

MAX14760/MAX14762/MAX14764

超摆幅、低导通漏电流模拟开关

概述

MAX14760/MAX14762/MAX14764模拟开关允许通过超出其电源电压摆幅的双极性信号，器件采用+3.0V至+5.5V电源供电，支持-25V至+25V的信号范围。

MAX14760为单通道单刀单掷(SPST)模拟开关，MAX14762为双路SPST模拟开关，MAX14764则为单通道单刀双掷(SPDT)模拟开关。

MAX14760/MAX14762/MAX14764具有20Ω(最大值)导通电阻和±10nA(最大值)导通漏电流(MAX14760/MAX14762)。

MAX14760/MAX14764提供8引脚(3mm x 3mm) TDFN封装，MAX14762提供10引脚(3mm x 3mm) TDFN封装。这些器件能够工作在-40°C至+85°C扩展级温度范围。

优势和特性

- ◆ 简化电源需求
 - ◇ 3.0V至5.5V供电范围
 - ◇ -25V至+25V信号范围
- ◆ 高性能
 - ◇ ±10nA(最大值)导通漏电流(MAX14760/MAX14762)
 - ◇ 20Ω(最大值)导通电阻
 - ◇ 低至58mΩ(典型值)的导通电阻平坦度
 - ◇ 热关断保护
 - ◇ -40°C至+85°C工作温度范围
 - ◇ 宽带: 115MHz(典型值)
- ◆ 节省电路板空间
 - ◇ 小尺寸、8引脚和10引脚TDFN封装

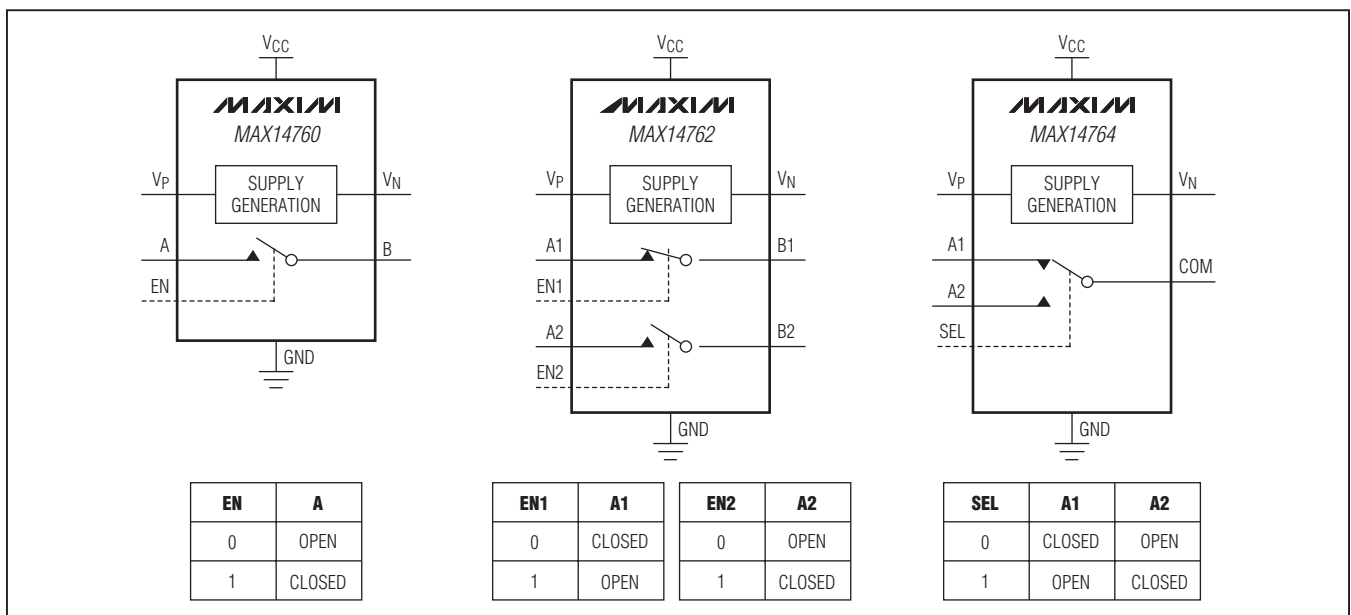
应用

订购信息/选型指南在数据资料的最后给出。

相关型号以及配合该器件使用的推荐产品，请参见：china.maxim-ic.com/MAX14760.related。

工业测量系统
仪表系统
光中继替代方案
医疗系统
ATE系统
音频信号路由和切换

功能框图/真值表



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ABSOLUTE MAXIMUM RATINGS

(All voltages referenced to GND, unless otherwise noted.)

V _{CC}	-0.3V to +6V
EN, EN1, EN2, SEL	-0.3V to +(V _{CC} + 0.3V)
A, A1, A2, B, B1, B2, COM	(V _N - 0.3V) to Lesser of (V _P + 0.3V) or (V _N + 52V)
V _P	-0.3V to Lesser of (+52V) or (V _N + 70V)
V _N	Greater of (V _{CC} - 40V) or (V _P - 70V) to +0.3V
V _P to V _N	-0.3V to 70V
Continuous Current	±25mA

Continuous Power Dissipation (T_A = +70°C)

8-Pin TDFN Package (derate 24.4mW/°C above +70°C).....	1951.2mW
10-Pin TDFN Package (derate 24.4mW/°C above +70°C).....	1951.2mW
Operating Temperature Range.....	-40°C to +85°C
Storage Temperature Range.....	-65°C to +160°C
Lead Temperature (soldering, 10s)	+300°C
Soldering Temperature (reflow)	+260°C

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.

PACKAGE THERMAL CHARACTERISTICS (Note 1)

8 TDFN

Junction-to-Ambient Thermal Resistance (θ _{JA}).....	41°C/W
Junction-to-Case Thermal Resistance (θ _{JC}).....	8°C/W

10 TDFN

Junction-to-Ambient Thermal Resistance (θ _{JA}).....	41°C/W
Junction-to-Case Thermal Resistance (θ _{JC}).....	9°C/W

Note 1: Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to china.maxim-ic.com/thermal-tutorial.

ELECTRICAL CHARACTERISTICS

(V_{CC} = 3.0V to 5.5V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = 5V, and T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC CHARACTERISTICS						
Power Supply Range	V _{CC}		3.0		5.5	V
Continuous Current Through Switch	I _A		-25		+25	mA
Supply Current	I _{CC}	V _{CC} ≤ 4.7V	V _{EN} = V _{CC}	4.1	10	mA
			V _{EN} = V _{CC} /2	4.1	10	
		V _{CC} > 4.7V	V _{EN} = V _{CC}	2.5	6	
			V _{EN} = V _{CC} /2	2.5	6	
Analog Signal Range	V _{COM} , V _A _, V _B _	Switch open or closed	-25		+25	V
On-Resistance	R _{ON}	I _{COM} or I _B _ = ±25mA, V _A _ = ±25V		8	20	Ω
On-Resistance Flatness	ΔR _{ON}	-25V < V _A _ < +25V, I _{COM} or I _B _ = ±25mA		58		mΩ
A, A1, A2 Off-Leakage Current	I _A (OFF)	V _A _ = +25V, V _{COM} or V _B _ = 0V, Figure 1	-30		+30	nA
COM, B, B1, B2 Off-Leakage Current	I _{COM} (OFF), I _B _(OFF)	V _{COM} or V _B _ = 15V, V _A _ = 0V, Figure 1 (MAX14764)	-10		+10	nA
		V _B _ = 15V, V _A _ = 0V, Figure 1 (MAX14760/MAX14762)	-10		+10	

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ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 3.0V$ to $5.5V$, $T_A = -40^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted. Typical values are at $V_{CC} = 5V$, and $T_A = +25^{\circ}C$.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
On-Leakage Current	I_{ON}	$V_{A_} = \pm 25V$, B/COM is unconnected, Figure 1 (MAX14760/MAX14762)	-10		+10	nA
		$V_{A_} = \pm 25V$, B/COM is unconnected, Figure 1 (MAX14764)	-30		+30	
DIGITAL LOGIC						
Input-Voltage Logic-Low	V_{IL}	$V_{CC} = 3.0V$			0.7	V
		$V_{CC} = 3.6V$			0.7	
		$V_{CC} = 4.5V$			0.8	
		$V_{CC} = 5.5V$			0.8	
Input-Voltage Logic-High	V_{IH}	$V_{CC} = 3.0V$	1.7			V
		$V_{CC} = 3.6V$	1.9			
		$V_{CC} = 4.5V$	2.0			
		$V_{CC} = 5.5V$	2.1			
Input Current	I_L		-1		+1	μA
AC CHARACTERISTICS						
Power-On Time	t_{PWRON}	$V_{A_} = \pm 10V$, $C_{VP} = C_{VN} = 1\mu F$ (Note 3)		320		ms
Enable Turn-On Time	t_{ON}	$V_{A_} = \pm 10V$, $R_L = 10k\Omega$, Figure 2 (MAX14760/MAX14762)		100	200	μs
		$V_{A_} = \pm 10V$, $R_L = 10k\Omega$, Figure 2 (MAX14764)		1.04	1.6	ms
Enable Turn-Off Time	t_{OFF}	(Figure 2)		110	400	μs
Break-Before-Make Interval	t_{BBM}	$V_{A_} = 1V_{RMS}$, $R_L = 10k\Omega$, Figure 3 (MAX14764)		740		μs
Off-Isolation	V_{ISO}	$V_{A_} = 1V_{RMS}$, $f = 100kHz$, $R_L = 50\Omega$, $C_L = 15pF$, Figure 4		-77		dB
Crosstalk	V_{CT}	$R_S = R_L = 50\Omega$, $f = 100kHz$, $V_{COM} = 1V_{RMS}$, Figure 5 (MAX14764)		-92		dB
-3dB Bandwidth	BW	$R_S = 50\Omega$, $R_L = 1k\Omega$, $V_{A_} = 1V_{P-P}$, Figure 6		115		MHz
Total Harmonic Distortion	THD+N	$R_S = R_L = 1k\Omega$, $f = 20Hz$ to $20kHz$		0.005		%
Charge Injection	Q	$V_{A_} = GND$, $C_L = 1nF$, Figure 7		19		pC
Input Capacitance	C_{IN}	At A, A1, A2, B, B1, B2, and COM pins		32		pF
THERMAL PROTECTION						
Thermal Shutdown Temperature	t_{HYST}			+154		$^{\circ}C$
Shutdown Temperature Hysteresis	t_{SHUT}			24		$^{\circ}C$
ESD PROTECTION						
All Pins		Human Body Model		± 2		kV

Note 2: All devices are 100% production tested at $T_A = +25^{\circ}C$. Specifications over operating temperature range are guaranteed by design.

Note 3: The power-on time is defined as the settling time for the charge pump's output to reach steady-state value within 1%.

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测试电路/时序图

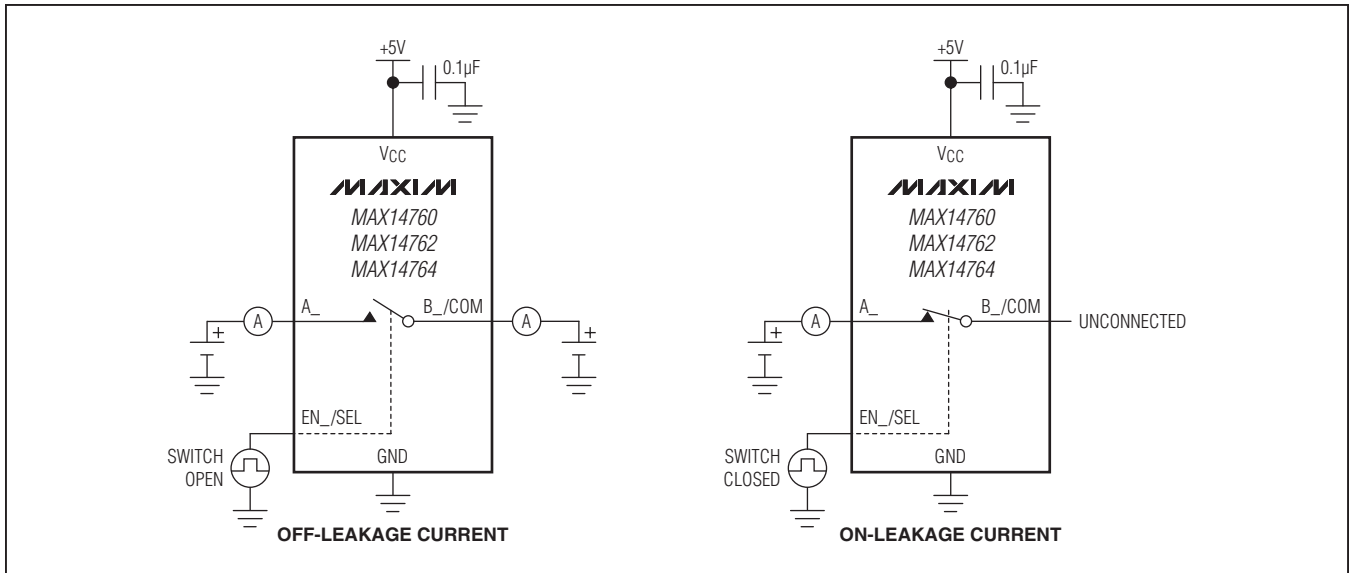


图1. 漏电流测量

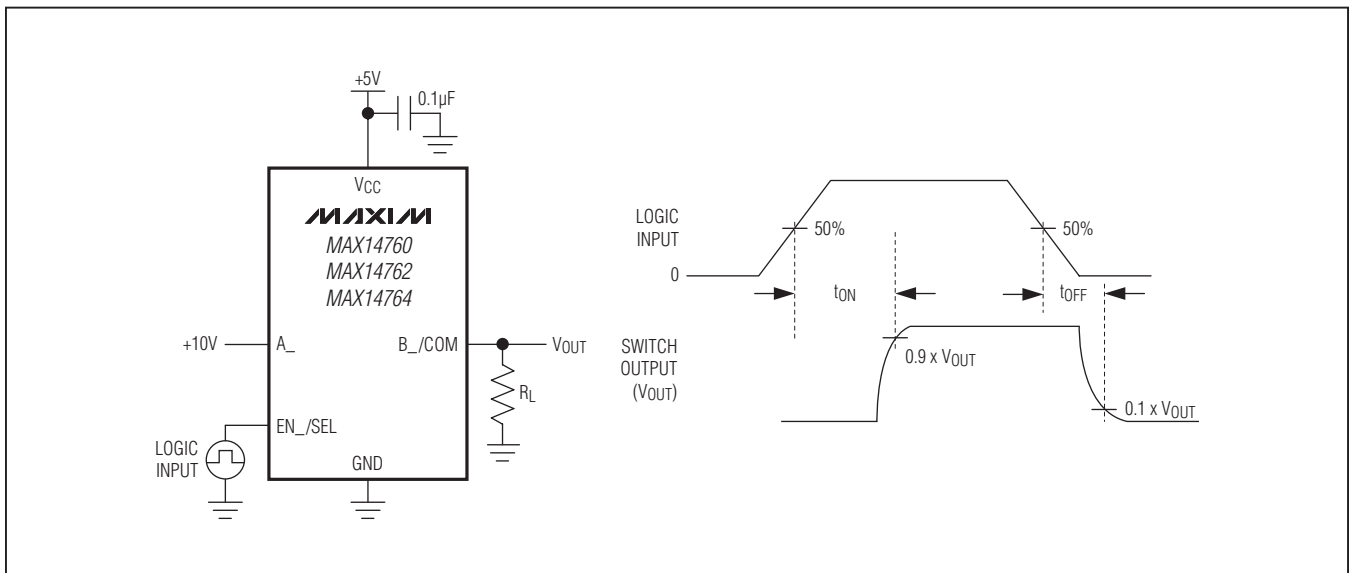


图2. 开关时间

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测试电路/时序图(续)

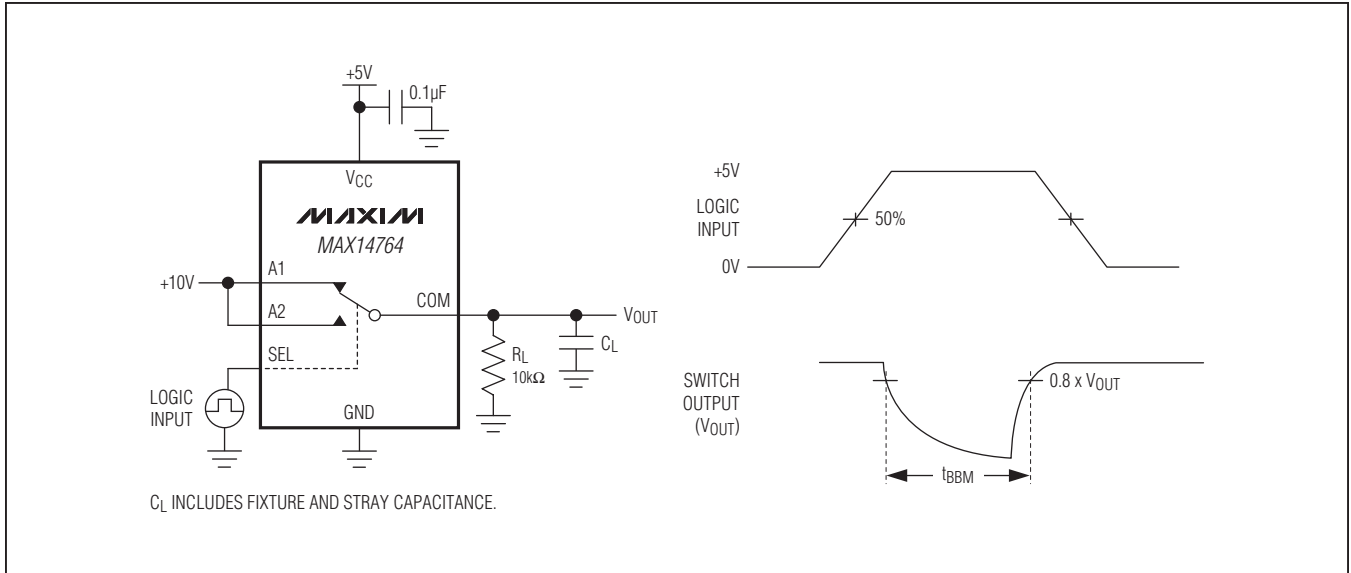


图3. 先开后合

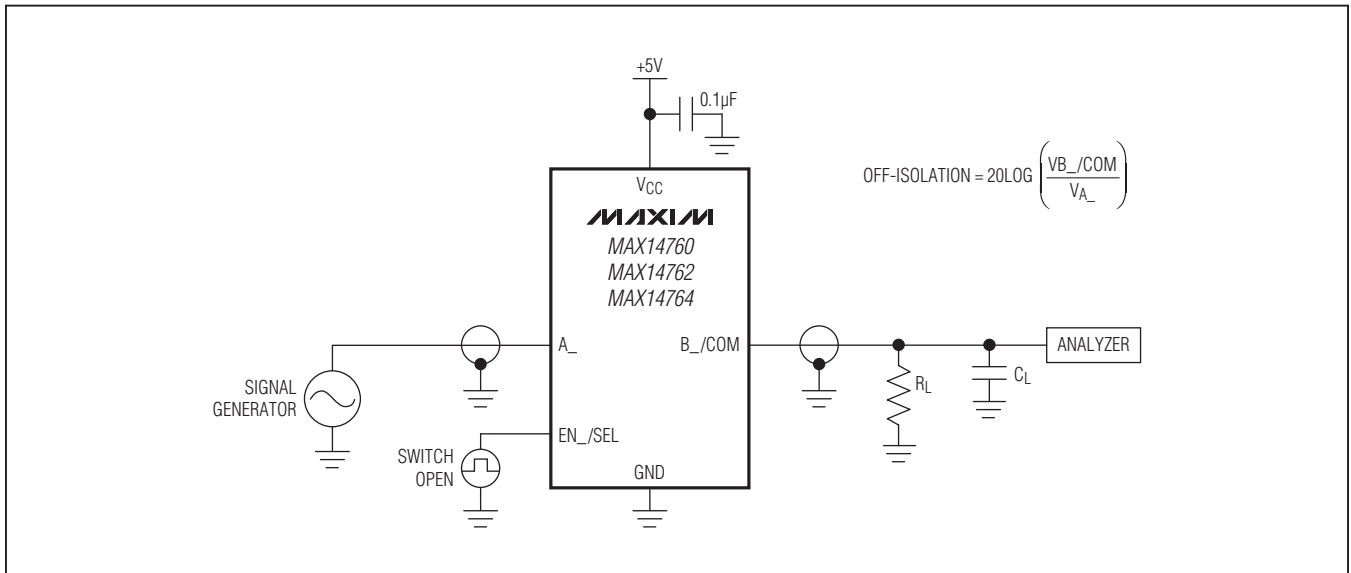


图4. 关断隔离

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测试电路/时序图(续)

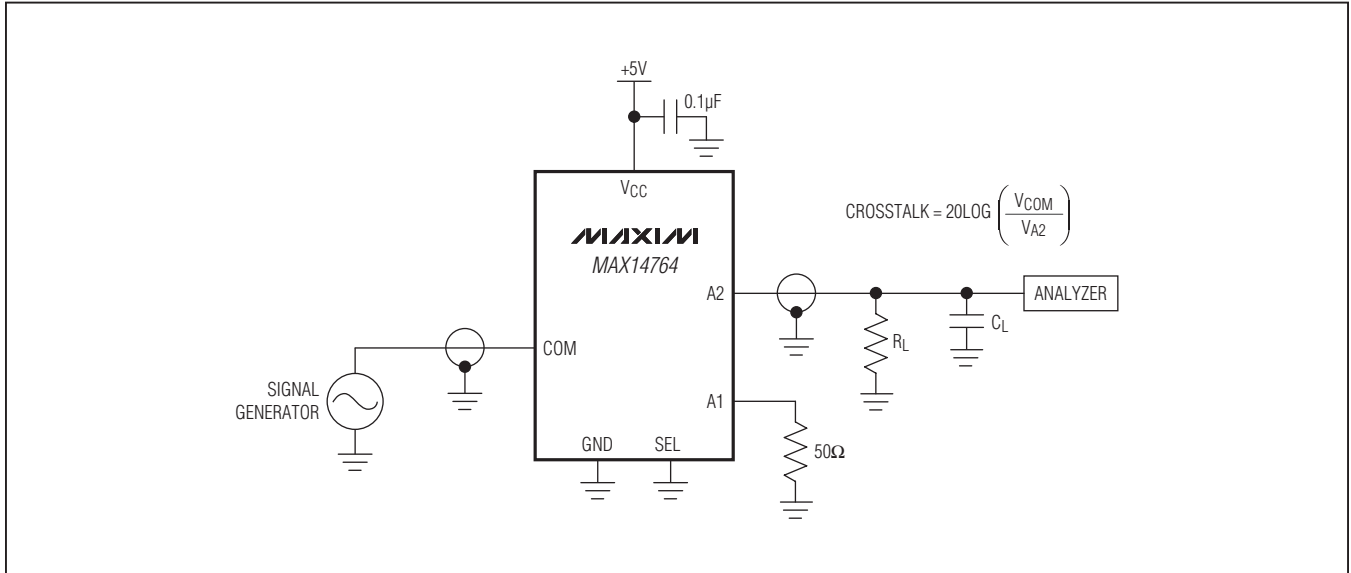


图5. 串扰

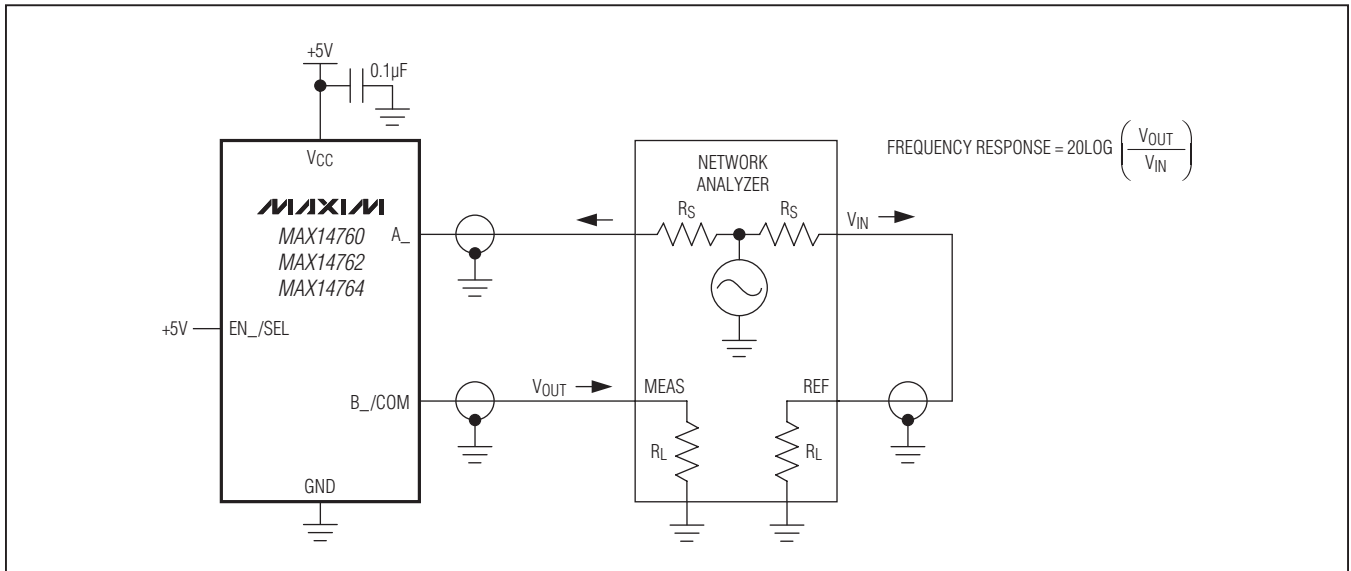


图6. 插入损耗

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测试电路/时序图(续)

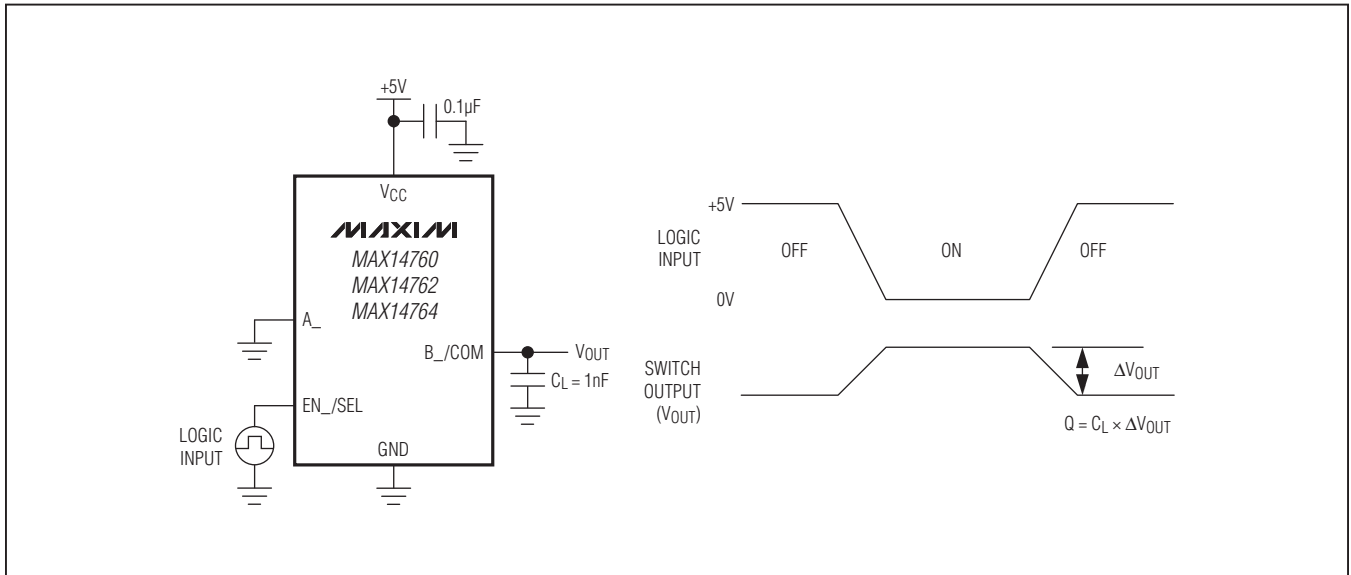
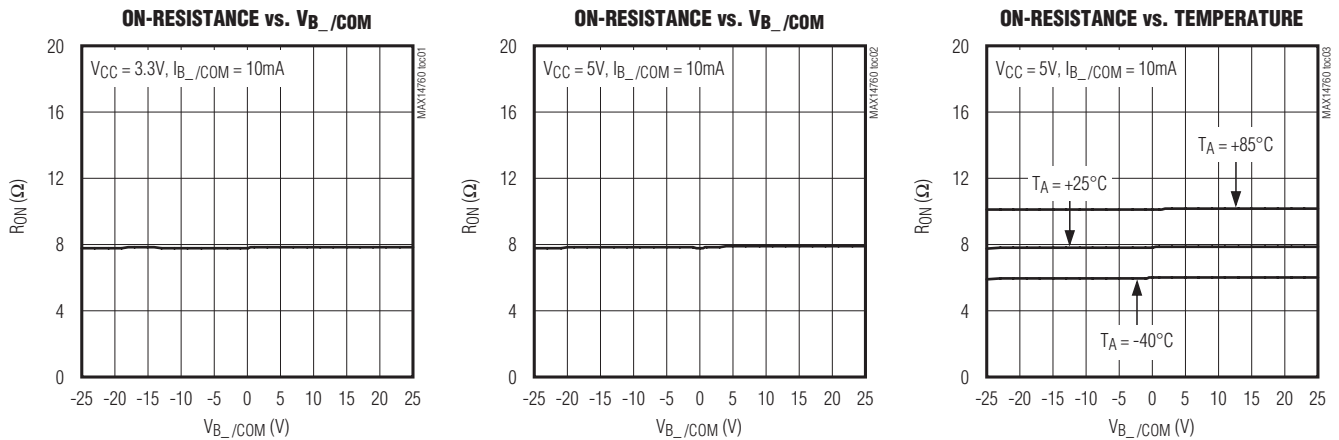


图7. 电荷注入

典型工作特性

($T_A = +25^\circ\text{C}$, unless otherwise noted.)

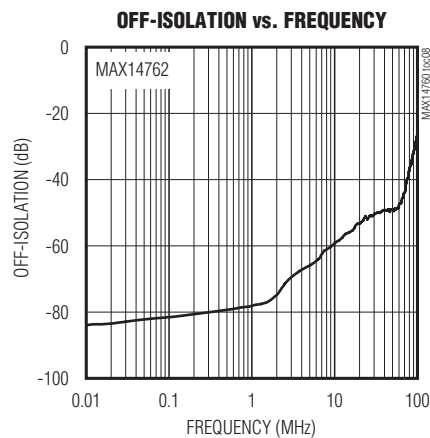
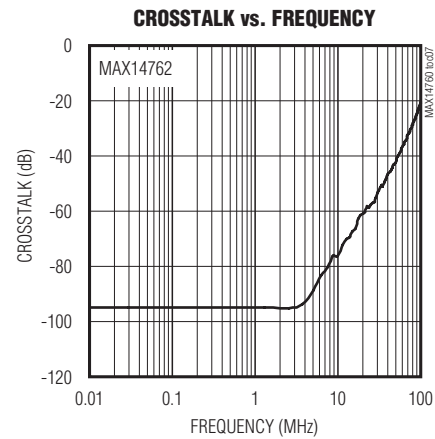
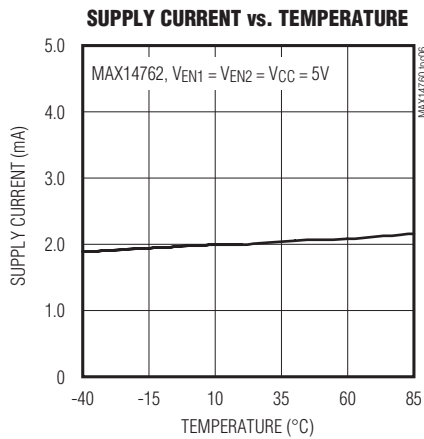
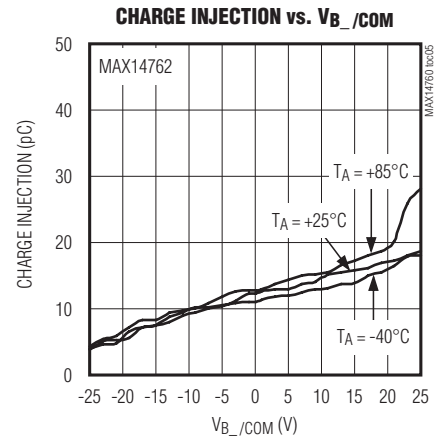
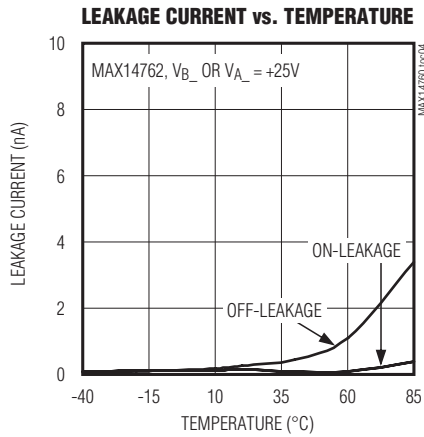


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典型工作特性(续)

($T_A = +25^\circ\text{C}$, unless otherwise noted.)

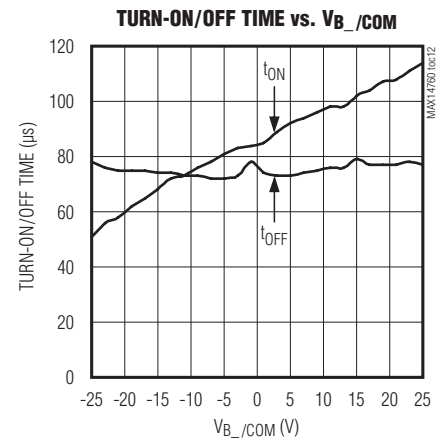
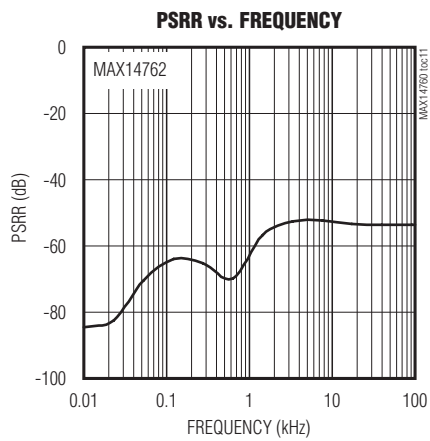
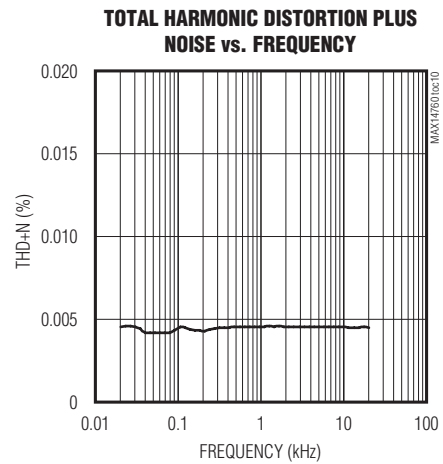
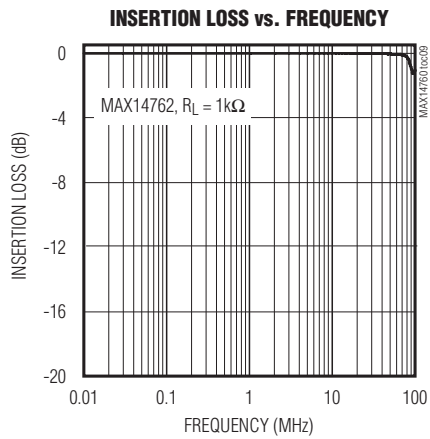


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典型工作特性(续)

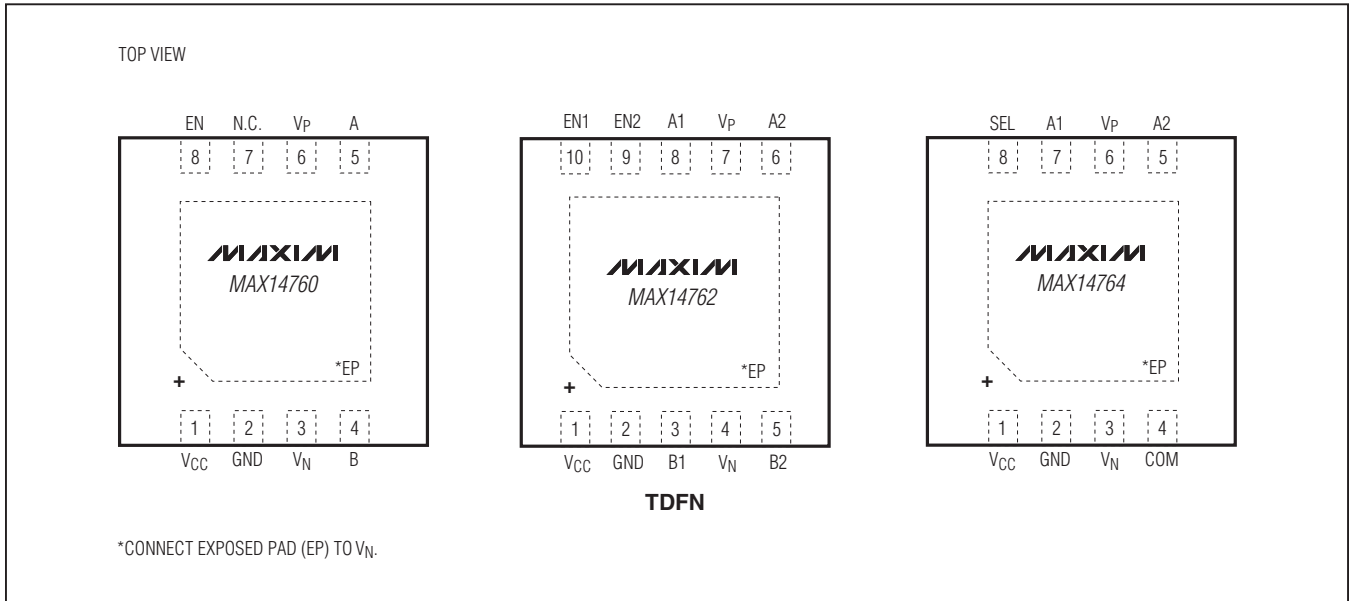
($T_A = +25^\circ\text{C}$, unless otherwise noted.)



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引脚配置



引脚说明

引脚			名称	功能
MAX14760	MAX14762	MAX14764		
1	1	1	V_{CC}	正电源电压输入，利用0.1 μ F陶瓷电容将 V_{CC} 旁路至GND，电容须尽量靠近器件放置。
2	2	2	GND	地。
3	4	3	V_N	负电压输出，利用1 μ F陶瓷电容将 V_N 旁路至GND，电容须尽量靠近器件放置。
4	—	—	B	模拟开关公共端。
—	—	4	COM	模拟开关公共端。
5	—	—	A	模拟开关常开端。
6	7	6	V_P	正电压输出，利用1 μ F陶瓷电容将 V_P 旁路至GND，电容须尽量靠近器件放置。
7	—	—	N.C.	无连接，保持浮空。
8	—	—	EN	开关控制输入，将EN驱动为高电平闭合开关，或将EN驱动为低电平断开开关。
—	8	7	A1	模拟开关1常闭端。

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引脚说明(续)

引脚			名称	功能
MAX14760	MAX14762	MAX14764		
—	3	—	B1	模拟开关1公共端。
—	6	5	A2	模拟开关2常开端。
—	5	—	B2	模拟开关2公共端。
—	10	—	EN1	开关1控制输入，将EN1驱动为高电平断开开关1，或将EN1驱动为低电平闭合开关1。
—	9	—	EN2	开关2控制输入，将EN2驱动为高电平闭合开关2，或将EN2驱动为低电平断开开关2。
—	—	8	SEL	开关控制输入，将SEL驱动为低电平时，COM端连接至A1；将SEL驱动为高电平时，COM端连接至A2。
—	—	—	EP	裸焊盘。内部连接至V _N ，不要将其作为电气连接，裸焊盘应保持浮空。

详细说明

MAX14760/MAX14762/MAX14764模拟开关能够处理超摆幅信号。器件采用+3.0V至+5.5V单电源供电，可处理-25V至+25V范围的信号。

模拟信号范围

器件能够切换-25V至+25V范围的超摆幅信号，在-25V至+25V整个输入电压范围内，器件导通电阻保持较高的平坦度(58mΩ)。模拟开关允许通过双向电流，所以A、A1、A2、B、B1、B2和COM既可作为输入，也可作为输出。

旁路电容

V_P和V_N引脚需要接外部电容，以稳定偏置。建议采用1μF陶瓷电容，确保可靠工作。不要将V_P和V_N用作其它电路的供电电源。

应用信息

上电条件

V_{CC}上电1秒内确保A₋、B₋或COM输入端没有负信号。

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订购信息/选型指南

PART	TEMP RANGE	PIN-PACKAGE	FUNCTION	R _{ON} (MAX) (Ω)
MAX14760ETA+	-40°C to +85°C	8 TDFN-EP*	1 x SPST	20
MAX14762ETB+	-40°C to +85°C	10 TDFN-EP*	2 x SPST	20
MAX14764ETA+	-40°C to +85°C	8 TDFN-EP*	1 x SPDT	20

+表示无铅(Pb)符合RoHS标准的封装。

*EP = 裸焊盘。

芯片信息

PROCESS: BiCMOS

封装信息

如需最近的封装外形信息和焊盘布局(占位面积), 请查询china.maxim-ic.com/packages。请注意, 封装编码中的“+”、“#”或“-”仅表示RoHS状态。封装图中可能包含不同的尾缀字符, 但封装图只与封装有关, 与RoHS状态无关。

封装类型	封装编码	外形编号	焊盘布局编号
8 TDFN	T833+2	21-0137	90-0059
10 TDFN	T1033+1	21-0137	90-0003

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修订历史

修订号	修订日期	说明	修改页
0	9/11	最初版本。	—

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