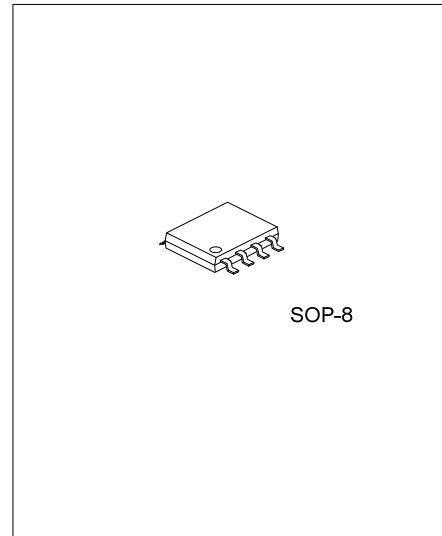




U7WBC66

CMOS IC

LOW VOLTAGE UHS DUAL SPST NORMALLY OPEN ANALOG SWITCH OR 2-BIT BUS SWITCH



SOP-8

Lead-free: U7WBC66L
Halogen-free: U7WBC66G

DESCRIPTION

As an ultra high-speed (UHS) dual single pole/ single-throw (SPST) analog switch or 2-bit bus switch, the UTC **U7WBC66** consists of advanced sub-micron CMOS technology to achieve high speed enable and disable times and low on Resistance over a broad V_{CC} range. The device is organized as a dual switch with independent CMOS compatible switch enable (OE) controls and it is specified to operate over the 1.65 ~ 5.5V V_{CC} operating range. The switch is ON and Port A is connected to Port B when OE is HIGH, but the switch is OPEN and a high-impedance state exists between Port A and Port B when OE is LOW. Independent of the V_{CC} operating range, the enable inputs tolerate voltages up to 5.5V.

FEATURES

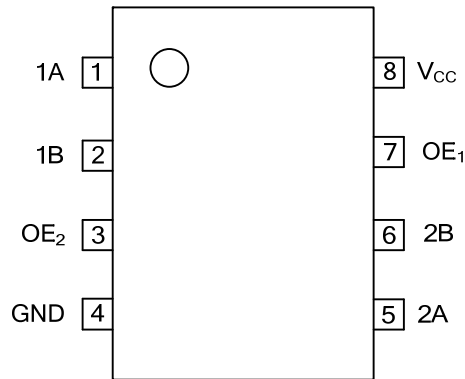
- * Useful in both analog and digital applications
- * Typical 7Ω On Resistance @ 5V V_{CC}
- * Broad V_{CC} operating range: 1.65V ~ 5.5V
- * Rail-to-rail signal handling
- * Power down high impedance control inputs
- * Control inputs are overvoltage tolerant
- * Control inputs are CMOS compatible
- * >300 MHz -3dB bandwidth

ORDERING INFORMATION

Ordering Number			Package	Packing
Normal	Lead Free Plating	Halogen Free		
U7WBC66-S08-R	U7WBC66L-S08-R	U7WBC66G-S08-R	SOP-8	Tape Reel
U7WBC66-S08-T	U7WBC66L-S08-T	U7WBC66G-S08-T	SOP-8	Tube

<p>U7WBC66L-S08-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) S08: SOP-8 (3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn</p>
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PIN CONFIGURATION

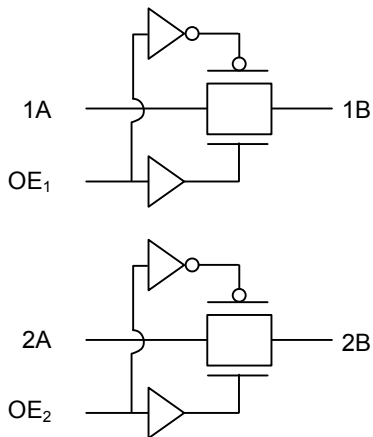


■ FUNCTION TABLE (each gate)

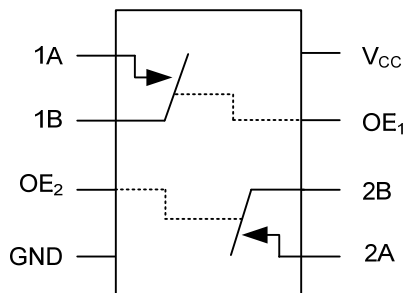
Switch Enable Input (OE)	Function
L	N/C
H	B Connected to A

Note: H=High logic level, L=Low logic level

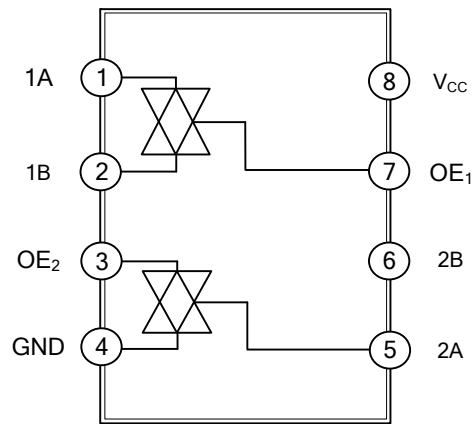
■ LOGIC SYMBOL



■ ANALOG SYMBOL



■ CONNECTION DIAGRAMS



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5~+7.0	V
DC Switch Voltage	V_S	-0.5~ $V_{CC}+0.5$	V
DC Input Voltage	V_{IN}	-0.5~+7.0	V
DC Input Diode Current @ $V_{IN} < 0V$	I_{IK}	-50mA	mA
DC Switch Output Current	I_{OUT}	±128	mA
DC V_{CC} or Ground Current	I_{CC}/I_{GND}	±100	mA
Power Dissipation	P_D	250	mW
Junction Temperature	T_J	+150	°C
Operating Temperature	T_{OPR}	-40 ~ + 85	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°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.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction-to-Ambient	θ_{JA}		250		°C/W

■ RECOMMENDED OPERATING CONDITIONS(Note)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		1.65		5.5	V
Input Voltage	V_{IN}		0		5.5	V
Switch Input Voltage	V_S		0		V_{CC}	V
Switch Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	t_R, t_F	$V_{CC}=1.65V\sim 2.7V$	0		20	ns/V
		$V_{CC}=3.0V\sim 3.6V$	0		10	
		$V_{CC}=4.5V\sim 5.5V$	0		5	

Note: Unused inputs must be held HIGH or LOW. They may not float.

■ STATIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DC CHARACTERISTICS						
Analog Signal Range	V_{CC}		0		V_{CC}	V
High Level Input Voltage	V_{IH}	$V_{CC}=1.65\sim 1.95V$	$0.75V_{CC}$			V
		$V_{CC}=2.3\sim 5.5V$	$0.7 V_{CC}$			
LOW Level Input Voltage	V_{IL}	$V_{CC}=1.65\sim 1.95V$			$0.25V_{CC}$	V
		$V_{CC}=2.3\sim 5.5V$			$0.3 V_{CC}$	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0\sim 5.5V, 0 \leq V_{IN} \leq 5.5V$			±0.1	µA
Switch OFF Leakage Current	$I_{S(OFF)}$	$V_{CC}=1.65\sim 5.5V, 0 \leq A, B \leq V_{CC}$			±0.1	µA
Quiescent Supply Current	I_Q	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND $I_{OUT}=0$			1	µA
Switch ON Resistance (Note 1)	R_{ON}	$V_{CC}=4.5V, V_{IN}=0V, I_{OUT}=30mA$		6	10	Ω
		$V_{CC}=4.5V, V_{IN}=2.4V, I_{OUT}=-30mA$		7	13.5	
		$V_{CC}=4.5V, V_{IN}=4.5V, I_{OUT}=-30mA$		6	10	
		$V_{CC}=3V, V_{IN}=0V, I_{OUT}=24mA$		7.5	15	
		$V_{CC}=3V, V_{IN}=3V, I_{OUT}=-24mA$		8.5	15	
		$V_{CC}=2.3V, V_{IN}=0V, I_{OUT}=8 mA$		9	20	
		$V_{CC}=2.3V, V_{IN}=2.3V, I_{OUT}=-8 mA$		10.5	20	
		$V_{CC}=1.65V, V_{IN}=0V, I_{OUT}=-4 mA$		12.5	30	
		$V_{CC}=1.65V, V_{IN}=1.65V, I_{OUT}=-4 mA$		17	30	

■ STATIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DC CHARACTERISTICS						
ON Resistance over Signal Range	RRange	$V_{CC}=4.5V, I_{OUT}=-30mA, 0 \leq V_{IN} \leq V_{CC}$		8	15	Ω
		$V_{CC}=3V, I_{OUT}=-24mA, 0 \leq V_{IN} \leq V_{CC}$		15	30	
		$V_{CC}=2.3V, I_{OUT}=-8mA, 0 \leq V_{IN} \leq V_{CC}$		45	75	
		$V_{CC}=1.65V, I_{OUT}=-4mA, 0 \leq V_{IN} \leq V_{CC}$		150	275	
ON Resistance Match Between Channels(Note 2)	ΔR_{ON}	$V_{CC}=4.5V, I_{OUT}=-30mA, V_{IN}=3.15V$		0.2		Ω
		$V_{CC}=3V, I_{OUT}=-24mA, V_{IN}=2.1V$		0.2		
		$V_{CC}=2.3V, I_{OUT}=-8mA, V_{IN}=1.6V$		0.5		
		$V_{CC}=1.65V, I_{OUT}=-4mA, V_{IN}=1.15V$		0.6		
N Resistance Flatness	R_{FLAT}	$V_{CC}=4.5V, I_{OUT}=-30mA, 0 \leq V_{IN} \leq V_{CC}$		2.5	6	
		$V_{CC}=3V, I_{OUT}=-24mA, 0 \leq V_{IN} \leq V_{CC}$		8	17.5	
		$V_{CC}=2.3V, I_{OUT}=-8mA, 0 \leq V_{IN} \leq V_{CC}$		33	60	
		$V_{CC}=1.65V, I_{OUT}=-4mA, 0 \leq V_{IN} \leq V_{CC}$		135	250	
AC CHARACTERISTICS						
Off Isolation (Note 3)	OIRR	$V_{CC}=1.65V, R_L=50\Omega, C_L=5pF, f=10MHz$		-55		dB
Crosstalk	Xtalk	$V_{CC}=1.65V, R_L=50\Omega, C_L=5pF, f=10MHz$		-70		dB
-3dB Bandwidth	BW	$V_{CC}=1.65V, R_L=50\Omega$		>300		MHz
Total Harmonic Distortion	THD	$V_{CC}=5V, R_L=600\Omega, 0.5 V_{P-P}, f=600Hz \sim 20KHz$		0.016		%

Note: 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) pins.
 2. $\Delta R_{ON}=R_{ON(MAX)}-R_{ON(MIN)}$ measured at identical V_{CC} , temperature and voltage levels.
 3. OFF Isolation = $20 \log_{10} [V_A/V_{Bn}]$

■ DYNAMIC CHARACTERISTICS ($T_a=25^\circ C, R_U=R_D=500\Omega, C_L=50pF$)

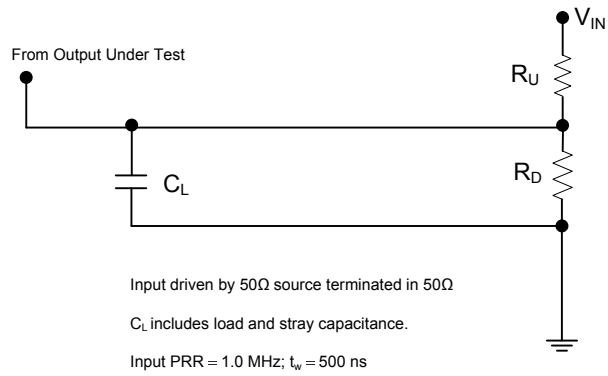
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay Bus to Bus (Note)	t_{PHL}, t_{PLH}	$V_{CC}=4.5 \sim 5.5V, V_{IN}=OPEN$		0.35	1.0	ns
		$V_{CC}=3.0 \sim 3.6V, V_{IN}=OPEN$		0.7	1.5	
		$V_{CC}=2.3 \sim 2.7V, V_{IN}=OPEN$		1.1	2.5	
		$V_{CC}=1.65 \sim 1.95V, V_{IN}=OPEN$		2.0	4.0	
Output Enable Time Turn ON Time	t_{PZL}, t_{PZH}	$V_{CC}=4.5 \sim 5.5V, V_{IN}=0V$ for t_{PZH} , $V_{IN}=2xV_{CC}$ for t_{PZL}	0.8	2.0	3.2	ns
		$V_{CC}=3.0 \sim 3.6V, V_{IN}=0V$ for t_{PZH} , $V_{IN}=2xV_{CC}$ for t_{PZL}	1.2	2.5	3.9	
		$V_{CC}=2.3 \sim 2.7V, V_{IN}=0V$ for t_{PZH} , $V_{IN}=2xV_{CC}$ for t_{PZL}	1.5	3.2	5.6	
		$V_{CC}=1.65 \sim 1.95V, V_{IN}=0V$ for t_{PZH} , $V_{IN}=2xV_{CC}$ for t_{PZL}	2.5	5.7	10	
Output Disable Time Turn OFF Time	t_{PLZ}, t_{PHZ}	$V_{CC}=4.5 \sim 5.5V, V_{IN}=0V$ for t_{PHZ} , $V_{IN}=2xV_{CC}$ for t_{PLZ}	0.8	2.6	4.1	ns
		$V_{CC}=3.0 \sim 3.6V, V_{IN}=0V$ for t_{PHZ} , $V_{IN}=2xV_{CC}$ for t_{PLZ}	1.5	3.4	5.0	
		$V_{CC}=2.3 \sim 2.7V, V_{IN}=0V$ for t_{PHZ} , $V_{IN}=2xV_{CC}$ for t_{PLZ}	2.0	4.2	6.9	
		$V_{CC}=1.65 \sim 1.95V, V_{IN}=0V$ for t_{PHZ} , $V_{IN}=2xV_{CC}$ for t_{PLZ}	3.0	6.2	10.5	

Note: This parameter is guaranteed by design. The switch contributes no propagation delay other than the RC delay of the On resistance of the switch and the 50pF load capacitance.

■ CAPACITANCE

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Control Pin Input Capacitance	C_{IN}	$V_{CC}=0V$		2.5		pF
Switch Port Off Capacitance	$C_{I/O(OFF)}$	$V_{CC}=5.0V$		5		pF
Switch Port Capacitance when Switch is Enabled	$C_{I/O(ON)}$	$V_{CC}=5.0V$		10		pF

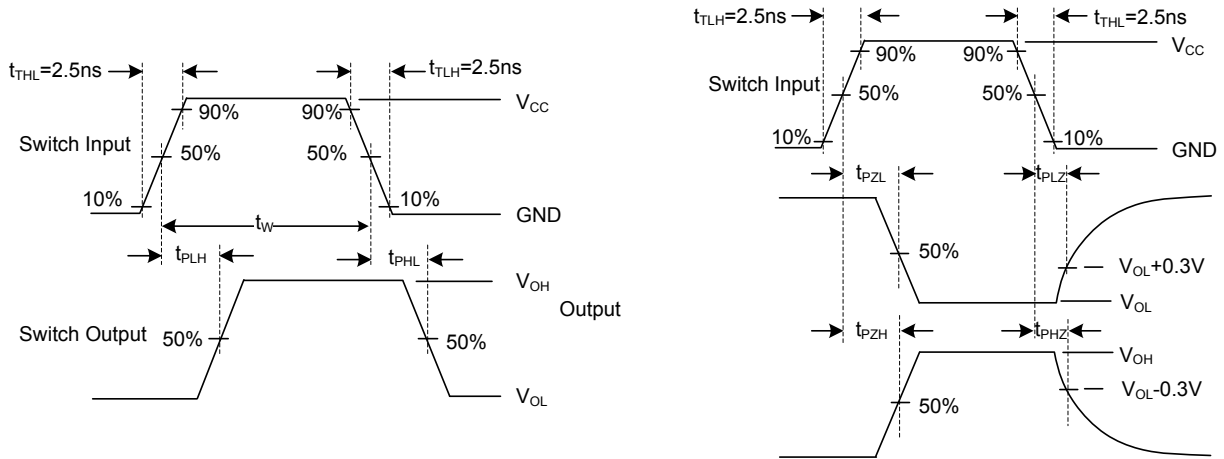
■ TEST CIRCUIT



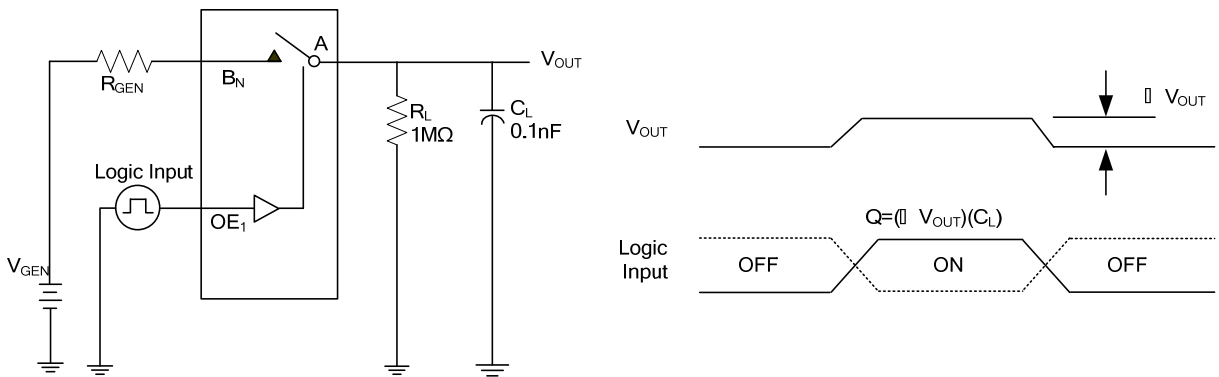
AC Test Circuit

■ AC LOADING AND WAVEFORMS

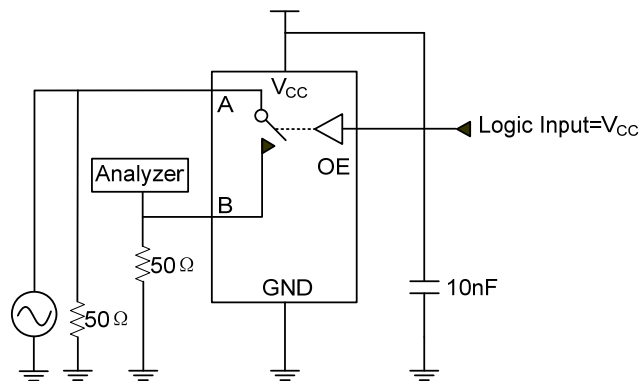
AC Waveforms



Charge Injection Test

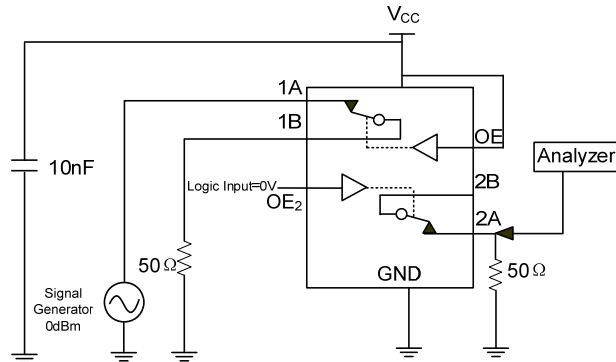


OFF Isolation

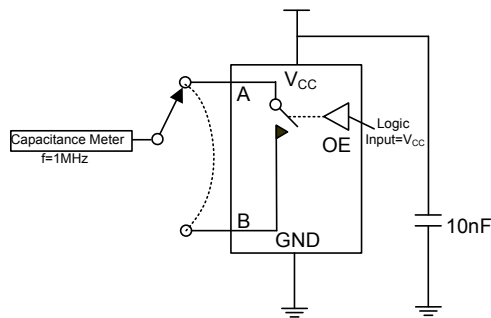


■ AC LOADING AND WAVEFORMS(Cont.)

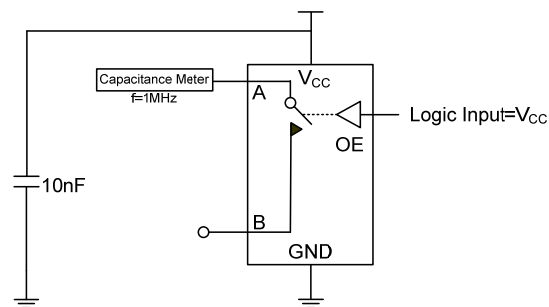
Crosstalk



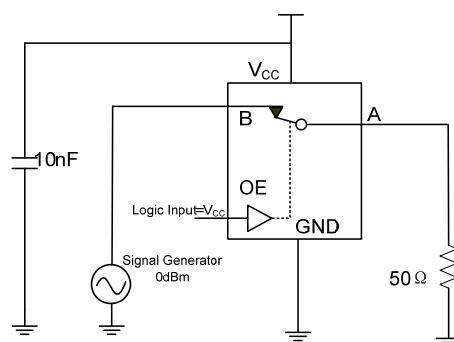
Channel OFF Capacitance



Channel ON Capacitance



Bandwidth



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