

SiT3822

220-625 MHz High Performance Differential VCXO



Features

- Any frequency between 220 MHz and 625 MHz accurate to 6 decimal places
- Widest pull range options: ± 25 , ± 50 , ± 100 , ± 150 , ± 200 , ± 400 , ± 800 , ± 1600 ppm
- Superior pull range linearity of $\leq 1\%$, 10 times better than quartz
- < 1 ps RMS phase jitter (random) over 12 kHz to 20 MHz bandwidth
- Industrial and extended commercial temperature ranges
- Industry-standard packages: 3.2 mm x 2.5 mm, 5.0 mm x 3.2 mm and 7.0 mm x 5.0 mm
- For frequencies higher than 220 MHz, refer to SiT3821 datasheet

Applications

- Ideal for SONET, Video, Instrumentation, Satellite applications
- Telecom, networking, broadband



INSTANT
SAMPLES



GREEN
SOLUTIONS



LIFETIME
WARRANTY

Electrical Characteristics

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVPECL and LVDS, Common AC Characteristics						
Output Frequency Range	f	220	–	625	MHz	For frequency coverage see last page
Frequency Stability	F _{stab}	-10	–	+10	ppm	Inclusive of initial tolerance, operating temperature, rated power, supply voltage and load change
		-25	–	+25	ppm	
		-50	–	+50	ppm	
Operating Temperature Range	T _{use}	-40	–	+85	°C	Industrial
		-20	–	+70	°C	Extended Commercial
Start-up Time	T _{start}	–	–	10	ms	
Duty Cycle	DC	45	–	55	%	f = 220 to 312.5 MHz and f = 525 to 625 MHz
		40	–	60	%	f = 420 to 500 MHz
Pull Range	PR	± 25 , ± 50 , ± 100 , ± 150 , ± 200 , ± 400 , ± 800 , ± 1600			ppm	See the last page for Absolute Pull Range, APR table
Upper Control Voltage	VC _U	3	–	3.1	V	V _{dd} = 3.3V, Voltage at which maximum deviation is guaranteed
		2.25	–	2.3	V	V _{dd} = 2.5V, Voltage at which maximum deviation is guaranteed
Lower Control Voltage	VC _L	0	–	0.1	V	Voltage at which maximum deviation is guaranteed
Linearity	Lin	–	0.2	1	%	
Frequency Change Polarity	–	Positive Slope			–	
Control Voltage Bandwidth (-3dB)	V _{BW}	–	8	–	kHz	Contact SiTime for 16 kHz bandwidth
1-year Aging		-1	–	+1	ppm	First year @25°C
10-year Aging		-5	–	+5	ppm	
LVPECL, DC and AC Characteristics						
Supply Voltage	V _{dd}	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
Current Consumption	I _{dd}	–	61	69	mA	Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V
OE Disable Supply Current	I _{OE}	–	–	35	mA	OE = GND
Output Disable Leakage Current	I _{leak}	–	–	1	μA	OE = GND
Maximum Output Current	I _{driver}	–	–	30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	V _{dd} -1.1	–	V _{dd} -0.7	V	See Figure 1
Output Low Voltage	VOL	V _{dd} -1.9	–	V _{dd} -1.5	V	See Figure 1
Pk-Pk Output Voltage Swing	V _{Swing}	600	800	1000	mV	See Figure 1
Rise/Fall Time	Tr, Tf	100	300	500	ps	20% to 80%
OE Enable/Disable Time	T _{oe}	–	–	105	ns	f = 220 MHz - For other frequencies, T _{oe} = 100ns + 3 period
RMS Period Jitter	T _{jitt}	–	1	1.7	ps	f = 100 MHz, V _{dd} = 3.3V or 2.5V
		–	1	1.7	ps	f = 156.25 MHz, V _{dd} = 3.3V or 2.5V
		–	1	1.7	ps	f = 212.5 MHz, V _{dd} = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	–	0.5	0.75	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}

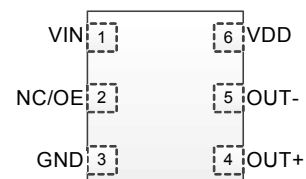
Electrical Characteristics

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVDS, DC, and AC Characteristics						
Supply Voltage	V _{dd}	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
Current Consumption	I _{dd}	–	47	55	mA	Excluding Load Termination Current, V _{dd} = 3.3V or 2.5V
OE Disable Current	I _{OE}	–	–	35	mA	OE = V _{dd}
Output Disable Leakage Current	I _{leak}	–	–	1	μA	OE = V _{dd}
Differential Output Voltage	V _{OD}	200	350	500	mV	See Figure 4
V _{OD} Magnitude Change	ΔV _{OD}	–	–	50	mV	See Figure 4
Offset Voltage	V _{OS}	1.125	1.2	1.375	V	See Figure 4
V _{OS} Magnitude Change	ΔV _{OS}	–	–	50	mV	See Figure 4
Rise/Fall Time	T _r , T _f	360	495	380	ps	20% to 80%
OE Enable/Disable Time	T _{oe}	–	–	105	ns	f = 220 MHz - For other frequencies, T _{oe} = 100ns + 3 period
RMS Period Jitter	T _{jitt}	–	1.2	1.7	ps	f = 100 MHz, V _{dd} = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, V _{dd} = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, V _{dd} = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	–	0.5	0.75	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}

Pin Description

Pin	Map	Functionality	
1	VIN	Input	Control Voltage
2	NC	Input	No Connect (only for 3225 package)
	OE	Input	H or Open: specified frequency output L: output is high impedance (only for 7050 and 5032 packages)
3	GND	Power	VDD Power Supply Ground
4	OUT+	Output	Oscillator Output
5	OUT-	Output	Complementary Oscillator Output
6	VDD	Power	Power Supply Voltage

Top View



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	–	2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C
Program Retention over -40 to 125°C, Process, VDD (0 to 3.65V)	1,000+	–	years

Thermal Consideration

Package	θJA, 4 Layer Board (°C/W)	θJC, Bottom (°C/W)
7050, 6-pin	142	27
5032, 6-pin	97	20
3225, 6-pin	109	20

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

Termination Diagrams

LVPECL:

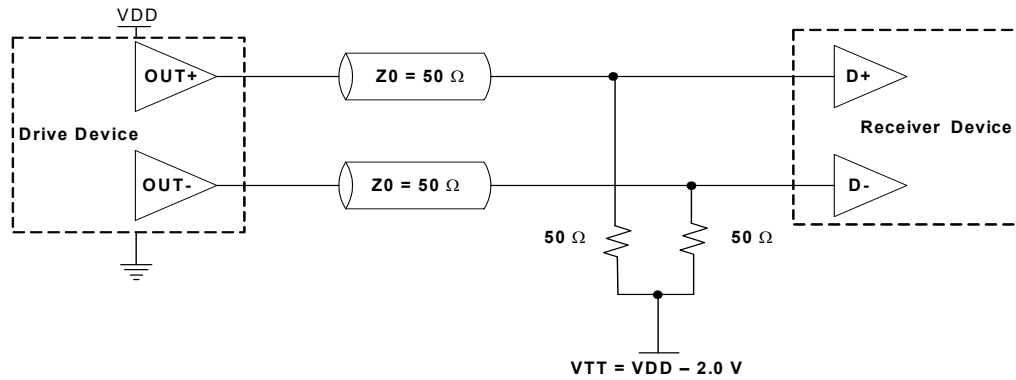


Figure 1. LVPECL Typical Termination

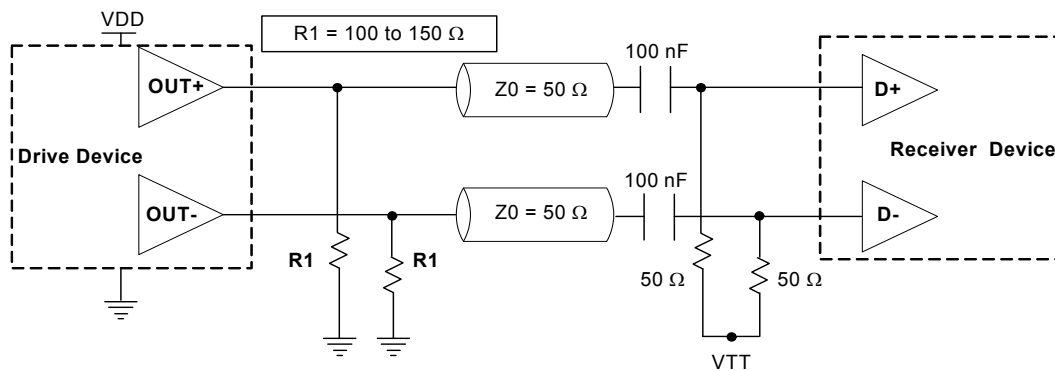


Figure 2. LVPECL AC Coupled Termination

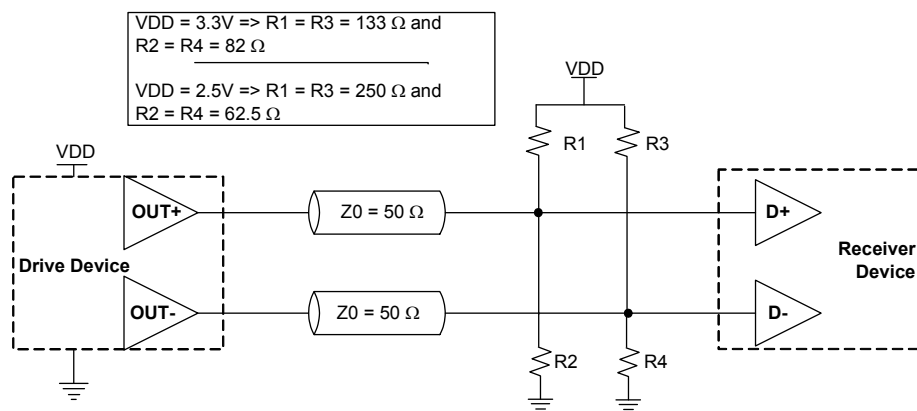


Figure 3. LVPECL with Thevenin Typical Termination

LVDS:

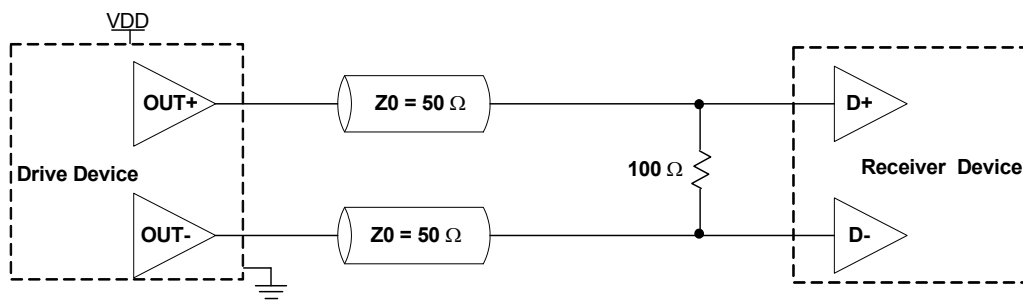
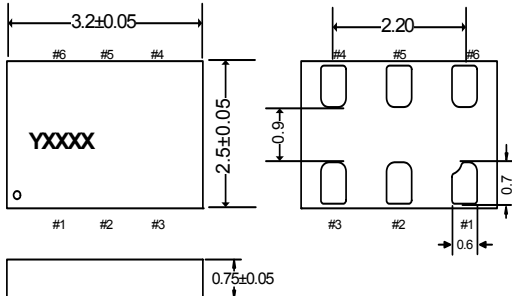
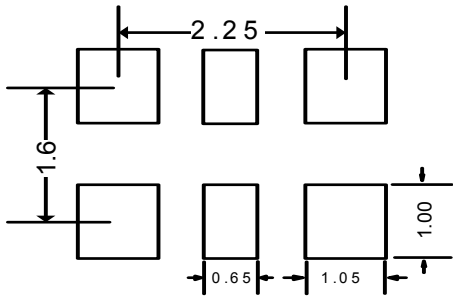
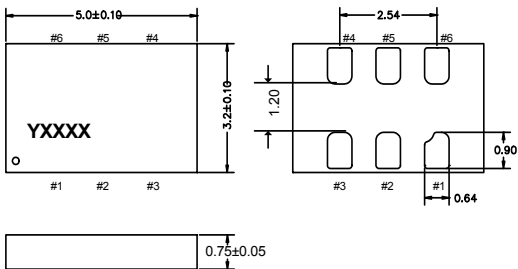
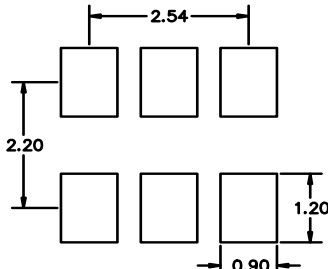
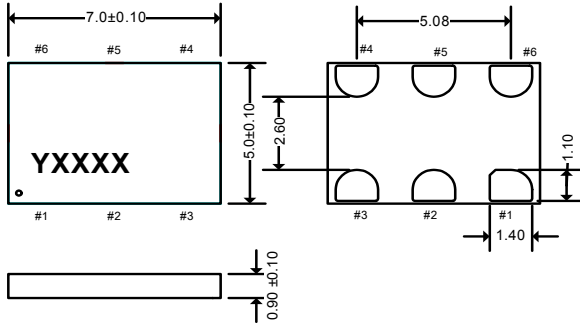
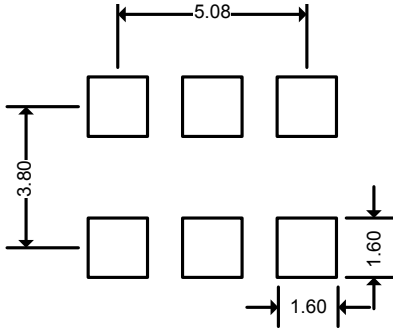


Figure 4. LVDS Single Termination (Load Terminated)

Dimensions and Patterns

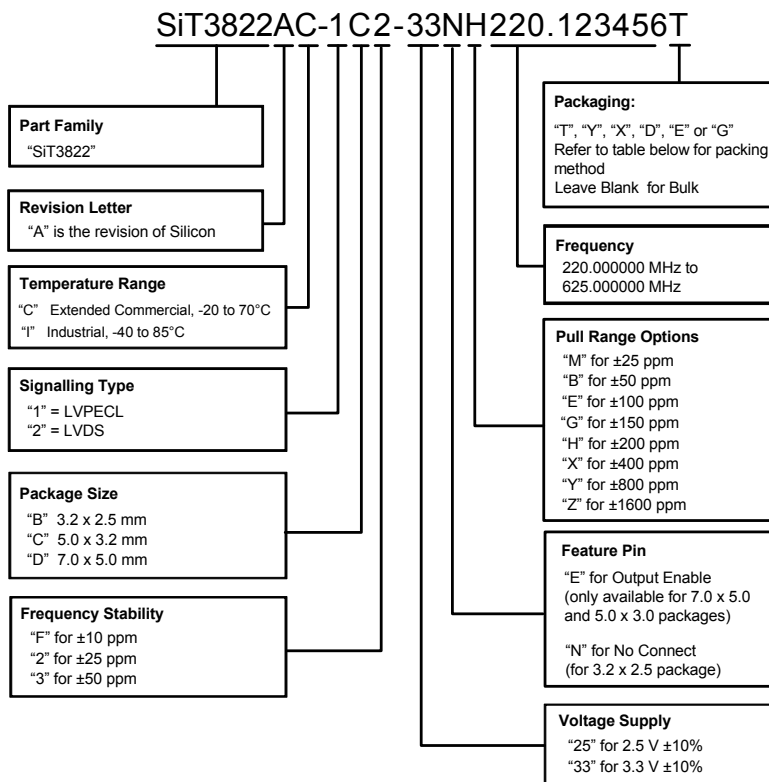
Package Size – Dimensions (Unit: mm) ^[1]	Recommended Land Pattern (Unit: mm) ^[2]
3.2 x 2.5 x 0.75 mm 	
5.0 x 3.2 x 0.75 mm 	
7.0 x 5.0 x 0.90 mm 	

1. 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.
2. A capacitor of value 0.1 μ F between Vdd and GND is recommended.

SiT3822

220-625 MHz High Performance Differential VCXO

Ordering Information



Frequencies Not Supported

Range 1: From 209.000001 MHz to 210.999999 MHz
Range 2: From 251.000001 MHz to 263.999999 MHz
Range 3: From 314.000001 MHz to 422.999999 MHz
Range 4: From 502.000001 MHz to 527.999999 MHz

APR Definition

Absolute pull range (APR) = Nominal pull range (PR) - frequency stability (F_{stab}) - Aging (F_{aging})

APR Table

Nominal Pull Range	Frequency Stability		
	± 10	± 25	±50
	APR (ppm)		
± 25	± 10	—	—
± 50	± 35	± 20	—
± 100	± 85	± 70	± 45
± 150	± 135	± 120	± 95
± 200	± 185	± 170	± 145
± 400	± 385	± 370	± 345
± 800	± 785	± 770	± 745
± 1600	± 1585	± 1570	± 1545

Ordering Codes for Supported Tape & Reel Packing Method

Device Size	8 mm T&R (3ku)	8 mm T&R (1ku)	8 mm T&R (250u)	12 mm T&R (3ku)	12 mm T&R (1ku)	12 mm T&R (250u)	16 mm T&R (3ku)	16 mm T&R (1ku)	16 mm T&R (250u)
7.0 x 5.0 mm	—	—	—	—	—	—	T	Y	X
5.0 x 3.2 mm	—	—	—	T	Y	X	—	—	—
3.2 x 2.5 mm	D	E	G	T	Y	X	—	—	—

Revision History

Version	Release Date	Change Summary
1.0	6/12/12	Original
1.1	6/6/14	Included 3225 package
1.2	9/12/14	Corrected the "Frequencies Not Supported" section
1.3	10/6/14	Modified Thermal Consideration values

© SiTime Corporation 2014. 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.