

PECL and LVDS Low Phase Noise VCXO (for 65-130MHz Fund Xtal)

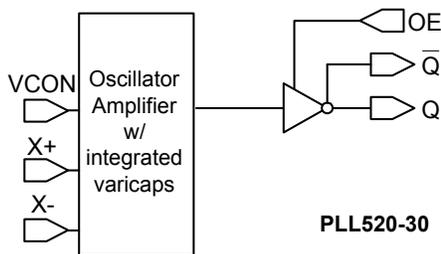
FEATURES

- 65MHz to 130MHz Fundamental Mode Crystal.
- Output range: 65MHz – 130MHz (no PLL).
- Low Injection Power for crystal 50uW.
- Complementary outputs: PECL or LVDS.
- Selectable OE Logic
- Integrated variable capacitors.
- Supports 2.5V or 3.3V-Power Supply.
- Available in die form.
- Thickness 10 mil.

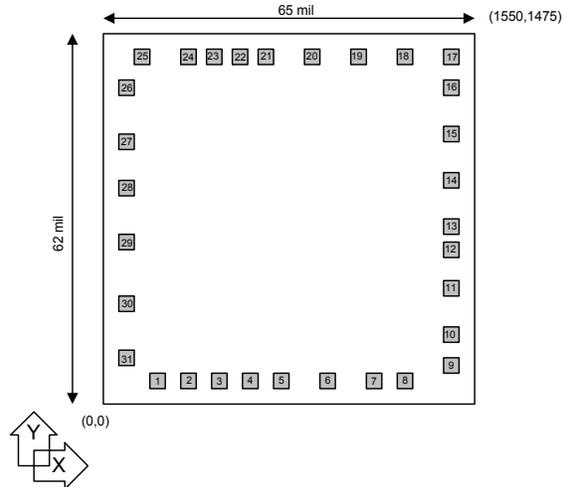
DESCRIPTIONS

PLL520-30 is a VCXO IC specifically designed to pull frequency fundamental crystals from 65MHz to 130MHz, with selectable PECL or LVDS outputs and OE logic (enable high or enable low). 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. Its internal varicaps allow an on chip frequency pulling, controlled by the VCON input.

BLOCK DIAGRAM



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, #25 and #30: Bond to GND to set to "0", bond to VDD to set to "1"
Pad #30: Logical states defined by PECL levels if OESEL is "1"
Logical states defined by CMOS levels if OESEL is "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	0	70	°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.

2. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Built-in Capacitance	CX+	65MHz to 130MHz (VDD=3.3V)			2	pF
	CX-				2	
Inter-electrode capacitance	C ₀			2.6		
C0/C1 ratio (gamma)	γ				300	-
Oscillation Frequency	OF	Fund.	65		130	MHz

3. Voltage Control Crystal Oscillator

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
VCXO Stabilization Time *	T _{VCXOSTB}	From power valid		10		ms
VCXO Tuning Range		XTAL C ₀ /C ₁ < 300	200*			ppm
CLK output pullability		0V ≤ VCON ≤ 3.3V at room temperature		±100*		ppm
On-chip Varicaps control range		VCON = 0 to 3.3V		4 – 18*		pF
Linearity				5*	10*	%
VCXO Tuning Characteristic				65		ppm/V
VCON input impedance				60		kΩ
VCON modulation BW		0V ≤ VCON ≤ 3.3V, -3dB	25			kHz

Note: Parameters denoted with an asterisk (*) represent nominal characterization data and are not production tested to any specific limits.

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4. 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) @ V _{dd} - 1.3V (PECL)	45 45	50 50	55 55	%
Short Circuit Current				±50		mA

5. Jitter specifications

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Period jitter RMS	77.76MHz		3.5*		ps
Period jitter peak-to-peak	77.76MHz		24*		ps
Integrated jitter RMS	Integrated 12 kHz to 20 MHz at 77.76MHz		0.5*		ps

*: To be measured

6. Phase noise specifications

PARAMETERS	FREQUENCY	@10Hz	@100Hz	@1kHz	@10kHz	@100kHz	UNITS
Phase Noise relative to carrier	77.76MHz	-75	-95	-125	-145	-155	dBc/Hz

Note: Phase Noise at VCON = 0V – to be measured

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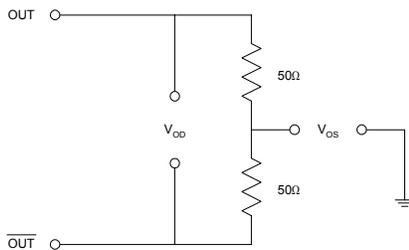
7. LVDS Electrical Characteristics

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

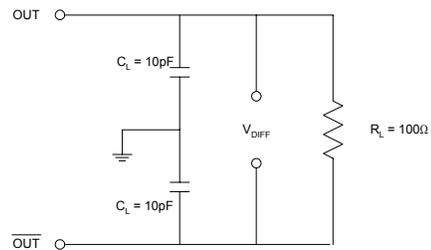
8. LVDS Switching Characteristics

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

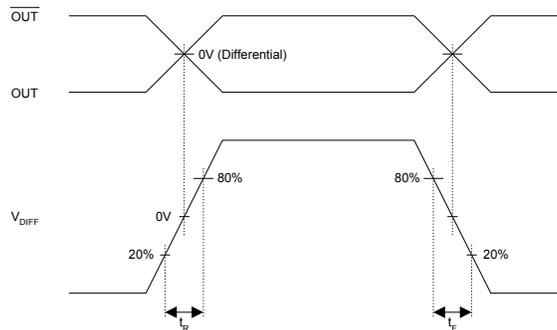
LVDS Levels Test Circuit



LVDS Switching Test Circuit



LVDS Transition Time Waveform



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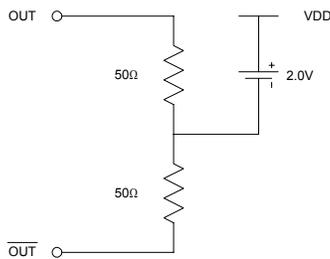
9. PECL Electrical Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	MAX.	UNITS
Output High Voltage	V_{OH}	$R_L = 50 \Omega$ to $(V_{DD} - 2V)$ (see figure)	$V_{DD} - 1.025$	$V_{DD} - 0.750$	V
Output Low Voltage	V_{OL}		$V_{DD} - 1.900$	$V_{DD} - 1.620$	V

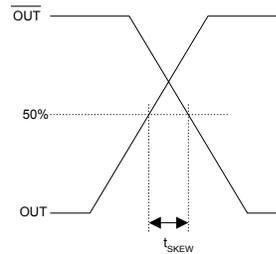
10. PECL Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Clock Rise Time	t_r	@20/80% - PECL	0.3	0.6	1.5	ns
Clock Fall Time	t_f	@80/20% - PECL	0.3	0.5	1.5	ns

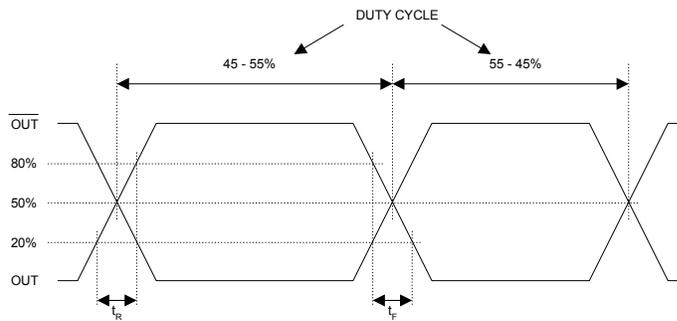
PECL Levels Test Circuit



PECL Output Skew



PECL Transition Time Waveform



PECL and LVDS Low Phase Noise VCXO (for 65-130MHz Fund Xtal)
PAD ASSIGNMENT

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

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

