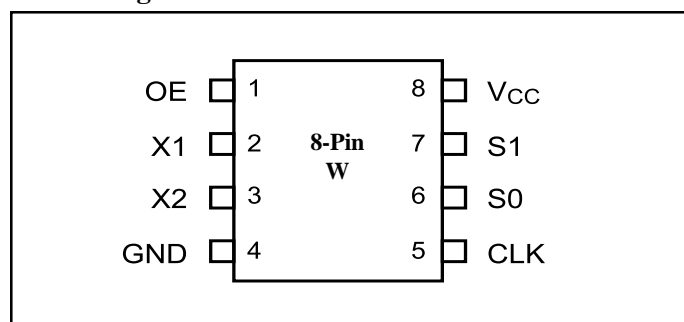


## Features

- No external capacitors (919 only)
- Excellent signal quality
- Very low jitter
- Precise frequencies
- Minimal undershoot, ringback or overshoot
- Nearly perfect 50% duty cycle
- Four selectable clock frequencies
- Operates at  $V_{CC}=3.3V$
- Output may be disabled to save power
- Small 150-mil wide SOIC-8 (W) package saves board area

## Pin Configuration



## Output CLK Frequency Selection

| Selection<br>S1, S0 | N/M <sup>(2)</sup> | Clock<br>(using 10<br>MHz Xtal) | Clock<br>(using 16.6<br>MHz Xtal) | Clock<br>(using 20<br>MHz Xtal) | Clock<br>(using 22.1<br>MHz Xtal) |
|---------------------|--------------------|---------------------------------|-----------------------------------|---------------------------------|-----------------------------------|
| 00                  | 2                  | —                               | 33.3 <sup>(1)</sup>               | 40                              | 44.2                              |
| 01                  | 4                  | 40 <sup>(1)</sup>               | 66.6 <sup>(1)</sup>               | 80 <sup>(1)</sup>               | 88.4                              |
| 10                  | 5                  | 50 <sup>(1)</sup>               | 83                                | 100 <sup>(1)</sup>              | 110.5                             |
| 11                  | 7                  | 70 <sup>(1)</sup>               | 116                               | —                               | —                                 |

### Notes:

1. Indicates popular target frequencies.
2. The ratio of N/M may be changed by mask option.

## Description

The PI6C918 and PI6C919 are high-precision, low-voltage general-purpose clock generators that reach a maximum output frequency of 120 MHz. These devices use an external low-cost crystal to generate very accurate and stable system clocks.

These frequency synthesizers include a crystal oscillator, a programmable PLL and an output buffer. Any one of four different output frequencies can be selected via two select pins (S0, S1). The frequency multipliers are: 2, 4, 5, and 7.

The PI6C919 has on-chip capacitors, eliminating the need for external capacitors at the X1, X2 pins. This reduces overall parts count and board area, and increases reliability.

The OE (output enable) pin may be pulled down to disable the output buffer and save system power.

The small surface-mount SOIC-8 package is ideal for compact portable equipment applications.

## Pin Description

| Pin Name | Pin # | I/O | Description   |
|----------|-------|-----|---|
| S0       | 6     | I   | Select 0, internal pull-up                            |
| S1       | 7     | I   | Select 1, internal pull-up                            |
| X1       | 2     | C   | Crystal or clock input, 8 to 23 MHz                   |
| X2       | 3     | C   | Crystal connection or no connect                      |
| CLK      | 5     | O   | Clock output  |
| OE       | 1     | I   | OE = 1 Enable CLK output<br>OE = 0 Disable CLK output |

### Note:

1. I = Input, O = Output, C = Crystal

## Product Speed Grades

| Part No.      | Max CLK<br>Output Freq. | Max VCO<br>Frequency |
|---------------|-------------------------|----------------------|
| PI6C918/919   | 80 MHz                  | 160 MHz              |
| PI6C918A/919A | 100 MHz                 | 200 MHz              |
| PI6C918B/919B | 120 MHz                 | 240 MHz              |

## Maximum Ratings

|  |                 |
|--|-----------------|
| Storage Temperature .....  | −65°C to +150°C |
| Ambient Temperature with Power Applied .....                             | 0°C to +70°C    |
| Supply Voltage to Ground Potential (Inputs & V <sub>CC</sub> Only) ..... | −0.5V to +7.0V  |
| Supply Voltage to Ground Potential (Outputs & D/O Only) ..               | −0.5V to +7.0V  |
| DC Input Voltage .....   | −0.5V to +7.0V  |
| DC Output Current .....  | 120mA           |
| Power Dissipation .....  | 0.5W            |

### Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

## DC Electrical Characteristics

Operating Range, V<sub>CC</sub> = 3.3V ±10% (918/919/918A/919A). V<sub>CC</sub> = 3.3V ±5% (918B/919B), Temperature 0°C to +70°C

| Symbol          | Description                                 | Test Conditions   |                        | Min.                  | Typ.   | Max. | Units |
|-----------------|---|---|------------------------|-----------------------|--------|------|-------|
| V <sub>OH</sub> | Output HIGH Voltage                         | V <sub>CC</sub> = Min.,<br>V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | V <sub>OH</sub> = −8mA | V <sub>CC</sub> − 0.4 | -      | -    | V     |
| V <sub>OL</sub> | Output LOW Voltage                          |   | V <sub>OL</sub> = 8mA  | -                     | -      | 0.4  |       |
| V <sub>IH</sub> | Select Input HIGH Voltage                   | V <sub>CC</sub> = 5V  |                        | 2.0                   | -      | -    |       |
| V <sub>IL</sub> | Select Input LOW Voltage                    |   |                        | -                     | -      | 0.8  |       |
| V <sub>IH</sub> | Select Input HIGH Current                   | V <sub>CC</sub> = Max., V <sub>IN</sub> = V <sub>CC</sub>                       |                        | -                     | -      | 5    | μA    |
| V <sub>IL</sub> | Select Input LOW Current                    | V <sub>CC</sub> = Max., V <sub>IN</sub> = 0V                                    |                        | -                     | -      | −10  |       |
| I <sub>CC</sub> | Supply Current                              | V <sub>CC</sub> = Max., CLK frequency = 40 MHz                                  |                        | -                     | 10     | 20   | mA    |
| R <sub>L</sub>  | X1, X2 Negative Resistance                  |   |                        | −1,000                | −2,000 | -    | Ω     |
| R <sub>FB</sub> | On-chip X1, X2 Internal Feedback Resistance |   |                        | 227                   | -      | -    | kΩ    |

**Note:** There is no guarantee that on-chip capacitance eliminates the need for external capacitors.

## AC Electrical Characteristics

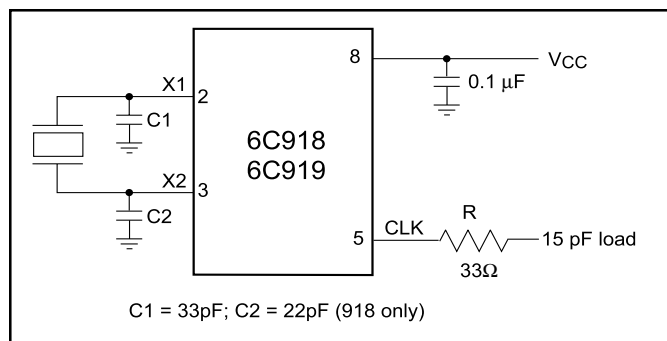
Operating Range, V<sub>CC</sub> = 3.3V ±10% (918/919/918A/919A). V<sub>CC</sub> = 3.3V ±5% (918B/919B), Temperature 0°C to +70°C

| Symbol                          | Description                  | Test Conditions <sup>(1)</sup> | Min. | Typ. | Max. | Units |
|---------------------------------|------------------------------|--------------------------------|------|------|------|-------|
| dT                              | Duty Cycle,                  | V <sub>TH</sub> = 1.4V         | 45   | 50   | 55   | %     |
| T <sub>R</sub> , T <sub>F</sub> | Rise/Fall Time               | 20% and 80% V <sub>CC</sub>    | —    | —    | 3    | ns    |
| t <sub>PU</sub>                 | Power-up Time <sup>(2)</sup> |                                | —    | —    | 10   | ms    |
| FXTAL                           | Crystal Input Frequency      | 918/918A/919/919A              | 10   | —    | 20   | MHz   |
|                                 |                              | 918B/919B                      | 10   | —    | 24   |       |
| T <sub>JLS</sub>                | One Sigma Jitter             | f <sub>VCO</sub> ≥60 MHz       | —    | —    | 60   | ps    |

### Notes:

1. Test load of 15pF, 2-inch trace
2. Time from when the power supply reaches 90% until locked clock output waveform is reached.

### External Circuit



#### Notes:

1. Locate crystal as close to X1, X2 pins as possible.
2. Connect a 0.1μF bypass capacitor at Vcc (Pin 8).

### Ordering Information

| Part No.  | Max. Freq. | Package       |
|-----------|------------|---------------|
| PI6C918W  | 80 MHz     | Narrow SOIC-8 |
| PI6C918AW | 100 MHz    |               |
| PI6C918BW | 120 MHz    |               |
| PI6C919W  | 80 MHz     |               |
| PI6C919AW | 100 MHz    |               |
| PI6C919BW | 120 MHz    |               |

### Crystal Specifications

It is the customer's responsibility to procure the prototype and production crystals directly from crystal vendors.

| Typical Characteristic <sup>(1)</sup>               | Value                                    |
|---|--|
| Frequency, F  | 18.43200 MHz nominal                     |
| Frequency Tolerance at 25°C                         | ±50 ppm                                  |
| Frequency Stability<br>vs. Temperature<br>vs. Aging | ±35 ppm (0°C to 70°C)<br>±15 ppm/4 years |
| Oscillation Mode                                    | Fundamental                              |
| Calibration Mode                                    | Parallel resonant                        |
| Load Capacitance, C <sub>L</sub>                    | 20 pF, Fundamental                       |
| Shunt Capacitance, C <sub>O</sub>                   | 7 pF max., Fundamental                   |
| Series Resistance, R1                               | 50Ω Typical                              |
| Drive Level   | 1mΩ Typical                              |
| Operating Temperature                               | 0° to 70°C                               |
| Storage Temperature                                 | -40° to 85°C                             |