## MC74LVXT8051

## Analog Multiplexer / Demultiplexer High-Performance Silicon-Gate CMOS

The MC74LVXT8051 utilizes silicon-gate CMOS technology to achieve fast propagation delays, low ON resistances, and low OFF leakage currents. This analog multiplexer/demultiplexer controls analog voltages that may vary across the complete power supply range (from $\mathrm{V}_{\mathrm{CC}}$ to GND).

The LVXT8051 is similar in pinout to the high-speed HC4051A and the metal-gate MC14051B. The Channel-Select inputs determine which one of the Analog Inputs/Outputs is to be connected by means of an analog switch to the Common Output/Input. When the Enable pin is HIGH, all analog switches are turned off.

The Channel-Select and Enable inputs are compatible with TTL-type input thresholds. The input protection circuitry on this device allows overvoltage tolerance on the input, allowing the device to be used as a logic-level translator from 3.0 V CMOS logic to 5.0 V CMOS Logic or from 1.8V CMOS logic to 3.0 V CMOS Logic while operating at the higher-voltage power supply.

The MC74LVXT8051 input structure provides protection when voltages up to 7.0 V are applied, regardless of the supply voltage. This allows the MC74LVXT8051 to be used to interface 5.0 V circuits to 3.0 V circuits.

This device has been designed so that the ON resistance $\left(R_{o n}\right)$ is more linear over input voltage than $\mathrm{R}_{\text {on }}$ of metal-gate CMOS analog switches.

## Features

- Fast Switching and Propagation Speeds
- Low Crosstalk Between Switches
- Diode Protection on All Inputs/Outputs
- Analog Power Supply Range $\left(\mathrm{V}_{\mathrm{CC}}-\mathrm{GND}\right)=2.0$ to 6.0 V
- Digital (Control) Power Supply Range $\left(\mathrm{V}_{\mathrm{CC}}-\mathrm{GND}\right)=2.0$ to 6.0 V
- Improved Linearity and Lower ON Resistance Than Metal-Gate Counterparts
- Low Noise
- In Compliance With the Requirements of JEDEC Standard No. 7A
- $\mathrm{Pb}-$ Free Packages are Available*


See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

[^0]
## MC74LVXT8051



FUNCTION TABLE - MC74LVXT8051

| Control Inputs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Select |  |  |  |
| Enable | C | B | A | ON Channels |
| L | L | L | L | X0 |
| L | L | L | H | X1 |
| L | L | H | L | X2 |
| L | L | H | H | X3 |
| L | H | L | L | X4 |
| L | H | L | H | X5 |
| L | H | H | L | X6 |
| L | H | H | H | X7 |
| H | X | X | X | NONE |

X = Don't Care


Figure 1. LOGIC DIAGRAM
Single-Pole, 8-Position Plus Common Off

ORDERING INFORMATION

| Device | Package | Shipping $^{\dagger}$ |
| :--- | :---: | :---: |
| MC74LVXT8051D | SOIC-16 | 48 Units / Rail |
| MC74LVXT8051DG | SOIC-16 <br> (Pb-Free) | 48 Units / Rail |
| MC74LVXT8051DR2 | SOIC-16 | 2500 Tape \& Reel |
| MC74LVXT8051DR2G | SOIC-16 <br> (Pb-Free) | 2500 Tape \& Reel |
| MC74LVXT8051DTR2 | TSSOP-16* | 2500 Tape \& Reel |
| MC74LVXT8051M | SOEIAJ-16 | 50 Units / Rail |
| MC74LVXT8051MG | SOEIAJ-16 <br> (Pb-Free) | 50 Units / Rail |
| MC74LVXT8051MEL | SOEIAJ-16 | 2000 Tape \& Reel |
| MC74LVXT8051MELG | SOEIAJ-16 <br> (Pb-Free) | 2000 Tape \& Reel |

$\dagger$ 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 $\mathrm{Pb}-$ Free.

MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
| :---: | :--- | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | Positive DC Supply Voltage (Referenced to GND) | -0.5 to +7.0 | V |
| $\mathrm{~V}_{\mathrm{IS}}$ | Analog Input Voltage | -0.5 to $\mathrm{V}_{\mathrm{CC}}+0.5$ | V |
| $\mathrm{~V}_{\text {in }}$ | Digital Input Voltage (Referenced to GND) | -0.5 to $\mathrm{V}_{\mathrm{CC}}+0.5$ | V |
| I | DC Current, Into or Out of Any Pin | -20 | mA |
| $\mathrm{P}_{\mathrm{D}}$ | Power Dissipation in Still Air,SOIC Package $\dagger$ <br> TSSOP Packaget | 500 | mW |
|  | 450 | -65 to +150 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{\text {stg }}$ | Storage Temperature Range | 260 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{\mathrm{L}}$ | Lead Temperature, 1 mm from Case for 10 Seconds |  |  |

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.
$\dagger$ Derating - SOIC Package: $-7 \mathrm{~mW} /{ }^{\circ} \mathrm{C}$ from $65^{\circ}$ to $125^{\circ} \mathrm{C}$
TSSOP Package: $-6.1 \mathrm{~mW} /{ }^{\circ} \mathrm{C}$ from $65^{\circ}$ to $125^{\circ} \mathrm{C}$

## RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
| :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | Positive DC Supply Voltage (Referenced to GND) | 2.0 | 6.0 | V |
| $\mathrm{V}_{\text {IS }}$ | Analog Input Voltage | 0.0 | $\mathrm{V}_{\mathrm{CC}}$ | V |
| $\mathrm{V}_{\text {in }}$ | Digital Input Voltage (Referenced to GND) | GND | $\mathrm{V}_{\text {cc }}$ | V |
| $\mathrm{V}_{10}{ }^{*}$ | Static or Dynamic Voltage Across Switch |  | 1.2 | V |
| $\mathrm{T}_{\mathrm{A}}$ | Operating Temperature Range, All Package Types | -55 | +85 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{t}_{\mathrm{r}}, \mathrm{t}_{\mathrm{f}}$ | ```Input Rise/Fall Time (Channel Select or Enable Inputs) VCC}=3.3\textrm{V}\pm0.3\textrm{V VCC}=5.0\textrm{V}\pm0.5\textrm{V``` | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} 100 \\ 20 \end{gathered}$ | ns/V |

*For voltage drops across switch greater than 1.2 V (switch on), excessive $\mathrm{V}_{\mathrm{CC}}$ current may be drawn; i.e., the current out of the switch may contain both $\mathrm{V}_{\mathrm{CC}}$ and switch input components. The reliability of the device will be unaffected unless the Maximum Ratings are exceeded.

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, $\mathrm{V}_{\text {in }}$ and $V_{\text {out }}$ should be constrained to the range $\mathrm{GND} \leq\left(\mathrm{V}_{\text {in }}\right.$ or $\left.\mathrm{V}_{\text {out }}\right) \leq \mathrm{V}_{\mathrm{CC}}$.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or $\mathrm{V}_{\mathrm{Cc}}$ ). Unused outputs must be left open.

DC CHARACTERISTICS - Digital Section (Voltages Referenced to GND)

| Symbol | Parameter | Condition | $\underset{\mathrm{V}}{\mathrm{v}_{\mathrm{cc}}}$ | Guaranteed Limit |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | -55 to $25^{\circ} \mathrm{C}$ | $\leq 85^{\circ} \mathrm{C}$ | $\leq 125^{\circ} \mathrm{C}$ |  |
| $\mathrm{V}_{\mathrm{IH}}$ | Minimum High-Level Input Voltage, Channel-Select or Enable Inputs | $\mathrm{R}_{\text {on }}=$ Per Spec | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 1.2 \\ & 2.0 \\ & 2.0 \end{aligned}$ | $\begin{aligned} & 1.2 \\ & 2.0 \\ & 2.0 \end{aligned}$ | $\begin{aligned} & 1.2 \\ & 2.0 \\ & 2.0 \end{aligned}$ | V |
| $\mathrm{V}_{\text {IL }}$ | Maximum Low-Level Input Voltage, Channel-Select or Enable Inputs | $\mathrm{R}_{\text {on }}=$ Per Spec | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{gathered} 0.53 \\ 0.8 \\ 0.8 \end{gathered}$ | $\begin{gathered} 0.53 \\ 0.8 \\ 0.8 \end{gathered}$ | $\begin{gathered} 0.53 \\ 0.8 \\ 0.8 \end{gathered}$ | V |
| $1{ }_{\text {in }}$ | Maximum Input Leakage Current, Channel-Select or Enable Inputs | $\mathrm{V}_{\text {in }}=\mathrm{V}_{\text {CC }}$ or GND | 5.5 | $\pm 0.1$ | $\pm 1.0$ | $\pm 1.0$ | $\mu \mathrm{A}$ |
| Icc | Maximum Quiescent Supply Current (per Package) | Channel Select, Enable and $\mathrm{V}_{\text {IS }}=\mathrm{V}_{\mathrm{CC}}$ or GND; $\mathrm{V}_{\text {IO }}=0 \mathrm{~V}$ | 5.5 | 4 | 40 | 160 | $\mu \mathrm{A}$ |

DC ELECTRICAL CHARACTERISTICS Analog Section

| Symbol | Parameter | Test Conditions | $\underset{\mathrm{V}}{\mathrm{v}_{\mathrm{cc}}}$ | Guaranteed Limit |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | -55 to $25^{\circ} \mathrm{C}$ | $\begin{gathered} \leq \\ 85^{\circ} \mathrm{C} \end{gathered}$ | $\begin{gathered} \leq \\ 125^{\circ} \mathrm{C} \end{gathered}$ |  |
| $\mathrm{R}_{\text {on }}$ | Maximum "ON" Resistance | $\begin{aligned} & \mathrm{V}_{\text {in }}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}} \\ & \mathrm{~V}_{\mathrm{IS}}=\mathrm{V}_{\mathrm{CC}} \text { to } \mathrm{GND} \\ & \left\|I_{\mathrm{S}}\right\| \leq 10.0 \mathrm{~mA} \text { (Figures } 1,2 \text { ) } \end{aligned}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 40 \\ & 30 \\ & 25 \end{aligned}$ | $\begin{aligned} & 45 \\ & 32 \\ & 28 \end{aligned}$ | $\begin{aligned} & 50 \\ & 37 \\ & 30 \end{aligned}$ | $\Omega$ |
|  |  | $\begin{aligned} & \mathrm{V}_{\text {in }}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}} \\ & \mathrm{~V}_{\mathrm{IS}}=\mathrm{V}_{\mathrm{CC}} \text { or } G N D \text { (Endpoints) } \\ & \mid I_{\mathrm{S}} \leq 10.0 \mathrm{~mA} \text { (Figures 1, 2) } \end{aligned}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 30 \\ & 25 \\ & 20 \end{aligned}$ | $\begin{aligned} & 35 \\ & 28 \\ & 25 \end{aligned}$ | $\begin{aligned} & 40 \\ & 35 \\ & 30 \end{aligned}$ |  |
| $\Delta \mathrm{R}_{\text {on }}$ | Maximum Difference in "ON" Resistance Between Any Two Channels in the Same Package | $\begin{aligned} & \hline V_{\text {in }}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}} \\ & \mathrm{~V}_{\mathrm{IS}}=1 / 2\left(\mathrm{~V}_{\mathrm{CC}}-\mathrm{GND}\right) \\ & \|\mathrm{II}\| \leq 10.0 \mathrm{~mA} \end{aligned}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & \hline 15 \\ & 8.0 \\ & 8.0 \end{aligned}$ | $\begin{aligned} & \hline 20 \\ & 12 \\ & 12 \end{aligned}$ | $\begin{aligned} & 25 \\ & 15 \\ & 15 \end{aligned}$ | $\Omega$ |
| 1 off | Maximum Off-Channel Leakage Current, Any One Channel | $\begin{aligned} & \mathrm{V}_{\text {in }}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}} ; \\ & \mathrm{V}_{1 \mathrm{O}}=\mathrm{V}_{\mathrm{CC}} \text { or } \mathrm{GND} ; \\ & \text { Switch Off (Figure 3) } \end{aligned}$ | 5.5 | 0.1 | 0.5 | 1.0 | $\mu \mathrm{A}$ |
|  | Maximum Off-Channel Leakage Current, Common Channel | $\begin{aligned} & \mathrm{V}_{\text {in }}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{HH}} ; \\ & \mathrm{V}_{\mathrm{IO}}=\mathrm{V}_{\mathrm{CC}} \text { or } G N D ; \\ & \text { Switch Off (Figure 4) } \end{aligned}$ | 5.5 | 0.2 | 2.0 | 4.0 |  |
| $\mathrm{I}_{\text {on }}$ | Maximum On-Channel Leakage Current, Channel-to-Channel | $\mathrm{V}_{\mathrm{in}}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}}$ <br> Switch-to-Switch = $\mathrm{V}_{\mathrm{CC}}$ or GND; (Figure 5) | 5.5 | 0.2 | 2.0 | 4.0 | $\mu \mathrm{A}$ |

AC CHARACTERISTICS $\left(C_{L}=50 \mathrm{pF}\right.$, Input $\left.\mathrm{t}_{\mathrm{r}}=\mathrm{t}_{\mathrm{f}}=3 \mathrm{~ns}\right)$

| Symbol | Parameter | $\mathrm{v}_{\mathrm{cc}}$ | Guaranteed Limit |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | -55 to $25^{\circ} \mathrm{C}$ | $\leq 85{ }^{\circ} \mathrm{C}$ | $\leq 125^{\circ} \mathrm{C}$ |  |
| tpLH, <br> $\mathrm{t}_{\mathrm{PHL}}$ | Maximum Propagation Delay, Channel-Select to Analog Output (Figure 9) | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 30 \\ & 20 \\ & 15 \\ & 15 \end{aligned}$ | $\begin{aligned} & 35 \\ & 25 \\ & 18 \\ & 18 \end{aligned}$ | $\begin{aligned} & 40 \\ & 30 \\ & 22 \\ & 20 \end{aligned}$ | ns |
| $\mathrm{tpLH},$ $\mathrm{t}_{\mathrm{PHL}}$ | Maximum Propagation Delay, Analog Input to Analog Output (Figure 10) | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 4.0 \\ & 3.0 \\ & 1.0 \\ & 1.0 \end{aligned}$ | $\begin{aligned} & 6.0 \\ & 5.0 \\ & 2.0 \\ & 2.0 \end{aligned}$ | $\begin{aligned} & \hline 8.0 \\ & 6.0 \\ & 2.0 \\ & 2.0 \end{aligned}$ | ns |
| $\begin{aligned} & \text { tpLZ, } \\ & \text { tpHZ } \end{aligned}$ | Maximum Propagation Delay, Enable to Analog Output (Figure 11) | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 30 \\ & 20 \\ & 15 \\ & 15 \end{aligned}$ | $\begin{aligned} & 35 \\ & 25 \\ & 18 \\ & 18 \end{aligned}$ | $\begin{aligned} & 40 \\ & 30 \\ & 22 \\ & 20 \end{aligned}$ | ns |
| $\begin{aligned} & \text { tpzL, } \\ & \text { tpzH } \end{aligned}$ | Maximum Propagation Delay, Enable to Analog Output (Figure 11) | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 20 \\ & 12 \\ & 8.0 \\ & 8.0 \end{aligned}$ | $\begin{aligned} & 25 \\ & 14 \\ & 10 \\ & 10 \end{aligned}$ | $\begin{aligned} & 30 \\ & 15 \\ & 12 \\ & 12 \end{aligned}$ | ns |
| $\mathrm{C}_{\text {in }}$ | Maximum Input Capacitance, Channel-Select or Enable Inputs |  | 10 | 10 | 10 | pF |
| $\mathrm{Cl}_{1 / \mathrm{O}}$ | Maximum Capacitance Analog I/O <br> (All Switches Off) Common O/I <br>  Feedthrough |  | 35 130 1.0 | 35 130 1.0 | 35 130 1.0 | pF |


|  |  | Typical @ $\mathbf{2 5}{ }^{\circ} \mathbf{C}, \mathbf{V}_{\mathbf{C C}}=\mathbf{5 . 0} \mathbf{V}$ |  |
| :--- | :--- | :---: | :---: |
| $\mathrm{C}_{\text {PD }}$ | Power Dissipation Capacitance (Figure 13) | pF |  |

*Used to determine the no-load dynamic power consumption: $P_{D}=C_{P D} V_{C C}{ }^{2 f}+I_{C C} V_{C C}$.

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ADDITIONAL APPLICATION CHARACTERISTICS (GND = 0 V )

| Symbol | Parameter | Condition | $\stackrel{\mathrm{v}_{\mathrm{cc}}}{\mathrm{~V}}$ | Limit ${ }^{*}$ | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | $25^{\circ} \mathrm{C}$ |  |
| BW | Maximum On-Channel Bandwidth or Minimum Frequency Response (Figure 6) | $\mathrm{f}_{\text {in }}=1 \mathrm{MHz}$ Sine Wave; Adjust $\mathrm{f}_{\text {in }}$ Voltage to Obtain OdBm at $\mathrm{V}_{\mathrm{OS}}$; Increase $\mathrm{f}_{\text {in }}$ Frequency Until dB Meter Reads -3dB; $R_{L}=50 \Omega, C_{L}=10 \mathrm{pF}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 80 \\ & 80 \\ & 80 \end{aligned}$ | MHz |
| - | Off-Channel Feedthrough Isolation (Figure 7) | $\mathrm{f}_{\text {in }}=$ Sine Wave; Adjust $\mathrm{f}_{\text {in }}$ Voltage to Obtain OdBm at $\mathrm{V}_{\text {IS }}$ $f_{\text {in }}=10 \mathrm{kHz}, R_{L}=600 \Omega, C_{L}=50 \mathrm{pF}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & -50 \\ & -50 \\ & -50 \end{aligned}$ | dB |
|  |  | $\mathrm{f}_{\text {in }}=1.0 \mathrm{MHz}, \mathrm{R}_{\mathrm{L}}=50 \Omega, \mathrm{C}_{\mathrm{L}}=10 \mathrm{pF}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & -37 \\ & -37 \\ & -37 \end{aligned}$ |  |
| - | Feedthrough Noise. Channel-Select Input to Common I/O (Figure 8) | $\mathrm{V}_{\text {in }} \leq 1 \mathrm{MHz}$ Square Wave ( $\mathrm{t}_{\mathrm{r}}=\mathrm{t}_{\mathrm{f}}=3 \mathrm{~ns}$ ); Adjust $\mathrm{R}_{\mathrm{L}}$ at Setup so that $I_{S}=0 A$; Enable $=$ GND $R_{L}=600 \Omega, C_{L}=50 p F$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{gathered} \hline 25 \\ 105 \\ 135 \end{gathered}$ | mV VPP |
|  |  | $R_{L}=10 \mathrm{k} \Omega, \mathrm{C}_{\mathrm{L}}=10 \mathrm{pF}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{gathered} \hline 35 \\ 145 \\ 190 \end{gathered}$ |  |
| - | Crosstalk Between Any Two Switches (Figure 12) | $\mathrm{f}_{\text {in }}=$ Sine Wave; Adjust $\mathrm{f}_{\text {in }}$ Voltage to Obtain OdBm at $\mathrm{V}_{\text {IS }}$ $\mathrm{f}_{\mathrm{in}}=10 \mathrm{kHz}, \mathrm{R}_{\mathrm{L}}=600 \Omega, \mathrm{C}_{\mathrm{L}}=50 \mathrm{pF}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & \hline-50 \\ & -50 \\ & -50 \\ & \hline \end{aligned}$ | dB |
|  |  | $\mathrm{f}_{\text {in }}=1.0 \mathrm{MHz}, \mathrm{R}_{\mathrm{L}}=50 \Omega, \mathrm{C}_{\mathrm{L}}=10 \mathrm{pF}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & \hline-60 \\ & -60 \\ & -60 \end{aligned}$ |  |
| THD | Total Harmonic Distortion (Figure 14) | $\begin{aligned} & \mathrm{f}_{\text {in }}=1 \mathrm{kHz}, \mathrm{R}_{\mathrm{L}}=10 \mathrm{k} \Omega, \mathrm{C}_{\mathrm{L}}=50 \mathrm{pF} \\ & T H D=T H D_{\text {measured }}-\mathrm{THD}_{\text {source }} \\ & \mathrm{V}_{\mathrm{IS}}=2.0 \mathrm{~V}_{\mathrm{PP}} \text { sine wave } \\ & \mathrm{V}_{\mathrm{IS}}=4.0 \mathrm{~V}_{\mathrm{PP}} \text { sine wave } \\ & \mathrm{V}_{\mathrm{IS}}=5.0 \mathrm{~V}_{\mathrm{PP}} \text { sine wave } \end{aligned}$ | $\begin{aligned} & 3.0 \\ & 4.5 \\ & 5.5 \end{aligned}$ | $\begin{aligned} & 0.10 \\ & 0.08 \\ & 0.05 \end{aligned}$ | \% |

*Limits not tested. Determined by design and verified by qualification.


Figure 1a. Typical On Resistance, $\mathrm{V}_{\mathrm{CC}}=3.0 \mathrm{~V}$


Figure 1b. Typical On Resistance, $\mathrm{V}_{\mathrm{Cc}}=4.5 \mathrm{~V}$


Figure 1c. Typical On Resistance, $\mathrm{V}_{\mathrm{Cc}}=5.5 \mathrm{~V}$


Figure 2. On Resistance Test Set-Up


Figure 3. Maximum Off Channel Leakage Current, Any One Channel, Test Set-Up


Figure 5. Maximum On Channel Leakage Current, Channel to Channel, Test Set-Up


Figure 7. Off Channel Feedthrough Isolation, Test Set-Up


Figure 4. Maximum Off Channel Leakage Current, Common Channel, Test Set-Up


Figure 6. Maximum On Channel Bandwidth, Test Set-Up


Figure 8. Feedthrough Noise, Channel Select to Common Out, Test Set-Up


Figure 9a. Propagation Delays, Channel Select to Analog Out


Figure 10a. Propagation Delays, Analog In to Analog Out


Figure 11a. Propagation Delays, Enable to Analog Out


Figure 9b. Propagation Delay, Test Set-Up Channel Select to Analog Out

*Includes all probe and jig capacitance
Figure 10b. Propagation Delay, Test Set-Up Analog In to Analog Out


Figure 11b. Propagation Delay, Test Set-Up Enable to Analog Out


Figure 12. Crosstalk Between Any Two Switches, Test Set-Up


Figure 14a. Total Harmonic Distortion, Test Set-Up


Figure 13. Power Dissipation Capacitance, Test Set-Up


Figure 14b. Plot, Harmonic Distortion

## APPLICATIONS INFORMATION

The Channel Select and Enable control pins should be at $\mathrm{V}_{\mathrm{CC}}$ or GND logic levels. $\mathrm{V}_{\mathrm{CC}}$ being recognized as a logic high and GND being recognized as a logic low. In this example:

$$
\begin{aligned}
& \mathrm{V}_{\mathrm{CC}}=+5 \mathrm{~V} \\
&=\text { logic high } \\
& \mathrm{GND}=0 \mathrm{~V}=\text { logic low }
\end{aligned}
$$

The maximum analog voltage swing is determined by the supply voltage $\mathrm{V}_{\mathrm{CC}}$. The positive peak analog voltage should not exceed $\mathrm{V}_{\mathrm{CC}}$. Similarly, the negative peak analog voltage should not go below GND. In this example, the difference between $\mathrm{V}_{\mathrm{CC}}$ and GND is five volts. Therefore, using the configuration of Figure 15, a maximum analog signal of five volts peak-to-peak can be controlled. Unused analog inputs/outputs may be left floating (i.e., not
connected). However, tying unused analog inputs and outputs to $\mathrm{V}_{\mathrm{CC}}$ or GND through a low value resistor helps minimize crosstalk and feedthrough noise that may be picked up by an unused switch.

Although used here, balanced supplies are not a requirement. The only constraints on the power supplies are that:

$$
\mathrm{V}_{\mathrm{CC}}-\mathrm{GND}=2 \text { to } 6 \text { volts }
$$

When voltage transients above $\mathrm{V}_{\mathrm{CC}}$ and/or below GND are anticipated on the analog channels, external Germanium or Schottky diodes $\left(\mathrm{D}_{\mathrm{x}}\right)$ are recommended as shown in Figure 16. These diodes should be able to absorb the maximum anticipated current surges during clipping.

## MC74LVXT8051



Figure 15. Application Example


Figure 16. External Germanium or Schottky Clipping Diodes


Figure 17. Interfacing to Low Voltage CMOS Outputs


## MC74LVXT8051

## PACKAGE DIMENSIONS

SOIC-16
D SUFFIX
CASE 751B-05
ISSUE J


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
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.

|  | MILLIMETERS |  | INCHES |  |
| :---: | ---: | ---: | ---: | ---: |
| DIM | MIN |  | MAX | MIN | MAX $\quad$.

TSSOP-16
DT SUFFIX
CASE 948F-01
ISSUE A


SOEIAJ-16
M SUFFIX
CASE 966-01
ISSUE O



DETAIL $P$


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH TOTAL IN EXCESS OF THE LEAD WIDTH
DIMENSION AT MAXIMUM MATERIAL CONDITION. DIMENSION AT MAXIMUM MATERIAL CONDITION.
DAMBAR CANNOT BE LOCATED ON THE LOWER DAMBAR CANNOT BE LOCATED ON THE
RADIUS OR THE FOOT. MINIMUM SPACE RADIUS OR THE FOOT. MINIMUM SPACE
BETWEEN PROTRUSIONS AND ADJACENT LEAD BETWEEN PROTRUS
TO BE 0.46 ( 0.018 ).

| DIM | MILLIMETERS |  | INCHES |  |
| :---: | :---: | :---: | :---: | :---: |
|  | MIN | MAX | MIN | MAX |
| A | --- | 2.05 | --- | 0.081 |
| $\mathrm{A}_{1}$ | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 0.35 | 0.50 | 0.014 | 0.020 |
| c | 0.18 | 0.27 | 0.007 | 0.011 |
| D | 9.90 | 10.50 | 0.390 | 0.413 |
| E | 5.10 | 5.45 | 0.201 | 0.215 |
| e | 1.27 BSC |  | 0.050 BSC |  |
| $\mathrm{H}_{\mathrm{E}}$ | 7.40 | 8.20 | 0.291 | 0.323 |
| L | 0.50 | 0.85 | 0.020 | 0.033 |
| $L_{E}$ | 1.10 | 1.50 | 0.043 | 0.059 |
| M | $0^{\circ}$ | $10^{\circ}$ | $0^{\circ}$ | $10^{\circ}$ |
| $Q_{1}$ | 0.70 | 0.90 | 0.028 | 0.035 |
| Z | -- | 0.78 | --- | 0.031 |

[^1]
## PUBLICATION ORDERING INFORMATION

## LITERATURE FULFILLMENT:

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