74V2G66

Dual bilateral switch

Features

- High speed: t_{PD} = 0.3 ns (typ.) at V_{CC} = 5 V, t_{PD} = 0.4 ns (typ.) at V_{CC} = 3.3 V
- Low power dissipation: I_{CC} = 1 µA (max.) at T_A = 25 °C
- Low "ON" resistance: R_{ON} = 6.5 Ω (typ.) at V_{CC} = 5 V II/O = 1 mA R_{ON} = 8.5 Ω (typ.) at V_{CC} = 3.3 V II/O = 1 mA
- Sine wave distortion: 0.04% at V_{CC} = 3.3 V, f = 1 KHz
- Wide operating range: V_{CC} (opr.) = 2 V to 5.5 V
- Improved latch-up immunity

SOT23-8L

Table 1. Device summary

Order codes	
Package	**Tape and reel**
SOT23-8L	74V2G66STR

Contents

1 Description

The 74V2G66 is an advanced high-speed CMOS dual bilateral switch developed using silicon gate C^2MOS technology. It achieves high speed propagation delay and very low ON resistance, 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 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 various applications, such as battery-powered systems and test equipment. It is available in the commercial and extended temperature range housed in a SOT23-8L package. All inputs and outputs are equipped with protection circuits to defend against static discharge, giving them ESD immunity and transient excess voltage protection.

Figure 1. Pin connection and IEC logic symbols

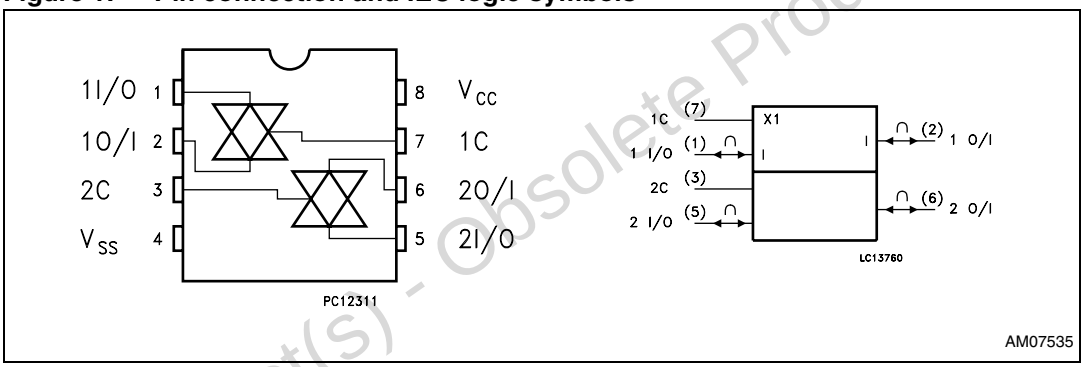


Figure 2. Input equivalent circuit

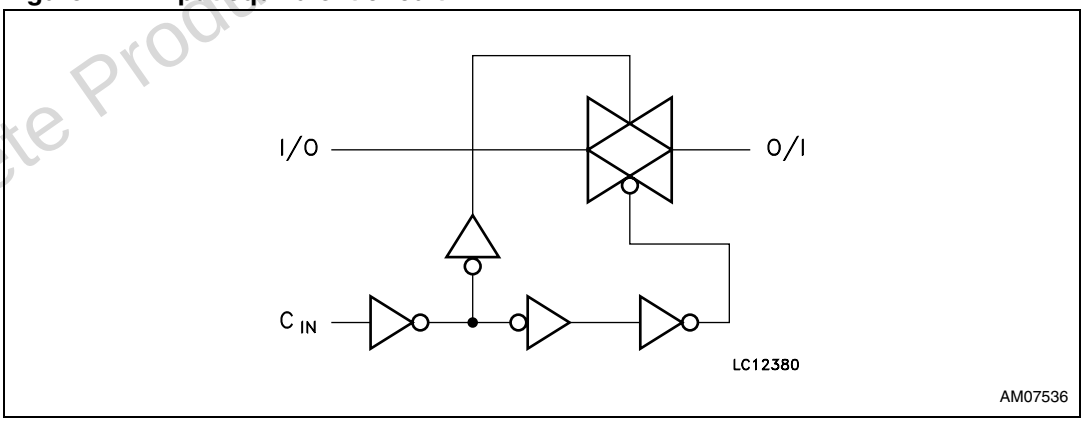


Table 2. Pin description

Pin No.	Symbol	Name and function
1, 5	1I/O, 2I/O	Independent input/output
2, 6	1O/I, 2O/I	Independent output/input
7, 3	1C, 2C	Enable input (active HIGH)
4	GND	Ground (0 V)
8	V_{CC}	Positive supply voltage

Table 3. Truth table

Control	Switch function
H	ON
L	OFF(1)

1. High impedance state.

Table 4. Absolute maximum ratings(1)

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	± 20	mA
II_K	DC control input diode current	-20	mA
I_{OK}	DC output diode current	± 20	mA
I_O	DC output current	± 50	mA
I_{CC} or I_{GND}	DC V_{CC} or ground current	± 50	mA
T_{stg}	Storage temperature	-65 to +150	°C
T_L	Lead temperature (10 sec.)	300	°C

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

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(1) 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_{CC} (V)		T_A = 25 °C			-40 to 85 °C		-55 to 125 °C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High level input	2.0		1.5			1.5		1.5		V
	Voltage	2.7 to 5.5		0.7 V_{CC}			0.7 V_{CC}		0.7 V_{CC}		
V_{IL}	Low level input	2.0				0.5		0.5		0.5	V
	Voltage	2.7 to 5.5				0.3 V_{CC}		0.3 V_{CC}		0.3 V_{CC}	
R_{ON}	ON resistance	3.3(1)	V_{IC} = V_{IH}, $V_{I/O}$ = V_{CC} to GND, $I_{I/O}$ ≤1 mA		12.5	19		23		27	Ω
		5.0(2)			7.5	10		12		14	
R_{ON}	ON resistance	3.3(1)	V_{IC} = V_{IH}, $V_{I/O}$ = V_{CC} or GND, $I_{I/O}$ ≤1mA		8.5	10.5		12.5		15	Ω
		5.0(2)			6.5	8.5		10		12	
I_{OFF}	Input/output leakage current (SWITCH OFF)	5.5	V_{OS} = V_{CC} to GND, V_{IS} = V_{CC} to GND, V_{IC} = V_{IL}			±0.1		± 1		± 5	µA
I_{IZ}	Switch input leakage current (SWITCH ON, OUTPUT OPEN)	5.5	V_{OS} = V_{CC} to GND, V_{IC} = V_{IH}			±0.1		± 1		± 5	µA
I_{IN}	Control input leakage current	0 to 5.5	V_{IC} = 5.5 V or GND			±0.1		±1.0		± 1.0	µA
I_{CC}	Quiescent supply current	5.5	V_I = V_{CC} 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 °C			-40 to 85 °C		-55 to 125 °C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{PD}	Delay time	3.3(1)	$t_r = t_f$ = 6 ns		0.4	0.8		1.2		2.4	ns
		5.0(2)			0.3	0.6		1.0		2.0	
t_{PLZ} t_{PHZ}	Output disable Time	3.3(1)	R_L = 500 Ω		5.0	7.5		9.0		10.0	ns
		5.0(2)			5.0	7.5		9.0		10.0	
t_{PZL} t_{PZH}	Output enable Time	3.3(1)	RL =1 KΩ		2.5	4.0		5.0		7.0	ns
		5.0(2)			2.0	4.0		5.0		7.0	

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

Table 8. Capacitive characteristics

Symbol	Parameter	Test condition		Value							Unit
		V_{CC} (V)		T_A = 25 °C			-40 to 85 °C		-55 to 125 °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(1)	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 test circuit). Average operating current can be obtained by the following equation: $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/4$.

Table 9. Analog switch characteristics (GND = 0 V; T_A = 25 °C)

Symbol	Parameter	Test condition			Value	Unit
		V_{CC} (V)	V_{IN} (V_{p-p})		Typ.	
	Sine wave distortion (THD)	3.3(1)	2.75	f_{IN} = 1 KHz, R_L = 10 KΩ, C_L = 50 pF	0.04	%
		5.0(2)	4		0.04	
f_{MAX}	Frequency response (switch ON)	3.3(1)	Adjust f_{IN} voltage to obtain 0 dBm at V_{OS}. Increase f_{IN} frequency until dB meter reads -3 dB, R_L = 50 Ω, C_L = 10 pF		150	MHz
		5.0(2)			180	
	Feed through attenuation (switch OFF)	3.3(1)	V_{IN} is centered at V_{CC}/2 Adjust f_{IN} voltage to obtained 0 dBm at V_{IS}, R_L = 600 Ω, C_L = 50 pF, f_{IN} = 1 KHz sine wave		-60	dB
		5.0(2)			-60	
	Crosstalk (control input to signal output)	3.3(1)	R_L = 600 Ω, CL = 50 pF, f_{IN} = 1 KHz square wave $t_r = t_f$ = 6 ns		60	mV
		5.0(2)			60	

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

Figure 3. Switching characteristics test circuit

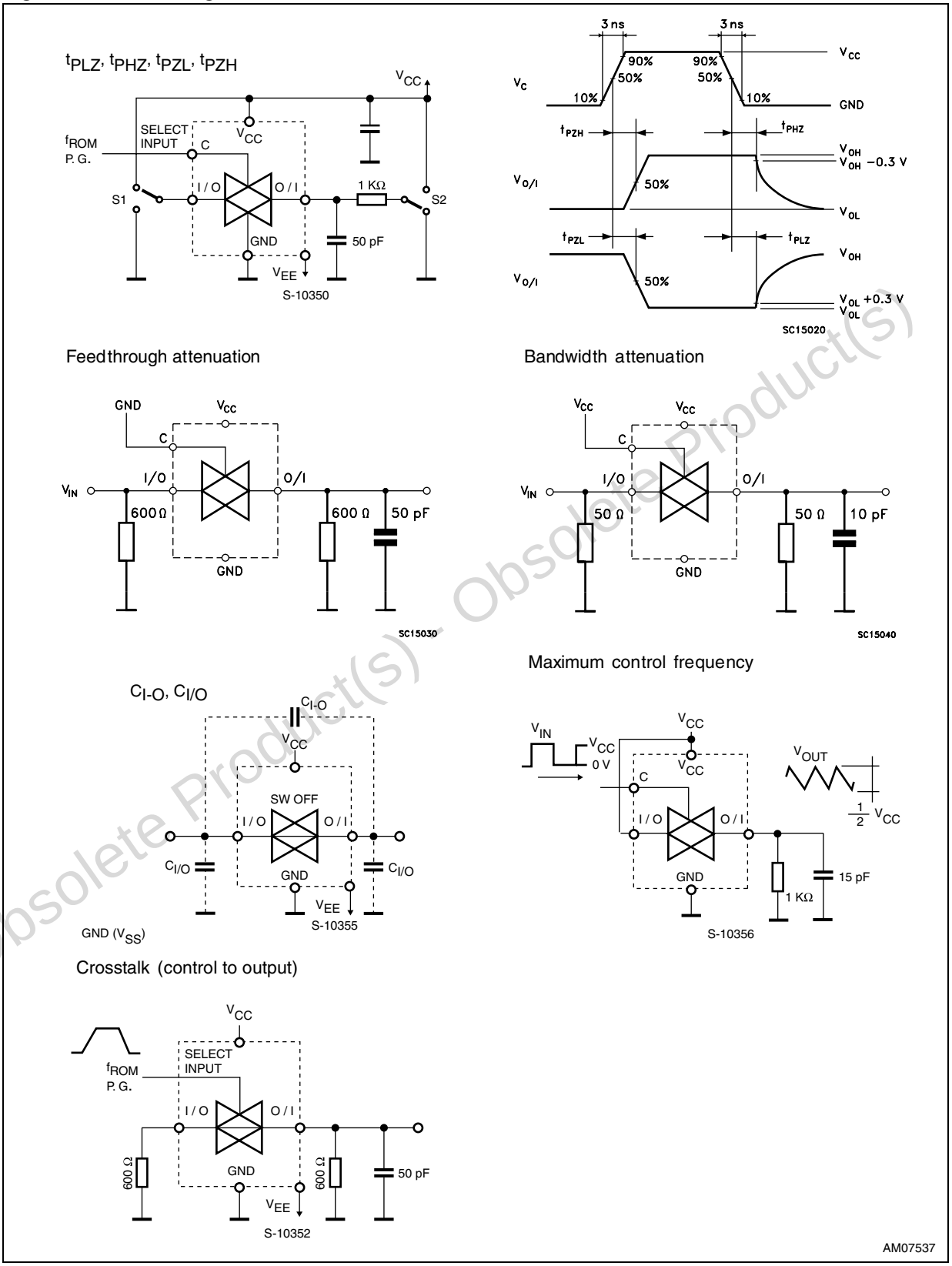


Figure 4. Channel resistance (R_{ON})

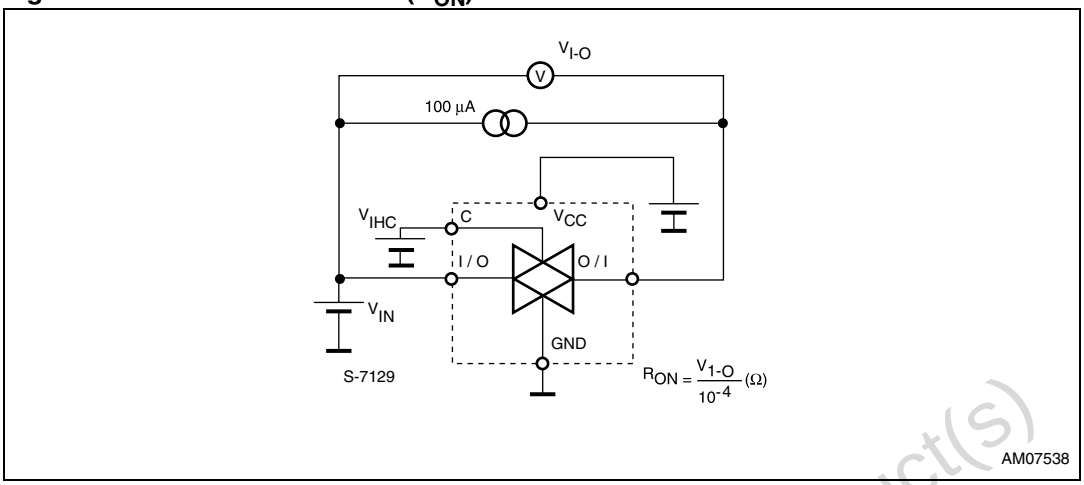
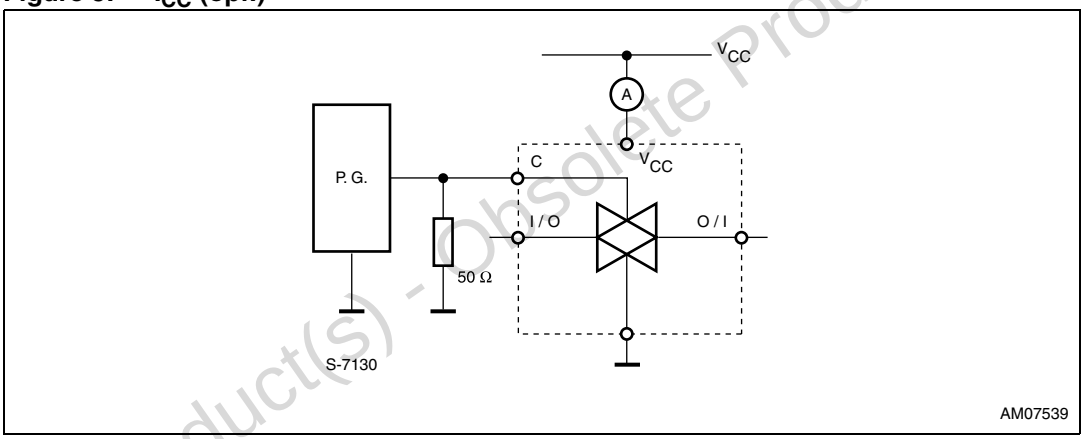


Figure 5. I_{CC} (opr.)



2 Package mechanical data

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Figure 6. SOT23-8L package mechanical

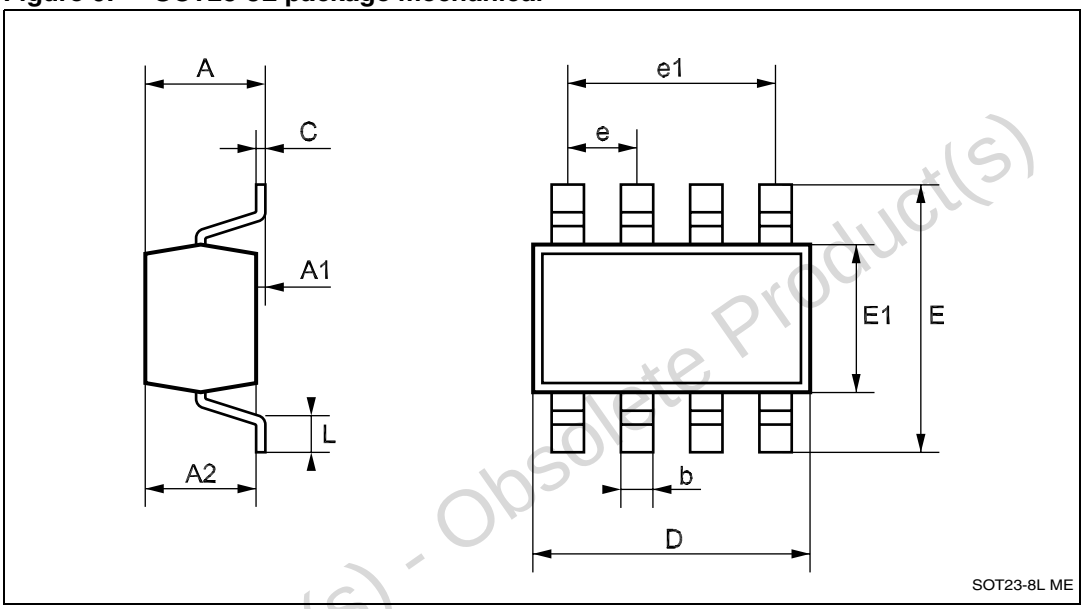
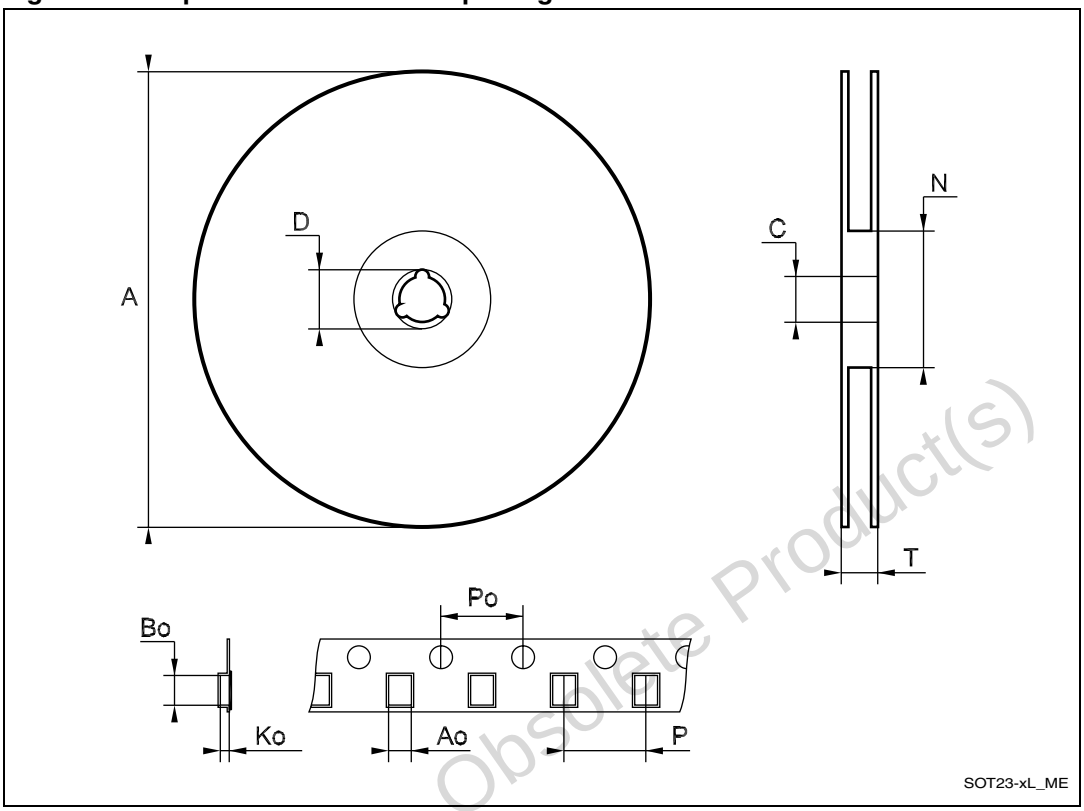


Table 10. SOT23-8L mechanical data

Symbol	Dimensions					
	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	0.22		0.38	8.6		14.9
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		0.65			25.6	
e1		1.95			76.7	
L	0.35		0.55	13.7		21.6

Figure 7. Tape and reel SOT23-xL package mechanical(1)



1. Drawing not in scale.

Table 11. Tape and reel SOT23-xL mechanical data

Symbol	Dimensions					
	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

3 Revision history

Table 12. Document revision history

Date	Revision	Changes
19-Oct-2011	5	Removed “Obsolete Products” watermark, document reformatted, added ECOPACK®, minor text corrections throughout document.

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