TOSHIBA

TC74AC05
Hex Inverter (Open Drain)

Features:

- **High Speed:** t_{pz} = 3.4ns (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.)
- **Symmetrical Output Impedance:** I_{OL} = 24mA (min.). Capability of driving 50Ω transmission lines.
- **Wide Operating Voltage Range:** V_{CC} (opr)=2V~5.5V
- **Open Drain Structure**
- **Pin and Function Compatible with 74F05**
- **Available in 14-pin DIP and 150 mil SOIC**

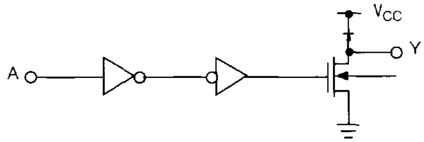
The TC74AC05 is an advanced high speed CMOS INVERTER fabricated with silicon gate and double-layer metal wiring C²MOS technology.

It achieves the high speed operation similar to equivalent Bipolar Schottky TTL, while maintaining the CMOS low power dissipation.

Pin configuration and function are the same as the TC74AC04, but the TC74AC05 has high performance MOS N-channel transistor (OPEN-DRAIN) outputs.

This device can, therefore, with suitable pull-up resistors, be used in wired-OR, LED drive and other applications.
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

System Diagram (per Gate)

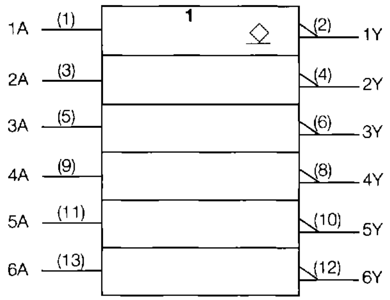


Truth Table

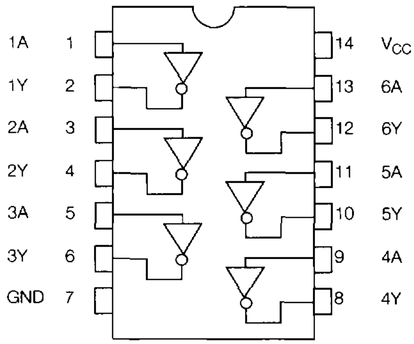
A	Y
L	Z
H	L

Z: High Impedance

IEC Logic Symbol



Pin Assignment



(TOP VIEW)

Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5~7.0	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}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC}/Ground Current	I_{CC}	±150	mA
Power Dissipation	P_D	500 (DIP) */180 (SOP)	mW
Storage Temperature	T_{stg}	-65~150	°C
Lead Temperature 10sec	T_L	300	°C

* 500mW in the range of Ta = −40°C~65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C should be applied up to 300mW.

Recommended Operating Conditions

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	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	dt/dv	0~100 (V_{CC} = 3.3 ±0.3V) 0~20 (V_{CC} = 5 ±0.5V)	ns/v

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITION			Ta = 25°C			Ta = -40~85°C		UNIT
				V_{CC}	Min.	Typ.	Max.	Min.	Max.	
High-Level Input Voltage	V_{IH}	—		2.0	1.50	—	—	1.50	—	V
				3.0	2.10	—	—	2.10	—	
				5.5	3.85	—	—	3.85	—	
Low-Level Input Voltage	V_{IL}	—		2.0	—	—	0.50	—	0.50	V
				3.0	—	—	0.90	—	0.90	
				5.5	—	—	1.65	—	1.65	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50µA	2.0	—	0.0	0.1	—	0.1	V
				3.0	—	0.0	0.1	—	0.1	
				4.5	—	0.0	0.1	—	0.1	
			I_{OL}=12mA	3.0	—	—	0.36	—	0.44	V
			I_{OL}=24mA	4.5	—	—	0.36	—	0.44	
			I_{OL}=75mA*	5.5	—	—	—	—	1.65	
3-State Output Off-State Current	I_{OZ}	V_{IN} = V_{IH} or V_{IL}		5.5	—	—	±0.5	—	±5.0	µA
		V_{OUT} = V_{CC} or GND		5.5	—		±0.5	—	±5.0	
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		5.5	—	—	±0.1	—	±0.1	
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	4.0	—	40.0	

* This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.

AC Electrical Characteristics (C_L = 50pF, R_L = 500Ω, Input t_r = t_f = 3ns)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT
			V_{CC}	Min.	Typ.	Max.	Min.	Max.	
Propagation Delay Time	t_{pLZ}	—	3.3±0.3	—	4.1	7.0	1.0	8.0	ns
			5.0±0.5	—	3.5	5.3	1.0	6.0	
Propagation Delay Time	t_{pZL}	—	3.3±0.3	—	5.9	9.1	1.0	10.4	
			5.0±0.5	—	4.1	6.6	1.0	7.5	
Input Capacitance	C_{IN}	—	—	—	5	10	—	10	pF
Output Capacitance	C_{out}	—	—	—	10	—	—	—	
Power Dissipation Capacitance	C_{PD} [1]	—	—	—	8	—	—	—	

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: $I_{CC\,(opr)} = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC} / 6$ (per Gate).