

IC for System Reset Monolithic IC PST573

November 21, 2001

Outline

This IC functions in a variety of CPU systems and other logic systems, to detect supply voltage and reset the system accurately when the power is turned on or interrupted. It is a high-reset type system reset IC with ultra-low current consumption developed using high-resistance process and current-minimizing circuit design technology.

Features

- | | | |
|--|---|--|
| 1. Ultra-low current consumption | $I_{CCH}=450\mu A$ typ. $I_{CCL}=1\mu A$ typ. | |
| 2. Low operating limit voltage | 0.65V typ. | |
| 3. Large output current during power-on | -6mA typ. | |
| 4. Hysteresis voltage provided for detection voltage | 50mV typ. | |
| 5. 10 ranks of detection voltages are available. | PST573 | |
-
- | | |
|---------------|---------------|
| C : 4.5V typ. | H : 3.1V typ. |
| D : 4.2V typ. | I : 2.9V typ. |
| E : 3.9V typ. | J : 2.7V typ. |
| F : 3.6V typ. | K : 2.5V typ. |
| G : 3.3V typ. | L : 2.3V typ. |

Packages

MMP-3A (PST573□M)

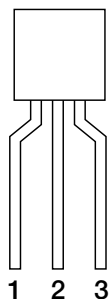
TO-92A (PST573□)

*The box represents a rank of detection voltage.

Applications

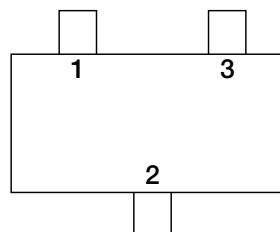
1. Reset circuits for microcomputers, CPUs and MPUs
2. Reset circuits for logic circuits
3. Battery voltage check circuits
4. Back-up power supply switching circuits
5. Level detection circuits

Pin Assignment



TO-92A

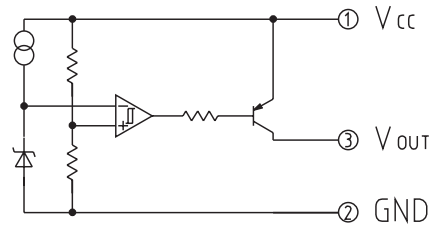
1	V _{CC}
2	GND
3	V _{OUT}



MMP-3A
(TOP VIEW)

1	V _{CC}
2	GND
3	V _{OUT}

Equivalent Circuit Diagram



Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Units
Storage temperature	T _{STG}	-40~+125	°C
Operating temperature	T _{OPR}	-20~+75	°C
Power supply voltage	V _{CC} max.	-0.3~10	V
Allowable loss	P _d	200(MMP-3A) 300(TO-92A)	mW

Electrical Characteristics (Ta=25°C) (Except where noted otherwise, resistance unit is Ω)

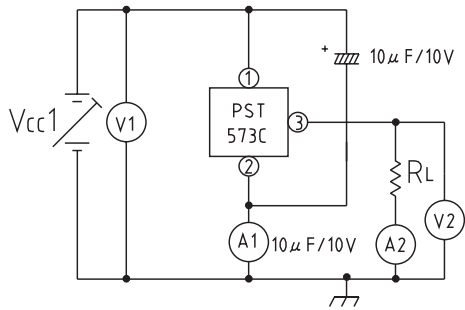
Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units	
Detection voltage	V _s	1	R _L =4.7k V _{OL} ≤ V _{CC} -0.4V V _{CC} =H→L	PST573C	4.3	4.5	4.7	V
				PST573D	4.0	4.2	4.4	
				PST573E	3.7	3.9	4.1	
				PST573F	3.4	3.6	3.8	
				PST573G	3.1	3.3	3.5	
				PST573H	2.9	3.1	3.3	
				PST573I	2.75	2.90	3.05	
				PST573J	2.55	2.70	2.85	
				PST573K	2.35	2.50	2.65	
				PST573L	2.15	2.30	2.45	
Hysteresis voltage	ΔV _s	1	R _L =4.7k V _{CC} =L→H→L	25	50	100	mV	
Detection voltage temperature coefficient	V _s /ΔT	1	R _L =4.7k Ta=-20°C~+75°C		±0.01		%/°C	
High level output voltage	V _{OH}	1	V _{CC} =V _s min. -0.05V R _L =4.7k	V _{CC} -0.4			V	
Output leakage current	I _{OH}	1	V _{CC} =7.5V			0.1	μA	
Circuit current while on	I _{CCL}	1	V _{CC} =V _s min. -0.05V R _L =∞		450	700	μA	
Circuit current while off	I _{CCH}	1	V _{CC} =V _s typ. /0.85V R _L =∞		1.0	1.8	μA	
"H"transport delay time	tpLH	2	R _L =4.7k *1 C _L =100pF		25	60	μs	
"L"transport delay time	tpHL	2	R _L =4.7k *1 C _L =100pF		8	20	μs	
Operation limit voltage	V _{opL}	1	R _L =4.7k V _{OL} ≥ V _{CC} -0.4V		0.65	0.85	V	
Output current while on 1	I _{OL I}	1	V _{CC} =V _s min. -0.05V R _L =0	-2.0	-6.0		mA	
Output current while on 2	I _{OL II}	1	Ta=-20°C~+75°C *2 R _L =0	-1.5			mA	

*1 : tpLH : V_{CC}=(V_s typ.-0.4V)→(V_s typ.+0.4V), tpHL : V_{CC}=(V_s typ.+0.4V)→(V_s typ.-0.4V)

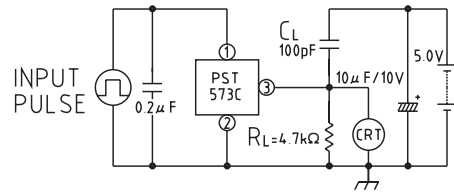
*2 : V_{CC}=V_s min.-0.15V

Measuring Circuit

[1]

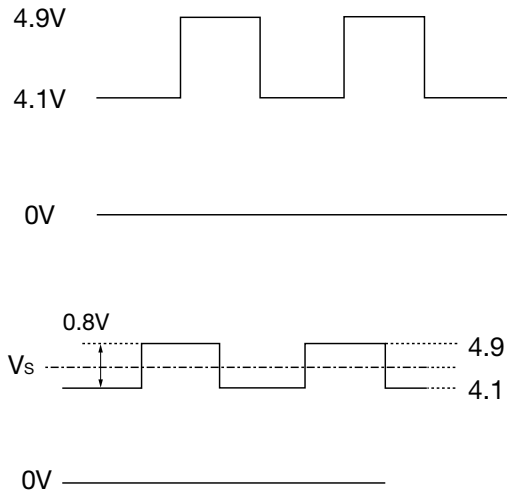


[2]



A : DC ammeter
V : DC voltmeter
CRT: Oscilloscope

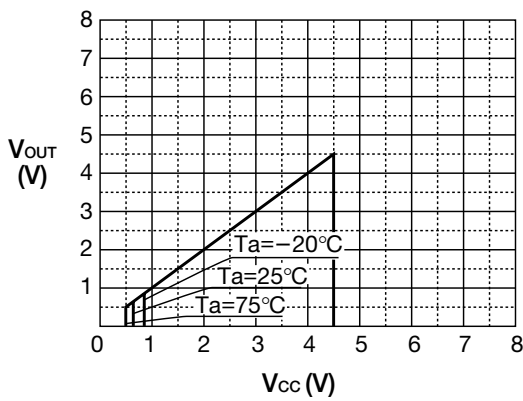
INPUT PULSE



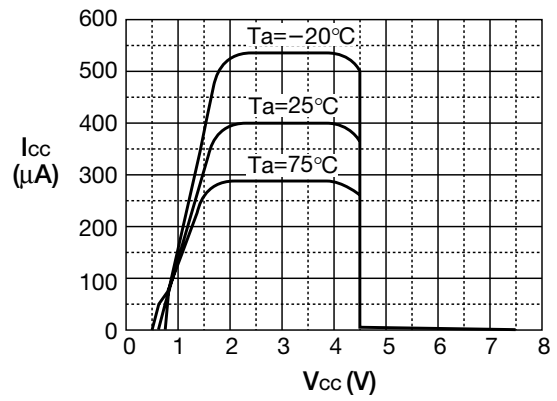
Note: Input model is an example for PST573C.

Characteristics (Example: PST573C)

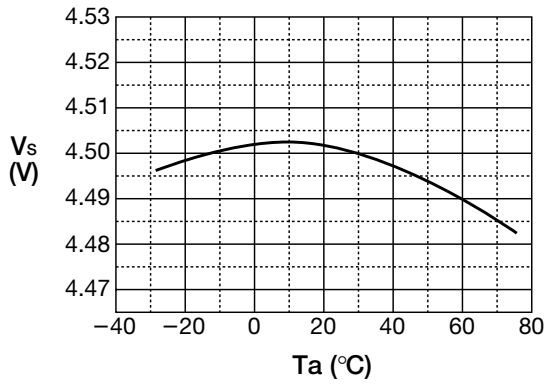
Vcc vs. Vout



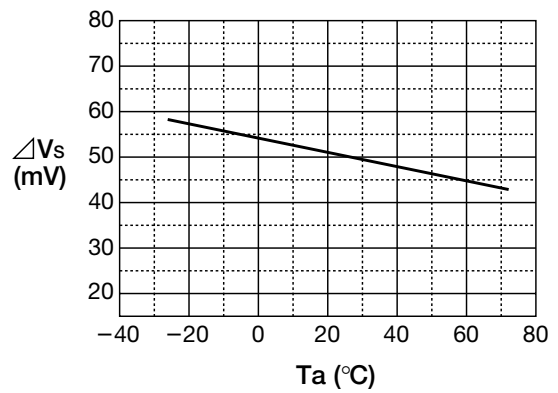
Vcc vs. Icc



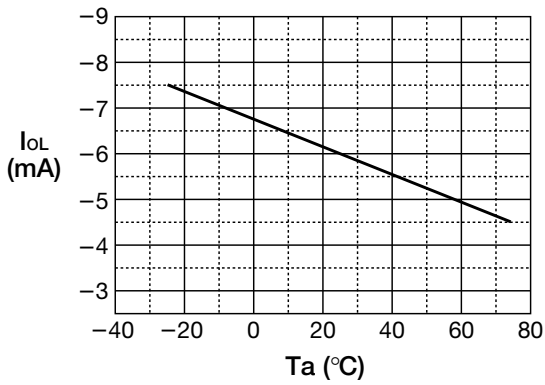
■ V_s vs. T_a



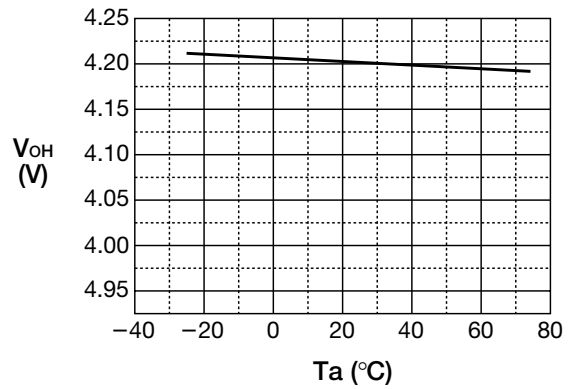
■ ΔV_s vs. T_a



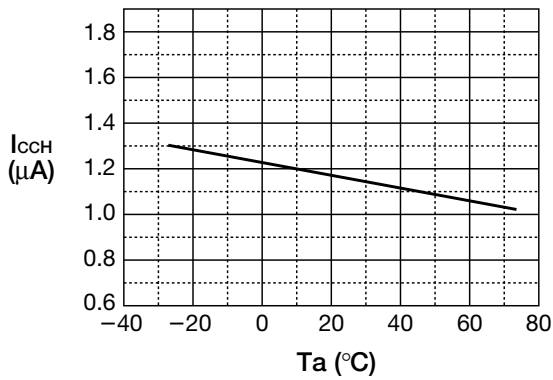
■ I_{OL} vs. T_a



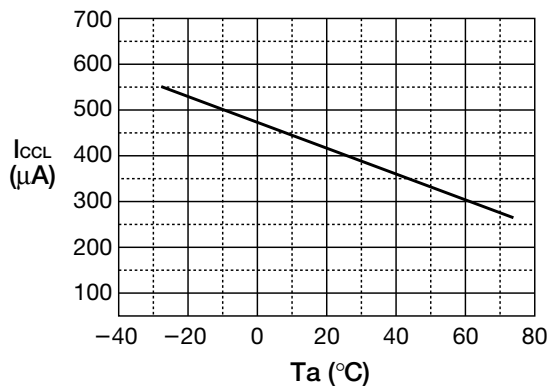
■ V_{OH} vs. T_a



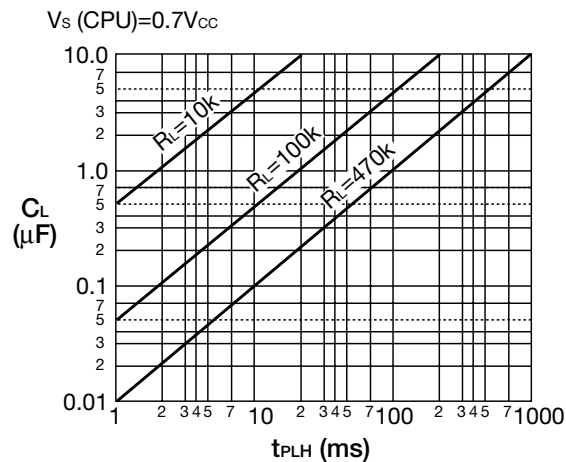
■ I_{CCH} vs. T_a



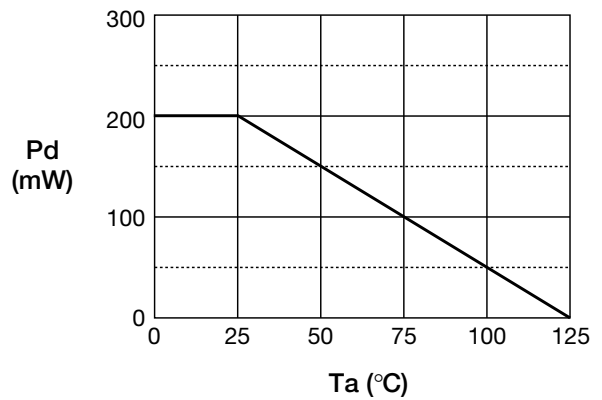
■ I_{CCL} vs. T_a



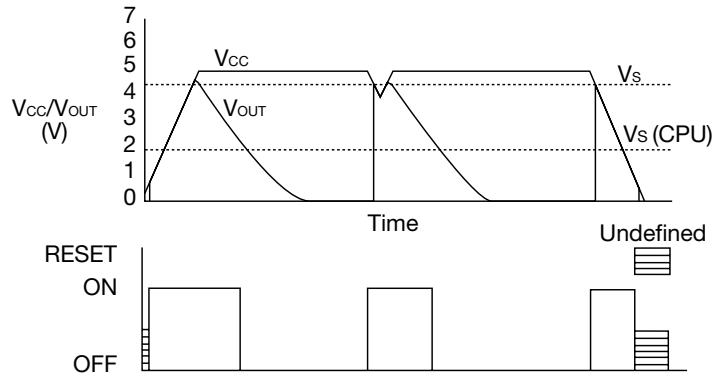
■ C_L (RL) vs. t_{PLH}



■ P_d vs. T_a

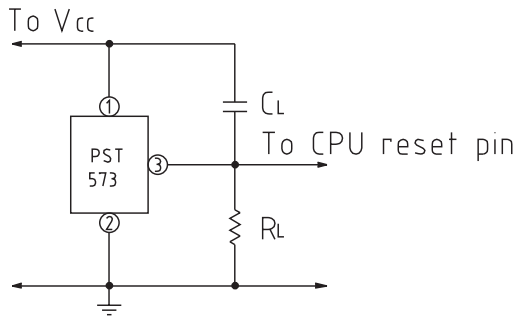


Timing Chart



Application circuits

1. Normal hard reset



Delay time (tpLH)

$$\approx C_L \times R_L \times \left[\ln \frac{V_{CC}-0.2}{V_{s\text{cpu}}} \right] + 0.025 \text{ (ms)}$$

CL : μF

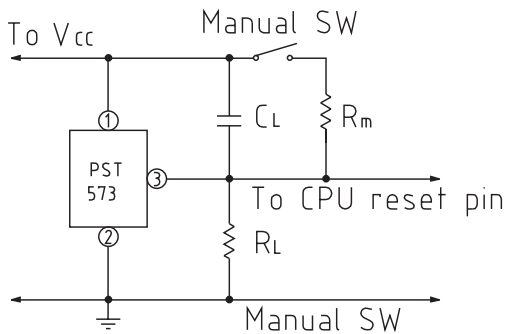
RL : kΩ

Vs cpu : Reset threshold voltage of CPU, MPU, etc.

Voltage: V

Note: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.

2. Manual reset added



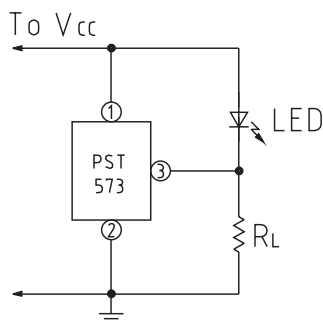
Note 1: Use RL, CL and Rm to prevent manual switch chattering.

Note that Rm should be set to the following conditions.

$$R_m \leq 1/20R_L$$

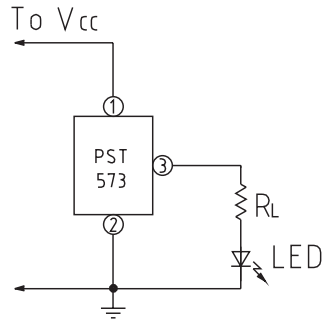
Note 2: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.

3. Battery checker (LED ON for high voltage)



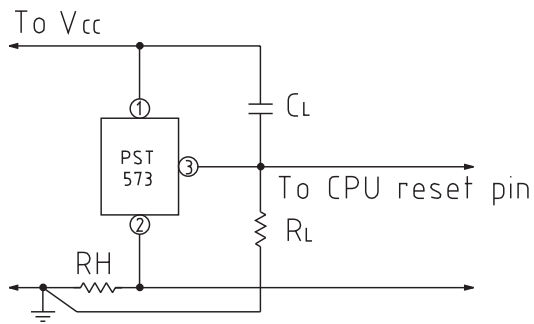
Note: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.

4 Battery checker (LED ON for low voltage)



Note: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.

5. Hysteresis voltage UP method



When increasing hysteresis voltage for stable system operation, determine RH as follows and connect externally.

However, I_{CCH} is $-5000\text{PPM}/^\circ\text{C}$, so perform temperature compensation at RH when using over a wide temperature range.

Hysteresis voltage UP amount (ΔV_{sup}) is

$$\Delta V_{sup} \cong RH \times I_{CCL}$$

Total hysteresis voltage (ΔV_{stotal}) is

$$\Delta V_{stotal} \cong V_s + \Delta V_{sup}$$

Note: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.