PhaseLink Corporation

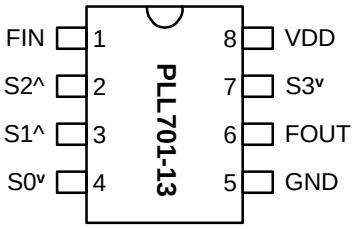
# PLL701-13

## Low EMI Spread Spectrum Multiplier Clock

### FEATURES

- Spread Spectrum Clock Generator with selectable multiplier from 1x to 4x outputs.
- Output frequency ranges: 24MHz to 240MHz.
- Selectable Down Spread Modulation.
- TTL/CMOS compatible outputs.
- 3.3V Operating Voltage.
- Low short term jitter.
- Available in 8-Pin 150mil SOIC.

### PIN CONFIGURATION




FIN = 24 ~ 120 Mhz

**Note:** v: 30kΩ Internal Pull down ^: 30kΩ Internal Pull up.

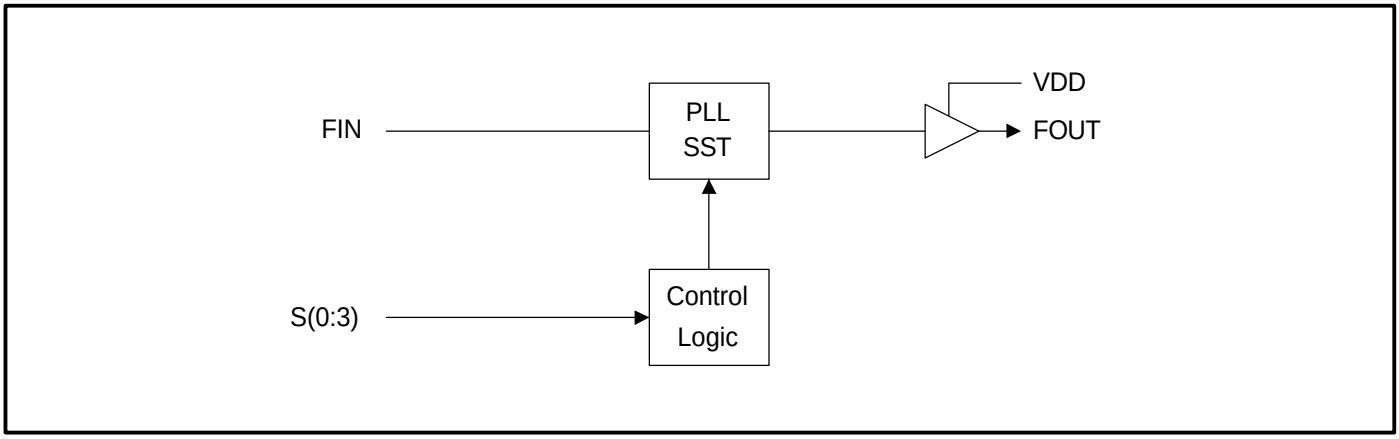
### DESCRIPTIONS

The PLL701-13 is a Spread Spectrum Clock Generator designed for the purpose of reducing EMI in high-speed digital systems. The selectable Down Spread modulation amplitude (see table below) permits EMI reduction without over-clocking the output. Any output frequency can be selected by programming 4 multiplier modes. The device operates over a very wide range of input frequencies and provides 1x to 4x modulated clock outputs.

### OUTPUT CLOCK (FOUT) SELECTION

| S3 | S2 | S1 | S0 | FIN Range (MHz) | FOUT | Spread Spectrum Modulation | |
|---|---|---|---|---|---|---|---|
| | | | | | | Frequency | Magnitude |
| 0 | 0 | 0 | 0 | 24 - 60 | X1 | Fin / 256 | -1.5% |
| 0 | 0 | 0 | 1 | 24 - 60 | X1 | | -2.0% |
| 0 | 0 | 1 | 0 | 24 - 60 | X1 | | -2.5% |
| 0 | 0 | 1 | 1 | 24 - 60 | X1 | | -3.0% |
| 0 | 1 | 0 | 0 | 24 - 60 | X2 | | -0.5% |
| 0 | 1 | 0 | 1 | 24 - 60 | X2 | | -1.0% |
| 0 | 1 | 1 | 0 | 24 - 60 | X2 | | -1.5% |
| 0 | 1 | 1 | 1 | 24 - 60 | X2 | | -2.0% |
| 1 | 0 | 0 | 0 | 24 - 60 | X2 | | -2.5% |
| 1 | 0 | 0 | 1 | 24 - 60 | X2 | | -3.0% |
| 1 | 0 | 1 | 0 | 24 - 60 | X4 | | -0.5% |
| 1 | 0 | 1 | 1 | 24 - 60 | X4 | | -1.0% |
| 1 | 1 | 0 | 0 | 60 - 120 | X1 | | -0.5% |
| 1 | 1 | 0 | 1 | 60 - 120 | X1 | | -1.0% |
| 1 | 1 | 1 | 0 | 60 - 120 | X1 | | -1.5% |
| 1 | 1 | 1 | 1 | 60 - 120 | X1 | | -2.0% |

## BLOCK DIAGRAM




## PIN DESCRIPTIONS

| Name | Number | Type | Description |
|---|---|---|---|
| FIN | 1 | I | Input Clock Frequency. |
| S2 | 2 | I | Digital control input to select output frequency and SST modulation amplitude. Has internal pull-up. |
| S1 | 3 | I | Digital control input to select output frequency and SST modulation amplitude. Has internal pull-up. |
| S0 | 4 | I | Digital control input to select output frequency and SST modulation amplitude. Has internal pull-down. |
| S3 | 7 | I | Digital control input to select output frequency and SST modulation amplitude. Has internal pull-down. |
| VDD | 8 | P | 3.3V Power Supply. |
| FOUT | 6 | O | SST Modulated Clock Frequency Output. The frequency before modulation is synthesized by multiplying the input frequency by 1X, 2X, or 4X, depending on S(0:3). |
| GND | 5 | P | Ground. |

## ELECTRICAL SPECIFICATIONS

### 1. Absolute Maximum Ratings

| PARAMETERS | SYMBOL | MIN. | MAX. | UNITS |
|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | $V_{SS}$-0.5 | 6 | V |
| Input Voltage Range | $V_I$ | $V_{SS}$-0.5 | $V_{DD}$+0.5 | V |
| Output Voltage Range | $V_O$ | $V_{SS}$-0.5 | $V_{DD}$+0.5 | V |
| Soldering Temperature | | | 260 | °C |
| Storage Temperature | $T_S$ | -65 | 150 | °C |
| Ambient Operating Temperature* | $T_A$ | -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.

### 2. DC/AC Specification

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | | 3.15 | | 3.45 | V |
| Input High Voltage | $V_{IH}$ | | 0.7*VDD | | | V |
| Input Low Voltage | $V_{IL}$ | | | | 0.3*VDD | V |
| Input High Current | $I_{IH}$ | | | | 100 | µA |
| Input Low Current | $I_{IL}$ | | | | 100 | µA |
| Output High Voltage | $V_{OH}$ | $I_{OH}$=5mA, VDD=3.3V | 2.4 | | | |
| Output Low Voltage | $V_{OL}$ | $I_{OL}$=6mA, VDD=3.3V | | | 0.4 | |
| Input Frequency | $F_{IN}$ | | 24 | | 120 | MHz |
| Maximum interruption of $F_{IN}$ | | | | | none | µs |
| Input Capacitance | $C_{in1}$ | | | 4 | | pF |
| Pull-up Resistor | $R_{pu}$ | PIN 2, 3 | | 30 | | kΩ |
| Pull-down Resistor | $R_{pd}$ | PIN 4, 7 | | 30 | | kΩ |
| Short Circuit Current | $I_{sc}$ | | | 25 | | mA |
| 3.3V Dynamic Supply Current | $I_{CC}$ | No Load | | 20 | | mA |

## 3. TIMING CHARACTERISTICS

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Rise Time | $T_r$ | Measured at 0.8V ~ 2.0V @ 3.3V | 0.8 | 0.95 | 1.1 | ns |
| Fall Time | $T_f$ | Measured at 2.0V ~ 0.8V @ 3.3V | 0.78 | 0.85 | 0.9 | ns |
| Output Duty Cycle | $D_T$ | | 45 | 50 | 55 | % |
| Input to Output Delay | | | 2 | | 4 | ns |
| Cycle to Cycle Jitter | $T_{cyc-cyc}$ | Over output frequency range @ 3.3V | | | 100 | ps |

## FUNCTIONAL DESCRIPTION

### Selectable spread spectrum and modulation rates

The PLL701-13 provides selectable spread spectrum modulation, as well as selectable modulation rate. Selection is made by connecting specific pins to a logical “zero” or “one”, according to the output clock selection table and modulation rate selection table on page 1.

Pins 2 (S2), 3 (S1), 4 (S0), and 7 (S3) are used as inputs to select the spread spectrum modulation as shown on the output clock selection table (page 1).

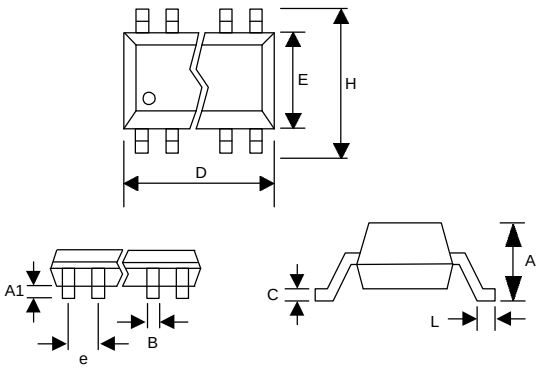
### Default values for S(0:3) through internal pull-up and pull-down resistor

Selection pins S0 and S3 have an internal pull-down resistor of 30kΩ, pins 2 and 3 (S1 and S2) have an internal pull-up resistor of 30kΩ. This internal pull-up (or pull-down) resistor will pull the input value to a logical “one” (or “zero” respectively) by default, i.e. when no resistive load is connected between the pin and GND (VDD respectively). In order to override the internal pull-up (pull-down), the pin has to be connected to GND (VDD respectively).

## PACKAGE INFORMATION

8 PIN Narrow SOIC ( mm )

| | SOIC | |
|---|---|---|
| Symbol | Min. | Max. |
| A | 1.47 | 1.73 |
| A1 | 0.10 | 0.25 |
| B | 0.33 | 0.51 |
| C | 0.19 | 0.25 |
| D | 4.80 | 4.95 |
| E | 3.80 | 4.00 |
| H | 5.80 | 6.20 |
| L | 0.38 | 1.27 |
| e | 1.27 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

**PLL701-13 S C**

*PART NUMBER*

TEMPERATURATURE
C=COMMERCIAL
M=MILITARY
I=INDUSTRAL

PACKAGE TYPE
S=SOIC