

MM54HCT245/MM74HCT245



T-52-31

MM54HCT245/MM74HCT245 Octal TRI-STATE® Transceiver

General Description

This TRI-STATE bi-directional buffer utilizes advanced silicon-gate CMOS technology and is intended for two-way asynchronous communication between data buses. It has high drive current outputs which enable high speed operation even when driving large bus capacitances. This circuit possesses the low power consumption of CMOS circuitry, yet has speeds comparable to low power Schottky TTL circuits.

This device is TTL input compatible and can drive up to 15 LS-TTL loads, and all inputs are protected from damage due to static discharge by diodes to V_{CC} and ground.

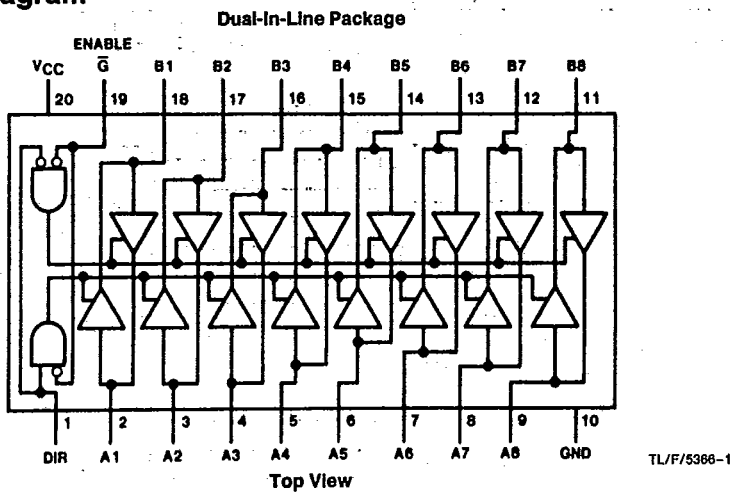
MM54HCT245/MM74HCT245 has one active low enable input (\bar{G}), and a direction control (DIR). When the DIR input is high, data flows from the A inputs to the B outputs. When DIR is low, data flows from B to A.

MM54HCT/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.

Features

- TTL input compatible
- TRI-STATE outputs for connection to system busses
- High output drive current: 6 mA (min)
- High speed: 16 ns typical propagation delay
- Low power: 80 μ A (74HCT Series)

Connection Diagram



Order Number MM54HCT245* or MM74HCT245*

*Please look into Section 8, Appendix D for availability of various package types.

Truth Table

Control Inputs		Operation
\bar{G}	DIR	245
L	L	B data to A bus
L	H	A data to B bus
H	X	isolation

H = high level L = low level, X = irrelevant

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Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, 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 Temperature (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
MM54HCT	-55	+125	°C
Input Rise or Fall Times (t _r , t _f)		500	ns

DC Electrical Characteristics (V_{CC}=5V ± 10%, unless otherwise specified.)

Symbol	Parameter	Conditions	T _A = 25°C			Units	
			Typ	74HCT T _A = -40 to 85°C	54HCT T _A = -55 to 125°C		
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} = V _{IH} or V _{IL} I _{OUT} = 20 μA	V _{CC}	V _{CC} - 0.1	V _{CC} - 0.1	V _{CC} - 0.1	V
		I _{OUT} = 6.0 mA, V _{CC} = 4.5V	4.2	3.98	3.84	3.7	V
		I _{OUT} = 7.2 mA, V _{CC} = 5.5V	5.2	4.98	4.84	4.7	V
V _{OL}	Maximum Low Level Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} = 20 μA	0	0.1	0.1	0.1	V
		I _{OUT} = 6.0 mA, V _{CC} = 4.5V	0.2	0.26	0.33	0.4	V
		I _{OUT} = 7.2 mA, V _{CC} = 5.5V	0.2	0.26	0.33	0.4	V
I _{IN}	Maximum Input Current	V _{IN} = V _{CC} or GND, V _{IH} or V _{IL} , Pin 1 or 19	±0.1	±1.0	±1.0	μA	
I _{OZ}	Maximum TRI-STATE Output Leakage Current	V _{OUT} = V _{CC} or GND G̅ = V _{IH}	±0.5	±5.0	±10	μA	
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA	8	80	160	μA	
		V _{IN} = 2.4V or 0.5V (Note 4)	0.6	1.0	1.3	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; ceramic "J" package: -12 mW/°C from 100°C to 125°C.

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

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AC Electrical Characteristics MM54HCT245/MM74HCT245

V_{CC}=5.0V, t_r=t_f=6 ns, T_A=25°C (unless otherwise specified)

Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t _{PHL} , t _{PLH}	Maximum Output Propagation Delay	C _L = 45 pF	16	20	ns
t _{PZL} , t _{PZH}	Maximum Output Enable Time	C _L = 45 pF R _L = 1 kΩ	29	40	ns
t _{PLZ} , t _{PHZ}	Maximum Output Disable Time	C _L = 5 pF R _L = 1 kΩ	20	25	ns

AC Electrical Characteristics MM54HCT245/MM74HCT245

V_{CC}=5.0V ± 10%, t_r=t_f=6 ns (unless otherwise specified)

Symbol	Parameter	Conditions	T _A = 25°C		74HCT	54HCT	Units
			Typ		T _A = -40 to 85°C	T _A = -55 to 125°C	
t _{PHL} , t _{PLH}	Maximum Output Propagation Delay	C _L = 50 pF	17	23	29	34	ns
		C _L = 150 pF	24	30	38	45	ns
t _{PZL}	Maximum Output Enable Time	R _L = 1 kΩ C _L = 50 pF	31	42	53	63	ns
t _{PZH}	Maximum Output Enable Time	R _L = 1 kΩ C _L = 50 pF	23	33	41	49	ns
t _{PHZ} , t _{PLZ}	Maximum Output Disable Time	R _L = 1 kΩ C _L = 50 pF	21	30	38	45	ns
t _{THL} , t _{TLH}	Maximum Output Rise and Fall Time	C _L = 50 pF	8	12	15	18	ns
C _{IN}	Maximum Input Capacitance		10	15	15	15	pF
C _{OUT}	Maximum Output/Input Capacitance		20	25	25	25	pF
C _{PD}	Power Dissipation Capacitance	(Note 5) $\bar{G} = V_{CC}$	7				pF
		GND $\bar{G} =$	100				pF

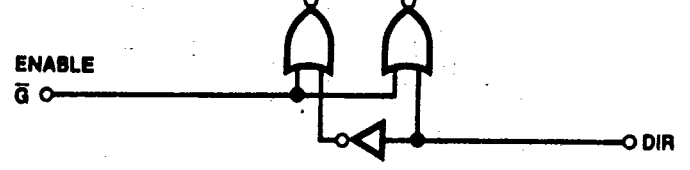
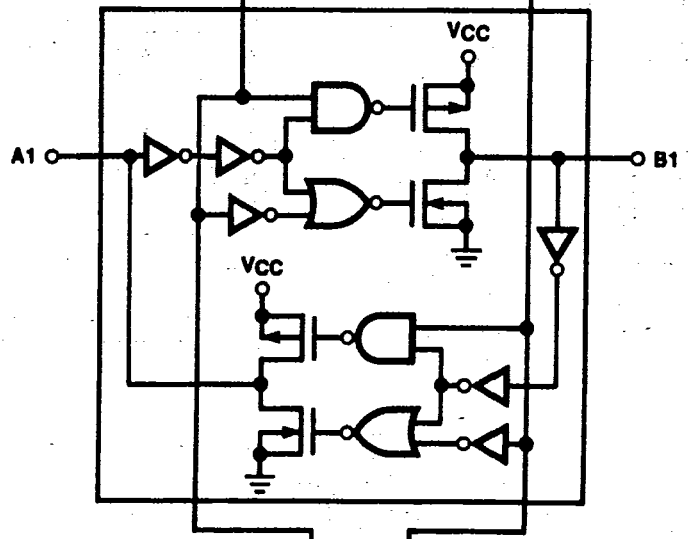
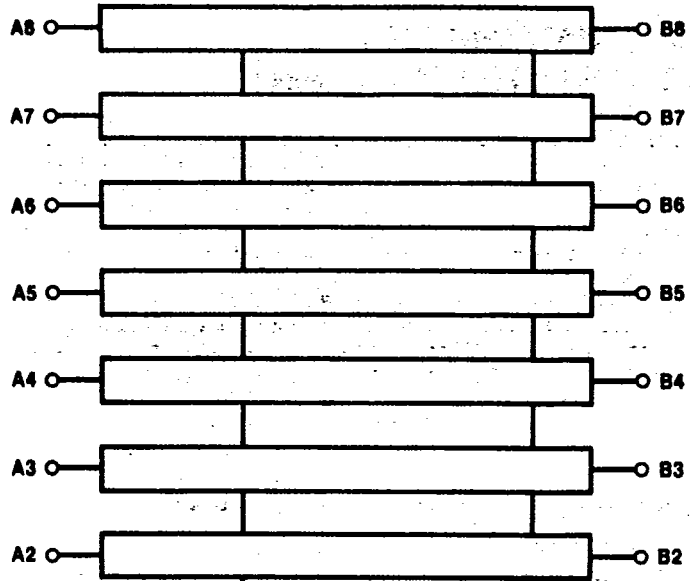
Note 5: C_{PD} determines the no load power consumption, P_D=C_{PD} V_{CC}² f + I_{CC} V_{CC}, and the no load dynamic current consumption, I_S=C_{PD} V_{CC} f + I_{CC}.

MMS4HCT245/MM74HCT245

Logic Diagram

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HCT245



TL/F/5368-2

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