

TPL5010 Evaluation Module

This user's guide provides the setup instructions, configuration, and operation of the TPL5010 evaluation module (EVM). Also included are the printed-circuit board (PCB) layouts, schematic, and the bill of materials (BOM).

Contents

1	Introduction	2
2	Setup	3
	2.1 Jumpers and Connectors	3
	2.2 Battery Requirements	5
	2.3 TPL5010EVM Configuration.....	5
3	Operation	11
	3.1 Supply Current Measurement	11
4	Board Layout.....	14
5	Schematic	16
6	Bill of Materials	17

List of Figures

1	TPL5010EVM	2
2	J1 Jumper Setting	3
3	J1 Jumper Setting	3
4	J2 Jumper Setting	4
5	I_SEL Jumper Setting	4
6	R_SEL Jumper Setting.....	4
7	Jumpers Configuration – EVM Standalone Without Microcontroller	6
8	Jumpers Configuration – EVM With Microcontroller	7
9	Jumpers Configuration – EVM With LaunchPad	8
10	Current Measurement Setup – TPL5010 Only	11
11	Current Measurement Setup – TPL5010 During the Reading of the Resistance.....	12
12	Current Measurement Setup – TPL5010 With Microcontroller	13
13	Top Layer.....	14
14	Bottom Layer.....	15
15	TPL5010EVM Schematic.....	16

List of Tables

1	Device and Package Configurations	2
2	Input/Output Connectors Description.....	3
3	Jumpers Description.....	3
4	Switches and Selectors Description	4
5	Test Points Description	4
6	TPL5010EVM Bill of Materials	17

1 Introduction

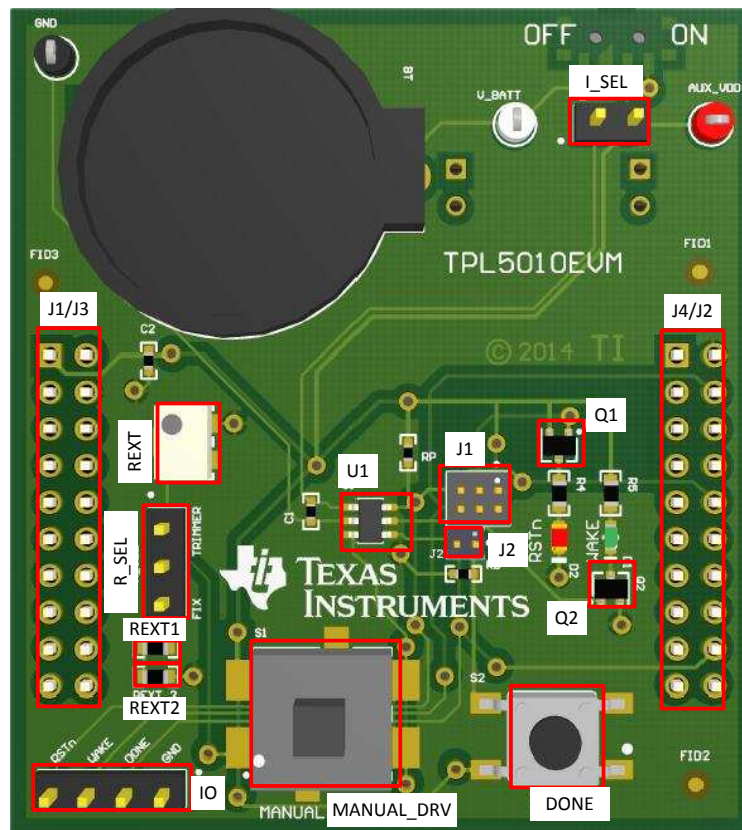


Figure 1. TPL5010EVM

TI's TPL5010EVM evaluation module (EVM) allows a designer to configure the timer intervals of the TPL5010 and measure its very low current consumption. Moreover, the TPL5010EVM is ready to be connected to the LaunchPad™ of the MSP430F5529 in order to test its watchdog and timer features. The EVM has an onboard battery holder (coin battery) to supply the TPL5010 and the microcontroller, if connected.

The EVM contains one TPL5010 (see [Table 1](#)).

Table 1. Device and Package Configurations

Device	IC	Package
U1	TPL5010DDC	SOT23-6

2 Setup

[Section 2.1](#) describes the jumpers and connectors on the EVM and [Section 2.3](#) describes how to properly connect, set up, and use the TPL5010EVM.

See [Figure 1](#) for locations of the top layer jumpers and switches.

2.1 Jumpers and Connectors

[Table 2](#) through [Table 5](#) list the input/output connectors description, jumpers description, switches and selectors description, and the test points description.

Table 2. Input/Output Connectors Description

Name	Layer	Description
J1/J3	Bottom	2 × 10 pin receptacle to plug the TPL5010EVM into the MSP430F5529 LaunchPad
J4/J2	Bottom	2 × 10 pin receptacle to plug the TPL5010EVM into the MSP430F5529 LaunchPad
RST	Bottom	2-pin receptacle to plug the TPL5010EVM into the MSP430F5529 LaunchPad
VCC	Bottom	2-pin receptacle to plug the TPL5010EVM into the MSP430F5529 LaunchPad
IO	Top	4-pin header connector to bring out RSTn, WAKE, DONE, and GND signals
		IO.1 GND Ground
		IO.2 DONE DONE signal from external microcontroller
		IO.3 WAKE WAKE signal to external microcontroller
		IO.4 RSTn RSTn signal to external microcontroller

Table 3. Jumpers Description

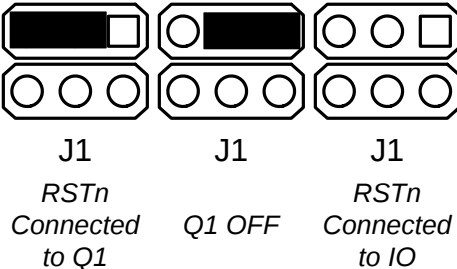
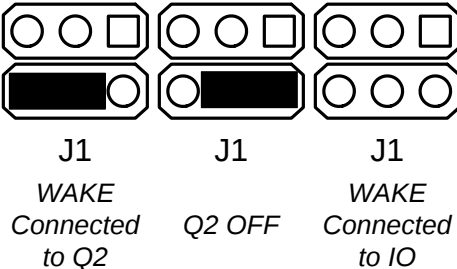
Name	Layer	Description
J1	Top	J1.5–J1.3 shorted, the RSTn pin of the TPL5010 is connected to the gate of Q1 MOSFET. J1.3–J1.1 shorted, the gate of Q1 MOSFET is connected to VDD (MOSFET OFF).  Figure 2. J1 Jumper Setting
		J1.6–J1.4 shorted, the WAKE pin of the TPL5010 is connected to the gate of Q2 MOSFET. J1.4–J1.2 shorted, the gate of Q2 MOSFET is connected to VDD (MOSFET OFF).  Figure 3. J1 Jumper Setting

Table 3. Jumpers Description (continued)

Name	Layer	Description
J2	Top	In short configuration, the DONE pin of the TPL5010 is connected to the S2 switch with a pull-down resistor.   J2 <i>DONE</i> <i>Connected to S2</i> J2 <i>DONE</i> <i>Connected to IO</i> Figure 4. J2 Jumper Setting
I_SEL	Top	In open configuration allows the measurement of the current consumption of the TPL5010.   I_SEL <i>Normal Operation</i> I_SEL <i>TPL5010 Current Measurement</i> Figure 5. I_SEL Jumper Setting
R_SEL	Top	Pin1-2 in short configuration, the variable resistance is used to set the timer interval. Pin2-3 in short configuration, the fix resistance is used to set the timer interval.   R_SEL <i>Variable Resistance</i> R_SEL <i>Fix Resistance</i> Figure 6. R_SEL Jumper Setting

Table 4. Switches and Selectors Description

Name	Layer	Description
S_ON_OFF	Bottom	In ON position turns ON the EVM, in OFF position turns OFF the EVM
S1	Top	When pushed, the SPST switch generates a DONE pulse
S2	Top	When pushed, the SPDT ON/Momentary switch generates a Manual reset pulse

Table 5. Test Points Description

Name	Layer	Description
GND	Top	Test point of the ground, connect the GND of the power supplies
V_BATT	Top	Test point to monitor battery voltage
AUX_VDD	Top	Test point to connect external supply voltage in alternative to the coin cell battery

2.2 Battery Requirements

In case the EVM is battery powered, the battery must meet the following requirements:

- Battery type: CR2032 UL-certified battery
- Voltage: 3 V
- Minimum capacity: 220 mAh
- Minimum discharge rate: N/A mA

NOTE: Only insert DURACELL® 2032 Lithium battery type CR2032, or equivalent.

2.3 TPL5010EVM Configuration

The evaluation board can work standalone or plugged into the MSP430F5529 LaunchPad.

2.3.1 Setting the Time Interval Period

Set the Time interval period by tuning the variable resistance (the trimmer can generate resistances in the range between 1 k Ω and 200 k Ω).

To tune the value of the resistance:

1. Connect a DMM between pin 1 of R_SEL and GND.
2. Turn the screw on the top of the trimmer until you reach the desired value.
3. Disconnect the DMM at the end of the operation.

Alternatively, set the DRV pulse interval with the fix resistances (R_EXT1 = 500 Ω , R_EXT2 = 0 Ω). If required, replace the resistances with customized ones.

See [Figure 1](#) for locations of the resistances REXT1 and REXT2.

2.3.2 EVM Standalone Without Microcontroller

The following settings are provided to use the EVM standalone, without a microcontroller:

- Put the S_ON_OFF selector in the OFF position.
- Set the mode of operation through the MODE header (see [Table 3](#)).
- Insert a CR2032 coin cell battery in the battery holder (BT), alternatively, connect a voltage source between the AUX_VDD and GND test points.
- Configure jumper J1 (RSTn connected to Q1, WAKE connected to Q2) and J2 (DONE connected to S2), as explained in [Table 3](#).

NOTE: Do not connect the coin cell battery and the voltage source to supply the evaluation board at same time.

- Put the S_ON_OFF selector in the ON position, or turn on the external voltage source if it is used instead of the coin cell battery.

The DONE and WAKE signals can be monitored at the IO connector (pin 2 and 3, respectively).

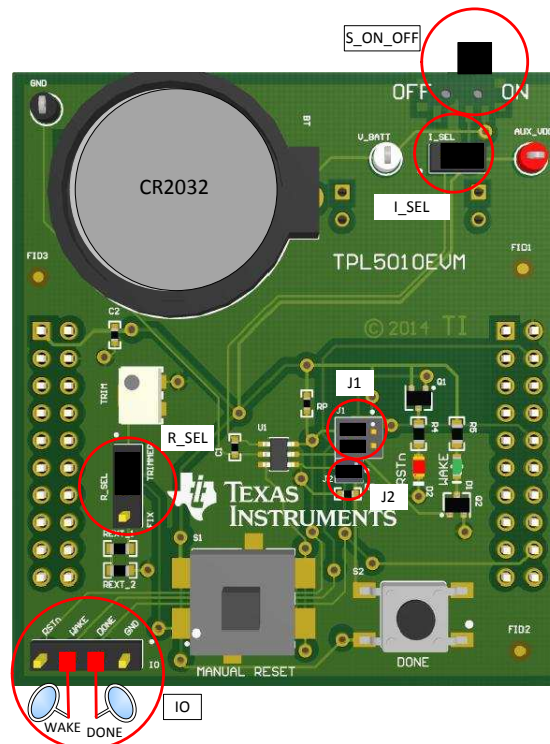


Figure 7. Jumpers Configuration – EVM Standalone Without Microcontroller

2.3.3 EVM With Microcontroller

The following settings are provided to use the EVM with a microcontroller:

- Put the S_ON_OFF selector in the OFF position.
- Set the mode of operation through the MODE header (see [Table 3](#)).
- Connect the microcontroller to the IO header in order to manage the I/O signal of the design under test (DUT).
- Supply the microcontroller, connecting its supply pin to the AUX_VDD test point and the ground to the GND pin of the IO header.
- Insert a CR2032 coin cell battery in the battery holder (BT), alternatively, connect a voltage source between the AUX_VDD and GND test points.
- Configure the jumper J1 (RSTn connected to IO, WAKE connected to IO) and J2 (DONE connected to IO), as explained in [Table 3](#).

NOTE: Do not connect the coin cell battery and the voltage source to supply the evaluation board at same time.

Do not use the switch S2 (DONE), in this configuration the DONE switch is connected to a digital output pin of the microcontroller.

- Put the S_ON_OFF selector in the ON position, or turn on the external voltage source if it is used instead of the coin cell battery.

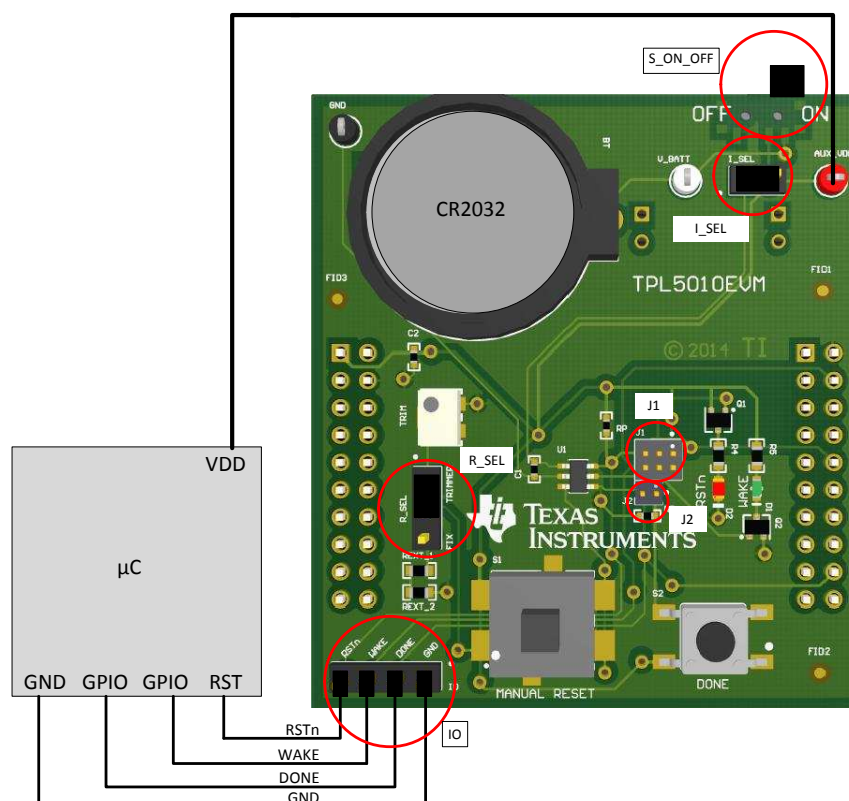


Figure 8. Jumpers Configuration – EVM With Microcontroller

2.3.4 EVM With LaunchPad

Load the code from this section into the MSP430F5529 of the LaunchPad. Refer to [MSP430 LaunchPad \(MSP-EXP430F5529\) Wiki](#) for more details.

- Put the S_ON_OFF selector in the OFF position.
- Set the mode of operation through the MODE header (see [Table 3](#)).
- Remove jumpers VCC and RST of the LaunchPad.
- Plug the EVM into the LaunchPad (MSP430F5529), according to the following table:

TPL5010EVM			MSP430 LaunchPad		
J1/J3	J1.1	VDD_μC	J1/J3	pin 1	3V3
	pin 4	GND		pin 4	GND
J4/J2	pin 2	GND	J4/J2	pin 2	GND
	pin 4	WAKE		pin 4	P2.0
	pin 10	RSTn		pin 10	RST
	pin 18	DONE		pin 18	P2.3
VCC			3V3		
RST			SBW RST		

- Insert a CR2032 coin cell battery in the battery holder (BT), alternatively, connect a voltage source between the AUX_VDD and GND test points.
- Configure the jumper J1 (RSTn connected to Q1, WAKE connected to Q2) and J2 (DONE connected to IO), as explained in [Table 3](#).

NOTE: Do not connect the coin cell battery and the voltage source to supply the evaluation board at the same time.

Do not use the switch S2 (DONE), in this configuration, the DONE switch is connected to a digital output pin of the microcontroller.

- Put the S_ON_OFF selector in ON position, or turn on the external voltage source if it is used instead of the coin cell battery.

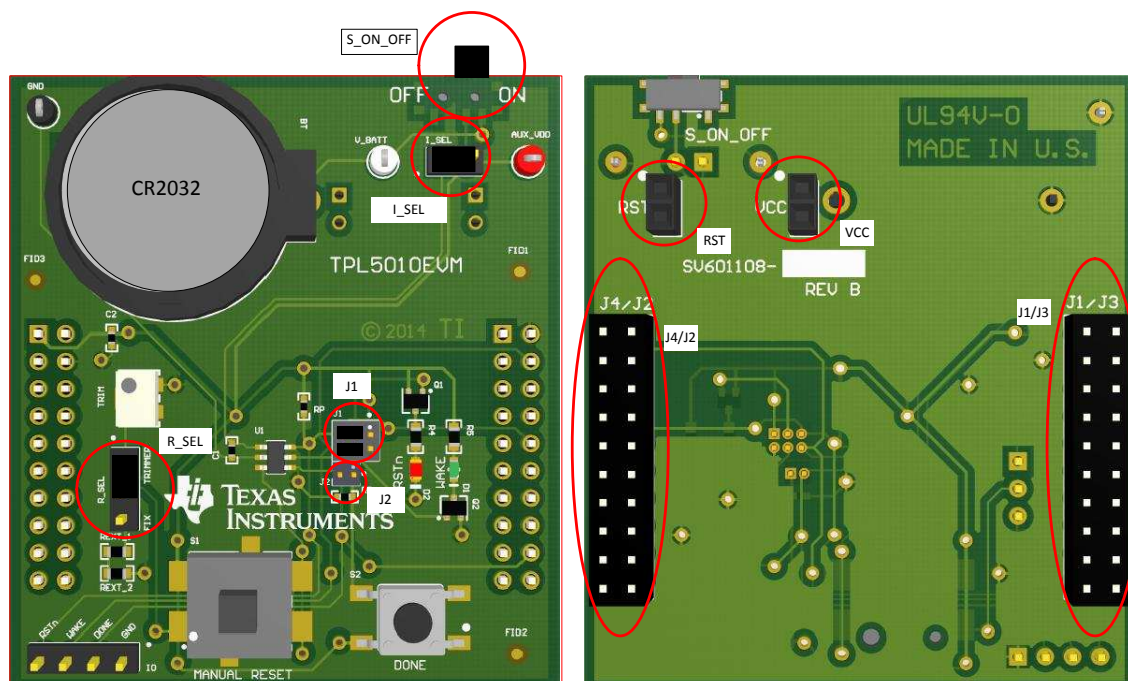


Figure 9. Jumpers Configuration – EVM With LaunchPad

Example code

Once loaded into the MSP430 of the LaunchPad, the code presented in this section performs the following features:

- At power on, the green LED present on the LaunchPad is turned on and turned off.
- When the MSP430 receives a RSTn, the red LED is toggled 5 times, then the green LED is turned ON and OFF and the MSP430 sends a DONE signal to the TPL5010.
- When the MSP430 receives a WAKE pulse, the green LED is turned ON and OFF and the MSP430 sends a DONE signal to the TPL5010.

```
#include <msp430.h>
```

```
void main(void) {
```

```
    WDTCTL = WDTPW | WDTHOLD;          // Stop watchdog timer

    P1DIR |= BIT0;                      // Set P1.0 to output direction
    P2DIR |= BIT3;                      // Set P2.3 to output direction
    P4DIR |= BIT7;                      // Set P4.7 to output direction

    P1OUT &= ~BIT0;                     // Set P1.0 RED LED OFF
    P2OUT &= ~BIT3;                     // Set P2.3 DONE Low
    P4OUT &= ~BIT7;                     // Set P4.7 GREEN LED OFF

    P2IES &= ~BIT0;                     // P2.0 Lo/Hi edge
    P2IFG &= ~BIT0;                     // P2.0 IFG Cleared
    P2IE  |= BIT0;                      // P2.0 Interrupt Enabled

    SFRRPCR |= SYSNMIIES | SYSNMI;     // Select NMI function for the RST/NMI pin,
                                        // interrupt on falling edge
                                        // (pull-up R on RST/NMI is already enabled after PUC)
    SFRIE1 |= NMIIE;                   // Set NMI pin interrupt enable

    P4OUT |= BIT7;                      // Set P4.7 GREEN LED ON
    __delay_cycles(500000);             // Set Delay
    P4OUT &= ~BIT7;                     // Set P4.7 GREEN LED OFF

    P2OUT |= BIT3;                      // Done High
    __delay_cycles(100);                 // Set Delay
    P2OUT &= ~BIT3;                     // Done Low

    __bis_SR_register(LPM4_bits + GIE); // Enter LPM4
}
```

```
// Port 2 interrupt service routine
```

```
#pragma vector=PORT2_VECTOR
```

```
__interrupt void Port_2(void)
```

```
{
```

```
    volatile unsigned int i;
```

```
    P4OUT |= BIT7;                      // GREEN LED ON
    i = 10000;                          // SW Delay
    do i--;
    while(i != 0);
    P4OUT &= ~BIT7;                     // Set P4.7 GREEN LED OFF

    P2OUT |= BIT3;                      // Done High
    __delay_cycles(100);                 // Set Delay
    P2OUT &= ~BIT3;                     // Done Low

    P2IES &= ~BIT0;                     // P2.0 Lo/Hi edge
    P2IFG &= ~BIT0;                     // P2.0 IFG Cleared
    P2IE  |= BIT0;                      // P2.0 Interrupt Enabled
```

```

}

// User NMI interrupt service routine
#pragma vector=UNMI_VECTOR
__interrupt void UNMI_ISR (void)
{
    int n=0;
    // Efficiently decode the User NMI interrupt source
    switch (__even_in_range(SYSUNIV, SYSUNIV_SYSBUSIV)) {
        case SYSUNIV_NMIIFG :
        {
            for(n=0; n<10; n++) {
                volatile unsigned int i;
                P1OUT ^= 0x01;           // Toggle RED led
                i = 10000;               // SW Delay
                do i--;
                while(i != 0);

            }
            volatile unsigned int i;
            P4OUT |= BIT7;               // GREEN LED ON
            i = 10000;                   // SW Delay
            do i--;
            while(i != 0);
            P4OUT &= ~BIT7;              // Set P4.7 GREEN LED OFF

            P2OUT |= BIT3;               // Done High
            __delay_cycles(100);         // Set Delay;
            P2OUT &= ~BIT3;              // Done Low;

        }
        break;
        case SYSUNIV_OFIFG :
        case SYSUNIV_ACCVIFG :
        case SYSUNIV_BUSIFG :
        default :
            break;
    }
}
}

```

3 Operation

Once the EVM is powered ON, the TPL5010 starts working. Refer to the TPL5010 datasheet ([SNAS651](#)) for further details on the timing:

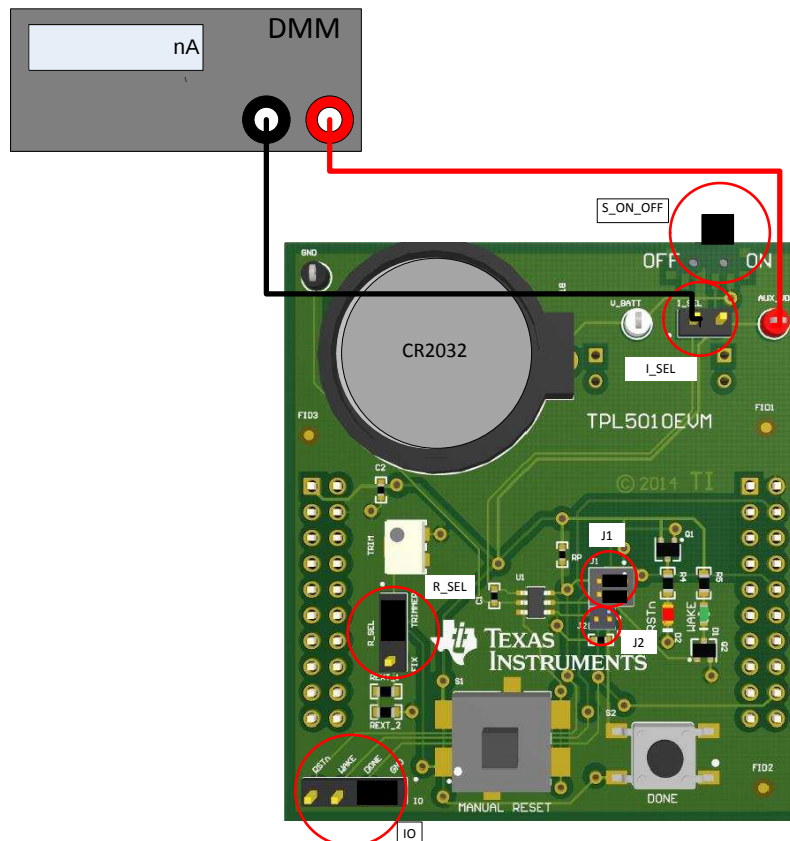
- Configure the trimmer equal to 5 k Ω to set a time interval of 1 s.
- When an RSTn pulse is generated by the TPL5010, the red LED (D2) is turned on. The green LED (D1) is turned on when a WAKE signal is generated by the TPL5010.
- If the DONE switch (S2) is pushed, a DONE pulse is sent to the TPL5010. If the DONE pulse is sent within the programmed time interval, at the next cycle the green LED (D1) is turned ON.
- When the M_RST switch (S1) is pushed, a manual reset pulse is sent to the TPL5010. For both DONE and M_RST pulses, the width of the pulse is proportional to the pressure time. While the M_RST switch is pressed the red LED turns ON.

3.1 Supply Current Measurement

3.1.1 Supply Current Measurement of the TPL5010 Only

First, turn off the EVM (ON/OFF switch to OFF position), then disconnect the EVM from the LaunchPad or microcontroller, in order to not load the digital output pins of the DUT.

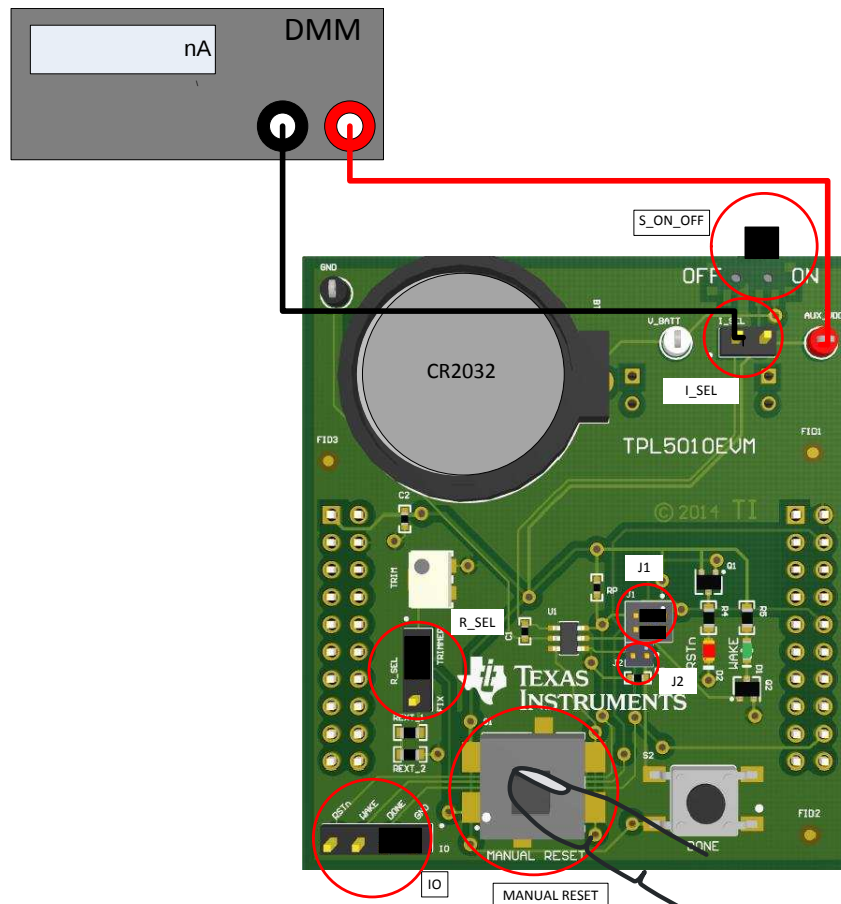
- Leave the I_SEL jumper open.
- **Do not leave digital input pins floating;** Short the DONE pin (second pin of IO header) to GND (first pin of IO header), turn OFF the Q1 and Q2 MOSFET (as explained in [Table 3](#)).
- Connect a digital multimeter, configured as the current meter (able to measure nA), between AUX_VDD and pin 1 of I_SEL.
- Turn on the EVM (ON/OFF switch to ON position).
- Read the current consumption on the DMM.



3.1.2 Supply Current Measurement of the TPL5010 During the Reading of the Resistance

First, turn off the EVM (ON/OFF switch to OFF position), then disconnect the EVM from the LaunchPad or your microcontroller, in order to not load the digital output pins of the DUT.

- Leave the I_SEL jumper open.
- **Do not leave digital input pins floating;** Short the DONE pin (second pin of IO header) to GND (first pin of IO header), turn OFF the Q1 and Q2 MOSFET (as explained in [Table 3](#)).
- Connect a digital multimeter, configured as the current meter (able to measure nA), between AUX_VDD and pin 1 of I_SEL.
- Keep the MANUAL_RST switch pressed while turning ON the EVM.
- Turn on the EVM (ON/OFF switch to ON position).
- Read the current consumption on the DMM.



3.1.3 Supply Current Measurement of the TPL5010 With Microcontroller

First, turn off the EVM (ON/OFF switch to OFF position):

- Load the code into the microcontroller.
- Connect the microcontroller to the EVM, refer to [Section 2.3.3](#).
- Install the I_SEL jumper.
- **Do not leave digital input pins floating**; Ensure that the DONE signal is controlled by the microprocessor, turn OFF the Q1 and Q2 MOSFET (as explained in [Table 3](#)).
- Connect a digital multimeter, configured as the current meter (able to measure nA), between V_BATT test point and AUX_VDD test point.
- Leave the EVM OFF (ON/OFF switch to OFF position).
- Read the current consumption on the DMM while pressing the MANUAL_RESET switch.

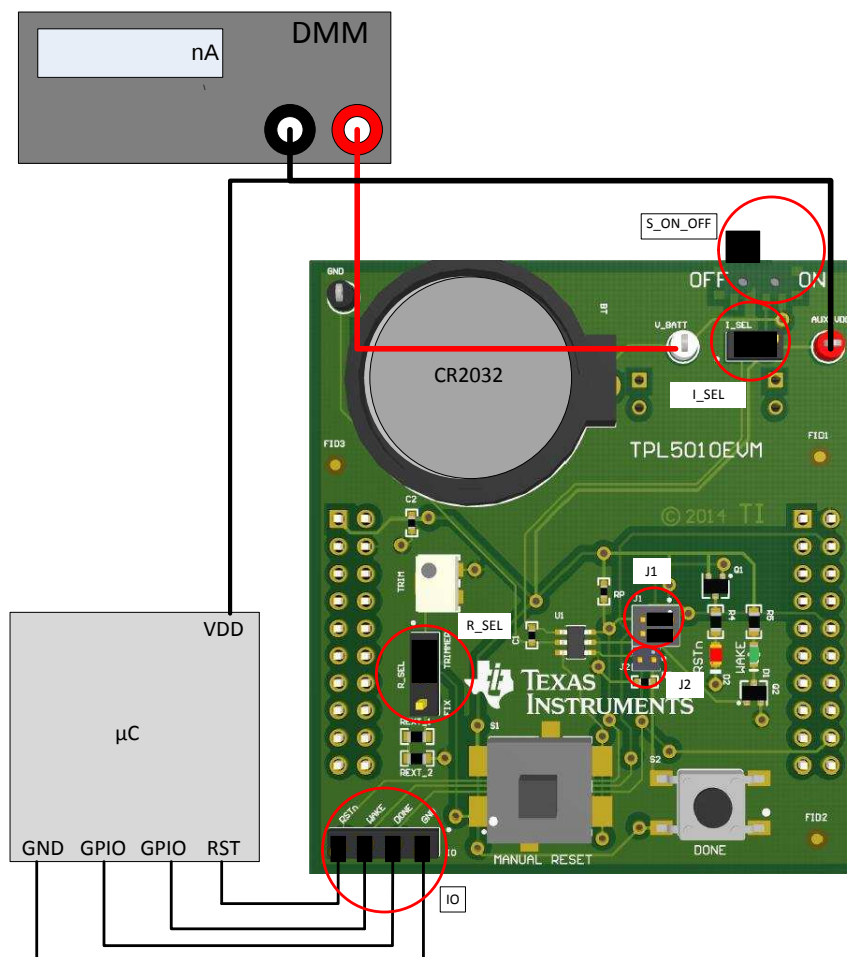


Figure 12. Current Measurement Setup – TPL5010 With Microcontroller

4 Board Layout

Figure 13 and Figure 14 illustrate the TPL5010EVM board layouts.

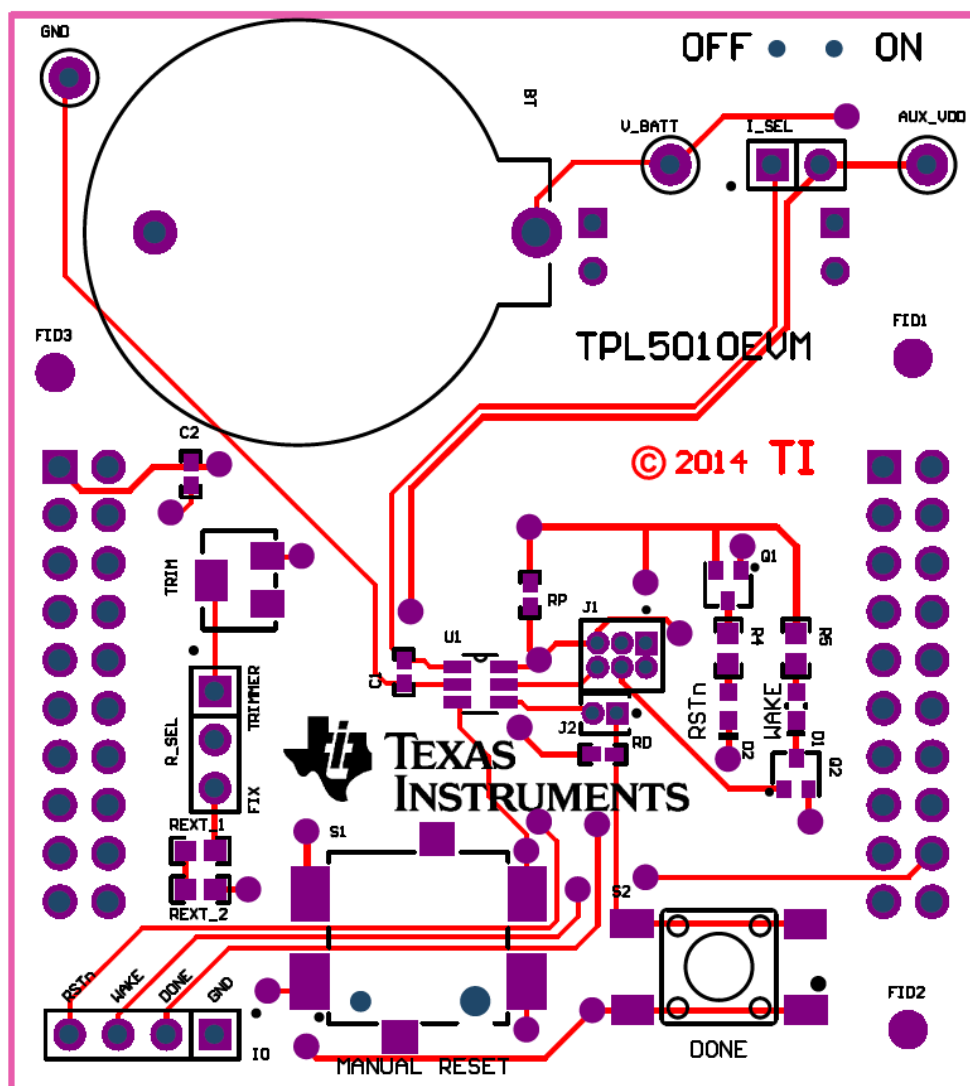


Figure 13. Top Layer

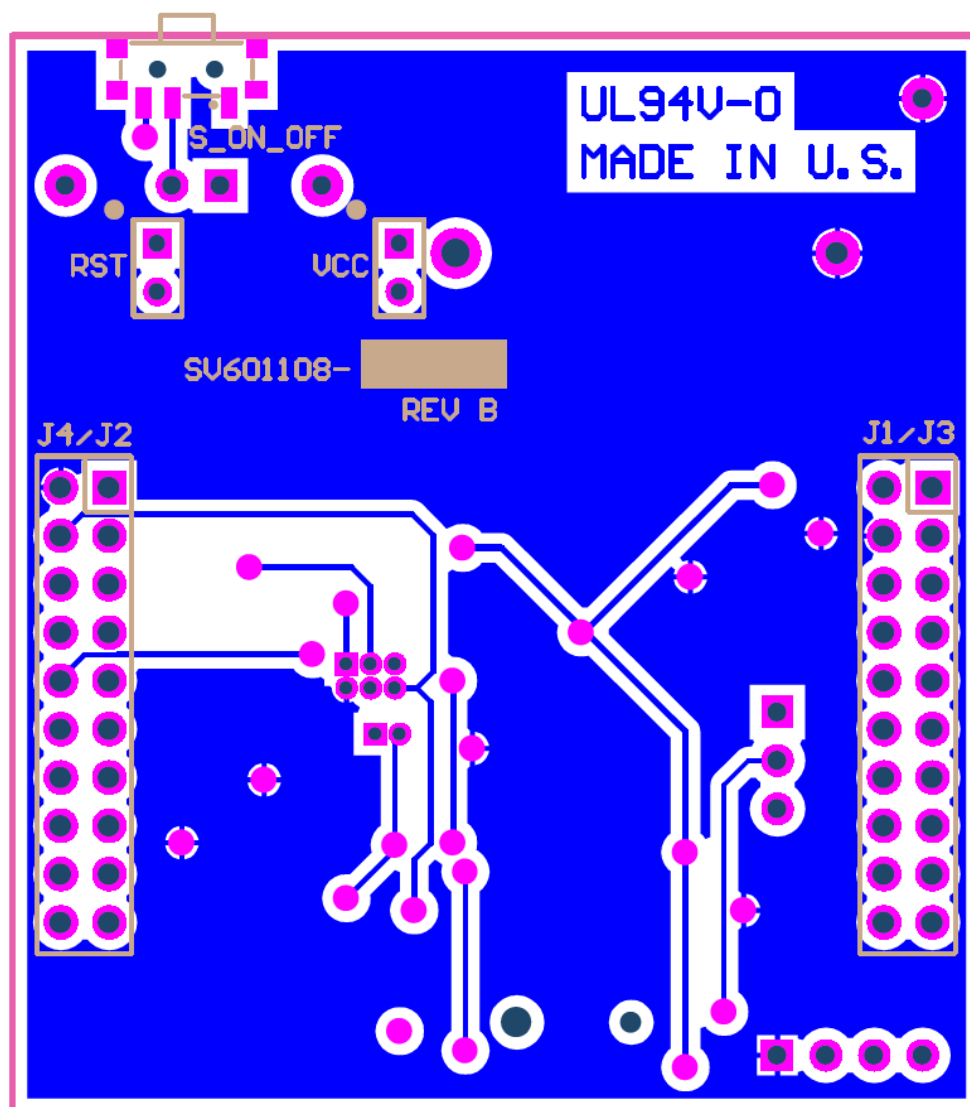


Figure 14. Bottom Layer

Figure 15 illustrates the TPL5010EVM schematic.

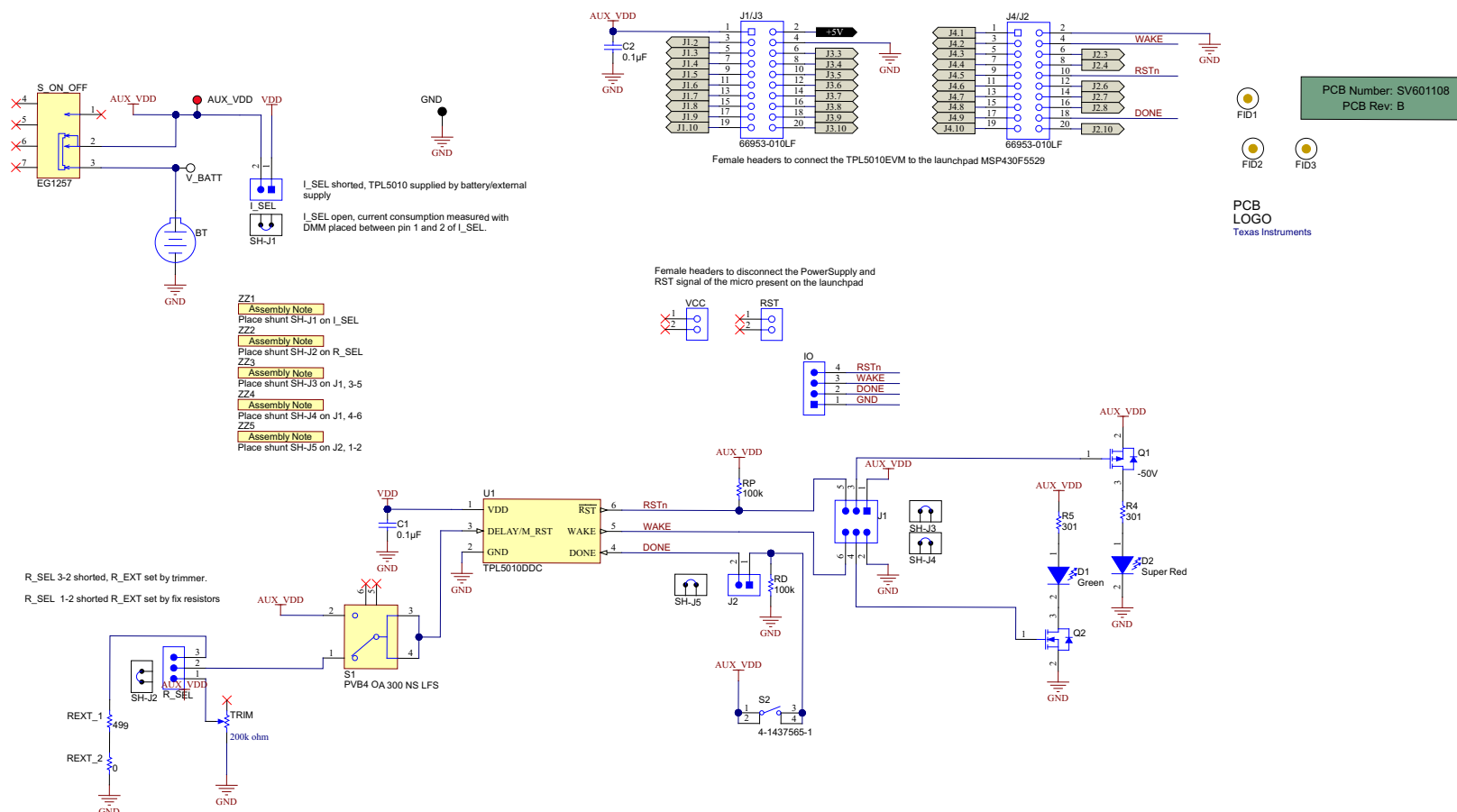


Figure 15. TPL5010EVM Schematic

6 Bill of Materials

Table 6 lists the TPL5010EVM BOM.

Table 6. TPL5010EVM Bill of Materials

Designator	Description	Manufacturer	Part Number	Quantity
AUX_VDD	Test Point, TH, Miniature, Red	Keystone	5000	1
BT	Battery Holder, CR2032, Retainer clip, TH	Memory Protection Devices	BS-7	1
C1, C2	CAP, CERM, 0.1uF, 6.3V, +/-10%, X5R, 0402	TDK	C1005X5R0J104K	2
D1	LED, Green, SMD	OSRAM	LG L29K-G2J1-24-Z	1
D2	LED, Super Red, SMD	Lumex	SML-LX0603SRW-TR	1
GND	Test Point, TH, Miniature, Black	Keystone	5001	1
IO	Header, 100mil, 4x1, Gold, TH	Samtec	TSW-104-07-G-S	1
I_SEL	Header, TH, 100mil, 2x1, Gold plated, 230 mil above insulator	Samtec	TSW-102-07-G-S	1
J1	Header, 50mil, 3x2, Gold, TH	Sullins Connector Solutions	GRPB032VWVN-RC	1
J2	Header, 50mil, 2x1, Gold, TH	Sullins Connector Solutions	GRPB021VWVN-RC	1
J1/J3, J4/J2	Receptacle, 100mil, 10X2, TH	FCI	66953-010LF	2
Q1	MOSFET, P-CH, -50V, -0.13A, SOT-323	Diodes Inc.	BSS84W-7-F	1
Q2	MOSFET, N-CH, 50V, 0.2A, SOT-323	Diodes Inc.	BSS138W-7-F	1
R4, R5	RES, 301 ohm, 1%, 0.1W, 0603	Vishay-Dale	CRCW0603301RFKEA	2
REXT_1	RES, 499 ohm, 0.1%, 0.1W, 0603	Susumu Co Ltd	RG1608P-4990-B-T5	1
REXT_2	RES, 0 ohm, 5%, 0.1W, 0603	Vishay-Dale	CRCW06030000Z0EA	1
RD, RP	RES, 100k ohm, 5%, 0.063W, 0402	Vishay-Dale	CRCW0402100KJNED	2
RST, VCC	Connector, Receptacle, 100mil, 2x1, Gold plated, TH	TE Connectivity	5-534206-1	2
R_SEL	Header, TH, 100mil, 3x1, Gold plated, 230 mil above insulator	Samtec, Inc.	TSW-103-07-G-S	1
S1	Switch, Pushbutton, SPDT, 0.1A 14V	C&K Components	PVB4 OA 300 NS LFS	1
S2	Switch, Tactile, SPST-NO, 0.05A, 12V, SMT	TE Connectivity	4-1437565-1	1
SH-J1, SH-J2	Shunt, 100mil, Gold plated, Black	3M	969102-0000-DA	2
SH-J3, SH-J4, SH-J5	Mini Shunt, Closed Top, 650 V AC, -45 to 85°C, Pitch 1.27 mm, Height 3 mm, RoHS	Sullins Connector Solutions	NPB02SVAN-RC	3
S_ON_OFF	Switch, Slide, SPDT, 0.3A, SMT	E-Switch	EG1257	1
TRIM	TRIMMER, 200K, 0.25W, SMD	Bourns	3224W-1-204E	1
U1	Ultra-Low Power System Timer with Watchdog functionality and Manual Reset, DDC0006A	Texas Instruments	TPL5010DDC	1
V_BATT	Test Point, Miniature, White, TH	Keystone	5002	1

STANDARD TERMS AND CONDITIONS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, or documentation (collectively, an "EVM" or "EVMs") to the User ("User") in accordance with the terms and conditions set forth herein. Acceptance of the EVM is expressly subject to the following terms and conditions.

- 1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM ("Software") shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms and conditions that accompany such Software
- 1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

- 2 *Limited Warranty and Related Remedies/Disclaimers:*

- 2.1 These terms and conditions do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.
- 2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI. Moreover, TI shall not be liable for any defects that result from User's design, specifications or instructions for such EVMs. Testing and other quality control techniques are used to the extent TI deems necessary or as mandated by government requirements. TI does not test all parameters of each EVM.
- 2.3 If any EVM fails to conform to the warranty set forth above, TI's sole liability shall be at its option to repair or replace such EVM, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

- 3 *Regulatory Notices:*

- 3.1 *United States*

3.1.1 *Notice applicable to EVMs not FCC-Approved:*

This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

3.2 Canada

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

3.3 Japan

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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2. 実験局の免許を取得後ご使用いただく。
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3.3.3 *Notice for EVMS for Power Line Communication:* Please see http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_02.page
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4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMS are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMS, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

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