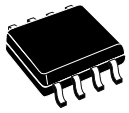
# STS5PF20V

## P-CHANNEL 20V - 0.065Ω - 5A SO-8
## 2.5V-DRIVE STripFET™ II POWER MOSFET

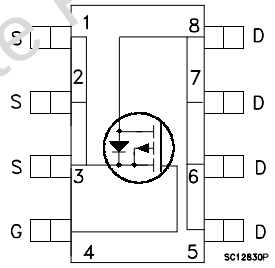
| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| STS5PF20V | 20 V | < 0.080 Ω (@4.5V)<br>< 0.10 Ω (@2.5V) | 5 A |

- TYPICAL $R_{DS}(on)$ = 0.065Ω (@4.5V)
- TYPICAL $R_{DS}(on)$ = 0.085Ω (@2.5V)
- ULTRA LOW THRESHOLD GATE DRIVE (2.5V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY



**SO-8**

**INTERNAL SCHEMATIC DIAGRAM**




### DESCRIPTION

This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely extremely low on-resistance when driven at 2.5V.

### APPLICATIONS

- POWER MANAGEMENT IN CELLULAR PHONES
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT

Obsolete Product(s) - Obsolete Product(s)
Obsolete Product(s) - Obsolete Product(s)

### ORDER CODES

| PART NUMBER | MARKING | PACKAGE | PACKAGING |
|---|---|---|---|
| STS5PF20V | S5PF20V | SO-8 | TAPE & REEL |

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source Voltage ($V_{GS}$ = 0) | 20 | V |
| $V_{DGR}$ | Drain-gate Voltage ($R_{GS}$ = 20 kΩ) | 20 | V |
| $V_{GS}$ | Gate- source Voltage | ± 8 | V |
| $I_D$ | Drain Current (continuous) at $T_C$ = 25°C | 5 | A |
| $I_D$ | Drain Current (continuous) at $T_C$ = 100°C | 3.1 | A |
| $I_{DM}$ (•) | Drain Current (pulsed) | 20 | A |
| $P_{TOT}$ | Total Dissipation at $T_C$ = 25°C | 2.5 | W |

(•) Pulse width limited by safe operating area
Note: For the P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

## THERMAL DATA

| | | | |
|---|---|---|---|
| Rthj-amb | Thermal Resistance Junction-ambient Max | 50 | °C/W |
| $T_j$ | Max. Operating Junction Temperature | –55 to 150 | °C |
| $T_{stg}$ | Storage Temperature | –55 to 150 | °C |

## ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D$ = 250 µA, $V_{GS}$ = 0 | 20 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{GS}$ = 0) | $V_{DS}$ = Max Rating | | | 1 | µA |
| | | $V_{DS}$ = Max Rating, $T_C$ = 125 °C | | | 10 | µA |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS}$ = 0) | $V_{GS}$ = ± 8V | | | ±100 | nA |

ON (1)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA | 0.45 | | | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$ = 4.5V, $I_D$ = 2.5 A | | 0.065 | 0.080 | Ω |
| | | $V_{GS}$ = 2.5V, $I_D$ = 2.5 A | | 0.085 | 0.10 | Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (1) | Forward Transconductance | $V_{DS}$ = 15 V , $I_D$ = 2.5 A | | 6.6 | | S |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 15 V, f = 1 MHz, $V_{GS}$ = 0 | | 412 | | pF |
| $C_{oss}$ | Output Capacitance | | | 179 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 42.5 | | pF |

Obsolete Product(s) - Obsolete Product(s)

**ELECTRICAL CHARACTERISTICS** (CONTINUED)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$ = 10 V, $I_D$ = 2.5 A | | 11 | | ns |
| $t_r$ | Rise Time | $R_G$ = 4.7Ω $V_{GS}$ = 2.5 V (see test circuit, Figure 1) | | 47 | | ns |
| $Q_g$ | Total Gate Charge | $V_{DD}$ = 10 V, $I_D$ = 5 A, | | 4.5 | 6 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{GS}$ = 2.5V | | 0.73 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | (see test circuit, Figure 2) | | 1.75 | | nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(off)}$ | Turn-off-Delay Time | $V_{DD}$ = 10 V, $I_D$ = 2.5 A, | | 39 | | ns |
| $t_f$ | Fall Time | $R_G$ = 4.7Ω, $V_{GS}$ = 2.5 V (see test circuit, Figure 1) | | 20 | | ns |

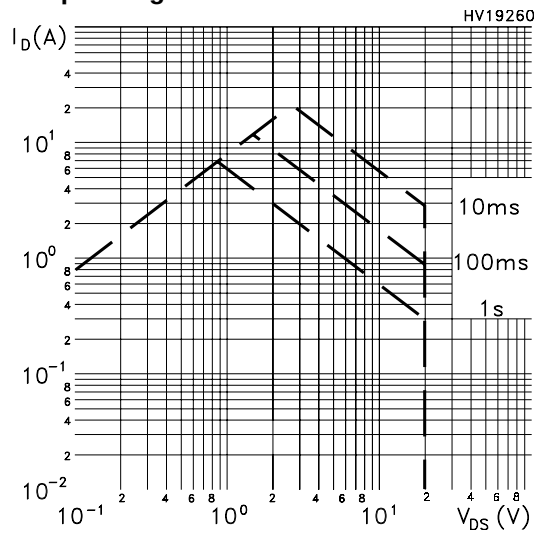
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Source-drain Current | | | | 5 | A |
| $I_{SDM}$ | Source-drain Current (pulsed) | | | | 20 | A |
| $V_{SD}$ (1) | Forward On Voltage | $I_{SD}$ = 5 A, $V_{GS}$ = 0 | | | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$ = 5 A, di/dt = 100 A/µs, | | 32 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | $V_{DD}$ = 16 V, $T_j$ = 150°C | | 12.8 | | nC |
| $I_{RRM}$ | Reverse Recovery Current | (see test circuit, Figure 3) | | 0.8 | | A |

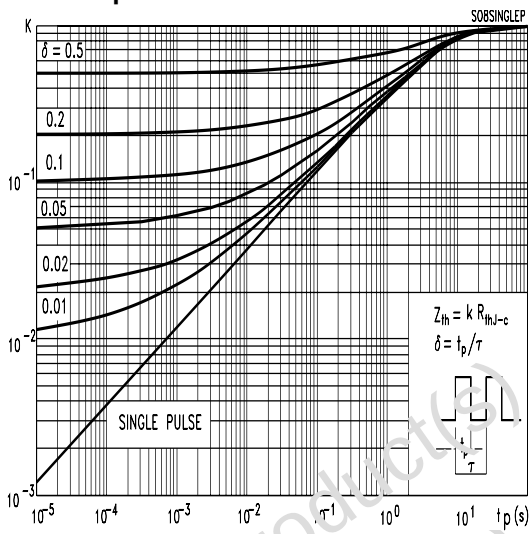
Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.

Obsolete Product(s) - Obsolete Product(s)
Obsolete Product(s) - Obsolete Product(s)

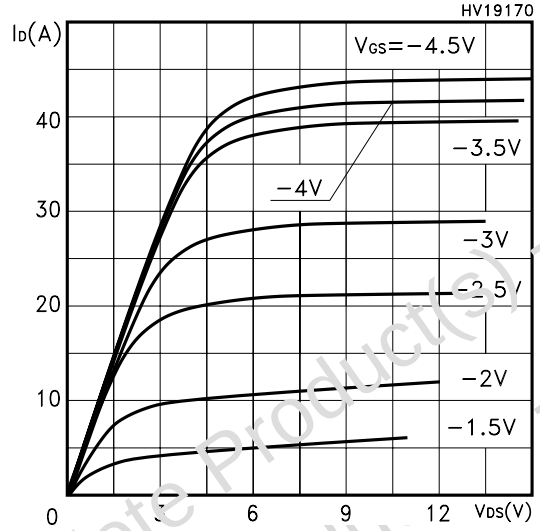
### Safe Operating Area



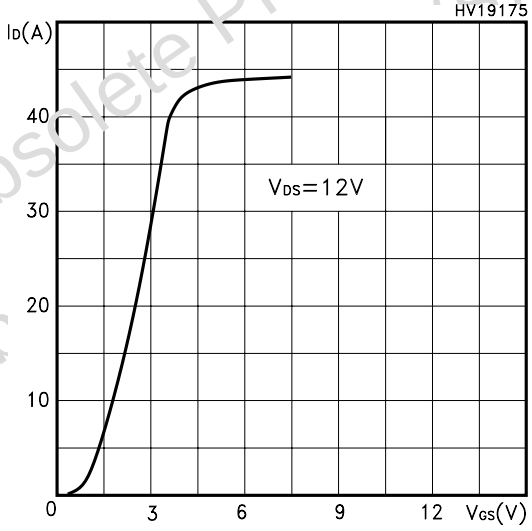

### Thermal Impedence



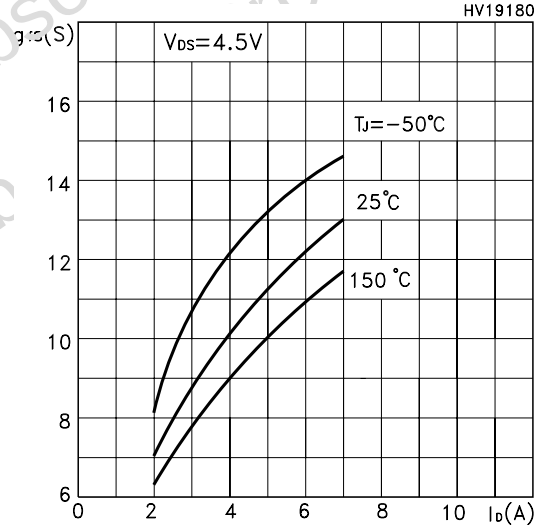

### Output Characteristics



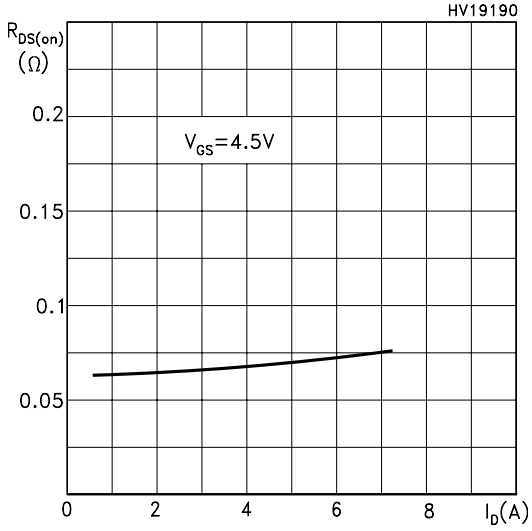

### Transfer Characteristics




### Transconductance

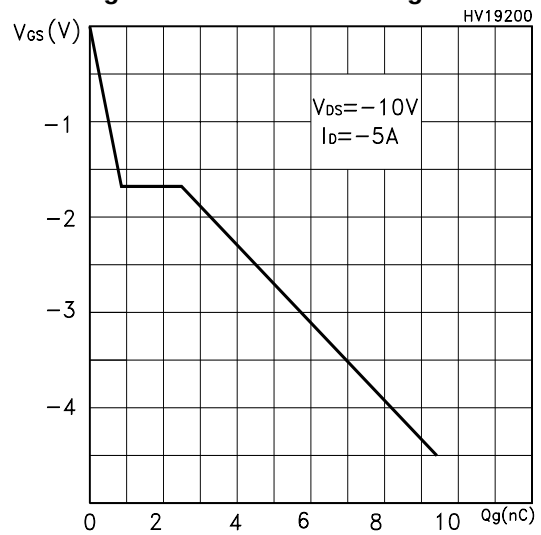



### Static Drain-source On Resistance

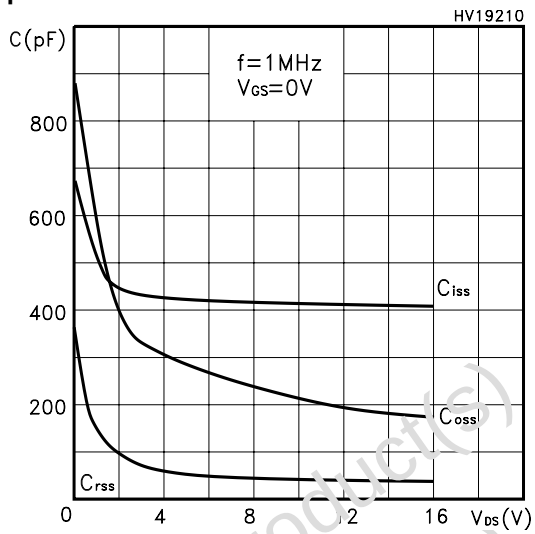



Obsolete Product(s) - Obsolete Product(s)

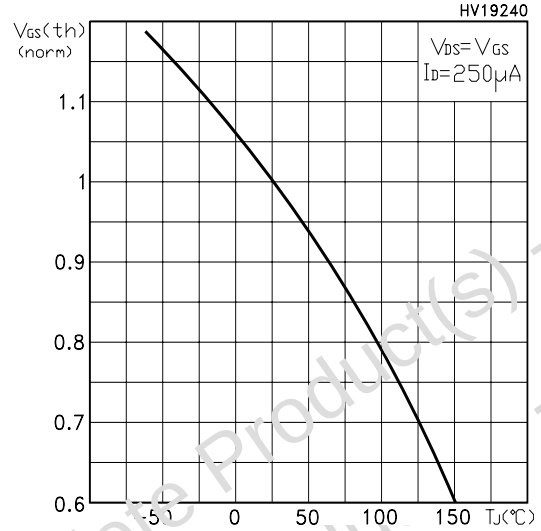
**Gate Charge vs Gate-source Voltage**



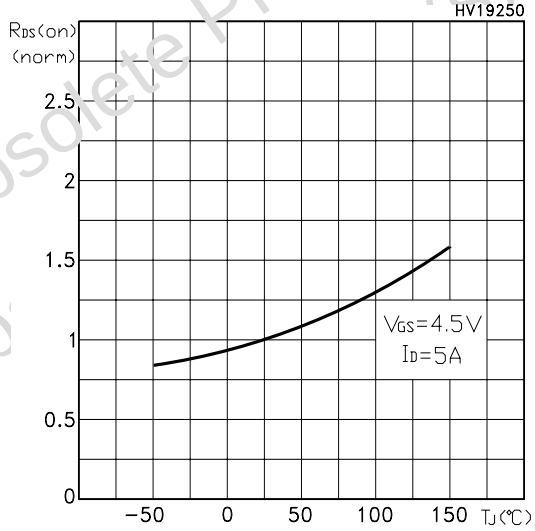

**Capacitance Variations**



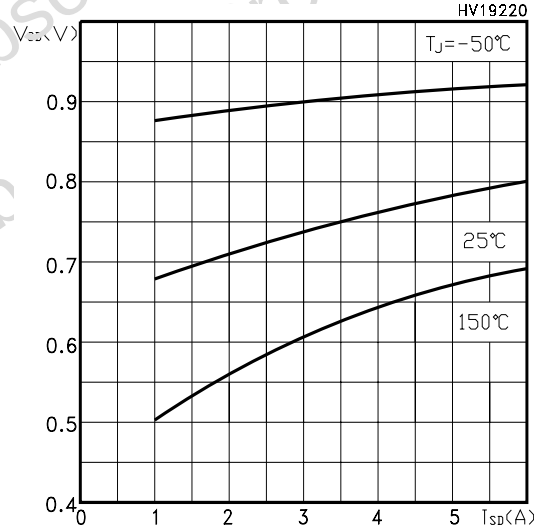

**Normalized Gate Thereshold Voltage vs Temp.**




**Normalized On Resistance vs Temperature**




**Source-drain Diode Forward Characteristics**




Obsolete Product(s) - Obsolete Product(s)

**Fig. 1:** Switching Times Test Circuit For Resistive Load

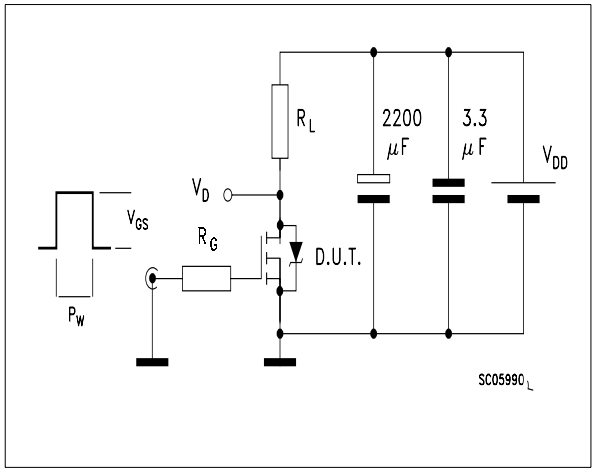



**Fig. 2:** Gate Charge test Circuit

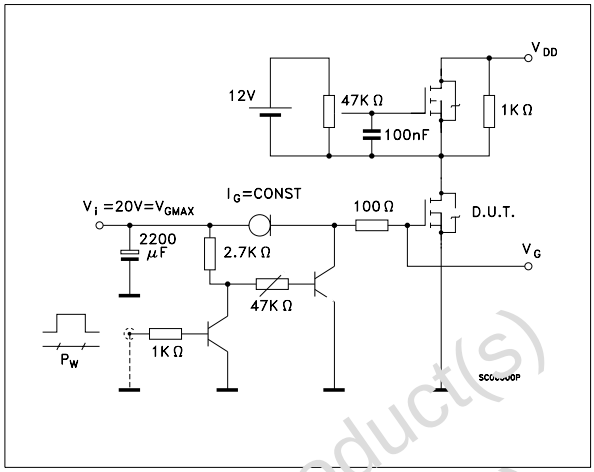
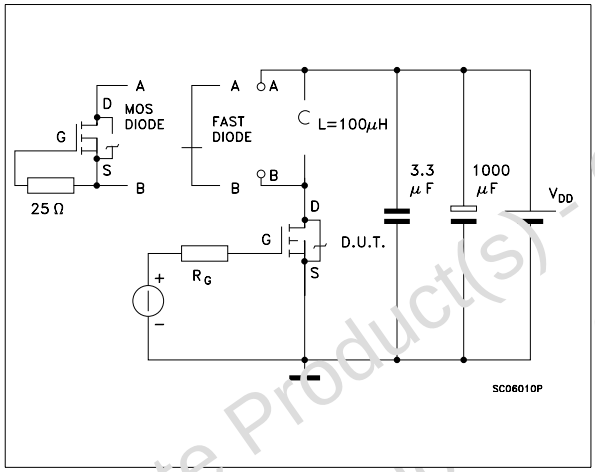


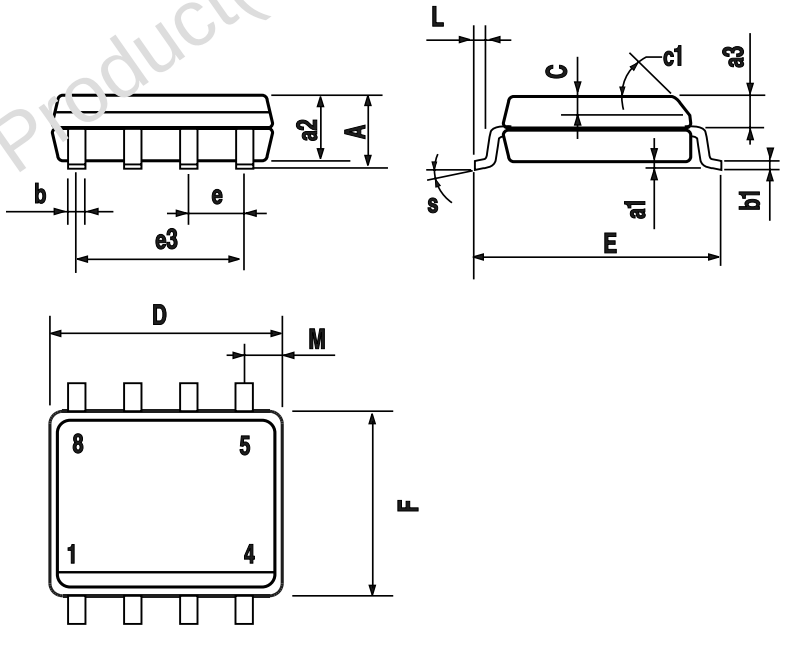

**Fig. 3:** Test Circuit For Diode Recovery Behaviour




Obsolete Product(s)
Obsolete Product(s)
Obsolete Product(s)

## SO-8 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.25 | 0.003 | | 0.009 |
| a2 | | | 1.65 | | | 0.064 |
| a3 | 0.65 | | 0.85 | 0.025 | | 0.033 |
| b | 0.35 | | 0.48 | 0.013 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | 0.25 | | 0.5 | 0.010 | | 0.019 |
| c1 | 45 (typ.) | | | | | |
| D | 4.8 | | 5.0 | 0.188 | | 0.196 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 3.81 | | | 0.150 | |
| F | 3.8 | | 4.0 | 0.14 | | 0.157 |
| L | 0.4 | | 1.27 | 0.015 | | 0.050 |
| M | | | 0.6 | | | 0.023 |
| S | 8 (max.) | | | | | |




0016023

Obsolete Product(s) - Obsolete Product(s)

Obsolete Product(s) - Obsolete Product(s)

**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**

**© 2004 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.

**http://www.st.com**