

3-Pin Microprocessor Reset Circuits

❖ GENERAL DESCRIPTION

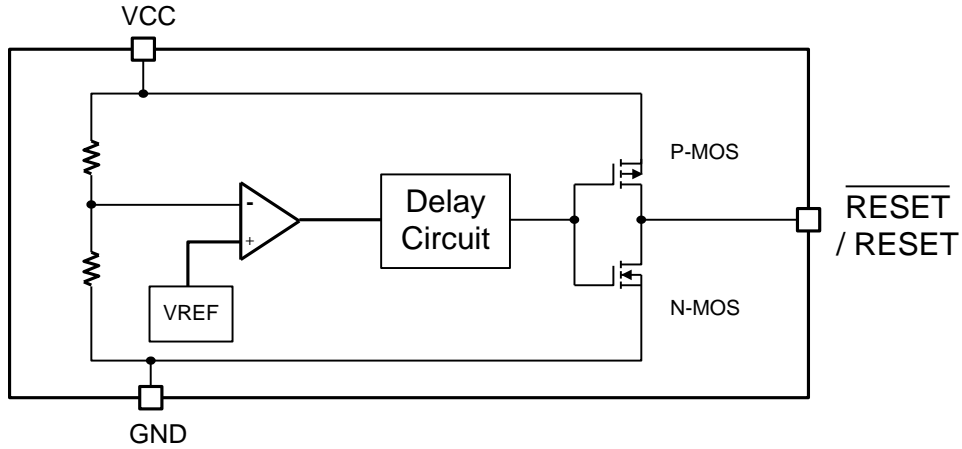
The AX6905/6 is used for microprocessor (μ P) supervisory circuits to monitor the power supplies in μ P and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V, +2.5V powered circuits.

These circuits perform a single function: they assert a reset signal whenever the VCC supply voltage declines below a preset threshold, keeping it asserted for at least 200ms after VCC has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available. The AX6905/6 has push pull outputs. The AX6905 have an active low $\overline{\text{RESET}}$ output, while the AX6906 has an active high RESET output. The reset comparator is designed to ignore fast transients on VCC, and the outputs are guaranteed to be in the correct logic state for VCC down to 1.0V. Low supply current makes the AX6905/6 ideal for use in portable equipment. The AX6905/6 is available in a 3-pin SOT-23 and SC70 package.

❖ FEATURES

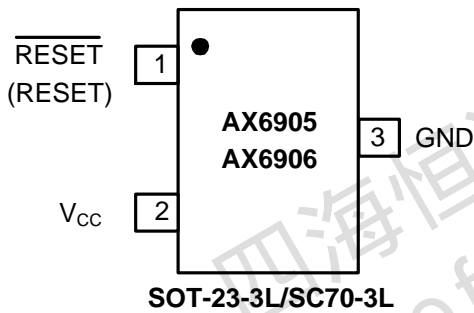
- Precision Monitoring of +2.5,+3V, +3.3V, and +5V Power-Supply Voltages
- Fully Specified Over Temperature
- Available in Three Output Configurations
- Push-Pull $\overline{\text{RESET}}$ Low Output (AX6905)
- Push-Pull RESET High Output (AX6906)
- 200ms (Typ.)min Power-On Reset Pulse Width
- 25 μ A Supply Current
- Guaranteed Reset Valid to VCC = +1.0V
- Power Supply Transient Immunity
- No External Components
- Available in the 3-Pin Pb-Free SOT-23 and SC70 Package

❖ BLOCK DIAGRAM



❖ PIN ASSIGNMENT

The packages of AX6905/6 are SOT-23-3L and SC70-3L; the pin assignment is given by:
(Top View)



Name	Description
GND	Ground
RESET (RESET)	Reset output pin L: for AX6905 H: for AX6906
Vcc	Operating voltage input

❖ ORDER/MARKING INFORMATION

Order Information	
AX690 X X X X	
Enable 5: Active-Low 6: Active-High	Voltage A: 4.63 B: 4.38 C: 4.00 D: 3.08 E: 2.93 F: 2.63 G: 2.25 H: 2.70 I : 4.25
Package A: SC70-3L R: SOT-23-3L	
Packing Blank : Bag A : Taping	
Top Marking	
L L Y W X → ID Code: internal WW : 01~26(A~Z) 27~52(a~z) Year : A = 2010 1 = 2011 Identification code	L L Y W → WW : 01~26(A~Z) 27~52(a~z) ID Code: internal Year : A = 2010 1 = 2011 Identification code

Appendix

Part Number	Package	Identification Code	Part Number	Package	Identification Code
AX6905A	SOT23-3L	SA	AX6905A	SC70-3L	SQ
AX6905B	SOT23-3L	SB	AX6905B	SC70-3L	SR
AX6905C	SOT23-3L	SC	AX6905C	SC70-3L	SS
AX6905D	SOT23-3L	SD	AX6905D	SC70-3L	ST
AX6905E	SOT23-3L	SE	AX6905E	SC70-3L	SU
AX6905F	SOT23-3L	SF	AX6905F	SC70-3L	SV
AX6905G	SOT23-3L	SG	AX6905G	SC70-3L	SW
AX6905H	SOT23-3L	Sa	AX6905H	SC70-3L	Sc
AX6905I	SOT23-3L	Sb	AX6905I	SC70-3L	Sd
AX6906A	SOT23-3L	SH	AX6906A	SC70-3L	SX
AX6906B	SOT23-3L	SI	AX6906B	SC70-3L	SY
AX6906C	SOT23-3L	SJ	AX6906C	SC70-3L	SZ
AX6906D	SOT23-3L	SK	AX6906D	SC70-3L	S2
AX6906E	SOT23-3L	SL	AX6906E	SC70-3L	S3
AX6906F	SOT23-3L	SO	AX6906F	SC70-3L	S4
AX6906G	SOT23-3L	SP	AX6906G	SC70-3L	S5
AX6906H	SOT23-3L	Se	AX6906H	SC70-3L	Sg
AX6906I	SOT23-3L	Sf	AX6906I	SC70-3L	Sh

❖ ABSOLUTE MAXIMUM RATINGS (at $T_A=25^{\circ}\text{C}$)

Characteristics	Symbol	Rating	Unit
VCC Pin Voltage	V_{CC}	GND - 0.3 to GND + 6.5	V
RESET, $\overline{\text{RESET}}$ (push-pull) Pin Voltage	V_{RESET}	GND - 0.3 to $V_{CC} + 0.3$	V
Input Current, V_{CC}	I_{CC}	20	mA
Output Current, RESET, $\overline{\text{RESET}}$	I_O	5	mA
Power Dissipation	PD	$(T_J - T_A) / \theta_{JA}$	mW
Storage Temperature Range	T_{ST}	-60 to +150	$^{\circ}\text{C}$
Operating Temperature Range	T_{OP}	-40 to +85	$^{\circ}\text{C}$
Junction Temperature	T_J	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance from Junction to case	θ_{JC}	110	$^{\circ}\text{C/W}$
Thermal Resistance from Junction to ambient	θ_{JA}	250	$^{\circ}\text{C/W}$

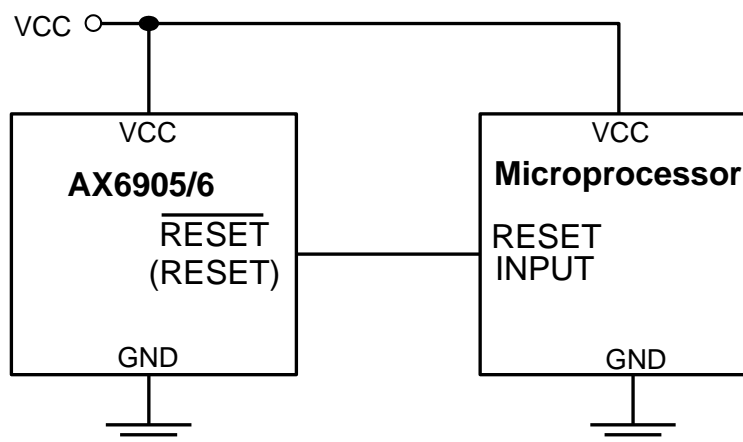
Note : θ_{JA} is measured with the PCB copper area of approximately 1 in²(Multi-layer). That need connect to Vss pin.

❖ ELECTRICAL CHARACTERISTICS

T_A=25°C (unless otherwise noted)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Operating V _{CC} Range	V _{Range}		1.0	-	6	V
Supply Current	I _{CC}	V _{CC} = V _{TH} +1.0V	-	25	35	μA
Reset Threshold T _A =25°C	V _{TH}	AX6905/6A	4.54	4.63	4.71	V
		AX6905/6B	4.29	4.38	4.46	
		AX6905/6I	4.16	4.25	4.33	
		AX6905/6C	3.92	4.00	4.08	
		AX6905/6D	3.02	3.08	3.15	
		AX6905/6E	2.87	2.93	3.00	
		AX6905/6H	2.64	2.70	2.75	
		AX6905/6F	2.57	2.63	2.69	
AX6905/6G	2.20	2.25	2.30			
Reset Threshold Tempco	V _{THT}	T _A = 0°C to +85°C	-	50	-	ppm/°C
Set-up Time	T _S	V _{CC} = 0 to (V _{TH} - 100mV)	1	-	-	μs
V _{CC} to Reset Delay	T _{RD}	V _{CC} =V _{TH} to (V _{TH} -100mV)	-	20	-	μs
Reset Active Timeout Period	T _{DELAY}	T _A = 0°C to +85°C	140	200	260	ms
$\overline{\text{RESET}}$ Output Voltage (AX6905)	V _{OL}	1.8V < V _{CC} < V _{TH(min)} , I _{SINK} = 1.2mA	-	-	0.3	V
		1.2V < V _{CC} < 1.8V, I _{SINK} = 50uA				
	V _{OH}	V _{CC} > V _{TH(max)} , I _{SOURCE} = 500uA,	0.8V _{CC}	-	-	V
RESET Output Voltage (AX6906)	V _{OL}	V _{CC} > V _{TH(max)} , I _{SINK} = 1.2mA,	-	-	0.3	V
		1.8V < V _{CC} < V _{TH(min)} , I _{SOURCE} = 500uA	0.8 V _{CC}	-	-	
	V _{OH}	1.2V < V _{CC} < 1.8V, I _{SOURCE} = 150uA				V
Hysteresis at V _{CC}	V _{Hys}	Input voltage	-	40	-	mV

❖ APPLICATION CIRCUIT



❖ FUNCTION DESCRIPTIONS

A microprocessor's (μP 's) reset input starts the μP in a known state. The AX6905/6 asserts reset to prevent code-execution errors during power-up, power-down, or brownout conditions. They assert a reset signal whenever the VCC supply voltage declines below a preset threshold, keeping it asserted for at least 200ms after VCC has risen above the reset threshold. The AX6905/6 has a push-pull output stage.

❖ APPLICATION INFORMATION

Negative-Going VCC Transients

In addition to issuing a reset to the μP during power-up, power-down, and brownout conditions, the AX6905/6 is relatively immune to short-duration negative-going VCC transients (glitches).

The AX6905/6 does not generate a reset pulse. The graph was generated using a negative going pulse applied to VCC, starting 0.5V above the actual reset threshold and ending below it by the magnitude indicated (reset comparator overdrive). The graph indicates the maximum pulse width a negative going VCC transient can have without causing a reset pulse. As the magnitude of the transient increases (goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, a VCC transient that goes 50mV below the reset threshold A 0.1 μF bypass capacitor mounted as close as possible to the VCC pin provides additional transient immunity.

Ensuring a Valid Reset Output Down to VCC = 0

$\overline{\text{RESET}}$ is guaranteed to be a logic low for VCC > 1.0V. Once VCC exceeds the reset threshold, an internal timer keeps $\overline{\text{RESET}}$ low for the reset timeout period; after this interval, $\overline{\text{RESET}}$ goes high. If a brownout condition occurs (VCC dips below the reset threshold), $\overline{\text{RESET}}$ goes low. Any time VCC goes below the reset threshold, the internal timer resets to zero, and $\overline{\text{RESET}}$ goes low. The internal timer starts after VCC returns above the reset threshold, and $\overline{\text{RESET}}$ remains low for the reset timeout period.

When VCC falls below 1.0V, the AX6905 $\overline{\text{RESET}}$ output no longer sinks current—it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to $\overline{\text{RESET}}$ can drift to undetermined voltages.

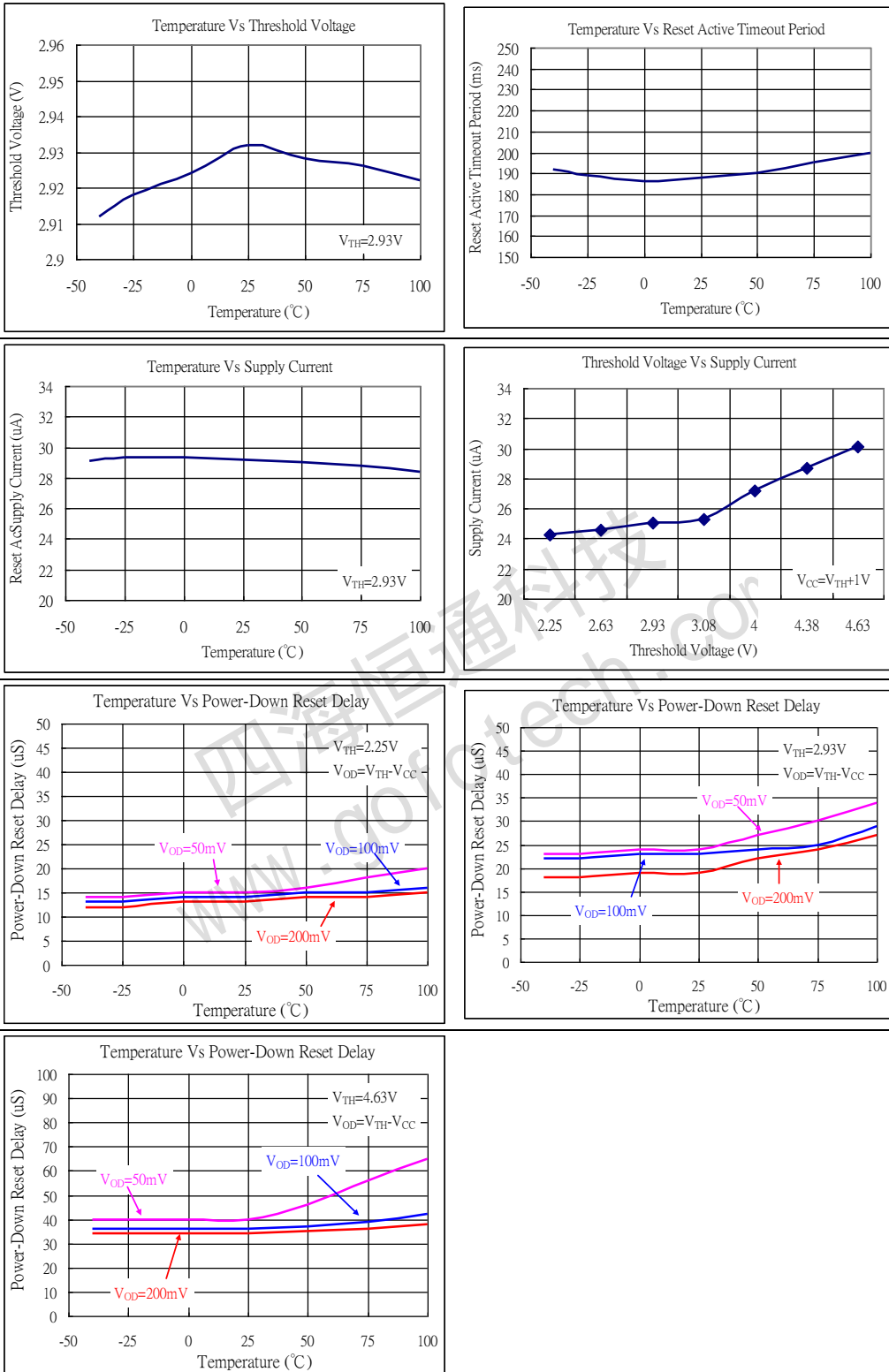
This presents no problem in most applications since most μP and other circuitry is inoperative with VCC below 1.0V. However, in applications where $\overline{\text{RESET}}$ must be valid down to 0V, adding a pull down resistor to $\overline{\text{RESET}}$ causes any stray leakage currents to flow to ground, holding $\overline{\text{RESET}}$ low. R1's value is not critical; 100k is large enough not to load $\overline{\text{RESET}}$ and small enough to pull $\overline{\text{RESET}}$ to ground. For the AX6906 if $\overline{\text{RESET}}$ is required to remain valid for VCC < 1.0V.

Benefits of Highly Accurate Reset Threshold

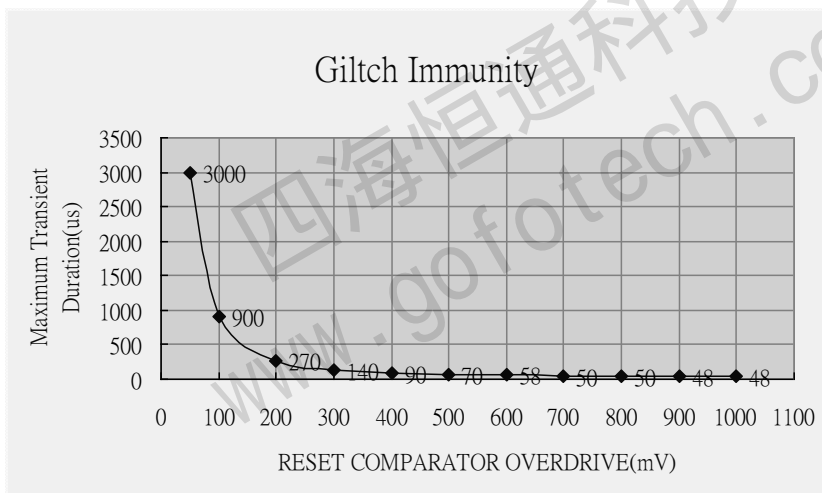
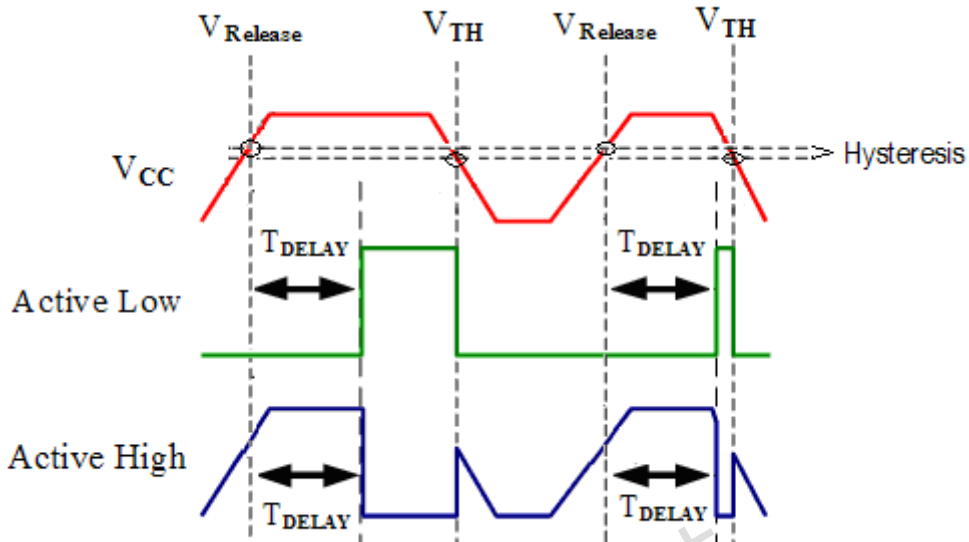
Most μ P supervisor ICs has reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal. When using ICs rated at only the nominal supply $\pm 5\%$, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

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❖ TYPICAL CHARACTERISTICS

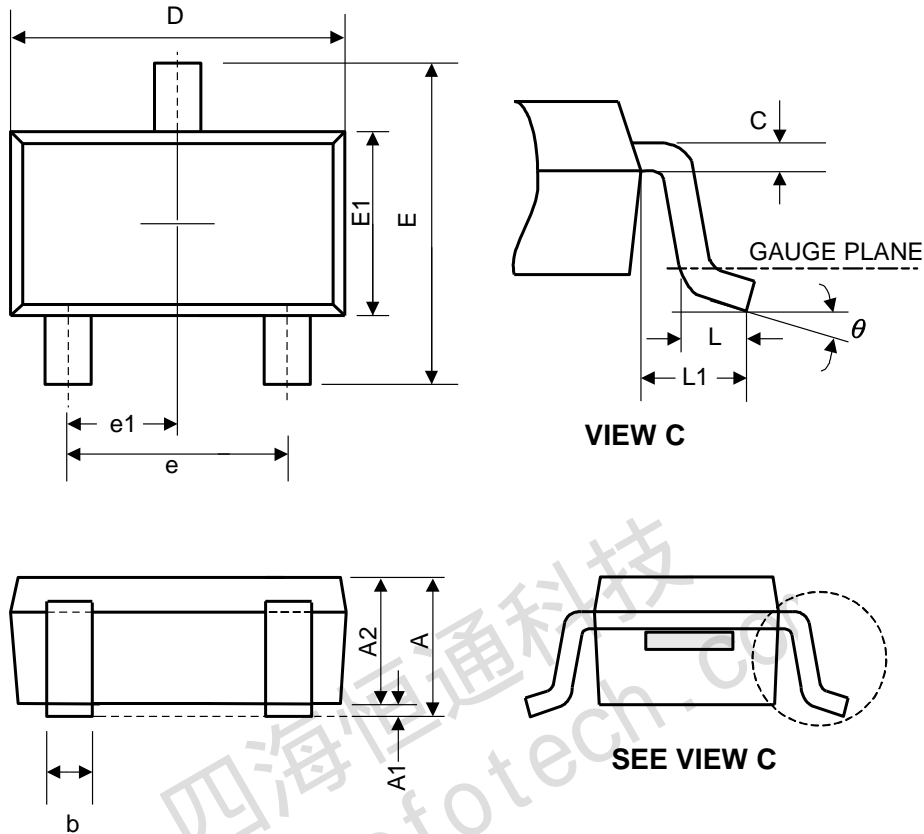


❖ TIMING DIAGRAM



❖ PACKAGE OUTLINES

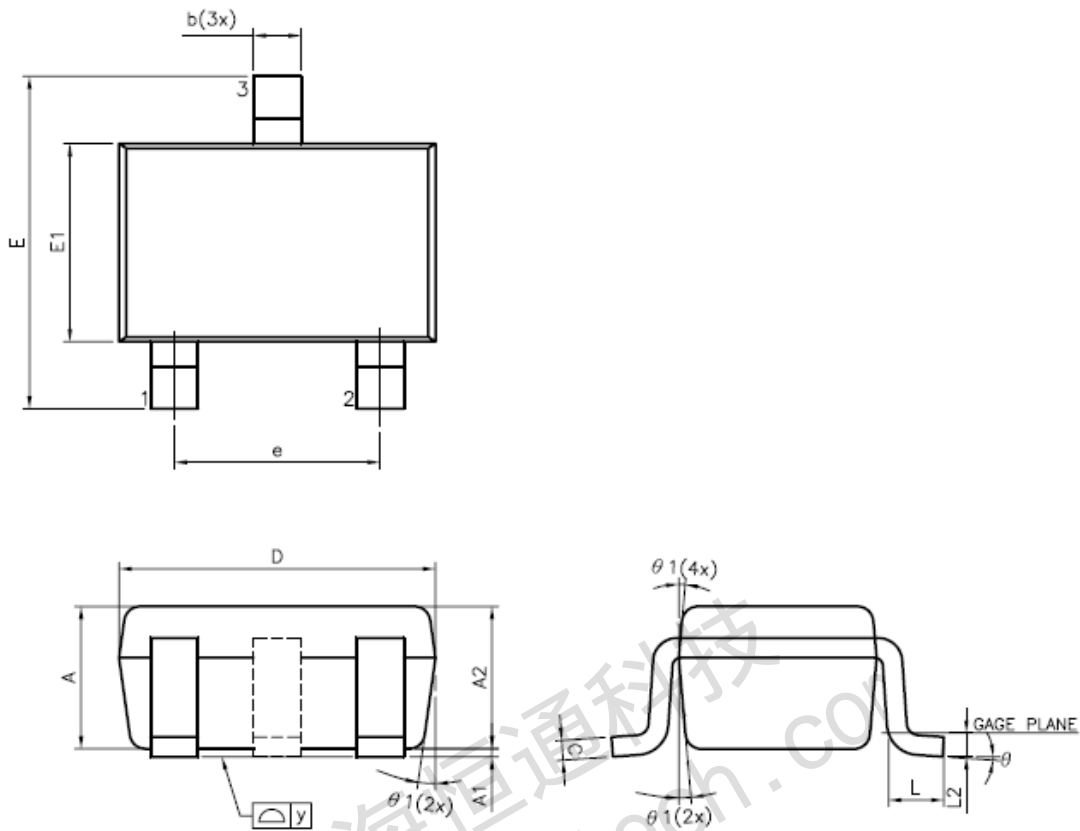
(1) SOT-23-3L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.45	-	-	0.057
A1	0.00	0.08	0.15	-	-	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
b	0.30	0.40	0.50	0.012	0.016	0.020
C	0.08	0.15	0.22	0.003	0.006	0.009
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.40	1.60	1.80	0.055	0.063	0.071
L	0.30	0.45	0.60	0.012	0.018	0.024
L1	0.50	0.60	0.70	0.020	0.024	0.028
e	1.9 BSC			0.075 BSC		
e1	0.95 BSC			0.037 BSC		
θ	0°	4°	8°	0°	4°	8°

JEDEC outline: NA

(2) SC70-3L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70	0.90	1.00	0.028	0.035	0.039
b	0.20	0.30	0.40	0.008	0.012	0.016
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.95	2.20	2.45	0.077	0.087	0.096
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	1.30 BSC			0.051 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
y	-	-	0.10	-	-	0.004
theta	0°	4°	8°	0°	4°	8°
theta	4°	-	12°	4°	-	12°

Mold flash shall not exceed 0.15mm per side