

8-bit USB Microcontrollers

DEMO9S08JM16

Lab tutorials

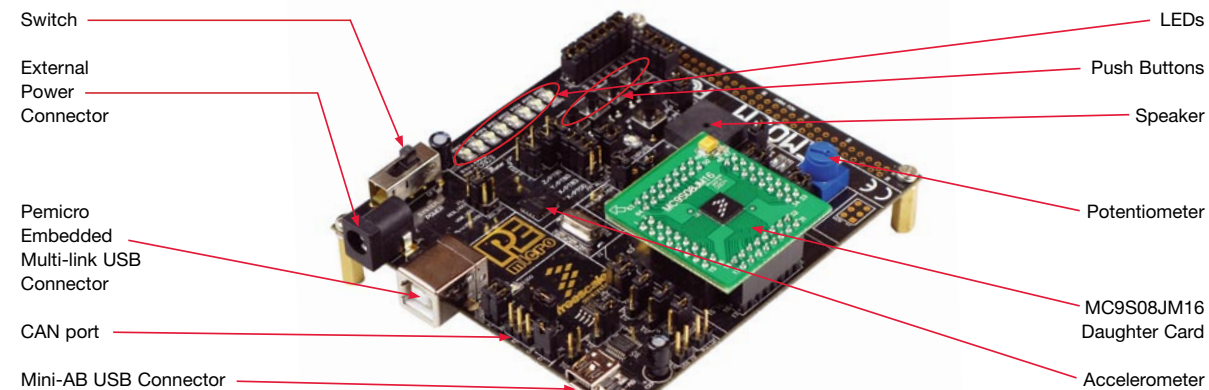


Figure 1. DEMOJM baseboard with MC9S08JM16 daughter card

Learn More: For more information about Freescale products, please visit www.freescale.com/8bit.

Freescale and the Freescale logo are trademarks or registered trademarks of Freescale Semiconductor, Inc. in the U.S. and other countries. All other product or service names are the property of their respective owners. © Freescale Semiconductor, Inc. 2008.

Agile Number: 926-77133 / REV A
Document Number: DEMO9S08JM16LAB / REV 0



MCU Port Connector Pinout

The following is the pinout for the MCU port connector on the DEMOJM board Rev D.

VDD	1	2	IRQ/TPMCLK
VSS	3	4	RESET
PTE0/TxD1	5	6	BKGD/MS
PTE1/RxD1	7	8	VUSB33
PTG0/KBIP0	9	10	PTB0/MISO2/ADP0
PTG1/KBIP0	11	12	PTB1/MIS2/ADP1
PTE2/TPM1CH0	13	14	PTB2/SPSCK2/ADP2
PTE3/TPM1CH1	15	16	PTB3/SS2/ADP3
PTE5/MOSI1	17	18	PTB4/KBIP4/ADP4
PTE4/MISO1	19	20	PTB5/KBIP5/ADP5
PTE6/SPSCK1	21	22	N.C.
PTE7/SS1	23	24	N.C.
PTF0/TPM1CH2	25	26	PTC0/SCL
PTF1/TPM1CH3	27	28	PTC1/SDA
N.C.	29	30	PTG2/KBIP6

N.C.	31	32	PTG3/KBIP7
VREFH	33	34	PTF4/TPM2CH0
VREFL	35	36	PTF5/TPM2CH1
PTD0/ADP8/ACMP+	37	38	PTC5/RxD2
PTD1/ADP9/ACMP-	39	40	PTC3/TxD2
PTD2/KBIP2/ACMP0	41	42	PTG4/XTAL
N.C.	43	44	PTG5/EXTAL
N.C.	45	46	PTA0
N.C.	47	48	N.C.
N.C.	49	50	N.C.
PTD7	51	52	N.C.
PTC2	53	54	N.C.
PTC4	55	56	PTA5
N.C.	57	58	PTF6
N.C.	59	60	N.C.

Default Jumper Settings

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

Jumper	Installed Settings	Jumper	Installed Settings
J3	3 & 4	J18	2 & 3
J4	1 & 2, 3 & 4	J19	2 & 3
J6	2 & 3	J20	2 & 3
J7	1 & 2	J21	1 & 2, 3 & 4, 5 & 6
J8	1 & 2, 3 & 4	J24	1 & 2
J11	1 & 2	J27	ALL ON
J12	1 & 2	J28	1 & 2, 3 & 4
J13	2 & 3	J29	1 & 2, 3 & 4
J14	2 & 3	J30	1 & 2
J17	ALL ON	J31	1 & 2, 3 & 4
		J32	1 & 2, 3 & 4
		J33	1 & 2

About DEMO9S08JM16 Labs

These labs will show you the various USB examples included with the complimentary USB-LITE stack by CMX for MC9S08JM16 (JM16). Instructions to install the software stack are explained in the DEMO9S08JM16 Quick Start Guide (DEMO9S08JM16 QSG). Start each lab with the board powered ON and both provided USB cables connected between host pc and board.

The USB-LITE stack by CMX gets installed at C:\CMXUSB_LITE. HID and CDC class software projects can be found at C:\CMXUSB_LITE\usb-peripheral\projects\CodeWarrior\hc9S08jm16\

Easy-to-use USB

LAB 1 HID Class Keyboard

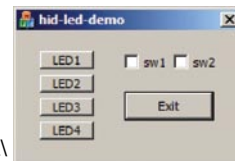
This lab will pick up with the HID class mouse example pre-loaded into the microcontroller's on-chip flash memory described by the DEMO9S08JM16 Quick Start Guide (DEMO9S08JM16QSG). The HID class mouse example is the default mode upon powering up the board with factory settings. The HID class keyboard example can be entered by running the pre-loaded software and following the steps listed below.

1. Make sure that the Quick Start Application, HID class mouse example, is running.
2. Press and hold button labeled "PTG0," while you reset the microcontroller by pressing on button labeled "RESET."
3. Release button labeled "PTG0."
4. Your computer will recognize the MC9S08JM16 as an HID keyboard device and begin installation (no user interaction needed). When hardware installation is complete, the MC9S08JM16 will now behave as a keyboard.
5. Click button labeled "PTG0" for Page Up key action.
6. Click button labeled "PTG1" for Page Down key action.
7. Click Caps Lock and/or Num Lock key on your computer keyboard and a "PTE3" and "PTE2" LEDs will turn on/off respectively.

LAB 2 HID Class Generic Device

This lab will pick up with the HID class keyboard example pre-loaded into the microcontroller's on-chip flash memory and described by Lab 1 in this document. The HID class generic device example can be entered by running the pre-loaded software and following the steps listed below. This example will use a virtual C++ graphical user interface (GUI) to read data from and write data to the MC9S08JM16 over USB interface.

1. Make sure the Quick Start Application, HID class mouse example, or the Lab1, HID class keyboard example, is running.
2. Press and hold button labeled "PTG1", while you reset the microcontroller by pressing on button labeled "RESET."
3. Release button labeled "PTG1."
4. Your computer will recognize the MC9S08JM16 as an HID generic device (aka. HID led demo) and begin installation (no user interaction needed). When hardware installation is complete, the MC9S08JM16 will now behave as a generic USB device.
5. Open "hid-led-demo.exe" GUI on your computer by double-clicking on the file within the C:\CMXUSB_LITE\usb-peripheral\pc-side\hid-led-demo\Debug directory.
6. Click on virtual LED1, LED2, LED3 and LED4 buttons on computer GUI to turn on/off the LEDs tied to "PTE2," "PTE3," "PTF0" and "PTF1" on board.
7. Press buttons labeled "PTG0" and "PTG1" on board to turn on/off SW1 and SW2 indicators on computer GUI.
8. When done, click "Exit" button on GUI.



LAB 3 CDC Class Terminal

This lab will shift gears from the HID class examples and into the CDC class software provided by the complimentary USB-LITE stack by CMX for MC9S08JM16. The CDC class software is not pre-loaded into the microcontroller's on-chip flash memory like the HID class software. Therefore the instructions below will guide you through programming the MCU. The CDC class terminal example will demonstrate how to transfer commands/data from the USB host to the device using a terminal window and virtual COM port.

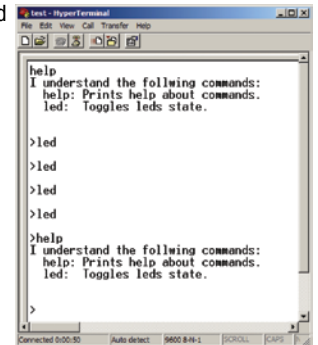
1. Open CodeWarrior for Microcontrollers. From Windows start menu, you can locate it using the "Programs>Freescale CodeWarrior>CW for Microcontroller V6.x>CodeWarrior IDE.exe" path.
2. From CodeWarrior startup dialog, click on "Start Using CodeWarrior".
3. Open the CDC terminal example project by pressing "CTRL" + "O" keys simultaneously. Follow C:\CMXUSB_LITE\usb-peripheral\projects\CodeWarrior\hc9S08jm16\cdc-terminal-demo and select "cdc-demo.mcp" and click "Open."
4. With board turned on and both cables attached between host and board, compile and program the MC9S08JM16 microcontroller with CDC class terminal example by clicking on "Debug" button, launching Debugger.
5. From Connection Manager menu, select "DEMOJM on USB1" port and click on "Connect (Reset)."
6. From Erase and Program Flash menu, click on "Yes" to allow the debugger to mass erase the microcontroller's on-chip flash memory and program it with the new application.
7. Click on the "Start/Continue (F5)" button in the debugger to run application. Close debugger.
8. Your computer will recognize the MC9S08JM16 as a CDC device and begin installation. Some interaction is needed to provide the USB driver. When prompted by computer choose to specify location and provide the "HC9S08JMxx.inf" driver located in C:\CMXUSB_LITE\usb-peripheral\src\hc9s08\cdc-demo. When hardware installation is complete, the MC9S08JM16 will now be recognized as a CDC device with an assigned virtual COM port.
9. Verify the assigned virtual COM port for your board in the device manager under "Ports (COM and LPT)."

LAB 4 CDC to/from UART

This lab will take the CDC class software to the next level by creating a bridge between CDC and UART. The CDC to/from UART software example differs from the CDC class terminal example described by Lab3. Therefore the instructions below will guide you through programming the MCU. The CDC to/from UART example will demonstrate how to transfer commands/data between the CDC virtual COM port and true serial COM port using two independent terminal windows.

1. Open CodeWarrior for Microcontrollers. From Windows start menu, you can locate it using the "Programs>Freescale CodeWarrior>CW for Microcontroller V6.x>CodeWarrior IDE.exe" path.
2. From CodeWarrior startup dialog, click on "Start Using CodeWarrior."
3. Open the CDC terminal example project by pressing "CTRL" + "O" keys simultaneously. Follow C:\CMXUSB_LITE\usb-peripheral\projects\CodeWarrior\hc9S08jm16\cdc-serial-demo and select "cdc-serial-demo.mcp" and click "Open."
4. With board turned on and both cables attached between host and board, compile and program the MC9S08JM16 microcontroller with CDC class terminal example by clicking on "Debug" button, launching Debugger.
5. From Connection Manager menu, select "DEMOJM on USB1" port and click on "Connect (Reset)."
6. From Erase and Program Flash menu, click on "Yes" to allow the debugger to mass erase the microcontroller's on-chip flash memory and program it with the new application.
7. Click on the "Start/Continue (F5)" button in the debugger to run application. Close debugger.
8. Your computer will recognize the MC9S08JM16 as a CDC device and begin installation. Some interaction is needed to provide the USB driver. When prompted by computer choose to specify location and provide the "HC9S08JMxx.inf" driver located in C:\CMXUSB_LITE\usb-peripheral\src\hc9s08\cdc-demo. When hardware installation is complete, the MC9S08JM16 will now be recognized as a CDC device with an assigned virtual COM port. This assigned virtual COM port will differ from the one assigned in Lab 3. Also, this step is not required if driver is installed previously.
9. Verify the assigned virtual COM port for your board in the device manager under "Ports (COM and LPT)".
10. Launch two terminal window utilities. You can use either Hyperterminal or Pemicro Toolkit terminal window for CDC side, but Pemicro Toolkit terminal window must be used for UART side. Hyperterminal can be found under Start>Programs>Accessories>Communications and Pemicro Toolkit terminal window can be found under Start>Programs>P&E Embedded Multilink Toolkit>Utilities.

10. Launch terminal window utility. Hyperterminal can be found under Start>Programs>Accessories>Communications and Pemicro Toolkit terminal window can be found under Start>Programs>P&E Embedded Multilink Toolkit>Utilities.
11. Set port assigned to your board per device manager.
12. Set baud rate to 9600.
13. Open COM port.
14. Type "help" in terminal window and the device will return a help menu via USB.
15. Type "led" in terminal window and the on-board LED labeled "PTE2" will toggle.
16. Close COM port and terminal window.



11. In terminal window 1, set port assigned to your board per device manager.
12. Set baud rate to 9600.
13. Open COM port.
14. In terminal window 2 (PEMICRO Toolkit terminal window utility), set port to USB COM.
15. Set baud rate to 9600.
16. Click on "Open Serial Port" button.
17. Type "Hello World!!" or any other characters in CDC side and see them appear on UART side. The same will work in the opposite direction.
18. Close COM ports and terminal windows.

