PLL501-01/-03

VCXO Clock Generator IC

FEATURES

- Integrated voltage-controlled crystal oscillator circuitry (VCXO) (pull range 200ppm minimum).
- Ideal for ADSL (35.328MHz) and Set-Top Box and multimedia (27MHz) applications.
- VCXO tuning range: 0-3.3V.
- Uses inexpensive fundamental-mode parallel resonant crystals (from 10 to 20MHz).
- Integrated phase-locked loop (PLL) provides pullable output frequency at 2x (PLL501-01) and 4x (PLL501-03) crystal frequency.
- 3.3V supply voltage.
- Small circuit board footprint (8-pin 0.150'' SOIC).
- 12mA output drives capability at TTL level.

DESCRIPTIONS

The PLL501-01 and PLL501-03 are monolithic low jitter, high performance CMOS VCXO chips. They allow the control of the output frequency with an input voltage (VIN), using a low cost crystal. While the PLL501-03 provides a pullable output clock 4 times the input crystal frequency, the PLL501-01 provides a pullable output clock 2x the input crystal frequency. This makes the PLL501-01 ideal for 35.328MHz ADSL applications (using 17.664MHz crystal) and for 27MHz Set-Top Box / multimedia applications (with a 13.5MHz crystal).

PIN CONFIGURATION

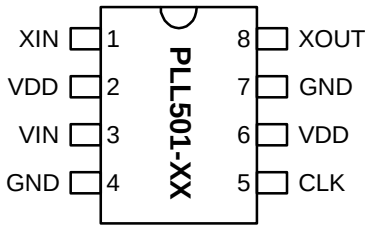
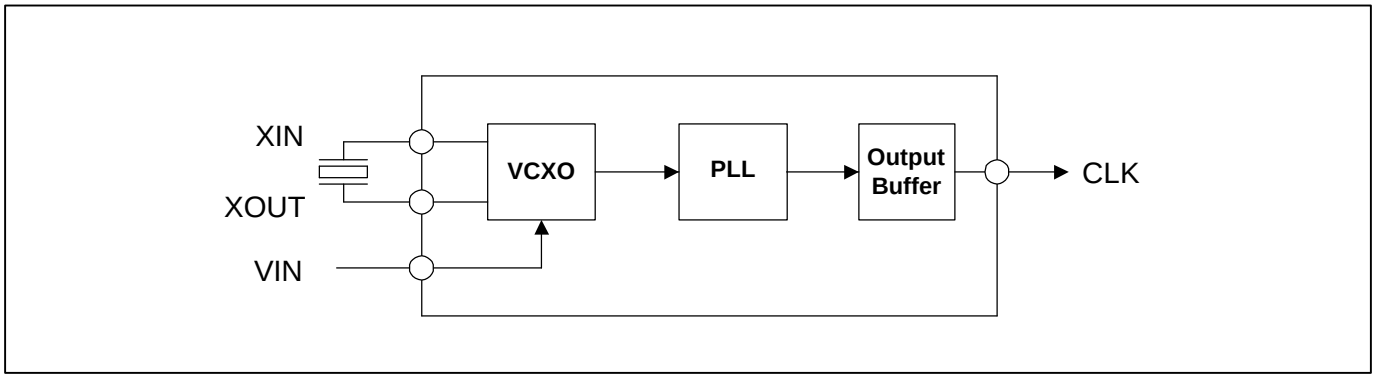


Table 1: Crystal / Output Frequencies

DEVICE	F_{XIN} (MHz)	CLK (MHz)
PLL501-01	10 - 20	2 x F_{XIN}
PLL501-03	10 - 15	4 x F_{XIN}

Note: Contact PhaseLink for custom PLL Frequencies

BLOCK DIAGRAM



PIN DESCRIPTIONS

Name	Number	Type	Description
XIN	1	I	Crystal input connection (parallel resonant crystal, C_L = 10pF).
VDD	2	P	3.3V Power Supply.
VIN	3	I	Voltage Input for VCXO Frequency Control.
GND	4	P	Ground for PLL Core.
CLK	5	O	Clock Output.
VDD	6	P	3.3V Power Supply.
GND	7	P	Ground.
XOUT	8	O	Crystal connection.

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. DC Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic, with Loaded Outputs	I_{DD}	F_{XIN} = 10 - 20MHz Ouput load of 10pF		20		mA
Operating Voltage	V_{DD}		3.13		3.47	V
Output High Voltage	V_{OH}	I_{OH} = -12mA	2.4			V
Output Low Voltage	V_{OL}	I_{LO} = 12mA			0.4	V
Output High Voltage at CMOS level	V_{OHC}	I_{OH} = -4mA	V_{DD}– 0.4			V
Operating Supply Current	I_{DD}	No Load		7		mA
Short Circuit Current				±50		mA
VIN, VCXO Control Voltage			0		3.3	V

3. AC Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency		PLL501-01	10		20	MHz
		PLL501-03	10		15	
Output Clock Rise Time	t_r	0.8V ~ 2.0V			1.5	ns
Output Clock Fall Time	t_f	2.0V ~ 0.8V			1.5	ns
Output Clock Duty Cycle		Measured @ 1.4V	45	50	55	%
Max Absolute Jitter		Short Term		100		ps
Short Circuit Current				±50		mA

4. Voltage Control Crystal Oscillator

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
PLL Stabilization Time *	T_{PLLSTB}	From VCXO stable		500		µs
VCXO Stabilization Time *	$T_{VCXOSTB}$	From power valid		10		ms
Output Frequency Synthesis Error		(Unless otherwise noted in Frequency Table)			±30	ppm
VCXO Tuning Range		F_{XIN} = 10 - 20MHz; XTAL C_0/C_1 < 250; C_L=10pF	200			ppm
CLK output pullability		0V≤VIN≤3.3V	±100			ppm
VCXO Tuning Characteristic				100		ppm/V

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

5. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F_{XIN}	Parallel Fundamental Mode	10		20 (PLL501-01) 15 (PLL501-03)	MHz
Crystal Loading Capacitance Rating	$C_{L\ (xtal)}$			10		pF
Crystal Pullability	$C_0/C_{1\ (xtal)}$	AT cut			250	-
Recommended ESR	R_E	AT cut			30	Ω

6. External Components and Layout Recommendations

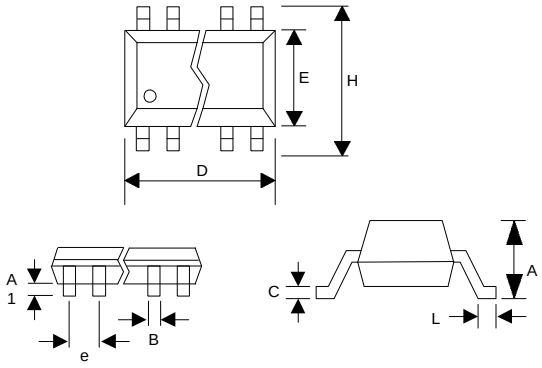
The PLL501-01/-03 requires a minimum number of external components for proper operation. A standard low frequency decoupling capacitor of 4.7µF or more should be used between VDD and GND (pin 2 and pin 4, as well as pin 6 and pin 7). Additionally, higher frequency decoupling capacitors of 0.1µF are required between VDD and GND (between pin 2 and 4, and between pin 6 and 7). These higher frequency decoupling capacitors must be connected as close to the PLL501-01/-03 chip as possible, and preferably directly next to the PLL501-01/-03 pins. A series termination resistor of 33Ω may be used for the clock output.

The input crystal must be connected as close to the chip as possible, and preferably directly next to the PLL501-01/-03 pins. If a crystal with C_L higher than 10pF is used, it will requires additional loading capacitors externally to complement the internal 10pF of the PLL501-01/-03: one between each crystal electrode and GND, as close to the crystal as possible, and preferably directly next to the crystal electrodes. Consult PhaseLink for recommended suppliers.

PACKAGE INFORMATION

8 PIN Narrow SOIC (mm)

	SOIC	
Symbol	Min.	Max.
A	1.55	1.73
A1	0.15	0.18
B	0.35	0.49
C	0.19	0.25
D	4.80	4.98
E	3.81	3.99
H	5.84	6.20
L	0.41	0.89
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

PLL501-0x S C

PART NUMBER

TEMPERATURATRE
C=COMMERCIAL
M=MILITARY
I=INDUSTRAL

PACKAGE TYPE
S=SOIC