Chipsmall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

MAXIM

0.8Ω, Low-Voltage, Single-Supply SPDT Analog Switch in SC70

MAX4714

General Description

The MAX4714 is a low on-resistance, low-voltage single-pole/double-throw (SPDT) analog switch that operates from a single +1.6V to +3.6V supply. The MAX4714 has break-before-make switching. This device also has fast switching speeds (t_{ON} = 18ns, max, t_{OFF} = 12ns, max).

When powered from a +3V supply, the MAX4714 features 0.8Ω (max) on-resistance (R_{ON}), with 0.18Ω (max) R_{ON} matching and flatness. The digital logic input is 1.8V CMOS compatible when using a single +3V supply.

The MAX4714 is pin compatible with the MAX4599 and is available in a 6-pin SC70 or μDFN package.

Applications

Power Routing

Battery-Operated Equipment

Audio and Video Signal Routing

Low-Voltage Data-Acquisition Systems

Communications Circuits

PCMCIA Cards

Cellular Phones

Modems

Hard Drives

Features

♦ **Low R_{ON}**
   0.8Ω (max) (+3V Supply)
   2.5Ω (max) (+1.8V Supply)

♦ **0.18Ω max R_{ON} Flatness (+3V Supply)**

♦ **+1.6V to +3.6V Single-Supply Operation**

♦ **Available in 6-Pin μDFN (1.5mm x 1mm) and SC70 Packages**

♦ **Fast Switching: t_{ON} = 18ns (max), t_{OFF} = 12ns (max)**

♦ **1.8V CMOS Logic Compatible (+3V Supply)**

♦ **Pin Compatible with MAX4599**

♦ **Guaranteed Break-Before-Make**

Ordering Information

PART	TEMP RANGE	PIN-PACKAGE	TOP MARK
MAX4714EXT-T	-40°C to +85°C	6 SC70-6	AAY
MAX4714ELT-T	-40°C to +85°C	6 μDFN-6	AJ

Pin Configurations/Functional Diagrams/Truth Table

LOGIC	NC	NO
0	ON	OFF
1	OFF	ON

SWITCHES SHOWN FOR LOGIC 0 INPUT

MAXIM _____ *Maxim Integrated Products* **1**

0.8Ω, Low-Voltage, Single-Supply SPDT Analog Switch in SC70

MAX4714

ABSOLUTE MAXIMUM RATINGS

Voltages Referenced to GND
  V+, IN ....-0.3V to +4V
  COM, NC, NO (Note 1)............................-0.3V to (V+ + 0.3V)
Continuous Current NO, NC to COM..............................±150mA
Peak Current NO, NC to COM
  (pulsed at 1ms, 10% duty cycle max)........................ ±300mA
Continuous Power Dissipation

6-Pin SC70 (derate 3.1mW/°C above +70°C)...............247mW
6-Pin µDFN-6 (derate 2.1mW/°C above +70°C) 167mW
Operating Temperature Range
  MAX4714EXT ....-40°C to +85°C
Junction Temperature ....+150°C
Storage Temperature Range ....-65°C to +150°C
Lead Temperature (soldering, 10s) .... +300°C

Note 1: Signals on NC, NO, and COM exceeding V+ or GND are clamped by internal diodes.

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.

ELECTRICAL CHARACTERISTICS—Single +3V Supply

(V+ = +2.7V to +3.6V, V_{IH} = +1.4V, V_{IL} = +0.5V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at V+ = +3.0V and T_A = +25°C.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS	T_A	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V_{COM}, V_{NO}, V_{NC}			0		V+	V
On-Resistance (Note 4)	R_{ON}	V+ = 2.7V, I_{COM} = 100mA, V_{NO} or V_{NC} = 1.5V	+25°C		0.6	0.8	Ω
			T_{MIN} to T_{MAX}			0.9	
On-Resistance Match Between Channels (Note 5)	ΔR_{ON}	V+ = 2.7V, I_{COM} = 100mA, V_{NO} or V_{NC} = 1.5V	+25°C		0.03	0.06	Ω
			T_{MIN} to T_{MAX}			0.08	
On-Resistance Flatness (Note 6)	$R_{FLAT(ON)}$	V+ = 2.7V, I_{COM} = 100mA, V_{NO} or V_{NC} = 0.6V, 1.5V, 2.1V	+25°C		0.1	0.18	Ω
			T_{MIN} to T_{MAX}			0.2	
NO or NC Off-Leakage Current	$I_{NO(OFF)}$, $I_{NC(OFF)}$	V+ = 3.3V, V_{COM} = 0.3V, 3V, V_{NO} or V_{NC} = 3V, 0.3V	+25°C	-1		+1	nA
			T_{MIN} to T_{MAX}	-5		+5	
COM On-Leakage Current	$I_{COM(ON)}$	V+ = 3.3V, V_{COM} = 0.3V, 3V, V_{NO} or V_{NC} = 0.3V, 3V or floating	+25°C	-2		+2	nA
			T_{MIN} to T_{MAX}	-10		+10	
DYNAMIC							
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, Figure 1	+25°C		13	18	ns
			T_{MIN} to T_{MAX}			20	
Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, Figure 1	+25°C		6	12	ns
			T_{MIN} to T_{MAX}			15	
Break-Before-Make Delay (Note 7)	t_{BBM}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, Figure 2	+25°C	1	9		ns
			T_{MIN} to T_{MAX}	1			
Charge Injection	Q	V_{GEN}, R_{GEN}, C_L = 1.0nF, Figure 3	+25°C		22		pC
Off-Isolation (Note 8)	V_{ISO}	f = 1MHz, V_{COM} = 1V_{RMS}, R_L = 50Ω, C_L = 5pF, Figure 4	+25°C		-54		dB
Crosstalk (Note 9)		f = 1MHz, V_{COM} = 1V_{RMS}, R_L = 50Ω, C_L = 5pF, Figure 4	+25°C		-54		dB
Total Harmonic Distortion	THD	f = 20Hz to 20kHz, V_{COM} = 2V_{P-P}, R_L = 32Ω	+25°C		0.01		%

MAXIM

ELECTRICAL CHARACTERISTICS—Single +3V Supply (continued)

(V+ = +2.7V to +3.6V, V_{IH} = +1.4V, V_{IL} = +0.5V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at V+ = +3.0V and T_A = +25°C.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS	T_A	MIN	TYP	MAX	UNITS
NC or NO Off-Capacitance	$C_{NO(OFF)}$, $C_{NC(OFF)}$	f = 1MHz, Figure 5	+25°C		30		pF
COM On-Capacitance	$C_{COM(ON)}$	f = 1MHz, Figure 5	+25°C		65		pF
LOGIC INPUT							
Input Voltage Low	V_{IL}					0.5	V
Input Voltage High	V_{IH}			1.4			V
Input Leakage Current	I_{IN}	V_{IN} = 0V or V+		-1		+1	µA
SUPPLY							
Power-Supply Range	V+			1.6		3.6	V
Positive Supply Current	I+	V+ = +3.6V, V_{IN} = 0V or V+	+25°C		0.04	0.2	µA
			T_{MIN} to T_{MAX}			2	

ELECTRICAL CHARACTERISTICS—Single +1.8V Supply
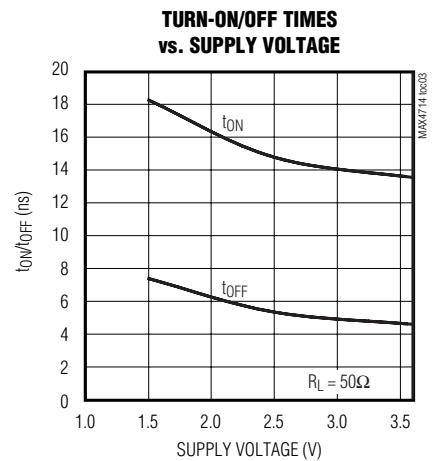
(V+ = +1.8V, V_{IH} = +1V, V_{IL} = +0.4V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS	T_A	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V_{COM}, V_{NO}, V_{NC}			0		V+	V
On-Resistance	R_{ON}	I_{COM} = 10mA, V_{NO} or V_{NC} = +0.9V	+25°C		1.2	2.5	Ω
			T_{MIN} to T_{MAX}			5	
NO or NC Off-Leakage Current	$I_{NO(OFF)}$, $I_{NC(OFF)}$	V_{COM} = 0.3V, 1.5V, V_{NO} or V_{NC} = 1.5V, 0.3V	+25°C	-1	0.01	+1	nA
			T_{MIN} to T_{MAX}	-5		+5	
COM On-Leakage Current	$I_{COM(ON)}$	V_{COM} = 0.3V, 1.5V, V_{NO} or V_{NC} = 0.3V, 1.5V or floating	+25°C	-2		+2	nA
			T_{MIN} to T_{MAX}	-10		+10	
DYNAMIC							
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, Figure 1	+25°C		18	25	ns
			T_{MIN} to T_{MAX}			30	
Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, Figure 1	+25°C		9	15	ns
			T_{MIN} to T_{MAX}			18	
Break-Before-Make Delay (Note 7)	t_{BBM}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, Figure 2	+25°C	2			ns
			T_{MIN} to T_{MAX}	2			
Charge Injection	Q	V_{GEN} = 0V, R_{GEN} = 0, C_L = 1nF, Figure 3	+25°C		12		pC

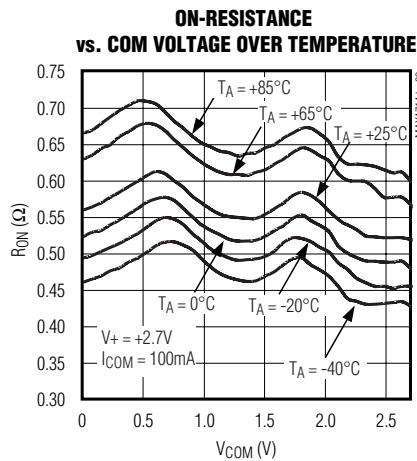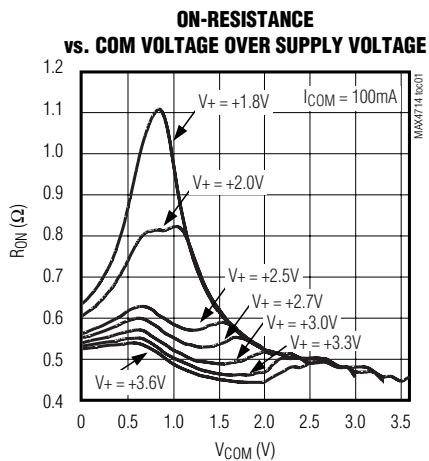**MAX4714**

ELECTRICAL CHARACTERISTICS—Single +1.8V Supply (continued)

(V+ = +1.8V, V_{IH} = +1V, V_{IL} = +0.4V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS	T_A	MIN	TYP	MAX	UNITS
LOGIC INPUT							
Input Voltage Low	V_{IL}					0.4	V
Input Voltage High	V_{IH}			1			V
Input Leakage Current	I_{IN}	V_{IN} = 0V or V+				1	µA
SUPPLY							
Positive Supply Current	I+	V_{IN} = 0V or V+	+25°C		0.04	0.2	µA
			T_{MIN} to T_{MAX}			2	

Note 2: The algebraic convention, where the most negative value is a minimum and the most positive value is a maximum, is used in this data sheet.

Note 3: Parts are 100% tested at +25°C. Limits across the full temperature range are guaranteed by design and correlation.

Note 4: Guaranteed by design for µDFN package.

Note 5: ΔR_{ON} = $R_{ON(MAX)}$ - $R_{ON(MIN)}$.

Note 6: Flatness is defined as the difference between the maximum and minimum values of on-resistance as measured over the specified analog signal range.

Note 7: Guaranteed by design.

Note 8: Off-Isolation = $20\log_{10}$ [V_{COM} / (V_{NC} or V_{NO})], V_{COM} = output, V_{NC} or V_{NO} = input to off switch.

Note 9: Between the two switches.

_____ _Typical Operating Characteristics_
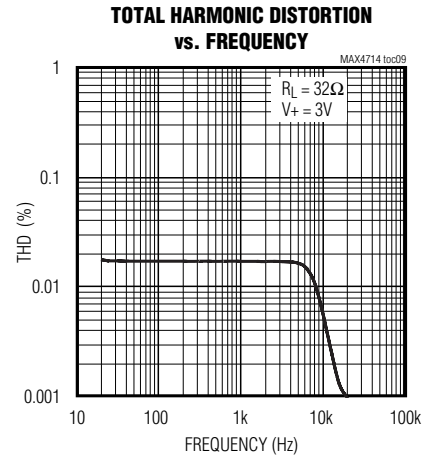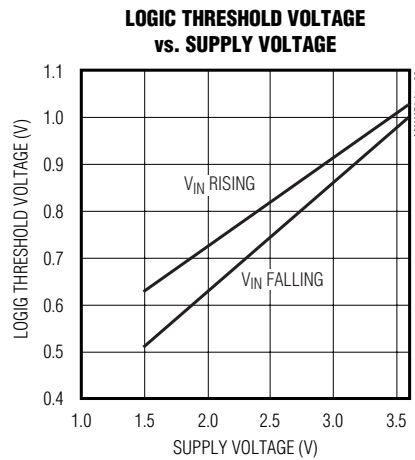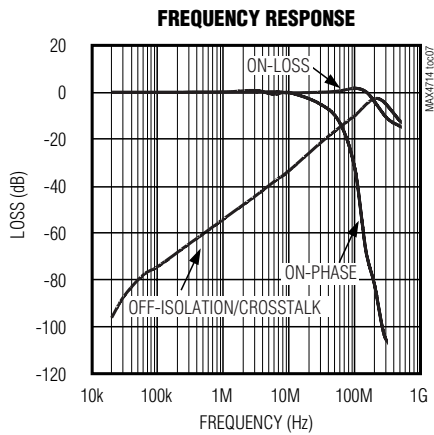
(T_A = +25°C, unless otherwise noted.)

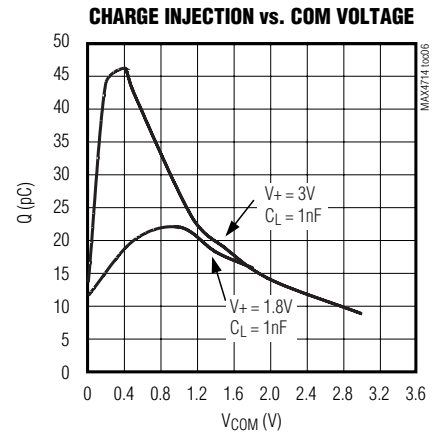ON-RESISTANCE vs. COM VOLTAGE OVER SUPPLY VOLTAGE

ON-RESISTANCE vs. COM VOLTAGE OVER TEMPERATURE

TURN-ON/OFF TIMES vs. SUPPLY VOLTAGE

MAXIM

(T_A = +25°C, unless otherwise noted.)

TURN-ON/OFF TIMES vs. TEMPERATURE

ON/OFF-LEAKAGE CURRENT vs. TEMPERATURE

CHARGE INJECTION vs. COM VOLTAGE

FREQUENCY RESPONSE

LOGIC THRESHOLD VOLTAGE vs. SUPPLY VOLTAGE

TOTAL HARMONIC DISTORTION vs. FREQUENCY
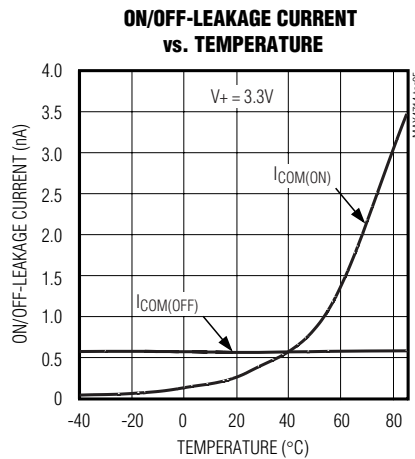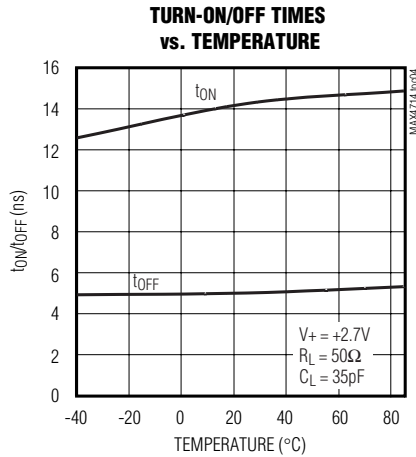
Pin Description

PIN	NAME	FUNCTION
1	IN	Digital Control Input
2	V+	Positive Supply Voltage Input
3	GND	Ground
4	NC	Analog Switch—Normally Closed
5	COM	Analog Switch—Common
6	NO	Analog Switch—Normally Open

MAX4714

Detailed Description

The MAX4714 is a low-on-resistance (R_{ON}), low-voltage, single-pole/double-throw (SPDT) analog switch that operates from a +1.6V to +3.6V supply. The MAX4714 has break-before-make switching. This device also has fast switching speeds (t_{ON} = 18ns, max, t_{OFF} = 12ns, max).

When powered from a +3V supply, the 0.8Ω (max) R_{ON} allows high continuous currents to be switched in a variety of applications.

Applications Information

Logic Inputs

The MAX4714 logic input can be driven up to +3.6V regardless of the supply voltage. For example, with a +3.3V supply, IN may be driven low to GND and high to +3.6V. Driving IN rail-to-rail minimizes power consumption.

Analog Signal Levels

Analog signals that range over the entire supply voltage (V+ to GND) can be passed with very little change in on-resistance (see *Typical Operating Characteristics*). The switches are bidirectional, so the NO, NC, and COM pins can be used as either inputs or outputs.

Chip Information

TRANSISTOR COUNT: 135

PROCESS: CMOS
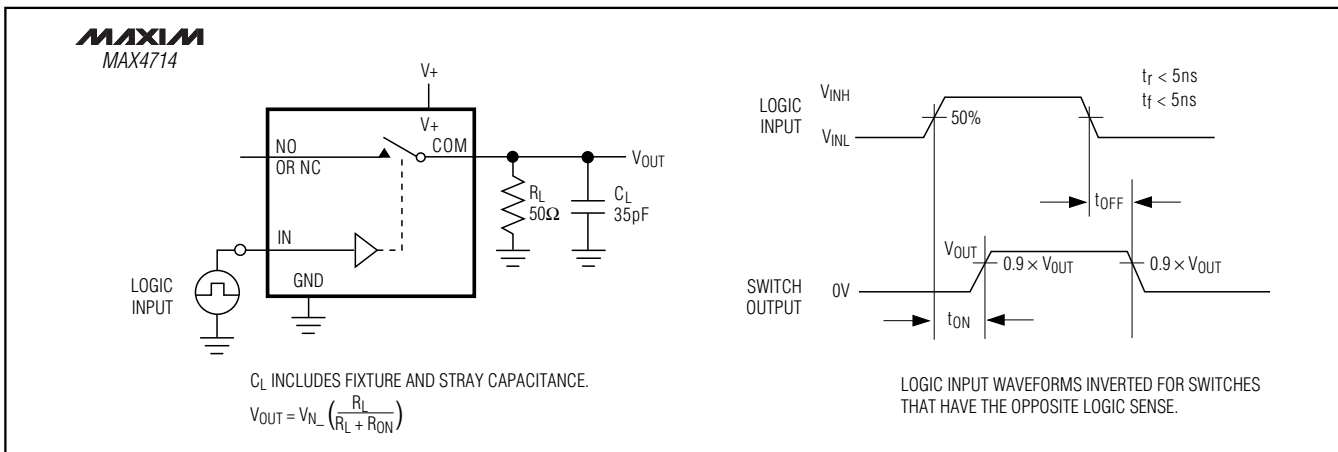
Test Circuits/Timing Diagrams

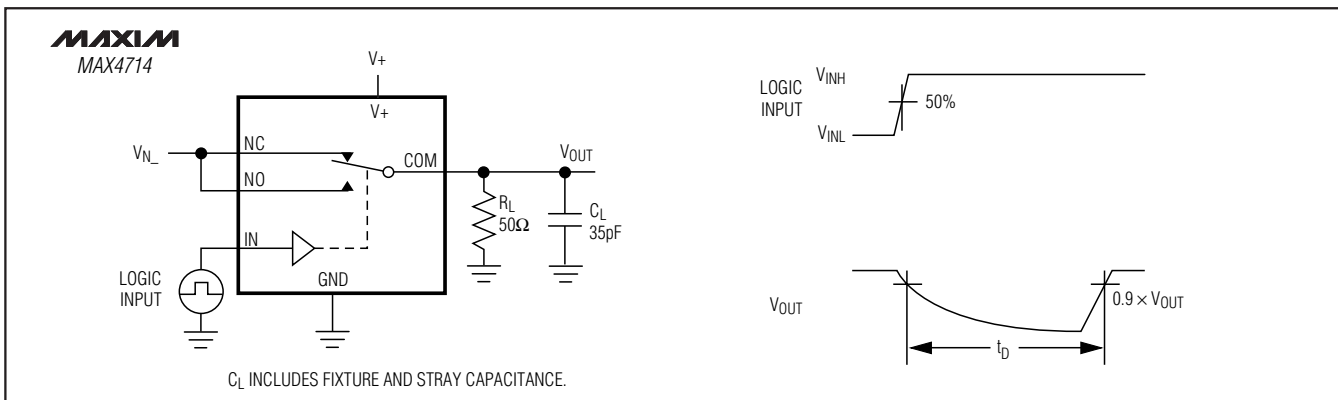$$V_{OUT} = V_{N\_}\left(\frac{R_L}{R_L + R_{ON}}\right)$$

Figure 1. Switching Time

Figure 2. Break-Before-Make Interval

Test Circuits/Timing Diagrams (continued)
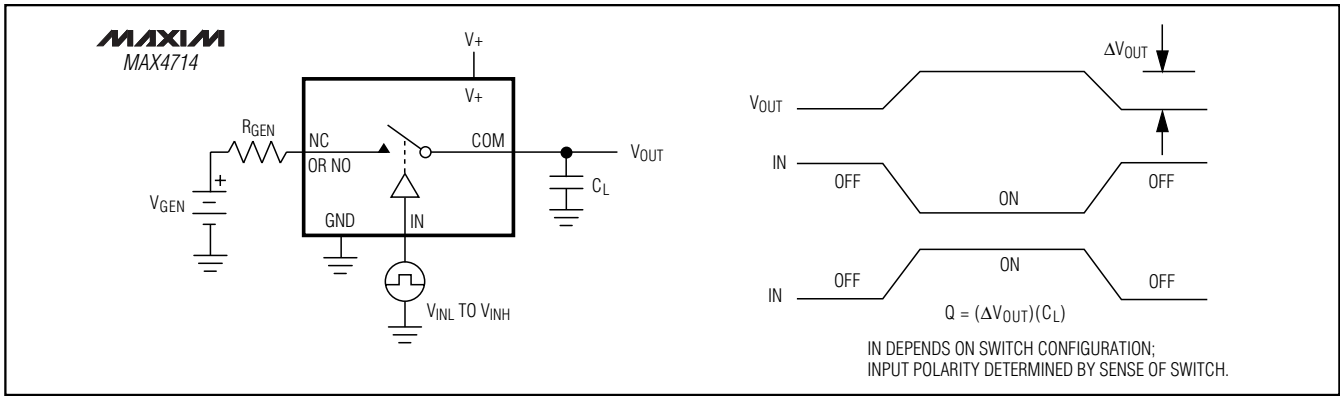
Figure 3. Charge Injection

$$Q = (\Delta V_{OUT})(C_L)$$

IN DEPENDS ON SWITCH CONFIGURATION;
INPUT POLARITY DETERMINED BY SENSE OF SWITCH.

$$\text{OFF-ISOLATION} = 20\log\frac{V_{OUT}}{V_{IN}}$$

$$\text{ON-LOSS} = 20\log\frac{V_{OUT}}{V_{IN}}$$

$$\text{CROSSTALK} = 20\log\frac{V_{OUT}}{V_{IN}}$$

MEASUREMENTS ARE STANDARDIZED AGAINST SHORTS AT IC TERMINALS.
OFF-ISOLATION IS MEASURED BETWEEN COM_ AND "OFF" NO_ OR NC_ TERMINAL ON EACH SWITCH.
ON-LOSS IS MEASURED BETWEEN COM_ AND "ON" NO_ OR NC_TERMINAL ON EACH SWITCH.
CROSSTALK IS MEASURED FROM ONE CHANNEL TO ALL OTHER CHANNELS.
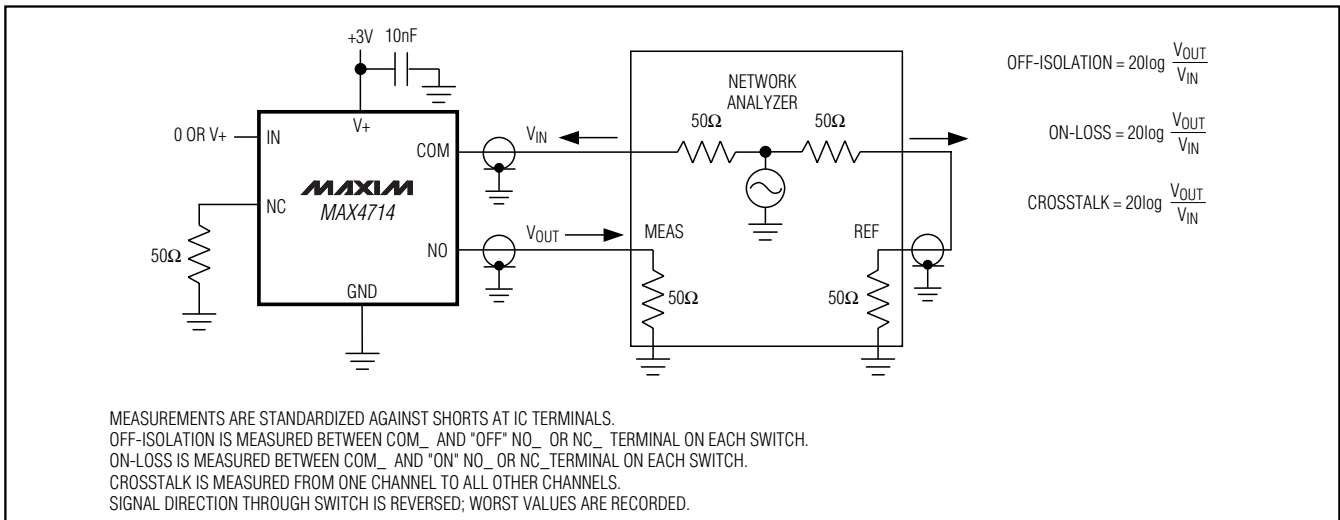SIGNAL DIRECTION THROUGH SWITCH IS REVERSED; WORST VALUES ARE RECORDED.

Figure 4. On-Loss, Off-Isolation, and Crosstalk
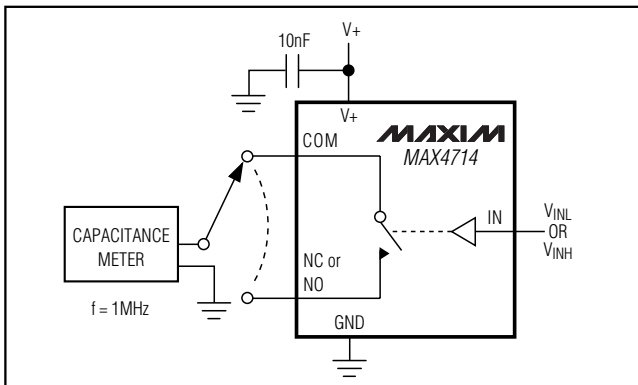
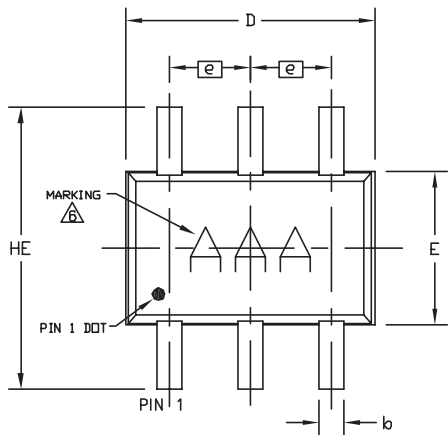

Figure 5. Channel Off/On-Capacitance

MAX4714

Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to **www.maxim-ic.com/packages**.)

SC70, 6L.EPS
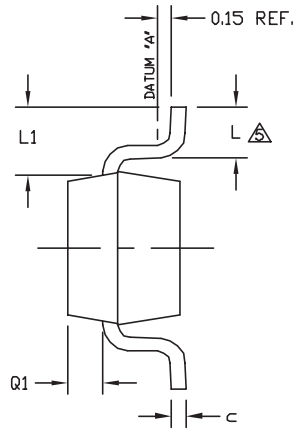
COMMON DIMENSIONS		
SYMBOL	MIN	MAX
A	0.80	1.10
A1	0.00	0.10
A2	0.80	1.00
b	0.15	0.30
c	0.10	0.18
D	1.80	2.20
e	0.65 BSC.	
E	1.15	1.35
HE	1.80	2.40
L	0.10	0.41
L1	0.425 TYP.	
Q1	0.10	0.40
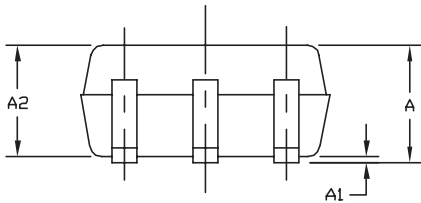
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. COPLANARITY 4 MILS. MAX.
5. FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM "A" AND LEAD SURFACE.
6. MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY.
7. LEAD CENTERLINES TO BE AT TRUE POSITION AS DEFINED BY BASIC DIMENSION "e", ±0.05.

DALLAS SEMICONDUCTOR /\/\/\X\I/\/\

TITLE		
PACKAGE OUTLINE, 6L SC70		
APPROVAL	DOCUMENT CONTROL NO. 21-0077	REV. C	1/1

−DRAWING NOT TO SCALE−

MAX4714

Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to **www.maxim-ic.com/packages**.)

6L UDFN.EPS

TOPMARK

PIN 1 INDEX AREA

AAA

TOP VIEW

SIDE VIEW

PIN 1 0.075x45¡

BOTTOM VIEW

SECTION A-A

S Y M B O L	COMMON DIMENSIONS		
	MIN.	NOM.	MAX.
A	0.64	0.72	0.80
A1	--	0.20	--
D	1.45	1.50	1.55
E	0.95	1.00	1.05
L	0.30	0.35	0.40
L1	--	--	0.08
L2	--	--	0.05
b	0.17	0.20	0.23
e	0.50 BSC.		

NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
2. MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY.
3. LEAD CENTERLINES TO BE AT TRUE POSITION AS DEFINED BY BASIC DIMENSION "e", ±0.05.

-DRAWING NOT TO SCALE-

DALLAS SEMICONDUCTOR /VI/\XI/VI

TITLE:
PACKAGE OUTLINE, 6L uDFN, 1.5x1.0x0.8mm

APPROVAL	DOCUMENT CONTROL NO.	REV.	
	21-0147	C	1/1