High Voltage High Precision Voltage Detector

■ General Description

The LN70XX series is a series of high voltage high-precision voltage detectors developed using standard CMOS process. The detection voltage is fixed internally with an accuracy of ±2.4%. Two output forms, Nch open-drain output, are available low current consumption and miniature package lineup can meet demand from the portable device applications.

■ Features

- Low current consumption 3μA typ. （Vin=8V）
- High-precision detection voltage ±2.4 %
- Operating voltage range -0.3V to 22V
- Detection voltage 2.4V to 7.0V (0.1V step)
- Output form Nch open-drain output (Active Low)
- Small package: TO-92 and others consumer required

■ Applications

- Battery checkers
- Power failure detectors
- Power monitor for portable equipments such as pagers, calculators, electronic notebooks and remote controllers.
- Constant voltage power monitor for cameras, video equipments and communication devices.
- Power monitor for microcomputers and reset for CPUs.

■ Package

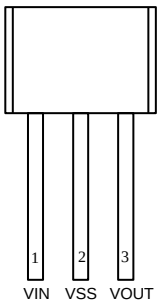
- SOT-89-3
- TO-92
- SOT23-3

■ Ordering Information

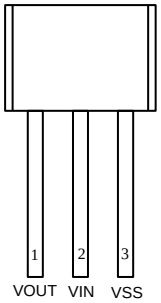
LN70 ①②③④

Designator	Description	Symbol	Description
① ②	Detect Voltage	15~50	e.g. 2.5V → ②2 , ③5
			e.g. 3.8V → ②3, ③8
③	Package	P	SOT-89-3
		T	TO-92
		V	SOT23-3
④	Device Orientation	R	Embossed tape, standard feed
		L	Embossed tape, reverse feed

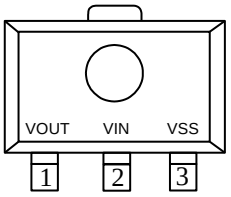
■ Pin Configurations



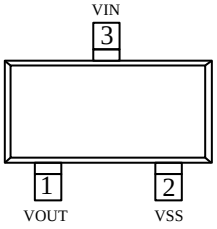
TO-92 (L Type)
(Front View)



TO-92 (T Type)
(Front View)



SOT-89-3L
(Top View)

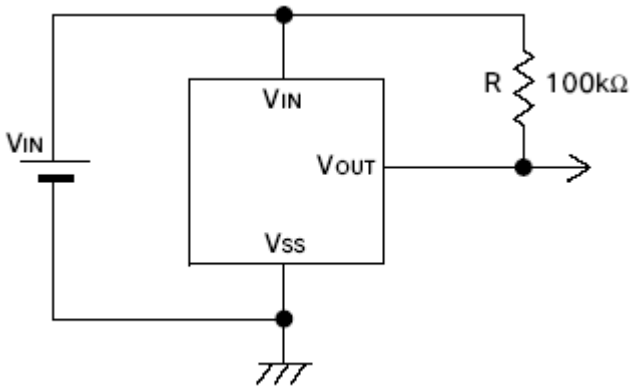


SOT-23-3
(TOP VIEW)

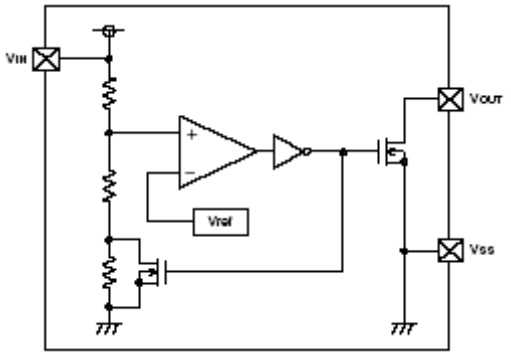
■ Pin Function Description

Pin No.				Pin name	Pin description
TO-92（T）	TO-92（L）	SOT23-3	SOT-89-3		
2	1	3	2	VIN	Voltage input pin
3	2	2	3	VSS	GND pin
1	3	1	1	VOUT	Voltage detection output pin

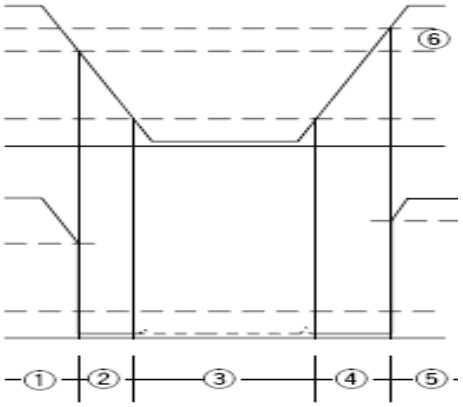
■ Typical Application Circuit



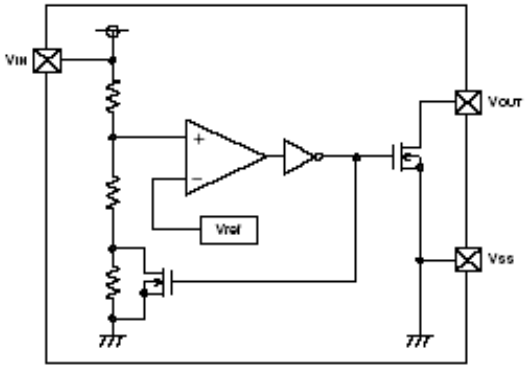
■ Function Block Diagram



■ Timing Chart



■ Operation



1-1. When the power supply voltage (V_{DD}) is higher than the release voltage (V_{DF}), the Nch transistor is OFF，Vout is pull up by external resistor to high logic.

1-2. When the power supply voltage (V_{DD}) is lower than the release voltage (V_{DF}), the Nch transistor is ON Vout is low.

1-3. When the V_{DD} falls below the minimum operating voltage, the output becomes undefined.

1-4. The V_{SS} level appears when the V_{DD} rises above the minimum operating voltage. The V_{SS} level still appears even when the V_{DD} surpasses − V_{DF}, as long as it does not exceed the release voltage + V_{DF}.

1-5. When the V_{DD} rises above + V_{DF} the Nch transistor becomes OFF, Vout is pull up by external resistor to high logic.

■ Absolute Maximum Ratings

Ta=25℃

Item		Symbol	Absolute maximum ratings	unit
Power supply voltage		Vin	22	V
Output current		Iout	50	mA
Output voltage				V
	N-ch		Vss-0.3～22	
Power dissipation	TO-92，SOT23-3	Pd	300	mW
	SOT-89-3		500	
Operating ambient temperature		Topr	-40～+85	℃

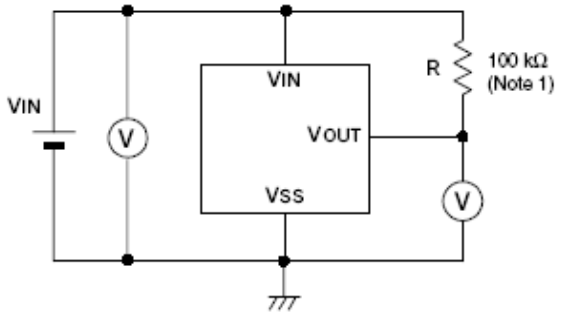
■ Electrical Characteristics

$V_{DF(T)}$=2.4V to 7.0V ±2.4% Ta=25℃

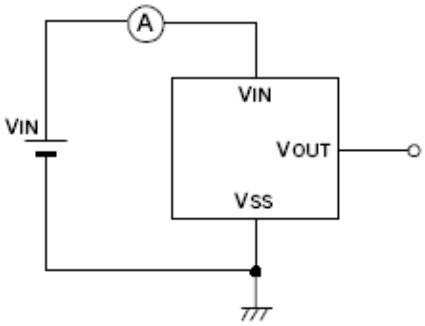
Item	Symbol	Condition		Min.	Typ.	Max.	unit	Test circuit
Detection voltage	V_{DF}			VDFx0.976	VDF	VDF x1.024	V	1
Release voltage	V_{HYS}			VDF x0.02	VDF x0.05	VDF x0.08	V	1
Current consumption	I_{SS}	Vin=8V			3	5.6	μA	2
Output sink current	I_{OL}	Vdd=3.0V	Vout=0.3V	0.8	1.5		mA	3
		Vdd=3.3V	Vout=0.33V	1	2			
		Vdd=3.6V	Vout=0.36V	1.2	2.5			
		Vdd=4.1V	Vout=0.41V	6.0	11.5			
Temperature coefficient		-40～+85℃			±100		ppm/℃	

■ Test Circuit

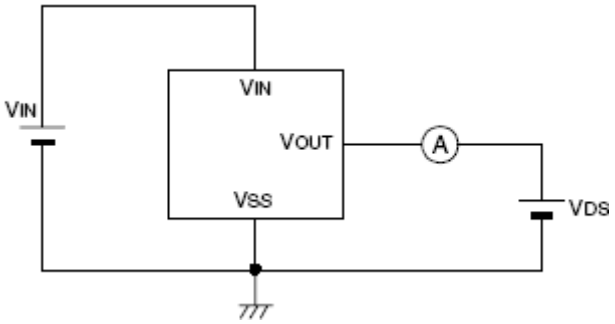
circuit1



circuit 2



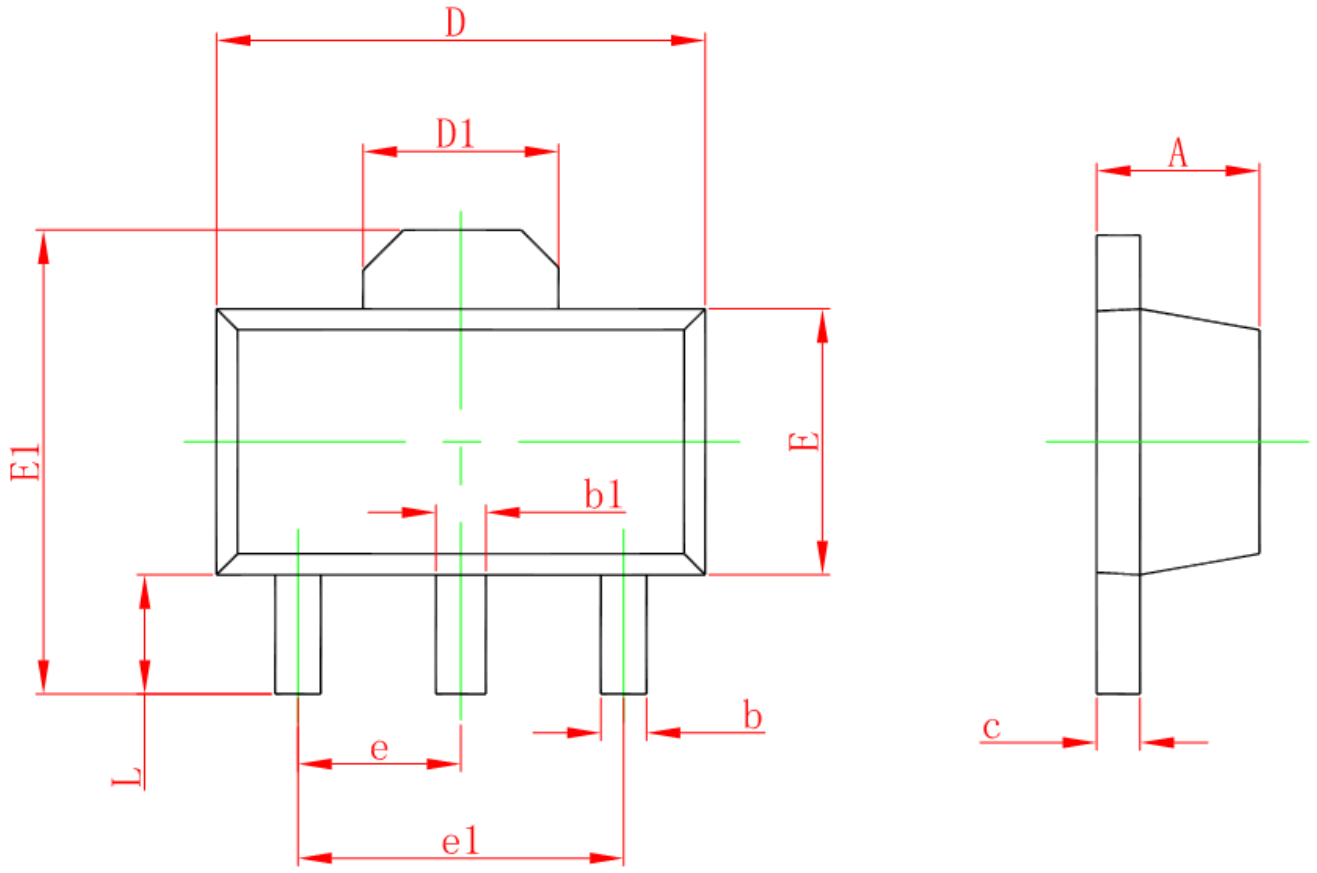
circuit 3



Note1 : The resistor is selected according the custom's system

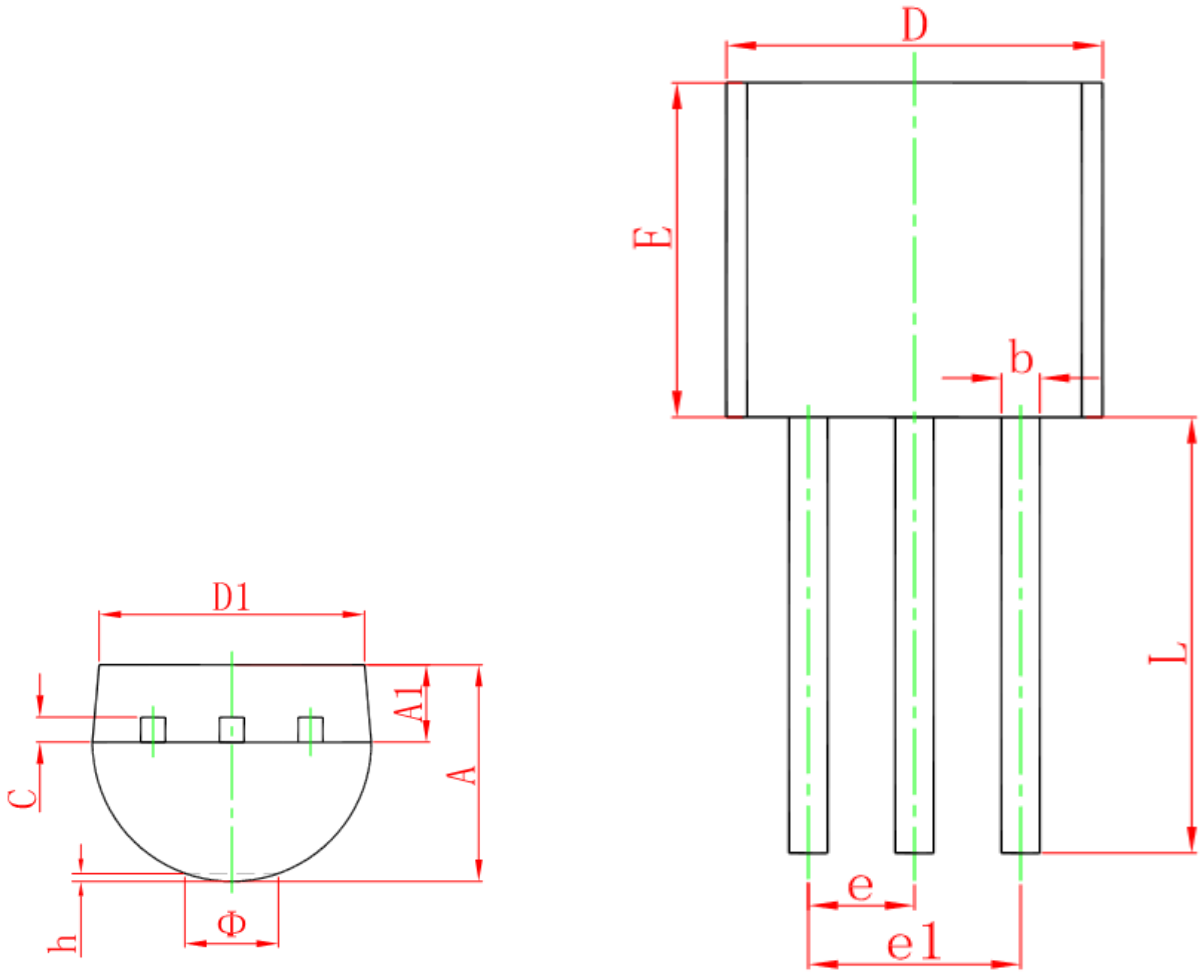
■ Package Information

- SOT-89-3



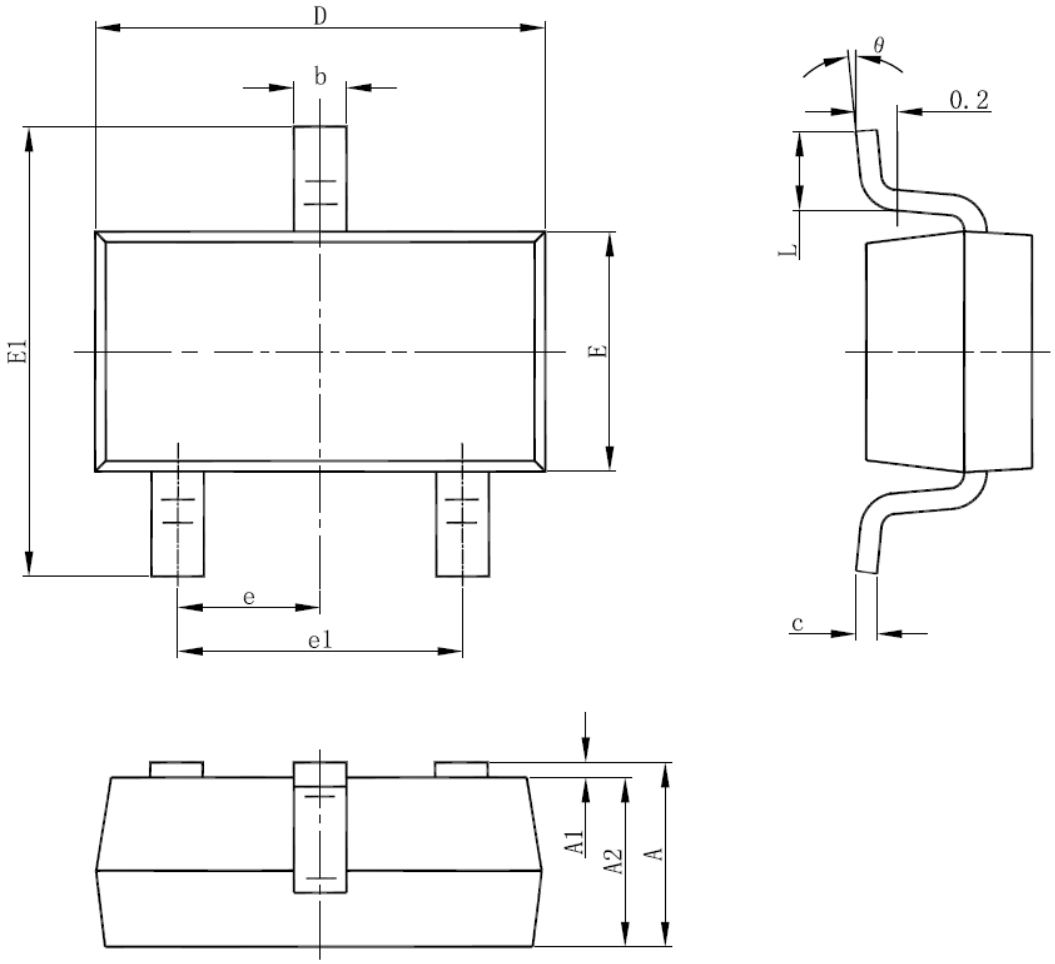
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

- TO-92



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

- SOT23-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°