

# DEVKIT-MOTORGD QUICK START GUIDE (QSG)

Ultra-Reliable MCUs for Industrial and Automotive Applications

[www.nxp.com/DEVKIT-MOTORGD](http://www.nxp.com/DEVKIT-MOTORGD)



EXTERNAL USE



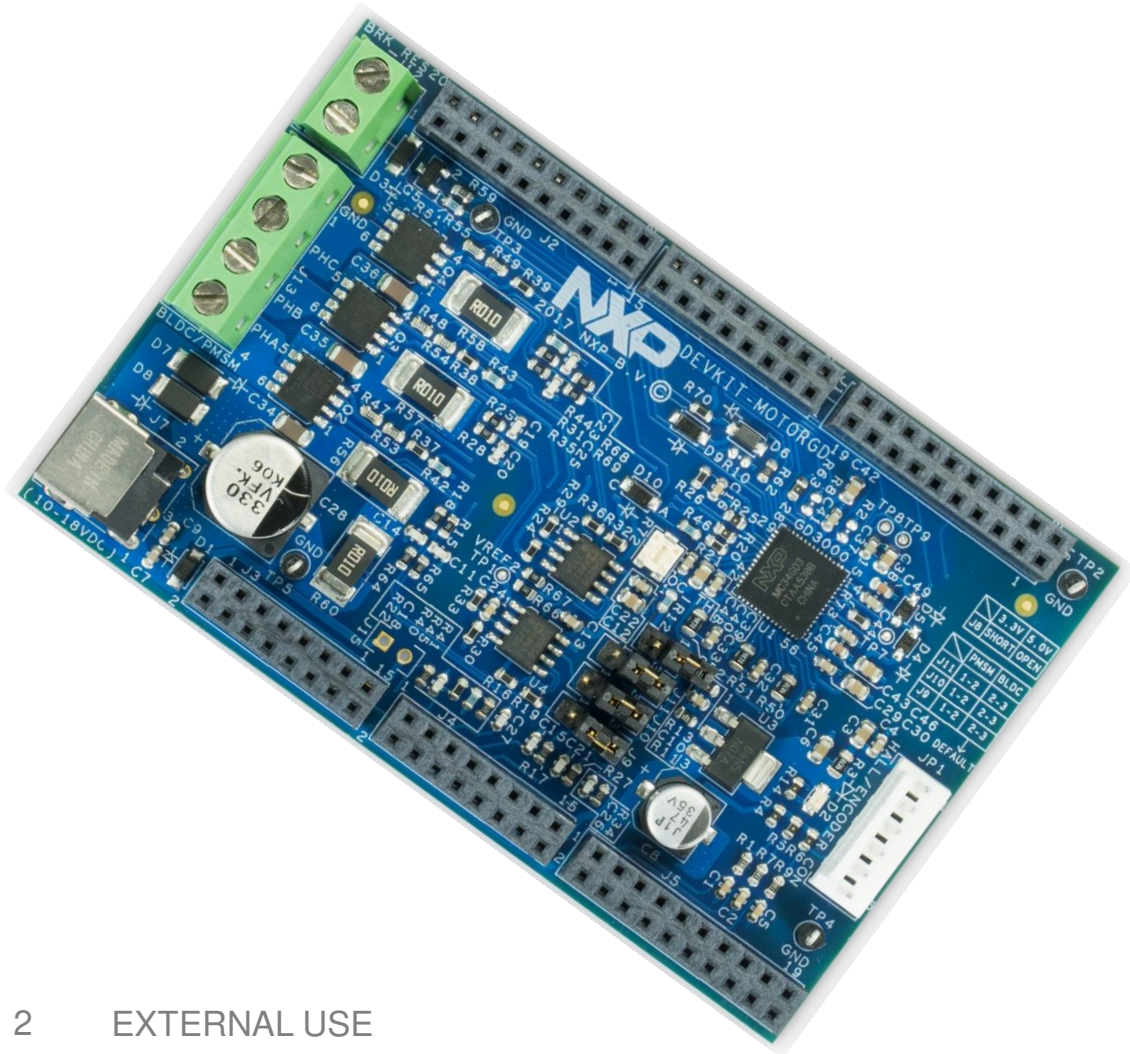
SECURE CONNECTIONS  
FOR A SMARTER WORLD

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# Step-by-Step Installation Instructions

In this quick start guide, you will learn how to set up the **DEVKIT-MOTORGD** board and run the default program.



1

## Install Software and Tools

Install S32 Design Studio IDE for base board (S32K144EVB-Q100 or DEVKIT-MPC5744P).

[S32 Design Studio for ARM/Power](#)

See Software Installation Guide (SWIG) from S32K144EVB-Q100 or DEVKIT-MPC5744P Quick Start Package.

2

## Program Base Board

Connect one end of the USB cable to the PC and the other end to the micro-B connector on DEVKIT-MPC5744P/S32K144EVB-Q100. Allow the PC to automatically configure the USB drivers. Flash motor control program to base board.

3

## Plug in MOTORGD

Plug in DEVKIT-MOTORGD to base board. Make sure base board is configured to be powered externally. DEVKIT-MOTORGD must supply power to base board. Plug in motor to phase and Hall sensors of DEVKIT-MOTORGD

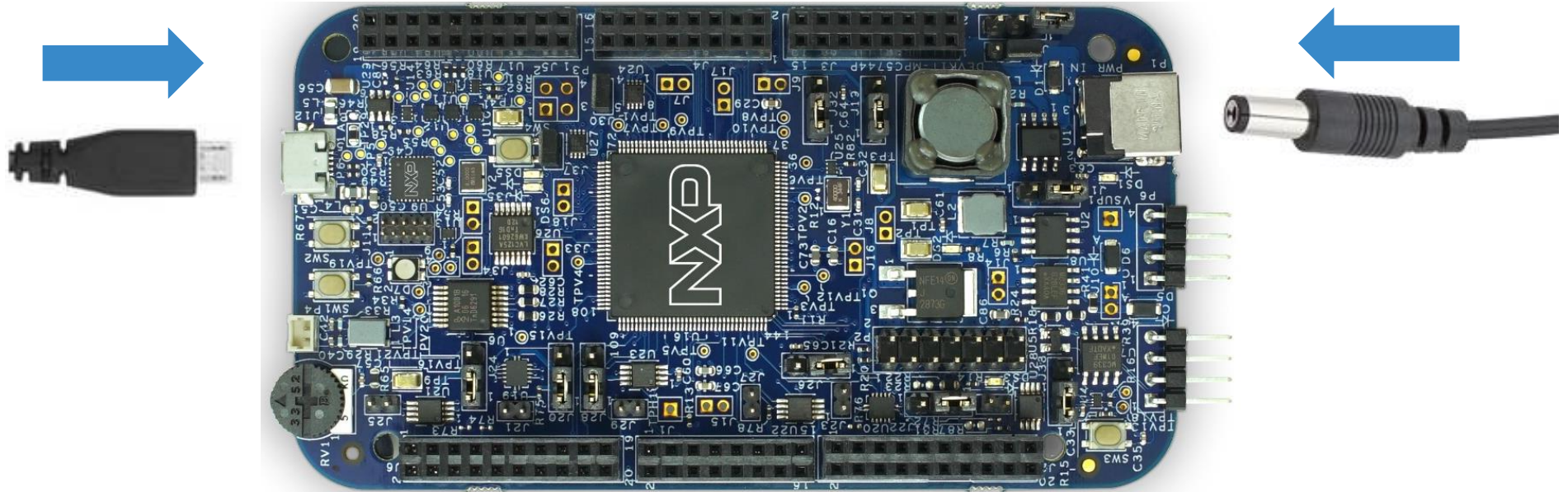
4

## Learn More About the DEVKIT-MOTORGD

Read release notes and documentation on the [nxp.com/DEVKIT-MOTORGD](http://nxp.com/DEVKIT-MOTORGD)

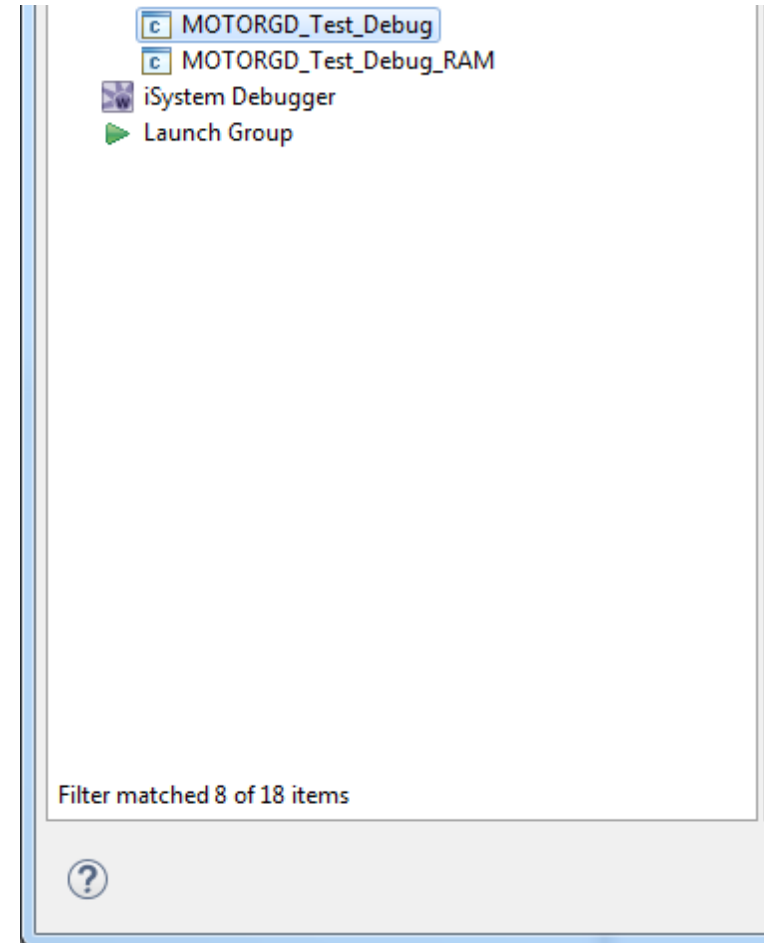
# How to Spin a Motor: Power the Base Board

- This example uses DEVKIT-MPC5744P as base board
- Base board can be powered by USB or external supply
  - Check base board jumpers
  - This [slide](#) shows settings for external power
- Plug in USB to base board for programming
- Plug in power supply if base board configured to be externally powered



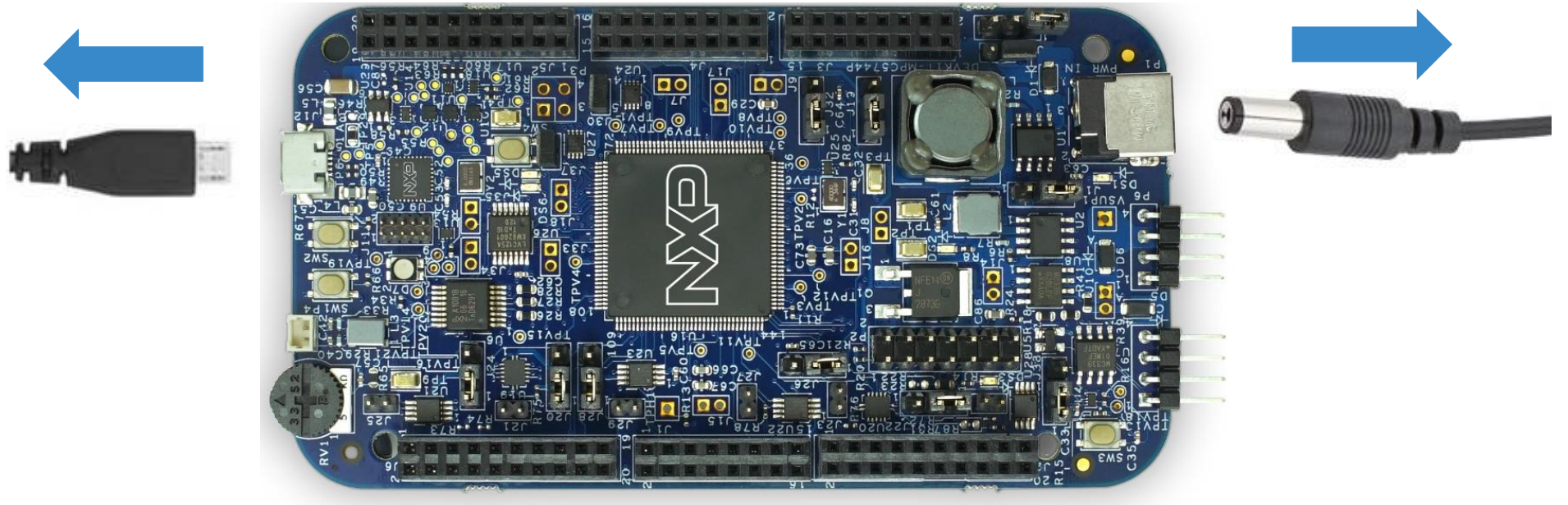
# How to Spin a Motor: Program the Base Board

- Load the motor control program onto base board
- Use S32DS
  - Refer to S32K144EVB-Q100 or DEVKIT-MPC5744 SWIG
- [Online tutorial](#) on installing software using Model Based Design Toolbox



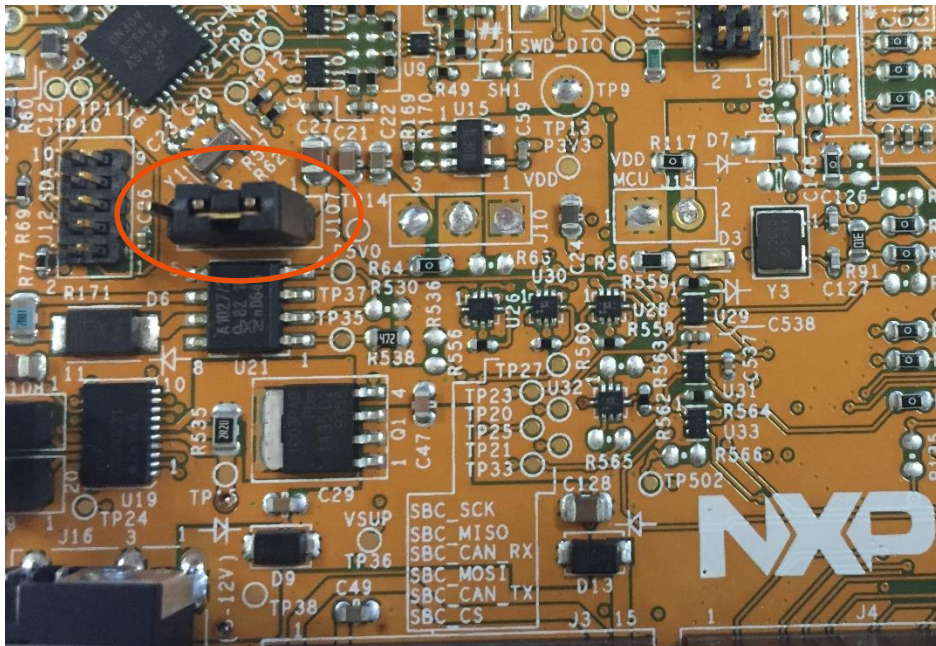
# How to Spin a Motor: Remove the USB

- Unplug the USB and external supply from base board
- DEVKIT-MOTORGD will power base board

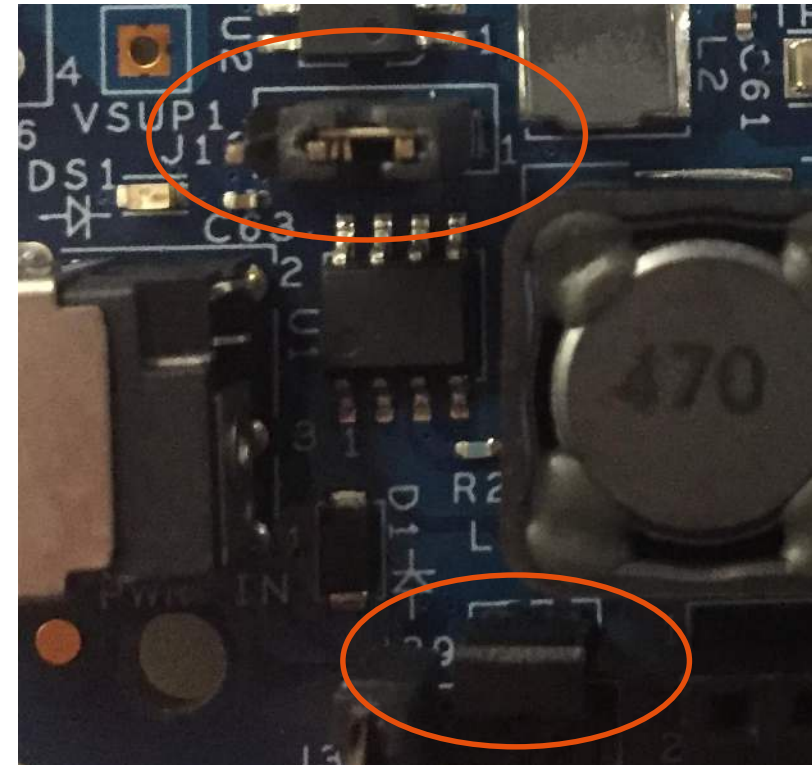


# How to Spin a Motor: Configure Base Board Jumpers

- Make sure base board is configured to be powered externally
- S32K144EVB-Q100: Short J107.1-2
- DEVKIT-MPC5744P: Short J13.1-2 and J39.1-2



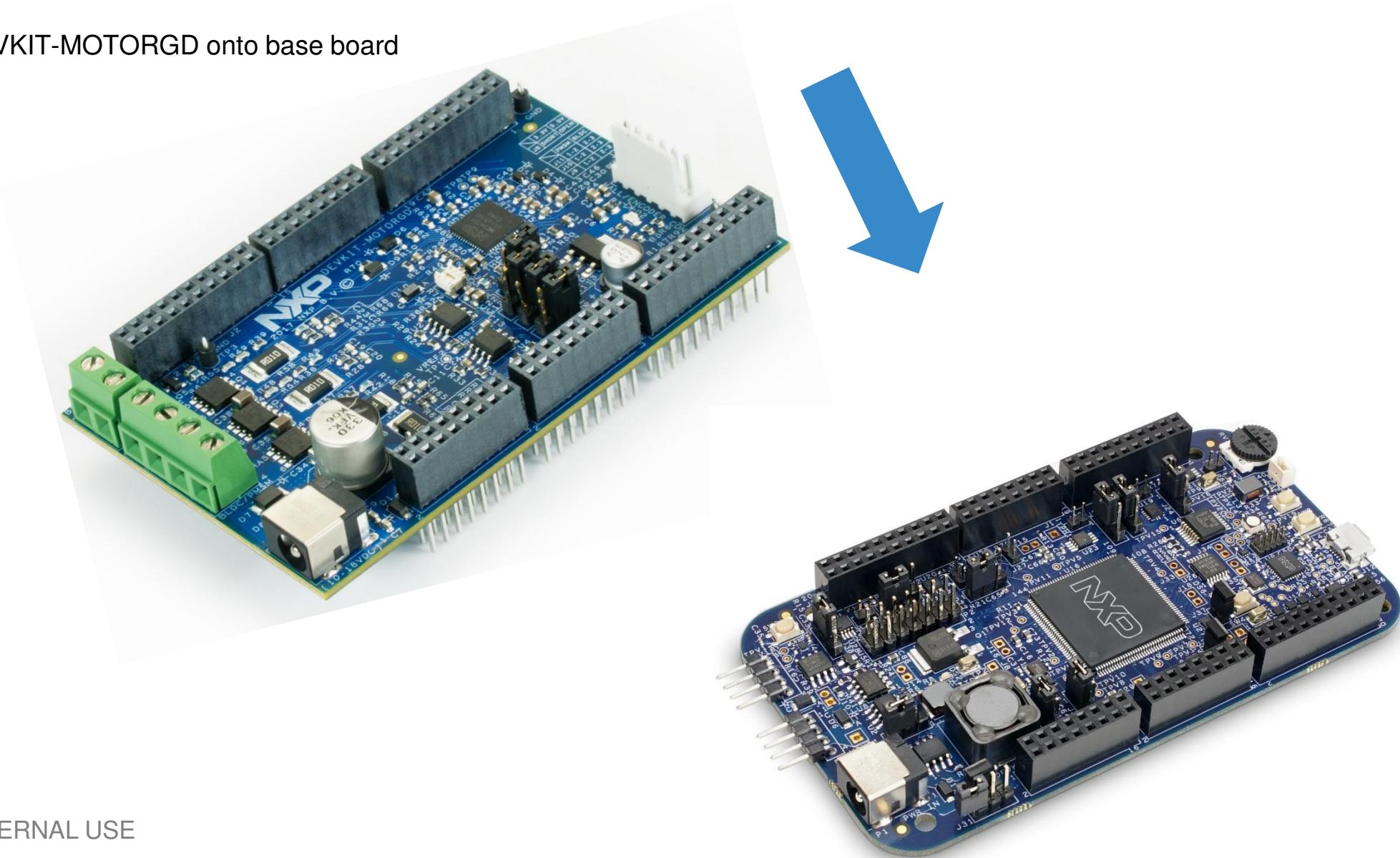
S32K144EVB-Q100



DEVKIT-MPC5744P

# How to Spin a Motor: Plug in DEVKIT-MOTORGD

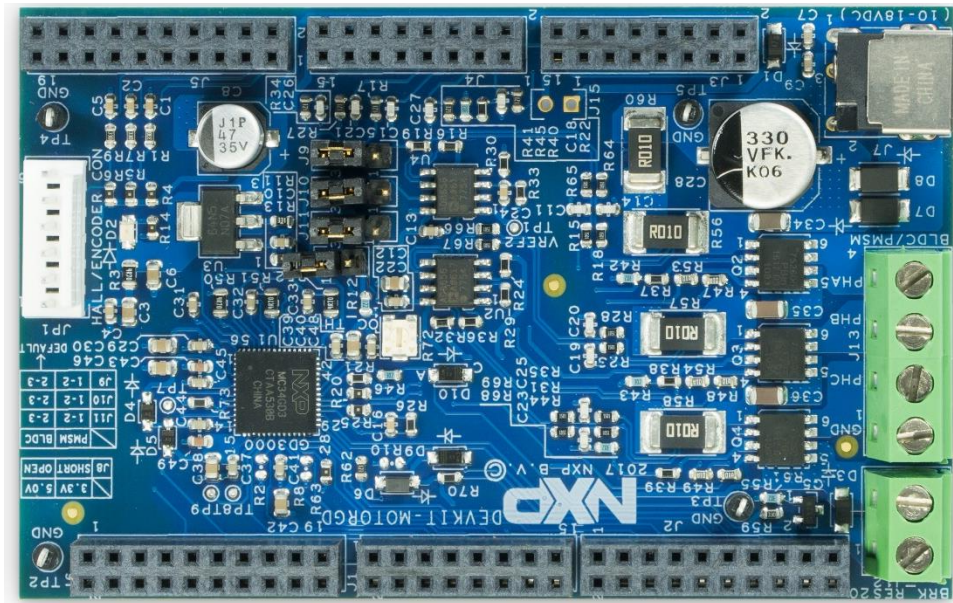
- Plug DEVKIT-MOTORGD onto base board





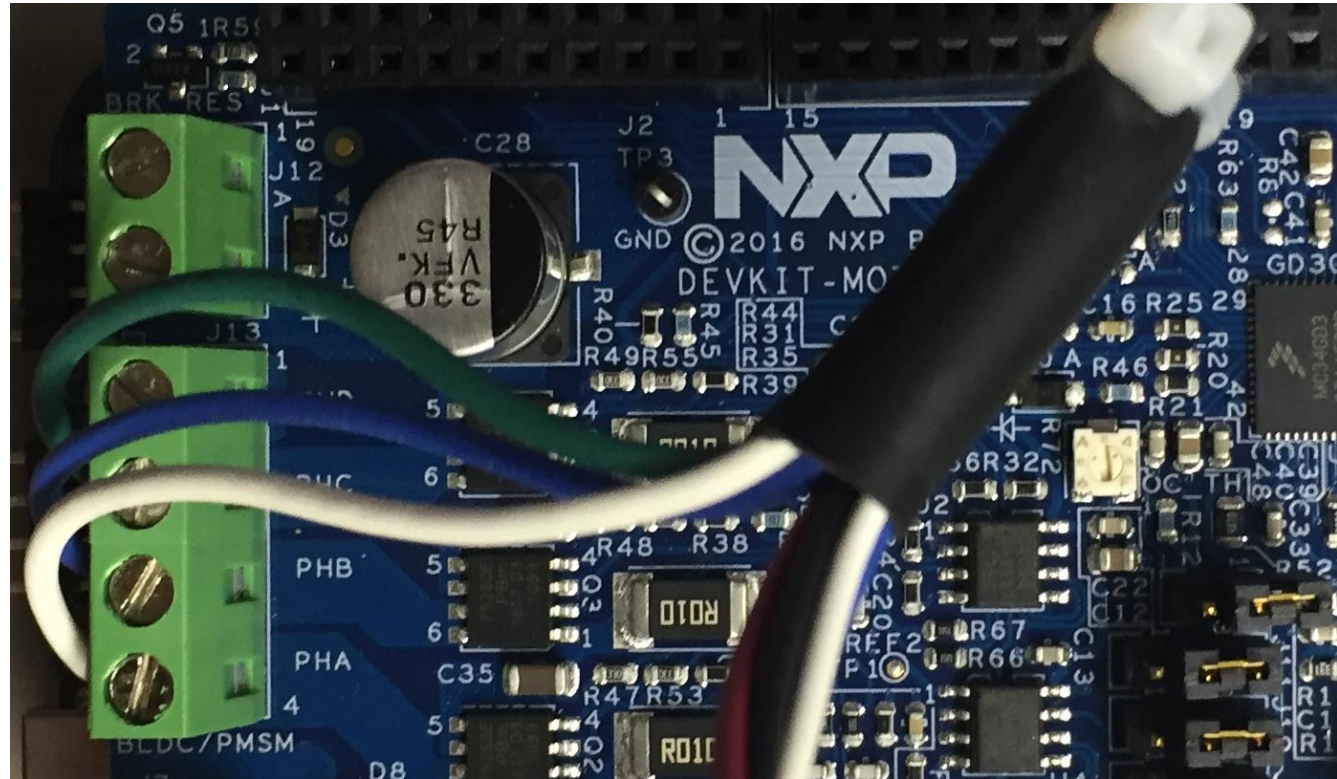
# How to Spin a Motor: Power Shield and Base Board

- Plug in barrel connector to DEVKIT-MOTORGD
- DEVKIT-MOTORGD also powers base board



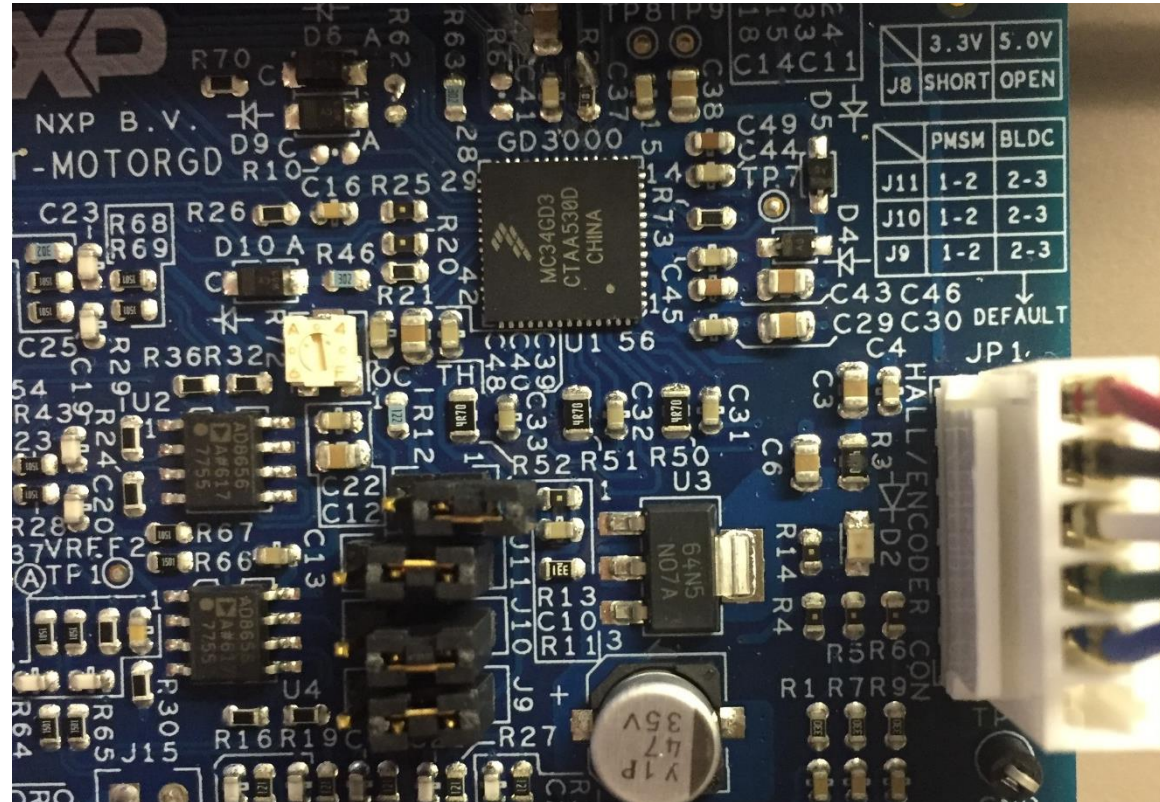
# How to Spin a Motor: Connect Phase Outputs (Linux)

- Connect the phase outputs
- NXP recommends and uses the Linux 45ZWN24-40 BLDC motor for evaluation purposes
- Alternative motor: [Nanotec DB41M024030-A](#)
- NXP example:
  - PHA – White
  - PHB – Blue
  - PHC – Green



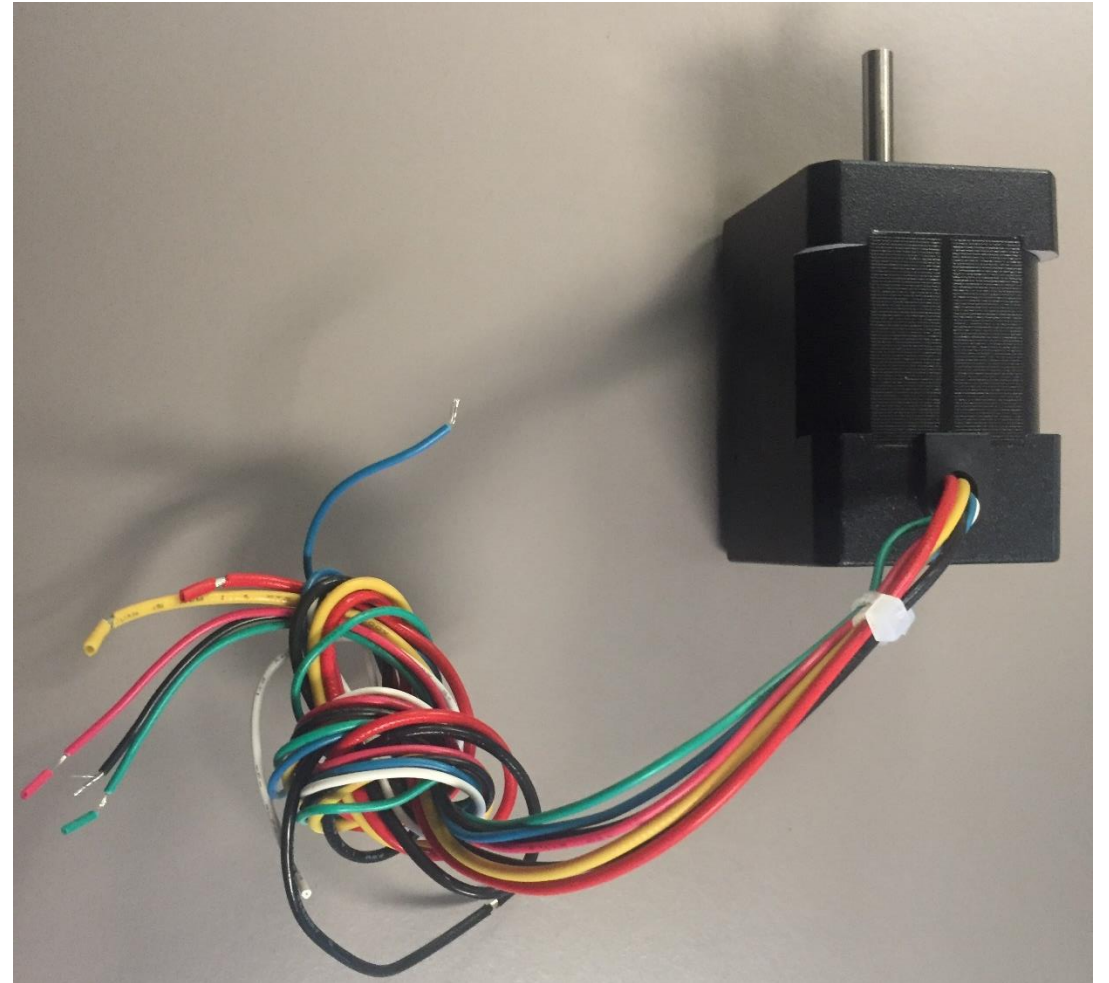
# How to Spin a Motor: Connect Hall Sensor (Sensored Only) (Linux)

- Plug in Hall sensor if motor control program requires Hall sensor JP1



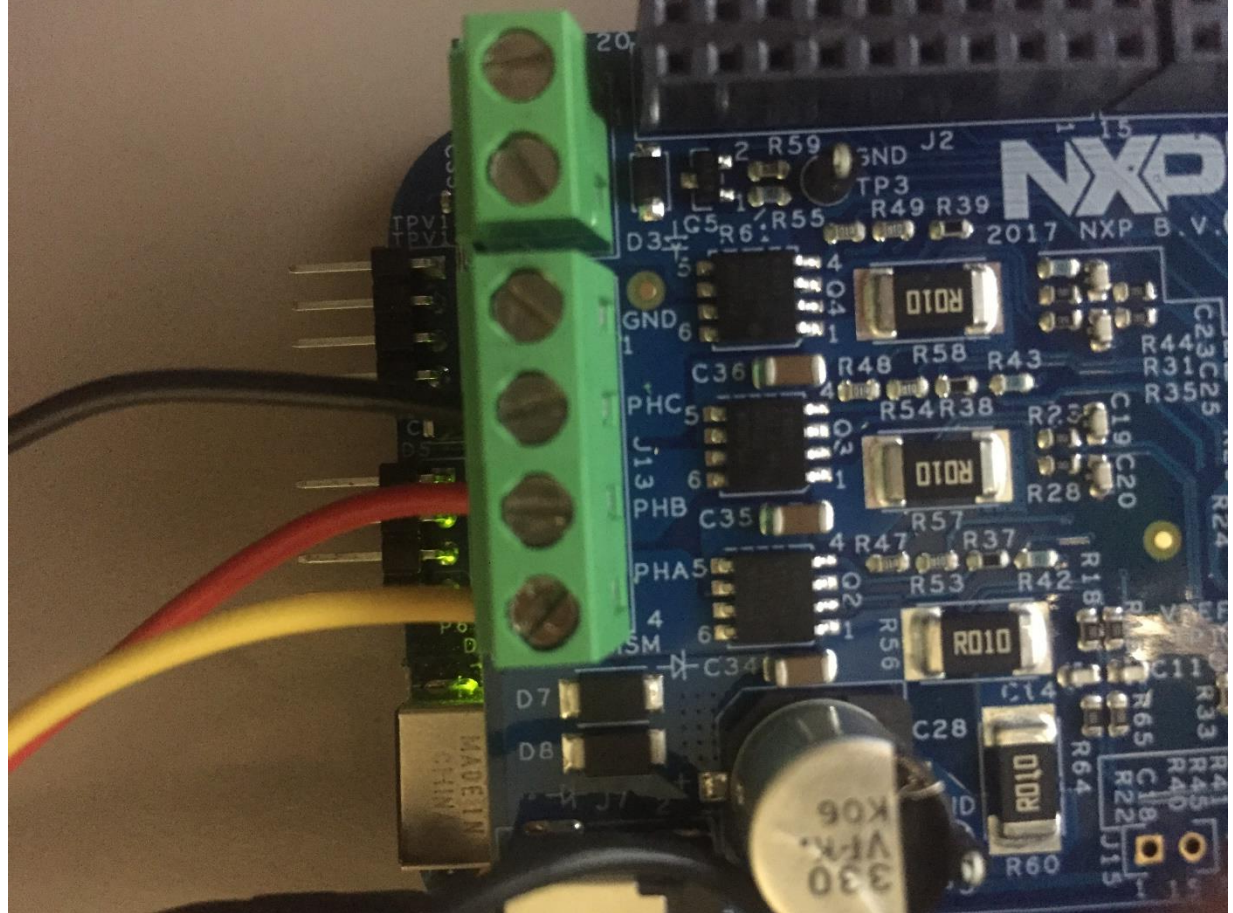
# How to Spin a Motor: Nanotec Alternative

- The [Nanotec DB41M024030-A](#) is an alternative to the Linux 45ZWN24-40
- It comes with its wires in a bunch
- Two groups
  - 3 thick wires (phases): Red, Yellow, Black
  - 5 slender wires (hall sensor): Red, Black, White, Green, Blue



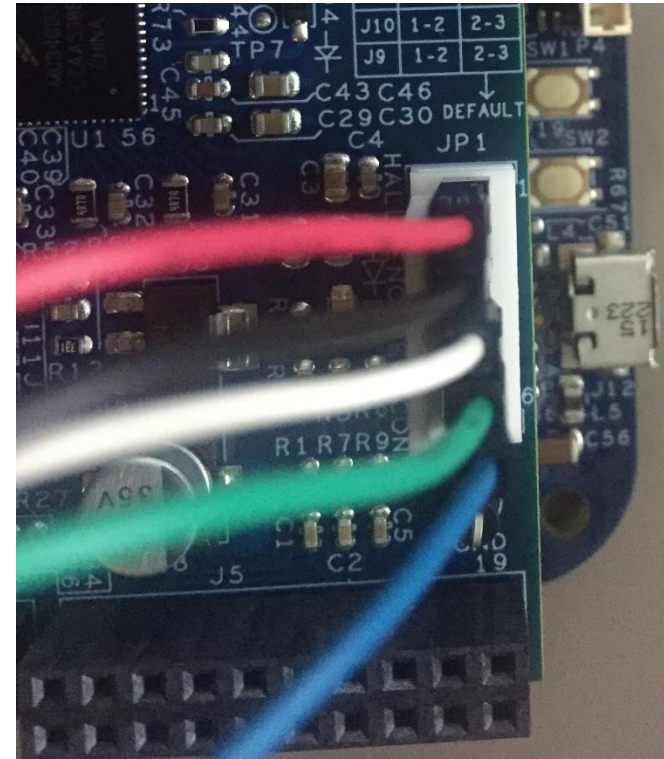
# How to Spin a Motor: Connect Phase Outputs (Nanotec)

- If you are running the NXP example on the [Nanotec DB41M024030-A](#) connect:
  - PHA – Yellow
  - PHB – Red
  - PHC – Black



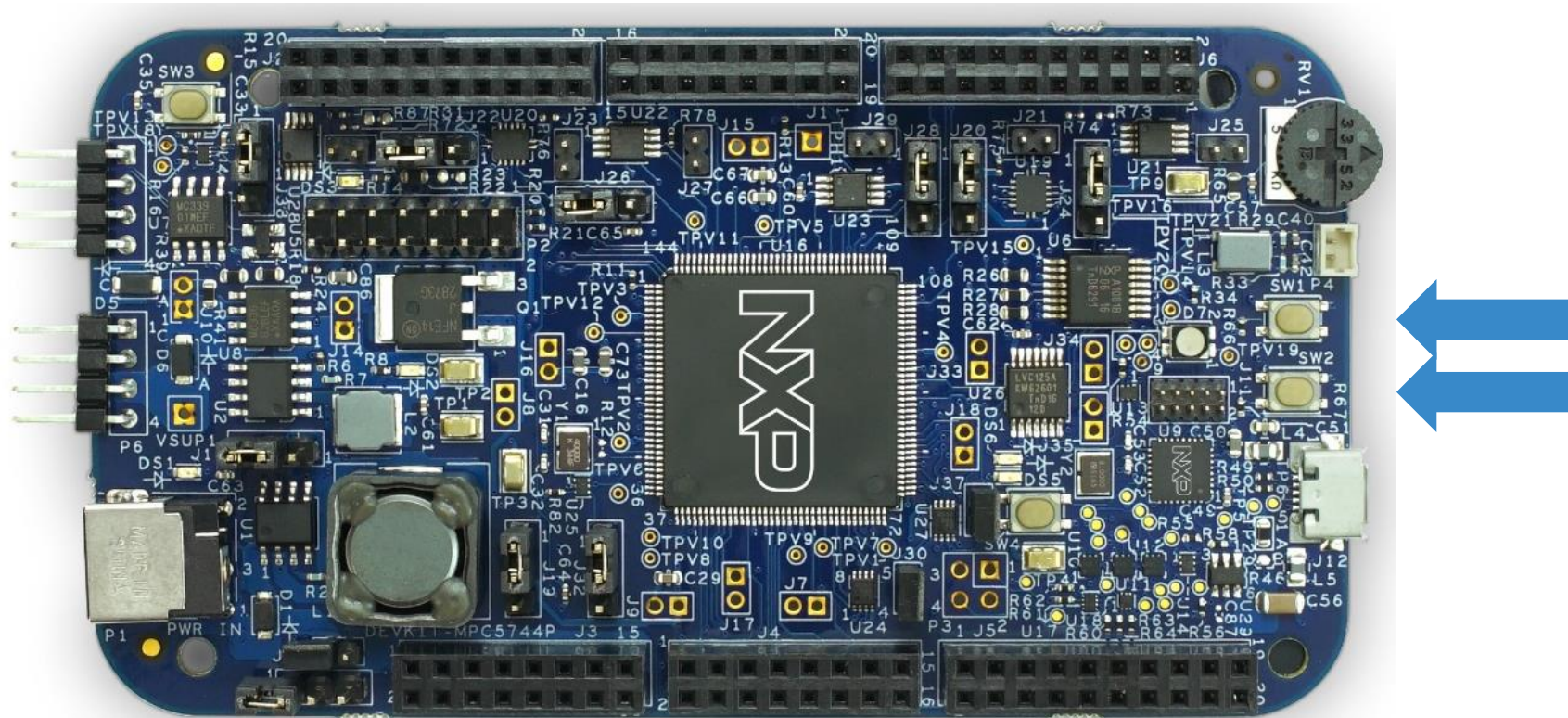
# How to Spin a Motor: Connect Hall Sensor (Nanotec)

- The Nanotec DB41M024030-A's hall sensor follows same color coding as the Linix 45ZWN24-40's hall sensor
- Connect the wires in the same order (from "JP1" label):
  - Red
  - Black
  - White
  - Green
  - Blue
  - No wire
- You may need to install headers of your choice for better connection



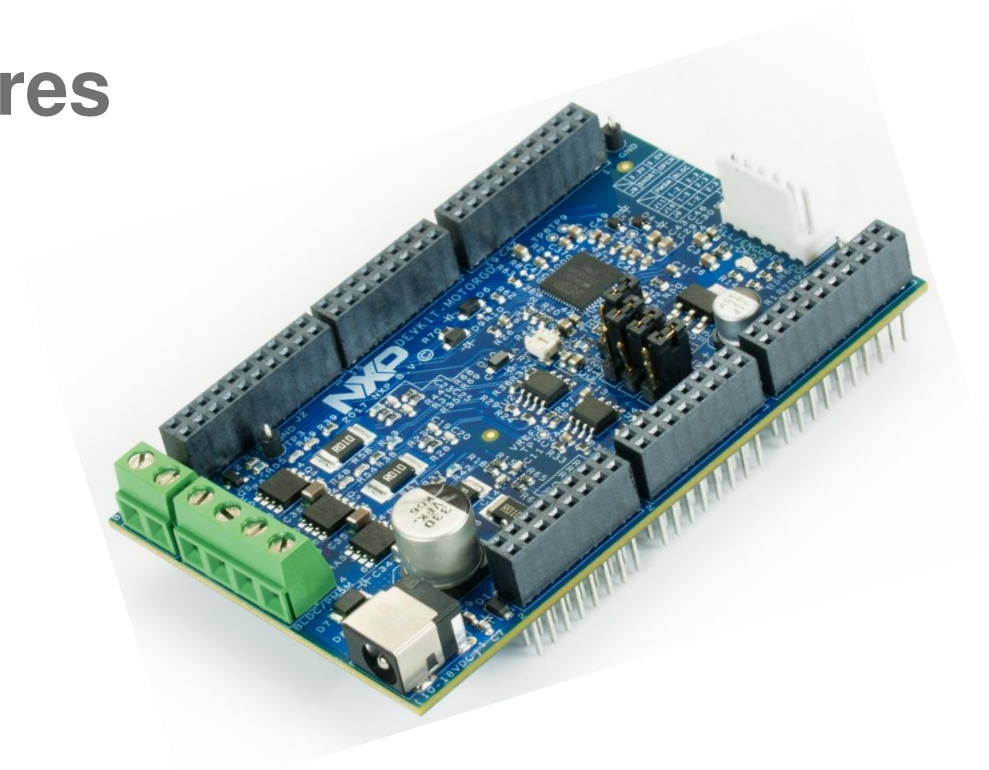
# How to Spin a Motor: Run the Motor

- If you use NXP's software example, motor will automatically start spinning after a few seconds
- Press SW1 to speed up
- Press SW2 to slow down/reverse



# DEVKIT-MOTORGD Board : Features

- Gate Driver Unit MC34GD3000EP
- 3-Phase Bridge
  - Output Parameters: 3 phase outputs, 10-18V, 5A phase current (RMS)
- Hall Encoder
- Arduino™ UNO R3 footprint-compatible with expansion “shield” support
- Easy access to the MCU I/O header pins for prototyping
- Flexible power supply options
  - 10-18V External power supply
- Supports DEVKIT-MPC5744P and S32K144EVB
- NXP recommends and uses the Linix 45ZWN24-40 or [Nanotec DB41M024030-A](#) BLDC motor for evaluation purposes



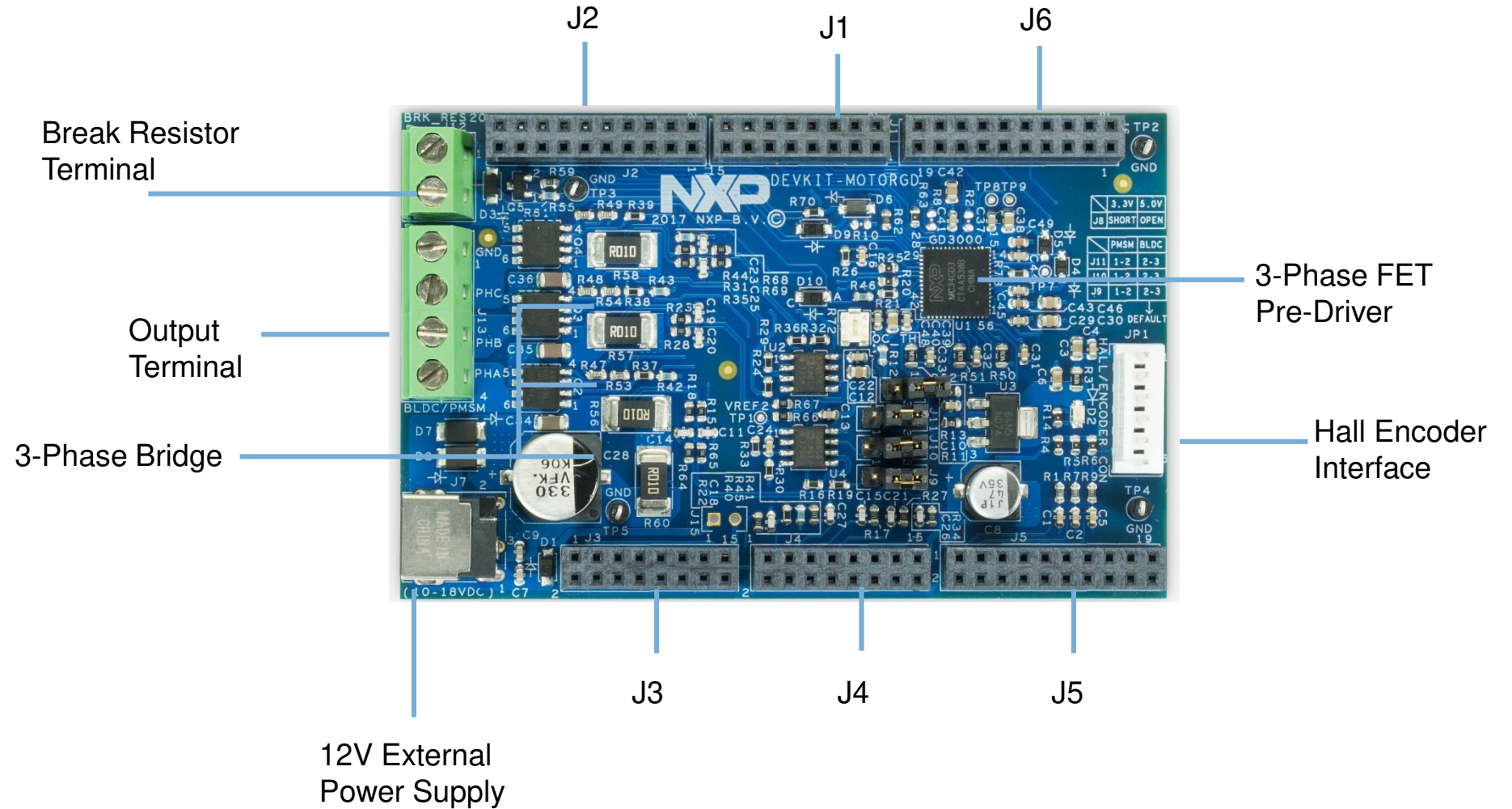
- Box includes:
  - DEVKIT-MOTORGD Shield
- Downloads include:
  - Quick Start Guide
  - Application notes



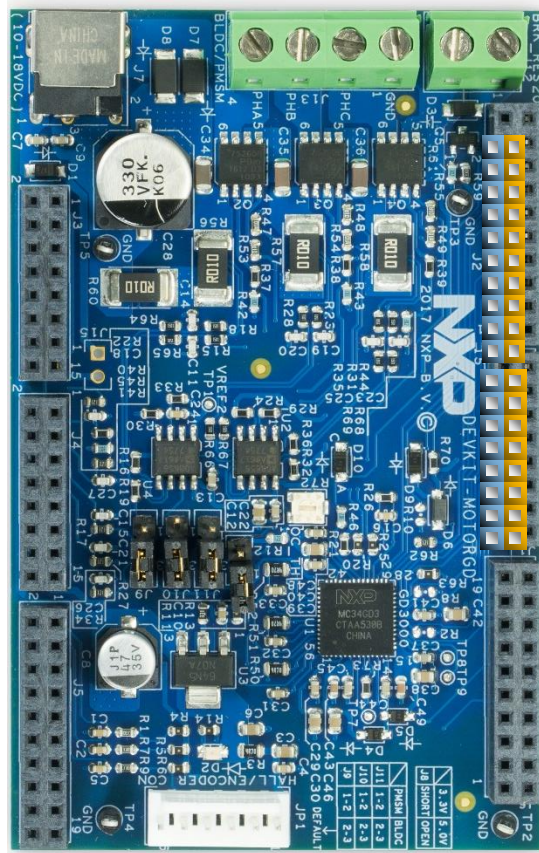
# DEVKIT-MOTORGD Board : Overview

The DEVKIT-MOTORGD is an ultra-low-cost development platform motor control.

Features include easy access to all base board I/Os and a standard-based form factor compatible with the Arduino™ pin layout, providing a broad range of expansion board options. The shield can be powered by external supply from 10V to 18V.



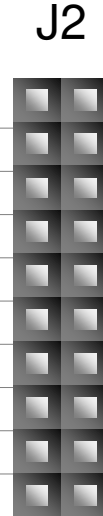
# DEVKIT-MOTORGD Board : Pinout



J2

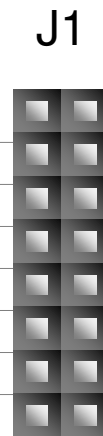
J1

FUNCTION	PORT	PIN
	GD_INT	J2-19
	OC_OUT	J2-17
	NC	J2-15
	GND	J2-13
	SPI_SCLK	J2-11
	SPI_MISO	J2-09
	SPI_MOSI	J2-07
	SPI_CS_B	J2-05
	BRAKE_PWM	J2-03
	NC	J2-01



PIN	PORT	FUNCTION
J2-20	NC	
J2-18	NC	
J2-16	NC	
J2-14	NC	
J2-12	NC	
J2-10	NC	
J2-08	NC	
J2-06	NC	
J2-04	NC	
J2-02	NC	

FUNCTION	PORT	PIN
	PWMC_LS	J1-15
	PWMC_HS	J1-13
	PWMB_LS	J1-11
	PWMB_HS	J1-09
	PWMA_LS	J1-07
	PWMA_HS	J1-05
	GD_RST_B	J1-03
	GD_EN	J1-01

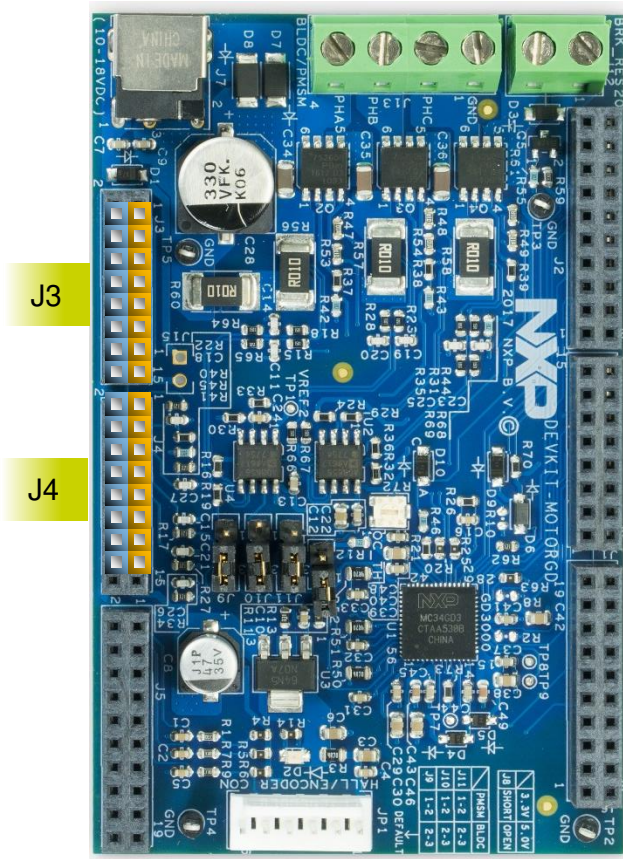


PIN	PORT	FUNCTION
J1-16	NC	
J1-14	NC	
J1-12	NC	
J1-10	NC	
J1-08	NC	
J1-06	NC	
J1-04	NC	
J1-02	NC	

**Arduino Compatibility**  
 The internal rows of the I/O headers on the DEVKIT-MOTORGD are arranged to fulfill Arduino™ shields compatibility .



# DEVKIT-MOTORGD Board : Pinout



J3

FUNCTION	PORT	PIN
	NC	J3-02
	NC	J3-04
	NC	J3-06
	NC	J3-08
	NC	J3-10
	NC	J3-12
	NC	J3-14
	NC	J3-16



PIN	PORT	FUNCTION
J3-01	J_VDC	VDC
J3-03	MC_VCC	5V
J3-05	NC	
J3-07	NC	
J3-09	NC	
J3-11	GND	
J3-13	GND	
J3-15	J_VDC	VDC

J4

FUNCTION	PORT	PIN
	NC	J4-02
	NC	J4-04
	NC	J4-06
	NC	J4-08
	NC	J4-10
	NC	J4-12
	NC	J4-14
	NC	J4-16

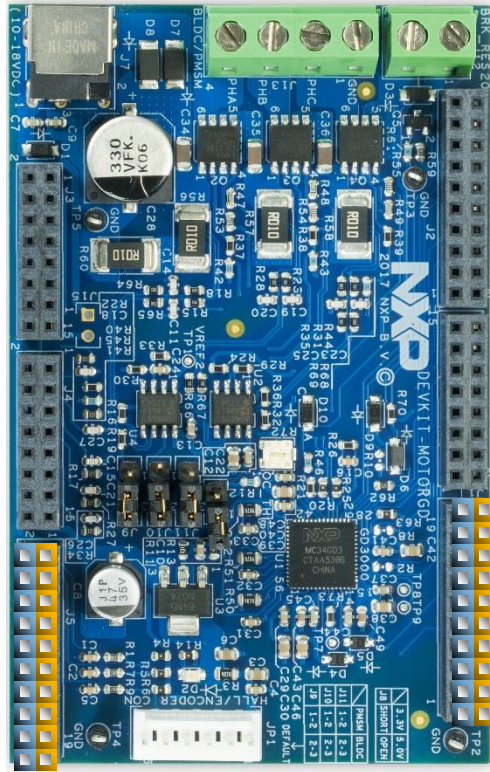


PIN	PORT	FUNCTION
J4-01	DCBI	Current
J4-03	DCBV	Voltage
J4-05	BEMF_A/PHA_I	Feedback/Output
J4-07	BEMF_B/PHB_I	Feedback/Output
J4-09	BEMF_C/PHC_I	Feedback/Output
J4-11	NC	
J4-13	NC	
J4-15	NC	

**Arduino Compatibility**  
 The internal rows of the I/O headers on the DEVKIT-MOTORGD are arranged to fulfill Arduino™ shields compatibility .



# DEVKIT-MOTRGD Board : Pinout



J5

J6

FUNCTION	PORT	PIN
	NC	J6-19
	NC	J6-17
	NC	J6-15
	NC	J6-13
	NC	J6-11
	NC	J6-09
	NC	J6-07
	NC	J6-05
	NC	J6-03
	NC	J6-01

J6



PIN	PORT	FUNCTION
J6-20	NC	
J6-18	NC	
J6-16	NC	
J6-14	NC	
J6-12	NC	
J6-10	NC	
J6-08	NC	
J6-06	NC	
J6-04	NC	
J6-02	NC	

FUNCTION	PORT	PIN
	NC	J5-2
	NC	J5-4
	NC	J5-6
	NC	J5-8
	NC	J5-10
	NC	J5-12
	NC	J5-14
	NC	J5-16
	NC	J5-18
	NC	J5-20

J5



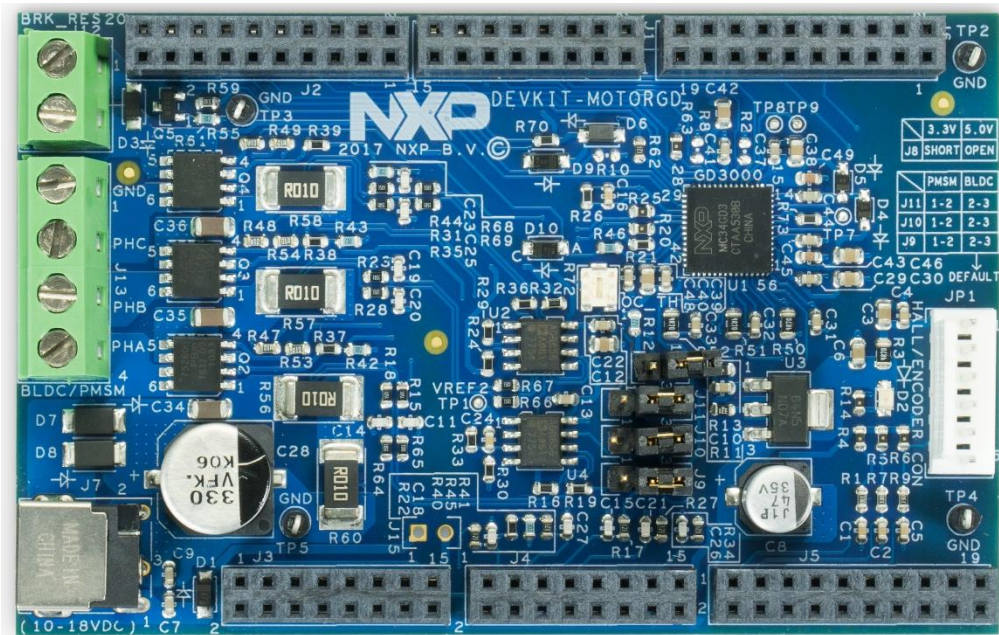
PIN	PORT	FUNCTION
J5-1	HALL_A/ENC_A	
J5-3	HALL_B/ENC_B	
J5-5	HALL_C/ENC_INDEX	
J5-7	NC	
J5-9	NC	
J5-11	NC	
J5-13	NC	
J5-15	NC	
J5-17	NC	
J5-19	NC	

### Arduino Compatibility

The internal rows of the I/O headers on the DEVKIT-MOTRGD are arranged to fulfill Arduino™ shields compatibility .



# DEVKIT-MOTORGD Board : Power Supply



External Power Supply


DEVKIT-MOTORGD supports power through an external 10-18V power supply, 12V being the most common. NXP does not directly sell 12V power supplies. You can obtain a power supply through a third-party.

Power supply specifications:

Fully regulated Switching Power Supply

Input Voltage 100-240V AC 50/60Hz

Output 12V 1A/2A DC

Plug size: 5.5mm x 2.1 mm, Center Positive 

12V must be used for CAN and LIN/UART communication.

# DEVKIT-MOTORGD Board : Order Information

Follow this [link](#) to order this board.

You can also do a search in NXP.com and look for “DEVKIT-MOTORGD”

SRP = \$49 USD

# EMC Requirements Note

To comply with EMC requirements, you must attach the included ferrite clamp to the motor wires connecting to terminal block J13 of the DEVKIT-MOTORGD board. The clamp must be installed at the end of the motor wires closest to the DEVKIT-MOTORGD board.

The following outlines how to install the ferrite clamp.

# EMC Requirements Note – Step 1

Using the provided tool, open the ferrite clamp by inserting it in the two slots on the clamp.





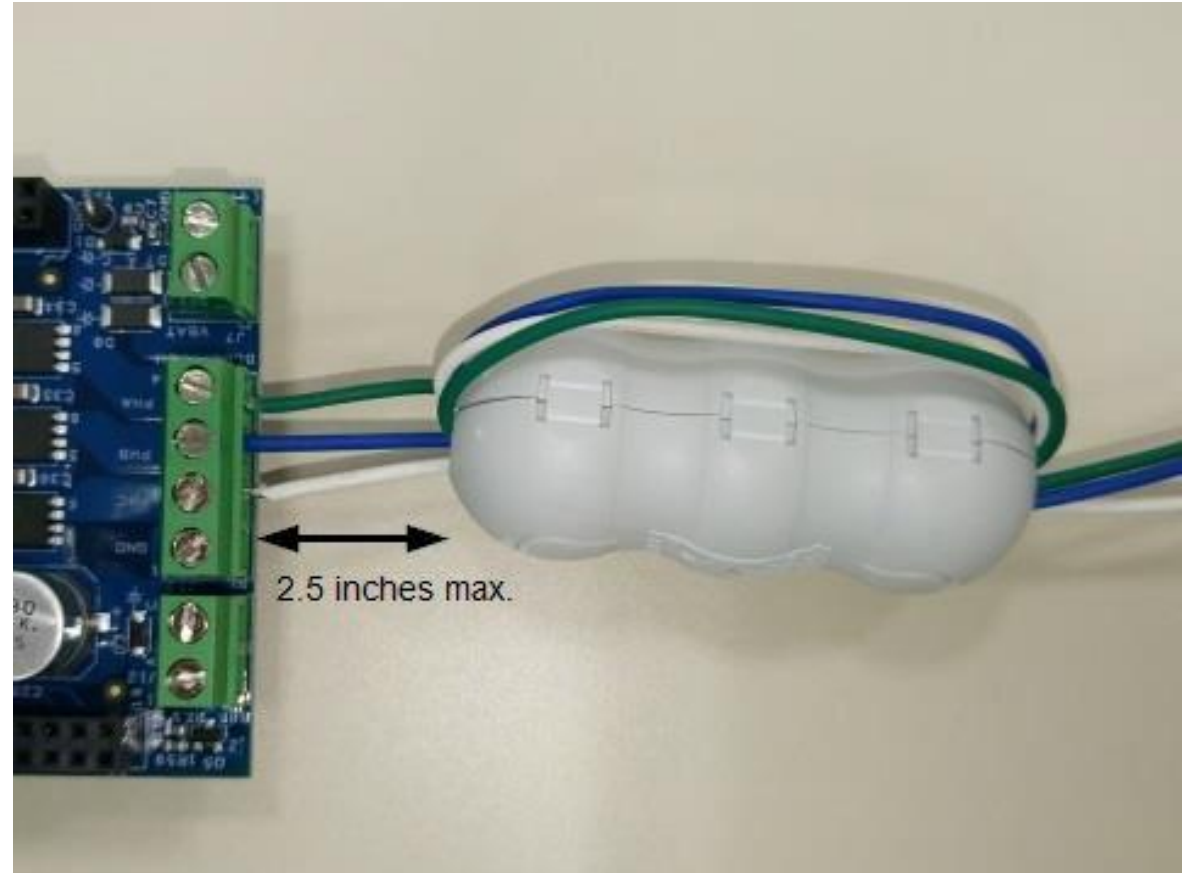
## EMC Requirements Note – Step 2

Loop the motor wires through and around the ferrite clamp so that the motor wires pass through the ferrite clamp twice. The maximum distance from the board is 2.5 inches.



## EMC Requirements Note – Step 3

Close the ferrite clamp carefully, ensuring none of the wires are pinched by the ferrite material and/or ferrite clamp housing



# Documentation and Reference Material

- **Documentation Links**

- MOTORGD Schematic (TBA)
- MOTORGD Factsheet (TBA)
- [Model-Based Design](#)

- **Software Suites**

- Automotive Math and Motor Control Library Set for [S32K14x](#)
- Automotive Math and Motor Control Library Set for [MPC574xP](#)

- **Reference Manuals**

- [S32K Reference Manual](#)
- [MPC574xP Reference Manual](#)

# Recommendations

- Keep S32 Design Studio IDE and OpenSDA firmware Up-to-date for best results
- Post Technical Questions on NXP community for [MPC5xxx](#).
- Useful Links:
  - [MPC5744P Webpage](#)
  - [S32K Webpage](#)
  - [DEVKIT-MOTOROGD Webpage](#)
  - [S32K144EVB-Q100 Webpage](#)
  - [DEVKIT-MPC5744P Webpage](#)
  - [nxp.com/community](http://nxp.com/community)





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