

# 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 1.0μA typ. (PST3709 ~ PST3719) has been achieved through use of the CMOS process. Also, detection voltage is high precision detection of ±2%.

### Features

- |                                     |   |
|-------------------------------------|---|
| 1. Super low consumption current    | 1.0μA typ. (when $V_{DD} = (-V_{DET}) + 2.0V$ ) PST3709 ~ PST3719 |
| 2. High precision detection voltage | ±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)  |

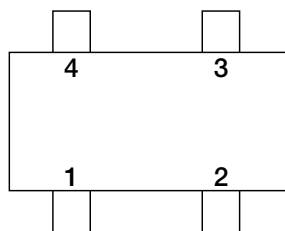
### Package

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

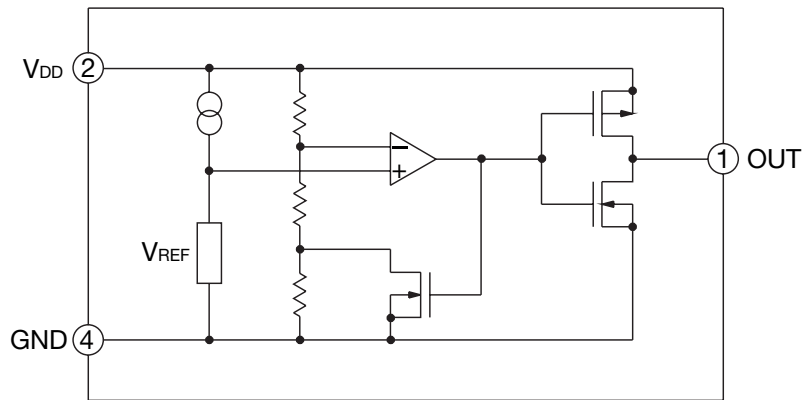
### Pin Assignment



1	OUT
2	V <sub>DD</sub>
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	1.0	0.9	2.7
PST3710	0.980	1.000	1.020	0.030	0.050	0.070		1.8	4.5		3.0	
PST3711	1.078	1.100	1.122	0.033	0.055	0.077		2.0	5.0		3.0	
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						
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						
PST3722	2.156	2.200	2.244	0.066	0.110	0.154		3.0	6.0		1.1	3.3
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						
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	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
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						
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	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.16V	5.0	10.0	1.3	3.9	
PST3741	4.018	4.100	4.182	0.123	0.205	0.287						
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						
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	V <sub>DD</sub> = (-V <sub>DET</sub> ) -0.20V	6.0	12.0	1.4	4.2	
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						
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						
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	6.5	13.0				
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						

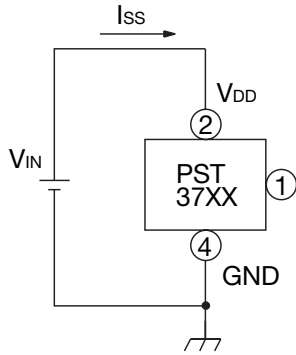
**Electrical Characteristics** (Ta=25°C)

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					N-ch	0.01	0.05				N-ch	V <sub>DD</sub> = 1.5V	1.0	2.0	P-ch	1.5	3.0
PST3716																	
PST3717																	
PST3718																	
PST3719																	
PST3720																	
PST3721																	
PST3722																	
PST3723																	
PST3724																	
PST3725																	
PST3726																	
PST3727																	
PST3728																	
PST3729																	
PST3730																	
PST3731																	
PST3732																	
PST3733																	
PST3734																	
PST3735																	
PST3736																	
PST3737																	
PST3738																	
PST3739																	
PST3740																	
PST3741																	
PST3742																	
PST3743																	
PST3744																	
PST3745																	
PST3746																	
PST3747																	
PST3748																	
PST3749																	
PST3750																	
PST3751																	
PST3752																	
PST3753																	
PST3754																	
PST3755																	
PST3756																	
PST3757																	
PST3758																	
PST3759																	
PST3760																	

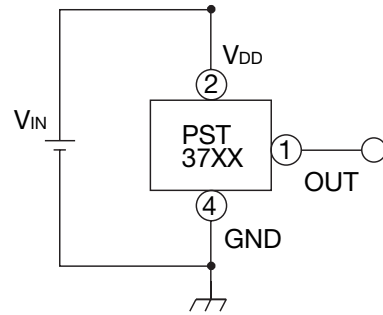


Measuring Circuit

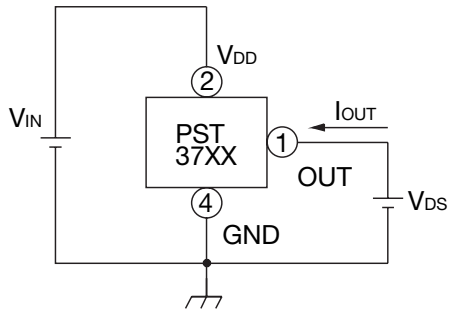
(1)



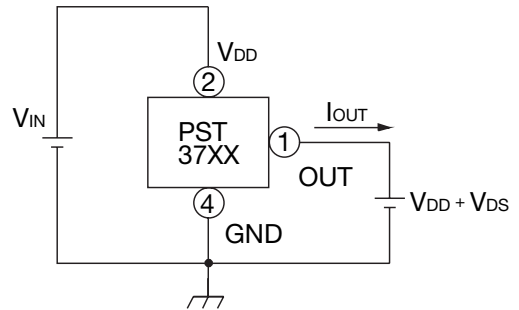
(2)



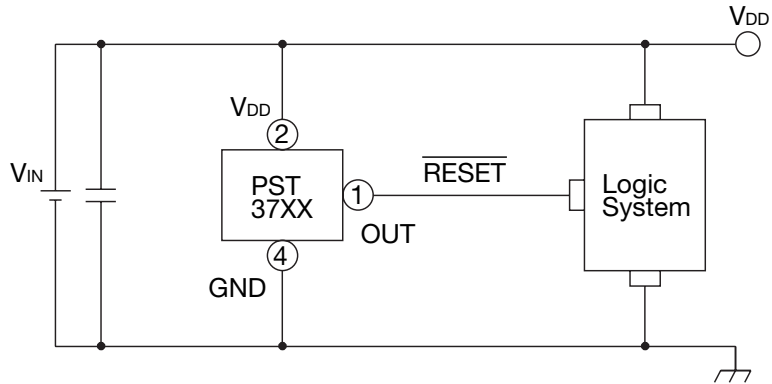
(3)



(4)

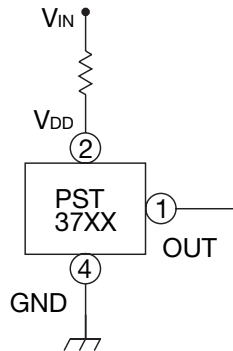


Application Circuits



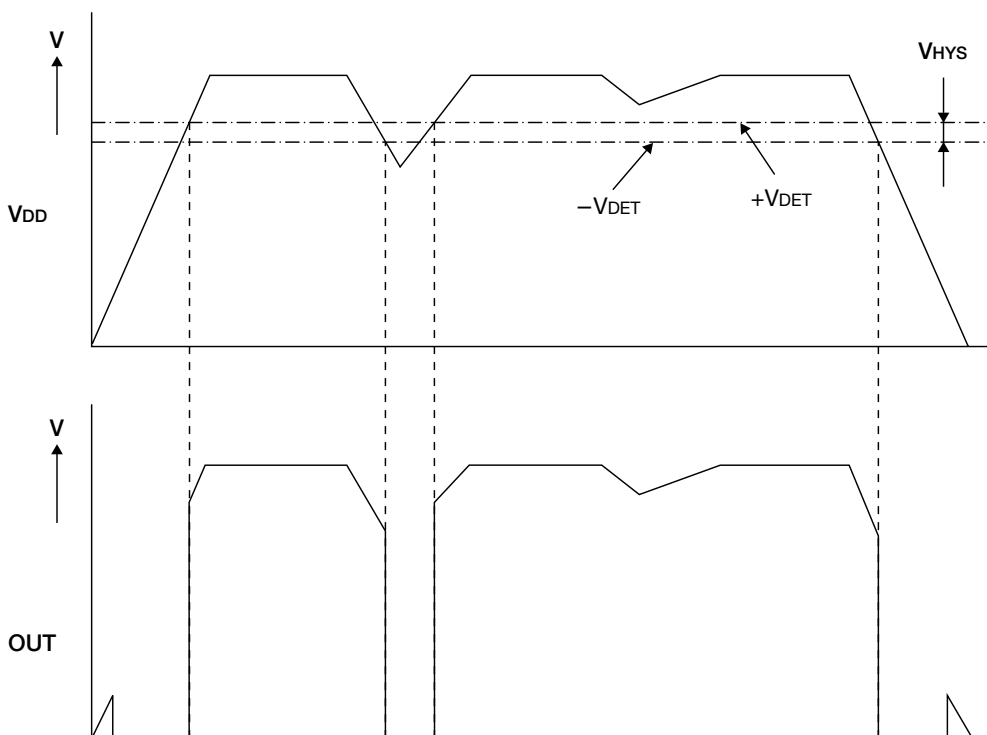
Please be advised that Mitsumi Electric Co., Ltd. is not liable for any accidents or damage caused as a result of the use of this circuit.

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 therefore.



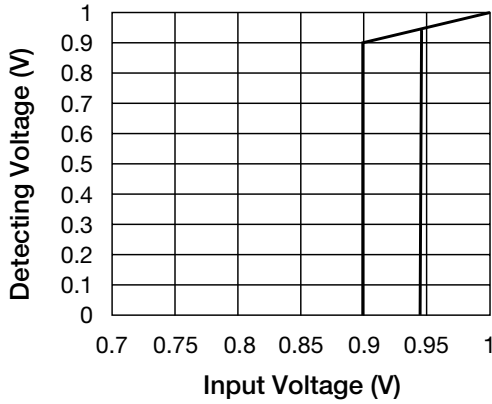
Please note that there is any possibility of circuit oscillation when resistance put in the line V<sub>IN</sub>.

Timing Chart

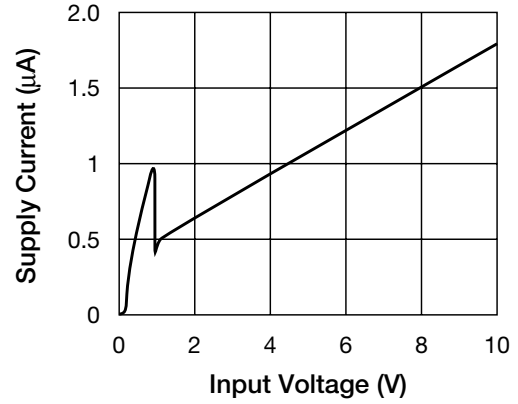


**Characteristics** (Typical Performance Characteristics 0.9V)

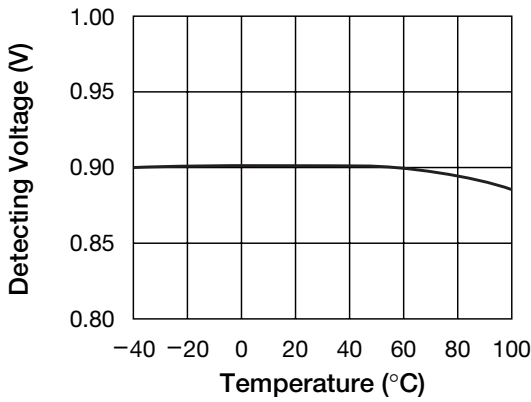
■ Detecting Voltage vs Input Voltage



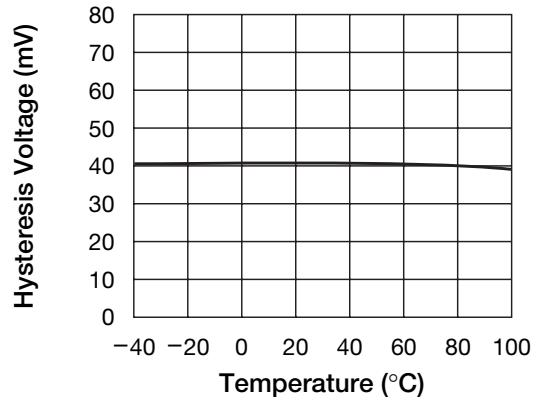
■ Supply Current vs Input Voltage



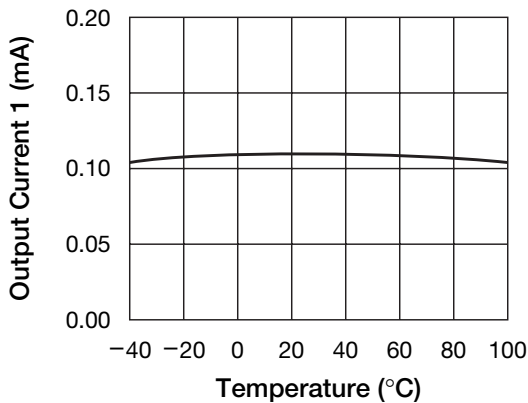
■ Detecting Voltage vs Temperature



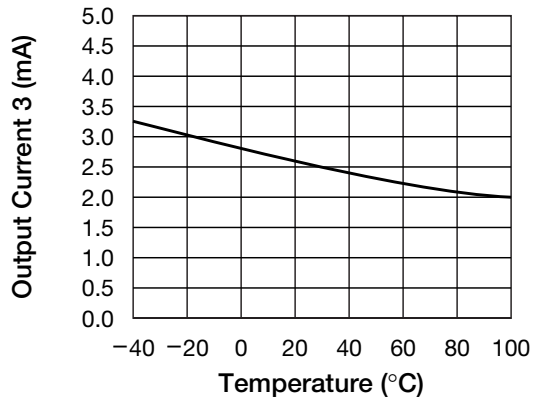
■ Hysteresis Voltage vs Temperature



■ 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)

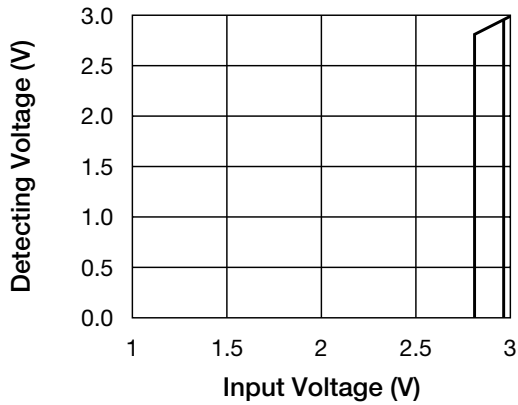


note : these are typical characteristics

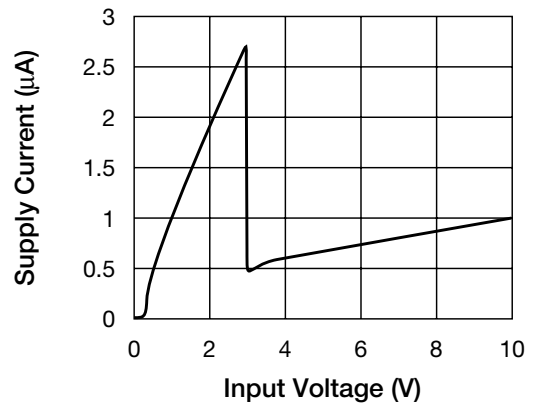


**Characteristics** (Typical Performance Characteristics 2.8V)

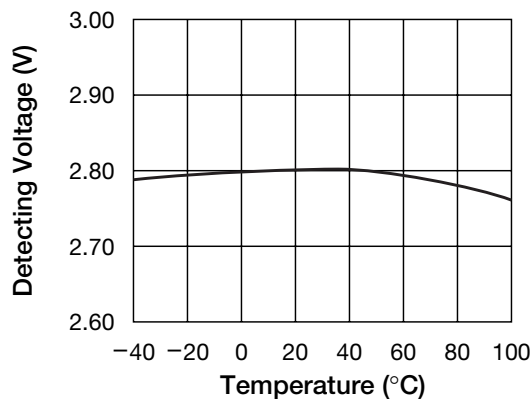
■ Detecting Voltage vs Input Voltage



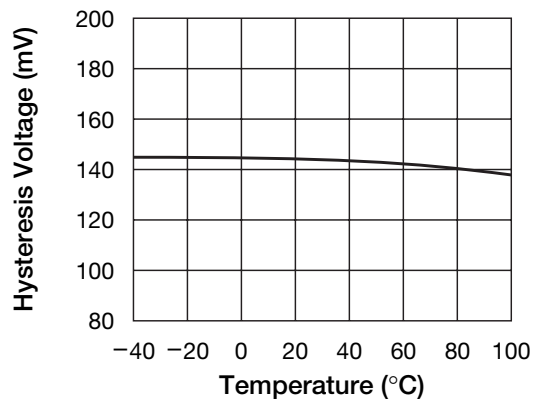
■ Supply Current vs Input Voltage



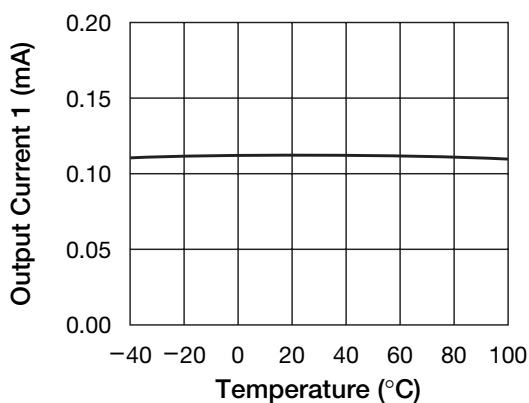
■ Detecting Voltage vs Temperature



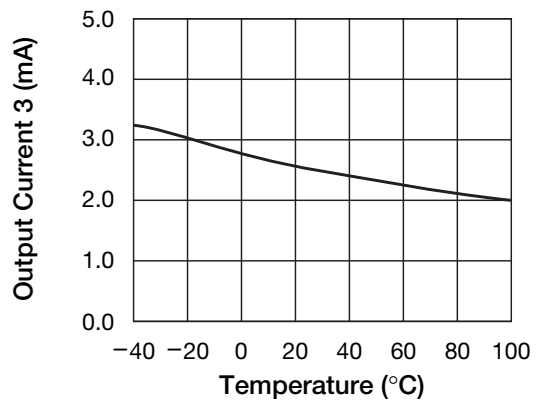
■ Hysteresis Voltage vs Temperature



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



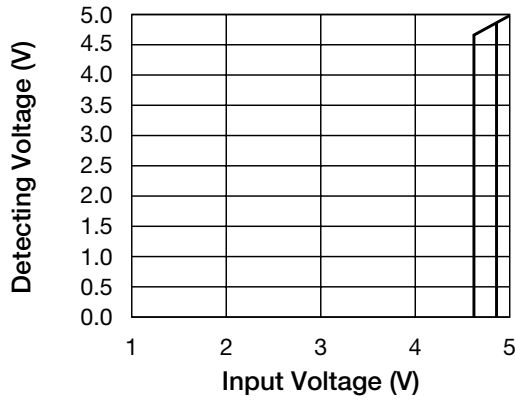
■ Output Current3 (P-ch) vs Temperature (V<sub>DD</sub> = 4.5V, V<sub>Ds</sub> = -2.1V)



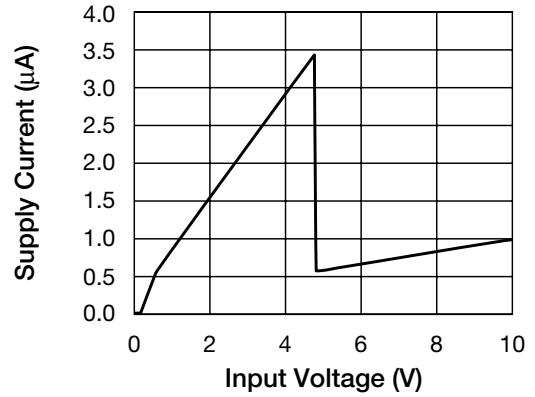
note : these are typical characteristics

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

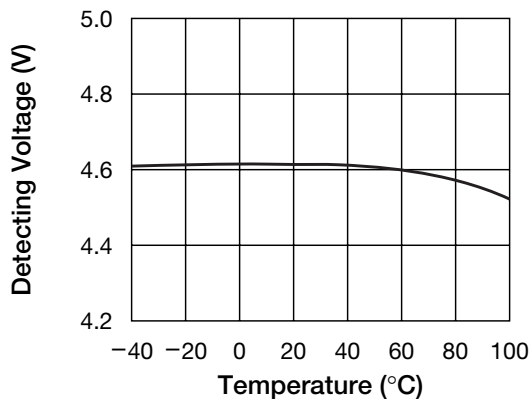
■ Detecting Voltage vs Input Voltage



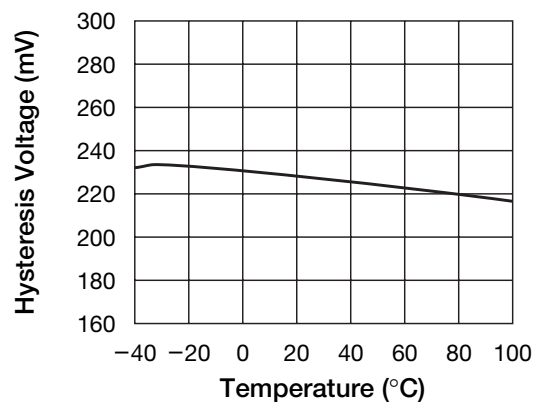
■ Supply Current vs Input Voltage



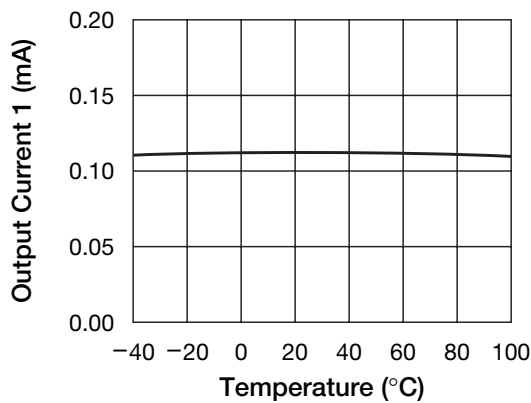
■ Detecting Voltage vs Temperature



■ Hysteresis Voltage vs Temperature



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



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

