DEMO9S08SV16/FL16

Demonstration Board for Freescale MC9S08SV16 or MC9S08FL16 Microcontroller

USER GUIDE

Web Site: www.axman.com

Support: support@axman.com

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REVISION

Date	Rev	Comments
June 5, 2009	A	Initial Release

CAUTIONARY NOTES

1) Electrostatic Discharge (ESD) prevention measures should be used when handling this product. ESD damage is not a warranty repair item.

2) Axiom Manufacturing does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under patent rights or the rights of others.

3) EMC Information on the DEMO9S08SV16/FL16 board:

   a) This product as shipped from the factory with associated power supplies and cables, has been verified to meet with requirements of CE and the FCC as a CLASS A product.

   b) This product is designed and intended for use as a development platform for hardware or software in an educational or professional laboratory.

   c) In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate prevention measures.

   d) Attaching additional wiring to this product or modifying the products operation from the factory default as shipped may effect its performance and cause interference with nearby electronic equipment. If such interference is detected, suitable mitigating measures should be taken.

TERMINOLOGY

This development module utilizes option select jumpers to configure default board operation. Terminology for application of the option jumpers is as follows:

Jumper – a plastic shunt that connects 2 terminals electrically

Jumper on, in, or installed – jumper is a plastic shunt that fits across 2 pins and the shunt is installed so that the 2 pins are connected with the shunt.

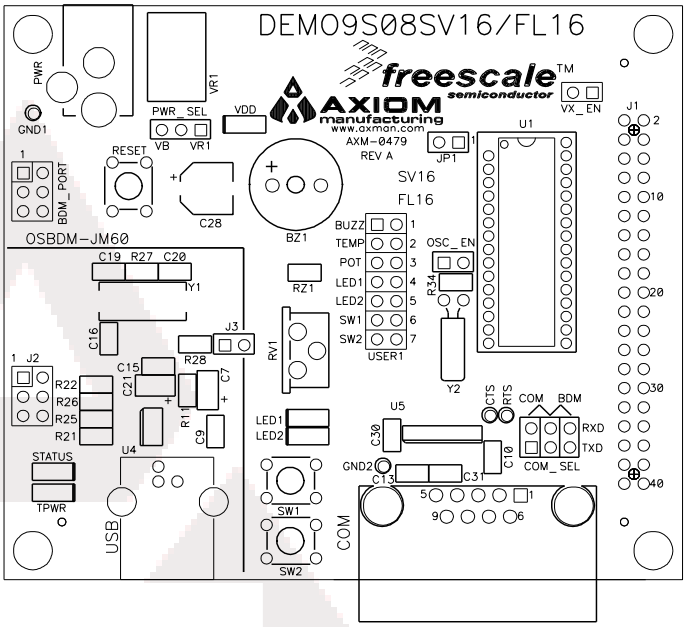
Jumper off, out, or idle – jumper or shunt is installed so that only 1 pin holds the shunt, no 2 pins are connected, or jumper is removed. It is recommended that the jumpers be placed idle by installing on 1 pin so they will not be lost.

Cut-Trace – a circuit trace connection between component pads. The circuit trace may be cut using a knife to break the default connection. To reconnect the circuit, simply install a suitably sized 0-ohm resistor or attach a wire across the pads.

Signal names followed by an asterisk (*) denote active-low signals.

FEATURES

The DEMO9S08SV16/FL16 is a demonstration board for the MC9S08SV16 or MC9S08FL16 microcontroller. Application development is quick and easy with the integrated, Open-Source, USB-BDM, sample software tools, and examples. An optional BDM_PORT port is also provided to allow use of a BDM_PORT cable. One, 40-pin connector provides access to all IO signals on the target MCU.



- MC9S08SV16 or MC9S08FL16, 32 SDIP
  - 16K Bytes Flash
  - 1K Bytes RAM
- RS-232 Serial Data Physical Layer Transceiver
- Integrated Open-Source, USB-BDM
- BDM_PORT header for external BDM cable support
- MCU_PORT pin header for access to MCU IO signals
- On-board +5V regulator
- Optional Power from USB-BDM or MCU_PORT connector
- Power Input Selection Jumpers
  - Power input from USB-BDM
  - Power input from on-board regulator
  - Power input from Connector J1
  - Optional Power output through Connector J1
- User Components Provided
  - 3 Push Switches; 2 User, 1 Reset
  - 5 LED Indicators; 2 User, VDD, STATUS, TPWR
  - 5K ohm POT w /LP Filter
  - 2300 Hz Piezo Buzzer w/ External Drive Circuit
- User Option Jumpers to disconnect Peripherals
- Connectors
  - 40-pin MCU I/O Pin Header
  - 2.0mm Barrel Connector
  - BDM_PORT Connector for External BDM Cable (not installed)
  - USB Connector
  - DB9 Connector

Specifications:
Board Size 3.25” x 3.0”

REFERENCES

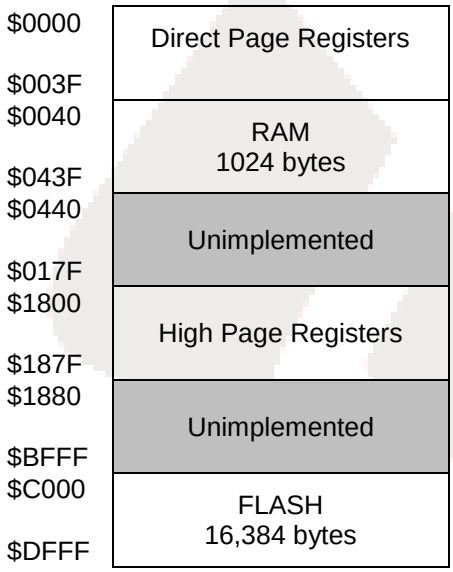
The following reference documents are available on the CD or DVD provided with this board in Acrobat Reader format. These documents are also available at www.axman.com/support.

DEMO9S08SV16_FL16_UG.doc	DEMO9S08SV16/FL16 User Guide (this document)
DEMO9S08SV16_FL16_SCH_A.pdf	DEMO9S08SV16/FL16 Schematic Rev. A
DEMO9S08SV16_FL16_Silk_A.pdf	DEMO9S08SV16/FL16 Top Silk, Rev A
DEMO9S08SV16_FL16_Assy_A.pdf	DEMO9S08SV16/FL16 Default Shunt Placement
DEMO9S08FL16.zip	DEMO9S08FL16 LED Demo Application
DEMO9S08SV16.zip	DEMO9S08SV16 LED Demo Application

MEMORY MAP

Figure 1 below shows the default memory map for the MC9S08SV16 and the MC9S08FL16 immediately out of reset. Refer to the MC9S08SV16 or MC9S08FL16 Reference Manual (RM) for further details.

Figure 1: Memory Map



NOTE: The memory map above applies to the MC9S08SV16 and MC9S08FL16 microcontrollers

SOFTWARE DEVELOPMENT

Software development requires the use of a compiler or an assembler supporting the HCS08 instruction set and a host PC operating a debug interface. CodeWarrior Development Studio for Microcontrollers is supplied with this board for application development and debug. Refer to the supporting CodeWarrior documentation for details on use and capabilities.

DEVELOPMENT SUPPORT

Application development and debug for the target MC9S08SV16 or MC9S08FL16 is supported through the integrated, Open-Source Background Debug Mode (BDM) interface. An optional 6-pos BDM_PORT header allows connecting an external HCS12/HCS08 BDM cable. The BDM_PORT header is not installed in default configurations.

Integrated BDM

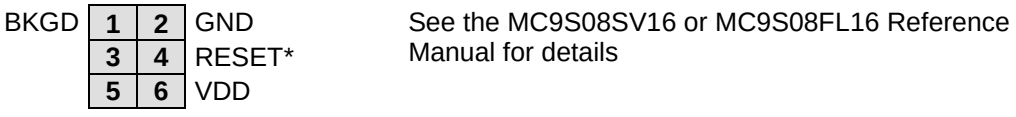
The DEMO9S08SV16/FL16 board features an integrated Open Source BDM (OSBDM-JM60) based on the Freescale MC9S08JM60 MCU. The integrated USB BDM supports application development and debugging via background debug mode. The integrated BDM is fully supported by CodeWarrior development tools.

The integrated USB BDM provides power and ground to the target board eliminating the need to power the board externally. Power from the USB BDM is derived from the USB bus. The integrated USB BDM is designed to sink a maximum of 300mA of current from the USB bus. Therefore, total current consumption for the target board, and connected circuitry, **must not exceed 300mA**. This current limit describes the current supplied by the USB cable to the BDM circuit, the target board, and any connected circuitry. Excessive current drain will violate the USB specification causing the bus to disconnect. Damage to the host PC USB hub or the target board may result.

BDM_PORT Header

A compatible HCS12 BDM cable may also attach to the 6-pin BDM interface header (BDM_PORT). Figure 2 below shows the pin-out for the BDM_PORT header.

Figure 2: BDM_PORT Header



NOTE: The BDM_PORT header is not installed in default configuration.

POWER

The DEMO9S08SV16/FL16 may be powered from the integrated USB-BDM or from an on-board voltage regulator and external power connector. The desired power source is selected using the PWR_SEL option header.

For application development and debug, the board may be powered from the integrated USB BDM. As noted above, total current consumption from this source is limited to 300 mA. A 2.0mm, center-positive, barrel connector (VIN) and on-board regulator supports stand-alone operation and higher power requirements.

Power may also be applied to connector J1 or the board may be configured to supply power from connector J1 to external circuitry.

CAUTION:

Damage to the board may result if voltages greater than +5.5V are applied at connector J1 input.

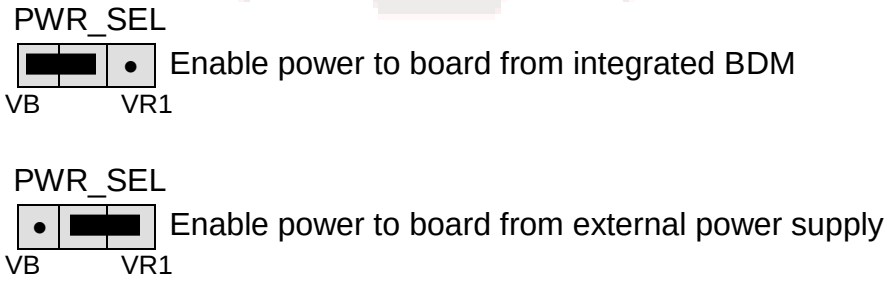
POWER SELECT

Power may be applied to the board through the integrated BDM circuitry, a 2.0mm barrel connector, or through connector J1. Power selection is achieved using 2 selection headers: the PWR_SEL option header and the VX_EN option header.

PWR_SEL

The PWR_SEL option header allows the user to select power input either from either an external power source connected to the VIN connector or from the integrated USB-BDM. Figure 3 below details the PWR_SEL header connections.

Figure 3: V_SEL Option Header



CAUTION:

Do not configure the target board to draw more than 300mA when powered from the integrated USB BDM. Damage to the target board or host PC may result otherwise.

Power from the integrated BDM is drawn from the USB bus and is limited to **300 mA**. This current limit accounts for the total current supplied over the USB cable to the BDM circuit, the target board, and any connected circuitry. Current drain in excess of value violates the USB specification and will cause the USB bus to disconnect. This will cause the board to exhibit power cycling where the board appears to turn off and back on continually. Damage to the host PC or the target board may result.

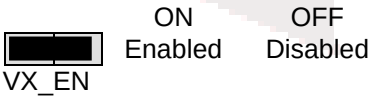
Although the on-board regulator can accept voltage input to +25VDC, the applied voltage should not exceed +12V to prevent the regulator (VR1) from overheating.

VX_EN

The VX_EN option header is a 2-pin jumper that connects or disconnects input J1-1 directly to the target board voltage rail. J1-3 connects directly to the target board ground plane. Use of this feature requires a regulated input power source. This power input is decoupled to minimize noise but is not regulated or protected. Care should be exercised when using this feature; no protection is applied on this input and damage to the target board may result if excessive voltage is applied. Also, do not attempt to power the target board through this connector while also applying power through the USB BDM or the PWR connector; damage to the board may result.

Power may also be sourced to off-board circuitry through the J1 connector. The current supplied from the USB bus or the on-board regulator limits current available to external circuitry. Excessive current drain may damage the target board, the host PC USB hub, or the on-board regulator. The figure below details the VX_EN header connections.

Figure 4: VX_EN Option Header



CAUTION:

Do not exceed available current from USB-BDM or on-board regulator when sourcing power through connector J1 to external circuitry.

RESET SWITCH

The RESET switch applies an asynchronous RESET to the MCU. The RESET switch is connected directly to the RESET* input on the MCU. Pressing the RESET switch applies a low voltage level to the RESET* input. A pull-up bias resistor allows normal MCU operation. Shunt capacitance ensures an adequate input pulse width.

Both the MC9S08SV16 and MC9S08FL16 MCU's apply a multiplexed RESET* input. To use the RESET switch, the RESET pin must be enabled (SOPT1_RSTPE). Refer to the MC9S08SV16 or MC9S08FL16 Reference Manual for details on configuring using the RESET* input.

LOW VOLTAGE RESET

Both the MC9S08SV16 and the MC9S08FL16 apply an internal Low Voltage Detect (LVD) circuitry. The LVD holds the MCU in reset until applied voltage reaches the appropriate level. The LVD also protects against under-voltage conditions. Consult the MC9S08SV16 or MC9S08FL16 Reference Manual for details on LVD operation.

TIMING

Default timing for the DEMO9S08SV16/FL16 is provided by the MC9S08SV16 or MC9S08FL16 internal timing source which is active out of RESET. External circuitry for an external 32 kHz XTAL oscillator is provided; however, these components are not populated in default configuration. Refer to the MC9S08SV16 or MC9S08FL16 Reference Manual for details on configuring the timing source.

COMMUNICATIONS

Serial communication on the DEMO9S08SV16/FL16 board is supported through an RS-232 physical layer interface and DB-9 connector and through a virtual serial port implemented in the USB-BDM. The COM_SEL option header selects between the applied serial function.

NOTE: Virtual serial port services are not functional as of the date of this document

COM Port

An RS-232 transceiver provides RS-232 to TTL/CMOS logic level translation between the COM connector and the MCU. The COM connector is a 9-pin Dsub, right-angle connector. A ferrite bead on shield ground provides conducted immunity protection. Communication signals TXD and RXD are routed from the transceiver to the MCU. These signals are also available on connector J1. Hardware flow control signals RTS and CTS are available on the logic side

of the RS-232 transceiver and are routed to test point vias located near the transceiver. RTS has been biased properly to provide handshaking if required.

RS-232 signals TXD and RXD are connected to the MCU through the COM_SEL option header. Table 1 below shows the RS-232 signal connections.

Table 1: COM Connections

MCU Port	COM Signal	I/O PORT CONNECTOR
PTB1/KBIP5/TXD/ADP5	TXD	J1-5
PTB0/KBIP4/RXD/ADP4	RXD	J1-7

Virtual COM Port

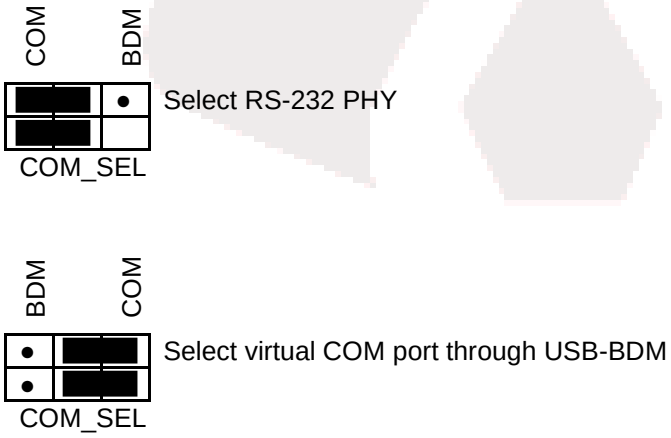
The UART output from the target MCU is connected to the BDM through the COM_SEL header. Future enhancements to the BDM firmware will support a Virtual COM Port through the USB-BDM. This functionality is not currently supported.

NOTE: Virtual serial port services are not functional as of the date of this document

COM_SEL

The COM_SEL option header selects between the virtual serial port implemented through the USB-BDM or the RS-232 PHY. Figure 5 below shows the shunt positions to select between the two options.

Figure 5: COM_EN Option Header

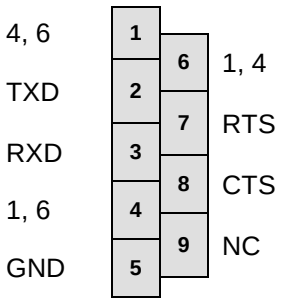


NOTE: Virtual serial port services are not functional as of the date of this document

COM Connector

A standard 9-pin Dsub connector provides external connections for the SCI port. The Dsub shell is connected to board ground through a ferrite bead. The ferrite bead provides noise isolation on the RS-232 connection. Figure 6 below, shows the pin-out of the DB9 connector.

Figure 6: COM Connector



Female DB9 connector that interfaces to the HC(S)08 internal SCI1 serial port via the U2 RS232 transceiver. It provides simple 2-wire asynchronous serial communications without flow control. Flow control is provided at test points on the board.

Pins 1, 4, and 6 are connected together.

USER OPTIONS

The DEMO9S08SV16/FL16 includes various input and output devices to aid application development and debug. User I/O includes 2 momentary pushbutton switches, 2 green LEDs, 1 potentiometer, 1 temperature sensor, and 1 piezo buzzer. Each device may be enabled or disabled individually with the USER_EN option header. Each user enable is clearly marked as to functionality.

Pushbutton Switches

Two push button switches provide momentary, active-low input, for user applications. Pull-ups internal to the MCU must be enabled to provide error free switch operation. Pushbutton switches SW1 and SW2 are enabled to the MCU I/O ports by the USER option bank. Table 2 below shows the user jumper settings and MCU connections.

LED Indicators

Two LEDs provide visual output for user applications. Both LEDs are configured for active-high operation. Table 2 below shows the user jumper settings and MCU connections.

Potentiometer

A 5k ohm, thumb-wheel type, potentiometer at RV1 provides variable resistance input for user applications. The output is the result of a voltage divider that changes as the thumb-wheel is turned. The potentiometer is connected between VDD and GND with the center tap providing the divider output. Table 2 below shows the user jumper settings and MCU connection.

Temperature Sensor

A surface-mount, NTC Thermistor (B = 3900) is installed at location RZ1. This component provides a voltage input to the MCU inversely proportional to temperature. Table 2 below shows the user jumper settings and MCU connections.

Buzzer

An externally modulated piezo-buzzer, with a center frequency of 2300 Hz for audible applications is applied. A push-pull drive circuit allows the target MCU to easily drive the buzzer. Table 2 below shows the user jumper settings and MCU connections.

Table 2: User Option Jumper Settings

Jumper	On	Off	MCU PORT
BUZZ	Enable BUZZ	Disable BUZZ	PTB4/TMP1CH0
TEMP	Enable TEMP	Disable TEMP	PTA0/**KBIP0**/ADP0
POT	Enable POT	Disable POT	PTA1/**KBIP1**/ADP1
LED1	Enable LED1	Disable LED1	PTB2/**KBIP6**/ADP6
LED2	Enable LED2	Disable LED2	PTB3/**KBIP7**/ADP7
SW1	Enable SW1	Disable SW1	PTA2/**KBIP2**/ADP2
SW2	Enable SW2	Disable SW2	PTA3/**KBIP3**/ADP3

NOTE: Signal names in **BOLD** are not available on the 9S08FL16 derivative

MCU I/O PORT

The MCU I/O PORT connector provides access to the MC9S08SV16 or MC9S08FL16 I/O signals. Figure 7 below show the pin-out for the MCU I/O connector.

Figure 7: MCU I/O PORT – J1

SV16	FL16			FL16	SV16
VDD	VDD	1	2	PTA5/IRQ*/TCLK/RESET*	PTA5/IRQ*/TCLK/RESET*
VSS	VSS	3	4	PTA5/IRQ*/TCLK/RESET*	PTA5/IRQ*/TCLK/RESET*
PTB1/KBIP5/TxD/ADP5	PTB1/TXD/ADP5	5	6	PTA4/BKGD/MS	PTA4/ACMPO/BKGD/MS
PTB0/KBP4/RxD/ADP4	PTB0/RXD/ADP4	7	8	NC	NC
PTA2/KBIP2/ADP2	PTA2/ADP2	9	10	NC	NC
PTA3/KBIP3/ADP3	PTA3/ADP3	11	12	NC	NC
PTC0/ADP8	PTC0/ADP8	13	14	PTA0/ADP0	PTA0/KBIP0/ADP0
PTC1/ADP9	PTC1/ADP9	15	16	PTA1/ADP1	PTA1/KBIP1/ADP1
PTB3/KBIP7/ADP7	PTB3/ADP7	17	18	NC	NC
PTB4/TPM1CH0	PTB4/TPM1CH0	19	20	NC	NC
PTB2/KBIP6/ADP6	PTB2/ADP6	21	22	PTA6/TMP2CH0	PTA6/TPM2CH0
PTB5/TPM1CH1	PTB5/TPM1CH1	23	24	PTA7/TPM2CH1	PTA7/TPM2CH1
PTD1/SDA	PTD1	25	26	PTB7/EXTAL	PTB7/EXTAL
PTD2/TPM1CH2	PTD2/TPM1CH2	27	28	PTB6/XTAL	PTB6/XTAL
PTD0/SCL	PTD0	29	30	PTD4	PTD4/TPM1CH4
PTD3/TPM1CH3	PTD3/TPM1CH3	31	32	PTD5	PTD5/TPM1CH5
PTC2/ADP10/ACMP+	PTC2/ADP10	33	34	NC	NC
PTC3/ADP11/ACMP	PTC3/ADP11	35	36	NC	NC
PTC4/SS	PTC4	37	38	PTC7	PTC7/MISO
PTC5/SPSCK	PTC5	39	40	PTC6	PTC6/MOSI

Стандарт Электрон Связь

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