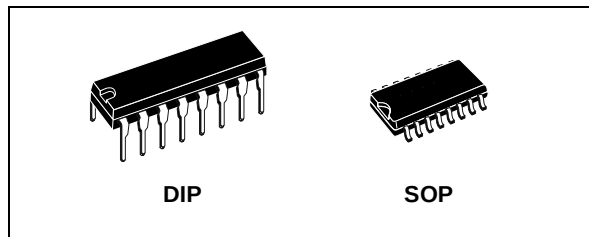


## 8-BIT PRIORITY ENCODER

- 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       | 1 & 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

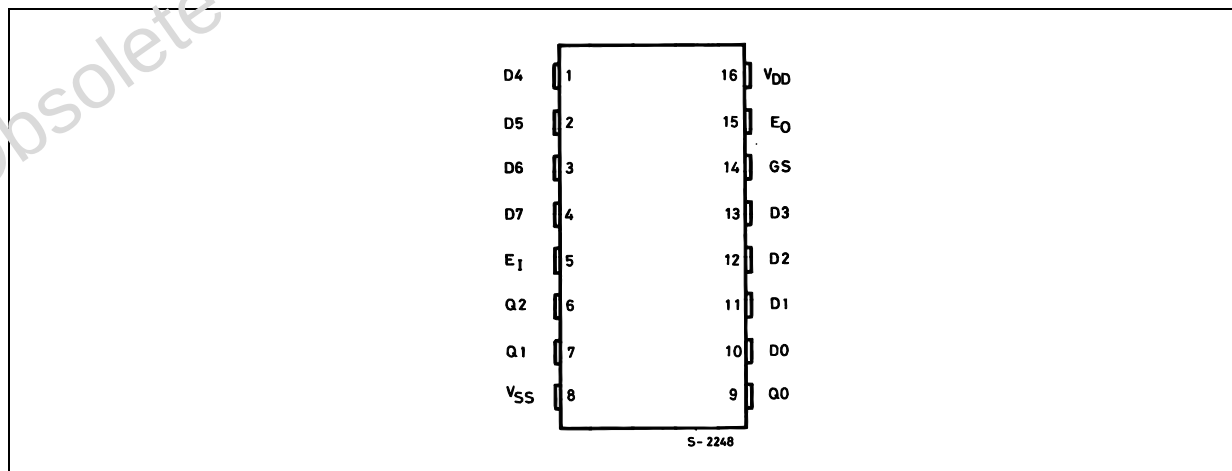


Figure 1: Input Equivalent Circuit

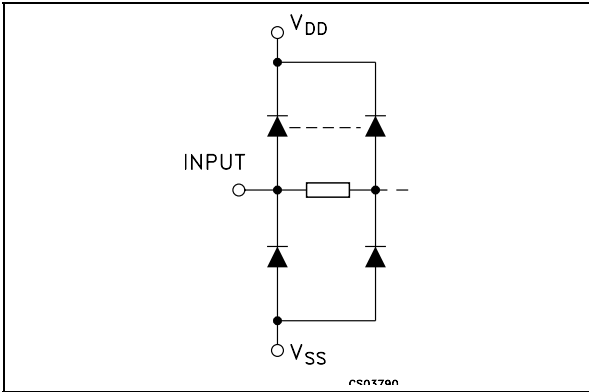


Table 1: Pin Description

| 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

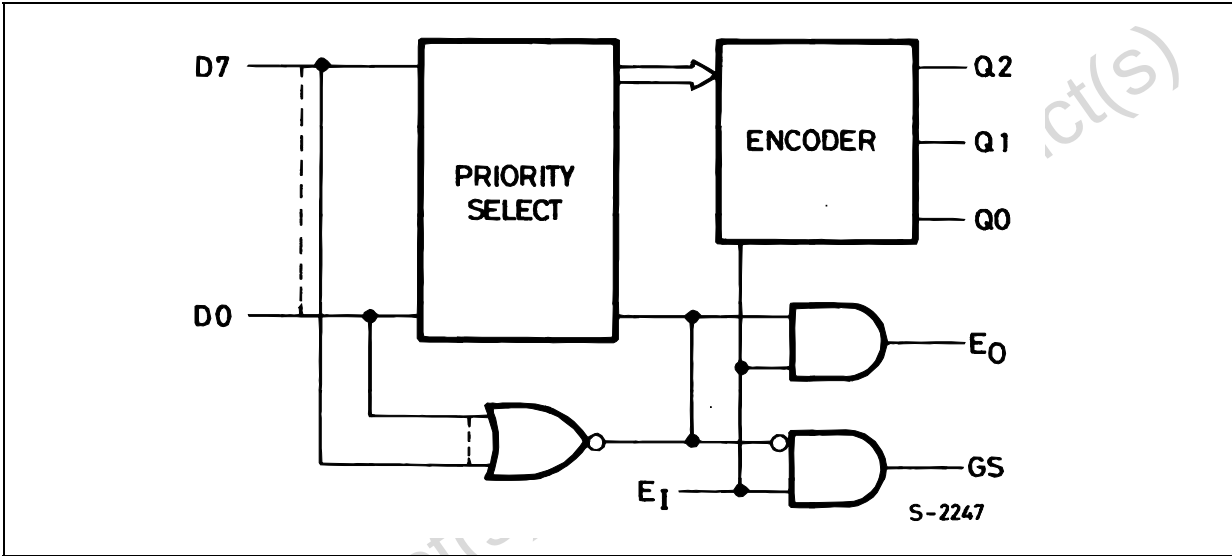


Table 2: Truth Table

| 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

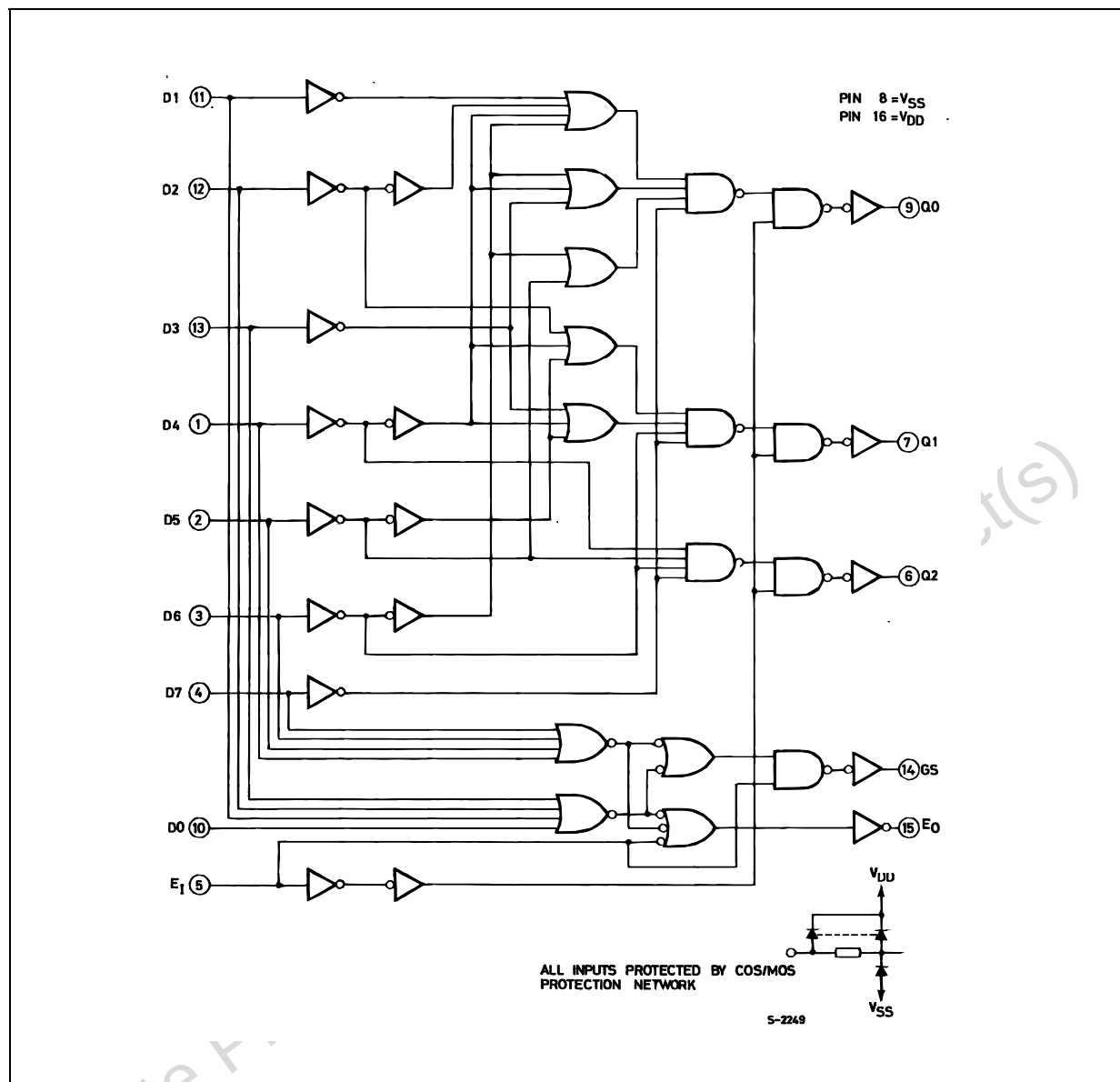


Table 3: Absolute Maximum Ratings

| 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            | °C   |
| $T_{stg}$ | Storage Temperature                     | -65 to +150            | °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 <sub>I</sub><br>(V) | V <sub>O</sub><br>(V) | I <sub>OL</sub>  <br>(μA) | V <sub>DD</sub><br>(V) | T <sub>A</sub> = 25°C |                   |      | -40 to 85°C |      | -55 to 125°C |      |    |      |
|                 |                           |                       |                       |                           |                        | Min.                  | Typ.              | Max. | Min.        | Max. | Min.         | Max. |    |      |
| I <sub>L</sub>  | Quiescent Current         | 0/5                   |                       |                           | 5                      |                       | 0.04              | 5    |             | 150  |              | 150  | μA |      |
|                 |                           | 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 <sub>OH</sub> | 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 <sub>OL</sub> | 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 <sub>IH</sub> | 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 <sub>IL</sub> | 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 <sub>OH</sub> | 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 <sub>OL</sub> | 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 <sub>I</sub>  | Input Leakage Current     | 0/18                  | Any Input             |                           | 18                     |                       | ±10 <sup>-5</sup> | ±0.1 |             | ±1   |              | ±1   | μA |      |
| C <sub>I</sub>  | 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  $V_{DD}=15V$

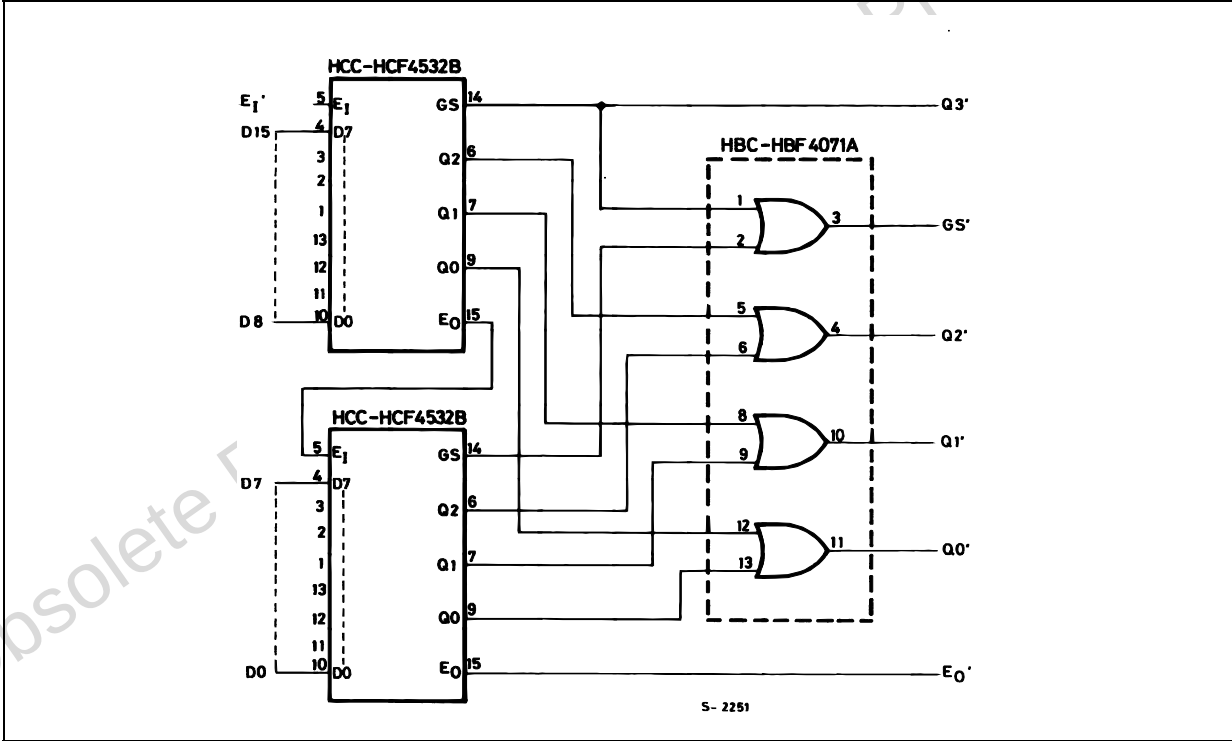
**Table 6: Dynamic Electrical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$ ,  $C_L = 50\text{pF}$ ,  $R_L = 200\text{K}\Omega$ ,  $t_r = t_f = 20\text{ ns}$ )

| Symbol              | Parameter                                                 | Test Condition |  | Value (*) |      |      | Unit |
|---------------------|-----------------------------------------------------------|----------------|--|-----------|------|------|------|
|                     |                                                           | $V_{DD}$ (V)   |  | Min.      | Typ. | Max. |      |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time<br>( $E_I$ to $E_O$ , $E_I$ to GS) | 5              |  |           | 110  | 220  | ns   |
|                     |                                                           | 10             |  |           | 55   | 110  |      |
|                     |                                                           | 15             |  |           | 45   | 85   |      |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time<br>( $E_I$ to $Q_m$ , $D_n$ to GS) | 5              |  |           | 170  | 340  | ns   |
|                     |                                                           | 10             |  |           | 85   | 170  |      |
|                     |                                                           | 15             |  |           | 65   | 125  |      |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time<br>( $D_n$ to $Q_m$ )              | 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 %/ $^{\circ}\text{C}$ .

**TYPICAL APPLICATIONS**

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





X : Don't Care

Figure 6: Digital To Analog Conversion

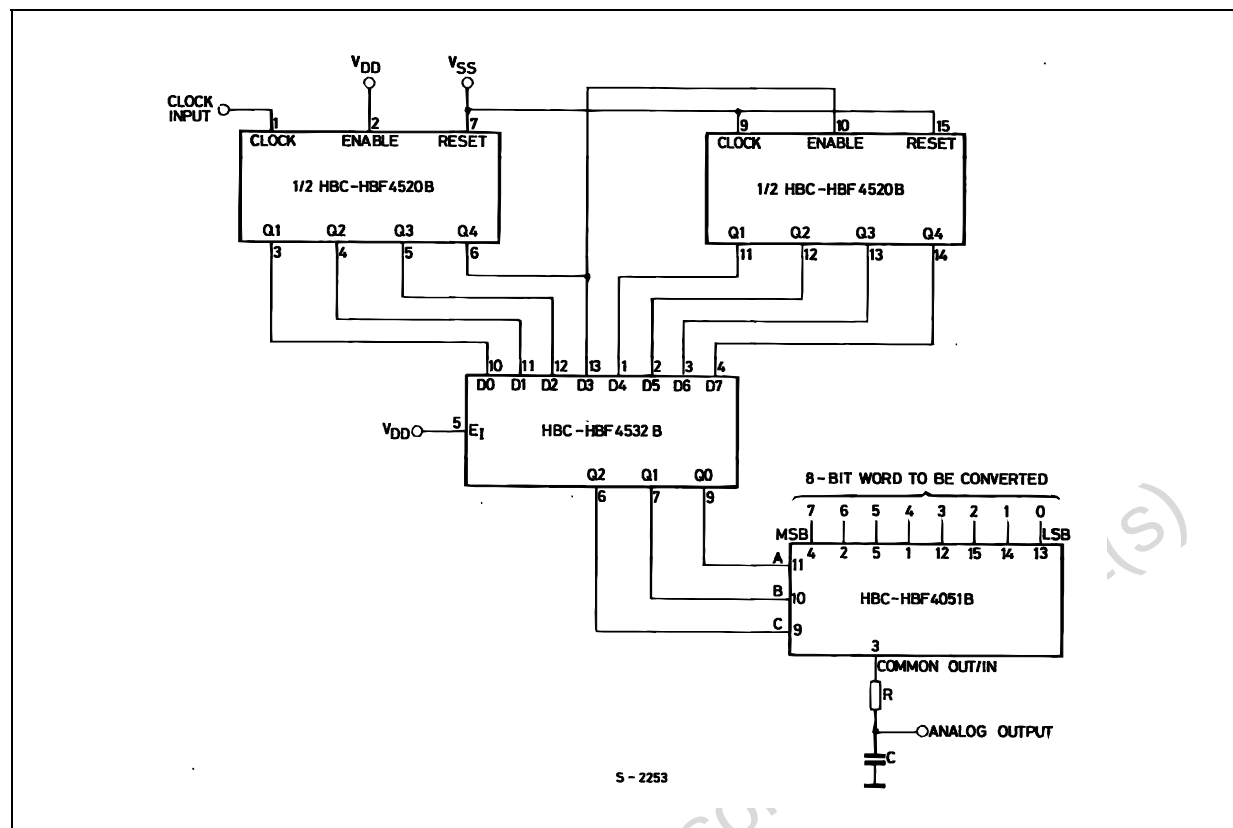
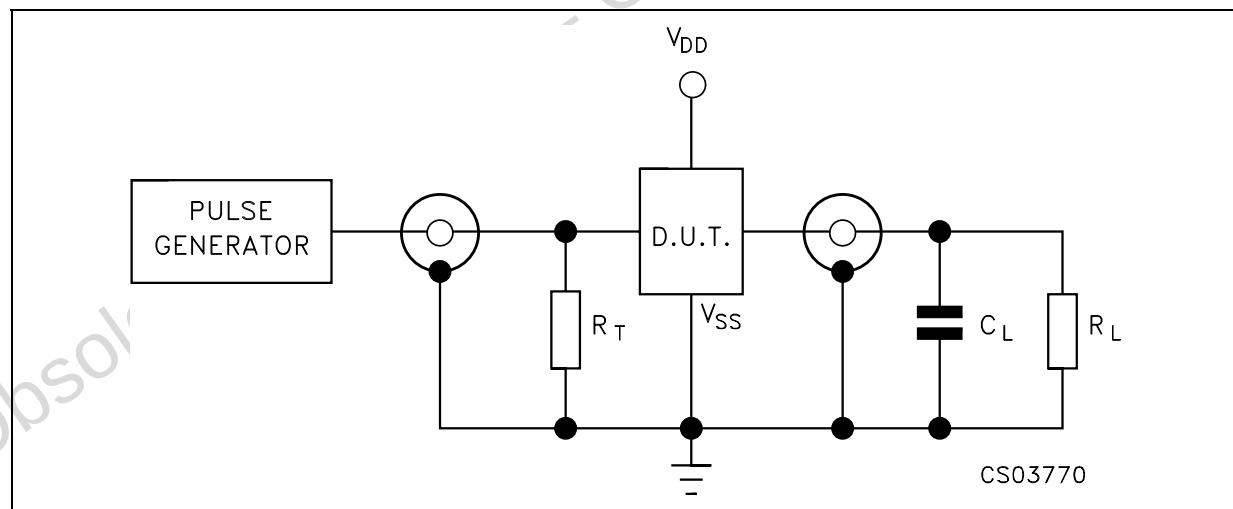
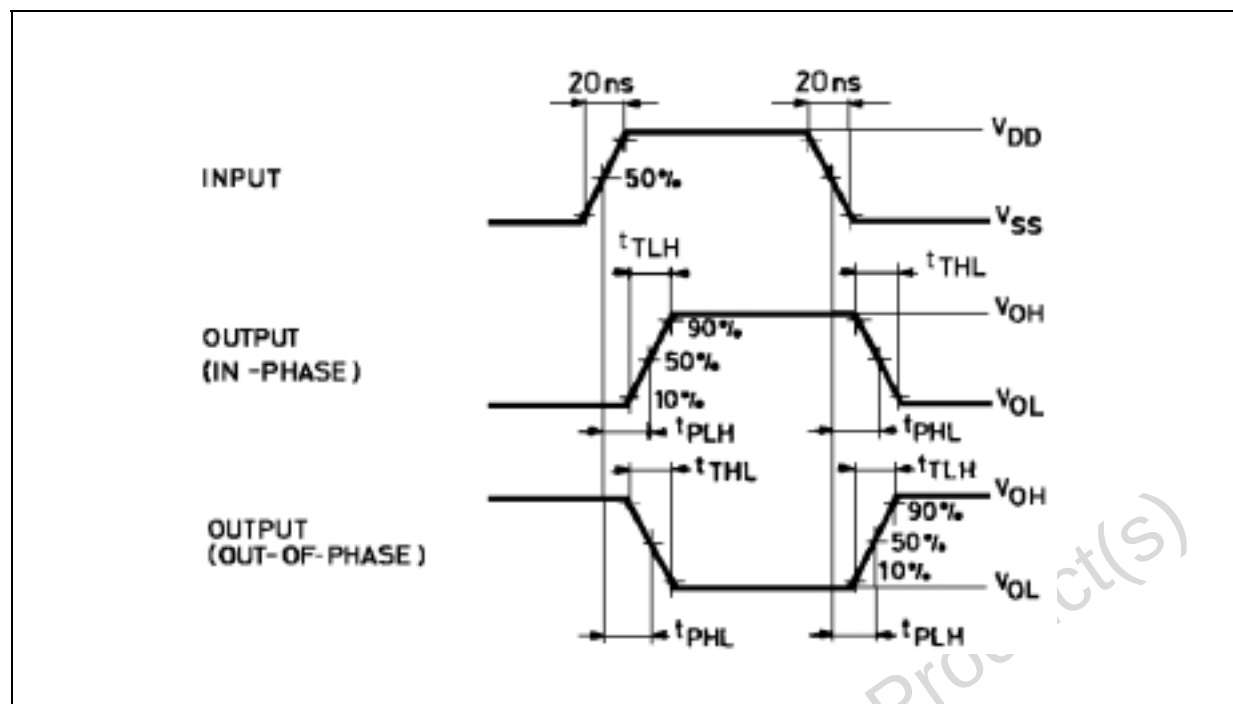


Figure 7: Test Circuit

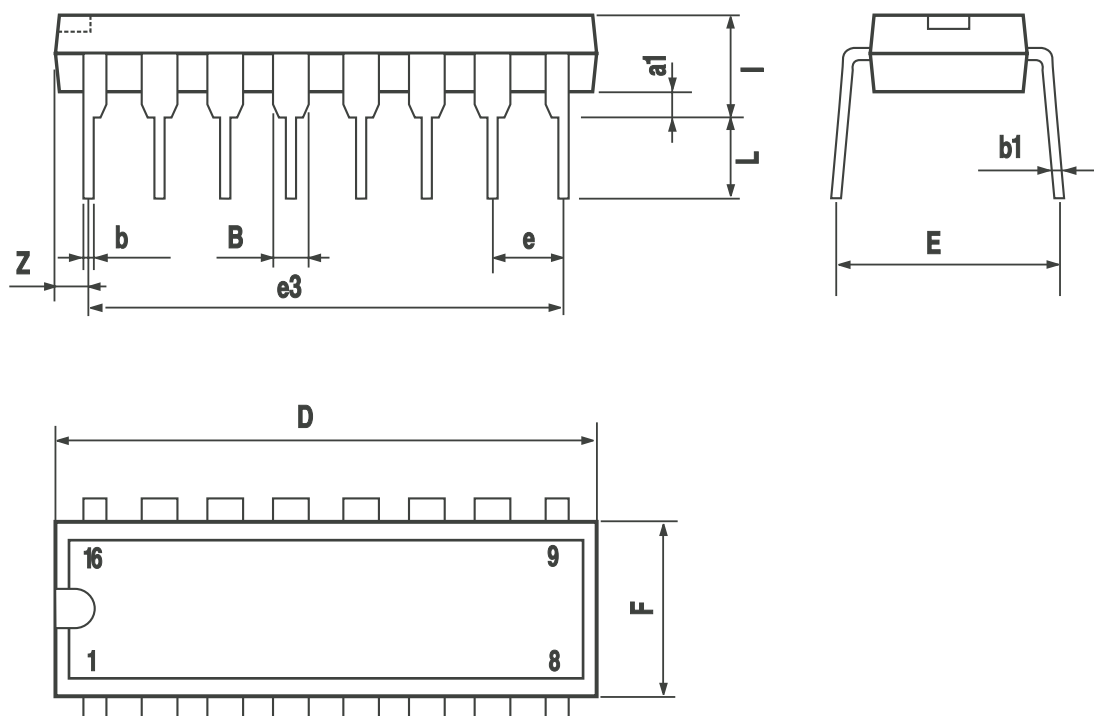


$C_L$  = 50pF or equivalent (includes jig and probe capacitance)  
 $R_L$  = 200K $\Omega$   
 $R_T$  = Z<sub>OUT</sub> of pulse generator (typically 50 $\Omega$ )

Figure 8: Waveform - Propagation Delay Times ( $f=1\text{MHz}$ ; 50% duty cycle)

# Plastic DIP-16 (0.25) MECHANICAL DATA

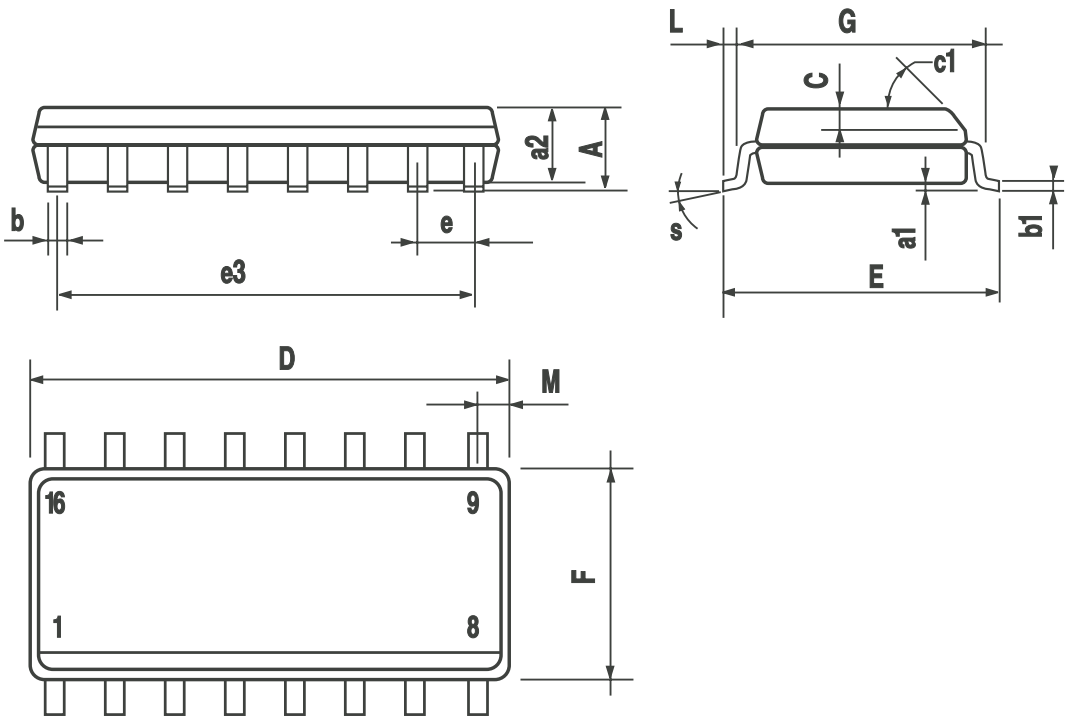
| DIM. | mm.  |       |      | inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | MIN. | TYP   | MAX. | MIN.  | TYP.  | MAX.  |
| a1   | 0.51 |       |      | 0.020 |       |       |
| B    | 0.77 |       | 1.65 | 0.030 |       | 0.065 |
| b    |      | 0.5   |  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



P001C

SO-16 MECHANICAL DATA

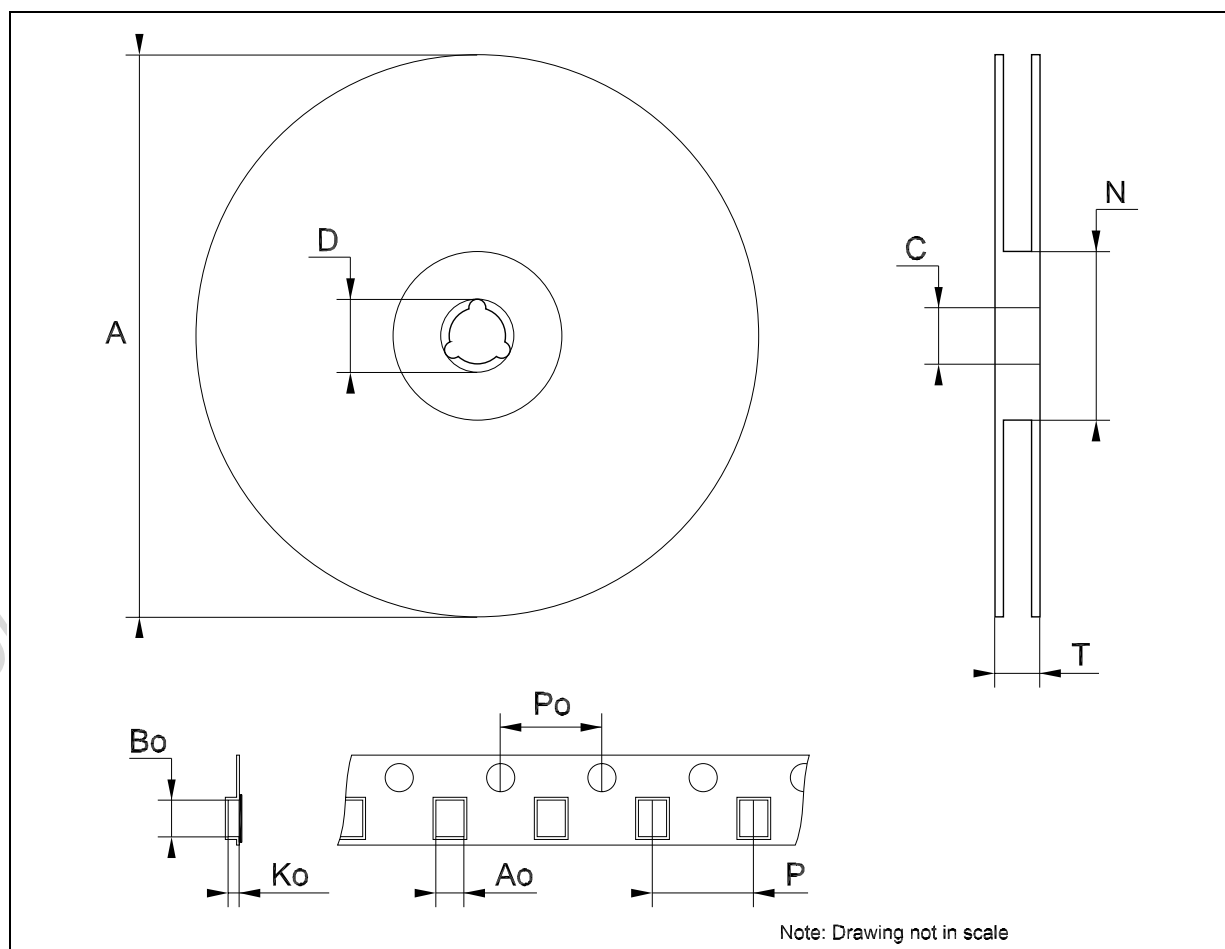
| DIM. | mm.        |      |      | inch  |       |       |
|------|------------|------|------|-------|-------|-------|
|      | MIN.       | TYP  | MAX. | MIN.  | TYP.  | MAX.  |
| A    |            |      | 1.75 |       |       | 0.068 |
| a1   | 0.1        |      | 0.2  | 0.004 |       | 0.008 |
|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