

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.

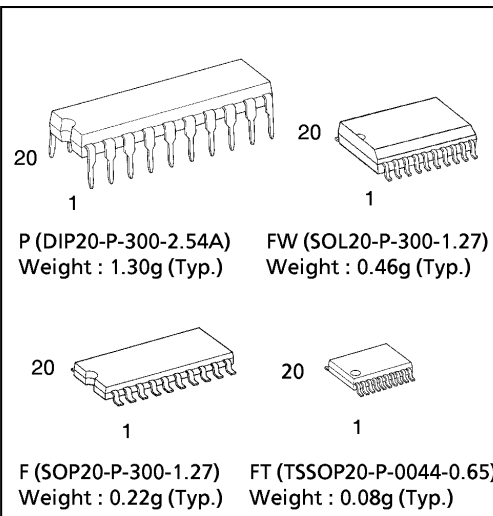
They are intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

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 :**

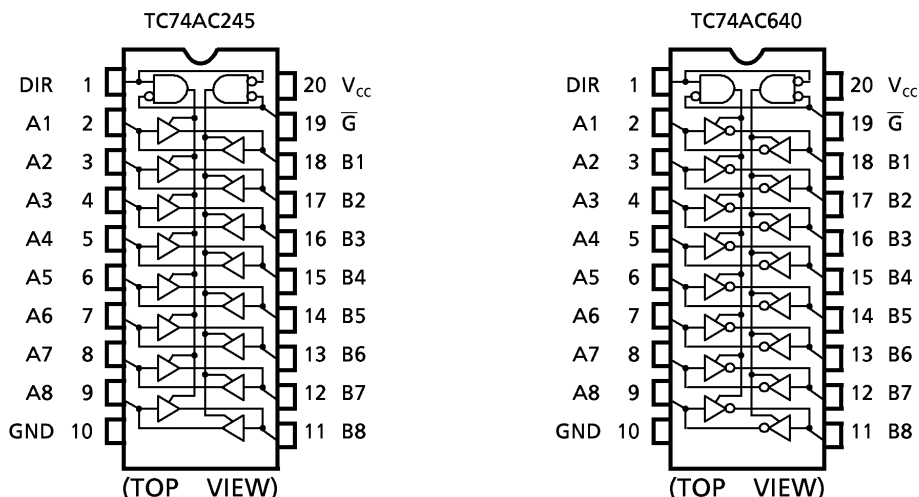
- High Speed..... $t_{pd} = 3.9ns$ (typ.) at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 8\mu A$ (Max.) at  $T_a = 25^\circ C$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (Min.)
- Symmetrical Output Impedance...  $|I_{OH}| = |I_{OL}| = 24mA$ (Min.)  
 Capability of driving  $50\Omega$  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.

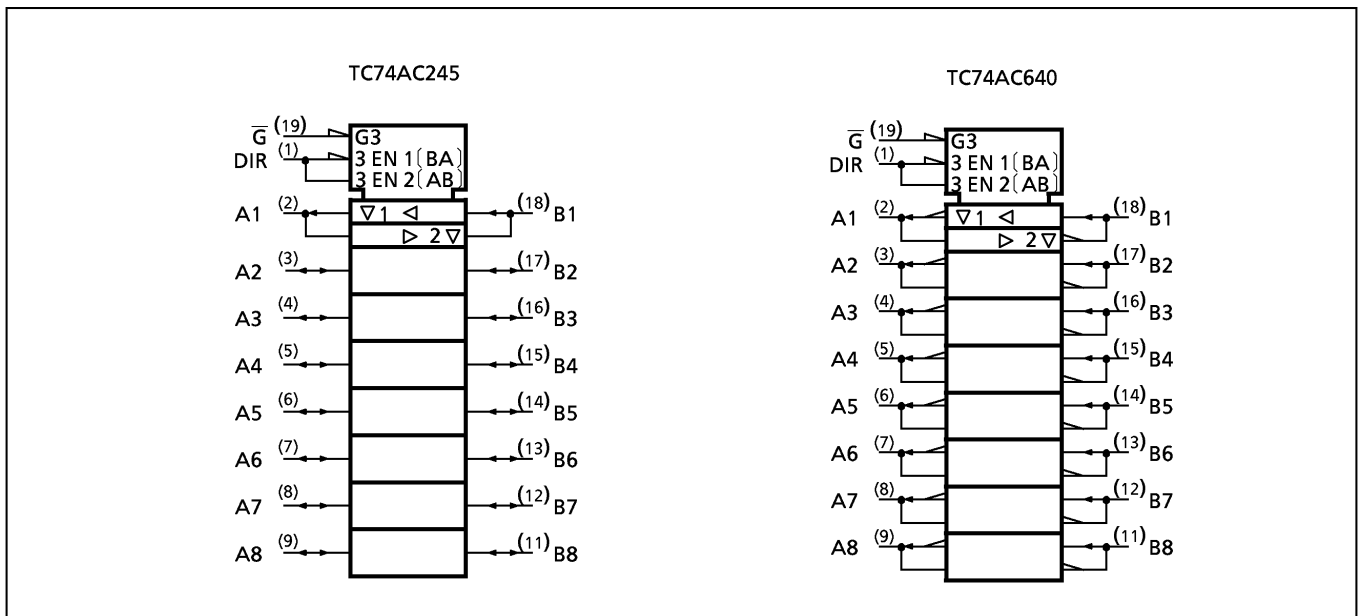
**PIN ASSIGNMENT**



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IEC LOGIC SYMBOL



TRUTH TABLE

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

X : Don't Care  
Z : High Impedance

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**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V <sub>CC</sub>	- 0.5~7.0	V
DC Input Voltage	V <sub>IN</sub>	- 0.5~V <sub>CC</sub> + 0.5	V
DC Output Voltage	V <sub>OUT</sub>	- 0.5~V <sub>CC</sub> + 0.5	V
Input Diode Current	I <sub>IK</sub>	± 20	mA
Output Diode Current	I <sub>OK</sub>	± 50	mA
DC Output Current	I <sub>OUT</sub>	± 50	mA
DC V <sub>CC</sub> /Ground Current	I <sub>CC</sub>	± 200	mA
Power Dissipation	P <sub>D</sub>	500 (DIP)* / 180 (SOP/TSSOP)	mW
Storage Temperature	T <sub>stg</sub>	- 65~150	°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 <sub>CC</sub>	2.0~5.5	V
Input Voltage	V <sub>IN</sub>	0~V <sub>CC</sub>	V
Output Voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating Temperature	T <sub>opr</sub>	- 40~85	°C
Input Rise and Fall Time	dt / dV	0~ 100 (V <sub>CC</sub> = 3.3 ± 0.3V) 0~ 20 (V <sub>CC</sub> = 5 ± 0.5V)	ns / V

**DC ELECTRICAL CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High - Level Input Voltage	V <sub>IH</sub>		2.0	1.50	—	—	1.50	—	V	
			3.0	2.10	—	—	2.10	—		
			5.5	3.85	—	—	3.85	—		
Low - Level Input Voltage	V <sub>IL</sub>		2.0	—	—	0.50	—	0.50	V	
			3.0	—	—	0.90	—	0.90		
			5.5	—	—	1.65	—	1.65		
High - Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -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		
				5.5	—	—	—	—		
Low - Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 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	
				5.5	—	—	—	—	—	
3 - State Output Off - State Current	I <sub>OZ</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND	I <sub>OL</sub> = 12mA I <sub>OL</sub> = 24mA I <sub>OL</sub> = 75mA*	3.0	—	—	0.36	—	0.44	µA
				4.5	—	—	0.36	—	0.44	
				5.5	—	—	—	—	1.65	
				5.5	—	—	± 0.5	—	± 5.0	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	± 0.1	—	± 1.0	µA	
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> 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.

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 :

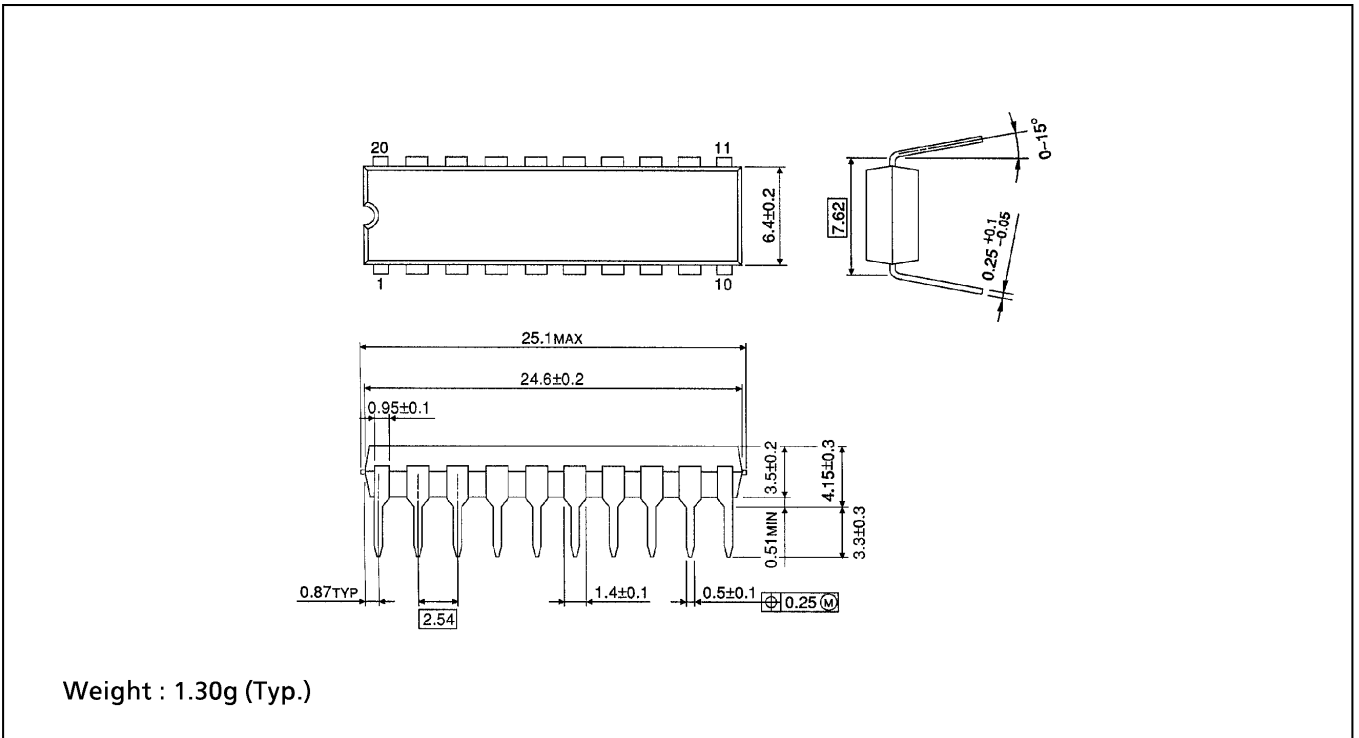
$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} \cdot I_{CC} / 8(\text{per bit})$$

(2) \* for TC74AC245 only

\*\* for TC74AC640 only

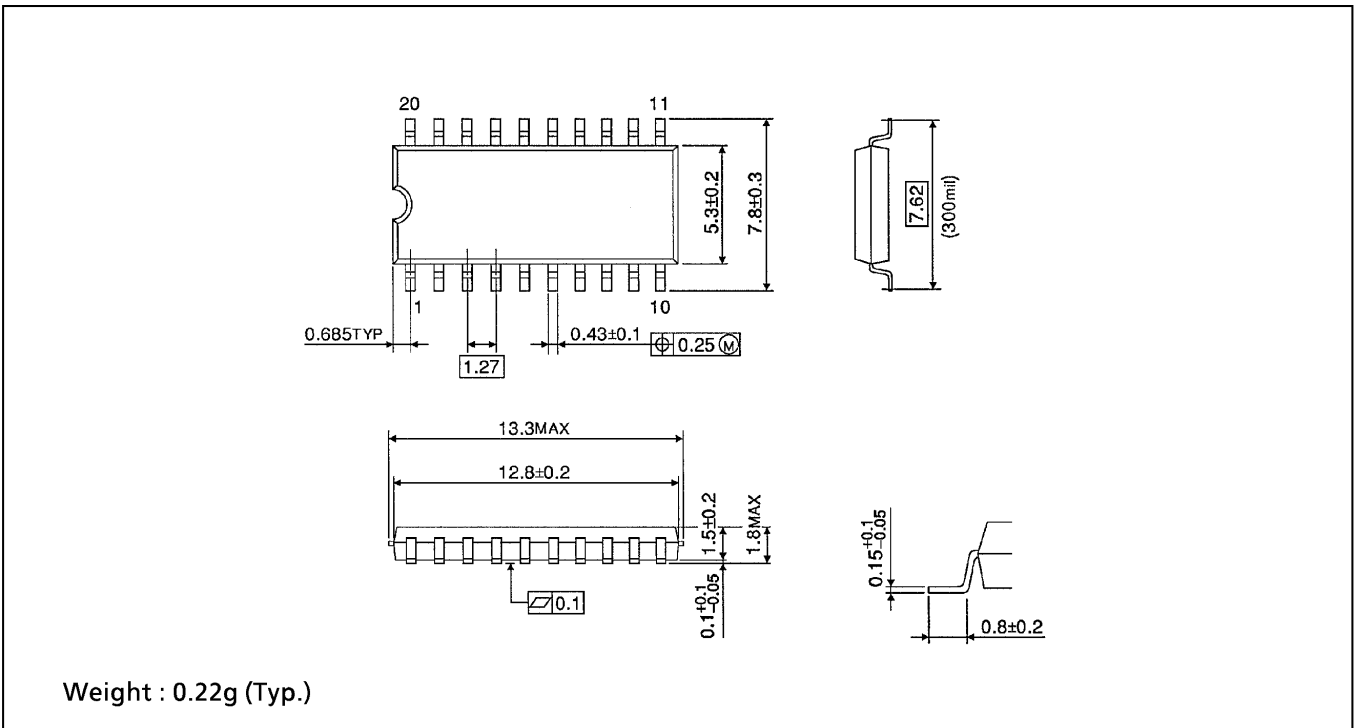
**DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A)**

Unit in mm



**SOP 20PIN (200mil BODY) OUTLINE DRAWING (SOP20-P-300-1.27)**

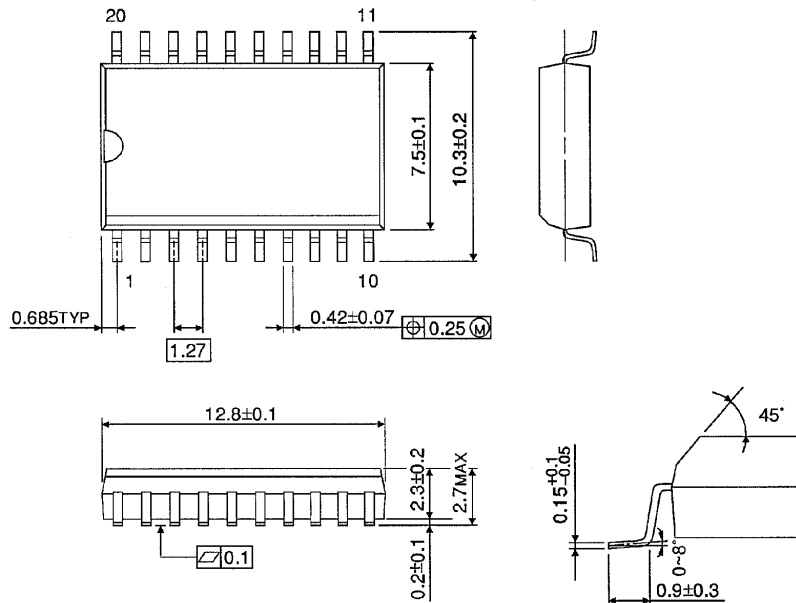
Unit in mm



**SOP 20PIN (300mil BODY) OUTLINE DRAWING (SOL20-P-300-1.27)**

Unit in mm

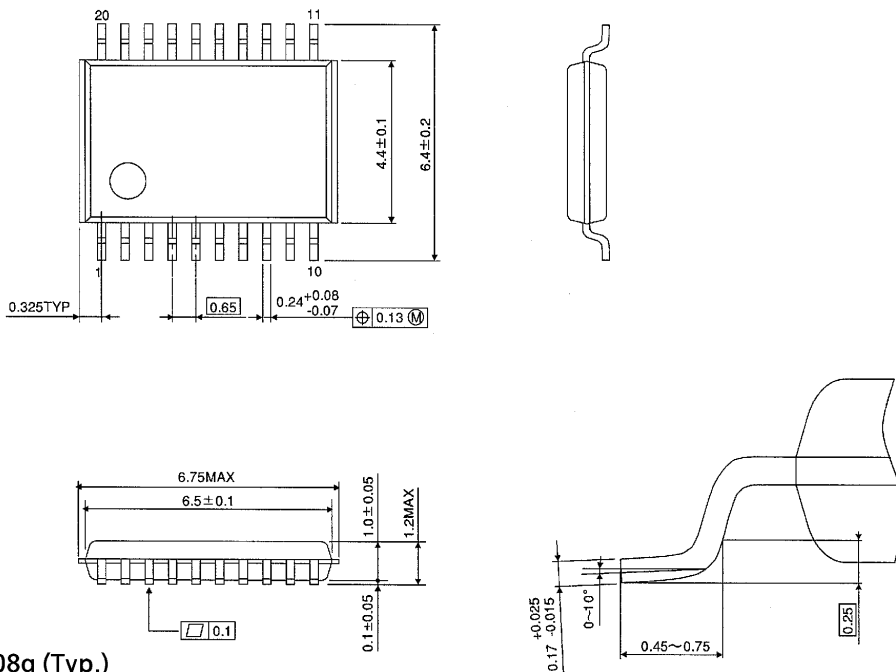
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

**TSSOP 20PIN OUTLINE DRAWING (TSSOP20-P-0044-0.65)**

Unit in mm



Weight : 0.08g (Typ.)