低电压单刀双掷（SPDT）模拟开关

UM3156 *SC70-6/SC88/SOT363*

描述

UM3156 是一款先进的 CMOS 模拟开关，采用硅栅 CMOS 技术制造。该器件在保持 CMOS 低功耗的同时，具备极低的传播延迟和导通电阻。这使其成为便携式和电池供电应用的理想选择。

UM3156 在打开时可在电源轨内同样良好地双向传输信号，而在关闭时则可阻断高达电源电平的信号，同时保证先断后连。

该器件的选择引脚具有过压保护功能，无论工作电压是多少，都允许该引脚上的电压高于 V_{CC}，最高可达 6.5V，而不会造成损坏或中断部件的运行。

UM3156 通过改变控制电路的输入缓冲器，只要将控制信号的输入保持在大于 V_{IH} 的最小值和小于 V_{IL} 的最大值，就能保持轨对轨信号的低功耗。因此，该部件可在混合电压轨环境中使用，特别是在手机应用中，可与基带处理器的通用 I/O 直接连接，不再需要将控制输入等同于 V_{CC}，以保持低功耗。

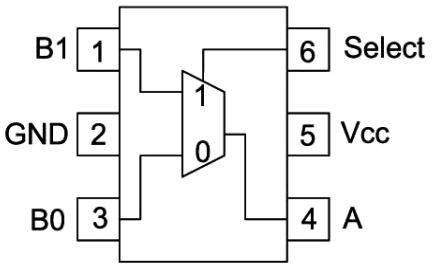
应用

- 采样和保持电路
- 电池供电设备
- 音频和视频信号路由
- 通信电路

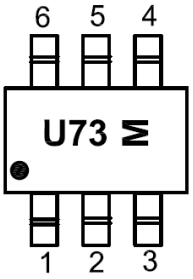
特性

- 控制引脚输入为 5V 耐压
- 低电荷注入
- 极佳的通道间导通电阻匹配
- 低总谐波失真
- 1.65V 至 5.5V 单电源运行
- ESD 性能：
  人体放电模型（HBM）>2kV
  机器放电模型（MM）>200V
- 采用 SC70-6/SC88/SOT363 封装
- 无铅封装

引脚配置



顶部视图



M: Month Code
UM3156
SC70-6/SC88/SOT363

Ordering Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM3156	SC70-6/SC88/SOT363	U73	3000pcs/7 Inch Tape & Reel

Function Table

Select Input	Function
L	B0 Connected to A
H	B1 Connected to A

Absolute Maximum Ratings

Symbol	Parameter	Limit	Unit
V_{CC}	Supply Voltage	-0.5 to +6.5	V
V_S	DC Switch Voltage (Note 1)	-0.5 to (V_{CC}+0.5)	
V_{IN}	DC IN Voltage (Note 1)	-0.5 to +6.5	
I_{IK}	DC Input Diode Current @ V_{IN}<0V	-50	mA
I_{OUT}	DC Output Current	128	
I_{CC}/I_{GND}	DC V_{CC} or Ground Current	+100	
T_J	Junction Temperature Under Bias	+150	℃
T_{STG}	Storage Temperature	-65 to +150	
T_L	Junction Lead Temperature (Soldering, 10 Seconds)	260	
θ_{JA}	Thermal Resistance	350	℃/W
P_D	Power Dissipation @ +85℃	180	mW

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

Recommended Ratings (Note 2)

Symbol	Parameter	Limit	Unit
V_{CC}	Supply Voltage Operating	1.65 to 5.5	V
V_{IN}	Switch Input Voltage	0 to V_{CC}	
V_{IN}	Select Input Voltage	0 to V_{CC}	
V_{OUT}	Output Voltage	0 to V_{CC}	
T_A	Operating Temperature	-55 to +125	℃
t_r, t_f	Input Rise and Fall Time Control Input V_{CC}=2.3V to 3.6V Control Input V_{CC}=4.5V to 5.5V	 0 to 10 0 to 5.0	ns/V

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

Electrical Characteristics

Symbol	Parameter	Test Conditions	V_{CC} (V)	Temp	Limits (-40℃ to 85℃)			Unit
					Min	Typ	Max	
DC Electrical Characteristics								
	Analog Signal Range		V_{CC}	Full	0		V_{CC}	V
I_{IN}	Input Leakage Current	$0 \le V_{IN} \le 5.5V$	0 to 5.5	Room Full		±0.05	±0.1 ±1	μA
I_{OFF}	OFF State Leakage Current	$0 \le A, B \le V_{CC}$	1.65 to 5.5	Room Full		±0.05	±0.1 ±1	μA
V_{IH}	Input High Voltage		1.65 to 2.3	Full	1.1			V
			2.3 to 2.7		1.4			
			2.7 to 3.6		1.8			
			3.6 to 4.3		2.1			
			4.3 to 5.5		2.6			
V_{IL}	Input Low Voltage		1.65 to 2.3	Full			0.4	V
			2.3 to 2.7				0.7	
			2.7 to 3.6				1.0	
			3.6 to 4.3				1.3	
			4.3 to 5.5				1.5	
I_{CC}	Quiescent Supply Current	$V_{IN}=V_{CC}$ or GND $I_O=0$	5.5	Room Full			1.0 10	μA
R_{ON}	On-Resistance (Note 3)	$V_{IN}=0V$, $I_O=30mA$ $V_{IN}=2.4V$, $I_O=-30mA$ $V_{IN}=4.5V$, $I_O=-30mA$	4.5	Full		3.0 4.0 4.5	7.0 12 15	Ω
		$V_{IN}=0V$, $I_O=24mA$ $V_{IN}=3V$, $I_O=-24mA$	3.0	Full		4.0 6.0	9.0 20	
		$V_{IN}=0V$, $I_O=8mA$ $V_{IN}=2.3V$, $I_O=-8mA$	2.3	Full		5.0 8.0	12 30	
		$V_{IN}=0V$, $I_O=4mA$ $V_{IN}=1.65V$, $I_O=-4mA$	1.65	Full		6.5 15	20 50	
R_{RANGE}	On Resistance Over Signal Range (Note 3, 7)	$I_A=-30mA$ $0 \le V_{Bn} \le V_{CC}$	4.5	Full			25	Ω
		$I_A=-24mA$ $0 \le V_{Bn} \le V_{CC}$	3.0	Full			50	
		$I_A=-8mA$, $0 \le V_{Bn} \le V_{CC}$	2.3	Full			100	
		$I_A=-4mA$, $0 \le V_{Bn} \le V_{CC}$	1.65	Full			300	
ΔR_{ON}	On Resistance Match Between Channels (Note 3, 4, 5)	$I_A=-30mA$, $V_{Bn}=3.15V$	4.5	Room		0.15		Ω
		$I_A=-24mA$, $V_{Bn}=2.1V$	3.0	Room		0.2		
		$I_A=-8mA$, $V_{Bn}=1.6V$	2.3	Room		0.5		
		$I_A=-4mA$, $V_{Bn}=1.15V$	1.65	Room		0.5		
R_{FLAT}	On Resistance Flatness (Note 3, 4, 6)	$I_A=-30mA$, $0 \le V_{Bn} \le V_{CC}$	5.0	Room		6.0		Ω
		$I_A=-24mA$, $0 \le V_{Bn} \le V_{CC}$	3.3	Room		12		
		$I_A=-8mA$, $0 \le V_{Bn} \le V_{CC}$	2.5	Room		28		
		$I_A=-4mA$, $0 \le V_{Bn} \le V_{CC}$	1.8	Room		125		

Electrical Characteristics (Continued)

Symbol	Parameter	Test Conditions	V_{CC} (V)	Temp	Limits (-40℃ to 85℃)			Unit
					Min	Typ	Max	
AC Electrical Characteristics								
t_{PHL} t_{PLH}	Propagation Delay Bus to Bus (Note 9)	V_I=OPEN	1.65 to1.95 2.3 to 2.7 3.0 to 3.6 4.5 to 5.5	Full			1.5 1.0 0.8	ns
t_{PZL} t_{PZH}	Output Enable Time Turn On Time (A to Bn)	V_I=2×V_{CC} for t_{PZL} V_I=0V for t_{PZH}	1.65 to1.95 2.3 to 2.7 3.0 to 3.6 4.5 to 5.5	Full	7.0 3.5 2.5 1.5		26 15 8.6 6.2	ns
t_{PLZ} t_{PHZ}	Output Disable Time Turn Off Time (A Port to B Port)	V_I=2×V_{CC} for t_{PLZ} V_I=0V for t_{PHZ}	1.65 to1.95 2.3 to 2.7 3.0 to 3.6 4.5 to 5.5	Full	3.0 2.0 1.7 0.8		13 7.5 5.3 3.8	ns
t_D	Break Before Make Time (Note 8)		1.65 to1.95 2.3 to 2.7 3.0 to 3.6 4.5 to 5.5	Full	0.5 0.5 0.5 0.5			ns
Q_{INJ}	Charge Injection (Note 8)	C_L=0.1nF, V_{GEN}=0V, R_{GEN}=0Ω	5.0 3.3	Room		9.0 4.0		pC
O_{IRR}	Off Isolation (Note 10)	R_L=50Ω, f=10MHz	1.65 to 5.5	Room		-60		dB
Xtalk	Crosstalk	R_L=50Ω, f=10MHz	1.65 to 5.5	Room		-54		dB
BW	-3 dB Bandwidth	R_L=50Ω	1.65 to 5.5	Room		230		MHz
THD	Total Harmonic Distortion (Note 8)	R_L=600Ω 0.5V_{P-P} f=600Hz to 20kHz	5.0	Room		0.011		%
Capacitance								
C_{IN}	IN Pin Input Capacitance (Note 11)	V_{CC}=0V				2.5		pF
C_{IO-B}	B Port Off Capacitance (Note 11)	V_{CC}=5.0V				7.5		pF
C_{IOA-ON}	A Port Capacitance when Switch is Enabled (Note 11)	V_{CC}=5.0V				20.1		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).

Note 4: Parameter is characterized but not tested in production.

Note 5: ΔR_{ON}= | $R_{ON(B0)}$−$R_{ON(B1)}$ | measured at identical V_{CC}, temperature and voltage levels.

Note 6: Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.

Note 7: Guaranteed by design.

Note 8: Guaranteed by design.

Note 9: 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).

Note 10: Off Isolation=20log10 [V_A/V_{Bn}].

Note 11: T_A=+25℃, f=1MHz. Capacitance is characterized but not tested in production.

Test Circuits/Timing Diagrams

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

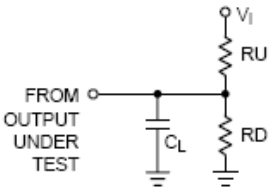


Figure 1. AC Test Circuit

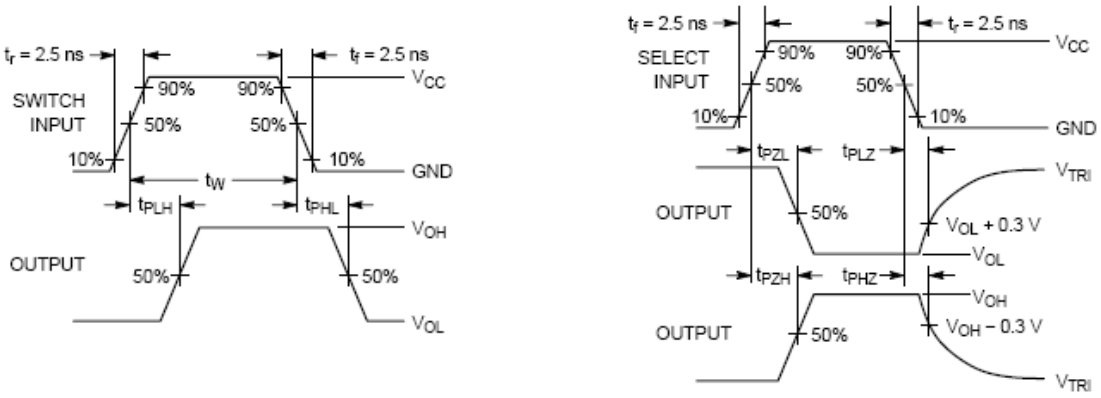
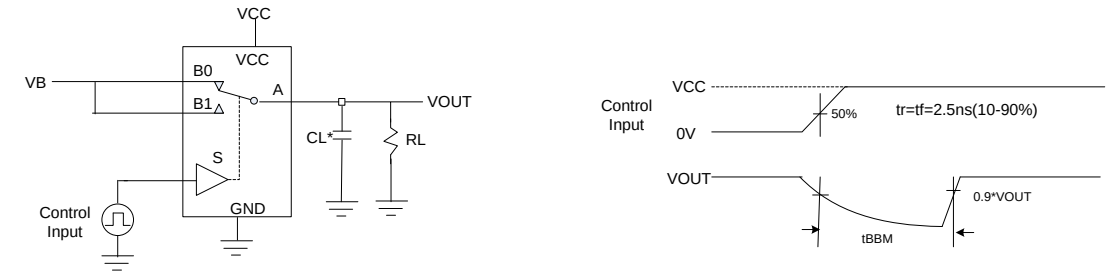


Figure 2. AC Waveforms

Figure 3. Break Before Make Interval Timing



CL* includes fixture and stray capacitance

Figure 4. Break-Before-Make Timing

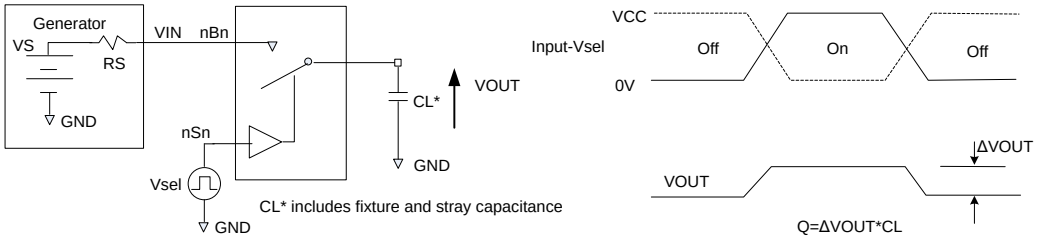


Figure 5. Charge Injection Test

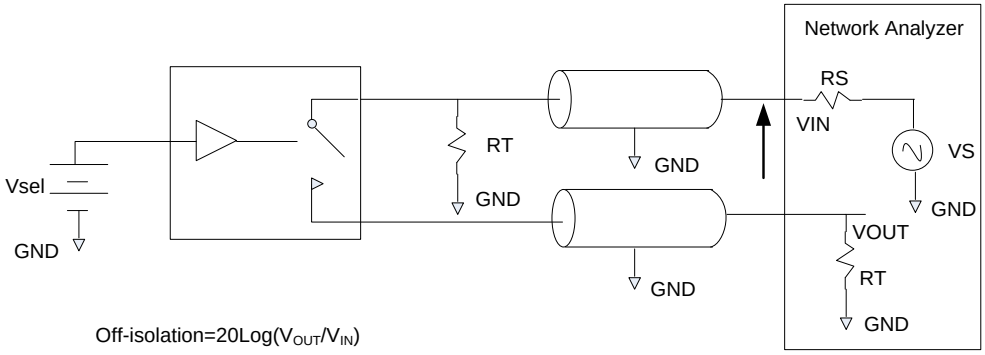


Figure 6. Off-Isolation

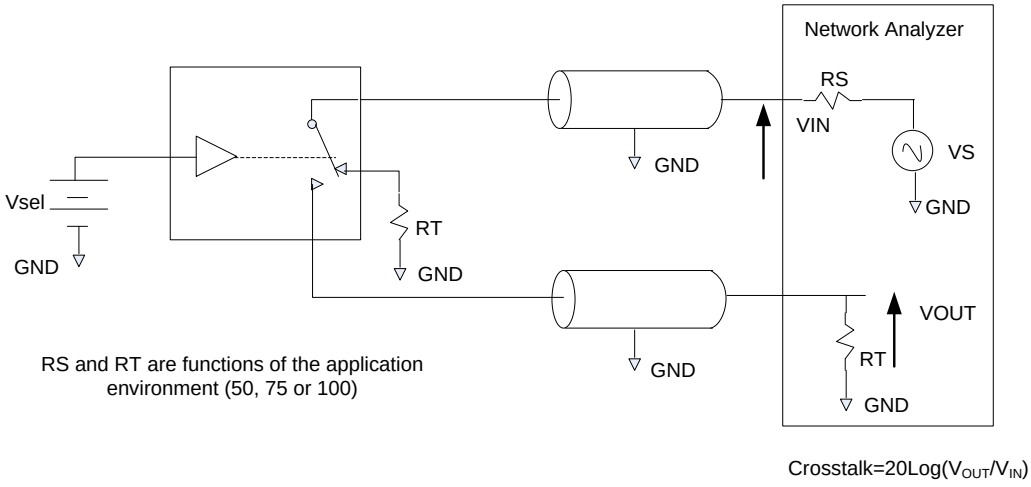


Figure 7. Non-Adjacent Channel-to-Channel Crosstalk

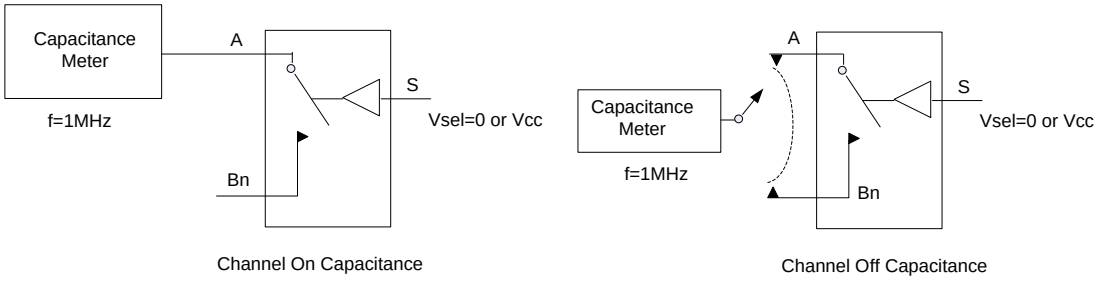


Figure 8. On/Off Capacitance Measurement Setup

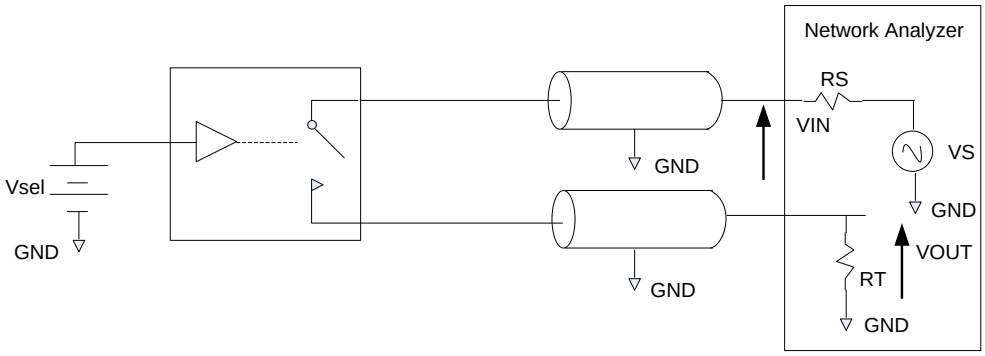
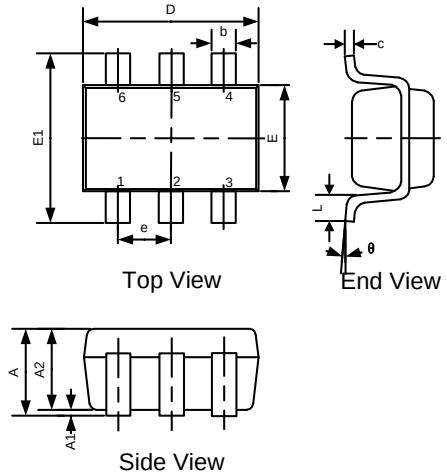


Figure 9. Bandwidth

Package Information

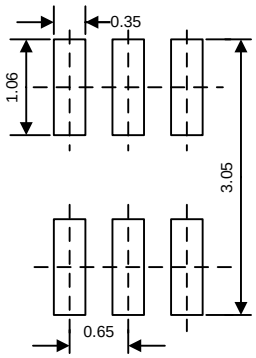
UM3156 SC70-6/SC88/SOT363

Outline Drawing



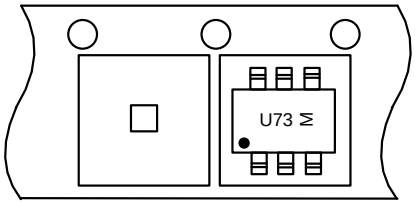
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.90	-	1.10	0.035	-	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.90	-	1.00	0.035	-	0.039
b	0.10	0.25	0.35	0.004	0.010	0.014
c	0.08	0.11	0.22	0.003	0.004	0.009
D	1.80	2.15	2.20	0.071	0.085	0.087
E	1.15	1.30	1.35	0.045	0.051	0.053
E1	2.00	-	2.45	0.079	-	0.096
e	0.65BSC			0.026BSC		
L	0.25	-	0.46	0.010	-	0.018
θ	0°	-	8°	0°	-	8°

Land Pattern



NOTES:
1. Compound dimension: 2.15×1.30;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



GREEN COMPLIANCE

Union Semiconductor is committed to environmental excellence in all aspects of its operations including meeting or exceeding regulatory requirements with respect to the use of hazardous substances. Numerous successful programs have been implemented to reduce the use of hazardous substances and/or emissions.
All Union components are compliant with the RoHS directive, which helps to support customers in their compliance with environmental directives. For more green compliance information, please visit:
http://www.union-ic.com/index.aspx?cat_code=RoHSDeclaration

IMPORTANT NOTICE

The information in this document has been carefully reviewed and is believed to be accurate. Nonetheless, this document is subject to change without notice. Union assumes no responsibility for any inaccuracies that may be contained in this document, and makes no commitment to update or to keep current the contained information, or to notify a person or organization of any update. Union reserves the right to make changes, at any time, in order to improve reliability, function or design and to attempt to supply the best product possible.