



钜地半导体  
Tudi Semiconductor

## Product Specification

TUDI-DS1232

Low Power MicroMonitor Chip

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

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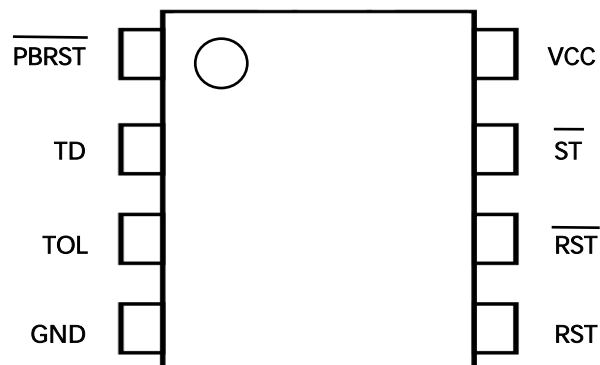
**semiconductor device  
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- Design
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- production
- and sales



## Features

- Super-low power version of 1232
- 65  $\mu$ A quiescent current
- Halts and restarts an out-of-control microprocessor
- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Accurate 5% or 10% microprocessor power supply monitoring
- 8-pin DIP, 8-pin SOIC package available
- Industrial temperature -40°C to +85°C available



Pin Diagram

## Description

The 1232 Low Power MicroMonitor Chip monitors three vital conditions for a microprocessor: power supply, software execution, and external over-ride. First, a precision temperature-compensated reference and comparator circuit monitors the status of  $V_{cc}$ . When an out-of-tolerance condition occurs, an internal power-fail signal is generated which forces reset to the active state. When  $V_{cc}$  returns to an in-tolerance condition, the reset signals are kept in the active state for a minimum of 250 ms to allow the power supply and processor to stabilize. The second function the 1232 performs is pushbutton reset control. The 1232 debounces the pushbutton input and guarantees an active reset pulse width of 250 ms minimum. The third function is a watchdog timer. The 1232 has an internal timer that forces the reset signals to the active state if the strobe input is not driven low prior to timeout.

## Pin description

1	PBRST	Pushbutton Reset Input
2	TD	Time Delay Set
3	TOL	Selects 5% or 10% $V_{cc}$ 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

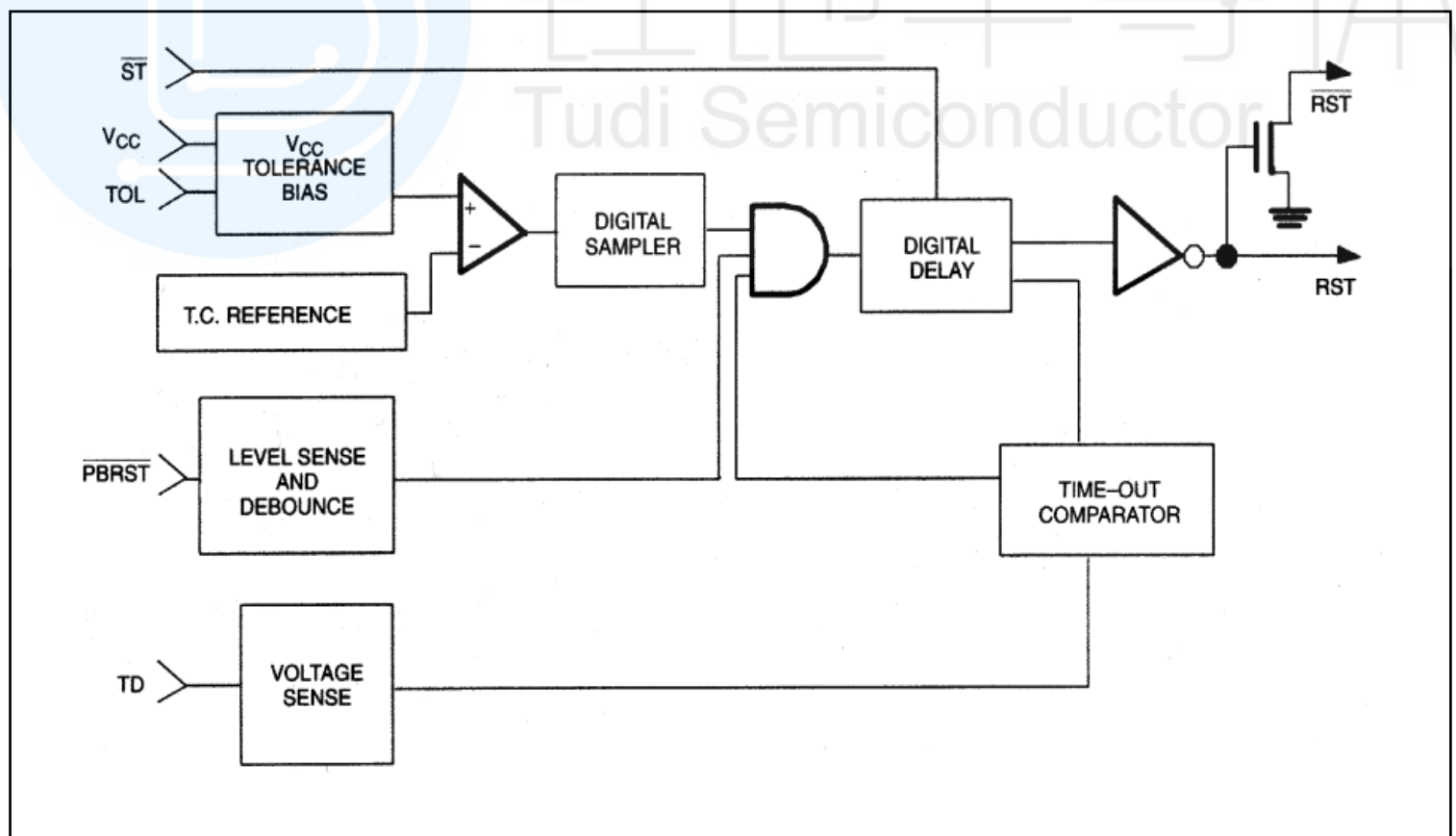


## Parameter limit

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.



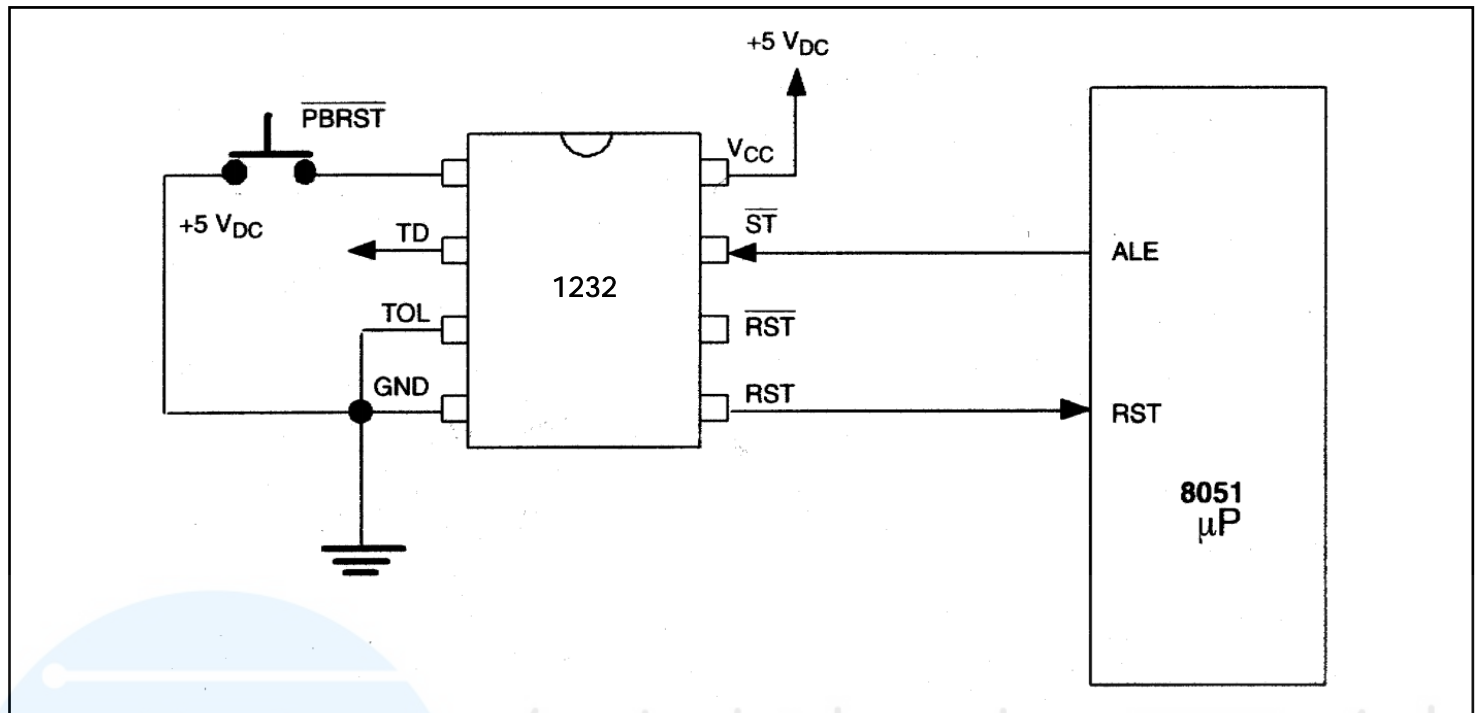


Figure 1 Button reset

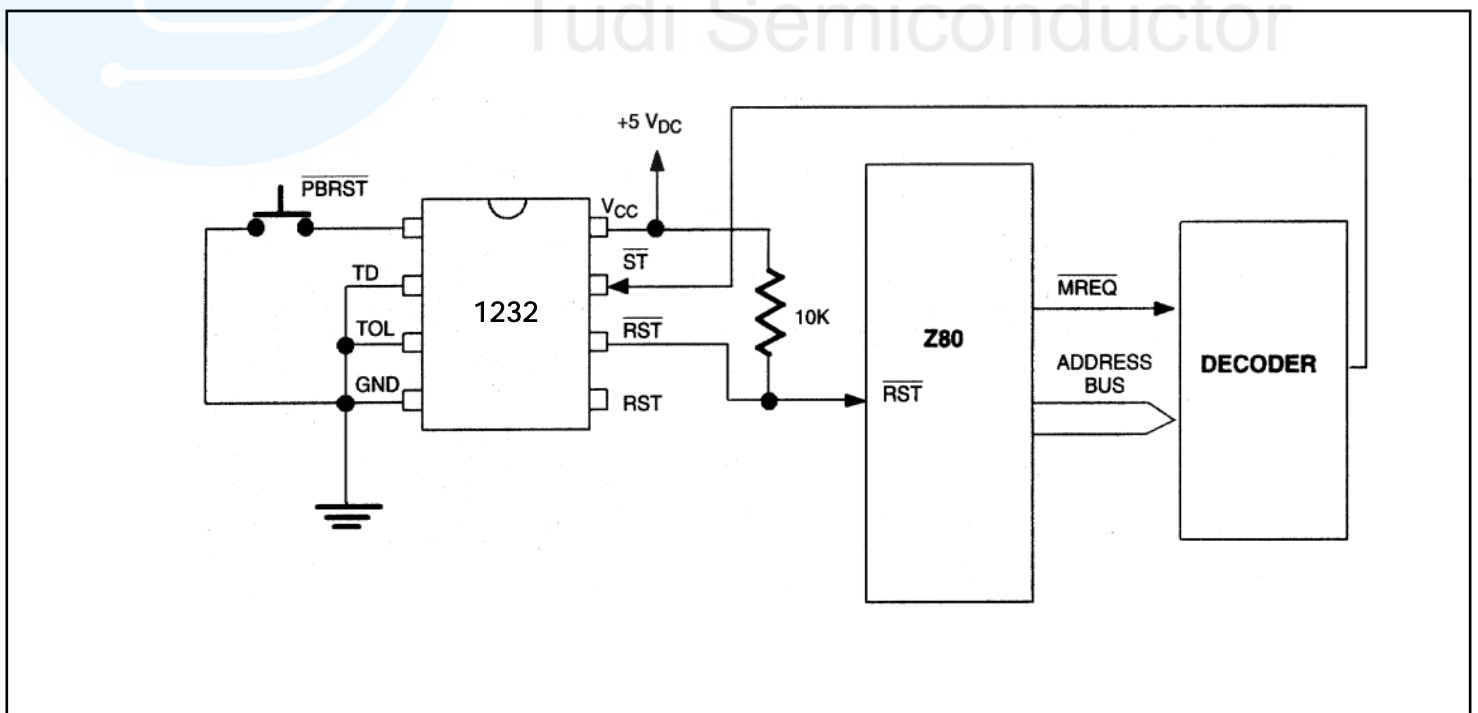


Figure 2 Watchdog timer

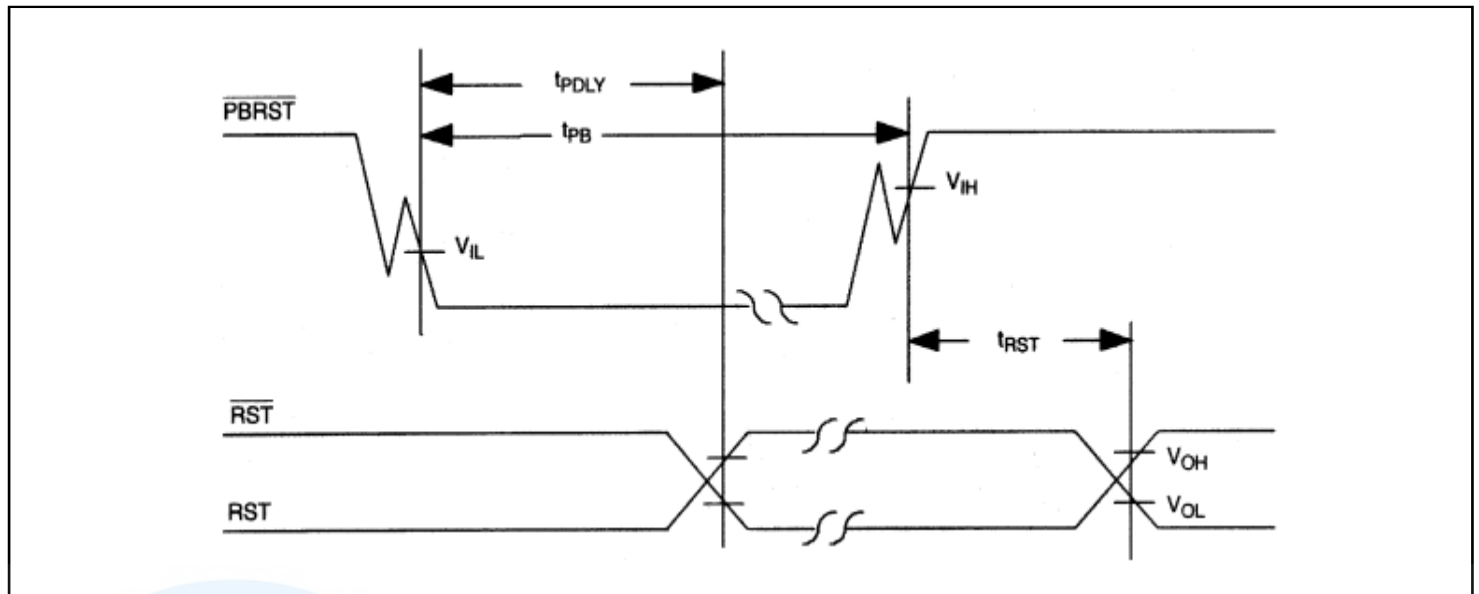


Figure 3 Timing diagram: button reset

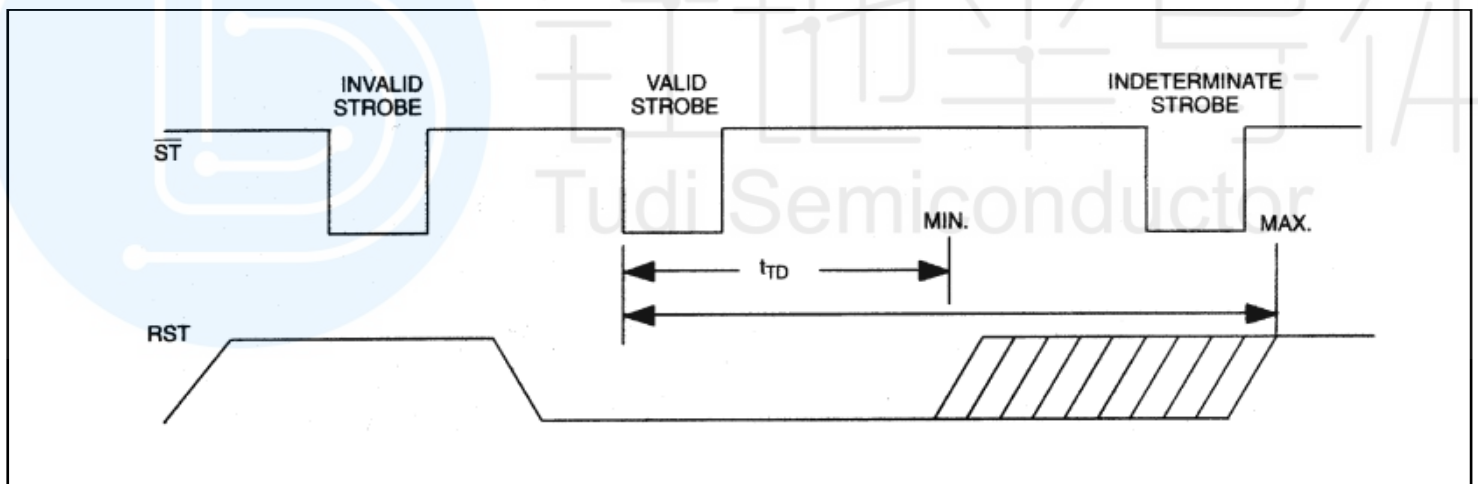


Figure 4 Timing diagram: pulse input

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

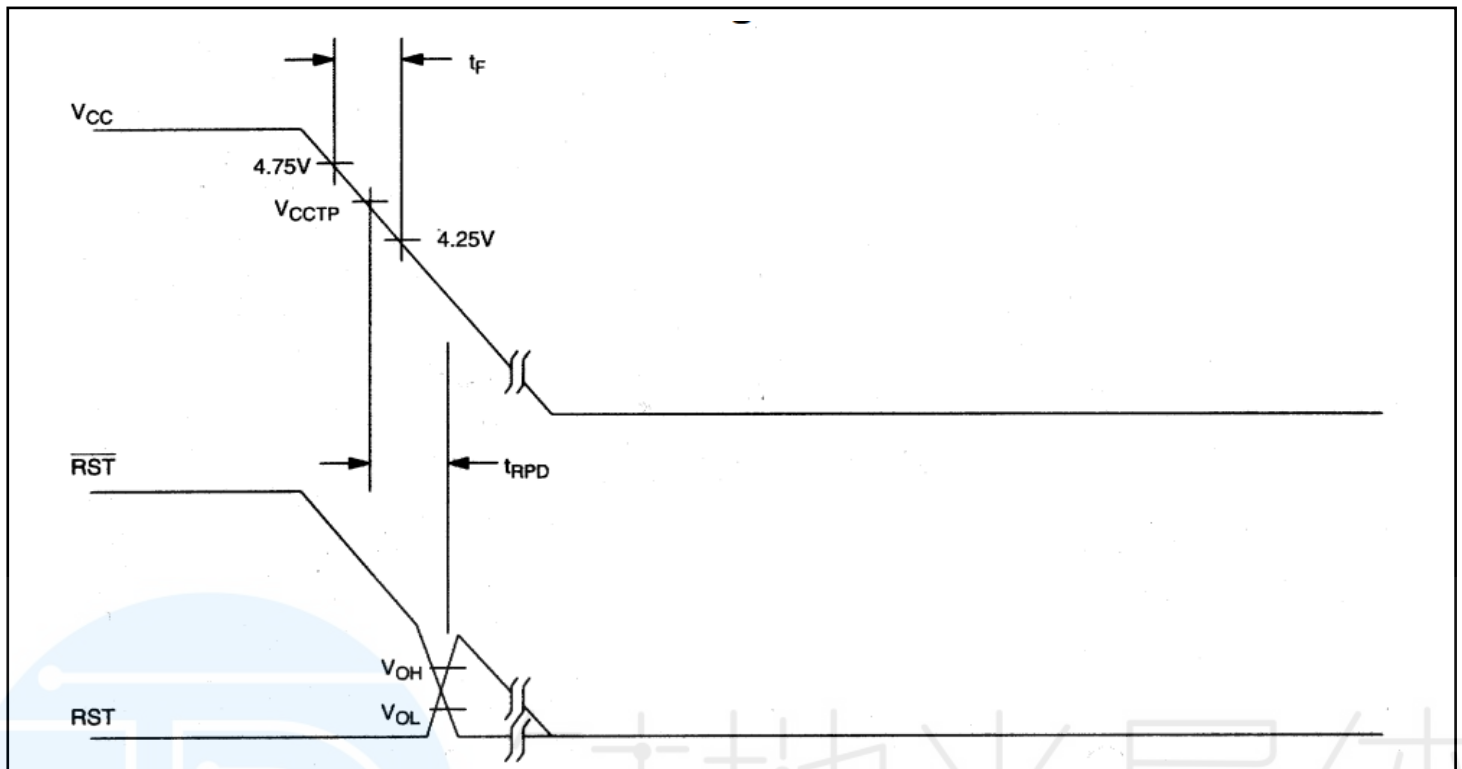


Figure 5 Timing diagram: power off

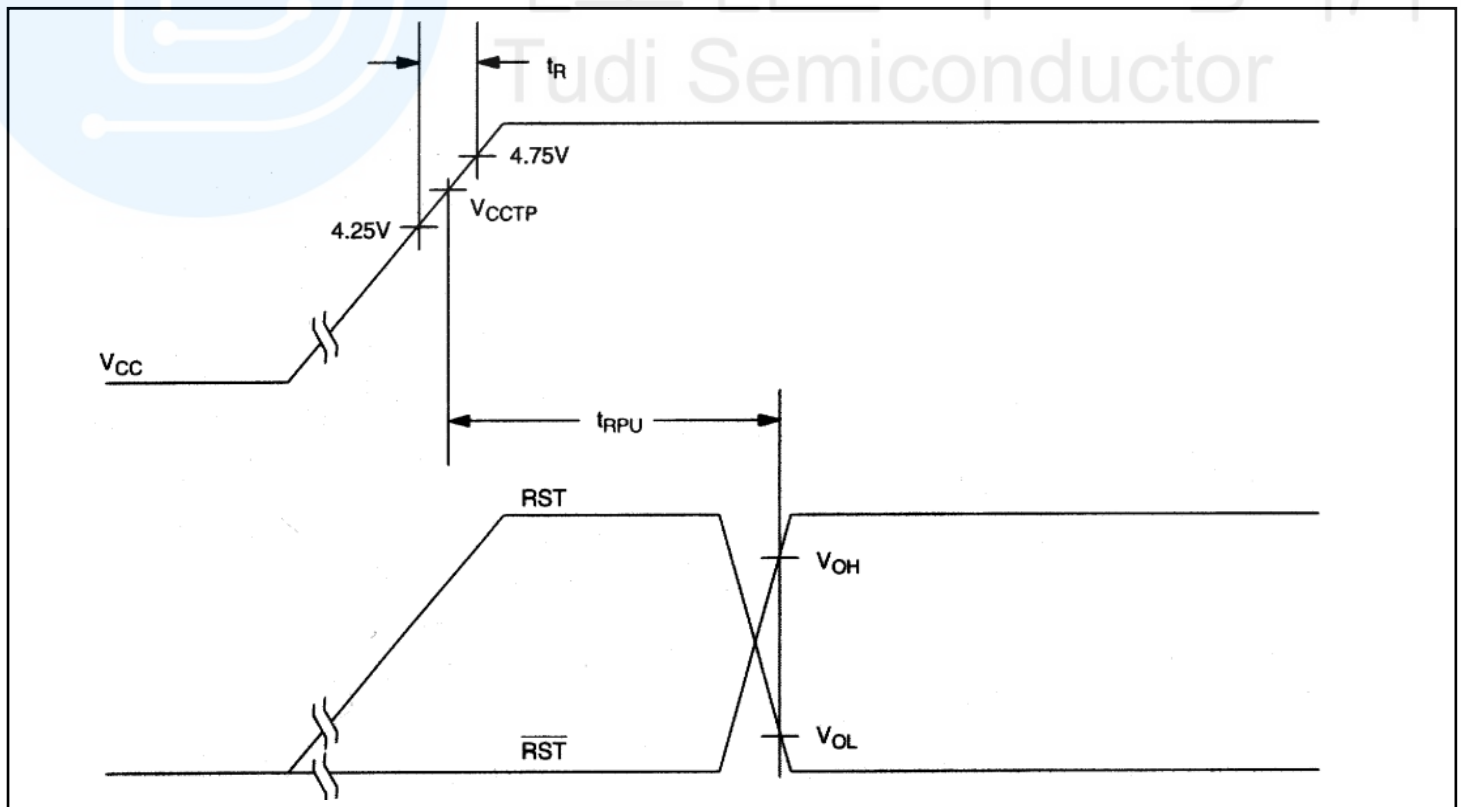


Figure 6 Timing diagram: power up



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.

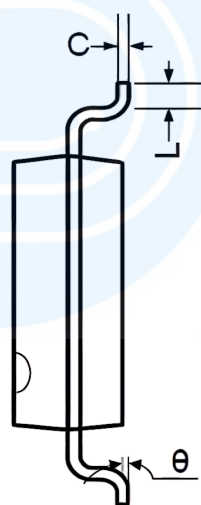
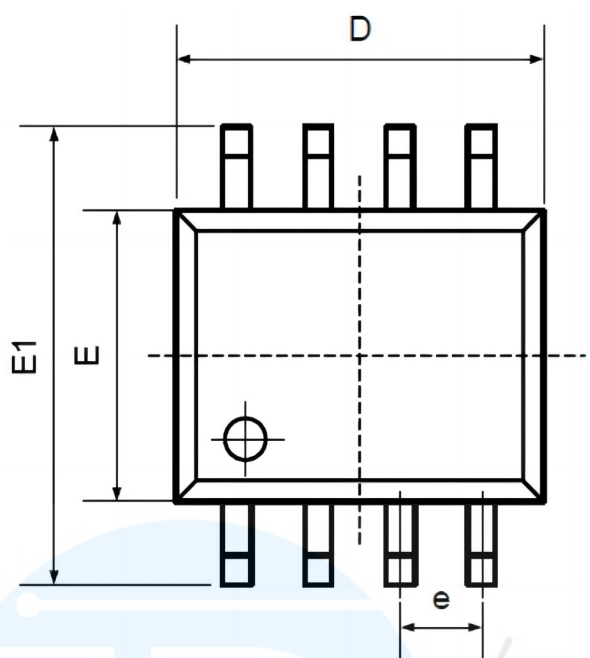
## Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
DS1232LPS-TUDI	SOP8	Tape,Reel,2500	DS1232L	- 40°C to 85°C
DS1232LP-TUDI	DIP8	Tube,50,A box of 2000	DS1232L	

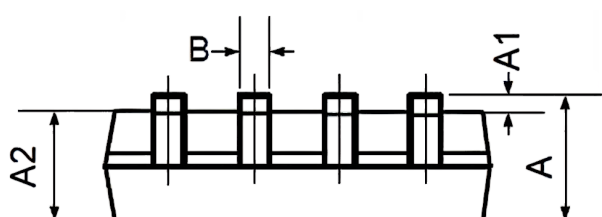




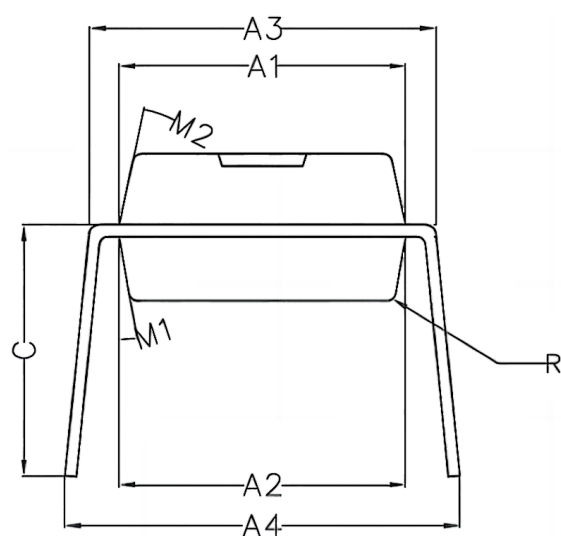
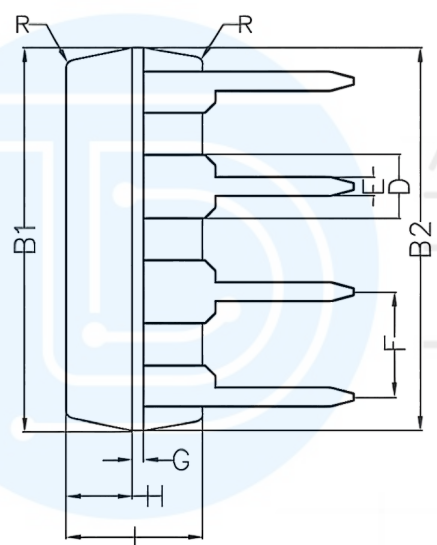
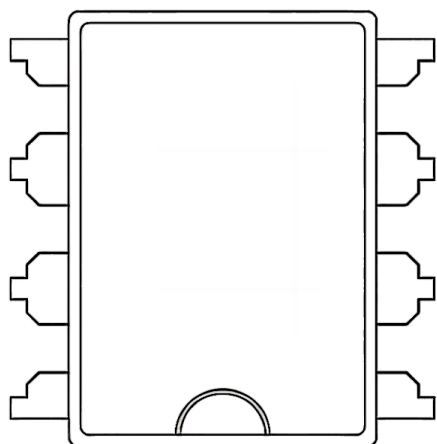
## Package SOP8



Symbol	Dimensions In Millimeters		Dimensions 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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