

## SINGLE BILATERAL SWITCH

- **HIGH SPEED:**  
 $t_{PD} = 0.1 \text{ ns (TYP.) at } V_{CC} = 5V$
- **LOW POWER DISSIPATION:**  
 $I_{CC} = 1 \mu A \text{ (MAX.) at } T_A = 25^\circ C$
- **LOW "ON" RESISTANCE:**  
 $R_{ON} = 10\Omega \text{ (TYP.) AT } V_{CC}=5V I_{I/O}=100\mu A$
- **SINE WAVE DISTORTION**  
 $0.04\% \text{ (TYP.) AT } V_{CC}=5V f=1KHz$

### DESCRIPTION

The 74V1T66 is an high-speed CMOS SINGLE BILATERAL SWITCH fabricated in silicon gate C2MOS technology. It achieves high speed propagation delay and VERY LOW ON resistances while maintaining true CMOS low power consumption. This feature makes this part ideal for battery-powered equipment. This bilateral switch handles rail to rail analog and digital signals that may vary across the full power-supply range (from Vcc to Ground).

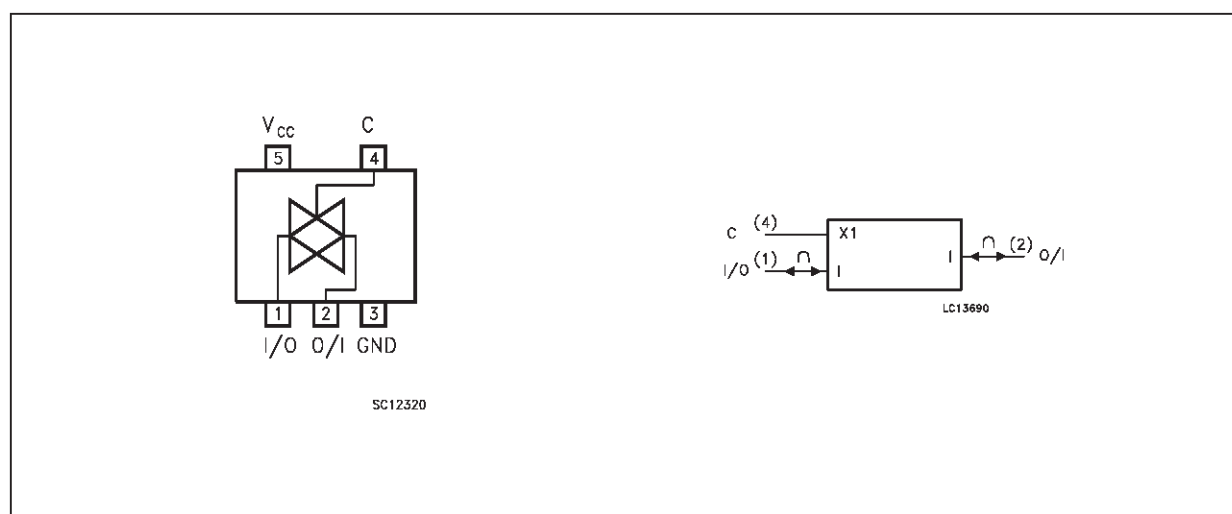
The C input is provided to control the switch and it's compatible with standard TTL output; the



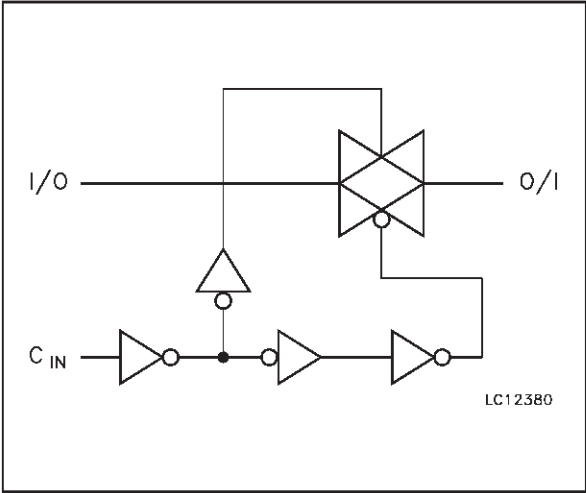
ORDER CODES		
PACKAGE	TUBE	T & R
SOT23-5L		74V1T66S-TR
SC-70		74V1T66C-TR

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, Audio Signal Routing, Communications System, Test Equipment. It's available in the commercial temperature range in SOT23-5L and SC-70-5L package.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



LOGIC DIAGRAM



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	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	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 condition is not implied.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	4.5 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:	-40 to +85	°C
dt/dv	Input Rise and Fall Time (note 1)	V <sub>CC</sub> =5V 0 to 20	ns/V

1) V<sub>IN</sub> from 0.8V to 2V

## DC SPECIFICATIONS

Symbol	Parameter	Test Conditions		Value					Unit
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
V <sub>IH</sub>	High Level Input Voltage	5.0 <sup>(*)</sup>		2.0			2.0		V
V <sub>IL</sub>	Low Level Input Voltage					0.8		0.8	V
R <sub>ON</sub>	ON Resistance	5.0 <sup>(*)</sup>	V <sub>IC</sub> = V <sub>IH</sub> V <sub>I/O</sub> = V <sub>CC</sub> to GND I <sub>I/O</sub> ≤ 1mA		12	17		20	Ω
R <sub>ON</sub>	ON Resistance	5.0 <sup>(*)</sup>	V <sub>IC</sub> = V <sub>IH</sub> V <sub>I/O</sub> = V <sub>CC</sub> or GND I <sub>I/O</sub> ≤ 1mA		10	14		18	Ω
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		±1.0	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		±1.0	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	μA
I <sub>CC</sub>	Quiescent Supply Current	5.5	V <sub>IC</sub> = V <sub>CC</sub> or GND			1		10	μA

(\*) Voltage range is 5V ± 0.5V

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

Symbol	Parameter	Test Condition		Value					Unit
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
t <sub>PD</sub>	Delay Time	5.0 <sup>(*)</sup>	t <sub>r</sub> = t <sub>f</sub> =6 ns		0.3	0.6		1.0	ns
t <sub>PZL</sub> t <sub>PZH</sub>	Output Enable Time	5.0 <sup>(*)</sup>	R <sub>L</sub> = 1kΩ		2.0	4.0		5.0	ns
t <sub>PLZ</sub> t <sub>PHZ</sub>	Output Disable Time	5.0 <sup>(*)</sup>	R <sub>L</sub> = 500Ω		5.0	7.5		9.0	ns
C <sub>IN</sub>	Input Capacitance				5				pF
C <sub>I/O</sub>	Switch Terminal Capacitance				10				pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)	5.0			3				pF

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<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>IN</sub> + I<sub>CC</sub> (switch).

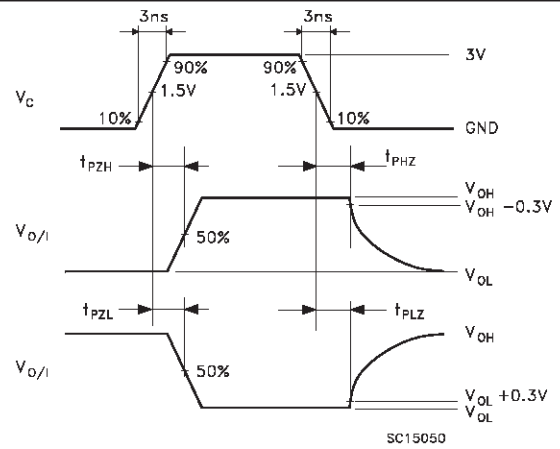
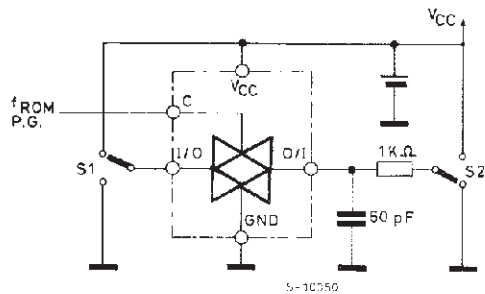
(\*) Voltage range is 5V ± 0.5V

**ANALOG SWITCH CHARACTERISTICS** (GND = 0 V,  $T_A = 25^\circ\text{C}$ )

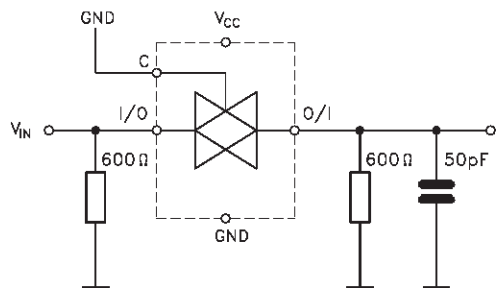
Symbol	Parameter	Test Condition			Value	Unit
		$V_{CC}$ (V)	$V_{IN}$ (Vp-p)			
	Sine Wave Distortion (THD)	5.0 <sup>(*)</sup>	4	$f_{IN} = 1\text{ KHz}$ $R_L = 10\text{K}\Omega$ $C_L = 50\text{ pF}$	0.04	%
$f_{MAX}$	Frequency Response (Switch ON)	5.0 <sup>(*)</sup>	Adjust $f_{IN}$ voltage to Obtain 0dBm at $V_{OS}$ . Increase $f_{IN}$ Frequency until dB Meter reads -3dB $R_L = 50\Omega$ , $C_L = 10\text{pF}$			180 MHz
	Feedthrough Attenuation (Switch OFF)	5.0 <sup>(*)</sup>	$V_{IN}$ is centered at $V_{CC}/2$ . Adjust $f_{IN}$ Voltage to obtain 0dBm at $V_{IS}$ $R_L = 600\Omega$ , $C_L = 50\text{pF}$ , $f_{IN} = 1\text{MHz}$ sine wave			-60 dB
	Crosstalk (Control Input to Signal Output)	5.0 <sup>(*)</sup>	$R_L = 600\Omega$ , $C_L = 50\text{pF}$ , $f_{IN} = 1\text{MHz}$ square wave $t_r = t_f = 6\text{ns}$			60 mV

(\*) Voltage range is  $5\text{V} \pm 0.5\text{V}$

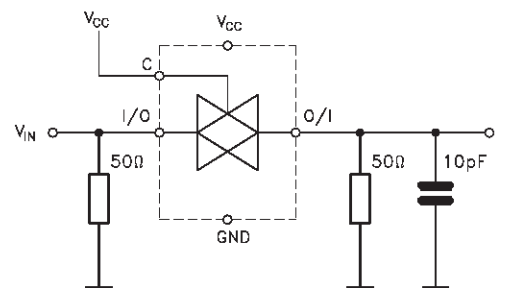
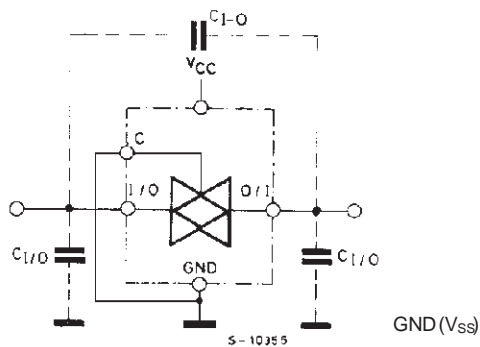
## SWITCHING CHARACTERISTICS TEST CIRCUIT

 $t_{PLZ}$ ,  $t_{PHZ}$ ,  $t_{PZL}$ ,  $t_{PZH}$ .

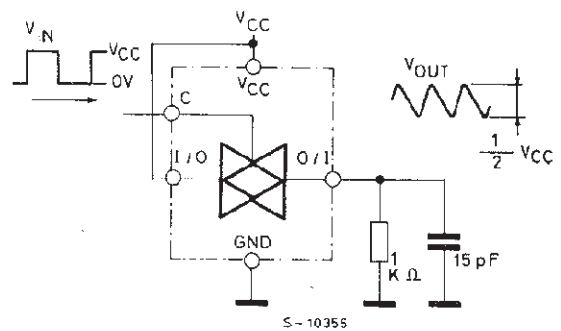
## FEEDTHROUGH ATTENUATION



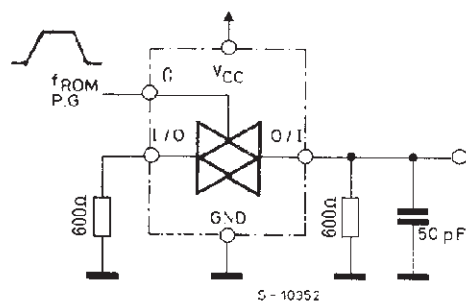
## BANDWIDTH ATTENUATION

C<sub>I-O</sub> C<sub>I/O</sub>

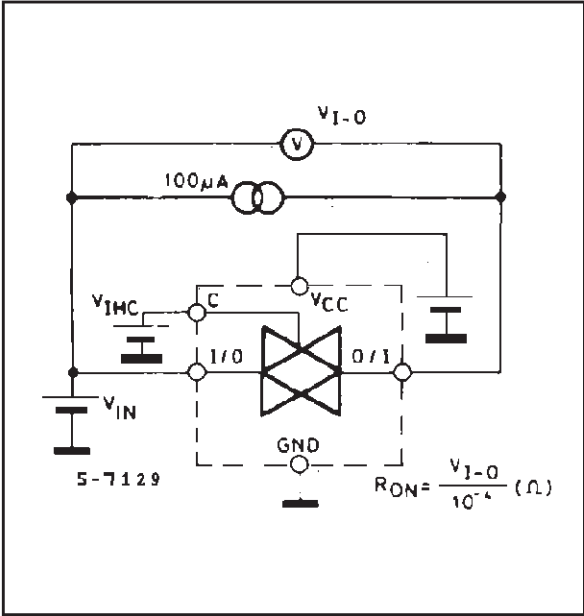
## MAXIMUM CONTROL FREQUENCY



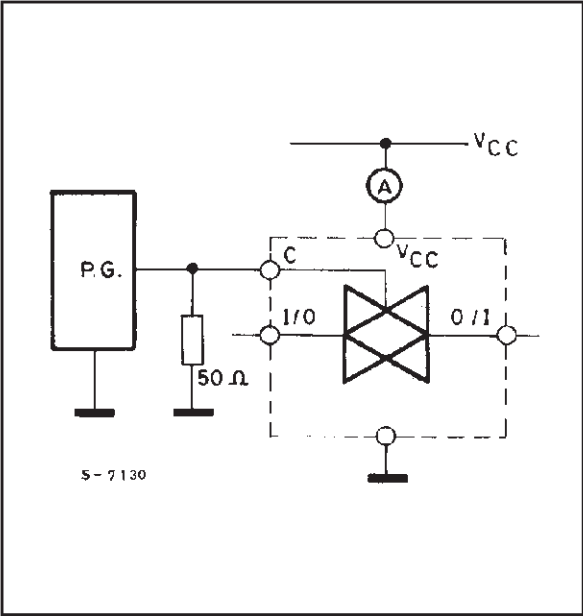
## CROSSTALK (control to output)



CHANNEL RESITANCE (RON)

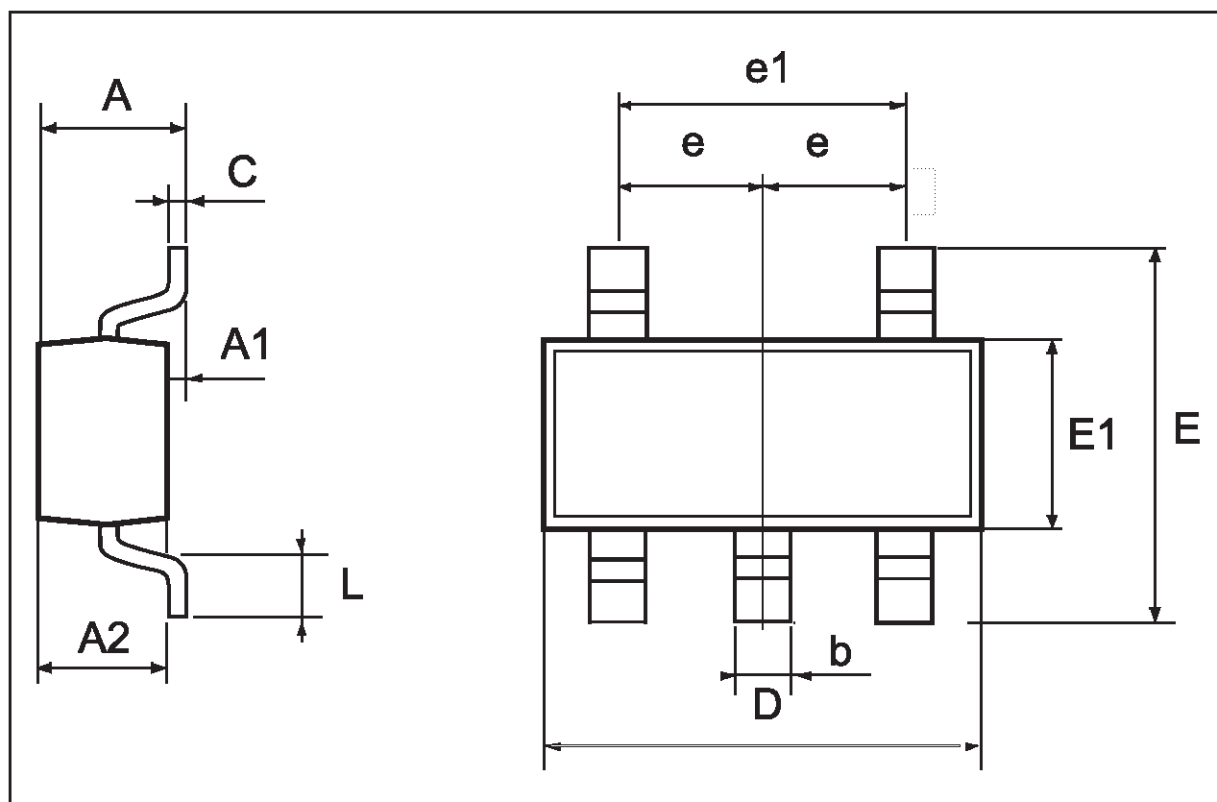


I<sub>CC</sub> (Opr.)



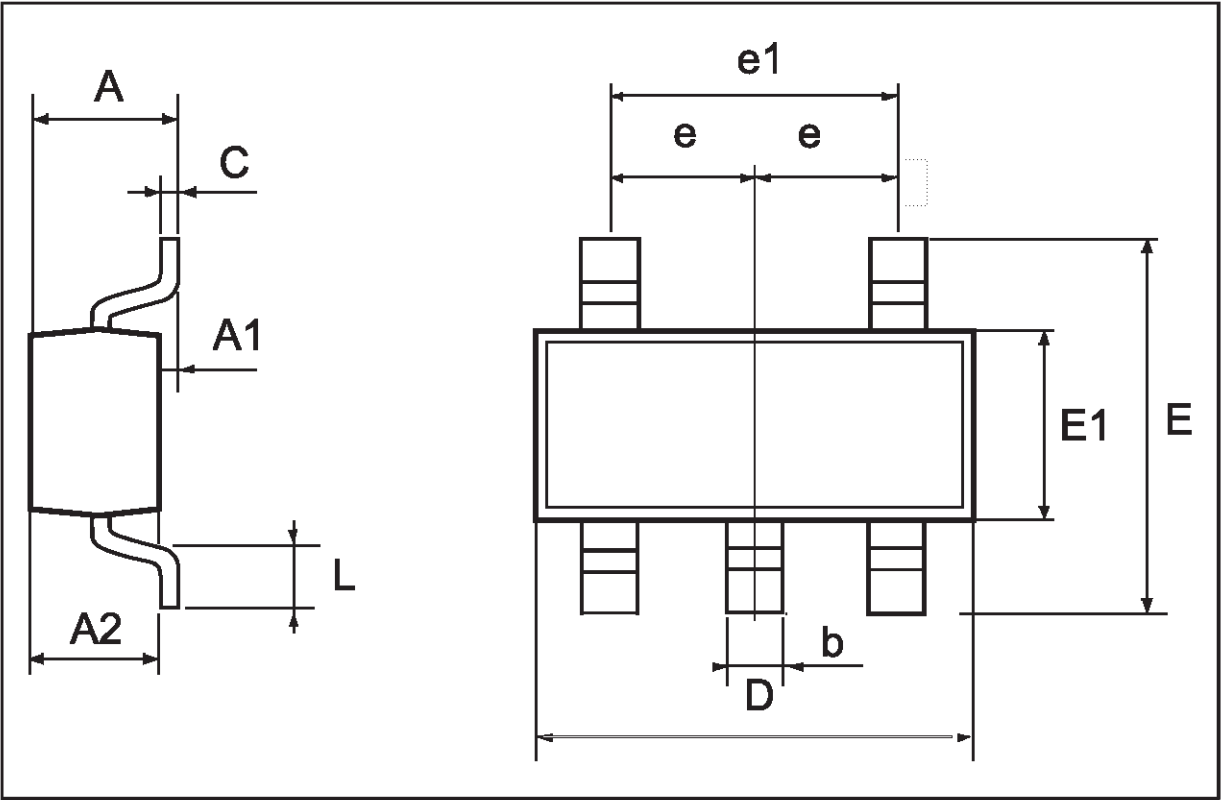
## SOT23-5L MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	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
L	0.35		0.55	13.7		21.6
e		0.95			37.4	
e1		1.9			74.8	



SC-70 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
L	0.10		0.30	3.9		11.8
e		0.65			25.6	
e1		1.3			51.2	





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