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}=450μA typ. I_{CCL}=1μA 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.	

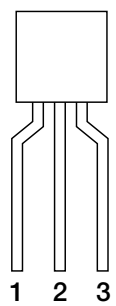
Packages

MMP-3A (PST573□M)
TO-92A (PST573□)
*The box represents a rank of detection voltage.

Applications

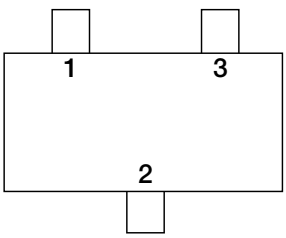
1. Reset circuits for microcomputers, CPUs and MPUs
2. Reset circuits for logic circuits
3. Battery voltage check circuits
4. Back-up power supply switching circuits
5. Level detection circuits

Pin Assignment



TO-92A

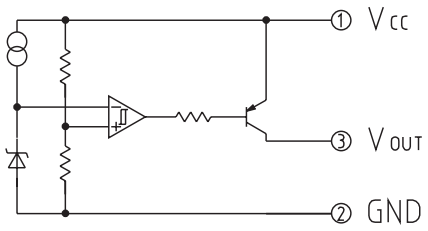
1	V_{CC}
2	GND
3	V_{OUT}



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	Tstg	–40~+125	°C
Operating temperature	Topr	–20~+75	°C
Power supply voltage	Vcc max.	–0.3~10	V
Allowable loss	Pd	200(MMP-3A) 300(TO-92A)	mW

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

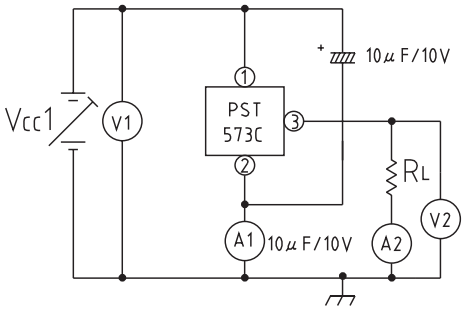
Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units
Detection voltage	Vs	1	RL=4.7k VOL≦Vcc–0.4V Vcc=H→L				V
			PST573C	4.3	4.5	4.7	
			PST573D	4.0	4.2	4.4	
			PST573E	3.7	3.9	4.1	
			PST573F	3.4	3.6	3.8	
			PST573G	3.1	3.3	3.5	
			PST573H	2.9	3.1	3.3	
			PST573I	2.75	2.90	3.05	
			PST573J	2.55	2.70	2.85	
			PST573K	2.35	2.50	2.65	
			PST573L	2.15	2.30	2.45	
Hysteresis voltage	⊿Vs	1	RL=4.7k Vcc=L→H→L	25	50	100	mV
Detection voltage temperature coefficient	Vs/⊿T	1	RL=4.7k Ta=–20°C~+75°C		±0.01		%/°C
High level output voltage	VOH	1	Vcc=Vs min. –0.05V RL=4.7k	Vcc –0.4			V
Output leakage current	IOH	1	Vcc=7.5V			0.1	µA
Circuit current while on	ICCL	1	Vcc=Vs min. –0.05V RL=∞		450	700	µA
Circuit current while off	ICCH	1	Vcc=Vs typ. /0.85V RL=∞		1.0	1.8	µA
"H"transport delay time	tpLH	2	RL=4.7k ✶1 CL=100pF		25	60	µs
"L"transport delay time	tpHL	2	RL=4.7k ✶1 CL=100pF		8	20	µs
Operation limit voltage	VopL	1	RL=4.7k VOL ≧ Vcc–0.4V		0.65	0.85	V
Output current while on 1	IOL I	1	Vcc=Vs min.–0.05V RL=0	–2.0	–6.0		mA
Output current while on 2	IOL II	1	Ta=–20°C~+75°C ✶2 RL=0	–1.5			mA

✶1 : tpLH : Vcc=(Vs typ.–0.4V)→(Vs typ.+0.4V), tpHL : Vcc=(Vs typ.+0.4V)→(Vs typ.–0.4V)

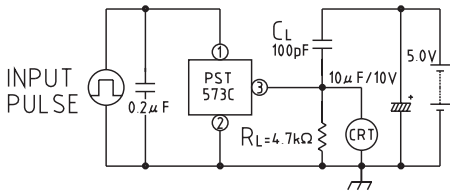
✶2 : Vcc=Vs min.–0.15V

Measuring Circuit

[1]

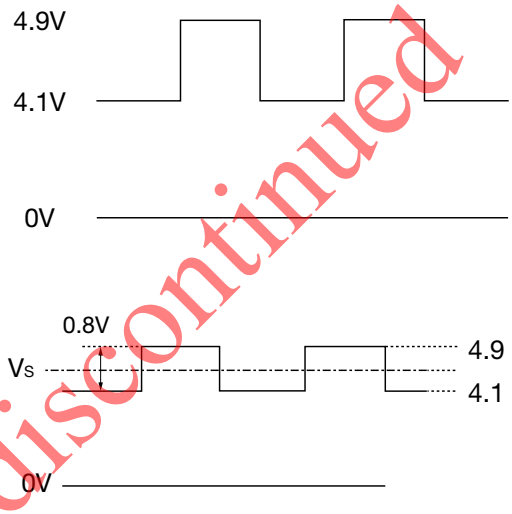


[2]



A : DC ammeter
V : DC voltmeter
CRT: Oscilloscope

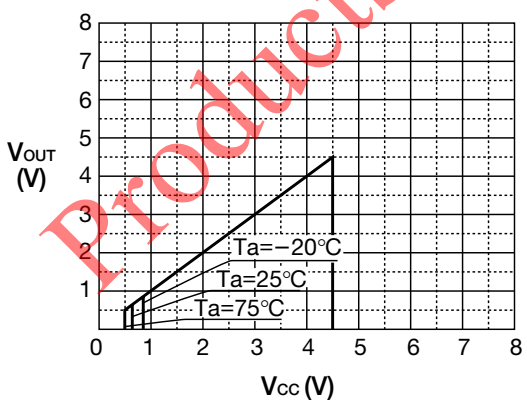
INPUT PULSE



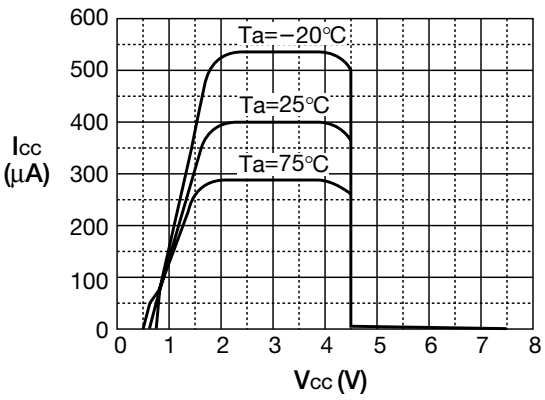
Note: Input model is an example for PST573C.

Characteristics (Example: PST573C)

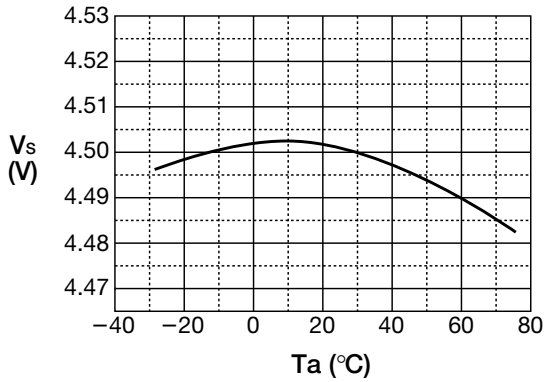
Vcc vs. Vout



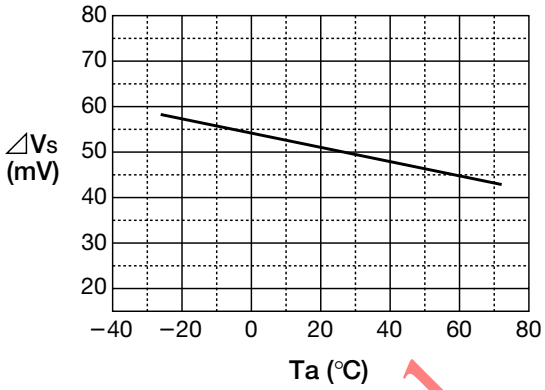
Vcc vs. Icc



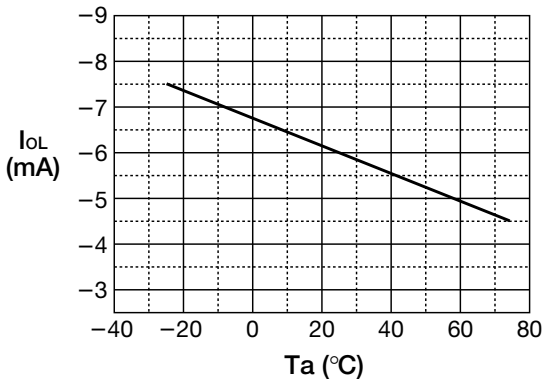
Vs vs. Ta



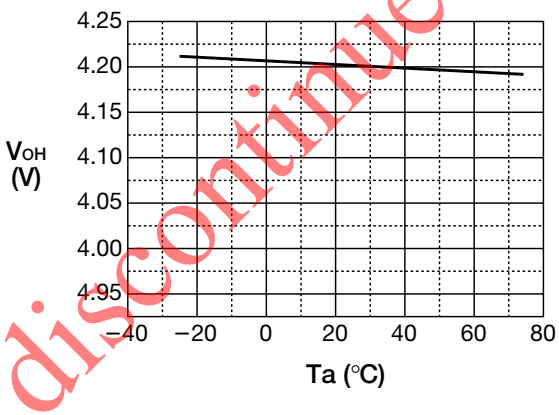
⊿Vs vs. Ta



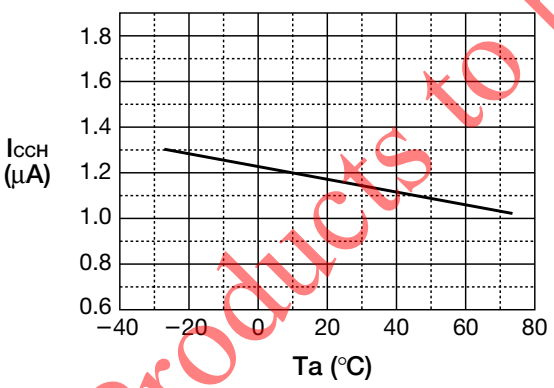
IOL vs. Ta



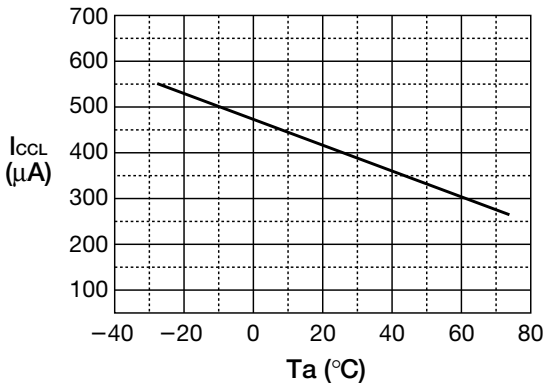
VOH vs. Ta



ICCH vs. Ta

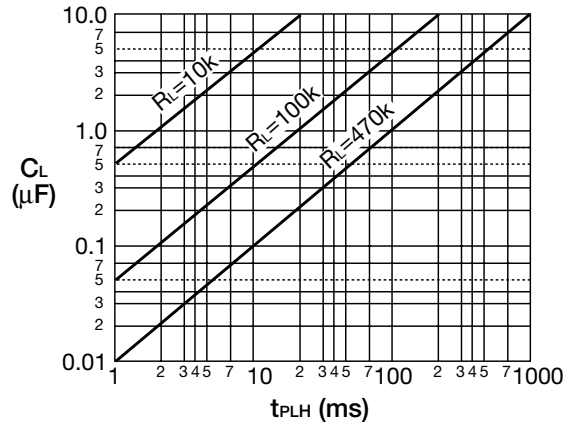


ICCL vs. Ta

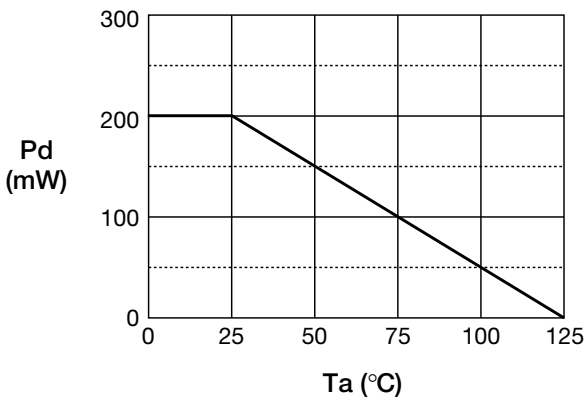


CL (RL) vs. tPLH

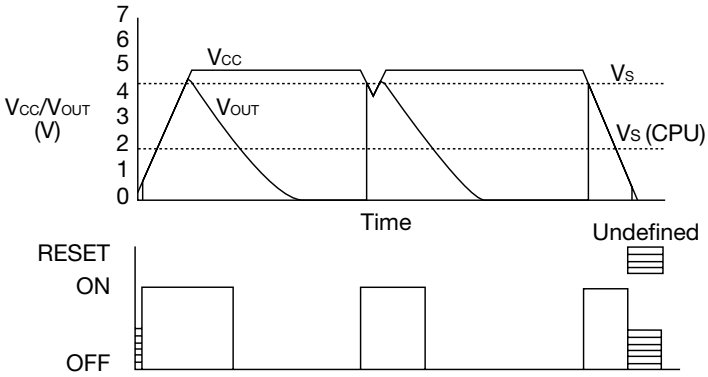
VS (CPU)=0.7VCC



Pd vs. Ta

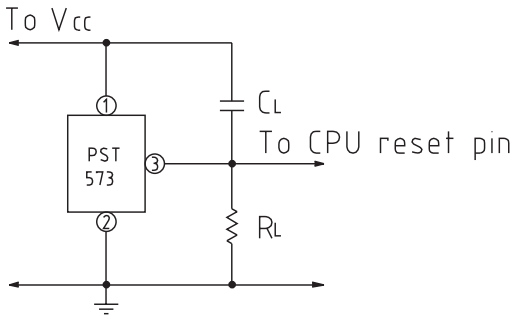


Timing Chart



Application circuits

1. Normal hard reset



Delay time (tpLH)

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

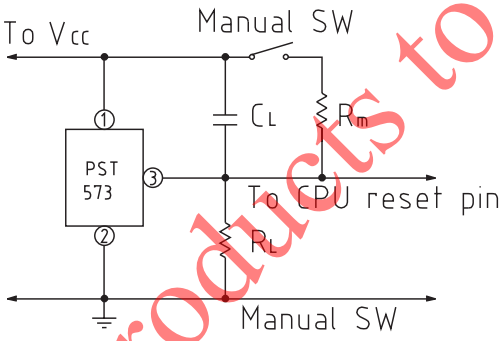
C_L: μF

R_L : 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.

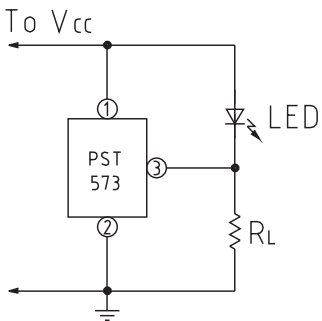
2. Manual reset added



Note 1: Use R_L, C_L and Rm to prevent manual switch chattering.
Note that Rm should be set to the following conditions.
$Rm \leqq 1/20R_L$

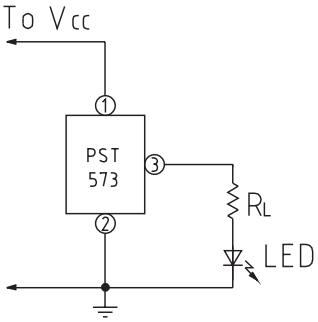
Note 2: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.

3. Battery checker (LED ON for high voltage)



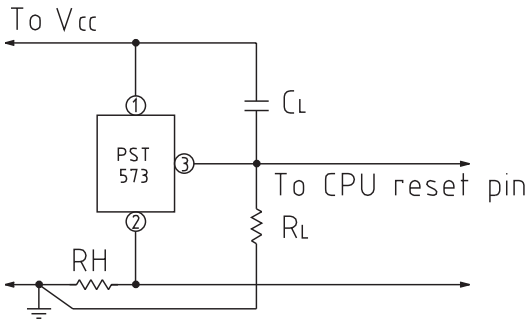
Note: Connect a capacitor between IC pins 1 and 2 if Vcc line impedance is high.

4 Battery checker (LED ON for low voltage)



Note: Connect a capacitor between IC pins 1 and 2 if V_{CC} 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 −5000PPM/℃, so perform temperature compensation at RH when using over a wide temperature range.
Hysteresis voltage UP amount (⊿Vsup) is
$\Delta V_{sup} \fallingdotseq RH \times I_{CCL}$
Total hysteresis voltage (⊿Vstotal) is
$\Delta V_{stotal} \fallingdotseq V_S + \Delta V_{sup}$

Note: Connect a capacitor between IC pins 1 and 2 if V_{CC} line impedance is high.