Freescale Semiconductor

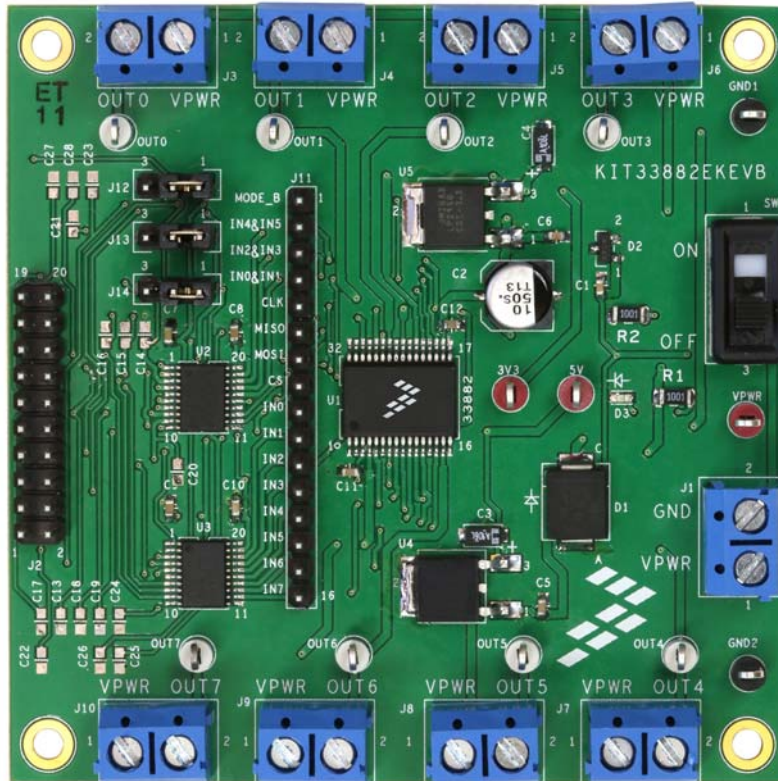User's Guide

Document Number: KT33882UG
Rev. 1.0, 12/2014

KIT33882EKEVB Evaluation Board

Figure 1. KIT33882EKEVB

Table of Contents

1 Important Notice

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This evaluation kit is intended for use of ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY. It is provided as a sample IC pre-soldered to a printed circuit board to make it easier to access inputs, outputs, and supply terminals. This EVB may be used with any development system or other source of I/O signals by simply connecting it to the host MCU or computer board via off-the-shelf cables. This EVB is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application will be heavily dependent on proper printed circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.

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2   Getting Started

2.1   Kit Contents/Packing List

The KIT33882EKEVB contents include:

- Assembled and tested evaluation board/module in an anti-static bag
- Quick Start Guide, Analog Tools
- One 20-pin ribbon cable
- Warranty card

2.2   Jump Start

Freescale's analog product development boards help to easily evaluate Freescale products. These tools support analog mixed signal and power solutions including monolithic ICs using proven high-volume SMARTMOS mixed signal technology, and system-in-package devices utilizing power, SMARTMOS and MCU dies. Freescale products enable longer battery life, smaller form factor, component count reduction, ease of design, lower system cost and improved performance in powering state of the art systems.

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- Locate your kit
- Review your Tool Summary Page
- Look for

↗ Jump Start Your Design

- Download documents, software, and other information

Once the files are downloaded, review the user guide in the bundle. The user guide includes setup instructions, BOM and schematics. Jump start bundles are available on each tool summary page with the most relevant and current information. The information includes everything needed for design.

2.3   Required Equipment and Software

To use this kit, you need:

- Power supply
- Oscilloscope (preferably 4-channel) with current probe(s)
- Digital multimeter
- FRDM-KL25Z Development Platform
- Typical loads (solenoid valves and brushed DC motors up to 1 A each)

2.4   System Requirements

The kit requires the following to function properly with the software:

- USB-enabled PC with Windows® XP or higher

3 Getting to Know the Hardware

3.1 Board Overview

The KIT33882EKEVB evaluation board is an easy-to-use circuit board that allows the user to exercise all the functions of the MC33882 Smart Six Output Switch (0.3 Ohm $R_{DS(on)}$) with SPI and Parallel Input Control.

There are two ways to communicate with the evaluation board:

1. A PC communicates with the evaluation board through a FRDM SPI Dongle (FSD), connected to the PC's USB port, or

2. the microcontroller on the FRDM-KL25Z communicates with the evaluation board via microcontroller code.

The Freescale SPIGen 7.0.1 or higher program provides the user interface to the MC33882 SPI port and allows the user to send commands to the IC and receive statuses from the IC.

The Freescale CodeWarrior IDE allows the user to program the FRDM-KL25Z board with microcontroller code to send commands to the IC and receive statuses from the IC.

3.2 Board Features

This evaluation kit features the MC33882 Smart Six Output Switch (0.3 Ohm $R_{DS(on)}$) with SPI and Parallel Input Control, which is a Smart Six Output Low-side Switch able to control system loads up to 1.0 A. The six outputs can be controlled via both serial peripheral interface (SPI) and parallel input control, making the device attractive for fault tolerant system applications. There are two additional 30 mA low-side switches with SPI diagnostic reporting (parallel input control only).

The PCB contains a board to FRDM-KL25Z connector, which allows the FRDM-KL25Z to act as either a FSD or simply as an access to the KL25Z microcontroller. The board's main features are as follows:

- Output terminals for loads
- Test points for various inputs, outputs, and SPI signals
- FSD connector

3.3 FRDM-KL25Z Features

The FRDM-KL25Z board features are as follows:

- MKL25Z128VLK4 MCU - 48 MHz, 128 KB Flash, 16 KB SRAM, USB OTG (FS), 80 LQFP
- Capacitive touch slider, MMA8451Q accelerometer, Tri-color LED
- Flexible power supply options - USB, coin cell battery, external source
- Easy access to MCU I/O
- Battery-ready, power-measurement access points
- Form factor compatible with Arduino™ R3 pin layout
- New, OpenSDA debug interface
- Mass storage device flash programming interface (default) - no tool installation required to evaluate demonstration applications
- P&E Debug interface provides run-control debugging and compatibility with IDE tools
- CMSIS-DAP interface: new ARM standard for embedded debug interface

Additional reference documents are available on freescale.com/FRDM-KL25Z.

3.4   Block Diagram

This evaluation board consists of an MC33882 Smart Six Output Switch (0.3 Ohm $R_{DS(on)}$) with SPI and Parallel Input Control. The high level system block diagram (Figure 2) outlines the way Freescale standard products are used to implement a low-side switch.
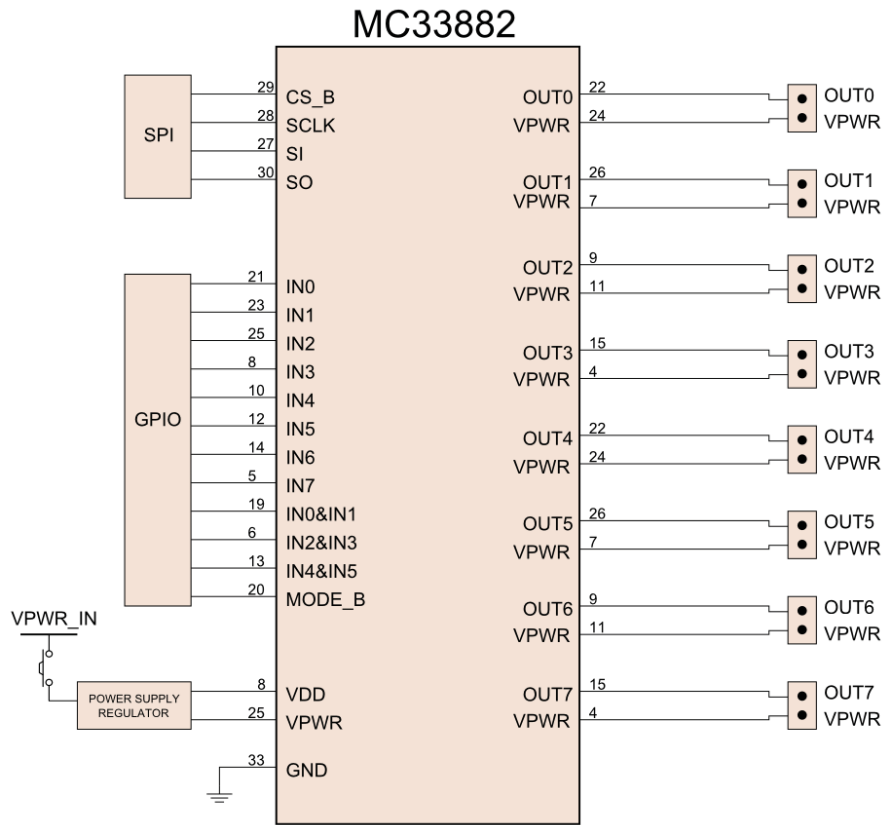

Figure 2. Block Diagram

3.4.1   Device Features

This evaluation board features the following Freescale product:

Table 1. MC33882 Device Features

Device	Description	Features
MC33882	Smart Six Output Low-side Switch	• Outputs clamped for switching inductive loads • Very low operational bias currents (< 2.0 mA) • CMOS input logic compatible with 5.0 V logic levels • Robust load dump (60 V transient at VPWR on OUT0 - OUT5) • Daisy chain operation of multiple devices possible • Switch outputs can be paralleled for higher currents • $R_{DS(on)}$ of 0.4 Ohm per output (25 °C) at 13 V VPWR • SPI operation guaranteed to 2.0 MHz

3.5   Board Description

The analog part consists of the MC33882 chip controlling external loads. The digital part consists of the KL25Z controlling the MC33882 by SPI and I/Os.

This evaluation board is meant to demonstrate how the MC33882 can control eight low-side switches.

Power is provided to the board via a VPWR/GND screw terminal (J1). Power can be disconnected from the board via an onboard switch (SW1). If power is ON, LED D3 will light up. The VDD input of the device can only accept 5.0 V. However, on-board level shifters are provided to shift 3.3 V levels up to 5 V. Note the KL25Z FSD uses a 3.3 V microcontroller.

The evaluation board provides a 20-pin connector (J2) to be used with the FRDM board. The connector J2 on the FRDM board connects to J2 on the evaluation board. The outputs of the switches are routed to independent 2-position screw terminals that have both one output and VPWR available (J3 through J10).

The evaluation board also includes several test points. A 16-pin row of pins allows access to all incoming signals. These sixteen signals are the following: MODE_B, IN4&IN5, IN2&IN3, IN0&IN1, CLK, MISO, MOSI, CS, IN0, IN1, IN2, IN3, IN4, IN5, IN6, and IN7. Eight loop test points provide access to the OUT0 through OUT7 signals. Two ground test points (GND1 and GND2) are available, as are three power test points (3V3, 5V, and VPWR).
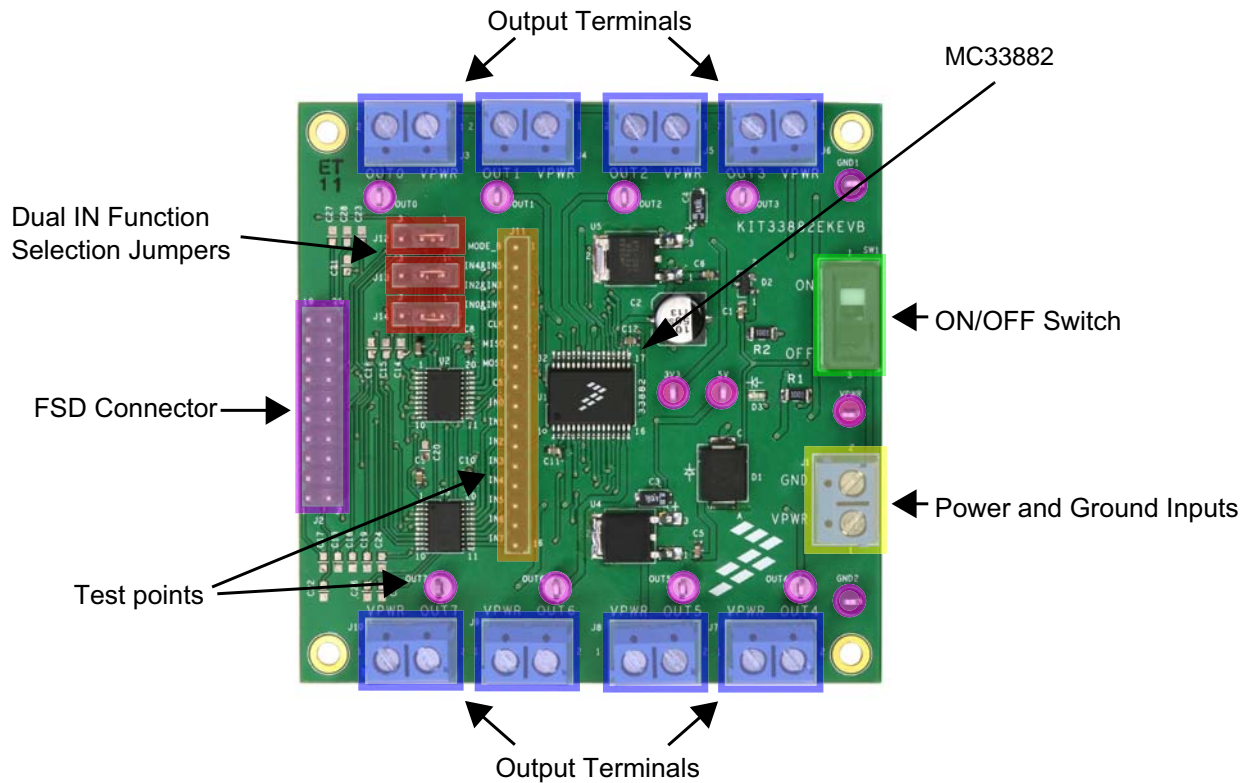

Figure 3. Board Description

Table 2. Board Description

Name	Description
Output Terminals	• Provides connection points for loads
Dual IN Function Selection Jumpers	• Allows the FSD to control one of two different signals (See Jumper Definitions on page 11 for more information)
FSD Connector	• Allows a FSD to be connected to the evaluation board via a 20-pin ribbon cable
Test Points	• Provides test points for various signals (See Test Point Definitions on page 8 for more information)
Power and Ground Inputs	• Provides connection points for power and ground

Table 2. Board Description (continued)

Name	Description
ON/OFF Switch	• Allows the board to be disconnected from power easily
MC33882	• Six output low-side switch with SPI and parallel input control

3.6 LED Display

The following LED is provided as a visual output device for the KIT33882EKEVB evaluation board:

1. LED D3 indicates when VPWR is present

3.7 Test Point Definitions

The following test points provide access to signals on the MC33882 IC:

Table 3. Test Point Definitions

Schematic Label	Name	Description
J11/1	MODE_B	Mode pin for device
J11/2	IN4&IN5	Dual output control for IN4 and IN5
J11/3	IN2&IN3	Dual output control for IN2 and IN3
J11/4	IN0&IN1	Dual output control for IN0 and IN1
J11/5	CLK	SPI clock
J11/6	MISO	SPI MISO (Master Input, Slave Output)
J11/7	MOSI	SPI MOSI (Master Output, Slave Input)
J11/8	CS	SPI chip select
J11/9	IN0	Parallel input control for IN0
J11/10	IN1	Parallel input control for IN1
J11/11	IN2	Parallel input control for IN2
J11/12	IN3	Parallel input control for IN3
J11/13	IN4	Parallel input control for IN4
J11/14	IN5	Parallel input control for IN5
J11/15	IN6	Parallel input control for IN6
J11/16	IN7	Parallel input control for IN7
TEST POINT	VPWR	VPWR
TEST POINT	3.3 V	3.3 V
TEST POINT	5.0 V	5.0 V
TEST POINT	GND	Ground
TEST POINT	OUT0	OUT0
TEST POINT	OUT1	OUT1
TEST POINT	OUT2	OUT2
TEST POINT	OUT3	OUT3
TEST POINT	OUT4	OUT4
TEST POINT	OUT5	OUT5
TEST POINT	OUT6	OUT6
TEST POINT	OUT7	OUT7

3.8 Input Signal Definitions

The MC33882 IC has twelve input signals that are used to control certain outputs or functions inside the circuit. These signals are:

Table 4. Input Signal Definitions

Schematic Label	Name	Description
MODE_B	MODE_B	Mode pin for device
IN4&IN5	IN4&IN5	Dual output control for IN4 and IN5
IN2&IN3	IN2&IN3	Dual output control for IN2 and IN3

Table 4. Input Signal Definitions (continued)

Schematic Label	Name	Description
IN0&IN1	IN0&IN1	Dual output control for IN0 and IN1
IN0	IN0	Parallel input control for IN0
IN1	IN1	Parallel input control for IN1
IN2	IN2	Parallel input control for IN2
IN3	IN3	Parallel input control for IN3
IN4	IN4	Parallel input control for IN4
IN5	IN5	Parallel input control for IN5
IN6	IN6	Parallel input control for IN6
IN7	IN7	Parallel input control for IN7

3.9 Output Signal Definitions

The MC33882 IC has eight output signals that are used to control various devices and outputs on the evaluation board. These signals are:

Table 5. Output Signal Definitions

Schematic Label	Name	Description
OUT0	OUT0	Controls OUT0
OUT1	OUT1	Controls OUT1
OUT2	OUT2	Controls OUT2
OUT3	OUT3	Controls OUT3
OUT4	OUT4	Controls OUT4
OUT5	OUT5	Controls OUT5
OUT6	OUT6	Controls OUT6
OUT7	OUT7	Controls OUT7

3.10 USB/SPI Dongle Connector

This is a 20-pin, 0.1" center, dual-row connector designed to interface directly to the FSD unit. The FRDM-KL25Z SPI dongle connector consists of the following 20 pins (J2 on FRDM-KL25Z).

Table 6: USB/SPI Dongle Pin Description

Pin Number	FSD Name	EVB Name	Description
1	DATA0	DATA0	Connected to IN0 or IN4&IN5 via a jumper
2	SPI1-CSB	<NC>	<unused>
3	DATA1	DATA1	Connected to IN1
4	SPI1-CLK	<NC>	<unused>
5	DATA2	DATA2	Connected to IN2 or IN2&IN3 via a jumper
6	SPI0-CSB	SPI0_CSB	SPI signal - Chip Select Bar
7	DATA3	DATA3	Connected to IN3
8	SPI0-MOSI	SPI0_MOSI	SPI signal - Serial In
9	DATA4	DATA4	Connected to MODE_B
10	SPI0-MISO	SPI0_MISO	SPI signal, Serial Out
11	CTRL0	CNTL0	Connected to IN4 or IN0&IN1 via a jumper
12	SPI0-CLK	SPI0_CLK	SPI signal - Serial Clock
13	CTRL1	CNTL1	Connected to IN5

Table 6: USB/SPI Dongle Pin Description (continued)

14	GND	GROUND	Signal Ground
15	<NC>	<NC>	NC
16	VREFH	<NC>	<unused>
17	SPI1-MISO	<NC>	<unused>
18	CTRL3	CNTL3	CNTL3 - connected to IN7
19	CTRL2	CNTL2	CNTL2 - connected to IN6
20	SPI1-MOSI	<NC>	<unused>

3.11 Screw Terminal Connections

The KIT33882EKEVB board features screw terminal connections to allow easy access to the MC33882 signals and supply rails. Figure 4 shows the board locations and names of the screw terminals.
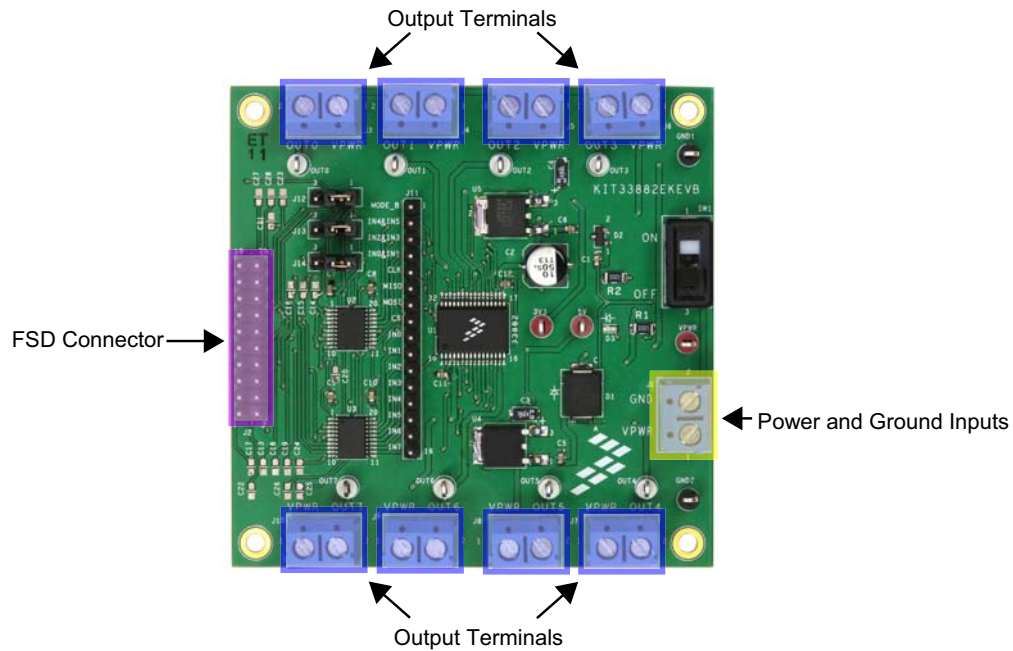
Figure 4. Connector Designations

3.12 Input and Output Evaluation Connectors

There is one input connector which provides the following signals:

Table 7. Input Connectors

Pin	Schematic	Signal
1	J1	VPWR
2		GND

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There are eight output connectors which provide the following signals:

Table 8. Output Connectors

Pin	Schematic	Signal
1	J3	VPWR
2		OUT0
1	J4	VPWR
2		OUT1
1	J5	VPWR
2		OUT2
1	J6	VPWR
2		OUT3
1	J7	VPWR
2		OUT4
1	J8	VPWR
2		OUT5
1	J9	VPWR
2		OUT6
1	J10	VPWR
2		OUT7

3.13 Jumper Definitions

The following table defines the evaluation board jumper positions and explains their functions.

Table 9. Jumper Table

Jumper	Description	Default Setting	Setting	Connection
J12	Determines if the signal from DATA0 goes to IN0 or IN4&IN5	1-2		The output of DATA0 is routed to IN0
			2-3	The output of DATA0 is routed to IN4&IN5
J13	Determines if the signal from DATA2 goes to IN2 or IN2&IN3	1-2		The output of DATA2 is routed to IN2
			2-3	The output of DATA2 is routed to IN2&IN3
J14	Determines if the signal from CNTL0 goes to IN4 or IN0&IN1	1-2		The output of CNTL0 is routed to IN4
			2-3	The output of CNTL0 is routed to IN0&IN1

The following table defines the jumper configurations for the three communication modes of the device.

Table 10. Jumper Configurations

Mode/Function	Controls	Jumpers (J12, J13, J14)	DATA4 (MODE_B)
Dual IN Control	0&1, 2&3, 4&5	Position 2-3	HIGH
IN Control	0, 1, 2, 3, 4, 5, 6, 7	Position 1-2	LOW
SPI Control	0, 1, 2, 3, 4, 5	X	LOW

4   Freedom Development Platform

The KIT33882EKEVB kit may be used with the FSD (see Figure 5), which provides a USB-to-SPI interface. This small board makes use of the USB, SPI and parallel ports built into Freescale's KL25Z microcontroller. The main function provided by this dongle is to allow Freescale evaluation kits that have a parallel port to communicate via a USB port to a PC. It can also be used as a regular microcontroller board if not configured as a SPI dongle.

Figure 5. FRDM-KL25Z Interface Dongle

4.1   Using the FRDM-KL25Z as a FSD

First, the MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA file must be loaded to the FRDM-KL25Z board. This is accomplished by plugging the mini-USB cable into the SDA USB port on the FRDM-KL25Z while holding down the reset button. The green LED should be flashing. The MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA file must then be drag and dropped onto the BOOTLOADER drive in Windows Explorer. The FRDM-KL25Z should be unplugged after the file has been transferred. The mini-USB cable must then be plugged back into the SDA USB port on the FRDM-KL25Z. The FSD srec file can then be drag and dropped onto the FRDM-KL25Z drive in Windows Explorer. To use the FRDM-KL25Z as a FSD, the mini-USB cable must be plugged into the KL25Z USB port.

4.2   Using the FRDM-KL25Z as a Microcontroller Board

4.2.1   Using the FRDM-KL25Z Sample Code Drag/Drop File

First, the MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA file must be loaded to the FRDM-KL25Z board. This is accomplished by plugging the mini-USB cable into the SDA USB port on the FRDM-KL25Z while holding down the reset button. The green LED should be flashing. The MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA file must then be drag and dropped onto the BOOTLOADER drive in Windows Explorer. The FRDM-KL25Z should be unplugged after the file has been transferred. The mini-USB cable must then be plugged back into the SDA USB port on the FRDM-KL25Z. The sample code srec file found in the SPIGen website can then be drag and dropped onto the FRDM-KL25Z drive in Windows Explorer. To use the FRDM-KL25Z with this sample code, the mini-USB cable must be plugged into the KL25Z USB port.

4.2.2   Using the FRDM-KL25Z with Custom CodeWarrior Code

First, the MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA file must be loaded to the FRDM-KL25Z board. This is accomplished by plugging the mini-USB cable into the SDA USB port on the FRDM-KL25Z while holding down the reset button. The green LED should be flashing. The MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA file must then be drag and dropped onto the BOOTLOADER drive in Windows Explorer. The FRDM-KL25Z should be unplugged after the file has been transferred. To use the FRDM-KL25Z as a programmable microcontroller with CodeWarrior, the mini-USB cable must be plugged into the SDA USB port. Sample code for this kit is available at the kit's website.

5 Installing the Software and Setting up the Hardware

5.1 Installing SPIGen Freeware on your Computer

The latest version of SPIGen is designed to run on any Windows 8, Windows 7, Vista or XP-based operating system. To install the software, go to www.freescale.com/analogtools and select your kit. Click on that link to open the corresponding Tool Summary Page. Look for "Jump Start Your Design". Download to your computer desktop the SPIGen software as well as the associated configuration file. Run the install program from the desktop. The Installation Wizard guides you through the rest of the process.

To use SPIGen, go to the Windows Start menu, then Programs, then SPIGen, and click on the SPIGen icon. The SPIGen Graphic User Interface (GUI) appears. Go to the file menu in the upper left hand corner of the GUI, and select "Open". In the file selection window that appears, set the "Files of type:" drop-down menu to "SPIGen Files (*.spi)". (As an exceptional case, the file name may have a .txt extension, in which case you should set the menu to "All Files (*.*)".) Next, browse for the configuration file you saved on your desktop earlier and select it. Click "Open", and SPIGen creates a specially configured SPI command generator for your evaluation board.

The GUI is shown in Figure 6. The text at the top is the name of the configuration file loaded. The left side panel displays folders that group user interfaces. The process of loading the configuration file has assigned a list of "Extra Pins" as well as a list "Quick Commands", all of which are board-specific.
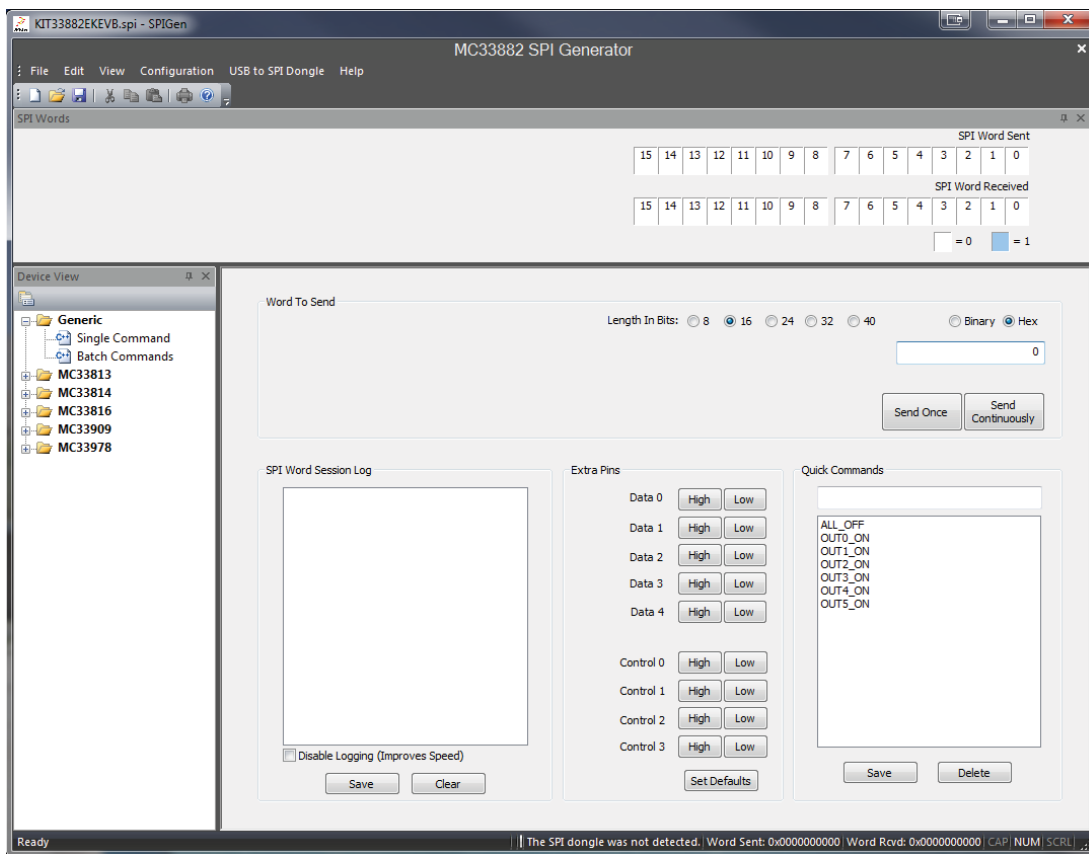
Figure 6. SPIGen GUI

5.2 Installing CodeWarrior on your Computer

This procedure explains how to obtain and install the latest version of CodeWarrior 10.5 or greater.

Notes: The sample software in this kit requires CodeWarrior 10.5 or greater. If CodeWarrior 10.5 or greater is already on your system, the steps in this section can be skipped.

1. Obtain the latest CodeWarrior 10.5 (or greater) installer file from freescale.com/codewarrior.
2. Run the executable file and follow the instructions.

During the installation, there is a request to select components to install. This kit requires Kinetis which also must be installed. User must install at least the Kinetis component. Select Kinetis and click on "Next" to complete the installation.

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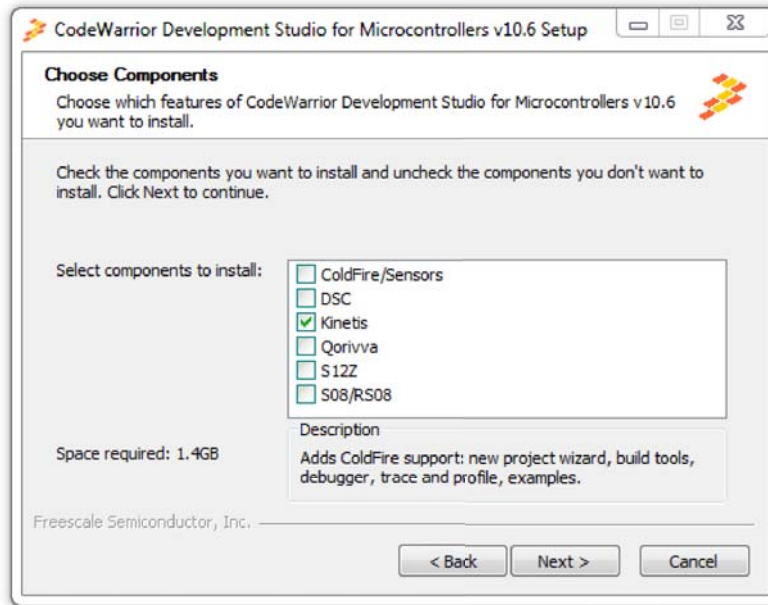
Figure 7. Choose Components GUI

5.3   Configuring the Hardware
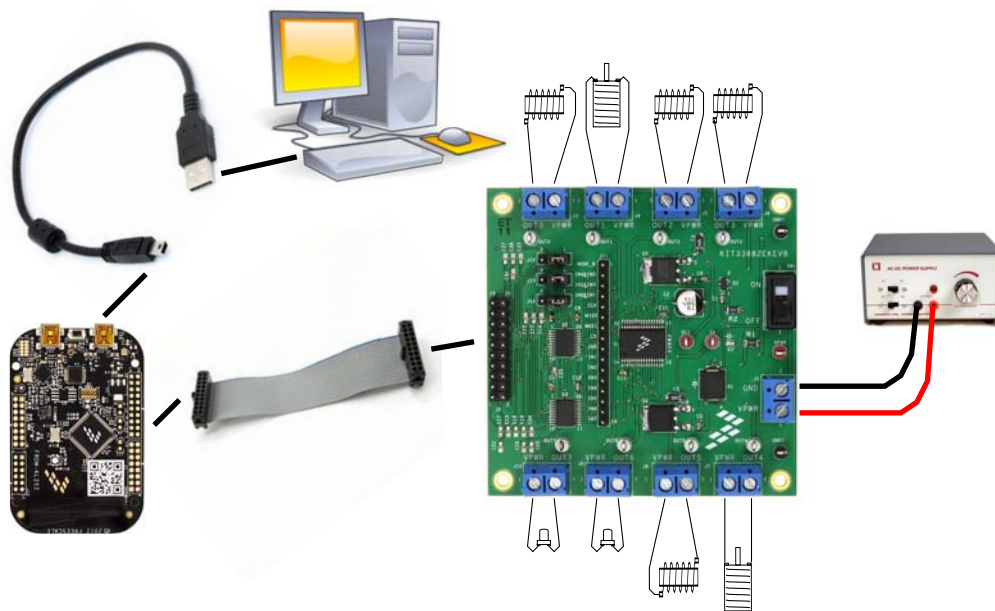
Note: Pictured loads are examples only

Figure 8. KIT33882EKEVB plus FRDM-KL25Z Board Setup

5.3.1   Step-by-step Instructions for Setting up the Hardware using SPIGen

In order to perform the demonstration examples, first set up the evaluation board hardware and software as follows:

1.   Ready the computer, install the SPIGen software. Make sure the FRDM board has been flashed with the correct SPIGen srec file.

2.   Connect the FRDM-KL25Z board to the KIT33882EKEVB evaluation board via the 20-pin ribbon cable. The FRDM-KL25Z board must have a 20-pin male header soldered onto the top of the FRDM-KL25Z board in J2.

3.   Connect the mini USB cable between the FRDM-KL25Z board and the PC (use the KL25Z port, not the SDA port).

4.   Attach the DC power supply (without turning on the power) to the VPWR/GND terminal (J1).

5.   If desired, attach loads to the output terminals on the board (J3 through J10).

6.   Launch SPIGen and load the .spi configuration file from the kit's website and open it in SPIGen.

7.   Turn on the power supply and switch SW1 to the ON position.

8.   Send various commands via SPIGen using the predefined sequences available.

Notes: Due to the limited number of available FSD I/O signals, several jumpers (J12 through J14) are available that control where DATA0, DATA2, and CNTL0 are routed. They can be used for either IN0, IN2, and IN4 or IN4&IN5, IN2&IN3, and IN0&IN1, respectively.

5.3.2 Step-by-step Instructions for Setting up the Hardware using Sample Flash File

1. Ready the computer. Only a USB port to provide power is required. (Make sure the FRDM board has been flashed with the correct srec file).

2. Connect the FRDM-KL25Z board to the KIT33882EKEVB evaluation board via the 20-pin ribbon cable. The FRDM-KL25Z board must have a 20-pin male header soldered onto the top of the FRDM-KL25Z board in J2.

3. Connect the mini USB cable between the FRDM-KL25Z board and the PC (use the KL25Z port, not the SDA port).

4. Attach the DC power supply (without turning on the power) to the VPWR/GND terminal (J1).

5. If desired, attach loads to the output terminals on the board (J3 through J10).

6. Turn on the power supply and switch SW1 to the ON position.

7. The flashed program will run automatically.

Notes: The sample code does not use the dual input signals (IN0&IN1, IN2&IN3, and IN4&IN5), so jumpers J12 through J14 must be set to the 1-2 configuration.

5.3.3 Step-by-step Instructions for Setting up the Hardware using CodeWarrior

1. Ready the computer, install the CodeWarrior software.

2. Connect the FRDM-KL25Z board to the KIT33882EKEVB evaluation board via the 20-pin ribbon cable. The FRDM-KL25Z board must have a 20-pin male header soldered onto the top of the FRDM-KL25Z board in J2.

3. Connect the mini USB cable between the FRDM-KL25Z board and the PC (use the SDA port, not the KL25Z port).

4. Attach the DC power supply (without turning on the power) to the VPWR/GND terminal (J1).

5. If desired, attach loads to the output terminals on the board (J3 through J10).

6. Launch CodeWarrior and either load the sample project or create your own bareboard project.

7. Turn on the power supply and switch SW1 to the ON position.

8. You can now program the board and debug your code.

Notes: Due to the limited number of available FSD I/O signals, several jumpers (J12 through J14) are available that control where DATA0, DATA2, and CNTL0 are routed. They can be used for either IN0, IN2, and IN4 or IN4&IN5, IN2&IN3, and IN0&IN1, respectively. However, these jumpers can be avoided and all signals may be connected to the FRDM-KL25Z if they are wired by hand from different pins on the FRDM-KL25Z connectors.
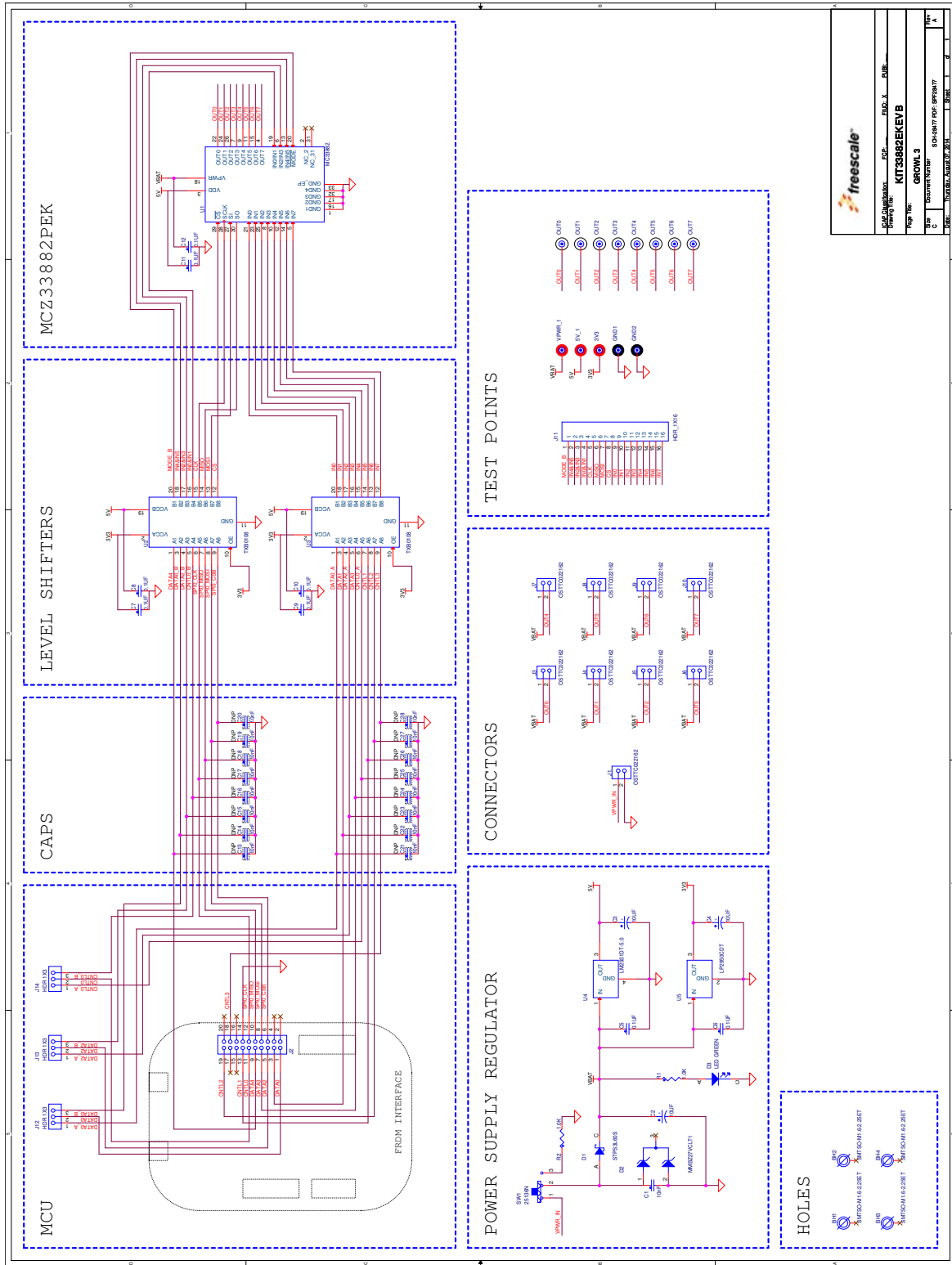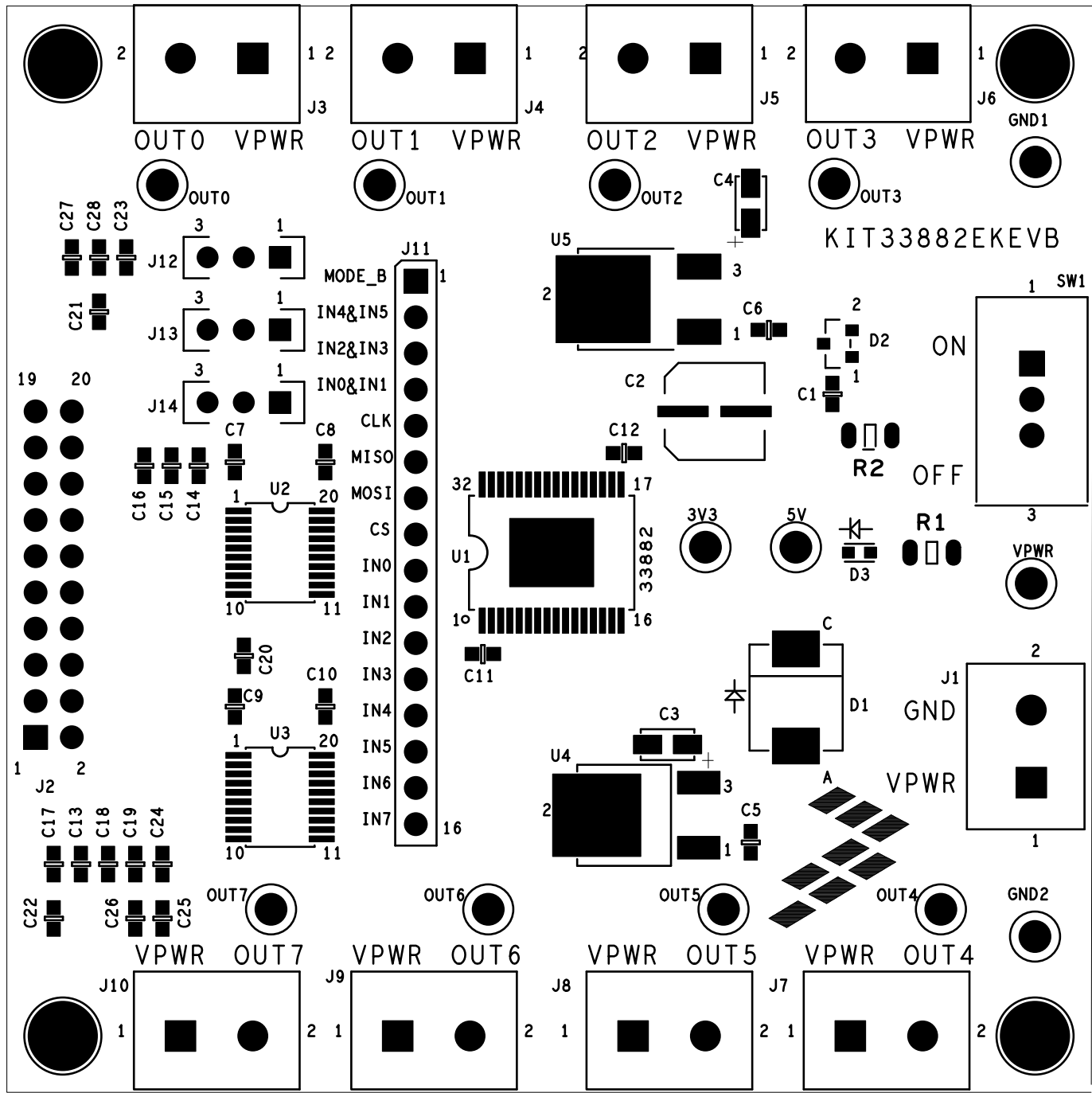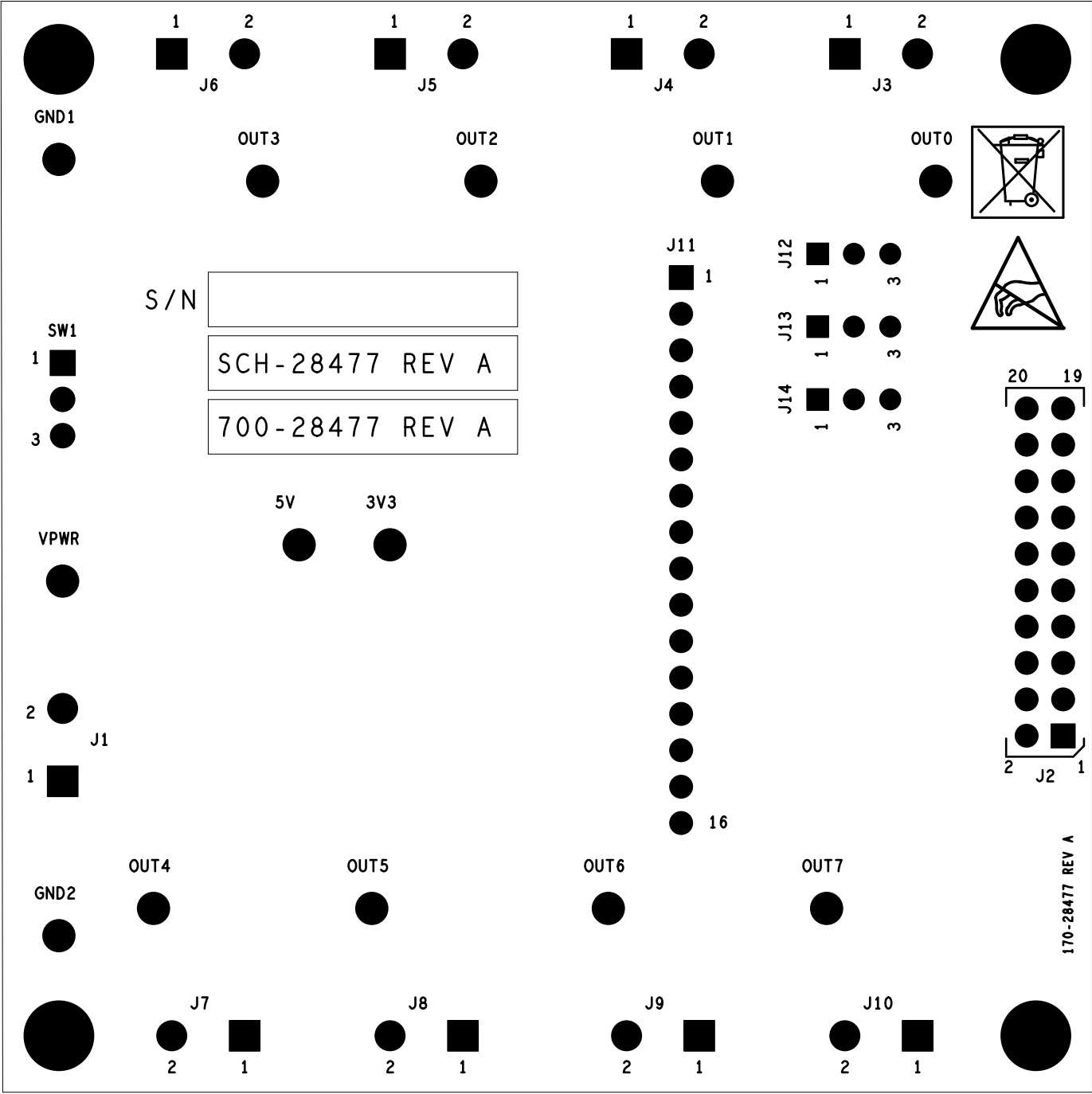
6   Schematic

Figure 9. Schematic

7   Silkscreens

7.1   Silkscreen Top

7.2 Silkscreen Bottom

Notes: This image is an exception to the standard top-view mode of representation used in this document. It has been flipped to show a bottom view.

8   Bill of Materials

Table 11. Bill of Materials [1]

Item	Qty	Schematic Label	Value	Description	Part Number	Assy Opt
Active Components						
1	1	U1		IC LIN SW LOW SIDE SIX OUTPUT 5 V SOIC32	MC33882PEK	[3]
Other Components						
2	2	U2, U3		IC VXLTR 8BIT BIDIR 15 KV ESD 1.2 V- 3.6 V/1.65 V- 5.5 V TSSOP20	TXB0108PWR	
3	1	U4		IC VREG LDO 5 V 100 MA 5.0 - 40 V DPACK	LM2931DT-5.0G	
4	1	U5		IC VREG LDO 3.3 V 100 MA 30 V TO -252343 H SN 100 L	LP2950CDT-3.3/NOPB	
Capacitors						
5	1	C1	0.01 μF	CAP CER 0.01 μF 50 V 5% X7R 0603	06035C103JAT2A	
6	1	C2	10 μF	CAP ALEL 10 μF 50 V 20% SMT (CASE D)	EEE1HA100SP	
7	2	C3, C4	10 μF	CAP TANT 10 μF 10 V 10% -- 3216-18	293D106X9010A2TE3	
8	8	C5, C6, C7, C8, C9, C10, C11, C12	0.1 μF	CAP CER 0.1 μF 50 V 10% X7R 0603	GRM188R71H104KA93D	
9	16	C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28	0.01 μF	CAP CER 0.01 μF 50 V 5% X7R 0603	06035C103JAT2A	[2]
Diodes						
10	1	D1		DIODE SCH RECT 3 A 60 V SMC	STPS3L60S	
11	1	D2		DIODE ZNR TVS -- 27 V/40 W SOT23	MMBZ27VCLT1G	
12	1	D3		LED GRN SGL 20 MA 0603	LG L29K-G2J1-24-Z	
Switches, Connectors, Jumpers and Test Points						
13	2	GND1, GND2		TEST POINT BLK 70X220 MIL TH	5006	
14	9	J1, J3, J4, J5, J6, J7, J8, J9, J10		CON 1X2 TB 5.08 MM SP 406 H SN 138 L	OSTTC022162	
15	1	J2		HDR 2X10 TH 100MIL CTR 343 H SN 100 L	TSW-110-07-T-D	
16	1	J11		HDR 1X16 TH 100 MIL SP 330 H AU 100 L	TSW-116-07-S-S	
17	3	J12,J13,J14		HDR 1x3 TH 100 MIL SP 343 H SN 100 L	TSW-103-07-T-S	
18	8	OUT1, OUT2, OUT3, OUT4, OUT5, OUT6, OUT7, OUT0		TEST POINT WHITE 70X220 MIL TH	5007	

Table 11. Bill of Materials [1] (continued)

19	1	SW1		SW SPDT SLD 125 V 4 A TH	25136NAH	
20	3	VPWR_1, 3V3, 5V_1		TEST POINT RED 70X220 MIL TH	5005	

Resistors

21	2	R1, R2	1.0 KΩ	RES MF 1.00 K 1/4 W 1% 1206	CRCW12061K00FKEA	

Notes:

1. Freescale does not assume liability, endorse, or warrant components from external manufacturers that are referenced in circuit drawings or tables. While Freescale offers component recommendations in this configuration, it is the customer's responsibility to validate their application.
2. Do not populate.
3. **Critical components.** For critical components, it is vital to use the manufacturer listed.

9 References

Following are URLs where you can obtain information on related Freescale products and application solutions:

Freescale.com Support Pages	Description	URL
KIT33882EKEVB	Tool Summary Page	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=KIT33882EKEVB
MC33882	Product Summary Page	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MC33882
FRDM-KL25Z	Freescale Development Platform	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=FRDM-KL25Z
SPIGen	Software	http://www.freescale.com/files/soft_dev_tools/software/device_drivers/SPIGen.html
CodeWarrior	Software	http://www.freescale.com/webapp/sps/site/homepage.jsp?code=CW_HOME&tid=vanCODEWARRIOR

9.1 Support

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

9.2 Warranty

Visit www.freescale.com/warranty for a list of phone numbers within your region.

10 Revision History

Revision	Date	Description of Changes
1.0	12/2014	• Initial Release

Document Number: KT33882UG
Rev. 1.0
12/2014