

## QUAD BILATERAL SWITCH

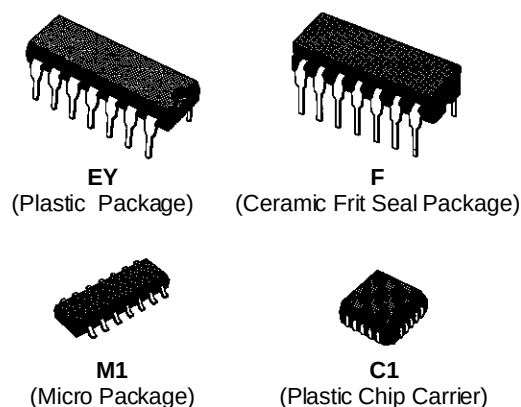
- 20V DIGITAL OR  $\pm 10V$  PEAK-TO-PEAK SWITCHING
- 280 $\Omega$  TYPICAL ON RESISTANCE FOR 15V OPERATION
- SWITCH ON RESISTANCE MATCHED TO WITHIN 10 $\Omega$  TYP. OVER 15V SIGNAL INPUT RANGE
- HIGH ON/OFF OUTPUT-VOLTAGE RATIO : 65dB TYP. @  $f_{is} = 10\text{kHz}$ ,  $R_L = 10\text{k}\Omega$
- HIGH DEGREE OF LINEARITY : < 0.5% DISTORTION TYP. @  $f_{is} = 1\text{kHz}$ ,  $V_{is} = 5\text{V}_{pp}$ ,  $V_{DD} - V_{SS} \geq 10V$ ,  $R_L = 10\text{k}\Omega$
- EXTREMELY LOW OFF SWITCH LEAKAGE RESULTING IN VERY LOW OFFSET CURRENT AND HIGH EFFECTIVE OFF RESISTANCE: 100pA TYP. @  $V_{DD} - V_{SS} = 18V$ ,  $T_{amb} = 25^\circ\text{C}$
- EXTREMELY HIGH CONTROL INPUT IMPEDANCE (control circuit isolated from signal circuit 10<sup>12</sup> $\Omega$  typ.)
- LOW CROSSTALK BETWEEN SWITCHES : 50dB TYP. @  $f_{is} = 0.9\text{MHz}$ ,  $R_L = 1\text{k}\Omega$
- MATCHED CONTROL-INPUT TO SIGNAL-OUTPUT CAPACITANCE : REDUCES OUTPUT SIGNAL TRANSIENTS
- FREQUENCY RESPONSE' SWITCH ON = 40MHz (typ.)
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 5V, 10V, AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100nA AT 18V AND 25 $^\circ\text{C}$  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 **HCC4016B** (extended temperature range) and **HCF4016B** (intermediate temperature range) are monolithic integrated circuit, available in 14-lead dual in-line plastic or ceramic package and plastic micropackage.

The **HCC/HCF4016B** Series types are quad bilateral switches intended for the transmission or multiplexing

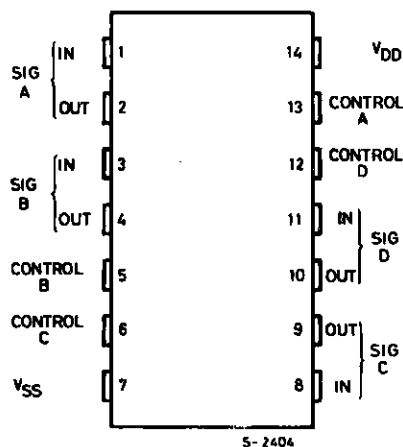
of analog or digital signals. Each of the four independent bilateral switches has a single control signal input which simultaneously biases both the p and n device in a given switch ON or OFF.



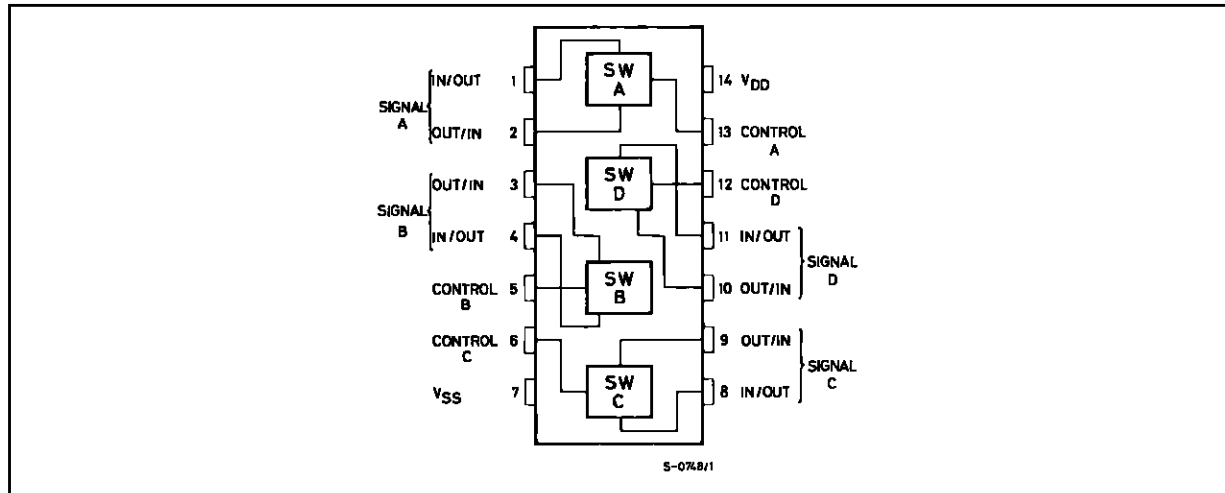
### ORDER CODES:

|            |            |
|------------|------------|
| HCC4016BF  | HCF4016BM1 |
| HCF4016BEY | HCF4016BC1 |

### PIN CONNECTIONS



## FUNCTIONAL DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

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

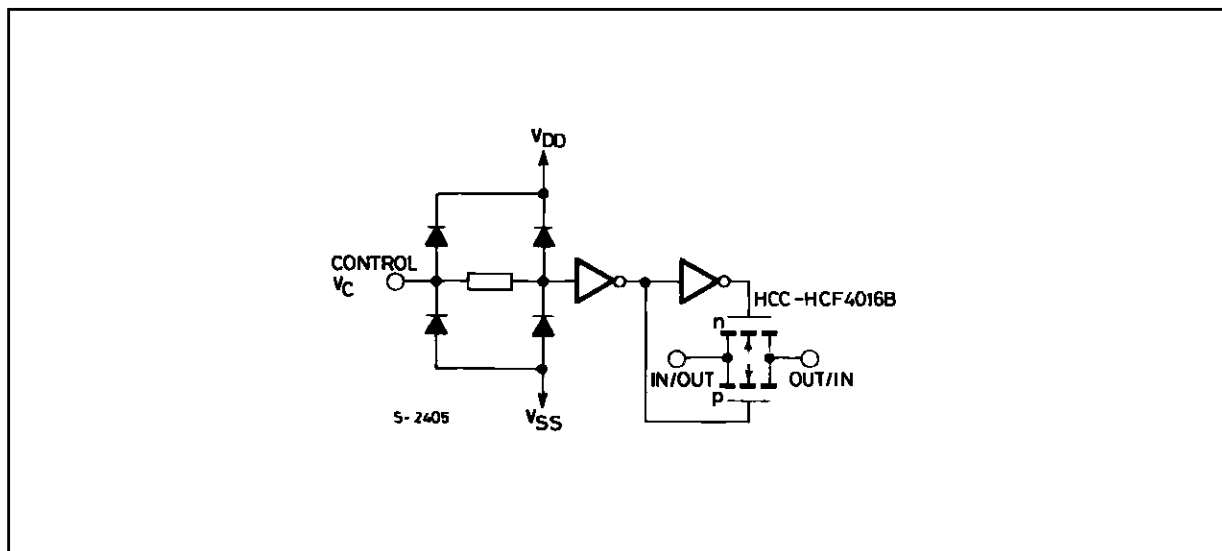
\* All voltage values are referred to  $V_{SS}$  pin voltage.

## RECOMMENDED OPERATING CONDITIONS

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

## SCHEMATIC DIAGRAM

1 OF 4 IDENTICAL SECTION



## STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

| Symbol          | Parameter                                                      |           | Test Conditions       |                                     |                        |                          | Value              |      |                   |                    |      |                     |      | Unit |
|-----------------|----------------------------------------------------------------|-----------|-----------------------|-------------------------------------|------------------------|--------------------------|--------------------|------|-------------------|--------------------|------|---------------------|------|------|
|                 |                                                                |           |                       | V <sub>C</sub> =<br>V <sub>DD</sub> | V <sub>SS</sub><br>(V) | V <sub>DD</sub><br>(V)   | T <sub>Low</sub> * |      | 25°C              |                    |      | T <sub>High</sub> * |      |      |
|                 |                                                                |           |                       |                                     |                        |                          | Min.               | Max. | Min.              | Typ.               | Max. | Min.                | Max. |      |
| I <sub>L</sub>  | Quiescent Device Current (all switches on or all switches off) | HCC Types |                       |                                     |                        | 5                        | 0.25               |      | 0.01              | 0.25               |      | 7.5                 | μA   |      |
|                 |                                                                |           |                       |                                     |                        | 10                       | 0.5                |      | 0.01              | 0.5                |      | 15                  |      |      |
|                 |                                                                |           |                       |                                     |                        | 15                       | 1                  |      | 0.01              | 1                  |      | 30                  |      |      |
|                 |                                                                |           |                       |                                     |                        | 20                       | 5                  |      | 0.02              | 5                  |      | 150                 |      |      |
|                 |                                                                | HCF Types |                       |                                     |                        | 5                        | 1                  |      | 0.01              | 1                  |      | 7.5                 |      |      |
|                 |                                                                |           |                       |                                     |                        | 10                       | 2                  |      | 0.01              | 2                  |      | 15                  |      |      |
|                 |                                                                |           |                       |                                     |                        | 15                       | 4                  |      | 0.01              | 4                  |      | 30                  |      |      |
| SWITCH          |                                                                |           |                       |                                     | V <sub>IS</sub>        |                          |                    |      |                   |                    |      |                     |      |      |
| R <sub>ON</sub> | Resistance                                                     | HCC       | R <sub>L</sub> = 10kΩ | + 7.5                               | − 7.5                  | + 7.5<br>− 7.5<br>± 0.25 | 360<br>360<br>775  |      | 200<br>200<br>280 | 400<br>400<br>850  |      | 600<br>600<br>1230  | Ω    |      |
|                 |                                                                | HCF       |                       |                                     |                        | + 7.5<br>− 7.5<br>± 0.25 | 370<br>370<br>790  |      | 200<br>200<br>280 | 400<br>400<br>850  |      | 520<br>520<br>1080  |      |      |
|                 |                                                                | HCC       | R <sub>L</sub> = 10kΩ | + 5                                 | − 5                    | + 5<br>− 5<br>± 0.25     | 600<br>600<br>1870 |      | 250<br>250<br>580 | 660<br>660<br>2000 |      | 960<br>960<br>2600  |      |      |
|                 |                                                                | HCF       |                       |                                     |                        | + 5<br>− 5<br>± 0.25     | 610<br>610<br>1900 |      | 250<br>250<br>580 | 660<br>660<br>2000 |      | 840<br>840<br>2380  |      |      |

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

## STATIC ELECTRICAL CHARACTERISTICS (continued)

| Symbol                                                                            | Parameter                                                   |              | Test Conditions         |                  |                          |                         |             | Value              |      |                   |                    |              |                    | Unit     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|-------------------------|------------------|--------------------------|-------------------------|-------------|--------------------|------|-------------------|--------------------|--------------|--------------------|----------|
|                                                                                   |                                                             |              |                         | $V_C =$          | $V_{SS}$                 | $V_{DD}$                | $T_{Low}^*$ |                    | 25°C |                   |                    | $T_{High}^*$ |                    |          |
|                                                                                   |                                                             |              |                         | $V_{DD}$         | (V)                      | (V)                     | Min.        | Max.               | Min. | Typ.              | Max.               | Min.         | Max.               |          |
| SWITCH (continued)                                                                |                                                             |              |                         |                  |                          |                         |             |                    |      |                   |                    |              |                    |          |
| $R_{ON}$                                                                          | Resistance                                                  | HCC          | $R_L = 10k\Omega$       | + 15             | 0                        | + 15<br>+ 0.25<br>+ 9.3 |             | 360<br>360<br>775  |      | 200<br>200<br>300 | 400<br>400<br>850  |              | 600<br>600<br>1230 | $\Omega$ |
|                                                                                   |                                                             | HCF          |                         | + 15             | 0                        | + 15<br>+ 0.25<br>+ 9.3 |             | 370<br>370<br>790  |      | 200<br>200<br>300 | 400<br>400<br>800  |              | 520<br>520<br>1080 |          |
|                                                                                   |                                                             | HCC          | $R_L = 10k\Omega$       | + 10             | 0                        | + 10<br>+ 0.25<br>+ 5.6 |             | 600<br>600<br>1870 |      | 250<br>250<br>560 | 660<br>660<br>2000 |              | 960<br>960<br>2600 |          |
|                                                                                   |                                                             | HCF          |                         | + 10             | 0                        | + 10<br>+ 0.25<br>+ 5.6 |             | 610<br>610<br>1900 |      | 250<br>250<br>560 | 660<br>660<br>2000 |              | 840<br>840<br>2380 |          |
| $\Delta ON$                                                                       | Resistance $\Delta RON$<br>(between any 2<br>of 4 switches) |              | $R_L = 10k\Omega$       | + 7.5            | – 7.5                    | $\pm 7.5$               |             |                    |      | 10                |                    |              |                    | $\Omega$ |
|                                                                                   |                                                             |              |                         | + 5              | – 5                      | $\pm 5$                 |             |                    |      | 15                |                    |              |                    |          |
| Input or Output<br>Leakage Current<br>Switch OFF<br>(effective off<br>resistance) |                                                             | HCC          |                         | $V_{DD}$<br>+18  | $V_C =$<br>$V_{SS}$<br>0 |                         |             | $\pm 0.1$          |      | $10^{-5}$         | $\pm 0.1$          |              | 1                  | $\mu A$  |
|                                                                                   |                                                             | HCF          |                         | $V_{DD}$<br>+ 15 | $V_C =$<br>$V_{SS}$<br>0 |                         |             | $\pm 0.3$          |      | $10^{-5}$         | $\pm 0.3$          |              | 1                  |          |
| $C_I$                                                                             | Input Capacitance                                           |              | $V_{CC} = V_{SS} = - 5$ |                  |                          | + 5                     |             |                    |      | 4                 |                    |              |                    | pF       |
| $C_O$                                                                             | Output Capacitance                                          |              |                         |                  |                          |                         |             |                    |      | 4                 |                    |              |                    |          |
| $C_{IO}$                                                                          | Feedthrough                                                 |              |                         |                  |                          |                         |             |                    |      | 0.2               |                    |              |                    |          |
| CONTROL ( $V_C$ )                                                                 |                                                             |              |                         |                  |                          |                         |             |                    |      |                   |                    |              |                    |          |
| $V_{TH}$                                                                          | Switch Threshold<br>Voltage                                 |              | $I_{IS} = 10\mu A$      |                  |                          | 5                       | 1           |                    | 1    | 2.25              |                    | 1            |                    | V        |
|                                                                                   |                                                             |              |                         |                  |                          | 10                      | 2           |                    | 2    | 4.5               |                    | 2            |                    |          |
|                                                                                   |                                                             |              |                         |                  |                          | 15                      | 2           |                    | 2    | 6.75              |                    | 2            |                    |          |
| $I_I$                                                                             | Input<br>Current                                            | HCC<br>Types | $V_{IS} \leq V_{DD}$    |                  |                          | 18                      |             | $\pm 0.1$          |      | $\pm 10^{-5}$     | $\pm 0.1$          |              | $\pm 1$            | $\mu A$  |
|                                                                                   |                                                             | HCF<br>Types |                         |                  |                          | 15                      |             | $\pm 0.3$          |      | $\pm 10^{-5}$     | $\pm 0.3$          |              | $\pm 1$            |          |
| $C_I$                                                                             | Input Capacitance                                           |              |                         |                  |                          |                         |             |                    |      | 5                 | 7.5                |              |                    | pF       |

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

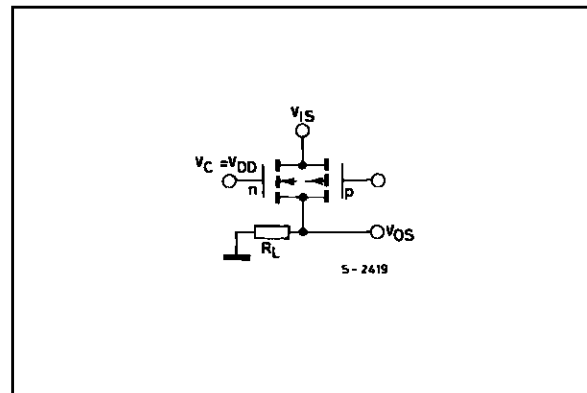
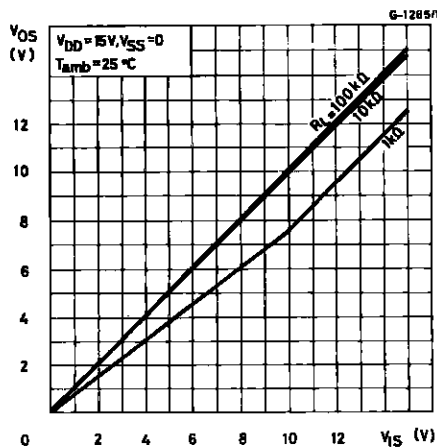
**DYNAMIC ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ ,  $C_L = 50\text{pF}$  all input square wave rise and fall time = 20ns)

| Parameter                                                                                               | Test Conditions                                                                        |                     |                      |                                          |                     |                     |                                        | Value |      | Unit |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------|----------------------|------------------------------------------|---------------------|---------------------|----------------------------------------|-------|------|------|
|                                                                                                         | V <sub>C</sub> (V)                                                                     | R <sub>L</sub> (kΩ) | f <sub>i</sub> (KHz) | V <sub>I</sub> (V)                       | V <sub>ss</sub> (V) | V <sub>DD</sub> (V) |                                        | Typ.  | Max. |      |
| SWITCH                                                                                                  |                                                                                        |                     |                      |                                          |                     |                     |                                        |       |      |      |
| t <sub>pd</sub> Propagation Delay Time<br>(signal input to output)                                      | = V <sub>DD</sub>                                                                      | 10                  |                      | 10sq.<br>Wave                            | GND                 | 5                   |                                        | 40    | 100  | ns   |
|                                                                                                         |                                                                                        |                     |                      |                                          |                     | 10                  |                                        | 20    | 50   |      |
|                                                                                                         |                                                                                        |                     |                      |                                          |                     | 15                  |                                        | 15    | 40   |      |
| Crosstalk Between any 2 of 4<br>Switches (f @ – 50dB)<br>20 log 10 $\frac{V_{O(B)}}{V_{I(A)}}$ = – 50dB | V <sub>C(A)</sub> = V <sub>DD</sub> = + 5<br>V <sub>C(B)</sub> = V <sub>SS</sub> = – 5 | 1                   |                      | V <sub>I(A)</sub><br>Δ<br>= 5p-p         |                     |                     |                                        | 0.9   |      | MHz  |
| Frequency Response Switch<br>"ON" (sine wave input)<br>At 20 log 10 $\frac{V_O}{V_I}$ = – 3dB           | = V <sub>DD</sub><br>= + 5                                                             | 1                   |                      | 5p-p                                     | – 5                 |                     |                                        | 40    |      | MHz  |
| Feedthrough (switch OFF)<br>At 20 log 10 $\frac{V_O}{V_I}$ = – 50dB                                     | = V <sub>SS</sub><br>= – 5                                                             | 1                   |                      | – 5p-p                                   |                     | 5                   |                                        | 1.25  |      | MHz  |
| Sine Wave Distortion                                                                                    | = V <sub>DD</sub><br>= 5                                                               | 10                  | 1                    | 5p-p                                     | – 5                 |                     |                                        | 0.4   |      | %    |
| CONTROL (V <sub>C</sub> )                                                                               |                                                                                        |                     |                      |                                          |                     |                     |                                        |       |      |      |
| Propagation Delay :<br>(turn on control to<br>output)                                                   | V <sub>DD</sub> – V <sub>SS</sub><br>(sq. wave)                                        | 1                   |                      | V <sub>DD</sub><br>or<br>V <sub>SS</sub> |                     | 5                   | V <sub>DD</sub> –V <sub>SS</sub> = 10V | 35    | 70   | ns   |
|                                                                                                         |                                                                                        |                     |                      |                                          |                     | 10                  |                                        | 20    | 40   |      |
|                                                                                                         |                                                                                        |                     |                      |                                          |                     | 15                  |                                        | 15    | 30   |      |
| Max. Allowable Control Input<br>Repetition Rate                                                         | 10 (sq. wave)                                                                          | 1                   |                      | V <sub>DD</sub>                          | GND                 | 10                  |                                        | 10    |      | MHz  |
| Crosstalk (control input to<br>signal output)                                                           | 10 (sq. wave)                                                                          | 10                  |                      |                                          | GND                 | 10                  |                                        | 50    |      | mV   |

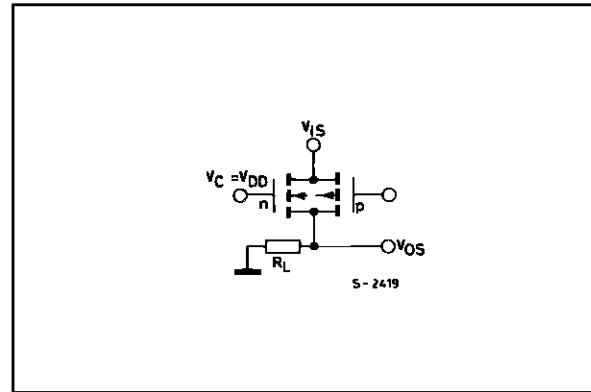
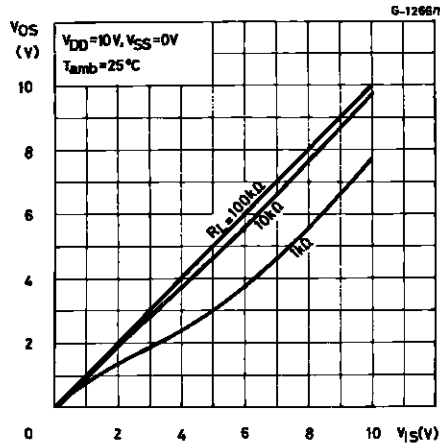
( $\Delta$ ) Symmetrical about OV

( $\bullet$ ) For all test conditions.

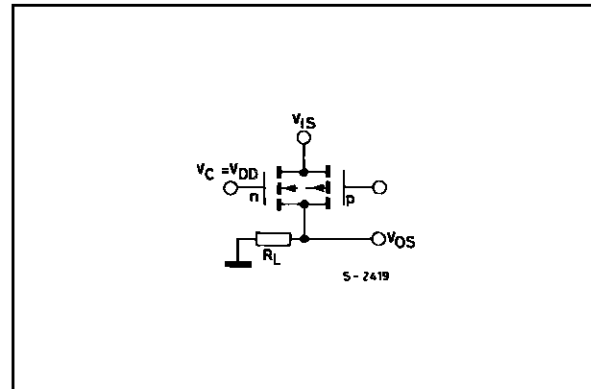
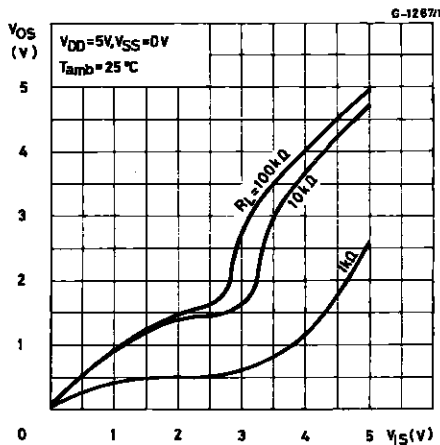
Typical "ON" Characteristics for 1 of 4 switches with  $V_{DD} = + 15\text{V}$ ,  $V_{SS} = 0\text{V}$ , and Test Circuit.



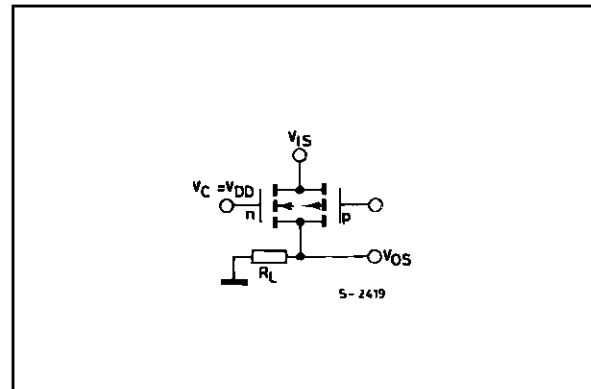
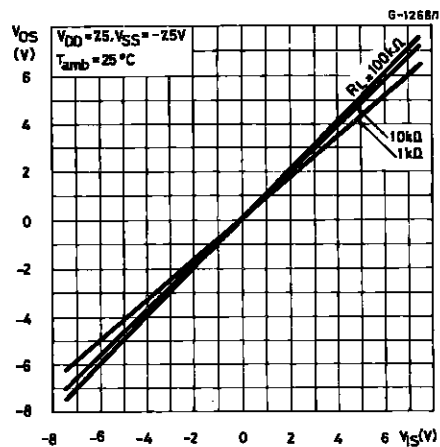
Typical "ON" Characteristics for 1 of 4 switches with  $V_{DD} = +10V$ ,  $V_{SS} = 0V$ , and Test Circuit.



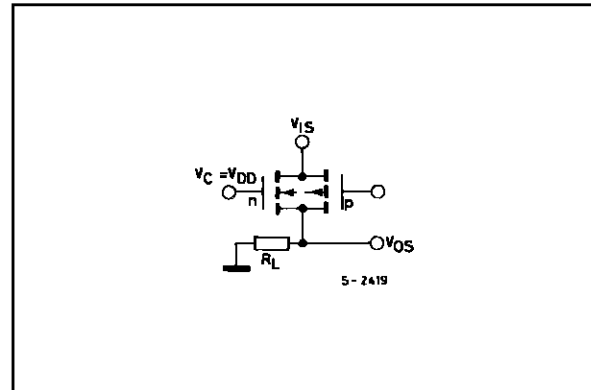
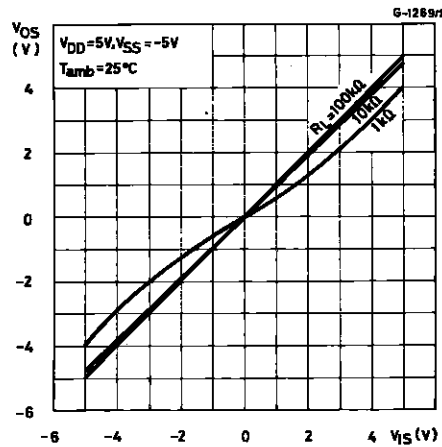
Typical "ON" Characteristics for 1 of 4 switches with  $V_{DD} = +5V$ ,  $V_{SS} = 0V$ , and Test Circuit.



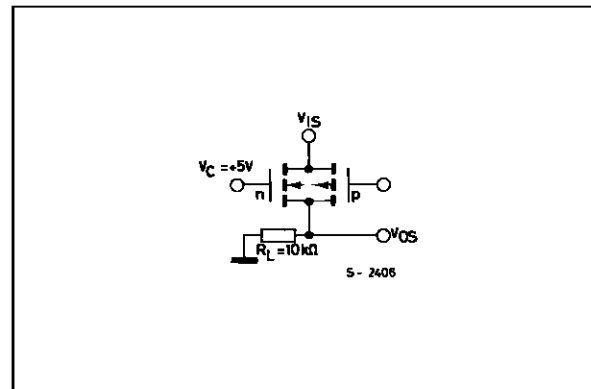
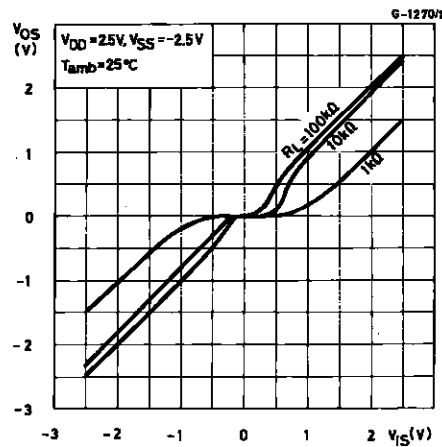
Typical "ON" Characteristics for 1 of 4 switches with  $V_{DD} = +7.5V$ ,  $V_{SS} = -7.5V$ , and Test Circuit.



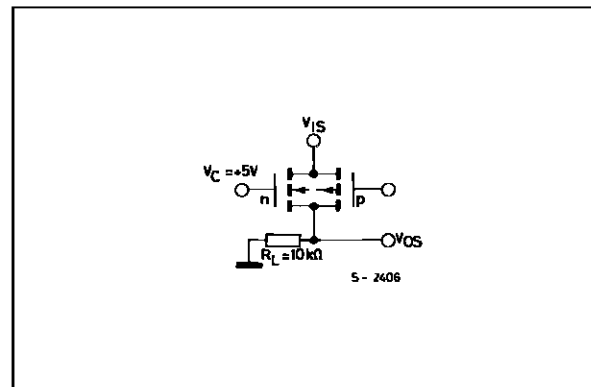
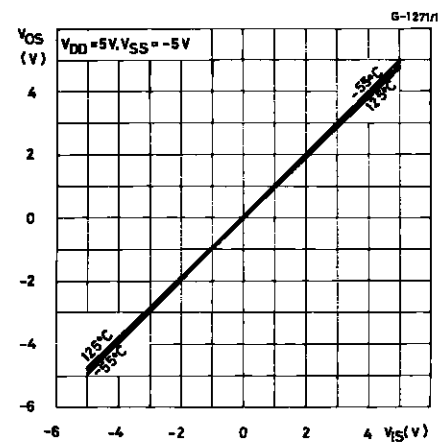
Typical "ON" Characteristics for 1 of 4 switches with  $V_{DD} = +5V$ ,  $V_{SS} = -5V$ , and Test Circuit.



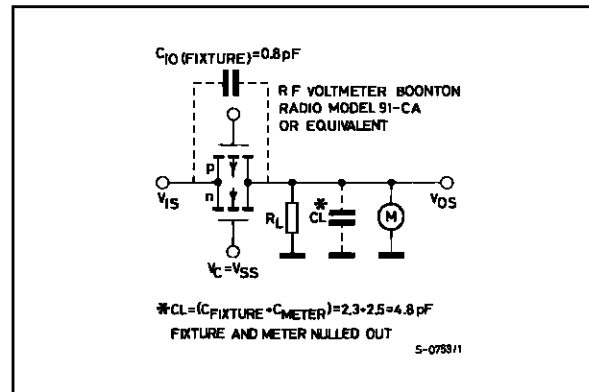
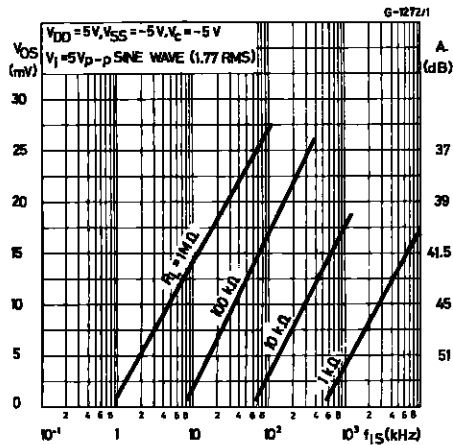
Typical "ON" Characteristics for 1 of 4 switches with  $V_{DD} = +2.5V$ ,  $V_{SS} = -2.5V$ , and Test Circuit.



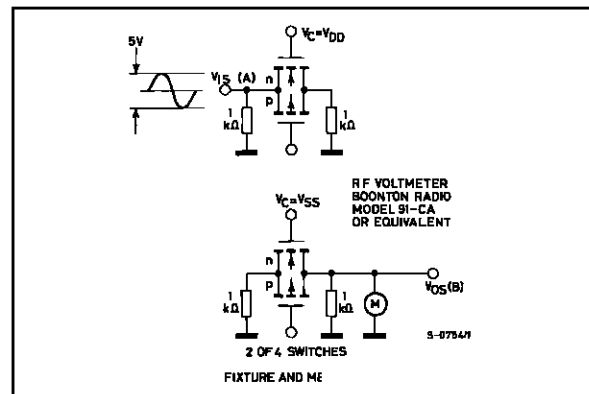
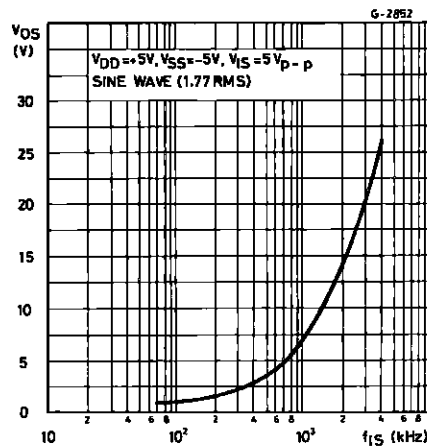
Typical "ON" Characteristics as function of temp. for 1 of 4 switches with  $V_{DD} = +5V$  and Test Circuit.



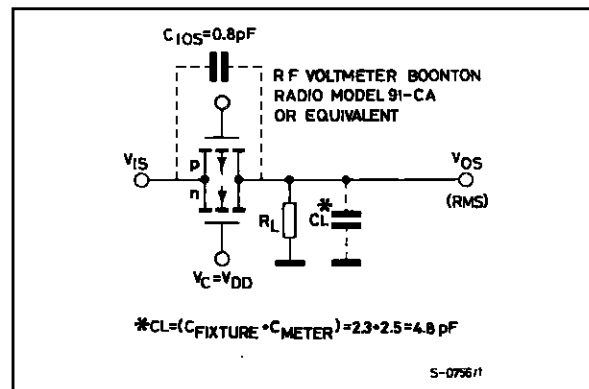
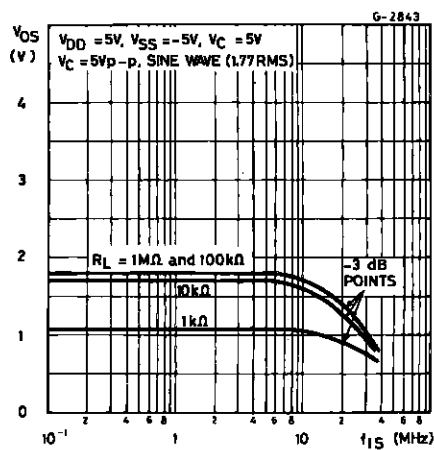
Typical feedthru vs. frequency-switch "OFF" and Test Circuit.



Typical Crosstalk between Switch Circuits in the Same Package.



Typical Switch Frequency response-switch "ON" and Test Circuit.





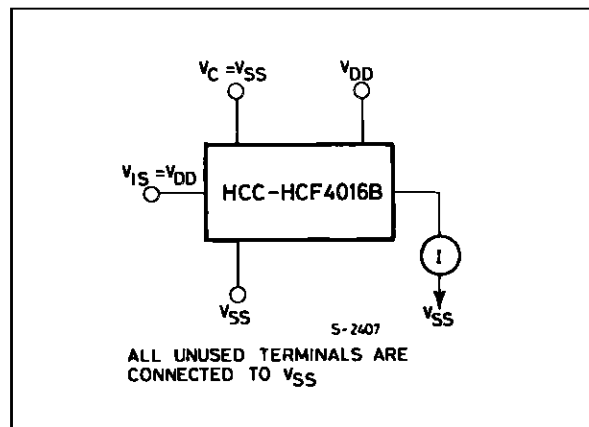
TYPICAL "ON" RESISTANCE CHARACTERISTICS,  $T_{amb} = 25^{\circ}\text{C}$ 

| Characteristic*      | Supply Conditions |                 | Load Conditions          |                 |                           |                 |                            |                 |
|----------------------|-------------------|-----------------|--------------------------|-----------------|---------------------------|-----------------|----------------------------|-----------------|
|                      |                   |                 | $R_L = 1\text{ k}\Omega$ |                 | $R_L = 10\text{ k}\Omega$ |                 | $R_L = 100\text{ k}\Omega$ |                 |
|                      | $V_{DD}$<br>(V)   | $V_{SS}$<br>(V) | Value<br>( $\Omega$ )    | $V_{is}$<br>(V) | Value<br>( $\Omega$ )     | $V_{is}$<br>(V) | Value<br>( $\Omega$ )      | $V_{is}$<br>(V) |
| $R_{ON}$             | + 15              | 0               | 200                      | + 15            | 200                       | + 15            | 180                        | + 15            |
|                      |                   |                 | 200                      | 0               | 200                       | 0               | 200                        | 0               |
| $R_{ON}(\text{max})$ | + 15              | 0               | 300                      | + 11            | 300                       | + 9.3           | 320                        | + 9.2           |
| $R_{ON}$             | + 10              | 0               | 290                      | + 10            | 250                       | + 10            | 240                        | + 10            |
|                      |                   |                 | 290                      | 0               | 250                       | 0               | 300                        | 0               |
| $R_{ON}(\text{max})$ | + 10              | 0               | 500                      | + 7.4           | 560                       | + 5.6           | 610                        | +5.5            |
| $R_{ON}$             | + 5               | 0               | 860                      | + 5             | 470                       | + 5             | 450                        | + 5             |
|                      |                   |                 | 600                      | 0               | 580                       | 0               | 800                        | 0               |
| $R_{ON}(\text{max})$ | + 5               | 0               | 1.7k                     | + 4.2           | 7k                        | + 2.9           | 33k                        | +2.7            |
| $R_{ON}$             | + 2.5             | - 2.5           | 590                      | + 2.5           | 450                       | + 2.5           | 490                        | + 2.5           |
|                      |                   |                 | 720                      | - 2.5           | 520                       | - 2.5           | 520                        | - 2.5           |
| $R_{ON}(\text{max})$ | + 2.5             | - 2.5           | 232k                     | $\pm 0.25$      | 300k                      | $\pm 0.25$      | 870k                       | $\pm 0.25$      |

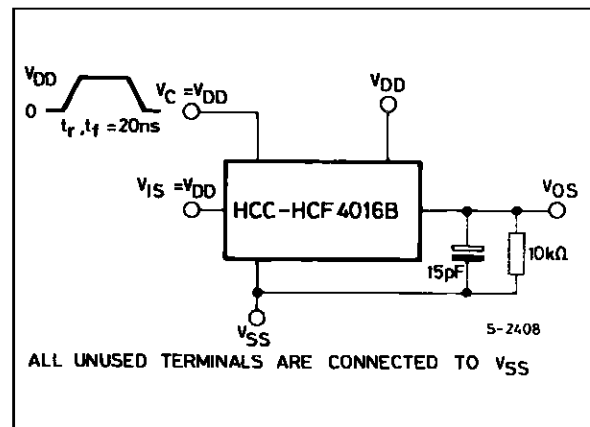
\* Variation from a perfect switch,  $R_{ON} = 0\Omega$ .

## TEST CIRCUITS

"OFF" Switch Input or Put Leakage Current.



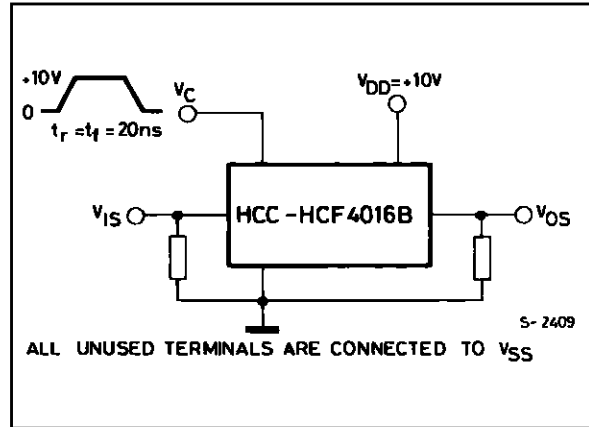
Square-Wave Response.



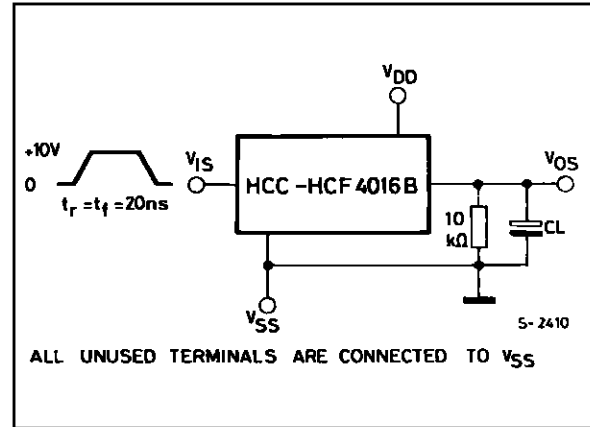
## HCC/HCF4016B

### TEST CIRCUITS (continued)

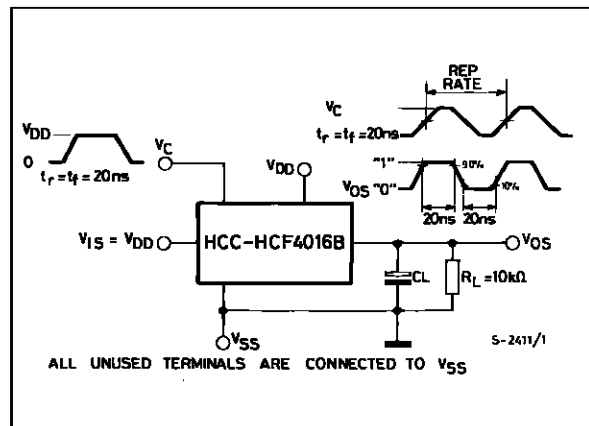
Crosstalk-control Input to Signal Output.



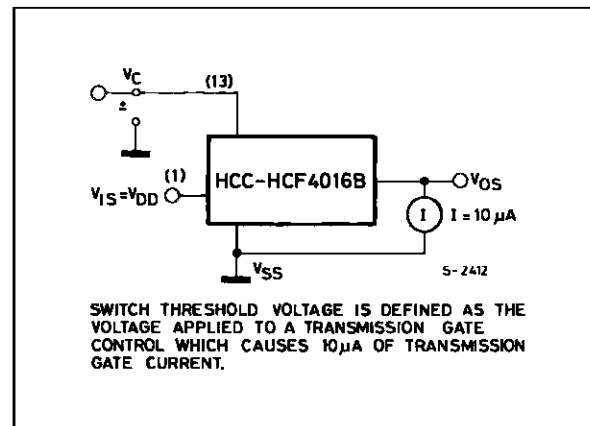
Propagation Delay Time Signal Input ( $V_{IS}$ ) to Signal Output ( $V_{OS}$ ).



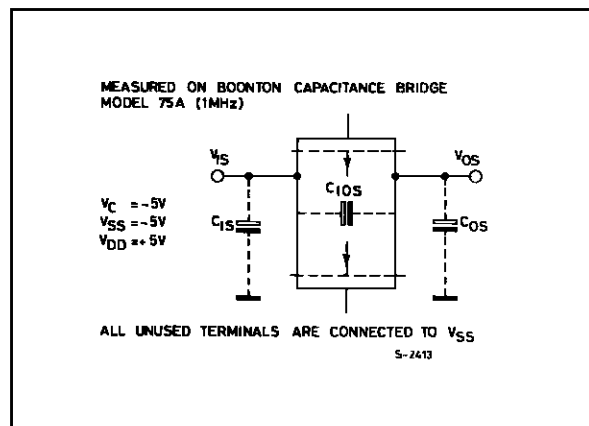
Max Allowable Control-input Repetition Rate.



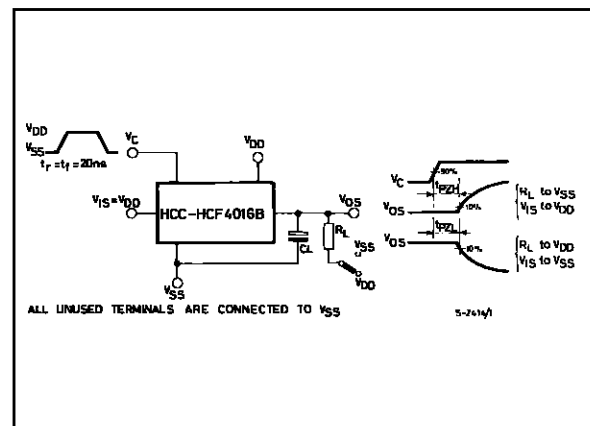
Switch Threshold Voltage.



Capacitance  $C_{IOS}$  and  $C_{OS}$ .

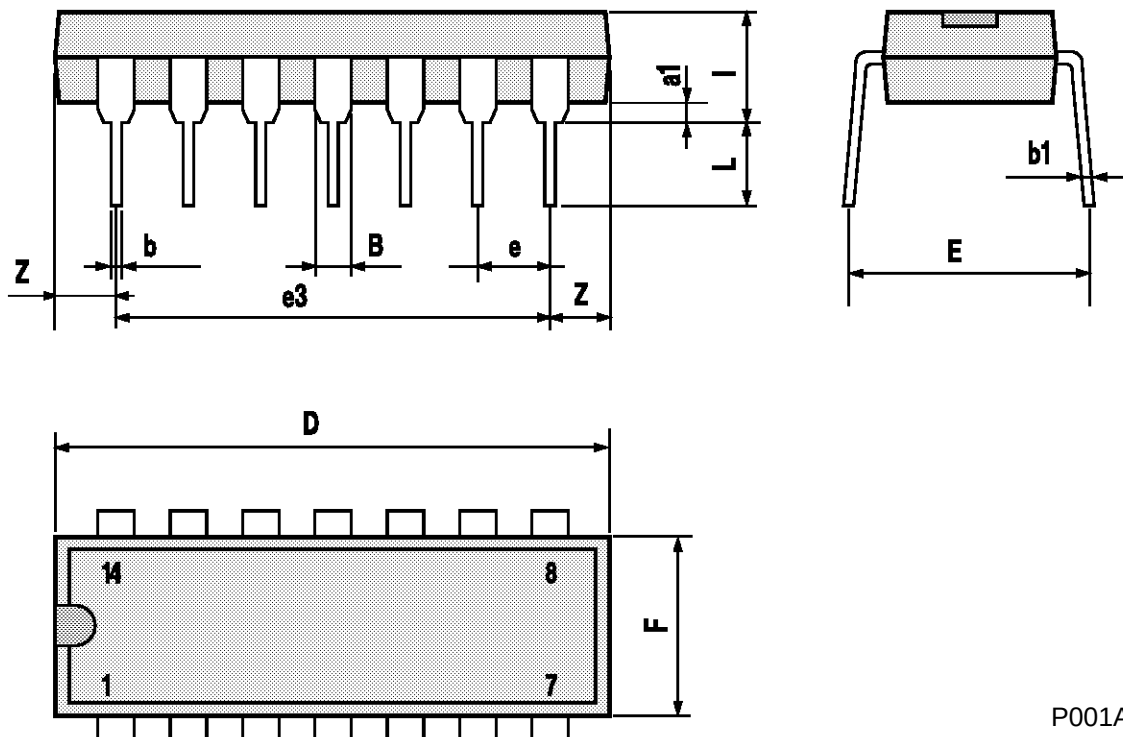


Turn-On Propagation Delay-control Input to Output.



## Plastic DIP14 MECHANICAL DATA

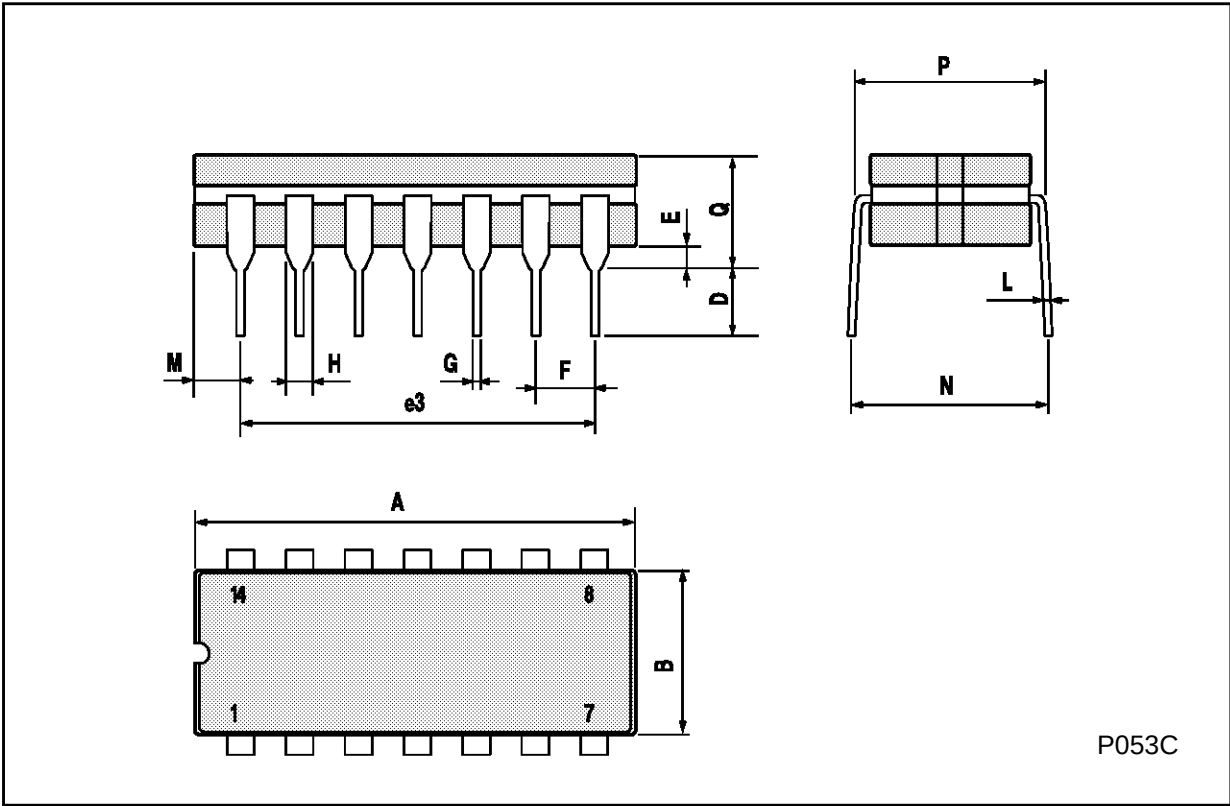
| DIM. | mm   |       |      | inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | MIN. | TYP.  | MAX. | MIN.  | TYP.  | MAX.  |
| a1   | 0.51 |       |      | 0.020 |       |       |
| B    | 1.39 |       | 1.65 | 0.055 |       | 0.065 |
| b    |      | 0.5   |      |       | 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

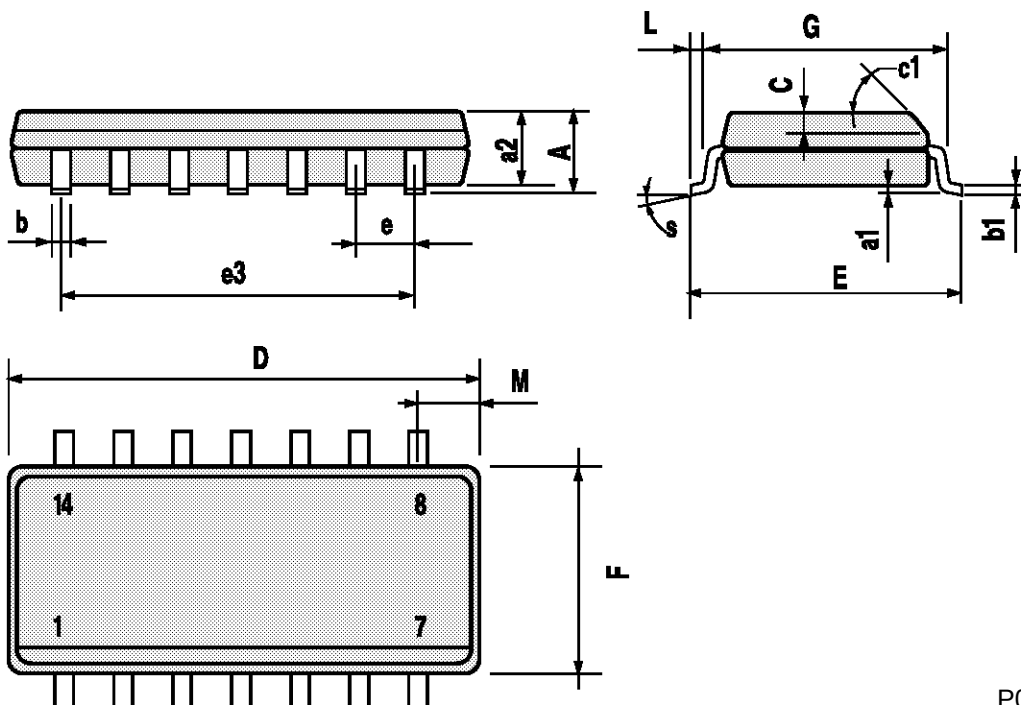
Ceramic DIP14/1 MECHANICAL DATA

| 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

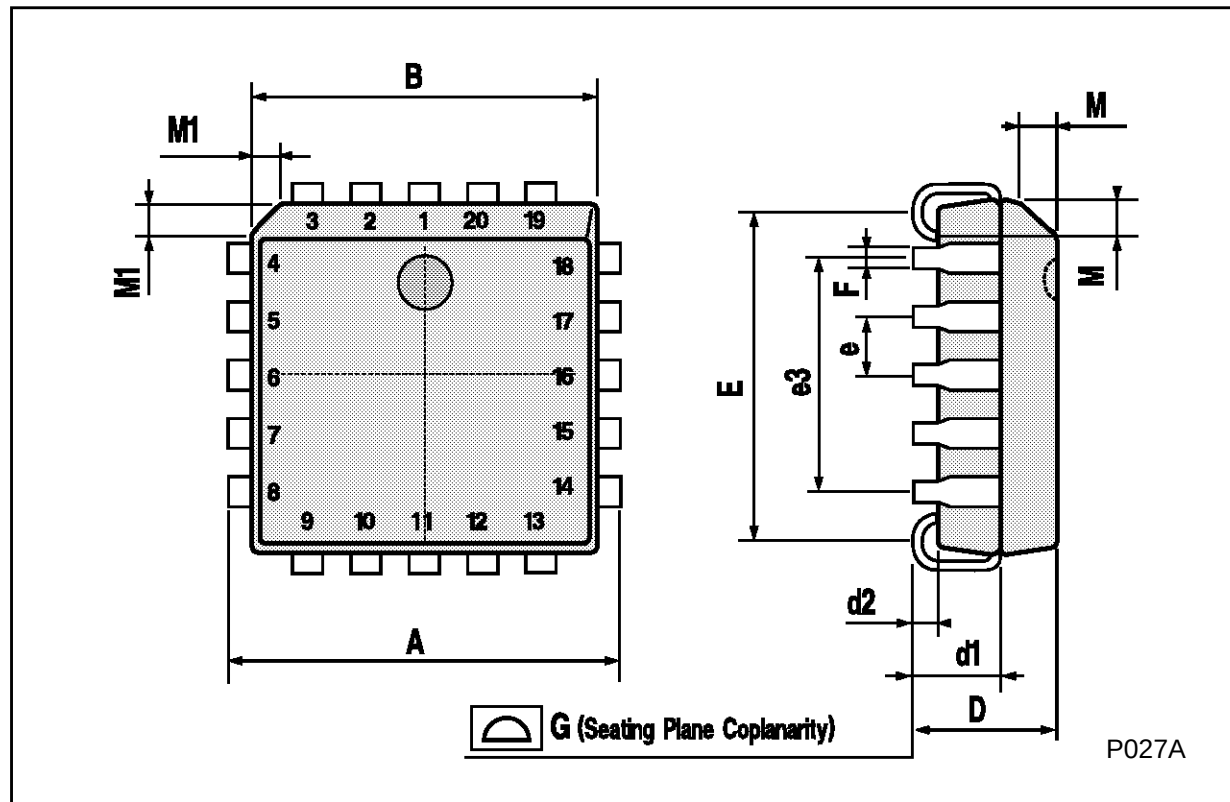
| DIM. | mm         |      |      | inch  |       |       |
|------|------------|------|------|-------|-------|-------|
|      | MIN.       | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |            |      | 1.75 |       |       | 0.068 |
| a1   | 0.1        |      | 0.2  | 0.003 |       | 0.007 |
| 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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