

## Voltage Detectors, BL8506B Series

### ■ General Description

BL8506B Series are a set of three-terminal low power voltage detectors implemented in NMOS technology. Each voltage detector in the series detects a particular fixed voltage ranging from 2.0V to 7.0V. The voltage detectors consist of a high precision and low power consumption standard voltage source, a comparator, hysteresis circuit, and an output driver. NMOS technology ensures low power consumption.

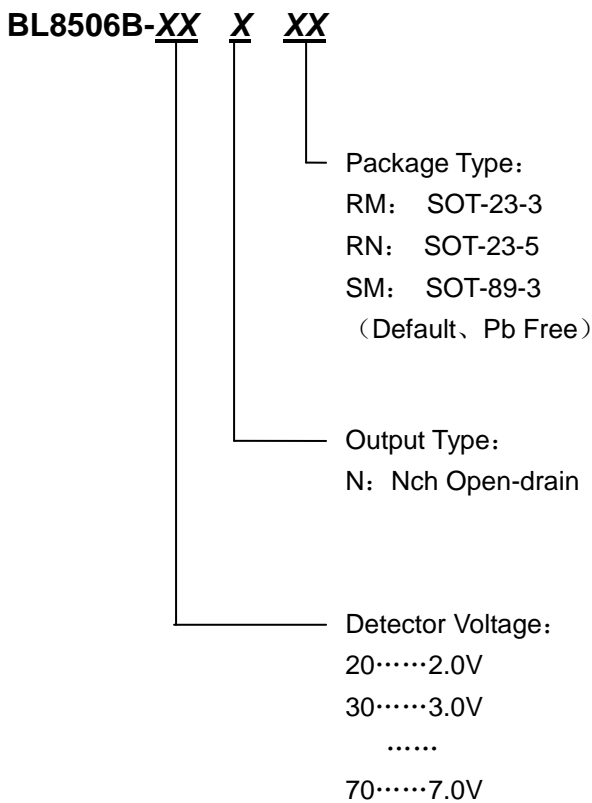
### ■ Features

- Highly accuracy:  $\pm 2\%$
- Low power consumption: TYP 1.8uA ( $V_{in}=3V$ )
- Detect voltage range: 2.0V~7.0V in 0.1V increments
- Operating voltage range: 1.5V~18V
- Detect voltage temperature characteristics:  
TYP $\pm 0.9mV/^{\circ}C$
- Output configuration: NMOS
- Package: SOT-23-3, SOT-23-5, SOT-89-3

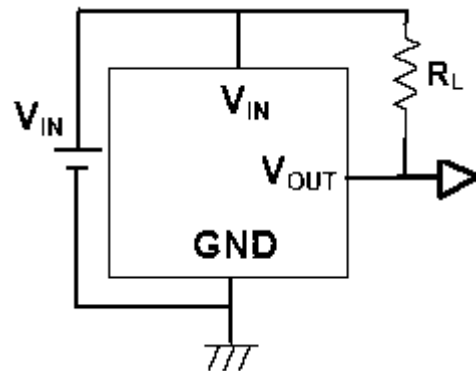
### ■ Typical Application

- Battery checkers
- Level selectors
- Power failure detectors
- Microcomputer reset
- Battery backup of Memories
- Store non-volatile RAM signal protectors

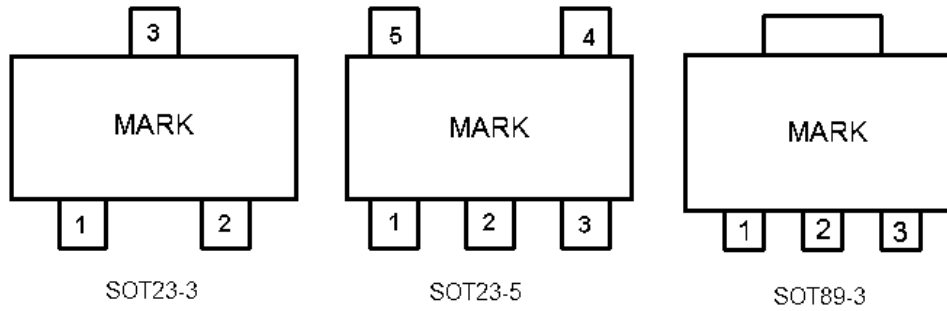
### ■ Selection Guide



### ■ Typical Application Circuit



## ■ Pin Configuration



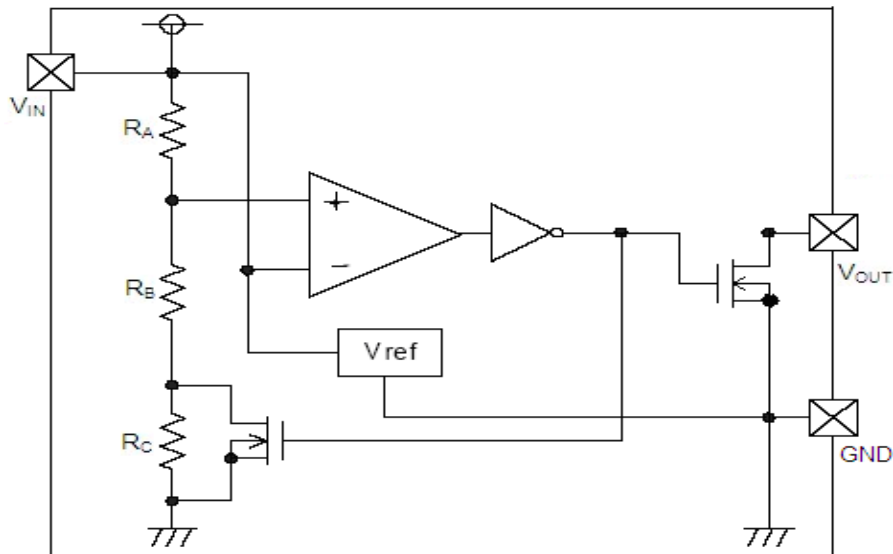
## ■ Pin Assignment

Pin Number			Pin Name	Functions
SOT-23-3	SOT-23-5	SOT-89-3		
2	3	3	GND	Ground
1	1	1	$V_{OUT}$	Output Voltage
3	2	2	$V_{IN}$	Input Voltage
	4		NC	No Connection
	5		NC	No Connection

## ■ Product Classification

Product Name	Detector Voltage	Output Type	Package
BL8506B-XXNRM	XX V	Nch Open-Drain	SOT-23-3
BL8506B-XXNRN	XX V	Nch Open-Drain	SOT-23-5
BL8506B-XXNSM	XX V	Nch Open-Drain	SOT-89-3

## ■ Block Diagram



**■ Absolute Maximum Ratings**

PARAMETER		SYMBAL	RATINGS	UNITS
V <sub>IN</sub> Input Voltage		V <sub>IN</sub>	18	V
Output Current		I <sub>OUT</sub>	50	mA
Output Voltage	NMOS	V <sub>OUT</sub>	GND-0.3~ V <sub>IN</sub> +0.3	V
Continuous Total Power Dissipation	SOT23-3/5	P <sub>D</sub>	300	mW
	SOT89-3		500	
Operating Ambient Temperature		T <sub>Opr</sub>	0~+70	°C
Storage Temperature		T <sub>stg</sub>	-50~+125	°C
Soldering temperature and time		T <sub>solder</sub>	260°C, 10s	

**■ Electrical Characteristics** (V<sub>DET</sub> =2.0V to 7.0V ,T<sub>A</sub>=25°C ,unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
V <sub>DET</sub>	Detect Voltage			V <sub>DET</sub> ×0.99	V <sub>DET</sub>	V <sub>DET</sub> ×1.01	V
V <sub>HYS</sub>	Hysteresis Width			V <sub>DET</sub> ×0.02	V <sub>DET</sub> ×0.05	V <sub>DET</sub> ×0.1	V
I <sub>IN</sub>	Operating Current	V <sub>DET</sub> =2.0V~ 2.8V	V <sub>IN</sub> =3.0V	-	1.8	3	μA
		V <sub>DET</sub> =2.8V~ 3.6V	V <sub>IN</sub> =4.0V	-	1.8	4	
		V <sub>DET</sub> =3.6V ~ 4.7V	V <sub>IN</sub> =5.0V	-	2.1	4	
		V <sub>DET</sub> =4.7V~ 7.0V	V <sub>IN</sub> =8.0V	-	2.5	4	
V <sub>IN</sub>	Operating Voltage	V <sub>DET</sub> =2.0V to 7.0V		0.7	-	18	V
I <sub>OL</sub>	Output Sink Current	V <sub>DET</sub> =2.0V~ 2.8V	V <sub>IN</sub> =-V <sub>DET(S)</sub> -0.2 V , V <sub>OUT</sub> =0.2V	0.5			mA
		V <sub>DET</sub> =2.8V~ 3.6V	V <sub>IN</sub> =-V <sub>DET(S)</sub> -0.5 V , V <sub>OUT</sub> =0.3V	0.5			
		V <sub>DET</sub> =3.6V ~ 4.7V	V <sub>IN</sub> =-V <sub>DET(S)</sub> -0.5 V , V <sub>OUT</sub> =0.3V	1.2			
		V <sub>DET</sub> =4.7V~ 7.0V	V <sub>IN</sub> =-V <sub>DET(S)</sub> -0.5 V , V <sub>OUT</sub> =0.3V	2.5			
ΔV <sub>DET</sub> /ΔT <sub>A</sub>	Temperature characteristics	0°C≤T <sub>opr</sub> ≤70°C			±0.9		mV/°C

- Note:**
- 1、VDF(S) : Specified Detection Voltage value
  - 2、VDF : Actual Detection Voltage value
  - 3、Release Voltage: VDR=VDF+VHYS

■ **Functional Description**

The BL8506B series is a set of voltage detectors equipped with a high stability voltage reference which is connected to the negative input of a comparator — denoted as  $V_{REF}$  in the following figure (Fig. 1). When the voltage drop to the positive input of the comparator (i.e.,  $V_B$ ) is higher than  $V_{REF}$ ,  $V_{OUT}$  goes high, M1 turns off, and  $V_B$  is expressed as  $V_{BH} = V_{IN} \times (R_B + R_C) / (R_A + R_B + R_C)$ . If  $V_{IN}$  is decreased so that  $V_B$  falls to a value that is less than  $V_{REF}$ , the comparator output inverts (from high to low),  $V_{OUT}$  goes low,  $V_C$  is high, M1 turns on,  $R_C$  is bypassed, and  $V_B$  becomes:  $V_{BL} = V_{IN} \times R_B / (R_A + R_B)$ , which is less than  $V_{BH}$ . By so doing the comparator out-put will stay low to prevent the circuit from oscillating when  $V_B \approx V_{REF}$ . If  $V_{IN}$  falls below the minimum operating voltage, the output becomes undefined. When  $V_{IN}$  goes from low to  $V_{IN} \times R_B / (R_A + R_B) > V_{REF}$ , the comparator output goes high and  $V_{OUT}$  goes high again. The detection voltage is as defined:

$$V_{DET(-)} = (R_A + R_B + R_C) \times V_{REF} / (R_B + R_C)$$

The release voltage is as defined:

$$V_{DET(+)} = (R_A + R_B) \times V_{REF} / R_B$$

The hysteresis width is:

$$V_{HYS} = V_{DET(+)} - V_{DET(-)}$$

Fig.1 demonstrates the NMOS output type with positive output polarity ( $V_{OUT}$  is normally high, active low).

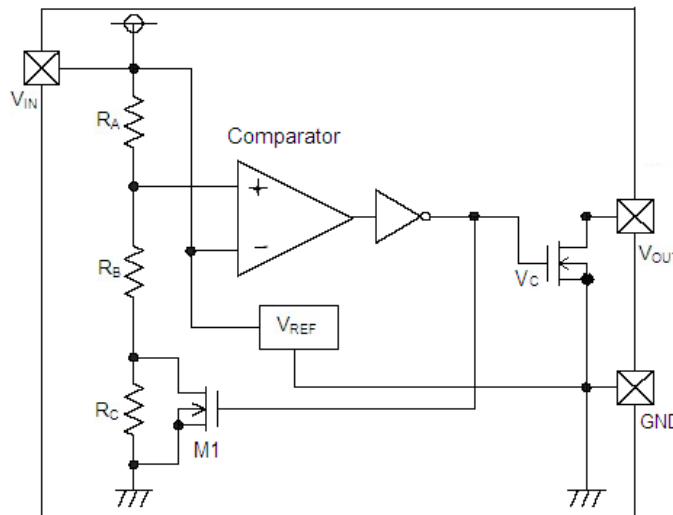
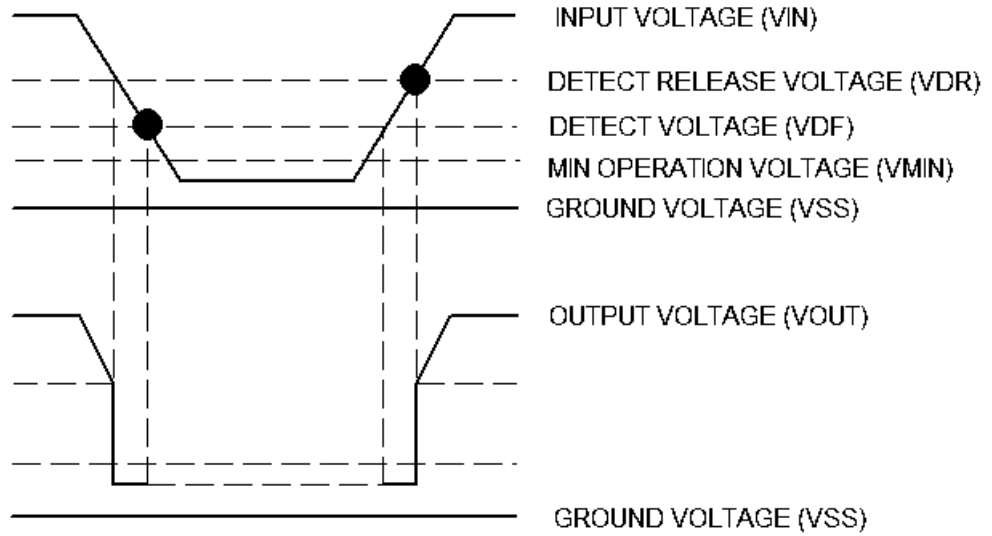


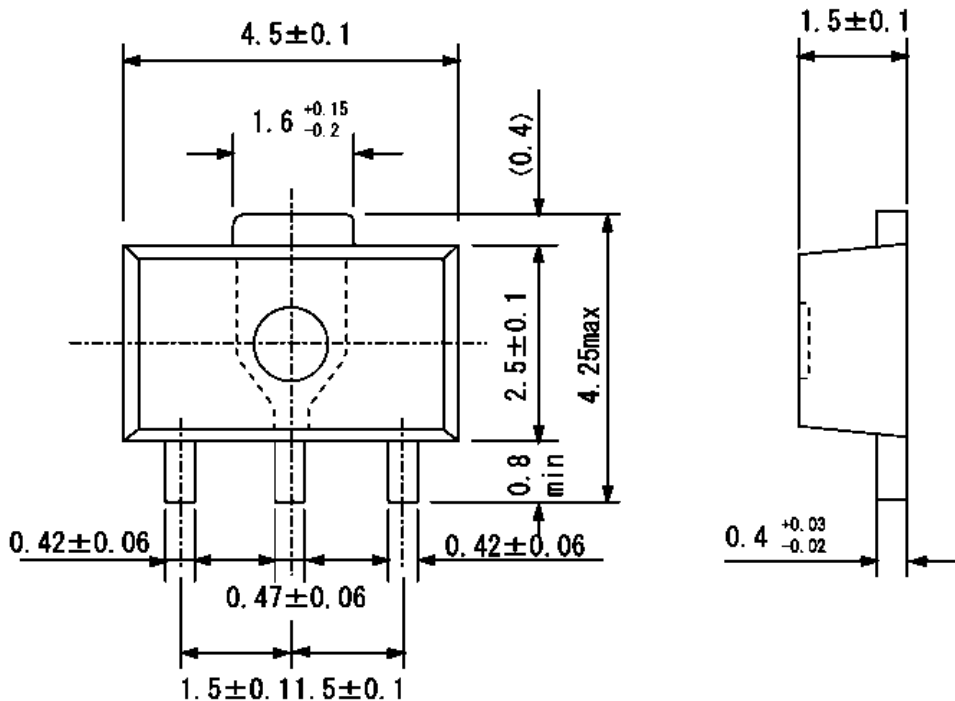
Fig.1 NMOS output voltage detector (BL8506B)

■ **Timing Chart**

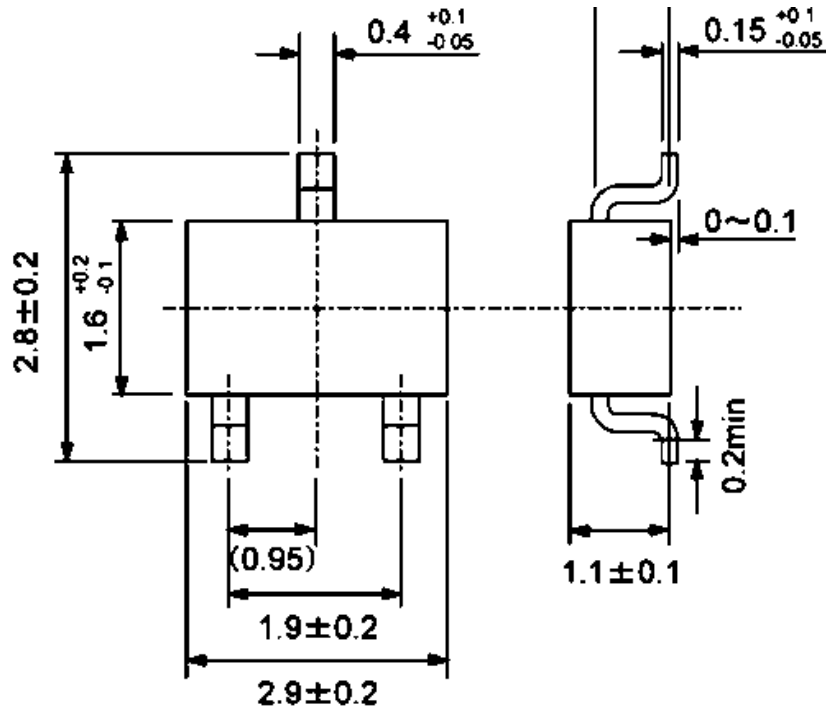


■ **Package Information**

- SOT89-3



● SOT23-3



● SOT23-5

