InstaSPIN™ Quick Start Guide

This document acts as a guide book for your evaluation of a Piccolo LaunchPad™ development kit with InstaSPIN-FOC™ software paired with a BOOSTXL-DRV8323RS, a three phase smart gate driver evaluation module.

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1 Introduction

Figure 1 shows the connections overview of the BOOSTXL-DRV8323Rx EVM.

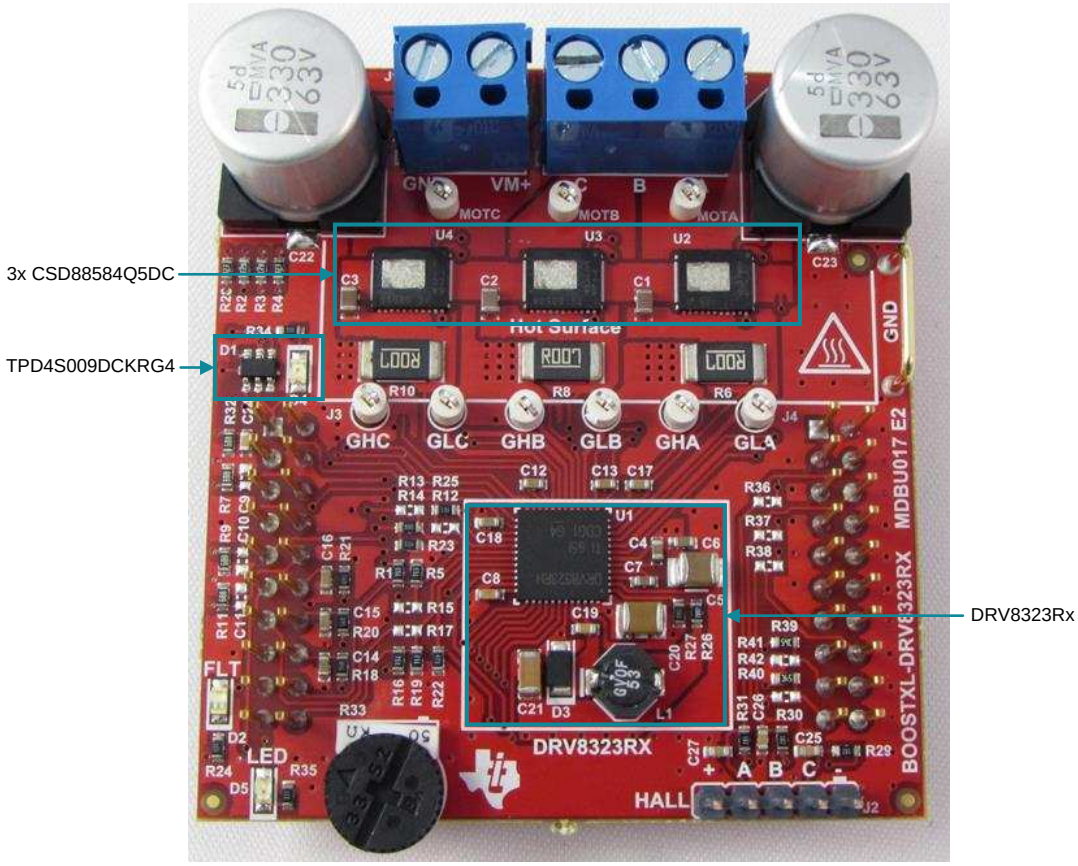

Figure 1. BOOSTXL-DRV8323Rx EVM Hardware Connections Overview

The BOOSTXL-DRV8323Rx EVM supports the following:

- Piccolo controllers with InstaSPIN™ software
  - LAUNCHXL-F28069M LaunchPad development kit for InstaSPIN-FOC software
    - Includes on-card XDS100v2 JTAG (isolated)

  - LAUNCHXL-F28027F LaunchPad development kit for InstaSPIN-FOC software
    - Includes on-card XDS100v2 JTAG (isolated)
- 3-phase inverters
  - Low voltage, medium current: boostxldrv8323Rx_revA
    - Tool number: BOOSTXL-DRV8323RS

For more information about the DRV8323RS device, refer to the *DRV832x 6 to 60-V Three-Phase Smart Gate Driver* data sheet. For more information about the BOOSTXL-DRV8323RS EVM, refer to the *BOOSTXL-DRV8323Rx EVM User's Guide* user's guide.

1. Always make sure the latest version of MotorWare™ software is used:
   1. Go to www.ti.com/tool/motorware to download the latest software.
   2. The LaunchPad development kit and BoosterPack™ plug-in module support starts with version motorware_1_01_00_18.
   3. The MotorWare software contains all of the modules, drivers, example Code Composer Studio™ software based InstaSPIN software projects, and associated documentation.
   4. Run the MotorWare.exe from the installation directory to browse.

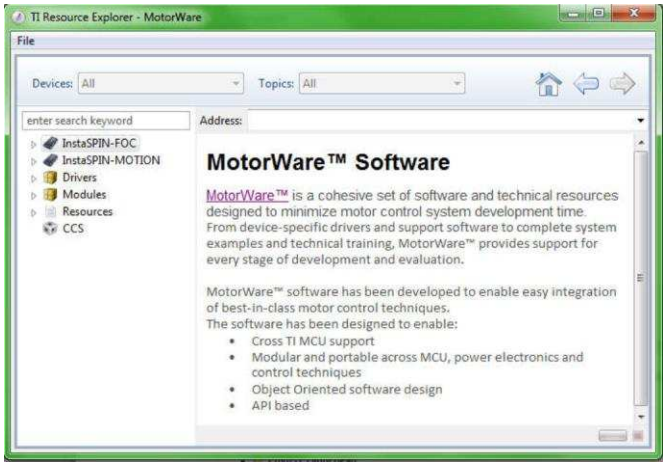

Figure 2.

2. Set-up the hardware according to documentation.

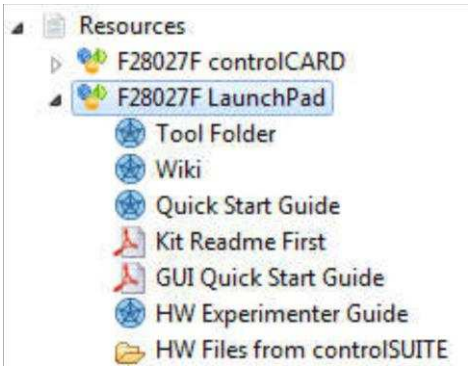

Figure 3.

For typical use, use these settings:

- LAUNCHXL-F28027F
  1. Remove jumpers 1, 2, and 3 to isolate USB and power from the BOOSTXL-DRV8323Rx.
  2. Set the S1 switch to OFF-ON-ON to allow JTAG
  3. Set the S4 switch to OFF

4. Provide DC bus through the BoosterPack plug-in module

- LAUNCHXL-F28069M
  1. Remove jumpers 1 and 2 to isolate USB and power from BOOSTXL-DRV8323Rx.
  2. Set the S1 switch to ON-ON-ON
  3. Set JP3, JP6, JP7 to ON-ON-ON
  4. Set JP4, JP5 to
     - ON-ON if just using bottom BoosterPack headers J5-J8
     - OPEN-OPEN if using top BoosterPack headers J1-J4 or using both BoosterPack headers J1-J4 and J5-J8
  5. Provide the DC bus at any attached BoosterPack plug-in module
- BOOSTXL-DRV8323RS
  1. Solder the three capacitors, C9, C10, and C11, with 0.1-µF capacitance.
  2. Connect the BoosterPack to Launchxl-F28027F or Launchxl-F28069M
  3. Download the software package for the DRV8323RS device. Extract the compressed files to find three file directories as shown in Figure 4. Copy and overwrite the files to the corresponding directories in MotorWare:
     1. Copy *drvic* to \sw\drivers\drvic
     2. Copy *hal* to \sw\modules\hal
     3. Copy *instaspin_foc* to \sw\solutions\instaspin_foc.

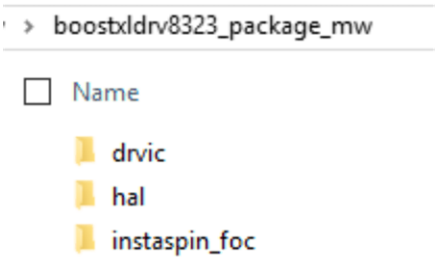

Figure 4.

3. Read additional documentation as required:
   - Texas Instruments, *InstaSPIN-FOC™ and InstaSPIN-MOTION™ User's Guide*
   - Texas Instruments, *TMS320F28026F, TMS320F28027F InstaSPIN™-FOC Software* technical reference manual
   - Texas Instruments, *TMS320F28069F, TMS320F28068F, TMS320F28062F InstaSPIN™-FOC Software* technical reference manual

Six lab projects supporting the BOOSTXL-DRV8323RS for both LaunchXL-F28027F and LaunchXL-F28069M are available. These projects can be opened and run like any other InstaSPIN software lab. Figure 5 shows the 6 supported labs prjects.

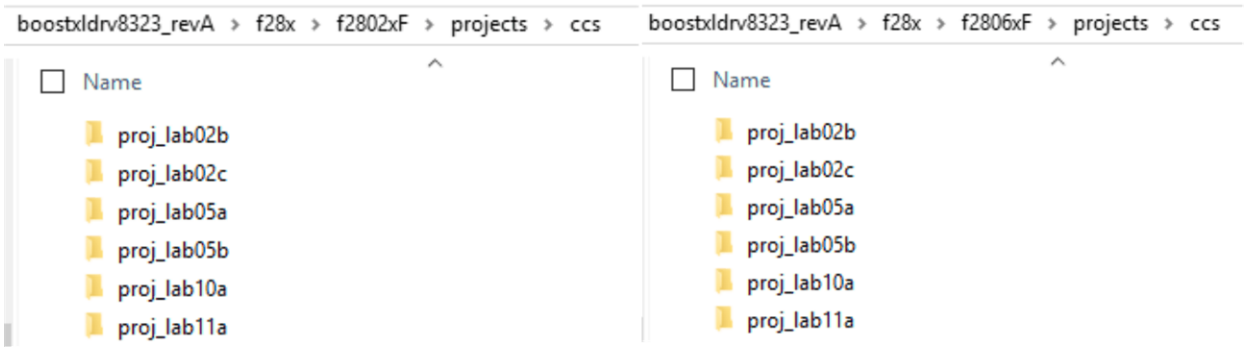

Figure 5.

The following steps should be followed to migrate one of the 6 supported projects from an existing DRV83xx device to the DRV8323RS:

Step 1. Copy the target project from *\sw\solutions\instaspin_foc\boards\boostxldrv8305_revA\f28x\f2802xF\projects\ccs* to *\sw\solutions\instaspin_foc\boards\boostxldrv8323_revA\f28x\f2802xF\projects\ccs*.

Step 2. Remove the drv8305.c from the now transferred project, and add drv8323.c from *\sw\drivers\drvic\drv8323\src\32b\f28x\f2802x* to the project.

Step 3. Remove hal.c from the project, and add the DRV8323RS version of hal.c from *sw\modules\hal\boards\boostxldrv8323_revA\f28x\f2802x\src* to the project.

Step 4. Change the include path in *Project→Properties→Build→C2000 Compiler→Include Options* to *${MW_INSTALL_DIR}/sw/modules/hal/boards//boostxldrv8323_revA/f28x/f2802x/src/* as shown in Figure 6.

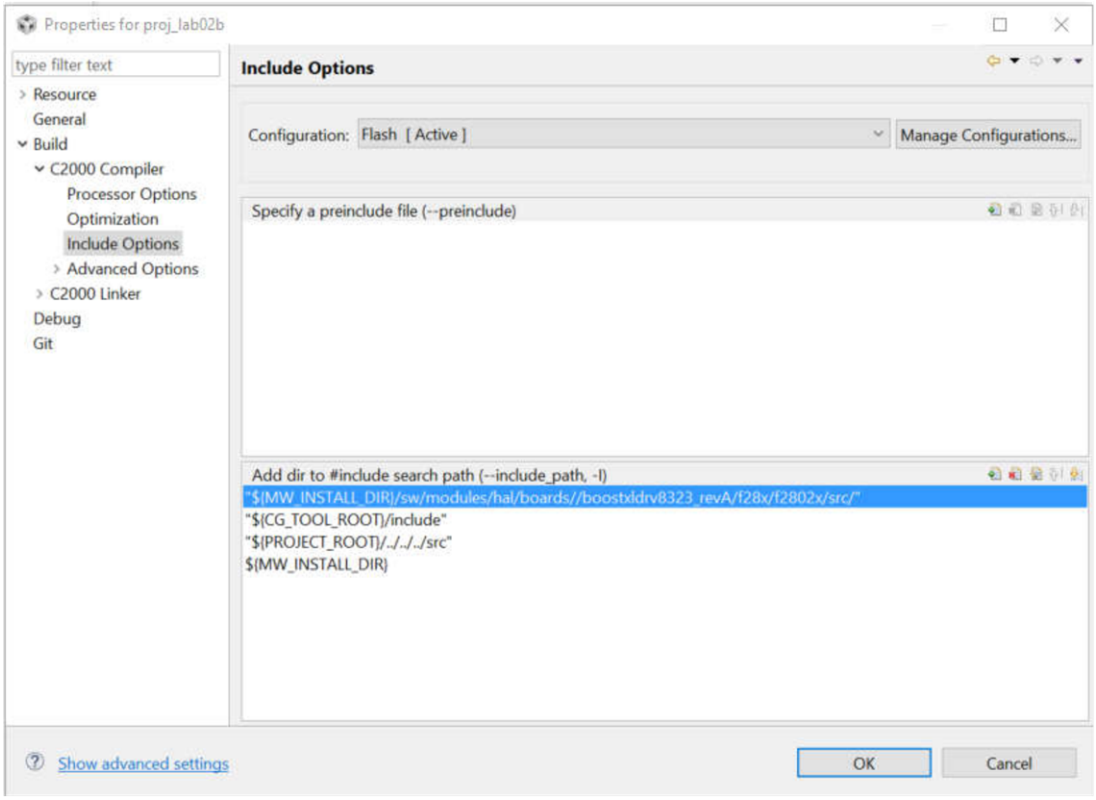

Figure 6.

Step 5. Refer to the example lab projects to copy and add the following code to the project main

source file, proj_lab0x.c.

1. Object definition codes

```
#ifdef DRV8323_SPI
// Watch window interface to the 8323 SPI
DRV_SPI_8323_Vars_t gDrvSpi8323Vars;
#endif
```

2. Turn on and initialize the DRV8323 driver interface

```
#ifdef DRV8323_SPI
  // turn on the DRV8323 if present
  HAL_enableDrv(halHandle);
  // initialize the DRV8323 interface
  HAL_setupDrvSpi(halHandle,&gDrvSpi8323Vars);
  gDrvSpi8323Vars.Ctrl_Reg_06.CSA_GAIN = Gain_20VpV;
  gDrvSpi8323Vars.Ctrl_Reg_06.VREF_DIV = 1;
  gDrvSpi8323Vars.WriteCmd = true;
  HAL_writeDrvData(halHandle,&gDrvSpi8323Vars);
  gDrvSpi8323Vars.ReadCmd = true;
  HAL_readDrvData(halHandle,&gDrvSpi8323Vars);
#endif
```

3. Write or read the DRV8323 registers

```
#ifdef DRV8323_SPI
      HAL_writeDrvData(halHandle,&gDrvSpi8323Vars);
      HAL_readDrvData(halHandle,&gDrvSpi8323Vars);
#endif
```

If using the LaunchXL-F28069M, change *f2802x* to *f2806x* in the directory labels for the steps.

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (March 2018) to A Revision	Page
• Changed the title of the document	1

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