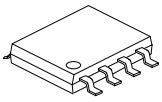
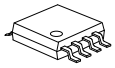
3:1 MUX/DEMUX BUS SWITCH



SOP-8



MSOP-8

■ DESCRIPTION

The UTC **US5C3309** is a single 1-of-3 Multiplexer/Demultiplexer. The low on-resistor (5Ω) allows connected to be made without any additional ground bounce noise or propagation delay when one channel is selected. An additional 3-State output is introduced if no channel is selected.

■ FEATURES

* Low on-resistor connection between input and output (5Ω typical)
* Near-Zero propagation delay
* Direct bus connection when switches are ON
* Ultra Low Quiescent Power (0.2μA typical)
  - Ideally suited for notebook applications

■ ORDERING INFORMATION

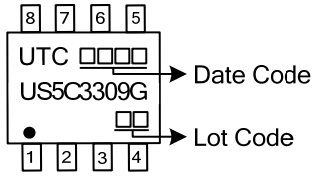
Ordering Number	Package	Packing
US5C3309G-S08-R	SOP-8	Tape Reel
US5C3309G-SM1-R	MSOP-8	Tape Reel

US5C3309G-S08-R

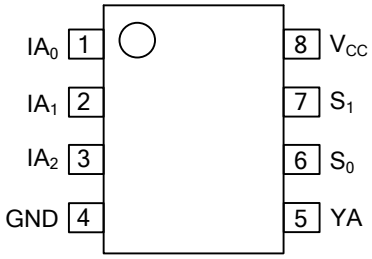
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) S08: SOP-8, SM1: MSOP-8
(3) G: Halogen Free and Lead Free

■ MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

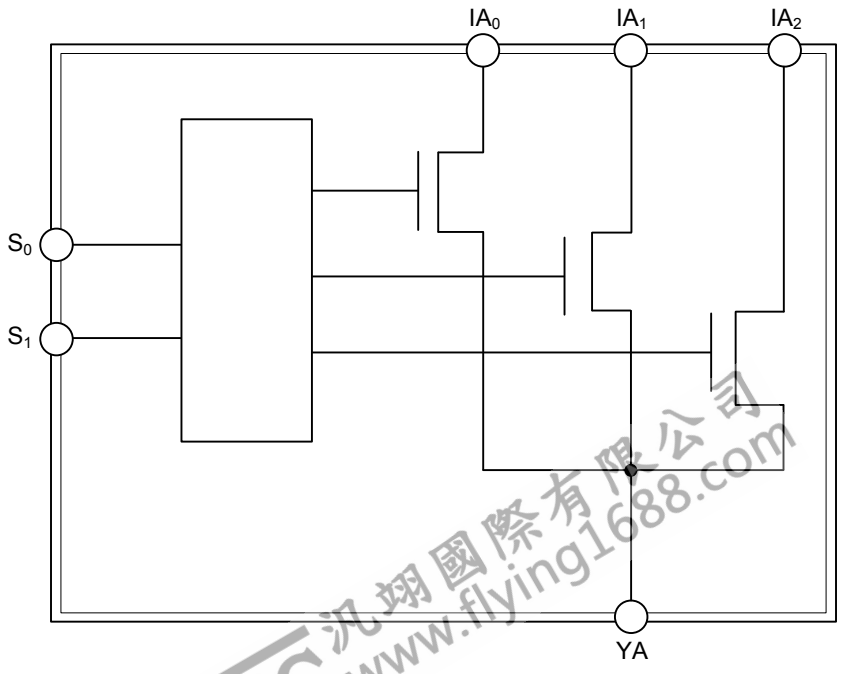
PIN NO.	PIN NAME	DESCRIPTION
1, 2, 3	IAn	Data Inputs
4	GND	Ground
5	YA	Data Output
6, 7	S0, S1	Select Inputs
8	V_{CC}	Power

■ TRUTH TABLE (Note 1)

Select			
S1	S0	YA	Function
L	L	IA0	S1-0=0
L	H	IA1	S1-0=1
H	L	IA2	S1-0=2
H	H	Hi-Z	S1-0=3

Note: H=High Voltage Level, L=Low Voltage Level

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

(Above which the useful life may be impaired. For user guidelines, not tested.)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage to Ground Potential (Inputs & V_{CC} Only)			-0.5 ~ +7.0	V
Supply Voltage to Ground Potential (Outputs & D/O Only)			-0.5 ~ +7.0	V
DC Input Voltage			-0.5 ~ +7.0	V
DC Output Current			120	mA
Power Dissipation	SOP-8	P_D	0.5	W
	MSOP-8		0.35	W
Storage Temperature		T_{STG}	-65 ~ +150	°C
Ambient Temperature with Power Applied		T_A	-40 ~ +85	°C

Note: 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.

■ DC ELECTRICAL CHARACTERISTICS (Over the Operating Range, T_A=-40°C~+85°C, V_{CC}=5V±5%)

PARAMETER	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP (Note 2)	MAX	UNIT
Input HIGH Voltage	V_{IH}	Guaranteed Logic HIGH Level	2.0			V
Input LOW Voltage	V_{IL}	Guaranteed Logic LOW Level	-0.5		0.8	V
Input HIGH Current	I_{IH}	V_{CC}=Max., V_{IN}=V_{CC}			±1	μA
Input LOW Current	I_{IL}	V_{CC}=Max., V_{IN}=GND			±1	μA
High Impedance Output Current	I_{OZH}	0≤I_N, Y_N≤V_{CC}			±1	μA
Clamp Diode Voltage	V_{IK}	V_{CC}=Min, I_{IN}=-18mA	-0.7		1.2	V
Short Circuit Current	I_{OS}	I (Y)=0V, Y (I)=V_{CC}			100	mA
Input Hysteresis at Control Pins	V_H			150		mV
Switch On-Resistance (Note 3)	R_{ON}	V_{CC}=Min, V_{IN}=0.0V, I_{ON}=48mA		5	7	Ω
		V_{CC}=Min, V_{IN}=2.4V, I_{ON}=15mA		10	15	Ω

Notes: 1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type
2. Typical values are at V_{CC}=5.0V, T_A=25°C ambient and maximum loading.
3. Measured by the voltage drop between I and Y pin at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (I, Y) pins.

■ POWER SUPPLY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS (Note 1)		MIN	TYP (Note 2)	MAX	UNIT
Quiescent Power Supply Current	I_{CC}	V_{CC}=Max.	V_{IN}=GND or V_{CC}		0.1	3.0	μA
Supply Current per Input @ TTL HIGH	△I_{CC}		V_{IN}=3.4V (Note 3)			2.5	mA
Supply Current Per Input Per MHz (Note 4)	I_{CCD}	VCC=Max. I and Y Pins Open Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

Notes: 1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{CC}=5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN}=3.4V, control inputs only); I and Y pins do not contribute to I_{CC}.
4. This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The I and Y inputs generate no significant AC or DC currents as they transition. The parameter is not tested, but is guaranteed by design.

■ CAPACITANCE (T_A=25°C, f =1MHz)

PARAMETER (Note 1)	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP	MAX	UNIT
Input Capacitance	C_{IN}	V_{IN}=0V		3		pF
I_A Capacitance, Switch Off	C_{OFF}			4		pF
I_A Capacitance, Switch On	C_{ON}			16		pF

Note: This parameter is determined by device characterization but is not production tested.

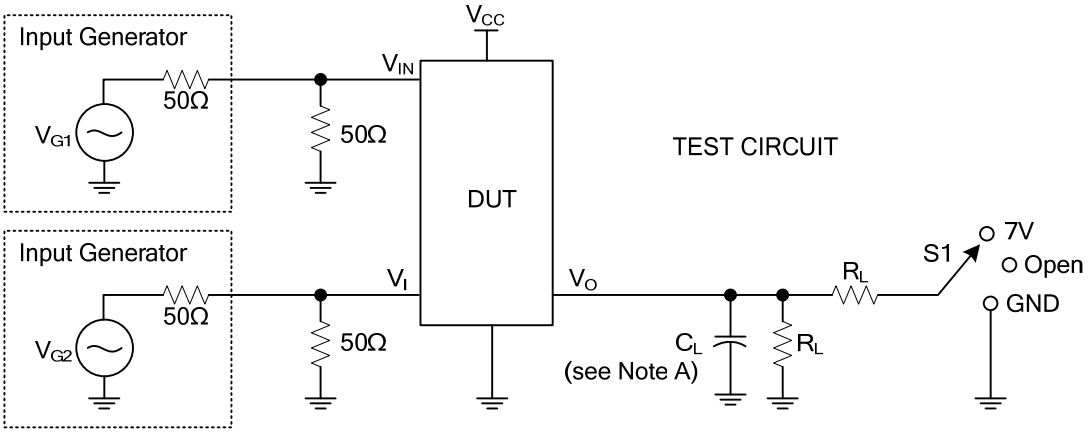
■ SWITCHING CHARACTERISTICS OVER OPERATING RANGE (C_L=50pF, R_L=500Ω)

PARAMETER	DESCRIPTION	TEST CONDITIONS	Com			UNIT
			MIN	TYP	MAX	
Propagation Delay (Note 1, 2) I_N to Y_N	t_{IY}				0.25	ns
Bus Select Time S_N to Y_N	t_{SY}	C_L=50pF, R_L=500Ω	0.5		6.6	ns
Bus Enable Time S_N to Y_N	t_{PZH}/t_{PZL}		0.5		6.0	ns
Bus Disable Time S_N to Y_N	t_{PHZ}/t_{PLZ}		0.5		6.0	ns

Notes: 1. This parameter is guaranteed but not tested on Propagation Delays.

2. The bus switch contributes no propagational delay other than the RC delay of the On-Resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns for 50pF load. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

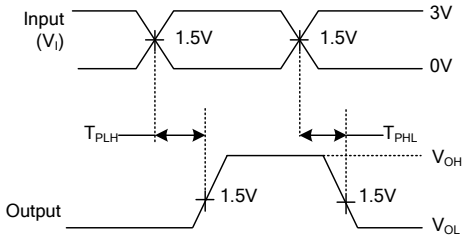
■ TEST CIRCUIT



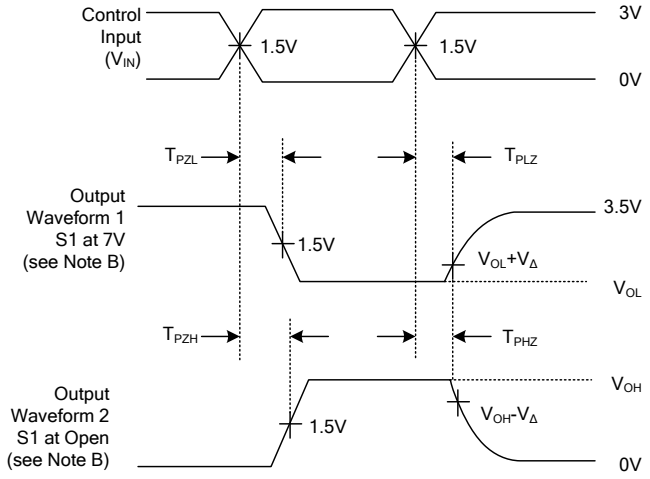
■ SWITCH POSITIONS

TEST	S1	R_L	V_I	C_L	V_Δ
$T_{PD(S)}$	Open	500Ω	V_{CC} or GND	50pF	
$T_{PLZ/TPZL}$	7V	500Ω	GND	50pF	0.3V
$T_{PHZ/TPZH}$	GND	500Ω	V_{CC}	50pF	0.3V

■ ENABLE AND DISABLE TIMING



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES ($T_{PD(S)}$)



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

Notes: 1. CL includes probe and jig capacitance.
2. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
3. All input pulses are supplied by generators having the following characteristics: PRR≤10MHz, Z_O=50Ω, T_R≤2.5ns, T_F≤2.5ns.
4. The outputs are measured one at a time, with one transition per measurement.
5. T_{PLZ} and T_{PHZ} are the same as T_{DIS}.
6. T_{PZL} and T_{PZH} are the same as T_{EN}.
7. T_{PLH} and T_{PHL} are the same as $T_{PD\ (S)}$.
8. All parameters and waveforms are not applicable to all devices.