

### Features

- Extremely low RMS phase jitter (random)
  - <1 ps (typical)
- Wide frequency range
  - 1 MHz to 220 MHz
  - 220 MHz to 800 MHz refer to SiT9107
- High frequency stability
  - $\pm 10$  PPM,  $\pm 15$  PPM,  $\pm 20$  PPM
  - $\pm 25$  PPM,  $\pm 50$  PPM
- Operating voltage
  - 1.8, 2.5 or 3.3 V
  - Other voltages up to 3.63 V (contact SiTime)
- Operating temperature range
  - Industrial, -40 to 85 °C
  - Extended Commercial, -20 to 70 °C
  - Commercial, 0 to 70 °C
- Small footprint
  - 5.0 x 3.2 x 0.75 mm
  - 7.0 x 5.0 x 0.90 mm
- Pb-free and RoHS compliant
- For Spread Spectrum see SiT9002
- Ultra-reliable start up and greater immunity from interference

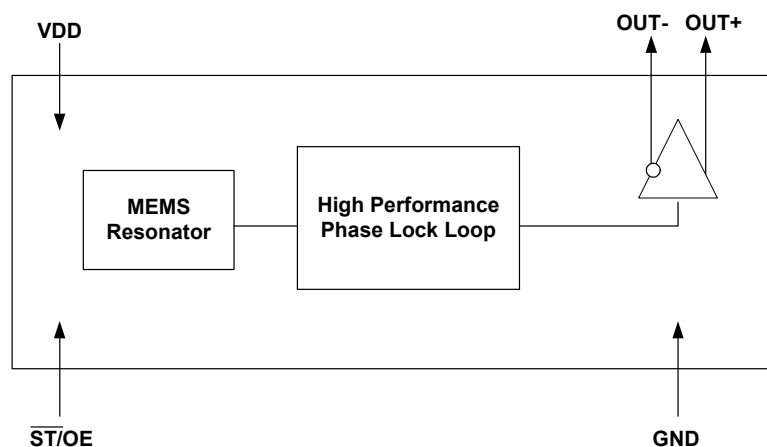
### Benefits

- Ultra fast lead time: 2 to 3 weeks
- No crystal or capacitors required
- Eliminates crystal qualification time
- 50% + board saving space
- More cost effective than quartz oscillators, quartz crystals and clock ICs.
- Completely quartz-free

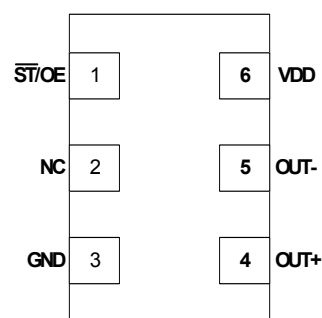
### Applications

- Server
- Router
- RAID controller
- Gigabit Ethernet
- 10 Gigabit Ethernet
- Fiber Channel
- SATA / SAS
- PCI-Express
- Fully Buffered DIMM
- System clock
- Networking and computing

### Block Diagram



### Pinout



## Pin Description

| Pin No. | Name  |        | Pin Description                                                                                                                                                                                                                                                                              |
|---------|-------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | ST/OE | 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 |
| 2       | NC    | NA     | Do Not 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 .                                                                                                                                                                                                                                                     |
| 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 at 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<br>7.0 x 5.0 package when center pad is soldered down<br>7.0 x 5.0 package when center pad is not soldered down         | —         | 68        | °C/W  |
|                                                                                                                                                                                        | —         | 38        | °C/W  |
|                                                                                                                                                                                        | —         | 90        | °C/W  |
| Theta JC (with PCB traces of 0.010 inch to all pins) 5.0 x 3.2 package<br>7.0 x 5.0 package when center pad is soldered down<br>7.0 x 5.0 package when center pad is not soldered down | —         | 45        | °C/W  |
|                                                                                                                                                                                        | —         | 35        | °C/W  |
|                                                                                                                                                                                        | —         | 48        | °C/W  |
| Soldering Temperature (follow standard Pb free soldering guidelines)                                                                                                                   | —         | 260       | °C    |
| Number of Program Writes                                                                                                                                                               | —         | 1         | NA    |
| Program Retention over -40 to 125°C, Process, VDD (0 to 3.6V)                                                                                                                          | —         | 1,000+    | years |
| Human Body Model (JESD22-A114)                                                                                                                                                         | 2000      | —         | —     |
| Charged Device Model (JESD22-C101)                                                                                                                                                     | 750       | —         | —     |
| Machine Model (JESD22-A115)                                                                                                                                                            | 200       | —         | —     |

## 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                                    |

## DC Electrical Specifications

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

| Symbol          | Parameter          | Condition                                                                             | Min. | Typ. | Max. | Unit             |
|-----------------|--------------------|---------------------------------------------------------------------------------------|------|------|------|------------------|
| V <sub>IH</sub> | Input High Voltage |                                                                                       | 70   | –    | –    | %V <sub>DD</sub> |
| V <sub>IL</sub> | Input Low Voltage  |                                                                                       | –    | –    | 30   | %V <sub>DD</sub> |
| I <sub>IH</sub> | Input High Current | OE or ST pin                                                                          | –    | –    | 10   | μA               |
| I <sub>IL</sub> | Input Low Current  | OE or ST pin                                                                          | -10  | –    | –    | μA               |
| T <sub>pu</sub> | 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°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    |
| I <sub>DD</sub>    | Supply Current             | V <sub>DD</sub> = 3.3, Excluding Load Termination Current | –                    | 68   | 74                   | mA   |
|                    |                            | V <sub>DD</sub> = 2.5, Excluding Load Termination Current | –                    | 65   | 71                   | mA   |
| V <sub>OH</sub>    | Output High Voltage        | 50 Ohm termination to V <sub>DD</sub> - 2.0V              | V <sub>DD</sub> -1.1 | –    | V <sub>DD</sub> -0.7 | V    |
| V <sub>OL</sub>    | Output Low Voltage         | See Figure 2, 3.                                          | V <sub>DD</sub> -2.0 | –    | V <sub>DD</sub> -1.4 | V    |
| V <sub>swing</sub> | Pk-Pk Output Voltage Swing |                                                           | 600                  | 800  | 1000                 | mV   |

HCSL, 3.3V  $\pm 10\%$  or 2.5V  $\pm 10\%$ , -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    |
| I <sub>DD</sub>    | Supply Current             | V <sub>DD</sub> = 3.3, Excluding Load Termination Current | –    | 65   | 70   | mA   |
|                    |                            | V <sub>DD</sub> = 2.5, Excluding Load Termination Current | –    | 62   | 67   | mA   |
| V <sub>OH</sub>    | Output High Voltage        | 50 Ohm termination to GND                                 | 600  | –    | 950  | mV   |
| V <sub>OL</sub>    | Output Low Voltage         | See Figure 4.                                             | 0.0  | –    | 50   | mV   |
| V <sub>swing</sub> | Pk-Pk Output Voltage Swing |                                                           | 600  | –    | 950  | mV   |

LVDS, 3.3V  $\pm 10\%$  or 2.5V  $\pm 10\%$ , -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    |
| I <sub>DD</sub>   | Supply Current                   | V <sub>DD</sub> = 3.3, Excluding Load Termination Current | –    | 73   | 79   | mA   |
|                   |                                  | V <sub>DD</sub> = 2.5, Excluding Load Termination Current | –    | 70   | 76   | mA   |
| V <sub>OD1</sub>  | Differential Output Voltage      | Swing Mode = Normal                                       | 250  | 350  | 450  | mV   |
| ΔV <sub>OD1</sub> | V <sub>OD</sub> Magnitude Change | Single load termination. See Figure 5.                    | –    | –    | 50   | mV   |
| V <sub>OS1</sub>  | Offset Voltage                   |                                                           | –    | 1.2  | –    | V    |
| ΔV <sub>OS1</sub> | V <sub>OS</sub> Magnitude Change |                                                           | –    | –    | 50   | mV   |
| V <sub>OD2</sub>  | Differential Output Voltage      | Swing Mode = High                                         | 500  | 700  | 900  | mV   |
| ΔV <sub>OD2</sub> | V <sub>OD</sub> Magnitude Change | Single load termination. See Figure 5.                    | –    | –    | 50   | mV   |
| V <sub>OS2</sub>  | Offset Voltage                   |                                                           | –    | 1.2  | –    | V    |
| ΔV <sub>OS2</sub> | V <sub>OS</sub> Magnitude Change |                                                           | –    | –    | 50   | mV   |
| V <sub>OD3</sub>  | Differential Output Voltage      | Swing Mode = High                                         | 250  | 350  | 450  | mV   |
| ΔV <sub>OD3</sub> | V <sub>OD</sub> Magnitude Change | Double load termination. See Figure 6.                    | –    | –    | 50   | mV   |
| V <sub>OS3</sub>  | Offset Voltage                   |                                                           | –    | 1.2  | –    | V    |
| ΔV <sub>OS3</sub> | V <sub>OS</sub> Magnitude Change |                                                           | –    | –    | 50   | mV   |

CML, 3.3V  $\pm 10\%$  or 2.5V  $\pm 10\%$  or 1.8V  $\pm 5\%$ , -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                                          |                                    | 47                     | 50                   | mA   |
|                     |                            | V <sub>DD</sub> = 1.8V                                          |                                    | 38                     | 41                   | 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  $\pm 10\%$ , -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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to10 MHz                                            |             | –    | 1.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.875 to 20 MHz                                             |             | –    | 0.5  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.7  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 1.8  | 2.3  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 1.3  | 1.8  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.3  | 1.8  | ps   |

LVPECL, 2.5V  $\pm 10\%$ , -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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to 10 MHz                                           |             | –    | 1.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.875 to 20 MHz                                             |             | –    | 0.5  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.7  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 1.8  | 2.3  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 1.3  | 1.8  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.3  | 1.8  | ps   |

HCSL, 3.3V  $\pm 10\%$ , -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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 100 MHz @ BW: 1.5 MHz to 22 MHz                                              |             | –    | 0.8  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1.5 MHz to 22 MHz                                              |             | –    | 0.4  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 100 MHz                                                                      |             | –    | 1.6  | 2.2  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.5  | 1.9  | ps   |

HCSL, 2.5V  $\pm 10\%$ , -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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 100 MHz @ BW: 1.5 MHz to 22 MHz                                              |             | –    | 0.8  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1.5 MHz to 22 MHz                                              |             | –    | 0.4  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 100 MHz                                                                      |             | –    | 1.6  | 2.2  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.5  | 2.1  | ps   |

LVDS, 3.3V  $\pm 10\%$ , -40 to 85°C

| Symbol                         | Parameter                 | Condition                                                                                       |             | Min. | Typ. | Max. | Unit |
|--------------------------------|---------------------------|-------------------------------------------------------------------------------------------------|-------------|------|------|------|------|
| F <sub>out</sub>               | Output Frequency          |                                                                                                 |             | 10   | –    | 220  | MHz  |
| F <sub>stab</sub>              | Frequency Stability       | Inclusive of initial stability, operating temp., rated power supply voltage change, load change | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to 10 MHz                                           |             | –    | 1.7  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.875 to 20 MHz                                             |             | –    | 0.7  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.7  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 2.0  | 2.7  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 1.8  | 2.5  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.8  | 2.5  | ps   |

LVDS, 2.5V  $\pm 10\%$ , -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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to 10 MHz                                           |             | –    | 1.7  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.875 to 20 MHz                                             |             | –    | 0.7  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.7  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 2.5  | 3.3  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 2.4  | 3.5  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 2.4  | 3.5  | ps   |

CML, 3.3V  $\pm 10\%$ , -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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to 10 MHz                                           |             | –    | 1.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.875 to 20 MHz                                             |             | –    | 0.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.8  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 2    | 2.5  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 1.9  | 2.5  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.9  | 2.4  | 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 | 0 to 70°C   | -10  | –    | +10  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 |             | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to10 MHz                                            |             | –    | 1.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.875 to 20 MHz                                             |             | –    | 0.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.8  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 2.1  | 2.5  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 1.9  | 2.5  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 1.9  | 2.5  | ps   |

CML, 1.8V ± 5%, -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 | 0 to 70°C   | -15  | –    | +15  | PPM  |
|                                |                           |                                                                                                 | -20 to 70°C | -20  | –    | +20  | PPM  |
|                                |                           |                                                                                                 | -40 to 85°C | -25  |      | +25  | PPM  |
|                                |                           |                                                                                                 |             | -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  | 240  | 325  | ps   |
| PH <sub>J</sub>                | RMS Phase Jitter (random) | F <sub>out</sub> = 106.25 MHz @ BW: 637 kHz to10 MHz                                            |             | –    | 1.7  | –    | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz @ BW: 1.87 to 20 MHz                                              |             | –    | 0.6  | –    | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz @ BW: 1 to 20 MHz                                                    |             | –    | 0.8  | –    | ps   |
| P <sub>J</sub>                 | RMS Period Jitter         | F <sub>out</sub> = 106.25 MHz                                                                   |             | –    | 2.3  | 2.9  | ps   |
|                                |                           | F <sub>out</sub> = 156.25 MHz                                                                   |             | –    | 2.1  | 2.7  | ps   |
|                                |                           | F <sub>out</sub> = 200 MHz                                                                      |             | –    | 2.1  | 2.7  | ps   |

## Termination Diagrams

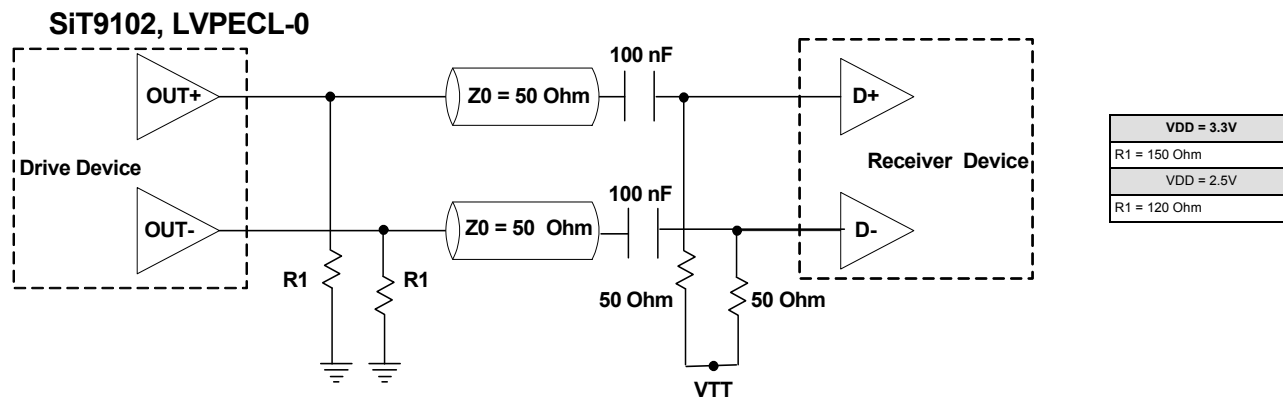


Figure 1. LVPECL AC Coupled Typical Termination

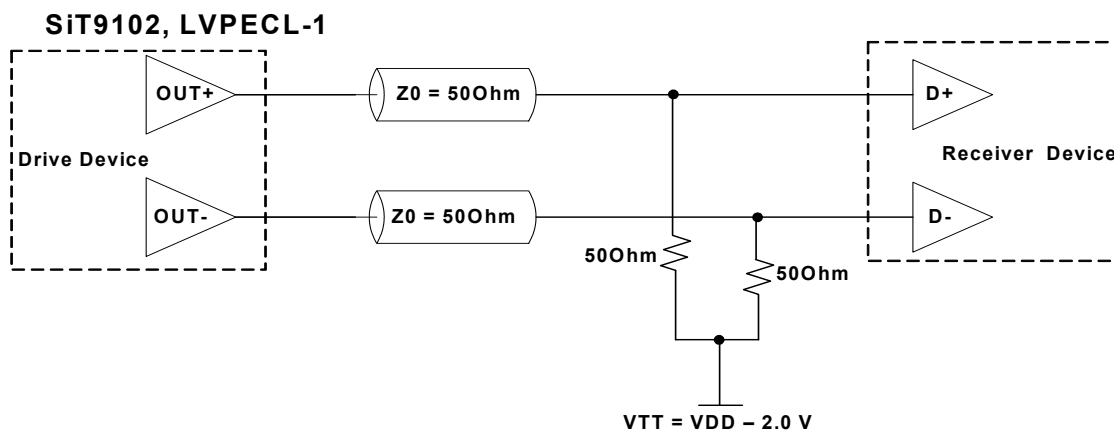


Figure 2. LVPECL DC Coupled Typical Termination with Termination Voltage

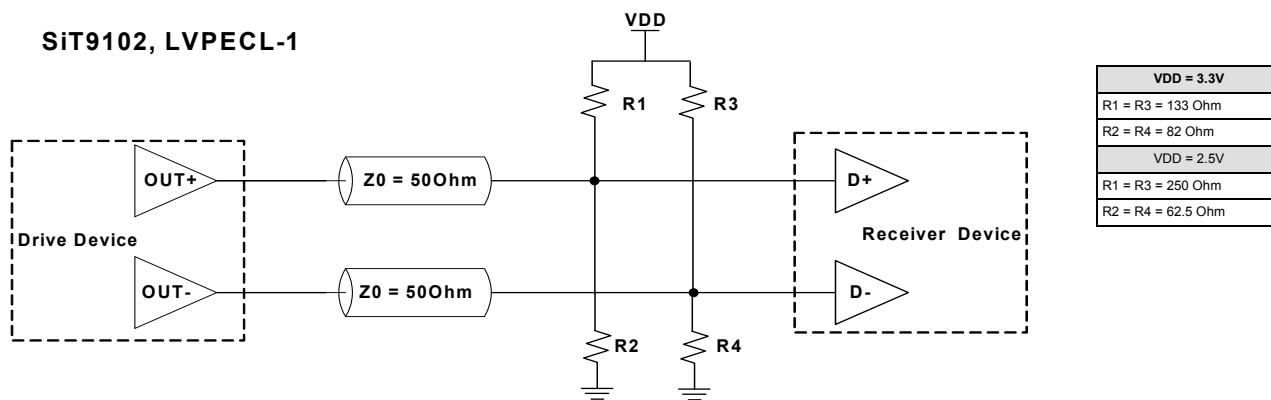


Figure 3. LVPECL DC Coupled Typical Termination without Termination Voltage

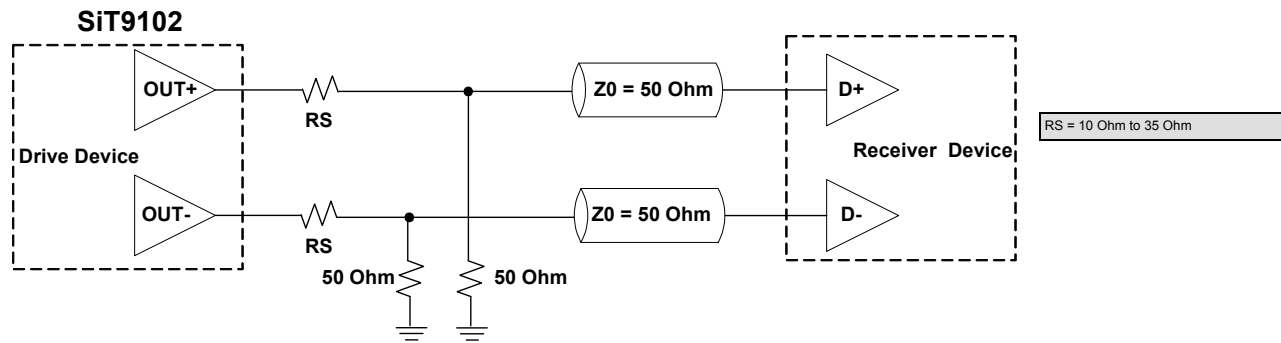


Figure 4. HCSL Typical Termination

**Note:**

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

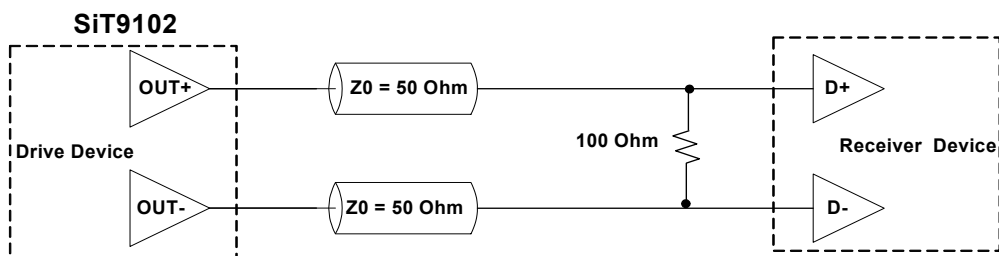
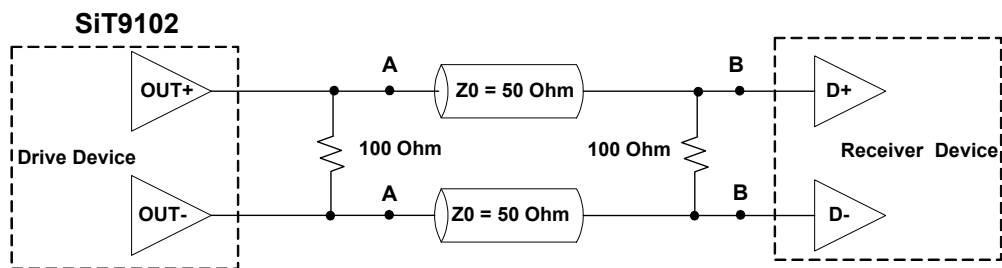


Figure 5. LVDS Single Termination (Load Terminated)



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

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

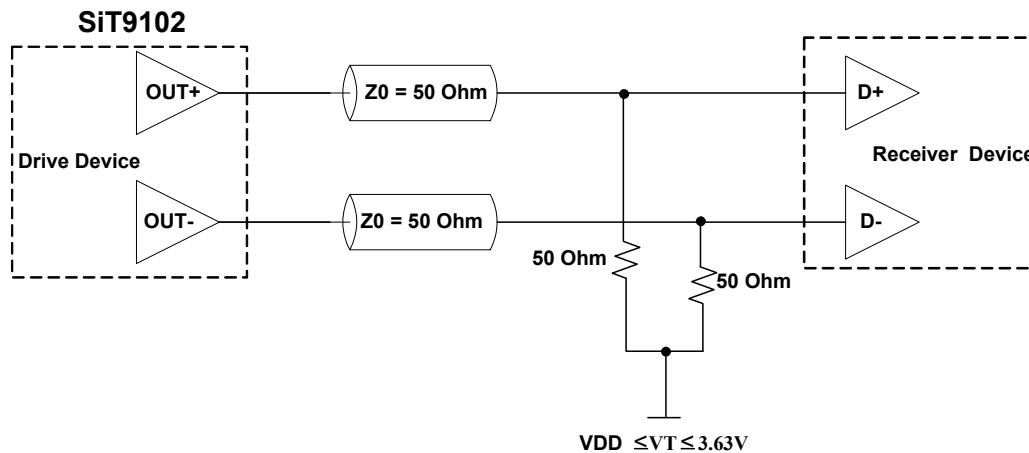
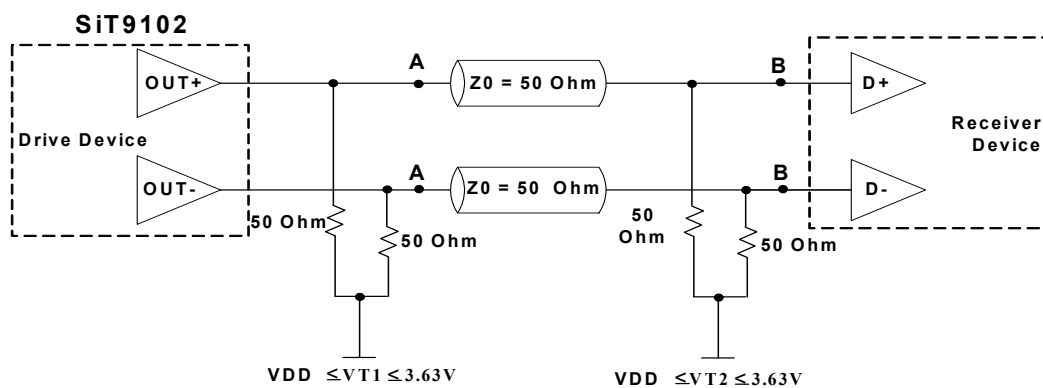


Figure 7. CML Single Load Termination



**Notes:**

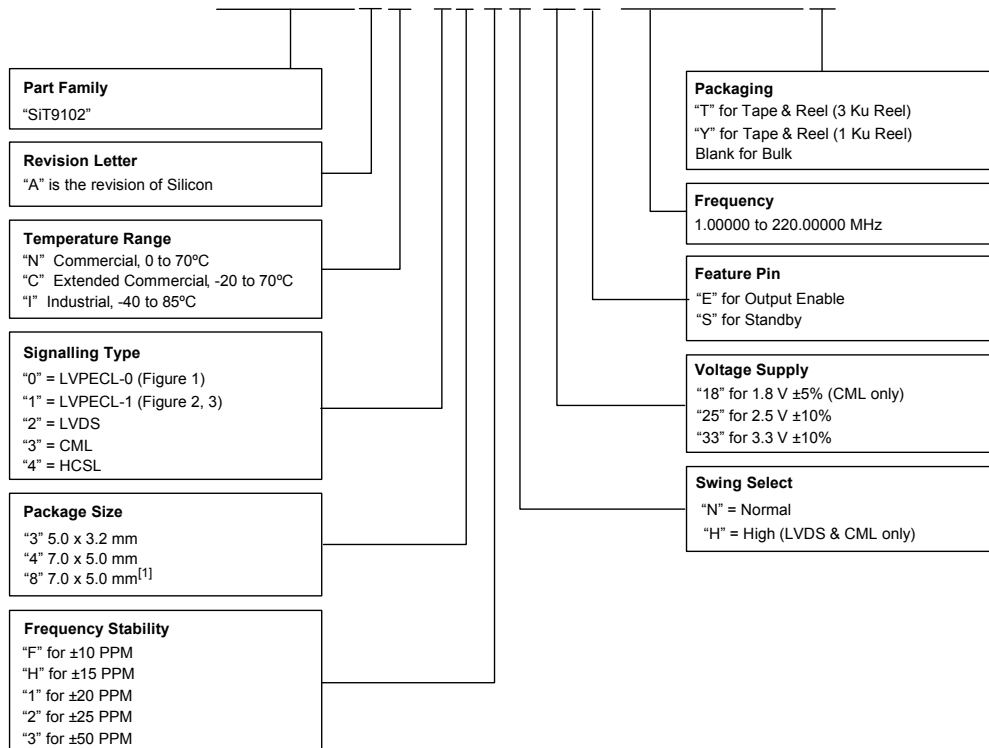
1. For DC-coupled operation,  $V_{T1} = V_{T2}$
2. For AC coupled operation, include/insert decoupling caps at points A or B
2. For AC-coupled operation with capacitors placed at point A,  $V_{T2}$  sets the input common mode of Receiver Device and need not to be related to  $V_{T1}$

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](#).

SiT9102AC- 132N33E123.12345T



## Frequency Stability vs. Temperature Range Options

| Frequency Stability (PPM) | Temperature Range | Supply Voltage |       |       |
|---------------------------|-------------------|----------------|-------|-------|
|                           |                   | 1.8 V          | 2.5 V | 3.3 V |
| ±10                       | N (0 to +70°C)    | –              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | –              | –     | –     |
|                           | I (-40 to +85°C)  | –              | –     | –     |
| ±15                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | –              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | –              | ✓     | ✓     |
| ±20                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |
| ±25                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |
| ±50                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |

Note:

1. Without Center Pad.

## Signaling Type vs. Swing Select Options

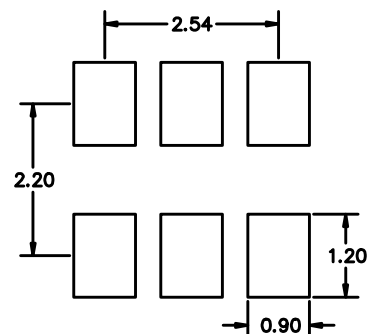
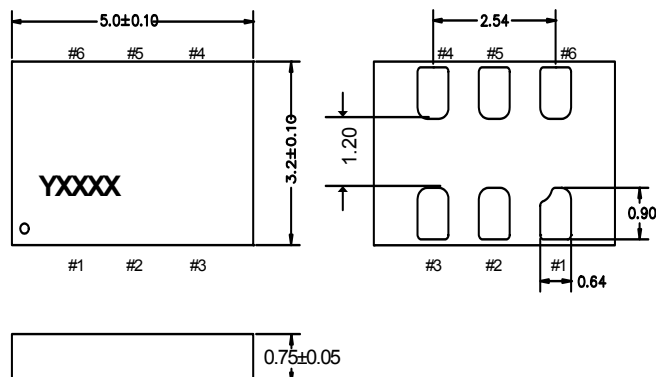
| Signaling Type | Swing Select | Supply Voltage |       |       |
|----------------|--------------|----------------|-------|-------|
|                |              | 1.8 V          | 2.5 V | 3.3 V |
| LVPECL-0       | Normal       | –              | ✓     | ✓     |
|                | High         | –              | –     | –     |
| LVPECL-1       | Normal       | –              | ✓     | ✓     |
|                | High         | –              | –     | –     |
| LVDS           | Normal       | –              | ✓     | ✓     |
|                | High         | –              | ✓     | ✓     |
| CML            | Normal       | ✓              | ✓     | ✓     |
|                | High         | ✓              | ✓     | ✓     |
| HCSL           | Normal       | –              | ✓     | ✓     |
|                | High         | –              | –     | –     |

## Package Information [2]

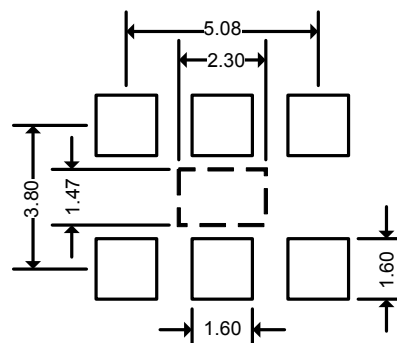
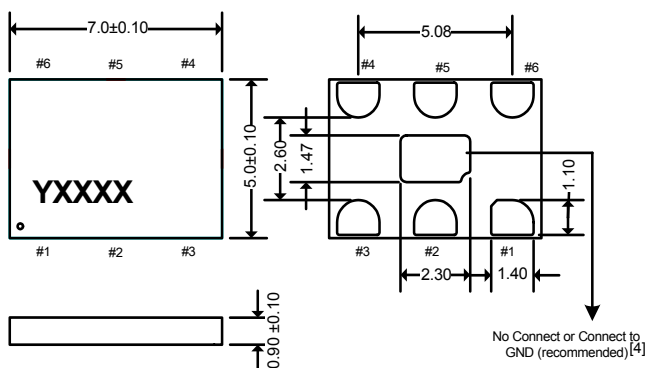
Dimension (mm)

Land Pattern [3] (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" 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.

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