



**L3100B**  
**L3100B1**

Application Specific Discretes  
A.S.D.™

OVERVOLTAGE AND OVERCURRENT  
PROTECTION FOR TELECOM LINE

## FEATURES

- UNIDIRECTIONAL FUNCTION
- PROGRAMMABLE BREAKDOWN VOLTAGE  
UP TO 265 V
- PROGRAMMABLE CURRENT LIMITATION  
FROM 50 mA TO 550 mA
- HIGH SURGE CURRENT CAPABILITY  
 $I_{PP} = 100A \quad 10/1000 \mu s$

## DESCRIPTION

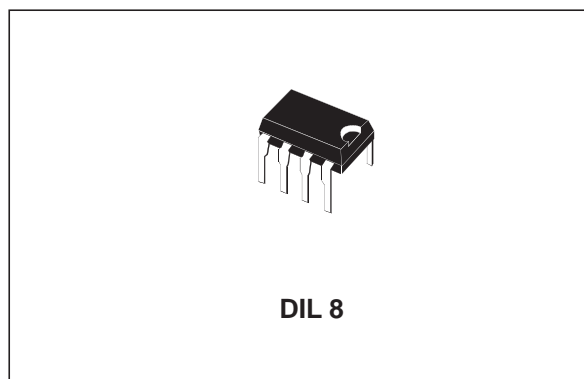
Dedicated to sensitive telecom equipment protection, this device can provide both voltage protection and current limitation with a very tight tolerance.

Its high surge current capability makes the L3100B a reliable protection device for very exposed equipment, or when series resistors are very low. The breakdown voltage can be easily programmed by using an external zener diode.

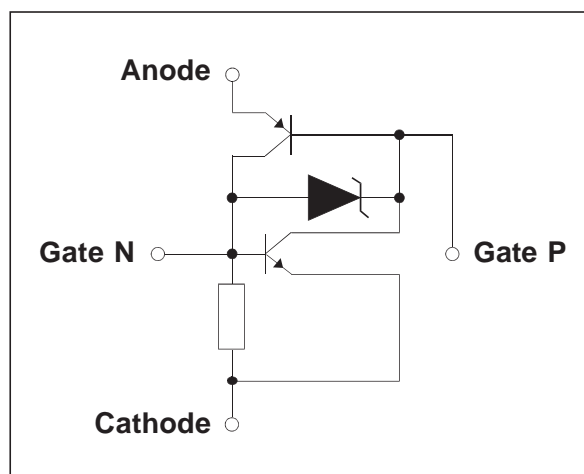
A multiple protection mode can also be performed when using several zener diodes, providing each line interface with an optimized protection level. The current limiting function is achieved with the use of a resistor between the gate N and the cathode. The value of the resistor will determine the level of the desired current.

## COMPLIES WITH THE FOLLOWING STANDARDS :

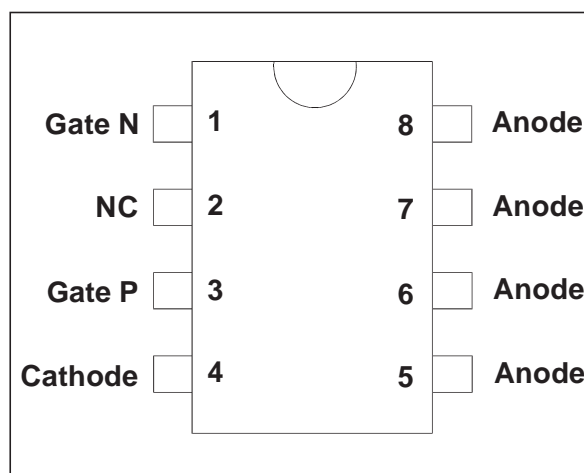
<b>CCITT K17 - K20</b>	10/700 $\mu s$	1.5	kV
	5/310 $\mu s$	38	A
<b>VDE 0433</b>	10/700 $\mu s$	2	kV
	5/200 $\mu s$	50	A
<b>CNET</b>	0.5/700 $\mu s$	1.5	kV
	0.2/310 $\mu s$	38	A



## SCHEMATIC DIAGRAM



## CONNECTION DIAGRAM



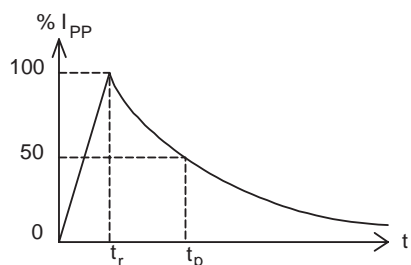
TM: ASD is trademarks of STMicroelectronics.

## L3100B/L3100B1

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb}= 25\text{ }^{\circ}\text{C}$ )

Symbol	Parameter		Value	Unit
$I_{PP}$	Peak pulse current (see note 1)	10/1000 $\mu\text{s}$ 8/20 $\mu\text{s}$	100 250	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 10\text{ ms}$	50	A
$T_{stg}$ $T_j$	Storage temperature range Maximum operating junction temperature		- 40 to + 150 + 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$
$T_L$	Maximum lead temperature for soldering during 10s		230	$^{\circ}\text{C}$

**Note 1 :** Pulse waveform 10/1000  $\mu\text{s}$

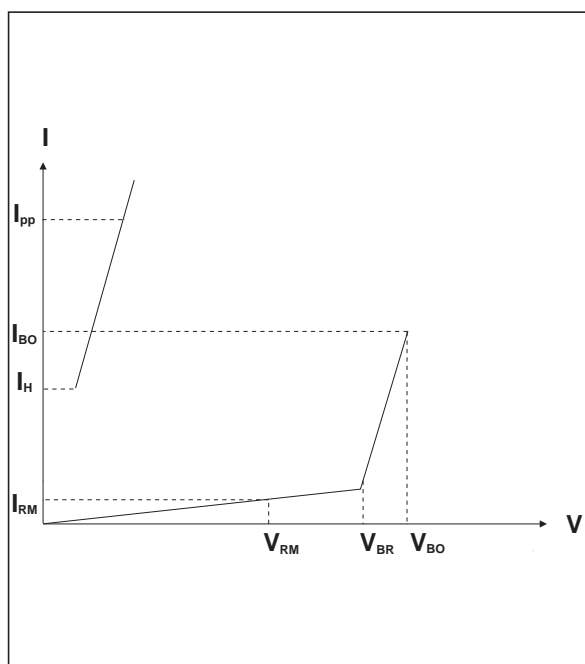


### THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-to-ambient	80	$^{\circ}\text{C/W}$

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

Symbol	Parameter
$V_{RM}$	Stand-off voltage
$I_{RM}$	Reverse leakage current
$V_{BR}$	Breakdown voltage
$V_{BO}$	Breakover voltage
$I_H$	Holding current
$I_{BO}$	Breakover current
$I_{PP}$	Peak pulse current
$V_{GN}$	Gate voltage
$I_{GN}, I_{GP}$	Triggering gate current
$V_{RGN}$	Reverse gate voltage
C	Capacitance

**OPERATION WITHOUT GATE**

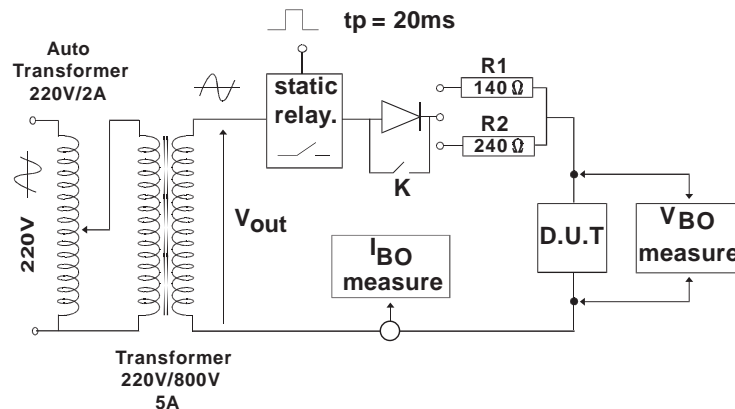
Type	$I_{RM} @ V_{RM}$ max.		$V_{BR} @ I_R$ min.		$V_{BO} @ I_{BO}$ max. min. max. note 1			$I_H$ min. note 1	C max. note 2
	$\mu A$	V	V	mA	V	mA	mA	mA	pF
L3100B	6 40	60 250	265	1	350	200	500	280	100
L3100B1	6 40	60 250	255	1	350	200	500	210	100

**OPERATION WITH GATES**

Type	$V_{GN} @ I_{GN} = 200\text{ mA}$		$I_{GN} @ V_{AC} = 100V$		$V_{RGN} @ I_G = 1mA$ min.	$I_{GP} @ V_{AC} = 100V$ max.
	min.	max.	min.	max.		
					V	mA
	V	V	mA	mA		
L3100B/B1	0.6	1.8	30	200	0.7	150

## L3100B/L3100B1

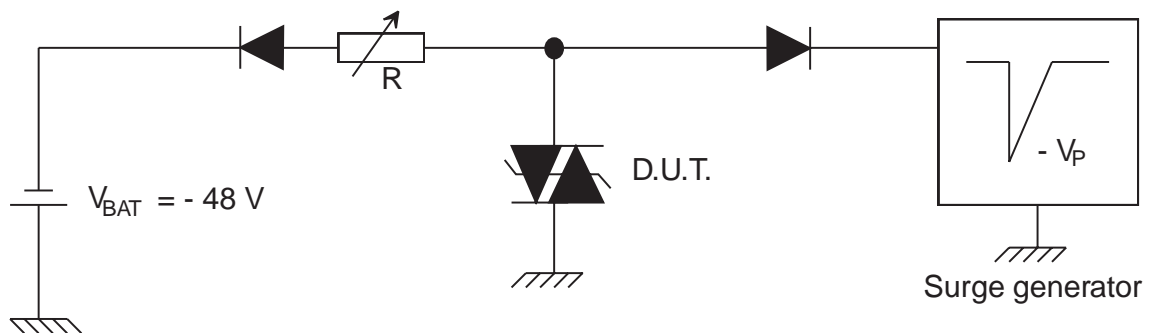
### REFERENCE TEST CIRCUIT FOR $I_{BO}$ and $V_{BO}$ parameters :



#### TEST PROCEDURE :

- Pulse Test duration ( $t_p = 20\text{ms}$ ):
  - For Bidirectional devices = Switch K is closed
  - For Unidirectional devices = Switch K is open.
- $V_{OUT}$  Selection
  - Device with  $V_{BO} < 200\text{ Volt}$ 
    - $V_{OUT} = 250\text{ V}_{RMS}$ ,  $R_1 = 140\ \Omega$ .
  - Device with  $V_{BO} \geq 200\text{ Volt}$ 
    - $V_{OUT} = 480\text{ V}_{RMS}$ ,  $R_2 = 240\ \Omega$ .

### FUNCTIONAL HOLDING CURRENT ( $I_H$ ) TEST CIRCUIT = GO - NOGO TEST.



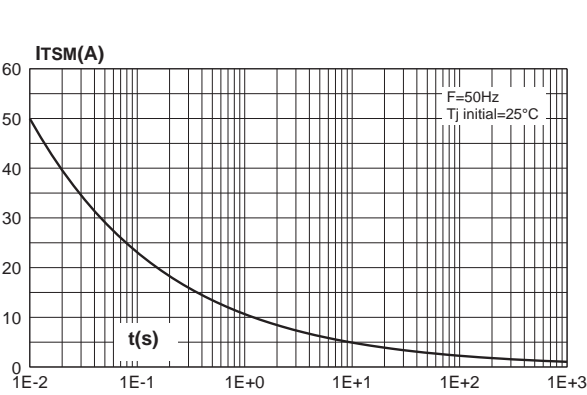
This is a GO-NOGO Test which allows to confirm the holding current ( $I_H$ ) level in a functional test circuit.

This test can be performed if the reference test circuit can't be implemented.

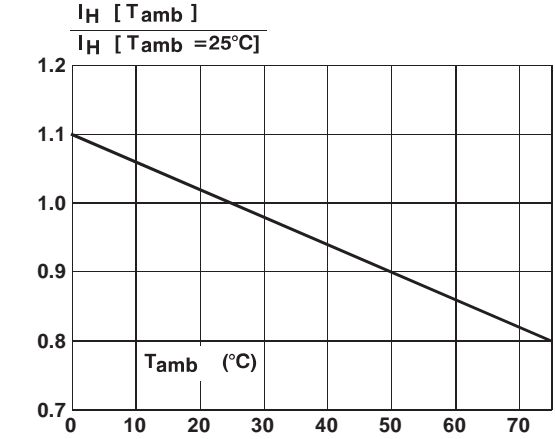
#### TEST PROCEDURE :

- 1) Adjust the current level at the  $I_H$  value by short circuiting the AK of the D.U.T.
- 2) Fire the D.U.T with a surge Current :  $I_{pp} = 10\text{A}$  ,  $10/1000\ \mu\text{s}$ .
- 3) The D.U.T will come back to the OFF-State within a duration of 50 ms max.

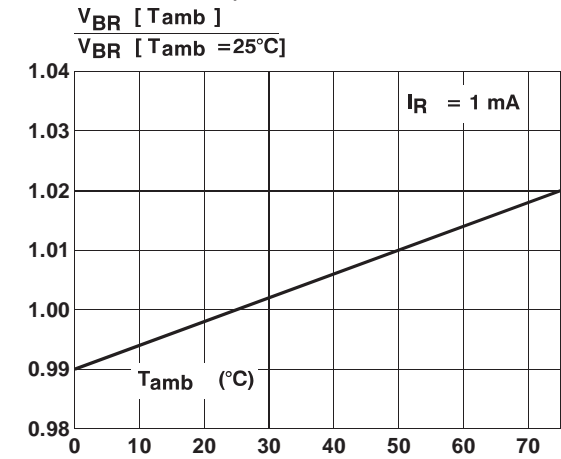
**Figure 1 :** Surge peak current versus overload duration.



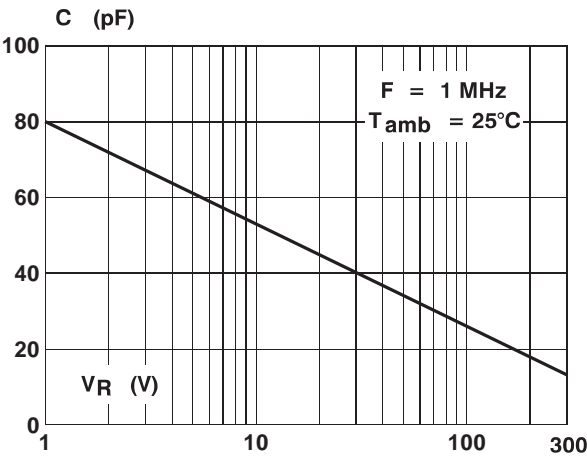
**Figure 2 :** Relative variation of holding current versus junction temperature.



**Figure 3 :** Relative variation of breakdown voltage versus ambient temperature.



**Figure 4 :** Junction capacitance versus reverse applied voltage.



**L3100B/L3100B1**

**APPLICATION CIRCUIT**

Overvoltage Protection and Current limitation

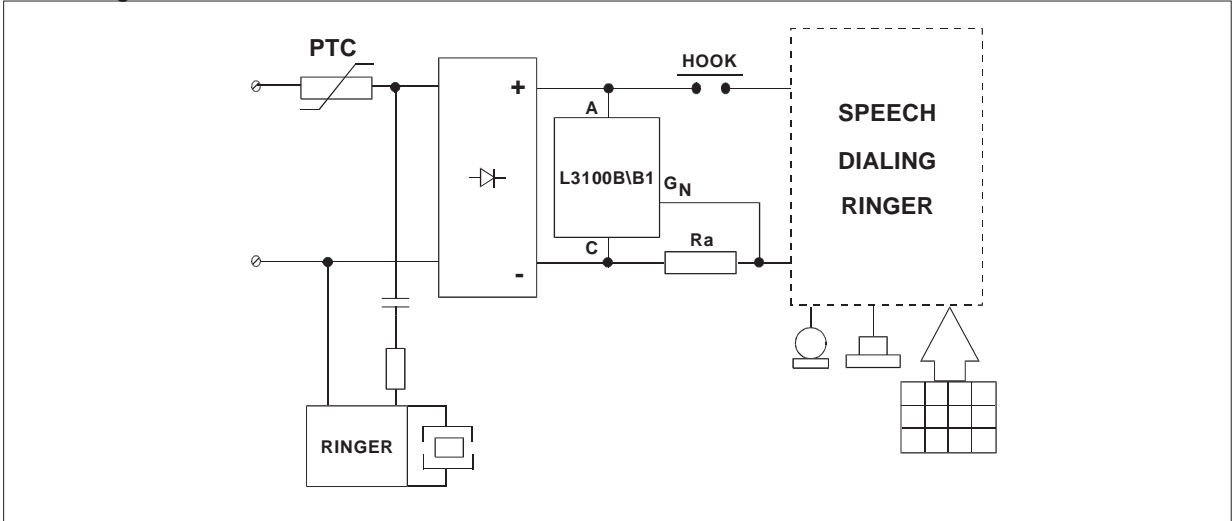
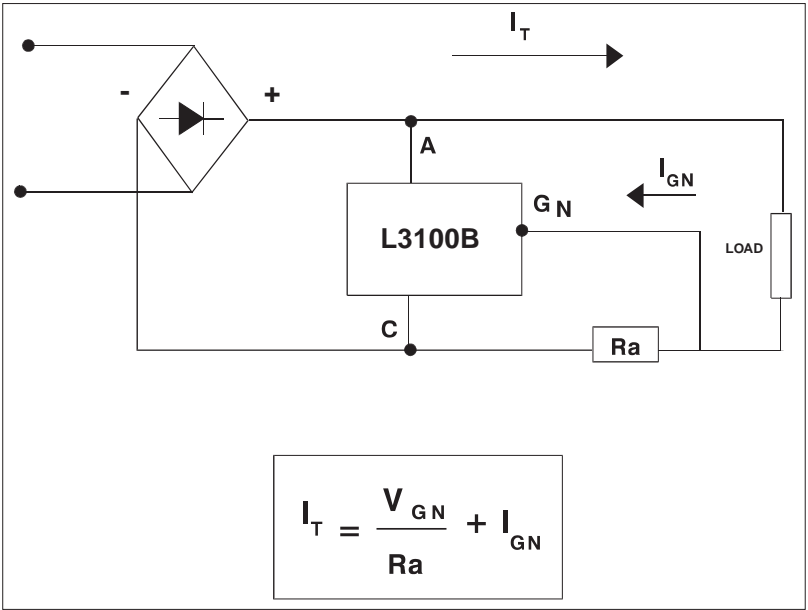


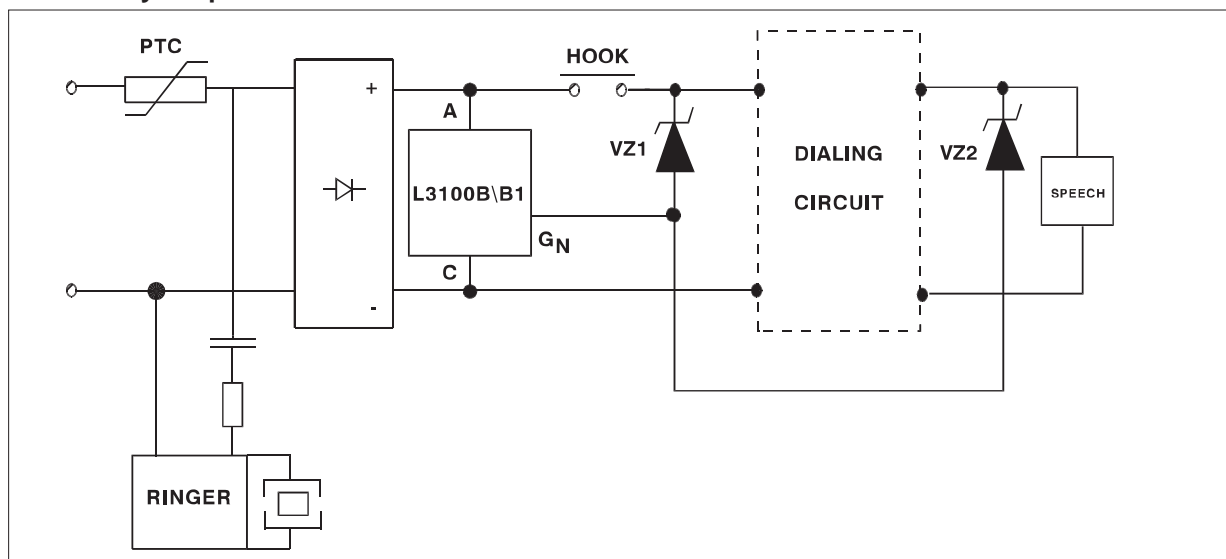
Table below gives the tolerance of the limited current  $I_T$  for each standardized resistor value. The formula (1) has been used with  $V_{GN}$  values specified at the typical gate current level  $I_{GN}$ .

CURRENT TOLERANCE		
R Ω (± 5%)	$I_T$ mA min	$I_T$ mA max
3.00	268	533
3.30	246	503
3.60	228	478
3.90	213	456
4.30	196	433
4.70	181	413
5.10	170	396
5.60	158	379
6.20	145	361
6.80	135	347
7.50	152	333
8.20	117	322
9.10	108	310
10.10	101	299
11.00	95	291
12.00	90	283
13.00	85	277
15.00	78	266
16.00	75	263
18.00	70	256
20.00	66	250
22.00	62	245
24.00	60	242
27.00	56	237
30.00	54	233



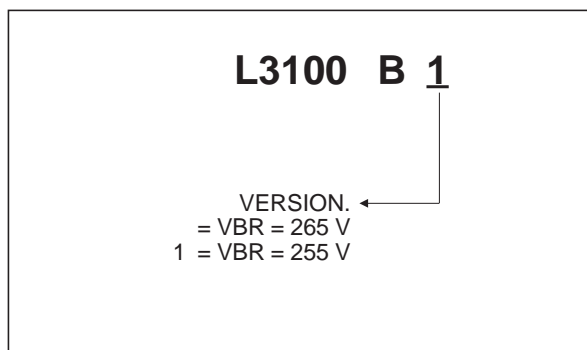
$V_{GN}$ @ $I_{GN}$		
Min.	Max.	Typ.
V	V	mA
0.75	0.95	100

## Ground key telephone set Protection

**PROTECTION MODES :**

**ON HOOK** = Ringer circuit protection is ensured with breakdown voltage at 265 V.

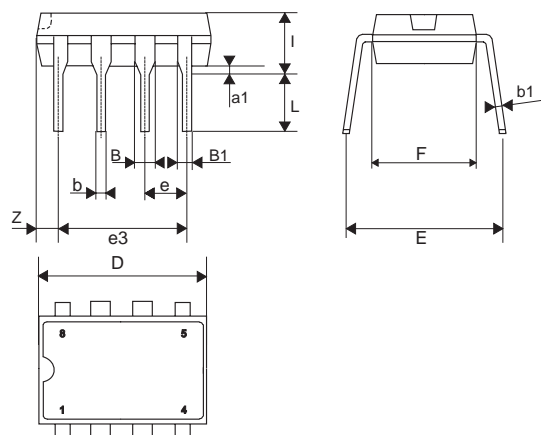
**OFF HOOK** = In dialing mode and in speech mode, the breakdown voltage of L3100B can be adapted to different levels with zener diodes.

**ORDER CODE**

**MARKING** : Logo, Date Code, part Number.

**L3100B/L3100B1****PACKAGE MECHANICAL DATA.**

DIL 8 (Plastic)



REF.	DIMENSIONS					
	Millimetres			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.70			0.027		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.50	0.015		0.020
D			9.80			0.385
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.60	0.017		0.063

**Weight:**0.59 g**Packaging :** Product supplied in antistatic tubes.

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](http://www.st.com)