Reset IC

PST853/PST854 Series

Overview

This IC is a system reset IC that detect turn-off or the power flicker in power supply of CPU or logic systems. The IC has the delay time pin by an external capacitor and separated sense pin. The output don't occur to turn over without minimum operating limit voltage by separated sense and power supply pin. Therefore the IC is suitable for low voltage detection applications.

Features

- Low current consumption
- Separated sense pin

Main specifications

- Absolute maximum rating : -0.3V ~ 6.5V
- Operating voltage : 0.7V ~ 6.0V
- Operating ambient temperature : -40℃ ~ 85℃
- Detection voltage : 0.8V ~ 5.2V (0.1V step)
- Detection voltage accuracy : ±1%
- Hysteresis voltage : Typ. VTH×0.05
- Consumption current : Typ. 0.35uA
- Output type : PST853A: CMOS
  PST854A: Open drain
- Output Logic : Active L
- Delay Resistance : Typ. 1MΩ

Packages

- SOT-25A
- SSON-6J

Application

- Reset circuits for microcomputers, CPUs and MPUs
- Reset circuits for logic circuits
- Battery voltage check circuits
- Back-up power supply switching circuits
- Level detection circuits

Mitsumi Electric CO.,LTD.
Semiconductor Business Division
Strategy Engineering Department
tel:+81-46-230-3470

Model Name

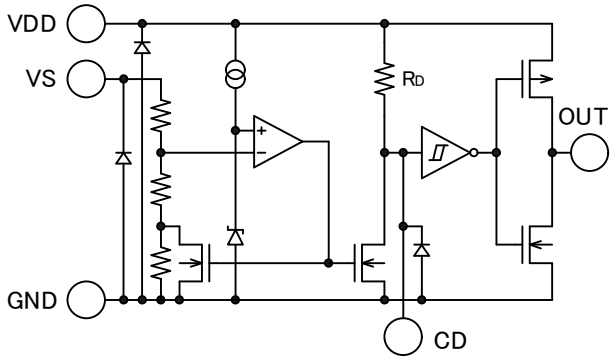
P S T 8 5 X X X X X X X

Series name (A) (B) (C) (D) (E)

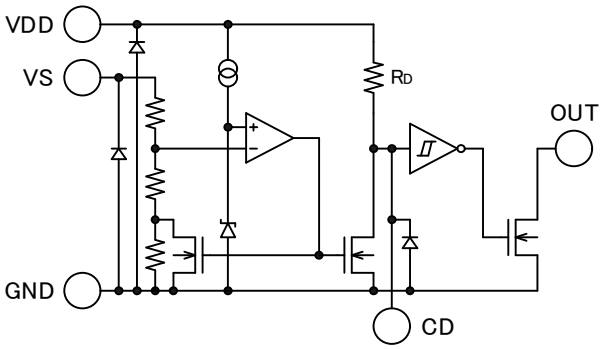
(A)	Output type	3	CMOS
		4	Open drain
(B)	Delay circuit type	A	Resistance 1MΩ
(C)	Reset detection voltage	080	Specify the detection voltage with a three-digit number. Detection voltage is 0.80V to 5.20V (0.10V steps.)
		≀	
		520	
(D)	Package	N	SOT-25A
		R	SSON-6J
(E)	Packing specifications	R	R housing (SOT-25A)
		L	L housing (SSON-6J) / Halogen free

Block Diagram

- PST853A (CMOS output)

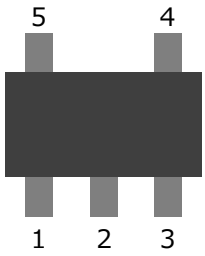


- PST854A (Open drain output)



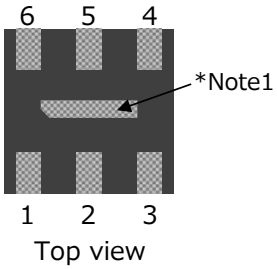
Pin Configuration

- SOT-25A



Pin No.	Pin name	Function
1	OUT	Output pin
2	VDD	Power supply input pin
3	GND	Ground pin
4	VS	Sence pin
5	CD	Delay pin with external capacitor

- SSON-6J



Pin No.	Pin name	Function
1	CD	Delay pin with external capacitor
2	VDD	Power supply input pin
3	VS	Sence pin
4	GND	Ground pin
5	NC	No Connection
6	OUT	Output pin

*Note1:Heat Spreader Bottom with VDD or open.

Absolute Maximum Ratings

Item		Symbol	Min.	Max.	Unit
Supply voltage		VDD	-0.3	6.5	V
VS pin voltage		VS	-0.3	6.5	V
CD pin voltage		VCD	-0.3	VDD+0.3	V
Output voltage	PST853	VOUT	-0.3	VDD+0.3	V
	PST854		-0.3	6.5	V
Output current		IOUT	0	20	mA
Storage temperature		Tstg	-55	125	℃

Recommended Operating Conditions

Item	Symbol	Min.	Max.	Unit
Operating Ambient temperature	Topr	-40	85	℃
Operating voltage (VDD)	Vop	0.7	6.0	V

Electrical Characteristics

(Ta=25°C, unless otherwise specified) *Note2

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit	Test circuit
Reset voltage *Note2	VTH	VDD=VTH+1V VS=H→L Upper line Ta=25℃ Lower line Ta=-40℃~85℃	0.8V	0.780 0.776	0.800 -	0.820 0.824	V	①
			0.9V	0.880 0.873	0.900 -	0.920 0.927		
			1.0V	0.980 0.970	1.000 -	1.020 1.030		
			1.1V	1.080 1.067	1.100 -	1.120 1.133		
			1.2V	1.180 1.164	1.200 -	1.220 1.236		
			1.3V	1.280 1.261	1.300 -	1.320 1.339		
			1.4V	1.380 1.358	1.400 -	1.420 1.442		
			1.5V	1.480 1.455	1.500 -	1.520 1.545		
			1.6V	1.580 1.552	1.600 -	1.620 1.648		
			1.7V	1.680 1.649	1.700 -	1.720 1.751		
			1.8V	1.780 1.746	1.800 -	1.820 1.854		
			1.9V	1.880 1.843	1.900 -	1.920 1.957		
			2.0V	1.980 1.940	2.000 -	2.020 2.060		
			2.1V	2.079 2.037	2.100 -	2.121 2.163		
			2.2V	2.178 2.134	2.200 -	2.222 2.266		
			2.3V	2.277 2.231	2.300 -	2.323 2.369		
			2.4V	2.376 2.328	2.400 -	2.424 2.472		
			2.5V	2.475 2.425	2.500 -	2.525 2.575		
			2.6V	2.574 2.522	2.600 -	2.626 2.678		
			2.7V	2.673 2.619	2.700 -	2.727 2.781		
			2.8V	2.772 2.716	2.800 -	2.828 2.884		
			2.9V	2.871 2.813	2.900 -	2.929 2.987		
			3.0V	2.970 2.910	3.000 -	3.030 3.090		

Electrical Characteristics

(Ta=25°C, unless otherwise specified) *Note2

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit	Test circuit
Reset voltage *Note2	VTH	VDD=VTH+1V VS=H→L Upper line Ta=25℃ Lower line Ta=-40℃~85℃	3.1V	3.069 3.007	3.100 -	3.131 3.193	V	①
			3.2V	3.168 3.104	3.200 -	3.232 3.296		
			3.3V	3.267 3.201	3.300 -	3.333 3.399		
			3.4V	3.366 3.298	3.400 -	3.434 3.502		
			3.5V	3.465 3.395	3.500 -	3.535 3.605		
			3.6V	3.564 3.492	3.600 -	3.636 3.708		
			3.7V	3.663 3.589	3.700 -	3.737 3.811		
			3.8V	3.762 3.686	3.800 -	3.838 3.914		
			3.9V	3.861 3.783	3.900 -	3.939 4.017		
			4.0V	3.960 3.880	4.000 -	4.040 4.120		
			4.1V	4.059 3.977	4.100 -	4.141 4.223		
			4.2V	4.158 4.074	4.200 -	4.242 4.326		
			4.3V	4.257 4.171	4.300 -	4.343 4.429		
			4.4V	4.356 4.268	4.400 -	4.444 4.532		
			4.5V	4.455 4.365	4.500 -	4.545 4.635		
			4.6V	4.554 4.462	4.600 -	4.646 4.738		
			4.7V	4.653 4.559	4.700 -	4.747 4.841		
			4.8V	4.752 4.656	4.800 -	4.848 4.944		
			4.9V	4.851 4.753	4.900 -	4.949 5.047		
			5.0V	4.950 4.850	5.000 -	5.050 5.150		
			5.1V	5.049 4.947	5.100 -	5.151 5.253		
			5.2V	5.148 5.044	5.200 -	5.252 5.356		

Electrical Characteristics

(Ta=25°C, unless otherwise specified) *Note2

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit	Test circuit
Hysteresis voltage	⊿VTH	VDD=VTH+1V VS=0V→VTH+1V→0V	0.8V	0.024	0.040	0.064	V	①
			0.9V	0.027	0.045	0.072		
			1.0V	0.030	0.050	0.080		
			1.1V	0.033	0.055	0.088		
			1.2V	0.360	0.600	0.960		
			1.3V	0.039	0.065	0.104		
			1.4V	0.042	0.070	0.112		
			1.5V	0.045	0.075	0.120		
			1.6V	0.048	0.080	0.128		
			1.7V	0.051	0.085	0.136		
			1.8V	0.054	0.090	0.144		
			1.9V	0.057	0.095	0.152		
			2.0V	0.060	0.100	0.160		
			2.1V	0.063	0.105	0.168		
			2.2V	0.066	0.110	0.176		
			2.3V	0.069	0.115	0.184		
			2.4V	0.072	0.120	0.192		
			2.5V	0.075	0.125	0.200		
			2.6V	0.078	0.130	0.208		
			2.7V	0.081	0.135	0.216		
			2.8V	0.084	0.140	0.224		
			2.9V	0.087	0.145	0.232		
			3.0V	0.090	0.150	0.240		
			3.1V	0.093	0.155	0.248		
			3.2V	0.096	0.160	0.256		
			3.3V	0.099	0.165	0.264		
			3.4V	0.102	0.170	0.272		
			3.5V	0.105	0.175	0.280		
			3.6V	0.108	0.180	0.288		
			3.7V	0.111	0.185	0.296		
			3.8V	0.114	0.190	0.304		
			3.9V	0.117	0.195	0.312		
			4.0V	0.120	0.200	0.320		
			4.1V	0.123	0.205	0.328		
			4.2V	0.126	0.210	0.336		
			4.3V	0.129	0.215	0.344		
			4.4V	0.132	0.220	0.352		
			4.5V	0.135	0.225	0.360		
			4.6V	0.138	0.230	0.368		
			4.7V	0.141	0.235	0.376		
			4.8V	0.144	0.240	0.384		
			4.9V	0.147	0.245	0.392		
			5.0V	0.150	0.250	0.400		
			5.1V	0.153	0.255	0.408		
			5.2V	0.156	0.260	0.416		

Electrical Characteristics

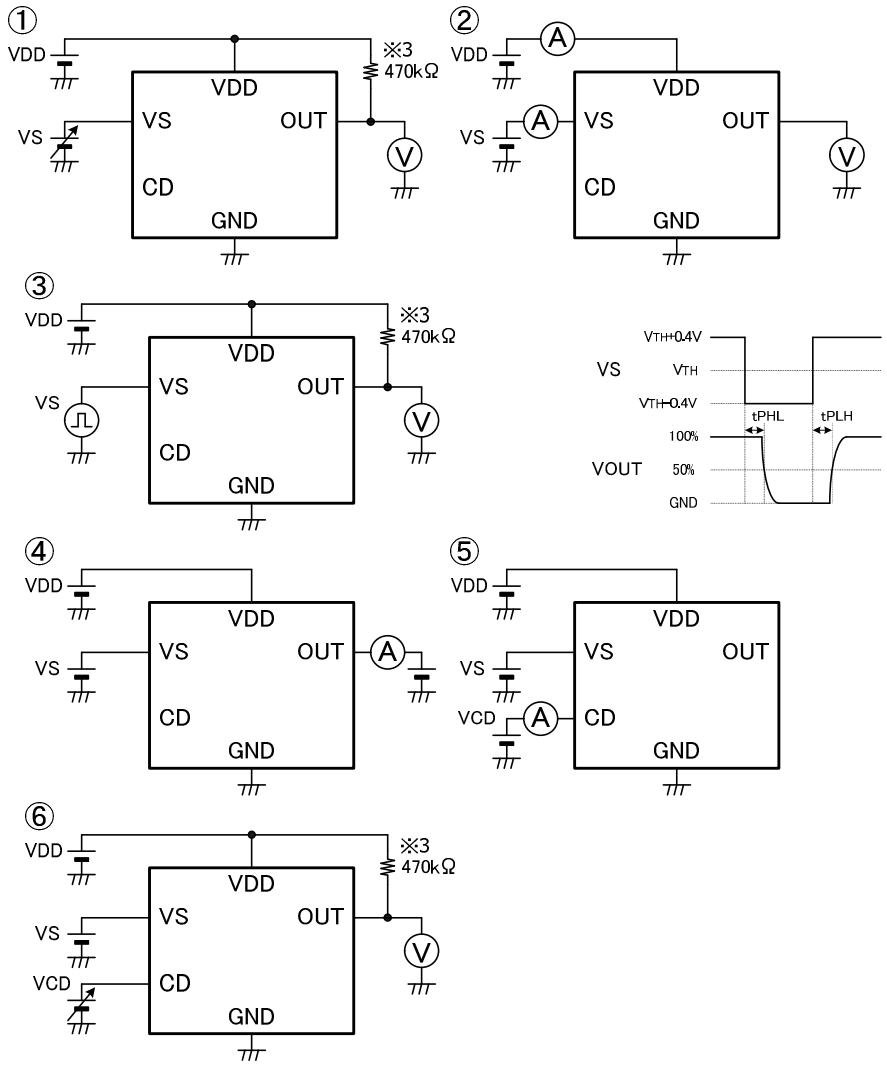
(Ta=25°C, unless otherwise specified) *Note2

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit	Test circuit
Consumption current	IDD	VDD=VTH+1V VS=VTH+1V	0.8V~ 5.2V	-	0.35	1.0	uA	②
Reset threshold temperature coefficient *Note3	⊿VTH/℃	Ta=-40℃～+85℃	0.8V~ 5.2V	-	±100	-	ppm/℃	①
"L" Transfer delay time *Note3	tPHL	VDD=VTH+0.4V VS=VTH+0.4V→VTH-0.4V	1.2V~ 5.2V	2	15	100	us	③
"H" Transfer delay time *Note3	tPLH	VDD=VTH+0.4V VS=VTH-0.4V→VTH+0.4V	1.2V~ 5.2V	2	15	100	us	③
"L" Output current	IOL1	VDD=VS=0.7V, VDS=0.05V	0.8V~ 5.2V	0.01	0.10	–	mA	④
	IOL2	VDD=VS=1.2V, VDS=0.5V	1.3V~ 5.2V	0.23	2.00	–		
	IOL3	VDD=VS=2.4V, VDS=0.5V	2.5V~ 5.2V	1.60	8.00	–		
	IOL4	VDD=VS=3.6V, VDS=0.5V	3.7V~ 5.2V	3.20	12.0	–		
"H" Output current	IOH1	VDD=VS=4.8V, VDS=0.5V PST853 only	0.8V~ 4.7V	0.36	0.62	-	mA	④
	IOH2	VDD=VS=6.0V, VDS=0.5V PST853 only	0.8V~ 5.2V	0.46	0.75	-		
Output leakage current	Ileak	VDD=6V, VOUT=6V PST854 only	0.8V~ 5.2V	-	-	0.1	uA	④
Delay resistance	RCD	VDD=VS=VTH+1V VCD=0V	0.8V~ 5.2V	0.5	1.0	2.0	MΩ	⑤
CD pin threshold voltage	VTCD	VDD=VS=VTH×1.1 VCD=0V→VDD	0.8V~ 5.2V	VDD×0.3	VDD×0.5	VDD×0.7	V	⑥
CD pin output current 1	ICD1	VDD=VS=0.7V VCD=0.1V	0.8V~ 5.2V	2	30	-	uA	⑤
CD pin output current 2	ICD2	VDD=VS=0.8V VCD=0.5V	0.8V~ 1.0V	20	80	-	uA	⑤
		VDD=VS=1.0V VCD=0.5V	1.1V~ 1.5V	50	150	-	uA	⑤
		VDD=VS=1.5V VCD=0.5V	1.6V~ 5.2V	200	400	-	uA	⑤
VS Input current	RVS	VDD=VTH+1V VS=VHT+1V	0.8V~ 5.2V	-	15	-	MΩ	②

*Note2: The IC is only tested at Ta=25℃ in final test. It is guaranteed by design except Ta=25℃.

*Note3: The parameter is guaranteed by design.

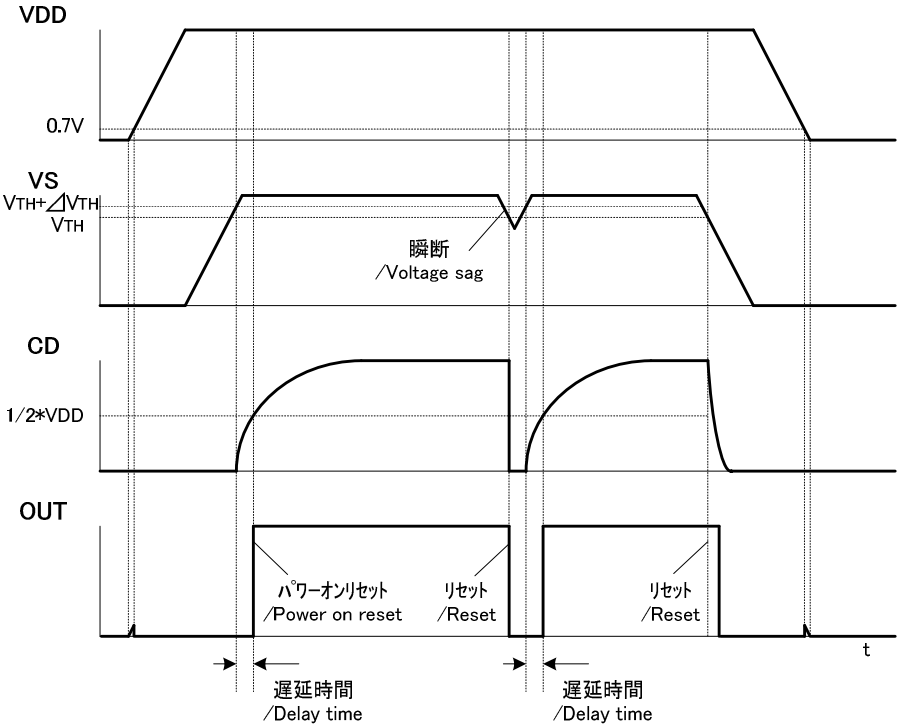
Test Circuit



*3 PST854 only

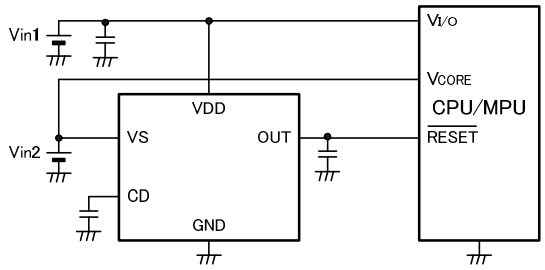
Timing Chart

- PST854A (Open drain output)

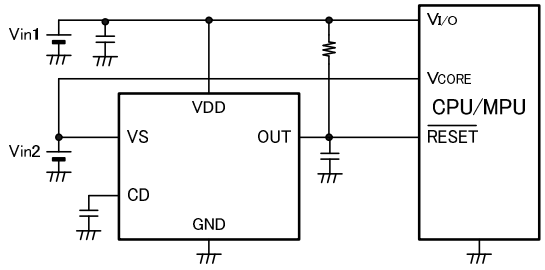


Application Circuit

▪PST853



▪PST854



- The typical application circuit is not guaranteed for a set applications. It has to test sufficiently in a set applications.
- In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, Mitsumi shall not be liable for any such problem, nor grant a license therefore.

Application notes

- Reset voltage

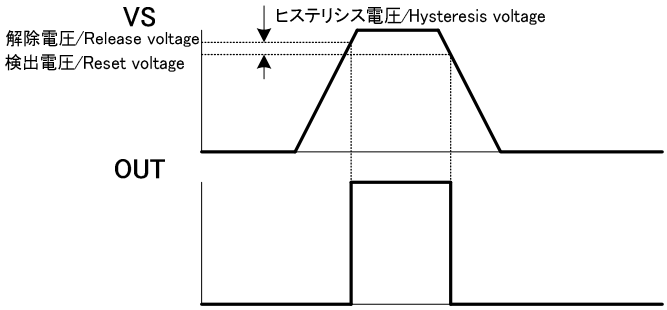
  In case of VS=H→L, the reset voltage is the detected voltage at OUT=H→L.

- Release voltage

  In case of VS=L→H, the release voltage is the detected voltage at OUT=L→H.
  (Release voltage = Reset voltage + Hysteresis voltage)

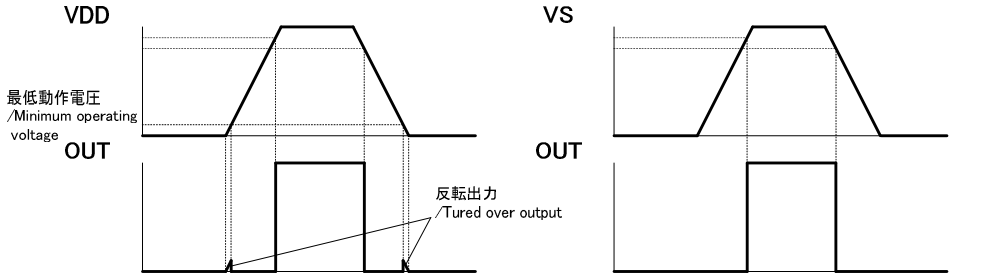
- Hysteresis voltage

  The hysteresis voltage prevents a malfunction from power supply noise.
  (Hysteresis voltage = Release voltage - Reset voltage)



- VS pin

  The VS pin is sense pin is separated from VDD. It does not have the minimum operating voltage,
  because VDD is supplied by another bias. Therefore the function is suitable to low voltage reset applications.



Normal Reset IC　　Separated sense pin Reset IC

- VDD pin

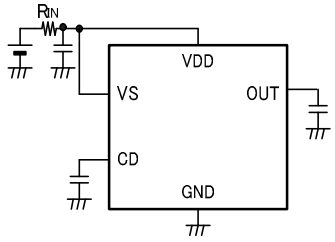
  VDD pin is bias of internal circuit. When VDD is sharp fluctuated, a malfunction may occur in the IC.
  It is recommended to use for VDD a stable power supply.

- Supply voltage sequence

  The turning on supply voltage sequence is VDD→VS, the turning off sequence is VS→VDD.

- VDD to VS short circuit

  VS pin can use to connect with VDD pin. But an input resistance can not be inserted on an input line as below.
  (It is possible to oscillate by through-current of VDD.)
  And then OUT pin is occurred to turn over less than the minimum operating voltage of VDD.

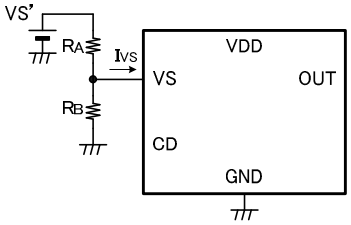


Application notes

■ Reset voltage of external setting

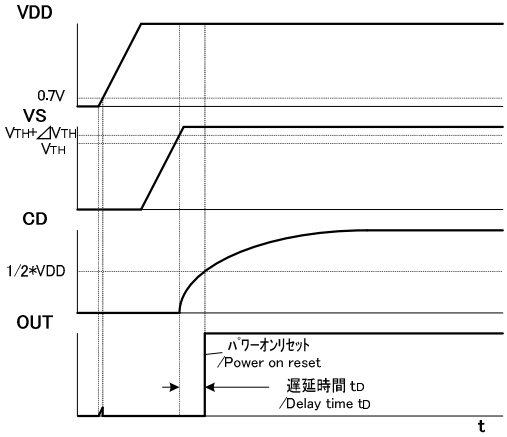
Reset voltage can be set by external resistances. Reset voltage VS' is as below.
RA and RB is set to consider an error of IVS.

VS'=(1+(RA/RB))×VS+RA×IVS



■ Delay time

The delay circuit is connected with an external capacitor to CD pin.
The delay time is decided on time constant by an internal resistance and an external capacitor.
Power-on-reset (VS=L→H) is released, after an input voltage turned on stable voltage.



Delay Time

tD = 0.69×CD×RD [s]

C_D: External capacitor [F]
R_D: Delay resistance [Ω]

The charging time formula of the CR time constant, is a case of " VCD = 0.5 × VDD".
tD=-CD×RD×ln(1-VCD/VDD)

V_{CD}: CD threshold voltage [V]

■ Delay circuit type

Delay circuit type are an internal resistance.
The resistance type is compatible with PST83/84xx and PST893/894A.

■ CD pin

CD pin is high impedance for a delay resistance or constant current circuit.
It is necessary to take care for dew condensation or PCB or capacitor leakage.

■ Long delay time

When a high delay capacitor is used, the release delay time can be long.
But a delay time occurs in reset operation by discharge time of capacitor.
A set is recommended to design considering the delay time.

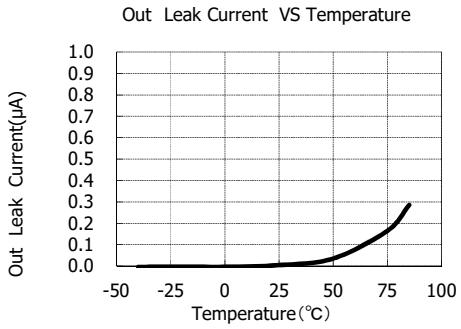
Application notes

- CMOS output

  CMOS output is inverter output between VDD and GND. It is not necessary to connect a pull-up resistance.

- Open drain output

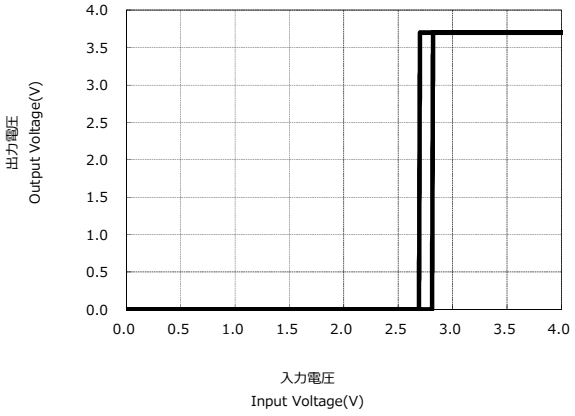
  Open drain output is certainly connected with an external pull-up resistance.
  The pull-up resistance can be supplied for any voltage and more than VDD voltage.
  At high tempreture, please pays attention to the leak current for open drain NMOS,
  it happens output voltage is up to leak current.



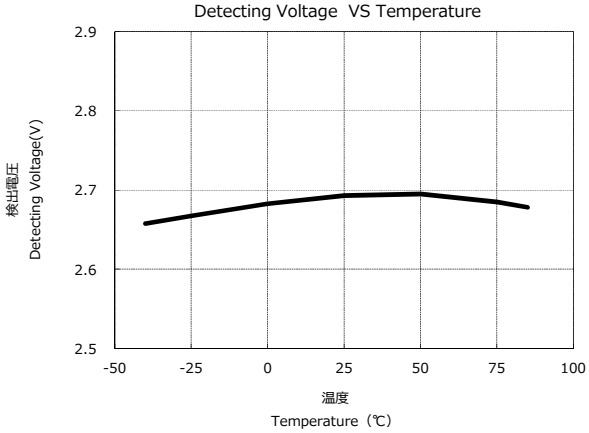
Typical Performance Characteristics (PST854A270)

(Ta=25°C, unless otherwise specified)

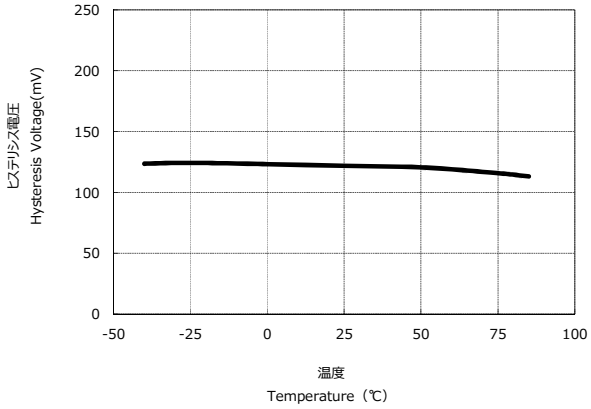
検出電圧
Detecting Voltage



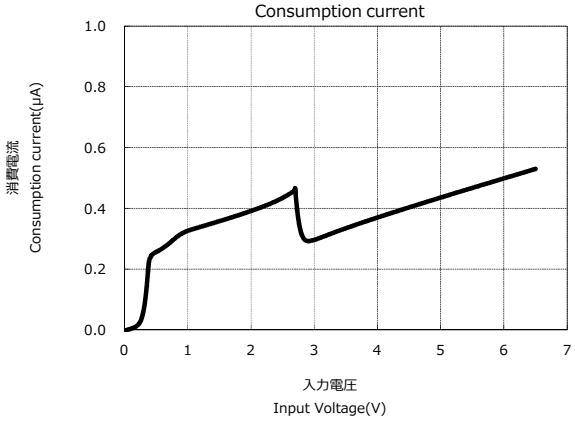
検出電圧 対 温度
Detecting Voltage VS Temperature



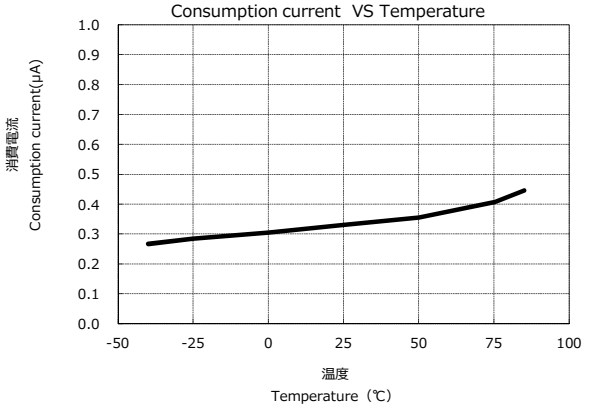
ヒステリシス電圧 対 温度
Hysteresis Voltage VS Temperature



消費電流
Consumption current



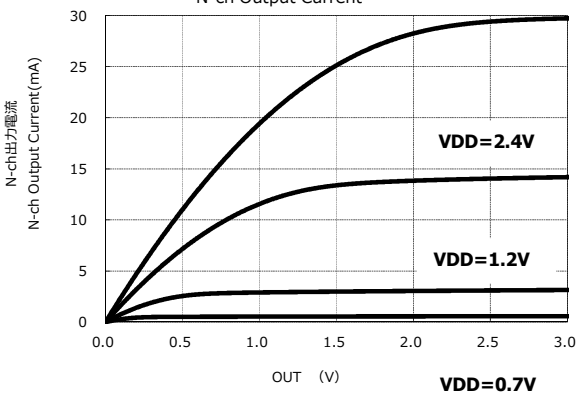
消費電流 対 温度
Consumption current VS Temperature



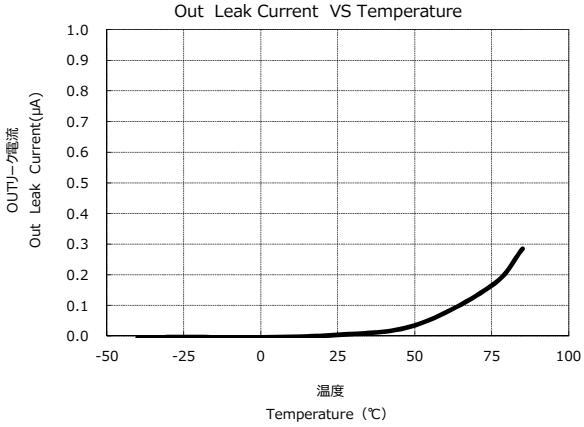
Typical Performance Characteristics (PST854A270)

(Ta=25°C, unless otherwise specified)

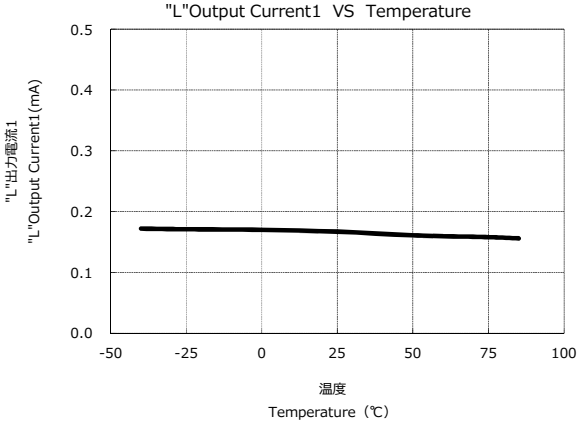
N-ch出力電流
N-ch Output Current



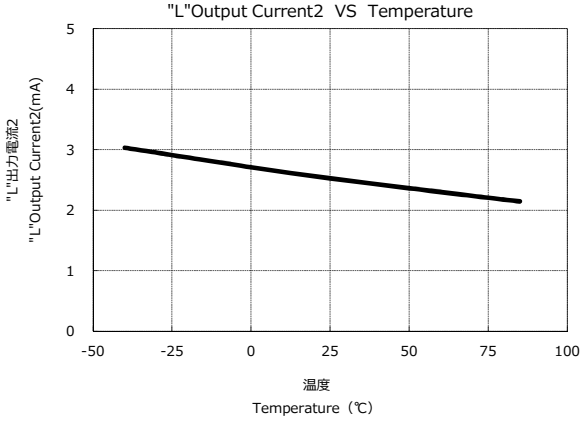
OUTリーク電流 対 温度
Out Leak Current VS Temperature



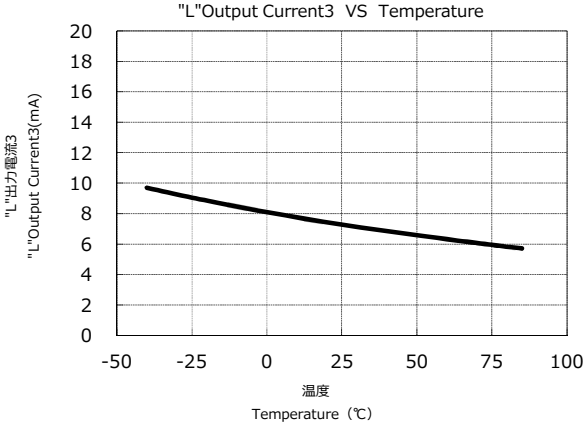
"L"出力電流1 対 温度
"L"Output Current1 VS Temperature



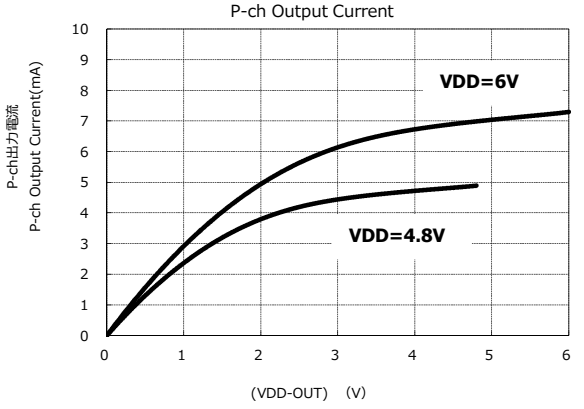
"L"出力電流2 対 温度
"L"Output Current2 VS Temperature



"L"出力電流3 対 温度
"L"Output Current3 VS Temperature



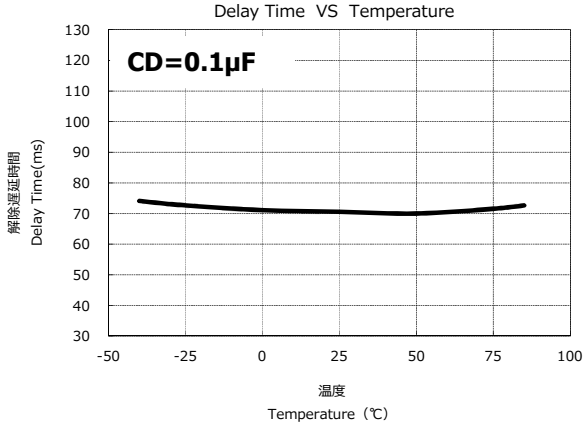
P-ch出力電流
P-ch Output Current



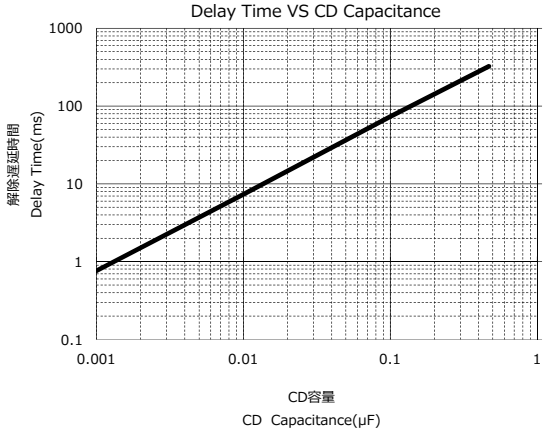
Typical Performance Characteristics (PST854A270)

(Ta=25°C, unless otherwise specified)

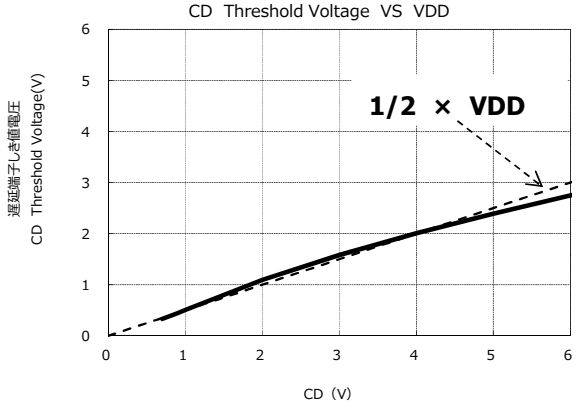
解除遅延時間 対 温度
Delay Time VS Temperature



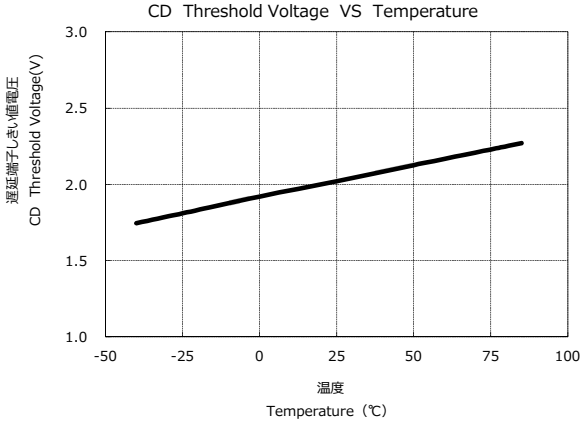
解除遅延時間 対 CD容量
Delay Time VS CD Capacitance



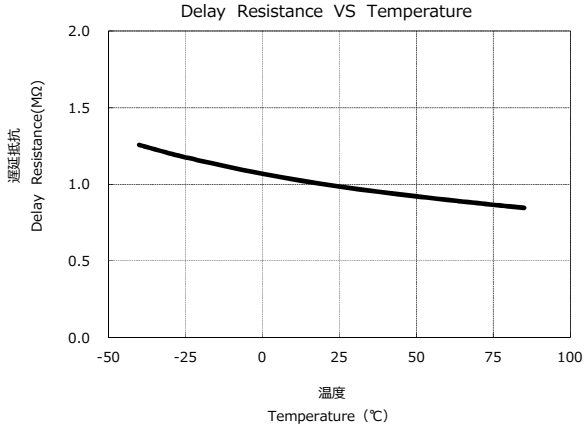
遅延端子しきい値電圧 対 VDD
CD Threshold Voltage VS VDD



遅延端子しきい値電圧 対 温度
CD Threshold Voltage VS Temperature



遅延抵抗 対 温度
Delay Resistance VS Temperature



Typical Performance Characteristics (PST854A270)

(Ta=25°C, unless otherwise specified)