



General Description

The LM10502 is an advanced PMU containing two configurable, high efficiency buck regulators for supplying variable voltages plus a low drop-out linear regulator. The device is ideal for supporting ASIC and SOC designs for SSD and Flash drives.

Evaluation Kit Overview

LM10502 Evaluation Kit is a single board solution allowing control and measurement from a user interface software. The board operates either from PC control via the USB port or as a separately powered stand-alone evaluation platform.

The evaluation kit consists of:

- LM10502 Evaluation board REV 1
- USB Interface cable
- CD including
 - Evaluation software
 - Evaluation kit document (this doc.)

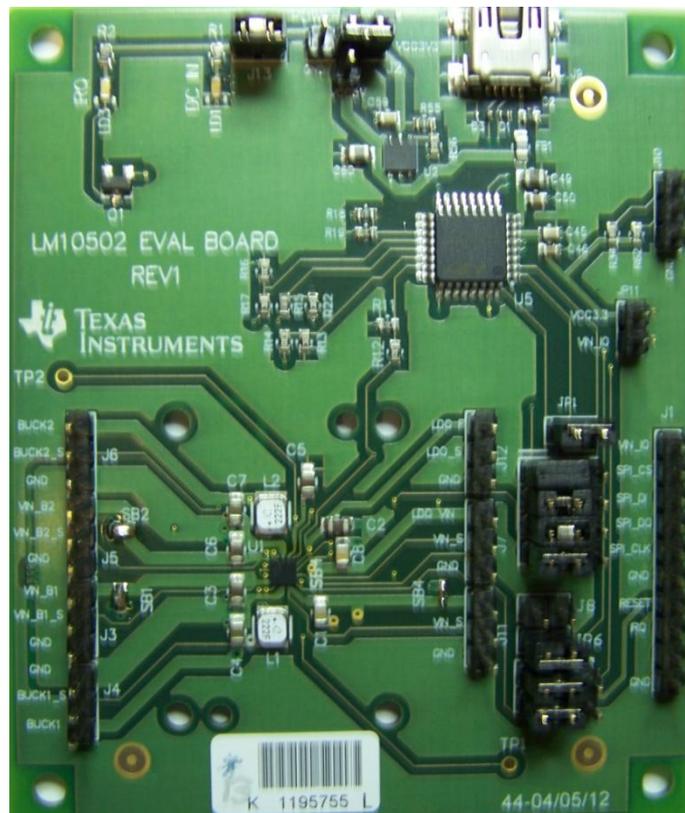


Figure 1 : LM10502 evaluation board

Evaluation software

LM10502 evaluation software is supplied together with documentation regarding the circuit. Copy the folder "LM10502" to your PC's hard disk. The software is run by double clicking the icon of LM10502.exe found in folder. The software does not require any installation.

The evaluation software allows control of all registers necessary to program the device. To simplify the use of software, the registers are set by directly named controls. The user does not need the register value as this is taken care of by the software, e.g. to change BUCK1 output voltage to 1.2 V, choose the related value and software will send the correct value to the BUCK1 control register. To observe corresponding change in the probes, the **Poll Status** must be set.

Hardware Set Up

Please use ESD protection when handling the evaluation boards to prevent any damage due to ESD events!

Connect the LM10502 Evaluation board to the USB port of a PC using the USB cable.

When the USB board is plugged in for the first time, the operating system prompts for "New hardware found" and installs the USB driver. If this does not happen, try unplugging and plugging in the cable again.

Always disconnect the USB cable from the computer when changing jumper settings.

If the evaluation board is not responding or the evaluation software hangs up disconnect the USB cable for 5 seconds.

Using the Evaluation Software

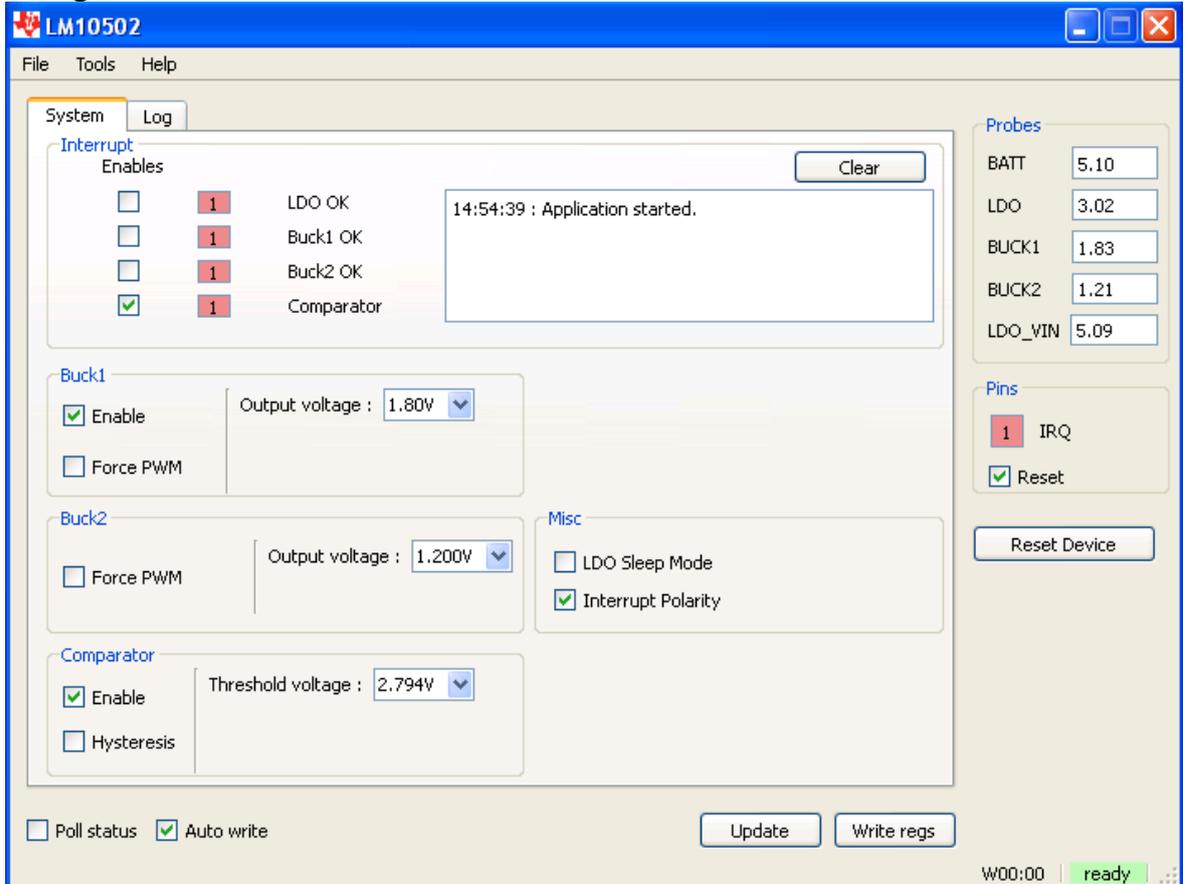


Figure 2 : System Settings Tab

The graphical user interface has a main screen with 2 tab screens which allow control and indication for different functions of the device.

Once the evaluation board is connected to the PC, device can be controlled via the software interface.

The LM10502 should become active as soon as the USB cable is plugged in. When device starts up correctly, a yellow LED LD1 and green LED LD3 is illuminated. All the device functions can be accessed via the control buttons.

Main Screen (Figures 2 & 3)

Right and lower part of screen is visible as the background for both tab screens. Common functions can be controlled here.

Right part of screen

Probes frame contains results of voltage measurements. Values can be read the moment when the device becomes active.

Pins frame shows the status of **IRQ** and **Reset** pins.

Press of **RESET_DEVICE** button causes 50 ms negative pulse in reset pin.

Lower part of screen

This part of the screen contains following checkboxes and buttons :

Poll status checkbox

Allows continuous reading of the evaluation chip status register, state of I/O pins and voltage measurement results.

Auto write checkbox

If this box is checked, any change to registers will be written to the device immediately. Otherwise user must press

Write regs button to update registers. This way, user can change values in several registers and update changes simultaneously.

Update button

Reads content of every register and updates screen accordingly.

Write regs button

If **Auto write** checkbox is disabled, user can press this button to update content of every register.

There is a status bar at the bottom of the screen. It shows if connection to evaluation board is established, and information about the last register write/read operation. Register information is given in the format: "R/WXX:YY", where first letter indicates operation (read or write), XX is register address and YY is data.

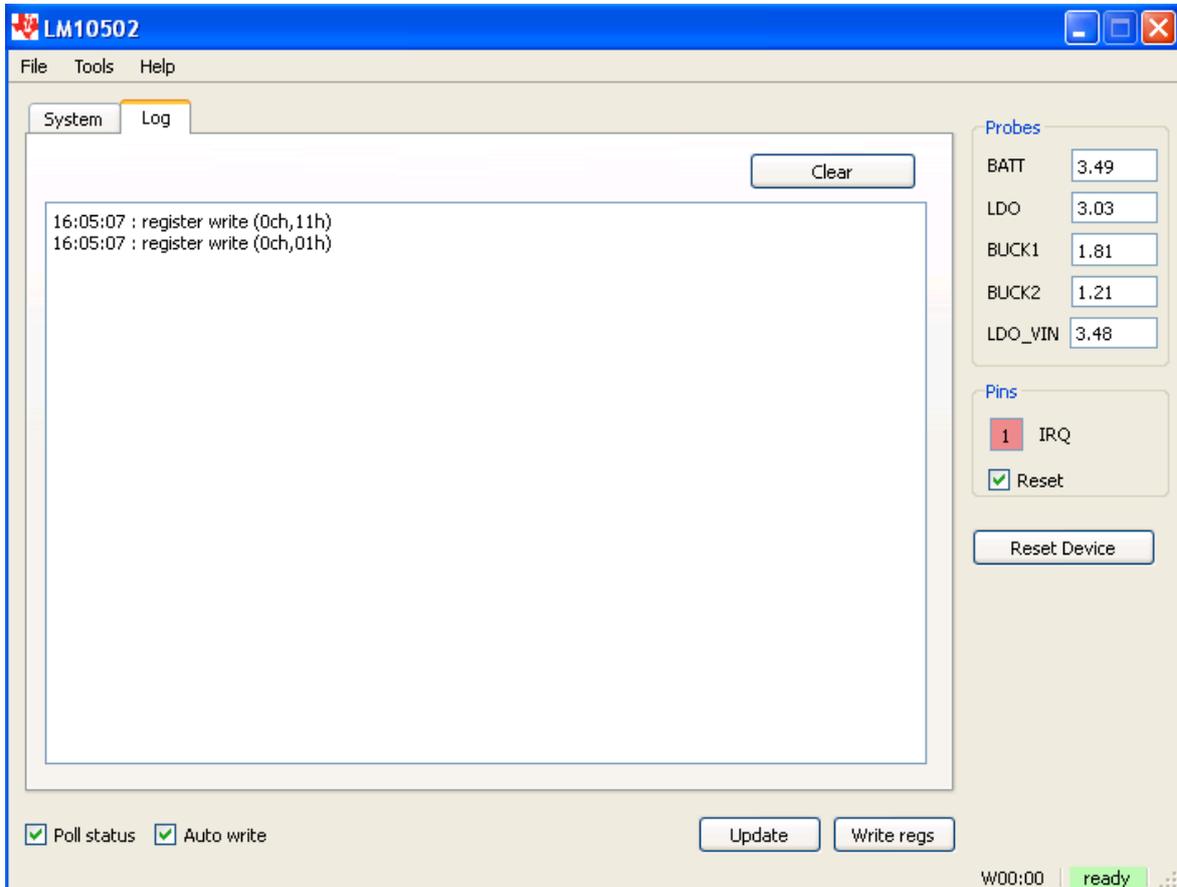


Figure 3 : Log Tab

System Settings Tab (Figure 2)

Selecting this tab allows access to the controls of Buck1, Buck2, Comparator, LDO Sleep Mode and Interrupt pin polarity. It also shows a log of occurred events.

In System **Interrupt** frame, the user can chose to enable the output monitor function in the **Enables** checkboxes and can observe the output **Status** bits. Also, if the **Poll status** checkbox is checked at lower part of

screen this frame will get continuous status updates (1update/sec).

In **Buck1** and **Buck2** frames the user can set the output voltage of the buck regulator, enable regulator for Buck1, or force it to PWM mode.

In the **Comparator** frame the user can **enable** the comparator and set the **threshold voltage** and enable **hysteresis**.

The **Misc** frame contains controls for **LDO Sleep Mode** bit and **Interrupt pin polarity**.

Log tab (Figure 3)

This tab records all SPI transfers. The user can copy write or read sequences to clipboard. The log window can be cleared by pressing clear button.

Menus

Under “File” menu user can save and load contents of register map.

Under “Tools” menu user can open “Direct Register Access” dialog, shown in figure 4.

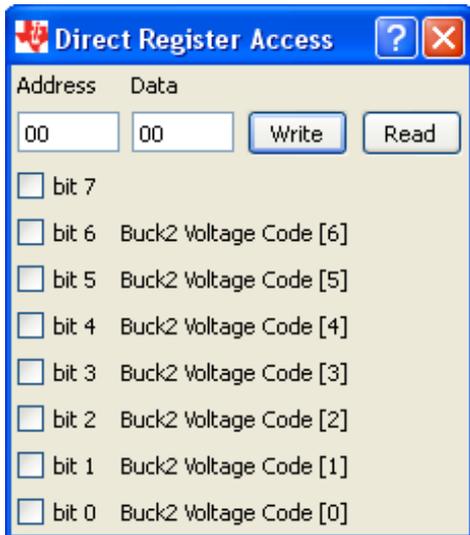


Figure 4: Direct Register access

Binary data may be written and read from the registers. Use hexadecimal values in address and data fields. Correct data value can also be created by setting and clearing individual bits. Value is immediately written to the device by pressing ‘Write’ button and read from the device by pressing ‘Read’ button. Next to each bit shows a description of each bit.

Using the Evaluation Hardware

Connectors are provided to allow a battery connection and output voltage measurement. Jumpers allow user selectable or USB controlled settings for device functions.

Power Supply

The evaluation board may be powered from a battery connector or from the USB interface.

Set jumper between J2 pin2 and TP36 to use 5V supply from USB. Maximum current for USB supply is 500mA. Alternatively moving the jumper to pins1 and 2 will provide a 3.3V supply to the device.

BATTERY CONNECTOR J2

Pin	Function
1	VCC3V3
2	Battery (+) terminal
3	GND
TP36	VCC5V

Table 1. Battery connector pins

Control

A green and a yellow LED will be illuminated once the LM10502 has started up. Place a jumper on JP1 to connect VIN_IO to LDO_OUT. Otherwise to power VIN_IO from the on-board 3.3V supply, place a jumper on JP11, JP1 should be open in this case.

LOGIC CONNECTORS

The logic signals can be controlled either by the evaluation software or externally through connector labeled. Set the jumper block shown accordingly.

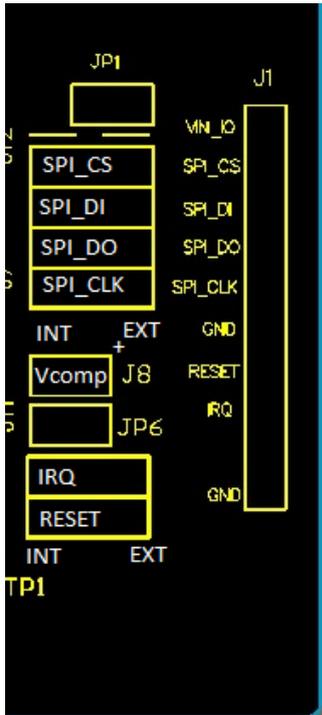


Figure 5: Logic Signal Jumper Detail

Logic Jumpers

Jumper		Control
JP2	SPI_CS	Int / Ext
JP3	SPI_DI	Int / Ext
JP4	SPI_DO	Int / Ext
JP5	SPI_CLK	Int / Ext
JP7	IRQ	Int / Ext
JP8	RESET	Int / Ext

Other Jumper Connections

Jumper	Option
JP1	Connect LDO_OUT to VIN_IO
JP6	Connect VIN to VCOMP
JP9	Connect LDO_VIN to VIN via JP6 and VCOMP

Board Power INPUT and OUTPUT connectors

CONNECTOR J3

Pin	Function
1	VIN_B1
2	VIN_B1 sense
3	GND

Table 3. Connector J3 pins

CONNECTOR J4

Pin	Function
1	BUCK1
2	BUCK1 sense
3	GND

Table 3. Connector J4 pins

CONNECTOR J5

Pin	Function
1	VIN_B2
2	VIN_B2 sense
3	GND

Table 3. Connector J5 pins

CONNECTOR J6

Pin	Function
1	BUCK2
2	BUCK2 sense
3	GND

Table 4. Connector J6 Pins

CONNECTOR J7

Pin	Function
1	LDO_VIN
2	LDO_VIN sense
3	GND

Table 5. Connector J7 Pins

CONNECTOR J8

Pin	Function
1	VCOMP
2	GND

Table 6. Connector J8 Pins

CONNECTOR J11

Pin	Function
1	VIN
2	VIN sense
3	GND

Table 9. Connector J11 Pins

CONNECTOR J12

Pin	Function
1	LDO
2	LDO sense
3	GND

Table 10. Connector J12 Pins

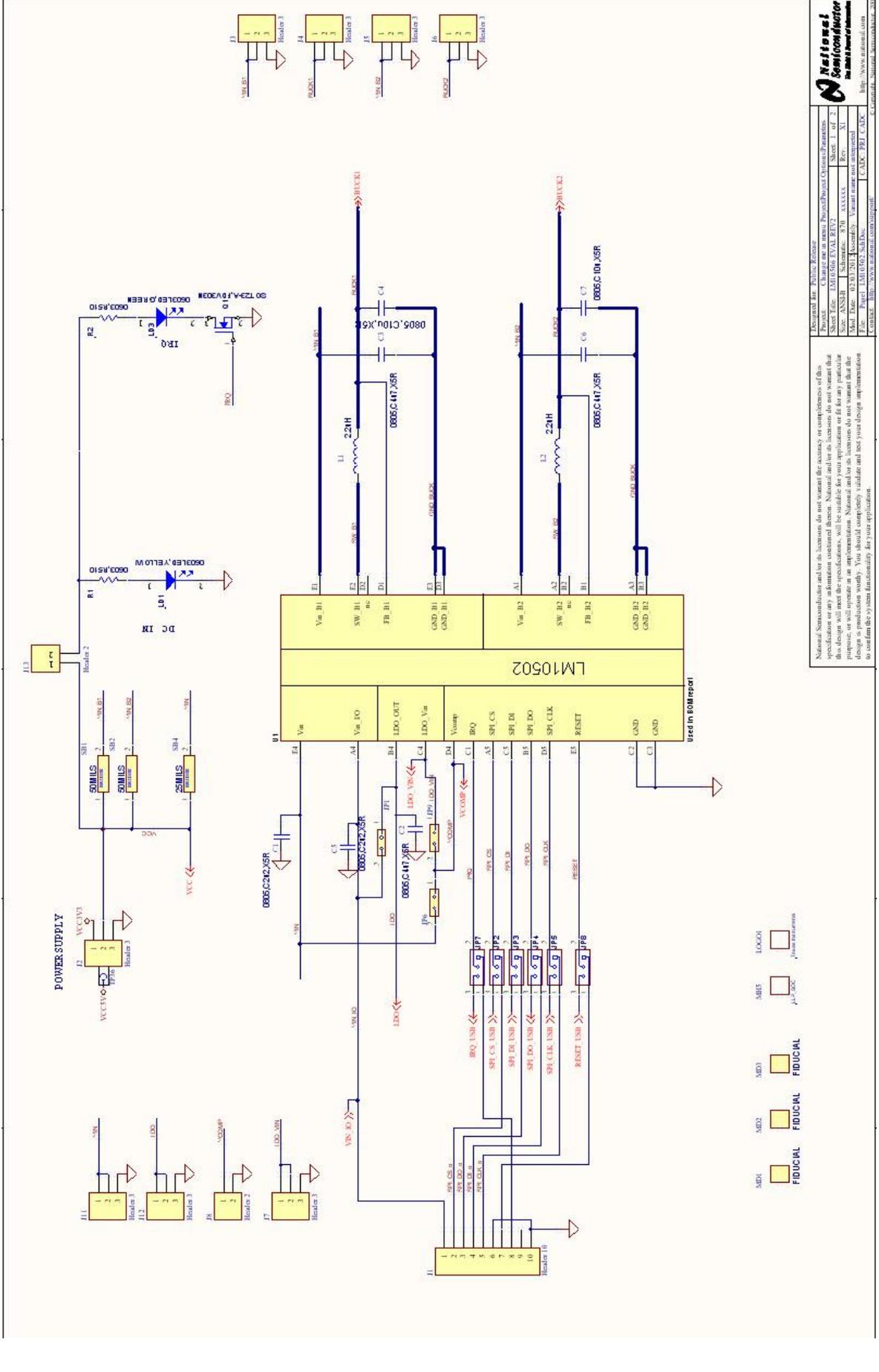
USER CONNECTOR J1

For accessing the signals externally via this connector, jumpers from JP2 to JP5 and JP7 and JP8 should be set to EXT position.

Pin	Function
1	VIN_IO
2	SPI_CS
3	SPI_DI
4	SPI_DO
5	SPI_CLK
6	GND
7	RESET
8	IRQ
9	
10	GND

Table 2. User Connector Pins

Schematics of LM10502 evaluation board

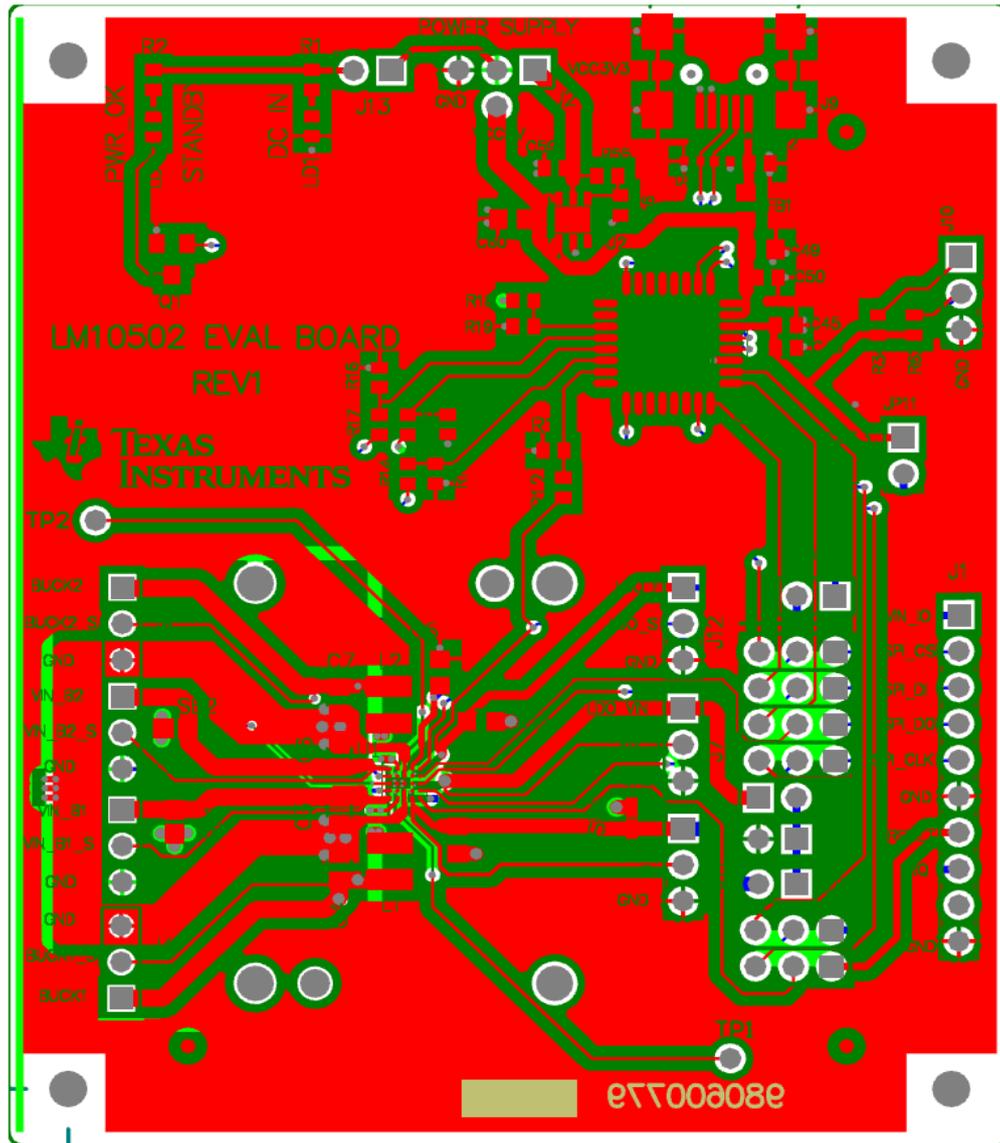


Disclaimer: This document is provided for informational purposes only. National Instruments does not warrant the accuracy or completeness of this information. National Instruments and/or its licensors do not warrant that this design will meet the specifications, will be suitable for your application or fit for any particular purpose, or will operate as an implementation. National Instruments and/or its licensors do not warrant that the design is production ready. You should completely validate and test your design implementation to confirm the system functionality for your application.

Copyright © 2011 National Instruments. All rights reserved. <http://www.ni.com>

LM10502 Evaluation Kit

Evaluation Board Layers



LM10502 Evaluation Kit

TI/NATIONAL INTERIM IMPORTANT NOTICE

Texas Instruments has purchased National Semiconductor. As of Monday, September 26th, and until further notice, products sold or advertised under the National Semiconductor name or logo, and information, support and interactions concerning such products, remain subject to the preexisting National Semiconductor standard terms and conditions of sale, terms of use of website, and Notices (and/or terms previously agreed in writing with National Semiconductor, where applicable) and are not subject to any differing terms and notices applicable to other TI components, sales or websites. To the extent information on official TI and National websites and business social networking media, etc., pertains to both TI and National-branded products, both companies' instructions, warnings and limitations in the above-referenced terms of use apply.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Audio	www.ti.com/audio	Communications and Telecom	www.ti.com/communications
Amplifiers	amplifier.ti.com	Computers and Peripherals	www.ti.com/computers
Data Converters	dataconverter.ti.com	Consumer Electronics	www.ti.com/consumer-apps
DLP® Products	www.dlp.com	Energy and Lighting	www.ti.com/energy
DSP	dsp.ti.com	Industrial	www.ti.com/industrial
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Security	www.ti.com/security
Logic	logic.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Power Mgmt.	power.ti.com	Transportation and Automotive	www.ti.com/automotive
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com	Wireless	www.ti.com/wireless-apps
RF/IF and ZigBee® Solutions	www.ti.com/lprf	TI E2E Community Home Page	e2e.ti.com