TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HC240AP, TC74HC240AF, TC74HC240AFW, TC74HC241AP TC74HC241AF, TC74HC244AP, TC74HC244AF, TC74HC244AFW

OCTAL BUS BUFFER

TC74HC240AP / AF / AFW INVERTED, 3 – STATE OUTPUTS
TC74HC241AP / AF NON – INVERTED, 3 – STATE OUTPUTS
TC74HC244AP / AF / AFW NON – INVERTED, 3 – STATE OUTPUTS

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

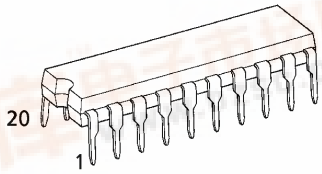
The TC74HC240A, 241A and 244A are high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate C^2MOS technology.

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

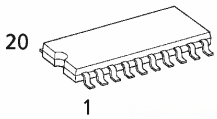
The 74HC240A is an inverting 3 - state buffer having two active - low output enables. The TC74HC241A and TC74HC244A are non - inverting 3 - state buffers that differ only in that the 241A has one active - high and one active - low output enable, and the 244A has two active - low output enables.

These devices are designed to be used with 3 - state memory address drivers, etc.

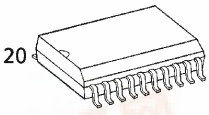
All inputs are equipped with protection circuits against static discharge or transient excess voltage.



P (DIP20-P-300-2.54A)
Weight : 1.30g (Typ.)



F (SOP20-P-300-1.27)
Weight : 0.22g (Typ.)



FW (SOL20-P-300-1.27)
Weight : 0.46g (Typ.)

FEATURES :

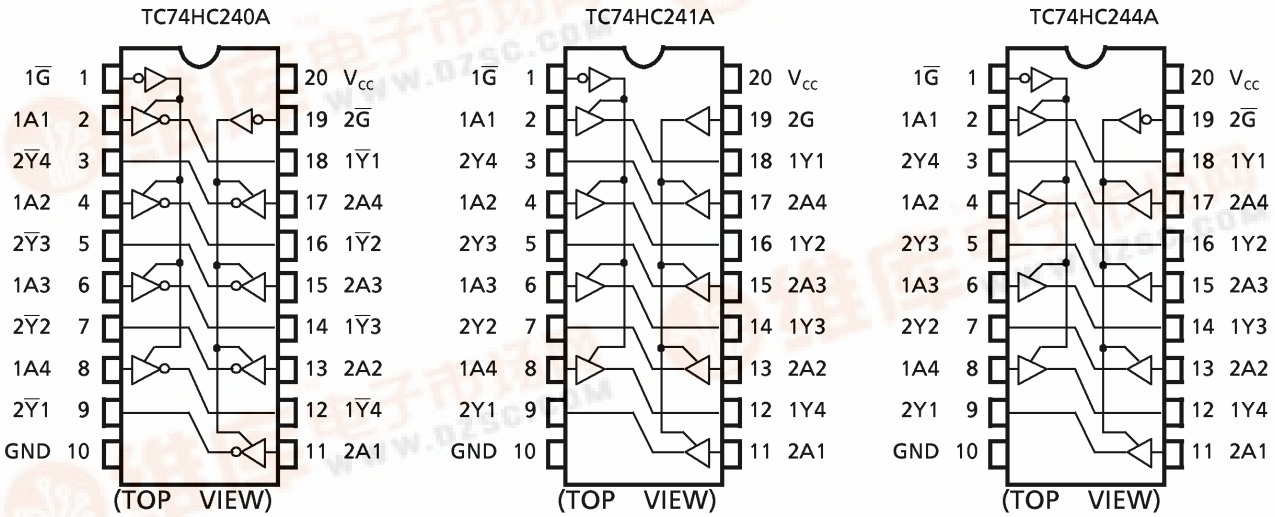
- High Speed ····· t_{pd} = 10ns(typ.) at V_{CC} = 5V
- Low Power Dissipation ····· I_{CC} = 4μA(Max.) at Ta = 25°C
- High Noise Immunity ····· $V_{NIH} = V_{NIL}$ = 28% V_{CC} (Min.)
- Output Drive Capability ····· 15 LSTTL Loads
- Symmetrical Output Impedance ··· $|I_{OH}| = I_{OL}$ = 6mA(Min.)
- Balanced Propagation Delays ····· $t_{pLH} \simeq t_{pHL}$
- Wide Operating Voltage Range ···· V_{CC} (opr.) = 2V ~ 6V
- Pin and Function Compatible with 74LS 240 / 241 / 244

TRUTH TABLE

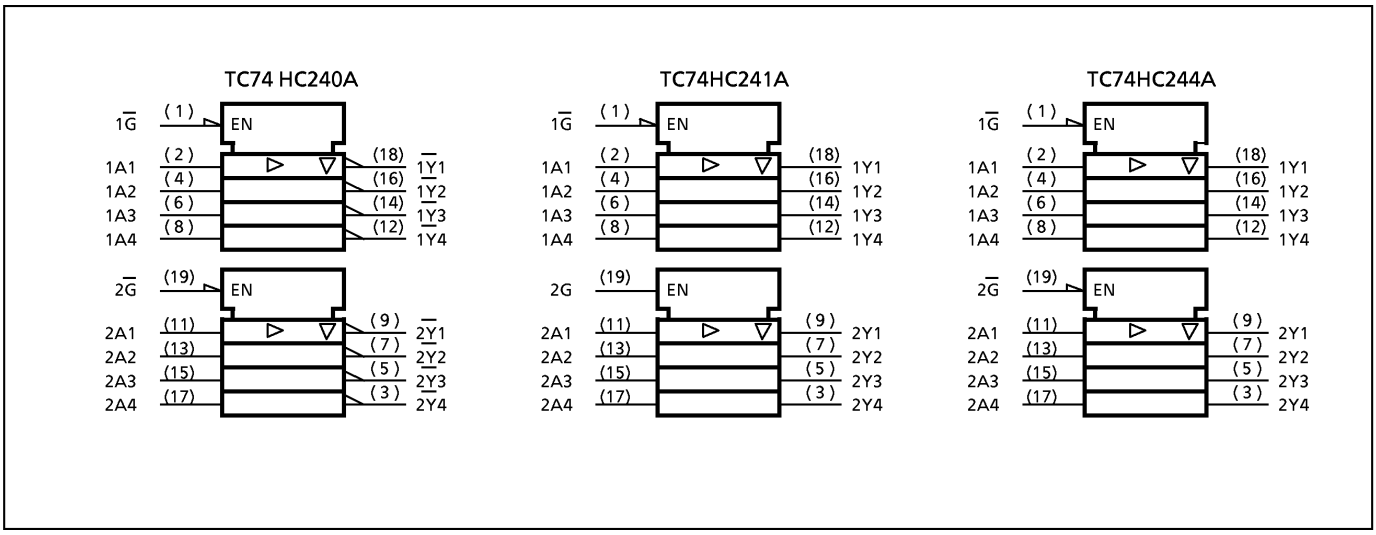
INPUTS			OUTPUTS	
$\overline{G}$	G△	A_n	Y_n	$\overline{Y}_n$△△
L	H	L	L	H
L	H	H	H	L
H	L	X	Z	Z

△ : for TC74HC241A only
△△ : for TC74HC240A only
X : Don't Care
Z : High Impedance

PIN ASSIGNMENT



IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	−0.5~7	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}	±20	mA
DC Output Current	I_{OUT}	±35	mA
DC V_{CC} / Ground Current	I_{CC}	±75	mA
Power Dissipation	P_D	500 (DIP)* / 180 (SOP)	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 shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2~6	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	t_r, t_f	0~1000 (V_{CC}=2.0V) 0~500 (V_{CC}=4.5V) 0~400 (V_{CC}=6.0V)	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC} (V)	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=−40~85°C MIN.	Ta=−40~85°C MAX.	UNIT
High - Level Input Voltage	V_{IH}			2.0 4.5 6.0	1.50 3.15 4.20	— — —	— — —	1.50 3.15 4.20	— — —	V
Low - Level Input Voltage	V_{IL}			2.0 4.5 6.0	— — —	— — —	0.50 1.35 1.80	— — —	0.50 1.35 1.80	V
High - Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −20μA	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	— — —	V
			I_{OH} = −6 mA I_{OH} = −7.8mA	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	— —	
Low - Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20μA	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
			I_{OL} = 6 mA I_{OL} = 7.8mA	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	
3 - State Output Off - State Current	I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND		6.0	—	—	±0.5	—	±5.0	μA
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	—	±0.1	—	±1.0	
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	—	4.0	—	40.0	

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6ns$)

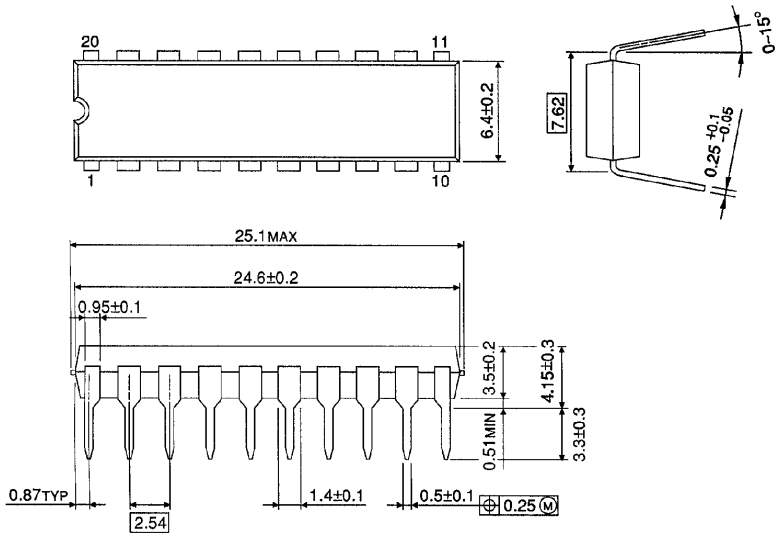
PARAMETER	SYMBOL	TEST CONDITION	CL (pF)	V_{CC} (V)	Ta = 25°C MIN.	Ta = 25°C TYP.	Ta = 25°C MAX.	Ta = −40~85°C MIN.	Ta = −40~85°C MAX.	UNIT
Output Transition Time	t_{TLH} t_{THL}		50	2.0	−	25	60	−	75	ns
				4.5	−	7	12	−	15	
				6.0	−	6	10	−	13	
Propagation Delay Time	t_{pLH} t_{pHL}		50	2.0	−	36	90	−	115	
				4.5	−	12	18	−	23	
				6.0	−	10	15	−	20	
			150	2.0	−	51	130	−	165	
				4.5	−	17	26	−	33	
				6.0	−	14	22	−	28	
Output Enable time	t_{pZL} t_{pZH}	$R_L = 1k\Omega$	50	2.0	−	48	125	−	155	
				4.5	−	16	25	−	31	
				6.0	−	14	21	−	26	
			150	2.0	−	63	165	−	205	
				4.5	−	21	33	−	41	
				6.0	−	18	28	−	35	
Output Disable time	t_{pLZ} t_{pHZ}	$R_L = 1k\Omega$	50	2.0	−	32	125	−	155	
				4.5	−	15	25	−	31	
				6.0	−	14	21	−	26	
Input Capacitance	C_{IN}				−	5	10	−	10	pF
Output Capacitance	C_{OUT}				−	10	−	−	−	
Power Dissipation Capacitance	C_{PD}(1)	TC74HC240A			−	31	−	−	−	
		TC74HC241A / 244A			−	33	−	−	−	

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 :

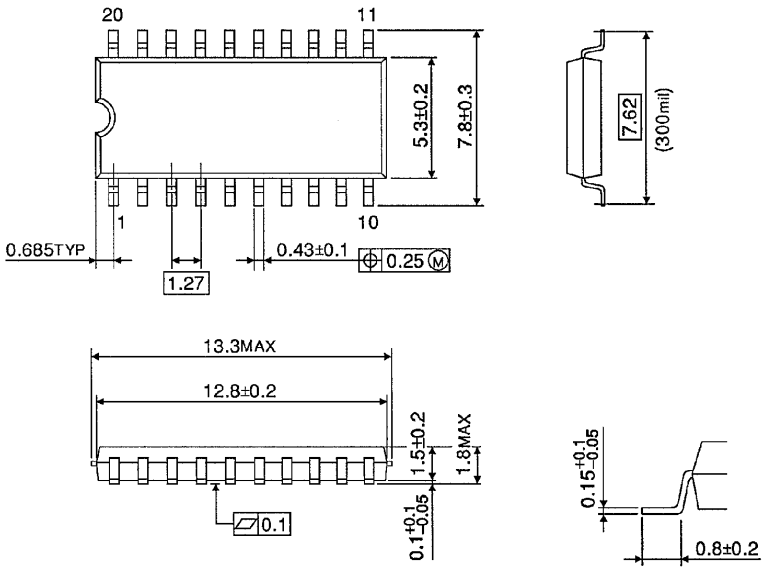
$I_{CC}(opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 8$ (per bit)

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



Weight : 1.30g (Typ.)

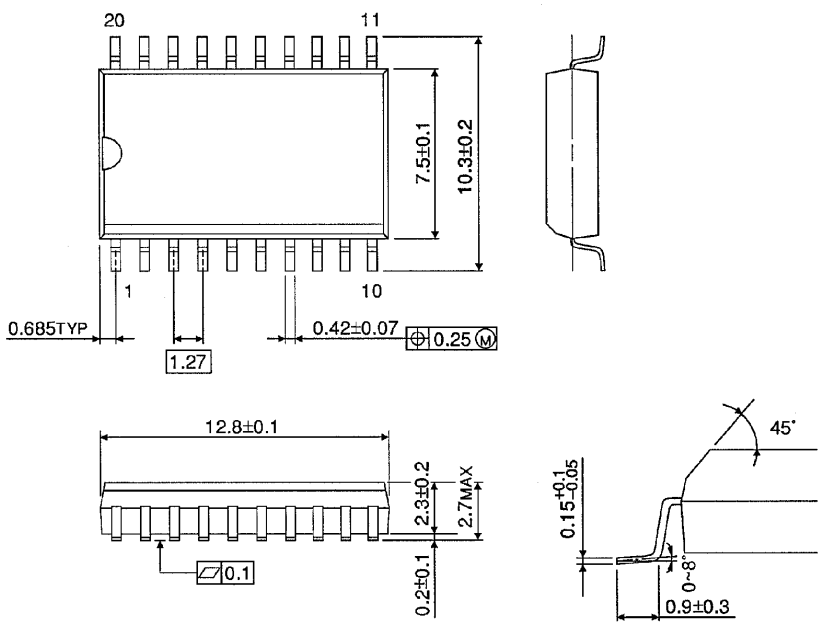
SOP 20PIN (200mil BODY) PACKAGE DIMENSIONS (SOP20-P-300-1.27) Unit in mm



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.)

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