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EVB9S12XF512E User Manual

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Contents

1 Introduction and Default Settings

This kit contains everything you need to get started using the EVB9S12XF512E, including a description of the pin function of test points, jumpers, and connectors. This document guides you through the steps necessary to download your own program using a downloading tool and connection. You can test the EVB9S12XF512E with the sample code supplied on a data CD or with your own application, which can be downloaded into the MCU. This evaluation board (EVB) supports the M9S12XF512 in the 112 LQFP and 64 LQFP packages.

This EVB can work in two modes: stand alone and daughter.

The stand-alone mode is used to program and test the device assembled in the board. This allows you to create and debug the application you want to use and to integrate it into the system.

If you use the EVB in daughter mode, you can run and probe the application with the additional functionality of the EVB9S12XEP100. This permits an improved experience through the use of the features that are supported by the motherboard.

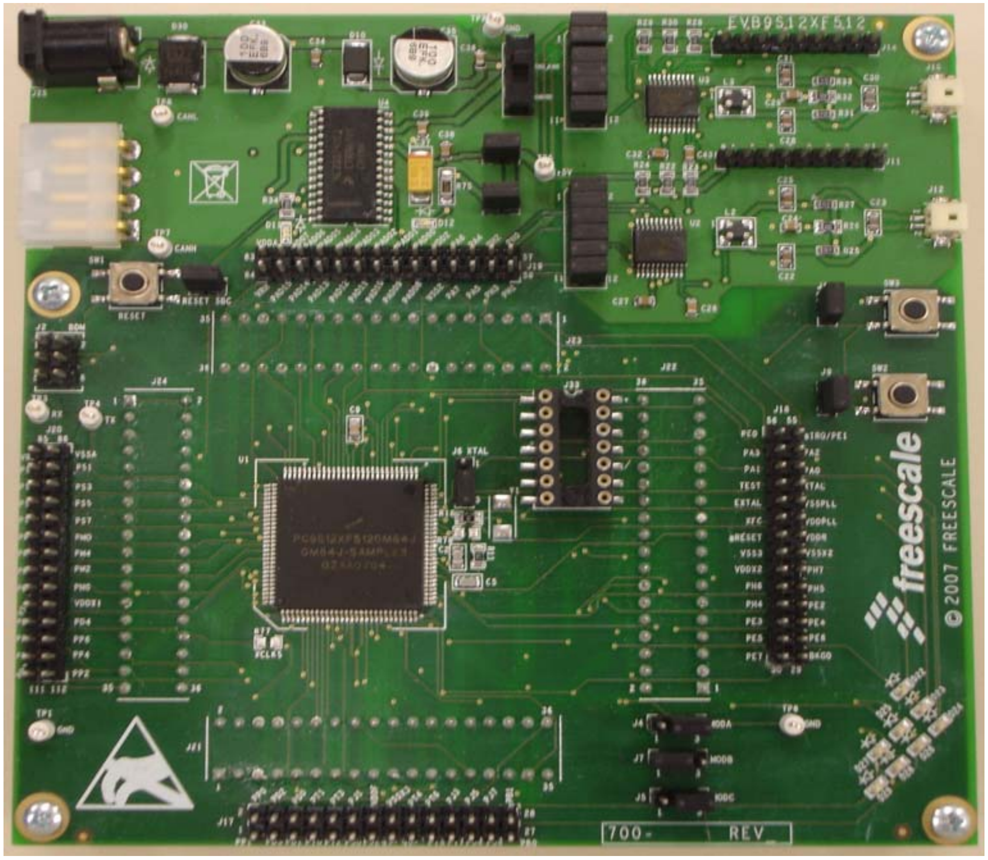


Figure 1. EVB9S12XF512E

The clock configuration (XCLKS) in the board is determined by five components: resistors R17, R18, R19, and R77, and jumper J6. Table 1 shows the different configurations and required configuration.

Table 1. Clock Configuration

Clock Configuration	Jumper J6	R17	R18	R19	R77 Assembly
Loop-controlled Pierce oscillator	Position 2–3 (default)	Not populated (default)	Populated 0 Ω (default)	Populated 2.2 K (default)	Not populated (default)
Full-swing Pierce oscillator	Position 2–3 (default)	Populated (according to datasheet)	Populated (according to datasheet)	Not populated	Populated 0 Ω
External clock	Position 1–2	Don’t care	Don’t care	Don’t care	Populated 0 Ω

Table 2 shows the default jumper configuration for the EVB9S12XF512E.

Table 2. Default Jumper Configuration

Jumper	Position
J4 MODA [1]	2–3
J5 MODC [1]	1–2
J6 XTAL	2–3
J7 MODB [1]	2–3
J9 SW2	Connected
J10 SW3	Connected
J26	Connected
J27 RESET	Connected
J30	Connected
J31	Connected
J32	Connected

[1] Table 20 describes the modes the S12XF can have depending on the position of jumpers J4 MODA, J5 MODB, and J7 MODC.

Application example codes are available on the CD shipped with the EVB9S12XF512E package.

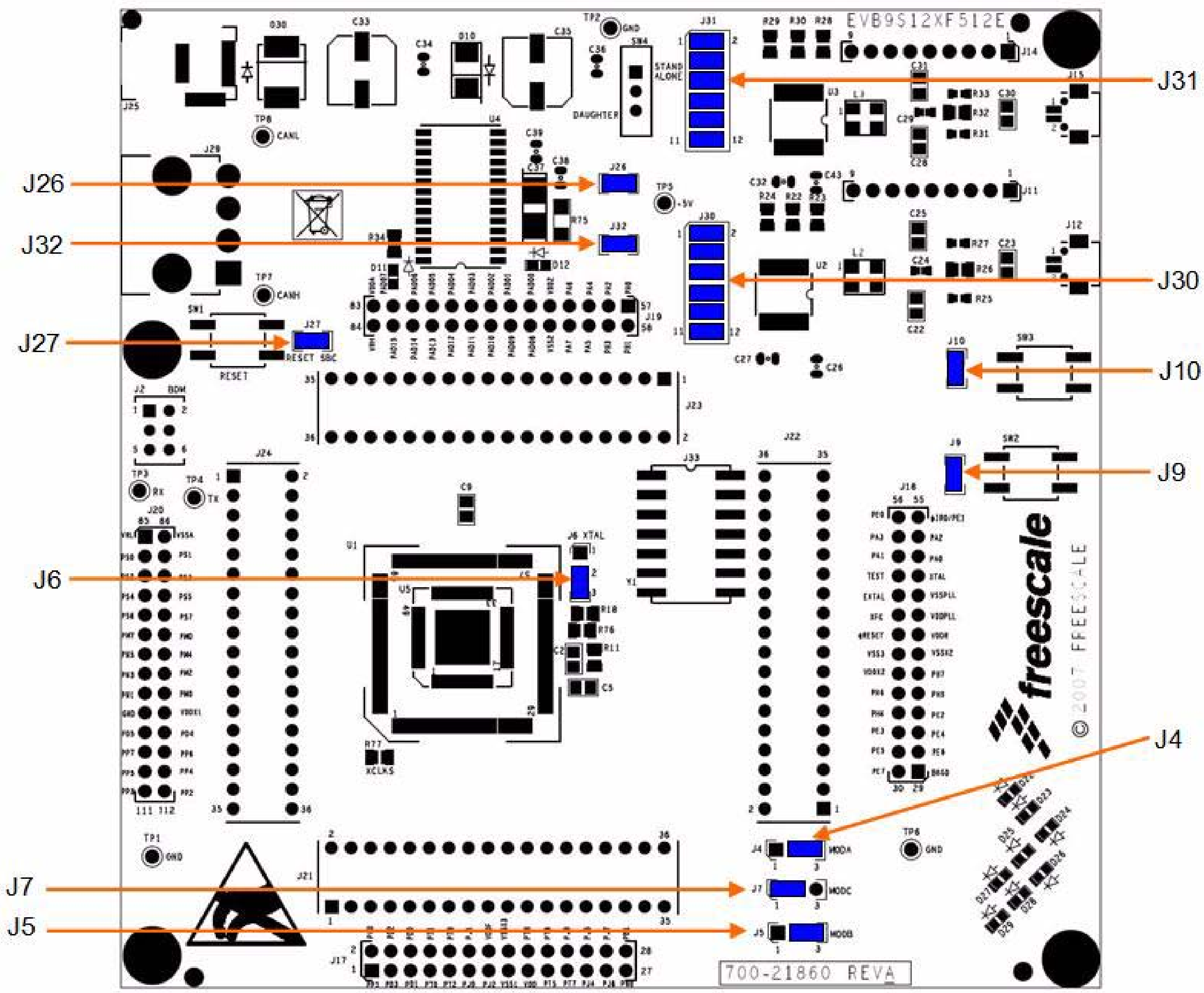


Figure 2. EVB9S12XF512E Default Jumper Configuration

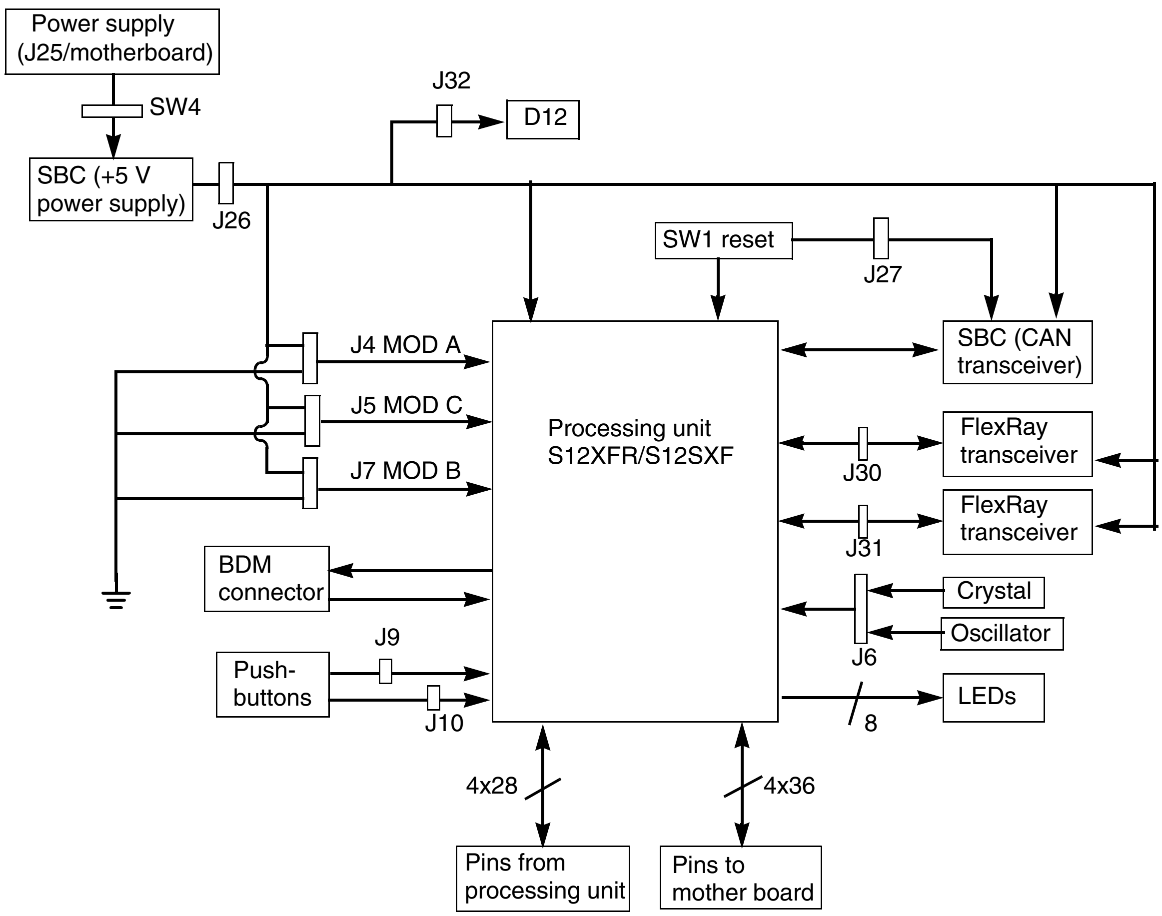


Figure 3. EVB9SXF512E Block Diagram

2 Operation Modes

The EVB9S12XF512E can be used in two modes: stand alone and daughter. Depending on which mode is used, there are two ways power is supplied to the board.

In the stand-alone mode (default jumper configuration), slide switch SW4 must be in the STAND_ALONE position and a 12 V_{DC} voltage supply must be connected to J25, which is a 2.1 mm power jack with a positive-center polarity.

To use the EVBMC9S12XF512E with the EVB9S12XEP100 motherboard, select the DAUGHTER position in slide switch SW4 and disconnect jumper J26. The EVB9S12XF512E is powered by the motherboard with a 5 V supply.

For powering the EVB9S12XF512E, the power supply from the motherboard or the external power supply must not exceed 12 V.

If the EVB is going to be used as a daughter card, connect it carefully but firmly on the corresponding connectors of the motherboard. Use the configuration and programming procedures of the motherboard guide.

With the default firmware into the microcontroller and the default settings described above, the application should run. The signals in the different connectors and the LEDs provide feedback on the evaluation board.

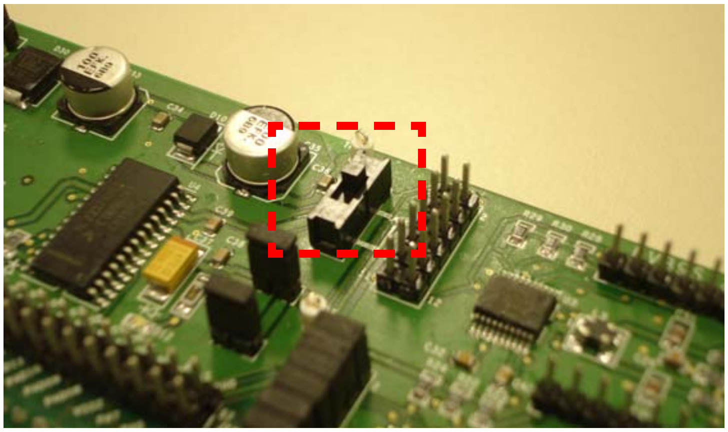


Figure 4. Stand Alone/Daughter Mode Switch

2.1 Stand-Alone Mode for the EVB9S12XF512E

This operation mode allows you to use the EVB9S12XF512E alone and to connect it to analysis tools or to another EVB9S12XF512E to test the sample code included on the CD. Figure 5 shows the EVB9S12XF512E working in stand-alone mode. In this case, two EVB9S12XF512E boards are connected together by the FlexRay and CAN channels.

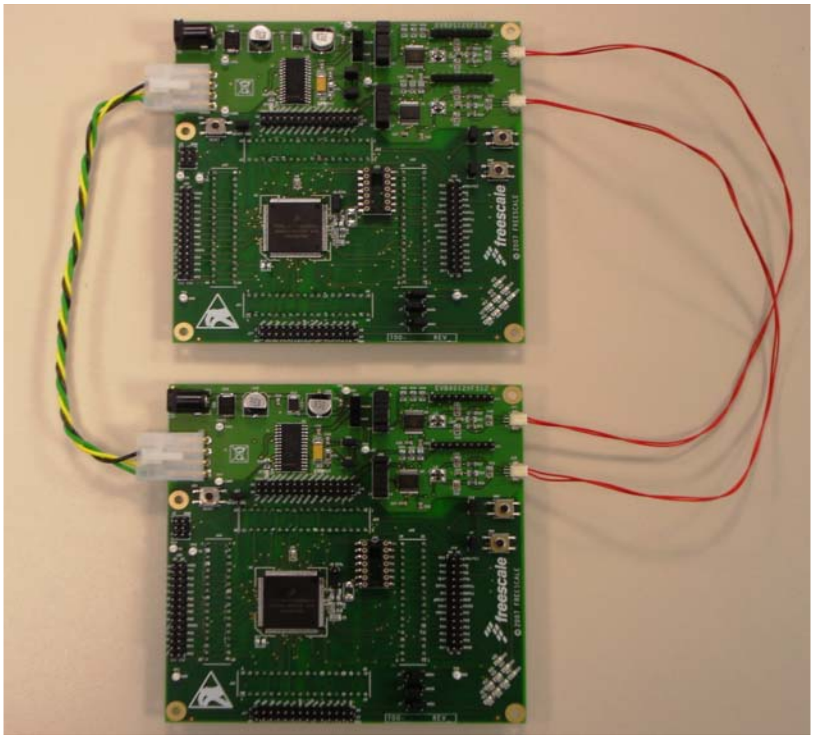


Figure 5. FlexRay and CAN Networks Enabled With Two EVB9S12XF512Es

NOTE

When the CAN channel is connected, the ground reference for both EVBs is the same. If you want to test them without using the CAN channel (not connected), you must connect the ground reference of both EVBs.

2.2 Daughter Mode for EVB9S12XF512E

To use the EVB9S12XF512E in daughter mode, you need a EVB9S12XEP100 motherboard with the same pin distribution and placement. Figure 6 shows one EVB9S12XF512E mounted on the motherboard and connected to another EVB9S12XF512E by the FlexRay and CAN channels. FlexRay communication is enabled directly by the EVB9S12XF512E, because SofTec's evaluation board does not have a FlexRay transceiver.

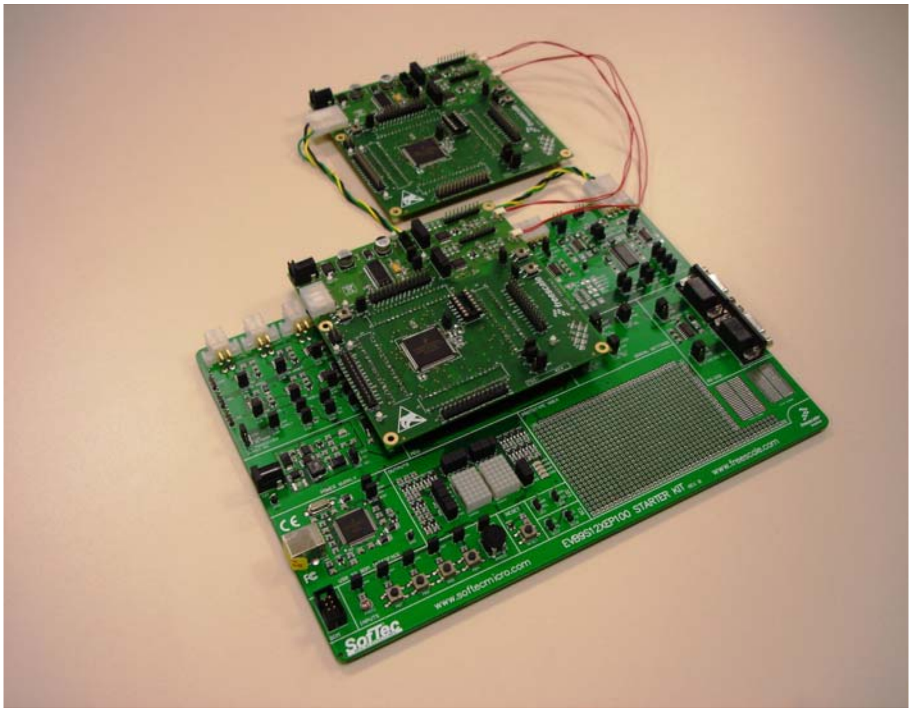


Figure 6. EVB9S12XF512E Working in Daughter Mode with the EVB9S12XEP100

3 High-Level Software and Hardware Functionality

3.1 Functional Blocks and Software Description

The EVB9S12XF512E includes software to illustrate some of the capabilities of the EVB, as a stand-alone board and for interconnected EVBs. The example projects are intended for the CodeWarrior Development Studio for HCS12(X) version 4.6, with the included upgrade to support the S12XF512 debugging.

3.1.1 Low-Speed Stand-Alone Application (EVB9S12XF512E_StandAlone_LS.mcp)

In this 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 and verify 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 LEDs 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)
  - — LEDs D24 and D26

3.1.2 Low-Speed FlexRay Network Application (EVB9S12XF512E_Node1_LS.mcp/ EVB9S12XF512E_Node2_LS.mcp)

This example requires two EVB9S12XF512E boards 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. Also, FlexRay channels must be 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
- FlexRay module fully configured for frames transmission and reception at 1.25 Mbit/s; in Node1 the FlexRay events are interrupt driven, but 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.

  For Node1, the LED activation is:

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

For Node2, the LED 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

3.1.3 Full-Speed Stand-Alone Application (EVB9S12XF512E_StandAlone_FS.mcp)

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 and to verify the code downloading procedure.

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 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

3.1.4 Full-Speed FlexRay and CAN Network Application (EVB9S12XF512E_Node1_FS.mcp/ EVB9S12XF512E_Node2_FS.mcp)

In this example you must use two EVB9S12XF512Es, 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 (this 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

The described example projects consist of software modules divided into low-level basic subroutines near the peripheral's operation and handling of input/output lines, and high-level modules that define the functional behavior of the EVB. The example software modules and the related files are described in the next sections. Complementary software documentation can be accessed through the file index.html in the subfolder \Doxygen\html in each example project folder.

3.1.5 Low-Level Modules

- Initial configuration (CPU.c, CPU.h)—This module has defined the initial conditions for the S12X operation: bus clock PLL driven, IPLL for the FlexRay module, peripherals configuration, interrupt settings for the real-time interrupt, PE0/XIRQ, and input capture on PT7/IOC7.
- XGATE configuration and interrupts handling (xgate.cxgate, xgate.h)—The peripheral co-processor services the input capture interrupt at PT7/IOC7.
- General-purpose input output (GPIO_macros.h)—The output tasks are implemented as macros that allow simple port handling. These macros are used to display output patterns to the general purpose LEDs in the EVB to indicate the current operation mode and the occurrence of events.
- SPI driver (SPI_driver.c, SPI_driver.h)—This module contains basic serial peripheral interface subroutines, configuration of the SPI module as a master , and read and write functions for handling the SBC.
- System basis chip driver (SBC_driver.c, SBC_driver.h)—This module contains a set of functions to configure the SBC CAN transceiver.
- FlexRay unified driver (Fr_UNIFIED.c, Fr_UNIFIED_cfg.c, Fr_UNIFIED.h, Fr_UNIFIED_cfg.h, Fr_UNIFIED_types.h)—The driver contains a set of functions in charge of the FlexRay channel's configuration, transmission, and reception of FlexRay messages. For proper use of the driver and information regarding the node's configuration, refer to the documentation and example programs generated when the FlexRay UNIFIED driver is installed.

3.1.6 High-Level Modules

- Interrupt service routines (Interrupts.c, Interrupts.h, Vectors.h)—Transitions generated through pushbuttons SW2 and SW3, connected to PE0/XIRQ and PT7/IOC7 inputs, are individually detected as interrupts and its occurrence is indicated by toggling LEDs D24 or D26. This module also contains the service routines related to the scheduler and handling of CAN and FlexRay interrupts.
- Scheduler (Scheduler.c)—This module is called by the S12XF real-time interrupt service routine. It assigns time frames for LEDs activation.
- FlexRay frames handler (FlexRay_handler.c)—The FlexRay module configuration and the functions related to timing and frames exchange are contained in this module, following an interrupt-based scheme for Node1 and a poll-driven approach in Node2.

3.2 Hardware Functionality Description

The EVB9S12XF512E has support for one CAN channel and two FlexRay channels (for 112 pin package only; the 64 pin package has one FlexRay channel). For the CAN channel the inputs can be seen on connectors TP7 (CANL) and TP8 (CANH). The inputs of the FlexRay Channel A are on connector J11 and the outputs are on connector J12.The FlexRay Channel B inputs are on connector J14 and the output can be seen on connector J15.

The board has support for the M9S12XF512 in the 112 LQFP and 64 LQFP packages, with no necessary hardware configuration adjustments. The major features of the board are:

- CAN transceiver integrated into the SBC MC33742
- FlexRay transceivers (NXP TJA1080)
- Connection capability with EVB9S12XEP100 motherboard.
- Stand-alone and daughter modes of operation.
- Selectable 4 MHz oscillator module (socketed) or a 4 MHz crystal.
- All microcontroller pins mirrored on connectors for testing.
- Possibility to disconnect the FlexRay ports from the transceivers for other applications.
- Double protection to avoid shortages when changing from stand-alone mode to daughter mode.
- Reset inputs for both the microcontroller and the SBC (through jumper J27).
- Eight user LEDs and two push buttons

4 Programming Settings

4.1 Programming Through Background Debug Mode Tool

NOTE

Jumper J27 must be disconnected before programming. After programming, reconnect J27 to enable the reset line for the SBC.

The steps described to program the device are intended for CodeWarrior Development Studio for HC12X, version 4.6. You must also install the included upgrade to support the S12XF512 (CW46_XF512_upgrade_beta0.zip).

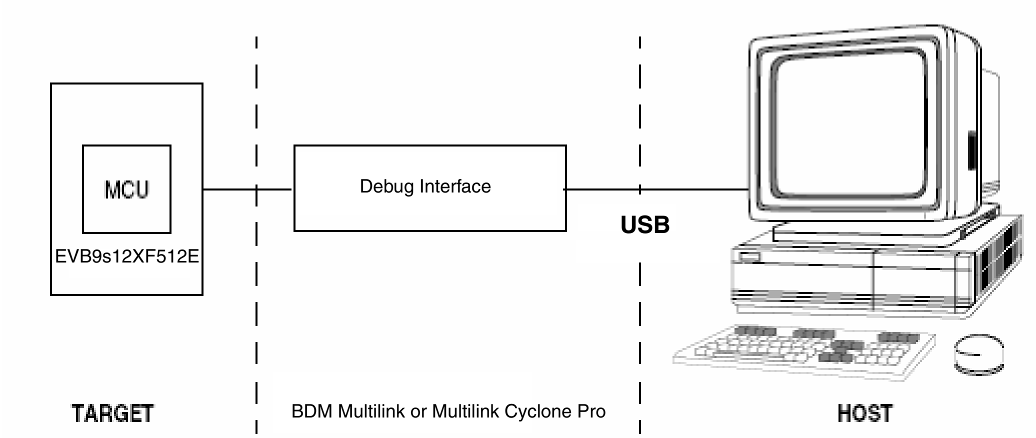
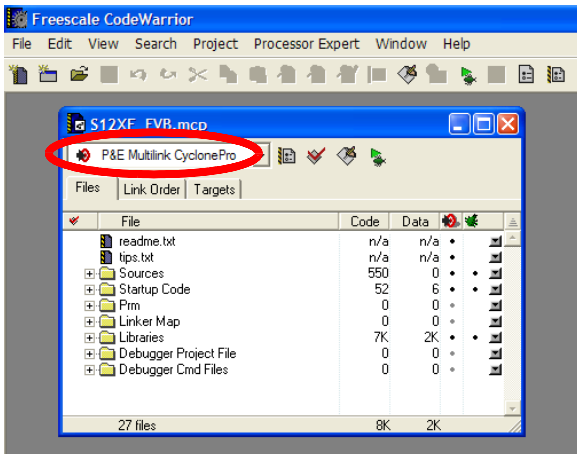


Figure 7. Connecting the EB9S12XF512E to a Host

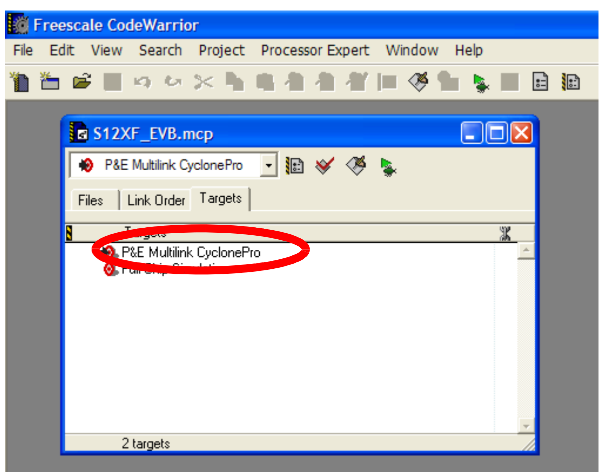
The EVB9S12XF512E has pre-flashed code for the low-seed stand-alone application. The S12XFSTARTERKITE has pre-flashed code for the low-speed FlexRay application.

To download the firmware you need the *P&E BDM Multilink* (USB or parallel) or the *P&E Cyclone Pro* (USB, serial, or Ethernet).

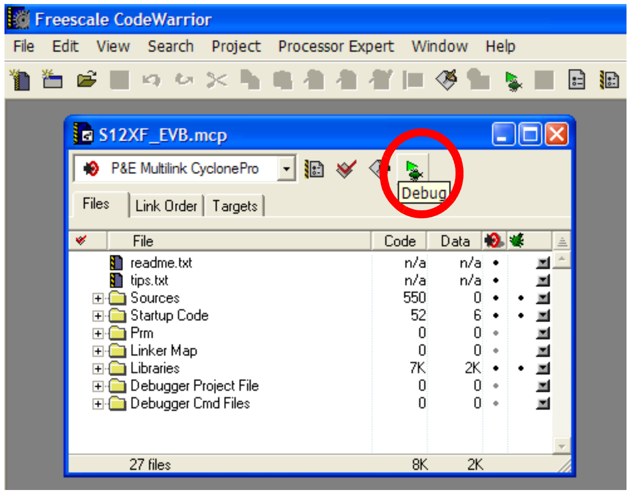
1. Open the project that corresponds to the desired example: EVB9S12XF512E_StandAlone_LS.mcp for low-speed single board application, EVB9S12XF512E_Node1_LS.mcp or EVB9S12XF512E_Node2_LS.mcp for the CAN/FlexRay network example. Full-speed versions of this code supporting the CAN channels are EVB9S12XF512E_StandAlone_FS.mcp for the single-board applications and the EVB9S12XF512E_Node1_FS.mcp and the EVB9S12XF512E_Node2_FS.mcp for the CAN/FlexRay network example.
2. Hook the BDM adapter into the J2 connector. The red stripe on the flat ribbon cable should be aligned to the pin marked '1' on the connector J2. This indicated the correct polarization to avoid damaging the MCU. Connect the Multilink interface to your PC port and select P&E Multilink Cyclone Pro as the target.



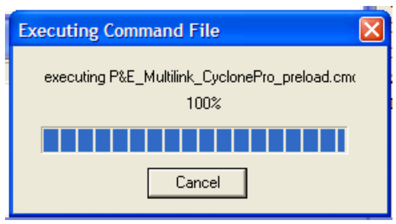
Or select the corresponding *target*:



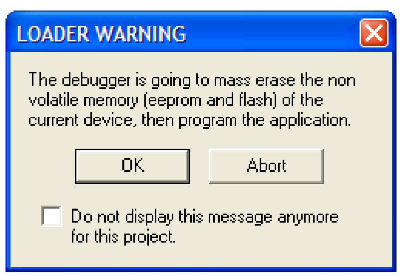
3. In the CodeWarrior project window, click the Debug button in the menu bar or press the F5 key.



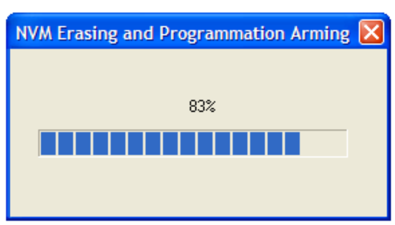
4. If the board is powered and the BDM connections is correct, the *True-Time Simulator & Real-Time Debugger* application starts and this window appears:



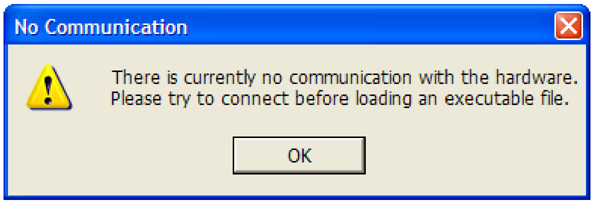
5. Next, this warning message window appears:

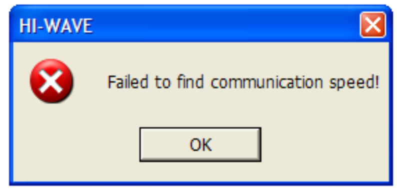


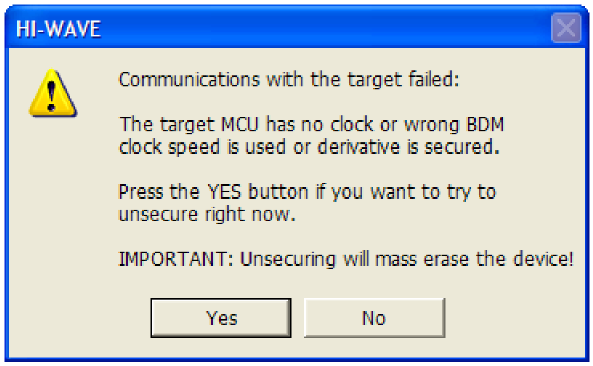
6. Click OK. A final window appears, showing the progress of the device programming.



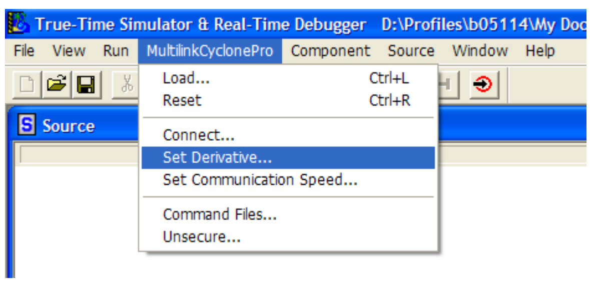
7. After the flash programming process finishes, unplug the BDM connector and reconnect J27.
   If an error occurs during the process, one of the following windows could appear:



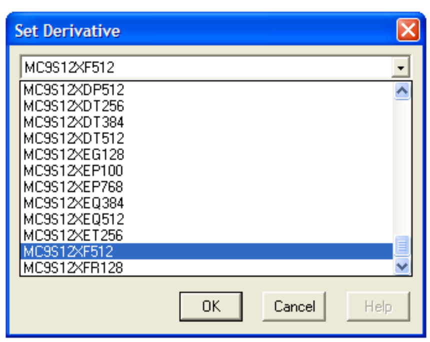




8. To correct the issue, confirm that the correct device is selected within the True-Time Simulator & Real-Time Debugger:

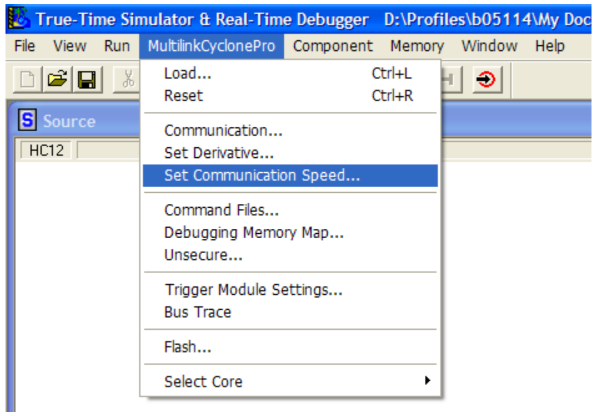


9. Select the proper device from the pull-down list:

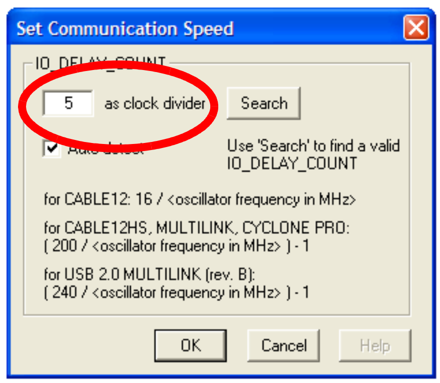


10. If the MC9S12XF512 is not shown, run the CW46_XF512_upgrade_beta0.zip upgrade.

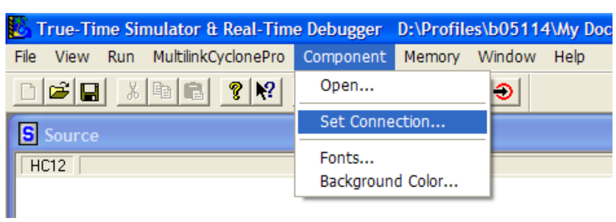
11. Next, set the connection speed by choosing Set Communication Speed from the Multilink Cyclone Pro menu.



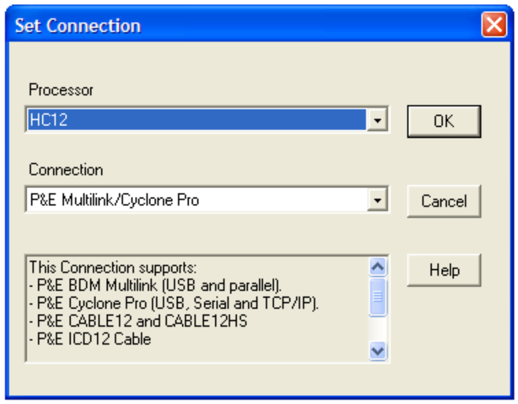
12. The following window appears. Enter the clock divider value and check the Auto detect option or use the equations shown to calculate the divider depending on the connection method (the oscillator frequency for the M9S12XF512 is 4 MHz):



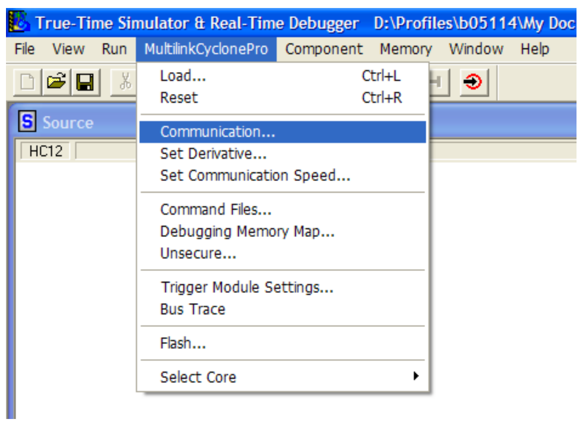
13. The clock interface configuration is verified and, if necessary, the selected processor and connection method should be fixed:



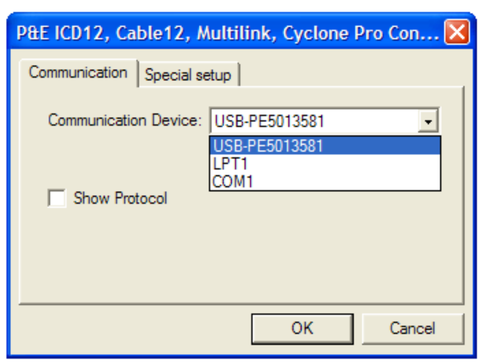
Use the parameters shown :



14. Click OK. The connection is re-attempted automatically. The physical channel for the connection can be modified if the problem persists. Select MultiLinkCyclonePro from the menu bar and choose Communication to open the communication settings in the application:



15. Choose the corresponding communication port and press the OK. The connection is attempted one more time.



5 Connector and Test Point Description

This section describes the function of the different jumpers and switches present in the EVB9S12XF512E. It also describes the signals on each of the test points and connectors of the board. The input signals to FlexRay transceivers A and B are available via test points of J11 and J14. A single-row connector of nine pins can be assembled to the board in J11 and J14 for pin header test points.

Table 3. EVB9SI2XF512E Jumpers and Switches

Jumper name	Functional Description
J4	**Position 1–2:** MODA in MCU is enabled. **Position 2–3:** MODA in MCU is disabled. **Other:** Not valid
J5	**Position 1–2:** MODB in MCU is enabled. **Position 2–3:** MODB in MCU is disabled. **Other:** Not valid
J6	**Position 1–2:** Oscillator drives MCU. **Position 2–3:** 4 MHz or 40 MHz crystal drives MCU. **Other:** Not valid
J7	**Position 1–2:** MODC in MCU is enabled. **Position 2–3:** MODC in MCU is disabled. **Other:** Not valid
J9	**Connected:** Enables push button SW2. **Not connected:** Disables push button SW2.
J10	**Connected:** Enables push button SW3. **Not connected:** Disables push button SW3.
J26	**Connected:** Power to the board will be supplied by the 5 V supply of the SBC. **Not connected:** Power will be supplied by the motherboard.
J27	**Connected:** Connects the *RESET signal to the reset pin of U4 (SBC). **Not connected:** Disconnects the *RESET signal from the reset pin of U4 (SBC).
J30	**Connected:** The pins from FlexRay Channel A are connected to U2 (FlexRay transceiver A). **Not connected:** The pins from FlexRay Channel A of MCU are disconnected from U2 (FlexRay transceiver A).
J31	**Connected:** The pins from FlexRay Channel B are connected to U3 (FlexRay transceiver B). **Not connected:** The pins from FlexRay Channel B of MCU are disconnected from U3 (FlexRay transceiver B).
J32	**Connected:** Enables the use of D12 (power-on indicator). **Not connected:** Disables the use of D12 (power-on indicator).
SW1	Reset signal to the MCU and/or SBC (connected to SBC through J27).
SW2	Test pushbutton.
SW3	Test pushbutton.
SW4	**STAND_ALONE:** Enables the evaluation board to be used as a stand-alone device. **DAUGHTER:** Enables the evaluation board to draw power from the motherboard when it is connected as a daughter board.

Table 4. EVB9S12XF512E Test Point Description

Test Point Number	Signal Name	Description
TP1, TP2, TP6	GND	System ground, electrical reference test point
TP3	RX	Receive signal of SCI module (PS0)
TP4	TX	Transmit signal of SCI module (PS1)
TP5	+5V	5 V power supply output
TP7	CANL	Low line of the SBC's CAN transceiver
TP8	CANH	High line of the SBC's CAN transceiver

Table 5. EVB9S12XF512E Connector J2 (BDM Connector)

PIN#	Description
1	BKGD
2	GND
3	NC

PIN#	Description
4	RESET
5	NC
6	VDD

Table 6. EVB9S12XF512E Connector J11 (FlexRay Input A) Not assembled in board

PIN#	Description
1	RXEN_A
2	ERRN_A
3	Wake_A

PIN#	Description
4	STBN_A
5	BGE_A
6	RXD_A

PIN#	Description
7	TXEN_A
8	TXD_A
9	EN_A

Table 7. EVB9S12XF512E Connector J12 (FlexRay Output A)

PIN#	Description
1	BP_A
2	BM_A

Table 8. EVB9S12XF512E connector J14 (FlexRay Input B)

PIN#	Description
1	RXEN_B
2	ERRN_B
3	Wake_B

PIN#	Description
4	STBN_B
5	BGE_B
6	RXD_B

PIN#	Description
7	TXEN_B
8	TXD_B
9	EN_B

Table 9. EVB9S12XF512E connector J15 (FlexRay output B) not assembled in board

PIN#	Description
1	BP_B
2	BM_B

Table 10. EVB9S12XF512E Connector J17 (One-to-One Pins from M9S12XF512)

PIN#	Description	PIN#	Description	PIN#	Description
1	PP1	11	PJ0	20	PT6
2	PP0	12	PJ1	21	PT7
3	PD3	13	PJ2	22	PJ3
4	PD2	14	VDDF	23	PJ4
5	PD1	15	VSS1	24	PJ5
6	PD0	16	VSSX3	25	PJ6
7	PT0	17	VDDX3	26	PJ7
8	PT1	18	PT4	27	PB0
9	PT2	19	PT5	28	PB1
10	PT3				

Table 11. EVB9S12XF512E Connector J18 (One-to-One Pins from M9S12XF512)

PIN#	Description	PIN#	Description	PIN#	Description
1	BKGD	11	PH7	20	EXTAL
2	PE7	12	VDDX2	21	XTAL
3	PE6	13	VSSX2	22	TEST
4	PE5	14	VSS3	23	PA0
5	PE4	15	VDDR	24	PA1
6	PE3	16	RESET*	25	PA2
7	PE2	17	VDDPLL	26	PA3
8	PH4	18	XFC	27	*IRQ/PE1
9	PH5	19	VSSPLL	28	PE0
10	PH6				

Table 12. EVB9S12XF512E Connector J19 (One-to-One Pins from M9S12XF512)

PIN#	Description	PIN#	Description	PIN#	Description
1	PH0	11	PAD00	20	PAD12
2	PH1	12	PAD08	21	PAD05
3	PH2	13	PAD01	22	PAD13
4	PH3	14	PAD09	23	PAD06
5	PA4	15	PAD02	24	PAD14
6	PA5	16	PAD10	25	PAD07

Table 12. EVB9S12XF512E Connector J19 (One-to-One Pins from M9S12XF512)

PIN#	Description	PIN#	Description	PIN#	Description
7	PA6	17	PAD03	26	PAD15
8	PA7	18	PAD11	27	VDDA
9	VDD2	19	PAD04	28	VRH
10	VSS2				

Table 13. EVB9S12XF512E Connector J20 (One-to-One Pins from M9S12XF512)

PIN#	Description	PIN#	Description	PIN#	Description
1	VRL	11	PM7	20	VDDX1
2	VSSA	12	PM6	21	PD5
3	PS0	13	PM5	22	PD4
4	PS1	14	PM4	23	PP7
5	PS2	15	PM3	24	PP6
6	PS3	16	PM2	25	PP5
7	PS4	17	PM1	26	PP4
8	PS5	18	PM0	27	PP3
9	PS6	19	VSSX1	28	PP2
10	PS7				

Table 14. EVB9S12XF512E Connector J21 (One-to-One Name/Sockets from Motherboard)

PIN#	Description	PIN#	Description	PIN#	Description
1	PM7	13	PT2	25	BKGD
2	PM6	14	PT3	26	VDDX2
3	PM5	15	VDDF	27	VSSX2
4	PM4	16	VSS1	28	NC
5	NC	17	PT4	29	NC
6	NC	18	PT5	30	NC
7	NC	19	PT6	31	NC
8	NC	20	PT7	32	PB0
9	NC	21	NC	33	PB1
10	NC	22	NC	34	NC
11	PT0	23	NC	35	NC
12	PT1	24	NC	36	PP0

Table 15. EVB9S12XF512E Connector J22 (One-to-One Name/Sockets from Motherboard)

PIN#	Description	PIN#	Description	PIN#	Description
1	PP1	13	PE6	25	NC
2	PP2	14	PE5	26	NC
3	PP3	15	PE4	27	NC
4	NC	16	VSSX2	28	NC
5	NC	17	VDDX2	29	PD0
6	NC	18	*RESET	30	PD1
7	NC	19	VDDPLL	31	PD2
8	NC	20	NC	32	PD3
9	NC	21	VSSPLL	33	PE3
10	NC	22	NC	34	PE2
11	NC	23	NC	35	*IRQ/PE1
12	PE7	24	VSSPLL	36	PE0

Table 16. EVB9S12XF512E Connector J23 (One-to-One Name/Sockets from Motherboard)

PIN#	Description	PIN#	Description	PIN#	Description
1	PA0	13	NC	25	PAD04
2	PA1	14	NC	26	PAD12
3	PA2	15	VDD2	27	PAD05
4	PA3	16	VSS2	28	PAD13
5	PA4	17	PAD00	29	PAD06
6	PA5	18	PAD08	30	PAD14
7	PA6	19	PAD01	31	PAD07
8	PA7	20	PAD09	32	PAD15
9	VSS3	21	PAD02	33	NC
10	VDDX3	22	PAD10	34	NC
11	PD4	23	PAD03	35	VDDA
12	PD5	24	PAD11	36	VRH

Table 17. EVB9S12XF512E Connector J24 (One-to-One Name/Sockets from Motherboard)

PIN#	Description	PIN#	Description	PIN#	Description
1	VRL	13	PS2	25	NC
2	VSSA	14	PS3	26	NC
3	NC	15	PS4	27	NC
4	NC	16	PS5	28	PM1
5	NC	17	PS6	29	PM0

Table 17. EVB9S12XF512E Connector J24 (One-to-One Name/Sockets from Motherboard)

PIN#	Description	PIN#	Description	PIN#	Description
6	NC	18	PS7	30	VSSX1
7	NC	19	NC	31	VDDX1
8	NC	20	NC	32	NC
9	NC	21	NC	33	PP7
10	NC	22	NC	34	PP6
11	PS0	23	NC	35	PP5
12	PS1	24	NC	36	PP4

Table 18. EVB9S12XF512E Connector J29 (HSCAN Connector)

PIN#	Description	PIN#	Description
1	CANH Bus_SBC	3	GND
2	CANL Bus_SBC	4	NC

Table 19. EVB9S12XF512E Connector J33 (DIP 14 Socket for Oscillator)

PIN#	Description	PIN#	Description
1	GND	8	OSC OUT
2	NC	9	NC
3	NC	10	NC
4	GND	11	OSC OUT
5	NC	12	NC
6	NC	13	NC
7	GND	14	VDD

Table 20. Chip Modes for M9S12XF512

Chip Modes	MODC	MODB	MODA
Normal single chip	1	0	0
Special single chip	0	0	0
Emulation single chip	0	0	1
Normal expanded	1	0	1
Emulation expanded	0	1	1
Special test	0	1	0

NOTE

These operation modes for the M9S12XF512 are entered by using jumpers J4 MODA, J5 MODB, and J7 MODC.

6 Schematic Diagrams

Figure 8 through Figure 12 in this section show the schematic diagram of the EVB9S12XF512E.

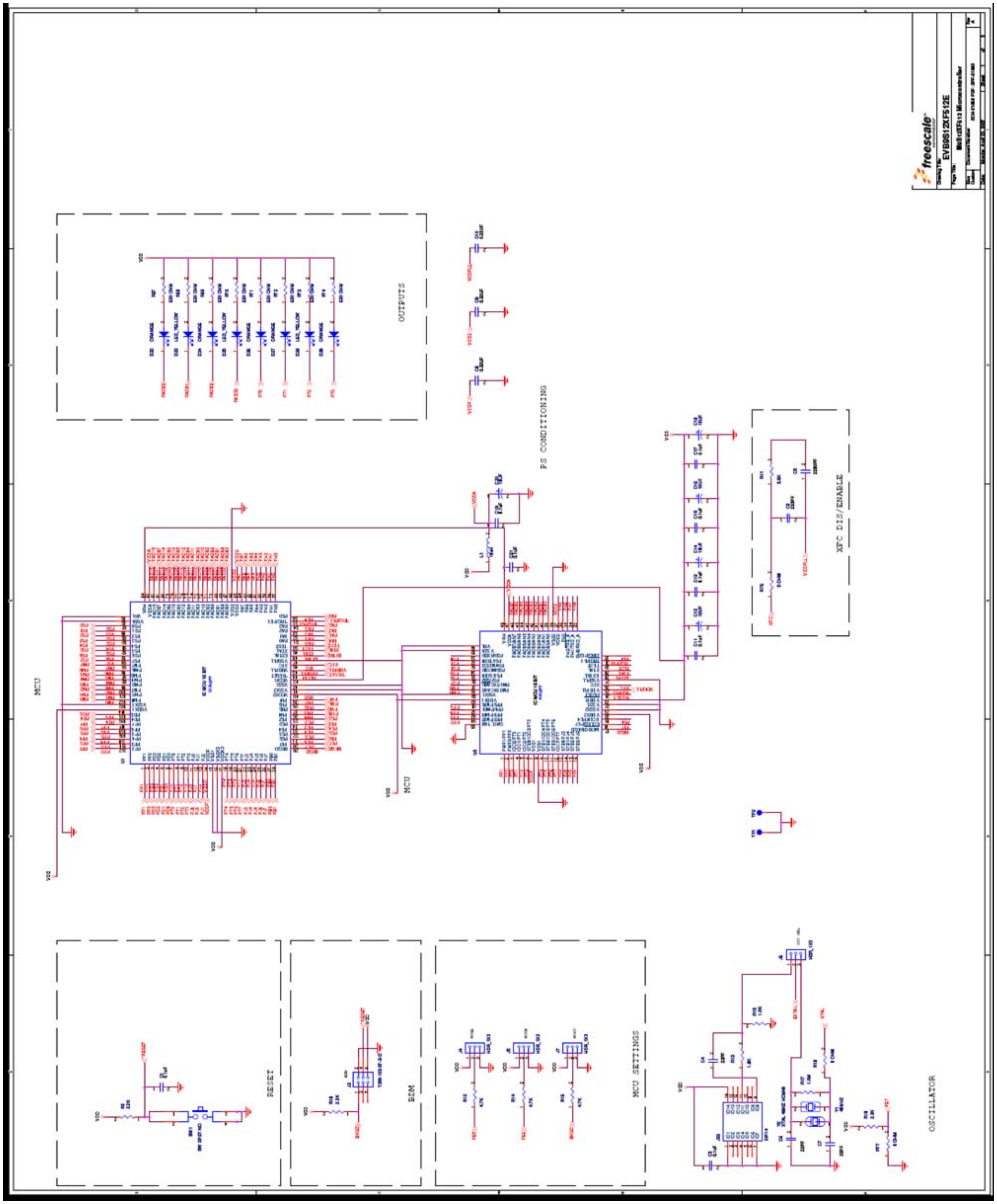


Figure 8. MC9S12XF512 Microcontroller

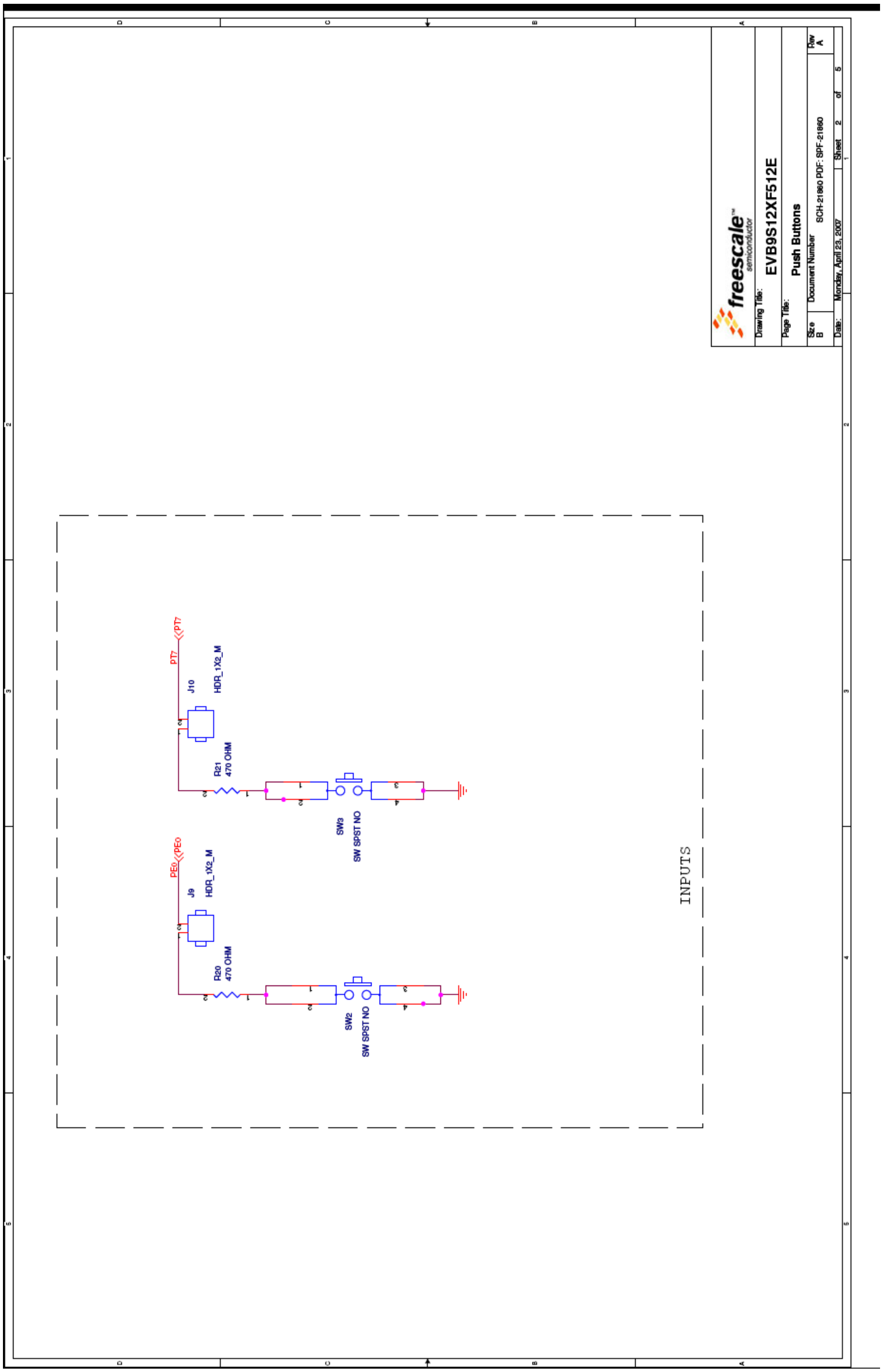


Figure 9. Power Supply Conditioning and Push Buttons

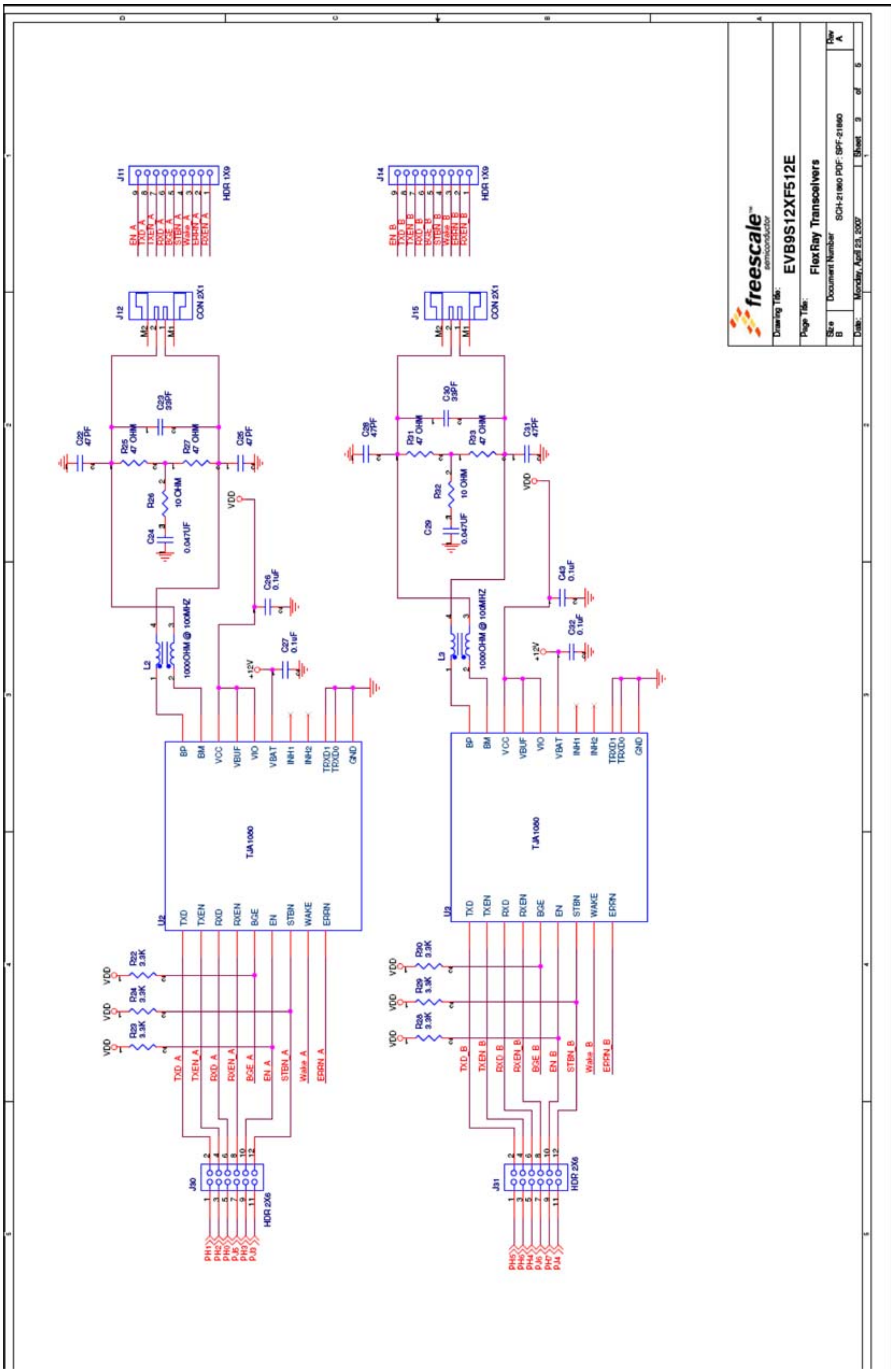


Figure 10. FlexRay Transceivers

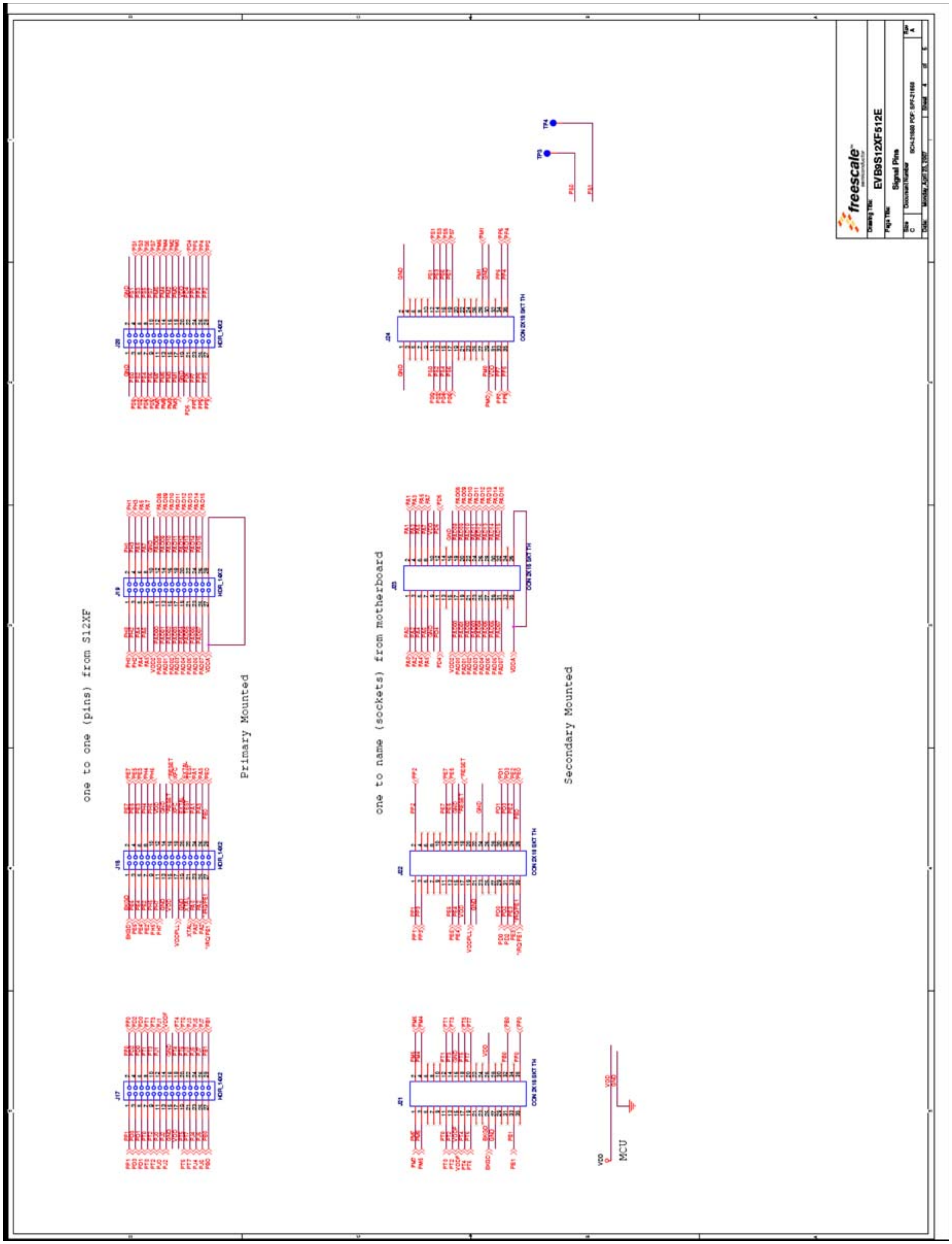


Figure 11. Signal Pins

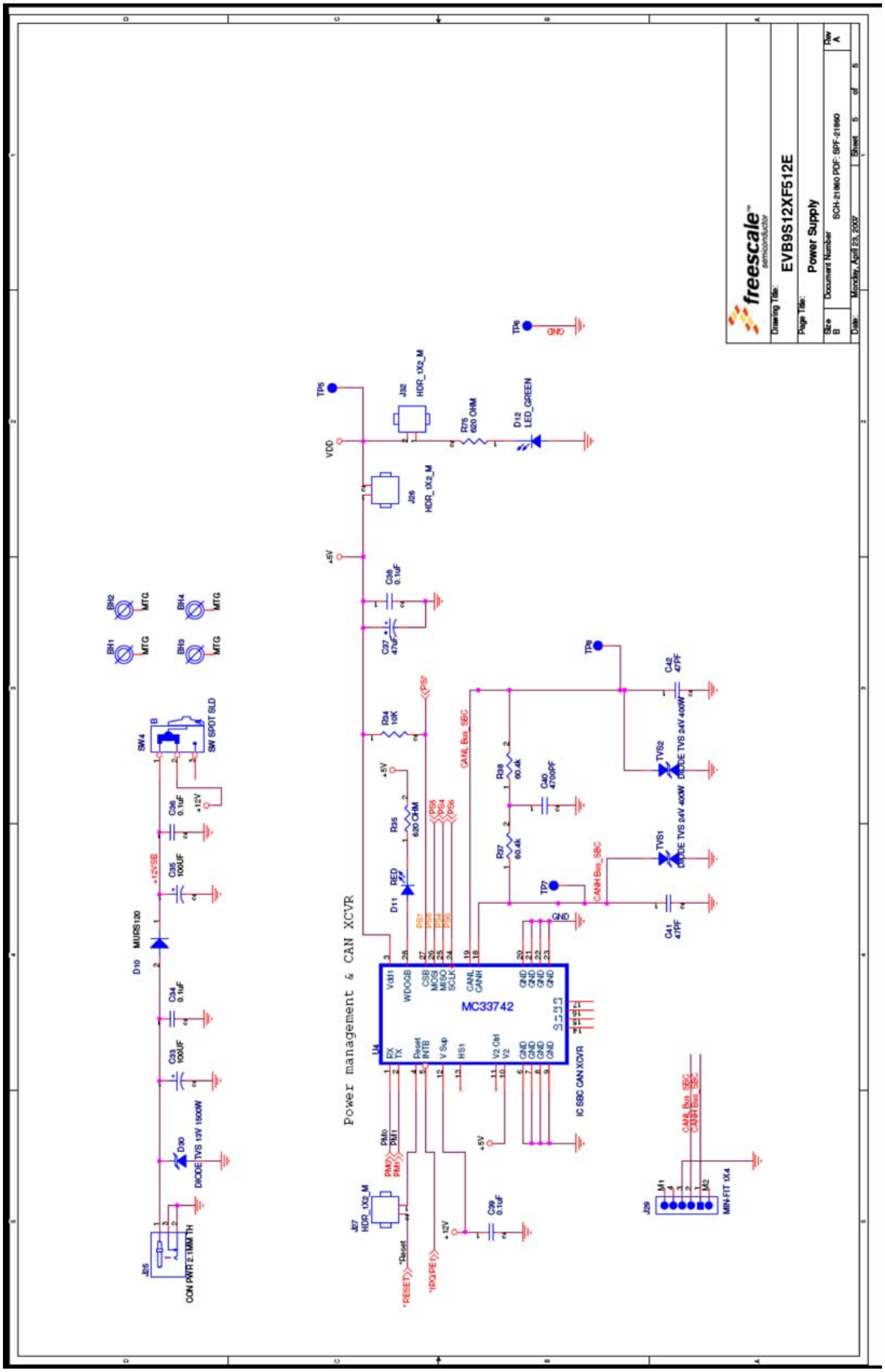


Figure 12. Power Supply

7 Additional Information

This section contains links to the product summary pages, data sheets, and other useful information for the EVB9S12XF512E.

7.1 Product Summary Pages

- Freescale M9S12XF512:
  http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MC9S12XF512
- Freescale MC33742:
  http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MC33742

7.2 Datasheets

- Freescale MC9S12XF512 Reference Manual:
  http://www.freescale.com/files/microcontrollers/doc/ref_manual/MC9S12XF512V1RM.pdf
- Freescale MC33742: http://www.freescale.com/files/analog/doc/data_sheet/MC33742.pdf
- NXP Homepage: http://www.nxp.com/

7.3 Tool Summary Pages

- Freescale S12XF Starter Kit (S12XFSTARTERKITE)
- http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=S12XFSTARTERKITE
- Freescale S12XF Evaluation Board (EVB9S12XF512E)
- http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=EVB9S12XF512E

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