

# GD54/74HC245, GD54/74HCT245

## OCTAL NONINVERTING 3-STATE TRANSCEIVERS

### General Description

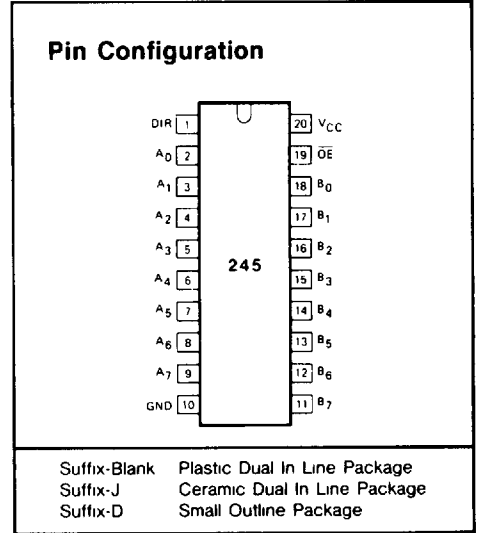
These Devices are identical in pinout to the 54/74LS245. They consist of eight transceivers which are designed for asynchronous two-way communications between data buses. Each device has noninverting outputs, and has an active-low output enable which is used to place the I/O ports into high-impedance states. The direction control determines the directions of data flow. When it is high, data flow from A to B; When it is low, data flow from B to A. Refer to the other devices from similar functionalities;

The HC/HCT 640 All Inverting outputs

The HC/HCT 643 4 Inverting &

4 Noninverting outputs.

These devices are characterized for operation over wide temperature ranges to meet industry and military specifications



### Features

- Low Power consumption characteristic of CMOS devices
- Output drive capability 15 LS TTL Loads Min.
- Operating speed superior to LS TTL
- Wide operating voltage range for HC 2 to 6 volts  
for HCT 4.5 to 5.5 volts
- Low input current 1μA Max
- Low quiescent current 80μA Max (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

### Function Table

INPUTS		INPUTS/OUTPUTS	
$\overline{OE}$	DIR	$A_n$	$B_n$
L	L	A=B	inputs
L	H	inputs	B=A
H	X	Z	Z

H = HIGH voltage level  
L = LOW voltage level  
X = don't care  
Z = high impedance OFF-state

## Absolute Maximum Ratings

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
$V_{CC}$	DC Supply voltage		-0.5	+7	V
$I_{IK}, I_{OK}$	DC input or output diode current	for $V_I < -0.5$ or $V_I > V_{CC} + 0.5$ V		20	mA
$I_O$	DC output source or sink current	for $-0.5$ V $< V_O < V_{CC} + 0.5$ V		35	mA
$I_{CC}$	DC $V_{CC}$ or GND current			70	mA
$T_{stg}$	Storage temperature range		-65	150	°C
$P_D$	Power dissipation per package	above +70°C derate linearly with 8mW/K		500	mW
$T_L$	Lead temperature	At distance $1/16 \pm 1/32$ in from case for 60 sec(CERAMIC) 10 sec(PLASTIC)		300 260	°C

## Recommended Operating Conditions

CHARACTERISTIC	LIMITS		UNITS
	MIN	MAX	
Supply-Voltage Range $V_{CC}$ GD54/74HC Types GD54/74HCT Types	2 4.5	6 5.5	V
DC Input or Output Voltage $V_I, V_O$	0	$V_{CC}$	V
Operating Temperature $T_A$ GD74 Types GD54 Types	-40 -55	+85 +125	°C
Input Rise and Fall times $t_r, t_f$ GD54/74HC Types at 2V at 4.5V at 6V GD54/74HCT Types at 4.5V		1000 500 400 500	ns

## Logic Diagram

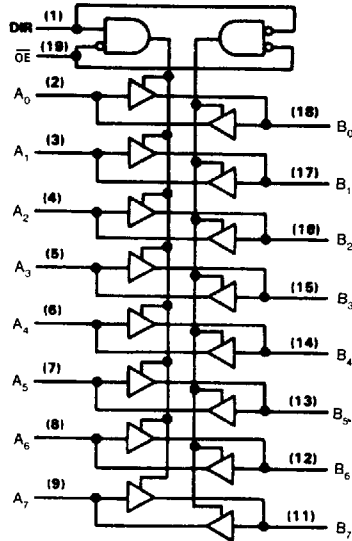


Fig. 1. Logic diagram

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub> (V)	T <sub>A</sub> = 25 °C			GD74HC245		GD54HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>IH</sub>	HIGH level input Voltage		2.0	1.5			1.5		1.5		V
			4.5	3.15			3.15		3.15		
			6.0	4.2			4.2		4.2		
V <sub>IL</sub>	LOW level input voltage		2.0			0.3		0.3		0.3	V
			4.5			0.9		0.9		0.9	
			6.0			1.2		1.2		1.2	
V <sub>OH</sub>	HIGH level output voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	2.0	1.9	2.0		1.9		1.9	V
				4.5	4.4	4.5		4.4		4.4	
				6.0	5.9	6.0		5.9		5.9	
V <sub>OL</sub>	LOW level output voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	2.0			0.1		0.1	0.1	V
				4.5			0.1		0.1	0.1	
				6.0			0.1		0.1	0.1	
V <sub>OL</sub>	LOW level output voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 6 mA	4.5		0.17	0.26		0.33	0.4	V
				6.0		0.15	0.26		0.33	0.4	
I <sub>IN</sub>	Input leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	6.0			0.1		1.0		1.0	μA
I <sub>OZ</sub>	Three-State leakage current	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>O</sub> = V <sub>CC</sub> or GND	6.0		0.01	0.5		5.0		10.0	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND I <sub>out</sub> = 0 μA	6.0			8		80		160	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub> (V)	T <sub>A</sub> = 25 °C			GD74HCT245		GD54HCT245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>IH</sub>	HIGH level input Voltage		4.5								V
			to								
			5.0	2.0			2.0		2.0		
V <sub>IL</sub>	LOW level input voltage		4.5								V
			to			0.8		0.8		0.8	
			5.5								
V <sub>OH</sub>	HIGH level output voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	4.5	4.4	4.5		4.4		4.4	V
				4.5	3.98	4.3		3.84		3.7	
V <sub>OL</sub>	LOW level output voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	4.5			0.1		0.1	0.1	V
				4.5		0.17	0.26		0.33	0.4	
I <sub>IN</sub>	Input leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5			0.1		1.0		1.0	μA
I <sub>OZ</sub>	Three-State leakage current	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>O</sub> = V <sub>CC</sub> or GND	5.5		0.01	0.5		5.0		10.0	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND I <sub>out</sub> = 0 μA	5.5			8		80		160	μA

## AC Characteristics for HC: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	$V_{CC}$ (V)	$T_A=25^\circ\text{C}$			GD74HC245		GD54HC245		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}$ / $t_{PHL}$	Propagation Delay Time	2.0		25	90		115		135	ns
	An to Bn, Bn to An	4.5		9	18		23		27	
		6.0		7	15		20		23	
$t_{PLZ}$ / $t_{PHZ}$	3-state Output Enable Time	2.0		30	150		190		225	ns
	$\overline{OE}$ to An or Bn	4.5		11	30		38		45	
		6.0		9	26		33		38	
$t_{PZH}$ / $t_{PZL}$	3-state Output Disable Time	2.0		41	150		190		225	ns
	$\overline{OE}$ to An or Bn	4.5		15	30		38		45	
		6.0		12	26		32		33	
$t_{TLH}$ / $t_{THL}$	Output Transition Time	2.0		14	60		75		90	ns
		4.5		7	12		15		18	
		6.0		6	10		13		15	

## AC Characteristics for HCT: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	$V_{CC}$ (V)	$T_A=25^\circ\text{C}$			GD74HCT245		GD54HCT245		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}$ / $t_{PHL}$	Propagation Delay Time	4.5		13	25		29		35	ns
	An to Bn, Bn to An									
$t_{PZH}$ / $t_{PZL}$	3-state Output Enable Time	4.5		16	32		38		45	ns
	$\overline{OE}$ to An or Bn									
$t_{PLZ}$ / $t_{PHZ}$	3 state Output Disable Time	4.5		15	32		38		45	ns
	$\overline{OE}$ to An or Bn									
$t_{TLH}$ / $t_{THL}$	Output Transition Time	4.5		7	12		15		18	ns

## AC Waveforms

