



EVB9S12XF512E

Quick Start Guide

by: Daniel Morfin
Guadalajara, Jal. Mexico

1 Introduction

Thank you for your interest in the Freescale Semiconductor M9S12XF512 evaluation board (EVB). This EVB helps you gain experience on the M9S12XF family of microcontrollers. By following the instructions in this guide, you can run code on the EVB in approximately 30 minutes, depending on the speed of your PC and the installation time of the CodeWarrior™ Development Studio software.

Contents

| | | |
|---|---|---|
| 1 | Introduction | 1 |
| 2 | Kit Contents | 2 |
| 3 | Information CD | 2 |
| 4 | Connecting the EVB | 3 |
| 5 | Application Example 1—Low-Speed Stand Alone | 4 |
| 6 | Application Example 2—Low-Speed FlexRay Network | 5 |
| 7 | Application Example 3—Full-Speed Stand Alone | 5 |
| 8 | Application Example 4—Full-Speed FlexRay and CAN Networks | 6 |

2 Kit Contents

Unpack the kit and verify all of the items listed are present. Please contact your Freescale representative if the kit is incomplete.

The EVB9S12XF512E kit contains:

- Freescale EVB9S12XF512E information CD
- One DC power supply with interchangeable AC prongs
- Evaluation board fit with jumpers
- One CAN cable assembly
- Two FlexRay cable assemblies
- Four aluminum standoffs, four screws, and two 9-pin headers
- Decomsys Designer Pro Evaluation version CD
- Warranty registration card
- Technical information center support sheet
- CodeWarrior Special Edition Tri-pak including Development Studio for HCS12(x) v. 4.6 CD, Development Studio for Microcontrollers v. 6.0 CD, and a service pack CD

3 Information CD

The information CD is included in the EVB9S12XF512E box.

- Data sheets
 - Link to M9S12XF512 reference manual (covers M9S12XF512, M9S12XF384, M9S12XF256, and M9S12XF128 microcontrollers)
 - MC33742 system basis chip technical data
- Documentation
 - EVB9S12XF512E user guide
 - EVB9S12XF512E quick start guide
 - S12XF Starter Kit quick start guide (used for the S12XFSTARTERKITE)
- Hardware
 - EVB9S12XF512E schematics
 - EVB9S12XF512E bill of materials
- Software
 - EVB9S12XF512E_StandAlone_LS.zip application example
 - EVB9S12XF512E_Node1_LS.zip application example
 - EVB9S12XF512E_Node2_LS.zip application example
 - EVB9S12XF512E_StandAlone_FS.zip application example
 - EVB9S12XF512E_Node1_FS.zip application example
 - EVB9S12XF512E_Node2_FS.zip application example

- Web links
 - M9S12XF512 product summary page
 - MCZ33742 product summary page
 - EVB9S12XF512E tool summary page
 - S12XF starter kit tool summary page
 - S12XF512 service pack download page
 - M9S12XF512 reference manual (covers M9S12XF512, M9S12XF384, M9S12XF256, and M9S12XF128 microcontrollers)
 - EVB9S12XF512E application example codes
 - S12XFSTARTERKITE application example codes

The Decomsys Designer Pro CD (evaluation version) is also included in the EVB9S12XF512E box. All information related to the Decomsys tool is included on the Decomsys CD.

4 Connecting the EVB

NOTE

Before programming the EVBS12XF512E, remove jumper J27. After the programming sequence is finished, jumper J27 must be connected to enable the reset line to the system basis chip. This procedure must be performed every time the EVB9S12XF512E is programmed. The signals of the FlexRay transceivers are present on the drill holes of connectors J11 and J14. For pin connections, 9-pin connectors can be assembled to the board in these places.

Using anti-static precautions, remove the EVB from its package and place on a smooth, level surface. The EVB is ready to use and does not require switch or jumper re-configuration. The EVB9S12XF512E comes pre-flashed with the low-speed stand alone application example. Connect the EVB as detailed:

1. Connect the USB Multilink (not included) to the J2 BDM connector on the EVB using connector polarization. The red stripe on the ribbon must be aligned to the pin marked 1 on connector J2, this indicates correct polarization to avoid damage to the MCU.
2. Verify the EVB switch SW4 (slide) on the upper part of the EVB is in the stand-alone position and connect the DC power supply to connector J25 of the EVB.
3. Connect the supplied FlexRay cables to connectors J12 and J15 of the EVB.
4. Connect the CAN cable included in the kit to connector J29 of the EVB. The CAN cable is required for application examples 3 and 4 only or any application developed by the user that uses the CAN features of the board.
5. Connect the DC power supply to the mains using the appropriate mains plug. If connected correctly, various EVB power LEDs illuminate. If the LEDs do not illuminate, check the power supply connections and reset the boards by pressing and releasing SW1.

Application Example 1—Low-Speed Stand Alone

Figure 1 shows the EVB after connection.

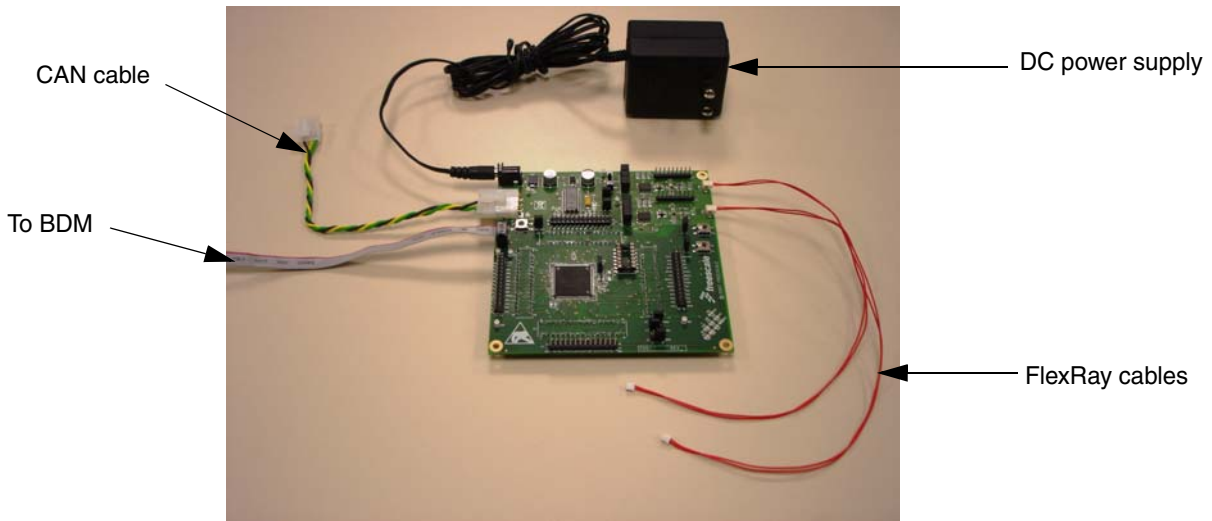


Figure 1. Connected EVB9S12XF512E

5 Application Example 1—Low-Speed Stand Alone

NOTE

For a detailed description of how to download the code to the EVB9S12XF512E, refer to Section 4 of the EVB9S12XF512E User Manual (document number EVB9S12XF512EUM) included on the user documentation CD.

Load the EVB9S12XF512E_StandAlone_LS.mcp project into the board (included in the EVB9S12XF512E_StandAlone_LS.zip file). In this example project the EVB9S12XF512E is configured to operate as an isolated board. Its local communication modules and the input/output capabilities are exercised to allow basic tests of the EVB hardware integrity as well as verifying the code downloading procedure.

The main functions performed in this example project are:

- Real-time interrupt configured to 500 ms period and used as the base time for the task scheduler
- SPI master operating at 500 kHz
- System basis chip (SBC) initialized in debug mode
- FlexRay module configured for wake-up frames transmission at 1.25 Mbit/s
- IRQ detection when SW2 is pressed, interrupt service indicated by toggling D26
- Input capture IOC7 stimulated by SW3, interrupt serviced by the XGATE and indicated by toggling D24
- Microcontroller successive tasks are separated by 1 s intervals, the general-purpose LED indicators are activated by columns to indicate the task executed in this sequence:
 - LEDs D22, D27, and D29
 - LEDs D23, D25, and D28 (FlexRay wake-up frames transmission)

— D24 and D26 toggled

6 Application Example 2—Low-Speed FlexRay Network

For this example you need two EVB9S12XF512E, because each acts as a FlexRay node, exchanging frames in a simple network. One EVB must be programmed using the EVB9S12XF512E_Node1_LS.mcp project and the other must be programmed with the EVB9S12XF512E_Node2_LS.mcp code (files are in the EVB9S12XF512E_Node1_LS.zip and EVB9S12XF512E_Node2_LS.zip files, respectively). Verify the FlexRay channels are properly connected between the EVBs.

The main functions performed in this example project are:

- Real-time interrupt configured to 500 ms period and used as the base time for the task scheduler
- SPI master operating at 500 kHz
- SBC initialized in debug mode
- CAN module configured for transmission and reception at 500 kbit/s rate
- FlexRay module fully configured for frames transmission and reception at 1.25 Mbit/s; in Node1 the FlexRay events are interrupt driven; whereas, in Node2 there is a polling procedure for the frames handling
- LED indicators D22, D27, and D29 are sequentially turned on at 1 s intervals
- FlexRay activity and frames interchange is indicated by the fast toggling of LEDs D23, D25, and D28 at 1 s intervals; to ease visual perception these LEDs are turned on each time the RTI is serviced and turned off when a FlexRay function is performed

The LED activation for Node 1 is:

- Slot 1 transmission, D23
- Slot 4 reception, D25
- Slot 62 reception, D28

The LED for Node 2 activation is:

- Slot 1 reception, D23
- Slot 4 transmission, D25
- Slot 62 transmission, D28
- IRQ detection when SW2 is pressed, interrupt service indicated by toggling D26
- Input capture IOC7 stimulated by SW3, interrupt serviced by the XGATE and indicated by toggling D24

7 Application Example 3—Full-Speed Stand Alone

Load the EVB9S12XF512E_StandAlone_FS.mcp project into the board. In this example project the EVB9S12XF512E is configured to operate as an isolated board, its local communication modules and the input/output capabilities are exercised to allow basic tests of the EVB hardware integrity as well as verifying the code downloading procedure.

The main functions performed in this example project are:

Application Example 4—Full-Speed FlexRay and CAN Networks

- Real-time interrupt configured to 75 ms period and used as the base time for the task scheduler
- SPI master operating at 2.5 MHz
- SBC initialized in debug mode
- CAN module configured for internal loopback transmission and reception at 500 kbit/s rate
- FlexRay module configured for wake-up frames transmission
- Periodic XGATE access to SBC through SPI channel, 75 ms period
- Microcontroller successive tasks are separated by 225 ms intervals for a total period of 900 ms; the general-purpose LEDs are activated by columns to indicate the task executed in the following sequence:
 - CAN internal loopback transmission/ reception; LED indicators D22, D27 and D29
 - FlexRay wake-up frames transmission; LED indicators activated D23, D25 and D28
 - D24 and D26 toggled
 - LED indicators off
- IRQ detection when SW2 is pressed, interrupt service indicated by toggling D26
- Input capture IOC7 stimulated by SW3, interrupt serviced by the XGATE and indicated by toggling D24

8 Application Example 4—Full-Speed FlexRay and CAN Networks

For this example, two EVB9S12XF512Es must be used because each one will act as a CAN and FlexRay node, exchanging frames in a simple network. one EVB must be programmed using the EVB9S12XF512E_Node1_FS.mcp project. The other must be programmed with the EVB9S12XF512E_Node2_FS.mcp code (the files are in the EVB9S12XF512E_Node1_FS.zip and EVB9S12XF512E_Node2_FS.zip files, respectively). The CAN and FlexRay channels must be properly connected between the EVBs.

The main functions performed in this example project are:

- Real-time interrupt configured to 75 ms period and used as the base time for the task scheduler
- SPI master operating at 2.5 MHz
- SBC initialized in debug mode
- CAN module configured for transmission and reception at 500 kbit/s rate
- FlexRay module fully configured for frames transmission and reception at 10 Mbit/s; in Node1, the FlexRay events are interrupt driven, whereas in Node2, there is a polling procedure for the frames handling
- LED D22 toggled each time the RTI is serviced (75 ms period)
- Periodic XGATE access to SBC through SPI channel (75 ms period)
- CAN frames transmission every 150 ms, LED D27 activated
- CAN reception is interrupt based, LED D29 is activated to indicate a CAN frame received

- FlexRay activity is indicated by the fast toggling of LEDs D23, D25, and D28; to ease visual perception, these LEDs are turned on each time the RTI is serviced and turned off when a FlexRay function is performed

For Node1 the LED activation is as follows:

- Slot 1 transmission, D23
- Slot 4 reception, D25
- Slot 62 reception, D28

For Node2 the LED activation is as follows:

- Slot 1 reception, D23
- Slot 4 transmission, D25
- Slot 62 transmission, D28

- IRQ detection when SW2 is pressed, interrupt service indicated by toggling D26
- Input capture IOC7 stimulated by SW3, interrupt serviced by the XGATE and indicated by toggling D24

How to Reach Us:**Home Page:**

www.freescale.com

Web Support:

<http://www.freescale.com/support>

USA/Europe or Locations Not Listed:

Freescale Semiconductor, Inc.
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
+1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:

Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:

Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:

Freescale Semiconductor Hong Kong Ltd.
Technical Information Center
2 Dai King Street
Tai Po Industrial Estate
Tai Po, N.T., Hong Kong
+800 2666 8080
support.asia@freescale.com

For Literature Requests Only:

Freescale Semiconductor Literature Distribution Center
P.O. Box 5405
Denver, Colorado 80217
1-800-441-2447 or 303-675-2140
Fax: 303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

Document Number: EVB9S12XF512EUG
Rev. 1
09/2007

Information in this document is provided solely to enable system and software implementers to use Freescale Semiconductor products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

Freescale Semiconductor reserves the right to make changes without further notice to any products herein. Freescale Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in Freescale Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. Freescale Semiconductor does not convey any license under its patent rights nor the rights of others. Freescale Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale Semiconductor was negligent regarding the design or manufacture of the part.

RoHS-compliant and/or Pb-free versions of Freescale products have the functionality and electrical characteristics as their non-RoHS-compliant and/or non-Pb-free counterparts. For further information, see <http://www.freescale.com> or contact your Freescale sales representative.

For information on Freescale's Environmental Products program, go to <http://www.freescale.com/epp>.

Freescale™ and the Freescale logo are trademarks of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners.
© Freescale Semiconductor, Inc. 2007. All rights reserved.