

### Features

- On-Resistance: 4.0Ω (TYP)
  - -3dB Bandwidth: 300MHz
  - Single-Supply Operation: +1.8V ~ +5.5V
  - Rail-to-Rail Operation
  - Low Static Power
  - TTL/CMOS Compatible
  - Operating Temperature: -40°C ~ +125°C
  - Small Package:
- GS3166 Available in SOT23-5 and SC70-5 Packages**

### General Description

The GS3166 is low on-resistance (4.0Ω), fast single-pole single-throw (SPST) CMOS switch with operation range +1.8V ~ +5.5V. The GS3166 is designed for low operating voltage, high current switching of signal gating, chopping, modulation or demodulation (modem), and speaker output for cell phone applications.

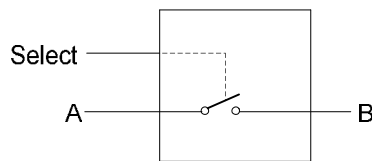
The control input, Select, tolerates input drive signals up to 5.5V, independent of supply voltage.

All devices are specified for the temperature range of -40°C to +125°C. The GS3166 single is available in Green SOT23-5 and SC70-5 packages.

### Applications

- Battery-Operated Equipment
- Wearable Devices
- Computer Peripherals
- Portable Systems
- Cell Phones
- PDAs

### Functional Diagram



### Pin Configuration

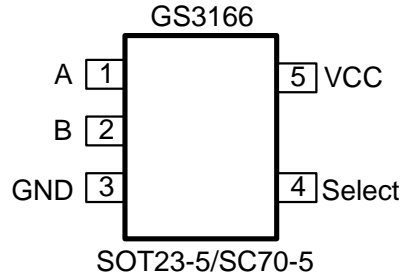


Figure 1. Pin Assignment Diagram

### Pin Description

Pin Name	Pin No	Pin Function
A	1	Independent input or output
B	2	Independent output or input
GND	3	Ground
Select	4	Enable input (active High)
V <sub>cc</sub>	5	Power Supply

### Logic Function Table

Logic Input(Select)	Function
0(Low)	All Switches OFF
1(High)	All Switches ON

### Absolute Maximum Ratings

Condition	Min	Max
Power Supply Voltage ( $V_{CC}$ to GND)	-0.5V	+7.5V
Analog Input Voltage (A or B)	GND-0.5V	$V_{CC}+0.5V$
Operating Temperature Range	-40°C	+125°C
Junction Temperature	+160°C	
Storage Temperature Range	-55°C	+150°C
Lead Temperature (soldering, 10sec)	+260°C	
<b>Package Thermal Resistance (<math>T_A=+25^\circ\text{C}</math>)</b>		
SOT23-5, $\theta_{JA}$	190°C/W	
SC70-5, $\theta_{JA}$	333°C/W	
<b>ESD Susceptibility</b>		
HBM	3500V	
MM	300V	

**Note:** Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### Package/Ordering Information

MODEL	CHANNEL	ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
GS3166	Single	GS3166-TR	SOT23-5	Tape and Reel,3000	3166
		GS3166-CR	SC70-5	Tape and Reel,3000	3166

## Electrical Characteristics

(At  $V_{CC} = +5V$ , and  $T_A = +25^\circ C$ , unless otherwise noted.)

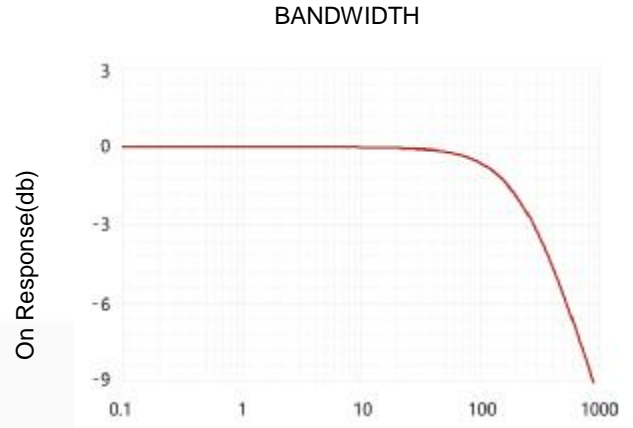
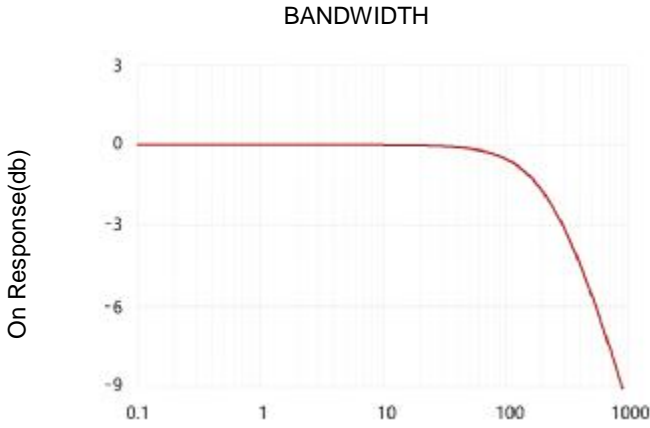
PARAMETER	SYMBOL	CONDITIONS	25°C	-40°C~85°C	-40°C~125°C	LIMIT	UNITS
<b>ANALOG SWITCH</b>							
Analog Signal Range	$V_A, V_B$		$V_{CC}$	$V_{CC}$	$V_{CC}$	MAX	V
On-Resistance	$R_{ON}$	$V_{CC} = 4.5V, V_A = 4V,$ $I_{AB} = -10mA, \text{Test Circuit 1}$	4.0			TYP	$\Omega$
On-Resistance Match Between Channels	$\Delta R_{ON}$	$V_{CC} = 4.5V, V_A = 4V,$ $I_{AB} = -10mA, \text{Test Circuit 1}$	0.3			TYP	$\Omega$
		$V_{CC} = 4.5V, V_A = 4V,$ $I_{AB} = -10mA, \text{Test Circuit 1}$	0.8			MAX	$\Omega$
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_{CC} = 4.5V, V_A = 1.0V, 2.0V, 3.5V$ $I_{AB} = -10mA, \text{Test Circuit 1}$	1.7			TYP	$\Omega$
		$V_{CC} = 4.5V, V_A = 1.0V, 2.0V, 3.5V$ $I_{AB} = -10mA, \text{Test Circuit 1}$	3.7			MAX	$\Omega$
Source OFF Leakage Current	$I_{A(OFF)}, I_{B(OFF)}$	$V_{CC} = 5.5V, V_A = 1.0V, 4.5V,$ $V_B = 4.5V, 1.0V$	$\pm 1$			MAX	$\mu A$
Channel ON Leakage Current	$I_{A(ON)}, I_{B(ON)}$	$V_{CC} = 5.5V, V_B = 1.0V, 4.5V$ $V_A = 1.0V, 4.5V, \text{or floating}$	$\pm 1$			MAX	$\mu A$
<b>DIGITAL INPUTS</b>							
Input High Voltage	$V_{INH}$	$V_{CC} = 5V$	1.5			MIN	V
		$V_{CC} = 3V$	0.9			MIN	V
Input Low Voltage	$V_{INL}$	$V_{CC} = 5V$	0.55			MAX	V
		$V_{CC} = 3V$	0.45			MAX	V
Input Leakage Current	$I_{IN}$	$V_{CC} = 5.5V, V_{select} = 0V \text{ or } 5.5V$	$\pm 1$			MAX	$\mu A$

(At  $V_{CC} = +5V$ , and  $T_A = +25^{\circ}C$ , unless otherwise noted.)

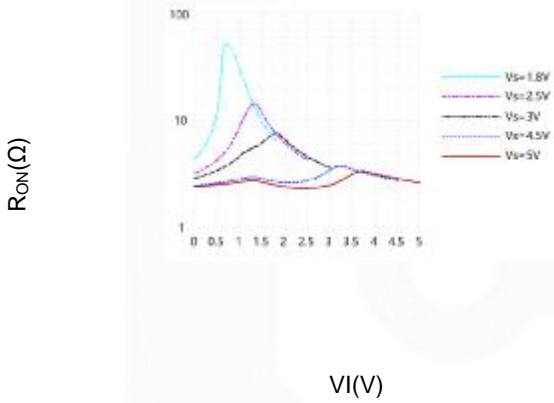
PARAMETER	SYMBOL	CONDITIONS	25°C	-40°C -85°C	-40°C -125°C	LIMIT	UNITS
<b>DYNAMIC CHARACTERISTICS</b>							
Turn-On Time	$T_{ON}$	$V_{CC} = 5V, V_A = 3V, V_{Select\_H} = 1.5V,$ $V_{Select\_L} = 0V,$ $R_L = 300\Omega, C_L = 35pF, \text{ Test Circuit 2}$	20			TYP	ns
		$V_{CC} = 3V, V_A = 3V, V_{Select\_H} = 1.5V,$ $V_{Select\_L} = 0V,$ $R_L = 300\Omega, C_L = 35pF, \text{ Test Circuit 2}$	30			TYP	ns
Turn-Off Time	$T_{OFF}$	$V_{CC} = 5V, V_A = 3V, V_{Select\_H} = 1.5V,$ $V_{Select\_L} = 0V,$ $R_L = 300\Omega, C_L = 35pF, \text{ Test Circuit 2}$	15			TYP	ns
		$V_{CC} = 3V, V_A = 3V, V_{Select\_H} = 1.5V,$ $V_{Select\_L} = 0V,$ $R_L = 300\Omega, C_L = 35pF, \text{ Test Circuit 2}$	25			TYP	ns
Skew	$T_{SKEW}$	$V_{CC} = 5V, R_S = 39\Omega, C_L = 50pF, \text{ Test Circuit 3}$	5			TYP	ns
		$V_{CC} = 3V, R_S = 39\Omega, C_L = 50pF, \text{ Test Circuit 3}$	2			TYP	ns
Off Isolation	$O_{ISO}$	$R_L = 50\Omega, \text{ Signal} =$ 0dBm, $C_L = 5pF, \text{ Test Circuit 4}$	f=10MHz	-51		TYP	db
			f=1MHz	-72		TYP	db
-3dB Bandwidth	BW	$R_L = 50\Omega, \text{ Signal} = 0dBm, C_L = 5pF, \text{ Test Circuit 5}$	120			TYP	MHz
Source OFF Capacitance	$C_{A(OFF)}, C_{B(OFF)}$	f=1MHz	5.5			TYP	pF
Channel ON Capacitance	$C_{A(ON)}, C_{B(ON)}$	f=1MHz	15.5			TYP	pF
<b>POWER REQUIREMENTS</b>							
Power Supply Range	$V_{CC}$		1.8			MIN	V
Power Supply Range	$V_{CC}$		5.5			MAX	V
Power Supply Current	$I_{VCC}$	$V_{Select} = 0V \text{ or } V_{CC}$	1			MAX	$\mu A$

**Typical Performance characteristics**

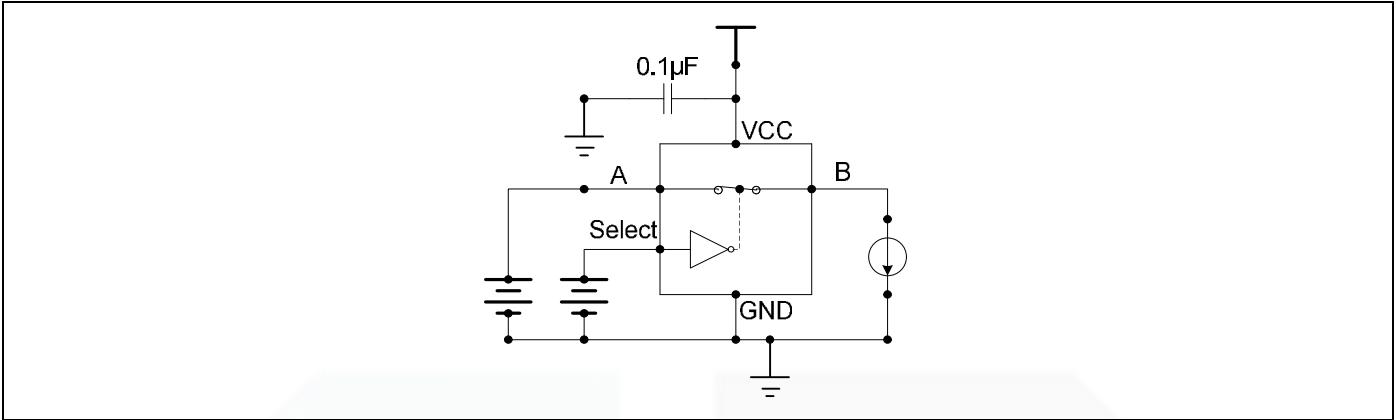
At  $T_A=+25^{\circ}\text{C}$ , and  $V_{CC}=+5\text{V}$ , unless otherwise noted.



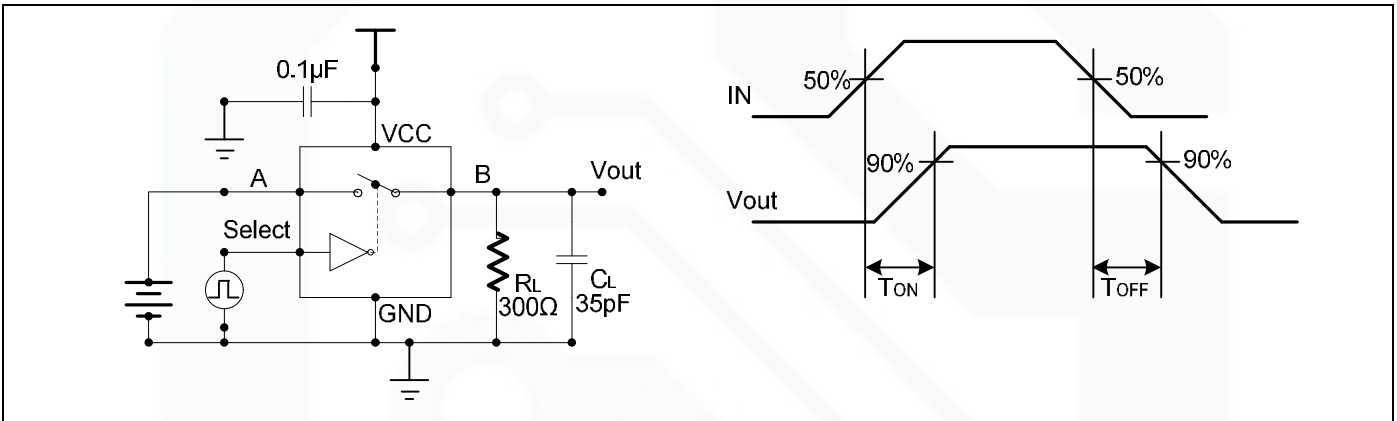
Typical  $R_{ON}$  vs Input Voltage ( $V_I$ )



Parameter Measurement Information

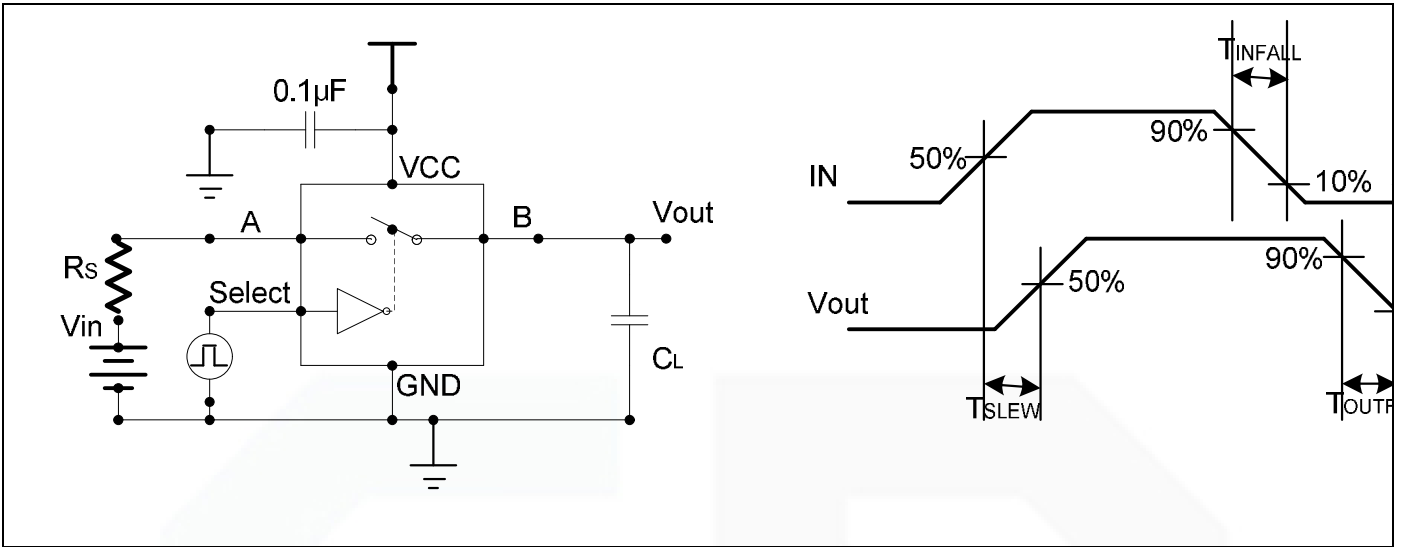


Test Circuit 1. On-Resistance

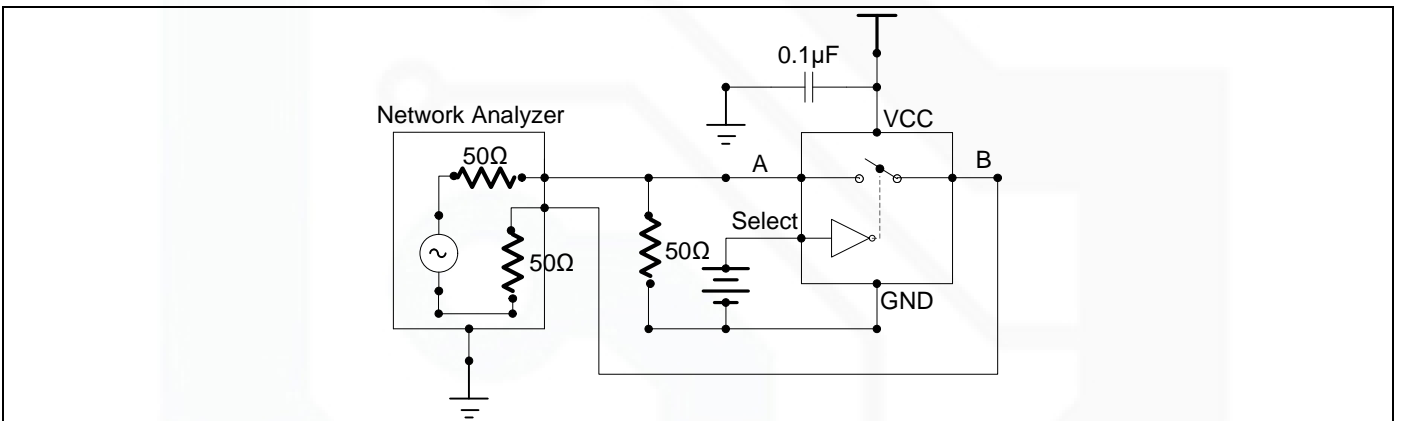


Test Circuit 2. Switching Times

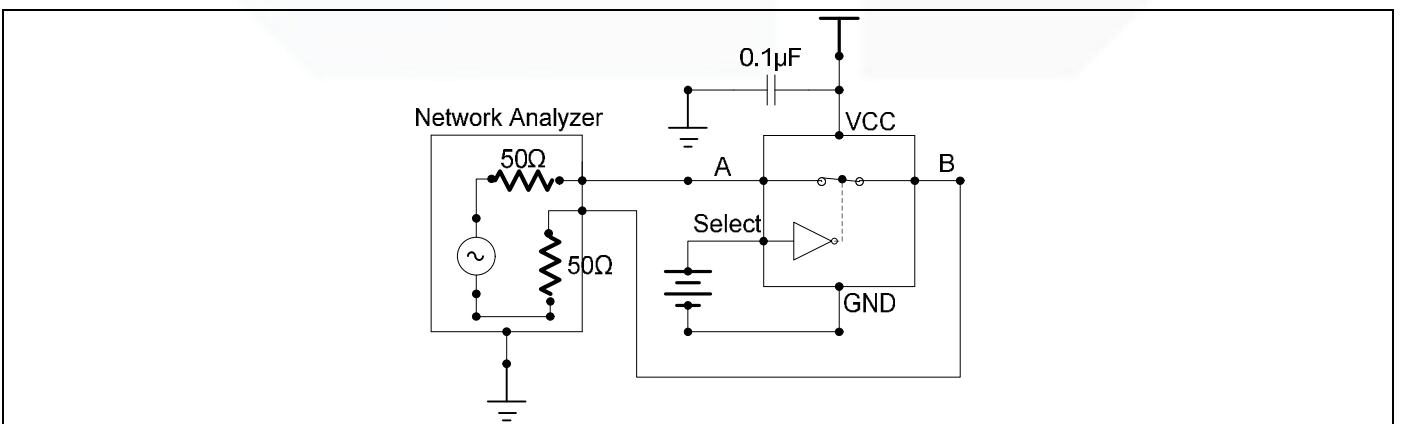
Parameter Measurement Information



Test Circuit 3. Output Signal Skew



Test Circuit 4. Off Isolation

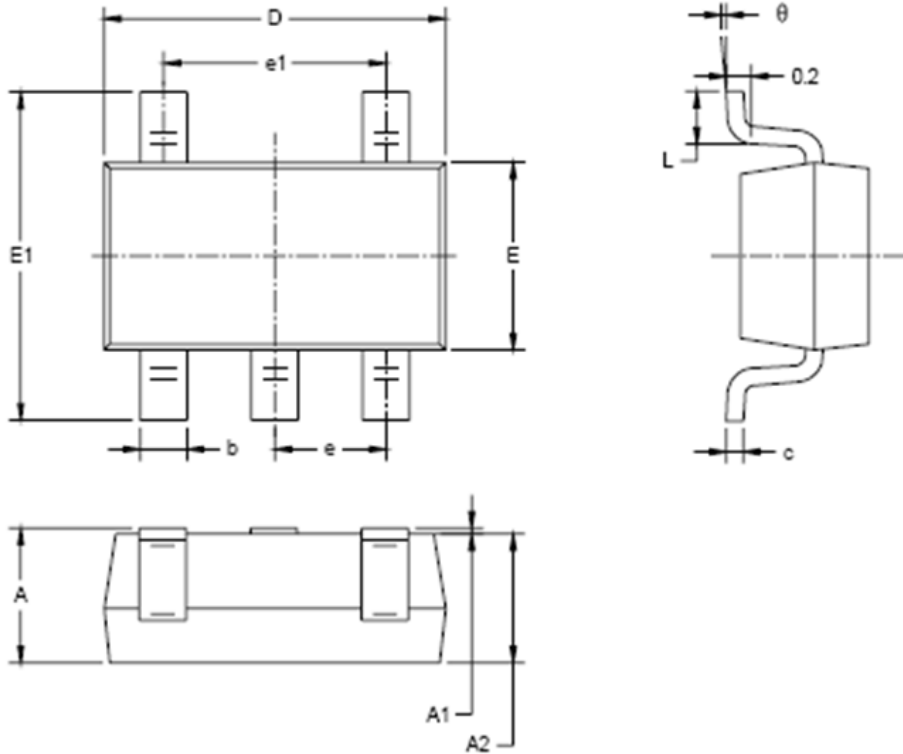


Test Circuit 5. -3dB Bandwidth



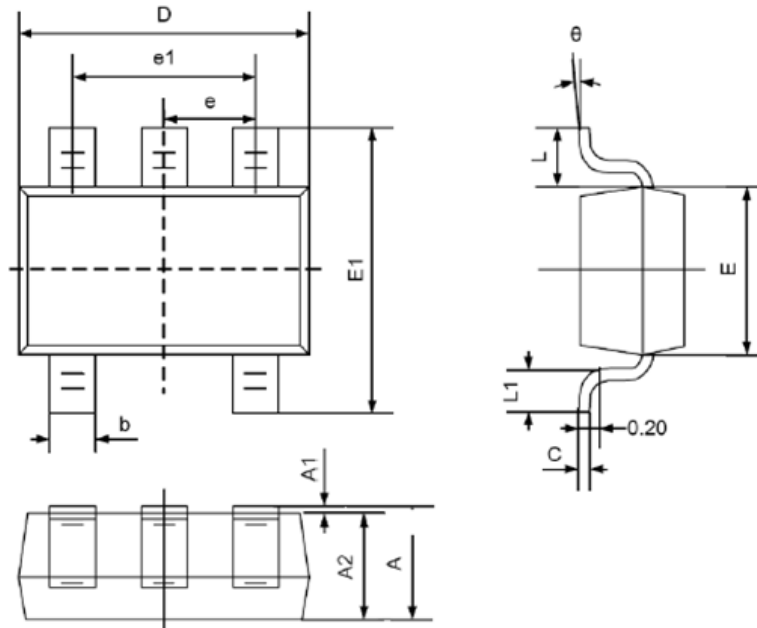
Package Information

SOT23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

SC70-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
C	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
$\theta$	0°	8°	0°	8°