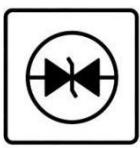




ESD



TVS



TSS



MOV



GDT



PLED

## DG4157EDL-T1-GE3-MS

### Product specification

## DESCRIPTION

The DG4157EDL-T1-GE3-MS is an advanced CMOS analog switch fabricated with silicon gate CMOS technology. It achieves very low propagation delay while maintaining CMOS low power dissipation. Analog and digital voltages that may vary across the full power-supply range (from VCC to GND).

The Select pin has over voltage protection that allows voltages above VCC , up to 6.0 V to be present on the pin without damage or disruption of operation of the part, regardless of the operating voltage.

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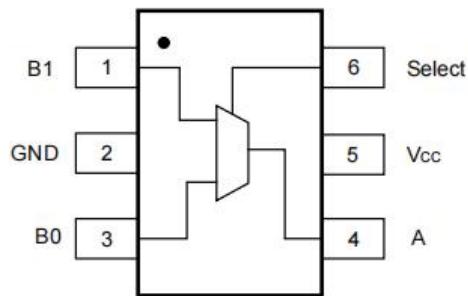
## FEATURES

- Low power dissipation
- High speed
- Standard CMOS logic levels
- High bandwidth, improved linearity
- Switches Standard NTSC/PAL Video, Audio, SPDIF and HDTV
- be used for Clock Switching, Data Mux'ing,etc.
- Low RDSON
- Break Before Make Circuitry, Prevents Inadvertent Shorts
- Operating temperature -25°C~ +85°C
- package : SC70-6

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## ORDER INFORMATION

Ordering Number	Package	Marking	Packing Option
DG4157EDL-T1-GE3-MS	SC70-6		Tape and Reel, 3000

**PIN CONFIGURATION (Top View)**
**SC70-6**

**PIN DESCRIPTIONS**

Pin	I/O	Pin Function
A, B0 , B1	I/O	Data port
Select	I	Controlling choice
VCC	/	Power supply port
GND	/	Ground

**FUNCTIONS DESCRIPTION**

Select input port	Function
L	B0 Connected to A
H	B1 Connected to A

**ABSOLUTE MAXIMUM RATINGS**

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-0.5 ~ +6.0	V
DC Switch Voltage <sup>(1)</sup>	$V_S$	-0.5 ~ $V_{CC}+0.5$	V
DC Input Voltage <sup>(1)</sup>	$V_{IN}$	-0.5 ~ +6.0	V
DC Input Diode Current @ $V_{IN} < 0$ V	$I_{IK}$	-50	mA
DC Output Current	$I_{out}$	128	mA
DC $V_{CC}$ or Ground Current	$I_{CC}/I_{GND}$	100	mA
Storage Temperature Range	$T_{STG}$	-65 ~ +150	°C
Junction Temperature Under Bias	$T_J$	85	°C
Junction Lead Temperature (Soldering, 10 Seconds)	$T_L$	260	°C
Power Dissipation @ +85°C	$P_D$	180	mW

**NOTE:**

Stresses beyond those listed under "ABSOLUTE MAXIMUM RATINGS" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

**CAUTION**

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. MSKSEMI recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

MSKSEMI reserves the right to make any change in circuit design, specification or other related thing if necessary without notice at any time. Please contact sales office to get the latest datasheet.

**RECOMMENDED OPERATING CONDITIONS (2)**

Characteristic	Symbol	Min	Max	Unit
Supply Voltage Operating	VCC	1.65	5.5	V
Select Input Voltage	VIN	0	VCC	V
Switch Input Voltage	VIN	0	VCC	V
Output Voltage	VOUT	0	VCC	V
Operating Temperature	TA	-25	+85	°C
Input Rise and Fall Time	Control Input VCC = 2.3 V ~ 3.6 V	tr,tf	0	10
	Control Input VCC = 4.5 V ~ 5.5 V		0	5.0
				ns/V

Note:

2. Select input must be held HIGH or LOW, it must not float.

**ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Test Conditions	VCC	TA = 25°C			TA = -25°C ~+85°C		Unit
				Min	Typ	Max	Min	Max	
<b>DC ELECTRICAL CHARACTERISTICS</b>									
VIH	High Level Input Voltage			1.65 ~ 1.95			0.75Vcc		V
				2.3 ~ 2.8			1.5		
				3 ~ 4.2			2.4		
				4.5 ~ 5.5			0.6Vcc		
VIL	Low Level Input Voltage			1.65 ~ 1.95				0.25VCC	V
				2.3 ~ 2.8				0.4	
				3 ~ 5.5				0.3Vcc	
IIN	Input Leakage Current	0 < VIN < 5.5 V	0 ~ 5.5		±0.05	±0.1		±1	uA
IOFF	OFF State Leakage Current	0 < A, B < Vcc	1.65 ~ 5.5		±0.05	±0.1		±1	uA
ICC	Quiescent Supply	VIN = Vcc or GND IOUT = 0	5.5			1.0		10	uA
	Analog Signal Range		VCC	0		VCC	0	VCC	V
RON	Switch On Resistance <sup>(3)</sup>	VIN = 0 V, IO = 30 mA	4.5		3.0			7.0	Ω
					5.0			12	Ω
					7.0			15	Ω
		VIN = 0 V, IO = 24 mA	3.0		4.0			9.0	Ω
					10			20	Ω
		VIN = 0 V, IO = 8 mA	2.3		5.0			12	Ω
					13			30	Ω
		VIN = 2.3 V, IO = -8 mA	1.65		6.5			20	Ω
					17			50	Ω
RRANGE	On Resistance Over Signal Range <sup>(3)(7)</sup>	IA = -30 mA 0 ≤ VBn ≤ VCC	4.5					25	Ω
		IA = -24 mA 0 ≤ VBn ≤ VCC	3					50	Ω

**ELECTRICAL CHARACTERISTICS (continued)**

Symbol	Parameter	Test Conditions	VCC	TA = 25°C			TA = -25°C ~ +85°C		Unit
				Min	Typ	Max	Min	Max	
RRANGE	On Resistance Over Signal Range(3)(7)	IA = -8 mA 0 ≤ VBn ≤ VCC	2.3					100	Ω
		IA = -4 mA 0 ≤ VBn ≤ VCC	1.65					300	Ω
Δ RON	On Resistance Match Between Channels(3)(4)(5)	IA = -30 mA VBn = 3.15	4.5		0.15				Ω
		IA = -24 mA VBn = 2.1	3		0.2				Ω
		IA = -8 mA VBn = 1.6	2.3		0.5				Ω
		IA = -4 mA VBn = 1.15	1.65		0.5				Ω
RFLAT	On Resistance Flatness(3)(4)(6)	IA = -30 mA 0 ≤ VBn ≤ VCC	5		6.0				Ω
		IA = -24 mA 0 ≤ VBn ≤ VCC	3.3		12				Ω
		IA = -8 mA 0 ≤ VBn ≤ VCC	2.5		28				Ω
		IA = -4 mA 0 ≤ VBn ≤ VCC	1.8		125				Ω

**AC ELECTRICAL CHARACTERISTICS**

tPHL tPLH	Propagation Delay Bus to Bus (8)	Figure 1 VI = OPEN	1.65 ~ 1.95						nS
			2.3 ~ 2.7					1.2	nS
			3.0 ~ 3.5					0.8	nS
			4.5 ~ 5.5					0.3	nS
tPZL tPZH	Output Enable Time, Turn On Time (A to Bn)	Figure 1 VI = 2*VCC for tPZL ,VI = 0 V for tPZH	1.65 ~ 1.95		23	7.0	24		nS
			2.3 ~ 2.7		13	3.5	14		nS
			3.0 ~ 3.5		6.9	2.5	7.6		nS
			4.5 ~ 5.5		5.2	1.7	5.7		nS
tPLZ tPHZ	Output Disable Time, Turn Off Time (A Port to B Port)	Figure 1 VI = 2*VCC for tPLZ ,VI = 0 V for tPHZ	1.65 ~ 1.95		12.5	3.0	13		nS
			2.3 ~ 2.7		7.0	2.0	7.5		nS
			3.0 ~ 3.5		5.0	1.5	5.3		nS
			4.5 ~ 5.5		3.5	0.8	3.8		nS

**ELECTRICAL CHARACTERISTICS (continued)**

Symbol	Parameter	Test Conditions	V <sub>CC</sub>	TA = 25 °C			TA = -25 °C ~ +85 °C		Unit
				Min	Typ	Max	Min	Max	
tB-M	Break Before Make Time (7)	Figure 2 , CL = 50 pF , RL = 600 Ω	1.65 ~ 1.95				0.5		nS
			2.3 ~ 2.7				0.5		nS
			3.0 ~ 3.5				0.5		nS
			4.5 ~ 5.5				0.5		nS
Q	(7) Charge Injection	Figure 3, CL = 0.1 nF , VGEN = 0 V , RGEN = 0 Ω	5.0		7.0				pC
			3.3		3.0				pC
OIRR	Off Isolation (9)	Figure 4, RL = 50 Ω , f = 10MHz	1.65 ~ 5.5		-57				dB
Xtalk	Crosstalk	Figure 5, RL = 50 Ω , f = 10MHz	1.65 ~ 5.5		-54				dB
BW	-3 dB Bandwidth	Figure 8, RL = 50 Ω	1.65 ~ 5.5		350M				Hz
THD	Total Harmonic Distortion (7)	RL = 600 Ω , 0.5VP-P f = 600 Hz ~ 20 kHz	5.0		0.011				%
CIN	Select Pin Input Capacitance (10)		0		2.3				pF
CIO-B	B Port Off Capacitance (10)	Figure 6	5.0		5.0				pF
CIOA-ON	A Port Capacitance when Switch is Enabled (10)	Figure 7	5.0		15.5				pF

Note:

3. Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B Ports).
4. Parameter is characterized but not tested in production.
5.  $\Delta R_{ON} = R_{ON \ max} - R_{ON \ min}$  measured at identical VCC, temperature and voltage levels.
6. Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.
7. Guaranteed by Design.
8. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).
9. Off Isolation =  $20 \log_{10} [V_A/V_Bn]$ .
10. TA = +25°C, f = 1 MHz, Capacitance is characterized but not tested in production.

## TEST CIRCUITS

NOTE: Input driven by 50  $\Omega$  source terminated in 50  $\Omega$   
 NOTE:  $C_L$  includes load and stray capacitance  
 NOTE: Input PRR = 1.0 MHz;  $t_W = 500$  ns

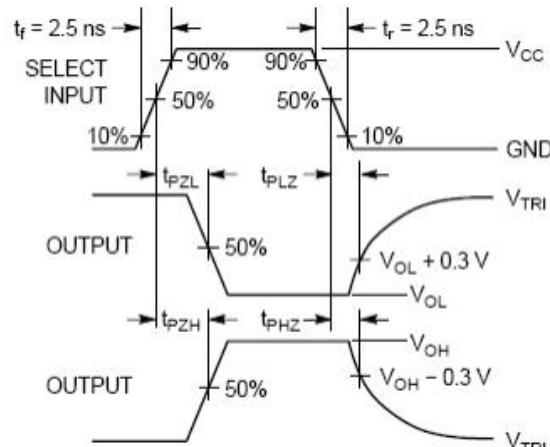
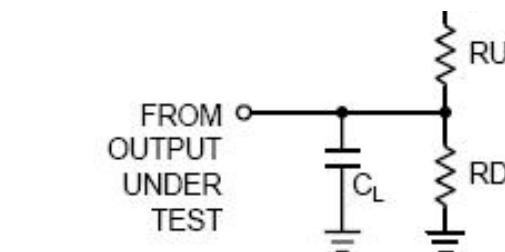
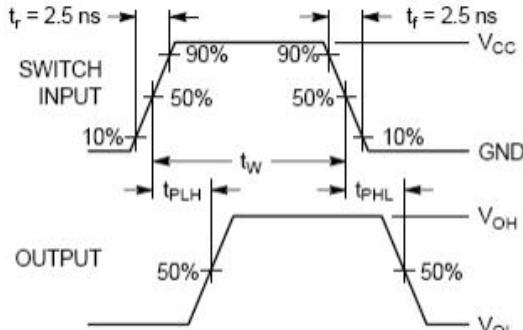


Figure 1. AC Test Circuit ,AC Waveforms

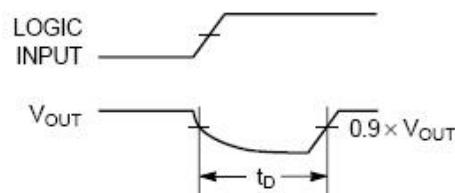
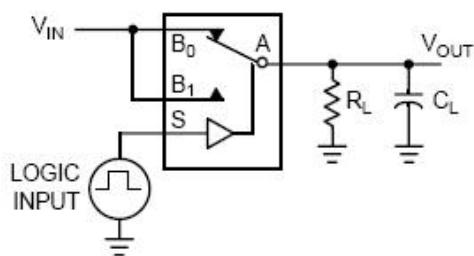
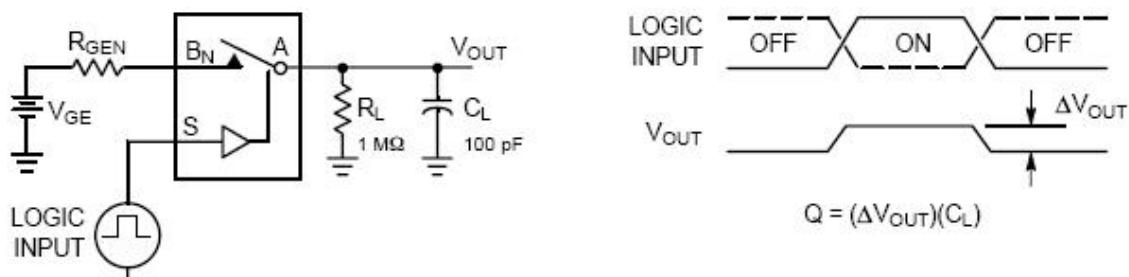
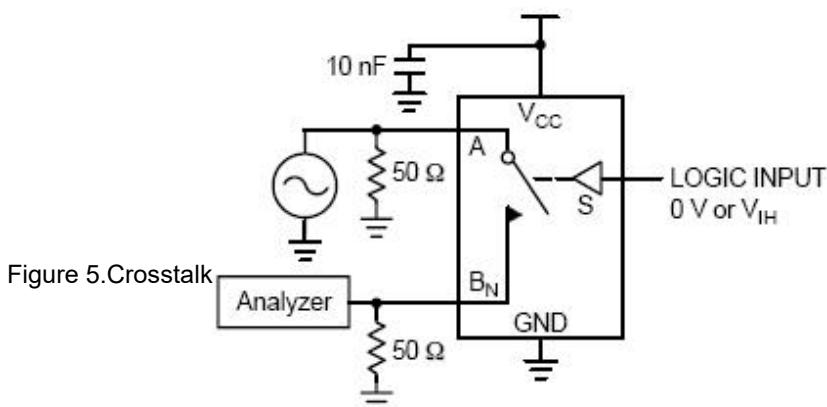


Figure 2. Break Before Make Interval Timing

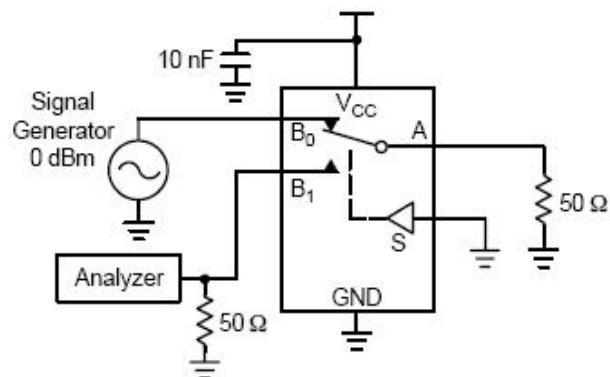
## TESTCIRCUITS(continued)



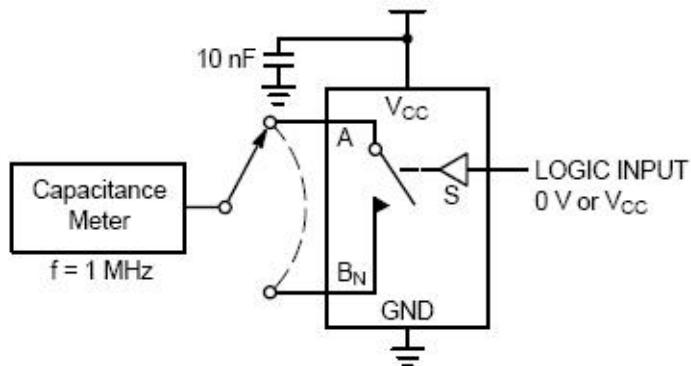
**Figure 3. Charge Injection Test**



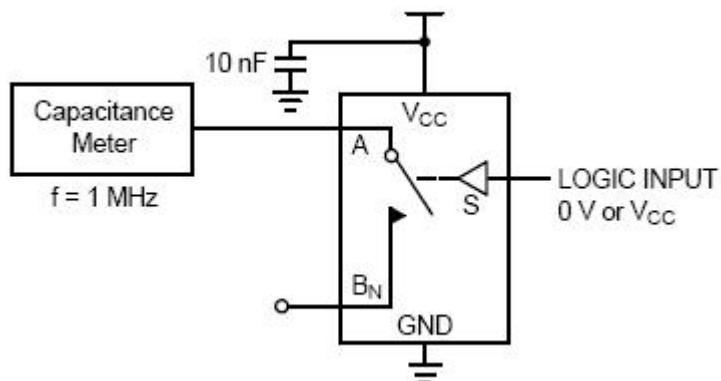
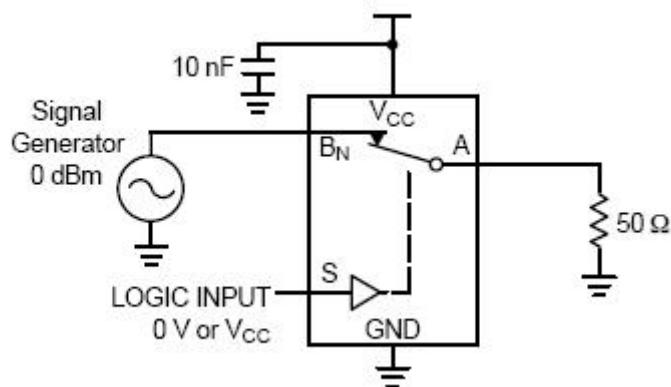
**Figure 4. Off Isolation**

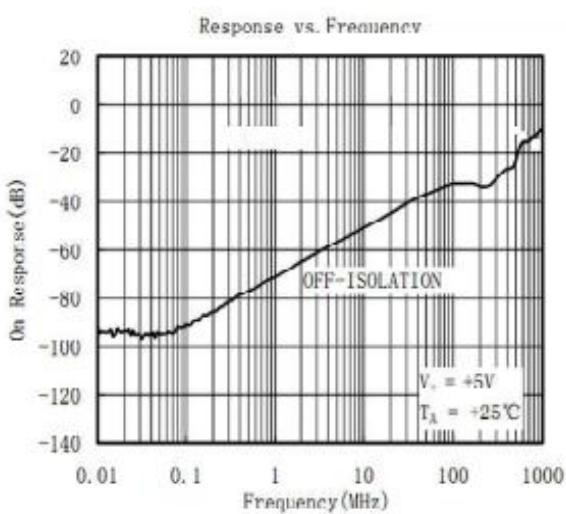
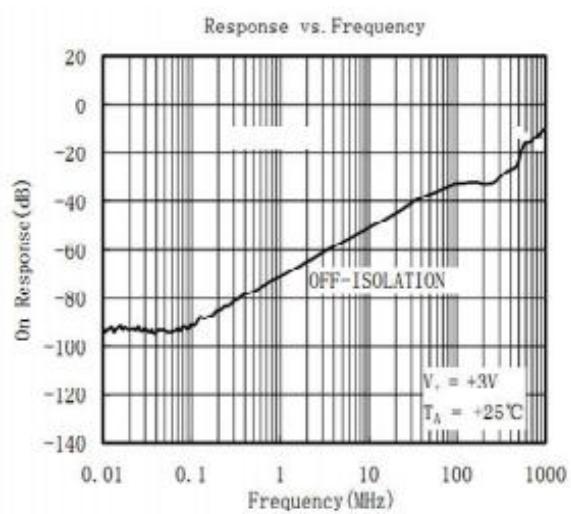
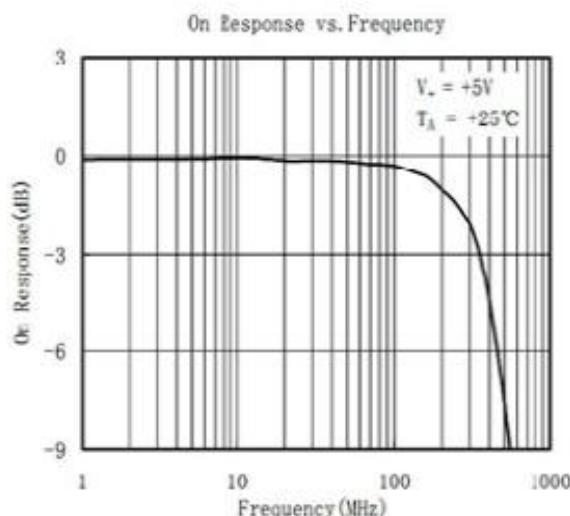
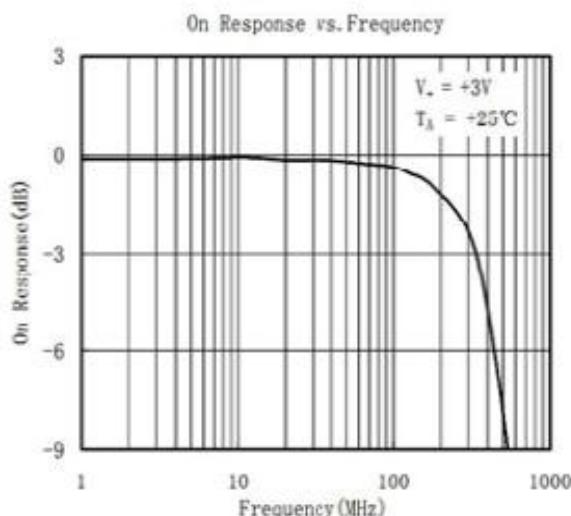


**Figure 5.Crosstalk**



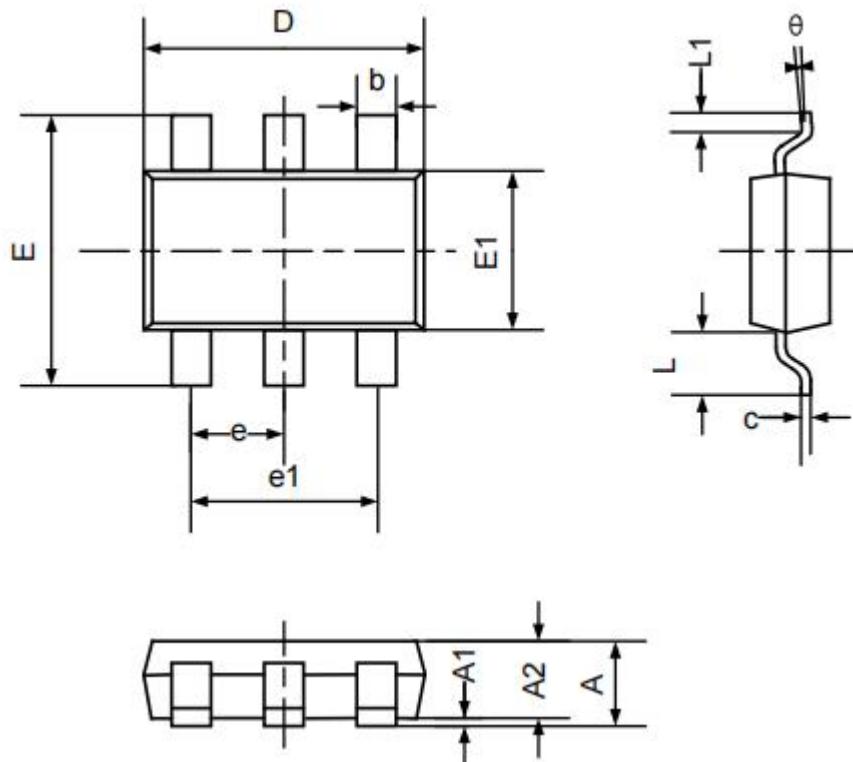
**Figure 6. Channel Off Capacitance**

**Figure 7. Channel On Capacitance****Figure 8. Bandwidth**



## PACKAGE OUTLINE

SC70-6



Symbol	Dimensions in Millimeters	
	Min	Max
A	0.85	1.05
A1	0.00	0.10
A2	0.80	1.00
b	0.15	0.35
c	0.08	0.22
D	2.02	2.12
E	2.20	2.40
E1	1.25	1.35
e	0.65BSC	
e1	1.30BSC	
L	0.50REF	
L1	0.28	0.38
θ	0°	8°

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