

- Supports PCI Local Bus Specification 2.1 and PCI-to-PCI Bridge Specification 1.0
- 3.3-V Core Logic With Universal PCI Interfaces Compatible With 3.3-V and 5-V PCI Signaling Environments
- Supports Two 32-Bit, 33-MHz PCI Buses
- Provides Internal Arbitration for Up to Six Secondary Bus Masters With Programmable Control
- Provides Six Secondary PCI Bus Clock Outputs
- Supports Burst Transfers to Maximize Data Throughput on Both PCI Buses
- Provides Two Extension Windows
- EEPROM Interface for Loading Texas Instruments (TI™) Subsystem ID and Subsystem Vendor ID
- Four Primary and Four Secondary General-Purpose I/Os
- Independent Read and Write Buffers for Each Direction
- Secondary Positive Decode
- Predictable Latency: Compliant With PCI Local Bus Specification 2.1
- External Arbiter Option
- Provides Concurrent Operation
- Serial IRQ Bridging
- Propagates Bus Locking
- Supports PCI Clock Run
- Secondary Bus Driven Low During Reset
- Docking Connect Detects
- PCI Local Bus Specification 2.0-Compliant Device Optimization
- Advanced Submicron, Low-Power CMOS Technology
- Provides VGA/Palette Memory and I/O, and Subtractive Decoding Options
- Packaged in 176-Pin Plastic Quad Flatpack

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# PCI2030 PCI-TO-PCI BRIDGE

XCPS012 – DECEMBER 1997

## description

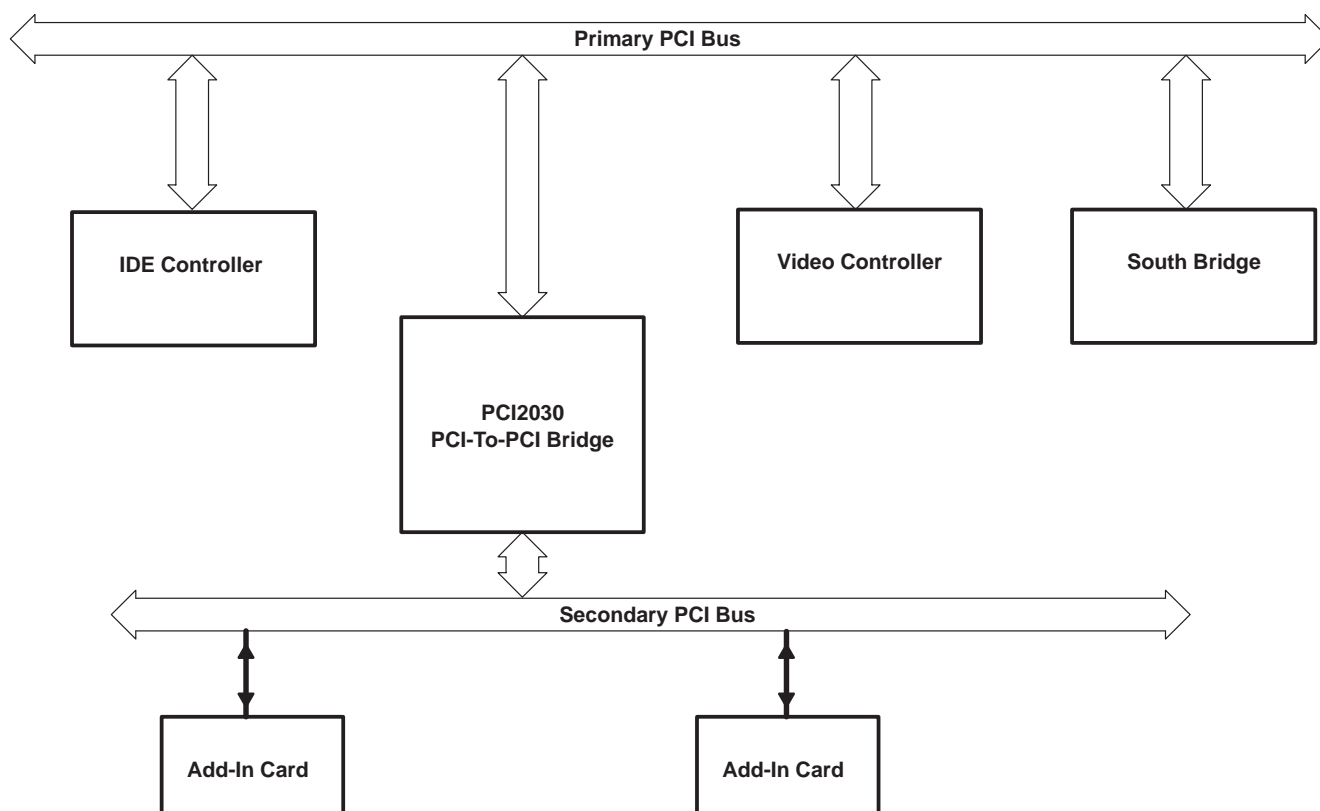
The TI PCI2030 PCI-to-PCI bridge provides a high-performance connection path between two peripheral component interconnect (PCI) buses. Transactions can occur between a master on one PCI bus and a target on another PCI bus. The bridge supports burst-mode transfers to maximize data throughput, and the two bus traffic paths through the bridge act independently.

The PCI2030 bridge is compliant with the PCI Local Bus Specification 2.1, and can be used to overcome the electrical loading limit of ten devices per PCI bus by creating hierarchical buses. Furthermore, add-in cards requiring multiple PCI devices can use the bridge to overcome the electrical loading limit of one PCI device per slot.

The PCI2030 bridge is also compliant with the PCI-to-PCI Bridge Specification 1.0, and implements many additional features that make it an ideal solution for bridging two PCI buses. It can be configured for subtractive decoding, and negative decoding can be disabled on the secondary interface. Two extension windows are also included for special decoding purposes. The serial- and parallel-port addresses can also be programmed for positive decoding on the primary interface. The bridge implements many other features, listed above, that add performance and flexibility.

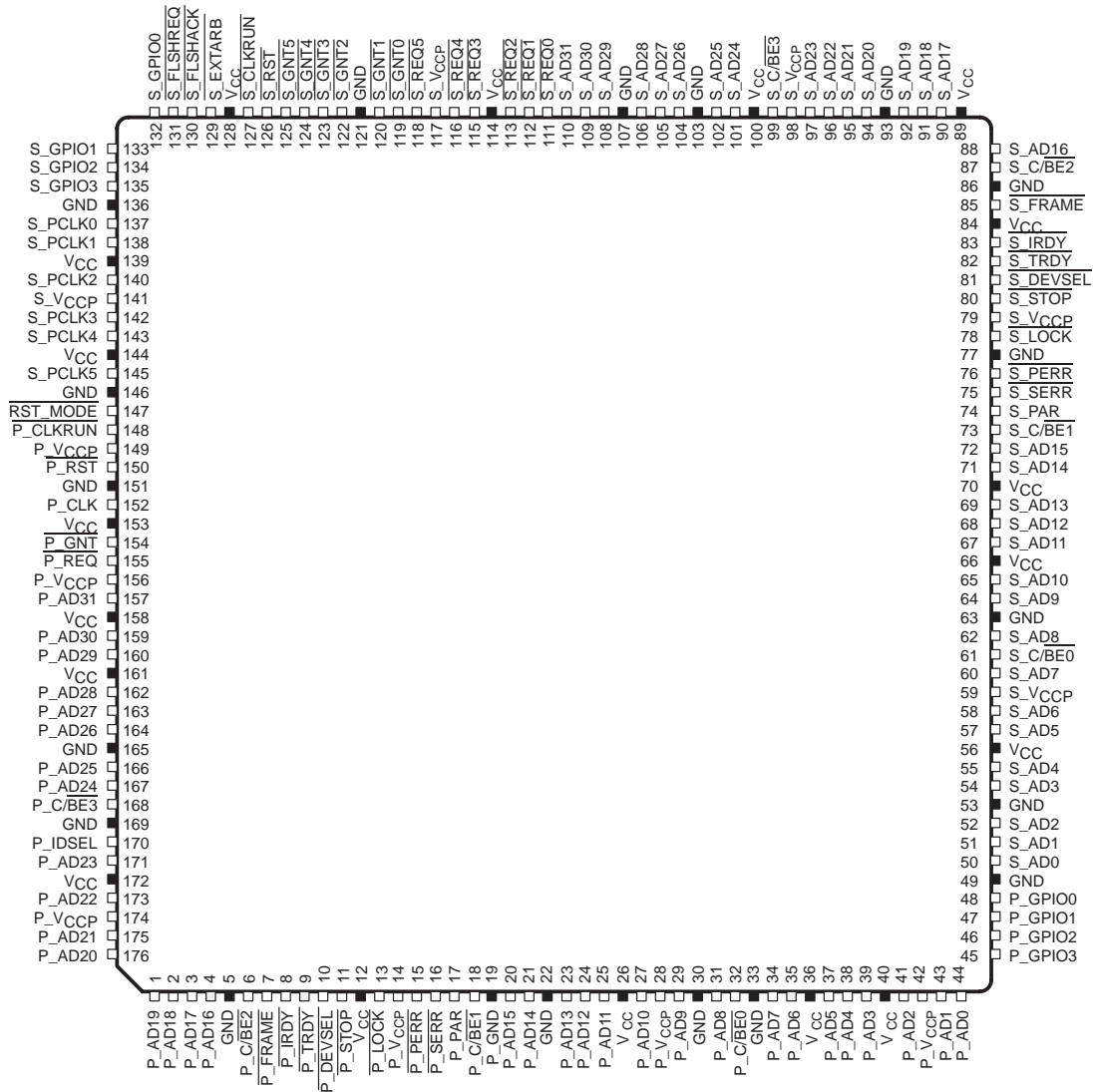
An advanced CMOS process is utilized to achieve low system-power consumption while operating at PCI clock rates up to 33 MHz.

## system block diagram



## terminal assignments

### PGF PACKAGE (TOP VIEW)



## Terminal Functions

### primary PCI system

TERMINAL NAME	NO.	I/O TYPE	FUNCTION
P_CLK	152	I	Primary PCI bus clock. P_CLK provides timing for all transactions on the primary PCI bus. All primary PCI signals are sampled at rising edge of P_CLK.
$\overline{\text{R\_RST}}$	150	I	PCI reset. When the primary PCI bus reset is asserted, $\overline{\text{P\_RST}}$ causes the bridge to 3-state all output buffers and reset all internal registers. When asserted, the device is completely nonfunctional. During P_RST, the secondary interface is driven low. After $\overline{\text{P\_RST}}$ is deasserted, the bridge is in its default state.

### primary PCI address and data

TERMINAL NAME	NO.	I/O TYPE	FUNCTION
P_AD31 P_AD30 P_AD29 P_AD28 P_AD27 P_AD26 P_AD25 P_AD24 P_AD23 P_AD22 P_AD21 P_AD20 P_AD19 P_AD18 P_AD17 P_AD16 P_AD15 P_AD14 P_AD13 P_AD12 P_AD11 P_AD10 P_AD9 P_AD8 P_AD7 P_AD6 P_AD5 P_AD4 P_AD3 P_AD2 P_AD1 P_AD0	157 159 160 162 163 164 166 167 171 173 175 176 1 2 3 4 20 21 23 24 25 27 29 31 34 35 37 38 39 41 43 44	I/O	Primary address/data bus. These signals make up the multiplexed PCI address and data bus on the primary interface. During the address phase of a primary bus PCI cycle, P_AD31–P_AD0 contain a 32-bit address or other destination information. During the data phase, P_AD31–P_AD0 contain data.
P_C/BE3 P_C/BE2 P_C/BE1 P_C/BE0	168 6 18 32	I/O	Primary bus commands and byte enables. These signals are multiplexed on the same PCI terminals. During the address phase of a primary bus PCI cycle, P_C/BE3–P_C/BE0 define the bus command. During the data phase, this 4-bit bus is used as byte enables. The byte enables determine which byte paths of the full 32-bit data bus carry meaningful data. P_C/BE0 applies to byte 0 (P_AD7–P_AD0), P_C/BE1 applies to byte 1 (P_AD15–P_AD8), P_C/BE2 applies to byte 2 (P_AD23–P_AD16), and P_C/BE3 applies to byte 3 (P_AD31–P_AD24).
$\overline{\text{P\_CLKRUN}}$	148	I/O	Primary PCI bus clock run. $\overline{\text{P\_CLKRUN}}$ is used by the central resource to request permission to stop the PCI clock or to slow it down.

## Terminal Functions (Continued)

### primary PCI interface control

TERMINAL NAME	NO.	I/O TYPE	FUNCTION
$\overline{\text{P\_DEVSEL}}$	10	I/O	Primary device select. The bridge asserts $\overline{\text{P\_DEVSEL}}$ to claim a PCI cycle as the target device. As a PCI initiator on the primary bus, the bridge monitors $\overline{\text{P\_DEVSEL}}$ until a target responds. If no target responds before time-out occurs, then the bridge terminates the cycle with an initiator abort.
$\overline{\text{P\_FRAME}}$	7	I/O	Primary cycle frame. $\overline{\text{P\_FRAME}}$ is driven by the initiator of a primary bus cycle. $\overline{\text{P\_FRAME}}$ is asserted to indicate that a bus transaction is beginning, and data transfers continue while this signal is asserted. When $\overline{\text{P\_FRAME}}$ is deasserted, the primary bus transaction is in the final data phase.
$\overline{\text{P\_GNT}}$	154	I	Primary bus grant to bridge. $\overline{\text{P\_GNT}}$ is driven by the primary PCI bus arbiter to grant the bridge access to the primary PCI bus after the current data transaction has completed. $\overline{\text{P\_GNT}}$ may or may not follow a primary bus request, depending on the primary bus parking algorithm.
P_GPIO3 P_GPIO2 P_GPIO1 P_GPIO0	45 46 47 48	I/O	Primary bus general-purpose I/O terminals. These terminals are provided for general input/output use in system design.
P_IDSEL	170	I	Initialization device select. P_IDSEL selects the bridge during configuration space accesses. P_IDSEL can be connected to one of the upper 24 PCI address lines on the primary PCI bus. Note: There is no IDSEL signal interfacing the secondary PCI bus; thus, the entire configuration space of the bridge can only be accessed from the primary bus.
$\overline{\text{P\_IRDY}}$	8	I/O	Primary initiator ready. $\overline{\text{P\_IRDY}}$ indicates the primary bus initiator's ability to complete the current data phase of the transaction. A data phase is completed on a rising edge of P_CLK where both $\overline{\text{P\_IRDY}}$ and $\overline{\text{P\_TRDY}}$ are asserted. Until $\overline{\text{P\_IRDY}}$ and $\overline{\text{P\_TRDY}}$ are both sampled asserted, wait states are inserted.
$\overline{\text{P\_LOCK}}$	13	I/O	Primary PCI bus lock. $\overline{\text{P\_LOCK}}$ is used to lock the primary bus and gain exclusive access as an initiator.
P_PAR	17	I/O	Primary parity. In all primary bus read and write cycles, the bridge calculates even parity across the P_AD and P_C/BE buses. As an initiator during PCI write cycles, the bridge outputs this parity indicator with a one-P_CLK delay. As a target during PCI read cycles, the calculated parity is compared to the initiator's parity indicator; a misdemeanor can result in a parity error assertion (P_PERR).
$\overline{\text{P\_PERR}}$	15	I/O	Primary parity error indicator. $\overline{\text{P\_PERR}}$ is driven by a primary bus PCI device to indicate that calculated parity does not match P_PAR when P_PERR is enabled through bit 6 of the command register.
$\overline{\text{P\_REQ}}$	155	O	Primary PCI bus request. $\overline{\text{P\_REQ}}$ is asserted by the bridge to request access to the primary PCI bus as an initiator.
$\overline{\text{P\_SERR}}$	16	O	Primary system error. Output pulsed from the bridge when enabled through the command register indicating a system error has occurred. The bridge need not be the target of the primary PCI cycle to assert $\overline{\text{P\_SERR}}$ . When bit 6 is enabled in the bridge control register, $\overline{\text{P\_SERR}}$ will also pulse, indicating that a system error has occurred on one of the subordinate buses downstream from the bridge.
$\overline{\text{P\_STOP}}$	11	I/O	Primary cycle stop signal. $\overline{\text{P\_STOP}}$ is driven by a PCI target to request the initiator to stop the current primary bus transaction. $\overline{\text{P\_STOP}}$ is used for target disconnects and is commonly asserted by target devices that do not support burst data transfers.
RST_MODE	147	I	If RST_MODE is asserted during $\overline{\text{P\_RST}}$ , it causes $\overline{\text{S\_RST}}$ to be asserted and the secondary clocks to be turned off.
$\overline{\text{P\_TRDY}}$	9	I/O	Primary target ready. $\overline{\text{P\_TRDY}}$ indicates the primary bus target's ability to complete the current data phase of the transaction. A data phase is completed on a rising edge of P_CLK where both $\overline{\text{P\_IRDY}}$ and $\overline{\text{P\_TRDY}}$ are asserted. Until both $\overline{\text{P\_IRDY}}$ and $\overline{\text{P\_TRDY}}$ are asserted, wait states are inserted.

## Terminal Functions (Continued)

### secondary PCI system

TERMINAL NAME	NO.	I/O TYPE	FUNCTION
S_PCLK5 S_PCLK4 S_PCLK3 S_PCLK2 S_PCLK1 S_PCLK0	145 143 142 140 138 137	O	Secondary PCI bus clock. Provides timing for all transactions on the secondary PCI bus. All secondary PCI signals are sampled at the rising edge of S_CLK5–S_CLK0.
<u>S_CLKRUN</u>	127	I/O	Secondary PCI bus clock run. <u>S_CLKRUN</u> is output by the bridge to indicate that S_CLK will be stopped. <u>S_CLKRUN</u> is driven by secondary bus PCI devices to request that S_CLK be stopped.
<u>S_EXTARB</u>	129	I	Secondary external arbiter enable. When <u>S_EXTARB</u> is asserted, the secondary external arbiter is enabled. When the external arbiter is enabled, <u>S_REQ0</u> is reconfigured as a secondary bus grant input to the bridge and <u>S_GNT0</u> is reconfigured as a secondary bus master request to the external arbiter on the secondary bus.
<u>S_RST</u>	126	O	Secondary PCI reset. <u>S_RST</u> is a logical OR of <u>P_RST</u> and the state of the secondary bus reset bit of the bridge control register. <u>S_RST</u> is asynchronous with respect to the state of the secondary interface CLK signal.

## Terminal Functions (Continued)

### secondary PCI address and data

TERMINAL NAME	NO.	I/O TYPE	FUNCTION
S_AD31 S_AD30 S_AD29 S_AD28 S_AD27 S_AD26 S_AD25 S_AD24 S_AD23 S_AD22 S_AD21 S_AD20 S_AD19 S_AD18 S_AD17 S_AD16 S_AD15 S_AD14 S_AD13 S_AD12 S_AD11 S_AD10 S_AD9 S_AD8 S_AD7 S_AD6 S_AD5 S_AD4 S_AD3 S_AD2 S_AD1 S_AD0	110 109 108 106 105 104 102 101 97 96 95 94 92 91 90 88 72 71 69 68 67 65 64 62 60 58 57 55 54 52 51 50	I/O	Secondary address/data bus. These signals make up the multiplexed PCI address and data bus on the secondary interface. During the address phase of a secondary bus PCI cycle, S_AD31–S_AD0 contain a 32-bit address or other destination information. During the data phase, S_AD31–S_AD0 contain data.
S_C/BE3 S_C/BE2 S_C/BE1 S_C/BE0	99 87 73 61	I/O	Secondary bus commands and byte enables. These signals are multiplexed on the same PCI terminals. During the address phase of a secondary bus PCI cycle, S_C/BE3–S_C/BE0 define the bus command. During the data phase, this 4-bit bus is used as byte enables. The byte enables determine which byte paths of the full 32-bit data bus carry meaningful data. S_C/BE0 applies to byte 0 (S_AD7–S_AD0), S_C/BE1 applies to byte 1 (S_AD15–S_AD8), S_C/BE2 applies to byte 2 (S_AD23–S_AD16), and S_C/BE3 applies to byte 3 (S_AD31–S_AD24).
S_DEVSEL	81	I/O	Secondary device select. The bridge asserts S_DEVSEL to claim a PCI cycle as the target device. As a PCI initiator on the secondary bus, the bridge monitors S_DEVSEL until a target responds. If no target responds before timeout occurs, then the bridge terminates the cycle with an initiator abort.
S_FRAME	85	I/O	Secondary cycle frame. S_FRAME is driven by the initiator of a secondary bus cycle. S_FRAME is asserted to indicate that a bus transaction is beginning and data transfers continue while S_FRAME is asserted. When S_FRAME is deasserted, the secondary bus transaction is in the final data phase.
S_GNT5 S_GNT4 S_GNT3 S_GNT2 S_GNT1 S_GNT0	125 124 123 122 120 119	O	Secondary bus grant to the bridge. The bridge provides internal arbitration and these signals are used to grant potential secondary PCI bus masters access to the bus. Seven potential initiators (including the bridge) can be located on the secondary PCI bus.  When the internal arbiter is disabled, S_GNT0 is reconfigured as an external secondary bus request signal for the bridge.

## Terminal Functions (Continued)

### secondary PCI interface control

TERMINAL NAME	NO.	I/O TYPE	FUNCTION
S_GPIO3 S_GPIO2 S_GPIO1 S_GPIO0	135 134 133 132	I/O	Secondary general-purpose I/O terminals. These terminals are provided for general-purpose input/output use in system design.
<u>S_IRDY</u>	83	I/O	Secondary initiator ready. <u>S_IRDY</u> indicates the secondary bus initiator's ability to complete the current data phase of the transaction. A data phase is completed on a rising edge of S_CLK where both <u>S_IRDY</u> and <u>S_TRDY</u> are asserted; until <u>S_IRDY</u> and <u>S_TRDY</u> are asserted, wait states are inserted.
<u>S_LOCK</u>	78	I/O	Secondary lock <u>S_LOCK</u> is used to lock the secondary bus and gain exclusive access as an initiator.
S_PAR	74	I/O	Secondary parity. In all secondary bus read and write cycles, the bridge calculates even parity across the S_AD and S_C/BE buses. As an initiator during PCI write cycles, the bridge outputs this parity indicator with a one-S_CLK delay. As a target during PCI read cycles, the calculated parity is compared to the initiator's parity indicator. A miscompare can result in a parity error assertion ( <u>S_PERR</u> ).
<u>S_PERR</u>	76	I/O	Secondary parity error indicator. <u>S_PERR</u> is driven by a secondary bus PCI device to indicate that calculated parity does not match S_PAR when enabled through the command register.
<u>S_REQ5</u> <u>S_REQ4</u> <u>S_REQ3</u> <u>S_REQ2</u> <u>S_REQ1</u> <u>S_REQ0</u>	118 116 115 113 112 111	I	Secondary PCI bus request signals. The bridge provides internal arbitration, and these signals are used as inputs from secondary PCI bus initiators requesting the bus. Seven potential initiators (including the bridge) can be located on the secondary PCI bus.  When the internal arbiter is disabled, <u>S_REQ0</u> is reconfigured as an external secondary bus grant for the bridge.
<u>S_SERR</u>	75	I	Secondary system error. <u>S_SERR</u> is passed through the primary interface by the bridge if enabled through the bridge control register. <u>S_SERR</u> is never asserted by the bridge.
<u>S_STOP</u>	80	I/O	Secondary cycle stop signal. <u>S_STOP</u> is driven by a PCI target to request the initiator to stop the current secondary bus transaction. <u>S_STOP</u> is used for target disconnects and is commonly asserted by target devices that do not support burst data transfers.
<u>S_TRDY</u>	82	I/O	Secondary target ready. <u>S_TRDY</u> indicates the secondary bus target's ability to complete the current data phase of the transaction. A data phase is completed on a rising edge of S_CLK where both <u>S_IRDY</u> and <u>S_TRDY</u> are asserted; until <u>S_IRDY</u> and <u>S_TRDY</u> are asserted, wait states are inserted.
<u>S_FLSHREQ</u>	131	I	Flush request. When <u>S_FLSHREQ</u> is asserted, it signals a request to the PCI2030 to suspend internal write posting. When the bridge is ready to suspend internal write posting, it responds by asserting <u>S_FLSHACK</u> . <u>S_FLSHACK</u> remains asserted until the write posting buffers are empty.
<u>S_FLSHACK</u>	130	O	Flush acknowledge. <u>S_FLSHACK</u> is asserted by the PCI2030 to indicate that the internal write posting is suspended. <u>S_FLSHACK</u> remains asserted until the write posting buffers are empty.

### power supply

TERMINAL NAME	NO.	FUNCTION
GND	5, 19, 22, 30, 33, 49, 53, 63, 77, 86, 93, 103, 107, 121, 136, 146, 151, 161, 165, 169	Device ground terminals
V <sub>CC</sub>	12, 26, 36, 40, 56, 66, 70, 84, 89, 100, 114, 128, 139, 144, 153, 158, 172	Power-supply terminal for core logic (3.3 V)
P_V <sub>CCP</sub>	14, 28, 42, 149, 156, 174	Primary bus-signaling environment supply. P_V <sub>CCP</sub> is used in protection circuitry on primary bus I/O signals.
S_V <sub>CCP</sub>	59, 79, 98, 117, 141	Secondary bus-signaling environment supply. S_V <sub>CCP</sub> is used in protection circuitry on primary bus I/O signals.



**absolute maximum ratings over operating temperature ranges (unless otherwise noted)†**

Supply voltage range: $V_{CC}$	–0.5 V to 4.6 V
$V_{CCP}$	–0.5 V to 6 V
Input voltage range, $V_I$ : Standard	–0.5 V to $V_{CC} + 0.5$ V
Output voltage range, $V_O$ : Standard	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) (see Note 1)	±20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 2)	±20 mA
Storage temperature range, $T_{stg}$	–65°C to 150°C
Virtual junction temperature, $T_J$	150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. Applies to external input and bidirectional buffers.  $V_I > V_{CC}$  does not apply to fail-safe terminals.  
2. Applies to external output and bidirectional buffers.  $V_O > V_{CC}$  does not apply to fail-safe terminals.

**recommended operating conditions**

			MIN	NOM	MAX	UNIT
$t_t$	Input transition (rise and fall) time	CMOS compatible	1		4	ns
$T_A$	Operating ambient temperature range	Commercial	0	25	70	°C
$T_J^\ddagger$	Virtual junction temperature	Commercial	0	25	115	°C

‡ These junction temperatures reflect simulation conditions. The customer is responsible for verifying junction temperature.

**recommended operating conditions for PCI interface**

			OPERATION	MIN	NOM	MAX	UNIT
$V_{CC}$	Core voltage	Commercial	3.3 V	3	3.3	3.6	V
$V_{CCP}$	PCI supply voltage	Commercial	3.3 V	3	3.3	3.6	V
			5 V	4.75	5	5.25	
$V_I$	Input voltage		3.3 V	0		$V_{CCP}$	V
			5 V	0		$V_{CCP}$	
$V_O^\S$	Output voltage		3.3 V	0		$V_{CCP}$	V
			5 V	0		$V_{CCP}$	
$V_{IH}^\P$	High-level input voltage	CMOS compatible	3.3 V	0.5 $V_{CCP}$			V
			5 V	2			
$V_{IL}^\P$	Low-level input voltage	CMOS compatible	3.3 V		0.3 $V_{CCP}$		V
			5 V			0.8	

§ Applies to external output buffers

¶ Applies to external input and bidirectional buffers without hysteresis

# PCI2030

## PCI-TO-PCI BRIDGE

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### electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER	SIDE	TEST CONDITIONS	OPERATION	MIN	MAX	UNIT
$V_{OH}$ High-level output voltage		$I_{OH} = -0.5 \text{ mA}$	3.3 V	$0.9 V_{CC}$		V
		$I_{OH} = -2 \text{ mA}$	5 V	2.4		
$V_{OL}$ Low-level output voltage		$I_{OL} = 1.5 \text{ mA}$	3.3 V	$0.1 V_{CC}$		V
		$I_{OL} = 6 \text{ mA}$	5 V	0.55		
$I_{IH}$ High-level input current	Input pins	$V_I = V_{CC}^{\dagger}$	3.6 V	10		$\mu\text{A}$
			5.25 V	20		
	I/O pins $^{\ddagger}$	$V_I = V_{CC}^{\dagger}$	3.6 V	20		
			5.25 V	25		
$I_{IL}$ Low-level input current	Input pins	$V_I = \text{GND}$	3.6 V to 5.25 V	-1		$\mu\text{A}$
	I/O pins $^{\ddagger}$	$V_I = \text{GND}$	3.6 V to 5.25 V	-20		
$I_{OZ}$ High-impedance output current		$V_O = V_{CCP}$ or GND		$\pm 20$		$\mu\text{A}$

$^{\dagger}$  For PCI pins,  $V_{CC} = V_{CCP}$ .

$^{\ddagger}$  For I/O pins, the input leakage current includes the off-state output current  $I_{OZ}$ .

### PCI clock/reset timing requirements over recommended ranges of supply voltage and operating free-air temperature (see Figure 1, Figure 2, and Figure 3)

	ALTERNATE SYMBOL	MIN	MAX	UNIT
$t_c$ Cycle time, PCLK	$t_{cyc}$	30	$\infty$	ns
$t_{wH}$ Pulse duration, PCLK high	$t_{high}$	11		ns
$t_{wL}$ Pulse duration, PCLK low	$t_{low}$	11		ns
$\Delta v/\Delta t$ Slew rate, PCLK	$t_r, t_f$	1	4	V/ns
$t_w$ Pulse duration, RSTIN	$t_{rst}$	1		ms
$t_{su}$ Setup time, PCLK active at end of $\overline{\text{RSTIN}}$ (see Note 3)	$t_{rst-clk}$	100		$\mu\text{s}$

NOTE 3: The setup and hold times for the secondary are identical to those for the primary; however, the times are relative to the secondary PCI close.

### PCI timing requirements over recommended ranges of supply voltage and operating free-air temperature (see Note 4 and Figure 1 and Figure 4)

	ALTERNATE SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
$t_{pd}$ Propagation delay time	PCLK to shared signal valid delay time $t_{val}$	$C_L = 50 \text{ pF}$ , See Note 5		11	ns
	PCLK to shared signal invalid delay time $t_{inv}$		2		
$t_{en}$ Enable time, high-impedance-to-active delay time from PCLK	$t_{on}$		2		ns
$t_{dis}$ Disable time, active-to-high-impedance delay time from PCLK	$t_{off}$			28	ns
$t_{su}$ Setup time before PCLK valid	$t_{su}$ , See Note 6		7		ns
$t_h$ Hold time after PCLK high	$t_h$ , See Note 6		0		ns

NOTES: 4. This data sheet uses the following conventions to describe time (t) intervals. The format is:  $t_A$ , where *subscript A* indicates the type of dynamic parameter being represented. One of the following is used:  $t_{pd}$  = propagation delay time,  $t_d$  = delay time,  $t_{su}$  = setup time, and  $t_h$  = hold time.

5. PCI shared signals are AD31–AD0,  $\overline{\text{C/BE3}}\text{--}\overline{\text{C/BE0}}$ ,  $\overline{\text{FRAME}}$ ,  $\overline{\text{TRDY}}$ ,  $\overline{\text{IRDY}}$ ,  $\overline{\text{STOP}}$ ,  $\overline{\text{IDSEL}}$ ,  $\overline{\text{DEVSEL}}$ , and  $\overline{\text{PAR}}$ .

6. The setup and hold times for the secondary are identical to those for the primary; however, the times are relative to the secondary PCI close.



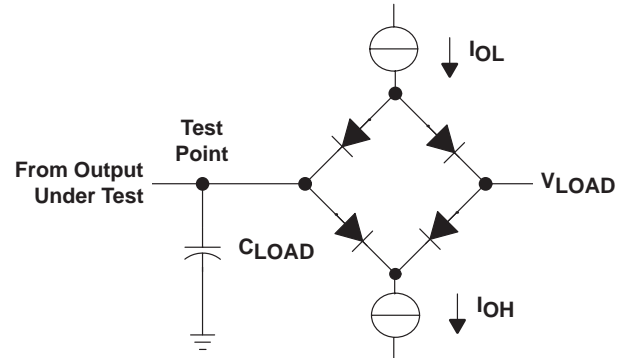
## PARAMETER MEASUREMENT INFORMATION

### LOAD CIRCUIT PARAMETERS

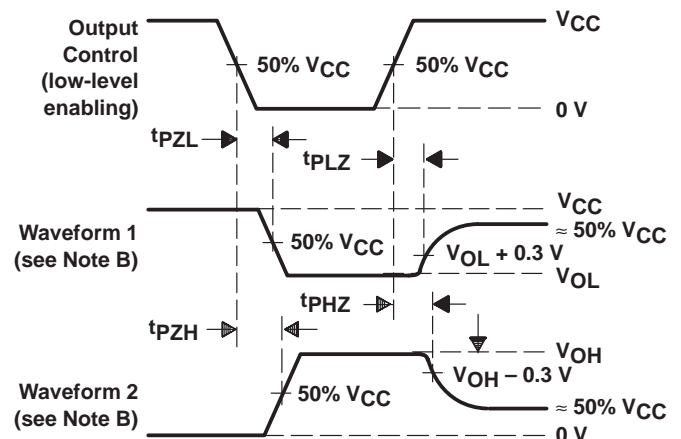
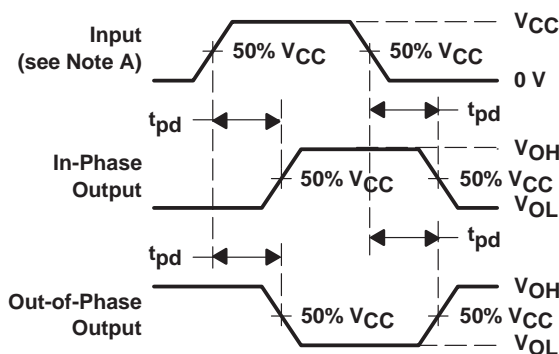
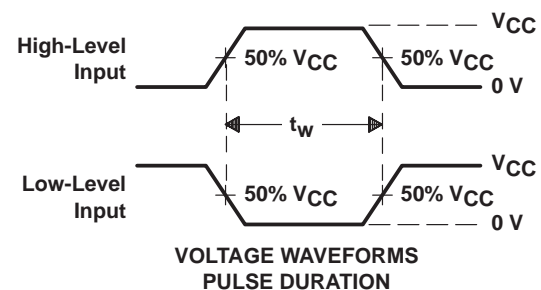
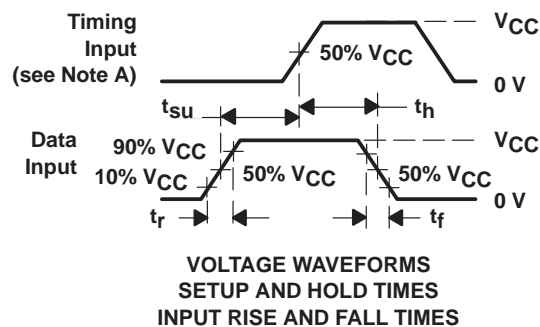
TIMING PARAMETER		$C_{LOAD}^{\dagger}$ (pF)	$I_{OL}$ (mA)	$I_{OH}$ (mA)	$V_{LOAD}$ (V)
$t_{en}$	$t_{PZH}$	50	8	-8	0
	$t_{PZL}$				3
$t_{dis}$	$t_{PHZ}$	50	8	-8	1.5
	$t_{PLZ}$				
$t_{pd}$		50	8	-8	‡

†  $C_{LOAD}$  includes the typical load-circuit distributed capacitance.

‡  $\frac{V_{LOAD} - V_{OL}}{I_{OL}} = 50 \Omega$ , where  $V_{OL} = 0.6 V$ ,  $I_{OL} = 8 mA$



LOAD CIRCUIT



- NOTES: A. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by pulse generators having the following characteristics:  $PRR = 1 MHz$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 6 ns$ ,  $t_f \leq 6 ns$ .
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. For  $t_{PLZ}$  and  $t_{PHZ}$ ,  $V_{OL}$  and  $V_{OH}$  are measured values.

Figure 1. Load Circuit and Voltage Waveforms

PCI BUS PARAMETER MEASUREMENT INFORMATION

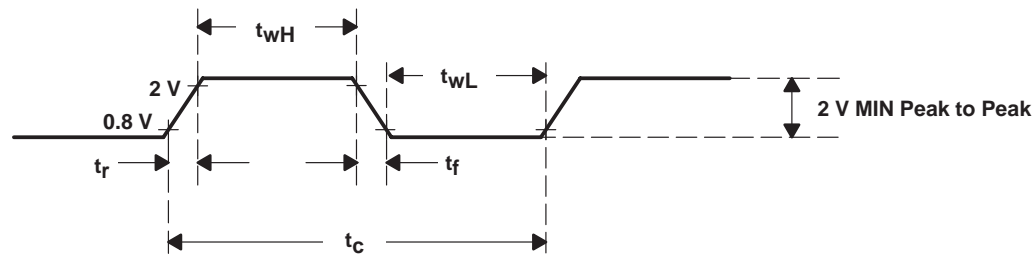


Figure 2. PCLK Timing Waveform

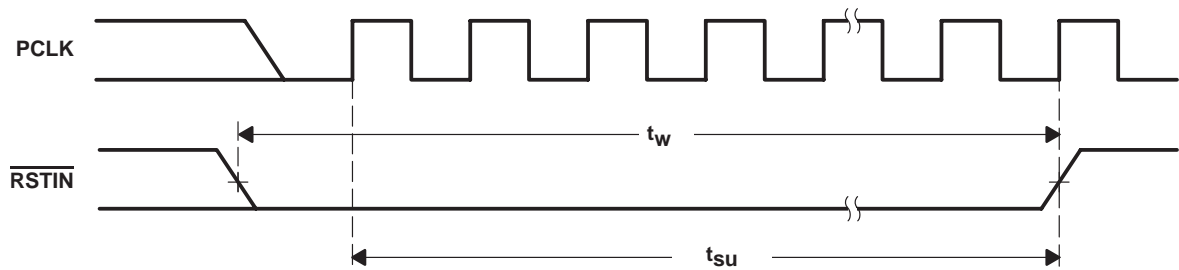


Figure 3.  $\overline{\text{RSTIN}}$  Timing Waveforms

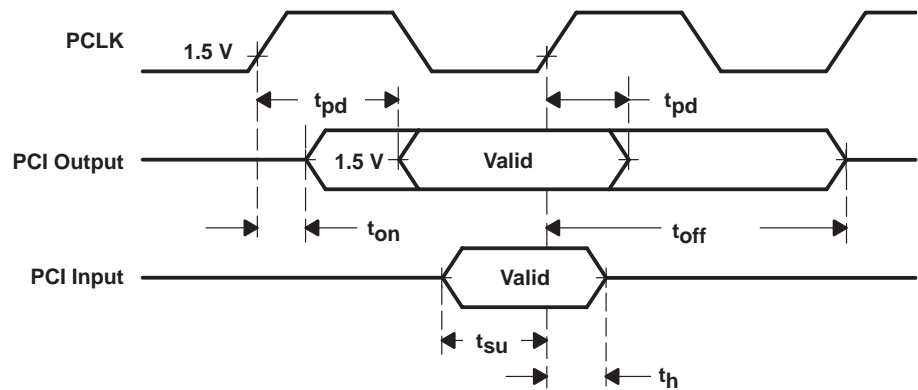
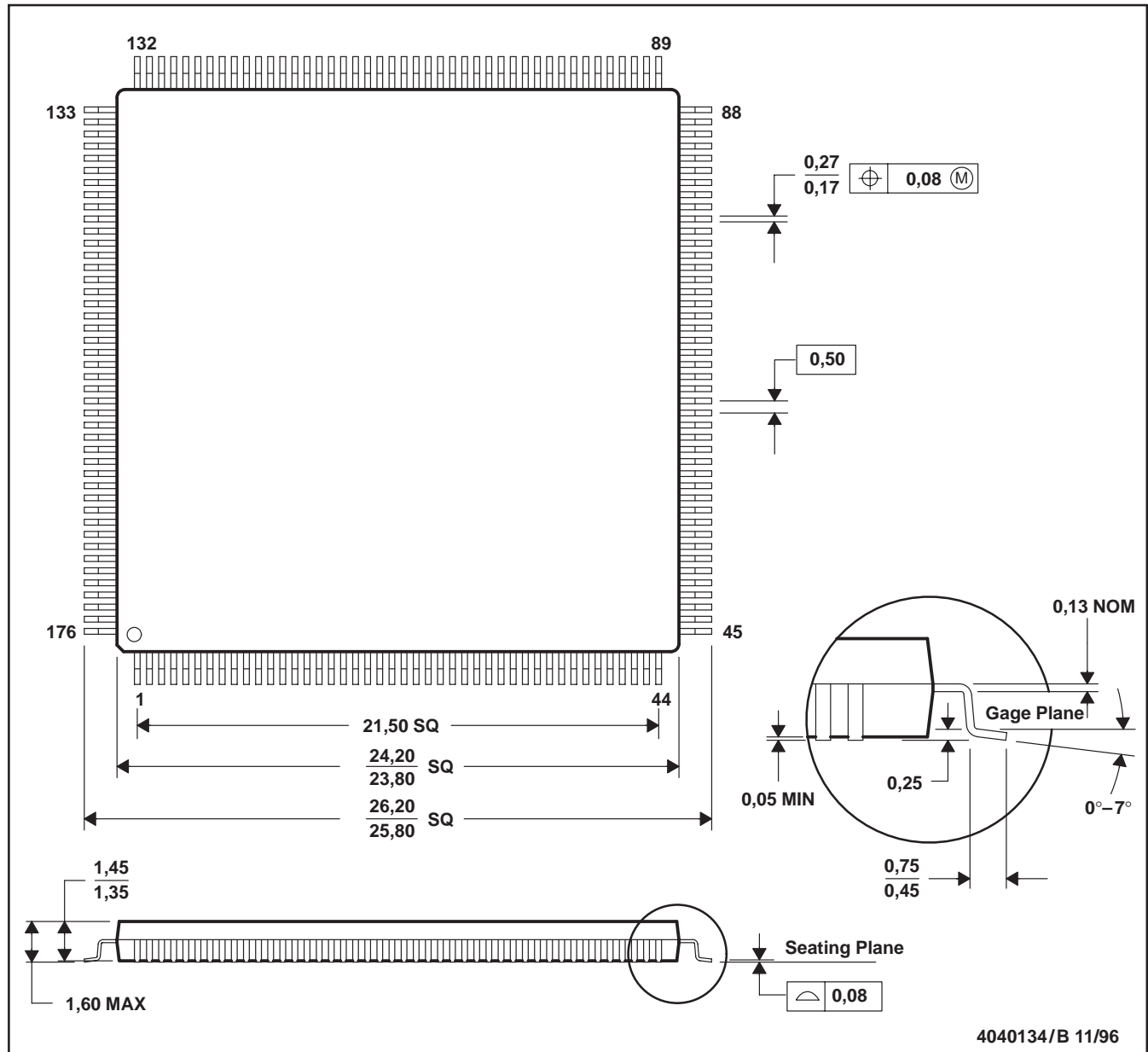


Figure 4. Shared-Signals Timing Waveforms

MECHANICAL DATA

PGF (S-PQFP-G176)

PLASTIC QUAD FLATPACK



- NOTES: A. All linear dimensions are in millimeters.  
B. This drawing is subject to change without notice.  
C. Falls within JEDEC MS-026

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