

#### Features

- World's first differential spread spectrum oscillator
- Extremely low cycle-cycle jitter
  - As low as 10 ps (typical)
- Wide frequency range
  - 1 MHz to 220 MHz
  - 220 MHz to 800 MHz (contact SiTime)
- Eight spread selections (31.5 KHz modulation rate)
  - Center Spread:  $\pm 0.25\%$ ,  $\pm 0.5\%$ ,  $\pm 1.0\%$ ,  $\pm 2.0\%$
  - Down Spread:  $-0.5\%$ ,  $-1.0\%$ ,  $-2.0\%$ ,  $-4.0\%$
  - For  $-0.25\%$  and  $\pm 0.125\%$  contact SiTime
- Low frequency stability (Spread = OFF)
  - $\pm 25$  ppm or  $\pm 50$  ppm
- Operating voltage
  - 1.8V or 2.5 or 3.3 V
- Operating temperature range:
  - Industrial,  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended Commercial,  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- Small footprint
  - $5.0 \times 3.2 \times 0.75$  mm
  - $7.0 \times 5.0 \times 0.90$  mm
- Pb-free and RoHS compliant
- Ultra-reliable start up and greater immunity from interference

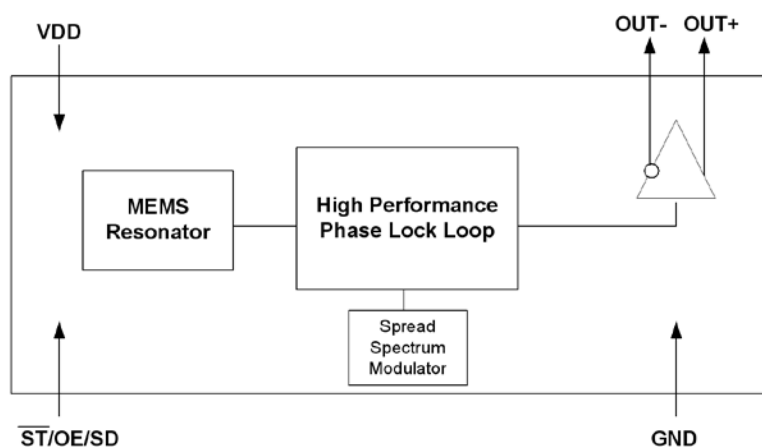
#### Benefits

- Services most PC peripherals, networking, and consumer applications
- Provides wide range of spread percentage for maximum electromagnetic interference (EMI) reduction
- Up to -17 dB reduction on third harmonic and -12dB on the fundamental
- Fast time to market due to not needing to redesign the PCB for EMI reduction
- Factory programmable for ultra-fast lead time
- No crystal or load capacitors required
- Eliminates crystal qualification time
- 50%+ board saving space
- Completely quartz-free

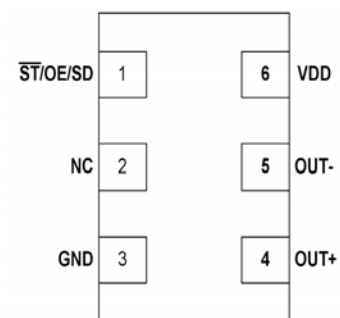
#### Applications

- PCI-Express
- USB 3.0
- Fully Buffered DIMM
- Blade Server
- Router
- System Clock
- Networking and Computing
- Automotive
- Industrial

#### Block Diagram



#### Pinout



## Pin Description

| Pin No. | Name     |        | Pin Description   |
|---------|----------|--------|---|
| 1       | ST/OE/SD | Input  | Standby or Output Enable pin for OUT+ and OUT-.<br>OE:<br>When High or Open : OUT+ and OUT- = active<br>When Low : OUT+ and OUT- = High Impedance state<br>ST:<br>When High or Open : OUT+ and OUT- = active<br>When Low : OUT+ and OUT- = Output is low (weak pull down), oscillation stops<br>SD: Spread Disable - disables spread spectrum<br>When High or Open : Spread Spectrum modulation = active<br>When Low : Spread Spectrum modulation = Off |
| 2       | NC       | NA     | No connect pin, leave it floating.  |
| 3       | GND      | Power  | VDD power supply ground. Connect to ground  |
| 4       | OUT+     | Output | 1 to 220 MHz programmable clock output. For frequencies > 220 MHz contact SiTime  |
| 5       | OUT-     | Output |   |
| 6       | VDD      | Power  | Power supply  |

## Absolute Maximum Ratings

Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not absolute maximum ratings.

## Absolute Maximum Table

| Parameter  | Min.      | Max.      | Unit  |
|--|-----------|-----------|-------|
| Storage Temperature  | -65       | 150       | °C    |
| VDD  | -0.5      | 4         | V     |
| Vin  | GND - 0.5 | VDD + 0.5 | V     |
| Theta JA ( with copper plane on VDD and GND) 5.0 x 3.2 package         | –         | 68        | °C/W  |
| 7.0 x 5.0 package when center pad is soldered down                     | –         | 38        | °C/W  |
| 7.0 x 5.0 package when center pad is not soldered down                 | –         | 90        | °C/W  |
| Theta JC (with PCB traces of 0.010 inch to all pins) 5.0 x 3.2 package | –         | 45        | °C/W  |
| 7.0 x 5.0 package when center pad is soldered down                     | –         | 35        | °C/W  |
| 7.0 x 5.0 package when center pad is not soldered down                 | –         | 48        | °C/W  |
| Soldering Temperature (follow standard Pb free soldering guidelines)   | –         | 260       | °C    |
| Number of Program Writes   | –         | 1         | NA    |
| Program Retention over -40 to 125C, Process, VDD (0 to 3.6V)           | –         | 1,000+    | years |
| Human Body Model (JESD22-A114)   | 2000      | –         | V     |
| Charged Device Model (JESD22-C101)                                     | 750       | –         | –     |
| Machine Model (JESD22-A115)  | 200       | –         | –     |

## DC Electrical Specifications

### Environmental Compliance

| Parameter                  | Condition/Test Method                           |
|----------------------------|---|
| Mechanical Shock           | MIL-STD-883F, Method 2002                       |
| Mechanical Vibration       | MIL-STD-883F, Method 2007                       |
| Temperature Cycle          | MIL-STD-883F, Method 1010-65-150°C (1000 cycle) |
| Solderability              | MIL-STD-883F, Method 2003                       |
| Moisture Sensitivity Level | MSL1 @ 260°C                                    |

LVCMOS input, OE or  $\overline{ST}$  pin,  $3.3V \pm 10\%$  or  $2.5V \pm 10\%$  or  $1.8V \pm 5\%$ ,  $-40$  to  $85^\circ C$

| Symbol   | Parameter          | Condition   | Min. | Typ. | Max. | Unit    |
|----------|--------------------|---|------|------|------|---------|
| $V_{IH}$ | Input High Voltage |   | 70   | –    | –    | %Vdd    |
| $V_{IL}$ | Input Low Voltage  |   | –    | –    | 30   | %Vdd    |
| $I_{IH}$ | Input High Current | OE or ST or SD pin  | –    | –    | 10   | $\mu A$ |
| $I_{IL}$ | Input Low Current  | OE or ST or SD pin  | -10  | –    | –    | $\mu A$ |
| $T_{pu}$ | Power Up Time      | Time from minimum power supply voltage to the first cycle (Guaranteed no runt pulses) | –    | –    | 10   | ms      |

LVPECL,  $3.3V \pm 10\%$  or  $2.5V \pm 10\%$ ,  $-40$  to  $85^\circ C$

| Symbol      | Parameter                  | Condition  | Min.         | Typ. | Max.         | Unit |
|-------------|----------------------------|--|--------------|------|--------------|------|
| $V_{DD}$    | Supply Voltage             |  | 2.97         | 3.3  | 3.63         | V    |
|             |                            |  | 2.25         | 2.5  | 2.75         | V    |
| $I_{DD}$    | Supply Current             | $V_{DD} = 3.3$ , Excluding Load Termination Current      | –            | 75   | 84           | mA   |
|             |                            | $V_{DD} = 2.5$ , Excluding Load Termination Current      | –            | 75   | 84           | mA   |
| $V_{OH}$    | Output High Voltage        | 50 Ohm termination to $V_{DD} - 2.0V$<br>See Figure 2,3. | $V_{DD}-1.1$ | –    | $V_{DD}-0.7$ | V    |
| $V_{OL}$    | Output Low Voltage         |  | $V_{DD}-2.0$ | –    | $V_{DD}-1.4$ | V    |
| $V_{swing}$ | Pk-Pk Output Voltage Swing |  | 600          | 800  | 1000         | mV   |

HCSL,  $3.3V \pm 10\%$  or  $2.5V \pm 10\%$ ,  $-40$  to  $85^\circ C$

| Symbol      | Parameter                  | Condition   | Min. | Typ. | Max. | Unit |
|-------------|----------------------------|---|------|------|------|------|
| $V_{DD}$    | Supply Voltage             |   | 2.97 | 3.3  | 3.63 | V    |
|             |                            |   | 2.25 | 2.5  | 2.75 | V    |
| $I_{DD}$    | Supply Current             | $V_{DD} = 3.3$ , Excluding Load Termination Current | –    | 73   | 80   | mA   |
|             |                            | $V_{DD} = 2.5$ , Excluding Load Termination Current | –    | 73   | 80   | mA   |
| $V_{OH}$    | Output High Voltage        | 50 Ohm termination to GND<br>See Figure 4.          | 0.6  | 0.75 | 0.95 | V    |
| $V_{OL}$    | Output Low Voltage         |   | 0.0  | –    | 50   | mV   |
| $V_{swing}$ | Pk-Pk Output Voltage Swing |   | 600  | 750  | 950  | mV   |

LVDS,  $3.3V \pm 10\%$  or  $2.5V \pm 10\%$ ,  $-40$  to  $85^\circ C$

| Symbol           | Parameter                   | Condition  | Min. | Typ. | Max. | Unit |
|------------------|-----------------------------|--|------|------|------|------|
| $V_{DD}$         | Supply Voltage              |  | 2.97 | 3.3  | 3.63 | V    |
|                  |                             |  | 2.25 | 2.5  | 2.75 | V    |
| $I_{DD}$         | Supply Current              | $V_{DD} = 3.3$ , Excluding Load Termination Current              | –    | 75   | 85   | mA   |
|                  |                             | $V_{DD} = 2.5$ , Excluding Load Termination Current              | –    | 70   | 77   | mA   |
| $V_{OD1}$        | Differential Output Voltage | Swing Mode = Normal<br>Single load termination.<br>See Figure 5. | 250  | 350  | 450  | mV   |
| $\Delta V_{OD1}$ | $V_{OD}$ Magnitude Change   |  | –    | –    | 50   | mV   |
| $V_{OS1}$        | Offset Voltage              |  | –    | 1.2  | –    | V    |
| $\Delta V_{OS1}$ | $V_{OS}$ Magnitude Change   |  | –    | –    | 50   | mV   |
| $V_{OD2}$        | Differential Output Voltage | Swing Mode = High<br>Single load termination.<br>See Figure 5.   | 500  | 700  | 900  | mV   |
| $\Delta V_{OD2}$ | $V_{OD}$ Magnitude Change   |  | –    | –    | 50   | mV   |
| $V_{OS2}$        | Offset Voltage              |  | –    | 1.2  | –    | V    |
| $\Delta V_{OS2}$ | $V_{OS}$ Magnitude Change   |  | –    | –    | 50   | mV   |
| $V_{OD3}$        | Differential Output Voltage | Swing Mode = High<br>Double load termination.<br>See Figure 6.   | 250  | 350  | 450  | mV   |
| $\Delta V_{OD3}$ | $V_{OD}$ Magnitude Change   |  | –    | –    | 50   | mV   |
| $V_{OS3}$        | Offset Voltage              |  | –    | 1.2  | –    | V    |
| $\Delta V_{OS3}$ | $V_{OS}$ Magnitude Change   |  | –    | –    | 50   | mV   |

CML, 3.3V ± 10% or 2.5V ± 10% or 1.8V ± 5%, -40 to 85°C

| Symbol              | Parameter                  | Condition   | Min.                               | Typ.                   | Max.                 | Unit |    |
|---------------------|----------------------------|---|------------------------------------|------------------------|----------------------|------|----|
| V <sub>DD</sub>     | Supply Voltage             |   | 2.97                               | 3.3                    | 3.63                 | V    |    |
|                     |                            |   | 2.25                               | 2.5                    | 2.75                 | V    |    |
|                     |                            |   | 1.71                               | 1.8                    | 1.89                 | V    |    |
| I <sub>DD</sub>     | Supply Current             | V <sub>DD</sub> = 3.3V  | Excluding Load Termination Current | –                      | 48                   | 51   | mA |
|                     |                            | V <sub>DD</sub> = 2.5V  |                                    | –                      | 48                   | 51   | mA |
|                     |                            | V <sub>DD</sub> = 1.8V  |                                    | –                      | 48                   | 51   | mA |
| V <sub>OH1</sub>    | Output High Voltage        | Swing Mode = Normal<br>Single Load Termination<br>See Figure 7. | V <sub>DD</sub> -0.1               | –                      | V <sub>DD</sub>      | V    |    |
| V <sub>OL1</sub>    | Output Low Voltage         |   | V <sub>DD</sub> -0.55              | V <sub>DD</sub> -0.425 | V <sub>DD</sub> -0.3 | V    |    |
| V <sub>swing1</sub> | Pk-Pk Output Voltage Swing |   | 300                                | 425                    | 550                  | mV   |    |
| V <sub>OH2</sub>    | Output High Voltage        | Swing Mode = High<br>Single Load Termination<br>See Figure 7.   | V <sub>DD</sub> -0.1               | –                      | V <sub>DD</sub>      | V    |    |
| V <sub>OL2</sub>    | Output Low Voltage         |   | V <sub>DD</sub> -1.1               | V <sub>DD</sub> -0.85  | V <sub>DD</sub> -0.6 | V    |    |
| V <sub>swing2</sub> | Pk-Pk Output Voltage Swing |   | 600                                | 850                    | 1100                 | mV   |    |
| V <sub>OH3</sub>    | Output High Voltage        | Swing Mode = High<br>Double Load Termination<br>See Figure 8.   | V <sub>DD</sub> -0.1               | –                      | V <sub>DD</sub>      | V    |    |
| V <sub>OL3</sub>    | Output Low Voltage         |   | V <sub>DD</sub> -0.55              | V <sub>DD</sub> -0.425 | V <sub>DD</sub> -0.3 | V    |    |
| V <sub>swing3</sub> | Pk-Pk Output Voltage Swing |   | 300                                | 425                    | 550                  | mV   |    |

## AC Electrical Specifications

LVPECL, 3.3V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 100         | 150  | 300  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 10   | 16   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 8    | 14   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 8    | 14   | ps   |     |

LVPECL, 2.5V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 100         | 150  | 300  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 10   | 16   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 8    | 14   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 8    | 14   | ps   |     |

HCSL, 3.3V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 200         | 280  | 375  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 10   | 16   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 10   | 15   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 10   | 15   | ps   |     |

HCSL, 2.5V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 200         | 300  | 400  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 9    | 19   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 9    | 17   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 9    | 15   | ps   |     |

LVDS, 3.3V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 100         | 200  | 325  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 11   | 19   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 11   | 20   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 11   | 21   | ps   |     |

LVDS, 2.5V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 100         | 260  | 325  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 14   | 26   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 14   | 26   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 14   | 27   | ps   |     |

CML, 3.3V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 150         | 220  | 300  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 11   | 20   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 11   | 18   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 10   | 19   | ps   |     |

CML, 2.5V ± 10%, -40 to 85°C

| Symbol                         | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|--------------------------------|-----------------------|---|-------------|------|------|------|-----|
| F <sub>out</sub>               | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| F <sub>stab</sub>              | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|                                |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| F <sub>age</sub>               | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC                             | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| t <sub>R</sub> /t <sub>F</sub> | Output Rise/Fall Time | 20% to 80%  | 150         | 230  | 300  | ps   |     |
| T <sub>CCJ</sub>               | Cycle-Cycle Jitter    | F <sub>out</sub> = 100 MHz, -0.5% down spread   | –           | 13   | 22   | ps   |     |
|                                |                       | F <sub>out</sub> = 150 MHz, -0.5% down spread   | –           | 12   | 19   | ps   |     |
|                                |                       | F <sub>out</sub> = 200 MHz, -0.5% down spread   | –           | 11   | 20   | ps   |     |

CML, 1.8V ± 5%, -40 to 85°C

| Symbol     | Parameter             | Condition   | Min.        | Typ. | Max. | Unit |     |
|------------|-----------------------|---|-------------|------|------|------|-----|
| $F_{out}$  | Output Frequency      |   | 1.0         | –    | 220  | MHz  |     |
| $F_{stab}$ | Frequency Stability   | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | -20 to 70°C | -25  | –    | +25  | ppm |
|            |                       |   | -40 to 85°C | -50  | –    | +50  | ppm |
| $F_{age}$  | Aging                 | First year @ 25°C   | –           | –    | 1    | PPM  |     |
| DC         | Duty Cycle            |   | 45          | –    | 55   | %    |     |
| $t_R/t_F$  | Output Rise/Fall Time | 20% to 80%  | 150         | 230  | 300  | ps   |     |
| $T_{CCJ}$  | Cycle-Cycle Jitter    | $F_{out} = 100$ MHz, -0.5% down spread  | –           | 13   | 23   | ps   |     |
|            |                       | $F_{out} = 150$ MHz, -0.5% down spread  | –           | 12   | 22   | ps   |     |
|            |                       | $F_{out} = 200$ MHz, -0.5% down spread  | –           | 12   | 21   | ps   |     |

### Termination Diagrams

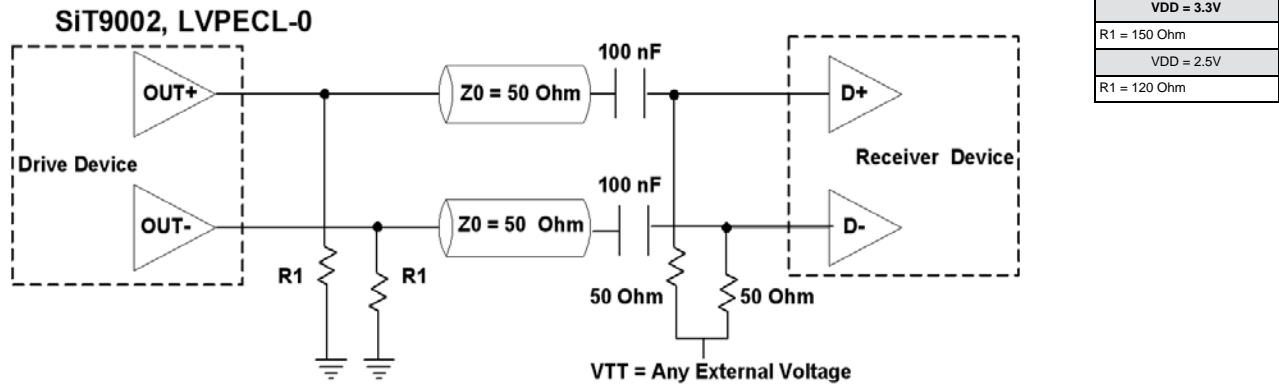


Figure 1. LVPECL AC Coupled Typical Termination

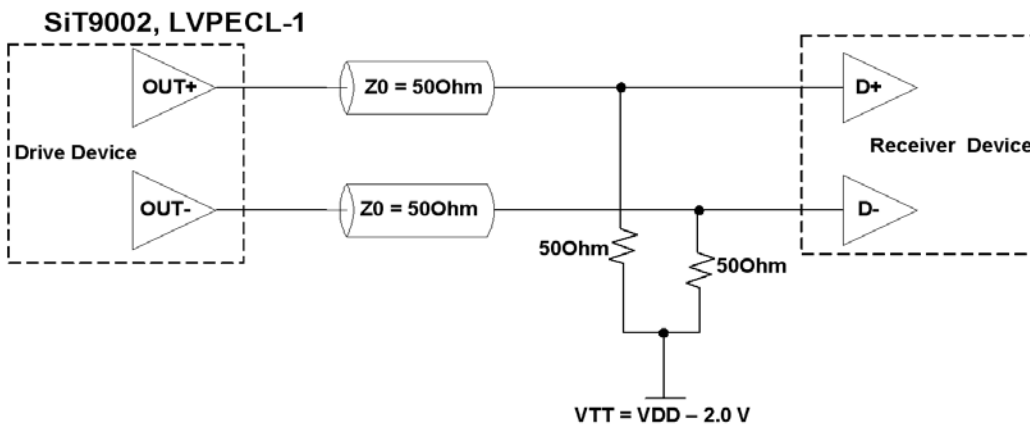


Figure 2. LVPECL DC Coupled Typical Termination with Termination Voltage

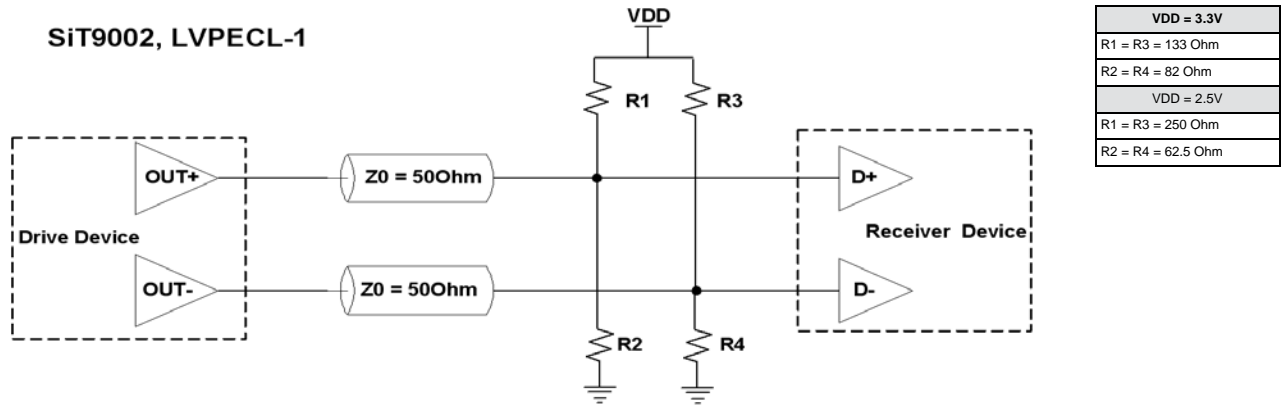


Figure 3. LVPECL DC Coupled Typical Termination without Termination Voltage

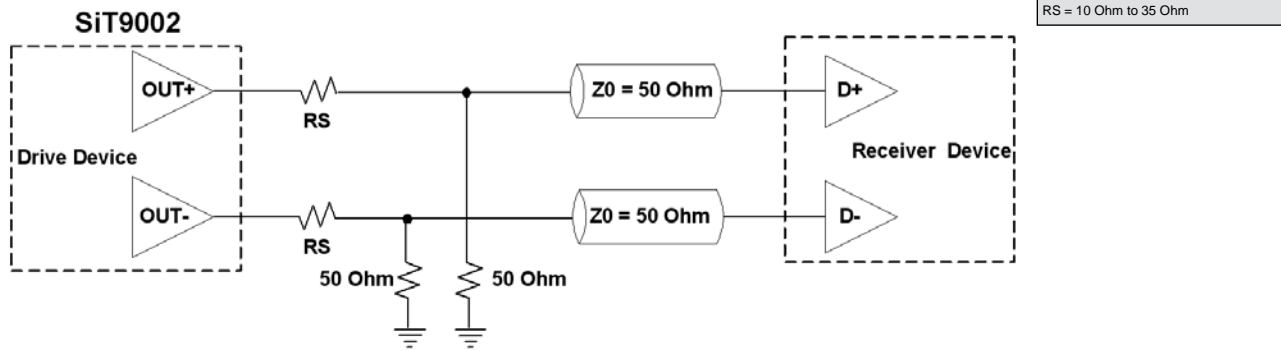


Figure 4. HCSL Typical Termination

**Note:**

1. All the tests are done with RS = 20 Ohm (recommended).

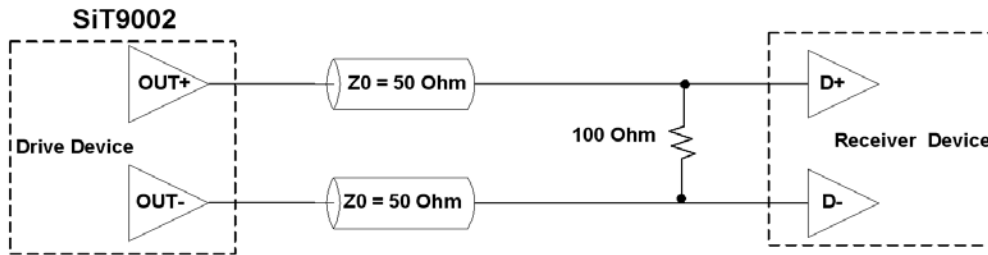
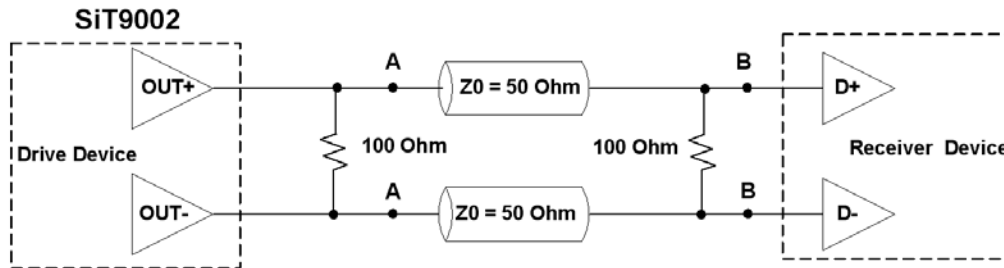


Figure 5. LVDS Single Load Termination (Load Terminated)





Note: For AC coupled operation, include/insert decoupling caps at points A or B

Figure 6. LVDS Double Termination (Source + Load Terminated)

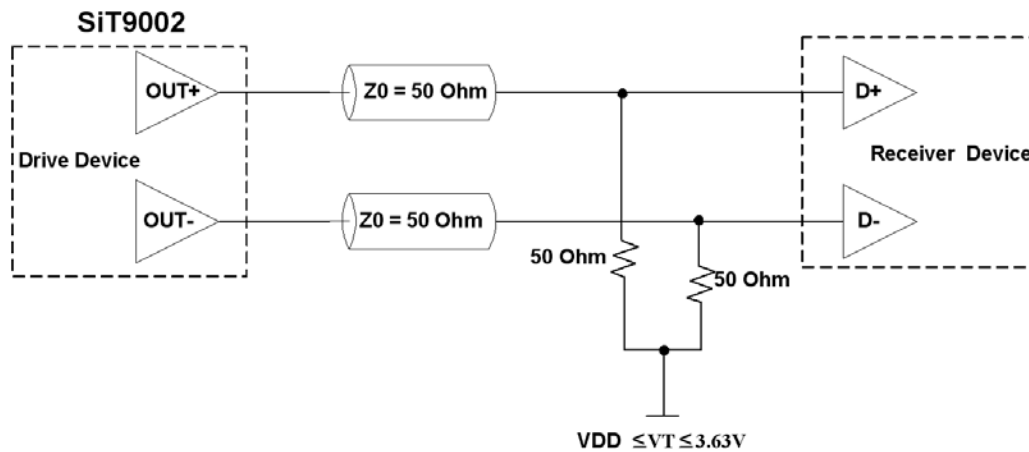
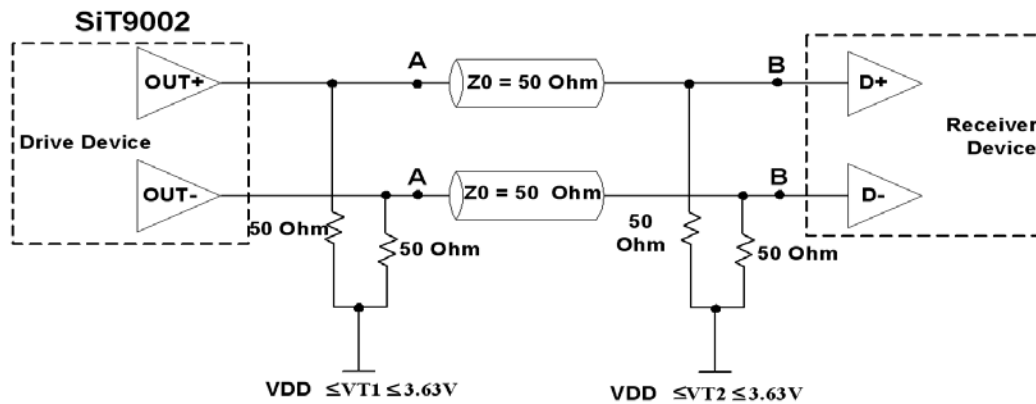


Figure 7. CML Single Load Termination



Notes:

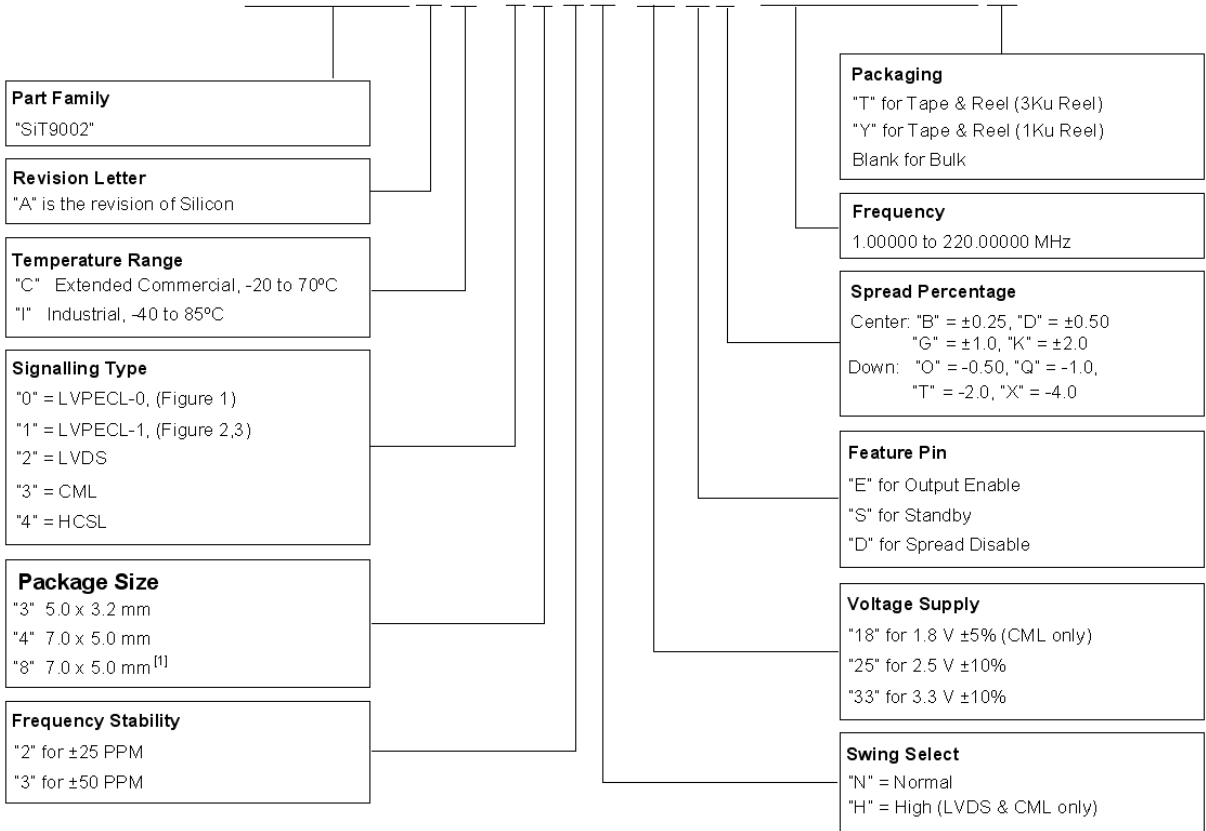
1. For DC-coupled operation,  $V_{T1} = V_{T2}$
2. For AC coupled operation, include/insert decoupling caps at points A or B
3. For AC-coupled operation with capacitors placed at point A,  $V_{T2}$  sets the input common mode of Receiver Device and need not to be related to  $V_{T1}$

Figure 8. CML Double Load Termination

### Ordering Information

The Part No. Guide is for reference only. For real-time customization and exact part number, use the SiTime [Part Number Generator](#).

## SiT9002AC -132N33EB123.12345T



### Frequency Stability vs. Temperature Range Options

| Frequency Stability (PPM) | Temperature Range | Supply Voltage |       |       |
|---------------------------|-------------------|----------------|-------|-------|
|                           |                   | 1.8 V          | 2.5 V | 3.3 V |
| ±25                       | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |
| ±50                       | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |

### Signalling Type vs. Swing Select Options

| Signalling Type | Swing Select | Supply Voltage |       |       |
|-----------------|--------------|----------------|-------|-------|
|                 |              | 1.8 V          | 2.5 V | 3.3 V |
| LVPECL-0        | Normal       | -              | ✓     | ✓     |
|                 | High         | -              | -     | -     |
| LVPECL-1        | Normal       | -              | ✓     | ✓     |
|                 | High         | -              | -     | -     |
| LVDS            | Normal       | -              | ✓     | ✓     |
|                 | High         | -              | ✓     | ✓     |
| CML             | Normal       | ✓              | ✓     | ✓     |
|                 | High         | ✓              | ✓     | ✓     |
| HCSSL           | Normal       | -              | ✓     | ✓     |
|                 | High         | -              | -     | -     |

**Note:**

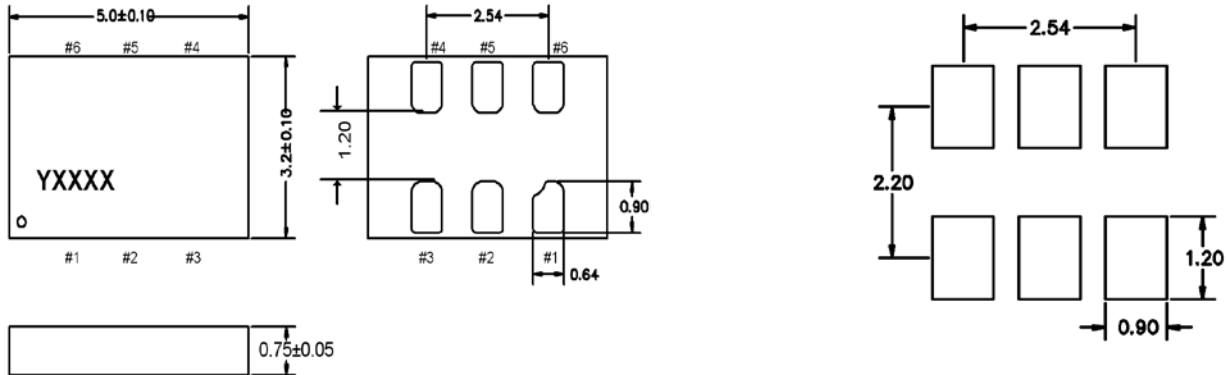
1. Without Center Pad.

### Package Information [2]

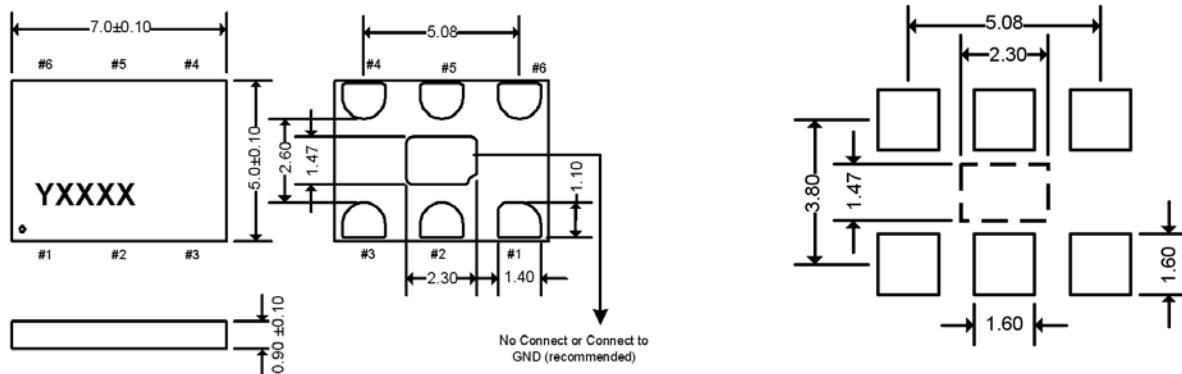
Dimension (mm)

Land Pattern<sup>[3]</sup> (recommended) (mm)

#### 5.0 x 3.2 x 0.75mm



#### 7.0 x 5.0 x 0.90mm



#### Notes:

2. Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
3. A capacitor of value 0.1µF between VDD and GND is recommended.
4. The 7050 package with part number designation "-8" has NO center pad.

© SiTime Corporation 2013. The information contained herein is subject to change at any time without notice. SiTime assumes no responsibility or liability for any loss, damage or defect of a Product which is caused in whole or in part by (i) use of any circuitry other than circuitry embodied in a SiTime product, (ii) misuse or abuse including static discharge, neglect or accident, (iii) unauthorized modification or repairs which have been soldered or altered during assembly and are not capable of being tested by SiTime under its normal test conditions, or (iv) improper installation, storage, handling, warehousing or transportation, or (v) being subjected to unusual physical, thermal, or electrical stress.

**Disclaimer:** SiTime makes no warranty of any kind, express or implied, with regard to this material, and specifically disclaims any and all express or implied warranties, either in fact or by operation of law, statutory or otherwise, including the implied warranties of merchantability and fitness for use or a particular purpose, and any implied warranty arising from course of dealing or usage of trade, as well as any common-law duties relating to accuracy or lack of negligence, with respect to this material, any SiTime product and any product documentation. Products sold by SiTime are not suitable or intended to be used in a life support application or component, to operate nuclear facilities, or in other mission critical applications where human life may be involved or at stake. All sales are made conditioned upon compliance with the critical uses policy set forth below.

#### CRITICAL USE EXCLUSION POLICY

BUYER AGREES NOT TO USE SITIME'S PRODUCTS FOR ANY APPLICATION OR IN ANY COMPONENTS USED IN LIFE SUPPORT DEVICES OR TO OPERATE NUCLEAR FACILITIES OR FOR USE IN OTHER MISSION-CRITICAL APPLICATIONS OR COMPONENTS WHERE HUMAN LIFE OR PROPERTY MAY BE AT STAKE.

SiTime owns all rights, title and interest to the intellectual property related to SiTime's products, including any software, firmware, copyright, patent, or trademark. The sale of SiTime products does not convey or imply any license under patent or other rights. SiTime retains the copyright and trademark rights in all documents, catalogs and plans supplied pursuant to or ancillary to the sale of products or services by SiTime. Unless otherwise agreed to in writing by SiTime, any reproduction, modification, translation, compilation, or representation of this material shall be strictly prohibited.