

LOW VOLTAGE 4Ω SPDT SWITCH

- HIGH SPEED:
 $t_{PD} = 0.3ns$ (TYP.) at $V_{CC} = 5V$
 $t_{PD} = 0.4ns$ (TYP.) at $V_{CC} = 3.3V$
- LOW POWER DISSIPATION:
 $I_{CC} = 1\mu A$ (MAX.) at $T_A=25^\circ C$
- LOW "ON" RESISTANCE:
 $R_{ON} = 4\Omega$ (MAX. $T_A=25^\circ C$) AT $V_{CC} = 5V$
 $R_{ON} = 6\Omega$ (TYP.) AT $V_{CC} = 3V$
- WIDE OPERATING VOLTAGE RANGE:
 V_{CC} (OPR) = 1.8V TO 5.5V SINGLE SUPPLY

DESCRIPTION

The STG719 is an high-speed S.P.D.T. (Single Pole Double Throw) SWITCH fabricated in silicon gate C²MOS technology. It designed to operate from 1.8V to 5.5V, making this device ideal for portable applications, audio signal routing, video switching, mobile and communication systems. It offers 4Ω ON-Resistance Max at 5V 25°C and very low ON-Resistance Flatness. Additional key features are fast switching speed ($t_{ON}=7ns$,

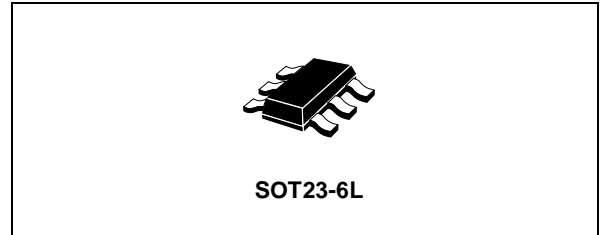


Table 1: Order Codes

| PACKAGE | T & R |
|----------|-----------|
| SOT23-6L | STG719STR |

$t_{OFF}=4.5ns$), 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's available in the commercial and extended temperature range.

Figure 1: Pin Connection And IEC Logic Symbols

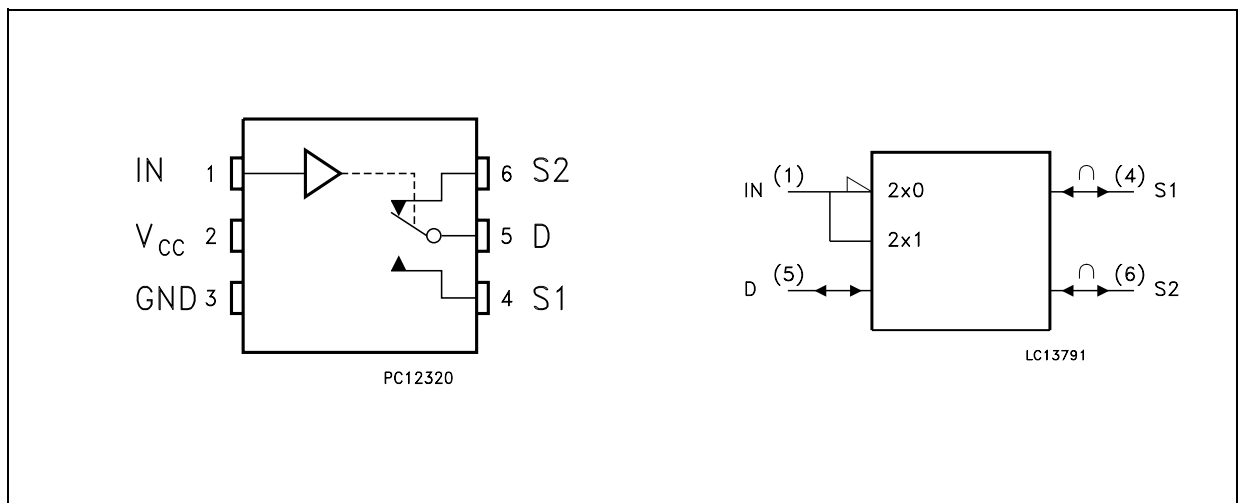


Figure 2: Input Equivalent Circuit

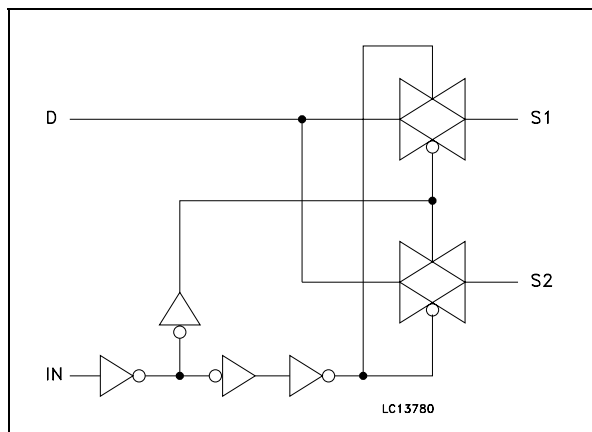


Table 2: Pin Description

| 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 (0V) |

TRUTH TABLE

| IN | SWITCH S1 | SWITCH S2 |
|----|-----------|-----------|
| L | ON | OFF |
| H | OFF | ON |

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 |
| T _{stg} | Storage Temperature | -65 to +150 | °C |
| T _L | Lead Temperature (10 sec) | 300 | °C |

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 (note 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 (note 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: 1.2V to 6V
 2) V_{IN} from 30% to 70% of V_{CC}

Table 5: 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 _{IHC} | High Level Control Input Voltage | 3.3(*) | | 2.0 | | | 2.0 | | 2.0 | | V |
| | | 5.0(**) | | 2.4 | | | 2.4 | | 2.4 | | |
| V _{ILC} | Low Level Control Input Voltage | 3.3(*) | | | | 0.4 | | 0.4 | | 0.4 | V |
| | | 5.0(**) | | | | 0.8 | | 0.8 | | 0.8 | |
| R _{ON} | ON Resistance | 3.3(*) | V _S = 0 to V _{CC} I _S = 10mA | | 6 | 7 | | 10 | | 12 | Ω |
| | | 5.0(**) | | | | 4 | | 5 | | 6 | |
| ΔR _{ON} | ON Resistance | 3.3(*) | V _S = 0 to V _{CC} I _S = 10mA | | 0.1 | | | 0.4 | | | Ω |
| | | 5.0(**) | | | 0.1 | | 0.4 | | | | |
| R _{FLATON} | ON Resistance fLATNESS | 3.3(*) | V _S = 0 to V _{CC} I _S = 10mA | | 2.5 | | | | | | Ω |
| | | 5.0(**) | | | 0.75 | | | | | | |
| I _{SOFF} | Source OFF Leakage | 3.3(*) | V _S = 1V or V _{CC} V _{DD} = V _{CC} or 1V V _{IN} = V _{CC} or GND | | ±0.01 | ±0.25 | | ±0.35 | | ±3.5 | nA |
| | | 5.0(**) | | | ±0.01 | ±0.25 | | ±0.35 | | ±3.5 | |
| I _{SON} | Channel ON Leakage | 3.3(*) | V _S =V _D =1V to V _{CC} -2.5V V _{IN} = V _{IHC} | | ±0.01 | ±0.25 | | ±0.35 | | ±3.5 | nA |
| | | 5.0(**) | | | ±0.01 | ±0.25 | | ±0.35 | | ±3.5 | |
| I _{IN} | Control Input Leakage Current | 3.3(*) | V _I = V _{IH} or V _{IL} | | 0.005 | | | ±0.1 | | ±1 | μA |
| | | 5.0(**) | | | 0.005 | | ±0.1 | | ±1 | | |
| I _{CC} | Quiescent Supply Current | 3.3(*) | V _I = V _{CC} or GND | | 0.001 | 1 | | 1 | | 2 | μA |
| | | 5.0(**) | | | 0.001 | | 1 | | 2 | | |

(*) Voltage range is 3.3V ± 0.3V

(**) Voltage range is 5V ± 0.5V

Table 6: AC Electrical Characteristics ($C_L = 35\text{pF}$, $R_L = 300\Omega$)

| Symbol | Parameter | Test Condition | | Value | | | | | | Unit | |
|------------|------------------------------|-----------------|---|--------------------------|------|------|------------------------------------|------|-------------------------------------|------|------|
| | | | | $T_A = 25^\circ\text{C}$ | | | $-40 \text{ to } 85^\circ\text{C}$ | | $-55 \text{ to } 125^\circ\text{C}$ | | |
| | | V_{CC} (V) | | Min. | Typ. | Max. | Min. | Max. | Min. | | Max. |
| t_{PD} | Delay Time | 3.3(*) | $V_S = 3\text{V}$ square wave $f = 1\text{MHz}$ $t_r = t_f = 6\text{ns}$ | | 0.4 | 0.8 | | 1.2 | | 2.4 | ns |
| | | 5.0(**) | | | 0.3 | 0.6 | | 1.0 | | 2.0 | |
| t_{ON} | ON Channel Time | 3.3(*) | $V_S = 2\text{V}$ | | 10 | | | 16 | | 19 | ns |
| | | 5.0(**) | $V_S = 3\text{V}$ | | 7 | | | 11 | | 13 | |
| t_{OFF} | OFF Channel Time | 3.3(*) | $V_S = 2\text{V}$ | | 5.5 | | | 7 | | 8.5 | ns |
| | | 5.0(**) | $V_S = 3\text{V}$ | | 4.5 | | | 6 | | 7.5 | |
| t_D | Break Before Make Time Delay | 3.3(*) | $V_S = 2\text{V}$ | 1 | 4 | | | | | | ns |
| | | 5.0(**) | $V_S = 3\text{V}$ | 1 | 4 | | | | | | |
| C_{SOFF} | OFF Channel Capacitance | | | | 19 | | | | | | pF |
| C_{SON} | ON Channel Capacitance | | | | 33 | | | | | | pF |

(*) Voltage range is $3.3\text{V} \pm 0.3\text{V}$

(**) Voltage range is $5.0\text{V} \pm 0.5\text{V}$

Table 7: Analog Switch Characteristics ($\text{GND} = 0\text{V}$; $T_A = 25^\circ\text{C}$)

| Symbol | Parameter | Test Condition | | Value | Unit |
|-----------|--|----------------|-----------------------------------|-------|------|
| | | | | Typ. | |
| f_{MAX} | Frequency Response (Switch ON) | 3.3(*) | Bandwidth at -3dB | 200 | MHz |
| | | 5.0(**) | | 200 | |
| | Feed through Attenuation (Switch OFF) | 3.3(*) | $f_{IN} = 10\text{MHz}$ sine wave | -40 | dB |
| | | 3.3(*) | $f_{IN} = 1\text{MHz}$ sine wave | -74 | |
| | | 5.0(**) | $f_{IN} = 10\text{MHz}$ sine wave | -40 | |
| | | 5.0(**) | $f_{IN} = 1\text{MHz}$ sine wave | -74 | |
| | Crosstalk (Control Input to Signal Output) | 3.3(*) | $f_{IN} = 10\text{MHz}$ sine wave | -39 | dB |
| | | 3.3(*) | $f_{IN} = 1\text{MHz}$ sine wave | -52 | |
| | | 5.0(**) | $f_{IN} = 10\text{MHz}$ sine wave | -39 | |
| | | 5.0(**) | $f_{IN} = 1\text{MHz}$ sine wave | -52 | |

(*) Voltage range is $3.3\text{V} \pm 0.3\text{V}$

(**) Voltage range is $5.0\text{V} \pm 0.5\text{V}$

TEST CIRCUITS

Figure 3: On Resistance

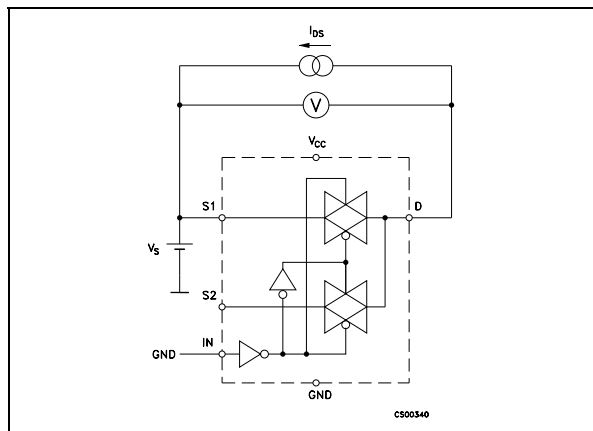


Figure 6: Off Isolation

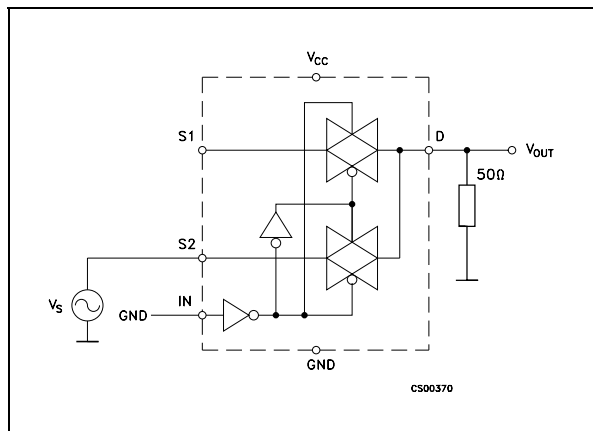


Figure 4: On Leakage

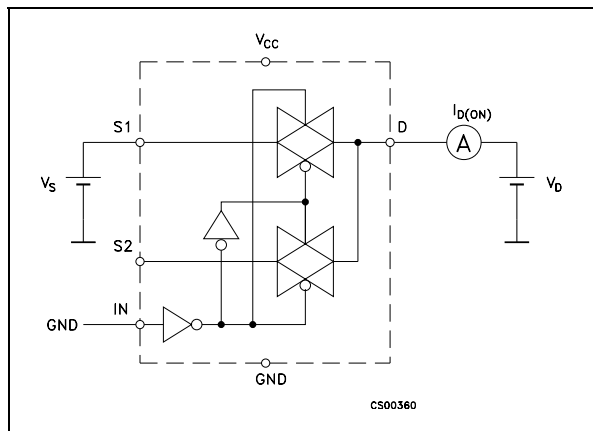


Figure 7: Bandwidth

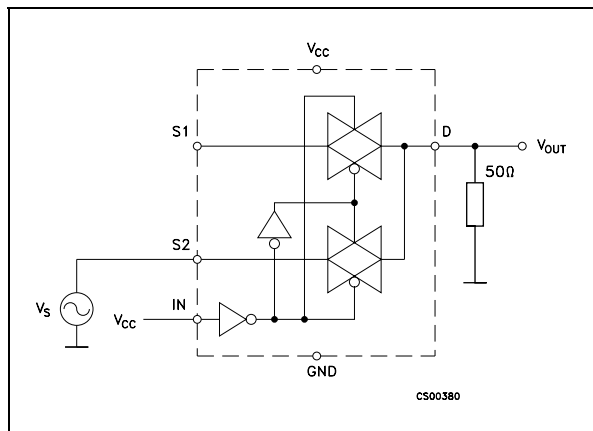


Figure 5: Off Leakage

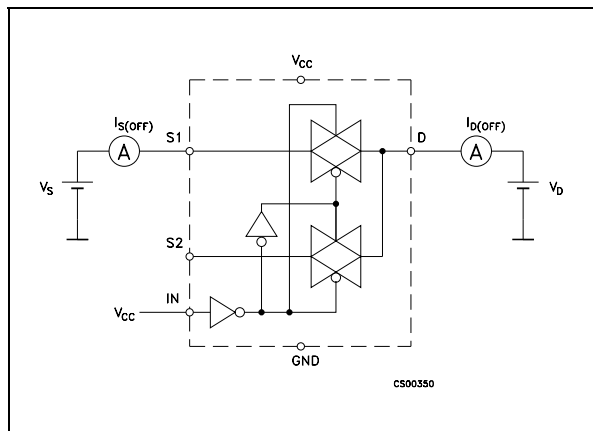


Figure 8: Channel To Channel Crosstalk

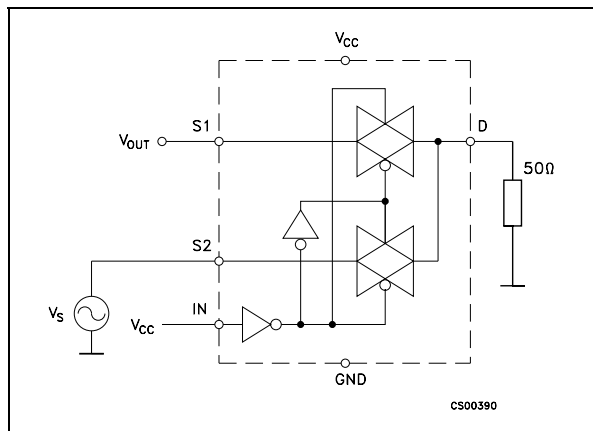


Figure 9: Switching Times

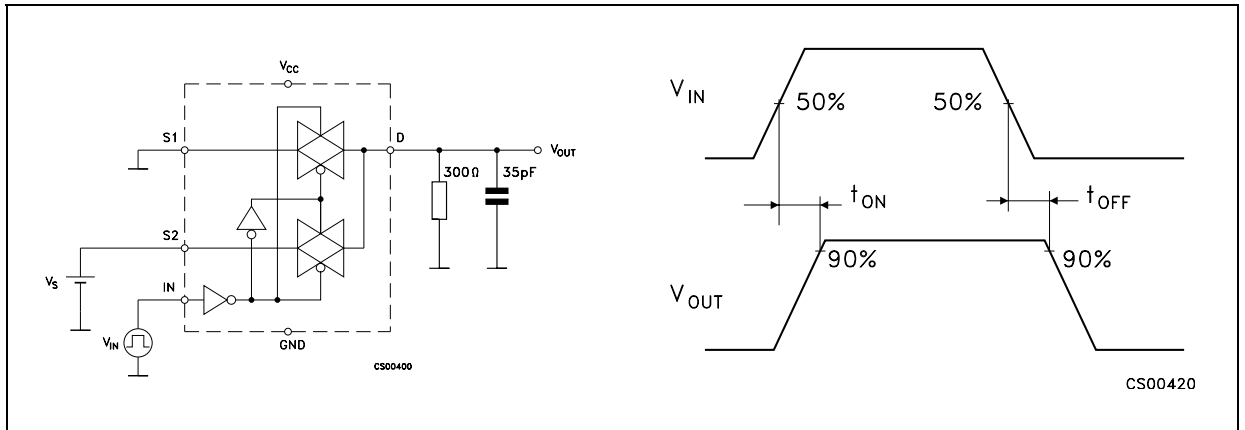
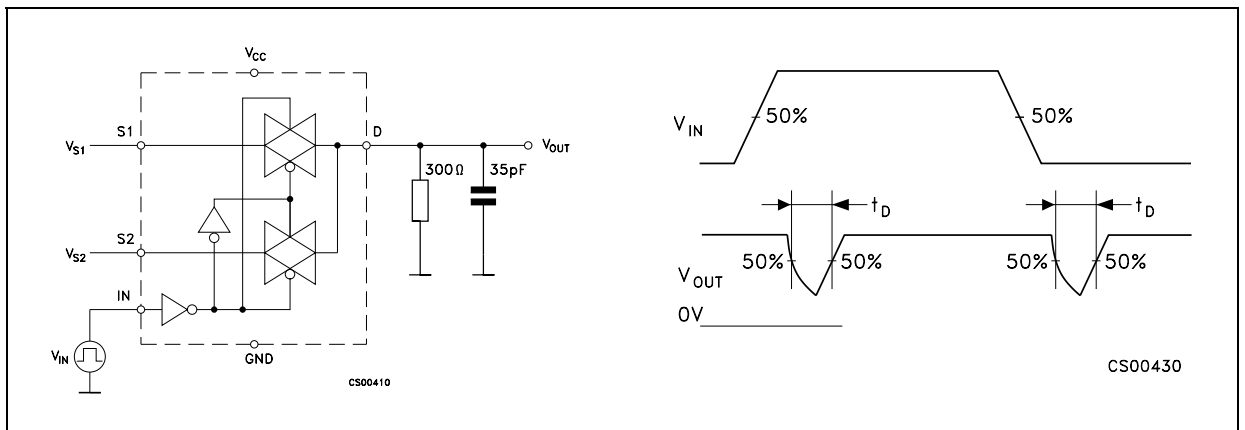
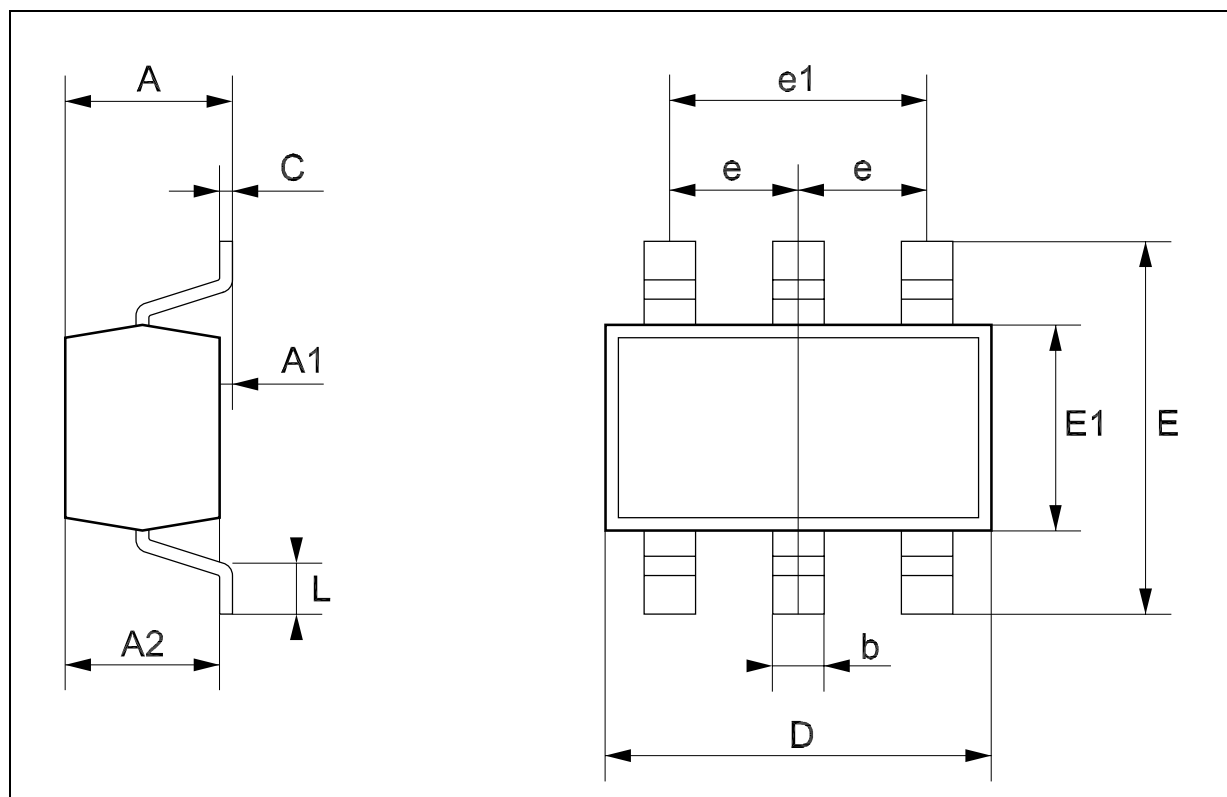


Table 8: Break Before Make Time Delay



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 |



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 |

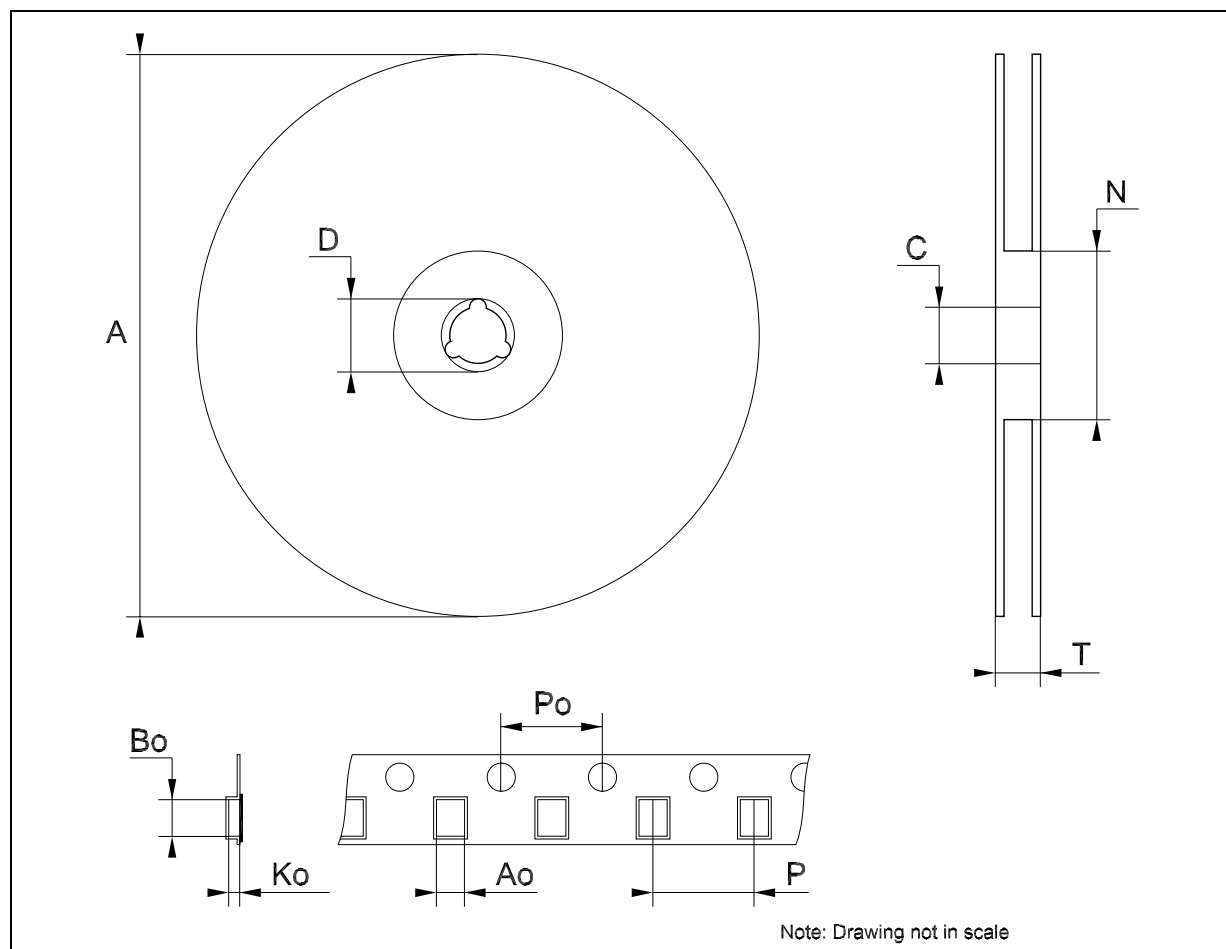


Table 9: Revision History

| Date | Revision | Description of Changes |
|-------------|----------|------------------------|
| 25-Nov-2004 | 8 | Mistake on Figure 1. |

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