

**Low Phase Noise VCXO (24MHz to 50MHz)**

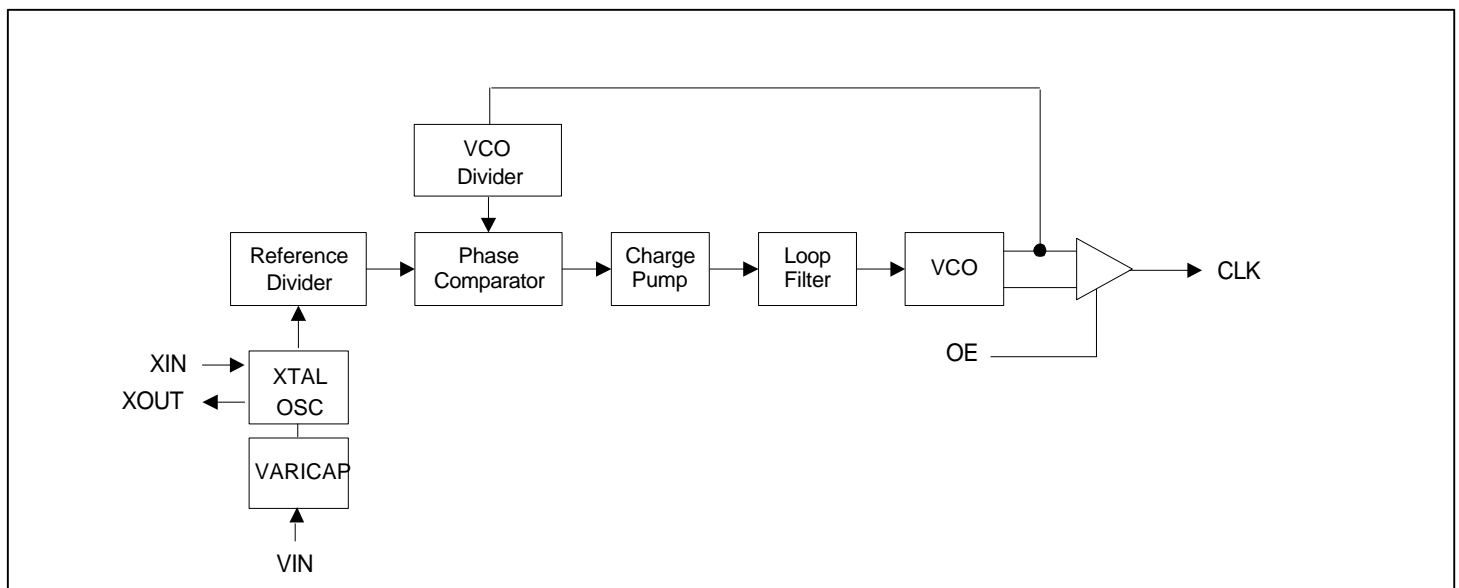
**FEATURES**

- Low phase noise VCXO output for the 24MHz to 50MHz range (-130 dBc at 10kHz offset).
- CMOS output.
- 12 to 25MHz crystal input.
- Integrated variable capacitors.
- Selectable High Drive (36mA drive capability at TTL level) or Standard Drive (12mA drive capability at TTL) output.
- Wide pull range (+/- 250 ppm).
- Low jitter (RMS): 10ps period (1 sigma).
- 3.3V operation.
- Available in 8-Pin TSSOP or SOIC.
- Pin-to-Pin compatible with Cypress CY24119

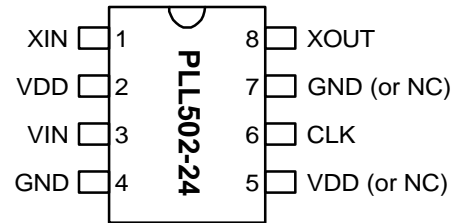
**DESCRIPTIONS**

The PLL502-24 is a low cost, high performance and low phase noise VCXO, providing less than -130dBc at 10kHz offset in the 24MHz to 50MHz operating range. The very low jitter (10 ps RMS period jitter) makes this chip ideal for applications requiring voltage controlled frequency sources. Input crystal can range from 12 to 25MHz (fundamental resonant mode).

**BLOCK DIAGRAM**



**PIN CONFIGURATION**



**OUTPUT RANGE**

MULTIPLIER	FREQUENCY RANGE	OUTPUT BUFFER
x2	24 - 50MHz	CMOS

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**PIN DESCRIPTIONS**

Name	Number	Type	Description
XIN	1	I	Crystal input pin.
VDD	2, 5	P	+3.3V VDD power supply pin (pin 5 is optional).
VIN	3	I	Frequency control voltage input pin.
GND	4, 7	P	Ground pin (pin 7 is optional).
CLK	6	O	Output clock pin.
XOUT	8	I	Crystal output pin.

**ELECTRICAL SPECIFICATIONS**
**1. Absolute Maximum Ratings**

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage Range	$V_{CC}$	-0.5	7	V
Input Voltage Range	$V_I$	-0.5	$V_{CC}+0.5$	V
Output Voltage Range	$V_O$	-0.5	$V_{CC}+0.5$	V
Soldering Temperature			260	°C
Storage Temperature	$T_S$	-65	150	°C
Ambient Operating Temperature*		-40	85	°C

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.

**Low Phase Noise VCXO (24MHz to 50MHz)**
**2. AC Electrical Specifications**

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency			12		25	MHz
Output Clock Rise/Fall Time (Low 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		
Output Clock Duty Cycle		Measured @ 1.4V	45	50	55	%
Short Circuit Current				±50		mA

**3. Voltage Control Crystal Oscillator**

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
VCXO Stabilization Time *	T <sub>VCXOSTB</sub>	From power valid		10		ms
VCXO Tuning Range		F <sub>XIN</sub> = 12 – 25MHz; XTAL C <sub>0</sub> /C <sub>1</sub> < 250	500			ppm
CLK output pullability		0V ≤ V <sub>IN</sub> ≤ 3.3V	±250			ppm
VCXO Tuning Characteristic				165		ppm/V
Pull range linearity					10	%
VCON pin input impedance			2000			kΩ
VCON modulation BW		0V ≤ V <sub>IN</sub> ≤ 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. Jitter and Phase Noise specification**

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
RMS Period Jitter (1 sigma – 1000 samples)	at 44MHz, with capacitive decoupling between VDD and GND.			10	ps
Phase Noise relative to carrier	44MHz @100Hz offset		-80		dBc/Hz
Phase Noise relative to carrier	44MHz @1kHz offset		-110		dBc/Hz
Phase Noise relative to carrier	44MHz @10kHz offset		-130		dBc/Hz
Phase Noise relative to carrier	44MHz @100kHz offset		-123		dBc/Hz
Phase Noise relative to carrier	44MHz @1MHz offset		-124		dBc/Hz

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**5. DC Specification**

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic, with Loaded Outputs	$I_{DD}$	$F_{XIN} = 12 - 25\text{MHz}$ Output load of 10pF		16	20	mA
Operating Voltage	$V_{DD}$		3.13		3.47	V
Output High Voltage	$V_{OH}$	$I_{OH} = -12\text{mA}$ (low drive)	2.4			V
Output Low Voltage	$V_{OL}$	$I_{LO} = 12\text{mA}$ (low drive)			0.4	V
Output High Voltage at CMOS level	$V_{OHC}$	$I_{OH} = -4\text{mA}$ (low drive)	$V_{DD} - 0.4$			V
Output drive current		At TTL level (High drive)	36	51		mA
		At TTL level (Low drive)	12	17		mA
Short Circuit Current				$\pm 50$		mA
VCXO Control Voltage	VCON		0		3.3	V
ESD Protection		Human Body Model	3000			

**6. Crystal Specifications**

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	$F_{XIN}$	12		25	MHz
Crystal Loading Capacitance Rating	$C_L$ (xtal)		9.5		pF
C0/C1				250	-
ESR	$R_s$			30	$\Omega$

**Note:** Crystal Loading rating: 9.5pF is the loading the crystal sees from the VCXO chip at VCON = 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.

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**PACKAGE INFORMATION**

8 PIN ( dimensions in mm )

Symbol	Narrow SOIC		TSSOP	
	Min.	Max.	Min.	Max.
A	1.47	1.73	-	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	4.80	4.95	2.90	3.10
E	3.80	4.00	4.30	4.50
H	5.80	6.20	6.20	6.60
L	0.38	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

**PLL502-24 X C**

PART NUMBER \_\_\_\_\_

TEMPERATURE  
 C=COMMERCIAL  
 M=MILITARY  
 I=INDUSTRIAL

PACKAGE TYPE  
 S=SOIC, O=TSSOP

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