



T73327 / 73327A / 73327B

15-36 MHz, 3.3V VCXO

Applications

- Crystal-driven clock source for low cost set top boxes

General Description

The TLSI T73327/73327A is a single-chip, low-jitter Voltage-Controlled-Crystal-Oscillator. The device accepts a 15 MHz-36 MHz crystal input and produces a low-jitter output at the same frequency. A 0V to +3.3V control signal is used to fine-tune the output clock frequency in the ± 120 ppm range.

Features

- +3.3V operating voltage
- Uses inexpensive pullable crystals
- 12mA drive capability at TTL levels
- Low Cost
- 240 ppm pull range (± 120 ppm)
- Excellent pull range linearity
- 8-pin SOIC, 8-pin MSOP packages available
- Alternate industry pinouts available

Figure 1. Functional Block Diagram

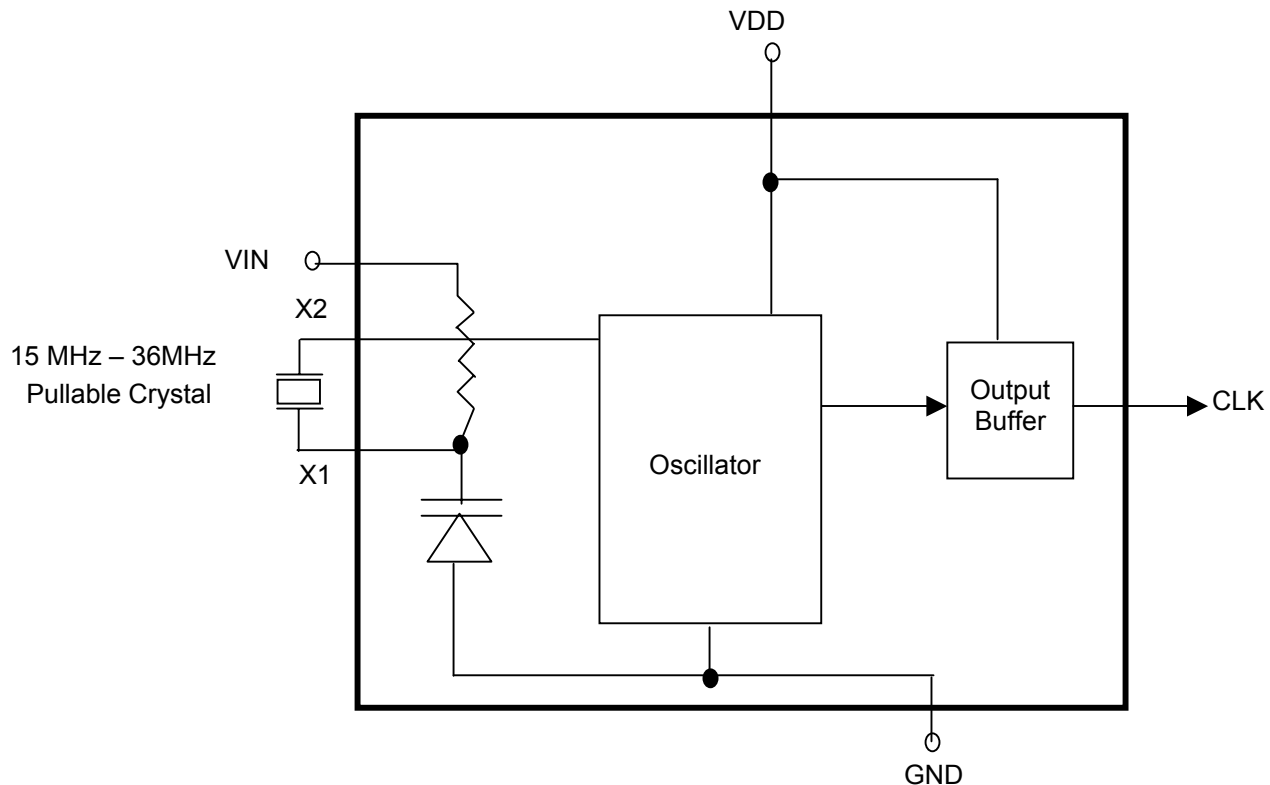
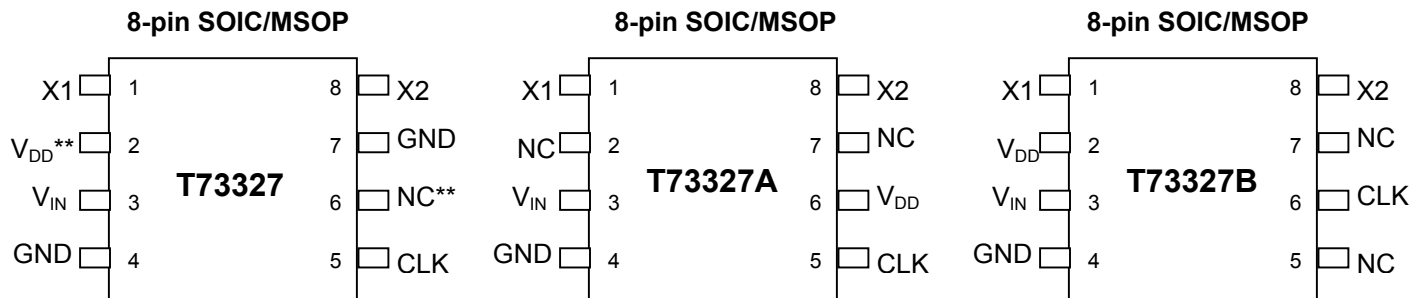


Figure 2. Pin Configuration



8-pin SOIC/MSOP
(See pages 4 & 5
for package outlines
&
ordering information)

Table 1. Pin Description

| Name | Pin No. | | | Type | Description |
|--------------------|---------|--------|--------|------|---|
| | 73327 | 73327A | 73327B | | |
| X1 | 1 | 1 | 1 | Xi | Crystal connection. Connect to a 15 MHz - 36MHz pullable crystal |
| V _{DD} ** | 2** | 6 | 2 | P | This pin can alternately be used to connect V _{DD} instead of pin 6 or left unconnected (for T73327 only). |
| V _{IN} | 3 | 3 | 3 | I | Tuning control input. Zero to +3.3V signal controls the frequency of the VCXO. |
| GND | 4, 7 | 4 | 4 | P | Connect to ground. |
| CLK | 5 | 5 | 6 | O | Clock output |
| NC** | 6** | - | 5 | NC | This pin can alternately be used to connect V _{DD} instead of pin 2 or left unconnected (for T73327 only). |
| NC | - | 2, 7 | 7 | NC | Do not connect |
| X2 | 8 | 8 | 8 | Xi | Crystal connection. Connect to a 15 MHz – 36 MHz pullable crystal. |

Legend: I = Input
O = Output
P = Power supply connection

Xi = Crystal connections
NC = No connection

****Note:** On the T73327 only, both pin 2 and pin 6 are internally connected to V_{DD}. Either pin or both can safely be connected to V_{DD} without damaging the part. Alternately, at the user's option, one pin may be used for V_{DD} with the other pin being left unconnected (NC).

Table 2. Absolute Maximum Ratings

| Parameter | Conditions | Min | Typ | Max | Units |
|---------------------------------|-------------------|------|-----|----------------------|-------|
| Supply voltage, V _{DD} | Referenced to GND | | | 7 | V |
| Inputs and Clock Outputs | Referenced to GND | -0.5 | | V _{DD} +0.5 | V |
| Soldering Temperature | Max of 10 seconds | | | +260 | °C |
| Storage temperature | | -65 | | +150 | °C |

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress specifications only and correct functional operation of the device at these or any other conditions above those listed in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

Table 3. Operating Conditions

| Parameter | Conditions | Min | Typ | Max | Units |
|--|------------|--------|------|--------|-------|
| Operating Voltage, V_{DD} | | +3.135 | +3.3 | +3.465 | V |
| Input High Voltage, V_{IH} , X1 pin only | | +2.5 | | | V |
| Input Low Voltage, V_{IL} , X1 pin only | | | | +0.4 | V |
| Operating Temperature | | 0 | | +70 | °C |
| VCXO control voltage, V_{IN} | | 0 | | +3.3 | V |

Table 4. DC Electrical Characteristics

$T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{DD} = +3.135\text{ V}$ to $+3.465\text{ V}$

| Parameter | Condition | Min | Typ ⁽¹⁾ | Max | Units |
|------------------------------------|-------------------------|-----|--------------------|------|-------|
| Output High Voltage, V_{OH} | $I_{OH} = -12\text{mA}$ | 2.4 | | | V |
| Output Low Voltage, V_{OL} | $I_{OL} = 12\text{mA}$ | | | 0.4 | V |
| Operating Supply Current, I_{DD} | No Load, 27 MHz | | 14.0 | 20.0 | mA |
| Short Circuit Current | Each output | | ±50 | | mA |
| Input Capacitance | | | 7 | | pF |

Note:

1. Typical values are at $V_{DD} = 3.3\text{V}$ and $+25^\circ\text{C}$

Table 5. AC Electrical Characteristics

$T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{DD} = +3.135\text{ V}$ to $+3.465\text{ V}$

| Symbol | Parameter | Condition | Min | Typ ⁽¹⁾ | Max | Units |
|----------------------------|---|---|------|--------------------|--------------|------------------|
| fosc | Input Crystal Frequency | | 15 | 27 | 36 | MHz |
| tr | Output Clock Rise Time | +0.8 to +2.0V | | | 1.5 | ns |
| tf | Output Clock Fall Time | +2.0 to +0.8V | | | 1.5 | ns |
| t _{od} | Output Clock Duty Cycle | At $V_{DD}/2$ | 45 | 50 | 55 | % |
| Lin | Pull Range Linearity ⁽²⁾ | $V_{IN} = 0.1 V_{DD} \sim 0.9 V_{DD}$ | | | 5 | % |
| | Frequency vs Supply voltage | | | | 5 | % |
| t _{jit} (pk – pk) | Maximum Absolute Jitter (Peak to Peak) | $C_L = 15\text{pF}$ | | | 50 | ps |
| | Phase Noise | 27 MHz @ 10 KHz 27 MHz @ 100 KHz | | | -154 -156 | dBc/Hz dBc/Hz |
| f _{PULL} | Output frequency pullability | $0\text{V} \leq V_{IN} \leq +3.3\text{V}$ | ±100 | ±120 | | ppm |

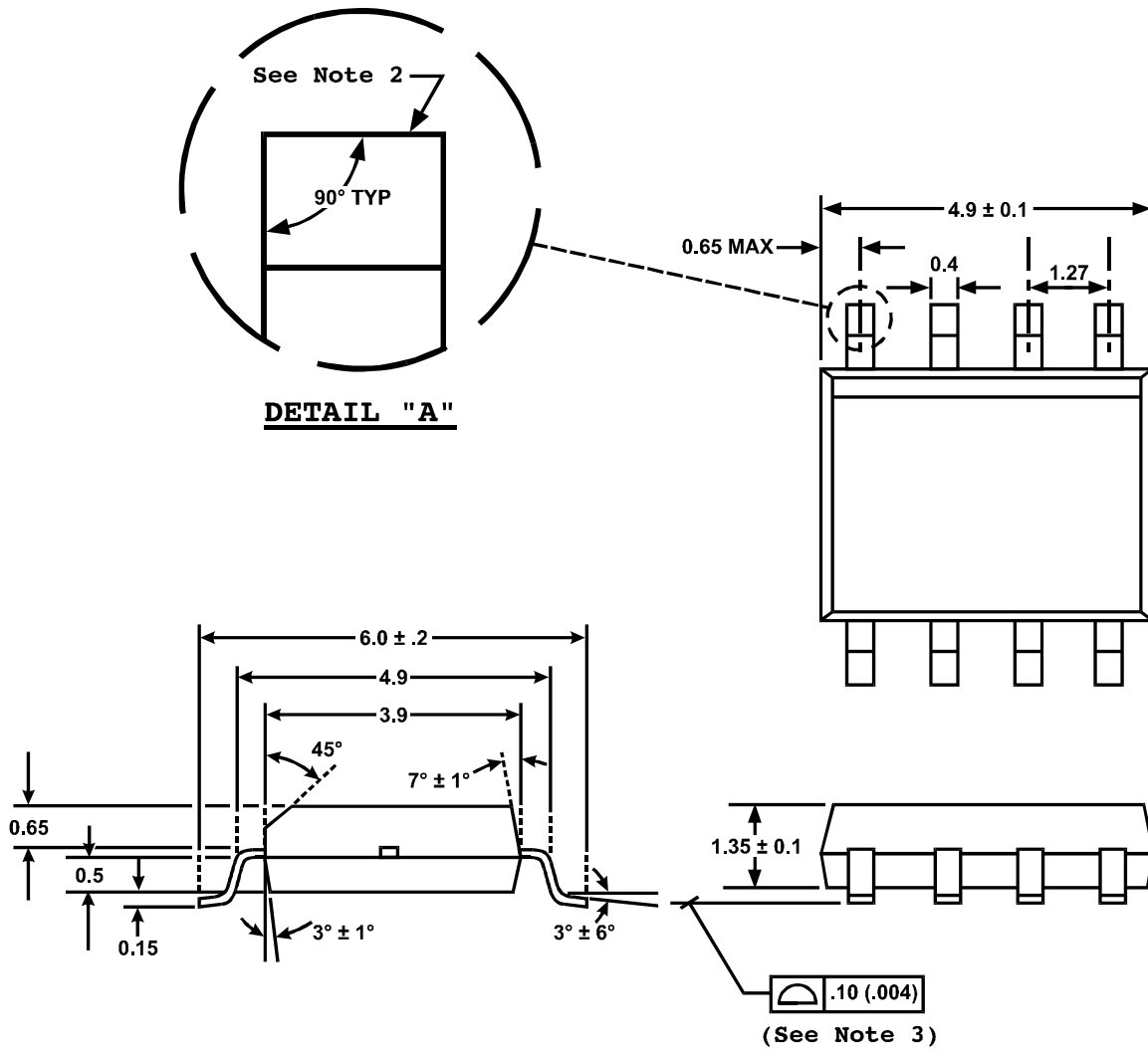
Note:

1. Typical values are at $V_{DD} = +3.3\text{V}$ and $+25^\circ\text{C}$
2. Mil-PRF-55310D 4.8.31.5 Deviation Linearity

Table 6. Pullable Crystal Specifications

| Parameter | Symbol | Value |
|--------------------------------|-----------|-----------------|
| Correlation (Load) Capacitance | C_L | 18 pF (typ) |
| Capacitance Ratio | C_0/C_1 | 240 max |
| Equivalent Series Resistance | ESR | 30 Ω max |

Figure 3. Package Outline (8-pin SOIC)



- Note:** 1) All dimensions are in mm.
 2) All leads must be blunt cut. (See DETAIL "A")
 3) Lead coplanarity not to exceed 0.004" maximum.

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Figure 4. Package Outline (8-pin MSOP)

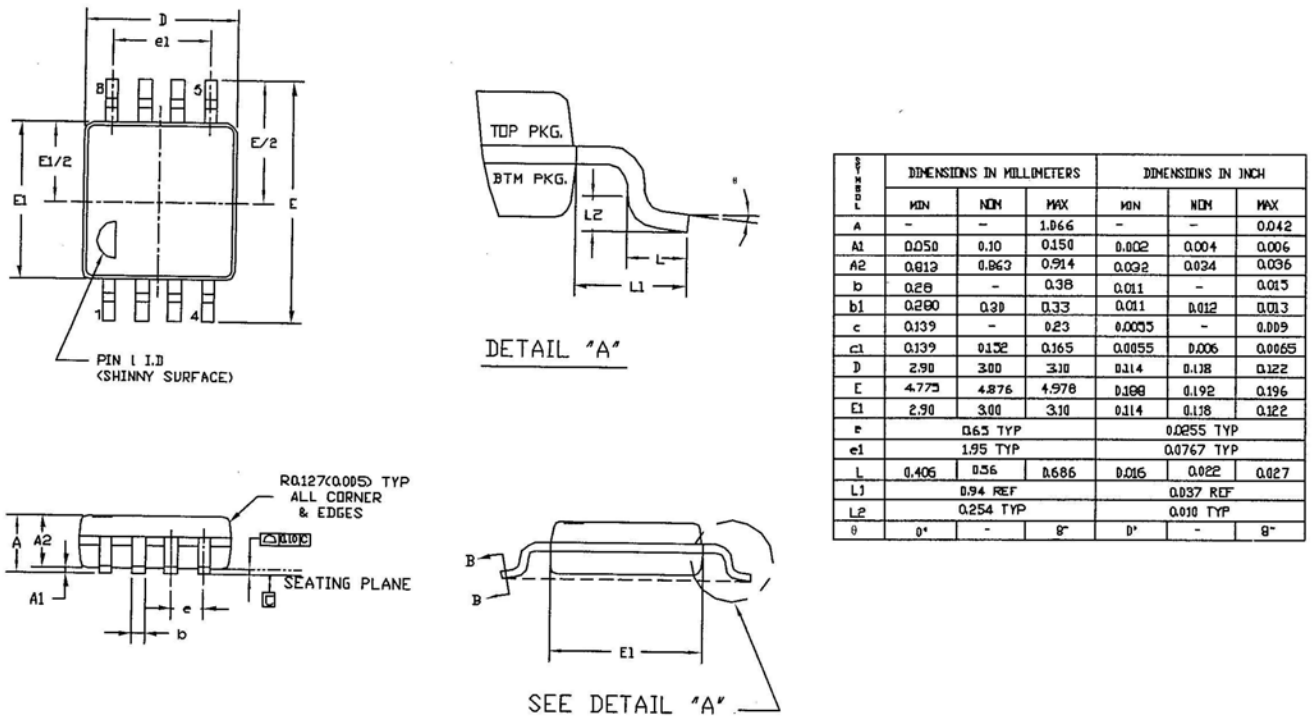


Table 7. Ordering Information

| Part Number | Marking | Shipping/Packaging | No. of Pins | Package | Temperature |
|--|------------------------------|---------------------|-------------|---------|--------------|
| T73327-SO8 T73327A-SO8 T73327B-SO8 | T73327 T73327A T73327B | Tubes | 8 | SOIC | 0°C to +70°C |
| T73327-SO8-TNR T73327A-SO8-TNR T73327B-SO8-TNR | T73327 T73327A T73327B | Tape & Reel | 8 | SOIC | 0°C to +70°C |
| T73327-MO8 T73327A-MO8 T73327B-MO8 | T73327 T73327A T73327B | Tubes | 8 | MSOP | 0°C to +70°C |
| T73327-MO8-TNR T73327A-MO8-TNR T73327B-MO8-TNR | T73327 T73327A T73327B | Tape & Reel | 8 | MSOP | 0°C to +70°C |
| T73327-DIE | N/A | Die in Waffle Pack | 8 | N/A | 0°C to +70°C |
| T73327-DPW | N/A | Die in Probed Wafer | 8 | N/A | 0°C to +70°C |