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# FT3001

## Reset Timer with Configurable Delay

### Features

- Delay Times: 3.0, 3.75, 4.5, 6.0 Seconds
- $\leq 1 \mu\text{A}$   $I_{\text{CC}}$  Current Consumption in Standby
- Primary and Secondary Input Reset Pins
- Push-Pull and Open-Drain Output Pins
- 1.65 V to 5.0 V Operation at  $T_A = 0^\circ\text{C}$  to  $+85^\circ\text{C}$
- 1.7 V to 5.0 V Operation at  $T_A = 0^\circ\text{C}$  to  $+85^\circ\text{C}$
- 1.8 V to 5.0 V Operation at  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$
- Available in 8-Lead MLP and 10-Lead UMLP Packages
- ESD Protection Exceeds:
  - 4 kV HBM (per JESD22-A114 & Mil Std 883e 3015.7)
  - 2 kV CDM (per ESD STM 5.3)

### Description

The FT3001 is a timer for resetting a mobile device where long reset times are needed. The long delay helps avoid unintended resets caused by accidental key presses. Four timer values can be selected by hard-wiring the DSR0 and DSR1 pins.

The FT3001 has two inputs for single- or dual-button resetting capability. The device has two outputs: a push-pull output with 0.5 mA drive and an open-drain output with 0.5 mA pull-down drive.

The FT3001 draws minimal supply current when inactive and functions over a power supply range of 1.65 V to 5.0 V.

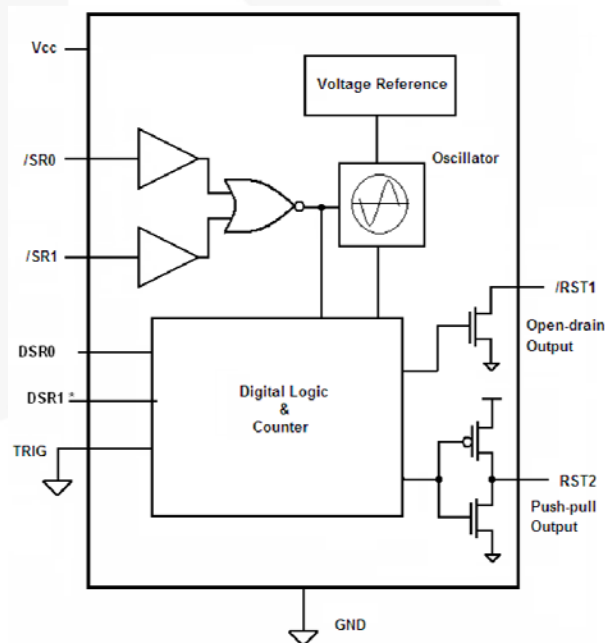


Figure 1. Block Diagram

### Ordering Information

| Part Number | Operating Temperature Range | Package  | Packing Method           |
|-------------|-----------------------------|--|--------------------------|
| FT3001UMX   | -40°C to +85°C              | 10-Lead, Ultrathin MLP, 1.4 x 1.8 x 0.55mm Package, 0.40 mm Pitch      | 5000 Units Tape and Reel |
| FT3001MPX   | -40°C to +85°C              | 8-Lead, Molded Leadless Package (MLP), Dual JEDEC, MO-229 2.0 x 2.0 mm | 3000 Units Tape and Reel |

## Pin Configurations

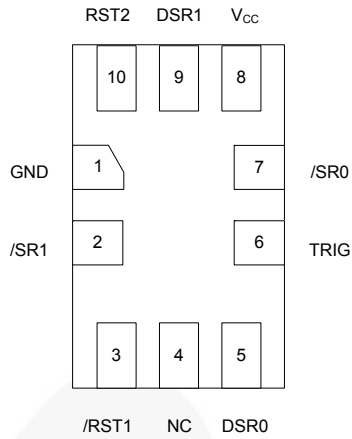


Figure 2. UMLP (Top Through View)

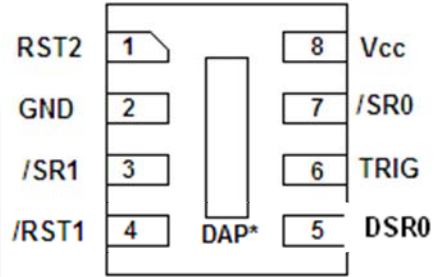


Figure 3. MLP (Top Through View)

## Pin Definitions

| UMLP Pin# | MLP Pin# | Name            | Description  |
|-----------|----------|-----------------|--|
| 1         | 2        | GND             | Ground   |
| 2         | 3        | /SR1            | Secondary Reset Input, Active LOW  |
| 3         | 4        | /RST1           | Open-Drain Output, Active LOW  |
| 4         |          | NC              | No Connect   |
| 5         | 5        | DSR0            | Delay Selection Input (Must be tied directly to GND or V <sub>CC</sub> ; do not use pull-up or pull-down resistors.) |
| 6         | 6        | TRIG            | Test Pin; tied to ground in normal use   |
| 7         | 7        | /SR0            | Primary Reset Input, Active LOW  |
| 8         | 8        | V <sub>CC</sub> | Power Supply   |
| 9         |          | DSR1            | Delay Selection Input (Must be tied directly to GND or V <sub>CC</sub> ; do not use pull-up or pull-down resistors.) |
| 10        | 1        | RST2            | Push-Pull Output, Active HIGH  |

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol          | Parameter                                       | Condition                         | Min. | Max.         | Unit |
|-----------------|---|-----------------------------------|------|--------------|------|
| $V_{CC}$        | Supply Voltage                                  |                                   | -0.5 | 7.0          | V    |
| $V_{IN}$        | DC Input Voltage                                | /SR0, /SR1, TRIG, DSR0            | -0.5 | 7.0          | V    |
| $V_{OUT}$       | Output Voltage <sup>(1)</sup>                   | /RST1, RST2 HIGH or LOW           | -0.5 | $V_{CC}+0.5$ | V    |
|                 |   | /RST1, RST2, $V_{CC}=0$ V         | -0.5 | 7.0          |      |
| $I_{IK}$        | DC Input Diode Current                          | $V_{IN} < 0$ V                    |      | -50          | mA   |
| $I_{OK}$        | DC Output Diode Current                         | $V_{OUT} < 0$ V                   |      | -50          | mA   |
|                 |   | $V_{OUT} > V_{CC}$                |      | +50          |      |
| $I_{OH}/I_{OL}$ | DC Output Source/Sink Current                   |                                   | -50  | +50          | mA   |
| $I_{CC}$        | DC $V_{CC}$ or Ground Current per Supply Pin    |                                   |      | $\pm 100$    | mA   |
| $T_{STG}$       | Storage Temperature Range                       |                                   | -65  | +150         | °C   |
| $V_{CC}$        | Junction Temperature Under Bias                 |                                   |      | +150         | °C   |
| $V_{IN}$        | Junction Lead Temperature, Soldering 10 Seconds |                                   |      | +260         | °C   |
| $P_D$           | Power Dissipation                               |                                   |      | 5            | mW   |
| ESD             | Electrostatic Discharge Capability              | Human Body Model, JESD22-A114     |      | 4            | kV   |
|                 |   | Charged Device Model, JESD22-C101 |      | 2            |      |

**Note:**

- $I_O$  absolute maximum rating must be observed.

## Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

| Symbol               | Parameter                                      | Conditions   | Min. | Max.            | Unit |
|----------------------|--|--|------|-----------------|------|
| V <sub>CC</sub>      | Supply Voltage                                 | T <sub>A</sub> = 0°C to +85°C                                | 1.65 | 5.00            | V    |
|                      |  | T <sub>A</sub> = -25°C to +85°C                              | 1.7  | 5.0             |      |
|                      |  | T <sub>A</sub> = -40°C to +85°C                              | 1.8  | 5.0             |      |
| t <sub>VCC_REC</sub> | V <sub>CC</sub> Recovery Time After Power Down | V <sub>CC</sub> = 0 V after power down, then rising to 0.5 V | 5    |                 | ms   |
| V <sub>IN</sub>      | Input Voltage <sup>(2)</sup>                   | /SR0, /SR1   | 0    | 5.0             | V    |
| V <sub>OUT</sub>     | Output Voltage                                 | /RST1, RST2 High or Low                                      | 0    | V <sub>CC</sub> | V    |
|                      |  | /RST1, RST2, V <sub>CC</sub> = 0 V                           | 0    | 5.0             |      |
| I <sub>OH</sub>      | DC Output Source Current                       | RST2, 1.8 V ≤ V <sub>CC</sub> ≤ 3.0 V                        | -100 |                 | μA   |
|                      |  | RST2, 3.0 V ≤ V <sub>CC</sub> ≤ 5.0 V                        | -500 |                 |      |
| I <sub>OL</sub>      | DC Output Sink Current                         | /RST1, RST2, V <sub>CC</sub> = 1.8V to 5.0 V                 | +500 |                 |      |
| T <sub>A</sub>       | Free Air Operating Temperature                 |  | -40  | +85             | °C   |
| θ <sub>JA</sub>      | Thermal Resistance                             | MLP-8  |      | 245             | °C/W |
|                      |  | UMLP-10  |      | 200             |      |

### Notes:

- All unused inputs must be held at V<sub>CC</sub> or GND.

## DC Electrical Characteristics

Unless otherwise specified, conditions of T<sub>A</sub>=-40 to 80C with V<sub>CC</sub>=1.8 - 5.0V OR T<sub>A</sub>=-25 to 85C with V<sub>CC</sub>=1.7 – 5V OR T<sub>A</sub>=0 to 85C with V<sub>CC</sub>=1.65 – 5V produce the performance characteristics below.

| Symbol          | Parameter                                 | Condition  | Min.                  | Max.                  | Unit |
|-----------------|---|--|-----------------------|-----------------------|------|
| V <sub>IH</sub> | Input High Voltage <sup>(3)</sup>         | /SR0, /SR1   | 0.8 x V <sub>CC</sub> |                       | V    |
| V <sub>IL</sub> | Input Low Voltage                         | /SR0, /SR1   |                       | 0.2 x V <sub>CC</sub> | V    |
| V <sub>IH</sub> | Input High Voltage                        | DSR0, DSR1   | 0.8 x V <sub>CC</sub> |                       | V    |
| V <sub>IL</sub> | Input Low Voltage                         | DSR0, DSR1   |                       | 0.2 x V <sub>CC</sub> | V    |
| V <sub>OH</sub> | High Level Output Voltage                 | RST2, I <sub>OH</sub> =-100 μA                               | 0.8 x V <sub>CC</sub> |                       | V    |
|                 |   | RST2, I <sub>OH</sub> =-500 μA, V <sub>CC</sub> =3.0 to 5.0V | 0.8 x V <sub>CC</sub> |                       |      |
| V <sub>OL</sub> | Low Level Output Voltage                  | RST2, I <sub>OL</sub> =500 μA                                |                       | 0.3                   | V    |
|                 |   | /RST1, I <sub>OL</sub> =500 μA                               |                       | 0.3                   |      |
| I <sub>IN</sub> | Input Leakage Current                     | V <sub>IN</sub> = 0.0 V or 5.0 V                             |                       | ±1                    | μA   |
| I <sub>CC</sub> | Quiescent Supply Current (Timer Inactive) | /SR0 or /SR1=V <sub>CC</sub>                                 |                       | 1                     | μA   |
| I <sub>CC</sub> | Dynamic Supply Current (Timer Active)     | /SR0 and /SR1=0 V  |                       | 100                   | μA   |

### Note:

- /SR0 and /SR1 HIGH levels should be referenced to the same V<sub>CC</sub> rail supplying the FT3001.

## AC Electrical Characteristics

Unless otherwise specified, conditions of  $T_A = -40$  to  $80^\circ\text{C}$  with  $V_{CC} = 1.8 - 5.0 \text{ V}$  OR  $T_A = -25$  to  $85^\circ\text{C}$  with  $V_{CC} = 1.7 - 5 \text{ V}$  OR  $T_A = 0$  to  $85^\circ\text{C}$  with  $V_{CC} = 1.65 - 5 \text{ V}$  produce the performance characteristics below.

| Symbol                     | Parameter                                   | Condition  | Min. | Typ. | Max. | Unit |
|----------------------------|---|--|------|------|------|------|
| $t_{PHL1}$ ,<br>$t_{PLH1}$ | Timer Delay, /SRn to /RST1 (DSR0=0, DSR1=0) | $C_L = 5 \text{ pF}$ , $R_L = 5 \text{ k}\Omega$ ,<br>Figure 9, Figure 4, Figure 5 | 2.40 | 3.00 | 3.60 | s    |
|                            | Timer Delay, /SRn to /RST1 (DSR0=0, DSR1=1) | $C_L = 5 \text{ pF}$ , $R_L = 5 \text{ k}\Omega$ , Figure 9, Figure 4, Figure 5    | 3.00 | 3.75 | 4.50 |      |
|                            | Timer Delay, /SRn to RST2 (DSR0=1, DSR1=0)  | $C_L = 5 \text{ pF}$ , $R_L = 10 \text{ k}\Omega$ , Figure 6, Figure 7             | 3.60 | 4.50 | 5.40 |      |
|                            | Timer Delay, /SRn to RST2 (DSR0=1, DSR1=1), | $C_L = 5 \text{ pF}$ , $R_L = 10 \text{ k}\Omega$ , Figure 6, Figure 7             | 4.80 | 6.00 | 7.20 |      |
| $t_{REC}$                  | Reset Timeout Delay, /RST1 and RST2         | Figure 4, Figure 5, Figure 6, Figure 7   |      | 400  |      | ms   |

## Capacitance Specifications

$T_A = +25^\circ\text{C}$ .

| Symbol    | Parameter          | Condition                | Typical | Unit |
|-----------|--------------------|--------------------------|---------|------|
| $C_{IN}$  | Input Capacitance  | $V_{CC} = \text{GND}$    | 4.0     | pF   |
| $C_{OUT}$ | Output capacitance | $V_{CC} = 5.0 \text{ V}$ | 5.0     | pF   |

### AC Test Circuits and Waveforms

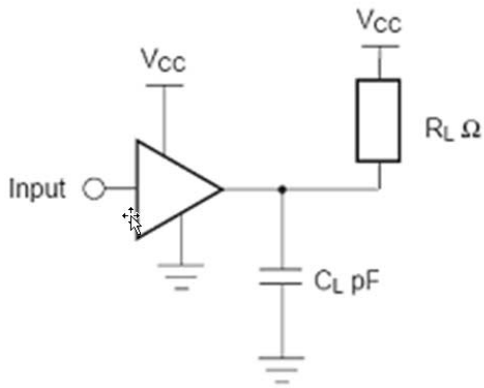


Figure 4. AC Test Circuit, RST1 Output

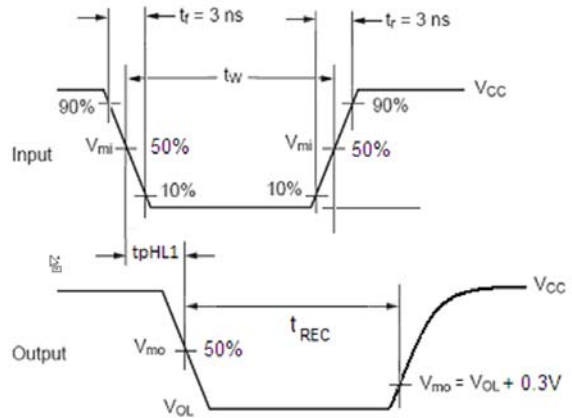


Figure 5. RST1 Output Waveform

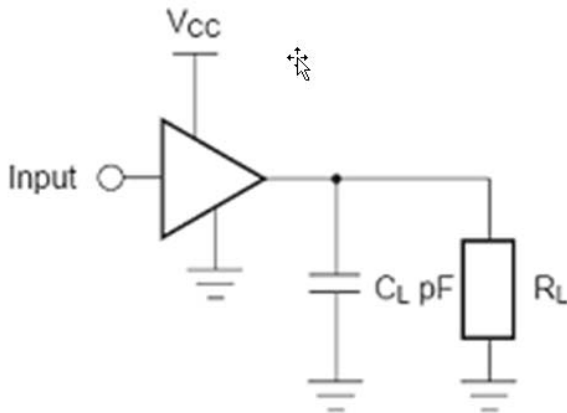


Figure 6. AC Test Circuit, RST2 Output

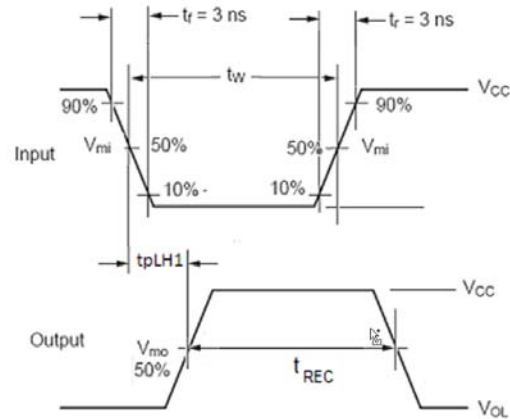


Figure 7. RST2 Output Waveform

## Functional Description

The reset timer uses an internal oscillator and a two-stage 21-bit counter to determine when the output pins switch. The time,  $n$ , is set by the hard-wired logic level of the DSR0 and DSR1 pins. See Table 1 & 2.

**Table 1. FT3001UMX Truth Table**


| DSR0 | DSR1 | Reset Time ( $\pm 20\%$ ) in Seconds |
|------|------|--------------------------------------|
| 0    | 0    | 3.00                                 |
| 0    | 1    | 3.75                                 |
| 1    | 0    | 4.50                                 |
| 1    | 1    | 6.00                                 |

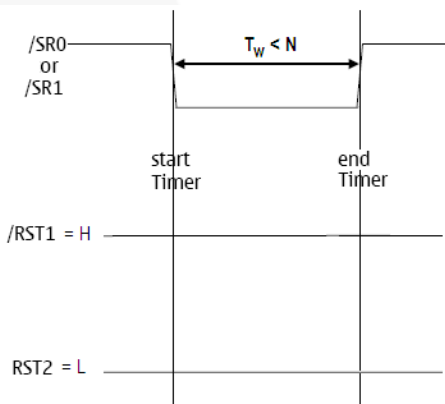
**Table 2. FT3001MPX Truth Table**

| DSR0 | Reset Time ( $\pm 20\%$ ) in Seconds |
|------|--------------------------------------|
| 0    | 3.0                                  |
| 1    | 4.5                                  |

The two CMOS input pins, /SR0 and /SR1, control the reset function. A low input signal on both /SR0 and /SR1 starts the oscillator. Both /SR0 and /SR1 pins must be held LOW for time  $n$  before the /RST1 and RST2 outputs are activated. The TRIG pin should be tied LOW during normal operation. The TRIG pin is used for SCAN testing.

**Table 3. Short Duration**

| /SR0  | /SR1 | /RST1 | RST2 | Description   |
|---|------|-------|------|---|
|  | L    | H     | L    | The timer starts counting when both inputs go LOW. The timer stops counting and resets when either input goes high. No changes occur on the outputs. Both /SR0 and /SR1 need to be LOW to activate (start) the timer. |



**Figure 8. Short Duration**

## Application Information

**IMPORTANT:** The DSR0 and DSR1 pins must be tied directly to  $V_{CC}$  or GND to provide a HIGH or LOW voltage level. The voltage level on the DSR pin determines the length of the configurable delay. The voltage level on the DSR pins must not change during normal operation. Do not use pull-up or pull-down resistors on DSR pins.

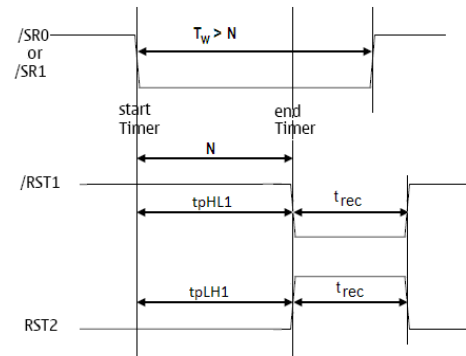
### Short Duration (Button Press Time $< n$ )

In this case, both input /SR0 and /SR1 are LOW for a duration ( $t_w$ ) that is shorter than time  $n$ . When an input goes LOW, the internal timer starts counting. If the input goes HIGH before time  $n$ , the timer stops counting and resets and no changes occur on the outputs.

### Long Duration ( $t_w > n$ )







In this case, both input /SR0 and /SR1 are LOW for a duration ( $t_w$ ) that is longer than time  $n$ . When an input goes LOW, the internal timer starts counting.

After time  $n$ , the outputs switch and the timer stops counting. After time  $t_{REC}$ , the outputs return to their original states.



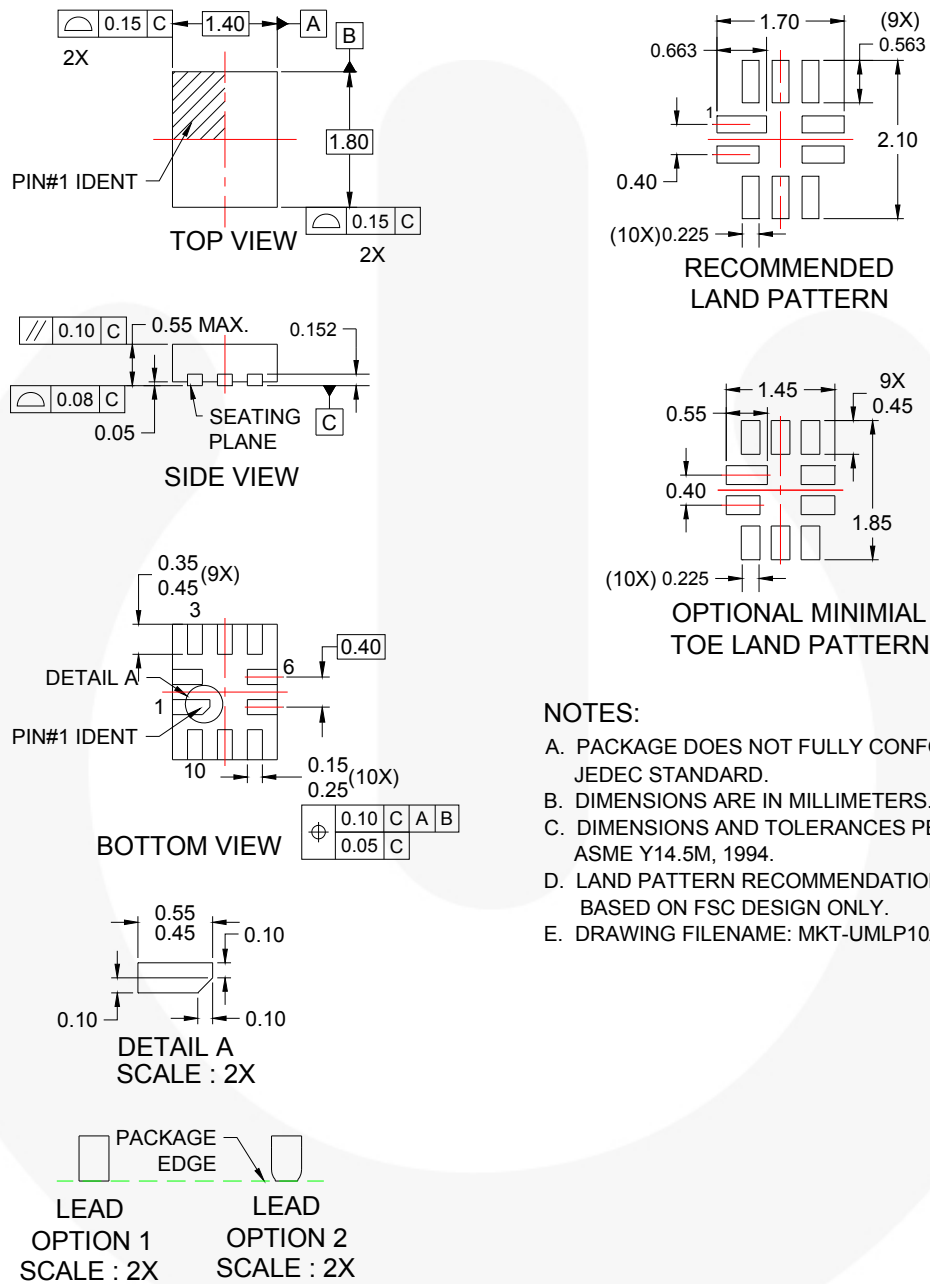
**Figure 9. Long Duration**

**Table 4. Long Duration**

| /SR0  | /SR1  | /RST1   | RST2  | Description  |
|---|---|---|---|--|
|  | L   |  |  | The timer starts counting when both inputs go LOW. After time $n$ , the outputs switch. After time $t_{REC}$ , the outputs return to their original states. Both /SR0 and /SR1 need to be LOW to activate (start) the timer. |
| L   |  |  |  |  |



## Physical Dimensions

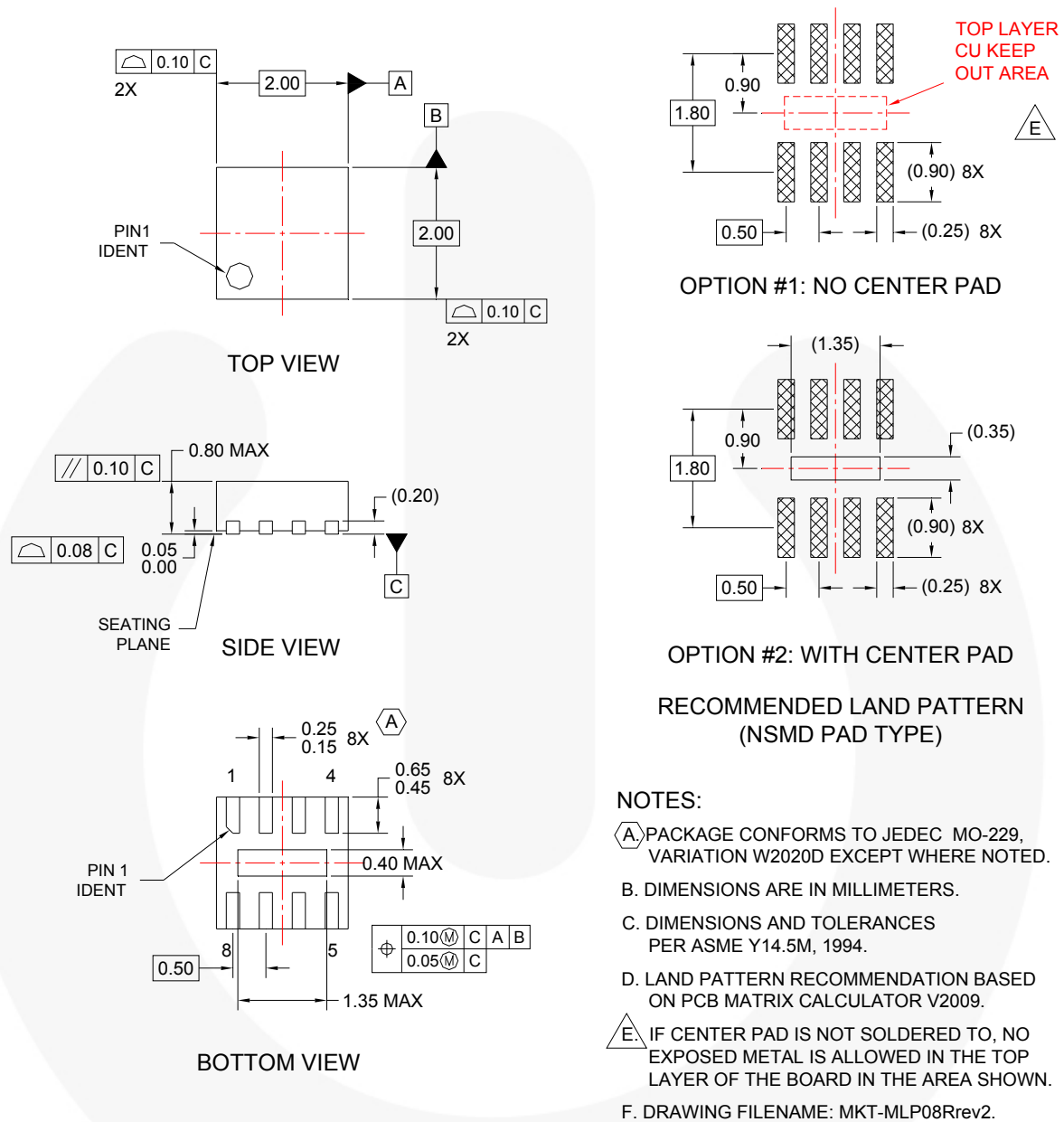


**Figure 10. 10-Lead, Ultrathin MLP, 1.4 x 1.8 x 0.55 mm Package, 0.40 mm Pitch**

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### Physical Dimensions (Continued)



**Figure 11. 8-Lead, Molded Leadless Package (MLP), Dual JEDEC, MO-229 2.0 x 2.0 mm**

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