# MC1455, MC1455B, NCV1455B

# Timers

The MC1455 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. Additional terminals are provided for triggering or resetting if desired. In the time delay mode, time is precisely controlled by one external resistor and capacitor. For astable operation as an oscillator, the free−running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200 mA or drive MTTL circuits.

## Features

- Direct Replacement for NE555 Timers
- Timing from Microseconds through Hours
- Operates in Both Astable and Monostable Modes
- Adjustable Duty Cycle
- High Current Output Can Source or Sink 200 mA
- Output Can Drive MTTL
- Temperature Stability of 0.005% per °C
- Normally ON or Normally OFF Output
- Pb−Free Packages are Available

## ON Semiconductor®

Figure 1. 22 Second Solid State Time Delay Relay Circuit
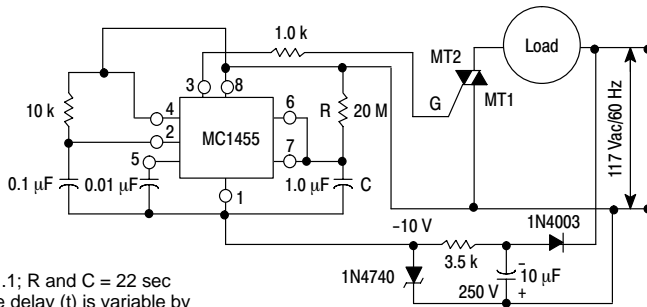
t = 1.1; R and C = 22 sec
Time delay (t) is variable by changing R and C (see Figure 16).
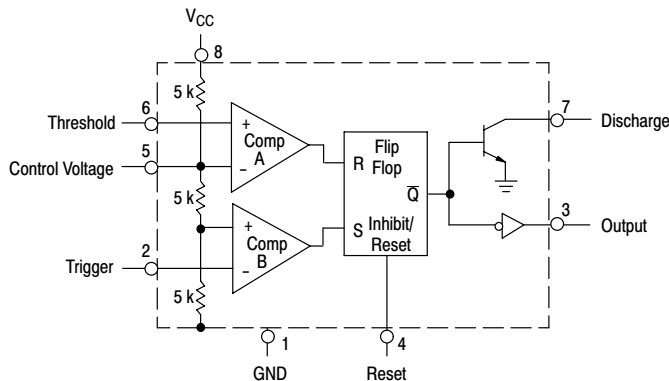


Figure 2. Representative Block Diagram
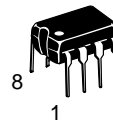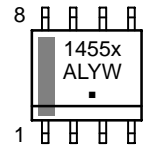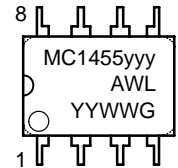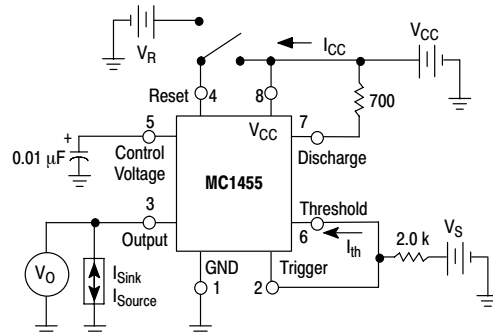
Test circuit for measuring DC parameters (to set output and measure parameters):
a) When $V_S \geq$ 2/3 $V_{CC}$, $V_O$ is low.
b) When $V_S \leq$ 1/3 $V_{CC}$, $V_O$ is high.
c) When $V_O$ is low, Pin 7 sinks current. To test for Reset, set $V_O$ high, apply Reset voltage, and test for current flowing into Pin 7. When Reset is not in use, it should be tied to $V_{CC}$.

Figure 3. General Test Circuit

1

# MC1455, MC1455B, NCV1455B

**MAXIMUM RATINGS** ($T_A$ = +25°C, unless otherwise noted.)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply Voltage | $V_{CC}$ | +18 | Vdc |
| Discharge Current (Pin 7) | $I_7$ | 200 | mA |
| Power Dissipation (Package Limitation)<br>  P1 Suffix, Plastic Package<br>    Derate above $T_A$ = +25°C<br>  D Suffix, Plastic Package<br>    Derate above $T_A$ = +25°C | $P_D$<br><br><br>$P_D$ | 625<br>5.0<br>625<br>160 | mW<br>mW/°C<br>mW<br>°C/W |
| Operating Temperature Range (Ambient)<br>  MC1455B<br>  MC1455<br>  NCV1455B | $T_A$ | <br>−40 to +85<br>0 to +70<br>−40 to +125 | °C |
| Maximum Operating Die Junction Temperature | $T_J$ | +150 | °C |
| Storage Temperature Range | $T_{stg}$ | −65 to +150 | °C |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = +25°C, $V_{CC}$ = +5.0 V to +15 V, unless otherwise noted.)

| Characteristics | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Supply Voltage Range | $V_{CC}$ | 4.5 | – | 16 | V |
| Supply Current<br>  $V_{CC}$ = 5.0 V, $R_L$ = ∞<br>  $V_{CC}$ = 15 V, $R_L$ = ∞, Low State (Note 1) | $I_{CC}$ | <br>–<br>– | <br>3.0<br>10 | <br>6.0<br>15 | mA |
| Timing Error (R = 1.0 kΩ to 100 kΩ) (Note 2)<br>  Initial Accuracy C = 0.1 μF<br>  Drift with Temperature<br>  Drift with Supply Voltage | | <br>–<br>–<br>– | <br>1.0<br>50<br>0.1 | <br>–<br>–<br>– | <br>%<br>PPM/°C<br>%/V |
| Threshold Voltage/Supply Voltage | $V_{th}/V_{CC}$ | – | 2/3 | – | |
| Trigger Voltage<br>  $V_{CC}$ = 15 V<br>  $V_{CC}$ = 5.0 V | $V_T$ | <br>–<br>– | <br>5.0<br>1.67 | <br>–<br>– | V |
| Trigger Current | $I_T$ | – | 0.5 | – | μA |
| Reset Voltage | $V_R$ | 0.4 | 0.7 | 1.0 | V |
| Reset Current | $I_R$ | – | 0.1 | – | mA |
| Threshold Current (Note 3) | $I_{th}$ | – | 0.1 | 0.25 | μA |
| Discharge Leakage Current (Pin 7) | $I_{dischg}$ | – | – | 100 | nA |
| Control Voltage Level<br>  $V_{CC}$ = 15 V<br>  $V_{CC}$ = 5.0 V | $V_{CL}$ | <br>9.0<br>2.6 | <br>10<br>3.33 | <br>11<br>4.0 | V |
| Output Voltage Low<br>  $I_{Sink}$ = 10 mA ($V_{CC}$ = 15 V)<br>  $I_{Sink}$ = 50 mA ($V_{CC}$ = 15 V)<br>  $I_{Sink}$ = 100 mA ($V_{CC}$ = 15 V)<br>  $I_{Sink}$ = 200 mA ($V_{CC}$ = 15 V)<br>  $I_{Sink}$ = 8.0 mA ($V_{CC}$ = 5.0 V)<br>  $I_{Sink}$ = 5.0 mA ($V_{CC}$ = 5.0 V) | $V_{OL}$ | <br>–<br>–<br>–<br>–<br>–<br>– | <br>0.1<br>0.4<br>2.0<br>2.5<br>–<br>0.25 | <br>0.25<br>0.75<br>2.5<br>–<br>–<br>0.35 | V |
| Output Voltage High<br>  $V_{CC}$ = 15 V ($I_{Source}$ = 200 mA)<br>  $V_{CC}$ = 15 V ($I_{Source}$ = 100 mA)<br>  $V_{CC}$ = 5.0 V ($I_{Source}$ = 100 mA) | $V_{OH}$ | <br>–<br>12.75<br>2.75 | <br>12.5<br>13.3<br>3.3 | <br>–<br>–<br>– | V |
| Rise Time Differential Output | $t_r$ | – | 100 | – | ns |
| Fall Time Differential Output | $t_f$ | – | 100 | – | ns |

1. 'Supply current when output is high is typically 1.0 mA less.
2. Tested at $V_{CC}$ = 5.0 V and $V_{CC}$ = 15 V Monostable mode.
3. This will determine the maximum value of $R_A + R_B$ for 15 V operation. The maximum total R = 20 MΩ.
4. $T_{low}$ = 0°C for MC1455, $T_{low}$ = −40°C for MC1455B, NCV1455B
   $T_{high}$ = +70°C for MC1455, $T_{high}$ = +85°C for MC1455B, $T_{high}$ = +125°C for NCV1455B
5. NCV prefix is for Automotive and other applications requiring site and change control.

# MC1455, MC1455B, NCV1455B

**ORDERING INFORMATION**

| Device | Operating Temperature Range | Package | Shipping[†] |
|---|---|---|---|
| MC1455P1 | | PDIP−8 | 50 Units / Rail |
| MC1455P1G | | PDIP−8 (Pb−Free) | 50 Units / Rail |
| MC1455D | | SOIC−8 | 98 Units / Rail |
| MC1455DG | $T_A$ = 0°C to +70°C | SOIC−8 (Pb−Free) | 98 Units / Rail |
| MC1455DR2 | | SOIC−8 | 2500 Units / Tape & Reel |
| MC1455DR2G | | SOIC−8 (Pb−Free) | 2500 Units / Tape & Reel |
| MC1455BD | | SOIC−8 | 98 Units / Rail |
| MC1455BDG | | SOIC−8 (Pb−Free) | 98 Units / Rail |
| MC1455BDR2 | | SOIC−8 | 2500 Units / Tape & Reel |
| MC1455BDR2G | $T_A$ = −40°C to +85°C | SOIC−8 (Pb−Free) | 2500 Units / Tape & Reel |
| MC1455BP1 | | PDIP−8 | 50 Units / Rail |
| MC1455BP1G | | PDIP−8 (Pb−Free) | 50 Units / Rail |
| NCV1455BDR2* | | SOIC−8 | 2500 Units / Tape & Reel |
| NCV1455BDR2G* | $T_A$ = −40°C to +125°C | SOIC−8 (Pb−Free) | 2500 Units / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
*NCV prefix is for automotive and other applications requiring site and control changes.

9

# MC1455, MC1455B, NCV1455B

## PACKAGE DIMENSIONS

**PDIP−8**
**P1 SUFFIX**
CASE 626−05
ISSUE L
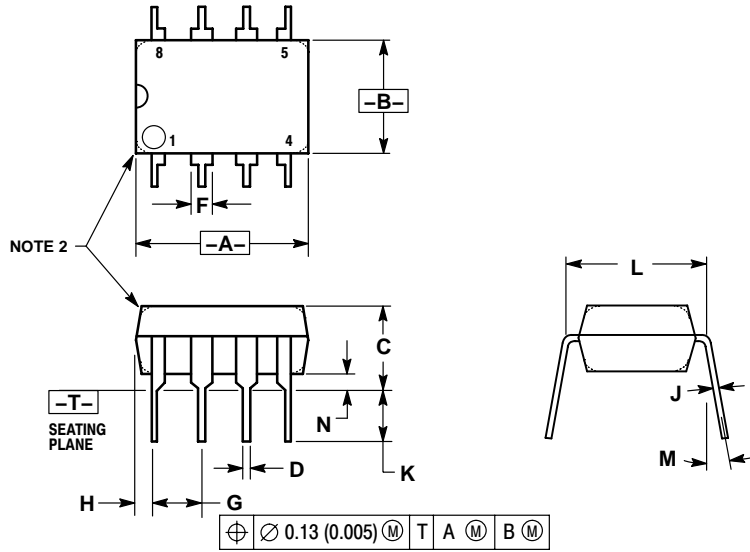


NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

| DIM | MILLIMETERS | | INCHES | |
|-----|------|------|------|------|
| | MIN | MAX | MIN | MAX |
| A | 9.40 | 10.16 | 0.370 | 0.400 |
| B | 6.10 | 6.60 | 0.240 | 0.260 |
| C | 3.94 | 4.45 | 0.155 | 0.175 |
| D | 0.38 | 0.51 | 0.015 | 0.020 |
| F | 1.02 | 1.78 | 0.040 | 0.070 |
| G | 2.54 BSC | | 0.100 BSC | |
| H | 0.76 | 1.27 | 0.030 | 0.050 |
| J | 0.20 | 0.30 | 0.008 | 0.012 |
| K | 2.92 | 3.43 | 0.115 | 0.135 |
| L | 7.62 BSC | | 0.300 BSC | |
| M | --- | 10° | --- | 10° |
| N | 0.76 | 1.01 | 0.030 | 0.040 |

**MC1455/D**

11