

NTE1172 Integrated Circuit Phase–Frequency Detector

Absolute Maximum Ratings: ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Supply Voltage, V_{CC}	7V
Input Voltage, V_I	5.5V
Output Voltage, V_O	5.5V
Power Dissipation, P_D	360mW
Operating Temperature Range, T_{opr}	-15° to $+75^\circ\text{C}$
Storage Temperature Range, T_{stg}	-40° to $+125^\circ\text{C}$

Recommended Operating Conditions:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}		4.75	5.0	5.25	V
Input Voltage, High Level	V_{IH}		2.0	–	5.0	V
Input Voltage, Low Level	V_{IL}		0	–	0.8	V

Electrical Characteristics: ($T_A = -15^\circ$ to $+75^\circ\text{C}$, GND = Pin7, Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Low Level Input Current (Pin1)	I_{IL}	$V_{CC} = 5.25\text{V}$, $V_{IL(1)} = 0.4\text{V}$	–	–	–4.8	mA
Low Level Input Current (Pin3)	I_{IL}	$V_{CC} = 5.25\text{V}$, $V_{IL(3)} = 0.4\text{V}$	–	–	–4.8	mA
Low Level Input Current (Pin11)	I_{IL}	$V_{CC} = 5.25\text{V}$, $V_{IL(11)} = 0.4\text{V}$	–	–	–1.6	mA
High Level Input Current (Pin1)	I_{IH}	$V_{CC} = 5.25\text{V}$, $V_{IH(1)} = 2.5\text{V}$	–	–	120	μA
High Level Input Current (Pin3)	I_{IH}	$V_{CC} = 5.25\text{V}$, $V_{IH(3)} = 2.5\text{V}$	–	–	120	μA
High Level Input Current (Pin11)	I_{IH}	$V_{CC} = 5.25\text{V}$, $V_{IH(11)} = 2.5\text{V}$	–	–	40	μA
Low Level Output Voltage (Pin6)	V_{OL}	$V_{CC} = 4.75\text{V}$, $V_{IH(1,3)} = 1.8\text{V}$, $I_{OL(6)} = 20\text{mA}$	–	–	0.4	V
Low Level Output Voltage (Pin12)	V_{OL}	$V_{CC} = 4.75\text{V}$, $V_{IH(1,3)} = 1.2\text{V}$, $I_{OL(12)} = 20\text{mA}$	–	–	0.4	V
High Level Output Voltage (Pin6)	V_{OH}	$V_{CC} = 4.75\text{V}$, $V_{IH(1,3)} = 1.8\text{V}$, $I_{OH(6)} = -1.6\text{mA}$	2.5	–	–	V
High Level Output Voltage (Pin12)	V_{OH}	$V_{CC} = 4.75\text{V}$, $V_{IH(1,3)} = 1.8\text{V}$, $I_{OH(12)} = -1.6\text{mA}$	2.5	–	–	V
High Level Output Voltage (Pin2)	V_{OH}	$V_{CC} = 4.75\text{V}$, $V_{OL(1,3)} = 1.1\text{V}$, $I_{OH(2)} = -1.6\text{mA}$, $I_{OL(13)} = 20\text{mA}$, Note 2	2.5	–	–	V
Low Level Output Voltage (Pin13)	V_{OL}		–	–	0.4	V

Note 1. Pin numbers shown in ().

Note 2. This value is measured at Input State 9 of the truth table and varies depending on the situation of sequential logic.

Electrical Charactersitics: ($T_A = -15^{\circ}$ to $+75^{\circ}\text{C}$ GND = Pin7, Note 1 unless otherwsie specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
High Level Output Voltage (Pin2)	V_{OH}	$V_{CC} = 4.75\text{V}$, $V_{OL(1,3)} = 1.1\text{V}$, $I_{OH(2)} = -0\text{mA}$, $I_{OL(13)} = -1.6\text{mA}$, Note 3	2.5	–	–	V
Low Level Output Voltage (Pin13)	V_{OL}		–	–	0.4	V
Short Circuit Output Current (Pin2)	I_{OS}	$V_{IH(1)} = 1.8\text{V}$, GND (2, 3, 7)	–20	–	–65	mA
Short Circuit Output Current (Pin6)	I_{OS}	$V_{CC} = 5\text{V}$, GND (1, 3, 6, 7)	–20	–	–65	mA
Short Circuit Output Current (Pin12)	I_{OS}	$V_{CC} = 5\text{V}$, GND (1, 3, 7, 12)	–20	–	–65	mA
Short Circuit Output Current (Pin13)	I_{OS}	$V_{CC} = 5\text{V}$, $V_{IH(1)} = 1.8\text{V}$, GND (3, 7, 13)	–20	–	–65	mA
Output Voltage (Pin10)	V_{EH}	$I_{OH(10)} = -1\text{mA}$, $V_{IL(11)} = 1.1\text{V}$	1.5	–	–	V
Output Current (Pin8)	I_O	$V_{CC(8)} = 5.25\text{V}$, $I_{A(9)} = 2\mu\text{A}$	0.8	–	–	mA
Output Leakage Current (Pin2)	I_{OLK}	$V_{CC(2,14)} = 5\text{V}$, $V_{IH(1)} = 1.8\text{V}$, GND (3, 7)	–	–	250	μA
Output Leakage Current (Pin6)	I_{OLK}	$V_{CC(6,14)} = 5\text{V}$, GND (1, 3, 9)	–	–	250	μA
Output Leakage Current (Pin12)	I_{OLK}	$V_{CC(12,14)} = 5\text{V}$, GND (1, 3, 7)	–	–	250	μA
Output Leakage Current (Pin13)	I_{OLK}	$V_{CC(2,14)} = 5\text{V}$, $V_{IH(1)} = 1.8\text{V}$, GND (3, 7)	–	–	250	μA
Collector–Emitter Voltage	V_{CE}	$I_{in(15)} = 1\text{mA}$, GND (4, 7)	0.5	–	–	V
Output Leakage Current (Pin8)	I_{OLK}	$V_{CC(8)} = 5.25\text{V}$, GND (7, 9)	–	–	120	μA
Output Leakage Current (Pin10)	I_{OLK}	$V_{CC} = 5.25\text{V}$, $V_{IH(11)} = 2.5\text{V}$, $V_{O(10)} = 1.5\text{V}$	–	–	5	μA
Supply Current	I_{CC}	$V_{CC} = 5\text{V}$	–	–	40	mA
Switching Characteristics						
Maximum Count Pulse Frequency	$f_{\max1}$	$C_L = 15\text{pF}$, $R_L = 300\Omega$	–	30	–	MHz
	$f_{\max2}$		–	30	–	MHz
Propagation Delay Time	t_{PHL1}		–	13	–	ns
	t_{PLH1}		–	19	–	ns
	t_{PHL2}		–	4.5	–	ns
	t_{PLH2}		–	10	–	ns

Note 1. Pin numbers shown in ().

Note 2. This value is measured at Input State 13 of the truth table and varies depending on the situation of sequential logic.

Truth Table: (0 = L, 1 = H, X = Don't Care)

Input State	Input		Output			
	Ref	Variable	Upper 1	Down 1	Upper 2	Down2
1	0	0	X	X	1	1
2	1	0	X	X	0	1
3	1	1	X	X	1	0
4	1	0	X	X	0	1
5	0	0	X	X	1	1
6	1	0	X	X	0	1
7	0	0	X	X	1	1
8	1	0	X	X	0	1
9	0	0	0	1	1	1
10	0	1	0	1	1	1
11	0	0	1	1	1	1
12	0	1	1	1	1	1
13	0	0	1	0	1	1
14	0	1	1	0	1	1
15	0	0	1	0	1	1
16	1	0	1	0	0	1
17	0	0	1	1	1	1

Pin Connection Diagram



