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NTE7493A Integrated Circuit TTL – 4-Bit Binary Counter

Description:

The NTE7493A is a monolithic 4-bit binary counter in a 14-Lead DIP type package that contains four master-slave flip-flops and additional gating to provide a divide-by-two counter and a three-stage binary counter for which the count cycle length is divide-by-eight. The counter also contains a gated zero reset.

To use the maximum count length of this device, the CKB input is connected to the QA output. The input count pulses are applied to CKA input and the outputs are as described in the function tables.

Absolute Maximum Ratings: (Note 1)

Supply Voltage, V _{CC}	7V
Input Voltage, V _{IN}	5.5V
Interemitter Voltage (Note 2)	5.5V
Power Dissipation	130mW
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.

Note 2. This is the voltage between two emitters of a multiple-emitter transistor. For this device, this rating applies between the two R₀ inputs.

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}	–	–	-800	μA
Low-Level Output Current	I _{OL}	–	–	16	mA
Count Frequency A Input	f _{count}	0	–	32	MHz
B Input		0	–	16	MHz
Pulse Width A Input	t _w	15	–	–	ns
B Input		30	–	–	ns
Reset Inputs		15	–	–	ns
Reset Inactive Setup Time	t _{su}	25	–	–	ns
Operating Temperature Range	T _A	0	–	+70	°C

Electrical Characteristics: (Note 3, Note 4)

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} = MIN, I _I = -12mA	-	-	-1.5	V
High Level Output Voltage	V _{OH}	V _{CC} = MIN, V _{IH} = 2V, V _{IL} = MAX, I _{OH} = -400μA	2.7	3.4	-	V
Low Level Output Voltage	V _{OL}	V _{CC} = MIN, V _{IH} = 2V, V _{IL} = 0.8V, I _{OL} = 16mA, Note 5	-	0.2	0.4	V
Input Current	I _I	V _{CC} = MAX, V _I = 5.5V	-	-	0.1	mA
High Level Input Current	I _{IH}	V _{CC} = MAX, V _I = 2.4V	Any Reset	-	40	μA
			CKA	-	80	μA
			CKB	-	80	μA
Low Level Input Current	I _{IL}	V _{CC} = MAX, V _I = 0.4V	Any Reset	-	-1.6	mA
			CKA	-	-3.2	mA
			CKB	-	-3.2	mA
Short-Circuit Output Current	I _{OS}	V _{CC} = MAX, Note 6	-18	-	-57	mA
Supply Current	I _{CC}	V _{CC} = MAX, Note 7	-	26	39	mA

Note 3. For conditions shown as MIN or MAX, use the appropriate value specified under "Recommended Operation Conditions".

Note 4. All typical values are at V_{CC} = 5V, T_A = +25°C.

Note 5. Q_A outputs are tested at I_{OL} = 16mA plus the limit value of I_{IL} for the CKB input. This permits driving the CKB input while maintaining full fan-out capability.

Note 6. Not more than one output should be shorted at a time.

Note 7. I_{CC} is measured with all outputs open, both R_O inputs grounded following momentary connection to 4.5V, and all other inputs grounded.

Switching Characteristics: (V_{CC} = 5V, T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Maximum Count Frequency (From CKA Input to Q _A Output) (From CKB Input to Q _B Output)	f _{max}	R _L = 400kΩ, C _L = 15pF	32	42	-	MHz
			16	-	-	MHz
Propagation Delay Time (From CKA Input to Q _A Output)	t _{PLH}		-	10	16	ns
	t _{PHL}		-	12	18	ns
Propagation Delay Time (From CKA Input to Q _D Output)	t _{PLH}		-	46	70	ns
	t _{PHL}		-	46	70	ns
Propagation Delay Time (From CKB Input to Q _B Output)	t _{PLH}		-	10	16	ns
	t _{PHL}		-	14	21	ns
Propagation Delay Time (From CKB Input to Q _C Output)	t _{PLH}		-	21	32	ns
	t _{PHL}		-	23	35	ns
Propagation Delay Time (From CKB Input to Q _D Output)	t _{PLH}		-	34	51	ns
	t _{PHL}		-	34	51	ns
Propagation Delay Time (From Set-to-0 Input to Any Output)	t _{PHL}		-	26	40	ns

Count Sequence (NOTE):

Count	Outputs			
	Q _D	Q _C	Q _B	Q _A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

H = HIGH Voltage Level

L = LOW Voltage Level

X = Irrelevant

NOTE: Output Q_A is connected to input CKB.

Reset/Count Function Table:

Reset Inputs		Outputs			
R ₀₍₁₎	R ₀₍₂₎	Q _D	Q _C	Q _B	Q _A
H	H	L	L	L	L
L	X	Count			
X	L	Count			

H = HIGH Voltage Level

L = LOW Voltage Level

X = Irrelevant

Pin Connection Diagram

