8-bit USB Microcontrollers

DEMO9S08JS16
Lab tutorial

freescale
semiconductor

Introduction

These labs provide various USB examples included with the complimentary USB stack for MC9S08JS16 (JS16) microcontroller (MCU). Instructions to install the software stack are explained in the DEMO9S08JS16 Quick Start Guide (DEMO9S08JS16 QSG). Start each lab with the board powered "On" and both provided USB cables connected between host and board.

The USB-MINI stack gets installed at C:\Program files\MC9S08JS16Demo.

Start/Continue (F5) button

Debug button

USB bootloader GUI button

Step-by-Step Installation Instructions

LAB
1

HID Class Keyboard

Start this lab with the board powered "On" and both provided USB cables connected between host and board.

1. Open CodeWarrior™ for Microcontrollers. From the Windows start menu, you can locate it using the path "Programs>Freescale CodeWarrior>CW for Microcontroller V6.2>CodeWarrior IDE.exe."

2. From the CodeWarrior startup dialog, click "Start Using CodeWarrior."

3. Open the HID keyboard example project by pressing "Ctrl" + "O" keys simultaneously. Follow C:\Program Files\MC9S08JS16Demo\JS16_HID_Keyboard and select "JS16_HID_Keyboard.mcp," then click "Open."

4. Remove all jumpers on J4 (demo board).

5. With the board turned on and both cables attached between host and board, compile and program the JS16 MCU with the HID class keyboard by clicking the button to launch the debugger.

6. From the connection manager menu, select "DEMOJM on USB1" port and click "Connect (Reset)."

7. From the Erase and Program Flash menu, click "Yes" to allow the debugger to mass erase the MCU's on-chip flash memory and program it with the new application.

8. Click the "Start/Continue (F5)" button in the debugger to run the application. Close the debugger.

9. Your computer will automatically recognize the JS16 as a HID keyboard and begin the installation without user interaction. When the installation is complete, the JS16 will behave as a keyboard.

10. Click button labeled "PTG1" for Page Up key action.

11. Click button labeled "PTG2" for Page Down key action.

12. Click button labeled "PTG3" for Caps Lock key action; the LED labeled "PTE3" will be switched on or off.

13. Click the Num Lock and/or Caps Lock key on your computer keyboard; the "PTE2" and/or "PTE3" LEDs will turn on/off respectively.

LAB 2

CDC Serial Bridge

This lab demonstrates a bridge between CDC and a serial port (SCI). The CDC-Serial example emulates a virtual serial port on the PC. The instructions below will guide you to program the JS16 MCU, install the driver for the virtual serial port and communicate with a true serial port using the two independent terminal windows.

1. Open CodeWarrior for Microcontrollers. From the Windows start menu, you can locate it using the path "Programs>Freescale CodeWarrior>CW for Microcontroller V6.2>CodeWarrior IDE.exe."

2. From the CodeWarrior startup dialog, click "Start Using CodeWarrior."

3. Open the CDC-Serial example project by pressing "Ctrl" + "O" keys simultaneously. Follow C:\Program Files\ MC9S08JS16Demo\JS16_CDC_Serial and select "JS16_CDC_Serial.mcp" and click "Open."

4. Short 1&2, 3&4 of J4 with jumpers.

5. With the board turned on and both cables attached between host and board, compile and program the JS16 MCU with CDC serial example by clicking the   button to launch the debugger.

6. From the connection manager menu, select "DEMOJM on USB1" port and click "Connect (Reset)."

7. From the Erase and Program Flash menu, click "Yes" to allow the debugger to mass erase the MCU's on-chip flash memory and program it with the new application.

8. Click the "Start/Continue (F5)" button in the debugger to run the application. Close the debugger.

9. Your computer will automatically recognize the JS16 as a CDC device and begin the installation. Some interaction is needed to install the USB driver. When prompted by the computer to specify a location, select the "MC9S08JS16CDC.inf" driver located in C:\Program Files\MC9S08JS16Demo\JS16_CDC_Serial. When hardware installation is complete, the JS16 will be recognized as a CDC device with an assigned virtual COM port.

10. Verify the virtual COM port assigned to your board in the device manager under "Port (COM and LTP)." In the following figure, the CDC-serial virtual port has been

11. Launch two terminal window utilities. You can use either HyperTerminal or P&E Micro Toolkit terminal window for CDC commands, however, P&E Micro Toolkit terminal window must be used for UART commands. HyperTerminal can be found under Start>Programs>Accessories>Communications and P&E Micro Toolkit terminal window can be found under Start>Programs>P&E Embedded Multilink Toolkit>Utilities.

12. In terminal window 1 (HyperTerminal), set the port assigned to your board per device manager.

13. Set the baud rate to 9600.

14. Open COM port.

15. In terminal window 2 (P&E Micro Toolkit terminal window utility), set port to USB COM.

16. Set the baud rate to 9600.

17. Click "Open Serial Port" button.

18. Type "Hello, Freescale!" or any other characters in CDC window utility and see them appear on UART window and vice-versa.

19. Close COM port and terminal windows.

**LAB
3**

USB Bootloader

This lab will demonstrate how to use the USB bootloader to update/download the firmware. The GUI for the USB bootloader needs to be installed before the beginning of this lab. The installation is described in the DEMO9S08JS16 Quick Start Guide. A detailed document on the USB bootloader is available for reference, "Bootloader GUI User Manual." The following steps demonstrate how to update/download the firmware to the JS16 flash.

1. With the board connected and both the cables attached between host and board, press and hold the button labeled "PTG0" while you power on the demo board.

2. Release button labeled "PTG0."

3. Your computer will prompt that a new USB device is found and present a dialog that will let you select the method to install the software of the new device. You can select "Install the software automatically (recommended)," then click the "Next" button.

4. The Windows operating system will complete the driver installation automatically. Now you can check the JS family bootloader in the device manager under Universal Serial Bus controllers folder.

5. Open the family bootloader V1.0 GUI using the path "Start>Programs>Freescale>JS Family Bootloader." The USB bootloader GUI is shown above.

6. Click the button in the USB bootloader GUI. When the file open dialog pops up, select the "Project.abs.s19" file located in C:\Program files\ MC9S08JS16Demo\JS16_HID_ Keyboard\bin.

7. Click the "Mass Erase" button to erase the content in flash.

8. Click the "Program" button, and the HID keyboard firmware will update/download to the JS16 flash automatically. The status window at the right of the GUI will display the status of update process.

9. After the "program" process is completed, click the "Reset" button to reset the MCU. The firmware downloaded into flash memory is now ready to work.
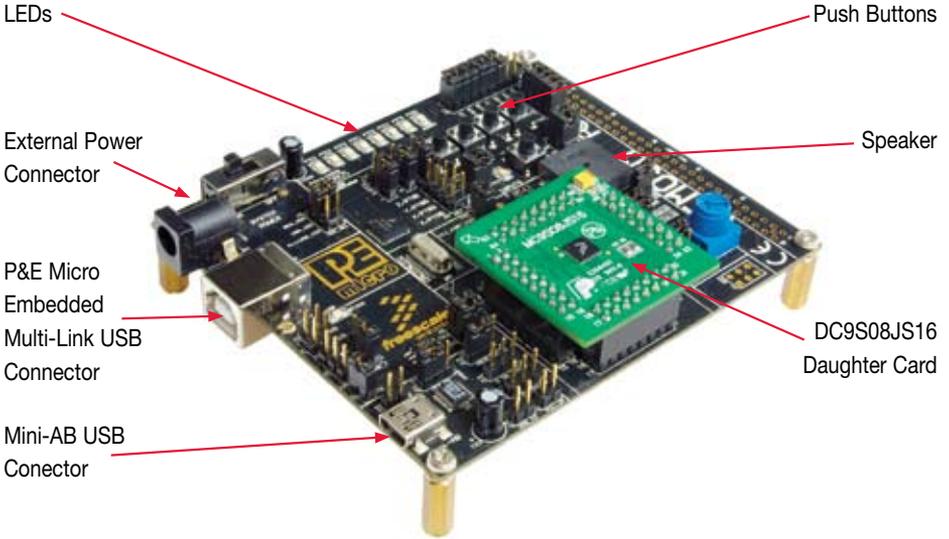
DEMO9S08JS16

LEDs

Push Buttons

External Power
Connector

Speaker

P&E Micro
Embedded
Multi-Link USB
Connector

DC9S08JS16
Daughter Card

Mini-AB USB
Conector

Figure 1. DEMO9S08JS16

MCU Port Connector Pin Out

The following is a pinout diagram for the MCU port connector on the DEMO9S08JS16 board Rev D.

Symbol	Number	Number	Symbol
VDD	1	2	PTB0/IRQ/TCLK
VSS	3	4	PTB1/RESET
PTA7/KBIP7/TxD	5	6	PTB2/BKGD/MS
PTA6/KBIP6/RxD	7	8	VUSB33
PTB3/BLMS	9	10	PTB0/IRQ/TCLK
PTA1/KBIP1/MISO	11	12	PTB1/RESET
PTA0/KBIP0/TPMCH0	13	14	PTB2/BKGD/MS
PTA5/KBIP5/TPMCH1	15	16	PTB3/BLMS
PTA2/KBIP2/MOSI	17	18	PTB4/XTAL
PTA1/KBIP1/MISO	19	20	PTB5/EXTAL
PTA3/KBIP3/SPSCK	21	30	PTA6/KBIP6/RxD
PTA4/KBIP4/SS	23	32	PTA7/KBIP7/TxD
N/C	25	42	PTB4/XTAL
N/C	27	44	PTB5/EXTAL
N/C	29	46	PTA0/KBIP0/TPMCH0
N/C	31	48	PTA1/KBIP1/MISO
N/C	33	50	PTA2/KBIP2/MOSI
N/C	35	52	PTA3/KBIP3/SPSCK
N/C	37	54	PTA4/KBIP4/SS
N/C	39	56	PTA5/KBIP5/TPMCH1

Default Jumper Settings

The following is a list of default jumper settings for the DEMOJM board used for the MC9S08JS16 demo. The settings listed indicate the ON (or installed) position.

Jumper	Installed Settings
J3	3&4
J4	ALL OFF
J6	2&3
J7	1&2
J8	1&2, 3&4
J10	OFF
J11	1&2
J12	1&2
J13	ALL OFF
J14	ALL OFF
J15	OFF
J16	OFF
J17	1&2, 3&4, 5&6, 7&8, 9&10, 11&12, 13&14, 15&16
J18	2&3
J19	2&3
J20	2&3
J21	ALL OFF
J24	1&2
J27	1&2, 3&4, 5&6, 7&8
J28	1&2, 3&4
J29	1&2, 3&4
J30	1&2
J31	ALL OFF
J32	ALL OFF
J33	1&2

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