

MM54C157,MM74C157

MM54C157 MM74C157 Quad 2-Input Multiplexers



Literature Number: SNOS321A

MM54C157/MM74C157 Quad 2-Input Multiplexers

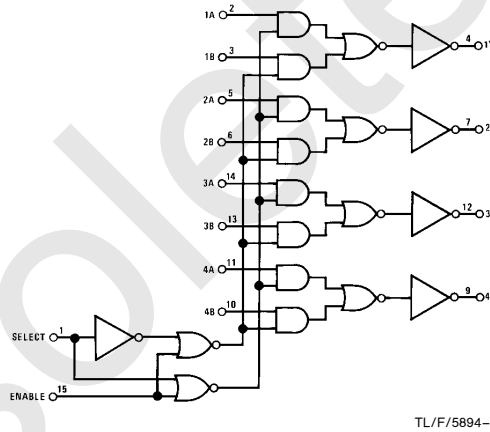
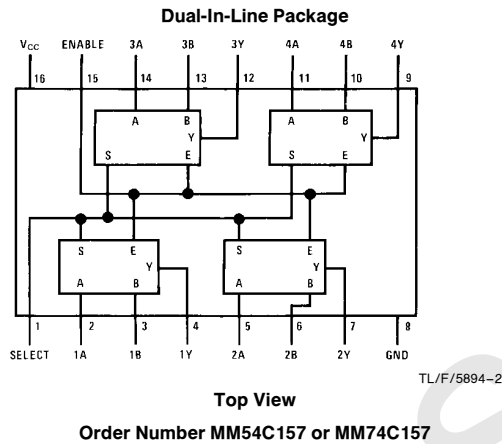
General Description

These multiplexers are monolithic complementary MOS (CMOS) integrated circuits constructed with N- and P-channel enhancement transistors. They consist of four 2-input multiplexers with common select and enable inputs. When the enable input is at logical "0" the four outputs assume the values as selected from the inputs. When the enable input is at logical "1", the outputs assume logical "0". Select decoding is done internally resulting in a single select input only.

Features

- Supply voltage range 3V to 15V
- High noise immunity 0.45 V_{CC} (typ.)
- Low power 50 nW (typ.)
- Tenth power TTL compatible Drive 2 LPTTL loads

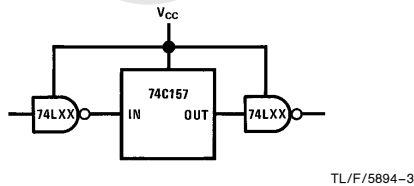
Logic & Connection Diagrams



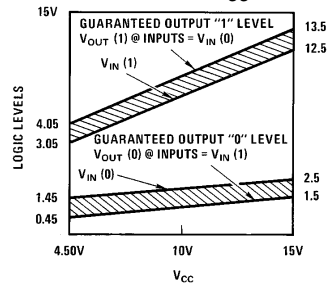
Truth Table

| Enable | Select | A | B | Output Y |
|--------|--------|---|---|----------|
| 1 | X | X | X | 0 |
| 0 | 0 | 0 | X | 0 |
| 0 | 0 | 1 | X | 1 |
| 0 | 1 | X | 0 | 0 |
| 0 | 1 | X | 1 | 1 |

74L Compatibility



Guaranteed Noise Margin as a Function of V_{CC}



Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

| | |
|-----------------------------|--------------------------|
| Voltage at Any Pin | -0.3V to $V_{CC} + 0.3V$ |
| Operating Temperature Range | -55°C to +125°C |
| MM54C157 | -40°C to +85°C |
| MM74C157 | |

| | |
|---------------------------------------|-----------------|
| Storage Temperature Range | -65°C to +150°C |
| Maximum V_{CC} Voltage | 18V |
| Power Dissipation (P_D) | |
| Dual-In-Line | 700 mW |
| Small Outline | 500 mW |
| Operating V_{CC} Range | 3V to 15V |
| Lead Temperature (Soldering, 10 sec.) | 260°C |

DC Electrical Characteristics Min/Max limits apply across temperature range unless otherwise noted

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---------------------|----------------------------|---------------------------------|------------|--------|------------|---------|
| CMOS TO CMOS | | | | | | |
| $V_{IN(1)}$ | Logical "1" Input Voltage | $V_{CC} = 5V$ $V_{CC} = 10V$ | 3.5 8.0 | | | V V |
| $V_{IN(0)}$ | Logical "0" Input Voltage | $V_{CC} = 5V$ $V_{CC} = 10V$ | | | 1.5 2.0 | V V |
| $V_{OUT(1)}$ | Logical "1" Output Voltage | $V_{CC} = 5V$ $V_{CC} = 10V$ | 4.5 9.0 | | | V V |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | $V_{CC} = 5V$ $V_{CC} = 10V$ | | | 0.5 1.0 | V V |
| $I_{IN(1)}$ | Logical "1" Input Current | $V_{CC} = 15V$ | | 0.005 | 1.0 | μA |
| $I_{IN(0)}$ | Logical "0" Input Current | $V_{CC} = 15V$ | -1.0 | -0.005 | | μA |
| I_{CC} | Supply Current | $V_{CC} = 15V$ | | 0.05 | 60 | μA |

CMOS TO TENTH POWER INTERFACE

| | | | | | | |
|--------------|----------------------------|---|----------------------------------|--|------------|--------|
| $V_{IN(1)}$ | Logical "1" Input Voltage | 54C $V_{CC} = 4.5V$ 74C $V_{CC} = 4.75V$ | $V_{CC} - 1.5$ $V_{CC} - 1.5$ | | | V V |
| $V_{IN(0)}$ | Logical "0" Input Voltage | 54C $V_{CC} = 4.5V$ 74C $V_{CC} = 4.75V$ | | | 0.8 0.8 | V V |
| $V_{OUT(1)}$ | Logical "1" Output Voltage | 54C $V_{CC} = 4.5V, I_O = -360 \mu A$ 74C $V_{CC} = 4.75V, I_O = -360 \mu A$ | 2.4 2.4 | | | V V |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | 54C $V_{CC} = 4.5V, I_O = 360 \mu A$ 74C $V_{CC} = 4.75V, I_O = 360 \mu A$ | | | 0.4 0.4 | V V |

OUTPUT DRIVE (See 54C/74C Family Characteristics Data Sheet) (Short Circuit Current)

| | | | | | | |
|--------------|-----------------------|---|-------|--|--|----|
| I_{SOURCE} | Output Source Current | $V_{CC} = 5V, V_{IN(0)} = 0V$ $T_A = 25^\circ C, V_{OUT} = 0V$ | -1.75 | | | mA |
| I_{SOURCE} | Output Source Current | $V_{CC} = 10V, V_{IN(0)} = 0V$ $T_A = 25^\circ C, V_{OUT} = 0V$ | -8.0 | | | mA |
| I_{SINK} | Output Sink Current | $V_{CC} = 5V, V_{IN(1)} = 5V$ $T_A = 25^\circ C, V_{OUT} = V_{CC}$ | 1.75 | | | mA |
| I_{SINK} | Output Sink Current | $V_{CC} = 10V, V_{IN(1)} = 10V$ $T_A = 25^\circ C, V_{OUT} = V_{CC}$ | 8.0 | | | mA |

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

AC Electrical Characteristics* $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, unless otherwise specified

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------|---|------------------------|-----|-----|-----|-------|
| t_{pd0} , t_{pd1} | Propagation Delay from Data to Output | $V_{CC} = 5.0\text{V}$ | | 150 | 250 | ns |
| | | $V_{CC} = 10\text{V}$ | | 70 | 110 | ns |
| t_{pd0} , t_{pd1} | Propagation Delay from Select to Output | $V_{CC} = 5\text{V}$ | | 180 | 300 | ns |
| | | $V_{CC} = 10\text{V}$ | | 80 | 130 | ns |
| t_{pd0} , t_{pd1} | Propagation Delay from Enable to Output | $V_{CC} = 5\text{V}$ | | 180 | 300 | ns |
| | | $V_{CC} = 10\text{V}$ | | 80 | 130 | ns |
| C_{IN} | Input Capacitance | (Note 2) | | 5 | | pF |
| C_{PD} | Power Dissipation Capacitance | (Note 3) | | 20 | | pF |

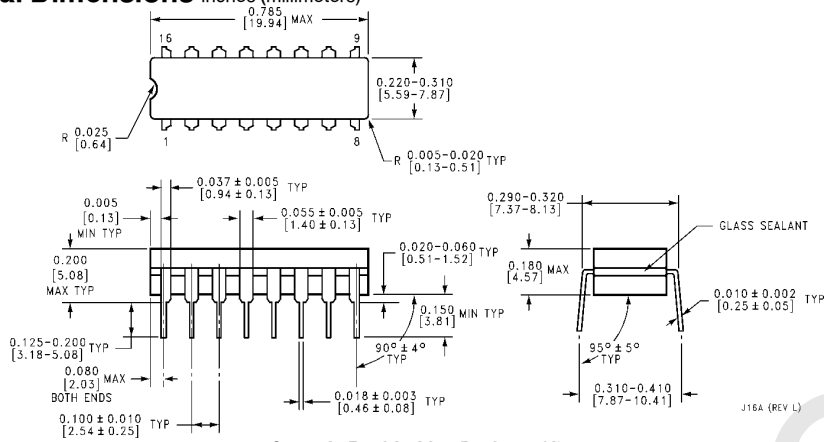
*AC Parameters are guaranteed by DC correlated testing.

Note 2: Capacitance is guaranteed by periodic testing.

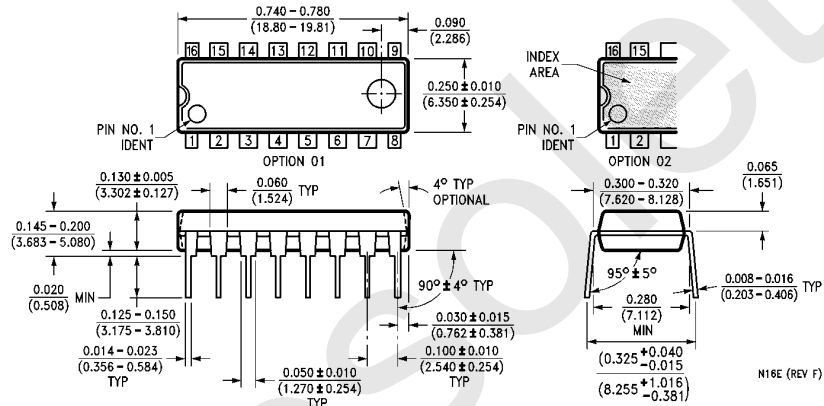
Note 3: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation, see 54C/74C Family Characteristics, Application Note AN-90.

Obsolete

Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number MM54C157J or MM74C157J
NS Package Number J16A



Molded Dual-In-Line Package (N)
Order Number MM54C157N or MM74C157N
NS Package Number N16E

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

| | | | |
|--|--|---|---|
|  <p>National Semiconductor Corporation 1111 West Bardin Road Arlington, TX 76017 Tel: (800) 272-9959 Fax: (800) 737-7018</p> | <p>National Semiconductor Europe Fax: (+49) 0-180-530 85 86 Email: onjwge@tevm2.nsc.com Deutsch Tel: (+49) 0-180-530 85 85 English Tel: (+49) 0-180-532 78 32 Français Tel: (+49) 0-180-532 93 58 Italiano Tel: (+49) 0-180-534 16 80</p> | <p>National Semiconductor Hong Kong Ltd. 19th Floor, Straight Block, Ocean Centre, 5 Canton Rd. Tsimshatsui, Kowloon Hong Kong Tel: (852) 2737-1600 Fax: (852) 2736-9960</p> | <p>National Semiconductor Japan Ltd. Tel: 81-043-299-2309 Fax: 81-043-299-2408</p> |
|--|--|---|---|

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

| | |
|------------------------|--|
| Audio | www.ti.com/audio |
| Amplifiers | amplifier.ti.com |
| Data Converters | dataconverter.ti.com |
| DLP® Products | www.dlp.com |
| DSP | dsp.ti.com |
| Clocks and Timers | www.ti.com/clocks |
| Interface | interface.ti.com |
| Logic | logic.ti.com |
| Power Mgmt | power.ti.com |
| Microcontrollers | microcontroller.ti.com |
| RFID | www.ti-rfid.com |
| OMAP Mobile Processors | www.ti.com/omap |
| Wireless Connectivity | www.ti.com/wirelessconnectivity |

Applications

| | |
|-------------------------------|--|
| Communications and Telecom | www.ti.com/communications |
| Computers and Peripherals | www.ti.com/computers |
| Consumer Electronics | www.ti.com/consumer-apps |
| Energy and Lighting | www.ti.com/energy |
| Industrial | www.ti.com/industrial |
| Medical | www.ti.com/medical |
| Security | www.ti.com/security |
| Space, Avionics and Defense | www.ti.com/space-avionics-defense |
| Transportation and Automotive | www.ti.com/automotive |
| Video and Imaging | www.ti.com/video |

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2011, Texas Instruments Incorporated