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NTE74LS378 Integrated Circuit TTL – Hex D–Type Flip–Flop with Enable

Description:

The NTE74LS378 is a hex monolithic, positive–edge–triggered flip–flop in a 16–Lead plastic DIP type package that utilizes TTL circuitry to implement D–type flip–flop logic with an enable input. The NTE74LS378 is similar to the NTE74LS174 but features a common enable instead of a common clear.

Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive–going edge of the clock pulse if the enable input \bar{G} is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive–going pulse. When the clock input is at either the high or low level, the D input signal has no effect at the output. The circuit is designed to prevent false clocking by transitions at the \bar{G} input.

The flip–flops are guaranteed to respond to clock frequencies ranging from 0 to 30Mhz while maximum clock frequency is typically 40Mhz. Typical power dissipation is 10mW per flip–flop.

Features:

- Contains Six Flip–Flops with Single Rail Outputs
- Individual Data Input to Each Flip–Flop

Applications:

- Buffer/Storage Registers
- Shift Registers
- Pattern Generators

Absolute Maximum Ratings: (Note 1)

Supply Voltage, V_{CC}	7V
DC Input Voltage, V_{IN}	7V
Operating Temperature Range, T_A	0°C to +70°C
Storage Temperature Range, T_{stg}	–65°C to +150°C

Note 1. Unless otherwise specified, all voltages are referenced to GND.

Recommended Operating Conditions:

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
High-Level Output Current	I_{OH}	-	-	-400	μ A
Low-Level Output Current	I_{OL}	-	-	8	mA
Clock Frequency	f_{clock}	0	-	30	MHz
Width of Clock Pulse	t_w	20	-	-	ns
Setup Time Data Input	t_{su}	20 \uparrow	-	-	ns
Enable Active-State		25 \uparrow	-	-	ns
Enable Inactive-State		10 \uparrow	-	-	ns
Hold Time	t_h	5 \uparrow	-	-	ns
Operating Temperature Range	T_A	0	-	+70	$^{\circ}$ C

Electrical Characteristics: (Note 2, Note 3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
High Level Input Voltage	V_{IH}		2	-	-	V	
Low Level Input Voltage	V_{IL}		-	-	0.8	V	
Input Clamp Voltage	V_{IK}	$V_{CC} = \text{MIN}, I_I = -18\text{mA}$	-	-	-1.5	V	
High Level Output Voltage	V_{OH}	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}, I_{OH} = -400\mu\text{A}$	2.7	3.5		V	
Low Level Output Voltage	V_{OL}	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}$	$I_{OL} = 4\text{mA}$	-	0.25	0.4	V
			$I_{OL} = 8\text{mA}$	-	0.35	0.5	V
Input Current	I_I	$V_{CC} = \text{MAX}, V_I = 7\text{V}$	-	-	0.1	mA	
High Level Input Current	I_{IH}	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$	-	-	20	μ A	
Low Level Input Current	I_{IL}	$V_{CC} = \text{MAX}, V_I = 0.4\text{V}$	-	-	-0.4	mA	
Short-Circuit Output Current	I_{OS}	$V_{CC} = \text{MAX}, \text{Note 4}$	-20	-	-100	mA	
Supply Current	I_{CC}	$V_{CC} = \text{MAX}, \text{Note 5}$	-	13	22	mA	

Note 2. For conditions shown as MIN or MAX, use the appropriate value specified under "Recommended Operation Conditions".

Note 3. All typical values are at $V_{CC} = 5\text{V}, T_A = +25^{\circ}\text{C}$.

Note 4. Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

Note 4. With all outputs open and ground applied to all data inputs, I_{CC} is measured after a momentary ground, then 4.5V is applied to the clock.

Switching Characteristics: ($V_{CC} = 5\text{V}, T_A = +25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Maximum Clock Frequency	f_{max}	$R_L = 2\text{k}\Omega, C_L = 15\text{pF}$	30	40	-	MHz
Propagation Delay Time, from Clock	t_{PLH}		-	17	27	ns
	t_{PHL}		-	18	27	ns

Function Table (Each Flip-Flop):

Inputs			Outputs	
G	Clock	Data	Q	\bar{Q}
H	X	X	Q_0	\bar{Q}_0
L	\uparrow	H	H	L
L	\uparrow	L	L	H
X	L	X	Q_0	\bar{Q}_0

Pin Connection Diagram

