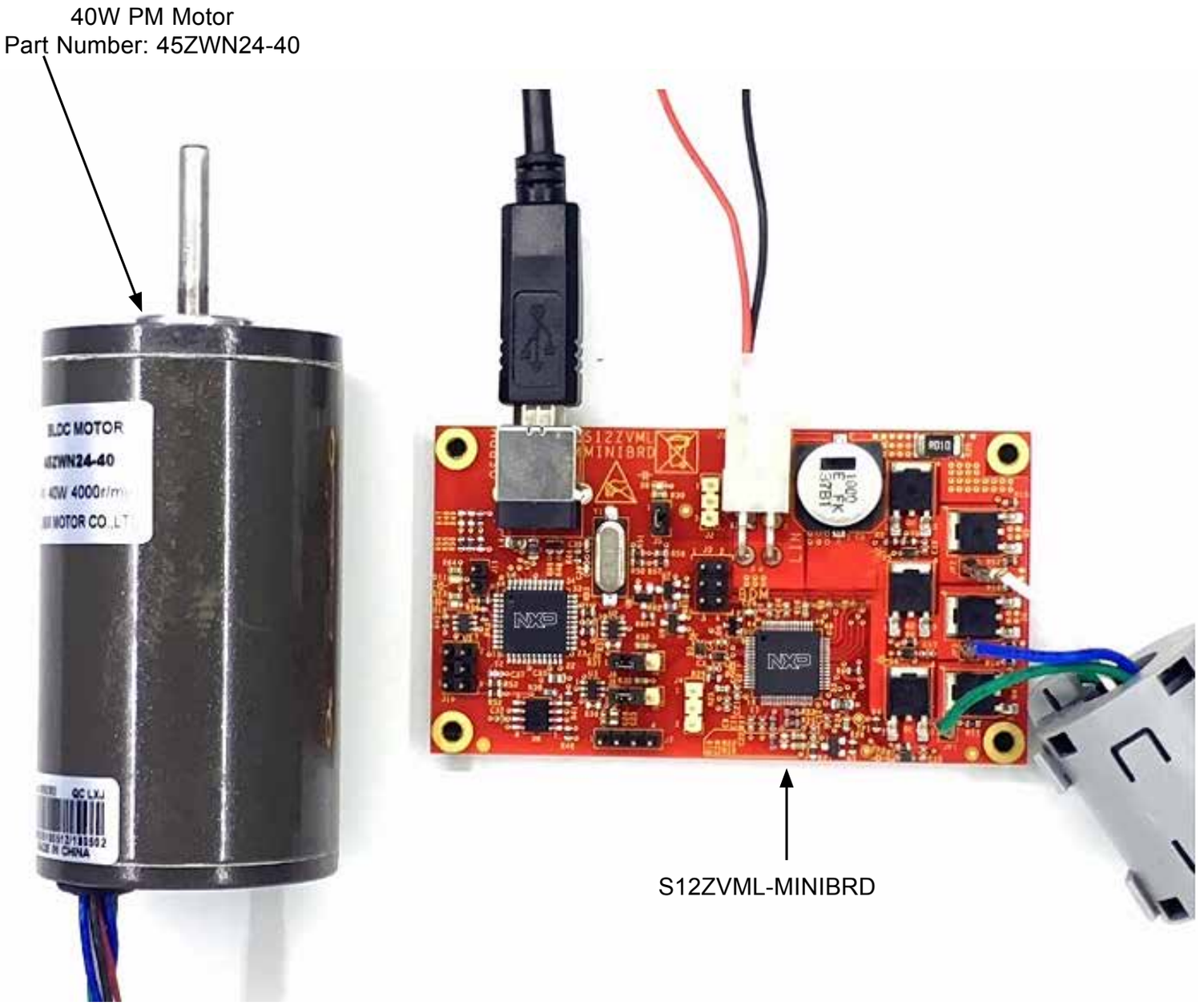
Quick Start Guide

S12ZVML-MINIKIT

3-phase BLDC and PMSM Development Kit with
NXP S12ZVML128 MCU

3-PHASE BLDC/PMSM DEVELOPMENT KIT WITH NXP S12ZVML128 MCU



GET TO KNOW THE S12ZVML-MINIBRD

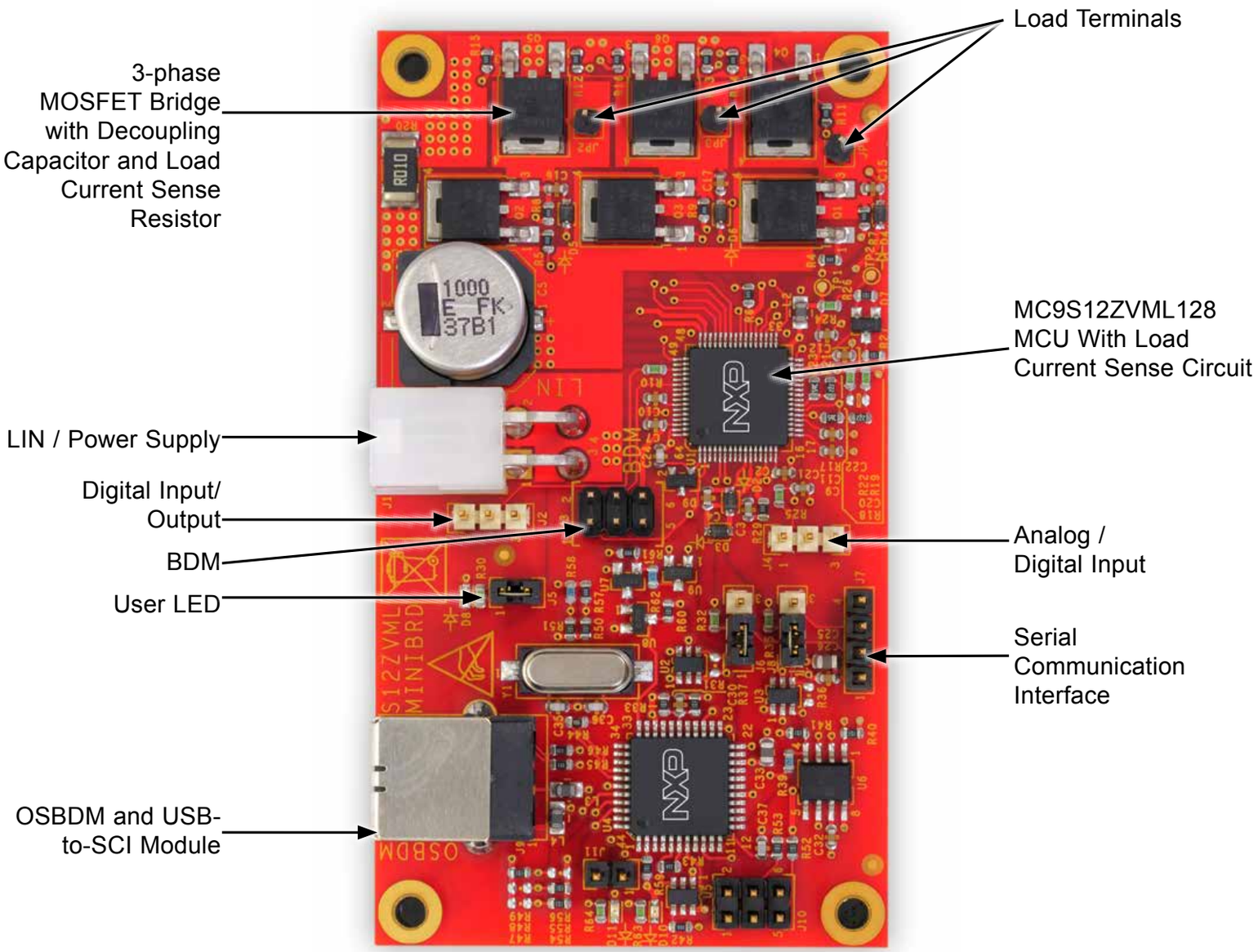


Figure 1: Front side of S12ZVML-MINIBRD

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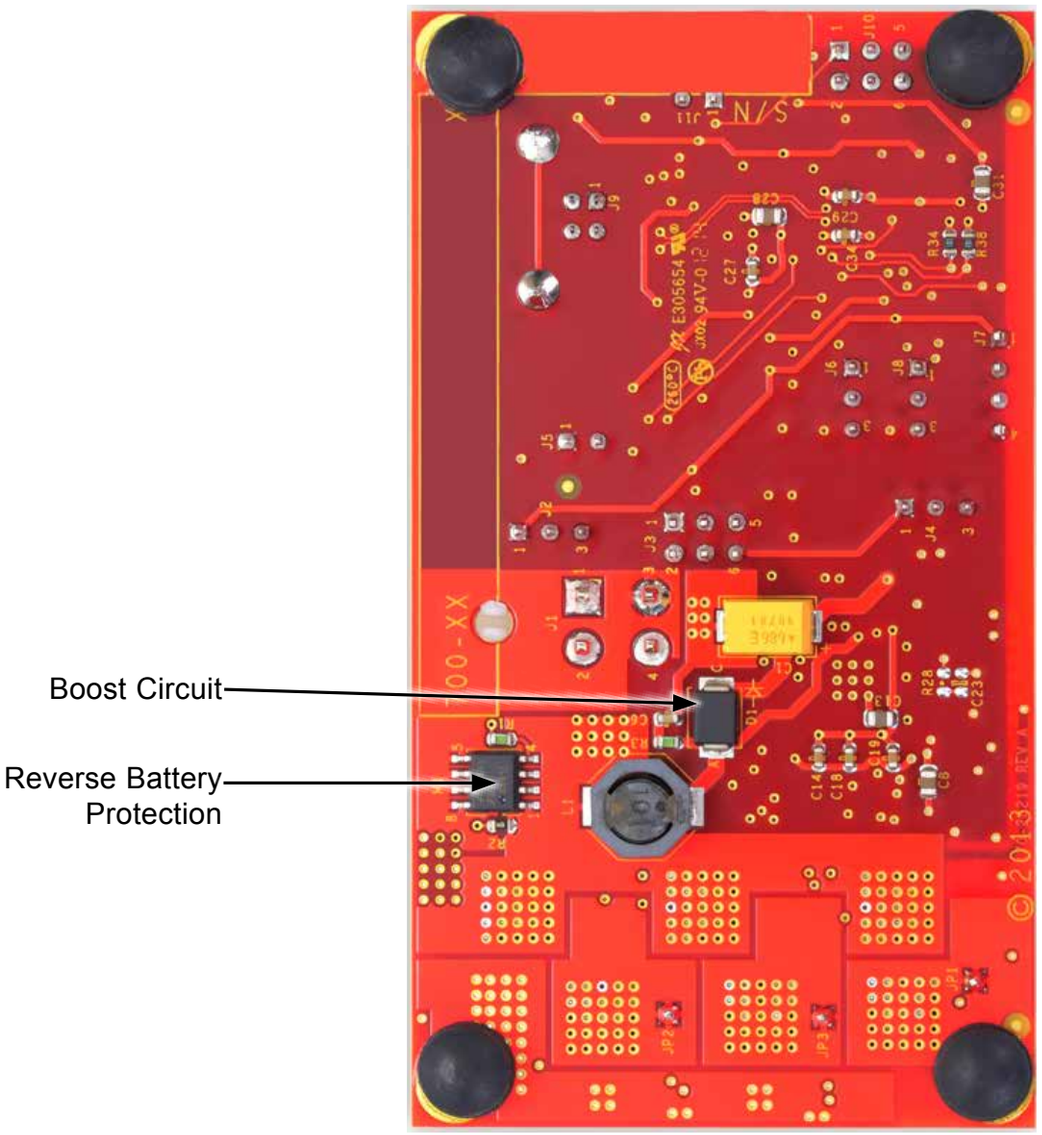

Figure 1: Back side of S12ZVML-MINIBRD

S12ZVML-MINIBRD FEATURES

Hardware

- **S12ZVML-MINIBRD**—MC9S12ZVML128 with LIN connectivity support, BDM and OSBDM downloading and debugging
- **Low Cost PM Motor**—3-phase PM motor,24VDC,4000RPM,40W,45Z WN24-40
- **Boost circuitry**--allow driving Vgs = 10 V MOSFETs from +3.5 V power supply
- **Mini Board size**—MC9S12ZVML128 related part size of 5cmx5cm,OSBDM related part size of 5cmx4cm
- **Reverse battery protection**
- **Load current monitoring**
- **On-board charge pumps**
- **USB cable**

Software

- **Automotive Motor Control Algorithm**
  - Sensorless control of the BLDC motor based on Six-step commutation control technique allowing torque/speed control with low CPU load
  - High-performance sensorless field-oriented control of the PMSM motor with DC-link current sensor and 3-phase current reconstruction, field weakening and other advanced algorithms
- **Automotive Math and Motor Control Library Set** — control algorithm built on blocks of precompiled SW library
- **FreeMASTER and MCAT** — Application tuning and variable tracking

STEP-BY-STEP INSTRUCTIONS

1 Download Software

Download installation software and documentation under **"Getting started"** at **nxp.com/AutoMCDevKits**.

2 Install CodeWarrior Development Studio IDE

Download and install CodeWrrior Development Studio IDE version 11.0 available at **nxp.com/codewarrior.**

3 Install FreeMASTER

Download and install FreeMASTER runtime debugging tool available at **nxp.com/FreeMASTER**.

4 Download BLDC Motor Control Software Package

Visit **nxp.com/S12ZVML-MINIBRD**. Navigate the "Getting Started" section and download the latest version of documentation and software package.

5 Connect the Motor

Connect the LINIX 45ZWN24-40 3-phase PM motor to the motor phase terminals on S12ZVML-MINIBRD board pins JP1,JP2, JP3.

6 Connect the Power Supply

Connect the power supply cable with J1 LIN connector. Keep the DC supply voltage within the range of -25 V to +25 V, nominal +12 V.

STEP-BY-STEP INSTRUCTIONS CONTINUED

7 Connect the USB Cable

Connect S12ZVML-MINIBRD to the PC using the USB cable. Allow the PC to automatically configure the USB drivers if needed.

8 Re-program the MCU using CodeWrrior IDE

Import the installed application software project in the CodeWrrior Development Studio IDE:

- Start CodeWarrior Development Studio application
- **Click File – Import**
- Select General – **Existing Projects into Workspace**
- Navigate to the installed application directory:
  - for BLDC application: **MC_DevKits\S12ZVMLMINIBRD\sw\S12ZVMLMINIBRD_BLDC_SW_CW11** and click **OK**
  - for PMSM application: **MC_DevKits\S12ZVMLMINIBRD\sw\S12ZVMLMINIBRD_PMSM_SW_CW11** and click **OK**
- Click **Finish**
- Click Run – **Debug**

STEP-BY-STEP INSTRUCTIONS CONTINUED

9 FreeMASTER Setup

- Start the FreeMASTER application
  - For BLDC application: Open FreeMASTER project **MC_DevKits\S12ZVMLMINIBRD\sw\S12ZVMLMINIBRD_BLDC_SW_CW11\FreeMASTER_control\S12ZVMLMINIBRD_BLDC_SW_CW11.pmp** by clicking File – **Open Project**
  - For PMSM application: Open FreeMASTER project **MC_DevKits\S12ZVMLMINIBRD\sw\S12ZVMLMINIBRD_PMSM_SW_CW11\FreeMASTER_control\S12ZVMLMINIBRD_PMSM_SW_CW11.pmp** by clicking File – **Open Project**
- Click the red **STOP** button in the FreeMASTER toolbar or press CTRL+K to enable the communication.
- Successful communication is signalized in the status bar at very bottom as **BLDC:** "RS232 UART Communication;COMn;speed = 9600". **PMSM:** "RS232 UART Communication;COMn;speed = 19200".

APPLICATION CONTROL

1. Click Motor 1 in the Motor Control Application Tuning tool(MCAT) tool tab menu to display the motor control page.
2. In case of pending faults, click the fault button Clear FAULT on theFreeMASTER MCATControl Page.
3. Start the application by pressing ON/OFF button on the FreeMASTER MCAT Control Page .
4. Set required speed by changing the Speed Required variable value manually in the.variable watch window, by clicking speed gauge. For BLDC application, the speed range is between 250rpm to 4000rpm. For PMSM application the speed range is between -4000rpm to 4000rpm. Do not exceed 2000rpm for more than 5 minutes.
5. To stop the application, click the ON/OFF button on the FreeMASTER MCAT Control page.

S12ZVML-MINIBRD JUMPER OPTIONS

JUMPER	OPTION	SETTING	DESCRIPTION
J2	Motor run/ stop	1-2	Motor run
		2-3	Motor stop
J5	Motor run/ stop	short	LED_GREEN Enabled
J6	PS2/ RxD1	1-2	USB OSBDM
		2-3	MCU RxD1 connect to J7 SCI port which allows to connect board external device using the MCU SCI module
J8	PS3/ TxD1	1-2	USB OSBDM
		2-3	MCU TxD1 connect to J7 SCI port which allows to connect board external device using the MCU SCI module
J11	Bootloader enable	Open	Bootloader disabled

SUPPORT

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

WARRANTY

Visit **www.nxp.com/warranty** for complete warranty information.

Get Started

Download installation software and documentation under **"Getting Started"** at **www.nxp.com/SZVML-MINIBRD**.

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