

MM74HCT240 Inverting Octal TRI-STATE® Buffer MM74HCT244 Octal TRI-STATE Buffer

General Description

These TRI-STATE buffers utilize advanced silicon-gate CMOS technology and are general purpose high speed inverting and non-inverting buffers. They possess high drive current outputs which enable high speed operation even when driving large bus capacitances. These circuits achieve speeds comparable to low power Schottky devices, while retaining the low power consumption of CMOS. All three devices are TTL input compatible and have a fanout of 15 LS-TTL equivalent inputs.

MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

The MM74HCT240 is an inverting buffer and the MM74HCT244 is a non-inverting buffer. Each device has two active low enables (1G and 2G), and each enable independently controls 4 buffers.

All inputs are protected from damage due to static discharge by diodes to V_{CC} and Ground.

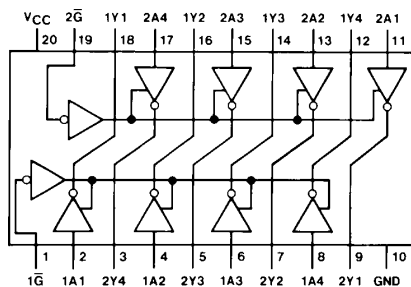
Features

- TTL input compatible
- Typical propagation delay: 14 ns
- TRI-STATE outputs for connection to system buses
- Low quiescent current: 80 μA
- High output drive current: 6 mA (min)

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Connection Diagrams

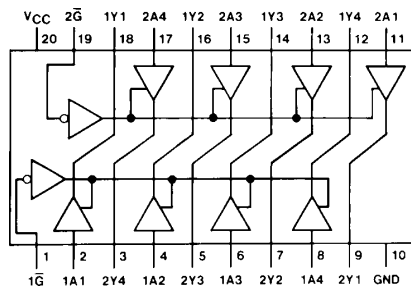
Dual-In-Line Packages



TL/F/5365-1

Top View

Order Number MM74HCT240



TL/F/5365-3

Top View

Order Number MM74HCT244

Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	−0.5 to +7.0V
DC Input Voltage (V_{IN})	−1.5 to $V_{CC} + 1.5V$
DC Output Voltage (V_{OUT})	−0.5 to $V_{CC} + 0.5V$
Clamp Diode Current (I_{IK}, I_{OK})	±20 mA
DC Output Current, per pin (I_{OUT})	±35 mA
DC V_{CC} or GND Current, per pin (I_{CC})	±70 mA
Storage Temperature Range (T_{STG})	−65°C to +150°C
Power Dissipation (P_D)	
(Note 3)	600 mW
S.O. Package only	500 mW
Lead Temp. (T_L) (Soldering 10 seconds)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
DC Input or Output Voltage (V_{IN}, V_{OUT})	0	V_{CC}	V
Operating Temp. Range (T_A)			
MM74HCT	−40	+85	°C
Input Rise or Fall Times (t_r, t_f)		500	ns

DC Electrical Characteristics

$V_{CC} = 5V \pm 10\%$ (unless otherwise specified)

Symbol	Parameter	Conditions	T _A = 25°C		74HCT T _A = −40 to 85°C	T _A = 125°C	Units
			Typ	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage			2.0	2.0	2.0	V
V _{IL}	Maximum Low Level Input Voltage			0.8	0.8	0.8	V
V _{OH}	Minimum High Level Output Voltage	V _{IN-EE} = V _{IH} or V _{IL} I _{OUT} = 20 μA I _{OUT} = 6.0 mA, V _{CC} = 4.5V I _{OUT} = 7.2 mA, V _{CC} = 5.5V	V _{CC} 4.2 5.2	V _{CC} − 0.1 3.98 4.98	V _{CC} − 0.1 3.84 4.84	V _{CC} − 0.1 3.7 4.7	V V V
V _{OL}	Maximum Low Level Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} = 20 μA I _{OUT} = 6.0 mA, V _{CC} = 4.5V I _{OUT} = 7.2 mA, V _{CC} = 5.5V	0 0.2 0.2	0.1 0.26 0.26	0.1 0.33 0.33	0.1 0.4 0.4	V V V
I _{IN}	Maximum Input Current	V _{IN} = V _{CC} or GND, V _{IH} or V _{IL}		±0.05	±0.5	±1.0	μA
I _{OZ}	Maximum TRI-STATE Output Leakage Current	V _{OUT} = V _{CC} or GND G̅ = V _{IH} G = V _{IL}		±0.25	±2.5	±10	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA		4.0	40	160	μA
		V _{IN} = 2.4V or 0.5V (Note 4)	0.6	1.0	1.3	1.5	mA

Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur.

Note 2: Unless otherwise specified all voltages are referenced to ground.

Note 3: Power Dissipation temperature derating — plastic "N" package: −12 mW/°C from 65°C to 85°C.

Note 4: Measured per input. All other inputs at V_{CC} or GND.

Truth Tables

'HCT240

1G	1A	1Y	2G	2A	2Y
L	L	H	L	L	H
L	H	L	L	H	L
H	L	Z	H	L	Z
H	H	Z	H	H	Z

'HCT244

1G	1A	1Y	2G	2A	2Y
L	L	L	L	L	L
L	H	H	L	H	H
H	L	Z	H	L	Z
H	H	Z	H	H	Z

H = high level, L = low level, Z = high impedance

AC Electrical Characteristics MM74HCT240, MM74HCT244 $V_{CC} = 5.0V$, $t_r = t_f = 6\text{ ns}$, $T_A = 25^\circ\text{C}$ (unless otherwise specified)

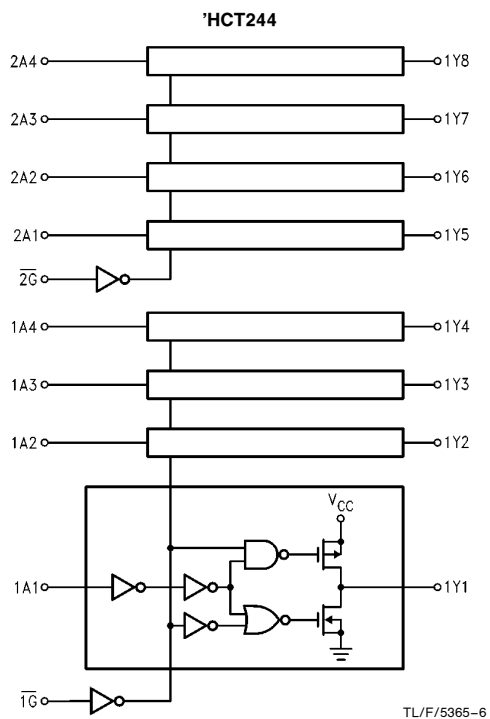
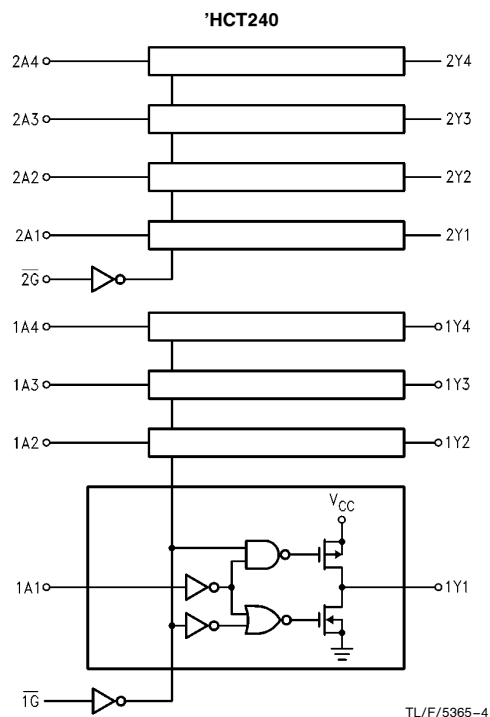
Symbol	Parameter	Conditions	Typ	Guaranteed Limits	Units
t_{PHL} , t_{PLH}	Maximum Output Propagation Delay	$C_L = 45\text{ pF}$	14	18	ns
t_{PZL} , t_{PZH}	Maximum Output Enable Time	$C_L = 45\text{ pF}$ $R_L = 1\text{ k}\Omega$	20	30	ns
t_{PLZ} , t_{PHZ}	Maximum Output Disable Time	$C_L = 5\text{ pF}$ $R_L = 1\text{ k}\Omega$	16	25	ns

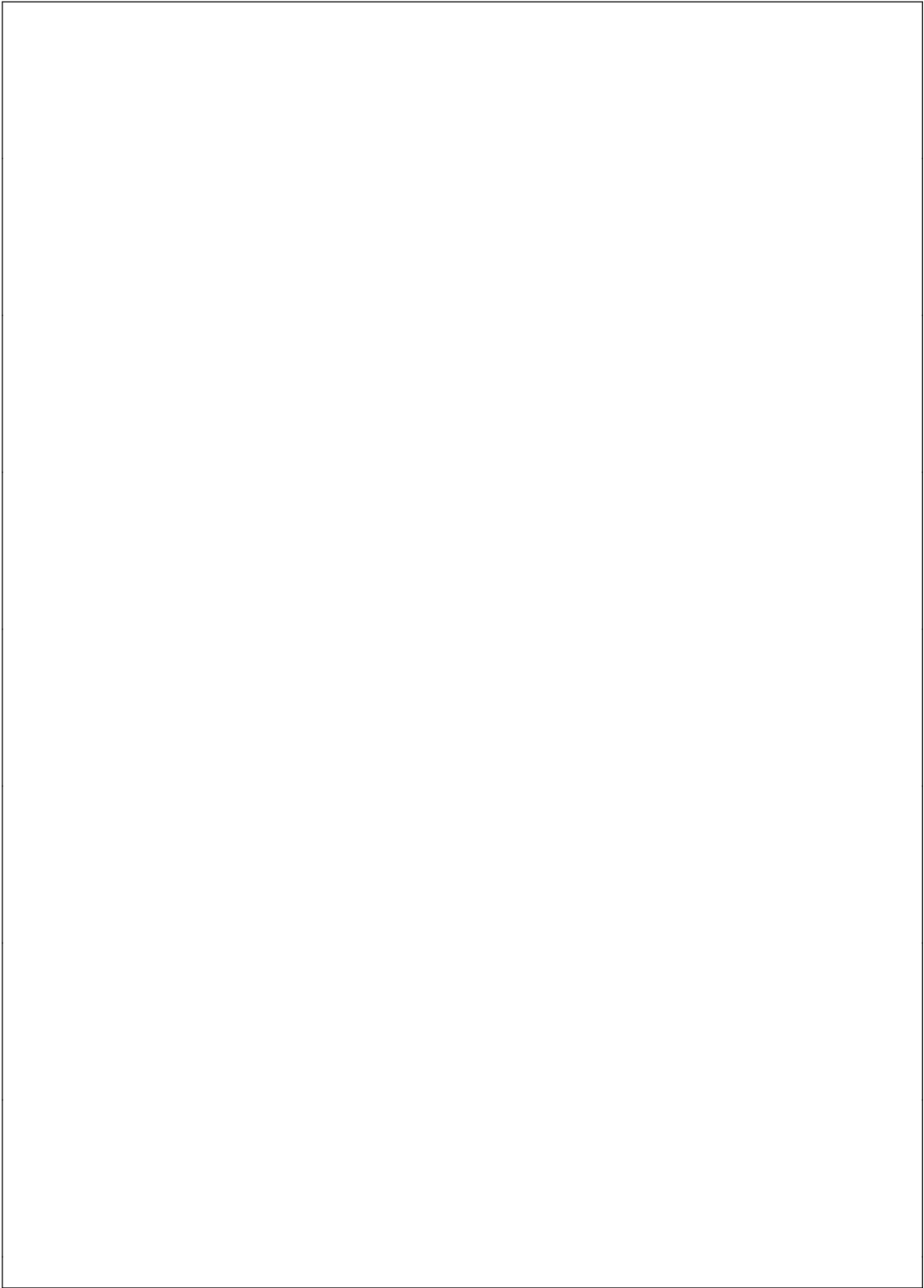
AC Electrical Characteristics MM74HCT240, MM74HCT244 $V_{CC} = 5.0V \pm 10\%$, $t_r = t_f = 6\text{ ns}$ (unless otherwise specified)

Symbol	Parameter	Conditions		T _A = 25°C		74HCT T _A = −40 to 85°C	T _A = 125°C	Units
				Typ	Guaranteed Limits			
t _{PHL} , t _{PLH}	Maximum Output Propagation Delay	C _L = 50 pF		14	20	25	30	ns
		C _L = 150 pF		20	28	35	42	ns
t _{PZH} , t _{PZL}	Maximum Output Enable Time	R _L = 1 kΩ	C _L = 50 pF	21	30	38	45	ns
			C _L = 150 pF	26	42	53	63	ns
t _{PHZ} , t _{PLZ}	Maximum Output Disable Time	R _L = 1 kΩ C _L = 50 pF		16	25	32	38	ns
t _{THL} , t _{TLH}	Maximum Output Rise and Fall Time	C _L = 50 pF		6	12	15	18	ns
C _{IN}	Maximum Input Capacitance			10	15	15	15	pF
C _{OUT}	Maximum Output Capacitance			15	20	20	20	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	(per buffer) G̅ = V _{CC} , G = GND G̅ = GND, G = V _{CC}		5 90				pF pF

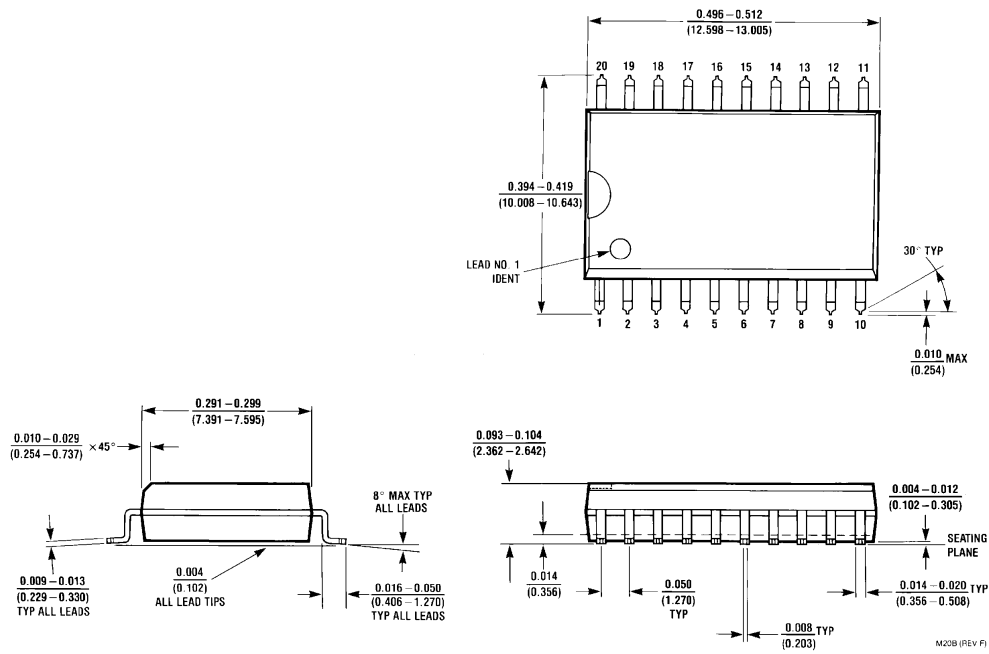
Note 5: C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Logic Diagrams





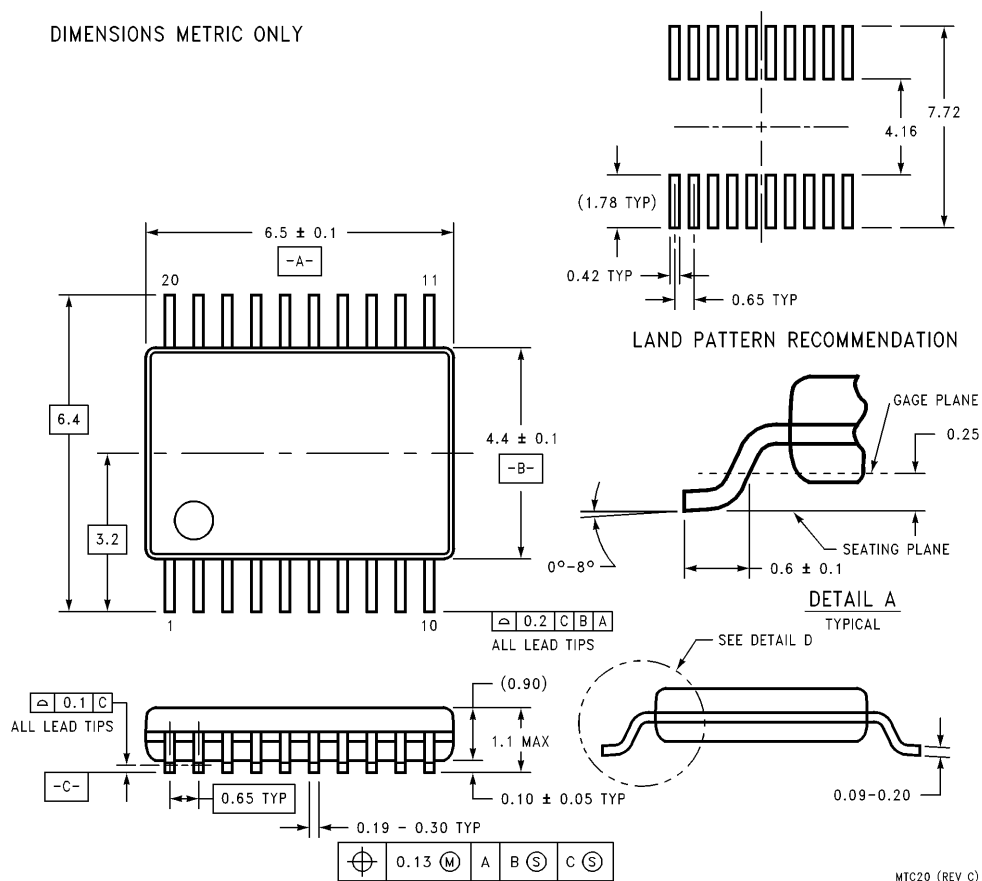
Physical Dimensions inches (millimeters) unless otherwise noted



Order Number MM74HCT240WM or MM74HCT244WM
NS Package M20B

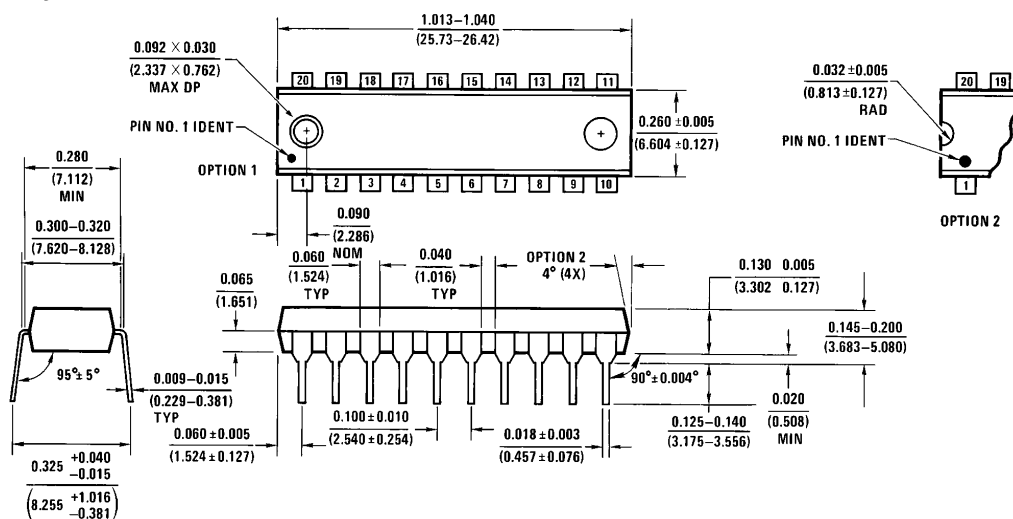
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

DIMENSIONS METRIC ONLY



Order Number MM74HCT240MTC or MM74HCT244MTC
NS Package MTC20

MTC20 (REV C)

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

N20A (REV G)

Order Number MM74HCT240N, or MM74HCT244N
NS Package N20A

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