Freescale Semiconductor
User Guide

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S12ZVC Evaluation Board Quick Start Guide

MagniV Mixed-signal MCUs

by: Jesús Sánchez, Luis Olea

Contents

1 Introduction and default settings

This guide shows how to quickly connect the board to a host PC and execute a demonstration application preloaded in to the flash memory.

The S12ZVC MCU integrates:

- S12Z CPU
- Power supply
  - PNP external ballast transistor for VDDX, VDDA, and VDDC
  - LED power indicators
- Reset
- LEDs
- Buzzer
- ADC potentiometer
- Keyboard matrix
- High-voltage input
- Sensors
  - Temperature and humidity
  - Pressure sensor
  - Inertial sensor SPI X-Y axis
- SENT
- CAN
- LIN

Default jumper positions of the VLG-S12ZVC board are shown in the following section.

2 Device overview S12ZVC family

The MC9S12ZVC family is a new member of the S12 MagniV product line integrating a battery level (12 V) voltage regulator, supply voltage monitoring, high voltage inputs, and a CAN physical interface. It's primarily targeting at CAN nodes like sensors, switch panels, or small actuators. It offers various low-power modes and wake-up management to address state of the art power consumption requirements.

Some members of the MC9S12ZVC family are also offered for high temperature applications requiring AEC-Q100 Grade 0 (-40°C to +150°C ambient operating temperature range). The MC9S12ZVC family is based on the enhanced performance, linear address space S12Z core and delivers an optimized solution with the integration of several key system components into a single device, optimizing system architecture and achieving significant space savings.

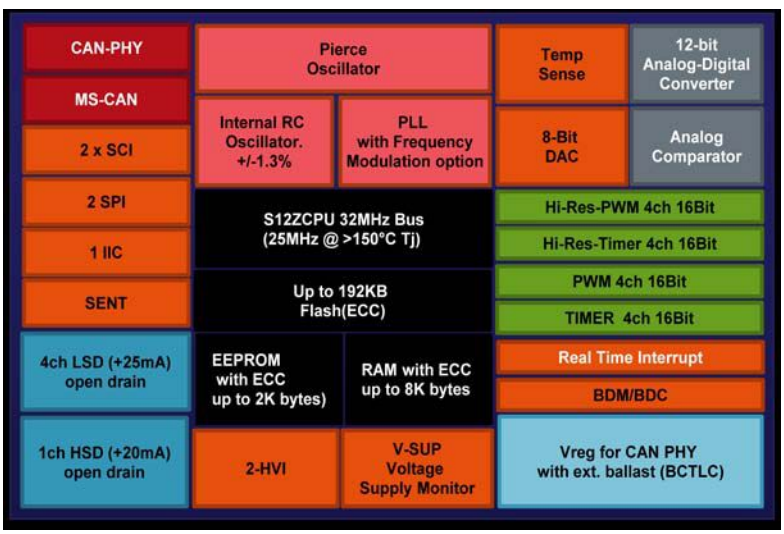

Figure 1. S12ZVC architecture diagram1

3 Jumper default configuration

This section describes about the jumper configuration.

1. **Block Diagram shows the maximum configuration. Not all pins or all peripherals are available on all devices and packages. Rerouting options are not shown.**

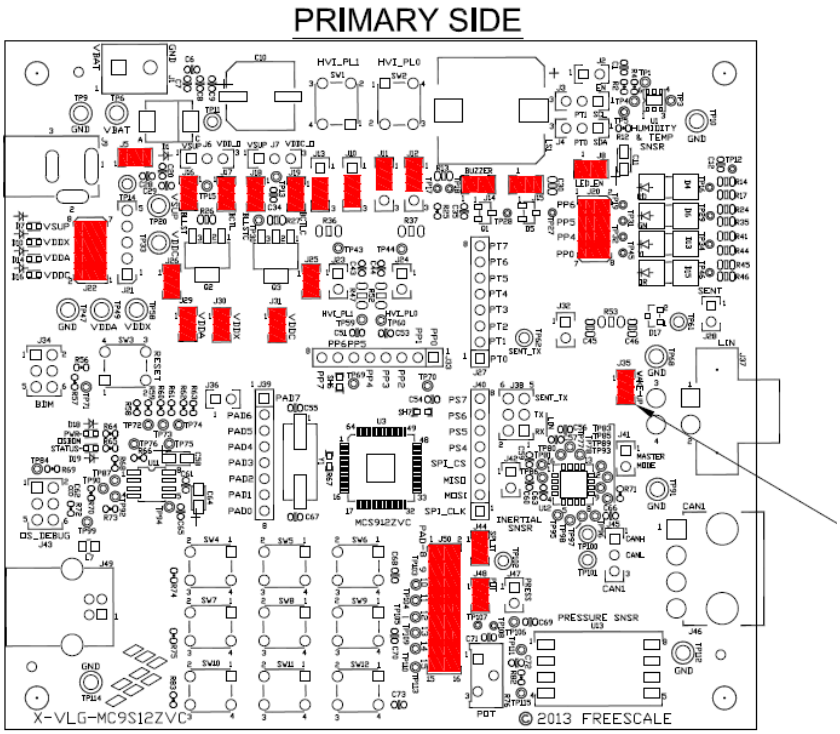

Figure 2. Jumper configuration diagram

The following table lists the jumper default configuration.

Table 1. Jumper default configuration

Header	Reference position
J5	1-2
J8	1-2
J10	2-3
J11	1-2
J12	1-2
J13	2-3
J15	1-2
J14	1-2
J20	1-2, 3-4, 5-6, 7-8
J48	1,2
J50	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
J16	1, 2
J17	1, 2
J18	1, 2
J19	1, 2
J22	1-2, 3-4, 5-6, 7-8
J25	1, 2
J26	1- 2

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Table 1. Jumper default configuration (continued)

Header	Reference position
J29	1- 2
J30	1- 2
J31	1- 2
J35	1- 2

4 Software tools installation

This section describes how to get started with the S12ZVC board by installing CodeWarrior development studio and testing the demo program that comes programmed with the board.

4.1 Install CodeWarrior development studio

Freescale's CodeWarrior for MCUs integrates the development tools for several architectures, including the S12Z architecture, into a single product based on the Eclipse open development platform. Eclipse offers an excellent framework for building software development environments and is a standard framework used by many embedded software vendors.

The latest version of CodeWarrior for MCUs (Eclipse IDE) can be downloaded from **freescale.com/codewarrior**.

4.2 Launch the demo program

The S12ZVC EVB board comes preprogrammed with a small demonstration application that exercises the different modules of the S12ZVC MCU family, including the ADC, SCI, I2C, and GPIO modules.

To see this demonstration:

1. Connect a 12 V power source to the EVB.
2. Connect a USB cable to the USB type B connector.
3. Press the keys on the keypad to hear tones on the buzzer.
4. Tilt the EVB to observe changes on the red and green LEDs.
5. Rotate the potentiometer to observe changes on the orange LED.
6. Notice that the pressure sensor controls the yellow LED.
7. Set up a terminal program to the OSBDM CDC serial port. Set it to a 9600 baud rate and press any key; you will get a menu to read temperature and humidity from the I2C sensor.

The software for this application is available on **freescale.com**.

5 Jumper list and description

The following table lists all of the jumpers in the S12ZVC evaluation board and its corresponding configuration options.

Table 2. Jumpers description

Jumper	Description	
J10	HVI Circuit –Reference Voltage Selector	
	Pin 1-2 Closed	- SW1 is connected to VBAT level. This provides a HIGH voltage level when switch SW1 is pressed.
	Pin 2-3 Closed	- SW1 is connected to GND level. This provides a LOW voltage level when switch SW1 is pressed.
J11	HVI Circuit –Reference Voltage Selector	
	Pin 1-2 Closed	– SW2 is connected to VBAT level. This provides a HIGH voltage level when switch SW2 is pressed.
	Pin 2-3 Closed	– SW2 is connected to GND level. This provides a LOW voltage level when switch SW2 is pressed.
J12	HVI Circuit –Reference Voltage Selector	
	Pin 1-2 Closed	– Enable VBAT level to pullup resistor. This provides a HIGH voltage level when switch SW2 is open.
	Pin 2-3 Closed	– Enable GND level to pullup resistor. This provides a LOW voltage level when switch SW2 is open.
J13	HVI Circuit –Reference Voltage Selector	
	Pin 1-2 Closed	Enable VBAT level to pullup resistor. This provides a HIGH voltage level when switch SW2 is open.
	Pin 2-3 Closed	Enable GND level to pullup resistor. This provide a LOW voltage level when switch SW2 is open.
J14	Buzzer Control	
	Closing this jumper enables the Buzzer control by PP7 port.	
J15	Buzzer Power	
	Closing this jumper powers the Buzzer circuit.	
J16	VDDX External Ballast Transistor	
	With this jumper closed, the VSUP Voltage is connected to PNP external transistor collector for the VDDX voltage regulation.	
J17	VDDX External Ballast Transistor	
	This jumper enables the signal control of the PNP external transistor collector for the VDDX voltage regulation.	
J18	VDDC External Ballast Transistor	

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Table 2. Jumpers description (continued)

Jumper	Description	
	With this jumper closed, the VSUP Voltage is connected to PNP external transistor collector for the VDDC voltage regulation.	
J19	VDDC External Ballast Transistor	
	This jumper enables the signal control of the PNP external transistor collector for the VDDC voltage regulation.	
J2	Humidity and temperature sensor power	
	Closing this jumper powers the humidity and temperature sensor.	
J20	LEDs	
	Pin 1-2 Closed	Red LED is connected to PP6 port
	Pin 3-4 Closed	Green LED is connected to PP5 port
	Pin 5-6 Closed	Yellow LED is connected to PP4 port
	Pin 7-8 Closed	Orange LED is connected to PP0 port
J22	Power Supply Voltages – LEDs Indicators	
	Pin 1-2 Closed	Enable VDDC - LED indicator
	Pin 3-4 Closed	Enable VDDA - LED indicator
	Pin 5-6 Closed	Enable VDDX - LED indicator
	Pin 7-8 Closed	Enable VSUP - LED indicator
J25	VDDC External Ballast Transistor - Output	
	Closing this jumper connects the external PNP ballast transistor output to VDDC_OUT line.	
J26	VDDX External Ballast Transistor - Output	
	Closing this jumper connects the external PNP ballast transistor output to VDD_OUT line.	
J29	VDDA Power	
	Closing this header connects VDDA to VDD_OUT line.	
J3	Humidity Temperature Sensor - Communication	
	Closing this jumper connects the SCL-line of the Humidity Temperature Sensor to PT1.	
J30	VDDX	
	Closing this jumper connects VDDX to VDD_OUT line.	
J31	VDDC	
	Closing this jumper connects VDDC to VDDC_OUT line.	

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Table 2. Jumpers description (continued)

Jumper	Description	
J32	SENT Transmitter Interface	
	Closing this header connects the SENT_TX line to SENT transmitter interface circuit.	
J35	LIN Mode	
	With this jumper, the user can configure the local and remote wake-up mode of MC33662 - LIN transceiver.	
J38	LIN and SENT Communication	
	Pin 1-2 Closed	PS4 is connected to LIN_RX
	Pin 3-4 Closed	PS5 is connected to LIN_TX
	Pin 5-6 Closed	PS7 is connected to SENT_TX
J4	Humidity Temperature Sensor - Communication	
	Closing this jumper connects the SDA line of the humidity temperature sensor to PT0.	
J41	LIN – Master/Slave Mode	
	With this jumper, the user can configure as master or slave mode.	
J42	INERTIAL Sensor Power	
	Closing this jumper powers the INERTIAL sensor circuit.	
J44	CAN	
	Closing this jumper connects the SPLIT pin to the resistors termination of CAN.	
J47	Press Sensor Power	
	Closing this jumper powers the press sensor circuit.	
J48	Potentiometer Reference	
	Closing this jumper connects the potentiometer to VDDA.	
J5	VBAT	
	Closing this jumper connects VBAT to all system.	
J50	Pin 1-2 Closed	Closing this jumper connects PAD8 port to the potentiometer.
	Pin 3-4 Closed	Closing this jumper connects PAD9 port to Press Sensor – Output.
	Pin 5-6 Closed	Closing this jumper connects PAD10 port to the keyword matrix.
	Pin 7-8 Closed	Closing this jumper connects PAD11 port to the keyword matrix.
	Pin 9-10 Closed	Closing this jumper connects PAD12 port to the keyword matrix.
	Pin 11-12 Closed	Closing this jumper connects PAD13 port to the keyword matrix.

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Table 2. Jumpers description (continued)

Jumper	Description	
	Pin 13-14 Closed	Closing this jumper connects PAD14 port to the keyword matrix.
	Pin 15-16 Closed	Closing this jumper connects PAD15 port to the keyword matrix.
J51	VDDX shunt resistor	
	Closing this jumper enables a shunt resistor on VDDX that can aid on current measurements for the VDDX ballast transistor.	
J52	VDDC shunt resistor	
	Closing this jumper enables a shunt resistor on VDDC that can aid on current measurements for the VDDC ballast transistor.	
J8	LEDs Power	
	Closing this jumper connects VDDX to D4, D6, D13, and D15.	

6 Headers and connectors list

The following table lists all of the connectors available in the S12ZVC evaluation board and their corresponding signals.

Table 3. Connectors description

Header / Connector	Description
J1	Main power connector (up to 18 V)
J21	VBAT, VSUP, VDDX, VDDC, and VDDA are connected to this header.
J23	**HVI Header** – External HVI signal
	This jumper allows a monitoring/measurement of the High voltage signal. If J13 and J10 are disabled, the user can apply an external signal. This jumper (pin 1-2) should always be OPEN.
J24	**HVI Header** – External HVI signal
	This jumper allows a monitoring/measurement of the High voltage signal. If J11 and J12 are disabled, the user can apply an external signal. This jumper (pin 1-2) should always be OPEN.
J27	GPIO Header - Port T
J28	SENT transmitter header with GND
J33	GPIO Header - Port P
J34	BDM Connector
J37	LIN Connector
J39	GPIO Header - Port AD
J40	GPIO Header - Port S
J45	CAN main connector

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Table 3. Connectors description (continued)

Header / Connector	Description
J46	CAN main connector
J49	OSBDM USB port for programming and debugging the main MCU.
J6	**VDDX - PNP Ballast Transistor Terminals**
	The header could be used for measurements/monitoring of all signals of the external PNP ballast transistor: Base, Collector, and Emitter. Opening J16, J17, and J27 connects the user to an additional transistor for validation.
J7	**VDDC – PNP Ballast Transistor Terminals**
	The header could be used for measurements/monitoring of all signals of the external PNP ballast transistor: Base, Collector, and Emitter. Opening J18, J19, and J25 connects the user to an additional transistor for validation.
J9	Main power connector (up to 18 V)

7 Peripheral list

The following table lists all the peripherals available in the S12ZVC evaluation board.

Table 4. Peripheral description

Peripheral	ID	MCU PORT	Description
Potentiometer	R76	PAD8	Potentiometer connected to ADC channel 8
LED – Voltage Indicator	D7	-	VSUP LED indicator
	D10	-	VDDX LED indicator
	D14	-	VDDA LED indicator
	D16	-	VDDC LED indicator
Switch Panel	SW4	-	Matrix keyboard switch
	SW5	-	
	SW6	-	
	SW7	-	
	SW8	-	
	SW9	-	
	SW10	-	
	SW11	-	
	SW12	-	
High Voltage Switch	SW1	PL1	Switch connected to PL1 (with 10 kΩ resistor)
	SW2	PL0	Switch connected to PL0 (with 10 kΩ resistor)

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Table 4. Peripheral description (continued)

Peripheral	ID	MCU PORT	Description
Buzzer	LS1	PP7	Buzzer controlled by PP7
LED – General purpose	D4	PP6	Red LED connected to port PP6
	D6	PP5	Green LED connected to port PP5
	D13	PP4	Yellow LED connected to port PP4
	D15	PP0	Orange LED connected to port PP0
Reset	SW3	-	Reset switch

8 References

For further reference, the following documents are available at **freescale.com**.

1. AN4851: Using the High Resolution Timer and PWM in the S12ZVC (AN4851)
2. AN4852: Using the SENT Transmitter Module in S12ZVC Devices (AN4852)

9 Revision history

Revision number	Date	Substantial changes
0	01/2014	Initial release

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