

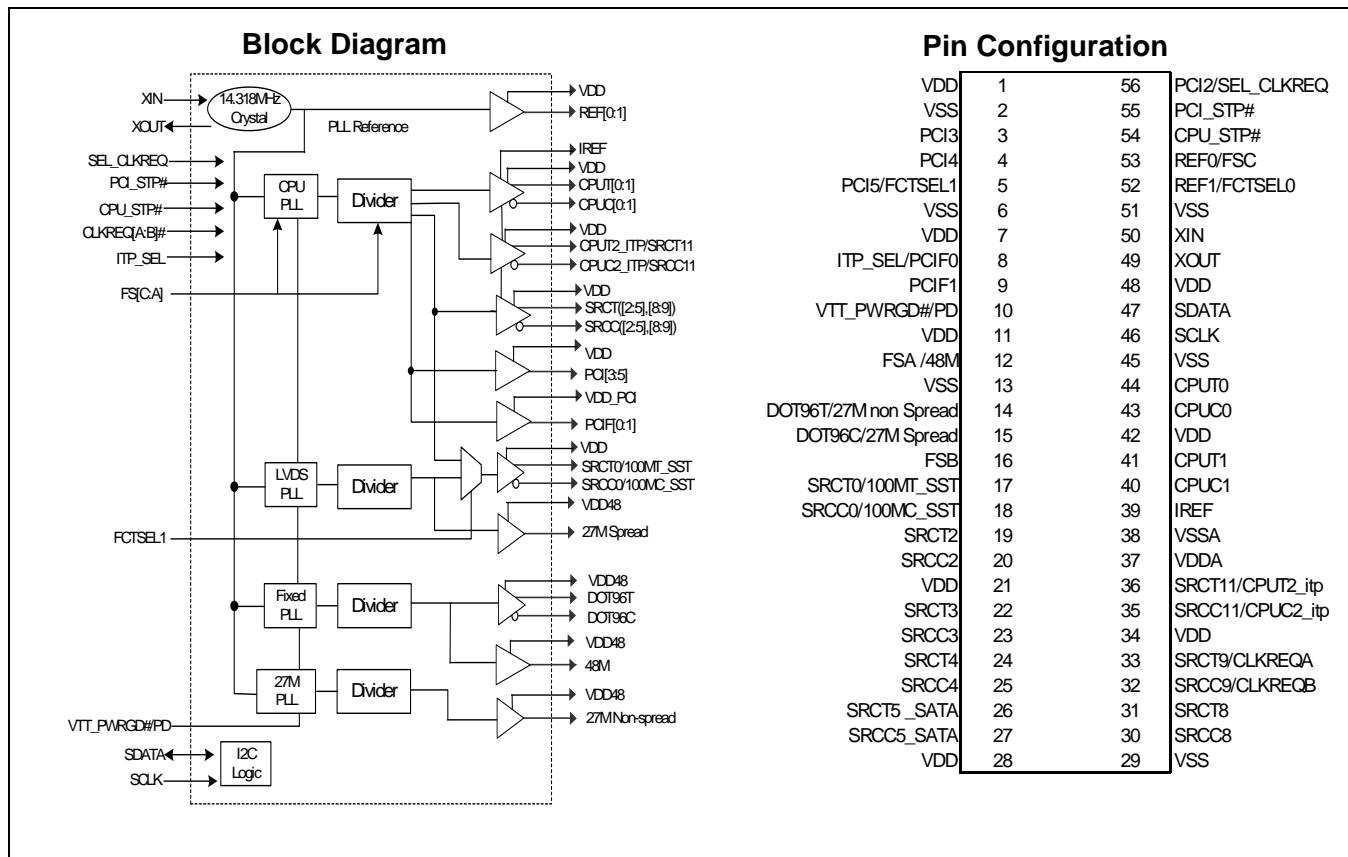
## Clock Generator for Intel® Calistoga Chipset

### Features

- Compliant to Intel® CK410M
- Selectable CPU frequencies
- Differential CPU clock pairs
- 100 MHz differential SRC clocks
- 96 MHz differential dot clock
- 27 MHz Spread and Non-spread video clock
- 48 MHz USB clocks
- SRC clocks independently stoppable through CLKREQ#[A:B]
- 96/100 MHz Spreadable differential video clock

- 33 MHz PCI clock
- Buffered Reference Clock 14.318 MHz
- Low-voltage frequency select input
- I<sup>2</sup>C support with readback capabilities
- Ideal Lexmark Spread Spectrum profile for maximum electromagnetic interference (EMI) reduction
- 3.3V power supply
- 56-pin SSOP/TSSOP packages

| CPU     | SRC    | PCI | REF | DOT96 | USB_48M | LCD | 27M |
|---------|--------|-----|-----|-------|---------|-----|-----|
| x2 / x3 | x5/6/7 | x6  | x 2 | x 1   | x 1     | x1  | x2  |



**Pin Descriptions**

| Pin No.                         | Name                                       | Type           | Description  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
|---------------------------------|--|----------------|--|-----------|-----------|--|--|---------|---------|--------|--------|--------|--------|---|---|--------|--------|-----------|-----------|---|---|--------|--------|-------|-------|---|---|----------------|------------|-------|-------|---|---|---------|-----|-------|-------|
| 1, 7, 11, 21,<br>28, 34, 42, 48 | VDD  | PWR            | <b>3.3V power supply.</b>  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 2, 6, 13, 29,<br>45, 51         | VSS  | GND            | <b>Ground.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 3,4                             | PCI[3:4]                                   | O, SE          | <b>33-MHz clock.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 5                               | PCI5/FCTSEL1                               | O, SE<br>PD    | <b>33 MHz clock/3.3 LVTTL input for selecting for pin 14, 15 (DOT96[T/C], 27M-non-spread and Spread) and pin 17,18 (SRC[T/C]0 or 100M[T/C]_SST) (sampled on the VTT_PWRGD# assertion).</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
|                                 |  |                | <table border="1"> <thead> <tr> <th>FCTSEL1</th><th>FCTSEL0</th><th>PIN 14</th><th>PIN 15</th><th>PIN 17</th><th>PIN 18</th></tr> </thead> <tbody> <tr> <td>0</td><td>0</td><td>DOT96T</td><td>DOT96C</td><td>100MT_SST</td><td>100MC_SST</td></tr> <tr> <td>0</td><td>1</td><td>DOT96T</td><td>DOT96C</td><td>SRCT0</td><td>SRCC0</td></tr> <tr> <td>1</td><td>0</td><td>27M_non spread</td><td>27M_Spread</td><td>SRCT0</td><td>SRCC0</td></tr> <tr> <td>1</td><td>1</td><td>OFF Low</td><td>TBD</td><td>SRCT0</td><td>SRCC0</td></tr> </tbody> </table> |           |           |  |  | FCTSEL1 | FCTSEL0 | PIN 14 | PIN 15 | PIN 17 | PIN 18 | 0 | 0 | DOT96T | DOT96C | 100MT_SST | 100MC_SST | 0 | 1 | DOT96T | DOT96C | SRCT0 | SRCC0 | 1 | 0 | 27M_non spread | 27M_Spread | SRCT0 | SRCC0 | 1 | 1 | OFF Low | TBD | SRCT0 | SRCC0 |
| FCTSEL1                         | FCTSEL0                                    | PIN 14         | PIN 15   | PIN 17    | PIN 18    |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 0                               | 0  | DOT96T         | DOT96C   | 100MT_SST | 100MC_SST |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 0                               | 1  | DOT96T         | DOT96C   | SRCT0     | SRCC0     |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 1                               | 0  | 27M_non spread | 27M_Spread   | SRCT0     | SRCC0     |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 1                               | 1  | OFF Low        | TBD  | SRCT0     | SRCC0     |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 8                               | ITP_SEL/PCIF0                              | I/O, SE        | <b>3.3V LVTTL input to enable SRC[T/C]11 or CPU[T/C]2_ITP / 33 MHz clock output.</b> (sampled on the VTT_PWRGD# assertion).<br>1 = CPU_ITP, 0 = SRC11  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 9                               | PCIF1                                      | I/O, SE        | <b>33-MHz clock output.</b>  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 10                              | VTT_PWRGD#/PD                              | I, PU          | <b>3.3V LVTTL input.</b> This pin is a level sensitive strobe used to latch the FS[C:A], ITP_SEL, FCTSEL[1:0], SEL_CLKREQ#. After VTT_PWRGD# (active LOW) assertion, this pin becomes a real-time input for asserting power-down (active HIGH).  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 12                              | FSA/48M                                    | I/O            | <b>3.3V-tolerant input for CPU frequency selection / Fixed 48-MHz clock output.</b><br>Refer to DC Electrical Specification Table for Vil_FS and Vih_FS specifications.  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 14, 15                          | DOT96T/27M_non spread<br>DOT96C/27M_Spread | O, DIF         | <b>Fixed 96 MHz Differential Clock / Single-ended 27 MHz clocks.</b> When configured for 27-MHz, only the clock on pin 15 contains spread. Selected via FCTSEL[0:1] at VTT_PWRGD# assertion.   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 16                              | FSB  | I              | <b>3.3V-tolerant input for CPU frequency selection.</b><br>Refer to DC Electrical Specification Table for Vil_FS and Vih_FS specifications   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 17,18                           | SRC[T/C]0/<br>100M[T/C]_SST                | O,DIF          | <b>100 MHz Differential Serial Reference Clock / 100 MHz LVDS Differential Clock.</b>  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 19,20,22,23,<br>24,25,30,31     | SRC[T/C]                                   | O, DIF         | <b>100 MHz Differential Serial Reference Clocks.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 26,27                           | SRC[T/C]5_SATA                             | O, DIF         | <b>Differential serial reference clock.</b> Recommended output for SATA.   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 33,32                           | SRCT9/CLKREQ#A,<br>SRCC9/CLKREQ#B          | I/O, PU        | <b>3.3V LVTTL input for enabling assigned SRC clock (active low) / 100 MHz Serial Reference Clock.</b><br>Default function is CLKREQ#  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 36,35                           | CPUT2_ITP/SRCT11,<br>CPUC2_ITP/SRCC11      | O, DIF         | <b>Selectable differential CPU / SRC clock output.</b><br>ITP_EN = 0 @ VTT_PWRGD# assertion = SRC11<br>ITP_EN = 1 @ VTT_PWRGD# assertion =CPU2_ITP   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 37                              | VDDA                                       | PWR            | <b>3.3V power supply for PLL.</b>  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 38                              | VSSA                                       | GND            | <b>Ground for PLL.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 39                              | IREF                                       | I              | <b>A precision resistor is attached to this pin,</b> which is connected to the internal current reference.   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 44,43,41,40                     | CPU[T/C][0:1]                              | O, DIF         | <b>Differential CPU clock outputs.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 46                              | SCLK                                       | I              | <b>SMBus-compatible SCLOCK.</b>  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 47                              | SDATA                                      | I/O<br>OD      | <b>SMBus-compatible SDATA.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 49                              | XOUT                                       | O, SE          | <b>14.318 MHz crystal output.</b>  |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 50                              | XIN  | I              | <b>14.318 MHz crystal input.</b>   |           |           |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |

**Pin Descriptions (continued)**

| Pin No. | Name             | Type           | Description   |           |           |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
|---------|------------------|----------------|---|-----------|-----------|--|--|--|---------|---------|--------|--------|--------|--------|---|---|--------|--------|-----------|-----------|---|---|--------|--------|-------|-------|---|---|----------------|------------|-------|-------|---|---|---------|-----|-------|-------|
| 52      | REF1/FCTSEL0     | I/O, SE PD     | <b>Fixed 14.318 MHz Clock Output / 3.3 LVTTL input for selecting for pin 14, 15 (DOT96[T/C], 27M-non-spread and Spread) and pin 17,18 (SRC[T/C]0 or 100M[T/C]_SST)</b><br>(sampled on the VTT_PWRGD# assertion).  |           |           |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
|         |                  |                | <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>FCTSEL1</th><th>FCTSEL0</th><th>PIN 14</th><th>PIN 15</th><th>PIN 17</th><th>PIN 18</th></tr> <tr> <td>0</td><td>0</td><td>DOT96T</td><td>DOT96C</td><td>100MT SST</td><td>100MC SST</td></tr> <tr> <td>0</td><td>1</td><td>DOT96T</td><td>DOT96C</td><td>SRCT0</td><td>SRCC0</td></tr> <tr> <td>1</td><td>0</td><td>27M non spread</td><td>27M Spread</td><td>SRCT0</td><td>SRCC0</td></tr> <tr> <td>1</td><td>1</td><td>OFF Low</td><td>TBD</td><td>SRCT0</td><td>SRCC0</td></tr> </table> |           |           |  |  |  | FCTSEL1 | FCTSEL0 | PIN 14 | PIN 15 | PIN 17 | PIN 18 | 0 | 0 | DOT96T | DOT96C | 100MT SST | 100MC SST | 0 | 1 | DOT96T | DOT96C | SRCT0 | SRCC0 | 1 | 0 | 27M non spread | 27M Spread | SRCT0 | SRCC0 | 1 | 1 | OFF Low | TBD | SRCT0 | SRCC0 |
| FCTSEL1 | FCTSEL0          | PIN 14         | PIN 15  | PIN 17    | PIN 18    |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 0       | 0                | DOT96T         | DOT96C  | 100MT SST | 100MC SST |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 0       | 1                | DOT96T         | DOT96C  | SRCT0     | SRCC0     |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 1       | 0                | 27M non spread | 27M Spread  | SRCT0     | SRCC0     |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 1       | 1                | OFF Low        | TBD   | SRCT0     | SRCC0     |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 53      | REF0/FSC         | I/O            | <b>Fixed 14.318 MHz clock output / 3.3V-tolerant input for CPU frequency selection</b><br>Refer to DC Electrical Specification Table for ViiFS_C, VimFS_C and VihFS_C specifications  |           |           |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 54      | CPU_STP#         | I, PU          | <b>3.3V LVTTL input for CPU_STP# active LOW.</b>  |           |           |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 55      | PCI_STP#         | I, PU          | <b>3.3V LVTTL input for PCI_STP# active LOW.</b>  |           |           |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |
| 56      | PCI2/SEL_CLKREQ# | I/O, PD SE     | <b>Fixed 33 MHz clock output/3.3V-tolerant input for CLKREQ# pins 32 and 33 selection</b><br>(sampled on the VTT_PWRGD# assertion).<br>0 = CLKREQ#[A:B] functionality<br>1 = SRC[T/C]9 functionality  |           |           |  |  |  |         |         |        |        |        |        |   |   |        |        |           |           |   |   |        |        |       |       |   |   |                |            |       |       |   |   |         |     |       |       |

**Table 1. Frequency Select Table FSA, FSB and FSC**

| FSC | FSB | FSA | CPU     | SRC     | PCIF/PCI | 27MHz  | REF0       | DOT96  | USB    |
|-----|-----|-----|---------|---------|----------|--------|------------|--------|--------|
| 1   | 0   | 1   | 100 MHz | 100 MHz | 33 MHz   | 27 MHz | 14.318 MHz | 96 MHz | 48 MHz |
| 0   | 0   | 1   | 133 MHz | 100 MHz | 33 MHz   | 27 MHz | 14.318 MHz | 96 MHz | 48 MHz |
| 0   | 1   | 1   | 166 MHz | 100 MHz | 33 MHz   | 27 MHz | 14.318 MHz | 96 MHz | 48 MHz |
| 0   | 1   | 0   | 200 MHz | 100 MHz | 33 MHz   | 27 MHz | 14.318 MHz | 96 MHz | 48 MHz |

**Frequency Select Pins (FSA, FSB, and FSC)**

Host clock frequency selection is achieved by applying the appropriate logic levels to FSA, FSB, FSC inputs prior to VTT\_PWRGD# assertion (as seen by the clock synthesizer). Upon VTT\_PWRGD# being sampled low by the clock chip (indicating processor VTT voltage is stable), the clock chip samples the FSA, FSB, and FSC input values. For all logic levels of FSA, FSB, and FSC, VTT\_PWRGD# employs a one-shot functionality in that once a valid low on VTT\_PWRGD# has been sampled, all further VTT\_PWRGD#, FSA, FSB, and FSC transitions will be ignored, except in test mode

## Serial Data Interface

To enhance the flexibility and function of the clock synthesizer, a two-signal serial interface is provided. Through the Serial Data Interface, various device functions, such as individual clock output buffers, can be individually enabled or disabled. The registers associated with the Serial Data Interface initializes to their default setting upon power-up, and therefore use of this interface is optional. Clock device register changes are normally made upon system initialization, if any are required. The interface cannot be used during system operation for power management functions.

## Data Protocol

The clock driver serial protocol accepts byte write, byte read, block write, and block read operations from the controller. For block write/read operation, the bytes must be accessed in sequential order from lowest to highest byte (most significant bit first) with the ability to stop after any complete byte has been transferred. For byte write and byte read operations, the system controller can access individually indexed bytes. The offset of the indexed byte is encoded in the command code, as described in *Table 2*.

The block write and block read protocol is outlined in *Table 3* while *Table 4* outlines the corresponding byte write and byte read protocol. The slave receiver address is 11010010 (D2h).

**Table 2. Command Code Definition**

| Bit   | Description   |
|-------|---|
| 7     | 0 = Block read or block write operation, 1 = Byte read or byte write operation  |
| (6:0) | Byte offset for byte read or byte write operation. For block read or block write operations, these bits should be '0000000' |

**Table 3. Block Read and Block Write Protocol**

| Block Write Protocol |  | Block Read Protocol |                                     |
|----------------------|--|---------------------|-------------------------------------|
| Bit                  | Description  | Bit                 | Description                         |
| 1                    | Start  | 1                   | Start                               |
| 8:2                  | Slave address – 7 bits   | 8:2                 | Slave address – 7 bits              |
| 9                    | Write  | 9                   | Write                               |
| 10                   | Acknowledge from slave   | 10                  | Acknowledge from slave              |
| 18:11                | Command Code – 8 bits  | 18:11               | Command Code – 8 bits               |
| 19                   | Acknowledge from slave   | 19                  | Acknowledge from slave              |
| 27:20                | Byte Count – 8 bits<br>(Skip this step if I <sup>2</sup> C_EN bit set) | 20                  | Repeat start                        |
| 28                   | Acknowledge from slave   | 27:21               | Slave address – 7 bits              |
| 36:29                | Data byte 1 – 8 bits   | 28                  | Read = 1                            |
| 37                   | Acknowledge from slave   | 29                  | Acknowledge from slave              |
| 45:38                | Data byte 2 – 8 bits   | 37:30               | Byte Count from slave – 8 bits      |
| 46                   | Acknowledge from slave   | 38                  | Acknowledge                         |
| ....                 | Data Byte /Slave Acknowledges  | 46:39               | Data byte 1 from slave – 8 bits     |
| ....                 | Data Byte N – 8 bits   | 47                  | Acknowledge                         |
| ....                 | Acknowledge from slave   | 55:48               | Data byte 2 from slave – 8 bits     |
| ....                 | Stop   | 56                  | Acknowledge                         |
|                      |  | ....                | Data bytes from slave / Acknowledge |
|                      |  | ....                | Data Byte N from slave – 8 bits     |
|                      |  | ....                | NOT Acknowledge                     |
|                      |  | ....                | Stop                                |

**Table 4. Byte Read and Byte Write Protocol**

| Byte Write Protocol |                        | Byte Read Protocol |                          |
|---------------------|------------------------|--------------------|--------------------------|
| Bit                 | Description            | Bit                | Description              |
| 1                   | Start                  | 1                  | Start                    |
| 8:2                 | Slave address – 7 bits | 8:2                | Slave address – 7 bits   |
| 9                   | Write                  | 9                  | Write                    |
| 10                  | Acknowledge from slave | 10                 | Acknowledge from slave   |
| 18:11               | Command Code – 8 bits  | 18:11              | Command Code – 8 bits    |
| 19                  | Acknowledge from slave | 19                 | Acknowledge from slave   |
| 27:20               | Data byte – 8 bits     | 20                 | Repeated start           |
| 28                  | Acknowledge from slave | 27:21              | Slave address – 7 bits   |
| 29                  | Stop                   | 28                 | Read                     |
|                     |                        | 29                 | Acknowledge from slave   |
|                     |                        | 37:30              | Data from slave – 8 bits |
|                     |                        | 38                 | NOT Acknowledge          |
|                     |                        | 39                 | Stop                     |

## Control Registers

### Byte 0: Control Register 0

| Bit | @Pup | Name                     | Description  |
|-----|------|--------------------------|--|
| 7   | 1    | RESERVED                 | RESERVED   |
| 6   | 1    | RESERVED                 | RESERVED   |
| 5   | 1    | SRC[T/C]5                | SRC[T/C]5 Output Enable<br>0 = Disable (Tri-state), 1 = Enable           |
| 4   | 1    | SRC[T/C]4                | SRC[T/C]4 Output Enable<br>0 = Disable (Tri-state), 1 = Enable           |
| 3   | 1    | SRC[T/C]3                | SRC[T/C]3 Output Enable<br>0 = Disable (Tri-state), 1 = Enable           |
| 2   | 1    | SRC[T/C]2                | SRC[T/C]2 Output Enable<br>0 = Disable (Tri-state), 1 = Enable           |
| 1   | 1    | RESERVED                 | RESERVED, Set = 1  |
| 0   | 1    | SRC[T/C]0 /100M[T/C]_SST | SRC[T/C]0 /100M[T/C]_SST Output Enable<br>0 = Disable (Hi-Z), 1 = Enable |

### Byte 1: Control Register 1

| Bit | @Pup | Name                | Description  |
|-----|------|---------------------|--|
| 7   | 1    | PCIF0               | PCIF0 Output Enable<br>0 = Disabled, 1 = Enabled                                   |
| 6   | 1    | 27M_nss_DOT_96[T/C] | 27M nonspread and DOT_96 MHz Output Enable<br>0 = Disable (Tri-state), 1 = Enabled |
| 5   | 1    | USB_48MHz           | USB_48M MHz Output Enable<br>0 = Disabled, 1 = Enabled                             |
| 4   | 1    | REF0                | REF0 Output Enable<br>0 = Disabled, 1 = Enabled                                    |
| 3   | 1    | REF1                | REF1 Output Enable<br>0 = Disabled, 1 = Enabled                                    |
| 2   | 1    | CPU[T/C]1           | CPU[T/C]1 Output Enable<br>0 = Disable (Tri-state), 1 = Enabled                    |
| 1   | 1    | CPU[T/C]0           | CPU[T/C]0 Output Enable<br>0 = Disable (Tri-state), 1 = Enabled                    |

**Byte 1: Control Register 1 (continued)**

| Bit | @Pup | Name                              | Description  |
|-----|------|-----------------------------------|--|
| 0   | 0    | CPU, SRC, PCI, PCIF spread enable | PLL1 (CPU PLL) Spread Spectrum Enable<br>0 = Spread off, 1 = Spread on |

**Byte 2: Control Register 2**

| Bit | @Pup | Name      | Description   |
|-----|------|-----------|---|
| 7   | 1    | PCI5      | PCI5 Output Enable<br>0 = Disabled, 1 = Enabled             |
| 6   | 1    | PCI4      | PCI4 Output Enable<br>0 = Disabled, 1 = Enabled             |
| 5   | 1    | PCI3      | PCI3 Output Enable<br>0 = Disabled, 1 = Enabled             |
| 4   | 1    | PCI2      | PCI2 Output Enable<br>0 = Disabled, 1 = Enabled             |
| 3   | 1    | RESERVED  | RESERVED  |
| 2   | 1    | RESERVED  | RESERVED  |
| 1   | 1    | CPU[T/C]2 | CPU[T/C]2 Output Enable<br>0 = Disabled (Hi-Z), 1 = Enabled |
| 0   | 1    | PCIF1     | PCIF1 Output Enable<br>0 = Disabled, 1 = Enabled            |

**Byte 3: Control Register 3**

| Bit | @Pup | Name     | Description   |
|-----|------|----------|---|
| 7   | 0    | RESERVED | RESERVED, Set = 0   |
| 6   | 0    | RESERVED | RESERVED, Set = 0   |
| 5   | 0    | SRC5     | Allow control of SRC[T/C]5 with assertion of PCI_STP# or SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 4   | 0    | SRC4     | Allow control of SRC[T/C]4 with assertion of PCI_STP# or SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 3   | 0    | SRC3     | Allow control of SRC[T/C]3 with assertion of PCI_STP# or SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 2   | 0    | SRC2     | Allow control of SRC[T/C]2 with assertion of PCI_STP# or SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 1   | 0    | RESERVED | RESERVED, Set = 0   |
| 0   | 0    | SRC0     | Allow control of SRC[T/C]0 with assertion of PCI_STP# or SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |

**Byte 4: Control Register 4**

| Bit | @Pup | Name          | Description  |
|-----|------|---------------|--|
| 7   | 0    | 100M[T/C]_SST | 100M[T/C]_SST PWRDWN Drive Mode<br>0 = Driven in PWRDWN, 1 = Tri-state                                     |
| 6   | 0    | DOT96[T/C]    | DOT PWRDWN Drive Mode<br>0 = Driven in PWRDWN, 1 = Tri-state   |
| 5   | 0    | SRC[T/C]      | SRC[T/C] Stop Drive Mode when CLKREQ# asserted<br>0 = Driven, 1 = Tri-state                                |
| 4   | 0    | PCIF1         | Allow control of PCIF1 with assertion of SW and HW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 3   | 0    | PCIF0         | Allow control of PCIF0 with assertion of SW and HW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 2   | 1    | CPU[T/C]2     | Allow control of CPU[T/C]2 with assertion of CPU_STP#<br>0 = Free running, 1 = Stopped with CPU_STP#       |

**Byte 4: Control Register 4 (continued)**

| Bit | @Pup | Name      | Description  |
|-----|------|-----------|--|
| 1   | 1    | CPU[T/C]1 | Allow control of CPU[T/C]1 with assertion of CPU_STP#<br>0 = Free running, 1 = Stopped with CPU_STP# |
| 0   | 1    | CPU[T/C]0 | Allow control of CPU[T/C]0 with assertion of CPU_STP#<br>0 = Free running, 1 = Stopped with CPU_STP# |

**Byte 5: Control Register 5**

| Bit | @Pup | Name      | Description  |
|-----|------|-----------|--|
| 7   | 0    | SRC[T/C]  | SRC[T/C] Stop Drive Mode<br>0 = Driven when PCI_STP# asserted, 1 = Tri-state when PCI_STP# asserted  |
| 6   | 0    | CPU[T/C]2 | CPU[T/C]2 Stop Drive Mode<br>0 = Driven when CPU_STP# asserted, 1 = Tri-state when CPU_STP# asserted |
| 5   | 0    | CPU[T/C]1 | CPU[T/C]1 Stop Drive Mode<br>0 = Driven when CPU_STP# asserted, 1 = Tri-state when CPU_STP# asserted |
| 4   | 0    | CPU[T/C]0 | CPU[T/C]0 Stop Drive Mode<br>0 = Driven when CPU_STP# asserted, 1 = Tri-state when CPU_STP# asserted |
| 3   | 0    | SRC[T/C]  | SRC[T/C] PWRDWN Drive Mode<br>0 = Driven when PD asserted, 1 = Tri-state when PD asserted            |
| 2   | 0    | CPU[T/C]2 | CPU[T/C]2 PWRDWN Drive Mode<br>0 = Driven when PD asserted, 1 = Tri-state when PD asserted           |
| 1   | 0    | CPU[T/C]1 | CPU[T/C]1 PWRDWN Drive Mode<br>0 = Driven when PD asserted, 1 = Tri-state when PD asserted           |
| 0   | 0    | CPU[T/C]0 | CPU[T/C]0 PWRDWN Drive Mode<br>0 = Driven when PD asserted, 1 = Tri-state when PD asserted           |

**Byte 6: Control Register 6**

| Bit | @Pup | Name   | Description  |
|-----|------|--|--|
| 7   | 0    | TEST_SEL   | REF/N or Tri-state Select<br>0 = Tri-state, 1 = REF/N Clock  |
| 6   | 0    | TEST_MODE  | Test Clock Mode Entry Control<br>0 = Normal operation, 1 = REF/N or Tri-state mode   |
| 5   | 1    | REF1   | REF0 Output Drive Strength<br>0 = Low, 1 = High  |
| 4   | 1    | REF0   | REF0 Output Drive Strength<br>0 = Low, 1 = High  |
| 3   | 1    | PCI, PCIF and SRC clock outputs except those set to free running | SW PCI_STP Function<br>0=SW PCI_STP assert, 1= SW PCI_STP deassert<br>When this bit is set to 0, all STOPPABLE PCI, PCIF, and SRC outputs will be stopped in a synchronous manner with no short pulses.<br>When this bit is set to 1, all STOPPED PCI, PCIF, and SRC outputs will resume in a synchronous manner with no short pulses. |
| 2   | HW   | FSC  | FSC Reflects the value of the FSC pin sampled on power-up<br>0 = FSC was low during VTT_PWRGD# assertion   |
| 1   | HW   | FSB  | FSB Reflects the value of the FSB pin sampled on power-up<br>0 = FSB was low during VTT_PWRGD# assertion   |
| 0   | HW   | FSA  | FSA Reflects the value of the FSA pin sampled on power-up<br>0 = FSA was low during VTT_PWRGD# assertion   |

**Byte 7: Vendor ID**

| Bit | @Pup | Name                | Description         |
|-----|------|---------------------|---------------------|
| 7   | 0    | Revision Code Bit 3 | Revision Code Bit 3 |
| 6   | 0    | Revision Code Bit 2 | Revision Code Bit 2 |
| 5   | 0    | Revision Code Bit 1 | Revision Code Bit 1 |
| 4   | 1    | Revision Code Bit 0 | Revision Code Bit 0 |
| 3   | 1    | Vendor ID Bit 3     | Vendor ID Bit 3     |
| 2   | 0    | Vendor ID Bit 2     | Vendor ID Bit 2     |
| 1   | 0    | Vendor ID Bit 1     | Vendor ID Bit 1     |
| 0   | 0    | Vendor ID Bit 0     | Vendor ID Bit 0     |

**Byte 8: Control Register 8**

| Bit | @Pup | Name       | Description  |
|-----|------|------------|--|
| 7   | 0    | CPU_SS     | 0: -0.5% (Peak to peak)<br>1: -1.0% (Peak to peak) |
| 6   | 0    | CPU-DWN_SS | 0: Down Spread<br>1: Center Spread                 |
| 5   | 0    | RESERVED   | RESERVED, Set = 0                                  |
| 4   | 0    | RESERVED   | RESERVED, Set = 0                                  |
| 3   | 0    | RESERVED   | RESERVED, Set = 0                                  |
| 2   | 1    | 48M        | 48-MHz Output Drive Strength<br>0 = Low, 1 = High  |
| 1   | 1    | RESERVED   | RESERVED, Set = 1                                  |
| 0   | 1    | PCIF0      | 33-MHz Output Drive Strength<br>0 = Low, 1 = High  |

**Byte 9: Control Register 9**

| Bit | @Pup | Name     | Description   |
|-----|------|----------|---|
| 7   | 0    | S3       | 27_96_100_SSC Spread Spectrum Selection table:  |
| 6   | 0    | S2       | S[3:0] SS%  |
| 5   | 0    | S1       | '0000' = -0.5%(Default value)   |
| 4   | 0    | S0       | '0001' = -1.0%<br>'0010' = -1.5%<br>'0011' = -2.0%<br>'0100' = ±0.25%<br>'0101' = ±0.5%<br>'0110' = ±0.75%<br>'0111' = ±1.0%<br>'1000' = -0.35%<br>'1001' = -0.68%<br>'1010' = -1.09%<br>'1011' = -1.425%<br>'1100' = ±0.17%<br>'1101' = ±0.34%<br>'1110' = ±0.545%<br>'1111' = ±0.712% |
| 3   | 1    | RESERVED | RESERVED, Set = 1   |



## Byte 9: Control Register 9 (continued)

| Bit | @Pup | Name                         | Description  |
|-----|------|------------------------------|--|
| 2   | 1    | 27M Spread                   | 27-MHz Spread Output Enable<br>0 = Disable (Hi-Z), 1 = Enable      |
| 1   | 1    | 27M_SS/LCD100M Spread Enable | 27M_SS/LCD100M Spread spectrum enable.<br>0 = Disable, 1 = Enable. |
| 0   | 0    | PCIF1                        | 33-MHz Output Drive Strength<br>0 = Low, 1 = High                  |

## Byte 10: Control Register 10

| Bit | @Pup | Name       | Description  |
|-----|------|------------|--|
| 7   | 1    | SRC[T/C]11 | SRC[T/C]11 Output Enable<br>0 = Disable (Hi-Z), 1 = Enable   |
| 6   | 1    | SRC[T/C]9  | SRC[T/C]9 Output Enable<br>0 = Disable (Hi-Z), 1 = Enable  |
| 5   | 1    | RESERVED   | RESERVED, Set = 1  |
| 4   | 1    | SRC[T/C]8  | SRC[T/C]8 Output Enable<br>0 = Disable (Hi-Z), 1 = Enable  |
| 3   | 0    | SRC[T/C]9  | Allow control of SRC[T/C]9 with assertion of SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP#  |
| 2   | 0    | SRC[T/C]11 | Allow control of SRC[T/C]11 with assertion of SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP# |
| 1   | 0    | RESERVED   | RESERVED, Set = 0  |
| 0   | 0    | SRC[T/C]8  | Allow control of SRC[T/C]8 with assertion of SW PCI_STP#<br>0 = Free running, 1 = Stopped with PCI_STP#  |

## Byte 11: Control Register 11

| Bit | @Pup | Name     | Description   |
|-----|------|----------|---|
| 7   | 0    | RESERVED | RESERVED Set = 0  |
| 6   | HW   | RESERVED | RESERVED  |
| 5   | HW   | RESERVED | RESERVED  |
| 4   | HW   | RESERVED | RESERVED  |
| 3   | 0    | 27MHz    | 27-MHz (spread and non-spread) Output Drive Strength<br>0 = Low, 1 = High |
| 2   | 0    | RESERVED | RESERVED Set = 0  |
| 1   | 0    | RESERVED | RESERVED Set = 0  |
| 0   | HW   | RESERVED | RESERVED  |

## Byte 12: Control Register 12

| Bit | @Pup | Name     | Description                               |
|-----|------|----------|---|
| 7   | 0    | CLKREQ#A | CLKREQ#A Enable<br>0 = Disable 1 = Enable |
| 6   | 0    | CLKREQ#B | CLKREQ#B Enable<br>0 = Disable 1 = Enable |
| 5   | 0    | RESERVED | RESERVED                                  |
| 4   | 0    | RESERVED | RESERVED                                  |
| 3   | 0    | RESERVED | RESERVED                                  |
| 2   | 0    | RESERVED | RESERVED                                  |
| 1   | 0    | RESERVED | RESERVED                                  |
| 0   | 0    | RESERVED | RESERVED                                  |

**Byte 13: Control Register 13**

| Bit | @Pup | Name                | Description   |
|-----|------|---------------------|---|
| 7   | 0    | RESERVED            | RESERVED  |
| 6   | 1    | 96/100M Clock Speed | 96/100 SRC Clock Speed<br>0 = 96 MHz, 1 = 100 MHz                       |
| 5   | 1    | RESERVED            | RESERVED, Set = 1   |
| 4   | 1    | RESERVED            | RESERVED, Set = 1   |
| 3   | 1    | PCI5                | PCI5 (Spread and Non-spread) Output Drive Strength<br>0 = Low, 1 = High |
| 2   | 1    | PCI4                | PCI4 (Spread and Non-spread) Output Drive Strength<br>0 = Low, 1 = High |
| 1   | 1    | PCI3                | PCI3 (Spread and Non-spread) Output Drive Strength<br>0 = Low, 1 = High |
| 0   | 1    | PCI2                | PCI2 (Spread and Non-spread) Output Drive Strength<br>0 = Low, 1 = High |

**Byte 14: Control Register 14**

| Bit | @Pup | Name     | Description   |
|-----|------|----------|---|
| 7   | 1    | RESERVED | RESERED   |
| 6   | 0    | RESERVED | RESERVED  |
| 5   | 0    | RESERVED | RESERVED  |
| 4   | 0    | CLKREQ#A | SRC[T/C]5 Control<br>0 = SRC[T/C]5 not stoppable by CLKREQ#A<br>1 = SRC[T/C]5 stoppable by CLKREQ#A |
| 3   | 0    | CLKREQ#A | SRC[T/C]4 Control<br>0 = SRC[T/C]4 not stoppable by CLKREQ#A<br>1 = SRC[T/C]4 stoppable by CLKREQ#A |
| 2   | 0    | CLKREQ#A | SRC[T/C]3 Control<br>0 = SRC[T/C]3 not stoppable by CLKREQ#A<br>1 = SRC[T/C]3 stoppable by CLKREQ#A |
| 1   | 0    | CLKREQ#A | SRC[T/C]2 Control<br>0 = SRC[T/C]2 not stoppable by CLKREQ#A<br>1 = SRC[T/C]2 stoppable by CLKREQ#A |
| 0   | 0    | CLKREQ#A | SRC[T/C]1 Control<br>0 = SRC[T/C]1 not stoppable by CLKREQ#A<br>1 = SRC[T/C]1 stoppable by CLKREQ#A |

**Byte 15: Control Register 15**

| Bit | @Pup | Name     | Description   |
|-----|------|----------|---|
| 7   | 1    | CLKREQ#B | SRC[T/C]8 Control<br>0 = SRC[T/C]8 not stoppable by CLKREQ#B<br>1 = SRC[T/C]8 stoppable by CLKREQ#B |
| 6   | 0    | RESERVED | RESERVED  |
| 5   | 0    | RESERVED | RESERVED  |
| 4   | 0    | CLKREQ#B | SRC[T/C]5 Control<br>0 = SRC[T/C]5 not stoppable by CLKREQ#B<br>1 = SRC[T/C]5 stoppable by CLKREQ#B |
| 3   | 0    | CLKREQ#B | SRC[T/C]4 Control<br>0 = SRC[T/C]4 not stoppable by CLKREQ#B<br>1 = SRC[T/C]4 stoppable by CLKREQ#B |
| 2   | 0    | CLKREQ#B | SRC[T/C]3 Control<br>0 = SRC[T/C]3 not stoppable by CLKREQ#B<br>1 = SRC[T/C]3 stoppable by CLKREQ#B |

**Byte 15: Control Register 15 (continued)**

| Bit | @Pup | Name     | Description   |
|-----|------|----------|---|
| 1   | 0    | CLKREQ#B | SRC[T/C]2 Control<br>0 = SRC[T/C]2 not stoppable by CLKREQ#B<br>1 = SRC[T/C]2 stoppable by CLKREQ#B |
| 0   | 0    | CLKREQ#B | SRC[T/C]1 Control<br>0 = SRC[T/C]1 not stoppable by CLKREQ#B<br>1 = SRC[T/C]1 stoppable by CLKREQ#B |

**Table 5. Crystal Recommendations**

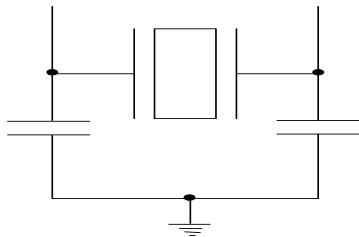
| Frequency (Fund) | Cut | Loading  | Load Cap | Drive (max.) | Shunt Cap (max.) | Motional (max.) | Tolerance (max.) | Stability (max.) | Aging (max.) |
|------------------|-----|----------|----------|--------------|------------------|-----------------|------------------|------------------|--------------|
| 14.31818 MHz     | AT  | Parallel | 20 pF    | 0.1 mW       | 5 pF             | 0.016 pF        | 35 ppm           | 30 ppm           | 5 ppm        |

The CY28443 requires a Parallel Resonance Crystal. Substituting a series resonance crystal will cause the CY28443 to operate at the wrong frequency and violate the ppm specification. For most applications there is a 300-ppm frequency shift between series and parallel crystals due to incorrect loading.

### Crystal Loading

Crystal loading plays a critical role in achieving low ppm performance. To realize low ppm performance, the total capacitance the crystal will see must be considered to calculate the appropriate capacitive loading (CL).

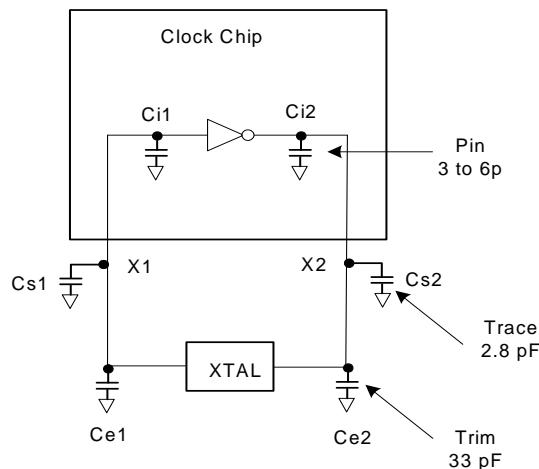
Figure 2 shows a typical crystal configuration using the two trim capacitors. An important clarification for the following discussion is that the trim capacitors are in series with the crystal not parallel. It's a common misconception that load capacitors are in parallel with the crystal and should be approximately equal to the load capacitance of the crystal. This is not true.


**Figure 1. Crystal Capacitive Clarification**

### Calculating Load Capacitors

In addition to the standard external trim capacitors, trace capacitance and pin capacitance must also be considered to correctly calculate crystal loading. As mentioned previously, the capacitance on each side of the crystal is in series with the crystal. This means the total capacitance on each side of the crystal must be twice the specified crystal load capacitance (CL). While the capacitance on each side of the crystal is in

series with the crystal, trim capacitors (Ce1,Ce2) should be calculated to provide equal capacitive loading on both sides.


**Figure 2. Crystal Loading Example**

Use the following formulas to calculate the trim capacitor values for Ce1 and Ce2.

#### Load Capacitance (each side)

$$Ce = 2 * CL - (Cs + Ci)$$

#### Total Capacitance (as seen by the crystal)

$$CLe = \frac{1}{\left( \frac{1}{Ce1 + Cs1 + Ci1} + \frac{1}{Ce2 + Cs2 + Ci2} \right)}$$

CL.....Crystal load capacitance

CLe.....Actual loading seen by crystal using standard value trim capacitors

Ce.....External trim capacitors

Cs.....Stray capacitance (terraced)

Ci .....Internal capacitance (lead frame, bond wires etc.)

## CLK\_REQ[0:1]# Description

The CLKREQ#[A:B] signals are active LOW inputs used for clean enabling and disabling selected SRC outputs. The outputs controlled by CLKREQ#[A:B] are determined by the settings in register byte 8. The CLKREQ# signal is a debounced signal in that its state must remain unchanged during two consecutive rising edges of SRCC to be recognized as a valid assertion or deassertion. (The assertion and deassertion of this signal is absolutely asynchronous.)

### CLK\_REQ[A:B]# Assertion (CLKREQ# -> LOW)

All differential outputs that were stopped are to resume normal operation in a glitch-free manner. The maximum latency from

the assertion to active outputs is between 2–6 SRC clock periods (2 clocks are shown) with all SRC outputs resuming simultaneously. All stopped SRC outputs must be driven HIGH within 10 ns of CLKREQ#[1:0] deassertion to a voltage greater than 200 mV.

### CLK\_REQ[A:B]# Deassertion (CLKREQ# -> HIGH)

The impact of deasserting the CLKREQ#[A:B] pins is that all SRC outputs that are set in the control registers to stoppable via deassertion of CLKREQ#[A:B] are to be stopped after their next transition. The final state of all stopped DIF signals is LOW, both SRCT clock and SRCC clock outputs will not be driven.

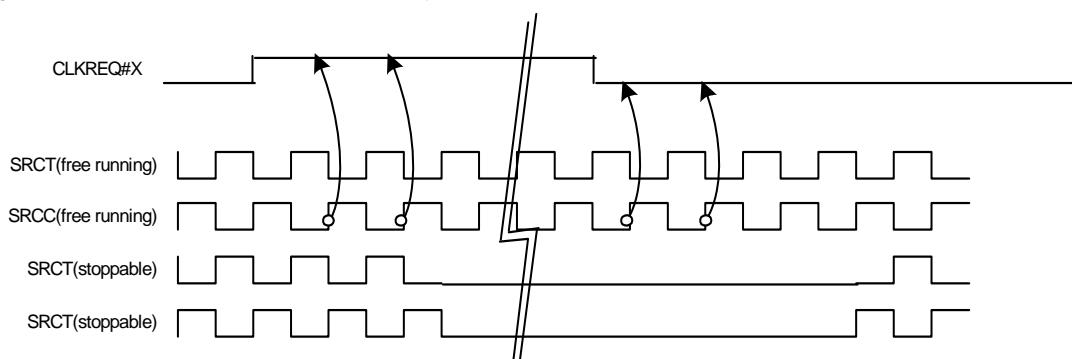


Figure 3. CLK\_REQ#[A:B] Deassertion/Assertion Waveform

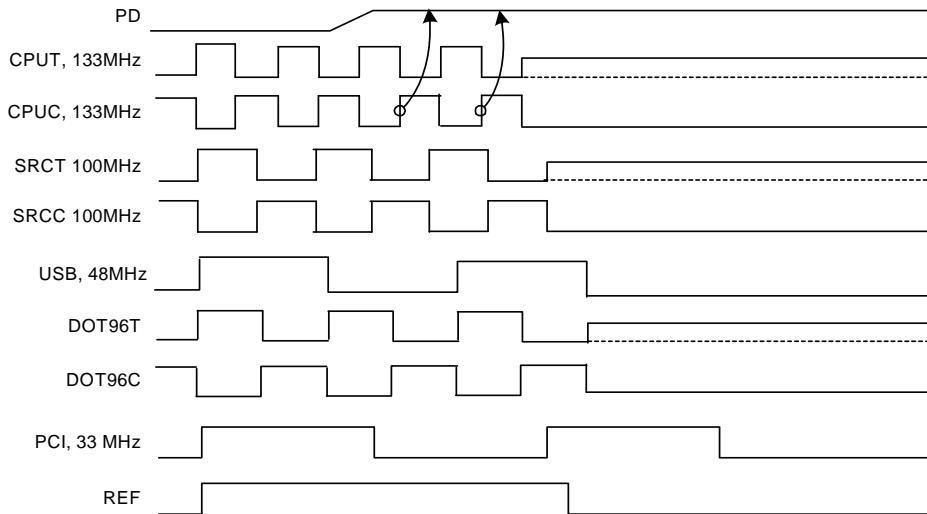
### PD (Power-down) Clarification

The VTT\_PWRGD# /PD pin is a dual-function pin. During initial power-up, the pin functions as VTT\_PWRGD#. Once VTT\_PWRGD# has been sampled LOW by the clock chip, the pin assumes PD functionality. The PD pin is an asynchronous active HIGH input used to shut off all clocks cleanly prior to shutting off power to the device. This signal is synchronized internal to the device prior to powering down the clock synthesizer. PD is also an asynchronous input for powering up the system. When PD is asserted HIGH, all clocks need to be driven to a LOW value and held prior to turning off the VCOs and the crystal oscillator.

### PD Assertion

When PD is sampled HIGH by two consecutive rising edges of CPUC, all single-ended outputs will be held LOW on their next HIGH-to-LOW transition and differential clocks must hold

high or tri-stated (depending on the state of the control register drive mode bit) on the next diff clock# HIGH-to-LOW transition within 4 clock periods. When the SMBus PD drive mode bit corresponding to the differential (CPU, SRC, and DOT) clock output of interest is programmed to '0', the clock output are held with "Diff clock" pin driven HIGH at  $2 \times I_{ref}$ , and "Diff clock#" tri-state. If the control register PD drive mode bit corresponding to the output of interest is programmed to "1", then both the "Diff clock" and the "Diff clock#" are tri-state. Note that Figure 4 shows CPU = 133 MHz and PD drive mode = '1' for all differential outputs. This diagram and description is applicable to valid CPU frequencies 100, 133, 166, and 200 MHz. In the event that PD mode is desired as the initial power-on state, PD must be asserted HIGH in less than 10  $\mu$ s after asserting Vtt\_PwrGd#. It should be noted that 96\_100\_SSC will follow the DOT waveform is selected for 96 MHz and the SRC waveform when in 100-MHz mode.

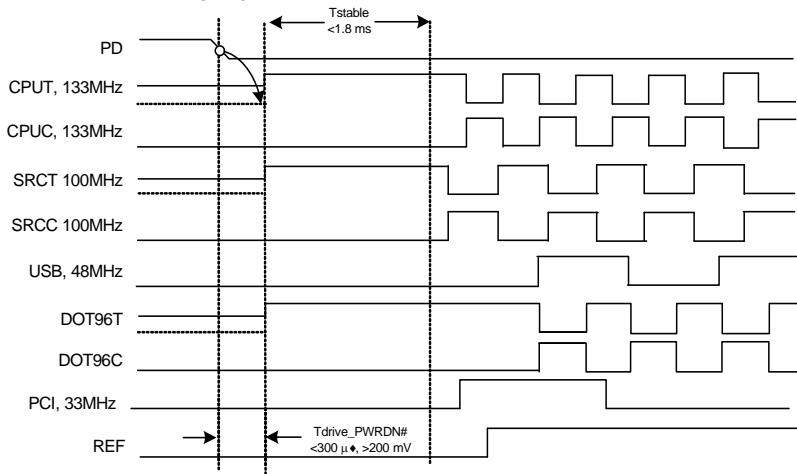


**Figure 4. PD Assertion Timing Waveform**

#### PD Deassertion

The power-up latency is less than 1.8 ms. This is the time from the deassertion of the PD pin or the ramping of the power supply until the time that stable clocks are output from the clock chip. All differential outputs stopped in a three-state condition resulting from power down will be driven high in less than 300  $\mu$ s of PD deassertion to a voltage greater than

200 mV. After the clock chip's internal PLL is powered up and locked, all outputs will be enabled within a few clock cycles of each other. *Figure 5* is an example showing the relationship of clocks coming up. It should be noted that 96\_100\_SSC will follow the DOT waveform is selected for 96 MHz and the SRC waveform when in 100 MHz mode.

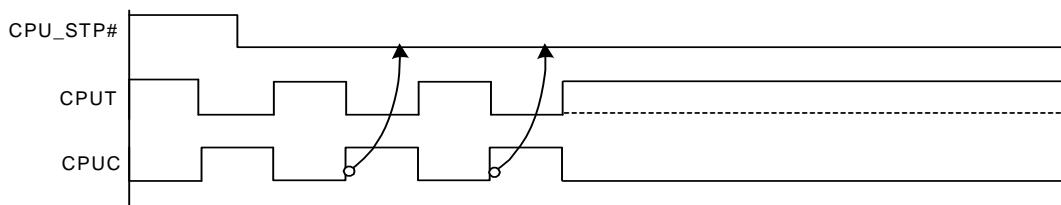


**Figure 5. PD Deassertion Timing Waveform**

#### CPU\_STP# Assertion

The CPU\_STP# signal is an active LOW input used for synchronous stopping and starting the CPU output clocks while the rest of the clock generator continues to function. When the CPU\_STP# pin is asserted, all CPU outputs that are set with the SMBus configuration to be stoppable via assertion

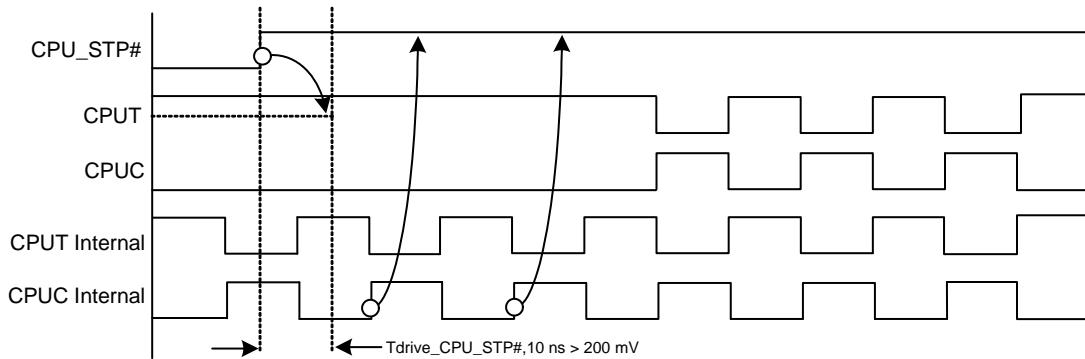
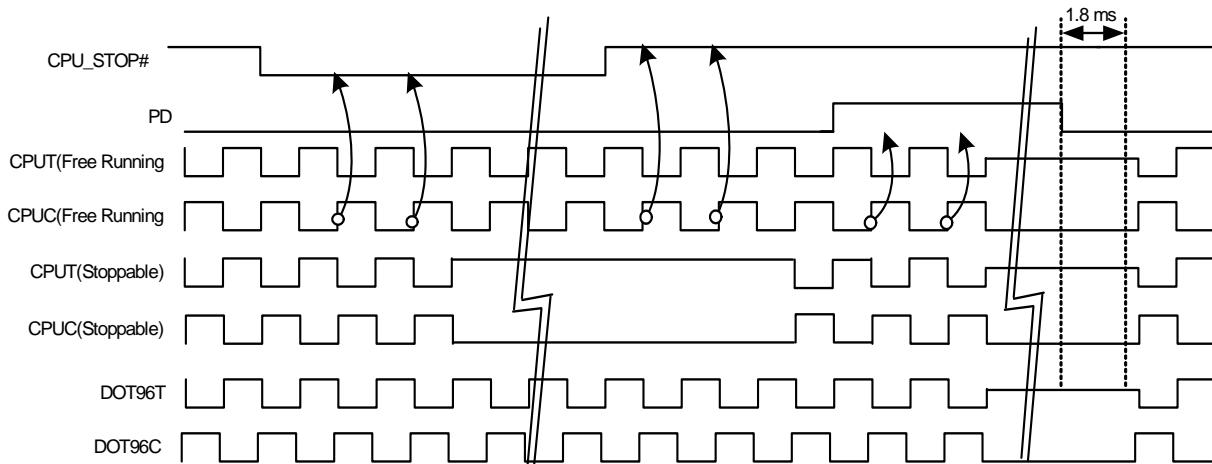
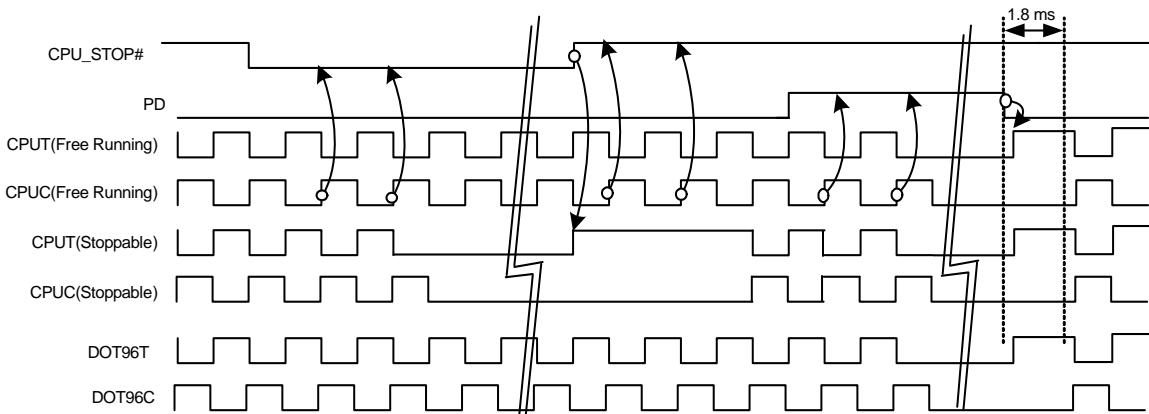
of CPU\_STP# will be stopped within two–six CPU clock periods after being sampled by two rising edges of the internal CPUC clock. The final states of the stopped CPU signals are CPUT = HIGH and CPUC = LOW. There is no change to the output drive current values during the stopped state. The CPUT is driven HIGH with a current value equal to 6 x (Iref), and the CPUC signal will be tri-stated.



**Figure 6. CPU\_STP# Assertion Waveform**

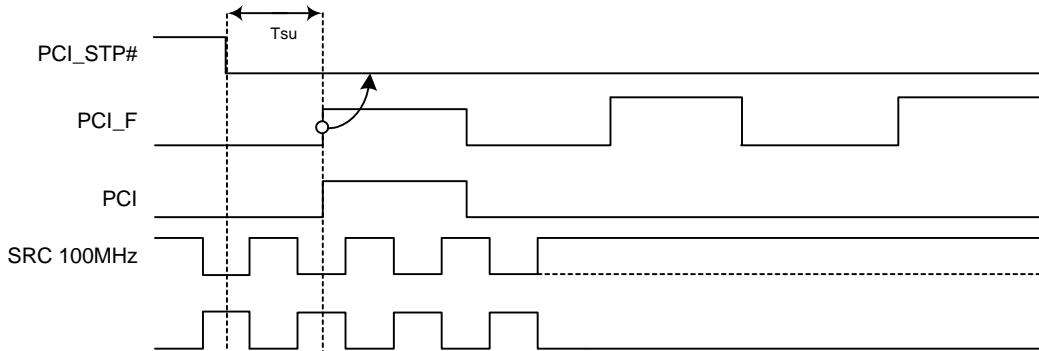
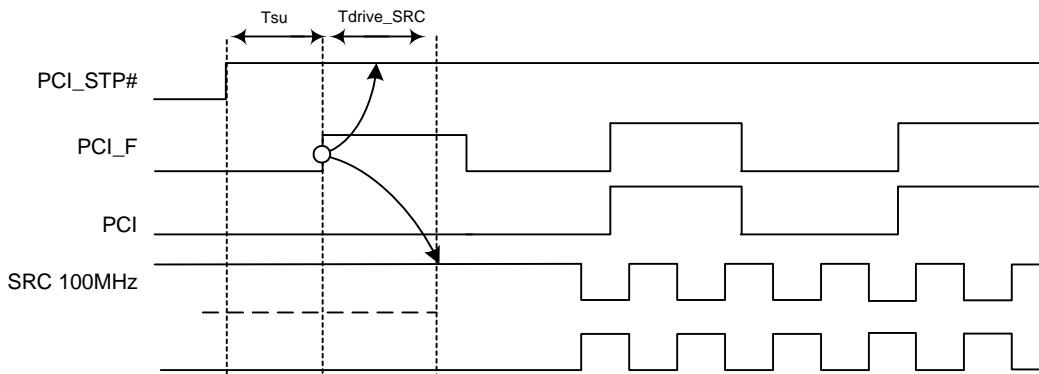
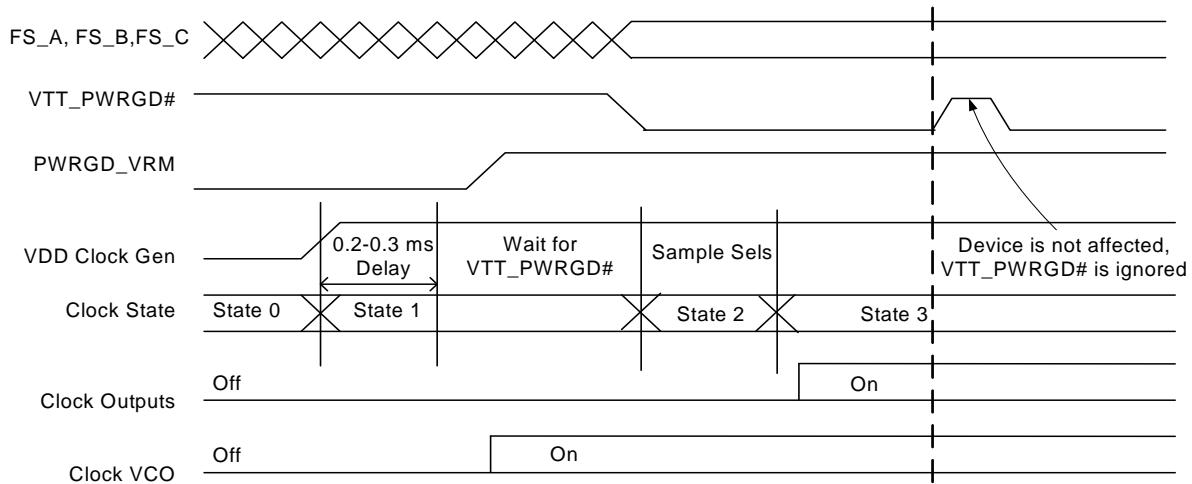
**CPU\_STP# Deassertion**

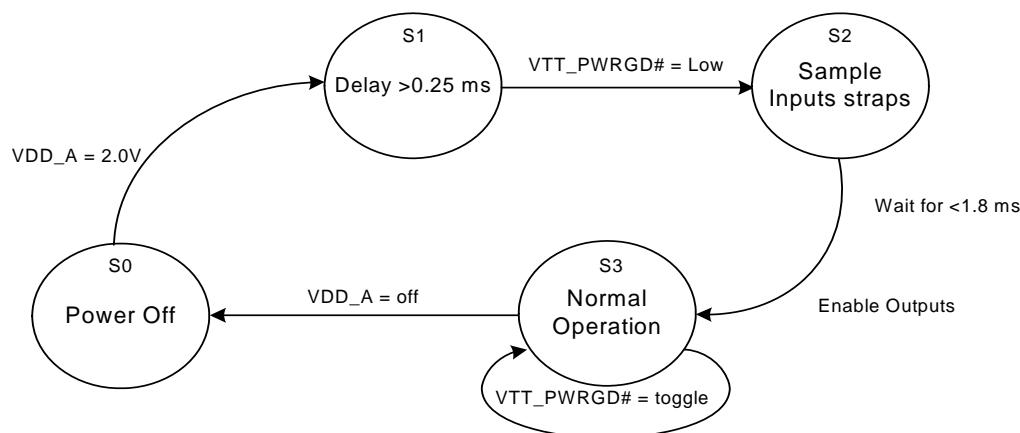
The deassertion of the CPU\_STP# signal will cause all CPU outputs that were stopped to resume normal operation in a synchronous manner. Synchronous manner meaning that no short or stretched clock pulses will be produced when the clock resumes. The maximum latency from the deassertion to active outputs is no more than two CPU clock cycles.


**Figure 7. CPU\_STP# Deassertion Waveform**

**Figure 8. CPU\_STP#=Driven, CPU\_PD = Driven, DOT\_PD = Driven**

**Figure 9. CPU\_STP#=Tri-state, CPU\_PD = Tri-state, DOT\_PD = Tri-state**

**PCI\_STP# Assertion**

The PCI\_STP# signal is an active LOW input used for synchronous stopping and starting the PCI outputs while the rest of the clock generator continues to function. The set-up time for capturing PCI\_STP# going LOW is 10 ns ( $t_{SU}$ ). (See Figure 10.) The PCIF clocks will not be affected by this pin if their corresponding control bit in the SMBus register is set to allow them to be free running.


**Figure 10. PCI\_STP# Assertion Waveform**

**Figure 11. PCI\_STP# Deassertion Waveform**

**Figure 12. VTT\_PWRGD# Timing Diagram**



**Figure 13. Clock Generator Power-up/Run State Diagram**

### Absolute Maximum Conditions

| Parameter          | Description                       | Condition                  | Min. | Max.           | Unit |
|--------------------|-----------------------------------|----------------------------|------|----------------|------|
| $V_{DD}$           | Core Supply Voltage               |                            | -0.5 | 4.6            | V    |
| $V_{DD\_A}$        | Analog Supply Voltage             |                            | -0.5 | 4.6            | V    |
| $V_{IN}$           | Input Voltage                     | Relative to $V_{SS}$       | -0.5 | $V_{DD} + 0.5$ | VDC  |
| $T_S$              | Temperature, Storage              | Non-functional             | -65  | 150            | °C   |
| $T_A$              | Temperature, Operating Ambient    | Functional                 | 0    | 85             | °C   |
| $T_J$              | Temperature, Junction             | Functional                 | -    | 150            | °C   |
| $\emptyset_{JC}$   | Dissipation, Junction to Case     | Mil-STD-883E Method 1012.1 | -    | 20             | °C/W |
| $\emptyset_{JA}$   | Dissipation, Junction to Ambient  | JEDEC (JESD 51)            | -    | 60             | °C/W |
| ESD <sub>HBM</sub> | ESD Protection (Human Body Model) | MIL-STD-883, Method 3015   | 2000 | -              | V    |
| UL-94              | Flammability Rating               | At 1/8 in.                 | V-0  |                |      |
| MSL                | Moisture Sensitivity Level        |                            | 1    |                |      |

**Multiple Supplies:** The Voltage on any input or I/O pin cannot exceed the power pin during power-up. Power supply sequencing is NOT required.

### DC Electrical Specifications

| Parameter     | Description                 | Condition  | Min.           | Max.           | Unit |
|---------------|-----------------------------|--|----------------|----------------|------|
| All VDDs      | 3.3V Operating Voltage      | $3.3 \pm 5\%$  | 3.135          | 3.465          | V    |
| $V_{IL2C}$    | Input Low Voltage           | SDATA, SCLK  | -              | 1.0            | V    |
| $V_{IH2C}$    | Input High Voltage          | SDATA, SCLK  | 2.2            | -              | V    |
| $V_{IL\_FS}$  | FS_[A,B] Input Low Voltage  |  | $V_{SS} - 0.3$ | 0.35           | V    |
| $V_{IH\_FS}$  | FS_[A,B] Input High Voltage |  | 0.7            | $V_{DD} + 0.5$ | V    |
| $V_{ILFS\_C}$ | FS_C Input Low Voltage      |  | $V_{SS} - 0.3$ | 0.35           | V    |
| $V_{IMFS\_C}$ | FS_C Input Middle Voltage   | Typical  | 0.7            | 1.7            | V    |
| $V_{IHFS\_C}$ | FS_C Input High Voltage     | Typical  | 2.0            | $V_{DD} + 0.5$ | V    |
| $V_{IL}$      | 3.3V Input Low Voltage      |  | $V_{SS} - 0.3$ | 0.8            | V    |
| $V_{IH}$      | 3.3V Input High Voltage     |  | 2.0            | $V_{DD} + 0.3$ | V    |
| $I_{IL}$      | Input Low Leakage Current   | Except internal pull-up resistors, $0 < V_{IN} < V_{DD}$   | -5             | 5              | µA   |
| $I_{IH}$      | Input High Leakage Current  | Except internal pull-down resistors, $0 < V_{IN} < V_{DD}$ | -              | 5              | µA   |
| $V_{OL}$      | 3.3V Output Low Voltage     | $I_{OL} = 1 \text{ mA}$                                    | -              | 0.4            | V    |
| $V_{OH}$      | 3.3V Output High Voltage    | $I_{OH} = -1 \text{ mA}$                                   | 2.4            | -              | V    |



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### DC Electrical Specifications (continued)

| Parameter    | Description                   | Condition   | Min.         | Max.         | Unit    |
|--------------|-------------------------------|---|--------------|--------------|---------|
| $I_{OZ}$     | High-impedance Output Current |   | -10          | 10           | $\mu A$ |
| $C_{IN}$     | Input Pin Capacitance         |   | 3            | 5            | $pF$    |
| $C_{OUT}$    | Output Pin Capacitance        |   | 3            | 6            | $pF$    |
| $L_{IN}$     | Pin Inductance                |   | -            | 7            | $nH$    |
| $V_{XIH}$    | Xin High Voltage              |   | 0.7 $V_{DD}$ | $V_{DD}$     | V       |
| $V_{XIL}$    | Xin Low Voltage               |   | 0            | 0.3 $V_{DD}$ | V       |
| $I_{DD3.3V}$ | Dynamic Supply Current        | At max load in low drive mode per <i>Figure 14</i> @133 MHz | -            | 300          | mA      |
| $I_{PD3.3V}$ | Power-down Supply Current     | PD asserted, Outputs Driven                                 | -            | 70           | mA      |
| $I_{PD3.3V}$ | Power-down Supply Current     | PD asserted, Outputs Tri-state                              | -            | 5            | mA      |

### AC Electrical Specifications

| Parameter          | Description                                | Condition   | Min.     | Max.     | Unit |
|--------------------|--|---|----------|----------|------|
| <b>Crystal</b>     |  |   |          |          |      |
| $T_{DC}$           | XIN Duty Cycle                             | The device will operate reliably with input duty cycles up to 30/70 but the REF clock duty cycle will not be within specification | 47.5     | 52.5     | %    |
| $T_{PERIOD}$       | XIN Period                                 | When XIN is driven from an external clock source  | 69.841   | 71.0     | ns   |
| $T_R / T_F$        | XIN Rise and Fall Times                    | Measured between 0.3 $V_{DD}$ and 0.7 $V_{DD}$  | -        | 10.0     | ns   |
| $T_{CCJ}$          | XIN Cycle to Cycle Jitter                  | As an average over 1- $\mu s$ duration  | -        | 500      | ps   |
| $L_{ACC}$          | Long-term Accuracy                         | Measured at crossing point $V_{OX}$   | -        | 300      | ppm  |
| <b>CPU at 0.7V</b> |  |   |          |          |      |
| $T_{DC}$           | CPUT and CPUC Duty Cycle                   | Measured at crossing point $V_{OX}$   | 45       | 55       | %    |
| $T_{PERIOD}$       | 100 MHz CPUT and CPUC Period               | Measured at crossing point $V_{OX}$   | 9.997001 | 10.00300 | ns   |
| $T_{PERIOD}$       | 133 MHz CPUT and CPUC Period               | Measured at crossing point $V_{OX}$   | 7.497751 | 7.502251 | ns   |
| $T_{PERIOD}$       | 166 MHz CPUT and CPUC Period               | Measured at crossing point $V_{OX}$   | 5.998201 | 6.001801 | ns   |
| $T_{PERIOD}$       | 200 MHz CPUT and CPUC Period               | Measured at crossing point $V_{OX}$   | 4.998500 | 5.001500 | ns   |
| $T_{PERIODSS}$     | 100 MHz CPUT and CPUC Period, SSC          | Measured at crossing point $V_{OX}$   | 9.997001 | 10.05327 | ns   |
| $T_{PERIODSS}$     | 133 MHz CPUT and CPUC Period, SSC          | Measured at crossing point $V_{OX}$   | 7.497751 | 7.539950 | ns   |
| $T_{PERIODSS}$     | 166 MHz CPUT and CPUC Period, SSC          | Measured at crossing point $V_{OX}$   | 5.998201 | 6.031960 | ns   |
| $T_{PERIODSS}$     | 200 MHz CPUT and CPUC Period, SSC          | Measured at crossing point $V_{OX}$   | 4.998500 | 5.026634 | ns   |
| $T_{PERIODAbs}$    | 100 MHz CPUT and CPUC Absolute period      | Measured at crossing point $V_{OX}$   | 9.912001 | 10.08800 | ns   |
| $T_{PERIODAbs}$    | 133 MHz CPUT and CPUC Absolute period      | Measured at crossing point $V_{OX}$   | 7.412751 | 7.587251 | ns   |
| $T_{PERIODAbs}$    | 166 MHz CPUT and CPUC Absolute period      | Measured at crossing point $V_{OX}$   | 5.913201 | 6.086801 | ns   |
| $T_{PERIODAbs}$    | 200 MHz CPUT and CPUC Absolute period      | Measured at crossing point $V_{OX}$   | 4.913500 | 5.086500 | ns   |
| $T_{PERIODSSAbs}$  | 100 MHz CPUT and CPUC Absolute period, SSC | Measured at crossing point $V_{OX}$   | 9.912001 | 10.13827 | ns   |
| $T_{PERIODSSAbs}$  | 133 MHz CPUT and CPUC Absolute period, SSC | Measured at crossing point $V_{OX}$   | 7.412751 | 7.624950 | ns   |
| $T_{PERIODSSAbs}$  | 166 MHz CPUT and CPUC Absolute period, SSC | Measured at crossing point $V_{OX}$   | 5.913201 | 6.116960 | ns   |

**SILICON LABS****CY28443****AC Electrical Specifications (continued)**

| Parameter                      | Description                                | Condition   | Min.     | Max.               | Unit |
|--------------------------------|--|---|----------|--------------------|------|
| $T_{PERIODSSAbs}$              | 200-MHz CPUT and CPUC Absolute period, SSC | Measured at crossing point $V_{OX}$                     | 4.913500 | 5.111634           | ns   |
| $T_{CCJ}$                      | CPUT/C Cycle to Cycle Jitter               | Measured at crossing point $V_{OX}$                     | –        | 85 <sup>[1]</sup>  | ps   |
| $T_{CCJ2}$                     | CPU2_ITP Cycle to Cycle Jitter             | Measured at crossing point $V_{OX}$                     | –        | 125 <sup>[1]</sup> | ps   |
| $L_{ACC}$                      | Long-term Accuracy                         | Measured at crossing point $V_{OX}$                     | –        | 300                | ppm  |
| $T_{SKEW}$                     | CPU1 to CPU0 Clock Skew                    | Measured at crossing point $V_{OX}$                     | –        | 100                | ps   |
| $T_{SKEW2}$                    | CPU2_ITP to CPU0 Clock Skew                | Measured at crossing point $V_{OX}$                     | –        | 210                | ps   |
| $T_R / T_F$                    | CPUT and CPUC Rise and Fall Time           | Measured from $V_{OL} = 0.175$ to $V_{OH} = 0.525V$     | 175      | 700                | ps   |
| $T_{RFM}$                      | Rise/Fall Matching                         | Determined as a fraction of $2*(T_R - T_F)/(T_R + T_F)$ | –        | 20                 | %    |
| $\Delta T_R$                   | Rise Time Variation                        |   | –        | 125                | ps   |
| $\Delta T_F$                   | Fall Time Variation                        |   | –        | 125                | ps   |
| $V_{HIGH}$                     | Voltage High                               | Math averages <i>Figure 16</i>                          | 660      | 850                | mV   |
| $V_{LOW}$                      | Voltage Low                                | Math averages <i>Figure 16</i>                          | –150     | –                  | mV   |
| $V_{OX}$                       | Crossing Point Voltage at 0.7V Swing       |   | 250      | 550                | mV   |
| $V_{OVS}$                      | Maximum Overshoot Voltage                  |   | –        | $V_{HIGH} + 0.3$   | V    |
| $V_{UDS}$                      | Minimum Undershoot Voltage                 |   | –0.3     | –                  | V    |
| $V_{RB}$                       | Ring Back Voltage                          | See <i>Figure 16</i> . Measure SE                       | –        | 0.2                | V    |
| <b>SRC at 0.7V</b>             |  |   |          |                    |      |
| $T_{DC}$                       | SRCT and SRCC Duty Cycle                   | Measured at crossing point $V_{OX}$                     | 45       | 55                 | %    |
| $T_{PERIOD}$                   | 100-MHz SRCT and SRCC Period               | Measured at crossing point $V_{OX}$                     | 9.997001 | 10.00300           | ns   |
| $T_{PERIODSS}$                 | 100-MHz SRCT and SRCC Period, SSC          | Measured at crossing point $V_{OX}$                     | 9.997001 | 10.05327           | ns   |
| $T_{PERIODAbs}$                | 100-MHz SRCT and SRCC Absolute Period      | Measured at crossing point $V_{OX}$                     | 9.872001 | 10.12800           | ns   |
| $T_{PERIODSSAbs}$              | 100-MHz SRCT and SRCC Absolute Period, SSC | Measured at crossing point $V_{OX}$                     | 9.872001 | 10.17827           | ns   |
| $T_{SKEW}$                     | Any SRCT/C to SRCT/C Clock Skew            | Measured at crossing point $V_{OX}$                     | –        | 250                | ps   |
| $T_{CCJ}$                      | SRCT/C Cycle to Cycle Jitter               | Measured at crossing point $V_{OX}$                     | –        | 125 <sup>[1]</sup> | ps   |
| $L_{ACC}$                      | SRCT/C Long Term Accuracy                  | Measured at crossing point $V_{OX}$                     | –        | 300                | ppm  |
| $T_R / T_F$                    | SRCT and SRCC Rise and Fall Time           | Measured from $V_{OL} = 0.175$ to $V_{OH} = 0.525V$     | 175      | 700                | ps   |
| $T_{RFM}$                      | Rise/Fall Matching                         | Determined as a fraction of $2*(T_R - T_F)/(T_R + T_F)$ | –        | 20                 | %    |
| $\Delta T_R$                   | Rise Time Variation                        |   | –        | 125                | ps   |
| $\Delta T_F$                   | Fall Time Variation                        |   | –        | 125                | ps   |
| $V_{HIGH}$                     | Voltage High                               | Math averages <i>Figure 16</i>                          | 660      | 850                | mV   |
| $V_{LOW}$                      | Voltage Low                                | Math averages <i>Figure 16</i>                          | –150     | –                  | mV   |
| $V_{OX}$                       | Crossing Point Voltage at 0.7V Swing       |   | 250      | 550                | mV   |
| $V_{OVS}$                      | Maximum Overshoot Voltage                  |   | –        | $V_{HIGH} + 0.3$   | V    |
| $V_{UDS}$                      | Minimum Undershoot Voltage                 |   | –0.3     | –                  | V    |
| $V_{RB}$                       | Ring Back Voltage                          | See <i>Figure 16</i> . Measure SE                       | –        | 0.2                | V    |
| <b>96_100_SSC/SRC0 at 0.7V</b> |  |   |          |                    |      |
| $T_{DC}$                       | SSCT and SSCC Duty Cycle                   | Measured at crossing point $V_{OX}$                     | 45       | 55                 | %    |

**AC Electrical Specifications (continued)**

| Parameter         | Description                                | Condition                           | Min.     | Max.     | Unit |
|-------------------|--|-------------------------------------|----------|----------|------|
| $T_{PERIOD}$      | 100-MHz SSCT and SSCC Period               | Measured at crossing point $V_{OX}$ | 9.997001 | 10.00300 | ns   |
| $T_{PERIODSS}$    | 100-MHz SSCT and SSCC Period, SSC          | Measured at crossing point $V_{OX}$ | 9.997001 | 10.05327 | ns   |
| $T_{PERIODAbs}$   | 100-MHz SSCT and SSCC Absolute Period      | Measured at crossing point $V_{OX}$ | 9.872001 | 10.12800 | ns   |
| $T_{PERIODSSAbs}$ | 100-MHz SRCT and SRCC Absolute Period, SSC | Measured at crossing point $V_{OX}$ | 9.872001 | 10.17827 | ns   |
| $T_{PERIOD}$      | 96-MHz SSCT and SSCC Period                | Measured at crossing point $V_{OX}$ | 10.41354 | 10.41979 | ns   |
| $T_{PERIODSS}$    | 96-MHz SSCT and SSCC Period, SSC           | Measured at crossing point $V_{OX}$ | 10.41354 | 10.47215 | ns   |
| $T_{PERIODAbs}$   | 96-MHz SSCT and SSCC Absolute Period       | Measured at crossing point $V_{OX}$ | 10.16354 | 10.66979 | ns   |
| $T_{PERIODSSAbs}$ | 96-MHz SRCT and SRCC Absolute Period, SSC  | Measured at crossing point $V_{OX}$ | 10.16354 | 10.72266 | ns   |
| $T_{CCJ}$         | SSCT/C Cycle to Cycle Jitter               | Measured at crossing point $V_{OX}$ | –        | 140      | ps   |
| $L_{ACC}$         | SSCT/C Long Term Accuracy                  | Measured at crossing point $V_{OX}$ | –        | 300      | ppm  |

**Note:**

1. Measured with one REF on.

|              |                                      |   |      |                  |    |
|--------------|--------------------------------------|---|------|------------------|----|
| $T_R / T_F$  | SSCT and SSCC Rise and Fall Time     | Measured from $V_{OL} = 0.175$ to $V_{OH} = 0.525V$     | 175  | 700              | ps |
| $T_{RFM}$    | Rise/Fall Matching                   | Determined as a fraction of $2*(T_R - T_F)/(T_R + T_F)$ | –    | 20               | %  |
| $\Delta T_R$ | Rise Time Variation                  |   | –    | 125              | ps |
| $\Delta T_F$ | Fall Time Variation                  |   | –    | 125              | ps |
| $V_{HIGH}$   | Voltage High                         | Math averages Figure 16                                 | 660  | 850              | mV |
| $V_{LOW}$    | Voltage Low                          | Math averages Figure 16                                 | –150 | –                | mV |
| $V_{OX}$     | Crossing Point Voltage at 0.7V Swing |   | 250  | 550              | mV |
| $V_{OVS}$    | Maximum Overshoot Voltage            |   | –    | $V_{HIGH} + 0.3$ | V  |
| $V_{UDS}$    | Minimum Undershoot Voltage           |   | –0.3 | –                | V  |
| $V_{RB}$     | Ring Back Voltage                    | See Figure 16. Measure SE                               | –    | 0.2              | V  |

**PCI/PCIF at 3.3V**

|                   |                                       |                                     |          |                    |      |
|-------------------|---------------------------------------|-------------------------------------|----------|--------------------|------|
| $T_{DC}$          | PCI Duty Cycle                        | Measurement at 1.5V                 | 45       | 55                 | %    |
| $T_{PERIOD}$      | Spread Disabled PCIF/PCI Period       | Measurement at 1.5V                 | 29.99100 | 30.00900           | ns   |
| $T_{PERIODSS}$    | Spread Enabled PCIF/PCI Period, SSC   | Measurement at 1.5V                 | 29.9910  | 30.15980           | ns   |
| $T_{PERIODAbs}$   | Spread Disabled PCIF/PCI Period       | Measurement at 1.5V                 | 29.49100 | 30.50900           | ns   |
| $T_{PERIODSSAbs}$ | Spread Enabled PCIF/PCI Period, SSC   | Measurement at 1.5V                 | 29.49100 | 30.65980           | ns   |
| $T_{HIGH}$        | PCIF and PCI high time                | Measurement at 2.4V                 | 12.0     | –                  | ns   |
| $T_{LOW}$         | PCIF and PCI low time                 | Measurement at 0.4V                 | 12.0     | –                  | ns   |
| $T_R / T_F$       | PCIF/PCI rising and falling Edge Rate | Measured between 0.8V and 2.0V      | 1.0      | 4.0                | V/ns |
| $T_{SKEW}$        | Any PCI clock to Any PCI clock Skew   | Measurement at 1.5V                 | –        | 500                | ps   |
| $T_{CCJ}$         | PCIF and PCI Cycle to Cycle Jitter    | Measurement at 1.5V                 | –        | 500 <sup>[2]</sup> | ps   |
| $L_{ACC}$         | PCIF/PCI Long Term Accuracy           | Measured at crossing point $V_{OX}$ | –        | 300                | ppm  |

**DOT96 at 0.7V**

|                 |                                   |                                     |          |          |    |
|-----------------|-----------------------------------|-------------------------------------|----------|----------|----|
| $T_{DC}$        | DOT96T and DOT96C Duty Cycle      | Measured at crossing point $V_{OX}$ | 45       | 55       | %  |
| $T_{PERIOD}$    | DOT96T and DOT96C Period          | Measured at crossing point $V_{OX}$ | 10.41354 | 10.41979 | ns |
| $T_{PERIODAbs}$ | DOT96T and DOT96C Absolute Period | Measured at crossing point $V_{OX}$ | 10.16354 | 10.66979 | ns |
| $T_{CCJ}$       | DOT96T/C Cycle to Cycle Jitter    | Measured at crossing point $V_{OX}$ | –        | 250      | ps |

**SILICON LABS****CY28443****AC Electrical Specifications (continued)**

| Parameter    | Description                          | Condition   | Min. | Max.             | Unit |
|--------------|--------------------------------------|---|------|------------------|------|
| $L_{ACC}$    | DOT96T/C Long Term Accuracy          | Measured at crossing point $V_{OX}$                     | –    | 300              | ppm  |
| $T_R / T_F$  | DOT96T and DOT96C Rise and Fall Time | Measured from $V_{OL} = 0.175$ to $V_{OH} = 0.525V$     | 175  | 700              | ps   |
| $T_{RFM}$    | Rise/Fall Matching                   | Determined as a fraction of $2*(T_R - T_F)/(T_R + T_F)$ | –    | 20               | %    |
| $\Delta T_R$ | Rise Time Variation                  |   | –    | 125              | ps   |
| $\Delta T_F$ | Fall Time Variation                  |   | –    | 125              | ps   |
| $V_{HIGH}$   | Voltage High                         | Math averages <i>Figure 16</i>                          | 660  | 850              | mV   |
| $V_{LOW}$    | Voltage Low                          | Math averages <i>Figure 16</i>                          | –150 | –                | mV   |
| $V_{OX}$     | Crossing Point Voltage at 0.7V Swing |   | 250  | 550              | mV   |
| $V_{OVS}$    | Maximum Overshoot Voltage            |   | –    | $V_{HIGH} + 0.3$ | V    |
| $V_{UDS}$    | Minimum Undershoot Voltage           |   | –0.3 | –                | V    |
| $V_{RB}$     | Ring Back Voltage                    | See <i>Figure 16</i> . Measure SE                       | –    | 0.2              | V    |

**48\_M at 3.3V**

|                 |                              |                                     |          |          |      |
|-----------------|------------------------------|-------------------------------------|----------|----------|------|
| $T_{DC}$        | Duty Cycle                   | Measurement at 1.5V                 | 45       | 55       | %    |
| $T_{PERIOD}$    | Period                       | Measurement at 1.5V                 | 20.83125 | 20.83542 | ns   |
| $T_{PERIODAbs}$ | Absolute Period              | Measurement at 1.5V                 | 20.48125 | 21.18542 | ns   |
| $T_{HIGH}$      | 48_M High time               | Measurement at 2.4V                 | 8.094    | 11.200   | ns   |
| $T_{LOW}$       | 48_M Low time                | Measurement at 0.4V                 | 7.694    | 11.500   | ns   |
| $T_R / T_F$     | Rising and Falling Edge Rate | Measured between 0.8V and 2.0V      | 1.0      | 2.0      | V/ns |
| $T_{CCJ}$       | Cycle to Cycle Jitter        | Measurement at 1.5V                 | –        | 350      | ps   |
| $L_{ACC}$       | 48M Long Term Accuracy       | Measured at crossing point $V_{OX}$ | –        | 100      | ppm  |

**27\_M at 3.3V**

|              |                              |                                     |        |         |      |
|--------------|------------------------------|-------------------------------------|--------|---------|------|
| $T_{DC}$     | Duty Cycle                   | Measurement at 1.5V                 | 45     | 55      | %    |
| $T_{PERIOD}$ | Spread Disabled 27M Period   | Measurement at 1.5V                 | 27.000 | 27.0547 | ns   |
|              | Spread Enabled 27M Period    | Measurement at 1.5V                 | 27.000 | 27.0547 |      |
| $T_{HIGH}$   | 27_M High time               | Measurement at 2.0V                 | 10.5   | –       | ns   |
| $T_{LOW}$    | 27_M Low time                | Measurement at 0.8V                 | 10.5   | –       | ns   |
| $T_R / T_F$  | Rising and Falling Edge Rate | Measured between 0.8V and 2.0V      | 1.0    | 4.4     | V/ns |
| $T_{CCJ}$    | Cycle to Cycle Jitter        | Measurement at 1.5V                 | –      | 520     | ps   |
| $L_{ACC}$    | 27_M Long Term Accuracy      | Measured at crossing point $V_{OX}$ | –      | 0       | ppm  |

**REF at 3.3V**

|                 |                                  |                                |          |          |      |
|-----------------|----------------------------------|--------------------------------|----------|----------|------|
| $T_{DC}$        | REF Duty Cycle                   | Measurement at 1.5V            | 45       | 55       | %    |
| $T_{PERIOD}$    | REF Period                       | Measurement at 1.5V            | 69.8203  | 69.8622  | ns   |
| $T_{PERIODAbs}$ | REF Absolute Period              | Measurement at 1.5V            | 68.82033 | 70.86224 | ns   |
| $T_R / T_F$     | REF Rising and Falling Edge Rate | Measured between 0.8V and 2.0V | 1.0      | 4.0      | V/ns |
| $T_{SKEW}$      | REF Clock to REF Clock           | Measurement at 1.5V            | –        | 500      | ps   |
| $T_{CCJ}$       | REF Cycle to Cycle Jitter        | Measurement at 1.5V            | –        | 1000     | ps   |
| $L_{ACC}$       | Long Term Accuracy               | Measurement at 1.5V            | –        | 300      | ppm  |

**ENABLE/DISABLE and SET-UP**

|              |                                   |  |      |     |    |
|--------------|-----------------------------------|--|------|-----|----|
| $T_{STABLE}$ | Clock Stabilization from Power-up |  | –    | 1.8 | ms |
| $T_{SS}$     | Stopclock Set-up Time             |  | 10.0 | –   | ns |

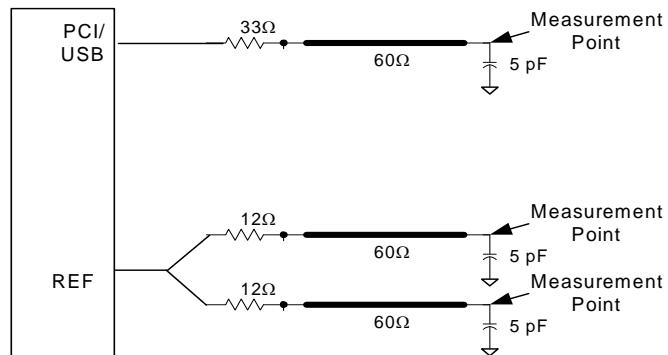
**Note:**

2. Measured in Low drive mode.

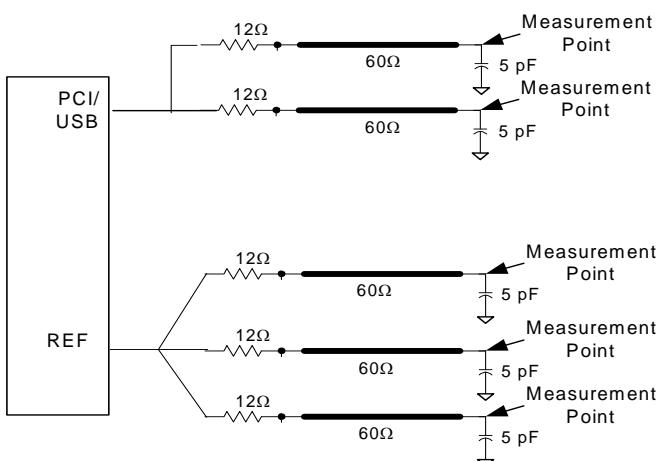
## Test and Measurement Set-up

### For PCI Single-ended Signals and Reference

The following diagram shows test load configurations for the single-ended PCI, USB, and REF output signals.

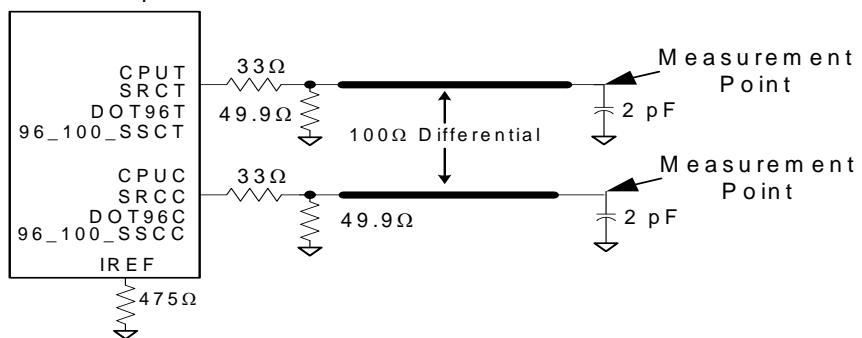


**Figure 14. Single-ended Load Configuration Low Drive Option**

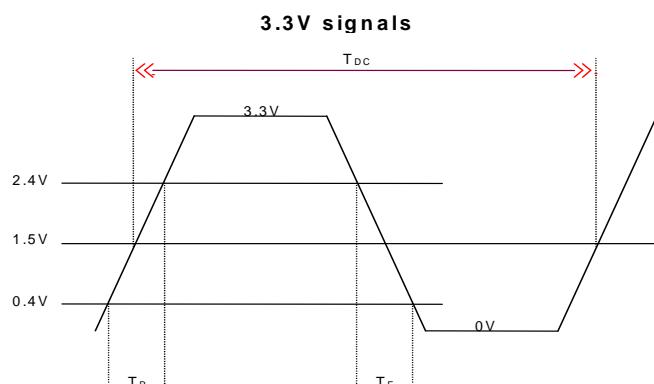


**Figure 15. Single-ended Load Configuration High Drive Option**

The following diagram shows the test load configuration for the differential CPU and SRC outputs.



**Figure 16. 0.7V Differential Load Configuration**



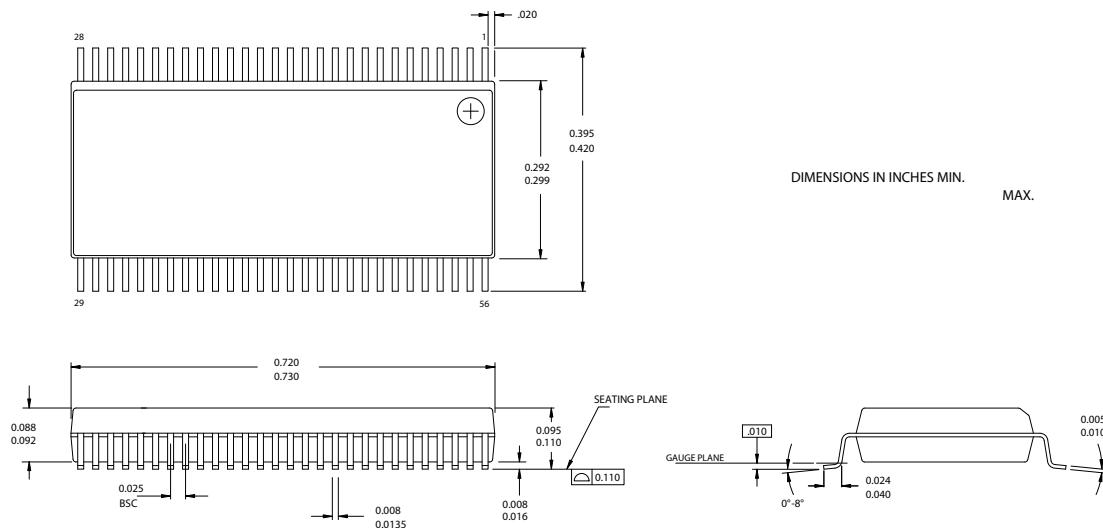
**Figure 17. Single-ended Output Signals (for AC Parameters Measurement)**

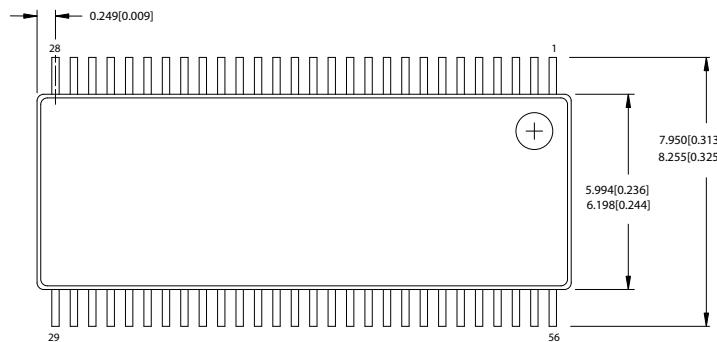
## Ordering Information

| Part Number      | Package Type                 | Product Flow           |
|------------------|------------------------------|------------------------|
| <b>Lead-free</b> |                              |                        |
| CY284430XC       | 56-pin SSOP                  | Commercial, 0° to 85°C |
| CY284430XCT      | 56-pin SSOP – Tape and Reel  | Commercial, 0° to 85°C |
| CY28443ZXC       | 56-pin TSSOP                 | Commercial, 0° to 85°C |
| CY28443ZXCT      | 56-pin TSSOP – Tape and Reel | Commercial, 0° to 85°C |

## Package Diagrams

## 56-Lead Shrunk Small Outline Package O56



**Package Diagrams (continued)**
**56-Lead Thin Shrunk Small Outline Package, Type II (6 mm x 12 mm) Z56**


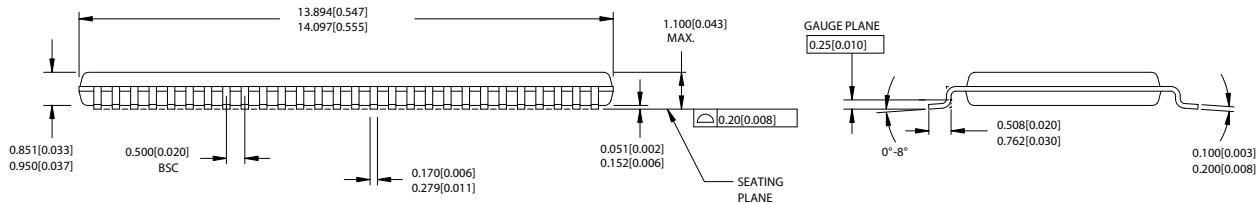
DIMENSIONS IN MM[INCHES] MIN.

MAX.

REFERENCE JEDEC MO-153

PACKAGE WEIGHT 0.42gms

| PART #                |
|-----------------------|
| Z5624 STANDARD PKG.   |
| ZZ5624 LEAD FREE PKG. |

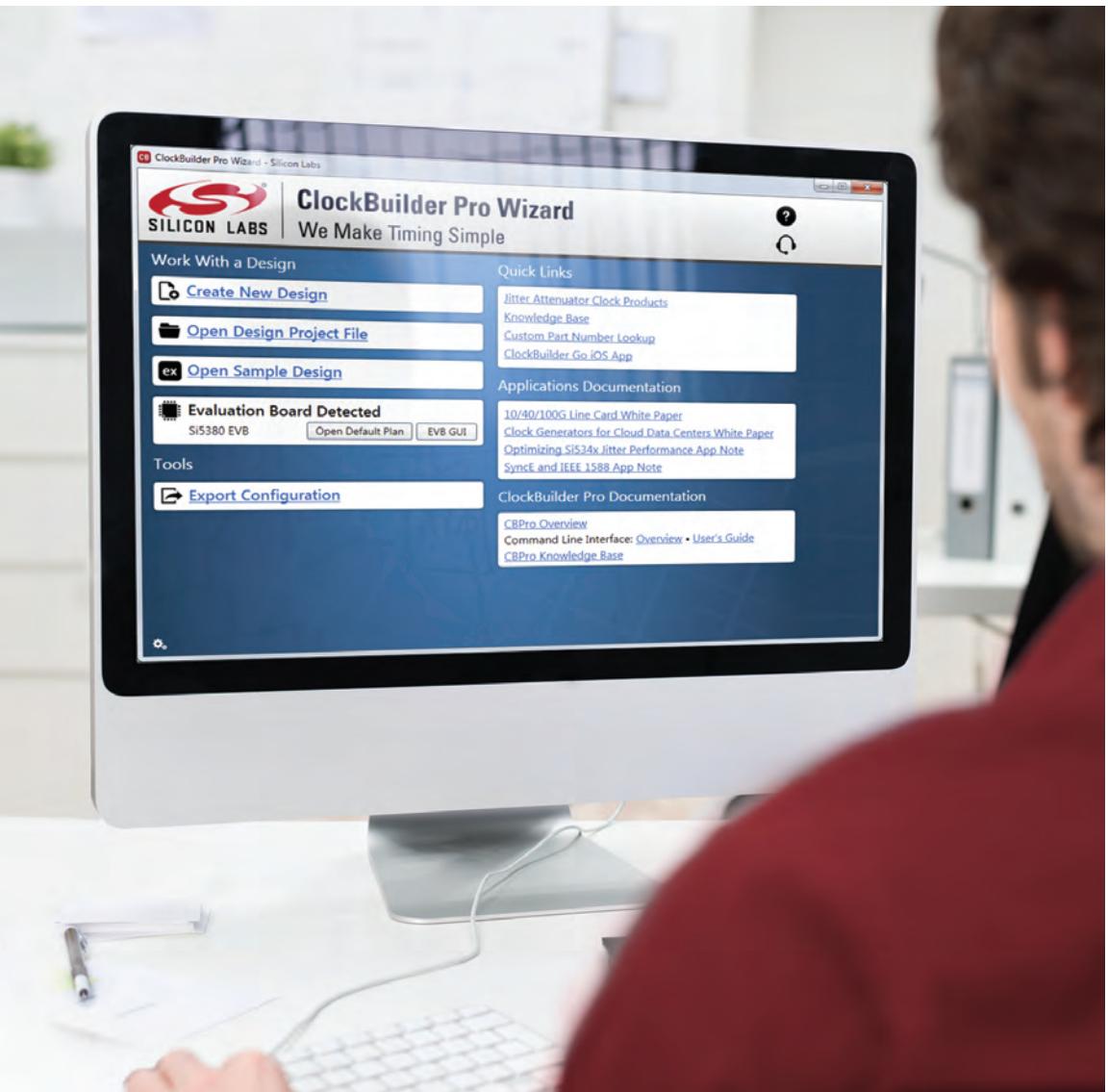


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