19-4255; Rev 3; 7/10

MAXIM

8通道/双4通道72V模拟复用器

概述

MAX14752/MAX14753为8选1和双路4选1高压模拟多路复用器。这两款器件具有60Ω (典型值)低导通电阻和0.03Ω (典型值)的导通电阻平坦度。这些低导通电阻多路复用器可双向工作。EN输入可灵活定义用于通道选择的逻辑电平。

MAX14752为8选1多路复用器，MAX14753为双路4选1多路复用器。这两款器件均可采用±10V至±36V双电源或+20V至+72V单电源供电。

MAX14752/MAX14753采用16引脚TSSOP封装，引脚与工业标准的DG408/DG409兼容。MAX14752/MAX14753工作在-40°C至+85°C扩展级温度范围。

特性

- ±36V (最大值)较宽的双电源供电范围
- +72V (最大值)较宽的单电源供电范围
- 低导通电阻60Ω (典型值)
- 共模电压范围内R_{ON}平坦度保持在0.03Ω (典型值)
- 导通状态下，具有低输入漏电流(20nA，最大值)
- EN电压决定S0、S1和S2的逻辑电平
- 禁止模式下具有较低的25µA (最大值) I_{DD}电源电流
- 钳位保护二极管实现过压保护/欠压保护
- 先断后合操作
- 引脚与工业标准的DG408/DG409兼容

应用

可编程逻辑控制器

环境控制系统

ATE系统

医学监测系统

汽车

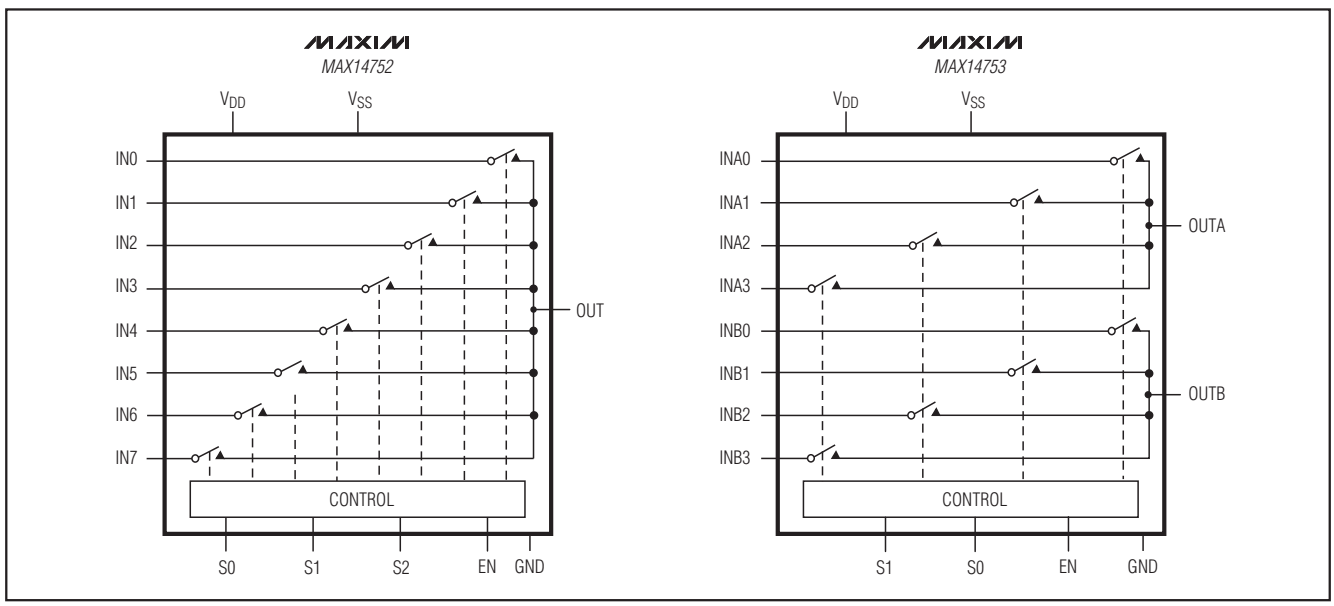
引脚配置在数据资料的最后给出。

定购信息

PART	TEMP RANGE	PIN-PACKAGE
MAX14752EUE+	-40°C to +85°C	16 TSSOP
MAX14753EUE+	-40°C to +85°C	16 TSSOP

+表示无铅(Pb)/符合RoHS标准的封装。

功能框图



ABSOLUTE MAXIMUM RATINGS

V_{DD} to V_{SS} .....-0.3V to +72V
GND to V_{SS} .....-0.3V to V_{DD}
EN, S0, S1, S2 to GND .....
.....-0.3V to the lesser of (+12V and V_{DD} + 0.3V)
IN_, INA_, INB_, OUT, OUTA, OUTB to V_{SS} .....
.....-2V to (V_{DD} - V_{SS} + 2V) or 100mA (whichever occurs first)
Continuous Current into IN_, INA_,
INB_, OUT, OUTA, OUTB 100mA
Continuous Power Dissipation (T_A = +70°C)
16-Pin TSSOP (derate 11.1mW/°C above +70°C) 890mW
Junction-to-Ambient Thermal Resistance (θ_{JA}) (Note 1)
16-Pin TSSOP .....90°C/W
Junction-to-Case Thermal Resistance (θ_{JC}) (Note 1)
16-Pin TSSOP .....27°C/W
Maximum Operating Temperature Range.....-40°C to +125°C
Junction Temperature..... +150°C
Storage Temperature Range .....-65°C to +150°C
Lead Temperature (soldering, 10s) .....+300°C
Soldering Temperature (reflow) .....+260°C

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**.

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.

DC ELECTRICAL CHARACTERISTICS–DUAL SUPPLIES

(V_{DD} = +35V, V_{SS} = -35V, V_{GND} = 0V, V_{EN} = +3.3V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
POWER SUPPLY						
V_{DD} Supply Voltage Range	V_{DD}		+10		+36	V
V_{SS} Supply Voltage Range	V_{SS}		-10		-36	V
V_{DD} Supply Current	$I_{DD(OFF)}$	V_{EN} = $V_{S\_}$ = 0V, $V_{IN\_}$ = $V_{INA\_}$ = $V_{INB\_}$ = +20V		12	25	µA
	$I_{DD(ON)}$	V_{EN} = +5V, $V_{S\_}$ = 0V or V_{EN}, $V_{IN\_}$ = $V_{INA\_}$ = $V_{INB\_}$ = +20V		270	600	
V_{SS} Supply Current	$I_{SS(OFF)}$	V_{EN} = $V_{S\_}$ = 0V, $V_{IN\_}$ = $V_{INA\_}$ = $V_{INB\_}$ = +20V		11	25	µA
	$I_{SS(ON)}$	V_{EN} = +5V, $V_{S\_}$ = 0V or V_{EN}, $V_{IN\_}$ = $V_{INA\_}$ = $V_{INB\_}$ = +20V		260	600	
ANALOG MUX						
Analog Signal Range	$V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$, V_{OUT}, V_{OUTA}, V_{OUTB}		V_{SS}		V_{DD}	V
Current Through Multiplexer	$I_{IN\_}$, $I_{INA\_}$, $I_{INB\_}$	$V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = ±20V	-5		+5	mA
On-Resistance	R_{ON}	$I_{IN\_}$, $I_{INA\_}$, $I_{INB\_}$ = 5mA; $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$, V_{OUT}, V_{OUTA}, V_{OUTB} = ±20V, Figure 1		60	130	Ω
On-Resistance Matching Between Channels	ΔR_{ON}	$I_{IN\_}$, $I_{INA\_}$, $I_{INB\_}$ = 5mA, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = ±20V, 0V		0.5		Ω
On-Resistance Flatness	$R_{FLAT\_(ON)}$	$I_{IN\_}$, $I_{INA\_}$, $I_{INB\_}$ = 5mA, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$, V_{OUT}, V_{OUTA}, V_{OUTB} = ±20V		0.03		Ω
Output On-Leakage Current	$I_{OUT(ON)}$	MAX14752: V_{OUT}, V_{OUTA}, V_{OUTB} = ±20V, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = unconnected, Figure 2	-20		+20	nA
		MAX14753: V_{OUT}, V_{OUTA}, V_{OUTB} = ±20V, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = unconnected, Figure 2	-10		+10	

DC ELECTRICAL CHARACTERISTICS–DUAL SUPPLIES (continued)

(V_{DD} = +35V, V_{SS} = -35V, V_{GND} = 0V, V_{EN} = +3.3V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Off-Leakage Current	$I_{OUT(OFF)}$	MAX14752: V_{OUT}, V_{OUTA}, V_{OUTB} = ±20V, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = -20V, Figure 3	-20		+20	nA
		MAX14753: V_{OUT}, V_{OUTA}, V_{OUTB} = ±40V, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = -40V, Figure 3	-10		+10	
Input Off-Leakage Current	$I_{IN(OFF)}$	V_{OUT}, V_{OUTA}, V_{OUTB} = ±20V, $V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = ±20V, Figure 3	-5		+5	nA
LOGIC (EN, S0, S1, S2)						
EN Input Voltage Low	V_{EN_IL}				0.8	V
EN Input Voltage High	V_{EN_IH}		2.1			V
EN, S_ Input Voltage Range	V_{EN}, $V_{S\_}$				11	V
EN Input Current	$I_{EN\_IH(DC)}$	V_{EN} = +11V, V_{S0} = V_{S1} = V_{S2} = (0.25 x V_{EN}) or (0.75 x V_{EN})			0.4	mA
S0, S1, S2 Input Voltage Low	V_{IL}				0.25 x V_{EN}	V
S0, S1, S2 Input Voltage High	V_{IH}		0.75 x V_{EN}			V
DYNAMIC CHARACTERISTICS						
Enable Turn-On Time	t_{ON}	V_{IN0}, V_{INA0} = ±10V, R_L = 10kΩ, Figure 4		1	25	µs
Enable Turn-Off Time	t_{OFF}	V_{IN0}, V_{INA0} = ±10V, R_L = 10kΩ, Figure 4		0.8	2	µs
Transition Time	t_{TRANS}	V_{IN0}, V_{INA0} = ±10V, R_L = 10kΩ, Figure 5		10		µs
Break-Before-Make Time Delay	t_{BBM}	$V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = ±10V, R_L = 10kΩ, Figure 6		10		µs
Frequency Response	BW	R_S = 50Ω, R_L = 1kΩ, Figure 7			20	MHz
Off-Isolation	V_{ISO}	$V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = $1V_{RMS}$, f = 100kHz, R_L = 50Ω, C_L = 15pF, Figure 8		65		dB
Crosstalk	V_{CT}	R_S = R_L = 50Ω, Figure 9		62		dB
Total Harmonic Distortion Plus Noise	THD+N	R_S = R_L = 1kΩ, f = 20Hz to 20kHz		0.0014		%
Charge Injection	Q	$V_{IN\_}$, $V_{INA\_}$, $V_{INB\_}$ = GND, C_L = 1nF, Figure 10		200		pC

DC ELECTRICAL CHARACTERISTICS–SINGLE SUPPLY

(V_{DD} = +70V, V_{SS} = V_{GND} = 0V, V_{EN} = +3.3V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
On-Resistance	R_{ON}	$I_{IN\_}$ = 5mA, $V_{IN\_}$, V_{OUT} = +20V (MAX14752), $V_{INA\_}$, V_{OUTA}, $V_{INB\_}$, V_{OUTB} = +20V (MAX14753), Figure 1			60	130	
OUT, OUTA, OUTB Off-Leakage Current	$I_{OUT(OFF)}$, $I_{OUTA(OFF)}$, $I_{OUTB(OFF)}$	MAX14752: V_{OUT} = +40V, $V_{IN\_}$ = $V_{INA\_}$ = $V_{INB\_}$ = +10V, Figure 3		20		+20	nA
		MAX14753: V_{OUT} = +40V, $V_{IN\_}$ = $V_{INA\_}$ = $V_{INB\_}$ = +10V, Figure 3		-10		+10	
On-Input Capacitance	C_{IN_ON}	MAX14752, V_{DD} = +50V, OUT unconnected	$V_{IN\_}$ = 4V		43		pF
			$V_{IN\_}$ = 25V		26		
		MAX14753, V_{DD} = +50V, OUTA, OUTB unconnected	$V_{INA\_}$, $V_{INB\_}$ = 4V		26		
			$V_{INA\_}$, $V_{INB\_}$ = 25V		16		
Off-Input Capacitance	C_{IN_OFF}	MAX14752, V_{DD} = +50V	$V_{IN\_}$ = 4V		6		pF
			$V_{IN\_}$ = 25V		3.7		
		MAX14753, V_{DD} = +50V	$V_{INA\_}$, $V_{INB\_}$ = 4V		6		
			$V_{INA\_}$, $V_{INB\_}$ = 25V		3.7		
Off-Output Capacitance	C_{OUT_OFF}	MAX14752, V_{DD} = +50V	$V_{OUT\_}$ = 4V		35		pF
			$V_{OUT\_}$ = 25V		20		
		MAX14753, V_{DD} = +50V	$V_{OUTA\_}$, $V_{OUTB\_}$ = 4V		19		
			$V_{OUTA\_}$, $V_{OUTB\_}$ = 25V		11		

Note 2: All parameters in single-supply operation are expected to be the same as in dual-supplies operation.
Note 3: IN-OUT capacitances are negligible (< 1pF).

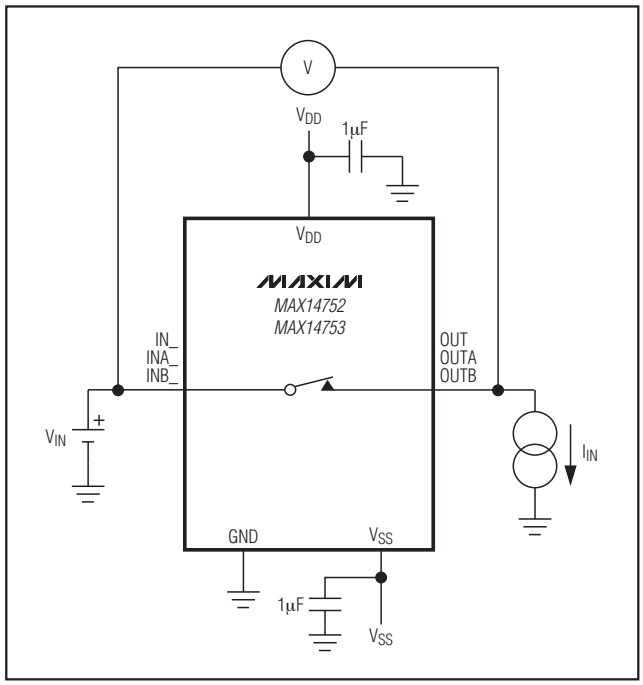


图1. 导通电阻

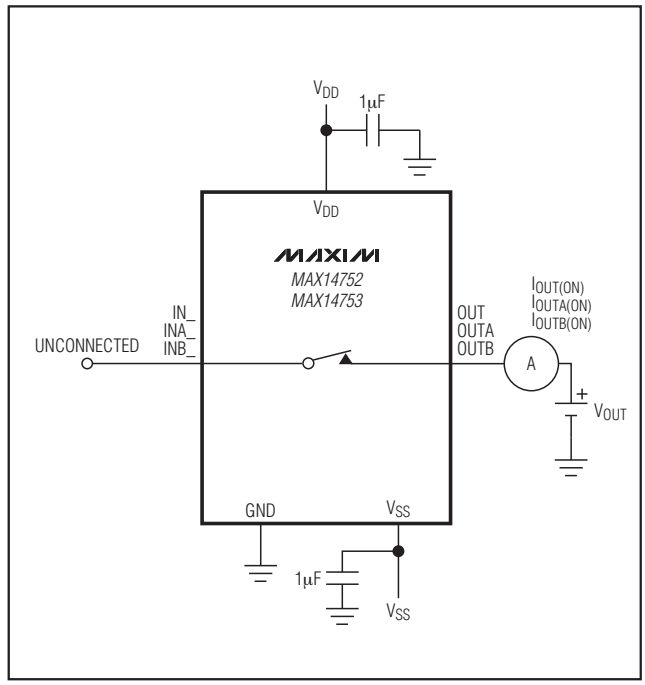


图2. 导通漏电流

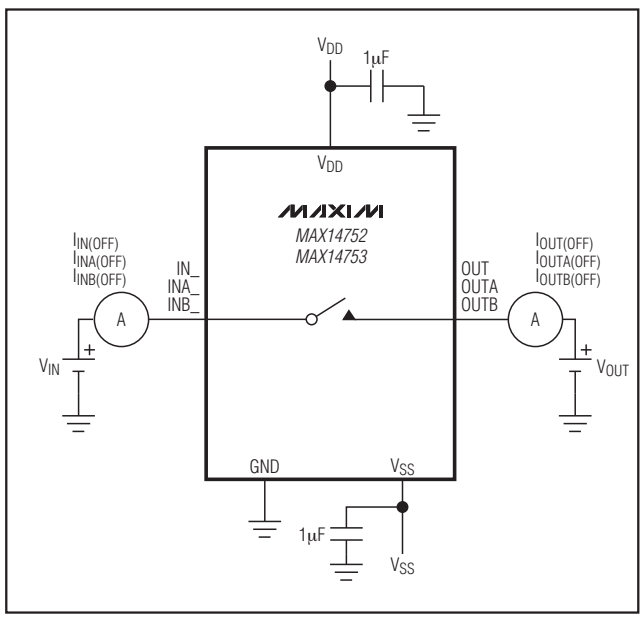


图3. 关断漏电流

测试电路/时序图/真值表(续)

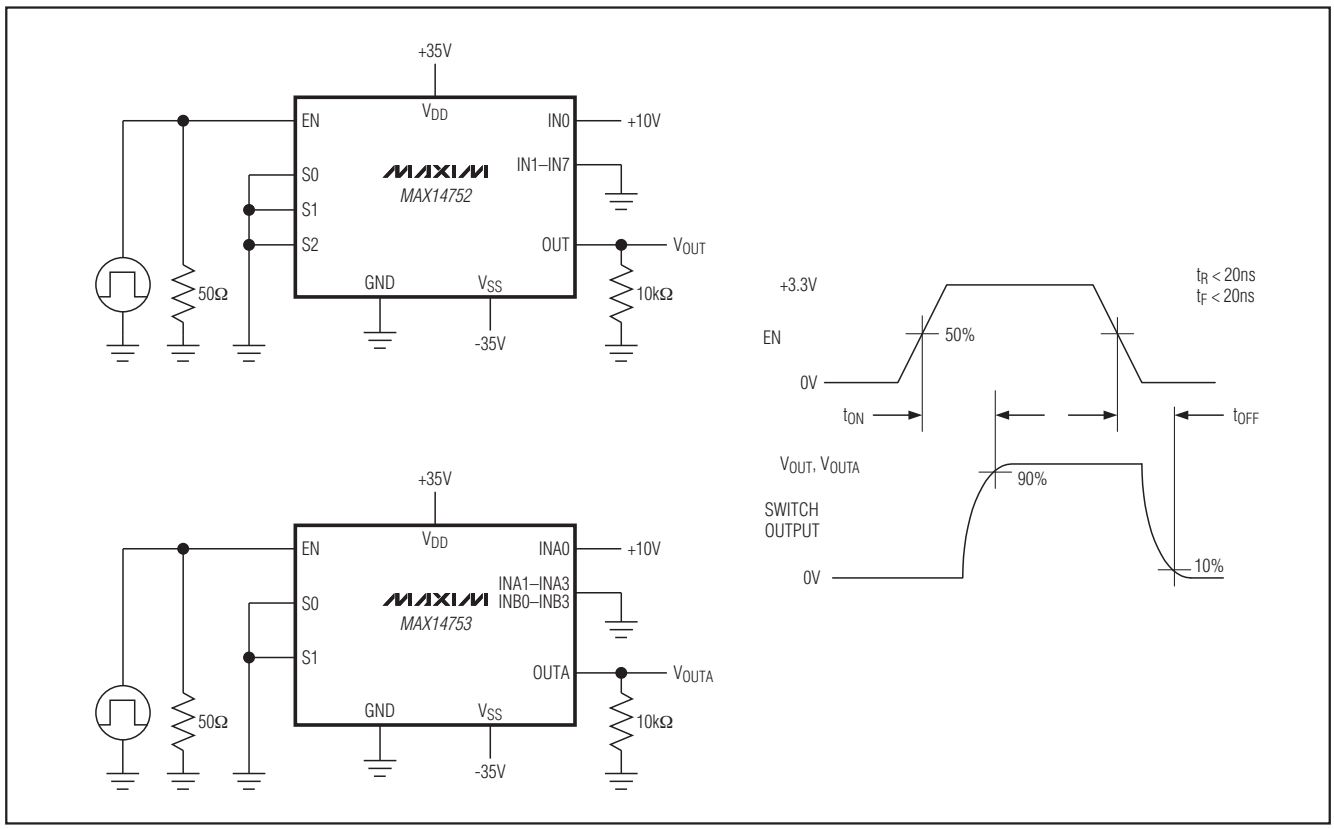


图4. 使能开关时间

测试电路/时序图/真值表(续)

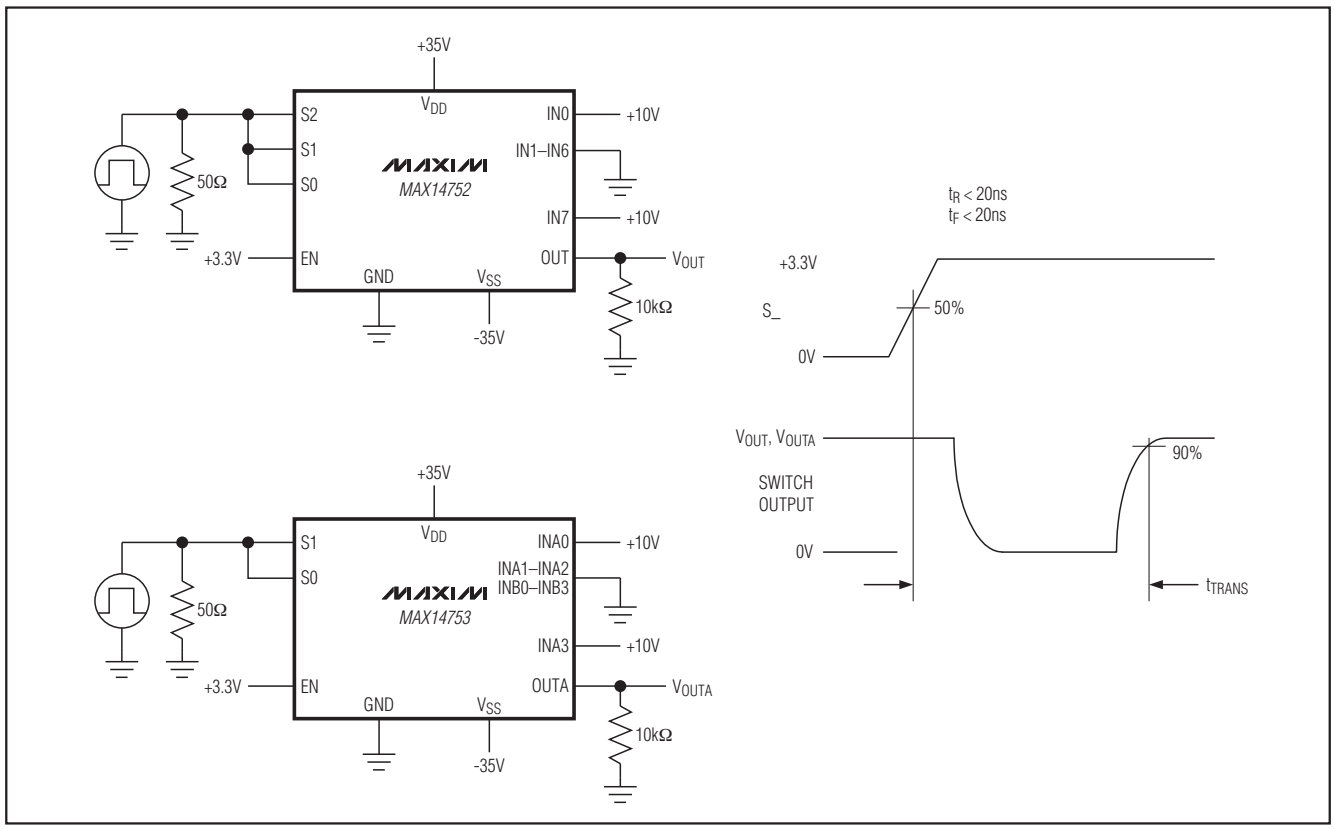


图5. 转换时间

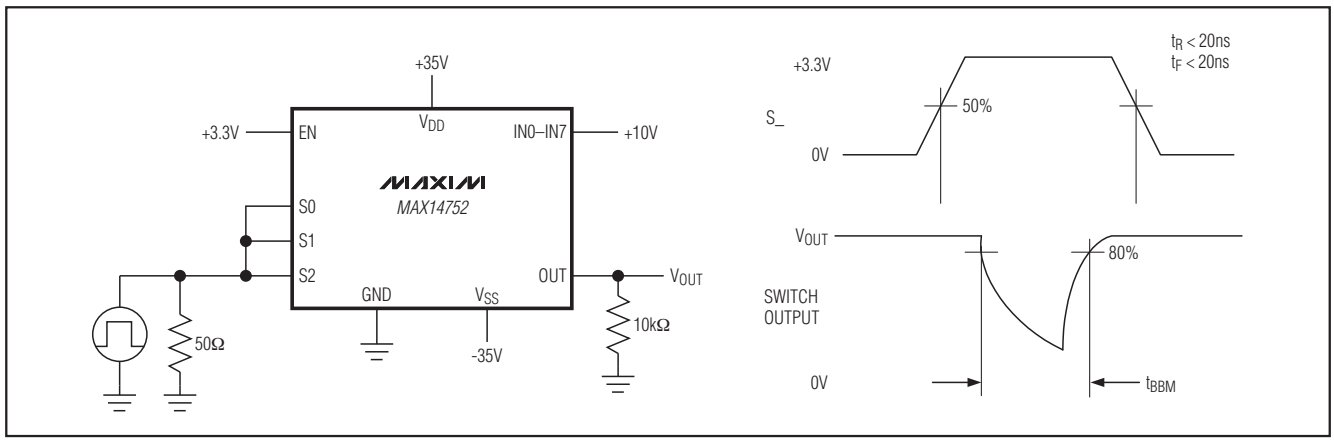


图6. 先断后合的间隔

测试电路/时序图/真值表(续)

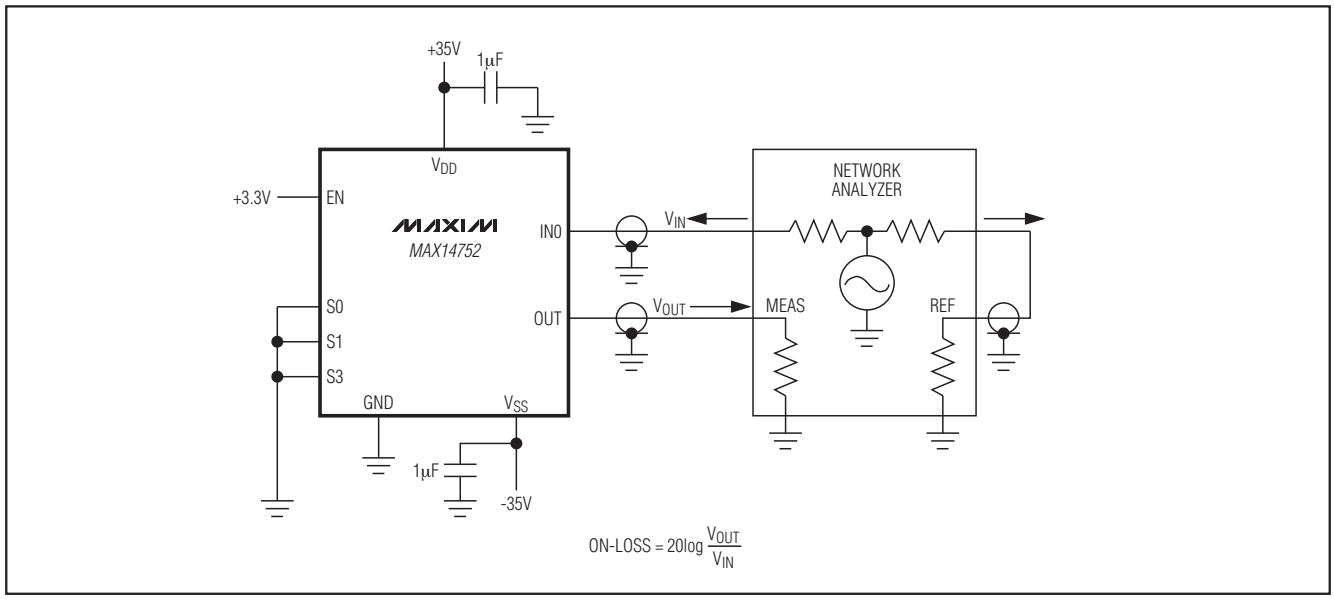


图7. 频率响应

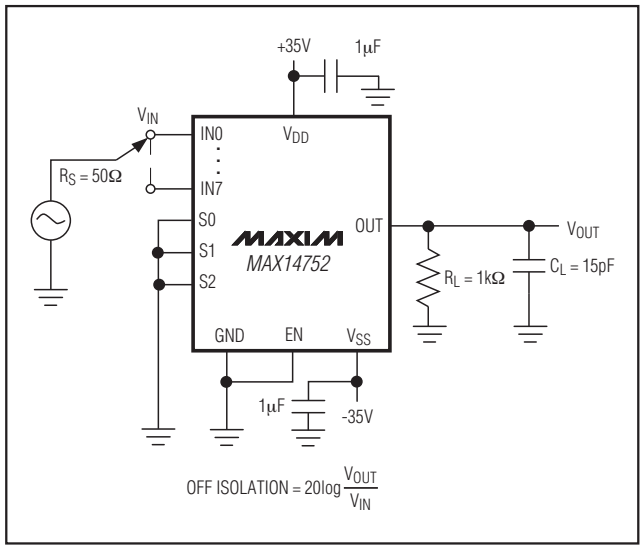


图8. 关断隔离

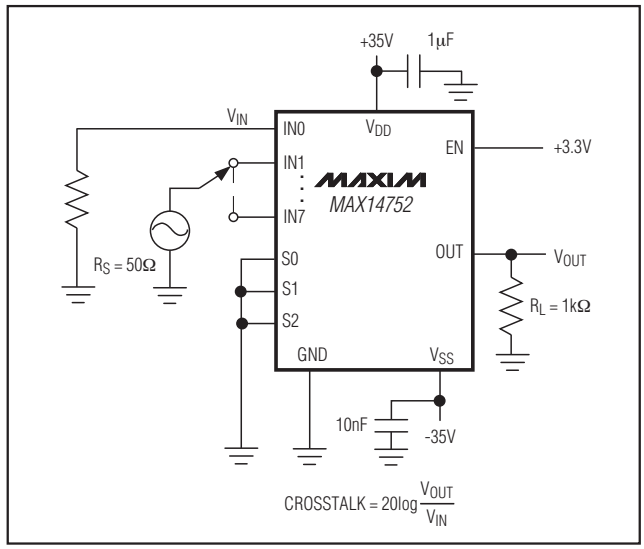


图9. 串扰

测试电路/时序图/真值表(续)

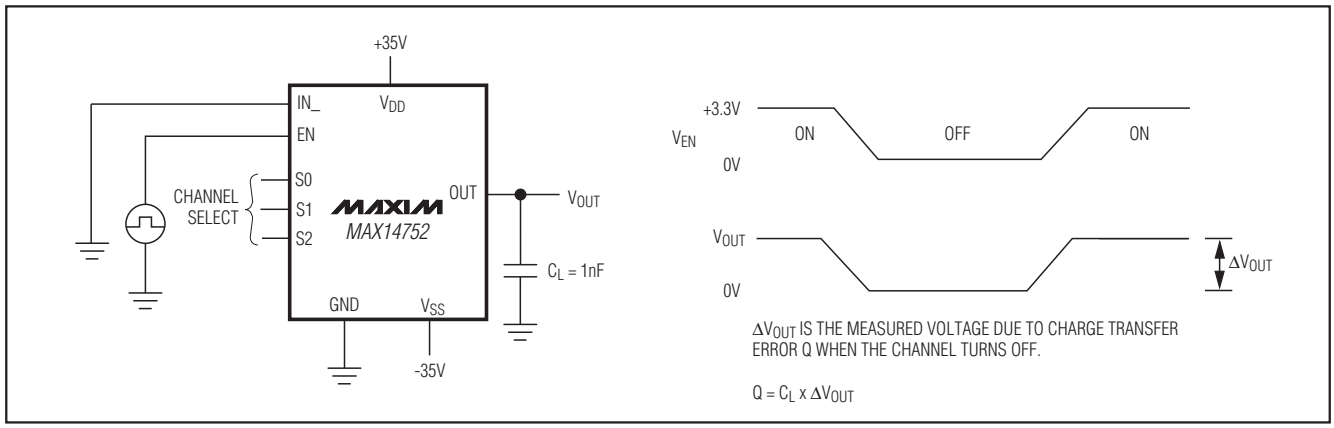


图10. 电荷注入

表1. MAX14752真值表

S2	S1	S0	EN	OUT
X	X	X	0	All off
0	0	0	1	IN0
0	0	1	1	IN1
0	1	0	1	IN2
0	1	1	1	IN3
1	0	0	1	IN4
1	0	1	1	IN5
1	1	0	1	IN6
1	1	1	1	IN7

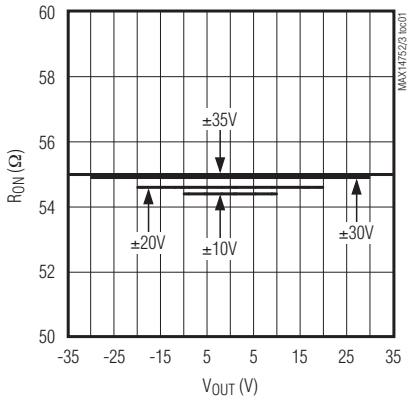
表2. MAX14753真值表

S1	S0	EN	OUTA	OUTB
X	X	0	All off	All off
0	0	1	INA0	INB0
0	1	1	INA1	INB1
1	0	1	INA2	INB2
1	1	1	INA3	INB3

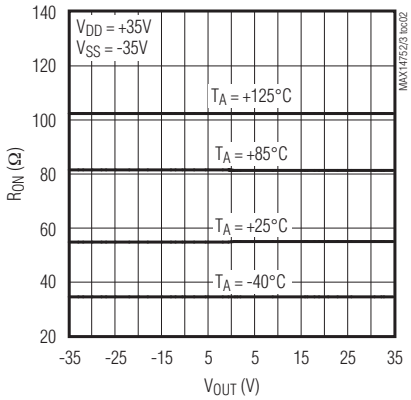
典型工作特性

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

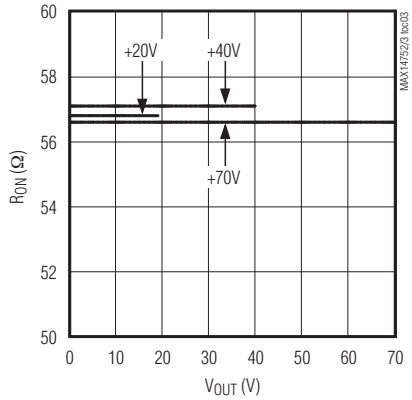
ON-RESISTANCE vs. V_{OUT} (DUAL SUPPLIES)



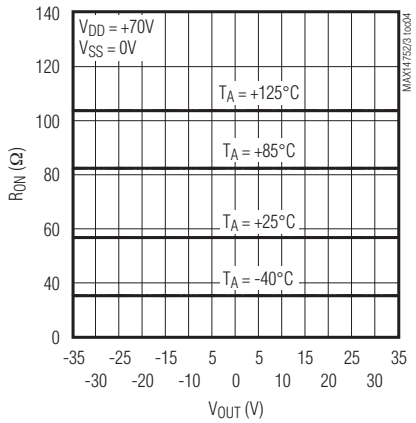
ON-RESISTANCE vs. V_{OUT} AND TEMPERATURE (DUAL SUPPLIES)



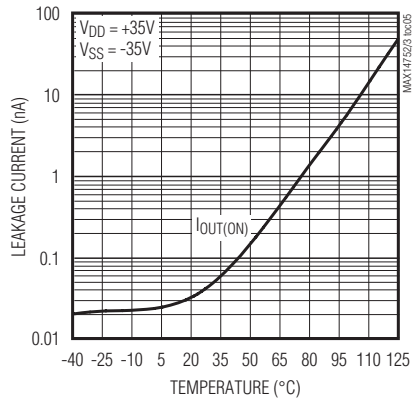
ON-RESISTANCE vs. V_{OUT} (SINGLE SUPPLY)



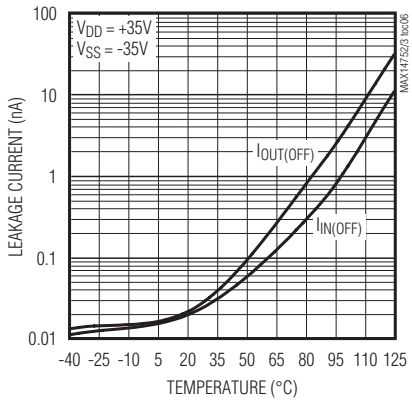
ON-RESISTANCE vs. V_{OUT} AND TEMPERATURE (SINGLE SUPPLY)



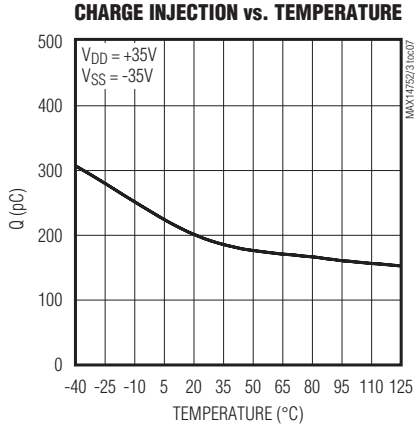
ON-LEAKAGE vs. TEMPERATURE



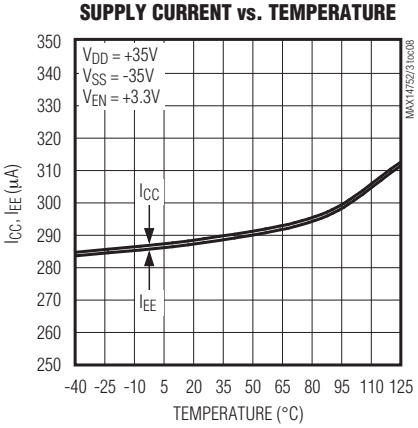
OFF-LEAKAGE vs. TEMPERATURE



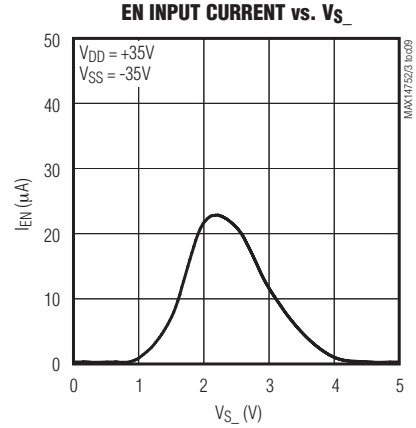
CHARGE INJECTION vs. TEMPERATURE



SUPPLY CURRENT vs. TEMPERATURE



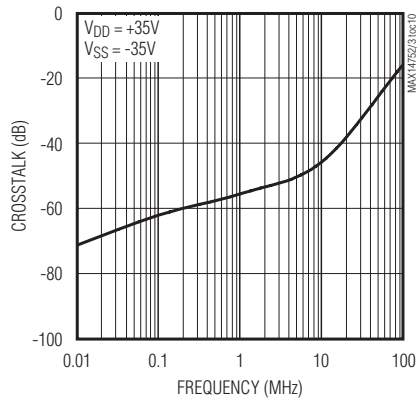
EN INPUT CURRENT vs. $V_{S\_}$



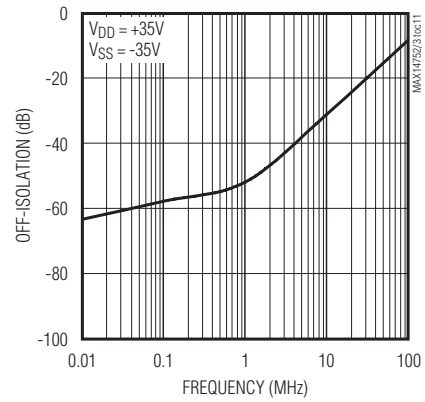
典型工作特性(续)

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

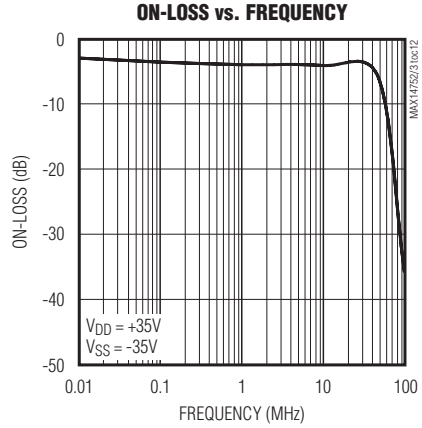
CROSSTALK vs. FREQUENCY



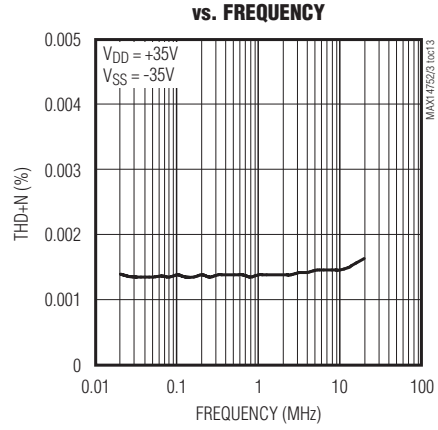
OFF-ISOLATION vs. FREQUENCY



ON-LOSS vs. FREQUENCY



TOTAL HARMONIC DISTORTION PLUS NOISE vs. FREQUENCY



MAX14752引脚说明(单路8选1复用器)

引脚	名称	功能
1	S0	复用器输入选择。
2	EN	复用器使能，驱动EN至高电平，使能器件。EN的高电平电压决定S0、S1和S2的输入逻辑电压。
3	V_{SS}	负电源电压，采用一只1µF陶瓷电容将V_{SS}旁路至GND。
4	IN0	双向模拟输入。
5	IN1	双向模拟输入。
6	IN2	双向模拟输入。
7	IN3	双向模拟输入。
8	OUT	双向模拟输出。
9	IN7	双向模拟输入。
10	IN6	双向模拟输入。
11	IN5	双向模拟输入。
12	IN4	双向模拟输入。
13	V_{DD}	正电源电压，采用一只1µF陶瓷电容将V_{DD}旁路至GND。
14	GND	地，单电源工作时将GND连接至V_{SS}。双电源工作时，采用一只1µF陶瓷电容将GND旁路至V_{SS}。
15	S2	复用器输入选择。
16	S1	复用器输入选择。

MAX14753引脚说明(双路4选1复用器)

引脚	名称	功能
1	S0	复用器输入选择。
2	EN	复用器使能，驱动EN至高电平，使能器件。EN的高电平电压决定S0和S1的输入逻辑电压。
3	V_{SS}	负电源电压，采用一只1µF陶瓷电容将V_{SS}旁路至GND。
4	INA0	双向模拟输入。
5	INA1	双向模拟输入。
6	INA2	双向模拟输入。
7	INA3	双向模拟输入。
8	OUTA	双向模拟输出。
9	OUTB	双向模拟输出。
10	INB3	双向模拟输入。
11	INB2	双向模拟输入。
12	INB1	双向模拟输入。
13	INB0	双向模拟输入。
14	V_{DD}	正电源电压，采用一只1µF陶瓷电容将V_{DD}旁路至GND。
15	GND	地，单电源工作时将GND连接至V_{SS}。双电源工作时，采用一只1µF陶瓷电容将GND旁路至V_{SS}。
16	S1	复用器输入选择。

详细说明

MAX14752/MAX14753为8选1和双路4选1高压模拟多路复用器。这两款器件具有60Ω (典型值)低导通电阻和0.03Ω (典型值)的导通电阻平坦度，这些低导通电阻多路复用器可双向工作。

MAX14752为8选1多路复用器，MAX14753为双路4选1多路复用器。这两款器件均可采用±10V至±36V双电源或+20V至+72V单电源供电。两款器件也可以工作在非平衡供电条件下，如+36V和-10V。这些复用器支持满摆幅输入和输出信号，控制逻辑电平通过EN输入定义。这些器件对供电顺序没有要求。

应用信息

流过复用器的电流

流过MAX14752/MAX14753多路复用器每个通道的电流必须限制在±5mA，以保证正常工作。如果超出该限制，相应通道的内部漏电流会流入V_{SS}；如果没有超出最大耗散功率，较大的输入电流不会造成器件损坏。

输入电压钳位

对于输入电压超出正常工作电压限制的应用，V_{DD}和V_{SS}的内部输入二极管可以限制输入电压。如图11所示，输入端的串联电阻在欠压或过压情况下可以限制流入二极管的电流。按照输入电流限制在$I_{IN_}$(max) = 100mA的情况选择限流电阻。可根据下式计算限流电阻，取R_{LIM+}和R_{LIM-}中的较大值。

$$R_{LIM+} = \frac{V_{IN\_}(max) - V_{DD}}{I_{IN\_}(max)}$$

$$R_{LIM-} = \frac{V_{SS} - V_{IN\_}(min)}{I_{IN\_}(max)}$$

在欠压或过压情况下，输入电阻等于R_{LIM}。需要计算由于故障电流造成的额外功耗。当一个没有切换的通道处于过压或欠压钳位时，MAX14752/MAX14753复用器的导通通道可正常工作。

超出电源摆幅的输入

如果输入电压可能超出电源电压，但仍处于MAX14752/MAX14753的极限电源电压范围内，可在电源上串联两个二极管，如图12所示。

出现欠压和过压状况期间，内部二极管将V_{DD}/V_{SS}电源拉高/低。这种架构的优点是输入阻抗高，在过压或欠压情况下电流不会流过MAX14752/MAX14753。输入电压必须限制在*Absolute Maximum Ratings*部分规定的电压范围内。

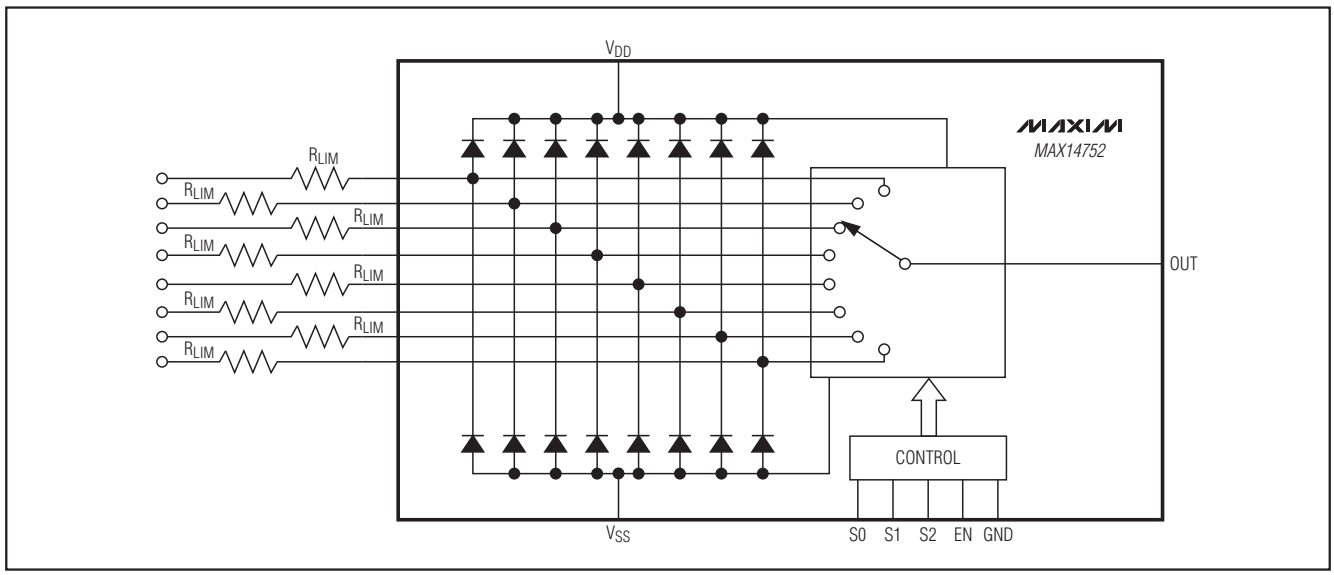


图11. 输入过压和输入欠压钳位

8通道/双4通道72V模拟复用器

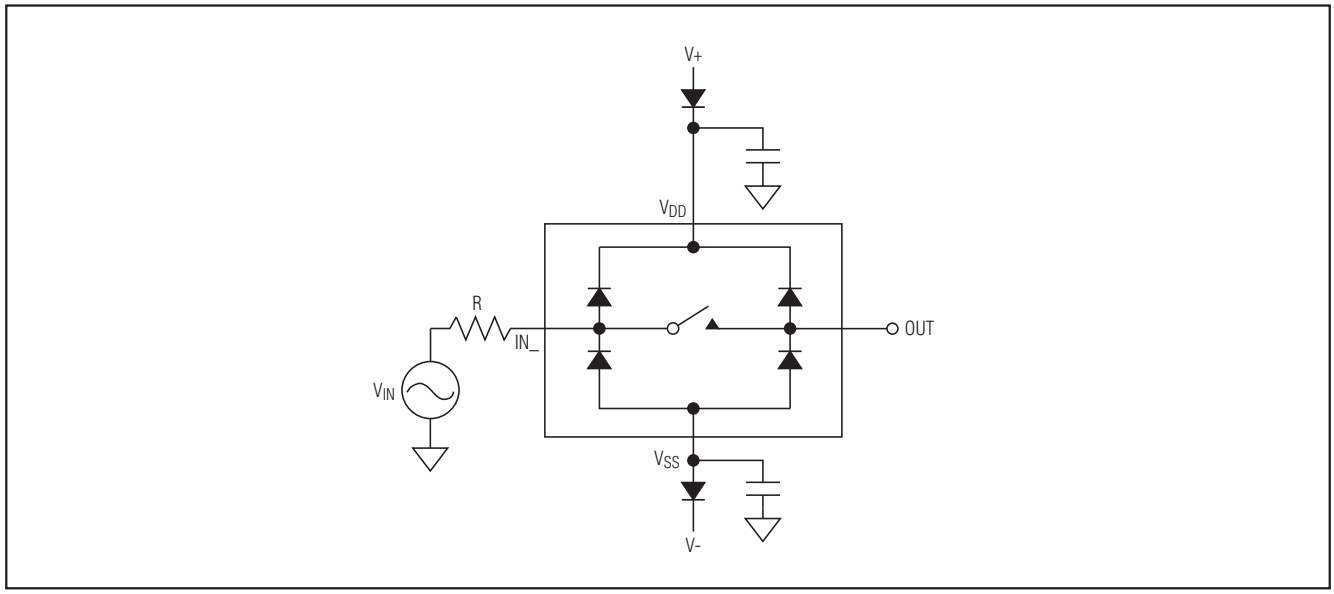
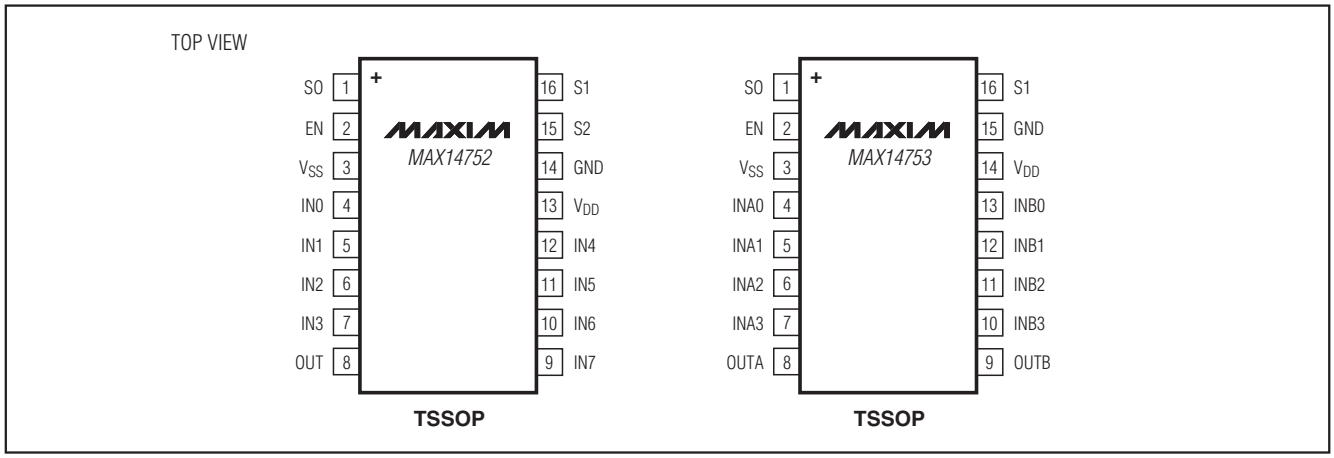


图12. 超电源摆幅应用

引脚配置



芯片信息

PROCESS: CMOS

封装信息

如需最近的封装外形信息和焊盘布局，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
16 TSSOP	U16+1	21-0066	90-0117

修订历史

修订号	修订日期	说明	修改页
0	8/08	最初版本。	—
1	10/08	在*DC Electrical Characteristics—Dual Supplies*表中，将V_{DD}和V_{SS}电源电流的单位由mA修改为μA。	2
2	2/09	在*Electrical Characteristics*表中增加了电容信息。	2, 4, 13, 14, 15, 16
3	7/10	从*DC Electrical Characteristics—Dual Supplies*表中删除了“输入电容”参数。	3

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