Standard Products

UT54ACS139/UT54ACTS139
Dual 2-Line to 4-Line Decoders/Demultiplexers

Datasheet
November 2010
www.aeroflex.com/logic

FEATURES
- Incorporates two enable inputs to simplify cascading and/or data reception
- 1.2μ CMOS
  - Latchup immune
- High speed
- Low power consumption
- Single 5 volt supply
- Available QML Q or V processes
- Flexible package
  - 16-pin DIP
  - 16-lead flatpack
- UT54ACS139 - SMD 5962-96546
- UT54ACTS139 - SMD 5962-96547

DESCRIPTION
The UT54ACS139 and the UT54ACTS139 are designed to be used in high-performance memory-decoding or data-routing applications requiring very short propagation delay times.

The devices consist of two individual two-line to four-line decoders in a single package. The active-low enable input can be used as a data line in demultiplexing applications.

The devices are characterized over full military temperature range of -55°C to +125°C.

FUNCTION TABLE

<table>
<thead>
<tr>
<th>ENABLE INPUTS</th>
<th>SELECT INPUTS</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>H</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

PINOUTS

16-Pin DIP Top View

| 1G | 1 | 16 | VDD |
| 1A | 2 | 15 | 2G  |
| 1B | 3 | 14 | 2A  |
| 1Y0| 4 | 13 | 2B  |
| 1Y1| 5 | 12 | 2Y0 |
| 1Y2| 6 | 11 | 2Y1 |
| 1Y3| 7 | 10 | 2Y2 |
| VSS| 8 | 9  | 2Y3 |

16-Lead Flatpack Top View

| 1G | 1 | 16 | VDD |
| 1A | 2 | 15 | 2G  |
| 1B | 3 | 14 | 2A  |
| 1Y0| 4 | 13 | 2B  |
| 1Y1| 5 | 12 | 2Y0 |
| 1Y2| 6 | 11 | 2Y1 |
| 1Y3| 7 | 10 | 2Y2 |
| VSS| 8 | 9  | 2Y3 |

LOGIC DIAGRAM
Note:
### OPERATIONAL ENVIRONMENT

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>LIMIT</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Dose</td>
<td>1.0E6</td>
<td>rads(Si)</td>
</tr>
<tr>
<td>SEU Threshold</td>
<td>80</td>
<td>MeV·cm²/mg</td>
</tr>
<tr>
<td>SEL Threshold</td>
<td>120</td>
<td>MeV·cm²/mg</td>
</tr>
<tr>
<td>Neutron Fluence</td>
<td>1.0E14</td>
<td>n/cm²</td>
</tr>
</tbody>
</table>

Notes:
1. Logic will not latchup during radiation exposure within the limits defined in the table.
2. Device storage elements are immune to SEU affects.

### ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>LIMIT</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDD</td>
<td>Supply voltage</td>
<td>-0.3 to 7.0</td>
<td>V</td>
</tr>
<tr>
<td>VIO</td>
<td>Voltage any pin</td>
<td>-.3 to VDD +.3</td>
<td>V</td>
</tr>
<tr>
<td>TSTG</td>
<td>Storage Temperature range</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>TJ</td>
<td>Maximum junction temperature</td>
<td>+175</td>
<td>°C</td>
</tr>
<tr>
<td>TLS</td>
<td>Lead temperature (soldering 5 seconds)</td>
<td>+300</td>
<td>°C</td>
</tr>
<tr>
<td>ΘJC</td>
<td>Thermal resistance junction to case</td>
<td>20</td>
<td>°C/W</td>
</tr>
<tr>
<td>I₁</td>
<td>DC input current</td>
<td>±10</td>
<td>mA</td>
</tr>
<tr>
<td>PD</td>
<td>Maximum power dissipation</td>
<td>1</td>
<td>W</td>
</tr>
</tbody>
</table>

Note:
1. Stresses outside the listed absolute maximum ratings may cause permanent damage to the device. This is a stress rating only, functional operation of the device at these or any other conditions beyond limits indicated in the operational sections is not recommended. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>LIMIT</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDD</td>
<td>Supply voltage</td>
<td>4.5 to 5.5</td>
<td>V</td>
</tr>
<tr>
<td>VIN</td>
<td>Input voltage any pin</td>
<td>0 to VDD</td>
<td>V</td>
</tr>
<tr>
<td>TC</td>
<td>Temperature range</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
</tbody>
</table>
DC ELECTRICAL CHARACTERISTICS

(V\text{DD} = 5.0V \pm 10\%; V\text{SS} = 0V, -55°C < T\text{C} < +125°C); Unless otherwise noted, T\text{c} is per the temperature range ordered.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITION</th>
<th>MIN</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
</table>
| V\text{IL} | Low-level input voltage ¹  
ACTS  
ACS | | 0.8  
.3V\text{DD} | V |
| V\text{IH} | High-level input voltage ¹  
ACTS  
ACS | | .5V\text{DD}  
.7V\text{DD} | V |
| I\text{IN} | Input leakage current  
ACTS/ACS | V\text{IN} = V\text{DD} or V\text{SS} | -1 | 1 | μA |
| V\text{OL} | Low-level output voltage ³  
ACTS  
ACS | I\text{OL} = 8.0mA  
I\text{OL} = 100μA | 0.40 | 0.25 | V |
| V\text{OH} | High-level output voltage ³  
ACTS  
ACS | I\text{OH} = -8.0mA  
I\text{OH} = -100μA | .7V\text{DD}  
V\text{DD} - 0.25 | V |
| I\text{OL} (Sink) | Output current¹⁰  
V\text{IN} = V\text{DD} or V\text{SS}  
V\text{OL} = 0.4V | 8 | mA |
| I\text{OH} (Source) | Output current¹⁰  
V\text{IN} = V\text{DD} or V\text{SS}  
V\text{OH} = V\text{DD} - 0.4V | -8 | mA |
| I\text{OS} | Short-circuit output current ², ⁴  
ACTS/ACS | V\text{O} = V\text{DD} and V\text{SS} | -200 | 200 | mA |
| P\text{total} | Power dissipation ², ⁸, ⁹  
C\text{L} = 50pF | 1.8 | mW/MHz |
| I\text{DDQ} | Quiescent Supply Current  
V\text{DD} = 5.5V | 10 | μA |
| ΔI\text{DDQ} | Quiescent Supply Current Delta  
ACTS  
For input under test  
V\text{IN} = V\text{DD} - 2.1V  
For all other inputs  
V\text{IN} = V\text{DD} or V\text{SS}  
V\text{DD} = 5.5V | 1.6 | mA |
| C\text{IN} | Input capacitance ⁵  
f = 1MHz @ 0V | 15 | pF |
| C\text{OUT} | Output capacitance ⁵  
f = 1MHz @ 0V | 15 | pF |
Notes:
1. Functional tests are conducted in accordance with MIL-STD-883 with the following input test conditions: \( V_{IH} = V_{IH}(\text{min}) + 20\% \), \(-0\%\); \( V_{IL} = V_{IL}(\text{max}) + 0\% \), \(-50\%\), as specified herein, for TTL, CMOS, or Schmitt compatible inputs. Devices may be tested using any input voltage within the above specified range, but are guaranteed to \( V_{IH}(\text{min}) \) and \( V_{IL}(\text{max}) \).
2. Supplied as a design limit but not guaranteed or tested.
3. Per MIL-PRF-38535, for current density \( \leq 5.0 \times 10^5 \) amps/cm\(^2\), the maximum product of load capacitance (per output buffer) times frequency should not exceed 3,765 pF/MHz.
4. Not more than one output may be shorted at a time for maximum duration of one second.
5. Capacitance measured for initial qualification and when design changes may affect the value. Capacitance is measured between the designated terminal and \( V_{SS} \) at frequency of 1MHz and a signal amplitude of 50mV rms maximum.
6. Maximum allowable relative shift equals 50mV.
7. All specifications valid for radiation dose \( \leq 1 \times 10^6 \) rads(Si).
8. Power does not include power contribution of any TTL output sink current.
9. Power dissipation specified per switching output.
10. This value is guaranteed based on characterization data, but not tested.
AC ELECTRICAL CHARACTERISTICS ²
(VDD = 5.0V ±10%; VSS = 0V ¹, -55°C < TC < +125°C); Unless otherwise noted, TC is per the temperature range ordered.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>tPHL</td>
<td>Select to output Yn</td>
<td>2</td>
<td>14</td>
<td>ns</td>
</tr>
<tr>
<td>tPLH</td>
<td>Select to output Yn</td>
<td>2</td>
<td>15</td>
<td>ns</td>
</tr>
<tr>
<td>tPHL</td>
<td>Enable to output Yn</td>
<td>2</td>
<td>14</td>
<td>ns</td>
</tr>
<tr>
<td>tPLH</td>
<td>Enable to output Yn</td>
<td>2</td>
<td>12</td>
<td>ns</td>
</tr>
</tbody>
</table>

Notes:
1. Maximum allowable relative shift equals 50mV.
2. All specifications valid for radiation dose ≤ 1E6 rads(Si).
UT54ACS139/UT54ACTS139: SMD

Lead Finish: (Notes 1 & 2)
- A = Solder
- C = Gold
- X = Optional

Package Type:
- X = 16-lead ceramic bottom-brazed dual-in-line Flatpack
- C = 16-lead ceramic side-brazed dip

Class Designator:
- Q = QML Class Q
- V = QML Class V

Device Type:
- 01

Drawing Number:
- 96546 = UT54ACS139
- 96547 = UT54ACTS139

Total Dose: (Notes 3 & 4)
- R = 1E5 rads(Si)
- F = 3E5 rads(Si)
- G = 5E5 rads(Si)
- H = 1E6 rads(Si)

Notes:
1. Lead finish (A, C, or X) must be specified.
2. If an “X” is specified when ordering, part marking will match the lead finish and will be either “A” (solder) or “C” (gold).
3. Total dose radiation must be specified when ordering. QML Q and QML V not available without radiation hardening. For prototype inquiries, contact factory.
4. Device type 02 is only offered with a TID tolerance guarantee of 3E5 rads(Si) or 1E6 rads(Si) and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A and section 3.11.2. Device type 03 is only offered with a TID tolerance guarantee of 1E5 rads(Si), 3E5 rads(Si), and 5E5 rads(Si), and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A.
Aeroflex Colorado Springs - Datasheet Definition

Advanced Datasheet - Product In Development
Preliminary Datasheet - Shipping Prototype
Datasheet - Shipping QML & Reduced Hi-Rel

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