

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 C²MOS 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	
STG719	

Order code	
Package	SOT23-6L
Tape and reel	STG719STR

1 Pin connection

Figure 1. Pin connection and IEC logic symbols

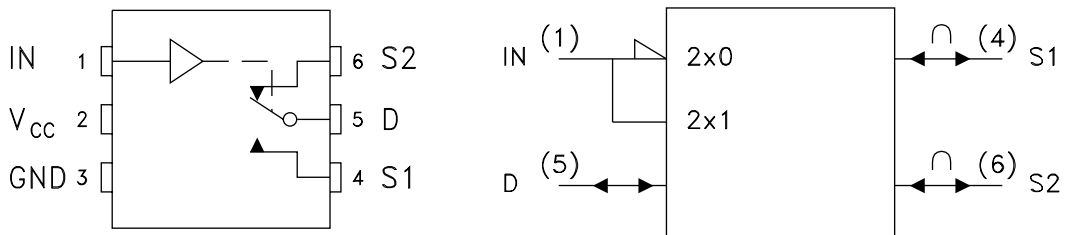


Figure 2. Input equivalent circuit

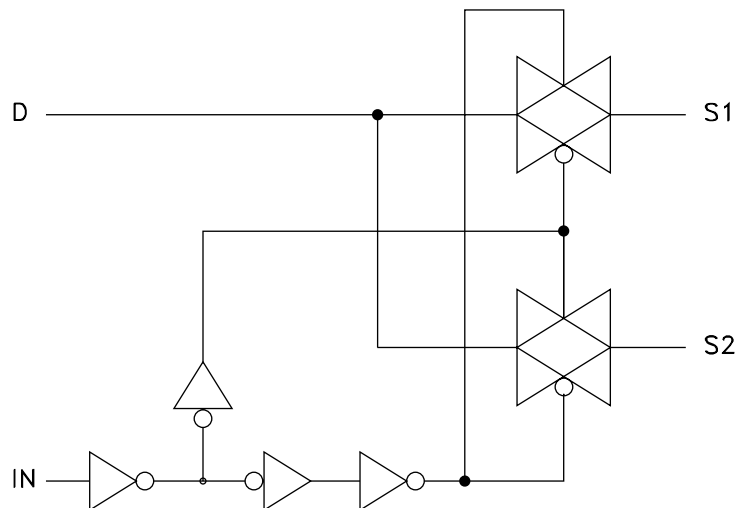


Table 1. Pin description

Pin n°	Symbol	Name and function
1	IN	Control
4, 6	S1, S2	Independent channel
5	D	Common channel
2	V _{CC}	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	± 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
I_{P-P}	Peak to peak current	100	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 ⁽¹⁾	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 ⁽²⁾	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 _{CC} (V)		T _A = 25 °C			-40 to 85 °C		-55 to 125 °C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V _{IHC}	High level control input voltage	3.3 ⁽¹⁾		2.0			2.0		2.0		V
		5.0 ⁽²⁾		2.4			2.4		2.4		
		5.0 ⁽³⁾		2.25			2.25		2.25		
V _{ILC}	Low level control input voltage	3.3 ⁽¹⁾				0.4		0.4		0.4	V
		5.0 ⁽²⁾				0.8		0.8		0.8	
R _{ON}	ON-resistance	3.3 ⁽¹⁾	V _S = 0 to V _{CC}		6	7		10		12	Ω
		5.0 ⁽²⁾	I _S = 10 mA			4		5		6	
ΔR _{ON}	ON-resistance	3.3 ⁽¹⁾	V _S = 0 to V _{CC}		0.1			0.4			Ω
		5.0 ⁽²⁾	I _S = 10 mA		0.1			0.4			
R _{FLATON}	ON-resistance flatness	3.3 ⁽¹⁾	V _S = 0 to V _{CC}		2.5						Ω
		5.0 ⁽²⁾	I _S = 10 mA		0.75						
I _{SOFF}	Source OFF leakage	3.3 ⁽¹⁾	V _S = 1 V or V _{CC} V _{DD} = V _{CC} or 1 V V _{IN} = V _{CC} or GND		±0.01	±0.25		± 0.35		± 3.5	nA
		5.0 ⁽²⁾			±0.01	±0.25		± 0.35		± 3.5	
I _{SON}	Channel ON leakage	3.3 ⁽¹⁾	V _S = V _D = 1 V to V _{CC} - 2.5 V V _{IN} = V _{IHC}		±0.01	±0.25		± 0.35		± 3.5	nA
		5.0 ⁽²⁾			±0.01	±0.25		± 0.35		± 3.5	
I _{IN}	Control input leakage current	3.3 ⁽¹⁾	V _I = V _{IH} or V _{IL}		0.005			±0.1		±1	μA
		5.0 ⁽²⁾			0.005			±0.1		±1	
I _{CC}	Quiescent supply current	3.3 ⁽¹⁾	V _I = V _{CC} or GND		0.001	1		1		2	μA
		5.0 ⁽²⁾			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 _{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⁾	V _S = 3 V square wave f = 1 MHz 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 _{ON}	ON channel time	3.3 ⁽¹⁾	V _S = 2 V		10			16		19	ns
		5.0 ⁽²⁾	V _S = 3 V		7			11		13	
t _{OFF}	OFF channel time	3.3 ⁽¹⁾	V _S = 2 V		5.5			7		8.5	ns
		5.0 ⁽²⁾	V _S = 3 V		4.5			6		7.5	
t _D	Break before make time delay	3.3 ⁽¹⁾	V _S = 2 V	1	4						ns
		5.0 ⁽²⁾	V _S = 3 V	1	4						
C _{SOFF}	OFF channel				19						pF
C _{SON}	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_A = 25°C

Table 7. Analog switch characteristics

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

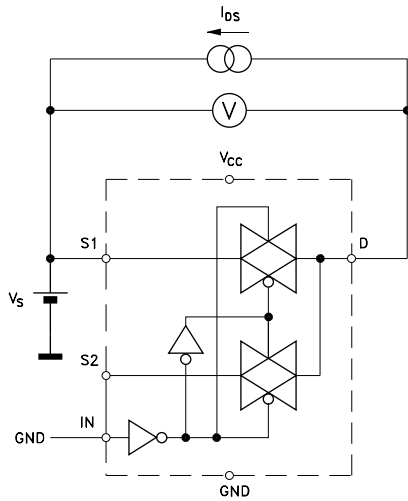
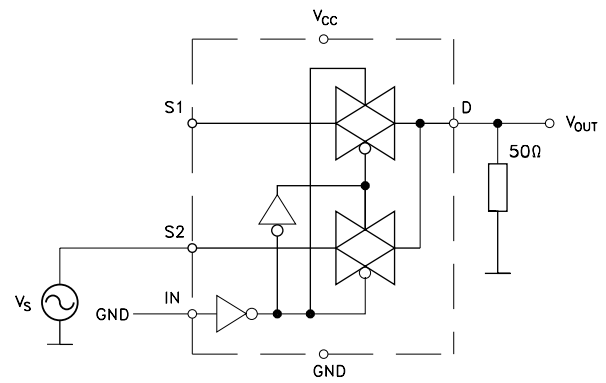
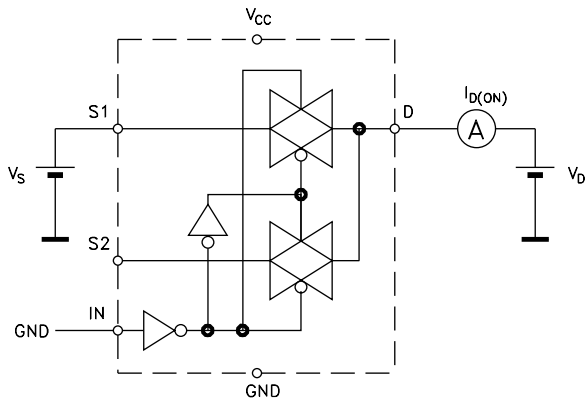
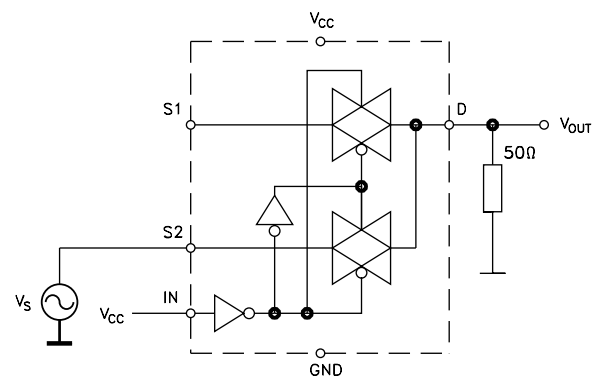
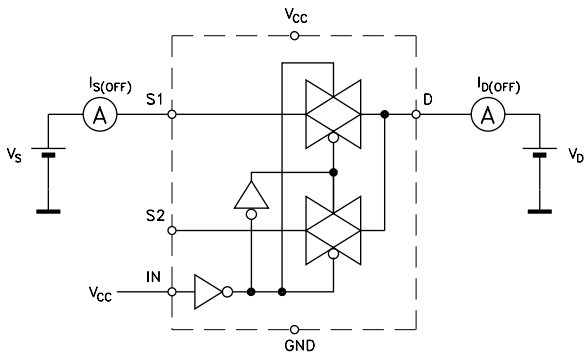
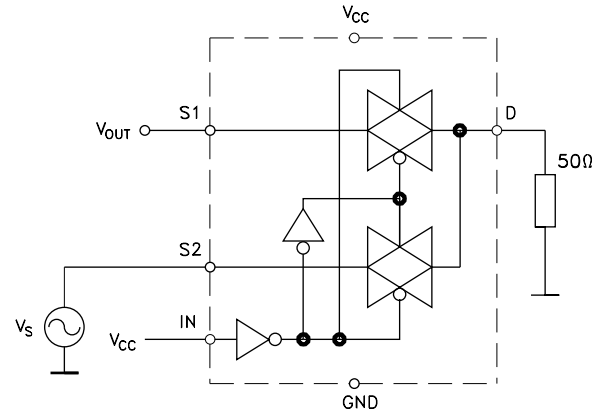
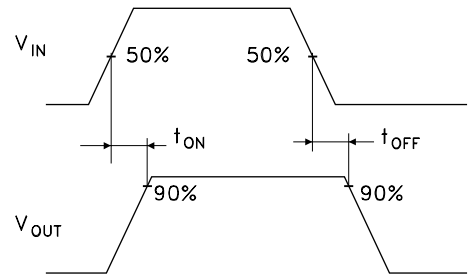
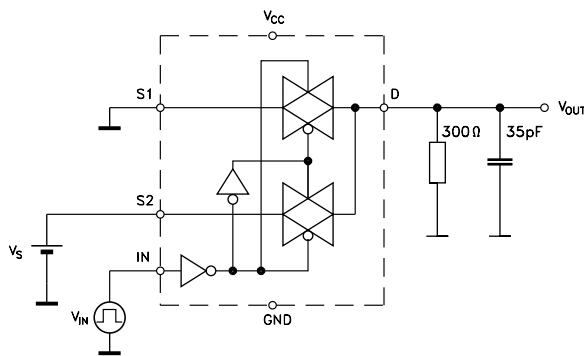
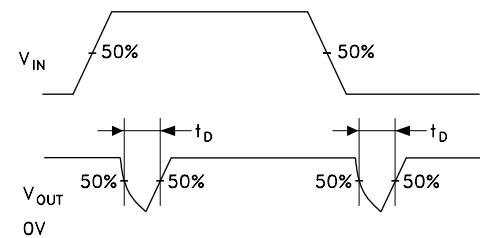
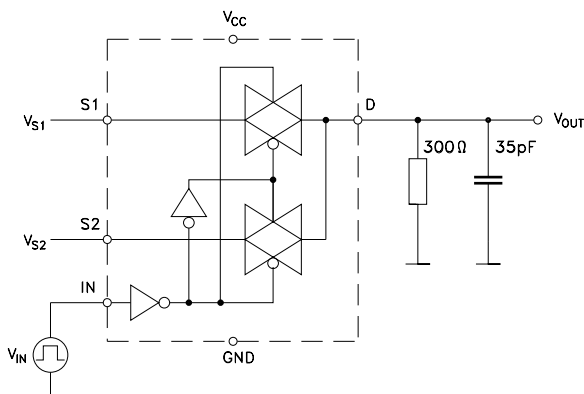
Figure 3. On-resistance

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. ECOPACK is an ST trademark.

5.1 SOT23-6L package information

Figure 11. SOT23-6L package outline

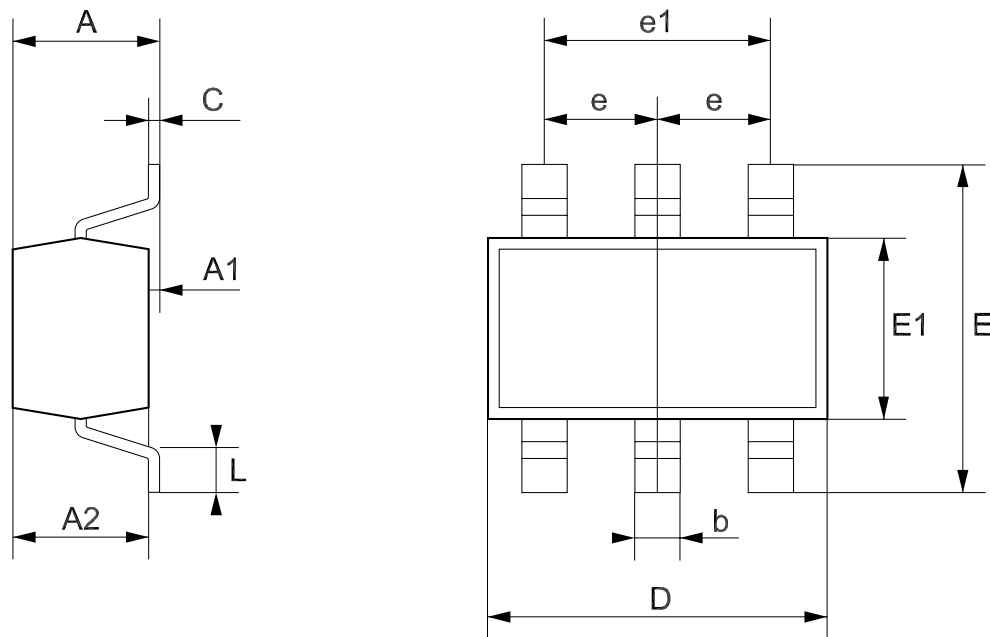
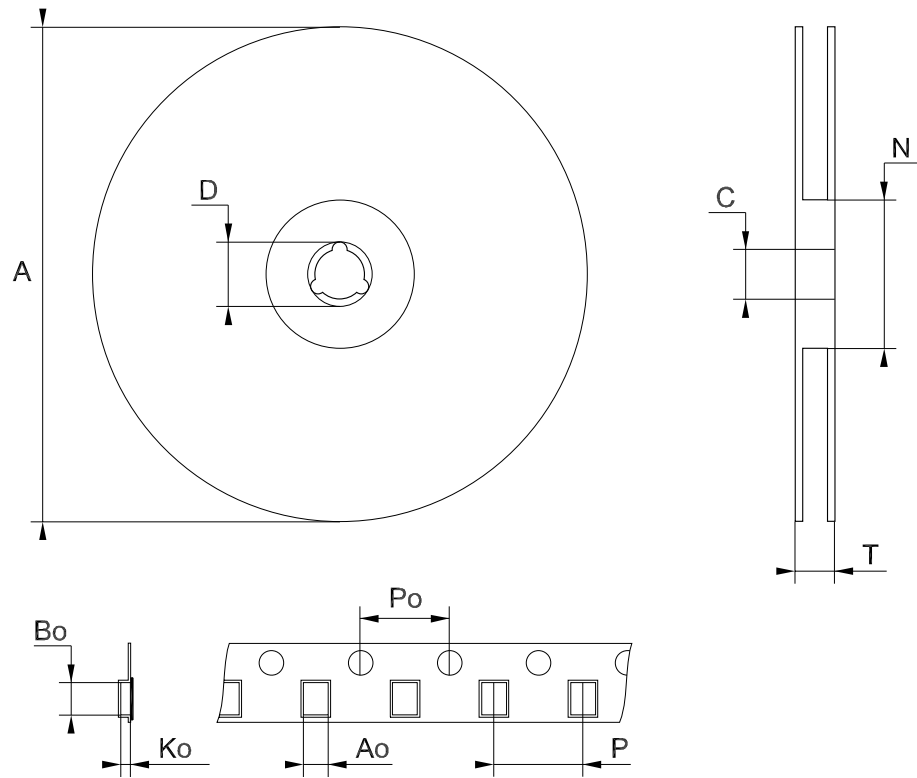


Table 8. SOT23-6L mechanical data

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.
15-Mar-2021	10	Added new $I_{P,P}$ parameter in Table 3. Absolute maximum ratings.

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