interrupt lines from the CL-PD6832 to the system, a common use is to connect this pin to the PCI bus INTA# interrupt line and use the PCI Interrupt Signalling mode.	203	1	O-TS	4	PCI Spec.
INTB#/RI_OUT*	**PCI Bus Interrupt B / Ring Indicate Output:** In PCI Interrupt Signalling mode, this output can be used as an interrupt output connected to the PCI bus INTB# interrupt line. RI_OUT* and INTB# are open-drain outputs. If **Misc Control 2** register bit 7 is '1', this pin works as a ring indicate output from a socket's BVD1/-STSCHG/-RI input. Ring Indicate capability is available in all of the Interrupt Signalling modes.	204	1	OD, O-TS	4	PCI Spec.

Table 2-1. PCI Bus Interface Pins *(cont.)*

Pin Name	Description	Pin Number	Qty.	I/O	Pwr.	Drive
SOUT#/ISLD/ IRQSER	**Serial Interrupt Output / Serial IRQ Load:** In PCI Interrupt Signalling mode, this pin is a no connect. In PC/PCI Serial Interrupt Signalling mode, this pin is the serial interrupt output, SOUT#. In PCI/Way Interrupt Signalling mode, this pin is the IRQSER signal, which is bidirectional. In External-Hardware Interrupt Signalling mode, this pin is the load signal, ISLD, used to load the serially transmitted interrupt data into the external serial-to-parallel shifters.	205	1	I/O	4	PCI Spec.
SIN#/ ISDAT	**Serial Interrupt Input / Serial IRQ Data:** In PCI Interrupt Signalling mode, this pin is a no connect. In PC/PCI Serial Interrupt Signalling mode, this pin is the serial interrupt input, SIN#. In External-Hardware Interrupt Signalling mode, this pin is the IRQ vector data, ISDAT, that is serially transmitted to the external serial-to-parallel shifters.	206	1	I/O	4	PCI Spec.
CLKRUN#	**Clock Run:** This pin is an input to indicate the status of PCI_CLK and an open-drain output to request the starting or speeding up of PCI_CLK. This pin complies with the *Mobile PCI Mobile Design Guide*.	208	1	I/O	4	PCI Spec.
GNT#	**Grant:** This signal indicates that access to the bus has been granted.	2	1	I	–	–
REQ#	**Request:** This signal indicates to the arbiter that the CL-PD6832 requests use of the bus.	3	1	O	4	PCI Spec.
PCI_VCC	**PCI Bus V_{CC}**: These pins can be connected to either a 3.3- or 5-V power supply. The PCI bus interface pin outputs listed in this table (Table 2-1) operate at the voltage applied to these pins, independent of the voltage applied to other CL-PD6832 pin groups.	6, 21, 37, 50	4	PWR	–	–

Table 2-2. Socket Interface Pins

Pin Name[1]	Description[2]	Pin Number		Qty.	I/O	Pwr.	Drive
		Socket A	Socket B				
-REG#/ CCBE3#	**Register Access:** During PC Card 16 memory cycles, this output chooses between attribute and common memory. During I/O cycles for non-DMA transfers, this signal is active (low). During ATA mode, this signal is always inactive. For DMA cycles on the CL-PD6832 to a DMA-capable card, -REG is inactive during I/O cycles to indicate DACK to the PC Card 16 card. In CardBus mode, this pin is the command and byte enable 3.	112	188	1	I/O	2 or 3	Card-Bus spec.
A[25:24]/ CAD[19, 17]	PC Card 16 socket address 25:24 outputs. In CardBus mode, these pins are the CardBus address/data bits 19 and 17, respectively.	102, 99	176, 174	2	I/O	2 or 3	Card-Bus spec
A23/ CFRAME#	PC Card 16 socket address 23 output. In CardBus mode, this pin is the CardBus FRAME# signal.	96	172	1	I/O PU	2 or 3	Card-Bus spec
A22/ CTRDY#	PC Card 16 socket address 22 output. In CardBus mode, this pin is the CardBus TRDY# signal.	94	170	1	I/O PU	2 or 3	Card-Bus spec
A21/ CDEVSEL#	PC Card 16 socket address 21 output. In CardBus mode, this pin is the CardBus DEVSEL# signal.	92	168	1	I/O PU	2 or 3	Card-Bus spec
A20/ CSTOP#	PC Card 16 socket address 20 output. In CardBus mode, this signal is the CardBus STOP# signal.	90	166	1	I/O PU	2 or 3	Card-Bus spec
A19/ CBLOCK#	PC Card 16 socket address 19 output. In CardBus mode, this signal is the CardBus LOCK# signal used for locked transactions.	88	164	1	I/O PU	2 or 3	Card-Bus spec
A18/ RFU	PC Card 16 socket address 18 output. In CardBus mode, this pin is reserved for future use.	85	161	1	O	2 or 3	Card-Bus spec
A17/ CAD16	PC Card 16 socket address 17 output. In CardBus mode, this pin is the CardBus address/data bit 16.	83	158	1	I/O	2 or 3	Card-Bus spec

[1] To differentiate the sockets in the pin diagram, all socket-specific pins have either A_ or B_ prepended to the pin names indicated. For example, A_A[25:0] and B_A[25:0] are the independent address buses to the sockets.

[2] When a socket is configured as an ATA drive interface, socket interface pin functions change. See Chapter 14.

Table 2-2. Socket Interface Pins *(cont.)*

Pin Name[1]	Description[2]	Pin Number		Qty.	I/O	Pwr.	Drive
		Socket A	Socket B				
A16/ CCLK	PC Card 16 socket address 16 output. In CardBus mode, this pin supplies the clock to the inserted card.	93	169	1	O	2 or 3	Clock spec.
A15/ CIRDY#	PC Card 16 socket address 15 output. In CardBus mode, this pin is the CardBus IRDY# signal.	95	171	1	I/O PU	2 or 3	Card-Bus spec.
A14/ CPERR#	PC Card 16 socket address 14 output. In CardBus, this pin is the CardBus PERR# signal.	86	162	1	I/O PU	2 or 3	Card-Bus spec.
A13/ CPAR	PC Card 16 socket address 13 output. In CardBus mode, this pin is the CardBus PAR signal.	84	159	1	I/O	2 or 3	Card-Bus spec.
A12/ CCBE2#	PC Card 16 socket address 12 output. In CardBus mode, this pin is the command and byte enable 2.	97	173	1	I/O	2 or 3	Card-Bus spec.
A[11:9]/ CAD[12, 9, 14]	PC Card 16 socket address 11:9 outputs. In CardBus mode, these pins are the CardBus address/data bits 12, 9, and 14, respectively.	77, 73, 80	153, 149, 155	3	I/O	2 or 3	Card-Bus spec.
A8/ CCBE1#	PC Card 16 socket address 8 output. In CardBus mode, this pin is the command and byte enable 1.	82	157	1	I/O	2 or 3	Card-Bus spec.
A[7:0]/ CAD[18, 20–26]	PC Card 16 socket address 7:0 outputs. In CardBus mode, these pins are the CardBus address/data bits 18 and 20–26, respectively.	100, 103, 105, 107, 109, 111, 113, 116	175, 178, 181, 183, 185, 187, 189, 191	8	I/O	2 or 3	Card-Bus spec.
D15/ CAD8	PC Card 16 socket data I/O bit 15. In CardBus mode, this pin is the CardBus address/data bit 8.	71	148	1	I/O	2 or 3	Card-Bus spec.
D14/ RFU	PC Card 16 socket data I/O bit 14. In CardBus mode, this pin is reserved for future use.	69	145	1	I/O	2 or 3	Card-Bus spec.
D[13:3]/ CAD[6, 4, 2, 31, 30, 28, 7, 5, 3, 1, 0]	PC Card 16 socket data I/O bits 13:3. In CardBus mode, these pins are the CardBus address/data bits 6, 4, 2, 31, 30, 28, 7, 5, 3, 1, and 0, respectively.	67, 65,63, 124, 122, 120, 68, 66, 64, 62, 59	142, 140, 138, 199, 197, 195, 144, 141, 139, 137, 135	11	I/O	2 or 3	Card-Bus spec.

[1] To differentiate the sockets in the pin diagram, all socket-specific pins have either A_ or B_ prepended to the pin names indicated. For example, A_A[25:0] and B_A[25:0] are the independent address buses to the sockets.

[2] When a socket is configured as an ATA drive interface, socket interface pin functions change. See Chapter 14.

Table 2-2. Socket Interface Pins *(cont.)*

Pin Name[1]	Description[2]	Pin Number		Qty.	I/O	Pwr.	Drive
		Socket A	Socket B				
D2/ RFU	PC Card 16 socket data I/O bit 2. In CardBus mode, this pin is reserved for future use.	123	198	1	I/O	2 or 3	Card-Bus spec.
D[1:0]/ CAD[29, 27]	PC Card 16 socket data I/O bits 1:0. In CardBus mode, these pins are the CardBus address/data bits 29 and 27, respectively.	121, 119	196, 194	2	I/O	2 or 3	Card-Bus spec.
-OE/ CAD11	**Output Enable**: This output goes active (low) to indicate a memory read from the PC Card 16 socket to the CL-PD6832. In CardBus mode, this pin is the CardBus address/data bit 11.	75	151	1	I/O	2 or 3	Card-Bus spec.
-WE/ CGNT#	**Write Enable**: This output goes active (low) to indicate a memory write from the CL-PD6832 to the PC Card 16 socket. In CardBus mode, this pin is the CardBus GNT# signal.	89	165	1	I/O	2 or 3	Card-Bus spec.
-IORD/ CAD13	**I/O Read**: This output goes active (low) for I/O reads from the socket to the CL-PD6832. In CardBus mode, this pin is the CardBus address/data bit 13.	78	154	1	O-TS	2 or 3	Card-Bus spec.
-IOWR/ CAD15	**I/O Write**: This output goes active (low) for I/O writes from the CL-PD6832 to the socket. In CardBus mode, this pin is the CardBus address/data bit 15.	81	156	1	I/O	2 or 3	Card-Bus spec.
WP/ -IOIS16/ CCLKRUN#	**Write Protect / I/O Is 16-Bit**: In Memory Card Interface mode, this input is interpreted as the status of the write protect switch on the PC Card 16 card. In I/O Card Interface mode, this input indicates the size of the I/O data at the current address on the PC Card 16 card. In CardBus mode, this pin is the CardBus CLKRUN# signal, which starts and stops the CardBus clock (CCLK).	125	201	1	I/O-PU	2 or 3	Card-Bus spec.

[1] To differentiate the sockets in the pin diagram, all socket-specific pins have either A_ or B_ prepended to the pin names indicated. For example, A_A[25:0] and B_A[25:0] are the independent address buses to the sockets.

[2] When a socket is configured as an ATA drive interface, socket interface pin functions change. See Chapter 14.

Table 2-2. Socket Interface Pins *(cont.)*

Pin Name[1]	Description[2]	Pin Number		Qty.	I/O	Pwr.	Drive
		Socket A	Socket B				
-INPACK/ CREQ#	**Input Acknowledge**: The -INPACK function is not applicable in PCI bus environments. This pin should be connected to the PC Card socket's -INPACK pin, since this can be the DREQ signal during DMA cycles. In CardBus mode, this pin is the CardBus REQ# signal.	110	186	1	I-PU	2 or 3	–
RDY/ -IREQ/ CINT#	**Ready / Interrupt Request**: In Memory Card Interface mode, this input indicates to the CL-PD6832 that the card is either ready or busy. In I/O Card Interface mode, this input indicates a card interrupt request. In CardBus mode, this pin is the CardBus Interrupt Request signal. This signal is active-low and level-sensitive.	91	167	1	I-PU	2 or 3	–
-WAIT/ CSERR#	**Wait**: This input indicates a request by the card to the CL-PD6832 to halt the cycle in progress until this signal is deactivated. In CardBus mode, this pin is the CardBus SERR# signal.	108	184	1	I-PU	2 or 3	–
-CD[2:1]/ CCD[2:1]#	**Card Detect**: These inputs indicate to the CL-PD6832 that a card is in the socket. They are internally pulled high to the voltage of the +5V power pin. In CardBus mode, these inputs are used in conjunction with CVS[2:1] to detect the presence and type of card.	126, 61	202, 136	2	I-PU	1	–
-CE2/ CAD10	**Card Enable:** This pin is driven low by the CL-PD6832 during card access cycles to control byte/word card access. -CE1 enables even-numbered address bytes, and -CE2 enables odd-numbered address bytes. When configured for 8-bit cards, only -CE1 is active and A0 is used to indicate access of odd- or even-numbered bytes. In CardBus mode, this pin is the CardBus address/data bit 10.	74	150	1	I/O	2 or 3	Card-Bus spec.

[1] To differentiate the sockets in the pin diagram, all socket-specific pins have either A_ or B_ prepended to the pin names indicated. For example, A_A[25:0] and B_A[25:0] are the independent address buses to the sockets.

[2] When a socket is configured as an ATA drive interface, socket interface pin functions change. See Chapter 14.

Table 2-2. Socket Interface Pins *(cont.)*

Pin Name[1]	Description[2]	Pin Number		Qty.	I/O	Pwr.	Drive
		Socket A	Socket B				
-CE1/ CCBE0#	**Card Enable:** This pin is driven low by the CL-PD6832 during card access cycles to control byte/word card access. -CE1 enables even-numbered address bytes, and -CE2 enables odd-numbered address bytes. When configured for 8-bit cards, only -CE1 is active and A0 is used to indicate access of odd- or even-numbered bytes. In CardBus mode, this pin is the command and byte enable 0.	70	147	1	I/O	2 or 3	Card-Bus spec.
RESET/ CRST#	**Card Reset:** This output is low for normal operation and goes high to reset the card. To prevent reset glitches to a card, this signal is high-impedance unless a card is seated in the socket, card power is applied, and the card's interface signals are enabled. In CardBus mode, this pin is the RST# input to the card, which is active-low.	106	182	1	O-TS	2 or 3	Card-Bus spec.
BVD2/ -SPKR/ -LED/ CAUDIO	**Battery Voltage Detect 2 / Speaker / LED:** In Memory Card Interface mode, this input serves as the BVD2 (battery warning status) input. In I/O Card Interface mode, this input can be configured as a card's -SPKR binary audio input. For ATA or non-ATA (SFF-68) disk-drive support, this input can also be configured as a drive-status LED input. In CardBus mode, this pin is the AUDIO input from the card.	114	190	1	I-PU	2 or 3	–
BVD1/ -STSCHG/ -RI / -CSTSCHG	**Battery Voltage Detect 1 / Status Change / Ring Indicate:** In Memory Card Interface mode, this input serves as the BVD1 (battery-dead status) input. In I/O Card Interface mode, this input is the -STSCHG input, which indicates to the CL-PD6832 that the card's internal status has changed. If bit 7 of the **Interrupt and General Control** register is set to '1', this pin serves as the ring indicate input for wakeup-on-ring system power management support. In CardBus mode, this pin is the CardBus Status Change used by the card to alert the system to changes in READY, WP, and BVD[2:1].	118	192	1	I-PU	2 or 3	–

[1] To differentiate the sockets in the pin diagram, all socket-specific pins have either A_ or B_ prepended to the pin names indicated. For example, A_A[25:0] and B_A[25:0] are the independent address buses to the sockets.

[2] When a socket is configured as an ATA drive interface, socket interface pin functions change. See Chapter 14.

Table 2-2. Socket Interface Pins *(cont.)*

Pin Name[1]	Description[2]	Pin Number		Qty.	I/O	Pwr.	Drive
		Socket A	Socket B				
VS2/ CVS2	**Voltage Sense 2:** This pin is used in conjunction with VS1 to determine the operating voltage of the card. This pin is internally pulled high to the voltage of the +5V power pin under the combined control of the external data write bits and the CD pull-up control bits. This pin connects to PC Card 16 socket pin 57. In CardBus mode, this is CardBus Voltage Sense 2. It is used in conjunction with CVS1, CCD1, and CCD2 to determine the initial voltage applied to the CardBus PC Card.	104	179	1	I/O	1	2 mA
VS1/ CVS1	**Voltage Sense 1:** This pin is used in conjunction with VS2 to determine the operating voltage of the card. This pin is internally pulled high to the voltage of the +5V power pin under the combined control of the external data write bits and the CD pull-up control bits. This pin connects to PC Card 16 socket pin 43. In CardBus mode, this is CardBus Voltage Sense 1. It is used in conjunction with CVS2, CCD1, and CCD2 to determine the initial voltage applied to the CardBus PC Card.	76	152	1	I/O	1	2 mA
SOCKET_VCC	Connect these pins to the V_{CC} supply of the socket (pins 17 and 51 of the respective PC Card 16 socket). These pins can be 0, 3.3, or 5 V, depending on card presence, card type, and system configuration. The socket interface outputs (listed in this table, Table 2-2) operate at the voltage applied to these pins, independent of the voltage applied to other CL-PD6832 pin groups.	117, 98, 60	200, 160, 143	3	PWR	–	–

[1] To differentiate the sockets in the pin diagram, all socket-specific pins have either A_ or B_ prepended to the pin names indicated. For example, A_A[25:0] and B_A[25:0] are the independent address buses to the sockets.

[2] When a socket is configured as an ATA drive interface, socket interface pin functions change. See Chapter 14.

Table 2-3. Power Control and General Interface Pins

Pin Name	Description	Pin Number	Qty.	I/O	Pwr.	Drive
SPKR_OUT*‡	**Speaker Output:** This output can be used as a digital output to a speaker to allow a system to support PCMCIA card fax/modem/voice and audio sound output. This output is enabled by setting the socket's **Misc Control 1** register bit 4 to '1' (for the socket whose speaker signal is to be directed from BVD2/-SPKR/-LED to this pin). This pin is used for configuration information during hardware reset. Refer to **Misc Control 3** register bit 0.	128	1	I/O	1	8 mA
LED_OUT*/ HW_SUSPEND#‡	**LED Output:** This output can be used as an LED driver to indicate disk activity when a socket's BVD2/-SPKR/-LED pin has been programmed for LED support. The **Extension Control 1** register bit 2 must be set to '1' to enable this output (to reflect any activity on BVD2/-SPKR/-LED), and a socket's **ATA Control** register bit 1 must be set to '1' to allow the level of the BVD2/-SPKR/-LED pin to reflect disk activity. This pin serves as a HW_SUSPEND# input pin when **Misc Control 3** register bit 4 is set to '1'. This pin is used for configuration information during hardware reset. Refer to **Misc Control 3** register bit 1.	133	1	I/O	1	8 mA
SCLK	**Serial Clock:** This input is used as a reference clock (10–100 kHz, usually 32 kHz) to control the serial interface of the socket power control chips. **CAUTION:** This pin must be driven at all times. See "Socket Power Control" on page 35 for more information.	132	1	I	–	–
SDATA/ SMBDATA‡	**Serial Data / System Management Bus Data:** This pin serves as output pin SDATA when used with the serial interface of Texas Instruments' TPS2202AIDF socket power control chip. It serves as a bidirectional pin SMBDATA when used with Intel's System Management Bus used by Maxim's socket power control chip. This pin is open drain for the SMB mode of operation and requires an external pull-up. This pin is used for configuration information during hardware reset. Refer to **Misc Control 3** register bit 3.	131	1	I/O	1	8 mA (for SDATA)

Table 2-3. Power Control and General Interface Pins *(cont.)*

Pin Name	Description	Pin Number	Qty.	I/O	Pwr.	Drive
SLATCH/ SMBCLK‡	**Serial Latch / System Management Bus Clock:** This pin serves as output pin SLATCH when used with the serial interface of Texas Instruments' TPS2202AIDF socket power control chip. It serves as a bidirectional pin SMBCLK when used with Intel's System Management Bus used by Maxim's socket power control chip. In the SMB mode of operation, this pin is open-drain and requires an external pull-up. This pin is used for configuration information during hardware reset. Refer to **Misc Control 3** register bit 2.	130	1	I/O-PU	1	8 mA (for SLATCH)

Table 2-4. Power and Ground Pins

Pin Name	Description	Pin Number	Qty.	I/O	Pwr.	Drive
+5V	This pin is connected to the system's 5-V power supply. In systems where 5 V is not available, this pin can be connected to the system's 3.3-V supply.	127	1	PWR	–	–
CORE_VDD	This pin provides power to the core circuitry of the CL-PD6832. This pin must be connected to the 3.3-V supply.	134, 79, 180	3	PWR	–	–
CORE_GND	All the CL-PD6832 ground lines should be connected to system ground.	26, 87, 177	3	GND	–	–
RING_GND	All the CL-PD6832 ground lines should be connected to system ground.	14, 28, 44, 57, 72, 101, 115, 129, 146, 163, 193	11	GND	–	–

Notes

3. INTRODUCTION TO THE CL-PD6832

3.1 System Architecture

This section describes the CL-PD6832 basic architecture in terms of PC Card functions. It first introduces PC Cards, the PCMCIA (Personal Computer Memory Card International Association), and the PC Card Standard, and then discusses how the CL-PD6832 complies with the standards. It also describes the windowing capabilities of the CL-PD6832.

3.1.1 PC Card Basics

PC Cards are credit-card-size peripherals that add memory and I/O capabilities to computers in a rugged, compact form factor. The PC Card Standard describes specifications for using these memory and I/O devices as insertable, exchangeable peripherals for personal and handheld computers. The PC Card Standard is published by the PCMCIA, a nonprofit trade association that promotes PC Card technology by defining technical standards.

There are two types of PC Cards: PC Card 16 (R2) and PC Card 32 (CardBus). PC Card 16 (R2) cards are 16-bit cards that comply with PCMCIA Standard Releases 2.0, 2.01, and 2.1. In 1995, the PCMCIA released a standard for PC Cards in conjunction with the standard for the PC Card 16 (R2) architecture, and renamed the joint standard as PC Card Standard. This joint standard introduced 32-bit operation and support for PC Card 32 (CardBus) bus mastering cards. PC Card 32 (CardBus) cards are 32-bit cards that comply with the PC Card Standard first released in February 1995.

The CL-PD6832 implements both PC Card 16 (R2) and PC Card 32 (CardBus) functions. The R2 functions of the CL-PD6832 implement the functions described in the PCMCIA Standard Release 2.1, while the CardBus functions of the CL-PD6832 are compatible with the PC Card Standard. Under software control, the CL-PD6832 uses the VS1, VS2, CD1, and CD2 pins in the manner described by the PC Card Standard to identify and power up the PC Card. The PC Card type (R2 or CardBus) determines its voltage requirements.

For simpler end-user and vendor implementation of the standard, systems employing the PC Card Standard should also be backward-compatible with industry-standard PC addressing. The CL-PD6832 is backward-compatible with PCMCIA Standard Releases 1.0, 2.0, 2.01, and 2.1. The CL-PD6832 is also compatible with JEIDA 4.1 and earlier standards corresponding with the PCMCIA standards above.

PC Card 16 (R2) cards can have *attribute* and *common* memory. Attribute memory indicates to host software the capabilities of the PC Card, and it allows host software to change the configuration of the card. Common memory can be used by host software for any purpose such as flash file system, system memory, and floppy emulation.

For memory-type PC Card 16 (R2) cards, the memory information must be mapped into the system memory address space. This is accomplished with a 'windowing' technique that is similar to expanded memory schemes already used in PC systems (for example, LIM 4.0 memory manager).

I/O-type PC Card 16 (R2) cards, such as modems, should also be directly addressable, as if the cards were I/O devices plugged into the PCI bus. For example, it would be highly desirable to have a PC Card modem accessible to standard communications software as if it were at a COM port. For COM1, this would require that the modem be accessed at system I/O address 3F8h–3FFh. The method of mapping a PC Card I/O address into anticipated areas of PCI I/O space is similar to memory windowing.

3.1.2 CL-PD6832 Windowing Capabilities

For full compatibility with existing software and to ensure compatibility with future memory card and multi-function I/O cards, the CL-PD6832 provides seven programmable general-purpose windows per socket. These windows default at reset to two I/O windows and five memory windows.

Any one of the seven windows can be programmed to respond on the PCI primary bus as either a memory or I/O window and to issue either a memory or I/O cycle to the PC Card. For example, in the case of a non-'X86 processor that must memory map I/O devices, a window would be set for memory on the primary PCI side and I/O on the PC Card side.

Table 3-1 and Table 3-2 show the programming options for the memory and I/O windows.

Table 3-1. Memory Window Options

Memory Window Option	Description
Enable	Each of the seven windows can be programmed as a memory window and individually enabled. **DEVSEL#** is not asserted for disabled windows.
Start Address	This is the start address of the memory window within the selected 16-Mbyte page of PCI memory. The start address can be programmed to reside on any 4-Kbyte boundary within the programmed page of PCI memory.
End Address	This is the end address of the memory window within the selected 16-Mbyte page of PCI memory. The end address can be programmed to reside on any 4-Kbyte boundary within the programmed page of PCI memory. Only memory accesses between the start and end address are responded to.
Offset Address	The offset address is added to the PCI address to determine the address for accessing the PC Card. This allows the addresses in the PC Card address space to be different from the PCI address space.
Upper Address	The upper memory address specifies a 16-Mbyte page of PCI memory.
Data Size	The size of accesses can be set manually to either 8 or 16 bits.
Timing	The timing of accesses (Setup/Command/Recovery) can be set by either of two timing register sets: **Timer Set 0** or **Timer Set 1**.
Register Access Setting	The -REG pin can be enabled on a per-window basis so that any of the windows can be used for accessing attribute memory.
Write Protect	If the window is programmed to be write-protected, then writes to the memory window are ignored (reads are still performed normally).

Table 3-2. I/O Window Options

I/O Window Option	Description
Enable	Each of the seven windows can be programmed as an I/O window and individually enabled.
Start Address	The start address of the window is programmable on single-byte boundaries from 0 to 64 Kbytes.
End Address	The end address of the window is also programmable on single-byte boundaries from 0 to 64 Kbytes.
Offset Address	The offset address is added to the PCI address to determine the address for accessing the PC Card.
Auto Size	The size of accesses can be set automatically, based on the PC Card -IOIS16 signal.
Data Size	The size of accesses can be set manually to either 8 or 16 bits, overriding the Auto Size option.
Timing	The timing of accesses (Setup/Command/Recovery) can be set by either of two timing register sets: **Timer Set 0** or **Timer Set 1**.

CAUTION: The windows of the CL-PD6832 should never be allowed to overlap with each other or the other devices in the system. This would cause signal collisions, resulting in erratic behavior.

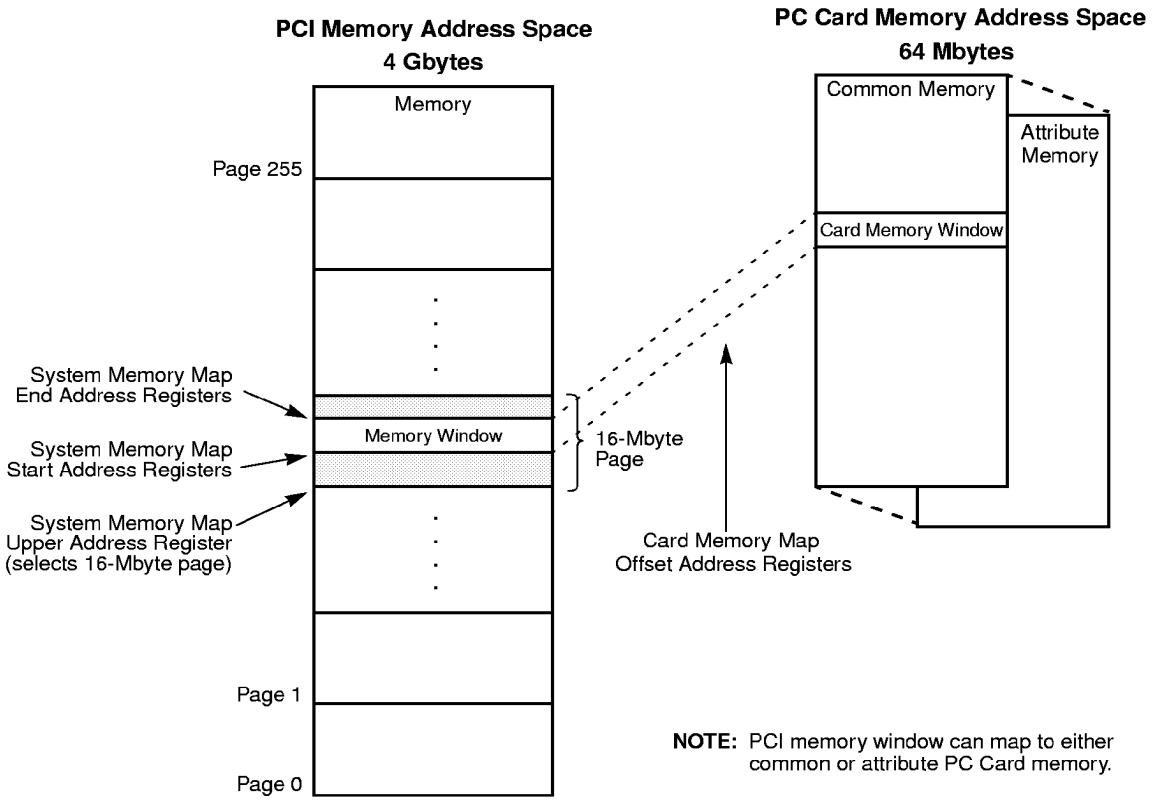
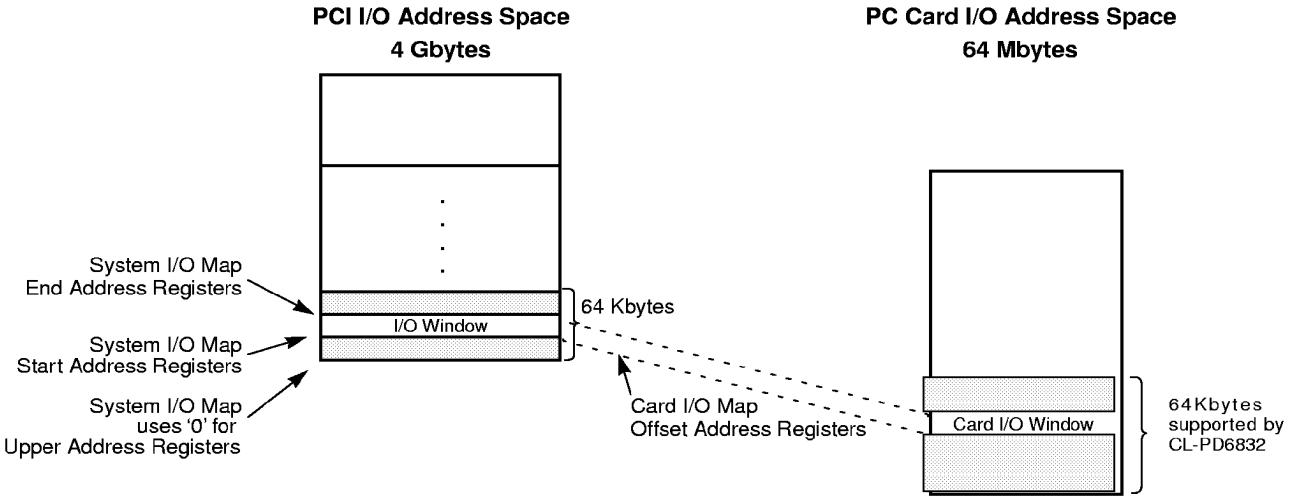


Figure 3-1. Memory-to-Memory Window Organization



NOTE: The CL-PD6832 only decodes the first 64 Kbytes of the PCI I/O space.

Figure 3-2. I/O-to-I/O Window Organization

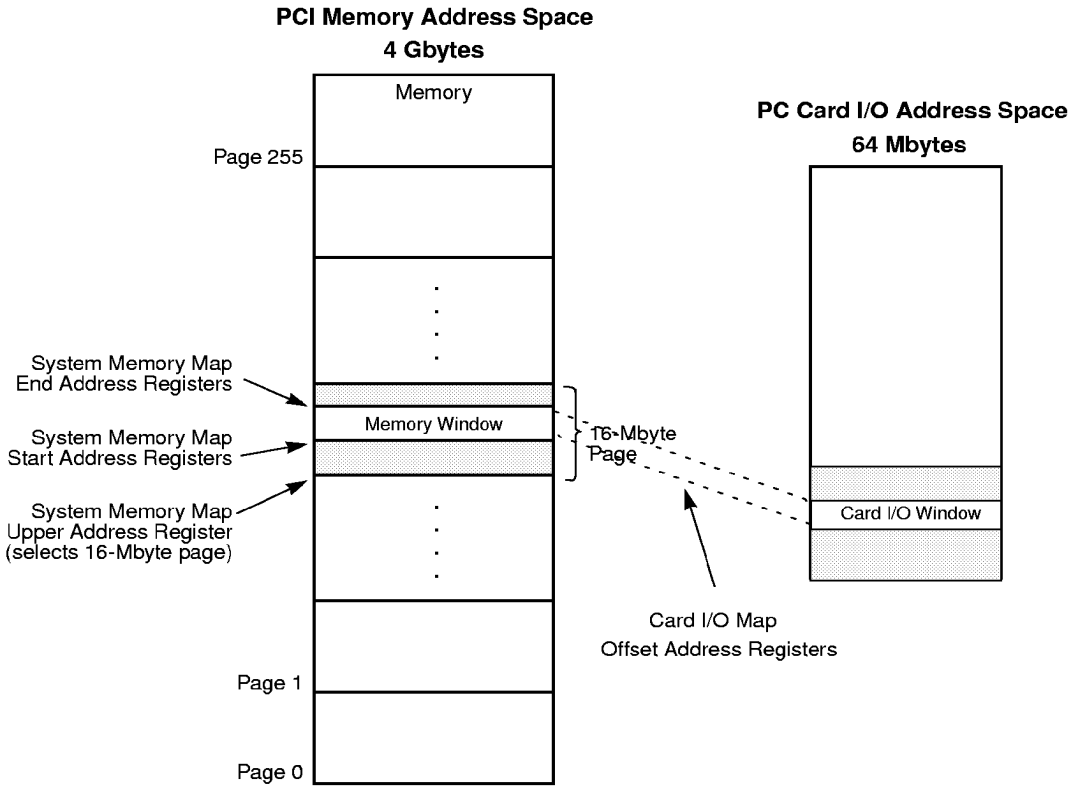
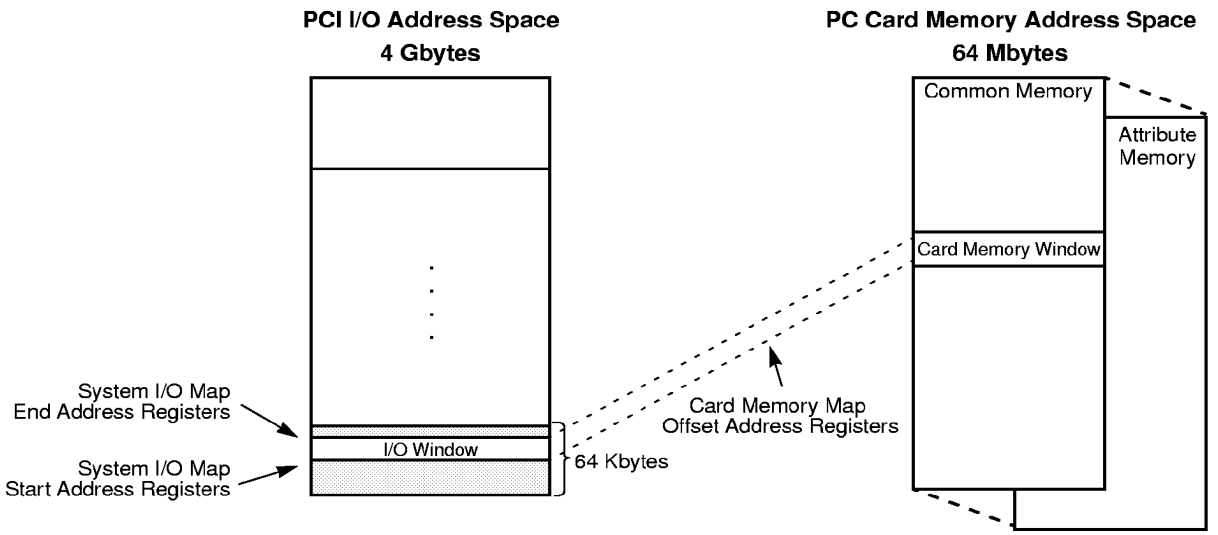


Figure 3-3. Memory-to-I/O Window Organization



NOTE: The CL-PD6832 only decodes the first 64 Kbytes of the PCI I/O space.

Figure 3-4. I/O-to-Memory Window Organization

3.1.3 Zoomed Video Port

The CL-PD6832 supports the implementation of the ZV (zoomed video) Port at the PC Card interface. The ZV Port provides a direct connection between a PC Card, a VGA controller, and an audio DAC. It allows the PC Card to directly write video data to a graphics controller input port and audio data to a digital-to-analog converter.

The CL-PD6832 supports the ZV Port in the 'bypass' mode during which the signals are directly routed from the PC Card bus to the video port of the VGA controller. Rerouting is accomplished by tristating address lines A[25:4] from the CL-PD6832. The CL-PD6832 enters the ZV Port mode when the Multimedia Enable bit (bit 0 of the **Misc. Control 1** register at index 16h or memory offset 816h) is set to a '1'. The CL-PD6832 has a Multimedia Arm bit (bit 7 of the **Misc. Control 3** register at I/O index 2Fh, Extended Index 25h or memory offset 925h) that works as an overriding control bit. Until the Multimedia Arm bit is set, the Multimedia Enable bit does not tristate the address pins as previously described. When the Multimedia Expand bit (bit 6 of **Misc. Control 3** register) is set to '1', it causes CE2 and D[15:8] to be tristated to the 16-bit PC Card bus in addition to the tristating of the address signals A[25:4]. The Multimedia Expand bit allows 24-bit video from a Multimedia PC Card.

Figure 3-5 on page 30 shows an example of the ZV Port implementation using the CL-PD6832. For more details, refer to the application note *Zoomed Video (ZV) Port Implementation (AN-PD10).*

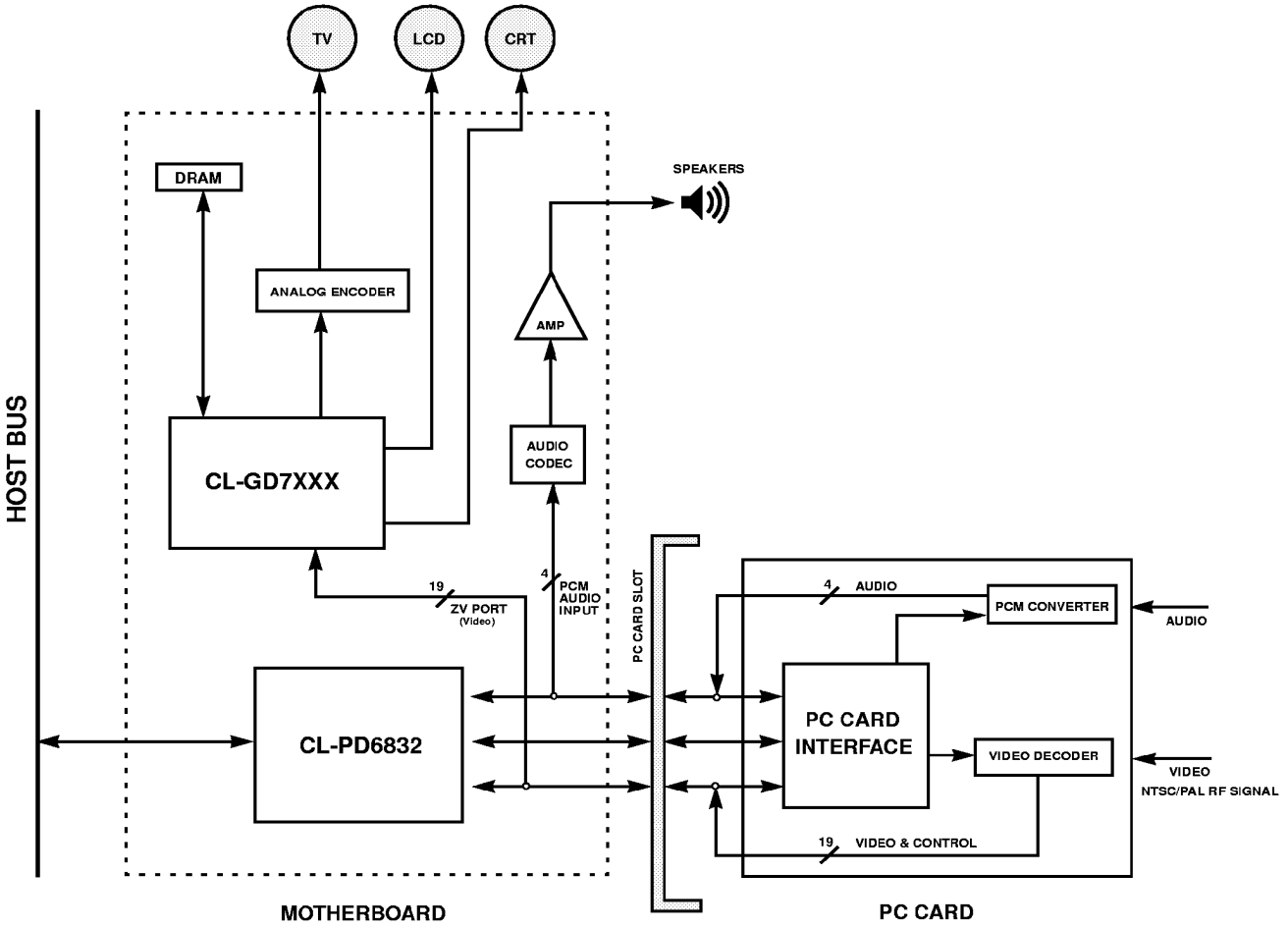


Figure 3-5. A Typical ZV Port Implementation

3.1.4 Interrupts

The I/O-type PC Cards usually have interrupts that need to be serviced by host software. For example, for a modem card accessed as if at COM1, the software would expect the modem to generate interrupts on the IRQ4 line. To ensure all interrupts are routed as expected, the CL-PD6832 can steer the interrupt from the PC Card to one of the four PCI-bus-defined interrupts or to one of several standard PC interrupts. The CL-PD6832 supports four interrupt schemes: PCI Interrupt, Intel's PC/PCI Serial Interrupt Protocol, PCI/Way Interrupt, and External-Hardware Interrupt. The CL-PD6832 allows sharing of interrupts under software control. This is accomplished by programming the CL-PD6832 to alternately pulse and then tristate the desired interrupt pin. In addition, the CL-PD6832 allows two I/O devices to share one interrupt line in systems that have only one interrupt line and all interrupt requests are routed to that one interrupt line. For example, two fax/modem cards can be inserted into the dual-socket PC Card controller. Both are active and share the only interrupt line provided by the host system. The application software can still identify the requester and type of the pending interrupt.

The CL-PD6832 supports two classes of interrupts:

- Socket or card functional interrupts (initiated by the PC Card activating its RDY/-IREQ signal)
- Management interrupts (triggered by changes in PC Card status)

There are four changes in PC Card status that can be programmed to cause management interrupts:

— Card insertion or removal

— Battery dead indicator (BVD1) or I/O-type card status change (-STSCHG)

— Battery warning indicator (BVD2) change on a memory-type card

— Ready (RDY) status change on a memory-type card

Any interrupt from either class of interrupts can be steered by the CL-PD6832 to any interrupt output. This is useful because IRQ-type interrupts in PC-compatible systems are not generally shared by hardware. Therefore, each device in the system using IRQ-type interrupts must have a unique interrupt line. Additionally, many software applications assume that certain I/O devices use specific IRQ signals. To allow PC Cards with differing I/O functionality to be connected to appropriate nonconflicting IRQ locations, the CL-PD6832 can steer the interrupt signal from a PC Card to any one of 10 interrupt outputs.

The CL-PD6832 provides four pins for interrupts. These pins have multiple functionality to allow the CL-PD6832 to output a number of specific interrupts, depending on which of four interrupt signalling modes is selected:

- External-Hardware Interrupt Signalling mode
- PCI/Way Interrupt Signalling mode
- PCI Interrupt Signalling mode
- PC/PCI Interrupt Signalling mode

The interrupt signalling mode is usually established during power-on reset by the level of pins 133 (LED_OUT*/HW_SUSPEND#) and 128 (SPKR_OUT*), but it can also be set by writing to bits 1:0 of the **Misc. Control 3** register. Refer to Table 3-3 for the Interrupt Signalling mode configuration.

Table 3-3. Interrupt Signalling Mode Configuration

MODE	LED_OUT*/ HW_SUSPEND# (Pin 133)	SPKR_OUT (Pin 128)	Misc. Control 3	
			Bit 1	Bit 0
PC/PCI	Pull-down	Pull-down	0	0
External-Hardware	Pull-down	Pull-up	0	1
PCI/WAY	Pull-up	Pull-down	1	0
PCI	Pull-up	Pull-up	1	1

Note that depending on the mode, the INTB#/RI_OUT* pin can be configured to function as a ring indicator output (RI_OUT*) to an 80360-type chipset's -RI input. When configured in Ring Indicate mode by programming **Misc. Control 2** register bit 7 to '1', outputs from a I/O-type card's -STSCHG pin[1] are passed through to the INTB#/RI_OUT* pin of the CL-PD6832.

External-Hardware Interrupt Signalling Mode

In this mode, up to eight ISA IRQ interrupts and two PCI interrupts are supported. Two pins (pin 205 functioning as ISLD and pin 206 functioning as ISDAT) interface with external hardware, which converts the signals to appropriate ISA-type IRQ totem-pole interrupt outputs.

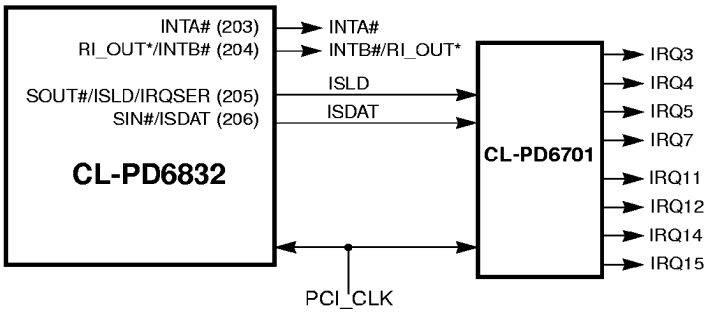


Figure 3-6. External-Hardware Interrupt Signalling Mode

The interrupts are serially passed on the ISDAT pin to the external hardware. The interrupts are shifted into the external serial-to-parallel converter using PCI_CLK. The interrupts are latched using the ISLD signal.

In this mode, pin 203 functions as INTA#, and pin 204 functions as INTB#/RI_OUT*. For more details, refer to application note *Interrupt Signalling Modes for the CL-PD6730 and CL-PD6832* (*AN-PD8*).

This is the only mode that supports pulse mode interrupts. The CL-PD6832 contains unique logic that allows ISA-style, IRQ-type interrupts to be shared under software control. This is accomplished by programming the CL-PD6832 to alternately pulse and then tristate the desired interrupt pin, which is programmed as an IRQ-type output. This unique IRQ interrupt sharing technique requires additional software to allow for the sharing of interrupts.

PCI/Way Interrupt Signalling Mode

This mode of operation uses the PCI/Way single pin interrupt system. In this mode one pin (pin 205) interfaces with a PCI/Way compliant motherboard chipset.

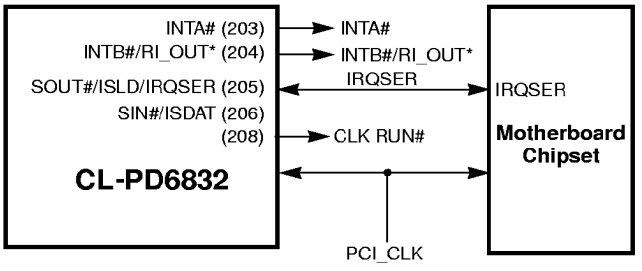


Figure 3-7. PCI/Way Serial Interrupt Signalling Mode

On the CL-PD6832, the SOUT#/ISLD/IRQSER pin is the bidirectional serial interrupt line. In this mode, pin 203 works as INTA# and pin 204 works as INTB#/RI_OUT*. Pin 206 is not used.

[1] **Interrupt and General Control** register bits 5 and 7 must be set to '1's for a socket interface to accept an -RI input.

PCI Interrupt Signalling Mode

This is the default mode, as per the power-on-reset condition of the **Misc. Control 3** register. It uses pins 203 and 204 directly as the PCI-type 'INT#' open-drain interrupts (refer to Figure 3-8). If the CL-PD6832 is not programmed for Ring Indicate, INTA# is used for function 0 and INTB# is used for function 1. If the CL-PD6832 is programmed for Ring Indicate, INTA# is used for both function 0 and 1. Ring-Indicate output appears on INTB#. Programming PC Card interrupts (**Interrupt and General Control** register, index 3h) or management interrupts (**Management Interrupt Configuration** register, index 5h) does not affect PCI mode.

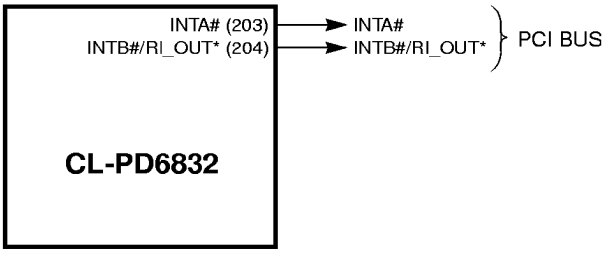


Figure 3-8. PCI Interrupt Signalling Mode (A Common Interrupt Mapping)

PC/PCI Serial Interrupt Signalling Mode

This mode supports the Mobile PC/PCI Extended Interrupt Programming Model. In this mode, two pins (pin 205 functioning as SOUT# and pin 206 functioning as SIN#) interface with an SIC (serial interrupt controller). The number of interrupts supported depends on the SIC configuration.

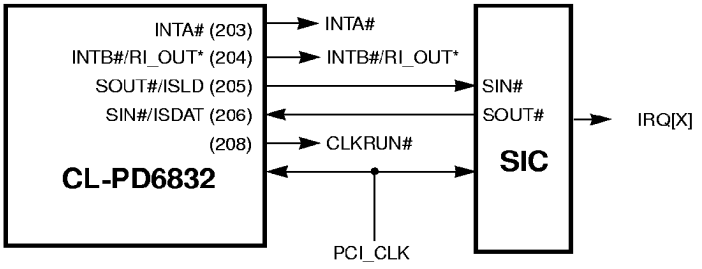


Figure 3-9. PC/PCI Serial Interrupt Signalling Mode

On the CL-PD6832, the SIN# pin is the serial interrupt input line from other devices in the interrupt loop, and the SOUT# pin is the serial interrupt output line containing the logical 'AND' of the interrupt level in the CL-PD6832, along with SIN# interrupts. The SIC is clocked by PCI_CLK, and CLKRUN# is used by the CL-PD6832 to restart PCI_CLK if it has stopped.

In this mode, pin 204 is INTB#/RI_OUT* and pin 203 is INTA#. Program **Misc. Control 2** register bit 7 to a '1' for ring indicate function.

3.1.5 PCI/Way DMA

The CL-PD6832 supports the PCI/Way DMA (direct memory access). This DMA approach is applicable to a PC system that does not have an ISA bus as its main system bus. The approach requires that two or more devices (on a non-ISA bus) support legacy DMA. Since the PCI/Way DMA specification describes an approach that distributes independent, standard programming model bus-master channels among devices, it is also popularly known as distributed DMA.

The CL-PD6832 provides complete, seamless support for DMA-capable PC Cards on the PCMCIA bus as outlined in the PC Card Standard. When a DMA-capable PC Card requests DMA operation, the CL-PD6832 uses the REQ#, GNT# protocol on the PCI bus to handle the DMA transfer. Programming registers in the CL-PD6832 reflect the functions found in the legacy 8237 DMA controller chip.

3.1.6 CL-PD6832 Power Management

The CL-PD6832 employs power management techniques to provide long battery life. This is achieved by minimizing the power consumption of the CL-PD6832 and that of the PC Cards. Substantial power is saved by turning off the PCI_CLK to the CL-PD6832 or reducing the frequency of that clock. More power can be saved by putting the CL-PD6832 in the HW (Hardware) Suspend mode. To put the CL-PD6832 in the HW Suspend mode, bit 4 of the **Miscellaneous Control 3** (extended I/O index 25h) must be set to a '1'. Thereafter, the LED_OUT*/HW_SUSPEND# pin can be driven to a '0' logic state. While in the HW Suspend mode, the CL-PD6832 tristates all its outputs except the REQ# signal, which is driven high.

During HW Suspend mode, the PCI bus signals to the CL-PD6832 can be turned off. However, the RST# signal on the PCI bus must always be held high. An inactive state of the RST# signal ensures that the internal state of the CL-PD6832 is maintained during the power-down modes. Table 3-4 illustrates the various power management modes and the corresponding power consumption.

Table 3-4. Power Consumption in Various Modes

Mode Name	RST# level	Measurement Conditions	Typical Power Consumption
Normal Operation	High	CL-PD6832 fully functional PCI Bus active Core_VDD = 3.3 V PCI_VCC, +5 V = 5 V Clock = 33 MHz	tbd
PCI_CLK Stopped	High	Only interrupts and RI_OUT* available[a] PCI Bus active Core_VDD = 3.3 V PCI_VCC,+5V = 5V Clock = 0 MHz	tbd
HW Suspend PCI_CLK Stopped	High	Only interrupts and RI_OUT* available[a] PCI bus turned off[b] Core_VDD = 3.3 V +5 V = 5 V PCI_VCC = 0 V Clock = 0 MHz	tbd

[a] The CL-PD6832 uses the CLKRUN mechanism to assert ISA IRQs. PCI interrupts (INTA# and/or INTB#) and RI_OUT* can be asserted while the PCI_CLK is stopped.

[b] The CL-PD6832 tristates all PCI bus signals. REQ# is driven high on the PCI bus.

3.1.7 Socket Power Management Features

3.1.7.1 Socket Power Control

The CL-PD6832 provides two pins to serially control the socket power. These pins have multiple functionality to allow the CL-PD6832 to interface with a number of socket power-control chips. Following are the three socket power-control signalling modes supported by the CL-PD6832:

- Texas Instruments TPS2202AIDF Serial Signalling mode
- External-Hardware Serial Signalling mode
- SMBus™ (system management bus)[1] Signalling mode using the Maxim 1601

The socket power-control signalling mode is usually established during power-on reset by the level of pins 131 (SDATA/SMBDATA) and 130 (SLATCH/SMBCLK), but it can also be set by writing to bits 3:2 of the **Misc. Control 3** register. Refer to Table 3-5 for the configuration of the power-control signalling mode.

Table 3-5. Socket Power Control Configuration

Socket Power Signalling Mode	SDATA/SMB DATA (Pin 131)	SLATCH/ SMBCLK (Pin 130)	Misc. Control 3	
			Bit 3	Bit 2
External-Hardware Serial	Pull-down	Pull-down	0	0
Reserved	Pull-down	Pull-up	0	1
Texas Instruments TPS2202AIDF Serial Mode	Pull-up	Pull-down	1	0
SMBus	Pull-up	Pull-up	1	1

Texas Instruments TPS2202AIDF Serial Signalling Mode

In this mode, the CL-PD6832 can interface with the Texas Instruments TPS2202AIDF dual-socket PC Card power interface switch, which uses a three-pin interface: SCLK, SDATA, and SLATCH (refer to Figure 3-10). SCLK is connected to the 10–100-kHz (usually 32-kHz) clock typically available on the system. This serves as a reference clock for the CL-PD6832 and as a clock to the TPS2202AIDF. The data is serially transferred over SDATA, and the latch signal is SLATCH.

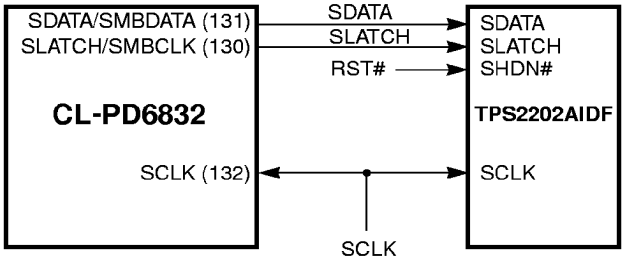


Figure 3-10. Power Control Using Texas Instruments TPS2202AIDF Serial Signalling Mode

[1] SMBus is a trademark of Intel Corporation.

External-Hardware Serial Signalling Mode

In this mode, the CL-PD6701 is used to establish a parallel power-control interface. In the CL-PD6832, this mode is currently the same as Texas Instruments TPS2202AIDF Serial Signalling mode (Refer to Figure 3-11). This mode enables the use of parallel socket power control chips.

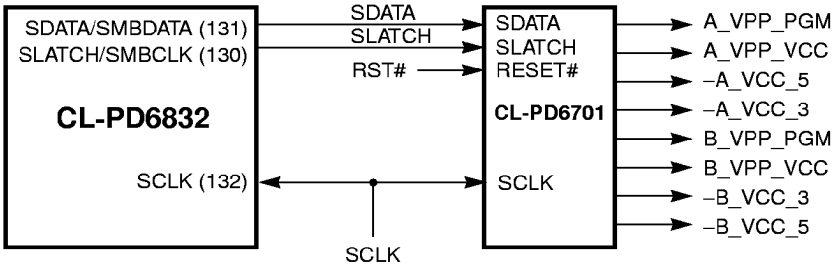


Figure 3-11. Power Control Using External-Hardware Signalling Mode

System Management Bus Signalling Mode

In this mode, the CL-PD6832 supports the Intel SMBus (system management bus) protocol, which uses a two-pin interface: SMBDATA and SMBCLK (refer to Figure 3-12). The system management bus is a subset of the I^2C bus. The serial data is available on the SMBDATA pin, and the serial clock is on the SMBCLK pin. The SCLK pin is used as a reference clock for the CL-PD6832. The Maxim MAX1601 dual-channel PC Card V_{CC}/V_{PP} power-switching network supports the SMBus protocol. The PCI bus reset signal can be used to reset the MAX1601 chip.

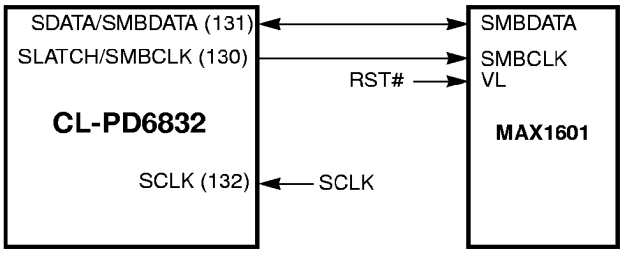


Figure 3-12. Power Control Using SMBus™ Signalling Mode

3.1.7.2 Card Removal

When a card is removed from a socket, the CL-PD6832 automatically disables the V_{CC} and V_{PP} supplies to the socket. The CL-PD6832 can also be configured to have management interrupts notify software of card removal.

3.1.7.3 Card Insertion

Power to the socket is off at reset, and whenever there is no card in a socket. When a card is detected (card detect input pins, -CD1 and -CD2, to the CL-PD6832 become asserted low), power is applied by software after sensing card insertion. Card insertion is sensed by allowing any change in state on -CD2 and -CD1 pins to generate a management interrupt.

3.1.8 Bus Sizing

The CL-PD6832 operates in 32-bit mode. All PCI transactions are 32-bit, even when supporting 8- or 16-bit PC Cards.

3.1.9 Programmable PC Card Timing

The CL-PD6832 can be programmed to match the timing requirements of any PC Card. The memory command signals (-WE, -OE) and I/O command signals (-IOWR, -IORD) at the PC Card interface have three phases: setup, command, and recovery. These three phases are programmable through Timing registers on a per socket basis. There are two sets of timing registers, **Timer Set 0** and **Timer Set 1**, which can be selected on a per-window basis for both I/O and memory windows.

3.1.10 ATA Mode Operation

The CL-PD6832 supports direct connection to ATA hard drives when in PC Card mode. ATA drives use an interface very similar to the IDE interface found on many popular portable computers.

3.1.11 PC Card Sensing

The CL-PD6832 provides sensing capabilities for all types of cards and voltages compliant with the PC Card Specification. This includes the following card types:

- PC Card 16 (R2) at 5.0 or 3.3 V
- PC Card 32 (CardBus) at 3.3 V

The pins -CD2, -CD1, VS2, and VS1 are used to sense the types and operating voltages of inserted cards, as shown in Table 3-6. The x.x and y.y operating voltages are detected and reflected in the **Present State** register. Values of these voltages are not yet defined by the PC Card Specification. The CL-PD6832 assumes a low-voltage key (CardBus-capable socket in system). After PC Card insertion, card type and voltage information is available in the **Socket Present State** register.

Table 3-6. Card Detect and Voltage Sense

CD2#/CCD2#	CD1#/CCD1#	VS2/CVS2	VS1/CVS1	Card Type	Voltage
GND	GND	OPEN	OPEN	PC Card 16	5.0
GND	GND	GND	GND	PC Card 16	3.3/X.X
GND	CVS1	OPEN	CCD1#	PC Card 32	3.3
CVS2	GND	CCD2#	GND	PC Card 32	3.3/X.X
CVS1	GND	GND	CCD2#	PC Card 32	3.3/X.X/Y.Y
GND	GND	GND	OPEN	PC Card 16	X.X
CVS2	GND	CCD2#	OPEN	PC Card 32	X.X
GND	CVS2	CCD1#	OPEN	PC Card 32	X.X/Y.Y
CVS1	GND	OPEN	CCD2#	PC Card 32	Y.Y
GND	CVS1	GND	CCD1#	Reserved	Reserved
GND	CVS2	CCD1#	GND	Reserved	Reserved

3.2 Host Access to Registers

The CL-PD6832 CardBus registers can be accessed in Memory-Mapped mode only. Other CL-PD6832 registers can be accessed either in Memory-Mapped mode or I/O-Mapped mode. To access registers in Memory-Mapped mode, program the CL-PD6832 memory base address offset 10h in the configuration space. To access registers in I/O-Mapped mode, program offset 44h in the configuration space accordingly. In I/O-Mapped mode, the CL-PD6832 registers are accessed through an 8-bit indexing mechanism. An **Index** register scheme allows a large number of internal registers to be accessed by the CPU using only two I/O addresses.

The **Index** register (see Chapter 7) is used to specify which of the internal registers the CPU accesses next. The value in the **Index** register is called the Register Index and is the number that specifies a unique internal register. The **Data** register is used by the CPU to read and write the internal register specified by the **Index** register.

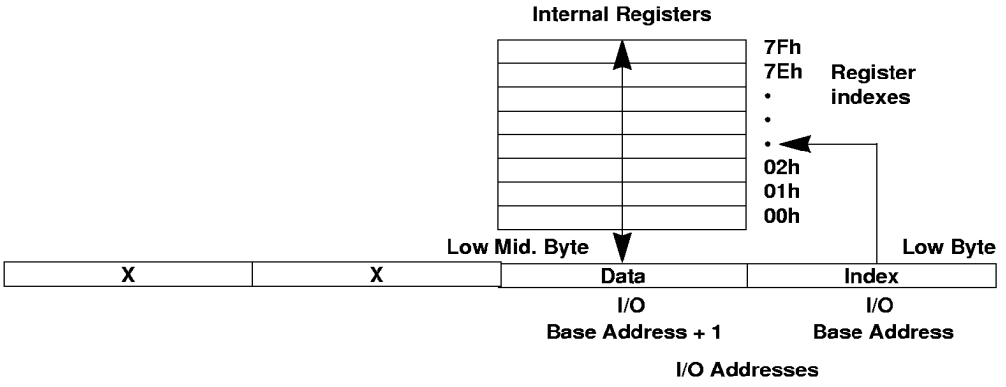


Figure 3-13. Indexed 8-Bit Register Structure

The following code segment demonstrates use of an indexed 8-bit register:

```
mov dx, I/O_Base_Address
mov al, 02h
mov ah, 3Ch
out dx, ax
```

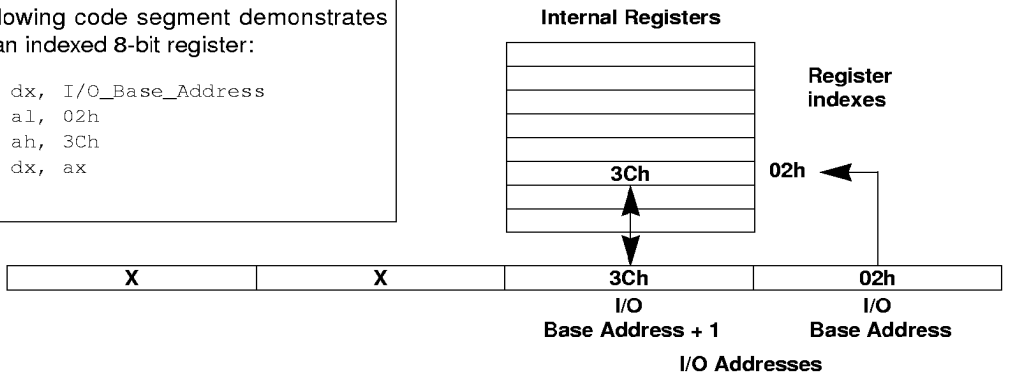


Figure 3-14. Indexed 8-Bit Register Example

The CL-PD6832 has **Extension** registers that add to the functionality of the 82365SL-compatible register set. Within the **Extension** registers is an **Extended Index** register and **Extended Data** register that provide access to more registers. The registers accessed through **Extended Index** and **Extended Data** are thus double-indexed. The following example shows how to access the **Extension Control 1** register, one of the double-indexed registers.

```
;Write to Extension Control 1 register example

;Constants section
     Extended_IndexEQU 2Eh
     Index_RegEQU 2Fh
     Ext_Cntrl_1EQU 03h
     I/O_Base_AddressEQU XXX
          ;The base I/O address for the CL-PD6832
          ;should be obtained through PCI BIOS.

;Code section
     mov  dx, I/O_Base_Address
     mov  al, Extended_Index
     mov  ah, Ext_Cntrl_1
     out  dx, ax
     mov  al, Index_Reg
     mov  ah, user_data;Desired data to be
     out  dx, ax;written to
               ;extended index 03h


;Read from Extension Control 1 register example

;Code section
     mov  dx, I/O_Base_Address
     mov  al, Extended_Index
     mov  ah, Ext_Cntrl_1
     out  dx, ax
     mov  al, Index_Reg
     out  dx, al
     inc  dx   ;al has extended
     in   al, dx;index 03h data
```

The following software code shows a sample of how to access the CL-PD6832 in Memory-Mapped mode.

```
; assume ES Selector points to base address
; 8-bit read access example
mov EBx, 804h
mov al, ES:[BX]

; 16-bit read access example
mov ax, ES: [BX]

;32-bit read access example
mov Eax, ES: [BX]
mov al, 6H
MOV ES: [BX], al

; 16-bit write access example
mov al, 0806h
MOV ES: [BX], ax

; 32-bit write access example
MOV Eax, 090A1206h
MOV ES: [BX], eax
```

3.3 Power-On Setup

Following RST#-activated reset, the CL-PD6832 must be configured by host initialization or BIOS software. The application of the RST# signal on power-up causes initialization of all the CL-PD6832 register bits and fields to their reset values.

4. REGISTER DESCRIPTION CONVENTIONS

Register Headings

The description of each register starts with a header containing the following information:

Header Field	Description
Register Name	This indicates the register name.
Offset	This is added to the base address to generate the total effective address.
Register Per	This indicates whether the register affects both sockets, marked *chip*, or an individual socket, marked *socket*. If *socket* is indicated, there are two registers being described, each with a separate Index value (one for each socket, A and B). [a]
Index [a]	This is the Index value through which an internal register in an indexed register set is accessed in I/O mode.
Register Compatibility Type	This indicates whether the register is 82365SL-compatible, marked *365*; a register extension, marked *ext.*; or DMA-compatible for PCI/Way, marked *DMA*.

[a] When the register is socket-specific, the Index value given in the register heading is for Socket A only. For the Socket B register, add 40h to the Index value of the Socket A register to obtain the I/O address. The memory address of any socket register is an offset from the memory base address of the configuration space for that socket.

Special Function Bits

Following is a description of bits with special functions:

Bit Type	Description
Reserved	These bits are reserved and should not be changed.
Compatibility Bit	These bits have no function on the CL-PD6832 but are included for compatibility with the 82365SL register set.
0 or 1	These read-only bits are forced to either '0' or '1' at reset and cannot be changed.
PCI/Way	These bits provide the programming model for the PCI/Way DMA support.
RFU	These bits are reserved for future use.
Scratchpad Bit	These read/write bits are available for use as bits of memory.

Bit Naming Conventions

The following keywords are used within bit and field names:

Keyword	Description
Enable	Indicates that the function described in the rest of the bit name is active when the bit is '1'.
Disable	Indicates that the function described in the rest of the bit name is active when the bit is '0'.
Mode	Indicates that the bit alters the interpretation of the values in other registers.
Input	Indicates a bit or field that is read from a pin.
Output	Indicates a bit or field that is driven to a pin.
Select	Indicates that the bit or field selects between multiple alternatives. Fields that contain *Select* in their names have an indirect mapping between the value of the field and the effect.
Status	Indicates one of two types of bits: either read-only bits used by the CL-PD6832 to report information to the system or bits set by the CL-PD6832 in response to an event that can also be cleared by the system. The system cannot directly cause a Status bit to become '1'.
Value	Indicates that the bit or field value is used as a number.

Register Bit Types

Type	Description
C	Clearable by writing a '1' to the bit
R	Readable
W	Writable

5. PCI CONFIGURATION REGISTERS

The CL-PD6832 has two **PCI Configuration** register sets. Each of these register sets corresponds to a socket. The second socket is the second function and starts at 100h. These register sets occupy configuration offsets 00h–4Fh. The register sets vary only in the function number (see *PCI Bus Specification*, Rev. 2.1 for further information). They control basic PCI bus functionality. **PCMCIA Operation** registers are accessed through either the **Memory Base Address** register or the **PC Card 16-Bit IF Legacy Mode Base Address** register. The registers in this section are specific to each socket.

Table 5-1. PCI Configuration Registers Quick Reference

Register Name				Memory Offset	Page
Device ID = 1110h		Vendor ID = 1013h		00h	44
Status		Command		04h	45
Class Code = 060700h			Revision ID	08h	48
BIST = 0	Header Type = 82h	Latency Timer	Cache Line Size = 00h	0Ch	49
Memory Base Address				10h	50
CardBus Status				14h	51
CardBus Latency Timer	Subordinate Bus Number	CardBus Number	PCI Bus Number	18h	53
Memory Base 0				1Ch	54
Memory Limit 0				20h	55
Memory Base 1				24h	54
Memory Limit 1				28h	55
I/O Base 0				2Ch	56
I/O Limit 0				30h	57
I/O Base 1				34h	56
I/O Limit 1				38h	57
Bridge Control		Interrupt Pin	Interrupt Line	3Ch	58
Subsystem ID		Subsystem Vendor ID		40h	61
PC Card 16-Bit IF Legacy Mode Base Address				44h	62
DMA Slave Register				48h	63
Socket Number				4Ch	64

5.1 Vendor ID and Device ID

Configuration Register Name: **Vendor ID and Device ID**
Offset: **00h** *Register Per:* chip

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **Device ID** *(high)*	Device ID *(high)* R:00010001							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2 **Device ID** *(low)*	Device ID *(low)* R:00010000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1 **Vendor ID** *(high)*	Vendor ID *(high)* R:00010000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0 **Vendor ID** *(low)*	Vendor ID *(low)* R:00010011							

Bits 15:0 — Vendor ID

This read-only field is the vendor identification assigned to Cirrus Logic by the PCI Special Interest Group. This field always reads back 1013h.

Bits 31:16 — Device ID

This read-only field is the device identification assigned to this device by Cirrus Logic. This field always reads back 1110h for the CL-PD6832. (Revision number identification for the CL-PD6832 part itself is indicated by the Revision ID field in the **Revision ID and Class Code** register at configuration offset 08h.)

5.2 Command and Status

Configuration Register Name: **Command and Status**
Offset: **04h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **Status** *(high)*	Address/Data Parity Error Detected	System Error (SERR#) Generated	Received Master Abort	Received Target Abort	Signalled Target Abort	DEVSEL# Timing		Master Data Parity Error Reported
	RC:0	RC:0	RC:0	RC:0	RC:0	R:01		RC:0
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2 **Status** *(low)*	Fast Back-to-Back Capable	UDF Supported	66-MHz Supported	*Reserved*				
	R:0	R:0	R:0	R:00000				
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1 **Command** *(high)*	*Reserved*							System Error (SERR#) Enable
	R:0000000							R/W:0
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 **Command** *(low)*	Wait Cycle Control	Parity Error Check/Report Enable	*Reserved*	Memory Write and Invalidate Enable	Special Cycle Enable	Bus Master Enable	PCI Memory Space Enable	PCI I/O Space Enable
	R:0	R/W:0	R:0	R:0	R:0	R/W:0	R/W:0	R/W:0

Bit 0 — PCI I/O Space Enable

This bit does not affect R2 I/O space.

0	If this bit is '0' for both sockets (socket 0 and 1), any reads or writes to the I/O registers of the CL-PD6832 and are ignored. If this bit is a '1', I/O accesses to the registers or CardBus card are carried out. For configuration space 0, I/O accesses to both sockets are disabled.
1	The I/O space for the CL-PD6832 is enabled and responds to the reads and writes to the I/O address range defined in **I/O Base Address** register and any I/O window addresses. For configuration space 0, this bit enables I/O register accesses for both Sockets A and B.

Bit 1 — PCI Memory Space Enable

This bit must be set or the CL-PD6832 does not respond to memory transactions. This bit does not affect R2 memory space.

0	The memory space for the CL-PD6832 is disabled. Any reads or writes to the CL-PD6832 memory space are ignored.
1	The memory space for the CL-PD6832 is enabled, allowing memory window access and access to memory mapped CL-PD6832 registers.

Bit 2 — Bus Master Enable

This bit must be set to enable the bus master capability in the CL-PD6832.

0	Bus master capability disabled.
1	Bus master capability enabled.

Bit 3 — Special Cycle Enable

This bit reads back a '0' since a PCI-to-PCI bridge cannot respond to special cycle transactions as a target.

Bit 4 — Memory Write and Invalidate Enable

This bit reads back a '0' since a PCI-to-PCI bridge cannot initiate a memory write and invalidate command.

Bit 5 — Reserved

Bit 6 — Parity Error Check/Report Enable

This bit enables data parity-reporting-related circuitry, except for bit 31 of this register.

0	Data parity checking and reporting is disabled.
1	Data parity checking and reporting is enabled.

Bit 7 — Wait Cycle Control

This bit always reads '0', indicating that the CL-PD6832 does not employ address or data stepping.

Bit 8 — System Error (SERR#) Enable

This bit enables the CL-PD6832 to report system errors by asserting the SERR# pin when address parity errors occur. Bit 6 must also be set to '1' to allow a data parity error to cause SERR# activation. See also the description of bit 30 in this register.

0	Activation of SERR# on address parity error is disabled.
1	SERR# is activated whenever an address parity error is internally detected (slave mode).

Bits 20:9 — Reserved

Bits 23:21 — Fast back-to-back, UDF supported, and 66-MHz supported.

All of these features are unsupported and read back '0's.

Bit 24 — Master Data Parity Error Reported

This bit is set when a parity error is generated or detected, bit 6 of this register is set, and the CL-PD6832 is acting as a bus master. To clear this bit, software must write a '1' to it.

Bits 26:25 — DEVSEL# Timing

This field always reads back '01', identifying the CL-PD6832 as a medium-speed device.

Bit 27 — Signalled Target Abort

To clear this bit, software must write a '1' to it.

0	No target device has signalled a target abort
1	A target device has signalled a target abort

Bit 28 — Received Target Abort

To clear this bit, software must write a '1' to it.

0	No master's transaction has been terminated with a target abort.
1	A master's transaction has been terminated with a target abort.

Bit 29 — Received Master Abort

To clear this bit, software must write a '1' to it.

0	No transaction has been terminated due to master abort.
1	A master device has terminated its transaction with master abort

Bit 30 — System Error (SERR#) Generated

This bit is set whenever the CL-PD6832 asserts SERR# because of internal detection of a PCI address parity error. Bit 8 of this register must be set before system errors can be reported, and bit 6 must be set to allow address parity errors to be detected. The CL-PD6832 only asserts SERR# if address parity errors occur. To clear this bit, software must write a '1' to it.

0	SERR# was not asserted by this device.
1	SERR# was asserted by this device, indicating a PCI address parity error.

Bit 31 — Address/Data Parity Error Detected

This bit indicates whether a parity error was detected, independent of whether bit 6 of this register is '1'. To clear this bit, software must write a '1' to it.

0	No data parity errors detected.
1	Address or data parity error detected.

5.3 Revision ID and Class Code

Configuration Register Name: **Revision ID and Class Code**
Offset: **08h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **Class Code** *(high)*	Class Code *(high)* R:00000110							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2 **Class Code** *(mid.)*	Class Code *(mid.)* R:00000111							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1 **Class Code** *(low)*	Class Code *(low)* R:00000000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0 **Revision ID**	1	1	Revision ID R:11nnnnnn[a]					

[a] This read-only value depends on the revision level of the CL-PD6832.

Bits 7:0 — Revision ID

This read-only field identifies the revision level of the CL-PD6832 chip. It reflects the value of bits [5:0] of the **Chip Information** register (index 1Fh). Bits 7 and 6 always read back a '1'.

Bits 31:8 — Class Code

This field always reads back 060700h, identifying the CL-PD6832 as a PC Card 16 (R2)/PC Card 32 (CardBus) bridge device.

5.4 Cache Line Size, Latency Timer, Header Type, and BIST

Configuration Register Name: **Cache Line Size, Latency Timer, Header Type, and BIST**
Offset: **0Ch** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **BIST**	*Reserved* R:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2 **Header Type**	Header Type R:10000010							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1 **Latency Timer**	Latency Timer 7:3 R/W:00000					Latency Timer 2:0 R:000		
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0 **Cache Line Size**	Cache Line Size R:00000000							

Bits 7:0 — Cache Line Size

This read-only field is always 00h, indicating that the CL-PD6832 does not participate in PCI-defined caching algorithms, and only generates memory write invalidate as a result of a PC Card 32 master cycle.

Bits 15:8 — Latency Timer

This field programs the master latency time-out value. If the full byte were available, the latency timer would program in increments of one PCI clock (PCI_CLK), but because bits 10:8 on the CL-PD6832 are read-only and must be programmed to 0h, master latency time-out values are programmable in increments of 8 PCI clocks.

Bits 23:16 — Header Type

This read-only field is always 82h, specifying that the CL-PD6832 is a multi-function PCI-to-CardBus bridge.

Bits 31:24 — Reserved

5.5 Memory Base Address

Configuration Register Name: **Memory Base Address**
Offset: **10h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Controller Memory Base Address *(high)* R/W:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	Controller Memory Base Address *(high mid.)* R/W:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	Controller Memory Base Address *(low mid.)* R/W:0000				Controller Memory Base Address *(low mid.)* R:0000			
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	Controller Memory Base Address *(low)* R:0000				Prefetchable R:0	Type R:00		Memory Space Indicator R:0

This is the PCI memory address space base address for the **Operation** registers.

Bit 0 — Memory Space Indicator

This bit always reads back '0', indicating that this base address register defines a PCI memory space.

Bits 2:1 — Type

These bits indicate that the controller can be located anywhere in the 32-bit address space.

Bit 3 — Prefetchable

This bit indicates that the **Controller** registers are not prefetchable.

Bits 31:4 — Controller Memory Base Address

This field specifies the memory-mapped register space of the CL-PD6832. The **Operation** registers can be accessed through this window only after these bits are set to a non-zero value.

5.6 CardBus Status

Configuration Register Name: **CardBus Status**
Offset: **14h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **CardBus Status** *(high)*	Address/Data Parity Error Detected	Received System Error (SERR#)	Received Master Abort	Received Target Abort	Signalled Target Abort	*Reserved*		Secondary Bus Data Parity Error Reported
	RC:0	RC:0	RC:0	RC:0	RC:0	R:00		RC:0
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2 **CardBus Status** *(low)*	*Reserved* R:00000000							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	*Reserved* R:00000000							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	*Reserved* R:00000000							

NOTE: The CardBus (Secondary) Status bytes are similar to the Status bytes in the **Command and Status** register, but these contain information relating to the CardBus. Bit 30 is defined differently than in the **Command and Status** register. These bits are reset by PCI reset and by writing the bit to a '1'.

Bits 23:0 — Reserved

Bit 24 — Secondary Bus Data Parity Error Reported

This bit is used to report the receipt of PERR# on the PC Card 32 bus. Write a '1' to this bit to clear it.

Bits 26:25 — Reserved

Bit 27 — Signalled Target Abort

To clear this bit, software must write a '1' to it.

0	No target device has signalled a target abort.
1	A target device has signalled a target abort.

Bit 28 — Received Target Abort

To clear this bit, software must write a '1' to it.

0	No master's transaction has been terminated with a target abort.
1	A master's transaction has been terminated with a target abort.

Bit 29 — Received Master Abort

To clear this bit, software must write a '1' to it.

0	No transaction has been terminated due to master abort.
1	A master device has terminated its transaction with master abort

Bit 30 — Received System Error (SERR#)

This bit is set whenever the CardBus interface detects an address parity error. Bit 17 of the **Interrupt Line, Interrupt Pin, and Bridge Control** register must be set before system errors can be reported, and bit 16 of the **Interrupt Line, Interrupt Pin, and Bridge Control** register must be set to allow address parity errors to be detected. The CL-PD6832 only asserts SERR# if address parity errors occur. To clear this bit, software must write a '1' to it.

0	SERR# assertion on the CardBus interface has not been detected.
1	SERR# assertion on the CardBus interface has been detected.

Bit 31 — Address/Data Parity Error Detected

This bit indicates whether a parity error was detected, independent of whether bit 16 of the **Bridge Control** register 3Ch is '1'. To clear this bit, software must write a '1' to it.

0	No data parity errors detected.
1	Address or data parity error detected.

5.7 PCI Bus Number, CardBus Number, Subordinate Bus Number, and CardBus Latency Timer

Configuration Register Name: **PCI Bus Number, CardBus Number, Subordinate Bus Number, and CardBus Latency Timer**
Offset: **18h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **CardBus Latency Timer**	CardBus Latency Timer 7:3 R/W:00000					CardBus Latency Timer 2:0 R:000		
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2 **Subordinate Bus Number**	Subordinate Bus Number R/W:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1 **CardBus Number**	CardBus Number R/W:00000000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0 **PCI Bus Number**	PCI Bus Number R/W:00000000							

Bits 7:0 — PCI Bus Number

This byte identifies the number of the PCI bus on the primary side of the bridge. This byte is set by PCI BIOS configuration software.

Bits 15:8 — CardBus Number

This byte identifies the number of the CardBus attached to the socket, and it is set by PCI BIOS configuration software or Socket Services.

Bits 23:16 — Subordinate Bus Number

This byte is defined for PCI to PCI bridges. It identifies the number of the bus at the lowest part of the hierarchy behind the bridge. Normally, a CardBus bridge is at the bottom of the bus hierarchy and this register holds the same value as the **CardBus Number** register.

Bits 31:24 — CardBus Latency Timer

This byte has the same functionality of the primary PCI bus Latency Timer, but it applies to the CardBus attached to this specific socket. This byte is set by PCI BIOS configuration software or Socket Services.

5.8 Memory Base 0–1

Configuration Register Name: **Memory Base 0–1**
Offset: **1Ch, 24h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Memory Base 31:24 R/W:11111111							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	Memory Base 23:16 R/W:11111111							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	Memory Base 15:12 R/W:1111				Memory Base 11:8 R:0000			
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	Memory Base 7:0 R:00000000							

NOTE: **Memory Base 0–1** and **Memory Limit 0–1** are enabled by bit 1 of the **Command and Status** register. To disable one window, set the limit of that window below the base.

Bits 31:0 — Memory Base [31:0]

This register defines the bottom address of a memory window. The upper 20 bits correspond to address bits AD[31:12]. The bottom 12 bits (corresponding to address bits AD[11:0]) of this register are read-only and return '0' when read.

5.9 Memory Limit 0–1

Configuration Register Name: **Memory Limit 0–1**
Offset: **20h, 28h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Memory Limit 31:24 R/W:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	Memory Limit 23:16 R/W:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	Memory Limit 15:12 R/W:0000				Memory Limit 11:8 R:0000			
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	Memory Limit 7:0 R:00000000							

NOTE: **Memory Base 0–1** and **Memory Limit 0–1** are enabled by bit 1 of the **Command and Status** register. To disable one window, set the limit of that window below the base.

Bits 31:0 — Memory Limit [31:0]

This register defines the top address of a memory window. The upper 20 bits correspond to address bits AD[31:12]. The bottom 12 bits (corresponding to address bits AD[11:0]) are read-only and return zero when read; however, the bridge assumes AD[11:0] are '1's to determine the range defined, so if **Memory Base 0–1** and **Memory Limit 0–1** registers are set to the same value, a 4-Kbyte window is defined.

5.10 I/O Base 0–1

Configuration Register Name: **I/O Base 0–1**
Offset: **2Ch, 34h**
Register Per: socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	I/O Base 31:24 R/W:11111111							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	I/O Base 23:16 R/W:11111111							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	I/O Base 15:8 R/W:11111111							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	I/O Base 7:2 R/W:111111						I/O Space Indicator R:00	

Bits 1:0 — I/O Space Indicator [1:0]

These bits are an extension to the **I/O Limit** register and always read back '00'. A value of '00' indicates that the CL-PD6832 supports 16-bit I/O decoding.

Bits 31:2 — I/O Base [31:2]

These bits define the bottom of an address range that is used by the bridge to determine when to forward an I/O transaction to the CardBus. The bits in this register correspond to AD[31:2]. Bits AD[1:0] are used to indicate that the bridge implements 32- bit I/O addressing. For address decoding, address bits AD[31:2] provide the 4-byte granularity required by CardBus.

NOTE: **I/O Base 0–1** and **I/O Limit 0–1** registers are enabled by bit 0 of the **Command and Status** register. To disable one window, set the limit of that window below the base. For example, if I/O base = I/O limit, the CL-PD6832 does doubleword I/O addressing.

5.11 I/O Limit 0–1

Configuration Register Name: **I/O Limit 0–1**
Offset: **30h, 38h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	I/O Limit 31:24 R/W:00000000							
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2	I/O Limit 23:16 R/W:00000000							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	I/O Limit 15:8 R/W:00000000							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	I/O Limit 7:2 R/W:000000						I/O Space Indicator R:00	

Bits 1:0 — I/O Space Indicator [1:0]

These bits are an extension to the **I/O Limit** register and always reads back '00'.

Bits 31:2 — I/O Limit [31:2]

These bits define the top of the address range that is used by the bridge to determine when to forward an I/O access to the CardBus. The bits in this register correspond to AD[31:2].

5.12 Interrupt Line, Interrupt Pin, and Bridge Control

Configuration Register Name: **Interrupt Line, Interrupt Pin, and Bridge Control**
Offset: **3Ch** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **Bridge Control** *(high)*	*Reserved* R:00000				Management Interrupt Enable R/W:0	Write Posting Enable R/W:0	Memory 1 Prefetch Enable R:0	Memory 0 Prefetch Enable R:0
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2 **Bridge Control** *(low)*	IREQ-INT Enable R/W:0	CardBus Reset R/W:1	Master Abort Mode R/W:0	*Reserved* R:0	VGA Enable R:0	ISA Enable R:0	CardBus System Error (SERR#) Enable R/W:0	CardBus Parity Error Response Enable R/W:0
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1 **Interrupt Pin**	Interrupt Pin R:00000001/00000010							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0 **Interrupt Line**	Interrupt Line R/W:00000000							

Bits 7:0 — Interrupt Line

This register is used by software to communicate the routing of the interrupts (INTA# for socket 0 and INTB# for socket 1).

Bits 15:8 — Interrupt Pin

These read-only registers indicate that the CL-PD6832 requires one interrupt line per function (socket 0 and socket 1) and that these lines are INTA# and INTB#.

Bit 16 — CardBus Parity Error Response Enable

This bit determines the response to parity errors on the CardBus interface.

0	Ignore address/data parity errors on the CardBus interface.
1	Enable parity error reporting and detection on the CardBus interface.

Bit 17 — CardBus System Error (SERR#) Enable

This bit controls the forwarding of the CardBus interface SERR# assertions to the primary interface.

0	Disable forwarding of CardBus interface SERR# to the primary interface.
1	Enable forwarding of CardBus interface SERR# to the primary interface.

Bit 18 — ISA Enable

This applies only to addresses that are enabled by the **I/O Base and Limit** registers and are also in the first 64 Kbytes of PCI I/O space. When set, the bridge blocks forwarding from PCI to CardBus I/O transactions by addressing the last 768 bytes in each 1-Kbyte block. In the opposite direction (CardBus to PCI) I/O transactions are forwarded if they address the last 768 bytes in each 1-Kbyte block.

Bit 19 — VGA Enable

This bit modifies the bridge's response to VGA compatible addresses. When set, the bridge forwards transactions in the following ranges:

Memory	0A 0000h to 0B FFFFh
I/O	Addresses where AD[9:0] are in the ranges 3B0h–3BBh and 3C0h–3DFh (inclusive of ISA address aliases; AD[15:10] are not decoded)

When the VGA Enable bit is set, forwarding of these accesses is independent of both the I/O and memory address ranges. Forwarding is also independent of the setting of the ISA Enable bit or the VGA Snoop bit in the **Command** register. Forwarding of these accesses is affected by the I/O and Memory Enable bits in the **Command** Register.

Bit 20 — Reserved

Bit 21 — Master Abort Mode

This bit controls the behavior of the bridge when a master abort termination occurs on either interface while bridge is the master.

0	Do not report master aborts and return all ones (FFFFFFFFh) on reads and discard data on writes to the secondary master.
1	Report master aborts by signalling target abort, if possible, or by asserting SERR# if enabled.

Bit 22 — CardBus Reset

This bit forces a reset on the CardBus interface whenever it is set. The CardBus interface is also reset whenever the RST# of the primary interface is asserted. Note that when the CRST# pin on the CardBus interface is asserted (low), this *does not* mean the primary interface gets reset too.

Forcing a reset on the CardBus interface causes its configuration registers to reset to their default states.

0	The reset signal to the CardBus card is inactive (high).
1	The reset signal to the CardBus card is active (low).

Bit 23 — IREQ-INT Enable

This bit is used to control the routing of PC Card IREQ (or CIREQ for CardBus cards) interrupts to ISA IRQ or PCI INT pin. This is used only when the CL-PD6832 is programmed for non-PCI style interrupts.

When this bit is set to '1', PC Card IREQ (CIREQ) interrupts are routed to ISA IRQ line (IRQ3, 4, 5, 7, 11, 12, 14, or 15) as indicated by the **Interrupt and General Control** register index 803h. When this bit is set to '0', PC Card IREQ (CIREQ) interrupts are routed to INT pin indicated by the **Interrupt Pin** register, configuration space offset 3Dh (INTA# for socket 0, INTB# for socket 1, if CL-PD6832 is programmed for Ring Indicate, then INTB# is used for ring out and INTA# pin is used for both socket 0 and 1, that is, INTB# is not available for function interrupt routing.)

0	PC Card interrupts are routed to the INTX# pin indicated by the **Interrupt Pin** register.
1	PC Card interrupts are routed to the ISA IRQ's pin indicated by the **Interrupt Pin** register.

Bit 24 — Memory 0 Prefetch Enable

This bit is not implemented.

0	Read Prefetching for memory window 0 disabled.
1	Read Prefetching for memory window 0 enabled.

Bit 25 — Memory 1 Prefetch Enable

This bit is not implemented.

0	Read Prefetching for memory window 1 disabled.
1	Read Prefetching for memory window 0 enabled.

Bit 26 — Write Posting Enable

This bit enables posting of Write data to the socket. If this bit is not set the bridge must drain any data in its buffers before accepting data for the socket. Each data word must then be accepted by the target before the bridge can accept the next from the source master. The bridge must not release the source master until the last word is accepted by the target. Operating with write posting disabled inhibits system performance.

0	Write posting disabled.
1	Write posting enabled.

Bit 27 — Management Interrupt Enable

This bit is used to control the routing of management interrupts to ISA IRQ or PCI INT pin. This is used only when the CL-PD6832 is programmed for non-PCI style interrupts.

When this bit is set to '1', management interrupts are routed to ISA IRQ line (IRQ3, 4, 5, 7, 11, 12, 14, or 15) as indicated by the **Management Interrupt Configuration** register index 805h. When this bit is set to '0', management interrupts are routed to INT pin indicated by the **Interrupt Pin** register, configuration space offset 3Dh (INTA# for socket 0, INTB# for socket 1, if CL-PD6832 is programmed for Ring Indicate, then INTB# is used for ring out and INTA# pin is used for both socket 0 and 1, that is, INTB# is not available for function interrupt routing.)

Bits 31:28 — Reserved

5.13 Subsystem Vendor ID and Subsystem Device ID

Configuration Register Name: **Subsystem Vendor ID and Subsystem Device ID**
Offset: **40h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3 **Subsystem Device ID** *(high)*	Subsystem Device ID *(high)* R/W:00000000							
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2 **Subsystem Device ID** *(low)*	Subsystem Device ID *(low)* R/W:00000000							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1 **Subsystem Vendor ID** *(high)*	Subsystem Vendor ID *(high)* R/W:00000000							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 **Subsystem Vendor ID** *(low)*	Subsystem Vendor ID *(low)* R/W:00000000							

Bits 15:0 — Subsystem Vendor ID

This field is the identification assigned to the subsystem vendor by the PCI Special Interest Group.

Bits 31:16 — Subsystem Device ID

This field is the device identification assigned by the subsystem vendor to its device.

5.14 PC Card 16-Bit IF Legacy Mode Base Address

Configuration Register Name: **PC Card 16-Bit IF Legacy Mode Base Address**
Offset: **44h** *Register Per:* chip

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Controller I/O Base Address *(high)* R/W:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	Controller I/O Base Address *(high mid.)* R/W:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	Controller I/O Base Address *(low mid.)* R/W:00000000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	Controller I/O Base Address *(low)* R/W:000000						I/O Space Indicator R:01	

This is the PCI I/O space base address for the **Operation** registers.

Bits 1:0 — I/O Space Indicator

These bits always read back '01', indicating that this **Base Address** register defines a PCI I/O space.

Bits 31:2 — Controller I/O Base Address

This field specifies the I/O-mapped register space of the CL-PD6832. The **Operation** registers can be accessed through this window only after these bits are set to a non-zero value. The allowable range is anywhere in the I/O map. For legacy software this register should be set to '000003E1h'.

5.15 DMA Slave Configuration Register

Configuration Register Name: **DMA Slave Configuration Register**
Offset: **48h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	DMA I/O Base Address *(high)* R/W:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	DMA I/O Base Address *(high mid.)* R/W:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	DMA I/O Base Address *(low mid.)* R/W:00000000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	DMA I/O Base Address *(low)* R/W:0000				Non-Legacy Extended Addressing R/W:0	Transfer Size R/W:00		Channel Enable R/W:0

This is the DMA I/O base address for the **DMA** registers.

Bit 0 — Channel Enable

This bit along with the **DREQ Enable** bits in **Extension Control 1** enables the DMA channel. When this bit is a '0,' DMA operations are not allowed. If both of the **DREQ Enable** bits in **Extension Control 1** are '0,' DMA operations are not allowed.

Bits 2:1 — Transfer Size

These bits define the size of the DMA transfer at the PC Card 16 socket.

Bits 2:1		Size of Transfer at the PC Card Socket
0	0	8-bit transfer at the PC Card
0	1	16-bit transfers at the PC Card
1	0	32-bit transfers at the PC Card
1	1	Not allowed

Bit 3 — Non-Legacy Extended Addressing

When this bit is set to a '1', it enables use of the DMA extended addressing.

Bits 31:4 — DMA I/O Base Address

These bits are used to define the I/O address at which the **DMA Operation** registers can be located.

5.16 Socket Number

Configuration Register Name: **Socket Number**
Offset: **4Ch** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Reserved R:00000000							
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2	Reserved R:00000000							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	Reserved R:00000000							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved R:00000					Socket Number R/W:000 / 001		

This is the socket number used for backward-compatible addressing in the I/O space.

Bits 2:0 — Socket Number

These bits define the socket number that is used for the I/O addressing mode of operation. Socket A and B must have the same address, and therefore bit 2 of this register must be the same for each configuration space.

Bits 2:0			Address of Each Socket	Example Address
0	0	0	A1 = 0; Index Register bits 7:6 = 00	Index Register at 03E0, Data at 03E1
0	0	1	A1 = 0; Index Register bits 7:6 = 01	Index Register at 03E0, Data at 03E1
0	1	0	A1 = 0; Index Register bits 7:6 = 10	Index Register at 03E0, Data at 03E1
0	1	1	A1 = 0; Index Register bits 7:6 = 11	Index Register at 03E0, Data at 03E1
1	0	0	A1 = 1; Index Register bits 7:6 = 00	Index Register at 03E2, Data at 03E3
1	0	1	A1 = 1; Index Register bits 7:6 = 01	Index Register at 03E2, Data at 03E3
1	1	0	A1 = 1; Index Register bits 7:6 = 10	Index Register at 03E2, Data at 03E3
1	1	1	A1 = 1; Index Register bits 7:6 = 11	Index Register at 03E2, Data at 03E3

Bits 31:3 — Reserved

6. CARDBUS REGISTERS

The CardBus registers occupy offsets 000h–7FFh from the **Memory Base Address** register. These registers are reset by RST#.

CAUTION: A bit indicated as read only (R:) should be written to as a '0'.

Table 6-1. CardBus Registers Quick Reference

Register Name	Memory Offset	Page
Status Event	000h	65
Status Mask	004h	67
Present State	008h	68
Event Force	00Ch	70
Control	010h	72

6.1 Status Event

Register Name: **Status Event**
Memory Offset: **000h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	*Reserved* R:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	*Reserved* R:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	*Reserved* R:00000000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	*Reserved* R:0000				Power Cycle R/W:0	CCD2 R/W:0	CCD1 R/W:0	CSTSCHG/ WAKEUP R/W:0

The **Status Event** register indicates when a change occurs in socket status. These bits do not indicate what the change is, only that a change occurred. Software must read the **Present State** register for current status. Bits 3:0 can be cleared by writing a '1' to each bit. These bits can be set to '1' by software through writing '1' to the corresponding bit in the **Event Force** register, provided the **Status Mask** register has been set. All bits in this register are cleared by RST#. Software needs to clear this register before enabling interrupts.

Bit 0 — CSTSCHG/WAKEUP

This bit indicates that the CSTSCHG and/or WAKEUP signal is asserted. It only indicates the assertion event and is not a reflection of the CSTSCHG bit from the card. It is latched by the controller and must be explicitly cleared by the appropriate software. The status change interrupt, driven by the controller, must be based on this event bit rather than the **Present Value** register. When a card is powered, this bit indicates a status change and is driven continuously by the card. When a socket is powered down, this bit is a WAKEUP bit. Deassertion of CSTSCHG is controlled by software or reset clearing the signal on the bus. Indicating that change would not be useful. This bit is not set if an event is detected during the time period when the bridge starts the power up cycle of the socket, but has not yet signalled a Power Up Complete interrupt. This prevents spurious signals from a card, during power up, generating invalid events. This bit is re-enabled when the Power Up Complete interrupt is generated. During the power-down sequence the card is responsible for preventing glitches.

Bit 1 — CCD1

This bit indicates that a change has occurred in the corresponding Card Detect bit.

Bit 2 — CCD2

This bit indicates that a change has occurred in the corresponding Card Detect bit.

Bit 3 — Power Cycle

This bit is set to '1' by the bridge (CL-PD6832) to indicate that the bridge has completed powering up or powering down. The **Present State** register should be read to determine that the voltage requested is actually applied. The bridge does not allow an unsupported voltage to be applied to a CardBus card. This bit is meaningless when a 16-bit card is in the socket. It is not possible to power up a CardBus card to a voltage not indicated by the VS/CD lines.

Bits 31:4 — Reserved

6.2 Status Mask

Register Name: **Status Mask**
Memory Offset: **004h**
Register Per: socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	*Reserved* R:00000000							
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	*Reserved* R:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	*Reserved* R:00000000							
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	*Reserved* R:0000				Power Cycle Complete R/W:0	CCD2 Changed R/W:0	CCD1 Changed R/W:0	CSTSCHG/ WAKEUP R/W:0

This register gives software the ability to control the events that can cause interrupts. If the Card Detect Changed bit is enabled at the time a card is removed, an interrupt is generated. This register is cleared automatically when the card is removed. If it is required to have the bridge generate an interrupt when a new card is inserted, software must again set the Card Detect Changed Mask bit.

Bit 0 — CSTSCHG/WAKEUP

When this bit is set, it enables an interrupt based on the CSTSCHG signal being asserted by a CardBus card. CSTSCHG interrupts generated by 16-bit cards are controlled by registers in that interface's register space.

Bit 1 — CCD1 Changed

When this bit is set, it enables an interrupt when the bridge detects change.

Bit 2 — CCD2 Changed

When this bit is set, it enables an interrupt when the bridge detects change.

Bit 3 — Power Cycle Complete

When this bit is set, the bridge generates an interrupt 256 cycles after powering up a socket.

Bits 31:4 — Reserved

6.3 Present State

Register Name: **Present State**
Memory Offset: **008h** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Y-V Socket	X-V Socket	3.3-V Socket	5-V Socket	*Reserved*			
	R:0	R:0	R:1	R:1	R:0000			
	Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Byte 2	*Reserved*							
	R:00000000							
	Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Byte 1	*Reserved*		Y-V Card	X-V Card	3.3-V Card	5-V Card	Bad V_{CC} Request	Data Lost
	R:00		R:0	R:0	R:0	R:0	R:0	RC:0
	Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Byte 0	Not a Card	Interrupt	CardBus PC Card	16-Bit PC Card	Power Cycle Complete	CCD2	CCD1	CSTSCHG/ WAKEUP
	R:0	R:0	R:0	R:0	R:0	R:1	R:1	R:0

The **Present State** register reflects the present value of the socket's status. Some of the bits in this register are merely reflections of interface signals while others are flags set to indicate a status change.

Bit 0 — CSTSCHG/WAKEUP

This bit reflects the current status of the CSTSCHG/WAKEUP pin on the CardBus interface.

Bit 1 — CCD1

This bit provides for detection of a PC Card insertion/removal/presence. Also used by the bridge, in conjunction with CVS1, to determine card type (PC Card 16 vs. PC Card 32). It is a reflection of the CCD1 pin.

Bit 2 — CCD2

This bit provides for detection of a PC Card insertion/removal/presence. Also used by the bridge, in conjunction with CVS2, to determine card type (PC Card 16 vs. PC Card 32). It is a reflection of the CCD2 pin.

Bit 3 — Power Cycle Complete

When this bit is set, it indicates the interface is powered up. When cleared the socket is powered down.

Bit 4 — 16-Bit PC Card

When this bit is set, it indicates that the Card Detect state machine determined a PC Card was inserted. This bit is cleared when another card is inserted that is not 16-bit.

Bit 5 — CardBus PC Card

When this bit is set, it indicates that the Card Detect state machine determined a CardBus card was inserted. When another card is inserted that is not a CardBus card, this bit is cleared. This bit is set to zero by RST#.

NOTE: This bit and the 16-bit PC Card bit do not indicate that a card is installed. They only indicate what kind of card was last installed. The Card Detect bits indicate if a card is currently in the socket.

Bit 6 — Interrupt

When this bit is set to '1', it indicates that the inserted card is driving its interrupt pin active. This bit is not registered and its assertion/deassertion follows the interrupt pin from the card. The controller automatically inverts this bit when the interrupt comes from a 16-bit PC Card.

Bit 7 — Not a Card

This bit indicates that an unsupported card is installed in the socket. The bridge does not allow power to be applied to the socket if this bit is set. This bit is set to '0' by RST#.

Bit 8 — Data Lost

This bit indicates that a card was removed while the interface was active. Data may be lost. Any data in the bridge data buffers is lost when this event occurs. This bit is set to '0' by RST#.

This bit allows software to fail in a graceful manner, if it chooses to, when this occurs. To clear this bit, software must write a '1' to it.

Bit 9 — Bad V_{CC} Request

This bit indicates that software attempted to apply an unsupported or incorrect voltage level to a CardBus card. This bit is set to zero by RST#, or an attempt to apply correct voltage.

Bit 10 — 5-V Card

When this bit is set, the card installed requires and/or supports 5.0-V operation. This bit is set by the state machine used to detect card voltage requirements. This bit is set to '0' by RST#.

Bit 11 — 3.3-V Card

When this bit is set, the card installed requires and/or supports 3.3-V operation. This bit is set by the state machine used to detect card voltage requirements. This bit is set to '0' by RST#.

Bit 12 — X-V Card

When this bit is set, the card installed requires and/or supports X-V operation. This bit is set by the state machine used to detect card voltage requirements. This bit is set to '0' by RST#.

Bit 13 — Y-V Card

When this bit is set, the card installed requires and/or supports Y-V operation. This bit is set by the state machine used to detect card voltage requirements. This bit is set to '0' by RST#.

Bits 27:14 — Reserved

Bits 31:28 — Y-, X-, 3.3-, and 5-V Sockets

These bits indicate the V_{CC} voltages available for the sockets in this system.

6.4 Event Force

Register Name: **Event Force**
Memory Offset: **00Ch** *Register Per:* socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	*Reserved* R:00000000							
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2	*Reserved* R:00000000							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	*Reserved* W:0	CV Test W:0	Y-V W:0	X-V W:0	3.3-V Card W:0	5-V Card W:0	Bad V_{CC} Request W:0	Data Lost W:0
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Not a Card W:0	*Reserved* W:0	CardBus PC Card W:0	16-Bit PC Card W:0	Power Cycle W:0	CCD2 Changed W:0	CCD1 Changed W:0	CSTSCHG Signal W:0

The **Event Force** register is a phantom register. These bits are merely control bits. They are not registered and need no clearing. They provide software the ability to force various status and event bits in the bridge. This gives software the ability to test and restore status. Writing '1' to a bit in this register sets the corresponding bit in the **Socket Event** register and/or the **Present State** register. Bits 3:0 generate Management Interrupt if the correct Mask bit is set.

Bit 0 — CSTSCHG Signal

This bit sets the Card Status Change bit in the **Event** register. The **Present State** register remains unchanged.

Bit 1 — CCD1 Changed

This bit sets the CCD1 bit in the **Event** register. The **Present State** register remains unchanged.

Bit 2 — CCD2 Changed

This bit sets the CCD2 bit in the **Event** register. The **Present State** register remains unchanged.

Bit 3 — Power Cycle

This bit sets the Power Cycle bit in the **Event** register. The **Present State** register remains unchanged.

Bit 4 — 16-Bit PC Card

This bit sets the 16-bit PC Card bit in the **Present State** register. If a card is installed in the socket, writes to this bit are ignored.

Bit 5 — CardBus PC Card

This bit sets the CardBus PC Card bit in the **Present State** register. If a card is installed in the socket, writes to this bit are ignored.

Bit 6 — Reserved

Bit 7 — Not a Card

This bit sets the Not a Card bit in the **Present State** register. If a card is installed in the socket, writes to this bit are ignored.

Bit 8 — Data Lost

This bit causes the Data Lost bit to be set in the **Present State** register.

Bit 9 — Bad V_{CC} Request

This bit causes the Bad V_{CC} Request bit in the **Present State** register to be set.

Bit 10 — 5-V Card

This bit causes the 5-V Card bit in the **Present State** register to be set. Writes to this bit disable the bridge's ability to power up the socket. To change the voltage of a card, after forcing this bit, the bridge must either receive a RST# or retest the card's supported voltages. The latter can be accomplished by forcing the CV Test bit. This is necessary to prevent software from applying an incorrect voltage to the bridge.

Bit 11 — 3.3-V Card

This bit causes the 3.3-V Card bit in the **Present State** register to be set. Writes to this bit disables the bridge's ability to power up the socket. To change the voltage of a card, after forcing this bit, the bridge must either receive a RST# or retest the card's supported voltages. The latter can be accomplished by forcing the CV Test bit. This is necessary to prevent software from applying an incorrect voltage to the bridge.

Bit 12 — X-V Card

This bit causes the X-V Card bit in the **Present State** register to be set. Writes to this bit disables the bridge's ability to power up the socket. To change the voltage of a card, after forcing this bit, the bridge must either receive a RST# or retest the card's supported voltages. The latter can be accomplished by forcing the CV Test bit. This is necessary to prevent software from applying an incorrect voltage to the bridge.

Bit 13 — Y-V Card

This bit causes the Y-V Card bit in the **Present State** register to be set. Writes to this bit disables the bridge's ability to power up the socket. To change the voltage of a card, after forcing this bit, the bridge must either receive a RST# or retest the card's supported voltages. The latter can be accomplished by forcing the CV Test bit. This is necessary to prevent software from applying an incorrect voltage to the bridge.

Bit 14 — CV Test

This bit causes the controller to test the VS and CCD lines to determine the card type and voltages supported. This test is run automatically when a new card is inserted.

Bit 31:15 — Reserved

6.5 Control

Register Name: **Control**
Memory Offset: **010h**
Register Per: socket

	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Byte 3	Reserved R:00000000							
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Byte 2	Reserved R:00000000							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	Reserved R:00000000							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved R:0	V_{CC} Control R/W:000			Reserved R:0	V_{PP} Control R/W:000		

The **Socket Control** register provides control of the socket's V_{CC} and V_{PP}. All bits in this register are set to zero by RST# and power removed from the socket. This register is write protected by writes to the **Event Force** register bits 13:10. Write protection is removed on completion of the decoding sequence of the **CD1, CD2, VS1** and **VS2** lines or completion of CV test. Use either this register or the **Power Control** register (index 02h) for power control. Do not use both registers.

Bits 2:0 — V_{PP} Control

Used to switch the V_{PP} power using external V_{PP} control logic. The bridge has no knowledge of a card's V_{PP} voltage requirement. Software must determine the needed voltage from the card's CIS.

Bits 2:0			V_{PP} Power
0	0	0	0 V
0	0	1	12.0 V
0	1	0	V_{CC}
0	1	1	V_{CC}
100 – 111			Reserved

Bit 3 — Reserved

Bits 6:4 — V_{CC} Control

These bits control the power to the PC Card using external control logic. The bridge determines the voltages that can be applied by decoding the CD and VS signals per the CardBus specification, which are reflected in the **Present State** register. The settings in the **Present State** register as per the voltages available in system determine the V_{CC} options. The value written to this register must agree with the value needed to apply the correct value of V_{CC}. The bridge must not allow an incorrect V_{CC} voltage to be applied to a socket. The voltages available are shown in the **Status** register.

Bits 6:4			V_{CC} Power
0	0	0	0 V
0	0	1	Reserved
0	1	0	5.0 V
0	1	1	3.3 V
100 – 111			Reserved

Bits 31:7 — Reserved

Notes

7. OPERATION REGISTERS

In I/O mode, the CL-PD6832 internal **Device Control, Window Mapping, Extension, and Timing** registers are accessed through a pair of Operation registers — an **Index** register and a **Data** register.

The **Index** register is accessed at the address that is programmed in the **I/O Base Address** register, and the **Data** register (see page 80) is accessed by adding 1 to the programmed address in **I/O Base Address**.

Figure 7-1. Operation Registers as PCI Doubleword I/O Space at I/O Base Address Register (Programmed at Configuration Space, Offset 44h)

7.1 Index

Register Name: **Index** *Register Per:* chip
Index: **n/a** *Register Compatibility Type:* 365

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Socket Index		Register Index					
R/W:0	R/W:0	R/W:000000					

Bits 5:0 — Register Index

These bits determine which of the 64 possible socket-specific registers are accessed when the **Data** register is next accessed by the processor. Note that some values of the Register Index field are reserved (see Table 7-1 on page 76).

Bit 7:6 — Socket Index

These bits determine which set of socket-specific registers are selected.

The **Index** register value determines which internal register should be accessed (read or written) in response to each CPU access of the **Data** register. Each of the two possible PC Card sockets is allocated 64 of the 256 locations in the internal register index space.

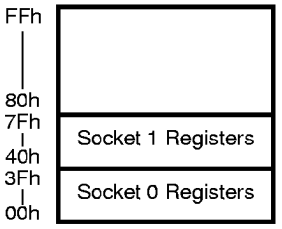


Figure 7-2. Socket and Register Index Space

When viewed as a 7-bit value, the contents of this register completely specify a single internal-register byte. For example, at reset, when the value of this register is in the range 00h–3Fh, a **Socket A** register is selected (Socket Index bit is '0'), and when the value of this register is in the range 40h–7Fh, a **Socket B** register is selected (Socket Index bit is '1').

The internal register that is accessed when the CPU reads or writes the **Data** register is determined by the current value of the **Index** register, as follows:

Table 7-1. Index Registers

Register Name	I/O Index Value 6-Bit Value	Memory Offset Value	Chapter	Page
Chip Revision	00h[a]	800h[a]	Chapter 8: "DEVICE CONTROL REGISTERS"	81
Interface Status	01h	801h		82
Power Control	02h	802h		84
Interrupt and General Control	03h	803h		86
Card Status Change	04h	804h		88
Management Interrupt Configuration	05h	805h		89
Mapping Enable	06h	806h		91
I/O Window Control	07h	807h	Chapter 9: "WINDOW MAPPING REGISTERS"	94
Gen Map 5 Start Address Low	08h	808h	Chapter 10: "GENERAL WINDOW MAPPING REGISTERS"	107
Gen Map 5 Start Address High	09h	809h		107
Gen Map 5 End Address Low	0Ah	80Ah		108
Gen Map 5 End Address High	0Bh	80Bh		109
Gen Map 6 Start Address Low	0Ch	80Ch		107
Gen Map 6 Start Address High	0Dh	80Dh		107
Gen Map 6 End Address Low	0Eh	80Eh		108
Gen Map 6 End Address High	0Fh	80Fh		109
Gen Map 0 Start Address Low	10h	810h		107
Gen Map 0 Start Address High	11h	811h		107
Gen Map 0 End Address Low	12h	812h		108
Gen Map 0 End Address High	13h	813h		109
Gen Map 0 Offset Address Low	14h	814h		109
Gen Map 0 Offset Address High	15h	815h		110
Misc Control 1	16h	816h	Chapter 11: "EXTENSION REGISTERS"	116
FIFO Control	17h	817h		118
Gen Map 1 Start Address Low	18h	818h	Chapter 10: "GENERAL WINDOW MAPPING REGISTERS"	107
Gen Map 1 Start Address High	19h	819h		107
Gen Map 1 End Address Low	1Ah	81Ah		108
Gen Map 1 End Address High	1Bh	81Bh		109
Gen Map 1 Offset Address Low	1Ch	81Ch		109
Gen Map 1 Offset Address High	1Dh	81Dh		110

Table 7-1. Index Registers *(cont.)*

Register Name	I/O Index Value 6-Bit Value	Memory Offset Value	Chapter	Page
Misc Control 2	1Eh[a]	81Eh[a]	Chapter 11: "EXTENSION REGISTERS"	119
Chip Information	1Fh[a]	81Fh[a]		120
Gen Map 2 Start Address Low	20h	820h	Chapter 10: "GENERAL WINDOW MAPPING REGISTERS"	107
Gen Map 2 Start Address High	21h	821h		107
Gen Map 2 End Address Low	22h	822h		108
Gen Map 2 End Address High	23h	823h		109
Gen Map 2 Offset Address Low	24h	824h		109
Gen Map 2 Offset Address High	25h	825h		109
ATA Control	26h	826h	Chapter 11: "EXTENSION REGISTERS":	121
Scratchpad	27h	827h	–	–
Gen Map 3 Start Address Low	28h	828h	Chapter 10: "GENERAL WINDOW MAPPING REGISTERS"	107
Gen Map 3 Start Address High	29h	829h		107
Gen Map 3 End Address Low	2Ah	82Ah		108
Gen Map 3 End Address High	2Bh	82Bh		109
Gen Map 3 Offset Address Low	2Ch	82Ch		109
Gen Map 3 Offset Address High	2Dh	82Dh		109

Table 7-1. Index Registers *(cont.)*

Register Name	I/O Index Value 6-Bit Value	Memory Offset Value	Chapter	Page
Extended Index	2Eh	–	Chapter 11: "EXTENSION REGISTERS"	122
Extended Data:	2Fh –	–		123
Scratchpad	Extended index 00h	900h		–
Reserved	Extended index 01h	*Reserved*		–
Reserved	Extended index 02h	*Reserved*		–
Extension Control 1	Extended index 03h	903h		123
Reserved	Extended index 04h	*Reserved*		–
Gen Map 0 Upper Address	Extended index 05h	840h		125
Gen Map 1 Upper Address	Extended index 06h	841h		125
Gen Map 2 Upper Address	Extended index 07h	842h		125
Gen Map 3 Upper Address	Extended index 08h	843h		125
Gen Map 4 Upper Address	Extended index 09h	844h		125
External Data	Extended index 0Ah	90Ah		125
Extension Control 2	Extended index 0Bh	90Bh		126
Reserved	Extended index 0Ch–1Fh	*Reserved*		–
Gen Map 5 Upper Address	Extended index 20h	845h		125
Gen Map 6 Upper Address	Extended index 21h	846h		125
PCI Space Control	Extended index 22h	922h		126
PC Card Space Control	Extended index 23h	923h		127
Window Type Select	Extended index 24h	924h		127
Misc Control 3	Extended index 25h	925h		128
SMB Socket Power Control Address	Extended index 26h	926h		130
Gen Map 0 Extra Control	Extended index 27h	927h		130
Gen Map 1 Extra Control	Extended index 28h	928h		130
Gen Map 2 Extra Control	Extended index 29h	929h		130
Gen Map 3 Extra Control	Extended index 2Ah	92Ah		130
Gen Map 4 Extra Control	Extended index 2Bh	92Bh		130
Gen Map 5 Extra Control	Extended index 2Ch	92Ch		130
Gen Map 6 Extra Control	Extended index 2Dh	92Dh		130
Extension Card Status Change	Extended index 2Eh	92Eh		132
Misc Control 4	Extended index 2Fh	92Fh		133
Misc Control 5	Extended index 30h	930h		133
Misc Control 6	Extended index 31h	931h		134
Mask Revision Byte	Extended index 34h	934h		135
Product ID Byte	Extended index 35h	935h		136
Device Capability Byte A	Extended index 36h	936h		136
Device Capability Byte B	Extended index 37h	937h		137
Device Implementation Byte A	Extended index 38h	938h		138
Device Implementation Byte B	Extended index 39h	939h		139
Device Implementation Byte C	Extended index 3Ah	93Ah		140
Device Implementation Byte D	Extended index 3Bh	93Bh		141
Gen Map 4 Start Address Low	30h	830h	Chapter 10: "GENERAL WINDOW MAPPING REGISTERS"	107
Gen Map 4 Start Address High	31h	831h		107
Gen Map 4 End Address Low	32h	832h		108
Gen Map 4 End Address High	33h	833h		109
Gen Map 4 Offset Address Low	34h	834h		109
Gen Map 4 Offset Address High	35h	835h		110

Table 7-1. Index Registers *(cont.)*

Register Name	I/O Index Value 6-Bit Value	Memory Offset Value	Chapter	Page
Gen Map 5 Offset Address Low	36h	836h	Chapter 10: "GENERAL WINDOW MAPPING REGISTERS"	109
Gen Map 5 Offset Address High	37h	837h		110
Gen Map 6 Offset Address Low	38h	838h		109
Gen Map 6 Offset Address High	39h	839h		110
Setup Timing 0	3Ah	83Ah	Chapter 12: "TIMING REGISTERS"	143
Command Timing 0	3Bh	83Bh		144
Recovery Timing 0	3Ch	83Ch		145
Setup Timing 1	3Dh	83Dh		143
Command Timing 1	3Eh	83Eh		144
Recovery Timing 1	3Fh	83Fh		145
Reserved	–	905h-909h	–	–
Reserved	–	914h-921h	–	–
Scratchpad	–	90Ch-913h	–	–
Reserved	–	847h-8FFh	–	–
Reserved	–	93Ch-FFFh	–	–

[a] This register affects both sockets (it is not specific to either socket).

7.2 Data

Register Name: **Data** *Index:* **n/a**							*Register Per:* chip *Register Compatibility Type:* 365
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Data							

The **Data** register is accessed at **I/O Base Address** + 1. This register indicates the contents of the register at the Socket/Register Index selected by the **Index** register.

This register indicates the contents of the register at the socket selected by register location programmed into the **Index** register.

8. DEVICE CONTROL REGISTERS

Table 8-1. Device Control Registers Quick Reference

Register Name	I/O Index	Memory Offset	Page
Chip Revision	00h	800h	81
Interface Status	01h	801h	82
Power Control	02h	802h	84
Interrupt and General Control	03h	803h	86
Card Status Change	04h	804h	88
Management Interrupt Configuration	05h	805h	89
Mapping Enable	06h	806h	91

8.1 Chip Revision

Register Name: **Chip Revision**
I/O Index: **00h**
Memory Offset: **800h**
Register Per: chip
Register Compatibility Type: 365

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Interface ID		*0*	*0*	Revision			
R:10		R:0	R:0	R:0010[a]			

[a] This value is for the current stepping only.

Bits 3:0 — Revision

This field indicates the CL-PD6832's compatibility with the Intel's 82365SL A-step.

Bits 5:4 — 0

These read-only bits are forced to '0' at reset and cannot be changed.

Bits 7:6 — Interface ID

Bits 7:6		Interface Supported
0	0	I/O only
0	1	Memory only
1	0	Memory and I/O
1	1	Reserved

These bits identify what type of interface this controller supports. The CL-PD6832 supports both memory and I/O interface PC Card 16 (R2) cards.

8.2 Interface Status

Register Name: **Interface Status** *Register Per:* socket
I/O Index: **01h** *Register Compatibility Type:* 365
Memory Offset: **801h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
		RDY	*WP*	*-CD2*	*-CD1*	*BVD2*	*BVD1*
1	Card Power On	Ready/Busy*/ Interrupt Request Status	Write Protect	Card Detect		Battery Voltage Detect	
R:1[a]	R:0	R[b]	R[c]	R[d]		R[e]	

[a] Bit 7 always reads '1' on the CL-PD6832.

[b] Bit 5 indicates the value of the RDY/-IREQ pin (see page 19) in PC Card 16 mode. In I/O card mode, this bit is used to identify the source of interrupt request either from socket A or B. In I/O card mode, this bit always indicates the inverted state of the RDY/BSY -INTR pin.

[c] Bit 4 indicates the value of the WP/-IOIS16 pin (see page 18).

[d] Bits 3:2 indicate the inversion of the values of the -CD1 and -CD2 pins (see page 19).

[e] Bits 1:0 indicate the values of the BVD1/-STSCHG/-RI and BVD2/-SPKR/-LED pins (see page 20).

Bits 1:0 — Battery Voltage Detect

BVD2 Level	BVD1 Level	Bit 1	Bit 0	PC Card 16 (R2) Interpretation
Low	Low	0	0	Card data lost
Low	High	0	1	Battery low warning
High	Low	1	0	Card data lost
High	High	1	1	Battery/data okay

In Memory Card Interface mode, these bits are used by PC Card 16 (R2) support software and firmware to indicate the remaining capacity of the battery in the PC Cards. In I/O Card Interface mode, bit 0 indicates the state of the BVD1/-STSCHG/-RI pin (see page 20). Bit 1 status is not valid in I/O Card Interface mode.

Bits 3:2 — Card Detect

-CD2 Level	-CD1 Level	Bit 3	Bit 2	Card Detect Status
High	High	0	0	Either no card, or card is not fully inserted
High	Low	0	1	Card is not fully inserted
Low	High	1	0	Card is not fully inserted
Low	Low	1	1	Card is fully inserted

These bits indicate the state of the -CD1 and -CD2 pins (see page 19).

Bit 4 — Write Protect

0	Card is not write protected.
1	Card is write protected.

In Memory Card Interface mode, this bit indicates the state of the WP/-IOIS16 pin (see page 18) on the card. This bit is not valid in I/O Card Interface mode.

Bit 5 — Ready/Busy*/Interrupt Request Status

0	Card is not ready.
1	Card is ready.

In Memory Card Interface mode, this bit indicates the state of the RDY/-IREQ pin (see page 19) on the card. This bit reads the state of the Interrupt Request in the I/O mode of operation. If the card holds the Interrupt Request line active until the interrupt is serviced this bit can be used to examine the source of the interrupt. This bit represents the inverted realtime value of the Interrupt Request pin.

Bit 6 — Card Power On

0	Power to the card is not on.
1	Power to the card is on.

This status bit indicates whether power to the card is on. Refer to Table 8-2 for more details.

Bit 7 — 1

This bit always reads '1'.

8.3 Power Control

Register Name: **Power Control**
I/O Index: **02h**
Memory Offset: **802h**
Register Per: socket
Register Compatibility Type: 365

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Card Enable[a]	Compatibility Bit	*Reserved*	V_{CC} Power	Compatibility Bits		$V_{PP}1$ Power	
R/W:0	R/W:0	R/W:0	R/W:0	R/W:00		R/W:00	

[a] This only applies to PC Card 16 (R2) cards.

This register is write protected by writes to the **Event Force** register. The register is no longer write-protected when a CV test completes. A CV test can be started by a card insertion or by a write to bit 14 of the **Event Force** register. Use either the **Control** register (see page 72) or this **Power Control** register to set card power. Do not use both registers.

Table 8-2. Enabling of Socket Power Commands

RST# Level	Both -CD1 and -CD2 are Active (Low)	Power Control Register	Interface Status Register (see page 82)	V_{CC} Command to Power Device	V_{PP} Command to Power Device
		V_{CC} Power (Bit 4)	Card Power On (Bit 6)		
Low	X	X	0	Inactive (high)	Inactive (low)
High	X	0	0	Inactive (high)	Inactive (low)
High	No	X	X	Inactive (high)	Inactive (low)
High	Yes	1	1	Activated through bit 1 of the **Misc Control 1** register	Activated through bits 1 and 0 of the **Power Control** register

Table 8-3. Enabling of PC Card 16 (R2) Output Signals to Socket

RST# Level	Both -CD1 and -CD2 are Active (Low)	Power Control Register		State of the CL-PD6832 V_{CC} Command to Power Device
		V_{CC} Power (Bit 4)	Card Enable (Bit 7 [a])	
Low	X	X	X	High-impedance
High	No	X	X	High-impedance
High	Yes	0	0	High-impedance
High	Yes	0	1	Enabled
High	Yes	1	0	High-impedance
High	Yes	1	1	Enabled

[a] This only applies to PC Card 16 (R2) cards.

Bits 1:0 — $V_{PP}1$ Power

Bit 1	Bit 0	VPP_PGM	VPP_VCC	PC Card 16 (R2) Intended Socket Function
0	0	Inactive (low)	Inactive (low)	Zero volts to PC Card 16 (R2) socket $V_{PP}1$ pin
0	1	Inactive (low)	Active (high) [a]	Selected card V_{CC} to PC Card 16 (R2) socket $V_{PP}1$ pin
1	0	Active (high) [a]	Inactive (low)	+12V to PC Card 16 (R2) socket $V_{PP}1$ pin
1	1	Inactive (low)	Inactive (low)	Zero volts to PC Card 16 (R2) socket $V_{PP}1$ pin

[a] This state exists under conditions where $V_{PP}1$ power is activated. See Table 8-2.

These bits control the power to the $V_{PP}1$ pin of the PC Card 16 (R2).

Bits 3:2 — Compatibility Bits

Bit 4 — V_{CC} Power

0	Power is not applied to the card.
1	Power is applied to the card. If -CD2 and -CD1 are active low, then the selected V_{CC} voltage is applied.

Setting this bit to '1' applies power to the card. The V_{CC} 3.3-V bit (see page 116) determines whether 3.3-V or 5-V power is applied. Note that this bit is reset to '0' when a card is removed from the socket.

Bit 5 — Reserved

Bit 6 — Compatibility Bit

Bit 7 — Card Enable

0	Outputs to card socket are not enabled and are floating.
1	Outputs to card socket are enabled if -CD1 and -CD2 are active low and bit 4 is '1'.

This bit only applies to PC Card 16 (R2) cards. When this bit is '1', the outputs to the PC Card 16 (R2) card are enabled if a card is present and card power is being supplied. The pins affected include -CE2, -CE1, -IORD, -IOWR, -OE, -REG, RESET, A[25:0], D[15:0], and -WE.

8.4 Interrupt and General Control

Register Name: **Interrupt and General Control** *Register Per:* socket
I/O Index: **03h** *Register Compatibility Type:* 365
Memory Offset: **803h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Ring Indicate Enable	Card Reset*	Card Is I/O	Compatibility Bit	PC Card IRQ Selection			
R/W:0	R/W:0	R/W:0	R/W:0	R/W:0000			

Bits 3:0 — PC Card IRQ Selection

Bits 3:0				IRQ Selection
0	0	0	0	IRQ disabled
0	0	0	1	IRQ1 for PCI/Way operation, Reserved for other modes
0	0	1	0	SMI for PCI/Way operation, Reserved for other modes
0	0	1	1	IRQ3
0	1	0	0	IRQ4
0	1	0	1	IRQ5
0	1	1	0	IRQ6 for PCI/Way operation, Reserved for other modes
0	1	1	1	IRQ7
1	0	0	0	IRQ8 for PCI/Way operation, Reserved for other modes
1	0	0	1	IRQ9 for PCI/Way operation, Reserved for other modes
1	0	1	0	IRQ10 for PCI/Way operation, Reserved for other modes
1	0	1	1	IRQ11
1	1	0	0	IRQ12
1	1	0	1	IRQ13 for PCI/Way operation, Reserved for other modes
1	1	1	0	IRQ14
1	1	1	1	IRQ15

NOTE: This is for I/O Card Interface mode (bit 5 is '1').

These bits determine which IRQ occurs when the card causes an interrupt through the RDY/-IREQ pin on the PC Card 16 (R2) socket when serial interrupt signalling is used. In PCI interrupt mode these bits have no effect.

Bit 4 — Compatibility Bit

Bit 5 — Card Is I/O

0	Sets Memory Card Interface mode. The card socket is configured to support memory-only-type cards. All dual-function socket interface pins are defined to perform memory-only-type interface functions.
1	Sets I/O Card Interface mode. The card socket is configured to support combined I/O-and-memory-type cards. All dual-function socket interface pins are defined to perform all I/O and basic memory type interface functions.

This bit determines how dual-function socket interface pins are used. For more information on specific pins, refer to Table 2-2 on page 16.

Bit 6 — Card Reset

0	The RESET signal to the card socket is set active (high for normal, low for ATA mode).
1	The RESET signal to the card socket is set inactive (low for normal, high for ATA mode).

This bit determines whether the RESET signal (see page 20) to the card is active or inactive. When the Card Enable bit (see page 85) is '0', the RESET signal to the card is high-impedance. See Chapter 10 for further description of ATA mode functions.

Bit 7 — Ring Indicate Enable

0	BVD1/-STSCHG/-RI pin is status change function.
1	BVD1/-STSCHG/-RI pin is ring indicate input pin from card.

In I/O Card Interface mode, this bit determines whether the -STSCHG input pin is used in conjunction with the RI_OUT*/INTB# is RI_Out bit (**Misc Control 2** bit 7, see page 119). To activate the Ring Indicate function, bit 5 of register index 03h must be set. This bit is not valid in Memory Card Interface mode.

8.5 Card Status Change

Register Name: **Card Status Change**						*Register Per:* socket	
I/O Index: **04h**						*Register Compatibility Type:* 365	
Memory Offset: **804h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
0	*0*	*0*	*0*	Card Detect Change	Ready Change	Battery Warning Change	Battery Dead Or Status Change
R:0	R:0	R:0	R:0	R:0	R:0	R:0	R:0

This register indicates the source of a management interrupt generated by the CL-PD6832.

Bit 0 — Battery Dead Or Status Change

0	A transition (from high to low in Memory Card Interface mode or either high-to-low or low-to-high in I/O Card Interface mode) on the BVD1/-STSCHG/-RI pin has not occurred since this register was last read.
1	A transition on the BVD1/-STSCHG/-RI pin has occurred.

In Memory Card Interface mode, this bit is set to '1' when the BVD1/-STSCHG/-RI pin (see page 20) changes from high to low, indicating a battery dead condition. In I/O Card Interface mode, this bit is set to '1' when the BVD1/-STSCHG/-RI pin changes from either high to low or low to high. In I/O Card Interface mode, the function of this bit is not affected by bit 7 of the **Interrupt and General Control** register. This bit is reset to '0' whenever this register is read.

Bit 1 — Battery Warning Change

0	A transition (from high to low) on the BVD2/-SPKR/-LED pin has not occurred since this register was last read.
1	A transition on the BVD2/-SPKR/-LED pin has occurred.

In Memory Card Interface mode, this bit is set to '1' when the BVD2/-SPKR/-LED pin changes from high to low, indicating a battery warning. This bit is not valid in I/O Card Interface mode. This bit is reset to '0' whenever this register is read.

Bit 2 — Ready Change

0	A transition on the RDY/-IREQ pin has not occurred since this register was last read.
1	A transition on the RDY/-IREQ pin has occurred.

This bit is '1' when a change has occurred on the RDY/-IREQ pin (see page 19). This bit is reset to '0' whenever this register is read. This bit is not valid in I/O card interface mode.

Bit 3 — Card Detect Change

0	A transition on neither the -CD1 nor the -CD2 pin has occurred since this register was last read.
1	A transition on either the -CD1 or the -CD2 pin or both has occurred.

This bit is set to '1' when a change has occurred on the -CD1 or -CD2 pin (see page 19). This bit is reset to '0' whenever this register is read.

Bits 7:4 — 0

These bits always read '0's.

8.6 Management Interrupt Configuration

Register Name: **Management Interrupt Configuration** *Register Per:* socket
I/O Index: **05h** *Register Compatibility Type:* 365
Memory Offset: **805h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Management IRQ				Card Detect Enable	Ready Enable	Battery Warning Enable	Battery Dead Or Status Change Enable
R/W:0000				R/W:0	R/W:0	R/W:0	R/W:0

This register controls which status changes cause management interrupts. They also control the pin location where the management interrupts appear.

Bit 0 — Battery Dead Or Status Change Enable

0	Battery Dead Or Status Change management interrupt disabled.
1	If Battery Dead Or Status Change bit is '1', a management interrupt will occur.

When this bit is '1', a management interrupt occurs when the **Card Status Change** register's Battery Dead Or Status Change bit (see page 88) is '1'. This allows management interrupts to be generated on changes in level of the BVD1/-STSCHG/-RI pin.

Bit 1 — Battery Warning Enable

0	Battery Warning Change management interrupt disabled.
1	If Battery Warning Change bit is '1', a management interrupt will occur.

When this bit is '1', a management interrupt occurs if the **Card Status Change** register's Battery Warning Change bit (see page 88) is '1'. This allows management interrupts to be generated on changes in level of the BVD2/-SPKR/-LED pin. This bit is not valid in I/O Card Interface mode.

Bit 2 — Ready Enable

0	Ready Change management interrupt disabled.
1	If Ready Change bit is '1', a management interrupt occurs.

This bit applies to Memory mode only. When this bit is '1', a management interrupt occurs if the **Card Status Change** register's Ready Change bit (see page 88) is '1'. This allows management interrupts to be generated on changes in level of the RDY/-IREQ pin. This bit is not valid in I/O Card Interface mode.

Bit 3 — Card Detect Enable

0	Card Detect Change management interrupt disabled.
1	If Card Detect Change bit is '1', a management interrupt occurs.

When this bit is '1', a management interrupt occurs by when the **Card Status Change** register's Card Detect Change bit (see page 88) is '1'. This allows management interrupts to be generated on changes in level of the -CD1 and -CD2 pins.

Bits 7:4 — Management IRQ

Bits 7:4				Interrupt Pin Used for Card Status Change Management Interrupts
0	0	0	0	IRQ disabled
0	0	0	1	IRQ1 for PCI/Way operation, Reserved for others
0	0	1	0	SMI for PCI/Way operation, Reserved for others
0	0	1	1	IRQ3
0	1	0	0	IRQ4
0	1	0	1	IRQ5
0	1	1	0	IRQ6 for PCI/Way operation, Reserved for others
0	1	1	1	IRQ7
1	0	0	0	IRQ8 for PCI/Way operation, Reserved for others
1	0	0	1	IRQ9 for PCI/Way operation, Reserved for others
1	0	1	0	IRQ10 for PCI/Way operation, Reserved for others
1	0	1	1	IRQ11
1	1	0	0	IRQ12
1	1	0	1	IRQ13 for PCI/Way operation, Reserved for others
1	1	1	0	IRQ14
1	1	1	1	IRQ15

These bits determine which interrupt pin is used for card status change management interrupts in serial interrupt modes. In PCI Interrupt Signalling mode, management interrupts are on INTA# for socket A and INTB# for socket B, except when RI_OUT* is enabled, in which case all interrupts are routed through INTA#.

8.7 Mapping Enable

Register Name: **Mapping Enable**							*Register Per:* socket
I/O Index: **06h**							*Register Compatibility Type:* 365
Memory Offset: **806h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
I/O Map 1 Enable	I/O Map 0 Enable	Compatibility Bit	Memory Map 4 Enable	Memory Map 3 Enable	Memory Map 2 Enable	Memory Map 1 Enable	Memory Map 0 Enable
R/W:0	R/W:0	R:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bit 0 — Memory Map 0 Enable

0	**Memory Window Mapping** registers for Memory Window 0 disabled.
1	**Memory Window Mapping** registers for Memory Window 0 enabled.

When this bit is '1', the **Memory Window Mapping** registers for Memory Window 0 are enabled and the controller responds to memory accesses in the memory space defined by those registers.

Bit 1 — Memory Map 1 Enable

0	**Memory Window Mapping** registers for Memory Window 1 disabled.
1	**Memory Window Mapping** registers for Memory Window 1 enabled.

When this bit is '1', the **Memory Window Mapping** registers for Memory Window 1 are enabled and the controller responds to memory accesses in the memory space defined by those registers.

Bit 2 — Memory Map 2 Enable

0	**Memory Window Mapping** registers for Memory Window 2 disabled.
1	**Memory Window Mapping** registers for Memory Window 2 enabled.

When this bit is '1', the **Memory Window Mapping** registers for Memory Window 2 are enabled and the controller responds to memory accesses in the memory space defined by those registers.

Bit 3 — Memory Map 3 Enable

0	**Memory Window Mapping** registers for Memory Window 3 disabled.
1	**Memory Window Mapping** registers for Memory Window 3 enabled.

When this bit is '1', the **Memory Window Mapping** registers for Memory Window 3 are enabled and the controller responds to memory accesses in the memory space defined by those registers.

Bit 4 — Memory Map 4 Enable

0	**Memory Window Mapping** registers for Memory Window 4 disabled.
1	**Memory Window Mapping** registers for Memory Window 4 enabled.

When this bit is '1', the **Memory Window Mapping** registers for Memory Window 4 are enabled and the controller responds to memory accesses in the memory space defined by those registers.

Bit 5 — Compatibility Bit

Bit 6 — I/O Map 0 Enable

0	**I/O Window Mapping** registers for I/O Window 0 disabled.
1	**I/O Window Mapping** registers for I/O Window 0 enabled.

When this bit is '1', the **I/O Window Mapping** registers for I/O Window 0 are enabled and the controller responds to I/O accesses in the I/O space defined by those registers.

Bit 7 — I/O Map 1 Enable

0	**I/O Window Mapping** registers for I/O Window 1 disabled.
1	**I/O Window Mapping** registers for I/O Window 1 enabled.

When this bit is '1', the **I/O Window Mapping** registers for I/O Window 1 are enabled and the controller responds to I/O accesses in the I/O space defined by those registers.

9. WINDOW MAPPING REGISTERS

Chapter 9 and Chapter 10 discuss the window mapping technique for PC Card application.

Chapter 9 discusses the conventional or Standard method for mapping windows. This method is featured in all earlier versions of the Cirrus Logic PC Card products and is also 82365SL compatible. This method of window mapping uses seven windows to access the memory and I/O space of the PC Card. The seven windows consist of two windows dedicated to the I/O space and five widows dedicated to the memory space.

For clarity, we use labels that are consistent with earlier data sheets to describe the window mapping registers.

NOTE: As of this writing, only the Standard Mapping Method is used by PC Card software vendors.

Table 9-1. Window Mapping Registers Quick Reference

Register Name	I/O Index	Memory Offset	Page Number
I/O Window Mapping Registers			
I/O Window Control	07h	807h	94
System I/O Map 0–1 Start Address Low	08h, 0Ch	808h, 80Ch	96
System I/O Map 0–1 Start Address High	09h, 0Dh	809h, 80Dh	96
System I/O Map 0–1 End Address Low	0Ah, 0Eh	80Ah, 80Eh	97
System I/O Map 0–1 End Address High	0Bh, 0Fh	80Bh, 80Fh	97
Card I/O Map 0–1 Offset Address Low	36h, 38h	836h, 838h	98
Card I/O Map 0–1 Offset Address High	37h, 39h	837h, 839h	98
Memory Window Mapping Registers			
System Memory Map 0–4 Start Address Low	10h, 18h, 20h, 28h, 30h	810h, 818h, 820h, 828h, 830h	99
System Memory Map 0–4 Start Address High	11h, 19h, 21h, 29h, 31h	811h, 819h, 821h, 829h, 831h	100
System Memory Map 0–4 End Address Low	12h, 1Ah, 22h, 2Ah, 32h	812h, 81Ah, 822h, 82Ah, 832h	101
System Memory Map 0–4 End Address High	13h, 1Bh, 23h, 2Bh, 33h	813h, 81Bh, 823h, 82Bh, 833h	102
Card Memory Map 0–4 Offset Address Low	14h, 1Ch, 24h, 2Ch, 34h	814h, 81Ch, 824h, 82Ch, 834h	103
Card Memory Map 0–4 Offset Address High	15h, 1Dh, 25h, 2Dh, 35h	815h, 81Dh, 825h, 82Dh, 835h	104

Chapter 10 describes another technique for mapping the seven windows: the General Mapping method. General Mapping method allows for the flexibility to map any of the seven windows as either a memory window or an I/O window. Additional flexibility allows mapping from PCI memory space or PCI I/O space to PC Card memory space or PC Card I/O space (as shown in Table 9-2).

NOTE: The General Mapping method is not currently used by PC Card software vendors.

Table 9-2 shows the different registers that have to be programmed to use the various flavors of the Standard and General Mapping.

Table 9-2. Window Mapping Registers

Window Type Select	PCI Space Control	PC Card Space Control	PCI Bus	PC Card	Window Configuration
Reset to '0'	Don't Care	Don't Care	I/O	I/O	Standard Mapping
Reset to '0'	Don't Care	Don't Care	Memory	Memory	Standard Mapping
Set to '1'	Set to '1'	Set to '1'	I/O	I/O	General Mapping
Set to '1'	Set to '1'	Reset to '0'	I/O	Memory	General Mapping
Set to'1'	Reset to '0'	Reset to '0'	Memory	Memory	General Mapping
Set to '1'	Reset to '0'	Set to '1'	Memory	I/O	General Mapping

The **General Window Mapping** registers are first presented describing the functionality of the registers when configured in I/O mode. Thereafter, the same register functionality is described when configured in Memory mode. This facilitates understanding since the bit assignments and definitions of these registers are different in the I/O mode and Memory mode.

NOTE: A combination of both Standard Window Mapping method and General Window Mapping method can be used.

9.1 I/O Window Mapping Registers

CAUTION: Be sure that the I/O windows do not map to the **Base Address 0** register programmed at offset 10h.

9.1.1 I/O Window Control

Register Name: **I/O Window Control** — *Register Per:* socket
I/O Index: **07h** — *Register Compatibility Type:* 365
Memory Offset: **807h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Timing Register Select 1	*Compatibility Bit*	Auto-Size I/O Window 1	I/O Window 1 Size	Timing Register Select 0	*Compatibility Bit*	Auto-Size I/O Window 0	I/O Window 0 Size
R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bit 0 — I/O Window 0 Size

0	8-bit data path to I/O Window 0.
1	16-bit data path to I/O Window 0.

When the Auto-Size I/O Window 0 bit (bit 1 of this register) is '0', this bit determines the width of the data path for I/O Window 0 accesses to the card. When bit 1 is '1', this bit is ignored.

Bit 1 — Auto-Size I/O Window 0

0	I/O Window 0 Size (see bit 0 of this register) determines the data path for I/O Window 0 accesses.
1	The data path to I/O Window 0 is determined by the -IOIS16 level returned by the card.

This bit controls how the data path width for I/O Window 0 accesses to the card is determined. When this bit is '1', the -IOIS16 signal determines the data path width to the card.

Bit 2 — Compatibility Bit

Bit 3 — Timing Register Select 0

0	Accesses made with timing specified in **Timer Set 0** registers.
1	Accesses made with timing specified in **Timer Set 1** registers.

This bit determines the access timing specification for I/O Window 0.

Bit 4 — I/O Window 1 Size

0	8-bit data path to I/O Window 1.
1	16-bit data path to I/O Window 1.

When the Auto-Size I/O Window 1 bit (bit 5 of this register) is '0', this bit determines the width of the data path for I/O Window 1 accesses to the card. When bit 5 is '1', this bit is ignored.

Bit 5 — Auto-Size I/O Window 1

0	I/O Window 1 Size (see bit 4 of this register) determines the data path for I/O Window 1 accesses.
1	The data path to I/O Window 1 is determined based on -IOIS16 returned by the card.

This bit controls how the data path width for I/O Window 1 accesses to the card is determined. When this bit is '1', the -IOIS16 signal determines the data path width to the card. This bit must be set to '1' for correct ATA mode operation.

Bit 6 — Compatibility Bit

Bit 7 — Timing Register Select 1

0	Accesses made with timing specified in Timer Set 0.
1	Accesses made with timing specified in Timer Set 1.

This bit determines the access timing specification for I/O Window 1.

9.1.2 System I/O Map 0–1 Start Address Low

Register Name: **System I/O Map 0–1 Start Address Low**
I/O Index: **08h, 0Ch**
Memory Offset: **808h, 80Ch**
Register Per: socket
Register Compatibility Type: 365

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Start Address 7:0							
R/W:00000000							

There are two separate **System I/O Map Start Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System I/O Map Start Address Low
08h	System I/O Map 0 Start Address Low
0Ch	System I/O Map 1 Start Address Low

Bits 7:0 — Start Address [7:0]

This register contains the least-significant byte of the address that specifies where in the I/O space the corresponding I/O map begins. I/O accesses that are equal or above this address and equal or below the corresponding System I/O Map End Address are mapped into the I/O space of the corresponding PC Card.

The most-significant byte is located in the **System I/O Map 0–1 Start Address High** register.

9.1.3 System I/O Map 0–1 Start Address High

Register Name: **System I/O Map 0–1 Start Address High**
I/O Index: **09h, 0Dh**
Memory Offset: **809h, 80Dh**
Register Per: socket
Register Compatibility Type: 365

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Start Address 15:8							
R/W:00000000							

There are two separate **System I/O Map Start Address High** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System I/O Map Start Address High
09h	System I/O Map 0 Start Address High
0Dh	System I/O Map 1 Start Address High

Bits 7:0 — Start Address [15:8]

This register contains the most-significant byte of the Start Address. See the description of the Start Address field associated with bits 7:0 of the **System I/O Map 0–1 Start Address Low** register.

9.1.4 System I/O Map 0–1 End Address Low

Register Name: **System I/O Map 0–1 End Address Low** *Register Per:* socket
I/O Index: **0Ah, 0Eh** *Register Compatibility Type:* 365
Memory Offset: **80Ah, 80Eh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
End Address 7:0							
R/W:00000000							

There are two separate **System I/O Map End Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System I/O Map End Address Low
0Ah	System I/O Map 0 End Address Low
0Eh	System I/O Map 1 End Address Low

Bits 7:0 — End Address [7:0]

This register contains the least-significant byte of the address that specifies where in the I/O space the corresponding I/O map ends. I/O accesses that are equal or below this address and equal or above the corresponding System I/O Map Start Address are mapped into the I/O space of the corresponding PC Card.

The most-significant byte is located in the **System I/O Map 0–1 End Address High** register.

9.1.5 System I/O Map 0–1 End Address High

Register Name: **System I/O Map 0–1 End Address High** *Register Per:* socket
I/O Index: **0Bh, 0Fh** *Register Compatibility Type:* 365
Memory Offset: **80Bh, 80Fh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
End Address 15:8							
R/W:00000000							

There are two separate **System I/O Map End Address High** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System I/O Map End Address High
0Bh	System I/O Map 0 End Address High
0Fh	System I/O Map 1 End Address High

Bits 7:0 — End Address [15:8]

This register contains the most-significant byte of the End Address. See the description of the End Address field associated with bits 7:0 of the **System I/O Map 0–1 End Address Low** register.

9.1.6 Card I/O Map 0–1 Offset Address Low

Register Name: **Card I/O Map 0–1 Offset Address Low** *Register Per:* socket
I/O Index: **36h, 38h** *Register Compatibility Type:* ext.
Memory Offset: **836h, 838h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Offset Address 7:1							*0*
R/W:0000000							R/W:0

There are two separate **Card I/O Map Offset Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	Card I/O Map Offset Address Low
36h	Card I/O Map 0 Offset Address Low
38h	Card I/O Map 1 Offset Address Low

Bit 0 — 0

This bit must be programmed to '0'.

Bits 7:1 — Offset Address [7:1]

This register contains the least-significant byte of the quantity that is added to the system I/O address that determines where in the PC Card's I/O map the I/O access occurs.

The most-significant byte is located in the **Card I/O Map 0–1 Offset Address High** register.

9.1.7 Card I/O Map 0–1 Offset Address High

Register Name: **Card I/O Map 0–1 Offset Address High** *Register Per:* socket
I/O Index: **37h, 39h** *Register Compatibility Type:* ext.
Memory Offset: **837h, 839h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Offset Address 15:8							
R/W:00000000							

There are two separate **Card I/O Map Offset Address High** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	Card I/O Map Offset Address High
37h	Card I/O Map 0 Offset Address High
39h	Card I/O Map 1 Offset Address High

Bits 7:0 — Offset Address [15:8]

This register contains the most-significant byte of the Offset Address. See the description of the End Address field associated with bits 7:1 of the **Card I/O Map 0–1 Offset Address Low** register.

9.2 Memory Window Mapping Registers

The following information about the memory map windows is important:

- The memory window mapping registers determine where in the PCI memory space and PC card memory space accesses occur. There are five memory windows that can be used independently.
- The memory windows are enabled and disabled using the **Mapping Enable** register.
- To specify where in the PCI space a memory window is mapped, start and end addresses are specified. A memory window is selected whenever the appropriate Memory Map Enable bit is set and the following conditions are true:
  - The PCI address is greater than or equal to the appropriate **System Memory Map Start Address** register (see page 99).
  - The PCI address is less than or equal to the appropriate **System Memory Map End Address** register (see page 101).
  - The **System Memory Map Upper Address** register is equal to the upper PCI address.
- Start and end addresses are specified with PCI Address bits 31:12. This sets the minimum size of a memory window to 4 Kbytes. Memory windows are specified in the PCI memory address space.
- To ensure proper operation, none of the memory windows can overlap in the PCI address space.

9.2.1 System Memory Map 0–4 Start Address Low

Register Name: **System Memory Map 0–4 Start Address Low** *Register Per:* socket
I/O Index: **10h, 18h, 20h, 28h, 30h** *Register Compatibility Type:* 365
Memory Offset: **810h, 818h, 820h, 828h, 830h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Start Address 19:12							
R/W:00000000							

There are five separate **System Memory Map Start Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System Memory Map Start Address Low
10h	System Memory Map 0 Start Address Low
18h	System Memory Map 1 Start Address Low
20h	System Memory Map 2 Start Address Low
28h	System Memory Map 3 Start Address Low
30h	System Memory Map 4 Start Address Low

Bits 7:0 — Start Address [19:12]

This register contains the least-significant byte of the address that specifies where in the memory space the corresponding memory map begins. Memory accesses that are equal or above this address and equal or below the corresponding System Memory Map End Address are mapped into the memory space of the corresponding PC Card.

The most-significant four bits are located in the **System Memory Map 0–4 Start Address High** register.

9.2.2 System Memory Map 0–4 Start Address High

Register Name: **System Memory Map 0–4 Start Address High** — *Register Per:* socket
I/O Index: **11h, 19h, 21h, 29h, 31h** — *Register Compatibility Type:* 365
Memory Offset: **811h, 819h, 821h, 829h, 831h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Window Data Size	*Compatibility Bit*	*Scratchpad Bits*		Start Address 23:20			
R/W:0	R/W:0	R/W:00		R/W:0000			

There are five separate **System Memory Map Start Address High** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System Memory Map Start Address High
11h	System Memory Map 0 Start Address High
19h	System Memory Map 1 Start Address High
21h	System Memory Map 2 Start Address High
29h	System Memory Map 3 Start Address High
31h	System Memory Map 4 Start Address High

Bits 3:0 — Start Address [23:20]

This field contains the most-significant four bits of the Start Address. See the description of the Start Address field associated with bits 7:0 of the **System Memory Map 0–4 Start Address Low** register.

Bits 5:4 — Scratchpad Bits

Bit 6 — Compatibility Bit

Bit 7 — Window Data Size

0	8-bit data path to the card.
1	16-bit data path to the card.

This bit determines the data path size to the card.

9.2.3 System Memory Map 0–4 End Address Low

Register Name: **System Memory Map 0–4 End Address Low** *Register Per:* socket
I/O Index: **12h, 1Ah, 22h, 2Ah, 32h** *Register Compatibility Type:* 365
Memory Offset: **812h, 81Ah, 822h, 82Ah, 832h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
End Address 19:12							
R/W:00000000							

There are five separate **System Memory Map End Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System Memory Map End Address Low
12h	System Memory Map 0 End Address Low
1Ah	System Memory Map 1 End Address Low
22h	System Memory Map 2 End Address Low
2Ah	System Memory Map 3 End Address Low
32h	System Memory Map 4 End Address Low

Bits 7:0 — End Address [19:12]

This register contains the least-significant byte of the address that specifies where in the memory space the corresponding memory map ends. Memory accesses that are equal or below this address and equal or above the corresponding System Memory Map Start Address are mapped into the memory space of the corresponding PC Card.

The most-significant four bits are located in the **System Memory Map 0–4 End Address High** register.

9.2.4 System Memory Map 0–4 End Address High

Register Name: **System Memory Map 0–4 End Address High** *Register Per:* socket
I/O Index: **13h, 1Bh, 23h, 2Bh, 33h** *Register Compatibility Type:* 365
Memory Offset: **813h, 81Bh, 823h, 82Bh, 833h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Card Timer Select		*Scratchpad Bits*		End Address 23:20			
R/W:00		R/W:00		R/W:0000			

There are five separate **System Memory Map End Address High** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	System Memory Map End Address High
13h	System Memory Map 0 End Address High
1Bh	System Memory Map 1 End Address High
23h	System Memory Map 2 End Address High
2Bh	System Memory Map 3 End Address High
33h	System Memory Map 4 End Address High

Bits 3:0 — End Address [23:20]

This field contains the most-significant four bits of the End Address. See the description of the End Address field associated with bits 7:0 of the **System Memory Map 0–4 End Address Low** register. Note that the upper memory addresses are stored in the **System Memory Map Upper Address** register.

Bits 5:4 — Scratchpad Bits

Bits 7:6 — Card Timer Select

Bits 7:6		Timer Set Select
0	0	Selects Timer Set 0.
0	1	Selects Timer Set 1.
1	0	Selects Timer Set 1.
1	1	Selects Timer Set 1.

This field selects the timer set. Timer Set 0 and 1 reset to values compatible with standard PCI and three-wait-state cycles.

9.2.5 Card Memory Map 0–4 Offset Address Low

Register Name: **Card Memory Map 0–4 Offset Address Low** *Register Per:* socket
I/O Index: **14h, 1Ch, 24h, 2Ch, 34h** *Register Compatibility Type:* 365
Memory Offset: **814h, 81Ch, 824h, 82Ch, 834h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Offset Address 19:12							
R/W:00000000							

There are five separate **Card Memory Map Offset Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	Card Memory Map Offset address Low
14h	Card Memory Map 0 Offset Address Low
1Ch	Card Memory Map 1 Offset Address Low
24h	Card Memory Map 2 Offset Address Low
2Ch	Card Memory Map 3 Offset Address Low
34h	Card Memory Map 4 Offset Address Low

Bits 7:0 — Offset Address [19:12]

This register contains the least-significant byte of the quantity that is added to the system memory address that determines where in the PC Card's memory map the memory access occurs.

The most-significant six bits are located in the **Card Memory Map 0–4 Offset Address High** register.

9.2.6 Card Memory Map 0–4 Offset Address High

Register Name: **Card Memory Map 0–4 Offset Address High**							*Register Per:* socket
I/O Index: **15h, 1Dh, 25h, 2Dh, 35h**							*Register Compatibility Type:* 365
Memory Offset: **815h, 81Dh, 825h, 82Dh, 835h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Write Protect	REG Setting	Offset Address 25:20					
R/W:0	R/W:0	R/W:000000					

There are five separate **Card Memory Map Offset Address High** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	Memory Map Address Offset High
15h	Card Memory Map 0 Offset Address High
1Dh	Card Memory Map 1 Offset Address High
25h	Card Memory Map 2 Offset Address High
2Dh	Card Memory Map 3 Offset Address High
35h	Card Memory Map 4 Offset Address High

Bits 5:0 — Offset Address [25:20]

This field contains the most-significant six bits of the Offset Address. See the description of the Offset Address field associated with bits 7:0 of the **Card Memory Map 0–4 Offset Address Low** register.

Bit 6 — REG Setting

0	-REG is not active for accesses made through this window.
1	-REG is active for accesses made through this window.

This bit determines whether -REG is active for accesses made through this window. CIS (Card Information Structure) memory is accessed by setting this bit to '1'.

Bit 7 — Write Protect

0	Writes to the card through this window are allowed.
1	Writes to the card through this window are inhibited.

This bit determines whether writes to the card through this window are allowed.

10. GENERAL WINDOW MAPPING REGISTERS

Table 10-1. General Window Mapping Registers Quick Reference

Register Name	I/O Index	Memory Offset	Page Number
General Mapping Registers for I/O Mode			
Gen Map 0–6 Start Address Low (I/O)	08h, 0Ch, 10h, 18h, 20h, 28h, 30h	808h, 80Ch, 810h, 818h, 820h, 828h, 830h	107
Gen Map 0–6 Start Address High (I/O)	09h, 0Dh, 11h, 19h, 21h, 29h, 31h	809h, 80Dh, 811h, 819h, 821h, 829h, 831h	107
Gen Map 0–6 End Address Low (I/O)	0Ah, 0Eh, 12h, 1Ah, 22h, 2Ah, 32h	80Ah, 80Eh, 812h, 81Ah, 822h, 82Ah, 832h	108
Gen Map 0–6 End Address High (I/O)	0Bh, 0Fh, 13h, 1Bh, 23h, 2Bh, 33h	80Bh, 80Fh, 813h, 81Bh, 823h, 82Bh, 833h	109
Gen Map 0–6 Offset Address Low (I/O)	14h, 1Ch, 24h, 2Ch, 34h, 36h, 38h	814h, 81Ch, 824h, 82Ch, 834h, 836h, 838h	109
Gen Map 0–6 Offset Address High (I/O)	15h, 1Dh, 25h, 2Dh, 35h, 37h, 39h	815h, 81Dh, 825h, 82Dh, 835h, 837h, 839h	110
General Mapping Register for Memory Mode			
Gen Map 0–6 Start Address Low (Memory)	08h, 0Ch, 10h, 18h, 20h, 28h, 30h	808h, 80Ch, 810h, 818h, 820h, 828h, 830h	111
Gen Map 0–6 Start Address High (Memory)	09h, 0Dh, 11h, 19h, 21h, 29h, 31h	809h, 80Dh, 811h, 819h, 821h, 829h, 831h	111
Gen Map 0–6 End Address Low (Memory)	0Ah, 0Eh, 12h, 1Ah, 22h, 2Ah, 32h	80Ah, 80Eh, 812h, 81Ah, 822h, 82Ah, 832h	112
Gen Map 0–6 End Address High (Memory)	0Bh, 0Fh, 13h, 1Bh, 23h, 2Bh, 33h	80Bh, 80Fh, 813h, 81Bh, 823h, 82Bh, 833h	113
Gen Map 0–6 Offset Address Low (Memory)	14h, 1Ch, 24h, 2Ch, 34h, 36h, 38h	814h, 81Ch, 824h, 82Ch, 834h, 836h, 838h	113
Gen Map 0–6 Offset Address High (Memory)	15h, 1Dh, 25h, 2Dh, 35h, 37h, 39h	815h, 81Dh, 825h, 82Dh, 835h, 837h, 839h	114

The following information about the I/O map windows is important:

- The **I/O Window Mapping** registers determine where in the PCI I/O space and PC card I/O space accesses occurs. On reset, there are two I/O windows that can be used independently.
- In addition, depending on the **PC Card Space Control, PCI Space Control** and **Window Type Select** registers, all mapping registers can be defined as **I/O Window Mapping** registers. This provides five additional I/O windows that can be used independently. A total of seven I/O windows can be realized.
- All the **I/O Window Mapping** registers have dual functionality. The functions are determined by the **PC Card Space Control, PCI Space Control** and **Window Type Select.** At reset the **Window Type Select** register is set to 00h. This configures the I/O and memory windows to be compatible with the CL-PD672X products. When a bit in the **Window Type Select** register is set the corresponding window can be programmed using the **PC Card Space Control** and **PCI Space Control** registers to respond to I/O or memory commands on the PCI bus and to present these cycles to the PC Card 16 socket as either memory or I/O cycles. To facilitate this operation anytime, a bit is set in the **Window Type Select** register the attributes for Timer selection and the size of the data for a window are programmed in the **Gen Map Extra Control** registers.
- The I/O windows are enabled and disabled using the **Mapping Enable** register (see page 91).
- To specify where in the PCI space an I/O window is mapped, start and end addresses are specified. An I/O window is selected whenever the appropriate **Gen Map Enable** bit is set and the following conditions are true:
  - — The PCI address is greater than or equal to the appropriate **Gen Map Start Address** register.
  - — The PCI address is less than or equal to the appropriate **Gen Map End Address** register.
  - — The upper 16 bits of the PCI address are all '0's.
- To specify where in the PCI space a memory window is mapped, start and end addresses are specified. A memory window is selected whenever the appropriate Memory Map Enable bit is set and the following conditions are true:
  - — The PCI address is greater than or equal to the appropriate **System Memory Map Start Address** register (see page 99).
  - — The PCI address is less than or equal to the appropriate **System Memory Map End Address** register (see page 101).
  - — The **System Memory Map Upper Address** register (see page 125) is equal to the upper PCI address.
  - — Start and end addresses are specified with PCI Address bits 31:12. This sets the minimum size of a memory window to 4 Kbytes. Memory windows are specified in the PCI memory address space.
- To ensure proper operation, none of the I/O windows can overlap in the PCI address space.
- In this document, references to I/O window 0 pertain to Gen Map 5 and I/O window 1 corresponds to Gen Map 6. Memory windows 0–4 are Gen Map 0–4.

CAUTION: Be sure that the I/O windows do not map to the **I/O Base Address** register programmed at offset 44h in the configuration space.

10.1 General Mapping Registers for I/O Mode

10.1.1 Gen Map 0–6 Start Address Low (I/O)

Register Name: **Gen Map 0–6 Start Address Low (I/O)** — *Register Per:* socket
I/O Index: **08h, 0Ch, 10h, 18h, 20h, 28h, 30h** — *Register Compatibility Type:* 365
Memory Offset: **808h, 80Ch, 810h, 818h, 820h, 828h, 830h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Start Address 7:0 (I/O)							
R/W:00000000							

There are seven separate **Gen Map Start Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map Start Address Low	Default operation
08h	808h	Gen Map 5 Start Address Low	I/O window 0
0Ch	80Ch	Gen Map 6 Start Address Low	I/O window 1
10h	810h	Gen Map 0 Start Address Low	Memory window 0
18h	818h	Gen Map 1 Start Address Low	Memory window 1
20h	820h	Gen Map 2 Start Address Low	Memory window 2
28h	828h	Gen Map 3 Start Address Low	Memory window 3
30h	830h	Gen Map 4 Start Address Low	Memory window 4

Bits 7:0 — Start Address [7:0] (I/O)

This register contains the least-significant byte of the address that specifies where the I/O space corresponding to the I/O map begins. I/O accesses that are equal or above this address and equal or below the corresponding **Gen Map End Address** are mapped into the I/O or memory space of the corresponding PC Card 16 (R2) card depending on the appropriate bit of the **PC Card Space Control** register.

10.1.2 Gen Map 0–6 Start Address High (I/O)

Register Name: **Gen Map 0–6 Start Address High (I/O)** — *Register Per:* socket
I/O Index: **09h, 0Dh, 11h, 19h, 21h, 29h, 31h** — *Register Compatibility Type:* 365
Memory Offset: **809h, 80Dh, 811h, 819h, 821h, 829h, 831h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Start Address 15:8 (I/O)							
R/W:00000000							

There are seven separate **Gen Map Start Address High** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map Start Address High	Default operation
09h	809h	Gen Map 5 Start Address High	I/O window 0
0Dh	80Dh	Gen Map 6 Start Address High	I/O window 1
11h	811h	Gen Map 0 Start Address High	Memory window 0
19h	819h	Gen Map 1 Start Address High	Memory window 1
21h	821h	Gen Map 2 Start Address High	Memory window 2
29h	829h	Gen Map 3 Start Address High	Memory window 3
31h	831h	Gen Map 4 Start Address High	Memory window 4

Bits 7:0 — Start Address [15:8] (I/O)

This register contains the most significant byte of the address of the I/O space Start Address.

10.1.3 Gen Map 0–6 End Address Low (I/O)

Register Name: **Gen Map 0–6 End Address Low (I/O)** *Register Per:* socket
I/O Index: **0Ah, 0Eh, 12h, 1Ah, 22h, 2Ah, 32h** *Register Compatibility Type:* 365
Memory Offset: **80Ah, 80Eh, 812h, 81Ah, 822h, 82Ah, 832h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
End Address 7:0 (I/O)							
R/W:00000000							

There are seven separate **Gen Map End Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map End Address Low	Default operation
0Ah	80Ah	Gen Map 5 End Address Low	I/O window 0
0Eh	80Eh	Gen Map 6 End Address Low	I/O window 1
12h	812h	Gen Map 0 End Address Low	Memory window 0
1Ah	81Ah	Gen Map 1 End Address Low	Memory window 1
22h	822h	Gen Map 2 End Address Low	Memory window 2
2Ah	82Ah	Gen Map 3 End Address Low	Memory window 3
32h	832h	Gen Map 4 End Address Low	Memory window 4

Bits 7:0 — End Address [7:0] (I/O)

This register contains the least-significant byte of the address that specifies where the I/O space corresponding to the I/O map ends. I/O accesses that are equal or below this address and equal or above the corresponding **Gen Map Start Address** are mapped into the I/O or memory space of the corresponding PC Card.

10.1.4 Gen Map 0–6 End Address High (I/O)

Register Name: **Gen Map 0–6 End Address High (I/O)**							*Register Per:* socket
I/O Index: **0Bh, 0Fh, 13h, 1Bh, 23h, 2Bh, 33h**							*Register Compatibility Type:* 365
Memory Offset: **80Bh, 80Fh, 813h, 81Bh, 823h, 82Bh, 833h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
End Address 15:8 (I/O)							
R/W:00000000							

There are seven separate **Gen Map End Address High** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map End Address High	Default operation
0Bh	80Bh	Gen Map 5 End Address High	I/O window 0
0Fh	80Fh	Gen Map 6 End Address High	I/O window 1
13h	813h	Gen Map 0 End Address High	Memory window 0
1Bh	81Bh	Gen Map 1 End Address High	Memory window 1
23h	823h	Gen Map 2 End Address High	Memory window 2
2Bh	82Bh	Gen Map 3 End Address High	Memory window 3
33h	833h	Gen Map 4 End Address High	Memory window 4

Bits 7:0 — End Address [15:8] (I/O)

This register contains the most-significant byte of the address of the I/O space End Address.

10.1.5 Gen Map 0–6 Offset Address Low (I/O)

Register Name: **Gen Map 0–6 Offset Address Low (I/O)**							*Register Per:* socket
I/O Index: **14h, 1Ch, 24h, 2Ch, 34h, 36h, 38h**							*Register Compatibility Type:* ext.
Memory Offset: **814h, 81Ch, 824h, 82Ch, 834h, 836h, 838h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Offset Address 7:1 (I/O)							*0*[a]
R/W:0000000							R/W:0

[a] This bit must be programmed to '0' for I/O offset.

There are seven separate **Gen Map Offset Address Low** registers, each with identical fields. These registers are located at the following indexes:

I/O Index	Memory Offset	Gen Map Offset Address Low	Default operation
14h	814h	Gen Map 0 Offset Address Low	Memory window 0
1Ch	81Ch	Gen Map 1 Offset Address Low	Memory window 1
24h	824h	Gen Map 2 Offset Address Low	Memory window 2
2Ch	82Ch	Gen Map 3 Offset Address Low	Memory window 3
34h	834h	Gen Map 4 Offset Address Low	Memory window 4
36h	836h	Gen Map 5 Offset Address Low	I/O window 0
38h	838h	Gen Map 6 Offset Address Low	I/O window 1

Bits 7:1 — Offset Address [7:1] (I/O)

This register contains the least-significant byte of the quantity that is added to the system address that determines where in the PC Card 16 (R2) card's I/O map the I/O access occurs.

Bit 0 — 0

This bit must be programmed to '0' for I/O offset.

10.1.6 Gen Map 0–6 Offset Address High (I/O)

Register Name: **Gen Map 0–6 Offset Address High (I/O)** *Register Per:* socket
I/O Index: **15h, 1Dh, 25h, 2Dh, 35h, 37h, 39h** *Register Compatibility Type:* ext.
Memory Offset: **815h, 81Dh, 825h, 82Dh, 835h, 837h, 839h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Offset Address 15:8 (I/O)							
R/W:00000000							

There are seven separate **Gen Map Offset Address High** registers, each with identical fields. These registers are located at the following indexes:

I/O Index	Memory Offset	Gen Map Offset Address High	Default operation
15h	815h	Gen Map 0 Offset Address High	Memory window 0
1Dh	81Dh	Gen Map 1 Offset Address High	Memory window 1
25h	825h	Gen Map 2 Offset Address High	Memory window 2
2Dh	82Dh	Gen Map 3 Offset Address High	Memory window 3
35h	835h	Gen Map 4 Offset Address High	Memory window 4
37h	837h	Gen Map 5 Offset Address High	I/O window 0
39h	839h	Gen Map 6 Offset Address High	I/O window 1

Bits 7:0 — Offset Address [15:8] (I/O)

This register contains the most-significant bits of the quantity that is added to the system address that determines where in the PC Card 16 (R2) card's I/O map the I/O access occurs.

10.2 General Mapping Register for Memory Mode

10.2.1 Gen Map 0–6 Start Address Low (Memory)

Register Name: **Gen Map 0–6 Start Address Low (Memory)** — *Register Per:* socket
I/O Index: **08h, 0Ch, 10h, 18h, 20h, 28h, 30h** — *Register Compatibility Type:* 365
Memory Offset: **808h, 80Ch, 810h, 818h, 820h, 828h, 830h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Start Address 19:12 (Memory)							
R/W:00000000							

There are seven separate **Gen Map Start Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map Start Address Low	Default operation
08h	808h	Gen Map 5 Start Address Low	I/O window 0
0Ch	80Ch	Gen Map 6 Start Address Low	I/O window 1
10h	810h	Gen Map 0 Start Address Low	Memory window 0
18h	818h	Gen Map 1 Start Address Low	Memory window 1
20h	820h	Gen Map 2 Start Address Low	Memory window 2
28h	828h	Gen Map 3 Start Address Low	Memory window 3
30h	830h	Gen Map 4 Start Address Low	Memory window 4

Bits 7:0 — Start Address [19:12] (Memory)

This register contains the least-significant byte of the address that specifies where the memory space of the corresponding memory map begins. Memory accesses that are equal or above this address and equal or below the corresponding **Gen Map End Address** are mapped into the I/O or memory space of the corresponding PC Card 16 (R2) card depending on the appropriate bits of the **PC Card Space Control** and **Window Type Select** registers.

The most-significant bits are located in the **Gen Map 0–6 Start Address High** register.

10.2.2 Gen Map 0–6 Start Address High (Memory)

Register Name: **Gen Map 0–6 Start Address High (Memory)** — *Register Per:* socket
I/O Index: **09h, 0Dh, 11h, 19h, 21h, 29h, 31h** — *Register Compatibility Type:* 365
Memory Offset: **809h, 80Dh, 811h, 819h, 821h, 829h, 831h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Compatibility Bit	Scratchpad Bits		Start Address 23:20			
R/W:0	R/W:0	R/W:00		R/W:0000			

There are seven separate **Gen Map Start Address High** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map Start Address High	Default operation
09h	809h	Gen Map 5 Start Address High	I/O window 0
0Dh	80Dh	Gen Map 6 Start Address High	I/O window 1
11h	811h	Gen Map 0 Start Address High	Memory window 0
19h	819h	Gen Map 1 Start Address High	Memory window 1
21h	821h	Gen Map 2 Start Address High	Memory window 2
29h	829h	Gen Map 3 Start Address High	Memory window 3
31h	831h	Gen Map 4 Start Address High	Memory window 4

Bits 3:0 — Start Address [23:20]

This field contains the most-significant four bits of the Memory Start Address.

Bits 5:4 — Scratchpad Bits

Bit 6 — Compatibility Bit

Bit 7 — Reserved

10.2.3 Gen Map 0–6 End Address Low (Memory)

Register Name: **Gen Map 0–6 End Address Low (Memory)** *Register Per:* socket
I/O Index: **0Ah, 0Eh, 12h, 1Ah, 22h, 2Ah, 32h** *Register Compatibility Type:* 365
Memory Offset: **80Ah, 80Eh, 812h, 81Ah, 822h, 82Ah, 832h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
End Address 19:12 (Memory)							
R/W:00000000							

There are seven separate **Gen Map End Address Low** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map End Address Low	Default operation
0Ah	80Ah	Gen Map 5 End Address Low	I/O window 0
0Eh	80Eh	Gen Map 6 End Address Low	I/O window 1
12h	812h	Gen Map 0 End Address Low	Memory window 0
1Ah	81Ah	Gen Map 1 End Address Low	Memory window 1
22h	822h	Gen Map 2 End Address Low	Memory window 2
2Ah	82Ah	Gen Map 3 End Address Low	Memory window 3
32h	832h	Gen Map 4 End Address Low	Memory window 4

Bits 7:0 — Memory End Address [19:12] (Memory)

This register contains the least-significant byte of the address that specifies where in the memory space corresponding to the Memory map ends. Memory accesses that are equal or below this address and equal or above the corresponding Gen Map Start Address are mapped into the I/O or memory space of the corresponding PC Card.

The most-significant bits are located in the **Gen Map 0–6 End Address High** register.

10.2.4 Gen Map 0–6 End Address High (Memory)

Register Name: **Gen Map 0–6 End Address High (Memory)** — *Register Per:* socket
I/O Index: **0Bh, 0Fh, 13h, 1Bh, 23h, 2Bh, 33h** — *Register Compatibility Type:* 365
Memory Offset: **80Bh, 80Fh, 813h, 81Bh, 823h, 82Bh, 833h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved		*Scratchpad Bits*		End Address 23:20			
R/W:00		R/W:00		R/W:0000			

There are seven separate **Gen Map End Address High** registers, each with identical fields. These registers are located at the following indexes:

Index	Memory Offset	Gen Map End Address High	Default operation
0Bh	80Bh	Gen Map 5 End Address High	I/O window 0
0Fh	80Fh	Gen Map 6 End Address High	I/O window 1
13h	813h	Gen Map 0 End Address High	Memory window 0
1Bh	81Bh	Gen Map 1 End Address High	Memory window 1
23h	823h	Gen Map 2 End Address High	Memory window 2
2Bh	82Bh	Gen Map 3 End Address High	Memory window 3
33h	833h	Gen Map 4 End Address High	Memory window 4

Bits 3:0 — End Address [23:20]

This field contains the most-significant four bits of the Memory End Address for registers that default to memory operation.

Bits 5:4 — Scratchpad Bits

Bits 7:6 — Reserved

10.2.5 Gen Map 0–6 Offset Address Low (Memory)

Register Name: **Gen Map 0–6 Offset Address Low (Memory)** — *Register Per:* socket
I/O Index: **14h, 1Ch, 24h, 2Ch, 34h, 36h, 38h** — *Register Compatibility Type:* ext.
Memory Offset: **814h, 81Ch, 824h, 82Ch, 834h, 836h, 838h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Offset Address 19:12							
R/W:0000000							

There are seven separate **Gen Map Offset Address Low** registers, each with identical fields. These registers are located at the following indexes:

I/O Index	Memory Offset	Gen Map Offset Address Low	Default operation
14h	814h	Gen Map 0 Offset Address Low	Memory window 0
1Ch	81Ch	Gen Map 1 Offset Address Low	Memory window 1
24h	824h	Gen Map 2 Offset Address Low	Memory window 2
2Ch	82Ch	Gen Map 3 Offset Address Low	Memory window 3
34h	834h	Gen Map 4 Offset Address Low	Memory window 4
36h	836h	Gen Map 5 Offset Address Low	I/O window 0
38h	838h	Gen Map 6 Offset Address Low	I/O window 1

Bits 7:0 — Offset Address [19:12]

This register contains the least-significant byte of the quantity that are added to the system address that determines where in the PC Card 16 (R2) card's memory map the memory access occurs.

The most-significant bits are located in the **Gen Map 0–6 Offset Address High** register.

10.2.6 Gen Map 0–6 Offset Address High (Memory)

Register Name: **Gen Map 0–6 Offset Address High (Memory)** *Register Per:* socket
I/O Index: **15h, 1Dh, 25h, 2Dh, 35h, 37h, 39h** *Register Compatibility Type:* 365
Memory Offset: **815h, 81Dh, 825h, 82Dh, 835h, 837h, 839h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Write Protect	REG Setting	Offset Address 25:20					
R/W:0	R/W:0	R/W:000000					

There are seven separate **Gen Map Offset Address High** registers, each with identical fields. These registers are located at the following indexes:

I/O Index	Memory Offset	Gen Map Offset Address High	Default operation
15h	815h	Gen Map 0 Offset Address High	Memory window 0
1Dh	81Dh	Gen Map 1 Offset Address High	Memory window 1
25h	825h	Gen Map 2 Offset Address High	Memory window 2
2Dh	82Dh	Gen Map 3 Offset Address High	Memory window 3
35h	835h	Gen Map 4 Offset Address High	Memory window 4
37h	837h	Gen Map 5 Offset Address High	I/O window 0
39h	839h	Gen Map 6 Offset Address High	I/O window 1

Bits 5:0 — Offset Address [25:20]

This field contains the most-significant six bits of the Memory Offset Address.

Bit 6 — REG Setting

0	-REG (see page 16) is not active for accesses made through this window.
1	-REG is active for accesses made through this window.

This bit determines whether -REG (see page 16) is active for accesses made through this window. CIS (Card Information Structure) memory is accessed by setting this bit to '1'.

Bit 7 — Write Protect

0	Writes to the card through this window are allowed.
1	Writes to the card through this window are inhibited.

This bit determines whether writes to the card through this window are allowed.

See the description of the Offset Address field associated with bits 7:0 of the **Gen Map 5–6 Offset Address Low** register.

11. EXTENSION REGISTERS

Table 11-1. Extension Registers Quick Reference

Register Name	I/O Index	Memory Offset	Extended Index	Page Number
Misc Control 1	16h	816h	–	116
FIFO Control	17h	817h	–	118
Misc Control 2	1Eh	81Eh	–	119
Chip Information	1Fh	81Fh	–	120
ATA Control	26h	826h	–	121
Extended Index	2Eh, 6Eh	–	–	122
Extended Data	2Fh, 6Fh	–	–	123
Extension Control 1	2Fh	903h	03h	123
Gen Map 0–6 Upper Address (Memory)	2Fh	840h, 841h, 842h, 843h, 844h, 845h, 846h	05h–09h, 20h, 21h	125
External Data (Index 2Fh)	2Fh	90Ah (first socket only)	0Ah	125
External Data (Index 6Fh)	6Fh	90Ah (second socket only)	0Ah	125
Extension Control 2	2Fh	903h	03h	126
PCI Space Control	2Fh	922h	22h	126
PC Card Space Control	2Fh	923h	23h	127
Window Type Select	2Fh	924h	24h	127
Misc Control 3	2Fh	925h	25h	128
SMB Socket Power Control Address	2Fh	926h	26h	130
Gen Map 0–6 Extra Control (I/O and Memory)	2Fh	927h–92Dh	27h–2Dh	130
Extension Card Status Change	2Fh	92Eh	2Eh	132
Misc Control 4	2Fh	92Fh	2Fh	133
Misc Control 5	2Fh	930h	30h	133
Misc Control 6	2Fh	931h	31h	134
Device Identification and Implementation Scheme				135
Mask Revision Byte	34h	934h	–	135

Table 11-1. Extension Registers Quick Reference *(cont.)*

Register Name	I/O Index	Memory Offset	Extended Index	Page Number
Product ID Byte	35h	935h	–	136
Device Capability Byte A	36h	936h	–	136
Device Capability Byte B	37h	937h	–	137
Device Implementation Byte A	38h	938h	–	138
Device Implementation Byte B	39h	939h	–	139
Device Implementation Byte C	3Ah	93Ah	–	140
Device Implementation Byte D	3Bh	93Bh	–	140

11.1 Misc Control 1

Register Name: **Misc Control 1** *Register Per:* socket
I/O Index: **16h** *Register Compatibility Type:* ext.
Memory Offset: **816h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Compatibility Bit	Scratchpad Bits		Speaker Enable	Pulse System IRQ Interrupt[a]	Pulse Management Interrupt[a]	V_{CC} 3.3V	Multimedia Enable
R:0	R/W:00		R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

[a] Bits 3:2 are valid only in External-Hardware Interrupt Signalling mode.

Bit 0 — Multimedia Enable

0	Socket address lines are normal.
1	Socket address lines A[25:4] are high-impedance.

This bit helps ensure compliance with the PCMCIA's ZV Port proposal. When this bit is set to '1', the host tristates address lines A[25:4]. This bit has no effect unless the Multimedia Arm bit (bit 7 of the **Misc Control 3** register, memory offset 925h) is set to '1'.

Bit 1 — V_{CC} 3.3V

0	5 V activated when card power is to be applied.
1	3 V activated when card power is to be applied.

This bit determines whether 3 V or 5 V is applied to the socket when card power is applied; this bit is used in conjunction with bit 4 of the **Power Control** register.

Bit 2 — Pulse Management Interrupt

0	Interrupts are passed to the IRQ[XX] pin as level-sensitive.
1	When an interrupt occurs, the IRQ[XX] pin is driven with the pulse train shown in High-Z and allows for interrupt sharing.

This bit is valid only in External-Hardware Interrupt Signalling mode. This bit selects Level or Pulse mode operation of the IRQ[XX] pin. Note that a clock must be present on PCI_CLK for pulsed interrupts to work. Refer to Section 15.3.2 for more information on interrupt timing.

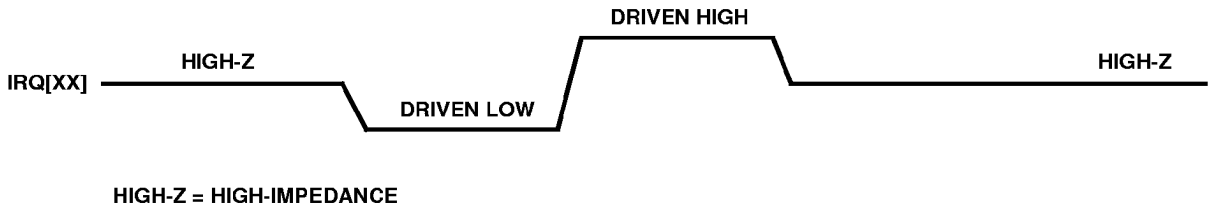


Figure 11-1. Pulse Mode Interrupts

Bit 3 — Pulse System IRQ Interrupt

0	Interrupts are passed to the IRQ[XX] pin as level-sensitive.
1	When an interrupt occurs, the IRQ[XX] pin is driven with the pulse train shown in Figure 11-1 and allows for interrupt sharing.

This bit is valid only in External-Hardware Interrupt Signalling mode. This bit selects Level or Pulse mode operation of the IRQ[XX] pins.

Bit 4 — Speaker Enable

0	SPKR_OUT* is high-impedance.
1	SPKR_OUT* is driven from the XOR of -SPKR from each enabled socket.

This bit determines whether the card -SPKR pin drives SPKR_OUT* (see page 22).

Bit 6:5 — Scratchpad Bits

Bit 7 — Compatibility Bit

11.2 FIFO Control

Register Name: **FIFO Control**							*Register Per:* socket
I/O Index: **17h**							*Register Compatibility Type:* ext.
Memory Offset: **817h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
FIFO Status/ Flush FIFO	Disable Memory Posting	Disable I/O Posting	*Reserved*				
R/W:1	R/W:0	R/W:0	R/W:00000				

Bits 4:0 — Reserved

These bits should not be used due to the sensitive nature of the FIFO Status/Flush FIFO bit.

Bit 5 — Disable I/O Posting

0	I/O writes are posted.
1	I/O writes slow down to card speed.

When this bit is set, I/O writes do not post to the FIFO but instead are issued directly to the PC Card.

Bit 6 — Disable Memory Posting

0	Memory writes are posted.
1	Memory writes slow down to card speed.

When this bit is set, Memory writes do not post to the FIFO but instead are issued directly to the PC Card.

Bit 7 — FIFO Status/Flush FIFO

Bit 7	I/O Read	I/O Write
0	FIFO not empty	No operation occurs (default at reset)
1	FIFO empty	Flush the FIFO

This bit controls FIFO operation and reports FIFO status. When this bit is set to '1' during write operations, all data in the FIFO is lost. During read operations, when this bit is '1', the FIFO is empty. During read operations when this bit is '0', the FIFO has valid data.

This bit is used to ensure the FIFO is empty before changing any registers; register writes are retried if the FIFO is not empty.

FIFO contents are lost whenever any of the following occur:

- RST# pin (see page 14) is '0'.
- The card is removed.
- V_{CC} Power bit (see page 85) is programmed to '0'.
- The Flush FIFO bit is set to '1'.

11.3 Misc Control 2

Register Name: **Misc Control 2**							*Register Per:* chip
I/O Index: **1Eh**							*Register Compatibility Type:* ext.
Memory Offset: **81Eh**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
RI_OUT*/ INTB# is RI Out	*Reserved*						
R/W:0	R:0	R/W:0	R/W:0	R:0	R/W:0	R/W:0	R/W:0

Bits 6:0 — Reserved

Bit 7 — RI_OUT*/INTB#/IRQ10 is RI Out

0	Normal interrupt operation on the RI_OUT*/INTB# pin.
1	RI_OUT*/INTB# is connected to ring indicate pin on the system logic.

This bit determines the function of the RI_OUT*/INTB# pin. When this bit is set to '1', RI_OUT*/INTB# can be used to trigger restoration of system activity when a high-to-low change is detected on the BVD1/-STSCHG/-RI pin. Bit 5 of index 03h must be set to '1' for RI to work.

11.4 Chip Information

Register Name: **Chip Information** — *Register Per:* chip
I/O Index: **1Fh** — *Register Compatibility Type:* ext.
Memory Offset: **81Fh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Cirrus Logic Host-Adapter Identification		Dual/Single Socket	CL-PD6832 Revision Level				*Reserved*
R:11		R:1	R:nnnn[a]				R:1

[a] This read-only value depends on the revision level of the CL-PD6832 chip.

Bit 0 — Reserved

Bits 4:1 — CL-PD6832 Revision Level

This field identifies the revision of the controller. Contact Cirrus Logic for more information on revision levels for the CL-PD6832.

Bit 5 — Dual/Single Socket

0	Chip identified as a single-socket controller.
1	Chip identified as a dual-socket controller.

This bit specifies that the CL-PD6832 supports two sockets.

Bits 7:6 — Cirrus Logic Host-Adapter Identification

Bits 7:6		Register Read
0	0	Second read after I/O write to this register.
1	1	First read after I/O write to this register.

This field identifies a Cirrus Logic host-adapter device. After chip reset or when doing an I/O write to this register, the first read of this register returns a '11'. On the next read, this field is '00'. This pattern of toggling data on subsequent reads can be used by software to determine presence of a Cirrus Logic host adapter in a system or to determine occurrence of a device reset. If bits [4:1] of the register at memory offset 81Fh read back '0h', the chip information is contained in bits [3:0] of the register at memory offset 934h.

11.5 ATA Control

Register Name: **ATA Control** *Register Per:* socket
I/O Index: **26h** *Register Compatibility Type:* ext.
Memory Offset: **826h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
A25/CSEL	A24/M/S*	A23/VU	A22	A21	*Scratchpad Bit*	Speaker is LED Input	ATA Mode
R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bit 0 — ATA Mode

0	Normal operation.
1	Configures the socket interface to handle ATA-type disk drives.

This bit reconfigures the particular socket as an ATA drive interface. Refer to Table 14-1 on page 153 for PCMCIA socket pin definitions in ATA mode.

Bit 1 — Speaker is LED Input

0	Normal operation.
1	The PCMCIA -SPKR pin is used to drive the LED-OUT* pin.

This bit changes the function of the BVD2/-SPKR/-LED pin (see page 20) from digital speaker input to disk status LED input. When in I/O Card Interface mode or ATA mode, setting this bit to '1' reconfigures the BVD2/-SPKR/-LED input pin to serve as a -LED input from the socket.

NOTE: This bit should be set to '0' if in Memory Card Interface mode.

Bit 2 — Scratchpad Bit

Bit 3 — A21

In ATA mode, the value in this bit is applied to the ATA A21 pin and is vendor-specific. Certain ATA drive vendor-specific performance enhancements beyond the PCMCIA 2.1 standard can be controlled through use of this bit. This bit has no hardware control function when not in ATA mode.

Bit 4 — A22

In ATA mode, the value in this bit is applied to the ATA A22 pin and is vendor-specific. Certain ATA drive vendor-specific performance enhancements beyond the PCMCIA 2.1 standard can be controlled through use of this bit. This bit has no hardware control function when not in ATA mode.

Bit 5 — A23/VU

In ATA mode, the value in this bit is applied to the ATA A23 pin and is vendor-specific. Certain ATA drive vendor-specific performance enhancements beyond the PCMCIA 2.1 standard can be controlled through use of this bit. This bit has no hardware control function when not in ATA mode.

Bit 6 — A24/M/S*

In ATA mode, the value in this bit is applied to the ATA A24 pin and is vendor-specific. Certain ATA drive vendor-specific performance enhancements beyond the PCMCIA 2.1 standard can be controlled through use of this bit. This bit has no hardware control function when not in ATA mode.

Bit 7 — A25/CSEL

In ATA mode, the value in this bit is applied to the ATA A25 pin and is vendor-specific. Certain ATA drive vendor-specific performance enhancements beyond the PCMCIA 2.1 standard can be controlled through use of this bit. This bit has no hardware control function when not in ATA mode.

11.6 Extended Index

Register Name: **Extended Index**							Register Per: socket
I/O Index: **2Eh, 6Eh**							Register Compatibility Type: ext.
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Extended Index							
R/W:00000000							

This register controls which of the following registers at index 2Fh can be accessed:

Table 11-2. Extended Index Registers

Register Name at Index 2Fh	Extended Index	Memory Offset
Scratchpad	00h	
Reserved	01h	
Reserved	02h	
Extension Control 1	03h	903h
Reserved	04h	
Gen Map 0 Upper Address	05h	840h
Gen Map 1 Upper Address	06h	841h
Gen Map 2 Upper Address	07h	842h
Gen Map 3 Upper Address	08h	843h
Gen Map 4 Upper Address	09h	844h
External Data	0Ah	90Ah
Extension Control 2	0Bh	90Bh
Reserved	0Ch–1Fh	
System Memory Map 5 Upper Address	20h	845h
System Memory Map 6 Upper Address	21h	846h
PCI Space Control	22h	922h
PC Card Space Control	23h	923h
Window Type Select	24h	924h
Misc Control 3	25h	925h
SMB Power Control Address	26h	926h
Gen Map 0 Extra Control	27h	927h
Gen Map 1 Extra Control	28h	928h
Gen Map 2 Extra Control	29h	929h

Table 11-2. Extended Index Registers *(cont.)*

Register Name at Index 2Fh	Extended Index	Memory Offset
Gen Map 3 Extra Control	2Ah	92Ah
Gen Map 4 Extra Control	2Bh	92Bh
Gen Map 5 Extra Control	2Ch	92Ch
Gen Map 6 Extra Control	2Dh	92Dh
Extension Card Status Change	2Eh	92Eh
Misc Control 4	2Fh	92Fh
Misc Control 5	2Fh	930h
Misc Control 6	2Fh	931h

For information on how to access these registers, see Section 3.2 on page 38.

11.7 Extended Data

Register Name: **Extended Data** — Register Per: socket
I/O Index: **2Fh** — Register Compatibility Type: ext.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Extended Data							

The data in this register allows the registers indicated by the **Extended Index** register to be read and written. The value of this register is the value of the register selected by the **Extended Index** register.

11.7.1 Extension Control 1

Register Name: **Extension Control 1** — Register Per: socket
I/O Index: **2Fh** *Extended Index:* **03h** — Register Compatibility Type: ext.
Memory Offset: **903h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DREQ Enable		Pull-Up Control	*Reserved*	*Reserved*	LED Activity Enable	*Reserved*	V_{CC} Power Lock
R/W:00		R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bit 0 — V_{CC} Power Lock

0	The V_{CC} Power bit (bit 4 of **Power Control** register) is not locked.
1	The V_{CC} Power bit (bit 4 of **Power Control** register) cannot be changed by software.

This bit can be used to prevent card drivers from overriding the Socket Services' task of controlling power to the card, thus preventing situations where cards are powered incorrectly.

Bit 1 — Reserved

Bit 2 — LED Activity Enable

0	LED activity disabled.
1	LED activity enabled.

This bit allows the LED_OUT* pin to reflect any activity in the card. Whenever PC Card cycles are in process to or from a card in either socket, LED_OUT* is active low.

Bits 4:3 — Reserved

Bit 5 — Pull-Up Control

0	Pull-ups on VS2, VS1, CD2, and CD1 are in use.
1	Pull-ups on VS2, VS1, CD2, and CD1 are turned off.

This bit turns off the pull-ups on VS2, VS1, CD2, and CD1. Turning off these pull-ups can be used in addition to Suspend mode to even further reduce power when cards are inserted but no card accessibility is required. Even though power may or may not still be applied, all pull-ups and their associated inputs are disabled.

Note that insertion or removal of a card cannot be determined when this bit is set to '1'. Also, when a card is already in the socket, a card detect interrupt is generated when this bit is changed from '0' to '1'.

Bit 7:6 — DREQ Enable

Bit 7	Bit 6	Pin Used
0	0	DREQ Disabled
0	1	-INPACK
1	0	WP/IOIS16
1	1	BVD2/-SPKR

These bits are used to identify which PC Card 16 pin is used for DREQ and to enable the DMA operation of the socket. At reset these bits are reset and this disables the DREQ line. When either or both of these bits are set, DREQ pin is selected by the table above.

11.7.2 Gen Map 0–6 Upper Address (Memory)

Register Name: **Gen Map 0–6 Upper Address (Memory)** — Register Per: socket
I/O Index: **2Fh** *Extended Index:* **05h-09h, 20h, 21h** — Register Compatibility Type: ext.
Memory Offset: **840h, 841h, 842h, 843h, 844h, 845h, 846h**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Upper Address							
R/W:00000000							

These bits are used in comparing PCI Address bits 31:24 for each memory window (0–6). These bits are used in conjunction with the **Window type Select, Gen Map 0–6 Start Address** and **Gen 0–6 End Address** registers. If the **Window Type Select** bit corresponding to windows 0–4 is reset, that window is a memory window and this register specifies that window's upper address. If the **Window Type Select** bit for a window is set and the corresponding bit in the **PCI Space Control** register is reset, then that window is a memory window on the PCI side and this register sets the upper address for that memory window. If none of the above conditions is true, then this register is ignored.

11.7.3 External Data (Index 2Fh)

Register Name: **External Data Write** — Register Per: socket
I/O Index: **2Fh** *Extended Index:* **0Ah** — Register Compatibility Type: ext.
Memory Offset: **90Ah first socket only**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved							
R/W							

External Data register (extended index 0Ah) functionality varies depending on whether index 2Fh or 6Fh is accessed.

Bits 7:0 — Reserved

11.7.4 External Data (Index 6Fh)

Register Name: **External Data Read** — Register Per: socket
I/O Index: **6Fh** *Extended Index:* **0Ah** — Register Compatibility Type: ext.
Memory Offset: **90Ah second socket only**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved							
R/W							

External Data register (extended index 0Ah) functionality varies depending on whether index 2Fh or 6Fh is accessed.

Bits 7:0 — Reserved

11.7.5 Extension Control 2

Register Name: **Extension Control 2**							Register Per: socket
I/O Index: **2Fh** *Extended Index:* **0Bh**							Register Compatibility Type: ext.2
Memory Offset: **90Bh**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved							
R/W:00000000							

Bits 7:0 — Reserved

11.7.6 PCI Space Control

Register Name: **PCI Space Control**							*Register Per:* socket
I/O Index: **2Fh** *Extended Index:* **22h**							*Register Compatibility Type:* ext.
Memory Offset: **922h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Gen Map 6 PCI Type	Gen Map 5 PCI Type	*Reserved*	Gen Map 4 PCI Type	Gen Map 3 PCI Type	Gen Map 2 PCI Type	Gen Map 1 PCI Type	Gen Map 0 PCI Type
R/W:1	R/W:1	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bits 7:6, 4:0 — Gen Map 6:5, 4:0 PCI Type

0	**General Map** registers configured for PCI memory operation.
1	**General Map** registers configured for PCI I/O operation.

If the corresponding bit in the **Window Type Select** register is set, and the PCI Space Control bit is reset, then the programmed general map window responds to PCI *memory* operations. If the PCI Space Control bit is set, then the programmed general map window responds to PCI *I/O* operations. If the corresponding bit in the **Window Type Select** register is reset, this bit is ignored.

Bit 5 — Reserved

11.7.7 PC Card Space Control

Register Name: **PC Card Space Control**							*Register Per:* socket
I/O Index: **2Fh** *Extended Index:* **23h**							*Register Compatibility Type:* ext
Memory Offset: **923h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Gen Map 6 PC Card Type	Gen Map 5 PC Card Type	*Reserved*	Gen Map 4 PC Card Type	Gen Map 3 PC Card Type	Gen Map 2 PC Card Type	Gen Map 1 PC Card Type	Gen Map 0 PC Card Type
R/W:1	R/W:1	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bits 7:6, 4:0 — Gen Map 6:5, 4:0 PC Card Type

0	General Map configured for PC Card memory offset and commands.
1	General Map configured for PC Card I/O offset and commands.

If the corresponding bit in the **Window Type Select** register is set, and the PC Card Space Control bit is reset, then accesses through this window are *memory* commands to the PC Card. If the corresponding bit in the **Window Type Select** register is set, and the PC Card Space Control bit is set, then accesses through this window are *I/O* commands to the PC Card.

If the corresponding bit in the **Window Type Select** register is reset, this bit is ignored.

Bit 5 — Reserved

11.7.8 Window Type Select

Register Name: **Window Type Select**							*Register Per:* socket
I/O Index: **2Fh** *Extended Index:* **24h**							*Register Compatibility Type:* ext
Memory Offset: **924h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Gen Map 6 Type	Gen Map 5 Type	*Reserved*	Gen Map 4 Type	Gen Map 3 Type	Gen Map 2 Type	Gen Map 1 Type	Gen Map 0 Type
R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:0

Bits 7:6, 4:0 — Gen Map Type

0	**General Map** registers configured for default operation.
1	**General Map** registers configured for programmable operation.

When these bits are set, the corresponding general windows are programmable with the **PCI Space Control** and **PC Card Space Control** registers. The controls for the Window data size, timer select, and auto data size bits are programmed in the **Gen Map Extra Control** registers. When these bits are reset, the corresponding **General Map** registers revert to their default configuration. The controls for the Window data size, timer select, and auto data size bits comes from the **I/O Window Control**, **Memory Map Start Address High,** and **Memory Map End Address High** registers.

Bit 5 — Reserved

11.7.9 Misc Control 3

Register Name: **Misc Control 3** *Register Per:* chip *I/O Index:* **2Fh** *Extended Index:* **25h** *Register Compatibility Type:* ext. *Memory Offset:* **925h**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Multimedia Arm	Multimedia Expand	*Reserved*	Hardware Suspend Enable	Socket Power-Control Interface Signalling Mode		System Interrupt Signalling Mode	
R/W:0	R/W:	R/W:0	R/W:0	R/W:00[a]		R/W:00[b]	

[a] During power-on reset or hardware reset, bit 3 is loaded with value of the SDATA/SMBDATA pin (pin 131), and bit 2 is loaded with value of the SLATCH/SMBCLK pin (pin 130).

[b] During power-on reset or hardware reset, bit 1 is loaded with value of the LED_OUT* pin (pin 133), and bit 0 is loaded with value of the SPKR_OUT* pin (pin 128).

For a functional description of the Hardware Suspend mode, refer to Section 3.1.6 on page 34. Bits 3:0 are configuration switches loaded during a power-on reset or hardware reset. The configuration values determine the type of serial interrupt protocol and the type of serial socket power control to be used. The configuration values are to be preset using pull-down resistors or a pull-up resistor. These bits can also be loaded through a register write. Bits 3:0 are connected to the pads as follows:

Bits 1:0 — System Interrupt Signalling Mode

Bits 1:0		Interrupt Signalling Mode
0	0	PC/PCI Interrupt Signalling mode: requires systems supporting SIC (serial interrupt controller)
0	1	External-Hardware Interrupt Signalling mode
1	0	Special serial format
1	1	PCI Interrupt Signalling mode

The CL-PD6832 supports four interrupt signalling modes: PCI Interrupt Signalling mode, PC/PCI Interrupt Signalling mode, External-Hardware Interrupt Signalling mode (ISA architecture), and the PCI/Way Interrupt Signalling mode.

When configured for PCI Interrupt Signalling mode, the CL-PD6832 uses pins 203 and 204 as INTA# and INTB#/RI_OUT*, respectively.

When configured for PC/PCI Interrupt Signalling mode, pins 205 and 206 are SOUT# and SIN#, respectively, pin 204 is INTB#/RI_OUT*, and pin 203 is INTA#.

When configured for External-Hardware Interrupt Signalling mode, pins 205 and 206 are used as the ISLD and ISDAT signals to the external CL-PD6701 that provides eight parallel IRQ lines, and pins 203 is INTA#, and pin 204 is INTB#/RI_OUT*. Refer to application note *"Interrupt Signalling Modes for the CL-PD6730 and CL-PD6832"* (AN-PD8).

When configured for the PCI/Way Interrupt Signalling mode, pin 205 works as the IRQSER bidirectional interrupt line. Pin 203 works as INTA# and pin 204 works as INTB#/RI_OUT*. Pin 206 is not used. This is the only mode in which pin 203 works as an LED indicator for socket 0 and pin 206 works as an LED indicator for socket 1. Refer to the **Misc. Control 5** register at Extended index 30h (memory offset 930h).

Bits 3:2 — Socket Power-Control Interface Signalling Mode

Bits 1:0		Interrupt Signalling Mode
0	0	External-Hardware Serial Signalling mode (currently uses TI's TPS2202 serial protocol)
0	1	Reserved
1	0	TI's TPS2202 Serial Signalling mode (uses 3 pins, supports two sockets)
1	1	System Management Bus Signalling mode (uses 2 pins, supports two sockets)

When these two bits are '10', external glue logic is used to control the socket power. This interface uses three pins: SCLK, SDATA, and SLATCH. This mode is the same as the '10' encoding below except that the shutdown bit is not supported.

When these two bits are '10', the TI's TPS2202 serial interface protocol is enabled. This interface uses three pins: SCLK, SDATA and SLATCH. SCLK is the reference clock to the CL-PD6832. The power control data is sent to TI's TPS2202 over the SDATA pin and latch signal over the SLATCH pin.

When these two bits are '11', the Intel SMBus protocol is supported. This interface uses two pins: SMBDATA and SMBCLK. The reference clock of 32 kHz is fed through the SCLK pin and is required during suspend (both hardware and software). The power control data is sent serially over SMBDATA (bidirectional) and clock over SMBCLK. This interface is used by MAX-1601 dual-socket power control chip (serial version).

Bit 4 — Hardware Suspend Enable

0	Normal operation.
1	Chip goes into Hardware Suspend if pin 133 (LED_OUT*) is low.

Refer to Section 3.1.6 on page 34 for a functional description of the Hardware Suspend mode.

Bit 5 — Reserved

Bit 6 — Multimedia Expand

0	Multimedia expand disabled.
1	Multimedia expand enabled.

This bit allows 24-bit video from the PC Card. If the Multimedia Arm bit and Multimedia Enable bit are both set to '1', this bit causes CE2 and D[15:8] to be tristated on the 16-bit PC Card bus, and also tristates A[25:4].

Bit 7 — Multimedia Arm

0	Multimedia Arm disabled.
1	Multimedia Arm enabled.

No multimedia operation can occur without first setting this bit to '1'; the bit provides an overriding control mechanism. By setting only bit 0 of index 16h, the Multimedia Arm bit ensures that multimedia operation is not inadvertently set by software or point enablers.

11.7.10 SMB Socket Power Control Address

Register Name: **SMB Socket Power Control Address** *Register Per:* chip
I/O Index: **2Fh** *Extended Index:* **26h** *Register Compatibility Type:* ext.
Memory Offset: **926h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
A6	A5	A4	A3	A2	A1	*Reserved*	
R/W:1	R/W:0	R/W:1	R/W:0	R/W:0	R/W:0	R/W:00	

This register contains the most-significant six bits of the SMB (system management bus) slave address for the socket power-control device. The SMB specification for the slave address for a PCMCIA socket power control device is 101000XX. This register resets to '101000' for bits 7:2, and the socket power control device can be hard configured to this address to eliminate additional software setup. The CL-PD6832 supports the Maxim MAX-1601, which is a dual-socket power control chip employing the SMB protocol. (Also refer to the **Misc Control 3** register.)

Bits 1:0 — Reserved

Bits 7:2 — SMB Socket Power Control Address (A [6:1])

11.7.11 Gen Map 0–6 Extra Control (I/O and Memory)

Register Name: **Gen Map 0–6 Extra Control (I/O)** Register Per: socket
I/O Index: **2Fh** *Extended Index:* **27h–2Dh** Register Compatibility Type: ext.
Memory Offset: **927h–92Dh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved				Extra Timing Register Select	Reserved	Extra Auto-Size I/O Window	Extra I/O Window Size
R:0000				R/W:0	R/W:0	R/W:0	R/W:0

Bit 0 — Extra I/O Window Size

0	8-bit data path to Gen Map I/O Window.
1	16-bit data path to Gen Map I/O Window.

When bit 1 if this register is '0', this bit determines the width of the data path for Gen Map I/O Window accesses to the card. When bit 1 is '1', this bit is ignored.

Bit 1 — Extra Auto-Size I/O Window

0	Gen Map I/O Window Size (see bit 0 of this register) determines the data path for Gen Map I/O Window accesses.
1	The data path to Gen Map I/O Window is determined by the -IOIS16 level returned by the card.

This bit controls the method that the width of the data path for Gen Map I/O Window accesses to the card is determined. Note that when this bit is '1', the -IOIS16 signal determines the width of the data path to the card.

Bit 2 — Reserved

Bit 3 — Extra Timing Register Select

0	Accesses made with timing specified in **Timer Set 0** registers.
1	Accesses made with timing specified in **Timer Set 1** registers.

This bit determines the access timing specification for Gen Map I/O Window.

Bits 7:4 — Reserved

When the Window Type Select register bit corresponding to a general map register is set (and that window is configured in PC Card space control as an I/O), this register is used to program the I/O behavior to the PC Card socket. When the **Window Type Select** register bit is reset this register is ignored. When the **Window Type Select** register bit is set and the **PC Card Space Control** register bit is set to '0' (indicating memory operation), this register is configured as follows.

Register Name: **Gen Map 0–6 Extra Control (Memory)** — Register Per: socket
I/O Index: **2Fh** *Extended Index:* **27h–2Dh** — Register Compatibility Type: ext.
Memory Offset: **927h–92Dh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved				Extra Card Timer Select		*Reserved*	Extra Window Data Size
R:0000				R/W:00		R/W:0	R/W:0

Bit 0 — Extra Window Data Size

0	8-bit data path to PC Card.
1	16-bit data path to PC Card.

Bit 1 — Reserved

Bits 3:2 — Extra Card Timer Select

Bits 3:2		Extra Card Timer Select
0	0	Selects Timer Set 0
0	1	Selects Timer Set 1
1	0	Selects Timer Set 1
1	1	Selects Timer Set 1

This field selects the timer set. Timer Set 0 and 1 reset to values compatible with standard PCI and three-wait-state cycles.

Bits 7:4 —Reserved

11.7.12 Extension Card Status Change

Register Name: **Extension Card Status Change**						Register Per: socket	
I/O Index: **2Fh** *Extended Index:* **2Eh**						Register Compatibility Type: ext.2	
Memory Offset: **92Eh**							
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved				Latched Card Detect change	Latched Ready Change	Latched Battery Warning Change	Latched Battery Dead or Status Change
R:0000				R/W:0	R/W:0	R/W:0	R/W:0

This register indicates the source of a management interrupt generated by the CL-PD6832.

NOTE: The corresponding bit in the **Management Interrupt Configuration** register must be set to '1' to enable each specific status change detection. This register can only be cleared after accessing register 804h, and writing a '1' to the corresponding bit in register 92Eh.

Bit 0 — Latched Battery Dead Or Status Change

0	A transition (from high to low in Memory Card Interface mode or either high to low or low to high in I/O Card Interface mode) on the BVD1/-STSCHG/-RI pin has not occurred since this register was last read.
1	A transition on the BVD1/-STSCHG/-RI pin has occurred.

In Memory Card Interface mode, this bit is set to '1' when the BVD1/-STSCHG/-RI pin (see page 20) changes from high to low, indicating a battery dead condition. In I/O Card Interface mode, this bit is set to '1' when the BVD1/-STSCHG/-RI pin changes from either high to low or low to high. In I/O Card Interface mode, the function of this bit is not affected by bit 7 of the **Interrupt and General Control** register. This bit is reset to a '0' if the **Card Status** register is first cleared and then a '1' is written to this bit.

Bit 1 — Latched Battery Warning Change

0	A transition (from high to low) on the BVD2/-SPKR/-LED pin has not occurred since this register was last read.
1	A transition on the BVD2/-SPKR/-LED pin has occurred.

In Memory Card Interface mode, this bit is set to '1' when the BVD2/-SPKR/-LED pin changes from high to low, indicating a battery warning. This bit is not valid in I/O Card Interface mode. This bit is reset to a '0' if the **Card Status** register is first cleared and then a '1' is written to this bit.

Bit 2 — Latched Ready Change

0	A transition on the RDY/-IREQ pin has not occurred since this register was last read.
1	A transition on the RDY/-IREQ pin has occurred.

This bit is '1' when a change has occurred on the RDY/-IREQ pin. This bit is reset to a '0' if the **Card Status** register is first cleared and then a '1' is written to this bit.

Bit 3 — Latched Card Detect Change

0	A transition on neither the -CD1 nor the -CD2 pin has occurred since this register was last read.
1	A transition on either the -CD1 or the -CD2 pin or both has occurred.

This bit is set to '1' when a change has occurred on the -CD1 or -CD2 pin. This bit is reset to a '0' if the **Card Status** register is first cleared and then a '1' is written to this bit.

Bit 7:4 — Reserved

11.7.13 Misc Control 4

Register Name: **Misc Control 4** *Register Per:* socket
I/O Index: **2Fh** *Extended Index:* **2Fh** *Register Compatibility Type:* ext.
Memory Offset: **92Fh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved					Socket Active	Socket Clock Divide Control	
R:00000					R:0	R/W:00	

Bit 1:0 — Socket Clock Divide Control

These bits control the clock rate to the sockets and are a binary divide from the PCI input clock.

Bit 2 — Socket Active

This bit is reset to '0' by RST# and by any read of this register. When the PC Card is accessed for write or read this bit is set. This bit can be used to monitor the traffic flow of a card. By reading this bit during a periodic interrupt, a profile of the card activity can be established for power management.

Bits 7:3 — Reserved

11.7.14 Misc Control 5

Register Name: **Misc Control 5** *Register Per:* socket
I/O Index: **2Fh** *Extended Index:* **30h** *Register Compatibility Type:* ext.
Memory Offset: **930h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved							
R:00000000							

Bits 7:0 — Reserved

11.7.15 Misc Control 6

Register Name: **Misc Control 6**
I/O Index: **2Fh** *Extended Index:* **31h**
Memory Offset: **931h**

Register Per: socket
Register Compatibility Type: ext.

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Y-V Socket	X-V Socket	3.3-V Socket	5-V Socket	*Reserved*			
W:0	W:0	W:0	W:0	R:0000			

Bits 3:0 — Reserved

Bit 4 — 5-V Socket

This bit sets the 5-V Socket bit in the **Present State** register (memory offset 008h).

Bit 5 — 3.3-V Socket

This bit sets the 3.3-V Socket bit in the **Present State** register.

Bit 6 — X-V Socket

This bit sets the X-V Socket bit in the **Present State** register.

Bit 7 — Y-V Socket

This bit sets the Y-V Socket bit in the **Present State** register.

11.8 Device Identification and Implementation Scheme

There are four byte-wide registers with read-only device information, and four byte-wide read/write registers that contain specific system implementation information.

Determining This Register Exists

If bits 4:1 of the **Chip Information** register (memory offset 81Fh) read back '0h', the chip information is contained in bits 3:0 of the **Mask Revision Byte** register at memory offset 934h.

11.8.1 Mask Revision Byte

Register Name: **Mask Revision Byte** — *Register Per:* chip
I/O Index: **34h** — *Register Compatibility Type:* ext.
Memory Offset: **934h**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
RFU				Mask Revision			
R:0000				R:0	R:0	R:0	R:1

Bits 3:0 — Mask Revision

These bits indicate the mask revision of the device. The binary value is interpreted as in the following table:

Bits 3:0	Mask Revision
0h	A
1h	B
2h	C
3h	D
4h	E
5h	F
6h	G
7h	H
8h	J
9h	K
Ah	L
Bh	M
Ch	N
Dh	P
Eh	Q
Fh	R

Bits 7:4 — RFU (reserved for future use)

11.8.2 Product ID Byte

Register Name: **Product ID Byte** *Register Per:* chip
I/O Index: **35h** *Register Compatibility Type:* ext.
Memory Offset: **935h**

Bit 15	*Bit 14*	*Bit 13*	*Bit 12*	*Bit 11*	*Bit 10*	*Bit 9*	*Bit 8*
Family Code				Product Code			
R:0	R:1	R:0	R:0	R:0	R:0	R:0	R:0

Bits 11:8 — Product Code

These bits indicate the product code of the device within its family.

Bits 11:8	Product Codes — CL-PD683X Family (Family Code 04h)
0h	CL-PD6832 PCI/CardBus Controller, dual-isolated sockets, 208-pin MQFP or LQFP
1h–Fh	Reserved for future use for CL-PD683X devices.

Bits 15:12 — Family Code

A value of '04h' indicates the CL-PD683X family.

11.8.3 Device Capability Byte A

Register Name: **Device Capability Byte A** *Register Per:* chip
I/O Index: **36h** *Register Compatibility Type:* ext.
Memory Offset: **936h**

Bit 23	*Bit 22*	*Bit 21*	*Bit 20*	*Bit 19*	*Bit 18*	*Bit 17*	*Bit 16*
Per-Socket LED	RFU	GPSTB Capable	RFU	Slave DMA	IDE Interface	# Sockets 1	# Sockets 0
R:1	R:0	R:0	R:0	R:1	R:0	R:0	R:1

Bits 17:16 — Number of Sockets Supportable By Device (# Sockets 1:0)

This bit field indicates how many sockets a device is capable of supporting, expressed as the highest socket index number supportable. For example, '00' indicates only socket 0 is supportable, meaning a single-socket device, and '11' indicates sockets 3 through 0 are supportable, indicating a four-socket-capable device.

Bit 18 — IDE Interface

A value of '0' indicates that the CL-PD6832 does not support driving an external IDE drive.

Bit 19 — Slave DMA

A value of '1' at this bit indicates that the CL-PD6832 may act as a DMA slave. Bit 34 (see page 138) indicates whether a system is wired to allow this feature to be used.

Bit 20 — RFU (reserved for future use)

Bit 21 — GPSTB Capable

A value of '0' in this field indicates that the CL-PD6832 does not support general-purpose strobe.

Bit 22 — RFU (reserved for future use)

Bit 23 — Per-Socket LED

If this bit is set to '1', the device is capable of supporting independent LEDs on each socket.

If this bit is set to '1', it is intended that Socket Services would go check bits 48 and 49 (see page 140) to determine if per-socket LEDs are supported in the system implementation. The description of bits 48 and 49 explains the software implications if per-socket LED support is to be enabled.

11.8.4 Device Capability Byte B

Register Name: **Device Capability Byte B** *Register Per:* chip
I/O Index: **37h** *Register Compatibility Type:* ext.
Memory Offset: **937h**

Bit 31	*Bit 30*	*Bit 29*	*Bit 28*	*Bit 27*	*Bit 26*	*Bit 25*	*Bit 24*
Extended Definitions	RFU (ZV)			RFU (CB)	CLKRUN Support	LOCK# Support	CardBus Capable
R:0	R:000			R:0	R:1	R:1	R:1

Bit 24 — CardBus Capable

A value of '1' in this bit indicates that the CL-PD6832 is capable of supporting CardBus PCMCIA cards.

Bit 25 — LOCK# Support

A value of '1' indicates that the CL-PD6832 is capable of supporting operations involving the LOCK# signal.

NOTE: Bit 57 of the **Device Implementation Byte D** register on page 141 must be referenced to determine whether LOCK# is a supported signal in the system implementation.

Bit 26 — CLKRUN Support

A value of '1' indicates that the CL-PD6832 is capable of supporting PCI Mobile Spec CLKRUN signalling for control of system clock turn on/turn off. Note that bit 56 (see page 141) must be referenced to determine whether this feature is supported in the system implementation.

Bits 30:27 — RFU (reserved for future use)

Bit 31 — Extended Definitions

A value of '0' indicates that there is no extended definition.

11.8.5 Device Implementation Byte A

I/O Index: **Device Implementation Byte A**							*Register Per:* chip
I/O Index: **38h**							*Register Compatibility Type:* ext.
Memory Offset: **938h**							
Bit 39	*Bit 38*	*Bit 37*	*Bit 36*	*Bit 35*	*Bit 34*	*Bit 33*	*Bit 32*
RI_OUT Wired	Hardware Suspend Wired	GPSTB B Wired	GPSTB A Wired	VS1/VS2 Wired	Slave DMA Wired	Sockets Present 1	Sockets Present 0
R/W:0	R/W:0	R/W:0	R/W:0	R/W:1	R/W:0	R/W:0	R/W:1

All bits of this byte are read/write.

Device reset defaults are specific to each device. It is intended that a BIOS write to this byte before bringing up socket services would set these bits to reflect which of these features are supported in the system implementation.

Bit 32 — Sockets Present 0

Bit 33 — Sockets Present 1

Bits 1:0 indicate the socket features supported in the system implementation.

Bit 34 — Slave DMA Wired

This bit indicates whether the system is wired to allow the slave DMA feature to be used.

Bit 35 — VS1/VS2 Wired

When this bit is '1', the system is wired to use the VS1/VS2 pin. When this bit is '0' the system is not wired and is not capable of using the VS1/VS2 pin.

Bits 36:37 — GPSTB [B:A] Wired

Bits 5:4 indicate the general-purpose strobe features supported in the system implementation.

Bit 38 — Hardware Suspend Wired

A value of '1' indicates that a pin on the device designated as a hardware control of suspend for deep power saving has been connected to system circuitry designed for power management.

Bit 39 — RI_OUT Wired

A value of '1' indicates that a pin on the device designated as 'RI_OUT' has been connected to ring indicate circuitry. Socket services must set register 1E bit 7 to a '1', thereby enabling this alternate pin definition as it has been wired.

A value of '1' implies that the RI_OUT*/INTB# pin is not connected to the PCI bus INTB# line, but is instead connected to an SMI type system function designed to wake up a system on modem ring.

11.8.6 Device Implementation Byte B

I/O Index: **Device Implementation Byte B** *I/O Index:* **39h** *Memory Offset:* **939h**					*Register Per:* chip *Register Compatibility Type:* ext.		
Bit 47	*Bit 46*	*Bit 45*	*Bit 44*	*Bit 43*	*Bit 42*	*Bit 41*	*Bit 40*
RFU	RF Rated Sockets	VPP_ VCC 1A	VPP 12V Avail	X.X-V Capable	Y.Y-V Capable	5.0-V VCC Capable	3.3-V VCC Capable
R/W:0	R/W:1	R/W:0	R/W:1	R/W:0	R/W:0	R/W:1	R/W:1

Bit 40 — 3.3-V V_{CC} Capable

A value of '1' indicates that a 3.3-V voltage source is available in this system. A value of '0' indicates that 3.3 V voltage source is not available in this system.

Bit 41 — 5.0-V V_{CC} Capable

A value of '1' indicates that a 5.0-V voltage source is available in this system. A value of '0' indicates that 5.0 V voltage source is not available in this system.

Bit 42 — Y.Y-V Capable

A value of '1' indicates that a Y.Y-V voltage source is available in this system. A value of '0' indicates that Y.Y V voltage source is not available in this system.

Bit 43 — X.X-V Capable

A value of '1' indicates that a X.X-V voltage source is available in this system. A value of '0' indicates that X.X V voltage source is not available in this system.

Bit 44 — V_{PP} 12 V Available

A value of '1' indicates that a V_{PP} of 12 V is supported in this system. A value of '0' indicates that a V_{PP} of 12 V is not supported in this system.

Bit 45 — V_{PP}_V_{CC} 1A

A value of '1' indicates that the socket can deliver 1 A at $V_{PP} = V_{CC}$.

Bit 46 — RF Rated Sockets

A value of '1' indicates that the sockets in this systems are designed to handle cards that operate at radio frequencies like cellular fax/modem, pagers, etc. A value of '0' indicates that the sockets in this systems are not designed to handle cards that operate at radio frequencies like cellular fax/modem, pagers, and so on.

Bit 47 — RFU (reserved for future use)

11.8.7 Device Implementation Byte C

I/O Index: **Device Implementation Byte C** *I/O Index:* **3Ah** *Memory Offset:* **93Ah**						*Register Per:* chip *Register Compatibility Type:* ext.	
Bit 55	*Bit 54*	*Bit 53*	*Bit 52*	*Bit 51*	*Bit 50*	*Bit 49*	*Bit 48*
RFU	RFU (ZV)	RFU (ZV)	ZV Port B Wired	ZV Port A Wired	Speaker Wired	Per Socket LED	LED Wired
R/W:0	R/W:0	R/W:0	R/W:0	R/W:0	R/W:1	R/W:0	R/W:0

Bit 48 — LED Wired

A value of '1' indicates that a single activity socket LED is available for both sockets. A value of '0' indicates that a single activity socket LED is not available for both sockets.

Bit 49 — Per Socket LED

A value of '1' indicates that an activity socket LED is available on each socket and is controlled through extended index 931h. A value of '0' indicates an activity socket LED is not available on each socket and is not controlled through extended index 931h.

Bit 50 — Speaker Wired

A value of '1' indicates that a speaker is connected to the sockets. A value of '0' indicates that a speaker is not connected to the sockets.

Bit 51 — ZV Port A Wired

A value of '1' indicates that Socket A is wired for ZV operation. A value of '0' indicates that Socket A is not wired for ZV operation.

Bit 52 — ZV Port B Wired

A value of '1' indicates that Socket B is wired for ZV operation. A value of '0' indicates that Socket B is not wired for ZV operation.

Bits 55:53 — RFU (reserved for future use)

11.8.8 Device Implementation Byte D

I/O Index: **Device Implementation Byte D**
I/O Index: **3Bh**
Memory Offset: **93Bh**

Register Per: chip
Register Compatibility Type: ext.

Bit 63	*Bit 62*	*Bit 61*	*Bit 60*	*Bit 59*	*Bit 58*	*Bit 57*	*Bit 56*
RFU	Clock Opt. Wired	RFU				LOCK# Wired	CLKRUN Wired
R/W:0	R/W:0	R/W:0				R/W:1	R/W:1

Bit 63 — RFU (reserved for future use)

Bit 62 — Clock Opt. Wired

A value of '1' indicates that an external clock is available to the CL-PD6832. A value of '0' indicates that an external clock is not available to the CL-PD6832.

Bits 61:58 — RFU (reserved for future use)

Bit 57 — LOCK# Wired

A value of '1' indicates that the system supports a LOCK#. A value of '0' indicates that the system does not support a LOCK#.

Bit 56 — CLKRUN Wired

A value of '1' indicates that the system supports CLKRUN protocol. A value of '0' indicates that the system does not support CLKRUN protocol.

Notes

12. TIMING REGISTERS

Table 12-1. Timing Registers Quick Reference

Register Name	I/O Index	Memory Offset	Page Number
Setup Timing 0–1	3Ah, 3Dh	83Ah, 83Dh	143
Command Timing 0–1	3Bh, 3Eh	83Bh, 83Eh	144
Recovery Timing 0–1	3Ch, 3Fh	83Ch, 83Fh	145

The following information about the timing registers is important:

- All timing registers take effect immediately if the FIFO is empty (see the **FIFO Control** register on page 118).
- Selection of **Timer Set 0 or Timer Set 1** register sets is controlled by **I/O Window Control**, bits 3 and 7.

12.1 Setup Timing 0–1

Register Name: **Setup Timing 0–1** *Register Per:* socket
I/O Index: **3Ah, 3Dh** *Register Compatibility Type:* 365
Memory Offset: **83Ah, 83Dh**

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved		Setup Multiplier Value					
R:00		R/W:000000/000011					

There are two separate **Setup Timing** registers, each with identical fields. These registers are located at the following indexes:

Index (Socket A)	Setup Timing
3Ah	Setup Timing 0
3Dh	Setup Timing 1

The **Setup Timing** register for each timer set controls how long a PC Card cycle's command (that is, -OE, -WE, -IORD, -IOWR; see page 18) setup time is, in terms of the number of internal clock cycles.

The overall command setup timing length S is programmed by selecting a value (bits 5:0) to produce the overall command setup timing length according to the following formula:

$$S = N_{val} + 1 \qquad \textbf{Equation 12-1}$$

The value of S, representing the number of clock cycles for command setup, is then multiplied by the clock period to determine the actual command setup time (see Section 15.3.3 for further discussion).

Bits 5:0 — Setup Multiplier Value

This field indicates an integer value N_{val} from 0 to 63 to control the length of setup time before a command becomes active.

Bits 7:6 — Reserved

12.2 Command Timing 0–1

Register Name: **Command Timing 0–1** *Register Per:* socket
I/O Index: **3Bh, 3Eh** *Register Compatibility Type:* 365
Memory Offset: **83Bh, 83Eh**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved		Command Multiplier Value					
R:00		R/W:000111/011101					

There are two separate **Command Timing** registers, each with identical fields. These registers are located at the following indexes:

I/O Index	Memory Offset	Command Timing (Socket A)
3Bh	83Bh	Command Timing 0
3Eh	83Eh	Command Timing 1

The **Command Timing** register for each timer set controls how long a PC Card cycle's command (that is, -OE, -WE, -IORD, -IOWR; see page 18) active time is, in terms of the number of internal clock cycles.

The overall command timing length C is programmed by selecting a multiplier value (bits 5:0) to produce the overall command timing length according to the following formula:

$$C = N_{val} + 1$$ **Equation 12-2**

The value of C, representing the number of clock cycles for a command, is then multiplied by the clock period to determine the actual command active time (see Section 15.3.3 for further discussion).

Bits 5:0 — Command Multiplier Value

This field indicates an integer value N_{val} from 0 to 63; it controls the length that a command is active.

Bits 7:6 — Reserved

12.3 Recovery Timing 0–1

Register Name: **Recovery Timing 0–1** *Register Per:* socket
I/O Index: **3Ch, 3Fh** *Register Compatibility Type:* 365
Memory Offset: **83Ch, 83Fh**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved		Recovery Multiplier Value					
R:00		R/W:000100/000100					

There are two separate **Recovery Timing** registers, each with identical fields. These registers are located at the following indexes:

I/O Index	Memory Offset	Recovery Timing (Socket A)
3Ch	83Ch	Recovery Timing 0
3Fh	83Fh	Recovery Timing 1

The **Recovery Timing** register for each timer set controls how long a PC Card cycle's command (that is, -OE, -WE, -IORD, -IOWR; see page 18) recovery time is, in terms of the number of internal clock cycles.

The overall command recovery timing length R is programmed by selecting a multiplier value (bits 5-0) to produce the overall command recovery timing length according to the following formula:

$$R = N_{val} + 1$$ **Equation 12-3**

The value of R, representing the number of clock cycles for command recovery, is then multiplied by the clock period to determine the actual command recovery time (see Section 15.3.3 for further discussion).

Bits 5:0 — Recovery Multiplier Value

This field indicates an integer value N_{val} from 0 to 63; it controls the length of recovery time after a command is active.

Bits 7:6 — Reserved

Notes

13. DMA OPERATION REGISTERS

Table 13-1. DMA Operation Registers Quick Reference

Register Name	DMA Base Address Offset	Page Number
Low Address	0h	147
Mid Low Address	1h	148
Mid High Address	2h	148
High Address	3h	149
Low Count	4h	149
Mid Count	5h	149
High Count	6h	150
DMA Command and Status	8h	150
Request Register	9h	151
Mode Register	Bh	151
Master Clear	Dh	152
Mask Register	Fh	152

This chapter discusses the DMA registers used to make PCI/Way DMA operate. All of the registers in this chapter are I/O registers offset from the **DMA Slave Configuration** register. Bits 31:4 of this register make up the DMA base address used for all of these registers. The registers in this chapter are derived from the Intel 8237 register set.

13.1 Low Address

Register Name: **Low Address** — *Register Per:* socket
DMA Base Address Offset : **0h** — *Register Compatibility Type:* DMA

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Low Address 8 bit 7:0 16 bit 8:1 R/W:00000000							

This register is used to form part of the address for DMA transfers. This register corresponds to the Base and Current Address register of the Intel 8237 for write operations. For read operations this register contains the Current Address.

Bits 7:0 — Low Address

When bits 2:1 of the **DMA Slave Configuration** register indicate that an 8-bit transfer is to occur, this register contains the starting address bits 7:0. If bits 2:1 of the **DMA Slave Configuration** register indicate that a 16-bit transfer is to occur, then this register contains starting address bits 8:1 and address 0 is always '0' at the PC Card.

13.2 Mid Low Address

Register Name: **Mid Low Address** — *Register Per:* socket
DMA Base Address Offset : **1h** — *Register Compatibility Type:* DMA

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Mid Low Address 8 bit 15:8 16 bit 16:9 R/W:00000000							

This register is used to form part of the address for DMA transfers.

Bits 7:0 — Mid Low Address

This register corresponds to the Base and Current Address register of the Intel 8237 for write operations. For read operations this register contains the Current Address. When bits 2:1 of the **DMA Slave Configuration** register indicate that an 8 bit transfer is to take place this register contains the starting address bits 15:8. If bits 2:1 of the **DMA Slave Configuration** register indicate that a 16-bit transfer is to take place then this register contains the starting address bits 16:9.

13.3 Mid High Address

Register Name: **Mid High Address** — *Register Per:* socket
DMA Base Address Offset : **2h** — *Register Compatibility Type:* DMA

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Mid High Address 8 bit 23:16 16 bit 23:17 R/W:00000000							

This register is used to form part of the address for DMA transfers.

Bits 7:0 — Mid High Address

This register corresponds to the Base and Current Address register of the Intel 8237 for write operations. For read operations, this register contains the Current Address. When bits 2:1 of the **DMA Slave Configuration** register indicate that an 8-bit transfer is to occur, this register contains the starting address bits 23:16. If bits 2:1 of the **DMA Slave Configuration** register indicate that a 16-bit transfer is to occur, then this register contains low address bits 23:17 and bit 0 of this register is not used.

13.4 High Address

Register Name: **High Address**							*Register Per:* socket
DMA Base Address Offset : **3h**							*Register Compatibility Type:* DMA
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
High Address 8 bit 31:24 16 bit 31:24 R/W:00000000							

This register is used to form part of the address for DMA transfers. This register is only employed to indicate the memory address of the DMA transfer when bit 3 of the **DMA Slave Configuration** is set to '1'.

Bits 7:0 — High Address

This register corresponds to the Base and Current Address register of the Intel 8237 for write operations. For read operations this register contains the Current Address. This register contains the starting address bits 31:24. This register is enabled by bit 3 of the **DMA Slave Configuration** register. If bit 3 of the **DMA Slave Configuration** register is reset, then address bits 31:24 are '00' during DMA transfers from the CL-PD6832 to memory.

13.5 Low Count

Register Name: **Low Count**							*Register Per:* socket
DMA Base Address Offset : **4h**							*Register Compatibility Type:* DMA
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Low Count 7:0 R/W:00000000							

This register is used to form part of the count for DMA transfers.

Bits 7:0 — Low Count

This register corresponds to the Base and Current Word Count of the Intel 8237 register set. DMA transfers are counted by transaction not by byte, word, or doubleword. The count registers countdown from the programmed value to '0' and then one more. When written this register is the total count of transactions plus one. When read this register reflects the remaining transactions.

13.6 Mid Count

Register Name: **Mid Low Count**							*Register Per:* socket
DMA Base Address Offset : **5h**							*Register Compatibility Type:* DMA
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Mid Count 15:8 R/W:00000000							

This register is used to form part of the count for DMA transfers.

Bits 7:0 — Mid Count

13.7 High Count

Register Name: **High Count**							*Register Per:* socket
DMA Base Address Offset : **6h**							*Register Compatibility Type:* DMA
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
High Count 23:16							
R/W:00000000							

This register is used to form part of the count for DMA transfers when bit 3 of the **DMA Slave Configuration** register is set. When that bit is not set, this register is not used.

Bits 7:0 — High Count

This register when enabled can be used to increase the total number of transfers above the original 64 K transfers of the original Intel 8237.

13.8 DMA Command and Status

Register Name: **DMA Command and Status**							*Register Per:* socket
DMA Base Address Offset : **8h**							*Register Compatibility Type:* DMA
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
DACK Sense	DREQ Sense	Extended Write Select	Rotating Priority	Compressed Timing	Controller Disable	Address Hold Enable	Memory-to-Memory Enable
R:0	R:0	R:0	R:0	R/W:0	R:0	R:0	R/W:0

Bit 0 — Memory-to-Memory Enable

Reads from this bit return Terminal Count.

Bit 1 — Address Hold Enable

Reads from this bit return Terminal Count.

Bit 2 — Controller Disable

This bit disables DMA transfers. Reads from this bit return Terminal Count.

Bit 3 — Compressed Timing

Reads from this bit return Terminal Count.

Bit 4 — Rotating Priority

Reads from this bit return the state of the PC Card DMA request line inverted.

Bit 5 — Extended Write Select

Reads from this bit return the state of the PC Card DMA request line inverted.

Bit 6 — DREQ Sense

Reads from this bit return the state of the PC Card DMA request line inverted.

Bit 7 — DACK Sense

Reads from this bit return the state of the PC Card DMA request line inverted.

13.9 Request Register

Register Name: **Request Register**						*Register Per:* socket	
DMA Base Address Offset : **9h**						*Register Compatibility Type:* DMA	
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved					Set Request	*Reserved*	
R:00000					W:0	R:00	

This register is similar to the request register of the Intel 8237. Reads from this register are undefined and only the set request bit has any meaning for this implementation.

Bits 1:0 — Reserved

Bit 2 — Set Request

If the transfer mode bits are set to do block transfers, this bit initiates transfers with no hardware request present on the PC Card interface.

Bits 7:3 — Reserved

13.10 Mode Register

Register Name: **Mode Register**						*Register Per:* socket	
DMA Base Address Offset : **Bh**						*Register Compatibility Type:* DMA	
Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Request Mode		Address Decrement	Autoinitialize	Transfer Mode		*Ignored*	
R/W:00		R/W:0	R/W:0	R/W:00		R/W:00	

This register emulates the mode register of the Intel 8237. Unlike the 8237 mode register, this register is readable.

Bits 1:0 — Ignored

Writes to these bits have no effect. These bits read back what was written into them.

Bit 3:2 — Transfer Mode

These two bits determine the transfer mode to be used.

Bits 3:2		Transfer Mode
0	0	Verify Mode
0	1	DMA Write
1	0	DMA Read
1	1	Reserved

Bit 4 — Autoinitialize

This bit puts the DMA controller in Autoinitialize mode. In this mode the current address and count registers are reloaded from the Base registers. This sets the DMA controller for a new transfer at the end of the current transfer.

Bit 5 — Address Decrement

If this bit is set, the addresses generated proceed downward from the base address until the count is exhausted. If this bit is reset, the addresses generated increment until the end of transfer.

Bits 7:6 — Request Mode

These two bits determine the request mode to be used.

Bits 7:6		Request Mode
0	0	Demand Mode
0	1	Single Transfer Mode
1	0	Block Mode Select
1	1	Cascade Mode (not implemented)

13.11 Master Clear

Register Name: **Master Clear** — *Register Per:* socket
DMA Base Address Offset : **Dh** — *Register Compatibility Type:* DMA

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Master Clear							
R/W:0							

This register emulates the Master Clear register of the Intel 8237. Unlike the 8237, there is no temporary register to read back, so read back is not supported. When this register is written the DMA section of the CL-PD6832 assumes the same state as caused by PCI_RST. The **DMA Slave Configuration** register is unaffected by writes to this register.

Bits 7:0 — Master Clear

13.12 Mask Register

Register Name: **Mask Register** — *Register Per:* socket
DMA Base Address Offset : **Fh** — *Register Compatibility Type:* DMA

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
Reserved							Mask
R/W:0							R/W:0

This register emulates the Mask registers of the Intel 8237. Unlike the 8237, there is only one channel represented here. Read back is supported.

Bit 0 — Mask

When this bit is '1', DREQ from the PC Card is ignored. When this bit is '0', DMA requests are enabled. This bit is automatically set if the Autoinitialize bit is not set when a transfer completes.

Bits 7:1 — Reserved

14. ATA MODE OPERATION

The CL-PD6832 card interfaces can be dynamically configured to support a PC Card–compatible ATA disk interface (commonly known as 'IDE') instead of the standard PC Card interface. Disk drives that can be made mechanically compatible with PC Card dimensions can thus operate through the socket using the ATA electrical interface.

Configuring a socket to support ATA operation changes the function of certain card socket signals to support the needs of the ATA disk interface. Table 14-1 lists each interface pin and its function when a CL-PD6832 card socket is operating in ATA mode. Refer to application note AN-PD5, *Configuring PCMCIA Sockets for ATA Drive Interface*, for more information.

All register functions of the CL-PD6832 are available in ATA mode, including socket power control, interface signal disabling, and card window control. No memory operations are allowed in ATA mode.

NOTE: General Windows 5 and 6 must be used for proper ATA operation.

Table 14-1. ATA Pin Cross-reference

PC Card Socket Pin Number	Function	
	PC Card Interface	ATA Interface
1	Ground	Ground
2	D3	D3
3	D4	D4
4	D5	D5
5	D6	D6
6	D7	D7
7	-CE1	-CS0
8	A10	n/c
9	-OE	-ATA (always low)
10	A11	n/c
11	A9	CS1*
12	A8	n/c
13	A13	n/c
14	A14	n/c
15	-WE	n/c
16	-IREQ	IREQ
17	VCC	VCC
18	VPP1	n/c
19	A16	n/c
20	A15	n/c

Table 14-1. ATA Pin Cross-reference *(cont.)*

PC Card Socket Pin Number	Function	
	PC Card Interface	ATA Interface
21	A12	n/c
22	A7	n/c
23	A6	n/c
24	A5	n/c
25	A4	n/c
26	A3	n/c
27	A2	A2
28	A1	A1
29	A0	A0
30	D0	D0
31	D1	D1
32	D2	D2
33	-IOIS16	-IOCS16
34	Ground	Ground
35	Ground	Ground
36	-CD1	-CD1
37	D11	D11
38	D12	D12
39	D13	D13
40	D14	D14

Table 14-1. ATA Pin Cross-reference *(cont.)*

PC Card Socket Pin Number	Function	
	PC Card Interface	ATA Interface
41	D15	D15
42	-CE2	-CS1
43	VS1	VS1
44	-IORD	-IORD
45	-IOWR	-IOWR
46	A17	n/c
47	A18	n/c
48	A19	n/c
49	A20	n/c
50	A21	n/c
51	VCC	VCC
52	VPP2	n/c
53	A22	n/c
54	A23	VU

Table 14-1. ATA Pin Cross-reference *(cont.)*

PC Card Socket Pin Number	Function	
	PC Card Interface	ATA Interface
55	A24	-M/S
56	A25	CSEL
57	VS2	VS2
58	RESET	RESET*
59	-WAIT	IOCHRDY
60	-INPACK	DREQ
61	-REG	-DACK
62	-SPKR	-LED
63	-STSCHG	-PDIAG
64	D8	D8
65	D9	D9
66	D10	D10
67	-CD2	-CD2
68	Ground	Ground

15. ELECTRICAL SPECIFICATIONS

15.1 Absolute Maximum Ratings

Description	Absolute Maximum Rating[a]
Ambient temperature under bias	0°C to 70°C
Storage temperature	–65°C to 150°C
Voltage on any pin (with respect to ground)	–0.3 V to 0.3 V greater than voltage of the +5V pin, respective to ground
Operating power dissipation	500 mW
Power dissipation during Suspend mode	10 mW
Power supply voltage	7 V [a]
Injection current (latch up)	25 mA [a]

[a] Stresses above those listed may cause permanent damage to system components. These are stress ratings only; functional operation at these or any conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect system reliability.

15.2 DC Specifications

Table 15-1. General DC Specifications

Symbol	Parameter	MIN	MAX	Unit	Conditions
C_{IN}	Input capacitance	—	10.0	pF	—
C_{OUT}	Output capacitance	—	10.0	pF	—
I_{IL}	Input leakage	–10.0	10.0	µA	$0 < V_{IN} <$ respective V_{CC} supply pin
I_{PU}	Internal pull-up current	–30	–400	µA	—

Table 15-2. PC Card (PCMCIA) Bus Interface DC Specifications

Symbol	Parameter	MIN	MAX	Unit	Conditions
$SOCKET\_VCC_{5V}$	Power supply voltage	4.5	5.5	V	Normal operation
$SOCKET\_VCC_{3V}$		3.0	3.6	V	
V_{IH}	Input high voltage	2.0	—	V	V_{DD} core voltage = 3.0 V, **Misc Control 2** register, bit 3 = '0'
V_{IL}	Input low voltage	—	0.8	V	V_{DD} core voltage = 3.6 V, **Misc Control 2** register, bit 3 = '0'
V_{OH}	Output high voltage	2.4	—	V	At rated I_{OH}, respective SOCKET_VCC = 3.0 V
V_{OHC}	Output high voltage CMOS	SOCKET_VCC – 0.5	—	V	At rated I_{OHC}, respective SOCKET_VCC = 3.0 V
V_{OL}	Output low voltage	—	0.4	V	At rated I_{OL}
I_{OH}	Output high current	–2	—	mA	Respective SOCKET_VCC = 3.0 V, V_{OH} = 2.4 V
I_{OHC}	Output high current CMOS	–1	—	mA	Respective SOCKET_VCC = 3.0 V, V_{OHC} = SOCKET_VCC – 0.5 V
I_{OL}	Output low current	2	—	mA	Respective SOCKET_VCC = 3.0 V, V_{OL} = 0.4 V

Table 15-3. PCI Bus Interface DC Specifications

Symbol	Parameter	MIN	MAX	Unit	Conditions
PCI_VCC_{5V}	Power supply voltage	4.5	5.5	V	Normal operation
PCI_VCC_{3V}		3.0	3.6	V	
V_{IH} [a]	Input high voltage	2.0		V	V_{DD} core voltage = 3.0 V
V_{IL} [a]	Input low voltage		0.8	V	V_{DD} core voltage = 3.6 V
V_{OH}	Output high voltage	2.4	—	V	At rated I_{OH}, PCI_VCC = 3.0 V
V_{OHC}	Output high voltage CMOS	PCI_VCC – 0.5	—	V	At rated I_{OHC}, PCI_VCC = 3.0 V
V_{OL}	Output low voltage		0.5	V	At rated I_{OL}
I_{OH}	Output current high	–5	—	mA	PCI_VCC = 3.0 V, V_{OH} = 2.4 V
I_{OHC}	Output current high CMOS	–1	—	mA	PCI_VCC = 3.0 V, V_{OHC} = PCI_VCC – 0.5 V
I_{OL}	Output current low	16	—	mA	PCI_VCC = 3.0 V, V_{OL} = 0.5 V

[a] When CORE_VDD is 3.3 V, input thresholds are TTL-compatible; when CORE_VDD is 5 V, input thresholds are CMOS-compatible.

Table 15-4. CardBus Interface DC Specifications

Symbol	Parameter	MIN	MAX	Unit	Conditions
V_{CC}	Supply voltage	3.0	3.6	V	—
V_{IH}	Input high voltage	0.475 V_{CC}	V_{CC} + 0.5	V	—
V_{IL}	Input low voltage	–0.5	0.325 V_{CC}	V	—
V_{OH}	Output high voltage	0.9 V_{CC}	—	V	I_{OUT} = 150 µA
V_{OL}	Output low voltage	—	0.1 V_{CC}	V	I_{OUT} = 700 µA
I_{IL}	Input leakage current	—	±10	µA	$0 < V_{IN} < V_{CC}$
I_{CC}	Supply current	—	1	A	—

Table 15-5. CardBus Interface AC Specifications

Symbol	Parameter	MIN	MAX	Unit
t_{VAL}	CCLK to signal valid delay	2	18	ns
t_{ON}	Float to active delay	2	—	ns
t_{OFF}	Active to float delay	—	28	ns
t_{SU}	Input setup time to CCLK	7	—	ns
t_H	Input hold time from CCLK	0	—	ns
t_{RST}	Reset active time after power stable	1	—	ms
$t_{RST-CLK}$	Reset active time after CCLK stable	100	—	Clocks
$t_{RST-OFF}$	Reset active to output float delay	—	40	ns
t_{PULSE}	CSTSCHG remote wakeup pulse width	1	—	ns

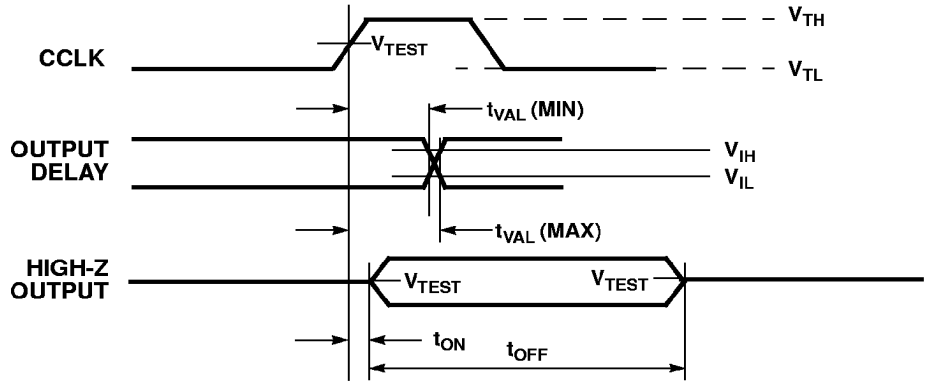


Figure 15-1. Output Timing Measurement Conditions

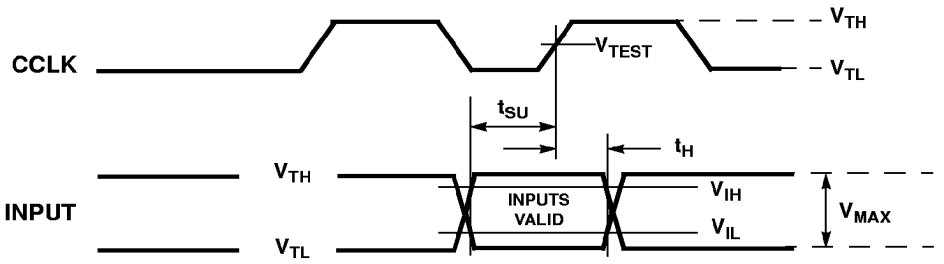


Figure 15-2. Input Timing Measurement Conditions

Table 15-6. CardBus PC Card Clock Specifications

Symbol	Parameter	MIN	MAX	Unit
t_{CYC}	CCLK cycle time	30	∞	ns
t_{HIGH}	CCLK high time	12	—	ns
t_{LOW}	CCLK low time	12	—	ns
–	CCLK slew rate	1	4	V/ns

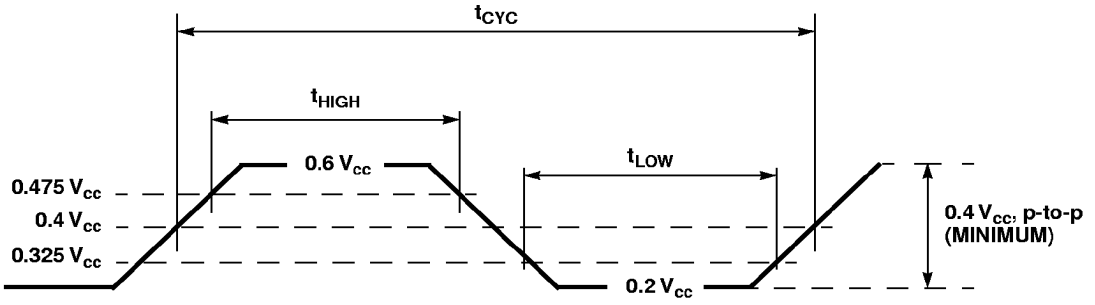


Figure 15-3. CardBus PC Card Clock Specifications

Table 15-7. Power Control Interface (+5V Powered) DC Specifications

Symbol	Parameter	MIN	MAX	Unit	Conditions
+5V	+5V supply voltage	Highest V_{CC} – 0.3	5.5	V	
V_{IH}	Input high voltage	2.0		V	+5V pin voltage = 4.5 V
V_{IL}	Input low voltage		0.8	V	+5V pin voltage = 5.5 V
V_{OH}	Output high voltage	2.4		V	+5V pin voltage = 4.5 V, I_{OH} = –5 mA
V_{OHC}	Output high voltage CMOS	+5V voltage – 0.5		V	+5V pin voltage = 4.5 V, I_{OH} = –1 mA
V_{OL}	Output low voltage		0.4	V	
I_{OH}	Output current high	–5		mA	Respective +5V pin voltage = 4.5 V, V_{OH} = 2.4 V
I_{OHC}	Output current high CMOS	–1		mA	Respective +5V pin voltage = 4.5 V, V_{OHC} = +5V pin voltage – 0.5 V
I_{OL}	Output current low	16		mA	Respective +5V pin voltage = 4.5 V, V_{OL} = 0.4 V

Table 15-8. Operating Current Specifications (3.3 V)

Symbol	Parameter	MIN	TYP	MAX	Unit	Conditions
$Icc_{tot(1)}$	Power supply current, operating	tbd	tbd	tbd	mA	CORE_VDD = 3.3 V; +5V, SOCKET_VCC, and PCI_VCC = 5.0 V; P_{DISS} = < 85 mW
$Icc_{tot(2)}$	Power supply current, Suspend mode (**Misc Control 2**, bit 2 = '1')		tbd		µA	CORE_VDD = 3.3 V; +5V, SOCKET_VCC, and PCI_VCC = 5.0 V; P_{DISS} = < 2 mW
$Icc_{tot(3)}$	Power supply current, RST# active, no clocks		tbd		µA	CORE_VDD = 3.3 V; +5V, SOCKET_VCC, and PCI_VCC = 5.0 V; P_{DISS} = < 1 mW

15.3 AC Timing Specifications

This section includes system timing requirements for the CL-PD6832. Unless otherwise specified, timings are provided in nanoseconds (ns), at TTL input levels, with the ambient temperature varying from 0°C to 70°C, and V_{CC} varying from 3.0 V to 3.6 V or 4.5 V to 5.5 V DC. The PCI bus speed is 33 MHz unless otherwise specified. Note the following conventions:

- A pound sign (#) at the end of a pin name indicates an active-low signal for the PCI bus.
- A dash (-) at the beginning of a pin name indicates an active-low signal for the PC Card (PCMCIA) bus.
- An asterisk (*) at the end of a pin name indicates an active-low signal that is a general-interface for the CL-PD6832.

Additionally, the following statements are true for all timing information:

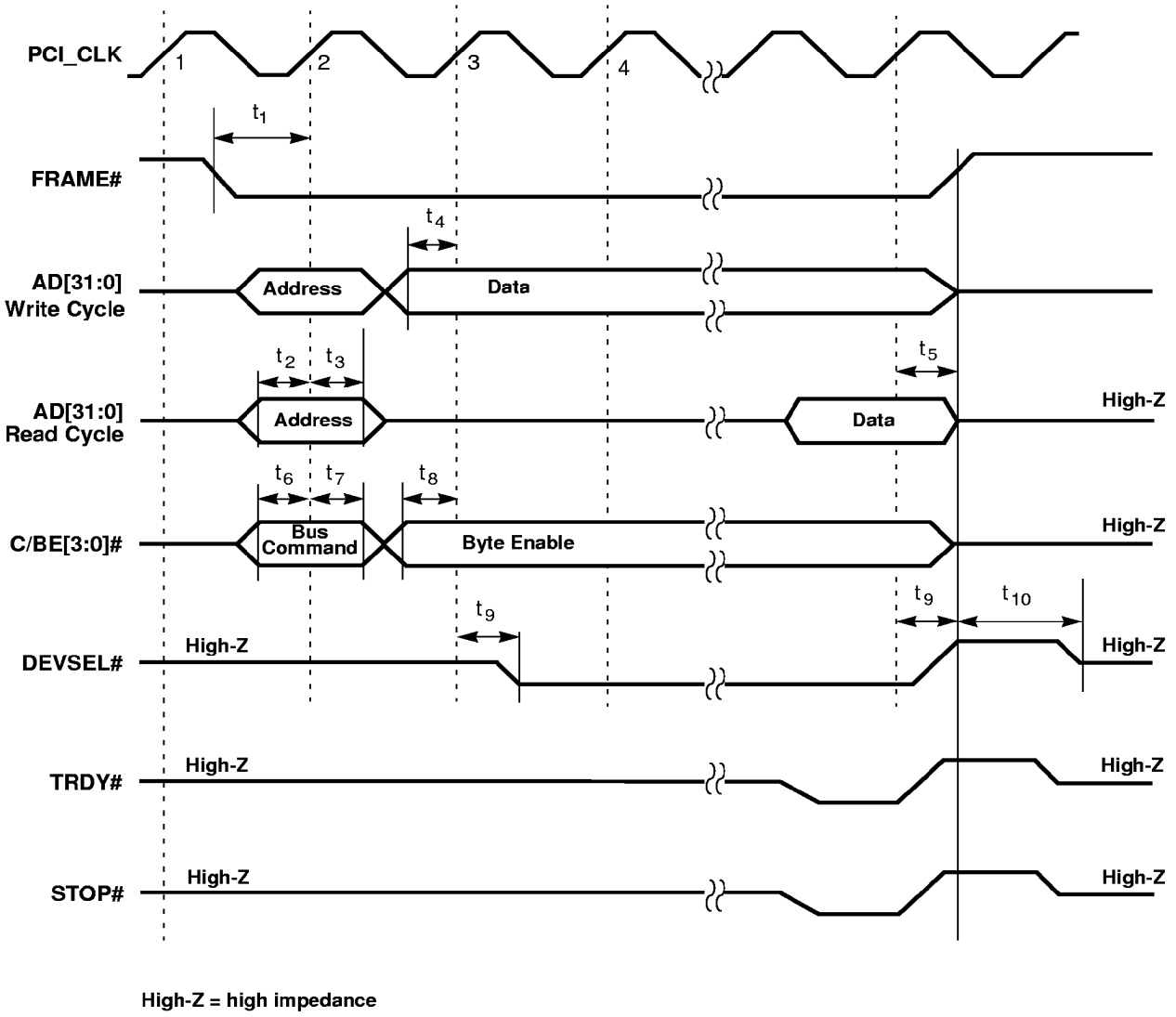
- All timings assume a load of 50 pF.
- TTL signals are measured at TTL threshold; CMOS signals are measured at CMOS threshold.

Table 15-9. Index of AC Timing Specifications

15.3.1 PCI Bus Timing

Table 15-10. FRAME#, AD[31:0], C/BE[3:0]#, and DEVSEL#

Symbol	Parameter	PCI_VCC = 3.3 V		PCI_VCC = 5.0 V		Units
		MIN	MAX	MIN	MAX	
t_1	FRAME# setup to PCI_CLK	7	–	7	–	ns
t_2	AD[31:0] (address) setup to PCI_CLK	7	–	7	–	ns
t_3	AD[31:0] (address) hold from PCI_CLK	0	–	0	–	ns
t_4	AD[31:0] (data) setup to PCI_CLK	7	–	7	–	ns
t_5	AD[31:0] (data) active to High-Z from PCI_CLK	0	28	0	28	ns
t_6	C/BE[3:0]# (bus command) setup to PCI_CLK	7	–	7	–	ns
t_7	C/BE[3:0]# (bus command) hold from PCI_CLK	0	–	0	–	ns
t_8	C/BE[3:0]# (byte enable) setup to PCI_CLK	7	–	7	–	ns
t_9	DEVSEL# delay from PCI_CLK	–	11	–	11	ns
t_{10}	DEVSEL# high before High-Z	1	–	1	–	PCI_CLK



High-Z = high impedance

Figure 15-4. FRAME#, AD[31:0], C/BE[3:0]#, and DEVSEL# (PCI™ Bus)

Table 15-11. TRDY# and STOP# Delay

Symbol	Parameter	PCI_VCC = 3.3 V		PCI_VCC = 5.0 V		Units
		MIN	MAX	MIN	MAX	
t_1	TRDY# active delay from PCI_CLK	–	11	–	11	ns
t_2	TRDY# inactive delay from PCI_CLK	–	11	–	11	ns
t_3	TRDY# high before High-Z	1	–	1	–	PCI_CLK
t_4	STOP# active delay from PCI_CLK	–	11	–	11	ns
t_5	STOP# inactive delay from PCI_CLK	–	11	–	11	ns
t_6	STOP# high before High-Z	1	–	1	–	PCI_CLK

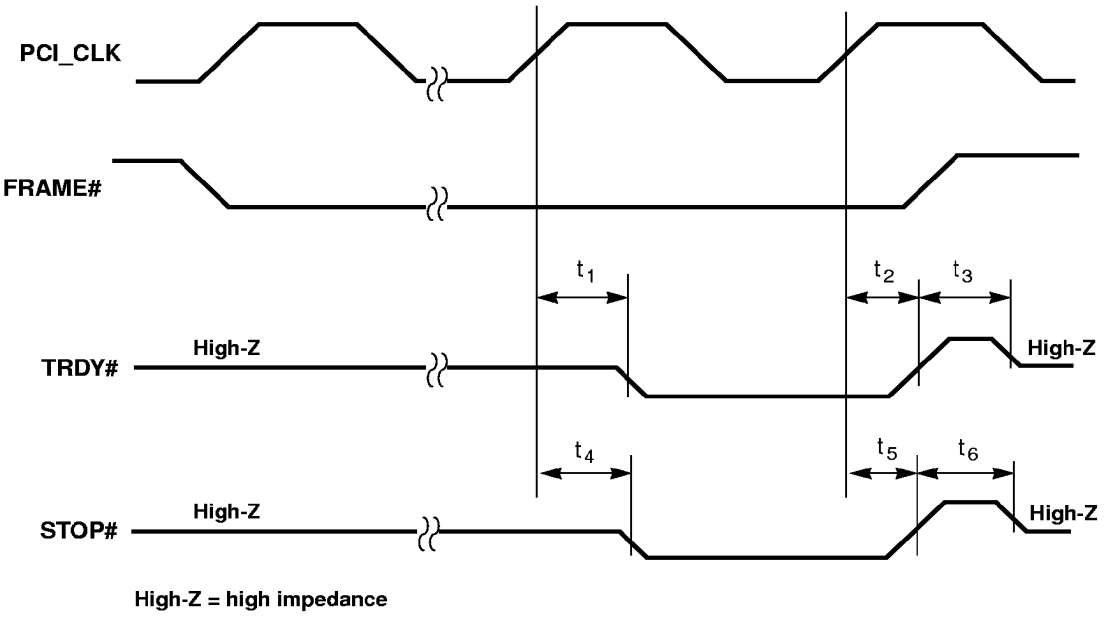


Figure 15-5. TRDY# and STOP# Delay (PCI™ Bus)

Table 15-12. IDSEL Timing in a Configuration Cycle

Symbol	Parameter	MIN	MAX	Units
t_1	IDSEL setup to PCI_CLK	7	–	ns
t_2	IDSEL hold from PCI_CLK	0	–	ns

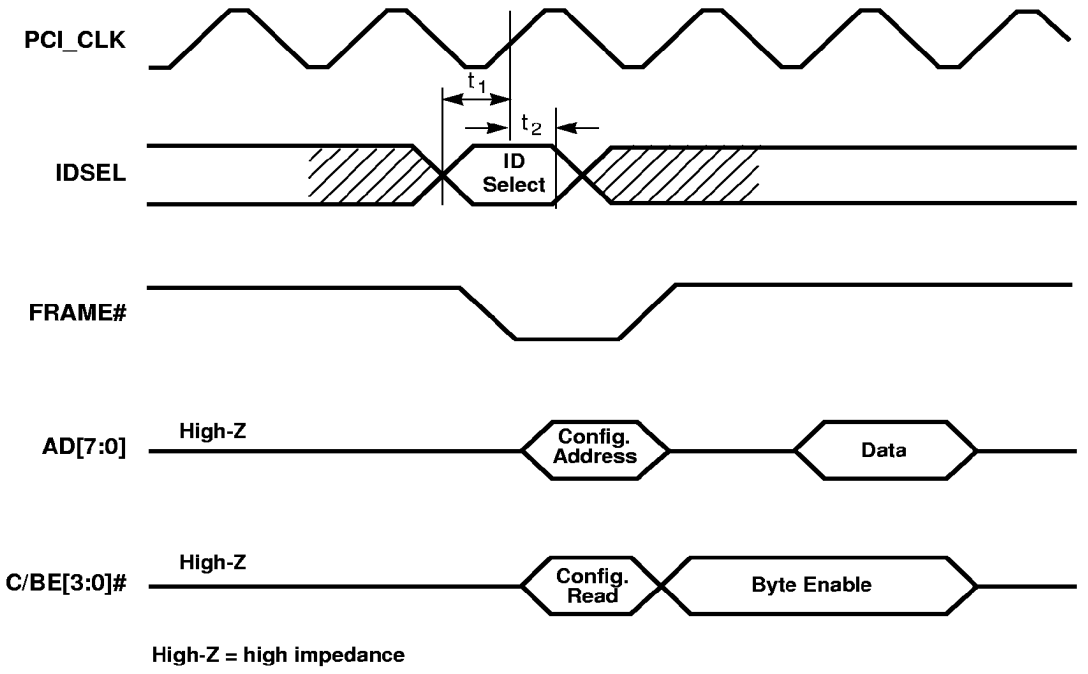
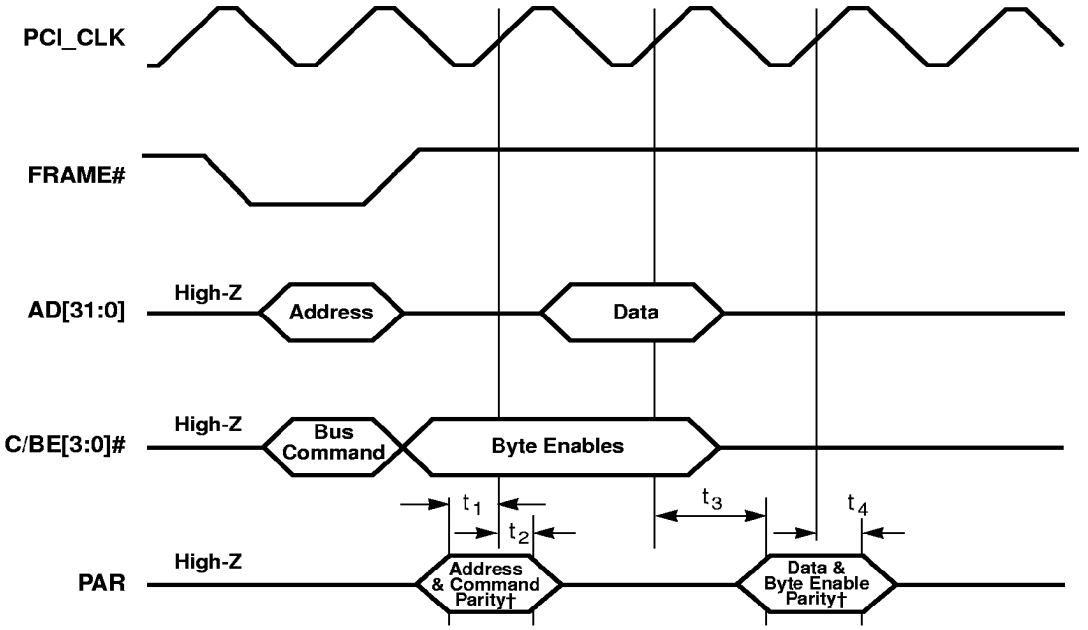


Figure 15-6. IDSEL Timing in a Configuration Cycle (PCI™ Bus)

Table 15-13. PAR Timing

Symbol	Parameter	MIN	MAX	Units
t_1	PAR setup to PCI_CLK (input to CL-PD6832)	7	–	ns
t_2	PAR hold from PCI_CLK (input to CL-PD6832)	0	–	ns
t_3	PAR valid delay from PCI_CLK (output from CL-PD6832)	–	11	ns
t_4	PAR hold from PCI_CLK (output from CL-PD6832)	0	–	ns



High-Z = high impedance

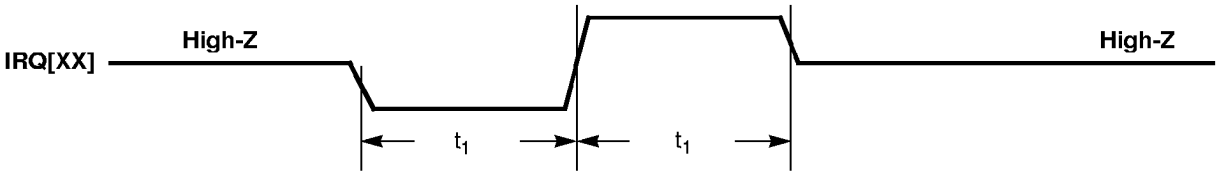
† PAR goes high or low depending on AD[31:0] and C/BE[3:0]# values.

Figure 15-7. PAR Timing (PCI™ Bus)

15.3.2 System Interrupt Timing

Table 15-14. Pulse Mode Interrupt Timing

Symbol	Parameter	MIN	MAX	Units
t_1	IRQ[XX] low or high	15	18	PCI_CLK



High-Z = high impedance

Figure 15-8. Pulse Mode Interrupt Timing

15.3.3 PC Card (PCMCIA) Bus Timing Calculations

Calculations for minimum PC Card (PCMCIA) cycle Setup, Command, and Recovery timings are made by first calculating factors derived from the applicable timer set's timing registers and then by applying the factor to an equation relating it to the internal clock period.

The PC Card (PCMCIA) cycle timing factors, in terms of the number of internal clocks, are calculated as follows:

$$S = N_{val} + 1 \quad \text{Equation 15-1}$$

$$C = N_{val} + 1 \quad \text{Equation 15-2}$$

$$R = N_{val} + 1 \quad \text{Equation 15-3}$$

N_{val} is the specific selected multiplier value from the timer set's Setup, Command, and Recovery Timing registers (see <Xref>Chapter 12 for description of these registers).

From this, a PC Card (PCMCIA) cycle's Setup, Command, and Recovery time for the selected timer set are calculated as follows:

$$\text{Minimum Setup time} = (S \times Tcp) - 10\ ns \quad \text{Equation 15-4}$$

$$\text{Minimum Command time} = (C \times Tcp) - 10\ ns \quad \text{Equation 15-5}$$

$$\text{Minimum Recovery time} = (R + 1) \times Tcp - 10\ ns \quad \text{Equation 15-6}$$

Tcp is the period of the internal clock.

If PCI_CLK is selected (**Misc Control 2** register bit 0 is a '0') and operates at 25 MHz, and the clock input is not being divided (**Misc Control 2** register bit 4 is a '0'), then:

$$Tcp = 40\ ns \quad \text{Equation 15-7}$$

The timing diagrams that follow were derived for a CL-PD6832 using the PCI clock at 25 MHz. The examples are for the default values of the Timing registers for Timer Set 0, as follows:

Timing Register Name (Timer Set 0)	I/O Index	Value (Default)	Resultant N_{val}
Setup Timing 0	3Ah	00h	0
Command Timing 0	3Bh	07h	7
Recovery Timing 0	3Ch	04h	4

Thus the minimum times for the default values are as follows:

$$\text{Minimum Setup time} = (S \times Tcp) - 10\ ns = \{[0 + 1] \times 40\ ns\} - 10\ ns = \mathbf{30\ ns} \quad \text{Equation 15-8}$$

$$\text{Minimum Command time} = (C \times Tcp) - 10\ ns = \{[7 + 1] \times 40\ ns\} - 10\ ns = \mathbf{310\ ns} \quad \text{Equation 15-9}$$

$$\text{Minimum Recovery time} = (R + 1) \times Tcp - 10\ ns = \{[5 + 1] \times 40\ ns\} - 10\ ns = \mathbf{230\ ns} \quad \text{Equation 15-10}$$

15.3.4 PC Card (PCMCIA) Bus Timing

Table 15-15. Memory Read/Write Timing

Symbol	Parameter	MIN	MAX	Units
t_1	-REG, -CE[2:1], Address, and Write Data setup to Command active[1]	(S × Tcp) – 10		ns
t_2	Command pulse width[2]	(C × Tcp) – 10		ns
t_3	Address hold and Write Data valid from Command inactive[3]	(R × Tcp) – 10		ns
t_4	-WAIT active from Command active		(C – 2) Tcp – 10	ns
t_5	Command hold from -WAIT inactive	2 Tcp		ns
t_6	Data setup before -OE inactive	(2 Tcp) + 10		ns
t_7	Data hold after -OE inactive	0		ns
t_8	Data valid from -WAIT inactive	Tcp + 10		ns

1 The Setup time is determined by the value programmed into the **Setup Timing** register, index 3Ah/3Dh. Using the Timer Set 0 default value of 00h, the setup time would be 30 ns. S = N_{val} + 1, see page 168.

2 The Command time is determined by the value programmed into the **Command Timing** register, index 3Bh/3Eh. Using the Timer Set 0 default value of 07h, the Command time would be 310 ns. C = N_{val} + 1, see page 168.

3 The Recovery time is determined by the value programmed into the **Recovery Timing** register, index 3Ch/3Fh. Using the Timer Set 0 default value of 04h, the hold (Recovery) time would be 230 ns. R = N_{val} + 1, see page 168.

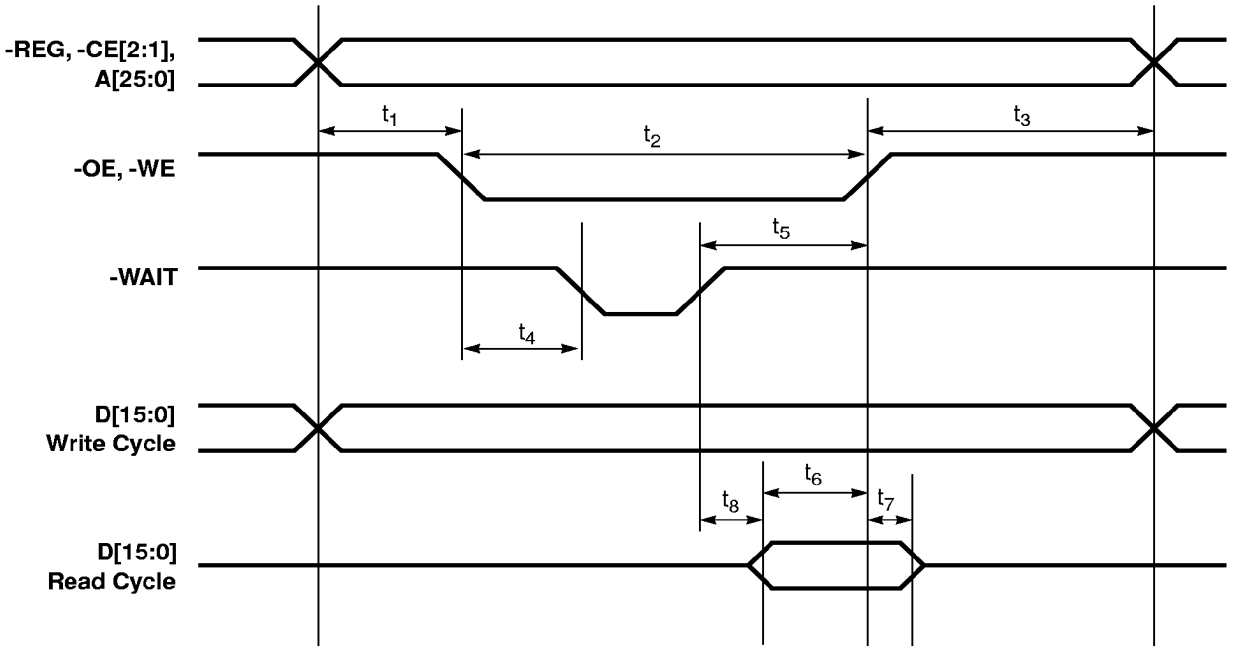


Figure 15-9. Memory Read/Write Timing

Table 15-16. Word I/O Read/Write Timing

Symbol	Parameter	MIN	MAX	Units
t_1	-REG or Address setup to Command active[1]	(S × Tcp) – 10		ns
t_2	Command pulse width[2]	(C × Tcp) – 10		ns
t_3	Address hold and Write Data valid from Command inactive[3]	(R × Tcp) – 10		ns
t_4	-WAIT active from Command active[4]		(C – 2)Tcp – 10	ns
t_5	Command hold from -WAIT inactive	(2 Tcp) + 10		ns
t_{ref}	Card -IOIS16 delay from valid Address (PC Card specification)		35	ns
t_6	-IOIS16 setup time before Command end	(3 Tcp) + 10		ns
t_7	-CE2 delay from -IOIS16 active[5]	Tcp – 10		ns
t_8	Data valid from -WAIT inactive		Tcp + 10	ns
t_9	Data setup before -IORD inactive	(2 Tcp) + 10		ns
t_{10}	Data hold after -IORD inactive	0		ns

[1] The Setup time is determined by the value programmed into the **Setup Timing** register, index 3Ah/3Dh. Using the Timer Set 0 default value of 00h, the setup time would be 30 ns. S = N_{val} + 1, see page 168.

[2] The Command time is determined by the value programmed into the **Command Timing** register, index 3Bh/3Eh. Using the Timer Set 0 default value of 07h, the Command time would be 310 ns. C = N_{val} + 1, see page 168.

[3] The Recovery time is determined by the value programmed into the **Recovery Timing** register, index 3Ch/3Fh. Using the Timer Set 0 default value of 04h, the hold (Recovery) time would be 230 ns. R = N_{val} + 1, see page 168.

[4] For active timing programmed at 230 ns, maximum – WAIT timing is 100 ns after command active.

[5] -IOIS16 must go low within 3Tcp + 10 ns of the cycle beginning or -IOIS16 will be ignored and -CE will not be activated.

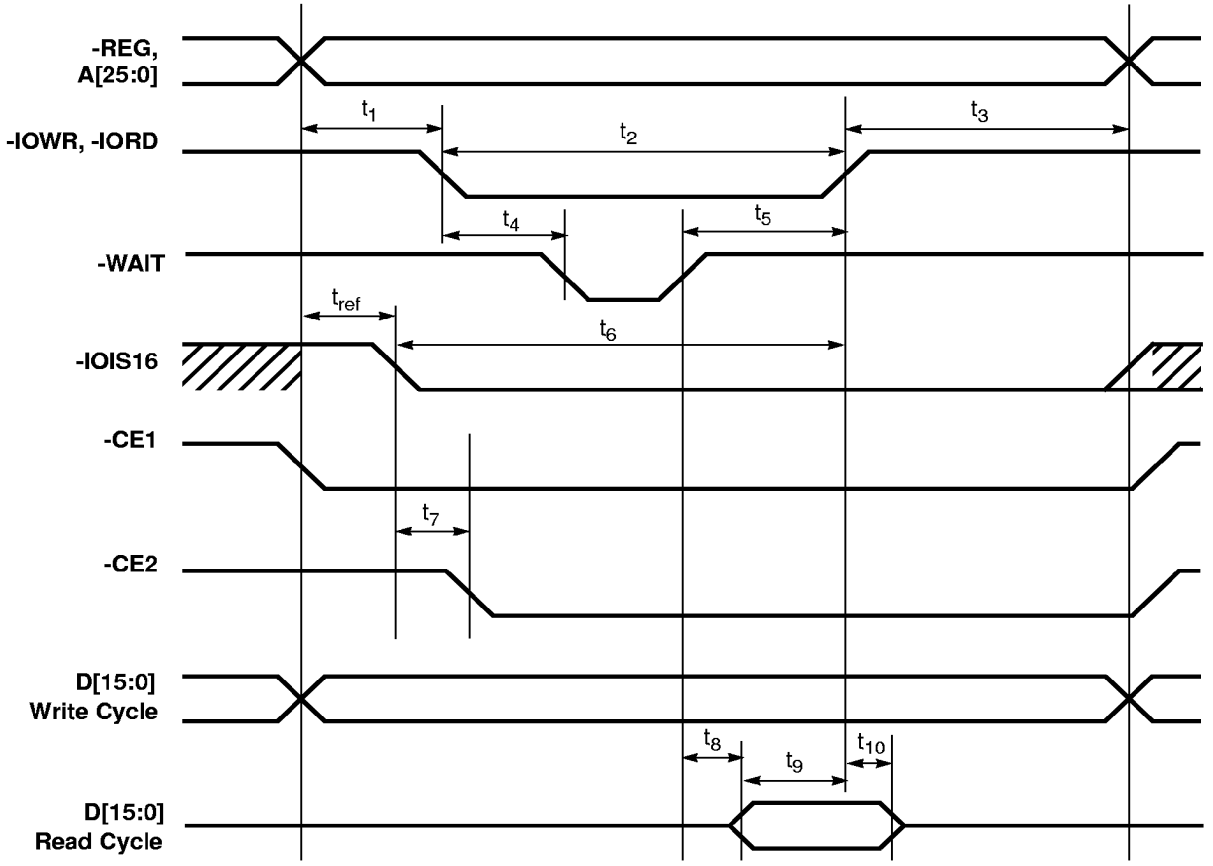


Figure 15-10. Word I/O Read/Write Timing

Table 15-17. PC Card (PCMCIA) Read/Write Timing when System is 8-Bit

Symbol	Parameter	MIN	MAX	Units
t_1	-REG or Address setup to Command active[1]	(S × Tcp) – 10		ns
t_2	Command pulse width[2]	(C × Tcp) – 10		ns
t_3	Address hold from Command inactive[3]	(R × Tcp) – 10		ns
t_4	Data setup before Command inactive	(2 Tcp) + 10		ns
t_5	Data hold after command inactive	0		ns

[1] The Setup time is determined by the value programmed into the **Setup Timing** register, index 3Ah/3Dh. Using the Timer Set 0 default value of 00h, the setup time would be 30 ns. S = N_{val} + 1, see page 168.

[2] The Command time is determined by the value programmed into the **Command Timing** register, index 3Bh/3Eh. Using the Timer Set 0 default value of 07h, the Command time would be 310 ns. C = N_{val} + 1, see page 168.

[3] The Recovery time is determined by the value programmed into the **Recovery Timing** register, index 3Ch/3Fh. Using the Timer Set 0 default value of 04h, the hold (Recovery) time would be 230 ns. R = N_{val} + 1, see page 168.

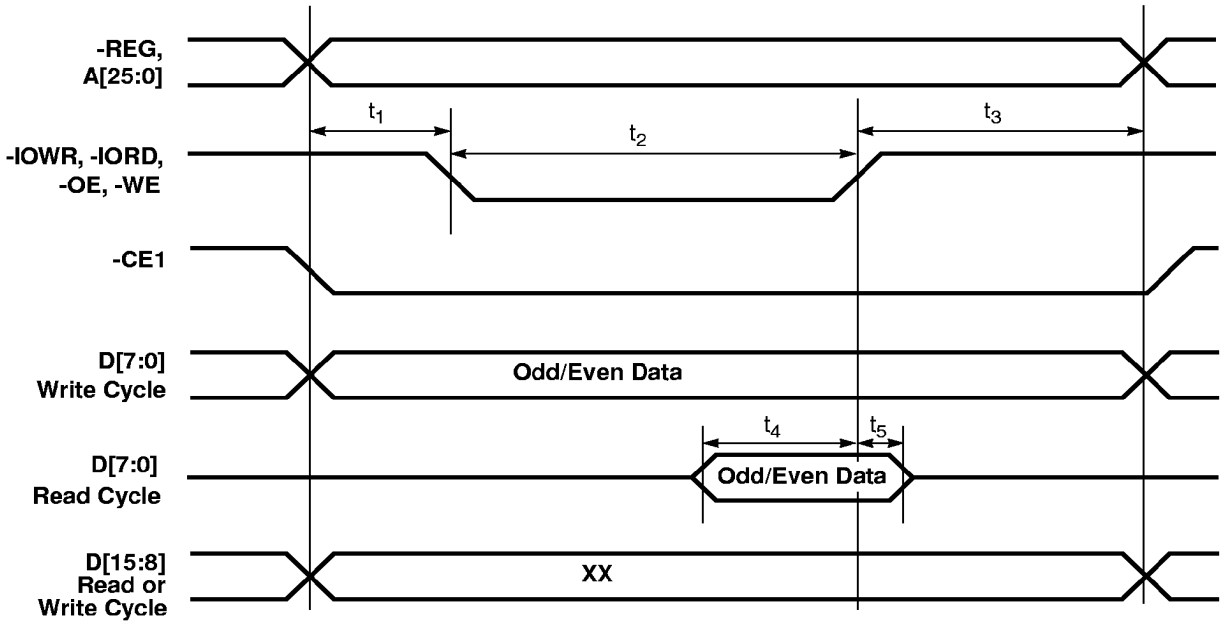


Figure 15-11. PC Card (PCMCIA) when System is 8 Bit

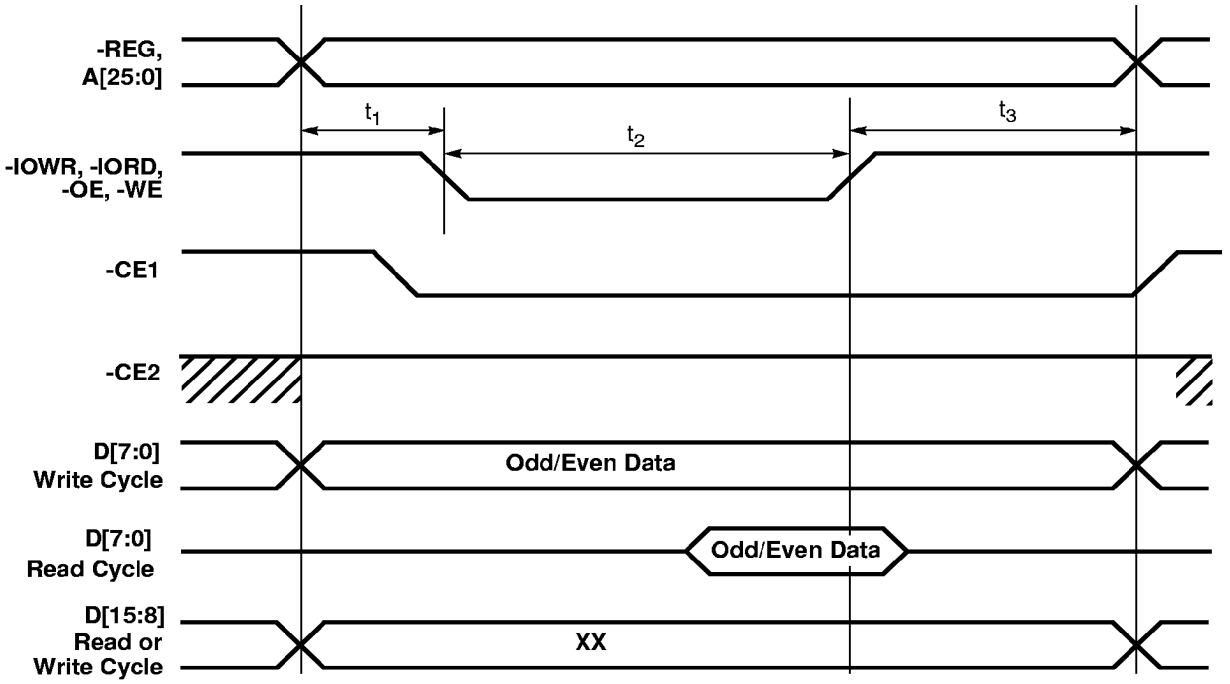
Table 15-18. Normal Byte Read/Write Timing

Symbol	Parameter	MIN	MAX	Units
t_1	Address setup to Command active[1]	(S × Tcp) – 10		ns
t_2	Command pulse width[2]	(C × Tcp) – 10		ns
t_3	Address hold from Command inactive[3]	(R × Tcp) – 10		ns

[1] The Setup time is determined by the value programmed into the **Setup Timing** register, index 3Ah/3Dh. Using the Timer Set 0 default value of 00h, the setup time would be 30 ns. S = N_{val} + 1, see page 168.

[2] The Command time is determined by the value programmed into the **Command Timing** register, index 3Bh/3Eh. Using the Timer Set 0 default value of 07h, the Command time would be 310 ns. C = N_{val} + 1, see page 168.

[3] The Recovery time is determined by the value programmed into the **Recovery Timing** register, index 3Ch/3Fh. Using the Timer Set 0 default value of 04h, the hold (Recovery) time would be 230 ns. R = N_{val} + 1, see page 168.



NOTE: This is the normal byte read/write timing for all other byte accesses, including odd I/O cycles where -IOIS16 is low.

Figure 15-12. Normal Byte Read/Write Timing

Table 15-19. 16-Bit System to 8-Bit I/O Card: Odd Byte Timing

Symbol	Parameter	MIN	MAX	Units
t_1	Address change to -IOIS16 inactive[4]		(3Tcp) + 10	ns
t_2	-IOIS16 inactive to -CE2 inactive		20	ns
t_3	-IOIS16 inactive to -CE1 active		20	ns
t_4	Address setup to Command active[1]	(S × Tcp) – 10		ns
t_5	Command pulse width[2]	(C × Tcp) – 10		ns
t_6	Address hold from Command inactive[3]	(R × Tcp) – 10		ns

1 The Setup time is determined by the value programmed into the **Setup Timing** register, index 3Ah/3Dh. Using the Timer Set 0 default value of 00h, the setup time would be 30 ns. S = N_{val} + 1, see page 168.

2 The Command time is determined by the value programmed into the **Command Timing** register, index 3Bh/3Eh. Using the Timer Set 0 default value of 07h, the Command time would be 310 ns. C = N_{val} + 1, see page 168.

3 The Recovery time is determined by the value programmed into the **Recovery Timing** register, index 3Ch/3Fh. Using the Timer Set 0 default value of 04h, the hold (Recovery) time would be 230 ns. R = N_{val} + 1, see page 168.

4 -IOIS16 level from card must be valid within 3 clocks of an address change to the card.

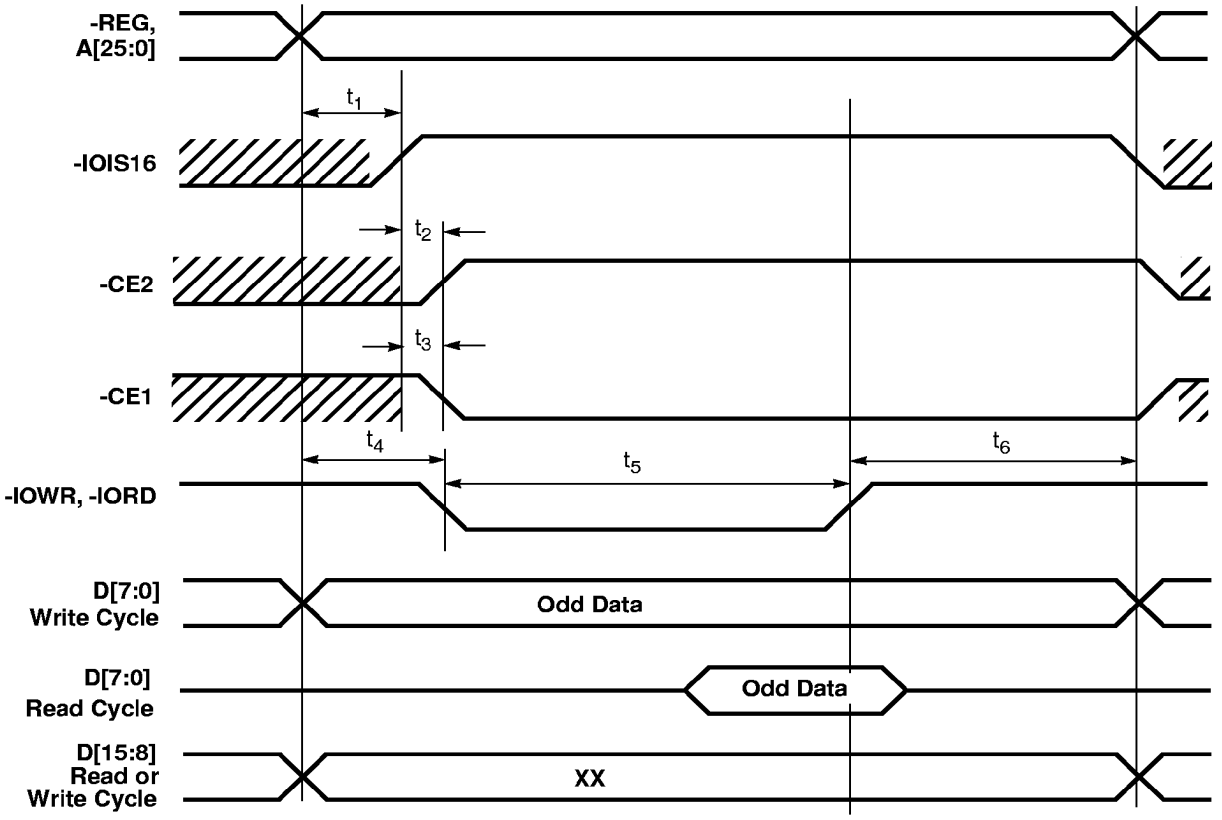
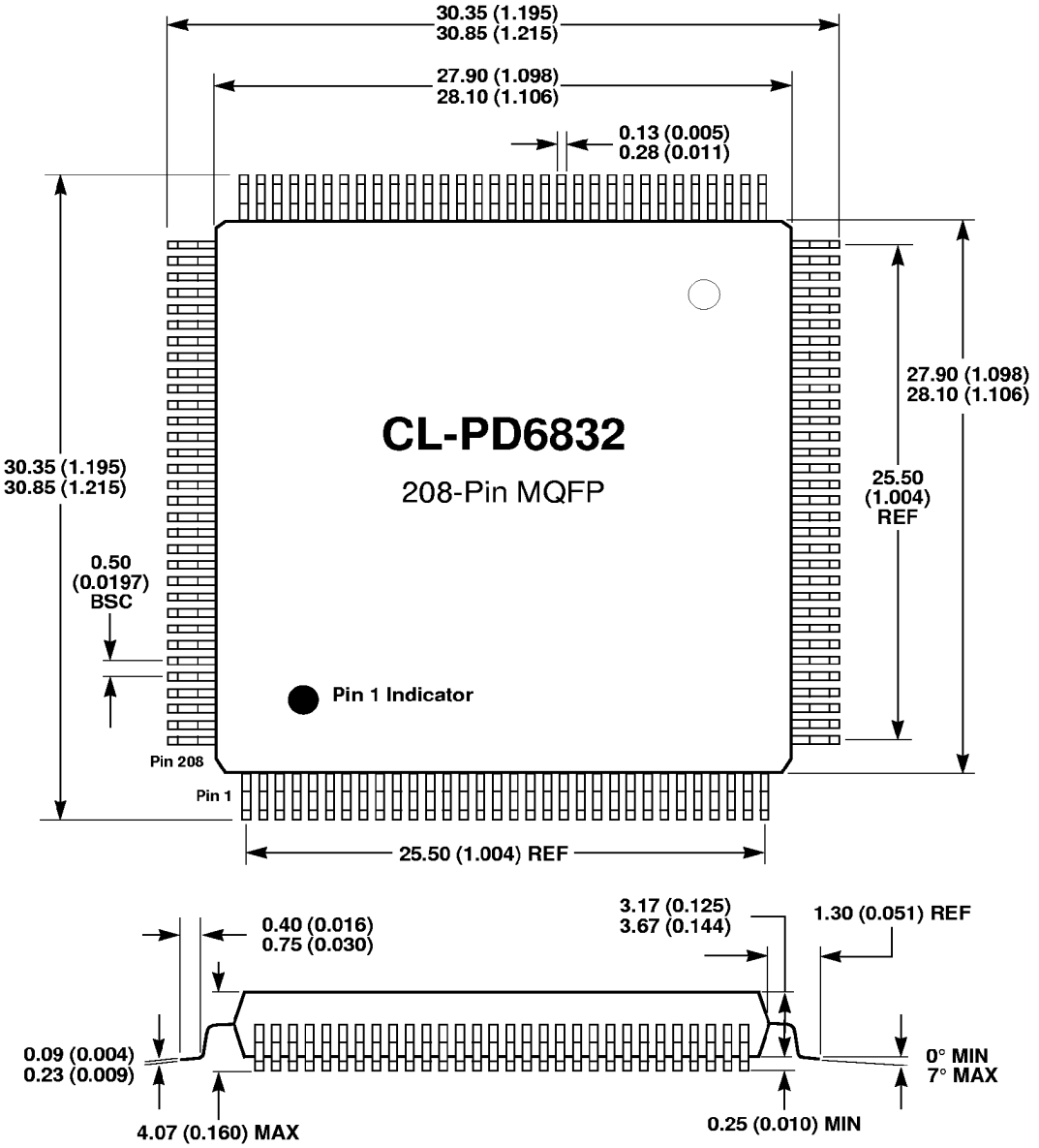


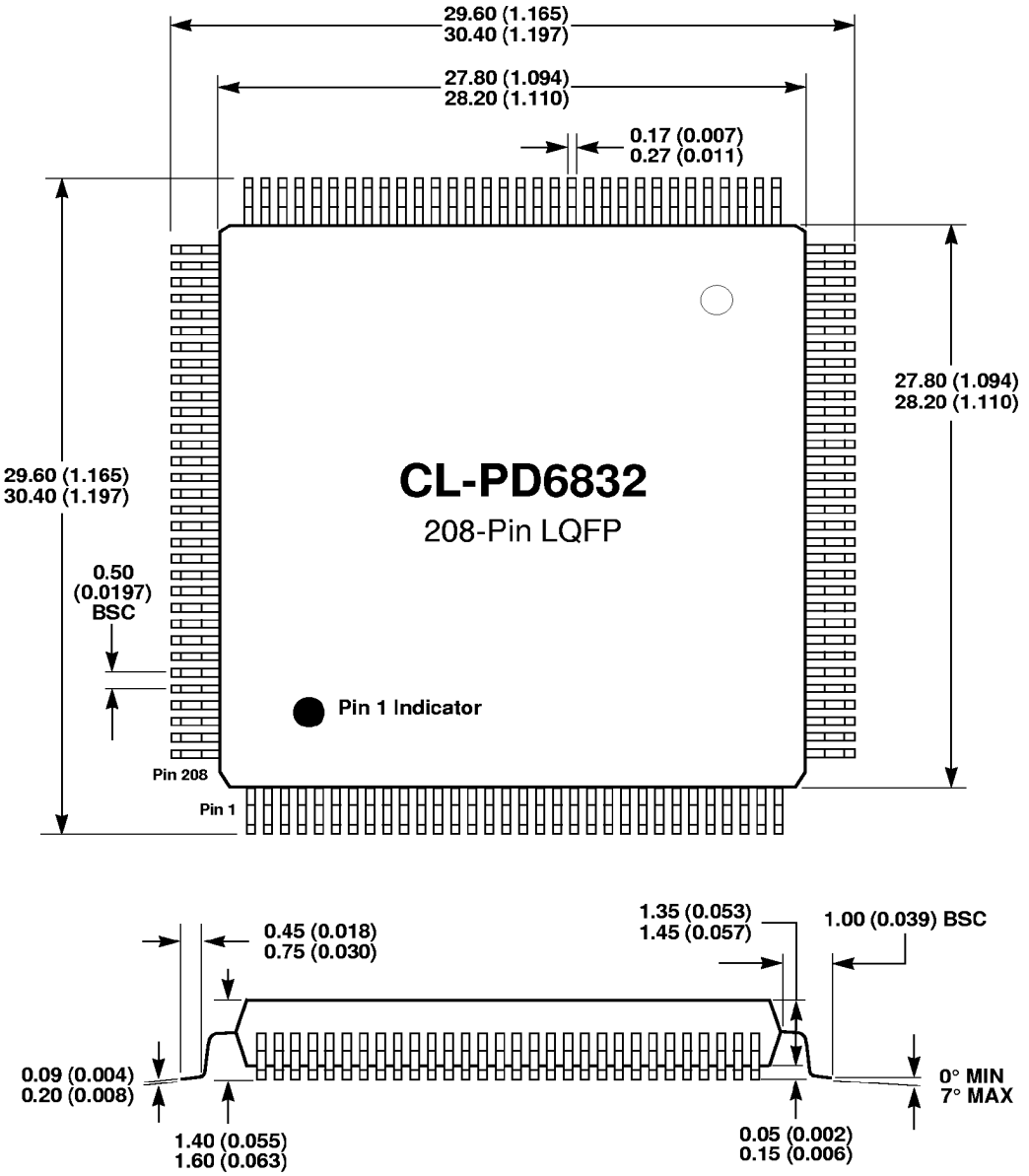
Figure 15-13. 16-Bit System to 8-Bit I/O Card: Odd Byte Timing

16. PACKAGE SPECIFICATIONS



NOTES:

1) Dimensions are in millimeters (inches), and the controlling dimension is millimeter.
2) Drawing above does not reflect exact package pin count.
3) Before beginning any new design with this device, please contact Cirrus Logic for the latest package information.

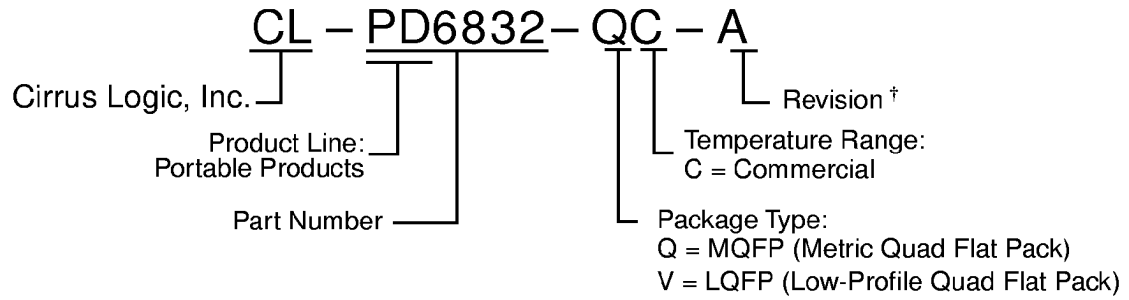


NOTES:

1) Dimensions are in millimeters (inches), and controlling dimension is millimeter.
2) Drawing above does not reflect exact package pin count.
3) Before beginning any new design with this device, please contact Cirrus Logic for the latest package information.

17. ORDERING INFORMATION

The order number for the part is:



† Contact Cirrus Logic for up-to-date information on revisions.

Notes

Appendix A

Pin Listings

This appendix contains the following pin listings:

Table A-1. CL-PD6832 Pin Listing in Numerical Order Using PC Card 16 Signal Names

No.	Pin Name
1	PCI_CLK
2	GNT#
3	REQ#
4	AD31
5	AD30
6	PCI_VCC
7	AD29
8	AD28
9	AD27
10	AD26
11	AD25
12	AD24
13	C/BE3#
14	RING_GND
15	IDSEL
16	AD23
17	AD22
18	AD21
19	AD20
20	AD19
21	PCI_VCC
22	AD18
23	AD17
24	AD16
25	C/BE2#
26	CORE_GND
27	FRAME#
28	RING_GND
29	IRDY#
30	TRDY#
31	DEVSEL#
32	STOP#
33	PERR#
34	SERR#
35	PAR
36	C/BE1#
37	PCI_VCC
38	AD15
39	AD14
40	AD13
41	AD12
42	AD11
43	AD10
44	RING_GND
45	AD9
46	AD8
47	C/BE0#
48	AD7
49	AD6
50	PCI_VCC
51	AD5
52	AD4

No.	Pin Name
53	AD3
54	AD2
55	AD1
56	AD0
57	RING_GND
58	LOCK#
59	A_D3
60	A_SOCKET_VCC
61	A_-CD1
62	A_D4
63	A_D11
64	A_D5
65	A_D12
66	A_D6
67	A_D13
68	A_D7
69	A_D14
70	A_-CE1
71	A_D15
72	RING_GND
73	A_A10
74	A_-CE2
75	A_-OE
76	A_VS1
77	A_A11
78	A_-IORD
79	CORE_VDD
80	A_A9
81	A_-IOWR
82	A_A8
83	A_A17
84	A_A13
85	A_A18
86	A_A14
87	CORE_GND
88	A_A19
89	A_-WE
90	A_A20
91	A_RDY/-IREQ
92	A_A21
93	A_A16
94	A_A22
95	A_A15
96	A_A23
97	A_A12
98	A_SOCKET_VCC
99	A_A24
100	A_A7
101	RING_GND
102	A_A25
103	A_A6
104	A_VS2

No.	Pin Name
105	A_A5
106	A_RESET
107	A_A4
108	A_-WAIT
109	A_A3
110	A_-INPACK
111	A_A2
112	A_-REG
113	A_A1
114	A_BVD2/-SPKR/-LED
115	RING_GND
116	A_A0
117	A_SOCKET_VCC
118	A_BVD1/-STSCHG/-RI
119	A_D0
120	A_D8
121	A_D1
122	A_D9
123	A_D2
124	A_D10
125	A_WP/-IOIS16
126	A_-CD2
127	+5V
128	SPKR_OUT*‡
129	RING_GND
130	SLATCH/SMBCLK‡
131	SDATA/SMBDATA‡
132	SCLK
133	LED_OUT*/ HW_SUSPEND#‡
134	CORE_VDD
135	B_D3
136	B_-CD1
137	B_D4
138	B_D11
139	B_D5
140	B_D12
141	B_D6
142	B_D13
143	B_SOCKET_VCC
144	B_D7
145	B_D14
146	RING_GND
147	B_-CE1
148	B_D15
149	B_A10
150	B_-CE2
151	B_-OE
152	B_VS1
153	B_A11
154	B_-IORD
155	B_A9
156	B_-IOWR

No.	Pin Name
157	B_A8
158	B_A17
159	B_A13
160	B_SOCKET_VCC
161	B_A18
162	B_A14
163	RING_GND
164	B_A19
165	B_-WE
166	B_A20
167	B_RDY/-IREQ
168	B_A21
169	B_A16
170	B_A22
171	B_A15
172	B_A23
173	B_A12
174	B_A24
175	B_A7
176	B_A25
177	CORE_GND
178	B_A6
179	B_VS2
180	CORE_VDD
181	B_A5
182	B_RESET
183	B_A4
184	B_-WAIT
185	B_A3
186	B_-INPACK
187	B_A2
188	B_-REG#
189	B_A1
190	B_BVD2/-SPKR/-LED
191	B_A0
192	B_BVD1/-STSCHG/-RI
193	RING_GND
194	B_D0
195	B_D8
196	B_D1
197	B_D9
198	B_D2
199	B_D10
200	B_SOCKET_VCC
201	B_WP/-IOIS16
202	B_-CD2
203	INTA#
204	INTB#/RI_OUT*
205	SOUT#/ISLD/IRQSER
206	SIN#/ISDAT
207	RST#
208	CLKRUN#

Table A-2. CL-PD6832 Pin Listing in Numerical Order Using PC Card 32 Signal Names

No.	Pin Name
1	PCI_CLK
2	GNT#
3	REQ#
4	AD31
5	AD30
6	PCI_VCC
7	AD29
8	AD28
9	AD27
10	AD26
11	AD25
12	AD24
13	C/BE3#
14	RING_GND
15	IDSEL
16	AD23
17	AD22
18	AD21
19	AD20
20	AD19
21	PCI_VCC
22	AD18
23	AD17
24	AD16
25	C/BE2#
26	CORE_GND
27	FRAME#
28	RING_GND
29	IRDY#
30	TRDY#
31	DEVSEL#
32	STOP#
33	PERR#
34	SERR#
35	PAR
36	C/BE1#
37	PCI_VCC
38	AD15
39	AD14
40	AD13
41	AD12
42	AD11
43	AD10
44	RING_GND
45	AD9
46	AD8
47	C/BE0#
48	AD7
49	AD6
50	PCI_VCC
51	AD5
52	AD4

No.	Pin Name
53	AD3
54	AD2
55	AD1
56	AD0
57	RING_GND
58	LOCK#
59	A_CAD0
60	A_SOCKET_VCC
61	A_CCD1#
62	A_CAD1
63	A_CAD2
64	A_CAD3
65	A_CAD4
66	A_CAD5
6 7	A_CAD6
68	A_CAD7
69	A_RFU
70	A_CCBE0#
71	A_CAD8
72	RING_GND
73	A_CAD9
74	A_CAD10
75	A_CAD11
76	A_CVS1
77	A_CAD12
78	A_CAD13
79	CORE_VDD
80	A_CAD14
81	A_CAD15
82	A_CCBE1#
83	A_CAD16
84	A_CPAR
85	A_RFU
86	A_CPERR#
87	CORE_GND
88	A_CBLOCK#
89	A_CGNT#
90	A_CSTOP#
91	A_CINT#
92	A_CDEVSEL#
93	A_CCLK
94	A_CTRDY#
95	A_CIRDY#
96	A_CFRAME#
97	A_CCBE2#
98	A_SOCKET_VCC
99	A_CAD17
100	A_CAD18
101	RING_GND
102	A_CAD19
103	A_CAD20
104	A_CVS2

No.	Pin Name
105	A_CAD21
106	A_CRST#
107	A_CAD22
108	A_CSERR#
109	A_CAD23
110	A_CREQ#
111	A_CAD24
112	A_CCBE3#
113	A_CAD25
114	A_CAUDIO
115	RING_GND
116	A_CAD26
117	A_SOCKET_VCC
118	A_CSTSCHG
119	A_CAD27
120	A_CAD28
121	A_CAD29
122	A_CAD30
123	A_RFU
124	A_CAD31
125	A_CCLKRUN#
126	A_CCD2#
127	+5V
128	SPKR_OUT*
129	RING_GND
130	SLATCH
131	SDATA
132	SCLK
133	LED_OUT*/ HW_SUSPEND#
134	CORE_VDD
135	B_CAD0
136	B_CCD1#
137	B_CAD1
138	B_CAD2
139	B_CAD3
140	B_CAD4
141	B_CAD5
142	B_CAD6
143	B_SOCKET_VCC
144	B_CAD7
145	B_RFU
146	RING_GND
147	B_CCBE0#
148	B_CAD8
149	B_CAD9
150	B_CAD10
151	B_CAD11
152	B_CVS1
153	B_CAD12
154	B_CAD13
155	B_CAD14
156	B_CAD15

No.	Pin Name
157	B_CCBE1#
158	B_CAD16
159	B_CPAR
160	B_SOCKET_VCC
161	B_RFU
162	B_CPERR#
163	RING_GND
164	B_CBLOCK#
165	B_CGNT#
166	B_CSTOP#
167	B_CINT#
168	B_CDEVSEL#
169	B_CCLK
170	B_CTRDY#
171	B_CIRDY#
172	B_CFRAME#
173	B_CCBE2#
174	B_CAD17
175	B_CAD18
176	B_CAD19
177	CORE_GND
178	B_CAD20
179	B_CVS2
180	CORE_VDD
181	B_CAD21
182	B_CRST#
183	B_CAD22
184	B_CSERR#
185	B_CAD23
186	B_CREQ#
187	B_CAD24
188	B_CCBE3#
189	B_CAD25
190	B_CAUDIO
191	B_CAD26
192	B_CSTSCHG
193	RING_GND
194	B_CAD27
195	B_CAD28
196	B_CAD29
197	B_CAD30
198	B_RFU
199	B_CAD31
200	B_SOCKET_VCC
201	B_CCLKRUN#
202	B_CCD2#
203	INTA#
204	INTB#/RI_OUT*
205	SOUT#/ISLD/IRQSER
206	SIN#/ISDAT
207	RST#
208	CLKRUN#

Table A-3. CL-PD6832 Pin Listing in Alphabetical Order Using PC Card 16 Signal Names

Pin Name	No.
A_A0	116
A_A1	113
A_A2	111
A_A3	109
A_A4	107
A_A5	105
A_A6	103
A_A7	100
A_A8	82
A_A9	80
A_A10	73
A_A11	77
A_A12	97
A_A13	84
A_A14	86
A_A15	95
A_A16	93
A_A17	83
A_A18	85
A_A19	88
A_A20	90
A_A21	92
A_A22	94
A_A23	96
A_A24	99
A_A25	102
A_BVD1/ -STSCHG/-RI	118
A_BVD2/ -SPKR/-LED	114
A_-CD1	61
A_-CD2	126
A_-CE1	70
A_-CE2	74
A_D0	119
A_D1	121
A_D2	123
A_D3	59
A_D4	62
A_D5	64
A_D6	66
A_D7	68
A_D8	120
A_D9	122
A_D10	124
A_D11	63
A_D12	65
A_D13	67
A_D14	69
A_D15	71
A_-INPACK	110
A_-IORD	78
A_-IOWR	81
A_-OE	75

Pin Name	No.
A_RDY/-IREQ	91
A_REG	112
A_RESET	106
A_VS1	76
A_VS2	104
A_-WAIT	108
A_-WE	89
A_WP/-IOIS16	125
A_SOCKET_VCC	60
A_SOCKET_VCC	98
A_SOCKET_VCC	117
AD0	56
AD1	55
AD2	54
AD3	53
AD4	52
AD5	51
AD6	49
AD7	48
AD8	46
AD9	45
AD10	43
AD11	42
AD12	41
AD13	40
AD14	39
AD15	38
AD16	24
AD17	23
AD18	22
AD19	20
AD20	19
AD21	18
AD22	17
AD23	16
AD24	12
AD25	11
AD26	10
AD27	9
AD28	8
AD29	7
AD30	5
AD31	4
B_A0	191
B_A1	189
B_A2	187
B_A3	185
B_A4	183
B_A5	181
B_A6	178
B_A7	175
B_A8	157
B_A9	155
B_A10	149

Pin Name	No.
B_A11	153
B_A12	173
B_A13	159
B_A14	162
B_A15	171
B_A16	169
B_A17	158
B_A18	161
B_A19	164
B_A20	166
B_A21	168
B_A22	170
B_A23	172
B_A24	174
B_A25	176
B_BVD1/ -STSCHG/-RI	192
B_BVD2/ -SPKR/-LED	190
B_-CD1	136
B_-CD2	202
B_-CE1	147
B_-CE2	150
B_D0	194
B_D1	196
B_D2	198
B_D3	135
B_D4	137
B_D5	139
B_D6	141
B_D7	144
B_D8	195
B_D9	197
B_D10	199
B_D11	138
B_D12	140
B_D13	142
B_D14	145
B_D15	148
B_-INPACK	186
B_-IORD	154
B_-IOWR	156
B_-OE	151
B_RDY/-IREQ	167
B_-REG#	188
B_RESET	182
B_VS1	152
B_VS2	179
B_-WAIT	184
B_-WE	165
B_WP/-IOIS16	201
B_SOCKET_VCC	143
B_SOCKET_VCC	160
B_SOCKET_VCC	200

Pin Name	No.
C/BE0#	47
C/BE1#	36
C/BE2#	25
C/BE3#	13
CLKRUN#	208
CORE_GND	26
CORE_GND	87
CORE_GND	177
CORE_VDD	79
CORE_VDD	134
CORE_VDD	180
DEVSEL#	31
FRAME#	27
GNT#	2
IDSEL	15
IRDY#	29
INTA#	203
INTB#/RI_OUT*	204
LED_OUT*/ HW_SUSPEND#‡	133
LOCK#	58
PAR	35
PCI_CLK	1
PCI_VCC	6
PCI_VCC	21
PCI_VCC	37
PCI_VCC	50
PERR#	33
REQ#	3
RING_GND	14
RING_GND	28
RING_GND	44
RING_GND	57
RING_GND	72
RING_GND	101
RING_GND	115
RING_GND	129
RING_GND	146
RING_GND	163
RING_GND	193
RST#	207
SCLK	132
SDATA/SMBDATA‡	131
SERR#	34
SIN#/ISDAT	206
SLATCH/SMBCLK‡	130
SOUT#/ISLD/ IRQSER	205
SPKR_OUT*‡	128
STOP#	32
TRDY#	30
+5V	127

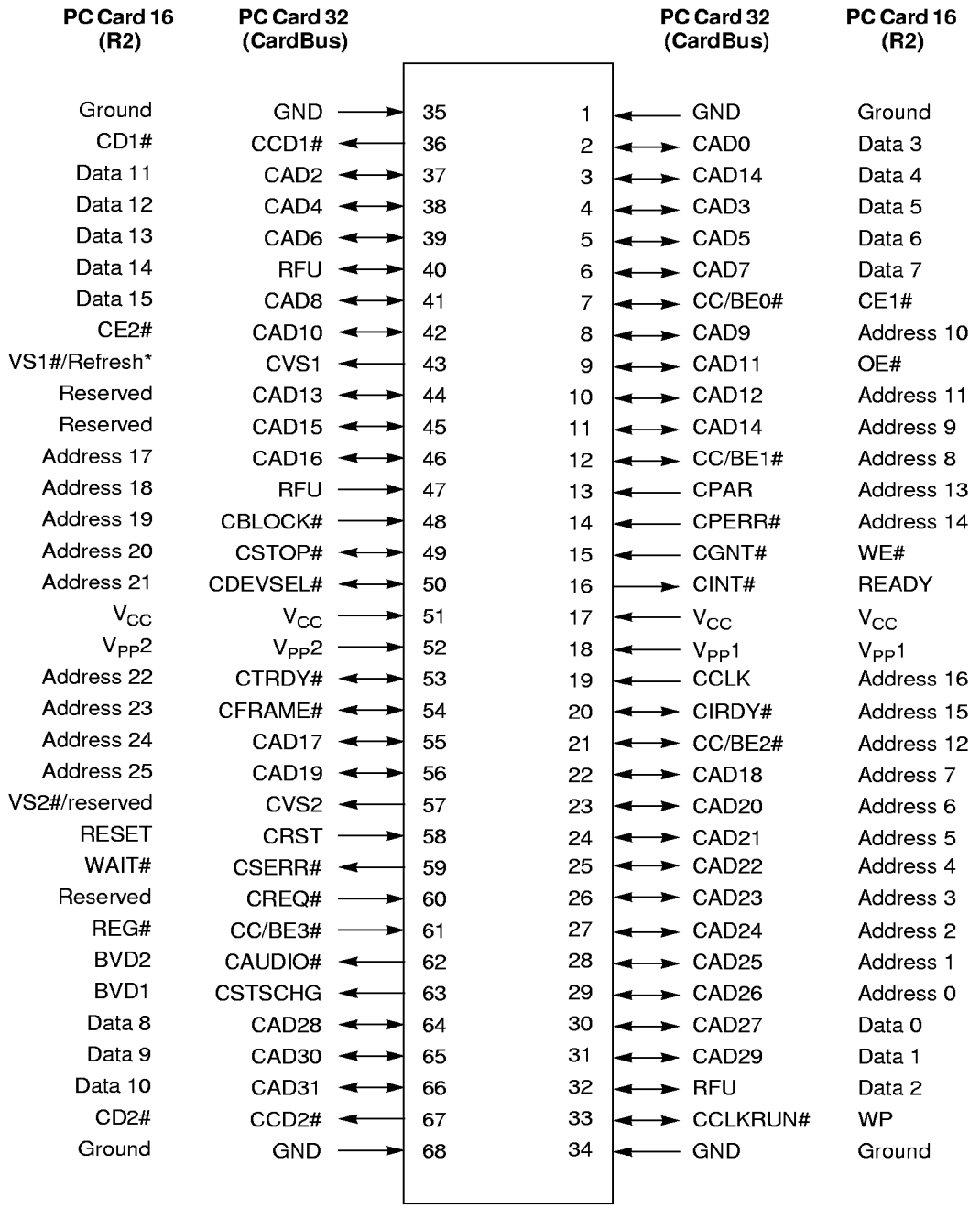
Table A-4. CL-PD6832 Pin Listing in Alphabetical Order Using PC Card 32 Signal Names

Pin Name	No.
A_CAD0	59
A_CAD1	62
A_CAD2	63
A_CAD3	64
A_CAD4	65
A_CAD5	66
A_CAD6	67
A_CAD7	68
A_CAD8	71
A_CAD9	73
A_CAD10	74
A_CAD11	75
A_CAD12	77
A_CAD13	78
A_CAD14	80
A_CAD15	81
A_CAD16	83
A_CAD17	99
A_CAD18	100
A_CAD19	102
A_CAD20	103
A_CAD21	105
A_CAD22	107
A_CAD23	109
A_CAD24	111
A_CAD25	113
A_CAD26	116
A_CAD27	119
A_CAD28	120
A_CAD29	121
A_CAD30	122
A_CAD31	124
A_CAUDIO	114
A_CBLOCK#	88
A_CCBE0#	70
A_CCBE1#	82
A_CCBE2#	97
A_CCBE3#	112
A_CCD1#	61
A_CCD2#	126
A_CCLK	93
A_CCLKRUN#	125
A_CDEVSEL#	92
A_CFRAME#	96
A_CGNT#	89
A_CINT#	91
A_CIRDY#	95
A_CPAR	84
A_CPERR#	86
A_CREQ#	110
A_CRST#	106
A_CSERR#	108
A_CSTOP#	90

Pin Name	No.
A_CSTSCHG	118
A_CTRDY#	94
A_CVS1	76
A_CVS2	104
A_RFU	69
A_RFU	85
A_RFU	123
A_SOCKET_VCC	60
A_SOCKET_VCC	98
A_SOCKET_VCC	117
AD0	56
AD1	55
AD2	54
AD3	53
AD4	52
AD5	51
AD6	49
AD7	48
AD8	46
AD9	45
AD10	43
AD11	42
AD12	41
AD13	40
AD14	39
AD15	38
AD16	24
AD17	23
AD18	22
AD19	20
AD20	19
AD21	18
AD22	17
AD23	16
AD24	12
AD25	11
AD26	10
AD27	9
AD28	8
AD29	7
AD30	5
AD31	4
B_CAD0	135
B_CAD1	137
B_CAD2	138
B_CAD3	139
B_CAD4	140
B_CAD5	141
B_CAD6	142
B_CAD7	144
B_CAD8	148
B_CAD9	149
B_CAD10	150

Pin Name	No.
B_CAD11	151
B_CAD12	153
B_CAD13	154
B_CAD14	155
B_CAD15	156
B_CAD16	158
B_CAD17	174
B_CAD18	175
B_CAD19	176
B_CAD20	178
B_CAD21	181
B_CAD22	183
B_CAD23	185
B_CAD24	187
B_CAD25	189
B_CAD26	191
B_CAD27	194
B_CAD28	195
B_CAD29	196
B_CAD30	197
B_CAD31	199
B_CAUDIO	190
B_CBLOCK#	164
B_CCBE0#	147
B_CCBE1#	157
B_CCBE2#	173
B_CCBE3#	188
B_CCD1#	136
B_CCD2#	202
B_CCLK	169
B_CCLKRUN#	201
B_CDEVSEL#	168
B_CFRAME#	172
B_CGNT#	165
B_CINT#	167
B_CIRDY#	171
B_CPAR	159
B_CPERR#	162
B_CREQ#	186
B_CRST#	182
B_CSERR#	184
B_CSTOP#	166
B_CSTSCHG	192
B_SOCKET_VCC	143
B_SOCKET_VCC	160
B_SOCKET_VCC	200
B_CTRDY#	170
B_CVS1	152
B_CVS2	179
B_RFU	145
B_RFU	161
B_RFU	198
C/BE0#	47

Pin Name	No.
C/BE1#	36
C/BE2#	25
C/BE3#	13
CLKRUN#	208
CORE_GND	26
CORE_GND	87
CORE_GND	177
CORE_VDD	79
CORE_VDD	134
CORE_VDD	180
DEVSEL#	31
FRAME#	27
GNT#	2
IDSEL	15
IRDY#	29
INTA#	203
INTB#/RI-OUT*	204
LED_OUT*/ HW_SUSPEND#	133
LOCK#	58
PAR	35
PCI_CLK	1
PCI_VCC	6
PCI_VCC	21
PCI_VCC	37
PCI_VCC	50
PERR#	33
REQ#	3
RING_GND	14
RING_GND	28
RING_GND	44
RING_GND	57
RING_GND	72
RING_GND	101
RING_GND	115
RING_GND	129
RING_GND	146
RING_GND	163
RING_GND	193
RST#	207
SCLK	132
SDATA	131
SERR#	34
SIN#/ISDAT	206
SLATCH	130
SOUT#/ISLD/ IRQSER	205
SPKR_OUT*	128
STOP#	32
TRDY#	30
+5V	127



NOTE: RFU is reserved for future use. *VS1# was named Refresh in PCMCIA 2.1.

Figure A-1. PC Card Connector

Table A-5. PCI Bus Pin Listing (for reference only)

Pin	5-V Board		Universal Board		3.3-V Board	
	Side B	Side A	Side B	Side A	Side B	Side A
1	+12V	TRST#	+12V	TRST#	+12V	TRST#
2	TCK	+12V	TCK	+12V	TCK	+12V
3	Ground	TMS	Ground	TMS	Ground	TMS
4	TDO	TDI	TDO	TDI	TDO	TDI
5	+5V	+5V	+5V	+5V	+5V	+5V
6	+5V	INTA#	+5V	INTA#	+5V	INTA#
7	INTB#	INTC#	INTB#	INTC#	INTB#	INTC#
8	INTD#	+5V	INTD#	+5V	INTD#	+5V
9	PRSNT1#	Reserved	PRSNT1#	Reserved	PRSNT1#	Reserved
10	Reserved	+5V	Reserved	$+V_{I/O}$	Reserved	+3.3V
11	PRSNT2#	Reserved	PRSNT2#	Reserved	PRSNT2#	Reserved
12	Ground	Ground	Keyway		Keyway	
13	Ground	Ground	Keyway		Keyway	
14	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
15	Ground	RST#	Ground	RST#	Ground	RST#
16	CLK	+5V	CLK	$+V_{I/O}$	CLK	+3.3V
17	Ground	GNT#	Ground	GNT#	Ground	GNT#
18	REQ#	Ground	REQ#	Ground	REQ#	Ground
19	+5V	Ground	$+V_{I/O}$	Ground	+3.3V	Ground
20	AD[31]	AD[30]	AD[31]	AD[30]	AD[31]	AD[30]
21	AD[29]	+3.3V	AD[29]	+3.3V	AD[29]	+3.3V
22	Ground	AD[28]	Ground	AD[28]	Ground	AD[28]
23	AD[27]	AD[26]	AD[27]	AD[26]	AD[27]	AD[26]
24	AD[25]	Ground	AD[25]	Ground	AD[25]	Ground
25	+3.3V	AD[24]	+3.3V	AD[24]	+3.3V	AD[24]
26	C/BE[3]#	IDSEL	C/BE[3]#	IDSEL	C/BE[3]#	IDSEL
27	AD[23[	+3.3V	AD[23[	+3.3V	AD[23[	+3.3V
28	Ground	AD[22]	Ground	AD[22]	Ground	AD[22]
29	AD[21]	AD[20]	AD[21]	AD[20]	AD[21]	AD[20]
30	AD[19]	Ground	AD[19]	Ground	AD[19]	Ground
31	+3.3V	AD[18]	+3.3V	AD[18]	+3.3V	AD[18]
32	AD[17]	AD[16]	AD[17]	AD[16]	AD[17]	AD[16]
33	C/BE[2]#	+3.3V	C/BE[2]#	+3.3V	C/BE[2]#	+3.3V

Table A-5. PCI Bus Pin Listing (for reference only) *(cont.)*

Pin	5-V Board		Universal Board		3.3-V Board	
	Side B	Side A	Side B	Side A	Side B	Side A
34	Ground	FRAME#	Ground	FRAME#	Ground	FRAME#
35	IRDY#	Ground	IRDY#	Ground	IRDY#	Ground
36	+3.3V	TRDY#	+3.3V	TRDY#	+3.3V	TRDY#
37	DEVSEL#	Ground	DEVSEL#	Ground	DEVSEL#	Ground
38	Ground	STOP#	Ground	STOP#	Ground	STOP#
39	LOCK#	+3.3V	LOCK#	+3.3V	LOCK#	+3.3V
40	PERR#	SDONE	PERR#	SDONE	PERR#	SDONE
41	+3.3V	SBO#	+3.3V	SBO#	+3.3V	SBO#
42	SERR#	Ground	SERR#	Ground	SERR#	Ground
43	+3.3V	PAR	+3.3V	PAR	+3.3V	PAR
44	C/BE[1]#	AD[15]	C/BE[1]#	AD[15]	C/BE[1]#	AD[15]
45	AD[14]	+3.3V	AD[14]	+3.3V	AD[14]	+3.3V
46	Ground	AD[13]	Ground	AD[13]	Ground	AD[13]
47	AD[12]	AD[11]	AD[12]	AD[11]	AD[12]	AD[11]
48	AD[10]	Ground	AD[10]	Ground	AD[10]	Ground
49	Ground	AD[09]	M66EN	AD[09]	M66EN	AD[09]
50	Keyway		Keyway		Ground	Ground
51	Keyway		Keyway		Ground	Ground
52	AD[08]	C/BE[0]#	AD[08]	C/BE[0]#	AD[08]	C/BE[0]#
53	AD[07]	+3.3V	AD[07]	+3.3V	AD[07]	+3.3V
54	+3.3V	AD[08]	+3.3V	AD[08]	+3.3V	AD[08]
55	AD[05]	AD[04]	AD[05]	AD[04]	AD[05]	AD[04]
56	AD[03]	Ground	AD[03]	Ground	AD[03]	Ground
57	Ground	AD[02]	Ground	AD[02]	Ground	AD[02]
58	AD[01]	AD[00]	AD[01]	AD[00]	AD[01]	AD[00]
59	+5V	+5V	$+V_{I/O}$	$+V_{I/O}$	+3.3V	+3.3V
60	ACK64#	ACK64#	ACK64#	REQ64#	ACK64#	REQ64#
61	+5V	+5V	+5V	+5V	+5V	+5V
62	+5V	+5V	+5V	+5V	+5V	+5V