

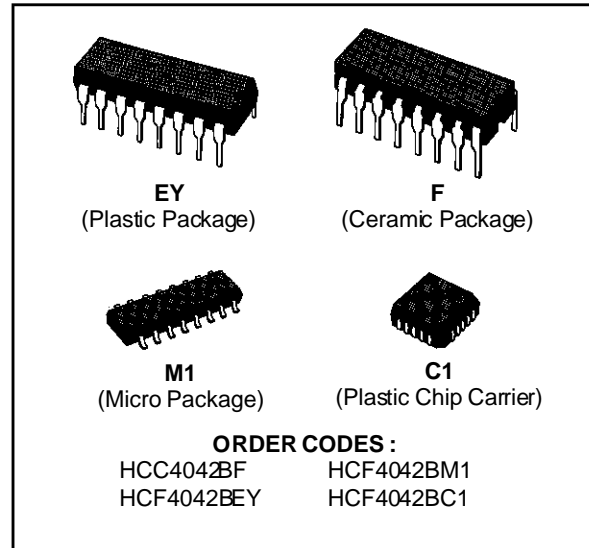
Logic

| Order code | Manufacturer code | Description |
|------------|-------------------|-----------------------------------|
| 83-0370 | HCF4042BEY | 4042B QUAD CLOCKED D TYPE LATCHES |

| | |
|--|--------------------------|
| Logic | Page 1 of 13 |
| The enclosed information is believed to be correct, Information may change 'without notice' due to product improvement. Users should ensure that the product is suitable for their use. E. & O. E. | Revision A 04/07/2003 |

QUAD CLOCKED "D" LATCH

- CLOCK POLARITY CONTROL
- Q AND \bar{Q} OUTPUTS
- COMMON CLOCK
- LOW POWER TTL COMPATIBLE
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 5V, 10V, AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100nA AT 18V AND 25°C FOR HCC DEVICE
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD N° 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"



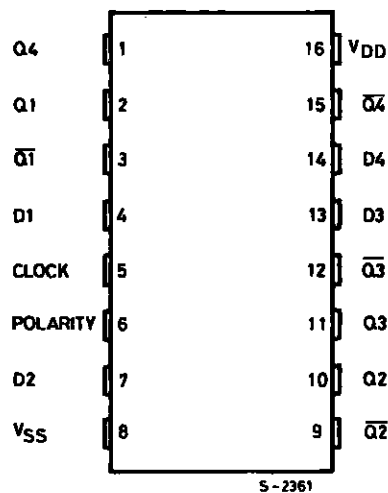
DESCRIPTION

The **HCC4042B** (extended temperature range) and **HCF4042B** (intermediate temperature range) are monolithic integrated circuit, available in 16-lead dual in-line plastic or ceramic package and plastic micro package.

The **HCC/HCF4042B** types contain four latch circuits, each strobed by a common clock. Complementary buffered outputs are available from each circuit. The impedance of the n- and p-channel output devices is balanced and all outputs are electrically identical.

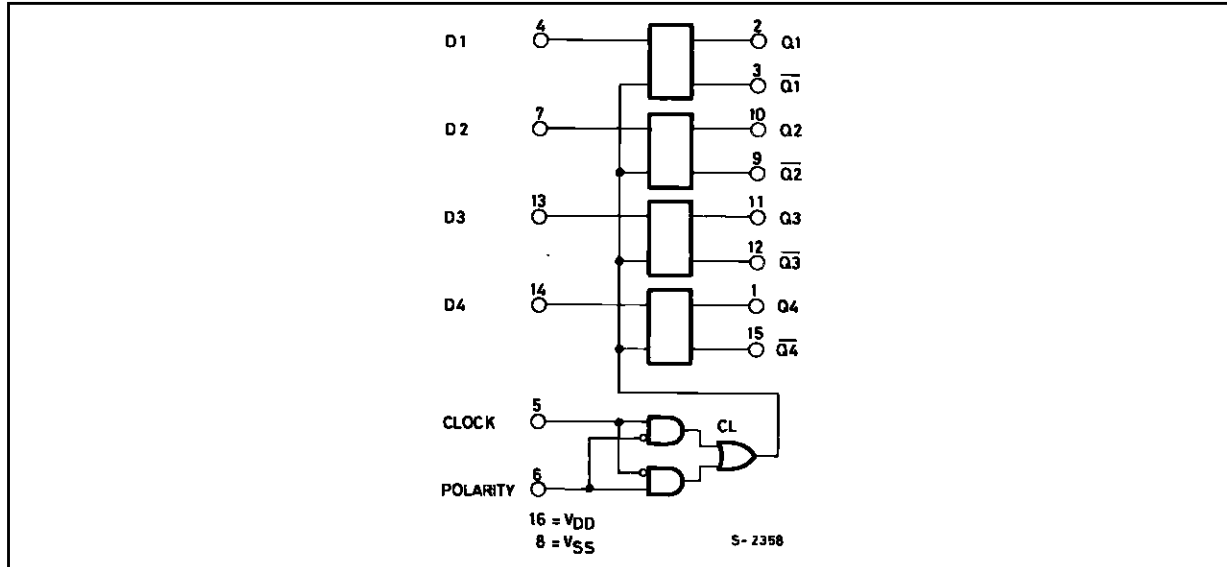
Information present at the data input is transferred to outputs Q and \bar{Q} during the CLOCK level which is programmed by the POLARITY input. For POLARITY = 0 the transfer occurs during the 0 CLOCK level and for POLARITY = 1 the transfer occurs during the 1 CLOCK level. The outputs follow the data input providing the CLOCK and POLARITY levels defined above are present. When a CLOCK transition occurs (positive for POLARITY = 0 and negative for POLARITY = 1) the information present at the input during the CLOCK transition is retained at the outputs until an opposite CLOCK transition occurs.

PIN CONNECTIONS



HCC/HCF4042B

FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

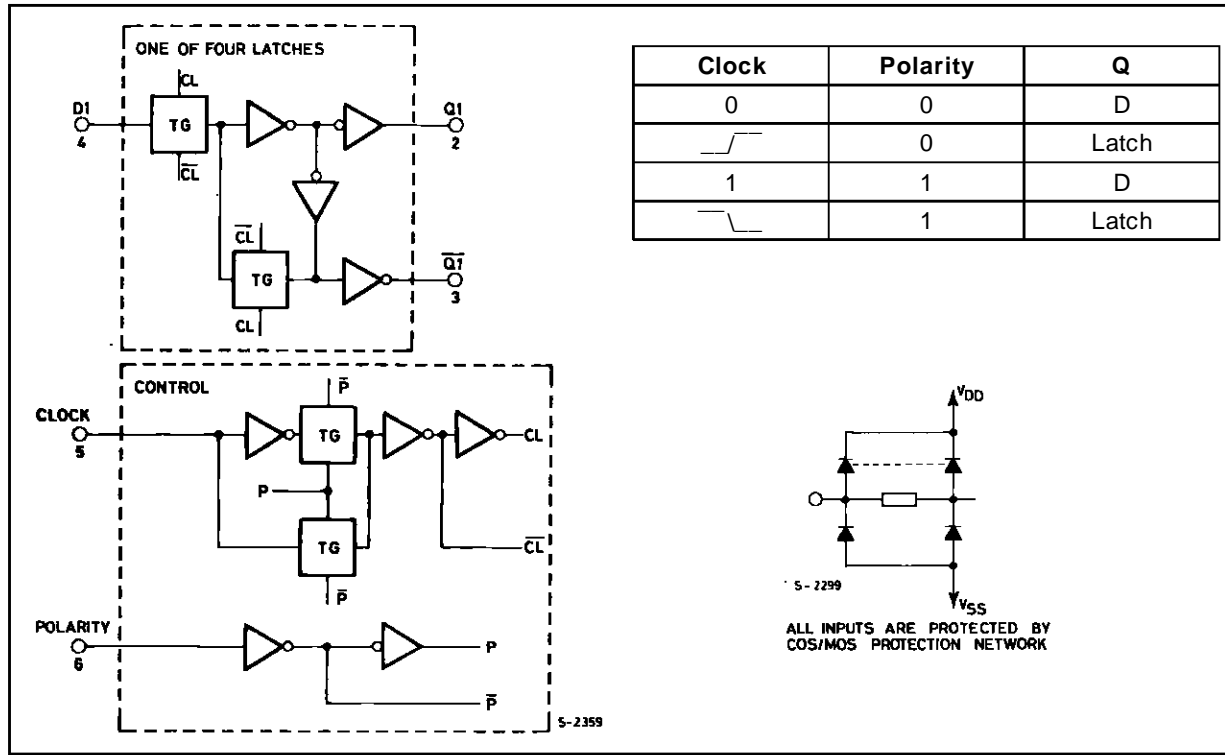
| Symbol | Parameter | Value | Unit |
|------------|---|--------------------------------|----------------------------|
| V_{DD}^* | Supply Voltage : HCC Types HCF Types | - 0.5 to + 20 - 0.5 to + 18 | V V |
| V_i | Input Voltage | - 0.5 to $V_{DD} + 0.5$ | V |
| I_i | DC Input Current (any one input) | ± 10 | mA |
| P_{tot} | Total Power Dissipation (per package) Dissipation per Output Transistor for T_{op} = Full Package-temperature Range | 200 100 | mW mW |
| T_{op} | Operating Temperature : HCC Types HCF Types | - 55 to + 125 - 40 to + 85 | $^{\circ}C$ $^{\circ}C$ |
| T_{stg} | Storage Temperature | - 65 to + 150 | $^{\circ}C$ |

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for external periods may affect device reliability.
* All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Value | Unit |
|----------|--|-------------------------------|----------------------------|
| V_{DD} | Supply Voltage HCC Types : HCF Types | 3 to 18 3 to 15 | V V |
| V_i | Input Voltage | 0 to V_{DD} | V |
| T_{op} | Operating Temperature : HCC Types HCF Types | - 55 to + 125 - 40 to + 85 | $^{\circ}C$ $^{\circ}C$ |

LOGIC BLOCK DIAGRAM AND TRUTH TABLE



STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

| Symbol | Parameter | Test Conditions | | | | Value | | | | | | Unit | |
|-----------------|---------------------|-----------------------|-----------------------|--------------------------|------------------------|--------------------|------|-------|------|-------|---------------------|------|------|
| | | V _I (V) | V _O (V) | I _O (μA) | V _{DD} (V) | T _{Low} * | | 25°C | | | T _{High} * | | |
| | | | | | | Min. | Max. | Min. | Typ. | Max. | Min. | | Max. |
| I _L | Quiescent Current | | | | 5 | 1 | | 0.02 | 1 | | 30 | μA | |
| | | | | | | 2 | | 0.02 | 2 | 60 | | | |
| | | | | | | 4 | | 0.02 | 4 | 120 | | | |
| | | | | | | 20 | | 0.04 | 20 | 600 | | | |
| | | | | | | 4 | | 0.02 | 4 | 30 | | | |
| | | | | | | 8 | | 0.02 | 8 | 60 | | | |
| | | | | | | 16 | | 0.02 | 16 | 120 | | | |
| V _{OH} | Output High Voltage | | | < 1 | 5 | 4.95 | | 4.95 | | 4.95 | | V | |
| | | | | | | 9.95 | | 9.95 | | 9.95 | | | |
| | | | | | | 14.95 | | 14.95 | | 14.95 | | | |
| V _{OL} | Output Low Voltage | | | < 1 | 5 | 0.05 | | | 0.05 | | 0.05 | V | |
| | | | | | | 0.05 | | | 0.05 | 0.05 | | | |
| | | | | | | 0.05 | | | 0.05 | 0.05 | | | |
| V _{IH} | Input High Voltage | | | < 1 | 5 | 3.5 | | 3.5 | | 3.5 | | V | |
| | | | | | | 7 | | 7 | | 7 | | | |
| | | | | | | 11 | | 11 | | 11 | | | |

* T_{Low} = - 55°C for HCC device : - 40°C for HCF device.
 * T_{High} = + 125°C for HCC device : + 85°C for HCF device.
 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.

HCC/HCF4042B

STATIC ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Test Conditions | | | | Value | | | | | | Unit | |
|-----------------------------------|-----------------------|-----------------------|-----------------------|--------------------------------|------------------------|--------------------|-----------|------|---------------|-----------|---------------------|---------|---------|
| | | V _I (V) | V _O (V) | I _O (μ A) | V _{DD} (V) | T _{Low} * | | 25°C | | | T _{High} * | | |
| | | | | | | Min. | Max. | Min. | Typ. | Max. | Min. | | Max. |
| V _{IL} | Input Low 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 | HCC Types | 0/ 5 | 2.5 | | 5 | - 2 | | - 1.6 | - 3.2 | | - 1.15 | mA |
| | | | 0/ 5 | 4.6 | | 5 | - 0.64 | | - 0.51 | - 1 | | - 0.36 | |
| | | | 0/10 | 9.5 | | 10 | - 1.6 | | - 1.3 | - 2.6 | | - 0.9 | |
| | | | 0/15 | 13.5 | | 15 | - 4.2 | | - 3.4 | - 6.8 | | - 2.4 | |
| | | HCF Types | 0/ 5 | 2.5 | | 5 | - 1.53 | | - 1.36 | - 3.2 | | - 1.1 | |
| | | | 0/ 5 | 4.6 | | 5 | - 0.52 | | - 0.44 | - 1 | | - 0.36 | |
| | | | 0/10 | 9.5 | | 10 | - 1.3 | | - 1.1 | - 2.6 | | - 0.9 | |
| | | | 0/15 | 13.5 | | 15 | - 3.6 | | - 3.0 | - 6.8 | | - 2.4 | |
| I _{OL} | Output Sink Current | HCC Types | 0/ 5 | 0.4 | | 5 | 0.64 | | 0.51 | 1 | | 0.36 | mA |
| | | | 0/10 | 0.5 | | 10 | 1.6 | | 1.3 | 2.6 | | 0.9 | |
| | | | 0/15 | 1.5 | | 15 | 4.2 | | 3.4 | 6.8 | | 2.4 | |
| | | HCF Types | 0/ 5 | 0.4 | | 5 | 0.52 | | 0.44 | 1 | | 0.36 | |
| | | | 0/10 | 0.5 | | 10 | 1.3 | | 1.1 | 2.6 | | 0.9 | |
| | | | 0/15 | 1.5 | | 15 | 3.6 | | 3.0 | 6.8 | | 2.4 | |
| I _{IH} , I _{IL} | Input leakage Current | HCC Types | 0/18 | Any Input | 18 | | ± 0.1 | | $\pm 10^{-5}$ | ± 0.1 | | ± 1 | μ A |
| | | HCF Types | 0/15 | | | | | | | | | | |
| C _I | Input Capacitance | | Any Input | | | | | | 5 | 7.5 | | | pF |

* T_{Low} = - 55°C for HCC device : - 40°C for HCF device.

* T_{High} = + 125°C for HCC device : + 85°C for HCF device.

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.

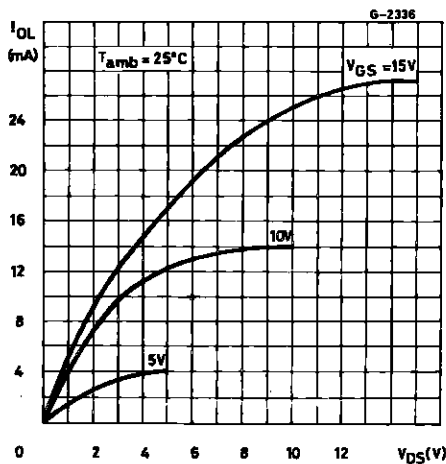
DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200k Ω , typical temperature coefficient for all V_{DD} values is 0.3%/°C, all input rise and fall times = 20ns)

| Symbol | Parameter | Test Conditions | Value | | | Unit | | |
|-------------------------------------|------------------------|-----------------|----------------------|------|------|------|------|-----|
| | | | V _{DD} (V) | Min. | Typ. | | Max. | |
| t _{PLH} , t _{PHL} | Propagation Delay Time | Data in to Q | 5 | | 110 | 220 | ns | |
| | | | 10 | | 55 | 110 | | |
| | | | 15 | | 40 | 80 | | |
| | | | Data in to \bar{Q} | 5 | | 150 | | 300 |
| | | | | 10 | | 75 | | 150 |
| | | | | 15 | | 50 | | 100 |
| | | Clock to Q | 5 | | 225 | 450 | | |
| | | | 10 | | 100 | 200 | | |
| | | | 15 | | 80 | 160 | | |
| | | | Clock to \bar{Q} | 5 | | 250 | | 500 |
| | | | | 10 | | 115 | | 230 |
| | | | | 15 | | 90 | | 180 |

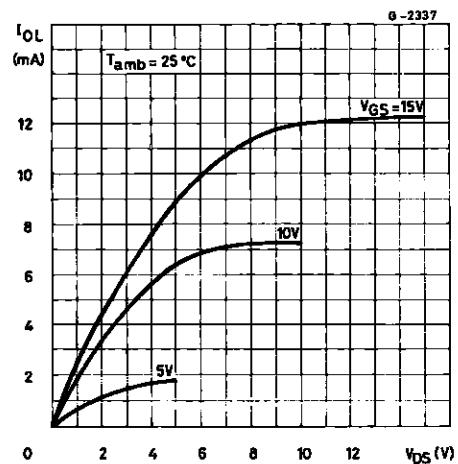
DYNAMIC ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Test Conditions | | Value | | | Unit |
|-------------------------------------|-------------------------------|-----------------|---------------------|---------------------------------|------|------|------|
| | | | V _{DD} (V) | Min. | Typ. | Max. | |
| t _{THL} , t _{TLH} | Transition Time | | 5 | | 100 | 200 | ns |
| | | | 10 | | 50 | 100 | |
| | | | 15 | | 40 | 80 | |
| t _w | Clock Pulse Width | | 5 | 200 | 100 | | ns |
| | | | 10 | 100 | 50 | | |
| | | | 15 | 60 | 30 | | |
| t _{setup} | Setup Time | | 5 | 50 | 0 | | ns |
| | | | 10 | 30 | 0 | | |
| | | | 15 | 25 | 0 | | |
| t _{hold} | Hold Time | | 5 | 120 | 60 | | ns |
| | | | 10 | 60 | 30 | | |
| | | | 15 | 50 | 25 | | |
| t _r , t _f | Clock Input Rise or Fall Time | | 5 | Not Rise or Fall Time Sensitive | | | μs |
| | | | 10 | | | | |
| | | | 15 | | | | |

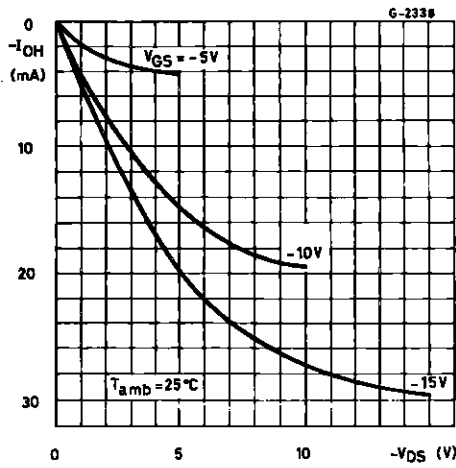
Typical Output Low (sink) Current Characteristics.



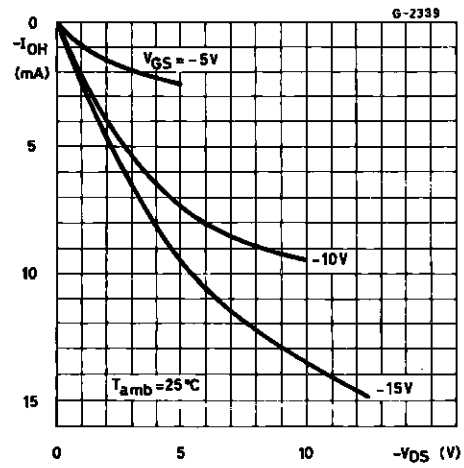
Minimum Output Low (sink) Current Characteristics.



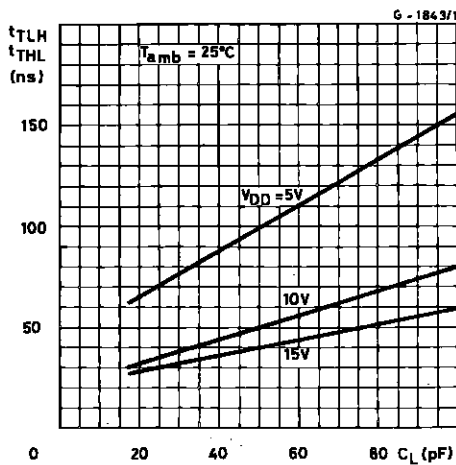
Typical Output High (source) Current Characteristics.



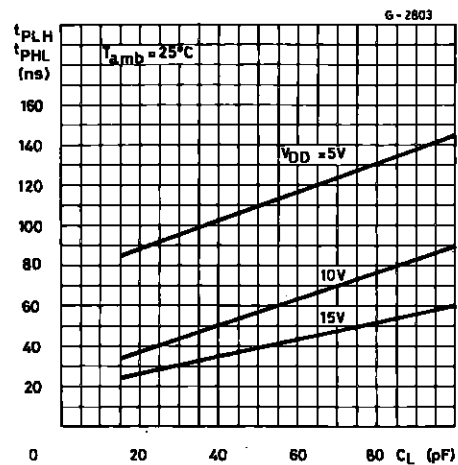
Minimum Output High (source) Current Characteristics.



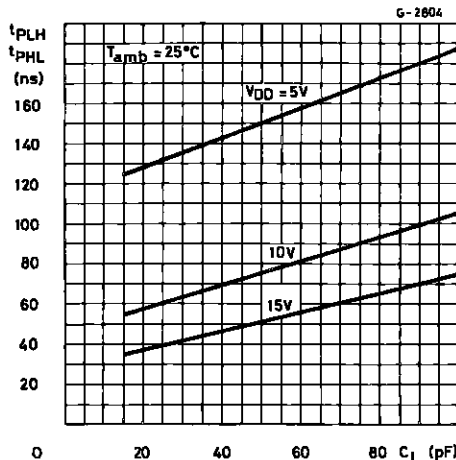
Typical Transition Time vs. Load Capacitance.



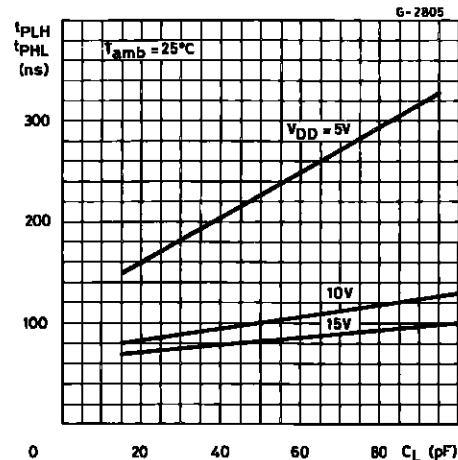
Typical Propagation Delay Time vs. Load Capacitance (data to Q).



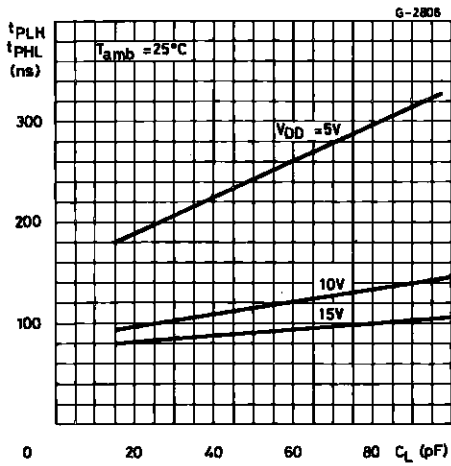
Typical Propagation Delay Time vs. Load Capacitance (data to Q).



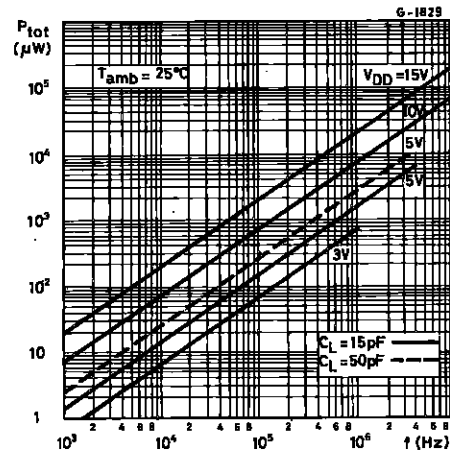
Typical Propagation Delay Time vs. Load Capacitance (clock to Q).



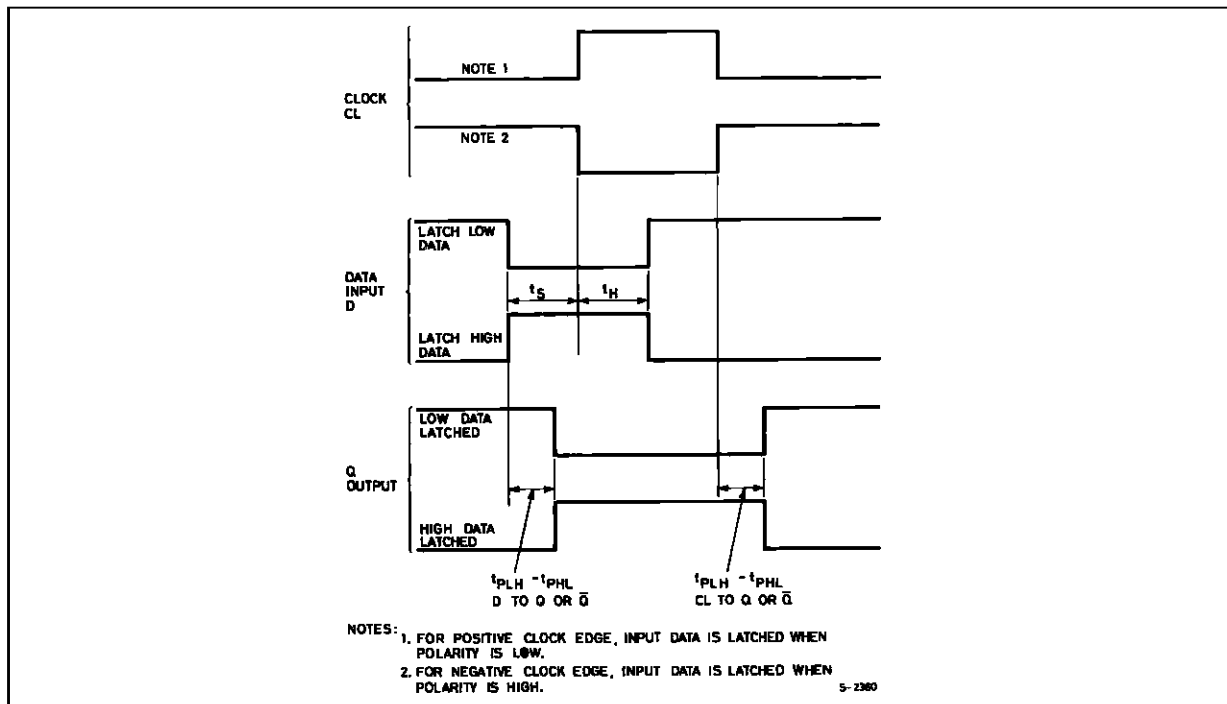
Typical Propagation Delay Time vs. Load Capacitance (clock to Q).



Typical Power Dissipation/device vs. Frequency.

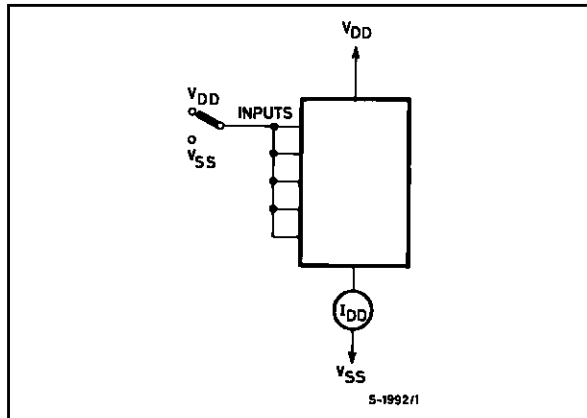


Dynamic Test Parameters.

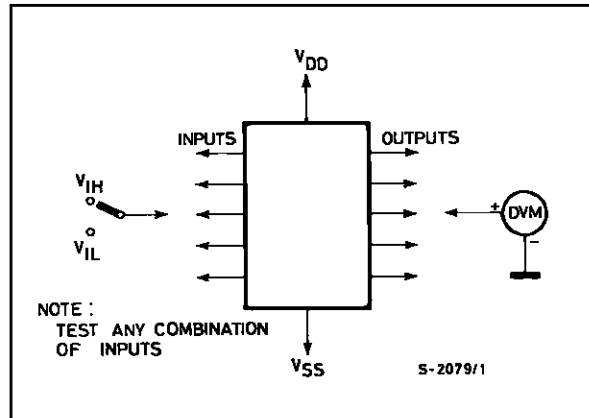


TEST CIRCUITS

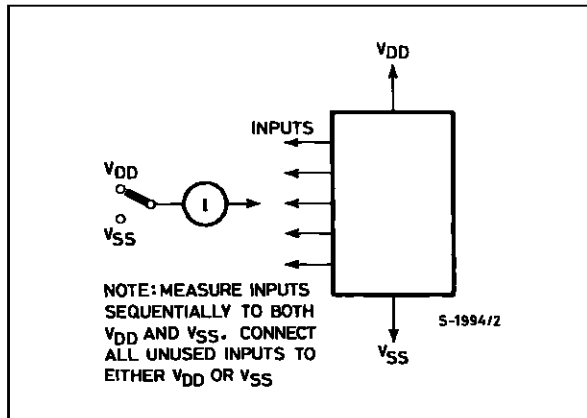
Quiescent Device Current.



Noise Immunity.

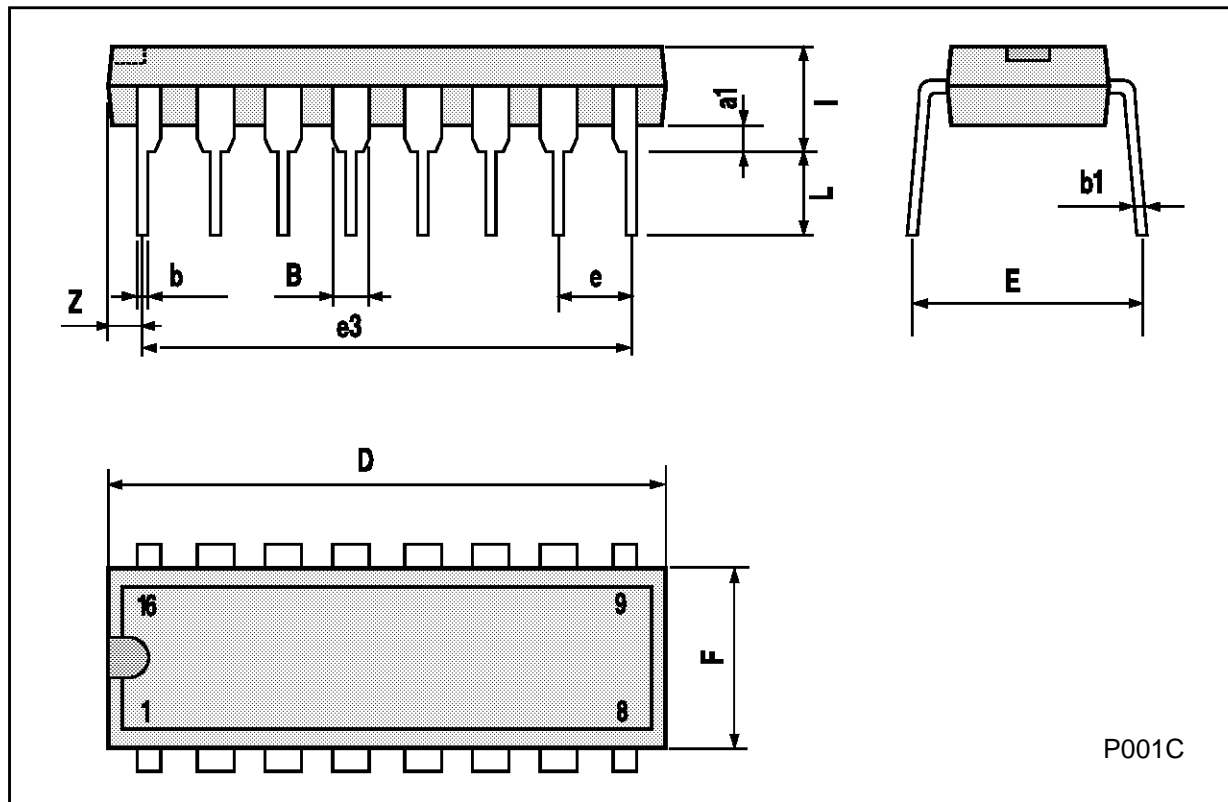


Input Leakage Current.



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

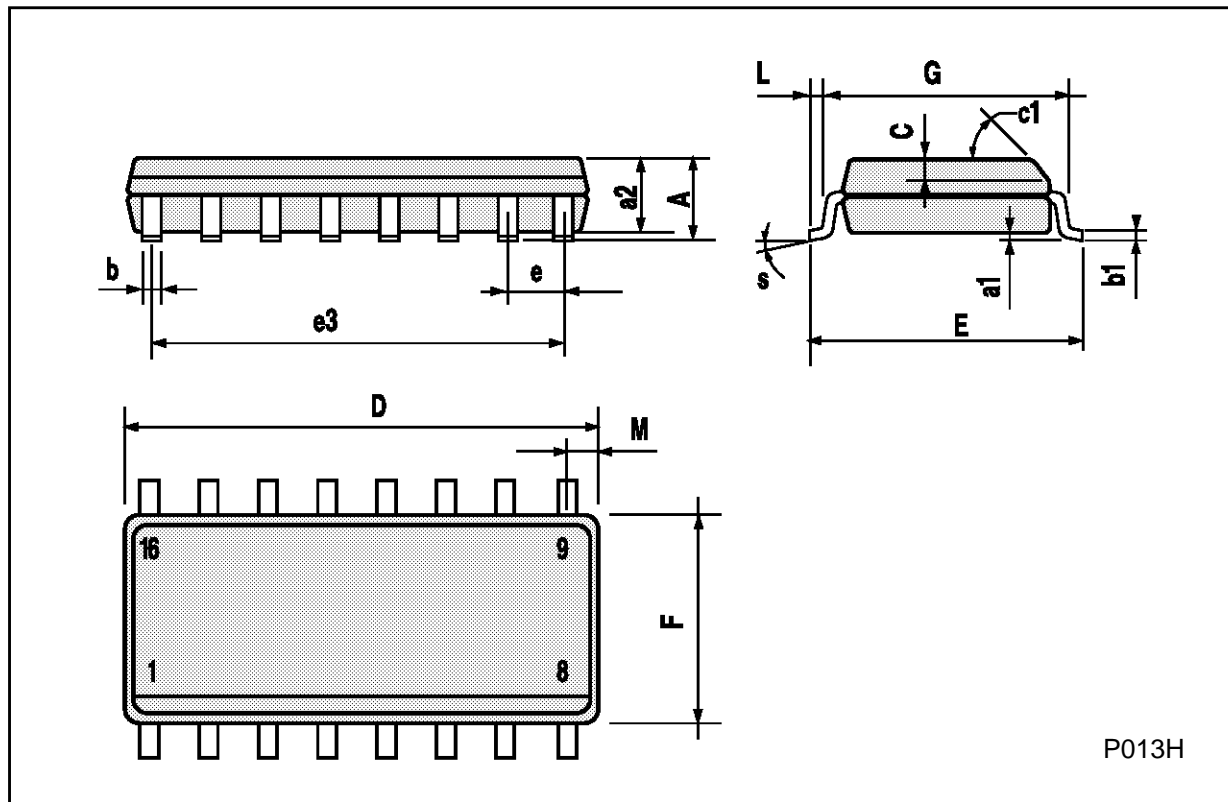
Ceramic DIP16/1 MECHANICAL DATA

| 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

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 | |

