# Ultra Low Current XO 10 MHz to 52 MHz

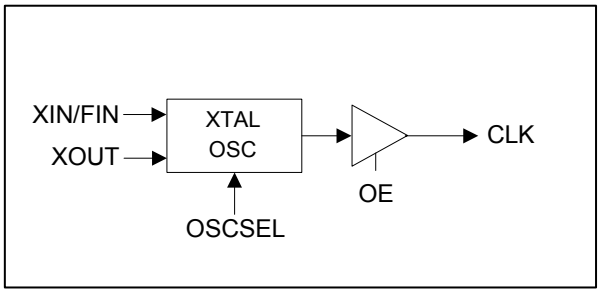
## FEATURES

- Low phase noise (-145 dBc @ 10kHz offset).
- CMOS output with OE tri-state control.
- Ultra Low current consumption ( <2mA, at 27MHz, 3.3V)
- 10 to 52MHz fundamental or 3rd OT crystal input.
- 12mA drive capability at TTL output.
- Low jitter (RMS): 2.5ps period jitter.
- 1.8V, 2.5V and 3.3V DC operation.
- Available in 8 pin SOIC

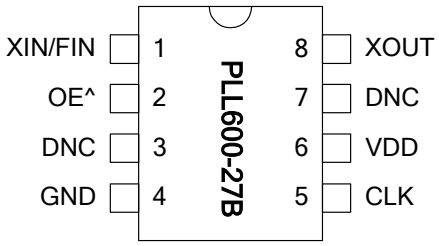
## DESCRIPTION

The PLL600-27B form a low cost family of XO IC's, designed to consume the lowest current on the market for the 10MHz to 52MHz range. It accepts fundamental resonant mode crystal input from 10 to 52MHz. Providing less than -145 dBc at 10kHz offset at 30MHz and with a very low jitter (2.5 ps RMS period jitter) makes this chip ideal for applications requiring low current frequency sources.

## BLOCK DIAGRAM

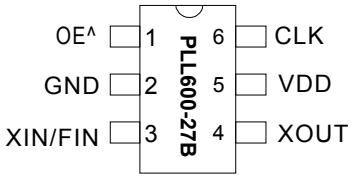



## PIN ASSIGNMENT (PACKAGE)



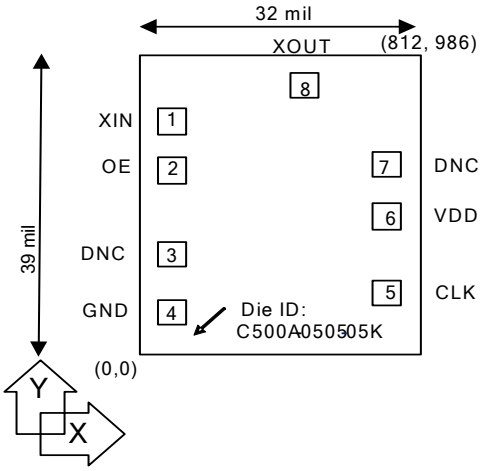

^ : denotes internal pull-up

**8-pin SOIC**




**SOT-23**

## PAD LAYOUT




## OE LOGIC SELECTION TABLE

| OE^ | OUTPUT |
|---|---|
| 0 | Disabled - osc. off |
| 1(default) | Enabled |

^ Internal Pull-up, default value is '1' when not connected.

## PACKAGE PIN DESCRIPTION

| Name | Pin No. | | Pad | | | Type | Description |
|---|---|---|---|---|---|---|---|
| | SOIC-8 | SOT-6 | No. | X (μm) | Y (μm) | | |
| XIN/FIN | 1 | 3 | 1 | 94.18 | 768.60 | I | Crystal input or reference clock input pin. |
| OE | 2 | 1 | 2 | 94.16 | 605.03 | I | Output Enable input. See Table on page 1. |
| DNC | 3 | - | 4 | 94.18 | 331.76 | - | Do Not Connect. |
| GND | 4 | 2 | 3 | 94.19 | 140.38 | P | Ground connection. |
| CLK | 5 | 6 | 5 | 715.31 | 203.87 | O | Output clock. |
| VDD | 6 | 5 | 6 | 715.31 | 455.73 | P | Power supply connection. |
| DNC | 7 | - | 7 | 715.47 | 626.72 | - | Do Not Connect. |
| XOUT | 8 | 4 | 8 | 476.91 | 888.88 | O | Crystal output. |

OE has internal pull-up resistor, so the default value is '1' when not connected.

## 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. AC Electrical Specifications

| PARAMETERS | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|
| Input Crystal Frequency | | 10 | | 52 | MHz |
| Settling time | At power-up (Vdd reaches 1.62V) | | | 10 | ms |
| | Disable to enable, osc. Off | | | 10 | ms |
| | Disable to enable, osc. On | | | 500 | µs |
| Output Clock Rise/Fall Time | 0.8V ~ 2.0V with 10 pF load | | 1.15 | | ns |
| | 0.3V ~ 3.0V with 15 pF load | | 2.4 | | |
| VDD sensitivity | Frequency vs. VDD +/- 10% | 0.8 | | 0.8 | ppm |
| Output Clock Duty Cycle | Measured @ 50% $V_{DD}$ | 45 | 50 | 55 | % |

## 3. Jitter and Phase Noise Specifications

| PARAMETERS | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|
| RMS Period Jitter (1 sigma – 10,000 samples) | With capacitive decoupling between VDD and GND. | | 2.1 | 2.5 | ps |
| Phase Noise relative to carrier | 27MHz @100Hz offset | | -108 | | dBc/Hz |
| Phase Noise relative to carrier | 27MHz @1kHz offset | | -135 | | dBc/Hz |
| Phase Noise relative to carrier | 27MHz @10kHz offset | | -147 | | dBc/Hz |
| Phase Noise relative to carrier | 27MHz @100kHz offset | | -148 | | dBc/Hz |
| Phase Noise relative to carrier | 27MHz @1MHz offset | | -148 | | dBc/Hz |

## 4. DC Specification

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Supply Current, Dynamic, with Loaded Outputs (at VDD = 3.3V) | $I_{DD}$ | At 10MHz, Cload=15pF | | 1.3 | 1.5 | mA |
| | | At 13.5MHz, Cload=15pF | | 1.5 | 1.7 | |
| | | At 17.7MHz, Cload=15pF | | 1.7 | 2.0 | |
| | | At 27MHz, Cload=15pF | | 2.3 | 2.7 | |
| | | At 48MHz, Cload=15pF | | 4.0 | 4.6 | |
| Operating Voltage | $V_{DD}$ | | 1.62 | | 3.63 | V |
| Output High Voltage | $V_{OH}$ | $I_{OH}$ = -12mA (3.3V) | 2.4 | | | V |
| Output Low Voltage | $V_{OL}$ | $I_{OL}$ = 12mA (3.3V) | | | 0.4 | V |
| Output High Voltage at CMOS level | $V_{OHC}$ | $I_{OH}$ = -4mA | $V_{DD}$ – 0.4 | | | V |
| Output drive current | | At TTL level (3.3V) | 12 | 17 | | mA |
| Short Circuit Current | | (3.3V) | | ±50 | | mA |

## 5. Crystal Specifications

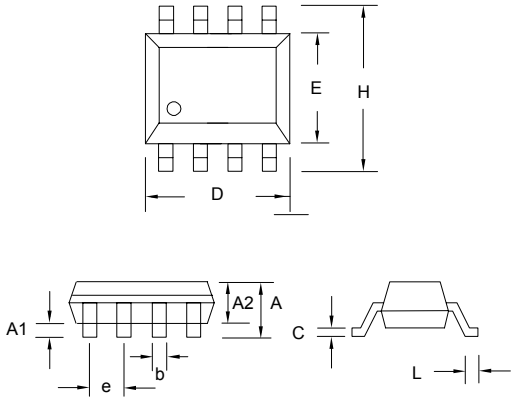
| PARAMETERS | SYMBOL | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|
| Crystal Resonator Frequency | $F_{XIN}$ | 10 | | 52 | MHz |
| Crystal Loading Rating | $C_{L\ (xtal)}$ | | 8.5 | | pF |
| Maximum Sustainable Drive Level | | | | 200 | µW |
| Operating Drive Level | | | 50 | | µW |
| C0 (for frequencies below 30MHz) | | | | 5 | pF |
| C0 (for frequencies above 30MHz) | | | | 4 | pF |
| ESR | $R_S$ | | | 30 | Ω |

**Note:** A detailed crystal specification document is also available for this part

## PACKAGE INFORMATION

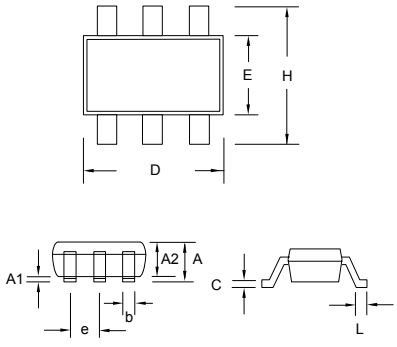
### SOIC (8L)

| Symbol | Dimension in MM | |
|---|---|---|
| | Min. | Max. |
| A | 1.47 | 1.73 |
| A1 | 0.1 | 0.25 |
| A2 | | |
| B | 0.33 | 0.51 |
| C | | |
| D | 4.8 | 4.95 |
| E | 3.8 | 4.0 |
| H | 6.0 BSC | |
| L | 0.38 | 1.27 |
| e | 1.27 BSC | |




### SOT-23 (6L)

| Symbol | Dimension in MM | |
|---|---|---|
| | Min. | Max. |
| A | 1.05 | 1.35 |
| A1 | 0.05 | 0.15 |
| A2 | 1.00 | 1.20 |
| B | 0.30 | 0.50 |
| C | 0.08 | 0.20 |
| D | 2.80 | 3.00 |
| E | 1.50 | 1.70 |
| H | 2.60 | 3.00 |
| L | 0.35 | 0.55 |
| e | 0.95 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

**PLL600-27B X X X-R**

*PART NUMBER*

PACKAGE TYPE
S=SOIC
T= SOT

TEMPERATURE
C=COMMERCIAL
I= INDUSTRIAL

NONE= NORMAL PACKAGE
L= GREEN PACKAGE

NONE= TUBE
R= TAPE AND REEL

**Note:** PhaseLink Supports GREEN Packaging

| Part / Order Number | Marking | Package Option |
|---|---|---|
| PLL600-27BSC | P600-27BSC | 8-Pin SOIC (Tube) |
| PLL600-27BSC-R | P600-27BSC | 8-Pin SOIC (Tape and Reel) |
| PLL600-27BSCL | P600-27BSCL | 8-Pin SOIC (Tube), GREEN |
| PLL600-27BSCL-R | P600-27BSCL | 8-Pin SOIC (Tape and Reel), GREEN |
| PLL600-27BTCL-R | P600-27BTC | 6-Pin SOT (Tape and Reel) |