

Outline:

BL8506D is a series of high precision voltage detector with ultra low current consumption (250nA typ. at $V_{DD}=V_{TH}+1V$). It can work at very low voltage, which makes it perfect for system reset.

BL8506D is composed of high precision voltage reference, comparator, 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.

BL8506D is available in SOT-89-3, SOT-23-3 TO92, SOT23-5 packages which is Pb free.

Features:

- High-precision detection Voltage:
0.8V~1.9V: $\pm 0.8\%$
2.0V~6.0V: $\pm 0.5\%$
- Detection Voltage: 0.8V~6.0V (in 0.1V steps)
- Precise hysteresis
- Operating Voltage range: 0.7V~10V
- Ultra-low current consumption: 250nA typ. (at $V_{DD}=V_{TH}+1V$)
- Two Output forms : CMOS and N-channel open-drain

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

Selection Guide:

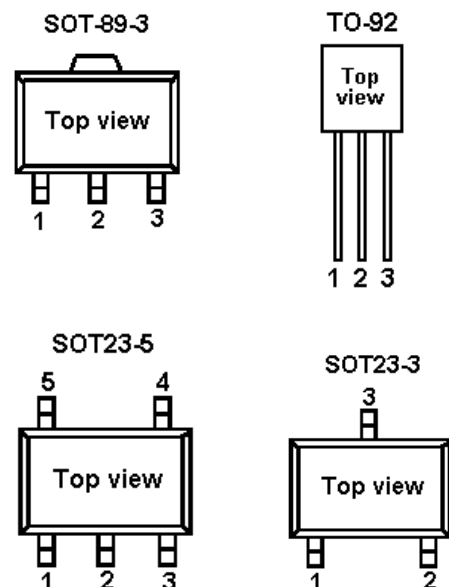
8506D-XX X XX

Package Type:
RM: SOT-23-3
RN: SOT-23-5
SM: SOT-89-3
T: TO-92
(Default, Pb Free)

Output Type:
N: Nch Open-drain
C: CMOS

Detector Voltage:
09.....0.9V
30.....3.0V
.....
50.....5.0V
60.....6.0V

Pin Assignment:



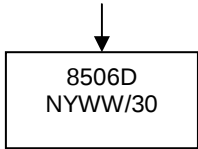
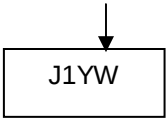
Pin Description:

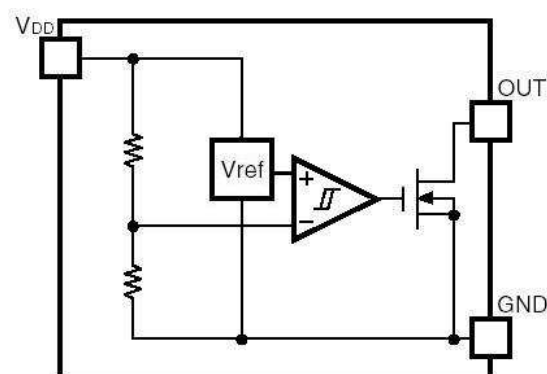
PIN Number				PIN Name	Function
SOT-89-3	TO-92	SOT-23-3	SOT-23-5		
1	3	1	1	VOUT	Voltage detection output Pin
2	1	3	2	VDD	Voltage input Pin
3	2	2	3	VSS	GND Pin
—	—	—	4	NC	No connection
—	—	—	5	NC	No connection

Product Classification:

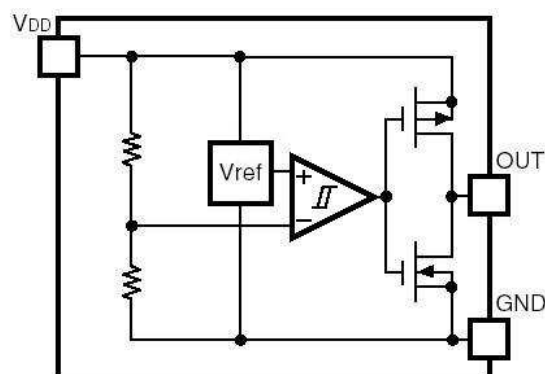
Product Name	Detector Voltage	Output Type	Package
BL8506D-XXNRM	XX V	Nch Open-Drain	SOT-23-3
BL8506D-XXNRN	XX V	Nch Open-Drain	SOT-23-5
BL8506D-XXNSM	XX V	Nch Open-Drain	SOT-89-3
BL8506D-XXNT	XX V	Nch Open-Drain	TO-92
BL8506D-XXCRM	XX V	CMOS	SOT-23-3
BL8506D-XXCRN	XX V	CMOS	SOT-23-5
BL8506D-XXCSM	XX V	CMOS	SOT-89-3
BL8506D-XXCT	XX V	CMOS	TO-92

Product Mark Information:

SOT-89-3 TO-92	SOT-23-5 SOT-23-3
Example: BL8506D-30NSM  Y: Year WW: Week	Example: BL8506D-30NRM  YW: Data Code

Block diagram:


N channel open-drain



CMOS output

Absolute Maximum Ratings:

Parameter	Symbol	Rating	Unit
Supply Voltage	VDDmax	-0.3 ~ +12.0	V
Output Voltage	OUT	-0.3 ~ +12.0	V
Input Current	IDD	20	mA
Output Current	IOUT	20	mA
Power Dissipation	PD	150	mW
Operating Temperature	Topr	-40 ~ +105	°C
Storage Temperature	Tstg	-65 ~ +150	°C

Recommended Work Conditions:

Parameter	Symbol	Rating	Unit
Operating Temperature	Topr	-40 ~ +105	°C
Supply Voltage	VDD	+0.70 ~ +10.0	V

Electrical Characteristics:

(Typical values are at $T_a=+25^{\circ}\text{C}$)

[illegible]

			8229	2.8855	2.900	2.9145		
				2.8275	-	2.9725		
			8230	2.9850	3.000	3.0150		
				2.9250	-	3.0750		

Parameter	Symbol	Test Condition	Rank	MIN.	TYP.	MAX.	Unit	Circuit
Reset Threshold (Note2)	V_{TH}	上段 $T_a=+25^{\circ}\text{C}$ 下段 $T_a=-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$	8254	5.3730	5.4000	5.4270	V	2
				5.2650	-	5.5350		
			8255	5.4725	5.5000	5.5275		
				5.3625	-	5.6375		
			8256	5.5720	5.6000	5.6280		
				5.4600	-	5.7400		
			8257	5.6715	5.7000	5.7285		
				5.5575	-	5.8425		
			8258	5.7710	5.8000	5.8290		
				5.6550	-	5.9450		
			8259	5.8705	5.9000	5.9295		
				5.7525	-	6.0475		
Reset Threshold Hysteresis	ΔV_{TH}	$V_{DD}=0V \rightarrow V_{TH}+1V \rightarrow 0V$	8260	5.9700	6.0000	6.0300	V	2
				5.8500	-	6.1500		
			8208	0.000	0.000	0.000		
			8209	0.000	0.000	0.000		
			8210	0.000	0.000	0.000		
			8211	0.000	0.000	0.000		
			8212	0.000	0.000	0.000		
			8213	0.000	0.000	0.000		
			8214	0.000	0.000	0.000		
			8215	0.000	0.000	0.000		
			8216	0.000	0.000	0.000		
			8217	0.000	0.000	0.000		
			8218	0.000	0.000	0.000		
			8219	0.000	0.000	0.000		
			8220	0.000	0.000	0.000		
			8221	0.000	0.000	0.000		
			8222	0.000	0.000	0.000		
			8223	0.000	0.000	0.000		
			8224	0.000	0.000	0.000		
			8225	0.000	0.000	0.000		
			8226	0.000	0.000	0.000		
			8227	0.000	0.000	0.000		
			8228	0.000	0.000	0.000		
			8229	0.000	0.000	0.000		
			8230	0.000	0.000	0.000		
			8231	0.000	0.000	0.000		

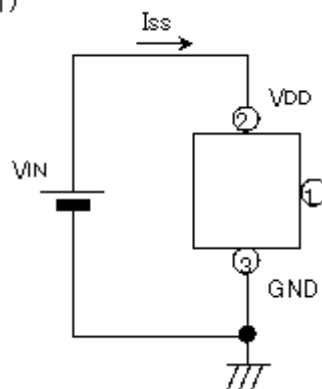
			8232	0.000	0.000	0.000		
			8233	0.000	0.000	0.000		
			8234	0.000	0.000	0.000		
			8235	0.000	0.000	0.000		
			8236	0.000	0.000	0.000		
			8237	0.000	0.000	0.000		
			8238	0.000	0.000	0.000		
			8239	0.000	0.000	0.000		
			8240	0.000	0.000	0.000		

Parameter	Symbol	Test Condition	Rank	MIN.	TYP.	MAX.	Unit	Circuit
Reset Threshold Hysteresis	ΔV_{TH}	VDD=0V→V _{TH} +1V→0V	8241	0.000	0.000	0.000	V	2
			8242	0.000	0.000	0.000		
			8243	0.000	0.000	0.000		
			8244	0.000	0.000	0.000		
			8245	0.000	0.000	0.000		
			8246	0.000	0.000	0.000		
			8247	0.000	0.000	0.000		
			8248	0.000	0.000	0.000		
			8249	0.000	0.000	0.000		
			8250	0.000	0.000	0.000		
			8251	0.000	0.000	0.000		
			8252	0.000	0.000	0.000		
			8253	0.000	0.000	0.000		
			8254	0.000	0.000	0.000		
			8255	0.000	0.000	0.000		
			8256	0.000	0.000	0.000		
			8257	0.000	0.000	0.000		
			8258	0.000	0.000	0.000		
			8259	0.000	0.000	0.000		
			8260	0.000	0.000	0.000		
Supply Current	I _{DD}	VDD=V _{TH} +1V	8208~ 8260	—	0.25	1.0	μA	1
Reset Threshold Temp. Coefficient	$\Delta V_{TH}/^{\circ}\text{C}$ (Note2)	Ta=-40℃~+85℃	8208~ 8260	—	±100	—	ppm/ ℃	2
L transfer delay time	(Note2) t _{PHL}	VDD=V _{TH} +0.4V→V _{TH} -0.4V (Note2)	8208~ 8260	2	15	100	μs	4
H transfer delay time	t _{PLH} (Note2)	VDD=V _{TH} -0.4V→V _{TH} +0.4V (Note2)	8208~ 8260	2	15	100	μs	4
"L" Output Current	I _{OL1}	VDD=0.7V, VDS=0.05V	8208~ 8260	0.01	0.10	—	mA	3

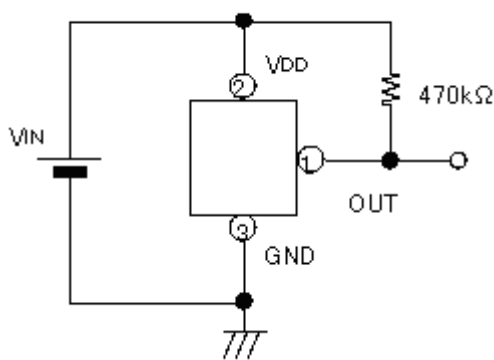
	I_{OL2}	VDD=1.2V, VDS=0.5V $V_{TH} \geq 1.3V$	8213~ 8260	0.23	2.00	—		
	I_{OL3}	VDD=2.4V, VDS=0.5V $V_{TH} \geq 2.5V$	8225~ 8260	1.60	8.00	—		
	I_{OL4}	VDD=3.6V, VDS=0.5V $V_{TH} \geq 3.7V$	8237~ 8260	3.20	12.0	—		
Output Leakage Current	I_{leak}	VDD=10V, OUT=10V (IC-PST82XX series only)	8208~ 8260	—	—	0.1	μA	3

Test Circuit:

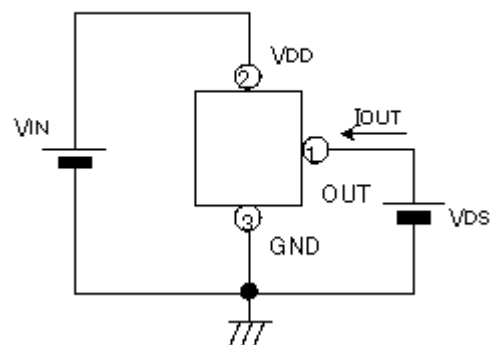
1)



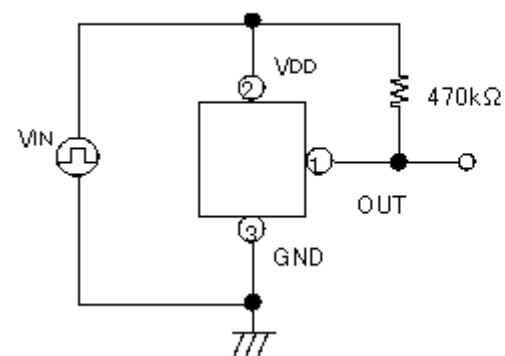
2)



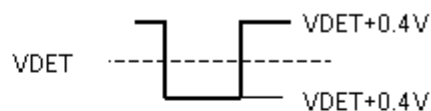
3)



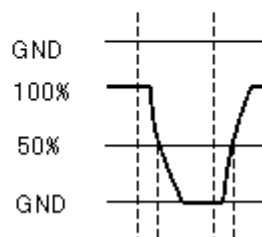
4)



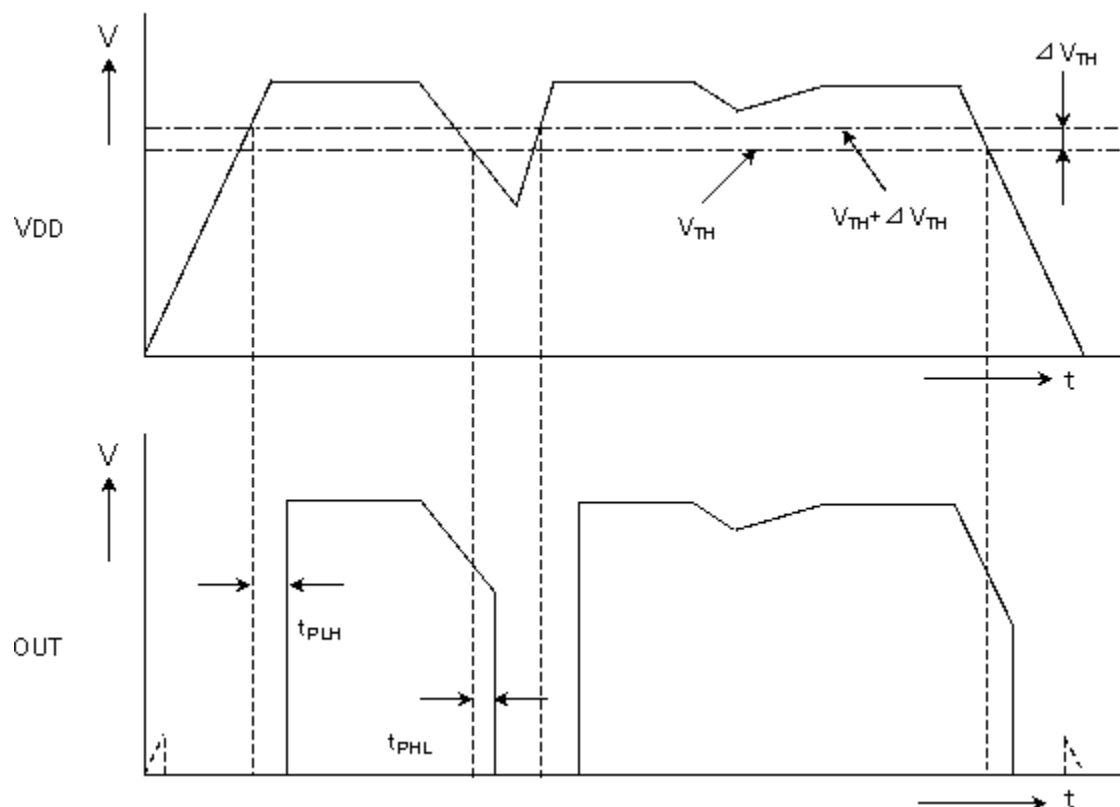
Input Voltage

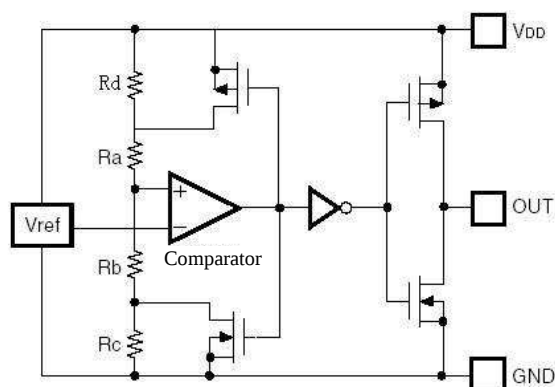


Output Voltage



Timing Chart:



Function description:


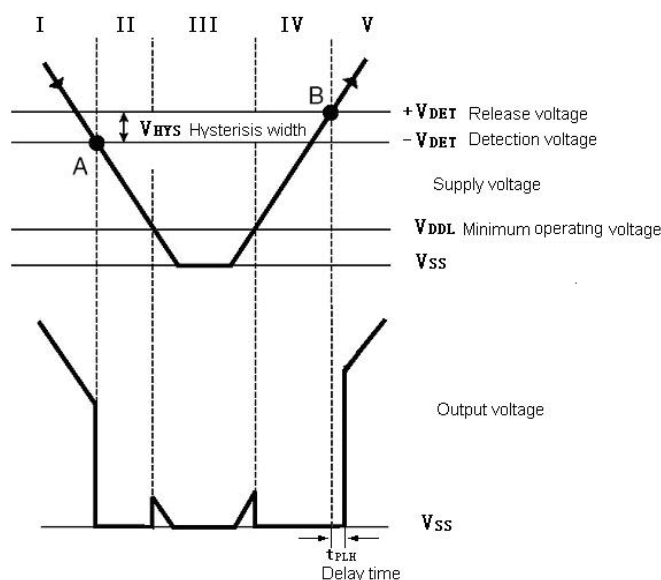
High precision low temperature co-efficiency reference voltage is applied to the negative input of a comparator. Input voltage, divided by resistor array of Ra Rb and Rc, is applied to the positive input of the comparator. Output of the comparator controls a pair of NMOS and PMOS switches, generating 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:

$$- V_{DET} = V_{REF} * (1 + R_a / (R_b + R_c))$$

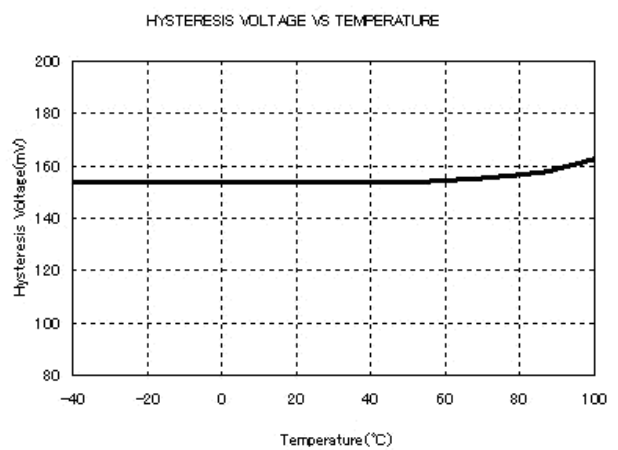
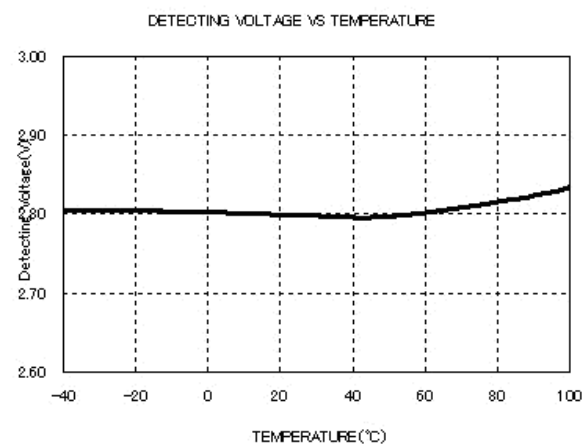
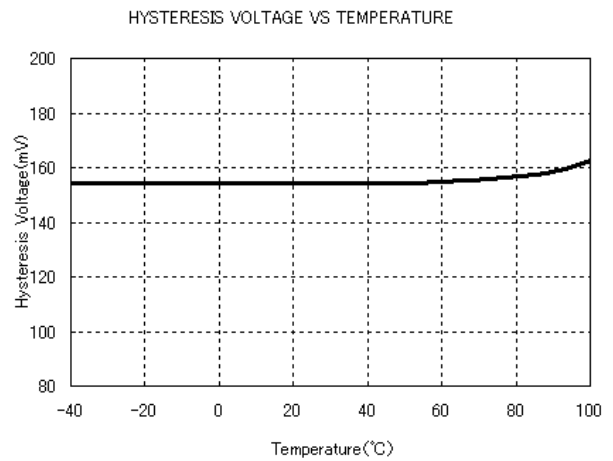
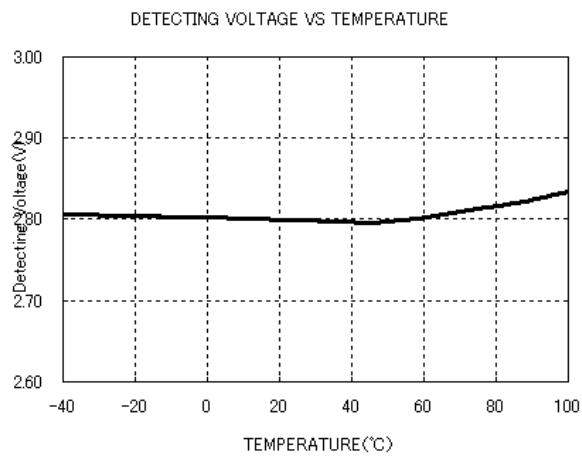
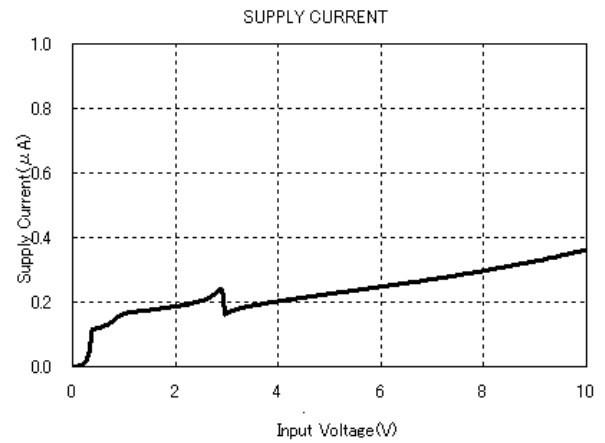
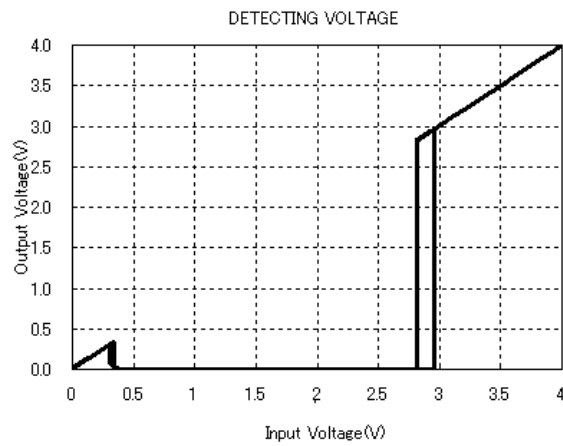
$$+ V_{DET} = V_{REF} * (1 + (R_a + R_d) / R_b) = V_{REF} * (1 + (R_a + R_c) / R_b)$$

$$V_{HYS} = + V_{DET} - (- V_{DET}) = V_{REF} * (R_a + R_b + R_c) (1/R_b - 1/(R_b + R_c))$$

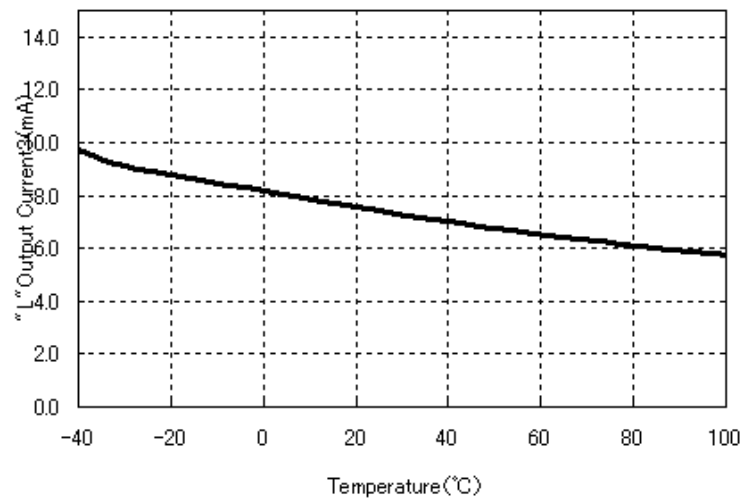


No.	Operation status	Output status
I	$V_{DD} > -V_{DET}$	Output voltage is equal to the supply voltage
II	V_{DD} drops below $-V_{DET}$	Output voltage equals to GND level
III	V_{DD} drops further below V_{DDL}	Output voltage is undefined
IV	V_{DD} rises above V_{DDL}	Output voltage equals to GND level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

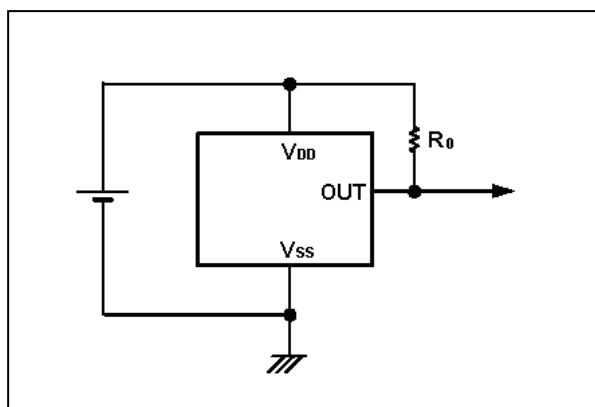
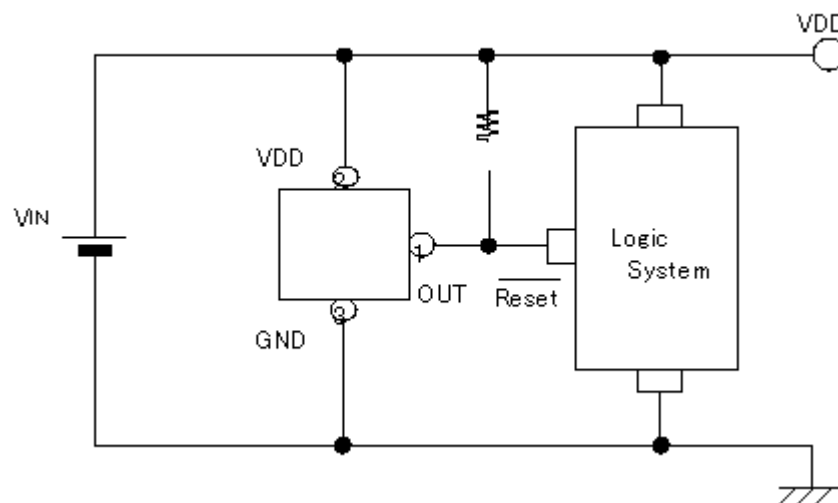
Typical Performance Characteristics:



"L" OUTPUT CURRENT3 VS TEMPERATURE



Typical applications:



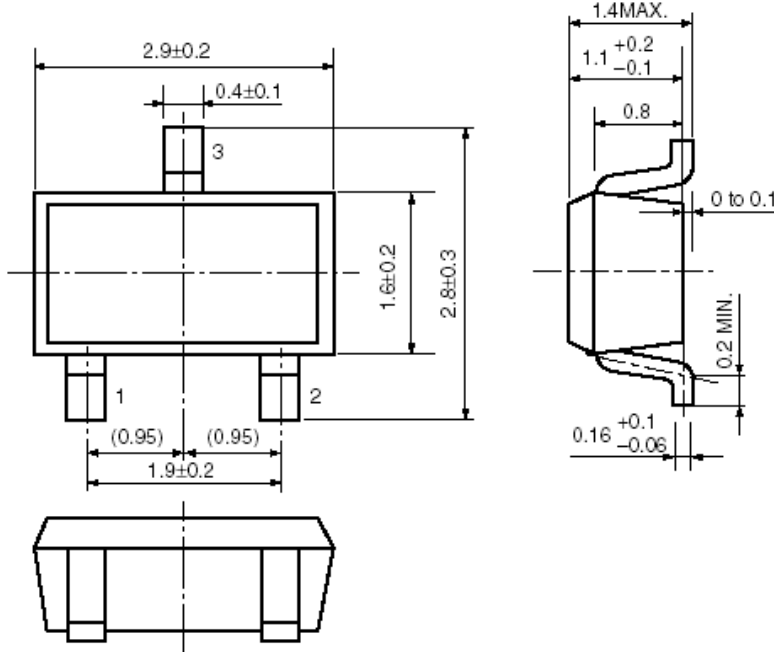
Note:

1. R_0 is unnecessary for CMOS output products.
2. The value of R_0 need to be selected in different application, Typical value is 470k Ω

Package Outline:
SOT-23-3:

Package	SOT-23-3	Devices per reel	3000	Unit	mm
---------	----------	------------------	------	------	----

Package dimension:

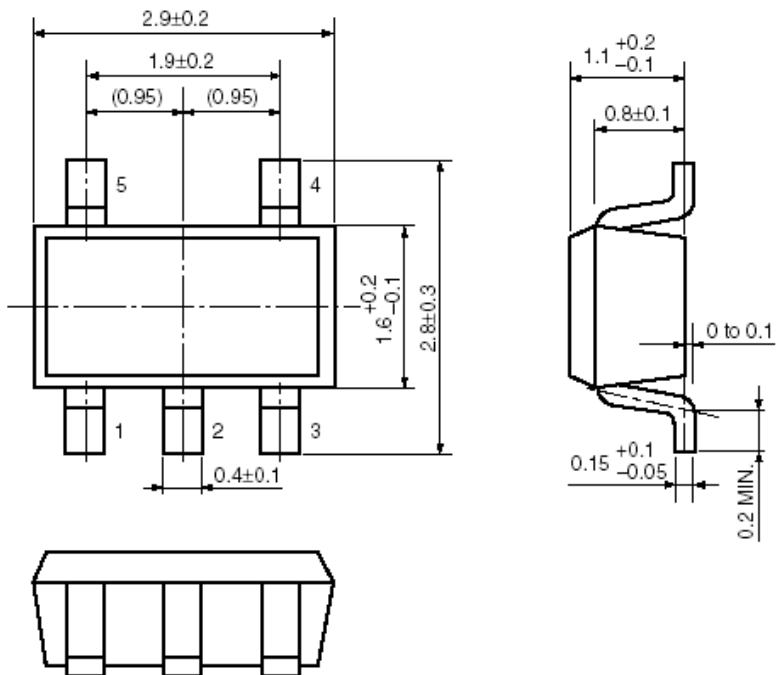


The diagram shows the SOT-23-3 package dimensions. The top view shows a rectangular package with a width of 2.9 ± 0.2 mm and a length of 1.9 ± 0.2 mm. The distance between the two side pins is 0.4 ± 0.1 mm. The distance between the two bottom pins is 1.9 ± 0.2 mm. The distance from the center of the package to the center of the side pin is 0.95 mm. The distance from the center of the package to the center of the bottom pin is 0.95 mm. The package has a maximum height of 1.4 mm. The distance from the top of the package to the top of the side pin is $1.1^{+0.2}_{-0.1}$ mm. The distance from the top of the package to the top of the bottom pin is 0.8 mm. The distance from the top of the package to the bottom of the side pin is 0.2 mm. The distance from the top of the package to the bottom of the bottom pin is $0.16^{+0.1}_{-0.06}$ mm. The package has a minimum height of 0.2 mm. The package has a maximum width of 1.4 mm. The package has a maximum length of 1.9 mm. The package has a maximum distance between pins of 0.4 mm. The package has a maximum distance from center to pin of 0.95 mm. The package has a maximum height of 1.4 mm. The package has a maximum distance from top to side pin of 1.1 mm. The package has a maximum distance from top to bottom pin of 0.8 mm. The package has a maximum distance from top to bottom of side pin of 0.2 mm. The package has a maximum distance from top to bottom of bottom pin of 0.16 mm. The package has a minimum height of 0.2 mm.

SOT-23-5:

Package	SOT-23-5	Devices per reel	3000	Unit	mm
---------	----------	------------------	------	------	----

Package dimension:



The diagram shows the SOT-23-5 package dimensions. The top view shows a rectangular package with a width of 2.9 ± 0.2 mm and a length of 1.9 ± 0.2 mm. The distance between the two side pins is 0.4 ± 0.1 mm. The distance between the two bottom pins is 1.9 ± 0.2 mm. The distance from the center of the package to the center of the side pin is 0.95 mm. The distance from the center of the package to the center of the bottom pin is 0.95 mm. The package has a maximum height of 1.4 mm. The distance from the top of the package to the top of the side pin is $1.1^{+0.2}_{-0.1}$ mm. The distance from the top of the package to the top of the bottom pin is 0.8 ± 0.1 mm. The distance from the top of the package to the bottom of the side pin is 0.2 mm. The distance from the top of the package to the bottom of the bottom pin is $0.15^{+0.1}_{-0.05}$ mm. The package has a minimum height of 0.2 mm. The package has a maximum width of 1.4 mm. The package has a maximum length of 1.9 mm. The package has a maximum distance between pins of 0.4 mm. The package has a maximum distance from center to pin of 0.95 mm. The package has a maximum height of 1.4 mm. The package has a maximum distance from top to side pin of 1.1 mm. The package has a maximum distance from top to bottom pin of 0.8 mm. The package has a maximum distance from top to bottom of side pin of 0.2 mm. The package has a maximum distance from top to bottom of bottom pin of 0.15 mm. The package has a minimum height of 0.2 mm.