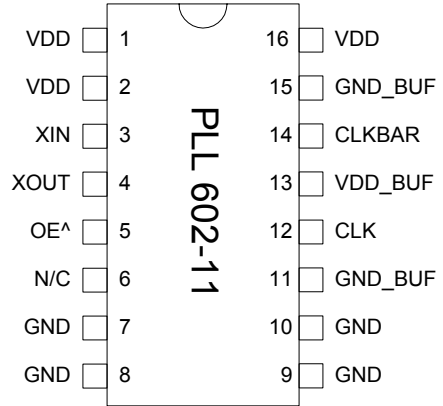


**96MHz – 200MHz Low Phase Noise PECL XO (12 – 25MHz Crystals)**

**FEATURES**

- Low phase noise output for the 96MHz to 200MHz range (-134 dBc at 10kHz offset).
- PECL output.
- 12 to 25MHz crystal input.
- Integrated crystal load capacitor: no external load capacitor required.
- Output Enable selector.
- 3.3V operation.
- Available in 16 Pin TSSOP.

**PIN CONFIGURATION**



Note: ^ denotes internal pull up

$$F_{OUT} = F_{XIN} \times 8$$

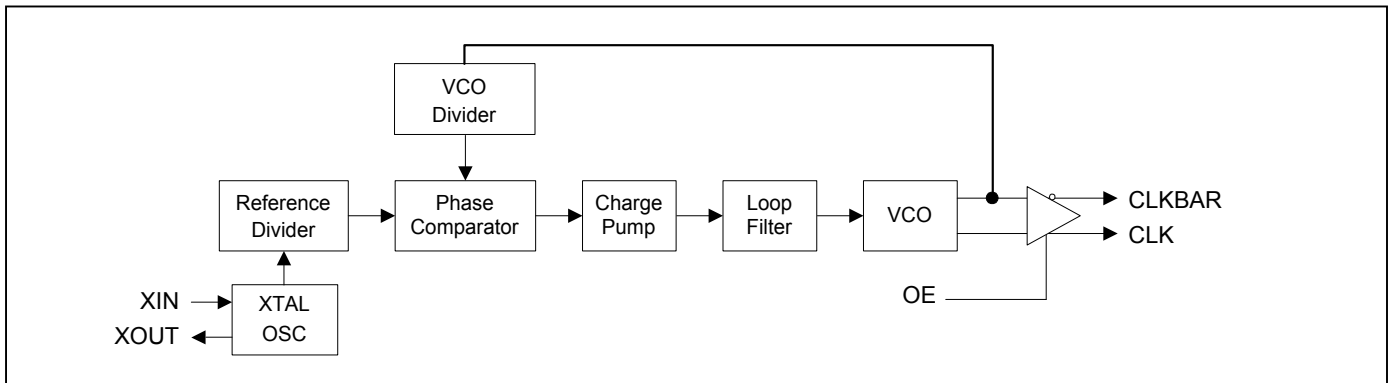
**DESCRIPTION**

The PLL602-11 is a monolithic low jitter and low phase noise (-134dBc/Hz @ 10kHz offset) XO IC with PECL output, for 96MHz to 200MHz output range. It provides a low phase noise reference frequency using a low cost crystal.

The chip delivers an output frequency of  $F_{XIN} \times 8$ . This makes the PLL602-11 ideal for a wide range of applications, including 155.52MHz for SONET.

| OE (Pin 5)  | Output State   |
|-------------|----------------|
| 0           | Tri-state      |
| 1 (Default) | Output enabled |

**BLOCK DIAGRAM**



## 96MHz – 200MHz Low Phase Noise PECL XO (12 – 25MHz Crystals)

### PIN DESCRIPTIONS

| Name    | Number   | Type | Description   |
|---------|----------|------|---|
| VDD     | 1,2,16   | P    | Power supply.   |
| XIN     | 3        | I    | Crystal input. See Crystal Specifications on page 2.  |
| XOUT    | 4        | I    | Crystal output. See Crystal Specifications on page 2.   |
| OE      | 5        | I    | Output enable input. Disables (tri-state) output when low. Internal pull-up enables output by default if pin is not connected to low. |
| N/C     | 6        | -    | Not connected.  |
| GND     | 7,8,9,10 | P    | Ground.   |
| GND_BUF | 11,15    | P    | Ground for output buffers.  |
| CLK     | 12       | O    | True clock output.  |
| VDD_BUF | 13       | P    | Power supply for output buffers.  |
| CLKB    | 14       | O    | Complementary clock output.   |

### 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. 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) |                           |      | 20   |      | pF       |
| Recommended ESR             | $R_E$        | AT cut                    |      |      | 30   | $\Omega$ |

## 96MHz – 200MHz Low Phase Noise PECL XO (12 – 25MHz Crystals)

### 3. General Electrical Specifications

| PARAMETERS                                    | SYMBOL          | CONDITIONS                      | MIN. | TYP. | MAX. | UNITS |
|---|-----------------|---------------------------------|------|------|------|-------|
| Supply Current, Dynamic (with Loaded Outputs) | I <sub>DD</sub> | PECL                            |      |      | 80   | mA    |
| Operating Voltage                             | V <sub>DD</sub> |                                 | 2.97 |      | 3.63 | V     |
| Output Clock Duty Cycle                       |                 | @ V <sub>DD</sub> – 1.3V (PECL) | 45   | 50   | 55   | %     |
| Short Circuit Current                         |                 |                                 |      | ±50  |      | mA    |

### 4. Jitter and Phase Noise Specification

| PARAMETERS                      | CONDITIONS  | MIN. | TYP. | MAX. | UNITS  |
|---------------------------------|---|------|------|------|--------|
| Period jitter RMS               | With capacitive decoupling between VDD and GND.                     |      | 4    |      | ps     |
| Accumulated jitter RMS          | With capacitive decoupling between VDD and GND. Over 10,000 cycles. |      | 9    |      | ps     |
| Phase Noise relative to carrier | 155MHz @100Hz offset  |      | -95  |      | dBc/Hz |
| Phase Noise relative to carrier | 155MHz @1kHz offset   |      | -120 |      | dBc/Hz |
| Phase Noise relative to carrier | 155MHz @10kHz offset  |      | -125 |      | dBc/Hz |
| Phase Noise relative to carrier | 155MHz @100kHz offset   |      | -121 |      | dBc/Hz |

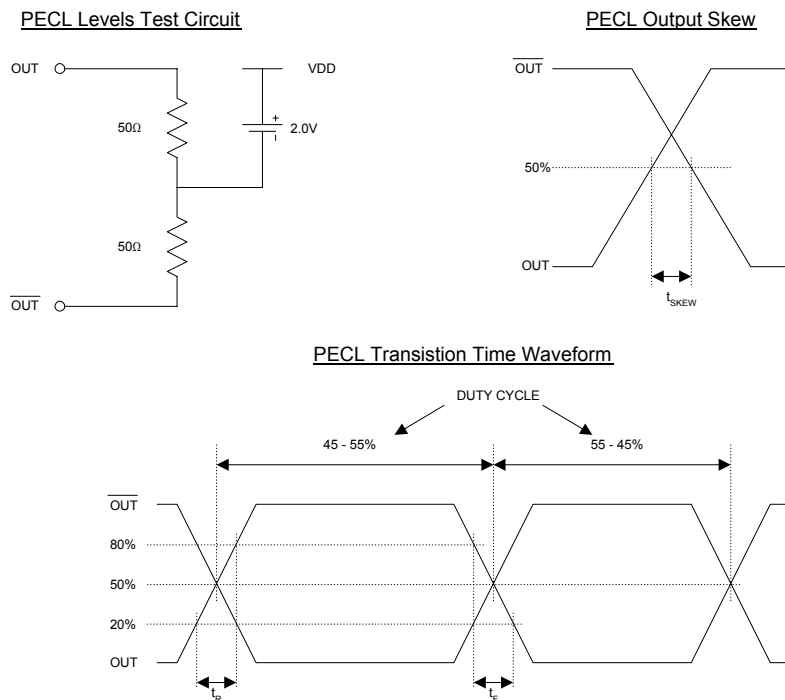
**96MHz – 200MHz Low Phase Noise PECL XO (12 – 25MHz Crystals)**

**5. PECL Electrical Characteristics**

| PARAMETERS          | SYMBOL   | CONDITIONS   | MIN.             | MAX.             | UNITS |
|---------------------|----------|--|------------------|------------------|-------|
| Output High Voltage | $V_{OH}$ | $R_L = 50 \Omega$ to $(V_{DD} - 2V)$<br>(see figure) | $V_{DD} - 1.025$ |                  | V     |
| Output Low Voltage  | $V_{OL}$ |  |                  | $V_{DD} - 1.620$ | V     |

**6. PECL Switching Characteristics**

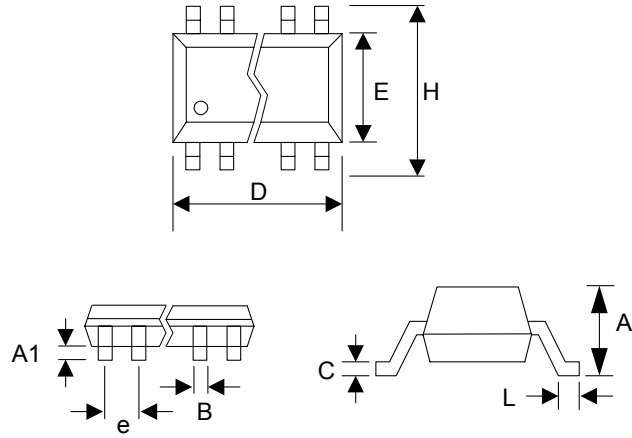
| PARAMETERS      | SYMBOL | CONDITIONS     | MIN. | TYP. | MAX. | UNITS |
|-----------------|--------|----------------|------|------|------|-------|
| Clock Rise Time | $t_r$  | @20/80% - PECL |      | 0.6  | 1.5  | ns    |
| Clock Fall Time | $t_f$  | @80/20% - PECL |      | 0.5  | 1.5  | ns    |



**96MHz – 200MHz Low Phase Noise PECL XO (12 – 25MHz Crystals)**

**PACKAGE INFORMATION**

| 16 PIN TSSOP ( mm ) |          |      |
|---------------------|----------|------|
| Symbol              | Min.     | Max. |
| A                   | -        | 1.20 |
| A1                  | 0.05     | 0.15 |
| B                   | 0.19     | 0.30 |
| C                   | 0.09     | 0.20 |
| D                   | 4.90     | 5.10 |
| E                   | 4.30     | 4.50 |
| H                   | 6.40 BSC |      |
| L                   | 0.45     | 0.75 |
| e                   | 0.65 BSC |      |



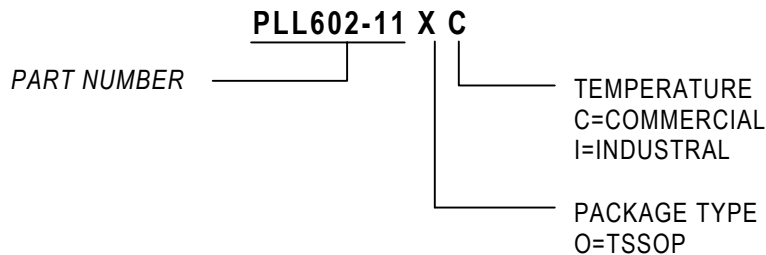
**ORDERING INFORMATION**

**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



| <u>Order Number</u> | <u>Marking</u> | <u>Package Option</u> |
|---------------------|----------------|-----------------------|
| PLL602-110C-R       | P602-110C      | TSSOP - Tape and Reel |
| PLL602-110C         | P602-110C      | TSSOP – Tube          |

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