User's Guide
TLC6A598 Power Logic 8-Bit Shift Register Evaluation Module

TEXAS INSTRUMENTS

ABSTRACT

This user's guide describes the characteristics, setup, and usage of the TLC6A598 evaluation module (EVM). The TLC6A598EVM helps the user to evaluate the features of the Texas Instruments TLC6A598, power logic 8-Bit shift register. This user's guide includes hardware setup instructions, graphical user interface (GUI) instructions, printed-circuit board (PCB) layout drawings, a schematic diagram, and a bill of materials.

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1 Introduction

The TLC6A598 evaluation module (EVM) helps designers evaluate the operation and performance of the TLC6A598 8-Bit Shift Register designed for the high current multi-load application. The TLC6A598 device is a monolithic, high-voltage, high-current power 8-bit shift register designed for systems that require relatively high load power, such as LEDs. The device contains a built-in voltage clamp on the outputs for inductive transient protection. Power driver applications include relays, solenoids, and other high current or high voltage loads. Each open-drain DMOS transistor features an independent chopping current limiting circuit to prevent damage in the case of a short circuit.

The TLC6A598EVM provides an eight-channel relays control example solution. It is designed to operate with two supply power rails, one power rail for the TLC6A598 and another power rail for the relays. This evaluation board is designed to work with the USB2ANY board and USB2ANY Explore Software. See the TLC6A598 data sheet for more information about the digital communication.
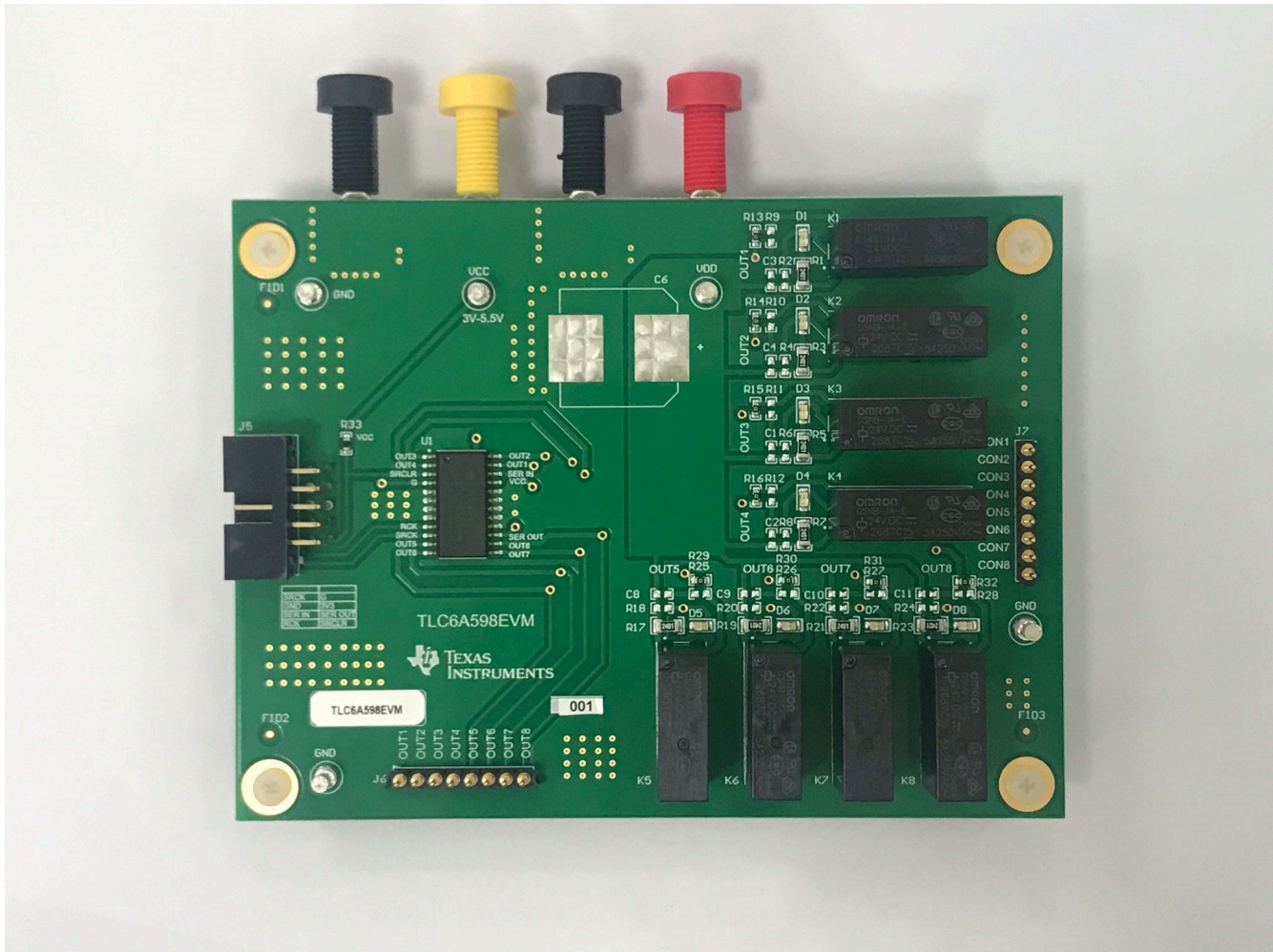
The LP5860EVM kit is illustrated in Figure 1-1.

Figure 1-1. TLC6A598EVM Kit

This design describes an application of the TLC6A598 as a relay controller using the specifications shown in Table 1-1. For applications with a different input voltage range or different output voltage and current, please refer to the TLC6A598 data sheet.

Table 1-1. TLC6A598EVM Electrical Specifications

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Input voltage range, V_{CC}		3		5.5	V
Input voltage range, V_{DD}			24		V
Relay	G5NB-1A-E D24		8.3		mA

2 Test Setup

This section describes the test setup for the evaluation of the TLC6A598EVM board. Table 2-1 shows the EVM connectors and test points.

Table 2-1. TLC6A598EVM Connectors and Test Points

Reference Designator	Function
J1	V_{CC}
J2	GND for V_{CC}
J3	V_{DD}
J4	GND for V_{DD}
J5	USB2ANY Connector
J6	Outputs connector for TLC6A598
J7	Outputs connector for Relays
TP1	Test point for V_{CC}
TP2	Test Point for V_{DD}
TP3, TP4, TP5	GND Test Point

The following equipment are required for the test setup:
- A power supply 1 capable of supplying 5 V @ 0.3 A is required to supply V_{CC}.
- A power supply 2 capable of supplying 24 V @ 1 A is required to supply V_{DD}.

To evaluate the TLC6A598EVM board, the USB2ANY interface adapter provided by TI is recommended here. Please download and install the USB2ANY Explorer Software on the computer.

Figure 2-1 shows the test bench setup for the evaluation of the TLC6A598EVM board.
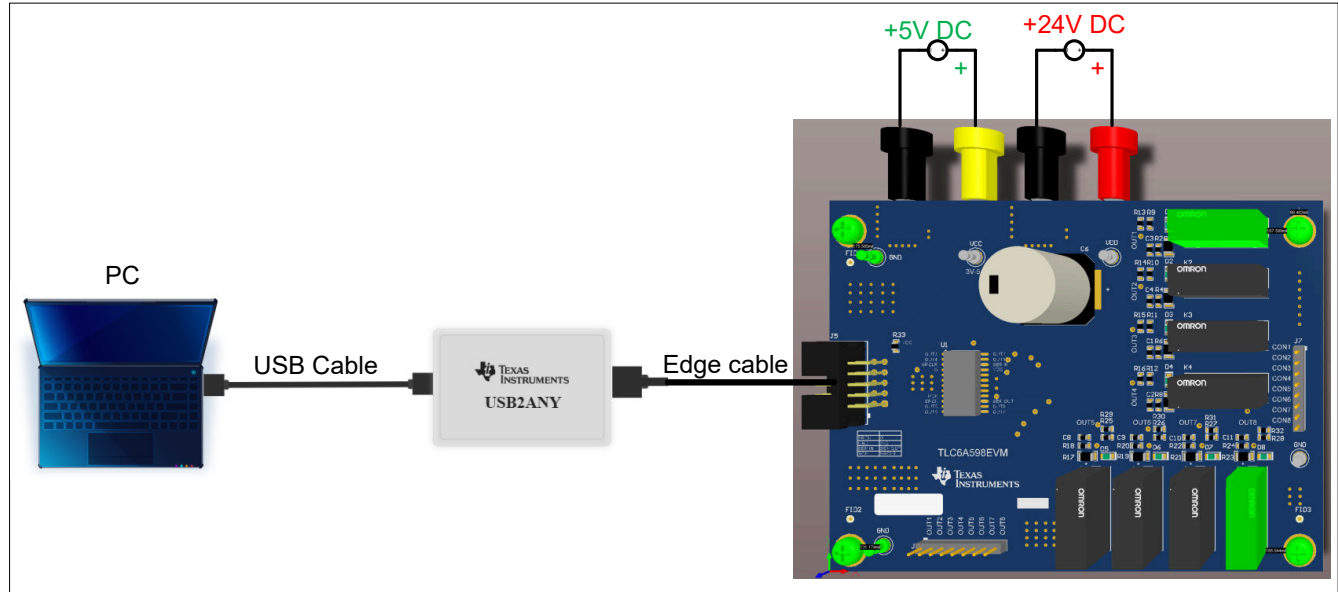

Figure 2-1. TLC6A598EVM Test Bench Setup

Set the input voltage power supply 1 to 5 V and the current limit to 0.3 A. Turn off the power supply 1. Connect the power supply 1 to the J1 and J2 connectors with the positive terminal of the supply connected to V_{CC} (J1) and the negative terminal of the supply connected to GND (J2). Set the input voltage power supply 2 to 24 V and the current limit to 1 A. Turn off the power supply 2. Connect the power supply 2 to the J3 and J4 connectors, with the positive terminal of the supply connected to V_{DD} (J3) and the negative terminal of the supply connected to GND (J4).

Connect the USB2ANY with Edge cable to J5 and connect USB2ANY to the PC with USB cable.

With above setup and connections completed, turn on the power supply 1 and 2. Then open the USB2ANY Explorer Software and the software will show as Figure 2-2.
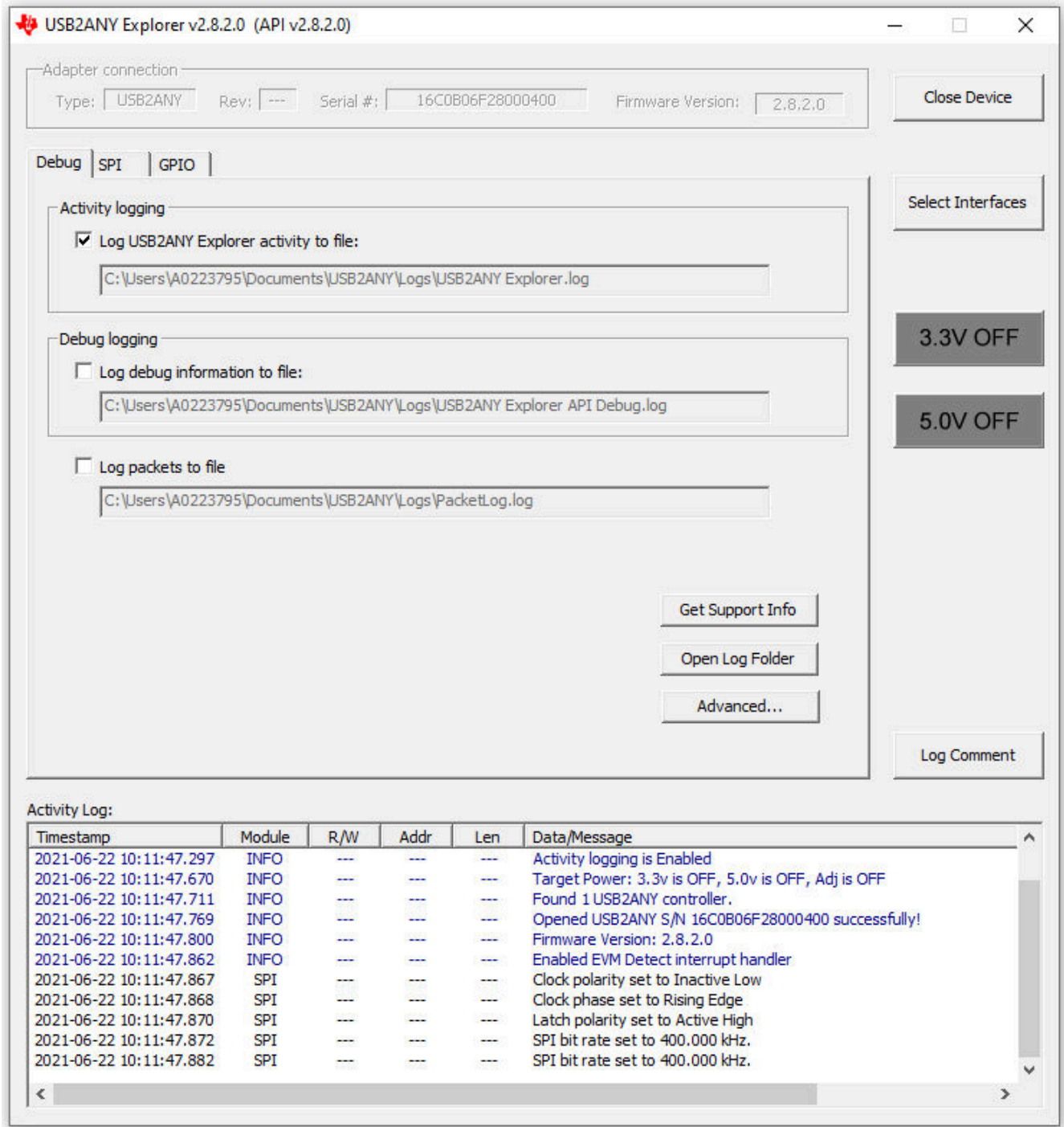

Figure 2-2. USB2ANY Explorer

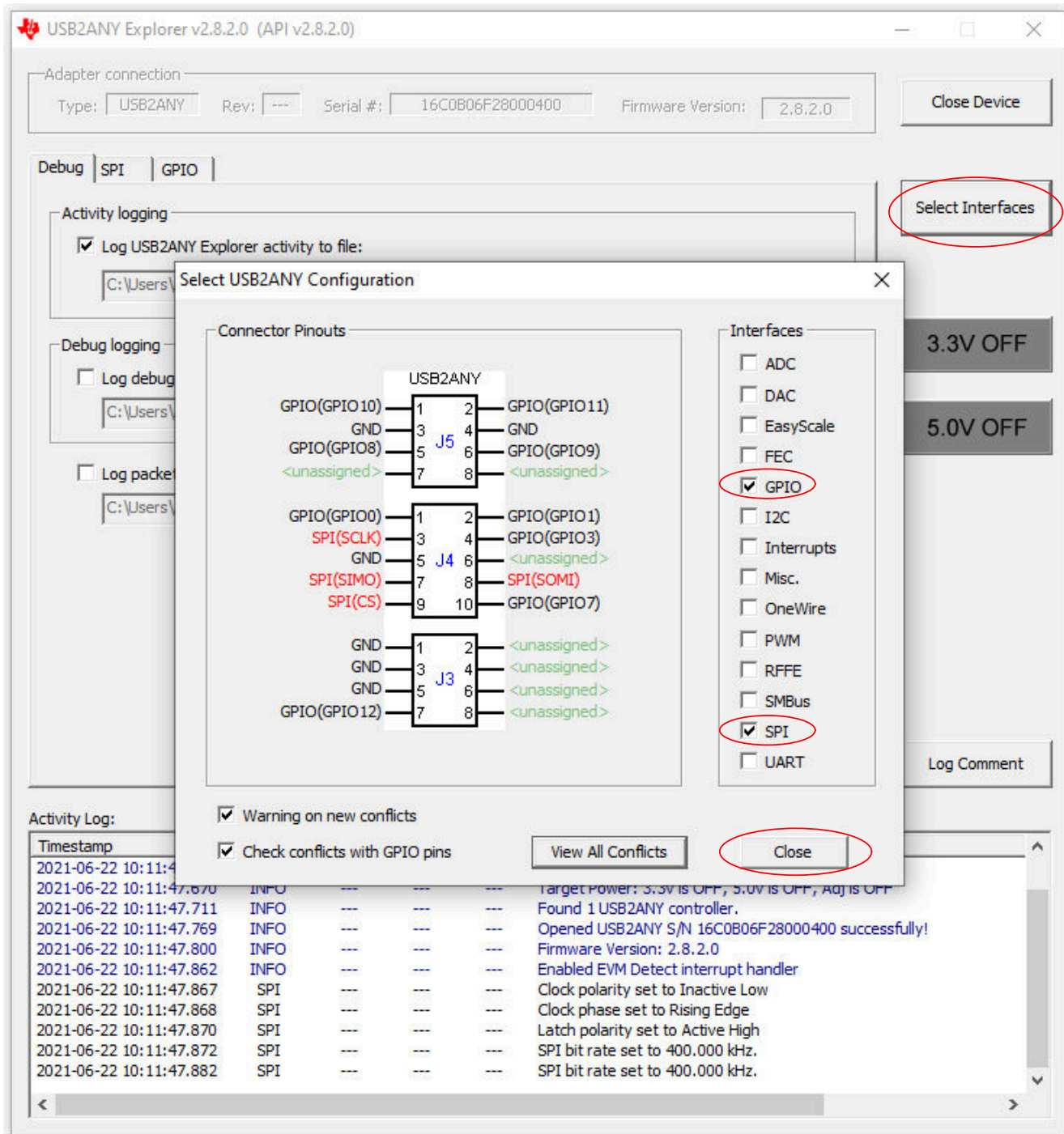Click the 'Select Interface' button and choose the 'GPIO' and 'SPI' as Figure 2-3 and click the 'Close' button.

Figure 2-3. GPIO and SPI Selection

Click the 'GPIO' button and configure the GPIO3 as Figure 2-4. If you cannot see the 'GPIO' button, please adjust the display scale of the PC to 100%.

Figure 2-4. GPIO3 Configuration

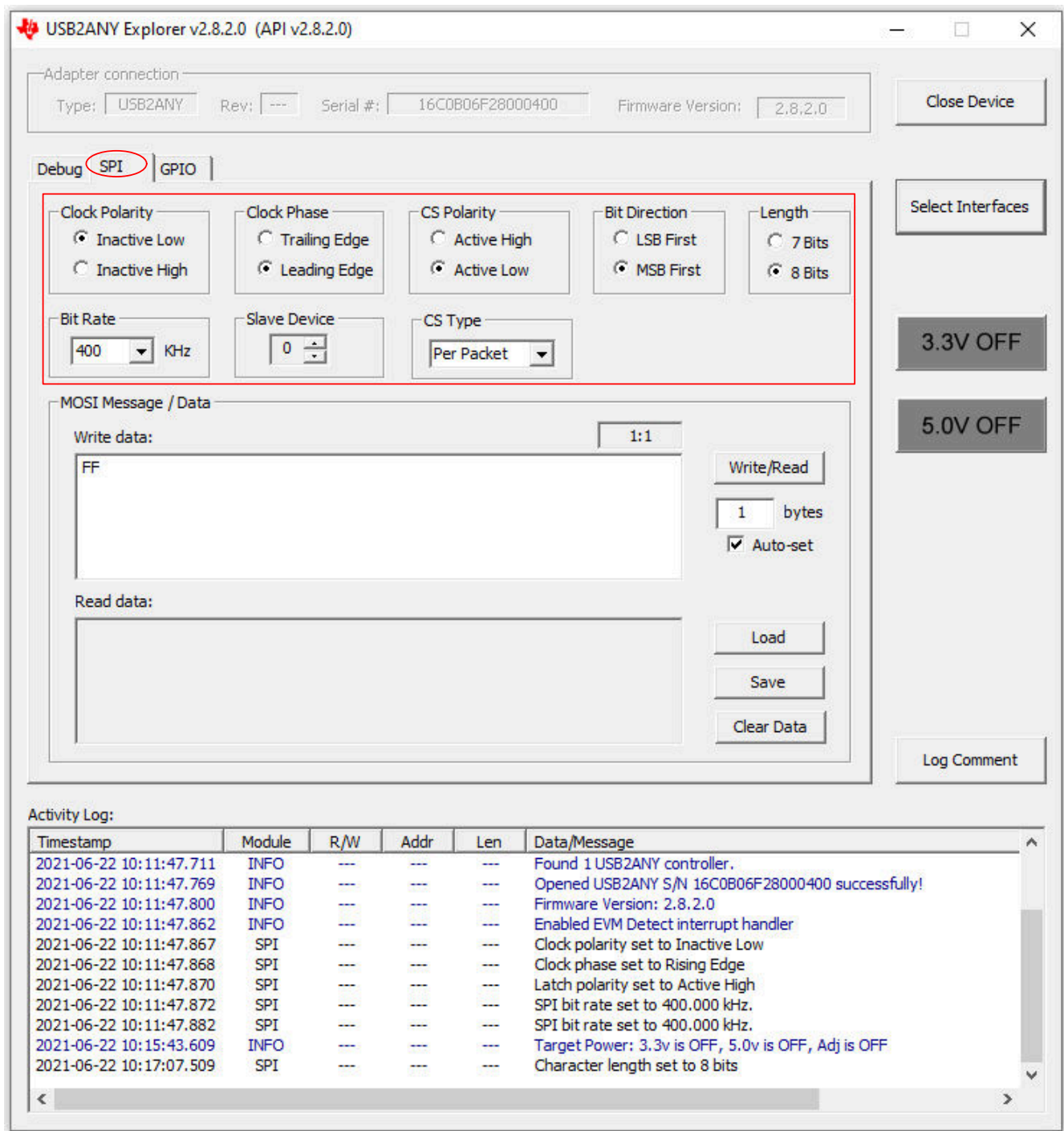Click the 'SPI' button and configure the SPI interface as Figure 2-5:

Figure 2-5. SPI Configuration

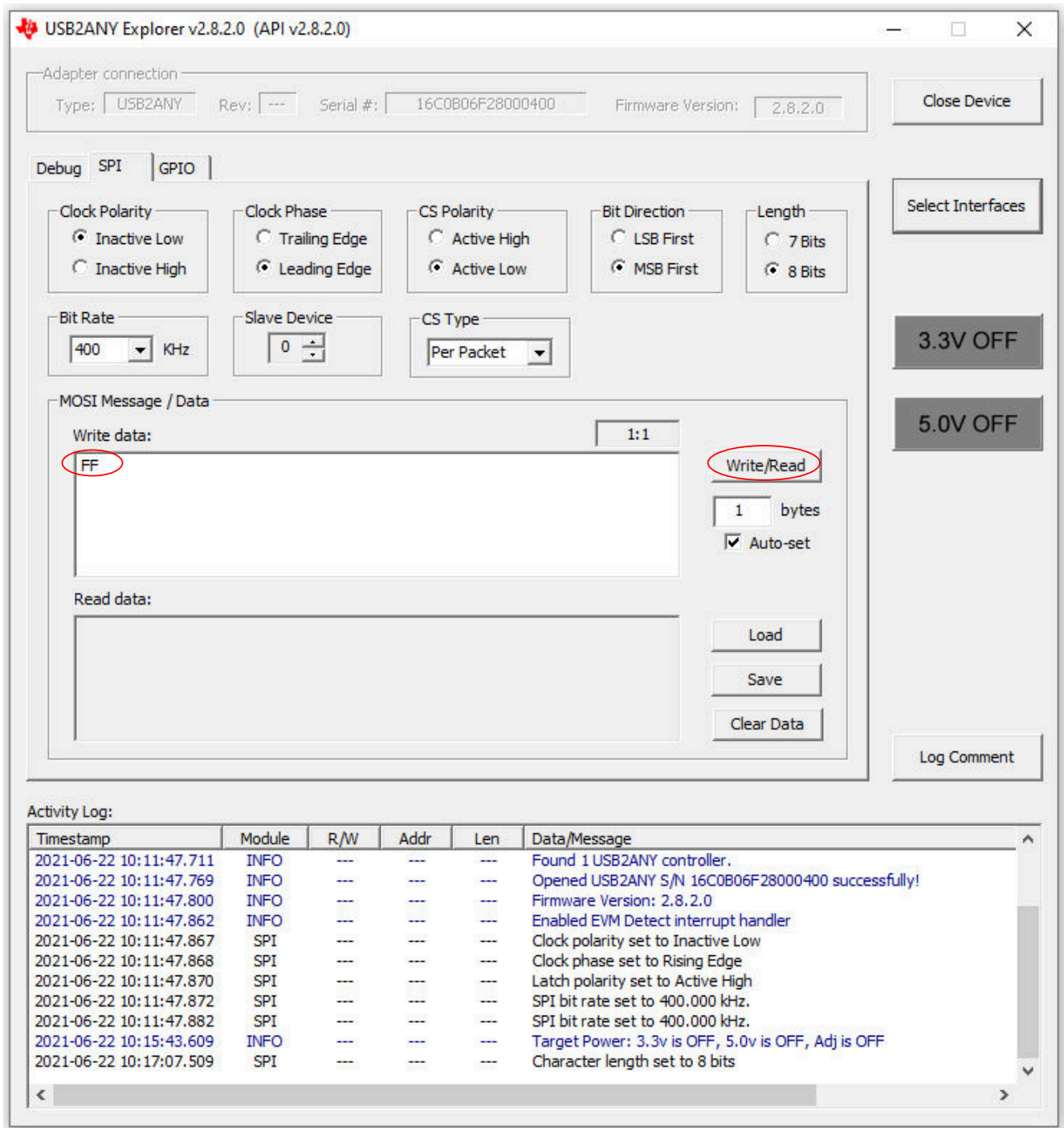In the 'Write date' command window, write 'FF' and click 'Write/Read' button as Figure 2-6:

Figure 2-6. Data Write with SPI Interface

Then, the eight relays K1 to K8 will turn on and the eight Green LEDs D1 to D8 will turn on accordingly.

Please refer to the TLC6A598 data sheet for additional functional tests.

3 Design Files

The layout, schematic, and bill of materials (BOM) of the TLC6A598 EVM board design are included in this section.

3.1 Layout

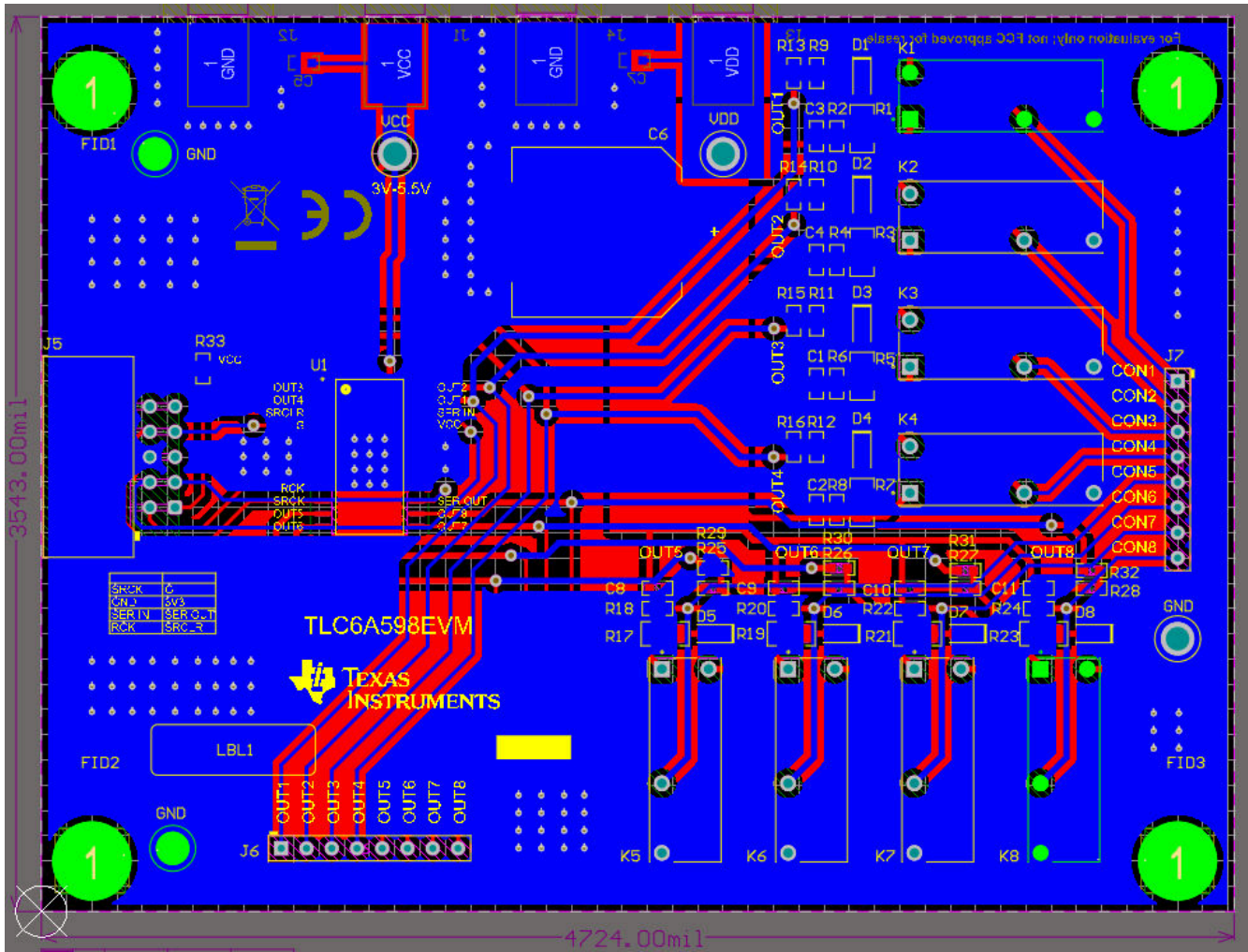Figure 3-1 and Figure 3-2 demonstrate the TLC6A598EVM layout images.

Figure 3-1. TLC6A598EVM Top Layer

Figure 3-2. TLC6A598EVM Bottom Layer

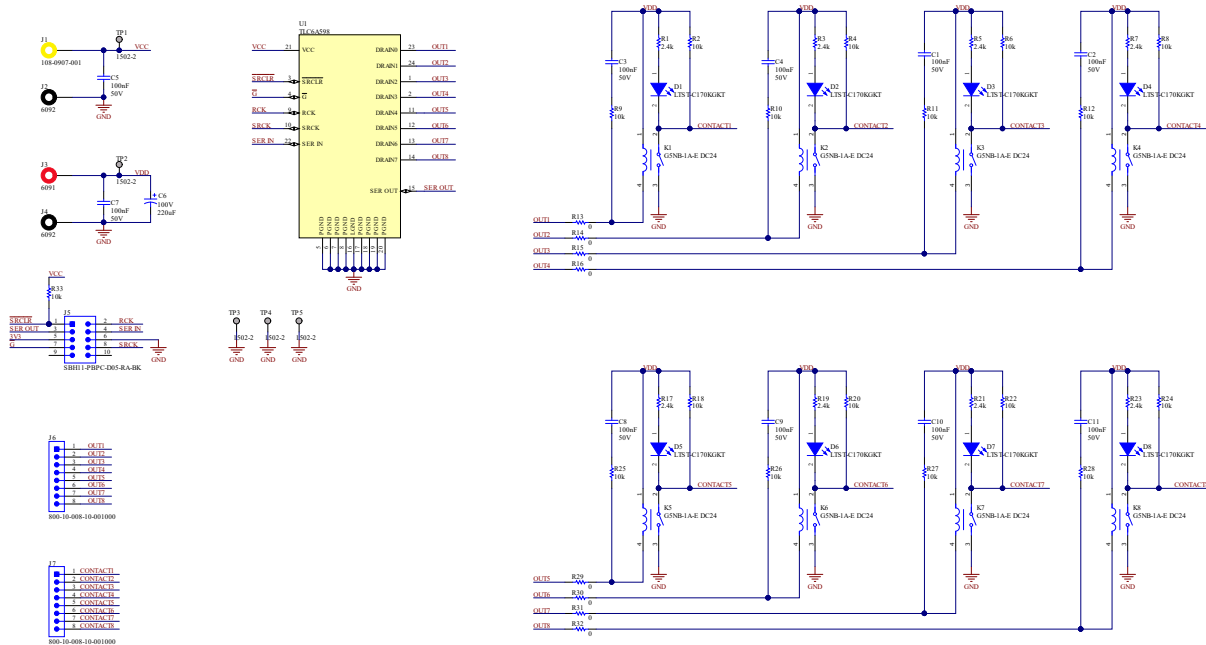## 3.2 Schematic

shows the TLC6A598EVM schematic.

Figure 3-3. TLC6A598EVM Schematic

3.3 BOM

To download the bill of materials (BOM), see the design files at the TLC6A598EVM tools folder.

Table 3-1. TLC6A598EVM Bill of Materials (BOM)

Designator	Quantity	Description	Part Number	Manufacturer
C5, C7	2	CAP, CERM, 0.1 uF, 50 V, +/-10%, X7R, 0603	06035C104KAT2A	AVX
D1, D2, D3, D4, D5, D6, D7, D8	8	LED, Green, SMD	LTST-C170KGKT	Lite-On
FID1, FID2, FID3	3	Fiducial mark. There is nothing to buy or mount.	N/A	N/A
H1, H2, H3, H4	4	Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	NY PMS 440 0025 PH	B&F Fastener Supply
H5, H6, H7, H8	4	Standoff, Hex, 0.5"L #4-40 Nylon	1902C	Keystone
J1	1	BANANA JACK, 15A, Insulated, Nylon,Yellow	108-0907-001	Cinch Connectivity
J2, J4	2	Standard Banana Jack, Insulated, Black	6092	Keystone
J3	1	Standard Banana Jack, Insulated, Red	6091	Keystone
J5	1	Header(shrouded), 2.54mm, 5x2, Gold, R/A, TH	SBH11-PBPC-D05-RA-BK	Sullins Connector Solutions
J6, J7	2	Header, 100mil, 8x1, TH	800-10-008-10-001000	Mill-Max

Table 3-1. TLC6A598EVM Bill of Materials (BOM) (continued)

Designator	Quantity	Description	Part Number	Manufacturer
K1, K2, K3, K4, K5, K6, K7, K8	8	General Purpose Relay SPST-NO (1 Form A) 24VDC Coil Through Hole	G5NB-1A-E DC24	Omron
R1, R3, R5, R7, R17, R19, R21, R23	8	RES, 2.4 k, 5%, 0.25 W, AEC-Q200 Grade 0, 1206	CRCW12062K40JNEA	Vishay-Dale
R13, R14, R15, R16, R29, R30, R31, R32	8	RES, 0, 5%, 0.1 W, 0603	RC0603JR-070RL	Yageo
R33	1	RES, 10 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	CRCW060310K0JNEA	Vishay-Dale
TP1, TP2, TP3, TP4, TP5	5	Terminal, Turret, TH, Double	1502-2	Keystone
U1	1	50V, 350mA, 8ch Relay/LED Driver	TLC6A598	TI Will Provide Later
C1, C2, C3, C4, C8, C9, C10, C11	0	CAP, CERM, 0.1 uF, 50 V, +/-10%, X7R, 0603	06035C104KAT2A	AVX
C6	0	CAP, AL, 220 uF, 100 V, +/-20%, 0.16 ohm, SMD	EMVY101GTR221MLN0S	Chemi-Con
R2, R4, R6, R8, R9, R10, R11, R12, R18, R20, R22, R24, R25, R26, R27, R28	0	RES, 10 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	CRCW060310K0JNEA	Vishay-Dale

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