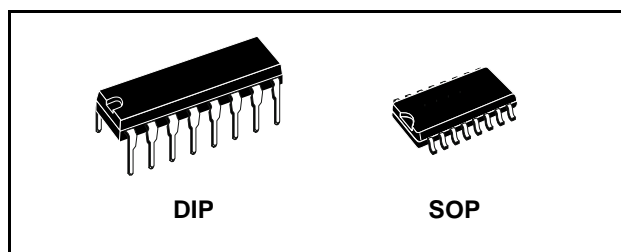


## 8-BIT PRIORITY ENCODER

- CONVERTS FROM 1 TO 8 TO INPUTS BINARY
- PROVIDES CASCADING FEATURE TO HANDLE ANY NUMBER OF INPUTS
- GROUP SELECT INDICATES ONE OR MORE PRIORITY INPUTS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT  
 $I_l = 100\text{nA (MAX) AT } V_{DD} = 18\text{V } T_A = 25^\circ\text{C}$
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B "STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"

### DESCRIPTION

HCF4532B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. HCF4532B consists of a combinational logic that encodes the highest priority input (D7-D0) to a 3-bit binary code. The eight inputs, D7 through D0,



### ORDER CODES

| PACKAGE | TUBE       | T & R         |
|---------|------------|---------------|
| DIP     | HCF4532BEY |               |
| SOP     | HCF4532BM1 | HCF4532M013TR |

each have an assigned priority. D7 is the highest priority and D0 is the lowest. The priority encoder is inhibited when the chip enable input  $E_1$  is low. When  $E_1$  is high the binary representation of the highest priority input appears on output lines Q2-Q0, and the group select line GS is high to indicate that priority inputs are present. The enable out ( $E_0$ ) is high when no priority inputs are present. If any input is high,  $E_0$  is low and all cascaded lower order stages are disabled.

### PIN CONNECTION

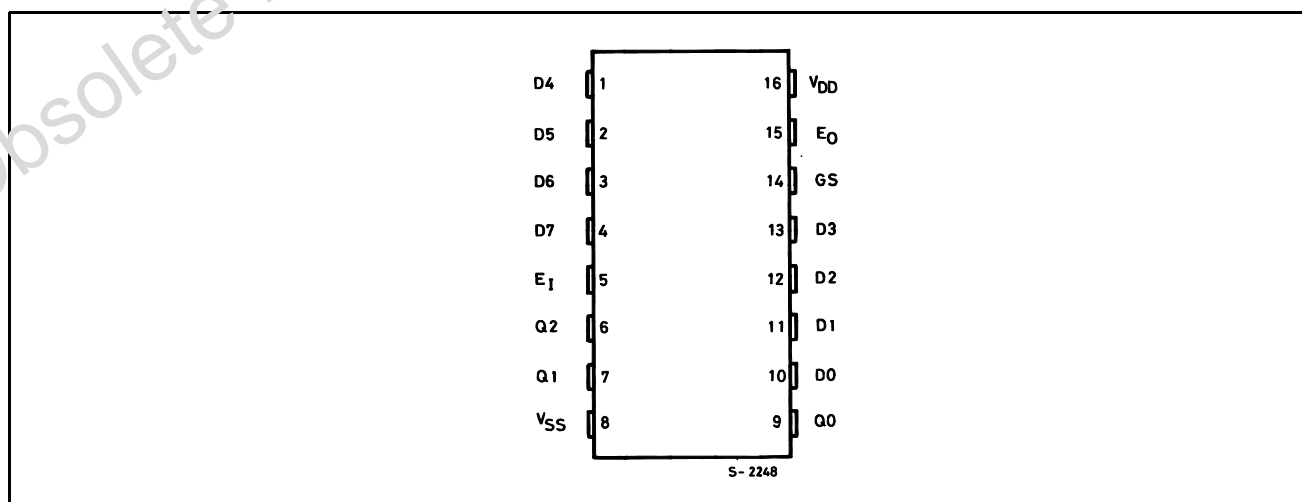


Figure 1: Input Equivalent Circuit

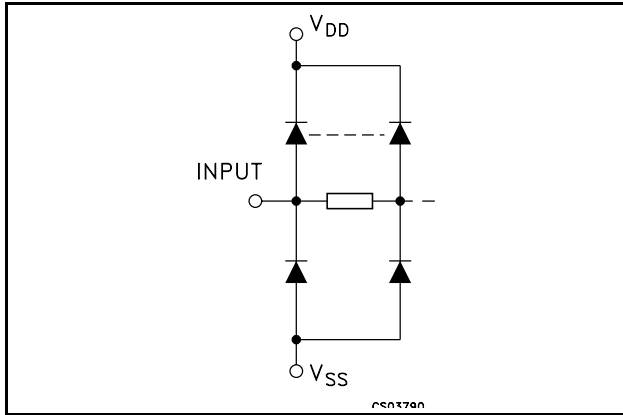


Table 1: Pin Description

| PIN N°                     | SYMBOL          | NAME AND FUNCTION       |
|----------------------------|-----------------|-------------------------|
| 10, 11, 12, 13, 1, 2, 3, 4 | D0 to D7        | Data Inputs             |
| 9, 7, 6                    | Q0 to Q2        | Data Output Lines       |
| 5                          | E <sub>I</sub>  | Chip Enable Input       |
| 15                         | E <sub>O</sub>  | Enable Output           |
| 14                         | GS              | Group Select Line       |
| 8                          | V <sub>SS</sub> | Negative Supply Voltage |
| 16                         | V <sub>DD</sub> | Positive Supply Voltage |

Figure 2: Functional Diagram

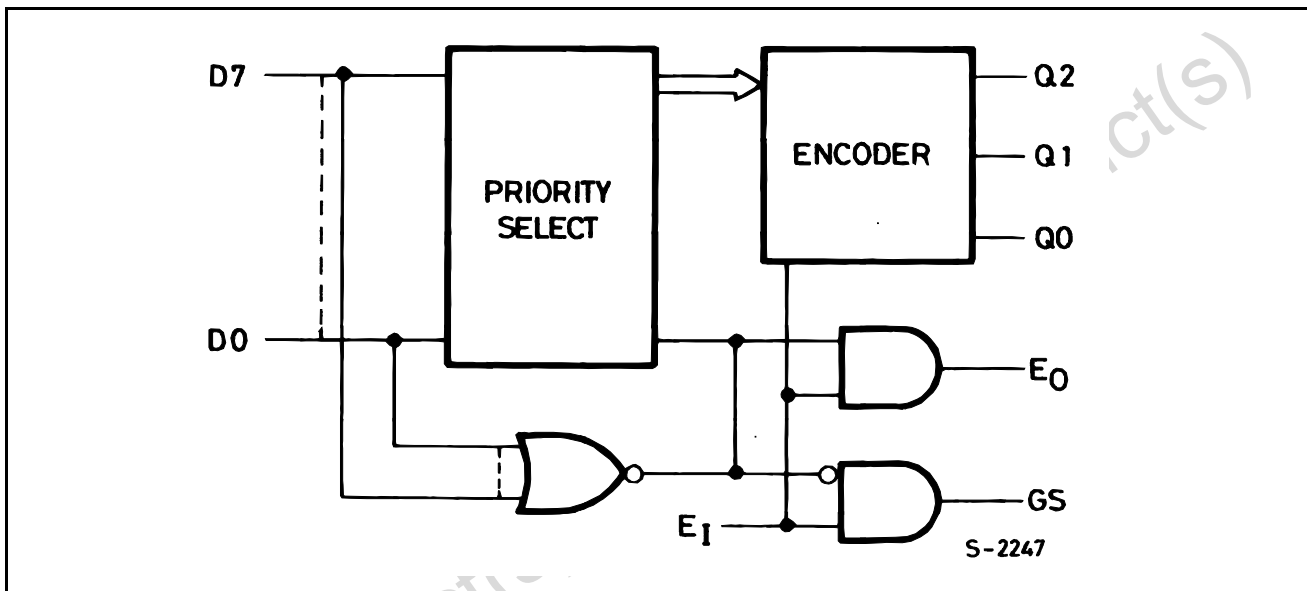


Table 2: Truth Table

| INPUTS         |    |    |    |    |    |    |    |    | OUTPUTS |    |    |    |                |
|----------------|----|----|----|----|----|----|----|----|---------|----|----|----|----------------|
| E <sub>I</sub> | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | GS      | Q2 | Q1 | Q0 | E <sub>O</sub> |
| L              | X  | X  | X  | X  | X  | X  | X  | X  | L       | L  | L  | L  | L              |
| H              | L  | L  | L  | L  | L  | L  | L  | L  | L       | L  | L  | L  | H              |
| H              | H  | X  | X  | X  | X  | X  | X  | X  | H       | H  | H  | H  | L              |
| H              | L  | H  | X  | X  | X  | X  | X  | X  | H       | H  | H  | L  | L              |
| H              | L  | L  | H  | X  | X  | X  | X  | X  | H       | H  | L  | H  | L              |
| H              | L  | L  | L  | H  | X  | X  | X  | X  | H       | H  | L  | L  | L              |
| H              | L  | L  | L  | L  | H  | X  | X  | X  | H       | L  | H  | H  | L              |
| H              | L  | L  | L  | L  | L  | H  | X  | X  | H       | L  | H  | L  | L              |
| H              | L  | L  | L  | L  | L  | L  | H  | X  | H       | L  | L  | H  | L              |
| H              | L  | L  | L  | L  | L  | L  | L  | H  | H       | L  | L  | L  | L              |

X : Don't Care

Figure 3: Logic Diagram

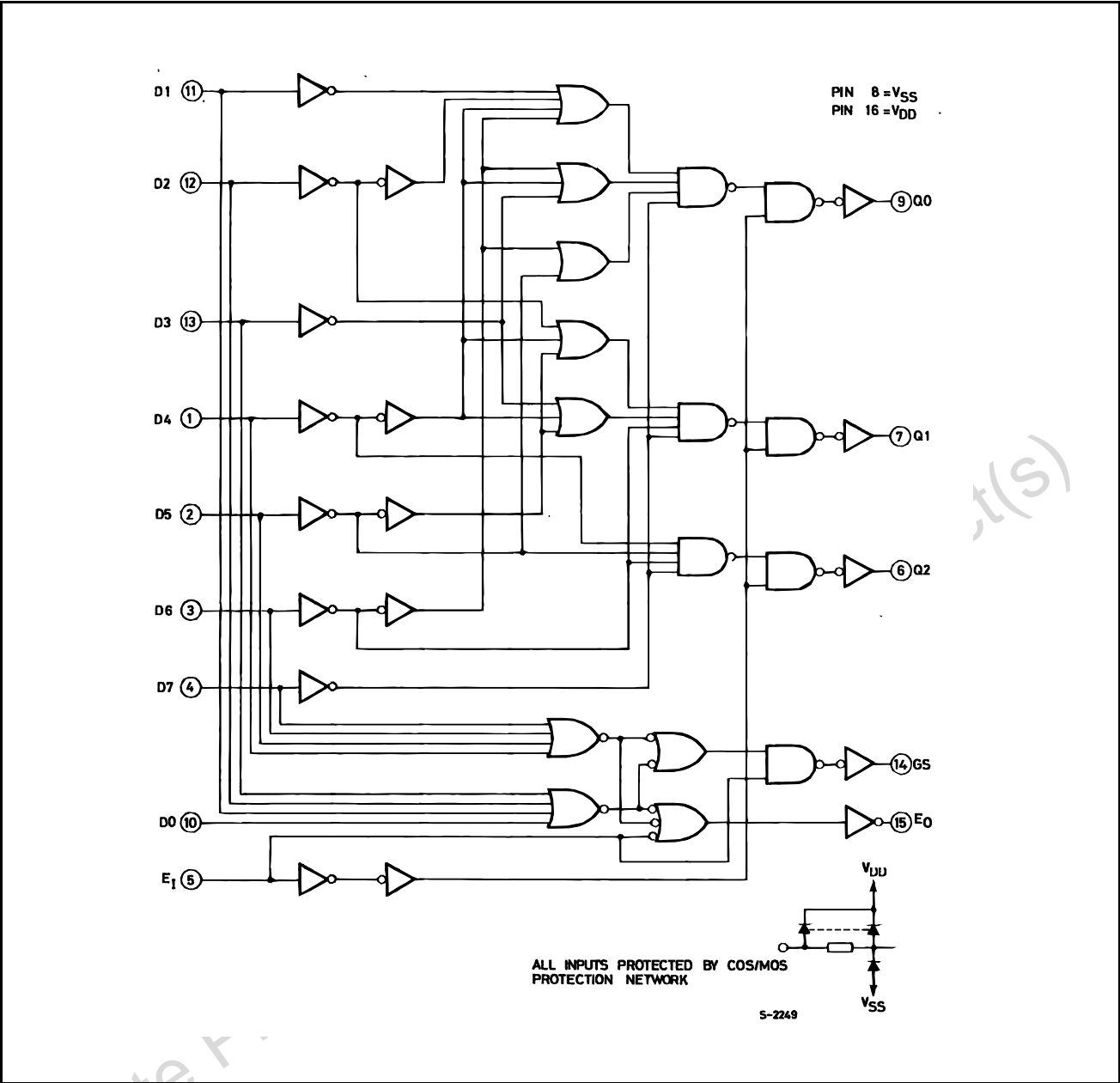


Table 3: Absolute Maximum Ratings

| Symbol    | Parameter                               | Value                  | Unit        |
|-----------|---|------------------------|-------------|
| $V_{DD}$  | Supply Voltage                          | -0.5 to +22            | V           |
| $V_I$     | DC Input Voltage                        | -0.5 to $V_{DD} + 0.5$ | V           |
| $I_I$     | DC Input Current                        | $\pm 10$               | mA          |
| $P_D$     | Power Dissipation per Package           | 200                    | mW          |
|           | Power Dissipation per Output Transistor | 100                    | mW          |
| $T_{op}$  | Operating Temperature                   | -55 to +125            | $^{\circ}C$ |
| $T_{stg}$ | Storage Temperature                     | -65 to +150            | $^{\circ}C$ |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. All voltage values are referred to  $V_{SS}$  pin voltage.



Table 4: Recommended Operating Conditions

| Symbol   | Parameter             | Value         | Unit |
|----------|-----------------------|---------------|------|
| $V_{DD}$ | Supply Voltage        | 3 to 20       | V    |
| $V_I$    | Input Voltage         | 0 to $V_{DD}$ | V    |
| $T_{op}$ | Operating Temperature | -55 to 125    | °C   |

Table 5: DC Specifications

| Symbol   | Parameter                 | Test Condition |              |                       |                 | Value                    |               |           |                             |         |                              | Unit    |         |
|----------|---------------------------|----------------|--------------|-----------------------|-----------------|--------------------------|---------------|-----------|-----------------------------|---------|------------------------------|---------|---------|
|          |                           | $V_I$<br>(V)   | $V_O$<br>(V) | $ I_O $<br>( $\mu$ A) | $V_{DD}$<br>(V) | $T_A = 25^\circ\text{C}$ |               |           | $-40$ to $85^\circ\text{C}$ |         | $-55$ to $125^\circ\text{C}$ |         |         |
|          |                           |                |              |                       |                 | Min.                     | Typ.          | Max.      | Min.                        | Max.    | Min.                         |         | Max.    |
| $I_L$    | Quiescent Current         | 0/5            |              |                       | 5               |                          | 0.04          | 5         |                             | 150     |                              | 150     | $\mu$ A |
|          |                           | 0/10           |              |                       | 10              |                          | 0.04          | 10        |                             | 300     |                              | 300     |         |
|          |                           | 0/15           |              |                       | 15              |                          | 0.04          | 20        |                             | 600     |                              | 600     |         |
|          |                           | 0/20           |              |                       | 20              |                          | 0.08          | 100       |                             | 3000    |                              | 3000    |         |
| $V_{OH}$ | High Level Output Voltage | 0/5            |              | <1                    | 5               | 4.95                     |               |           | 4.95                        |         | 4.95                         |         | V       |
|          |                           | 0/10           |              | <1                    | 10              | 9.95                     |               |           | 9.95                        |         | 9.95                         |         |         |
|          |                           | 0/15           |              | <1                    | 15              | 14.95                    |               |           | 14.95                       |         | 14.95                        |         |         |
| $V_{OL}$ | Low Level Output Voltage  | 5/0            |              | <1                    | 5               |                          | 0.05          |           |                             | 0.05    |                              | 0.05    | V       |
|          |                           | 10/0           |              | <1                    | 10              |                          | 0.05          |           |                             | 0.05    |                              | 0.05    |         |
|          |                           | 15/0           |              | <1                    | 15              |                          | 0.05          |           |                             | 0.05    |                              | 0.05    |         |
| $V_{IH}$ | High Level Input Voltage  |                | 0.5/4.5      | <1                    | 5               | 3.5                      |               |           | 3.5                         |         | 3.5                          |         | V       |
|          |                           |                | 1/9          | <1                    | 10              | 7                        |               |           | 7                           |         | 7                            |         |         |
|          |                           |                | 1.5/13.5     | <1                    | 15              | 11                       |               |           | 11                          |         | 11                           |         |         |
| $V_{IL}$ | Low Level Input Voltage   |                | 4.5/0.5      | <1                    | 5               |                          |               | 1.5       |                             | 1.5     |                              | 1.5     | V       |
|          |                           |                | 9/1          | <1                    | 10              |                          |               | 3         |                             | 3       |                              | 3       |         |
|          |                           |                | 13.5/1.5     | <1                    | 15              |                          |               | 4         |                             | 4       |                              | 4       |         |
| $I_{OH}$ | Output Drive Current      | 0/5            | 2.5          | <1                    | 5               | -1.36                    | -3.2          |           | -1.1                        |         | -1.1                         |         | mA      |
|          |                           | 0/5            | 4.6          | <1                    | 5               | -0.44                    | -1            |           | -0.36                       |         | -0.36                        |         |         |
|          |                           | 0/10           | 9.5          | <1                    | 10              | -1.1                     | -2.6          |           | -0.9                        |         | -0.9                         |         |         |
|          |                           | 0/15           | 13.5         | <1                    | 15              | -3.0                     | -6.8          |           | -2.4                        |         | -2.4                         |         |         |
| $I_{OL}$ | Output Sink Current       | 0/5            | 0.4          | <1                    | 5               | 0.44                     | 1             |           | 0.36                        |         | 0.36                         |         | mA      |
|          |                           | 0/10           | 0.5          | <1                    | 10              | 1.1                      | 2.6           |           | 0.9                         |         | 0.9                          |         |         |
|          |                           | 0/15           | 1.5          | <1                    | 15              | 3.0                      | 6.8           |           | 2.4                         |         | 2.4                          |         |         |
| $I_I$    | Input Leakage Current     | 0/18           | Any Input    |                       | 18              |                          | $\pm 10^{-5}$ | $\pm 0.1$ |                             | $\pm 1$ |                              | $\pm 1$ | $\mu$ A |
| $C_I$    | Input Capacitance         |                | Any Input    |                       |                 |                          | 5             | 7.5       |                             |         |                              |         | pF      |

The Noise Margin for both "1" and "0" level is: 1V min. with  $V_{DD}=5V$ , 2V min. with  $V_{DD}=10V$ , 2.5V min. with  $V_{DD}=15V$

**Table 6: Dynamic Electrical Characteristics** ( $T_{amb} = 25^{\circ}C$ ,  $C_L = 50pF$ ,  $R_L = 200K\Omega$ ,  $t_r = t_f = 20 ns$ )

| Symbol              | Parameter  | Test Condition |  | Value (*) |      |      | Unit |
|---------------------|--|----------------|--|-----------|------|------|------|
|                     |  | $V_{DD}$ (V)   |  | Min.      | Typ. | Max. |      |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time (E <sub>1</sub> to E <sub>0</sub> , E <sub>1</sub> to GS) | 5              |  |           | 110  | 220  | ns   |
|                     |  | 10             |  |           | 55   | 110  |      |
|                     |  | 15             |  |           | 45   | 85   |      |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time (E <sub>1</sub> to Q <sub>m</sub> , D <sub>n</sub> to GS) | 5              |  |           | 170  | 340  | ns   |
|                     |  | 10             |  |           | 85   | 170  |      |
|                     |  | 15             |  |           | 65   | 125  |      |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time (D <sub>n</sub> to Q <sub>m</sub> )                       | 5              |  |           | 220  | 440  | ns   |
|                     |  | 10             |  |           | 110  | 220  |      |
|                     |  | 15             |  |           | 85   | 160  |      |
| $t_{TLH}$ $t_{THL}$ | Transition Time  | 5              |  |           | 100  | 200  | ns   |
|                     |  | 10             |  |           | 50   | 100  |      |
|                     |  | 15             |  |           | 40   | 80   |      |

(\*) Typical temperature coefficient for all  $V_{DD}$  value is 0.3 %/°C.

**TYPICAL APPLICATIONS**

**Figure 4: 16-Level Priority Encoder**

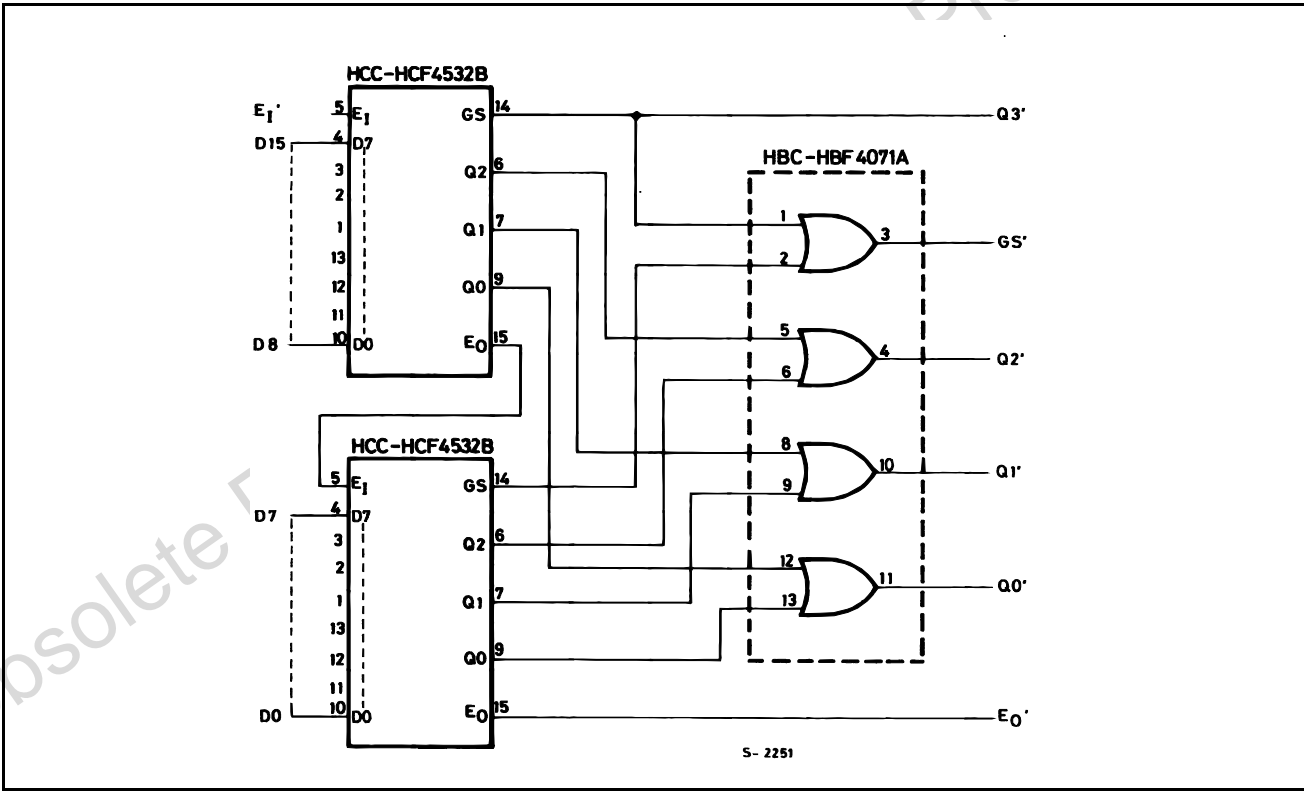


Figure 5: 0 To 9 Keyboard Encoder

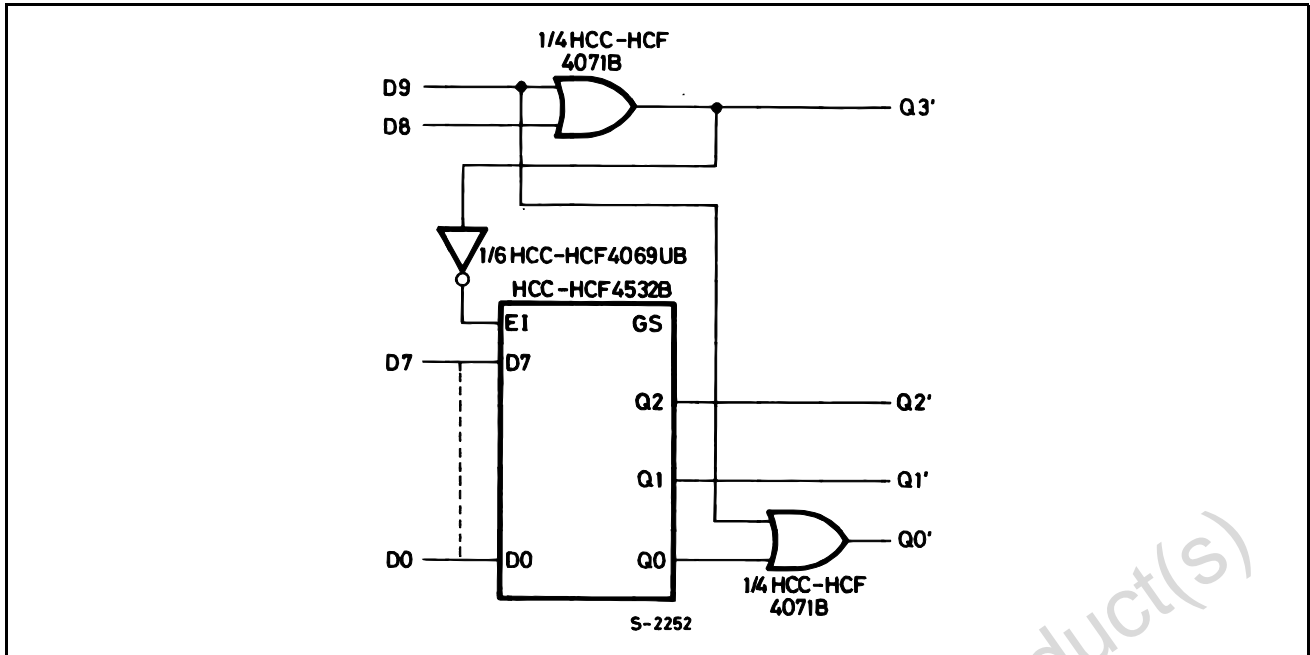


Table 7: Truth Table

| INPUTS |    |    |    |    |    |    |    |    |    | OUTPUTS |     |     |     |    |
|--------|----|----|----|----|----|----|----|----|----|---------|-----|-----|-----|----|
| D9     | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | GS      | Q3' | Q2' | Q1' | Q0 |
| H      | X  | X  | X  | X  | X  | X  | X  | X  | X  | L       | H   | L   | L   | H  |
| L      | H  | X  | X  | X  | X  | X  | X  | X  | X  | L       | H   | L   | L   | L  |
| L      | L  | H  | X  | X  | X  | X  | X  | X  | X  | H       | L   | H   | H   | H  |
| L      | L  | L  | H  | X  | X  | X  | X  | X  | X  | H       | L   | H   | H   | L  |
| L      | L  | L  | L  | H  | X  | X  | X  | X  | X  | H       | L   | H   | L   | H  |
| L      | L  | L  | L  | L  | H  | X  | X  | X  | X  | H       | L   | H   | L   | L  |
| L      | L  | L  | L  | L  | L  | H  | X  | X  | X  | H       | L   | L   | H   | H  |
| L      | L  | L  | L  | L  | L  | L  | H  | X  | X  | H       | L   | L   | H   | L  |
| L      | L  | L  | L  | L  | L  | L  | L  | H  | X  | H       | L   | L   | L   | H  |
| L      | L  | L  | L  | L  | L  | L  | L  | L  | H  | H       | L   | L   | L   | L  |

X : Don't Care

Figure 6: Digital To Analog Conversion

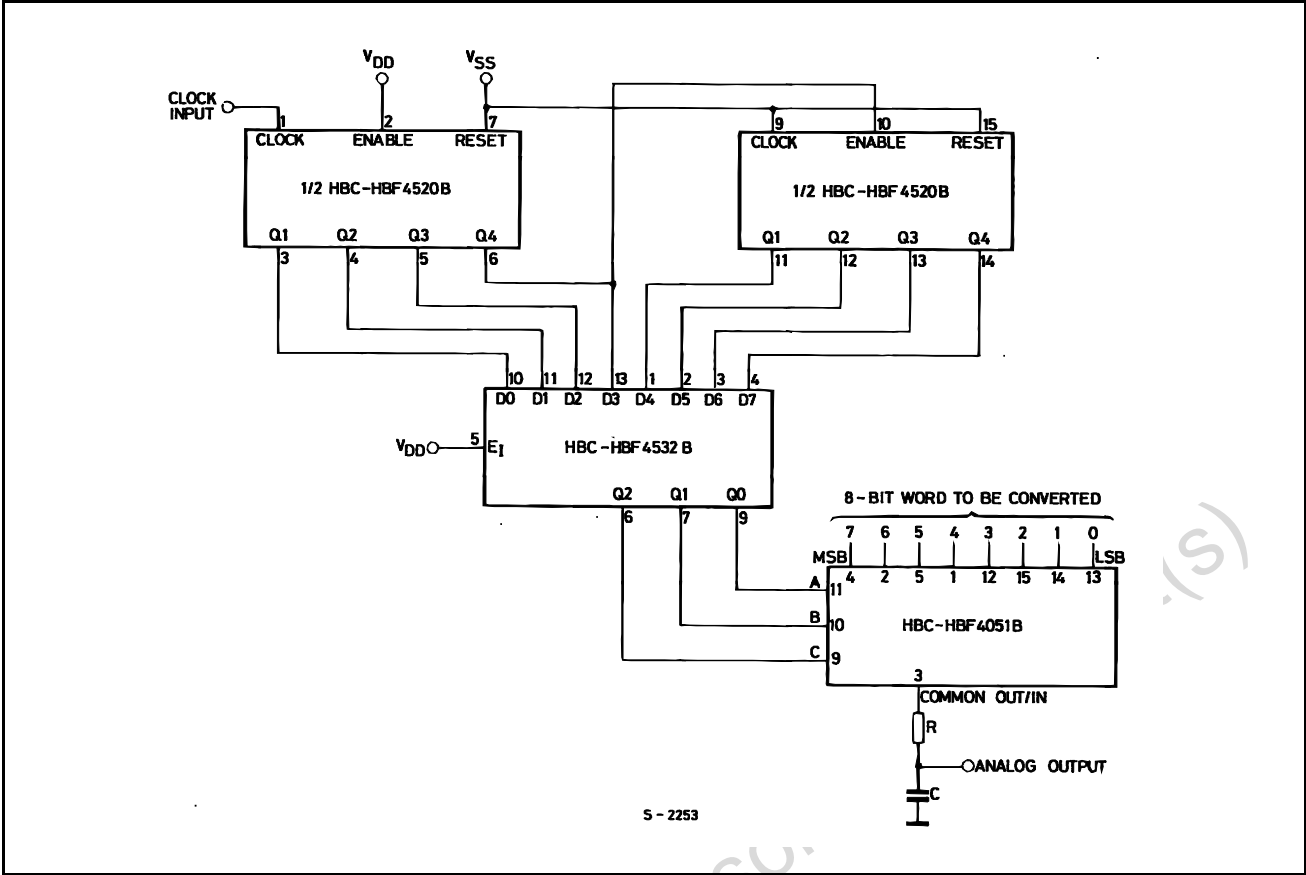
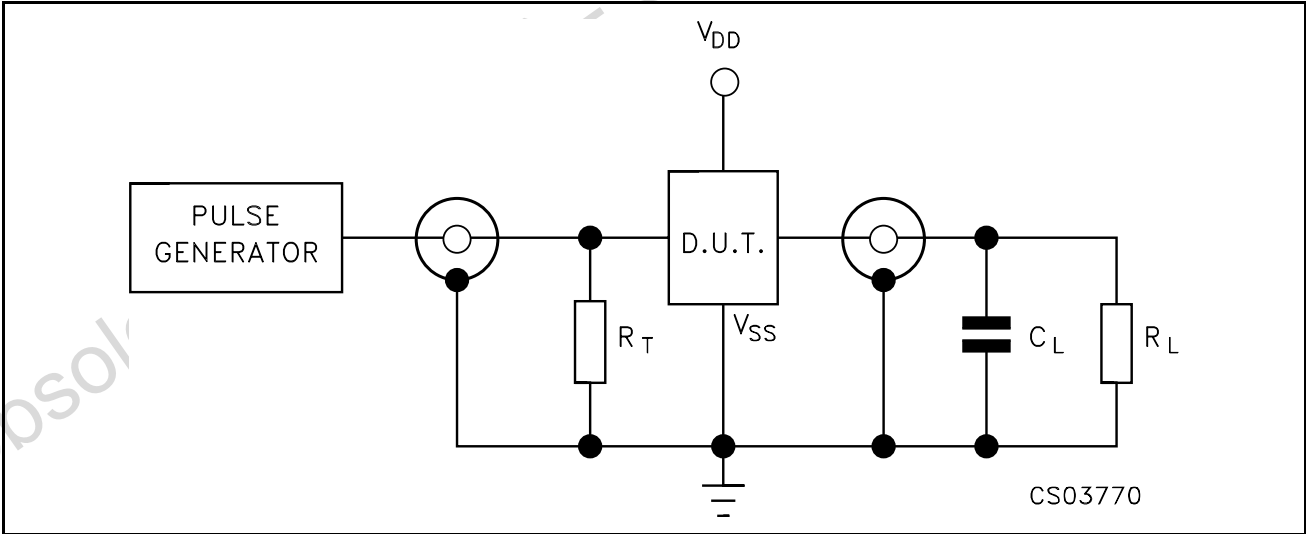
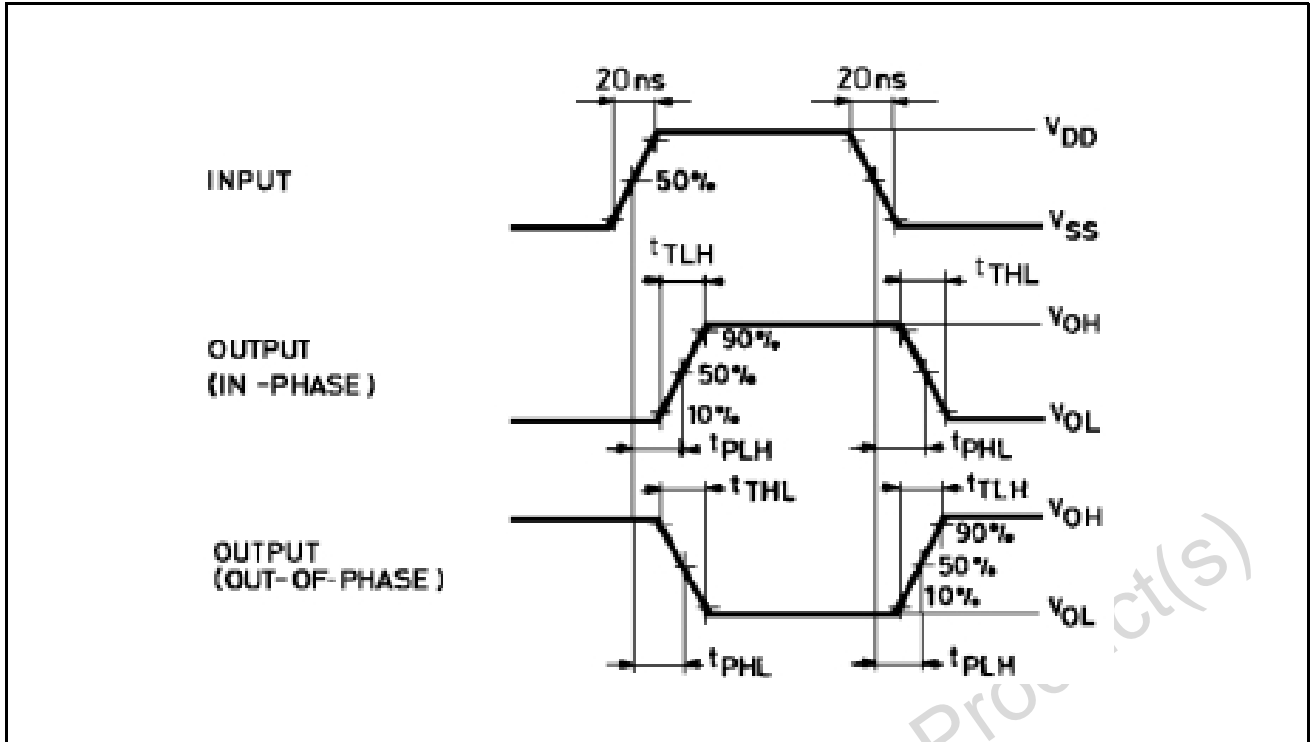


Figure 7: Test Circuit



C<sub>L</sub> = 50pF or equivalent (includes jig and probe capacitance)  
R<sub>L</sub> = 200KΩ  
R<sub>T</sub> = Z<sub>OUT</sub> of pulse generator (typically 50Ω)

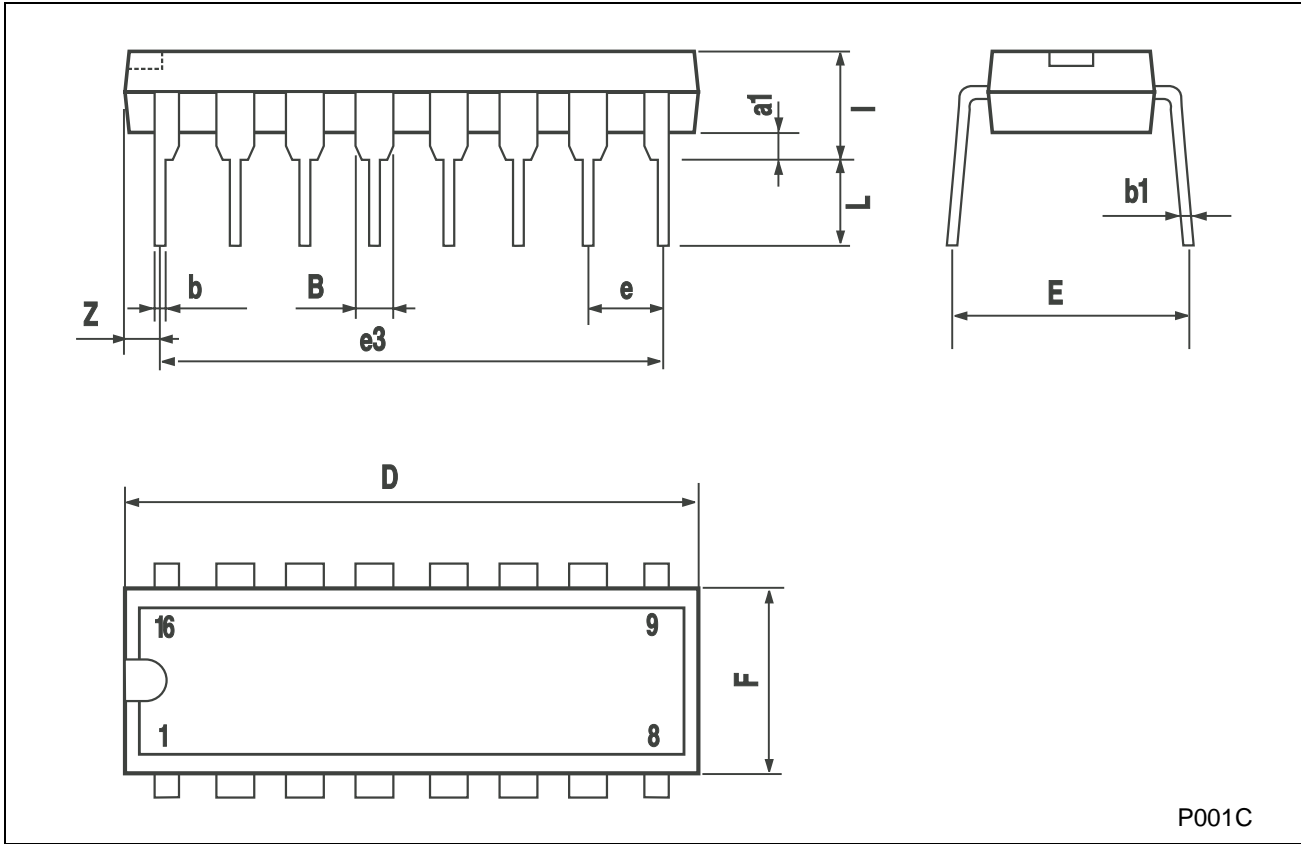
Figure 8: Waveform - Propagation Delay Times (f=1MHz; 50% duty cycle)





**Plastic DIP-16 (0.25) MECHANICAL DATA**

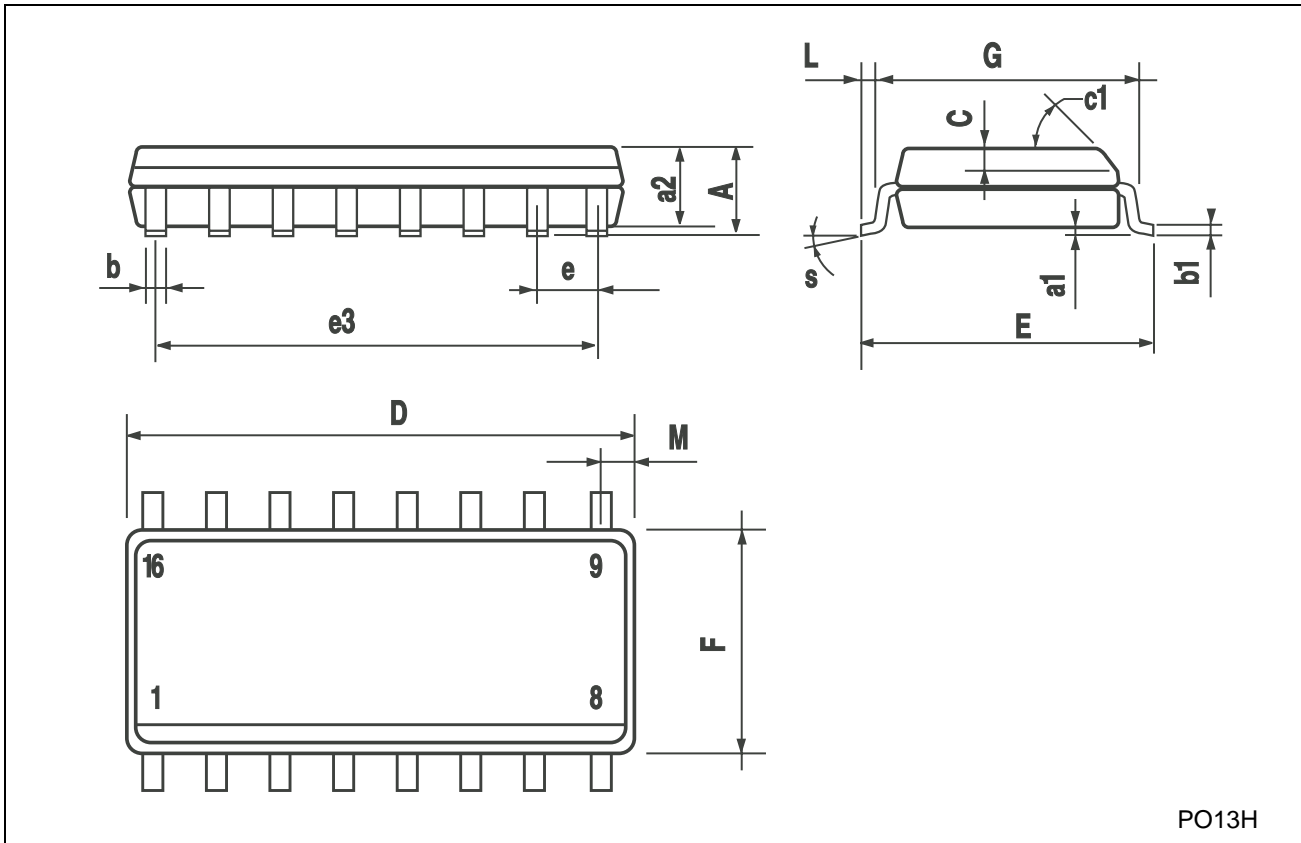
| DIM. | mm.  |       |      | inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | MIN. | TYP   | MAX. | MIN.  | TYP.  | MAX.  |
| a1   | 0.51 |       |      | 0.020 |       |       |
| B    | 0.77 |       | 1.65 | 0.030 |       | 0.065 |
| b    |      | 0.5   |      |       | 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 |
| l    |      |       | 5.1  |       |       | 0.201 |
| L    |      | 3.3   |      |       | 0.130 |       |
| Z    |      |       | 1.27 |       |       | 0.050 |



P001C

**SO-16 MECHANICAL DATA**

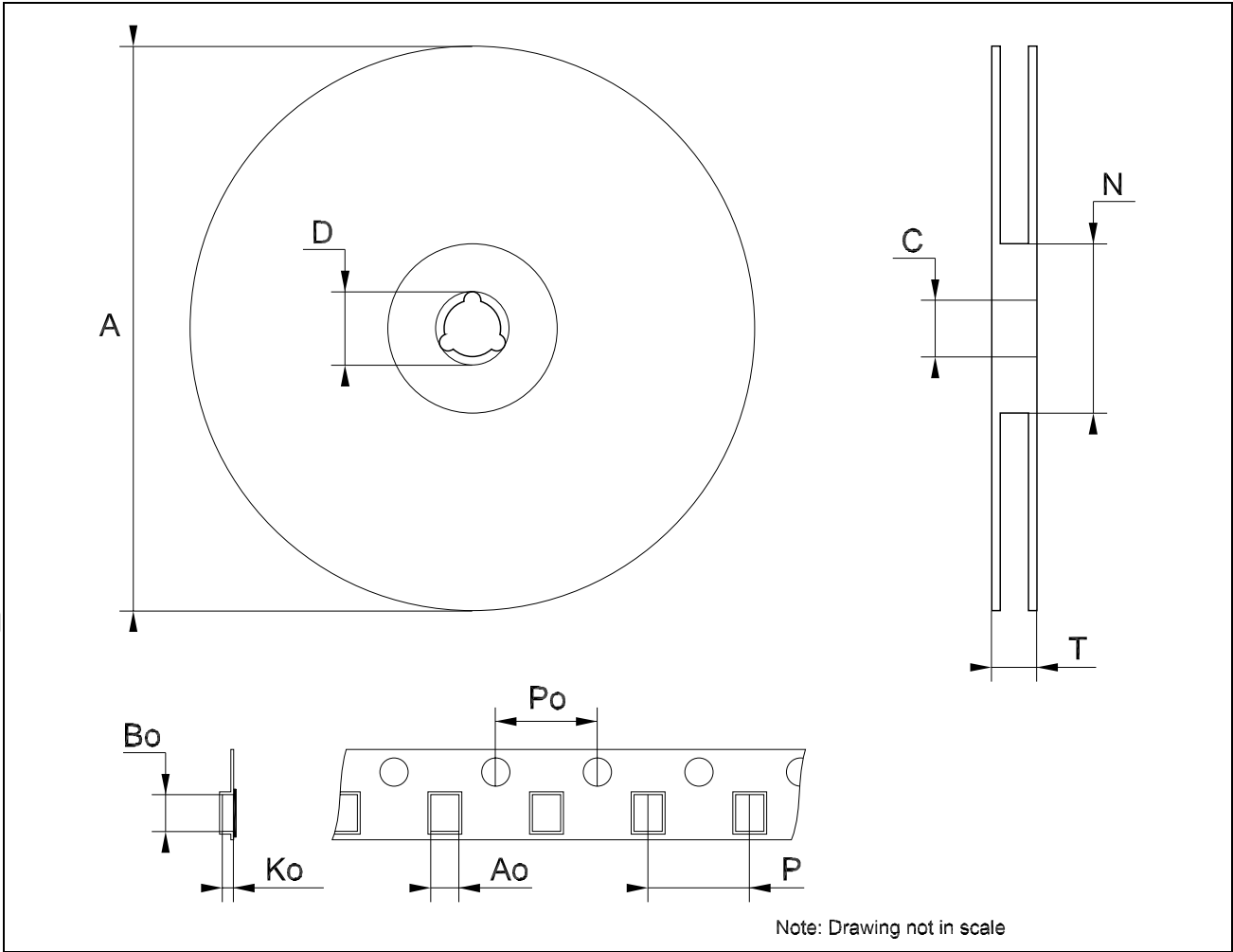
| DIM. | mm.        |      |      | inch     |       |       |
|------|------------|------|------|----------|-------|-------|
|      | MIN.       | TYP  | MAX. | MIN.     | TYP.  | MAX.  |
| A    |            |      | 1.75 |          |       | 0.068 |
| a1   | 0.1        |      | 0.2  | 0.004    |       | 0.008 |
| 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.) |       |       |



PO13H

### Tape & Reel SO-16 MECHANICAL DATA

| DIM. | mm.  |     |      | inch  |      |        |
|------|------|-----|------|-------|------|--------|
|      | MIN. | TYP | MAX. | MIN.  | TYP. | MAX.   |
| A    |      |     | 330  |       |      | 12.992 |
| C    | 12.8 |     | 13.2 | 0.504 |      | 0.519  |
| D    | 20.2 |     |      | 0.795 |      |        |
| N    | 60   |     |      | 2.362 |      |        |
| T    |      |     | 22.4 |       |      | 0.882  |
| Ao   | 6.45 |     | 6.65 | 0.254 |      | 0.262  |
| Bo   | 10.3 |     | 10.5 | 0.406 |      | 0.414  |
| Ko   | 2.1  |     | 2.3  | 0.082 |      | 0.090  |
| Po   | 3.9  |     | 4.1  | 0.153 |      | 0.161  |
| P    | 7.9  |     | 8.1  | 0.311 |      | 0.319  |



**Table 8: Revision History**

| Date        | Revision | Description of Changes                 |
|-------------|----------|--|
| 07-May-2004 | 2        | Mistake Truth Table - Table 2 - Pag. 2 |

Obsolete Product(s) - Obsolete Product(s)

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