

## Low voltage 4 Ω SPDT switch



SOT23-6L

### 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:
  - $R_{ON} = 4 \Omega$  (max.  $T_A = 25 \text{ }^\circ\text{C}$ ) at  $V_{CC} = 5 \text{ V}$
  - $R_{ON} = 6 \Omega$  (typ.) at  $V_{CC} = 3 \text{ V}$
- Wide operating voltage range:
  - $V_{CC} \text{ (OPR)} = 1.8 \text{ V to } 5.5 \text{ V}$  single supply

### Description

The **STG719** is a high-speed S.P.D.T. (single pole double throw) switch developed thanks to silicon gate C<sup>2</sup>MOS technology. It is designed to operate from 1.8 V to 5.5 V, making this device ideal for portable applications, audio signal routing, video switching, mobile and communication systems.

It offers 4 Ω on-resistance max. at 5 V 25 °C and very low on-resistance flatness. Additional key features are fast switching speed ( $t_{ON} = 7 \text{ ns}$ ,  $t_{OFF} = 4.5 \text{ ns}$ ), break before make delay time and low power consumption.

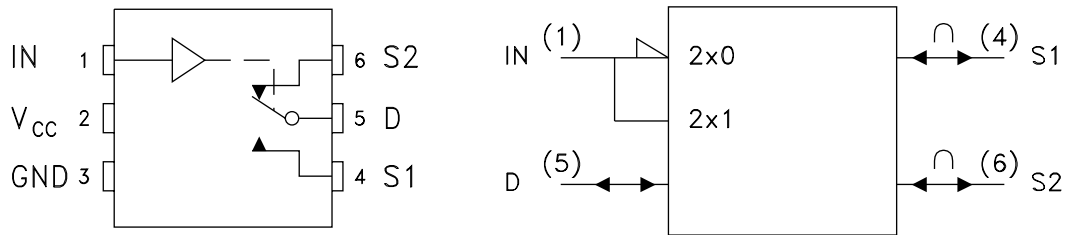
All inputs and outputs are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage. It is available in the commercial and extended temperature range.

Maturity status link	
<a href="#">STG719</a>	

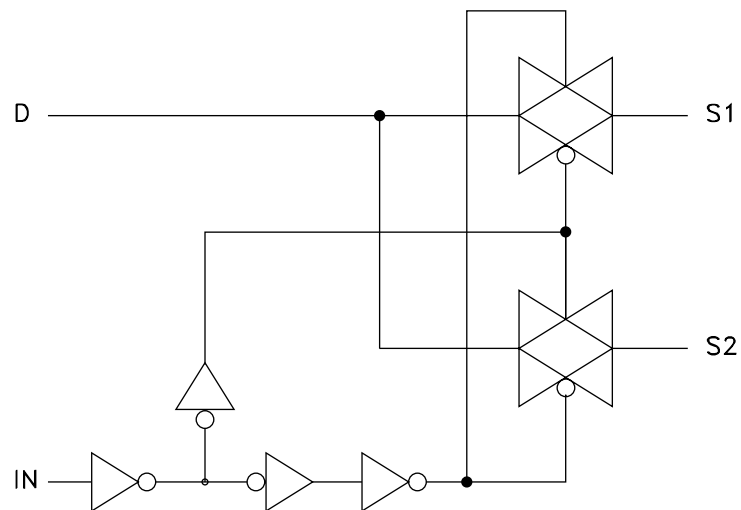
Order code	
<b>Package</b>	SOT23-6L
<b>Tape and reel</b>	STG719STR

# 1 Pin connection

**Figure 1. Pin connection and IEC logic symbols**



**Figure 2. Input equivalent circuit**



**Table 1. Pin description**

Pin n°	Symbol	Name and function
1	IN	Control
4, 6	S1, S2	Independent channel
5	D	Common channel
2	V <sub>CC</sub>	Positive supply voltage
3	GND	Ground (0 V)

**Table 2. Truth table**

IN	Switch S1	Switch S2
L	ON	OFF
H	OFF	ON

## 2 Maximum ratings

**Table 3. 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 $V_{CC} + 0.5$	V
$V_O$	DC output voltage	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC input diode current	$\pm 20$	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 s.)	300	°C

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

**Table 4. Recommended operating conditions**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply voltage <sup>(1)</sup>	1.8 to 5.5	V
$V_I$	Input voltage	0 to $V_{CC}$	V
$V_{IC}$	Control input voltage	0 to $V_{CC}$	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 on control pin <sup>(2)</sup>	0 to 10	ns/V
dt/dv	Input rise and fall time on I/O pins	0 to DC	ns/V

1. Truth table guaranteed: 1.2 V to 6 V.

2.  $V_{IN}$  from 30% to 70% of  $V_{CC}$ .

**Table 5. DC specifications**

Symbol	Parameter	Test conditions		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C			-40to 85 °C		-55 to 125 °C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>IHC</sub>	High level control input voltage	3.3 <sup>(1)</sup>		2.0			2.0		2.0		V
		5.0 <sup>(2)</sup>		2.4			2.4		2.4		
		5.0 <sup>(3)</sup>		2.25			2.25		2.25		
V <sub>ILC</sub>	Low level control input voltage	3.3 <sup>(1)</sup>				0.4		0.4		0.4	V
		5.0 <sup>(2)</sup>				0.8		0.8		0.8	
R <sub>ON</sub>	ON-resistance	3.3 <sup>(1)</sup>	V <sub>S</sub> = 0 to V <sub>CC</sub>		6	7		10		12	Ω
		5.0 <sup>(2)</sup>	I <sub>S</sub> = 10 mA			4		5		6	
ΔR <sub>ON</sub>	ON-resistance	3.3 <sup>(1)</sup>	V <sub>S</sub> = 0 to V <sub>CC</sub>		0.1			0.4			Ω
		5.0 <sup>(2)</sup>	I <sub>S</sub> = 10 mA		0.1			0.4			
R <sub>FLATON</sub>	ON-resistance flatness	3.3 <sup>(1)</sup>	V <sub>S</sub> = 0 to V <sub>CC</sub>		2.5						Ω
		5.0 <sup>(2)</sup>	I <sub>S</sub> = 10 mA		0.75						
I <sub>SOFF</sub>	Source OFF leakage	3.3 <sup>(1)</sup>	V <sub>S</sub> = 1 V or V <sub>CC</sub> V <sub>DD</sub> = V <sub>CC</sub> or 1 V V <sub>IN</sub> = V <sub>CC</sub> or GND		±0.01	±0.25		± 0.35		± 3.5	nA
		5.0 <sup>(2)</sup>			±0.01	±0.25		± 0.35		± 3.5	
I <sub>SON</sub>	Channel ON leakage	3.3 <sup>(1)</sup>	V <sub>S</sub> = V <sub>D</sub> = 1 V to V <sub>CC</sub> - 2.5 V V <sub>IN</sub> = V <sub>IHC</sub>		±0.01	±0.25		± 0.35		± 3.5	nA
		5.0 <sup>(2)</sup>			±0.01	±0.25		± 0.35		± 3.5	
I <sub>IN</sub>	Control input leakage current	3.3 <sup>(1)</sup>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>		0.005			±0.1		±1	μA
		5.0 <sup>(2)</sup>			0.005			±0.1		±1	
I <sub>CC</sub>	Quiescent supply current	3.3 <sup>(1)</sup>	V <sub>I</sub> = V <sub>CC</sub> or GND		0.001	1		1		2	μA
		5.0 <sup>(2)</sup>			0.001			1		2	

1. Voltage range is 3.3 V ± 0.3 V
2. Voltage range is 5 V ± 0.5 V
3. Voltage range is 5 V ± 0.125 V

### 3 Electrical characteristics

 $C_L = 35 \text{ pF}$ ,  $R_L = 300 \Omega$ 
**Table 6. AC electrical characteristics**

Symbol	Parameter	Test conditions		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>(1)</sup>	V <sub>S</sub> = 3 V square wave f = 1 MHz t <sub>r</sub> = t <sub>f</sub> = 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 <sub>ON</sub>	ON channel time	3.3 <sup>(1)</sup>	V <sub>S</sub> = 2 V		10			16		19	ns
		5.0 <sup>(2)</sup>	V <sub>S</sub> = 3 V		7			11		13	
t <sub>OFF</sub>	OFF channel time	3.3 <sup>(1)</sup>	V <sub>S</sub> = 2 V		5.5			7		8.5	ns
		5.0 <sup>(2)</sup>	V <sub>S</sub> = 3 V		4.5			6		7.5	
t <sub>D</sub>	Break before make time delay	3.3 <sup>(1)</sup>	V <sub>S</sub> = 2 V	1	4						ns
		5.0 <sup>(2)</sup>	V <sub>S</sub> = 3 V	1	4						
C <sub>SOFF</sub>	OFF channel				19						pF
C <sub>SON</sub>	ON channel				33						pF

1. Voltage range is 3.3 V ± 0.3 V

2. Voltage range is 5.0 V ± 0.5 V

 GND = 0 V; T<sub>A</sub> = 25°C

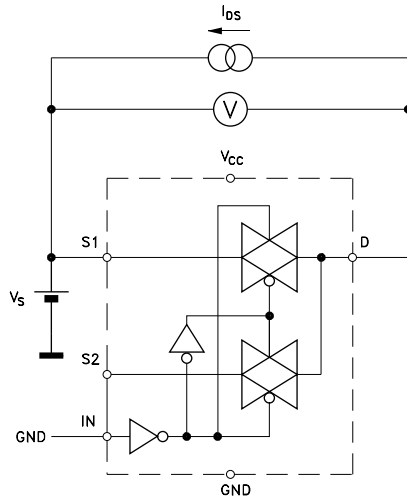
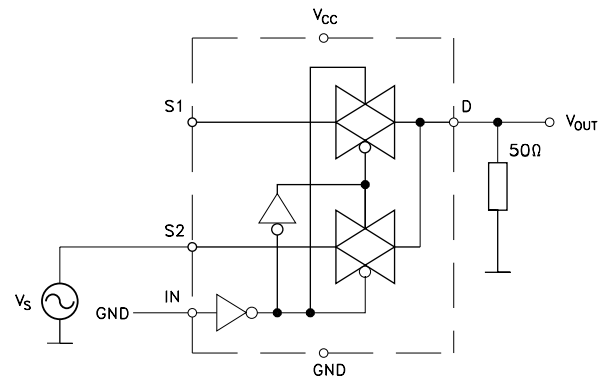
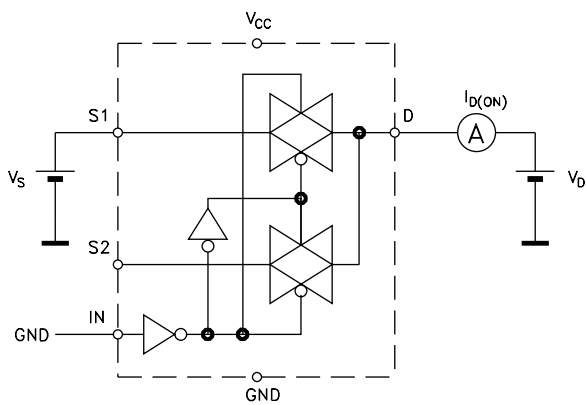
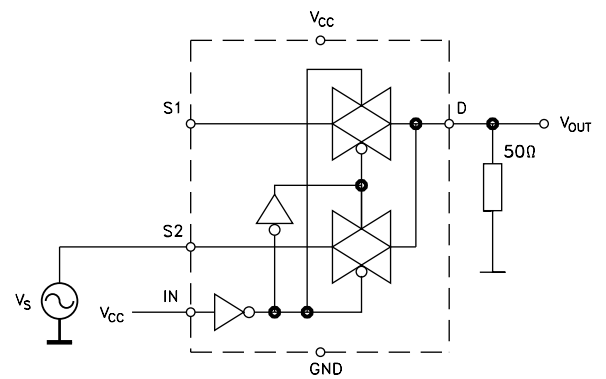
**Table 7. Analog switch characteristics**

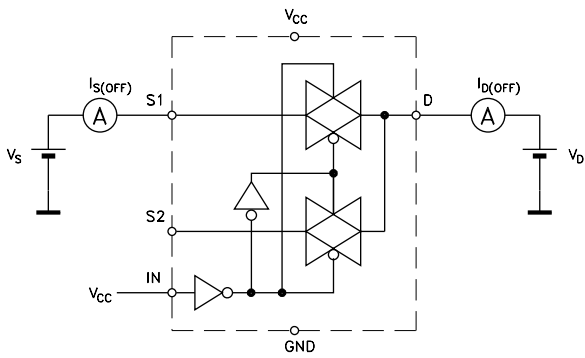
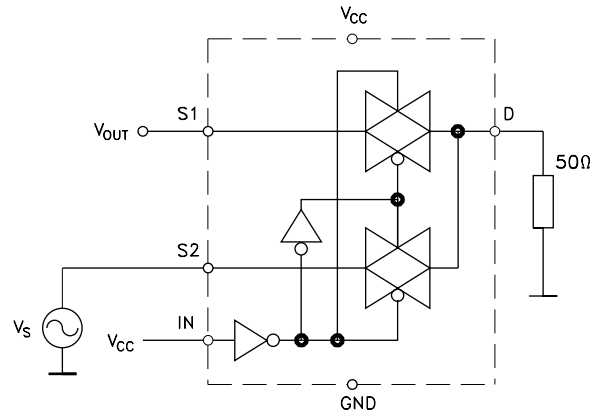
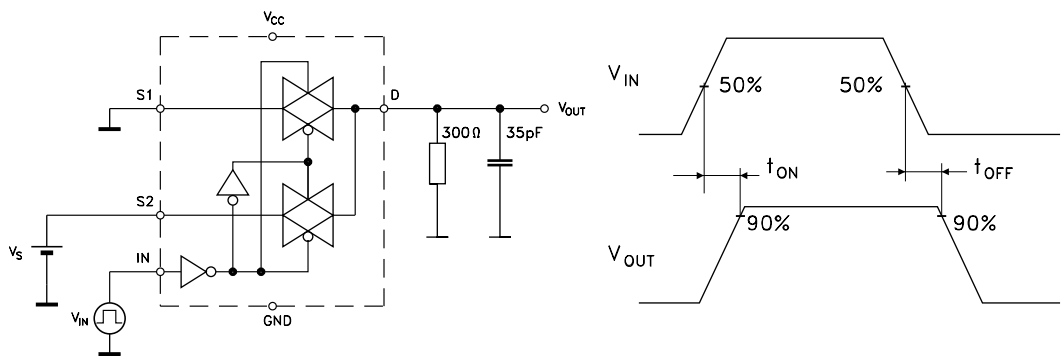
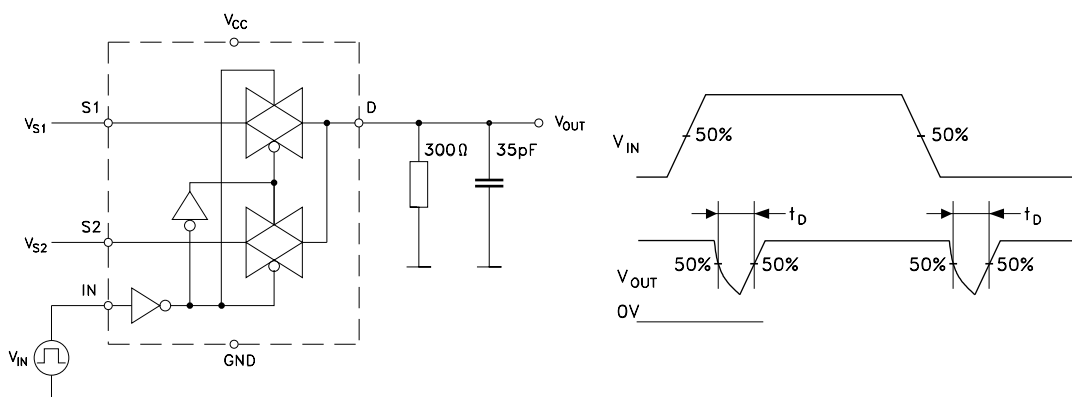
Symbol	Parameter	Test conditions		Value	Unit
		V <sub>CC</sub> (V)		Typ.	
f <sub>MAX</sub>	Frequency response (switch ON)	3.3 <sup>(1)</sup>	Bandwidth at -3 dB	200	MHz
		5.0 <sup>(2)</sup>		200	
	Feed through attenuation (switch OFF)	3.3 <sup>(1)</sup>	f <sub>IN</sub> = 10 MHz sine wave	-40	dB
		<sup>(1)</sup>	f = 1 MHz sine wave	-74	
		5.0 <sup>(2)</sup>	f <sub>IN</sub> = 10 MHz sine wave	-40	
		5.0 <sup>(2)</sup>	f <sub>IN</sub> = 1 MHz sine wave	-74	
	Crosstalk (control input to signal output)	3.3 <sup>(1)</sup>	f <sub>IN</sub> = 10 MHz sine wave	-39	dB
		<sup>(1)</sup>	f = 1 MHz sine wave	-52	
		5.0 <sup>(2)</sup>	f <sub>IN</sub> = 10 MHz sine wave	-39	
		5.0 <sup>(2)</sup>	f <sub>IN</sub> = 1 MHz sine wave	-52	

1. Voltage range is 3.3 V ± 0.3 V

2. Voltage range is 5.0 V ± 0.5 V

## 4 Test circuits

**Figure 3. On-resistance**

**Figure 4. Off isolation**

**Figure 5. On leakage**

**Figure 6. Bandwidth**


**Figure 7. Off leakage**

**Figure 8. Channel-to-channel crosstalk**

**Figure 9. Switching times**

**Figure 10. Break before make delay time**




## 5 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 5.1 SOT23-6L package information

Figure 11. SOT23-6L package outline

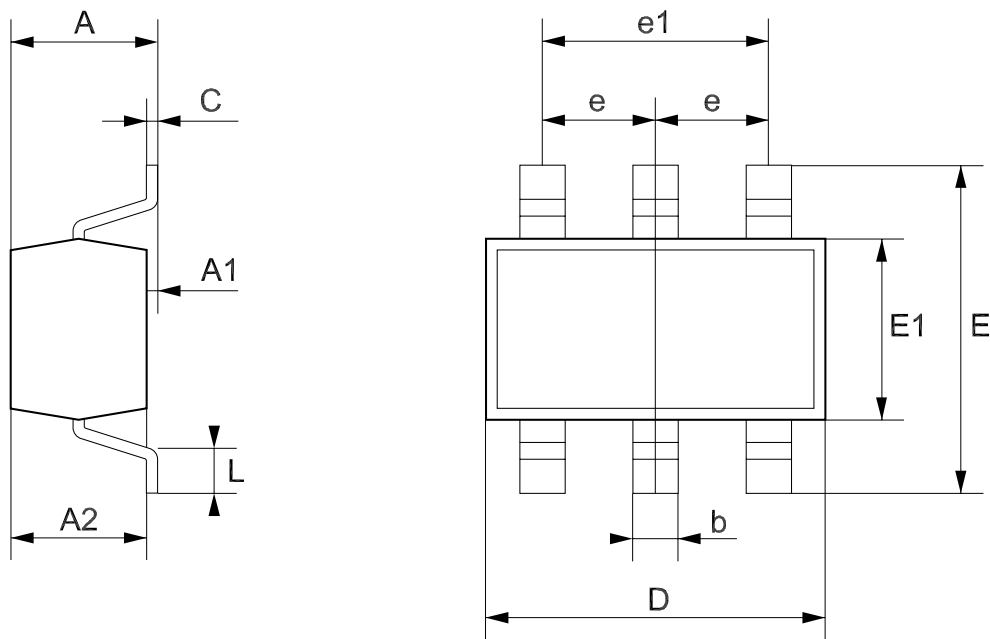
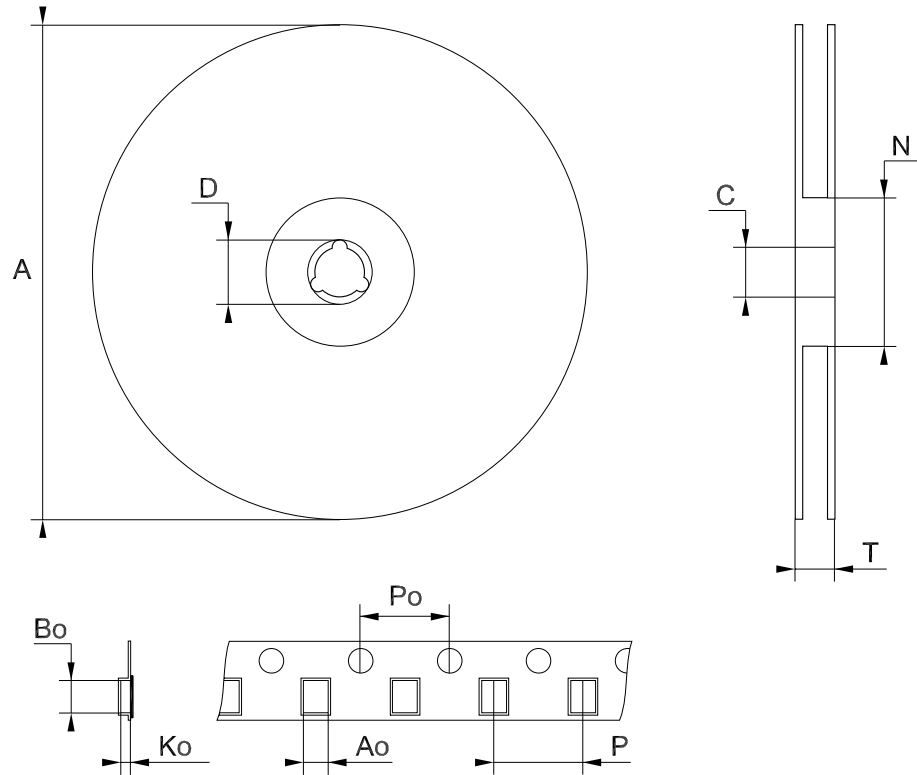


Table 8. SOT23-6L mechanical data

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
e		0.95			37.4	
e1		1.9			74.8	
L	0.35		0.55	13.7		21.6

## 5.2 SOT23-6L packing information

Figure 12. SOT23-6L tape and reel outline



Note: Drawing not in scale

Table 9. SOT23-6L tape and reel 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

## Revision history

**Table 10. Document revision history**

Date	Revision	Changes
25-Nov-2004	8	Mistake on figure 1.
12-Sep-2019	9	Add new test condition $V_{ICH}$ in Table 5. DC specifications.

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