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## Flash Preparation for VS1000

Version history:

Version	Date	Prepared	Description of the version
0.1	9.4.2008	TK	Initial version

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## **1. PURPOSE**

This document contains short description of Flash programming options.

## **2. SCOPE**

This document applies to all end products that use VS1000B device and have custom boot code, encryption key and product content stored into the same Flash.

The document is intended for those VS1000 customers who are in phase of production setup design of their product.

## **3. REFERENCES**

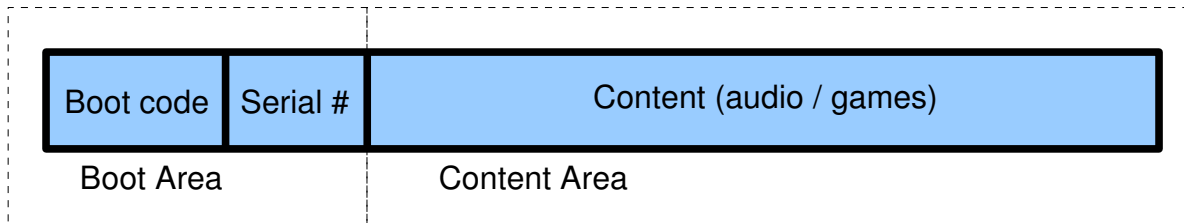
1. VS1000 Datasheet

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## 4. FLASH PROGRAMMING ALTERNATIVES



### 4.1 Flash memory organization

#### 4.1.1 Boot Area

The Flash has Boot Area code in the beginning of the memory address space. The boot area of Flash is guaranteed by memory manufacturers to be bit error free. The Boot Area contains

- Boot code of VS1000 device
- The serial number of the product. It is used for protection of the content.

#### 4.1.2 Content Area

The content area has typically FAT32 file system and contains all kind of content files. Typically the file name extension such as *file.ogg* is used to select the desired functionality of the content.

### 4.2 Preprogrammed Flash

Preprogrammed Flash option is using one image that is programmed into the Flash by using Flash programmer. The image contains all above fields (Boot code, Serial number and Content).

The Flash programming is done by using a commercial Flash programmer. Simple programmers are usually provided by the Flash manufacturers. The programmer must be able to

- detect and skip bad blocks of the Flash
- create serial number and add it into the image (not needed if same serial number is used for all products of the firmware version)

Flash programmers are typically not able to mark the bad block such that VS1000 could read it to build (FAT32) file system. Therefore, **preprogrammed Flash is an option just for a read only file system!**

This option can use VLSI's imggen utility, see

<http://www.vlsi.fi/en/support/software/vs1000tools.html> for details.

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### **4.3 Flash programming by using VS1000**

When product is build such that Flash is uninitialized after PCB assembly, VS1000 device is not able to show the Flash initially when device is connected to the connector USB of the PC. Instead it will show RAM disk.

The RAM disk is small memory that is used to drag and drop the Boot Code and Serial Number of the application. When boot files are seen in the RAM disk they are not yet physically in the Flash since Windows (or other OS) has taken the control.

VS1000 needs a signal before Flash writing can be started. The selected signal is USB data lines. VS1000 starts writing the Flash when USB data lines are shortly disconnected from the PC. The Boot Area writing is immediately followed by initialization (low level formatting) of the content segment.

When data lines are re-connected to the USB of the PC VS1000 device will report itself as Removable Disk. Now disk should be formatted as FAT32.

When disk has been formatted contents can be drag and dropped into it.

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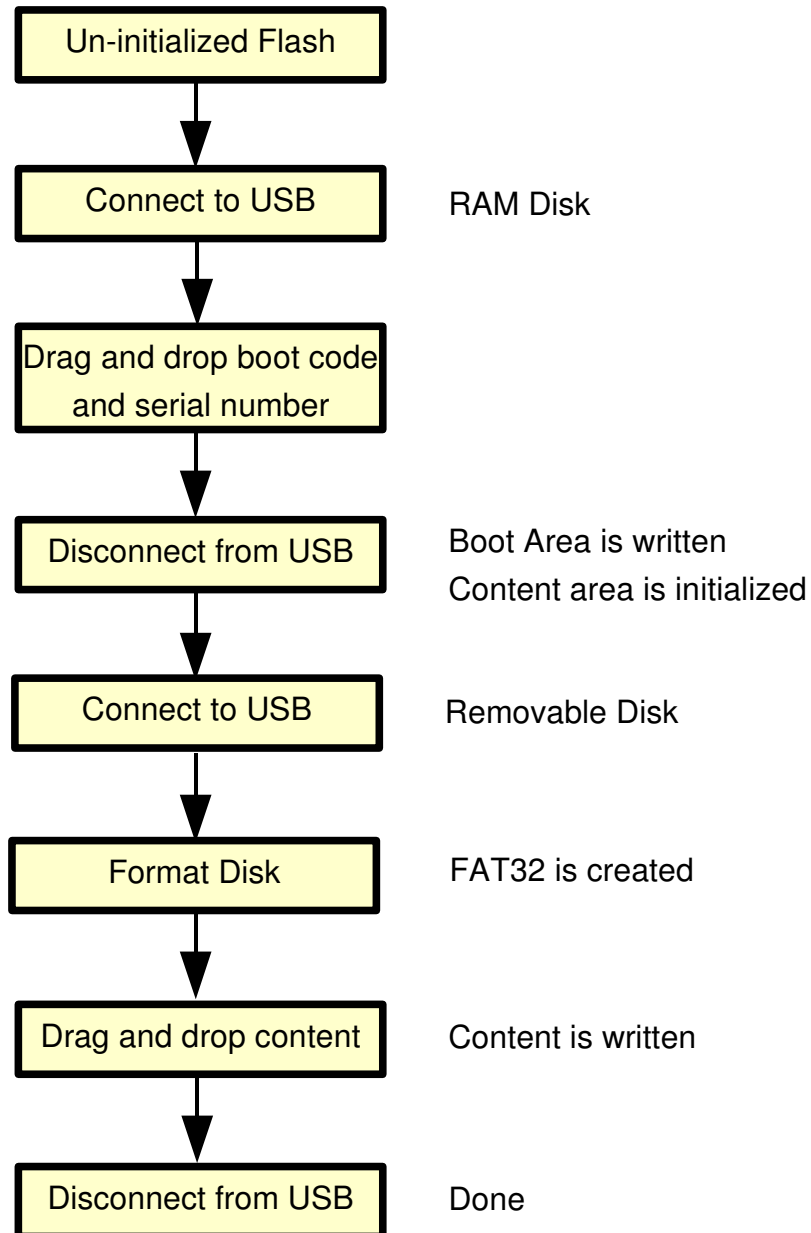


Figure 1: Flash programming procedure for R/W applications

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## 5. PROPOSED FLASH PRODUCTION PROGRAMMER (R/W APPLICATION)

When product is capable to transfer content via USB it falls into category of “Flash programming by using VS1000” of Figure 1.

The USB connection/disconnection can be automated with simple mini relay that switches on/off the USB data lines 2 and 3.

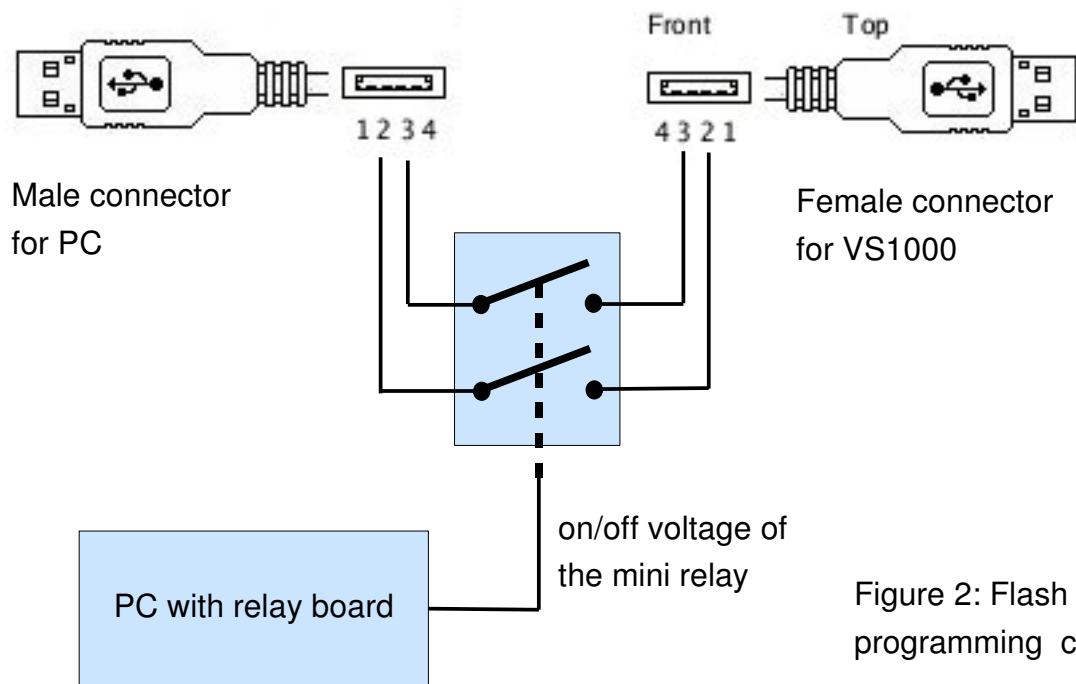


Figure 2: Flash programming cable

The control programming software for PC can be implemented for instance by java script. The structure of the script would be the following:

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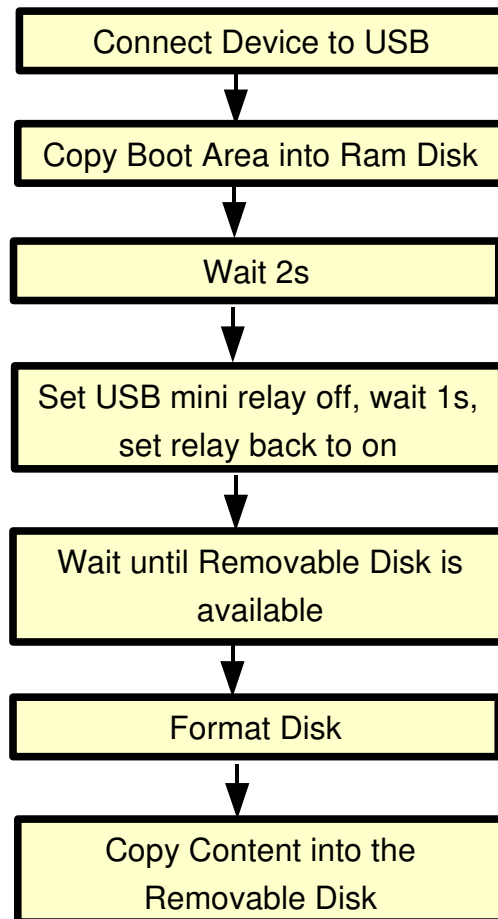


Figure 3: Flash programming script