

Features

- Any frequency between 10 MHz and 220 MHz accurate to 6 decimal places
- Widest pull range options: ± 25 , ± 50 , ± 80 , ± 100 , ± 150 , ± 200 , ± 400 , ± 800 , ± 1600 , ± 3200 ppm
- 0.23 ps RMS phase jitter (Typ) over 12 kHz to 20 MHz bandwidth
- Wide temperature range support from -40°C to 85°C
Contact SiTime for other temperature range options
- Industry-standard packages: 3.2x2.5, 7.0x5.0 mm
Contact SiTime for 5.0 x 3.2 mm package
- For frequencies 220 MHz to 700 MHz, refer to SiT3373 datasheet

Applications

- Remote Radio Head (RRH), Cable Modem Termination System (CMTS), Video, Broadcasting System, Audio, Industrial Sensors
- SATA, SAS, 10GB Ethernet, Fibre Channel, PCI-Express



INSTANT
SAMPLES



GREEN
SOLUTIONS



LIFETIME
WARRANTY

Electrical Characteristics

All Min and Max limits in the Electrical Characteristics tables are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at 25°C and nominal supply voltage

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency Range						
Output Frequency Range	f	10	–	220	MHz	Accurate to 6 decimal places
Frequency Stability						
Frequency Stability	F_stab	-15	–	+15	ppm	Inclusive of initial tolerance, operating temperature, rated power supply voltage, load variations, and first year aging at 25°C condition
		-25	–	+25	ppm	
		-30	–	+30	ppm	
		-50	–	+50	ppm	
Temperature Range						
Operating Temperature Range	T_use	-20	–	+70	$^{\circ}\text{C}$	Extended Commercial
		-40	–	+85	$^{\circ}\text{C}$	Industrial. Contact SiTime for other temperature range options.
Supply Voltage						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
		2.7	3.0	3.3	V	
		2.52	2.8	3.08	V	
		2.25	2.5	2.75	V	
Voltage Control Characteristics						
Pull Range	PR	± 25 , ± 50 , ± 80 , ± 100 , ± 150 , ± 200 , ± 400 , ± 800 , ± 1600 , ± 3200 ppm			ppm	See the last page for Absolute Pull Range, APR Table. Contact SiTime for custom pull range options.
Upper Control Voltage	VC_U	90%	–	–	Vdd	Voltage at which maximum frequency deviation is guaranteed
Lower Control Voltage	VC_L	–	–	10%	Vdd	Voltage at which minimum frequency deviation is guaranteed
Control Voltage Input Impedance	VC_z	–	10	–	M Ω	
Control Voltage Input Bandwidth	V_c	–	10	–	kHz	Contact SiTime for other input bandwidth options
Pull Range Linearity	Lin	–	1	TBD	%	
Frequency Change Polarity	–	Positive Slope			–	
Input Characteristics						
Input Voltage High	VIH	70%	–	–	Vdd	Pin 2, OE
Input Voltage Low	VIL	–	–	30%	Vdd	Pin 2, OE
Input Pull-up Impedance	Z_in	–	100	–	k Ω	Pin 2, OE logic high or logic low

Table 2. Electrical Characteristics - Common to LVPECL, LVDS and HCSL (Cont'd)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Characteristics						
Duty Cycle	DC	45	–	55	%	
Startup and OE Timing						
Start-up Time	T_start	–	–	5	ms	Measured from the time Vdd reaches its rated minimum value.
OE Enable/Disable Time	T_oe	–	–	515	ns	f = 212.5 MHz - For other frequencies, T_oe = 500ns + 3 period

Table 3. Electrical Characteristics - LVPECL Specific

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Current Consumption						
Current Consumption	I _{dd}	–	–	84	mA	Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V
OE Disable Supply Current	I _{OE}	–	–	55	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	–	250	–	ps	20% to 80%, see Figure 2
Jitter						
RMS Period Jitter ^[1]	T _{jitt}	–	1	2	ps	f = 156.25 MHz, V _{DD} = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	–	0.23	–	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}
		–	0.1	–	ps	f = 156.25 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, all V _{dds}

Notes:

1. Measured according to JESD65B

Table 4. Electrical Characteristics – LVDS Specific

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Current Consumption						
Current Consumption	I _{dd}	–	–	76	mA	Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V
OE Disable Supply Current	I _{OE}	–	–	55	mA	OE = Low
Output Disable Leakage Current	I _{leak}	–	0.15	–	μA	OE = Low
Output Characteristics						
Differential Output Voltage	VOD	250	–	450	mV	See Figure 4
VOD Magnitude Change	ΔVOD	–	–	50	mV	See Figure 4
Offset Voltage	VOS	1.125	–	1.375	V	See Figure 4
VOS Magnitude Change	ΔVOS	–	–	50	mV	See Figure 4
Rise/Fall Time	Tr, Tf	–	340	–	ps	Measured with 2 pF capacitive loading to GND, 20% to 80%, see Figure 4
Jitter						
RMS Period Jitter ^[2]	T _{jitt}	–	1	2	ps	f = 156.25 MHz, V _{DD} = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	–	0.23	–	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}
		–	0.1	–	ps	f = 156.25 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, all V _{dds}

Notes:

2. Measured according to JESD65B

Table 5. Electrical Characteristics – HCSL Specific

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Current Consumption						
Current Consumption	I _{dd}	–	–	84	mA	Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V
OE Disable Supply Current	I _{OE}	–	–	55	mA	OE = Low
Output Disable Leakage Current	I _{leak}	–	0.15	–	μA	OE = Low
Output Characteristics						
Output High Voltage	VOH	0.6	–	0.8	V	See Figure 2
Output Low Voltage	VOL	-0.05	–	0.05	V	See Figure 2
Output Differential Voltage Swing	V _{Swing}	1	1.4	1.8	V	See Figure 3
Rise/Fall Time	Tr, Tf	–	350	–	ps	Measured with 2 pF capacitive loading to GND, 20% to 80%, see Figure 2
Jitter						
RMS Period Jitter ^[3]	T _{jitt}	–	1	2	ps	f = 156.25 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	–	0.23	–	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}
		–	0.1	–	ps	f = 156.25 MHz, IEEE802.3-2005 10GbE jitter mask integration bandwidth = 1.875 MHz to 20 MHz, all V _{dds}

Notes:

3. Measured according to JESD65B

Table 6. Pin Description

Pin	Symbol	Functionality	
1	VIN	Input	Control Voltage
2	NC/OE	No Connect (NC)	No Connect: Leave it floating or connect to GND for better heat dissipation
		Output Enable (OE)	H ^[4] : specified frequency output L: output is high impedance. Only output driver is disabled
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 pF between V_{dd} and GND is required for the best phase jitter performance

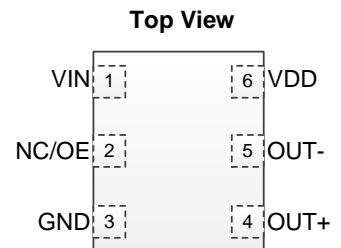


Figure 1. Pin Assignments

Table 7. Absolute Maximum

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
Storage Temperature	-65	150	°C
VDD	-0.5	4	V
Electrostatic Discharge (HBM)	–	2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C

Table 8. Thermal Consideration^[6]

Package	θ_{JA} , 4 Layer Board (°C/W)	θ_{JC} , Bottom (°C/W)
3225, 6-pin	TBD	TBD
7050, 6-pin	TBD	TBD

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 9. Maximum Operating Junction Temperature^[7]

Max Operating Temperature (ambient)	Maximum Operating Junction Temperature
70°C	80
85°C	95

Notes:

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

Table 10. Environmental Compliance

Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method 2002
Mechanical Vibration	MIL-STD-883F, Method 2007
Temperature Cycle	JESD22, Method A104
Solderability	MIL-STD-883F, Method 2003
Moisture Sensitivity Level	MSL1 @ 260°C

Waveform Diagrams

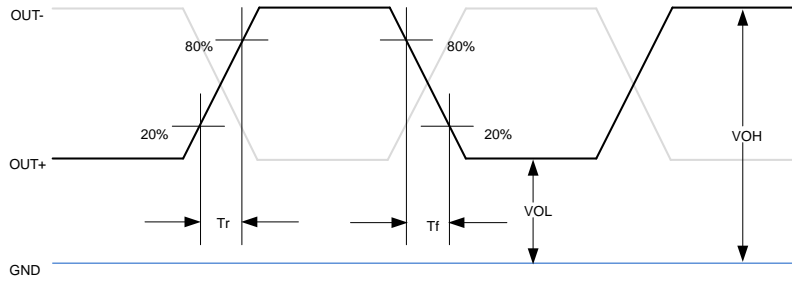


Figure 2. LVPECL/HCSL Voltage Levels per Differential Pin (OUT+/OUT-)

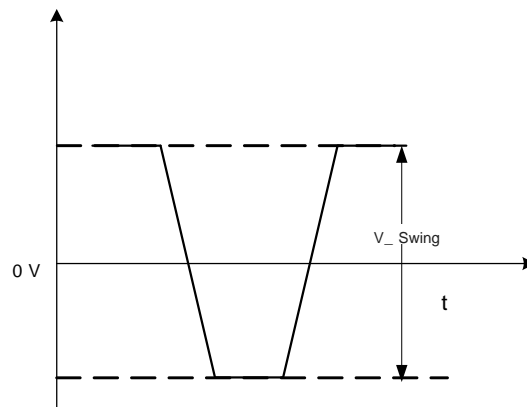


Figure 3. LVPECL/HCSL Voltage Levels across Differential Pair

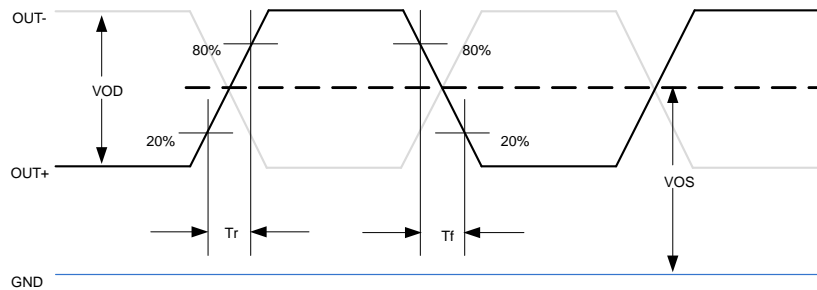


Figure 4. LVDS Voltage Levels per Differential Pin (OUT+/OUT-)

Termination Diagrams

LVPECL:

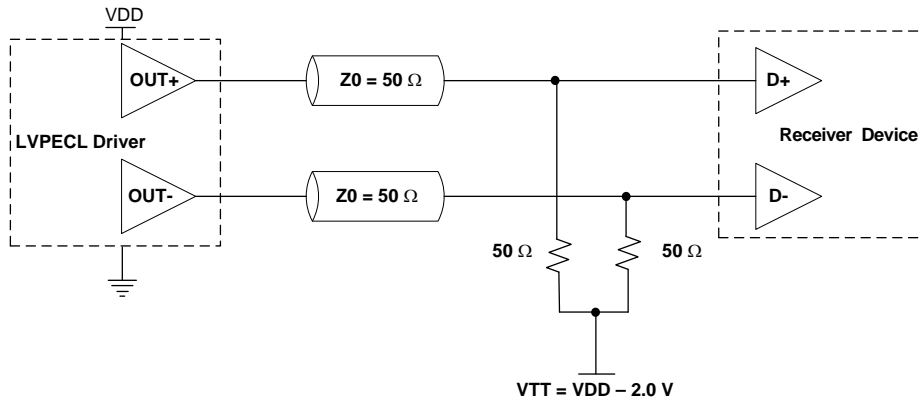


Figure 5. LVPECL Typical Termination

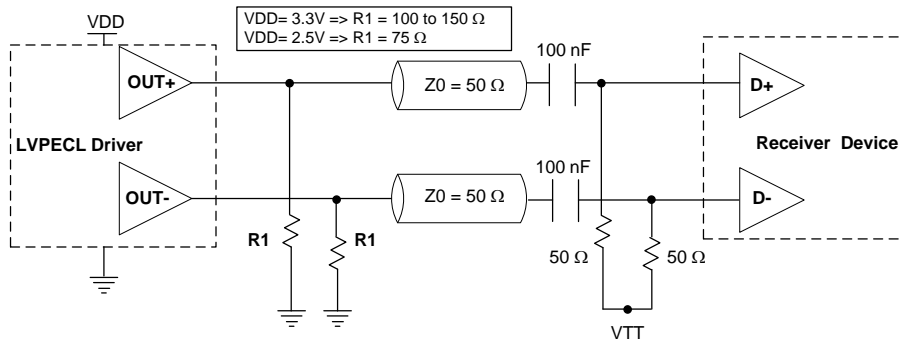


Figure 6. LVPECL AC Coupled Termination

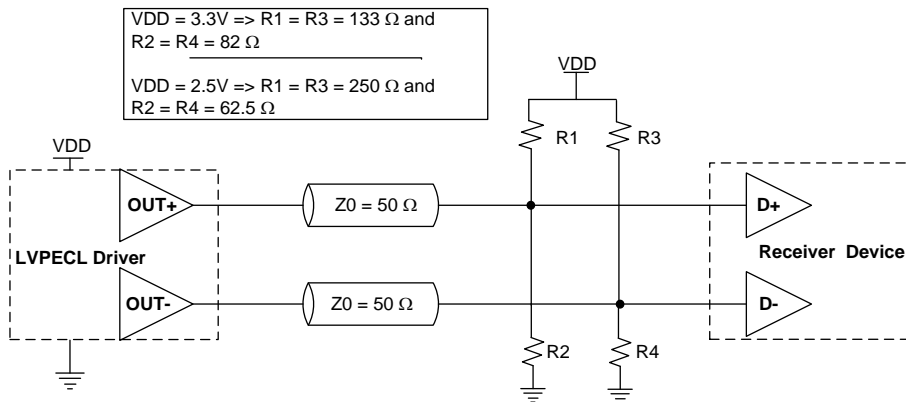


Figure 7. LVPECL with Thevenin Typical Termination

Termination Diagrams (Continued)

LVDS:

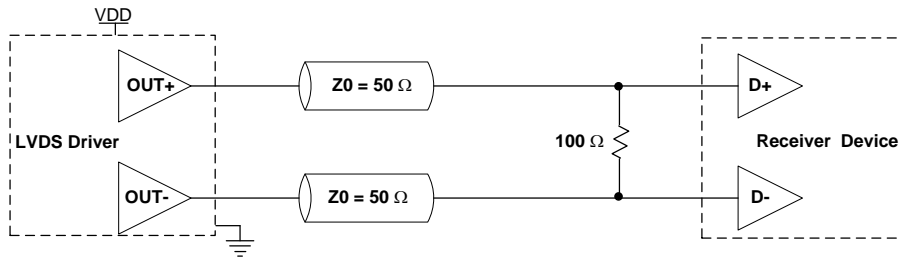


Figure 8. LVDS Single Termination (Load Terminated)

HCSL:

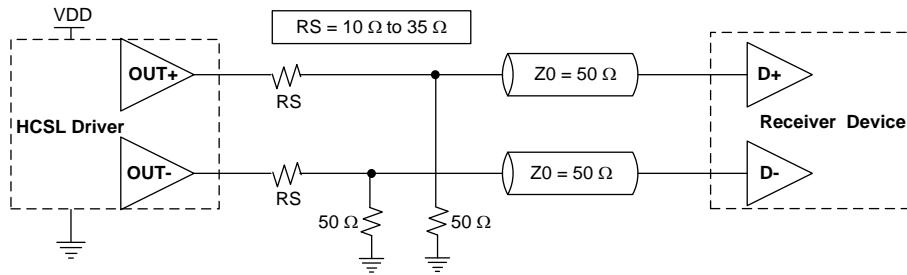


Figure 9. HCSL Typical Termination

Dimensions and Patterns

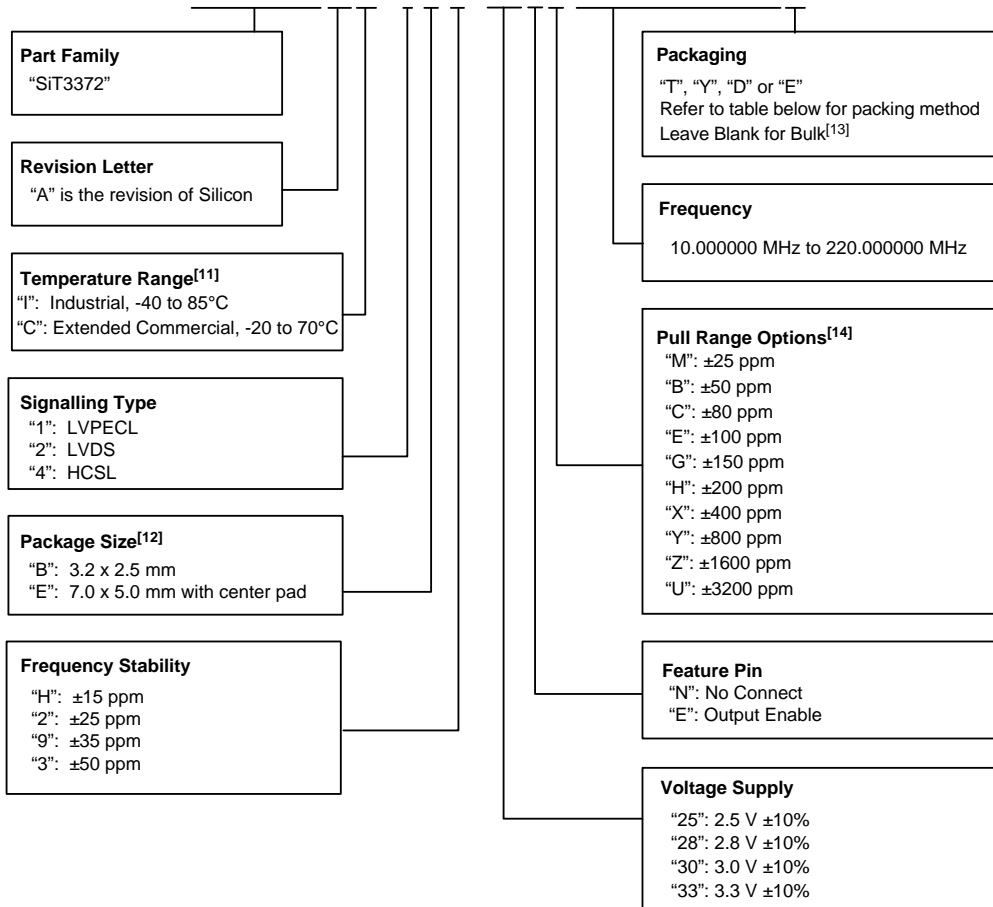
Package Size – Dimensions (Unit: mm) ^[8]	Recommended Land Pattern (Unit: mm) ^[9]
<p>3.2 x 2.5x 0.75 mm</p>	
<p>7.0 x 5.0x 0.90 mm^[10]</p>	

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 μF or higher between Vdd and GND is required.
- 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

SiT3372AC-1B2-33-H122.123456T



Notes:

- 11. Contact SiTime for higher temperature options
- 12. Contact SiTime for 5.0 x 3.2 package
- 13. Bulk is available for sampling only
- 14. Contact SiTime for custom pull range options

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
3.2 x 2.5	D	E	T	Y	—	—

Table 12. APR Table

Absolute pull range (APR) = Nominal pull range (PR) - frequency stability (F_stab)

Nominal Pull Range	Frequency Stability			
	± 15	± 25	± 35	± 50
	APR (ppm)			
± 25	± 5	—	—	—
± 50	± 30	± 20	± 10	—
± 80	± 60	± 50	± 40	± 25
± 100	± 80	± 70	± 60	± 45
± 150	± 130	± 120	± 110	± 95
± 200	± 180	± 170	± 160	± 145
± 400	± 380	± 370	± 360	± 345
± 800	± 780	± 770	± 760	± 745
± 1600	± 1580	± 1570	± 1560	± 1545
± 3200	± 3180	± 3170	± 3160	± 3145

Table 13. Revision History

Revision	Release Date	Change Summary
0.1	09/14/16	Initial draft
0.2	9/16/16	Removed 5.0 x 3.2 package
0.25	9/21/16	Revised the Electrical characteristics tables Revised frequency stability values in the ordering information Added Output Enable option into Pin 2 function Revised 7050 package dimension

© SiTime Corporation 2016. 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

SiT3372 **Advanced Information**
10 MHz to 220 MHz Ultra-low Jitter Differential VCXO



prohibited.