



# AN1643 APPLICATION NOTE

## 6 CH VOLUME CONTROLLER PLUS SAM261 BASH AMPLIFIER

by Luigi Pagotto & Marco Motta

*In this document is explained how to connect the Audio processor TDA7448 to the board BASH SAM261, in order to obtain a complete amplifier with the volume controlled via I<sup>2</sup>C bus.*

Before to start the description we summarize what are the characteristic of the two boards.

### TDA7448 Board:

With this board is possible to obtain the independent Volume Control for six channels in 1.0dB Steps, the Volume attenuation ranges from 0 to -79dB.

All functions are programmable via serial Bus (I<sup>2</sup>C).

The board is feed with a supply voltage ranging from 4.75 to 10V.

It will be also described how to use the control sw.

### SAM261 BOARD:

SAM261 is a BASH@6.1 (6x50W + 1X100W) amplifier utilizing the STA530 IC.

This board is specifically designed for multi-channel implementation in DVD - HTIB Systems, Multi - Media systems, Mini and Micro systems and Set Top boxes.

SAM261 is dimensioned to provide the maximum Output Power (@ THD= 10%) on two channels and 1/3 max Pout on the remaining Outputs, this assumption is important to define the main Power Supply size (+50V).

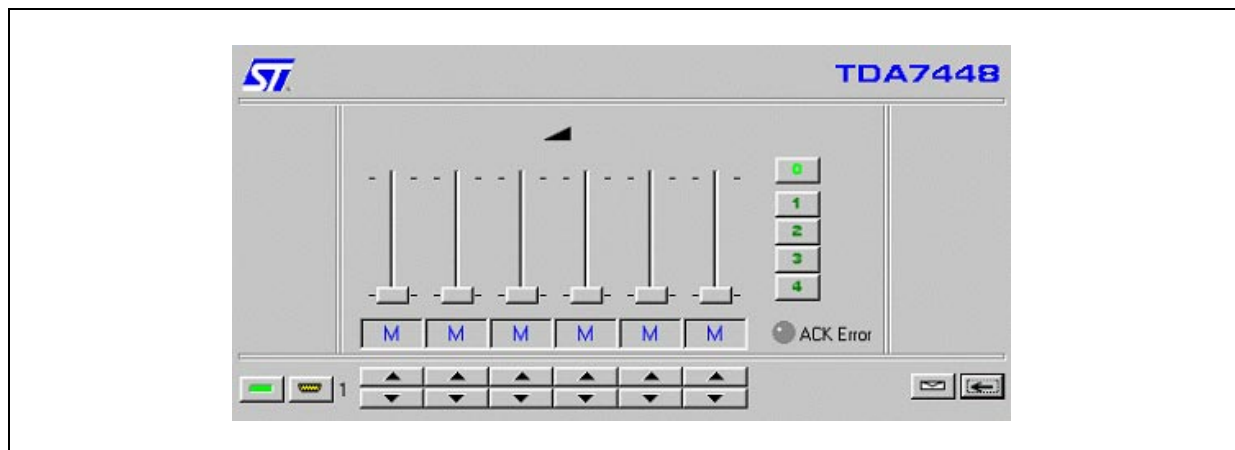
In this document we describe an application configuration where the used loads are:

5 X 50 W @ 8 ohm load (Left / Right/ Rear-Left /Rear- Right/ Centre)

1 X 100W @ 4 ohm load (Subwoofer)

### CONTROL SOFTWARE

Figure 1.



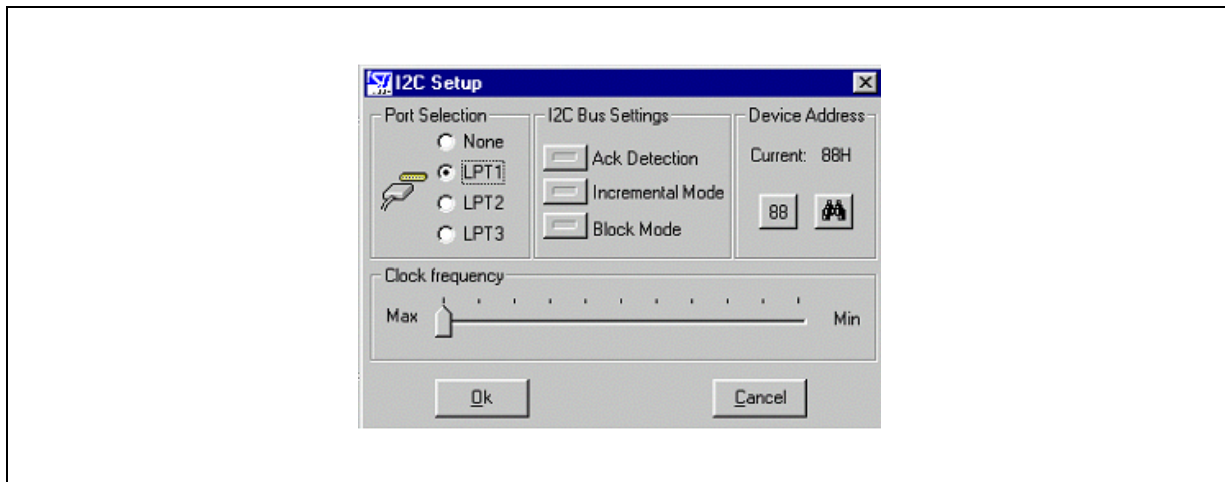
## AN1643 APPLICATION NOTE

Once installed, the control software will appear as shown in fig.1, here below is explained how to work with it.

### STEP 1:

Clicking on the "parallel port" icon it will appear the following image.

Figure 2.



The program automatically detects the printer ports installed in the system and enables them. Select the port connected to the device evaluation board through the appropriate interface. To verify if the device is working, press the button with the **binocular**.

The program scans all possible device address and stops when it receives the acknowledge. To restore **default device address** press the button with the default value.

The **clock frequency** slider allows the user to vary the communication speed.

Three buttons set the bus operating mode:

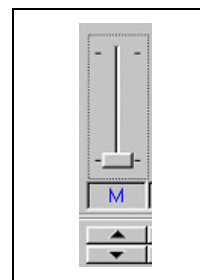
- **ACK detection.** It toggles ACK detection ON/OFF. If the ack detection is ON and the device is not acknowledging the commands, the button is **RED**, signaling that ack error occurred on last command.
- **Incremental mode.** It toggles incremental bus ON/OFF .When incremental bus is active all the pre-set commands are sent by using incremental bus mode (i.e. the message is made by the first sub-address and then all the data bytes follow. The device automatically increments the destination address internally). The Send button acts as well
- **Block mode.** It toggles block mode ON/OFF . When block mode is ON , any variation in Volume is not sent to the device in real time. Commands are sent all together either when user click on **Send** command or block mode is turned to OFF.

### STEP 2:


Push the Button **0** in order to Load the default reset condition.


It is possible now to Increment /Decrement the Volume attenuation acting on the Sliders command or pushing the buttons that allow to attenuate by one step.

It is possible to save 4 settings for the Volume pressing the Buttons [1...4] + SHIFT.



### Additional Features:

Acting on the button  is shown the registers' table, where is shown the current value of all the device's registers. It is real time updated as the user modifies any parameter. It is possible to entry directly a value in **binary**, **hexadecimal** or **decimal** notation by clicking on the correspondent cell and inserting a new value.

The **send** command  refresh all registers of the device with current settings. It may use the incremental mode it is enabled.

### PCB and Components Layout

In fig.2 is shown how to connect the two boards TDA7448 and SAM261 in order to have a complete amplification system with Volume control via I<sup>2</sup>C.

To complete the application it is necessary to provide the correct Power Supply for the two boards as follows:

#### TDA7448: (connector J6)

The supply voltage to be used can range from +5 up to +10V

#### SAM261: (connector J9)

SAM261 module utilize two supply voltages:

- Signal Supply Voltage +/-Vs: +/- 24Vdc / 100mA
- Power Section Voltage +/-DC: +50V /3.0A

In the dimensioning of the power section is important to know that the module is able to provide the maximum power (@THD=10%) on two channels and instantaneously 1/3 Max Pout on the remaining outputs or continuously 1/8 of Max. Pout.

The two supply voltages are completely separated between them: the signal VS is splitted (+/-24V) and its central point (A-gnd) is the reference ground for the STA530 circuits (inputs, stand-by, etc.), while the Power DC is a single supply and its reference must be completely isolated from A-gnd.

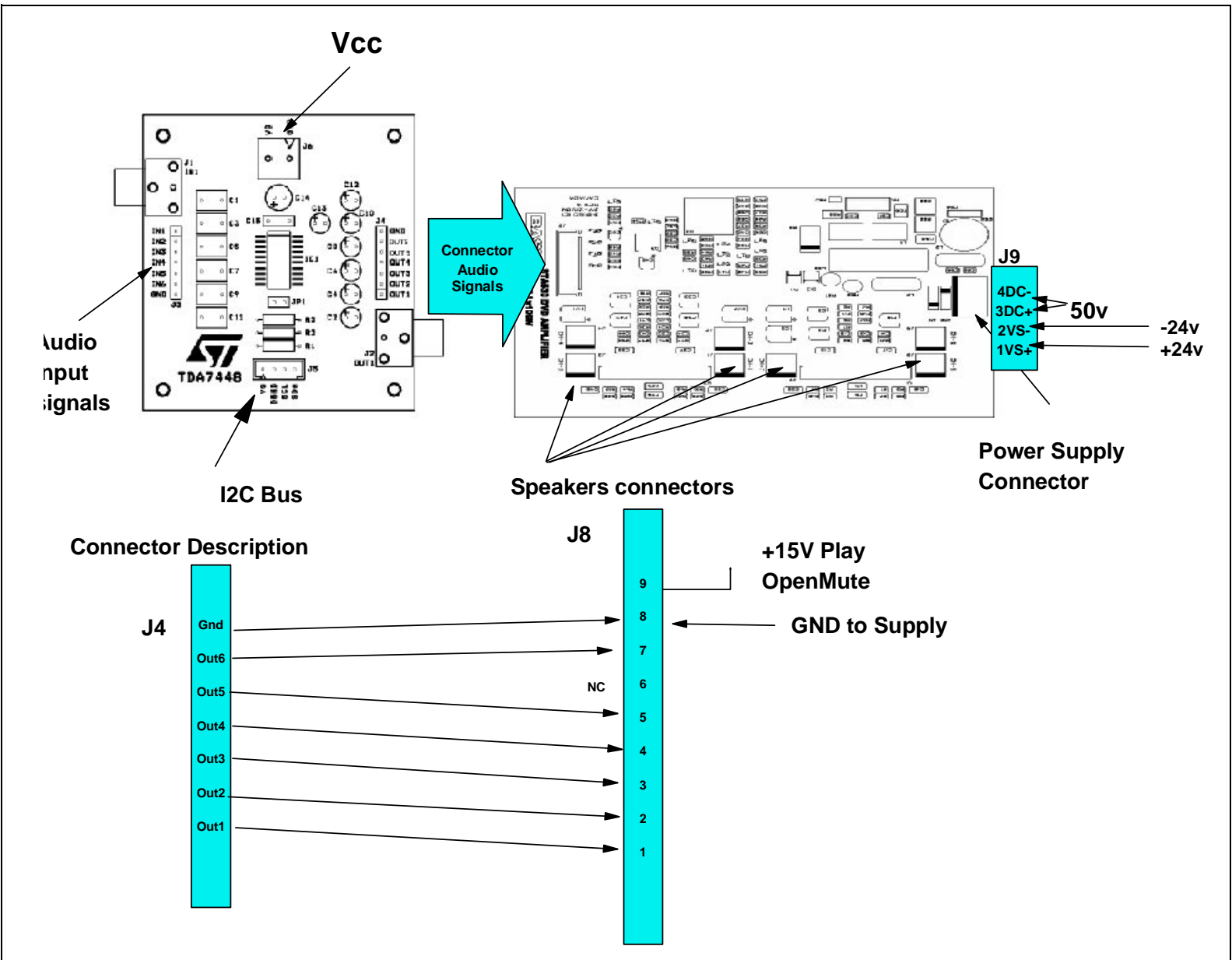
In order to implement the Mute function for the SAM261 module it is necessary to connect a wire to the pin.9 of the connector J8:

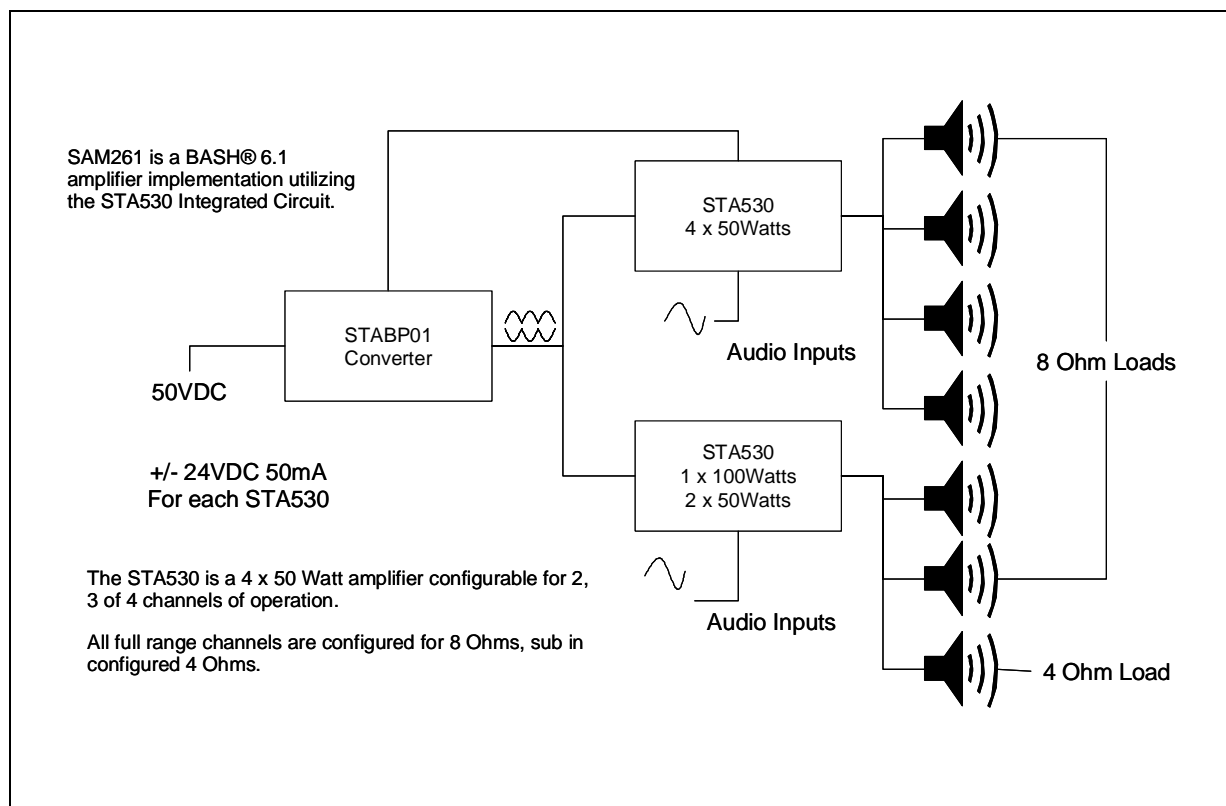
- **when pin.9 open:** SAM261 module is Muted
- **when pin.9 is at 15V:** SAM261 module is in Play.

All the 7 channels are configurated in BTL and completely separated among them and isolated from the rest of the system.

– Interfacing TDA7448 to BASH@SAM261

Figure 3.



**BASH@SAM261 module 6.1 configuration:****Figure 4. Block Diagram****System Specification****Table 1.**

Parameter	Rating	Notes
Output Power	Sats @8ohm – <u>50W@THD10%</u>	See Graphs
THD+N	<0.05% @ 40W <0.05% @ 75W	Measured @ 1KHz
SNR	-102dB (relative to full power) -110dB (A-weighted)	Ch 5 terminated
Sensitivity	1VRMS	
Crosstalk	-87dB	Ch 5 @ 10W ,1KHz, 8 ohm Ch 3 input terminated
Main Power Supply	50V / 3A	Max Voltage is 50V Min. Voltage is 40V
Aux Power Supply	+/- 24V / 100mA	

## AN1643 APPLICATION NOTE

### Power - On-Off sequences:

In order to avoid damages to the SAM261 board it is important to follow these sequences:

At **Power-On** apply in the first the **Auxiliary Power Supply ( $\pm 24V$ )** and after the **Main Power Supply ( $+50V$ )**, in this condition the system is in "Mute state" and it can move in "play state" with the switch present on the pcb.

At **Power-Off** is better to bring the SAM module in "Mute state" and after that to follow this order: switch-off the **Main Supply Voltage ( $+50V$ )** and subsequently the **Auxiliary Power Supply. ( $\pm 24V$ )**.

Figure 5. Thd +noise vs. Output Power Satellite channels

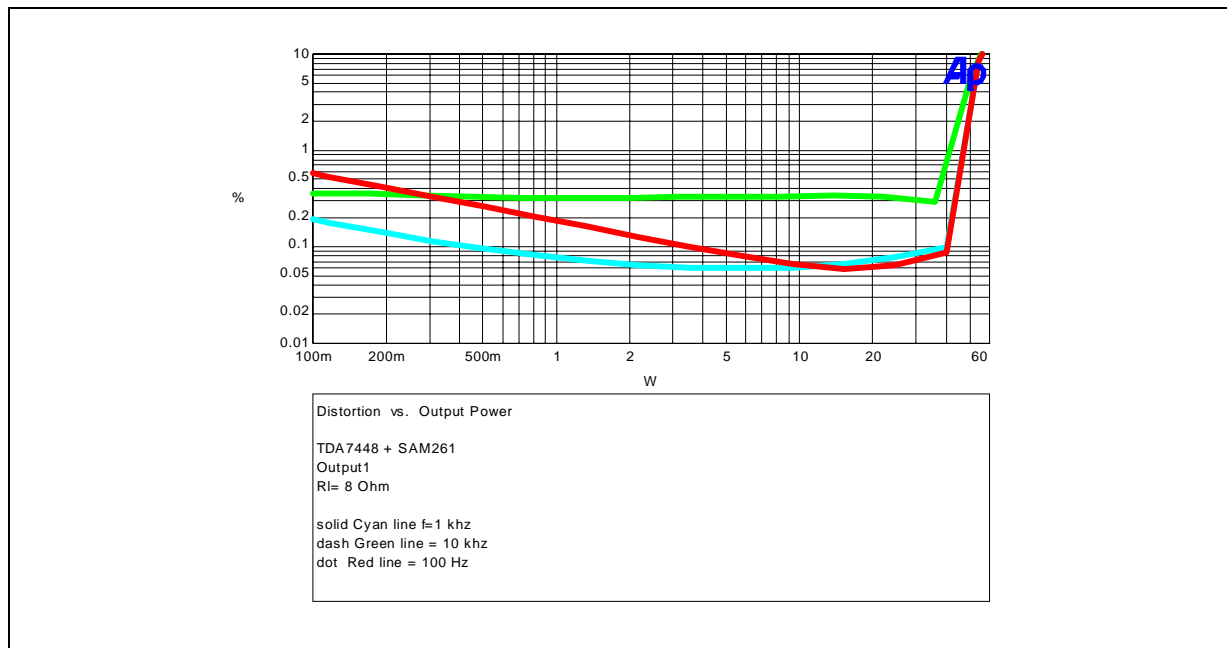
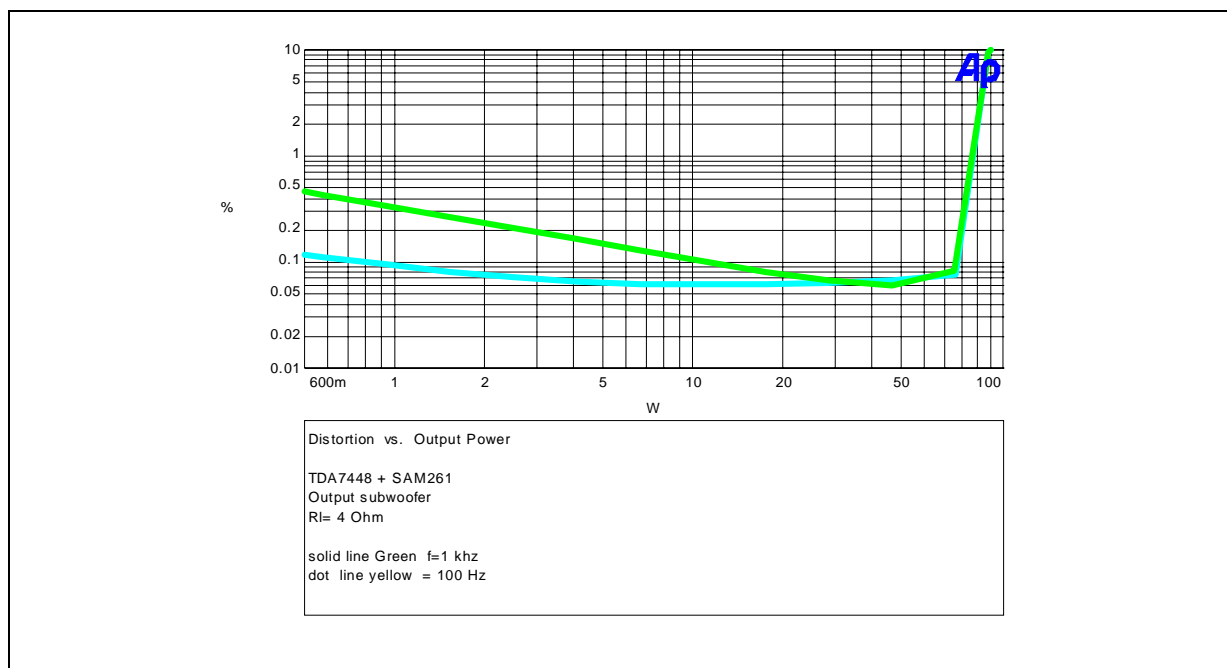


Figure 6. Thd +noise vs. Output Power Subwoofer channel



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  
© 2003 STMicroelectronics - All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

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

<http://www.st.com>