



钜地半导体  
Tudi Semiconductor

## Product Specification

TUDI-CAT1232

5 V Supply Monitor, Watchdog Timer, Manual Reset,  
with Active High & Low Resets

网址 [www.sztdbdt.com](http://www.sztdbdt.com) Q

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## Features

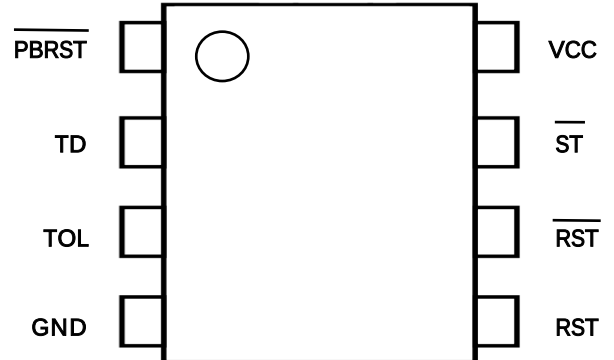
- Selectable reset voltage tolerance
  - CAT1232LP for 5 V supply
- Selectable watchdog period: 150 ms, 600 ms or 1.2 s
- Two reset outputs
  - Active high, push-pull reset output
  - Active low, open-drain reset output
- Debounced manual push-button reset

## Applications

- Microprocessor Systems
- Portable Equipment
- Controllers
- Single Board Computers
- Instrumentations
- Telecommunications

## Description

The 1232 microprocessor monitor can suspend and re-start “hung” or “stalled” microprocessors, start the microprocessor after a power interruption, and debounce the manual/pushbutton microprocessor reset switch. A precision reference and comparator circuit monitors the 5V power supply voltage VCC. RESET and  $\overline{\text{RESET}}$  are both activated when the power supply voltage is outside the selected tolerance limit at power-on or at any time. the power supply voltage rises above the RE threshold voltage, the reset signal remains active for a minimum of 250ms to allow the power supply and system processor to stabilize. over-zero tolerance input TOL selects the over-zero tolerance for the 1232 5V power supply as either 5% or 10% and 10 or 20%. All devices have a push-pull high-level reset output. The 1232 also has an open-drain lowlevel reset output. The debounced manual reset input activates the reset output and remains active for a minimum of 20ms after release. Also included is a watchdog timer forcing a microprocessor that has stopped due to a software or hardware fault. Three watchdog timeout periods are selectable, 150ms, 600ms, and 1.2s. If a low-level pulse is not received on the  $\overline{\text{ST}}$  input before the watchdog timeout period, the reset will remain active for a minimum of 20ms.



Pin Diagram

## Pin description

|   |       |                                      |
|---|-------|--------------------------------------|
| 1 | PBRST | Pushbutton Reset Input               |
| 2 | TD    | Time Delay Set                       |
| 3 | TOL   | Selects 5% or 10% Vcc Detect         |
| 4 | GND   | Ground                               |
| 5 | RST   | Reset Output (Active High)           |
| 6 | RST   | Reset Output (Active Low, opendrain) |
| 7 | ST    | Strobe Input                         |
| 8 | Vcc   | +5 Volt Power                        |

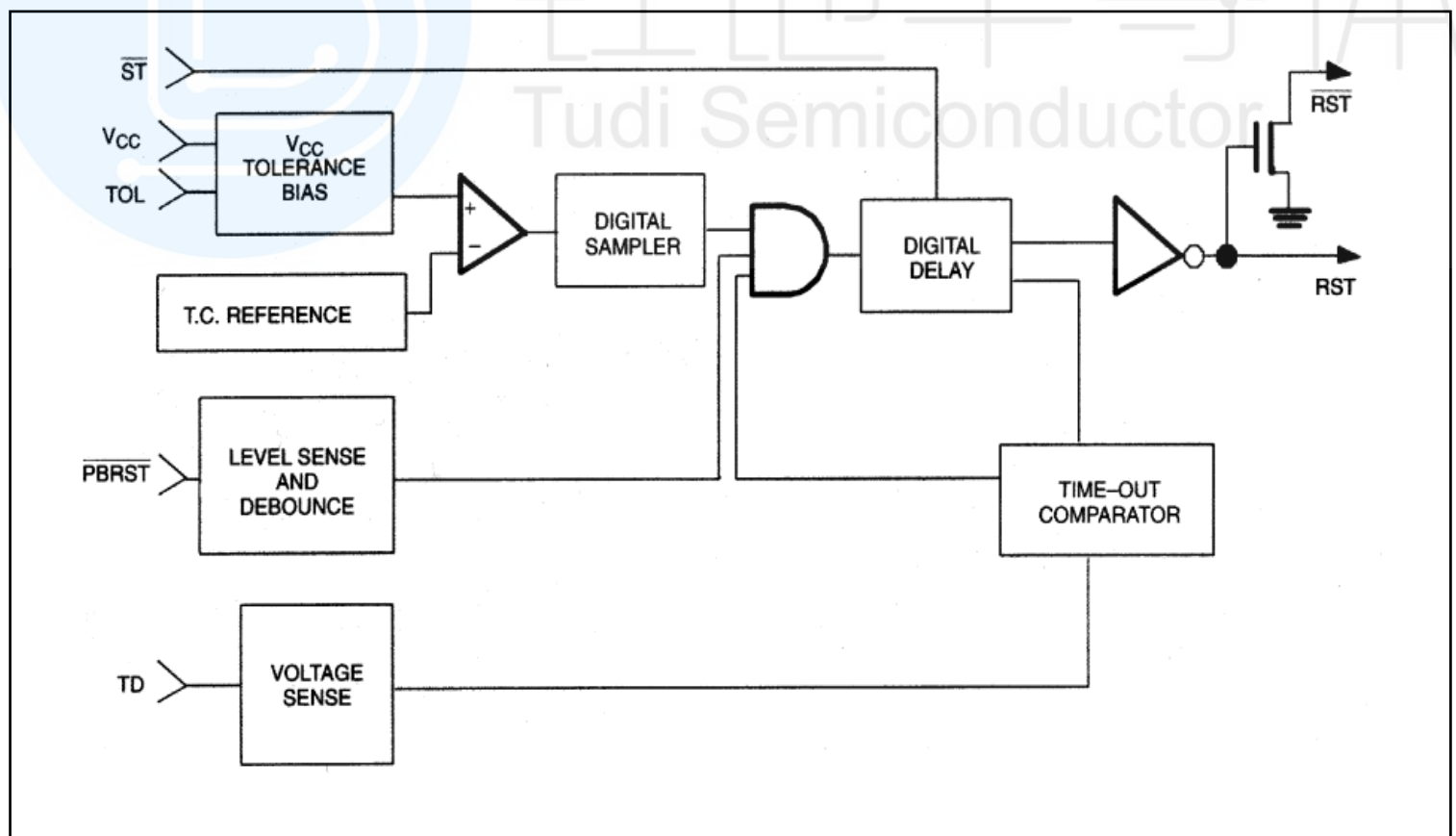


## Parameter limit

|                                            |                      |
|--------------------------------------------|----------------------|
| Voltage on Vcc Pin Relative to Ground      | -0.5V to +7.0V       |
| Voltage on I/O Relative to Ground          | -0.5V to Vcc+0.5V    |
| Operating Temperature                      | 0°C to 70°C          |
| Operating Temperature (Industrial Version) | - 40°C to 85°C       |
| Storage Temperature                        | -55°C to+125°C       |
| Soldering Temperature                      | 260°C for 10 seconds |

This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

## Micro-detector block diagram





### Operation - Power monitoring

The 1232 detects out-of-tolerance power supply conditions and warns a processor-based system of impending power failure. When  $V_{cc}$  falls below a preset level as defined by TOL, the  $V_{cc}$  comparator outputs the signals RST and  $\overline{RST}$ . When TOL is connected to ground, the RST and  $\overline{RST}$  signals become active as  $V_{cc}$  falls below 4.75 volts. When TOL is connected to  $V_{cc}$ , the RST and  $\overline{RST}$  signals become active as  $V_{cc}$  falls below 4.5 volts. The RST and  $\overline{RST}$  are excellent control signals for a microprocessor, as processing is stopped at the last possible moments of valid  $V_{cc}$ . On power-up, RST and  $\overline{RST}$  are kept active for a minimum of 250 ms to allow the power supply and processor to stabilize.

### Operation - Button reset

The 1232 provides an input pin for direct connection to a pushbutton (Figure 1). The pushbutton reset input requires an active low signal. Internally, this input is debounced and timed such that RST and  $\overline{RST}$  signals of at least 250 ms minimum are generated. The 250 ms delay starts as the pushbutton reset input is released from low level.

### Operation - Watchdog timer

The watchdog timer function forces RST and  $\overline{RST}$  signals to the active state when the  $\overline{ST}$  input is not stimulated for a predetermined time period. The time period is set by the TD input to be typically 150 ms with TD connected to ground, 600 ms with TD left unconnected, and 1.2 seconds with TD connected to  $V_{cc}$ . The watchdog timer starts timing out from the set time period as soon as RST and  $\overline{RST}$  are inactive. If a high-to-low transition occurs on the  $\overline{ST}$  input pin prior to timeout, the watchdog timer is reset and begins to timeout again. If the watchdog timer is allowed to timeout, then the RST and  $\overline{RST}$  signals are driven to the active state for 250 ms minimum. The  $\overline{ST}$  input can be derived from microprocessor address signals, data signals, and/or control signals. When the microprocessor is functioning normally, these signals would, as a matter of routine, cause the watchdog to be reset prior to timeout. To guarantee that the watchdog timer does not timeout, a high-to-low transition must occur at or less than the minimum shown in Table 1. A typical circuit example is shown in Figure 2.



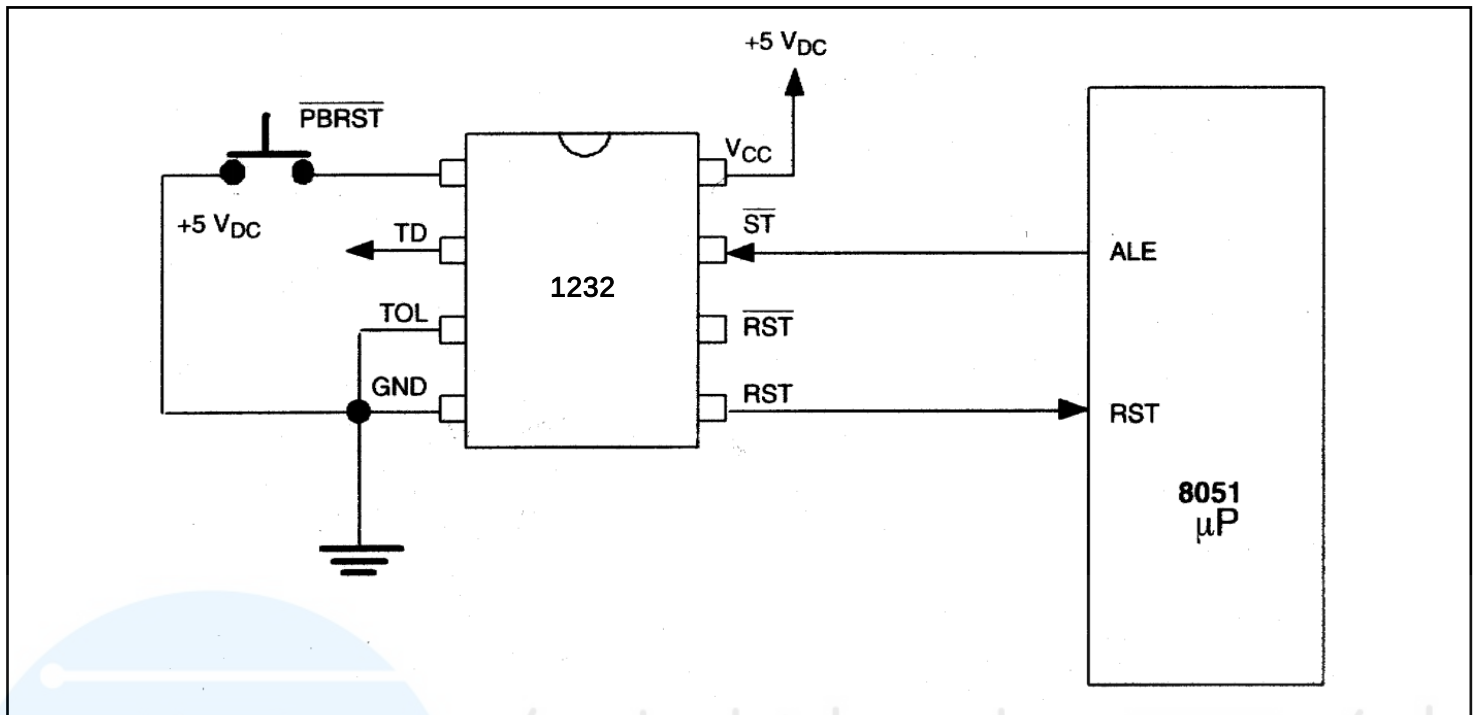


Figure 1 Button reset

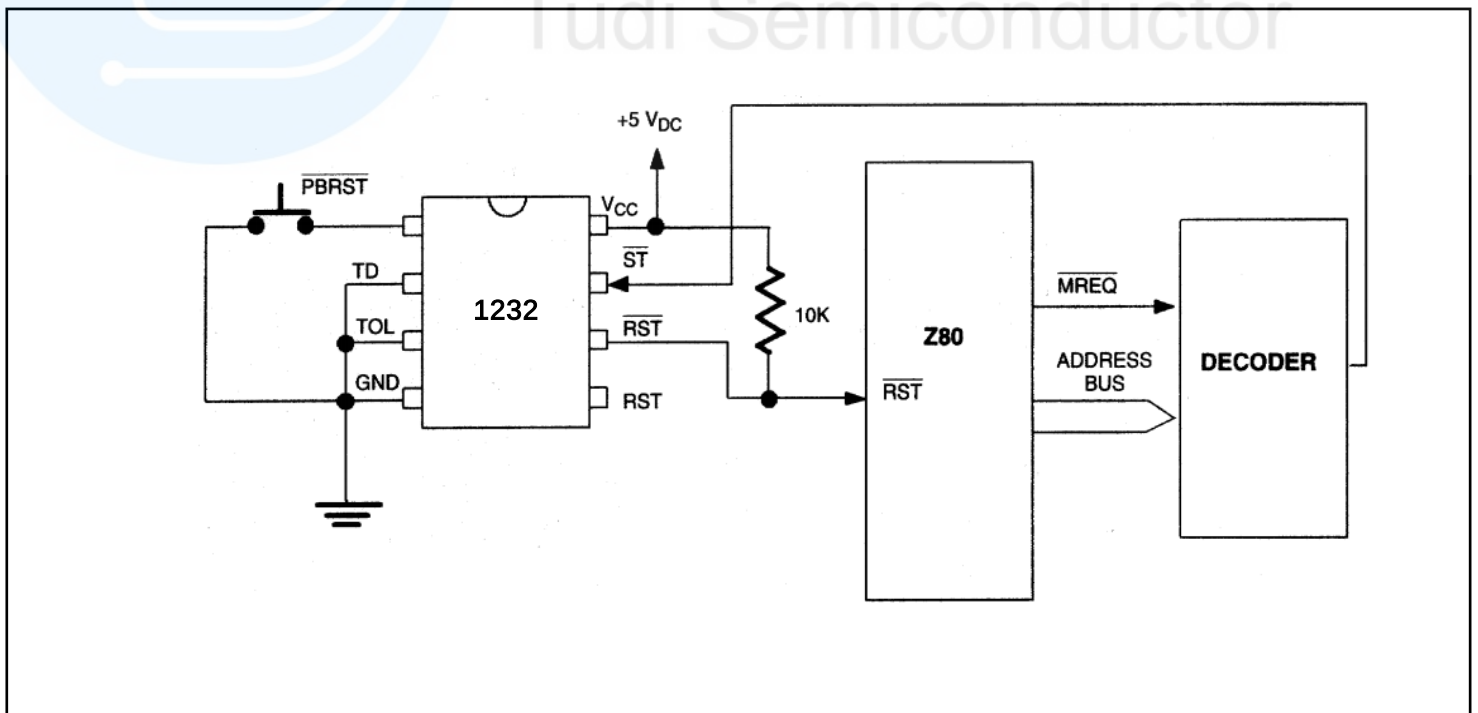


Figure 2 Watchdog timer

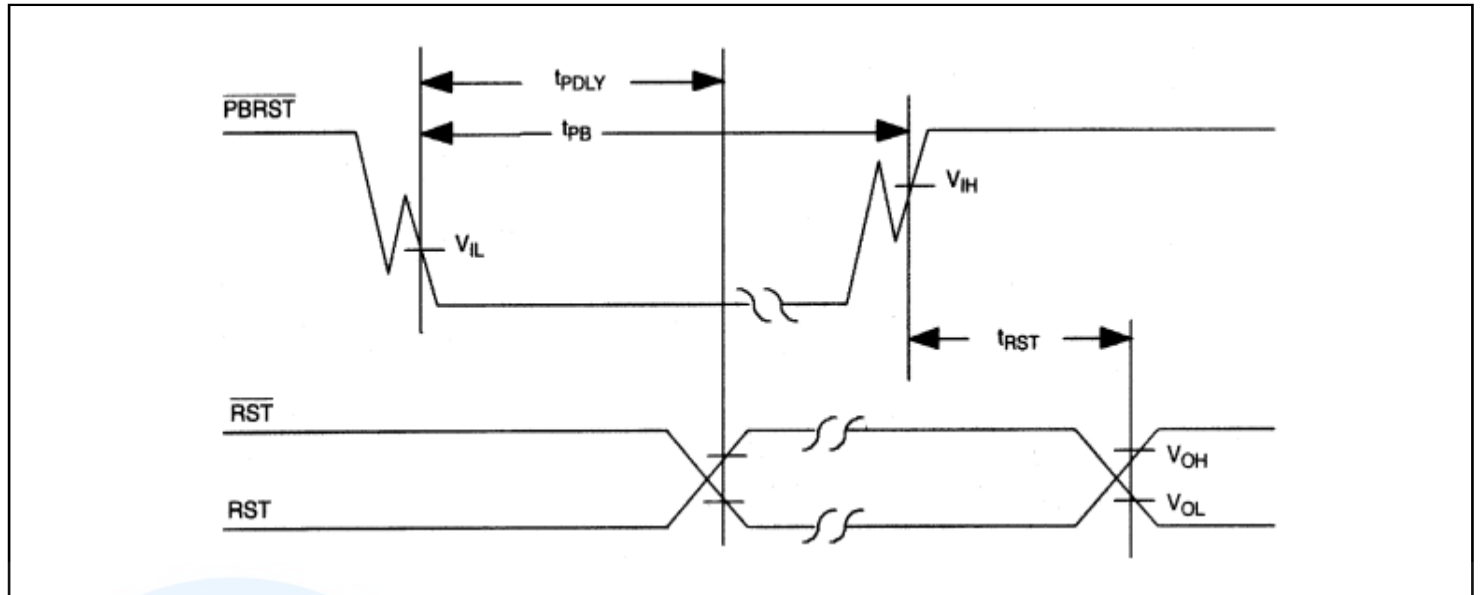


Figure 3 Timing diagram: button reset

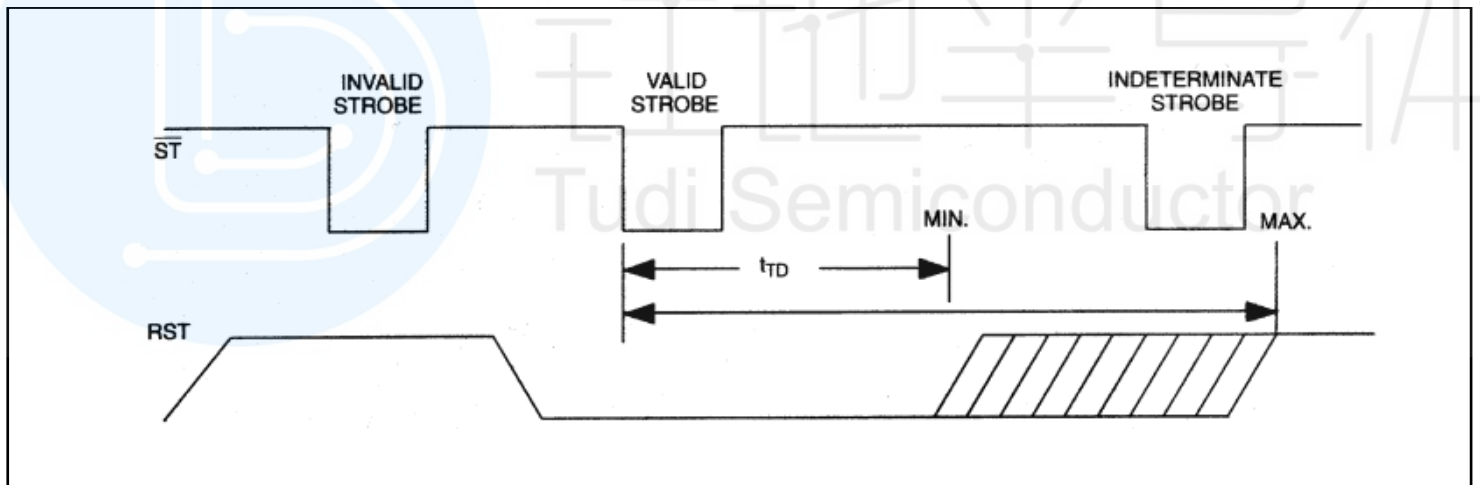


Figure 4 Timing diagram: pulse input

| TD    | Time-out |         |         |
|-------|----------|---------|---------|
|       | MIN      | TYP     | MAX     |
| GND   | 62.5 ms  | 150 ms  | 250 ms  |
| Float | 250 ms   | 600 ms  | 1000 ms |
| Vcc   | 500 ms   | 1200 ms | 2000 ms |

Table 1 Watchdog timeout

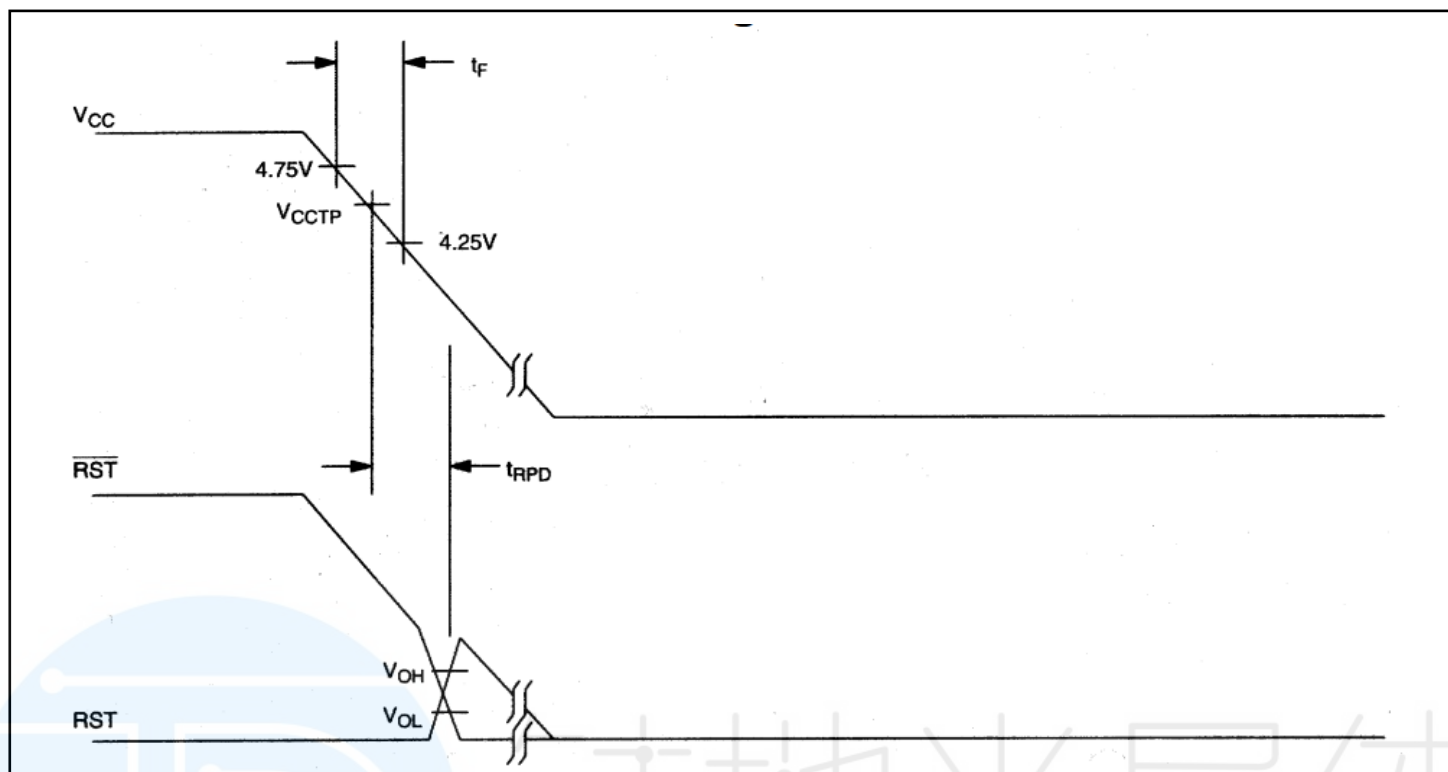


Figure 5 Timing diagram: power off

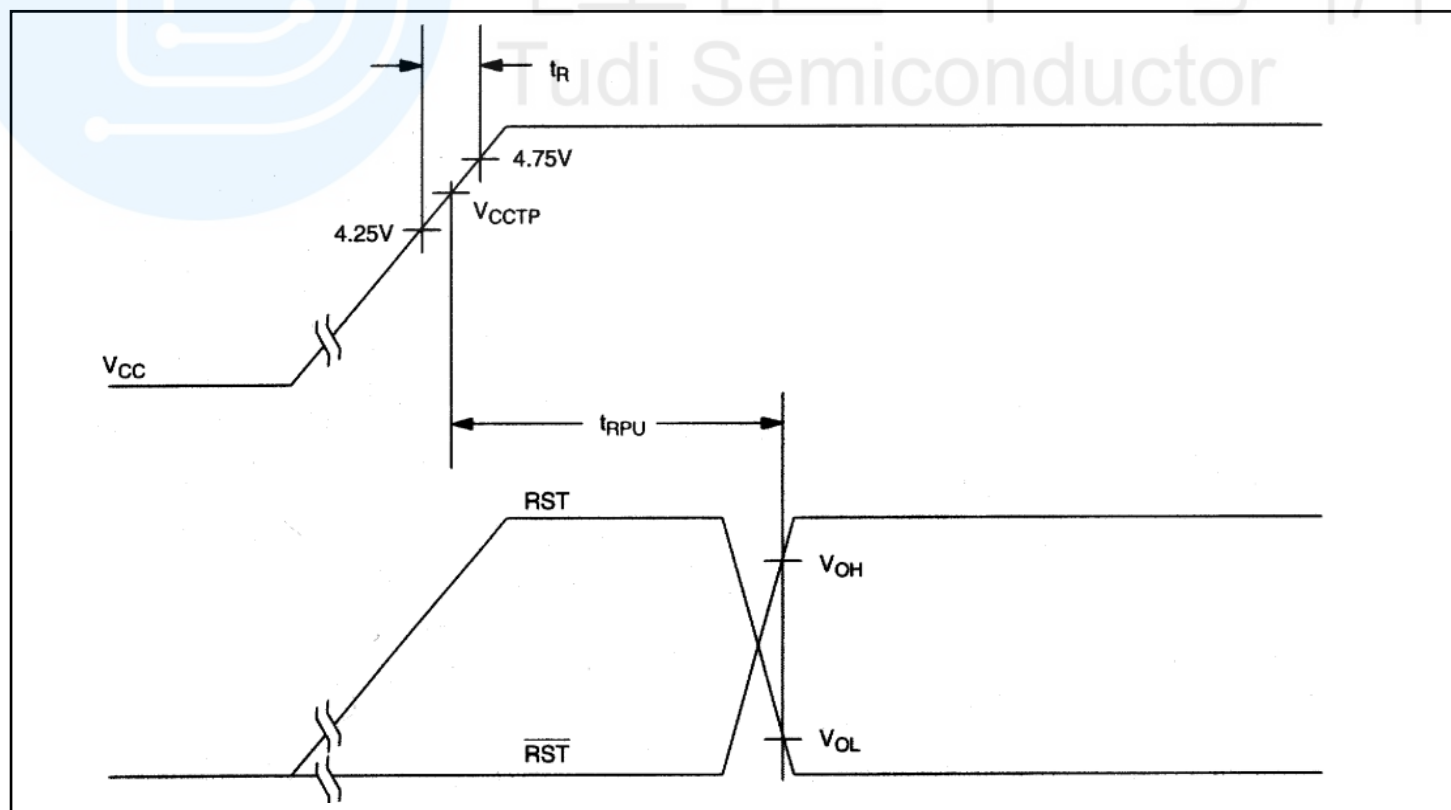


Figure 6 Timing diagram: power up



| Recommended DC operating conditions (0°C to 70°C)                                     |                     |                       |                       |                      |       |       |
|---------------------------------------------------------------------------------------|---------------------|-----------------------|-----------------------|----------------------|-------|-------|
| Parameter                                                                             | Symbols             | Min                   | Typ                   | Max                  | Units | Notes |
| Supply Voltage                                                                        | V <sub>CC</sub>     | 4.5                   | 5.0                   | 5.5                  | V     | 1     |
| $\overline{ST}$ and $\overline{PBRST}$ Input High Level                               | V <sub>H</sub>      | 2.0                   |                       | V <sub>CC</sub> +0.3 | V     | I     |
| $\overline{ST}$ and $\overline{PBRST}$ Input Low Level                                | V                   | -0.3                  |                       | +0.8                 | V     | I     |
| Direct current electrical characteristics (0°C to 70°C; V <sub>CC</sub> =4.5 to 5.5V) |                     |                       |                       |                      |       |       |
| Parameter                                                                             | Symbols             | Min                   | Typ                   | Max                  | Units | Notes |
| Input Leakage                                                                         | I <sub>L</sub>      | -1.0                  |                       | +1.0                 | μA    | 3     |
| Output Current @2.4V                                                                  | I <sub>OH</sub>     | -8                    | -10                   |                      | mA    | 5     |
| Output Current @0.4V                                                                  | I <sub>OL</sub>     | 10                    |                       |                      | mA    |       |
| Low Level @RST                                                                        | V <sub>OL</sub>     |                       |                       | 0.4                  | V     | 1     |
| Output Voltage @-500 uA                                                               | V <sub>OH</sub>     | V <sub>CC</sub> -0.5V | V <sub>CC</sub> -0.1V |                      | V     | 17    |
| Output Current(CMOS)                                                                  | I <sub>CC1</sub>    |                       |                       | 50                   | μA    | 2     |
| Operating Current(TTL)                                                                | I <sub>CC2</sub>    |                       | 200                   | 500                  | μA    | 8     |
| V <sub>CC</sub> Trip Point (TOL=GND)                                                  | V <sub>CC</sub> CTP | 4.50                  | 4.62                  | 4.74                 | V     | 1     |
| V <sub>CC</sub> Trip Point (TOL=V <sub>CC</sub> )                                     | V <sub>CC</sub> CTP | 4.25                  | 4.37                  | 4.49                 | V     | 1     |
| Capacitance (t <sub>A</sub> =25°C)                                                    |                     |                       |                       |                      |       |       |
| Parameter                                                                             | Symbols             | Min                   | Typ                   | Max                  | Units | Notes |
| Input Capacitance                                                                     | C <sub>IN</sub>     |                       |                       | 5                    | pF    |       |
| Output Capacitance                                                                    | C <sub>OUT</sub>    |                       |                       | 7                    | pF    |       |
| AC electrical characteristics (0°C to 70°C; V <sub>CC</sub> =5V±10%)                  |                     |                       |                       |                      |       |       |
| Parameter                                                                             | Symbols             | Min                   | Typ                   | Max                  | Units | Notes |
| $\overline{PBRST}$ =V <sub>I</sub>                                                    | t <sub>pB</sub>     | 20                    |                       |                      | ms    |       |
| RESET Active Time                                                                     | t <sub>RST</sub>    | 250                   | 610                   | 1000                 | ms    |       |
| $\overline{ST}$ Pulse Width                                                           | t <sub>sT</sub>     | 20                    |                       |                      | ns    | 69    |
| V <sub>CC</sub> Fail Detect to RST and $\overline{RST}$                               | t <sub>RPD</sub>    |                       | 50                    | 175                  | μs    |       |
| V <sub>CC</sub> Slew Rate 4.75V to 4.25V                                              | t <sub>p</sub>      | 300                   |                       |                      | μs    |       |
| V <sub>CC</sub> Detect to RST and $\overline{RST}$ Inactive                           | t <sub>RPU</sub>    | 250                   | 610                   | 1000                 | ms    | 4     |
| V <sub>CC</sub> Slew Rate 4.25V to 4.75V                                              | t <sub>r</sub>      | 0                     |                       |                      | ns    |       |
| $\overline{PBRST}$ Stable Low to $\overline{RST}$ and RST                             | t <sub>pDLY</sub>   |                       |                       | 20                   | ms    |       |



**Notes:**

1. All voltages referenced to ground.
2. Measured with outputs open and  $\overline{ST}$  and  $\overline{PBRST}$  within 0.5V of supply rails.
3.  $\overline{PBRST}$  is internally pulled up to  $V_{CC}$  with an internal impedance of 40k typical.
4.  $t_R = 5 \mu s$ .
5.  $\overline{RST}$  is an open-drain output.
6. Must not exceed  $t_{TD}$  minimum. See Table 1.
7.  $\overline{RST}$  remains within 0.5V of  $V_{CC}$  on power-down until  $V_{CC}$  drops below 2.0V.  $\overline{RST}$  remains within 0.5V of GND on power-down until  $V_{CC}$  drops below 2.0V.
8. Measured with outputs open and  $\overline{ST}$  and  $\overline{PBRST}$  at TTL levels.
9. Watchdog can not be disabled. It must be strobed to avoid resets.

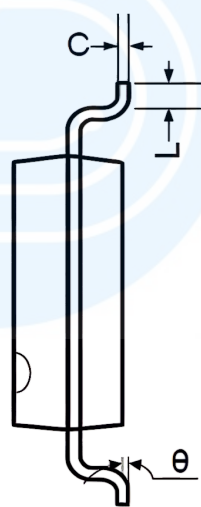
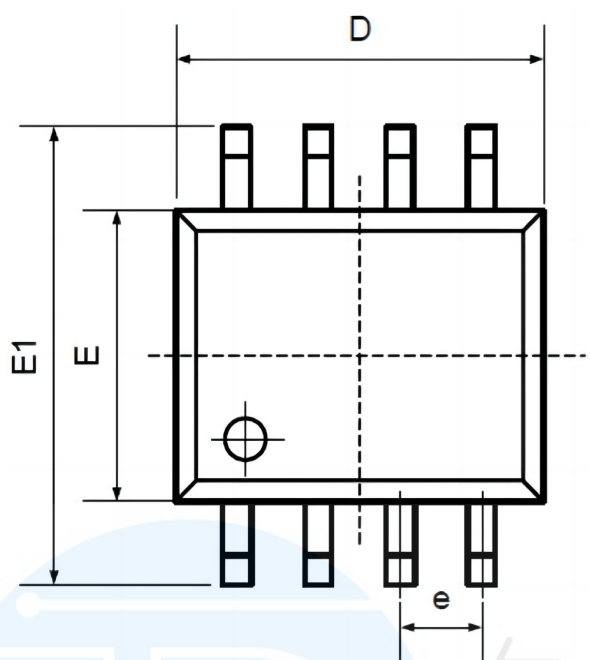
## Order information

| Order Number        | Package | Package Quantity      | Marking<br>On The park | Temperature    |
|---------------------|---------|-----------------------|------------------------|----------------|
| CAT1232LPL-G-TUDI   | DIP8    | Tube,50,A box of 2000 | CAT1232LP              | - 40°C to 85°C |
| CAT1232LPV-GT3-TUDI | SOP8    | Tape,Reel,2500        | 1232LPV                |                |

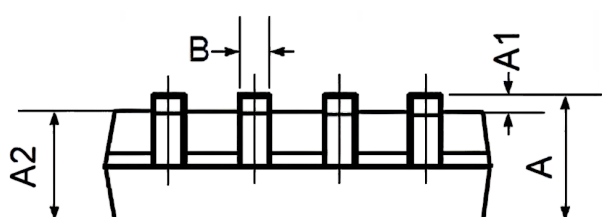




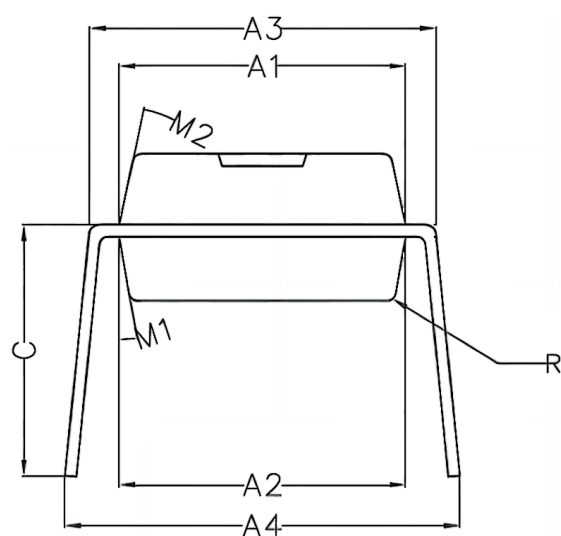
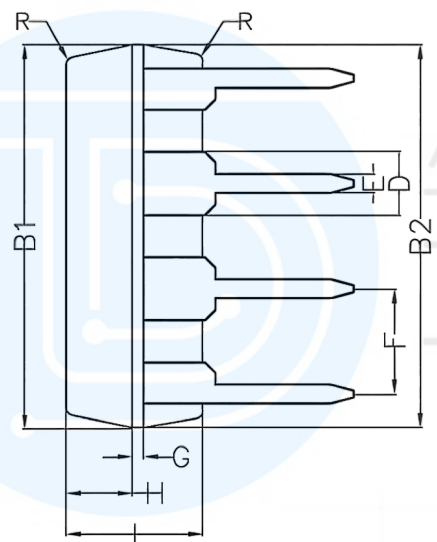
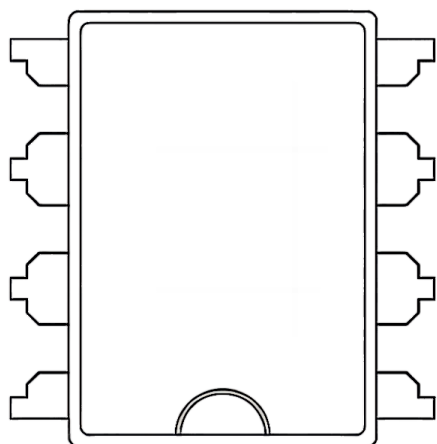
## Package SOP8



| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|--------|------------------------------|-------|-------------------------|-------|
|        | Min                          | Max   | Min                     | Max   |
| A      | 1.350                        | 1.750 | 0.053                   | 0.069 |
| A1     | 0.100                        | 0.250 | 0.004                   | 0.010 |
| A2     | 1.350                        | 1.550 | 0.053                   | 0.061 |
| B      | 0.330                        | 0.510 | 0.013                   | 0.020 |
| C      | 0.190                        | 0.250 | 0.007                   | 0.010 |
| D      | 4.780                        | 5.000 | 0.188                   | 0.197 |
| E      | 3.800                        | 4.000 | 0.150                   | 0.157 |
| E1     | 5.800                        | 6.300 | 0.228                   | 0.248 |
| e      | 1.270TYP                     |       | 0.050TYP                |       |
| L      | 0.400                        | 1.270 | 0.016                   | 0.050 |
| θ      | 0°                           | 8°    | 0°                      | 8°    |



## Package DIP8



| Symbol | Min  | Non  | Max  |
|--------|------|------|------|
| A1     | 6.28 | 6.33 | 6.38 |
| A2     | 6.33 | 6.38 | 6.43 |
| A3     | 7.52 | 7.62 | 7.72 |
| A4     | 7.80 | 8.40 | 9.00 |
| B1     | 9.15 | 9.20 | 9.25 |
| B2     | 9.20 | 9.25 | 9.30 |
| C      |      | 5.57 |      |
| D      |      | 1.52 |      |
| E      | 0.43 | 0.45 | 0.47 |
| F      |      | 2.54 |      |
| G      |      | 0.25 |      |
| H      | 1.54 | 1.59 | 1.64 |
| I      | 3.22 | 3.27 | 3.32 |
| R      |      | 0.20 |      |
| M1     | 9°   | 10°  | 11°  |
| M2     | 11°  | 12°  | 13°  |



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