

Features

- AEC-Q100 Grade 2 temperature range (-40°C to 105°C). Grade 3 and 4 also available
- Any frequency between 1 MHz and 220 MHz, accurate to 6 decimal places. For frequency between 220 and 725 MHz, see [SiT9387](#)
- LVPECL, LVDS and HCSL output signaling types
- 0.23 ps RMS (typ) phase jitter (random, 12 kHz to 20 MHz)
- Frequency stability as low as ± 10 ppm – [contact SiTime](#)
- Industry-standard packages: 3.2 x 2.5, 7.0 x 5.0 mm. [Contact SiTime](#) for 5.0 x 3.2 mm package

Applications

- Automotive, and other high reliability electronics
- Infotainment systems, collision detection devices and in-vehicle 10/40/100 Gbps Ethernet



Electrical Characteristics

Table 1. Electrical Characteristics — Common to LVPECL, LVDS and HCSL

All Min and Max limits in the Electrical Characteristics tables are specified over temperature and rated operating voltage with standard output termination show in the termination diagrams. Typical values are at 25°C and nominal supply voltage.

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-------------------------------|---------|------|---------|------|------------|---|
| Frequency Range | | | | | | |
| Output Frequency Range | f | 1 | – | 220 | MHz | Accurate to 6 decimal places |
| Frequency Stability | | | | | | |
| Frequency Stability | | -10 | – | +10 | ppm | Inclusive of initial tolerance, operating temperature, rated power supply voltage and load variations. Contact SiTime for ± 10 ppm |
| | | -20 | – | +20 | ppm | |
| | | -25 | – | +25 | ppm | |
| | | -50 | – | +50 | ppm | |
| First Year Aging | F_1y | – | ± 1 | – | ppm | At 25°C |
| Temperature Range | | | | | | |
| Operating Temperature Range | T_use | -20 | – | +70 | °C | AEC-Q100 Grade 4 |
| | | -40 | – | +85 | °C | AEC-Q100 Grade 3 |
| | | -40 | – | +105 | °C | AEC-Q100 Grade 2 |
| Supply Voltage | | | | | | |
| Supply Voltage | Vdd | 2.97 | 3.3 | 3.63 | V | |
| | | 2.70 | 3.0 | 3.30 | V | |
| | | 2.52 | 2.8 | 3.08 | V | |
| | | 2.25 | 2.5 | 2.75 | V | |
| Input Characteristics | | | | | | |
| Input Voltage High | VIH | 70% | – | – | Vdd | Pin 1, OE |
| Input Voltage Low | VIL | – | – | 30% | Vdd | Pin 1, OE |
| Input Pull-up Impedance | Z_in | – | 100 | – | k Ω | Pin 1, OE logic high or logic low |
| Output Characteristics | | | | | | |
| Duty Cycle | DC | 45 | – | 55 | % | |
| Startup and OE Timing | | | | | | |
| Start-up Time | T_start | – | – | 3.0 | ms | Measured from the time Vdd reaches its rated minimum value |
| OE Enable/Disable Time | T_oe | – | – | 3.8 | μ s | f = 156.25 MHz. Measured from the time OE pin reaches rated VIH and VIL to the time clock pins reach 90% of swing and high-Z. See Figure 6 and Figure 7 |

Table 2. Electrical Characteristics – LVPECL

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-----------------------------------|---------------------|-----------------------|-------|----------------------|------|--|
| Current Consumption | | | | | | |
| Current Consumption | I _{dd} | – | – | 89 | mA | Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V |
| OE Disable Supply Current | I _{OE} | – | – | 58 | mA | OE = Low |
| Output Disable Leakage Current | I _{leak} | – | 0.15 | – | μA | OE = Low |
| Maximum Output Current | I _{driver} | – | – | 33 | mA | Maximum average current drawn from OUT+ or OUT- |
| Output Characteristics | | | | | | |
| Output High Voltage | VOH | V _{dd} -1.15 | – | V _{dd} -0.7 | V | See Figure 2 |
| Output Low Voltage | VOL | V _{dd} -2.0 | – | V _{dd} -1.5 | V | See Figure 2 |
| Output Differential Voltage Swing | V _{Swing} | 1.2 | 1.6 | 2.0 | V | See Figure 3 |
| Rise/Fall Time | Tr, Tf | – | 225 | 310 | ps | 20% to 80%, see Figure 3 |
| Jitter – 7.0 x 5.0 package | | | | | | |
| RMS Period Jitter ⁽¹⁾ | T _{jitt} | – | 1.0 | 1.6 | ps | f = 100, 156.25 or 212.5 MHz, V _{dd} = 3.3V or 2.5V |
| RMS Phase Jitter (random) | T _{phj} | – | 0.225 | 0.270 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature ranges -20 to 70°C and -40 to 85°C |
| | | – | 0.225 | 0.300 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -40 to 105°C |
| | | – | 0.1 | – | ps | f = 156.25 or 322.265625 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, includes spurs, all V _{dd} levels |
| Jitter – 3.2 x 2.5 package | | | | | | |
| RMS Period Jitter ⁽¹⁾ | T _{jitt} | – | 1.0 | 1.6 | ps | f = 100, 156.25 or 212.5 MHz, V _{dd} = 3.3V or 2.5V |
| RMS Phase Jitter (random) | T _{phj} | – | 0.225 | 0.275 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -20 to 70°C and -40 to 85°C |
| | | – | 0.225 | 0.340 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -40 to 105°C |
| | | – | 0.1 | – | ps | f = 156.25 or 322.265625 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, includes spurs, all V _{dd} levels |

Notes:

1. Measured according to JESD65B

Table 3. Electrical Characteristics – LVDS

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|--|---------------------------------|-------|-------|-------|------|---|
| Current Consumption | | | | | | |
| Current Consumption | I _{dd} | – | – | 79 | mA | Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V |
| OE Disable Supply Current | I _{OE} | – | – | 58 | mA | OE = Low |
| Output Disable Leakage Current | I _{leak} | – | 0.15 | – | μA | OE = Low |
| Output Characteristics | | | | | | |
| Differential Output Voltage | V _{OD} | 250 | – | 450 | mV | See Figure 4 |
| VOD Magnitude Change | ΔV _{OD} | – | – | 50 | mV | See Figure 4 |
| Offset Voltage | V _{OS} | 1.125 | – | 1.375 | V | See Figure 4 |
| VOS Magnitude Change | ΔV _{OS} | – | – | 50 | mV | See Figure 4 |
| Rise/Fall Time | T _r , T _f | – | 400 | 515 | ps | Measured with 2 pF capacitive loading to GND, 20% to 80%, see Figure 5 |
| Jitter – 7.0 x 5.0 package | | | | | | |
| RMS Period Jitter^[2] | T _{jitt} | – | 1.0 | 1.6 | ps | f = 100, 156.25 or 212.5 MHz, V _{dd} = 3.3V or 2.5V |
| RMS Phase Jitter (random) | T _{phj} | – | 0.215 | 0.265 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature ranges -20 to 70°C and -40 to 85°C. |
| | | – | 0.215 | 0.300 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -40 to 105°C |
| | | – | 0.1 | – | ps | f = 156.25 or 322.265625 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, includes spurs, all V _{dd} levels. |
| Jitter – 3.2 x 2.5 package | | | | | | |
| RMS Period Jitter^[2] | T _{jitt} | – | 1.0 | 1.6 | ps | f = 100, 156.25 or 212.5 MHz, V _{dd} = 3.3V or 2.5V |
| RMS Phase Jitter (random) | T _{phj} | – | 0.235 | 0.275 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature ranges -20 to 70°C and -40 to 85°C |
| | | – | 0.235 | 0.320 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -40 to 105°C |
| | | – | 0.1 | – | ps | f = 156.25 or 322.265625 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, includes spurs, all V _{dd} levels |

Notes:

2. Measured according to JESD65B

Table 4. Electrical Characteristics – HCSL

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-----------------------------------|---------------------|-------|-------|-------|------|---|
| Current Consumption | | | | | | |
| Current Consumption | I _{dd} | – | – | 92 | mA | Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V |
| OE Disable Supply Current | I _{OE} | – | – | 58 | mA | OE = Low |
| Output Disable Leakage Current | I _{leak} | – | 0.15 | – | μA | OE = Low |
| Maximum Output Current | I _{driver} | – | – | 35 | mA | Maximum average current drawn from OUT+ or OUT- |
| Output Characteristics | | | | | | |
| Output High Voltage | VOH | 0.60 | – | 0.90 | V | See Figure 2 |
| Output Low Voltage | VOL | -0.05 | – | 0.08 | V | See Figure 2 |
| Output Differential Voltage Swing | V _{Swing} | 1.2 | 1.4 | 1.80 | V | See Figure 3 |
| Rise/Fall Time | Tr, Tf | – | 360 | 495 | ps | Measured with 2 pF capacitive loading to GND, 20% to 80%, see Figure 3 |
| Jitter – 7.0 x 5.0 package | | | | | | |
| RMS Period Jitter ^[3] | T _{jitt} | – | 1.0 | 1.6 | ps | f = 100, 156.25 or 212.5 MHz, V _{dd} = 3.3V or 2.5V |
| RMS Phase Jitter (random) | T _{phj} | – | 0.220 | 0.270 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -20 to 70°C and -40 to 85°C. |
| | | – | 0.220 | 0.300 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -40 to 105°C |
| | | – | 0.1 | – | ps | f = 156.25 or 322.265625 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, includes spurs, all V _{dd} levels. |
| Jitter – 3.2 x 2.5 package | | | | | | |
| RMS Period Jitter ^[3] | T _{jitt} | – | 1.0 | 1.6 | ps | f = 100, 156.25 or 212.5 MHz, V _{dd} = 3.3V or 2.5V |
| RMS Phase Jitter (random) | T _{phj} | – | 0.230 | 0.275 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature ranges -20 to 70°C and -40 to 85°C. |
| | | – | 0.230 | 0.340 | ps | f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature range -40 to 105°C |
| | | – | 0.1 | – | ps | f = 156.25 or 322.265625 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, includes spurs, all V _{dd} levels. |

Notes:

3. Measured according to JESD65B

Table 5. Pin Description

| Pin | Map | Functionality | |
|-----|-------|--------------------|--|
| 1 | OE/NC | Output Enable (OE) | H ^[4] : specified frequency output L: output is high impedance |
| | | Non Connect (NC) | H or L or Open: No effect on output frequency or other device functions |
| 2 | NC | NA | No Connect; Leave it floating or connect to GND for better heat dissipation |
| 3 | GND | Power | Vdd Power Supply Ground |
| 4 | OUT+ | Output | Oscillator output |
| 5 | OUT- | Output | Complementary oscillator output |
| 6 | Vdd | Power | Power supply voltage ^[5] |

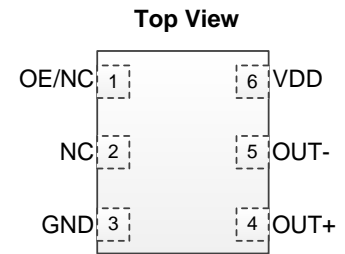


Figure 1. Pin Assignments

Notes:

- 4. In OE mode, a pull-up resistor of 10 kΩ or less is recommended if pin 1 is not externally driven.
- 5. A capacitor of value 0.1 μF or higher between Vdd and GND is required. An additional 10 μF capacitor between Vdd and GND is required for the best phase jitter performance

Table 6. Absolute Maximum Ratings

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

| Parameter | Min. | Max. | Unit |
|--|------|------------|------|
| Vdd | -0.5 | 4.0 | V |
| V _{IH} | | Vdd + 0.3V | V |
| V _{IL} | -0.3 | | V |
| Storage Temperature | -65 | 150 | °C |
| Maximum Junction Temperature | | 130 | °C |
| Soldering Temperature (follow standard Pb-free soldering guidelines) | | 260 | °C |

Table 7. Thermal Considerations^[6]

| Package | θ _{JA} , 4 Layer Board (°C/W) | θ _{JC} , Bottom (°C/W) |
|-------------|--|---------------------------------|
| 3225, 6-pin | 80 | 30 |
| 7050, 6-pin | 52 | 19 |

Notes:

- 6. Refer to JESD51 for θ_{JA} and θ_{JC} definitions, and reference layout used to determine the θ_{JA} and θ_{JC} values in the above table.

Table 8. Maximum Operating Junction Temperature^[7]

| Max Operating Temperature (ambient) | Maximum Operating Junction Temperature |
|-------------------------------------|--|
| 70°C | 95°C |
| 85°C | 110°C |
| 105°C | 130°C |

Notes:

- 7. Datasheet specifications are not guaranteed if junction temperature exceeds the maximum operating junction temperature.

Table 9. Environmental Compliance

| Parameter | Test Conditions | Value | Unit |
|--|---------------------------|--------|------|
| Mechanical Shock Resistance | MIL-STD-883F, Method 2002 | 10,000 | g |
| Mechanical Vibration Resistance | MIL-STD-883F, Method 2007 | 70 | g |
| Soldering Temperature (follow standard Pb free soldering guidelines) | MIL-STD-883F, Method 2003 | 260 | °C |
| Moisture Sensitivity Level | MSL1 @ 260°C | | |
| Electrostatic Discharge (HBM) | HBM, JESD22-A114 | 2,000 | V |
| Charge-Device Model ESD Protection | JESD220C101 | 750 | V |
| Latch-up Tolerance | JESD78 Compliant | | |

Waveform Diagrams (continued)

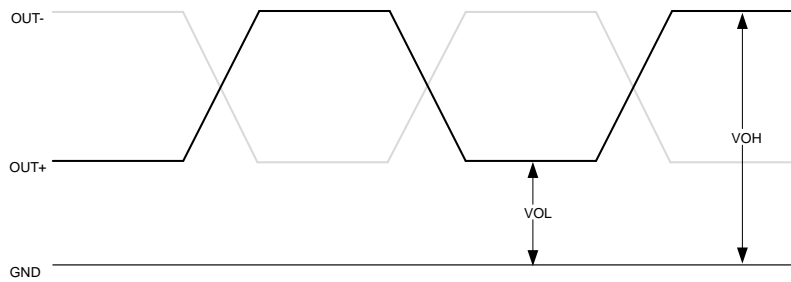


Figure 2. LVPECL/HCSL Voltage Levels per Differential Pin (OUT+/OUT-)

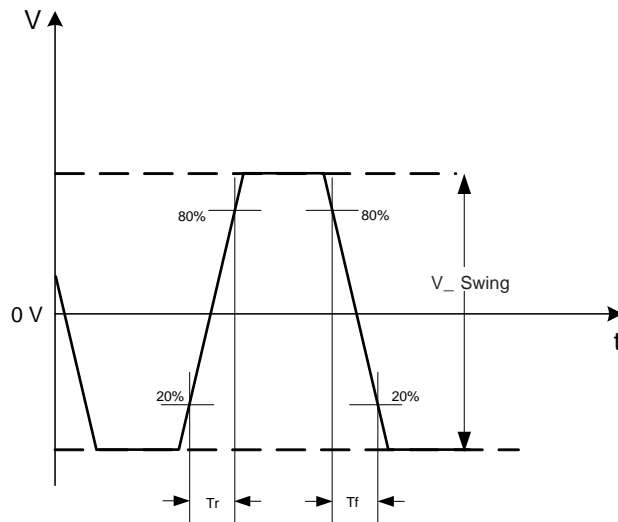


Figure 3. LVPECL/HCSL Voltage Levels across Differential Pair

Waveform Diagrams (continued)

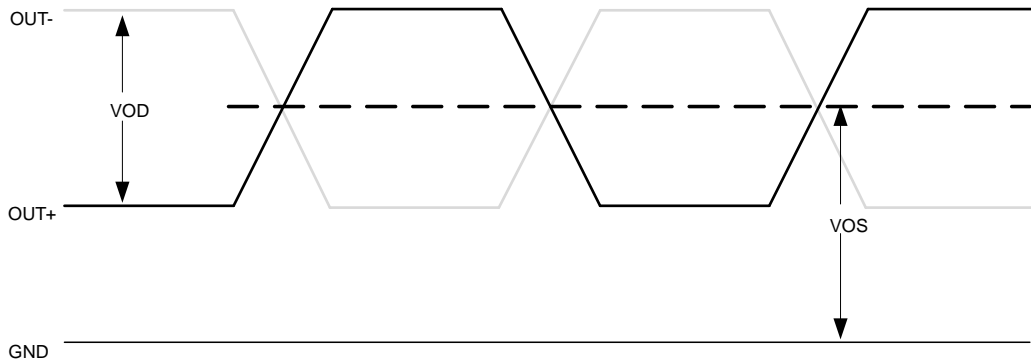


Figure 4. LVDS Voltage Levels per Differential Pin (OUT+/OUT-)

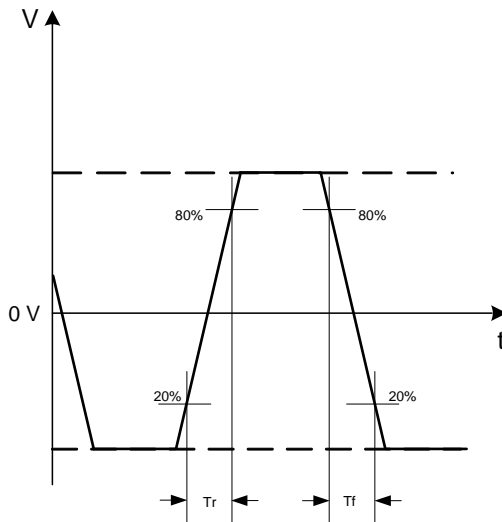


Figure 5. LVDS Differential Waveform

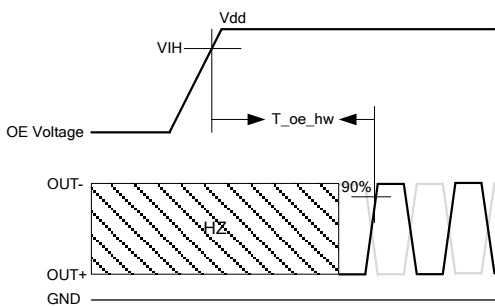


Figure 6. Hardware OE Enable Timing

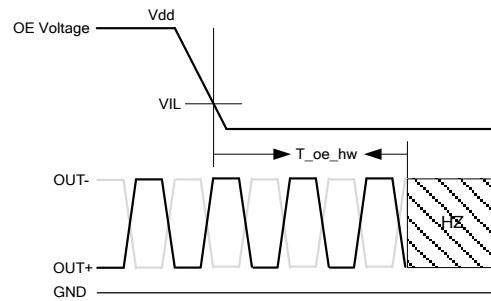


Figure 7. Hardware OE Disable Timing

Termination Diagrams

LVPECL:

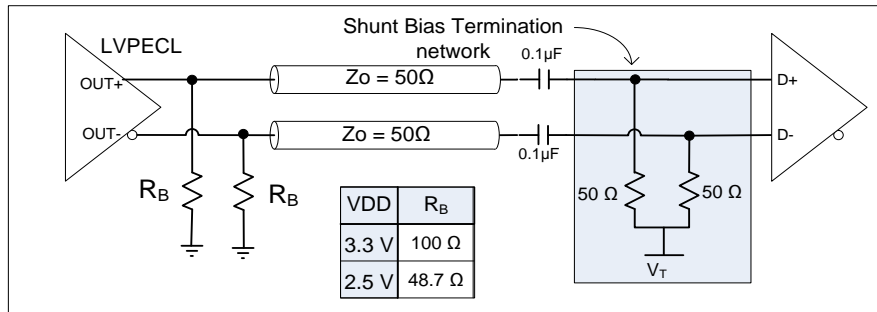


Figure 8. LVPECL with AC-coupled termination

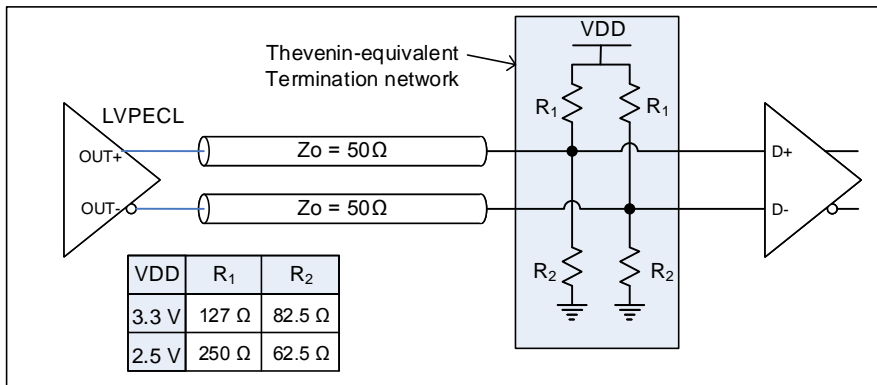


Figure 9. LVPECL DC-coupled load termination with Thevenin equivalent network

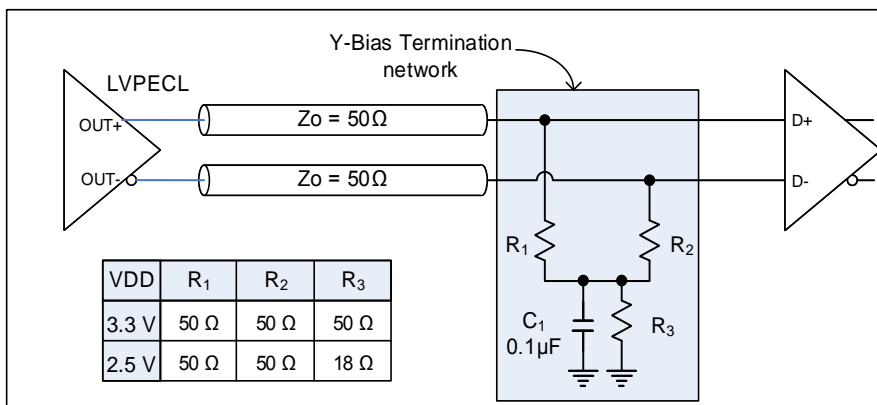


Figure 10. LVPECL with Y-Bias termination

Termination Diagrams (continued)

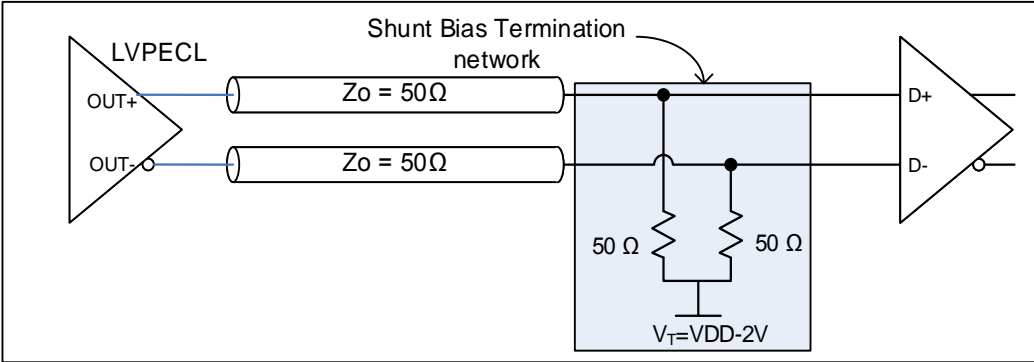


Figure 11. LVPECL with DC-coupled parallel shunt load termination

Termination Diagrams (continued)

LVDS:

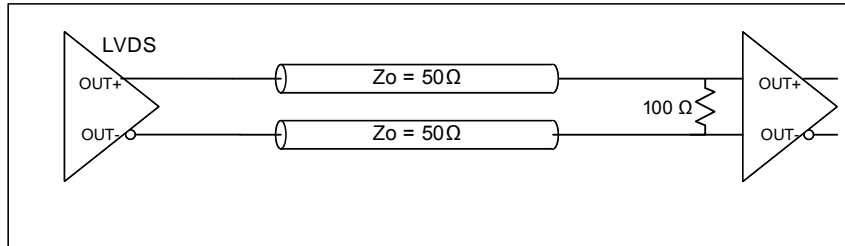


Figure 12. LVDS single DC termination at the load

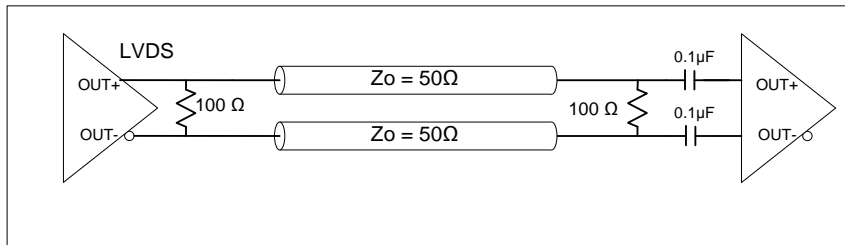


Figure 13. LVDS double AC termination with capacitor close to the load

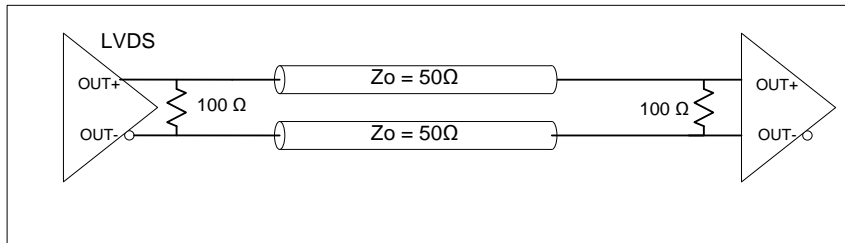


Figure 14. LVDS double DC termination

Termination Diagrams (continued)

HCSL:

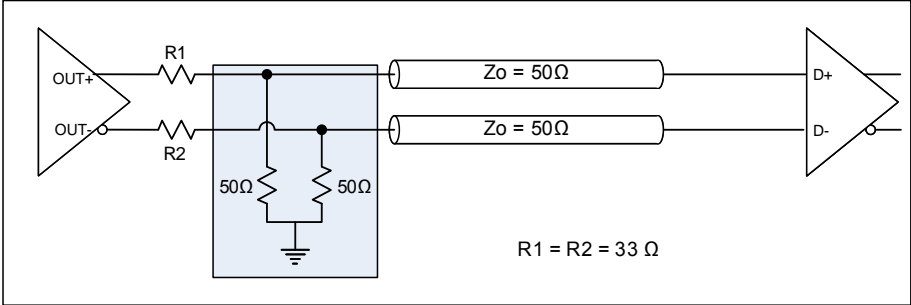


Figure 15. HCSL interface termination

Dimensions and Patterns

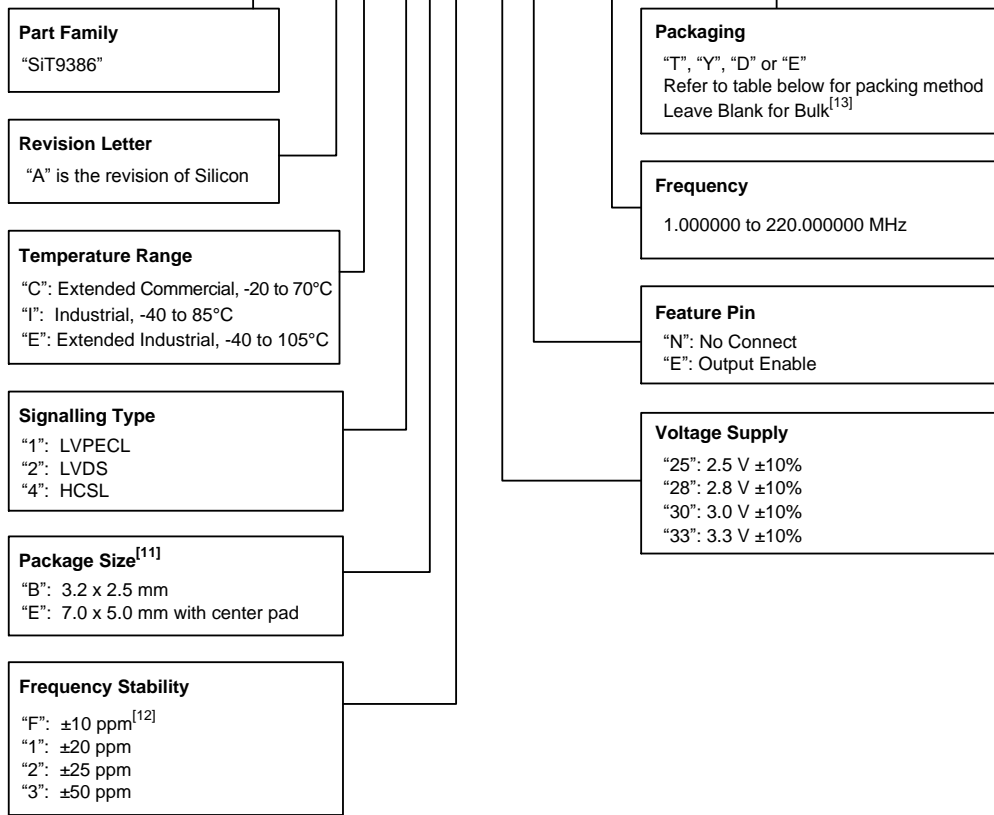
| Package Size – Dimensions (Unit: mm) ^[8] | Recommended Land Pattern (Unit: mm) ^[9] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--------|-----------|-------|-------|-----------------|---|-------|-------|-------|-----------|----|-------|-------|-------|-----------|---|---|-----------|--|---|---|-----------|--|------------|---|-------|-------|-------|-------------|---|-------|-------|-------|-------|------------|-----------|-------|------------|-------|-------------|-----------|-------|-------------------|-------|----|-------|-----------|---------------|------------|---|-------|-----------|-------------|-------------------|-----|-------|-------|--------------|---------------|-----|-----------|-------|---------------|-------------|-----|-----------|-------|--------------|--------------|---|-----------|-----------|-----------------|---------------|---------|-------------------------|----------------------|--|--------------------|----|-----------------------------------|-----------|--|-----------------|--|---------|-------------------------|----------------------|--|--------------------|--|--|
| <p>3.2 x 2.5 x 0.85 mm</p> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th></th> <th>SYMBOL</th> <th>MIN</th> <th>NOM</th> <th>MAX</th> </tr> </thead> <tbody> <tr> <td>TOTAL THICKNESS</td> <td>A</td> <td>0.800</td> <td>0.850</td> <td>0.900</td> </tr> <tr> <td>STAND OFF</td> <td>A1</td> <td>0.000</td> <td>0.035</td> <td>0.050</td> </tr> <tr> <td rowspan="2">BODY SIZE</td> <td>X</td> <td>D</td> <td>3.200 BSC</td> <td></td> </tr> <tr> <td>Y</td> <td>E</td> <td>2.500 BSC</td> <td></td> </tr> <tr> <td>LEAD WIDTH</td> <td>b</td> <td>0.550</td> <td>0.600</td> <td>0.650</td> </tr> <tr> <td rowspan="2">LEAD LENGTH</td> <td>L</td> <td>0.650</td> <td>0.700</td> <td>0.750</td> </tr> <tr> <td>L1</td> <td></td> <td>1.000 REF</td> <td></td> </tr> <tr> <td>LEAD PITCH</td> <td>e</td> <td></td> <td>1.100 BSC</td> <td></td> </tr> <tr> <td>PACKAGE TOLERANCE</td> <td>aaa</td> <td></td> <td>0.100</td> <td></td> </tr> <tr> <td>MOLD FLATNESS</td> <td>bbb</td> <td></td> <td>0.100</td> <td></td> </tr> <tr> <td>COPLANARITY</td> <td>ccc</td> <td></td> <td>0.080</td> <td></td> </tr> <tr> <td>DIMPLE WIDTH</td> <td>T</td> <td></td> <td>0.300 REF</td> <td></td> </tr> <tr> <td>DIMPLE LENGTH</td> <td>P</td> <td></td> <td>0.150 REF</td> <td></td> </tr> <tr> <td>DIMPLE DEPTH</td> <td>A2</td> <td></td> <td>0.100 REF</td> <td></td> </tr> </tbody> </table> <p>Notes 1. Dimensioning and tolerancing conform to ASME Y14.5-2009 2. All dimensions are in millimeters</p> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">Package Outline</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">6L PQFD</td> <td style="text-align: center;">PCD-PQFD-006-C03225-038</td> </tr> <tr> <td colspan="2" style="text-align: center;">3.200x2.500x0.850 mm</td> </tr> <tr> <td colspan="2" style="text-align: center;">2019/03/13 Rev B00 </td> </tr> </tbody> </table> | | SYMBOL | MIN | NOM | MAX | TOTAL THICKNESS | A | 0.800 | 0.850 | 0.900 | STAND OFF | A1 | 0.000 | 0.035 | 0.050 | BODY SIZE | X | D | 3.200 BSC | | Y | E | 2.500 BSC | | LEAD WIDTH | b | 0.550 | 0.600 | 0.650 | LEAD LENGTH | L | 0.650 | 0.700 | 0.750 | L1 | | 1.000 REF | | LEAD PITCH | e | | 1.100 BSC | | PACKAGE TOLERANCE | aaa | | 0.100 | | MOLD FLATNESS | bbb | | 0.100 | | COPLANARITY | ccc | | 0.080 | | DIMPLE WIDTH | T | | 0.300 REF | | DIMPLE LENGTH | P | | 0.150 REF | | DIMPLE DEPTH | A2 | | 0.100 REF | | Package Outline | | 6L PQFD | PCD-PQFD-006-C03225-038 | 3.200x2.500x0.850 mm | | 2019/03/13 Rev B00 | | <p>3.2 x 2.5 x 0.85 mm</p> | | | | | | | | | | | |
| | SYMBOL | MIN | NOM | MAX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL THICKNESS | A | 0.800 | 0.850 | 0.900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STAND OFF | A1 | 0.000 | 0.035 | 0.050 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BODY SIZE | X | D | 3.200 BSC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Y | E | 2.500 BSC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEAD WIDTH | b | 0.550 | 0.600 | 0.650 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEAD LENGTH | L | 0.650 | 0.700 | 0.750 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | L1 | | 1.000 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEAD PITCH | e | | 1.100 BSC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PACKAGE TOLERANCE | aaa | | 0.100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MOLD FLATNESS | bbb | | 0.100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| COPLANARITY | ccc | | 0.080 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIMPLE WIDTH | T | | 0.300 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIMPLE LENGTH | P | | 0.150 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIMPLE DEPTH | A2 | | 0.100 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Package Outline | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6L PQFD | PCD-PQFD-006-C03225-038 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.200x2.500x0.850 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2019/03/13 Rev B00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>7.0 x 5.0 x 0.85 mm^[10]</p> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th></th> <th>SYMBOL</th> <th>MIN</th> <th>NOM</th> <th>MAX</th> </tr> </thead> <tbody> <tr> <td>TOTAL THICKNESS</td> <td>A</td> <td>0.800</td> <td>0.850</td> <td>0.900</td> </tr> <tr> <td>STAND OFF</td> <td>A1</td> <td>0.000</td> <td>0.035</td> <td>0.050</td> </tr> <tr> <td rowspan="2">BODY SIZE</td> <td>X</td> <td>D</td> <td>7.000 BSC</td> <td></td> </tr> <tr> <td>Y</td> <td>E</td> <td>5.000 BSC</td> <td></td> </tr> <tr> <td rowspan="2">EP SIZE</td> <td>X</td> <td>J</td> <td>3.400</td> <td>3.500</td> <td>3.600</td> </tr> <tr> <td>Y</td> <td>K</td> <td>1.400</td> <td>1.500</td> <td>1.600</td> </tr> <tr> <td>LEAD WIDTH</td> <td>b</td> <td>1.350</td> <td>1.400</td> <td>1.450</td> </tr> <tr> <td rowspan="2">LEAD LENGTH</td> <td>L</td> <td>0.850</td> <td>0.900</td> <td>0.950</td> </tr> <tr> <td>L1</td> <td></td> <td>1.000 REF</td> <td></td> </tr> <tr> <td>LEAD PITCH</td> <td>e</td> <td></td> <td>2.540 BSC</td> <td></td> </tr> <tr> <td>PACKAGE TOLERANCE</td> <td>aaa</td> <td></td> <td>0.100</td> <td></td> </tr> <tr> <td>MOLD FLATNESS</td> <td>bbb</td> <td></td> <td>0.100</td> <td></td> </tr> <tr> <td>COPLANARITY</td> <td>ccc</td> <td></td> <td>0.080</td> <td></td> </tr> <tr> <td>DIMPLE WIDTH</td> <td>T</td> <td></td> <td>0.300 REF</td> <td></td> </tr> <tr> <td>DIMPLE LENGTH</td> <td>P</td> <td></td> <td>0.150 REF</td> <td></td> </tr> <tr> <td>DIMPLE DEPTH</td> <td>A2</td> <td></td> <td>0.100 REF</td> <td></td> </tr> </tbody> </table> <p>Notes 1. Dimensioning and tolerancing conform to ASME Y14.5-2009 2. All dimensions are in millimeters</p> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">Package Outline</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">6L PQFV</td> <td style="text-align: center;">PCD-PQFV-006-C07050-037</td> </tr> <tr> <td colspan="2" style="text-align: center;">5.000x7.000x0.850 mm</td> </tr> <tr> <td colspan="2" style="text-align: center;">2019/03/13 Rev B00 </td> </tr> </tbody> </table> | | SYMBOL | MIN | NOM | MAX | TOTAL THICKNESS | A | 0.800 | 0.850 | 0.900 | STAND OFF | A1 | 0.000 | 0.035 | 0.050 | BODY SIZE | X | D | 7.000 BSC | | Y | E | 5.000 BSC | | EP SIZE | X | J | 3.400 | 3.500 | 3.600 | Y | K | 1.400 | 1.500 | 1.600 | LEAD WIDTH | b | 1.350 | 1.400 | 1.450 | LEAD LENGTH | L | 0.850 | 0.900 | 0.950 | L1 | | 1.000 REF | | LEAD PITCH | e | | 2.540 BSC | | PACKAGE TOLERANCE | aaa | | 0.100 | | MOLD FLATNESS | bbb | | 0.100 | | COPLANARITY | ccc | | 0.080 | | DIMPLE WIDTH | T | | 0.300 REF | | DIMPLE LENGTH | P | | 0.150 REF | | DIMPLE DEPTH | A2 | | 0.100 REF | | Package Outline | | 6L PQFV | PCD-PQFV-006-C07050-037 | 5.000x7.000x0.850 mm | | 2019/03/13 Rev B00 | | <p>7.0 x 5.0 x 0.85 mm^[10]</p> <p>Note: Circles in center pad are thermal vias, recommended to improve thermal performance</p> |
| | SYMBOL | MIN | NOM | MAX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL THICKNESS | A | 0.800 | 0.850 | 0.900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STAND OFF | A1 | 0.000 | 0.035 | 0.050 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BODY SIZE | X | D | 7.000 BSC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Y | E | 5.000 BSC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EP SIZE | X | J | 3.400 | 3.500 | 3.600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Y | K | 1.400 | 1.500 | 1.600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEAD WIDTH | b | 1.350 | 1.400 | 1.450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEAD LENGTH | L | 0.850 | 0.900 | 0.950 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | L1 | | 1.000 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEAD PITCH | e | | 2.540 BSC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PACKAGE TOLERANCE | aaa | | 0.100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MOLD FLATNESS | bbb | | 0.100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| COPLANARITY | ccc | | 0.080 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIMPLE WIDTH | T | | 0.300 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIMPLE LENGTH | P | | 0.150 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIMPLE DEPTH | A2 | | 0.100 REF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Package Outline | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6L PQFV | PCD-PQFV-006-C07050-037 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.000x7.000x0.850 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2019/03/13 Rev B00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes:

8. Top Marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
9. A capacitor of value 0.1 μ F or higher between Vdd and GND is required. An additional 10 μ F capacitor between Vdd and GND is required for the best phase jitter performance
10. The center pad has no electrical function. Soldering down the center pad to the GND is recommended for best thermal dissipation, but is optional.

Ordering Information

SiT9386AC-1B2-33E123.456789T



Notes:

- 11. Contact SiTime for 5.0 x 3.2 mm package
- 12. Contact SiTime for ±10 ppm option.
- 13. Bulk is available for sampling only.

Table 10. Ordering Codes for Supported Tape & Reel Packing Method

| Device Size (mm x mm) | 8 mm T&R (3ku) | 8 mm T&R (1ku) | 12 mm T&R (3ku) | 12 mm T&R (1ku) | 16 mm T&R (3ku) | 16 mm T&R (1ku) |
|-----------------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| 7.0 x 5.0 | — | — | — | — | T | Y |
| 3.2 x 2.5 | D | E | — | — | — | — |

Table 11. Additional Information

| Document | Description | Download Link |
|------------------------|--|---|
| ECCN #: EAR99 | Five character designation used on the commerce Control List (CCL) to identify dual use items for export control purposes. | — |
| Part number Generator | Tool used to create the part number based on desired features. | — |
| Manufacturing Notes | Tape & Reel dimension, reflow profile and other manufacturing related info | http://www.sitime.com/manufacturing-notes |
| Qualification Reports | RoHS report, reliability reports, composition reports | http://www.sitime.com/support/quality-and-reliability |
| Performance Reports | Additional performance data such as phase noise, current consumption and jitter for selected frequencies | http://www.sitime.com/support/performance-measurement-report |
| Termination Techniques | Termination design recommendations | http://www.sitime.com/support/application-notes |
| Layout Techniques | Layout recommendations | http://www.sitime.com/support/application-notes |

Table 12. Revision History

| Revision | Release Date | Change Summary |
|----------|--------------|--|
| 0.1 | 03/11/2017 | Initial draft |
| 0.87 | 11/06/2017 | Updated package drawings Corrected tape/reel ordering information Updated Electrical Characteristics based on characterization Included max numbers for IPJ Added additional information table Corrected formatting issues Increased temperature range from 95°C to 105°C Removed ± 10 ppm options for automotive and industrial temperature ranges Changed ± 20 ppm to "contact SiTime" Updated termination diagrams Lower mechanical shock from 20,000 to 10,000 g |
| 0.90 | 11/24/2017 | Ordering information updates and page layout changes |
| 1.0 | 03/15/2019 | Updated Electrical Characteristics tables Updated waveform diagrams Added OE enable/disable timing diagrams Updated package dimensions Added an AEC-Q100 Grade 4 temperature option Updated the ordering information |

SiTime Corporation, 5451 Patrick Henry Drive, Santa Clara, CA 95054, USA | Phone: +1-408-328-4400 | Fax: +1-408-328-4439

© SiTime Corporation 2017-2019. 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.