

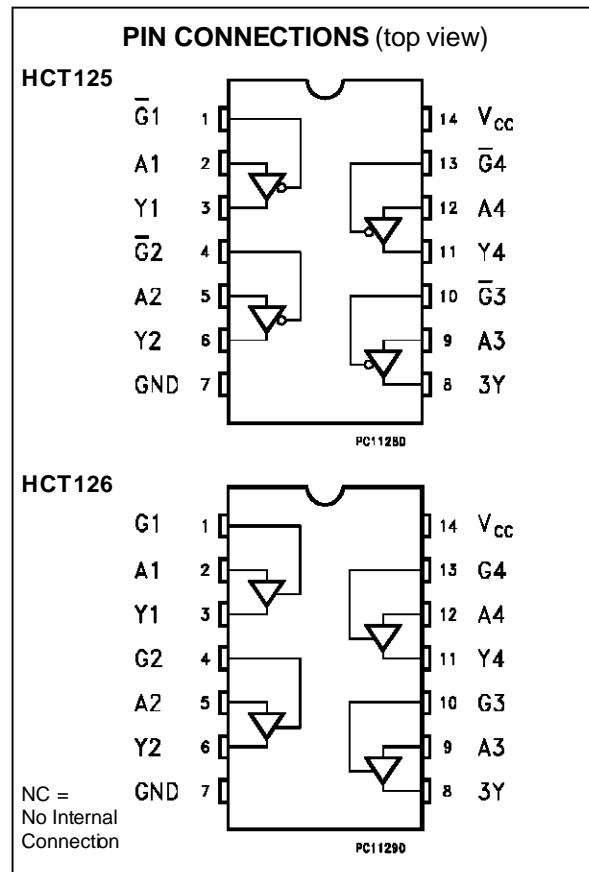
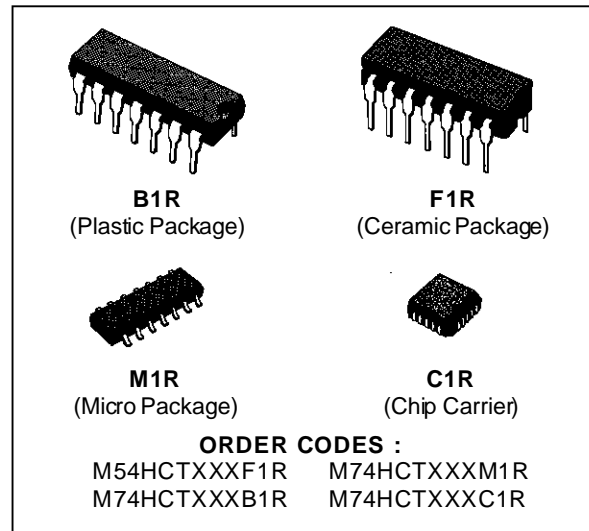
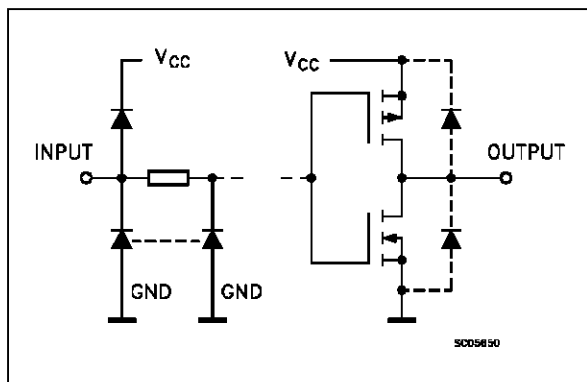
QUAD BUS BUFFERS (3-STATE)

- HIGH SPEED
 $t_{PD} = 12 \text{ ns (TYP.) AT } V_{CC} = 5 \text{ V}$
- LOW POWER DISSIPATION
 $I_{CC} = 4 \mu\text{A (MAX.) AT } 25^\circ\text{C}$
- OUTPUT DRIVE CAPABILITY
 15 LSTTL LOADS
- BALANCED PROPAGATION DELAYS
 $t_{PLH} = t_{PHL}$
- SYMMETRICAL OUTPUT IMPEDANCE
 $I_{OL} = |I_{OH}| = 6 \text{ mA (MIN.)}$
- COMPATIBLE WITH TTL OUTPUTS
 $V_{IH} = 2 \text{ V (MIN.) } V_{IL} = 0.8 \text{ V (MAX.)}$
- PIN AND FUNCTION COMPATIBLE
 WITH 54/74LS125/126

DESCRIPTION

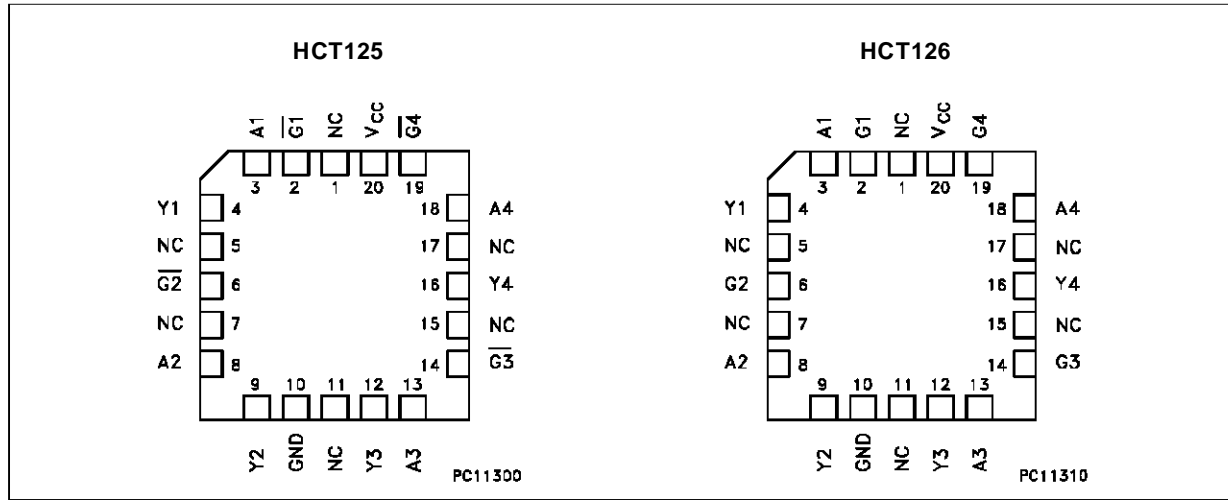
The M54/74HCT125/126 are high speed CMOS QUAD BUS BUFFER (3-STATE) FABRICATED IN SILICON GATE C²MOS technology. They have the same high speed performance of LSTTL combined with true CMOS low power consumption. These devices require the same 3-STATE control input G to be taken high to make the output go into the high impedance state. This integrated circuit has input and output characteristics that are fully compatible with 54/74 LSTTL logic families. M54/74HCT devices are designed to directly interface HSC²MOS systems with TTL and NMOS components. They are also plug in replacements for LSTTL devices giving a reduction of power consumption. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

INPUT AND OUTPUT EQUIVALENT CIRCUIT



M54/M74HCT125/126

CHIP CARRIER



TRUTH TABLE (HCT125)

| A | \overline{G} | Y |
|---|----------------|---|
| X | H | Z |
| L | L | L |
| H | L | H |

TRUTH TABLE (HCT126)

| A | G | Y |
|---|---|---|
| X | L | Z |
| L | H | L |
| H | H | H |

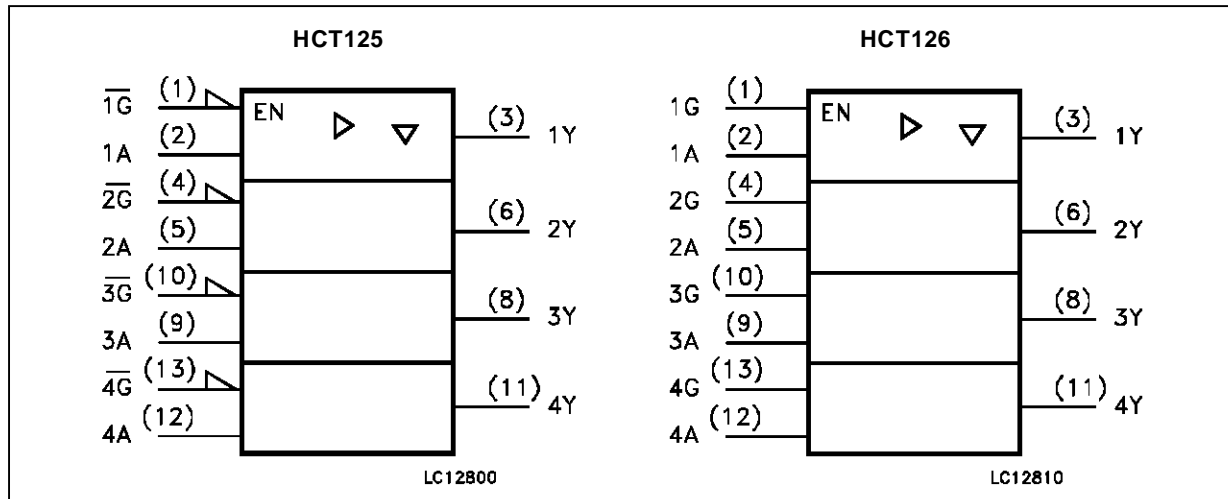
PIN DESCRIPTION (HCT125)

| PIN No | SYMBOL | NAME AND FUNCTION |
|--------------|------------------------------------|-------------------------|
| 1, 4, 10, 13 | $\overline{G1}$ to $\overline{G4}$ | Output Enable Input |
| 2, 5, 9, 12 | A1 to A4 | Data Inputs |
| 3, 6, 8, 11 | Y1 to Y4 | Data Outputs |
| 7 | GND | Ground (0V) |
| 14 | Vcc | Positive Supply Voltage |

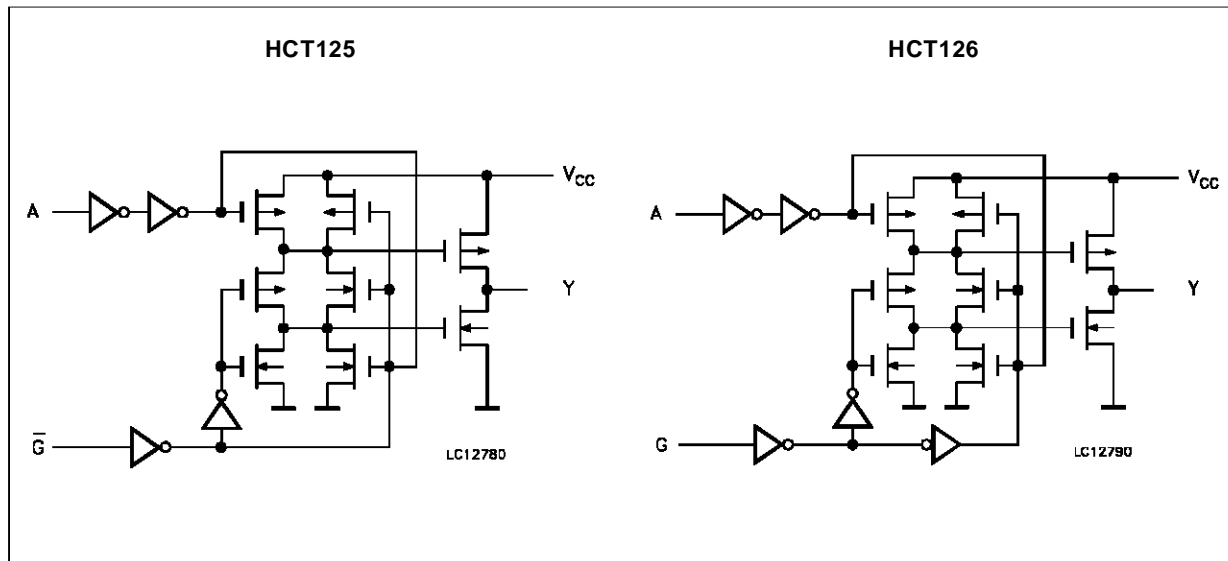
PIN DESCRIPTION (HCT126)

| PIN No | SYMBOL | NAME AND FUNCTION |
|--------------|----------|-------------------------|
| 1, 4, 10, 13 | G1 to G4 | Output Enable Input |
| 2, 5, 9, 12 | A1 to A4 | Data Inputs |
| 3, 6, 8, 11 | Y1 to Y4 | Data Outputs |
| 7 | GND | Ground (0V) |
| 14 | Vcc | Positive Supply Voltage |

IEC LOGIC SYMBOLS



CIRCUIT DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-------------------------------------|--|-------------------------------|------|
| V _{CC} | Supply Voltage | -0.5 to +7 | V |
| V _I | DC Input Voltage | -0.5 to V _{CC} + 0.5 | V |
| V _O | DC Output Voltage | -0.5 to V _{CC} + 0.5 | V |
| I _{IK} | DC Input Diode Current | ± 20 | mA |
| I _{OK} | DC Output Diode Current | ± 20 | mA |
| I _O | DC Output Source Sink Current Per Output Pin | ± 35 | mA |
| I _{CC} or I _{GND} | DC V _{CC} or Ground Current | ± 70 | mA |
| P _D | Power Dissipation | 500 (*) | mW |
| T _{stg} | Storage Temperature | -65 to +150 | °C |
| T _L | Lead Temperature (10 sec) | 300 | °C |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions 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 _{CC} | Supply Voltage | 4.5 to 5.5 | 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} = 4.5 to 5.5V) | 0 to 500 | ns |

DC SPECIFICATIONS

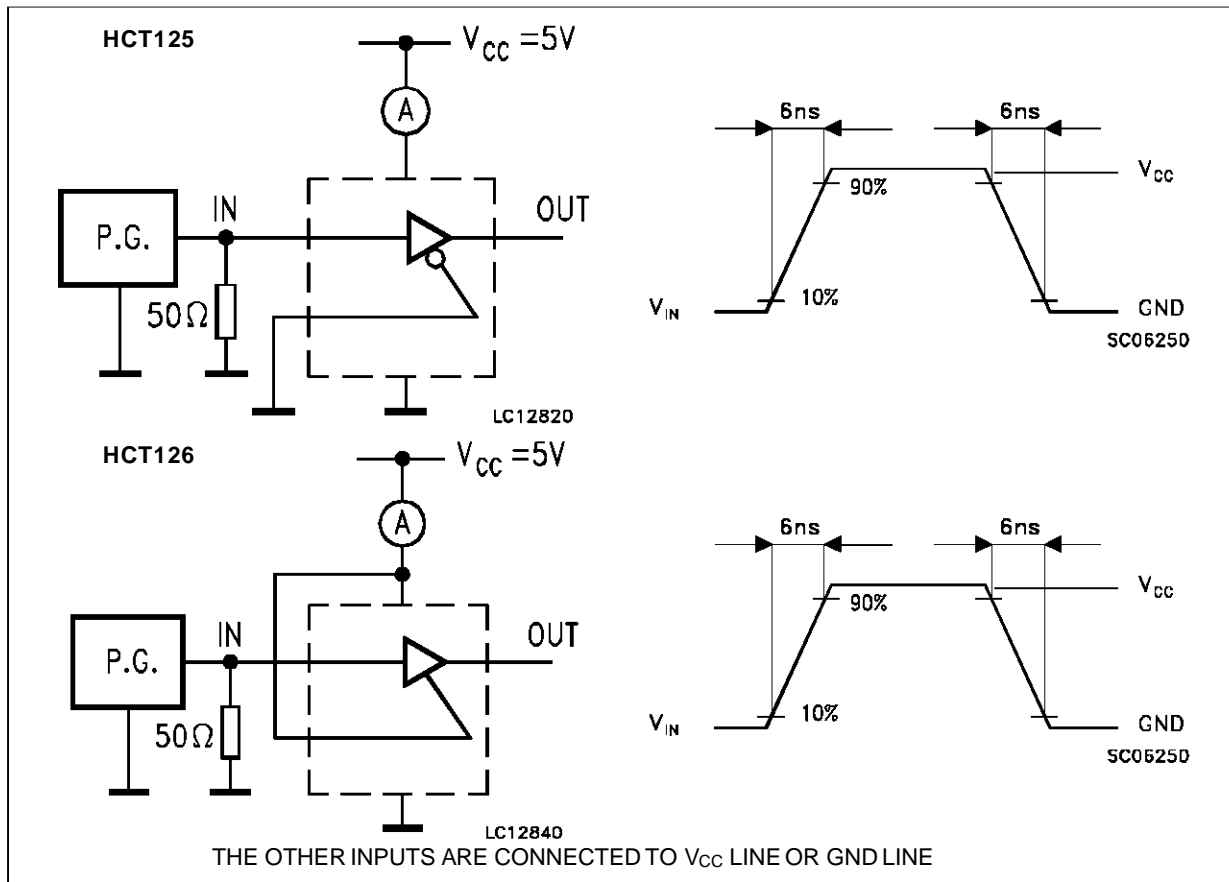
| Symbol | Parameter | Test Conditions | | Value | | | | | | Unit | | |
|------------------|--------------------------------------|------------------------|---|---|------|------|----------------------|------|-----------------------|------|------|----|
| | | V _{CC} (V) | | T _A = 25 °C 54HC and 74HC | | | -40 to 85 °C 74HC | | -55 to 125 °C 54HC | | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | | Max. | |
| V _{IH} | High Level Input Voltage | 4.5 to 5.5 | | 2.0 | | | 2.0 | | 2.0 | | V | |
| V _{IL} | Low Level Input Voltage | 4.5 to 5.5 | | | | 0.8 | | 0.8 | | 0.8 | V | |
| V _{OH} | High Level Output Voltage | 4.5 | V _I = V _{IH} or V _{IL} | I _O = -20 μA | 4.4 | 4.5 | | 4.4 | | 4.4 | V | |
| | | | | I _O = -6.0 mA | 4.18 | 4.31 | | 4.13 | | 4.10 | | |
| V _{OL} | Low Level Output Voltage | 4.5 | V _I = V _{IH} or V _{IL} | I _O = 20 μA | | 0.0 | 0.1 | | 0.1 | | 0.1 | V |
| | | | | I _O = 6.0 mA | | 0.17 | 0.26 | | 0.33 | | 0.4 | |
| I _I | Input Leakage Current | 5.5 | V _I = V _{CC} or GND | | | | ±0.1 | | ±1 | | ±1 | μA |
| I _{CC} | Quiescent Supply Current | 5.5 | V _I = V _{CC} or GND | | | | 4 | | 40 | | 80 | μA |
| I _{OZ} | 3 State Output Off State Current | 6.0 | V _I = V _{IH} or V _{IL} V _O = V _{CC} or GND | | | | ±0.5 | | ±5 | | ±10 | μA |
| ΔI _{CC} | Additional worst case supply current | 5.5 | Per Input pin V _I = 0.5V or V _I = 2.4V Other Inputs at V _{CC} or GND I _O = 0 | | | | 2.0 | | 2.9 | | 3.0 | mA |

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 6 ns)

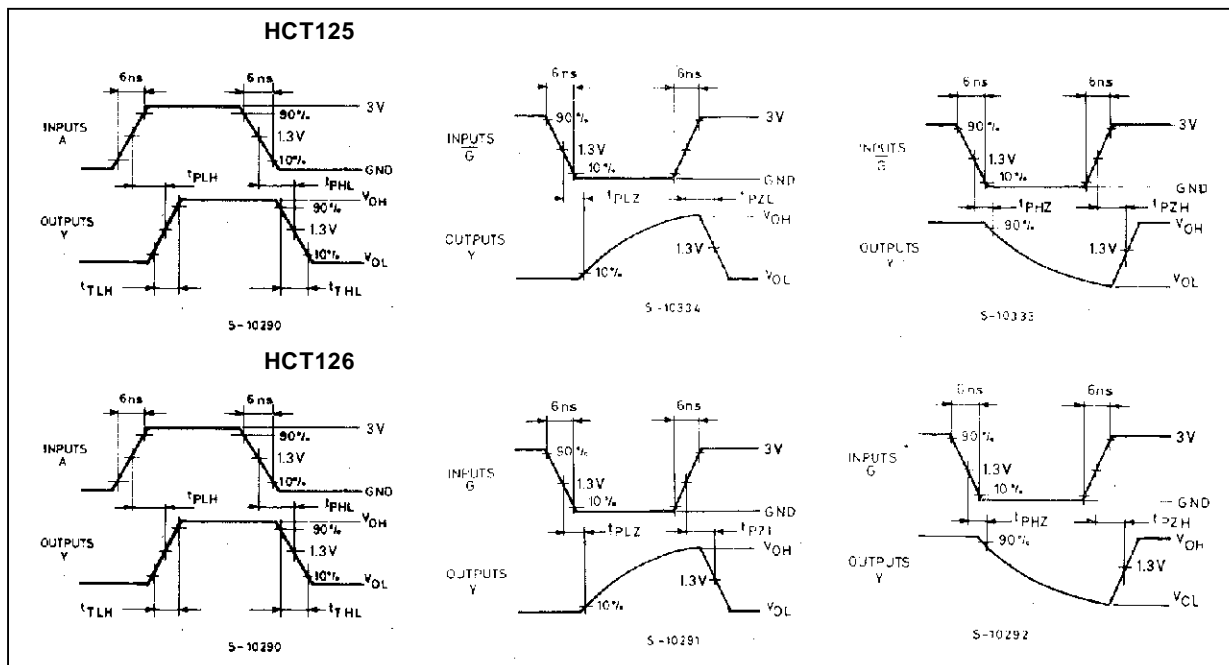
| Symbol | Parameter | Test Conditions | | Value | | | | | | Unit | |
|--------------------------------------|-------------------------------|------------------------|------------------------|---|------|------|----------------------|------|-----------------------|------|------|
| | | V _{CC} (V) | C _L (pF) | T _A = 25 °C 54HC and 74HC | | | -40 to 85 °C 74HC | | -55 to 125 °C 54HC | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | | Max. |
| t _{TLH} t _{THL} | Output Transition Time | 4.5 | 50 | | 7 | 12 | | 15 | | 18 | ns |
| t _{PLH} t _{PHL} | Propagation Delay Time | 4.5 | 50 | | 13 | 21 | | 26 | | 32 | ns |
| | | 4.5 | 150 | | 17 | 27 | | 34 | | 41 | ns |
| t _{PZL} t _{PZH} | 3 State Output Enable Time | 4.5 | 50 | R _L = 1 KΩ | 15 | 24 | | 30 | | 36 | ns |
| | | 4.5 | 150 | R _L = 1 KΩ | 19 | 30 | | 38 | | 45 | ns |
| t _{PLZ} t _{PHZ} | 3 State Output Disable Time | 4.5 | 50 | R _L = 1 KΩ | 17 | 24 | | 30 | | 36 | ns |
| | | | | | | | | | | | |
| C _{IN} | Input Capacitance | | | | 5 | 10 | | 10 | | 10 | pF |
| C _{PD} (*) | Power Dissipation Capacitance | | | | 56 | | | | | | 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} • V_{CC} • f_{IN} + I_{CC}

TEST CIRCUIT I_{CC} (Opr.)

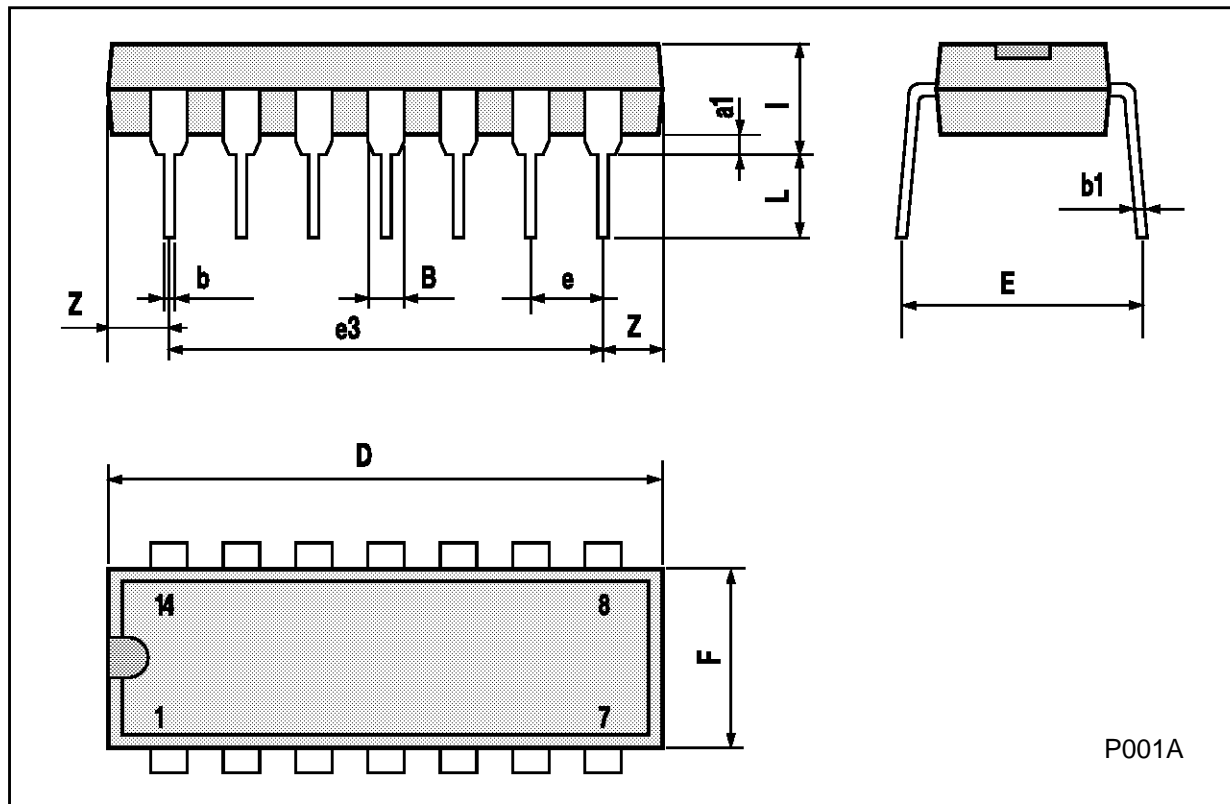


SWITCHING CHARACTERISTICS TEST WAVEFORM



Plastic DIP14 MECHANICAL DATA

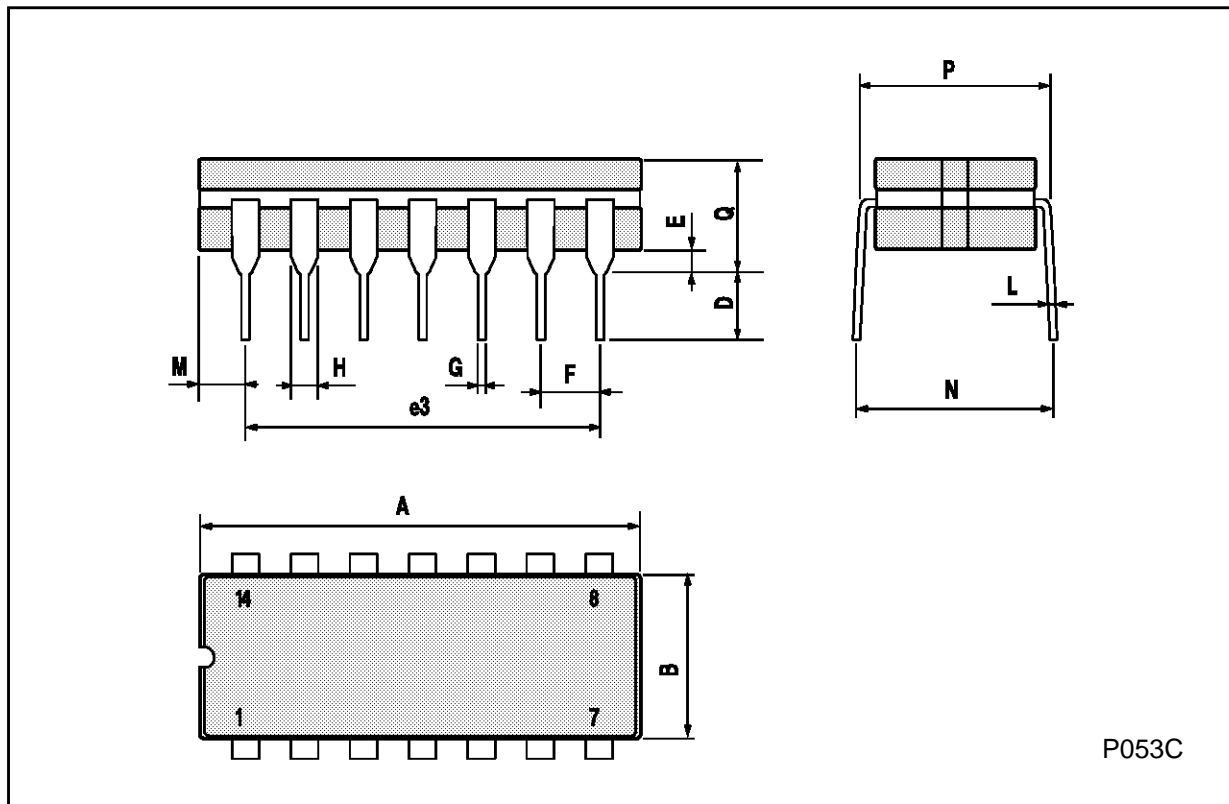
| DIM. | mm | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.51 | | | 0.020 | | |
| B | 1.39 | | 1.65 | 0.055 | | 0.065 |
| b | | 0.5 | | | 0.020 | |
| b1 | | 0.25 | | | 0.010 | |
| D | | | 20 | | | 0.787 |
| E | | 8.5 | | | 0.335 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 15.24 | | | 0.600 | |
| F | | | 7.1 | | | 0.280 |
| I | | | 5.1 | | | 0.201 |
| L | | 3.3 | | | 0.130 | |
| Z | 1.27 | | 2.54 | 0.050 | | 0.100 |



P001A

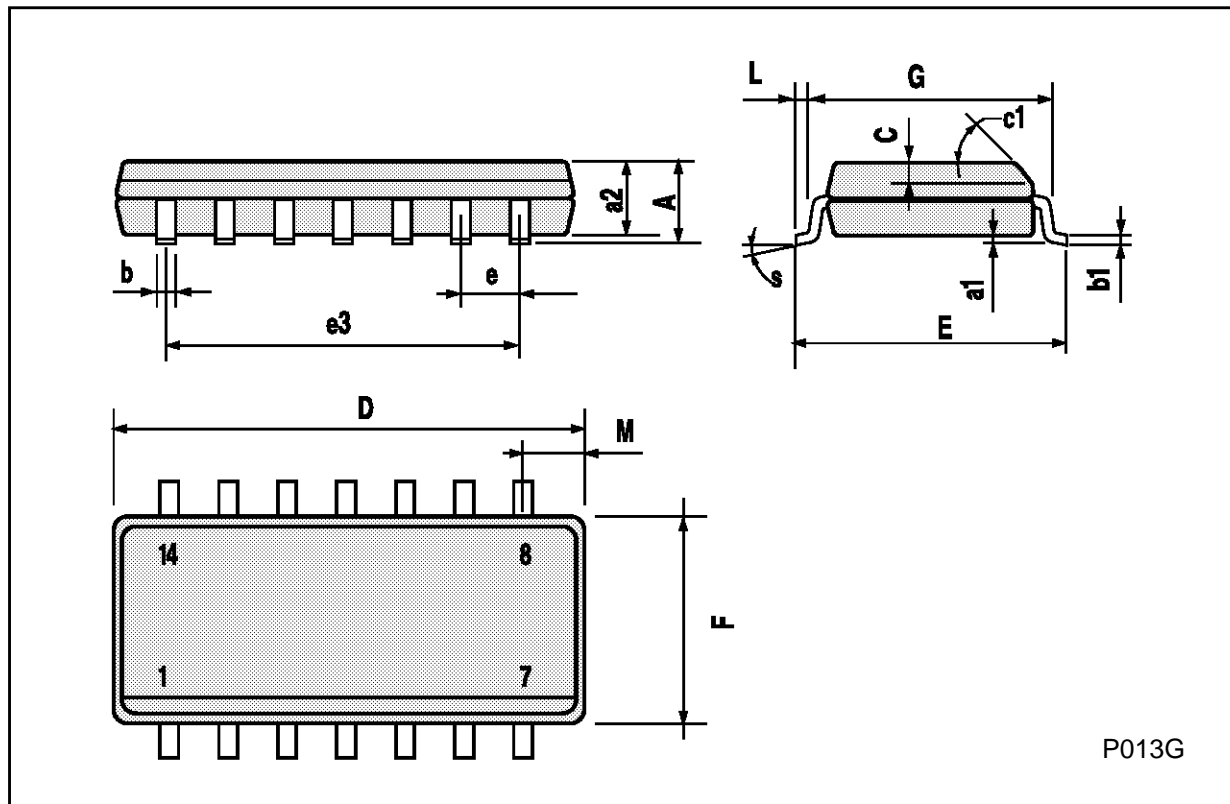
Ceramic DIP14/1 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 20 | | | 0.787 |
| B | | | 7.0 | | | 0.276 |
| D | | 3.3 | | | 0.130 | |
| E | 0.38 | | | 0.015 | | |
| e3 | | 15.24 | | | 0.600 | |
| 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 | 1.52 | | 2.54 | 0.060 | | 0.100 |
| N | | | 10.3 | | | 0.406 |
| P | 7.8 | | 8.05 | 0.307 | | 0.317 |
| Q | | | 5.08 | | | 0.200 |



SO14 MECHANICAL DATA

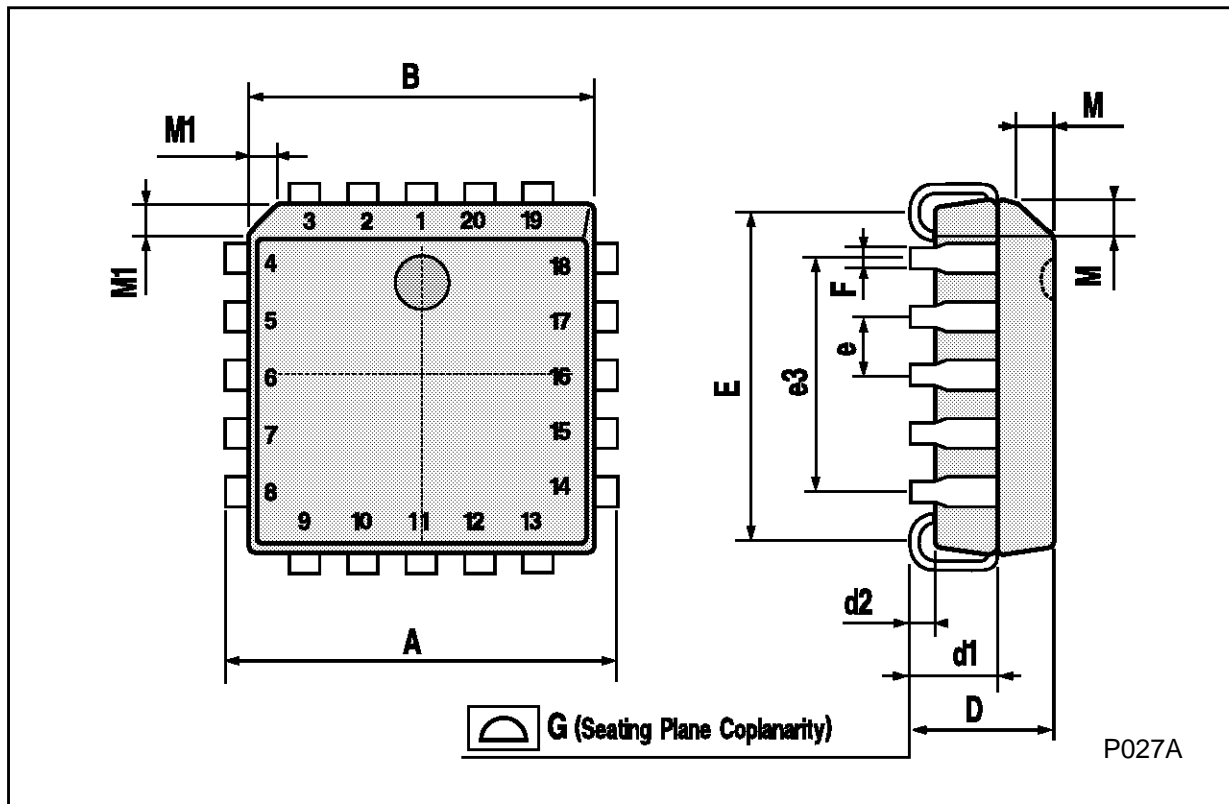
| DIM. | mm | | | inch | | |
|------|------------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.2 | 0.003 | | 0.007 |
| a2 | | | 1.65 | | | 0.064 |
| b | 0.35 | | 0.46 | 0.013 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | | 0.5 | | | 0.019 | |
| c1 | 45° (typ.) | | | | | |
| D | 8.55 | | 8.75 | 0.336 | | 0.344 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 7.62 | | | 0.300 | |
| 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 | | | 0.68 | | | 0.026 |
| S | 8° (max.) | | | | | |



P013G

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 | |



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