

### Product Features

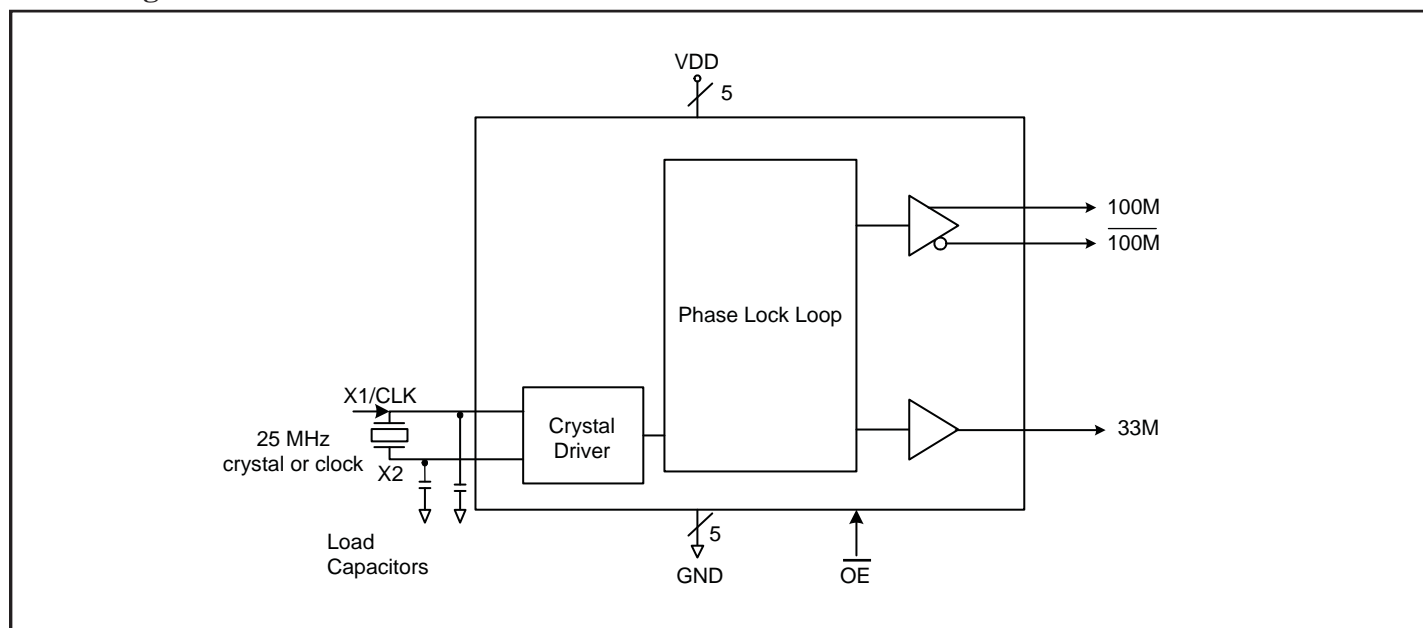
- 100MHz Differential Output, 33MHz LVC MOS
- Supply voltage of 3.3V  $\pm$ 5%
- 25MHz input frequency
- Jitter 60ps cycle-to-cycle (typ) 100MHz
- Industrial temperature range
- Packaging: (Pb-free and Green)  
—16-pin, 173 mils wide TSSOP

### Description

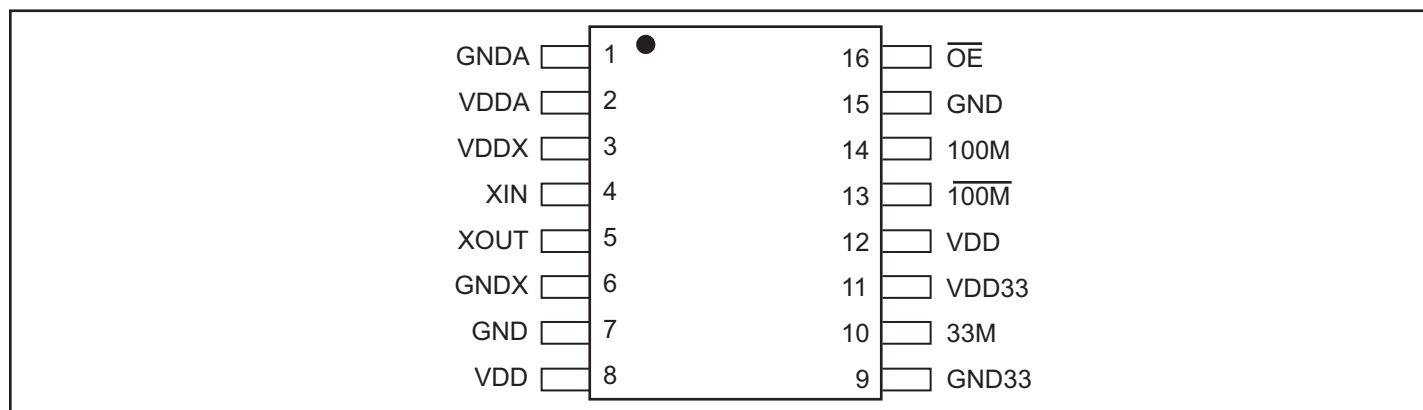
The PI6C557-10 is an integrated 100MHz differential and 33MHz LVC MOS clock generator. It uses a 25MHz quartz crystal to provide an input frequency reference. The high performance internal PLL multiplier is a proven design that ships world-wide for PCI Express applications.

The PI6C557-10 is available in a 16 lead 4.4 x 5.0mm TSSOP package and is operated from a single 3.3V supply. Separate supply pins are provided for analog core, 100MHz differential output, and 33MHz LVC MOS output to adhere to lowest risk, best known power supply partitioning practices.

### Block Diagram



### Pin Configuration



## Pin Description

| Pin # | Pin Name          | I/O Type | Description   |
|-------|-------------------|----------|---|
| 1     | GNDA              | Power    | Analog Ground   |
| 2     | VDDA              | Power    | Analog power, connect to clean 3.3V source  |
| 3     | VDDX              | Power    | Crystal oscillator circuit power  |
| 4     | XIN               | Input    | Crystal input.  |
| 5     | XOUT              | Output   | Crystal output.   |
| 6     | GNDX              | Power    | Crystal power ground.   |
| 7     | GND               |          | Ground.   |
| 8     | VDD               |          | Power.  |
| 9     | GND33             | Power    | Ground for 33MHz output.  |
| 10    | 33M               | Output   | 33.3MHz LVC MOS output.   |
| 11    | VDD33             | Power    | Power for 33MHz output  |
| 12    | VDD               | Power    | Power.  |
| 13    | $\overline{100M}$ | Output   | Complimentary 100MHz differential output.   |
| 14    | 100M              | Output   | 100MHz differential output.   |
| 15    | GND               | Power    | Ground.   |
| 16    | $\overline{OE}$   | Input    | Output enable, tristates both 100MHz and 33MHz outputs when HIGH. Internal pull-down is 30Kohm. |

## Application Information

### Decoupling Capacitors

Decoupling capacitors of 0.01 $\mu$ F should be connected between each V<sub>DD</sub> pin and the ground plane and placed as close to the V<sub>DD</sub> pin as possible.

## Electrical Specifications

### Maximum Ratings

|   |                                |
|---|--------------------------------|
| Supply Voltage to Ground Potential..... | 5.5V                           |
| All Inputs and Outputs .....            | -0.5V to V <sub>DD</sub> +0.5V |
| Ambient Operating Temperature .....     | -40 to +85°C                   |
| Storage Temperature .....               | -65 to +150°C                  |
| Junction Temperature .....              | 150°C                          |
| Soldering Temperature .....             | 260°C                          |

**Note:**

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### DC Characteristics (V<sub>DD</sub> = 3.3V ± 5%, T<sub>A</sub> = -40°C to +85°C)

| Symbol            | Parameter                         | Conditions   | Min.     | Typ. | Max.                 | Unit |
|-------------------|-----------------------------------|--|----------|------|----------------------|------|
| V <sub>DD</sub>   | Supply Voltage                    |  | 3.135    | 3.3  | 3.465                | V    |
| V <sub>IH</sub>   | Input High Voltage <sup>(1)</sup> | $\overline{OE}$  | 2.0      |      | V <sub>DD</sub> +0.3 | V    |
| V <sub>IL</sub>   | Input Low Voltage <sup>(1)</sup>  | $\overline{OE}$  | GND -0.3 |      | 0.8                  | V    |
| I <sub>IL</sub>   | Input Leakage Current             | 0 < V <sub>in</sub> < V <sub>DD</sub><br>With input pull-up and pull-downs | -20      |      | 150                  | μA   |
| I <sub>DD</sub>   | Operating Supply Current          | Normal Operation   |          | 35   | 51                   | mA   |
| I <sub>DDOE</sub> |                                   | $\overline{OE}$ = HIGH   |          | 27   | 40                   | mA   |
| C <sub>IN</sub>   | Input Capacitance                 | Input pin capacitance  |          | 5    |                      | pF   |
| C <sub>OUT</sub>  | Output Capacitance                | Output pin capacitance   |          | 6.5  |                      | pF   |
| L <sub>PIN</sub>  | Pin Inductance                    |  |          |      | 5                    | nH   |

**Notes:**

1. Single edge is monotonic when transitioning through region.

**100MHz Differential DC Characteristics** ( $V_{DD} = 3.3V \pm 5\%$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ )

| Symbol   | Parameter                   | Conditions | Min. | Typ. | Max. | Units |
|----------|-----------------------------|------------|------|------|------|-------|
| $V_{OD}$ | Differential Output Voltage |            | 400  | 725  | 850  | mV    |
| $V_{OC}$ | Common Mode Voltage         |            | 1.0  | 1.25 | 1.6  | V     |

**100MHz Differential AC Characteristics** ( $V_{DD} = 3.3V \pm 5\%$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ )

| Symbol    | Parameter             | Conditions  | Min. | Typ. | Max. | Units |
|-----------|-----------------------|---|------|------|------|-------|
| $f_{out}$ | Output Frequency      |   |      |      | 100  | MHz   |
| $t_r/t_f$ | Output Rise/Fall time | 20% - 80% 100-Ohm<br>Differential Termination<br>$C_L = 10pF$ | 1    | 1.2  | 1.4  | ns    |
| $t_{DC}$  | Output duty cycle     |   | 47   |      | 53   | %     |
|           | Phase Jitter          | 1E-6 BER<br>PCIe Gen 1 (pk-pk)                                |      |      | 86   | ps    |

**33MHz LVC MOS DC Characteristics** ( $V_{DD} = 3.3V \pm 5\%$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ )

| Symbol   | Parameter           | Conditions                          | Min. | Typ. | Max. | Units    |
|----------|---------------------|-------------------------------------|------|------|------|----------|
| $V_{OL}$ | Output Voltage Low  | $V_{DD} = 3.135V$ , $I_{OL} = 6mA$  |      |      | 0.4  | V        |
| $V_{OH}$ | Output Voltage High | $V_{DD} = 3.135V$ , $I_{OH} = -6mA$ | 2.4  |      |      |          |
| $Z_O$    | Output Impedance    |                                     |      | 45   |      | $\Omega$ |

**33MHz LVC MOS AC Characteristics** ( $V_{DD} = 3.3V \pm 5\%$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ )

| Symbol    | Parameter              | Conditions  | Min. | Typ. | Max. | Units |
|-----------|------------------------|---|------|------|------|-------|
| $f_{out}$ | Output Frequency       |   |      |      | 33.3 | MHz   |
| $t_r/t_f$ | Output Rise/Fall time  | 20% to 80%, $C_L = 10pF$  |      | 3    | 4    | ns    |
| $t_{DC}$  | Output Duty Cycle      | $t_{DC} = t_H/t_{CY}$ , $t_H$ = High Pulse Width,<br>$t_{CY}$ = Output Cycle Time, @ $V_{DD}/2$ | 45   |      | 55   | %     |
| $J_{CC}$  | Jitter, Cycle-to-Cycle |   |      |      | 300  | ps    |

### Thermal Characteristics

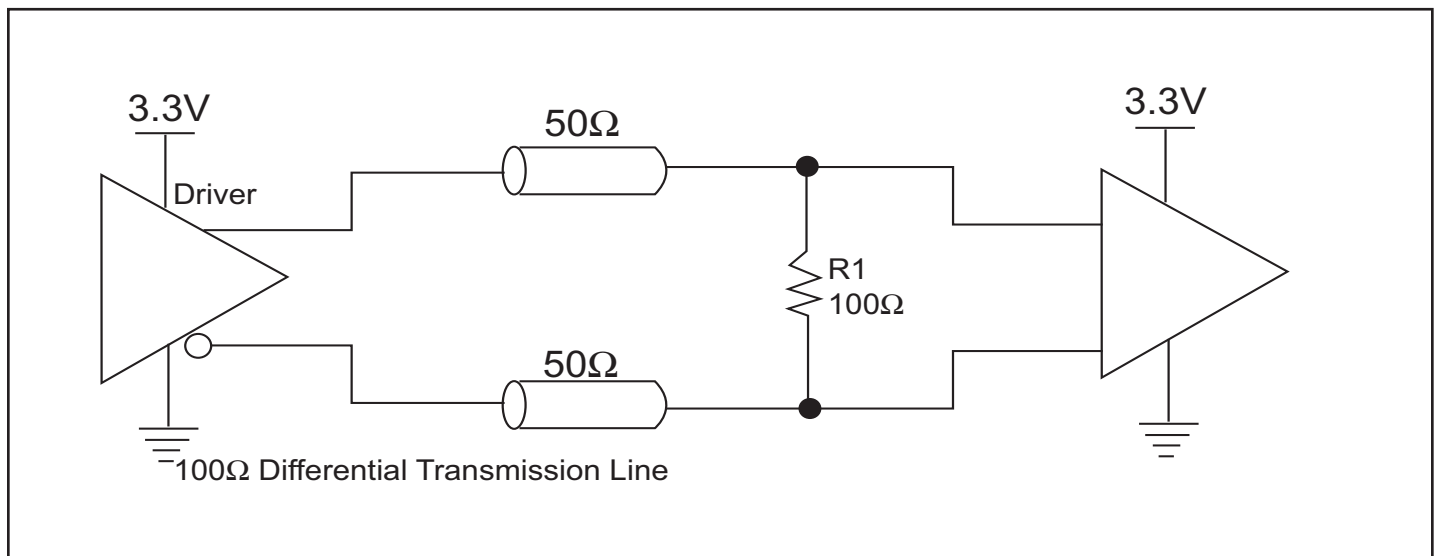
| Symbol        | Parameter                              | Conditions | Min. | Typ. | Max. | Unit                        |
|---------------|--|------------|------|------|------|-----------------------------|
| $\theta_{JA}$ | Thermal Resistance Junction to Ambient | Still air  |      |      | 90   | $^{\circ}\text{C}/\text{W}$ |
| $\theta_{JC}$ | Thermal Resistance Junction to Case    |            |      |      | 24   | $^{\circ}\text{C}/\text{W}$ |

### Recommended Crystal Specification

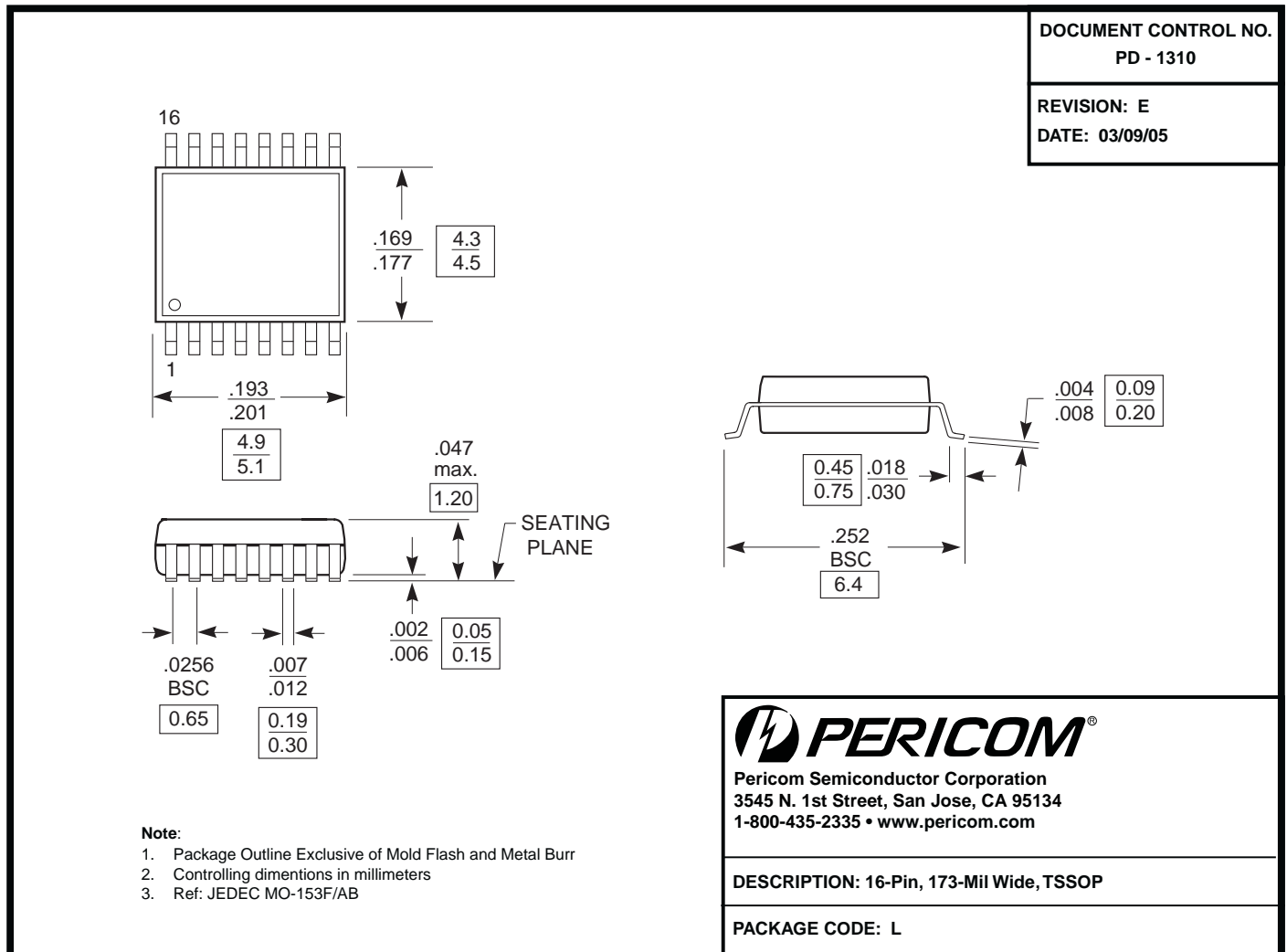
Pericom recommends SRX7278 for optimum performance.

| Parameter                       | Value          | Units         |
|---------------------------------|----------------|---------------|
| Mode of Oscillation             | Fundamental AT |               |
| Frequency                       | 25             | MHz           |
| Frequency Tolerance             | $\pm 20$       | PPM           |
| Temperature and Aging Stability | $\pm 30$       |               |
| Load Cap                        | 20             | pF            |
| Equivalent Series Resistance    | 35             | $\Omega$      |
| Drive Level                     | 100            | $\mu\text{W}$ |

### 3.3V Differential Driver Termination



A general interface is shown above. In a 100Ω differential transmission line environment, drivers require a matched load termination of 100Ω across near the receiver input.

**Package Mechanical: 16-Pin, TSSOP (L)**

**Ordering Information(1-3)**

| Ordering Code | Package Code | Package Type                  |
|---------------|--------------|-------------------------------|
| PI6C557-10LE  | L            | Pb-free & Green, 16-Pin TSSOP |

**Note:**

1. Thermal characteristics and package top marking information can be found at <http://www.pericom.com/packaging/>
2. E = lead-free and green packaging
3. Adding an X suffix = tape/reel

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