# User Guide

# TS13501 EVB V1.0

# Introduction

TS13501 is a bi-directional blocking 36V power DC/AC switch device which offers galvanic isolation between the control system and load. The differential input controls the state of the switch by way of a transient-immune serial protocol.

TS131501 EVB V1.0 enables the evaluation of TS13501.

# Objectives

The objective of this User Guide is to provide a fast, easy and thorough method to experiment with and evaluate the Semtech solutions. Sufficient information is provided to support the engineer in all aspects of adding support to their products. Developers are provided with all the information on how this EVM was built as a starting point for their own designs based on the TS13501.

# Product Description

TS13501 is a bi-directional blocking 36V power DC/AC switch device which offers galvanic isolation between the control system and load. The device includes integrated 240mΩ 36V switch allowing high efficiency switching of power loads or other high current applications. The differential input controls the state of the switch by way of a transient-immune serial protocol.

The TS13501 includes an over-current protection feature. Load current is monitored when the switch is in on state, notifying the system microcontroller of over-current faults by way of the STAT status pin.

The TS13501 is ideal for the applications including fire safety applications, industrial control, sprinker control, power load/rail switching, input supply multiplexing, etc. with the key advantage of no mechanical contact any more. Figure 1 shows the the typical system block diagram how TS13501 is used.

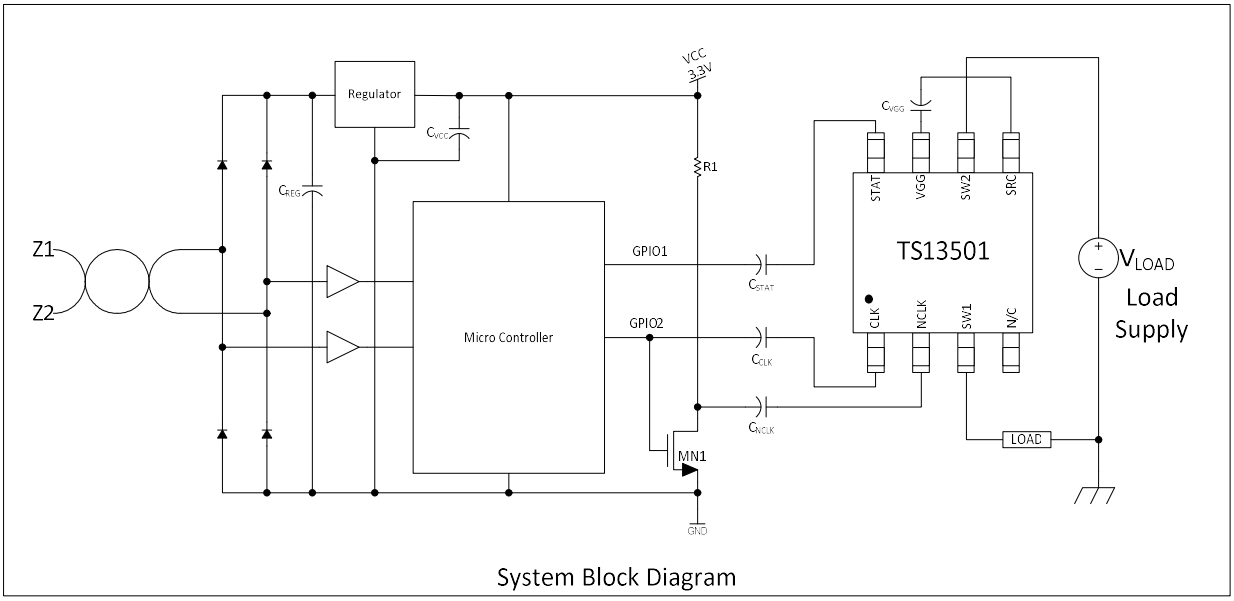


Figure 1 System Block Diagram of TS13501's Typical Application

TS13501 EVB (v1.0) helps the users to evaluate TS13501's functionalities/features.

# EVM Schematic

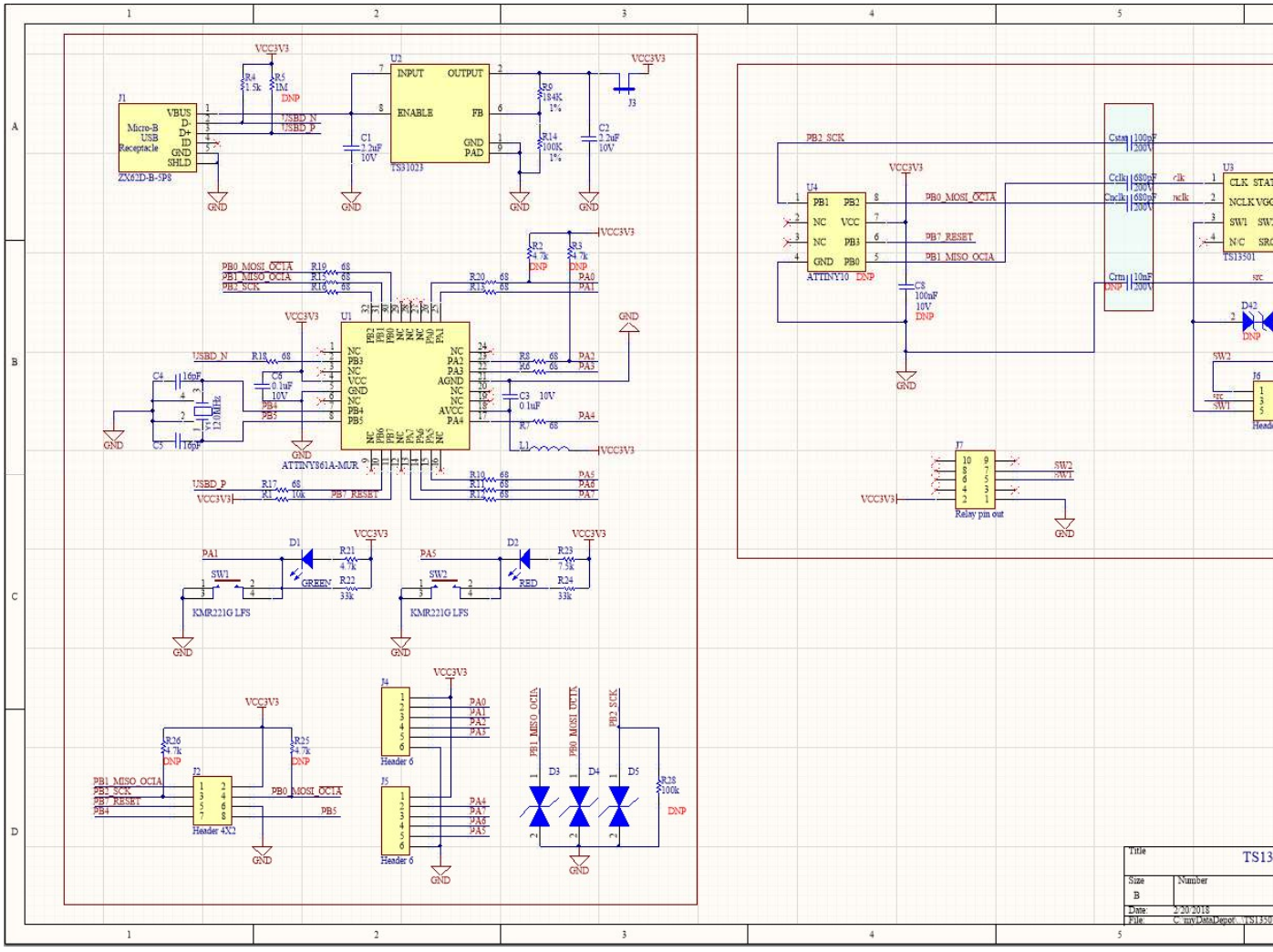

Figure 2 TS13501 EVB V1.0 Schematic

# Bill of Materials

| Designator | Quantity | Value | Value2 | Value3 | Manufacturer | ManufacturerCode | DNP |
|---|---|---|---|---|---|---|---|
| C1, C2 | 2 | 2.2uF | 10V | | | | |
| C3, C6 | 2 | 0.1uF | 10V | | | | |
| C4, C5 | 2 | 16pF | 10V | | | | |
| C8 | 1 | 100nF | 10V | | | | DNP |
| Cclk, Cnclk | 2 | 680pF | | 200V | | | |
| Crtn | 1 | 10nF | | 200V | | | DNP |
| Cstat | 1 | 100pF | | 200V | | | |
| Cvgg | 1 | 470nF | 10%, 0603 | 10V | | | |
| D1 | 1 | | | | Rohm Semiconductor | SML-P11MTT86 | |
| D2 | 1 | | | | Rohm Semiconductor | SML-P11UTT86 | |
| D3, D4, D5 | 3 | | | | Semtech | | |
| D42 | 1 | | | | Comchip Technology | ATV02W430B-HF | DNP |
| J1 | 1 | | | | Hirose | ZX62D-B-5P8 | |
| J2 | 1 | | | | | | |
| J3 | 1 | | | | | | |
| J4, J5 | 2 | | | | | | |
| J6 | 1 | | | | | | DNP |
| L1 | 1 | 100uH | | | TDK | | |
| R1 | 1 | 10k | | | | | |
| R2, R3, R25, R26 | 4 | 4.7k | | | | | |
| R4 | 1 | 1.5k | | | | | |
| R5 | 1 | 1M | | | | | |
| R6, R7, R8, R10, R11, R12, R13, R15, R16, R17, R18, R19, R20 | 13 | 68 | | | | | |
| R9 | 1 | 184K | 1% | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| R14 | 1 | 100K | 1% | | | | |
| R21 | 1 | 4.7k | | | | | |
| R22, R24 | 2 | 33k | | | | | |
| R23 | 1 | 7.5k | | | | | |
| R28 | 1 | 100k | | | | | |
| SW1, SW2 | 2 | | | | ITT cannon | KMR221G LFS | |
| U1 | 1 | | | | Microchip | | |
| U2 | 1 | | | | Triune Sys-tems | TS31023 | |
| U3 | 1 | | | | | | |
| U4 | 1 | | | | Atmel | | DNP |
| Y1 | 1 | 12.0MHz | | | Abracon LLC | ABM8G-12.000MHZ-4Y-T3 | |

# EVM board appearance

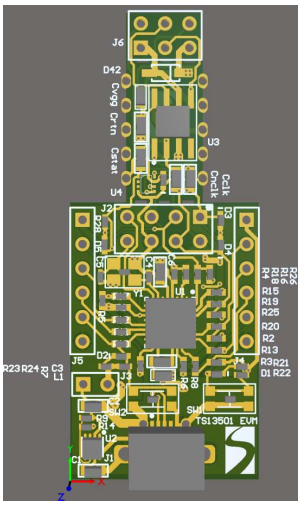

Figure 3 TS13501 EVB V1.0

# Operation of the EVB

Hook up the 16Vac transformer (16Vac is chosen for TS13501's 36V rating), the contactor with appropriate coil voltage rating (24Vac is chosen in this case) as load and "TS13501 EVB V1.0" as Figure 4. Connect the EVB with PC with micro-USB cable.

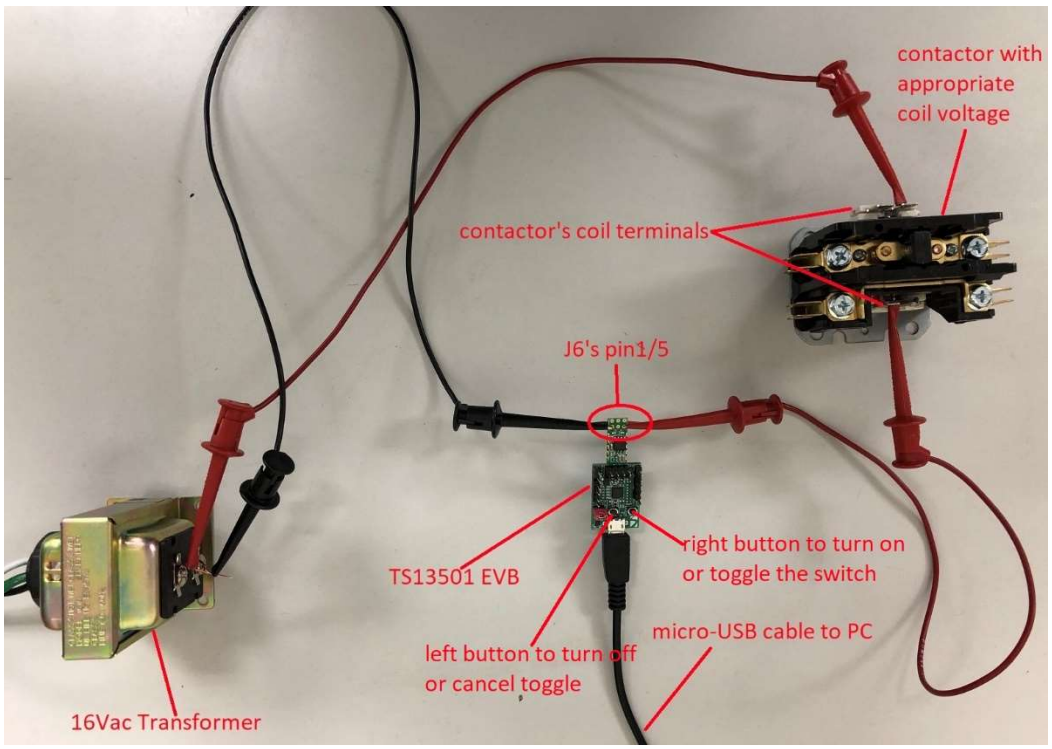


Figure 4 TS13501 EVB V1.0 hook up with contactor load

The user can use the button on board to operate the EVB, short-push (shorter than 1 second) then release the right button will turn on the TS13501 switch; short-push then release the left button will turn off the switch. Long-push (longer than 1 second) then release the right button will toggle the TS13501 switch ~1 second on and ~1 second off, short-push then release the left button will cancel the toggling.

If TS13501 is turned on, the green LED will be lit; if TS13501 is turned off, the green LED is dimmed. If TS13501 is in “ON” state and the switch is heathly (the “STAT” is feeding back pulses at $F_{CLK}$ / 4 of “CLK” frequency), the red LED is dimmed; If TS13501 is in “ON” state and the switch is not heathly (the “STAT” is not feeding back pulses at $F_{CLK}$ / 4 of “CLK” frequency), the red LED is lit.

Or user can use the GUI on a PC to control EVB operation, as figure 5.

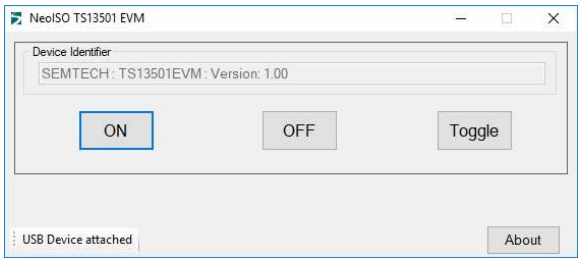


Figure 5 TS13501 EVB GUI

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