



US5C3305

Preliminary

CMOS IC

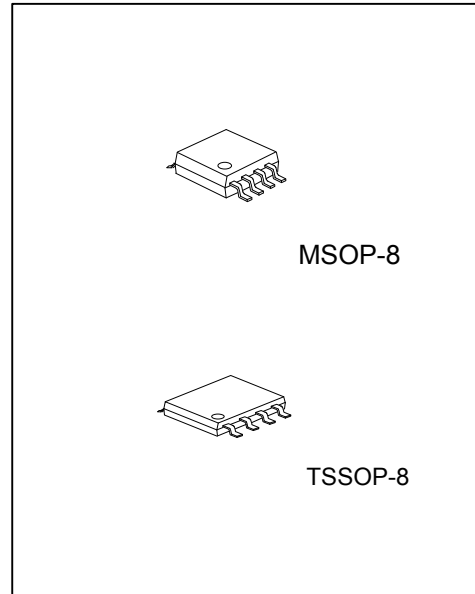
2-BIT BUS SWITCH WITH INDIVIDUAL ENABLES

■ DESCRIPTION

The UTC **US5C3305** consist of two independent 5Ω switches with fast individual enables. The “A” pin is connected to the “B” pin directly when the associated Bus Enable (BE) pin is set to “High”. The bus switch introduces no additional propagation delay or additional ground bounce noise.

■ FEATURES

- * Low on-resistor between two ports (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

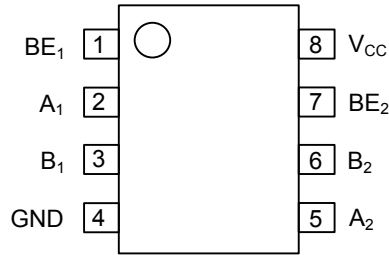
Ordering Number		Package	Packing
Lead Free	Halogen Free		
US5C3305L-P08-R	US5C3305G-P08-R	TSSOP-8	Tape Reel
US5C3305L-SM1-R	US5C3305G-SM1-R	MSOP-8	Tape Reel

<p>US5C3305G-P08-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) P08: TSSOP-8, SM1: MSOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

MSOP-8	TSSOP-8

■ PIN CONFIGURATION



■ PIN DESCRIPTION

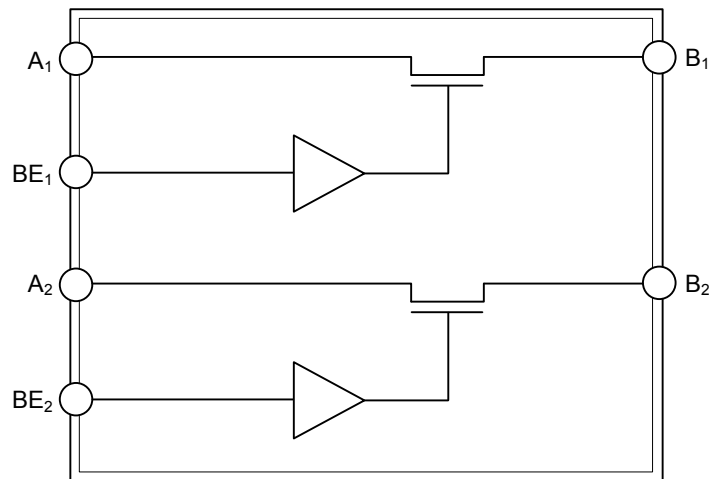
PIN NO.	PIN NAME	DESCRIPTION
1, 7	BE ₁ , BE ₂	Switch Enable
2, 5	A ₁ , A ₂	Bus A
3, 6	B ₁ , B ₂	Bus B
4	GND	Ground
8	V _{CC}	Power

■ TRUTH TABLE (Note 1)

BE _n	A _n	B _n	V _{CC}	Function
X (Note 2)	Hi-Z	Hi-Z	GND	Disconnect
L	Hi-Z	Hi-Z	V _{CC}	Disconnect
H	B _n	A _n	V _{CC}	Connect

Notes: 1. H=High Voltage Level, L=Low Voltage Level, Hi-Z=High Impedance, X=Don't Care
 2. A pull-up resistor should be provided for power-up protection.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

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

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage to Ground Potential			-0.5 ~ +7.0	V
DC Input Voltage			-0.5 ~ +7.0	V
DC Output Current			120	mA
Power Dissipation	TSSOP-8	P_D	0.4	W
	MSOP-8		0.35	W
Ambient Temperature with Power Applied		T_A	-40 ~ +85	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-65 ~ +150	$^{\circ}\text{C}$

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, $T_A=-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$, $V_{CC}=4\text{V}\sim 5.5\text{V}$)

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}	$V_{CC}=\text{Max.}$, $V_{IN}=V_{CC}$			± 1	μA
Input LOW Current	I_{IL}	$V_{CC}=\text{Max.}$, $V_{IN}=\text{GND}$			± 1	μA
High Impedance Output Current	I_{OZ}	$0\leq A$, $B\leq V_{CC}$			± 1	μA
Low Impedance Output Current	I_{ON}	$0\leq A$, $B\leq V_{CC}$			± 1	μA
Input Hysteresis at Control Pins	V_H			250		mV
Switch On-Resistance (Note 3)	R_{ON}	$V_{CC}=4.5\text{V}$, $V_{IN}=0.0\text{V}$, $I_{ON}=30\text{mA}$ or 64mA		4	7	Ω
		$V_{CC}=4.5\text{V}$, $V_{IN}=2.4\text{V}$, $I_{ON}=-15\text{mA}$		8	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 $V_{CC}=5.0\text{V}$, $T_A=25^{\circ}\text{C}$ ambient and maximum loading.

3. Measured by the voltage drop between A and B pin at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (A, B) pin

■ POWER SUPPLY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP (Note 2)	MAX	UNIT
Quiescent Power Supply Current	I_{CC}	$V_{IN}=\text{GND}$ or V_{CC}		0.1	3.0	μA
Supply Current per Input @ TTL HIGH	ΔI_{CC}	$V_{CC}=\text{Max.}$ $V_{IN}=3.4\text{V}$ (Note 3)			2.5	mA

Notes: 1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.

2. Typical values are at $V_{CC}=5.0\text{V}$, $+25^{\circ}\text{C}$ ambient.

3. Per TTL driven input ($V_{IN}=3.4\text{V}$, control inputs only); A and B pins do not contribute to I_{CC} .

■ CAPACITANCE ($T_A=25^{\circ}\text{C}$, $f=1\text{MHz}$)

PARAMETER (Note 1)	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP	MAX	UNIT
Input Capacitance	C_{IN}	$V_{IN}=0\text{V}$		3		pF
A/B Capacitance, Switch Off	C_{OFF}			5		pF
A/B Capacitance, Switch On	C_{ON}			10		pF

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

■ SWITCHING CHARACTERISTICS OVER OPERATING RANGE ($C_L=50\text{pF}$, $R_L=500\Omega$)

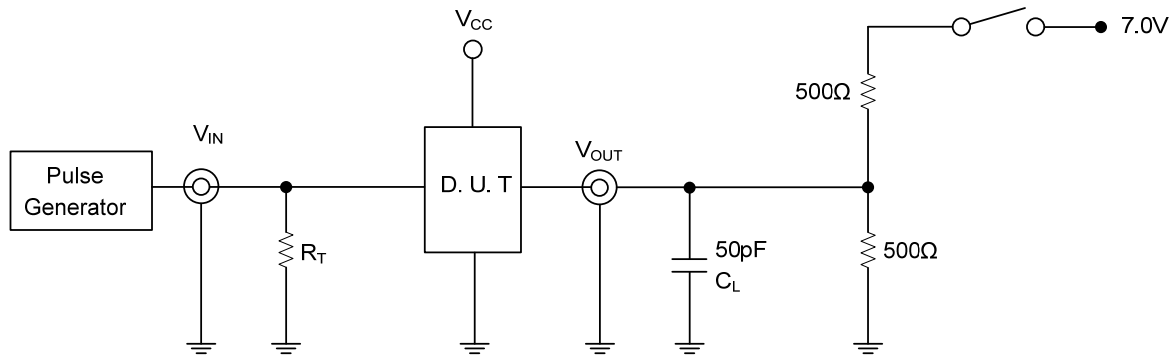
PARAMETER	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP	MAX	UNIT
Propagation Delay Time Signal A to B, B to A (Note 2, 3)	t_{PLH}/t_{PHL}	$V_{CC}=4\text{V}$			0.25	ns
		$V_{CC}=5\text{V}\pm 10\%$	1.0		0.25	ns
Bus Enable Time	t_{PZH}/t_{PZL}	$V_{CC}=4\text{V}$			5.5	ns
		$V_{CC}=5\text{V}\pm 10\%$	1.0		4.9	ns
Bus Disable Time	t_{PHZ}/t_{PLZ}	$V_{CC}=4\text{V}$			4.5	ns
		$V_{CC}=5\text{V}\pm 10\%$			4.2	ns

Notes: 1. See test circuit and waveforms.

2. This parameter is guaranteed but not tested on Propagation Delays.

3. 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



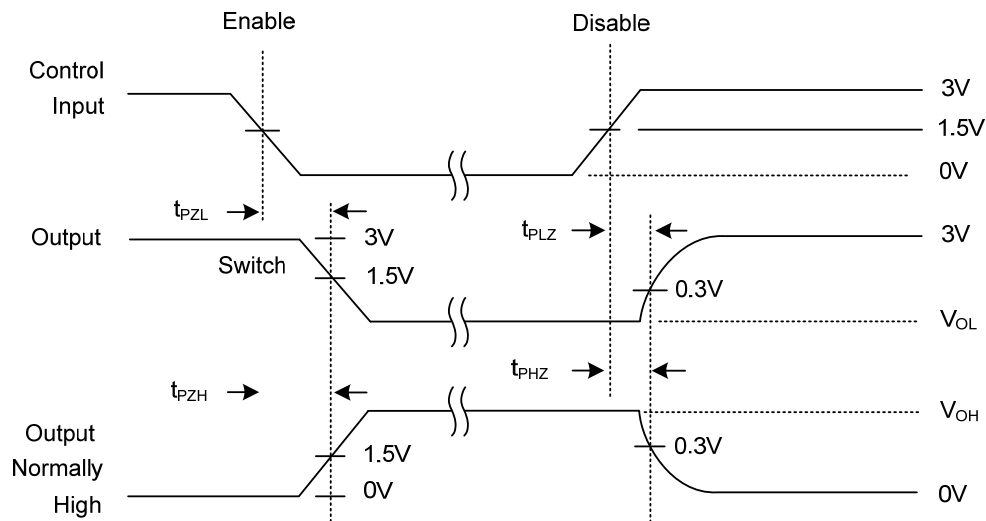
■ SWITCH POSITIONS

Test	Switch
Open Drain Disable LOW Enable LOW	7V
All Other Inputs	Open

Note: C_L=Load Capacitance: includes jig and probe capacitance.

R_T=Termination Resistance: should be equal to the Z_{OUT} of the Pulse Generator.

■ ENABLE AND DISABLE TIMING



Notes: 1. Input Control Enable = Low; Input Control Disable=High

2. Pulse Generator for All Pulses: Rate ≤1.0 MHz; Z_{OUT}≤50Ω; t_F, t_R, ≤2.5ns.

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