

SERIES 15830, SERIES 15930 DTL INTEGRATED CIRCUITS

DTL SMALL-SCALE INTEGRATION (SSI)

Function	Operating Temperature Ranges		Packages*		
	-55°C to 125°C	0°C to 75°C	Dual-In-		Flat
			Line	N	U
GATES WITH 6-kΩ PULL-UP RESISTORS					
Expandable Dual 4-Input NAND Gates	SN 15930	SN 15830	J	N	U
Quadruple 2-Input NAND Gates	SN 15946	SN 15846	J	N	U
Triple 3-Input NAND Gates	SN 15962	SN 15862	J	N	U
Dual 5-Input NAND Gates	SN 151900	SN 151800	J	N	U
Expandable 8-Input NAND Gates	SN 151902	SN 151802	J	N	U
10-Input NAND Gates	SN 151904	SN 151804	J	N	U
Quadruple 2-Input AND Gates	SN 151906	SN 151806	J	N	U
Quadruple 2-Input OR Gates	SN 151908	SN 151808	J	N	U
Quadruple 2-Input NOR Gates	SN 151910	SN 151810	J	N	U
Quadruple 2-Input Exclusive-OR Gates	SN 151912	SN 151812	J	N	U
GATES WITH 2-kΩ PULL-UP RESISTORS					
Quadruple 2-Input NAND Gates	SN 15949	SN 15849	J	N	U
Expandable Dual 4-Input NAND Gates	SN 15961	SN 15861	J	N	U
Triple 3-Input NAND Gates	SN 15963	SN 15863	J	N	U
Dual 5-Input NAND Gates	SN 151901	SN 151801	J	N	U
Expandable 8-Input NAND Gates	SN 151903	SN 151803	J	N	U
10-Input NAND Gates	SN 151905	SN 151805	J	N	U
Quadruple 2-Input AND Gates	SN 151907	SN 151807	J	N	U
Quadruple 2-Input OR Gates	SN 151909	SN 151809	J	N	U
Quadruple 2-Input NOR Gates	SN 151911	SN 151811	J	N	U
POWER/BUFFER GATES					
Expandable Dual 4-Input NAND Buffer Gates	SN 15932	SN 15832	J	N	U
Expandable Dual 4-Input NAND Power Gates	SN 15944	SN 15844	J	N	U
Quadruple 2-Input NAND Buffer Gates	SN 15957	SN 15857	J	N	U
Quadruple 2-Input NAND Power Gates	SN 15958	SN 15858	J	N	U
HEX INVERTERS					
6-kΩ Pull-Up Resistors	SN 15934	SN 15834	J	N	U
Expandable (Open-Base) or Translator Inputs	SN 15935	SN 15835	J	N	U
6-kΩ Pull-Up Resistors	SN 15936	SN 15836	J	N	U
2-kΩ Pull-Up Resistors	SN 15937	SN 15837	J	N	U
Open-Collector Outputs	SN 15938	SN 15838	J	N	U
EXPANDERS					
Dual 4-Input Expanders	SN 15933	SN 15833	J	N	U
FLIP-FLOPS					
Gated J-K/R-S (6-kΩ Pull-Up Resistors)	SN 15931	SN 15831	J	N	U
Gated J-K/R-S (6-kΩ Pull-Up Resistors)	SN 15945	SN 15845	J	N	U
Gated J-K/R-S (2-kΩ Pull-Up Resistors)	SN 15948	SN 15848	J	N	U
Pulse-Triggered Binary (Active Pull-Up)	SN 15950	SN 15850	J	N	U
Dual J-K, Individual Clocks and Presets (6-kΩ Pull-Up Resistors)	SN 159093	SN 158093	J	N	U
Dual J-K, Individual Clocks and Presets (2-kΩ Pull-Up Resistors)	SN 159094	SN 158094	J	N	U
Dual J-K, Common Clocks and Clears (2-kΩ Pull-Up Resistors)	SN 159097	SN 158097	J	N	U
Dual J-K, Common Clocks and Clears (6-kΩ Pull-Up Resistors)	SN 159099	SN 158099	J	N	U
MONOSTABLE MULTIVIBRATORS					
Gated, Negative-Edge-Triggered	SN 15951	SN 15851	J	N	U

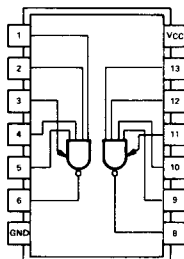
* For outline drawings of all packages, see Section 1.

—SEE ORDERING INSTRUCTIONS PAGE 1-1—

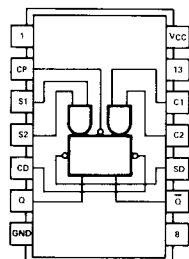
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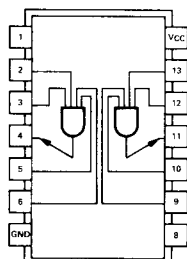
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SN15930, SN15932,
SN15944, SN15961



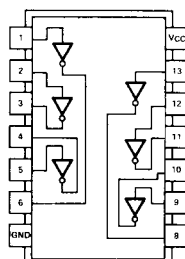
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SN15945, SN15948,
(See Truth Tables 1 and 2)



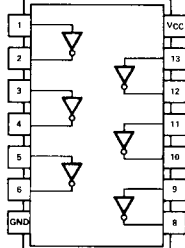
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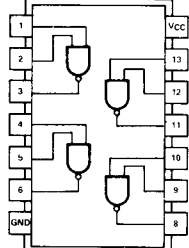
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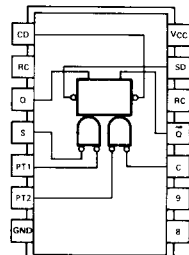
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SN15846, SN15849,
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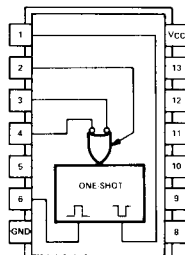


SN15850, SN15950
(See Truth Tables 3 and 4)



Each RC is a 1-k Ω resistor to V_{CC}.

SN15851, SN15951
(See Notes A, B, and C)



TRUTH TABLE 1
R-S MODE

S1	S2	C1	C2	t_n	t_{n+1}
L	X	L	X		Q_n
L	X	X	L		Q_n
X	L	L	X		Q_n
X	L	X	L		Q_n
L	X	H	H		L
X	L	H	H		L
H	H	L	X		H
H	H	X	L		H
H	H	H	H		Indeterminate

- NOTES: 1. t_n = bit time before clock pulse.
2. t_{n+1} = bit time after clock pulse.
3. H = high, L = low, X = irrelevant.
4. For operation in the J-K mode connect S2 to Q and C2 to \bar{Q} .

TRUTH TABLE 2
J-K MODE

S1	C1	t_n	t_{n+1}
L	L		Q_n
L	H		L
H	L		H
H	H		\bar{Q}_n

TRUTH TABLE 3
SYNCHRONOUS

t_n PULSE INPUT				t_{n+1} OUTPUT	
S	C	PT1	PT2	Q	\bar{Q}
H	X	X	H	Q_n	\bar{Q}_n
X	H	H	X	Q_n	\bar{Q}_n
L	H	L	X	H	L
L	X	L	H	H	L
H	L	X	L	L	H
X	L	H	L	L	H
L	L	L	L	Indeterminate	

TRUTH TABLE 4
ASYNCHRONOUS

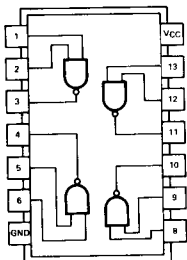
DIRECT INPUT		OUTPUT	
SD	CD	Q	\bar{Q}
H	H	Q_n	\bar{Q}_n
L	H	L	H
H	L	H	L
L	L	H	H

- NOTES: 5. Logical levels shown for pulse inputs PT1 and PT2 indicate that a transition to that level has just occurred.
6. Truth tables reflect individual conditions at the input. Either direct input may be used to inhibit its corresponding pulse input.

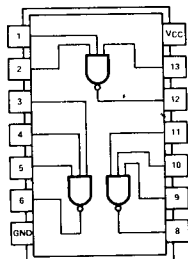
- NOTES: A. External timing resistor may be connected between pins 14 and 10 to control pulse width.
B. External timing capacitor may be connected between pins 10 and 11 to control pulse width.
C. Input sensitivity can be decreased by adding a capacitor from pin 5 to ground.

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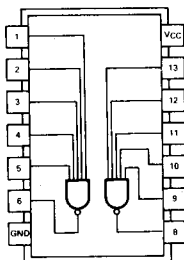
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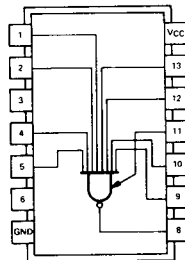
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SN15962, SN15963



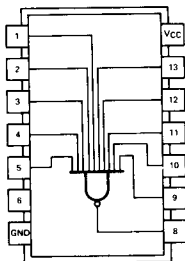
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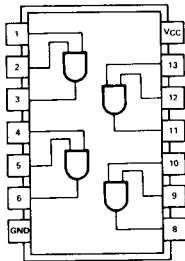
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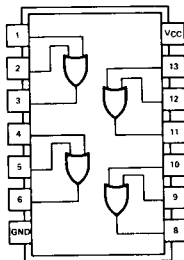
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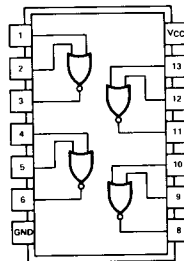
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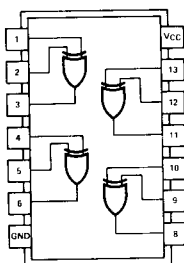
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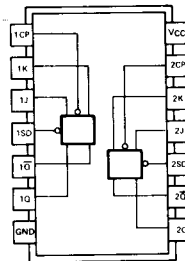
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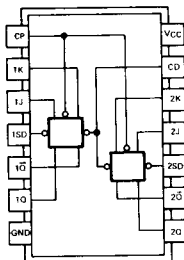
SN151812,
SN151912



SN158093, SN158094,
SN159093, SN159094
(See Truth Table 5)



SN158097, SN158099,
SN159097, SN159099
(See Truth Table 5)



TRUTH TABLE 5

	t_n	t_{n+1}
J	K	Q
L	L	\bar{Q}_n
L	H	L
H	L	H
H	H	\bar{Q}_n

**SERIES 15830, SERIES 15930
DTL INTEGRATED CIRCUITS**

SERIES 15830 GATES, EXPANDER, AND ONE-SHOT

electrical and switching characteristics (unless otherwise noted, $V_{CC} = 5\text{ V}$)

PARAMETER	CONDITIONS	SN15830		SN15833		SN15835		SN15836		SN15844 SN15868		SN151806		SN151807		SN151808		SN151809		SN151810		SN151811		SN151812		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
V_{OL}	$V_O - I_{OL}$ MIN	0	0.45	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	V
V_{OH}	$I_O - I_{OH}$ MIN	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5	V
V_{IL}		0	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	V
V_{IH}		0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	V
I_{OL}	$V_O - V_{OL}$ MAX	0	-0.12	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	mA
I_{OH}	$V_O - V_{OH}$ MIN	0	-0.12	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	-2.0	-2.5	mA
I_{OS}	$V_O - 0\text{ V}$	0	-1.3	-1.6	-1.4	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	-1.3	-1.6	mA
I_{IL}	$V_I - V_{OL}$ MAX	0	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	mA
I_{IH}	$V_I - 4\text{ V}$	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	mA
V_F	$I_F = 2\text{ mA}$	0	0.75	0.9	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	0.68	0.82	V
I_{CCL}	AVG PER GATE	25	4	15	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	mA
I_{CCH}	$V_{CC} - 8\text{ V}$	25	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	mA
I_{PHL}		25	10	30	15	40	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	ns
I_{PLH}		25	25	80	25	20	25	80	15	50	5	50	25	80	15	65	25	90	15	75	25	90	15	75	25	ns

(1) 25°C only.
 (2) For the SN15838, SN15844, and SN15858, V_{OH} is measured at 5 mA.
 (3) $V_I = 1.35\text{ V}$ at T_A of 0°C, 1.27 V at $T_A = 25^\circ\text{C}$, and 1.25 V at $T_A = 70^\circ\text{C}$.
 (4) For the SN15851, total quiescent values of I_{CC} are given for $V_{CC} = 5\text{ V}$ and $V_{CC} = 8\text{ V}$.

NOTE A: This monostable multivibrator is triggered with a negative-going transition ≥ 1 volt having a fall time ≤ 25 ns/volt.

SERIES 15830, SERIES 15930 DTL INTEGRATED CIRCUITS

SERIES 15930 GATES, EXPANDER, AND ONE-SHOT electrical and switching characteristics (unless otherwise noted, V_{CC} = 5 V)

PARAMETER	CONDITIONS	T _A (°C)	SN15930		SN15933		SN15925		SN15928		SN15944		SN15981		SN151906		SN151907		SN151908		SN151909		SN151910		SN151911		SN151912		UNIT	
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
V _{OL}	I _O = I _{OL} MIN	-55 and 75	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	V	
		125	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	V	
V _{OH}	I _O = I _{OH} MIN	-55	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	V	
		25	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	V	
		125	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	V	
V _{IL}		-55	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	V	
		25	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	V	
		125	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	V	
V _{IH}		-55	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	V	
		25	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	V	
		125	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	V	
I _{OL}	V _O = V _{OL} MAX	-55	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	mA	
		25	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	mA
		125	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	mA
I _{OH}	V _O = V _{OH} MIN	-55	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	mA	
		25	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	mA	
		125	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	mA	
I _{OS}	V _O = 0 V	-55 and 75	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	-1.34	mA	
		125	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	mA	
I _{IL}	V _I = 0 V	-55 and 75	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	mA	
		125	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	mA	
I _{IH}	V _I = 4 V	-55 and 75	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	μA	
		125	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	μA	
V _F	I _F = 2 mA	-55	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	V	
		25	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	0.7	0.82	V	
I _{CC1}	AVG PER GATE	25	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	3.25	13.3	mA	
I _{CC2}	AVG PER GATE	25	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	2.75	3	mA	
I _{CC3}	V _{CC} = 8 V	25	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	mA	
I _{PH}		25	10	30	15	40	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	mA	
I _{PLH}		25	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	80	25	mA

(1) 25°C only.
 (2) For the SN15938, SN15944, and SN15958, V_{OH} is measured at 5 mA.
 (3) V_I = 0.98 V at T_A = -55°C, 0.82 V at T_A = 25°C, and 0.65 V at T_A = 125°C.
 (4) For the SN15951, total quiescent values of I_{CC} are given for V_{CC} = 5 V and V_{CC} = 8 V.

NOTE A: This monostable multivibrator is triggered with a negative-going transition ≥ 1 volt having a fall time ≤ 25 ns/volt.

SERIES 15830, SERIES 15930
DTL INTEGRATED CIRCUITS

SERIES 15830 DTL FLIP-FLOPS

electrical and switching characteristics (unless otherwise noted, VCC = 5)

PARAMETER	CONDITIONS	TA (°C)	SN15831		SN15845		SN15848		SN15850		SN158093		SN158094		SN158097		SN158099		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
VOL	IO = IOL MIN	0 and 25	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	0.45	0.5	V
		75	2.6	2.5	2.6	2.5	3.8	3.7	3.8	3.7	2.6	2.5	3.8	3.7	2.6	2.5	3.8	3.7	V
VIL	VI = VOL MAX	0	1.2	1.1	1.2	1.1	1.2	1.1	1.2	1.1	1.2	1.1	1.2	1.1	1.2	1.1	1.2	1.1	V
		25	1.1	0.95	1.1	0.95	1.1	0.95	1.1	0.95	1.1	0.95	1.1	0.95	1.1	0.95	1.1	0.95	V
VIH	VI = VOL MAX	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	V
		25	1.9	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.9	1.8	V
IOL	VO = VOH MIN	0 and 25	10.5	10.2	16.8	16	15.4	14.6	15.4	14.6	12	11.4	16.8	15.4	15.4	14.6	16.8	16	mA
		75	10.2	-0.12	16.8	16	14.6	14.6	14.6	11.4	11.4	16	14.6	14.6	14.6	14.6	16	16	mA
IOS	VO = VOH MIN	0	-0.59	-1.41	-0.59	-1.41	-1.77	-4.2	-1.77	-4.2	-1.37	-29	-1.37	-29	-1.37	-29	-1.37	-29	mA
		25	-0.59	-1.41	-0.59	-1.41	-1.77	-4.2	-1.77	-4.2	-13.7	-29	-13.7	-29	-13.7	-29	-13.7	-29	mA
IIL	VO = VOH MIN	0 and 25	-1.05	-1	-0.95	-0.9	-0.95	-0.9	-0.95	-0.9	-2.1	-0.95	-0.95	-0.95	-0.95	-0.95	-0.95	-0.95	mA
		75	-1	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-2	-2	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	mA
IPL	VO = VOH MIN	0 and 25	-2.8	-2.67	-2.8	-2.67	-2.24	-2.13	-2.24	-2.13	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	mA
		75	-2.67	-2.67	-2.67	-2.67	-2.13	-2.13	-2.13	-2.13	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	mA
IPLH	VO = VOH MIN	0 and 25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	mA
		75	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	mA
ICC	VO = VOH MIN	0 and 25	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	μA
		75	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	μA
IPLH	VO = VOH MIN	0 and 25	30	40	30	30	20	30	20	20	20	20	20	20	20	20	20	20	μA
		75	40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	30	μA
IPLH	VO = VOH MIN	0 and 25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	μA
		75	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	μA
IPLH	VO = VOH MIN	25	14	14	16	16	17.5	17.5	9.3	9.3	32	32	32	32	32	32	32	32	mA
		75	18	18	18.5	18.5	22.5	22.5	19.6	19.6	37	37	37	37	37	37	37	37	mA
IPLH	VO = VOH MIN	25	35	35	15	15	65	65	5	5	15	15	15	15	15	15	15	15	ns
		75	35	35	25	25	75	75	25	25	25	25	25	25	25	25	25	25	ns

(1) Double the limit for the common clear input.

**SERIES 15830, SERIES 15930
DTL INTEGRATED CIRCUITS**

SERIES 15930 DTL FLIP-FLOPS

electrical and switching characteristics (unless otherwise noted, $V_{CC} = 5$)

PARAMETER	CONDITIONS	TA (°C)	SN15931		SN15945		SN15948		SN15950		SN15903		SN15904		SN15907		SN15909		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
V_{OL}	$I_O = I_{OL} \text{ MIN}$	-55 and 25	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	V
		125	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	
V_{OH}	$I_O = I_{OH} \text{ MIN}$	-55	2.5	2.6	2.5	2.5	3.8	3.8	3.8	3.8	2.5	2.5	3.8	3.8	3.8	3.8	2.5	2.5	V
		125	2.5	2.5	3.7	3.7	3.7	3.7	3.7	3.7	2.5	2.5	3.7	3.7	3.7	3.7	2.5	2.5	
V_{IL}		-55	1.1	0.95	1.4	1.1	1.4	1.1	1.1	1.4	1.4	1.1	1.1	1.1	1.1	1.4	1.1	1.1	V
		125	0.75	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.1	1.1	0.8	0.8	0.8	0.8	1.1	0.8	
V_{IH}		-55	2.1	1.9	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	V
		125	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	
I_{OL}	$V_O = V_{OL} \text{ MAX}$	-55	10	10.6	14.6	13	13	13	11.4	14.6	14.6	13	13	13	13	13	14.6	14.6	mA
		125	9.5	9.5	13.8	12.3	10.8	13.8	12.3	10.8	13.8	12.3	12.3	12.3	12.3	12.3	13.8	13.8	
I_{OH}	$V_O = V_{OH} \text{ MIN}$	-55	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	mA
		125	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	
I_{OS}	$V_O = 0 \text{ V}$	-55 and 25	-0.7	-1.33	-2.1	-3.96	-15.7	-27	-0.7	-1.33	-2.1	-3.96	-15.7	-27	-0.7	-1.33	-2.1	-3.96	mA
		125	-0.62	-1.3	-1.86	-3.54	-14.6	-26	-0.62	-1.3	-1.86	-3.54	-14.6	-26	-0.62	-1.3	-1.86	-3.54	
I_{HL}	DATA INPUTS	125	-1.07	-1	-1.07	-1	-1	-1	-2.4	-2.4	-1.07	-1	-1	-1	-1.07	-1	-1	-1	mA
		-55 and 25	-3.4	-3.2	-2.56	-2.2	-2.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	
	CLOCK INPUT	125	-3	-2.8	-2.4	-2.2	-2.2	-2.4	-2.4	-2.4	-3	-3	-3	-3	-3	-3	-3	-3	mA
		-55	-1.2	-2.4	-2.4	-2.4	-2.4	-1.82	-1.82	-1.82	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	
	PRESET or CLEAR INPUT	125	-1.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-1.62	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	mA
		-55 and 25	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
I_{HH}	$V_I = 4 \text{ V}$	125	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	μA
		-55 and 25	20	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
I_{PH}	FROM CLOCK TO OUTPUT	125	30	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	μA
		-55 and 25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
I_{PLH}	FROM CLOCK TO OUTPUT	125	11	14	16.2	8.7	8.7	16.2	16.2	8.7	28	32	32	32	28	28	28	28	mA
		25	14.5	17	21.6	18.4	18.4	21.6	21.6	18.4	34	42	42	42	34	34	34	34	
I_{PLL}	FROM CLOCK TO OUTPUT	25	35	75	15	75	15	75	15	75	15	75	15	75	15	75	15	75	ns
		25	35	75	25	75	25	75	25	75	25	75	25	75	25	75	25	75	

(1) 25°C only.
(2) Double the limit shown for common clear inputs.

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