

Reset IC

# PST89D/PST89E Series

## Overview

This IC is a reset IC for turning on/off power supply and power flicker in CPU or logic systems. This IC can change delay time by an external capacitor.

## Features

- Low current consumption

## Main specifications

- Absolute maximum rating : -0.3V ~ 7.0V
- Operating voltage : 0.95V ~ 6.5V
- Operating ambient temperature : -40°C ~ 105°C
- Detection voltage : 1.2V ~ 5.2V (0.1V step)
- Detection voltage accuracy : ±1%
- Hysteresis voltage : Typ.  $V_{TH} \times 0.05$
- Consumption current : Typ. 0.35µA
- Output type : PST89DA: CMOS  
PST89EA: Open drain
- Output Logic : Active L
- Delay Resistance : Typ. 10MΩ

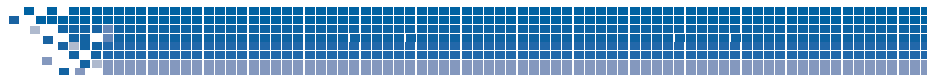
## Packages

- PLP-4C

## 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





## Model Name

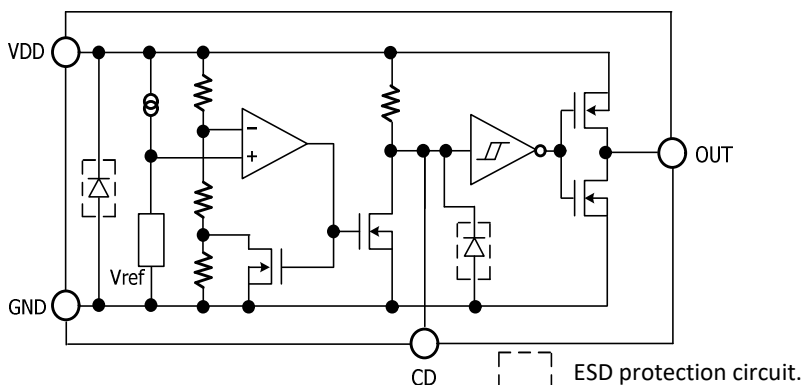
P
S
T
8
9
X
X
X
X
X
X
X

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

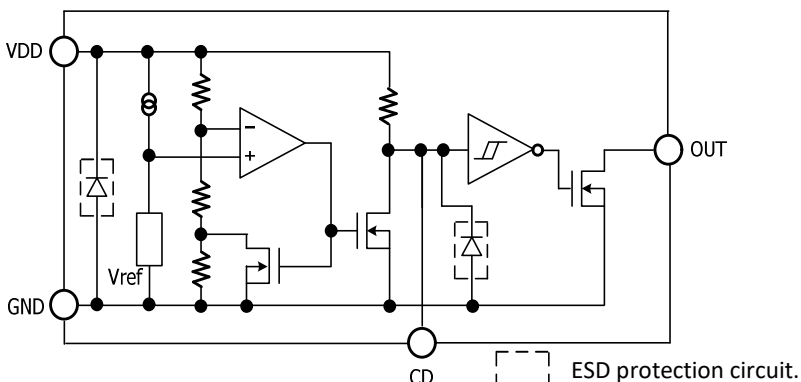
(A)	Output type	D	CMOS
		E	Open drain
(B)	Delay circuit type	A	Resistance 10MΩ
		B	Current source 100nA
(C)	Reset detection voltage	120	Specify the detection voltage with a three-digit number. Detection voltage is 1.20V to 5.20V (0.10V steps.)
		?	
		520	
(D)	Package	R	PLP-4C
(E)	Packing specifications	R	R housing / Halogen free

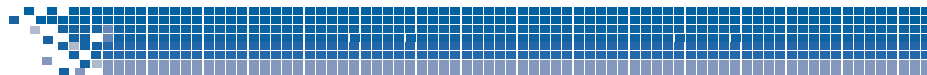
## Block Diagram

- PST89DA (CMOS output)



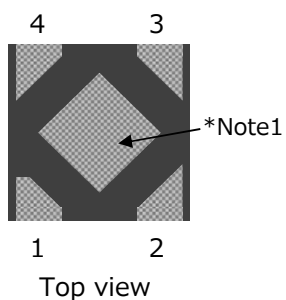
- PST89EA (Open drain output)





## Pin Configuration

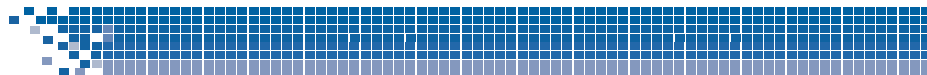
- PLP-4C



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

\*Note1:Heat Spreader Bottom with VDD.





## Absolute Maximum Ratings

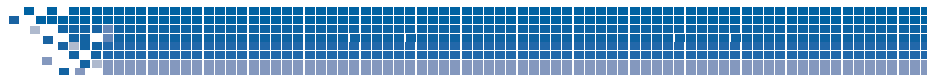
Item	Symbol	Min.	Max.	Unit
Supply voltage	VDD	-0.3	7.0	V
Output voltage	PST89EA	GND-0.3	VDD+0.3	V
	PST89DA	GND-0.3	7.0	V
Input current	IDD	0	20	mA
Output current	IOUT	0	20	mA
CD pin voltage	VCD	GND-0.3	VDD+0.3	V
Operating Temperature	Topr	-40	105	°C
Storage temperature	Tstg	-65	150	°C
Power Dissipation *Note2	Pd	-	1,300	mW

\*Note2:JEDEC51-7 standard (114.3mm\*76.2mm\*1.6mm)

## Recommended Operating Conditions

Item	Symbol	Min.	Max.	Unit
Operating Ambient temperature	Topr	-40	105	°C
Operating voltage	Vop	0.95	6.5	V





## Electrical Characteristics

(Ta=25°C, unless otherwise specified) \*Note3

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Test circuit	
Reset voltage *Note3	VTH	VDD=H→L Upper line Ta=25°C Lower line Ta=-40°C~85°C	1.2V	1.1880	1.2000	1.2120	V	①
				1.1700	-	1.2300		
			1.3V	1.2870	1.3000	1.3130		
				1.2675	-	1.3325		
			1.4V	1.3860	1.4000	1.4140		
				1.3650	-	1.4350		
			1.5V	1.4850	1.5000	1.5150		
				1.4625	-	1.5375		
			1.6V	1.5840	1.6000	1.6160		
				1.5600	-	1.6400		
			1.7V	1.6830	1.7000	1.7170		
				1.6575	-	1.7425		
			1.8V	1.7820	1.8000	1.8180		
				1.7550	-	1.8450		
			1.9V	1.8810	1.9000	1.9190		
				1.8525	-	1.9475		
			2.0V	1.9800	2.0000	2.0200		
				1.9500	-	2.0500		
			2.1V	2.0790	2.1000	2.1210		
				2.0475	-	2.1525		
			2.2V	2.1780	2.2000	2.2220		
				2.1450	-	2.2550		
			2.3V	2.2770	2.3000	2.3230		
				2.2425	-	2.3575		
			2.4V	2.3760	2.4000	2.4240		
				2.3400	-	2.4600		
			2.5V	2.4750	2.5000	2.5250		
				2.4375	-	2.5625		
			2.6V	2.5740	2.6000	2.6260		
				2.5350	-	2.6650		
			2.7V	2.6730	2.7000	2.7270		
				2.6325	-	2.7675		
2.8V	2.7720	2.8000	2.8280					
	2.7300	-	2.8700					
2.9V	2.8710	2.9000	2.9290					
	2.8275	-	2.9725					
3.0V	2.9700	3.0000	3.0300					
	2.9250	-	3.0750					
3.1V	3.0690	3.1000	3.1310					
	3.0225	-	3.1775					
3.2V	3.1680	3.2000	3.2320					
	3.1200	-	3.2800					
3.3V	3.2670	3.3000	3.3330					
	3.2175	-	3.3825					
3.4V	3.3660	3.4000	3.4340					
	3.3150	-	3.4850					



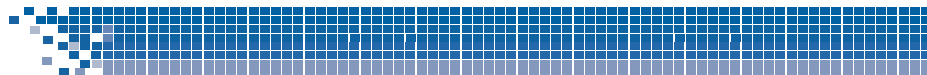


## Electrical Characteristics

(Ta=25°C, unless otherwise specified) \*Note3

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Test circuit	
Reset voltage *Note3	VTH	VDD=H→L Upper line Ta=25°C Lower line Ta=-40°C~85°C	3.5V	3.4650	3.5000	3.5350	V	①
				3.4125	-	3.5875		
			3.6V	3.5640	3.6000	3.6360		
				3.5100	-	3.6900		
			3.7V	3.6630	3.7000	3.7370		
				3.6075	-	3.7925		
			3.8V	3.7620	3.8000	3.8380		
				3.7050	-	3.8950		
			3.9V	3.8610	3.9000	3.9390		
				3.8025	-	3.9975		
			4.0V	3.9600	4.0000	4.0400		
				3.9000	-	4.1000		
			4.1V	4.0590	4.1000	4.1410		
				3.9975	-	4.2025		
			4.2V	4.1580	4.2000	4.2420		
				4.0950	-	4.3050		
			4.3V	4.2570	4.3000	4.3430		
				4.1925	-	4.4075		
			4.4V	4.3560	4.4000	4.4440		
				4.2900	-	4.5100		
			4.5V	4.4550	4.5000	4.5450		
				4.3875	-	4.6125		
			4.6V	4.5540	4.6000	4.6460		
				4.4850	-	4.7150		
4.7V	4.6530	4.7000	4.7470					
	4.5825	-	4.8175					
4.8V	4.7520	4.8000	4.8480					
	4.6800	-	4.9200					
4.9V	4.8510	4.9000	4.9490					
	4.7775	-	5.0225					
5.0V	4.9500	5.0000	5.0500					
	4.8750	-	5.1250					
5.1V	5.0490	5.1000	5.1510					
	4.9725	-	5.2275					
5.2V	5.1480	5.2000	5.2520					
	5.0700	-	5.3300					





### Electrical Characteristics

(Ta=25°C, unless otherwise specified) \*Note3

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Test circuit	
Hysteresis voltage	$\Delta V_{TH}$	VDD=0V→VTH+1V→0V	1.2V	0.036	0.060	0.096	V	②
			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) \*Note3

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Test circuit	
Consumption current	IDD	VDD=VTH+1V	1.2V~ 5.2V	-	0.35	1.0	uA	①
Reset threshold temperature coefficient *Note4	$\Delta V_{TH}/^{\circ}C$	Ta=-40°C~+85°C	1.2V~ 5.2V	-	±100	-	ppm/°C	②
"L" Transfer delay time *Note4	T <sub>PHL</sub>	VDD=VTH+0.4V→VTH-0.4V	1.2V~ 5.2V	2	15	100	us	⑥
"H" Transfer delay time *Note4	T <sub>PLH</sub>	VDD=VTH-0.4V→VTH+0.4V	1.2V~ 5.2V	2	15	100	us	⑥
"L" Output current	IOL1	VDD=0.95V, VDS=0.05V	1.2V~ 5.2V	0.01	0.10	-	mA	③
	IOL2	VDD=1.2V, VDS=0.5V	1.3V~ 5.2V	0.23	2.00	-		
	IOL3	VDD=2.4V, VDS=0.5V	2.5V~ 5.2V	1.60	8.00	-		
	IOL4	VDD=3.6V, VDS=0.5V	3.7V~ 5.2V	3.20	12.0	-		
"H" Output current	IOH1	VDD=4.8V, VDS=0.5V PST89D only	1.2V~ 4.7V	0.36	0.62	-	mA	③
	IOH2	VDD=6.1V, VDS=0.5V PST89D only	1.2V~ 5.2V	0.46	0.75	-		
Output leakage current	I <sub>leak</sub>	VDD=6.5V, OUT=6.5V PST89E only	1.2V~ 5.2V	-	-	0.1	uA	③
Delay resistance	R <sub>CD</sub>		1.2V~ 5.2V	9	10	11	MΩ	⑤
CD pin threshold voltage	V <sub>TC</sub>	VDD=VTH×1.1V	1.2V~ 5.2V	VDD×0.3	VDD×0.5	VDD×0.7	V	④
CD pin output current 1	ICD1	VDD=0.95V, VDS=0.1V	1.2V~ 5.2V	2.0	30.0	-	uA	⑤
CD pin output current 2	ICD2	VDD=1.0V, VDS=0.5V	1.2V~ 1.5V	50	200	-	uA	⑤
		VDD=1.5V, VDS=0.5V	1.6V~ 5.2V	200	800	-	uA	⑤

\*Note3: The IC is only tested at Ta=25°C in final test. It is guaranteed by design except Ta=25°C.

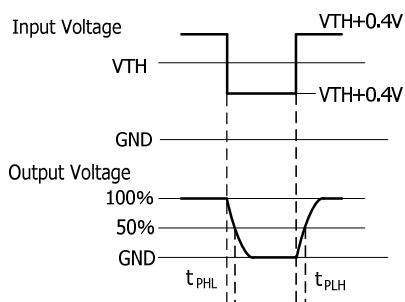
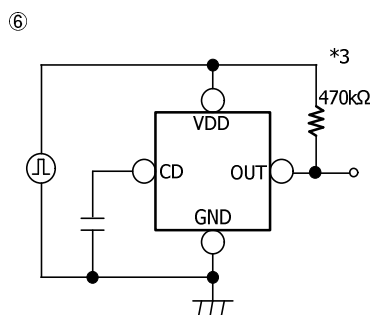
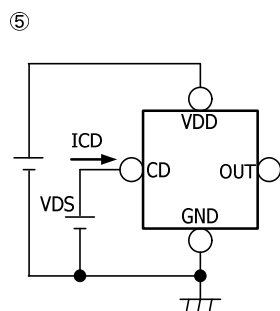
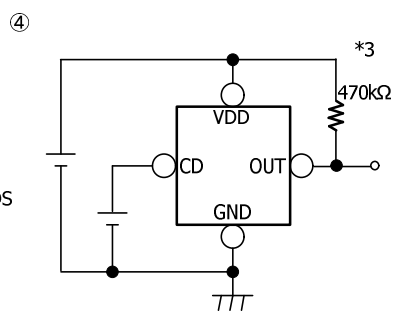
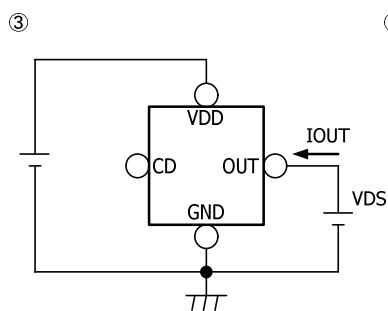
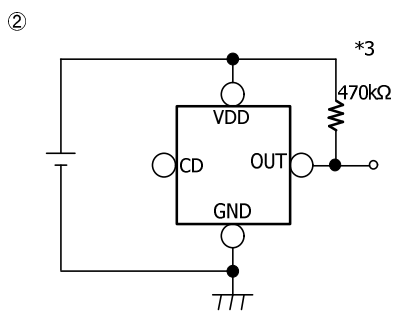
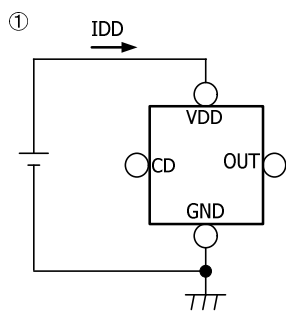
\*Note4: The parameter is guaranteed by design.







## Test Circuit

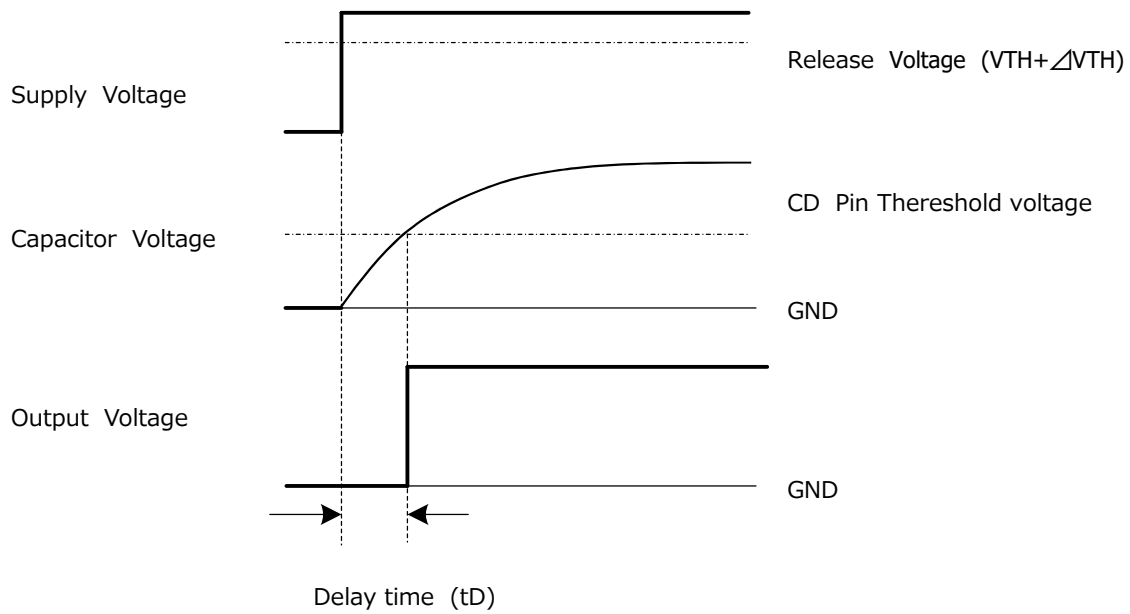


\*3 PST89E only



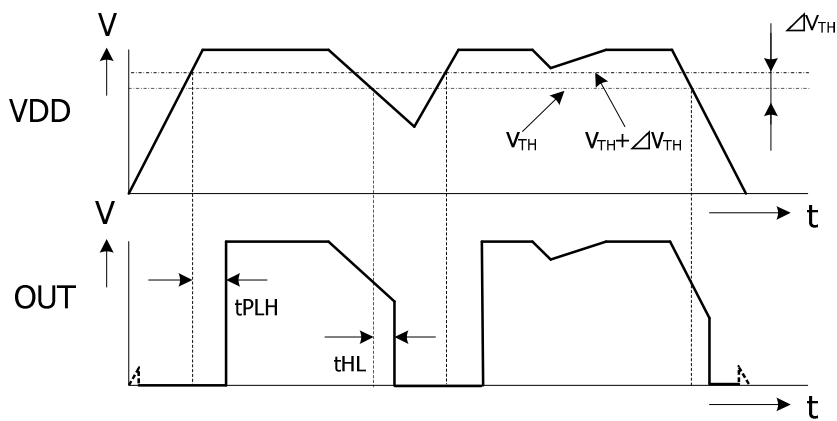


## Timing Chart



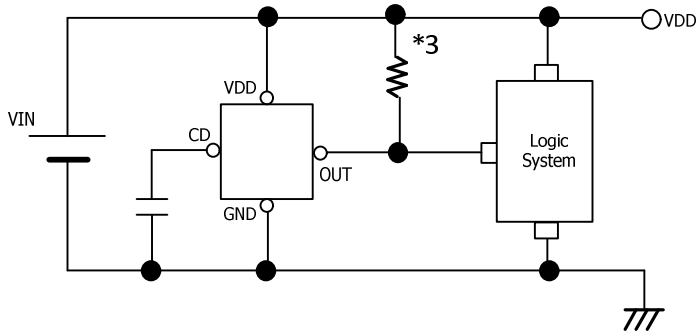
Delay time ( $t_D$ )  $t_D = 0.69 \times R_D \times C_D$  (s)

$R_D$  : CD Pin Resistance  
 $C_D$  : Capacitor



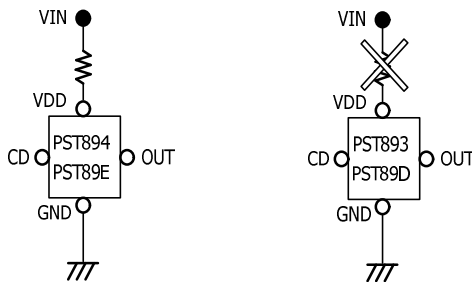


## 応用回路図



\*3 PST89E only

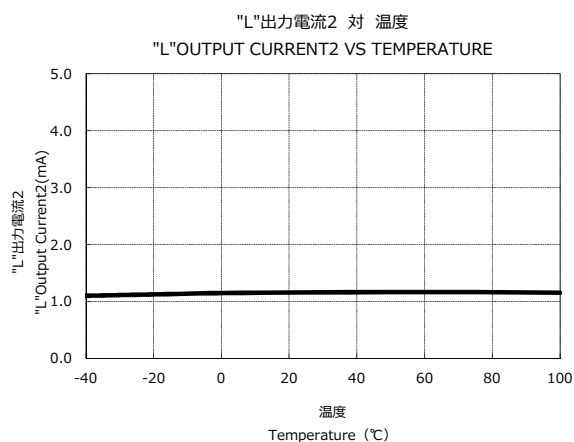
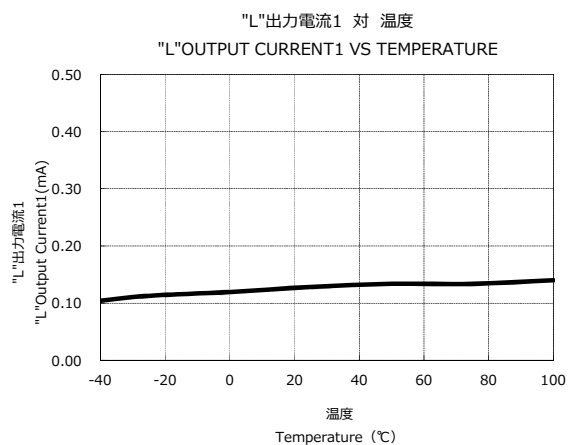
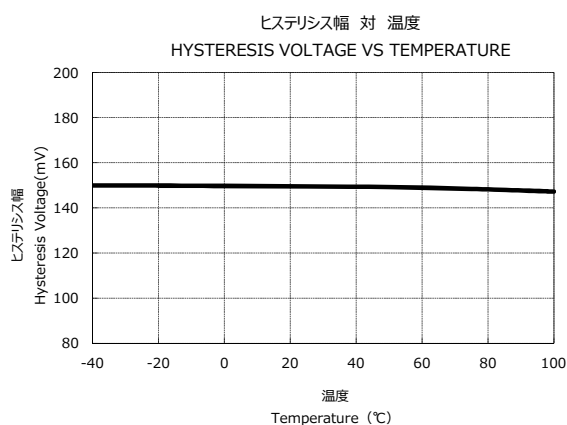
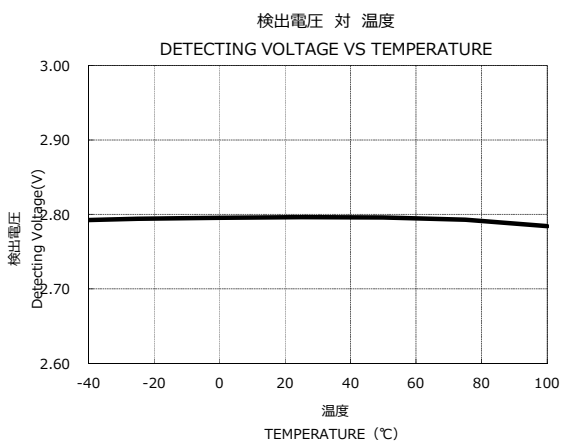
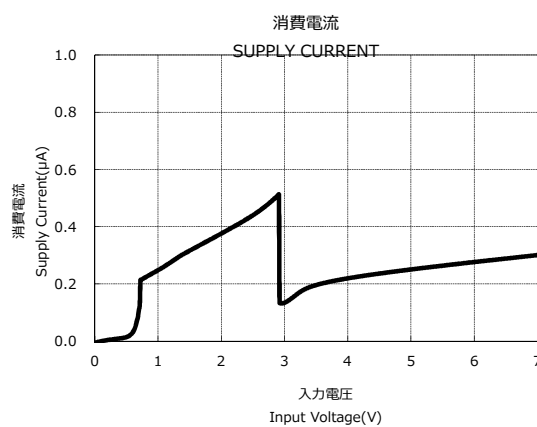
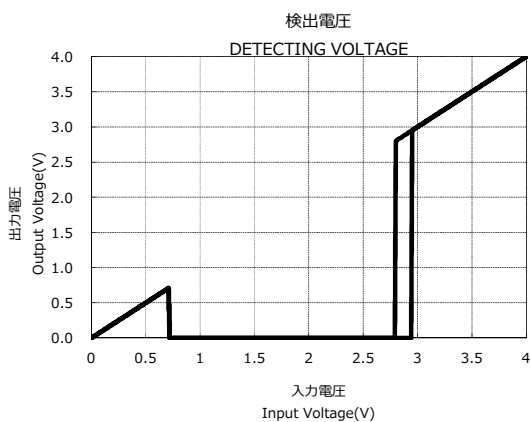
- The typical application circuit is not guaranteed for a set applications. It has to test sufficiently in a set applications.
- In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, Mitsumi shall not be liable for any such problem, nor grant a license therefore.
- Please note that there is any possibility of circuit oscillation when resistance put in the line VIN. In PST894,89E, please make it less than 15k ohm. In PST893,89D, since it may oscillate, please do not put resistance into the position of a figure.

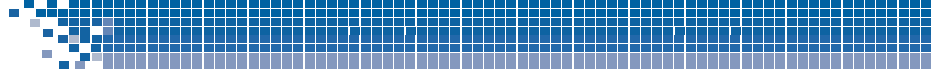




## Typical Performance Characteristics (VTH=2.8V)

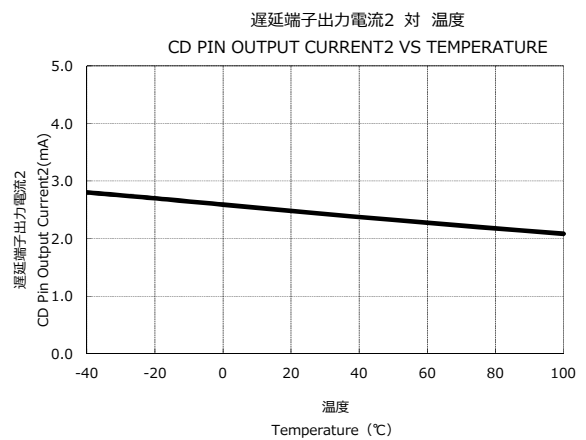
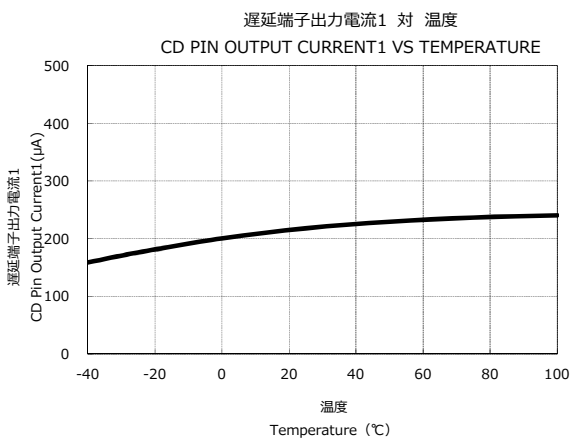
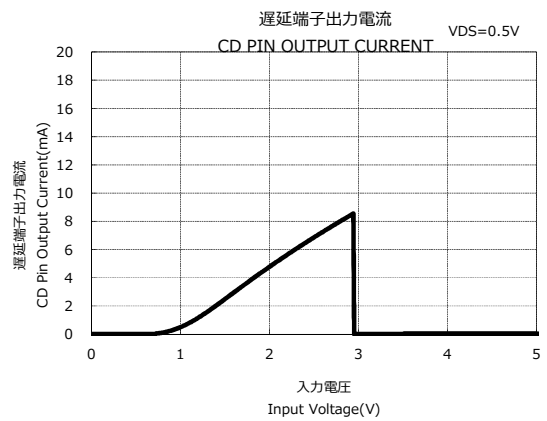
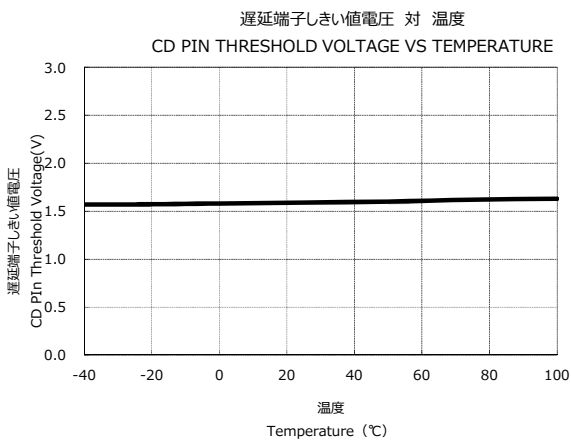
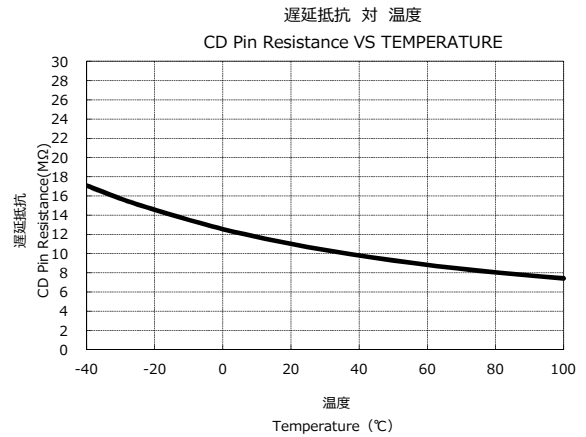
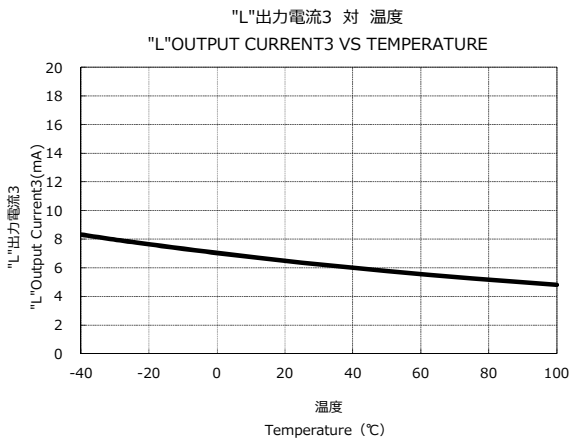
(Ta=25°C, unless otherwise specified)





## Typical Performance Characteristics (VTH=2.8V)

(Ta=25°C, unless otherwise specified)

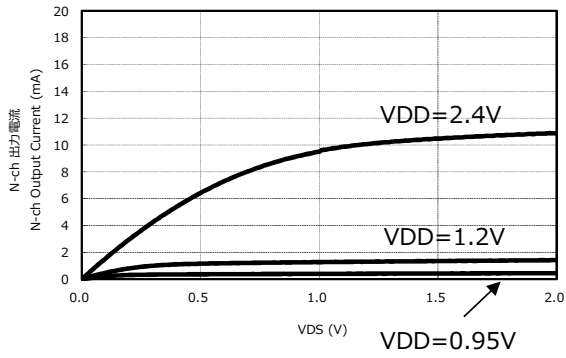




## Typical Performance Characteristics (VTH=2.8V)

(Ta=25°C, unless otherwise specified)

N-ch出力電流  
N-ch OUTPUT CURRENT



N-ch出力電流  
N-ch OUTPUT CURRENT

