

## VS1000C AUDIO MODULE TESTER

VS1000 “VLSI Solution Ogg Vorbis Player”

Project Code:  
Project Name: VS1000

Revision History			
Rev.	Date	Author	Description
0.9	2010-12-21	PO	Initial version.

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# 1 VS1000 Audio Module

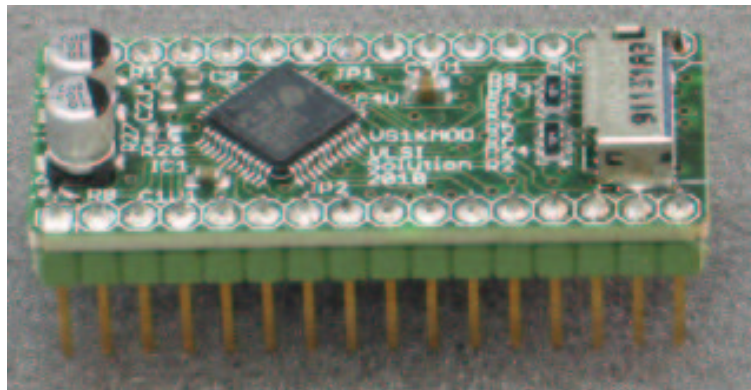


Figure 1.1: VS1000 Audio Module

The VS1000 Audio Module is a quick and easy way to add sound to a product. The minimum requirement is a ground, a single power supply connection and line output for the audio output signal.

The VS1000 Audio Module comes programmed with a default firmware, which can be controlled through UART. Ogg Vorbis audio files can reside in the internal 2MB SPI FLASH or can be played from the memory card inserted in the micro-SD socket. The micro-SD card can also have an 'auto-start' file, which can be used to update the internal SPI FLASH.

Read more about the VS1000 Audio Module from its own documentation.

## 2 VS1000 Audio Module Tester

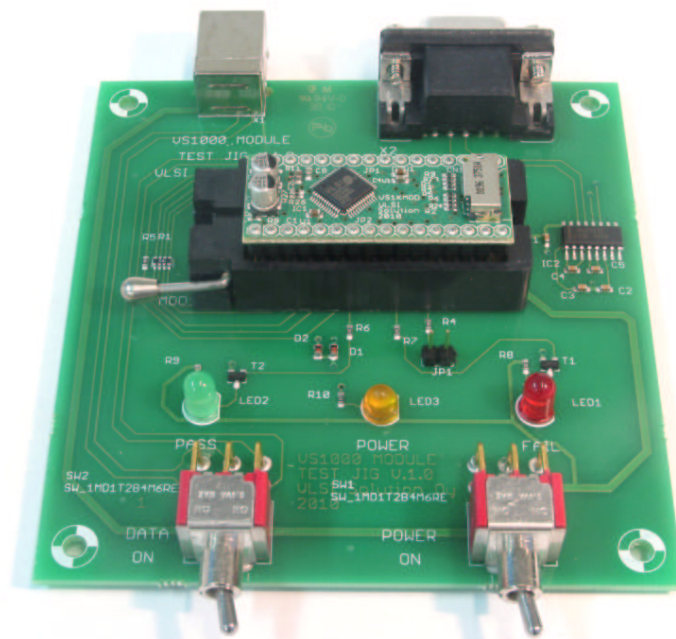


Figure 2.1: VS1000 Audio Module Tester

The VS1000 Audio Module Tester is a board containing a socket for the VS1000 Audio Module, UART driver for connecting to PC, LEDs for self-test result indication, USB and power switches, and USB connector for powering the board. The different operations possible with the tester board are:

- Testing VS1000 Audio Module – self test loaded through UART
- Uploading firmware of VS1000 Audio Module via UART (from PC)
- Uploading content of VS1000 Audio Module via UART or USB (from PC)
- Powering VS1000 Audio Module for automatic upgrade: default firmware allows upgrade from a micro-SD card inserted into the Module
- Developing and debugging custom firmware for VS1000 Audio Module

## 2.1 Testing VS1000 Audio Modules

Download the latest vs1kmodtest.zip package and extract it to a suitable directory. ( See <http://www.vlsi.fi/en/products/vs1000module.html> )

If you are testing modules that have been programmed with the default UART-controlled player, you need to prevent boot from SPI FLASH by having jumper JP1 present.

1. Set switch to "POWER ON" position
2. Insert VS1000 Audio Module into the socket
3. From command line prompt (Accessories/Command Prompt) change directory to vs1kmodtest/ , then run amtest.bat . If you use COM2 run amtest2.bat, for COM3 use amtest3.bat etc.

```
> cd c:\vs1kmodtest
> amtest
```

- GREEN, YELLOW and RED will light shortly
- GREEN and RED turn off shortly
- GREEN and RED turn on, YELLOW turns off
- Now insert microSD card, RED will turn off
- Successful completion is: GREEN on, YELLOW off, RED off  
any other combination is FAIL.
- Results are also printed on the screen. You will get something like the following:

```
ok 1, ok 0, PU/PD ok
USB PU ok
C214=REMS
0018=GBUF OK
All OK
Insert SD to clear the RED LED!
Card found.
```

- Remove microSD card (RED turns on)
  - Remove VS1000 Audio Module from the socket.
4. Press ctrl-C to end the test script, continue from step 2.

## 2.2 Uploading Firmware through UART

If you are developing your own firmware, get the source code package from <http://www.vlsi.fi/en/products/vs1000module.html> and follow the instructions in the accompanied README.txt file.

If you only need to compile and program the default firmware, you run `spi.bat` or `make program`. Both execute the following commands.

```
> make spiall.spi prommer24.bin
> vs3emu -chip vs1000 -s 115200 -p 1 -l prommer24.bin -c run.cmd
```

You get something like the following:

```
VS1000 SPI EEPROM Write Utility
Supports EEPROMS with 24bit address (128 kilobytes to 16 megabytes)
```

```
Erasing
```

```
0000
0004
0008
000c
0010
0014
0018
001c
0020
0024
0028
002c
0030
0034
0038
003c
```

```
Programming spiall.spi. This does not erase old image.
```

```
0001 0002 0003 0004 0005 0006 0007 0008 0009 000a 000b 000c 000d 000e 000f
0010 0011 0012 0013 0014 0015 0016 0017 0018 0019 001a 001b 001c 001d 001e
001f 0020 0021 0022 0023 0024 0025 0026 0027 0028 0029 002a Done.
```

The firmware has been programmed and you can press ctrl-C to exit the emulator.

## 2.3 Uploading Content through UART

If you program content through UART, get the source code package from <http://www.vlsi.fi/en/products/vs1000module.html> and follow the instructions in the accompanied README.txt file.

The VS1000 Audio Module web page has `imggen052.exe`, which you can use to create the required CONTENT.RAW files from your .ogg files. You must select "no boot image", "spi memory", "2MB", and "force FAT start at 0", then select the files in the order you want to play them. You should leave at least 16kB free when you make the image. Save the image as `content.raw`.

Copy the `content.raw` file into the working directory, and run `make content` to program it into the module. This compiles `content.bin` if needed, then executes the following command.

```
> vs3emu -chip vs1000 -s 115200 -p 1 -l content.bin -c run.cmd
```

Note that only quite small images should be programmed this way, because the UART is quite slow. For larger amounts of content use either programming through USB using normal USB mass storage mode, or take advantage of the micro-SD update feature of the default firmware (available since version 0.3).

## 2.4 Uploading Content through USB

The default firmware also acts as a USB mass storage device if USB insertion is detected. The module shows up as a normal removable disk drive.

If micro-SD card is not inserted, you can read and write the audio files on the internal SPI FLASH through USB. When micro-SD card is inserted, you can access the card as a disk drive.

## 2.5 Automatic Upgrade through micro-SD Card

Since VS1000 Audio Module firmware version 0.3 a program named SDUPDATE.PRG is automatically run from the micro-SD card. This makes it possible to perform both firmware and content copy very quickly from the micro-SD card.

In this update mode the Audio Module Tester simply provides power to the module, and the default firmware (JP1 must be open to allow boot from SPI FLASH) detects the inserted micro-SD card and runs SDUPDATE.PRG.

SDUPDATE.PRG then checks the micro-SD card content and decides what to do. If it finds CONTENT.RAW FAT image file, it copies it to the disk area in the module's SPI FLASH, replacing the old audio content. The firmware part of the SPI FLASH is not changed.

See how to create the CONTENT.RAW FAT image file from section 2.3.

The copy of the 2MB FAT image is quite fast, the speed is restricted by the SPI FLASH write speed.

If SDUPDATE.PRG finds FIRMWARE.RAW, it is copied to the firmware area in the module's SPI FLASH. The audio content is not changed.

SDUPDATE.PRG can be found with source code from VS1000 Audio Module software package starting from version 0.4.

## 2.6 Developing and Debugging

To make your own modifications, get the source code package from <http://www.vlsi.fi/en/products/vs1000module.html> . During development you can load and run the programs directly on the module through the UART using vs3emu. You can also create and program a boot image and then run the software from the SPI FLASH.

The module tester board does not have analog outputs easily accessible, because they are routed in a way suitable for self-testing. This limits the usefulness of the board for development. Until a dedicated VS1000 Audio Module development board is available, the next best alternative is to wire the audio module to the SimpleDSP Host board.

An VS1000 Audio Module project template will be added to the integrated graphical development environment VSIDE in Q1 2011.



## 3 Document Version Changes

### Version 0.9

- First version.