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pump solutions

## S12ZVM-EWP PMSM Water Pump Reference Design

The S12ZVM-EWP is a reference design board engineered for three-phase PMSM water pump applications with sensorless FOC dual shunt control, which provides high efficiency and dynamic performance.

### OVERVIEW

Based on the 16-bit S12 MagniV® S12ZVM mixed-signal microcontrollers, the S12ZVM-EWP board provides an A-sample of a PMSM electrical water pump ECU with hardware and software to accelerate the development and production of water pump products.

### KEY FEATURES

- ▶ Supports the MagniV S12ZVML64 MCU
- ▶ PMSM sensorless FOC algorithm supported
- ▶ 12 V system application, voltage supply range from 9 V to 18 V
- ▶ 7 A input current, up to 80 W input power
- ▶ Dual shunt current sampling
- ▶ Hardware overvoltage, undervoltage, overcurrent, and short protection
- ▶ PWM and LIN function integrated in 1 wire
- ▶ BDM and SCI integrated in 1 plug: 4 layers PCB with 1 layer components mounted
- ▶ Software over current, stall detection, under voltage, over voltage, over temperature protection
- ▶ Speed control by using PWM duty cycle and FreeMASTER
- ▶ Fault clear and restart auto-mode if related MACRO enabled

### RUNTIME SOFTWARE

- ▶ **S12ZVM-EWP\_SW**: Complete PMSM electrical water pump sensor-less FOC software package for S12ZVM-EWP reference design
- ▶ **AUTOMATH\_MCL**: Automotive Math and Motor Control Library Set
- ▶ **FreeMASTER** Run-Time Debugging Tool
- ▶ **MCATSW**: Motor Control Application Tuning (MCAT) Tool
- ▶ **CodeWarrior®** for MCUs (Eclipse IDE)

### TARGET APPLICATIONS

- ▶ Electrical fuel, water and oil pumps

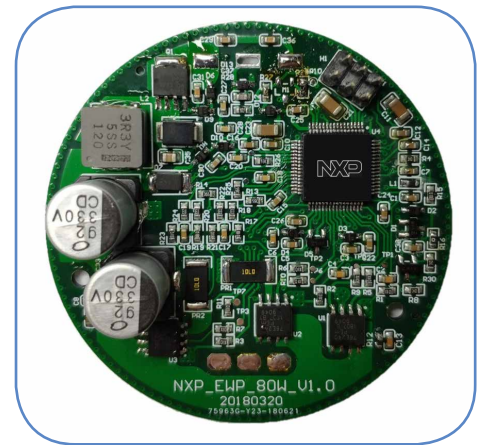


## S12ZVML64 MCU AND S12ZVM-EWP BOARD SPECIFICATIONS

Flash	128 KB	PMF	6-ch, 15-bit PWM
RAM	8 KB	12 V VREG	120 V / 70 mA, 170 mA with ballast
Core	S12Z	ADC	2x16-ch, 12-bit
Speed	50 MHz	PTU	2 trigger input sources / 2 trigger output
Package	64 LQFP	GDU	3/3
LIN-PHY	1	Temp	Up to +150°C
Comms	2 SCI, 1 SPI	EVDD	1 ch. 5 V / 20 mA (source)

Part Number	Motor Type	Kit Contains
S12ZVM-EWP	PMSM	Board

## S12ZVM-EWP BOARD



## MOTOR CONTROL ALGORITHM CONCEPT

