

8T20 Multivibrator

**Bidirectional One-Shot
Product Specification**

Logic Products

FEATURES

- Differential Input
Threshold = $\pm 4\text{mV}$
- Pulse Position Error = Typically
< 3ns
- Max. Input Frequency = 8MHz
- Triggers on Positive and/or
Transitions

APPLICATIONS

- Disc, Tape and Drum Readers
- Digital Communications Receivers
- Signal Conditioners
- Transition Detectors

DESCRIPTION

The Bidirectional One Shot is intended for applications where high speed low level signal processing is required.

The 8T20 is a Monolithic Building Block, consisting of a high speed analog comparator, digital control circuitry, and a precision monostable multivibrator. The differential input threshold voltage is be-

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
N8T20	30ns	

ORDERING CODE

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 5\%$; $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$
Plastic DIP	N8T20N

NOTE:

For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	8T
PEC, NEC	Input	1ul
MR	Input	1ul
A, A; Q, Q	Output	10ul

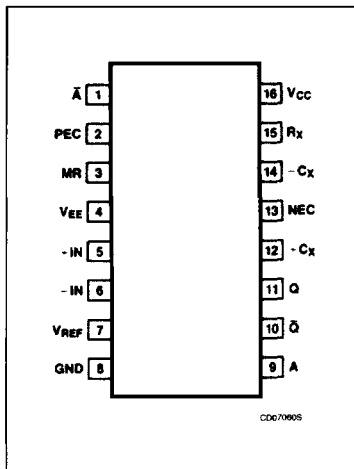
NOTE:

A unit load (ul) is $40\mu\text{A}$ I_{IH} and -1.6mA I_{IL} .

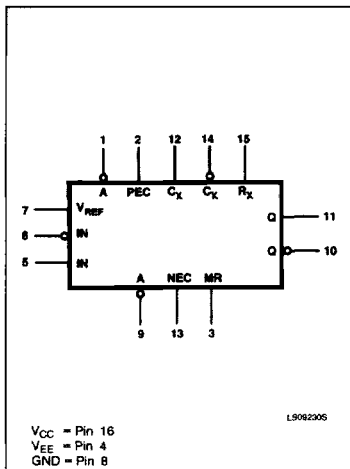
tween $\pm 4\text{mV}$ with respect to the input reference level which may range from -3.2V to $+4.2\text{V}$. For input frequencies up to 8MHz, the device may be condi-

tioned to act as a frequency doubler since it can trigger on both positive and negative input transitions.

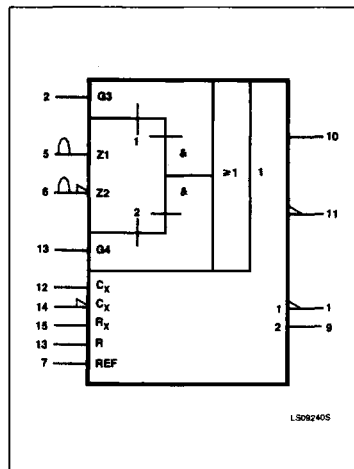
PIN CONFIGURATION



LOGIC SYMBOL



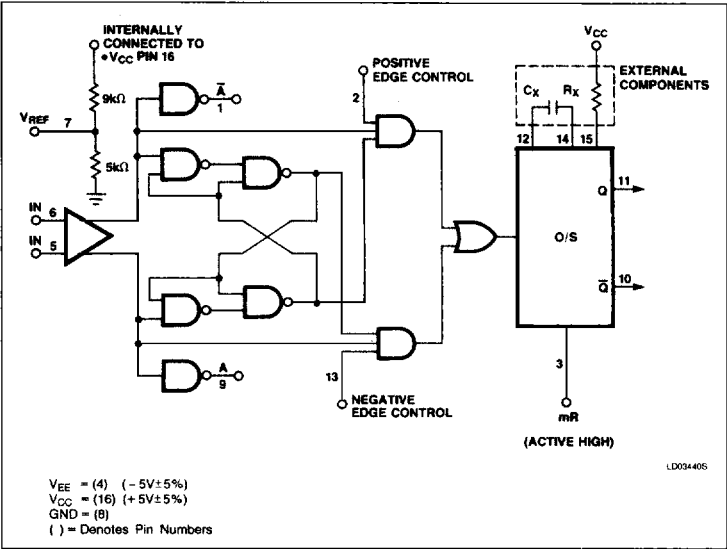
LOGIC SYMBOL (IEEE/IEC)



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LOGIC DIAGRAM



Timing pins permit using this device in a variety of applications where external control over pulse width is desirable. Pulse width (t^W) is defined by the relationship $t^W = C_x R_x$ Loge 2. Pulse width stability is internally compensated and virtually independent of temperature and V_{CC} variations, thus only limited by the accuracy of external timing components.

An internal resistive divider is available on the chip to provide a voltage of 1.4V (typ.). This output can be connected directly to either of the comparator inputs as a reference voltage when interfacing with TTL outputs.

ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER		8T	UNIT
V _{CC}	Supply voltage, positive	7.0	V
V _{EE}	Supply voltage, negative	-7.0	V
V _{DIF}	Differential input voltage	± 5.5	V
V _{IN}	Input voltage	-0.5 to +5.5	V
V _{OUT}	Voltage applied to output in HIGH output state	-0.5 to +V _{CC}	V
T _A	Operating free-air temperature range	0 to 70	°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER		8T			UNIT
		Min	Nom	Max	
V _{CC}	Supply voltage, positive	4.75	5.0	5.25	V
V _{EE}	Supply voltage, negative	-4.75	5.0	-5.25	V
V _{IH}	HIGH-level input voltage	2.0			V
V _{IL}	LOW-level input voltage			0.8	V
I _{IK}	Input clamp current			-12	mA
I _{OH}	HIGH-level output current			-800	μ A
I _{OL}	LOW-level output current			16	mA
T _A	Operating free-air temperature	0		70	°C

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DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

PARAMETER	TEST CONDITIONS ¹	8T20		UNIT
		Min	Max	
V _{IH} Input HIGH voltage	Guaranteed input HIGH threshold voltage	2.0		V
V _{IL} Input LOW voltage	Guaranteed input LOW threshold voltage		0.8	V
V _{IK} Input clamp diode voltage	V _{CC} = MIN, I _{IK} = -12mA		-1.5	V
V _{OH} HIGH-level output voltage	V _{CC} = MIN, I _{OH} = -800μA	2.4		V
V _{OL} LOW-level output voltage	V _{CC} = MIN, I _{OL} = 16mA		0.4	V
I _{IH} HIGH-level input current	V _{CC} = MAX, V _I = 4.5V		40	μA
I _{IL} LOW-level input current	V _{CC} = MAX, V _I = 0.4V PEC, NEC		-2.4	mA
I _{IL} Low level input current	V _{CC} = MAX, V _I = 0.4V mR		-1.6	mA
I _{OS} Short-circuit output current ³	V _{CC} = MAX	-20	-70	mA
I _{CC} Supply current (total)	V _{CC} = 5.25V		55	mA
I _{EE} Supply current (total)	V _{CC} = 5.25V		-20	mA

DIFFERENTIAL INPUTS

V _T Input threshold voltage ⁴		±4		mV
I _B Input bias current ⁵	V _{CC} = +5V, V _{EE} = -5V		125	μA
I _{OS} Input offset current		2		μA
V _{CM} Common mode input volt, range ⁶		-3.2	+4.2	V

NOTES:

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_A = 25°C.
3. I_{OS} is tested with V_{OUT} = +0.5V and V_{CC} = V_{CC} MAX + 0.5V. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
4. The differential input threshold voltage (V_T) is defined as the maximum DC voltage from the reference level necessary to trigger the one-shot.
5. Refer to Figure 5.
6. Common mode voltages that are confined within the dynamic range as specified will not cause false triggering of the one-shot.

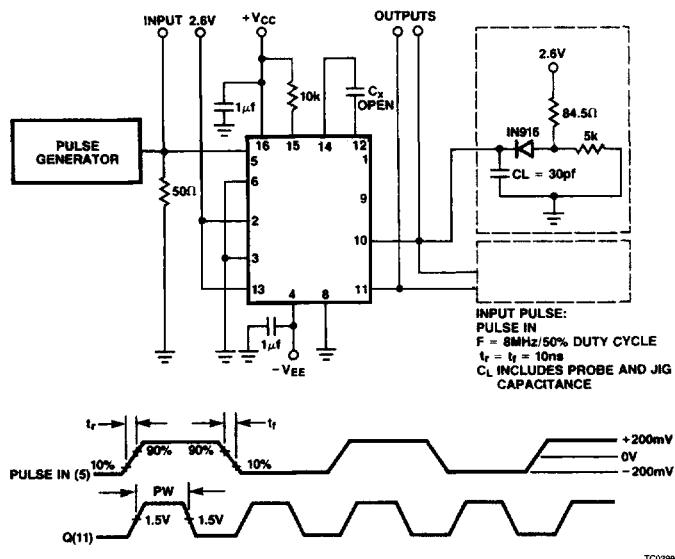
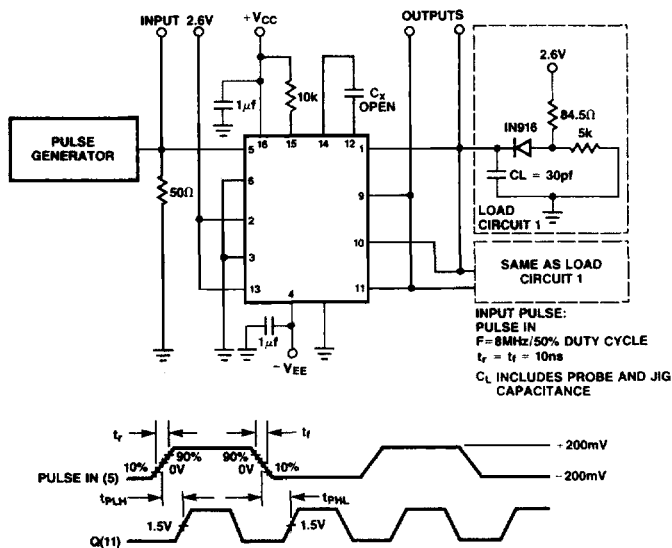
AC ELECTRICAL CHARACTERISTICS T_A = 25°C, V_{CC} = 5.0V

CHARACTERISTICS	TEST CONDITIONS	LIMITS			UNITS
		Min	Typ	Max	
Output frequency	Fig. 1, f _{in} = 8MHz	16			MHz
Propagation delay	Fig. 2 Fig. 4		30	50	ns
Input to Q, $\bar{Q}$			30	50	ns
Input to A, $\bar{A}$			20	30	ns
MR to Q, $\bar{Q}$					
Reference voltage (V _{REF})	Pin 7 tied to pin 6	0.8	1.4	2.0	V
Output pulse width, fig. 1	R _x = 10K, C _x = open	10		40	ns
Output pulse width, fig. 3	R _x = 10K, C _x = 100pF	600		800	ns

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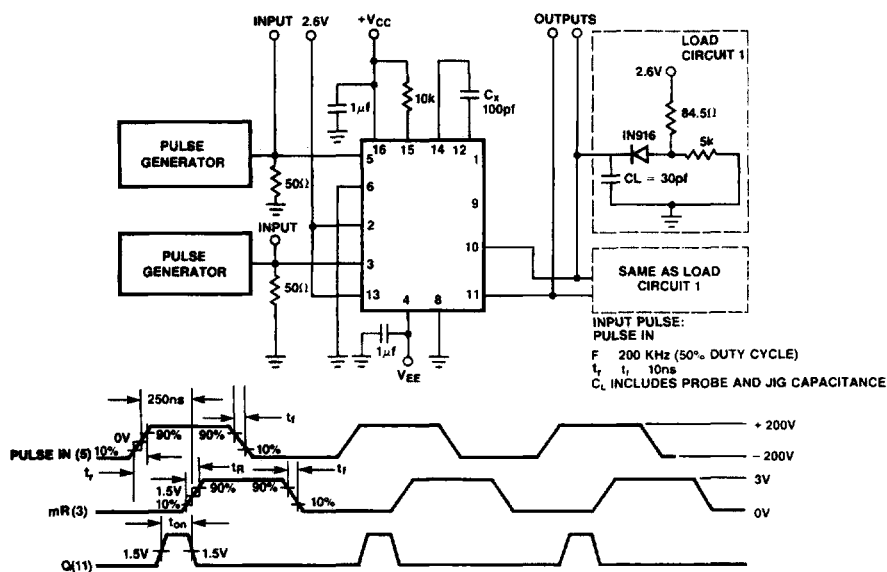
AC TEST CIRCUITS AND WAVEFORMS

Figure 1. Minimum Output Pulse Width ($C_{X2} = \text{OPEN}$)Figure 2. Propagation Delay (Input To Q , $\bar{Q}$ Outputs)

Multivibrator

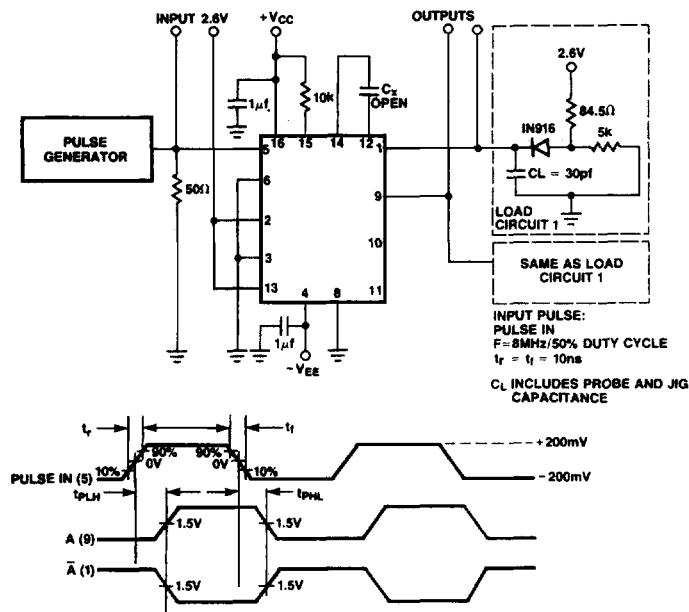
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AC TEST CIRCUITS AND WAVEFORMS (Continued)



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Figure 3. Propagation Delay (MR To Q, Q̄)



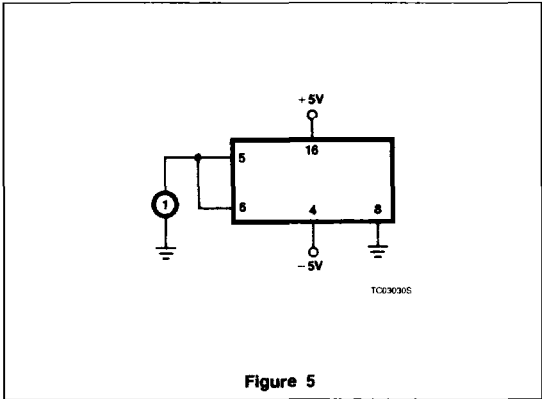
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Figure 4. Propagation Delay (Input To A, Ā Output)

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INPUT BIAS CURRENT TEST CIRCUIT



INPUT/OUTPUT WAVEFORMS

