

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74AC245P, TC74AC245F, TC74AC245FW, TC74AC245FT**  
**TC74AC640P, TC74AC640F, TC74AC640FW, TC74AC640FT**

**OCTAL BUS TRANSCEIVER**

**TC74AC245P/F/FW/FT 3 - STATE, NON - INVERTING**  
**TC74AC640P/F/FW/FT 3 - STATE, INVERTING**

(Note) The JEDEC SOP (FW) is not available in Japan.

The TC74AC245, 640 are advanced high speed CMOS OCTAL BUS TRANSCEIVERS fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

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

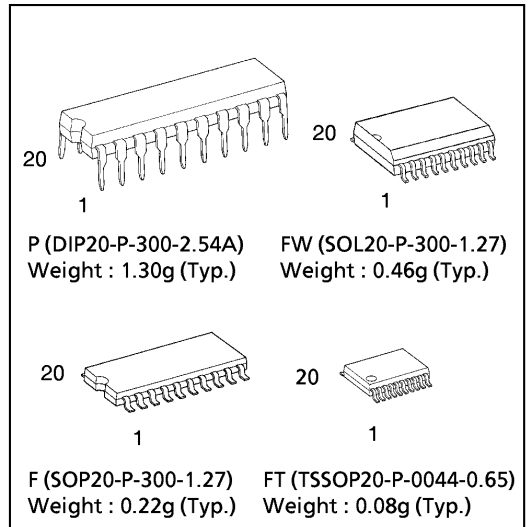
They are intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

The enable input ( $\bar{G}$ ) 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.

**FEATURES :**

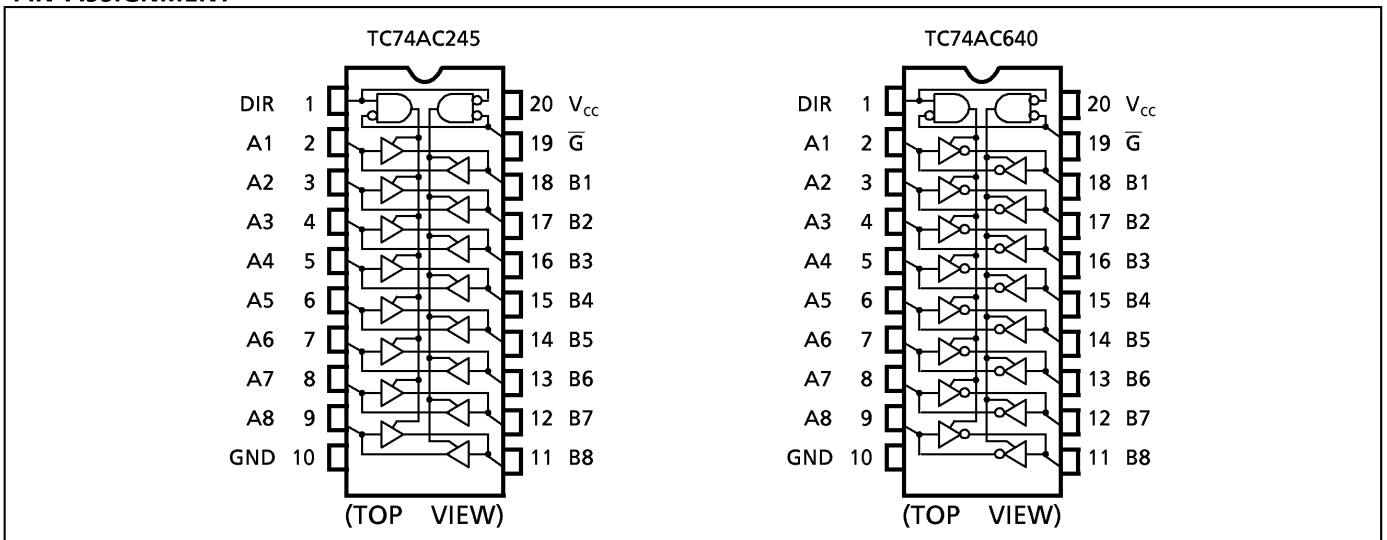
- High Speed..... $t_{pd} = 3.9ns(typ.)$  at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 8\mu A(Max.)$  at  $T_a = 25^\circ C$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC} (Min.)$
- Symmetrical Output Impedance...  $|I_{OH}| = |I_{OL}| = 24mA(Min.)$   
 Capability of driving  $50\Omega$  transmission lines.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range.... $V_{CC} (opr) = 2V \sim 5.5V$
- Pin and Function Compatible with 74F245 / 640



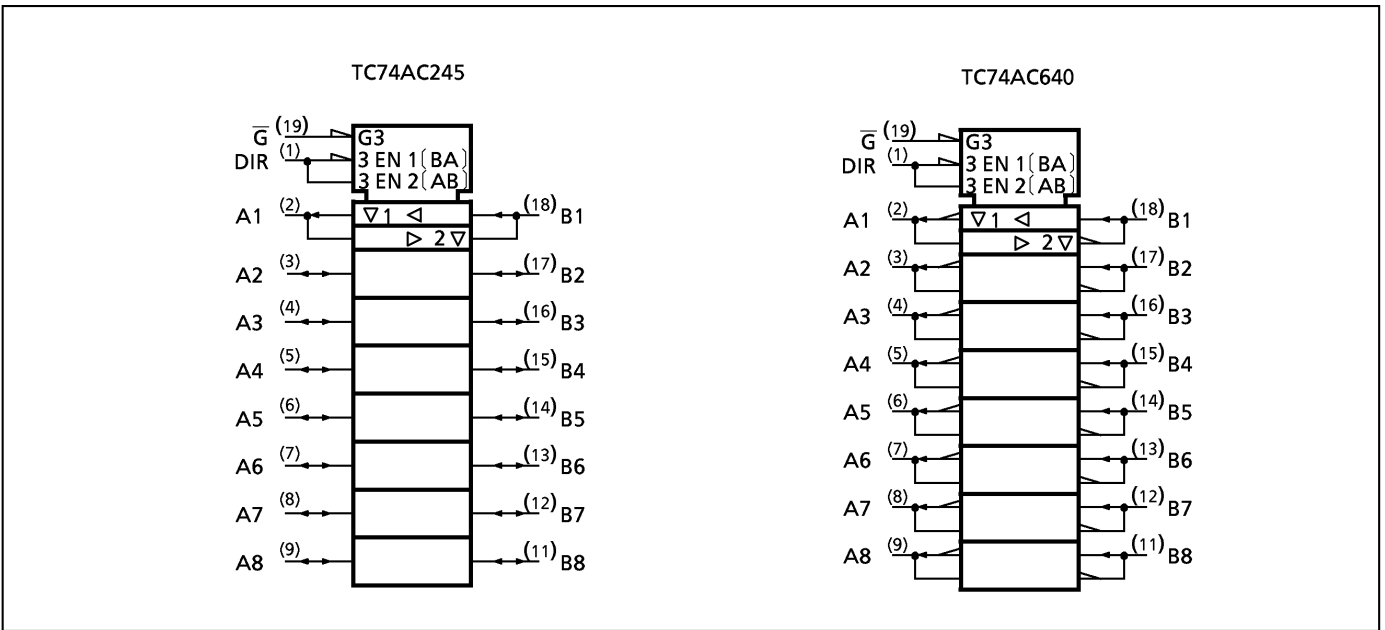
**APPLICATION NOTES**

- 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 or pull down resistors.

**PIN ASSIGNMENT**



IEC LOGIC SYMBOL



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

## 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/TSSOP)	mW
Storage Temperature	$T_{stg}$	-65~150	°C

\*500mW in the range of  $T_a = -40^{\circ}\text{C} \sim 65^{\circ}\text{C}$ . From  $T_a = 65^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  a derating factor of  $-10\text{mW}/^{\circ}\text{C}$  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 ( $V_{CC} = 3.3 \pm 0.3\text{V}$ ) 0~20 ( $V_{CC} = 5 \pm 0.5\text{V}$ )	ns/V

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	$V_{CC}$ (V)	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \sim 85^{\circ}\text{C}$		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
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 $V_{IL}$	$I_{OH} = -50\mu\text{A}$	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		—
				5.5	—	—	—	—		—
			$I_{OH} = -4\text{mA}$ $I_{OH} = -24\text{mA}$ $I_{OH} = -75\text{mA}^*$	3.0	2.58	—	—	2.48	V	
				4.5	3.94	—	—	3.80		—
				5.5	—	—	—	3.85		—
				—	—	—	—	—		—
Low - Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 50\mu\text{A}$	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	
				5.5	—	—	—	—	—	
			$I_{OL} = 12\text{mA}$ $I_{OL} = 24\text{mA}$ $I_{OL} = 75\text{mA}^*$	3.0	—	—	0.36	—	0.44	V
				4.5	—	—	0.36	—	0.44	
				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	$\mu\text{A}$	
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  $50\Omega$  transmission lines.  
One output should be tested at a time for a 10ms maximum duration.

AC ELECTRICAL CHARACTERISTICS (  $C_L = 50\text{pF}$ ,  $R_L = 500\Omega$ , Input  $t_r = t_f = 3\text{ns}$  )

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT	
			V <sub>CC</sub> (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Propagation Delay Time*	t <sub>pLH</sub> t <sub>pHL</sub>		3.3 ± 0.3	—	7.0	10.9	1.0	12.4	ns
			5.0 ± 0.5	—	5.0	7.5	1.0	8.5	
Propagation Delay Time**	t <sub>pLH</sub> t <sub>pHL</sub>		3.3 ± 0.3	—	6.4	10.0	1.0	11.4	
			5.0 ± 0.5	—	4.8	7.0	1.0	8.0	
Output Enable Time	t <sub>pZL</sub> t <sub>pZH</sub>		3.3 ± 0.3	—	9.3	15.3	1.0	17.4	
			5.0 ± 0.5	—	7.1	10.5	1.0	12.0	
Output Disable Time	t <sub>pLZ</sub> t <sub>pHZ</sub>		3.3 ± 0.3	—	7.1	11.4	1.0	13.0	
			5.0 ± 0.5	—	5.9	8.7	1.0	10.0	
Input Capacitance	C <sub>IN</sub>	DIR, $\bar{G}$	—	5	10	—	10	pF	
Bus Input Capacitance	C <sub>I/O</sub>	An, Bn	—	13	—	—	—		
Power Dissipation Capacitance	C <sub>PD</sub> (1)	TC74AC245	—	38	—	—	—		
		TC74AC640	—	36	—	—	—		

Note (1) C<sub>PD</sub> 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 :

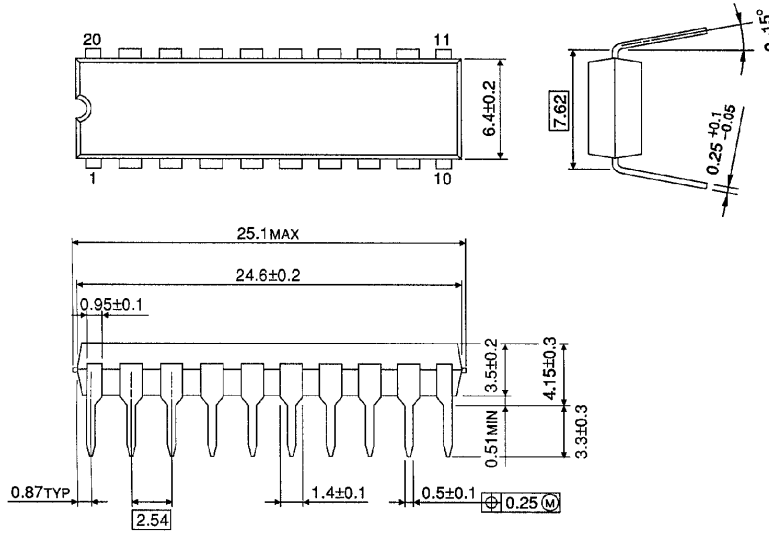
$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} \cdot I_{CC} / 8(\text{per bit})$$

(2) \* for TC74AC245 only

\*\* for TC74AC640 only

**DIP 20PIN PACKAGE DIMENSIONS (DIP20-P-300-2.54A)**

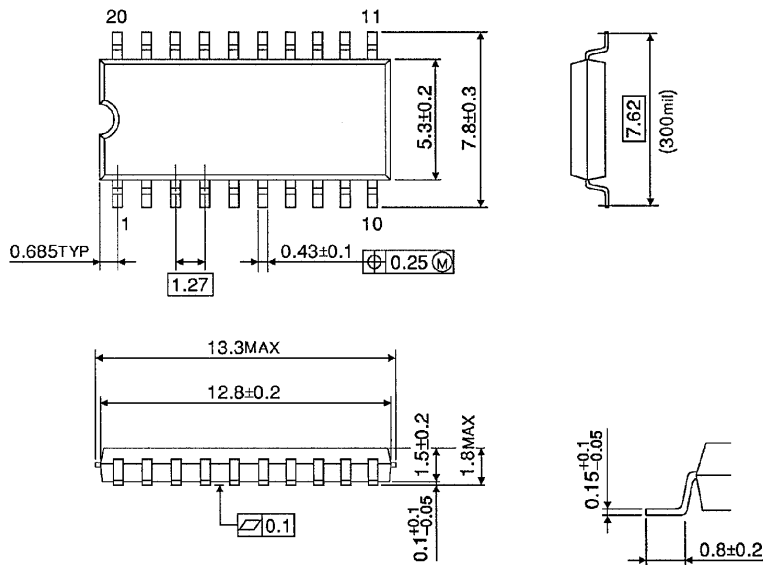
Unit in mm



Weight : 1.30g (Typ.)

**SOP 20PIN (200mil BODY) PACKAGE DIMENSIONS (SOP20-P-300-1.27)**

Unit in mm

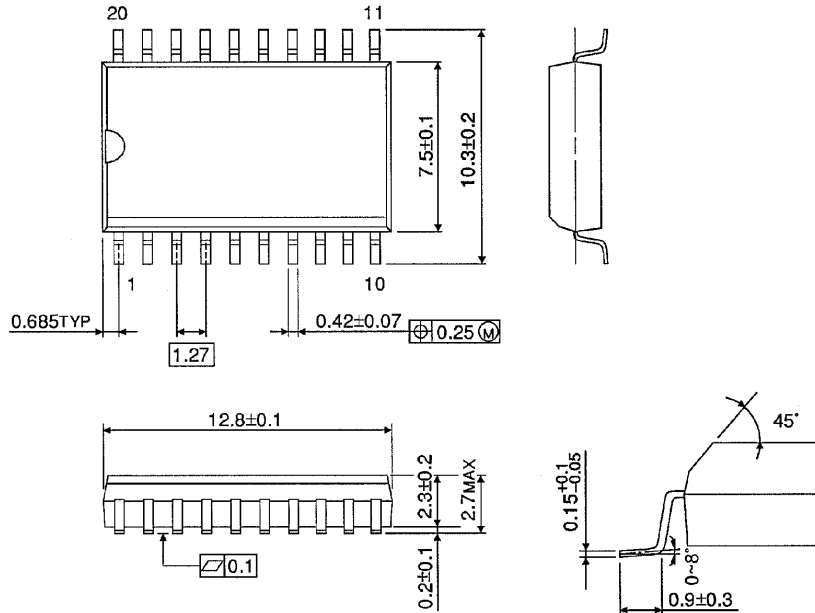


Weight : 0.22g (Typ.)

**SOP 20PIN (300mil BODY) PACKAGE DIMENSIONS (SOL20-P-300-1.27)**

Unit in mm

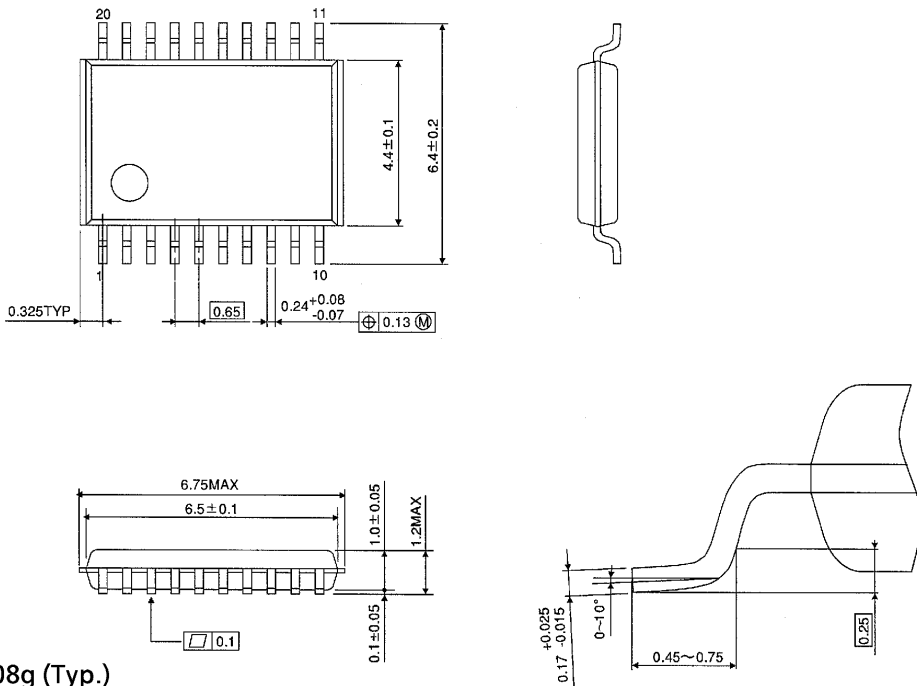
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

**TSSOP 20PIN PACKAGE DIMENSIONS (TSSOP20-P-0044-0.65)**

Unit in mm



Weight : 0.08g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

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