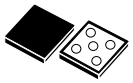
74LX1G125

SINGLE BUS BUFFER (3-STATE)

- 5V TOLERANT INPUTS
- HIGH SPEED: t_{PD} = 4.7ns (MAX.) at V_{CC} = 3V
- LOW POWER DISSIPATION: I_{CC} = 1µA (MAX.) at T_A = 25°C
- POWER DOWN PROTECTION ON INPUTS AND OUTPUTS
- SYMMETRICAL OUTPUT IMPEDANCE: $|I_{OH}| = I_{OL}$ = 24mA (MIN) at V_{CC} = 3V
- BALANCED PROPAGATION DELAYS: $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE: V_{CC}(OPR) = 1.65V to 5.5V (1.2V Data Retention)
- LATCH-UP PERFORMANCE EXCEED 300mA
- RoHS FLIP-CHIP AND SOT PACKAGES

SOT23-5L

SOT323-5L



Flip-Chip5
(Max dim = 1.23x1.23mm)

DESCRIPTION

The 74LX1G125 is a low voltage CMOS SINGLE BUS BUFFER fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology.

3-STATE control input $\overline{G}$ has to be set HIGH to place the output into the high impedance state.

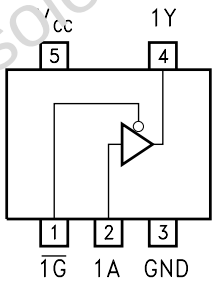
Power down protection is provided on all inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V or lower power supply systems. The sub-micron CMOS technology used allow ultra low power consumption and guarantee optimized operations between 2.8V and 1.8V system, as Smart Phone, Digital Still Camera, PDA, Notebook, or each other battery powered equipment.

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

ORDER CODES

PACKAGE	T & R
SOT23-5L	74LX1G125STR
SOT323-5L	74LX1G125CTR
Flip-Chip5	74LX1G125BJR

PIN CONNECTION AND IEC LOGIC SYMBOLS (top view for SOT, top through view for Flip-Chip)



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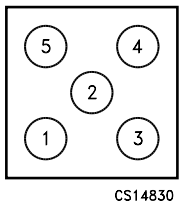

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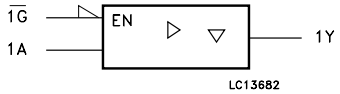

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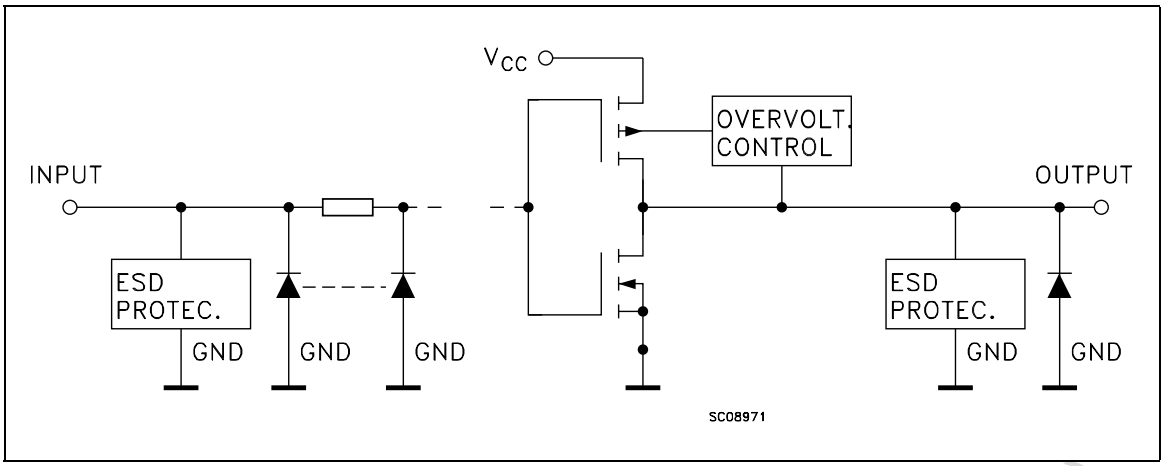
INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

SOT23-5L PIN N°	Flip-Chip PIN N°	SYMBOL	NAME AND FUNCTION
1	5	$\overline{1G}$	Output Enable Input
2	1	1A	Data Input
4	3	1Y	Data Output
3	2	GND	Ground (0V)
5	4	V_{CC}	Positive Supply Voltage

TRUTH TABLE

A	$\overline{G}$	Y
X	H	Z
L	L	L
H	L	H

X : Don't Care
Z : High Impedance

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7.0	V
V_I	DC Input Voltage	-0.5 to +7.0	V
V_O	DC Output Voltage (V_{CC} = 0V)	-0.5 to +7.0	V
V_O	DC Output Voltage (High or Low State) (note 1)	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	- 50	mA
I_{OK}	DC Output Diode Current (note 2)	- 50	mA
I_O	DC Output Current	± 50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current per Supply Pin	± 50	mA
T_{stg}	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature (10 sec)	260	°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_O absolute maximum rating must be observed
2) V_O < GND

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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)	± 32	mA
I_{OH}, I_{OL}	High or Low Level Output Current (V_{CC} = 3.0 to 3.6V)	± 24	mA
I_{OH}, I_{OL}	High or Low Level Output Current (V_{CC} = 2.7 to 3.0V)	± 12	mA
I_{OH}, I_{OL}	High or Low Level Output Current (V_{CC} = 2.3 to 2.7V)	± 8	mA
I_{OH}, I_{OL}	High or Low Level Output Current (V_{CC} = 1.65 to 2.3V)	± 4	mA
T_{op}	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (V_{CC} = 3.0 to 5.5V) (note 2)	0 to 10	ns/V
	(V_{CC} = 1.65 to 2.7V) (note 2)	0 to 20	

1) Truth Table guaranteed: 1.2V to 5.5V
2) V_{IN} from 0.8V to 2V at V_{CC} = 3.0V

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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		$0.75V_{CC}$		$0.75V_{CC}$		V
		2.3 to 2.7		$0.7V_{CC}$		$0.7V_{CC}$		
		3.0 to 5.5		$0.7V_{CC}$		$0.7V_{CC}$		
V_{IL}	Low Level Input Voltage	1.65 to 1.95			$0.25V_{CC}$		$0.25V_{CC}$	V
		2.3 to 2.7			$0.3V_{CC}$		$0.3V_{CC}$	
		3.0 to 5.5			$0.3V_{CC}$		$0.3V_{CC}$	
V_{OH}	High Level Output Voltage	1.65 to 4.5	I_O=-100 µA	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 µA		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_{OZ}	High Impedance Output Leakage Current	3.6	V_I = 0 to 5.5V		± 10		± 10	µA
I_I	Input Leakage Current	1.65 to 5.5	V_I = 0 to 5.5V		± 5		± 5	µA
I_{off}	Power Off Leakage Current	0	V_I or V_O = 5.5V		10		10	µA
I_{CC}	Quiescent Supply Current	1.65 to 5.5	V_I = V_{CC} or GND		10		10	µA
		3.6	V_I or V_O = 3.6 to 5.5V		± 10		± 10	

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AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition				Value				Unit
		V_{CC} (V)	C_L (pF)	R_L (Ω)	$t_s = t_r$ (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	1MΩ	3.0	2	10.0	2	11.0	ns
		2.3 to 2.7				2	7.0	2	8.0	
		3.0 to 3.6				1	4.7	1	5.7	
		4.5 to 5.5				1	4.1	1	5.1	
		1.65 to 1.95	30	1000	2.0	2	11.0	2	12.0	
		2.3 to 2.7	30	500	2.0	2	7.5	2	8.5	
		2.7	50	500	2.5	1	5.5	1	6.5	
		3.0 to 3.6	50	500	2.5	1	5.2	1	6.2	
		4.5 to 5.5	50	500	2.5	1	4.2	1	5.2	
t_{PLZ} t_{PHZ}	Output Disable Time	1.65 to 1.95	15	1MΩ	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	5.5	1	5.5	
		4.5 to 5.5				1	5.0	1	5.0	
		1.65 to 1.95	30	1000	2.0	2	9.2	2	9.2	
		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	5.0	1	5.0	
		4.5 to 5.5	50	500	2.5	1	4.2	1	4.2	
t_{PZL} t_{PZH}	Output Enable Time	1.65 to 1.95	15	1MΩ	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	6.0	1	6.0	
		4.5 to 5.5				1	5.5	1	5.5	
		1.65 to 1.95	30	1000	2.0	2	9.4	2	9.4	
		2.3 to 2.7	30	500	2.0	2	6.6	2	6.6	
		2.7	50	500	2.5	1	5.6	1	5.6	
		3.0 to 3.6	50	500	2.5	1	5.3	1	5.3	
		4.5 to 5.5	50	500	2.5	1	5.0	1	5.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value			Unit
		V_{CC} (V)		T_A = 25 °C			
				Min.	Typ.	Max.	
C_{IN}	Input Capacitance		V_{IN} = 0 or V_{CC}		4		pF
C_{OUT}	Output Capacitance		V_{IN} = 0 or V_{CC}		5	10	pF
C_{PD}	Power Dissipation Capacitance (note 1)	1.8	f_{IN} = 10MHz		18		pF
		2.5			18		
		3.3			21		

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 operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

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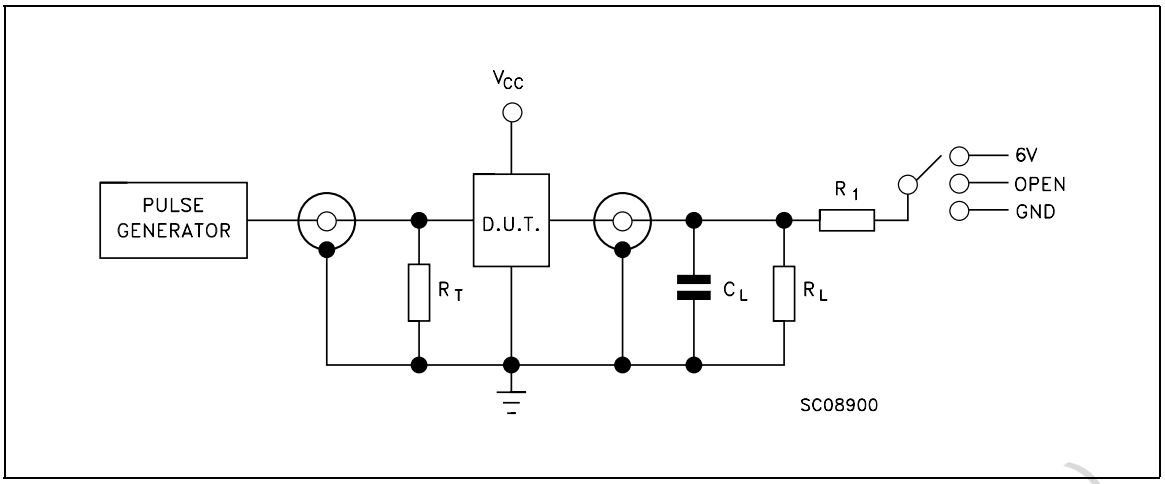
TEST CIRCUIT

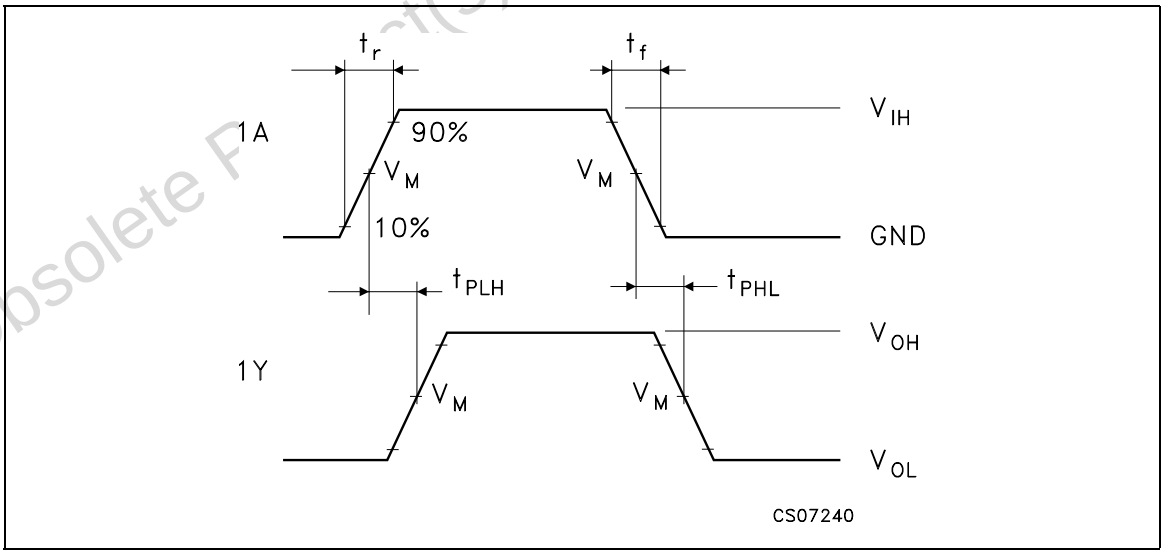


$R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

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
$R_L=R_1$	1MΩ/1000Ω	1MΩ/500Ω	1MΩ/500Ω
V_{IH}	V_{CC}	V_{CC}	V_{CC}
V_M	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
$t_r = t_r$	<2.0ns	<2.0ns	<2.5ns

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



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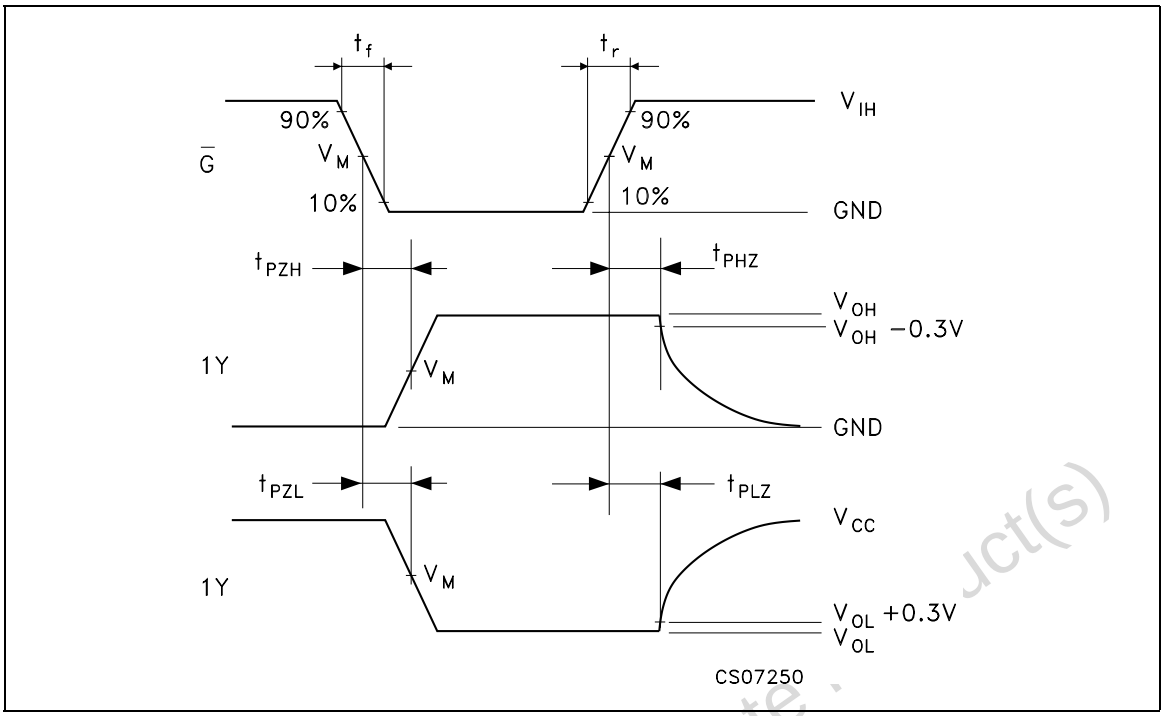
WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME (f=1MHz; 50% duty cycle)



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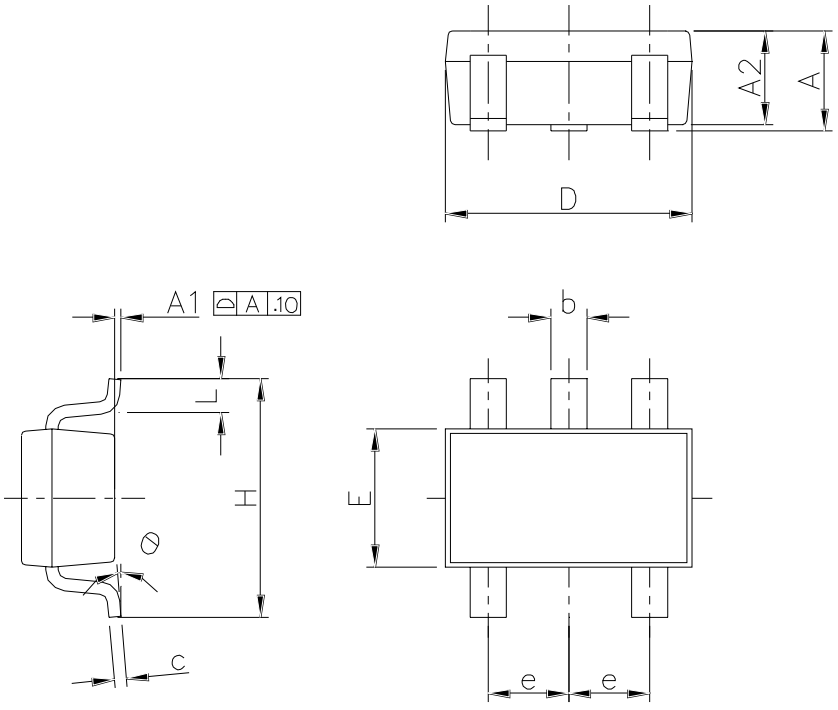
SOT23-5L MECHANICAL DATA

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



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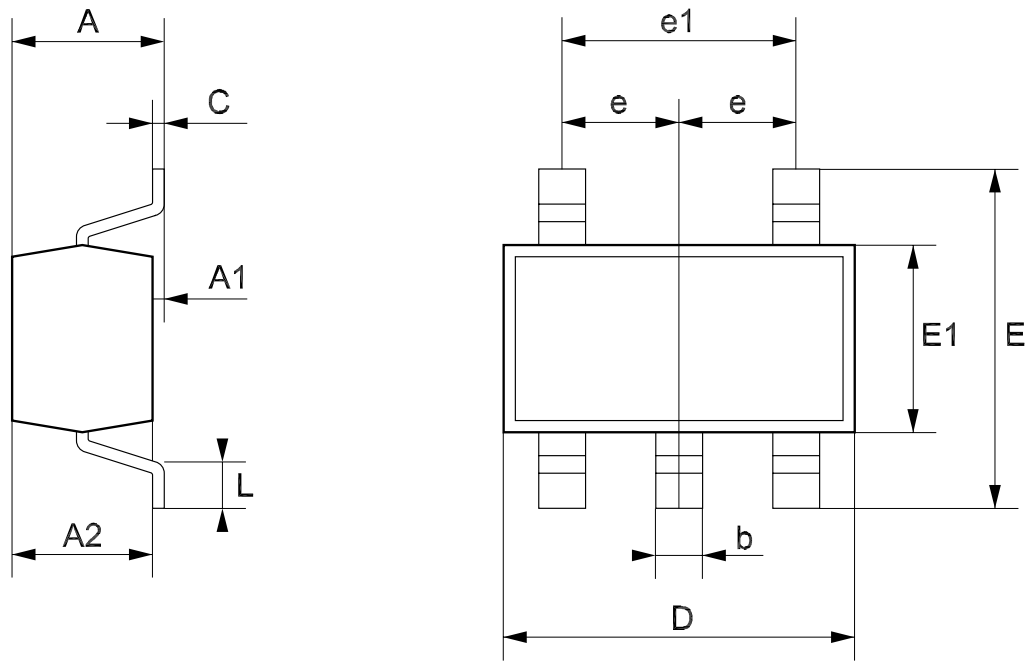
SOT323-5L MECHANICAL DATA

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



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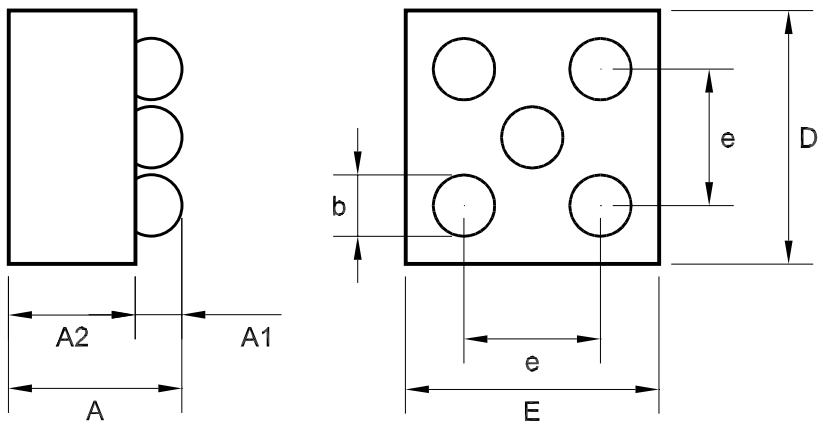
Flip-Chip5 MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A		0.6			23.622	
A1		0.25			9.843	
A2		0.35			13.779	
b	0.265	0.315	0.365	10.433	12.402	14.370
D	Value Depending On The Die Size					
E	Value Depending On The Die Size					
e		0.7			27.559	



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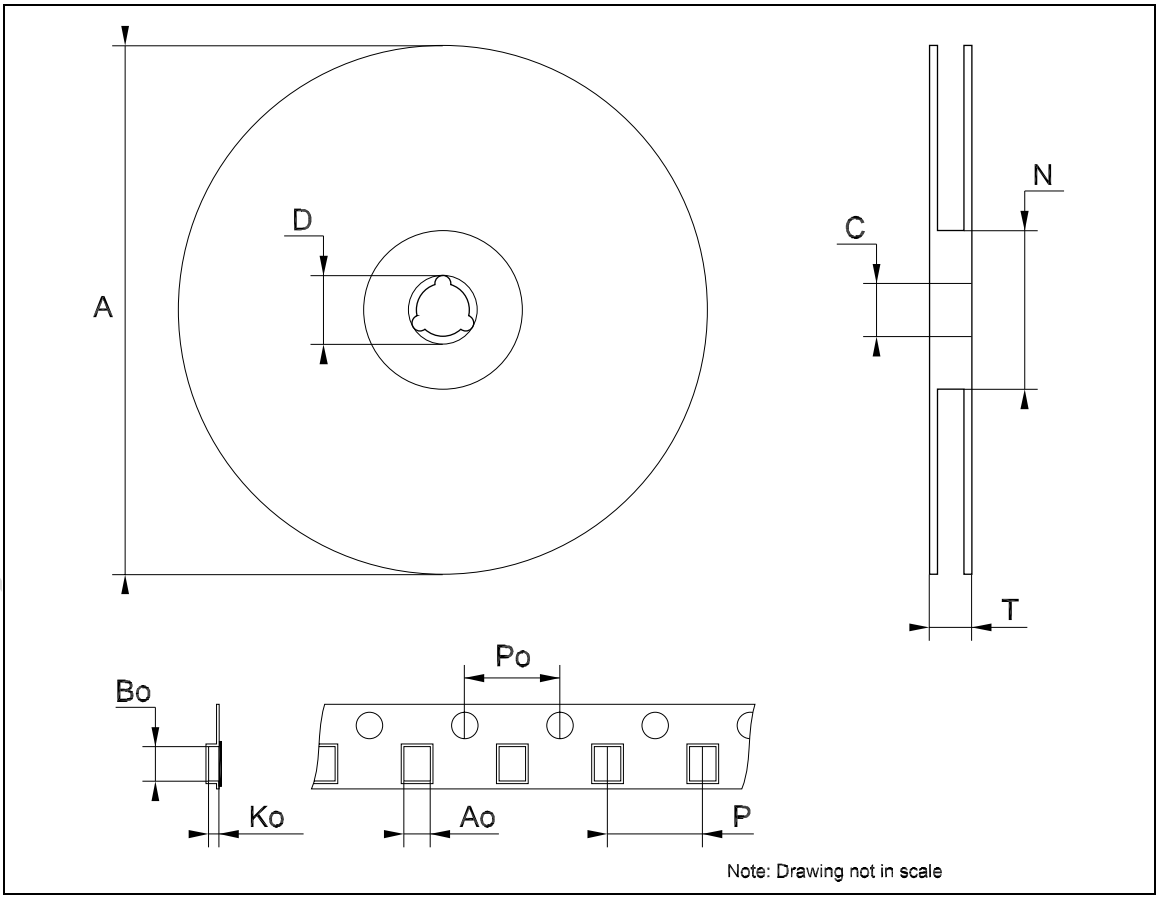
Tape & Reel SOT23-xL MECHANICAL DATA

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	0.0.58
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



Note: Drawing not in scale

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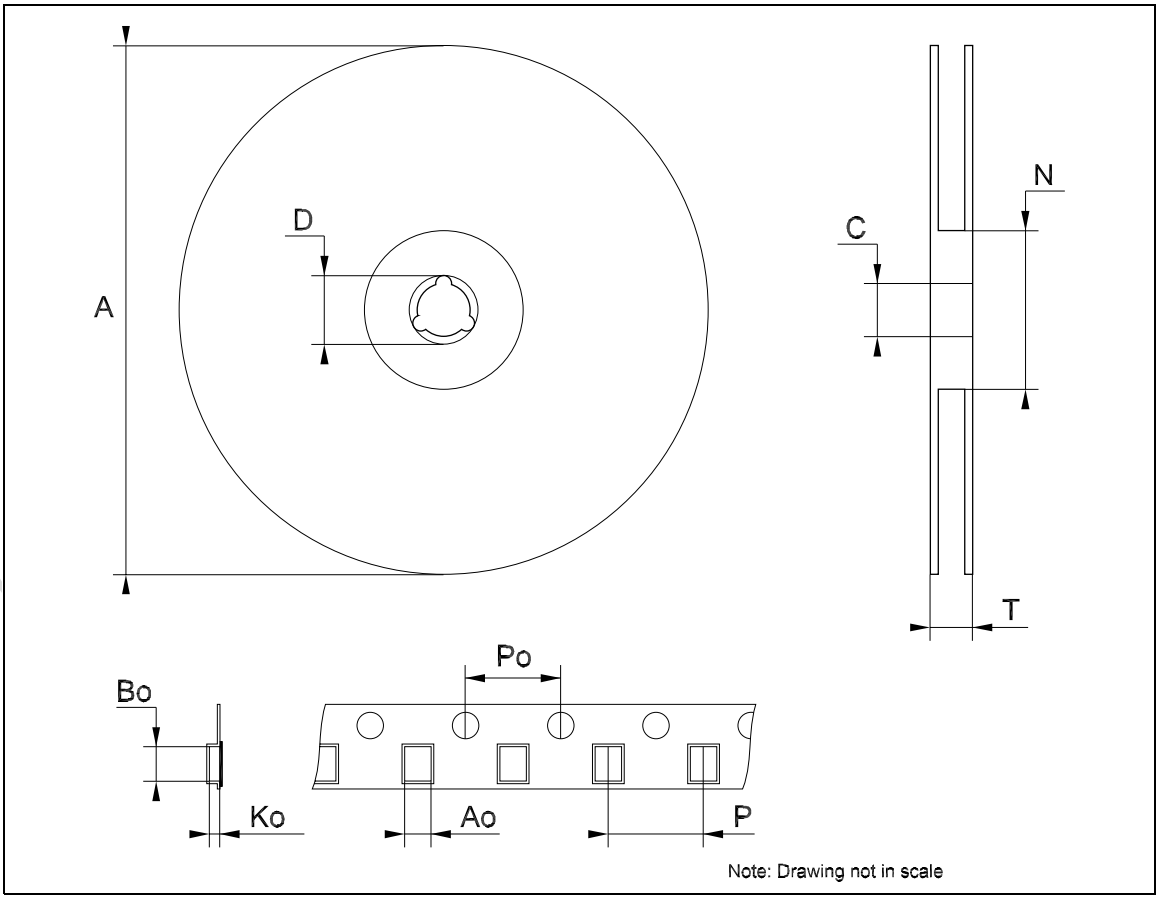
Tape & Reel SOT323-xL MECHANICAL DATA

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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