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EVB9S12XEP100

Evaluation Board
for Freescale
MC9S12XEP100

User's Manual

SofTec®
MICROSYSTEMS
Development Tools
for the Embedded World

EVB9S12XEP100

Evaluation Board for Freescale MC9S12XEP100 (144-Pin LQFP)

User's Manual

Revision 2.0

SofTec® MICROSYSTEMS

Development Tools for the Embedded World

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1 Introduction

1.1 Overview

The EVB9S12XEP100 Evaluation Board has been designed for the evaluation, demonstration and debugging of the Freescale MC9S12XEP100 microcontroller.

The EVB9S12XEP100 can be used as a standalone application, or via its built-in USB-to-BDM interface.

1.2 Package Contents

The EVB9S12XEP100 package includes the following items:

- The EVB9S12XEP100 evaluation board;
- A USB cable;
- An universal, 12 V DC power supply;
- The SofTec Microsystems “System Software” CD-ROM;
- The CodeWarrior Development Studio CD-ROM;
- A Quick Start Guide sheet;
- This user’s manual.

1.3 Supported Devices

The EVB9S12XEP100 Evaluation Board supports the following devices:

- MC9S12XEP100.

1.4 Recommended Reading

- Freescale microcontroller-specific datasheets and application notes;
- EVB9S12XEP100 Schematic.

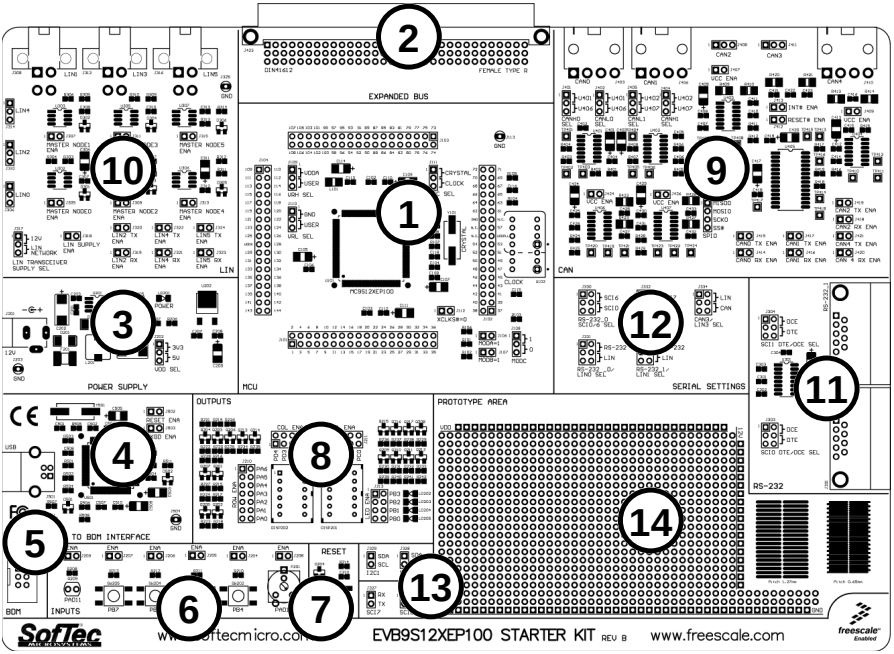
2 Hardware Features

2.1 Evaluation Board Features

The EVB9S12XEP100 board features:

1. A “MCU” section containing:
    - A MC9S12XEP100 microcontroller (in 144-pin LQFP package, already programmed with a demo application);
    - A clock module, and a crystal oscillator, together with jumpers to select the clock source;
    - Four header connectors with all of the MCU signals.
2. An Expanded Bus connector (DIN41612) replicating most of the MCU signals.
3. A power supply section containing a 12 V DC barrel input connector and a 3.3/5.0 V voltage selector for powering the board.
4. A built-in “USB TO BDM INTERFACE” section which allows the host PC to communicate with the microcontroller through a standard USB interface.
5. A BDM connector for interfacing to external in-circuit debuggers.
6. An “INPUTS” section containing:
    - Four push-buttons;
    - One potentiometer;
    - A light sensor;
    - A series of jumpers to connect/disconnect the above controls to/from the microcontroller.
7. A reset push-button;
8. An “OUTPUTS” section containing:
    - Two 5x7 dot-matrix displays;
    - Four user LEDs;
    - A series of jumpers to connect/disconnect the above controls to/from the microcontroller.

9. A “CAN” section containing five CAN connectors with five CAN transceivers (high speed and fault tolerant), plus a provision for two additional transceivers, together with a series of jumpers to select the CAN mode.
10. A “LIN” section containing six LIN connectors and six LIN transceivers, together with a series of jumpers to select the LIN mode.
11. An “RS-232” section containing two RS-232 connectors together with a series of jumpers to set the RS-232 mode.
12. A “SERIAL SETTINGS” section containing a series of jumpers to select which MCU pins are used for the various serial functions.
13. An “I2C” and “SCI” areas replicating the MCU’s I2C0, I2C1, SCI6 and SCI7 signals.
14. A prototype area.



The EVB9S12XEP100 Evaluation Board

3 Software Setup

3.1 Overview

Note: *before connecting the Evaluation Board to the PC, it is recommended that you install all of the required software first (see below), so that the appropriate USB driver will be automatically found by Windows when you connect the Evaluation Board.*

The Evaluation Board requires that both CodeWarrior Development Studio and SofTec Microsystems Additional Components be installed in the host PC.

Note: *CodeWarrior Development Studio must be installed first.*

3.2 Host System Requirements

The Evaluation Board is controlled by CodeWarrior Development Studio. The following hardware and software are required to run the CodeWarrior user interface together with the Evaluation Board:

- A 200-MHz (or higher) PC compatible system running Windows 98, Windows 2000 or Windows XP;
- 128 MB of available system RAM plus 1 GB of available hard disk space;
- A USB port;
- CD-ROM drive for installation.

3.3 Installing CodeWarrior Development Studio

To install the CodeWarrior Development Studio, insert the CodeWarrior CD-ROM into your computer's CD-ROM drive. A startup window will automatically appear. Follow the on-screen instructions.

3.4 Installing SofTec Microsystems Additional Components

The SofTec Microsystems Additional Components install all of the other required components to your hard drive. These components include:

- The Evaluation Board's USB driver;
- The software plug-in for CodeWarrior;
- Examples for CodeWarrior;
- Evaluation Board's user's manual;
- Evaluation Board's schematic;
- Additional documentation.

To install the SofTec Microsystems Additional Components, insert the SofTec Microsystems **"System Software"** CD-ROM into your computer's CD-ROM drive. A startup window will automatically appear. Choose **"Install Instrument Software"** from the main menu. A list of available software will appear. Click on the **"Additional Components"** option. Follow the on-screen instructions.

Note: *to install the Additional Components on Windows 2000 or Windows XP, you must log in as Administrator.*

4 Hardware Setup

4.1 First Connection

The Evaluation Board is connected to a host PC through a USB port. Connection steps are listed below in the recommended flow order:

1. Install all the required system software as described in the previous section.
2. Power the board through the barrel connector (12 V DC). The “POWER” LED will turn on.
3. Insert one end of the USB cable into a free USB port of the PC.
4. Insert the other end of the USB cable into the USB connector on the Evaluation Board.
5. The first time the Evaluation Board is connected to the PC, Windows recognizes the instrument and starts the **“Found New Hardware Wizard”** procedure, asking you to specify the driver to use for the instrument. On Windows XP (SP2) the following dialog box will appear.

   Select the **“No, not this time”** option and click the **“Next >”** button.
6. The following dialog box will appear.

Click the **"Next >"** button.

7. Depending on your Windows settings, the following warning may appear.

Note: *this warning is related to the fact that the USB driver used by the Evaluation Board is not digitally signed by Microsoft, and Windows considers it to be potentially malfunctioning or dangerous for the system. However, you can safely ignore the warning, since every kind of compatibility/security test has been carried out by SofTec Microsystems.*

Click the **"Continue Anyway"** button.

8. Windows will install the driver files to your system. At the end of the installation, the following dialog box will appear.

Click the **"Finish"** button to exit from the **"Found New Hardware Wizard"** procedure.

9. The Evaluation Board's USB driver is now installed on your system.

5 Operating Modes

5.1 Overview

The Evaluation Board can work in two modes: “standalone” mode and “host” mode.

5.2 Standalone Mode

In standalone mode, no PC connection is required. The microcontroller is factory programmed with a sample application.

To run the built-in example:

1. Verify that all jumpers are in their default position. See the *“Jumpers and Connectors Settings”* chapter.
2. Power the board. The power connector accepts 12 V DC wall plug-in power supply with a 2.1 mm pin and sleeve plug with positive in the center and sleeve as ground. The green “POWER” LED on the board should turn on.
3. Press the “PB4” push-button. The output of the light sensor will be displayed on the two dot-matrix displays, in a graphical way. The light sensor is placed on the left of the “PB7” push-button. Cover the sensor with a finger and see the effect on the displays.
4. Press the “PB5” push-button. The output of the light sensor will be displayed on the two dot-matrix displays, in a numerical (hexadecimal) way.
5. Press the “PB6” push-button. The value of the “PAD10” potentiometer will be displayed on the two dot-matrix displays, in a graphical way.
6. Press the “PB7” push-button. The value of the “PAD10” potentiometer will be displayed on the two dot-matrix displays, in a numerical (hexadecimal) way.

5.3 Host Mode

In host mode the program execution is controlled by the host PC through the “USB” connector. You can use the PC to debug the application by, for example, executing the program step by step and watching how the microcontroller registers vary, using the provided CodeWarrior Development Studio.

Note: *all MCUs in the S12X family contain a single-wire background debug interface which supports in-circuit programming of on-chip non-volatile memory. This system does not interfere with normal application resources. It does not use any user memory or locations in the memory map. The Background Debug Module (BDM) uses a single-wire communication interface (via the BKGD line) to allow non-intrusive access to target system memory and registers.*

To work in host mode (using the built-in USB to BDM interface):

- Make sure that the board is powered on;
- Make sure that the “RESET ENA” and “BKGD ENA” jumpers in the “USB TO BDM INTERFACE” section are inserted;
- Connect the host PC to the board through the provided USB cable.

6 Application Tutorial

6.1 Overview

This section will provide a step-by-step guide on how to launch your first project and get started with the CodeWarrior user interface (working in Host Mode).

6.2 Step-by-Step Tutorial

The sample application is the same as the one described in the *"Standalone Mode"* section above.

1. Set up the board so that it works in host mode (see "Host Mode" above).
2. Ensure that the Evaluation Board is connected to the PC (via the USB cable) and that the board is powered on.
3. Start CodeWarrior by selecting it in the Windows Start menu.
4. From the CodeWarrior main menu, choose **"File > Open"** and choose the **"\Program Files\Freescale\CW for HC12 V4.5\(CodeWarrior_Examples)\HCS12X\Evaluation Board Examples\EVB9S12XEP100\C\Demo\Demo.mcp".**
5. Click **"Open"**. The *Project Window* will open.
6. The code of this example is contained in the **"main.c"** file. Double click on it to open.
7. From the main menu, choose **"Project > Debug"**. This will compile the source code, generate an executable file and download it to the demo board.
8. A new debugger environment will open. From the main menu, choose **"Run > Start/Continue"**. The program will be executed in real-time.
9. From the main menu, choose **"Run > Halt"**. The program execution will stop. The next instruction to be executed is highlighted in the *Source* window.
10. From the main menu, choose **"Run > Single Step"**. The instruction highlighted in the *Source* window will be executed, and the program execution will be stopped immediately after.
11. From the main menu, choose **"Run > Start/Continue"**. The application will restart from where it was previously stopped.

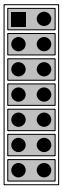
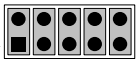
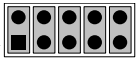
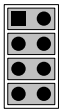
Congratulations! You have successfully completed this tutorial! You can continue to experiment with the CodeWarrior user interface and discover by yourself its potentialities. For an in-depth guide of all of the user interface features, select **"Help > CodeWarrior Help"** from CodeWarrior Development Studio's main menu.

7 Jumpers and Connectors Settings

7.1 Jumpers

Name	Reference	Description/Pinout	
J106		**MODA=1**	
		Installed:	MODA line pulled to VDD
		Not Installed:	**MODA line tied to ground by internal pull down (default)**
J107		**MODB=1**	
		Installed:	MODB line pulled to VDD
		Not Installed:	**MODB line tied to ground by internal pull down (default)**
J108		**MODC SELECTION**	
		1-2 ("1"):	**MODC pulled to VDD via a 4.7 KOhm resistor (default)**
		2-3 ("0"):	MODC line pulled to ground via a 4.7 KOhm resistor
J109		**VRH SELECTION**	
		1-2 ("VDDA"):	**VRH tied to VDDA (default)**
		2-3 ("USER"):	VRH connected to the J103 connector
J110		**VRL SELECTION**	
		1-2 ("GND"):	**VRL tied to ground (default)**
		2-3 ("USER"):	VRL connected to the J104 connector
J111		**OSC SELECTION**	
		1-2 ("CRYSTAL"):	**Crystal oscillator selected (default)**
		2-3 ("CLOCK"):	Clock oscillator selected
J112		**XCLKS#=0**	
		Installed:	XCLKS# pin pushed to ground. Full-swing Pierce oscillator or external clock source selected.
		Not Installed:	**XCLKS# pulled to VDD. Loop controlled Pierce oscillator selected. (default)**

Name	Reference	Description/Pinout
J102		**VDD SELECTION** 1-2 (“3V3”): Board powered by 3.3 V **2-3 (“5V”): Board powered by 5.0 V (default)**
J204		**PUSH-BUTTON “PB4” ENABLE** **Installed: The “PB4” push-button is connected to the microcontroller’s PB4 line (default)** Not Installed: The “PB4” push-button is not connected to the microcontroller’s PB4 line
J205		**PUSH-BUTTON “PB5” ENABLE** **Installed: The “PB5” push-button is connected to the microcontroller’s PB5 line (default)** Not Installed: The “PB5” push-button is not connected to the microcontroller’s PB5 line
J206		**PUSH-BUTTON “PB6” ENABLE** **Installed: The “PB6” push-button is connected to the microcontroller’s PB6 line (default)** Not Installed: The “PB6” push-button is not connected to the microcontroller’s PB6 line
J207		**PUSH-BUTTON “PB7” ENABLE** **Installed: The “PB7” push-button is connected to the microcontroller’s PB7 line (default)** Not Installed: The “PB7” push-button is not connected to the microcontroller’s PB7 line
J208		**POTENTIOMETER ENABLE** **Installed: The “PAD10” potentiomenter is connected to the microcontroller’s PAD10 line (default)** Not Installed: The “PAD10” potentiomenter is not connected to the microcontroller’s PAD10 line
J209		**PHOTO RESISTOR ENABLE** **Installed: The photoresistor network is connected to the microcontroller’s PAD11 analog input (default)** Not Installed: The photoresistor network is not connected to the microcontroller

Name	Reference	Description/Pinout
J210		**DISPLAY ROW ENABLE** **Installed:** **The displays' common rows are connected to the PA[6..0] ports of the microcontroller (default)** Not Installed: The displays' common rows are not connected to the microcontroller.
J211		**DISPLAY COL ENABLE (DISP201)** **Installed:** **The DISP201 display's columns are connected to the PC[4..0] ports of the microcontroller (default)** Not Installed: The DISP201 display's columns are not connected to the microcontroller.
J212		**DISPLAY COL ENABLE (DISP202)** **Installed:** **The DISP202 display's columns are connected to the PD[4..0] ports of the microcontroller (default)** Not Installed: The DISP202 display's columns are not connected to the microcontroller.
J213		**LED ENABLE** **Installed:** **The LEDs are connected to PB[3..0] ports of the microcontroller (default)** Not Installed: The LEDs are not connected to microcontroller.
J303		**SCI0 DTE/DCE SELECTION** **1-3, 2-4 ("DCE"):** **The RS-232 channel 0 is configured as DCE (default)** 3-5, 4-6 ("DTE"): The RS-232 channel 0 is configured as DTE
J304		**SCI1 DTE/DCE SELECTION** **1-3, 2-4 ("DCE"):** **The RS-232 channel 1 is configured as DCE (default)** 3-5, 4-6 ("DTE"): The RS-232 channel 1 is configured as DTE
J305		**LIN MASTER NODE0 ENABLE** **Installed:** **Master node (default)** Not Installed: Slave node

Name	Reference	Description/Pinout
J307		**LIN MASTER NODE1 ENABLE** **Installed:** **Master node (default)** Not Installed: Slave node
J309		**LINE MASTER NODE2 ENABLE** **Installed:** **Master node (default)** Not Installed: Slave node
J311		**LIN MASTER NODE3 ENABLE** **Installed:** **Master node (default)** Not Installed: Slave node
J313		**LIN MASTER NODE4 ENABLE** **Installed:** **Master node (default)** Not Installed: Slave node
J315		**LIN MASTER NODE5 ENABLE** **Installed:** **Master node (default)** Not Installed: Slave node
J317		**LIN TRANSCEIVER SUPPLY SELECTION** **1-2 (“12V”):** **LIN transceivers are supplied by the board’s internal 12 V DC voltage (default)** 2-3 (“LIN NETW.”): LIN transceivers supplied by the LIN bus’s VBAT line
J318		**LIN SUPPLY ENABLE** **Installed:** **LIN bus is powered by the board’s internal 12 V DC voltage (default)** Not Installed: LIN bus is self-powered
J319		**LIN2 RX ENABLE** **Installed:** **PJ0/RXD2 microcontroller line connected to LIN2 transceiver (default)** Not Installed: PJ0/RXD2 microcontroller line floating
J320		**LIN2 TX ENABLE** **Installed:** **PJ1/TXD2 microcontroller line connected to LIN2 transceiver (default)** Not Installed: PJ1/TXD2 microcontroller line floating

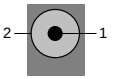
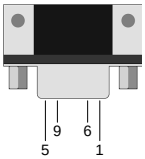
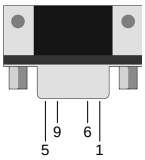
Name	Reference	Description/Pinout
J321		**LIN4 RX ENABLE** **Installed:** **PH4/RXD4 microcontroller line connected to LIN4 transceiver (default)** Not Installed: PH4/RXD4 microcontroller line floating
J322		**LIN4 TX ENABLE** **Installed:** **PH5/TXD4 microcontroller line connected to LIN4 transceiver (default)** Not Installed: PH5/TXD4 microcontroller line floating
J323		**LIN5 RX ENABLE** **Installed:** **PH6/RXD5 microcontroller line connected to LIN5 transceiver (default)** Not Installed: PH6/RXD5 microcontroller line floating
J324		**LIN5 TX ENABLE** **Installed:** **PH7/TXD5 microcontroller line connected to LIN5 transceiver (default)** Not Installed: PH7/TXD5 microcontroller line floating
J330		**RS-232_0 SCI0/6 SELECTION** **1-3, 2-4 ("SCI6"):** **The RS-232 channel 0 transceiver is connected to the microcontroller's SCI6 peripheral (default)** 3-5, 4-6 ("SCI0"): The RS-232 channel 0 transceiver is connected to the pin 1 and pin2 of the J331 jumper
J331		**RS-232_0/LIN0 SELECTION** 1-3, 2-4 ("RS-232"): The microcontroller's SCI0 peripheral is connected to the pin 5 and pin 6 of the J330 jumper **3-5, 4-6 ("LIN"):** **The microcontroller's SCI0 peripheral is connected to LIN0 transceiver (default)**
J332		**RS-232_1 SCI1/7 SELECTION** **1-3, 2-4 ("SCI7"):** **The RS-232 channel 1 transceiver is connected to the microcontroller's SCI7 peripheral (default)** 3-5, 4-6 ("SCI1"): The RS-232 channel 1 transceiver is connected to the pin 1 and pin2 of the J333 jumper

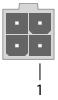
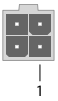
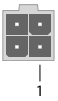
Name	Reference	Description/Pinout
J333		**RS-232_1/LIN1 SELECTION** 1-3, 2-4 (“RS-232”): The microcontroller’s SCI1 peripheral is connected to the pin 5 and pin 6 of the J332 jumper **3-5, 4-6 (“LIN”): The microcontroller’s SCI1 peripheral is connected to LIN1 transceiver (default)**
J334		**CAN3/LIN3 SELECTION** 1-3, 2-4 (“LIN”): The microcontroller’s SCI3 peripheral is connected to the LIN3 transceiver **3-5, 4-6 (“CAN”): The microcontroller’s CAN3 peripheral is connected to the CAN3 transceiver (default)**
J401		**CANH0 SELECTION** **1-2 (“U401”): CAN0 connector’s CANH signal provided by U401 transceiver (default)** 2-3 (“U406”): CAN0 connector’s CANH signal provided by U406 transceiver
J402		**CANL0 SELECTION** **1-2 (“U401”): CAN0 connector’s CANL signal provided by U401 transceiver (default)** 2-3 (“U406”): CAN0 connector’s CANL signal provided by U406 transceiver
J404		**CANH1 SELECTION** **1-2 (“U402”): CAN1 connector’s CANH signal provided by U402 transceiver (default)** 2-3 (“U407”): CAN1 connector’s CANH signal provided by U407 transceiver
J405		**CANL1 SELECTION** **1-2 (“U402”): CAN1 connector’s CANL signal provided by U402 transceiver (default)** 2-3 (“U407”): CAN1 connector’s CANL signal provided by U407 transceiver
J407		**CAN2 VCC ENABLE** **Installed: Powers the CAN2 transceiver with a 5 V voltage (default)** Not Installed: CAN2 transceiver not powered

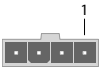
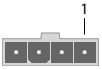
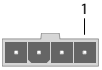
Name	Reference	Description/Pinout
J409		**CAN4 VCC ENABLE** **Installed:** **Powers the CAN4 transceiver with a 5 V voltage (default)** Not Installed: CAN4 transceiver not powered
J412		**CAN3 RESET ENABLE** Installed: Microcontroller's RESET# line connected to the CAN3 transceiver's RESET# line **Not Installed:** **CAN3 transceiver RESET# line floating (default)**
J413		**CAN3 INTERRUPT ENABLE** Installed: Microcontroller's PE1 line connected to the CAN3 transceiver's INTB line **Not Installed:** **CAN3 transceiver INTB line floating (default)**
J414		**CAN0 RX ENABLE** **Installed:** **Microcontroller's PM0/RXCAN0 line connected to CAN0 transceiver (default)** Not Installed: Microcontroller's PM0/RXCAN0 line floating
J415		**CAN0 TX ENABLE** **Installed:** **Microcontroller's PM1/TXCAN0 line connected to CAN0 transceiver (default)** Not Installed: Microcontroller's PM1/TXCAN0 line floating
J416		**CAN1 RX ENABLE** **Installed:** **Microcontroller's PM2/RXCAN1 line connected to CAN1 transceiver (default)** Not Installed: Microcontroller's PM2/RXCAN1 line floating
J417		**CAN1 TX ENABLE** **Installed:** **Microcontroller's PM3/TXCAN1 line connected to CAN1 transceiver (default)** Not Installed: Microcontroller's PM3/TXCAN1 line floating
J418		**CAN2 RX ENABLE** **Installed:** **Microcontroller's PM4/RXCAN2 line connected to CAN2 transceiver (default)** Not Installed: Microcontroller's PM4/RXCAN2 line floating

Name	Reference	Description/Pinout
J419		**CAN2 TX ENABLE** **Installed:** **Microcontroller's PM5/TXCAN2 line connected to CAN2 transceiver (default)** Not Installed: Microcontroller's PM5/TXCAN2 line floating
J420		**CAN4 RX ENABLE** **Installed:** **Microcontroller's PJ6/RXCAN4 line connected to CAN4 transceiver (default)** Not Installed: Microcontroller's PJ6/RXCAN4 line floating
J421		**CAN4 TX ENABLE** **Installed:** **Microcontroller's PJ7/TXCAN4 line connected to CAN4 transceiver (default)** Not Installed: Microcontroller's PJ7/TXCAN4 line floating
J502		**RESET ENABLE (USB TO BDM)** **Installed:** **Microcontroller's RESET# line connected to the "USB TO BDM INTERFACE" (default)** Not Installed: Microcontroller's RESET# line not connected to the "USB TO BDM INTERFACE"
J503		**BKGD ENABLE (USB TO BDM)** **Installed:** **Microcontroller's BKGD line connected to the "USB TO BDM INTERFACE" (default)** Not Installed: Microcontroller's BKGD line not connected to the "USB TO BDM INTERFACE"

7.2 Connectors

Name	Reference	Description/Pinout
J101, J102, J103, J104		**MCU I/O Connectors** See schematic for pin explanation
J105		**BDM Connector** 1. BKGD 2. GND 3. N.C. 4. RESET 5. N.C. 6. VDD
J113, J203, J325, J422, J504		**Test Points**
J201		**12 V DC Power Supply Input Connector (2.1 mm Barrel)** 1. 12 V DC 2. GND
J301		**RS-232_0 Connector** 1. N.C. 2. TX or RX (see J303 jumper) 3. RX or TX (see J303 jumper) 4. N.C. 5. GND 6. N.C. 7. N.C. 8. N.C. 9. N.C.
J302		**RS-232_1 Connector** 1. N.C. 2. TX or RX (see J304 jumper) 3. RX or TX (see J304 jumper) 4. N.C. 5. GND 6. N.C. 7. N.C. 8. N.C. 9. N.C.

Name	Reference	Description/Pinout
J306		**LIN0 Connector** 1. VBAT – LIN Bus Power Supply 2. LIN – LIN Signal 3. GND
J308		**LIN1 Connector** 1. GND 2. GND 3. VBAT – LIN Bus Power Supply 4. LIN – LIN Signal
J310		**LIN2 Connector** 1. VBAT – LIN Bus Power Supply 2. LIN – LIN Signal 3. GND
J312		**LIN3 Connector** 1. GND 2. GND 3. VBAT – LIN Bus Power Supply 4. LIN – LIN Signal
J314		**LIN4 Connector** 1. VBAT – LIN Bus Power Supply 2. LIN – LIN Signal 3. GND
J316		**LIN5 Connector** 1. GND 2. GND 3. VBAT – LIN Bus Power Supply 4. LIN – LIN Signal
J326		**SCI6 Connector** 1. RX 2. TX
J327		**SCI7 Connector** 1. RX 2. TX

Name	Reference	Description/Pinout
J328		**I2C0 Connector** 1. SDA 2. SCL
J329		**I2C1 Connector** 1. SDA 2. SCL
J403		**CAN0 Connector** 1. CANH 2. CANL 3. GND 4. N.C.
J406		**CAN1 Connector** 1. CANH 2. CANL 3. GND 4. N.C.
J408		**CAN2 Connector** 1. CANH 2. GND 3. CANL
J410		**CAN4 Connector** 1. CANH 2. CANL 3. GND 4. N.C.
J411		**CAN3 Connector** 1. CANH 2. GND 3. CANL
J423		**Expanded Bus Connector** DIN41612 female type R (see schematic for pin explanation)

Name	Reference	Description/Pinout
J501		**USB Connector** 1. 5 V DC USB Bus Power Supply Line 2. USB D- 3. USB D+ 4. GND

8 Troubleshooting

8.1 USB Driver Problems

If you connected the Evaluation Board to the PC before installing the SofTec Microsystems Additional Components, the Evaluation Board's USB driver may not have been correctly installed on your system. Unplugging and replugging the USB cable is of no use, since Windows has marked the device as "disabled". As a consequence, the PC cannot communicate with the Evaluation Board.
To restore the USB driver (provided the SofTec Microsystems Additional Components have been installed), perform the following steps under Windows XP:

1. Connect the Evaluation Board to the PC.
2. Open the Control Panel (**Start > Settings > Control Panel**).
3. Open the **"System"** options.
4. Select the **"Hardware"** tab.
5. Click the **"Device Manager"** button.
6. The **"uDART In-Circuit Debugger"** device will be shown with an exclamation mark next to it. Double click on this device.
7. In the **"General"** tab, click the **"Reinstall Driver"** button. Follow the on-screen instructions.

8.2 Communication Problems between the PC and the Evaluation Board

1. Make sure that the "BKGD ENA" and "RESET ENA" jumpers in the "USB TO BDM INTERFACE" section are inserted.
2. Make sure that the board is powered (verify that the "POWER" LED is turned on).
3. Make sure that a correct clock source is selected.