

8T20 Multivibrator

Bidirectional One-Shot Product Specification

Logic Products

FEATURES

- Differential Input Threshold = $\pm 4mV$
- 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 $V_{CC} = 5V \pm 5\%$; $T_A = 0^\circ C$ to $+70^\circ C$
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

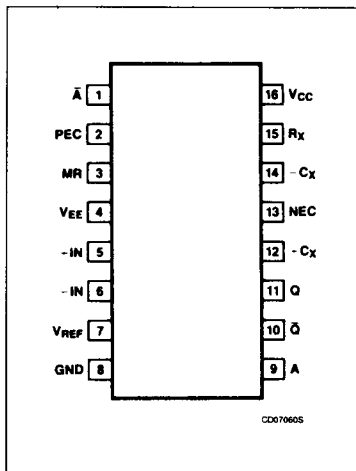
NOTE:

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

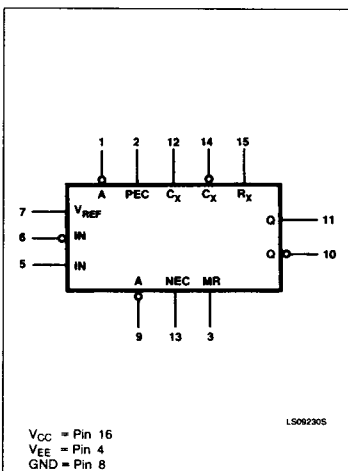
tween $\pm 4mV$ with respect to the input reference level which may range from $-3.2V$ to $+4.2V$. For input frequencies up to 8MHz, the device may be condi-

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

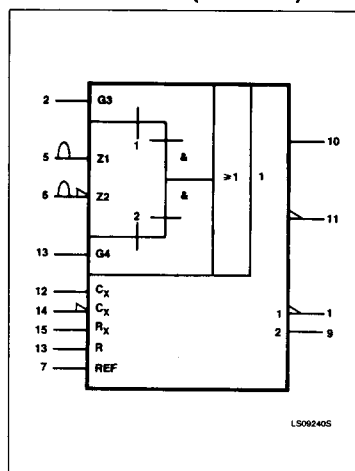
PIN CONFIGURATION



LOGIC SYMBOL



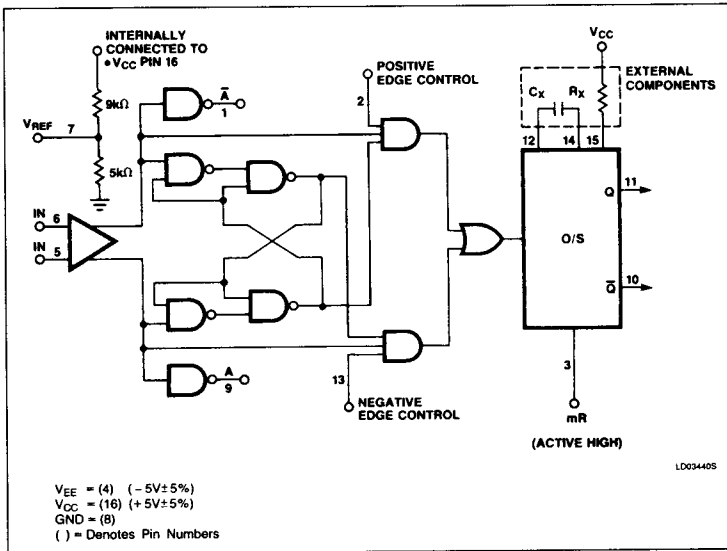
LOGIC SYMBOL (IEEE/IEC)



Multivibrator

8T20

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	$^{\circ}C$

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	μA
I_{OL} LOW-level output current			16	mA
T_A Operating free-air temperature	0		70	$^{\circ}C$

6

Multivibrator

8T20

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} = -800 μ A	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	μ A
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

PARAMETER	TEST CONDITIONS	Min	Max	UNIT
V _T Input threshold voltage ⁴		± 4		mV
I _B Input bias current ⁵	V _{CC} = +5V, V _{EE} = -5V		125	μ A
I _{OS} Input offset current		2		μ A
V _{CM} Common mode input volt, range ⁶		-3.2	+4.2	V

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V_{CC} = 5V, T_A = 25°C.
- 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.
- The differential input threshold voltage (V_T) is defined as the maximum DC voltage from the reference level necessary to trigger the one-shot.
- Refer to Figure 5.
- 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 Input to Q, \bar{Q} Input to A, \bar{A} MR to Q, \bar{Q}	Fig. 2 Fig. 4		30	50	ns
			30	50	ns
			20	30	ns
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

Multivibrator

8T20

AC TEST CIRCUITS AND WAVEFORMS

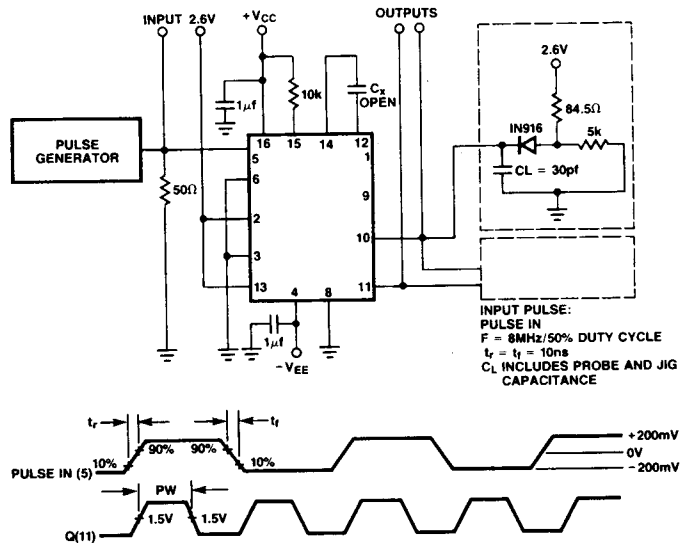


Figure 1. Minimum Output Pulse Width ($C_{x2} = \text{OPEN}$)

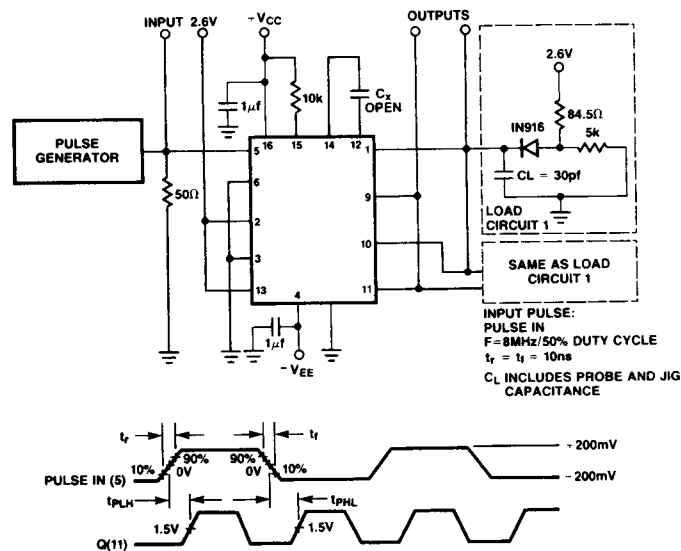


Figure 2. Propagation Delay (Input To Q, \bar{Q} Outputs)

Multivibrator

8T20

AC TEST CIRCUITS AND WAVEFORMS (Continued)

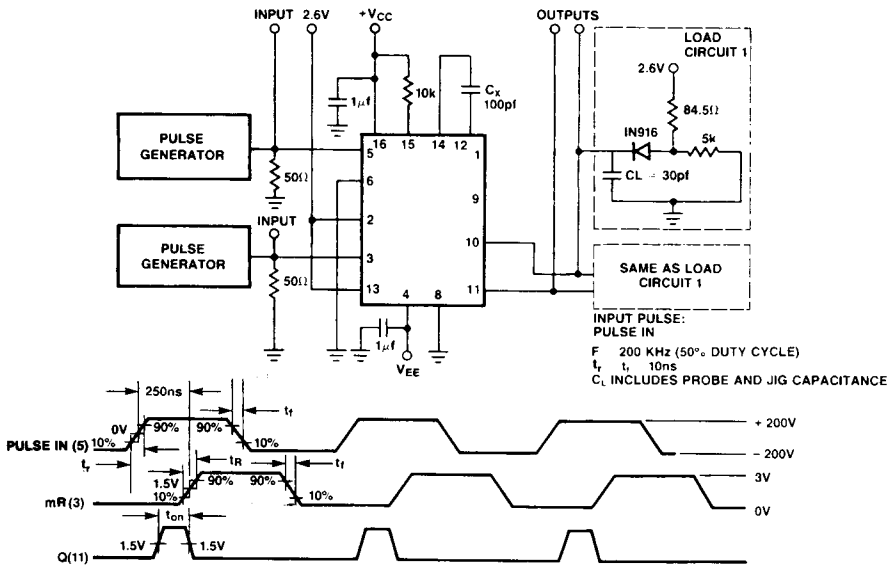


Figure 3. Propagation Delay (MR To Q, \bar{Q})

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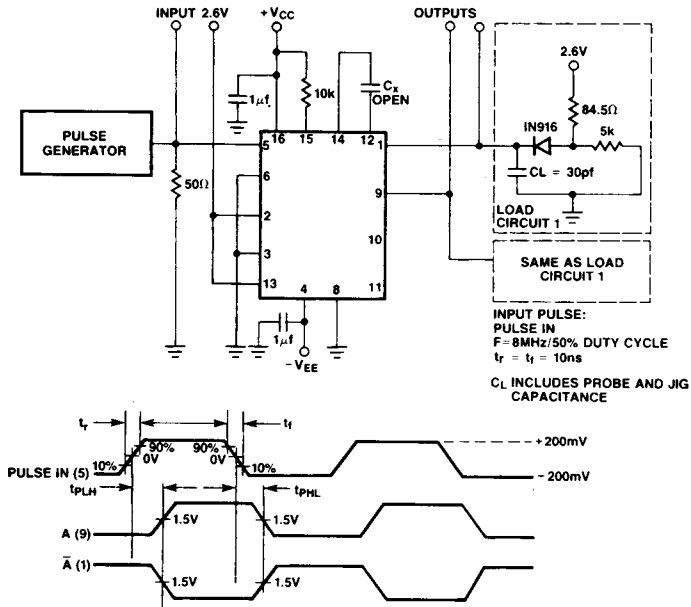


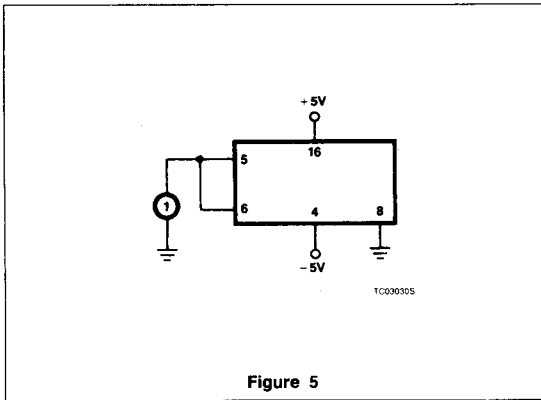
Figure 4. Propagation Delay (Input To A, \bar{A} Output)

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Multivibrator

8T20

INPUT BIAS CURRENT TEST CIRCUIT



INPUT/OUTPUT WAVEFORMS

