Document Number: KT06XS4200UG
Rev. 2.0, 8/2014

KIT06XS4200EVBE Evaluation Board

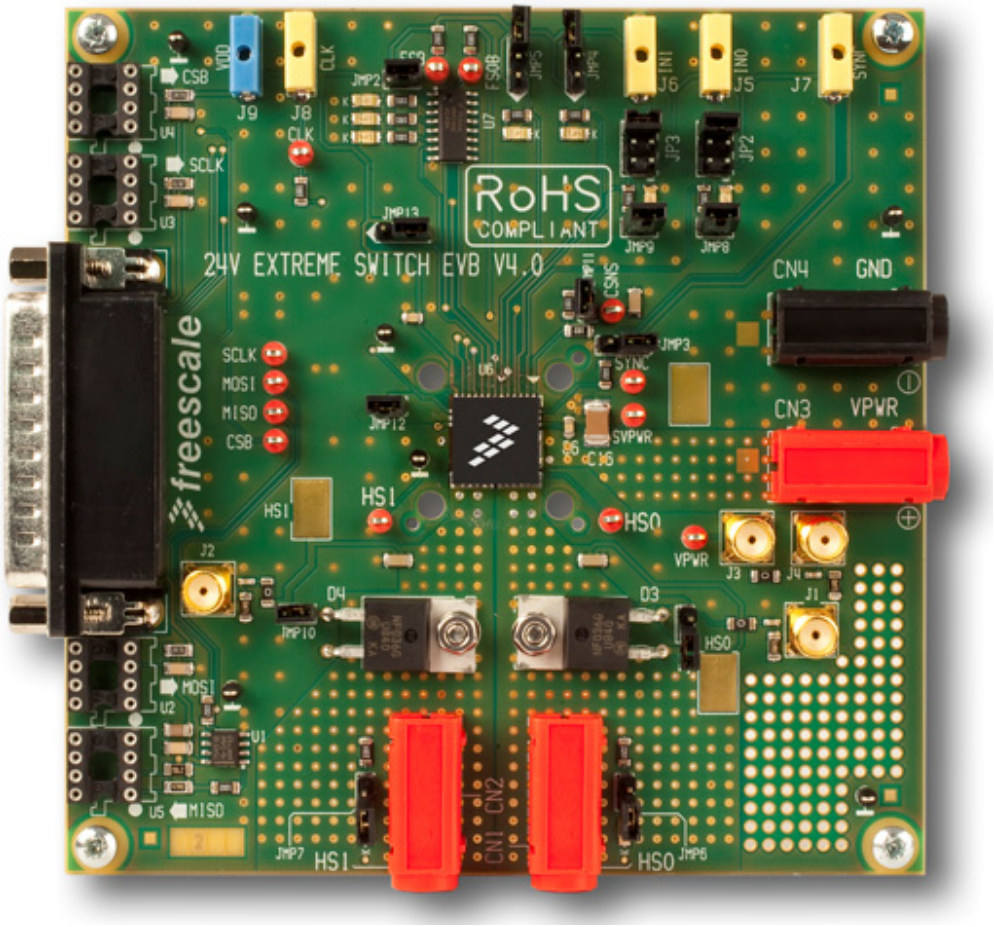


Figure 1. KIT06XS4200EVBE Evaluation Board

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1 Kit Contents / Packing List

- KIT06XS4200 Evaluation Board
- Freescale Warranty Card

2 Important Notice

Freescale provides the enclosed product(s) under the following conditions:

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.

The goods provided may not be complete in terms of required design, marketing, and or manufacturing related protective considerations, including product safety measures typically found in the end product incorporating the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. In order to minimize risks associated with the customers applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards. For any safety concerns, contact Freescale sales and technical support services.

Should this evaluation kit not meet the specifications indicated in the kit, it may be returned within 30 days from the date of delivery and will be replaced by a new kit.

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3 Introduction

This Extreme Switch Evaluation Board User Guide demonstrates the capability of the MC06XS4200 as a 24 V dual high side switch product, that provides integrated control along with a large number of protective and diagnostic functions.

This product has been designed for truck, bus, and industrial applications. The low RDS(ON) channels (< 6.0 mΩ) control different load types; bulb lamps, solenoids, or DC motors. Control, device configuration, and diagnostics are performed through a 16-bit SPI interface, allowing easy integration into existing applications.

Both channels can be controlled individually by external/internal clock signals or by direct inputs. Using the internal clock allows fully autonomous device operation. Programmable output voltage slew rates (individually programmable) helps improve EMC performance. To avoid shutting off the device upon inrush current, while still being able to closely track the load current, a dynamic overcurrent threshold profile is featured. Switching current of each channel can be sensed via a programmable sensing ratio. Whenever communication with the external microcontroller is lost, the device enters a fail-safe operation mode, but remains operational, controllable, and protected.

3.1 EVB Features

- Input voltage operation range from 6.0 to 58 V
- Dual high side switches
- Programming, control, and diagnostics accomplished via the use of a 16-bit SPI interface
- Output with selectable slew-rate satisfy electromagnetic compatibility (EMC) requirements
- Each output can be controlled with an internal PWM modulated clock signal, instead of an external clock

3.2 Required Equipment

Minimum required equipment:

- DC power supply capable of supplying up to 50 A at 6.0 to 58 V
- Electronic/resistive loads to load the various power channels
- No cable required

3.3 Optional Equipment for SPI

- 5.0 V Power supply, 1.0 A current capability
- USB enabled computer with Windows XP, Windows 2000, or Windows NT
- CD contains a graphical user interface (GUI) that allows control of all MC06XS4200 features via the SPI

4 EVB Setup Configuration Diagram

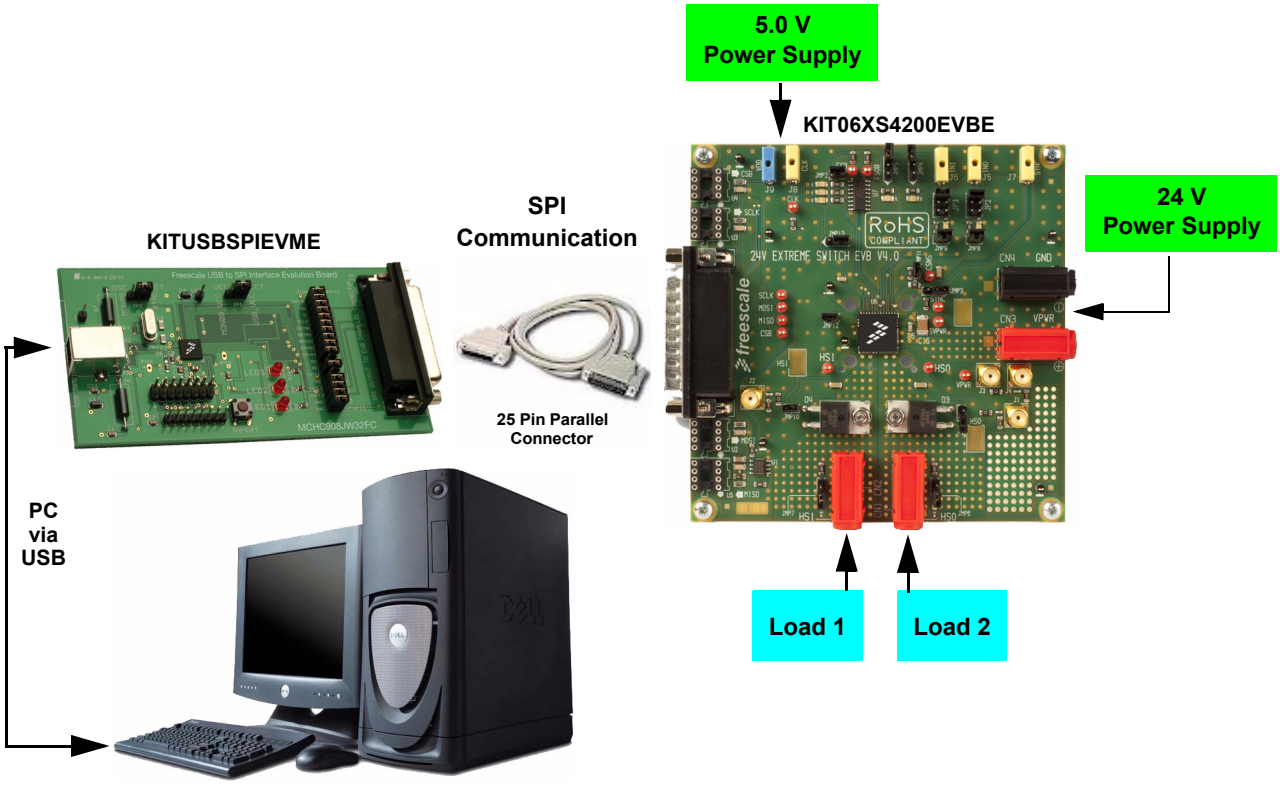


Figure 2. KIT06XS4200 Setup Configuration Diagram

5 Software/Hardware Installation

The KIT06XS4200EVBE operates with a single DC power supply from 6.0 to 58 V, and is fully controlled via the SPI with the help of an USB-SPI KITUSBSPIEVME EVB kit, requiring a 5.0 V DC power supply.

5.1 Starting Up KIT06XS4200EVBE

To Start working with KIT06XS4200EVBE, provide 24 V input voltage between 6.0 to 58 V, by connecting the (+) probe to the Star VPWR pin, and the (-) probe to the GND pin, on the input power terminal block. Then apply a 5.0 V input voltage between VDD and the GND terminal. The load is connected between the HS0 (or HS1) pin and the (-) terminal with the 24 V power supply.

5.2 Controlling KIT06XS4200EVBE via the SPI

The KITUSBSPIEVME EVB kit enables interaction with the KIT06XS4200EVBE. Full operation of the MC06XS4200 device is achieved via use of the graphical user interface developed by Freescale.

Note: SPI mapping is similar for all three User Guides (KT06, KT10, and KT20XS4200UG).

5.3 Initializing SPIGen

Once SPIGen has been successfully installed, the following screen appears:

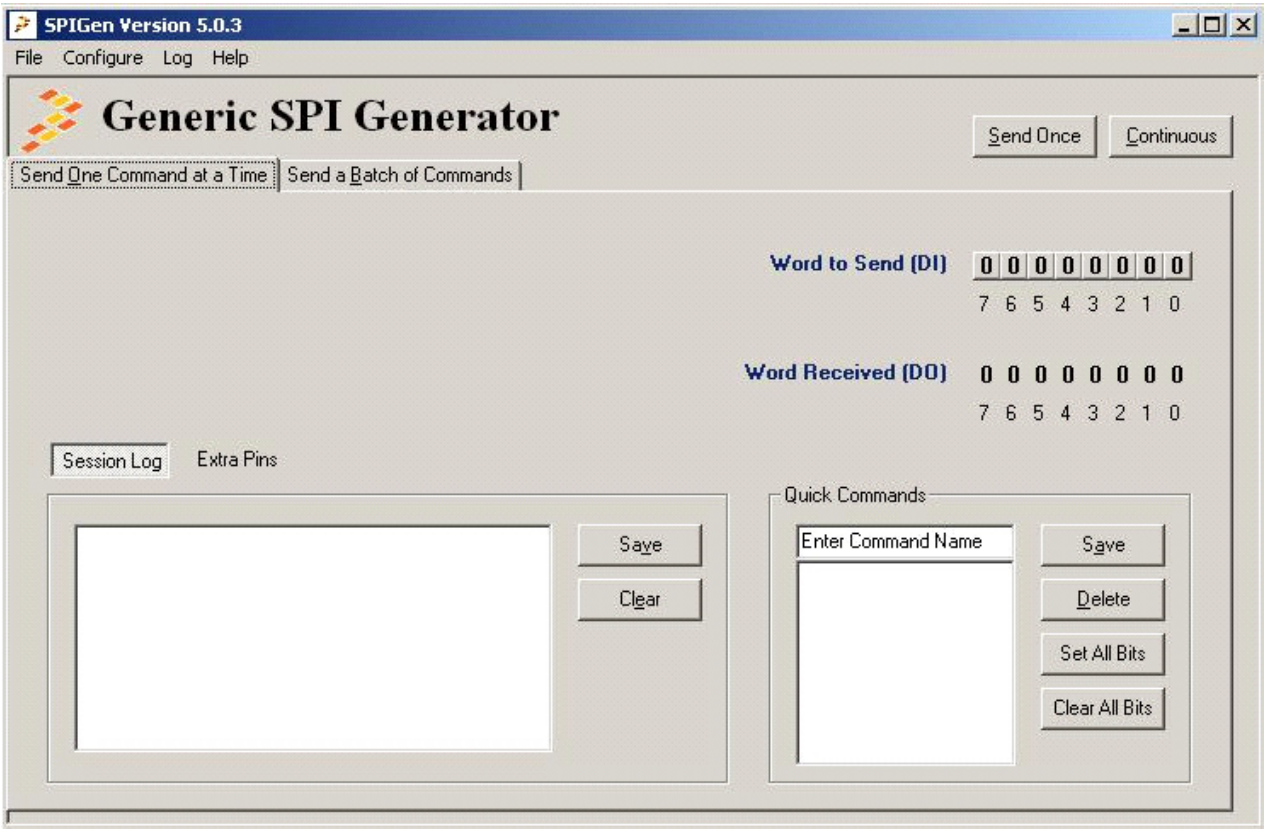


Figure 3. SPIGen After First Installation

5.4 SPD06 Configuration

To configure SPD06, download the Config SPI file.

Select File, Open, then SPD06_config.file.:

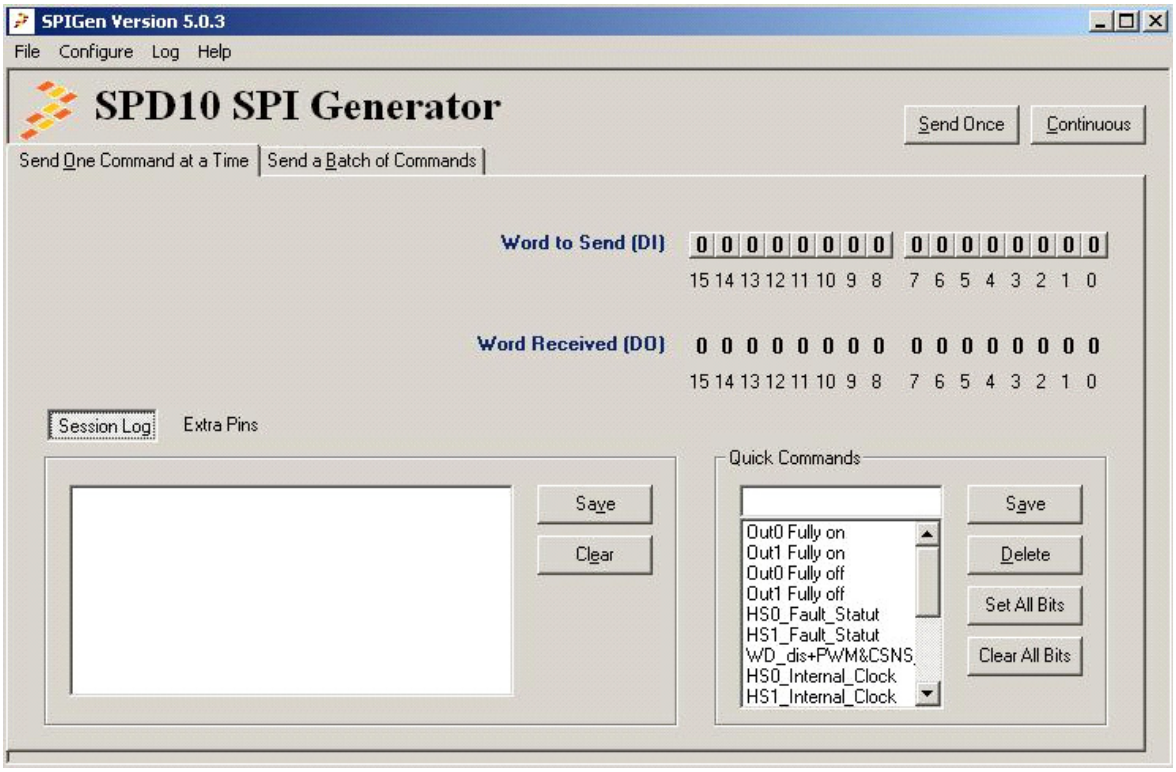


Figure 4. SPD06 Configuration

5.5 SPD06 Initialization

To control the device, do the following:

- Set R_{STB} to level high by entering Extra Pins into the Radio Box
- Set Control0 = High
- Set Bit 6 of SO to 1
- *Click* Send Once

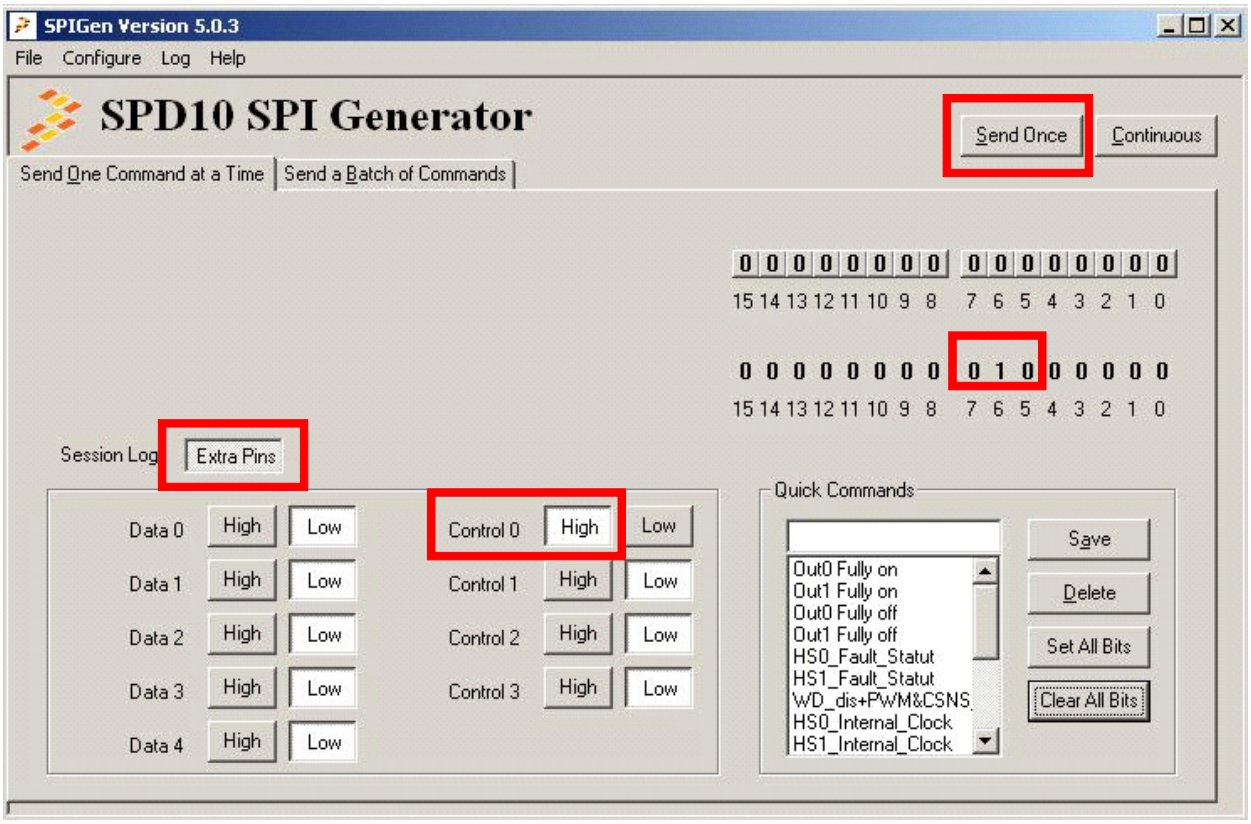


Figure 5. SPD06 Initialization

5.6 SPD06 Enhanced Initialization

If you want to initialize the device more quickly, select the **Send a Batch of Commands** tab, select **Init** for the setup, and then *Click on* Send Once.

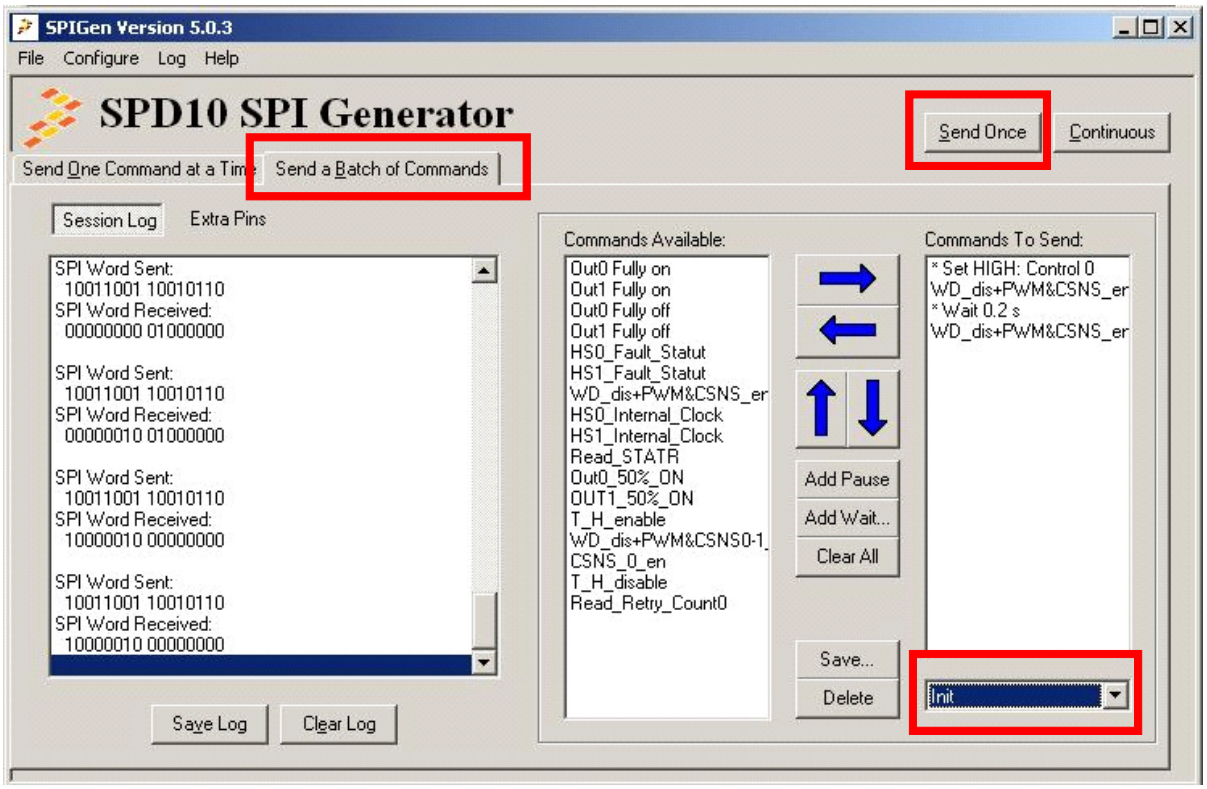


Figure 6. SPD06 Enhanced Initialization

6 Appendix

6.1 KIT06XS4200EVBE Schematic

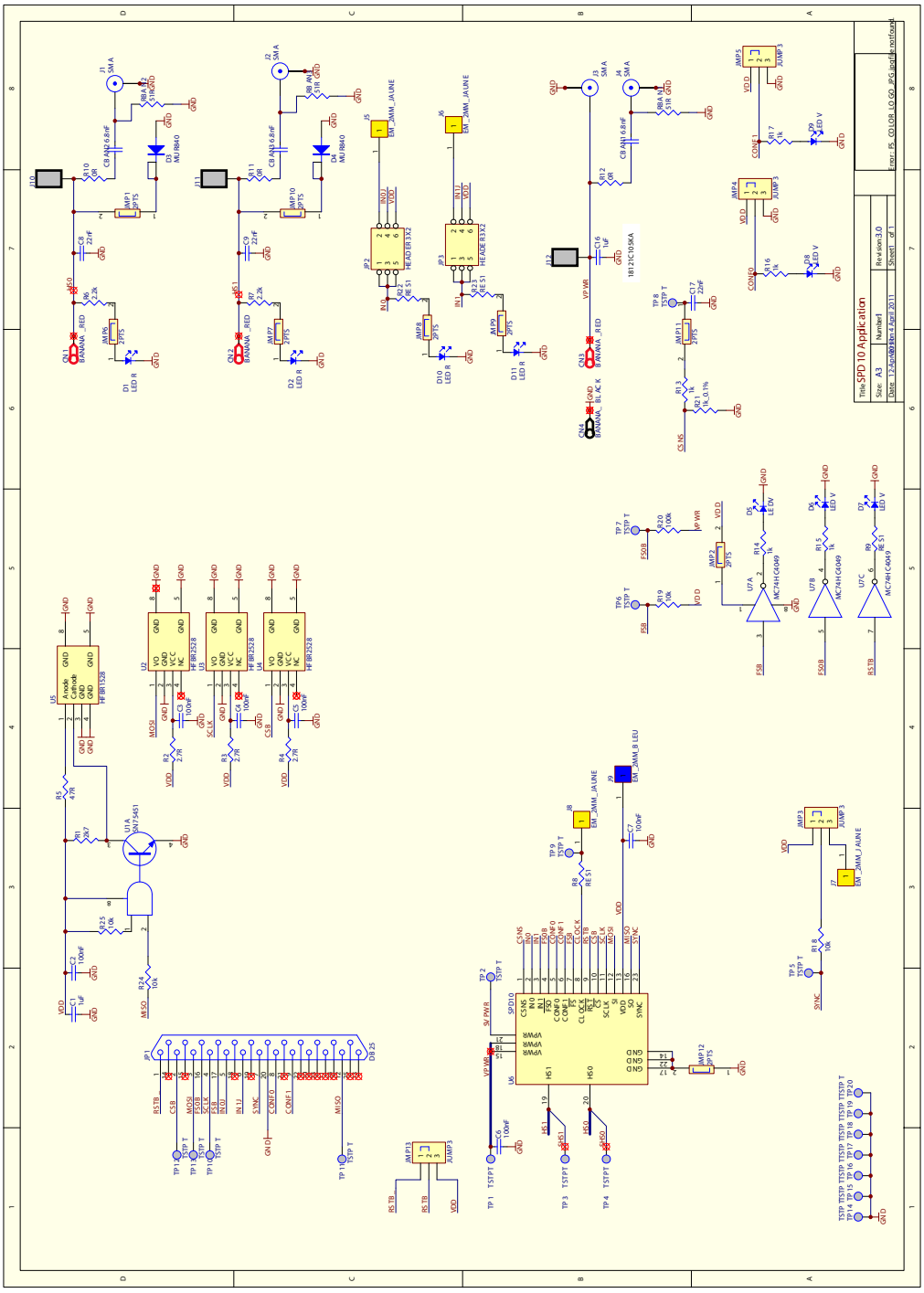


Figure 7. KIT06XS4200EVBE Schematic

6.2 KIT06XS4200EVBE Assembly Layer Top

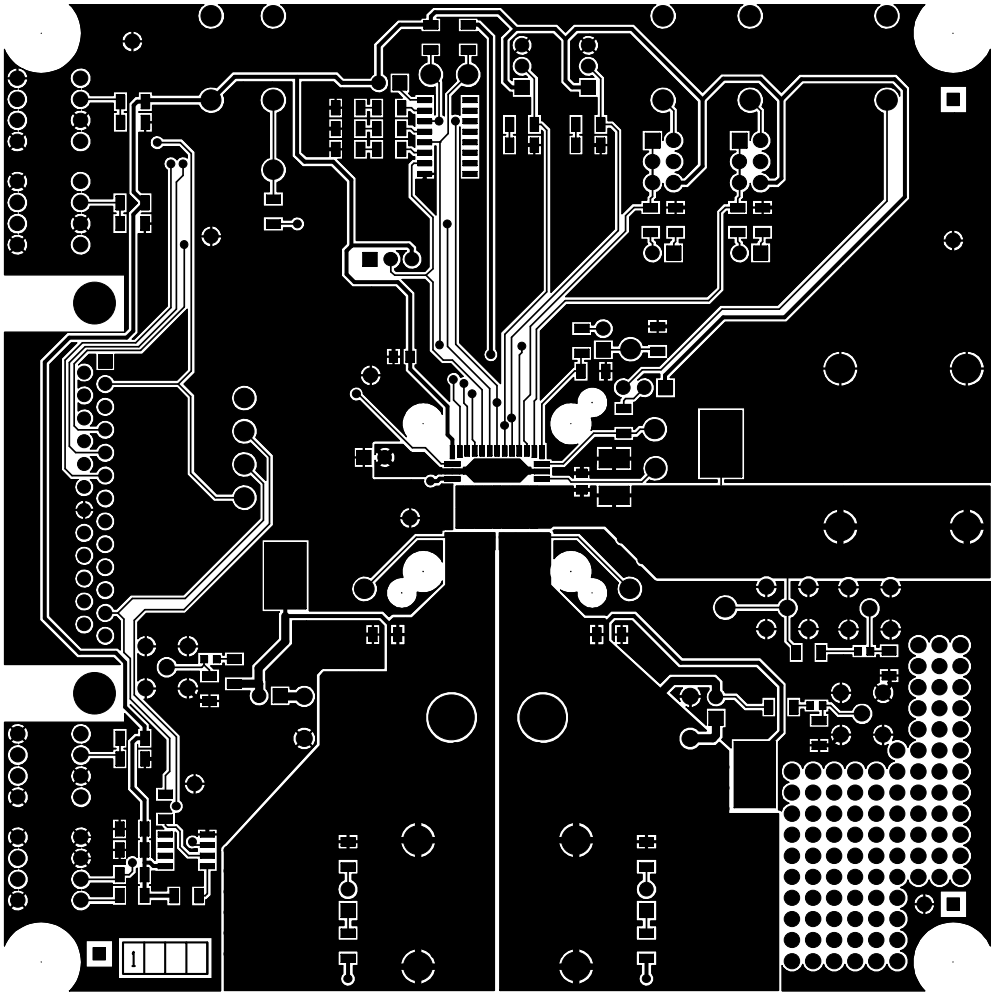


Figure 8. KIT06XS4200EVBE Assembly Layer Top

6.3 KIT06XS4200EVBE Assembly Layer Bottom

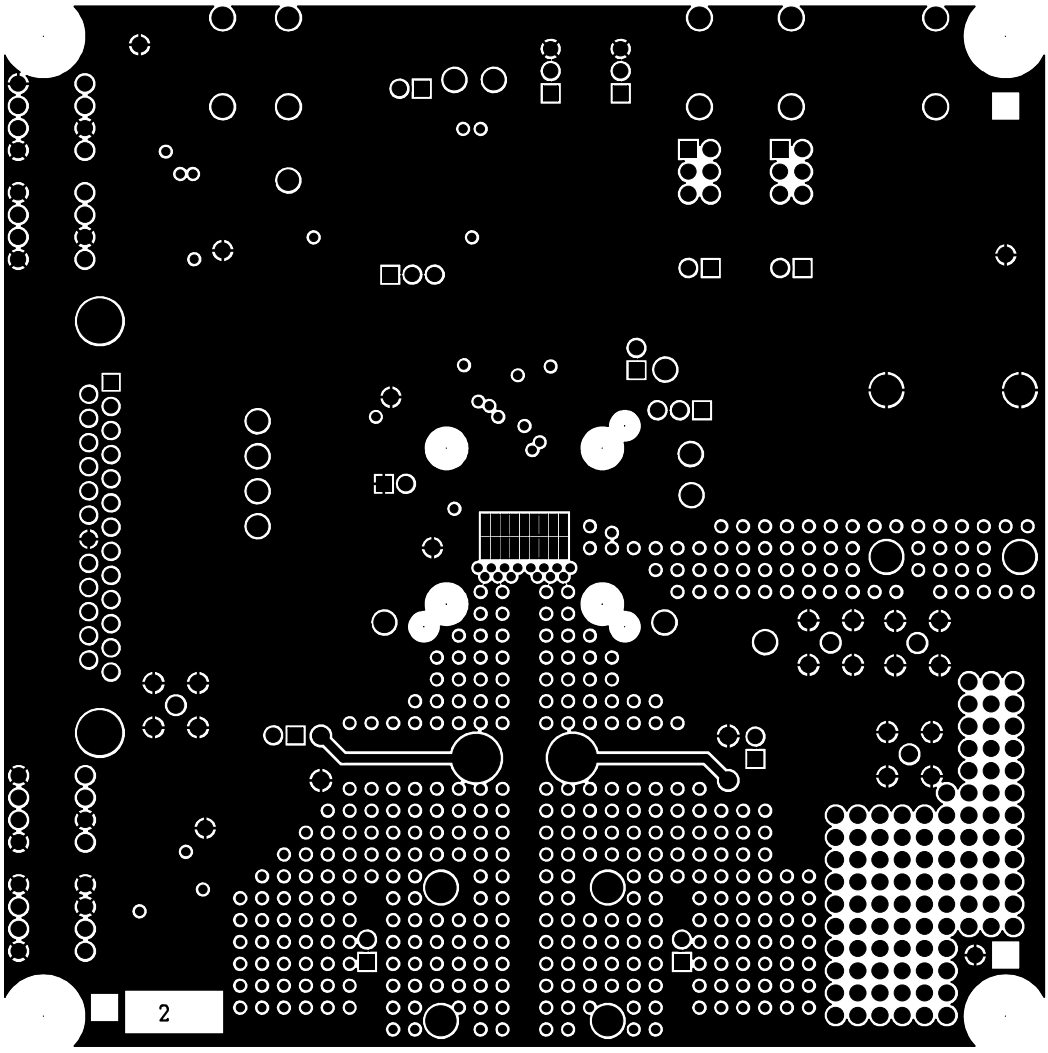


Figure 9. KIT06XS4200EVBE Assembly Layer Bottom

6.4 KIT06XS4200EVBE Silkscreen

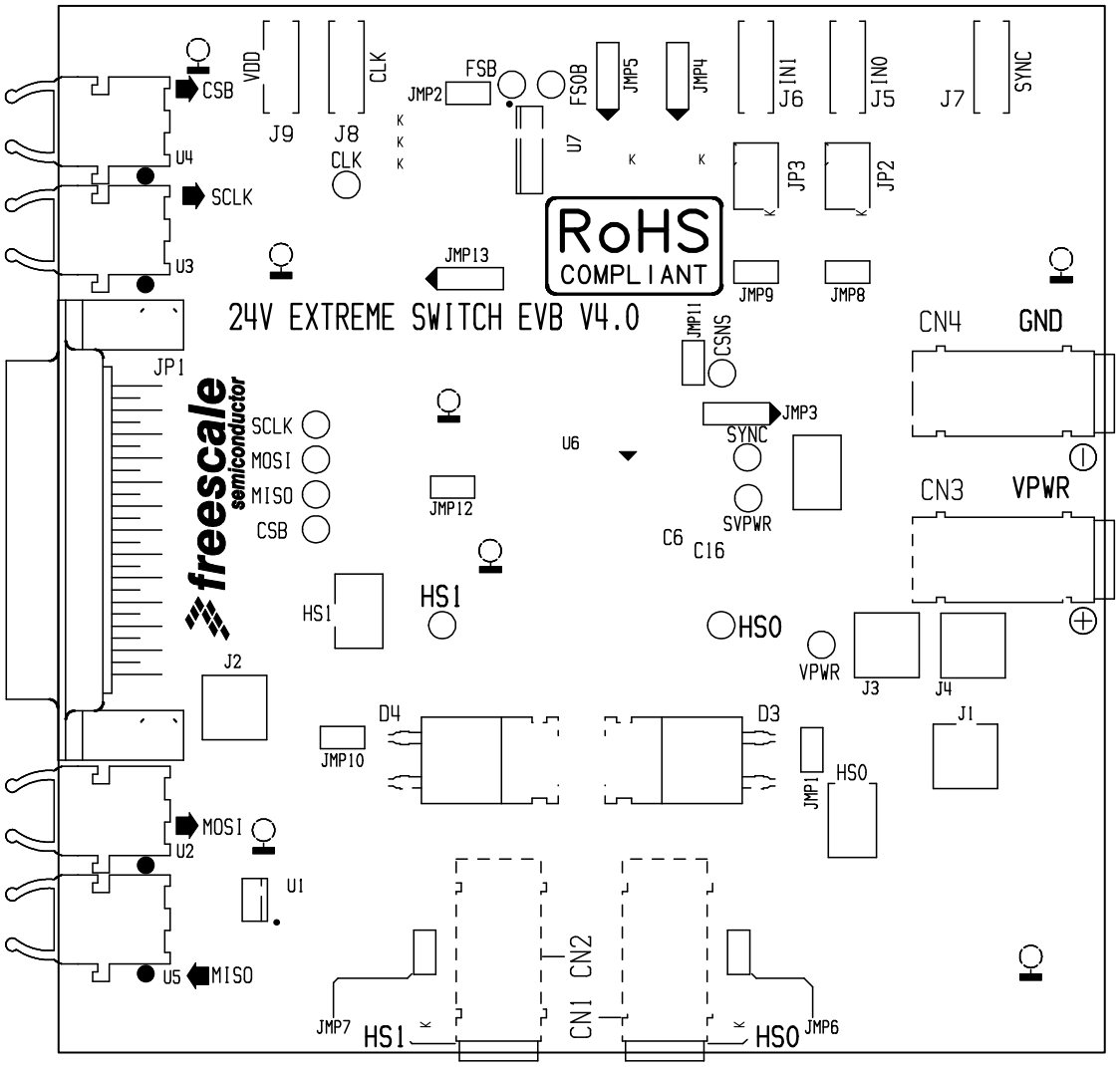


Figure 10. KIT06XS4200EVBE Silkscreen

7 Bill of Material

Table 1. KIT06XS4200 Bill of Material

ITEM	QTY	PART DESIGNATION	VALUE/RATING	PART NUMBER/MANUFACTURER
			RESISTORS	
1	1	R1	2.0 k7	Resistor 1%, SMD
2	3	R2, R3, R4	2.7 R	Resistor 1%, SMD
3	1	R5	47 R	Resistor 1%, SMD
4	2	R6, R7	2.2.0 k	Resistor 1%, SMD
5	3	R10, R11, R12	0 R	Resistor 1%, SMD
6	5	R13, R14, R15, R16, R17	1.0 k	Resistor 1%, SMD
7	4	R18, R19, R24, R25	10 k	Resistor 1%, SMD
8	1	R20	100 k	Resistor 1%, SMD
9	1	R21	1.0 k	Resistor 0,1%, SMD
			CAPACITORS	
10	2	C1, C16	1.0 uF	Capacitor Ceramic 50 V
11	6	C2, C3, C4, C5, C6, C7	100 nF	Capacitor Ceramic 50 V
12	3	C 8, C9, C17	22 nF	Capacitor Ceramic 50 V
13	3	CBAN1, CBAN2, CBAN3	6.8 nF	Capacitor Ceramic 50 V
			DIODES	
14	4	D1, D2, D10, D11	LEDR	Diode LED red
15	2	D3, D4	MUR840	Rectified diode 7.0 A, 400 V
16	5	D5, D6, D7, D8, D9	LEDV	Diode LED green
			ACTIVE COMPONENTS	
17	1	U7	MC74HC4049	Buffer/Converter Hex Inv CMOS
18	1	U1	SN75451	Dual peripheral driver
19	1	U6	MC06XS4200BFK	SPD06 Freescale device

Freescale Disclaimer:

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.

8 References

The following list contains URLs where you can obtain information on other Freescale products and MC06XS4200 product solutions:

DESCRIPTION	URL
MC06XS4200 Product Summary Page	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MC06XS4200
MC06XS4200 Data Sheet	http://cache.freescale.com/files/analog/doc/data_sheet/MC06XS4200
MC06XS4200 Fact Sheet	http://cache.freescale.com/files/analog/doc/fact_sheet/MC06XS4200FS.pdf
SPIGEN Reference	http://cache.freescale.com/files/soft_dev_tools/software/device_drivers/SPIGen.html
Freescale's Analog Web Site	www.freescale.com/analog
Freescale's Automotive Applications Web Site	www.freescale.com/automotive

8.1 Support

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

8.2 Warranty

Visit Freescale.com/warranty for complete warranty information.

9 Revision History

REVISION	DATE	DESCRIPTION OF CHANGES
1.0	1/2013	• Initial Release
2.0	8/2014	• Updated kit contents/packing list • Updated part number (changed MC06XS4200FK to MC06XS4200BFK) in the Bill of Material • Updated back page

How to Reach Us:

Home Page:
freescale.com

Web Support:
freescale.com/support

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