

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 μ 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 μ 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) |

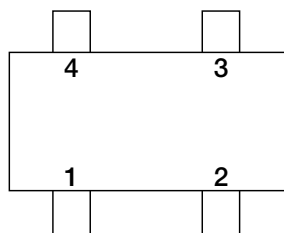
Package

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

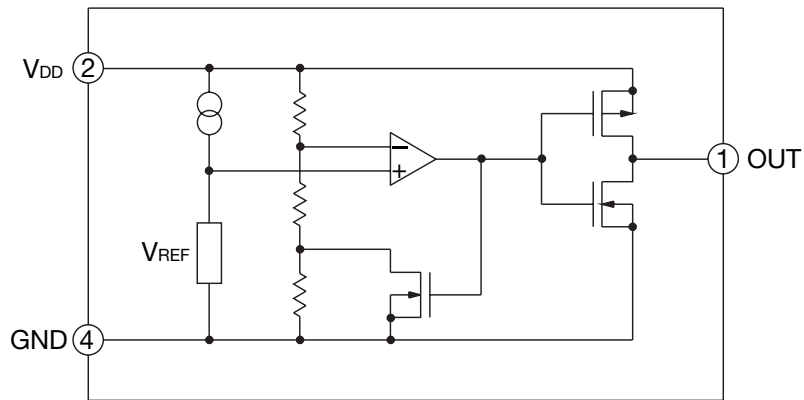
Pin Assignment



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 _{DD}	V _{DD} Pin / Voltage Detect Pin
3	NC	
4	GND	GND Pin

Absolute Maximum Ratings (T_a=25°C)

Item	Symbol	Rating	Unit
Operating Temperature	T _{OPR}	-30 ~ +85	°C
Storage Temperature	T _{STG}	-40 ~ +125	°C
Supply Voltage	V _{DD}	12	V
Output Voltage	V _{OUT}	V _{SS} - 0.3 ~ V _{DD} + 0.3	V
Output Current	I _{OUT}	70	mA
Power Dissipation	P _d	150	mW

Recommended Operating Conditions

Item	Symbol	Rating	Unit
Operating Temperature	T _{OPR}	-30 ~ +85	°C
Supply Voltage	V _{DD}	+0.70 ~ +10	V

Electrical Characteristics (Ta=25°C)

Product Name	Item											
	Detecting Voltage			Hysteresis Voltage			Supply Current 1			Supply Current 2		
	-V _{DET} (V)			V _{HYS} (V)			I _{SS1} (μA)			I _{SS2} (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 _{DD} = (-V _{DET}) -0.10V	1.5	3.7	V _{DD} (-V _{DET}) +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						
PST3713	1.274	1.300	1.326	0.039	0.065	0.091		2.5	5.5			
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		3.0	6.0			
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						
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		3.5	7.0			
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	4.0	8.0				
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						
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	5.0	10.0				
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						
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	5.5	11.0				
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	6.0	12.0				
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			6.5	13.0		
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)

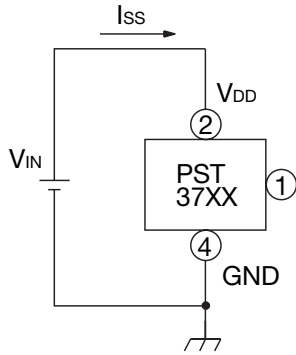
Product Name	Item													
	Output Current 1			Output Current 2			Output Current 3							
	I _{OUT1} (mA)			I _{OUT2} (mA)			I _{OUT3} (mA)							
	Test Circuit 3			Test Circuit 3			Test Circuit 4							
	Condition	Min.	Typ.	Condition	Min.	Typ.	Condition	Typ.	Max.					
PST3709	N-ch	0.01	0.05	N-ch	V _{DD} = 0.85V	0.05	0.5	P-ch	1.0	2.0				
PST3710														
PST3711														
PST3712					V _{DD} = 1.0V	0.2	1.0							
PST3713														
PST3714														
PST3715														
PST3716														
PST3717														
PST3718														
PST3719														
PST3720														
PST3721														
PST3722														
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PST3725														
PST3726														
PST3727														
PST3728														
PST3729														
PST3730														
PST3731														
PST3732														
PST3733					V _{DS} = 0.05V	0.01	0.05				N-ch	V _{DD} = 1.5V	1.0	2.0
PST3734														
PST3735					V _{DD} = 0.7V	0.01	0.05				N-ch	V _{DD} = 1.5V	1.0	2.0
PST3736														
PST3737														
PST3738														
PST3739														
PST3740														
PST3741														
PST3742														
PST3743														
PST3744														
PST3745														
PST3746														
PST3747														
PST3748														
PST3749														
PST3750	P-ch	1.5	3.0	N-ch	V _{DD} = 8.0V	1.0	2.0							
PST3751														
PST3752														
PST3753														
PST3754														
PST3755														
PST3756														
PST3757														
PST3758														
PST3759														
PST3760														

Electrical Characteristics

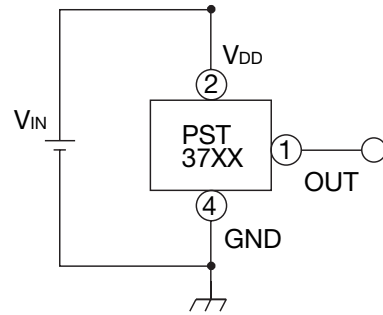
Product Name	Item							
	Threshold Operating Voltage1			Threshold Operating Voltage2			Detecting Voltage Temp. Coefficient	
	V _{DDL1} (V)			V _{DDL2} (V)			Δ-V _{DET} /ΔT _{OPT} (ppm / °C)	
	Test Circuit 2			Test Circuit 2			Test Circuit 2	
Condition	Typ.	Max.	Condition	Typ.	Max.	Condition	Typ.	
PST3709								
PST3710								
PST3711								
PST3712								
PST3713								
PST3714								
PST3715								
PST3716								
PST3717								
PST3718								
PST3719								
PST3720								
PST3721								
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PST3724								
PST3725								
PST3726								
PST3727								
PST3728								
PST3729								
PST3730								
PST3731								
PST3732								
PST3733	V _{OUT} ≤ 0.1V T _{OPT} = 25°C	0.55	0.70	V _{OUT} ≤ 0.1V	0.65	0.80	-30°C ≤ T _{OPT} ≤ 85°C	±100
PST3734								
PST3735								
PST3736								
PST3737								
PST3738								
PST3739								
PST3740								
PST3741								
PST3742								
PST3743								
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PST3759								
PST3760								

Measuring Circuit

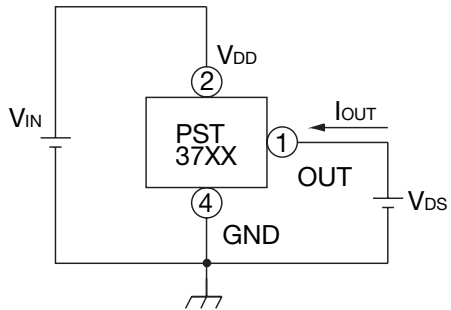
(1)



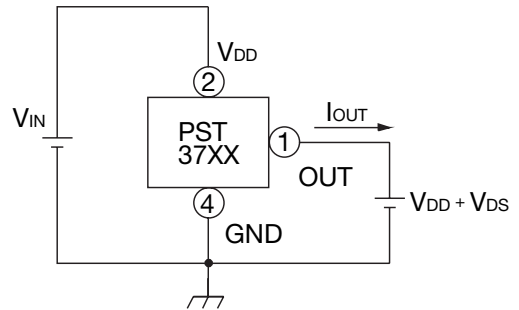
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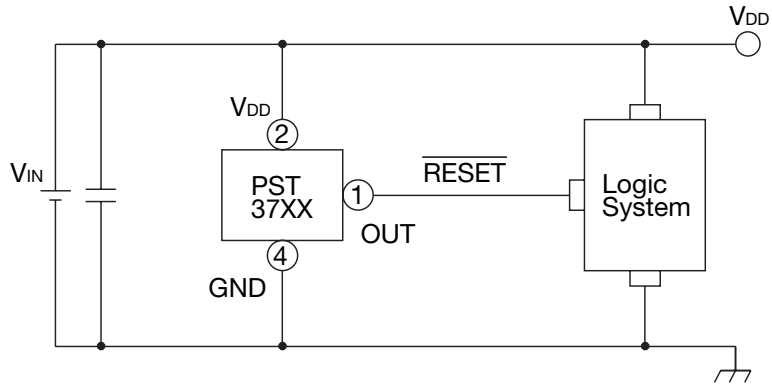
(3)



(4)

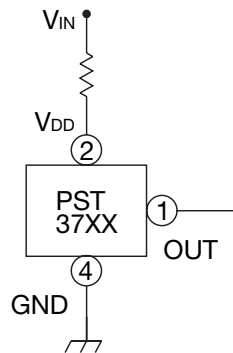


Application Circuits



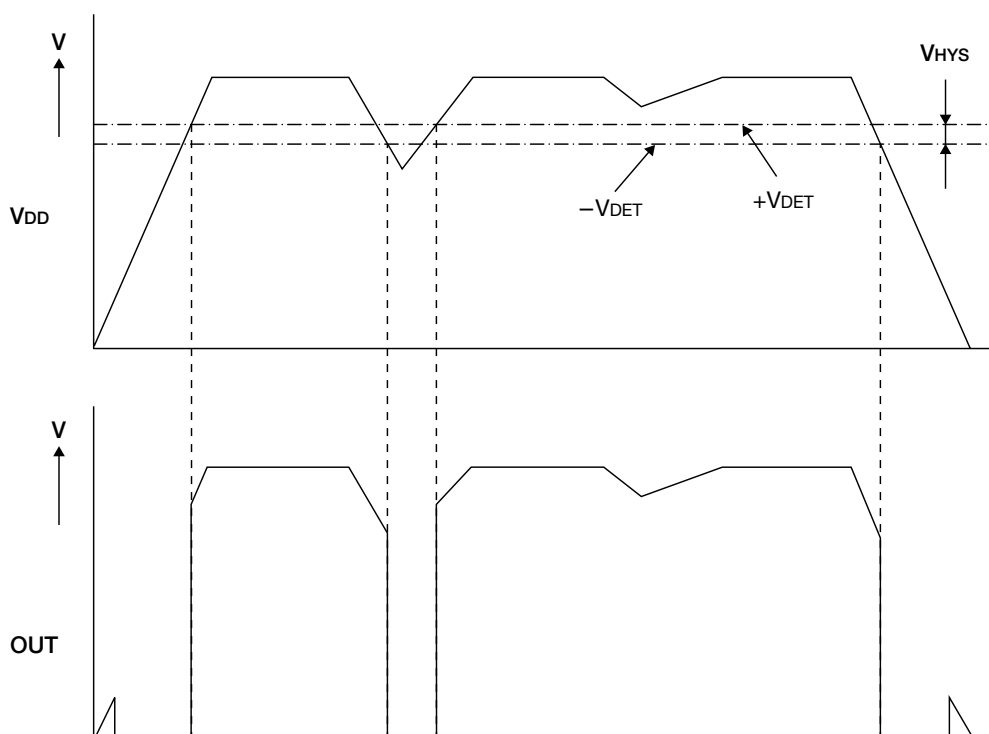
Please be advised that Mitsumi Electric Co., Ltd. is not liable for any accidents or damage caused as a result of the use of this circuit.

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.



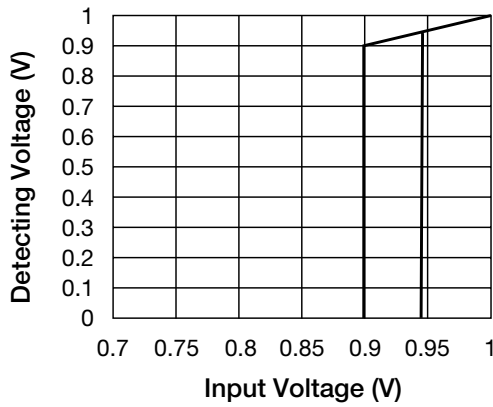
Please note that there is any possibility of circuit oscillation when resistance put in the line V_{IN}.

Timing Chart

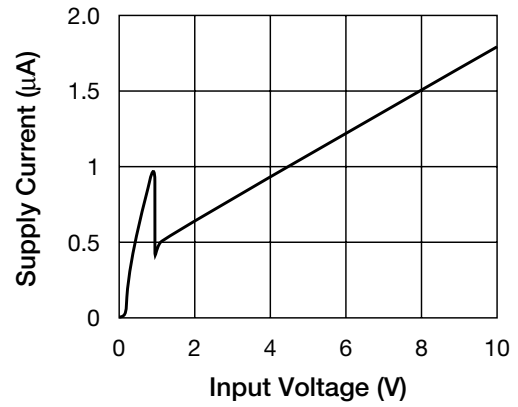


Characteristics (Typical Performance Characteristics 0.9V)

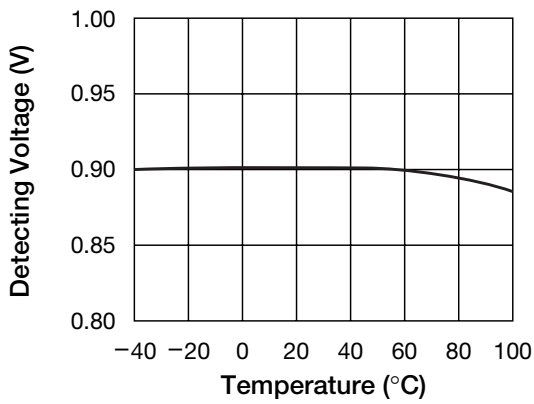
■ Detecting Voltage vs Input Voltage



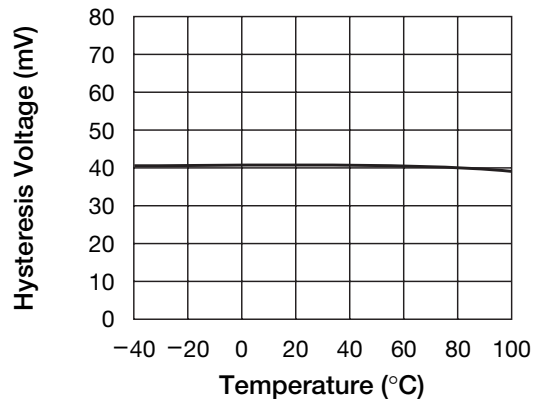
■ Supply Current vs Input Voltage



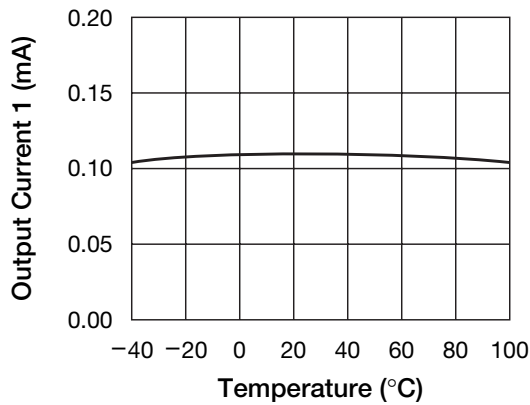
■ Detecting Voltage vs Temperature



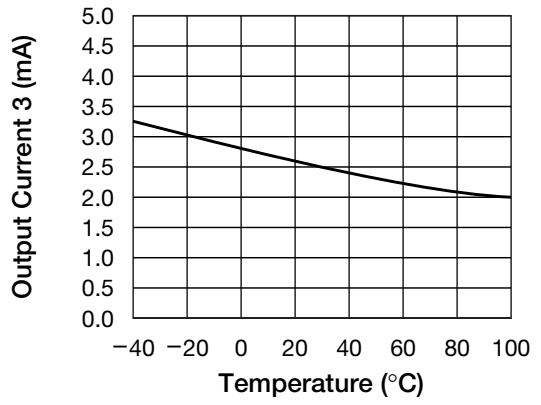
■ Hysteresis Voltage vs Temperature



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



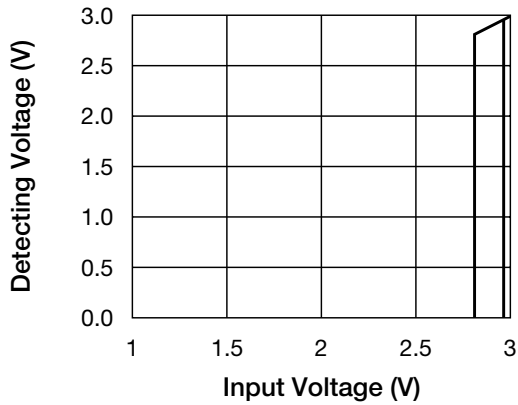
■ Output Current3 (P-ch) vs Temperature (V_{DD} = 4.5V, V_{DS} = -2.1V)



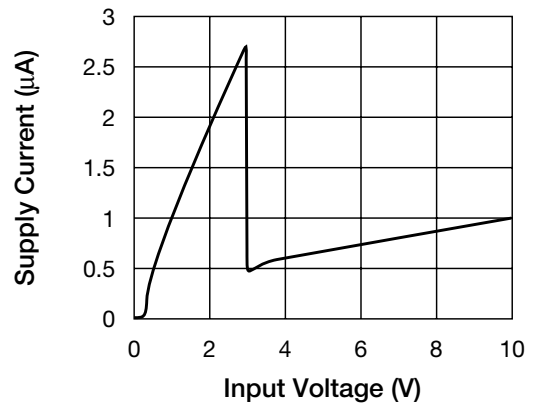
note : these are typical characteristics

Characteristics (Typical Performance Characteristics 2.8V)

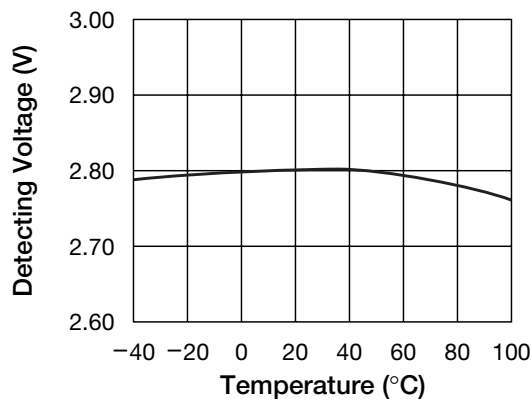
■ Detecting Voltage vs Input Voltage



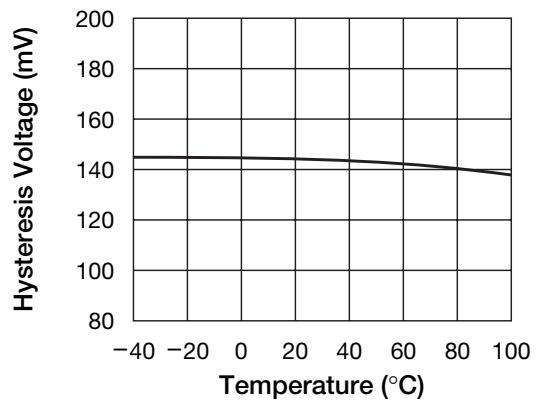
■ Supply Current vs Input Voltage



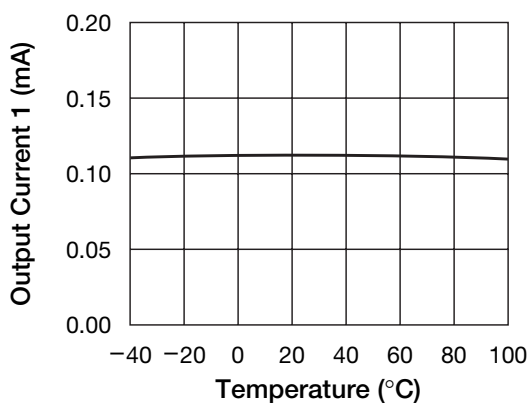
■ Detecting Voltage vs Temperature



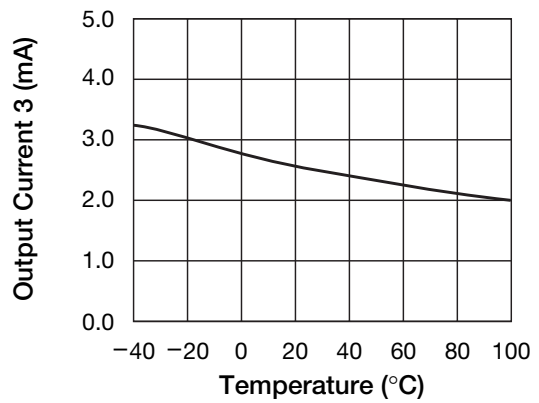
■ Hysteresis Voltage vs Temperature



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



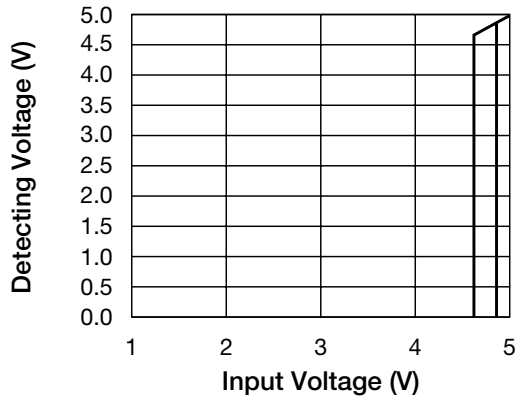
■ Output Current3 (P-ch) vs Temperature (V_{DD} = 4.5V, V_{Ds} = -2.1V)



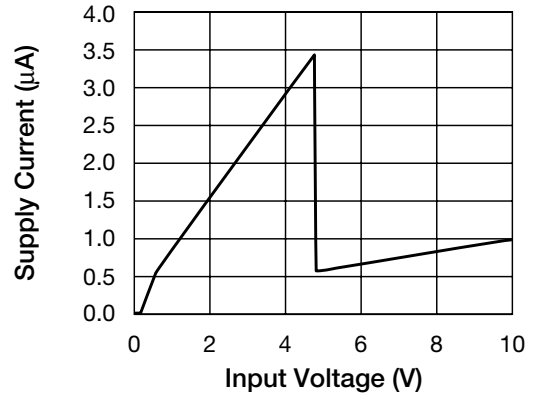
note : these are typical characteristics

Characteristics (Typical Performance Characteristics 4.6V)

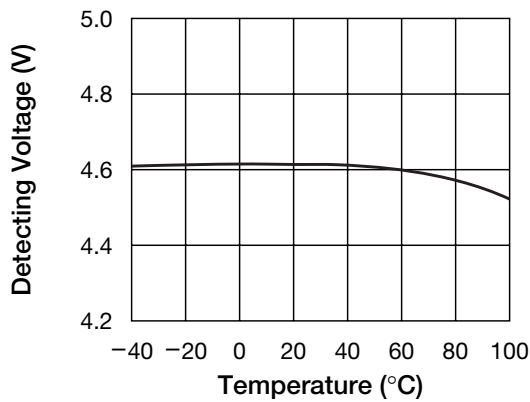
■ Detecting Voltage vs Input Voltage



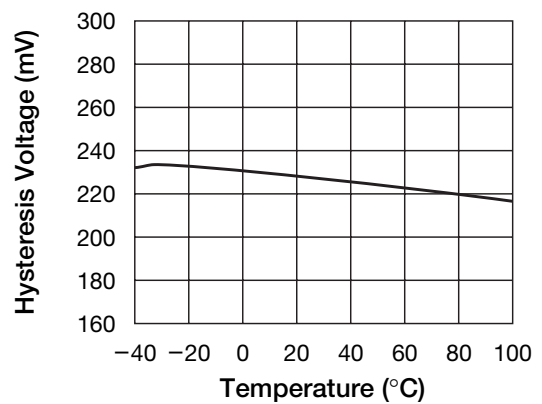
■ Supply Current vs Input Voltage



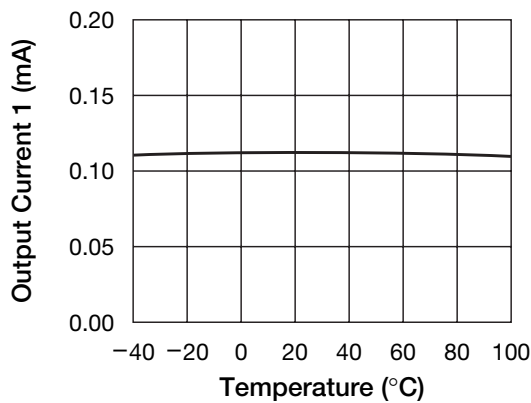
■ Detecting Voltage vs Temperature



■ 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)

