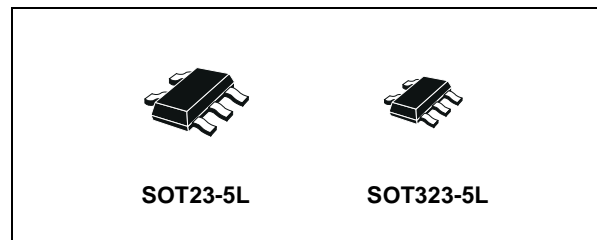


## SINGLE BILATERAL SWITCH

- HIGH SPEED:
  - $t_{PD} = 0.3ns$  (TYP.) at  $V_{CC} = 5V$
  - $t_{PD} = 0.4ns$  (TYP.) at  $V_{CC} = 3.3V$
- LOW POWER DISSIPATION:
  - $I_{CC} = 1\mu A$ (MAX.) at  $T_A=25^\circ C$
- LOW "ON" RESISTANCE:
  - $R_{ON} = 6.5\Omega$  (TYP.) AT  $V_{CC} = 5V I_{I/O} = 1mA$
  - $R_{ON} = 8.5\Omega$  (TYP.) AT  $V_{CC} = 3.3V I_{I/O} = 1mA$
- SINE WAVE DISTORTION:
  - 0.04% AT  $V_{CC} = 3.3V f = 1KHz$
- WIDE OPERATING RANGE:
  - $V_{CC}$  (OPR) = 2V TO 5.5V
- IMPROVED LATCH-UP IMMUNITY



### ORDER CODES

PACKAGE	T & R
SOT23-5L	74V1G66STR
SOT323-5L	74V1G66CTR

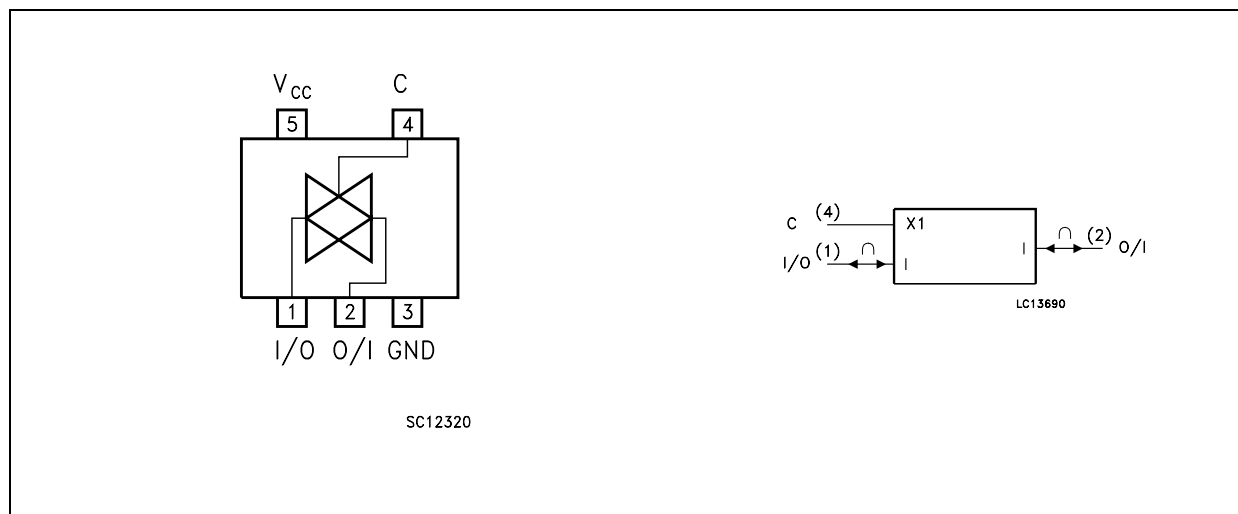
### DESCRIPTION

The 74V1G66 is an advanced high-speed CMOS SINGLE BILATERAL SWITCH fabricated in silicon gate C<sup>2</sup>MOS technology. It achieves high speed propagation delay and VERY LOW ON resistances while maintaining true CMOS low power consumption. This bilateral switch handles rail to rail analog and digital signals that may vary across the full power supply range (from GND to  $V_{CC}$  )

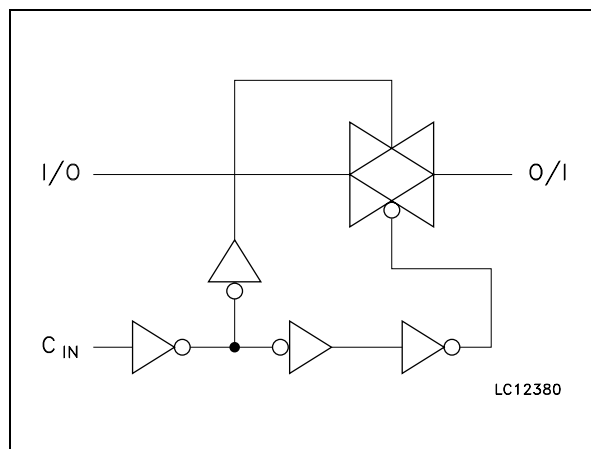
The C input is provided to control the switch and it's compatible with standard CMOS output; the

switch is ON (port I/O is connected to Port O/I) when the C input is held high and OFF (high impedance state exists between the two ports) when C is held low. It can be used in many application as Battery Powered System, Test Equipment. It's available in the commercial and extended temperature range in SOT23-5L and SC-70-5L package. All inputs and output are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



## INPUT EQUIVALENT CIRCUIT



## PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1	I/O	Independent Input/Output
2	O/I	Independent Output/Input
4	C	Enable Input (Active HIGH)
3	GND	Ground (0V)
5	V <sub>CC</sub>	Positive Supply Voltage

## TRUTH TABLE

CONTROL	SWITCH FUNCTION
H	ON
L	OFF *

\* : High Impedance State

## 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 V <sub>CC</sub> + 0.5	V
V <sub>IC</sub>	DC Control Input Voltage	-0.5 to +7.0	V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	± 20	mA
I <sub>IK</sub>	DC Control Input Diode Current	- 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	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	± 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

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	2 to 5.5	V
V <sub>I</sub>	Input Voltage	0 to V <sub>CC</sub>	V
V <sub>IC</sub>	Control Input Voltage	0 to 5.5	V
V <sub>O</sub>	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (note 1) V <sub>CC</sub> = 5.0V	0 to 20	ns/V

1) V<sub>IN</sub> from 30% to 70% of V<sub>CC</sub> on control pin

## DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>IH</sub>	High Level Input Voltage	2.0		1.5			1.5		1.5		V
		2.7 to 5.5		0.7V <sub>CC</sub>			0.7V <sub>CC</sub>		0.7V <sub>CC</sub>		
V <sub>IL</sub>	Low Level Input Voltage	2.0				0.5		0.5		0.5	V
		2.7 to 5.5				0.3V <sub>CC</sub>		0.3V <sub>CC</sub>		0.3V <sub>CC</sub>	
R <sub>ON</sub>	ON Resistance	3.3 <sup>(*)</sup>	V <sub>IC</sub> = V <sub>IH</sub>		12.5	19		23		27	Ω
		5.0 <sup>(**)</sup>	V <sub>I/O</sub> = V <sub>CC</sub> to GND I <sub>I/O</sub> ≤ 1mA		7.5	10		12		14	
R <sub>ON</sub>	ON Resistance	3.3 <sup>(*)</sup>	V <sub>IC</sub> = V <sub>IH</sub>		8.5	10.5		12.5		15	Ω
		5.0 <sup>(**)</sup>	V <sub>I/O</sub> = V <sub>CC</sub> or GND I <sub>I/O</sub> ≤ 1mA		6.5	8.5		10		12	
I <sub>OFF</sub>	Input/Output Leakage Current (SWITCH OFF)	5.5	V <sub>OS</sub> = V <sub>CC</sub> to GND V <sub>IS</sub> = V <sub>CC</sub> to GND V <sub>IC</sub> = V <sub>IL</sub>			±0.1		± 1		± 5	μA
I <sub>Iz</sub>	Switch Input Leakage Current (SWITCH ON, OUTPUT OPEN)	5.5	V <sub>OS</sub> = V <sub>CC</sub> to GND V <sub>IC</sub> = V <sub>IH</sub>			±0.1		± 1		± 5	μA
I <sub>IN</sub>	Control Input Leakage Current	0 to 5.5	V <sub>IC</sub> = 5.5V or GND			± 0.1		± 1.0		± 1.0	μA
I <sub>CC</sub>	Quiescent Supply Current	5.5	V <sub>I</sub> = V <sub>CC</sub> or GND			1		10		20	μA

(\*) Voltage range is 3.3V ± 0.3V

(\*\*) Voltage range is 5V ± 0.5V

AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50pF, Input t<sub>r</sub> = t<sub>f</sub> = 3ns)

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>PD</sub>	Delay Time	3.3 <sup>(*)</sup>	t <sub>r</sub> = t <sub>f</sub> = 6ns		0.4	0.8		1.2		2.4	ns
		5.0 <sup>(**)</sup>			0.3	0.6		1.0		2.0	
t <sub>PLZ</sub> t <sub>PHZ</sub>	Output Disable Time	3.3 <sup>(*)</sup>	R <sub>L</sub> = 500 Ω		5.0	7.5		9.0		10.0	ns
		5.0 <sup>(**)</sup>			5.0	7.5		9.0		10.0	
t <sub>PZL</sub> t <sub>PZH</sub>	Output Enable Time	3.3 <sup>(*)</sup>	R <sub>L</sub> = 1 KΩ		2.5	4.0		5.0		7.0	ns
		5.0 <sup>(**)</sup>			2.0	4.0		5.0		7.0	

(\*) Voltage range is 3.3V ± 0.3V

(\*\*) Voltage range is 5.0V ± 0.5V

## CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
C <sub>IN</sub>	Input Capacitance				3	10		10		10	pF
C <sub>I/O</sub>	Output Capacitance				10						
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)	3.3			2.5						pF
		5.0			3						

1) C<sub>PD</sub> 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.  $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

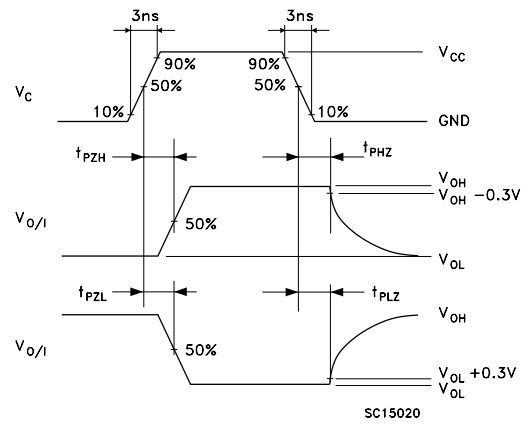
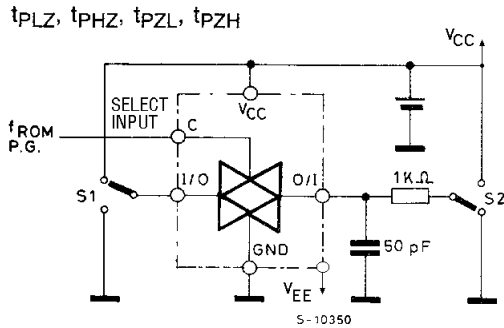
ANALOG SWITCH CHARACTERISTICS (GND = 0V; T<sub>A</sub> = 25°C)

Symbol	Parameter	Test Condition			Value	Unit
		V <sub>CC</sub> (V)	V <sub>IN</sub> (V <sub>p-p</sub> )		Typ.	
	Sine Wave Distortion (THD)	3.3(*)	2.75	f <sub>IN</sub> = 1 KHz R <sub>L</sub> = 10 KΩ, C <sub>L</sub> = 50 pF	0.04	%
		5.0(**)	4		0.04	
f <sub>MAX</sub>	Frequency Response (Switch ON)	3.3(*)	Adjust f <sub>IN</sub> voltage to obtain 0 dBm at V <sub>OS</sub> . Increase f <sub>IN</sub> Frequency until dB meter reads -3dB		150	MHz
		5.0(**)	R <sub>L</sub> = 50Ω, C <sub>L</sub> = 10 pF		180	
	Feed through Attenuation (Switch OFF)	3.3(*)	V <sub>IN</sub> is centered at V <sub>CC</sub> /2		-60	dB
		5.0(**)	Adjust f <sub>IN</sub> Voltage to obtained 0dBm at V <sub>IS</sub> R <sub>L</sub> = 600Ω, C <sub>L</sub> = 50 pF, f <sub>IN</sub> = 1KHz sine wave		-60	
	Crosstalk (Control Input to Signal Output)	3.3(*)	R <sub>L</sub> = 600Ω, C <sub>L</sub> = 50 pF, f <sub>IN</sub> = 1KHz square wave		60	mV
		5.0(**)	t <sub>r</sub> = t <sub>f</sub> = 6ns		60	

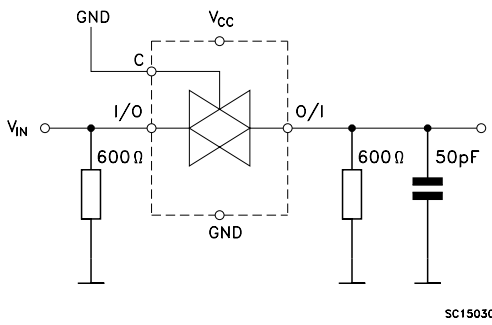
(\*) Voltage range is 3.3V ± 0.3V

(\*\*) Voltage range is 5.0V ± 0.5V

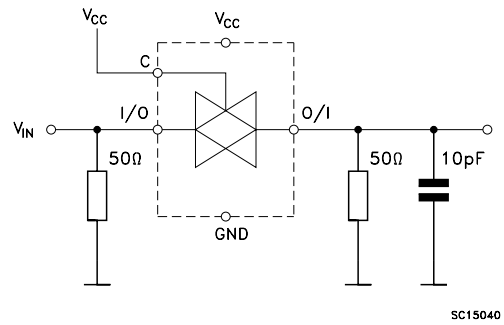
SWITCHING CHARACTERISTIC TEST CIRCUIT



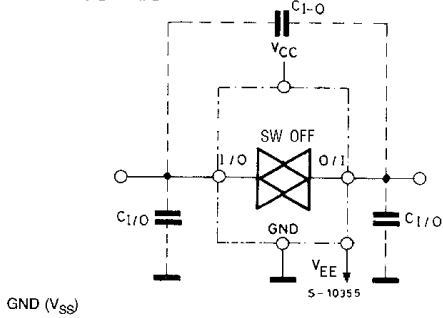
FEEDTHROUGH ATTENUATION



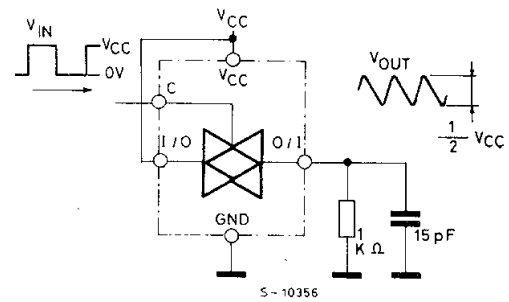
BANDWIDTH ATTENUATION



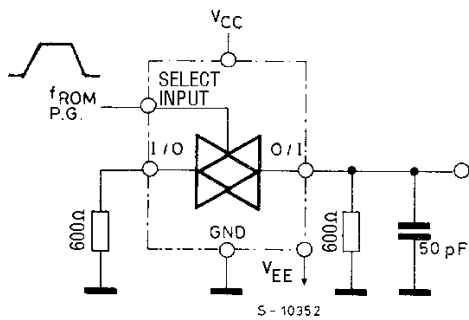
$C_{I-O}, C_{I/O}$



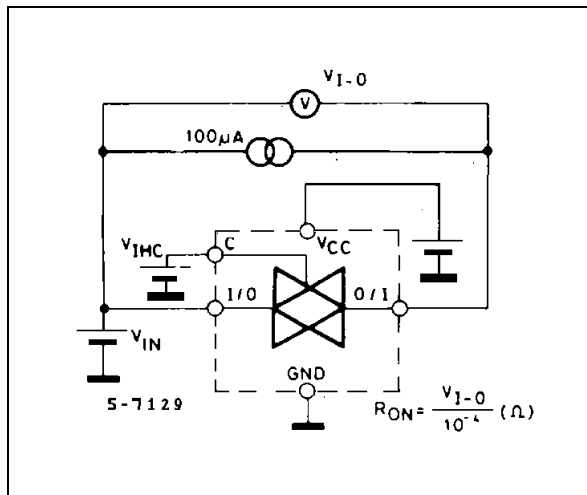
MAXIMUM CONTROL FREQUENCY



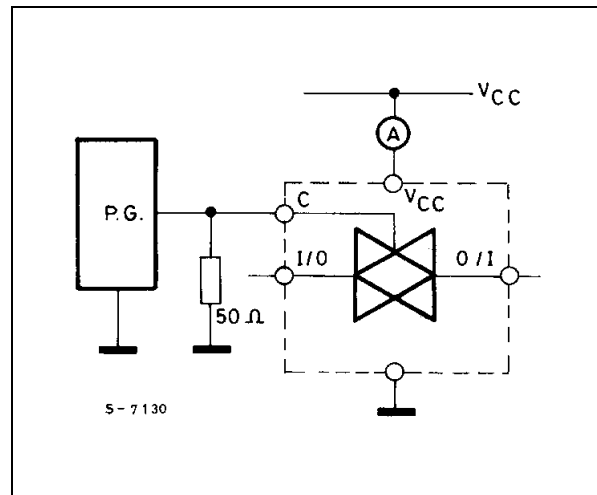
CROSSTALK (control to output)



CHANNEL RESISTANCE ( $R_{ON}$ )

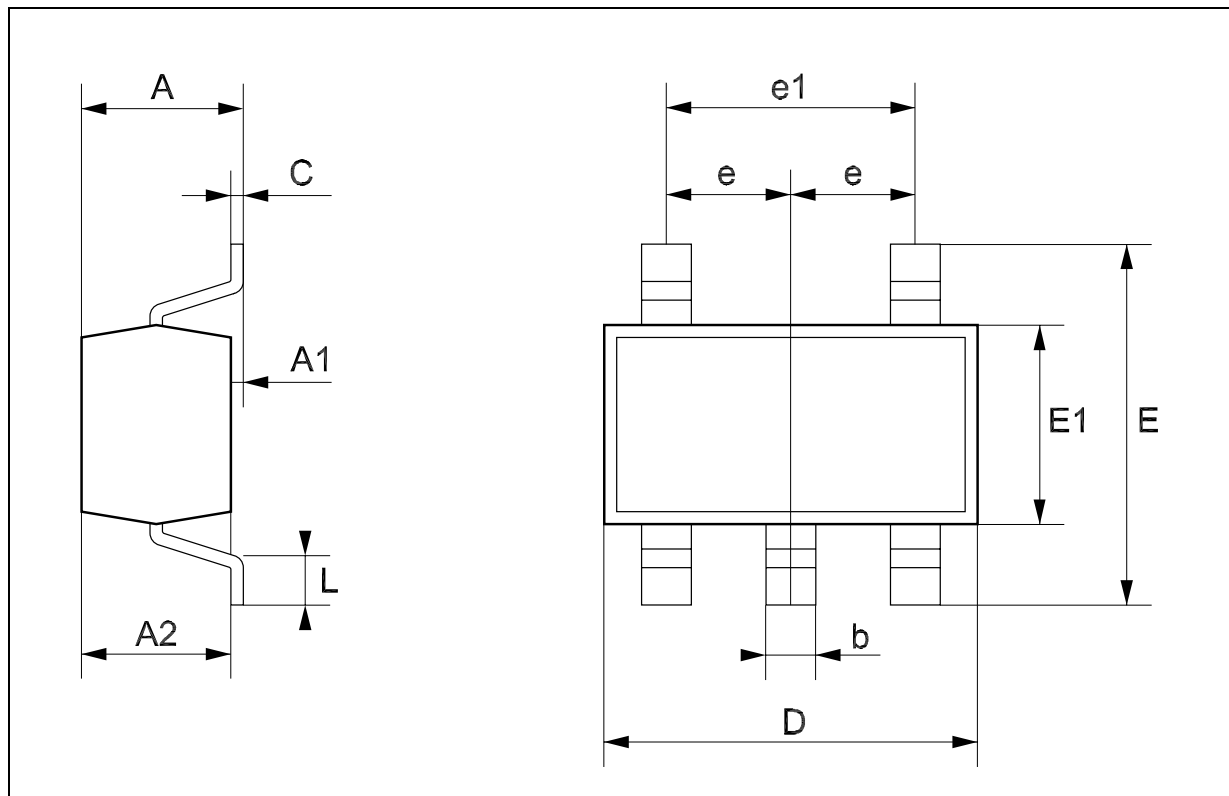


$I_{CC}$  (Opr.)



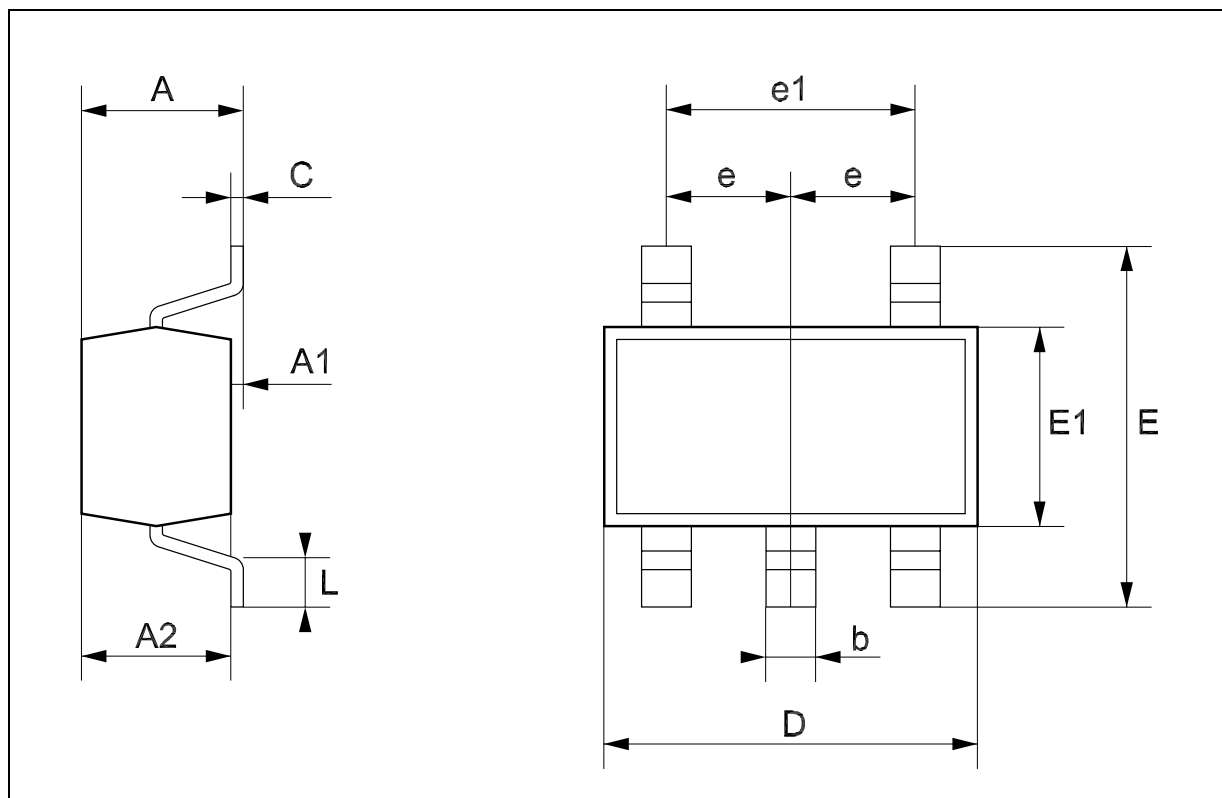
<b>SOT23-5L MECHANICAL DATA</b>
---------------------------------

DIM.	mm.			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.0		5.9
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	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
e		0.95			37.4	
e1		1.9			74.8	
L	0.35		0.55	13.7		21.6



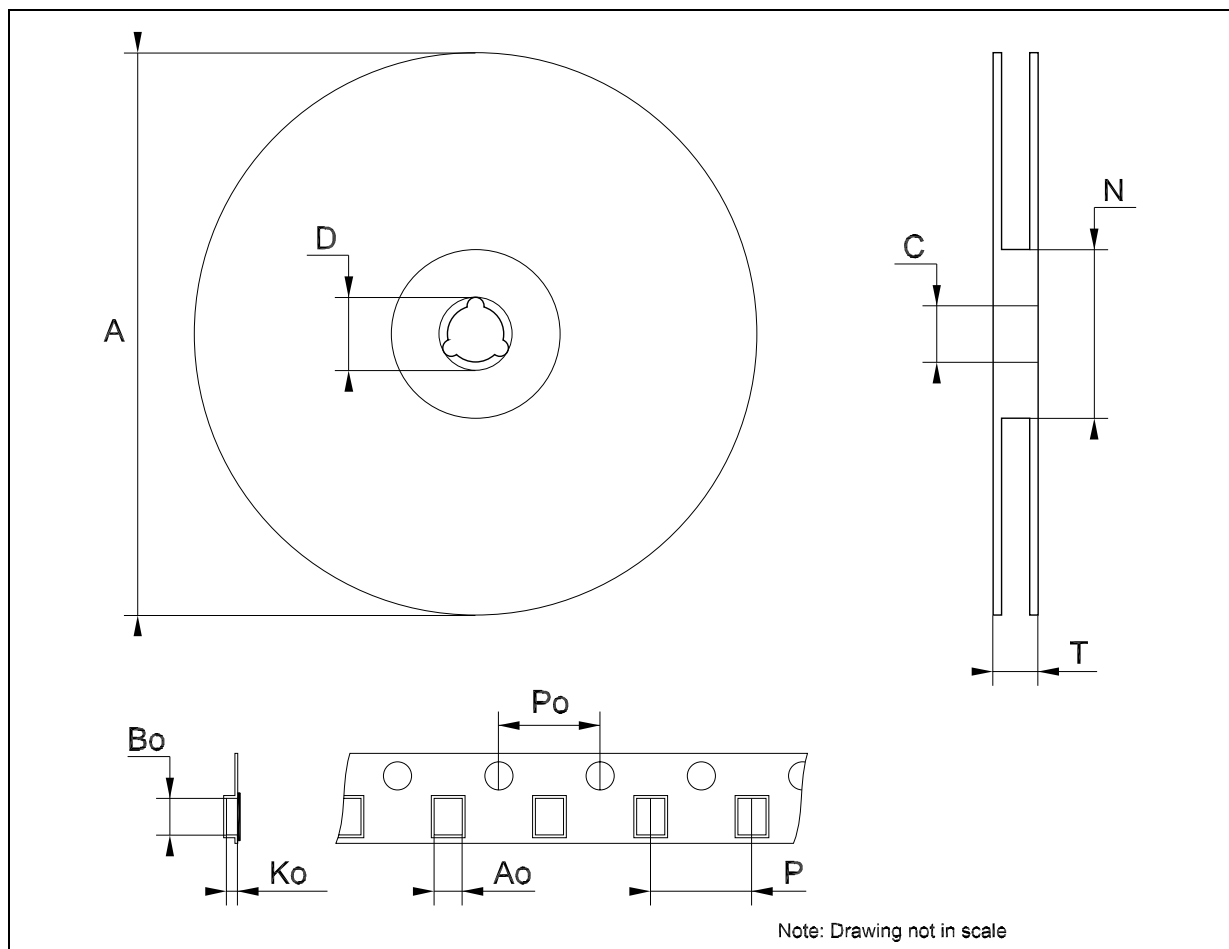
## SOT323-5L MECHANICAL DATA

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



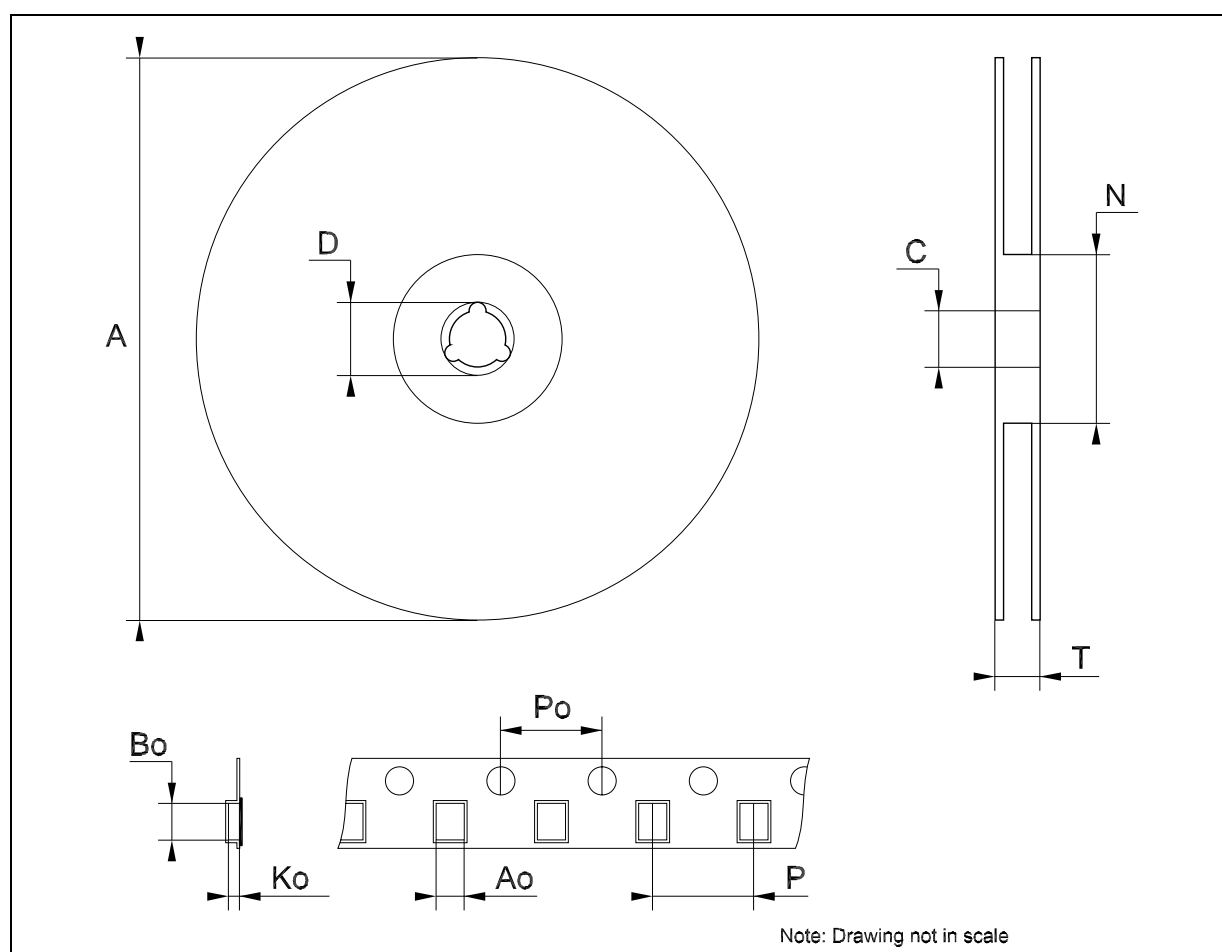
### Tape & Reel SOT23-xL MECHANICAL DATA

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 &amp; 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	3.98	4	4.2	0.156	0.157	0.165
P	3.98	4	4.2	0.156	0.157	0.165



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