M16C/6C Group

USB DFU Sample Software

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Introduction

DFU (Device Firmware Upgrade) is a USB class that has been specified to provide a standard way for USB devices to upgrade their firmware via USB. The specification was written with the idea that an upgrade may be necessary to enhance or bug fix a program but the scope of DFU can be extended to include any situation where a device needs to have its firmware or any other data upgraded. DFU can also be used in some cases to upload data to a host.

Sample software is available for the RSK M16C/6C that shows how DFU can be used to both upgrade and upload the data in the built in Data Flash memory of the M16C/6C.

Normally DFU operation is not the sole use of the USB port on a device and so it is important that the DFU operation can be added to an existing USB function. For this reason the sample software consists of two projects. The first demonstrates the USB HID class and DFU and the second the USB CDC class and DFU.

The sample software comes with a user manual that explains DFU in more detail and the operation of the sample code.

Target Device

The M16C/6C is suitable for a DFU class for the following reasons:

- It includes a USB module compliant with the USB 2.0 specification. DFU only requires Endpoint 0.
- It includes Flash memory that can be written to by the CPU.

See the M16C/6C Group Hardware Manual for details.

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1. Sample Code Overview

The firmware for the M16C/6C is supplied as a HEW project and is written in ANSI C.

The sample host applications are written for a Microsoft Windows® PC and are supplied as both pre-built executables and as Microsoft Visual C++® projects.

The CDC and HID classes are both supported by built in Windows® drivers. DFU, however, is not supported by a Windows® driver so an open-source project called LibUSB-Win32 is used to provide a Windows system driver.

To allow the DFU host application to connect to the device when it is operating as either a CDC or HID class the device enumerates as a USB composite device supporting CDC/DFU or HID/DFU respectively. Once connected the DFU host can be used to switch the device to DFU Mode. In this mode normal operation (CDC or HID) is stopped as the device is re-enumerated as solely a DFU device. The DFU host can then connect to the device in DFU Mode allowing it to then download or upload data from the device.

As a simple demonstration, the downloaded data is used to update the text the RSK will show on its LCD when a user presses a switch on the RSK. Suitable data is built into the DFU host application or, to show how the data could be stored as a file on a PC, there are example data files supplied. These files include a DFU header as required by the DFU specification.

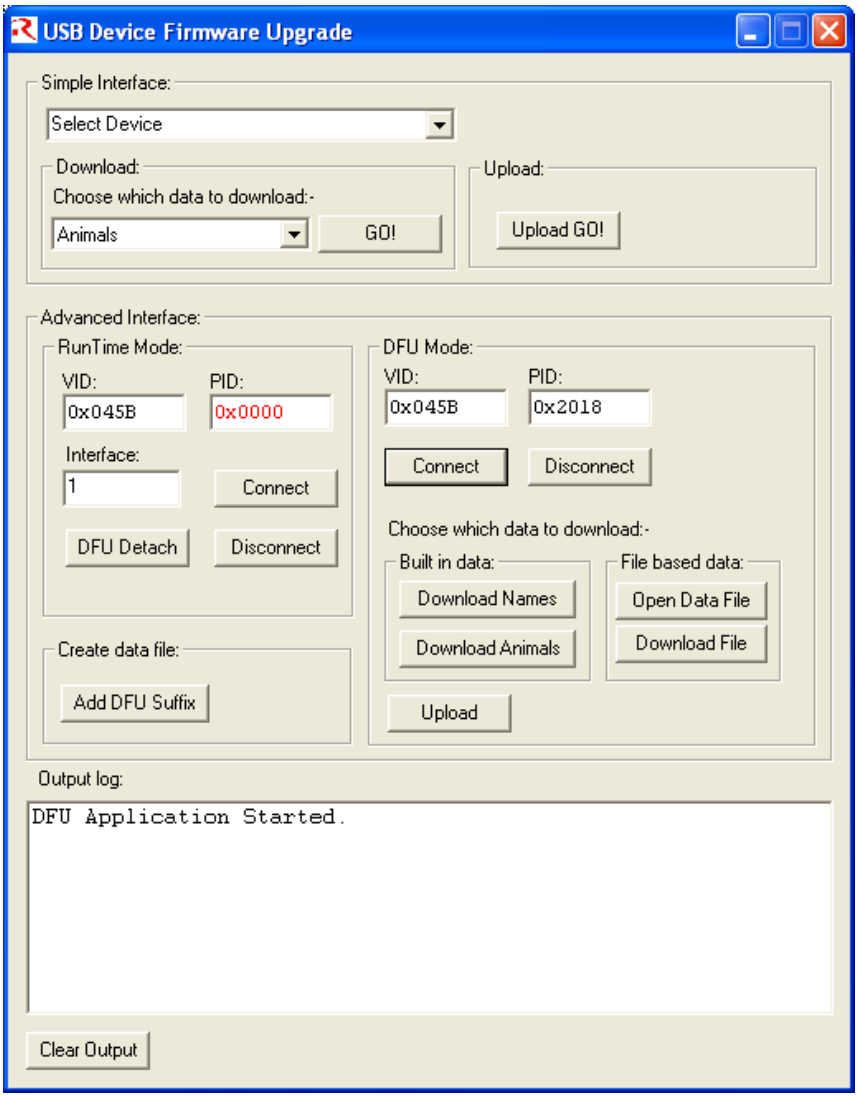

Figure 1 - DFU Host Screen Shot

2. Getting Started

An installer for the USB DFU Sample code for RSK M16C/6C should be available from the website along with this application note.

Note: Before running this installer you should already have installed the RSK M16C6C.

After running the installer a User Manual and the sample projects will be installed in HEW.

To see the User Manual go to the Renesas Manual Navigator (Start Menu > All Programs > Renesas > High-performance Embedded Workshop > Manual Navigator). Under the 'RSKM16C6C Product Documentation' locate the 'Renesas RSKM16C6C USB DFU Sample Software' entry.

This User Manual will explain how to create and run the sample projects.

Website and Support

Renesas Electronics Website
http://www.renesas.com/

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Revision Record

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		Page	Summary
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General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins
   Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.
   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment when power is supplied.
   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.
   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.
5. Differences between Products
   Before changing from one product to another, i.e. to one with a different type number, confirm that the change will not lead to problems.
   — The characteristics of MPU/MCU in the same group but having different type numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different type numbers, implement a system-evaluation test for each of the products.

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