DESCRIPTION

The A4806 is a series of high precision voltage detector with ultra low current consumption (500nA typ. at V_{DD}=3.0V).

The A4806 can work at very low voltage, which makes it perfect for system reset.

The A4806 is composed of high precision voltage reference, comparator, and 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.

A4806 is available in SOT-23 & SOT-25 package.

FEATURES

- High-Precision Detection Voltage: ±2%
- Detection Voltage: 0.9V~6.0V(in 0.1V step)
- Precise Hysteresis: 4% typ.
- Operating Voltage Range: 0.7V~10V
- Untra-Low Current Consumption: 0.5uA typ. (at V_{DD}=3.0V)
- Two Output Forms: CMOS and N-Channel Open-Drain
- Available in SOT-23 and SOT-25 package

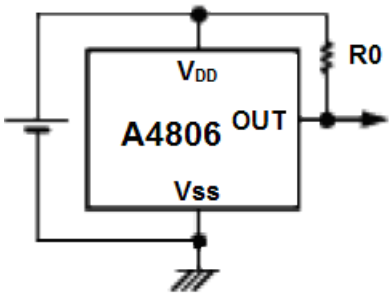
APPLICATION

- 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

ORDERING INFORMATION

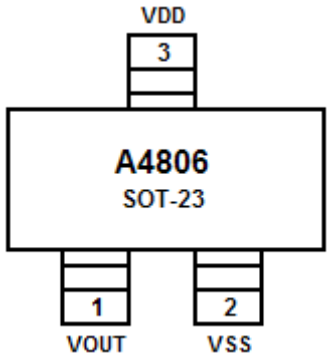
Package Type	Part Number	
SOT-23	E3	A4806E3R-XXZ
		A4806E3VR-XXZ
SOT-25	E5	A4806E5R-XXZ
		A4806E5VR-XXZ
Note	XX: Detect Voltage 29=2.9V, 33=3.3V R: Tape & Reel V: Green Package Z: N=Nch, C=CMOS	
AiT provides all Pb free products Suffix " V " means Green Package		

Typical Application

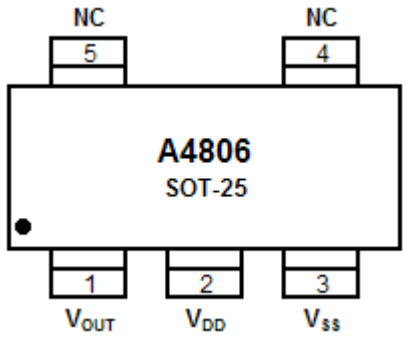


1. R0 is necessary for N-Channel output.
2. The value of R0 need to be selected in
3. different application, typical value is 470KΩ

PIN DESCRIPTION



Top View



Top View

Pin #		Symbol	Function
SOT-23	SOT-25		
1	1	V_{OUT}	Voltage detection output pin
3	2	V_{DD}	Voltage input pin
2	3	V_{SS}	GND pin
-	4, 5	NC	No connection

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 (Ts)	-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 are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

Test Condition: Topt=25°C, unless otherwise noted.

1. A4806-09C/N (0.9V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		0.882	0.9	0.918	V
V_{HYS}	Detector Threshold Hysteresis		0.018	0.036	0.054	V
Iss	Current Consumption	V_{DD}=2.9V		1	1.5	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 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
T_{PLH}	Output Delay Time				20	uS

2. A4806-27C/N (2.7V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		2.646	2.70	2.754	V
V_{HYS}	Detector Threshold Hysteresis		0.054	0.108	0.162	V
Iss	Current Consumption	V_{DD}=4.7V		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
T_{PLH}	Output Delay Time				20	uS

3. A4806-30C/N (3.0V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		2.94	3.0	3.06	V
V_{HYS}	Detector Threshold Hysteresis		0.06	0.12	0.18	V
Iss	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
T_{PLH}	Output Delay Time				20	uS

4. A4806-34C/N (3.4V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		3.332	3.4	3.468	V
V_{HYS}	Detector Threshold Hysteresis		0.068	0.136	0204	V
Iss	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
T_{PLH}	Output Delay Time				20	uS

5. A4806-44C/N (4.4V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$-V_{DET}$	Detector Threshold		4.312	4.4	4.488	V
V_{HYS}	Detector Threshold Hysteresis		0.088	0.176	0.264	V
Iss	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
T_{PLH}	Output Delay Time				20	uS

ELECTRICAL CHARACTERISTICS

By Detector Threshold

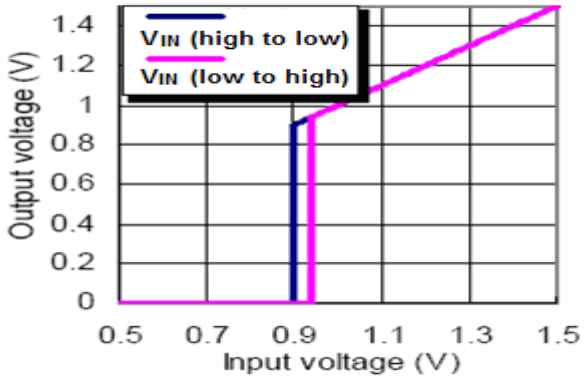
Part #	Detector Threshold			Detector Threshold Hysteresis			Supply Current			Supply Current 2		
	-V_{DET}(V)			V_{HYS}(V)			Iss1 (uA)			Iss2 (uA)		
	Min	Typ	Max	Min	Typ	Max	Condition	Typ	Max	Condition	Typ	Max
A4806-09	0.882	0.900	0.918	0.018	0.036	0.054	V_{DD}= (-V_{DET}) +0.1V	0.5		1.0	1.0	1.5
A4806-10	0.980	1.000	1.020	0.020	0.040	0.060						
A4806-11	1.078	1.100	1.122	0.022	0.044	0.066						
A4806-12	1.176	1.200	1.224	0.024	0.048	0.072						
A4806-13	1.274	1.300	1.326	0.026	0.052	0.078						
A4806-14	1.372	1.400	1.428	0.028	0.056	0.084						
A4806-15	1.470	1.500	1.530	0.030	0.060	0.090						
A4806-16	1.568	1.600	1.632	0.032	0.064	0.096						
A4806-17	1.666	1.700	1.734	0.034	0.068	0.102						
A4806-18	1.764	1.800	1.836	0.036	0.072	0.108						
A4806-19	1.862	1.900	1.938	0.038	0.076	0.114					0.5	1.0
A4806-20	1.960	2.000	2.040	0.040	0.080	0.120						
A4806-21	2.048	2.100	2.142	0.042	0.084	0.126						
A4806-22	2.156	2.200	2.244	0.044	0.088	0.132						
A4806-23	2.254	2.300	2.346	0.046	0.092	0.138						
A4806-24	2.352	2.400	2.448	0.048	0.096	0.144						
A4806-25	2.450	2.500	2.550	0.050	0.100	0.150						
A4806-26	2.548	2.600	2.652	0.052	0.104	0.156						
A4806-27	2.646	2.700	2.754	0.054	0.108	0.162						
A4806-28	2.744	2.800	2.856	0.056	0.112	0.168						
A4806-29	2.842	2.900	2.958	0.058	0.116	0.174						
A4806-30	2.940	3.000	3.060	0.060	0.120	0.180						
A4806-31	3.038	3.100	3.162	0.062	0.124	0.186						
A4806-32	3.136	3.2	3.264	0.064	0.128	0.192						
A4806-33	3.234	3.300	3.366	0.066	0.132	0.198						

Part #	Detector Threshold			Detector Threshold Hysteresis			Supply Current			Supply Current 2		
	$-V_{DET}$(V)			V_{HYS}(V)			Iss1 (uA)			Iss2 (uA)		
	Min	Typ	Max	Min	Typ	Max	Condition	Typ	Max	Condition	Typ	Max
A4806-34	3.332	3.400	3.468	0.068	0.136	0.204						
A4806-35	3.430	3.500	3.570	0.070	0.140	0.210						
A4806-36	3528	3.600	3.672	0.p72	0.144	0.216						
A4806-37	3.626	3.700	3.774	0.074	0.148	0.222						
A4806-38	3.724	3.800	3.876	0.076	0.152	0.228						
A4806-39	3.822	3.900	3.978	0.078	0.156	0.234						
A4806-40	3.920	4.000	4.080	0.080	0.160	0.240						
A4806-41	4.018	4.100	4.182	0.082	0.164	0.246						
A4806-42	4.116	4.200	4.284	0.084	0.168	0.252						
A4806-43	4.214	4.300	4.386	0.086	0.172	0.258						
A4806-44	4.312	4.400	4.488	0.088	0.176	0.264						
A4806-45	4.410	4.500	4.590	0.090	0.180	0.270	V_{DD}=			V_{DD}=	0.5	1.0
A4806-46	4.508	4.600	4.692	0.092	0.184	0.276	($-V_{DET}$)	0.5	1.0	(V_{DET})		
A4806-47	4.606	4.700	4.794	0.094	0.188	0.282	+0.1V			+2V		
A4806-48	4.704	4.800	4.896	0.096	0.192	0.288						
A4806-49	4.802	4.900	4.998	0.098	0.196	0.294						
A4806-50	4.900	5.000	5.100	0.100	0.200	0.300						
A4806-51	4.998	5.100	5.202	0.102	0.204	0.306						
A4806-52	5.096	5.200	5.304	0.104	0.208	0.312						
A4806-53	5.194	5.300	5.406	0.106	0.212	0.318						
A4806-54	5.292	5.400	5.508	0.108	0.216	0.324						
A4806-55	5.390	5.500	5.610	0.110	0.220	0.330						
A4806-56	5.488	5.600	5.712	0.112	0.224	0.336						
A4806-57	5.586	5.700	5.814	0.114	0.228	0.342						
A4806-58	5684	5.800	5.916	0.116	0.232	0.348						
A4806-59	5.782	5.900	6.018	0.118	0.236	0.354						
A4806-60	5.880	6.000	6.120	0.120	0.240	0.360						

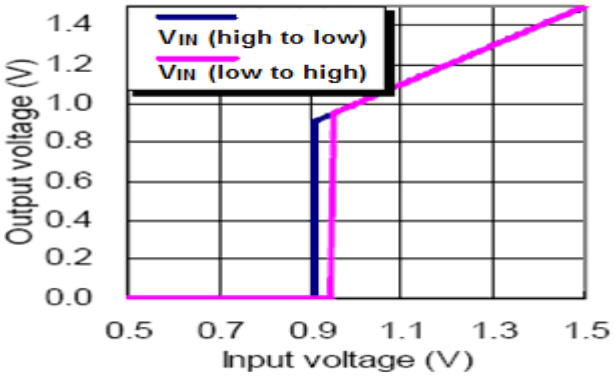
Output Current 1			Output Current 2			Output Delay Time	Minimum Operating Voltage		Detector Threshold Temperature Coefficient	
I_{OUT1} (mA)			I_{OUT2} (mA)			T_{PLH} (uS)	V_{DDL} (V)		Δ-V_{DET}/ΔTppm/°C	
Condition	Min	Typ	Condition	Min	Typ	Max	Typ	Max	Condition	Typ
Nch V_{DS}=0.05V V_{DD}=0.7V	0.01	0.05	V_{DD}=0.85V	0.1	0.5	20	0.5	0.7	-40°C≦ Topt ≦85°C	±100
			V_{DD}=1.00V	0.2	1.0					
			Nch V_{DS}=0.5V V_{DD}=1.5V	1.0	2.0					

TYPICAL PERFORMANCE CHARACTERISTICS

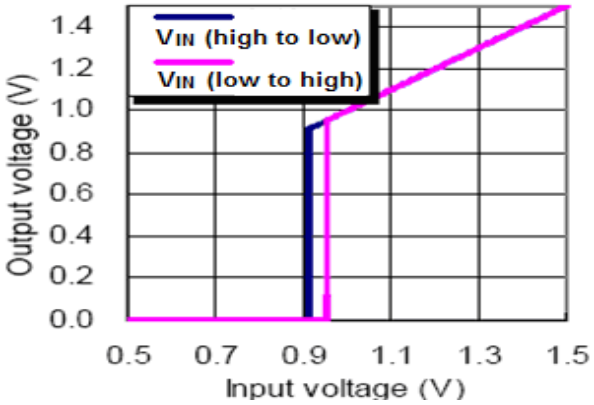
1. Output Voltage vs. Input Voltage
Detector Threshold=0.9V (-40°C)



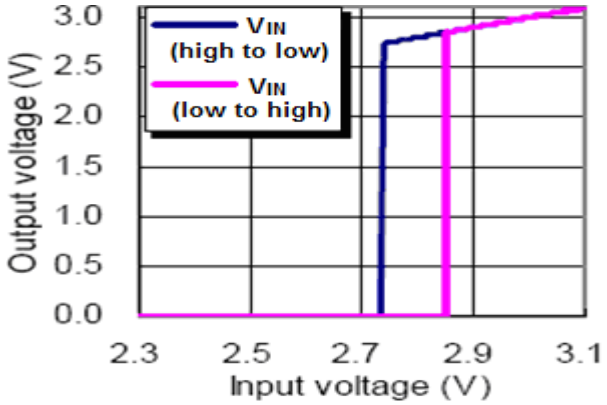
2. Output Voltage vs. Input Voltage
Detector Threshold=0.9V (25°C)



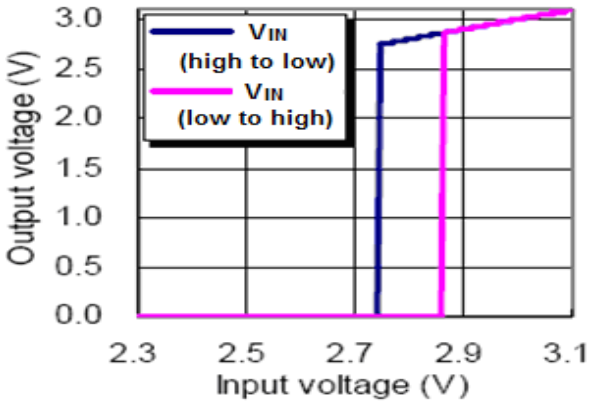
3. Output Voltage vs. Input Voltage
Detector Threshold=0.9V (70°C)



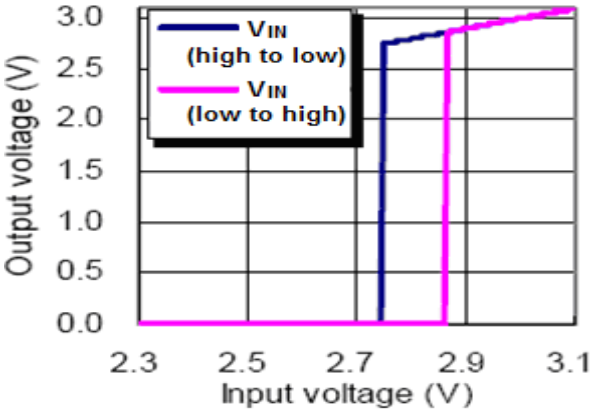
4. Output Voltage vs. Input Voltage
Detector Threshold=2.7V (-40°C)



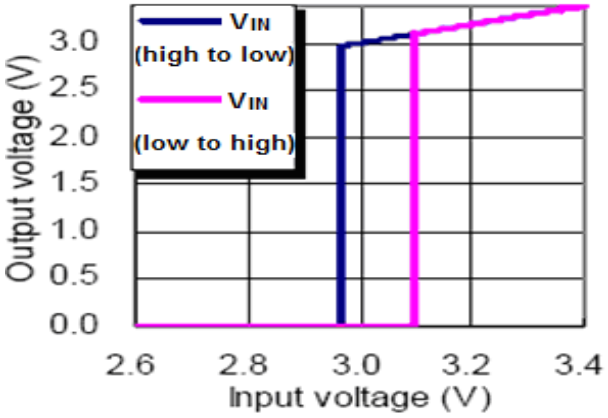
5. Output Voltage vs. Input Voltage
Detector Threshold=2.7V (25°C)



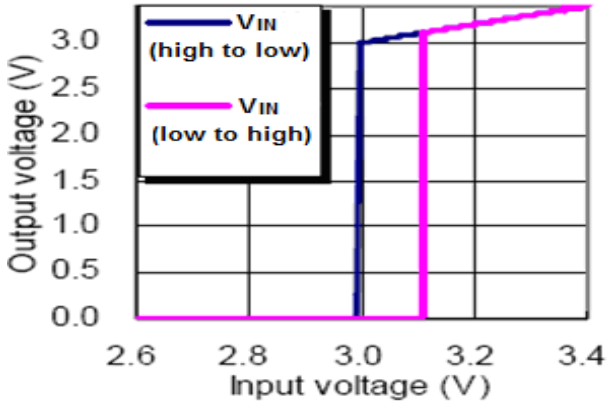
6. Output Voltage vs. Input Voltage
Detector Threshold=2.7V (70°C)



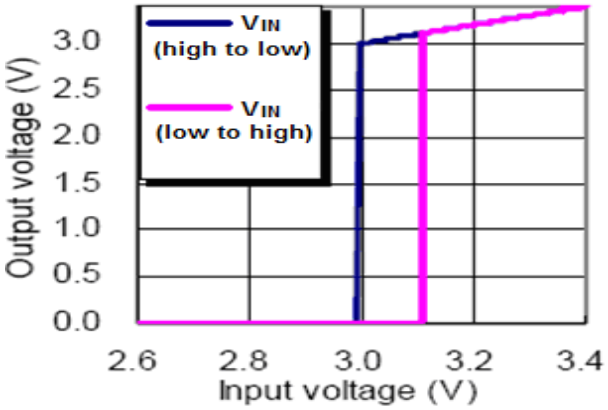
7. Output Voltage vs. Input Voltage
Detector Threshold=3.0V (-40°C)



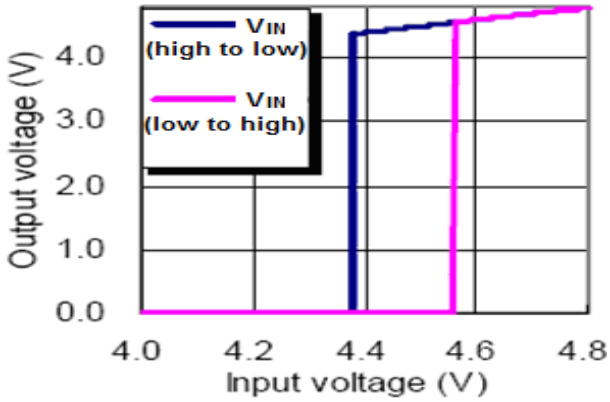
8. Output Voltage vs. Input Voltage
Detector Threshold=3.0V (25°C)



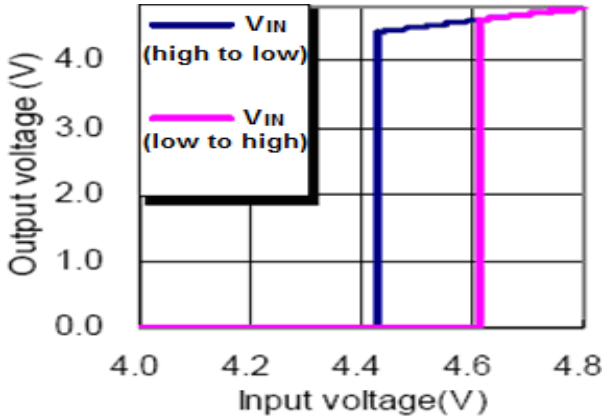
9. Output Voltage vs. Input Voltage
Detector Threshold=3.0V (70°C)



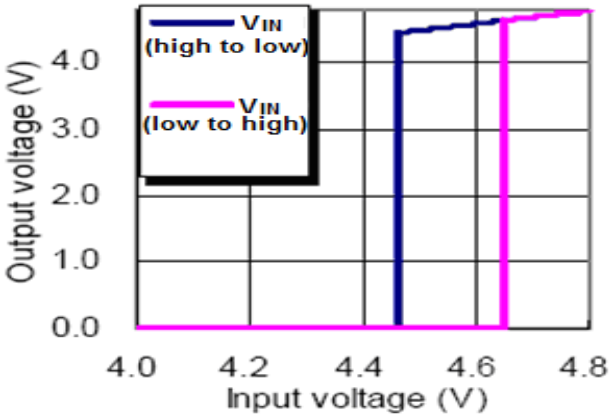
10. Output Voltage vs. Input Voltage
Detector Threshold=4.4V (-40°C)



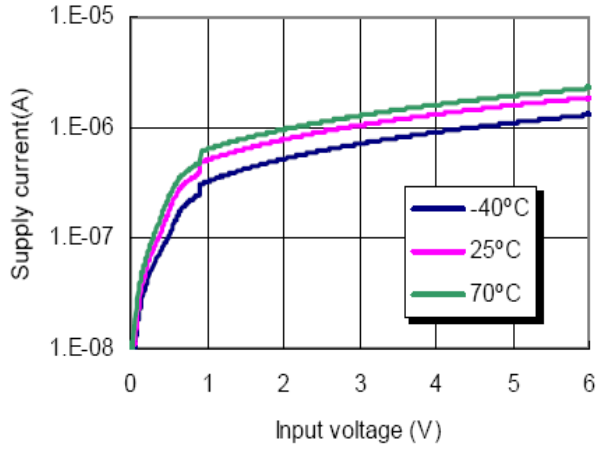
11. Output Voltage vs. Input Voltage
Detector Threshold=4.4V (25°C)



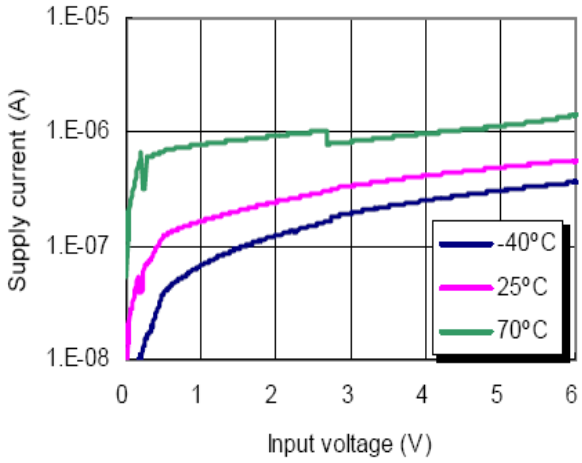
12. Output Voltage vs. Input Voltage
Detector Threshold=4.4V (70°C)



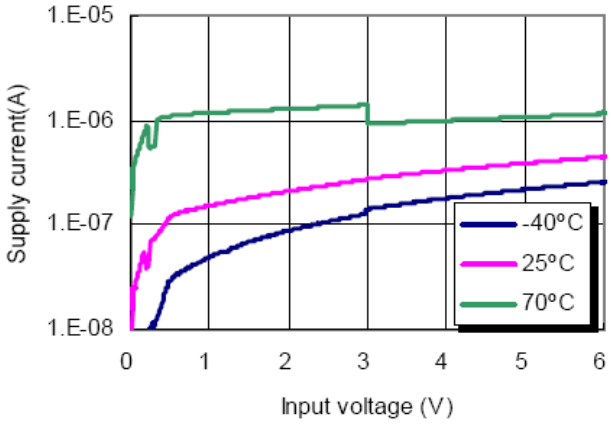
13. Supply Current vs. Input Voltage
Detector Threshold = 0.9V



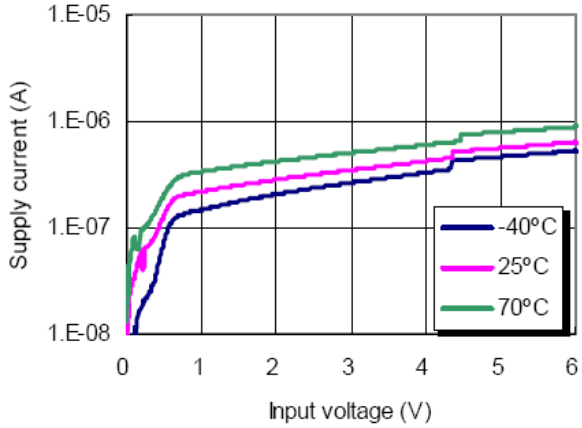
14. Supply Current vs. Input Voltage
Detector Threshold = 2.7V



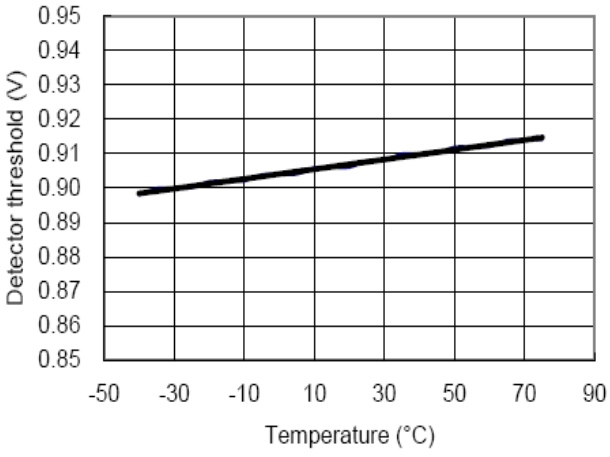
15. Supply Current vs. Input Voltage
Detector Threshold = 3.0V



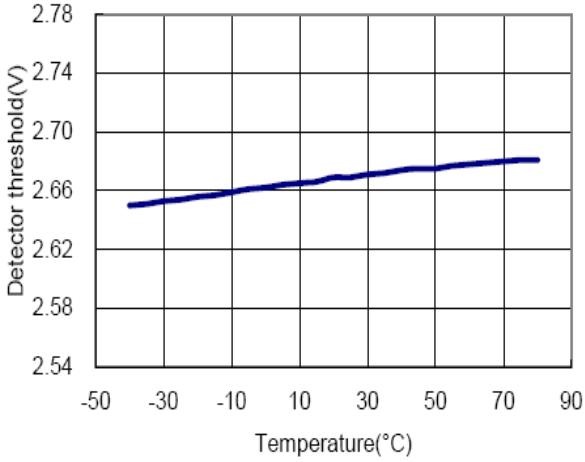
16. Supply Current vs. Input Voltage
Detector Threshold = 4.4V



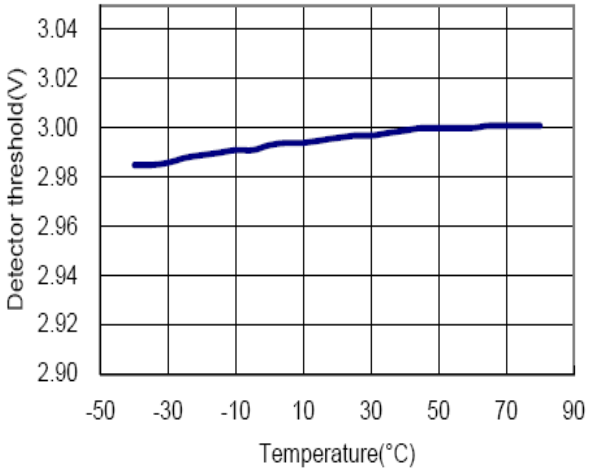
17. Detector Threshold Hysteresis vs. Temperature
Detector Threshold = 0.9V



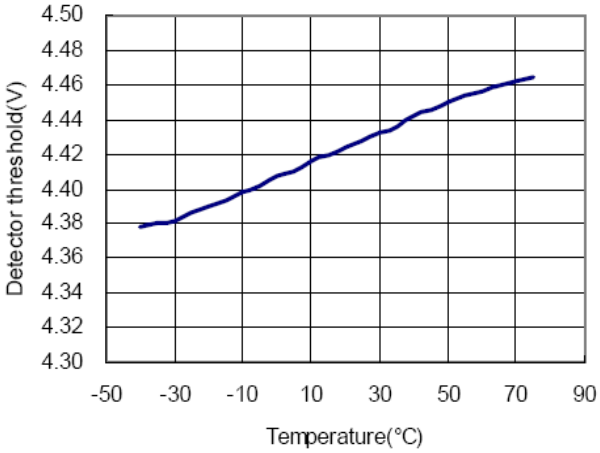
18. Detector Threshold Hysteresis vs. Temperature
Detector Threshold = 2.7V



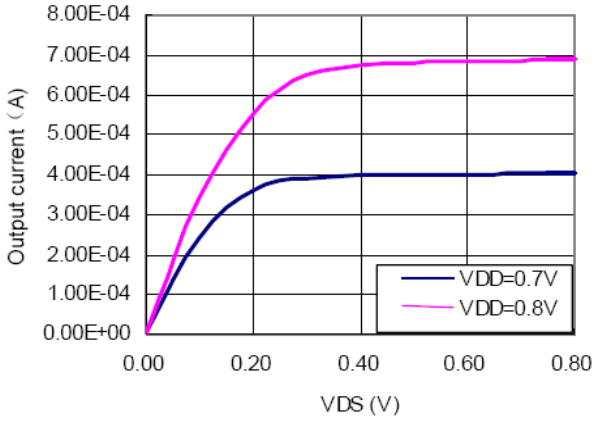
19. Detector Threshold Hysteresis vs. Temperature
Detector Threshold = 3.0V



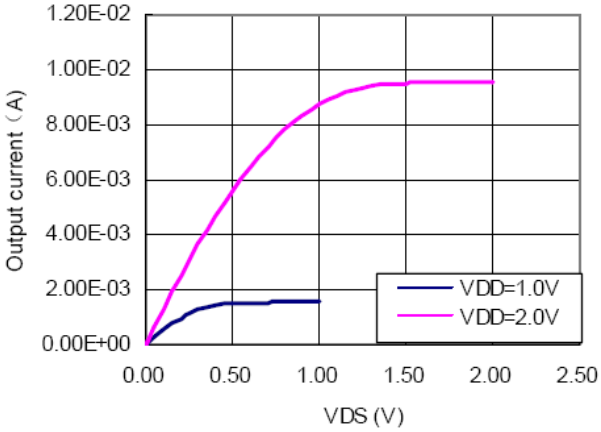
20. Detector Threshold Hysteresis vs. Temperature
Detector Threshold = 2.7V



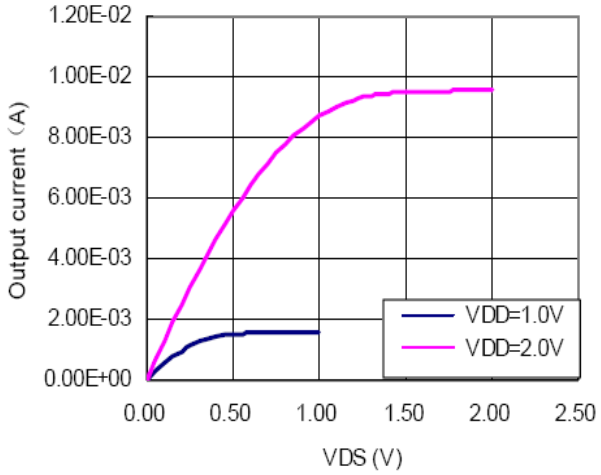
21. Nch Driver Output Current vs. V_{DS}
A4806-09C



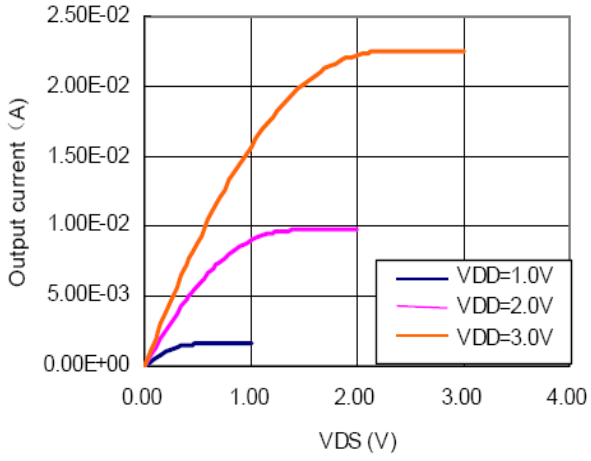
22. Nch Driver Output Current vs. V_{DS}
A4806-27C



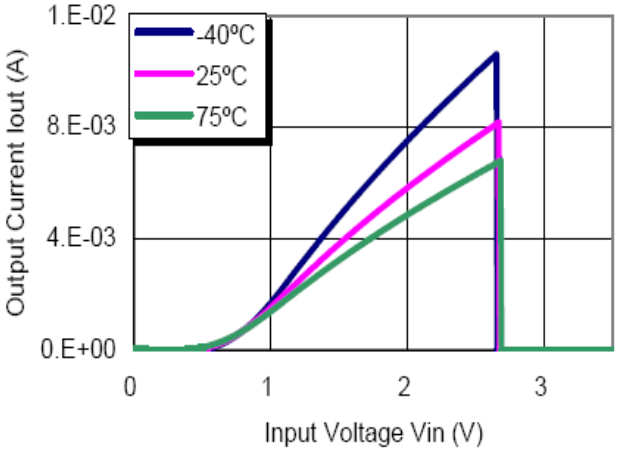
23. Nch Driver Output Current vs. V_{DS}
A4806-30C



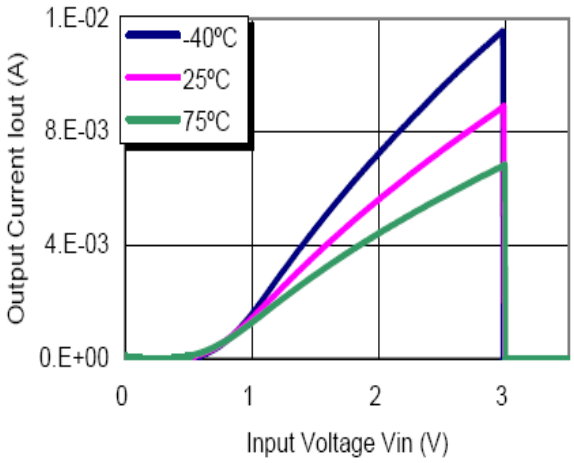
24. Nch Driver Output Current vs. V_{DS}
A4806-44C



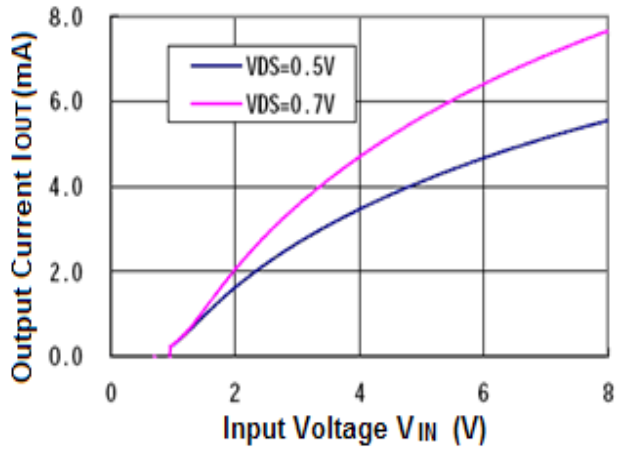
25. Nch Driver Output Current vs. Input Voltage
Detector Threshold = 2.7V



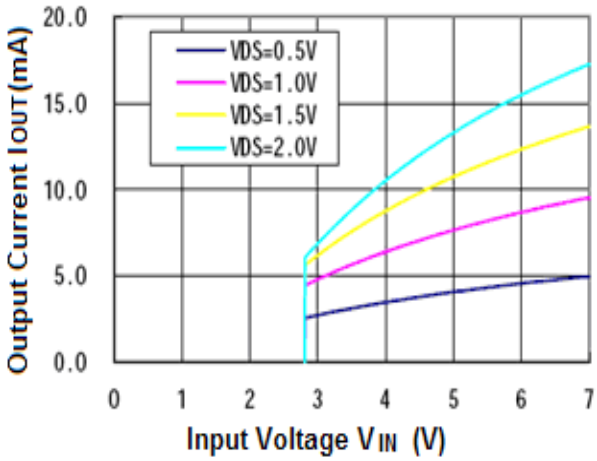
26. Nch Driver Output Current vs. Input Voltage
Detector Threshold = 3.0V



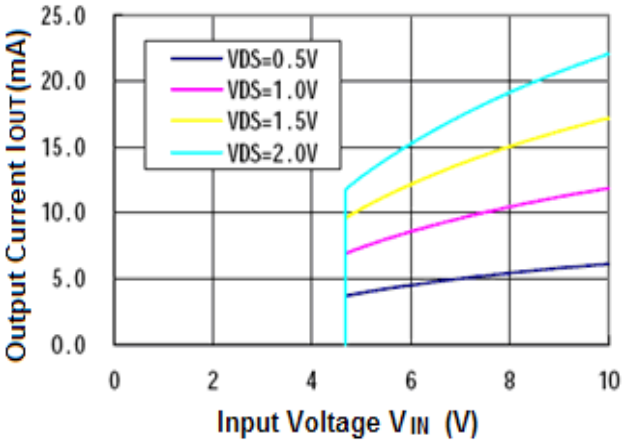
27. Pch Driver Output Current vs. Input Current
Detector Threshold = 0.9V



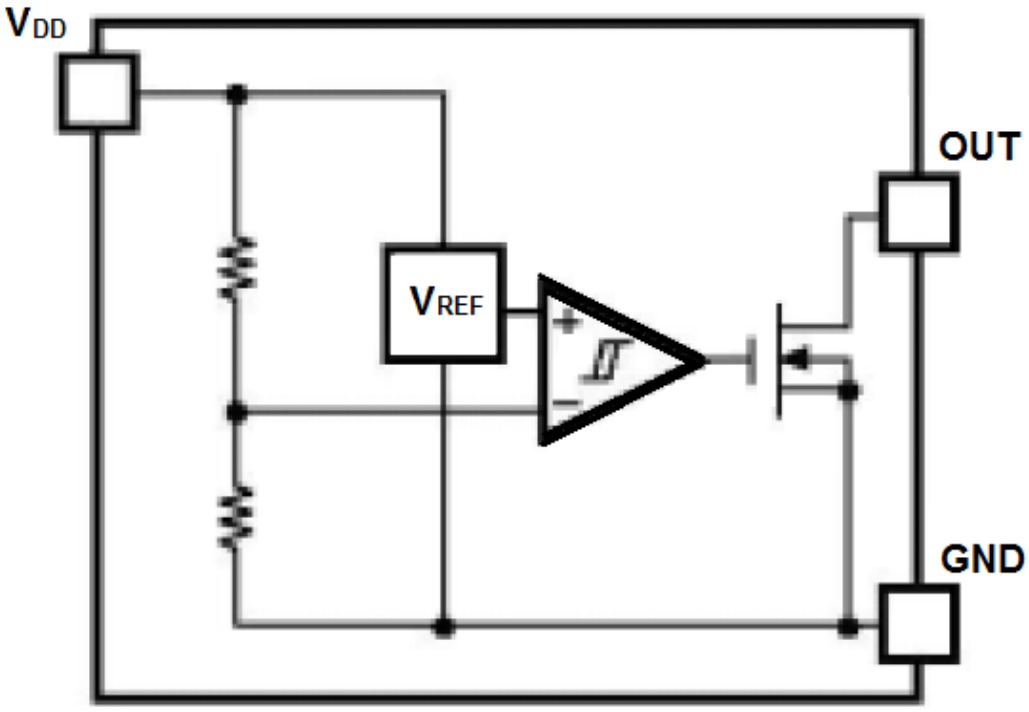
28. Pch Driver Output Current vs. Input Current
Detector Threshold = 2.7V



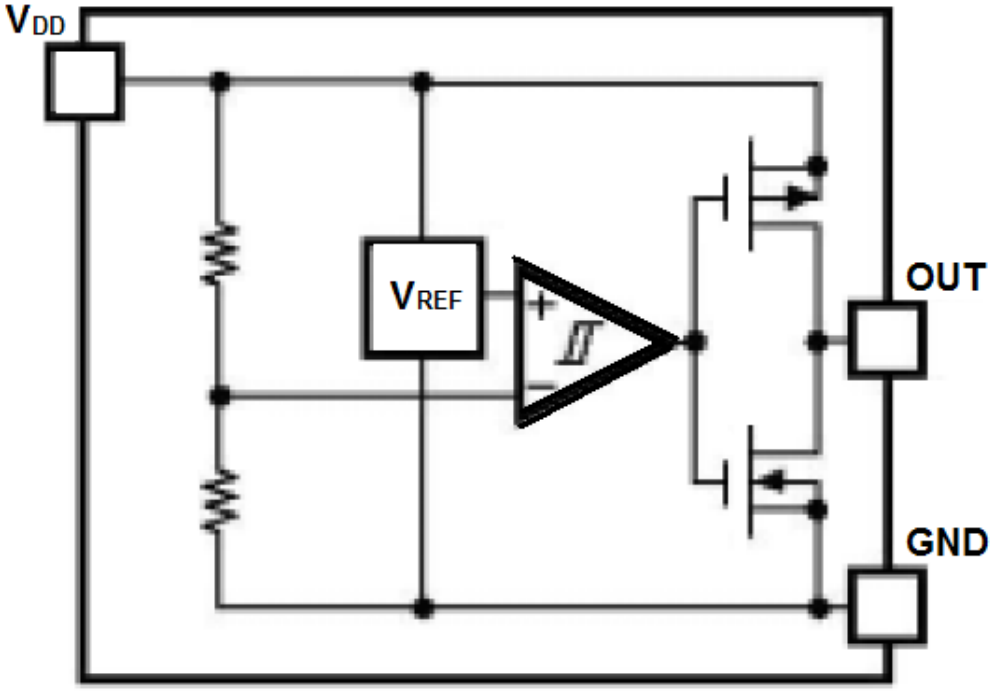
29. Pch Driver Output Current vs. Input Current
Detector Threshold = 4.4V



BLOCK DIAGRAM

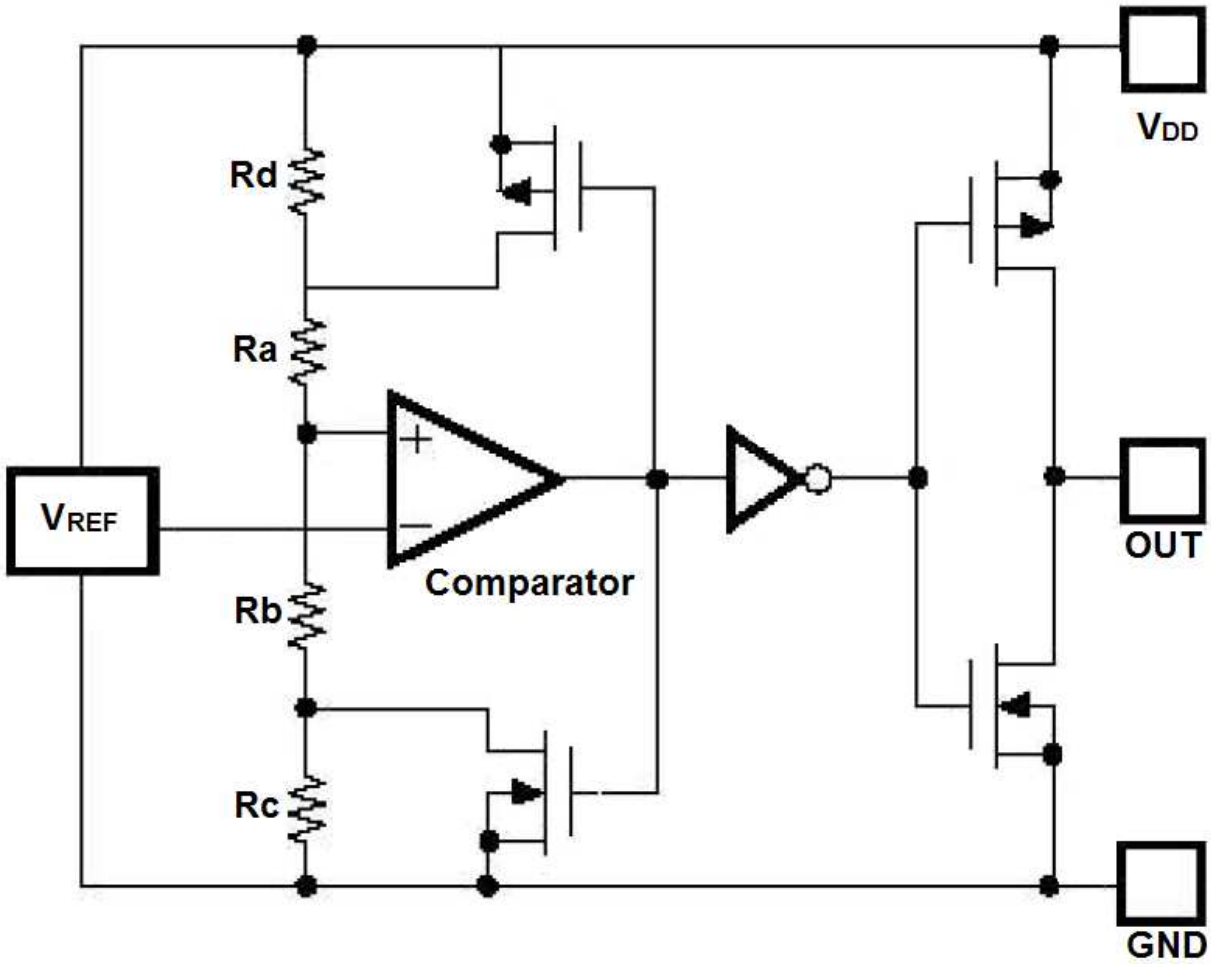


N-Channel Open-Drain



CMOS Output

DETAILED INFORMATION

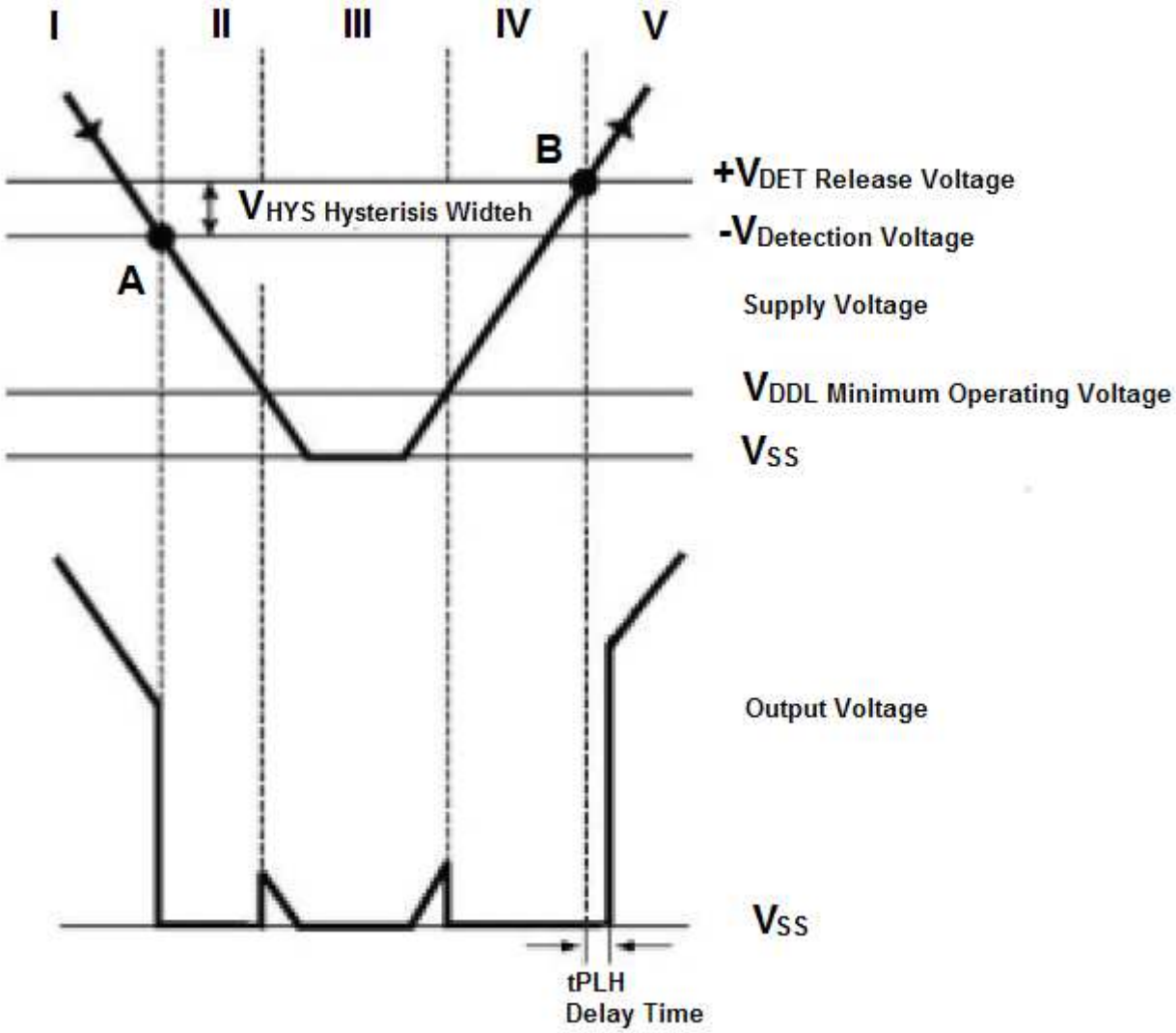


High Precision low temperature co-efficiency reference voltage is applied to the negative input of a comparator. Input voltage, divided by resistor array of Ra, Rb and Rc is applied to the positive input of the comparator. Output of the comparator controls a pair of NMOS and PMOS switches, generating the hysteresis. Output of the comparator passes a series of buffer to drive the output CMOS pair.
$+V_{DET}$, $-V_{DET}$, V_{HYS} can be calculated as follows:

$$-V_{DET} = V_{REF} \times \left(1+Ra / (Rb+Rc)\right)$$

$$+V_{DET} = V_{REF} \times 1+ (Ra+Rd) / Rb\rangle = V_{REF} \times \left(1+ (Ra+Rc) / Rb\right)$$

$$V_{HYS} = +V_{DET} – (-V_{DET})= V_{REF} \times (Ra+Rb+Rc) \left(1 / (Rb -1 / (Rb+Rc)\right)$$

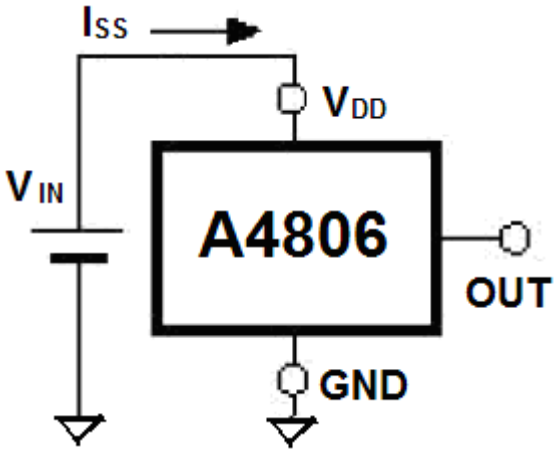


No.	Operation Status	Output Status
I	V_{DD} > $-V_{DET}$	Output Voltage is equal to the Supply Voltage
II	V_{DD} drops below $-V_{DET}$	Output Voltage equals to GND level
III	V_{DD} drops further below V_{DDL}	Output Voltge is undefined
IV	V_{DD} rises above V_{DDL}	Output Voltage equals to GND level
V	V_{DD} rises above $+V_{DET}$	Output Voltage equals to Supply Voltage, $V_{HYS} = (+V_{DET}) - (-V_{DET})$

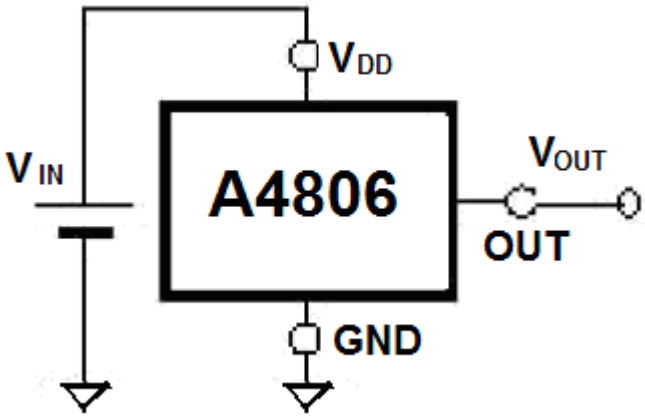
TEST CIRCUITS

A4806 test circuits as follows:

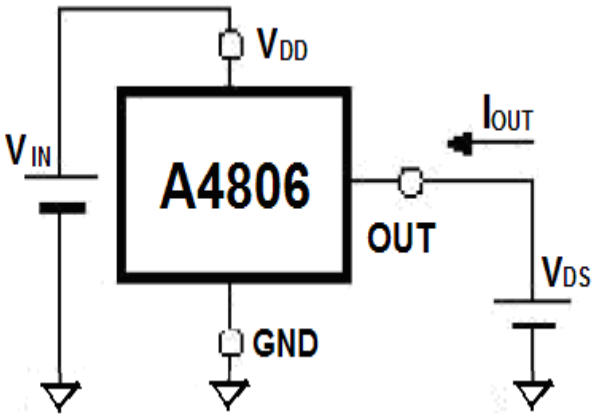
1. Supply Current



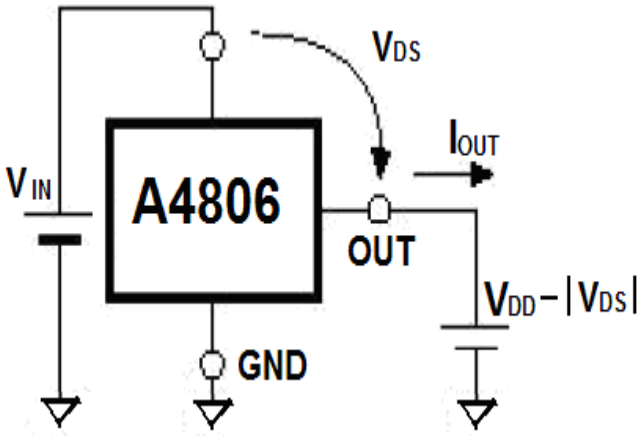
2. Detector Threshold



3. Nch Drive Output Current

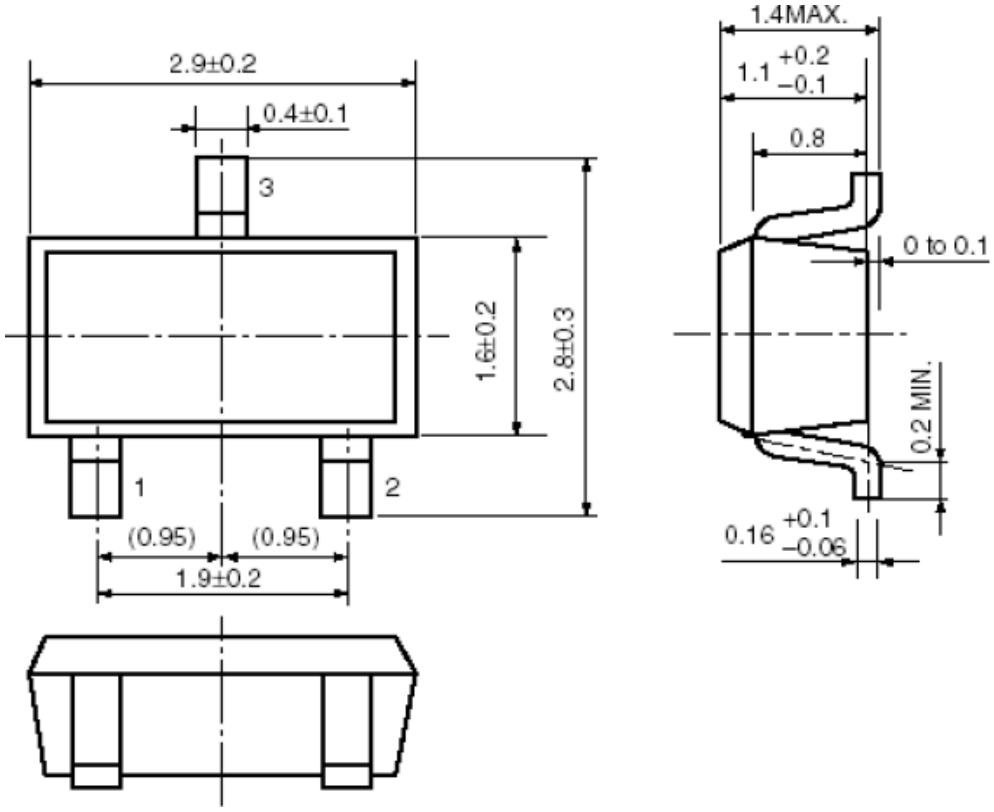


4. Pch Drive Output Current

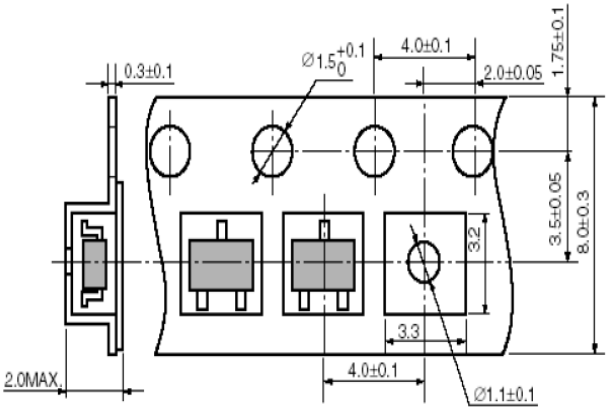


PACKAGE INFORMATION

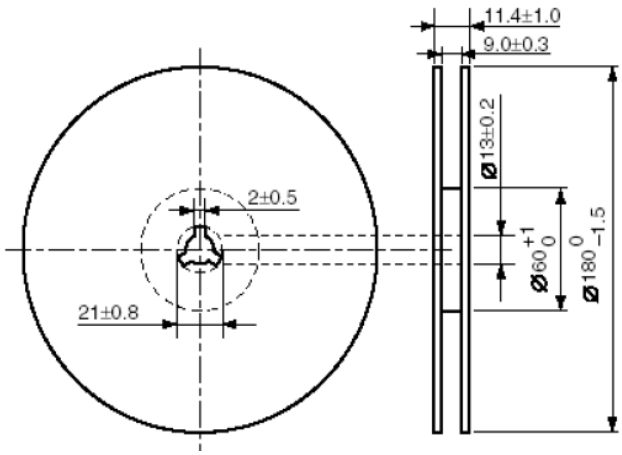
Dimension in SOT-23 Package (Unit: mm)



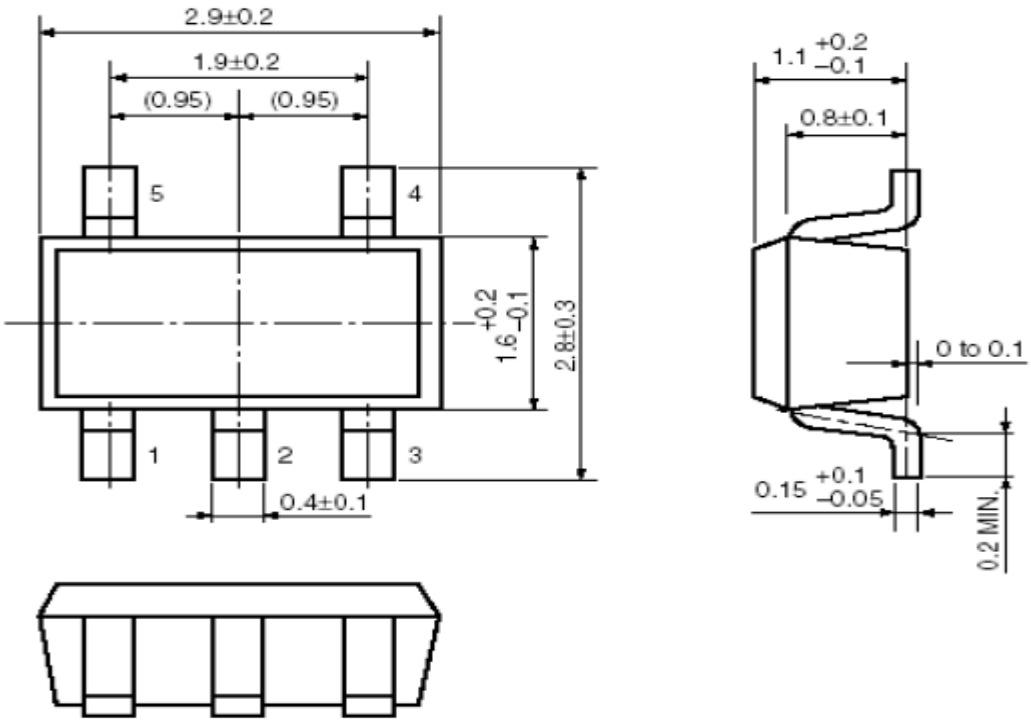
Tape Dimension



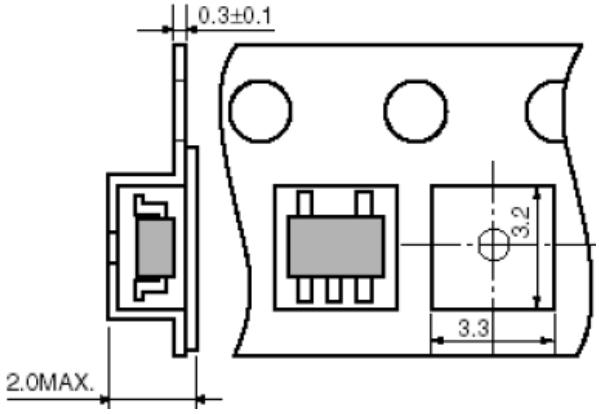
Tape & Reel Dimension



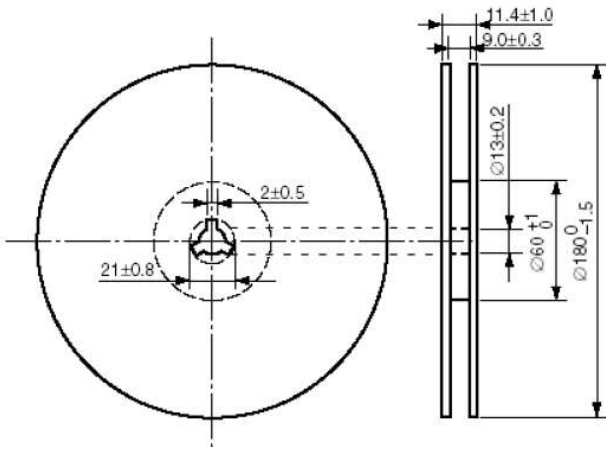
Dimension in SOT-25 Package (Unit: mm)



Tape Dimension



Tape & Reel Dimension



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