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Low Voltage Detector With Built-in Delay Circuit

DESCRIPTION

BL8509C is a series of high precision voltage detector with ultra-low current consumption (4.5uA typ. at $V_{in}=3.0V$) and a built-in delay circuit. It can work at very low voltage, which makes it perfect for system reset.

BL8509C 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. Only CMOS type is available.

BL8509C is available in small size SOT-23-3 package which is Pb free.

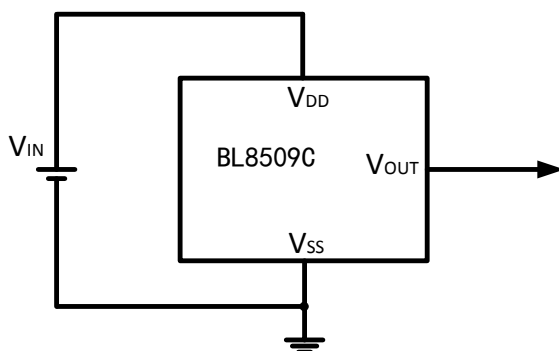
FEATURES

- High-Precision Detection Voltage: $\pm 3\%$
- Detection Voltage: 2.63V and 2.93V
- Built-in Power on Reset Delay time circuit: Refer to Selection Guide
- Operating Voltage Range: 1.2V~6V
- Ultra-low current consumption: 4.5uA typ. (at $V_{in}=3.0V$)
- Output Forms: CMOS (Active Low)

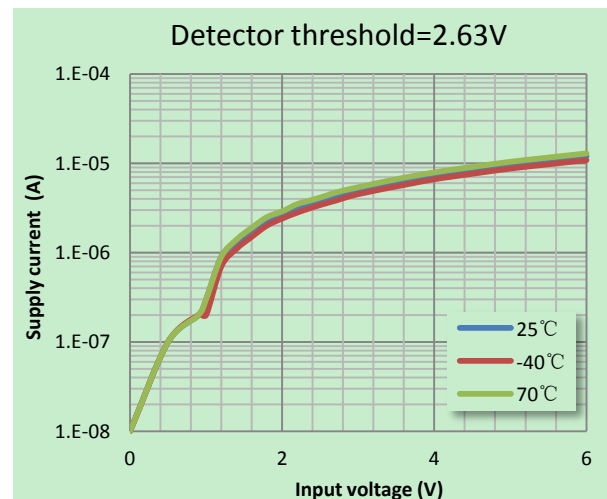
APPLICATIONS

- 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



ELECTRICAL CHARACTERISTICS



ORDERING INFORMATION

BL8509C ①②③④⑤⑥

Code	Description
①	Temperature&Rohs: C:-40~85°C ,Pb Free Rohs Std.
②	Package type: B3:SOT-23-3(A) B3B:SOT-23-3(B)
③	Packing type: TR:Tape&Reel (Standard)
④	Detector Voltage: e.g. 263=2.63V 293=2.93V
⑤	Delay time: D:200mS
⑥	Output forms: C:CMOS

PIN CONFIGURATION

Product Classification		BL8509CCB3TR□□□
Marking		SOT-23-3
XXXDC	XXX: Detector Voltage	
	D:Delay time D:200mS	
	C:CMOS	
Product Classification		BL8509CCB3BTR□□□
Marking		SOT-23-3
XXXDC	XXX: Detector Voltage	
	D:Delay time D:200mS	
	C:CMOS	
Vss	Ground Pin	
VDD	Supply Voltage Input	
Vout	Voltage detection output pin	

ABSOLUTE MAXIMUM RATING

Parameter	Value
Input Voltage	-0.3V-8V
Output Voltage range	-0.3V- 8V
Maximum Output current	70mA
Ambient Temperature(Ta)	-40°C -85°C
Power Dissipation	SOT-23-3 250mW
Storage Temperature(Ts)	-40°C -150°C
Lead Temperature & Time	260°C,10S

Note:

Exceed these limits to damage to the device.

Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED WORK CONDITIONS

Item	Min	Recommended	Max.	Unit
Input Voltage Range	1.2		6	V
Ambient Temperature	-40	25	85	°C

ELECTRICAL CHARACTERISTICS

BL8509CCXXTR263DC/N (2.63V)

(T_{opt} = 25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-VDET	Detector Threshold		2.551	2.63	2.709	V
ISS	Current consumption	VDD=4.63V		4.5	10	uA
VDDH	Maximum operating voltage				10	V
VDDL	Minimum Operating voltage			0.5		V
IOUT	Output current	Pch VDS=-2.1V, VDD=4.5V	1.0	2.0		mA

BL8509CCXXTR293DC/N (2.93V)

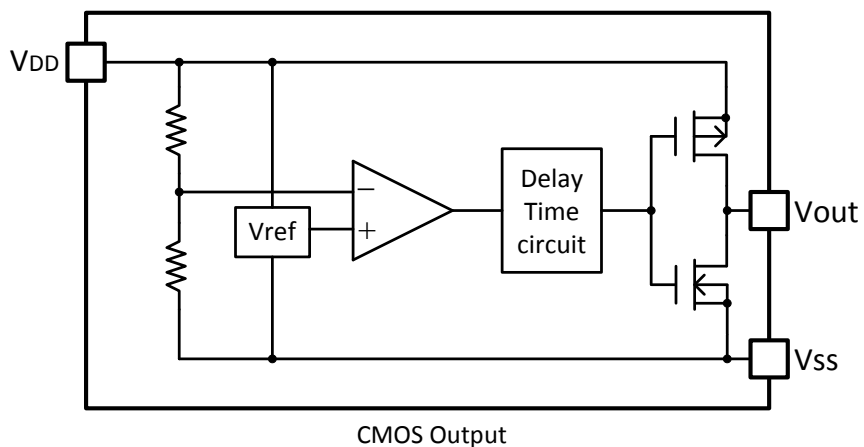
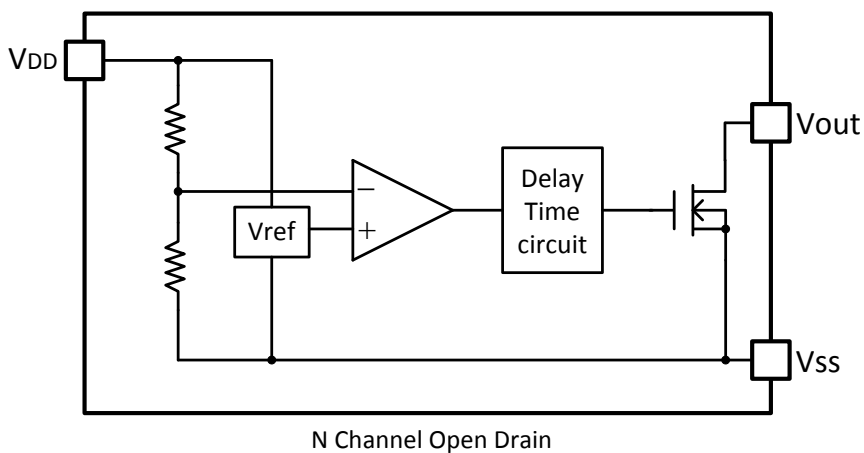
(T_{opt} = 25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-VDET	Detector Threshold		2.842	2.93	3.018	V
ISS	Current consumption	VDD=4.93V		4.5	10	uA
VDDH	Maximum operating voltage				10	V
VDDL	Minimum Operating voltage			0.5		V
IOUT	Output current	Pch VDS=-2.1V, VDD=4.5V	1.0	2.0		mA

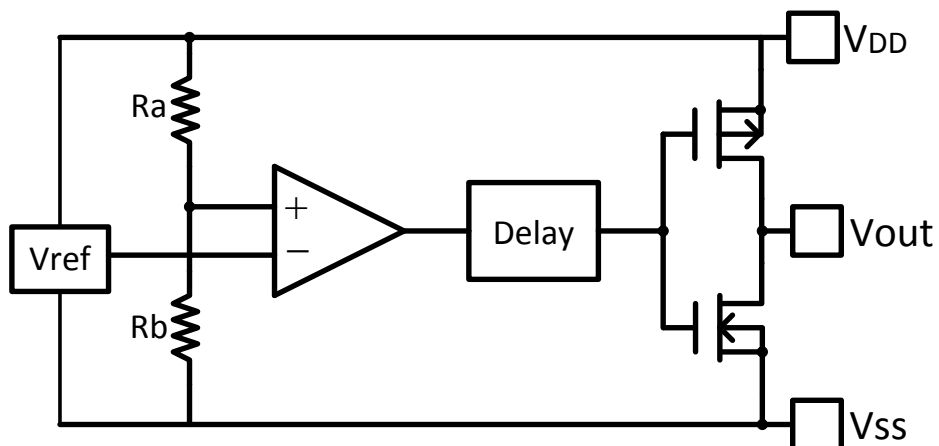
ELECTRICAL CHARACTERISTICS BY OUTPUT DELAY TIME

Part Number	Test Condition	Output Delay Time			Unit
		Min.	Typ.	Max.	
BL8509CCXXTRXXXDC/N	VDD=1.0V to Vdet+1.0V	180	200	220	ms

BLOCK DIAGRAM

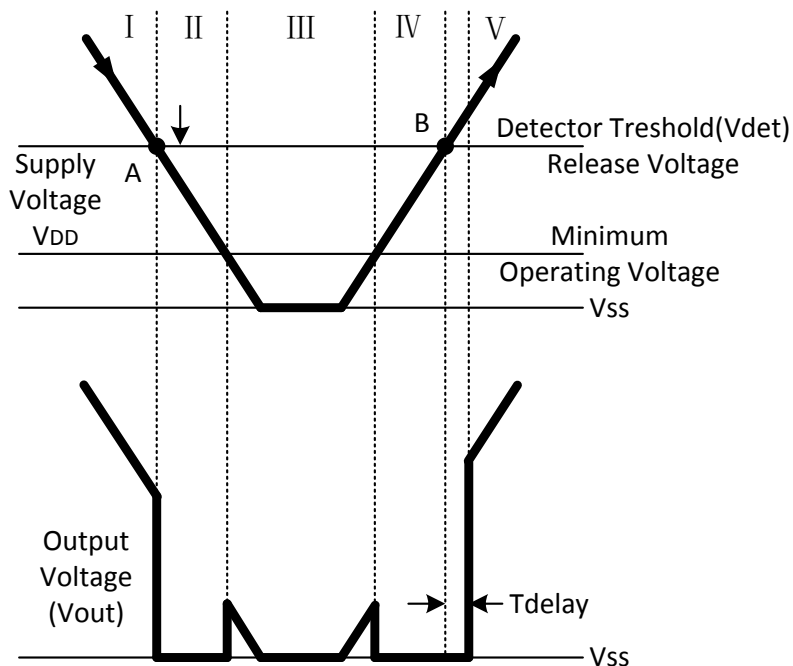


FUNCTION DESCRIPTION



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 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.

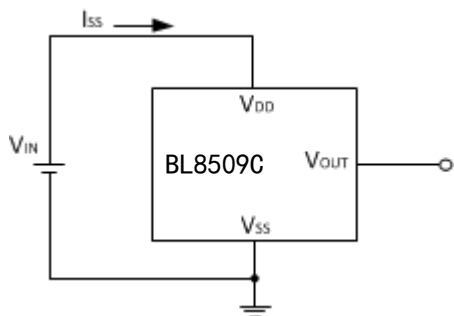
$$V_{DET} = V_{REF} * (1 + R_a/R_b)$$



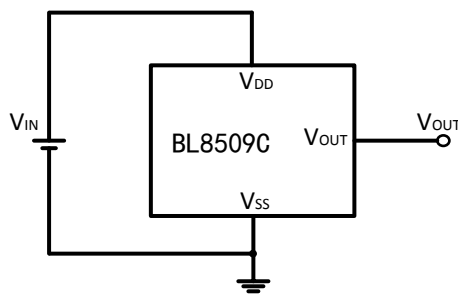
No.	Operation status	Output status
I	$V_{DD} > V_{det}$	Output voltage is equal to the supply voltage
II	V_{DD} drops below V_{det}	Output voltage equals to GND level
III	V_{DD} drops further below V_{DDL}	Output voltage is undefined
IV	V_{DD} rises above V_{DDL}	Output voltage equals to GND level
V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

TEST CIRCUITS

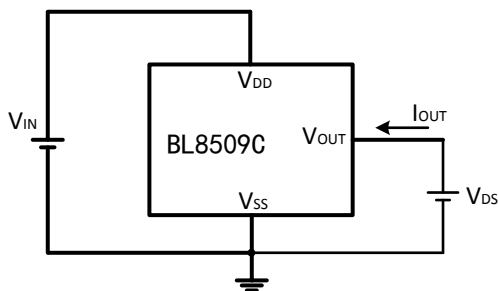
(1) Supply current test circuit



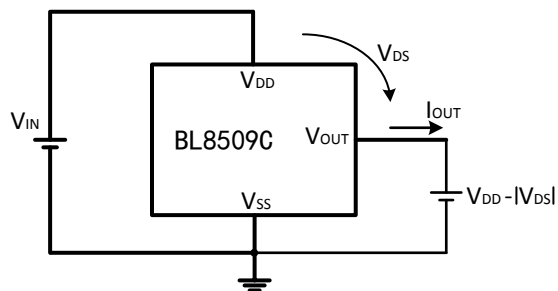
(2) Detector threshold test circuit



(3) NCH Drive Output Current Test Circuit

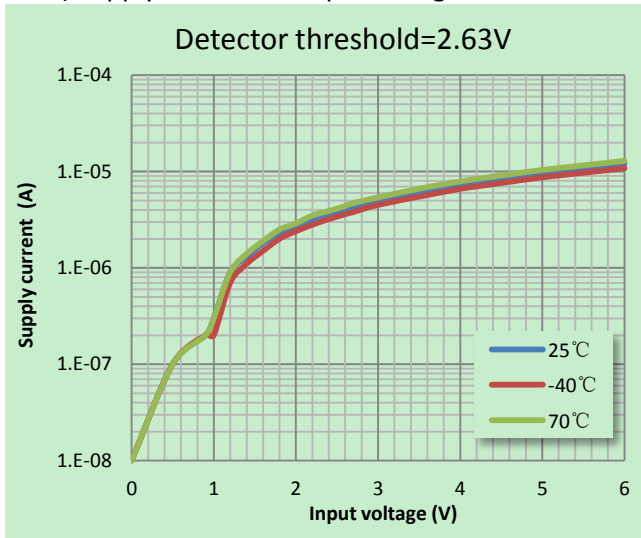


(4) PCH Drive Output Current Test Circuit

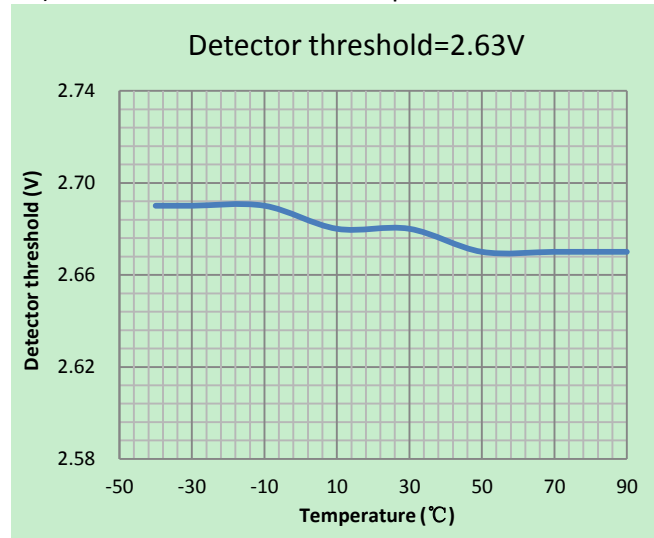


TYPICAL PERFORMANCE CHARACTERISTICS

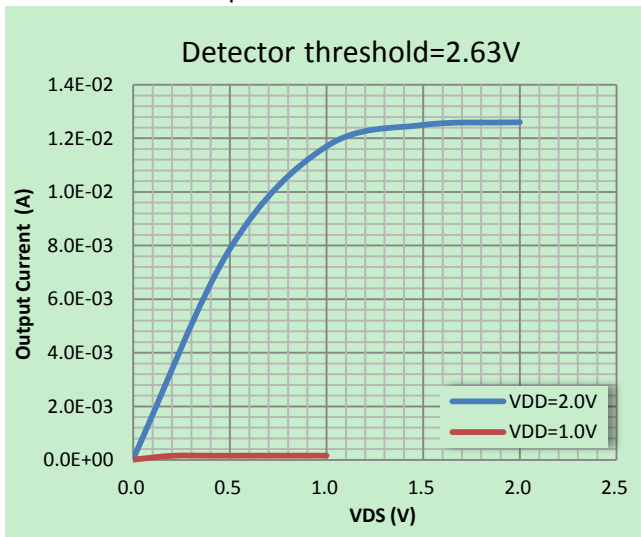
1) Supply current VS. Input voltage



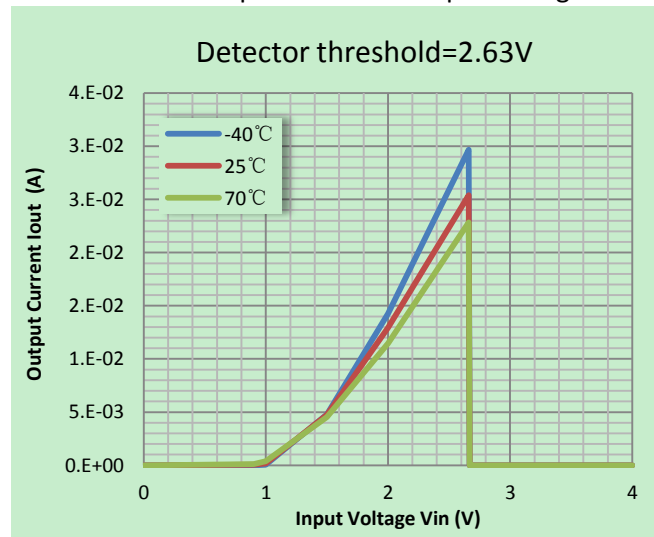
2) Detector Threshold VS. Temperature



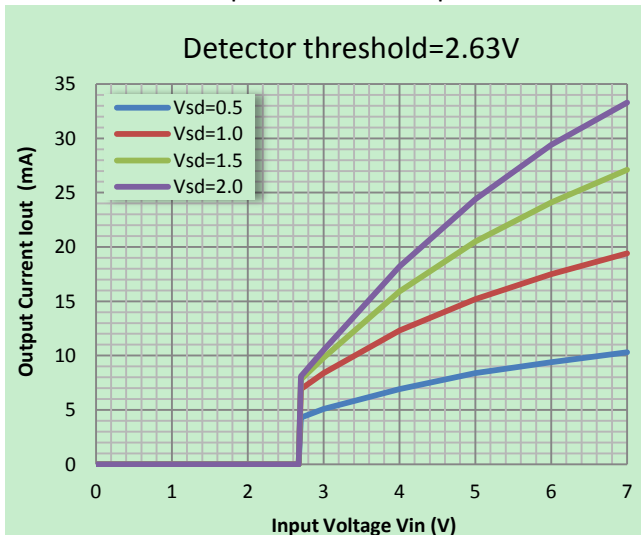
3) Nch Driver Output Current VS. VDS



4) NCH Driver Output Current vs. Input Voltage



5) PCH Driver Output Current vs. Input Current



PACKAGE LINE

Package	SOT-23-3	Devices per reel	3000Pcs	Unit	mm
<p>Package dimension:</p> <p>The technical drawing illustrates the BL8509C package in three views: top, side, and cross-sectional. Key dimensions include: <ul style="list-style-type: none"> Top View: Overall width of 2.400 ± 0.05 mm, distance between leads of 1.900 ± 0.05 mm, and lead width of 0.400 ± 0.03 mm. Lead radii are specified as $4 \times R0.1$ MAX. Side View: Overall height of 2.900 ± 0.05 mm, lead height of 1.000 mm, and lead thickness of 0.400 mm. Cross-sectional View: Lead thickness of 0.080 ± 0.02 mm, lead width of 0.100 mm, and lead angle of $0-0.1$ degrees. Radii of $R0.08$ are shown at the lead base. </p>					