



M54HC151
M74HC151

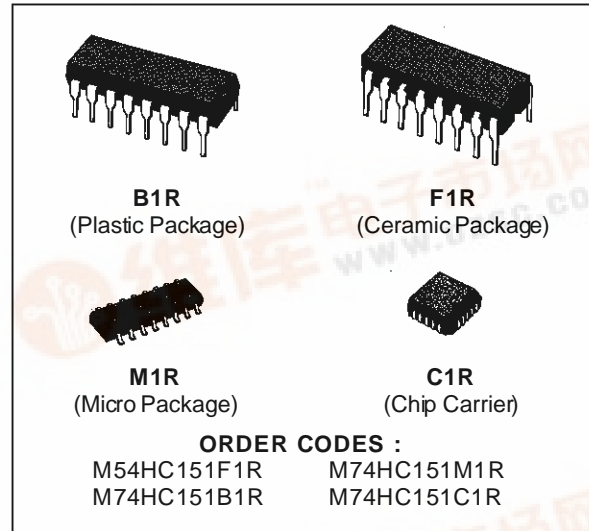
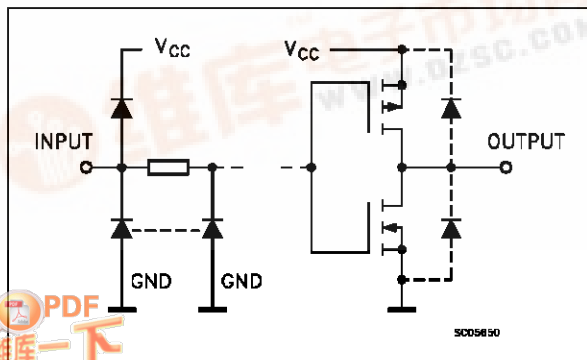
8 CHANNEL MULTIPLEXER

- HIGH SPEED
 $t_{PD} = 15 \text{ ns (TYP.) AT } V_{CC} = 5 \text{ V}$
- LOW POWER DISSIPATION
 $I_{CC} = 4 \mu\text{A (MAX.) AT } T_A = 25 \text{ }^\circ\text{C}$
- HIGH NOISE IMMUNITY
 $V_{NIH} = V_{NIL} = 28 \% V_{CC} \text{ (MIN.)}$
- OUTPUT DRIVE CAPABILITY
10 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE
 $|I_{OH}| = I_{OL} = 4 \text{ mA (MIN.)}$
- BALANCED PROPAGATION DELAYS
 $t_{PLH} = t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE
 $V_{CC} \text{ (OPR)} = 2 \text{ V TO } 6 \text{ V}$
- PIN AND FUNCTION COMPATIBLE
WITH 54/74LS151

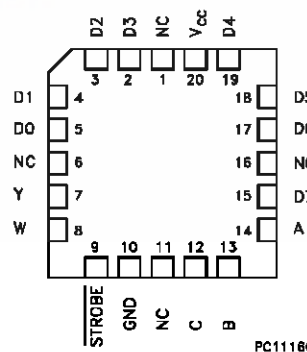
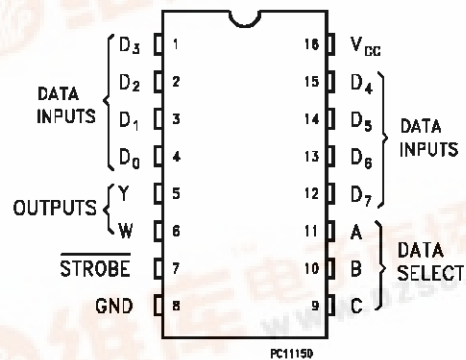
DESCRIPTION

The M54/74HC151 is a high speed CMOS 8 CHANNEL MULTIPLEXER fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption. It provides, in one package, the ability to select one bit of data from up to eight sources. The HC151 can be used as a universal function generator to generate any logic function of four variables. Outputs Y and W are complementary selection depends on the address inputs A, B and C. The strobe input must be taken low to enable this device, when the strobe is high W output is forced high and consequently Y output goes low. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN CONNECTIONS (top view)



NC =
No Internal
Connection



M54/M74HC151

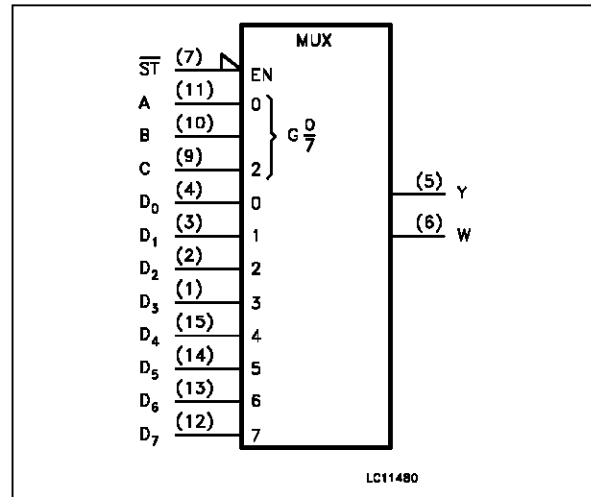
TRUTH TABLE

| INPUTS | | | | OUTPUTS | |
|--------|---|---|----------------|---------|-----------------|
| SELECT | | | STROBE | Y | W |
| C | B | A | \overline{S} | | |
| X | X | X | H | L | H |
| L | L | L | L | D0 | $\overline{D0}$ |
| L | L | H | L | D1 | $\overline{D1}$ |
| L | H | L | L | D2 | $\overline{D2}$ |
| L | H | H | L | D3 | $\overline{D3}$ |
| H | L | L | L | D4 | $\overline{D4}$ |
| H | L | H | L | D5 | $\overline{D5}$ |
| H | H | L | L | D6 | $\overline{D6}$ |
| H | H | H | L | D7 | $\overline{D7}$ |

PIN DESCRIPTION

| PIN No | SYMBOL | NAME AND FUNCTION |
|----------------------------|---------------------|----------------------------------|
| 4, 3, 2, 1, 15, 14, 13, 12 | D0 to D7 | Multiplexer Inputs |
| 5 | y | Multiplexer Output |
| 6 | w | Complementary Multiplexer Output |
| 7 | \overline{STROBE} | Strobe Input |
| 11, 10, 9 | A, B, C | Select Inputs |
| 8 | GND | Ground (0V) |
| 16 | V _{CC} | Positive Supply Voltage |

IEC LOGIC SYMBOL



M54/M74HC151

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Value | Unit |
|---------------------------------|---|--|----------|
| V _{CC} | Supply Voltage | 2 to 6 | V |
| V _I | Input Voltage | 0 to V _{CC} | V |
| V _O | Output Voltage | 0 to V _{CC} | V |
| T _{op} | Operating Temperature: M54HC Series M74HC Series | -55 to +125 -40 to +85 | °C °C |
| t _r , t _f | Input Rise and Fall Time | V _{CC} = 2 V 0 to 1000 V _{CC} = 4.5 V 0 to 500 V _{CC} = 6 V 0 to 400 | ns |

DC SPECIFICATIONS

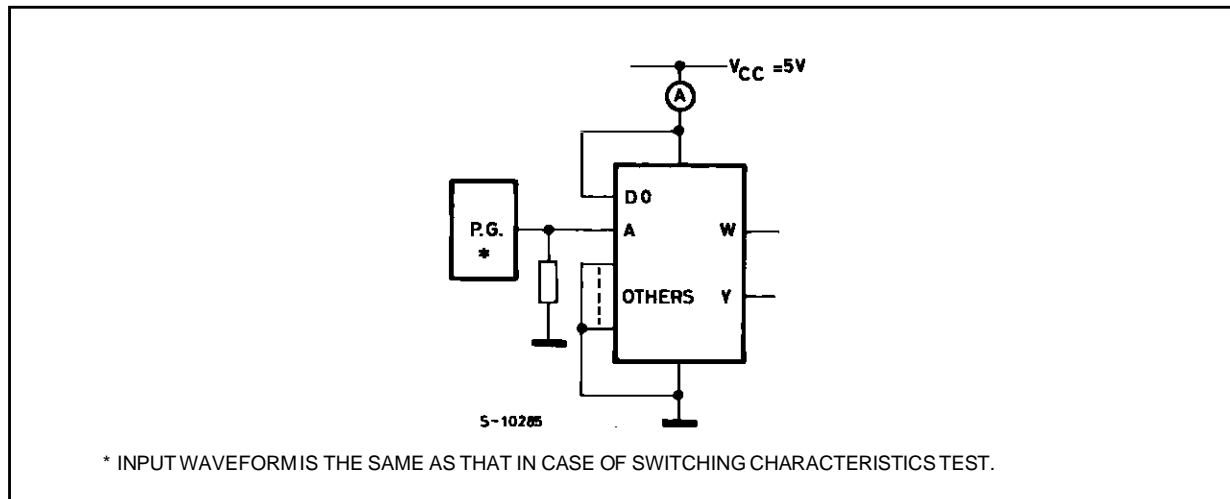
| Symbol | Parameter | Test Conditions | | Value | | | | | | Unit | | | |
|-----------------|---------------------------|------------------------|--|---|--------------------------|--------------------------|----------------------|------|-----------------------|------|------|------|------|
| | | | | T _A = 25 °C 54HC and 74HC | | | -40 to 85 °C 74HC | | -55 to 125 °C 54HC | | | | |
| | | V _{CC} (V) | | Min. | Typ. | Max. | Min. | Max. | Min. | | Max. | | |
| V _{IH} | High Level Input Voltage | 2.0 | | 1.5 | | | 1.5 | | 1.5 | | V | | |
| | | 4.5 | | 3.15 | | | 3.15 | | 3.15 | | | | |
| | | 6.0 | | 4.2 | | | 4.2 | | 4.2 | | | | |
| V _{IL} | Low Level Input Voltage | 2.0 | | | | 0.5 | | 0.5 | | 0.5 | V | | |
| | | 4.5 | | | | 1.35 | | 1.35 | | 1.35 | | | |
| | | 6.0 | | | | 1.8 | | 1.8 | | 1.8 | | | |
| V _{OH} | High Level Output Voltage | 2.0 | V _I = V _{IH} or V _{IL} | I _O = -20 μA | 1.9 | 2.0 | | 1.9 | | 1.9 | V | | |
| | | 4.5 | | | 4.4 | 4.5 | | 4.4 | | 4.4 | | | |
| | | 6.0 | | | 5.9 | 6.0 | | 5.9 | | 5.9 | | | |
| | | 4.5 | | | I _O = -4.0 mA | 4.18 | 4.31 | | 4.13 | | | 4.10 | |
| | | 6.0 | | | | I _O = -5.2 mA | 5.68 | 5.8 | | 5.63 | | | 5.60 |
| V _{OL} | Low Level Output Voltage | 2.0 | V _I = V _{IH} or V _{IL} | I _O = 20 μA | | 0.0 | 0.1 | | 0.1 | | 0.1 | V | |
| | | 4.5 | | | | 0.0 | 0.1 | | 0.1 | | 0.1 | | |
| | | 6.0 | | | | 0.0 | 0.1 | | 0.1 | | 0.1 | | |
| | | 4.5 | | | I _O = 4.0 mA | | 0.17 | 0.26 | | 0.33 | | | 0.40 |
| | | 6.0 | | | | I _O = 5.2 mA | | 0.18 | 0.26 | | 0.33 | | |
| I _I | Input Leakage Current | 6.0 | V _I = V _{CC} or GND | | | ±0.1 | | ±1 | | ±1 | μA | | |
| I _{CC} | Quiescent Supply Current | 6.0 | V _I = V _{CC} or GND | | | 4 | | 40 | | 80 | μA | | |

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

| Symbol | Parameter | Test Conditions | | Value | | | | | | Unit | |
|------------------------|--------------------------------------|-----------------|--|--|------|------|---|------|--|------|------|
| | | V_{CC} (V) | | $T_A = 25 \text{ }^\circ\text{C}$ 54HC and 74HC | | | $-40 \text{ to } 85 \text{ }^\circ\text{C}$ 74HC | | $-55 \text{ to } 125 \text{ }^\circ\text{C}$ 54HC | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | | Max. |
| t_{TLH} t_{THL} | Output Transition Time | 2.0 | | | 30 | 75 | | 95 | | 110 | ns |
| | | 4.5 | | | 8 | 15 | | 19 | | 22 | |
| | | 6.0 | | | 7 | 13 | | 16 | | 19 | |
| t_{PLH} t_{PHL} | Propagation Delay Time (D - W) | 2.0 | | | 56 | 130 | | 165 | | 190 | ns |
| | | 4.5 | | | 16 | 26 | | 33 | | 38 | |
| | | 6.0 | | | 14 | 22 | | 28 | | 32 | |
| t_{PLH} t_{PHL} | Propagation Delay Time (D - Y) | 2.0 | | | 56 | 130 | | 165 | | 190 | ns |
| | | 4.5 | | | 16 | 26 | | 33 | | 38 | |
| | | 6.0 | | | 14 | 22 | | 28 | | 32 | |
| t_{PLH} t_{PHL} | Propagation Delay Time (STROBE - W) | 2.0 | | | 30 | 85 | | 105 | | 125 | ns |
| | | 4.5 | | | 10 | 17 | | 21 | | 25 | |
| | | 6.0 | | | 9 | 14 | | 18 | | 21 | |
| t_{PLH} t_{PHL} | Propagation Delay Time (STROBE - Y) | 2.0 | | | 30 | 85 | | 105 | | 125 | ns |
| | | 4.5 | | | 10 | 17 | | 21 | | 25 | |
| | | 6.0 | | | 9 | 14 | | 18 | | 21 | |
| t_{PLH} t_{PHL} | Propagation Delay Time (A, B, C - W) | 2.0 | | | 72 | 160 | | 200 | | 235 | ns |
| | | 4.5 | | | 20 | 32 | | 40 | | 47 | |
| | | 6.0 | | | 17 | 27 | | 34 | | 40 | |
| t_{PLH} t_{PHL} | Propagation Delay Time (A, B, C - Y) | 2.0 | | | 72 | 160 | | 200 | | 235 | ns |
| | | 4.5 | | | 20 | 32 | | 40 | | 47 | |
| | | 6.0 | | | 17 | 27 | | 34 | | 40 | |
| C_{IN} | Input Capacitance | | | | 5 | 10 | | 10 | | 10 | pF |
| $C_{PD} (*)$ | Power Dissipation Capacitance | | | | 63 | | | | | | pF |

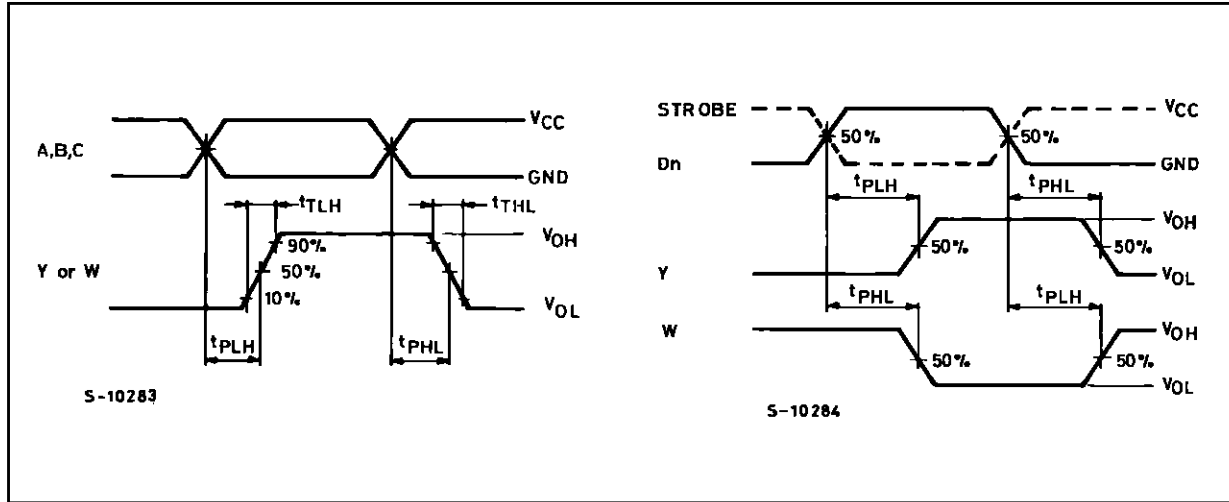
(*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

TEST CIRCUIT I_{CC} (Opr.)



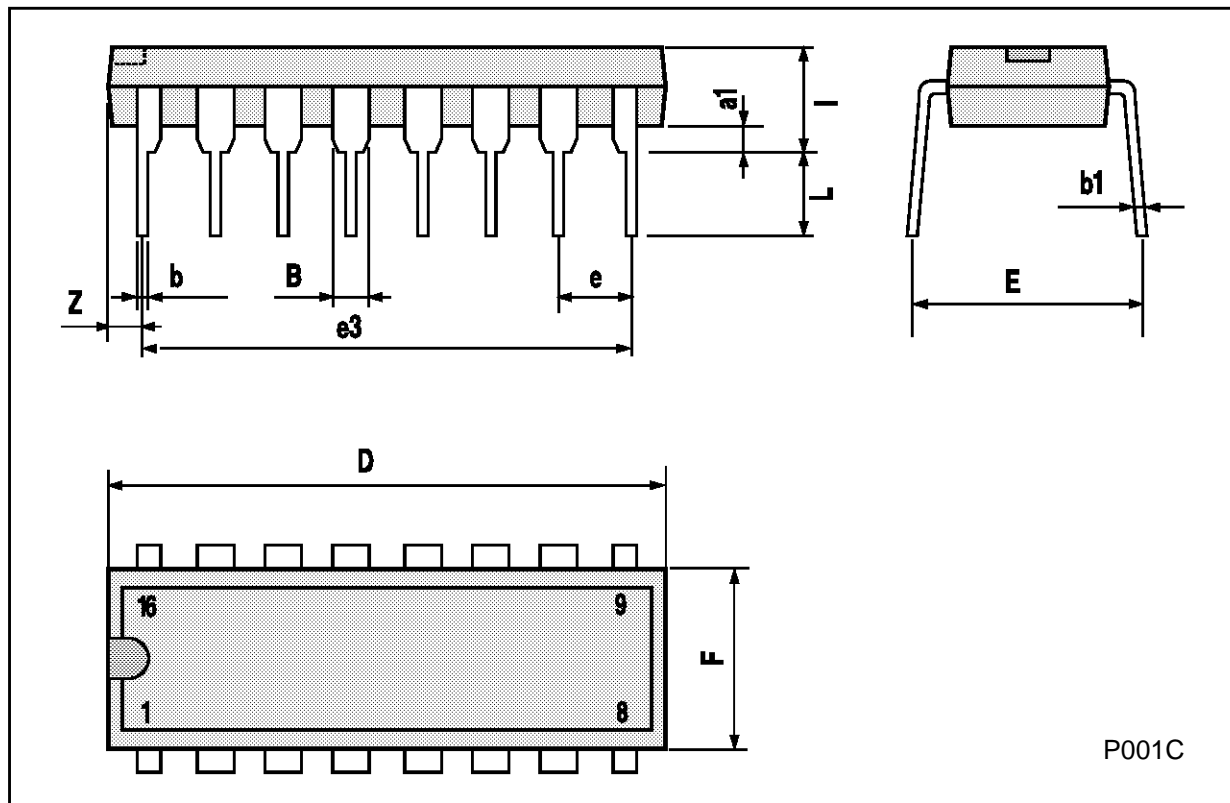
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SWITCHING CHARACTERISTICS TEST WAVEFORM



Plastic DIP16 (0.25) MECHANICAL DATA

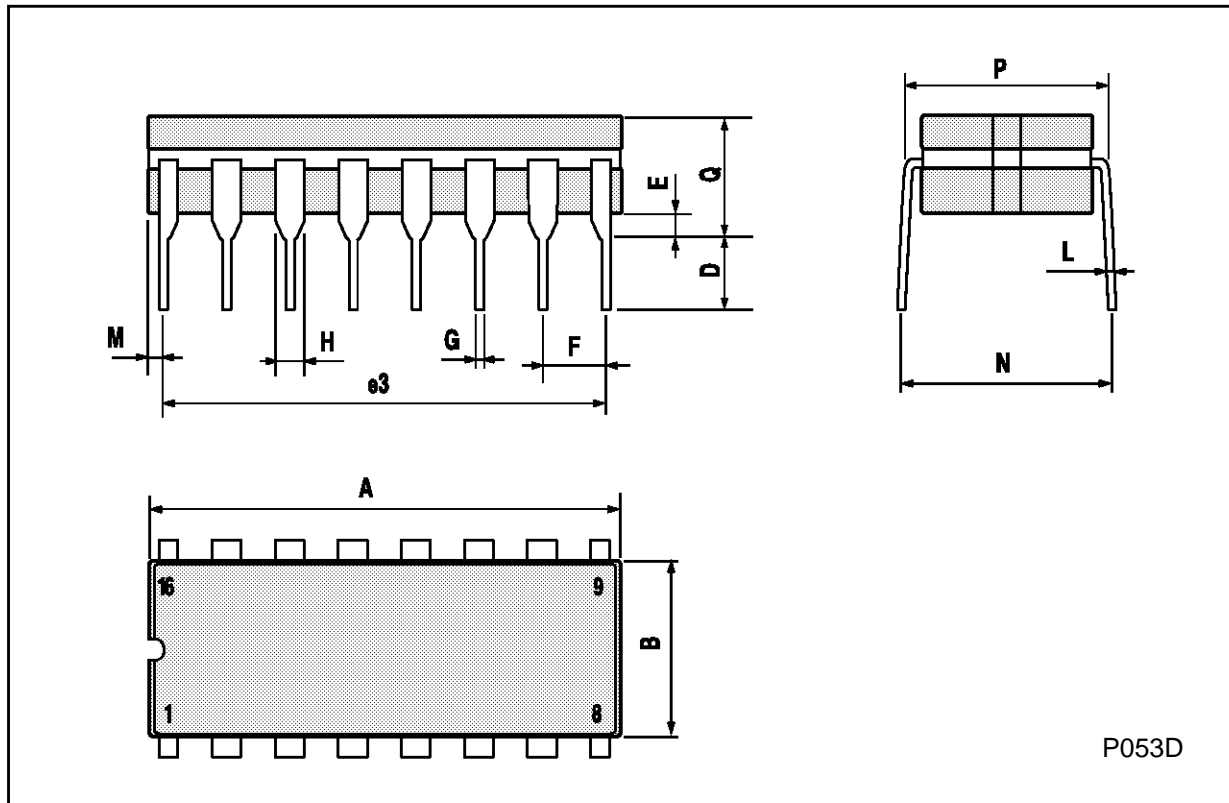
| DIM. | mm | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.51 | | | 0.020 | | |
| B | 0.77 | | 1.65 | 0.030 | | 0.065 |
| b | | 0.5 | | | 0.020 | |
| b1 | | 0.25 | | | 0.010 | |
| D | | | 20 | | | 0.787 |
| E | | 8.5 | | | 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 |



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Ceramic DIP16/1 MECHANICAL DATA

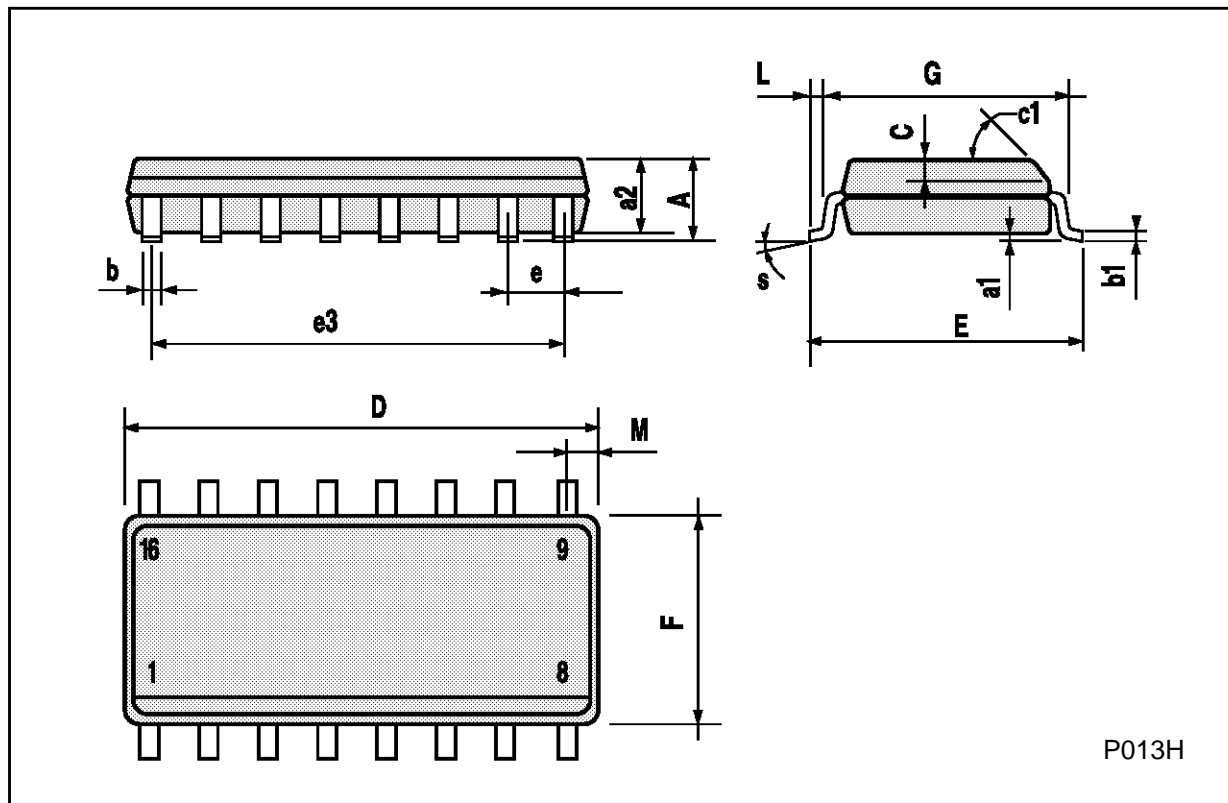
| DIM. | mm | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 20 | | | 0.787 |
| B | | | 7 | | | 0.276 |
| D | | 3.3 | | | 0.130 | |
| E | 0.38 | | | 0.015 | | |
| e3 | | 17.78 | | | 0.700 | |
| F | 2.29 | | 2.79 | 0.090 | | 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 |



P053D

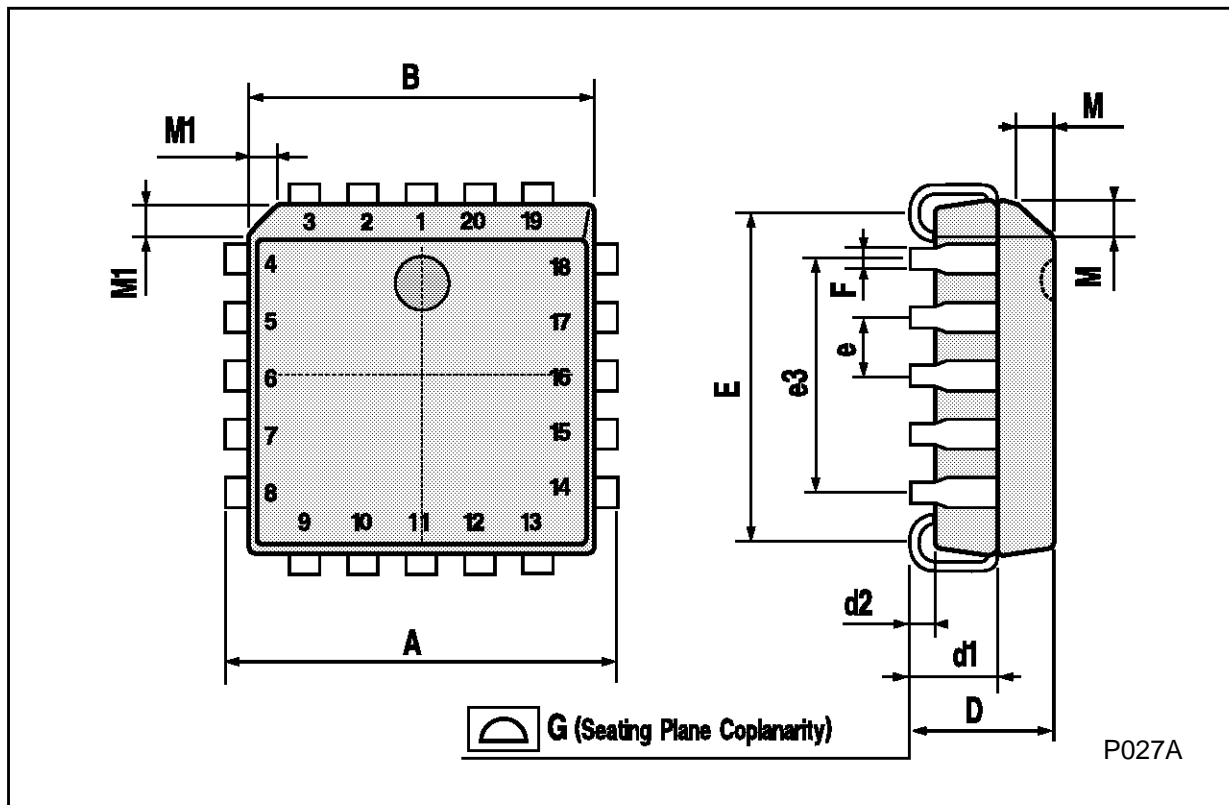
SO16 (Narrow) MECHANICAL DATA

| 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.) | | | | | |



PLCC20 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 9.78 | | 10.03 | 0.385 | | 0.395 |
| B | 8.89 | | 9.04 | 0.350 | | 0.356 |
| D | 4.2 | | 4.57 | 0.165 | | 0.180 |
| d1 | | 2.54 | | | 0.100 | |
| d2 | | 0.56 | | | 0.022 | |
| E | 7.37 | | 8.38 | 0.290 | | 0.330 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 5.08 | | | 0.200 | |
| F | | 0.38 | | | 0.015 | |
| G | | | 0.101 | | | 0.004 |
| M | | 1.27 | | | 0.050 | |
| M1 | | 1.14 | | | 0.045 | |



P027A

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