

Distributed by:

JAMECO[®]
ELECTRONICS

www.Jameco.com ♦ 1-800-831-4242

The content and copyrights of the attached
material are the property of its owner.

Jameco Part Number 1421165



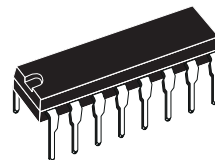
ULN2065B - ULN2067B
ULN2069B - ULN2071B
ULN2075B - ULN2077B

80 V - 1.5 A QUAD DARLINGTON SWITCHES

- OUTPUT CURRENT TO 1.5 A EACH DARLINGTON
- MINIMUM BREAKDOWN 80 V
- SUSTAINING VOLTAGE AT LEAST 50 V
- INTEGRAL SUPPRESSION DIODES (ULN2065B, ULN2067B, ULN2069B and ULN2071B)
- ISOLATED DARLINGTON PINOUT (ULN2075B and ULN2077B)
- VERSIONS COMPATIBLE WITH ALL POPULAR LOGIC FAMILIES

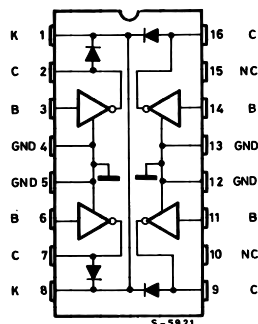
DESCRIPTION

Designed to interface logic to a wide variety of high current, high voltage loads, these devices each contain four NPN darlington switches delivering up to 1.5 A with a specified minimum breakdown of 80 V and a sustaining voltage of 50 V. The ULN2065B, ULN2067B, ULN2069B and ULN2071B contain integral suppression diodes for inductive loads and have common emitters; the ULN2075B and ULN2077B feature isolated darlington pinouts and are intended for applications such as emitter follower configurations. Inputs of the ULN2065B, ULN2069B and ULN2075B are compatible with popular 5 V logic families and the ULN2067B, ULN2071B and ULN2077B are compatible with 6-15 VCMOS and PMOS. The ULN2069B and ULN2071B include a predriver stage to provide extragain, reducing the load on control logic.

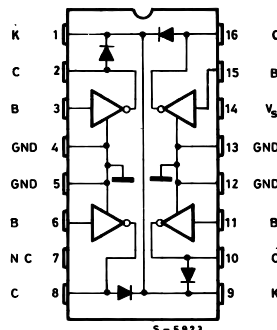


POWERDIP
12 + 2 + 2

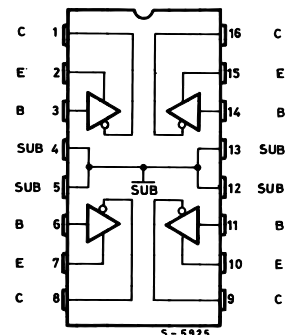
PIN CONNECTIONS AND ORDER CODES



ULN2065B
ULN2067B



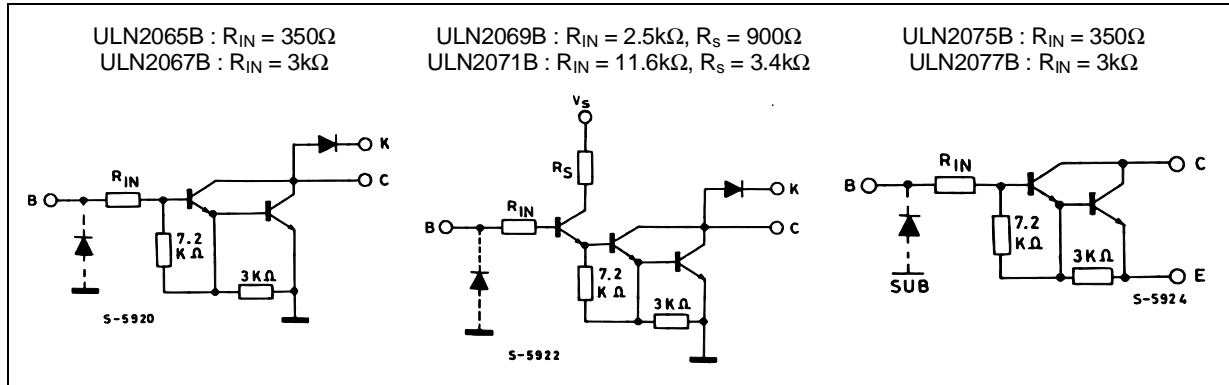
ULN2069B
ULN2071B



ULN2075B
ULN2077B

ULN2065B-ULN2067B-ULN2069B-ULN2071B-ULN2075B-ULN2077B

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------|-------------------------------------|---|---------------------|
| V_{CEX} | Output Voltage | 80 | V |
| $V_{CE(sus)}$ | Output Sustaining Voltage | 50 | V |
| I_O | Output Current | 1.75 | A |
| V_i | Input Voltage | for ULN2075B – 2077B for ULN2067B – 2071B for ULN2065B – 2069B | 60 30 15 V |
| I_i | Input Current | 25 | mA |
| V_S | Supply Voltage | for ULN2069B for ULN2071B | 10 20 V |
| P_{tot} | Power Dissipation | at $T_{pins} = 90\text{ }^{\circ}\text{C}$ at $T_{amb} = 70\text{ }^{\circ}\text{C}$ | 4.3 1 W |
| T_{amb} | Operating Ambient Temperature Range | – 20 to 85 | $^{\circ}\text{C}$ |
| T_{stg} | Storage Temperature | – 55 to 150 | $^{\circ}\text{C}$ |

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit | Fig. |
|---------------|--------------------------------------|---|--------------------------|------|--|--|--------------------------------------|
| I_{CEX} | Output Leakage Current | $V_{CE} = 80\text{V}$ $T_{amb} = 25^{\circ}\text{C}$ $T_{amb} = 70^{\circ}\text{C}$ | | | 100 500 | μA μA | 1 |
| $V_{CE(sus)}$ | Collector-emitter Sustaining Voltage | $I_C = 100\text{mA}$, $V_i = 0.4\text{V}$ | 50 | | | V | 2 |
| $V_{CE(sat)}$ | Collector-emitter Saturation Voltage | $I_C = 500\text{mA}$ $I_B = 625\mu\text{A}$ $I_C = 750\text{mA}$ $I_B = 935\mu\text{A}$ $I_C = 1\text{A}$ $I_B = 1.25\text{mA}$ $I_C = 1.25\text{A}$ $I_B = 2\text{mA}$ $I_C = 1.5\text{A}$ $I_B = 2.25\text{mA}$ | | | 1.1 1.2 1.3 1.4 1.5 | V V V V V | 3 3 3 3 3 |
| $I_{i(on)}$ | Input Current | for ULN2065B and ULN2075B $V_i = 2.4\text{V}$ $V_i = 3.75\text{V}$ for ULN2067B and ULN2077B $V_i = 5\text{V}$ $V_i = 12\text{V}$ for ULN2069B $V_i = 2.75\text{V}$ $V_i = 3.75\text{V}$ for ULN2071B $V_i = 5\text{V}$ $V_i = 12\text{V}$ | 1.4 3.3 0.6 1.7 | | 4.3 9.6 1.8 5.2 5.5 10 4 12.5 | mA mA mA mA mA mA mA mA | 4 4 4 4 4 4 4 4 |

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified) (continued)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit | Fig. |
|-------------|-----------------------------|--|------|------|------------------------------------|--------------------------------|----------------------------|
| $V_{i(on)}$ | Input Voltage | $V_{CE} = 2\text{V}$, $I_C = 1\text{A}$ ULN2065B, ULN2075B ULN2067B, ULN2077B $V_{CE} = 2\text{V}$, $I_C = 1.5\text{A}$ ULN2065B, ULN2075B ULN2067B, ULN2077B ULN2069B ULN2071B | | | 2 6.5 2.5 10 2.75 5 | V V V V V V | 5 5 5 5 5 5 |
| I_s | Supply Current | for ULN2069B $I_C = 500\text{mA}$, $V_i = 2.75\text{V}$ for ULN2071B $I_C = 500\text{mA}$, $V_i = 5\text{V}$ | | | 6 4.5 | mA mA | 8 8 |
| t_{PLH} | Turn-on Delay Time | $0.5 V_i$ to $0.5 V_o$ | | | 1 | μs | |
| t_{PHL} | Turn-off Delay Time | $0.5 V_i$ to $0.5 V_o$ | | | 1.5 | μs | |
| I_R | Clamp Diode Leakage Current | for ULN2065B-ULN2067B and ULN2069B-ULN2071B $V_R = 80\text{V}$ $T_{amb} = 25^{\circ}\text{C}$ $T_{amb} = 70^{\circ}\text{C}$ | | | 50 100 | μA μA | 6 |
| V_F | Clamp Diode Forward Voltage | for ULN2065B-ULN2067B and ULN2069B-ULN2071B $I_F = 1\text{A}$ $I_F = 1.5\text{A}$ | | | 1.75 2 | V V | 7 |

Notes : 1. Input voltage is with reference to the substrate (no connection to any other pins) for the ULN2075B and ULN2077B reference is ground for all other types.
2. Input current may be limited by maximum allowable input voltage.

TEST CIRCUITS

Figure 1.

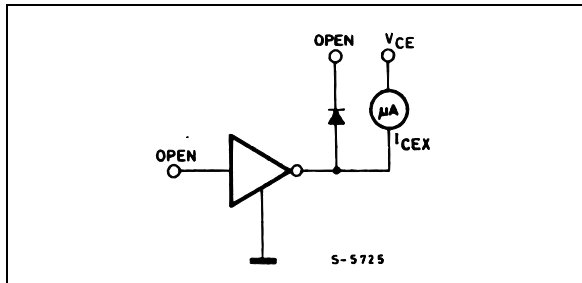


Figure 2.

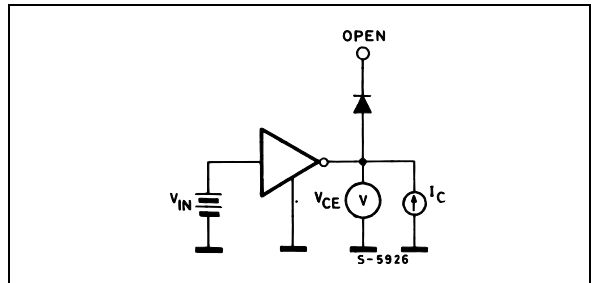


Figure 3.

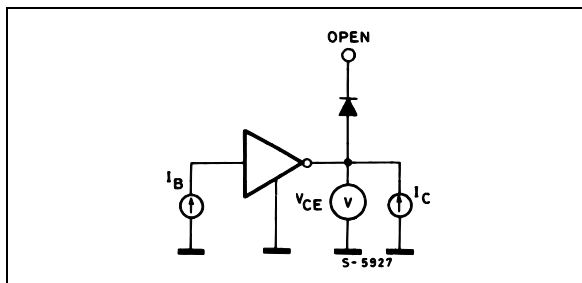


Figure 4.

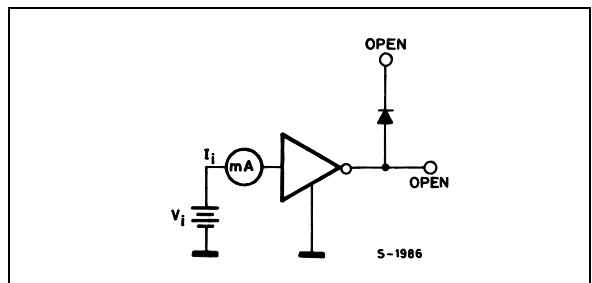


Figure 5.

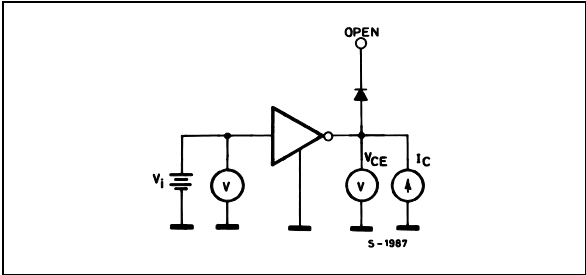


Figure 6.

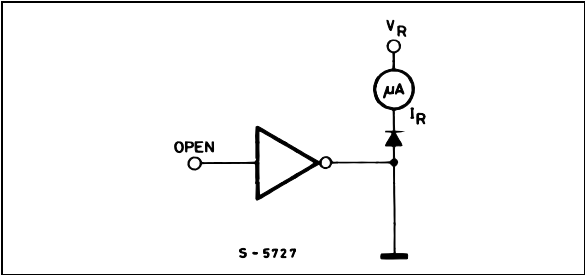


Figure 7.

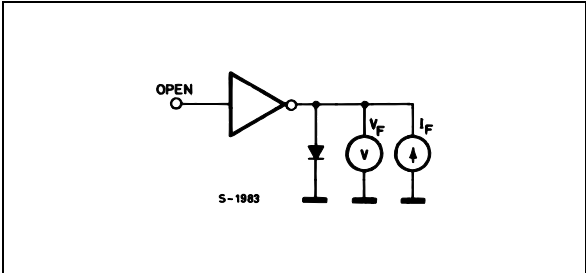


Figure 8.

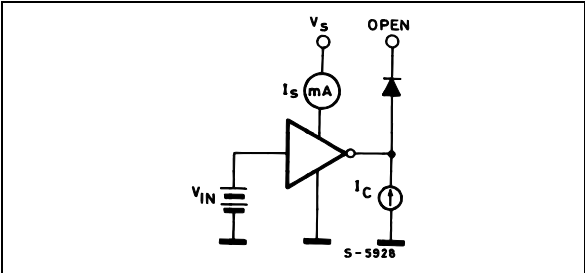


Figure 9 : Input Current as a Function of Input Voltage.

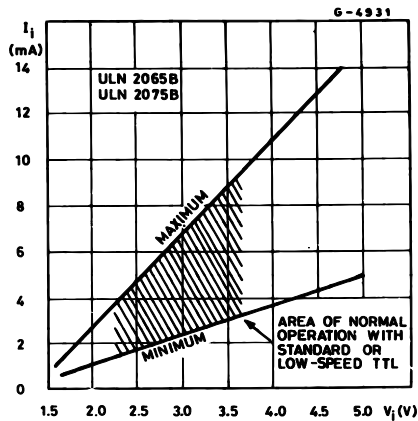


Figure 10 : Input Current as a Function of Input Voltage.

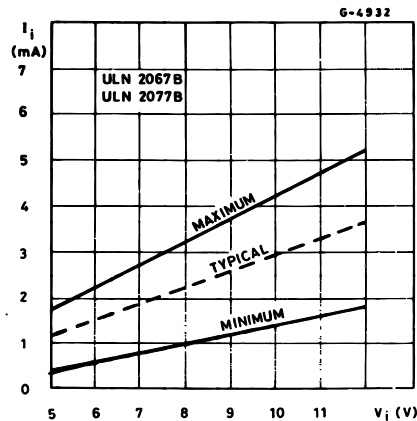
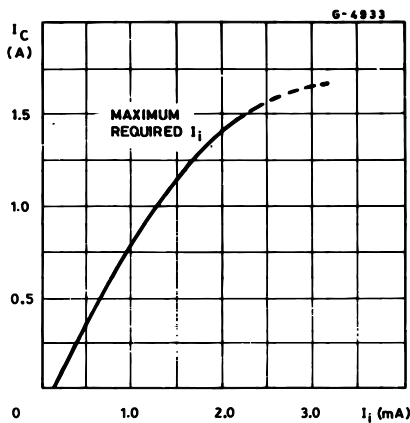


Figure 11 : Collector Current as a Function of Input Current.

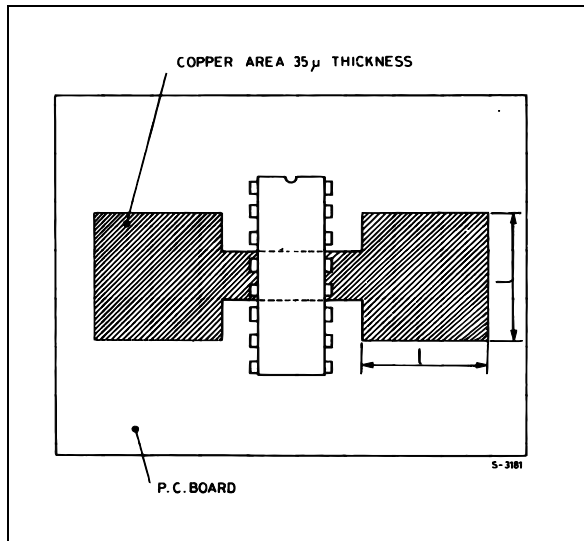


MOUNTING INSTRUCTIONS

The $R_{th\ j-amb}$ can be reduced by soldering the GND pins to a suitable copper area of the printed circuit board (Fig. 12) or to an external heatsink (Fig. 13).

The diagram of figure 14 shows the maximum dissippable power P_{tot} and the $R_{th\ j-amb}$ as a function of the side "l" of two equal square copper areas having a thickness of $35\ \mu$ (1.4 mils).

Figure 12 : Example of P.C. Board Area which is Used as Heatsink.



During soldering the pins temperature must not exceed $260\ ^\circ\text{C}$ and the soldering time must not be longer than 12 seconds.

The external heatsink or printed circuit copper area must be connected to electrical ground.

Figure 13 : External Heatsink Mounting Example.

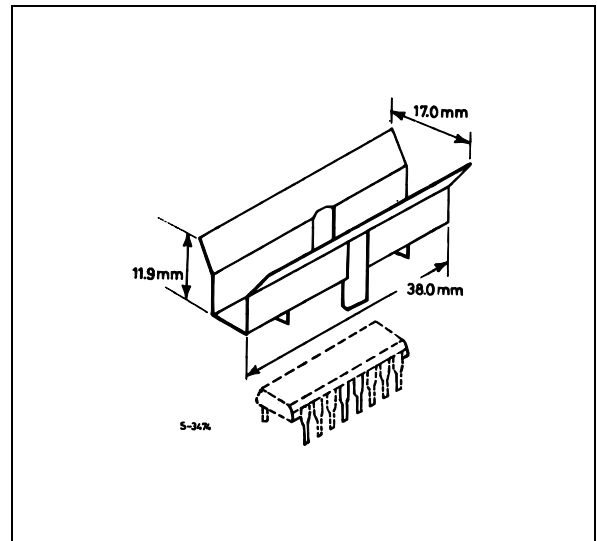


Figure 14 : Maximum Dissippable Power and Junction to Ambient Thermal Resistance vs. Side "l".

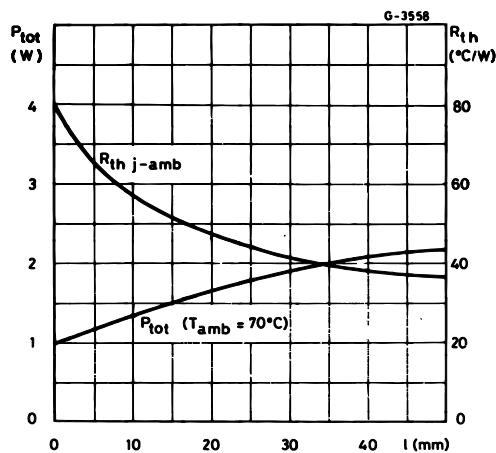
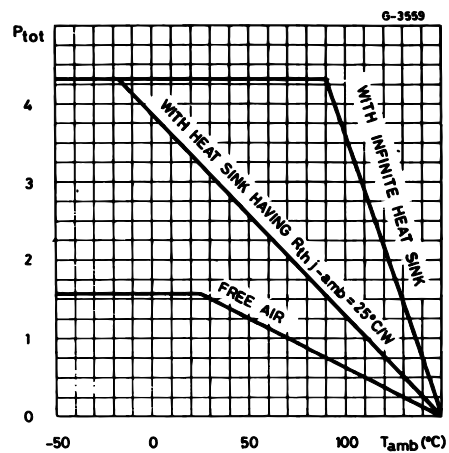
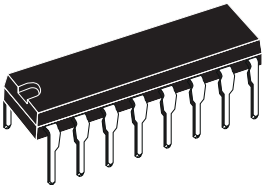


Figure 15 : Maximum Allowable Power Dissipation vs. Ambient Temperature.

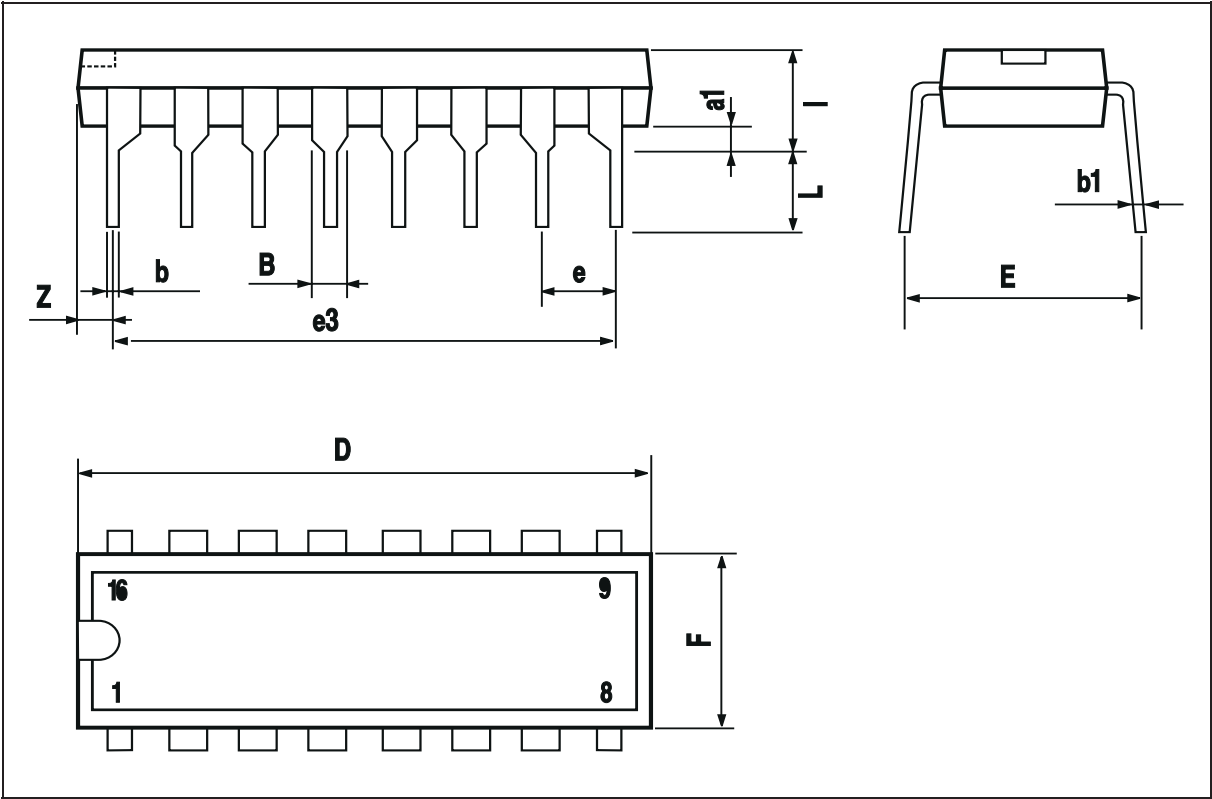


| DIM. | mm | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.51 | | | 0.020 | | |
| B | 0.85 | | 1.40 | 0.033 | | 0.055 |
| b | | 0.50 | | | 0.020 | |
| b1 | 0.38 | | 0.50 | 0.015 | | 0.020 |
| D | | | 20.0 | | | 0.787 |
| E | | 8.80 | | | 0.346 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 17.78 | | | 0.700 | |
| F | | | 7.10 | | | 0.280 |
| I | | | 5.10 | | | 0.201 |
| L | | 3.30 | | | 0.130 | |
| Z | | | 1.27 | | | 0.050 |

OUTLINE AND
MECHANICAL DATA



Powerdip 16



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.
All other names are the property of their respective owners

© 2003 STMicroelectronics - All rights reserved

STMicroelectronics GROUP OF COMPANIES

Australia – Belgium - Brazil - Canada - China – Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States
www.st.com