

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74ACT245P, TC74ACT245F, TC74ACT245FW, TC74ACT245FT
TC74ACT640P, TC74ACT640F, TC74ACT640FW, TC74ACT640FT

OCTAL BUS TRANSCEIVER
 TC74ACT245P/F/FW/FT 3 - STATE, NON - INVERTING
 TC74ACT640P/F/FW/FT 3 - STATE, INVERTING

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

The TC74ACT245 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.

These devices may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

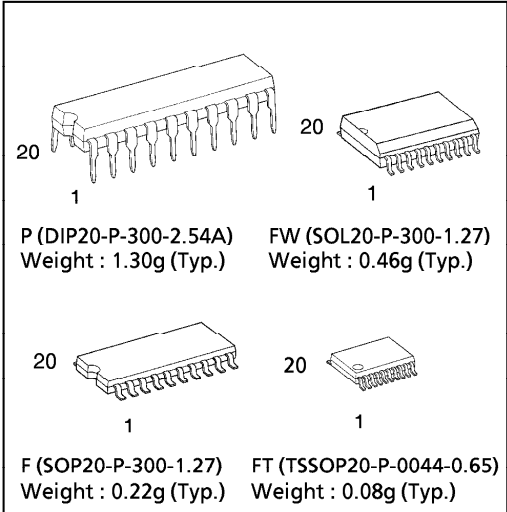
They are intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

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 :

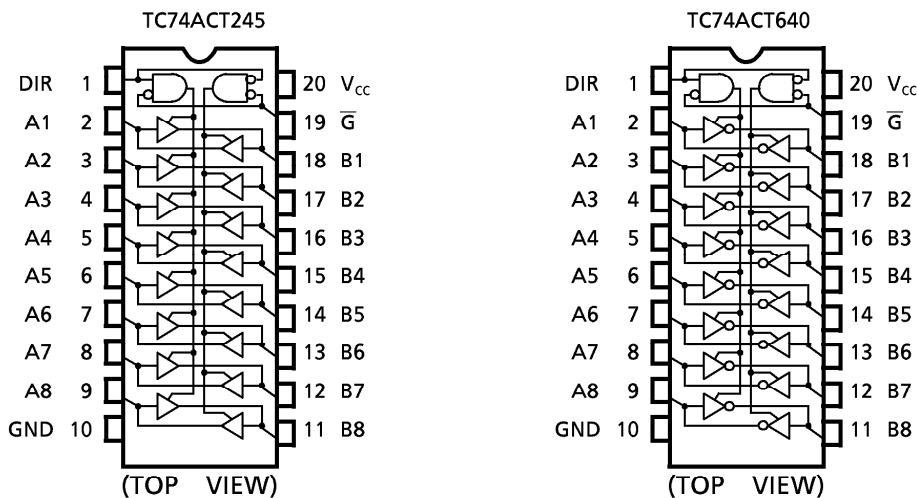
- High Speed..... $t_{pd} = 4.7ns(typ.)$ at $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 8\mu A(Max.)$ at $T_a = 25^\circ C$
- Compatible with TTL outputs... $V_{IL} = 0.8V(Max.)$
 $V_{IH} = 2.0V(Min.)$
- Symmetrical Output Impedance... $|I_{OH}| = |I_{OL}| = 24mA(Min.)$
 Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- 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.

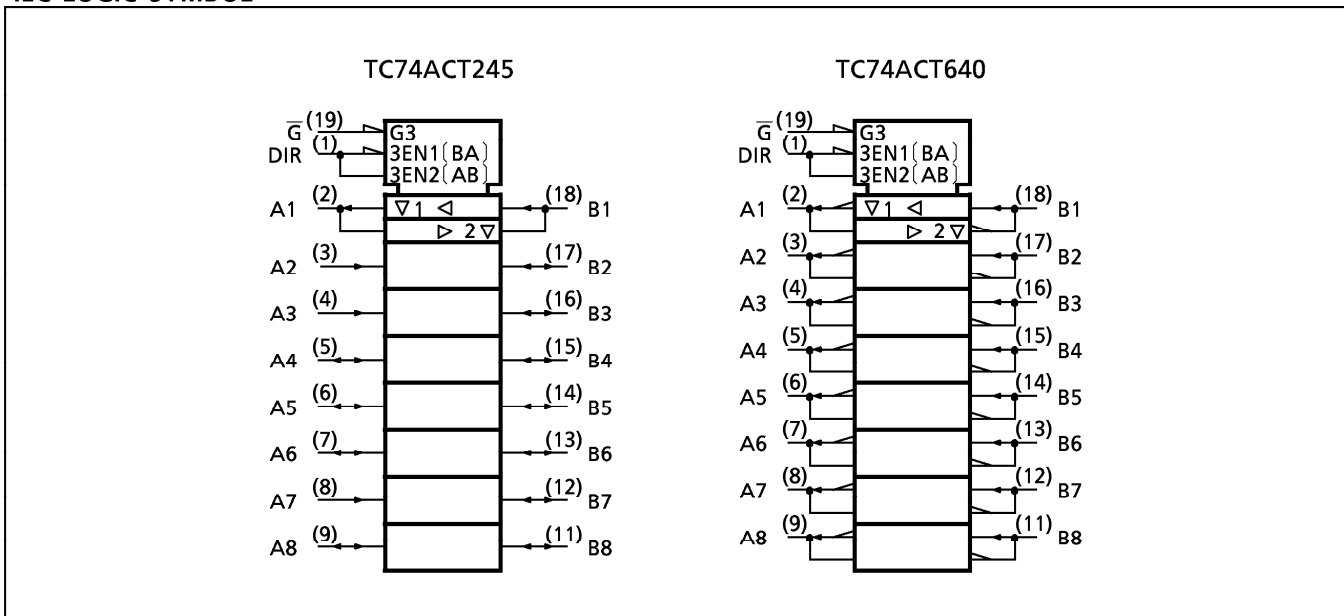
PIN ASSIGNMENT



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IEC LOGIC SYMBOL



TRUTH TABLE

INPUTS		FUNCTION		OUTPUTS	
\bar{G}	DIR	A BUS	B BUS	ACT245	ACT640
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 _{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}	4.5~5.5	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	0~10	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}		4.5 } 5.5	2.0	-	-	2.0	-	V
Low - Level Input Voltage	V _{IL}		4.5 } 5.5	-	-	0.8	-	0.8	V
High - Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50µA I _{OH} = -24mA I _{OH} = -75mA*	4.5 4.5 5.5	4.4 3.94 -	4.5 - -	- 3.80 3.85	- - -	V
Low - Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50µA I _{OL} = 24mA I _{OL} = 75mA*	4.5 4.5 5.5	- - -	0.0 - -	0.1 0.36 -	- - 0.1 0.44 1.65	V
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
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
	I _C	PER INPUT : V _{IN} = 3.4V OTHER INPUT : V _{CC} or GND		5.5	-	-	1.35	-	1.5

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

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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}		5.0 ± 0.5	—	5.0	8.0	1.0	9.0	ns
Propagation Delay Time**	t_{pLH} t_{pHL}		5.0 ± 0.5	—	5.7	8.5	1.0	9.5	
Output Enable Time	t_{pZL} t_{pZH}		5.0 ± 0.5	—	7.3	12.3	1.0	14.0	
Output Disable Time	t_{pLZ} t_{pHZ}		5.0 ± 0.5	—	6.3	9.7	1.0	11.0	
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)	TC74ACT245	—	—	38	—	—	—	
		TC74ACT640	—	—	43	—	—	—	

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 :

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

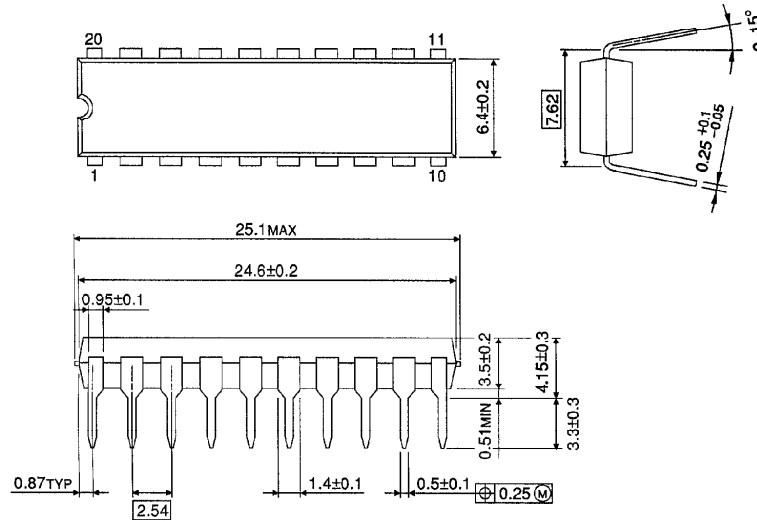
(2) * for TC74ACT245 only

** for TC74ACT640 only

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

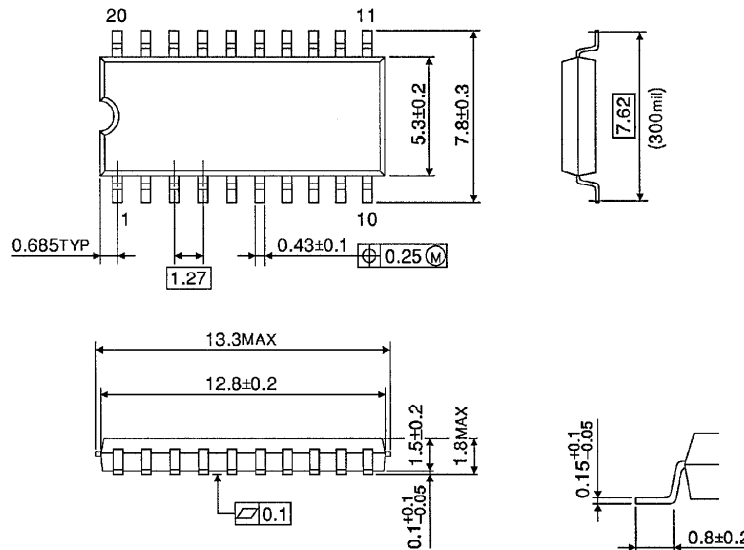
Unit in mm



Weight : 1.30g (Typ.)

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

Unit in mm

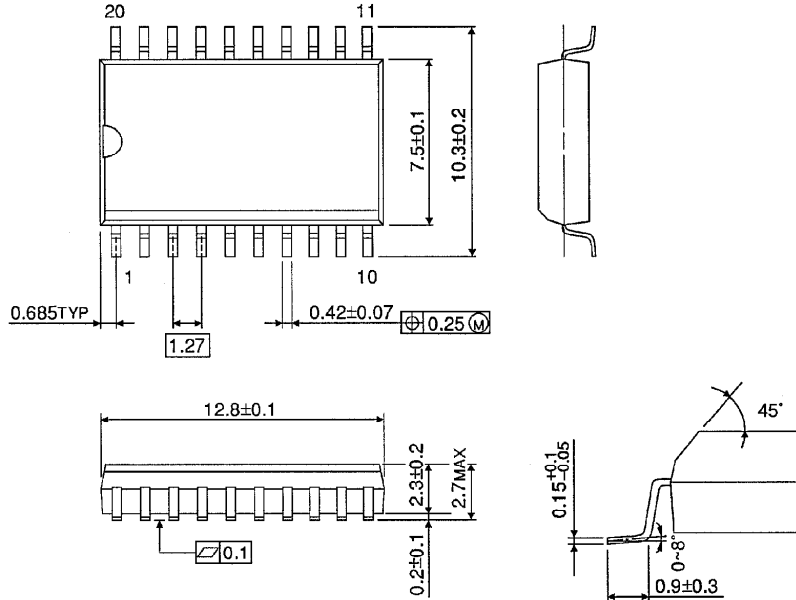


Weight : 0.22g (Typ.)

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

Unit in mm

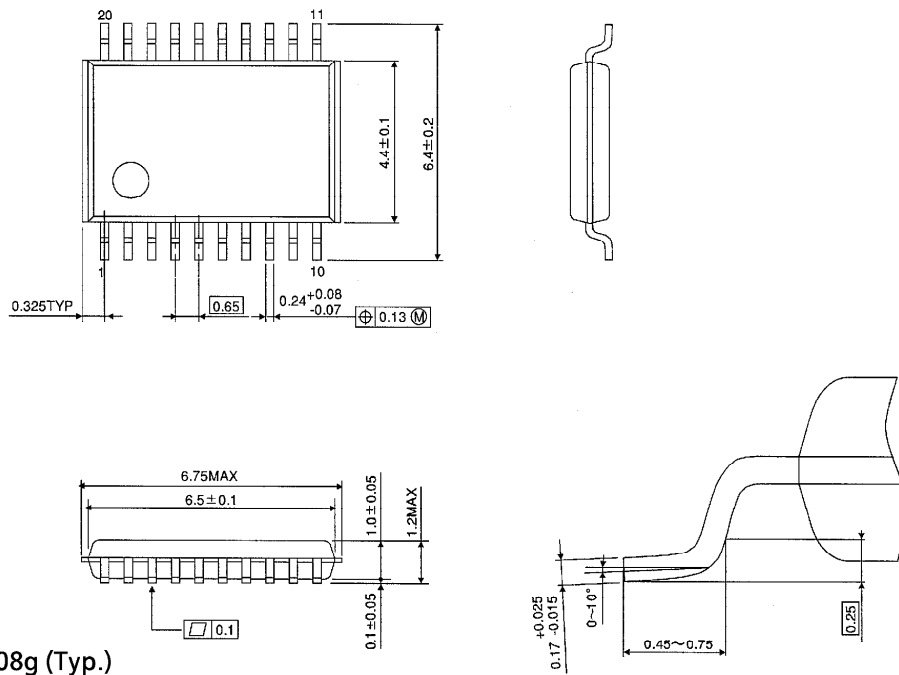
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

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

Unit in mm



Weight : 0.08g (Typ.)