

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

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.

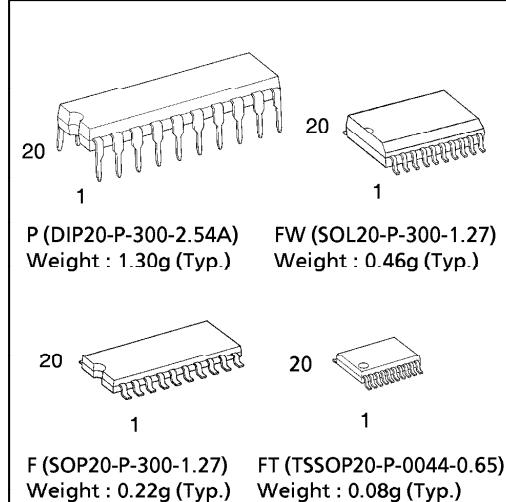
The enable input (\bar{G}) can be used to disable the device so that the busses are effectively isolated.

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

FEATURES :

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

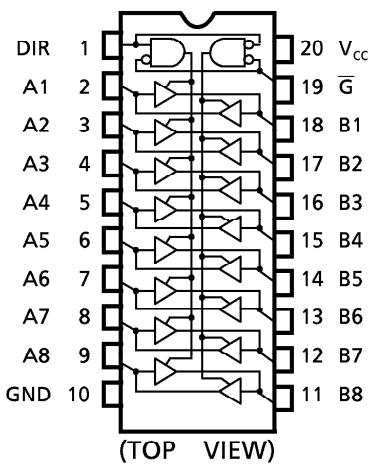
(Note) The JEDEC SOP (FW) is not available in Japan.

**APPLICATION NOTES**

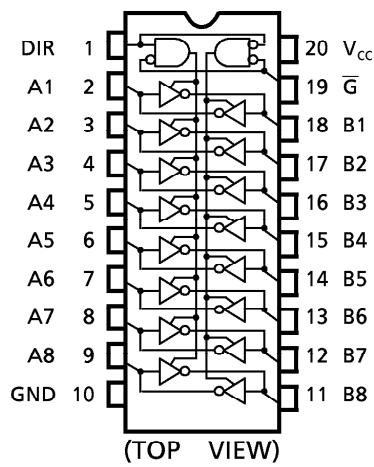
- 1) Do not apply a signal to any bus terminal when it is in the output mode. Damage may result.
- 2) All floating (high impedance) bus terminals must have their input levels fixed by means of pull up or pull down resistors.

PIN ASSIGNMENT

TC74AC245



TC74AC640

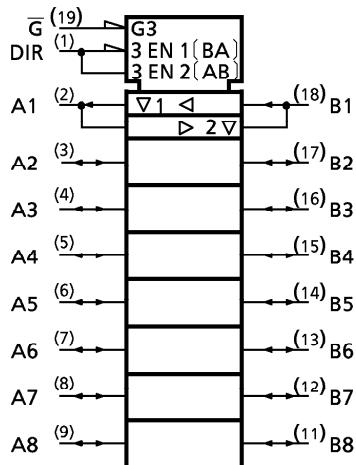


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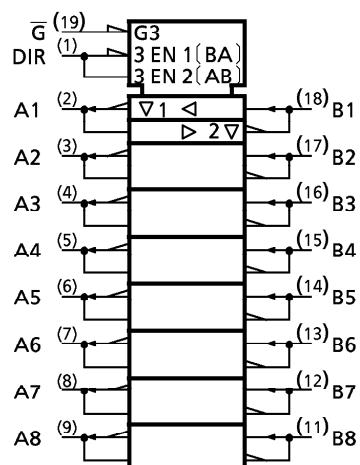
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IEC LOGIC SYMBOL

TC74AC245



TC74AC640



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_{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°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)	Ta = 25°C			Ta = -40~85°C		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V_{IH}		2.0 3.0 5.5	1.50 2.10 3.85	—	—	1.50 2.10 3.85	—	V
Low - Level Input Voltage	V_{IL}		2.0 3.0 5.5	— — —	— — —	— — —	0.50 0.90 1.65	— — —	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50\mu\text{A}$	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	— — —	1.9 2.9 4.4	—
			$I_{OH} = -4\text{mA}$	3.0 4.5 5.5	2.58 3.94 —	— — —	— — —	2.48 3.80 3.85	—
			$I_{OH} = -24\text{mA}$	—	—	—	— — —	— — —	V
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50\mu\text{A}$	2.0 3.0 4.5	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1
			$I_{OL} = 12\text{mA}$	3.0 4.5 5.5	— — —	— — —	0.36 0.36 —	— — —	0.44 0.44 1.65
			$I_{OL} = 24\text{mA}$	—	—	—	— — —	— — —	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
			5.5	—	—	—	± 0.1	—	± 1.0
			5.5	—	—	—	8.0	—	80.0
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	—	—	—	—
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	—	—	—	—

* : 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.	
Propagation Delay Time*	t_{pLH} t_{pHL}		3.3 ± 0.3	—	7.0	10.9	1.0	12.4
			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, G	—	5	10	—	10	pF
Bus Input Capacitance	C _{I/O}	A _n , B _n	—	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 :

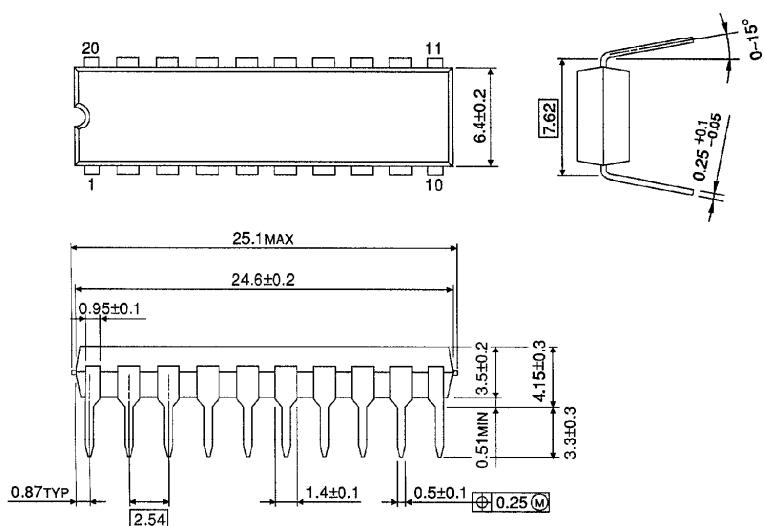
$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} \cdot I_{CC} / 8(\text{per bit})$$

(2) * for TC74AC245 only

** for TC74AC640 only

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

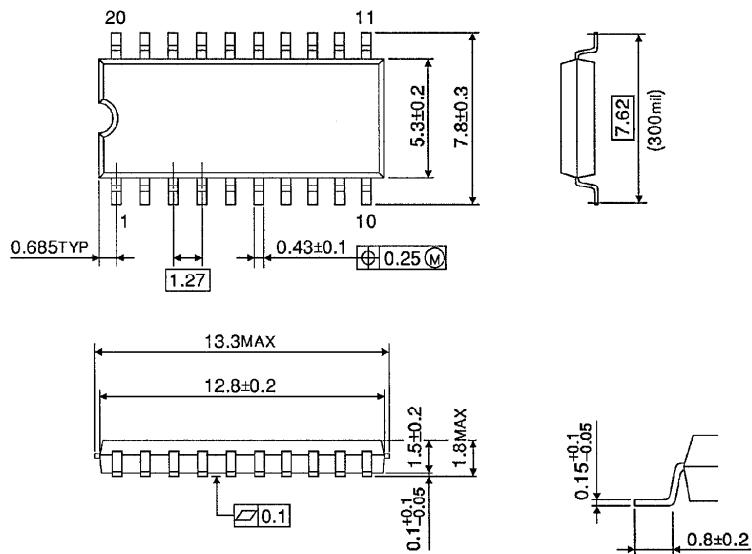
Unit in mm



Weight : 1.30g (Typ.)

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

Unit in mm

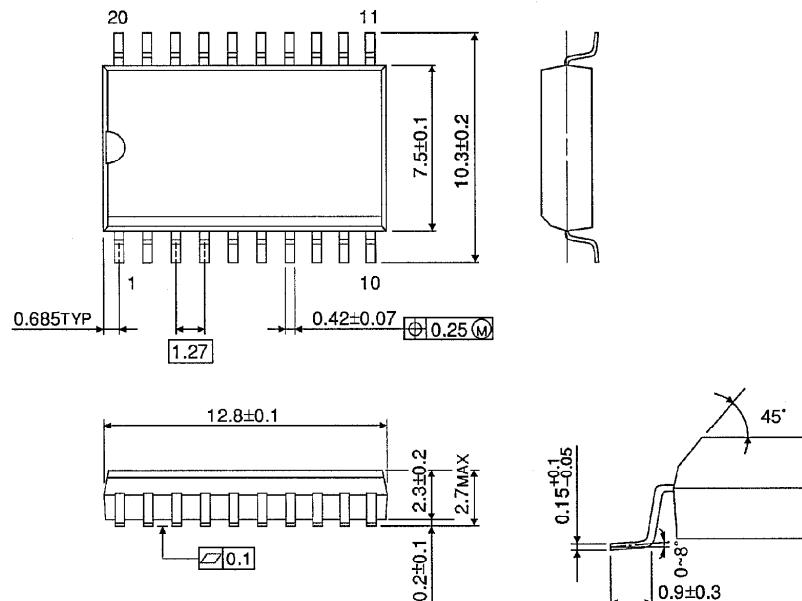


Weight : 0.22g (Typ.)

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

Unit in mm

(Note) This package is not available in Japan.



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

Unit in mm

