Quick Start Guide

S12 MagniV Mixed-signal MCUs

S12ZVC Evaluation Board

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.

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.

Jumper default configuration

This section describes about the jumper configuration.

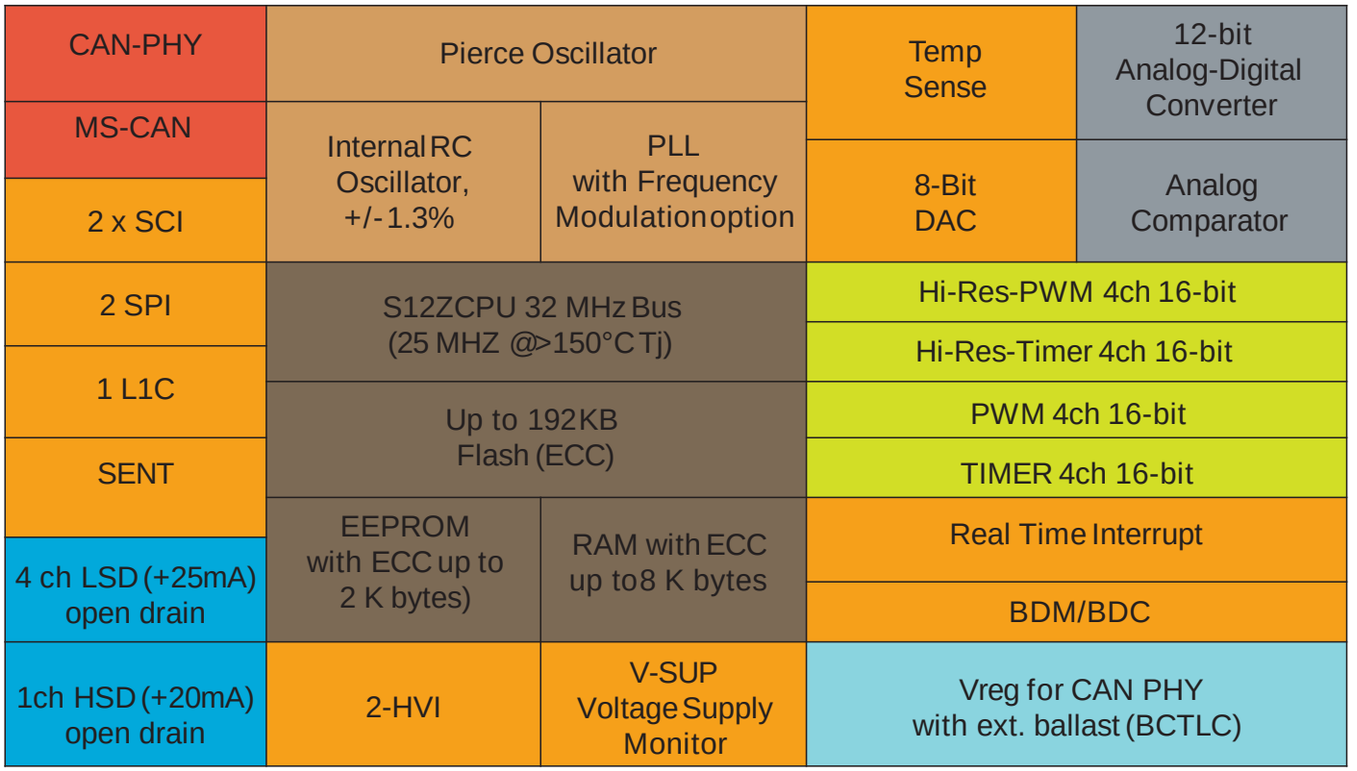

Figure 1. S12ZVC architecture diagram1

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

PRIMARY SIDE

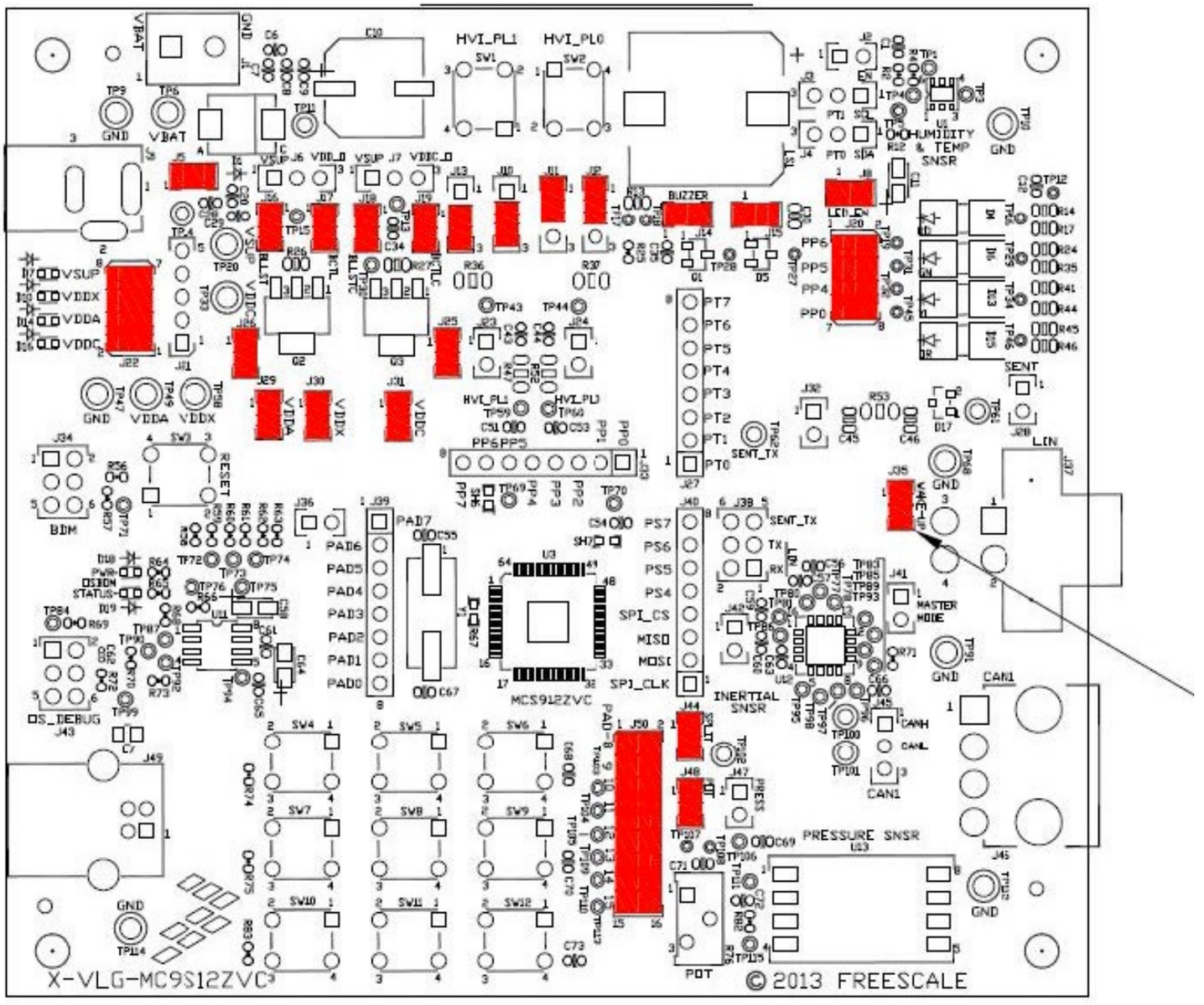

Figure 2. Jumper configuration diagram

Jumper default configuration

The following table lists the 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

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

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.

1 Install CodeWarrior development studio

NXP'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 nxp.com/codewarrior

Software tools installation (cont.)

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:

- Connect a 12 V power source to the EVB.
- Connect a USB cable to the USB type B connector.
- Press the keys on the keypad to hear tones on the buzzer.
- Tilt the EVB to observe changes on the red and green LEDs.
- Rotate the potentiometer to observe changes on the orange LED.
- Notice that the pressure sensor controls the yellow LED.

The software for this application is available on nxp.com.

Jumper list and 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 whenswitch 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	**Buzzer Control**	
	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 Power**	
	Closing this jumper enables the Buzzer control by PP7 port.	
J15	**HVI Circuit –Reference Voltage Selector**	
	Closing this jumper powers the Buzzer circuit.	

Jumper list and description (cont.)

Jumper	Description	
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**	
	With this jumper closed, the VSUP Voltage is connected to PNP external transistor	
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**	
	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

- Do not close J2 jumper to power up the sensor. The sensor must be supplied with a voltage range of 2.1V to 3.6V.

Jumper list and description (cont.)

Jumper	Description	
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	**VDDX External Ballast Transistor - Output**	
	Closing this jumper connects the external PNP ballast transistor output to VDD_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.	

Jumper list and description (cont.)

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.	

Jumper list and description (cont.)

Jumper	Description	
J5	**VBAT**	
	Closing this jumper connects VBAT to all system.	
J50	**LIN and SENT Communication**	
	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.
	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.	

Headers and connectors list

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

Header / Connector	Reference position
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

Headers and connectors list (cont.)

Header / Connector	Reference position
J37	LIN Connector
J39	GPIO Header - Port AD
J40	GPIO Header - Port S
J45	CAN main connector
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)

Peripheral list

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

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	–	

Peripheral list (cont.)

Peripheral	ID	MCU PORT	Description
High Voltage Switch	SW1	PL1	Switch connected to PL1 (with 10 kΩ resistor)
	SW2	PL0	Switch connected to PL0 (with 10 kΩ resistor)
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

References

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

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

Revision history

Revision number	Date	Substantial changes
0	01/2014	Initial release
1	08/2018	Slide 10 updated

Information in this document is provided solely to enable system and software implementers to use NXP products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits based on the information in this document. NXP reserves the right to make changes without further notice to any products herein.

NXP makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does NXP assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages.

"Typical" parameters that may be provided in NXP data sheets and/or specifications can and do vary in different applications, and actual performance may vary over time. All operating parameters, including "typicals," must be validated for each customer application by customer's technical experts.

NXP does not convey any license under its patent rights nor the rights of others.

NXP sells products pursuant to standard terms and conditions of sale, which can be found at the following address: nxp.com/SalesTermsandConditions