MC74HC153A

Dual 4-Input Data Selector/Multiplexer

High-Performance Silicon-Gate CMOS

The MC74HC153 is identical in pinout to the LS153. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

The Address Inputs select one of four Data Inputs from each multiplexer. Each multiplexer has an active–low Strobe control and a noninverting output.

The HC153 is similar in function to the HC253, which has 3–state outputs.

Features

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2 to 6 V
- Low Input Current: 1 μA
- High Noise Immunity Characteristic of CMOS Devices
- These are Pb-Free Devices

![Figure 1. Logic Diagram](http://onsemi.com)

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 A0 Strobe</td>
<td>Y</td>
</tr>
<tr>
<td>X  X  H</td>
<td>L</td>
</tr>
<tr>
<td>L  L  L</td>
<td>D0</td>
</tr>
<tr>
<td>H  L  L</td>
<td>D1</td>
</tr>
<tr>
<td>H  H  L</td>
<td>D2</td>
</tr>
<tr>
<td>H  H  L</td>
<td>D3</td>
</tr>
</tbody>
</table>

D0, D1, D2, and D3 = the level of the respective data input.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.
## MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC</td>
<td>DC Supply Voltage (Referenced to GND)</td>
<td>−0.5 to + 7.0</td>
<td>V</td>
</tr>
<tr>
<td>Vin</td>
<td>DC Input Voltage (Referenced to GND)</td>
<td>−1.5 to VCC + 1.5</td>
<td>V</td>
</tr>
<tr>
<td>Vout</td>
<td>DC Output Voltage (Referenced to GND)</td>
<td>−0.5 to VCC + 0.5</td>
<td>V</td>
</tr>
<tr>
<td>Iin</td>
<td>DC Input Current, per Pin</td>
<td>±20</td>
<td>mA</td>
</tr>
<tr>
<td>Iout</td>
<td>DC Output Current, per Pin</td>
<td>±25</td>
<td>mA</td>
</tr>
<tr>
<td>ICC</td>
<td>DC Supply Current, VCC and GND Pins</td>
<td>±50</td>
<td>mA</td>
</tr>
<tr>
<td>Pd</td>
<td>Power Dissipation in Still Air</td>
<td>500</td>
<td>mW</td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage Temperature</td>
<td>−65 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC</td>
<td>DC Supply Voltage (Referenced to GND)</td>
<td>2.0</td>
<td>6.0</td>
<td>V</td>
</tr>
<tr>
<td>Vin, Vout</td>
<td>DC Input Voltage, Output Voltage (Referenced to GND)</td>
<td>0</td>
<td>VCC</td>
<td>V</td>
</tr>
<tr>
<td>TA</td>
<td>Operating Temperature, All Package Types</td>
<td>−55</td>
<td>+125</td>
<td>°C</td>
</tr>
<tr>
<td>tR, tf</td>
<td>Input Rise and Fall Time</td>
<td>0</td>
<td>1000</td>
<td>ns</td>
</tr>
</tbody>
</table>

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Guaranteed Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIH</td>
<td>Minimum High-Level Input Voltage</td>
<td>Vout = 0.1 V or VCC − 0.1 V</td>
<td>VCC = 2.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>VIL</td>
<td>Maximum Low-Level Input Voltage</td>
<td>Vout = 0.1 V or VCC − 0.1 V</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>VOH</td>
<td>Minimum High-Level Output Voltage</td>
<td>Vout = 0.1 V or VCC − 0.1 V</td>
<td>VCC = 4.5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>VOL</td>
<td>Maximum Low-Level Output Voltage</td>
<td>Vout = 0.1 V or VCC − 0.1 V</td>
<td>VCC = 6.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Iin</td>
<td>Maximum Input Leakage Current</td>
<td>Vout = 0.1 V or VCC − 0.1 V</td>
<td>VCC = 2.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>ICC</td>
<td>Maximum Quiescent Supply Current (per Package)</td>
<td>Vout = 0.1 V or VCC − 0.1 V</td>
<td>VCC = 6.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.1</td>
</tr>
</tbody>
</table>

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, Vin and Vout should be constrained to the range GND ≤ Vin or Vout ≤ VCC.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or VCC). Unused outputs must be left open.
## AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input t_r = t_f = 6 ns)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Guaranteed Limit</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V_CC</td>
<td>−55 to 25°C</td>
<td>≤ 85°C</td>
</tr>
<tr>
<td>I_PHL, I_PHL</td>
<td>Maximum Propagation Delay, Input D to Output Y (Figures 2 and 5)</td>
<td>2.0</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.0</td>
<td>24</td>
</tr>
<tr>
<td>I_PHL, I_PHL</td>
<td>Maximum Propagation Delay, Input A to Output Y (Figures 3 and 5)</td>
<td>2.0</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.0</td>
<td>30</td>
</tr>
<tr>
<td>I_PHL, I_PHL</td>
<td>Maximum Propagation Delay, Strobe to Output Y (Figures 4 and 5)</td>
<td>2.0</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.0</td>
<td>16</td>
</tr>
<tr>
<td>T_THL, T_LHL</td>
<td>Maximum Output Transition Time, Any Output (Figures 2 and 5)</td>
<td>2.0</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.0</td>
<td>13</td>
</tr>
<tr>
<td>C_in</td>
<td>Maximum Input Capacitance</td>
<td>—</td>
<td>10</td>
</tr>
</tbody>
</table>

### Power Dissipation Capacitance (Per Multiplexer)

<table>
<thead>
<tr>
<th>C_PD</th>
<th>Typical @ 25°C, V_CC = 5.0 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SWITCHING WAVEFORMS

**Figure 2.**

**Figure 3.**

**Figure 4.**

**Figure 5.** Test Circuit

*Includes all probe and jig capacitance*
**PIN DESCRIPTIONS**

**DATA INPUTS**

D0a – D3a, D0b – D3b (Pins 3, 4, 5, 6, 10, 11, 12, 13)

Data Inputs. With the outputs enabled, the addressed Data Inputs appear at the Y outputs.

**CONTROL INPUTS**

A0, A1 (Pins 2, 14)

Address Inputs. These inputs address the pair of Data Inputs which appear at the corresponding outputs.

**Strobe (Pins 1, 15)**

Active–low Strobe. A low level applied to these pins enables the corresponding outputs.

**OUTPUTS**

Ya, Yb (Pins 7, 9)

Noninverting data outputs.

**Figure 6. Expanded Logic Diagram**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Device</th>
<th>Package</th>
<th>Shipping†</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC74HC153ADG</td>
<td>SOIC–16 (Pb–Free)</td>
<td>48 Units / Rail</td>
</tr>
<tr>
<td>MC74HC153ADR2G</td>
<td>SOIC–16 (Pb–Free)</td>
<td>2500 Tape &amp; Reel</td>
</tr>
<tr>
<td>MC74HC153ADTR2G</td>
<td>TSSOP–16*</td>
<td>2500 Tape &amp; Reel</td>
</tr>
<tr>
<td>MC74HC153ADTG</td>
<td>TSSOP–16*</td>
<td>96 Units / Tube</td>
</tr>
</tbody>
</table>

†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.

*This package is inherently Pb–Free.
**NOTES:**
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

<table>
<thead>
<tr>
<th>MILLIMETERS</th>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>MIN</td>
</tr>
<tr>
<td>1.35</td>
<td>0.053</td>
</tr>
<tr>
<td>2.35</td>
<td>0.093</td>
</tr>
<tr>
<td>3.15</td>
<td>0.124</td>
</tr>
<tr>
<td>5.80</td>
<td>0.228</td>
</tr>
<tr>
<td>6.40</td>
<td>0.252</td>
</tr>
<tr>
<td>B</td>
<td>MIN</td>
</tr>
<tr>
<td>0.85</td>
<td>0.033</td>
</tr>
<tr>
<td>1.05</td>
<td>0.041</td>
</tr>
<tr>
<td>2.12</td>
<td>0.084</td>
</tr>
</tbody>
</table>

**SOLDERING FOOTPRINT**

**STYLE 1:**
- PIN 1. COLLECTOR
- PIN 2. BASE
- PIN 3. Emitter
- PIN 4. NO CONNECTION
- PIN 5. Emitter
- PIN 6. BASE
- PIN 7. COLLECTOR
- PIN 8. COLLECTOR
- PIN 9. BASE
- PIN 10. Emitter
- PIN 11. NO CONNECTION
- PIN 12. Emitter
- PIN 13. BASE
- PIN 14. Emitter
- PIN 15. COLLECTOR
- PIN 16. COLLECTOR

**STYLE 2:**
- PIN 1. CATHODE
- PIN 2. ANODE
- PIN 3. NO CONNECTION
- PIN 4. CATHODE
- PIN 5. CATHODE
- PIN 6. NO CONNECTION
- PIN 7. ANODE
- PIN 8. CATHODE
- PIN 9. CATHODE
- PIN 10. ANODE
- PIN 11. NO CONNECTION
- PIN 12. ANODE
- PIN 13. CATHODE
- PIN 14. CATHODE
- PIN 15. NO CONNECTION
- PIN 16. CATHODE

**STYLE 3:**
- PIN 1. COLLECTOR, DYE #1
- PIN 2. BASE, #1
- PIN 3. Emitter, #1
- PIN 4. COLLECTOR, #1
- PIN 5. COLLECTOR, #2
- PIN 6. BASE, #2
- PIN 7. COLLECTOR, #3
- PIN 8. COLLECTOR, #4
- PIN 9. COLLECTOR, #3
- PIN 10. EMITTER, #4
- PIN 11. BASE, #3
- PIN 12. EMITTER, #3
- PIN 13. BASE, #2
- PIN 14. EMITTER, #2
- PIN 15. BASE, #4
- PIN 16. EMITTER, #1

**STYLE 4:**
- PIN 1. COLLECTOR, DYE #1
- PIN 2. COLLECTOR, #1
- PIN 3. COLLECTOR, #2
- PIN 4. COLLECTOR, #2
- PIN 5. COLLECTOR, #3
- PIN 6. COLLECTOR, #3
- PIN 7. COLLECTOR, #4
- PIN 8. COLLECTOR, #4
- PIN 9. BASE, #4
- PIN 10. EMITTER, #4
- PIN 11. BASE, #3
- PIN 12. EMITTER, #3
- PIN 13. BASE, #2
- PIN 14. EMITTER, #2
- PIN 15. BASE, #1
- PIN 16. EMITTER, #1

**STYLE 5:**
- PIN 1. DRAIN, DYE #1
- PIN 2. DRAIN, #1
- PIN 3. DRAIN, #2
- PIN 4. DRAIN, #2
- PIN 5. DRAIN, #3
- PIN 6. DRAIN, #3
- PIN 7. DRAIN, #4
- PIN 8. DRAIN, #4
- PIN 9. GATE, #4
- PIN 10. ANODE
- PIN 11. ANODE
- PIN 12. ANODE
- PIN 13. ANODE
- PIN 14. ANODE
- PIN 15. ANODE
- PIN 16. ANODE

**STYLE 6:**
- PIN 1. CATHODE
- PIN 2. CATHODE
- PIN 3. CATHODE
- PIN 4. CATHODE
- PIN 5. CATHODE
- PIN 6. CATHODE
- PIN 7. CATHODE
- PIN 8. CATHODE
- PIN 9. ANODE
- PIN 10. ANODE
- PIN 11. ANODE
- PIN 12. ANODE
- PIN 13. ANODE
- PIN 14. ANODE
- PIN 15. ANODE
- PIN 16. ANODE

**STYLE 7:**
- PIN 1. SOURCE N-CH
- PIN 2. COMMON DRAIN (OUTPUT)
- PIN 3. COMMON DRAIN (OUTPUT)
- PIN 4. GATE P-CH
- PIN 5. COMMON DRAIN (OUTPUT)
- PIN 6. COMMON DRAIN (OUTPUT)
- PIN 7. COMMON DRAIN (OUTPUT)
- PIN 8. COMMON DRAIN (OUTPUT)
- PIN 9. SOURCE P-CH
- PIN 10. ANODE
- PIN 11. ANODE
- PIN 12. ANODE
- PIN 13. ANODE
- PIN 14. ANODE
- PIN 15. ANODE
- PIN 16. ANODE

**DIMENSIONS: MILLIMETERS**

8X 6.40

16X 1.12

16X 0.58

1.27 PITCH
TSSOP-16
CASE 948F-01
ISSUE B

DATE 19 OCT 2006

NOTES:
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE "W-".

SOLDERING FOOTPRINT

DIMENSIONS: MILLIMETERS

DETAIL E

GENERAL MARKING DIAGRAM*

*This information is generic. Please refer to device data sheet for actual part marking.
Pb-Free indicator, "G" or microdot "•", may or may not be present.