



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.

CAN-PHY	Pierce Oscillator		Temp Sense	12-bit Analog-Digital Converter
MS-CAN	Internal RC Oscillator, +/- 1.3%	PLL with Frequency Modulation option		
2 x SCI			8-Bit DAC	Analog Comparator
2 SPI	S12ZCPU 32 MHz Bus (25 MHz @150°C TJ)		Hi-Res-PWM 4ch 16-bit	
1 L1C			Hi-Res-Timer 4ch 16-bit	
SENT	Up to 192KB Flash (ECC)		PWM 4ch 16-bit	
			TIMER 4ch 16-bit	
4 ch LSD (+25mA) open drain	EEPROM with ECC up to 2 K bytes)	RAM with ECC up to 8 K bytes	Real Time Interrupt	
			BDM/BDC	
1ch HSD (+20mA) open drain	2-HVI	V-SUP Voltage Supply Monitor	Vreg for CAN PHY with ext. ballast (BCTLc)	

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

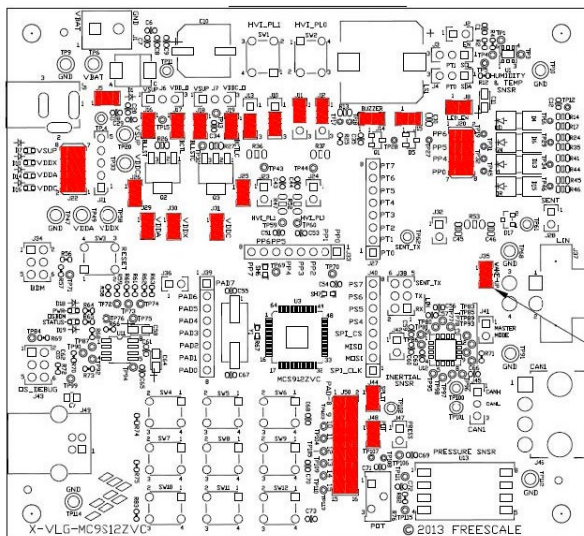


Figure 2. Jumper configuration diagram

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 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	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



Get Started

Download installation software and documentation under
“**Jump Start Your Design**” at nxp.com/VLG-MC9S12ZVC.

Support

Visit nxp.com/support for a list of phone numbers within your region.

Warranty

Visit nxp.com/warranty for complete warranty information.

For more information, visit nxp.com

NXP, the NXP logo, and CodeWarrior are trademarks of NXP Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. MagniV is a trademark of NXP Semiconductor, Inc. All other product or service names are the property of their respective owners. © 2015 NXP Semiconductor, Inc.

