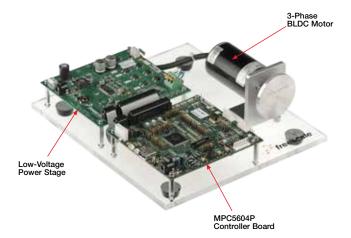# NXP

Quick Start Guide

3-Phase Sensorless BLDC Motor Control Development Kit
with Qorivva MPC5604P MCU

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3-Phase Sensorless BLDC Motor Control Development Kit with Qorivva MPC5604P MCU

3-Phase
BLDC Motor

Low-Voltage
Power Stage

MPC5604P
Controller Board

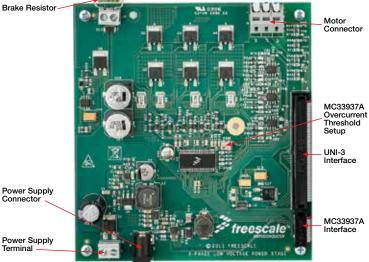# 3-Phase Sensorless BLDC Motor Control Development Kit Contents

Hardware

- Qorivva MPC5604P controller board
- 3-phase PMSM/BLDC low-voltage power stage
- 3-phase BLDC motor/24 V, 90 W, 9000 RPM/Linux® 45ZWN24-90
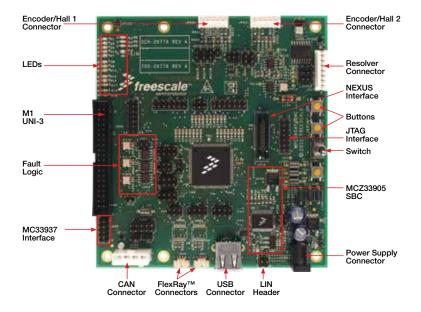- USB cable
- +24 VDC power supply

Resources

- BLDC development kit application source code
- Automotive math and motor control library set for MPC5604P installation package
- FreeMASTER installation pack
- FreeMASTER project
- 3-phase BLDC development kit quick start guide
- 3-phase BLDC development kit fact sheet
- 3-phase BLDC development kit application note
- Qorivva MPC5604P controller board user guide
- 3-phase BLDC/PMSM low-voltage power stage user guide

3-Phase Low-Voltage Power Stage

Brake Resistor

Motor Connector

MC33937A Overcurrent Threshold Setup

UNI-3 Interface

Power Supply Connector

Power Supply Terminal

MC33937A Interface

Qorivva MPC5604P Controller Board

Encoder/Hall 1 Connector

Encoder/Hall 2 Connector

LEDs

Resolver Connector

M1 UNI-3

NEXUS Interface

Buttons

JTAG Interface

Switch

Fault Logic

MCZ33905 SBC

MC33937 Interface

Power Supply Connector

CAN Connector

FlexRay™ Connectors

USB Connector

LIN Header

Software Tools Installation

1 Install the FreeMASTER debugging tool. For FreeMASTER application download, please visit **freescale.com/freemaster**.

2 Install the CP210x virtual COM port driver. For the CP210x virtual COM port driver installation file, please visit **freescale.com/automcdevkits**, Downloads section.

3 Run "Device Manager" on your system and check which COM port was assigned to the CP210x COM port driver.

Kit installation

1 Connect the USB cable to the Qorivva MPC5604P controller board and the host PC.

2 Connect the power supply to the power stage. The controller board power supply is taken from the power stage. The BLDC motor used is designed for phase voltage = 24 V.

Note: Please make sure the development kit is updated with the downloaded application software found at **freescale.com/automcdevkits** before proceeding to step 3.

3 Start the FreeMASTER project **MPC5604P_BLDC_Sensorless. pmp** located in **MTRCKTSBN5604P\SW\MPC5604P_ BLDC_Sensorless** project directory.

4 Enable communication by pressing the "STOP" button in the FreeMASTER, or by pressing "CTRL+K."

5 Successful communication is signalized in the status bar. If the communication is not established, check the USB connection between the PC and Qorivva MPC5604P controller board, communication port and speed. The communication port and speed can be set in the Project\Options menu (or pressing "CTRL+T"). The communication speed must be set at 19200 Bd.

Kit Installation (continued)

6 If no actual faults are present in the system, the LED-like indicators shall be dark red. If there is a fault present, identify the source of the fault and remove it. Successful removal is signalized by the switching off of the respective LED-like indicator.

7 If all te LED-like indicators are off, clear pending faults by pressing the green circled button "FAULT CLEAR."

8 Start the application by pressing 1-APP_ON on the flip/flop (APP_ON/APP_OFF) switch.

9 Enter the required speed by assigning this value to the "Nreq" variable in the variables watch window. The value is in revolutions per minute.

10 Stop the application by pressing 0-APP_OFF on the flip/flop (APP_ON/APP_OFF) switch.

11 Reset the application at any time by pressing the red circled button "APP_RESET."

Qorivva MPC5604P Controller Board Jumper Options

Table below shows the functions of the four push button switches on the board. The default installed jumper settings are shown in white text within the green boxes.

Jumper	Option	Setting	Description
JP1, JP2	CAN	Closed	Terminate CAN bus node.
JP104	MC33905 Debug Mode	Closed	Enter SBC driver MC33905 to debug mode.
JP105	MC33905 Save Mode	Open	Enter SBC driver MC33905 to safe mode.
JP200	Resolver Enable	Open	Resolver reference input signal from MCU disabled.
		Closed	Resolver reference input signal from MCU enabled.
J203	Resolver REFSIN Input	1–2	Positive input for SIN OPAM is DC offset voltage set up by trimmer R209.
		2–3	Positive input for SIN OPAM is REFSIN input of resolver.
J204	Resolver COS Input	1–2	Positive input for COS OPAM is DC offset voltage set up by trimmer R209.
		2–3	Positive input for COS OPAM is REFCOS input of resolver.
J205	Phase A Digital Signal	1–2	Resolver Phase A signal is connected to GPIO F[13].
		2–3	SIN/COS Phase A signal is connected to GPIO F[13].
J206	Phase B Digital Signal	1–2	Resolver Phase A signal is connected to GPIO A[5].
		2–3	SIN/COS Phase A signal is connected to GPIO A[5].

Qorivva MPC5604P Controller Board Jumper Options (continued)

Jumper	Option	Setting	Description
J2	Resolver Input Signal	2–3	Resolver reference signal is generated by GPIO C[11].
		1–2	Resolver reference signal is generated by GPIO C[12].
J301	FAULT1 Selection	1–2	UNI-3 Phase A overcurrent signal is connected to FAULT1 input G[9].
		2–3	UNI-3 DC bus overcurrent signal is connected to FAULT1 input G[9].
J312	BOOT Selection	Closed	MPC5604P boot from internal flash.
J500	Encoder 0 Phase A	1–2	Encoder0 JP500 pin three PHASE A input signal is connected to GPIO A[0].
		2–3	UNI-3 BEMFZCA input signal is connected to GPIO A[0].
J501	Encoder 0 Phase B	1–2	Encoder0 JP500 pin four PHASE B input signal is connected to GPIO A[1].
		2–3	UNI-3 BEMFZCB input signal is connected to GPIO A[1].
J502	Encoder 0 Index	1–2	Encoder0 JP500 pin five INDEX input signal is connected to GPIO A[2].
		2–3	UNI-3 BEMFZCC input signal is connected to GPIO A[2].
J503	Encoder 0 Home	Closed	Encoder0 JP500 pin six HOME input signal is connected to GPIO A[3].

Support

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

Warranty

Visit **freescale.com/warranty** for complete warranty information.

For more information, visit

freescale.com/automcdevkits