

MCS3157 Low Voltage, SPDT 4.0 Ω Analog Switch

1 Features

- On-Resistance: 4.0 Ω (TYP)
- -3dB Bandwidth: 300MHz
- Single-Supply Operation: +1.8V ~ +5.5V
- Break-Before-Make Switching
- Rail-to-Rail Operation
- Low Static Power
- TTL/CMOS Compatible
- Operating Temperature: -40°C ~ +125°C
- Small Package
 - MCS3157 Available in SOT23-6 and SC70-6 Packages

2 Applications

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

3 Description

The MCS3157 is low on-resistance (4.0 Ω), fast single-pole double-throw (SPDT) CMOS switch with operation range +1.8V ~+5.5V. The MCS3157 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 device contains a break-before-make (BBM) feature. The control input, IN, tolerates input drive signals up to 5.5V, independent of supply voltage. All devices are specified for the temperature range of -40 to +125. The MCS3157 single is available in Green SC70-6 and SOT23-6 packages.

4. Pin Configuration

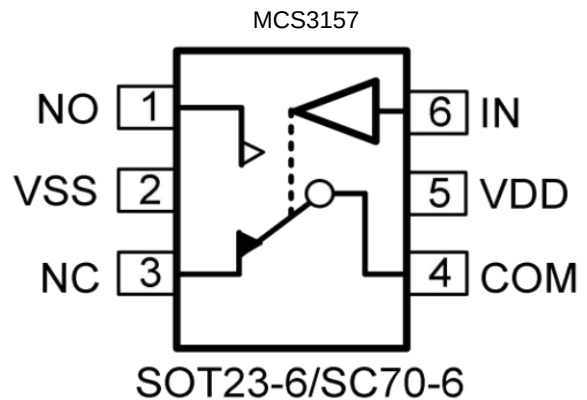


Figure 1. Pin Assignment Diagram

5. Absolute Maximum Ratings

Condition	Min	Max
Power Supply Voltage (V _{DD} to V _{ss})	-0.5V	+7.5V
Analog Input Voltage (NC NO or COM)	V _{ss} -0.5V	V _{DD} +0.5V
PDB Input Voltage	V _{ss} -0.5V	+7V
Operating Temperature Range	-40°C	+125°C
Junction Temperature	+160°C	
Storage Temperature Range	-55°C	+150°C
Lead Temperature (soldering, 10sec)	+260°C	
Package Thermal Resistance (T _A =+25°C)		
SOT23-6, θ _{JA}	190°C/W	
SC70-6, θ _{JA}	333°C/W	
ESD Susceptibility		
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.

6 Specifications

6.1 Electrical Characteristics

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

PARAMETER	SYMBOL	CONDITIONS					
			25℃	-40℃~85℃	-40℃~125℃	LIMIT	UNITS
ANALOG SWITCH							
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		V_S	V_S	V_S	MAX	V
On-Resistance	R_{ON}	$V_S = 4.5V, V_{NO} \text{ or } V_{NC} = 4V,$ $I_{COM} = -10mA, \text{ Test Circuit 1}$	4.0			TYP	Ω
On-Resistance Match Between Channels	ΔR_{ON}	$V_S = 4.5V, V_{NO} \text{ or } V_{NC} = 4V,$ $I_{COM} = -10mA, \text{ Test Circuit 1}$	0.3			TYP	Ω
		$V_S = 4.5V, V_{NO} \text{ or } V_{NC} = 4V,$ $I_{COM} = -10mA, \text{ Test Circuit 1}$	0.8			MAX	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_S = 4.5V, V_{NO} \text{ or } V_{NC} = 1.0V, 2.0V, 3.5V,$ $I_{COM} = -10mA, \text{ Test Circuit 1}$	1.7			TYP	Ω
		$V_S = 4.5V, V_{NO} \text{ or } V_{NC} = 1.0V, 2.0V, 3.5V,$ $I_{COM} = -10mA, \text{ Test Circuit 1}$	3.7			MAX	Ω
Source OFF Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_S = 5.5V, V_{NO} \text{ or } V_{NC} = 1.0V, 4.5V,$ $V_{COM} = 4.5V, 1.0V$	± 1			MAX	μA
Channel ON Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_S = 5.5V, V_{COM} = 1.0V, 4.5V$ $V_{NO} \text{ or } V_{NC} = 1.0V, 4.5V, \text{ or floating}$	± 1			MAX	μA
DIGITAL INPUTS							
Input High Voltage	V_{INH}	$V_S = 5V$	1.5			MIN	V
		$V_S = 3V$	0.9			MIN	V
Input Low Voltage	V_{INL}	$V_S = 5V$	0.55			MAX	V
		$V_S = 3V$	0.45			MAX	V
Input Leakage Current	I_{IN}	$V_S = 5.5V, V_{IN} = 0V \text{ or } 5.5V$	± 1			MAX	μA

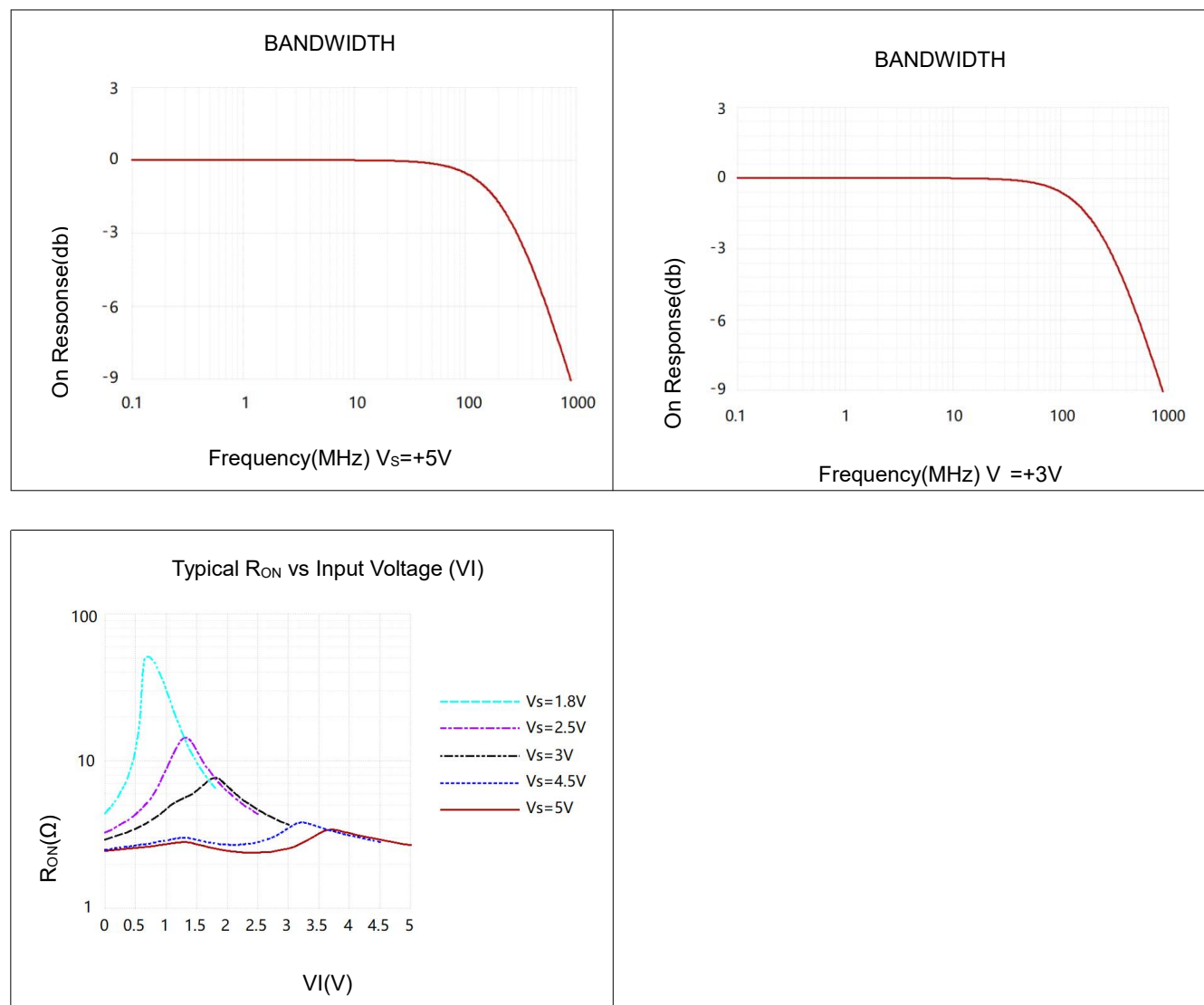
6.1 Electrical Characteristics (continued)

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

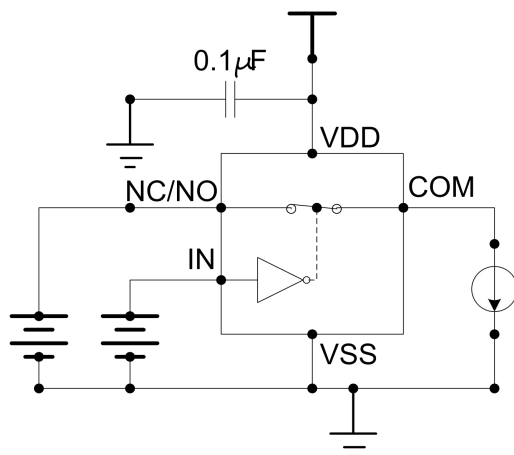
PARAMETER	SYMBOL	CONDITIONS						
				25℃	-40℃~85℃	-40℃~125℃	LIMIT	UNITS
DYNAMIC CHARACTERISTICS								
Turn-On Time	T _{ON}	V _S = 5V, V _{NO} or V _{NC} = 3V, V _{IN_H} = 1.5V, V _{IN_L} = 0V, R _L = 300Ω, C _L = 35pF, Test Circuit 2	20			TYP	ns	
		V _S = 3V, V _{NO} or V _{NC} = 1.5V, V _{IN_H} = 1.5V, V _{IN_L} = 0V, R _L = 300Ω, C _L = 35pF, Test Circuit 2	30			TYP	ns	
Turn-Off Time	T _{OFF}	V _S = 5V, V _{NO} or V _{NC} = 3V, V _{IN_H} = 1.5V, V _{IN_L} = 0V, R _L = 300Ω, C _L = 35pF, Test Circuit 2	15			TYP	ns	
		V _S = 3V, V _{NO} or V _{NC} = 1.5V, V _{IN_H} = 1.5V, V _{IN_L} = 0V, R _L = 300Ω, C _L = 35pF, Test Circuit 2	25			TYP	ns	
Break-Before-Make Time Delay	T _{BBM}	V _S = 5V, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 3V, R _L = 300Ω, C _L = 35pF, Test Circuit 3	5.0			TYP	ns	
		V _S = 3V, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 3V, R _L = 300Ω, C _L = 35pF, Test Circuit 3	8			TYP	ns	
Skew	T _{SKEW}	V _S = 5V, R _S = 39Ω, C _L = 50pF, Test Circuit 4	5			TYP	ns	
		V _S = 3V, R _S = 39Ω, C _L = 50pF, Test Circuit 4	2			TYP	ns	
Off Isolation	O _{ISO}	R _L = 50Ω, Signal = 0dBm, C _L = 5pF, Test Circuit 5	f=10MHz	-51		TYP	db	
			f=1MHz	-72		TYP	db	
-3dB Bandwidth	BW	R _L = 50Ω, Signal = 0dBm, C _L = 5pF, Test Circuit 6	120			TYP	MHz	
Source OFF Capacitance	C _{NC(OFF)} ,C _{NO(OFF)}	f=1MHz	5.5			TYP	pF	
Channel ON Capacitance	C _{NC(ON)} ,C _{NO(ON)} ,C _{COM(ON)}	f=1MHz	15.5			TYP	pF	
POWER REQUIREMENTS								
Power Supply Range	V _S		1.8			MIN	V	
Power Supply Range	V _S		5.5			MAX	V	
Power Supply Current	I _S	V _{IN} = 0V or V _S	1			MAX	μ A	

6.2 Typical Performance Characteristics

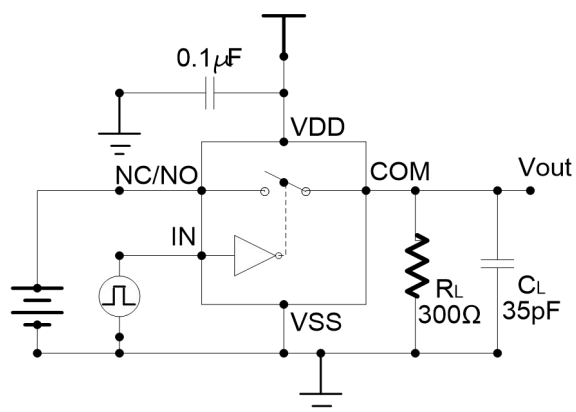
At $T_A=+25^{\circ}\text{C}$, and $V_S=+5\text{V}$, unless otherwise noted.



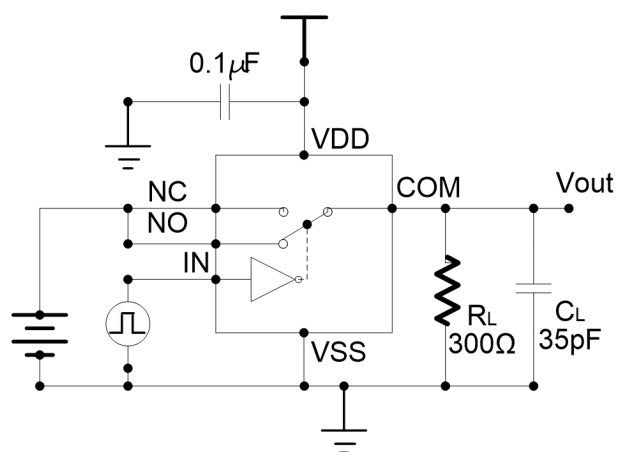
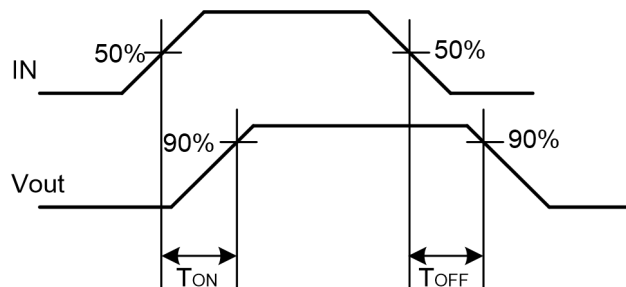
6.3 Parameter Measurement Information



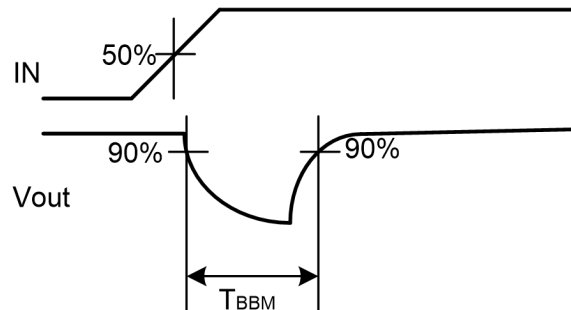
Test Circuit 1, On-Resistance



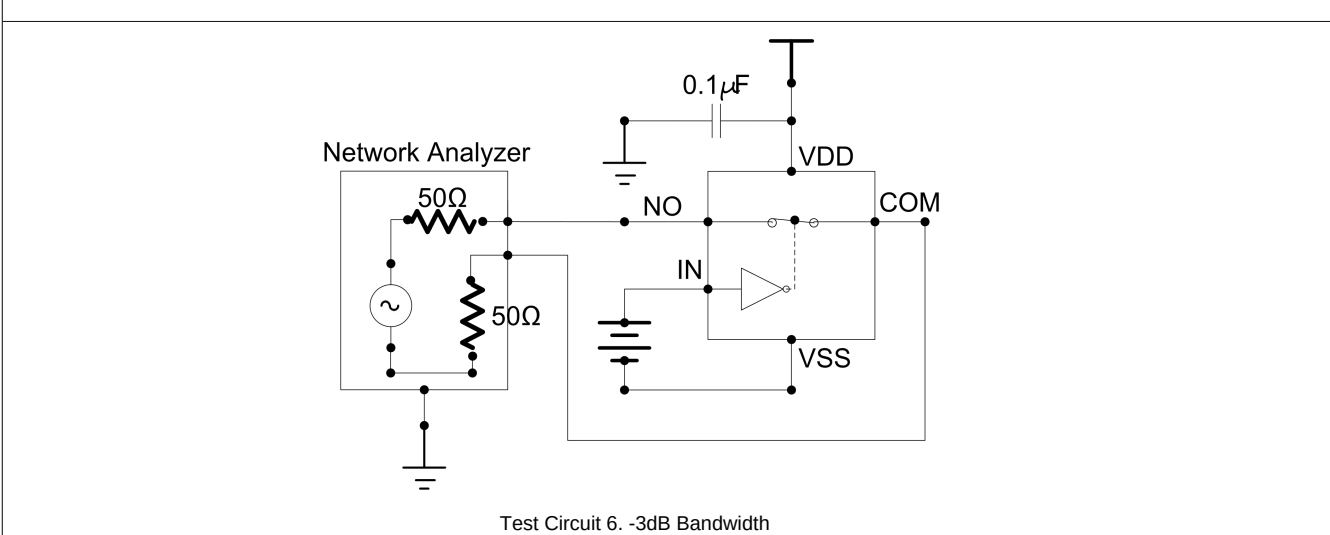
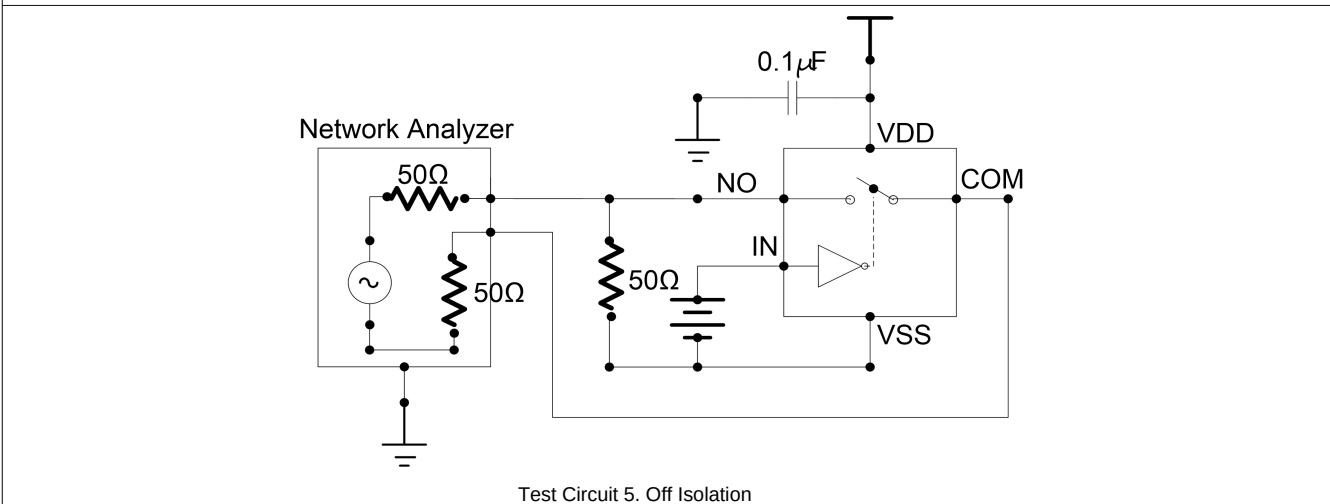
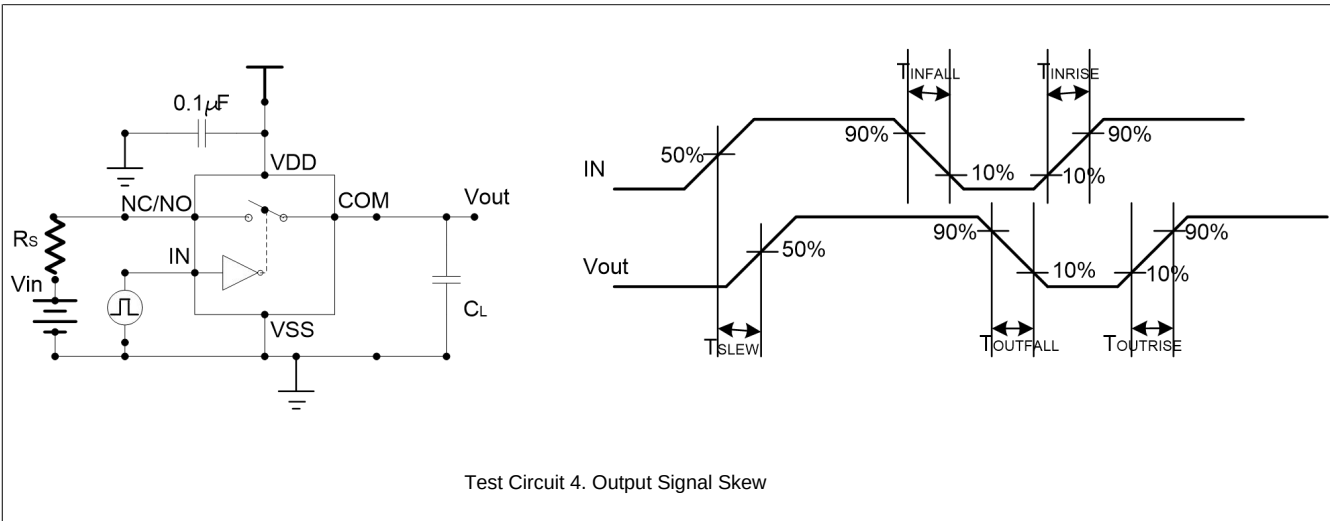
Test Circuit 2, Switching Times



Test Circuit 3, Break-Before-Make Time Delay



6.3 Parameter Measurement Information(continued)

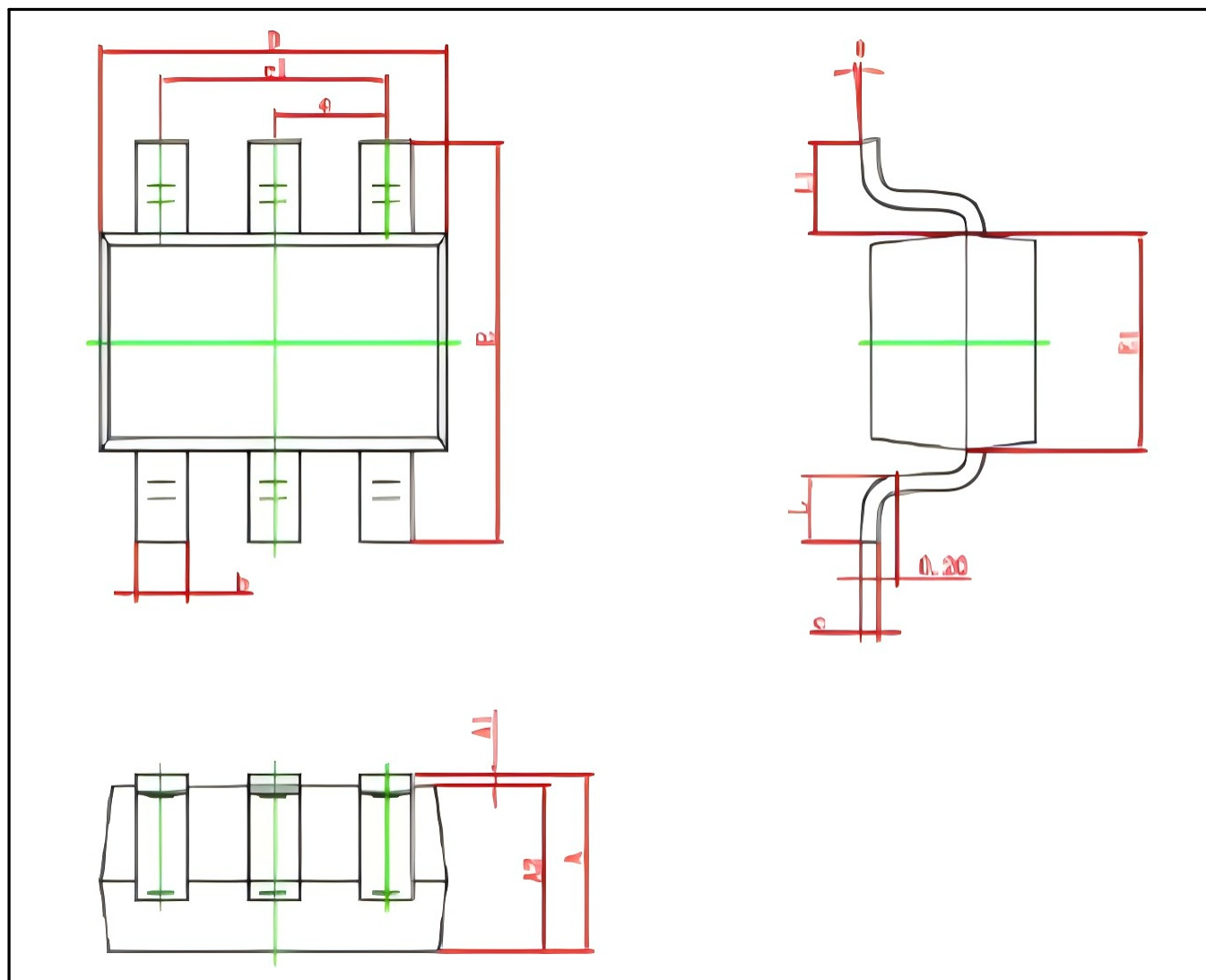


Package/Ordering Information

Model	Channel	Order number	Package Description	Package Option	Marking Information
MCS3157	Single	MCS3157-CR	SC70-6	Tape and Reel,3000	3157
		MCS3157-TR	SOT23-6	Tape and Reel,3000	3157

PACKAGE OUTLINE

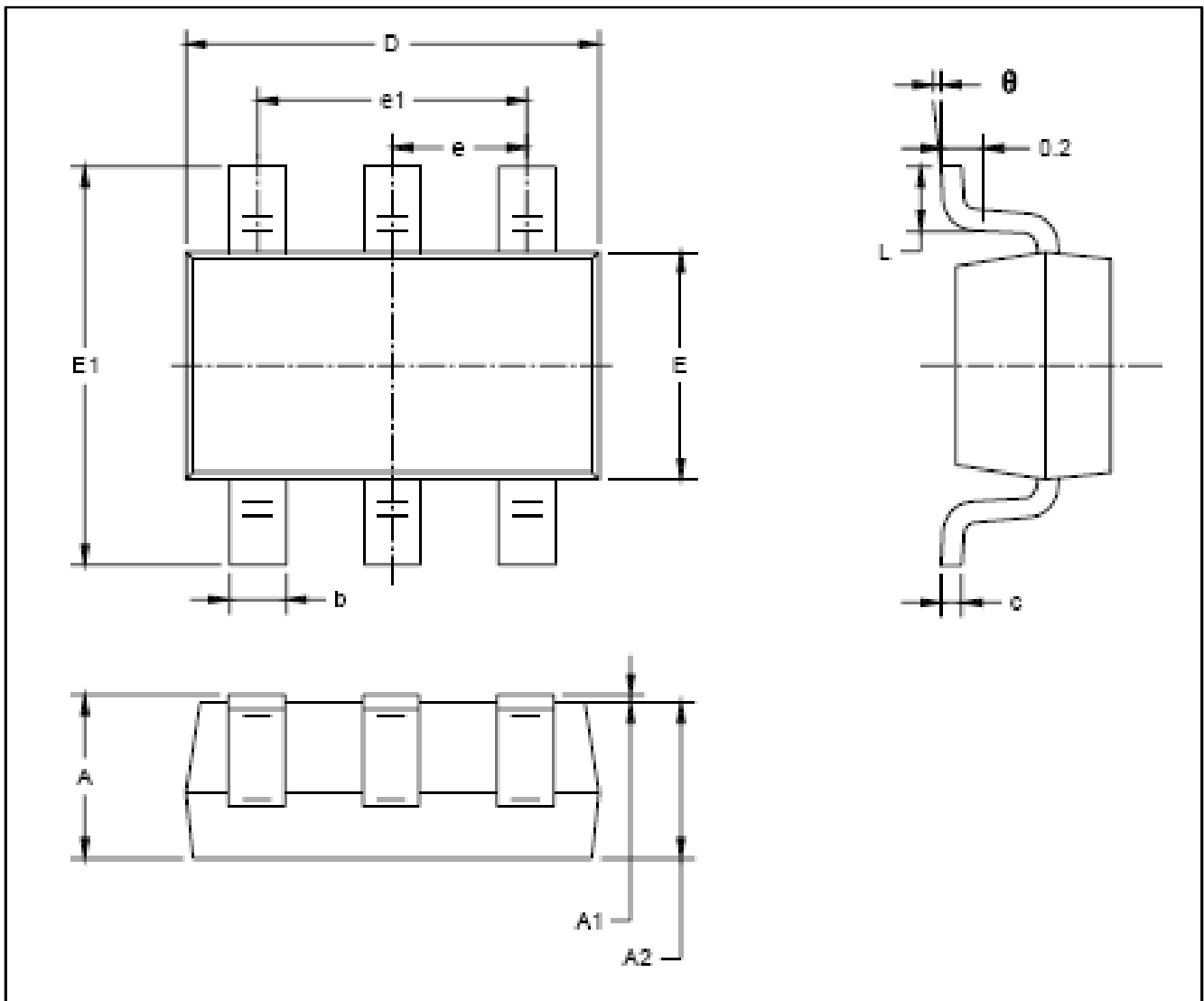
SC70-6 Package



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	2.150	2.450	0.085	0.096
E1	1.150	1.350	0.045	0.053
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.260	0.460	0.010	0.018
L1	0.525 REF		0.021 REF	
θ	0°	6°	0°	8°

PACKAGE OUTLINE

SOT23-6 Package



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
θ	0°	8°	0°	8°