



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
 - ^o Pressure sensor
 - ^o 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
MS-CAN	InternalRC	PLL		Converter
2 x SCI	Oscillator, +/-1.3%	with Frequency Modulation option	8-Bit DAC	Analog Comparator
2 SPI	S12ZCPU 3	2 MHz Bus	Hi-Res-PWM 4ch 16-bit	
	(25 MHZ @	>150°CTj)	Hi-Res-Timer 4ch 16-bit	
1 L1C	Up to 192KB		PWM 4ch 16-bit	
SENT	Flash	(ECC)	TIMER 4ch 16-bit	
	EEPROM with ECC up to 2 K bytes) RAM with ECC up to8 K bytes		Real Time	e Interrupt
4 ch LSD (+25mA) open drain			BDM/BDC	
1ch HSD (+20mA) open drain	2-HVI	V-SUP Voltage Supply Monitor	Vreg for with ext. bal	CAN PHY last (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.



nxp.com/S12MagniV

PRIMARY SIDE



Figure 2. Jumper configuration diagram



Jumper default configuration

The following table lists the jumper default configuration.

Header	Reference position	Header	Reference position
J5	1-2	J16	1, 2
J8	1-2	J17	1, 2
J10	2-3	J18	1, 2
J11	1-2	J19	1, 2
J12	1-2	J22	1-2, 3-4, 5-6, 7-8
J13	2-3	J25	1, 2
J15	1-2	J26	1-2
J14	1-2	J29	1-2
J20	1-2, 3-4, 5-6, 7-8	J30	1-2
J48	1,2	J31	1-2
J50	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16	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.

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 <u>nxp.com</u>.



Jumper list and description

Jumper	Description			
	HVI Circuit –Reference Voltage Selector			
J10	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.		
	ŀ	IVI Circuit –Reference Voltage Selector		
J11	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.		
	HVI Circuit –Reference Voltage Selector			
J12	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.		
		Buzzer Control		
J13	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.		
	Buzzer Power			
514	Closing this jumper enables the Buzzer control by PP7 port.			
115	HVI Circuit –Reference Voltage Selector			
010	Closing this jumper powers the Buzzer circuit.			



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Jumper list and description (cont.)

Jumper	Description		
116		VDDX External Ballast Transistor	
510	With this jumper closed, the VSUP Voltage is connected to PNP external transistor collector for the VDDX voltage regulation.		
		VDDX External Ballast Transistor	
J17	This jumper enables the signal control of the PNP external transistor collector for the VDDX voltage regulation.		
110		VDDC External Ballast Transistor	
J10	With this jumper closed, the VSUP Voltage is connected to PNP external transistor		
	VDDC External Ballast Transistor		
J19	This jumper enables the signal control of the PNP external transistor collector for the VDDC voltage regulation.		
12	Н	lumidity and temperature sensor power	
	This jumper powers the humidity and temperature sensor.*		
		LEDs	
J20	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		
	Power Supply Voltages – LEDs Indicators		
J22	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	
	VDDX External Ballast Transistor - Output		
J25	Closing this jumper connects the external PNP ballast transistor output to VDD_OUT line.		
	VDDX External Ballast Transistor - Output		
J26	Closing this jumper connects the external PNP ballast transistor output to VDD_OUT line.		
120	VDDA Power		
J29	Closing this header connects VDDA to VDD_OUT line.		
2	Humidity Temperature Sensor - Communication		
13	Closing this jumper connects the SCL-line of the Humidity Temperature Sensor to PT1.		
120	VDDX		
330	Closing this jumper connects VDDX to VDD_OUT line.		
131		VDDC	
001	Closing this jumper connects VDDC to VDDC_OUT line.		



Jumper list and description (cont.)

Jumper	Description			
J32	SENT Transmitter Interface			
	Closing this header conn	ects the SENT_TX line to SENT transmitter interface circuit.		
		LIN Mode		
J35	With this jumper, the use MC33662 - LIN transceiv	r can configure the local and remote wake-up mode of /er.		
		LIN and SENT Communication		
	Pin 1-2 Closed	PS4 is connected to LIN_RX		
J38	Pin 3-4 Closed	PS5 is connected to LIN_TX		
	Pin 5-6 Closed	PS7 is connected to SENT_TX		
И	Humidity Temperature Sensor - Communication			
J4	Closing this jumper connects the SDA line of the humidity temperature sensor to PT0.			
.141	LIN – Master/Slave Mode			
	With this jumper, the use	r can configure as master or slave mode.		
.142	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.			
147		Press Sensor Power		
	Closing this jumper powe	Closing this jumper powers the press sensor circuit.		
.148		Potentiometer Reference		
3-0	Closing this jumper conn	ects the potentiometer to VDDA.		



Jumper list and description (cont.)

Jumper	Description			
15	VBAT			
J2	Closing this jumper conne	ects VBAT to all system.		
		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.		
J50	Pin 5-6 Closed	Closing this jumper connects PAD10 port to the keyword matrix.		
	Pin7-8 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.		
	VDDX shunt resistor			
J51	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 enable measurements for the VD	Closing this jumper enables a shunt resistor on VDDC that can aid on current measurements for the VDDC ballast transistor.		
10		LEDs Power		
J0	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.		
	HVI Header – External HVI signal		
J23	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.		
	HVI Header – External HVI signal		
J24	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		





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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.
	VDDX - PNP Ballast Transistor Terminals
J6	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.
	VDDC – PNP Ballast Transistor Terminals
J7	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	
	D7	-	VSUP LED indicator	
	D10	-	VDDX LED indicator	
LED - Voltage Indicator	D14	-	VDDA LED indicator	
	D16	-	VDDC LED indicator	
	SW4	-		
	SW5	-		
	SW6	-		
	SW7	-		
Switch Panel	SW8	-	Matrix keyboard switch	
	SW9	-	·	
	SW10	-		
	SW11	-		
	SW12	-		





Peripheral list (cont.)

Peripheral	ID	MCU PORT	Description
High Voltage Switch	SW1	PL1	Switch connected to PL1 (with 10 k Ω resistor)
	SW2	PL0	Switch connected to PL0 (with 10 k Ω resistor)
Buzzer	LS1	PP7	Buzzer controlled by PP7
	D4	PP6	Red LED connected to port PP6
	D6	PP5	Green LED connected to port PP5
LED-General purpose	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



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Get Started

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