

Low Phase Noise XO with multipliers (for 120-200MHz Fund Xtal)

Universal Low Phase Noise IC's

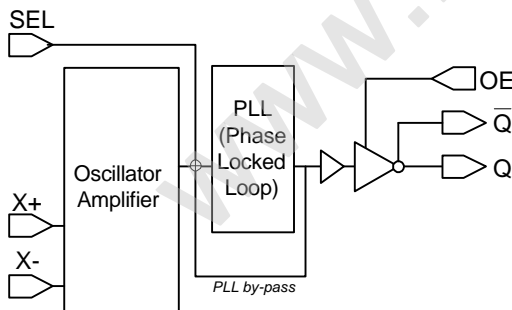
FEATURES

- 120MHz to 200MHz Fundamental Mode Crystal.
- Output range: 120 – 200MHz (no multiplication), 240 – 400MHz (2x multiplier) or 480 – 700MHz (4x multiplier).
- High yield design support up to 2pF string capacitance at 200MHz.
- CMOS (Standard drive PLL620-07 or Selectable Drive PLL620-06), PECL (Enable low PLL620-08 or Enable high PLL620-05) or LVDS output (PLL620-09).
- Supports 3.3V-Power Supply.
- Available in 16-Pin (TSSOP or 3x3mm QFN)
Note: PLL620-06 only available in 3x3mm.
Note: PLL620-07 only available in TSSOP.

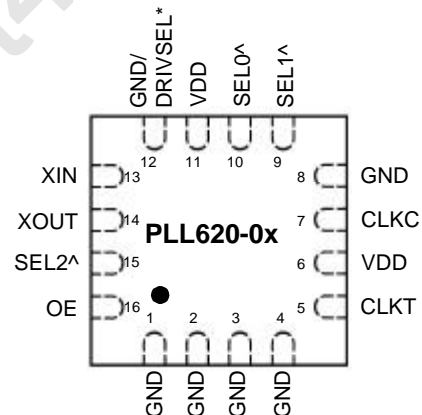
DESCRIPTIONS

PLL620-05/-06/-07/-08/-09 are XO IC specifically designed to pull high frequency fundamental crystals. Their design was optimized to tolerate higher limits of interelectrodes capacitance and bonding capacitance to improve yield. It achieves very low current into the crystal resulting in better overall stability.

BLOCK DIAGRAM



PIN CONFIGURATION (Top View)



- ^: Internal pull-up
- *: PLL620-06 pin 12 is output drive select (DRIVSEL) (0 for High Drive CMOS, 1 for Standard Drive CMOS)

OUTPUT ENABLE LOGICAL LEVELS

Part #	OE	State
PLL620-08	0 (Default)	Output enabled
	1	Tri-state
PLL620-05	0	Tri-state
PLL620-06	1 (Default)	Output enabled
PLL620-07		
PLL620-09		

OE input: Logical states defined by PECL levels for PLL620-08
Logical states defined by CMOS levels for PLL620-05/-06/-07/-09

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PIN DESCRIPTIONS

Name	TSSOP* Pin number	3x3mm QFN* Pin number	Type	Description
XIN	2	13	I	Crystal in connector.
XOUT	3	14	I	Crystal out connector.
OE	6	16	I	Output enable pin.
GND	7,8,9, 10, 14	1,2,3,4,8,12	P	GND (except pin 12 on PLL620-06: DRIVSEL see below).
DRIVSEL**	-	12	I	PLL620-06 only: Drive Select Input. This pin has an internal pull-up that will default DRIVSEL to '1' when not connect to GND. CMOS output of PLL620-06 will be high drive CMOS when DRIVSEL is set to '0', and will be standard CMOS otherwise.
CLKT	11	5	O	True output PECL (PLL620-08) or LVDS (PLL620-09) (N/C for PLL620-07)
CLKC	13	7	O	Complementary output PECL (PLL620-08) or LVDS (PLL620-09) (CMOS out for PLL620-07).
SEL0	16	10	I	Multiplier selector pins. These pins have an internal pull-up that will default SEL to '1' when not connected to GND.
SEL1	15	9	I	
SEL2	5	15	I	
SEL3	4	Not available	I	
VDD	1, 12	6,11	P	+3.3V VDD.

* Note: PLL620-06 only available in 3x3mm QFN, PLL620-07 only available in TSSOP.

** Note: DRIVSEL on pin 12 on PLL620-06 only.

FREQUENCY SELECTION TABLE

SEL3	SEL2	SEL1	SEL0	Selected Multiplier
1	0	1	1	Fin x 4
1	1	1	0	Fin x 2
1	1	1	1	No multiplication

Note: SEL3 is not available (always "1") in 3x3mm package

All pins have internal pull-ups (default value is 1). Connect to GND to set to 0.

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ELECTRICAL SPECIFICATIONS

1. Absolute Maximum Ratings

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	V _{DD}		7	V
Input Voltage, dc	V _I	V _{SS} -0.5	V _{DD} +0.5	V
Output Voltage, dc	V _O	V _{SS} -0.5	V _{DD} +0.5	V
Storage Temperature	T _S	-65	150	°C
Ambient Operating Temperature*	T _A	-40	85	°C
Junction Temperature	T _J		125	°C
Lead Temperature (soldering, 10s)			260	°C
Input Static Discharge Voltage Protection			2	kV

Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

* **Note:** Operating Temperature is guaranteed by design for all parts (COMMERCIAL and INDUSTRIAL), but tested for INDUSTRIAL grade only.

2. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	MAX.	UNITS
Built-in Capacitance	CX+	120MHz to 200MHz (VDD=3.3V)		2	pF
	CX-			2	
Inter-electrode capacitance	C ₀			2	
Oscillation Frequency	OF	Fund.	120	200	MHz

3. General Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current (Loaded Outputs)	I _{DD}	PECL/LVDS/CMOS			100/80/40	mA
Operating Voltage	V _{DD}		3.13		3.47	V
Output Clock Duty Cycle		@ 1.4V (CMOS)	45	50	55	%
		@ 1.25V (LVDS)	45	50	55	
		@ V _{DD} - 1.3V (PECL)	45	50	55	
Short Circuit Current				±50		mA

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4. Jitter specifications

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Period jitter RMS	At 155.52MHz, with capacitive decoupling between VDD and GND.		4		ps
Period jitter peak-to-peak			25		
Accumulated jitter RMS	At 155.52MHz, with capacitive decoupling between VDD and GND. Over 10,000 cycles.		7*		ps
Accumulated jitter peak-to-peak			45*		
Integrated jitter RMS at 155MHz	Integrated 12 kHz to 20 MHz		0.3		ps

*: To be measured

5. Phase noise specifications

PARAMETERS	FREQUENCY	@10Hz	@100Hz	@1kHz	@10kHz	@100kHz	UNITS
Phase Noise relative to carrier	155.52MHz	-75	-95	-125	-140	-145	dBc/Hz
	622.08MHz	-75	-95	-110	-125	-120	

6. CMOS Output Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output High Voltage	V _{OH}	I _{OH} = -12mA (Standard drive)	2.4			V
Output Low Voltage	V _{OL}	I _{LO} = 12mA (Standard drive)			0.4	V
Output High Voltage at CMOS level	V _{OHc}	I _{OH} = -4mA (Standard drive)	V _{DD} - 0.4			V
Output drive current		At TTL level (High drive*)	36	51		mA
		At TTL level (Standard drive)	12	17		mA

* Note: High Drive CMOS is available on PLL620-06 through DRIVSEL selector input on pin 12.

7. CMOS Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Clock Rise/Fall Time (Standard Drive)		0.8V ~ 2.0V with 10 pF load		1.15		ns
		0.3V ~ 3.0V with 15 pF load		3.7		
Output Clock Rise/Fall Time (High Drive*)		0.8V ~ 2.0V with 10 pF load		0.5		
		0.3V ~ 3.0V with 15 pF load		1.5		

* Note: High Drive CMOS is available on PLL620-06 through DRIVSEL selector input on pin 12.

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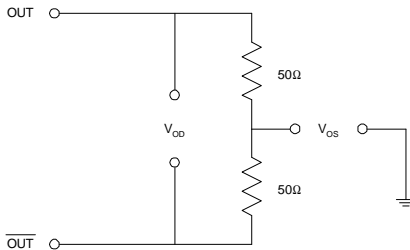
8. LVDS Electrical Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Differential Voltage	V_{OD}	$R_L = 100 \Omega$ (see figure)	247	355	454	mV
V_{DD} Magnitude Change	ΔV_{OD}		-50		50	mV
Output High Voltage	V_{OH}			1.4	1.6	V
Output Low Voltage	V_{OL}		0.9	1.1		V
Offset Voltage	V_{OS}		1.125	1.2	1.375	V
Offset Magnitude Change	ΔV_{OS}		0	3	25	mV
Power-off Leakage	I_{OXD}	$V_{out} = V_{DD}$ or GND $V_{DD} = 0V$		± 1	± 10	μA
Output Short Circuit Current	I_{OSD}			-5.7	-8	mA

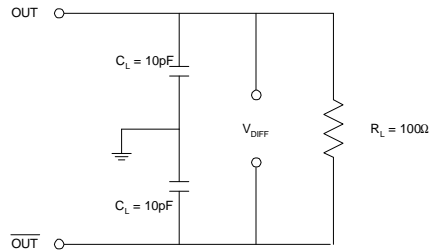
9. LVDS Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Differential Clock Rise Time	t_r	$R_L = 100 \Omega$ $C_L = 10 \text{ pF}$ (see figure)	0.2	0.7	1.0	ns
Differential Clock Fall Time	t_f		0.2	0.7	1.0	ns

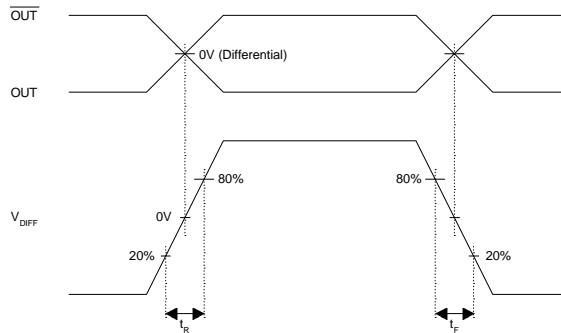
LVDS Levels Test Circuit



LVDS Switching Test Circuit



LVDS Transition Time Waveform



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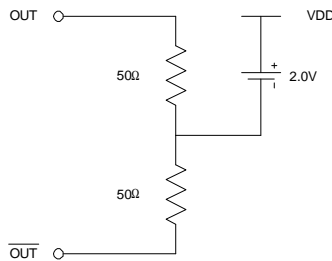
10. PECL Electrical Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	MAX.	UNITS
Output High Voltage	V_{OH}	$R_L = 50 \Omega$ to $(V_{DD} - 2V)$ (see figure)	$V_{DD} - 1.025$		V
Output Low Voltage	V_{OL}			$V_{DD} - 1.620$	V

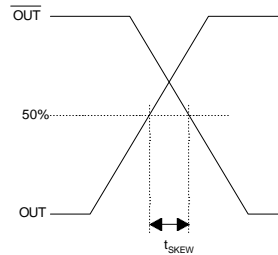
11. PECL Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Clock Rise Time	t_r	@20/80% - PECL		0.6	1.5	ns
Clock Fall Time	t_f	@80/20% - PECL		0.5	1.5	ns

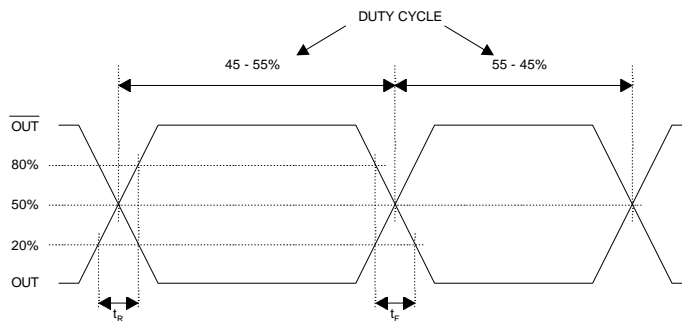
PECL Levels Test Circuit



PECL Output Skew



PECL Transition Time Waveform

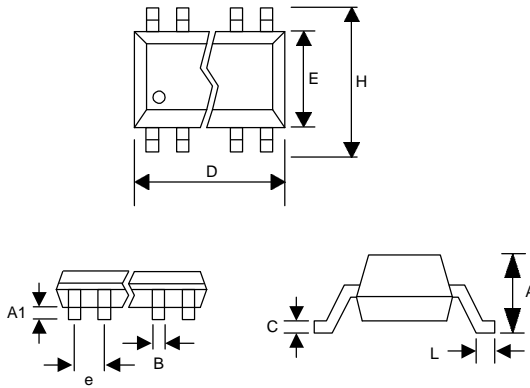


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PACKAGE INFORMATION

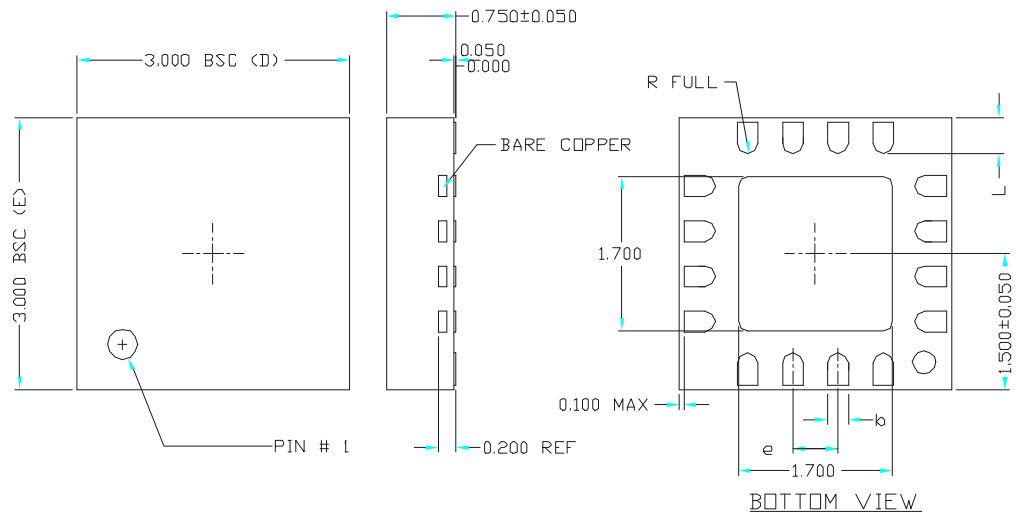
16 PIN Narrow SOIC, TSSOP (mm)

Symbol	SOIC		TSSOP	
	Min.	Max.	Min.	Max.
A	1.35	1.75	-	1.20
A1	0.10	0.25	0.05	0.15
B	0.33	0.51	0.19	0.30
C	0.19	0.25	0.09	0.20
D	9.80	10.00	4.90	5.10
E	3.80	4.00	4.30	4.50
H	5.80	6.20	6.40 BSC	
L	0.40	1.27	0.45	0.75
e	1.27 BSC		0.65 BSC	



VARIATIONS:

SYMBOL	16 LD		
	MIN	NOM	MAX
e	0.50 BSC		
b	0.18	0.23	0.30
L	0.30	0.40	0.50
ND	4		
NE	4		



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ORDERING INFORMATION

For part ordering, please contact our Sales Department:

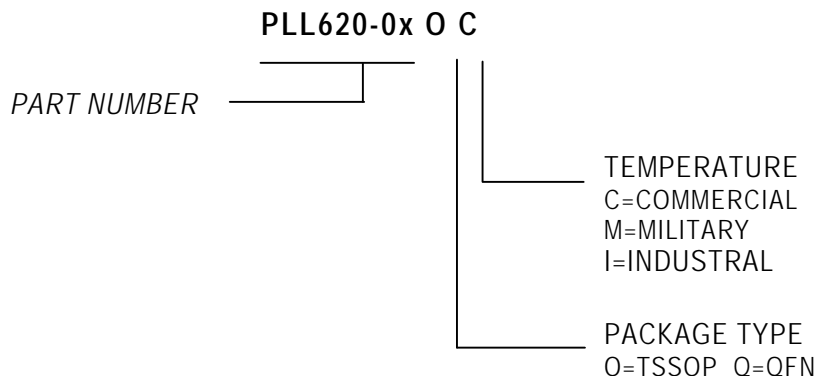
47745 Fremont Blvd., Fremont, CA 94538, USA

Tel: (510) 492-0990 Fax: (510) 492-0991

PART NUMBER

The order number for this device is a combination of the following:

Device number, Package type and Operating temperature range



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