

KITVR500EVM Evaluation Board

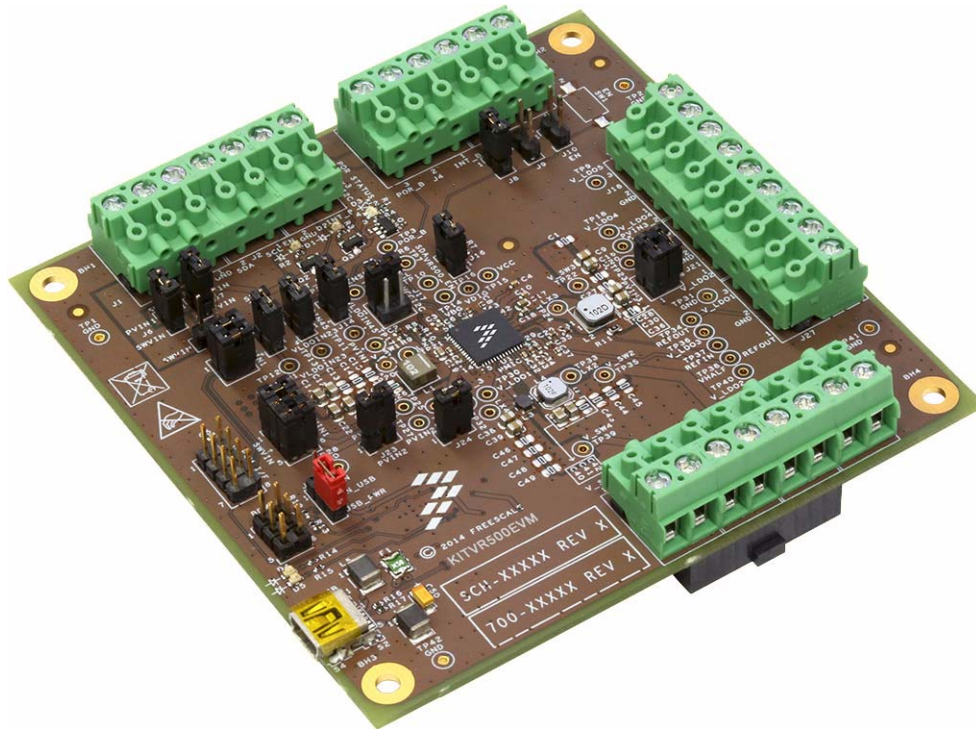


Figure 1. KITVR500EVM

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1 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 evaluation board 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 evaluation board 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.

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2 Getting Started

2.1 Kit Contents/Packing List

The KITVR500EVM contents include:

- Assembled and tested evaluation board/module in anti-static bag.
- Warranty card and Technical support brochure

2.2 Jump Start

Freescalé's analog product development boards help to easily evaluate Freescalé 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. Freescalé 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.

- Go to www.freescale.com/analogtools
- Locate your kit
- Review your Tool Summary Page
- Look for



- 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:
 - Output voltage range from 3.1 to 4.5 V
 - Current capability from 3.0 to 5.0 A (current requirement is dependent on output loading)
- Supply to board connection cables (capable of withstanding up to 5.0 A current)
- USB (male) to mini USB (male) communication cable
- USB-enabled computer
- Multimeter is recommended

2.4 System Requirements

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

- Windows XP or Windows 7 operating system
- **VR500_GUI_REV_1.1.zip**: Graphical User Interface (GUI) for KITVR500EVM

3 Getting to Know the Hardware

3.1 Board Overview

The KITVR500EVM evaluation board allows full evaluation capability of the 34VR500 PMIC for the QorIQ LS102x family of application processors. It provides access to all output voltage rails as well as control and signal pins through terminal block connectors for an easier out-of-the-box evaluation experience. A single terminal block connector for the input power supply allows the user to supply the board with an external DC power supply to fully evaluate the performance of the device.

3.2 Board Features

The board features are as follows:

- Input voltage operation range from 3.1 to 4.5 V
- Output voltage supplies accessible through detachable terminal blocks
 - Four buck converters
 - Five general purpose LDO regulators
 - One DDR memory termination voltage reference
- On/off push button support
- Hardware configuration flexibility through various jumper headers and resistors
- Integrated USB to I²C programming interface for full control/configuration
 - Onboard PMIC control through the I²C register map
- On board connectors for interfacing with future evaluation/debug tools
- Compact form factor (4 x 4 in²)

3.3 Device Features

This evaluation board features the following Freescale products:

Table 1. Features

Device	Description	Features
MC34VR500	Multi-output DC/DC Regulator for QorIQ LS1 Family of Communications Processors	<ul style="list-style-type: none"> • Four buck converters • Five general purpose linear regulators • Programmable output voltage, sequence, and timing • DDR termination reference voltage • Power control logic with processor interface and event detection • Individually programmable ON, OFF, Standby, and Sleep modes
MC9S08JM60	8-bit USB Cost-Effective JM MCUs	<ul style="list-style-type: none"> • 8-bit HCS08 Central Processing Unit (CPU) <ul style="list-style-type: none"> • Up to 24 MHz internal bus (48 MHz HCS08 core) frequency offering 2.7 to 5.5 V across temperature range of -40 °C to +85 °C • Support for up to 32 peripheral interrupt/reset sources • On-chip Memory <ul style="list-style-type: none"> • Up to 60 k flash read/program/erase over the full operating voltage and temperature • Up to 4.0 k RAM • 256 Byte USB RAM • Support for up to 32 peripheral interrupt/reset sources

3.4 Board Description

Figure 2 describes the main blocks of the KITVR500EVM.

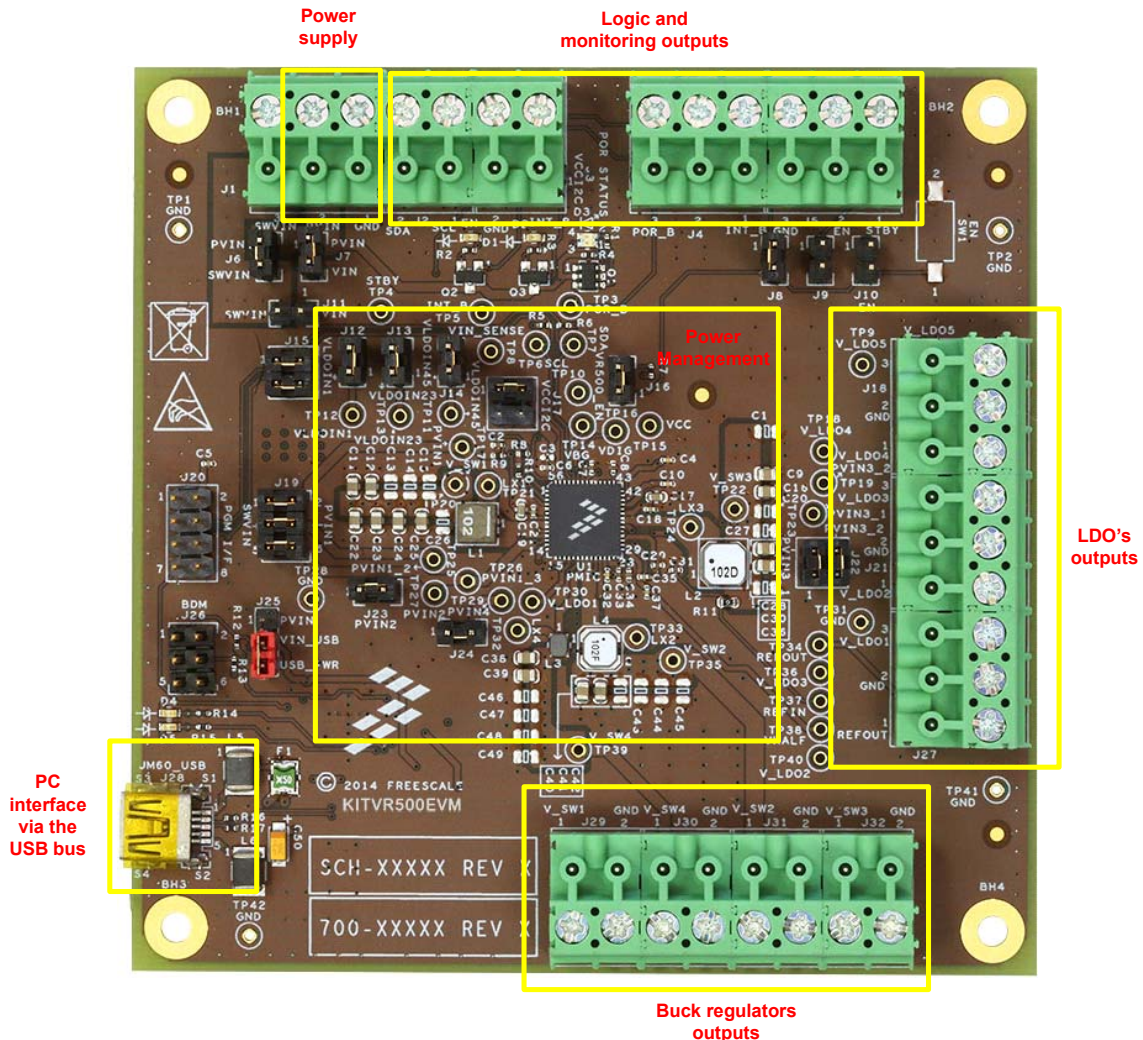


Figure 2. Board Description

Table 2. Board Description

Name	Summary Description
Power Supply	Main power supply connection (3.1 to 4.5 V)
Logic and monitoring outputs	I2C, INTB, EN, PORB and STBY connections for monitoring
LDO's outputs	LDO1, 2, 3, 4, 5 REFOUT output connections (can be used to connect a load)
Buck regulators outputs	SW1, 2, 3, 4 output connections (can be used to connect a load)
PC Interface	To be connected to the PC running the GUI

3.5 Jumper Description

Verify that the jumpers are placed in the right position as shown in [Figure 3](#). For a detailed description of the jumper functionality, refer to [Table 3](#).

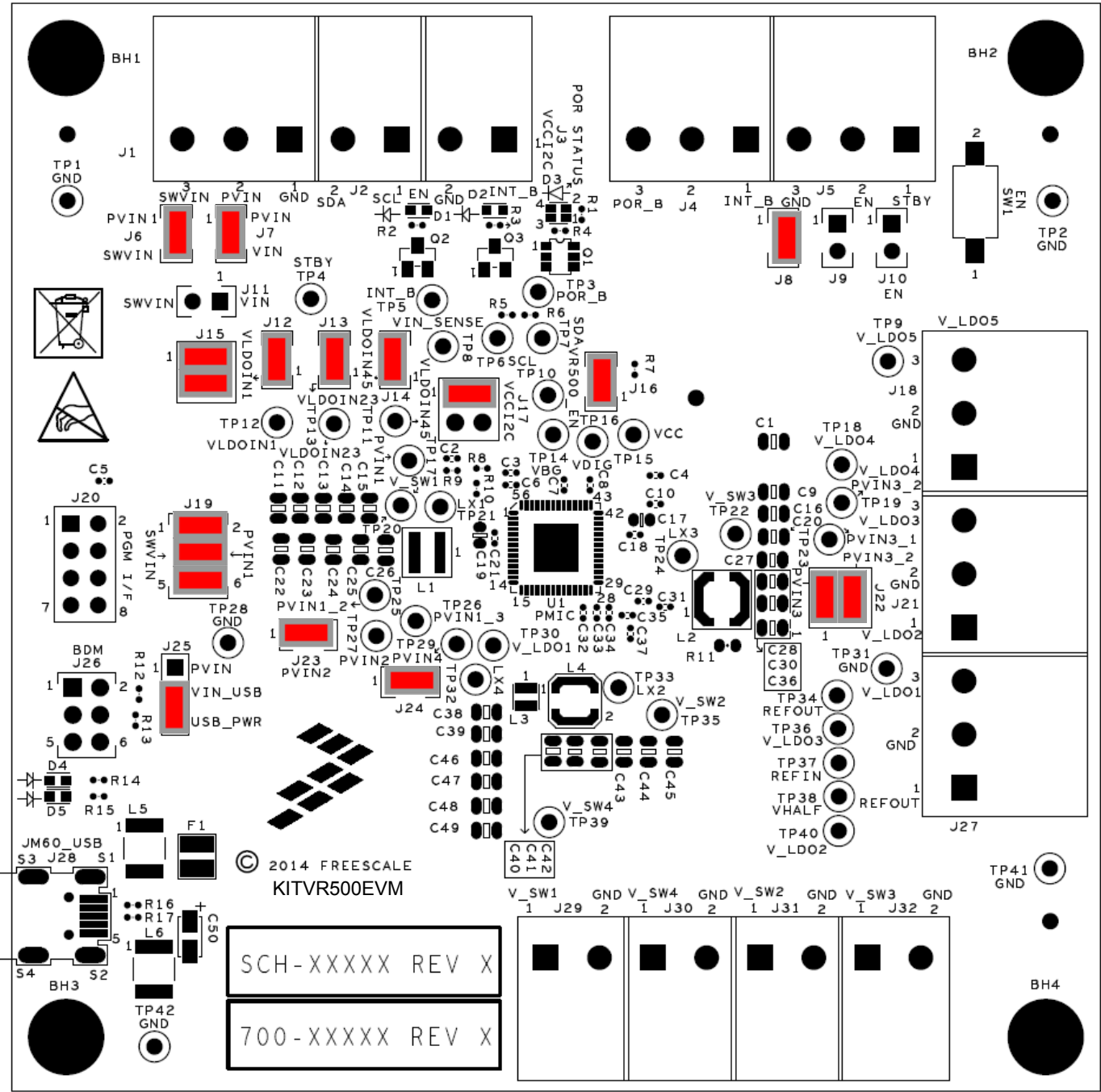


Figure 3. Default Jumper Configuration Diagram

Table 3. Jumper Description

Jumper	Default	Description
J6	Closed	Shorts PVIN and SWVIN. Allows supply isolation to provide more accurate efficiency readings on the switching supplies
J7	Closed	Shorts PVIN to VIN. Allows one to isolate or connect the 34VR500 logic input supply to PVIN net. (debugging option)
J8	Closed	Short EN to the MCU
J9	Open	Short to pull STBY to PVIN voltage supply
J10	Open	Short to hold EN pin low
J11	Open	Shorts SWVIN to VIN. Allows one to isolate or connect the 34VR500 logic input supply to SWVIN net. (debugging option)
J12, J13, J14	Closed	Short to connect VLDOIN to VIN
J15	Closed	Short to connect SCL and SDA to the MCU
J16	Closed	Short to connect EN to PVIN
J17	1 - 2	VCCI2C Supply selector <ul style="list-style-type: none"> • 1-2: Connect VCCI2C to 3V3 LDO • 3-4: Connect VCCI2C to SW2 output
J19, J23, J24	Closed	Buck regulators input power path isolation Short these jumpers to allow PVINx to be powered from the SWVIN supply
J22	1 - 2 3 - 4	Buck regulators input power path isolation
J25	2 - 3	Control Interface input supply selector <ul style="list-style-type: none"> • 1-2: Enables PVIN node as the input supply source for the control interface • 2-3: Enables USB power as the input supply source for the control interface

3.6 Connectors and Terminal Blocks Description

[Table 4](#) presents pin connection for each header present on the KITVR500EVM.

Table 4. Terminal Blocks Descriptions

Terminal Block	Function	Pin definition
J1	Main Input Supply	Pin 1 – GND Pin 2 – PVIN Pin 3 – SWVIN
J2	I ² C Signals	Pin 1 – SCL Pin 2 – SDA
J3	VCCI2C	Pin 1 – VCCI2C Pin 2 – GND
J4	Interfacing 1	Pin 1 – INT_B Pin 3 – POR_B
J5	Interfacing 2	Pin 1 – STBY Pin 2 – EN Pin 3 – GND
J18	LDO4 / LDO5	Pin 1 – LDO4 Output Pin 2 – GND Pin 3 – LDO5 Output
J21	LDO2 / LDO3	Pin 1 – LDO2 Output Pin 2 – GND Pin 3 – LDO3 Output
J27	REFOUT / LDO1	Pin 1 – REFOUT Output Pin 2 – GND Pin 3 – LDO1 Output
J29	SW1	Pin 1 – SW1 Output Pin 2 – GND

Table 4. Terminal Blocks Descriptions (continued)

J30	SW4	Pin 1 – SW4 Output Pin 2 – GND
J31	SW2	Pin 1 – SW2 Output Pin 2 – GND
J32	SW3	Pin 1 – SW3 Output Pin 2 – GND

Table 5. Connector Description

Connector	Function	Pin definition
J20	Debug Port 1	Debugging connector for future development tools
J26	BDM Connector	Pin 1 - BKGD_JM60 Pin 2 - GND Pin 3 - NC Pin 4 - RST_JM60 Pin 5 - NC Pin 6 - USB_PWR
J28	Mini USB Connector	Pin 1 - VBUS Pin 2 - D- Pin 3 - D+ Pin 4 - NC Pin 5 - GND Chassis - GND
J33	Debug Port 2	Debugging connector for future development tools
J34	Debug Port 3	Debugging connector for future development tools
J35	Debug Port 4	Debugging connector for future development tools

3.6.1 LDO Input Supply Source Selection

It is possible to modify the LDO input supply sources by removing the Jumpers J12, J13, J14, J17 and connecting another power supply, as one of the buck converters outputs.

VR500 - LDO & REF REG SECTION

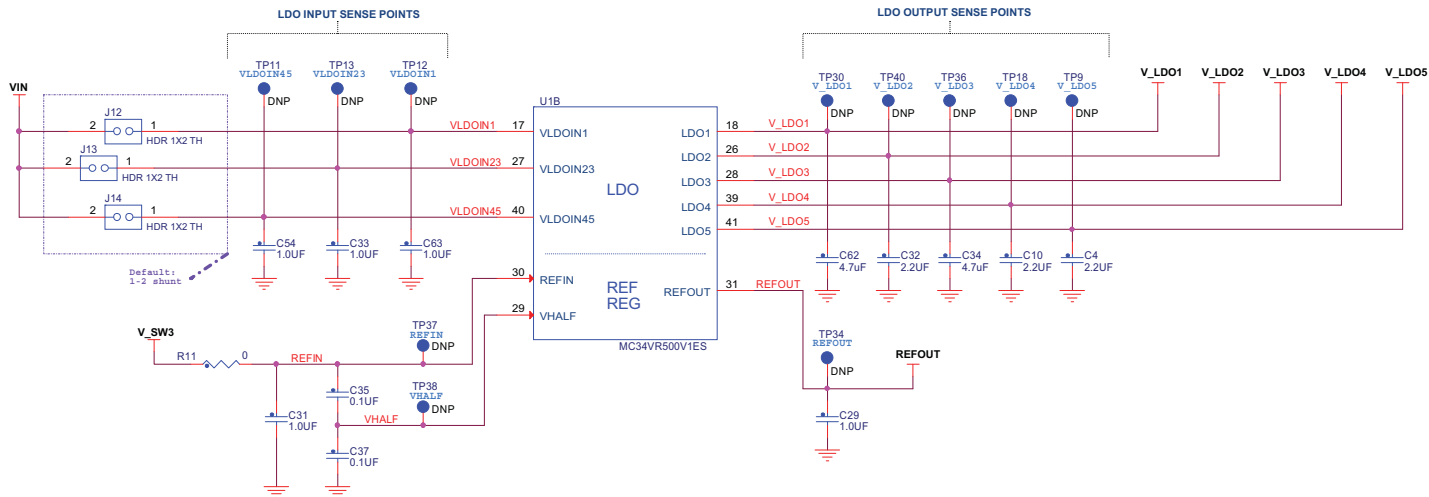


Figure 4. LDO Schematic Configuration

VR500 CONTROL LOGIC SECTION

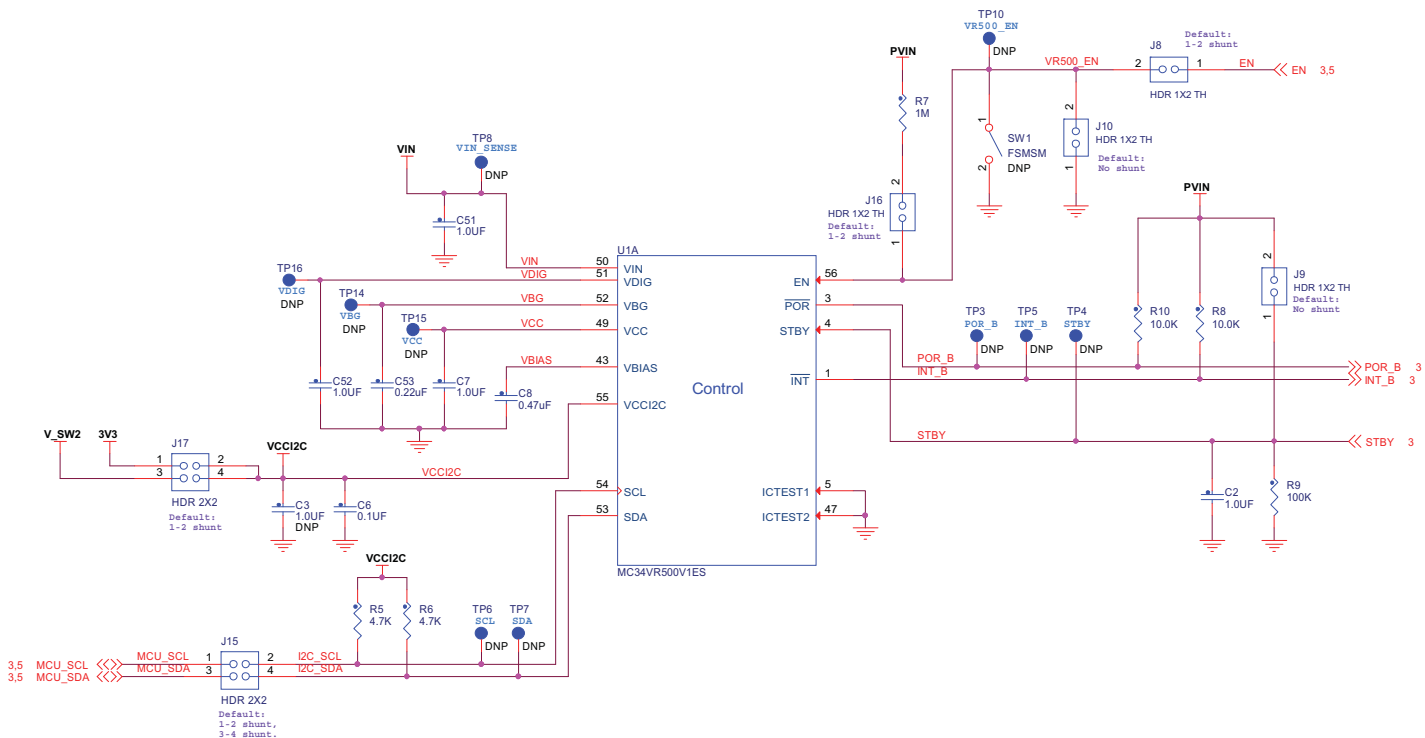


Figure 5. Logic and Core Supplies Schematic

Table 6. LDO Input Supply Configuration Chart

Input Pin	Input options
VLDOIN1	Input supply for LDO1: J12 Closed: VIN J12 Open: User's choice
VLDOIN23	Input supply for LDO2 and LDO3: J13 Closed: VIN J13 Open: User's choice
VLDOIN45	Input supply for LDO4 and LDO5: J14 Closed: VIN J14 Open: User's choice
REFIN	Input supply for REFOUT: R11 = V_SW3 R11 removed: User's choice
VCCI2C	Input supply for VCCI2C: 1 - 2: 3V3 3 - 4: V_SW2

3.6.2 Test point

All test points are clearly marked on the evaluation board. [Figure 6](#) shows the location of various test points of interest during evaluation.

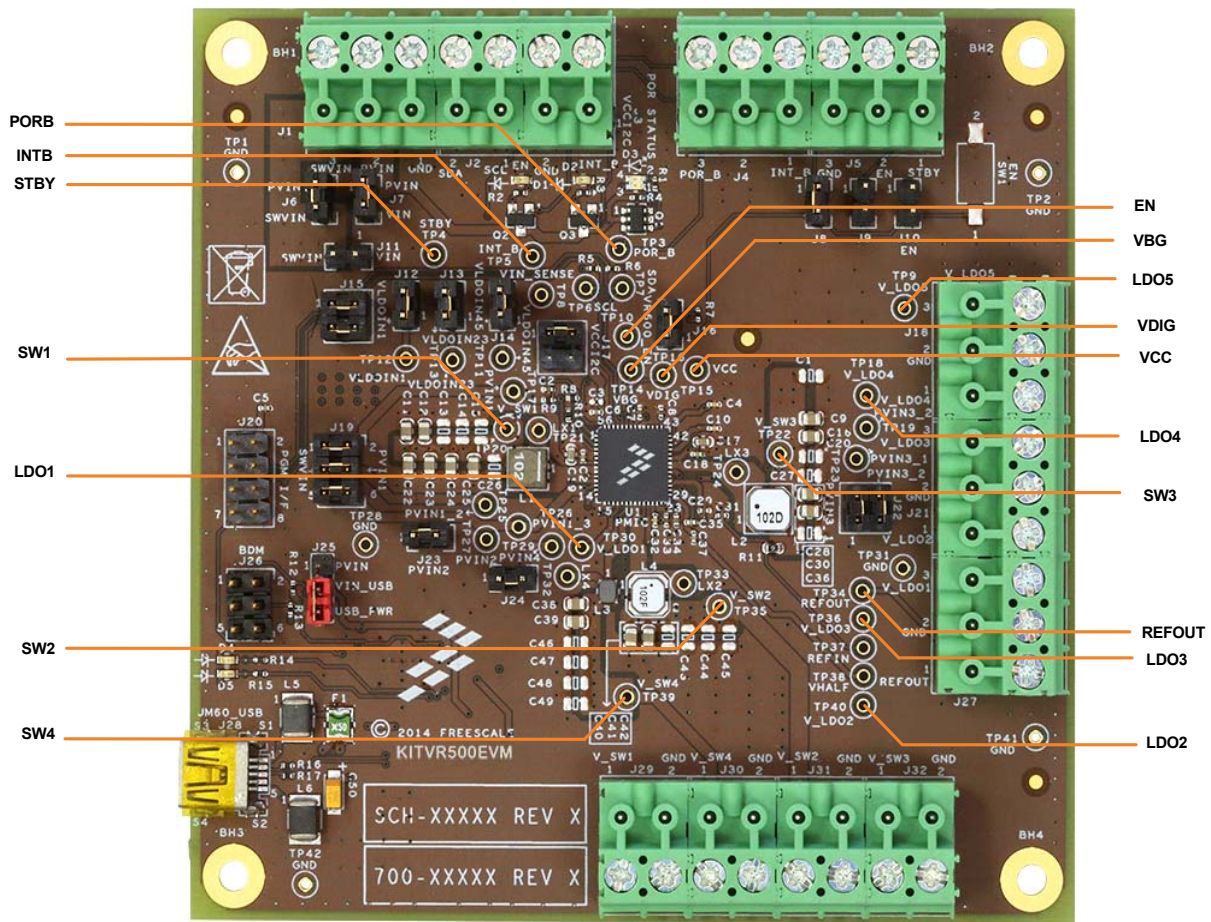


Figure 6. Key Test Point Locations

3.7 Miscellaneous Components

3.7.1 Power on Push Button

A footprint for a normally open, momentary push-button is provided at the EN terminal to allow a momentary low state by pressing the push button. J8 allows isolation of the EN terminal from the MCU GPIO controlling this pin.

VR500 CONTROL LOGIC SECTION

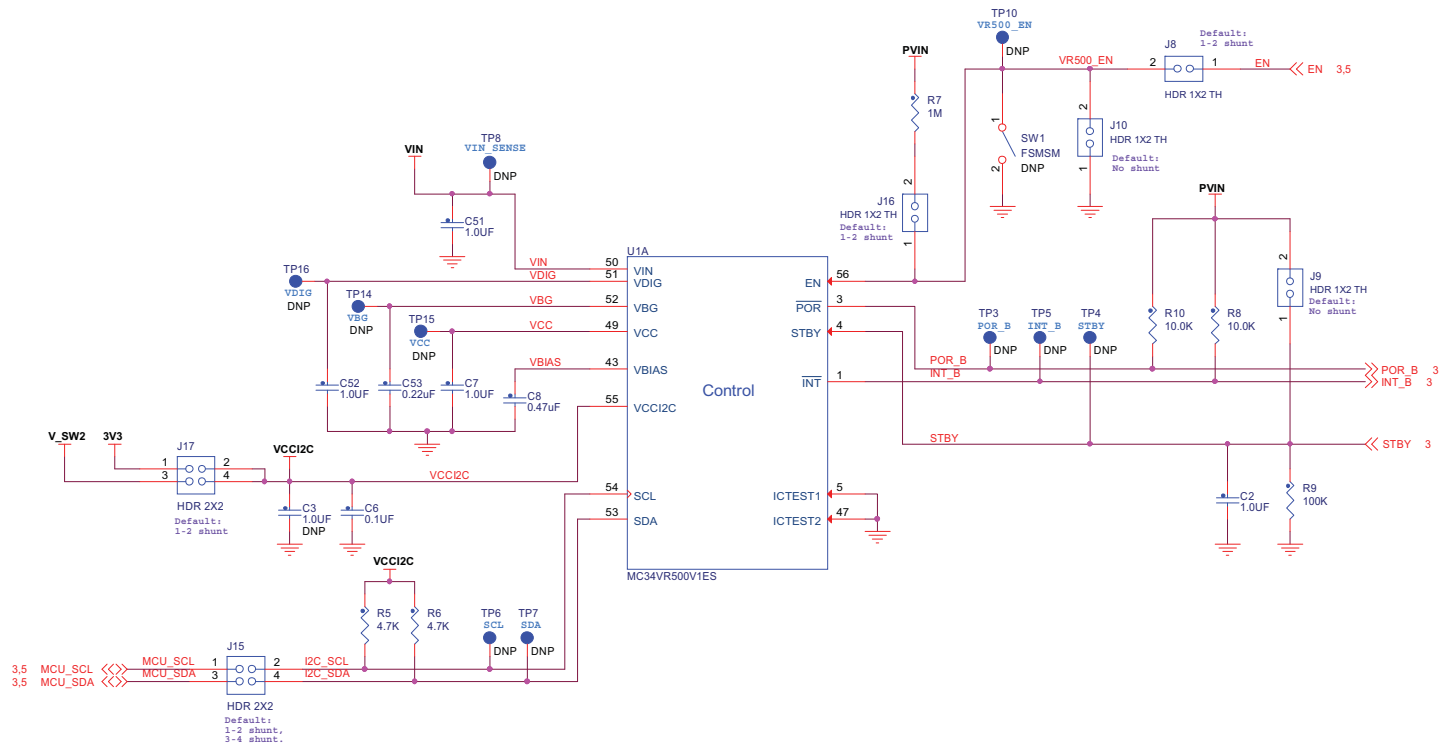


Figure 7. Power on Circuit

3.7.2 PMIC LED Indicators

LED indicators are provided to notify the PMIC status to the user. [Figure 8](#) shows the PMIC status LEDs D2 and D4, and a Reserved LED indicator D3, that allows for an external rework connection to the transistor gate if any given signal debug is required.

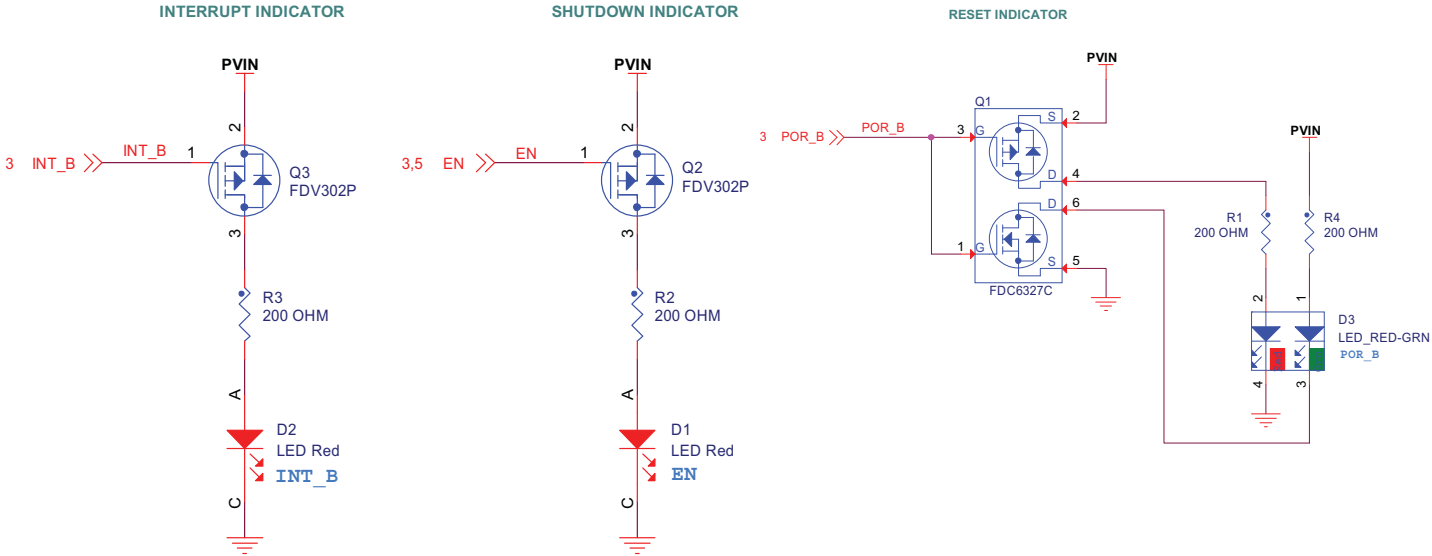


Figure 8. PMIC Status Indicators

[Table 7](#) describes the meaning of the LED state.

Table 7. LED State Description

LED	Description
D2	Interrupt Notification ON = PMIC has detected an unmasked interrupt OFF = No interrupt detected
D3	PORB Notification Green = PMIC is in regulation and operating properly Red = PMIC is out of regulation
D1	Reserved debug LED ON = Q3 gate (R84 pad) is low OFF = Q3 gate (R84 pad) is high or floating

4 Installing the GUI and Setting up the Hardware

4.1 Installing the GUI Interface

The new “driverless” environment allows automatically detecting and recognizing the board connected through the USB port, enabling the specific features and controls for each board.

1. Create a directory on your PC as follows: C:\Freescale\KITVR500GUI
2. Extract the KITVR500GUI.zip file into that directory.
3. Launch the “setup.exe” program.
4. When the following popup dialog appears, click the “Install” button.

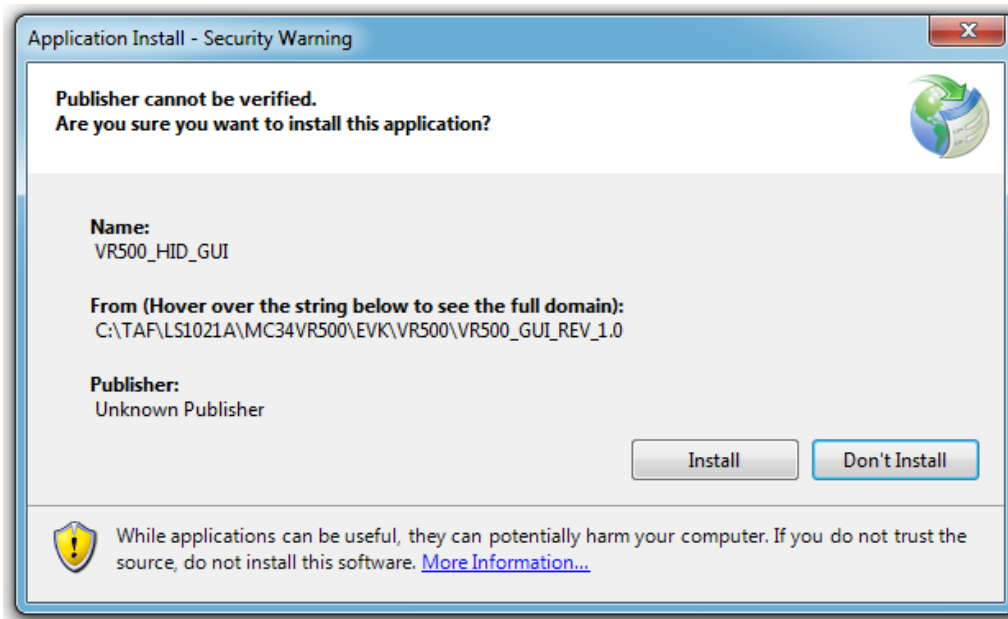


Figure 9. KITVR500EVM Installation Window

4.2 Configuring the Hardware

The KITVR500EVM operates with a single power supply from 3.1 to 4.5 V and is controlled via USB with help of an integrated USB-I2C communication bridge. By applying the input voltage supply, the KITVR500EVM powers up according to the default power-up sequence (34VR500V1) described in the MC34VR500 Data Sheet.

Connect the power supply and the USB communication cables as shown in **Figure 10**. Multimeter is optional but it is recommended in order to accurately verify that each one of the output supplies is providing the correct voltage level.

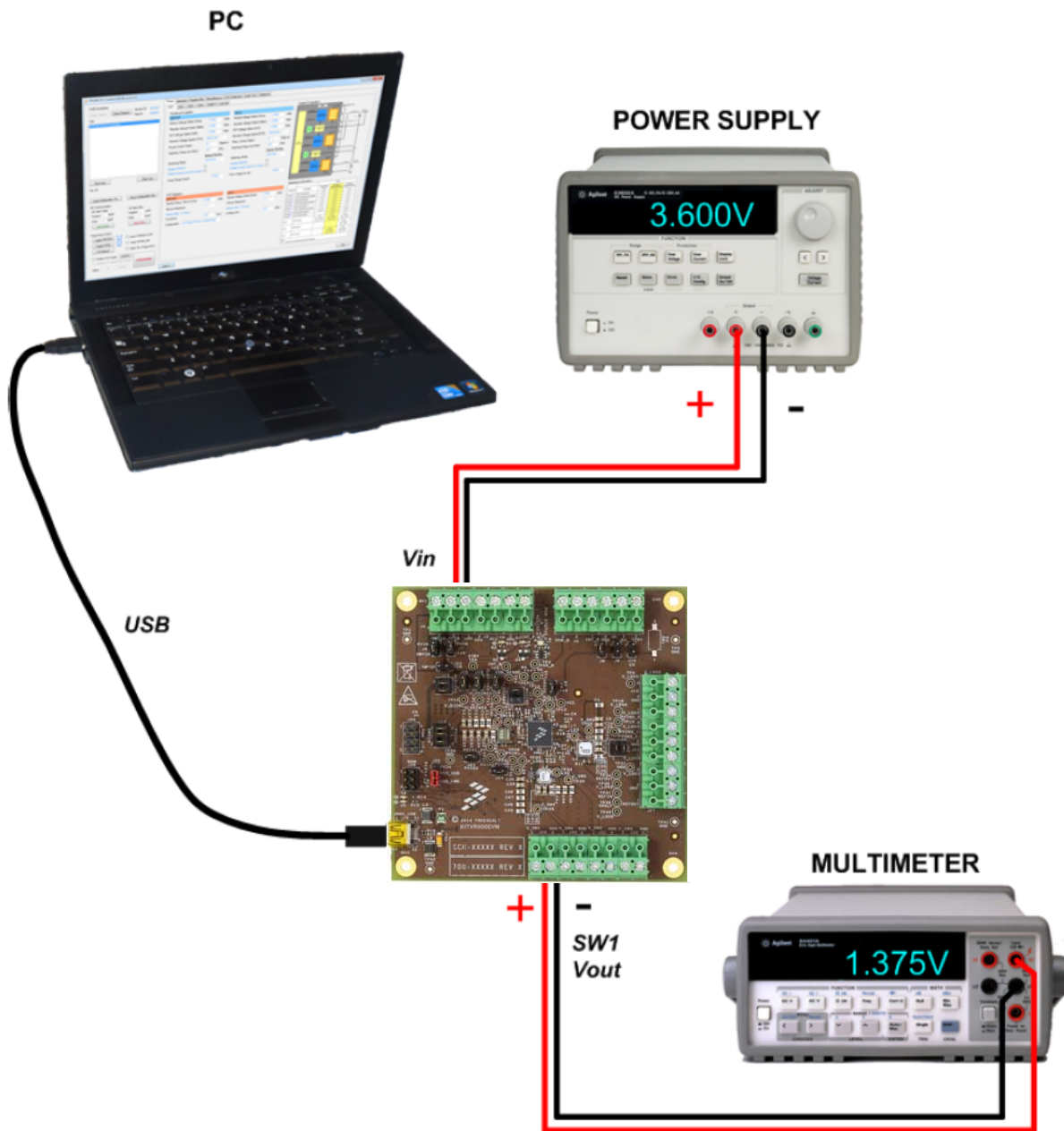


Figure 10. KITVR500EVM Board Setup

Note:

The KITVR500EVM allows the selection of SW2 regulator output or an external 3.3 V LDO output as the VCCI2C/I2C pull-up supply. By default, the 3.3 V LDO regulator is the source for the VDDIO supply (J17 = 1–2). If the SW2 regulator is to be set below 3.0 V then make sure the 3.3 V LDO output is connected to VCCI2C.

4.2.1 Step-by-step Instructions for Setting up the Hardware using GUI

To perform the demonstration examples, the following connections and setup must be performed:

1. Connect the power supply to J1, PVIN, and GND pins.
2. Switch on the power supply with a voltage set up between 3.1 and 4.5 V.
3. Connect the mini USB cable to J28 and to the computer.
4. Launch the VR500GUI, the description on how to use the GUI is provided in [KTVR500SWUG](#)

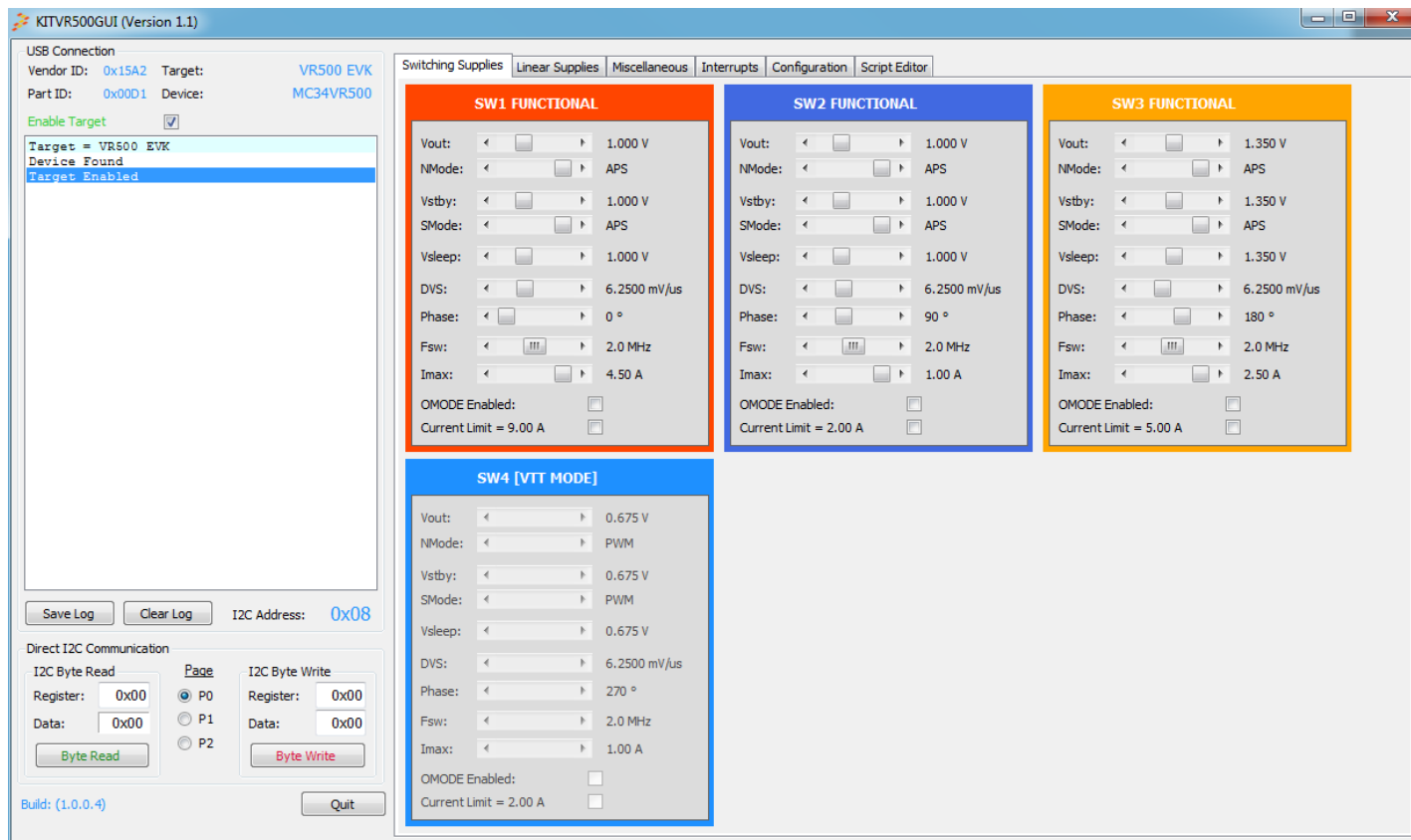


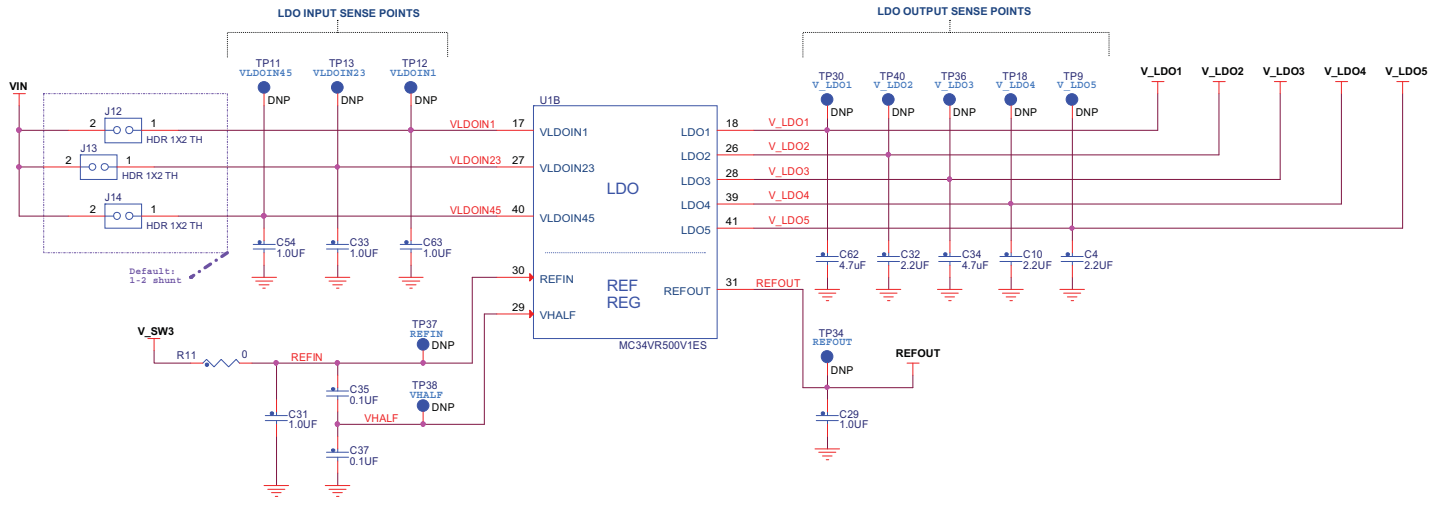
Figure 11. KITVR500GUI

The main features of the KITVR500GUI are:

- Automatic detection of the KITVR500EVM
- Read/write access to the 34VR500 PMIC
- Intuitive interface for controlling the 34VR500
- Monitoring all interrupts manually or continuously
- Scrip editor for prototyping, test emulation, or customized operation of the 34VR500 device
- Saving and recalling customized scripts files

5 Schematic

VR500 - LDO & REF REG SECTION



VR500 CONTROL LOGIC SECTION

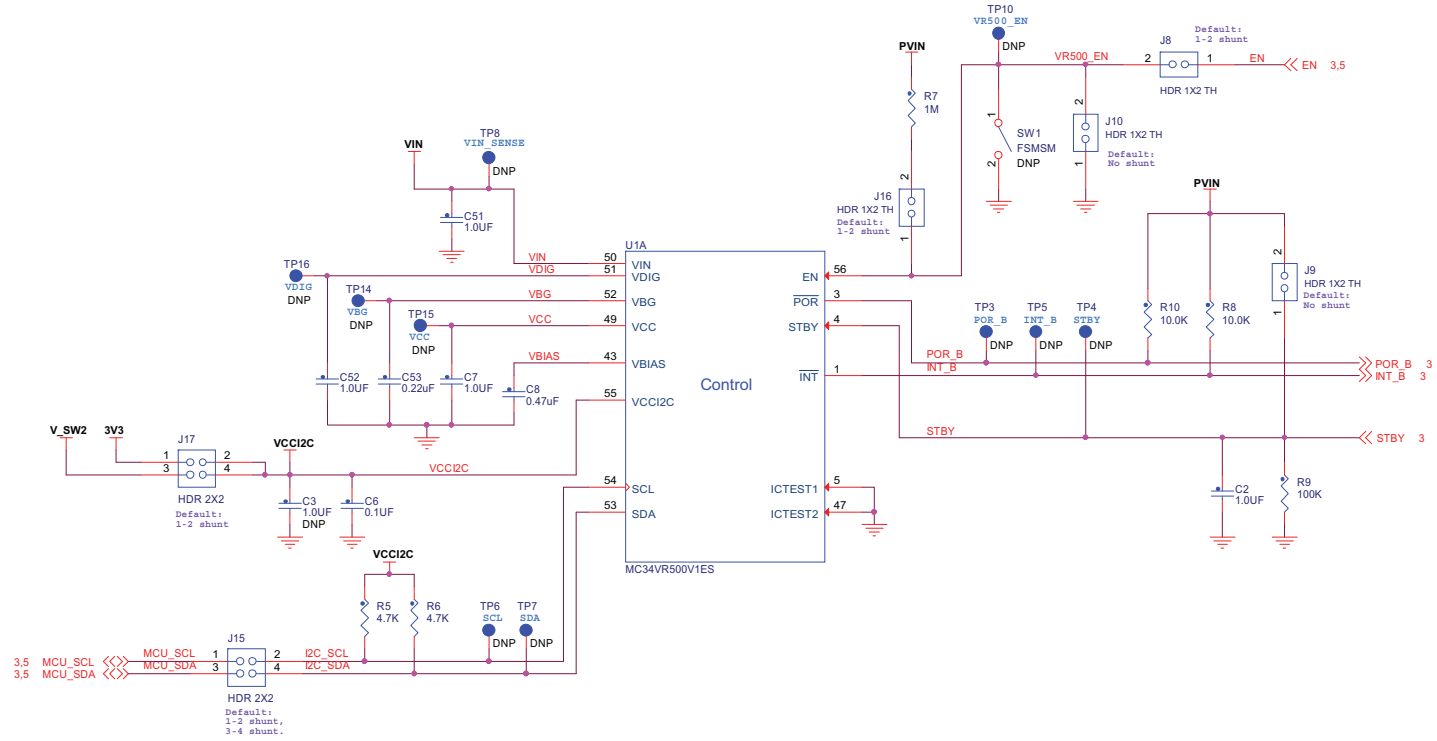
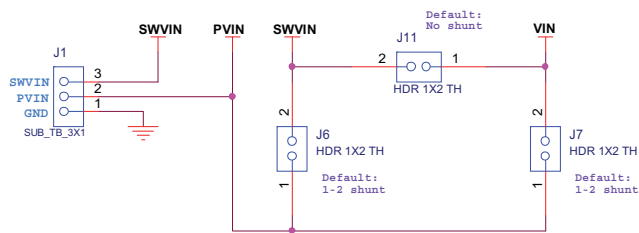


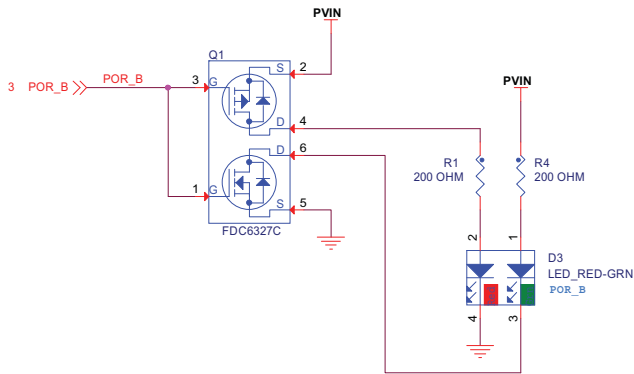
Figure 12. Evaluation Board Schematic, Part 1

INPUT POWER SECTION

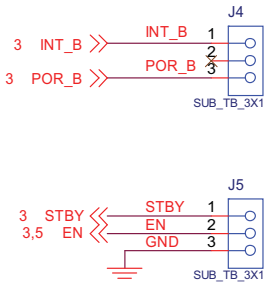


Supply	Input Source
PVIN - Main Input supply to the board	Input Terminal Block J1 pin 2
SWVIN - VR500 Switching Regulator input	Input Terminal Block J1 pin 3 (or) Feed the power from PVIN by shunting the header J6.
VIN - VR500 Main chip supply & Input supply for LDO.	Feed the power from PVIN by shunting the header J7 (or) Feed the power from SWVIN by shunting the header J11.

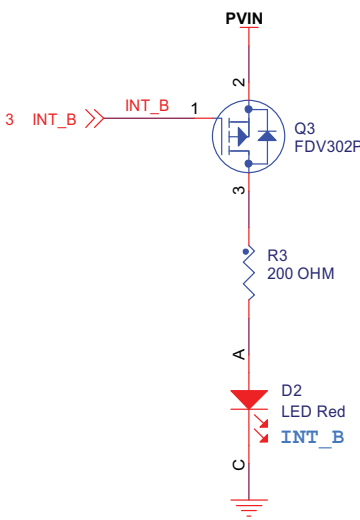
RESET INDICATOR



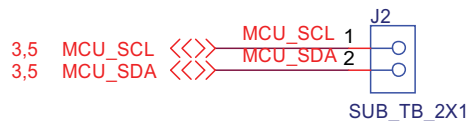
VR500 - CONTROL SIGNALS TERMINAL BLOCK SECTION



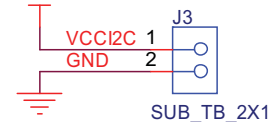
INTERRUPT INDICATOR



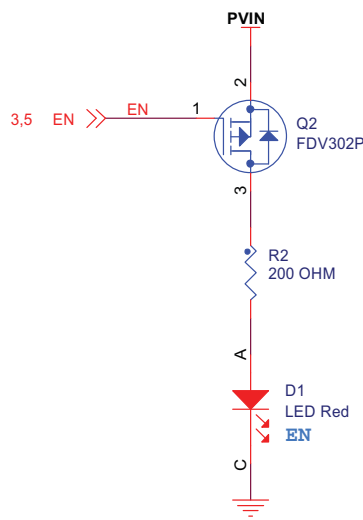
I2C Terminal Blocks



VCCI2C



SHUTDOWN INDICATOR



VR500 - LDO & REFOUT O/P HEADER SECTION

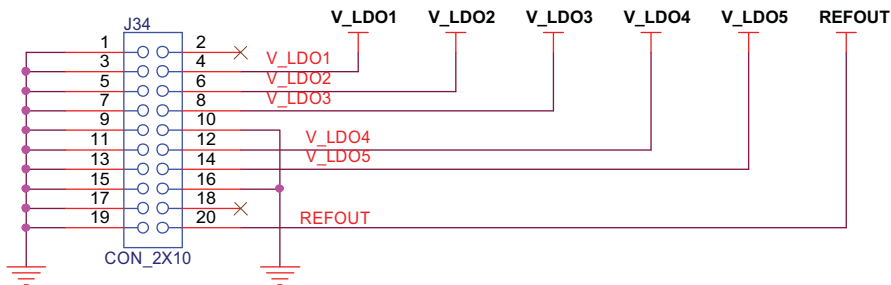
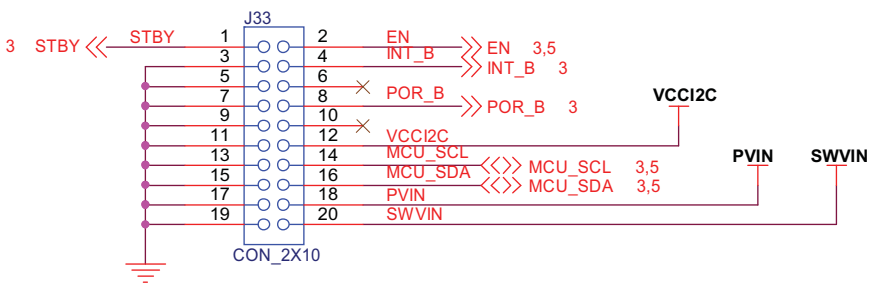
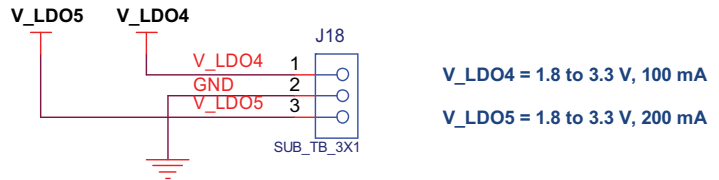
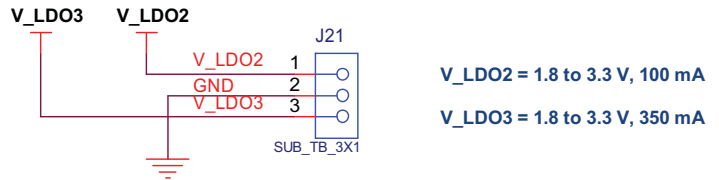
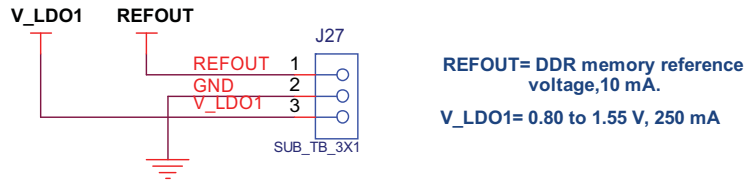


Figure 13. Evaluation Board Schematic, Part 2

VR500 - CONTROL/I2C SIGNALS HEADER



VR500 - LDO & REFOUT O/P TERMINAL BLOCK SECTION



MOUNTING HOLES

GROUND TEST POINTS

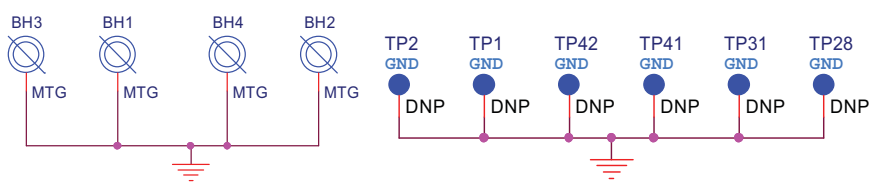
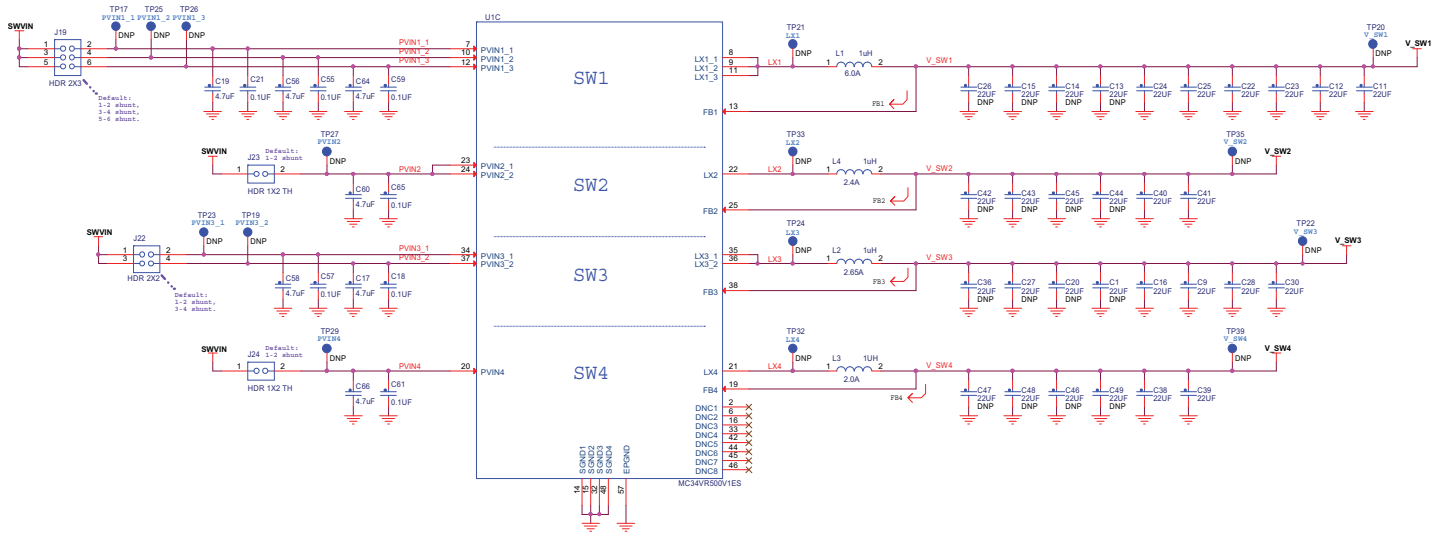


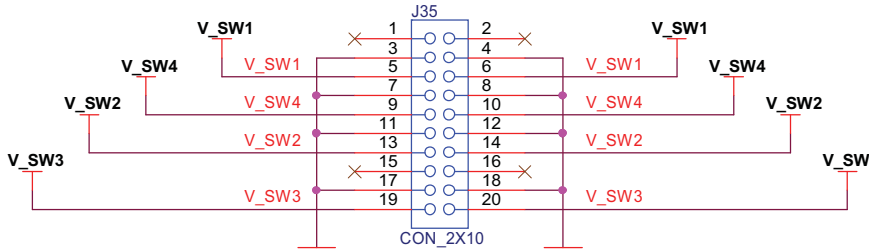
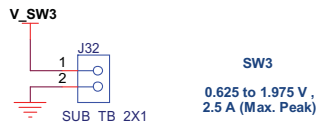
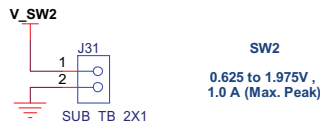
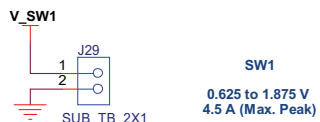
Figure 14. KITVR500EVM LDO/Control Schematic Part 3

VR500 - SWITCHING REGULATOR SECTION

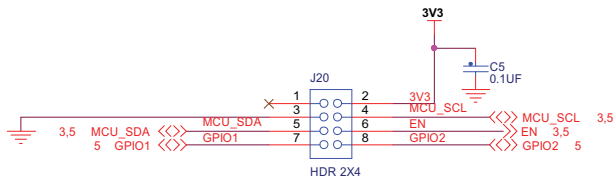


VR500-SWITCHING REGULATOR O/P TERMINAL BLOCK SECTION

VR500-SWITCHING REGULATOR O/P HDR



PROGRAMMING INTERFACE



LDO REGULATOR 3.3 V

Layout Note : Place this LDO section on the bottom side of the PCB.

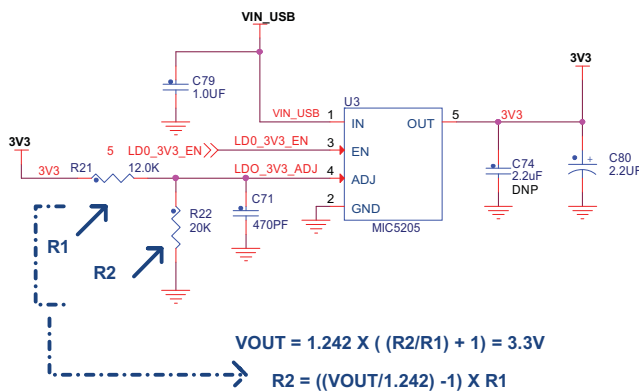


Figure 15. KITVR500EVM Switching Regulators Schematic

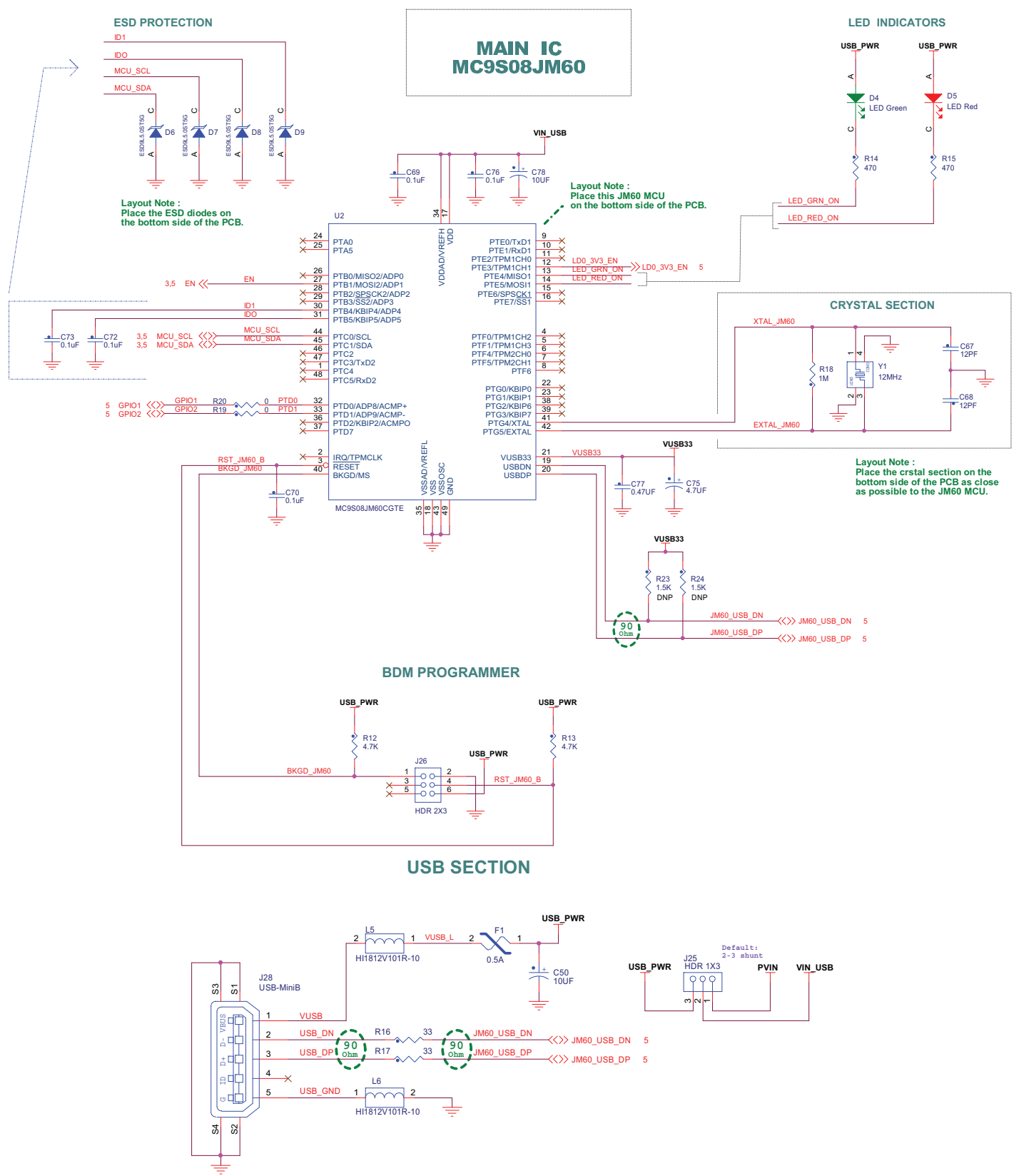
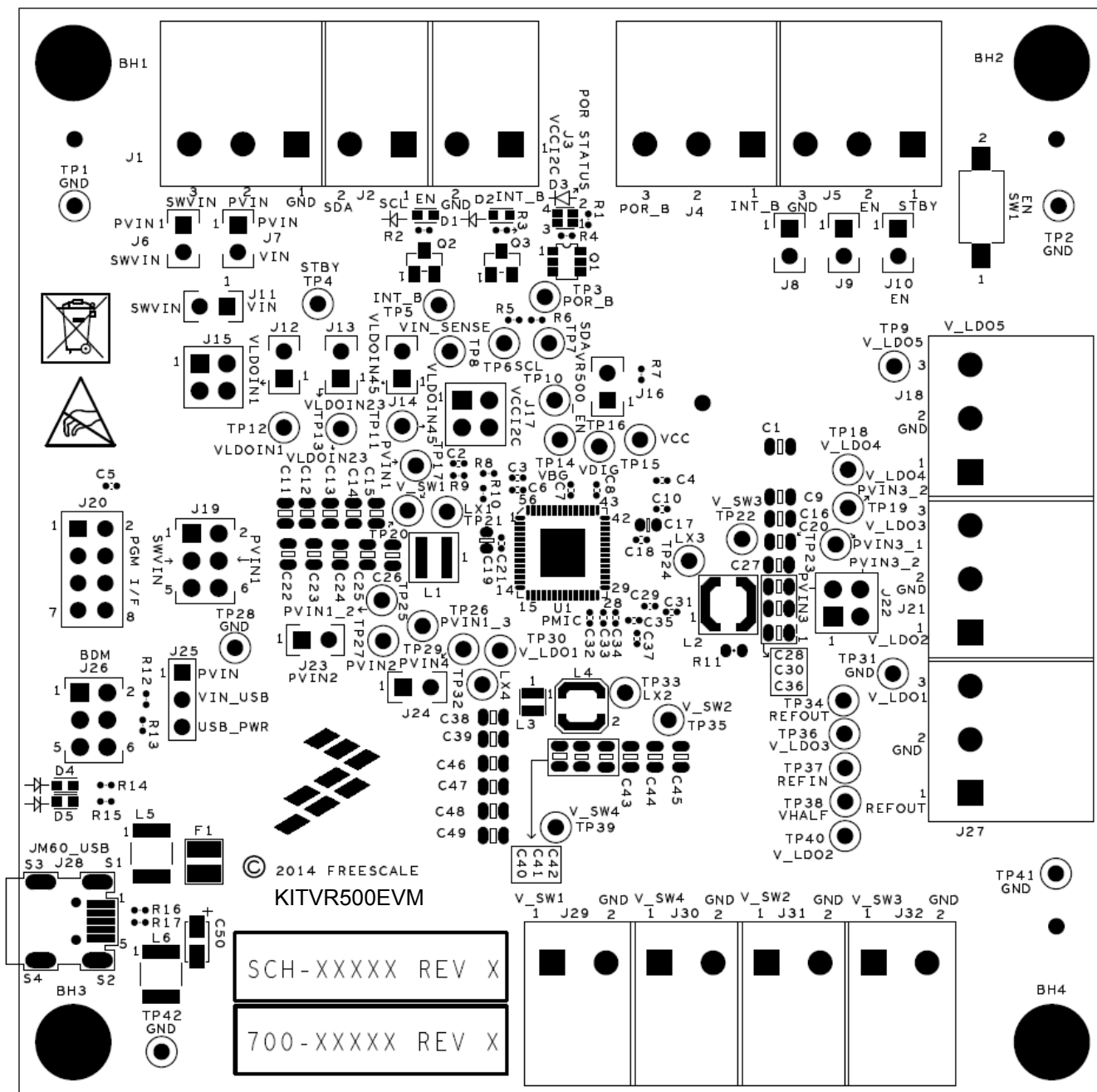


Figure 16. KITVR500EVM Control/programming Interface Schematic

6 Board Layout

6.1 Silkscreen



7 Board Bill of Materials

Table 8. Bill of Materials ⁽¹⁾

Item	Qty	Schematic Label	Value	Description	Part Number	Assy Opt
Active Components						
1	1	U1		Freescale IC POWER MANAGEMENT COMMUNICATION -0.3-4.8 V QFN56	MC34VR500V1ES	(3)
2	1	U2		Freescale IC MCU 8-bit 48 MHZ 60 KB FLASH 2.7-5.5V QFN48	MC9S08JM60CGTE	(3)
3	1	U3		Micrel IC LIN VREG LDO 1.5-15 V 150 MA 2.5-16 V SOT23-5	MIC5205YM5	(3)
4	1	Y1	12 MHz	Aker XTAL 12 MHZ 12PF -- 3.2X2.5MM SMT	C3E-12.000-12-3030-R	(3)
Mounting Hole						
5	4	BH1,BH2,BH3,BH4		MOUNTING HOLE 0.130 INCH, no part to order		
Capacitors						
6	16	C1,C13,C14,C15,C20,C26,C27,C36,C42,C43,C44,C45,C46,C47,C48,C49	22 μ F	CAP CER 22 μ F 10 V 20% X5R 0805	LMK212BJ226MG-T	(2)
7	9	C2,C7,C29,C31,C33,C51,C52,C54,C63	1.0 μ F	CAP CER 1.0 μ F 10 V 10% X5R 0402	CC0402KRX5R6BB105	
8	1	C3	1.0 μ F	CAP CER 1.0 μ F 10V 10% X5R 0402	CC0402KRX5R6BB105	(2)
9	3	C4,C10,C32	2.2 μ F	CAP CER 2.2 μ F 6.3 V 20% X5R 0402	C0402C225M9PACTU	
10	11	C5,C6,C18,C21,C35,C37,C55,C57,C59,C61,C65	0.1 μ F	CAP CER 0.1 μ F 10 V 10% X5R 0402	C0402C104K8PAC	
11	1	C8	0.47 μ F	CAP CER 0.47 μ F 16 V 10% X5R 0402	C1005X5R1C474K	
12	14	C9,C11,C12,C16,C22,C23,C24,C25,C28,C30,C38,C39,C40,C41	22 μ F	CAP CER 22 μ F 10 V 20% X5R 0805	LMK212BJ226MG-T	(3)
13	7	C17,C19,C56,C58,C60,C64,C66	4.7 μ F	CAP CER 4.7 μ F 10 V 10% X5R 0603	LMK107BJ475KA-T	
14	2	C34,C62	4.7 μ F	CAP CER 4.7 μ F 6.3 V 20% X5R 0402	C0402X5R6R3-475MNP	
15	2	C50,C78	10 μ F	CAP TANT 10 μ F 16 V 10% -- 3216-18	TAJA106K016R	
16	1	C53	0.22 μ F	CAP CER 0.22 μ F 16 V 10% X7R 0402	GRM155R71C224KA12D	
17	2	C67,C68	12 PF	CAP CER 12 PF 25 V 5% COG 0402	CC0402JRNPO8BN120	
18	5	C69,C70,C72,C73,C76	0.1 μ F	CAP CER 0.1 μ F 16 V 10% X5R 0402	C1005X5R1C104K	
19	1	C71	470 PF	CAP CER 470 PF 50 V 5% COG 0603	06035A471JAT2A	
20	1	C74	2.2 μ F	CAP CER 2.2 μ F 16 V 10% X5R 0603	GRM188R61C225KE15D	(2)
21	1	C75	4.7 μ F	CAP TANT 4.7 μ F 10 V 10% -- 3216-18	T491A475K010AT	
22	1	C77	0.47 μ F	CAP CER 0.47 μ F 16V 10% X7R 0603	C0603C474K4RAC	
23	1	C79	1.0 μ F	CAP CER 1.0 μ F 16 V 10% X5R 0603	C1608X5R1C105K	
24	1	C80	2.2 μ F	CAP TANT ESR=1.800 OHMS 2.2 μ F 10 V 10% 3216-18	TPSA225K010R1800	
Diodes						
25	3	D1,D2,D5	LED Red	LED RED SGL 30MA 0603	SML-LXFM0603SIC-TR	
26	1	D3	LED_RED-GRN	LED DUAL GRN/RED 30MA SMT	LTST-C195KGJRKT	

Table 8. Bill of Materials ⁽¹⁾ (continued)

Item	Qty	Schematic Label	Value	Description	Part Number	Assy Opt
27	1	D4	LED Green	LED GRN SGL 30MA SMT 0603	SML-LXFM0603SUGCTR	
28	4	D6,D7,D8,D9	ESD9L5.0ST5 G	DIODE TVS ESD PROT ULT LOW CAP 5-5.4V SOD-923	ESD9L5.0ST5G	
Resistors						
29	4	R1,R2,R3,R4	200 Ω	RES MF 200 Ω 1/10W 1% 0402	ERJ2RKF2000X	
30	4	R5,R6,R12,R13	4.7 K	RES MF 4.7 K 1/16W 1% 0402	RK73H1ETTP4701F	
31	2	R7,R18	1.0 M	RES MF 1.0 M 1/16W 1% AEC-Q200 0402	CRCW04021M00FKED	
32	2	R8,R10	10 K	RES MF 10 K 1/16W 1% AEC-Q200 0402	CRCW040210K0FKED	
33	1	R9	100 K	RES MF 100 K 1/16W 5% 0402	RK73B1ETTP104J	
34	1	R11	ZERO Ω	RES MF ZERO Ω 1/10W 1% 0603	MC0603SAF0000T5E	
35	2	R14,R15	470 Ω	RES MF 470 Ω 1/16W 1% 0402	CR-02FL6--470R	
36	2	R16,R17	33 Ω	RES MF 33 Ω 1/16W 1% 0402	CR-02FL6---33R	
37	2	R19,R20	ZERO Ω	RES MF ZERO Ω 1/10W -- 0402	ERJ-2GE0R00X	
38	1	R21	12 K	RES MF 12 K 1/10W 1% 0603	RK73H1JTTD1202F	
39	1	R22	20 K	RES MF 20 K 1/10W 5% 0603	CR0603-JW-203ELF	
40	2	R23,R24	1.5 K	RES MF 1.5 K 1/16W 5% 0402	CRCW04021K50JNED	(2)
Inductors						
41	1	L1	1 μH	Coilcraft IND PWR 1 μH@100 KHz 6 A 20% SMT	XAL4020-102MEC	(3)
42	1	L2	1 μH	Coilcraft IND PWR 1 μH@100 KHZ 2.65 A 20% SMT	LPS5015-102MLC	(3)
43	1	L3	1 μH	TDK IND PWR 1 μH@1 MHZ 2 A 30% SMT	VLS252010T-1R0N	(3)
44	1	L4	1 μH	Coilcraft IND PWR 1 μH@100 KHZ 2.4 A 30% SMT	LPS4012-102NLC	(3)
45	2	L5,L6	HI1812V101R-10	IND FER 100 Ω @100 MHZ 8 A 25% SMD/1812	HI1812V101R-10	
Switches, Connectors, Jumpers, and Test Points						
46	1	F1	0.5 A	FUSE PLYSW 0.5A 13.2V SMT	MICROSMD050F-2	
47	6	J1,J4,J5,J18,J21,J27	SUB_TB_3X1	SUBASSEMBLY HDR 1X3 TH 197MIL 374H SN 138L + CON 1X3 PLUG TB TH 5MM 449H	210-80542,211-79574	
48	6	J2,J3,J29,J30,J31,J32	SUB_TB_2X1	SUBASSEMBLY HDR 1X2 TH 197MIL 374H SN 138L + CON 1X2 PLUG TB TH 5MM 449H	210-80539,211-79573	
49	12	J6,J7,J8,J9,J10,J11,J12,J13,J14,J16,J23,J24	HDR 1X2 TH	HDR 1X2 TH 100MIL SP 339H AU 118L	210-91-02GB01	
50	3	J15,J17,J22	HDR 2X2	HDR 2X2 TH 100MIL CTR 340H SN 105L	5-146258-2	
51	2	J19,J26	HDR 2X3	HDR 2X3 TH 100MIL CTR 335H AU 95L	TSW-103-07-S-D	
52	1	J20	HDR 2X4	HDR 2X4 TH 100MIL CTR 425H AU 310L	TSW-104-16-G-D	
53	1	J25	HDR 1X3	HDR 1X3 TH 100MIL SP 340H AU 118L	M20-9990345	
54	1	J28	USB-MiniB	CON 5 USB MINI-B RA SHLD SKT SMT 31MIL SP AU	675031340	

Table 8. Bill of Materials ⁽¹⁾ (continued)

Item	Qty	Schematic Label	Value	Description	Part Number	Assy Opt
55	3	J33,J34,J35	CON_2X10	CON 2X10 SKT SMT 100MIL CTR 390H AU	SSW-110-22-F-D-VS-N	
56	1	Q1	FDC6327C	TRAN MOSFET DUAL N & P CHANNEL 2.5V S-SOT6	FDC6327C	
57	2	Q2,Q3	FDV302P	TRAN PMOS SW 120MA 25V SOT23	FDV302P	
58	1	SW1	FSMSM	SW SPST PB 12V 50MA SMT	1437566-4	(2)
59	42	TP1,TP2,TP3,TP4,TP5,TP6,TP7,TP8,TP9,TP10,TP11,TP12,TP13,TP14,TP15,TP16,TP17,TP18,TP19,TP20,TP21,TP22,TP23,TP24,TP25,TP26,TP27,TP28,TP29,TP30,TP31,TP32,TP33,TP34,TP35,TP36,TP37,TP38,TP39,TP40,TP41,TP42	TEST POINT RED	TEST POINT RED 40 MIL DRILL 180 MIL TH 109L	5000	(2)

Notes

1. Freescale does not assume liability, endorse, or warrant components from external manufacturers 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.

8 References

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

Freescale.com Support Pages	Description	URL
KITVR500EVM	Tool Summary Page	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=KITVR500EVM
MC34VR500	Product Summary Page	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MC34VR500
KTVR500SWUG	Software User Guide	http://cache.freescale.com/files/analog/doc/user_guide/KTVR500SWUG.pdf

8.1 Support

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

8.2 Warranty

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

9 Revision History

Revision	Date	Description of Changes
1.0	8/2014	• Initial Release