

## Single bilateral switch

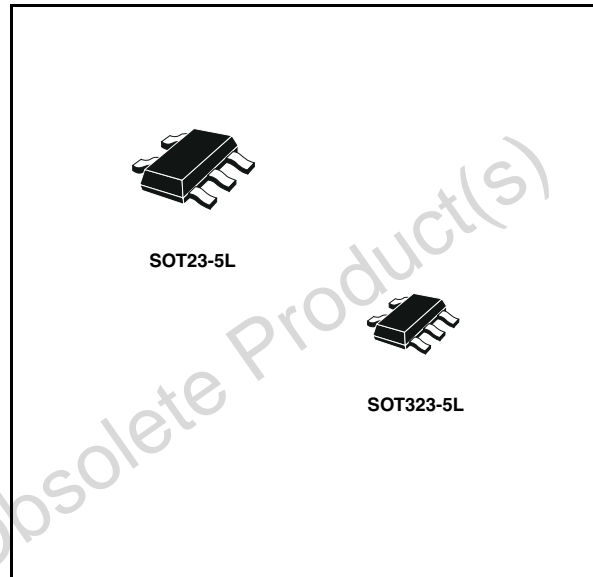
### Features

- High speed:
  - $t_{PD} = 0.3 \text{ ns (typ.) at } V_{CC} = 5 \text{ V}$
  - $t_{PD} = 0.4 \text{ ns (typ.) at } V_{CC} = 3.3 \text{ V}$
- Low power dissipation:
  - $I_{CC} = 1 \mu\text{A (max.) at } T_A = 25 \text{ }^\circ\text{C}$
- Low "ON" resistance:
  - $R_{ON} = 6.5 \Omega \text{ (typ.) at } V_{CC} = 5 \text{ V } I_{I/O} = 1 \text{ mA}$
  - $R_{ON} = 8.5 \Omega \text{ (typ.) at } V_{CC} = 3.3 \text{ V } I_{I/O} = 1 \text{ mA}$
- Sine wave distortion:
  - 0.04% at  $V_{CC} = 3.3 \text{ V } f = 1 \text{ kHz}$
- Wide operating range:
  - $V_{CC} \text{ (opr)} = 2 \text{ V to } 5.5 \text{ V}$
- Improved latch-up immunity

### 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 is compatible with standard CMOS outputs. 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 applications as battery powered systems or test equipments.



The 74V1G66 is available in the commercial and extended temperature range in SOT23-5L and SOT323-5L packages.

All inputs and outputs are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage.

**Table 1. Device summary**

Order code	Package	Packaging
74V1G66STR	SOT23-5L	Tape and reel
74V1G66CTR	SOT323-5L	Tape and reel

# 1 Pin connection

Figure 1. Pin connection and IEC logic symbols

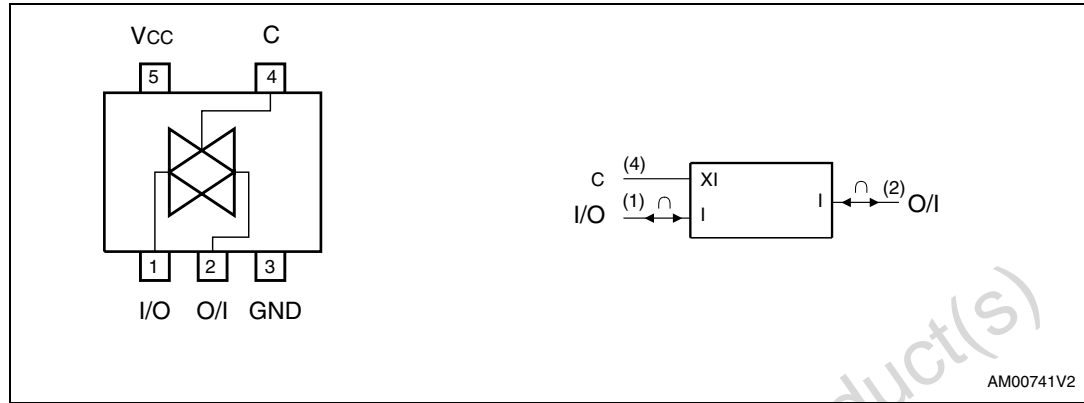


Table 2. Pin description

Pin number	Symbol	Name and function
1	I/O	Independent input/output
2	O/I	Independent output/input
3	GND	Ground (0 V)
4	C	Enable input (active high)
5	V <sub>CC</sub>	Positive supply voltage

Figure 2. Input equivalent circuit

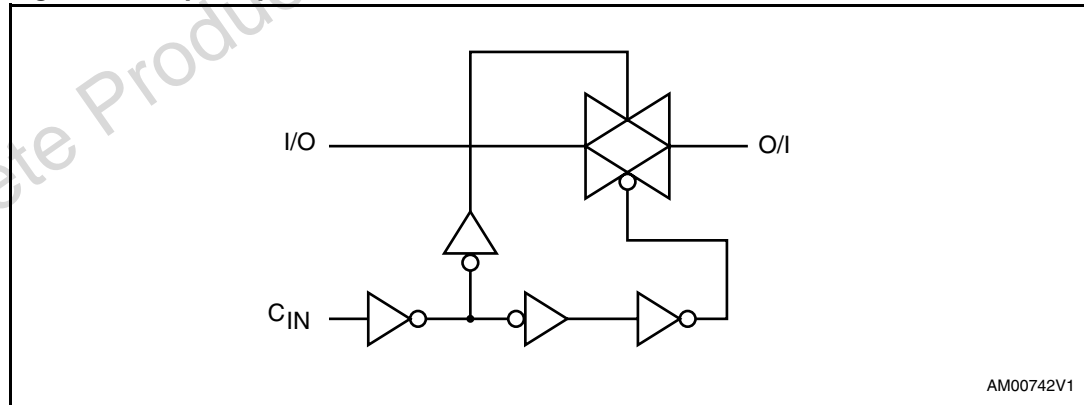


Table 3. Truth table

Control	Switch function
H	ON
L	OFF <sup>(1)</sup>

1. High impedance state.

## 2 Maximum rating

Stressing the device above the rating listed in the “Absolute Maximum Ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the Operating sections of this specification is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

**Table 4. 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 $V_{CC} + 0.5$	V
$V_{IC}$	DC control input voltage	-0.5 to +7.0	V
$V_O$	DC Output voltage	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC input diode current	$\pm 20$	mA
$I_{IK}$	DC control input diode current	- 20	mA
$I_{OK}$	DC output diode current	$\pm 20$	mA
$I_O$	DC output current	$\pm 50$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or ground current	$\pm 50$	mA
$T_{stg}$	Storage temperature	-65 to +150	°C
$T_L$	Lead temperature (10 sec)	300	°C

**Table 5. Recommended operating conditions**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply voltage	2 to 5.5	V
$V_I$	Input voltage	0 to $V_{CC}$	V
$V_{IC}$	Control input voltage	0 to 5.5	V
$V_O$	Output voltage	0 to $V_{CC}$	V
$T_{op}$	Operating temperature	-55 to 125	°C
dt/dv	Input rise and fall time <sup>(1)</sup> $V_{CC} = 5.0$ V	0 to 20	ns/V

1.  $V_{IN}$  from 30% to 70% of  $V_{CC}$  on control pin.

Table 6. 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>C</sub> c			0.7V cc		0.7V cc		
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>C</sub> c		0.3V cc		0.3V cc	
R <sub>ON</sub>	ON resistance	3.3 <sup>(1)</sup>	V <sub>IC</sub> = V <sub>IH</sub> V <sub>I/O</sub> = V <sub>CC</sub> to GND		12.5	21		23		27	Ω
		5.0 <sup>(2)</sup>	I <sub>I/O</sub> ≤ 1mA		7.5	10		12		14	
R <sub>ON</sub>	ON resistance	3.3 <sup>(1)</sup>	V <sub>IC</sub> = V <sub>IH</sub> V <sub>I/O</sub> = V <sub>CC</sub> or GND		8.5	11.5		12.5		15	Ω
		5.0 <sup>(2)</sup>	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

1. Voltage range is 3.3 V ± 0.3 V.
2. Voltage range is 5 V ± 0.5 V.

Table 7. AC electrical characteristics ( $C_L = 50$  pF, input  $t_r = t_f = 3$  ns)

Symbol	Parameter	Test condition		Value						Unit	
		$V_{CC}$ (V)		$T_A = 25^\circ\text{C}$			$-40$ to $85^\circ\text{C}$		$-55$ to $125^\circ\text{C}$		
				Min	Typ	Max	Min	Max	Min		Max
$t_{PD}$	Delay time	3.3 <sup>(1)</sup>	$t_r = t_f = 6$ ns		0.4	0.8		1.2		2.4	ns
		5.0 <sup>(2)</sup>			0.3	0.6		1.0		2.0	
$t_{PLZ}$ $t_{PHZ}$	Output disable time	3.3 <sup>(1)</sup>	$R_L = 500 \Omega$		5.0	7.5		9.0		10.0	ns
		5.0 <sup>(2)</sup>			5.0	7.5		9.0		10.0	
$t_{PZL}$ $t_{PZH}$	Output enable time	3.3 <sup>(1)</sup>	$R_L = 1$ K $\Omega$		2.5	4.0		5.0		7.0	ns
		5.0 <sup>(2)</sup>			2.0	4.0		5.0		7.0	

1. Voltage range is  $3.3 \text{ V} \pm 0.3 \text{ V}$ .

2. Voltage range is  $5 \text{ V} \pm 0.5 \text{ V}$ .

Table 8. Capacitive characteristics

Symbol	Parameter	Test condition		Value						Unit	
		$V_{CC}$ (V)		$T_A = 25^\circ\text{C}$			$-40$ to $85^\circ\text{C}$		$-55$ to $125^\circ\text{C}$		
				Min	Typ	Max	Min	Max	Min		Max
$C_{IN}$	Input capacitance				3	10		10		10	pF
$C_{I/O}$	Output capacitance				10						pF
$C_{PD}$	Power dissipation capacitance <sup>(1)</sup>	3.3			2.5						pF
		5.0			3						

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 the test circuit). Average operating current can be obtained by the following equation.

$$I_{CC(\text{opr})} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$$

**Table 9. Analog switch characteristics (GND = 0 V; 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 <sup>(1)</sup>	2.75	f <sub>IN</sub> = 1 KHz R <sub>L</sub> = 10 KΩ, C <sub>L</sub> = 50 pF	0.04	%
		5.0 <sup>(2)</sup>	4		0.04	
f <sub>MAX</sub>	Frequency response (switch ON)	3.3 <sup>(1)</sup>	Adjust f <sub>IN</sub> voltage to obtain 0 dBm at V <sub>OS</sub> .		150	MHz
		5.0 <sup>(2)</sup>	Increase f <sub>IN</sub> Frequency until dB meter reads -3dB R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 10 pF		180	
	Feed through attenuation (switch OFF)	3.3 <sup>(1)</sup>	V <sub>IN</sub> is centered at V <sub>CC</sub> /2		-60	dB
		5.0 <sup>(2)</sup>	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 <sup>(1)</sup>	R <sub>L</sub> = 600 Ω, C <sub>L</sub> = 50 pF, f <sub>IN</sub> = 1 KHz square wave t <sub>r</sub> = t <sub>f</sub> = 6 ns		60	mV
		5.0 <sup>(2)</sup>			60	

1. Voltage range is 3.3 V ± 0.3 V
2. Voltage range is 5.0 V ± 0.5 V

Obsolete Product(s) - Obsolete Product(s)

### 3 Switching characteristics test circuit

Figure 3. Enable and disable timing (circuit)

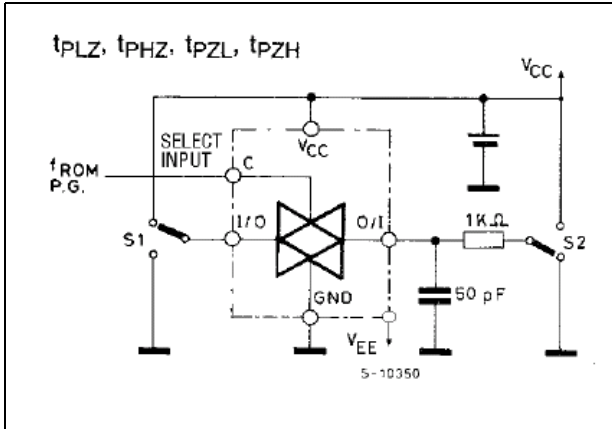


Figure 4. Enable and disable timing (waveform)

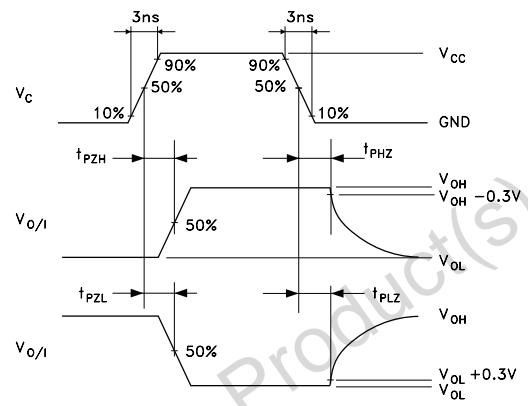


Figure 5. Resistive feedthrough attenuation

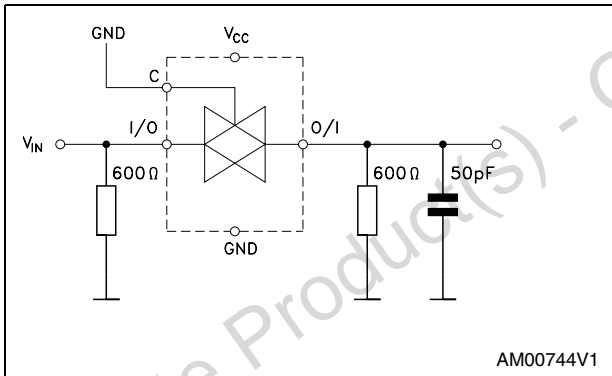


Figure 6. Capacitive feedthrough attenuation

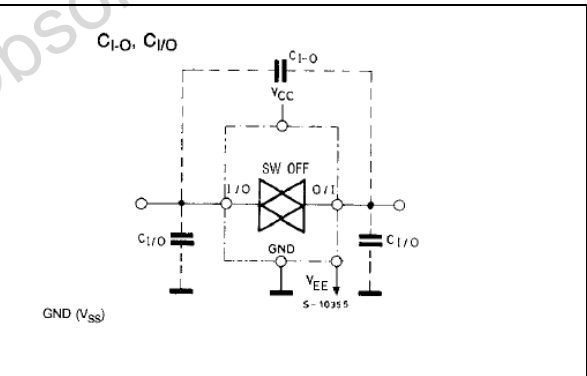


Figure 7. Bandwidth attenuation

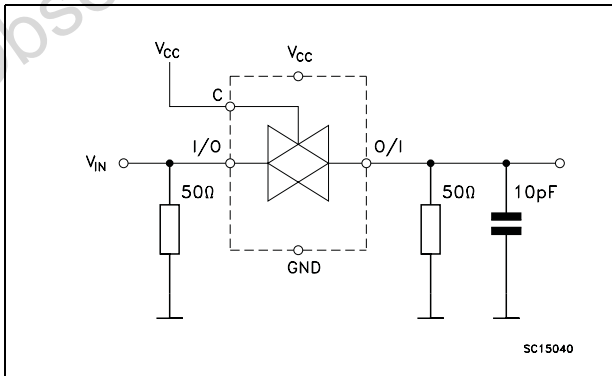


Figure 8. Maximum control frequency

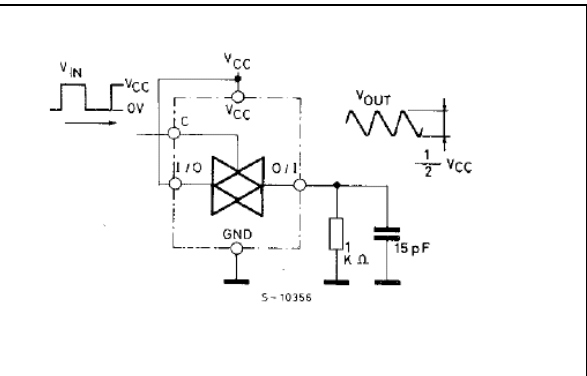


Figure 9. Crosstalk (control to output)

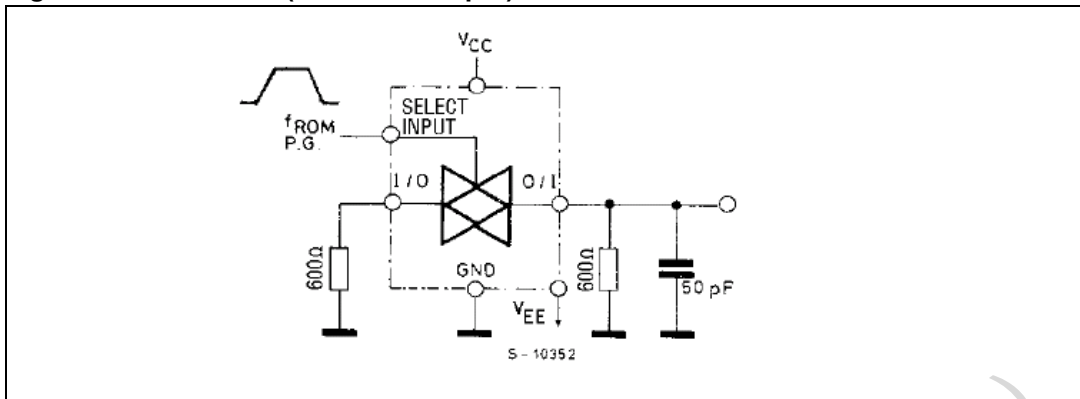


Figure 10. Channel resistance ( $R_{ON}$ )

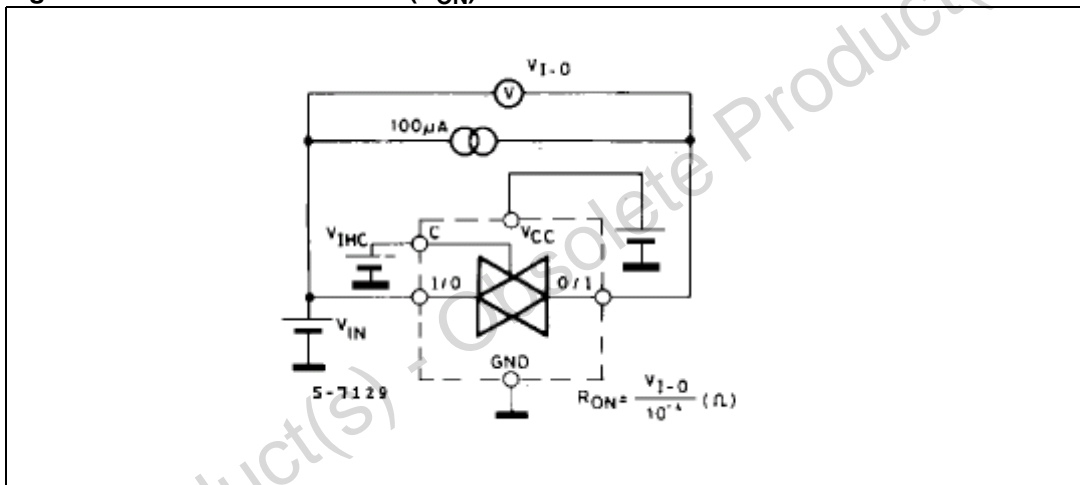
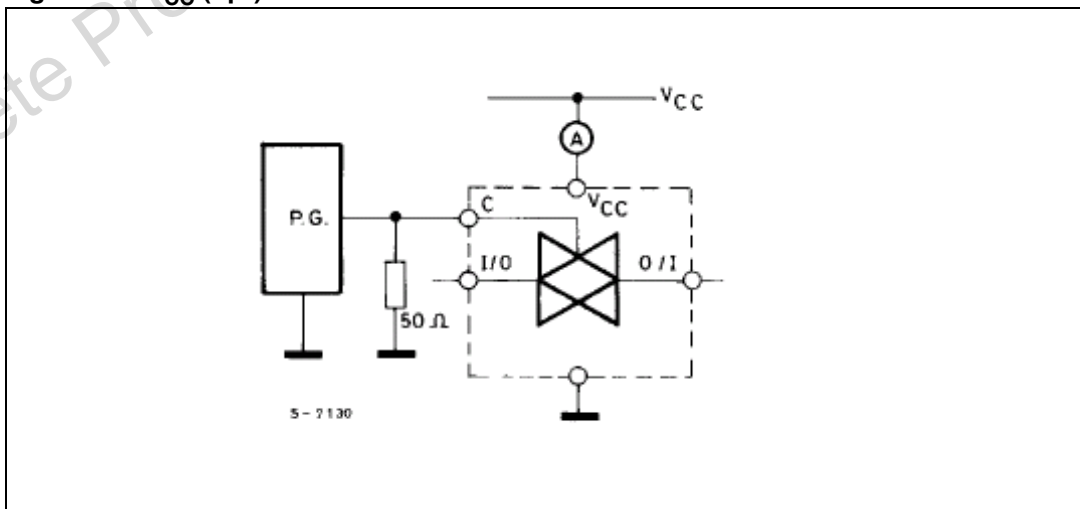


Figure 11.  $I_{CC}$  (opr)





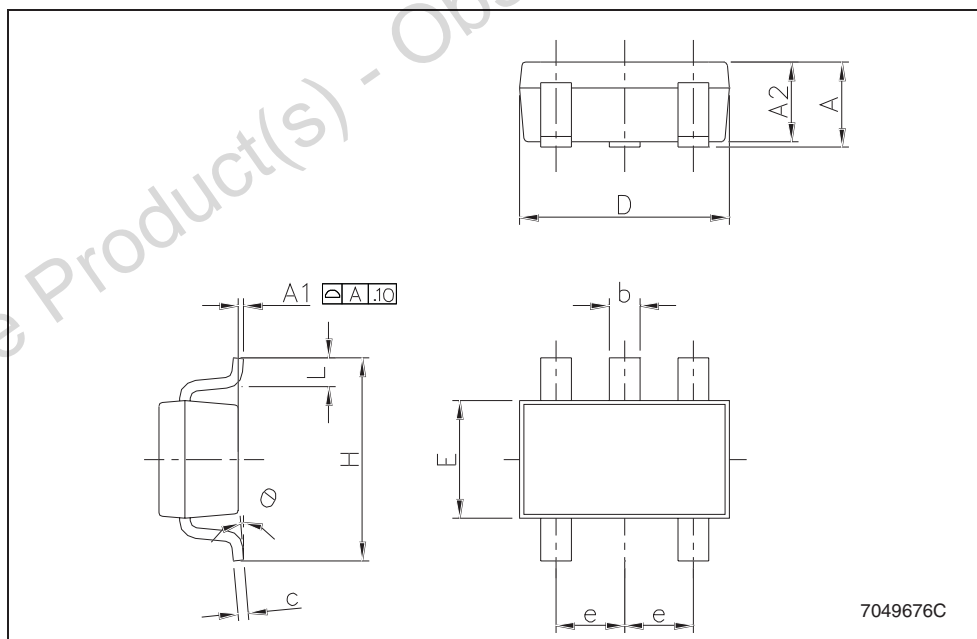
## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

Obsolete Product(s) - Obsolete Product(s)

**SOT23-5L MECHANICAL DATA**

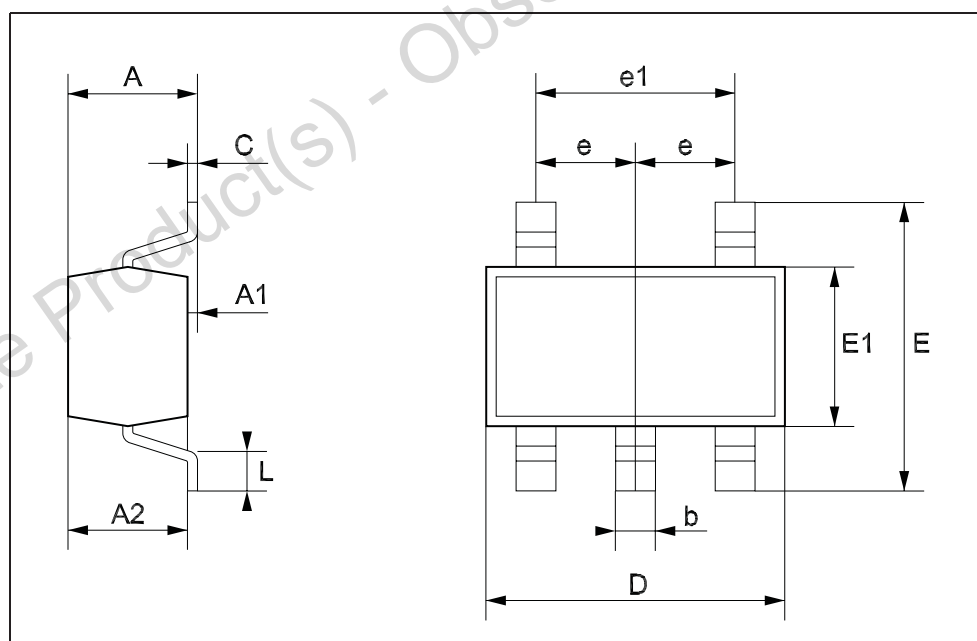
DIM.	mm.			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6



7049676C

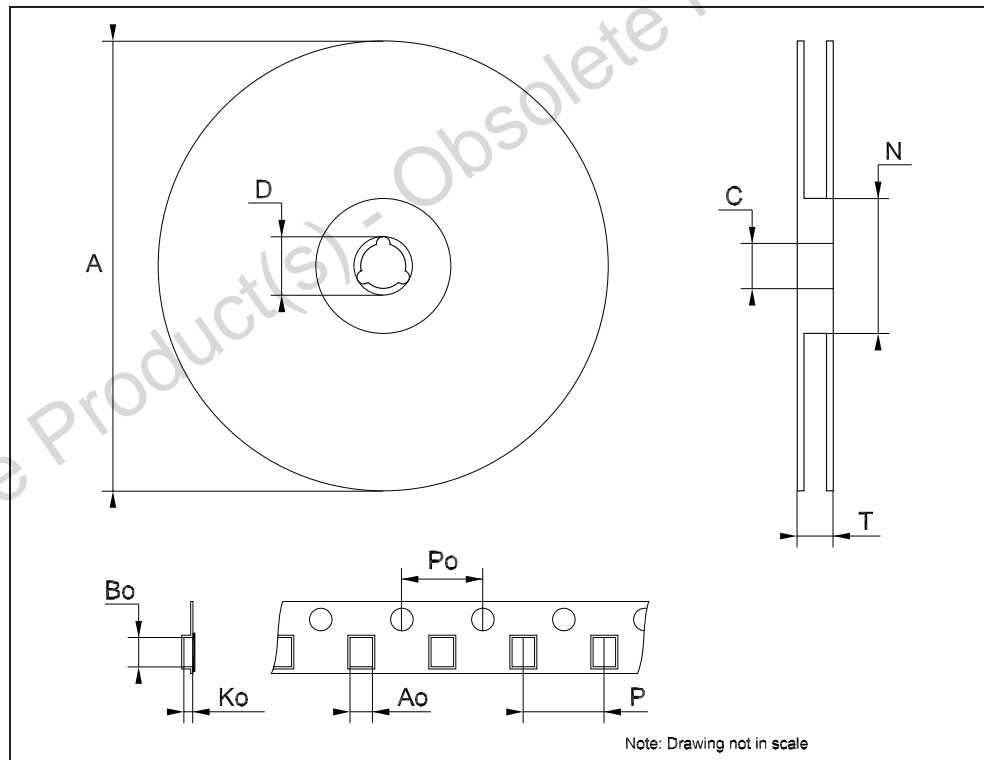
## SOT323-5L MECHANICAL DATA

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



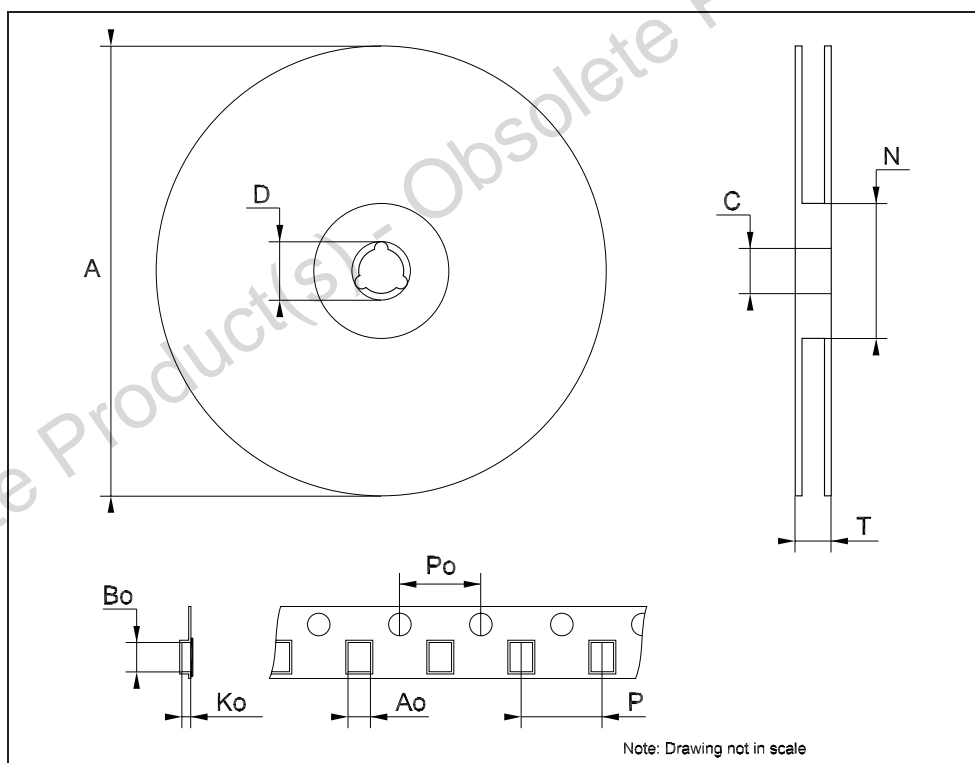
**Tape & Reel SOT23-xL MECHANICAL DATA**

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



## 5 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
01-Apr-2004	7	Updated data reel information.
28-Oct-2008	8	Document reformatted to improve readability. Updated <a href="#">Table 6: DC specifications on page 4</a> .

Obsolete Product(s) - Obsolete Product(s)

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2008 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)