

# 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)                                                  |

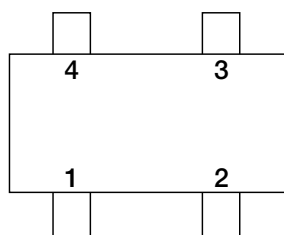
### Package

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

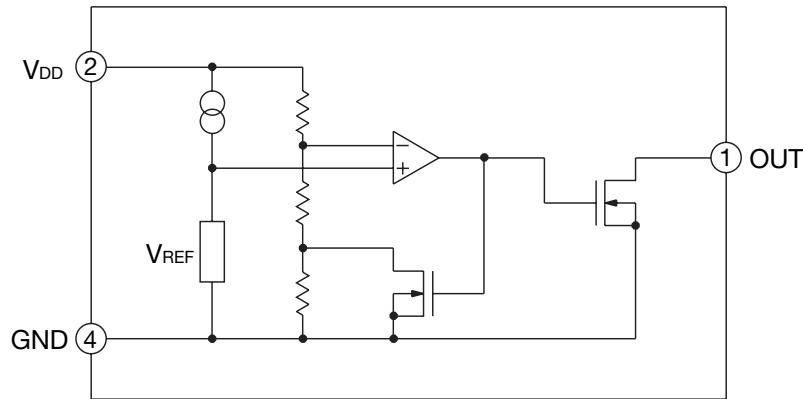
### Pin Assignment



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	V <sub>DD</sub>	V <sub>DD</sub> 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	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.13V	4.0	8.0	1.2	3.6	
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	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.16V	5.0	10.0	1.3	3.9	
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	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.20V	6.0	12.0	1.4	4.2	
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						

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

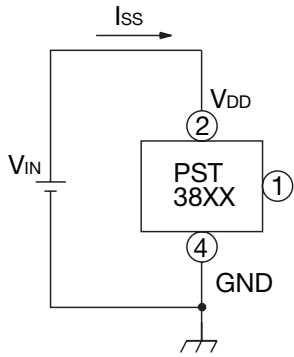
Product Name	Item									
	Output Current1			Output Current2			Leak Current			
	I <sub>OUT1</sub> (mA)			I <sub>OUT2</sub> (mA)			I <sub>LEAK</sub> (μA)			
	Test Circuit 3			Test Circuit 3			Test Circuit 3			
	Condition	Min.	Typ.	Condition	Min.	Typ.	Condition	Typ.	Max.	
PST3809	N-ch  V <sub>DS</sub> = 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										
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PST3859										
PST3860										

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

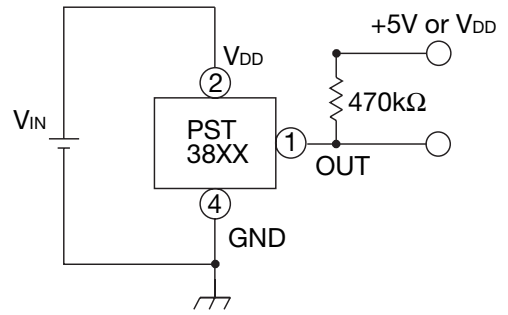
Product Name	Item							
	Threshold Operating Voltage1			Threshold Operating Voltage2			Detecting Voltage Temp. Coefficient	
	V <sub>DDL1</sub> (V)			V <sub>DDL2</sub> (V)			$\Delta -V_{DET} / \Delta T_{OPT}$ (ppm/°C)	
	Test Circuit 2			Test Circuit 2			Test Circuit 2	
Condition	Typ.	Max.	Condition	Typ.	Max.	Condition	Typ.	
PST3809								
PST3810								
PST3811								
PST3812								
PST3813								
PST3814								
PST3815								
PST3816								
PST3817								
PST3818								
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PST3829								
PST3830								
PST3831								
PST3832								
PST3833								
PST3834	V <sub>OUT</sub> ≤0.1V T <sub>OPT</sub> =25°C	0.55	0.70	V <sub>OUT</sub> ≤0.1V -30°C ≤ T <sub>OPT</sub> ≤85°C	0.65	0.80	-30°C ≤ T <sub>OPT</sub> ≤85°C	±100
PST3835								
PST3836								
PST3837								
PST3838								
PST3839								
PST3840								
PST3841								
PST3842								
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PST3860								

Measuring Circuit

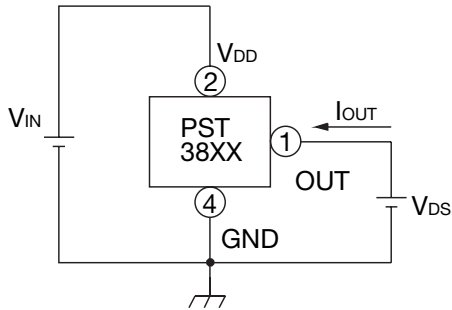
(1)



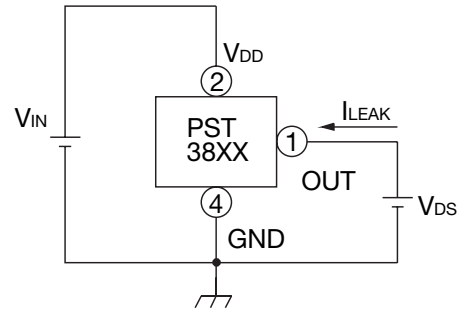
(2)



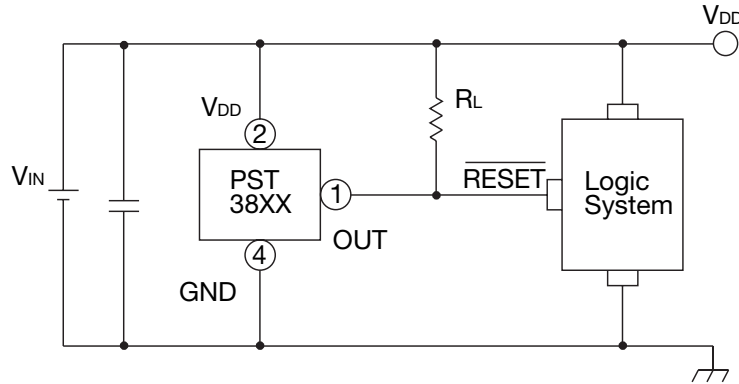
(3)



(4)

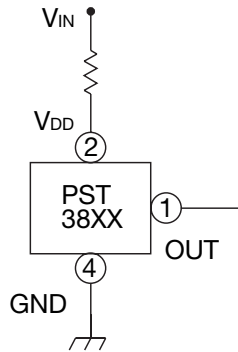


Application Circuits



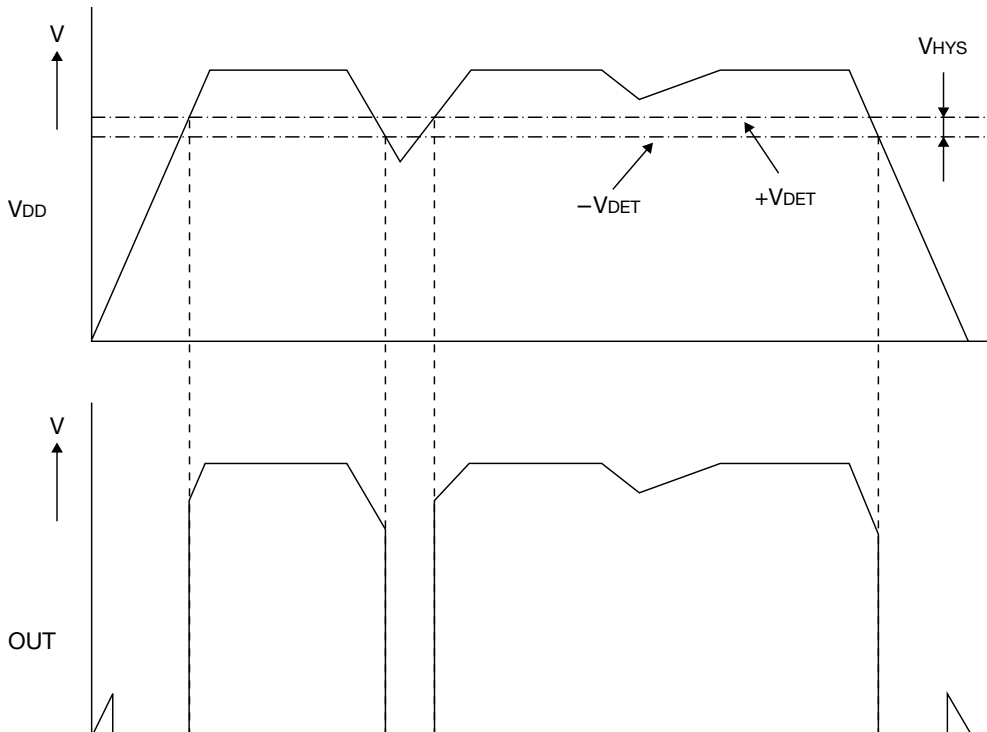
Please be advised that Mitsumi Electric Co., Ltd. is not liable for any accidents or damage caused as a result of the use of this circuit.

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.



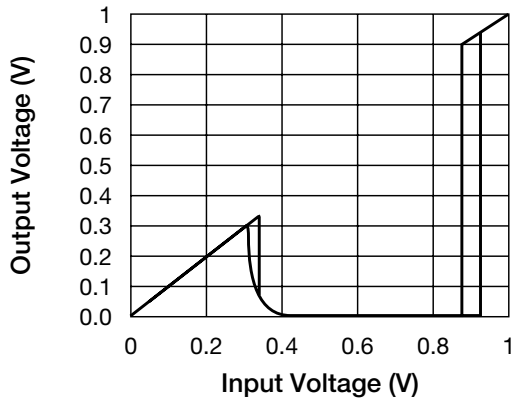
Please note that there is any possibility of circuit oscillation when resistance put in the line  $V_{IN}$ .

Timing Chart

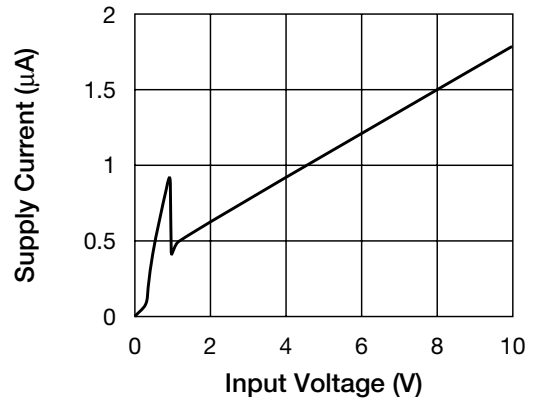


**Characteristics** PST3809 ( $-V_{DET}=0.9V$ )

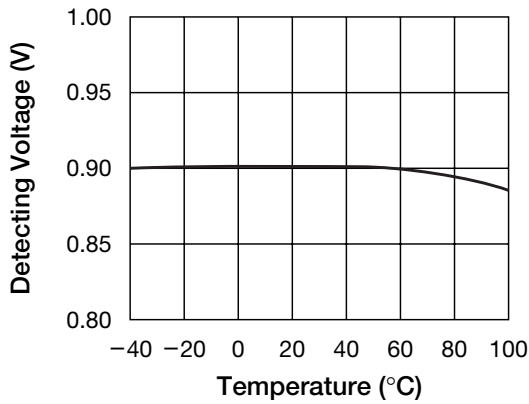
■ Detecting voltage vs input voltage



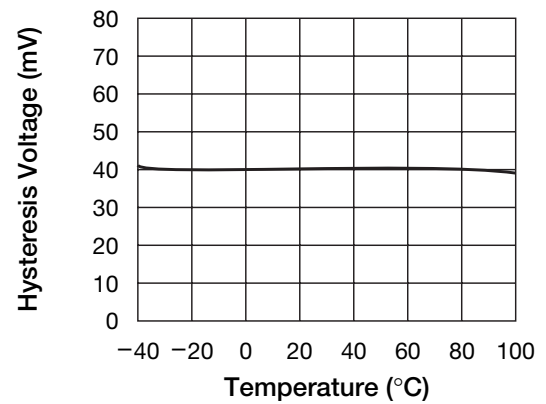
■ Supply Current vs input voltage



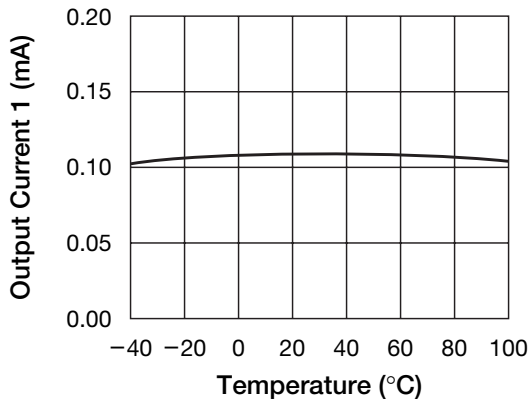
■ Detecting voltage vs temperature



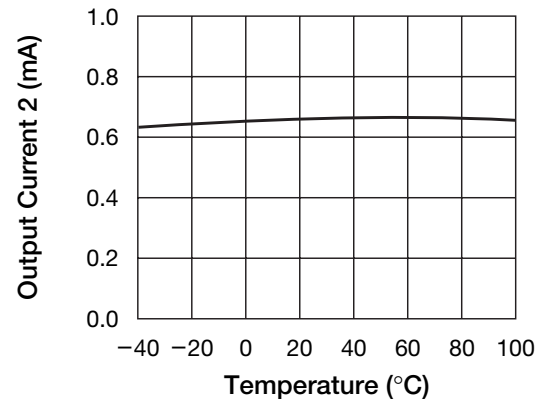
■ Hysteresis voltage vs temperature



■ Output current 1 vs temperature



■ Output current 2 vs temperature

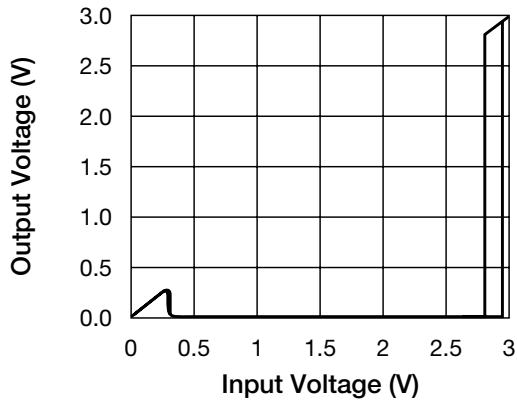


Note: These are typical characteristics.

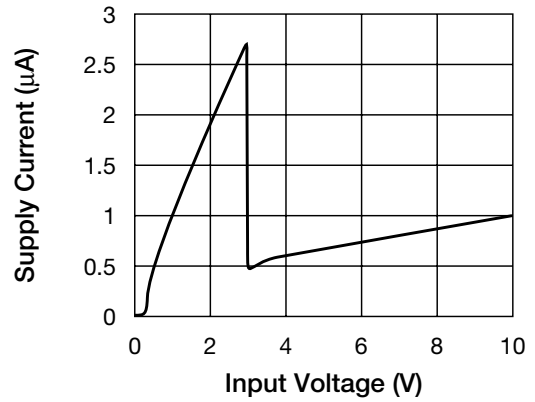


### Characteristics PST3828 ( $-V_{DET}=2.8V$ )

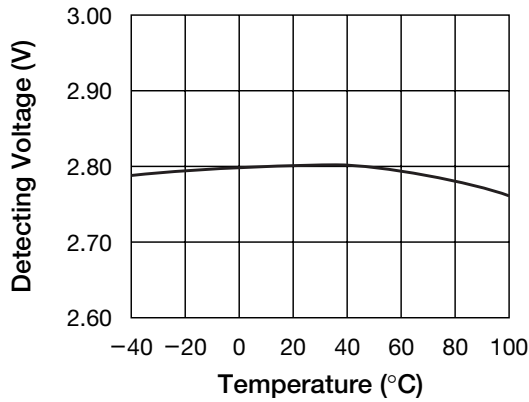
■ Detecting voltage vs input voltage



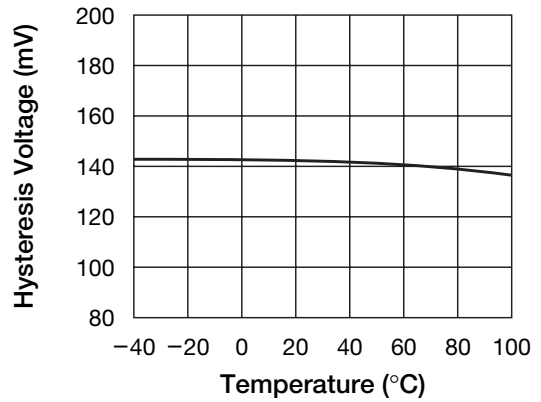
■ Supply current vs input voltage



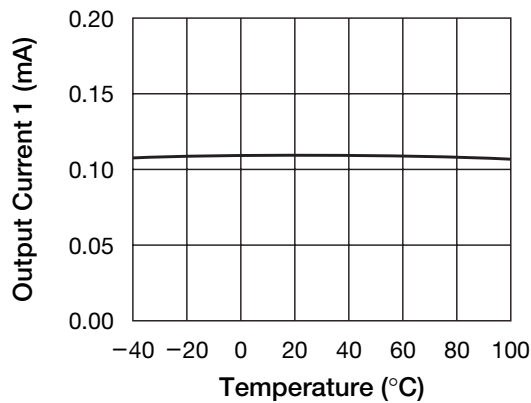
■ Detecting voltage vs temperature



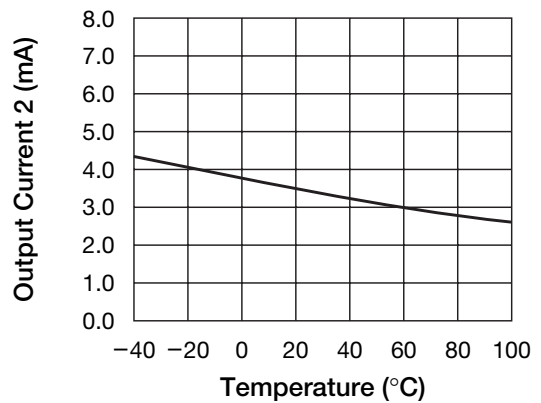
■ Hysteresis voltage vs temperature



■ Output current 1 vs temperature



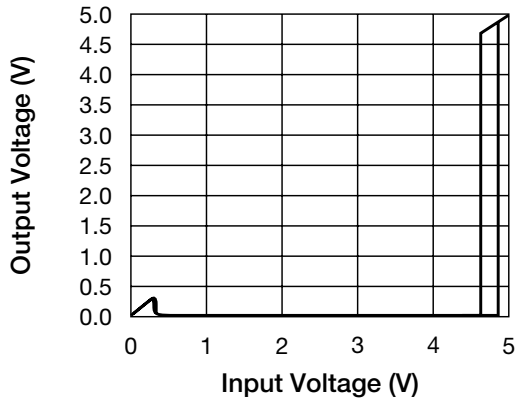
■ Output current 2 vs temperature



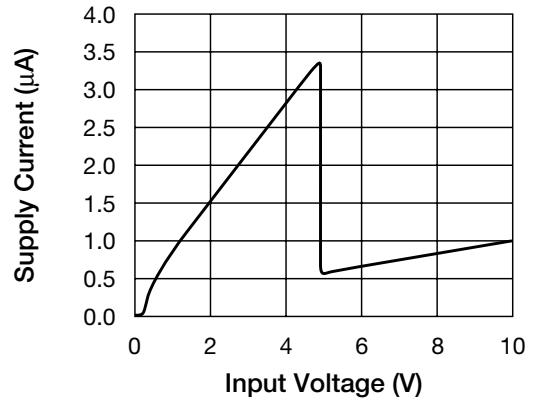
Note: These are typical characteristics.

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

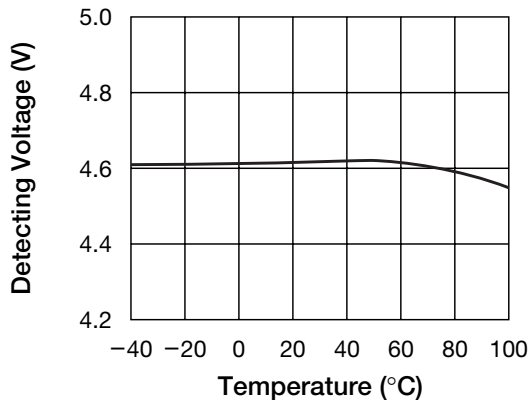
■ Detecting voltage vs input voltage



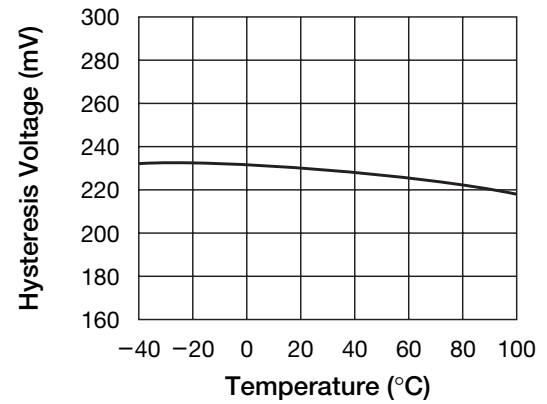
■ Supply current vs input voltage



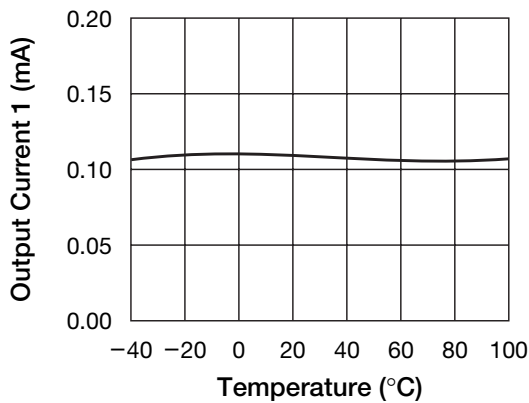
■ Detecting voltage vs temperature



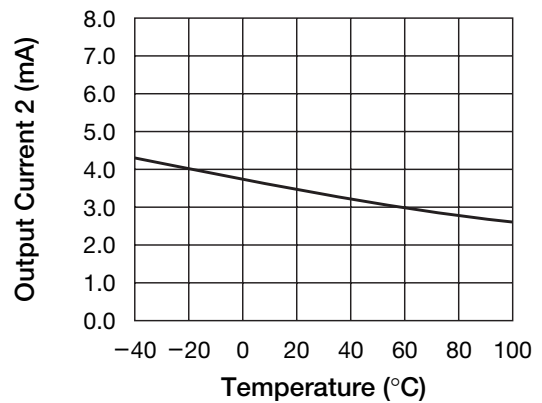
■ Hysteresis voltage vs temperature



■ Output current 1 vs temperature



■ Output current 2 vs temperature



Note: These are typical characteristics.