

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 C²MOS technology.

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

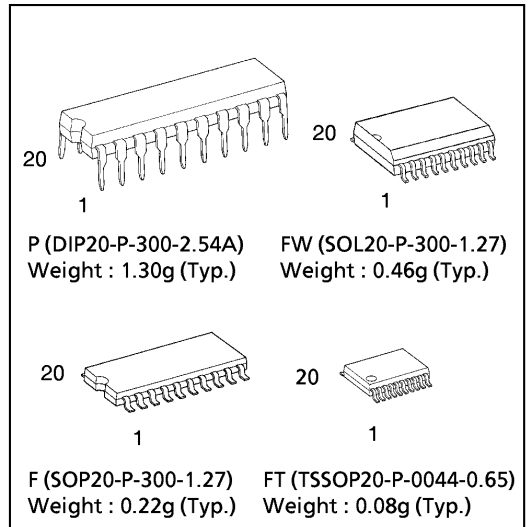
They are intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

The enable input (\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 :

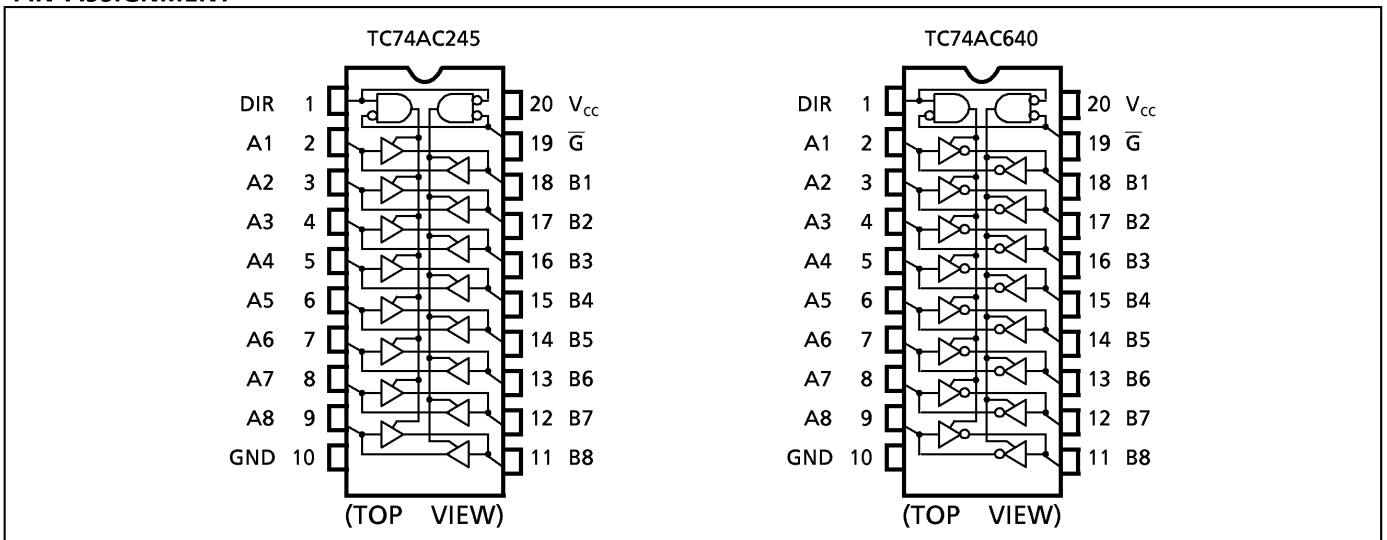
- High Speed..... $t_{pd} = 3.9ns(typ.)$ at $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 8\mu A(Max.)$ at $T_a = 25^\circ C$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC} (Min.)$
- Symmetrical Output Impedance... $|I_{OH}| = |I_{OL}| = 24mA(Min.)$
 Capability of driving 50Ω transmission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



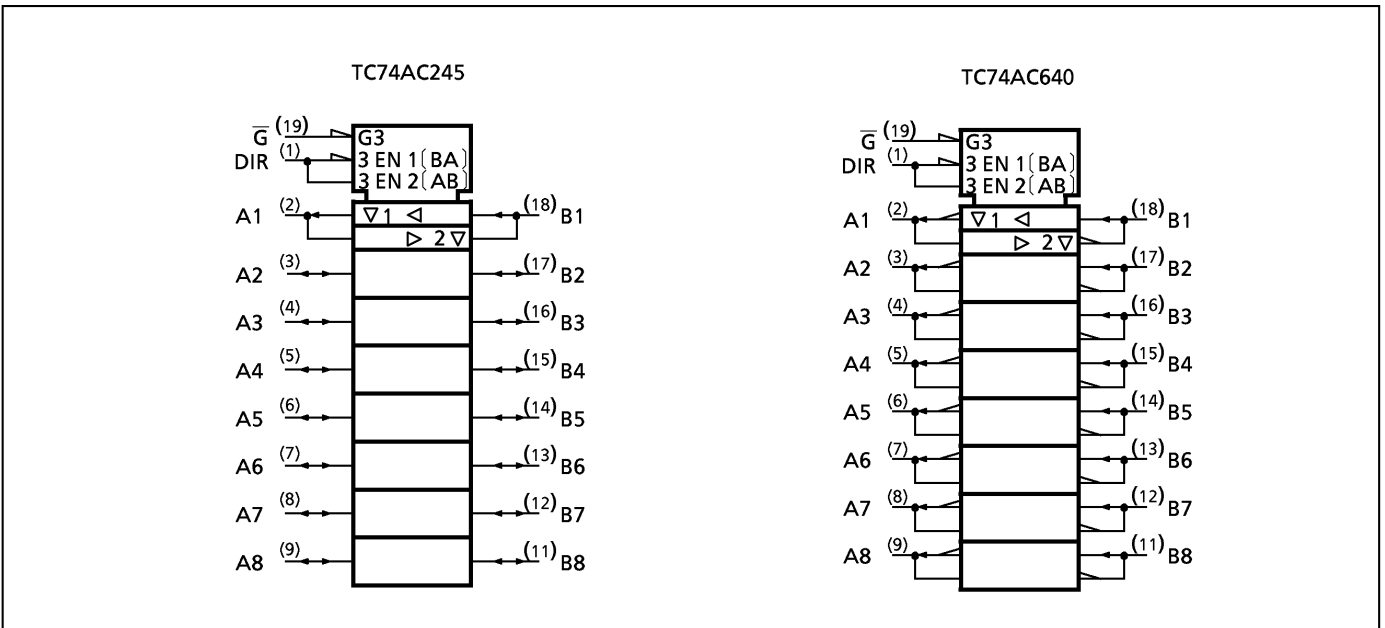
APPLICATION NOTES

- 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	
\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

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 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} (V)	Ta = 25°C			Ta = -40~85°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} = -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	—	—	—	—	
			I _{OH} = -4mA I _{OH} = -24mA I _{OH} = -75mA*	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} = 50μA	2.0	—	0.0	0.1	—	V
				3.0	—	0.0	0.1	—	
				4.5	—	0.0	0.1	—	
				5.5	—	—	—	—	
			I _{OL} = 12mA I _{OL} = 24mA I _{OL} = 75mA*	3.0	—	—	0.36	—	V
				4.5	—	—	0.36	—	
				5.5	—	—	—	0.44 0.44 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
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.

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 _{CC} (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Propagation Delay Time*	t _{pLH} t _{pHL}		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 _{pLH} t _{pHL}		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 _{pZL} t _{pZH}		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 _{pLZ} t _{pHZ}		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 _{IN}	DIR, \bar{G}	—	5	10	—	10	pF	
Bus Input Capacitance	C _{I/O}	An, Bn	—	13	—	—	—		
Power Dissipation Capacitance	C _{PD} (1)	TC74AC245	—	38	—	—	—		
		TC74AC640	—	36	—	—	—		

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 :

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

(2) * for TC74AC245 only

** for TC74AC640 only

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

Unit in mm



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

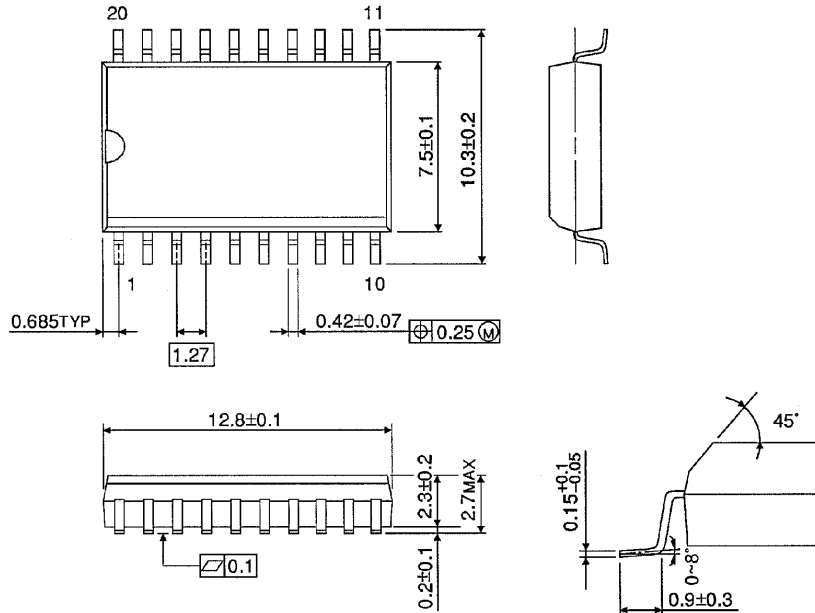
Unit in mm



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

Unit in mm

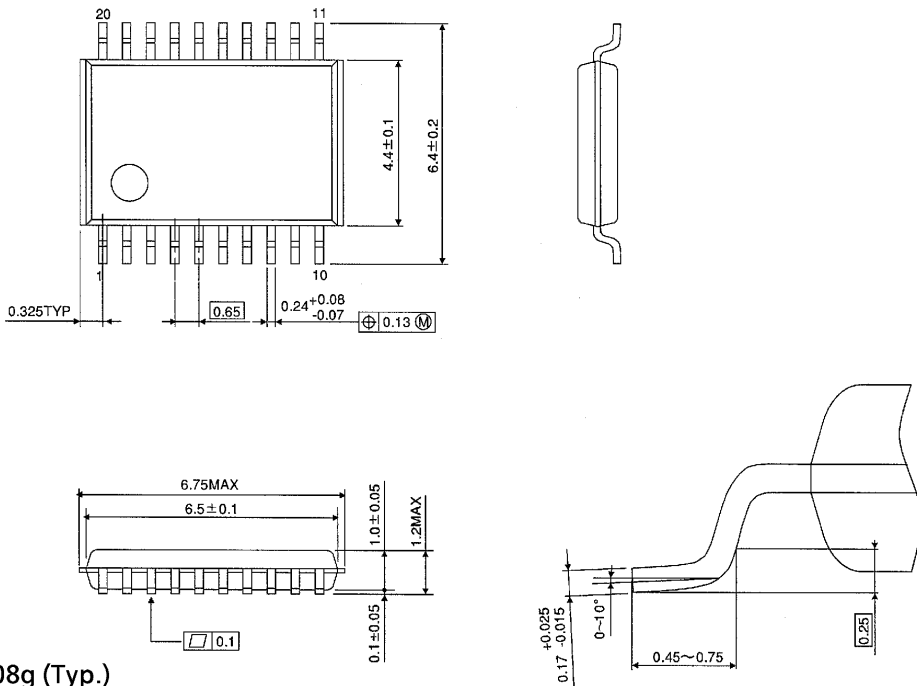
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

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

Unit in mm



Weight : 0.08g (Typ.)

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000707EBA

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