SGS-THOMSON MICROELECTRONICS

M54HCT240/241/244
M74HCT240/241/244

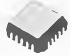
HCT240 OCTAL BUS BUFFER WITH INVERTED 3-STATE OUTPUTS
HCT241/4 OCTAL BUS BUFFER WITH NON-INVERTED 3-STATE OUTPUTS

- HIGH SPEED
  t_{PD} = 20 ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION
  I_{CC} = 4 μA (MAX.) at T_A = 25°C
- COMPATIBLE WITH TTL OUTPUTS
  V_{IH} = 2V (MIN.), V_{IL} = 0,8 V (MAX)
- OUTPUT DRIVE CAPABILITY
  15 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE
  $|I_{OH}|$ = I_{OL} = 6 mA (MIN.)
- BALANCED PROPAGATION DELAYS
  t_{PLH} = t_{PHL}
- PIN AND FUNCTION COMPATIBLE
  WITH 54/74LS240/241/244

B1N
Plastic Package

F1
Ceramic Frit Seal Package

M1
Micro Package



C1
Plastic Chip Carrier

ORDERING NUMBERS:

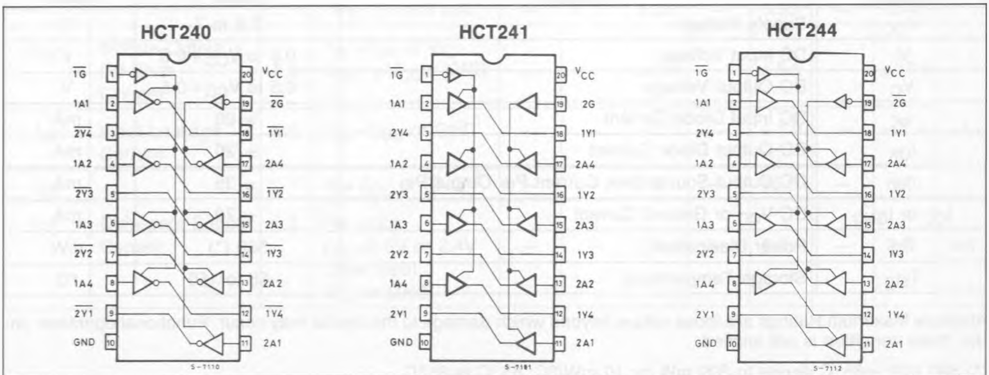
M54HCTXXX F1
M74HCTXXX B1N
M74HCTXXX F1
M74HCTXXX C1
M74HCTXXX M1

DESCRIPTION

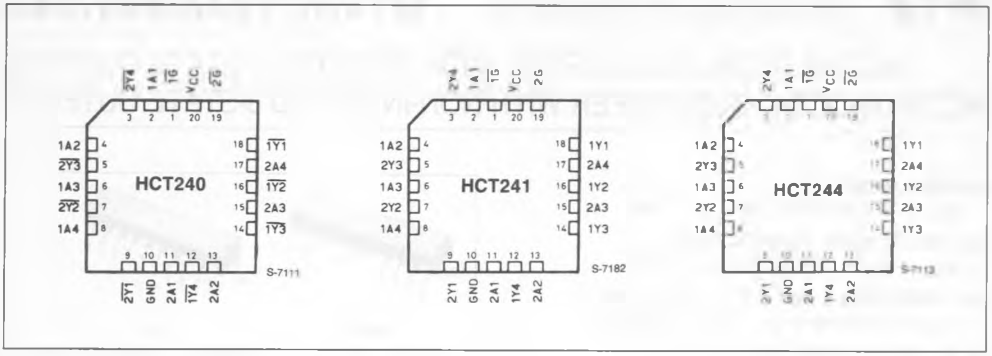
The HCT240, HCT241 and HCT244 are high speed CMOS OCTAL BUS BUFFER's fabricated with silicon C²MOS technology.
These devices may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.
They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

The designer has a choice of selected combinations of inverting and noninverting outputs, symmetrical $\overline{G}$ (active-low output control) inputs, and complementary G and $\overline{G}$ inputs. Each control input governs four BUS BUFFERs.
These devices are designated to be used with 3-state memory address drivers, etc. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

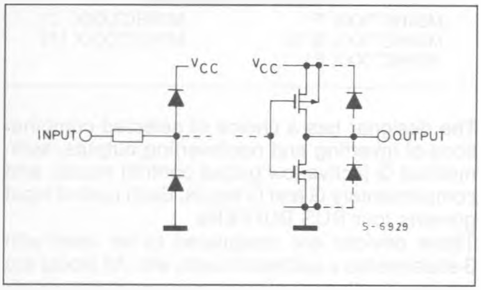
PIN CONNECTIONS (top view)



CHIP CARRIER



INPUT AND OUTPUT EQUIVALENT CIRCUIT



TRUTH TABLE

INPUTS			OUTPUTS	
$\overline{G}$	G ∆	An	Yn	$\overline{Yn}$ ∆ ∆
L	H	L	L	H
L	H	H	H	L
H	L	X	Z	Z

∆ : APPLIED ONLY FOR M54/74HCT241
∆ ∆ : APPLIED ONLY FOR M54/74HCT240
X: DON'T CARE
Z: HIGH IMPEDANCE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	− 0.5 to 7	V
V_I	DC Input Voltage	− 0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	− 0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Source Sink Current Per Output Pin	± 35	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 70	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	− 65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(*) 500 mW: ≅ 65°C derate to 300 mW by 10 mW/°C: 65°C to 85°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	4.5 to 5.5	V
V_I	Input Voltage	0 to V_{CC}	V
V_O	Output Voltage	0 to V_{CC}	V
T_A	Operating Temperature 74HC Series 54HC Series	– 40 to 85 – 55 to 125	°C
t_r, t_f	Input Rise and Fall Time	0 to 500	ns

DC SPECIFICATIONS

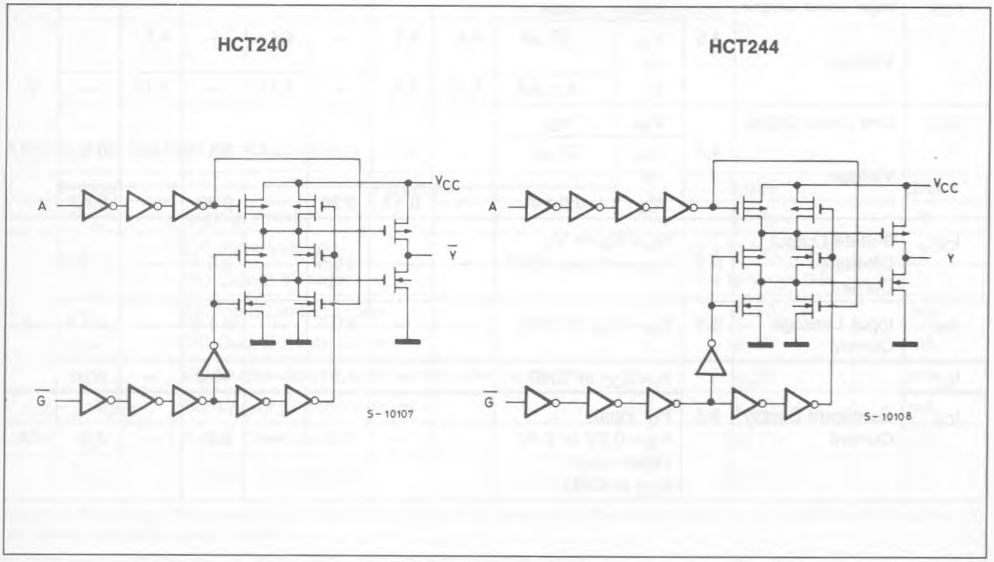
Symbol	Parameter	V_{CC}	Test Condition		T_A = 25°C 54HC and 74HC			–40 to 85°C 74HC		–55 to 125°C 54HC		Unit
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	4.5 to 5.5			2.0	—	—	2.0	—	2.0	—	V
V_{IL}	Low Level Input Voltage	4.5 to 5.5			—	—	0.8	—	0.8	—	0.8	V
V_{OH}	High Level Output Voltage	4.5	V_{IN}	I_{OH}								V
			V_{IH} or V_{IL}	–20 μA	4.4	4.5	—	4.4	—	4.4	—	
				–6.0 mA	4.18	4.31	—	4.13	—	4.10	—	
V_{OL}	Low Level Output Voltage	4.5	V_{IN}	I_{OL}								
			V_{IH} or V_{IL}	20 μA	—	0.0	0.1	—	0.1	—	0.1	
				6.0 mA	—	0.17	0.26	—	0.33	—	0.40	
I_{OZ}	3-State Output Off-State Current	5.5	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND		—	—	±0.5	—	±5.0	—	±10.0	μA
I_{IN}	Input Leakage Current	5.5	V_{IN} = V_{CC} or GND		—	—	±0.1	—	±1.0	—	±1.0	
I_{CC}	Quiescent Supply Current	5.5	V_I = V_{CC} or GND		—	—	4.0	—	40.0	—	80.0	
I_{CC}			Per input: V_{IN} = 0.5V or 2.4V Other input: V_{CC} or GND		—	—	2.0	—	2.9	—	3.0	mA

AC ELECTRICAL CHARACTERISTICS ($C_L = 50pF$, Input $t_r = t_f = 6ns$)

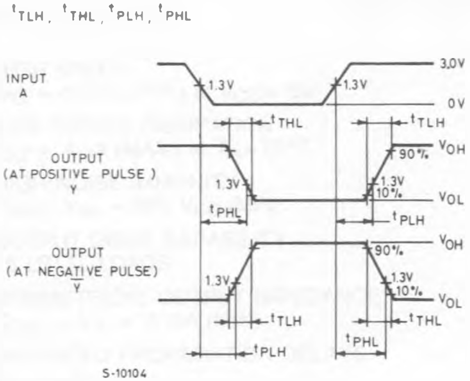
Symbol	Parameter	Test Condition		$T_A = 25°C$			−40 to 85°C		−55 to 125°C		Unit
			V_{CC}	Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} t_{TLH}	Output Transition Time		4.5	—	8	12	—	15	—	19	ns
t_{PLH} t_{PHL}	Propagation Delay Time (HCT240)		4.5	—	22	35	—	42	—	53	ns
t_{PLH} t_{PHL}	Propagation Delay Time (HCT241, HCT244)		4.5	—	23	36	—	44	—	54	ns
t_{PZL} t_{PZH}	Output Enable Time	$R_L = 1k\Omega$	4.5	—	23	35	—	43	—	53	ns
t_{PLZ} t_{PHZ}	Output Disable Time	$R_L = 1k\Omega$	4.5	—	30	47	—	57	—	71	ns
C_{IN}	Input Capacitance			—	5	10	—	10		10	pF
C_{OUT}	Output Capacitance			—	10	—	—	—	—	—	pF
C_{PD}(1)	Power Dissipation Capacitance	HCT240		—	42	—	—	—	—	—	pF
		HCT241		—	49	—	—	—	—	—	pF
		HCT244		—	46	—	—	—	—	—	pF

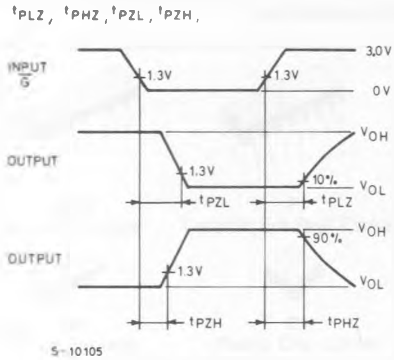
Note (1) C_{PD} is defined as the value of IC's of internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit)
Average operating current can be obtained by the following equation.
$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8$ (per Gate).

CIRCUIT DIAGRAM



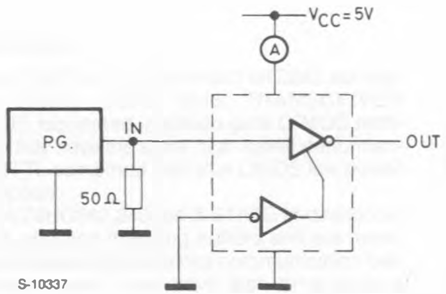
SWITCHING CHARACTERISTICS TEST WAVEFORM

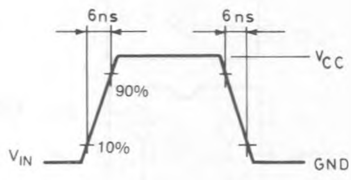




TEST CIRCUIT I_{CC} (Opr.)

HCT240





THE OTHER INPUTS ARE CONNECTED TO V_{CC} LINE OR GND LINE.