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NTE9093 & NTE9094 Integrated Circuit Diode Transistor Logic (DTL) Dual J-K Flip-Flop

Absolute Maximum Ratings: (Above which useful life may be impaired)

V_{CC} Pin, Potential to GND	-0.5 to +8.0V
V_{CC} , Pulsed, 1 Second	12V
Input Voltage, Applied to Input	-1.5 to 5.5V
Voltage Applied to Output when Output is High	+ V_{CC}
Input Current, Into Inputs	1mA
Current Into Output when Output is Low	30mA
Ambient Temperature Range Under Bias	-55° to +125°C
Storage Temperature Range	-65° to +150°C
Lead Temperature (During Soldering, 60sec)	+300°C

Note 1. The **NTE9093** is a **discontinued** device and no longer available.

Electrical Characteristics: ($T_A = +25^\circ\text{C}$, $V_{CC} = 5\text{V} \pm 10\%$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit				
Output High Voltage NTE9093	V_{OH}	$V_{CC} = 4.5\text{V}$, $I_{OH} = -180\mu\text{A}$	2.5	3.3	-	V				
NTE9094							$V_{CC} = 4.5\text{V}$, $I_{OH} = -540\mu\text{A}$	2.5	3.3	-
Output Low Voltage NTE9093	V_{OL}	$V_{CC} = 4.5\text{V}$, $I_{OL} = 12\text{mA}$	-	0.25	0.4	V				
NTE9094							$V_{CC} = 4.5\text{V}$, $I_{OH} = 13\text{mA}$	-	0.25	0.4
Input High Voltage	V_{IH}	Guaranteed Input High Threshold for All Inputs	1.9	-	-	V				
Input Low Voltage	V_{IL}	Guaranteed Input Low Threshold for All Inputs	-	-	1.1	V				
Input Leakage Current, All J-K, S, C, S_D , C_D Inputs	I_R	$V_{CC} = 5.5\text{V}$, $V_R = 4\text{V}$, GND on Other Inputs	-	-	2.0	μA				
Input Leakage Current, CP Inputs	I_{RCP}	$V_{CC} = 5.5\text{V}$, $V_R = 4\text{V}$, GND on Other Inputs	-	-	10	μA				
Input Current, All J, K, S, C Inputs	I_F	$V_{CC} = 5.5\text{V}$, $V_F = 0.4\text{V}$, 4V on Other Inputs	-	-0.82	-0.98	mA				
Input Current, S_D or C_D							-	-1.8	-2.2	mA
Input Current, CP Inputs NTE9093							-	-2.40	-2.93	mA
NTE9094							-	-1.93	-2.35	mA

Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$, $V_{CC} = 5\text{V} \pm 10\%$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Current, All J, K, S, C Inputs	I_F	$V_{CC} = 4.5\text{V}$, $V_F = 0.4\text{V}$, 4V on Other Inputs	-	-0.62	-0.76	mA
Input Current, S_D or C_D			-	-1.39	-1.70	mA
Input Current, CP Inputs NTE9093			-	-1.85	-2.26	mA
NTE9094			-	-1.50	-1.83	mA
V_{CC} Current NTE9093	I_{PD}	$V_{CC} = 5\text{V}$, All Inputs Open, Momentary GND on S_D	-	16.6	28.0	mA
NTE9094			-	19.8	32.4	mA
Switching Characteristics ($T_A = +25^\circ\text{C}$, $V_{CC} = 5\text{V}$)						
Clock to Output NTE9093	t_{pd+}		35	-	75	ns
NTE9094			30	-	65	ns
Clock to Output NTE9093	t_{pd-}		30	-	75	ns
NTE9094			30	-	75	ns
Set-Up Time	t_{set-up}		35	22	-	ns
Release Time	$t_{release}$		-	14	10	ns

Truth Table: Synchronous Operation

Before Clock				Outputs After Clock	
Outputs		Inputs			
One	Zero	J	K	One	Zero
L	H	L	X	L	H
L	H	H	X	H	L
H	L	X	L	H	L
H	L	X	H	L	H

Truth Table: Asynchronous Operation

Inputs		Outputs	
S_D	C_D	One	Zero
L	L	H	H
L	H	H	L
H	L	L	H
H	H	State determined by synchronous inputs and clock input	

Pin Connection Diagram

