

## Hex ECL/TTL Transceiver with Latches

The MC10/100H681 is a dual supply Hex ECL/TTL transceiver with latches in both directions. ECL controlled Direction and Chip Enable Bar pins. There are two Latch Enable pins, one for each direction.

The ECL outputs are single ended and drive 50 Ω. The TTL outputs are specified to source 15 mA and sink 48 mA, allowing the ability to drive highly capacitive loads. The high driving ability of the TTL outputs make the device ideal for bussing applications.

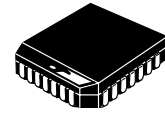
The ECL output levels are standard  $V_{OH}$  and  $V_{OL}$  cutoff equal to  $-2.0 V$  ( $V_{TT}$ ). When the ECL ports are disabled the outputs go to the  $V_{OL}$  cutoff level. Multiple ECL  $V_{CCO}$  pins are utilized to minimize switching noise.

The TTL ports have standard levels. The TTL input receivers have PNP input devices to significantly reduce loading. Multiple TTL power and ground pins are utilized to minimize switching noise.

The 10H version is compatible with MECL 10H ECL logic levels. The 100H version is compatible with 100K levels.

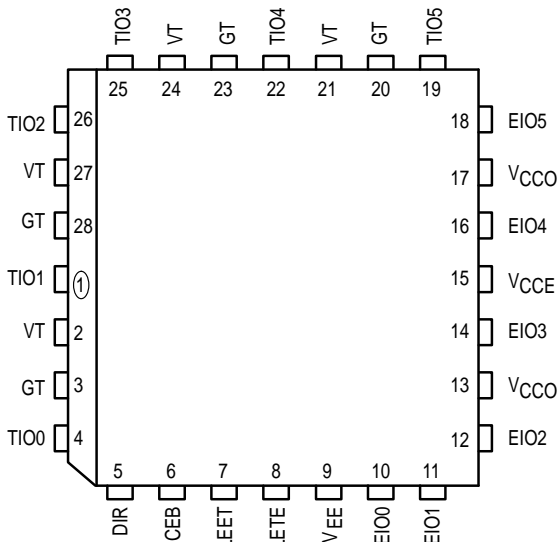
- Separate Latch Enable Controls for each Direction
- ECL Single Ended 50 Ω I/O Port
- High Drive TTL I/O Ports
- Extra TTL and ECL Power/Ground Pins to Minimize Switching Noise
- Dual Supply
- Direction and Chip Enable Control Pins

**MC10H681**  
**MC100H681**



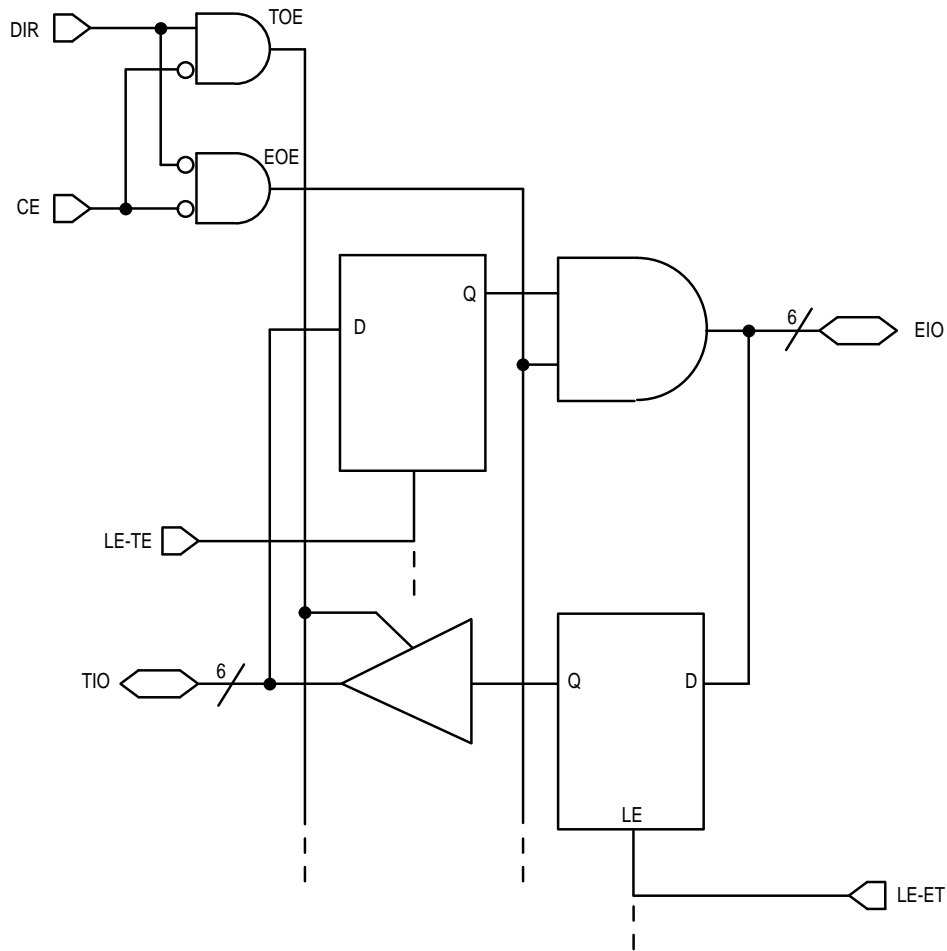
**FN SUFFIX**  
PLASTIC PACKAGE  
CASE 776-02

Pinout: 28-Lead PLCC (Top View)



| Pin | Symbol    | Description                        |
|-----|-----------|------------------------------------|
| 1   | TIO1      | TTL I/O BIT 1                      |
| 2   | VT        | TTL $V_{CC}$ (5.0 V)               |
| 3   | GT        | TTL GND (0 V)                      |
| 4   | TIO0      | TTL I/O Bit 0                      |
| 5   | DIR       | Direction Control (ECL)            |
| 6   | CEB       | Chip Enable Bar Control (ECL)      |
| 7   | LEET      | Latch Enable ECL-TTL Control (ECL) |
| 8   | LETE      | Latch Enable TTL-ECL Control (ECL) |
| 9   | $V_{EE}$  | ECL Supply ( $-5.2/-4.5 V$ )       |
| 10  | EIO0      | ECL I/O BIT 0                      |
| 11  | EIO1      | ECL I/O BIT 1                      |
| 12  | EIO2      | ECL I/O BIT 2                      |
| 13  | $V_{CCO}$ | ECL $V_{CC}$ (0 V) — Outputs       |
| 14  | EIO3      | TTL I/O BIT 3                      |
| 15  | $V_{CCE}$ | ECL $V_{CC}$ (0 V)                 |
| 16  | EIO4      | ECL I/O BIT 4                      |
| 17  | $V_{CCO}$ | ECL $V_{CC}$ (0 V) — Outputs       |
| 18  | EIO5      | ECL I/O BIT 5                      |
| 19  | TIO5      | TTL I/O BIT 5                      |
| 20  | GT        | TTL GND (0 V)                      |
| 21  | VT        | TTL $V_{CC}$ (5.0 V)               |
| 22  | TIO4      | TTL I/O BIT 4                      |
| 23  | GT        | TTL GND (0 V)                      |
| 24  | VT        | TTL $V_{CC}$ (5.0 V)               |
| 25  | TIO3      | TTL I/O BIT 3                      |
| 26  | TIO2      | TTL I/O BIT 2                      |
| 27  | VT        | TTL $V_{CC}$ (5.0 V)               |
| 28  | GT        | TTL $V_{CC}$ (0 V)                 |





**TRUTH TABLE**

| CEB | DIR | LEET | LETE | EOUT           | TOUT           |
|-----|-----|------|------|----------------|----------------|
| H   | X   | X    | X    | Z              | Z              |
| L   | H   | L    | L    | Z              | EIN            |
| L   | H   | H    | L    | Z              | Q <sub>0</sub> |
| L   | L   | L    | L    | TIN            | Z              |
| L   | L   | L    | H    | Q <sub>0</sub> | Z              |

- Hex
- Bi-Directional
- ECL/TTL Translation
- Dual Supply
- ECL Outputs, 50 Ohm S.E., V<sub>OH</sub>/Cutoff
- TTL Outputs, 48 mA Sink, 15 mA Source
- Multi Power and Ground Pins
- Separate LE Controls

MC10H681 MC100H681

**ECL DC CHARACTERISTICS:**  $V_{CCT} = +5.0\text{ V} \pm 10\%$ ,  $V_{EE} = -5.2 \pm 5\%$  (10H Version);  $V_{EE} = -4.2\text{ V}$  to  $-5.5\text{ V}$  (100H Version)

| Test Symbol          | Parameter                                 | $T_A = 0^\circ\text{C}$ |               | $T_A = 25^\circ\text{C}$ |               | $T_A = 75^\circ\text{C}$ |               | Unit          | Condition             |
|----------------------|---|-------------------------|---------------|--------------------------|---------------|--------------------------|---------------|---------------|-----------------------|
|                      |   | Min                     | Max           | Min                      | Max           | Min                      | Max           |               |                       |
| $I_{EE}$             | Supply Current/ECL                        | —                       | -113          | —                        | -113          | —                        | -113          | mA            |                       |
| $I_{INH}$            | Input HIGH Current                        | —                       | 225           | —                        | 145           | —                        | 145           | $\mu\text{A}$ |                       |
| $I_{INL}$            | Input LOW Current                         | 0.5                     | —             | 0.5                      | —             | 0.3                      | —             | $\mu\text{A}$ |                       |
| $V_{OH}$<br>$V_{OL}$ | Output HIGH Voltage<br>Output LOW Voltage | -1020<br>-2.1           | -840<br>-2.03 | -980<br>-2.1             | -810<br>-2.03 | -920<br>-2.1             | -735<br>-2.03 | mV<br>V       | 50 $\Omega$ to -2.1 V |

**10H ECL DC CHARACTERISTICS:**  $V_{CCT} = +5.0 \pm 10\%$ ,  $V_{EE} = -5.2 \pm 5\%$

| Test Symbol          | Parameter                               | $T_A = 0^\circ\text{C}$ |               | $T_A = 25^\circ\text{C}$ |               | $T_A = 75^\circ\text{C}$ |               | Unit | Condition |
|----------------------|---|-------------------------|---------------|--------------------------|---------------|--------------------------|---------------|------|-----------|
|                      |   | Min                     | Max           | Min                      | Max           | Min                      | Max           |      |           |
| $V_{IH}$<br>$V_{IL}$ | Input HIGH Voltage<br>Input LOW Voltage | -1170<br>-1950          | -840<br>-1480 | -1130<br>-1950           | -810<br>-1480 | -1070<br>-1950           | -735<br>-1450 | mV   |           |

**100H ECL DC CHARACTERISTICS:**  $V_{CCT} = +5.0 \pm 10\%$ ,  $V_{EE} = -4.2\text{ V}$  to  $-5.5\text{ V}$

| Test Symbol          | Parameter                               | $T_A = 0^\circ\text{C}$ |               | $T_A = 25^\circ\text{C}$ |               | $T_A = 75^\circ\text{C}$ |               | Unit | Condition |
|----------------------|---|-------------------------|---------------|--------------------------|---------------|--------------------------|---------------|------|-----------|
|                      |   | Min                     | Max           | Min                      | Max           | Min                      | Max           |      |           |
| $V_{IH}$<br>$V_{IL}$ | Input HIGH Voltage<br>Input LOW Voltage | -1165<br>-1810          | -880<br>-1475 | -1165<br>-1810           | -880<br>-1475 | -1165<br>-1810           | -880<br>-1475 | mV   |           |

**ABSOLUTE RATINGS (Do not exceed):**

|                                  |                            |                                 |                  |
|----------------------------------|----------------------------|---------------------------------|------------------|
| Power Supply Voltage             | $V_{EE}$ (ECL)             | -8.0 to 0                       | Vdc              |
| Power Supply Voltage             | $V_{CCT}$ (TTL)            | -0.5 to +7.0                    | Vdc              |
| Input Voltage                    | $V_I$ (ECL)<br>$V_I$ (TTL) | 0.0 to $V_{EE}$<br>-0.5 to +7.0 | Vdc              |
| Disabled 3-State Output          | $V_{out}$ (TTL)            | 0.0 to $V_{CCT}$                | Vdc              |
| Output Source Current Continuous | $I_{out}$ (ECL)            | 100                             | mAdc             |
| Output Source Current Surge      | $I_{out}$ (ECL)            | 200                             | mAdc             |
| Storage Temperature              | $T_{stg}$                  | -65 to 150                      | $^\circ\text{C}$ |
| Operating Temperature            | $T_{amb}$                  | 0.0 to +75                      | $^\circ\text{C}$ |

**TTL DC CHARACTERISTICS:**  $V_{CC} = +5.0\text{ V} \pm 10\%$ ,  $V_{EE} = -5.2 \pm 5\%$  (10H Version);  $V_{EE} = -4.2\text{ V}$  to  $-5.5\text{ V}$  (100H Version)

| Test Symbol                          | Parameter                                  | $T_A = 0^\circ\text{C}$ |           | $T_A = 25^\circ\text{C}$ |           | $T_A = 75^\circ\text{C}$ |           | Unit          | Condition   |
|--------------------------------------|--|-------------------------|-----------|--------------------------|-----------|--------------------------|-----------|---------------|---|
|                                      |  | Min                     | Max       | Min                      | Max       | Min                      | Max       |               |   |
| $V_{IH}$<br>$V_{IL}$                 | Standard Input<br>Standard Input           | 2.0<br>—                | —<br>0.8  | 2.0<br>—                 | —<br>0.8  | 2.0<br>—                 | —<br>0.8  | Vdc           |   |
| $V_{IK}$                             | Input Clamp                                | —                       | -1.2      | —                        | -1.2      | —                        | -1.2      | Vdc           | $I_{IN} = -18\text{ mA}$                              |
| $V_{OH}$                             | Output HIGH Voltage<br>Output HIGH Voltage | 2.5<br>2.0              | —<br>—    | 2.5<br>2.0               | —<br>—    | 2.5<br>2.0               | —<br>—    | V             | $I_{OH} = -3.0\text{ mA}$<br>$I_{OH} = -15\text{ mA}$ |
| $V_{OL}$                             | Output LOW Voltage                         | —                       | 0.55      | —                        | 0.55      | —                        | 0.55      | V             | $I_{OL} = 48\text{ mA}$                               |
| $I_{IH}/I_{OZH}$<br>$I_{IL}/I_{OZL}$ | Output Disable<br>Current                  | —<br>—                  | 70<br>200 | —<br>—                   | 70<br>200 | —<br>—                   | 70<br>200 | $\mu\text{A}$ | $V_{OUT} = 2.7\text{ V}$<br>$V_{OUT} = 0.5\text{ V}$  |
| $I_{CCL}$                            | Supply Current                             | —                       | 63        | —                        | 63        | —                        | 63        | mA            |   |
| $I_{CCH}$                            | Supply Current                             | —                       | 63        | —                        | 63        | —                        | 63        | mA            |   |
| $I_{CCZ}$                            | Supply Current                             | —                       | 63        | —                        | 63        | —                        | 63        | mA            |   |
| $I_{OS}$                             | Output Short Circuit Current               | -100                    | -225      | -100                     | -225      | -100                     | -225      | mA            | $V_{OUT} = 0\text{ V}$                                |

#### ECL TO TTL DIRECTION AC CHARACTERISTICS

| Test Symbol            | Parameter                      | $T_A = 0^\circ\text{C}$ |            | $T_A = 25^\circ\text{C}$ |            | $T_A = 75^\circ\text{C}$ |            | Unit | Condition            |
|------------------------|--------------------------------|-------------------------|------------|--------------------------|------------|--------------------------|------------|------|----------------------|
|                        |                                | Min                     | Max        | Min                      | Max        | Min                      | Max        |      |                      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation<br>Delay to Output | 4.0                     | 7.8        | 4.0                      | 7.8        | 4.2                      | 8.0        | ns   | $C_L = 50\text{ pF}$ |
| $t_{PLH}$<br>$t_{PHL}$ | LEET to<br>Output              | 5.5<br>5.5              | 8.3<br>7.6 | 5.5<br>5.5               | 8.3<br>7.6 | 5.7<br>5.8               | 8.5<br>8.0 | ns   | $C_L = 50\text{ pF}$ |
| $t_{PZH}$<br>$t_{PZL}$ | CEB to Output<br>Enable Time   | 5.5<br>5.3              | 8.3<br>8.3 | 5.5<br>5.3               | 8.3<br>8.3 | 4.7<br>5.4               | 8.5<br>8.4 | ns   | $C_L = 50\text{ pF}$ |
| $t_{PHZ}$<br>$t_{PLZ}$ | CEB to Output<br>Disable Time  | 3.5<br>3.5              | 7.2<br>5.3 | 3.5<br>3.5               | 7.2<br>5.3 | 3.7<br>4.1               | 7.3<br>5.8 | ns   | $C_L = 50\text{ pF}$ |
| $t_r/t_f$              | 1.0 Vdc to 2.0 Vdc             | 0.4                     | 2.2        | 0.4                      | 2.2        | 0.4                      | 2.2        | ns   | $C_L = 50\text{ pF}$ |

#### TTL TO ECL DIRECTION AC CHARACTERISTICS

| Test Symbol            | Parameter                        | $T_A = 0^\circ\text{C}$ |            | $T_A = 25^\circ\text{C}$ |            | $T_A = 75^\circ\text{C}$ |            | Unit | Condition             |
|------------------------|----------------------------------|-------------------------|------------|--------------------------|------------|--------------------------|------------|------|-----------------------|
|                        |                                  | Min                     | Max        | Min                      | Max        | Min                      | Max        |      |                       |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation<br>Delay to Output   | 1.9                     | 3.9        | 1.9                      | 3.9        | 2.2                      | 4.4        | ns   | 50 $\Omega$ to -2.0 V |
| $t_{PHL}$<br>$t_{PLH}$ | CEB to<br>Output                 | 2.2<br>2.3              | 4.0<br>4.6 | 2.2<br>2.3               | 4.0<br>4.6 | 2.5<br>2.7               | 4.3<br>5.0 | ns   | 50 $\Omega$ to -2.0 V |
| $t_{PHL}$<br>$t_{PLH}$ | LETE to<br>Output                | 2.4                     | 3.9        | 2.4                      | 3.9        | 2.7                      | 4.3        | ns   | 50 $\Omega$ to -2.0 V |
| $t_r/t_f$              | Output Rise/Fall<br>Time 20%–80% | 0.4                     | 2.2        | 0.4                      | 2.2        | 0.4                      | 2.2        | ns   | 50 $\Omega$ to -2.0 V |

TEST CIRCUITS AND WAVEFORMS

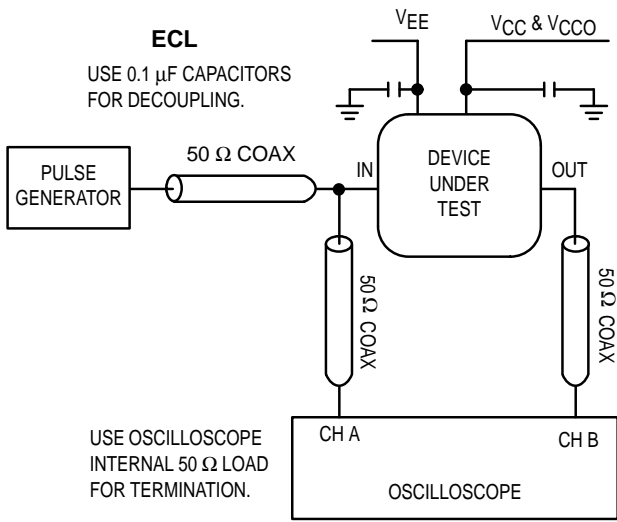


Figure 1. Test Circuit ECL

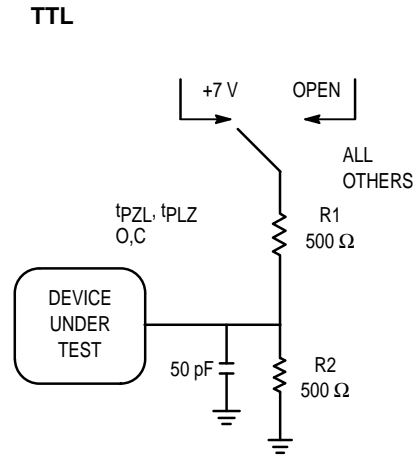


Figure 2. Test Circuit TTL

ECL/TTL

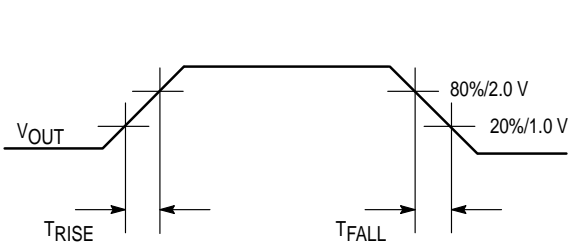


Figure 3. Rise and Fall Times

ECL/TTL

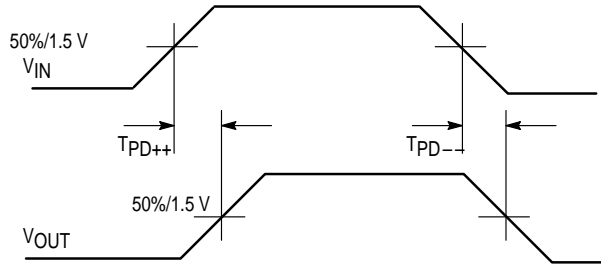


Figure 4. Propagation Delay — Single Ended

TTL

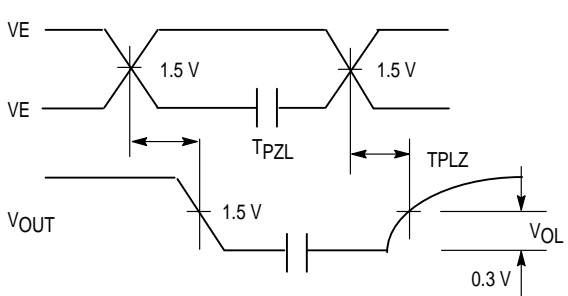


Figure 5. 3-State Output Low Enable and Disable Times

TTL

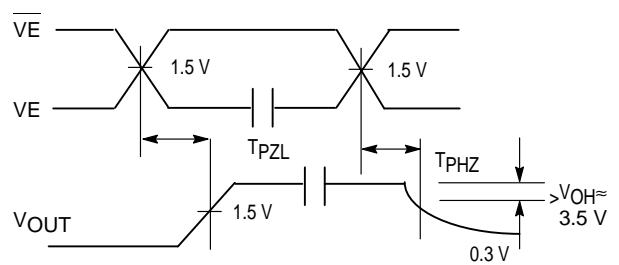
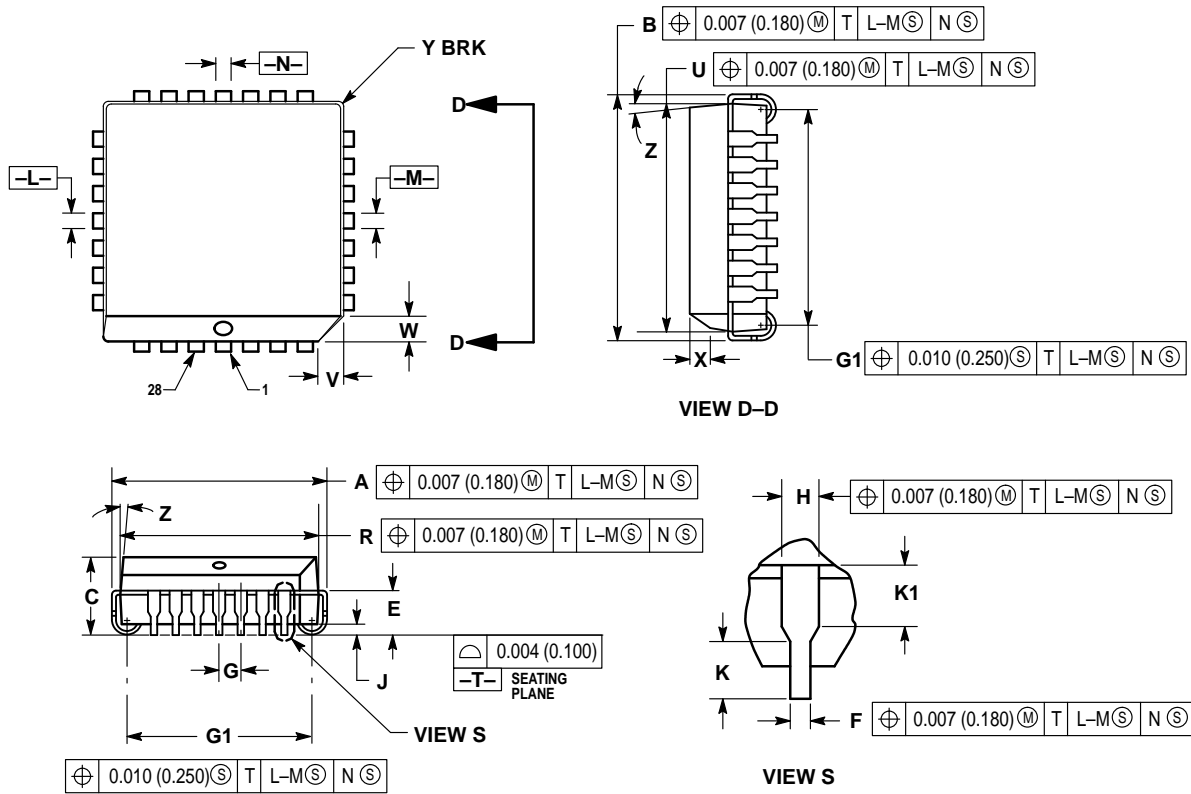


Figure 6. 3-State Output High Enable and Disable Times

OUTLINE DIMENSIONS

FN SUFFIX  
 PLASTIC PLCC PACKAGE  
 CASE 776-02  
 ISSUE D




NOTES:

1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.485     | 0.495 | 12.32       | 12.57 |
| B   | 0.485     | 0.495 | 12.32       | 12.57 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.019 | 0.33        | 0.48  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | —     | 0.51        | —     |
| K   | 0.025     | —     | 0.64        | —     |
| R   | 0.450     | 0.456 | 11.43       | 11.58 |
| U   | 0.450     | 0.456 | 11.43       | 11.58 |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | —         | 0.020 | —           | 0.50  |
| Z   | 2°        | 10°   | 2°          | 10°   |
| G1  | 0.410     | 0.430 | 10.42       | 10.92 |
| K1  | 0.040     | —     | 1.02        | —     |

MC10H681 MC100H681

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

**MFAX:** RMFAX0@email.sps.mot.com - TOUCHTONE 602-244-6609  
**INTERNET:** <http://Design-NET.com>

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



MC10H681/D

