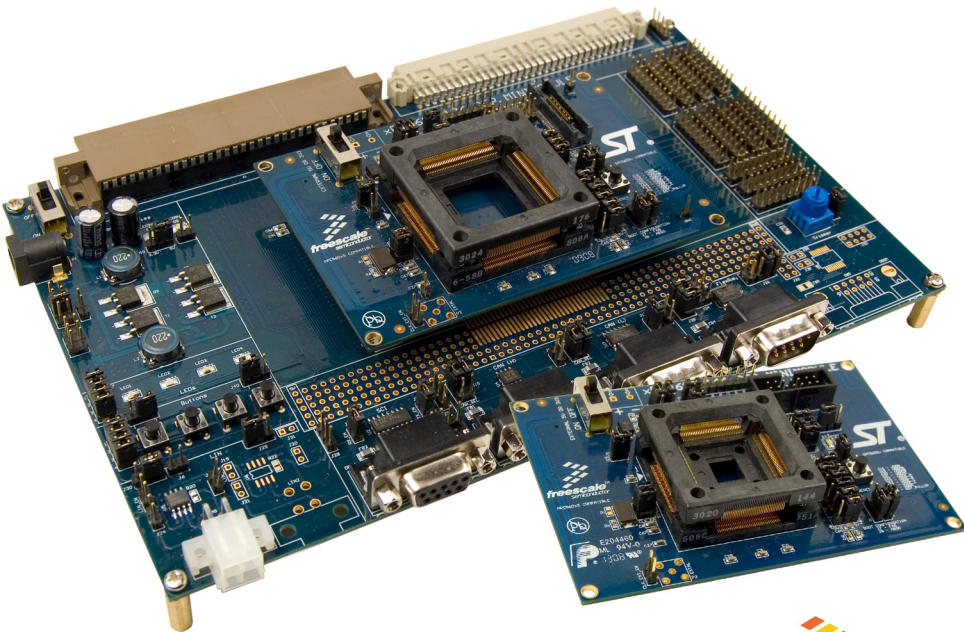


# PE micro

## XPC560S EVB User Manual



XPC560SEVBUM  
Rev. 1.00  
June 2008



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Manual version 1.00

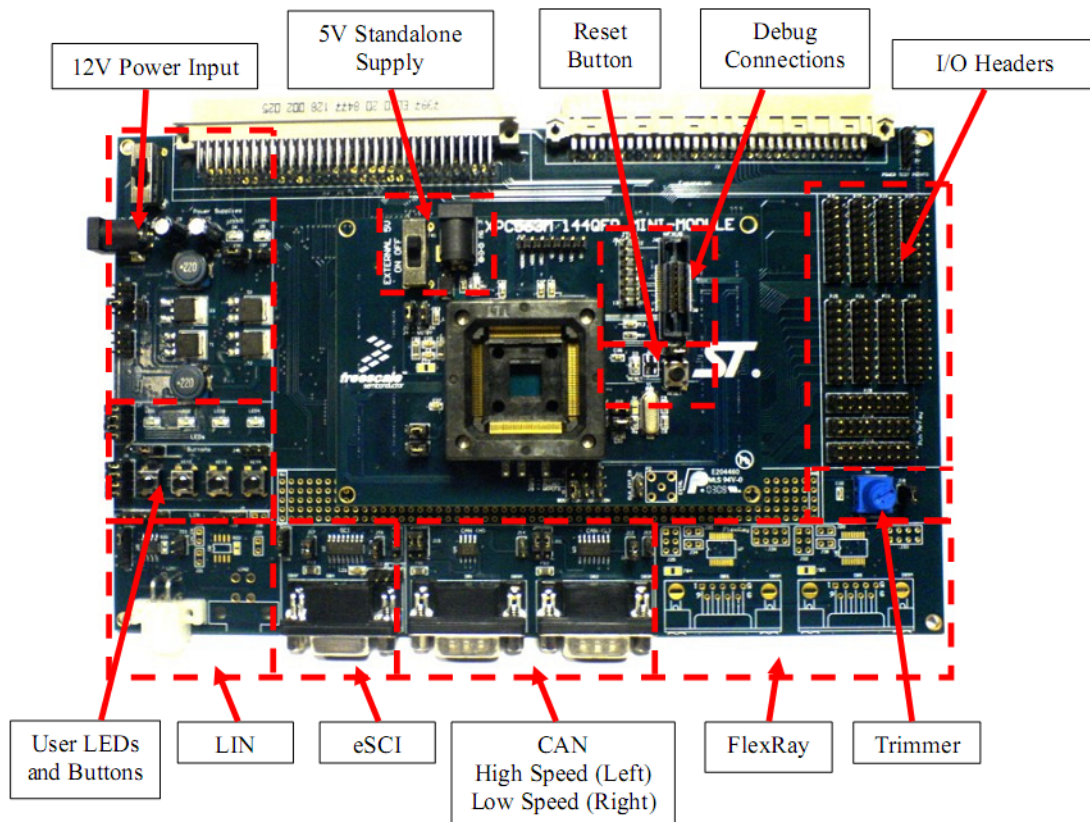
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# 1 OVERVIEW

The xPC560S EVB is an evaluation system supporting Freescale MPC560xS microprocessors. The complete system consists of an xPC56XXMB Motherboard and an xPC560SADPT Mini-Module which plugs into the motherboard. Different Mini-Modules are available for evaluating devices with different footprints in the MPC560xS family of microprocessors. The evaluation system allows full access to the CPU, all of the CPU's I/O signals, and the motherboard peripherals (such as CAN, SCI, LIN). The Mini-Module may be used as a stand-alone unit, which allows access to the CPU, but no access to the I/O pins or any motherboard peripherals.



**Figure 1-1: Overview of the xPC560S EVB**

## 1.1 Package Contents

An xPC560S Evaluation Kit includes the following items:

- One xPC56XXMB Motherboard
- One xPC560SADPT144S or xPC560SADPT176S or xPC560SADPT208S Mini-Module
- One xPC56XX Resources CD-ROM
- One P&E USB-ML-PPCNEXUS Hardware Interface Cable
- One USB A-to-B Cable
- Freescale Warranty Card

An xPC560S Adapter Package includes the following items:

- One xPC560SADPT144S or xPC560SADPT176S or xPC560SADPT208S Mini-Module
- One xPC56XX Resources CD-ROM
- Freescale Warranty Card

## 1.2 Supported Devices

The xPC560SADPT144S Mini-Module supports the following devices:

- MPC5606SEMLQ (144LQFP)

The xPC560SADPT176S Mini-Module supports the following devices:

- MPC5606SEMLU (176LQFP)

The xPC560SADPT208S Mini-Module supports the following devices:

- MPC5606SEMMG (208BGA)

## 1.3 Recommended Materials

- Freescale MPC5606S reference manual and datasheet
- xPC56XXMB schematic
- xPC560SADPT100S schematic
- xPC560SADPT144S schematic
- xPC560SADPT208S schematic

#### **1.4 Handling Precautions**

Please take care to handle the package contents in a manner such as to prevent electrostatic discharge.

## 2 HARDWARE FEATURES

The xPC560S EVB is an evaluation system for Freescale's MPC560xS microprocessors. A 38-pin Mictor Nexus port and/or a 14-pin JTAG port are provided on the Mini-Module to allow usage of an external PowerPC Nexus interface such as P&E USB-ML-PPCNEXUS cable and Cyclone MAX automated programmer.

- **xPC56XXMB Board Features**

- ON/OFF Power Switch w/ LED indicators
- A 12VDC power supply input barrel connector
- Onboard ST Microelectronics L9758 regulator provides three different power voltages simultaneously: 5V, 3.3V, and 1.2V
- Onboard peripherals can be configured to operate at 5V or 3.3V logic levels
- Two CAN channels with jumper enables
  - One CAN channel with High-Speed transceiver and DB9 male connector
  - One CAN channel with Low-Speed Fault Tolerant and High-Speed transceiver (selectable with jumpers) and DB9 male connector
- Two LIN channels with jumper enables
  - One channel with transceiver and pin header connector populated
  - One channel with footprints only
- One SCI channel with jumper enables
  - Transceiver with DB9 female connector
- Two FlexRay channels with jumper enables
  - One channel with transceiver and DB9 male connector
  - One channel with footprint only
- Four user push buttons with jumper enables and 0 or 1 forcing configurable



- Four user LED's with jumper enables
- One potentiometer for analog voltage input
- Pin array for accessing all I/O signals
- Expansion connectors for accessing all I/O signals
- Development zone with 0.1" spacing and SOIC footprint prototyping
- Specifications:
  - Board Size 5.5" x 9.0"
  - 12VDC Center Positive power supply with 2.5/5.5mm barrel connector

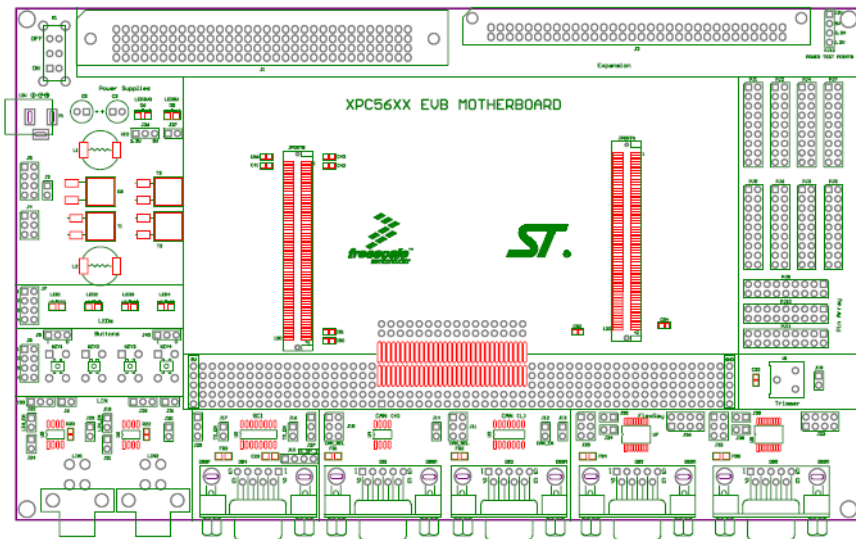


Figure 2-1: xPC56XXMB Top Component Placement

## 2.1 xPC560SADPT Mini-Module Board Features

- Can be used as a stand-alone board by providing external 5V power supply input
- ON/OFF Power Switch w/ LED indicator
- Reset button with filter and LED indicator

- xPC560SADPT100S has socket for MPC560xS in 100LQFP footprint
- xPC560SADPT144S has socket for MPC560xS in 144LQFP footprint
- xPC560SADPT208S has socket for MPC560xS in 208BGA footprint
- Debug ports: 38-pin Mictor Nexus port and/or 14-pin JTAG port
- Direct clock input through SMA connector (footprint only)
- Jumpers for boot configuration

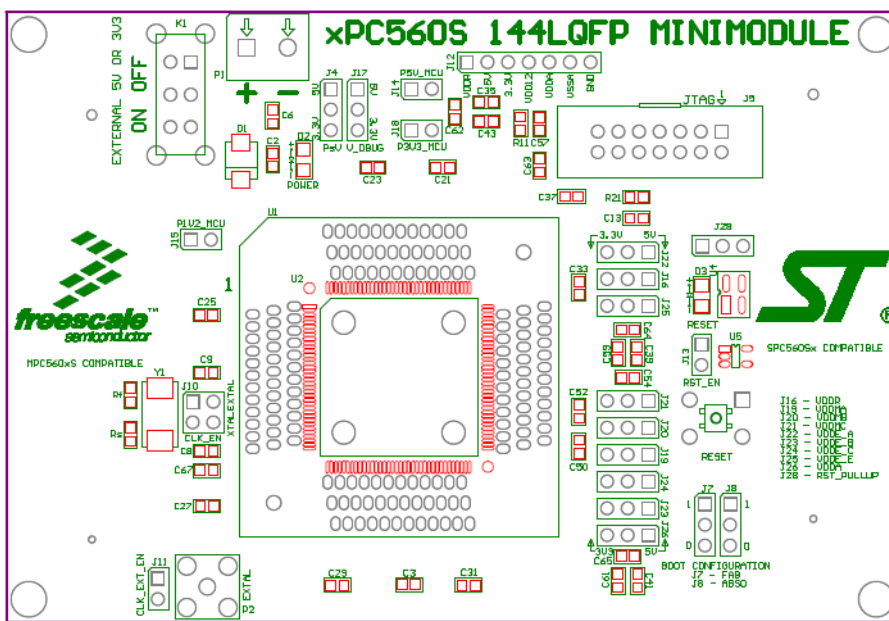


Figure 2-2: xPC560SADPT144S Top Component Placement



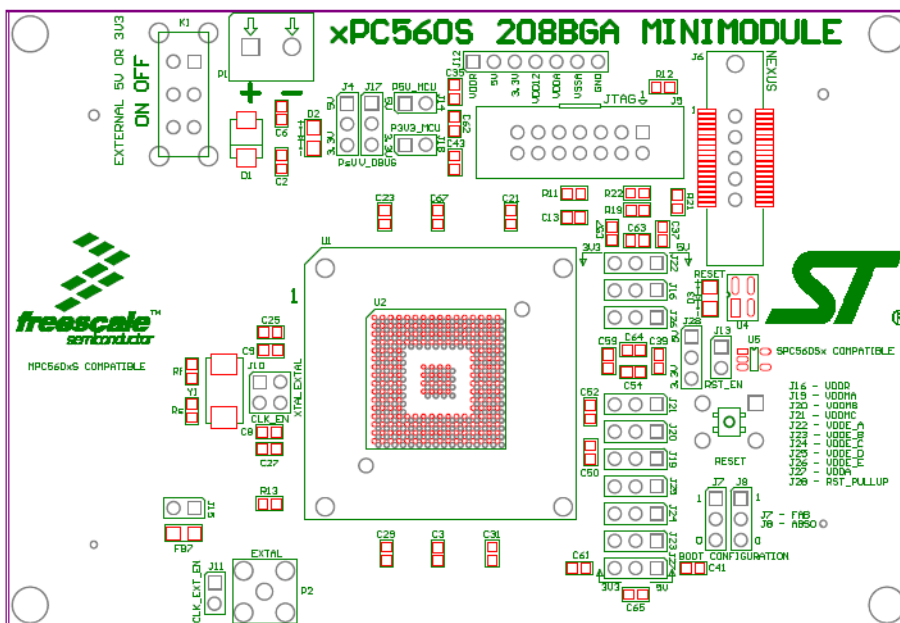
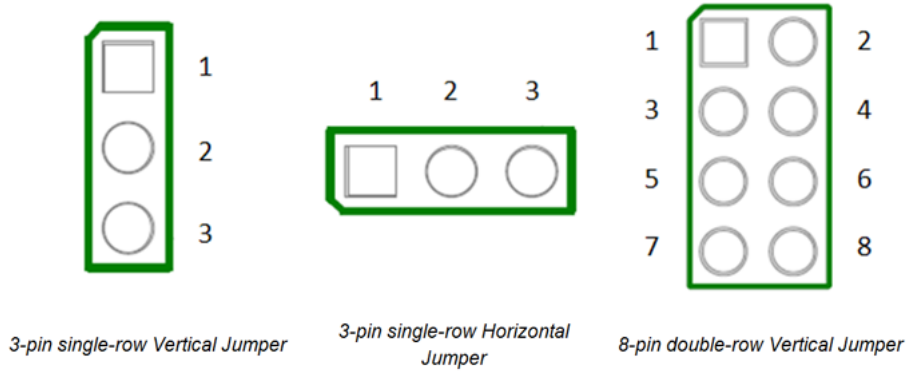


Figure 2-4: xPC560SADPT208S Top Component Placement

## 2.2 Pin Numbering for Jumpers

Jumpers for both the xPC56XXMB motherboard and the xPC560S Mini-Modules have a rounded corner to indicate the position of pin 1. See examples below for the numbering convention used in this manual for jumper settings.



**Figure 2-5: Pin Numbering**

### 3 xPC56XXMB HARDWARE & JUMPER SETTINGS

#### 3.1 Power Supplies

The xPC56XXMB obtains its power from the 12VDC Center Positive input barrel connector. The following jumpers are used to configure the power supply output:

##### J3 – VSA Tracking Regulator Configuration

| Jumper Setting | Effect   |
|----------------|--|
| On             | The ST L9758 tracking regulator VSA tracks the input voltage at its TRACK_REF pin. |
| Off (default)  | The ST L9758 tracking regulator VSA tracks 5V                                      |

##### J4 – VPROG Regulators Control

| Jumper Setting | Position      | Effect  |
|----------------|---------------|---|
| 1+2            | On            | $V_{KAM}$ regulator output is programmed to 1V    |
|                | Off (default) | $V_{KAM}$ regulator output is programmed to 1.5V  |
| 3+4            | On            | $V_{STBY}$ regulator output is programmed to 2.6V |
|                | Off (default) | $V_{STBY}$ regulator output is programmed to 3.3V |

|     |                  |  |
|-----|------------------|--|
| 5+6 | On               | $V_{DLL}$ regulator output is programmed to 2.6V |
|     | Off<br>(default) | $V_{DLL}$ regulator output is programmed to 3.3V |

### J5 – Regulators Enable & Standby

| Jumper Setting | Position         | Effect  |
|----------------|------------------|---|
| 1+2            | On               | The power regulator is always on  |
|                | Off<br>(default) | The power regulator is in standby if jumpers 5+6 are also in the “off” position |
| 3+4            | On               | VSB, VSC, and VSD tracking regulators are disabled                              |
|                | Off<br>(default) | VSB, VSC, and VSD tracking regulators are enabled                               |
| 5+6            | On<br>(default)  | The power regulator is always on  |
|                | Off              | The power regulator is in standby if jumpers 1+2 are also in the “off” position |
| 7+8            | On               | $V_{DLL}$ and $V_{CORE}$ regulators are disabled                                |
|                | Off<br>(default) | $V_{DLL}$ and $V_{CORE}$ regulators are enabled                                 |

### J36 – VIO Peripherals Logic Level

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | Onboard peripherals are configured for 3.3V logic |
| 2+3 (default)  | Onboard peripherals are configured for 5V logic   |

### J37 – VBat low voltage detection

| Jumper Setting | Effect                            |
|----------------|-----------------------------------|
| On             | Low battery detection is enabled  |
| Off (default)  | Low battery detection is disabled |

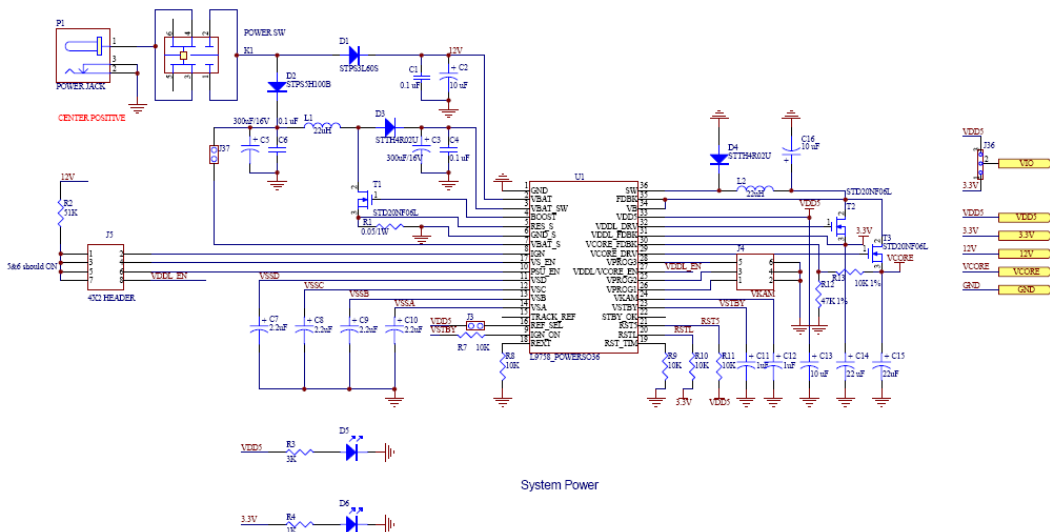


Figure 3-1: Power Supply circuitry schematic



### 3.2 LEDs

There are four user LEDs available on the xPC56XXMB. All LEDs are active low.

#### J7 – LEDs Enable

Controls whether the LEDs on the xPC56XXMB motherboard are connected to I/O pins of the processor. The jumpers can be removed and wires can be used to connect each LED to any processor I/O pin, if desired. Please note that although the schematics indicate that the processor I/O pins are eMIOSx, those are not the I/O pins for the xPC560S EVB. The table below has the correct pins listed.

| Jumper Setting   | Effect                |
|------------------|-----------------------|
| 1+2 (default on) | LED1 connected to PE4 |
| 3+4 (default on) | LED2 connected to PE5 |
| 5+6 (default on) | LED3 connected to PE6 |
| 7+8 (default on) | LED4 connected to PE7 |

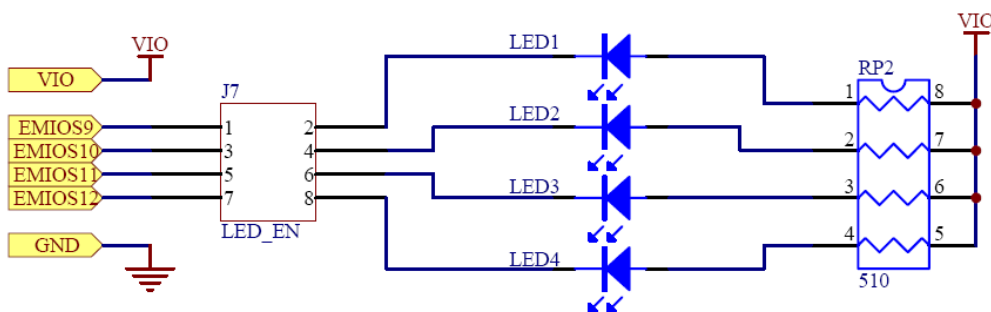


Figure 3-2: LEDs circuitry schematic

### 3.3 Buttons

There are four user buttons available on the xPC56XXMB.

#### J8 – Buttons Enable

Controls whether the buttons on the xPC56XXMB motherboard are connected to I/O pins of the processor. The jumpers can be removed and wires can be used to connect each button to any processor I/O pin, if desired. Please note that although the schematics indicate that the processor I/O pins are eMIOSx, those are not the I/O pins for the xPC560S EVB. The table below has the correct pins listed.

| Jumper Setting   | Effect                |
|------------------|-----------------------|
| 1+2 (default on) | KEY1 connected to PE0 |
| 3+4 (default on) | KEY2 connected to PE1 |
| 5+6 (default on) | KEY3 connected to PE2 |
| 7+8 (default on) | KEY4 connected to PE3 |

#### J9 – Buttons Driving Configuration

Selects whether the buttons drive logic high or drive logic low when pressed.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | When pressed, buttons will send logic high to the connected I/O pin |
| 2+3 (default)  | When pressed, buttons will send logic low to the connected I/O pin  |

#### J40 – Buttons Idle Configuration

Selects whether the I/O pins are pulled logic high or pulled logic low. This controls the default logic level of the I/O pins when the buttons are not pressed.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | I/O pins connected to the buttons are pulled up to logic high  |
| 2+3            | I/O pins connected to the buttons are pulled down to logic low |

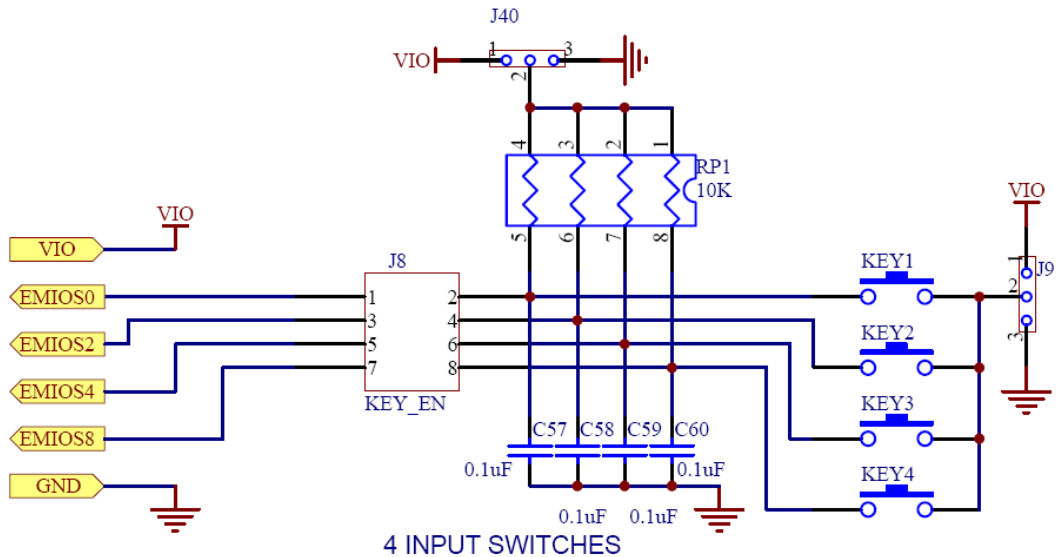


Figure 3-3: Buttons circuitry schematic

### 3.4 LIN

There are footprints for two LIN connections on the xPC56XXMB. By default, one LIN circuit is assembled (LIN1) and the other circuit is left unpopulated

(LIN2).

#### J6 – LIN1 pin2 configuration

| Jumper Setting | Effect  |
|----------------|---|
| On             | Pin 2 of the LIN1 connector is connected to 12V     |
| Off (default)  | Pin 2 of the LIN1 connector is not connected to 12V |

#### J22 – LIN1 enable

| Jumper Setting | Effect                        |
|----------------|-------------------------------|
| On (default)   | Enables the LIN1 transceiver  |
| Off            | Disables the LIN1 transceiver |

#### J23 – LIN1 master selection

| Jumper Setting | Effect                              |
|----------------|-------------------------------------|
| On             | LIN1 is configured as a master node |
| Off (default)  | LIN1 is configured as a slave node  |

#### J24 – LIN1 pin1 configuration

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

|               |   |
|---------------|---|
| On            | Pin 1 of the LIN1 connector is connected to 12V     |
| Off (default) | Pin 1 of the LIN1 connector is not connected to 12V |

### J27 – LIN1/SCI TxD selection

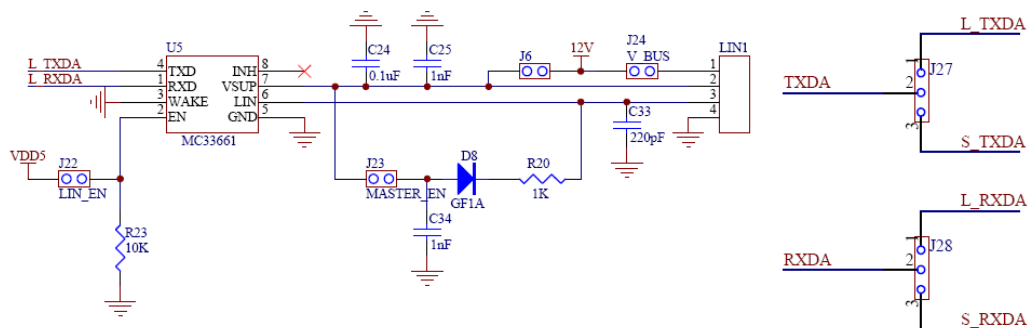
Controls whether the TxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The LIN1 TxD pin is connected to the “PB3” pin on the MPC560xS processor. This should be set if enabling LIN1. |
| 2+3            | The SCI TxD pin is connected to the “PB3” pin on the MPC560xS processor.                                       |

### J28 – LIN1/SCI RxD selection

Controls whether the RxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The LIN1 RxD pin is connected to the “PB2” pin on the MPC560xS processor. This should be set if enabling LIN1. |
| 2+3            | The SCI RxD pin is connected to the “PB2” pin on the MPC560xS processor.                                       |



**Figure 3-4: LIN1 Schematic**

**J31 – LIN2 pin2 configuration**

| Jumper Setting | Effect  |
|----------------|---|
| On             | Pin 2 of the LIN2 connector is connected to 12V     |
| Off (default)  | Pin 2 of the LIN2 connector is not connected to 12V |

**J19 – LIN2 enable**

| Jumper Setting | Effect                        |
|----------------|-------------------------------|
| On             | Enables the LIN2 transceiver  |
| Off (default)  | Disables the LIN2 transceiver |

### J20 – LIN2 master selection

| Jumper Setting | Effect                              |
|----------------|-------------------------------------|
| On             | LIN2 is configured as a master node |
| Off (default)  | LIN2 is configured as a slave node  |

### J21 – LIN2 pin1 configuration

| Jumper Setting | Effect  |
|----------------|---|
| On             | Pin 1 of the LIN2 connector is connected to 12V     |
| Off (default)  | Pin 1 of the LIN2 connector is not connected to 12V |

### J29 – LIN2/SCI TxD selection

Controls whether the TxD pin on LIN2 or SCI is connected to the default I/O pin on the MPC560xS processor.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The LIN2 TxD pin is connected to the “PI6” pin on the MPC560xS processor. This should be set if enabling LIN2. |
| 2+3            | The SCI TxD pin is connected to the “PI6” pin on the MPC560xS processor.                                       |

### J30 – LIN2/SCI RxD selection

Controls whether the RxD pin on LIN2 or SCI is connected to the default I/O pin on the MPC560xS processor.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The LIN2 RxD pin is connected to the “PI7” pin on the MPC560xS processor. This should be set if enabling LIN2. |
| 2+3            | The SCI RxD pin is connected to the “PI7” pin on the MPC560xS processor.                                       |

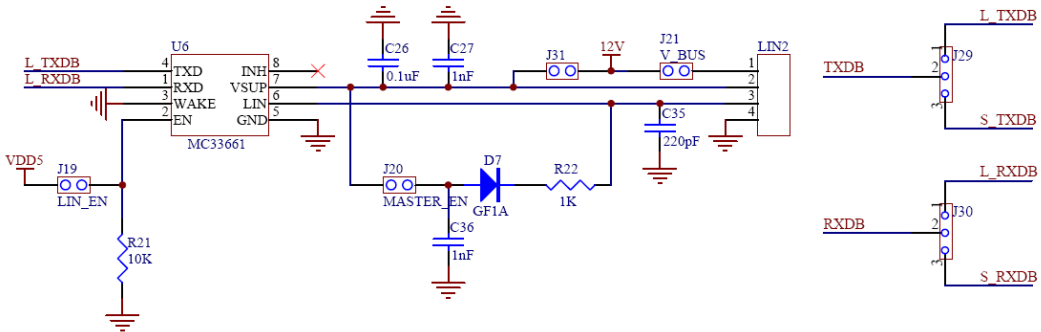


Figure 3-5: LIN2 schematic



## SCI

One SCI interface is available on the xPC56XXMB.

### J16 – SCI TxD Enable

| Jumper Setting | Effect                |
|----------------|-----------------------|
| On (default)   | Enables SCI transmit  |
| Off            | Disables SCI transmit |

### J17 – SCI RxD Enable

| Jumper Setting | Effect               |
|----------------|----------------------|
| On (default)   | Enables SCI receive  |
| Off            | Disables SCI receive |

### J27 – LIN1/SCI TxD selection

Controls whether the TxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The LIN1 TxD pin is connected to the “PB3” pin on the MPC560xS processor. |

|     |  |
|-----|--|
| 2+3 | The SCI TxD pin is connected to the “PB3” pin on the MPC560xS processor. This should be set if enabling SCI. |
|-----|--|

### J28 – LIN1/SCI RxD selection

Controls whether the RxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The LIN1 RxD pin is connected to the “PB2” pin on the MPC560xS processor.                                    |
| 2+3            | The SCI RxD pin is connected to the “PB2” pin on the MPC560xS processor. This should be set if enabling SCI. |

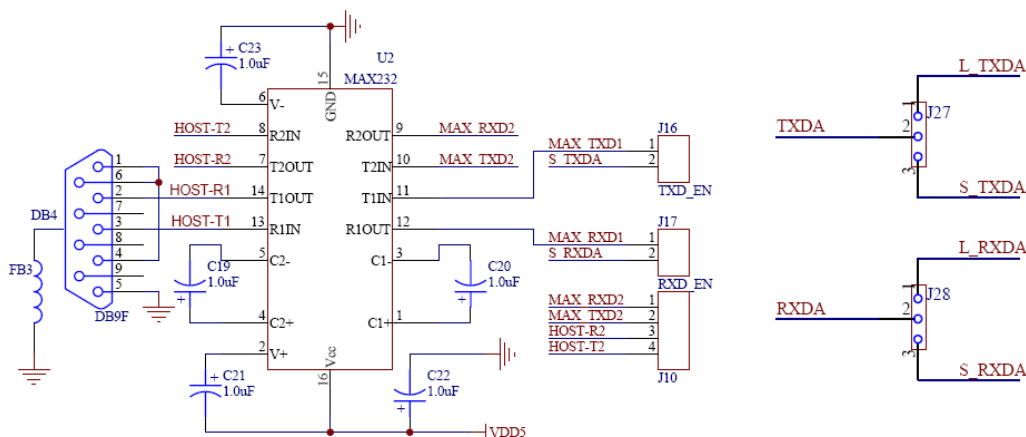


Figure 3-6: SCI schematic

### 3.5 CAN

Two CAN interfaces are implemented on the xPC56XXMB: a high-speed CAN interface and a low-speed CAN interface.

#### J14 – CAN (H) Transmit Enable

| Jumper Setting | Effect                    |
|----------------|---------------------------|
| On             | Enables CAN transmission  |
| Off (default)  | Disables CAN transmission |

#### J15 – CAN (H) TxD/RxD Enable

Controls which I/O pins on the MPC560xS processor are connected to the TxD and RxD pins on CAN (H).

| Jumper Setting | Effect   |
|----------------|--|
| 1+3 (default)  | The RxD pin of the CAN (H) interface is connected to the “PB1” pin of the MPC560xS processor.  |
| 3+5            | The RxD pin of the CAN (H) interface is connected to the “PB10” pin of the MPC560xS processor. |
| 2+4 (default)  | The TxD pin of the CAN (H) interface is connected to the “PB0” pin of the MPC560xS processor.  |
| 4+6            | The TxD pin of the CAN (H) interface is connected to the “PB11” pin of the MPC560xS processor. |

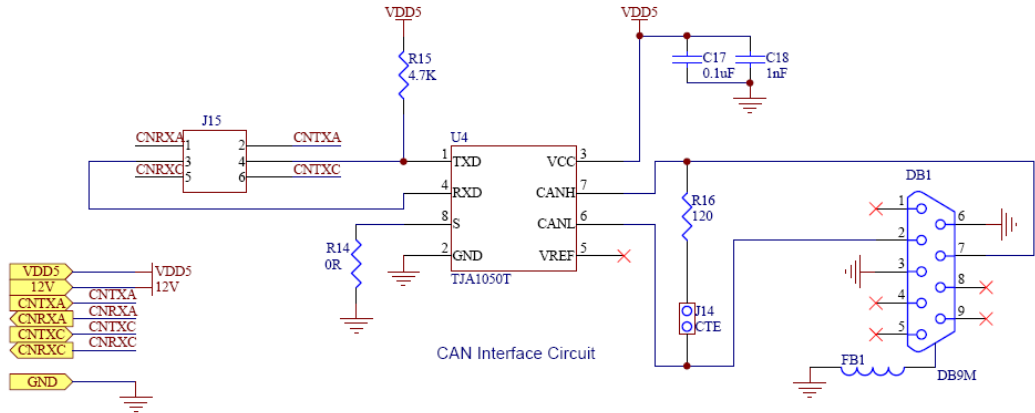
### J13 – CAN (L) CTE

| Jumper Setting | Effect                    |
|----------------|---------------------------|
| On             | Enables CAN transmission  |
| Off (default)  | Disables CAN transmission |

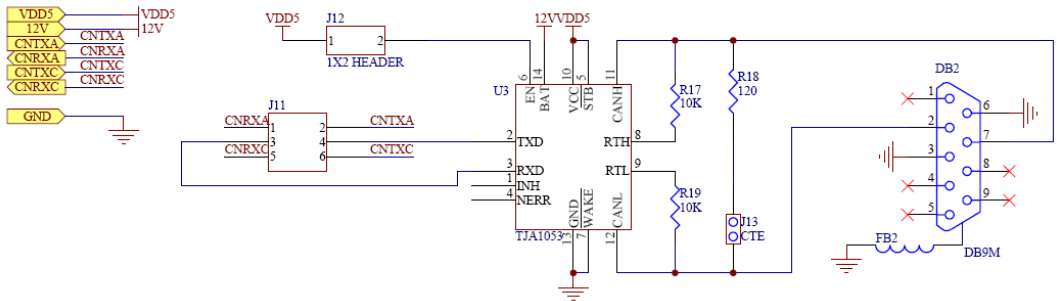
### J11 – CAN (L) TxD/RxD Enable

Controls which I/O pins on the MPC560xS processor are connected to the TxD and RxD pins on CAN (L).

| Jumper Setting | Effect   |
|----------------|--|
| 1+3            | The RxD pin of the CAN (L) interface is connected to the “PB1” pin of the MPC560xS processor.  |
| 3+5 (default)  | The RxD pin of the CAN (L) interface is connected to the “PB10” pin of the MPC560xS processor. |
| 2+4            | The TxD pin of the CAN (L) interface is connected to the “PB0” pin of the MPC560xS processor.  |
| 4+6 (default)  | The TxD pin of the CAN (L) interface is connected to the “PB11” pin of the MPC560xS processor. |



**Figure 3-7: High Speed CAN schematic**



**Figure 3-8: Low Speed CAN schematic**

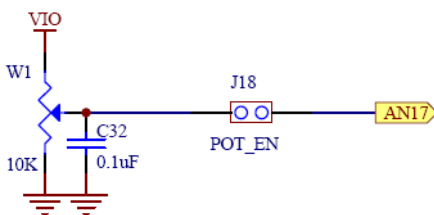
### 3.6 Potentiometer

A potentiometer is available on the xPC56XXMB to allow an analog voltage input.

#### J18 – POT Enable

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

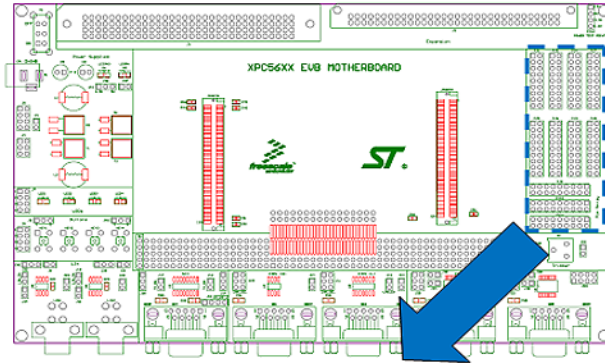
|              |   |
|--------------|---|
| On (default) | The potentiometer wiper terminal is connected to the “PBO” pin on the MPC560xS processor. |
| Off          | The potentiometer wiper terminal is left disconnected.                                    |



**Figure 3-9: Potentiometer schematic**

### 3.7 Pin Mapping

The following is the xPC560S EVB pin assignment for the Pin Array headers:



#### PJ1

|              |              |
|--------------|--------------|
| RESET        | RESET        |
| CNRX0 - PB1  | CNRX1 - PB10 |
| CNTX0 - PB0  | CNTX1 - PB11 |
| SINO - PB7   | SOUT0 - PB8  |
| SCKO - PB9   | PCS01 - PB4  |
| PCS0.2 - PB5 | PCS0.3 - PB6 |
| RXD0 - PB2   | TXD0 - PB3   |
| RXD1 - PB12  | TXD1 - PB13  |
| GND          | 5V           |

#### PJ2 - Port J

|      |      |
|------|------|
| PJ0  | PJ1  |
| PJ2  | PJ3  |
| PJ4  | PJ5  |
| PJ6  | PJ7  |
| PJ8  | PJ9  |
| PJ10 | PJ11 |
| PJ12 | PJ13 |
| PJ14 | PJ15 |
| GND  | 5V   |

#### PJ4 - Port C

|      |      |
|------|------|
| PC0  | PC1  |
| PC2  | PC3  |
| PC4  | PC5  |
| PC6  | PC7  |
| PC8  | PC9  |
| PC10 | PC11 |
| PC12 | PC13 |
| PC14 | PC15 |
| GND  | 5V   |

#### PJ7 - Port A + K

|      |      |
|------|------|
| PA0  | PA1  |
| PA2  | PA3  |
| PA4  | PA5  |
| PA6  | PA7  |
| PA8  | PA9  |
| PA10 | PA11 |
| PA12 | PA13 |
| PA14 | PA15 |
| PK0  | PK1  |

#### PJ5 - Port B

|      |      |
|------|------|
| PB0  | PB1  |
| PB2  | PB3  |
| PB4  | PB5  |
| PB6  | PB7  |
| PB8  | PB9  |
| PB10 | PB11 |
| PB12 | PB13 |
| PB14 | PB15 |
| GND  | 5V   |

#### PJ6 - Port C

|      |      |
|------|------|
| PI0  | PI1  |
| PI2  | PI3  |
| PI4  | PI5  |
| PI6  | PI7  |
| PI8  | PI9  |
| PI10 | PI11 |
| PI12 | PI13 |
| PI14 | PI15 |
| GND  | 5V   |

#### PJ3 - Port D

|      |      |
|------|------|
| PD0  | PD1  |
| PD2  | PD3  |
| PD4  | PD5  |
| PD6  | PD7  |
| PD8  | PD9  |
| PD10 | PD11 |
| PD12 | PD13 |
| PD14 | PD15 |
| GND  | 5V   |

#### PJ8 - Port E

|      |      |
|------|------|
| PE0  | PE1  |
| PE2  | PE3  |
| PE4  | PE5  |
| PE6  | PE7  |
| PE8  | PE9  |
| PE10 | PE12 |
| PE11 | PE13 |
| PE14 | PE15 |
| GND  | 5V   |

#### PJ9 - Port F

|     |      |      |      |     |     |     |     |     |
|-----|------|------|------|-----|-----|-----|-----|-----|
| GND | PF14 | PF12 | PF10 | PF8 | PF6 | PF4 | PF2 | PF0 |
| 5V  | PF15 | PF13 | PF11 | PF9 | PF7 | PF5 | PF3 | PF1 |

#### PJ10 - Port G

|     |      |      |      |     |     |     |     |     |
|-----|------|------|------|-----|-----|-----|-----|-----|
| GND | PG14 | PG12 | PG10 | PG8 | PG6 | PG4 | PG2 | PG0 |
| 5V  | PG15 | PG13 | PG11 | PG9 | PG7 | PG5 | PG3 | PG1 |

#### PJ11 - Port H

|     |      |      |      |     |     |     |     |     |
|-----|------|------|------|-----|-----|-----|-----|-----|
| GND | PH14 | PH12 | PH10 | PH8 | PH6 | PH4 | PH2 | PH0 |
| 5V  | PH15 | PH13 | PH11 | PH9 | PH7 | PH5 | PH3 | PH1 |

Figure 3-10: Pin Mapping

## 4 xPC560SADPT144S HARDWARE & JUMPER SETTINGS

### 4.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

#### J7 – FABM Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

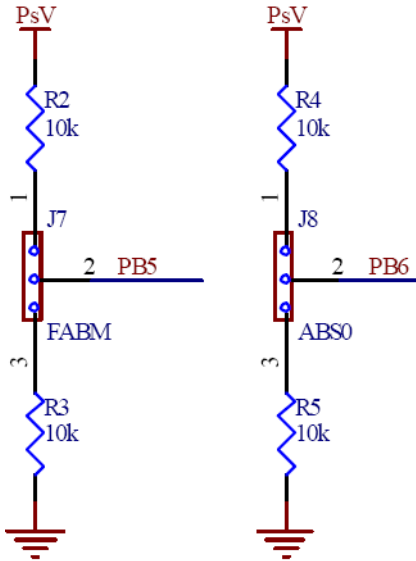
| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The MPC560xS processor uses serial boot mode   |
| 2+3 (default)  | The MPC560xS processor uses internal boot mode |

#### J8 – ABS0 Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The MPC560xS processor uses the CAN interface for serial boot mode  |
| 2+3 (default)  | The MPC560xS processor uses the UART interface for serial boot mode |





**Figure 4-1: Boot Configuration Jumpers**

## 4.2 Power Configuration

When the xPC560S Mini-Module is plugged into the xPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the xPC560S Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. Note that when using the xPC560S Mini-Module as a stand-alone board, only one power supply is available (5V or 3.3V), and all appropriate jumpers must be configured to use that power supply.

The following jumpers affect the power supply pins of the MPC560xS processor:

### J4 – VIO Voltage Selection

Controls whether certain I/O pins are powered using 5V or 3.3V. In particular,

this controls the voltage of the reset circuit and the logic high voltage for the FABM and ABS0 pins.

| Jumper Setting | Effect              |
|----------------|---------------------|
| 1+2 (default)  | VIO voltage is 5V   |
| 2+3            | VIO voltage is 3.3V |

#### J14 – 5V MCU Power Enable

Allows 5V to be selected for the various power pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | 5V is available to power the various power supply pins on the MPC560xS processor          |
| Off            | 5V cannot be used to power any of the various power supply pins on the MPC560xS processor |

#### J15 – 1.2V Core Voltage Enable

Controls whether power is provided to the “VDD 1V2” pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | MPC560xS “VDD 1V2” pins are connected to 1.2V power |

|     |   |
|-----|---|
| Off | MPC560xS “VDD 1V2” pins are left disconnected |
|-----|---|

### J17 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to communicate with the processor.

| Jumper Setting | Effect                                      |
|----------------|---|
| 1+2 (default)  | Debug port(s) are configured for 5V logic   |
| 2+3            | Debug port(s) are configured for 3.3V logic |

### J18 – 3.3V MCU Power Enable

Allows 3.3V to be selected for the various power pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | 3.3V is available to power the various power supply pins on the MPC560xS processor          |
| Off            | 3.3V cannot be used to power any of the various power supply pins on the MPC560xS processor |

### J22 – VDDE\_A Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_B” and “VDD\_IO\_C”

power pins.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_IO_B” and “VDD_IO_C” pins are powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_B” and “VDD_IO_C” pins are powered by 3.3V (J18 must be ON) |

#### J16 – VDDR Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_A” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_A” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_A” is powered by 3.3V (J18 must be ON) |

#### J25 – VDDE\_E Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_D” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_D” is powered by 5V (J14 must be ON) |

|     |   |
|-----|---|
| 2+3 | MPC560xS “VDD_IO_D” is powered by 3.3V (J18 must be ON) |
|-----|---|

### J21 – VDDMC Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_C” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_C” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_C” is powered by 3.3V (J18 must be ON) |

### J20 – VDDMB Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_B” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_B” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_B” is powered by 3.3V (J18 must be ON) |

### J19 – VDDMA Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_A” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_A” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_A” is powered by 3.3V (J18 must be ON) |

### J24 – VDDE\_C Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_F” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_F” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_F” is powered by 3.3V (J18 must be ON) |

### J23 – VDDE\_B Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_E” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_E” is powered by 5V (J14 must be ON) |

|     |   |
|-----|---|
| 2+3 | MPC560xS “VDD_IO_E” is powered by 3.3V (J18 must be ON) |
|-----|---|

### J26 – VDDA Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_ADC” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_ADC” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_ADC” is powered by 3.3V (J18 must be ON) |

## 4.3 System Clock Configuration

The xPC560S Mini-Modules support the usage of crystal clock sources as well as external clock sources.

### J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | The MPC560xS “EXTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module |
| 3+4 (default)  | The MPC560xS “XTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module  |

### J11 – External clock source enable

The xPC560S Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

| Jumper Setting | Effect   |
|----------------|--|
| On             | The MPC560xS “EXTAL” signal is connected to the SMA connector on the xPC560S Mini-Module |
| Off (default)  | The SMA connector on the xPC560S Mini-Module is disconnected from the processor          |



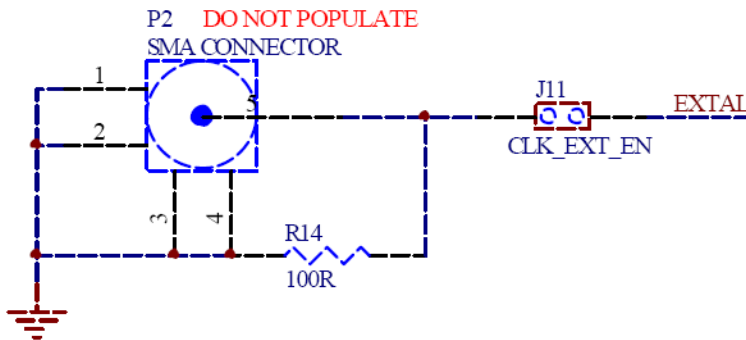
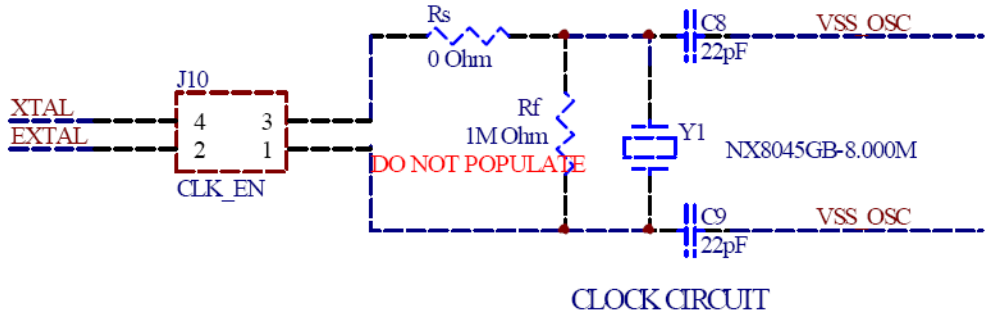


Figure 4-2: System Clock schematic

#### 4.4 General Configuration

##### J13 – Reset Enable

A RESET push button on the xPC560S Mini-Module can be used to reset the processor.

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

|              |   |
|--------------|---|
| On (default) | The RESET button on the xPC560S Mini-Module is enabled  |
| Off          | The RESET button on the xPC560S Mini-Module is disabled |

### J28 – Reset Pullup

The RESET signal of the MPC560xS processor can be pulled up to a logic high voltage.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The RESET signal on the MPC560xS processor is pulled up to 5V   |
| 2+3            | The RESET signal on the MPC560xS processor is pulled up to 3.3V |

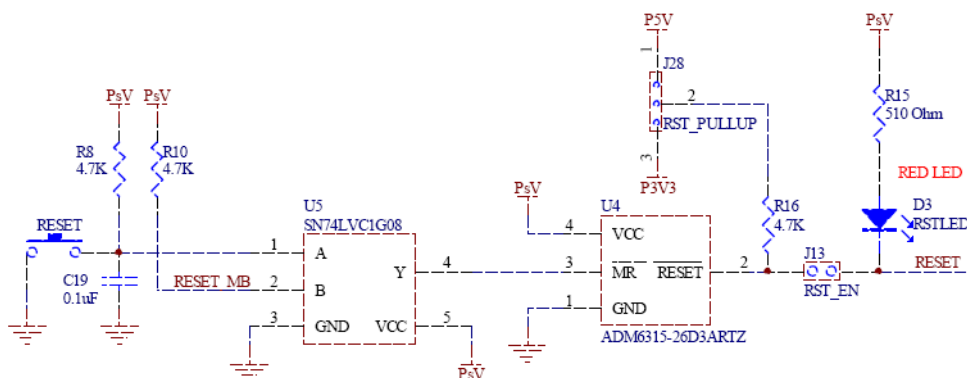


Figure 4-3: Reset circuitry schematic

## 5 xPC560SADPT176S HARDWARE & JUMPER SETTINGS

### 5.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

#### J7 – FABM Configuration

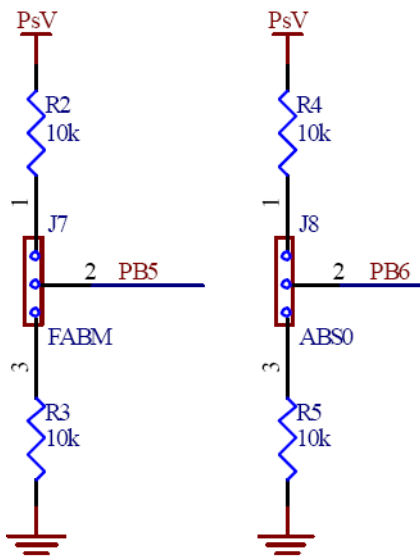
Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The MPC560xS processor uses serial boot mode   |
| 2+3 (default)  | The MPC560xS processor uses internal boot mode |

#### J8 – ABS0 Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The MPC560xS processor uses the CAN interface for serial boot mode  |
| 2+3 (default)  | The MPC560xS processor uses the UART interface for serial boot mode |



**Figure 5-1: Boot Configuration Jumpers**

## 5.2 Power Configuration

When the xPC560S Mini-Module is plugged into the xPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the xPC560S Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. Note that when using the xPC560S Mini-Module as a stand-alone board, only one power supply is available (5V or 3.3V), and all appropriate jumpers must be configured to use that power supply.

The following jumpers affect the power supply pins of the MPC560xS processor:

### J4 – VIO Voltage Selection

Controls whether certain I/O pins are powered using 5V or 3.3V. In particular,

this controls the voltage of the reset circuit and the logic high voltage for the FABM and ABS0 pins.

| Jumper Setting | Effect              |
|----------------|---------------------|
| 1+2 (default)  | VIO voltage is 5V   |
| 2+3            | VIO voltage is 3.3V |

#### J14 – 5V MCU Power Enable

Allows 5V to be selected for the various power pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | 5V is available to power the various power supply pins on the MPC560xS processor          |
| Off            | 5V cannot be used to power any of the various power supply pins on the MPC560xS processor |

#### J15 – 1.2V Core Voltage Enable

Controls whether power is provided to the “VDD 1V2” pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | MPC560xS “VDD 1V2” pins are connected to 1.2V power |

|     |   |
|-----|---|
| Off | MPC560xS “VDD 1V2” pins are left disconnected |
|-----|---|

### J17 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to communicate with the processor.

| Jumper Setting | Effect                                      |
|----------------|---|
| 1+2 (default)  | Debug port(s) are configured for 5V logic   |
| 2+3            | Debug port(s) are configured for 3.3V logic |

### J18 – 3.3V MCU Power Enable

Allows 3.3V to be selected for the various power pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | 3.3V is available to power the various power supply pins on the MPC560xS processor          |
| Off            | 3.3V cannot be used to power any of the various power supply pins on the MPC560xS processor |

### J22 – VDDE\_A Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_B”, “VDD\_IO\_C”, and

“VDD\_IO\_G” power pins.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” pins are powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” pins are powered by 3.3V (J18 must be ON) |

#### J16 – VDDR Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_A” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_A” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_A” is powered by 3.3V (J18 must be ON) |

#### J25 – VDDE\_E Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_D” power pin.

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

|               |   |
|---------------|---|
| 1+2 (default) | MPC560xS “VDD_IO_D” is powered by 5V (J14 must be ON)   |
| 2+3           | MPC560xS “VDD_IO_D” is powered by 3.3V (J18 must be ON) |

### J21 – VDDMC Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_C” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_C” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_C” is powered by 3.3V (J18 must be ON) |

### J20 – VDDMB Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_B” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_B” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_B” is powered by 3.3V (J18 must be ON) |



### J19 – VDDMA Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_A” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_A” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_A” is powered by 3.3V (J18 must be ON) |

### J24 – VDDE\_C Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_F” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_F” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_F” is powered by 3.3V (J18 must be ON) |

### J23 – VDDE\_B Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_A” and “VDD\_IO\_E” power pins.

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

|               |   |
|---------------|---|
| 1+2 (default) | MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 5V (J14 must be ON)   |
| 2+3           | MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 3.3V (J18 must be ON) |

### J26 – VDDA Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_ADC” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_ADC” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_ADC” is powered by 3.3V (J18 must be ON) |

## 5.3 System Clock Configuration

The xPC560S Mini-Modules support the usage of crystal clock sources as well as external clock sources.

### J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

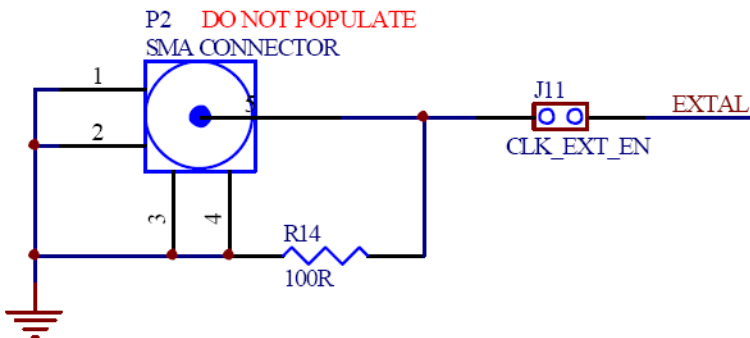
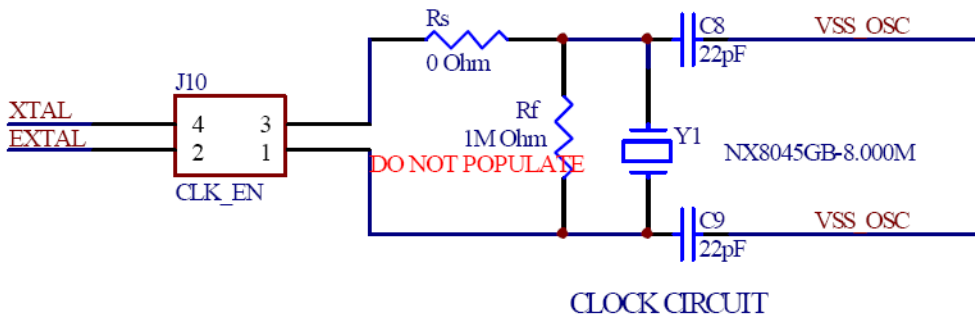
| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | The MPC560xS “EXTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module |

|               |  |
|---------------|--|
| 3+4 (default) | The MPC560xS “XTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module |
|---------------|--|

### J11 – External clock source enable

The xPC560S Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

| Jumper Setting | Effect   |
|----------------|--|
| On             | The MPC560xS “EXTAL” signal is connected to the SMA connector on the xPC560S Mini-Module |
| Off (default)  | The SMA connector on the xPC560S Mini-Module is disconnected from the processor          |



**Figure 5-2: System Clock schematic**

## 5.4 General Configuration

### J13 – Reset Enable

A RESET push button on the xPC560S Mini-Module can be used to reset the processor.

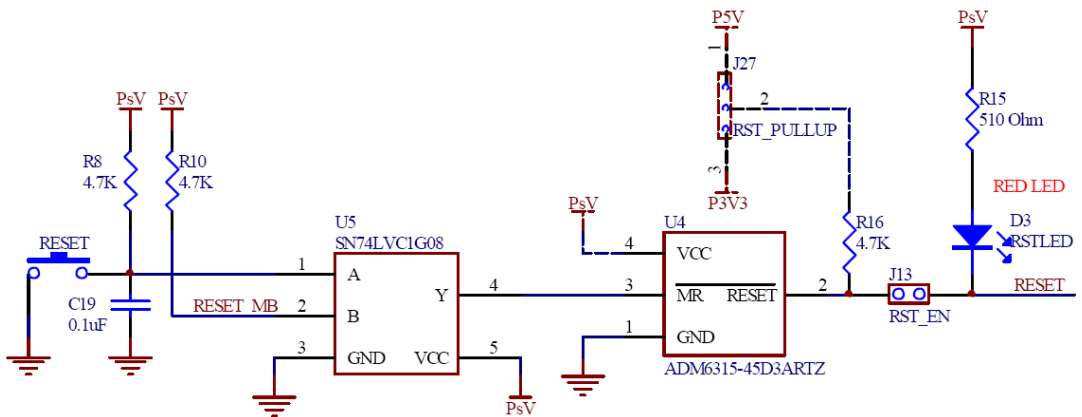
| Jumper Setting | Effect |
|----------------|--------|
|                |        |

|              |   |
|--------------|---|
| On (default) | The RESET button on the xPC560S Mini-Module is enabled  |
| Off          | The RESET button on the xPC560S Mini-Module is disabled |

### J27 – Reset Pullup

The RESET signal of the MPC560xS processor can be pulled up to a logic high voltage.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The RESET signal on the MPC560xS processor is pulled up to 5V   |
| 2+3            | The RESET signal on the MPC560xS processor is pulled up to 3.3V |



**Figure 5-3: Reset circuitry schematic**

## 6 xPC560SADPT208S HARDWARE & JUMPER SETTINGS

### 6.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

#### J7 – FABM Configuration

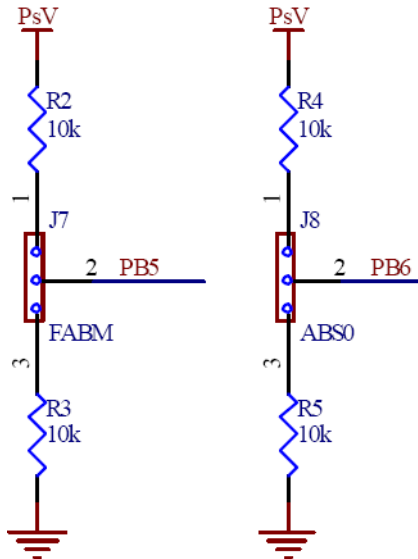
Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

| Jumper Setting | Effect   |
|----------------|--|
| 1+2            | The MPC560xS processor uses serial boot mode   |
| 2+3 (default)  | The MPC560xS processor uses internal boot mode |

#### J8 – ABS0 Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The MPC560xS processor uses the CAN interface for serial boot mode  |
| 2+3 (default)  | The MPC560xS processor uses the UART interface for serial boot mode |



**Figure 6-1: Boot Configuration Jumpers**

## 6.2 Power Configuration

When the xPC560S Mini-Module is plugged into the xPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the xPC560S Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. Note that when using the xPC560S Mini-Module as a stand-alone board, only one power supply is available (5V or 3.3V), and all appropriate jumpers must be configured to use that power supply.

The following jumpers affect the power supply pins of the MPC560xS processor:

### J4 – VIO Voltage Selection

Controls whether certain I/O pins are powered using 5V or 3.3V. In particular, this controls the voltage of the reset circuit and the logic high voltage for the

FABM and ABS0 pins.

| Jumper Setting | Effect              |
|----------------|---------------------|
| 1+2 (default)  | VIO voltage is 5V   |
| 2+3            | VIO voltage is 3.3V |

#### J14 – 5V MCU Power Enable

Allows 5V to be selected for the various power pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | 5V is available to power the various power supply pins on the MPC560xS processor          |
| Off            | 5V cannot be used to power any of the various power supply pins on the MPC560xS processor |

#### J15 – 1.2V Core Voltage Enable

Controls whether power is provided to the “VDD 1V2” pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | MPC560xS “VDD 1V2” pins are connected to 1.2V power |
| Off            | MPC560xS “VDD 1V2” pins are left disconnected       |



### J17 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to communicate with the processor.

| Jumper Setting | Effect                                      |
|----------------|---|
| 1+2 (default)  | Debug port(s) are configured for 5V logic   |
| 2+3            | Debug port(s) are configured for 3.3V logic |

### J18 – 3.3V MCU Power Enable

Allows 3.3V to be selected for the various power pins on the MPC560xS processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | 3.3V is available to power the various power supply pins on the MPC560xS processor          |
| Off            | 3.3V cannot be used to power any of the various power supply pins on the MPC560xS processor |

### J22 – VDDE\_A Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_B”, “VDD\_IO\_C”, and “VDD\_IO\_G” power pins.

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

|               |   |
|---------------|---|
| 1+2 (default) | MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” pins are powered by 5V (J14 must be ON)   |
| 2+3           | MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” pins are powered by 3.3V (J18 must be ON) |

### J16 – VDDR Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_A” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_A” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_A” is powered by 3.3V (J18 must be ON) |

### J26 – VDDE\_E Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_D” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_D” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_D” is powered by 3.3V (J18 must be ON) |

### J21 – VDDMC Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_C” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_C” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_C” is powered by 3.3V (J18 must be ON) |

### J20 – VDDMB Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_B” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_SMD_B” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_SMD_B” is powered by 3.3V (J18 must be ON) |

### J19 – VDDMA Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_SMD\_A” power pin.

| Jumper Setting | Effect |
|----------------|--------|
|----------------|--------|

|               |  |
|---------------|--|
| 1+2 (default) | MPC560xS “VDD_SMD_A” is powered by 5V (J14 must be ON)   |
| 2+3           | MPC560xS “VDD_SMD_A” is powered by 3.3V (J18 must be ON) |

### J24 – VDDE\_C Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_F” power pin.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_F” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_F” is powered by 3.3V (J18 must be ON) |

### J23 – VDDE\_B Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_IO\_A” and “VDD\_IO\_E” power pins.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 3.3V (J18 must be ON) |

### J27 – VDDA Voltage Selection

Sets the voltage level on the MPC560xS “VDD\_ADC” power pin.

| Jumper Setting | Effect   |
|----------------|--|
| 1+2 (default)  | MPC560xS “VDD_ADC” is powered by 5V (J14 must be ON)   |
| 2+3            | MPC560xS “VDD_ADC” is powered by 3.3V (J18 must be ON) |

## 6.3 System Clock Configuration

The xPC560S Mini-Modules support the usage of crystal clock sources as well as external clock sources.

### J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2 (default)  | The MPC560xS “OSCIN” signal is connected to the crystal clock source on the xPC560S Mini-Module |
| 3+4 (default)  | The MPC560xS “OSCOU” signal is connected to the crystal clock source on the xPC560S Mini-Module |

### J11 – External clock source enable

The xPC560S Mini-Module contains a footprint for an SMA connector, which

can be used to provide an external clock source to the system.

| Jumper Setting | Effect   |
|----------------|--|
| On             | The MPC560xS “EXTAL” signal is connected to the SMA connector on the xPC560S Mini-Module |
| Off (default)  | The SMA connector on the xPC560S Mini-Module is disconnected from the processor          |

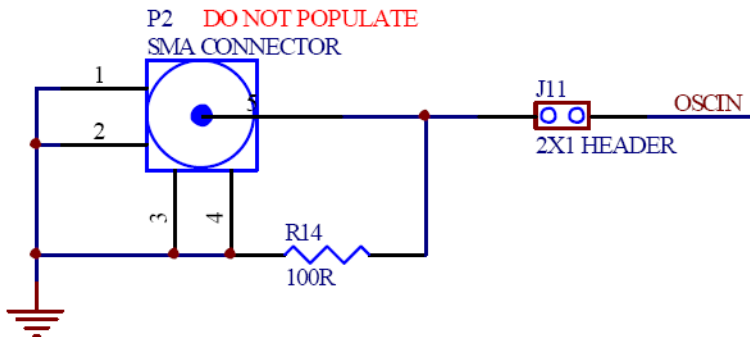
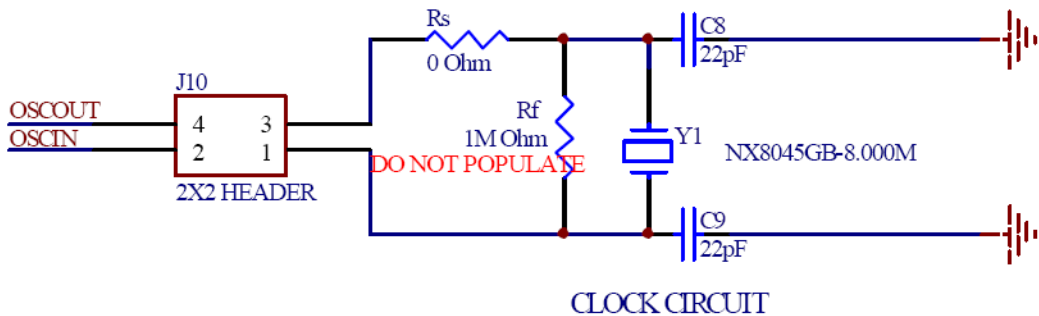


Figure 6-2: System Clock schematic

## 6.4 General Configuration

### J13 – Reset Enable

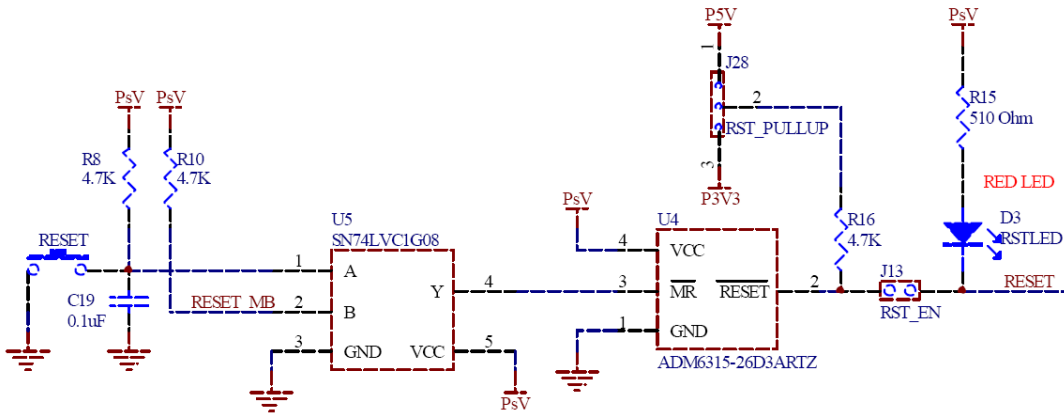
A RESET push button on the xPC560S Mini-Module can be used to reset the processor.

| Jumper Setting | Effect  |
|----------------|---|
| On (default)   | The RESET button on the xPC560S Mini-Module is enabled  |
| Off            | The RESET button on the xPC560S Mini-Module is disabled |

### J28 – Reset Pullup

The RESET signal of the MPC560xS processor can be pulled up to a logic high voltage.

| Jumper Setting | Effect  |
|----------------|---|
| 1+2            | The RESET signal on the MPC560xS processor is pulled up to 5V   |
| 2+3            | The RESET signal on the MPC560xS processor is pulled up to 3.3V |



**Figure 6-3: Reset circuitry schematic**



## 7 DEBUGGING/PROGRAMMING THE xPC560S EVB

P&E provides hardware and software tools for debugging and programming the xPC560S EVB system.

P&E's USB-ML-PPCNEXUS and Cyclone MAX offer two effective hardware solutions, depending on your needs. The USB-ML-PPCNEXUS is a development tool that will enable you to debug your code and program it onto your target. The Cyclone MAX is a more versatile and robust development tool with advanced features and production programming capabilities, as well as Ethernet support.

More information is available below to assist you in choosing the appropriate development tool for your needs.

### 7.1 Hardware Solutions At A Glance

The USB-ML-PPCNEXUS offers an affordable and compact solution for your development needs, and allows debugging and programming to be accomplished simply and efficiently. Those doing rapid development will find the USB-ML-PPCNEXUS easy to use and fully capable of fast-paced debugging and programming.

The Cyclone MAX is a more complete solution designed for both development and production. The Cyclone MAX features multiple communications interfaces (including USB, Ethernet, and Serial), stand-alone programming functionality, high speed data transfer, a status LCD, and many other advanced capabilities.

Below is an overview of the features and intended use of the USB-ML-PPCNEXUS and Cyclone MAX.

#### 7.1.1 USB-ML-PPCNEXUS Key Features

- Programming and debugging capabilities
- Compact and lightweight
- Communication via USB 2.0
- Supported by P&E software and Freescale's CodeWarrior

#### 7.1.2 Cyclone MAX Key Features

Advanced programming and debugging capabilities, including:

- PC-Controlled and User-Controlled Stand-Alone Operation

- Interactive Programming via Host PC
- In-Circuit Debugging, Programming, and Testing
- Compatible with Freescale’s ColdFireV2/3/4, PowerPC 5xx/8xx/55xx/56xx, and ARM7 microcontroller families
- Communication via USB, Serial, and Ethernet Ports
- Multiple image storage
- LCD screen menu interface
- Supported by P&E software and Freescale’s CodeWarrior

## 7.2 Working With P&E’s USB-ML-PPCNEXUS



**P&E’s USB-ML-PPCNEXUS**

### 7.2.1 Product Features & Implementation

P&E’s USB-ML-PPCNEXUS Interface (USB-ML-PPCNEXUS) connects your target to your PC and allows the PC access to the debug mode on Freescale’s PowerPC 5xx/8xx/55xx/56xx microcontrollers. It connects between a USB port on a Windows 2000/XP/2003/Vista machine and a standard 14-pin JTAG/Nexus connector on the target.

By using the USB-ML-PPCNEXUS Interface, the user can take advantage of the background debug mode to halt normal processor execution and use a PC to control the processor. The user can then directly control the target’s execution, read/write registers and memory values, debug code on the processor, and program internal or external FLASH memory devices. The USB-ML-PPCNEXUS enables you to debug, program, and test your code on your board.

### 7.2.2 Software

The USB-ML-PPCNEXUS Interface works with Codewarrior as well as P&E’s

in-circuit debugger and flash programmer to allow debug and flash programming of the target processor. P&E's USB-ML-PPCNEXUS Development Packages come with the USB-ML-PPCNEXUS Interface, as well as flash programming software, in-circuit debugging software, Windows IDE, and register file editor.

## 7.3 Working With P&E's Cyclone MAX



**P&E's Cyclone MAX**

### 7.3.1 Product Features & Implementation

P&E's Cyclone MAX is an extremely flexible tool designed for debugging, testing, and in-circuit flash programming of Freescale's ColdFireV2/3/4, PowerPC 5xx/8xx/55xx/56xx, and ARM7 microcontrollers. The Cyclone MAX connects your target to the PC via USB, Ethernet, or Serial Port and enables you to debug your code, program, and test it on your board. After development is complete the Cyclone MAX can be used as a production tool on your manufacturing floor.

For production, the Cyclone MAX may be operated interactively via Windows-based programming applications as well as under batch or .dll commands from a PC. Once loaded with data by a PC it can be disconnected and operated manually in a stand-alone mode via the LCD menu and control buttons. The Cyclone MAX has over 3Mbytes of non-volatile memory, which allows the on-board storage of multiple programming images. When connected to a PC for programming or loading it can communicate via the ethernet, USB, or serial interfaces.

### 7.3.2 Software

The Cyclone MAX comes with intuitive configuration software and interactive

programming software, as well as easy to use automated control software. The Cyclone MAX also functions as a full-featured debug interface, and is supported by Freescale's CodeWarrior as well as development software from P&E.

P&E's Cyclone MAX is also available bundled with additional software as part of various Development Packages. In addition to the Cyclone MAX, these Development Packages include in-circuit debugging software, flash programming software, a Windows IDE, and register file editor.

## Freescale Controller Continuum

68HC08/S08/RS08/(S)12(X) ColdFire® V1 ColdFire® V2/V3/V4 PowerPC® Nexus® ARM®



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