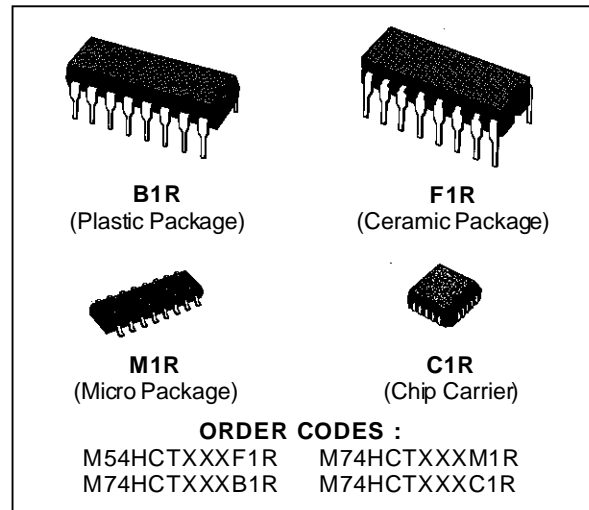


## HCT157 QUAD 2 CHANNEL MULTIPLEXER

## HCT158 QUAD 2 CHANNEL MULTIPLEXER (INV.)

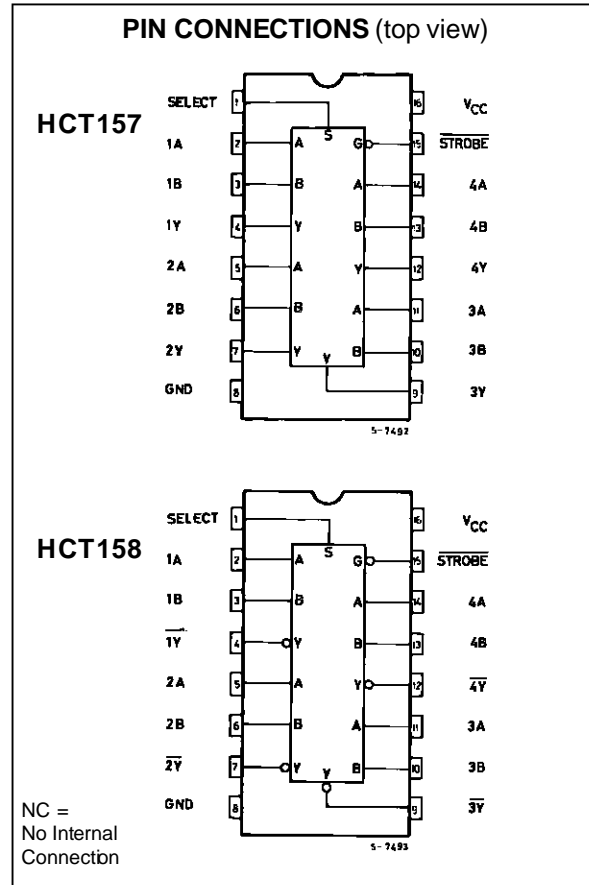
- HIGH SPEED  
 $t_{PD} = 21 \text{ ns (TYP.) AT } V_{CC} = 5 \text{ V}$
- LOW POWER DISSIPATION  
 $I_{CC} = 4 \mu\text{A (MAX.) AT } T_A = 25 \text{ }^\circ\text{C}$
- COMPATIBLE WITH TTL OUTPUTS  
 $V_{IH} = 2\text{V (MIN.) } V_{IL} = 0.8\text{V (MAX)}$
- OUTPUT DRIVE CAPABILITY  
 10 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE  
 $|I_{OH}| = I_{OL} = 4 \text{ mA (MIN.)}$
- BALANCED PROPAGATION DELAYS  
 $t_{PLH} = t_{PHL}$
- PIN AND FUNCTION COMPATIBLE  
 WITH 54/74LS157/158



### DESCRIPTION

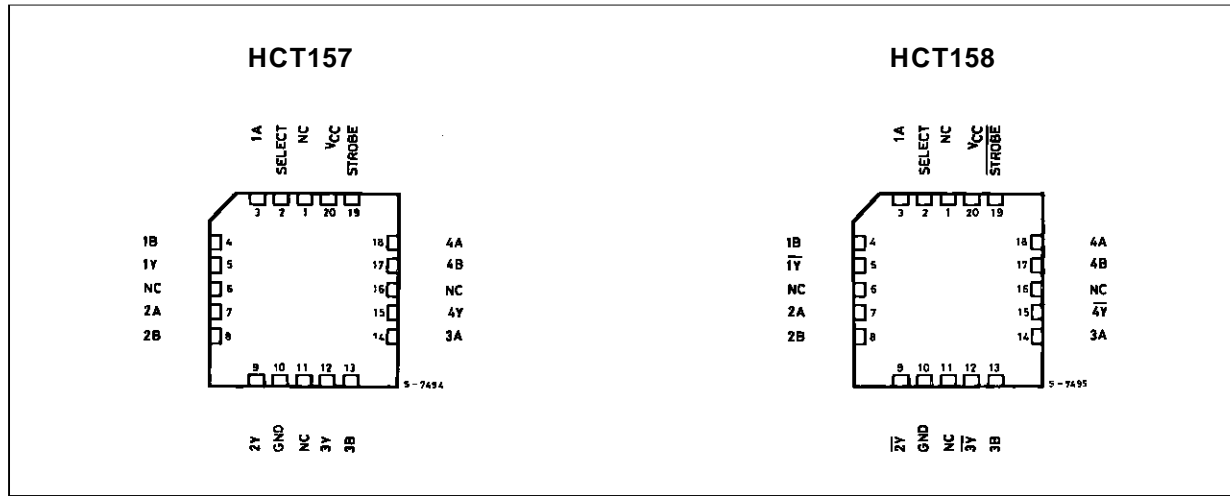
The M54/74HCT157 and the M54/74HCT158 are high speed CMOS QUAD 2-CHANNEL MULTIPLEXERS fabricated with silicon gate C<sup>2</sup>MOS technology. They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

These devices consist of four 2-input digital multiplexers with common select and strobe inputs. The HCT158 is an inverting multiplexer while the HCT157 is a non-inverting multiplexer. When the STROBE input is held High, selection of data is inhibited and all the outputs become Low in the M74HCT157 and High in the M74HCT158. The SELECT decoding determines whether the A or B inputs get routed to their corresponding Y outputs. All inputs are equipped with protection circuits against static discharge and transient excess voltage. M54/74HCT devices are designed to directly interface HSC<sup>2</sup>MOS systems with TTL and NMOS components. They are also plug in replacements for LSTTL devices giving a reduction of power consumption.

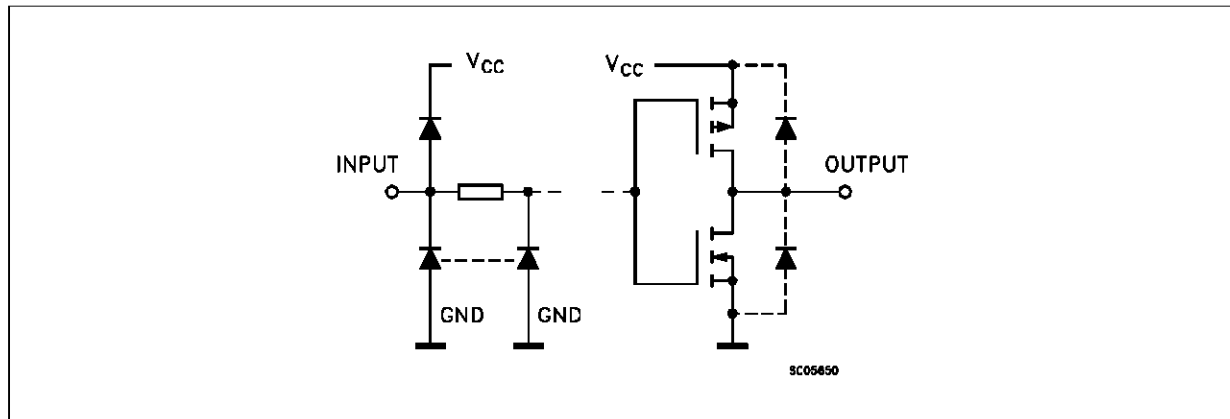


# M54/M74HCT157 M54/M74HCT158

## CHIP CARRIER



## INPUT AND OUTPUT EQUIVALENT CIRCUIT



### PIN DESCRIPTION (for HCT157)

| PIN No       | SYMBOL   | NAME AND FUNCTION         |
|--------------|----------|---------------------------|
| 1            | SELECT   | Common Data Select Input  |
| 2, 5, 11, 14 | 1A to 4A | Data Inputs From Source A |
| 3, 6, 10, 13 | 1B to 4B | Data Inputs From Source B |
| 4, 7, 9, 12  | 1Y to 4Y | Multiplexer Output        |
| 15           | STROBE   | Strobe Input              |
| 8            | GND      | Ground (0V)               |
| 16           | Vcc      | Positive Supply Voltage   |

### PIN DESCRIPTION (for HCT158)

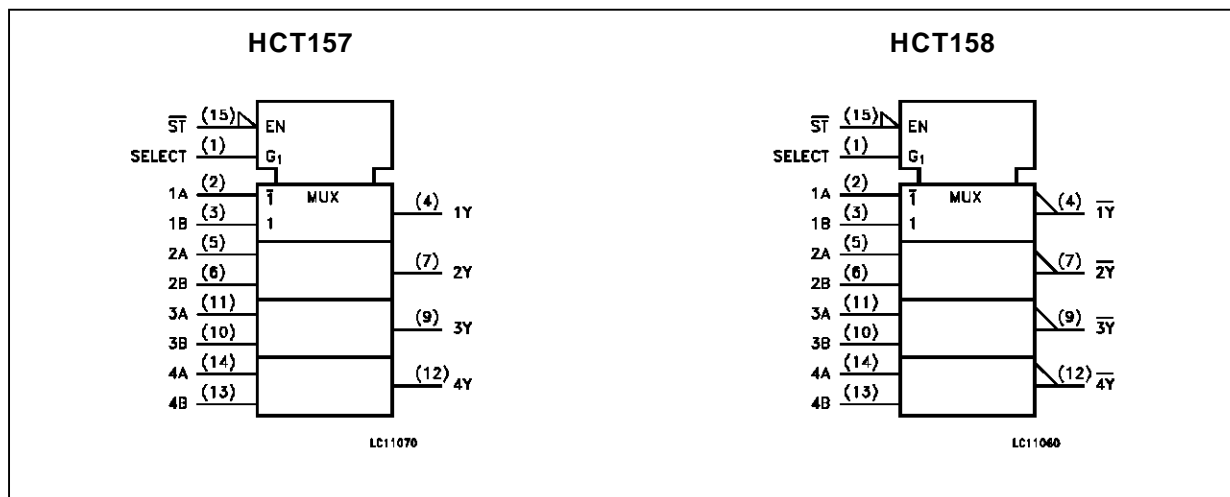
| PIN No       | SYMBOL   | NAME AND FUNCTION         |
|--------------|----------|---------------------------|
| 1            | SELECT   | Common Data Select Input  |
| 2, 5, 11, 14 | 1A to 4A | Data Inputs From Source A |
| 3, 6, 10, 13 | 1B to 4B | Data Inputs From Source B |
| 4, 7, 9, 12  | 1Y to 4Y | Multiplexer Output        |
| 15           | STROBE   | Strobe Input              |
| 8            | GND      | Ground (0V)               |
| 16           | Vcc      | Positive Supply Voltage   |

TRUTH TABLE

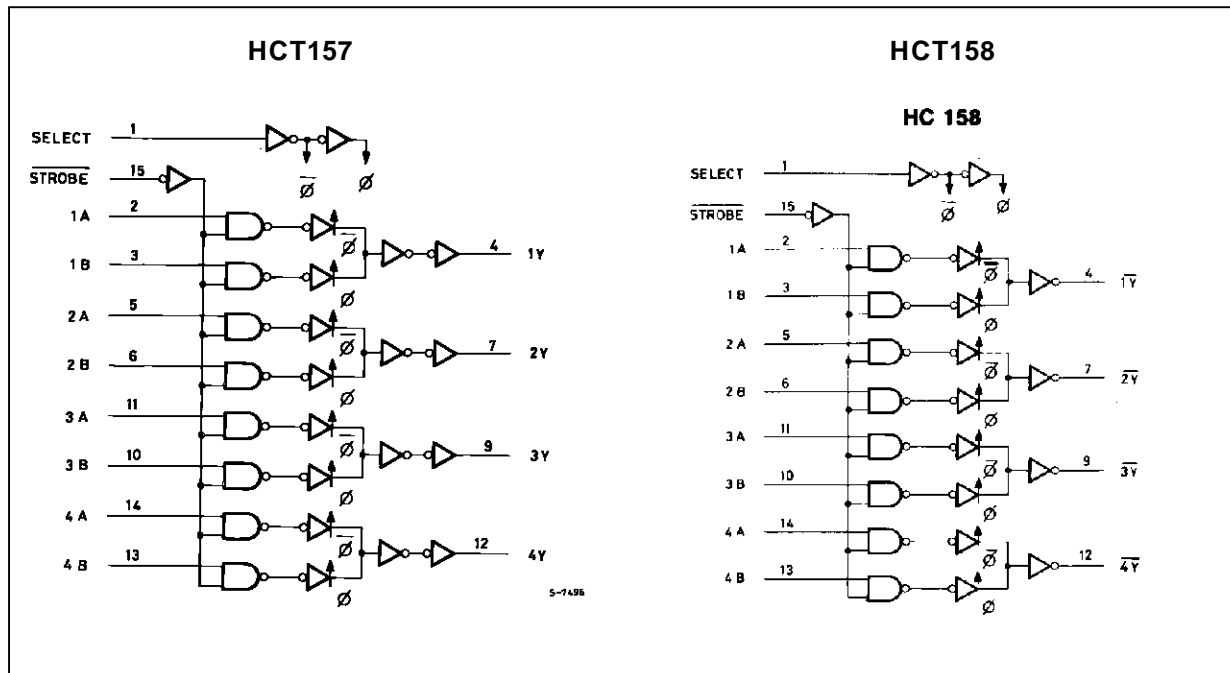
| INPUTS |        |   |   | OUTPUTS    |                    |
|--------|--------|---|---|------------|--------------------|
| STROBE | SELECT | A | B | Y (HCT157) | $\bar{Y}$ (HCT158) |
| H      | X      | X | X | L          | H                  |
| L      | L      | L | X | L          | H                  |
| L      | L      | H | X | H          | L                  |
| L      | H      | X | L | L          | H                  |
| L      | H      | X | H | H          | L                  |

X: DON'T CARE

IEC LOGIC SYMBOL



LOGIC DIAGRAM



**ABSOLUTE MAXIMUM RATINGS**

| Symbol                              | Parameter                                    | Value                         | Unit |
|-------------------------------------|--|-------------------------------|------|
| V <sub>CC</sub>                     | Supply Voltage                               | -0.5 to +7                    | V    |
| V <sub>I</sub>                      | DC Input Voltage                             | -0.5 to V <sub>CC</sub> + 0.5 | V    |
| V <sub>O</sub>                      | DC Output Voltage                            | -0.5 to V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>                     | DC Input Diode Current                       | ± 20                          | mA   |
| I <sub>OK</sub>                     | DC Output Diode Current                      | ± 20                          | mA   |
| I <sub>O</sub>                      | DC Output Source Sink Current Per Output Pin | ± 25                          | mA   |
| I <sub>CC</sub> or I <sub>GND</sub> | DC V <sub>CC</sub> or Ground Current         | ± 50                          | mA   |
| P <sub>D</sub>                      | Power Dissipation                            | 500 (*)                       | mW   |
| T <sub>stg</sub>                    | Storage Temperature                          | -65 to +150                   | °C   |
| T <sub>L</sub>                      | Lead Temperature (10 sec)                    | 300                           | °C   |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.  
(\*) 500 mW: ≅ 65 °C derate to 300 mW by 10mW/°C: 65 °C to 85 °C

**RECOMMENDED OPERATING CONDITIONS**

| Symbol                          | Parameter   | Value                     | Unit     |
|---------------------------------|---|---------------------------|----------|
| V <sub>CC</sub>                 | Supply Voltage  | 4.5 to 5.5                | V        |
| V <sub>I</sub>                  | Input Voltage   | 0 to V <sub>CC</sub>      | V        |
| V <sub>O</sub>                  | Output Voltage  | 0 to V <sub>CC</sub>      | V        |
| T <sub>op</sub>                 | Operating Temperature: <b>M54HC Series</b><br><b>M74HC Series</b> | -55 to +125<br>-40 to +85 | °C<br>°C |
| t <sub>r</sub> , t <sub>f</sub> | Input Rise and Fall Time (V <sub>CC</sub> = 4.5 to 5.5V)          | 0 to 500                  | ns       |

## DC SPECIFICATIONS

| Symbol           | Parameter                            | Test Conditions        |   | Value                                   |      |      |                      |      |                       | Unit |      |   |
|------------------|--------------------------------------|------------------------|---|---|------|------|----------------------|------|-----------------------|------|------|---|
|                  |                                      | V <sub>CC</sub><br>(V) |   | T <sub>A</sub> = 25 °C<br>54HC and 74HC |      |      | -40 to 85 °C<br>74HC |      | -55 to 125 °C<br>54HC |      |      |   |
|                  |                                      |                        |   | Min.                                    | Typ. | Max. | Min.                 | Max. | Min.                  |      | Max. |   |
| V <sub>IH</sub>  | High Level Input Voltage             | 4.5 to 5.5             |   | 2.0                                     |      |      | 2.0                  |      | 2.0                   |      | V    |   |
| V <sub>IL</sub>  | Low Level Input Voltage              | 4.5 to 5.5             |   |   |      | 0.8  |                      | 0.8  |                       | 0.8  | V    |   |
| V <sub>OH</sub>  | High Level Output Voltage            | 4.5                    | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   | I <sub>O</sub> = -20 μA                 | 4.4  | 4.5  |                      | 4.4  |                       | 4.4  | V    |   |
|                  |                                      |                        |   | I <sub>O</sub> = -4.0 mA                | 4.18 | 4.31 |                      | 4.13 |                       | 4.10 |      |   |
| V <sub>OL</sub>  | Low Level Output Voltage             | 4.5                    | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   | I <sub>O</sub> = 20 μA                  |      | 0.0  | 0.1                  |      | 0.1                   |      | 0.1  | V |
|                  |                                      |                        |   | I <sub>O</sub> = 4.0 mA                 |      | 0.17 | 0.26                 |      | 0.33                  |      | 0.4  |   |
| I <sub>I</sub>   | Input Leakage Current                | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> or GND   |   |      | ±0.1 |                      | ±1   |                       | ±1   | μA   |   |
| I <sub>CC</sub>  | Quiescent Supply Current             | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> or GND   |   |      | 4    |                      | 40   |                       | 80   | μA   |   |
| ΔI <sub>CC</sub> | Additional worst case supply current | 5.5                    | Per Input pin<br>V <sub>I</sub> = 0.5V or<br>V <sub>I</sub> = 2.4V<br>Other Inputs at<br>V <sub>CC</sub> or GND<br>I <sub>O</sub> = 0 |   |      | 2.0  |                      | 2.9  |                       | 3.0  | mA   |   |

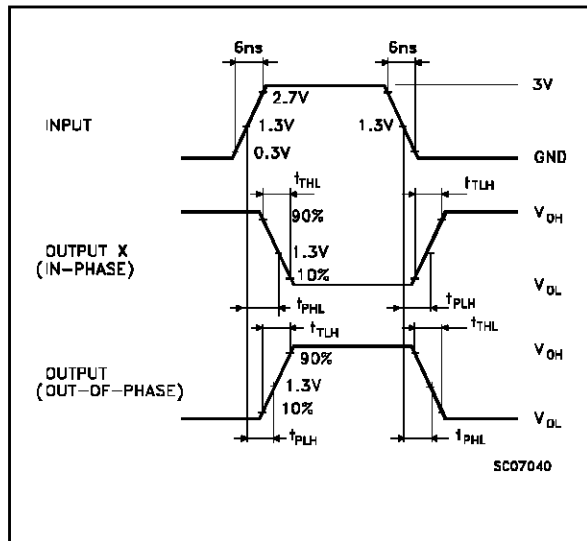
# M54/M74HCT157 M54/M74HCT158

## AC ELECTRICAL CHARACTERISTICS ( $C_L = 50 \text{ pF}$ , Input $t_r = t_f = 6 \text{ ns}$ )

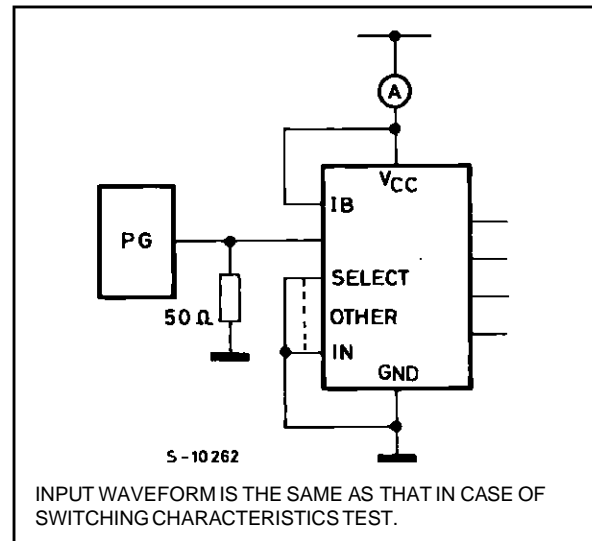
| Symbol                 | Parameter                           | Test Conditions |        | Value  |      |      |   |      |  | Unit |      |
|------------------------|-------------------------------------|-----------------|--------|--|------|------|---|------|--|------|------|
|                        |                                     | $V_{CC}$<br>(V) |        | $T_A = 25 \text{ }^\circ\text{C}$<br>54HC and 74HC |      |      | $-40 \text{ to } 85 \text{ }^\circ\text{C}$<br>74HC |      | $-55 \text{ to } 125 \text{ }^\circ\text{C}$<br>54HC |      |      |
|                        |                                     |                 |        | Min.   | Typ. | Max. | Min.  | Max. | Min.   |      | Max. |
| $t_{TLH}$<br>$t_{THL}$ | Output Transition Time              | 4.5             |        |  | 8    | 15   |   | 19   |  | 22   | ns   |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay Time (A, B - Y)   | 4.5             |        |  | 16   | 25   |   | 31   |  | 38   | ns   |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay Time (SELECT - Y) | 4.5             |        |  | 19   | 30   |   | 38   |  | 45   | ns   |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay Time (STROBE - Y) | 4.5             |        |  | 17   | 27   |   | 34   |  | 41   | ns   |
| $C_{IN}$               | Input Capacitance                   |                 |        |  | 5    | 10   |   | 10   |  | 10   | pF   |
| $C_{PD}$ (*)           | Power Dissipation Capacitance       |                 | HCT157 |  | 50   |      |   |      |  |      | pF   |
|                        |                                     |                 | HCT158 |  | 60   |      |   |      |  |      | pF   |

(\*)  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4$  (per channel)

### SWITCHING CHARACTERISTICS TEST CIRCUIT

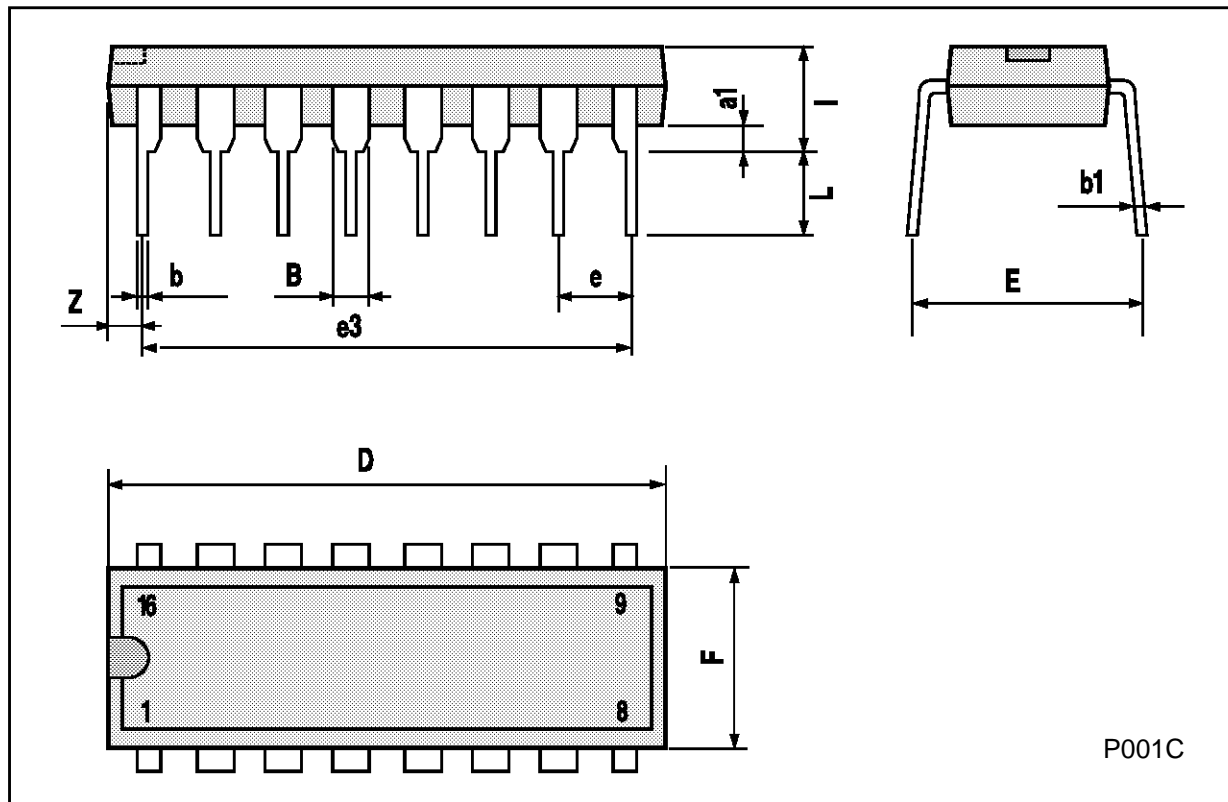


### TEST CIRCUIT $I_{CC}$ (Opr.)



## Plastic DIP16 (0.25) MECHANICAL DATA

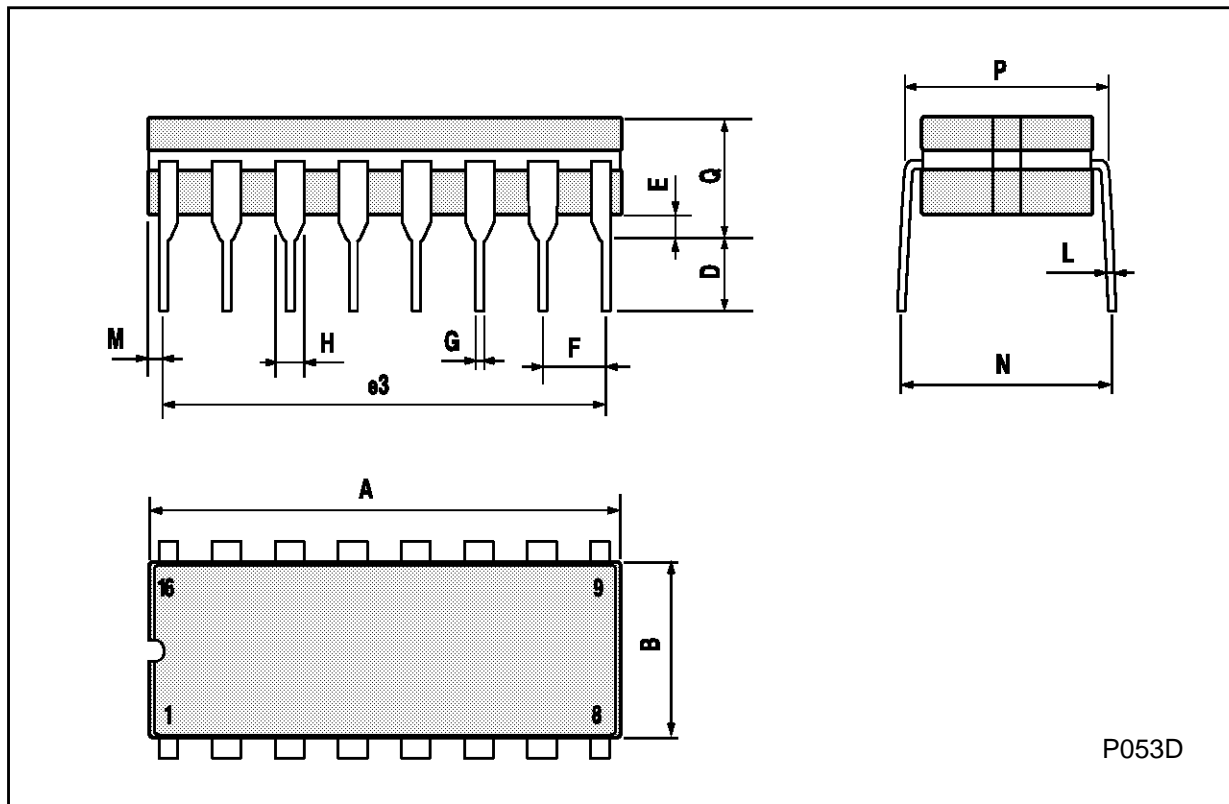
| DIM. | mm   |       |      | inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | MIN. | TYP.  | MAX. | MIN.  | TYP.  | MAX.  |
| a1   | 0.51 |       |      | 0.020 |       |       |
| B    | 0.77 |       | 1.65 | 0.030 |       | 0.065 |
| b    |      | 0.5   |      |       | 0.020 |       |
| b1   |      | 0.25  |      |       | 0.010 |       |
| D    |      |       | 20   |       |       | 0.787 |
| E    |      | 8.5   |      |       | 0.335 |       |
| e    |      | 2.54  |      |       | 0.100 |       |
| e3   |      | 17.78 |      |       | 0.700 |       |
| F    |      |       | 7.1  |       |       | 0.280 |
| I    |      |       | 5.1  |       |       | 0.201 |
| L    |      | 3.3   |      |       | 0.130 |       |
| Z    |      |       | 1.27 |       |       | 0.050 |



P001C

**Ceramic DIP16/1 MECHANICAL DATA**

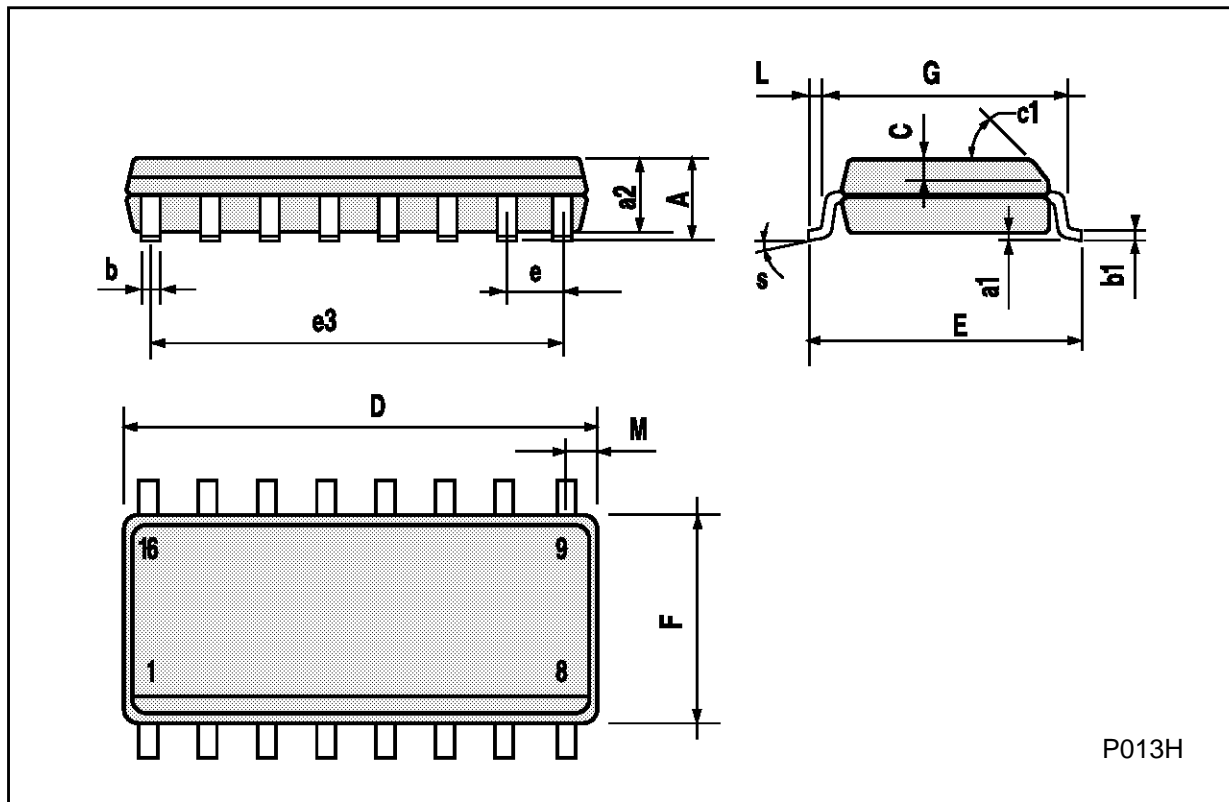
| DIM. | mm   |       |      | inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | MIN. | TYP.  | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      |       | 20   |       |       | 0.787 |
| B    |      |       | 7    |       |       | 0.276 |
| D    |      | 3.3   |      |       | 0.130 |       |
| E    | 0.38 |       |      | 0.015 |       |       |
| e3   |      | 17.78 |      |       | 0.700 |       |
| F    | 2.29 |       | 2.79 | 0.090 |       | 0.110 |
| G    | 0.4  |       | 0.55 | 0.016 |       | 0.022 |
| H    | 1.17 |       | 1.52 | 0.046 |       | 0.060 |
| L    | 0.22 |       | 0.31 | 0.009 |       | 0.012 |
| M    | 0.51 |       | 1.27 | 0.020 |       | 0.050 |
| N    |      |       | 10.3 |       |       | 0.406 |
| P    | 7.8  |       | 8.05 | 0.307 |       | 0.317 |
| Q    |      |       | 5.08 |       |       | 0.200 |





**SO16 (Narrow) MECHANICAL DATA**

| DIM. | mm         |      |      | inch  |       |       |
|------|------------|------|------|-------|-------|-------|
|      | MIN.       | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |            |      | 1.75 |       |       | 0.068 |
| a1   | 0.1        |      | 0.2  | 0.004 |       | 0.007 |
| a2   |            |      | 1.65 |       |       | 0.064 |
| b    | 0.35       |      | 0.46 | 0.013 |       | 0.018 |
| b1   | 0.19       |      | 0.25 | 0.007 |       | 0.010 |
| C    |            | 0.5  |      |       | 0.019 |       |
| c1   | 45° (typ.) |      |      |       |       |       |
| D    | 9.8        |      | 10   | 0.385 |       | 0.393 |
| E    | 5.8        |      | 6.2  | 0.228 |       | 0.244 |
| e    |            | 1.27 |      |       | 0.050 |       |
| e3   |            | 8.89 |      |       | 0.350 |       |
| F    | 3.8        |      | 4.0  | 0.149 |       | 0.157 |
| G    | 4.6        |      | 5.3  | 0.181 |       | 0.208 |
| L    | 0.5        |      | 1.27 | 0.019 |       | 0.050 |
| M    |            |      | 0.62 |       |       | 0.024 |
| S    | 8° (max.)  |      |      |       |       |       |



P013H



Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -  
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A