

Features

- 32 standard frequencies from 25 MHz to 325 MHz. For additional frequencies below from 1 to 220.00000 MHz, refer to [SiT9366](#) datasheet. For frequencies from 220.000001 to 725 MHz, refer to [SiT9367](#) datasheet.
- LVPECL, LVDS and HCSL output signaling
- 0.1 ps RMS phase jitter (random) for Ethernet applications
- Contact [SiTime](#) for ± 10 ppm frequency stability
- Wide temperature ranges from -40°C to 105°C
- Industry-standard packages: 3.2 x 2.5 mm, 7.0 x 5.0 mm and 5.0 x 3.2 mm package

Applications

- 10/40/100 Gbps Ethernet, SONET, SATA, SAS, Fibre Channel
- Telecom, networking, instrumentation, storage, servers



Electrical Characteristics

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

Table 1. Electrical Characteristics – Common to LVPECL, LVDS and HCSL (All temperature ranges)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency Range						
Output Frequency Range	f	32 standard frequencies between 25 MHz and 325.000000 MHz			MHz	
Frequency Stability						
Frequency Stability	F_stab	-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	$^{\circ}\text{C}$	Extended Commercial
		-40	–	+85	$^{\circ}\text{C}$	Industrial
		-40	–	+95	$^{\circ}\text{C}$	
		-40	–	+105	$^{\circ}\text{C}$	Extended Industrial
Supply Voltage						
Supply Voltage	Vdd	2.97	3.30	3.63	V	
		2.70	3.00	3.30	V	
		2.52	2.80	3.08	V	
		2.25	2.50	2.75	V	
Input Characteristics						
Input Voltage High	V _{IH}	70%	–	–	Vdd	Pin 1, OE
Input Voltage Low	V _{IL}	–	–	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						
Startup Time	T _{start}	–	–	3.0	ms	Measured from the time Vdd reaches its rated minimum value.
OE Enable/Disable Time	T _{oe}	–	–	3.8	μs	f = 156.25 MHz. Measured from the time OE pin reaches rated V _{IH} and V _{IL} 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}	–	–	30	mA	Maximum average current drawn from OUT+ or OUT-
Output Characteristics						
Output High Voltage	VOH	V _{dd} -1.1	–	V _{dd} -0.7	V	See Figure 2
Output Low Voltage	VOL	V _{dd} -1.9	–	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	290	ps	20% to 80%. See Figure 3
Jitter – 7.0 x 5.0 mm 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 ranges -40 to 95°C and -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 – 5.0 x 3.2 mm and 3.2 x 2.5 mm Packages						
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)		–	0.225	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
		–	0.225	0.340	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dd} levels, includes spurs. Temperature ranges -40 to 95°C and -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	470	ps	Measured with 2 pF capacitive loading to GND, 20% to 80%. See Figure 5
Jitter – 7.0 x 5.0 mm 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 ranges -40 to 95°C and -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 – 5.0 x 3.2 and 3.2 x 2.5 mm Packages						
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}	–	0.235	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 ranges -40 to 95°C and -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:

- Measured according to JESD65B

Table 4. Electrical Characteristics – HCSL

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}	–	–	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	465	ps	Measured with 2 pF capacitive loading to GND, 20% to 80%. See Figure 3
Jitter – 7.0 x 5.0 mm 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 ranges -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 ranges -40 to 95°C and -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 – 5.0 x 3.2 and 3.2 x 2.5 mm Packages						
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 ranges -40 to 95°C and -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]

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 V_{dd} and GND is required. An additional 10 μF capacitor between V_{dd} and GND is required for the best phase jitter performance

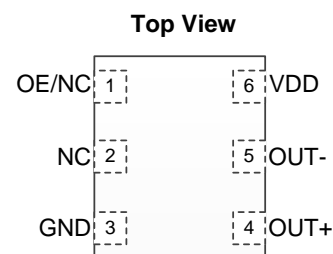


Figure 1. Pin Assignments

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
V _{dd}	-0.5	4.0	V
V _{IH}		V _{dd} + 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
5032, 6-pin	TBD	TBD
7050, 6-pin	52	19

Notes:

6. Refer to JE5D51 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
95°C	120°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	<i>g</i>
Mechanical Vibration Resistance	MIL-STD-883F, Method 2007	70	<i>g</i>
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

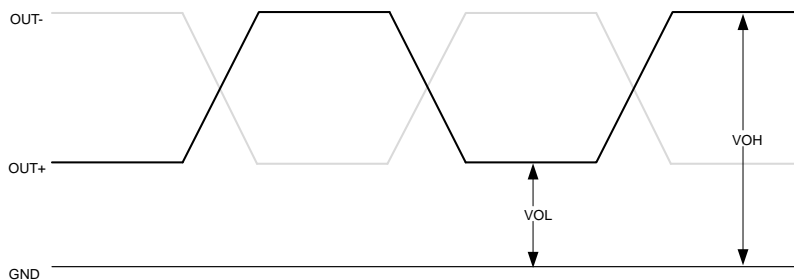


Figure 2. LVPECL/HCSL Voltage Levels per Differential Pin (OUT+/OUT-)

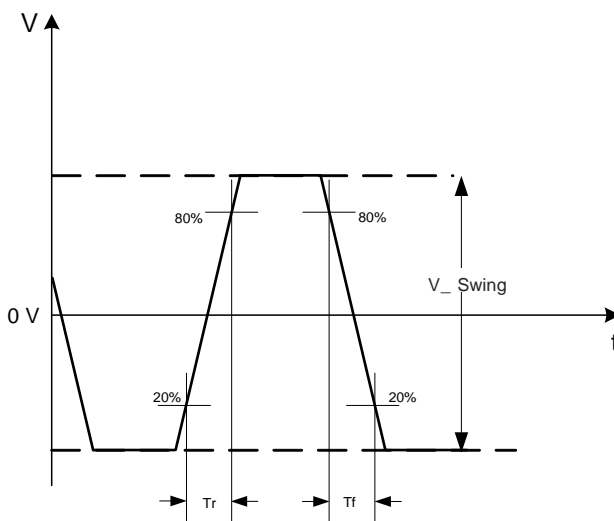


Figure 3. LVPECL/HCSL Voltage Levels Across Differential Pair

Waveform Diagrams (continued)

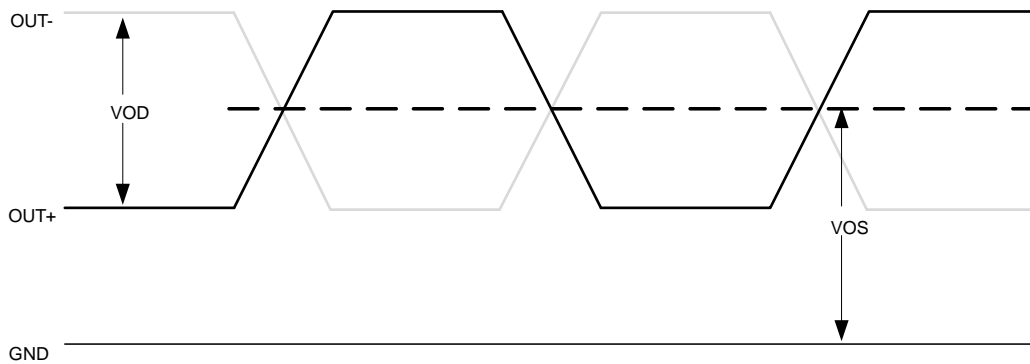


Figure 4. LVDS Voltage Levels per Differential Pin (OUT+/OUT-)

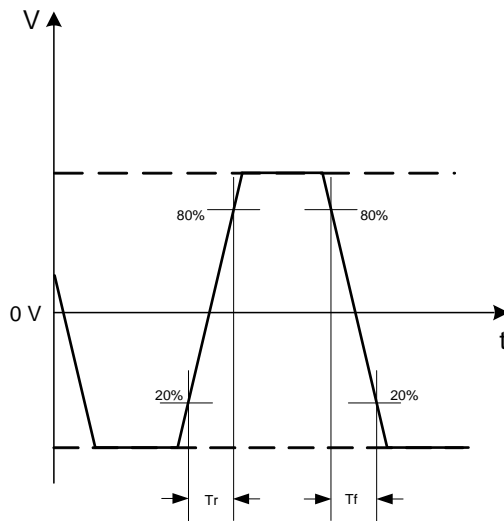


Figure 5. LVDS Differential Waveform

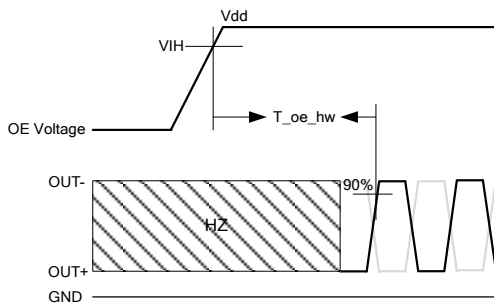


Figure 6. Hardware OE Enable Timing

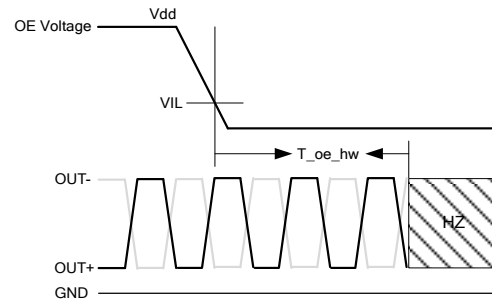


Figure 7. Hardware OE Disable Timing

Termination Diagrams

LVPECL:

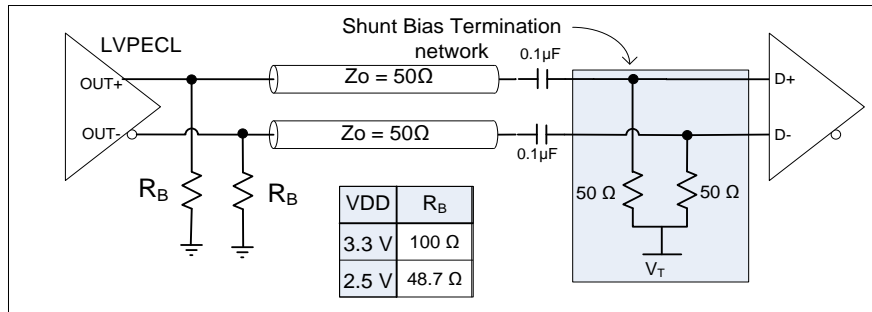


Figure 8. LVPECL with AC-coupled Termination

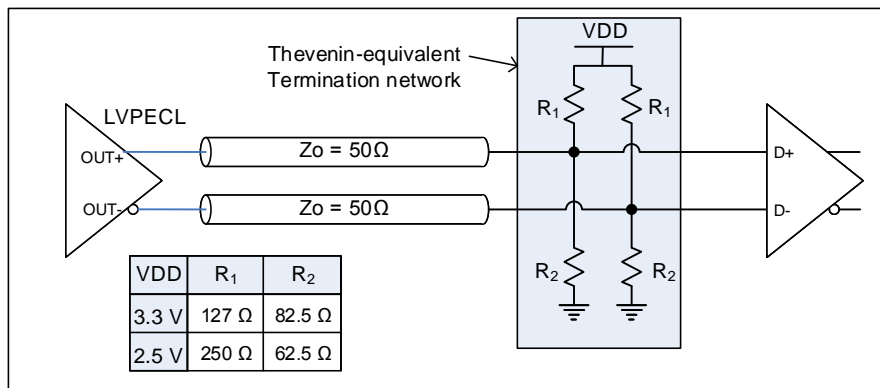


Figure 9. LVPECL DC-coupled Load Termination with Thevenin Equivalent Network

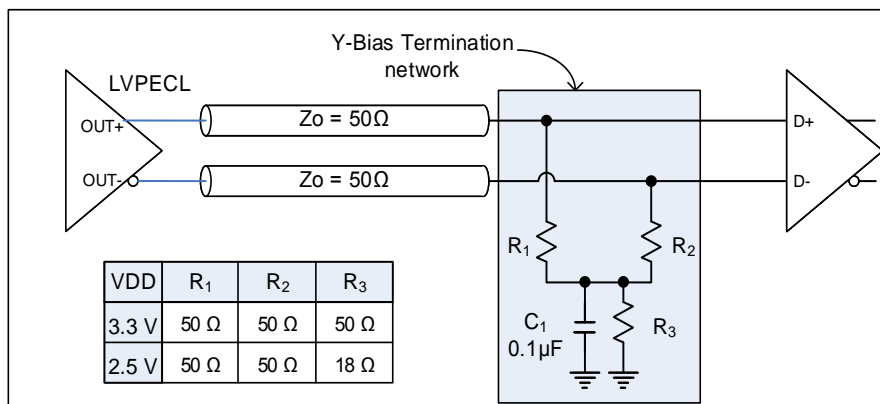


Figure 10. LVPECL with Y-Bias Termination

Termination Diagrams (continued)

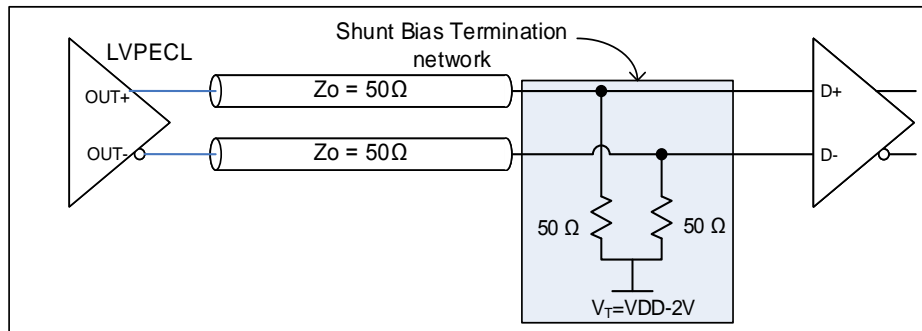


Figure 11. LVPECL with DC-coupled Parallel Shunt Load Termination

Termination Diagrams (continued)

LVDS:

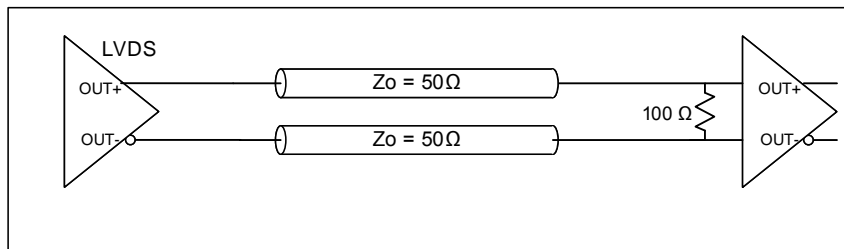


Figure 12. LVDS Single DC Termination at the Load

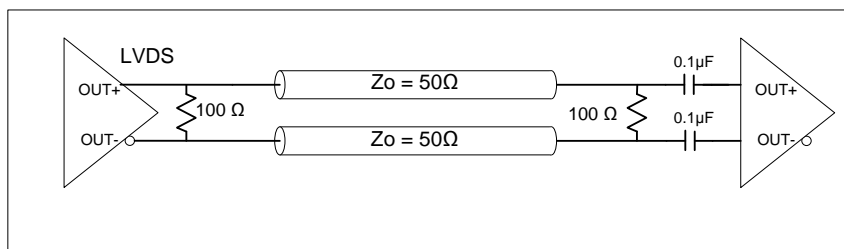


Figure 13. LVDS double AC Termination with Capacitor Close to the Load

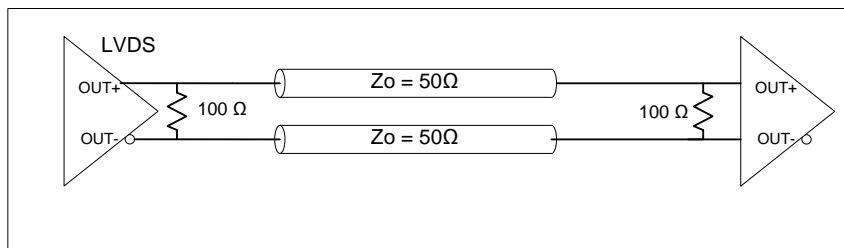


Figure 14. LVDS Double DC Termination

Termination Diagrams (continued)

HCSL:

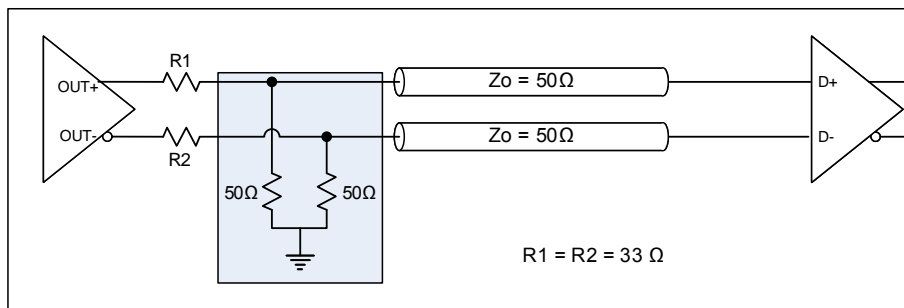


Figure 15. HCSL Interface Termination

Dimensions and Patterns

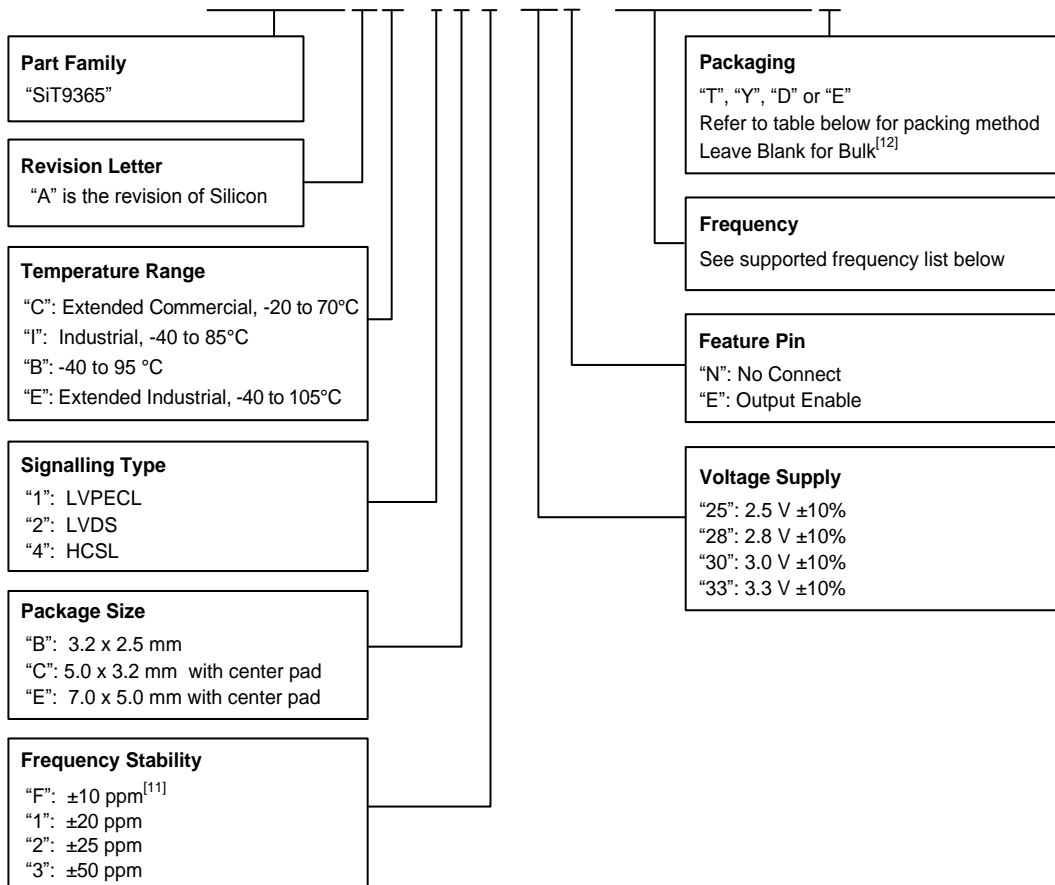
Package Size – Dimensions (Unit: mm) ^[8]	Recommended Land Pattern (Unit: mm) ^[9]																																																
<p>3.2 x 2.5 x 0.85 mm</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Dimension Table</caption> <thead> <tr> <th></th> <th>Symbol</th> <th>Min</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 rowspan="2">BODY SIZE</td> <td>X</td> <td>2.400</td> <td>2.500</td> <td>2.600</td> </tr> <tr> <td>Y</td> <td>3.200</td> <td>3.200</td> <td>3.300</td> </tr> <tr> <td>LEAD PITCH</td> <td>e</td> <td colspan="3">1.100 BSC</td> </tr> <tr> <td>LEAD LENGTH</td> <td>L</td> <td>0.650</td> <td>0.700</td> <td>0.750</td> </tr> <tr> <td>LEAD WIDTH</td> <td>W</td> <td>0.550</td> <td>0.600</td> <td>0.650</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px;">6L QFN</td> <td style="padding: 2px;">Package Outline</td> </tr> <tr> <td style="padding: 2px;">3.2 x 2.5 x 0.75 mm</td> <td rowspan="2" style="text-align: center; vertical-align: middle;"></td> </tr> <tr> <td style="padding: 2px;">POD-38 Rev A</td> </tr> </table> </div>		Symbol	Min	Nom	Max	TOTAL THICKNESS	A	0.800	0.850	0.900	BODY SIZE	X	2.400	2.500	2.600	Y	3.200	3.200	3.300	LEAD PITCH	e	1.100 BSC			LEAD LENGTH	L	0.650	0.700	0.750	LEAD WIDTH	W	0.550	0.600	0.650	6L QFN	Package Outline	3.2 x 2.5 x 0.75 mm		POD-38 Rev A	<p>3.2 x 2.5 x 0.85 mm</p>									
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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

SiT9365AC-1B2-33E125.000000T



Notes:

- 11. Contact [SiTime](#) for ±10 ppm option.
- 12. Bulk is available for sampling only.

Table 10. Supported Frequencies

25.000000 MHz	30.720000 MHz	50.000000 MHz	53.125000 MHz	61.440000 MHz	62.500000 MHz	74.175824 MHz	74.250000 MHz
75.000000 MHz	77.760000 MHz	98.304000 MHz	100.000000 MHz	106.250000 MHz	122.880000 MHz	125.000000 MHz	133.333333 MHz
148.351648 MHz	150.000000 MHz	153.600000 MHz	155.520000 MHz	156.250000 MHz	159.375000 MHz	160.000000 MHz	161.132813 MHz
166.666666 MHz	168.040678 MHz	200.000000 MHz	212.500000 MHz	250.000000 MHz	300.000000 MHz	322.265625 MHz	325.000000 MHz

Table 11. 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
5.0 x 3.2			T	Y		
3.2 x 2.5	D	E			—	—

Table 13. Revision History

Revision	Release Date	Change Summary
1.0	09/06/2017	Final release
1.04	04/17/2018	Added 5032 package. Added -40 to 95C and -40 to 105C temperature ranges Corrected minor errors Added Additional Information Table.
1.05	07/03/2018	Performed minor edits and updated Ordering Information.

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