Introduction
(General Description)

The EC9518C / 9519C Series is a high-precision voltage detector developed using CMOS process. The detection voltage is fixed internally with an accuracy of ±2.0 %. A time delayed reset can be accomplished with the addition of an external capacitor. Two output forms, N-channel open-drain and CMOS output, are available.

Applications

- Power supply monitor for portable equipment such as electronic organizers, notebook PCs, cellular phones, digital cameras
- Constant voltage power monitor for cameras, communication equipment and video equipment
- Power monitor and reset for CPUs and microcomputers

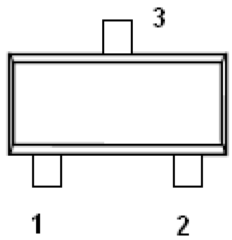
Features

- Ultra-low current consumption
  1.0 mA typ. (VDD=2.0 V)
  1.1 mA typ. (VDD=3.5 V)
- High-precision detection voltage ±2.0 %
- COperating voltage range 2.0 V to 6.0 V
- Detection voltage 2.2 V to 3.1 V (0.1 V step)
- Hysteresis characteristics 5 % typ.
- Two output forms: CMOS
  output active "L" Open-drain
  output active "L"

Packages

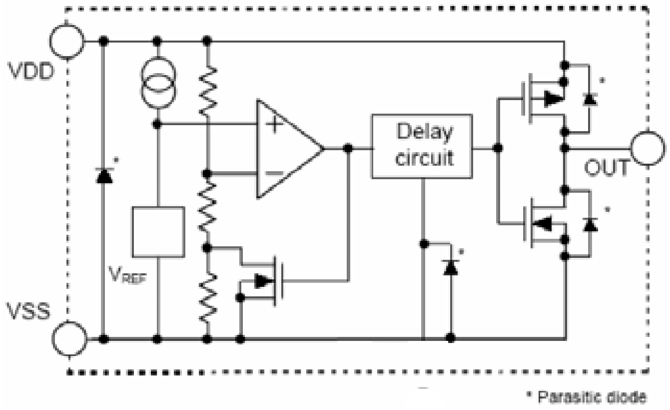
SOT-23-3

Pin Assignment

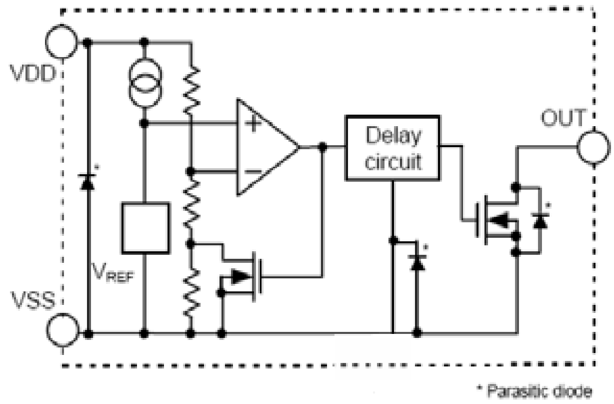


NO	SYMBOL	DESCRITION
1	OUT	VOLTAGE DETECTION PIN
2	VSS	GROUND PIN
3	VDD	VOLTAGE INPUT PIN

Block Diagrams

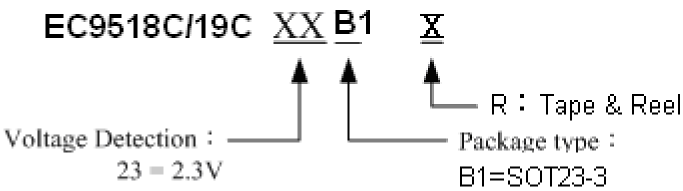


CMOS OUTPUT（EC9519C）



OPEN DRAIN（EC9518C）

Ordering Information



PART NUMBER	MARKING ID	Marking Information	PACKAGE	PACKING TYPE
EC9518C XXB1R	18CXX LLLLL	XX：Voltage Detection LLLLL：Lot No	SOT23-3	TAPE / REEL
EC9519C XXB1R	19CXX LLLLL		SOT23-3	TAPE / REEL

Absolute Maximum Ratings

PARAMETER	SYMBOL		RATING	UNIT
POWER SUPPLY VOLTAGE	VDD - VSS		8	V
CD PIN INPUT VOLTAGE	VCD		VSS -0.3 TO VDD +0.3	V
OUTPUT VOLTAGE	VOUT		VSS -0.3 TO VDD +0.3	V
OUTPUT CURRENT	IOUT		4	mA
POWER DISSIPATION	PD	SOT23 -5	150	mW
OPERATING TEMPERATURE	TOPR		-40 TO +85	℃
STORAGE TEMPERATURE	TSTG		-40 TO +125	℃
JUNCTION TEMPERATURE	Tj(max)		150	℃
JUNCTION TO AMBIENT THERMAL RESISTANCE	θja		347	℃/W
JUNCTION TO CASE THERMAL RESISTANCE	θjc		148	℃/W

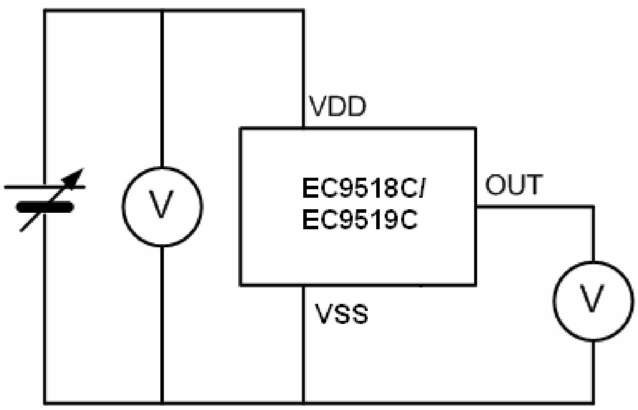
Electrical Characteristics

CMOS output products (Ta=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	Test circuit
Detection voltage	-VDET	--	-VDET(S) X 0.98	-VDET	-VDET(S) X 1.02	V	1
Hysteresis width	VHYS	--	-VDET X0.03	-VDET X0.05	-VDET X0.08	V	1
Current consumption	ISS	VDD=4V	--	4.5	6.5	uA	2
Operating voltage	VDD	--	2.0	--	6.0	V	1
Output Current of output transistor	IOUT	N-channel VDS=0.5V VDD= 2.4V	2.88	4.98	--	mA	3
		P-channel VDS=VDD-0.5V VDD=4.8 V	1.43	2.39	--	mA	5
Delay time	td	Input Signal Ramp=3V/ms	---	---	200	us	4

Test circuit

1.



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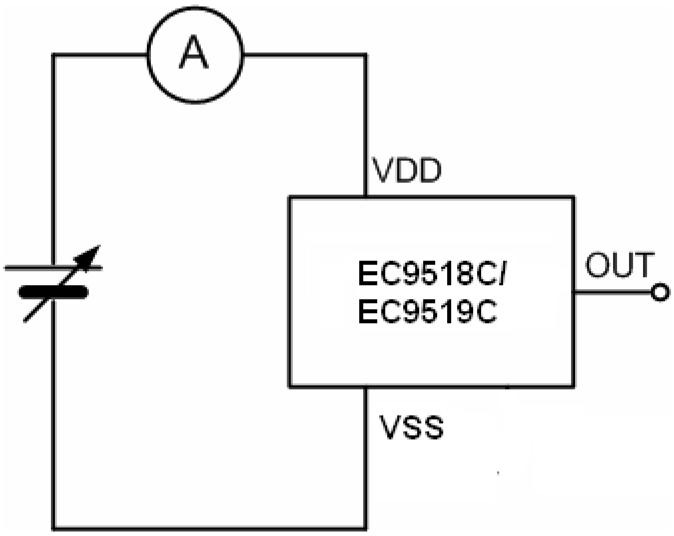
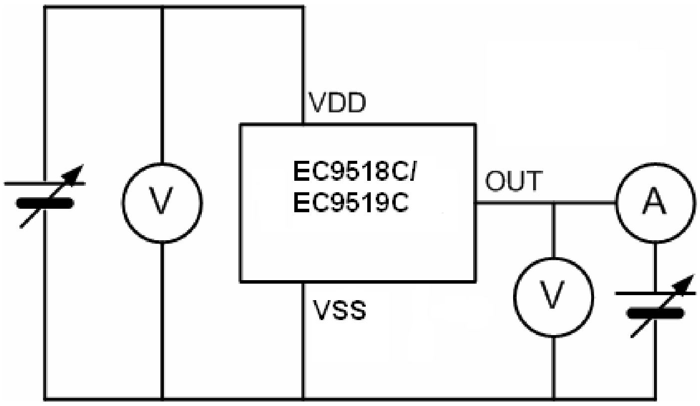


3.



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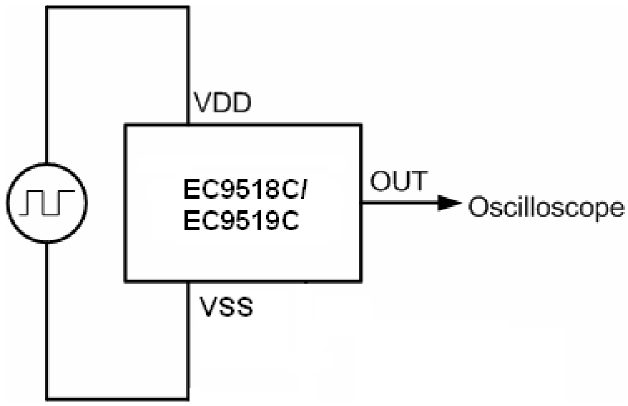
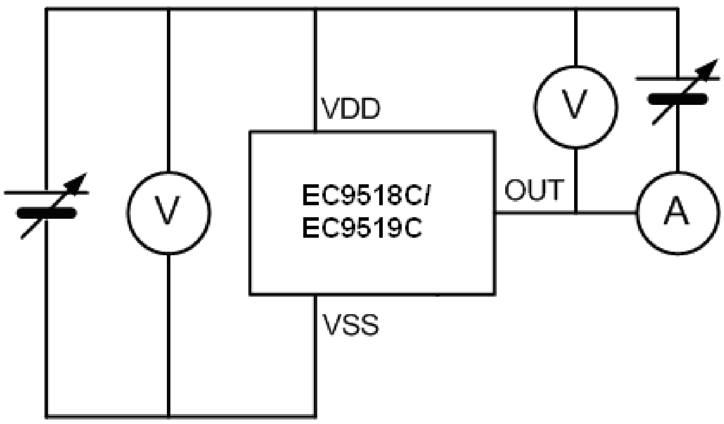
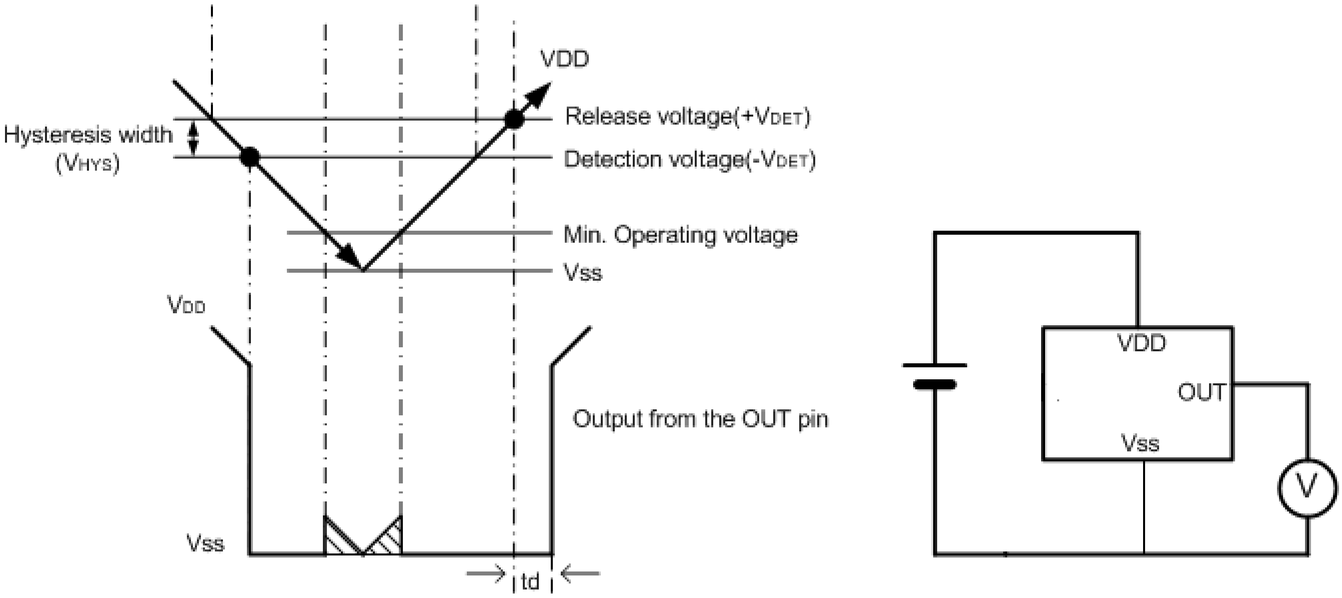


5.

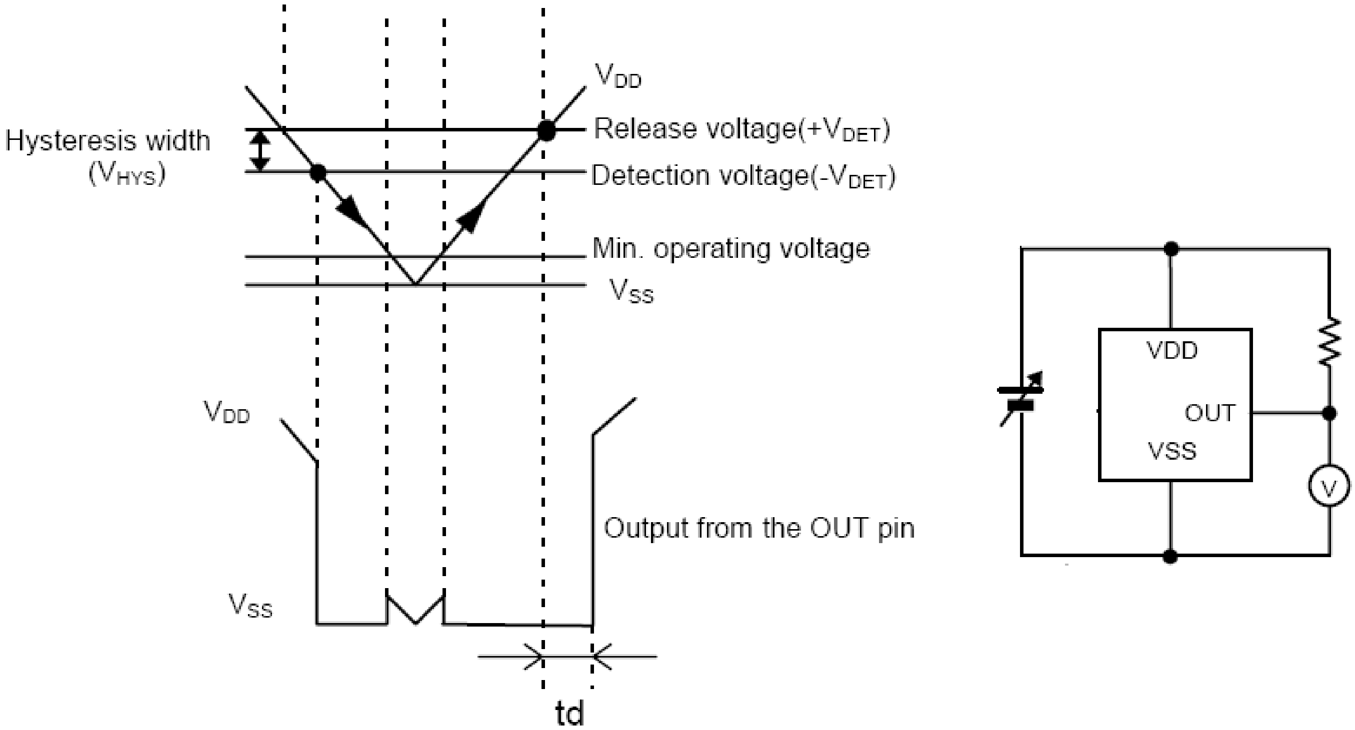


Timing chart

1. CMOS active low output



2. Nch open-drain active low output



Note：For values of VDD less than minimum operating voltage, values of OUT terminal output is free of the shaded region.

Definition of Technical Terms

1. Detection voltage ($-V_{DET}$)

Detection voltage $-V_{DET}$ is a voltage at which the output turns to low. This detection voltage varies slightly among products of the same specification. The variation of detection voltage between the specified minimum [($-V_{DET}$) min.] and maximum [($-V_{DET}$) max.] is called the detection voltage range (See Figure A).

2. Release voltage ($+V_{DET}$)

Release voltage $+V_{DET}$ is a voltage at which the output turns to high. This release voltage varies slightly among products of the same specification. The variation of release voltage between the specified minimum [($+V_{DET}$) min.] and maximum [($+V_{DET}$) max.] is called the release voltage range (See B).

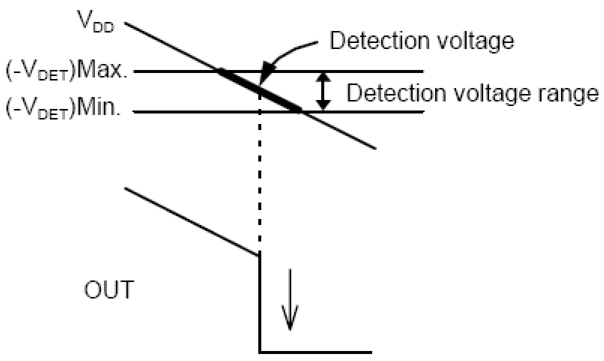


FIGURE A

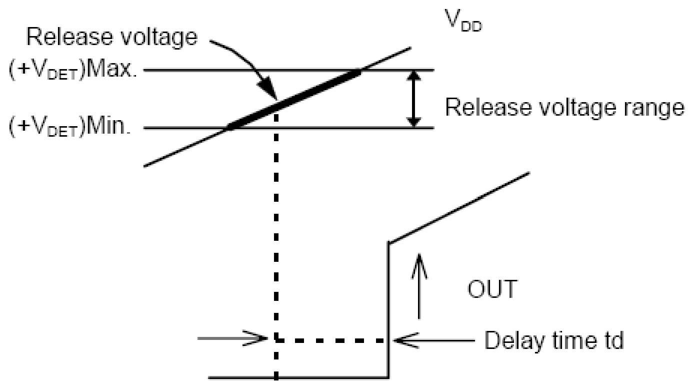


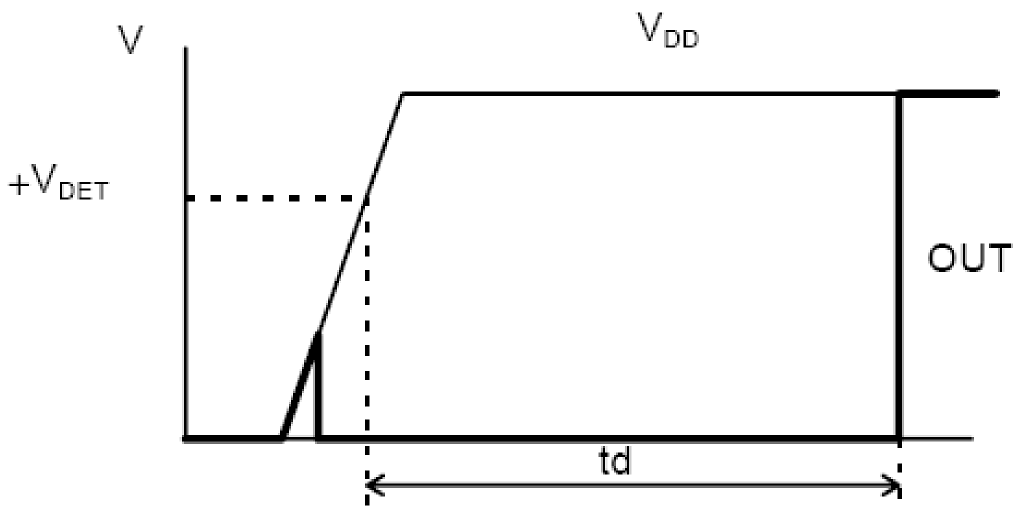
FIGURE B

3. Hysteresis width (V_{HYS})

Hysteresis width is the voltage difference between the detection voltage and the release voltage. The existence of the hysteresis width avoids malfunction caused by noise on input signal.

4. Delay time (td)

Delay time is a time internally measured from the instant at which V_{DD} pin exceeds the release voltage ($+V_{DET}$) to the point at which the output of the OUT pin inverts.



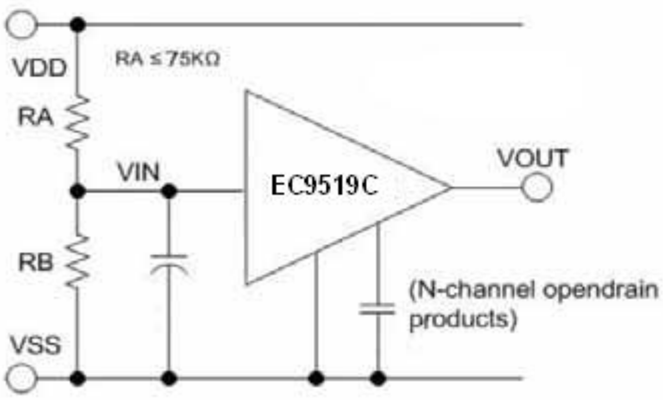
5. Short-circuit current

Short-circuit current refers to the current which flows instantaneously at the time of detection and release of a voltage detector. Short-circuit current is large in CMOS output products, and small in N channel open-drain output products.

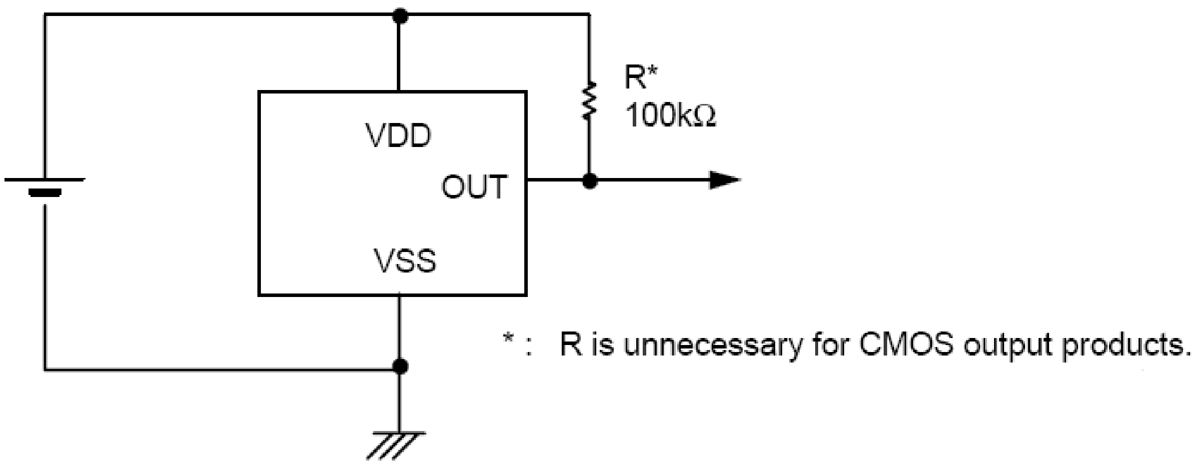
6. Oscillation

In applications where a resistor is connected to the voltage detector input as shown in Figure , taking a CMOS active low product for example, the short-circuit current, which flows at release when the output goes from low to high, causes a voltage drop equal to [short-circuit current] × [input resistance] across the resistor. When the input voltage falls below the detection voltage -VDET as a result, the output voltage goes to low level. In this state, the short-circuit current stops and its resultant voltage drop disappears, and the output goes from low to high. Short-circuit current again starts flowing, a voltage drop appears, and oscillation is finally induced by repeating the process.

Following is an example for bad implementation: input voltage divider for a CMOS output product.



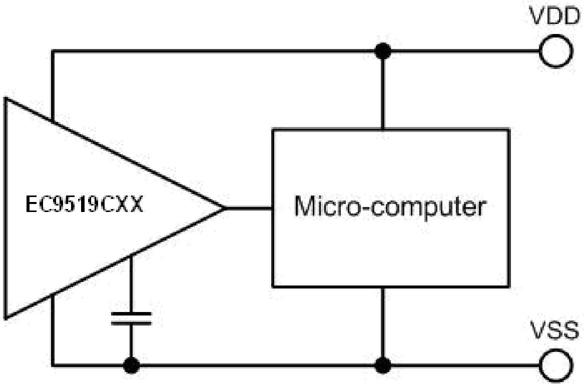
Standard Circuit



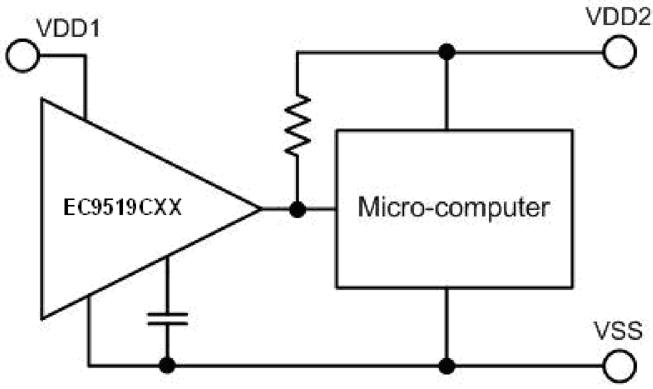
Application Circuit Examples

1. Microcomputer reset circuits

With the EC9519CXX Series which has a low operating voltage, a high-precision detection voltage and hysteresis characteristic, the reset circuits shown in Figures A to B can be easily constructed.



Figures A

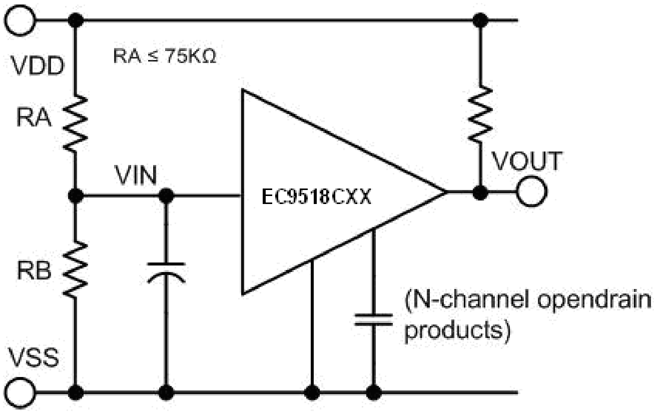


(Nch open-drain output products only)

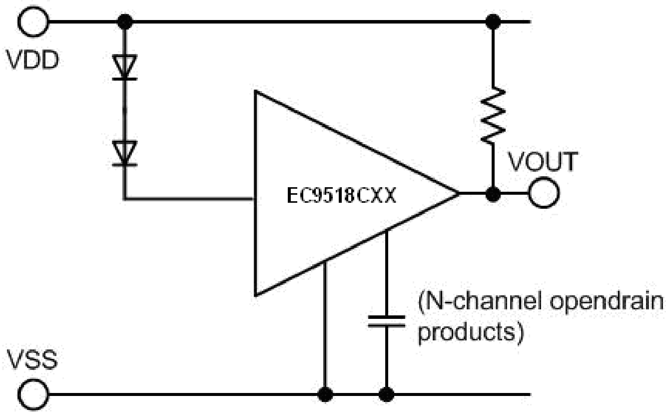
Figures B

2. Change of detection voltage

In Nch open-drain output products of the EC9508CXX Series, detection voltage can be changed using resistance dividers or diodes as shown in Figures C and D. Hysteresis width is also changed.



Figures C



Figures D

$$\text{Detection Voltage} = \frac{RA+RB}{RB} - V_{DET}$$

$$\text{Hysteresis width} = \frac{RA+RB}{RB} - V_{HYS}$$

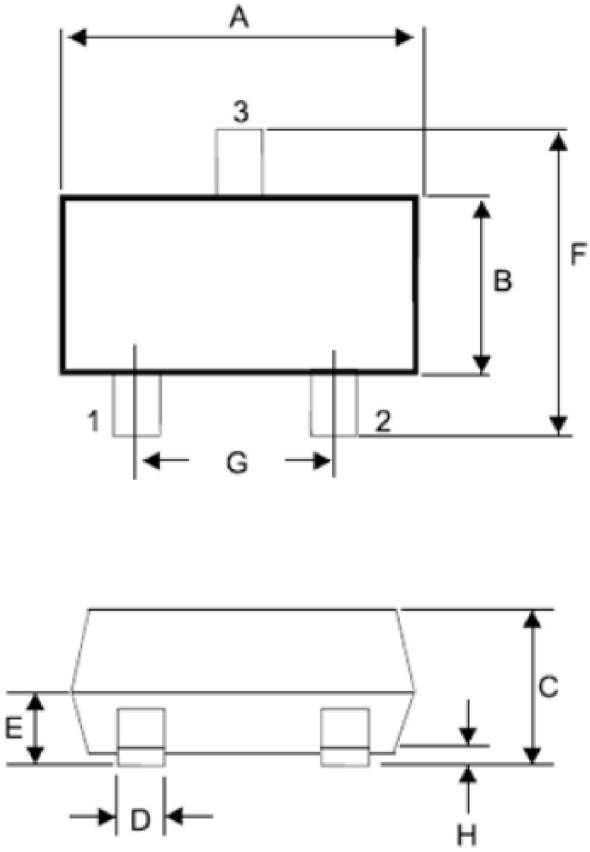
$$\text{Detection Voltage} = Vf1 + Vf2 + (-V_{DET})$$

Note1: If RA and RB are large, the hysteresis width may also be larger than the value given by the equation above due to short-circuit current (which flows slightly in an N channel open-drain product).

Note2: RA should be 75k Ω or less to prevent oscillation.

PACKAGE TYPE : SOT23-3

P



DIM	MILLIMETERS	
	MIN	MAX
A	2.70	3.10
B	1.50	1.80
C	1.00	1.30
D	0.35	0.50
E	0.70	0.90
F	2.60	3.00
G	1.70	2.10
H	0.00	0.10
I	0.80	0.95
J	1.40	1.50
K	0.56	0.66