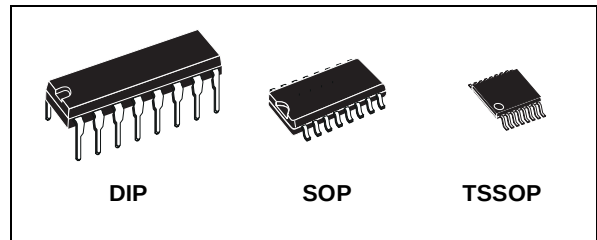


## PROGRAMMABLE DIVIDER/TIMER

- HIGH SPEED :  
 $f_{MAX} = 75 \text{ MHz (TYP.) at } V_{CC} = 6V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 4\mu A(\text{MAX.}) \text{ at } T_A = 25^\circ C$
- HIGH NOISE IMMUNITY:  
 $V_{NIH} = V_{NIL} = 28 \% V_{CC} (\text{MIN.})$
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OH}| = I_{OL} = 4mA (\text{MIN})$
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \approx t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:  
 $V_{CC} (\text{OPR}) = 2V \text{ to } 6V$
- PIN AND FUNCTION COMPATIBLE WITH  
 74 SERIES 7292



### ORDER CODES

| PACKAGE | TUBE         | T & R           |
|---------|--------------|-----------------|
| DIP     | M74HC7292B1R |                 |
| SOP     | M74HC7292M1R | M74HC7292RM13TR |
| TSSOP   |              | M74HC7292TTR    |

### DESCRIPTION

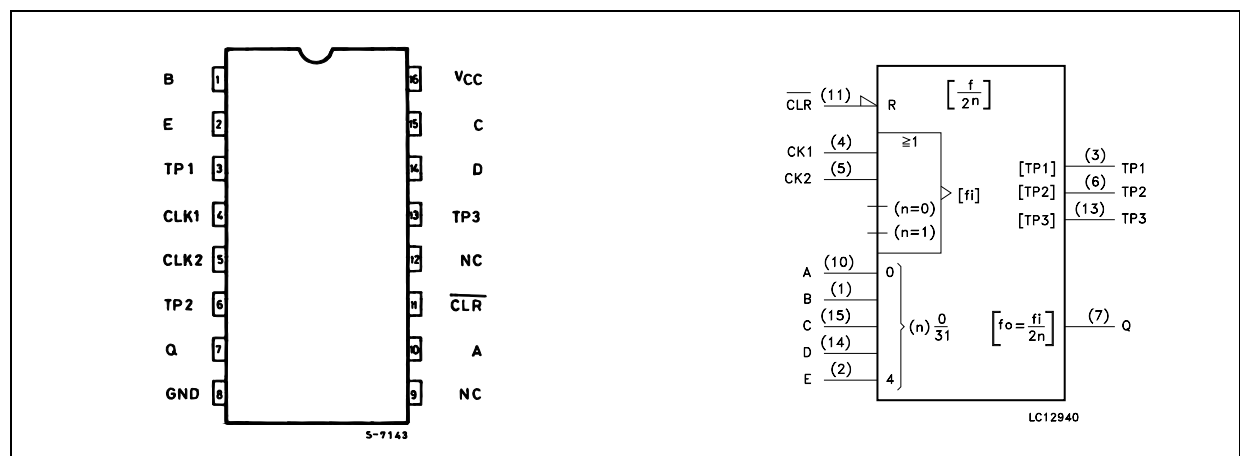
The M74HC7292 is an high speed CMOS PROGRAMMABLE DIVIDER/TIMER fabricated with silicon gate C<sup>2</sup>MOS technology.

This device is a programmable frequency divider and have two clock inputs, either one may be used for clock gating. (see the function table). The M74HC7292 can divide from  $2^2$  to  $2^{31}$ . This

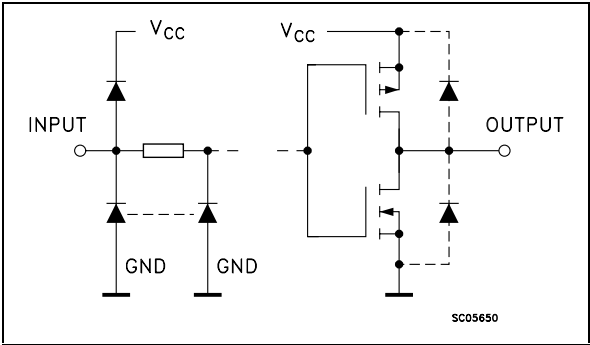
device feature an active-low clear input to initialize the state of all flip-flops. To facilitate incoming inspection, test points (TP1, TP2, TP3) are provided. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

This device have all outputs "Totem Pole"

### PIN CONNECTION AND IEC LOGIC SYMBOLS



INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

| PIN No           | SYMBOL        | NAME AND FUNCTION       |
|------------------|---------------|-------------------------|
| 4, 5             | CLK1, CLK2    | Input Clock             |
| 1, 2, 10, 14, 15 | A to E        | Program Inputs          |
| 3, 6, 13         | TP1, TP2, TP3 | Test Point Outputs      |
| 11               | CLR           | Clear (Active LOW)      |
| 7                | Q             | Output                  |
| 8                | GND           | Ground (0V)             |
| 16               | Vcc           | Positive Supply Voltage |

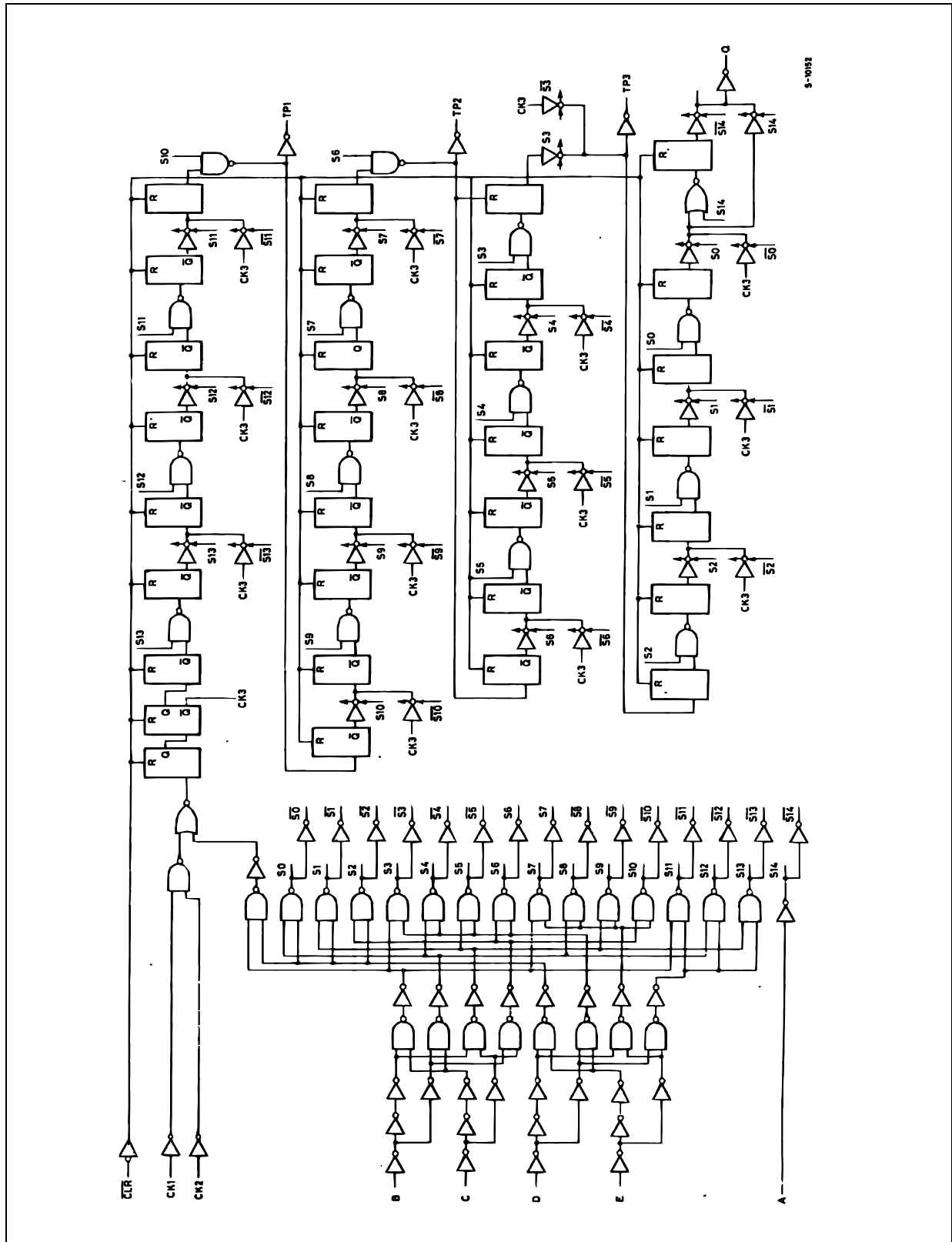
TRUTH TABLE

| CLR | CLK1 | CLK2 | Q OUTPUT MODE |
|-----|------|------|---------------|
| L   | X    | X    | CLEARED TO L  |
| H   |      | L    | UP COUNT      |
| H   | L    |      |               |
| H   | H    | X    | NO CHANGE     |
| H   | X    | H    |               |

## FUNCTIONAL TABLE

| PROGRAMMING<br>INPUTS |   |   |   |   | FREQUENCY DIVISION |               |                |         |                 |         |                 |            |
|-----------------------|---|---|---|---|--------------------|---------------|----------------|---------|-----------------|---------|-----------------|------------|
|                       |   |   |   |   | Q                  |               | TP1            |         | TP2             |         | TP3             |            |
| E                     | D | C | B | A | BINARY             | DECIMAL       | BINARY         | DECIMAL | BINARY          | DECIMAL | BINARY          | DECIMAL    |
| L                     | L | L | L | L | Inhibit            | Inhibit       | Inhibit        | Inhibit | Inhibit         | Inhibit | Inhibit         | Inhibit    |
| L                     | L | L | L | H | Inhibit            | Inhibit       | Inhibit        | Inhibit | Inhibit         | Inhibit | Inhibit         | Inhibit    |
| L                     | L | L | H | L | 2 <sup>2</sup>     | 4             | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| L                     | L | L | H | H | 2 <sup>3</sup>     | 8             | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| L                     | L | H | L | L | 2 <sup>4</sup>     | 16            | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| L                     | L | H | L | H | 2 <sup>5</sup>     | 32            | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| L                     | L | H | H | L | 2 <sup>6</sup>     | 64            | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| L                     | L | H | H | H | 2 <sup>7</sup>     | 128           | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| L                     | H | L | L | L | 2 <sup>8</sup>     | 256           | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>2</sup>  | 4          |
| L                     | H | L | L | H | 2 <sup>9</sup>     | 512           | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>2</sup>  | 4          |
| L                     | H | L | H | L | 2 <sup>10</sup>    | 1.024         | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>4</sup>  | 16         |
| L                     | H | L | H | H | 2 <sup>11</sup>    | 2.048         | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>4</sup>  | 16         |
| L                     | H | H | L | L | 2 <sup>12</sup>    | 4.096         | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>6</sup>  | 64         |
| L                     | H | H | L | H | 2 <sup>13</sup>    | 8.192         | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>6</sup>  | 64         |
| L                     | H | H | H | L | 2 <sup>14</sup>    | 16.384        | 2 <sup>9</sup> | 512     | Disabled Low    |         | 2 <sup>8</sup>  | 256        |
| H                     | H | H | H | H | 2 <sup>15</sup>    | 32.768        | 2 <sup>9</sup> | 512     | Disabled Low    |         | 2 <sup>8</sup>  | 256        |
| H                     | L | L | L | L | 2 <sup>16</sup>    | 65.536        | 2 <sup>9</sup> | 512     | 2 <sup>3</sup>  | 8       | 2 <sup>10</sup> | 1.024      |
| H                     | L | L | L | H | 2 <sup>17</sup>    | 131.072       | 2 <sup>9</sup> | 512     | 2 <sup>3</sup>  | 8       | 2 <sup>10</sup> | 1.024      |
| H                     | L | L | H | L | 2 <sup>18</sup>    | 262.144       | 2 <sup>9</sup> | 512     | 2 <sup>5</sup>  | 32      | 2 <sup>12</sup> | 4.096      |
| H                     | L | L | H | H | 2 <sup>19</sup>    | 524.288       | 2 <sup>9</sup> | 512     | 2 <sup>5</sup>  | 32      | 2 <sup>12</sup> | 4.096      |
| H                     | L | H | L | L | 2 <sup>20</sup>    | 1.048.576     | 2 <sup>9</sup> | 512     | 2 <sup>7</sup>  | 128     | 2 <sup>14</sup> | 16.384     |
| H                     | L | H | L | H | 2 <sup>21</sup>    | 2.097.152     | 2 <sup>9</sup> | 512     | 2 <sup>7</sup>  | 128     | 2 <sup>14</sup> | 16.384     |
| H                     | L | H | H | L | 2 <sup>22</sup>    | 4.194.304     | Disabled Low   |         | 2 <sup>9</sup>  | 512     | 2 <sup>16</sup> | 65.536     |
| H                     | L | H | H | H | 2 <sup>23</sup>    | 8.388.608     | Disabled Low   |         | 2 <sup>9</sup>  | 512     | 2 <sup>16</sup> | 65.536     |
| H                     | H | L | L | L | 2 <sup>24</sup>    | 16.777.216    | 2 <sup>3</sup> | 8       | 2 <sup>11</sup> | 2.048   | 2 <sup>18</sup> | 262.144    |
| H                     | H | L | L | H | 2 <sup>25</sup>    | 33.544.432    | 2 <sup>3</sup> | 8       | 2 <sup>11</sup> | 2.048   | 2 <sup>18</sup> | 262.144    |
| H                     | H | L | H | L | 2 <sup>26</sup>    | 67.108.864    | 2 <sup>5</sup> | 32      | 2 <sup>13</sup> | 8.192   | 2 <sup>20</sup> | 1.048.576  |
| H                     | H | L | H | H | 2 <sup>27</sup>    | 134.217.728   | 2 <sup>5</sup> | 32      | 2 <sup>13</sup> | 8.192   | 2 <sup>20</sup> | 1.048.576  |
| H                     | H | H | L | L | 2 <sup>28</sup>    | 268.435.456   | 2 <sup>7</sup> | 128     | 2 <sup>15</sup> | 32.768  | 2 <sup>22</sup> | 4.194.304  |
| H                     | H | H | L | H | 2 <sup>29</sup>    | 536.870.912   | 2 <sup>7</sup> | 128     | 2 <sup>15</sup> | 32.768  | 2 <sup>22</sup> | 4.194.304  |
| H                     | H | H | H | L | 2 <sup>30</sup>    | 1.073.741.824 | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |
| H                     | H | H | H | H | 2 <sup>31</sup>    | 2.147.483.648 | 2 <sup>9</sup> | 512     | 2 <sup>17</sup> | 131.072 | 2 <sup>24</sup> | 16.777.216 |

## LOGIC DIAGRAM



This logic diagram has not be used to estimate propagation delays

**ABSOLUTE MAXIMUM RATINGS**

| Symbol                | Parameter                     | Value                  | Unit |
|-----------------------|-------------------------------|------------------------|------|
| $V_{CC}$              | Supply Voltage                | -0.5 to +7             | V    |
| $V_I$                 | DC Input Voltage              | -0.5 to $V_{CC} + 0.5$ | V    |
| $V_O$                 | DC Output Voltage             | -0.5 to $V_{CC} + 0.5$ | V    |
| $I_{IK}$              | DC Input Diode Current        | $\pm 20$               | mA   |
| $I_{OK}$              | DC Output Diode Current       | $\pm 20$               | mA   |
| $I_O$                 | DC Output Current             | $\pm 25$               | mA   |
| $I_{CC}$ or $I_{GND}$ | DC $V_{CC}$ or Ground Current | $\pm 50$               | mA   |
| $P_D$                 | Power Dissipation             | 500(*)                 | mW   |
| $T_{stg}$             | Storage Temperature           | -65 to +150            | °C   |
| $T_L$                 | Lead Temperature (10 sec)     | 300                    | °C   |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

(\*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 65°C to 85°C

**RECOMMENDED OPERATING CONDITIONS**

| Symbol                          | Parameter                |                        | Value                | Unit |
|---------------------------------|--------------------------|------------------------|----------------------|------|
| V <sub>CC</sub>                 | Supply Voltage           |                        | 2 to 6               | V    |
| V <sub>I</sub>                  | Input Voltage            |                        | 0 to V <sub>CC</sub> | V    |
| V <sub>O</sub>                  | Output Voltage           |                        | 0 to V <sub>CC</sub> | V    |
| T <sub>op</sub>                 | Operating Temperature    |                        | -55 to 125           | °C   |
| t <sub>r</sub> , t <sub>f</sub> | Input Rise and Fall Time | V <sub>CC</sub> = 2.0V | 0 to 1000            | ns   |
|                                 |                          | V <sub>CC</sub> = 4.5V | 0 to 500             | ns   |
|                                 |                          | V <sub>CC</sub> = 6.0V | 0 to 400             | ns   |

## DC SPECIFICATIONS

| Symbol          | Parameter                      | Test Condition         |                                         | Value                 |      |       |             |      |              |      | Unit |  |
|-----------------|--------------------------------|------------------------|-----------------------------------------|-----------------------|------|-------|-------------|------|--------------|------|------|--|
|                 |                                | V <sub>CC</sub><br>(V) |                                         | T <sub>A</sub> = 25°C |      |       | -40 to 85°C |      | -55 to 125°C |      |      |  |
|                 |                                |                        |                                         | Min.                  | Typ. | Max.  | Min.        | Max. | Min.         | Max. |      |  |
| V <sub>IH</sub> | High Level Input Voltage       | 2.0                    |                                         | 1.5                   |      |       | 1.5         |      | 1.5          |      | V    |  |
|                 |                                | 4.5                    |                                         | 3.15                  |      |       | 3.15        |      | 3.15         |      |      |  |
|                 |                                | 6.0                    |                                         | 4.2                   |      |       | 4.2         |      | 4.2          |      |      |  |
| V <sub>IL</sub> | Low Level Input Voltage        | 2.0                    |                                         |                       |      | 0.5   |             | 0.5  |              | 0.5  | V    |  |
|                 |                                | 4.5                    |                                         |                       |      | 1.35  |             | 1.35 |              | 1.35 |      |  |
|                 |                                | 6.0                    |                                         |                       |      | 1.8   |             | 1.8  |              | 1.8  |      |  |
| V <sub>OH</sub> | High Level Output Voltage (Q)  | 2.0                    | I <sub>O</sub> =-20 μA                  | 1.9                   | 2.0  |       | 1.9         |      | 1.9          |      | V    |  |
|                 |                                | 4.5                    | I <sub>O</sub> =-20 μA                  | 4.4                   | 4.5  |       | 4.4         |      | 4.4          |      |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =-20 μA                  | 5.9                   | 6.0  |       | 5.9         |      | 5.9          |      |      |  |
|                 |                                | 4.5                    | I <sub>O</sub> =-4.0 mA                 | 4.18                  | 4.31 |       | 4.13        |      | 4.10         |      |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =-5.2 mA                 | 5.68                  | 5.8  |       | 5.63        |      | 5.60         |      |      |  |
| V <sub>OH</sub> | High Level Output Voltage (TP) | 2.0                    | I <sub>O</sub> =-20 μA                  | 1.9                   | 2.0  |       | 1.9         |      | 1.9          |      | V    |  |
|                 |                                | 4.5                    | I <sub>O</sub> =-20 μA                  | 4.4                   | 4.5  |       | 4.4         |      | 4.4          |      |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =-20 μA                  | 5.9                   | 6.0  |       | 5.9         |      | 5.9          |      |      |  |
|                 |                                | 4.5                    | I <sub>O</sub> =-1.0 mA                 | 4.18                  | 4.31 |       | 4.13        |      | 4.10         |      |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =-1.3 mA                 | 5.68                  | 5.8  |       | 5.63        |      | 5.60         |      |      |  |
| V <sub>OL</sub> | Low Level Output Voltage (Q)   | 2.0                    | I <sub>O</sub> =20 μA                   |                       | 0.0  | 0.1   |             | 0.1  |              | 0.1  | V    |  |
|                 |                                | 4.5                    | I <sub>O</sub> =20 μA                   |                       | 0.0  | 0.1   |             | 0.1  |              | 0.1  |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =20 μA                   |                       | 0.0  | 0.1   |             | 0.1  |              | 0.1  |      |  |
|                 |                                | 4.5                    | I <sub>O</sub> =4.0 mA                  |                       | 0.17 | 0.26  |             | 0.33 |              | 0.40 |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =5.2 mA                  |                       | 0.18 | 0.26  |             | 0.33 |              | 0.40 |      |  |
| V <sub>OL</sub> | Low Level Output Voltage (TP)  | 2.0                    | I <sub>O</sub> =20 μA                   |                       | 0.0  | 0.1   |             | 0.1  |              | 0.1  | V    |  |
|                 |                                | 4.5                    | I <sub>O</sub> =20 μA                   |                       | 0.0  | 0.1   |             | 0.1  |              | 0.1  |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =20 μA                   |                       | 0.0  | 0.1   |             | 0.1  |              | 0.1  |      |  |
|                 |                                | 4.5                    | I <sub>O</sub> =1.0 mA                  |                       | 0.17 | 0.26  |             | 0.33 |              | 0.40 |      |  |
|                 |                                | 6.0                    | I <sub>O</sub> =1.3 mA                  |                       | 0.18 | 0.26  |             | 0.33 |              | 0.40 |      |  |
| I <sub>I</sub>  | Input Leakage Current          | 6.0                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                       |      | ± 0.1 |             | ± 1  |              | ± 1  | μA   |  |
| I <sub>CC</sub> | Quiescent Supply Current       | 6.0                    | V <sub>I</sub> = V <sub>CC</sub> or GND |                       |      | 4     |             | 40   |              | 80   | μA   |  |

**AC ELECTRICAL CHARACTERISTICS** ( $C_L = 50 \text{ pF}$ , Input  $t_r = t_f = 6 \text{ ns}$ )

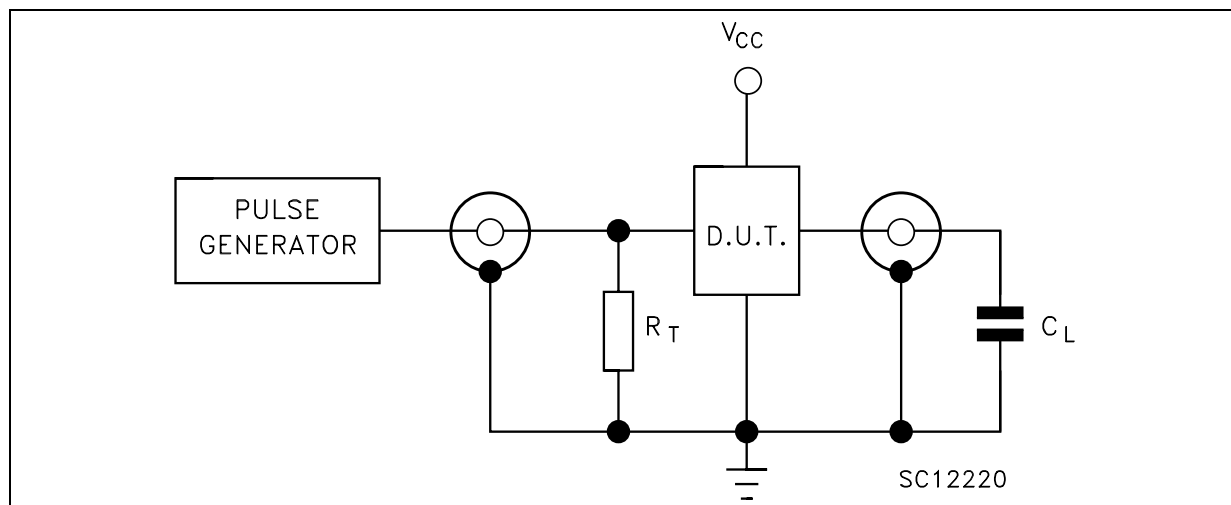
| Symbol                                 | Parameter                        | Test Condition         |  | Value                 |      |      |             |      |              | Unit |      |
|----------------------------------------|----------------------------------|------------------------|--|-----------------------|------|------|-------------|------|--------------|------|------|
|                                        |                                  | V <sub>CC</sub><br>(V) |  | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                                        |                                  |                        |  | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| t <sub>TLH</sub> t <sub>THL</sub>      | Output Transition Time (Q)       | 2.0                    |  |                       | 30   | 75   |             | 95   |              | 110  | ns   |
|                                        |                                  | 4.5                    |  |                       | 8    | 15   |             | 19   |              | 22   |      |
|                                        |                                  | 6.0                    |  |                       | 7    | 13   |             | 16   |              | 19   |      |
| t <sub>TLH</sub> t <sub>THL</sub>      | Output Transition Time (TP)      | 2.0                    |  |                       | 116  | 225  |             | 280  |              | 340  | ns   |
|                                        |                                  | 4.5                    |  |                       | 29   | 45   |             | 56   |              | 68   |      |
|                                        |                                  | 6.0                    |  |                       | 25   | 38   |             | 48   |              | 57   |      |
| t <sub>PLH</sub> t <sub>PHL</sub>      | Propagation Delay Time (CLK - Q) | 2.0                    |  |                       | 160  | 350  |             | 440  |              |      | ns   |
|                                        |                                  | 4.5                    |  |                       | 46   | 70   |             | 88   |              | 105  |      |
|                                        |                                  | 6.0                    |  |                       | 39   | 60   |             | 75   |              | 90   |      |
| t <sub>PHL</sub>                       | Propagation Delay Time (CLR - Q) | 2.0                    |  |                       | 130  | 320  |             | 400  |              | 210  | ns   |
|                                        |                                  | 4.5                    |  |                       | 42   | 64   |             | 80   |              | 100  |      |
|                                        |                                  | 6.0                    |  |                       | 36   | 54   |             | 68   |              | 81   |      |
| f <sub>MAX</sub>                       | Maximum Clock Frequency          | 2.0                    |  | 5.0                   | 21   |      | 4           |      | 3.4          |      | MHz  |
|                                        |                                  | 4.5                    |  | 27                    | 64   |      | 22          |      | 18           |      |      |
|                                        |                                  | 6.0                    |  | 32                    | 75   |      | 26          |      | 21           |      |      |
| t <sub>W(L)</sub><br>t <sub>W(H)</sub> | Minimum Pulse Width (CLK)        | 2.0                    |  |                       | 40   | 75   |             | 95   |              | 110  | ns   |
|                                        |                                  | 4.5                    |  |                       | 8    | 15   |             | 19   |              | 22   |      |
|                                        |                                  | 6.0                    |  |                       | 7    | 13   |             | 16   |              | 20   |      |
| t <sub>W(L)</sub>                      | Minimum Pulse Width (CLR)        | 2.0                    |  |                       | 48   | 125  |             | 155  |              | 190  | ns   |
|                                        |                                  | 4.5                    |  |                       | 12   | 25   |             | 31   |              | 38   |      |
|                                        |                                  | 6.0                    |  |                       | 10   | 21   |             | 26   |              | 32   |      |
| t <sub>REM</sub>                       | Minimum Removal Time             | 2.0                    |  |                       |      | 5    |             | 5    |              | 5    | ns   |
|                                        |                                  | 4.5                    |  |                       |      | 5    |             | 5    |              | 5    |      |
|                                        |                                  | 6.0                    |  |                       |      | 5    |             | 5    |              | 5    |      |

**CAPACITIVE CHARACTERISTICS**

| Symbol          | Parameter                              | Test Condition         |  | Value                 |      |      |             |      |              | Unit |      |
|-----------------|----------------------------------------|------------------------|--|-----------------------|------|------|-------------|------|--------------|------|------|
|                 |                                        | V <sub>CC</sub><br>(V) |  | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                 |                                        |                        |  | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| C <sub>IN</sub> | Input Capacitance                      | 5.0                    |  |                       | 5    | 10   |             | 10   |              | 10   | pF   |
| C <sub>PD</sub> | Power Dissipation Capacitance (note 1) | 5.0                    |  |                       | 21   |      |             |      |              |      | pF   |

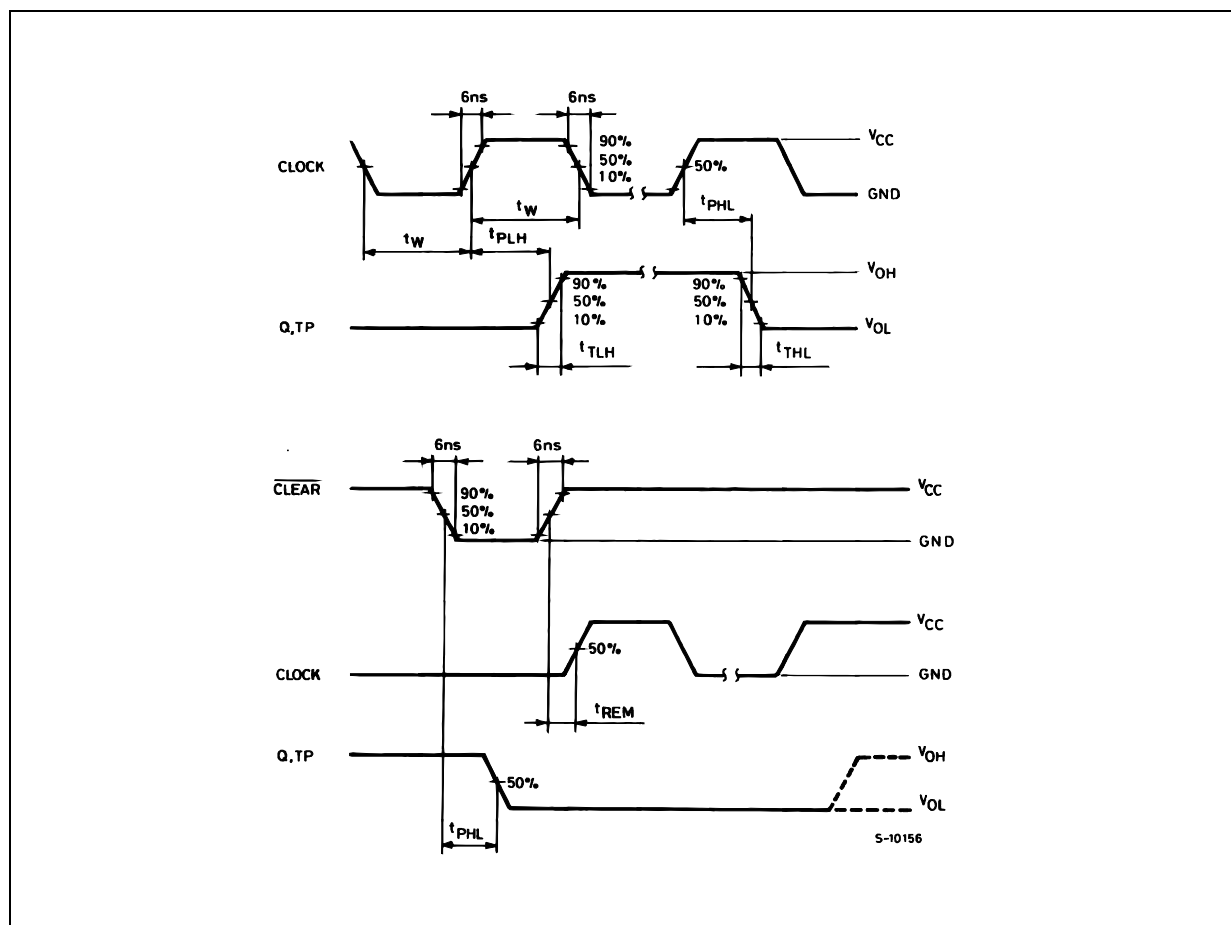
1)  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(oper)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

## TEST CIRCUIT



$C_L = 50\text{pF}$  or equivalent (includes jig and probe capacitance)  
 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

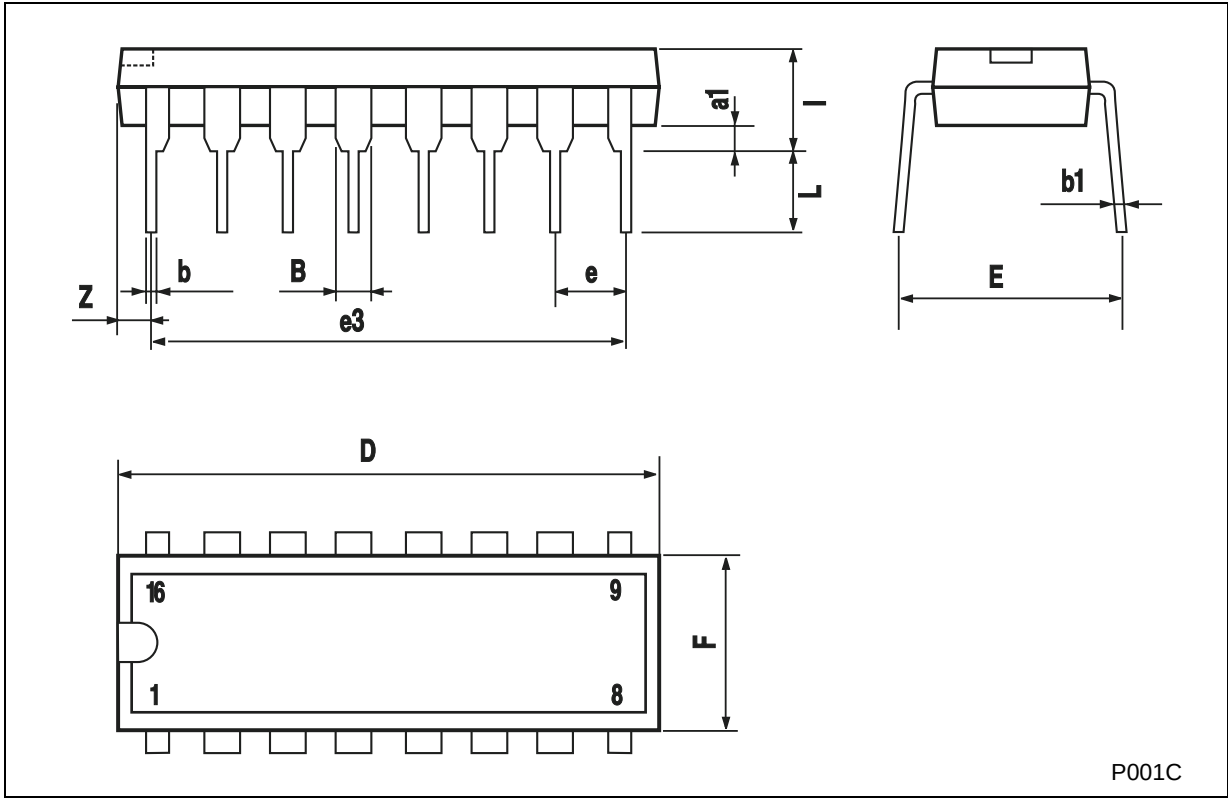
## SWITCHING CHARACTERISTICS TEST WAVEFORM (f=1MHz; 50% duty cycle)





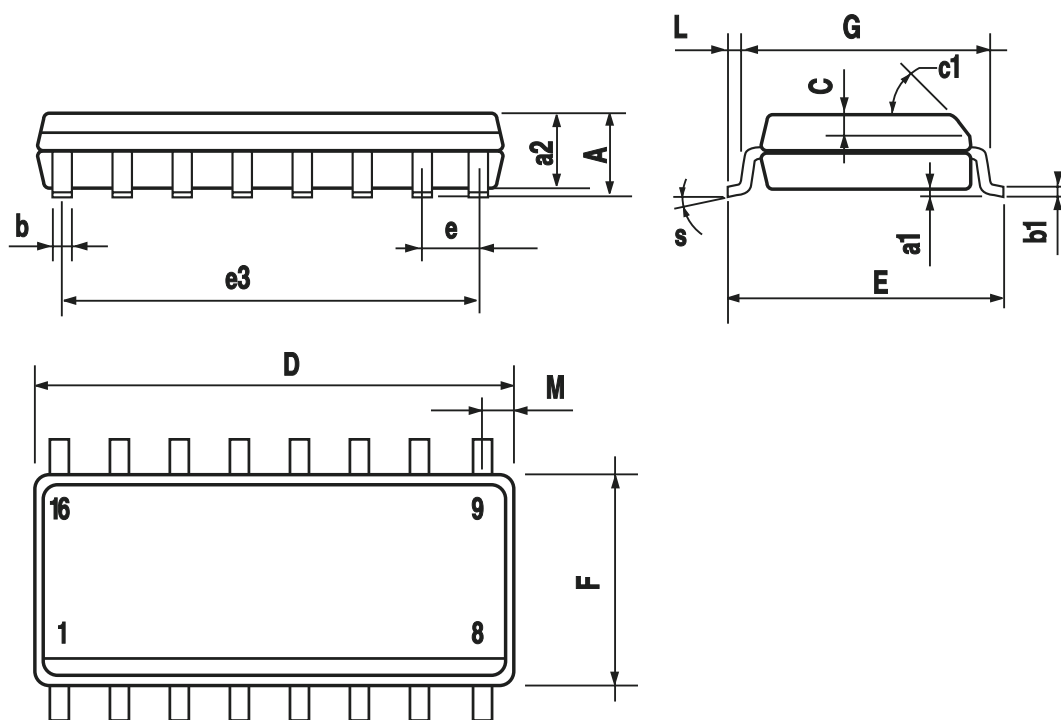
Plastic DIP-16 (0.25) MECHANICAL DATA

| 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 |
| I    |      |       | 5.1  |       |       | 0.201 |
| L    |      | 3.3   |      |       | 0.130 |       |
| Z    |      |       | 1.27 |       |       | 0.050 |



## SO-16 MECHANICAL DATA

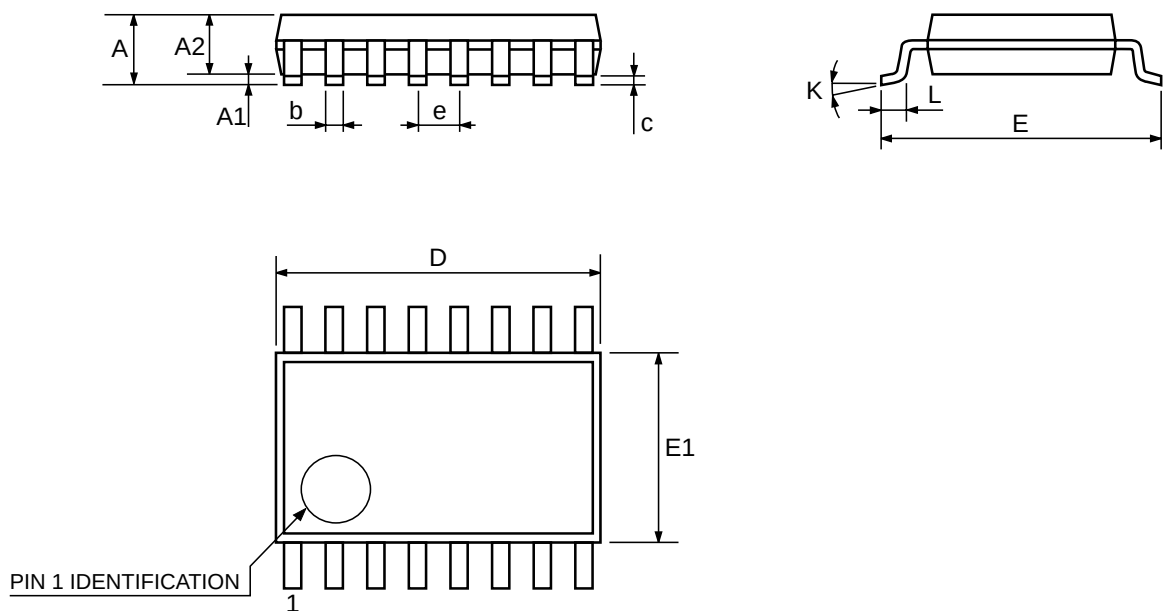
| DIM. | mm.        |      |      | inch  |       |       |
|------|------------|------|------|-------|-------|-------|
|      | MIN.       | TYP  | MAX. | MIN.  | TYP.  | MAX.  |
| A    |            |      | 1.75 |       |       | 0.068 |
| a1   | 0.1        |      | 0.2  | 0.003 |       | 0.007 |
|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

## TSSOP16 MECHANICAL DATA

| DIM. | mm.  |          |      | inch  |            |        |
|------|------|----------|------|-------|------------|--------|
|      | MIN. | TYP      | MAX. | MIN.  | TYP.       | MAX.   |
| A    |      |          | 1.2  |       |            | 0.047  |
| A1   | 0.05 |          | 0.15 | 0.002 | 0.004      | 0.006  |
| A2   | 0.8  | 1        | 1.05 | 0.031 | 0.039      | 0.041  |
| b    | 0.19 |          | 0.30 | 0.007 |            | 0.012  |
| c    | 0.09 |          | 0.20 | 0.004 |            | 0.0089 |
| D    | 4.9  | 5        | 5.1  | 0.193 | 0.197      | 0.201  |
| E    | 6.2  | 6.4      | 6.6  | 0.244 | 0.252      | 0.260  |
| E1   | 4.3  | 4.4      | 4.48 | 0.169 | 0.173      | 0.176  |
| e    |      | 0.65 BSC |      |       | 0.0256 BSC |        |
| K    | 0°   |          | 8°   | 0°    |            | 8°     |
| L    | 0.45 | 0.60     | 0.75 | 0.018 | 0.024      | 0.030  |



0080338D

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2001 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom

© <http://www.st.com>