



# AN1656 APPLICATION NOTE

## 6 CH VOLUME CONTROLLER PLUS SAM351 BASH AMPLIFIER

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*In this document is explained how to connect the Audio processor TDA7448 to the board BASH SAM351, 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.

### SAM351 BOARD:

SAM351 is a BASH@5.1 (6x100W) amplifier utilizing the STA575 IC.

This board is specifically designed for multi-channel implementation in DVD - HTIB Systems, Multi - Media systems, AV Receivers.

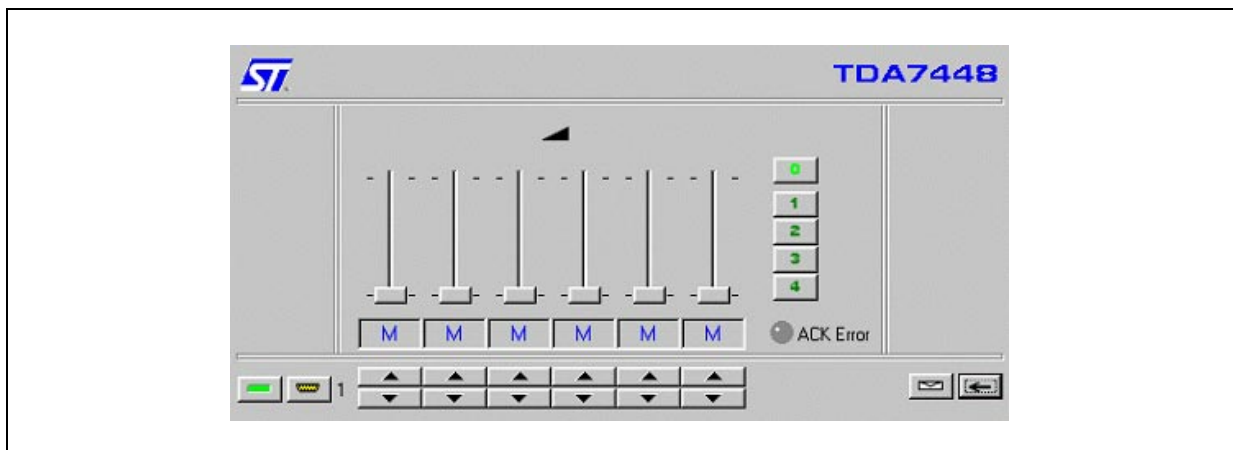
SAM351 is dimensioned to provide the maximum Output Power (@ THD= 10%) on two channels and 1/3 max Pout on the remaining Outputs, this assumption is important to define the main Power Supply size (+50V).

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

6 x 100W @ 6 ohm

## CONTROL SOFTWARE

Figure 1.



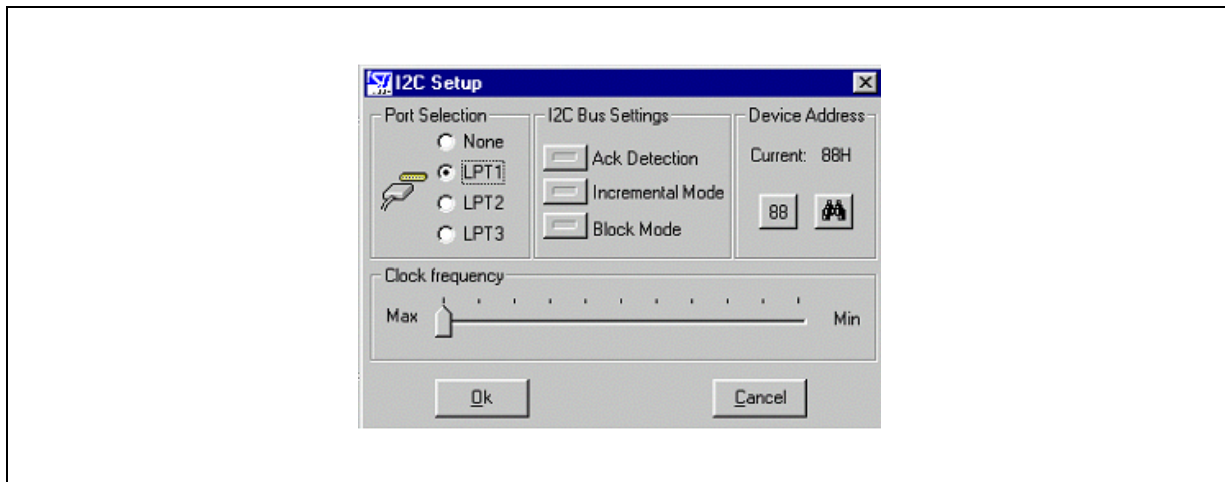
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Once installed, the control software will appear as shown in fig.1, here below is explained how to work with it.

### 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:

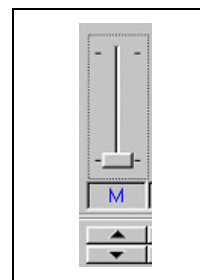
- **ACK detection.** It toggles ACK detection ON/OFF. If the ack detection is ON and the device is not acknowledging the commands, the button is **RED**, signaling that ack error occurred on last command.
- **Incremental mode.** It toggles incremental bus ON/OFF .When incremental bus is active all the 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 SAM351 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

#### SAM351: (connector J9)

SAM351 module utilize two supply voltages:

- Signal Supply Voltage +/-Vs: +/- 24Vdc / 100mA
- Power Section Voltage +/-DC: +50V /4.0A

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 STA575 circuits (inputs, stand-by, etc.), while the Power DC is a single supply and its reference must be completely isolated from A-gnd.

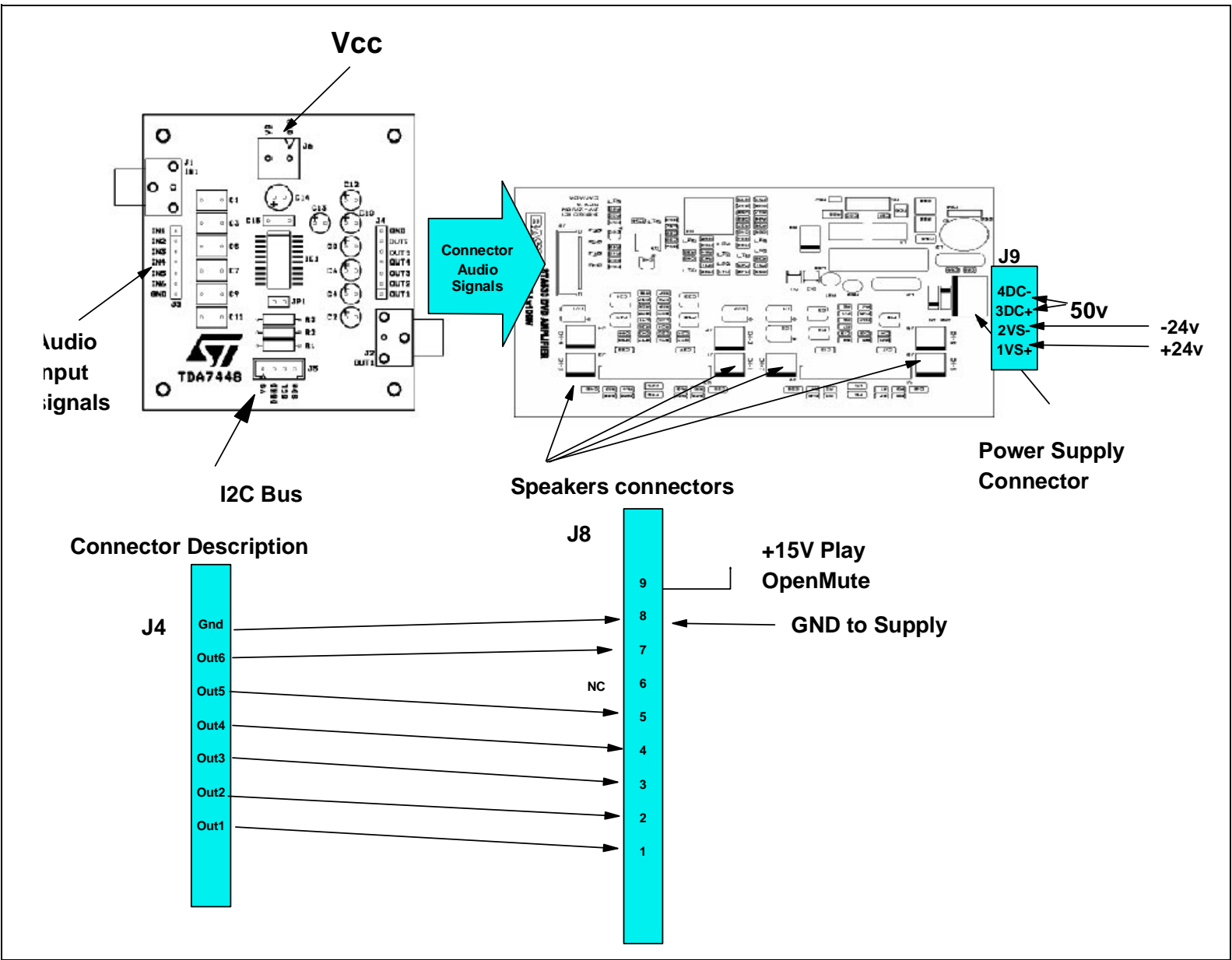
In order to implement the Mute function for the SAM351 module it is necessary to connect a wire to the pin.9 of the connector J8:

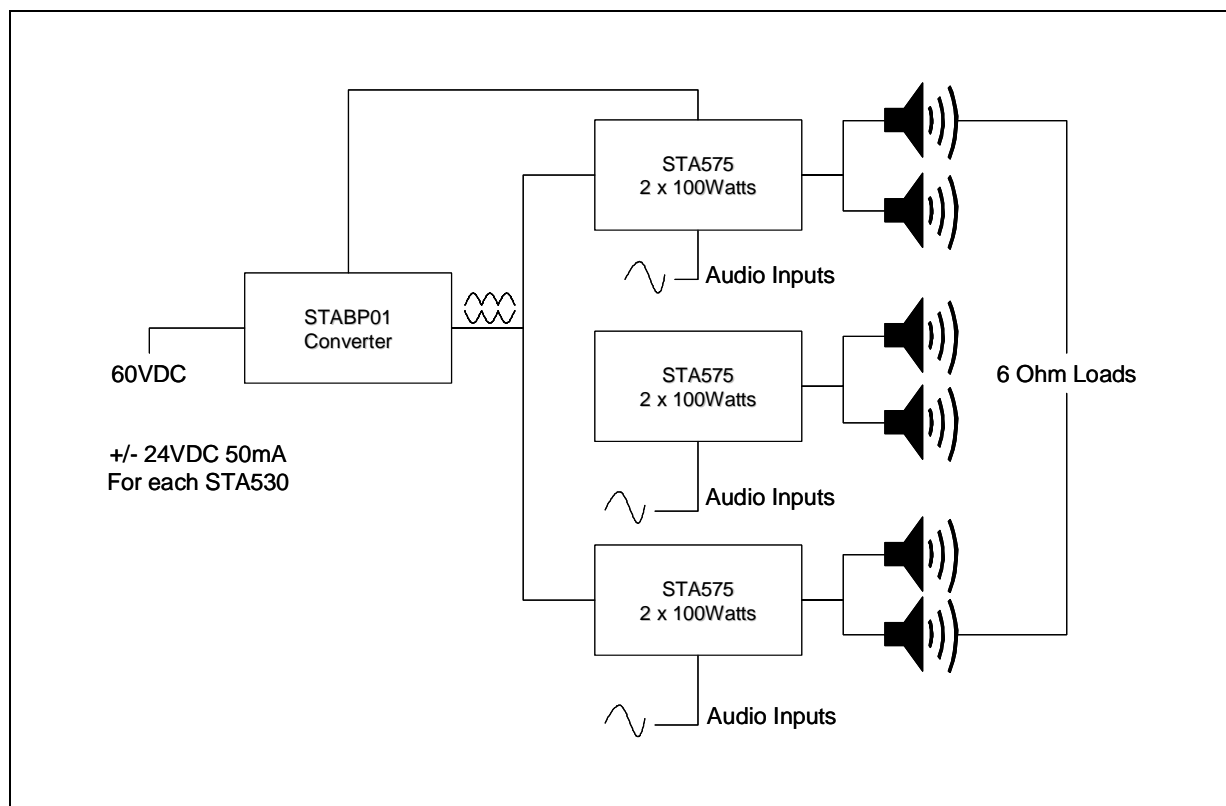
- **when pin.9 open:** SAM351 module is Muted
- **when pin.9 is at 15V:** SAM351 module is in Play.

All the 6 channels are configurated in BTL and completely separated among them and isolated from the rest of the system.

– Interfacing TDA7448 to BASH@SAM351

Figure 3.



**BASH@SAM351 module 6.1 configuration:****Figure 4. Block Diagram****System Specification****Table 1.**

Parameter	Rating	Notes
Output Power	Sats @6ohm – <u>100W@THD10%</u>	See Graphs
THD+N	<0.05% @ 40W <0.05% @ 75W	Measured @ 1KHz
SNR	-104dB (relative to full power) -113dB (A-weighted)	
Sensitivity	1.3VRMS	Amplifier
Crosstalk	-76dB (relative to 10W)	1KHz, 8 ohms
Main Power Supply	60V / 4A	Max Voltage is 60V Min. Voltage is 50V
Aux Power Supply	+/- 24V / 100mA	V <sub>s</sub> supply
Input Board		Supplied to facilitate

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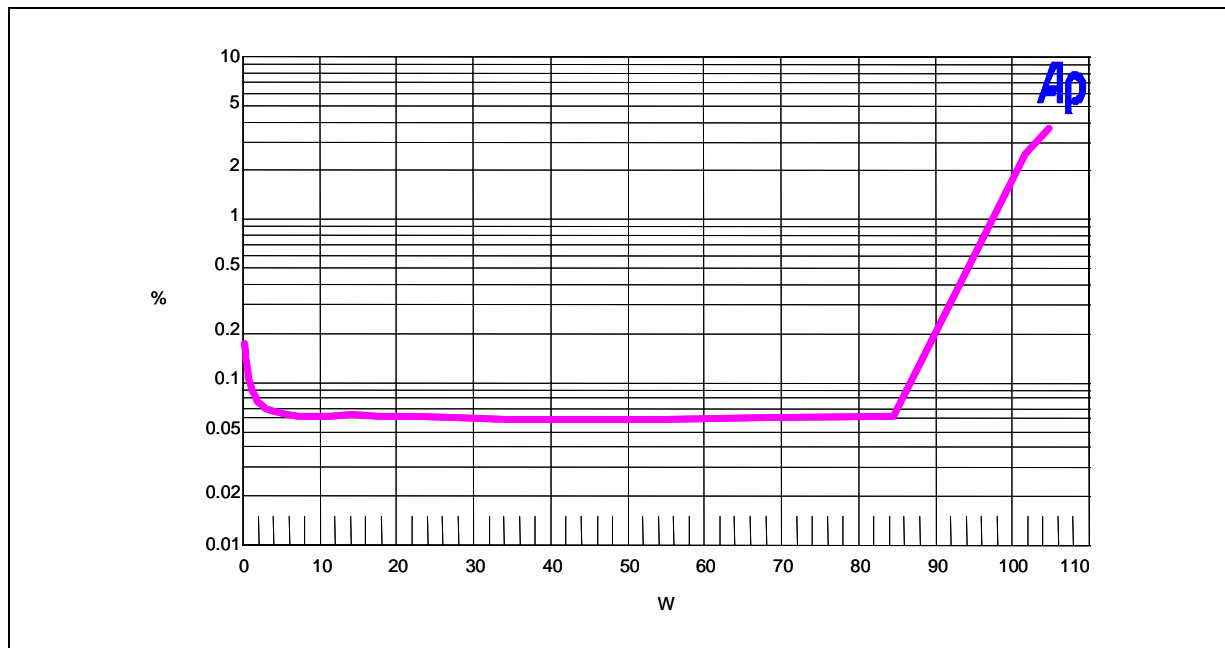
### Power - Up sequences:

In order to avoid damages to the SAM351 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



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