

192MHz – 400MHz Low Phase Noise PECL VCXO (12 – 25MHz Crystal)

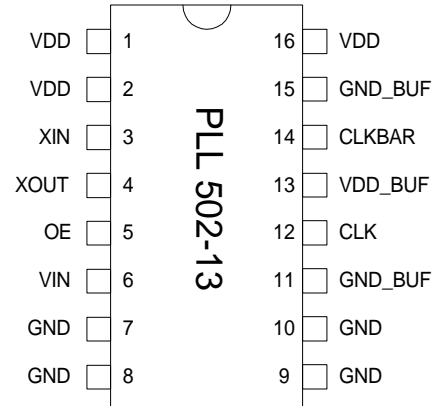
FEATURES

- Low phase noise output for the 192MHz to 400MHz range (-115 dBc at 10kHz offset).
- PECL output.
- 12 to 25MHz crystal input.
- Integrated crystal load capacitor: no external load capacitor required.
- Output Enable selector.
- Wide pull range (min. +/-190 ppm)
- 3.3V operation.
- Available in 16 Pin TSSOP or SOIC.

DESCRIPTION

The PLL502-13 is a monolithic low jitter and low phase noise (-115dBc/Hz @ 10kHz offset) VCXO IC with PECL output, for 192MHz to 400MHz output range. It allows the control of the output frequency with an input voltage (VIN), using a low cost crystal. The chip provides a pullable output at a frequency of $F_{XIN} \times 16$. This makes the PLL502-13 ideal for a wide range of applications.

PIN CONFIGURATION

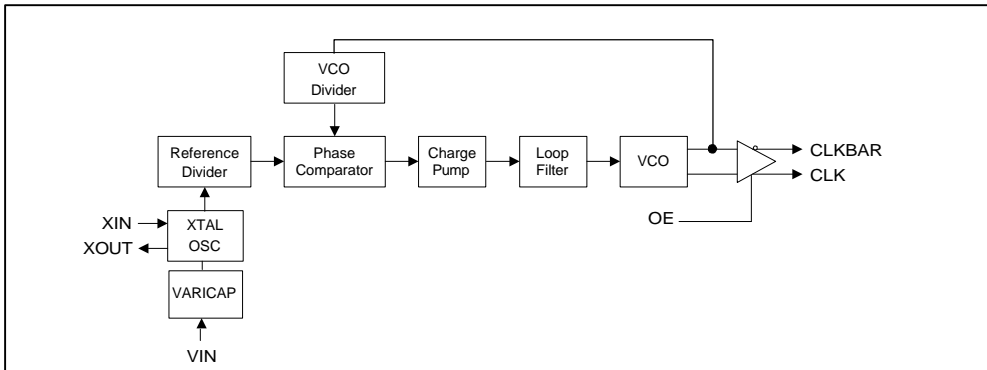


$$F_{OUT} = F_{XIN} \times 16$$

OE (Pin 5)	Output State
0 (Default)	Output enabled
1	Tri-state

Pin 5: Logical states are defined at PECL levels.

BLOCK DIAGRAM



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PIN DESCRIPTIONS

Name	Number	Type	Description
VDD	1,2,16	P	+3.3V Power supply connectors.
XIN	3	I	Crystal input pin.
XOUT	4	I	Crystal output pin.
OE	5	I	Output enable input pin. Disables (tri-state) output when low. Internal pull-up enables output by default if pin is not connected to low.
VIN	6	I	Frequency control voltage input pin.
GND	7,8,9,10	P	GND Power connectors.
GND_BUF	11,15	P	GND connector for output buffers.
CLK	12	O	True clock output pin.
VDD_BUF	13	P	+3.3V Power supply connector for output buffers.
CLKB	14	O	Complementary clock output pin.

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.

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2. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F_{XIN}	Parallel Fundamental Mode	12		25	MHz
Crystal Loading Rating	$C_L (xtal)$	At $V_{IN} = 1.65V$		9.5		pF
Crystal Pullability	$C_0/C_1 (xtal)$	AT cut			250	-
Recommended ESR	R_E	AT cut			30	Ω

Note: Crystal Loading rating: 9.5pF is the loading the crystal sees from the VCXO chip at $V_{IN} = 1.65V$. It is assumed that the crystal will be at nominal frequency at this load. If the crystal requires more load to be at nominal frequency, the additional load must be added externally. This however may reduce the pull range.

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		$F_{XIN} = 12 - 25MHz$; $XTAL C_0/C_1 < 250$	380			ppm
CLK output pullability		$0V \leq V_{CON} \leq 3.3V$	± 190			ppm
Linearity				5	10	%
VCXO Tuning Characteristic				115		ppm/V
VCON pin input impedance			2000			$k\Omega$
VCON modulation BW		$0V \leq V_{CON} \leq 3.3V, -3dB$	25			kHz

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

4. General Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic (with Loaded Outputs)	I_{DD}	PECL			80	mA
Operating Voltage	V_{DD}		3.13		3.47	V
Output Clock Duty Cycle		@ $V_{dd} - 1.3V$ (PECL)	45	50	55	%
Short Circuit Current				± 50		mA

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5. Jitter and Phase Noise specification

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Period jitter RMS at 311MHz	With capacitive decoupling between VDD and GND.		9		ps
Accumulated jitter RMS at 311MHz	With capacitive decoupling between VDD and GND. Over 10,000 cycles.		TBM		ps
Integrated jitter RMS at 311MHz	Integrated 12 kHz to 20 MHz		4		ps
Phase Noise relative to carrier	311MHz @10Hz offset		-60		dBc/Hz
Phase Noise relative to carrier	311MHz @100Hz offset		-90		dBc/Hz
Phase Noise relative to carrier	311MHz @1kHz offset		-111		dBc/Hz
Phase Noise relative to carrier	311MHz @10kHz offset		-115		dBc/Hz
Phase Noise relative to carrier	311MHz @100kHz offset		-110		dBc/Hz

Note: Phase Noise measured at VIN = 0V

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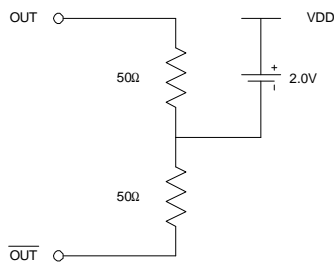
6. PECL Electrical Characteristics

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

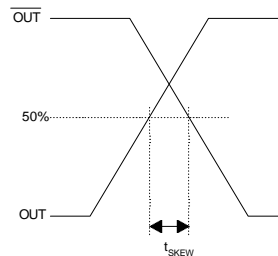
7. PECL Switching Characteristics

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

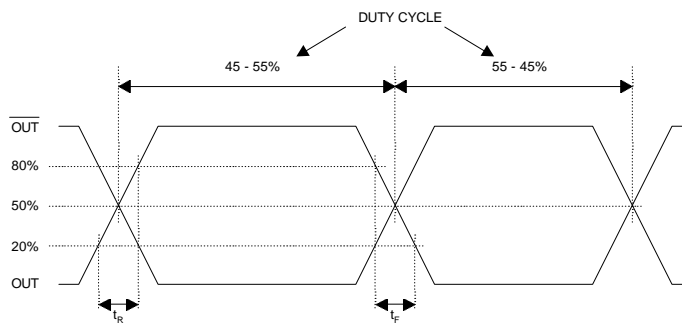
PECL Levels Test Circuit



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	

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

PLL502-13 S C XX

PART NUMBER _____

- _____ REVISION CODE (when applicable)
- _____ TEMPERATURE
 C=COMMERCIAL
 M=MILITARY
 I=INDUSTRIAL
- _____ PACKAGE TYPE
 S=SOIC. O=TSSOP

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