

# IC for CMOS System Reset

## Monolithic IC PST38XXU Series

April 16, 2001

### Outline

This open drain output system reset IC, developed using the CMOS process. Super low consumption current of 1.0 $\mu$ A typ. (PST3810 ~ PST3819) has been achieved through use of the CMOS process. Also, detection voltage is high precision detection of  $\pm 2\%$ .

### Features

- |                                      |   |
|--------------------------------------|---|
| (1) Super low consumption current    | 1.0 $\mu$ A typ. (when $V_{DD} = (-V_{DET}) + 2.0V$ ) PST3810 ~ PST3819 |
| (2) High precision detection voltage | $\pm 2\%$   |
| (3) Operating range                  | 0.7 ~ 10V   |
| (4) Wide operating temperature range | -30 ~ +85°C   |
| (5) Detection voltage                | 0.9 ~ 6.0V (0.1V step)  |

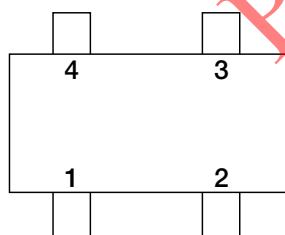
### Package

SC-82ABA, SC-82ABB

### Applications

- (1) Microcomputer, CPU, MPU reset circuits
- (2) Logic circuit reset circuits
- (3) Battery voltage check circuits
- (4) Back-up circuit switching circuits
- (5) Level detection circuits

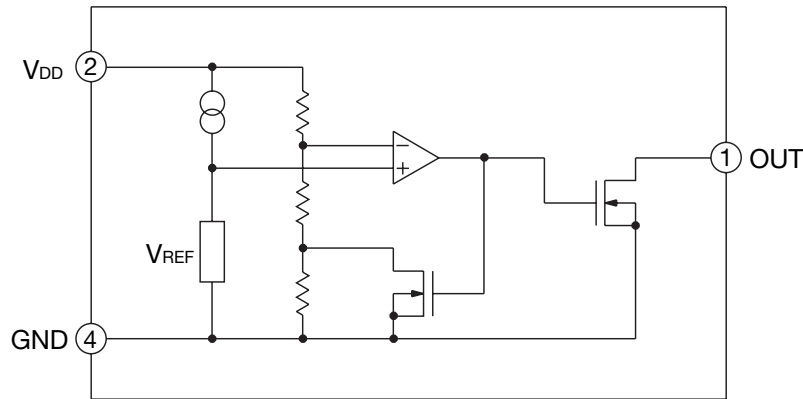
### Pin Assignment



1	OUT
2	$V_{DD}$
3	NC
4	GND

SC-82ABA  
SC-82ABB  
(TOP VIEW)

**Block Diagram**



**Pin Explanations**

Pin No.	Pin Name	Function
1	OUT	Reset Signal Output Pin
2	VDD	VDD Pin/Voltage Detect Pin
3	NC	
4	GND	GND Pin

**Absolute Maximum Ratings** (Ta=25°C)

Item	Symbol	Rating	Unit
Operating Temperature	T <sub>OPT</sub>	-30~+85	°C
Storage Temperature	T <sub>STG</sub>	-40~+125	°C
Supply Voltage	V <sub>DD max.</sub>	12	V
Output Voltage	V <sub>OUT</sub>	V <sub>SS</sub> -0.3~12	V
Output Current	I <sub>OUT</sub>	70	mA
Power Dissipation	P <sub>D</sub>	150	mW

**Recommended Operating Conditions**

Item	Symbol	Rating	Unit
Operating Temperature	T <sub>OPT</sub>	-30~+85	°C
Supply Voltage	V <sub>DD</sub>	+0.70~+10	V

**Electrical Characteristics** (Unless otherwise specified, Ta=25°C)

Product Name	Item																
	Detecting Voltage			Hysteresis Voltage			Supply Current1			Supply Current2							
	-V <sub>DET</sub> (V)			V <sub>HYS</sub> (V)			I <sub>SS1</sub> (μA)			I <sub>SS2</sub> (μA)							
	Test Circuit 2			Test Circuit 2			Test Circuit 1			Test Circuit 1							
Min.	Typ.	Max.	Min.	Typ.	Max.	Condition	Typ.	Max.	Condition	Typ.	Max.						
PST3809	0.882	0.900	0.918	0.027	0.045	0.063	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.10V	1.5	3.7	1.0	3.0						
PST3810	0.980	1.000	1.020	0.030	0.050	0.070											
PST3811	1.078	1.100	1.122	0.033	0.055	0.077											
PST3812	1.176	1.200	1.224	0.036	0.060	0.084											
PST3813	1.274	1.300	1.326	0.039	0.065	0.091											
PST3814	1.372	1.400	1.428	0.042	0.070	0.098											
PST3815	1.470	1.500	1.530	0.045	0.075	0.105											
PST3816	1.568	1.600	1.632	0.048	0.080	0.112											
PST3817	1.666	1.700	1.734	0.051	0.085	0.119											
PST3818	1.764	1.800	1.836	0.054	0.090	0.126											
PST3819	1.862	1.900	1.938	0.057	0.095	0.133											
PST3820	1.960	2.000	2.040	0.060	0.100	0.140											
PST3821	2.058	2.100	2.142	0.063	0.105	0.147											
PST3822	2.156	2.200	2.244	0.066	0.110	0.154											
PST3823	2.254	2.300	2.346	0.069	0.115	0.161											
PST3824	2.352	2.400	2.448	0.072	0.120	0.168											
PST3825	2.450	2.500	2.550	0.075	0.125	0.175											
PST3826	2.548	2.600	2.652	0.078	0.130	0.182											
PST3827	2.646	2.700	2.754	0.081	0.135	0.189											
PST3828	2.744	2.800	2.856	0.084	0.140	0.196											
PST3829	2.842	2.900	2.958	0.087	0.145	0.203											
PST3830	2.940	3.000	3.060	0.090	0.150	0.210											
PST3831	3.038	3.100	3.162	0.093	0.155	0.217											
PST3832	3.136	3.200	3.264	0.096	0.160	0.224											
PST3833	3.234	3.300	3.366	0.099	0.165	0.231											
PST3834	3.332	3.400	3.468	0.102	0.170	0.238											
PST3835	3.430	3.500	3.570	0.105	0.175	0.245											
PST3836	3.528	3.600	3.672	0.108	0.180	0.252											
PST3837	3.626	3.700	3.774	0.111	0.185	0.259											
PST3838	3.724	3.800	3.876	0.114	0.190	0.266											
PST3839	3.822	3.900	3.978	0.117	0.195	0.273											
PST3840	3.920	4.000	4.080	0.120	0.200	0.280											
PST3841	4.018	4.100	4.182	0.123	0.205	0.287											
PST3842	4.116	4.200	4.284	0.126	0.210	0.294											
PST3843	4.214	4.300	4.386	0.129	0.215	0.301											
PST3844	4.312	4.400	4.488	0.132	0.220	0.308											
PST3845	4.410	4.500	4.590	0.135	0.225	0.315											
PST3846	4.508	4.600	4.692	0.138	0.230	0.322											
PST3847	4.606	4.700	4.794	0.141	0.235	0.329											
PST3848	4.704	4.800	4.896	0.144	0.240	0.336											
PST3849	4.802	4.900	4.998	0.147	0.245	0.343											
PST3850	4.900	5.000	5.100	0.150	0.250	0.350											
PST3851	4.998	5.100	5.202	0.153	0.255	0.357											
PST3852	5.096	5.200	5.304	0.156	0.260	0.364											
PST3853	5.194	5.300	5.406	0.159	0.265	0.371											
PST3854	5.292	5.400	5.508	0.162	0.270	0.378											
PST3855	5.390	5.500	5.610	0.165	0.275	0.385											
PST3856	5.488	5.600	5.712	0.168	0.280	0.392											
PST3857	5.586	5.700	5.814	0.171	0.285	0.399											
PST3858	5.684	5.800	5.916	0.174	0.290	0.406											
PST3859	5.782	5.900	6.018	0.177	0.295	0.413											
PST3860	5.880	6.000	6.120	0.180	0.300	0.420											
							V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.13V	4.0	8.0	V <sub>DD</sub> = (-V <sub>DET</sub> ) +2.0V	1.2	3.6					
								4.5	9.0								
							V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.16V	5.0	10.0				1.3	3.9			
								5.5	11.0								
								V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.20V	6.0						12.0	1.4	4.2
									6.5						13.0		

**Electrical Characteristics** (Unless otherwise specified, Ta=25°C)

Product Name	Item									
	Output Current1			Output Current2			Leak Current			
	I <sub>OUT1</sub> (mA)			I <sub>OUT2</sub> (mA)			I <sub>LEAK</sub> (μA)			
	Test Circuit 3			Test Circuit 3			Test Circuit 3			
	Condition	Min.	Typ.	Condition	Min.	Typ.	Condition	Typ.	Max.	
PST3809	N-ch V <sub>DS</sub> = 0.05V V <sub>DD</sub> = 0.7V	0.01	0.05	N-ch V <sub>DS</sub> = 0.5V	V <sub>DD</sub> =0.85V	0.05	0.5	V <sub>DD</sub> = 10V V <sub>DS</sub> = 10V	-	0.1
PST3810										
PST3811										
PST3812					V <sub>DD</sub> =1.0V	0.2	1.0			
PST3813										
PST3814										
PST3815										
PST3816										
PST3817										
PST3818										
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PST3860										

Phased Out Products

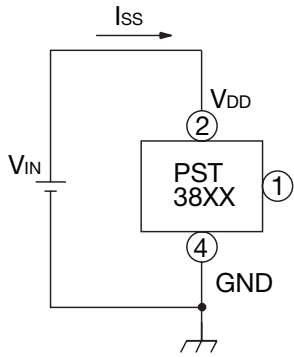
**Electrical Characteristics** (Unless otherwise specified, Ta=25°C)

Product Name	Item							
	Threshold Operating Voltage1			Threshold Operating Voltage2			Detecting Voltage Temp. Coefficient	
	V <sub>DDL1</sub> (V)			V <sub>DDL2</sub> (V)			Δ-V <sub>DET</sub> /ΔT <sub>OPT</sub> (ppm/°C)	
	Test Circuit 2			Test Circuit 2			Test Circuit 2	
Condition	Typ.	Max.	Condition	Typ.	Max.	Condition	Typ.	
PST3809								
PST3810								
PST3811								
PST3812								
PST3813								
PST3814								
PST3815								
PST3816								
PST3817								
PST3818								
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PST3826								
PST3827								
PST3828								
PST3829								
PST3830								
PST3831								
PST3832								
PST3833								
PST3834	V <sub>OUT</sub> ≤0.1V	0.55	0.70	V <sub>OUT</sub> ≤0.1V	0.65	0.80	-30°C ≤	
PST3835	T <sub>OPT</sub> =25°C			-30°C ≤			T <sub>OPT</sub>	
PST3836				T <sub>OPT</sub>			≤85°C	
PST3837				≤85°C			±100	
PST3838								
PST3839								
PST3840								
PST3841								
PST3842								
PST3843								
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PST3845								
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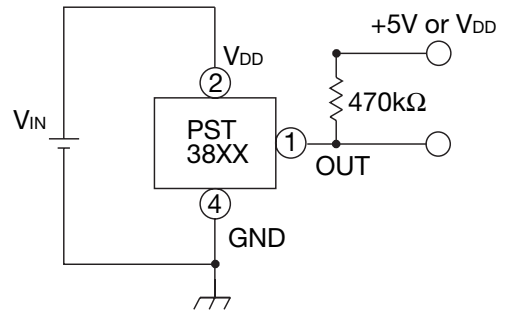
Phased Out Products

Measuring Circuit

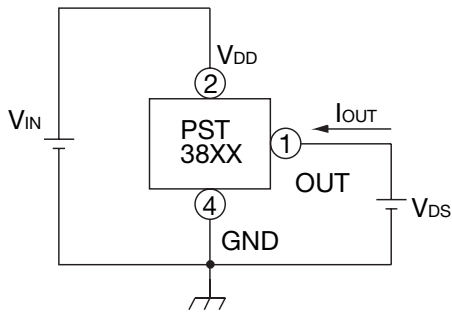
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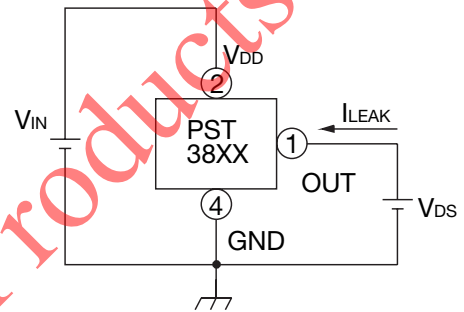
(2)



(3)

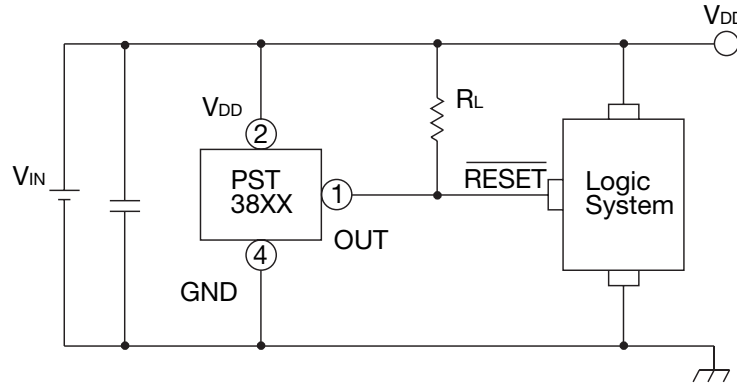


(4)



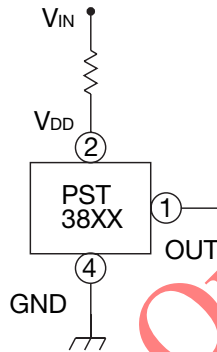
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Application Circuits



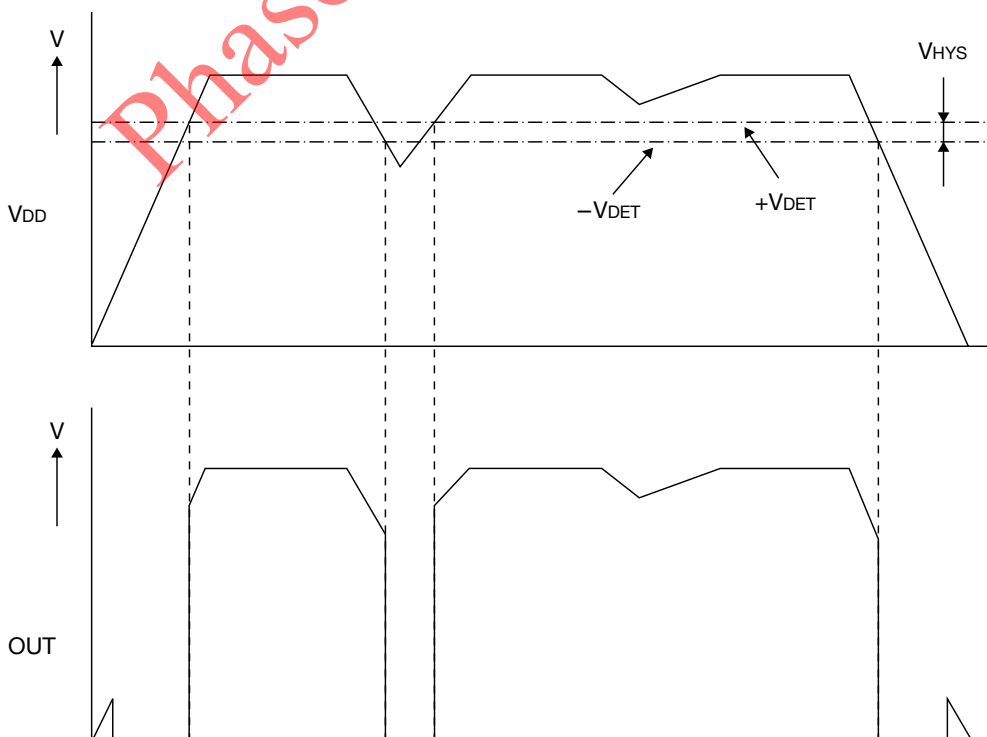
Please be advised that Mitsumi Electric Co., Ltd. is not liable for any accidents or damage caused as a result of the use of this circuit.

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 Electric Co., Ltd. shall not be liable for any such problem, nor grant a license therefor.



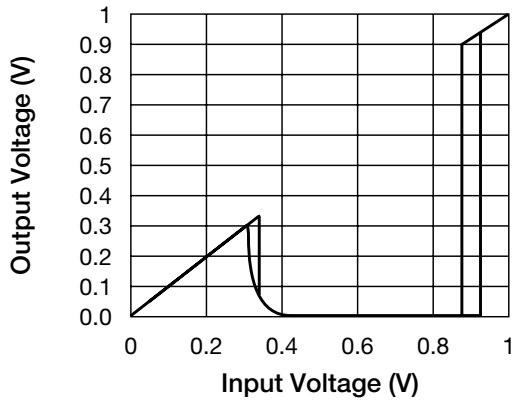
Please note that there is any possibility of circuit oscillation when resistance put in the line VIN.

Timing Chart

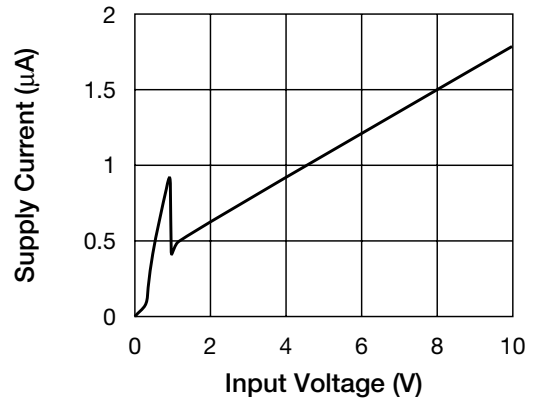


**Characteristics** PST3809 ( $-V_{DET}=0.9V$ )

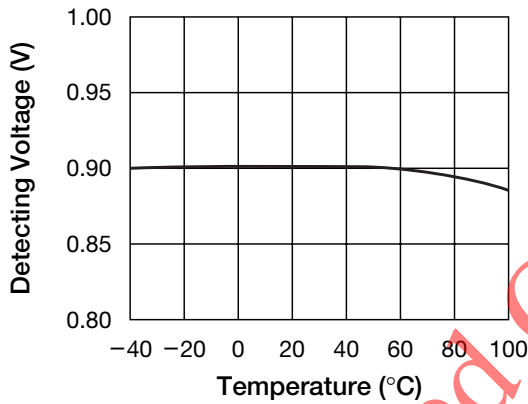
■ Detecting voltage vs input voltage



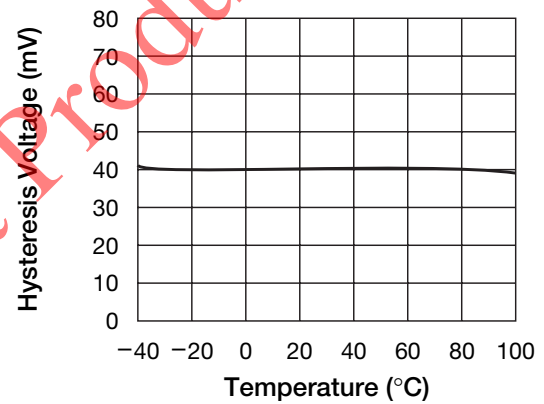
■ Supply Current vs input voltage



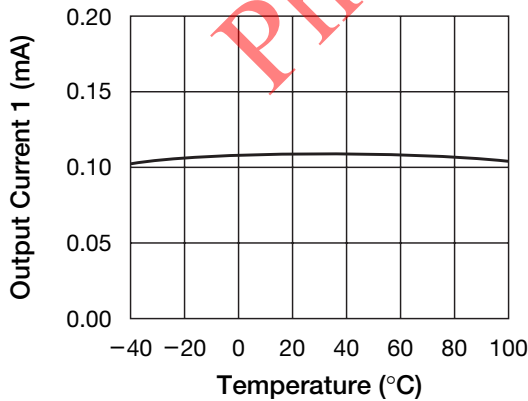
■ Detecting voltage vs temperature



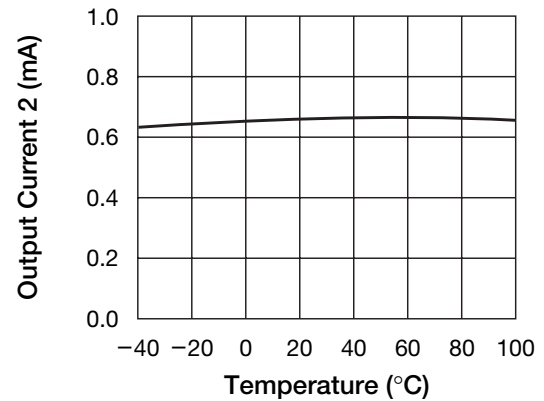
■ Hysteresis voltage vs temperature



■ Output current 1 vs temperature



■ Output current 2 vs temperature

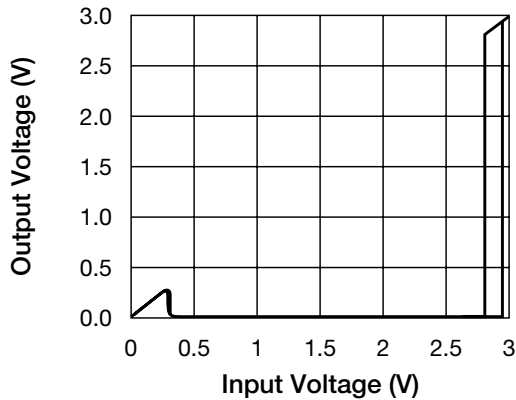


Note: These are typical characteristics.

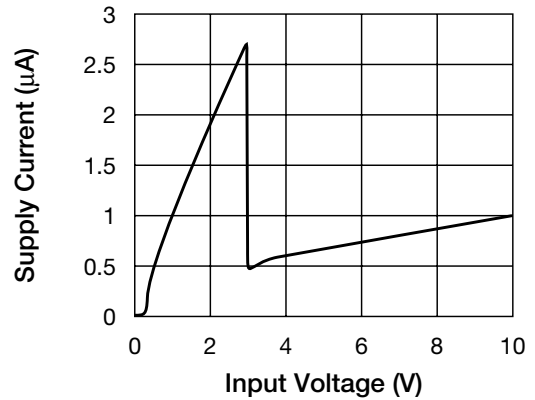


**Characteristics** PST3828 ( $-V_{DET}=2.8V$ )

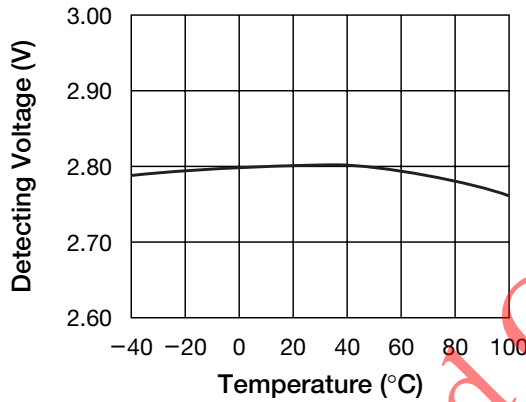
■ Detecting voltage vs input voltage



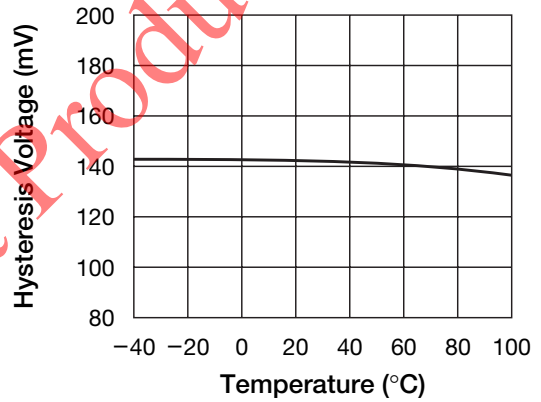
■ Supply current vs input voltage



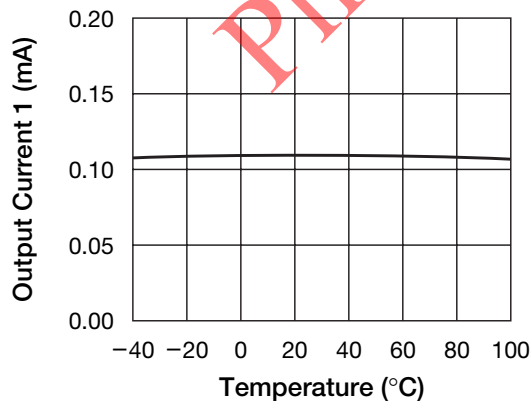
■ Detecting voltage vs temperature



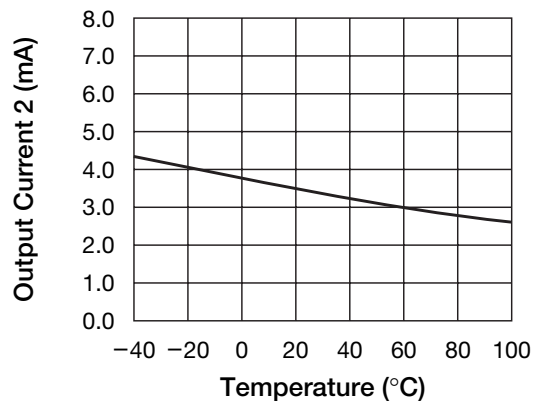
■ Hysteresis voltage vs temperature



■ Output current 1 vs temperature



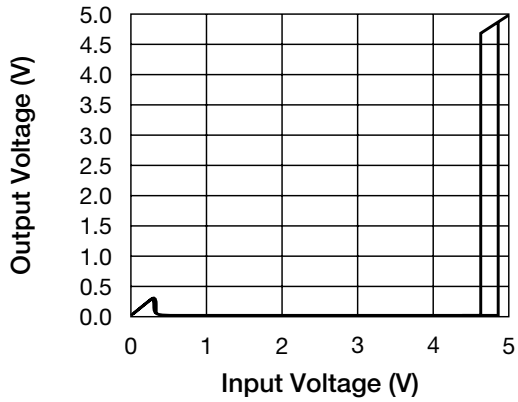
■ Output current 2 vs temperature



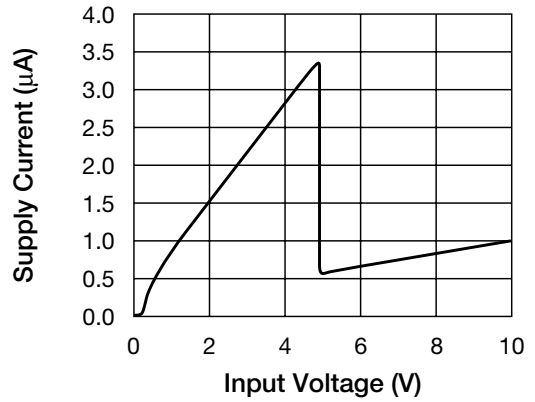
Note: These are typical characteristics.

**Characteristics** PST3846 ( $-V_{DET}=4.6V$ )

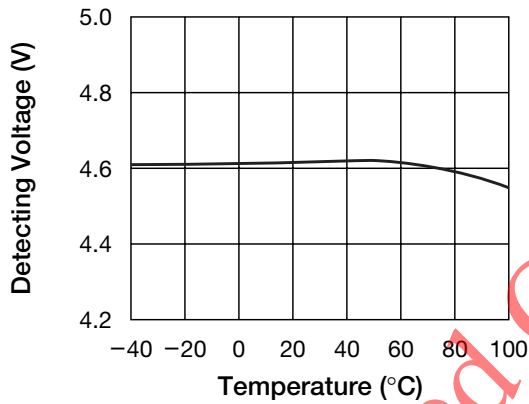
■ Detecting voltage vs input voltage



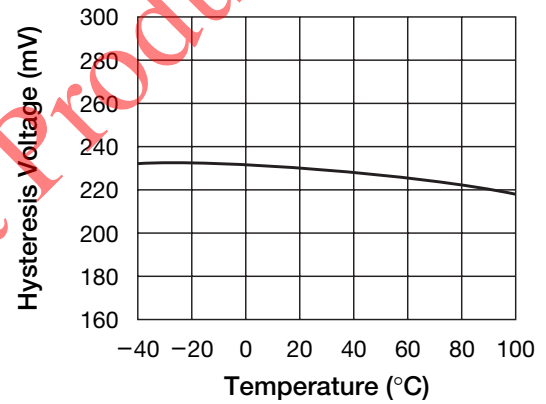
■ Supply current vs input voltage



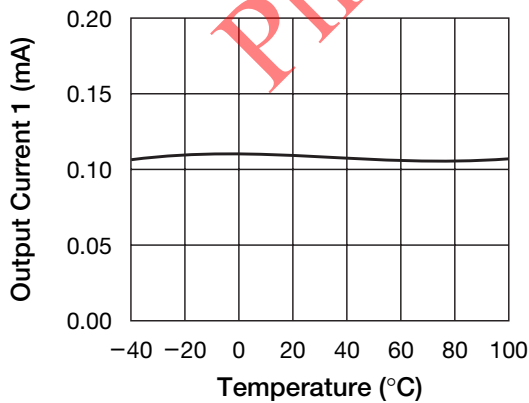
■ Detecting voltage vs temperature



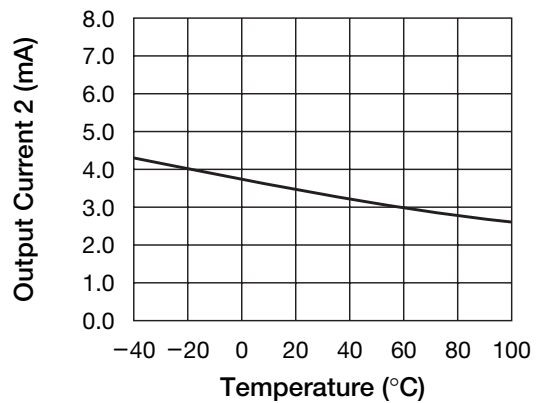
■ Hysteresis voltage vs temperature



■ Output current 1 vs temperature



■ Output current 2 vs temperature



Note: These are typical characteristics.