

# IC for CMOS System Reset

## Monolithic IC PST37XXU Series

July 13, 2001

### Outline

This CMOS output type system reset IC, developed using the CMOS. Super low consumption current of 1.0 $\mu$ A typ. (PST3709 ~ PST3719) 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 $V_{DD} = (-V_{DET}) + 2.0V$ ) PST3709 ~ PST3719 |
| 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)  |

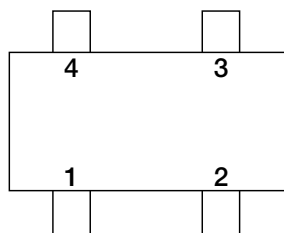
### Package

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

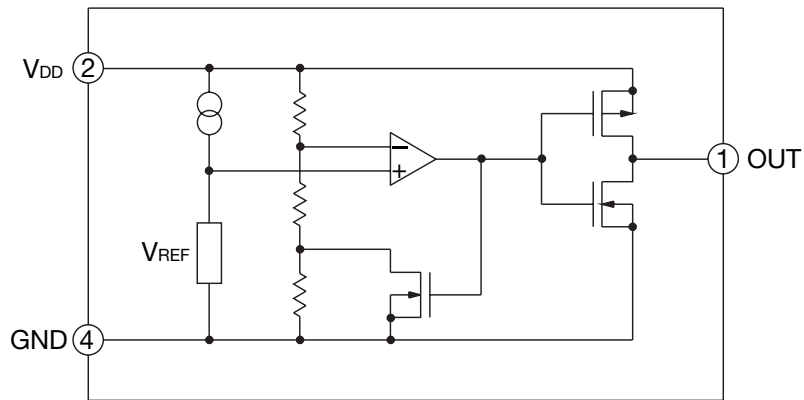
### Pin Assignment



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

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

Block Diagram



Pin Explanations

Pin No.	Pin Name	Functions
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>OPR</sub>	-30 ~ +85	°C
Storage Temperature	T <sub>STG</sub>	-40 ~ +125	°C
Supply Voltage	V <sub>DD</sub>	12	V
Output Voltage	V <sub>OUT</sub>	V <sub>SS</sub> - 0.3 ~ V <sub>DD</sub> + 0.3	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>OPR</sub>	-30 ~ +85	°C
Supply Voltage	V <sub>DD</sub>	+0.70 ~ +10	V

**Electrical Characteristics** (Ta=25°C)

Product Name	Item											
	Detecting Voltage			Hysteresis Voltage			Supply Current 1			Supply Current 2		
	-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.	
PST3709	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	V <sub>DD</sub> (-V <sub>DET</sub> ) +2.0V	0.9	2.7
PST3710	0.980	1.000	1.020	0.030	0.050	0.070		1.8	4.5			
PST3711	1.078	1.100	1.122	0.033	0.055	0.077		2.0	5.0			
PST3712	1.176	1.200	1.224	0.036	0.060	0.084		2.5	5.5		1.1	3.3
PST3713	1.274	1.300	1.326	0.039	0.065	0.091						
PST3714	1.372	1.400	1.428	0.042	0.070	0.098						
PST3715	1.470	1.500	1.530	0.045	0.075	0.105						
PST3716	1.568	1.600	1.632	0.048	0.080	0.112		3.0	6.0			
PST3717	1.666	1.700	1.734	0.051	0.085	0.119						
PST3718	1.764	1.800	1.836	0.054	0.090	0.126						
PST3719	1.862	1.900	1.938	0.057	0.095	0.133						
PST3720	1.960	2.000	2.040	0.060	0.100	0.140						
PST3721	2.058	2.100	2.142	0.063	0.105	0.147		3.5	7.0			
PST3722	2.156	2.200	2.244	0.066	0.110	0.154						
PST3723	2.254	2.300	2.346	0.069	0.115	0.161						
PST3724	2.352	2.400	2.448	0.072	0.120	0.168						
PST3725	2.450	2.500	2.550	0.075	0.125	0.175						
PST3726	2.548	2.600	2.652	0.078	0.130	0.182		4.0	8.0			
PST3727	2.646	2.700	2.754	0.081	0.135	0.189						
PST3728	2.744	2.800	2.856	0.084	0.140	0.196						
PST3729	2.842	2.900	2.958	0.087	0.145	0.203						
PST3730	2.940	3.000	3.060	0.090	0.150	0.210						
PST3731	3.038	3.100	3.162	0.093	0.155	0.217	4.5	9.0				
PST3732	3.136	3.200	3.264	0.096	0.160	0.224						
PST3733	3.234	3.300	3.366	0.099	0.165	0.231						
PST3734	3.332	3.400	3.468	0.102	0.170	0.238						
PST3735	3.430	3.500	3.570	0.105	0.175	0.245						
PST3736	3.528	3.600	3.672	0.108	0.180	0.252	5.0	10.0				
PST3737	3.626	3.700	3.774	0.111	0.185	0.259						
PST3738	3.724	3.800	3.876	0.114	0.190	0.266						
PST3739	3.822	3.900	3.978	0.117	0.195	0.273						
PST3740	3.920	4.000	4.080	0.120	0.200	0.280						
PST3741	4.018	4.100	4.182	0.123	0.205	0.287	5.5	11.0				
PST3742	4.116	4.200	4.284	0.126	0.210	0.294						
PST3743	4.214	4.300	4.386	0.129	0.215	0.301						
PST3744	4.312	4.400	4.488	0.132	0.220	0.308						
PST3745	4.410	4.500	4.590	0.135	0.225	0.315						
PST3746	4.508	4.600	4.692	0.138	0.230	0.322	6.0	12.0				
PST3747	4.606	4.700	4.794	0.141	0.235	0.329						
PST3748	4.704	4.800	4.896	0.144	0.240	0.336						
PST3749	4.802	4.900	4.998	0.147	0.245	0.343						
PST3750	4.900	5.000	5.100	0.150	0.250	0.350						
PST3751	4.998	5.100	5.202	0.153	0.255	0.357	6.5	13.0				
PST3752	5.096	5.200	5.304	0.156	0.260	0.364						
PST3753	5.194	5.300	5.406	0.159	0.265	0.371						
PST3754	5.292	5.400	5.508	0.162	0.270	0.378						
PST3755	5.390	5.500	5.610	0.165	0.275	0.385						
PST3756	5.488	5.600	5.712	0.168	0.280	0.392	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.20V	1.4	4.2			
PST3757	5.586	5.700	5.814	0.171	0.285	0.399						
PST3758	5.684	5.800	5.916	0.174	0.290	0.406						
PST3759	5.782	5.900	6.018	0.177	0.295	0.413						
PST3760	5.880	6.000	6.120	0.180	0.300	0.420						

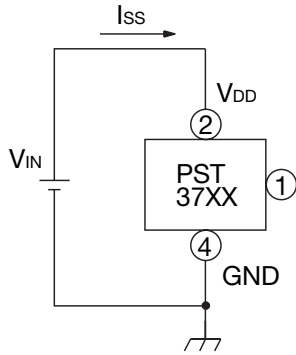
**Electrical Characteristics** (Ta=25°C)

Product Name	Item									
	Output Current 1			Output Current 2			Output Current 3			
	I <sub>OUT1</sub> (mA)			I <sub>OUT2</sub> (mA)			I <sub>OUT3</sub> (mA)			
	Test Circuit 3			Test Circuit 3			Test Circuit 4			
	Condition	Min.	Typ.	Condition	Min.	Typ.	Condition	Typ.	Max.	
PST3709	N-ch	0.01	0.05	N-ch	V <sub>DD</sub> = 0.85V	0.05	0.5	P-ch	1.0	2.0
PST3710										
PST3711										
PST3712					V <sub>DD</sub> = 1.0V	0.2	1.0			
PST3713										
PST3714										
PST3715										
PST3716										
PST3717										
PST3718										
PST3719										
PST3720										
PST3721										
PST3722										
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PST3724										
PST3725										
PST3726										
PST3727										
PST3728										
PST3729										
PST3730										
PST3731										
PST3732										
PST3733					V <sub>DS</sub> = 0.05V					
PST3734										
PST3735										
PST3736					V <sub>DD</sub> = 0.7V					
PST3737										
PST3738										
PST3739										
PST3740										
PST3741										
PST3742										
PST3743										
PST3744										
PST3745										
PST3746										
PST3747										
PST3748										
PST3749										
PST3750	P-ch	1.5	3.0							
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PST3760										

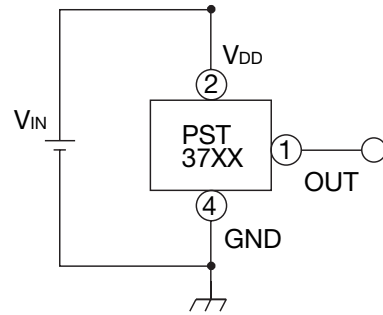


Measuring Circuit

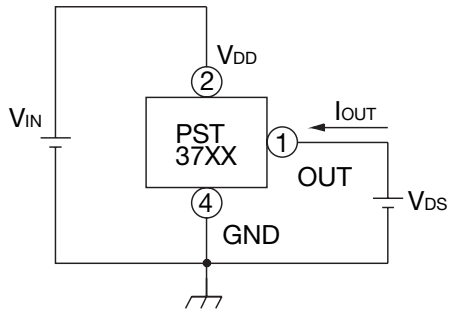
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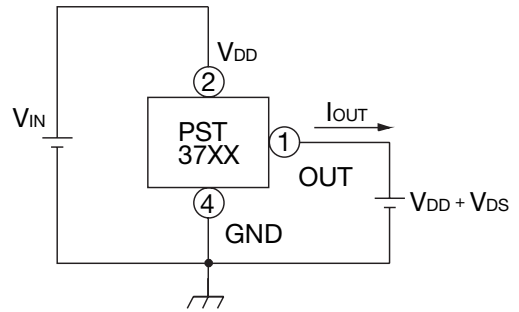
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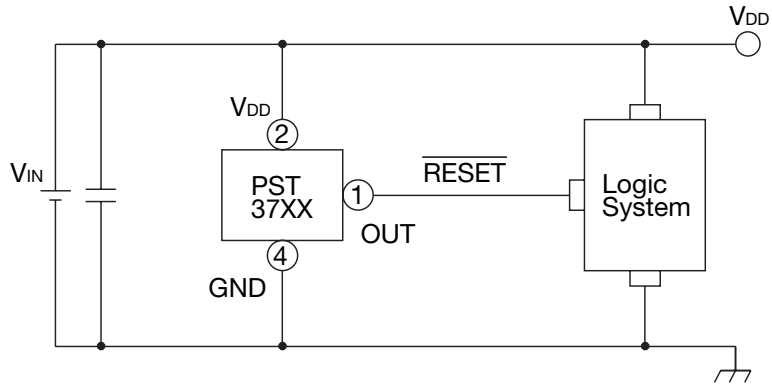
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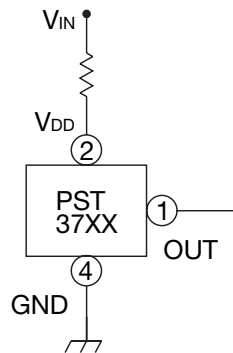


Application Circuits



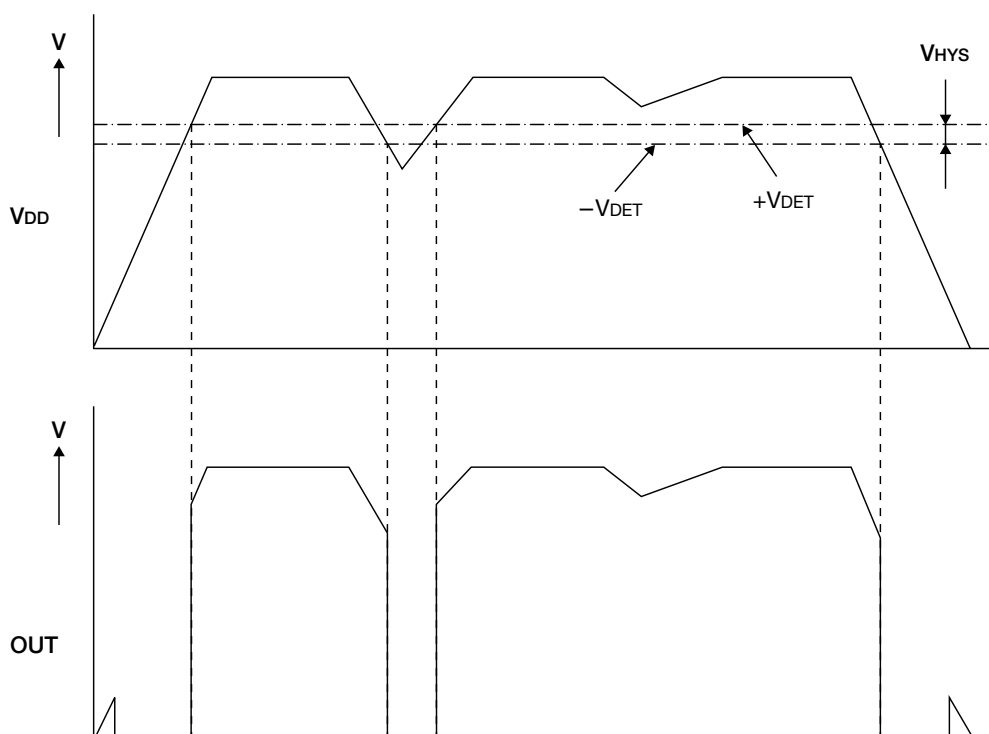
Please be advised that Mitsumi Electric Co., Ltd. is not liable for any accidents or damage caused as a result of the use of this circuit.

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 therefore.



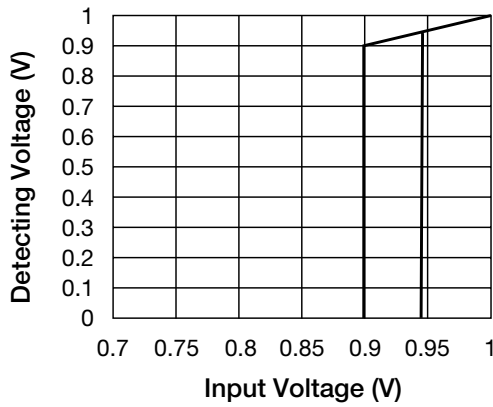
Please note that there is any possibility of circuit oscillation when resistance put in the line V<sub>IN</sub>.

Timing Chart

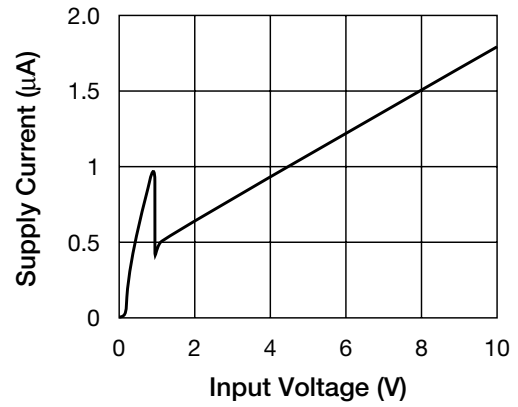


**Characteristics** (Typical Performance Characteristics 0.9V)

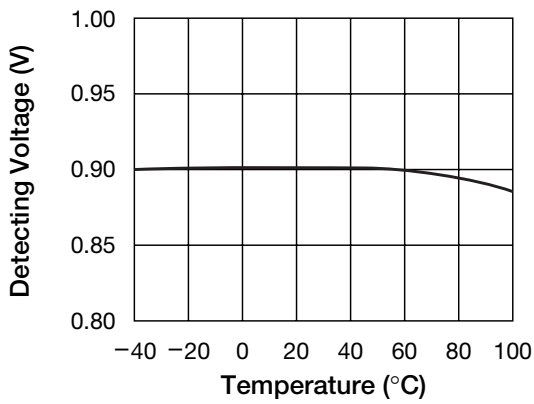
■ Detecting Voltage vs Input Voltage



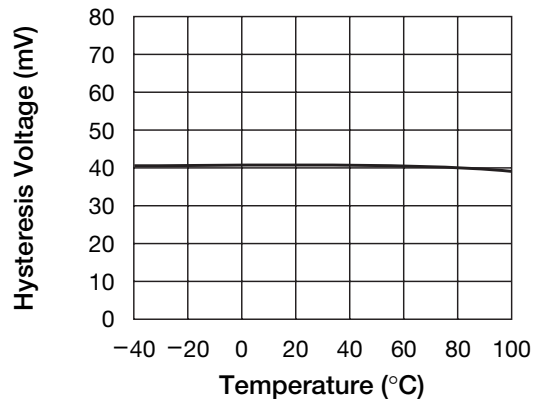
■ Supply Current vs Input Voltage



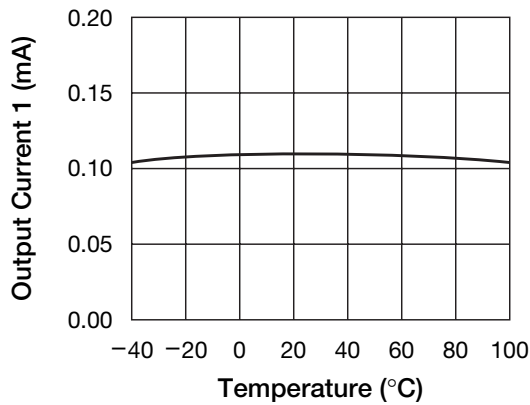
■ Detecting Voltage vs Temperature



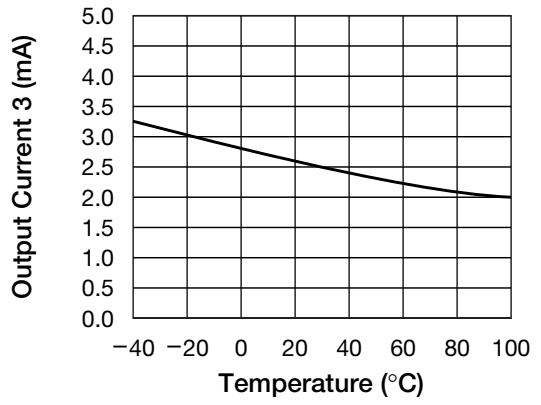
■ Hysteresis Voltage vs Temperature



■ Output Current1 (N-ch) vs Temperature (V<sub>DD</sub> = 0.7V, V<sub>DS</sub> = 0.05V)



■ Output Current3 (P-ch) vs Temperature (V<sub>DD</sub> = 4.5V, V<sub>DS</sub> = -2.1V)

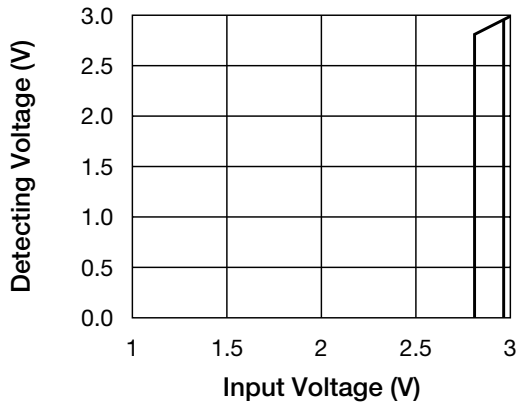


note : these are typical characteristics

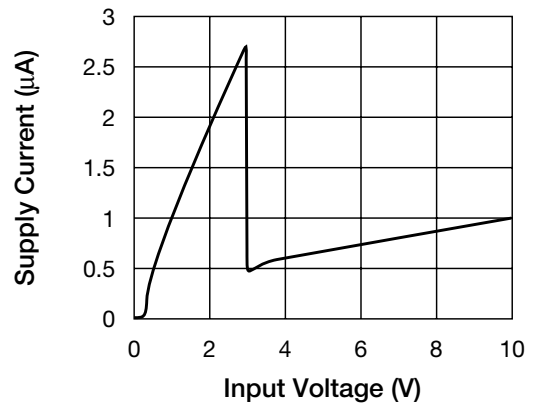


**Characteristics** (Typical Performance Characteristics 2.8V)

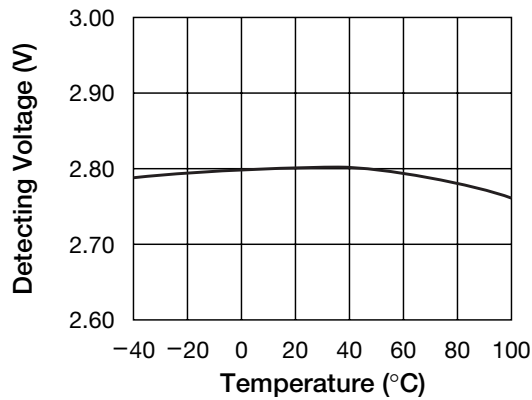
■ Detecting Voltage vs Input Voltage



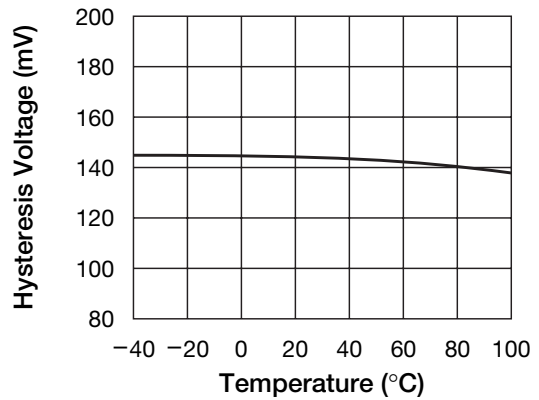
■ Supply Current vs Input Voltage



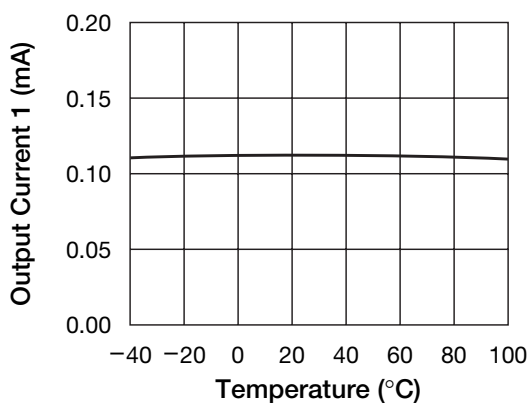
■ Detecting Voltage vs Temperature



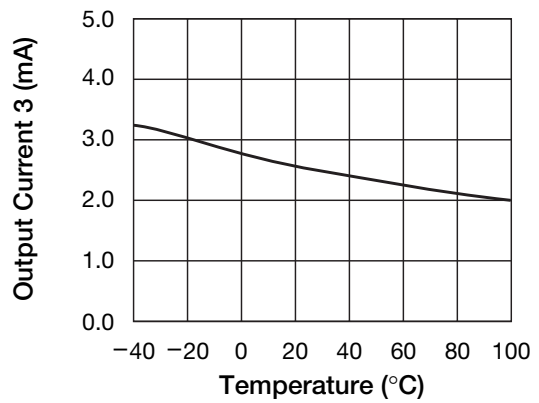
■ Hysteresis Voltage vs Temperature



■ Output Current1 (N-ch) vs Temperature (V<sub>DD</sub> = 0.7V, V<sub>Ds</sub> = 0.05V)



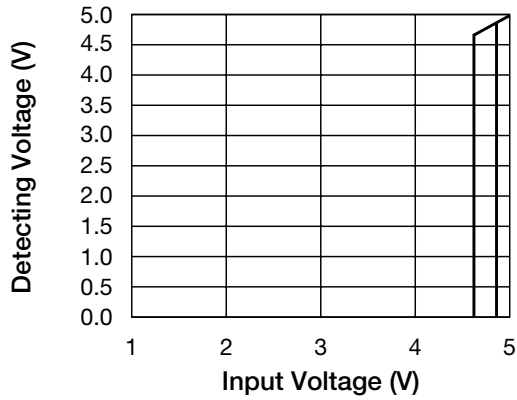
■ Output Current3 (P-ch) vs Temperature (V<sub>DD</sub> = 4.5V, V<sub>Ds</sub> = -2.1V)



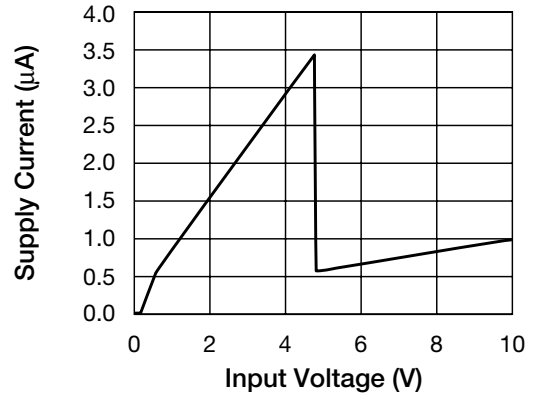
note : these are typical characteristics

**Characteristics** (Typical Performance Characteristics 4.6V)

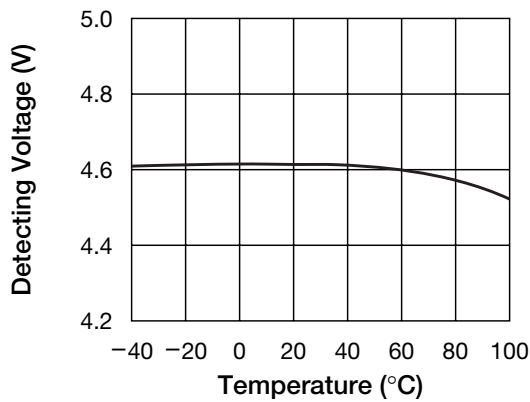
■ Detecting Voltage vs Input Voltage



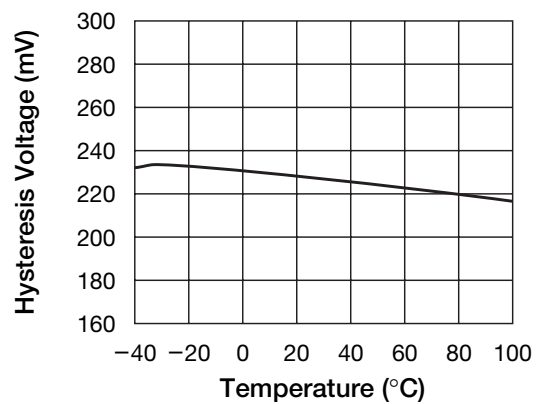
■ Supply Current vs Input Voltage



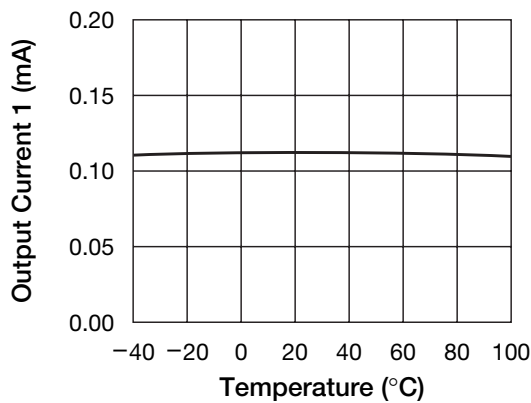
■ Detecting Voltage vs Temperature



■ Hysteresis Voltage vs Temperature



■ Output Current1 (N-ch) vs Temperature ( $V_{DD} = 0.7V, V_{DS} = 0.05V$ )



■ Output Current3 (P-ch) vs Temperature ( $V_{DD} = 4.5V, V_{DS} = -2.1V$ )

