



DESCRIPTION

The A4809 is a series of high precision voltage detector with ultra low current consumption (500nA typ. at $V_{DD}=3.0V$) and a built-in delay circuits. The A4809 can work at very low voltage, which makes it perfect for system reset.

The A4809 is composed of high precision voltage reference, comparator, delay circuit, output driver and resistor array. Internally preset detect voltage has a low temperature drift and requires no external trimming.

Two type of output; CMOS and N-Channel Open-Drain are available.

A4809 is available in SOT-23 package.

ORDERING INFORMATION

Package Type		Part Number			
SOT-23		E3	A4809E3R-XXXDZ		
			A4809E3VR-XXXDZ		
Note		XXX: Detector Voltage 090=0.9V 100=1.0V... D: Delay Time A-G, see below table Z: C=CMOS, N=Nch V: Green Package R: Tape & Reel			
Delay Time (Table)					
A	50ms	D	200ms	G	400ms
B	100ms	E	250ms		
C	150ms	F	300ms		
AiT provides all Pb free products Suffix "V" means Green Package					

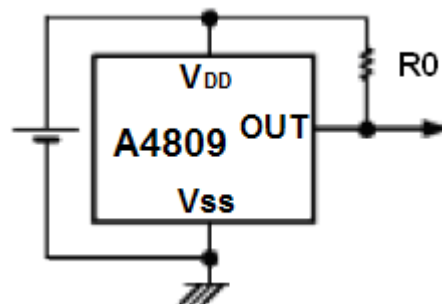
FEATURES

- High-Precision Detection Voltage: $\pm 2\%$
- Detection Voltage: 0.9V~6.0V(in 0.1V step)
- Ultra-Low Current Consumption: 0.5uA typ. (at $V_{DD}=3.0V$)
- Built-in Power on Reset Delay Time circuit
- Operating Voltage Range: 0.7V~10V
- Two Output Forms: CMOS and N-Channel Open-Drain
- SOT-23 Package

APPLICATION

- Power Monitor for Portable Equipment such as PDA, DSC, Mobile Phone, Notebook, MP3
- CPU and Logic Circuit Reset
- Battery Checker
- Battery Back-Up Circuit
- Power Failure Detector

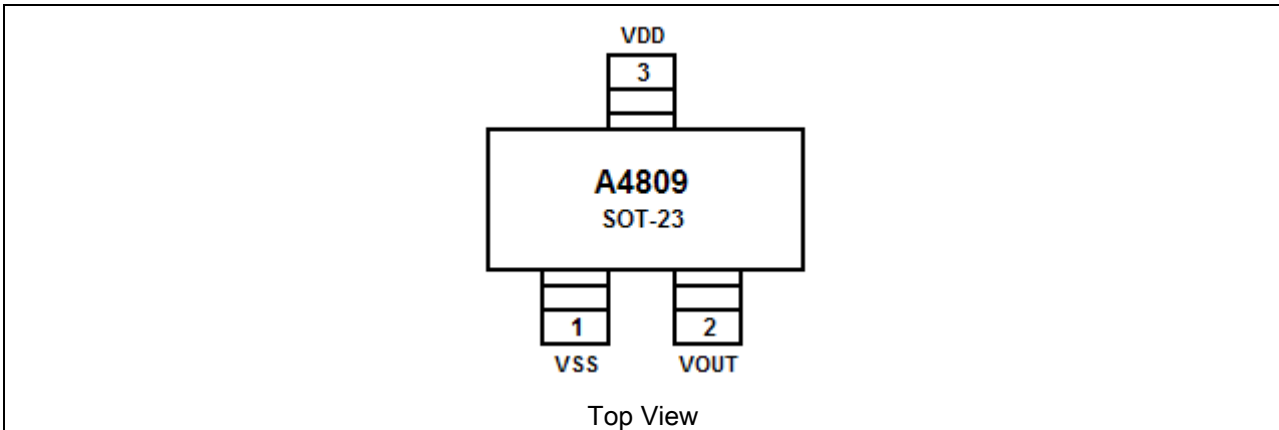
Typical Application



R0 is necessary for N-Ch output products



PIN DESCRIPTION



Pin #	Symbol	Function
1	V _{SS}	GND Pin
2	V _{OUT}	Voltage Detection Output Pin
3	V _{DD}	Voltage Input Pin

ABSOLUTE MAXIMUM RATINGS

Input Voltage Range	0.3V~12V
Output Voltage Range	0.3V~12V
Maximum Output Current	70mA
Maximum Power Dissipation	150mW
Ambient Temperature	-40~+70°C
Storage Temperature (T _s)	-40~+125°C
Lead Temperature and Time	260°C, 10S

Stresses beyond may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



ELECTRICAL CHARACTERISTICS

(Test Condition: $T_{OPT}=25^{\circ}C$, unless otherwise noted.)

1. A4809-090D (0.9V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		0.882	0.9	0.918	V
I_{SS}	Current Consumption	$V_{DD}=2.9V$		1	1.5	μA
V_{DDH}	Maximum Operating Voltage				10	V
V_{DDL}	Minimum Operating Voltage			0.5		V
I_{OUT}	Output Current	Nch $V_{DS}=0.05V, V_{DD}=0.7V$ $V_{DS}=0.50V, V_{DD}=0.8V$ Pch $V_{DS}=-2.1V, V_{DD}=4.5V$	0.01 0.05 1.0	0.05 0.50 2.0		mA

2. A4809-263D (2.63V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		2.577	2.63	2.682	V
I_{SS}	Current Consumption	$V_{DD}=4.7V$		0.5	1	μA
V_{DDH}	Maximum Operating Voltage				10	V
V_{DDL}	Minimum Operating Voltage			0.5		V
I_{OUT}	Output Current	Nch $V_{DS}=0.05V, V_{DD}=0.7V$ Pch $V_{DS}=-2.1V, V_{DD}=4.5V$	0.01 1.0	0.05 2.0		mA

3. A4809-270D (2.7V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		2.646	2.70	2.754	V
I_{SS}	Current Consumption	$V_{DD}=4.7V$		0.5	1	μA
V_{DDH}	Maximum Operating Voltage				10	V
V_{DDL}	Minimum Operating Voltage			0.5		V
I_{OUT}	Output Current	Nch $V_{DS}=0.05V, V_{DD}=0.7V$ Pch $V_{DS}=-2.1V, V_{DD}=4.5V$	0.01 1.0	0.05 2.0		mA



4. A4809-293D (2.93V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
-V _{DET}	Detector Threshold		2.871	2.93	3.516	V
I _{SS}	Current Consumption	V _{DD} =5.0V		0.5	1	uA
V _{DDH}	Maximum Operating Voltage				10	V
V _{DDL}	Minimum Operating Voltage			0.5		V
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.7V Pch V _{DS} =-2.1V, V _{DD} =4.5V	0.01 1.0	0.05 2.0		mA

5. A4809-300D (3.0V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
-V _{DET}	Detector Threshold		2.94	3.0	3.06	V
I _{SS}	Current Consumption	V _{DD} =5.0V		0.5	1	uA
V _{DDH}	Maximum Operating Voltage				10	V
V _{DDL}	Minimum Operating Voltage			0.5		V
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.7V Pch V _{DS} =-2.1V, V _{DD} =4.5V	0.01 1.0	0.05 2.0		mA

6. A4809-340D (3.4V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
-V _{DET}	Detector Threshold		3.332	3.4	3.468	V
I _{SS}	Current Consumption	V _{DD} =5.0V		0.5	1	uA
V _{DDH}	Maximum Operating Voltage				10	V
V _{DDL}	Minimum Operating Voltage			0.5		V
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.7V Pch V _{DS} =-2.1V, V _{DD} =4.5V	0.01 1.0	0.05 2.0		mA

7. A4809-440D (4.4V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
-V _{DET}	Detector Threshold		4.312	4.4	4.488	V
I _{SS}	Current Consumption	V _{DD} =6.4V		0.5	1	uA
V _{DDH}	Maximum Operating Voltage				10	V
V _{DDL}	Minimum Operating Voltage			0.5		V
I _{OUT}	Output Current	Nch V _{DS} =0.05V, V _{DD} =0.7V Pch V _{DS} =-2.1V, V _{DD} =8.0V	0.01 1.5	0.05 3.0		mA



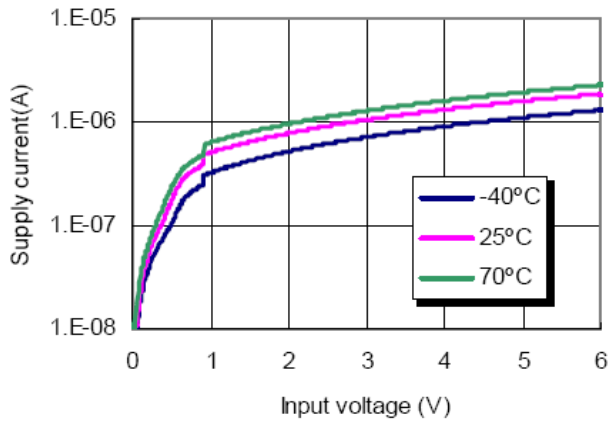
ELECTRICAL CHARACTERISTICS BY DETECTOR THRESHOLD

Part #	Detector Threshold			Detector Threshold Hysteresis			Supply Current			Supply Current 2					
	-V _{DET} (V)			V _{HYS} (V)			I _{SS1} (uA)			I _{SS2} (uA)					
	Min	Typ	Max	Min	Typ	Max	Condition	Typ	Max	Condition	Typ	Max			
A4809-09	0.882	0.900	0.918	0.018	0.036	0.054	V _{DD} = (-V _{DET}) +0.1V	0.5	1.0	V _{DD} = (-V _{DET}) +2V	1.0	1.5			
A4809-10	0.980	1.000	1.020	0.020	0.040	0.060									
A4809-11	1.078	1.100	1.122	0.022	0.044	0.066									
A4809-12	1.176	1.200	1.224	0.024	0.048	0.072									
A4809-13	1.274	1.300	1.326	0.026	0.052	0.078									
A4809-14	1.372	1.400	1.428	0.028	0.056	0.084									
A4809-15	1.470	1.500	1.530	0.030	0.060	0.090									
A4809-16	1.568	1.600	1.632	0.032	0.064	0.096									
A4809-17	1.666	1.700	1.734	0.034	0.068	0.102									
A4809-18	1.764	1.800	1.836	0.036	0.072	0.108									
A4809-19	1.862	1.900	1.938	0.038	0.076	0.114									
A4809-20	1.960	2.000	2.040	0.040	0.080	0.120									
A4809-21	2.048	2.100	2.142	0.042	0.084	0.126									
A4809-22	2.156	2.200	2.244	0.044	0.088	0.132									
A4809-23	2.254	2.300	2.346	0.046	0.092	0.138									
A4809-24	2.352	2.400	2.448	0.048	0.096	0.144									
A4809-25	2.450	2.500	2.550	0.050	0.100	0.150									
A4809-26	2.548	2.600	2.652	0.052	0.104	0.156									
A4809-27	2.646	2.700	2.754	0.054	0.108	0.162									
A4809-28	2.744	2.800	2.856	0.056	0.112	0.168									
A4809-29	2.842	2.900	2.958	0.058	0.116	0.174									
A4809-30	2.940	3.000	3.060	0.060	0.120	0.180									
A4809-31	3.038	3.100	3.162	0.062	0.124	0.186									
A4809-32	3.136	3.2	3.264	0.064	0.128	0.192									
A4809-33	3.234	3.300	3.366	0.066	0.132	0.198									
A4809-34	3.332	3.400	3.468	0.068	0.136	0.204									
A4809-35	3.430	3.500	3.570	0.070	0.140	0.210									
A4809-36	3.528	3.600	3.672	0.072	0.144	0.216									
A4809-37	3.626	3.700	3.774	0.074	0.148	0.222									
A4809-38	3.724	3.800	3.876	0.076	0.152	0.228									
A4809-39	3.822	3.900	3.978	0.078	0.156	0.234									
A4809-40	3.920	4.000	4.080	0.080	0.160	0.240									
A4809-41	4.018	4.100	4.182	0.082	0.164	0.246									
A4809-42	4.116	4.200	4.284	0.084	0.168	0.252									
A4809-43	4.214	4.300	4.386	0.086	0.172	0.258									
A4809-44	4.312	4.400	4.488	0.088	0.176	0.264									
A4809-45	4.410	4.500	4.590	0.090	0.180	0.270									
A4809-46	4.508	4.600	4.692	0.092	0.184	0.276									
A4809-47	4.606	4.700	4.794	0.094	0.188	0.282									
A4809-48	4.704	4.800	4.896	0.096	0.192	0.288									
A4809-49	4.802	4.900	4.998	0.098	0.196	0.294									
A4809-50	4.900	5.000	5.100	0.100	0.200	0.300									
A4809-51	4.998	5.100	5.202	0.102	0.204	0.306									
A4809-52	5.096	5.200	5.304	0.104	0.208	0.312									
A4809-53	5.194	5.300	5.406	0.106	0.212	0.318									
A4809-54	5.292	5.400	5.508	0.108	0.216	0.324									
A4809-55	5.390	5.500	5.610	0.110	0.220	0.330									
A4809-56	5.488	5.600	5.712	0.112	0.224	0.336									
A4809-57	5.586	5.700	5.814	0.114	0.228	0.342									
A4809-58	5.684	5.800	5.916	0.116	0.232	0.348									
A4809-59	5.782	5.900	6.018	0.118	0.236	0.354									
A4809-60	5.880	6.000	6.120	0.120	0.240	0.360									
														0.5	1.0

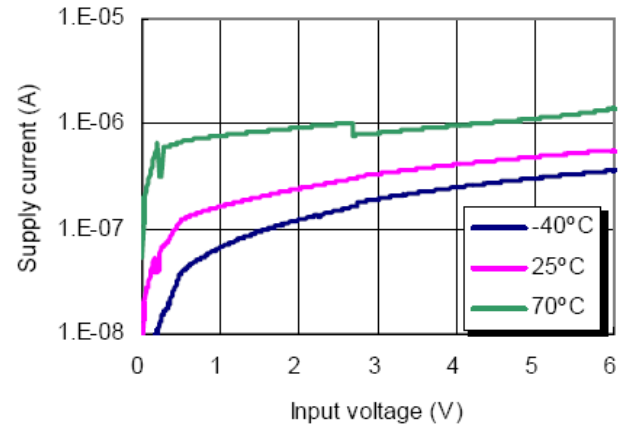


TYPICAL PERFORMANCE CHARACTERISTIC

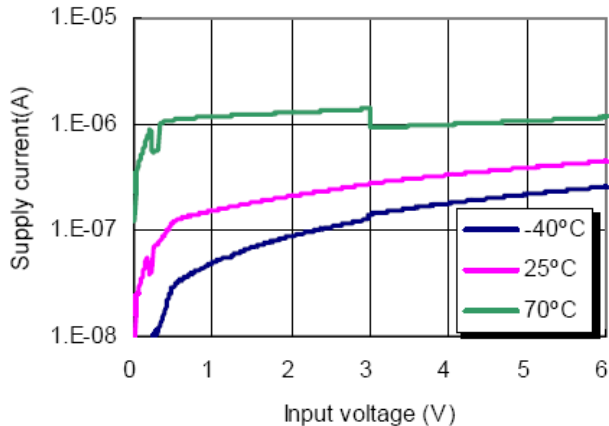
1. Output Voltage vs. Input Voltage
Detector Threshold=0.9V



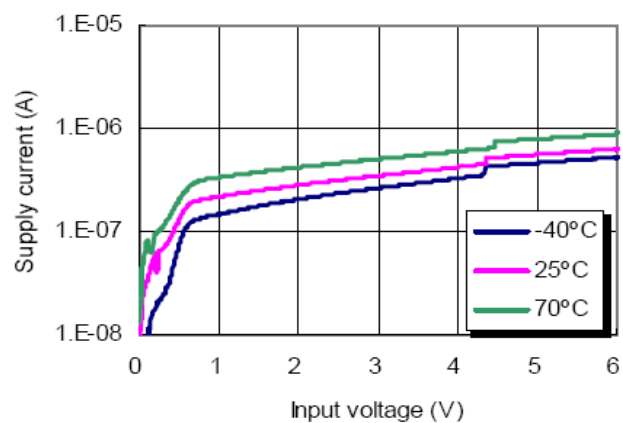
2. Output Voltage vs. Input Voltage
Detector Threshold=0.9V



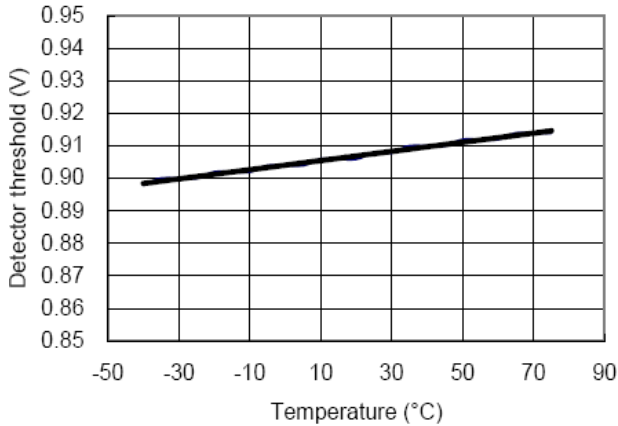
3. Output Voltage vs. Input Voltage
Detector Threshold=3.0V



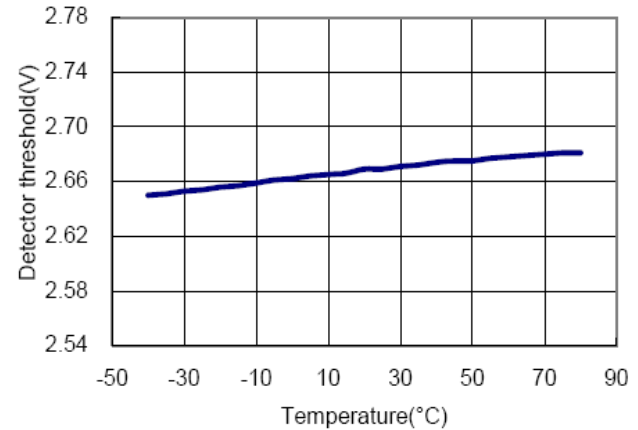
4. Output Voltage vs. Input Voltage
Detector Threshold=4.4V



5. Detector Threshold vs. Temperature
Detector Threshold=0.9V

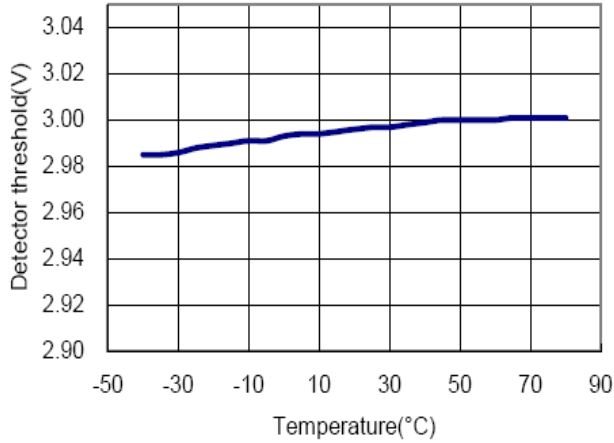


6. Detector Threshold vs. Temperature
Detector Threshold=2.7V

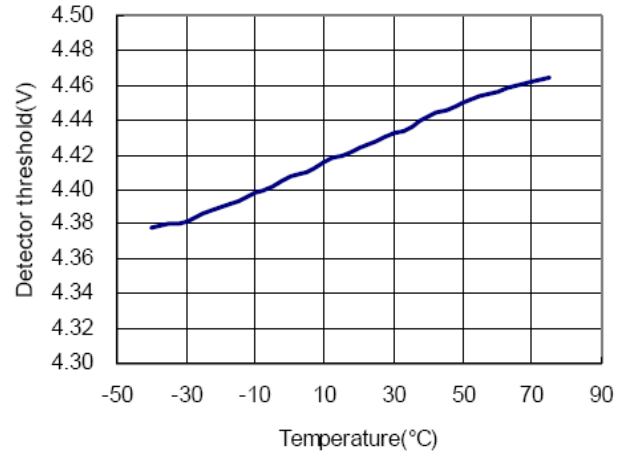




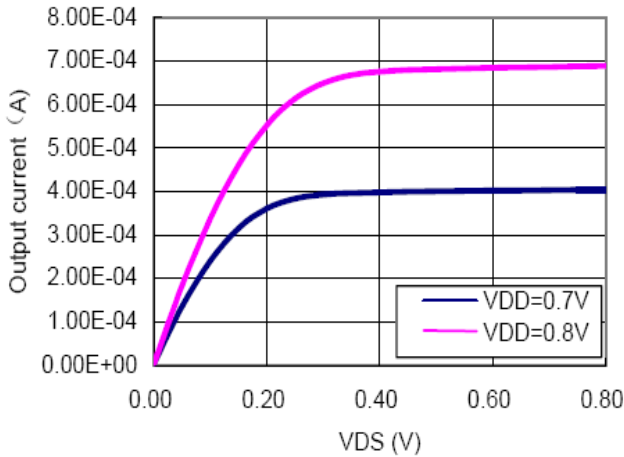
7. Detector Threshold vs. Temperature
Detector Threshold=3.0V



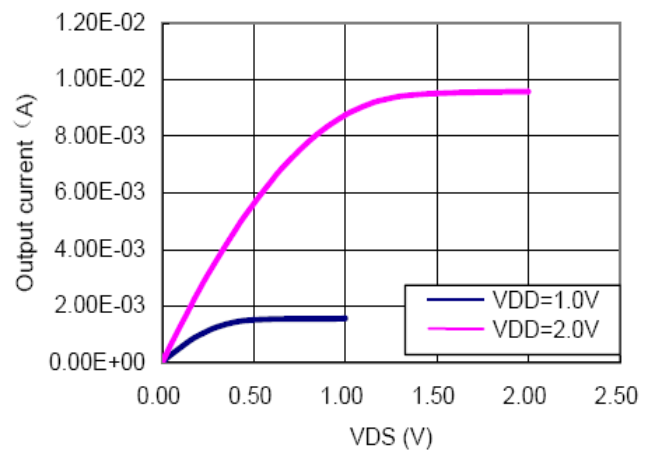
8. Nch Driver Output Current vs. V_{DS}
Detector Threshold=4.4V



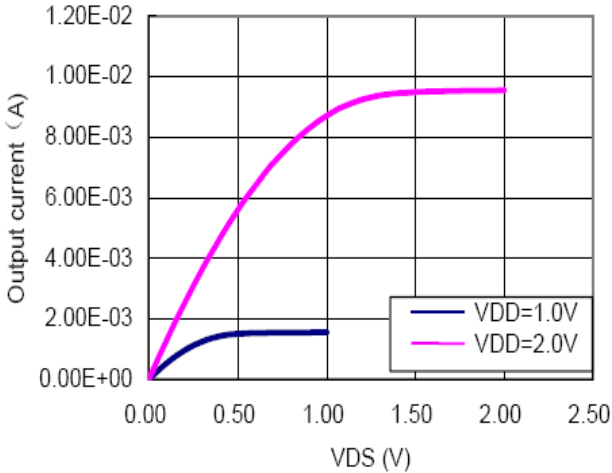
9. Nch Driver Output Current vs. V_{DS}
Detector Threshold=0.9V



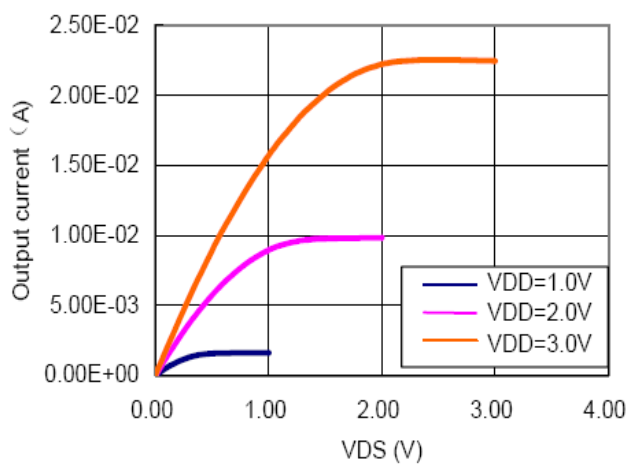
10. Nch Driver Output Current vs. V_{DS}
Detector Threshold=2.7V



11. Nch Driver Output Current vs. V_{DS}
Detector Threshold=3.0V

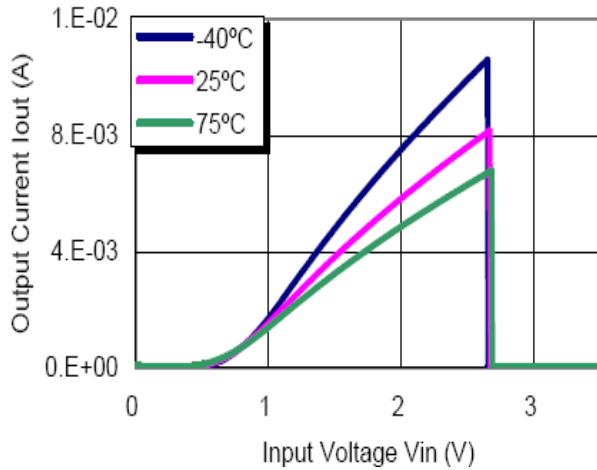


12. Nch Driver Output Current vs. V_{DS}
Detector Threshold=4.0V

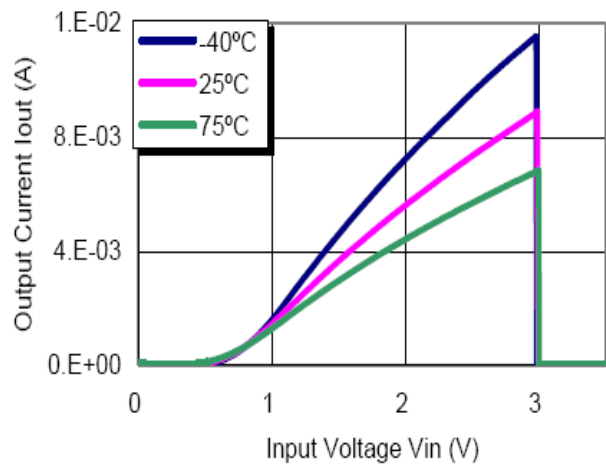




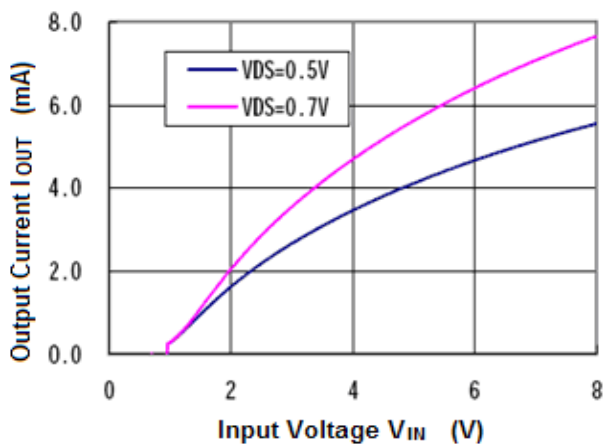
13. Nch Driver Output Current vs. Input Voltage
Detector Threshold=2.7V



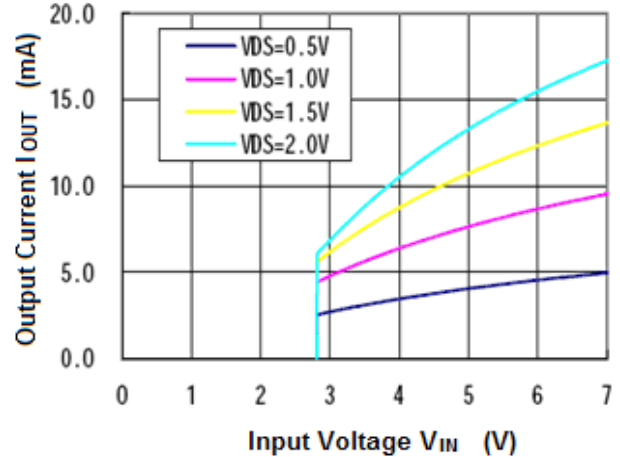
14. Nch Driver Output Current vs. Input Voltage
Detector Threshold=3.0V



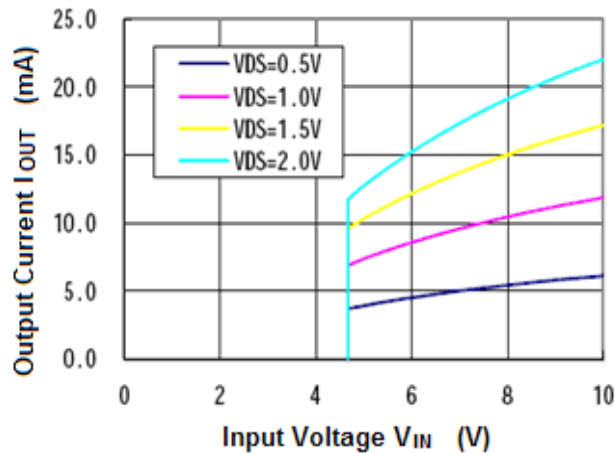
15. Pch Driver Output Current vs. Input Current
Detector Threshold=0.9V



16. Pch Driver Output Current vs. Input Current
Detector Threshold=2.7V

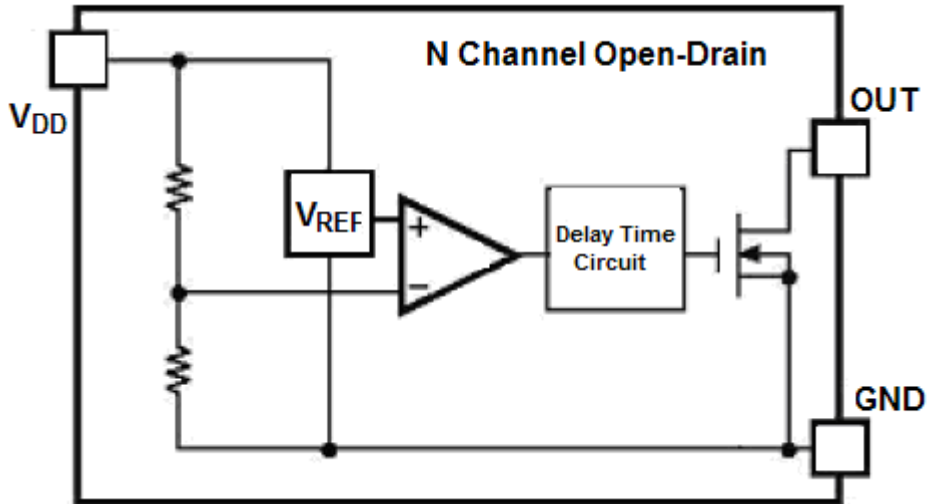


17. Pch Driver Output Current vs. Input Current
Detector Threshold=4.4V

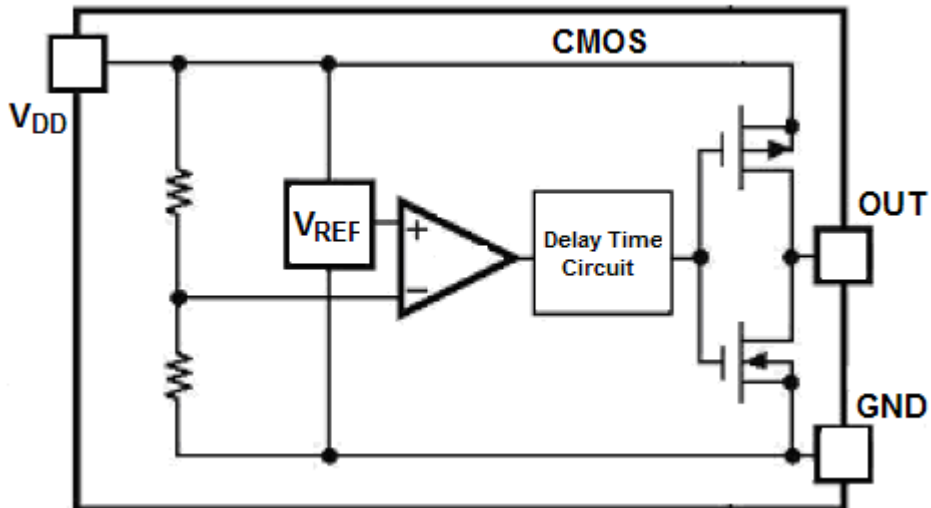




BLOCK DIAGRAM



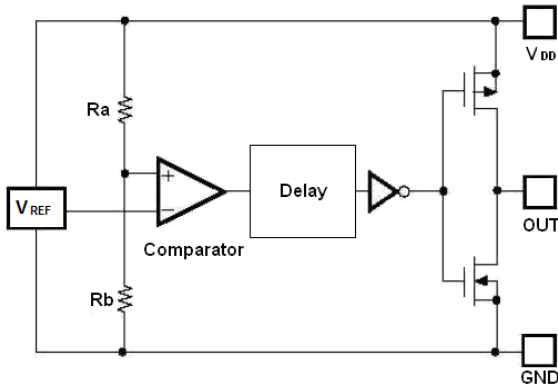
N Channel Open-Drain



CMOS Output

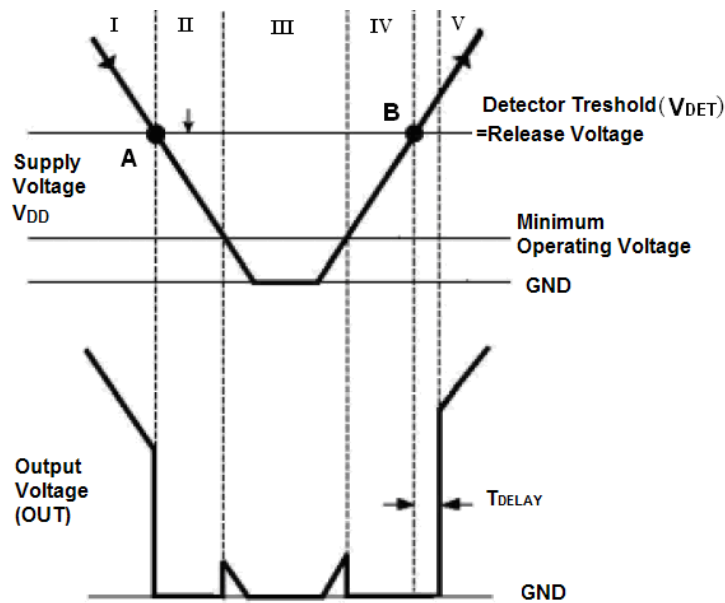


DETAILED INFORMATION



High precision low temperature co-efficiency reference voltage is applied to the negative input of a comparator. Input voltage, divided by resistor array of Ra and Rb, is applied to the positive input of the comparator. Output of the comparator passes a delay circuit and a series of buffer to drive the output CMOS pair.

$$V_{DET} = V_{REF} * (1 + Ra / Rb)$$



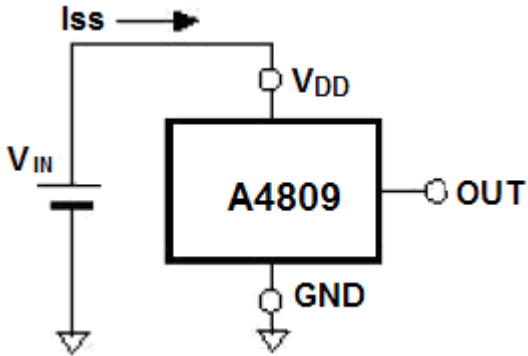
No	Operation Status	Output Status
I	$V_{DD} > V_{DET}$	Output voltage is equal to the supply voltage
II	V_{DD} drops below V_{DET}	Output voltage equals to GND level
III	V_{DD} drops further below V_{DDL}	Output voltage is undefined
IV	V_{DD} rises above V_{DDL}	Output voltage equals to GND level
V	V_{DD} rises above V_{DET}	Output voltage equals to supply voltage after T delay



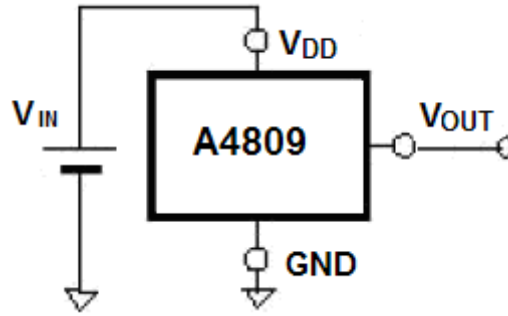
Test Circuits

A4809 test circuits as follows:

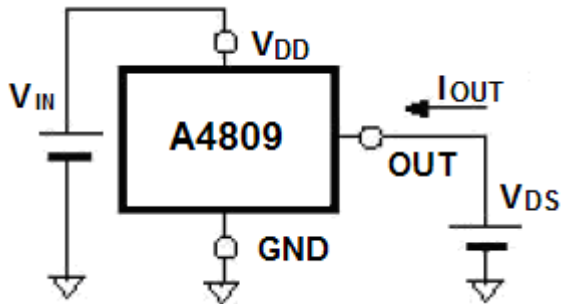
1. Supply Current



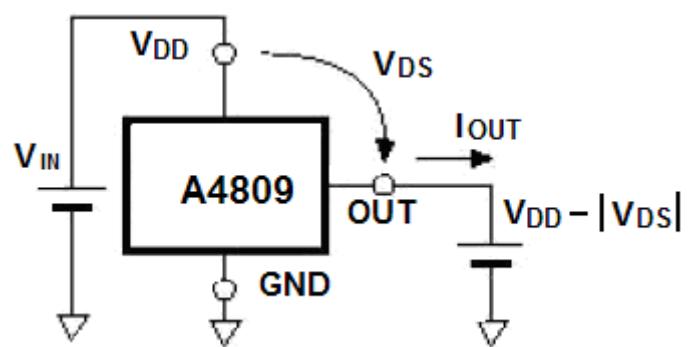
2. Detector Threshold



3. Nch Drive Output Current



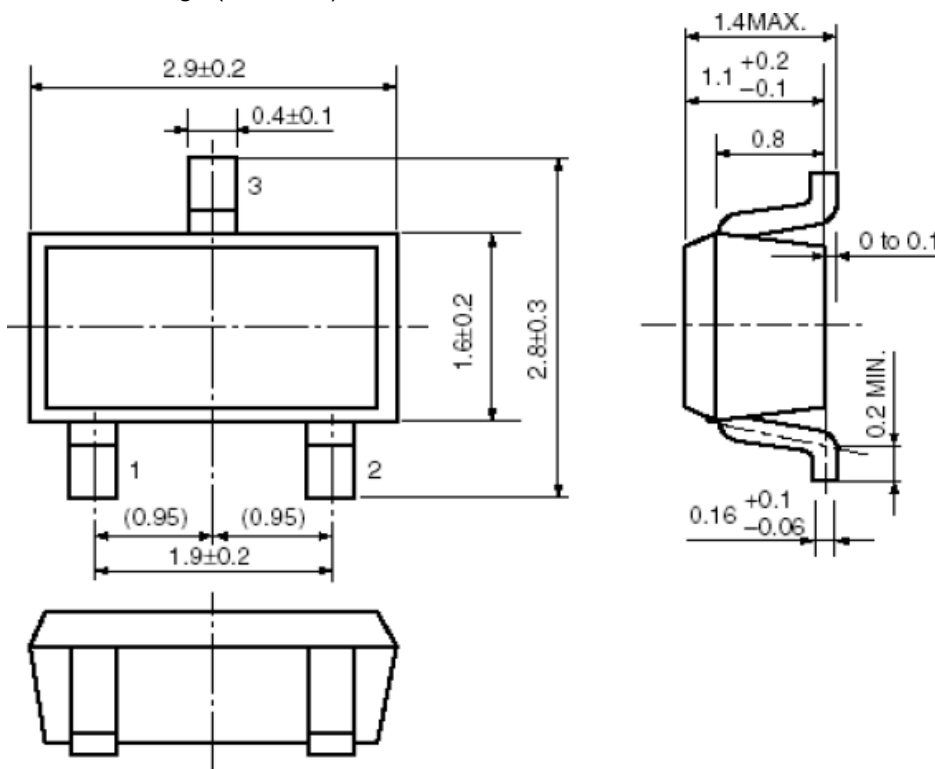
4. Pch Drive Output Current





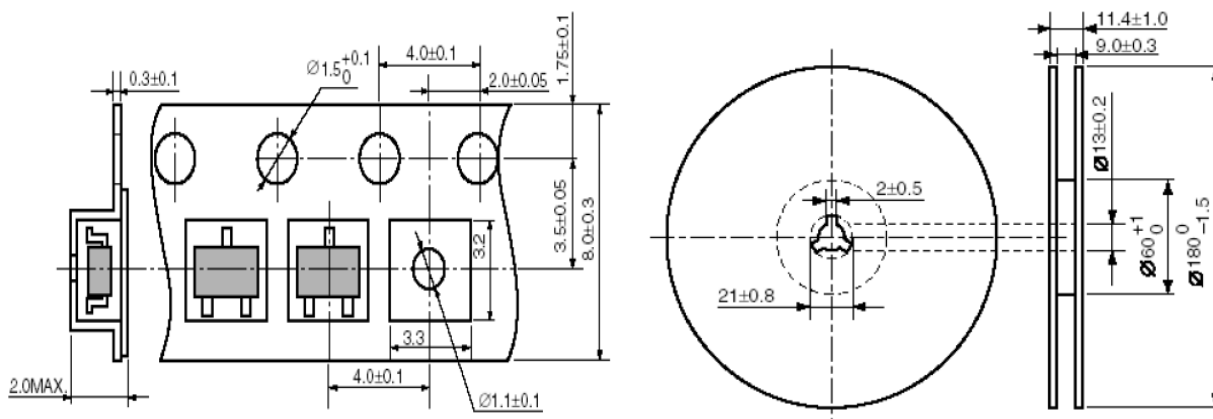
PACKAGE INFORMATION

Dimension in SOT-23 Package (Unit: mm)



Tape Dimension

Tape & Reel Dimension





IMPORTANT NOTICE

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