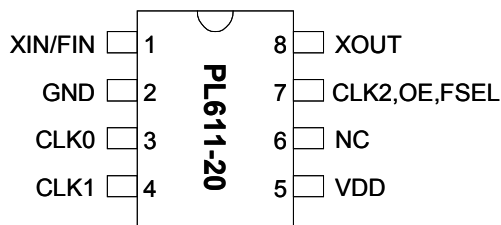


Programmable Quick Turn Clock™

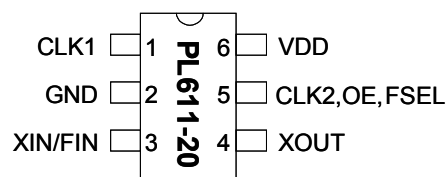
FEATURES

- Advanced programmable PLL design
- Very low Jitter and Phase Noise (< 40ps Pk-Pk typical)
- Up to 3 outputs
- Output frequency up to 200MHz CMOS.
- Crystal inputs:
 - Fundamental crystal: 10MHz-30MHz
 - 3RD overtone crystal: Up to 75MHz
- Accepts <1.0V reference signal input voltage
- One programmable I/O pin can be configured as Output Enable (OE), or Frequency Selection input (FSEL), or Reference clock.
- Single 2.5V or 3.3V ± 10% power supply
- Operating temperature range from -40°C to 85°C
- Available in 8-pin MSOP/SOIC, 6-pin SOT Green/RoHS compliant packages, or Die

PIN CONFIGURATION



**SOP-8
MSOP-8**

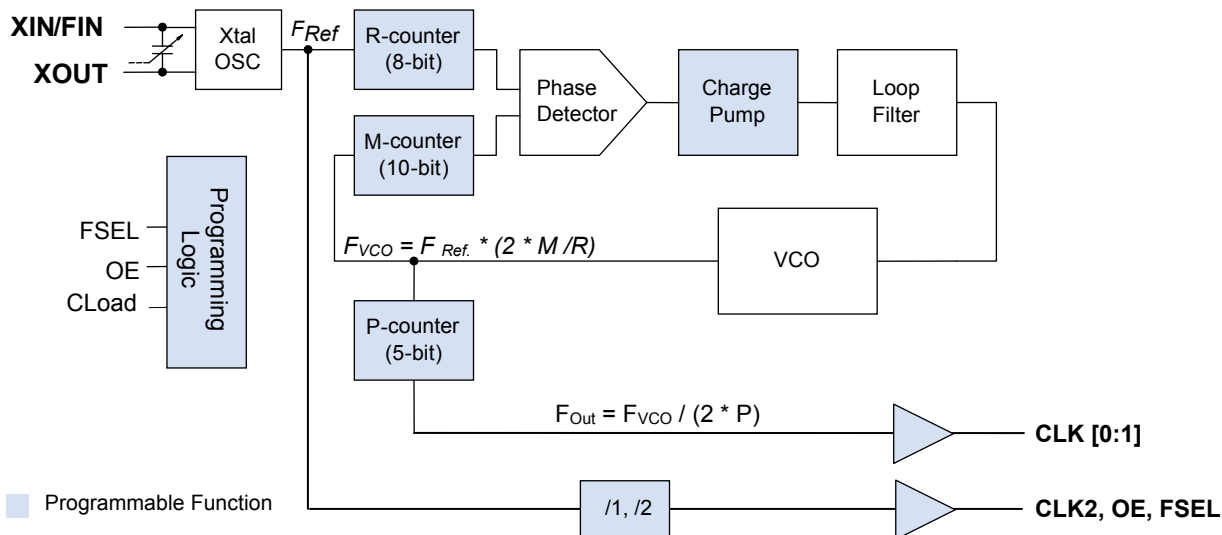


SOT-23

DESCRIPTION

The PL611-20 is a low-cost general purpose frequency synthesizer and a member of PhaseLink's Factory Programmable 'Quick Turn Clock (QTC)' family. PhaseLink's PL611-20 product family can generate any output frequency up to 200 MHz from fundamental crystal input between 10 MHz - 30 MHz, or a 3rd overtone crystal of up to 75Mhz.

BLOCK DIAGRAM



Programmable Quick Turn Clock™

KEY PROGRAMMING PARAMETERS

| CLK[0:2] Output Frequency | Output Drive Strength | Crystal Load | Programmable Input/Output (pin #7) | Charge-Pump Current |
|--|--|-----------------------|--|-------------------------------------|
| $F_{out} = F_{IN} * M / (R * P)$ where M=10 bit R = 8 bit P = 5 bit 1. CLK[0:1] = VCO / 2 * P 2. CLK0 = ~ CLK1 2. CLK[2]= FIN or FIN/2 | Std: 10mA (default) High: 24mA | +/- 200ppm tuning. | One output pin can be configured as 1. CLK2 = FIN or FIN/2 2. FSEL - input 3. OE - input | 4 levels of pump current setting |

PIN DESCRIPTION

| Name | Pin # | | Type | Description | | | | | | | | | |
|----------------|----------------------|------------------|------|--|-------|----|------|---|----------------------|------------------|-------------|----------------|------------------|
| | (M)SOP-8 | SOT-23 | | | | | | | | | | | |
| XIN/FIN | 1 | 3 | I | Crystal or Reference input pin | | | | | | | | | |
| GND | 2 | 2 | P | GND connection | | | | | | | | | |
| CLK[0:1] | 3,4 | 1 | O | Programmable Clock Output [note:CLK0=CLK1] | | | | | | | | | |
| VDD | 5 | 6 | P | VDD connection (2.25~3.63V) | | | | | | | | | |
| DNC | 6 | - | - | Do No Connect | | | | | | | | | |
| CLK2, OE, FSEL | 7 | 5 | B | <p>This programmable I/O pin can be configured as CLK2 (FIN or FIN/2) output, or OE input, or Frequency Selection (FSEL) input pin. This pin has an internal 60KΩ pull up resistor.</p> <table border="1" data-bbox="873 1255 1458 1474"> <thead> <tr> <th>State</th> <th>OE</th> <th>FSEL</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Tristate CLK[0:1]</td> <td>Select Freq. '1'</td> </tr> <tr> <td>1 (default)</td> <td>Normal mode</td> <td>Select Freq. '2'</td> </tr> </tbody> </table> | State | OE | FSEL | 0 | Tristate CLK[0:1] | Select Freq. '1' | 1 (default) | Normal mode | Select Freq. '2' |
| State | OE | FSEL | | | | | | | | | | | |
| 0 | Tristate CLK[0:1] | Select Freq. '1' | | | | | | | | | | | |
| 1 (default) | Normal mode | Select Freq. '2' | | | | | | | | | | | |
| XOUT | 8 | 4 | O | Crystal output pin | | | | | | | | | |

Programmable Quick Turn Clock™

DIE SPECIFICATION

| Name | Value |
|---------------|-----------------------|
| Size | 31.5x55.1 mil |
| Reverse side | GND |
| Pad Opening | 80 micron x 80 micron |
| Die Thickness | 10 mil |

PAD LAYOUT AND DIE ID

| | | | |
|------|---|---|----------------|
| XIN | 1 | 9 | XOUT |
| GND | 2 | 8 | CLK2, OE, FSEL |
| GND | 3 | 7 | VDD |
| CLK0 | 4 | 6 | VDD |
| CLK1 | 5 | | |

Note: CLK0=CLK1

PAD ASSIGNMENT and DESCRIPTION

| Name | Die Pads | | | Type | Description | | | | | | | | | |
|----------------|----------------------|------------------|--------|------|--|-------|----|------|---|----------------------|------------------|-------------|----------------|------------------|
| | Pad # | X (μm) | Y(μm) | | | | | | | | | | | |
| XIN | 1 | 101.5 | 1274.0 | I | Crystal input. | | | | | | | | | |
| GND | 2 | 101.5 | 1075.0 | P | GND connection. | | | | | | | | | |
| | 3 | 101.5 | 878.4 | | | | | | | | | | | |
| CLK0 | 4 | 101.5 | 671.8 | O | Optional same frequency clock output (CLK0=CLK1). If the clock output is not used, the pad should remain as 'Do Not Connect (DNC).' | | | | | | | | | |
| CLK1 | 5 | 101.5 | 425.0 | O | Programmable Clock Output. | | | | | | | | | |
| VDD | 6 | 697 | 483.0 | P | VDD connection. | | | | | | | | | |
| VDD | 7 | 697 | 790.0 | | | | | | | | | | | |
| CLK2, OE, FSEL | 8 | 697 | 1024.0 | O | <p>This programmable I/O pin can be configured as CLK2 (FIN or FIN/2) output, or OE input, or Frequency Selection (FSEL) input pin. This pin has an internal 60KΩ pull up resistor.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>State</th> <th>OE</th> <th>FSEL</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Tristate CLK[0:1]</td> <td>Select Freq. '1'</td> </tr> <tr> <td>1 (default)</td> <td>Normal mode</td> <td>Select Freq. '2'</td> </tr> </tbody> </table> | State | OE | FSEL | 0 | Tristate CLK[0:1] | Select Freq. '1' | 1 (default) | Normal mode | Select Freq. '2' |
| State | OE | FSEL | | | | | | | | | | | | |
| 0 | Tristate CLK[0:1] | Select Freq. '1' | | | | | | | | | | | | |
| 1 (default) | Normal mode | Select Freq. '2' | | | | | | | | | | | | |
| XOUT | 9 | 697 | 1274.0 | O | Crystal output. | | | | | | | | | |

Programmable Quick Turn Clock™
ELECTRICAL SPECIFICATIONS
ABSOLUTE MAXIMUM RATINGS

| PARAMETERS | SYMBOL | MIN. | MAX. | UNITS |
|---------------------------------------|-----------------|------|----------------------|-------|
| Supply Voltage Range | V _{DD} | -0.5 | 4.6 | V |
| Input Voltage Range | V _I | -0.5 | V _{DD} +0.5 | V |
| Output Voltage Range | V _O | -0.5 | V _{DD} +0.5 | V |
| Data Retention @ 85° C | | 10 | | Years |
| Soldering Temperature (Green Package) | | | 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.

AC SPECIFICATIONS

| PARAMETERS | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|--|------|------|------|-------|
| Crystal Input Frequency | Fundamental Crystal | 10 | | 30 | MHz |
| | 3 rd Overtone Crystal | | | 75 | MHz |
| Settling Time | At power-up (after V _{DD} increases over 1.62V) | | | 10 | ms |
| VDD Sensitivity | Frequency vs. V _{DD} +/-10% | -2 | | 2 | ppm |
| Output Rise Time | 15pF Load, 10/90%V _{DD} , Standard drive | | 2.5 | 3.5 | ns |
| | 15pF Load, 10/90%V _{DD} , High drive | | 1.0 | 1.5 | ns |
| Output Fall Time | 15pF Load, 90/10%V _{DD} , Standard drive | | 2.5 | 3.5 | ns |
| | 15pF Load, 90/10%V _{DD} , High drive | | 1.0 | 1.5 | ns |
| Duty Cycle | At V _{DD} /2 | 45 | 50 | 55 | % |
| Max. output skew between same frequency clocks | Equal loading (15 pF). Equal frequency & drive strength | | | 200 | ps |
| Period Jitter, peak-to-peak* (measured from 10,000 samples) | With capacitive decoupling between V _{DD} and GND. Operating only one output. | | 40 | | ps |

* Note: Jitter performance depends on the programming parameters.

DC SPECIFICATIONS

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|--|------------------|---|-----------------------|------|------|-------|
| Supply Current, Dynamic, with Loaded Outputs | I _{DD} | At 10MHz, load=15pF | | | 15 | mA |
| Operating Voltage | V _{DD} | | 2.25 | | 3.63 | V |
| Output Low Voltage | V _{OL} | I _{OL} = +4mA (Standard drive) | | | 0.4 | V |
| Output High Voltage | V _{OH} | I _{OH} = -4mA (Standard drive) | V _{DD} - 0.4 | | | V |
| Output Current | I _{OSD} | V _{OL} = 0.4V, V _{OH} = 2.4V (Standard drive) | | 10 | | mA |
| | I _{OHD} | V _{OL} = 0.4V, V _{OH} = 2.4V (High Drive) | | 24 | | mA |
| Short-circuit Current | I _s | | | ±50 | | mA |

CRYSTAL SPECIFICATIONS

| PARAMETERS | SYMBOL | MIN. | TYP. | MAX. | UNITS |
|---|-----------------------|------|------|--------|-------|
| Fundamental Crystal Resonator Frequency | F _{XIN} | 10 | | 30 | MHz |
| 3 rd Overtone Crystal Resonator Frequency | F _{XIN} | | | 75 | MHz |
| Crystal Loading Rating (The IC can be programmed for any value in this range.) | C _{L (xtal)} | 5 | | 20 | pF |
| Maximum Sustainable Drive Level | | | | 500 | μW |
| Operating Drive Level | | | 100 | | μW |
| Crystal Shunt Capacitance | C ₀ | | | 6 | pF |
| Effective Series Resistance, Fundamental, 10-30MHz | R _s | | | 30 | Ω |
| Effective Series Resistance, 3 rd Overtone, 30-50MHz [C ₀ < 4pF, C _L =5pF/8pF] | ESR | | | 100/70 | Ω |
| Effective Series Resistance, 3 rd Overtone, 50-65MHz, [C ₀ < 4pF, C _L =5pF/8pF] | ESR | | | 60/40 | Ω |
| Effective Series Resistance, 3 rd Overtone, 65-75MHz [C ₀ < 4pF, C _L =5pF/8pF] | ESR | | | 45/30 | Ω |

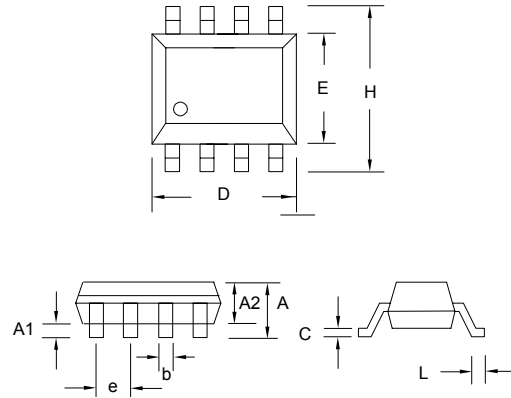
Note: A detailed crystal specification document is also available for this part

Programmable Quick Turn Clock™

PACKAGE DRAWINGS (GREEN PACKAGE COMPLIANT)

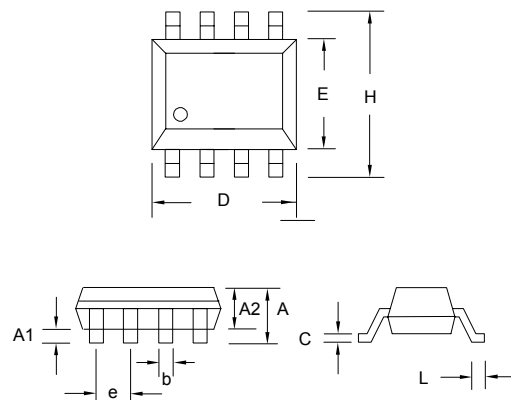
MSOP 8L

| Symbol | Dimension in MM | |
|--------|-----------------|-------|
| | Min. | Max. |
| A | --- | 1.10 |
| A1 | 0.05 | 0.15 |
| A2 | 0.81 | 0.91 |
| B | 0.25 | 0.40 |
| C | 0.13 | 0.23 |
| D | 2.90 | 3.10 |
| E | 2.90 | 3.10 |
| H | 4.90 BSC | |
| L | 0.445 | 0.648 |
| e | 0.65 BSC | |



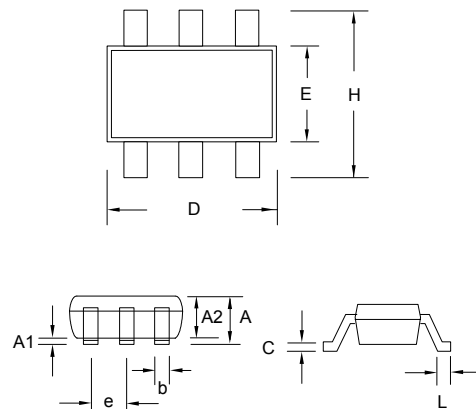
SOP 8L

| Symbol | Dimension in MM | |
|--------|-----------------|------|
| | Min. | Max. |
| A | 1.35 | 1.75 |
| A1 | 0.10 | 0.25 |
| A2 | 1.25 | 1.50 |
| B | 0.33 | 0.53 |
| C | 0.19 | 0.27 |
| D | 4.80 | 5.00 |
| E | 3.80 | 4.00 |
| H | 5.80 | 6.20 |
| L | 0.40 | 0.89 |
| e | 1.27 BSC | |



SOT-23 6 L

| 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 | 3.0 |
| L | 0.35 | 0.55 |
| e | 0.95 BSC | |



Programmable Quick Turn Clock™

ORDERING INFORMATION

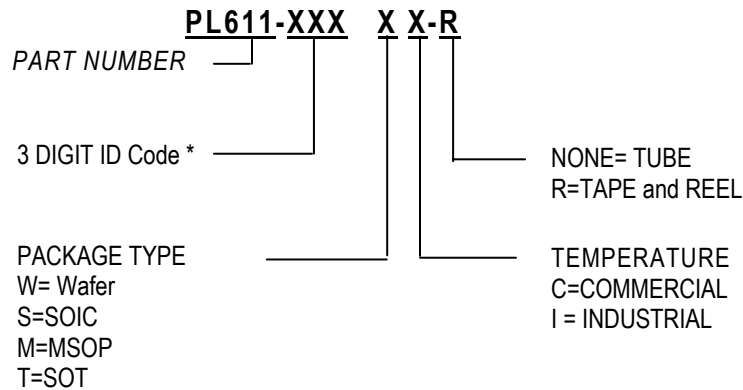
For part ordering, please contact our Sales Department:

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



* PhaseLink will assign a unique 3-digit ID code for each approved programmed part number.

* PhaseLink offers Green Package Only for this product family.

| Part / Order Number | Marking | Package Option |
|---------------------|-----------|------------------------------|
| PL611-20WC | P611-20WC | Wafer |
| PL611-20-XXXSC | C2XXX | 8-Pin SOIC (Tube) |
| PL611-20-XXXSC-R | C2XXX | 8-Pin SOIC (Tape and Reel) |
| PL611-20-XXXMC | C2XXX | 8-Pin MSOP (Tube) |
| PL611-20-XXXMC-R | C2XXX | 8-Pin MSOP (Tape and Reel) |
| PL611-20-XXXTC-R | C2XXX | 6-Pin SOT-23 (Tape and Reel) |

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