



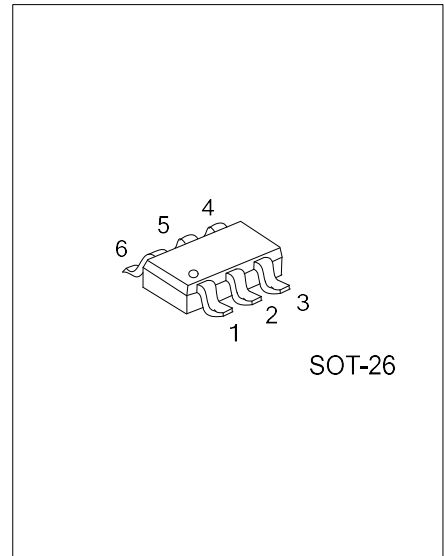
UTAS4157

CMOS IC

ANALOG SWITCH, SPDT, 1ΩRON

DESCRIPTION

The UTC **UTAS4157** is a low R_{ON} SPDT analog switch. This device is designed for low operating voltage, high current switching of speaker output for cell phone applications. It can switch a balanced stereo output. The UTC **UTAS4157** can handle a balanced microphone/speaker/ringtone generator in a monophone mode. The device contains a break-before-make (BBM) feature.



FEATURES

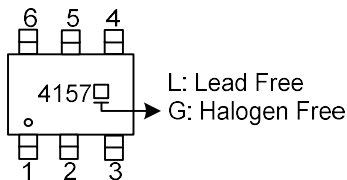
- * Single Supply Operation: 1.65V to 5.5V V_{CC}
Function Directly from LiON Battery
- * Low Static Power
- * R_{ON} Typical = 0.9 Ω @ V_{CC} = 4.5V

ORDERING INFORMATION

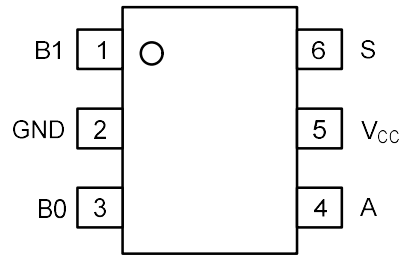
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UTAS4157L-AG6-R	UTAS4157G-AG6-R	SOT-26	Tape Reel

<p>UTAS4157G-AG6-R</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package 	<ul style="list-style-type: none"> (1) R: Tape Reel (2) AG6: SOT-26 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



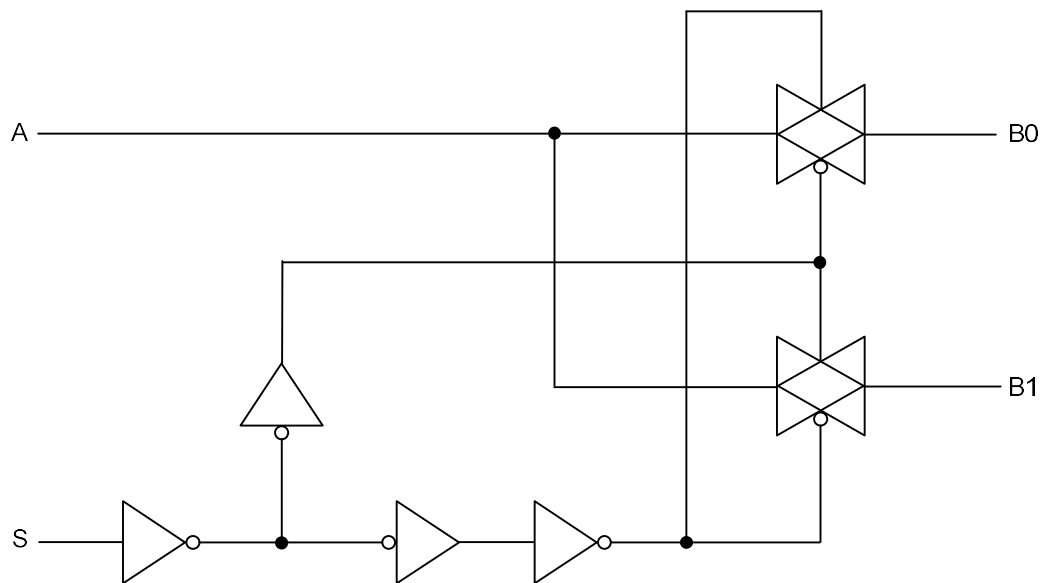
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1, 3, 4	B1, B0, A	Data Ports
2	GND	Ground
5	V _{CC}	Power supply
6	S	Control Input

■ INPUT EQUIVALENT CIRCUIT



■ TRUTH TABLE

CONTROL INPUT	FUNCTION
L	B0 Connected to A
H	B1 Connected to A

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Positive DC Supply Voltage	V_{CC}	-0.5 ~ +6.0	V
Analog Input Voltage (V_{NO} , V_{NC} , or V_{COM})	V_{IS}	-0.5 ~ $V_{CC}+0.5$	V
Digital Select Input Voltage	V_{IN}	-0.5 ~ +6.0	V
Continuous DC Current from COM to NC/NO	I_{an1}	±300	mA
Peak Current from COM to NC/NO, 10 Duty Cycles (Note 2)	$I_{an1-pk1}$	±500	mA
Continuous DC Current into COM/NC/NO with respect to V_{CC} or GND	I_{clmp}	±100	mA

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Defined as 10% ON, 90% off duty cycle.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Positive DC Supply Voltage	V_{CC}	1.65		5.5	V
Analog Input Voltage (A, B0, B1)	V_{IS}	0		V_{CC}	V
Digital Select Input Voltage (S)	V_{IN}	0		V_{CC}	V
Operating Temperature Range	T_A	-40		+85	°C
Input Rise or Fall Time, SELECT	$V_{CC}=3.0V$	t_r		20	ns/V
	$V_{CC}=5.5V$	t_f		10	ns/V

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			-40°C~+85°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
HIGH Level Input Voltage	V _{IH}	V _{CC} =2.7V	2.0			2.0			V
		V _{CC} =4.5V	2.4			2.4			
LOW Level Input Voltage	V _{IL}	V _{CC} =2.7V			0.6			0.6	V
		V _{CC} =4.5V			0.8			0.8	
Input Leakage Current	I _{IN}	V _{CC} =0~5.5V, 0≤V _{IN} ≤5.5 V			±0.1			±1	uA
OFF State Leakage Current (Note 6)	I _{OFF}	V _{CC} =5.5V, 0≤A, B≤V _{CC}	-0.1		+0.1			±1	uA
ON State Leakage Current (Note 6)	I _{ON}	V _{CC} =5.5V, 0≤A, B≤V _{CC}	-0.1		+0.1			±1	uA
Switch On Resistance (Note 1)	R _{ON}	V _{CC} =2.7V, I _O = -100 mA, B ₀ or B ₁ =1.5V		3.9	6.0			6.3	Ω
		V _{CC} =4.5V, I _O = -100 mA, B ₀ or B ₁ =3.5V		0.9	2.0			2.3	Ω
Quiescent Supply Current All Channels ON or OFF	I _{CC}	V _{CC} =5.5V, V _{IN} = V _{CC} or GND, I _{OUT} = 0			0.5			1.0	uA
ANALOG SIGNAL RANGE									
On Resistance Match Between Channels (Notes 1, 2, 3)	ΔR _{ON}	V _{CC} =2.7V, I _A =-100mA, B ₀ or B ₁ =1.5V		0.15				0.15	Ω
		V _{CC} =4.5V, I _A =-100mA, B ₀ or B ₁ =3.5V		0.12				0.15	Ω
On Resistance Flatness (Notes 1, 2, 4)	R _{flat}	V _{CC} =2.7V, I _A =-100mA, B ₀ or B ₁ =0V, 0.75V, 1.5V		1.4				0.4	Ω
		V _{CC} =4.5V, I _A =-100mA, B ₀ or B ₁ =0V, 1.0V, 2.0V		0.3				0.4	Ω

- Notes: 1. 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).
2. Parameter is characterized but not tested in production.
3. ΔR_{ON} = R_{ON max} - R_{ON min} measured at identical V_{CC}, temperature and voltage levels.
4. Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.
5. Guaranteed by Design.
6. 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).

■ AC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			-40°C~+85°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation Delay Bus to Bus (Note 1)	t _{PHL}	V _{CC} =2.7V, V _I =OPEN			2.0			2.2	ns
	t _{PLH}	V _{CC} =4.5V			0.3			0.5	ns
Output Enable Time Turn On Time (B _n to A)	t _{ON}	V _{CC} =2.7V, B ₀ or B ₁ =1.5V, R _L =50Ω, C _L =35pF			60			70	ns
		V _{CC} =4.5V, B ₀ or B ₁ =3.0V, R _L =50Ω, C _L =35pF			50			60	ns
Output Disable Time Turn ff Time (B Port to A Port)	t _{OFF}	V _{CC} =2.7V, B ₀ or B ₁ =1.5V, R _L =50Ω, C _L =35pF			20			25	ns
		V _{CC} =4.5V, B ₀ or B ₁ =3.0V, R _L =50Ω, C _L =35pF			15			20	ns
Break Before Make Time (Note 2)	t _{BBM}	V _{CC} =2.7V	0.5			0.5			ns
		V _{CC} =4.5V	0.5			0.5			ns
Charge Injection (Note 2)	Q	C _L =1.0nF, V _{GEN} =0V R _{GEN} =0Ω	V _{CC} =2.7V		26				pC
			V _{CC} =4.5V		48				pC
Off Isolation (Note 3)	O _{IRR}	V _{CC} =2.7~5.5V, R _L =50Ω, f=1.0MHz			-52				dB
Crosstalk	X _{talk}	V _{CC} =2.7~5.5V, R _L =50Ω, f=1.0MHz			-50				dB
-3 dB Bandwidth	BW	V _{CC} =2.7~5.5V, R _L =50Ω			40				MHz
Total Harmonic Distortion (Note 2)	THD	V _{CC} =2.7~5.5V, R _L =600Ω 0.5V _{P-P} , f=20Hz to 20kHz		0.012					%

Notes: 1. Guaranteed by Design.

2. 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).

3. Off Isolation = 20 log₁₀ [V_A/V_{Bn}].

■ CAPACITANCE (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Select Pin Input Capacitance	C _{IN}	V _{CC} =0V, f=1MHz	10			pF
B Port Off Capacitance	C _{IO-B}	V _{CC} =4.5V, f=1MHz	25			pF
A Port Capacitance when Switch is Enabled	C _{IOA-ON}	V _{CC} =4.5V, f=1MHz	87			pF

Note: f=1MHz, Capacitance is characterized but not tested in production.

■ TYPICAL APPLICATION CIRCUIT

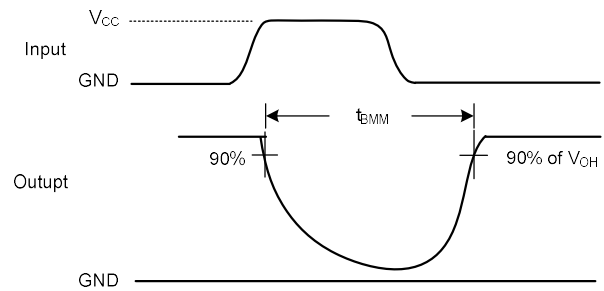
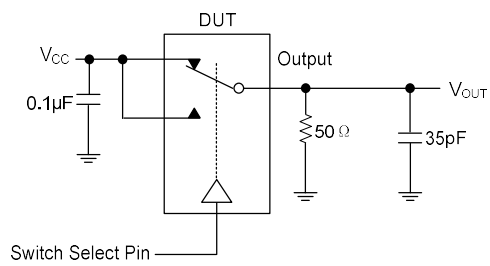


Figure 1. t_{BMM} (Time Break-Before-Make)

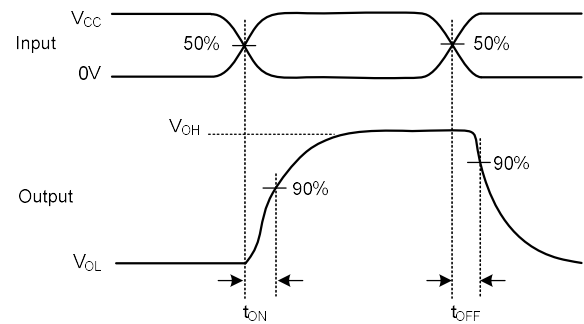
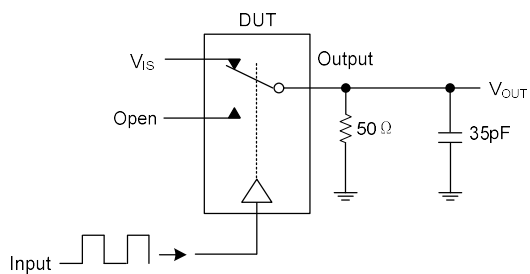


Figure 2. t_{ON}/t_{OFF}

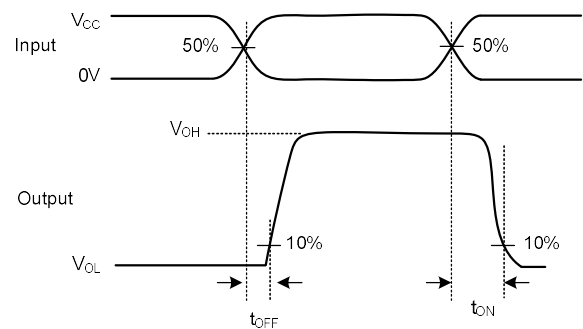
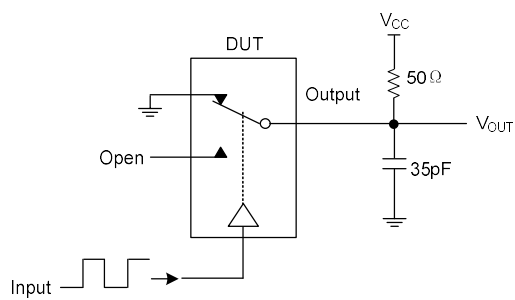
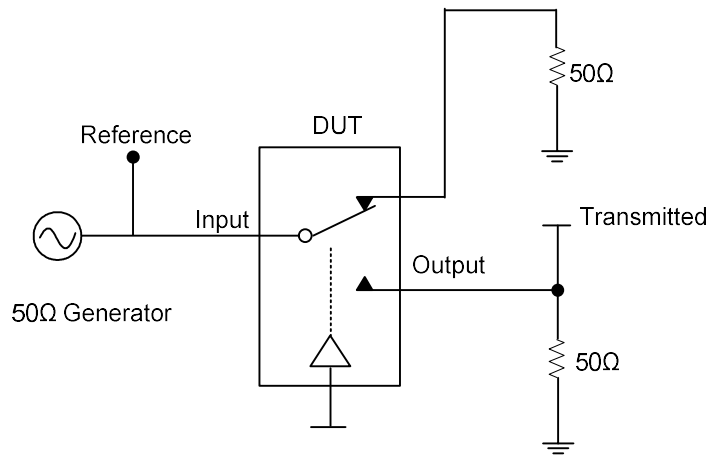


Figure 3. t_{ON}/t_{OFF}

■ TYPICAL APPLICATION CIRCUIT (Cont.)



Channel switch control/s test socket is normalized. Off isolation is measured across an off channel. On loss is the bandwidth of an On switch. V_{ISO} , Bandwidth and V_{ONL} are independent of the input signal direction.

$$V_{ISO} = \text{Off Channel Isolation} = 20 \text{ Log } \frac{V_{OUT}}{V_{IN}} \text{ for } V_{IN} \text{ at } 100 \text{ kHz}$$

$$V_{ONL} = \text{On Channel Loss} = 20 \text{ Log } \frac{V_{OUT}}{V_{IN}} \text{ for } V_{IN} \text{ at } 100 \text{ kHz to } 50 \text{ MHz}$$

Bandwidth (BW) = the frequency 3 dB below V_{ONL}

V_{CT} = Use V_{ISO} setup and test to all other switch analog input/outputs terminated with 50Ω

Figure 4. Off Channel Isolation/On Channel Loss (BW)/Crosstalk (On Channel to Off Channel)/ V_{ONL}

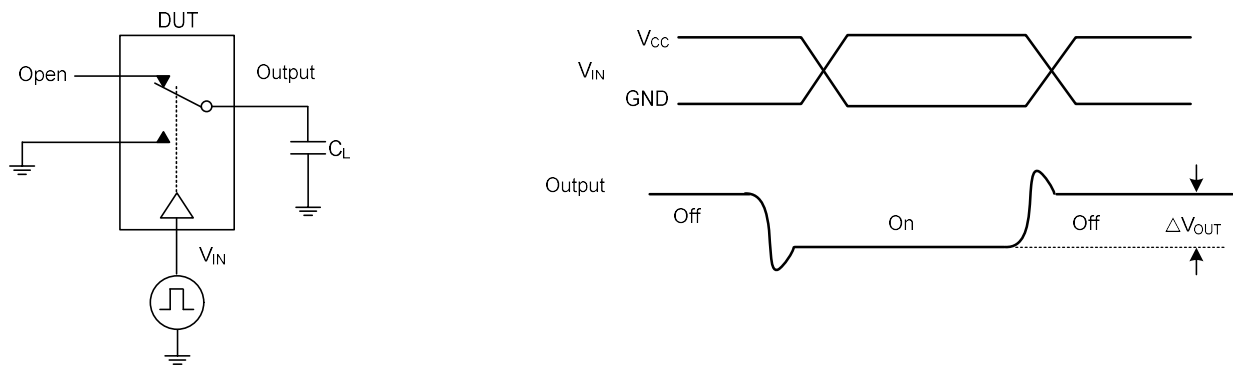
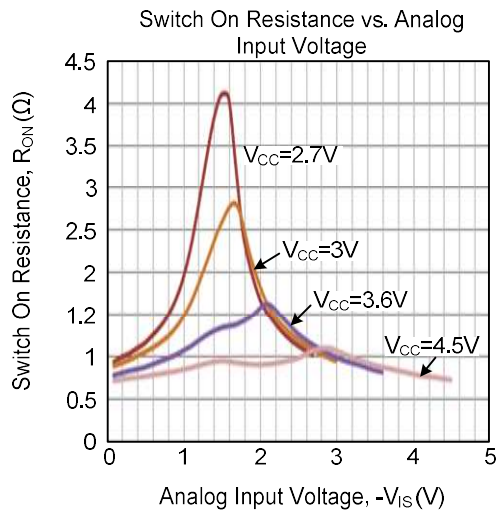


Figure 5. Charge Injection: (Q)

■ TYPICAL CHARACTERISTICS



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