

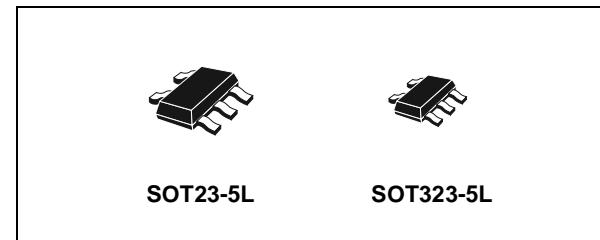
## LOW VOLTAGE CMOS SINGLE 2-INPUT AND GATE WITH 5V TOLERANT INPUT

- 5V TOLERANT INPUTS
- HIGH SPEED:  $t_{PD} = 4.5\text{ns}$  (MAX.) at  $V_{CC} = 3\text{V}$
- LOW POWER DISSIPATION:  
 $I_{CC} = 1\mu\text{A}$  (MAX.) at  $T_A = 25^\circ\text{C}$
- POWER DOWN PROTECTION ON INPUTS  
AND OUTPUTS
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OHI}| = I_{OL} = 24\text{mA}$  (MIN) at  $V_{CC} = 3\text{V}$
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \approx t_{PHL}$
- OPERATING VOLTAGE RANGE:  
 $V_{CC(OPR)} = 1.65\text{V}$  to  $5.5\text{V}$   
(1.2V Data Retention)
- IMPROVED LATCH-UP IMMUNITY

### DESCRIPTION

The 74LX1G08 is a low voltage CMOS SINGLE 2-INPUT AND GATE fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

It is ideal for 1.65 to 5.5  $V_{CC}$  operations and low power and low noise applications. The internal circuit is composed of 3 stages including buffer



### ORDER CODES

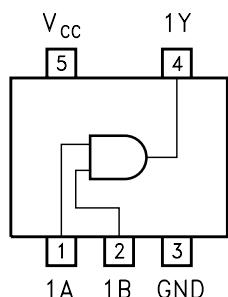
PACKAGE	T & R
SOT23-5L	74LX1G08STR
SOT323-5L	74LX1G08CTR

output, which provide high noise immunity and stable output.

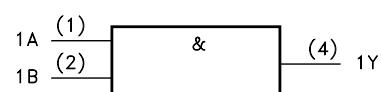
Power down protection is provided on input and output and 0 to 7V can be accepted on inputs with no regard to the supply voltage. It can be interfaced to 5V signal environment for inputs in mixed 3.3/5V system.

All inputs and outputs are equipped with protection circuits against static discharge.

### PIN CONNECTION AND IEC LOGIC SYMBOLS

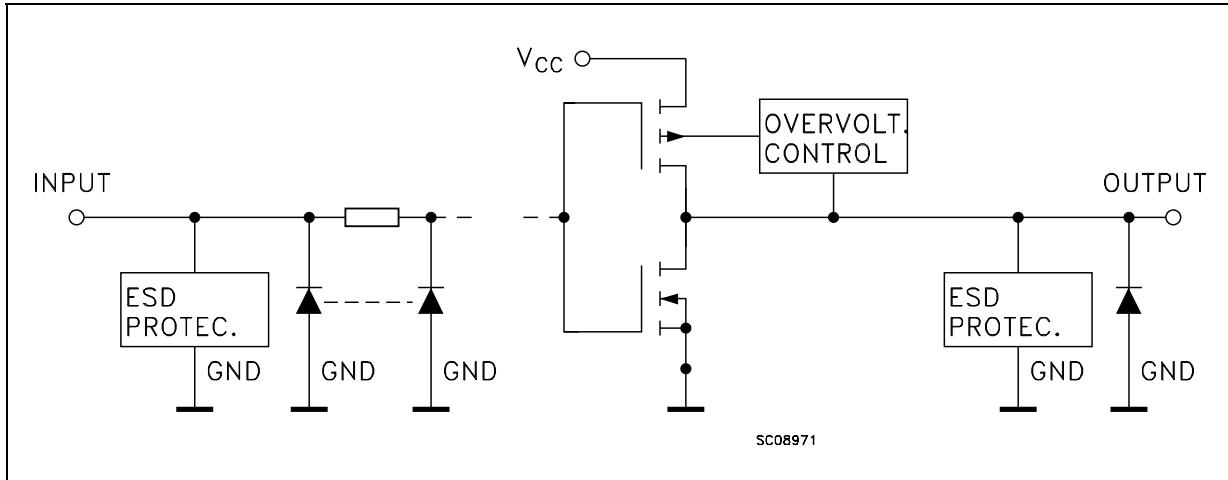


SC12270



LC13640

**INPUT AND OUTPUT EQUIVALENT CIRCUIT**



**PIN DESCRIPTION**

PIN N°	SYMBOL	NAME AND FUNCTION
1	1A	Data Input
2	1B	Data Input
3	GND	Ground (0V)
4	1Y	Data Output
5	V <sub>CC</sub>	Positive Supply Voltage

**TRUTH TABLE**

A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	-0.5 to +7.0	V
V <sub>O</sub>	DC Output Voltage (V <sub>CC</sub> = 0V)	-0.5 to +7.0	V
V <sub>O</sub>	DC Output Voltage (High or Low State) (note 1)	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	- 50	mA
I <sub>ok</sub>	DC Output Diode Current (note 2)	- 50	mA
I <sub>O</sub>	DC Output Current	± 50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current per Supply Pin	± 50	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

1) I<sub>O</sub> absolute maximum rating must be observed

2) V<sub>O</sub> < GND, V<sub>O</sub> > V<sub>CC</sub>

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage (note 1)	1.65 to 5.5	V
$V_I$	Input Voltage	0 to 5.5	V
$V_O$	Output Voltage ( $V_{CC} = 0V$ )	0 to 5.5	V
$V_O$	Output Voltage (High or Low State)	0 to $V_{CC}$	V
$I_{OH}, I_{OL}$	High or Low Level Output Current ( $V_{CC} = 4.5$ to 5.5V)	$\pm 32$	mA
$I_{OH}, I_{OL}$	High or Low Level Output Current ( $V_{CC} = 3.0$ to 3.6V)	$\pm 24$	mA
$I_{OH}, I_{OL}$	High or Low Level Output Current ( $V_{CC} = 2.7$ to 3.0V)	$\pm 12$	mA
$I_{OH}, I_{OL}$	High or Low Level Output Current ( $V_{CC} = 2.3$ to 2.7V)	$\pm 8$	mA
$I_{OH}, I_{OL}$	High or Low Level Output Current ( $V_{CC} = 1.65$ to 2.3V)	$\pm 4$	mA
$T_{op}$	Operating Temperature	-55 to 125	°C
$dt/dv$	Input Rise and Fall Time (note 2)	0 to 10	ns/V

1) Truth Table guaranteed: 1.2V to 3.6V

2)  $V_{IN}$  from 0.8V to 2V at  $V_{CC} = 3.0V$ 

## DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value				Unit	
		$V_{CC}$ (V)		-40 to 85 °C		-55 to 125 °C			
				Min.	Max.	Min.	Max.		
$V_{IH}$	High Level Input Voltage	1.65 to 1.95		0.75 $V_{CC}$		0.75 $V_{CC}$		V	
		2.3 to 2.7		0.7 $V_{CC}$		0.7 $V_{CC}$			
		3.0 to 5.5		0.7 $V_{CC}$		0.7 $V_{CC}$			
$V_{IL}$	Low Level Input Voltage	1.65 to 1.95			0.25 $V_{CC}$		0.25 $V_{CC}$	V	
		2.3 to 2.7			0.3 $V_{CC}$		0.3 $V_{CC}$		
		3.0 to 5.5			0.3 $V_{CC}$		0.3 $V_{CC}$		
$V_{OH}$	High Level Output Voltage	1.65 to 4.5	$I_O = -100 \mu A$	$V_{CC} - 0.1$		$V_{CC} - 0.1$		V	
		1.65	$I_O = -4 mA$	1.2		1.2			
		2.3	$I_O = -8 mA$	1.9		1.9			
		3.0	$I_O = -16 mA$	2.4		2.4			
			$I_O = -24 mA$	2.2		2.2			
		4.5	$I_O = -32 mA$	3.8		3.8			
$V_{OL}$	Low Level Output Voltage	1.65 to 4.5	$I_O = 100 \mu A$		0.1		0.1	V	
		1.65	$I_O = 4 mA$		0.45		0.45		
		2.3	$I_O = 8 mA$		0.3		0.3		
		3.0	$I_O = 16 mA$		0.4		0.4		
			$I_O = 24 mA$		0.55		0.55		
		4.5	$I_O = 32 mA$		0.55		0.55		
$I_I$	Input Leakage Current	1.65 to 5.5	$V_I = 0$ to 5.5V		$\pm 10$		$\pm 10$	$\mu A$	
$I_{off}$	Power Off Leakage Current	0	$V_I$ or $V_O = 5.5V$		10		10	$\mu A$	
$I_{cc}$	Quiescent Supply Current	1.65 to 5.5	$V_I = V_{CC}$ or GND		10		10	$\mu A$	

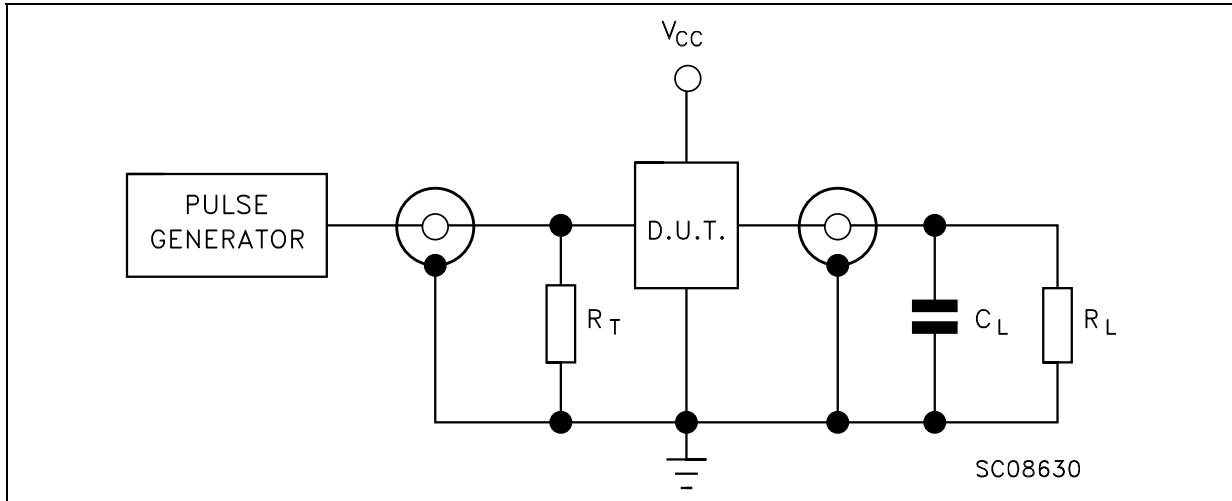
## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition				Value				Unit	
		$V_{CC}$ (V)	$C_L$ (pF)	$R_L$ ( $\Omega$ )	$t_s = t_r$ (ns)	-40 to 85 °C		-55 to 125 °C			
						Min.	Max.	Min.	Max.		
$t_{PLH}$ $t_{PHL}$	Propagation Delay Time	1.65 to 1.95	15	1M $\Omega$	3.0	2	12.0	2	12.0	ns	
		2.3 to 2.7				2	7.0	2	7.0		
		3.0 to 3.6				1	4.7	1	4.7		
		4.5 to 5.5				1	4.1	1	4.1		
		1.65 to 1.95	30	1000	2.0	2	7.5	2	7.5		
		2.3 to 2.7	30	500	2.0	2	5.5	2	5.5		
		2.7	50	500	2.5	1	5.2	1	5.2		
		3.0 to 3.6	50	500	2.5	1	4.2	1	4.2		
		4.5 to 5.5	50	500	2.5	1	3.7	1	3.7		

## CAPACITANCE CHARACTERISTICS

Symbol	Parameter	Test Condition			Value			Unit	
		$V_{CC}$ (V)	$T_A = 25$ °C						
			Min.	Typ.	Max.				
$C_{IN}$	Input Capacitance					4		pF	
$C_{PD}$	Power Dissipation Capacitance (note 1)	1.8	$f_{IN} = 10\text{MHz}$			21		pF	
		2.5				24			
		3.3				26			

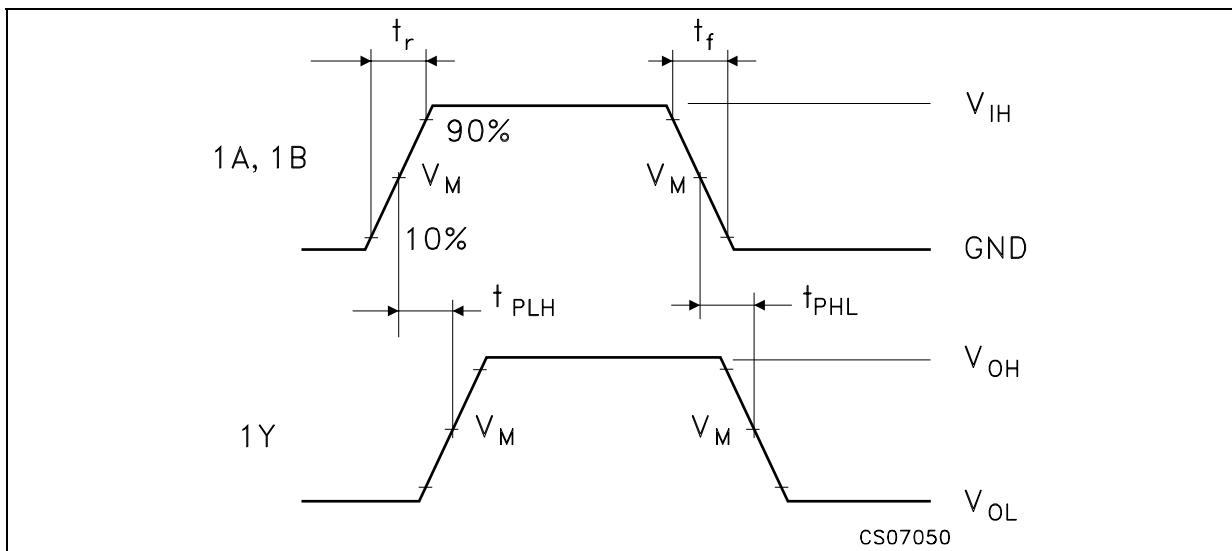
1)  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average current can be obtained by the following equation.  $I_{CC(\text{opr})} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

**TEST CIRCUIT**

$R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

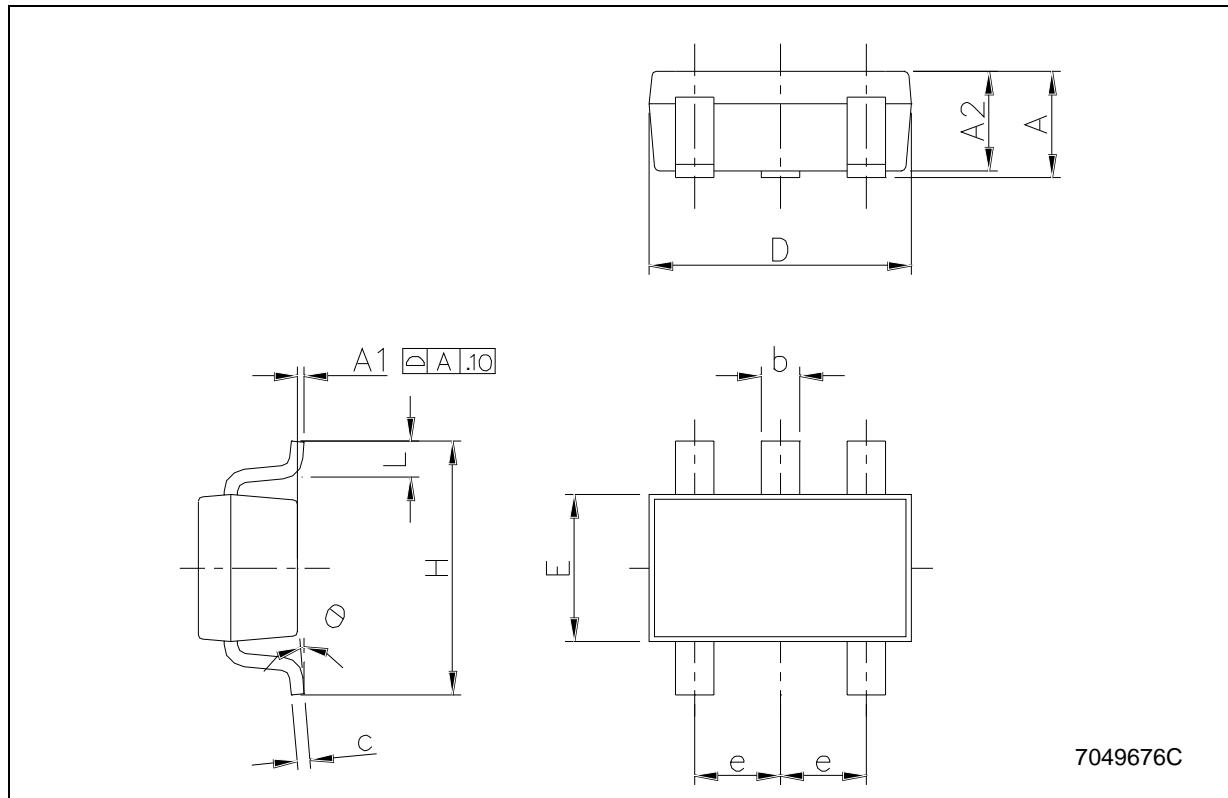
**TEST CIRCUIT AND WAVEFORM SYMBOL VALUE**

Symbol	$V_{CC}$		
	1.65 to 1.95V	2.3 to 2.7V	2.7 to 5.5V
$C_L$	15pF/30pF	15pF/30pF	15pF/50pF
$R_L$	$1M\Omega/1000\Omega$	$1M\Omega/500\Omega$	$1M\Omega/500\Omega$
$V_{IH}$	$V_{CC}$	$V_{CC}$	$V_{CC}$
$V_M$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
$t_r = t_f$	<2.0ns	<2.0ns	<2.5ns

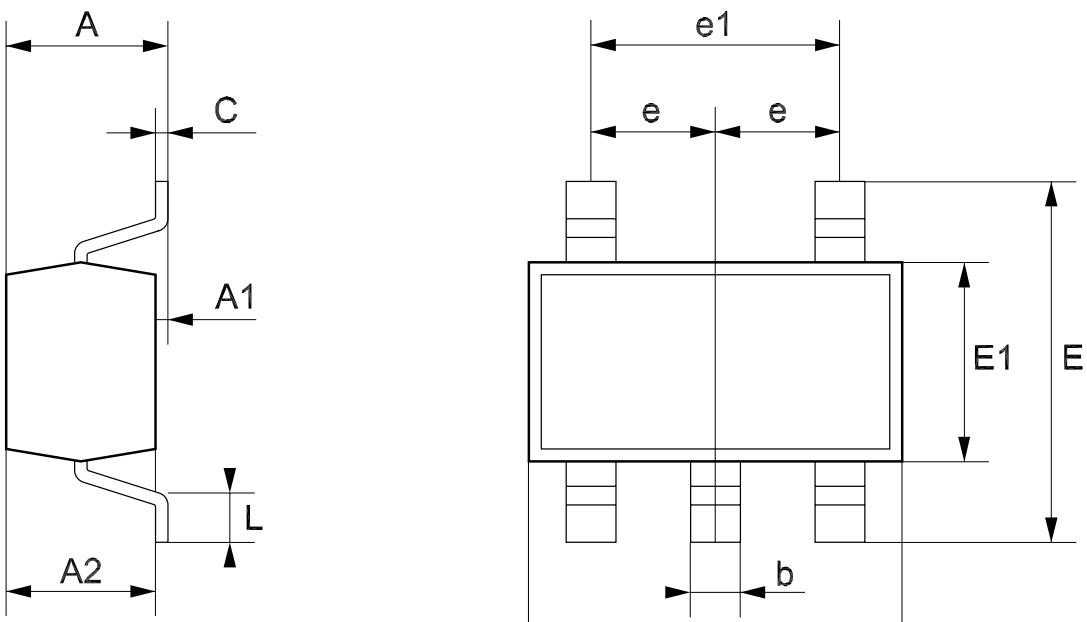
**WAVEFORM: PROPAGATION DELAY (f=1MHz; 50% duty cycle)**

SOT23-5L MECHANICAL DATA						
DIM.	mm.			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6

DIM.	mm.			mils		
MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6

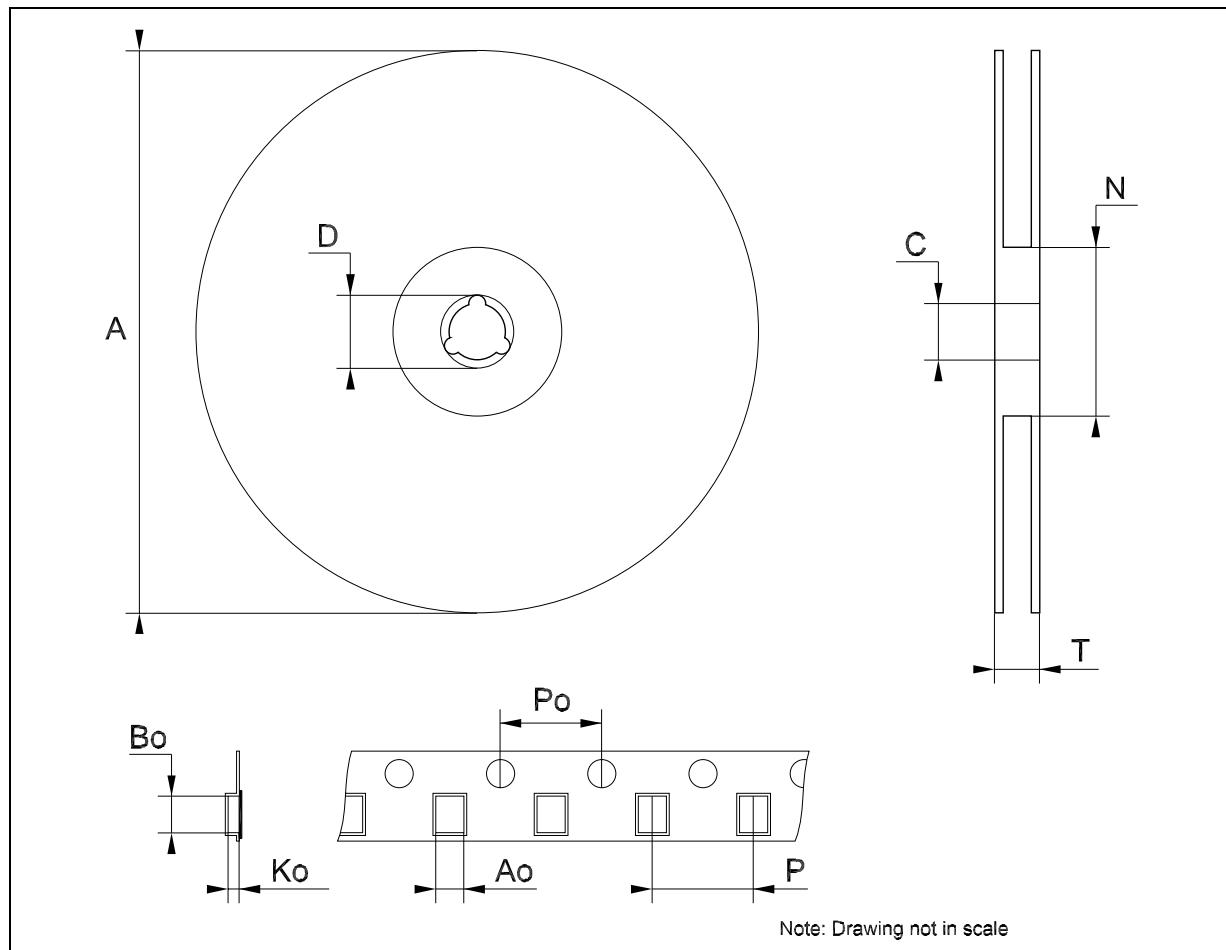


SOT323-5L MECHANICAL DATA						
DIM.	mm.			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.80		1.10	31.5		43.3
A1	0.00		0.10	0.0		3.9
A2	0.80		1.00	31.5		39.4
b	0.15		0.30	5.9		11.8
C	0.10		0.18	3.9		7.1
D	1.80		2.20	70.9		86.6
E	1.80		2.40	70.9		94.5
E1	1.15		1.35	45.3		53.1
e		0.65			25.6	
e1		1.3			51.2	
L	0.10		0.30	3.9		11.8



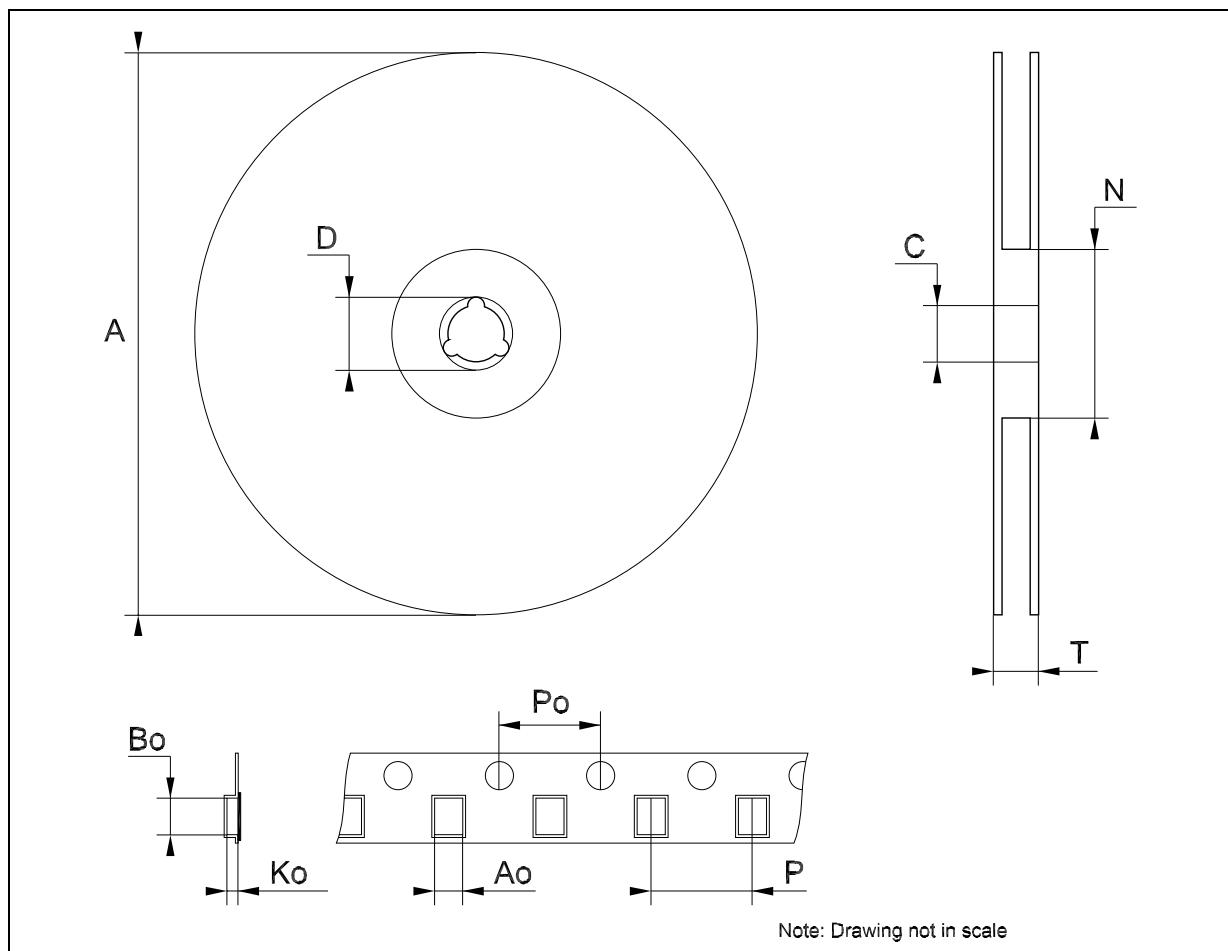
**Tape & Reel SOT23-xL MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	3.13	3.23	3.33	0.123	0.127	0.131
Bo	3.07	3.17	3.27	0.120	0.124	0.128
Ko	1.27	1.37	1.47	0.050	0.054	0.058
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	3.9	4.0	4.1	0.153	0.157	0.161



### Tape & Reel SOT323-xL MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	175	180	185	6.889	7.086	7.283
C	12.8	13	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	59.5	60	60.5		2.362	
T			14.4			0.567
Ao		2.25			0.088	
Bo		2.7			0.106	
Ko		1.2			0.047	
Po	3.9	4	4.1	0.153	0.157	0.161
P	3.8	4	4.2	0.149	0.157	0.165



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