

# HD14536B

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捷多邦, 专业PCB打样工厂, 24小时加急

出货

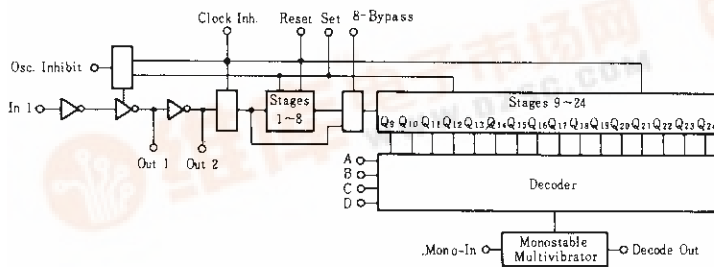
## Programmable Timer

The HD14536B programmable timer is a flexible 24-stage ripple binary counter with 16 stages selectable by a binary code. Provisions for an on-chip RC oscillator, or an external clock are provided. An on-chip monostable circuit incorporating a pulse-type output has also been included. By selecting the appropriate output in conjunction with the correct input clock frequency, a variety of timing can be achieved.

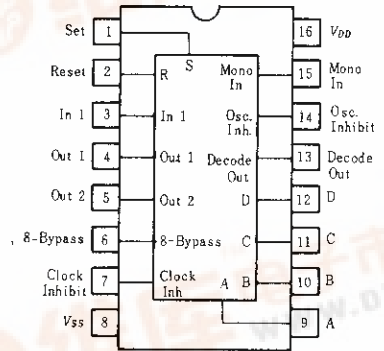
### FEATURES

- 24 Flip-Flop Stages ... Will Count from  $2^0$  to  $2^{24}$
- Last 16 Stages Selectable by Four-Bit Select Code
- Input Allows Bypassing of First Eight Stages
- Set and Reset Inputs
- Clock Inhibit Input
- On-Chip RC Oscillator Provisions
- On-Chip Monostable Output Provisions
- Clock Conditioning Circuit Permits Operation with Very Long Rise and Fall Times
- Clock Input  $f_{max} = 3\text{MHz typ. @}10\text{V}$
- Counter Advances On Negative Going Edge of Clock
- Test Mode Allows Fast Test Sequence
- Supply Voltage Range = 3 to 18V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range

### BLOCK DIAGRAM



### PIN ARRANGEMENT



(Top View)

### TRUTH TABLE

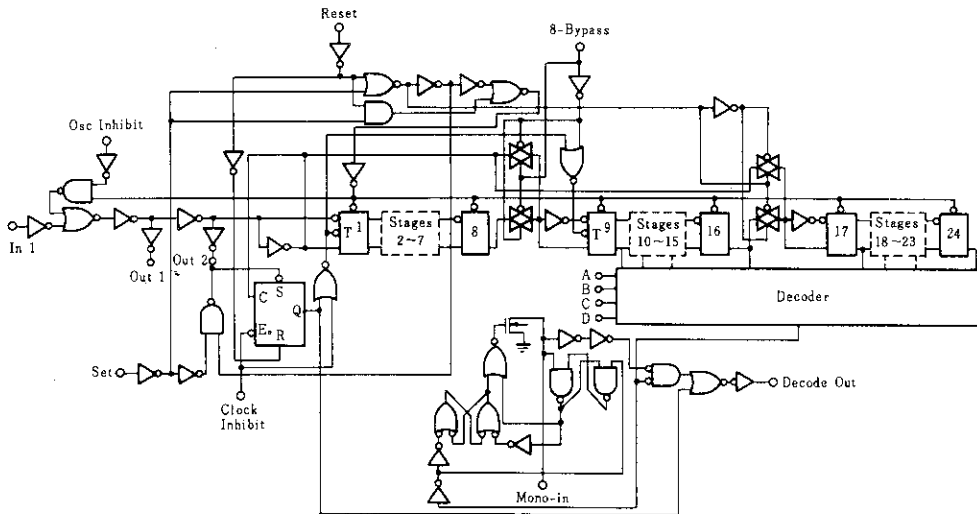
| D | C | B | A | Decode Out | 8-Bypass |
|---|---|---|---|------------|----------|
| 0 | 0 | 0 | 0 | 9          | 1        |
| 0 | 0 | 0 | 1 | 10         | 2        |
| 0 | 0 | 1 | 0 | 11         | 3        |
| 0 | 0 | 1 | 1 | 12         | 4        |
| 0 | 1 | 0 | 0 | 13         | 5        |
| 0 | 1 | 0 | 1 | 14         | 6        |
| 0 | 1 | 1 | 0 | 15         | 7        |
| 0 | 1 | 1 | 1 | 16         | 8        |
| 1 | 0 | 0 | 0 | 17         | 9        |
| 1 | 0 | 0 | 1 | 18         | 10       |
| 1 | 0 | 1 | 0 | 19         | 11       |
| 1 | 0 | 1 | 1 | 20         | 12       |
| 1 | 1 | 0 | 0 | 21         | 13       |
| 1 | 1 | 0 | 1 | 22         | 14       |
| 1 | 1 | 1 | 0 | 23         | 15       |
| 1 | 1 | 1 | 1 | 24         | 16       |

| In 1 | Set | Reset | Clock Inhibit | Osc. Inhibit | Out 1 | Out 2 | Decode Out            |
|------|-----|-------|---------------|--------------|-------|-------|-----------------------|
|      | 0   | 0     | 0             | 0            |       |       | No Change             |
|      | 0   | 0     | 0             | 0            |       |       | Advance to next stage |
| x    | 1   | 0     | 0             | 0            | 0     | 1     | 1                     |
| x    | 0   | 1     | 0             | 0            | 0     | 1     | 0                     |
| x    | 0   | 0     | 1             | 0            |       |       | No Change             |
| 0    | 0   | 0     | 0             | x            | 0     | 1     | No Change             |
| 1    | 0   | 0     | 0             |              |       |       | Advance to next stage |

x Don't Care



LOGIC DIAGRAM



ELECTRICAL CHARACTERISTICS

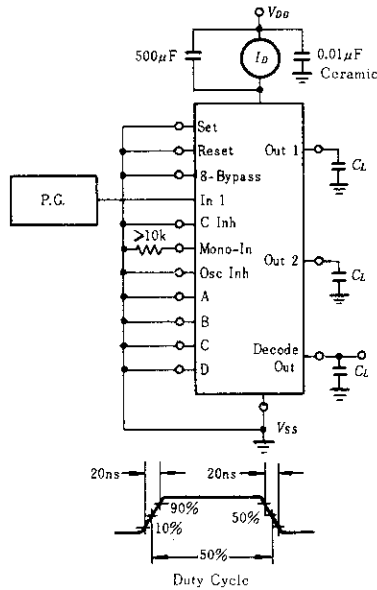
| Characteristic        | Symbol          | V <sub>DD</sub> (V)   | Test Conditions                       | -40°C |      | 25°C    |       |      | 85°C  |      | Unit |
|-----------------------|-----------------|-----------------------|---------------------------------------|-------|------|---------|-------|------|-------|------|------|
|                       |                 |                       |                                       | min   | max  | min     | typ   | max  | min   | max  |      |
| Output Voltage        | V <sub>OL</sub> | 5.0                   | V <sub>in</sub> =V <sub>DD</sub> or 0 | —     | 0.05 | —       | 0     | 0.05 | —     | 0.05 | V    |
|                       |                 | 10                    |                                       | —     | 0.05 | —       | 0     | 0.05 | —     | 0.05 |      |
|                       |                 | 15                    |                                       | —     | 0.05 | —       | 0     | 0.05 | —     | 0.05 |      |
|                       | V <sub>OH</sub> | 5.0                   | V <sub>in</sub> =0 or V <sub>DD</sub> | 4.95  | —    | 4.95    | 5.0   | —    | 4.95  | —    | V    |
|                       |                 | 10                    |                                       | 9.95  | —    | 9.95    | 10    | —    | 9.95  | —    |      |
|                       |                 | 15                    |                                       | 14.95 | —    | 14.95   | 15    | —    | 14.95 | —    |      |
| Input Voltage         | V <sub>IL</sub> | 5.0                   | V <sub>ext</sub> =4.5 or 0.5V         | —     | 1.5  | —       | 2.25  | 1.5  | —     | 1.5  | V    |
|                       |                 | 10                    | V <sub>ext</sub> =9.0 or 1.0V         | —     | 3.0  | —       | 4.50  | 3.0  | —     | 3.0  |      |
|                       |                 | 15                    | V <sub>ext</sub> =13.5 or 1.5V        | —     | 4.0  | —       | 6.75  | 4.0  | —     | 4.0  |      |
|                       | V <sub>IH</sub> | 5.0                   | V <sub>ext</sub> =0.5 or 4.5V         | 3.5   | —    | 3.5     | 2.75  | —    | 3.5   | —    | V    |
|                       |                 | 10                    | V <sub>ext</sub> =1.0 or 9.0V         | 7.0   | —    | 7.0     | 5.50  | —    | 7.0   | —    |      |
|                       |                 | 15                    | V <sub>ext</sub> =1.5 or 13.5V        | 11.0  | —    | 11.0    | 8.25  | —    | 11.0  | —    |      |
| Output Drive Current  | I <sub>OH</sub> | 5.0                   | V <sub>OH</sub> =2.5V                 | -1.0  | —    | -0.8    | -1.7  | —    | -0.6  | —    | mA   |
|                       |                 | 5.0                   | V <sub>OH</sub> =4.6V                 | -0.2  | —    | -0.16   | -0.36 | —    | -0.12 | —    |      |
|                       |                 | 10                    | V <sub>OH</sub> =9.5V                 | -0.5  | —    | -0.4    | -0.9  | —    | -0.3  | —    |      |
|                       |                 | 15                    | V <sub>OH</sub> =13.5V                | -1.4  | —    | -1.2    | -3.5  | —    | -1.0  | —    |      |
|                       | I <sub>OL</sub> | 5.0                   | V <sub>OL</sub> =0.4V                 | 0.52  | —    | 0.44    | 0.88  | —    | 0.36  | —    | mA   |
|                       |                 | 10                    | V <sub>OL</sub> =0.5V                 | 1.3   | —    | 1.1     | 2.25  | —    | 0.9   | —    |      |
| 15                    |                 | V <sub>OL</sub> =1.5V | 3.6                                   | —     | 3.0  | 8.8     | —     | 2.4  | —     |      |      |
| Input Current         | I <sub>in</sub> | 15                    | —                                     | ±0.3  | —    | ±0.0001 | ±0.3  | —    | ±1.0  | μA   |      |
| Input Capacitance     | C <sub>in</sub> | —                     | V <sub>in</sub> =0                    | —     | —    | —       | 5.0   | 7.5  | —     | pF   |      |
| Quiescent Current     | I <sub>DD</sub> | 5.0                   | Zero Signal, per Package              | —     | 50   | —       | 0.010 | 50   | —     | 375  | μA   |
|                       |                 | 10                    |                                       | —     | 100  | —       | 0.020 | 100  | —     | 750  |      |
|                       |                 | 15                    |                                       | —     | 200  | —       | 0.030 | 200  | —     | 1500 |      |
| Total Supply Current* | I <sub>T</sub>  | 5.0                   | Dynamic + I <sub>DD</sub> , per Gate  | —     | —    | —       | 1.15  | —    | —     | —    | μA   |
|                       |                 | 10                    |                                       | —     | —    | —       | 2.3   | —    | —     | —    |      |
|                       |                 | 15                    |                                       | —     | —    | —       | 3.55  | —    | —     | —    |      |

\* To calculate total supply current at frequency other than 1kHz.

@V<sub>DD</sub>=5.0V I<sub>T</sub>=(1.15μA/kHz)f+I<sub>DD</sub>, @V<sub>DD</sub>=10V I<sub>T</sub>=(2.3μA/kHz)f+I<sub>DD</sub>, @V<sub>DD</sub>=15V I<sub>T</sub>=(3.55μA/kHz)f+I<sub>DD</sub>

HD14536B

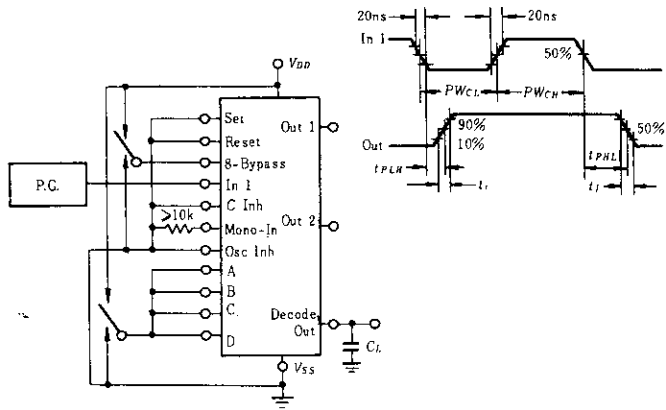
● POWER DISSIPATION TEST  
CIRCUIT AND WAVEFORM

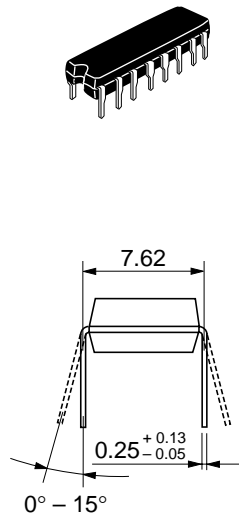
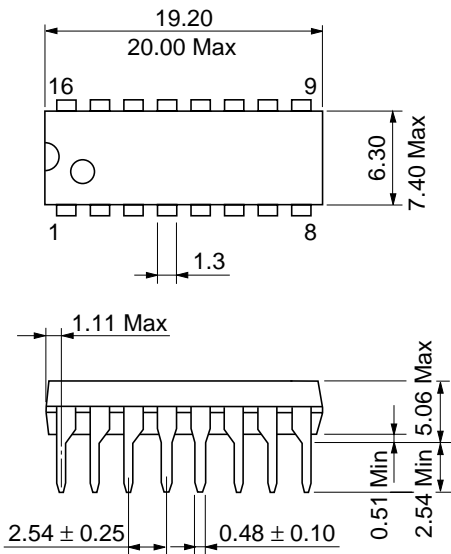


■ SWITCHING CHARACTERISTICS ( $C_L = 50\text{pF}$ ,  $T_a = 25^\circ\text{C}$ )

| Characteristic                 |                                | Symbol                 | $V_{DD}$ (V) | min      | typ  | max  | Unit |               |
|--------------------------------|--------------------------------|------------------------|--------------|----------|------|------|------|---------------|
| Output Rise Time               |                                | $t_r$                  | 5.0          | —        | 180  | 400  | ns   |               |
|                                |                                |                        | 10           | —        | 90   | 200  |      |               |
|                                |                                |                        | 15           | —        | 65   | 160  |      |               |
| Output Fall Time               |                                | $t_f$                  | 5.0          | —        | 120  | 250  | ns   |               |
|                                |                                |                        | 10           | —        | 60   | 125  |      |               |
|                                |                                |                        | 15           | —        | 40   | 100  |      |               |
| Propagation Delay Time         | Clock to $Q_1$<br>(Pin 6 High) |                        | 5.0          | —        | 1800 | 5400 | ns   |               |
|                                |                                |                        | 10           | —        | 650  | 2000 |      |               |
|                                |                                |                        | 15           | —        | 450  | 1500 |      |               |
|                                | Clock to $Q_1$<br>(Pin 6 Low)  | $t_{PLH}$<br>$t_{PHL}$ |              | 5.0      | —    | 3.8  | 12   | $\mu\text{s}$ |
|                                |                                |                        |              | 10       | —    | 1.5  | 4.5  |               |
|                                |                                |                        |              | 15       | —    | 1.1  | 3.5  |               |
|                                | Clock to $Q_{16}$              |                        |              | 5.0      | —    | 7.0  | 21   |               |
|                                |                                |                        |              | 10       | —    | 3.0  | 9.0  |               |
|                                |                                |                        |              | 15       | —    | 2.2  | 7.0  |               |
|                                | Reset to $Q_1$                 | $t_{PHL}$              |              | 5.0      | —    | 1500 | 4500 | ns            |
|                                |                                |                        |              | 10       | —    | 600  | 1800 |               |
|                                |                                |                        |              | 15       | —    | 450  | 1400 |               |
| Clock Pulse Width              |                                | $PW_C$                 | 5.0          | 900      | 300  | —    | ns   |               |
|                                |                                |                        | 10           | 300      | 100  | —    |      |               |
|                                |                                |                        | 15           | 255      | 85   | —    |      |               |
| Clock Frequency                |                                | $PRF$                  | 5.0          | —        | 1.2  | 0.4  | MHz  |               |
|                                |                                |                        | 10           | —        | 3.0  | 1.5  |      |               |
|                                |                                |                        | 15           | —        | 5.0  | 2.0  |      |               |
| Clock Pulse Rise and Fall Time |                                | $t_r, t_f$             | 5.0          | No Limit |      |      |      |               |
|                                |                                |                        | 10           |          |      |      |      |               |
|                                |                                |                        | 15           |          |      |      |      |               |
| Reset Pulse Width              |                                | $PW_R$                 | 5.0          | 1500     | 500  | —    | ns   |               |
|                                |                                |                        | 10           | 600      | 200  | —    |      |               |
|                                |                                |                        | 15           | 450      | 150  | —    |      |               |

■ SWITCHING TIME TEST CIRCUIT





Unit: mm

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