Future Technology Devices International Ltd.

Vinculum II ProgLoader and BootLoader Explained

Application Note AN_156

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This application note describes the difference between the Vinculum II ProgLoader code and the Bootloader code. It describes when each is used and why.

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1 Introduction

The Vinculum II device (VNC2) is a microcontroller based IC targeted at USB applications. VNC2 is delivered to users with no application firmware loaded. VNC2 is delivered programmed only with what is referred to as the ProgLoader. Specific applications must generate the Bootloader code and the application code which is programmed into the EEFLASH memory of VNC2 by the user.

This application note describes the purposes and the function of ProgLoader and BootLoader to allow access to the device for programming the EEFLASH memory of VNC2.

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2 ProgLoader

ProgLoader is programmed into VNC2 EEFLASH during production. ProgLoader is a small application that resides in the protected area of VNC2 FLASH. If the VNC2 PROG# pin is pulled to a logic 0 before the device is brought out of the reset state then this ProgLoader code will be run.

The code enables the IO_MUX of the VNC2 device and assigns the default pinout of the VNC2. This allows users to connect the UART RXD, TXD, RTS, CTS of the VNC2 to a PC and a .ROM file may be loaded onto the VNC2 via the UART interface (as opposed to using the alternative programming method via the debug pin).

	64 Pin pkg pin No.	48 Pin pkg Pin No.	32 Pin pkg Pin No.
UART TXD	39	31	23
UART RXD	40	32	24
UART RTS	41	33	25
UART CTS	42	34	26
PROG#	10	10	9
RESET#	9	9	10
Debug Port	11	11	11

Table 1: Default pinout for Programming over UART

If a user is programming using the UART interface, then a TTL-232R-3V3 cable from FTDI could be used to connect to the PC and then utility FT_PROG may be used to load the .ROM file generated by the Vinculum II toolchain.

FT_PROG is available from the FTDI website at: http://www.ftdichip.com/Support/Utilities.htm

The Vinculum II toolchain is also available at http://www.ftdichip.com/Firmware/VNC2tools.htm

Additionally because the default setting of the IO_MUX is restored, the debug pin is mapped to its default location. (Changing the pin assignment for the debugger is not recommended.)

3 BootLoader

BootLoader is added to an application by the linker when a user compiles a program with the Vinculum II toolchain. The purpose of the BootLoader section of the .ROM image is to initialise the VNC2 CPU, the peripheral blocks and memory. On completion of this, BootLoader will then load the user application's initialised variables into the appropriate area of RAM before jumping to the start of the program. BootLoader is only available when the user has loaded their application .ROM file into the VNC2. Additionally Bootloader only runs if the PROG# pin is logic 1 when VNC2 comes out from the reset state, otherwise the ProgLoader is invoked.

The bootloader code is built into the toolchain and cannot be modified. The BootLoader also holds the jump table for hardware interrupts.

4 Protected Memory

The VNC2 ROM (EEFLASH) is 256kBytes in total. The first 15 pages are reserved as a protected area. One page is 128 bytes in size and begins at address 0.

This protected area is programmed with the ProgLoader application during manufacture and is resident in all "blank" devices. The protected area and ProgLoader cannot be altered by the end user.

If the VNC2 is powered up with the PROG# pin at logic 0 then the interrupt table starts at address 0 and execution starts at address 0, otherwise the interrupt table and code execution begin at the first non protected area in ROM.

As part of the application code, the bootLoader is not in the protected area.

All ROM Memory beyond the protected area is available for user application code.

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Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Appendix A – References

Vinculum II datasheet

http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_Vinculum-II.pdf

Application and Technical Notes available at
http://www.ftdichip.com/Support/Documents/AppNotes.htm

Vinculum-II IO Mux Explained

http://www.ftdichip.com/Support/Documents/AppNotes/AN_139_Vinculum-II%20IO_Mux%20Explained.pdf

Vinculum-II IO Cell Description

http://www.ftdichip.com/Support/Documents/AppNotes/AN_137_Vinculum-II%20IO_Cell_Description.pdf

Vinculum-II Debug Interface Description

http://www.ftdichip.com/Support/Documents/AppNotes/AN_138_Vinculum-II_Debug_Interface_Description.pdf

Vinculum-II Toolchain Getting Started Guide

http://www.ftdichip.com/Support/Documents/AppNotes/AN_142_Vinculum-II_Tool_Chain_Getting_Started_Guide.pdf

Vinculum-II Toolchain Installation Guide

http://www.ftdichip.com/Support/Documents/AppNotes/AN_145_Vinculum-II_Toolchain_Installation_Guide.pdf

Vinculum-II Errata Technical Note

http://www.ftdichip.com/Support/Documents/TechnicalNotes/TN_118_VNC2%20Errata%20Technical%20Note.pdf

Vinculum II Toolchain (IDE)

http://www.ftdichip.com/Firmware/V2TC/VNC2toolchain.htm

FT_Prog

http://www.ftdichip.com/Support/Utilities/FT_Prog_v1.10.zip

Appendix B – Revision History

Version 1.0	First Release	29th October2010