Low Phase Noise XO (for HF Fund. and 3rd O.T.)

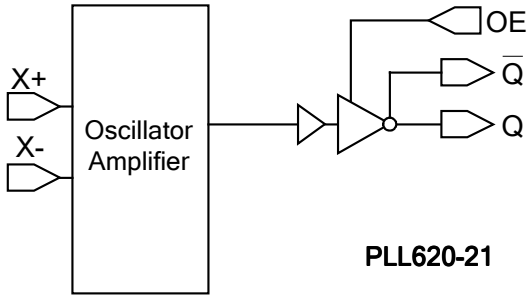
FEATURES

- 100MHz to 200MHz Fundamental Mode Crystal.
- Output range: 100 – 200MHz (no multiplication).
- Selectable OE logic.
- Minimum bondwires required for VDD and GND.
- Available outputs: PECL or LVDS.
- Supports 3.3V-Power Supply.
- Available in die form.
- Thickness 10 mil.

DESCRIPTIONS

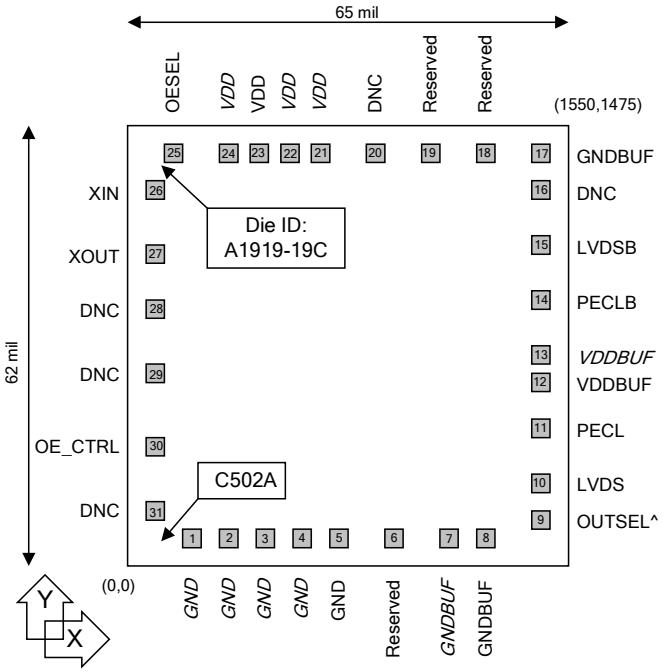
PLL620-21 is an XO IC specifically designed to work with high frequency fundamental and third overtone crystals. Its design was optimized to tolerate higher limits of interelectrodes capacitance and bonding capacitance to improve yield. It achieves very low current into the crystal resulting in better overall stability. It offers a selectable OE logic and is ideal for XO applications requiring LVDS or PECL output levels at high frequencies.

BLOCK DIAGRAM



PLL620-21

DIE CONFIGURATION



DIE SPECIFICATIONS

Name	Value
Size	62 x 65 mil
Reverse side	GND
Pad dimensions	80 micron x 80 micron
Thickness	10 mil

OUTPUT SELECTION AND ENABLE

Pad #9 OUTSEL	Selected Output
0	LVDS
1	PECL (default)

Pad #25 OESEL	Pad #30 OE_CTRL	State
0	0	Tri-state
	1	Output enabled (default)
1 (default)	0	Output enabled (default)
	1	Tri-state

Pad #9: Bond to GND to set to "0", bond to VDD to set to "1"
Pad #30: Logical states defined by PECL levels if OUTSEL (pad #9) is "1"
Logical states defined by CMOS levels if OUTSEL is "0"

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.	TYP.	MAX.	UNITS
Built-in Load Capacitance	C_L	IC only		4		pF
Shunt Capacitance	C_0				2	pF
Oscillation Frequency	OF	Fund. Or 3rd Overtone	120		200	MHz
Recommended ESR	R_E				30	Ω

3. General Electrical Specifications

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

4. Jitter specifications

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Period jitter RMS at 155MHz	With capacitive decoupling between VDD and GND.		2.5		ps
Period jitter peak-to-peak at 155MHz			20		
Accumulated jitter RMS at 155MHz	With capacitive decoupling between VDD and GND. Over 1,000,000 cycles.		3		ps
Accumulated jitter peak-to-peak at 155MHz			25		
Integrated jitter RMS at 155MHz	Integrated 12 kHz to 20 MHz		0.3		ps

Note: Higher Q factor of 3rd overtone crystals will result in even better jitter performance.

5. Phase noise specifications

PARAMETERS	FREQUENCY	@10Hz	@100Hz	@1kHz	@10kHz	@100kHz	UNITS
Phase Noise vs. carrier with fund. crystal.	155.52MHz	-80	-110	-125	-143	-145	dBc/Hz

Note: Higher Q factor of 3rd overtone crystals will result in even better phase noise performance.

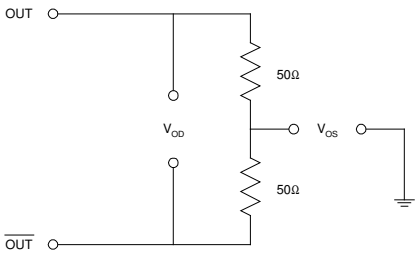
6. LVDS Electrical Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Differential Voltage	V_{OD}	R_L = 100 Ω (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	uA
Output Short Circuit Current	I_{OSD}			-5.7	-8	mA

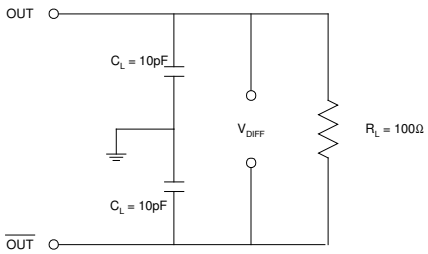
7. LVDS Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Differential Clock Rise Time	t_r	R_L = 100 Ω, C_L = 10 pF (see figure)	0.2	0.7	1.0	ns
Differential Clock Fall Time	t_f		0.2	0.7	1.0	ns

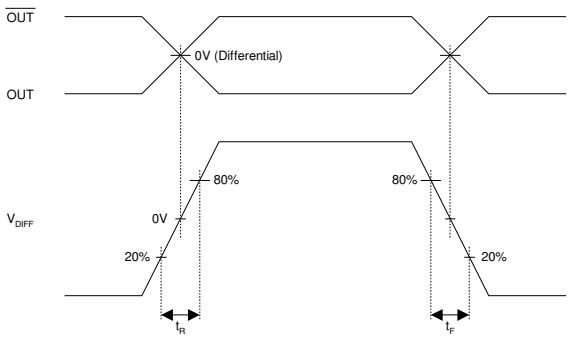
LVDS Levels Test Circuit



LVDS Switching Test Circuit



LVDS Transistion Time Waveform



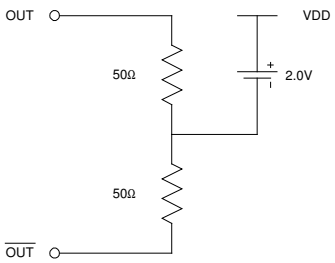
8. PECL Electrical Characteristics

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

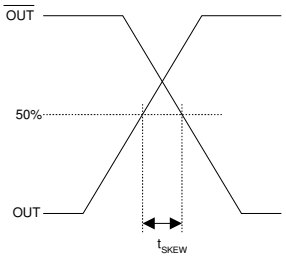
9. PECL Switching Characteristics

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

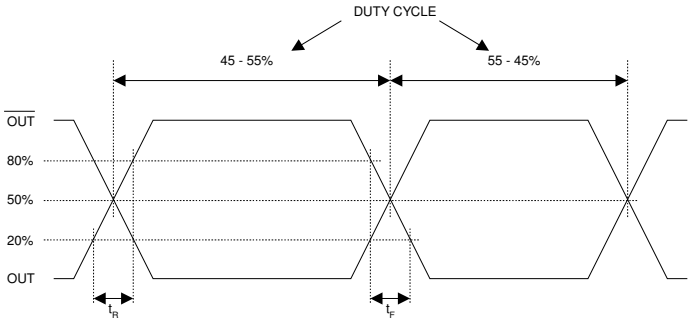
PECL Levels Test Circuit



PECL Output Skew



PECL Transistion Time Waveform



PAD ASSIGNMENT

Pad #	Name	X (µm)	Y (µm)
1	*Optional GND*	248	109
2	*Optional GND*	361	109
3	*Optional GND*	473	109
4	*Optional GND*	587	109
5	GND	702	109
6	*Reserved*	874	109
7	*Optional GNDBUF*	1042	109
8	GNDBUF	1171	109
9	OUTSEL	1400	125
10	LVDS	1400	259
11	PECL	1400	476
12	VDDBUF	1400	616
13	*Optional VDDBUF*	1400	716
14	PECLB	1400	871
15	LVDSB	1400	1089
16	*Do Not Connect*	1400	1227
17	GNDBUF	1389	1365
18	*Reserved*	1232	1365
19	*Do Not Connect*	1042	1365
20	*Do Not Connect*	854	1365
21	*Optional VDD*	659	1365
22	*Optional VDD*	559	1365
23	VDD	459	1365
24	*Optional VDD*	358	1365
25	OESEL	194	1365
26	XIN	109	1223
27	XOUT	109	1017
28	*Do Not Connect*	109	858
29	*Do Not Connect*	109	646
30	OE_CTRL	109	397
31	*Do Not Connect*	109	181

Note: for optimal Phase Noise performance, it is recommended to bond all optional VDD and GND pads.

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

PLL620-21 D C

PART NUMBER

TEMPERATURATRE
C=COMMERCIAL
M=MILITARY
I=INDUSTRAL

PACKAGE TYPE
D=DIE

Order Number	Marking	Package Option
PLL620-21DC	P620-21DC	Die – Waffle Pack