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)

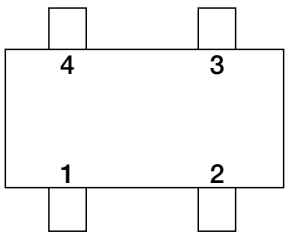
Package

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

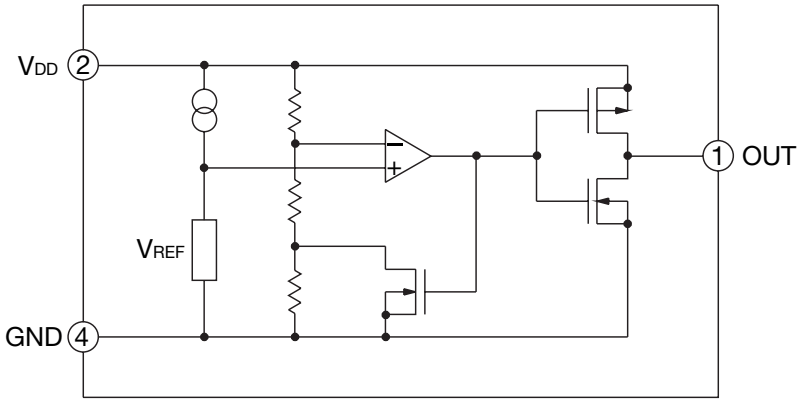
Pin Assignment



1	OUT
2	V_{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 (Ta=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

Recomended 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					1.0	3.0
PST3711	1.078	1.100	1.122	0.033	0.055	0.077		1.8	4.5			
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		2.0	5.0			
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		2.5	5.5			
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		3.0	6.0		1.1	3.3
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						
PST3725	2.450	2.500	2.550	0.075	0.125	0.175		3.5	7.0			
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	V_{DD} = (–V_{DET}) –0.13V	4.0	8.0		1.2	3.6
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		4.5	9.0			
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_{DD} = (–V_{DET}) –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		5.5	11.0			
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						
PST3750	4.900	5.000	5.100	0.150	0.250	0.350	V_{DD} = (–V_{DET}) –0.20V	6.0	12.0		1.4	4.2
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		6.5	13.0			
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						
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		
	$I_{OUT}1$ (mA)			$I_{OUT}2$ (mA)			$I_{OUT}3$ (mA)		
	Test Circuit 3			Test Circuit 3			Test Circuit 4		
	Condition	Min.	Typ.	Condition	Min.	Typ.	Condition	Typ.	Max.
PST3709	N–ch V_{DS} = 0.05V V_{DD} = 0.7V	0.01	0.05	N–ch V_{DS} = 0.5V V_{DD} = 0.85V	0.05	0.5	P–ch V_{DS} = –2.1V V_{DD} = 4.5V	1.0	2.0
PST3710									
PST3711				V_{DD} = 1.0V	0.2	1.0			
PST3712									
PST3713									
PST3714									
PST3715									
PST3716				V_{DD} = 1.5V	1.0	2.0			
PST3717									
PST3718									
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PST3721									
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PST3738									
PST3739									
PST3740							P–ch V_{DS} = –2.1V V_{DD} = 8.0V	1.5	3.0
PST3741									
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PST3759									
PST3760									

Electrical Characteristics

Product Name	Item							
	Threshold Operating Voltage1 $V_{DDL}1$ (V) Test Circuit 2			Threshold Operating Voltage2 $V_{DDL}2$ (V) Test Circuit 2			Detecting Voltage Temp. Coefficient $\Delta -V_{DET}/\Delta T_{OPT}$ (ppm / °C) Test Circuit 2	
	Condition	Typ.	Max.	Condition	Typ.	Max.	Condition	Typ.
PST3709	$V_{OUT} \leqq 0.1V$ $T_{OPT} = 25°C$	0.55	0.70	$V_{OUT} \leqq 0.1V$ $-30°C \leqq T_{OPT} \leqq 85°C$	0.65	0.80	$-30°C \leqq T_{OPT} \leqq 85°C$	±100
PST3710								
PST3711								
PST3712								
PST3713								
PST3714								
PST3715								
PST3716								
PST3717								
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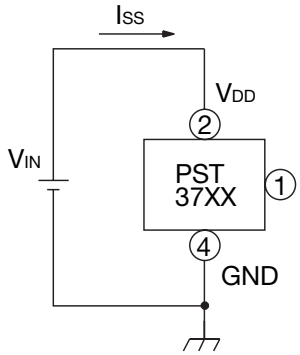
PST3760								

Measuring Circuit

(1)



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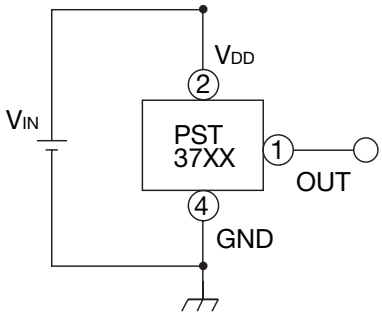

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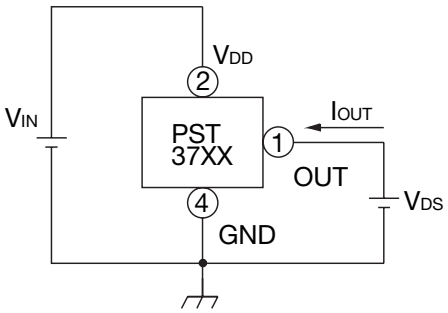

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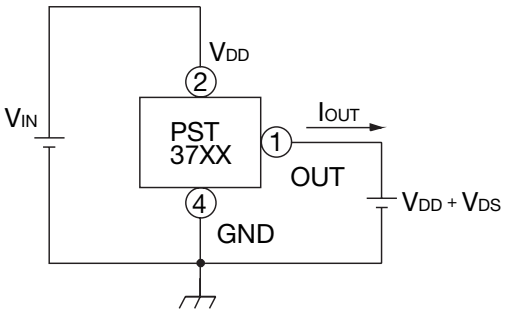
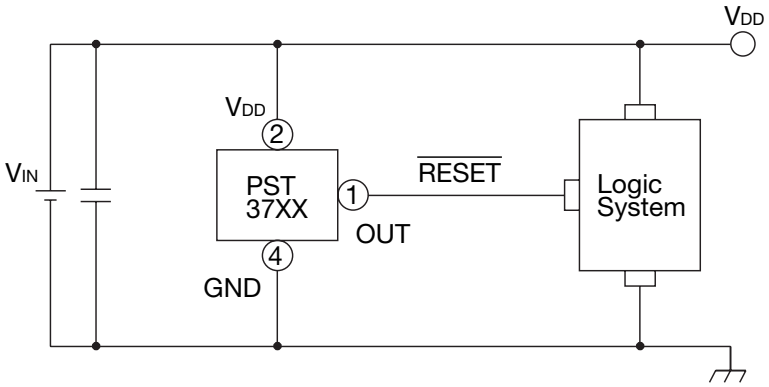
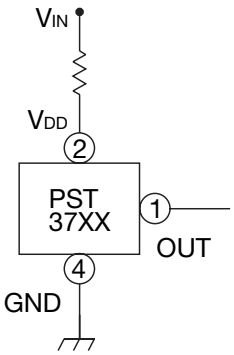


Application Circuits



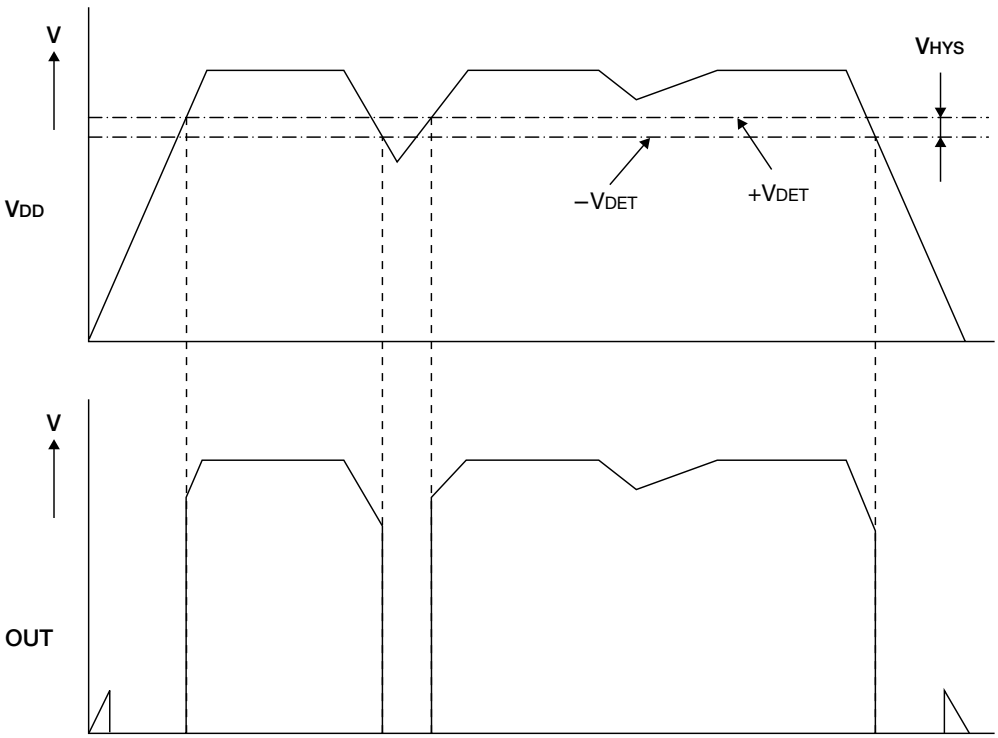
Please be advised that Mitsumi Electric Co., Ltd. is not liable for any accidents or damage caused as a result of the use of this circuit.

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.



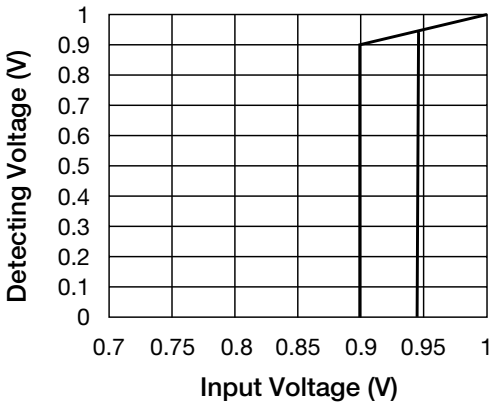
Please note that there is any possibility of circuit oscillation when resistance put in the line V_{IN}.

Timing Chart

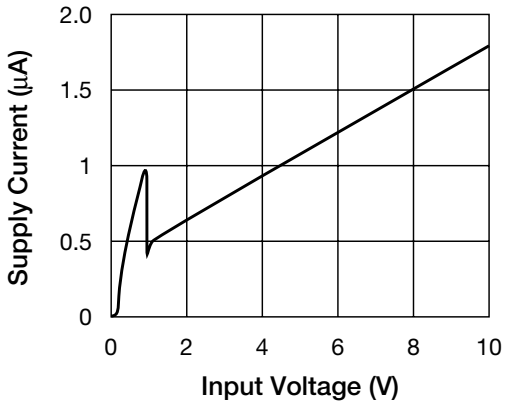


Characteristics (Typical Performance Characteristics 0.9V)

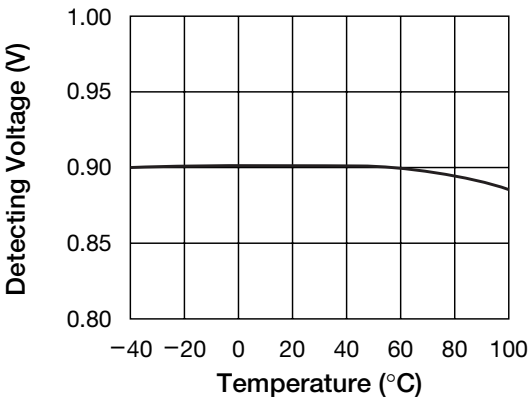
Detecting Voltage vs Input Voltage



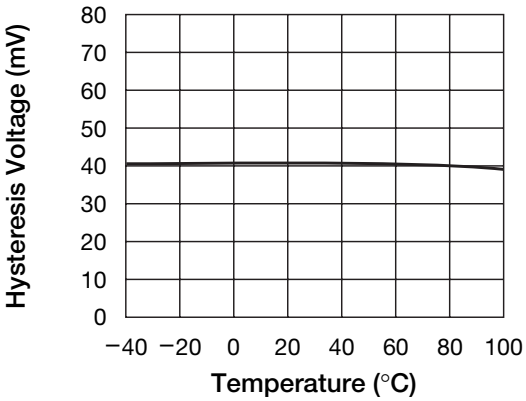
Supply Current vs Input Voltage



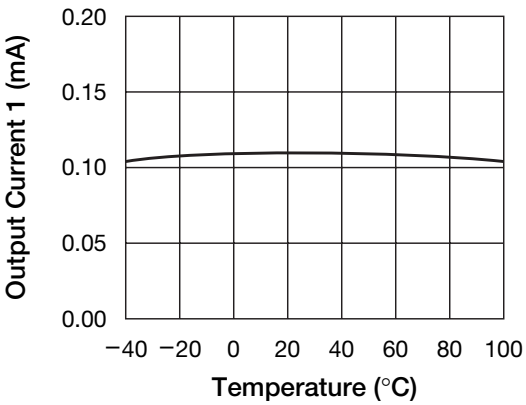
Detecting Voltage vs Temperature



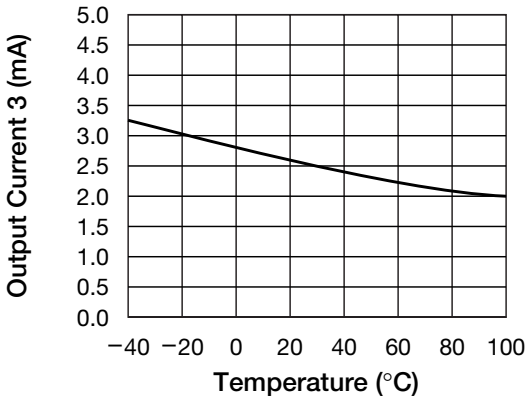
Hysteresis Voltage vs Temperature



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



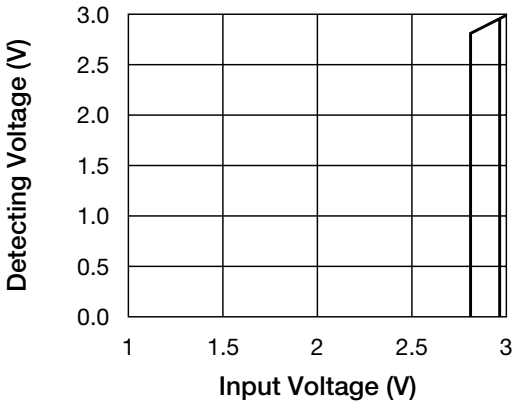
Output Current3 (P-ch) vs Temperature (V_{DD} = 4.5V ,V_{DS} = -2.1V)



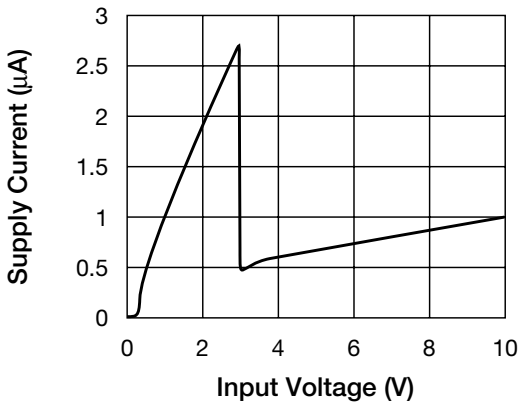
note : these are typical characteristics

Characteristics (Typical Performance Characteristics 2.8V)

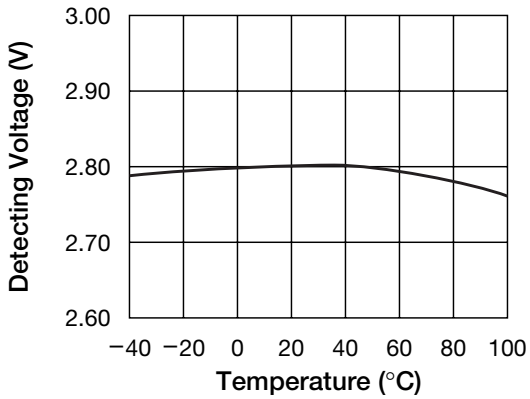
Detecting Voltage vs Input Voltage



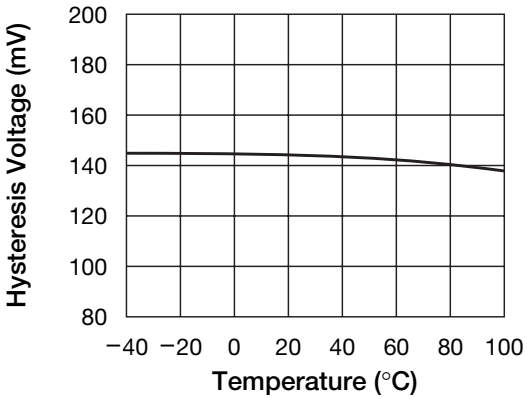
Supply Current vs Input Voltage



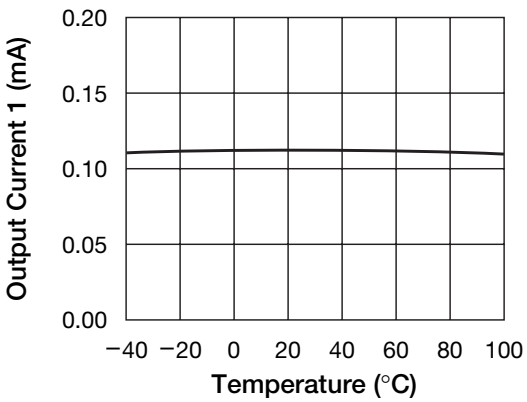
Detecting Voltage vs Temperature



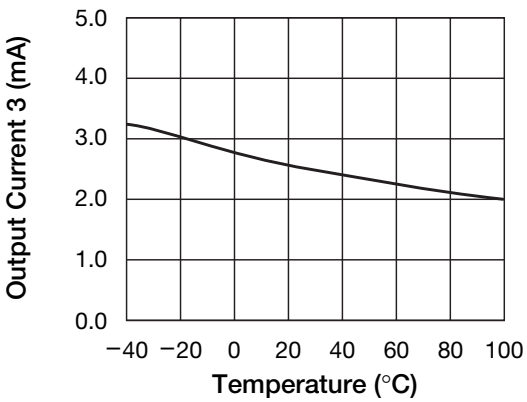
Hysteresis Voltage vs Temperature



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



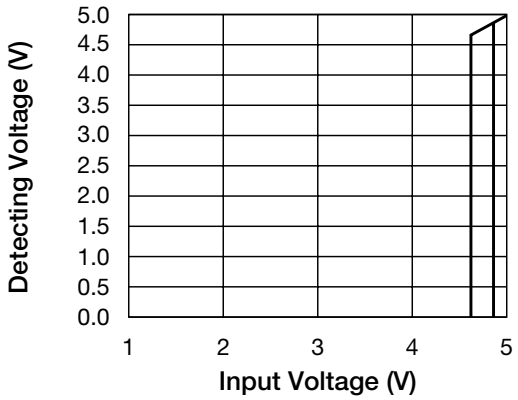
Output Current3 (P-ch) vs Temperature (V_{DD} = 4.5V ,V_{DS} = -2.1V)



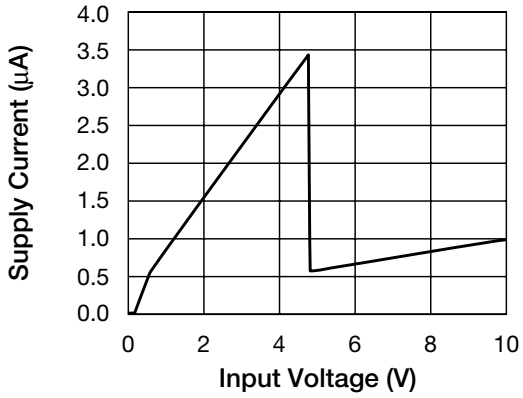
note : these are typical characteristics

Characteristics (Typical Performance Characteristics 4.6V)

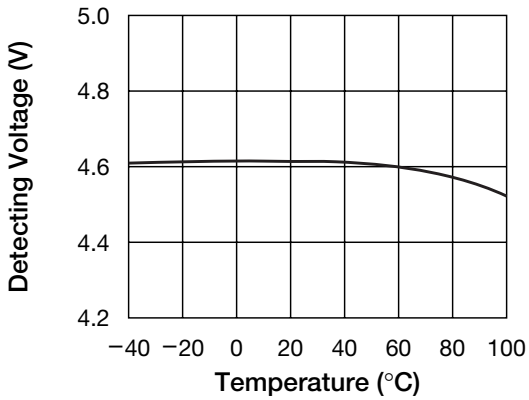
Detecting Voltage vs Input Voltage



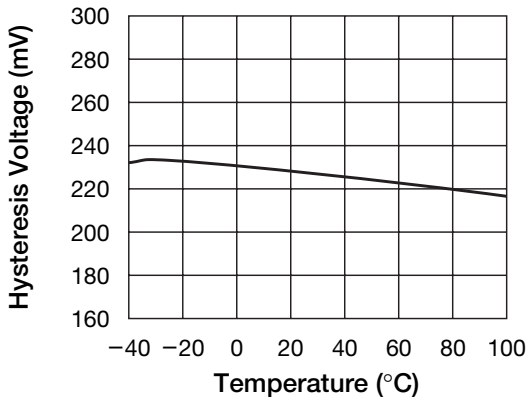
Supply Current vs Input Voltage



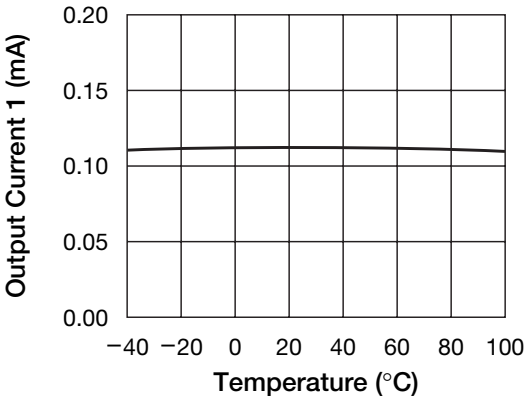
Detecting Voltage vs Temperature



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)