DATA SHEET

For a complete data sheet, please also download:

- The IC04 LOCMOS HE4000B Logic Family Specifications HEF, HEC
- The IC04 LOCMOS 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 ($\overline{I}_0$), and active HIGH input (I_1), an active LOW clear direct input ($\overline{C}_D$), an output (O) and its complement ($\overline{O}$), 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 output pulse is determined by the external timing components C_t and R_t.

A HIGH to LOW transition on $\overline{I}_0$ when I_1 is LOW or a LOW to HIGH transition on I_1 when $\overline{I}_0$ is HIGH produces a positive pulse (LOW-HIGH-LOW) and O and a negative pulse (HIGH-LOW-HIGH) on $\overline{O}$ if the $\overline{C}_D$ is HIGH. A LOW on $\overline{C}_D$ forces O LOW, $\overline{O}$ HIGH and inhibits any further pulses until $\overline{C}_D$ is HIGH.

(1) Always connected to ground.

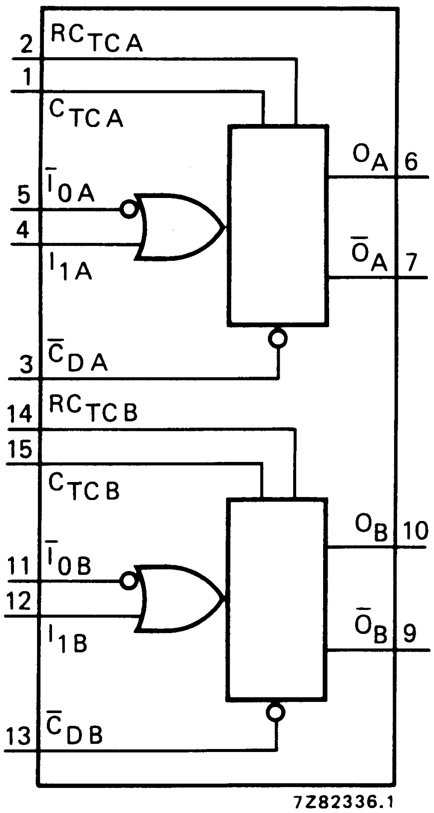

Fig.1 Functional diagram.

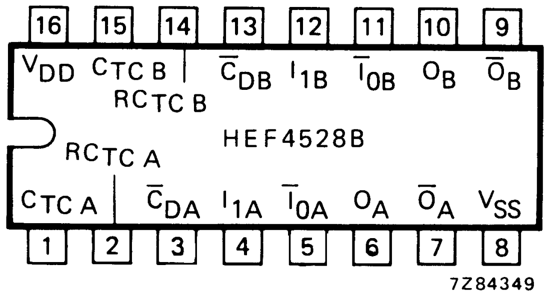

Fig.2 Pinning diagram.

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

$\overline{I}_{0A}$, $\overline{I}_{0B}$	input (HIGH to LOW triggered)
I_{1A}, I_{1B}	input (LOW to HIGH triggered)
$\overline{C}_{DA}$, $\overline{C}_{DB}$	clear direct input (active LOW)
O_A, O_B	output
$\overline{O}_A$, $\overline{O}_B$	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

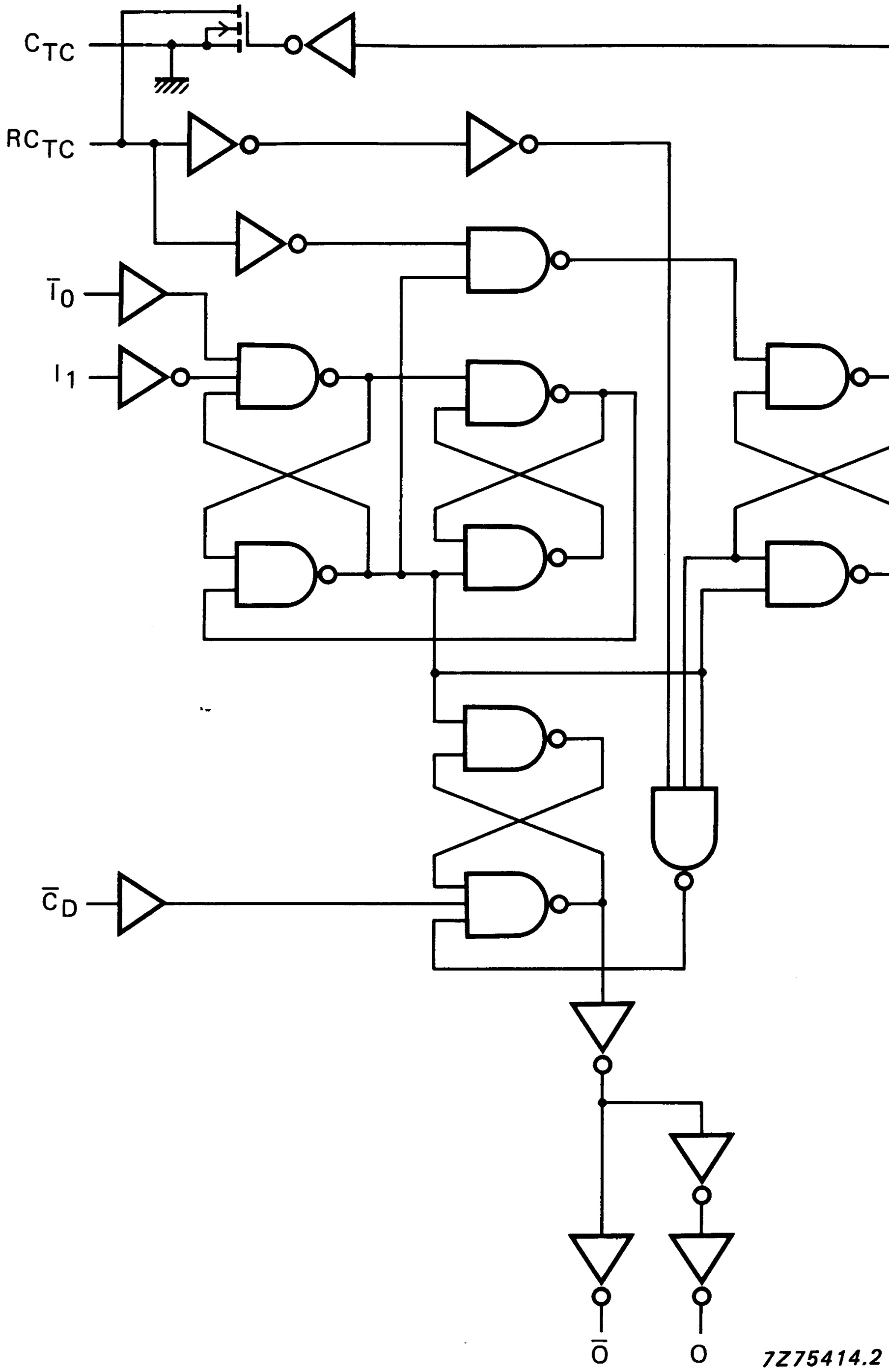

Fig.3 Logic diagram (one monostable multivibrator).

Dual monostable multivibrator

FUNCTION TABLE

INPUTS			OUTPUTS	
$\overline{I}_0$	I_1	$\overline{C}_D$	O	$\overline{O}$
↓	L	H	⎍	⊔
H	↑	H	⎍	⊔
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. ↑ = positive-going transition
5. ↓ = negative-going transition
6. ⎍ ⊔ = 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							
$\overline{I}_0$, I_1 → $\overline{O}$	5			140	280	ns	113 ns + (0,55 ns/pF) C_L
HIGH to LOW	10	t_{PHL}		50	100	ns	39 ns + (0,23 ns/pF) C_L
	15			35	70	ns	27 ns + (0,16 ns/pF) C_L
$\overline{I}_0$, I_1 → O	5			155	305	ns	128 ns + (0,55 ns/pF) C_L
LOW to HIGH	10	t_{PLH}		60	115	ns	49 ns + (0,23 ns/pF) C_L
	15			40	80	ns	32 ns + (0,16 ns/pF) C_L
$\overline{C}_D$ → O	5			105	210	ns	78 ns + (0,55 ns/pF) C_L
HIGH to LOW	10	t_{PHL}		40	85	ns	29 ns + (0,23 ns/pF) C_L
	15			30	60	ns	22 ns + (0,16 ns/pF) C_L
$\overline{C}_D$ → $\overline{O}$	5			120	240	ns	93 ns + (0,55 ns/pF) C_L
LOW to HIGH	10	t_{PLH}		50	105	ns	39 ns + (0,23 ns/pF) C_L
	15			35	70	ns	27 ns + (0,16 ns/pF) C_L
Output transition	5			60	120	ns	10 ns + (1,0 ns/pF) C_L
times	10	t_{THL}		30	60	ns	9 ns + (0,42 ns/pF) C_L
HIGH to LOW	15			20	40	ns	6 ns + (0,28 ns/pF) C_L
	5			60	120	ns	10 ns + (1,0 ns/pF) C_L
LOW to HIGH	10	t_{TLH}		30	60	ns	9 ns + (0,42 ns/pF) C_L
	15			20	40	ns	6 ns + (0,28 ns/pF) C_L

AC CHARACTERISTICS

V_{SS} = 0 V; T_{amb} = 25 °C; input transition times ≤ 20 ns; R_t = 5 kΩ; C_t = 15 pF

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

AC CHARACTERISTICS

V_{SS} = 0 V; T_{amb} = 25 °C; C_L = 50 pF; input transition times ≤ 20 ns; see also waveforms Fig.5.

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.		
Recovery time	5		0	–75		ns	
for $\overline{C}_D$	10	t_{RCD}	0	–30		ns	
	15		0	–25		ns	
Minimum $\overline{I}_0$	5		50	25		ns	
pulse width; LOW	10	t_{WI0L}	30	15		ns	
	15		20	10		ns	
Minimum I_1	5		50	25		ns	
pulse width; HIGH	10	t_{WI1H}	30	15		ns	
	15		20	10		ns	
Minimum $\overline{C}_D$	5		60	30		ns	
pulse width; LOW	10	t_{WCDL}	35	15		ns	
	15		25	10		ns	
Set-up time	5		0	–105		ns	to avoid change in output
$\overline{C}_D \rightarrow \overline{I}_0$ or I_1	10	t_{su}	0	–40		ns	
	15		0	–25		ns	
Output O pulse	5		–	235		ns	
width; HIGH	10	t_{WOH}	–	155		ns	note 1
	15		–	140		ns	
Output O pulse	5		–	5,45		μs	
width; HIGH	10	t_{WOH}	–	4,95		μs	note 2
	15		–	4,85		μs	
Change in output O	5		–	±3		%	
pulse width over	10	Δt_{WO}	–	±2		%	note 3
temperature	15		–	±2		%	
Change in output O	5		–	±2		%	
pulse width over	10	Δt_{WO}	–	±1		%	V_{DD} ± 5%
V_{DD}	15		–	±1		%	

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

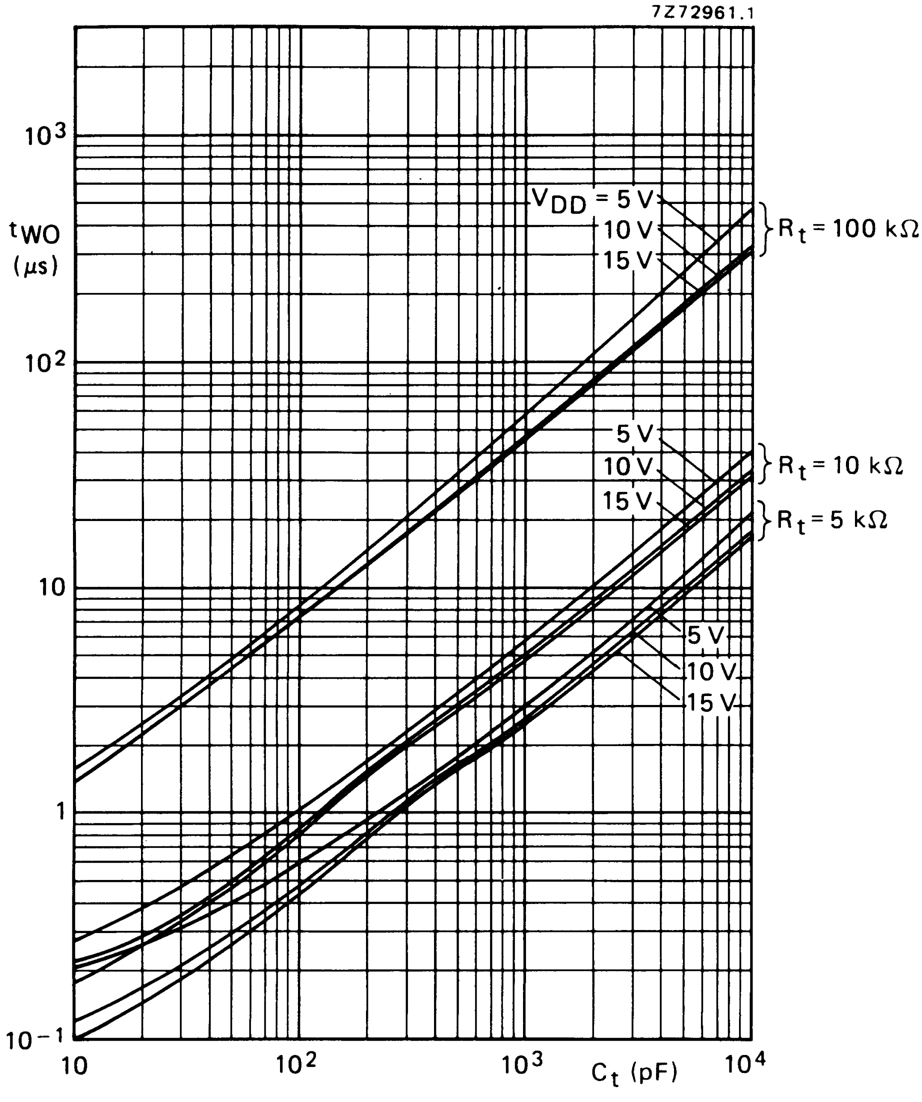

Fig.4 Output pulse width (t_{WO}) as a function of external timing capacitor (C_t).

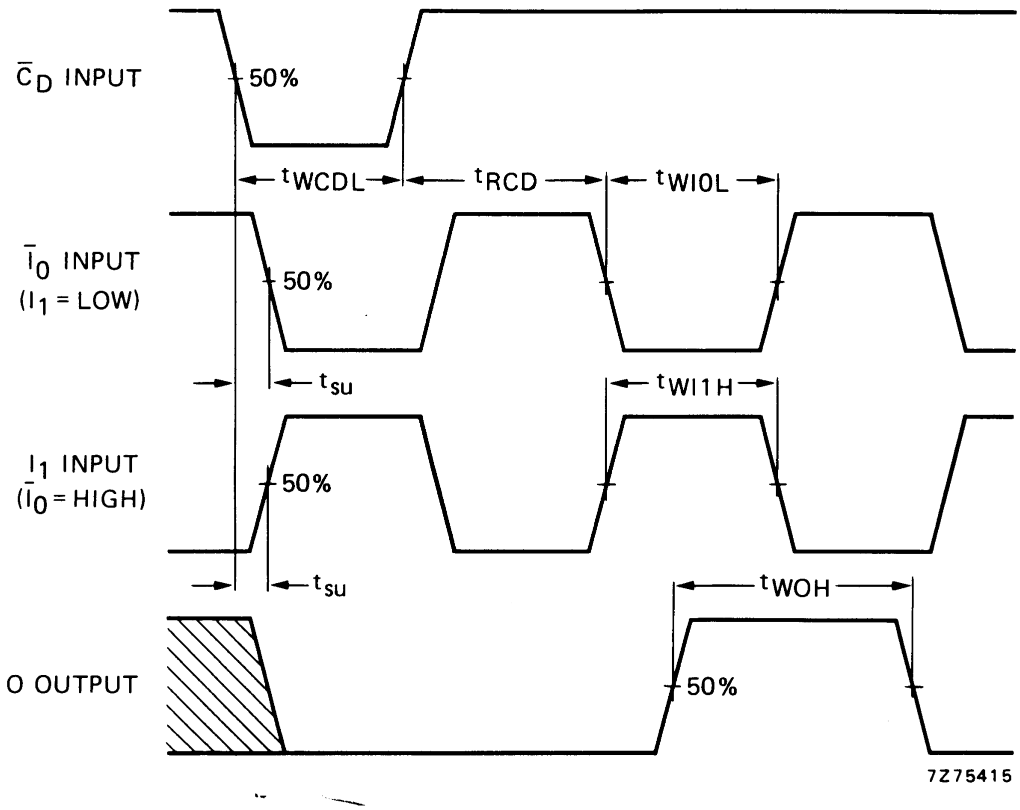

Fig.5 Waveforms showing minimum $\bar{I}_0$, I_1 and O pulse widths, set-up and recovery times. Set-up and recovery times are shown as positive values but may be specified as negative values.

APPLICATION INFORMATION

An example of an application for the HEF4528B is:

- Non-retriggerable monostable multivibrator

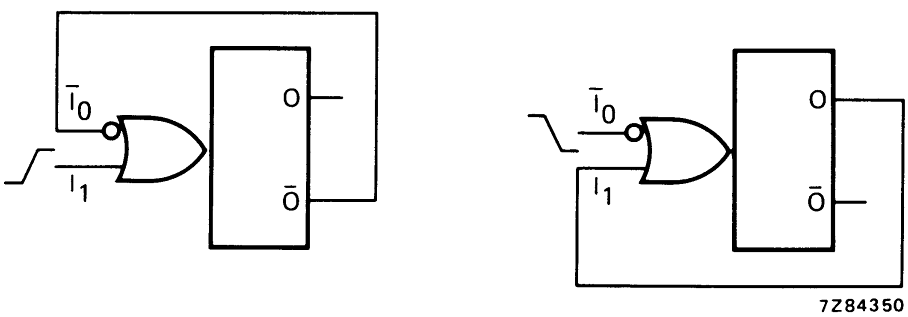

Fig.6 Two examples for a non-retriggerable monostable multivibrator using half of HEF4528B (LOW to HIGH and HIGH to LOW triggered).