

GET TO KNOW THE S12ZVMC256 BOARD

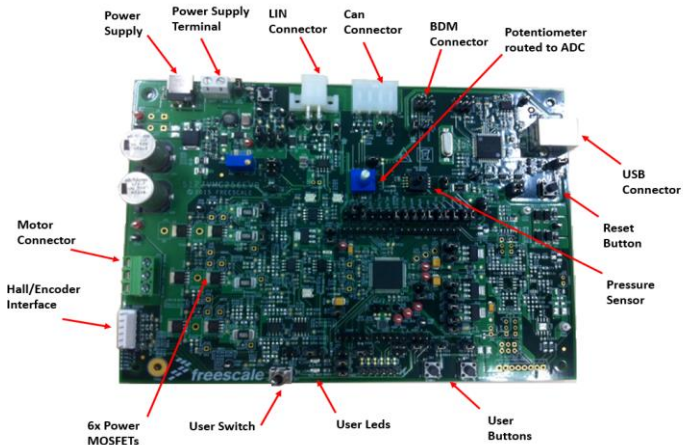
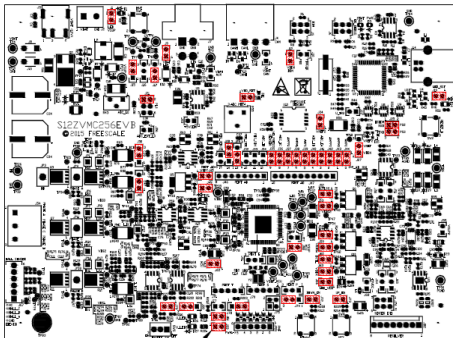


Figure 1: Front side of S12ZVMC256 Board

INTRODUCTION AND DEFAULT SETTINGS

The S12ZVMC256EVb features the S12ZVMC256 microcontroller, an automotive 16-bit MCU for three-phase BLDC motor control applications. The S12ZVMC256 integrates an S12Z CPU, a CAN physical interface, a 5 V regulator system to supply the microcontroller, and a gate driver unit (GDU) to drive up to six external power N-channel MOSFETs.



The board includes an onboard OSBDM, a USB-to-SCI interface, a resolver interface, a hall sensor interface, an external 4 MHz oscillator, current sense resistors, multiple op-amps for signal conditioning of voltage and current Measurements.

Default jumper positions of the S12ZVMC256 board are shown in the figure at right.

1 SOFTWARE TOOLS INSTALLATION

NXP's CodeWarrior development studio 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.

STEP-BY-STEP INSTRUCTIONS

The latest version of CodeWarrior for MCUs (Eclipse IDE) can be downloaded from www.nxp.com/CodeWarrior.

2 Launch the Demo Program

The project file contains a CodeWarrior project to exercise the different modules of the S12ZVMC microcontroller family, including the ADC, GDU, PTU, PMF, TIM, SCI and LIN modules.

JUMPER DEFAULT CONFIGURATION

Jumper	Setting			Description
	Default	BLDC	PMSM	
J1	1-2	1-2	1-2	VSUP LED indicator enable
J9	1-2	1-2	1-2	Enable LINPHY with VBAT
J12	1-2	1-2	1-2	VDDX supplies 5V to BDM header
J15	2-3	2-3	2-3	Disable function of SW1
J17	1-2	1-2	1-2	SW1 is energized with VSUP
J19	1-2	1-2	1-2	RESET LED indicator enable
J20	1-2	1-2	1-2	VDDX supplies 5V to ADC potentiometer
J21	1-2	1-2?	1-2?	SW1 enable in PL0 for HVI
J24	1-2	1-2	1-2	VREF generation supplied from VSUP enable
J25	1-2, 3-4	1-2, 3-4	1-2, 3-4	OSBDM RX and Tx are connected to ports PS2 and PS3.
J27	1-2	1-2	1-2	VREF supplied from VDDX
J28	2-3	2-3	2-3	PAD14 connected to external potentiometer(POT1)
J29	1-2	1-2	1-2	PAD13 connected to Temperature Sensor
J30	2-3	2-3	1-2	(1-2) Current sense op-amp inverting input connected to I_DCB (Phase current sense)
				(2-3) Current sense op-amp inverting input connected to GND (DC buss current sense)

Jumper	Setting			Description
	Default	BLDC	PMSM	
J35	1-2	1-2	1-2	PAD9 connected to Press Sensor
J36	1-2	1-2	1-2	PAD8 connected to ADC phase C
J37	1-2	1-2	1-2	PAD7 (AMPP1) connected to external gain-setting resistors
J38	1-2	1-2	1-2	PAD6 (AMPM1) connected to external gain-setting resistors
J39	1-2	1-2	1-2	PAD5 (AMP1) connected to external gain setting resistors
J40	1-2	1-2	1-2	PAD4 connected to ADC_IB (phase B current sense from external op-amp)
J41	1-2	1-2	1-2	PAD3 connected to ADC_IA (phase A current sense from external op-amp)
J42	1-2	1-2	1-2	PAD2 (AMPP0) connected to external gain-setting resistors
J43	1-2	1-2	1-2	PAD1 (AMPM0) connected to external gain-setting resistors
J44	1-2	1-2	1-2	PAD0(AMP0) connected to external gain-setting resistors
J45	1-2	1-2	1-2	VSUP supply to VDDC ballast
				(1-2)Current sense op-amp non-inverting input connected to Phase A (Phase current sense)
				(2-3) Current sense op-amp non-inverting input connected to I_DCB (DC buss current sense)
J48	1-2	2-3	1-2	
J49	1-2	1-2	1-2	Enable BCTL at Ballast VDDC ballast
J52	1-2	1-2	1-2	Enable BCTLS2 at VDDSD2 ballast
J53	1-2	1-2	1-2	VSUP supply to VDDSD2 ballast
J56	1-2	1-2	1-2	Enable BCTLS1 at VDDSD1 ballast
J58	1-2	1-2	1-2	VSUP supply to VSUP MCU
J59	1-2	1-2	1-2	VSUP supply to VDDSD1 ballast
J60	1-2	1-2	1-2	Enable BCTL at VDDX ballast
J62	1-2	1-2	1-2	VLS supply to VLS MCU
J63	1-2	1-2	1-2	VSUP supply to VDX ballast
J66	1-2	1-2	1-2	VDDX LED indicator enable
J72	1-2	1-2	1-2	PS0 "DOWN" push button enabled
J73	1-2	1-2	1-2	PP1 "UP" push button enabled
J74	2-3	2-3	2-3	PP0 connected to supply EVDD to Hall sensor interface
J78	2-3	2-3	2-3	PT2 connected to Hall/Encoder Phase B
J79	1-2	1-2	1-2	PT1 "ON/OFF" switch enabled
J80	2-3	2-3	2-3	PT1 connected to Hall/Encoder Phase A
J81	1-2	1-2	1-2	PT0 "User LED 1" enabled
J83	1-2	1-2	1-2	PS1 "User LED 2" enabled
J68	1-2	1-2	1-2	VDDX to +5VCD(Aplifiers supply) and to +5VA

JUMPER LIST AND DESCRIPTION

Jumper	Description
J1	VSUP LED indicator option Closing this jumper, the LED indicator for VSUP is connected to VSUP
J9	LINPHY interface supply option Closing this jumper, the LINPHY will be energized by VBAT
J12	BDM interface supply option Closing this jumper, the 5V pin on the BDM interface is connected to VDDX
J15	HVI switch polarity A selection pins 1-2 closed: SW1 is connected to VSUP pins 2-3 closed: SW1 is connected to ground.
J17	HVI switch polarity N selection pins 1-2 closed: SW1 is connected to VSUP pins 2-3 closed: SW1 is connected to ground.
J19	RESET LED indicator option Closing this jumper, the LED indicator for RESET is connected to RESET
J20	ADC potentiometer pull-up option Closing this jumper, VDDX supplies 5V to POT 1 (ADC potentiometer)
J21	HVI selection to PL0 pins 1-2 closed: PL0 is connected to SW1 pins 2-3 closed – PL0 is connected to VSUP pin 5-6 closed – PL0 is connected to an external analog input
J24	VREF generation supply option Closing this jumper connects VSUP to supply a regulated voltage at VREF
J25	SCI RXD selector pins 1-2 closed: RXD from OSBDM is connected to port PS2

JUMPER LIST AND DESCRIPTION (CONT.)

Jumper	Description
J27	VREF selector pins 1-2 closed – VREF supplied from VDDX pins 2-3 closed – VREF supplied from the VREF2 regulator
J28	ADC mapping – PAD14 pins 1-2 closed – Connects PAD14 to POS_SIN pins 2-3 closed – Connects PAD14 to external potentiometer
J29	ADC mapping – PAD13 pins 1-2 closed – Connects PAD13 to temperature sensor output pins 2-3 closed – Connects PAD13 to external potentiometer
J30	Internal AMP0 input selector (inverting) pins 1-2 closed – Connects DC Bus to the internal AMP0 inverting input (Phase A current sense) pins 2-3 closed – Connects Ground to the internal AMP0 inverting input (DC Bus current sense)
J35	ADC mapping – PAD9 Closing this jumper, PAD9 is connected to Pres sensor output
J36	ADC mapping – PAD8 Closing this jumper, PAD8 is connected to ADC_IC(phase C current sense from external op-amp)
J37	ADC mapping – PAD7 Closing this jumper, PAD7 is connected to AMP1 external gain-setting resistors
J38	ADC mapping – PAD6 Closing this jumper, PAD6 is connected to AMP1 external gain-setting resistors
J39	ADC mapping – PAD5 Closing this jumper, PAD5 is connected to AMP1 external gain-setting resistors
J40	ADC mapping – PAD4 Closing this jumper, PAD4 is connected to ADC_IB (phase B current sense from external op-amp)

JUMPER LIST AND DESCRIPTION (CONT.)

Jumper	Description
J41	ADC mapping – PAD3
	Closing this jumper, PAD3 is connected to ADC_IA (phase A current sense from external op-amp)
J42	ADC mapping – PAD2
	Closing this jumper, PAD2 is connected to AMPP0 external gain-setting resistors
J43	ADC mapping – PAD1
	Closing this jumper, PAD1 is connected to AMPM0 external gain-setting resistors
J44	ADC mapping – PAD0
	Closing this jumper, PAD0 is connected to AMP0 external gain-setting resistors
J45	VDDC ballast supply option
	Closing this jumper, the VDDC ballast is connected to VSUP
J48	Internal AMP0 input selector (inverting)
	pins 1-2 closed – Connects DC Bus to the internal AMPP0 inverting input (Phase A current sense)
	pins 2-3 closed – Connects Ground to the internal AMPP0 inverting input (DC Bus current sense)
J49	BCTL interface supply option
	Closing this jumper, enable ballast VDDC-VSUP through BCTL
J52	BCTLS2 interface supply option
	Closing this jumper, enable ballast VDDS2-VSUP through BCTLS2
J53	VDDS2 ballast supply option
	Closing this jumper, the VDDS2 ballast is connected to VSUP
J56	BCTLS1 interface supply option
	Closing this jumper, enable ballast VDDS1-VSUP through BCTLS1

JUMPER LIST AND DESCRIPTION (CONT.)

Jumper	Description
J58	Microcontroller supply option
	Closing this jumper connects the VSUP pin of the MCU to the supply voltage VSUP
J59	VDDS1 ballast supply option
	Closing this jumper, the VDDS1 ballast is connected to VSUP
J60	BCTL interface supply option
	Closing this jumper, enable ballast VDDX-VSUP through BCTL
J62	Microcontroller supply option
	Closing this jumper connects the VLS pin of the MCU to the supply voltage VLS
J63	VDDX ballast supply option
	Closing this jumper, the VDDX ballast is connected to VSUP
J66	VDDX LED indicator option
	Closing this jumper, the LED indicator for VDDX is connected to VDDX
J68	VDDX TO +5VDC and TO +5VA
	Closing this jumper, the +5VDC and +5VA are connected to VDDX
J72	"DOWN" push-button option
	Closing this jumper, the "DOWN" GPIO push button is connected to port PS0
J73	"UP" push-button option
	Closing this jumper, the "UP" GPIO push button is connected to port PP1
J74	EVDD or FAULT selector
	pins 1-2 closed: FAULT input is connected to port PP0 pins 2-3 closed: Port PP0 is connected to EVDD

JUMPER LIST AND DESCRIPTION (CONT.)

Jumper	Description
J78	Resolver or Hall/Encoder Phase B selector
	pins 1-2 closed: Phase B from Hall / Encoder interface is connected to port PT2
	pins 2-3 closed: Phase B from Resolver is connected to port PT2
J79	ON/OFF switch option
	Closing this jumper connects the "ON/OFF" GPIO switch to port PT1
J80	Resolver or Hall/Encoder Phase A selector
	pins 1-2 closed: Phase A from Resolver is connected to port PT1
	pins 2-3 closed: Phase A from Hall / Encoder interface is connected to port PT1
J81	USER LED1 option
	Closing this jumper, the GPIO LED1 is connected to port PT0
J83	USER LED2 option
	Closing this jumper, the GPIO LED2 is connected to port PS1

HEADERS AND CONNECTORS LIST

Header / Connector	Description
J2	Alternative power supply connector
J3	DC connector for wall power supply
J4	CAN connector (1. MSCAN_H, 2. MSCAN_L, 3. Gnd, 4. VBAT)
J5	External BDM connector for S12ZVM MCU
J6	External BDM connector for OSBDM (1. BKGD, 2. Ground, 3. PDO, 4. RESET, 5. PDOCLK, 6. VDD)
J7	LIN connector (1. GND, 2. GND, 3. +12V [HD], 4. LIN)
J8	Alternative connector (blade) for power supply (+12V) input
J10	Header for extended debug interface (1. PDOCLK, 2. PDO)
J13	Alternative connector (blade) for ground
J14	OSBDM USB connector

HEADERS AND CONNECTORS LIST (CONT.)

Header / Connector	Description
JP21	PMF Header (1. PT2, 2. PP1, 3. PT3, 4. PT0, 5. PT1, 6. PP0)
	Port AD Header
J46	(1. AN9, 2. AN10, 3. AN11, 4. AN12, 5. AN13, 6. AN14, 7. AN15, 8. GND)
J47	Port AD Header (1. AN0, 2. AN1, 3. AN2, 4. AN3, 5. AN4, 6. AN5, 7. AN6, 8. AN7, 9. AN8, 10. GND)
	3-Phase Motor power output connector
J54	Port L Header
J57	(1. PL0, 2. GND)
J61	Port E Header (1. PE0, 2. PE1, 3. GND)
	Hall sensor / Encoder interface (1. EVDD, 2. GND, 3. Ph-A, 4. Ph-B, 5. Ph-C)
J67	Port P Header (1. PP0, 2. PP1, 3. GND)
J70	Port S Header (1. PS0, 2. PS1, 3. PS2, 4. PS3, 5. GND)
	Port T Header (1. PT3, 2. PT2, 3. PT1, 4. PT0, 5. GND)
J76	SINCOS I/O Connector (1. Phase A, 2. SIN, 3. Phase B, 4. COS, 5. GND, 6. +5VA)
	Resolver I/O Connector (1. GEN_P, 2. GEN_M, 3. SIN, 4. SIN_REF, 5. COS, 6. COS_REF, 7. GND, 8. +5VA)

LEDs

LED	Description
D1	VSUP LED (Yellow)
D2	OSBDM Status LED (Green)
D3	OSBDM Power LED (Yellow)
D14	RESET LED (Red)
D21	FAULT5 LED (Red)
D24	VDD LED (Green)
D26	USER LED 1 (Blue)
D27	USER LED 2 (Blue)

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Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331