Signetics

8T20
Multivibrator

Bidirectional One-Shot
Product Specification

Logic Products

FEATURES

- **Differential Input Threshold = ±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 between ±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 conditioned to act as a frequency doubler since it can trigger on both positive and negative input transitions.

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

ORDERING CODE

PACKAGES	COMMERCIAL RANGE V_{CC} = 5V ±5%; T_A = 0°C to +70°C
Plastic DIP	N8T20N

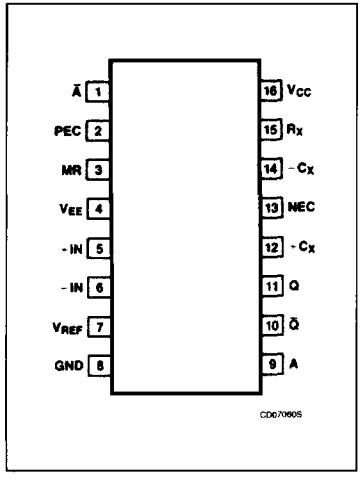
NOTE:
For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

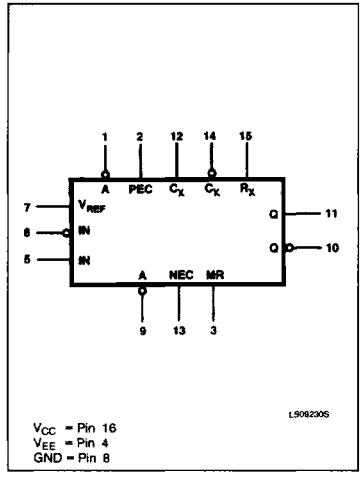
PINS	DESCRIPTION	8T
PEC, NEC	Input	1ul
MR	Input	1ul
A, Ā; Q, Q̄	Output	10ul

NOTE:
A unit load (ul) is 40μA I_{IH} and −1.6mA I_{IL}.

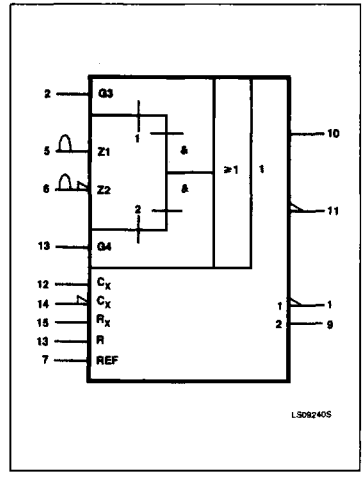
PIN CONFIGURATION



LOGIC SYMBOL

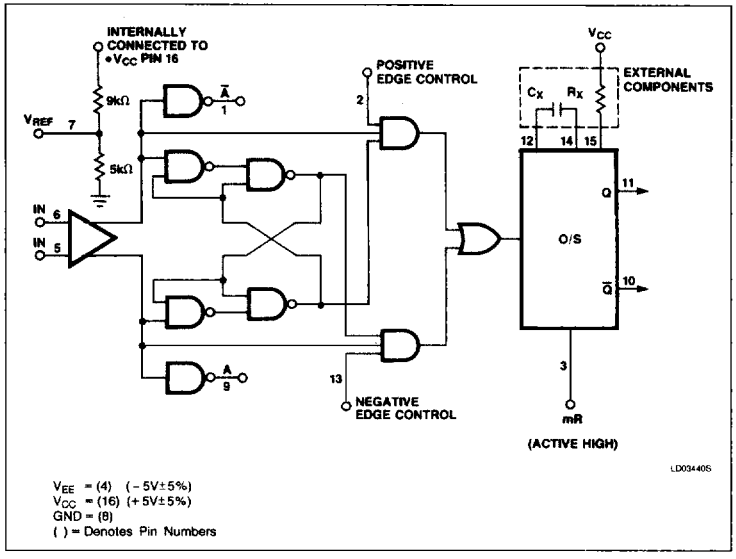


LOGIC SYMBOL (IEEE/IEC)



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 $t^W = C_XR_X$ 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	μA
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					
Input to Q, $\overline{Q}$	Fig. 2		30	50	ns
Input to A, $\overline{A}$	Fig. 4		30	50	ns
MR to Q, $\overline{Q}$			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	Rx = 10K, Cx = open	10		40	ns
Output pulse width, fig. 3	Rx = 10K, Cx = 100pF	600		800	ns

AC TEST CIRCUITS AND WAVEFORMS

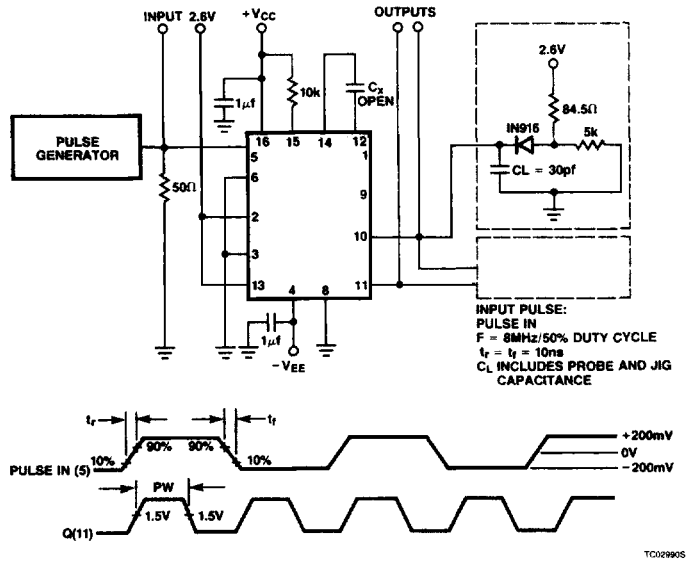


Figure 1. Minimum Output Pulse Width (C_{X2} = OPEN)

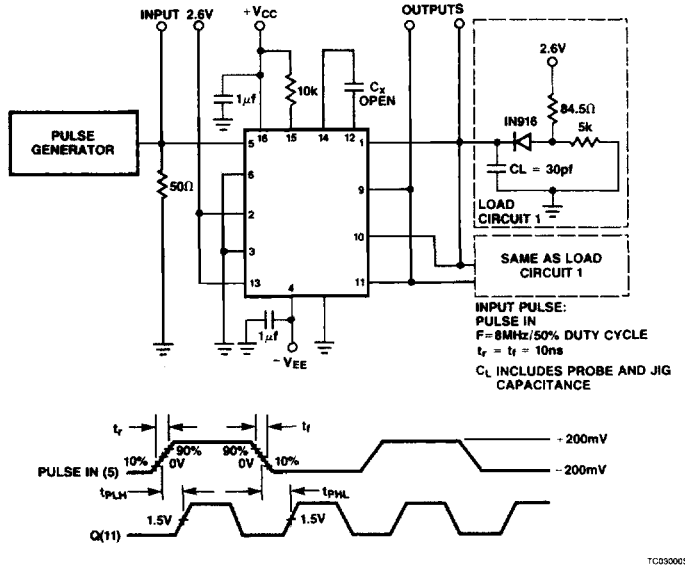


Figure 2. Propagation Delay (Input To Q, $\overline{Q}$ Outputs)

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AC TEST CIRCUITS AND WAVEFORMS (Continued)

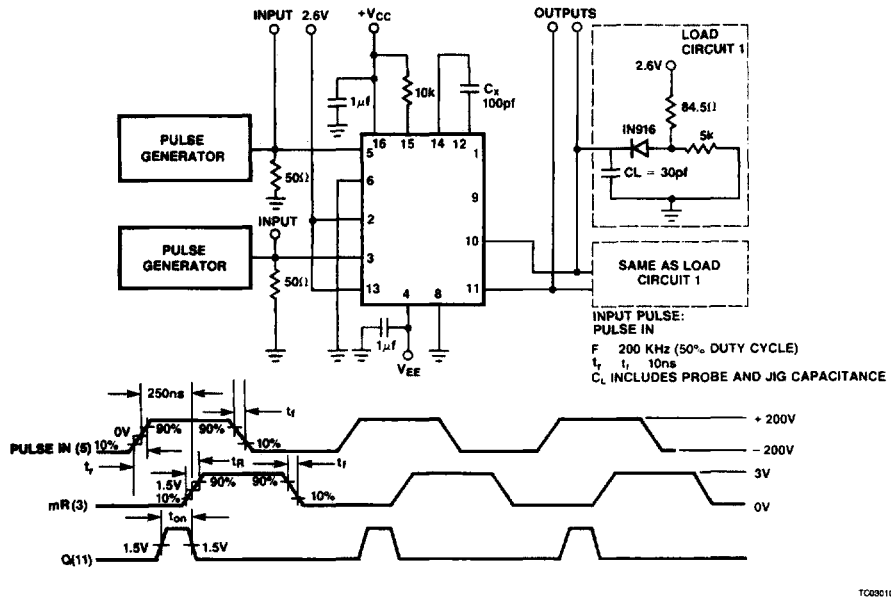


Figure 3. Propagation Delay (MR To Q, $\overline{Q}$)

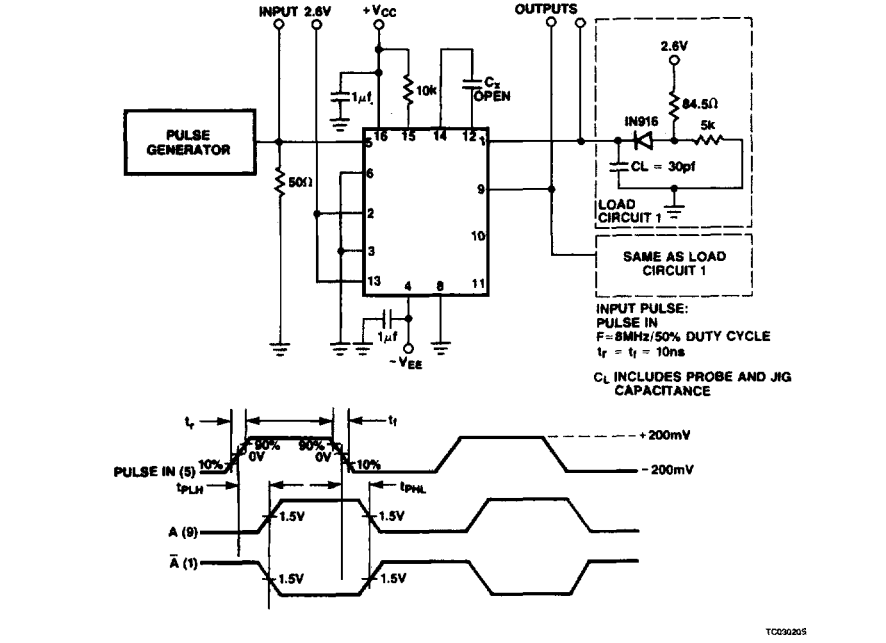


Figure 4. Propagation Delay (Input To A, $\overline{A}$ Output)

INPUT BIAS CURRENT TEST CIRCUIT

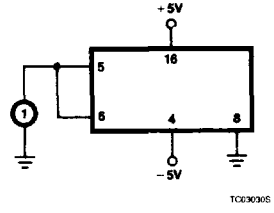


Figure 5

INPUT/OUTPUT WAVEFORMS

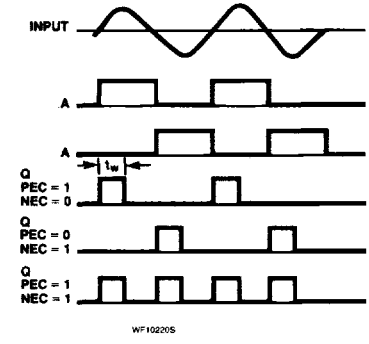


Figure 6