

Figure 1. DEMOJM baseboard with MCF51JM128 daughter card

**Learn More:** For more information about the JM Family, please visit [www.freescale.com/flexis](http://www.freescale.com/flexis).



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## 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/KBIP1	11	12	PTB1/MOSI2/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	PTB6/ADP6
PTE7/SS1	23	24	PTB7/ADP7
PTF0/TPM1CH2	25	26	PTC0/SCL
PTF1/TPM1CH3	27	28	PTC1/SDA
PTF2/TPM1CH4	29	30	PTG2/KBIP6

PTF3/TPM1CH5	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
PTD3/KBIP3/ADP10	43	44	PTG5/EXTAL
PTD4/ADP11	45	46	PTA0 /RGPI00
PTD5	47	48	PTA1 /RGPI01
PTD6	49	50	PTA2 /RGPI02
PTD7	51	52	PTA3 /RGPI03
PTC2	53	54	PTA4 /RGPI04
PTC4	55	56	PTA5 /RGPI05
PTC6/RXCAN	57	58	PTF6
N.C	59	60	PTF7 /TXCAN

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

## DEMOJM Lab Supplement for the 32-bit Flexis™ JM128

These labs will show you the various USB examples included with the complimentary USB-LITE by CMX stack for MCF51JM128. Instructions to install the software stack are explained in the DEMOJM Quick Start Guide (DEMOJMQSG). 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 for MCF51JM128 is installed at C:\CMXUSB\_LITE\_V1.

For device function demo, HID and CDC class software projects can be found at C:\CMXUSB\_LITE\_V1\usb-peripheral\projects\CodeWarrior-6.x\mcf51xx\

For host function demo, HID and mass storage class software projects can be found at C:\CMXUSB\_LITE\_V1\usb-host\projects\CodeWarrior-6.x\

For On-The-Go (OTG) function demo, the software project can be found at C:\CMXUSB\_LITE\_V1\usb-otg\projects\CodeWarrior-6.x\mcf51xx\

**Note:** The OTG demo can only be run on the EVB51JM128 board.



# 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 DEMOJM Quick Start Guide (DEMOJMQSG). 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 MCF51JM128 as an HID keyboard device and begin installation (no user interaction needed). When hardware installation is complete, the MCF51JM128 will now behave as a keyboard.
5. Click button labeled "PTG0" for Page Up key action.
6. Click button labeled "PTG2" for Page Down key action.
7. Click Caps Lock and/or Num Lock key on your keyboard and a "PTF1" and "PTF0" LEDs will turn on/off respectively.

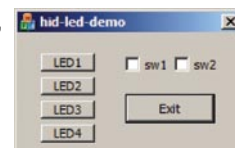
### Button Legend

-  Debugger Button
-  Start/Continue (F5) Button

## 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 MCF51JM128 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 "PTG2," while you reset the microcontroller by pressing on button labeled "RESET."
3. Release button labeled "PTG2."
4. Your computer will recognize the MCF51JM128 as an HID generic device (aka. HID led demo) and begin installation (no user interaction needed). When hardware installation is complete, the MCF51JM128 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\_V1\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 "PTF0," "PTF1," "PTE2," and "PTE3" on board.
7. Press buttons labeled "PTG0" and "PTG2" on board to turn on/off SW1 and SW2 indicators on computer GUI.
8. When done, click "Exit" button on GUI.



## LAB 3 CDC to/from UART

This lab will create a bridge between CDC and UART. 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\_V1\usb-peripheral\projects\CodeWarrior-6.x\mcf51xx\cdc-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 MCF51JM128 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 MCF51JM128 as a CDC device and begin installation. Some interaction is

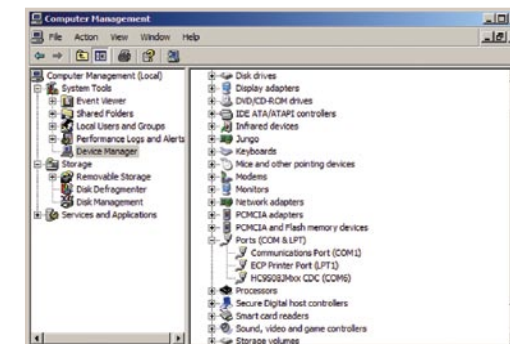
## LAB 4 Host-HID Class

This lab will show how to connect your board with one USB mouse or USB keyboard following the steps listed below.

1. Disconnect mini-AB cable from computer to board. Change the factory setting jumpers on board. Change J11 jumper to 2 & 3, and J12 jumper to 2 & 3 to configure board for host mode.
2. 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.
3. From CodeWarrior startup dialog, click on "Start Using CodeWarrior."
4. Open the Host-HID example project by pressing "CTRL" + "O" keys simultaneously. Follow C:\CMXUSB\_LITE\_V1\usb-host\projects\CodeWarrior-6.x\hid and select "host-hid-demo.mcp" and click "Open."
5. With board turned on and only the A to B gray cable attached between PC and board, compile and program the MCF51JM128 microcontroller with host-hid-demo example by clicking on "Debug" button, launching Debugger.
6. From Connection Manager menu, select "DEMOJM on USB1" port and click on "Connect (Reset)."
7. 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.
8. Close debugger.
9. Launch PEMICRO Toolkit terminal window and which can be found under Start>Programs>P&E Embedded Multilink Toolkit>Utilities.
10. In terminal window, set port to USB COM.
11. Set baud rate to 9600.
12. Click on "Open Serial Port" button.
13. Press "RESET" button on board to reset device.
14. The below information will be shown on the terminal window.  
**Host HID Demo.**  
**Waiting for device ...**
15. Connect USB mouse or USB keyboard to mini-AB USB connector on board using the provided A-receptacle to mini-A adapter. In terminal you will see the transmitted information from device to host.
16. Disconnect device from board when completed.

needed to provide the USB driver. When prompted by computer choose to specify location and provide the "mcf51xx.inf" driver located in C:\CMXUSB\_LITE\_V1\usb-peripheral\src\mcf51xx\cdc-demo. When hardware installation is complete, the MCF51JM128 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 & LTP)."
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.
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.



## LAB 5 Host-Mass-Storage Class

This lab will show how to connect your board with one USB Thumb Disk following the steps listed below.

1. Disconnect mini-AB cable from computer to board. Change the factory setting jumpers on board. Change J11 jumper to 2 & 3, and J12 jumper to 2 & 3 to configure the board for host mode.
2. 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.
3. From CodeWarrior startup dialog, click on "Start Using CodeWarrior."
4. Open the Host-HID example project by pressing "CTRL" + "O" keys simultaneously. Follow C:\CMXUSB\_LITE\_V1\usb-host\projects\CodeWarrior-6.x\mass-storage and select "mass-storage-demo.mcp" and click "Open."
5. With board turned on only the A to B gray cable attached between host and board, compile and program the MCF51JM128 microcontroller with mass-storage example by clicking on "Debug" button, launching Debugger.
6. From Connection Manager menu, select "DEMOJM on USB1" port and click on "Connect (Reset)."
7. 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.
8. Close debugger.
9. Launch PEMICRO Toolkit terminal window and which can be found under Start>Programs>P&E Embedded Multilink Toolkit>Utilities.
10. In terminal window, set port to USB COM.
11. Set baud rate to 9600.
12. Click on "Open Serial Port" button.
13. Press "RESET" button on board to reset device.
14. The below information will be shown on the terminal window.  
**Host Mass Storage Demo.**  
**Waiting for device ...**
15. Connect USB Disk to the mini-AB USB connector on board using the provided A-receptacle to mini-A adapter. In terminal type "help" to see available commands.
16. Disconnect device from board when completed.