

DATA SHEET

For a complete data sheet, please also download:

- The IC04 LOC莫斯 HE4000B Logic Family Specifications HEF, HEC
- The IC04 LOC莫斯 HE4000B Logic Package Outlines/Information HEF, HEC

HEF4528B **MSI** Dual monostable multivibrator

Product specification
File under Integrated Circuits, IC04

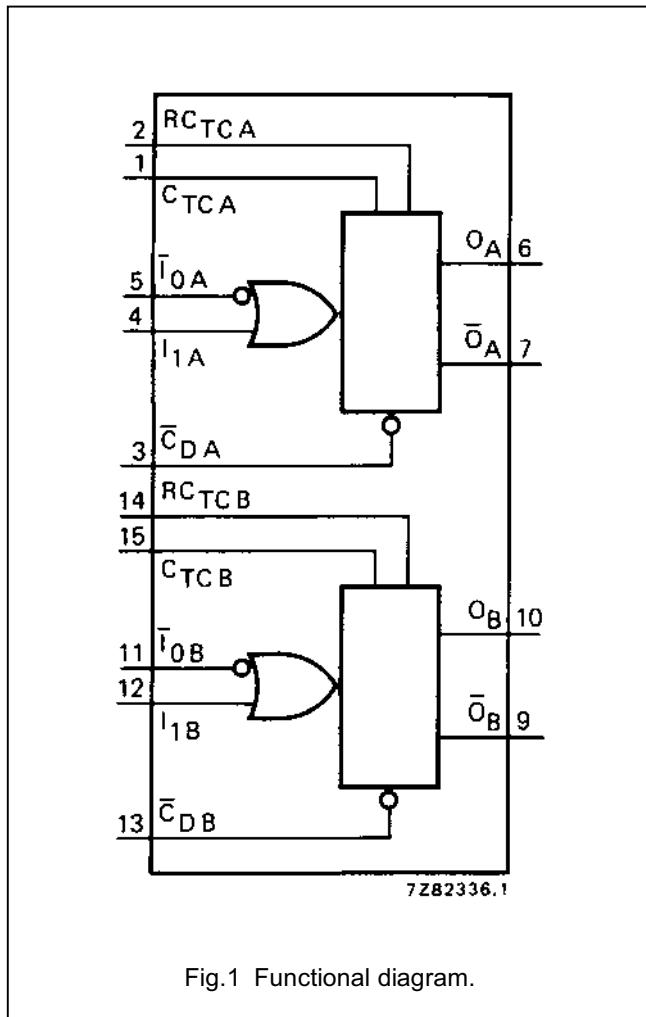
January 1995

Dual monostable multivibrator**HEF4528B
MSI****DESCRIPTION**

The HEF4528B is a dual retriggerable-resettable monostable multivibrator. Each multivibrator has an active LOW input (\bar{I}_0), and active HIGH input (I_1), an active LOW clear direct input (\bar{C}_D), an output (O) and its complement (\bar{O}), and two pins for connecting the external timing components ($C_{TC}^{(1)}$, RC_{TC}).

An external timing capacitor (C_t) must be connected between C_{TC} and RC_{TC} and an external resistor (R_t) must be connected between RC_{TC} and V_{DD} . The duration of the

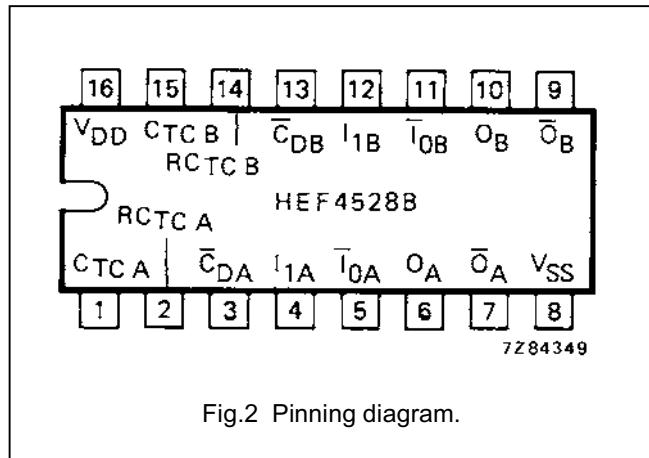
(1) Always connected to ground.



on \bar{C}_D forces O LOW, O HIGH and inhibits any further pulses until \bar{C}_D is HIGH.

output pulse is determined by the external timing components C_t and R_t .

A HIGH to LOW transition on \bar{I}_0 when I_1 is LOW or a LOW to HIGH transition on I_1 when \bar{I}_0 is HIGH produces a positive pulse (LOW-HIGH-LOW) and O and a negative pulse (HIGH-LOW-HIGH) on \bar{O} if the \bar{C}_D is HIGH. A LOW



HEF4528BP(N): 16-lead DIL; plastic (SOT38-1)

HEF4528BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)

HEF4528BT(D): 16-lead SO; plastic (SOT109-1)

(): Package Designator North America

PINNING

$\bar{I}_{0A}, \bar{I}_{0B}$	input (HIGH to LOW triggered)
I_{1A}, I_{1B}	input (LOW to HIGH triggered)
$\bar{C}_{DA}, \bar{C}_{DB}$	clear direct input (active LOW)
O_A, O_B	output
\bar{O}_A, \bar{O}_B	complementary output (active LOW)
$C_{TC\,A}, C_{TC\,B}$	external capacitor connections (1)
$RC_{TC\,A}, RC_{TC\,B}$	external capacitor/ resistor connections

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

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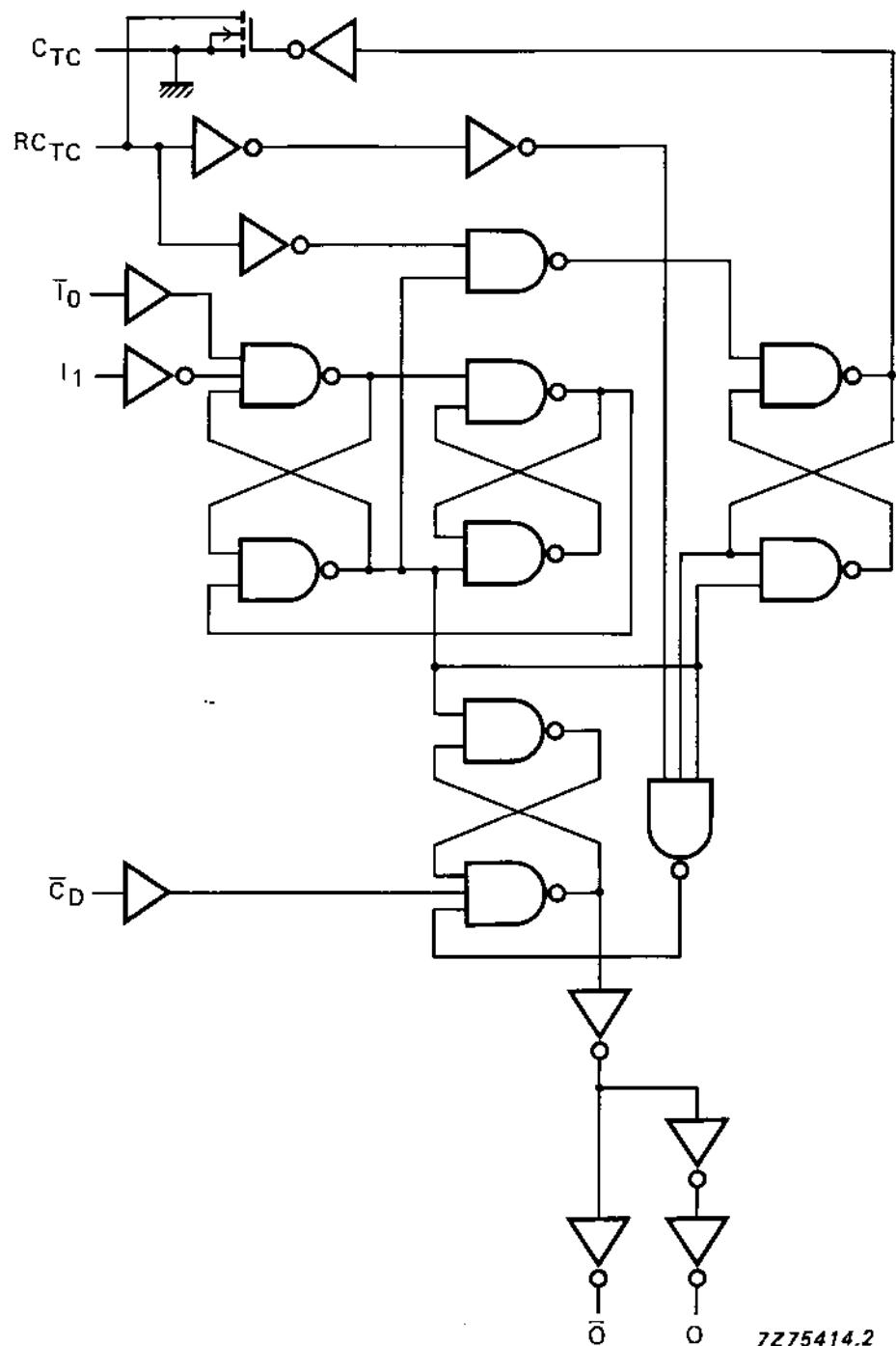
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Fig.3 Logic diagram (one monostable multivibrator).

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FUNCTION TABLE

INPUTS			OUTPUTS	
\bar{I}_0	I_1	\bar{C}_D	O	\bar{O}
\searrow	L	H	\nearrow	\searrow
H	\nearrow	H	\nearrow	\searrow
X	X	L	L	H

Notes

1. H = HIGH state (the more positive voltage)
2. L = LOW state (the less positive voltage)
3. X = state is immaterial
4. \nearrow = positive-going transition
5. \searrow = negative-going transition
6. \nearrow \searrow = positive or negative output pulse; width is determined by C_t and R_t

AC CHARACTERISTICS

 $V_{SS} = 0$ V; $T_{amb} = 25$ °C; $C_L = 50$ pF; input transition times ≤ 20 ns

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA	
Propagation delays	$\bar{I}_0, I_1 \rightarrow \bar{O}$ HIGH to LOW	5 10 15	t _{PHL}	140	280	ns	113 ns + (0,55 ns/pF) C _L
				50	100	ns	39 ns + (0,23 ns/pF) C _L
				35	70	ns	27 ns + (0,16 ns/pF) C _L
	$\bar{I}_0, I_1 \rightarrow O$ LOW to HIGH	5 10 15	t _{PLH}	155	305	ns	128 ns + (0,55 ns/pF) C _L
				60	115	ns	49 ns + (0,23 ns/pF) C _L
				40	80	ns	32 ns + (0,16 ns/pF) C _L
	$\bar{C}_D \rightarrow O$ HIGH to LOW	5 10 15	t _{PHL}	105	210	ns	78 ns + (0,55 ns/pF) C _L
				40	85	ns	29 ns + (0,23 ns/pF) C _L
				30	60	ns	22 ns + (0,16 ns/pF) C _L
	$\bar{C}_D \rightarrow \bar{O}$ LOW to HIGH	5 10 15	t _{PLH}	120	240	ns	93 ns + (0,55 ns/pF) C _L
				50	105	ns	39 ns + (0,23 ns/pF) C _L
				35	70	ns	27 ns + (0,16 ns/pF) C _L
Output transition times	$HIGH \rightarrow LOW$	5 10 15	t _{THL}	60	120	ns	10 ns + (1,0 ns/pF) C _L
				30	60	ns	9 ns + (0,42 ns/pF) C _L
				20	40	ns	6 ns + (0,28 ns/pF) C _L
	$LOW \rightarrow HIGH$	5 10 15	t _{TLH}	60	120	ns	10 ns + (1,0 ns/pF) C _L
				30	60	ns	9 ns + (0,42 ns/pF) C _L
				20	40	ns	6 ns + (0,28 ns/pF) C _L

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AC CHARACTERISTICS

 $V_{SS} = 0 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$; input transition times $\leq 20 \text{ ns}$; $R_t = 5 \text{ k}\Omega$; $C_t = 15 \text{ pF}$

	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5 10 15	$4000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $20\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $59\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$	where f_i = input freq. (MHz) f_o = output freq. (MHz) C_L = load capacitance (pF) $\sum (f_o C_L)$ = sum of outputs V_{DD} = supply voltage (V)

AC CHARACTERISTICS

 $V_{SS} = 0 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$; $C_L = 50 \text{ pF}$; input transition times $\leq 20 \text{ ns}$; see also waveforms Fig.5.

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	
Recovery time for \bar{C}_D	5	t_{RCD}	0	-75	ns	
	10		0	-30	ns	
	15		0	-25	ns	
Minimum \bar{l}_0 pulse width; LOW	5	t_{WIOL}	50	25	ns	
	10		30	15	ns	
	15		20	10	ns	
Minimum l_1 pulse width; HIGH	5	t_{WI1H}	50	25	ns	
	10		30	15	ns	
	15		20	10	ns	
Minimum \bar{C}_D pulse width; LOW	5	t_{WCDL}	60	30	ns	
	10		35	15	ns	
	15		25	10	ns	
Set-up time $\bar{C}_D \rightarrow \bar{l}_0$ or l_1	5	t_{su}	0	-105	ns	
	10		0	-40	ns	
	15		0	-25	ns	
Output O pulse width; HIGH	5	t_{WOH}	-	235	ns	note 1
	10		-	155	ns	
	15		-	140	ns	
Output O pulse width; HIGH	5	t_{WOH}	-	5,45	μs	note 2
	10		-	4,95	μs	
	15		-	4,85	μs	
Change in output O pulse width over temperature	5	Δt_{WO}	-	± 3	%	note 3
	10		-	± 2	%	
	15		-	± 2	%	
Change in output O pulse width over V_{DD}	5	Δt_{WO}	-	± 2	%	$V_{DD} \pm 5\%$
	10		-	± 1	%	
	15		-	± 1	%	

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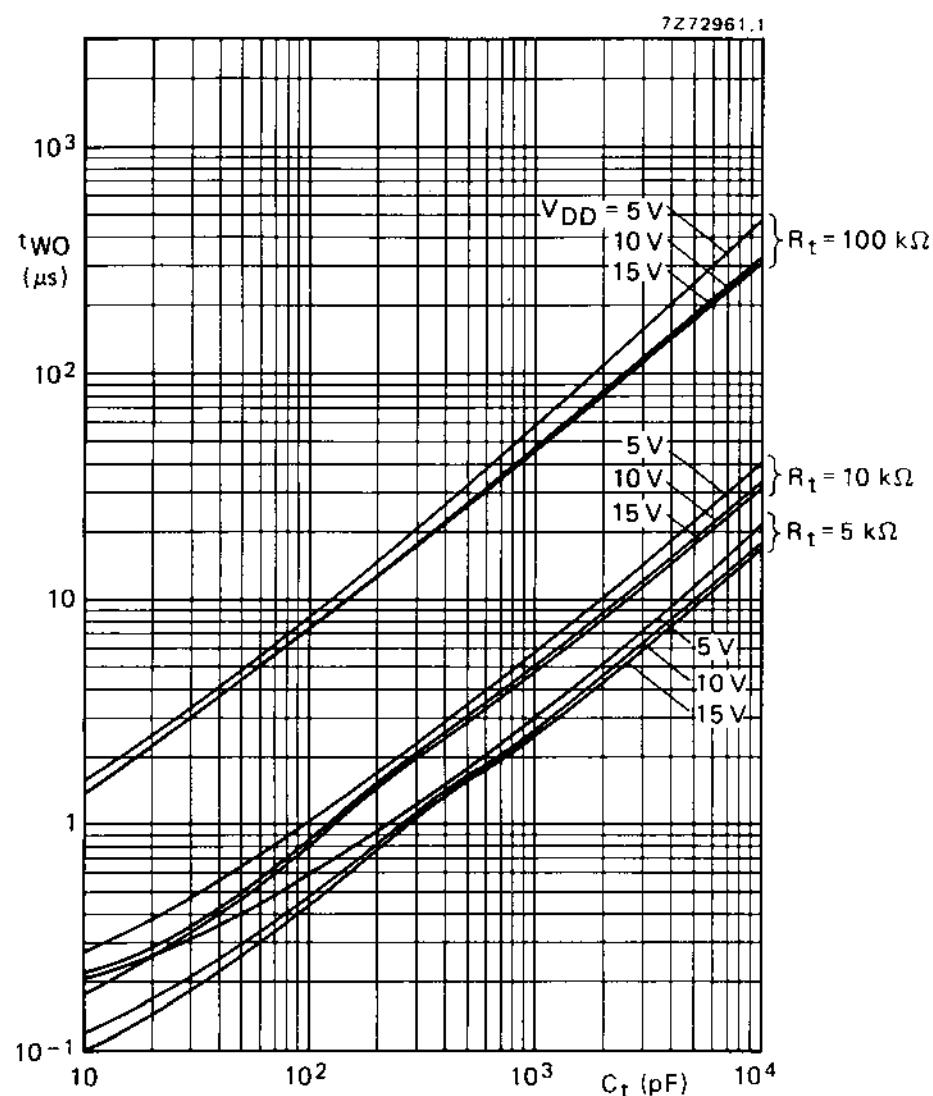
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	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	
External timing resistor	5	R_t	5	–	2000	kΩ
	10		5	–	2000	kΩ
	15		5	–	2000	kΩ
External timing capacitor	5	C_t	no limits			
	10		no limits			
	15		no limits			

Notes

1. $R_t = 5 \text{ k}\Omega$; $C_t = 15 \text{ pF}$; for other R_t , C_t combinations and $C_t < 0,01 \mu\text{F}$ see graph Fig.4.
2. $R_t = 10 \text{ k}\Omega$; $C_t = 1000 \text{ pF}$; for other R_t , C_t combinations and $C_t > 0,01 \mu\text{F}$ use formula $t_{WO} = K \cdot R_t \cdot C_t$.
where: t_{WO} = output pulse width (s)
3. $R_t = \text{external timing resistor } (\Omega)$
 $C_t = \text{external timing capacitor } (F)$
 $K = 0,42 \text{ for } V_{DD} = 5 \text{ V}$
 $K = 0,32 \text{ for } V_{DD} = 10 \text{ V}$
 $K = 0,30 \text{ for } V_{DD} = 15 \text{ V}$
3. $T_{amb} = -40 \text{ to } +85 \text{ }^\circ\text{C}$; Δt_{WO} is referenced to t_{WO} at $T_{amb} = 25 \text{ }^\circ\text{C}$.

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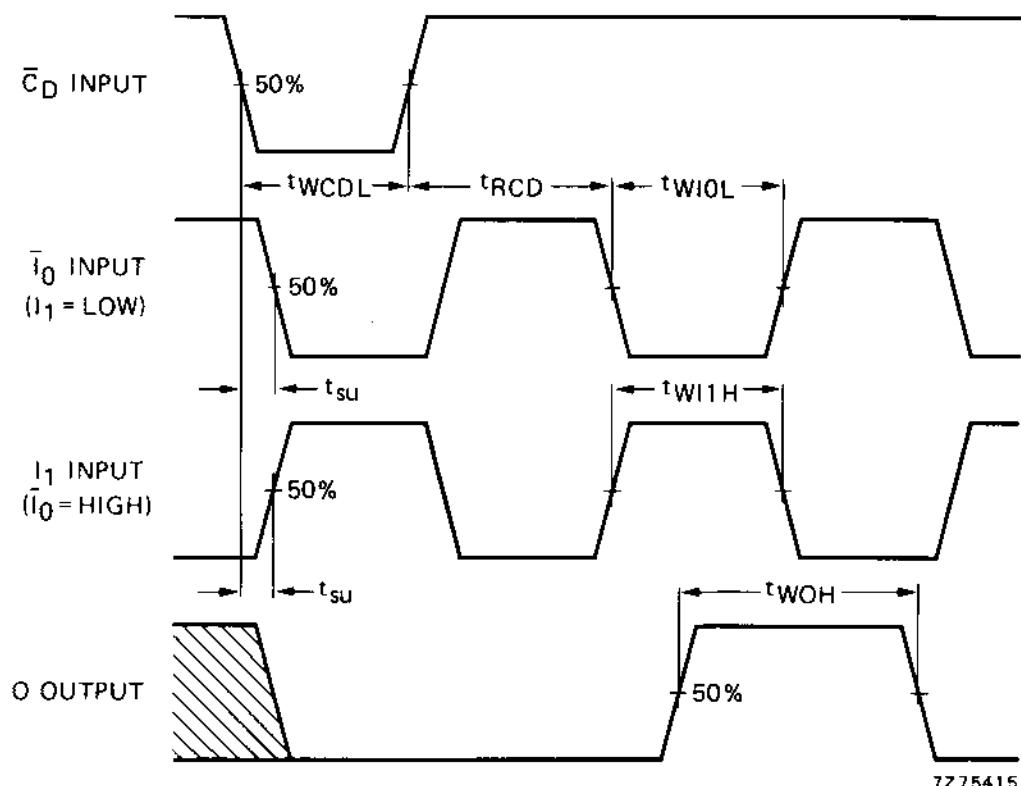
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Fig.5 Waveforms showing minimum \bar{I}_0 , I_1 and O pulse widths, set-up and recovery times. Set-up and recovery times are shown as positive values but may be specified as negative values.

APPLICATION INFORMATION

An example of an application for the HEF4528B is:

- Non-retriggerable monostable multivibrator

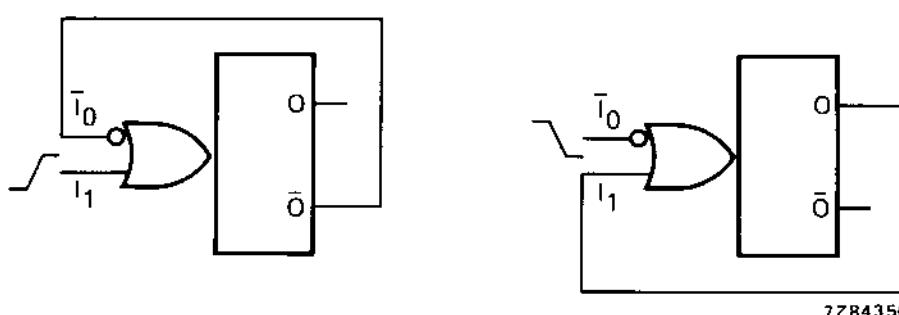


Fig.6 Two examples for a non-retriggerable monostable multivibrator using half of HEF4528B (LOW to HIGH and HIGH to LOW triggered).