

**Low Phase Noise VCXO (48MHz to 100MHz)**

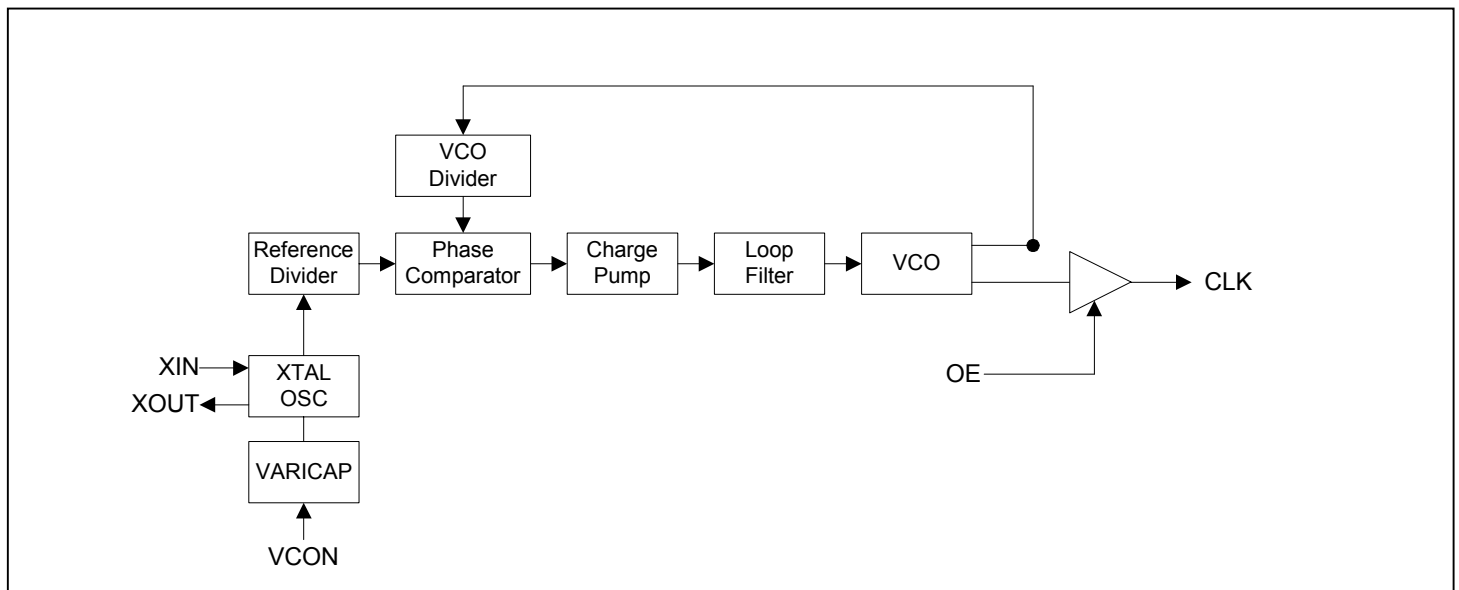
**FEATURES**

- VCXO output for the 48MHz to 100MHz range
- Low phase noise (-130 dBc @ 10kHz offset at 48MHz).
- CMOS output.
- 12 to 25MHz crystal input.
- Integrated variable capacitors.
- Selectable High Drive (30mA) or Standard Drive (10mA) output.
- Wide pull range (+/- 250 ppm).
- Low jitter (RMS): 3.5ps period.
- 3.3V operation.
- Available in 8-Pin SOIC.

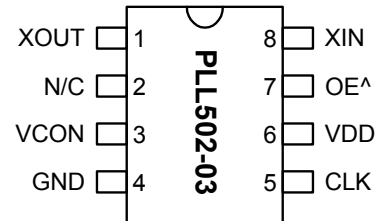
**DESCRIPTION**

The PLL502-03 is a low cost, high performance and low phase noise VCXO for the 48 to 100MHz range, providing less than -130dBc at 10kHz offset at 48MHz. The very low jitter (3.5ps 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**



Note: ^ denotes internal pull up

**OUTPUT RANGE**

MULTIPLIER	FREQUENCY RANGE	OUTPUT BUFFER
X4	48 - 100MHz	CMOS

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**PIN DESCRIPTIONS**

Name	Number	Type	Description
XOUT	1	I	Crystal output. See Crystal Specifications on page 3.
N/C	2	-	Not connected.
VCON	3	I	Voltage Control input.
GND	4	P	Ground.
CLK	5	O	Output clock.
VDD	6	P	+3.3V power supply.
OE	7	I	Output enable input. Disables (tri-state) output when low. Internal pull-up enables output by default if pin is not connected to low.
XIN	8	I	Crystal input. See Crystal Specifications on page 3.

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

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	$V_{DD}$		4.6	V
Input Voltage, dc	$V_I$	-0.5	$V_{DD}+0.5$	V
Output Voltage, dc	$V_O$	-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
ESD Protection, Human Body Model			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 COMMERCIAL grade only.

**2. DC Electrical Specifications**

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	$V_{DD}$		2.97		3.63	V
Output drive current (High Drive)	$I_{OH}$	$V_{OH} = V_{DD} - 0.4\text{V}$ , $V_{DD} = 3.3\text{V}$	30			mA
	$I_{OL}$	$V_{OL} = 0.4\text{V}$ , $V_{DD} = 3.3\text{V}$	30			mA
Output drive current (Standard Drive)	$I_{OH}$	$V_{OH} = V_{DD} - 0.4\text{V}$ , $V_{DD} = 3.3\text{V}$	10			mA
	$I_{OL}$	$V_{OL} = 0.4\text{V}$ , $V_{DD} = 3.3\text{V}$	10			mA
Short Circuit Current				±50		mA
VCXO Control Voltage	VCON		0		3.3	V

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**3. AC Electrical Specifications**

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency			12		25	MHz
Output Clock Rise/Fall Time (Standard Drive)		0.3V ~ 3.0V with 15 pF load		2.4		ns
Output Clock Rise/Fall Time (High Drive)		0.3V ~ 3.0V with 15 pF load		1.2		
Output Clock Duty Cycle		Measured @ 50% V <sub>DD</sub>	45	50	55	%

**4. 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 0V ≤ VCON ≤ 3.3V		500		ppm
CLK output pullability		VCON=1.65V, ±1.65V	±200			ppm
VCXO Tuning Characteristic				150		ppm/V
Pull range linearity					10	%
VCON pin input impedance			2000			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.

**5. Jitter and Phase Noise specification**

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
RMS Period Jitter (1 sigma – 1000 samples)	with capacitive decoupling between VDD and GND.		3.5		ps
Phase Noise relative to carrier	48MHz @100Hz offset		-100		dBc/Hz
Phase Noise relative to carrier	48MHz @1kHz offset		-123		dBc/Hz
Phase Noise relative to carrier	48MHz @10kHz offset		-130		dBc/Hz
Phase Noise relative to carrier	48MHz @100kHz offset		-125		dBc/Hz
Phase Noise relative to carrier	48MHz @1MHz offset		-125		dBc/Hz

**6. Crystal Specifications**

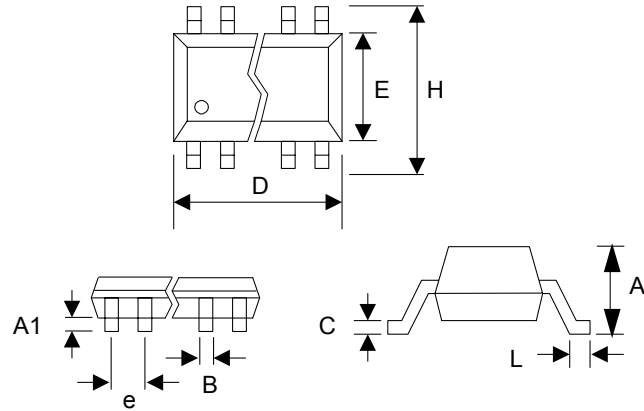
PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F <sub>XIN</sub>	12		25	MHz
Crystal Loading Capacitance Rating	C <sub>L (xtal)</sub>		9.5		pF
C0/C1				250	-
ESR	R <sub>s</sub>			30	Ω

**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 SOIC (in mm)		
Symbol	Min.	Max.
A	1.47	1.73
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	4.95
E	3.80	4.00
H	5.80	6.20
L	0.38	1.27
e	1.27 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

**PLL502-03 (H) X C**

PART NUMBER

Optional High Drive

TEMPERATURE  
C=COMMERCIAL  
I=INDUSTRIAL

PACKAGE TYPE  
S=SOIC

**Order Number**

**Marking**

**Package Option**

PLL502-03SC	P502-03SC	8-Pin SOIC (Tube)
PLL502-03SC -R	P502-03SC	8-Pin SOIC (Tape and Reel)
PLL502-03HSC	P502-03HSC	8-Pin SOIC (Tube)
PLL502-03HSC -R	P502-03HSC	8-Pin SOIC (Tape and Reel)

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