



钲地半导体
Tudi Semiconductor

Product Specification

TUDI-CAT1232

Microprocessor Monitor

网址 www.sztdbdt.com Q

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**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Precision Voltage Monitor: - Adjustable +4.5V or +4.75V
- Reset Pulse Width – 250 ms minimum
- No External Components
- Adjustable Watchdog Timer: - 150 ms, 600 ms or 1.2s
- Operating Voltage 4.0V to 5.5V
- Debounced Manual Reset Input for External Override

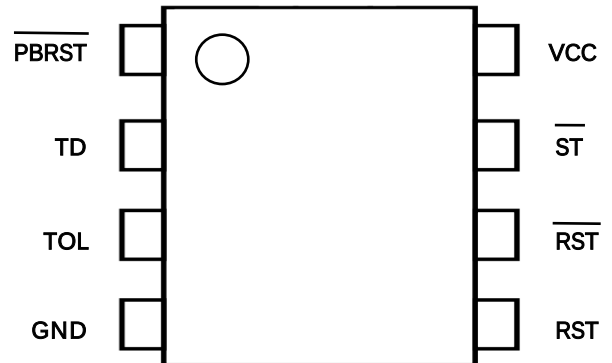
Applications

- Computers
- Controllers
- Intelligent Instruments
- Critical μ P Power Monitoring

Description

The TC1232 is a fully-integrated processor supervisor that provides three important functions to safeguard processor sanity: precision power on/off Reset control, Watchdog Timer and external Reset override. On power-up, the TC1232 holds the processor in the Reset state for a minimum of 250 ms after VCC is within tolerance to ensure a stable system start-up. Microprocessor sanity is monitored by the on-board watchdog circuit. The microprocessor must provide a periodic low-going signal on the ST input. Should the processor fail to supply this signal within the selected time-out period (150 ms, 600 ms or 1200 ms), an out-of-control processor is indicated and the TC1232 issues a processor Reset as a result.

The outputs of the TC1232 are immediately driven active when the PB input is brought low by an external push button switch or other electronic signal. When connected to a push button switch, the TC1232 provides contact debounce. The TC1232 is packaged in a space-saving 8-Pin PDIP or SOIC package, a 16-Pin SOIC (wide) package and requires no external components.



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

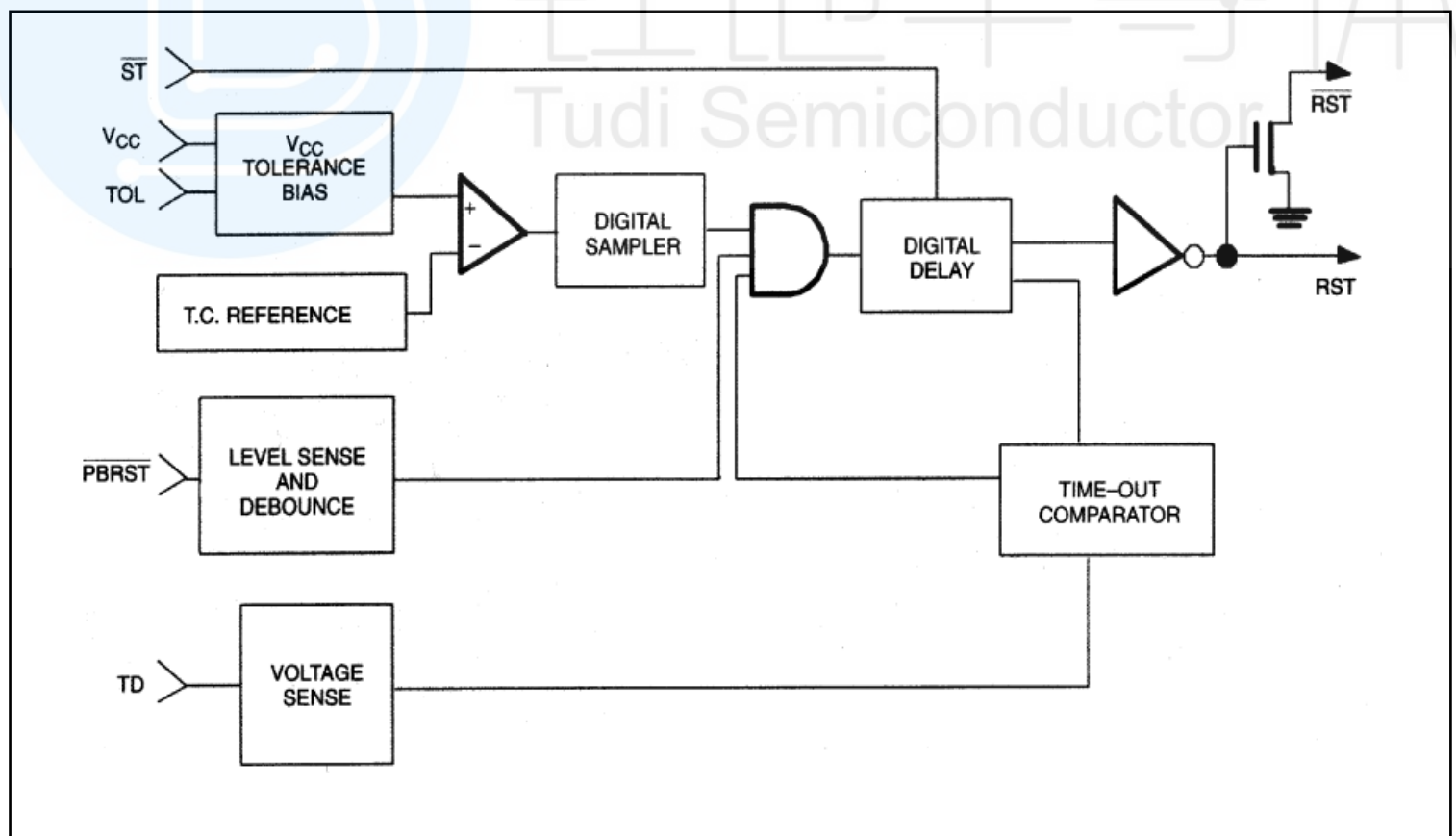


Parameter limit

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.

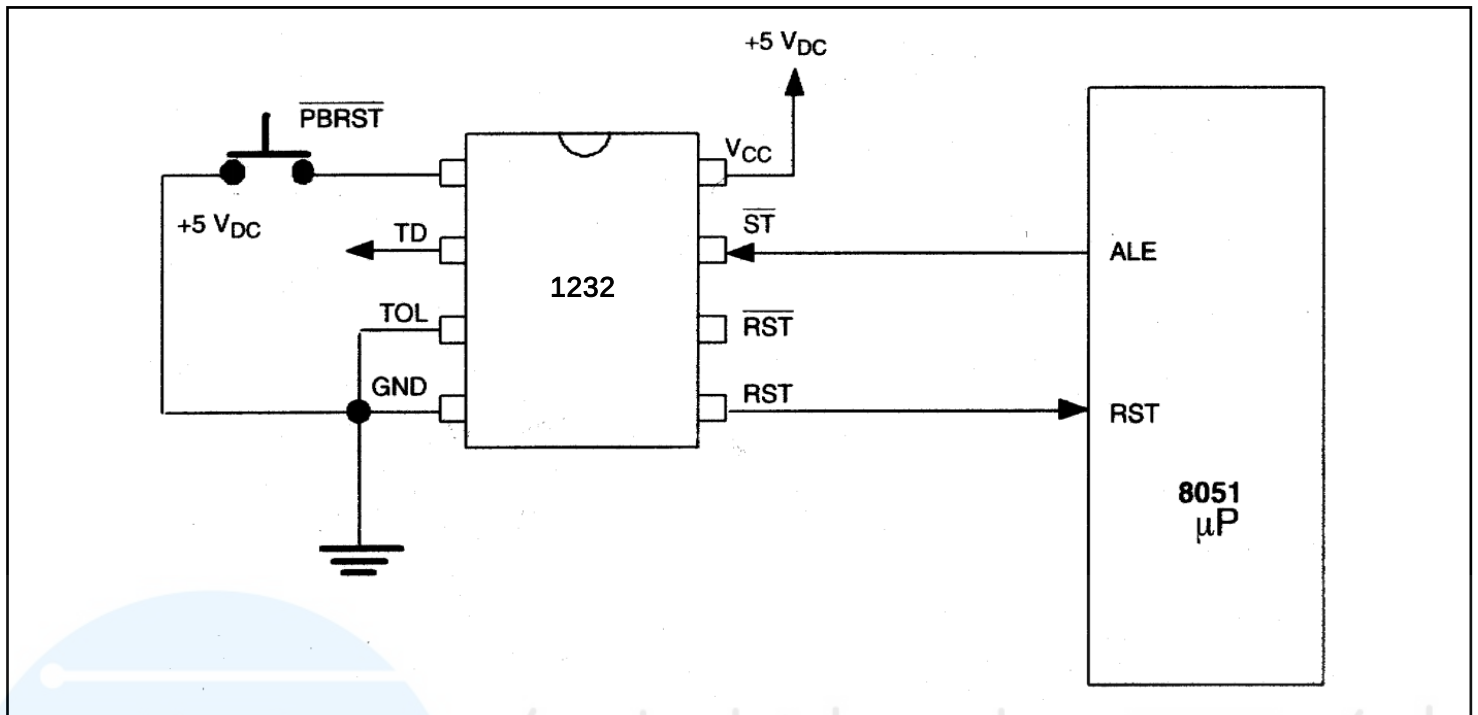


Figure 1 Button reset

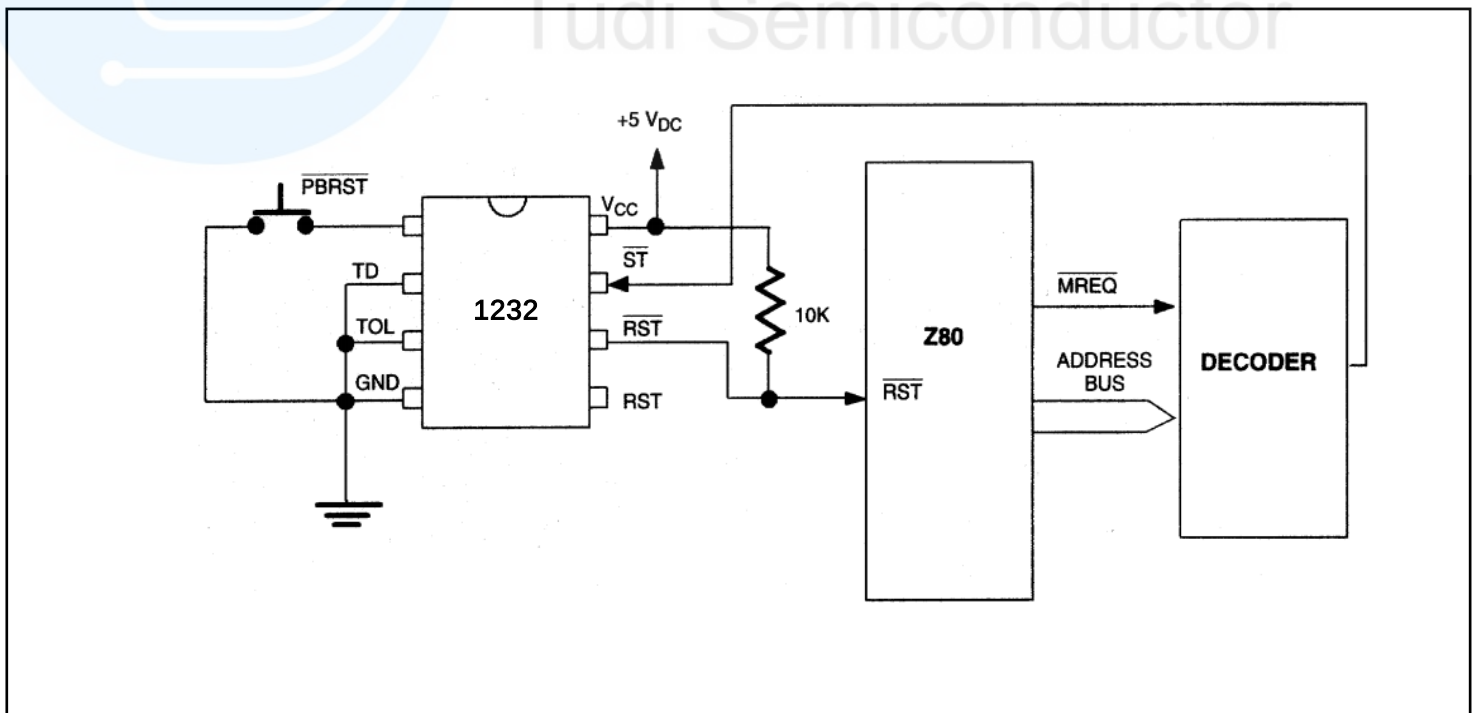


Figure 2 Watchdog timer

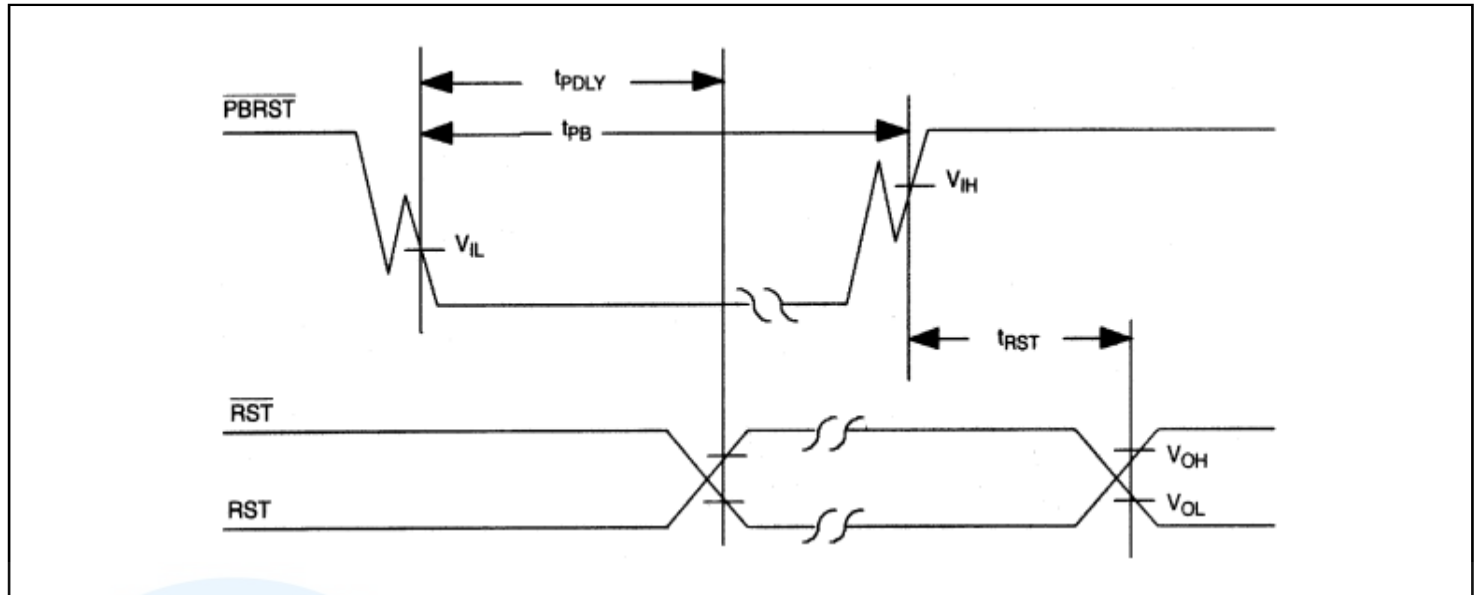


Figure 3 Timing diagram: button reset

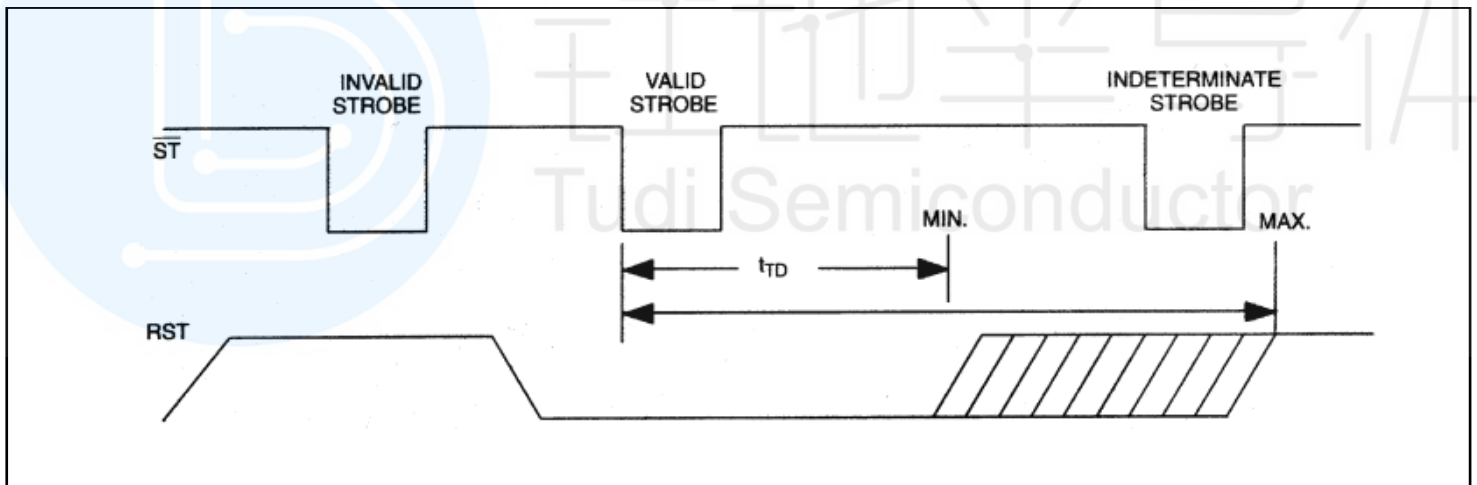


Figure 4 Timing diagram: pulse input

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

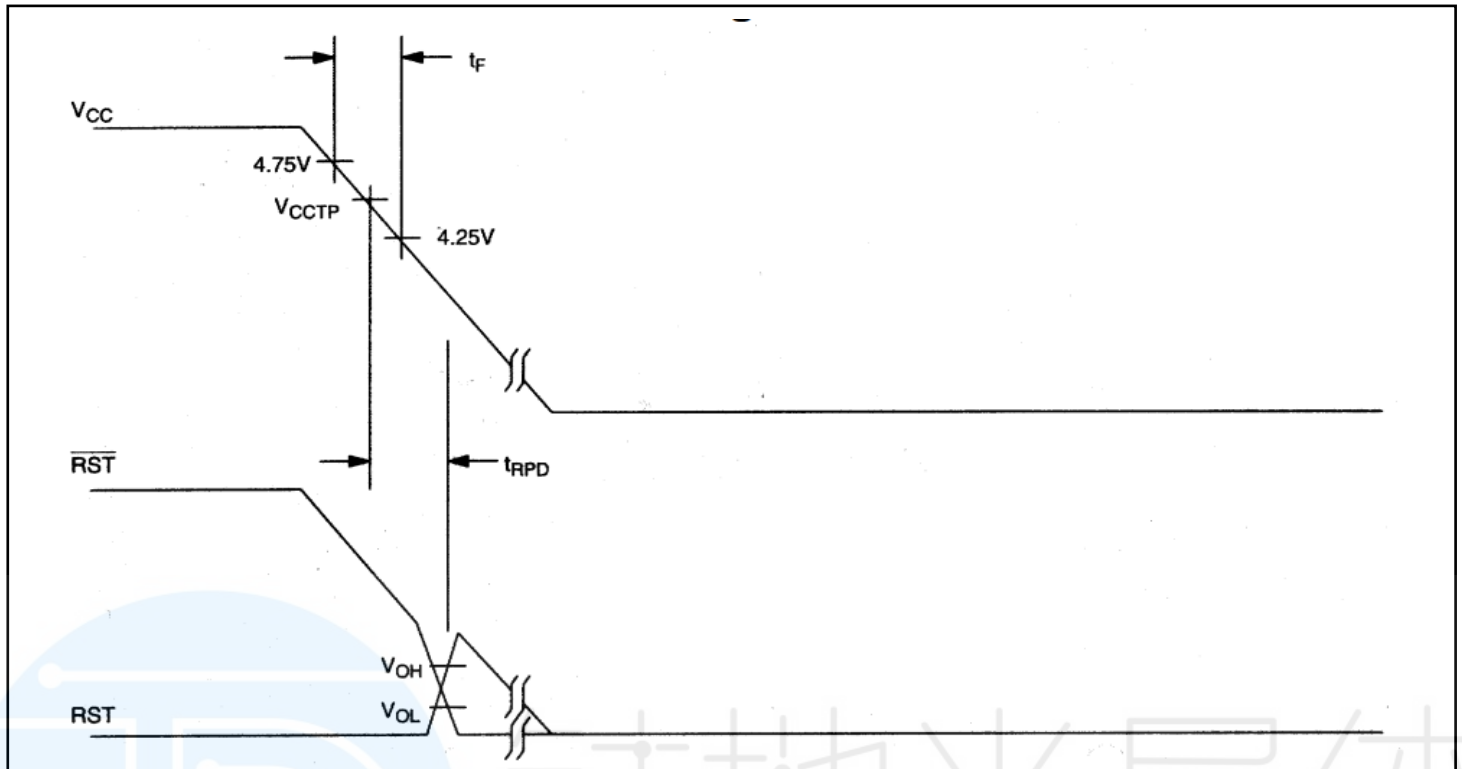


Figure 5 Timing diagram: power off

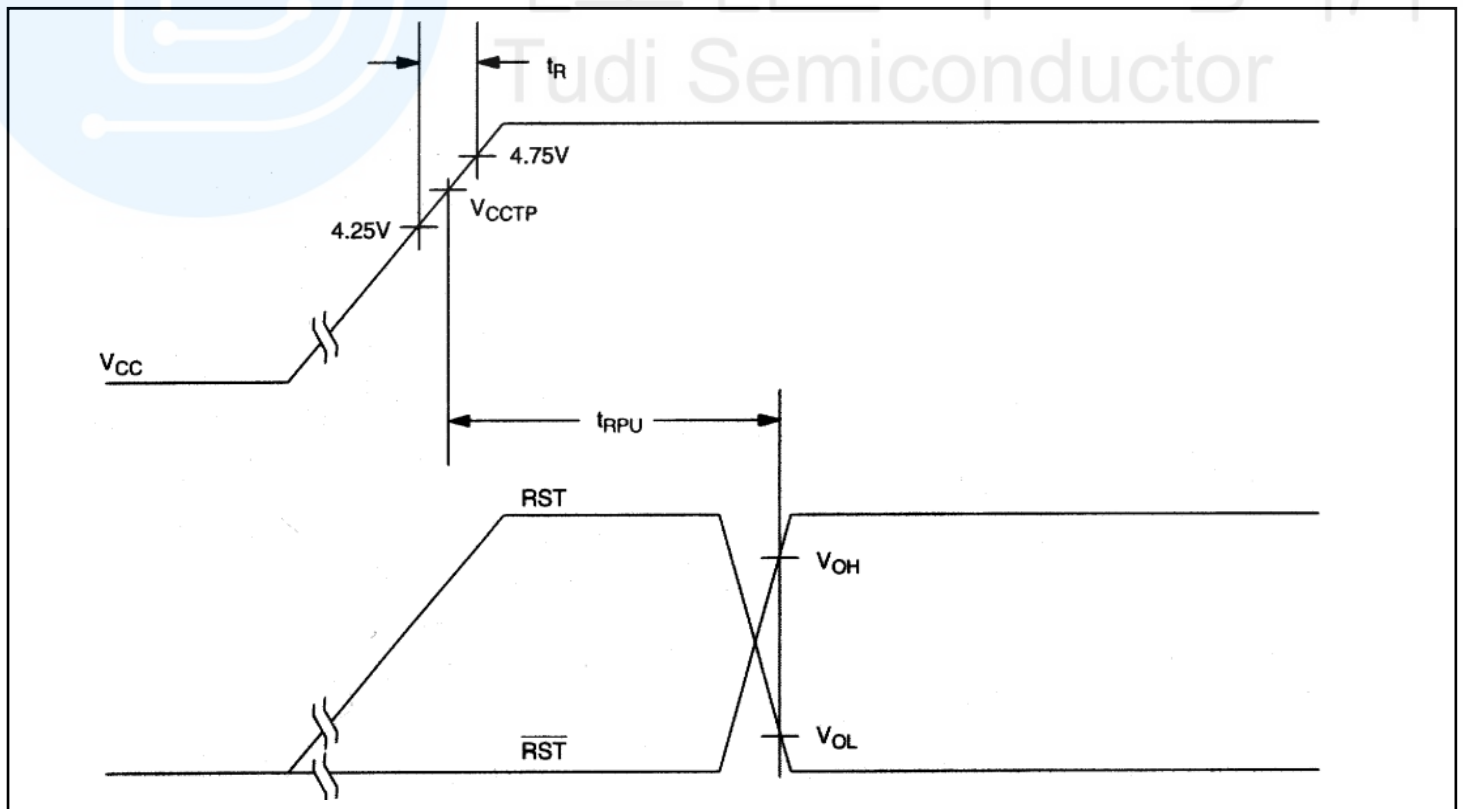


Figure 6 Timing diagram: power up



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



Notes:

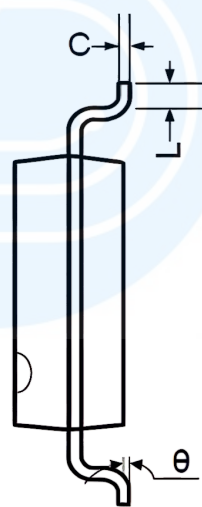
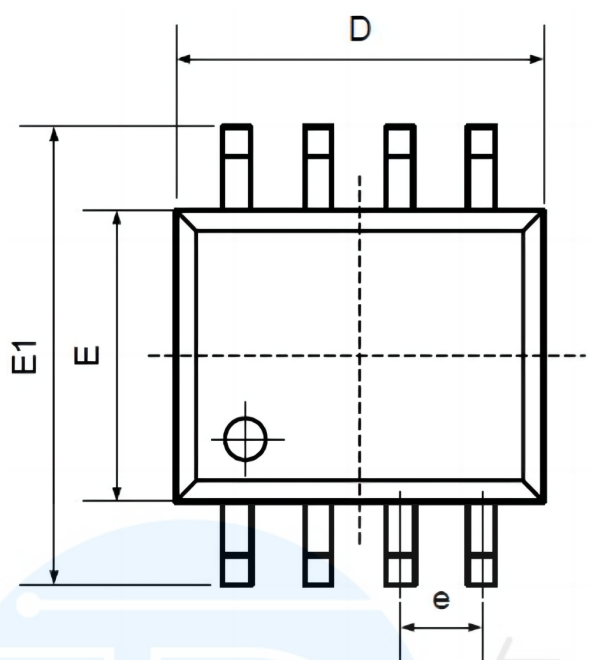
1. All voltages referenced to ground.
2. Measured with outputs open and $\overline{ST}$ and $\overline{PBRST}$ within 0.5V of supply rails.
3. $\overline{PBRST}$ is internally pulled up to V_{CC} with an internal impedance of 40k typical.
4. $t_R = 5 \mu s$.
5. $\overline{RST}$ is an open-drain output.
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

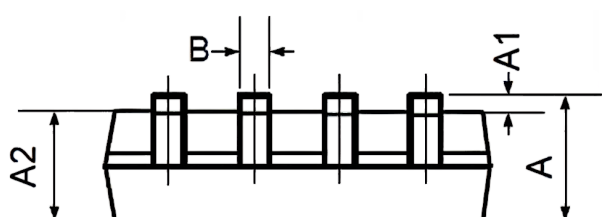
Order Number	Package	Package Quantity	Marking On The park	Temperature
TC1232CPA-TUDI	DIP8	Tube,50,A box of 2000	TC1232CPA	0°C to 70°C
TC1232COA-TUDI	SOP8	Tape,Reel,2500	TC1232COA	
TC1232EPA-TUDI	DIP8	Tube,50,A box of 2000	TC1232EPA	- 40°C to 85°C
TC1232EOA-TUDI	SOP8	Tape,Reel,2500	TC1232EOA	



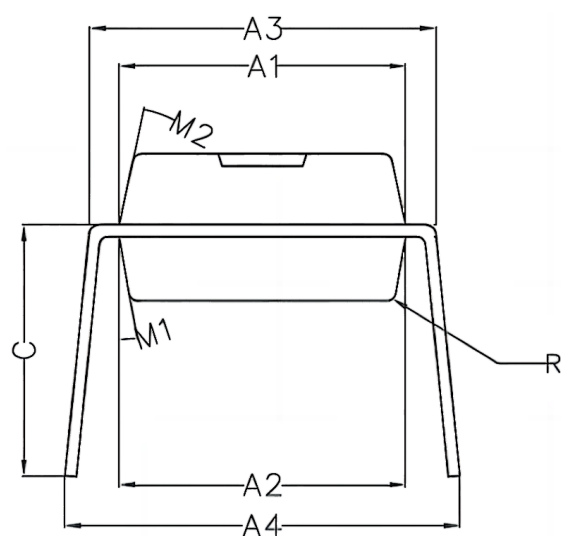
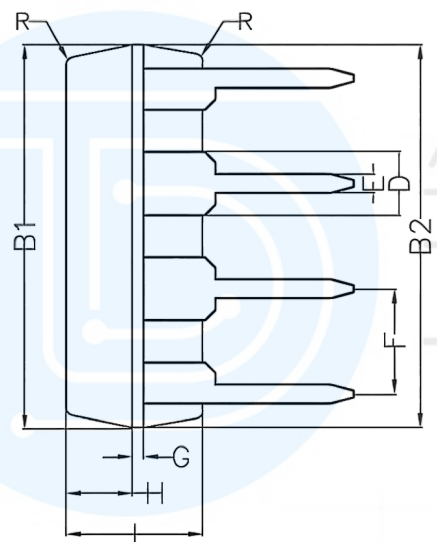
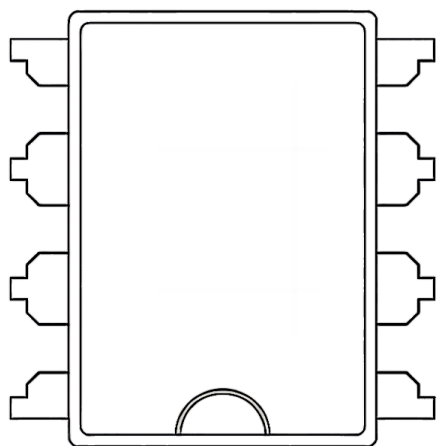
Package SOP8



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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