

**4 Outputs 12.5MHz – 200MHz Low Phase Noise Multiplier VCXO**

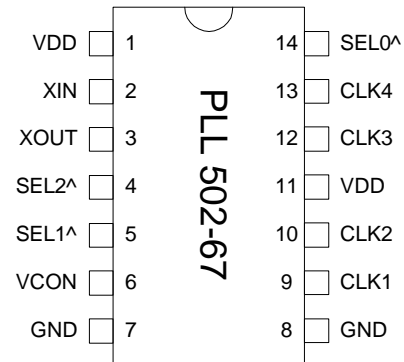
**FEATURES**

- Selectable 12.5MHz to 200MHz range.
- Low phase noise output (@ 10kHz frequency offset, -140dBc/Hz for 17.664MHz, -132dBc/Hz for 35.328MHz, -125dBc/Hz for 155.52MHz).
- 4 CMOS outputs (in phase).
- 12 to 25MHz crystal input.
- No external load capacitor or varicap required.
- Wide pull range (+/-190 ppm)
- Selectable 1/2 to 8x frequency multiplier.
- 3.3V operation.
- Available in 14-SOP.

**DESCRIPTIONS**

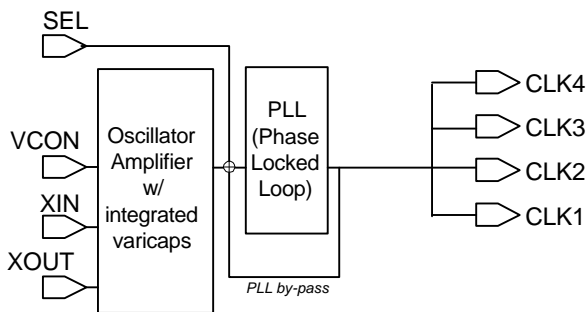
The PLL502-67 is high performance and low phase noise VCXO IC chip. It provides phase noise performance as low as -140dBc at 1kHz offset (at 17.664MHz) and -125dBc at 1kHz offset at 155.52MHz by multiplying the input crystal frequency up to 8x. The wide pull range (+/- 190 ppm) and very low jitter makes this chip ideal for a wide range of applications, from xDSL to SONET/SDH and FEC. The chip accepts a low cost fundamental parallel resonant mode crystal from 12 to 25MHz.

**PIN CONFIGURATION**  
(Top View)



<sup>^</sup>: Internal pull-up

**BLOCK DIAGRAM**



PLL502-67

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### FREQUENCY SELECTION TABLE

SEL2	SEL1	SEL0	Selected Multiplier
0	0	0	Reserved
0	0	1	Reserved
0	1	0	Reserved
0	1	1	Fin x 2
1	0	0	Fin / 2
1	0	1	Fin x 4
1	1	0	Fin x 8
1	1	1	No multiplication

Note: Internal pull-ups default SEL2, SEL1 and SEL0 to '1' if not connected

### PIN DESCRIPTIONS

Name	Pin number	Type	Description
XIN	2	I	Crystal in connector.
XOUT	3	I	Crystal out connector.
VCON	6	I	Frequency control input (0.3V to 3.0V)
GND	7,8	P	GND.
CLK1, CLK2	9,10	O	Output signal
CLK3, CLK4	12,13	O	Output signal.
SEL2	4	I	Multiplier selector pins. These pins have an internal pull-up that will default SEL to '1' when not connected to GND.
SEL1	5	I	
SEL0	14	I	
VDD	1, 11	P	+3.3V VDD.

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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*	$T_A$	-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.

#### 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 $V_{CON} = 1.65V$		9		pF
Crystal Pullability	$C_0/C_1 (xtal)$	AT cut			250	-
Recommended ESR	$R_E$	AT cut			30	$\Omega$

**Note:** Crystal Loading rating: 9pF is the loading the crystal sees from the VCXO chip at  $V_{CON} = 1.65V$ . 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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### 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		$F_{XIN} = 12 - 25\text{MHz}$ ; $XTAL C_0/C_1 < 250$	380			ppm
CLK output pullability		$0V \leq VCON \leq 3.3V$	$\pm 190$			ppm
Linearity				5	10	%
VCXO Tuning Characteristic				150		ppm/V
VCON input impedance			2000			$k\Omega$
VCON modulation BW		$0V \leq VCON \leq 3.3V, -3\text{dB}$	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)	$I_{DD}$	4 outputs loaded at 18pF	$F_{out} = 17.664\text{MHz}$		15	30	mA
			$F_{out} = 35.328\text{MHz}$		42	60	
			$F_{out} < 141\text{MHz}$		71	80	
Operating Voltage	$V_{DD}$		3.13		3.47	V	
Short Circuit Current				$\pm 50$		mA	

### 5. AC Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency			12		25	MHz
Output Clock Rise Time		0.8V ~ 2.0V with 10 pF load			1.5	ns
		0.3V ~ 3.0V with 15 pF load		2	5	
Output Clock Fall Time		2.0V ~ 0.8V with 10 pF load			1.5	
		3.0V ~ 0.3V with 15pF load		2	5	
Output Clock Duty Cycle		Measured @ 1.4V	45	50	55	%
Short Circuit Current				$\pm 50$		mA

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**6. Jitter specifications**

PARAMETERS	CONDITIONS	FREQUENCY	MIN.	TYP.	MAX.	UNITS
Period jitter RMS	With capacitive decoupling between VDD and GND.	17.664MHz		2.5	5	ps
		35.328MHz		4	7	
		155.52MHz		4.5	9	
Peak to Peak jitter	With capacitive decoupling between VDD and GND. Over 10,000 cycles.	155.52MHz		30	60	ps
Integrated jitter RMS	Integrated 12 kHz to 20 MHz	155.52MHz		2.5	4	ps

**7. Phase noise specifications**

PARAMETERS	FREQUENCY	@10Hz	@100Hz	@1kHz	@10kHz	@100kHz	UNITS
Phase Noise relative to carrier	17.664MHz	-60	-90	-112	-140	-150	dBc/Hz
	70.656MHz	-60	-90	-112	-127	-125	
	155.52MHz	-60	-90	-112	-125	-123	

Note: Phase Noise measured at VCON = 0V

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**PACKAGE INFORMATION**

14 PIN Narrow SOIC ( mm )

Symbol	SOIC	
	Min.	Max.
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	8.58	8.69
E	3.85	3.97
H	5.80	6.20
L	0.40	1.27
e	1.27 BSC	

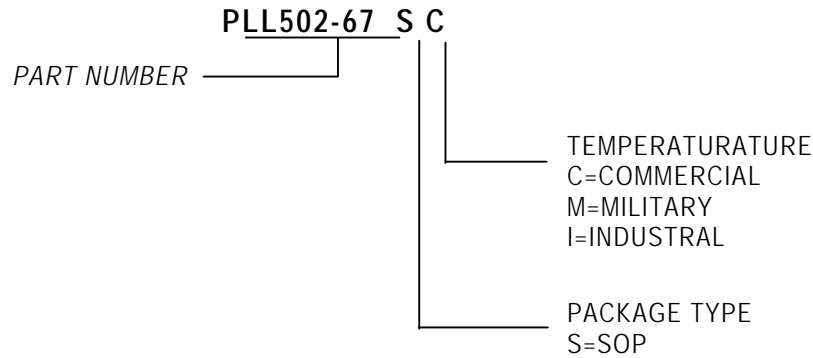
**ORDERING INFORMATION**

**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



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