SiT3821

1-220 MHz High Performance Differential VCXO

The Smart Timing Choice™

Features

- Any frequency between 1 MHz and 220 MHz accurate to 6 decimal places
- Widest pull range options: ±25, ±50, ±100, ±150, ±200, ±400, ±800, ±1600 ppm
- Superior pull range linearity of ≤ 1%, 10 times better than quartz
- 0.6ps 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 SiT3822 datasheet

Applications

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

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Electrical Characteristics

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVPECL and LVDS, Common AC Characteristics						
Output Frequency Range	f	1	–	220	MHz	
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	%	Contact SiTime for tighter duty cycle
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	3.2	–	–	V	Vdd = 3.3V, Voltage at which maximum deviation is guaranteed
		2.4	–	–	V	Vdd = 2.5V, Voltage at which maximum deviation is guaranteed
Lower Control Voltage	VC_L	–	–	0.1	V	Voltage at which maximum deviation is guaranteed
Linearity	Lin	–	–	1	%	
Frequency Change Polarity	–	Positive Slope			–	
Control Voltage Bandwidth (-3dB)	V_BW	–	8	–	kHz	Contact SiTime for 16 kHz or other high bandwidth options
Vin Pin Input Impedance	Z_vin	100	–	–	kΩ	Pin 1
First Year Aging		-2	–	+2	ppm	25°C
10-year Aging		-5	–	+5	ppm	25°C
LVPECL, DC and AC Characteristics						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
Current Consumption	Idd	–	61	69	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Supply Current	I_OE	–	–	35	mA	OE = Low
Output Disable Leakage Current	I_leak	–	–	1	µA	OE = Low
Maximum Output Current	I-driver	–	–	30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	Vdd-1.1	–	Vdd-0.7	V	See Figure 1
Output Low Voltage	VOL	Vdd-1.9	–	Vdd-1.5	V	See Figure 1
Output Differential Voltage Swing	V_Swing	1.2	1.6	2.0	V	See Figure 1
Rise/Fall Time	Tr, Tf	–	300	500	ps	20% to 80%
OE Enable/Disable Time	T_oe	–	–	115	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, Vdd = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, Vdd = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, Vdd = 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 Vdds

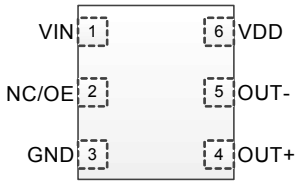
Electrical Characteristics

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVDS, DC, and AC Characteristics						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
Current Consumption	Idd	–	47	55	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Current	I_OE	–	–	35	mA	OE = Low
Output Disable Leakage Current	I_leak	–	–	1	µA	OE = Low
Differential Output Voltage	VOD	200	350	500	mV	See Figure 4
VOD Magnitude Change	ΔVOD	–	–	50	mV	See Figure 4
Offset Voltage	VOS	1.125	1.2	1.375	V	See Figure 4
VOS Magnitude Change	ΔVOS	–	–	50	mV	See Figure 4
Rise/Fall Time	Tr, Tf	–	495	600	ps	20% to 80%
OE Enable/Disable Time	T_oe	–	–	115	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, Vdd = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, Vdd = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, Vdd = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj	–	0.6	0.85	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all Vdds

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

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:

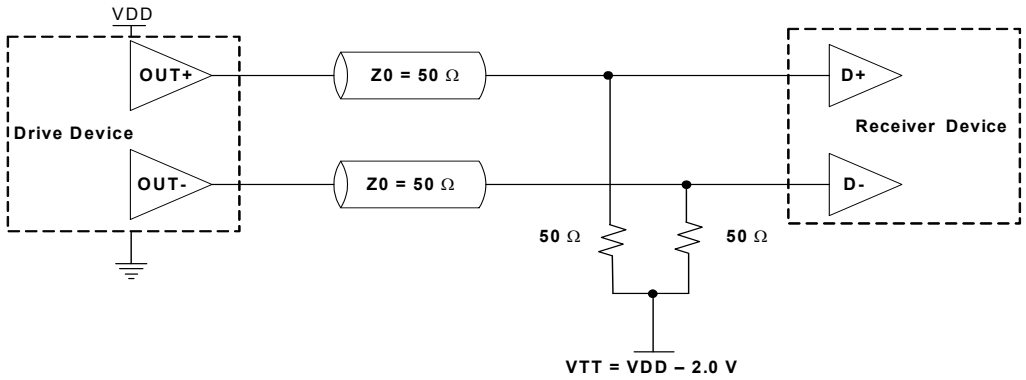


Figure 1. LVPECL Typical Termination

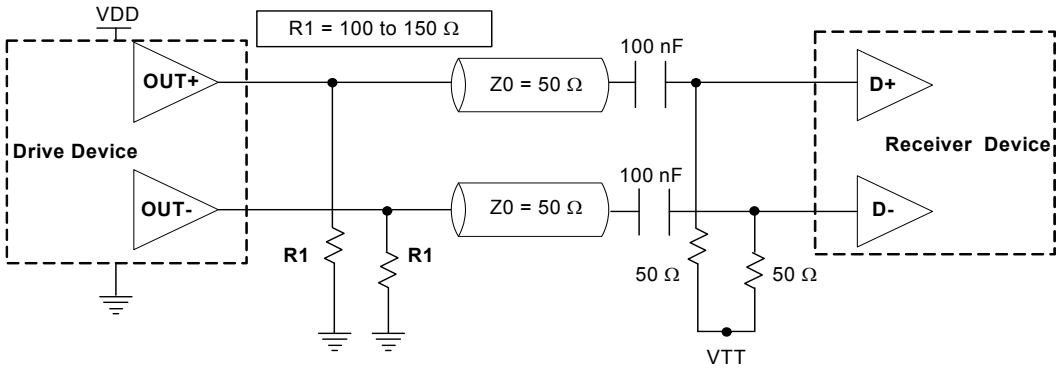


Figure 2. LVPECL AC Coupled Termination

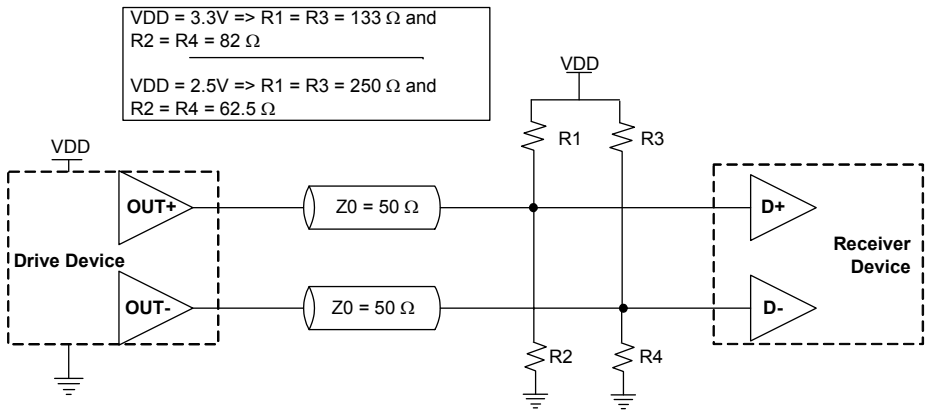


Figure 3. LVPECL with Thevenin Typical Termination

LVDS:

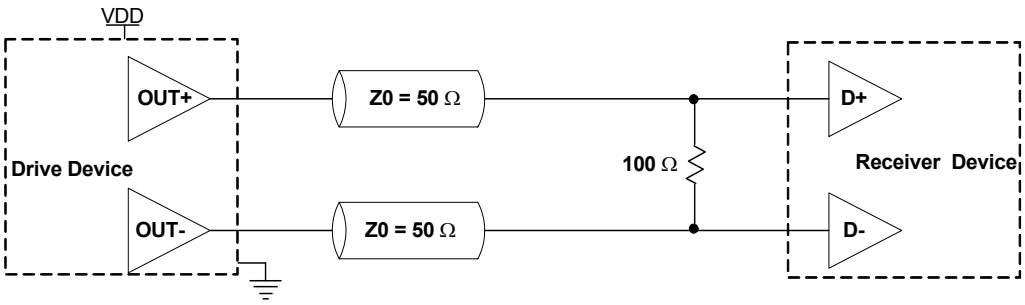
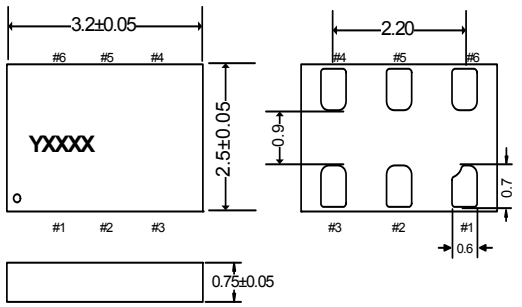
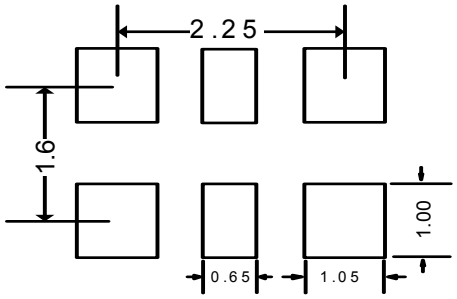
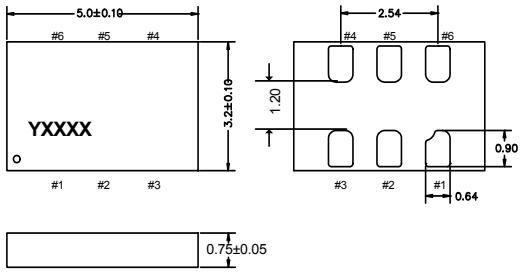
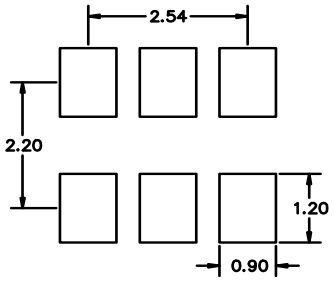
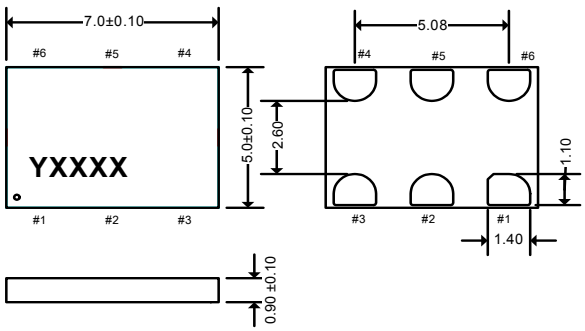
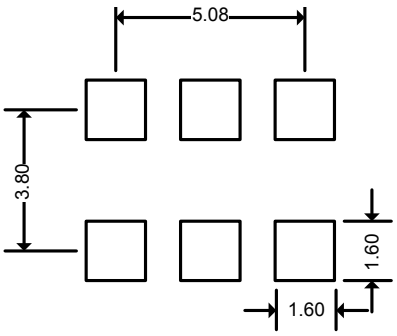


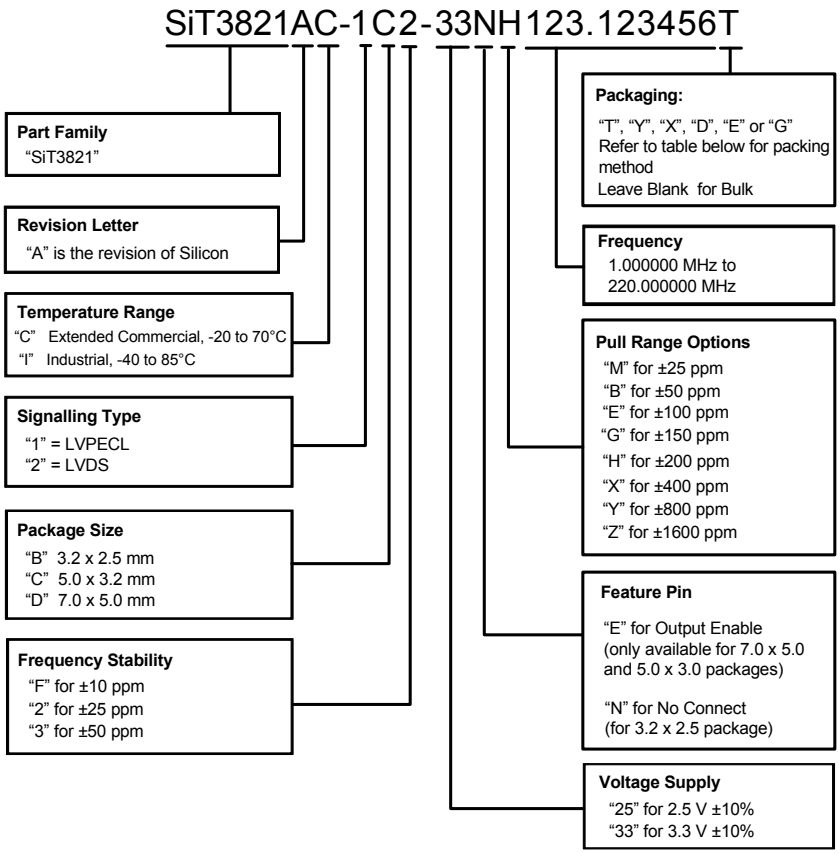
Figure 4. LVDS Single Termination (Load Terminated)

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 µF between Vdd and GND is recommended.

Ordering Information



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	10/6/14	Modified Thermal Consideration values