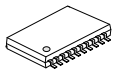
U74HC640

CMOS IC

OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS



SSOP-20

■ DESCRIPTION

The **U74HC640** is a octal bus transceivers with 3-state outputs. It is designed for asynchronous two-way communication between data buses. Depending on the direction-control (DIR) input, data are transmitted from the A bus to the B bus or from the B bus to the A bus.

When $\overline{OE}$ is high, the buses are effectively isolated. When $\overline{OE}$ is low, the buses are enable.

■ FEATURES

* Wide Supply Voltage Range from 2V to 6V
* Typical t_{PD} of 8ns at 6V, C_L=50pF
* Low Power Consumption, I_{CC} = 8μA (Max) at 5.5V
* ±7.8mA Output Driver at 6V

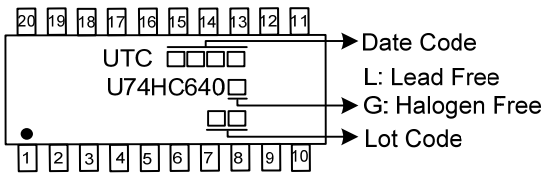
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC640L-R20-R	U74HC640G-R20-R	SSOP-20	Tape Reel

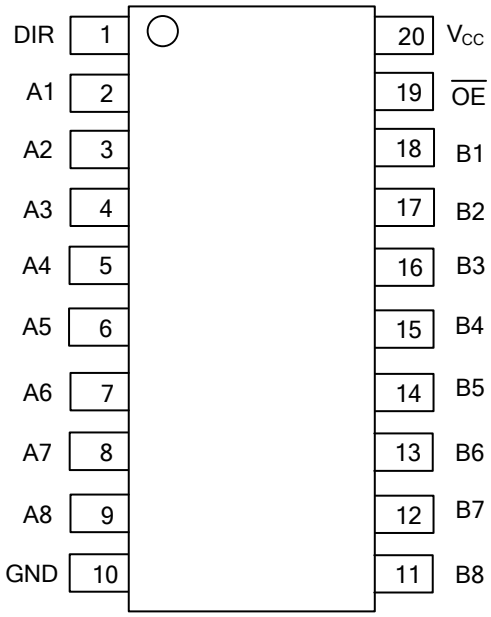
U74HC640G-R20-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) R20: SSOP-20
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



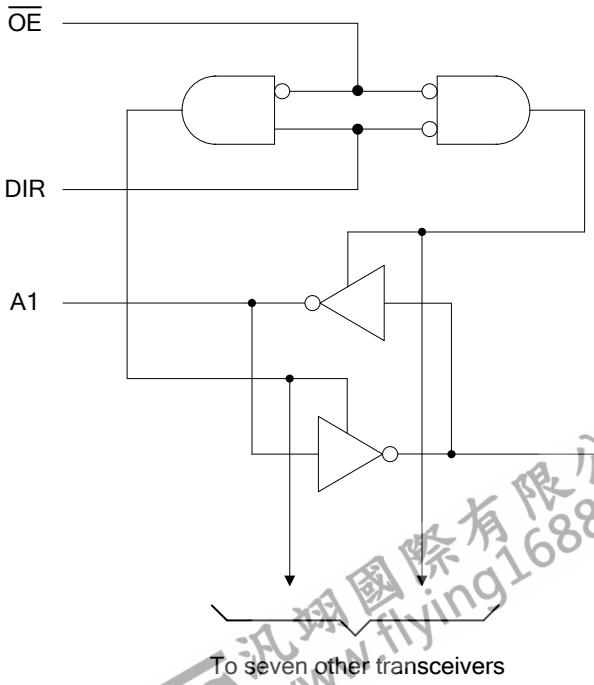
■ PIN CONFIGURATION



■ FUNCTION TABLE

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	$\overline{B}$ data to A bus
L	H	$\overline{A}$ data to B bus
H	X	Isolation

■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5~7	V
Input Voltage	V_{IN}	-0.5~7	V
Output Voltage	V_{OUT}	-0.5~V_{CC} +0.5	V
Input Clamp Current (V_{IN}<0)	I_{IK}	±20	mA
Output Clamp Current (V_{OUT}<0, or V_{OUT}>V_{CC})	I_{OK}	±20	mA
Output Current	I_{OUT}	±35	mA
V_{CC} or GND Current	I_{CC}	±70	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. 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.

■ RECOMMENDED OPERATING COMDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2	5	6	V
High-Level Input Voltage	V_{IH}	V_{CC} = 2V	1.5			V
		V_{CC} = 4.5V	3.15			
		V_{CC} = 6V	4.2			
Low-Level Input Voltage	V_{IL}	V_{CC} = 2V			0.5	V
		V_{CC} = 4.5V			1.35	
		V_{CC} = 6V			1.8	
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	Δt/Δv	V_{CC} = 2V			1000	ns/V
		V_{CC} = 4.5V			500	
		V_{CC} = 6V			400	
Operating Temperature	T_A		-40		85	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	I_{OH} = -20μA, V_{CC} = 2V	1.9	1.998		V
		I_{OH} = -20μA, V_{CC} = 4.5V	4.4	4.499		
		I_{OH} = -20μA, V_{CC} = 6V	5.9	5.999		
		I_{OH} = -6mA, V_{CC} = 4.5V	3.98	4.3		
		I_{OH} = -7.8mA, V_{CC} = 6V	5.48	5.8		
Low-Level Output Voltage	V_{OL}	I_{OL} = 20μA, V_{CC} = 2V		0.002	0.1	V
		I_{OL} = 20μA, V_{CC} = 4.5V		0.001	0.1	
		I_{OL} = 20μA, V_{CC} = 6V		0.001	0.1	
		I_{OL} = 6mA, V_{CC} = 4.5V		0.17	0.26	
		I_{OL} = 7.8mA, V_{CC} = 6V		0.15	0.26	
Input Leakage Current(DIR or $\overline{OE}$)	$I_{I(LEAK)}$	V_{IN} = V_{CC} or 0, V_{CC} = 6V		±0.1	±100	μA
High-Impedance State Current (A or B)	I_{OZ}	V_{OUT} = V_{CC} or 0, V_{CC} = 6V		±0.01	±0.5	μA
Quiescent Supply Current	I_{CC}	V_{IN}=V_{CC} or 0,I_{OUT}=0,V_{CC}=6V			8	μA
Input Capacitance (DIR or $\overline{OE}$)	C_{IN}	V_{IN}=V_{CC} or 0,V_{CC}=2V to 6V		3	10	pF

■ SWITCHING CHARACTERISTICS (T_A =25°C)

For C_L=50pF, R_L=1kΩ

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay from A to B or B to A	t_{PD}	V_{CC}=2V		29	105	ns
		V_{CC}=4.5V		10	21	
		V_{CC}=6V		8	18	
Enable Times from $\overline{OE}$ to A or B	t_{EN}	V_{CC}=2V		109	230	ns
		V_{CC}=4.5V		27	46	
		V_{CC}=6V		20	39	
Disable Times from $\overline{OE}$ to A or B	t_{DIS}	V_{CC}=2V		40	150	ns
		V_{CC}=4.5V		18	30	
		V_{CC}=6V		16	26	
Output Rise or fall Time	t_T	V_{CC}=2V		20	60	ns
		V_{CC}=4.5V		8	12	
		V_{CC}=6V		6	10	

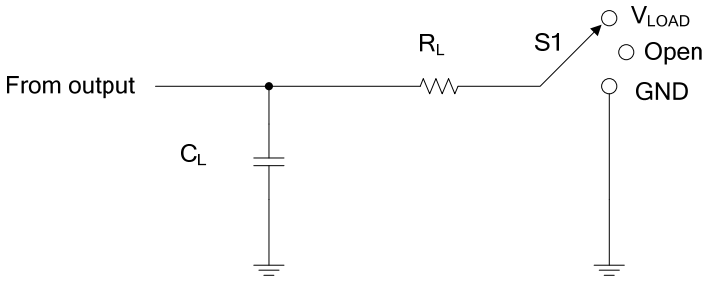
For C_L=150pF, R_L=1kΩ

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay from A to B or B to A	t_{PD}	V_{CC}=2V		44	190	ns
		V_{CC}=4.5V		14	38	
		V_{CC}=6V		11	33	
Enable Times from $\overline{OE}$ to A or B	t_{EN}	V_{CC}=2V		124	315	ns
		V_{CC}=4.5V		31	63	
		V_{CC}=6V		23	54	
OUTPUT rise or fall Time	t_T	V_{CC}=2V		45	210	ns
		V_{CC}=4.5V		17	42	
		V_{CC}=6V		13	36	

■ OPERATING CHARACTERISTICS (T_A =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	UNIT
Power Dissipation Capacitance	C_{PD}	No load	40	pF

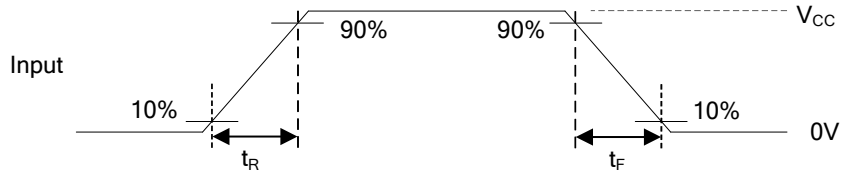
■ TEST CIRCUIT AND WAVEFORMS



Test Circuit

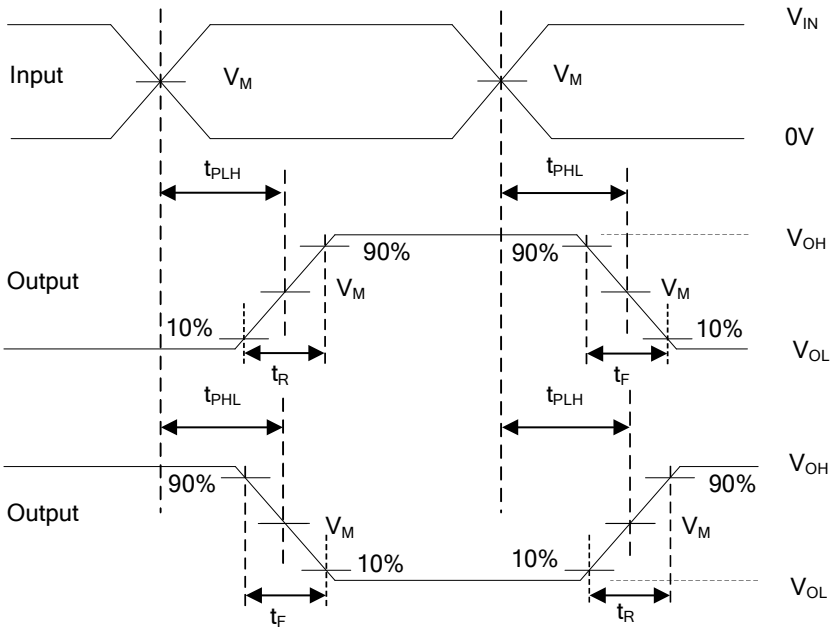
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	Input		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_{IN}	t_R, t_F					
3.3V±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	50pF 150pF	1kΩ	0.3V
5V±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	50pF 150pF	1kΩ	0.5V

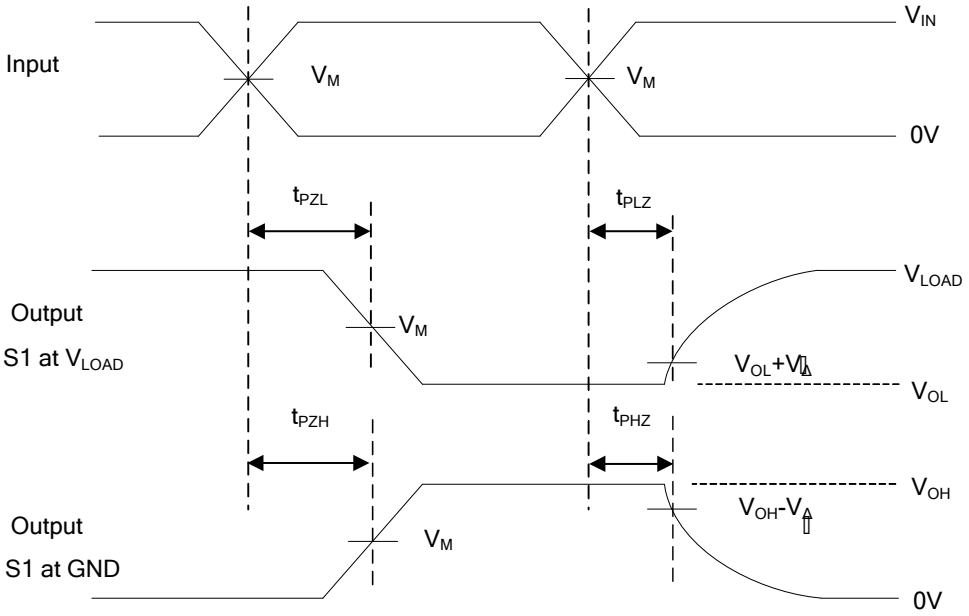


Voltage Waveforms Input Rise and Fall Times

■ TEST CIRCUIT AND WAVEFORMS(Cont.)



Voltage Waveforms Propagation Delay and Output Transition Times



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES

Notes: 1. C_L includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: P_{RR} ≤1MHz, Z_O = 50Ω, t_R=6ns, t_F=6ns.
3. t_{PLH} and t_{PHL} are the same as t_{PD} .
4. t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
5. t_{PZH} and t_{PZL} are the same as t_{EN} .