



# ACE303

## High-precision Low Voltage Detector

### Description

ACE303 is a series of high precision voltage detector with ultra low current consumption (500nA typ. at  $V_{DD}=3.0V$ ). It can work at very low voltage, which makes it perfect for system reset.

ACE303 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.

One type of output, N-channel open-drain is available.

### Features

- High-precision detection Voltage :  $\pm 3\%$
- Detection Voltage: 0.9V~6.0V (in 0.1V steps)
- Precise hysteresis: 4% typ.
- Operating Voltage range: 0.7V~10V
- Ultra-low current consumption: 500nA typ. (at  $V_{DD}=3.0V$ )

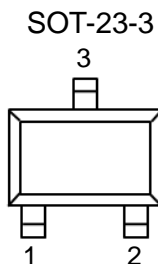
### Application

- 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

### Absolute Maximum Ratings

Parameter	Max	Unit
Input Voltage	-0.3~10	V
Output Voltage	-0.3~12	V
Maximum Output current	70	mA
Maximum power dissipation	250	mW
Ambient temperature	-40~+85	°C
Storage temperature	-40~+150	°C

### Packaging Type



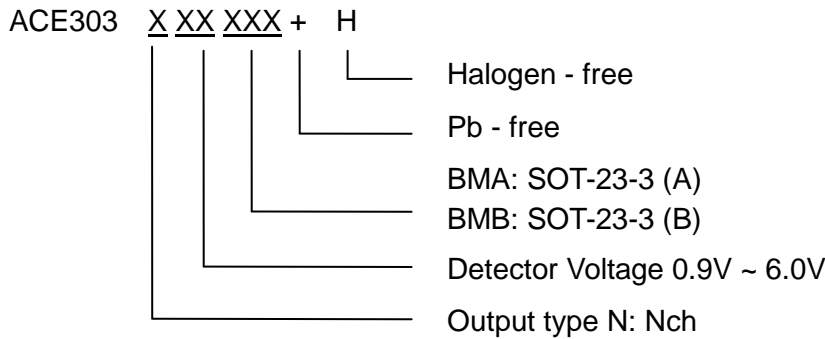
SOT-23-3(A)	SOT-23-3(B)	Description	Function
2	1	$V_{OUT}$	Voltage detection output Pin
1	2	$V_{DD}$	Voltage input Pin
3	3	$V_{SS}$	GND Pin



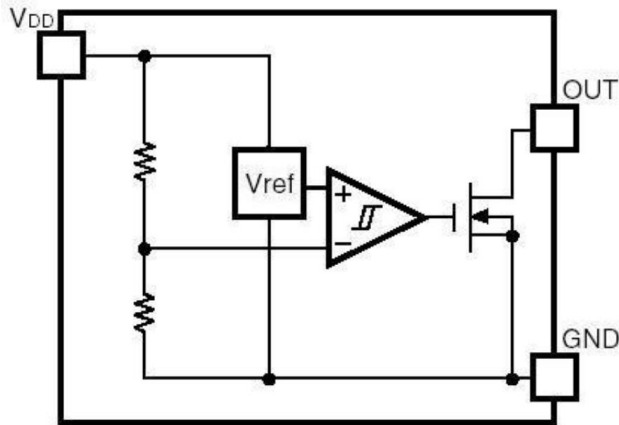
# ACE303

## High-precision Low Voltage Detector

### Ordering information



### Block diagram



N channel open-drain

### Recommended Work Conditions

Item	Min	Recommended	Max	Unit
Input Voltage	0.7		10	V
Ambient temperature	-40	25	85	°C

### Electrical Characteristics:

ACE303N09BMA + (0.9V) (Topt=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
$-V_{DET}$	Detector Threshold		0.873	0.900	0.927	V
$V_{HYS}$	Detector Threshold Hysteresis		0.018	0.036	0.054	V
$I_{SS}$	Current Consumption	$V_{DD}=2.9V$		1	2.5	uA
$V_{DDH}$	Maximum Operating Voltage				10	V
$V_{DDL}$	Minimum Operating Voltage			0.5		V
$I_{OUT}$	Output Current	$V_{DS}=0.05V, V_{DD}=0.7V$ $V_{DS}=0.50V, V_{DD}=0.8V$	0.01 0.05	0.05 0.50		mA
$T_{PLH}$	Output Delay Time				20	uS



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## High-precision Low Voltage Detector

ACE303N27XXX + (2.7V) (T<sub>opt</sub>=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-V <sub>DET</sub>	Detector Threshold		2.619	2.700	2.781	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.054	0.108	0.162	V
I <sub>SS</sub>	Current Consumption	V <sub>DD</sub> =4.7V		0.5	2.5	uA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage			0.5		V
I <sub>OUT</sub>	Output Current	V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.7V	0.01	0.05		mA
T <sub>PLH</sub>	Output Delay Time				20	uS

ACE303N30XXX + (3.0V) (T<sub>opt</sub>=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-V <sub>DET</sub>	Detector Threshold		2.91	3.00	3.09	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.060	0.12	0.18	V
I <sub>SS</sub>	Current Consumption	V <sub>DD</sub> =5.0V		0.5	2.5	uA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage			0.5		V
I <sub>OUT</sub>	Output Current	V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.7V	0.01	0.05		mA
T <sub>PLH</sub>	Output Delay Time				20	uS

ACE303N33XXX + (3.3V) (T<sub>opt</sub>=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-V <sub>DET</sub>	Detector Threshold		3.201	3.300	3.399	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.066	0.132	0.198	V
I <sub>SS</sub>	Current Consumption	V <sub>DD</sub> =5.0V		0.5	2.5	uA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage			0.5		V
I <sub>OUT</sub>	Output Current	V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.7V	0.01	0.05		mA
T <sub>PLH</sub>	Output Delay Time				20	uS



# ACE303

## High-precision Low Voltage Detector

ACE303N34XXX + (3.4V) (T<sub>opt</sub>=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-V <sub>DET</sub>	Detector Threshold		3.298	3.400	3.502	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.068	0.136	0.204	V
I <sub>SS</sub>	Current Consumption	V <sub>DD</sub> =5.0V		0.5	2.5	uA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage			0.5		V
I <sub>OUT</sub>	Output Current	V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.7V	0.01	0.05		mA
T <sub>PLH</sub>	Output Delay Time				20	uS

ACE303N35XXX + (3.5V) (T<sub>opt</sub>=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-V <sub>DET</sub>	Detector Threshold		3.395	3.500	3.605	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.070	0.140	0.210	V
I <sub>SS</sub>	Current Consumption	V <sub>DD</sub> =5.0V		0.5	2.5	uA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage			0.5		V
I <sub>OUT</sub>	Output Current	V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.7V	0.01	0.05		mA
T <sub>PLH</sub>	Output Delay Time				20	uS

ACE303N40XXX + (4.0V) (T<sub>opt</sub>=25°C, Unless otherwise specified.)

Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
-V <sub>DET</sub>	Detector Threshold		3.880	4.000	4.120	V
V <sub>HYS</sub>	Detector Threshold Hysteresis		0.08	0.16	0.24	V
I <sub>SS</sub>	Current Consumption	V <sub>DD</sub> =5.0V		0.5	2.5	uA
V <sub>DDH</sub>	Maximum Operating Voltage				10	V
V <sub>DDL</sub>	Minimum Operating Voltage			0.5		V
I <sub>OUT</sub>	Output Current	V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.7V	0.01	0.05		mA
T <sub>PLH</sub>	Output Delay Time				20	uS



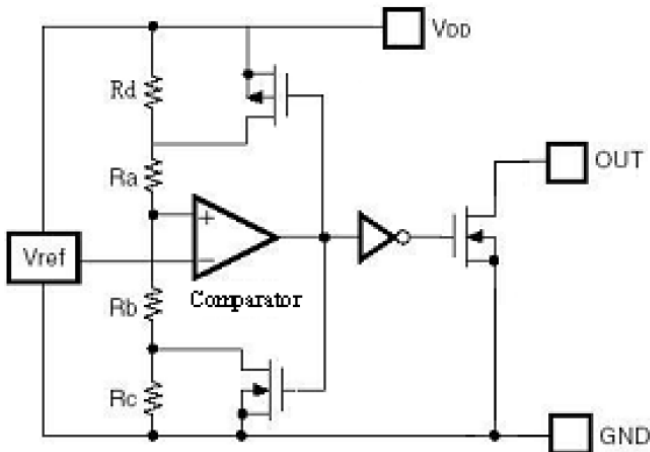
# ACE303

## High-precision Low Voltage Detector

ACE303N44XX + (4.4V) (Topt=25°C, Unless otherwise specified.)

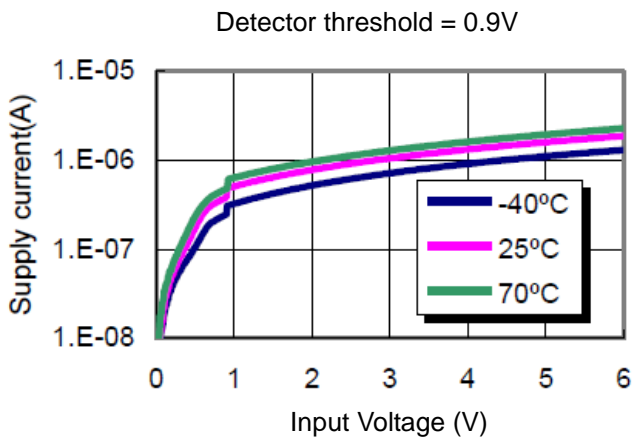
Symbol	Parameter	Conditions	Reference data			Unit
			Min.	Typ.	Max.	
$-V_{DET}$	Detector Threshold		4.268	4.400	4.532	V
$V_{HYS}$	Detector Threshold Hysteresis		0.088	0.176	0.264	V
$I_{SS}$	Current Consumption	$V_{DD}=6.4V$		0.5	2.5	uA
$V_{DDH}$	Maximum Operating Voltage				10	V
$V_{DDL}$	Minimum Operating Voltage			0.5		V
$I_{OUT}$	Output Current	$V_{DS}=0.05V, V_{DD}=0.7V$	0.01	0.05		mA
$T_{PLH}$	Output Delay Time				20	uS

### Function description



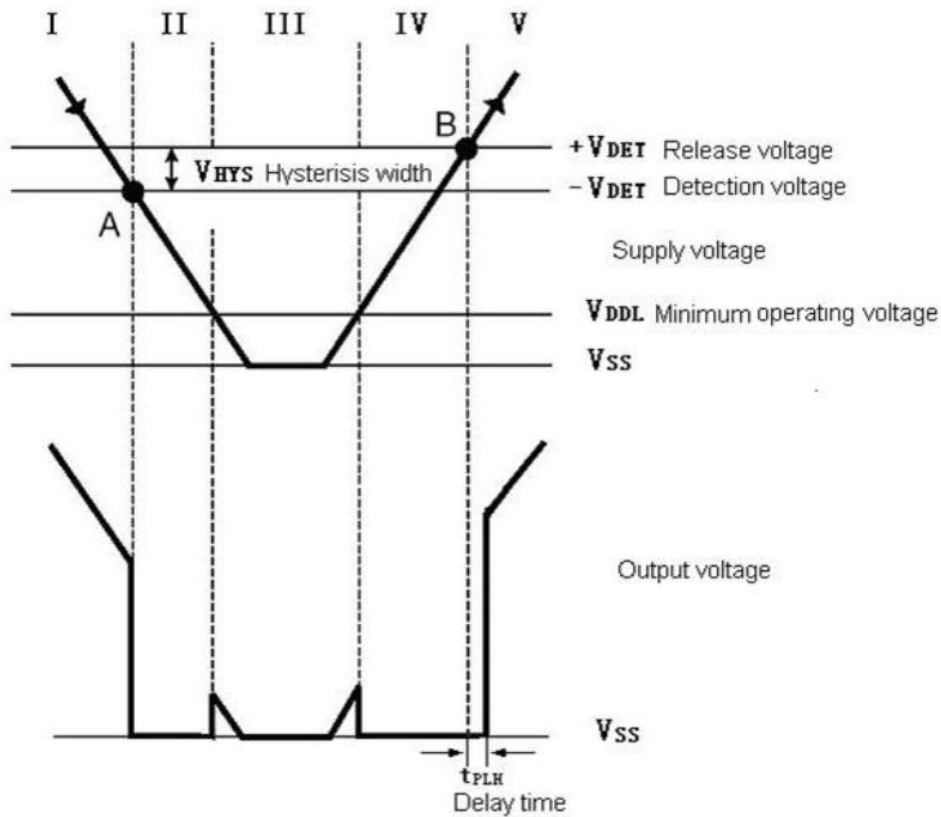
High precision low temperature coefficient reference voltage is applied to the negative input of a comparator. Input voltage, divided by resistor array of Ra Rb and Rc, is applied to the positive input of the comparator. Output of the comparator controls a pair of NMOS and PMOS switches, generating the hysteresis. Output of the comparator passes a series of buffer to drive the output NMOS.

### Electrical Characteristics



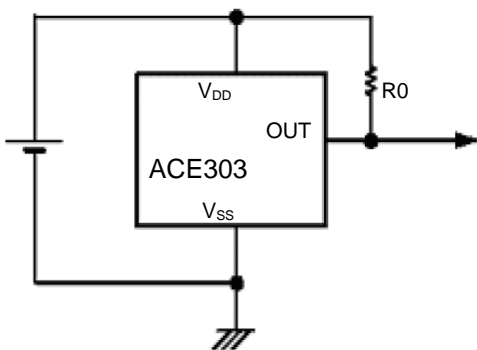


Output Action



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 GNP level
III	$V_{DD}$ drops further below $V_{DDL}$	Output voltage is undefined
IV	$V_{DD}$ rises above $V_{DDL}$	Output voltage equals to GNP level
V	$V_{DD}$ rises above $+V_{DET}$	Output voltage equals to supply voltage, $V_{HYS} = (+V_{DET}) - (-V_{DET})$

Typical application



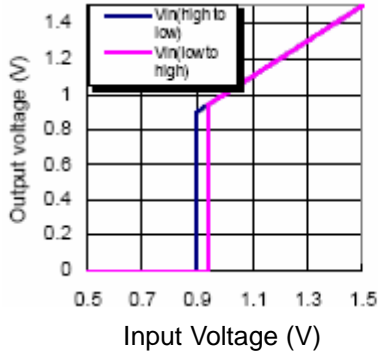


Typical Performance Characteristics

(1) Output voltage VS. Input Voltage

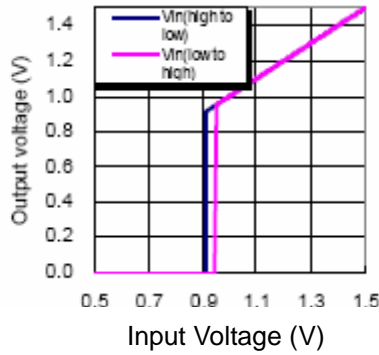
Detector threshold=0.9V

(-40°C)



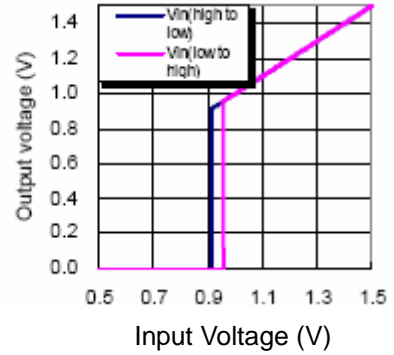
Detector threshold=0.9V

(25°C)



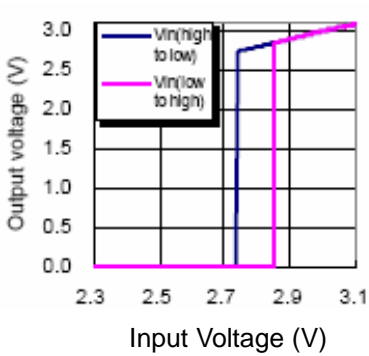
Detector threshold=0.9V

(70°C)



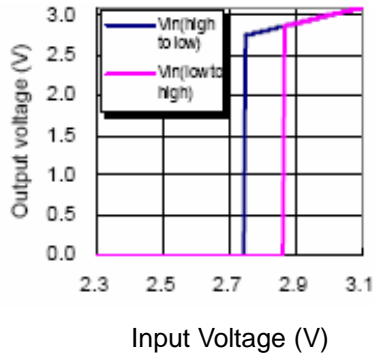
Detector threshold=2.7V

(-40°C)



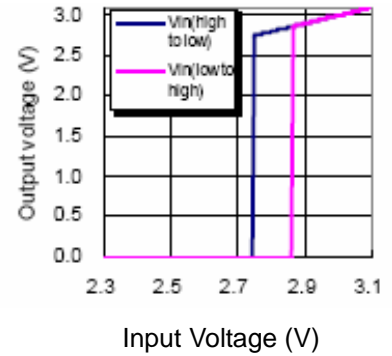
Detector threshold=2.7V

(25°C)



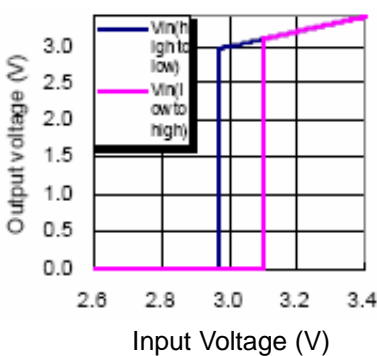
Detector threshold=2.7V

(70°C)



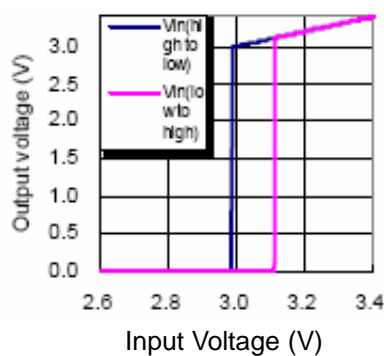
Detector threshold=3.0V

(-40°C)



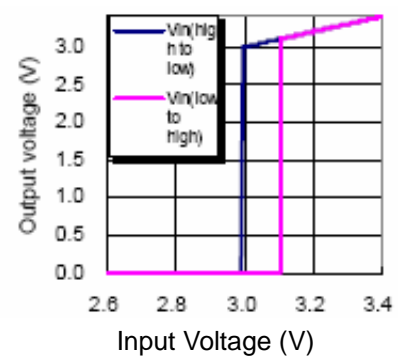
Detector threshold=3.0V

(25°C)



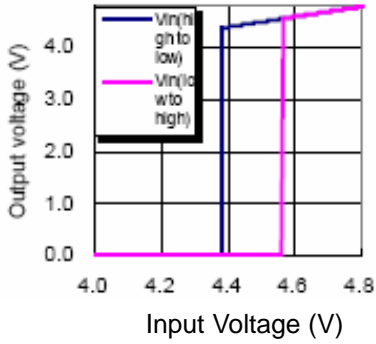
Detector threshold=3.0V

(70°C)

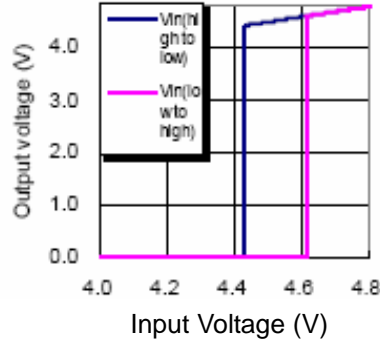




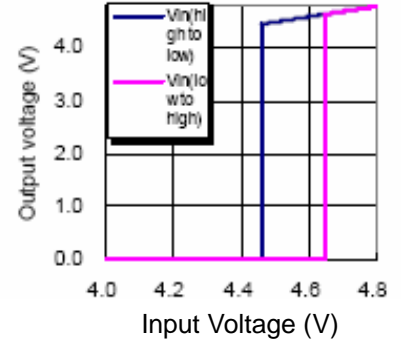
Detector threshold=4.4V  
(-40°C)



Detector threshold=4.4V  
(25°C)

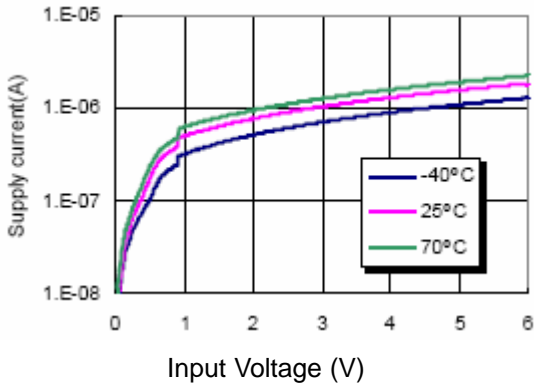


Detector threshold=4.4V  
(70°C)

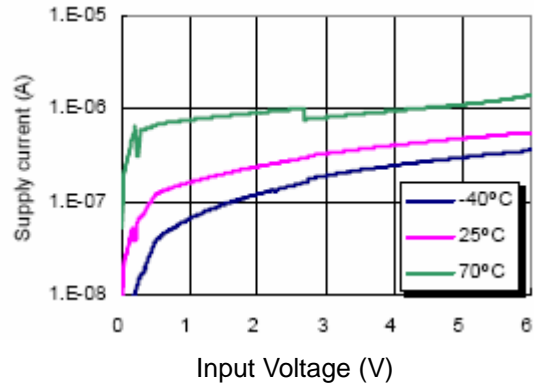


(2) Supply current VS. Input Voltage

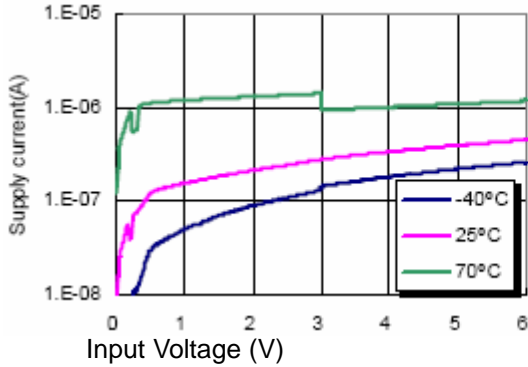
Detector threshold=0.9V



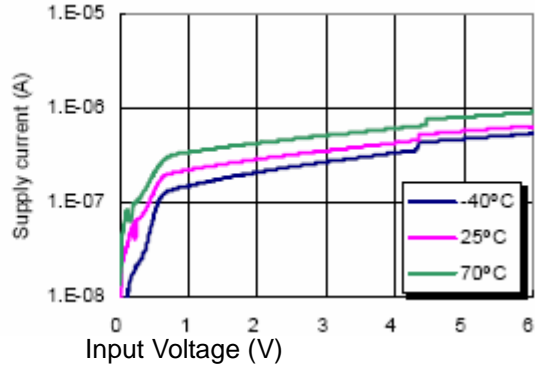
Detector threshold=2.7V



Detector threshold=3.0V



Detector threshold=4.4V

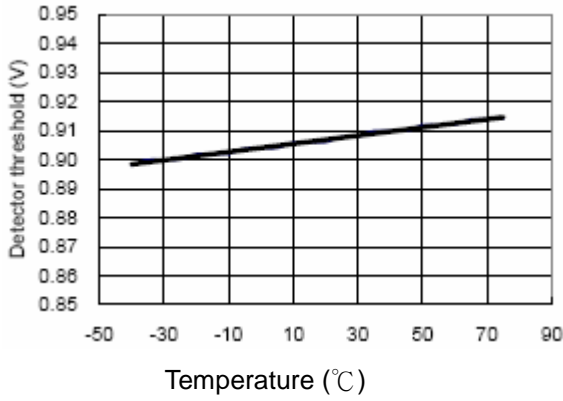




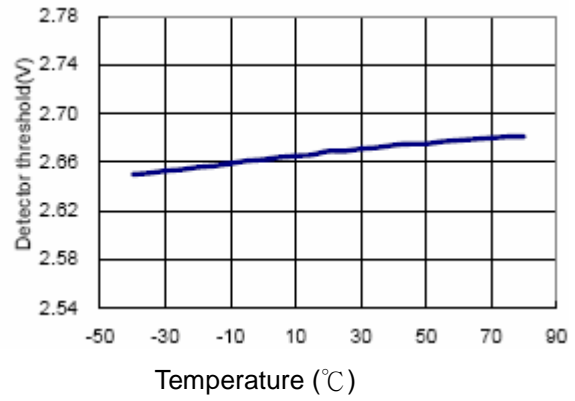


(3) Detector Threshold Hysteresis VS. Temperature

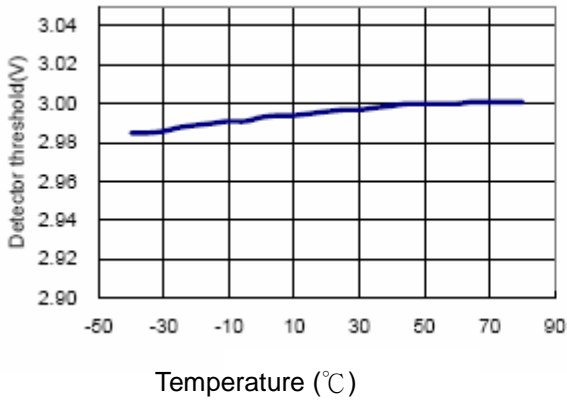
Detector threshold=0.9V



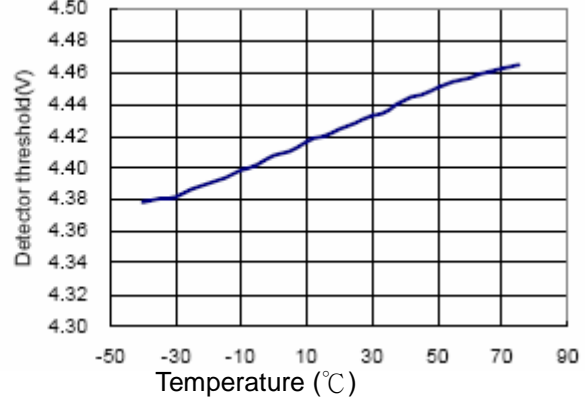
Detector threshold=2.7V



Detector threshold=3.0V

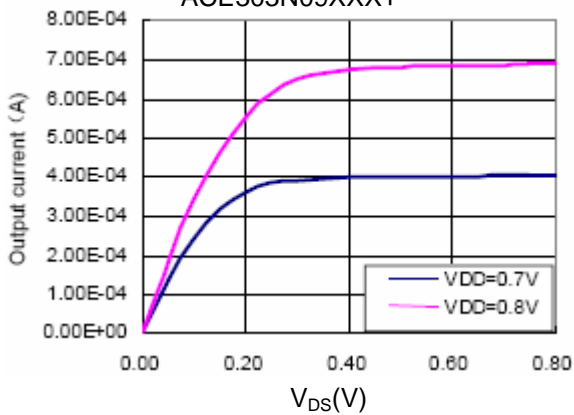


Detector threshold=4.4V

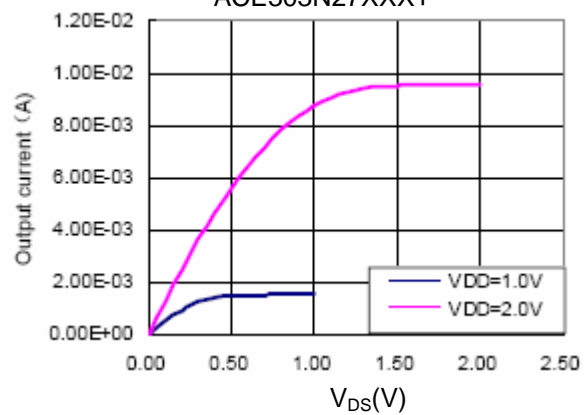


(4) Driver Output Current VS. V<sub>DS</sub>

ACE303N09XXX+



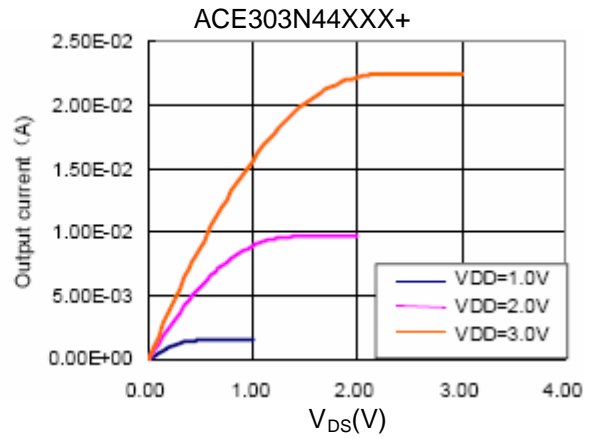
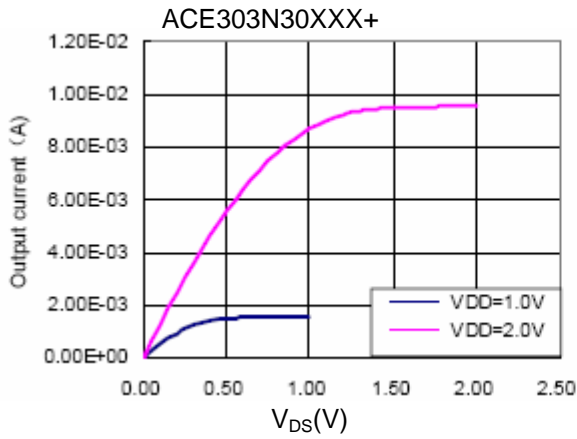
ACE303N27XXX+



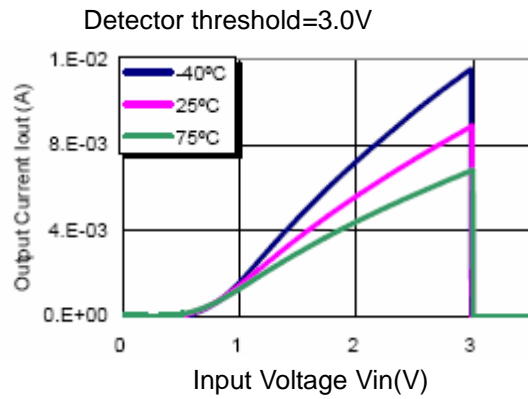
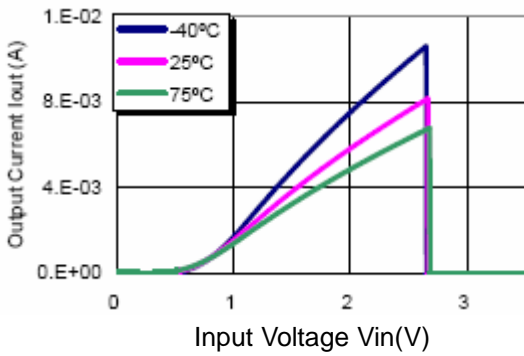


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## High-precision Low Voltage Detector



(5) Driver Output Current VS. Input Voltage  
Detector threshold=2.7V







# ACE303

## High-precision Low Voltage Detector

### Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ACE Technology Co., LTD.  
<http://www.ace-ele.com/>