

# PacketClock™ Spread Spectrum Clock Generator

## Features

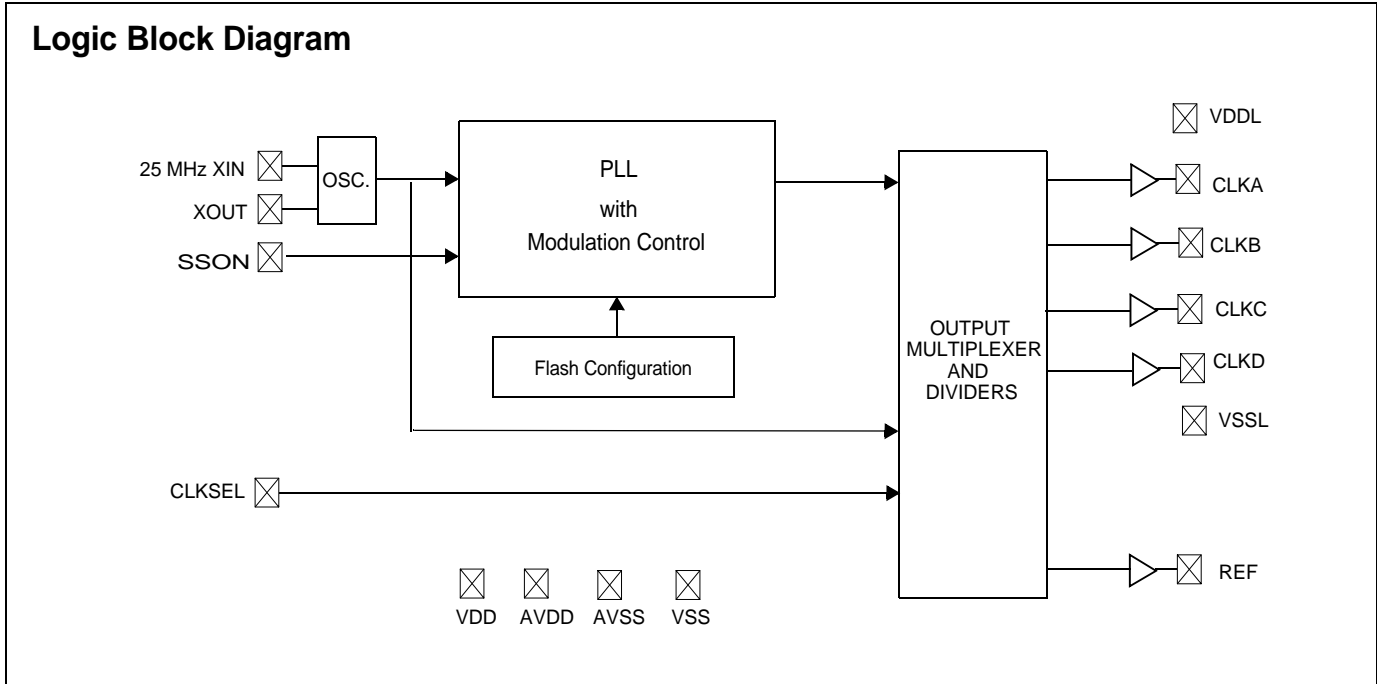
- Integrated phase-locked loop (PLL)
- Low jitter, high-accuracy outputs
- 3.3V operation
- 25-MHz input frequency
- 66.66-MHz or 33.33-MHz selectable output frequency (orig, -3,-11,-31)
- 33.33-MHz or 25-MHz selectable output frequency (-2,-21)

## Benefits

- High-performance PLL tailored for Spread Spectrum application
- Meets critical timing requirements in complex system designs
- Enables application compatibility
- Works with commonly available crystal or driven reference
- Downspread Spread Spectrum with 30-kHz nominal modulation frequency

**Table 1. Frequency Table for CLKA-D**

| Part Number | CLKSEL=0  | CLKSEL=1 | Spread% | Parallel Crystal Load |
|-------------|-----------|----------|---------|-----------------------|
| CY26121     | 66.66 MHz | 33.33    | -2.8%   | 6 pF                  |
| CY26121-2   | 33.33 MHz | 25.00    | -2.8%   | 6 pF                  |
| CY26121-3   | 66.66 MHz | 33.33    | -1.4%   | 6 pF                  |
| CY26121-11  | 66.66 MHz | 33.33    | -2.8%   | 15 pF                 |
| CY26121-21  | 33.33 MHz | 25.00    | -2.8%   | 15 pF                 |
| CY26121-31  | 66.66 MHz | 33.33    | -1.4%   | 15 pF                 |



## Pin Configuration

Figure 1. CY26121, 16-pin TSSOP

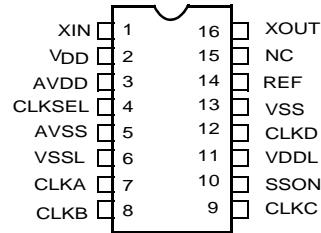


Table 2. Pin Definitions

| Name                | Pin Number            | Description   |
|---------------------|-----------------------|---|
| XIN                 | 1                     | Reference input Or Crystal Input                                |
| VDD                 | 2                     | 3.3V Voltage Supply   |
| AVDD                | 3                     | 3.3V Analog Voltage   |
| CLKSEL              | 4 (orig., -11,-3,-31) | 0 = 66.66MHz out, 1 = 33.33 MHz Out. Weak pull up.              |
| CLKSEL              | 4 (-2, -21)           | 0 = 33.33MHz out, 1 = 25 MHz Out. Weak pull up.                 |
| AVSS                | 5                     | Analog Ground   |
| VSSL                | 6                     | CLK Ground  |
| CLK(A:D)            | 7,8,9,12              | Clock Outputs at V <sub>DDL</sub> level                         |
| SSON                | 10                    | Spread Spectrum Enable pin 0 = SS off; 1 = SS on. Weak pull up. |
| VDDL                | 11                    | 3.3V Clock Voltage Supply                                       |
| VSS                 | 13                    | Ground  |
| REF                 | 14                    | Reference Output at V <sub>DD</sub> Level                       |
| NC                  | 15                    | No Connect  |
| XOUT <sup>[1]</sup> | 16                    | Crystal Output  |

### Maximum Ratings

Exceeding maximum ratings may impair the useful life of the device. These user guidelines are not tested.

Supply Voltage ( $V_{DD}$ ,  $AV_{DD}$ ,  $V_{DDL}$ ) ..... -0.5 to +7.0V  
 DC Input Voltage ..... -0.5V to  $V_{DD} + 0.5$   
 Storage Temperature  
 (Non-condensing) ..... -55°C to +125°C

Junction Temperature ..... -40°C to +125°C  
 Data Retention at  $T_j = 125^\circ\text{C}$  ..... > 10 years  
 Package Power Dissipation ..... 350 mW  
 Static Discharge Voltage .....  $\geq 2000\text{V}$   
 (per MIL-STD-883, Method 3015)

### Recommended Operating Conditions

| Parameter            | Description                                  | Min   | Typ. | Max   | Unit |
|----------------------|--|-------|------|-------|------|
| $V_{DD}$ , $AV_{DD}$ | Supply voltage                               | 3.135 | 3.30 | 3.465 | V    |
| $V_{DDL}$            | Supply voltage for CLK (A-D)                 | 3.135 | 3.30 | 3.465 | V    |
| $T_A$                | Ambient temperature (commercial temp. grade) | 0     |      | 70    | °C   |
| $T_A$                | Ambient Temperature (industrial temp grade)  | -40   |      | 85    | °C   |
| $C_{LOAD}$           | Max. output load capacitance                 |       |      | 15    | pF   |
| $F_{ref}$            | Reference frequency                          |       | 25   |       | MHz  |

### Crystal Specification<sup>[2]</sup>

| Parameter   | Name  | Min | Typ | Max | Unit     |
|-------------|---|-----|-----|-----|----------|
| $CR_{load}$ | Crystal load capacitance (original, -2, -3) |     | 6   |     | pF       |
| $CR_{load}$ | Crystal load capacitance (-11,-21,-31)      |     | 15  |     | pF       |
| ESR         | Equivalent series resistance                |     |     | 50  | $\Omega$ |

### DC Electrical Specifications

| Parameter      | Description                    | Condition  | Min | Typ. | Max | Unit          |
|----------------|--------------------------------|--|-----|------|-----|---------------|
| $I_{OH}$       | Output High Current            | $V_{OH} = V_{DD} - 0.5$ , $V_{DD}/V_{DDL}=3.3\text{V}$               | 12  | 24   |     | mA            |
| $I_{OL}$       | Output Low Current             | $V_{OL} = 0.5$ , $V_{DD}/V_{DDL} = 3.3\text{V}$                      | 12  | 24   |     | mA            |
| $I_{IH}$       | Input High Current             | $V_{IH} = V_{DD}$  |     | 5    | 10  | $\mu\text{A}$ |
| $I_{IL}$       | Input Low Current              | $V_{IL} = 0\text{V}$   |     |      | 50  | $\mu\text{A}$ |
| $V_{IH}$       | Input High Voltage             | CMOS levels  | 0.7 |      |     | $V_{DD}$      |
| $V_{IL}$       | Input Low Voltage              | CMOS levels  |     |      | 0.3 | $V_{DD}$      |
| $C_{IN}^{[3]}$ | Input Capacitance              | Input pins excluding XIN   |     |      | 7   | pF            |
| $R_{UP}^{[3]}$ | Pull up resistor on input pins | $V_{DD} = 3.14$ to $3.47\text{V}$ , measured at $V_{IN} = 0\text{V}$ | 80  | 100  | 150 | k $\Omega$    |
| $I_{DD}$       | Supply Current                 | $AV_{DD}/V_{DD}/V_{DDL}$ Current.                                    |     | 42   | 60  | mA            |

**Notes**

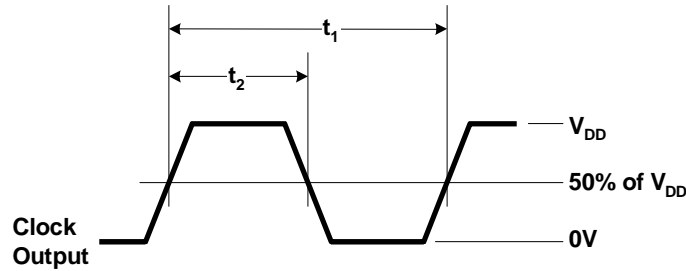
1. Float XOUT if XIN is externally driven.
2. A fundamental parallel resonant crystal must be used

**AC Electrical Specifications<sup>[3]</sup>**

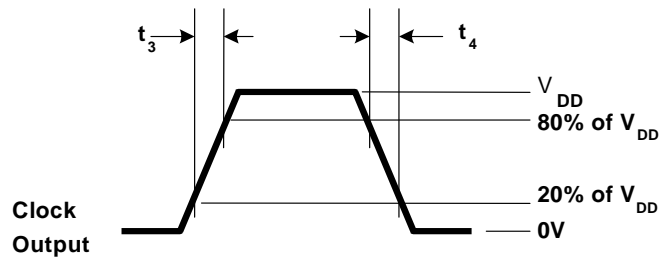
| Parameter | Description                     | Condition  | Min | Typ. | Max | Unit |
|-----------|---------------------------------|--|-----|------|-----|------|
| DC        | Output Duty Cycle               | Duty Cycle is defined in Figure 2, 50% of $V_{DD}$   | 45  | 50   | 55  | %    |
| ER        | Rising Edge Rate                | Output Clock Edge Rate, Measured from 20% to 80% of $V_{DD}$ , $C_{LOAD} = 15\text{ pF}$ See Figure 3. | 0.8 | 1.4  |     | V/ns |
| EF        | Falling Edge Rate               | Output Clock Edge Rate, Measured from 80% to 20% of $V_{DD}$ , $C_{LOAD} = 15\text{ pF}$ See Figure 3. | 0.8 | 1.4  |     | V/ns |
| tj        | RMS Clock Cycle-to-Cycle Jitter | RMS cycle-to-cycle jitter with Spread on. Measured at $V_{DD}/2$ .                                     |     | 15   | 40  | ps   |

**Voltage and Timing Definitions**

**Figure 2. Duty Cycle Definition**



**Figure 3.  $ER = (0.6 \times V_{DD}) / t_3$ ,  $EF = (0.6 \times V_{DD}) / t_4$**



**Note**

3. Guaranteed by Characterization, not 100% tested.

**Ordering Information**

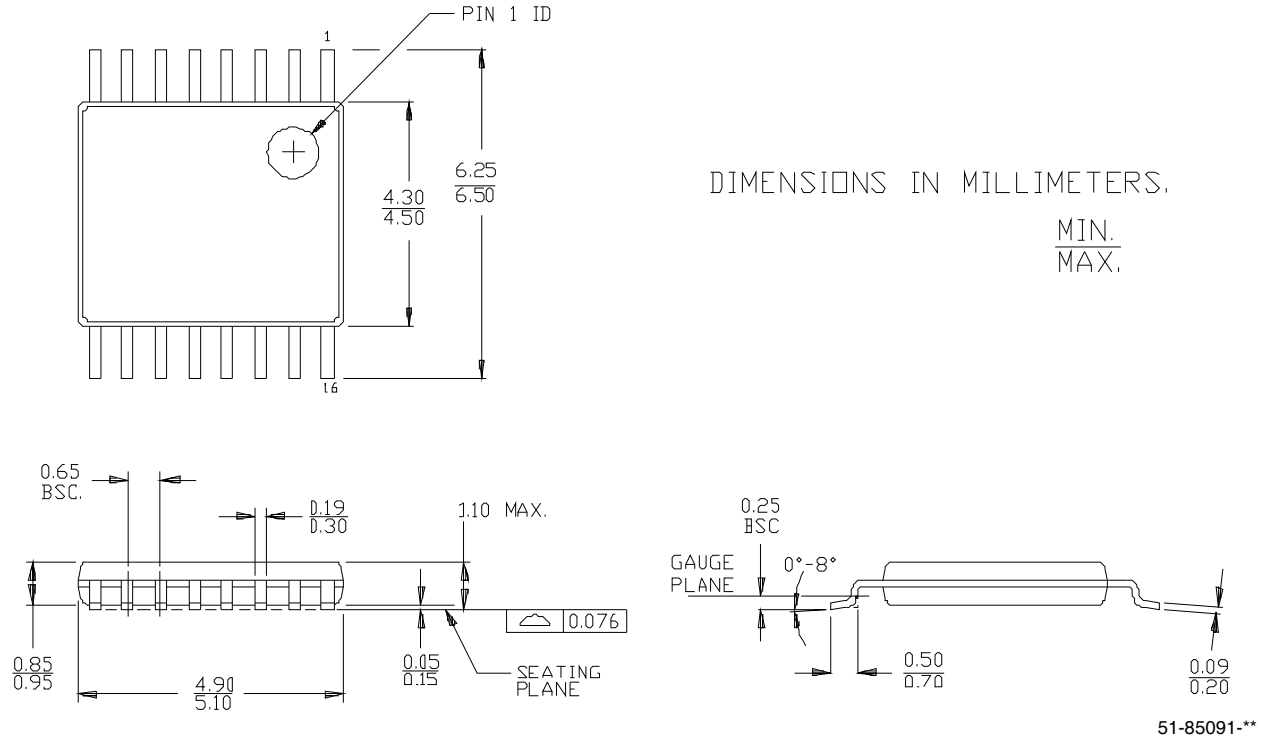
| Ordering Code                 | Package Type                 | Operating Range           |
|-------------------------------|------------------------------|---------------------------|
| CY26121ZC <sup>[4]</sup>      | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZCT <sup>[4]</sup>     | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121ZI <sup>[4]</sup>      | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121ZIT <sup>[4]</sup>     | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |
| CY26121ZC-2 <sup>[4]</sup>    | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZC-2T <sup>[4]</sup>   | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121ZI-2 <sup>[4]</sup>    | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121ZI-2T <sup>[4]</sup>   | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |
| CY26121ZC-3 <sup>[4]</sup>    | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZC-3T <sup>[4]</sup>   | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121ZI-3 <sup>[4]</sup>    | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121ZI-3T <sup>[4]</sup>   | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |
| CY26121ZC-11 <sup>[4]</sup>   | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZC-11T <sup>[4]</sup>  | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121ZC-21 <sup>[4]</sup>   | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZC-21T <sup>[4]</sup>  | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121ZI-21 <sup>[4]</sup>   | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121ZI-21T <sup>[4]</sup>  | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |
| CY26121ZC-31 <sup>[4]</sup>   | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZC-31T <sup>[4]</sup>  | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121KZC-21                 | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121KZC-21T                | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121KZI-21                 | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121KZI-21T                | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |
| <b>Pb-Free</b>                |                              |                           |
| CY26121ZXC-21 <sup>[4]</sup>  | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121ZXC-21T <sup>[4]</sup> | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121ZXI-21 <sup>[4]</sup>  | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121ZXI-21T <sup>[4]</sup> | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |
| CY26121KZXC-21                | 16-pin TSSOP                 | Commercial, 0°C to 70°C   |
| CY26121KZXC-21T               | 16-pin TSSOP – Tape and Reel | Commercial, 0°C to 70°C   |
| CY26121KZXI-21                | 16-pin TSSOP                 | Industrial, –40°C to 85°C |
| CY26121KZXI-21T               | 16-pin TSSOP – Tape and Reel | Industrial, –40°C to 85°C |

**Note**

4. Not recommended for new designs.

Package Drawing and Dimensions

Figure 4. 16-lead Thin Shrunk Small Outline Package (4.40 MM Body) Z16



| Parameter      | Inches    |       |       | Millimeters |      |      |
|----------------|-----------|-------|-------|-------------|------|------|
|                | Min       | Nom.  | Max   | Min         | Nom. | Max. |
| A              | -         | -     | 0.047 | -           | -    | 1.20 |
| A <sub>1</sub> | 0.002     | -     | 0.006 | 0.05        | -    | 0.15 |
| A <sub>2</sub> | 0.031     | 0.039 | 0.041 | 0.80        | 1.00 | 1.05 |
| B              | 0.007     | -     | 0.012 | 0.19        | -    | 0.30 |
| C              | 0.004     | -     | 0.008 | 0.09        | -    | 0.20 |
| D              | 0.193     | 0.197 | 0.201 | 4.90        | 5.00 | 5.10 |
| E              | 0.169     | 0.173 | 0.177 | 4.30        | 4.40 | 4.50 |
| e              | 0.026 BSC |       |       | 0.65 BSC    |      |      |
| H              | 0.244     | 0.252 | 0.260 | 6.20        | 6.40 | 6.60 |
| L              | 0.018     | 0.024 | 0.030 | 0.45        | 0.60 | 0.75 |
| a              | 0°        | -     | 8°    | 0°          | -    | 8°   |

## Document History Page

| Document Title: CY26121 PacketClock™ Spread Spectrum Clock Generator |         |            |                 |   |
|--|---------|------------|-----------------|---|
| Document Number: 38-07350  |         |            |                 |   |
| REV.   | ECN NO. | Issue Date | Orig. of Change | Description of Change   |
| **   | 121669  | 02/11/03   | CKN             | New Data Sheet  |
| *A   | 2440886 | See ECN    | KVM/AESA        | Updated template. Added Note "Not recommended for new designs."<br>Added part numbers CY26121ZXC-21, CY26121ZXC-21T, CY26121ZXI-21, and CY26121ZXI-21T in ordering information table.<br>Added part numbers CY26121KZC-21, CY26121KZC-21T, CY26121KZI-21, and CY26121KZI-21T.<br>Added part numbers CY26121KZXC-21, CY26121KZXC-21T, CY26121KZXI-21, and CY26121KZXI-21T.<br>Removed part numbers CY26121ZI-11, CY26121ZI-11T, CY26121ZI-31 and CY26121ZI-31T |

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