

AN13731

LPCxpresso55s36 Dual-Motor-Control Demo

Rev. 0 — 14 September 2022

Application note

Document information

Information	Content
Keywords	LPCxpresso55s36, LPC5536, LPC55S36, Dual Motor control, FRDM-MCLVPMSM, FOC, BLDC
Abstract	This application note describes how to use internal OPAM of LPC55S36/ LPC5536 microcontroller on LPCxpresso55s36 development board.



1 LPCxpresso55s36 dual-motor-control demo

This document describes how to run the dual-motor-control demo using the LPCxpresso55s36 EVK. It also provides a guideline on how to modify the FRDM-MC-LVPMSM board to utilize LPC55S36's internal op amps for 3-phase current sensing.

2 References

- "AN13731SW.zip" - package containing MCUXpresso dual-motor-control demo project patch files
- *MCUXpresso SDK Field-Oriented Control (FOC) of 3-Phase PMSM and BLDC motors* (document [PMSMLPC55S36EVK](#))

3 Prerequisites

- MCUXpresso IDE v11.6.0
- LPCxpresso55S36 SDK v2.10.2
 - mc_pmsm_dual demo app

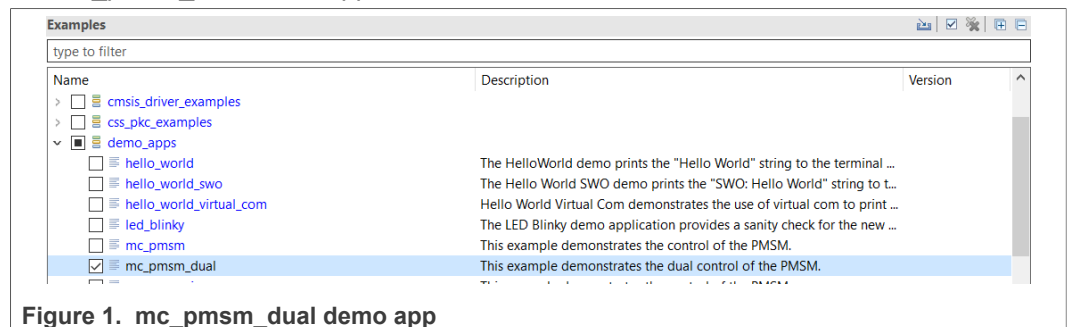


Figure 1. mc_pmsm_dual demo app

- LPCxpresso55S36 EVK board (rev. C)
- 2x FRDM-MC-LVPMSM board
- 2x 24 V capable power supply
- 2x PMSM motor (Linux or Teknic)

4 FRDM-MC-LVPMSM board modifications

This chapter describes the modifications of the FRDM-MC-LVPMSM board required to utilize LPC55S36's internal opamps for 3-phase current sensing.

5 LPCxpresso55s36 development board connectors

LPC55S36's internal op amp inputs are routed via the connector J13 (corresponding connector on the FRDM board – J4):

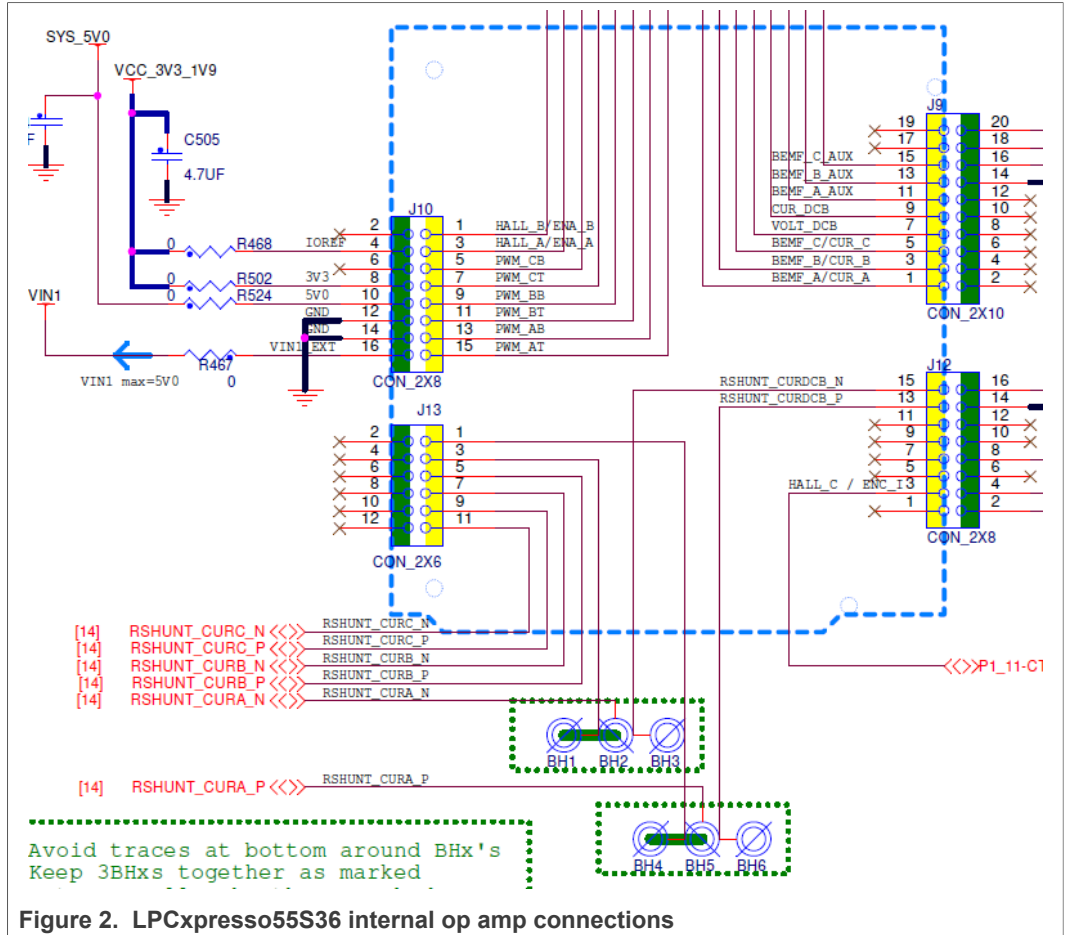


Figure 2. LPCxpresso55S36 internal op amp connections

6 FRDM-MC-LVPMSM board modifications

To measure the voltages on the FRDM onboard shunt resistors, it is necessary to route the shunt voltage signals to the J4 connector as shown in [Figure 3](#).

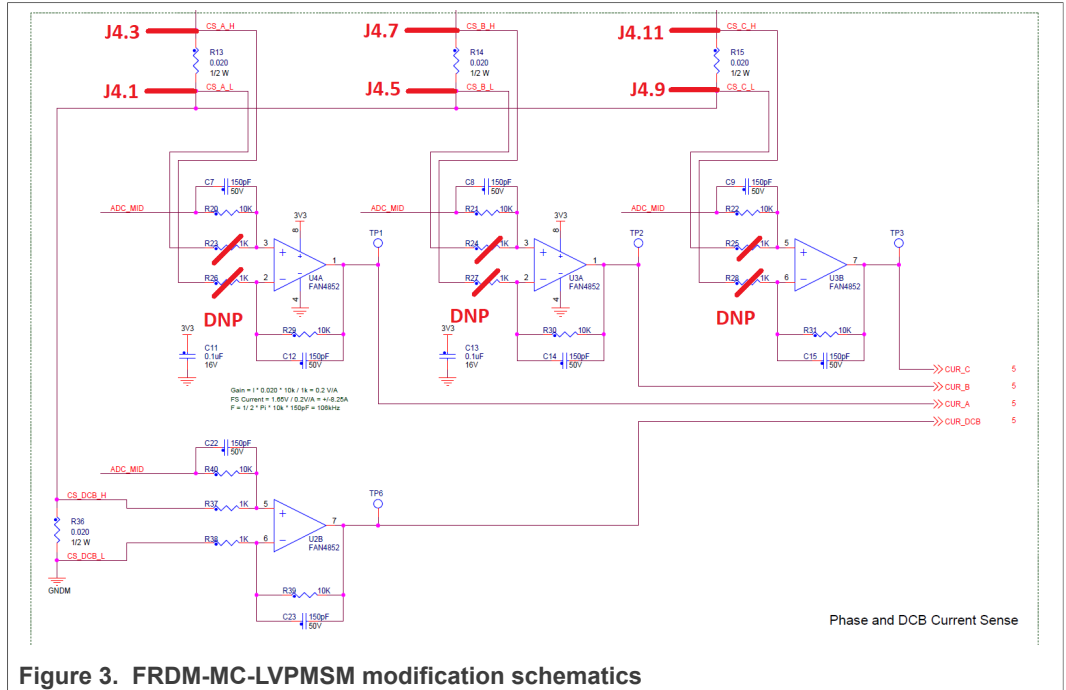


Figure 3. FRDM-MC-LVPMSM modification schematics

Resistors R23 – R28 must be depopulated to decouple the onboard op amp input resistance from the rest of the circuit.

7 FRDM-MC-LVPMSM board modification demonstration

7.1 Original board

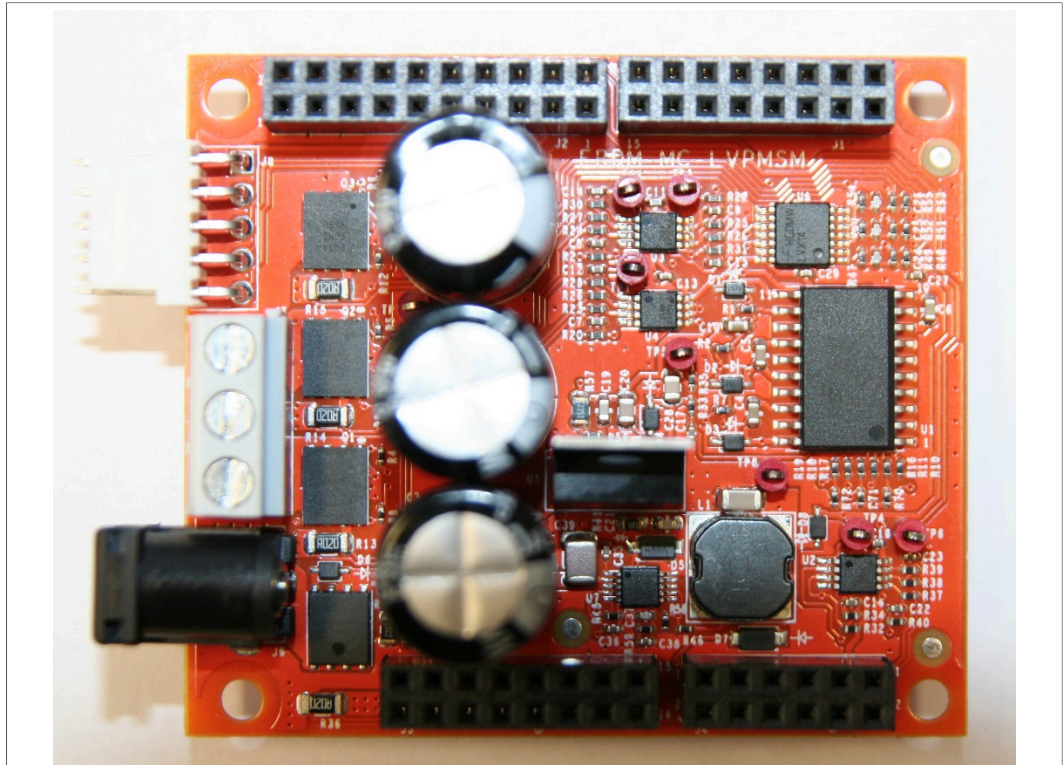


Figure 4. Original (unmodified) FRDM-MC-LVPMSM board

7.2 Modified board

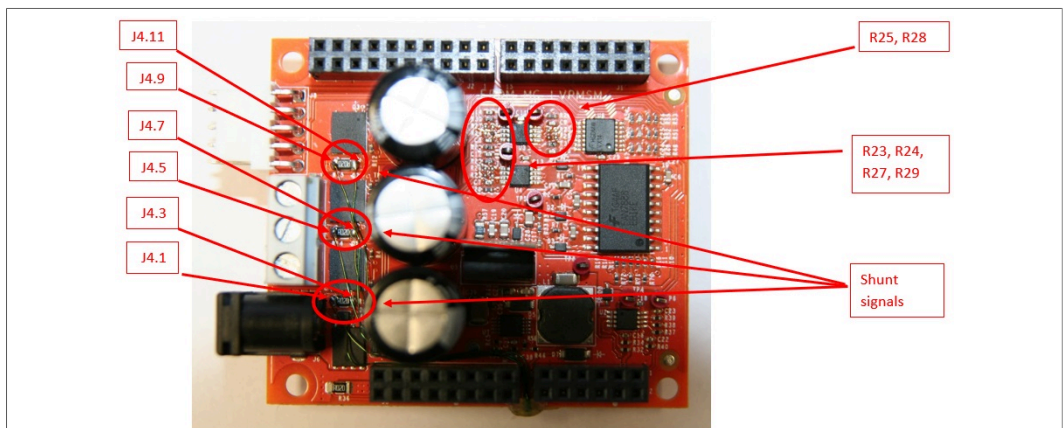


Figure 5. Modified FRDM-MC-LVPMSM board (top)

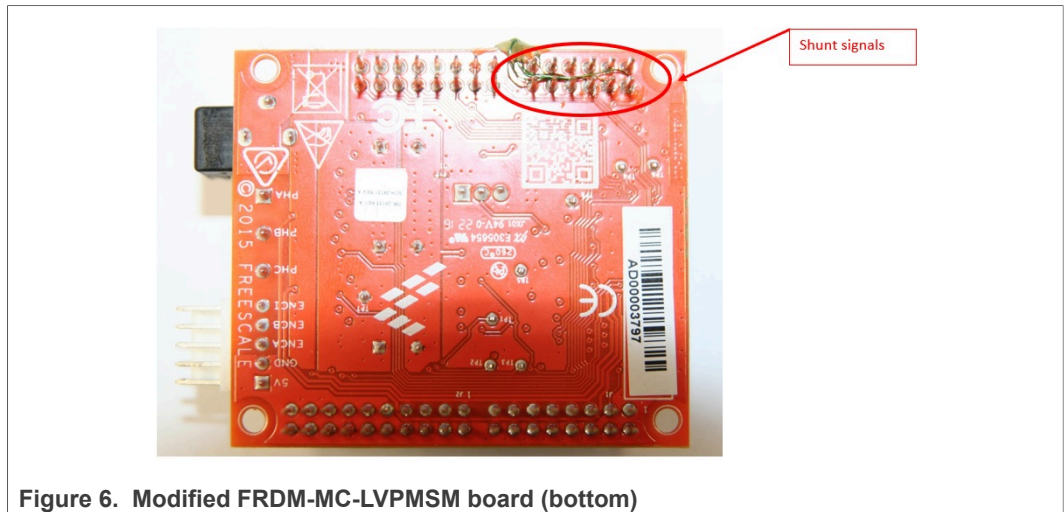
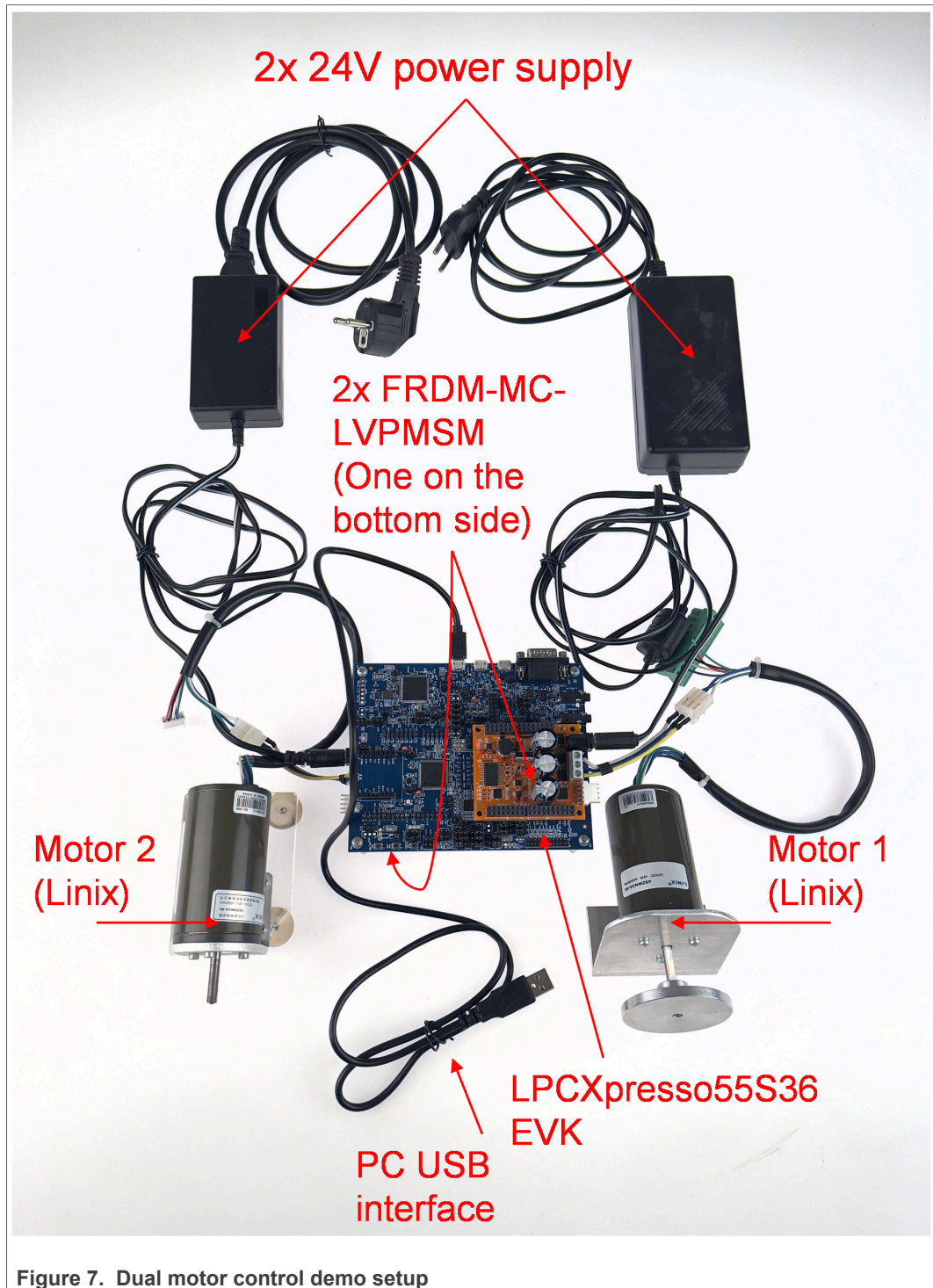


Figure 6. Modified FRDM-MC-LVPMSM board (bottom)

8 Dual motor control demo setup

The following figure shows the full dual motor control demo setup.



9 Configuration

The following files (distributed in the [package provided with this application note](#)) are modified when compared to the default SDK dual-motor-control demo:

- m1_pmsm_appconfig.h

- m2_pmsm_appconfig.h
- mc_periph_init.h

These files can be found and replaced in the "\${ProjName}/source" folder of the demo project. This modified demo provides the following #defines, allowing the user to select the proper motor type for both motor connectors (1 and 2) and choose between internal (LPC55S36) and external (FRDM-MC-LVPMSM) opamps for shunt voltage signal processing:

Table 1. Dual-motor-control demo configuration #defines

#define	Description	File	Notes
M1_MOTOR_LINUX	Set to "1" to use the LINUX motor on Motor Connector 1.	m1_pmsm_appconfig.h	The M1_MOTOR_LINUX and M1_MOTOR_TEKNIC defines are mutually exclusive. Set only one at a time.
M1_MOTOR_TEKNIC	Set to "1" to use the TEKNIC motor on Motor Connector 1.	m1_pmsm_appconfig.h	
M1_USE_INTERNAL_OPAMPS	Set to "1" to use the LPC55S36's internal op amp. Set to "0" to use FRDM-MC-LVPMSM onboard opamps.	m1_pmsm_appconfig.h	The FRDM-MC-LVPMSM board must be modified according to Section 6 .
M2_MOTOR_LINUX	Set to "1" to use the LINUX motor on Motor Connector 2.	m2_pmsm_appconfig.h	The M2_MOTOR_LINUX and M2_MOTOR_TEKNIC defines are mutually exclusive. Set only one at a time.
M2_MOTOR_TEKNIC	Set to "1" to use the TEKNIX motor on Motor Connector 2.	m2_pmsm_appconfig.h	

For more details, see *MCUXpresso SDK Field-Oriented Control (FOC) of 3-Phase PMSM and BLDC motors* (document [PMSMLPC55S36EVK](#)).

10 Revision history

Table 2. Revision history

Revision history	Date	Substantive changes
0	14 September 2022	Initial release

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