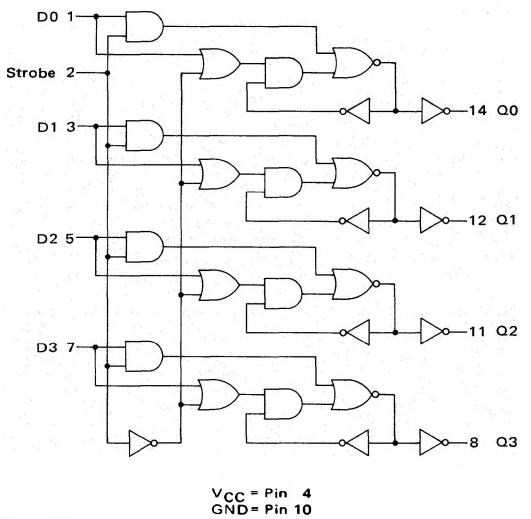
QUAD LATCH

# MC4337F,L*
# MC4037F,L,P*



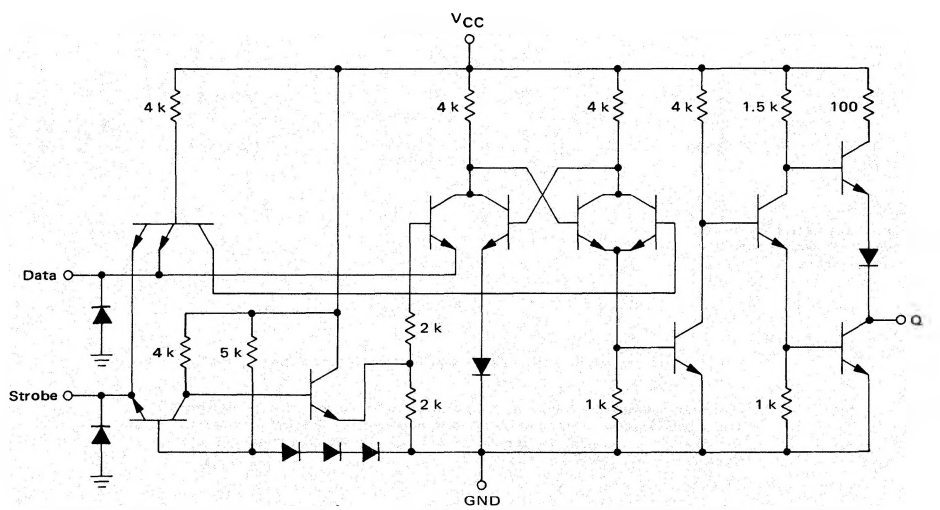

$V_{CC}$ = Pin 4
GND = Pin 10

This monolithic device consists of four latch circuits with active pullup networks for high capacitive load drive capability. Separate data inputs and a common Strobe input are provided. Information present on the data inputs prior to the negative edge of the strobe input will be stored in the latch. When the strobe input is high, the Q output will follow the data input.

Input Loading Factor (MTTL I Loads):
Data Input (Strobe High) – MC4337 = 4.2
MC4037 = 4.0
Data Input (Strobe Low) – MC4337 = 1.1
MC4037 = 0.9
Strobe – MC4337 = 5.2
MC4037 = 5.2
Output Loading Factor (MTTL I Loads):
MC4337 = 10 ($I_{OL}$ = 13.3 mAdc)
MC4037 = 10 ($I_{OL}$ = 16.6 mAdc)
Total Power Dissipation = 150 mW typ/pkg
Propagation Delay Time = 25 ns typ

**CIRCUIT SCHEMATIC**

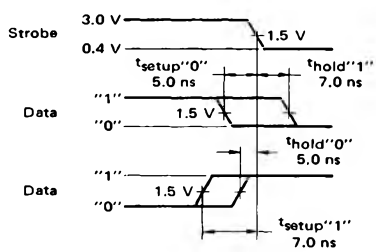
**1/4 OF DEVICE SHOWN**



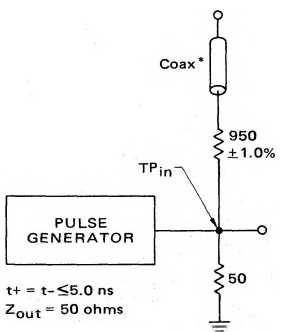

*F suffix = TO-86 ceramic flat package (Case 607).
L suffix = TO-116 ceramic dual in-line package (Case 632).
P suffix = TO-116 plastic dual in-line package (Case 605).

## OPERATING CHARACTERISTICS

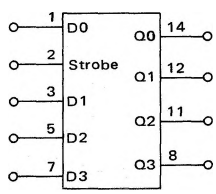
This quad latch consists of four gated latches that store data on the negative edge of the strobe input. Information must be present at the data inputs prior to the setup time and remain at the data inputs through the hold time to insure that it will be stored by the latch when the negative edge of the strobe occurs. The setup time is 7.0 ns for a logical "1" and 5.0 ns for a logical "0". Hold time is 7.0 ns after the strobe edge for a logical "1" and 5.0 ns prior to the strobe edge for a logical "0".

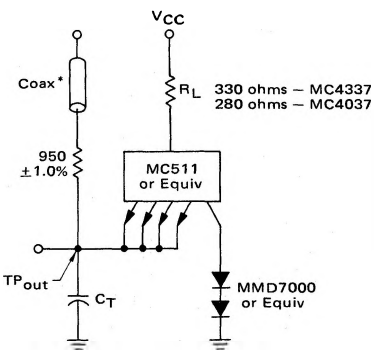



## SWITCHING TIME TEST CIRCUIT




Two pulse generators are required and must be slaved to provide the waveforms shown.



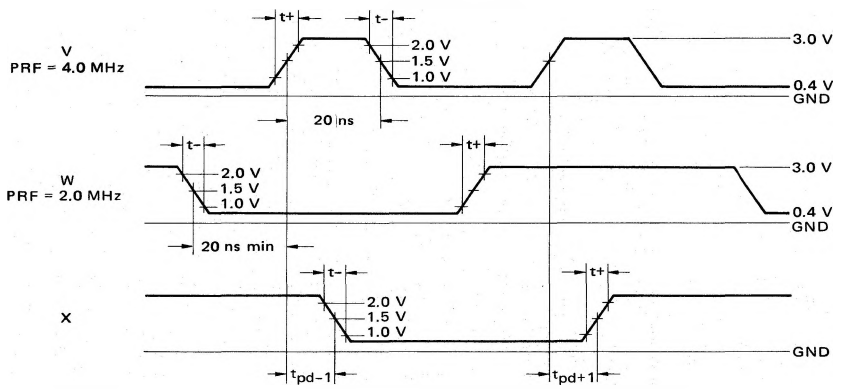




$C_T$ = 15 pF = total parasitic capacitance, which includes probe, wiring, and load capacitances.

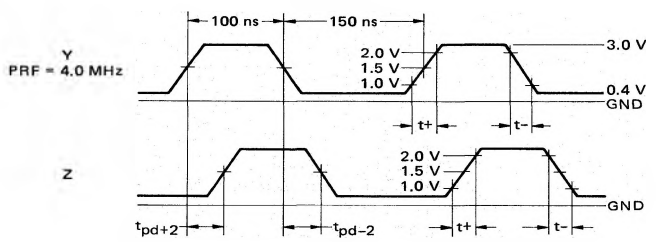
*The coax delays from input to scope and output to scope must be matched. The scope must be terminated in 50-ohm impedance. The 950-ohm resistor and the scope termination impedance constitute a 20:1 attenuator probe. Coax shall be CT-070-50 or equivalent.

**VOLTAGE WAVEFORMS**

**STROBE INPUT**




**DATA INPUTS**




**SWITCHING TIME TEST PROCEDURES** ($T_A$ = 25°C)

(Letters shown in test columns refer to waveforms.)

| TEST | SYMBOL | PIN UNDER TEST (In/Out) | INPUT | | OUTPUT | LIMITS (ns) Max |
|---|---|---|---|---|---|---|
| | | | Pin 1 D0 | Pin 2 Strobe | Pin 14 Q0 | |
| Strobe Propagation Delay | $t_{pd+1}$ | 2/14 | W | V | X | 25 |
| | $t_{pd-1}$ | 2/14 | W | V | X | 40 |
| Rise Time | t+ | 14 | W | V | X | 8.0 |
| Fall Time | t- | 14 | W | V | X | 5.0 |
| Data Propagation Delay | $t_{pd+2}$ | 1/14 | Y | 2.4 V | Z | 20 |
| | $t_{pd-2}$ | 1/14 | Y | 2.4 V | Z | 30 |
| Minimum Strobe Enable | – | 1/14 | W① | 1.8 V | ② | ② |
| Maximum Strobe Inhibit | – | 1/14 | W① | 1.0 V | ③ | ③ |

① Pulse W conditions changed: $V_L$ = 1.0 V, $V_H$ = 1.8 V.
② Output shall follow data input.
③ Output shall not toggle.

## ELECTRICAL CHARACTERISTICS

Test procedures are shown for only the Strobe input, one data input, and one output. Other data inputs and outputs are tested in the same manner.

| | | | MC4337 Test Limits | | | | | | MC4037 Test Limits | | | | | | | TEST CURRENT / VOLTAGE VALUES (All Temperatures) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | mA | | | Volts | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | $I_{OL}$ | $I_{OH}$ | $I_{in}$ | $V_{IL}$ | $V_{IH}$ | $V_F$ | $V_R$ | $V_{out}$ | $V_{max}$ | $V_{CC}$ | $V_{CCL}$ | $V_{CCH}$ | | | |
| | | | | | | | | | | | | | | | | MC4337 | 13.3 | -1.4 | 1.0 | 0.8 | 2.0 | 0.4 | 4.5 | 5.5 | 7.0 | 5.0 | 4.5 | 5.5 | | |
| | | | | | | | | | | | | | | | | MC4037 | 13.3 | -1.4 | 1.0 | 0.8 | 2.0 | 0.4 | 4.5 | 5.5 | 7.0 | 5.0 | 4.75 | 5.25 | | |
| | | | −55°C | | +25°C | | +125°C | | 0°C | | +25°C | | +75°C | | | TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW: | | | | | | | | | | | | | | |
| Characteristic | Symbol | Pin Under Test | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Unit | $I_{OL}$ | $I_{OH}$ | $I_{in}$ | $V_{IL}$ | $V_{IH}$ | $V_F$ | $V_R$ | $V_{out}$ | $V_{max}$ | $V_{CC}$ | $V_{CCL}$ | $V_{CCH}$ | Pulse 1 | Pulse 2 | Gnd |
| **Input** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Forward Current | $I_F$ | 1 | - | -5.6 | - | -5.6 | - | -5.6 | - | -6.7 | - | -6.7 | - | -6.7 | mAdc | - | - | - | - | - | 1 | 2 | - | - | - | - | 4 | - | - | 10 |
| | | 1 | - | -1.5 | - | -1.5 | - | -1.5 | - | -1.8 | - | -1.8 | - | -1.8 | | - | - | - | 2 | - | 1 | 3,5,7 | - | - | - | - | | - | - | |
| | | 2 | - | -7.0 | - | -7.0 | - | -7.0 | - | -8.6 | - | -8.6 | - | -8.6 | ↓ | - | - | - | - | - | 2 | 1,3,5,7 | - | - | - | - | ↓ | - | - | ↓ |
| Leakage Current | $I_R$ | 1 | - | 0.2 | - | 0.2 | - | 0.2 | - | 0.2 | - | 0.2 | - | 0.2 | mAdc | - | - | - | - | - | - | 1 | - | - | - | - | 4 | - | - | 2,10 |
| | | 2 | - | 0.5 | - | 0.5 | - | 0.5 | - | 0.5 | - | 0.5 | - | 0.5 | mAdc | - | - | - | - | - | - | 2 | - | - | - | - | 4 | - | - | 1,3,5,7,10 |
| Breakdown Voltage | $BV_{in}$ | 1 | - | - | 5.5 | - | - | - | - | - | 5.5 | - | - | - | Vdc | - | - | 1 | - | - | - | - | - | - | - | - | 4 | - | - | 2,10 |
| | | 2 | - | - | 5.5 | - | - | - | - | - | 5.5 | - | - | - | Vdc | - | - | 2 | - | - | - | - | - | - | - | - | 4 | - | - | 1, 3, 5, 7, 10 |
| **Output** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Output Voltage | $V_{OL}$ | 14 | - | 0.4 | - | 0.4 | - | 0.4 | - | 0.4 | - | 0.4 | - | 0.4 | Vdc | 14 | - | - | 1 | 2 | - | - | - | - | - | 4 | - | - | - | 10 |
| | | 14 | - | 0.4 | - | 0.4 | - | 0.4 | - | 0.4 | - | 0.4 | - | 0.4 | Vdc | 14 | - | - | - | - | - | - | - | - | - | 4 | - | 2 | 1 | 10 |
| | $V_{OH}$ | 14 | 2.4 | - | 2.4 | - | 2.4 | - | 2.4 | - | 2.4 | - | 2.4 | - | Vdc | - | 14 | - | - | 1,2 | - | - | - | - | - | 4 | - | - | - | 10 |
| Short-Circuit Current | $I_{SC}$ | 14 | -15 | -60 | -15 | -60 | -15 | -60 | -15 | -60 | -15 | -60 | -15 | -60 | mAdc | - | - | - | - | - | - | 1 | - | - | - | - | 4 | - | - | 10,14 |
| Leakage Current | $I_{CEX}$ | 14 | - | 0.25 | - | 0.25 | - | 0.25 | - | 0.25 | - | 0.25 | - | 0.25 | mAdc | - | - | - | - | - | - | 1,2 | 14 | - | - | - | 4 | - | - | 10 |
| **Power Requirements (Total Device)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Power Supply Current | $I_{max}$ | 4 | - | - | - | 40 | - | - | - | - | - | 50 | - | - | mAdc | - | - | - | - | - | - | 2 | - | 4 | - | - | - | - | - | 10 |
| Power Supply Drain | $I_{PDH}$ | 4 | - | 26 | - | 26 | - | 26 | - | 32 | - | 32 | - | 32 | mAdc | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | 10 |
| | $I_{PDL}$ | 4 | - | 45 | - | 45 | - | 45 | - | 55 | - | 55 | - | 55 | mAdc | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | 1, 3, 5, 7, 10 |