TC74AC245,640
Octal Bus Transceivers

245: 3-STATE, NON-INVERTING
640: 3-STATE, INVERTING

Features:

- **High Speed:** t_{pd} = 3.9ns (typ.) at V_{CC} = 5V
- **Low Power Dissipation:** I_{CC} = 8μA (max.) at Ta = 25°C
- **High Noise Immunity:** $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min.)
- **Symmetrical Output Impedance:** $|I_{OH}| = I_{OL}$ = 24mA (min.). Capability of driving 50Ω transmission lines.
- **Balanced Propagation Delays:** $t_{pLH} = t_{pHL}$
- **Wide Operating Voltage Range:** V_{CC}(opr)=2V~5.5V
- **Pin and Function Compatible with 74F245/640/643**
- **AC245 and AC640 Available in DIP, SOIC, SOP and SSOP Packages.**

The TC74AC245 and 640 are advanced high speed CMOS OCTAL BUS TRANSCEIVERS fabricated with silicon gate and double-layer metal wiring C²MOS technology.

They achieve the high speed operation similar to equivalent Bipolar Schottky TTL, while maintaining the CMOS low power dissipation.

They are intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

The enable input ($\overline{G}$) can be used to disable the device so that the busses are effectively isolated.

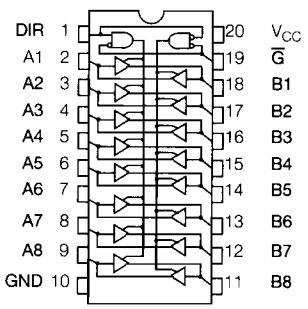
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Application Notes

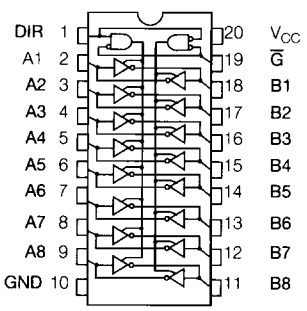
1) Do not apply a signal to any bus terminal when it is in the output mode. Damage may result.
2) All floating (high impedance) bus terminals must have their input levels fixed by means of pull up and down resistors or bus terminator ICs such as the TOSHIBA TC40117BP.

Pin Assignment

TC74AC245



TC74AC640



Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5~7.0	V
DC Input Voltage	V_{IN}	-0.5~V_{CC} + 0.5	V
DC Output Voltage	V_{OUT}	-0.5~V_{CC} + 0.5	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC}/Ground Current	I_{CC}	±200	mA
Power Dissipation	P_D	500 (DIP) */180 (SOP)	mW
Storage Temperature	T_{stg}	-65~150	°C
Lead Temperature 10sec	T_L	300	°C

* 500mW in the range of Ta = -40°C~65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C should be applied up to 300mW.

Recommended Operating Conditions

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	V
Input Voltage	V_{IN}	0~V_{CC}	V
Output Voltage	V_{OUT}	0~V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 (V_{CC} = 3.3 ± 0.3V) 0~20 (V_{CC} = 5 ± 0.5V)	ns/v

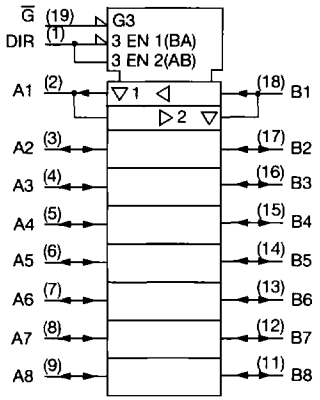
DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta = 25°C Min.	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40~85°C Min.	Ta = -40~85°C Max.	UNIT
High-Level Input Voltage	V_{IH}	—		2.0	1.50	—	—	1.50	—	V
				3.0	2.10	—	—	2.10	—	
				5.5	3.85	—	—	3.85	—	
Low-Level Input Voltage	V_{IL}	—		2.0	—	—	0.50	—	0.50	V
				3.0	—	—	0.90	—	0.90	
				5.5	—	—	1.65	—	1.65	
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -50μA	2.0	1.9	2.0	—	1.9	—	V
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			I_{OH} = -4mA	3.0	2.58	—	—	2.48	—	
			I_{OH} = -24mA	4.5	3.94	—	—	3.80	—	
			I_{OH} = -75mA*	5.5	—	—	—	3.85	—	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	2.0	—	0.0	0.1	—	0.1	V
				3.0	—	0.0	0.1	—	0.1	
				4.5	—	0.0	0.1	—	0.1	
			I_{OL} = 12mA	3.0	—	—	0.36	—	0.44	
			I_{OL} = 24mA	4.5	—	—	0.36	—	0.44	
			I_{OL} = 75mA*	5.5	—	—	—	—	1.65	
3-State Output Off-State Current	I_{OZ}	V_{IN}=V_{IH} or V_{IL} V_{OUT}=V_{CC} or GND		5.5	—	—	±0.5	—	±5.0	μA
				5.5	—	—	±0.5	—	±5.0	
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		5.5	—	—	±0.1	—	±1.0	
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	8.0	—	80.0	

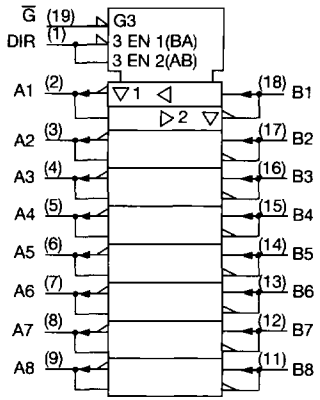
* This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.

Pin Assignment

TC74AC245



TC74AC640



Truth Table

INPUTS		FUNCTION		OUTPUTS	
$\overline{G}$	DIR	A BUS	B BUS	AC245	AC640
L	L	OUTPUT	INPUT	A = B	A = $\overline{B}$
L	H	INPUT	OUTPUT	B = A	B = $\overline{A}$
H	X	High Impedance		Z	Z

X: Don't Care
Z: High Impedance

AC Electrical Characteristics (C_L = 50pF, R_L = 500Ω, Input $t_r = t_f$ = 3ns)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT
			V_{CC}	Min.	Typ.	Max.	Min.	Max.	
Propagation Delay Time *(2)	t_{pLH} t_{pHL}	—	3.3±0.5	—	7.0	10.9	1.0	12.4	ns
			5.0±0.5	—	5.0	7.5	1.0	8.5	
Propagation Delay Time * *(2)	t_{pLH} t_{pHL}	—	3.3±0.5	—	6.4	10.0	1.0	11.4	
			5.0±0.5	—	4.8	7.0	1.0	8.0	
Output Enable Time	t_{pZL} t_{pZH}	—	3.3±0.5	—	9.3	15.3	1.0	17.4	
			5.0±0.5	—	7.1	10.5	1.0	12.0	
Output Disable Time	t_{pLZ} t_{pHZ}	—	3.3±0.5	—	7.1	11.4	1.0	13.0	
			5.0±0.5	—	5.9	8.7	1.0	10.0	
Input Capacitance	C_{IN}	DIR, $\overline{G}$		—	5	10	—	10	pF
Bus Input Capacitance	$C_{I/O}$	An, Bn		—	13	—	—	—	
Power Dissipation Capacitance	C_{PD} [1]	TC74AC245		—	38	—	—	—	
		TC74AC640		—	38	—	—	—	

Note (1): C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC\ (opr)} = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}/8$(per bit).

(2): * For TC74AC245 only.
** For TC74AC640 only.