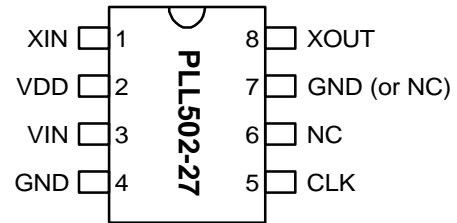


**Low Phase Noise VCXO (24MHz to 50MHz)**

**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 ICS MK3727

**PIN CONFIGURATION**



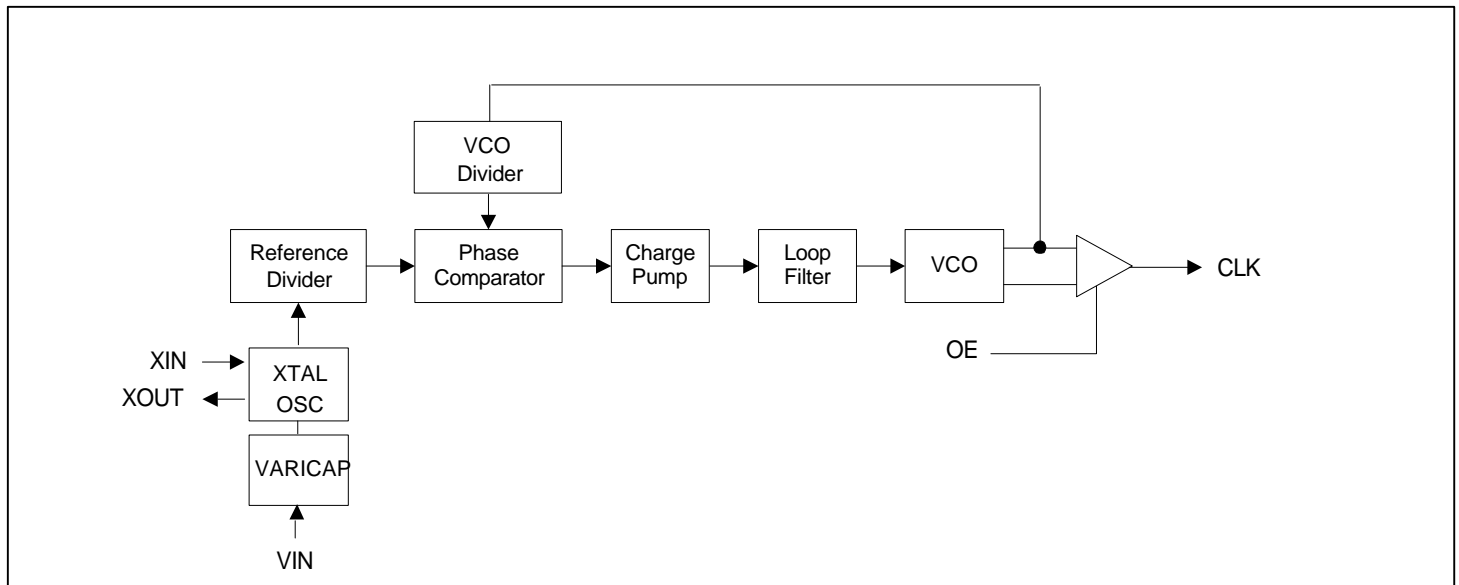
**DESCRIPTIONS**

The PLL502-27 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).

**OUTPUT RANGE**

| MULTIPLIER | FREQUENCY RANGE | OUTPUT BUFFER |
|------------|-----------------|---------------|
| x2         | 24 - 50MHz      | CMOS          |

**BLOCK DIAGRAM**



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

| Name | Number | Type | Description                          |
|------|--------|------|--------------------------------------|
| XIN  | 1      | I    | Crystal input pin.                   |
| VDD  | 2      | P    | +3.3V VDD power supply pin.          |
| VIN  | 3      | I    | Frequency control voltage input pin. |
| GND  | 4, 7   | P    | Ground pin (pin 7 is optional).      |
| CLK  | 5      | O    | Output clock pin.                    |
| N/C  | 6      | -    | Not connected.                       |
| 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;<br>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 |

**Low Phase Noise VCXO (24MHz to 50MHz)**
**5. DC Specification**

| PARAMETERS                                   | SYMBOL    | CONDITIONS   | MIN.           | TYP.     | MAX. | UNITS |
|--|-----------|--|----------------|----------|------|-------|
| Supply Current, Dynamic, with Loaded Outputs | $I_{DD}$  | $F_{XIN} = 12 - 25\text{MHz}$<br>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.

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

**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

**PLL502-27 X C**

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

- \_\_\_\_\_ TEMPERATURE  
 C=COMMERCIAL  
 M=MILITARY  
 I=INDUSTRIAL
- \_\_\_\_\_ PACKAGE TYPE  
 S=SOIC, O=TSSOP

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