



ELECTRONICS, INC.
 44 FARRAND STREET
 BLOOMFIELD, NJ 07003
 (973) 748-5089
<http://www.nteinc.com>

NTE74LS113 Integrated Circuit TTL – Dual J–K Negative Edge Triggered Flip–Flop with Preset

Description:

The NTE74LS113 contains two independent J–K negative–edge–triggered flip–flops in a 14–Lead plastic DIP type package. A low level at the preset input sets the outputs regardless of the levels of the other inputs. When preset (\overline{PRE}) is inactive (high), data at the J and K inputs meeting the setup time requirements are transferred to the outputs on the negative–going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold time interval, data at the J and K inputs may be changed without affecting the levels at the outputs. This versatile flip–flop can perform as a toggle flip–flop by tying J and K high.

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 Input Voltage	V_{IH}	2.0	–	–	V
Low–Level Input Voltage	V_{IL}	–	–	0.8	V
High–Level Output Current	I_{OH}	–	–	–0.4	mA
Low–Level Output Current	I_{OL}	–	–	8	mA
Clock Frequency	f_{clock}	0	–	30	MHz
Pulse Duration CLK High	t_w	20	–	–	ns
\overline{PRE} or \overline{CLR} Low		25	–	–	ns
Setup Time before CLK↓ Data High or Low	t_{su}	20	–	–	ns
\overline{PRE} Inactive		20	–	–	ns
Hold Time Data after CLK↓	t_h	20	–	–	ns
Operating Temperature Range	T_A	0	–	+70	°C

Electrical Characteristics: (Note 2, Note 3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Clamp Voltage	V_{IK}	$V_{CC} = \text{MIN}, I_I = -18\text{mA}$	-	-	-1.5	V
High Level Output Voltage	V_{OH}	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}, I_{OH} = -0.4\text{mA}$	2.7	3.4	-	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
		$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}, I_{OL} = 8\text{mA}$	-	0.35	0.5	V
Input Current J or K	I_I	$V_{CC} = \text{MAX}, V_I = 7\text{V}$	-	-	0.1	mA
$\overline{\text{PRE}}$			-	-	0.3	mA
$\overline{\text{CLK}}$			-	-	0.4	mA
High Level Input Current J or K	I_{IH}	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$	-	-	20	μA
$\overline{\text{PRE}}$			-	-	60	μA
$\overline{\text{CLK}}$			-	-	80	μA
Low Level Input Current J or K	I_{IL}	$V_{CC} = \text{MAX}, V_I = 0.4\text{V}$	-	-	-0.4	mA
$\overline{\text{CLR}}$ or $\overline{\text{CLK}}$			-	-	-0.8	mA
Short-Circuit Output Current	I_{OS}	$V_{CC} = \text{MAX}, \text{Note 4}$	-20	-	-100	mA
Supply Current	I_{CC}	$V_{CC} = \text{MAX}, \text{Note 5}$	-	4	6	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. For certain devices where state commutation can be caused by shorting an output to GND, an equivalent test may be performed with $V_O = 2.125\text{V}$ and the minimum and maximum limits reduced to one half of their stated values.

Note 5. With all outputs open, I_{CC} is measured with the Q and \overline{Q} outputs high in turn. At the time of measurement, the clock input is grounded.

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	t_{max}	$R_L = 2\text{k}\Omega,$ $C_L = 15\text{pF}$	30	45	-	MHz
Propagation Delay Time (From PRE or CLK Input to Q or \overline{Q} Output)	t_{PLH}		-	15	20	ns
	t_{PHL}		-	15	20	ns

Function Table (Each Flip-Flop):

Inputs				Outputs	
PRE	CLK	J	K	Q	\overline{Q}
L	X	X	X	H	L
H	↓	L	L	Q_0	$\overline{Q_0}$
H	↓	H	L	H	L
H	↓	L	H	L	H
H	↓	H	H	Toggle	
H	H	X	X	Q_0	$\overline{Q_0}$

Pin Connection Diagram

