IS32LT3181 Evaluation Board User's Manual

Rev. B

2025-06-14

GENERAL DESCRIPTION

IS32LT3181 integrates high current LED driver and touch-key controller with built-in MCU allowing intelligent control and flexibility to suite various automotive applications such as map/dome lights. It also includes BCM or PWM interface for controlling the LED and touch key status reporting.

The IS32LT3181 integrates key functional features for developing compact map lighting with touch buttons, reset buttons, or self-locking switches ECU nodes. An integrated low-drop voltage regulator to support internal circuit operation. It can sink a constant current of 150mA. It also Integrates a highly anti-interference touch controller and active proximity sensor. To minimize current consumption, IS32LT3181 supports a Sleep mode to power down with wake-up capability via the BCM control signal or touch key. The integrated MCU is an 8051 based CPU core with 48KB embedded flash with ECC and 2KB SRAM.

IS32LT3181 offers strong Electro Static Discharge (ESD) performance and can withstand high voltages on the BCM pin. BCM control signal is designed to minimize Electro Magnetic Emissions (EME).

APPLICATIONS

- Demo light
- Map/Reading light
- Trunk and glove box light
- Door handle

FEATURES

- Wide supply voltage 5.5V ~ 18V continuous with max input voltage up to 40V
  - Battery under-voltage and over-voltage detection
  - 5V LDO output can support 20mA external load
  - Low voltage detection for 5V LDO output
- Sleep mode supply current 50μA(max) with wake-up via BCM or touch key
- Integrated MCU for BCM control signal decoding
  - 1-T enhance 8051 core
  - Enhanced math processor for multiply and division
  - 16MHz (±2%) internal IOSC
  - 128KHz slow OSC
  - 3 watchdog timers, one 30-bit watchdog and one 16-bit window watchdog timer with system clock, one watchdog with independent SOSC clock
  - 48KB Flash, each nibble is protected by ECC for single bit detection and correction
  - 2KB SRAM
  - Timer/Capture/Comparator
  - GPIO and external interrupt and wake-up
  - 12-Bit SAR ADC with conversion time up to 10μs
  - On-chip temperature sensor
- LED controller and drivers
  - 100/150mA +/-5% accuracy after calibration
  - 256 steps (8-bit) DC current adjustment
  - LED short/open detection
  - 12 or 8+4 bit PWM, full on/off
  - Independent spread spectrum 16MHz clock
  - One PWM channel output through GPIO
- Touch controller
  - Up to 20-bit resolution
  - Up to 2 self-capacitance sensing touch keys
  - Shield output for water resistance
  - Parasitic capacitance compensation
  - Active proximity sensing also supports mutual capacitance sensing
  - Hardware wakeup in sleep mode
- GPIO
  - 1 HVIO shared with BCM
  - 1 HVIO shared with LED
  - 3 LVIO
  - Multifunction for each GPIO
- SOP-8 with exposed pad (SOP-8-EP) package
- AEC-Q100 Grade 1 ambient temperature range -40°C to 125°C
- RoHS, Halogen-Free and TSCA Compliance

QUICK START

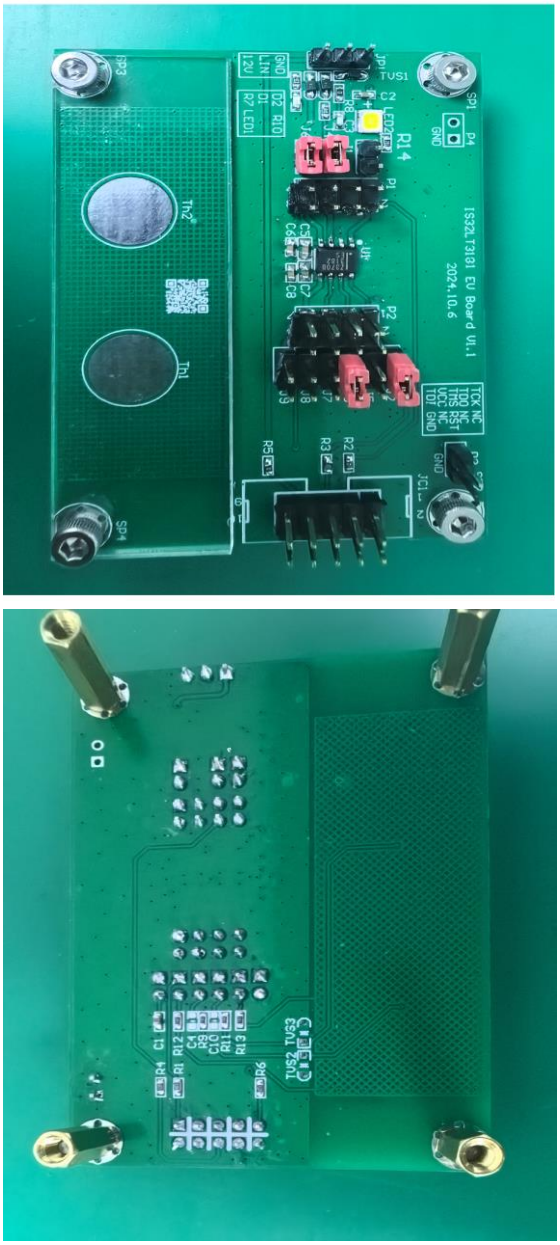


Figure 1: Photo of IS32LT3181 Evaluation Board

RECOMMENDED EQUIPMENT

- 8V~36V, 1.0A power supply

ABSOLUTE MAXIMUM RATINGS

- ≤ 40V power supply

Caution: Do not exceed the conditions listed above, otherwise the board will be damaged.

PROCEDURES OF SETTING EVALUATION BOARD

The IS32LT3181 Evaluation Board (EVB) is fully assembled and tested. Follow the steps listed below to verify board operation.

Caution: Do not turn on the power supply until all connections are completed.

1) Short JP9 jumper (Connect EzISP board output 5V to IS32LT3181 VDD5V) if power source is from EzISP Board. Else please keep it open.

EzISP PROGRAMMING BOARD OPERATION

The IS32LT3181 offers flexible flash programming via the Programming Mode of the EzISP Board. The Programming Mode of the EzISP Board require 7 pins of hardware (TRST, TCK, TMS, TDO, TDI, VCC(5V), GND).

When using the BCM-ISP Board to adjust Active Proximity Sensor parameters, the BCM-ISP Board require 3 pins of hardware (BAT_IN(12V), BCM, GND).

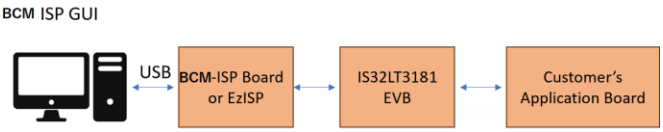


Figure 2: IS32LT3181 EVB Connection Block Diagram

ORDERING INFORMATION

Part No.	Temperature Range	Package	Remark
IS32LT3181-GRLCA3-EB	-40°C to +125°C	SOP-8-EP	Mandatory
EzISP Board	-40°C to +85°C	-	Optional
BCM-ISP_BOARD	-40°C to +85°C	-	Mandatory

Table 1: Ordering Information

For pricing, delivery, and ordering information, please contact LUMISSIL's marketing and sales team at http://www.lumissil.com/company/office-locations or +1-408-969-5100.

SOFTWARE SUPPORT START UP THE GUI WITH IS32LT3181 EVB

When using EzISP Board to program, two-step setup (Please refer to **Figure 2: IS32LT3181 EVB Connection Block Diagram**.):

1) Connect the USB cable between the USB port of the EzISP Board and the USB port of the PC.
2) Connect a 7-pin EzISP Board connector between the EzISP Board and the IS32LT3181 EVB.



Figure 3: Connection of IS32LT3181 EVB and EzISP Board

When using the BCM-ISP Board to program the user code, two-step setup (Please refer to **Figure 2: IS32LT3181 EVB Connection Block Diagram**.):

1) Connect the USB cable between the USB port of the BCM-ISP Board and the USB port of the PC.
2) Connect a 3-pin BCM-ISP Board connector between the BCM-ISP Board and the IS32LT3181 EVB.

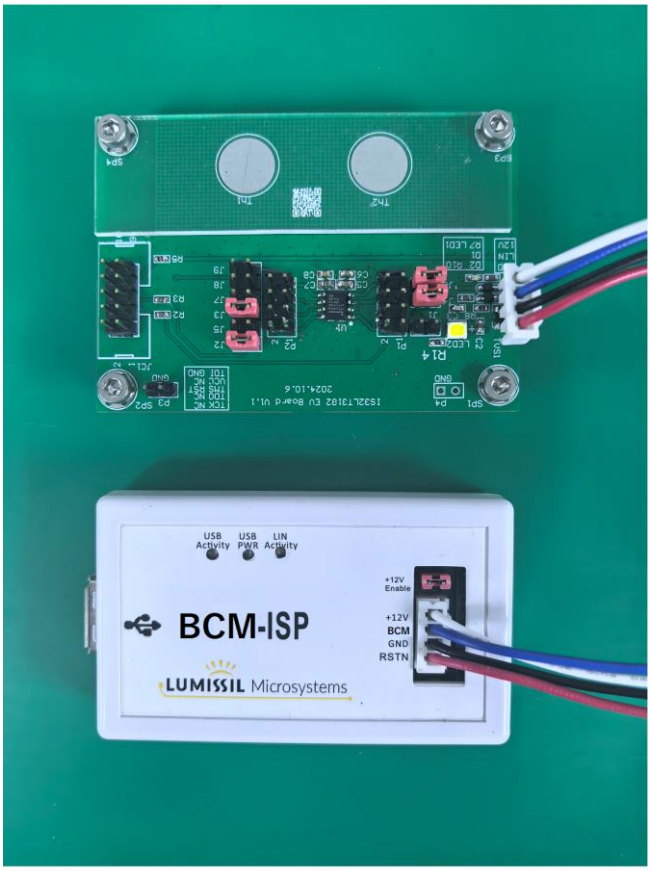


Figure 4: Connection of IS32LT3181 EVB and BCM-ISP Board

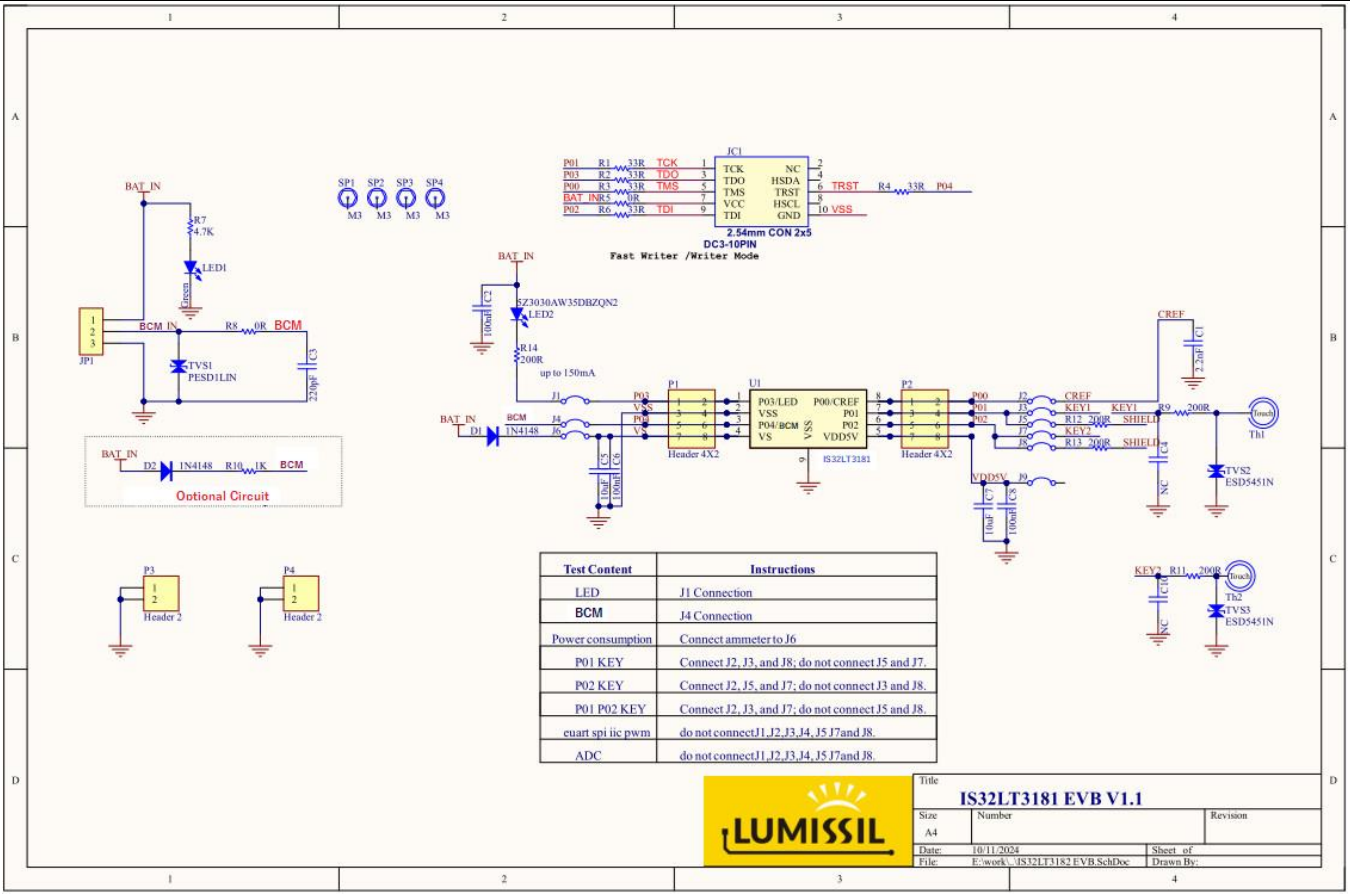


Figure 5: IS32LT3181 EVB Application Schematic

EVB SCHEMATIC

1) When Using EzISP Board to Program, the J9 jumper of IS32LT3181 EVB must be kept short.
2) Use +12V DC output power adapter as power supply source, the J6 jumper of IS32LT3181 EVB must be kept short.
3) When Using the Active Proximity Sensor function, the J1、J2、J3、J4、J6 and J7 jumper of IS32LT3181 EVB must be kept short.

BILL OF MATERIALS

Component Name	Description	Designator	Footprint	Quantity	Value3
0603 10nF 50V X7R 10%	0603 100nF 50V X7R 10%	C1	C 0603_L	1	2.2nF
0603 10nF 50V X7R 10%	0603 10nF 50V X7R 10%	C2, C6, C8	C 0603_L	3	100nF
0603 10nF 50V X7R 10%	0603 10nF 50V X7R 10%	C3	C 0603_L	1	220pF
0603 10nF 50V X7R 10%	0603 10nF 50V X7R 10%	C4, C10	C 0603_L	2	NC
0603 10nF 50V X7R 10%	0603 10nF 50V X7R 10%	C5, C7	C 0805_L	2	10uF
1N4148	高速开关二极管	D1, D2	SOD-323	2	
Jump	跳线	J1, J2, J3, J4, J5, J6, J7, J8, J9	HDR2.54-LI-2P	9	
2.54mm CON 2x5		JC1	CONN_IDC_5X2_2.54	1	
HDR-1X3	3P 接插件	JP1	HDR2.54-LI-3P	1	
Green	方形 LED	LED1	LED 0603G	1	
5Z3030AW35DBZQN2	方形 LED	LED2	LED-SMD_L3.0-W3.0_WHITE-1	1	
Header 4X2	Header, 4-Pin, Dual row	P1, P2	HDR2X4	2	
Header 2	Header, 2-Pin	P3, P4	HDR1X2	2	
0603 100R 1/10W 1%	0603 100R 1/10W 1%	R1, R2, R3, R4, R6	R 0603_L	5	33R
0603 100R 1/10W 1%	0603 100R 1/10W 1%	R5, R8	R 0603_L	2	0R
0603 100R 1/10W 1%	0603 100R 1/10W 1%	R7	R 0603_L	1	4.7K
0603 100R 1/10W 1%	0603 100R 1/10W 1%	R10	R 0603_L	5	200R
0603 100R 1/10W 1%	0603 100R 1/10W 1%	R10	R 0603_L	1	1K
M3	铜柱	SP1, SP2, SP3, SP4	M3x4_N	4	
Touch 10X10mm	触控焊盘	Th1, Th2	TOUCH-10X10MM	2	
PESD1BCM	瞬态电压抑制二极管	TVS1	SOD-323	1	
ESD5451N	瞬态电压抑制二极管	TVS2, TVS3	SOD-323	2	
IS32LT3181		U1	SOP8_L	1	

Table 2: Bill of Materials, refer to Figure 5.

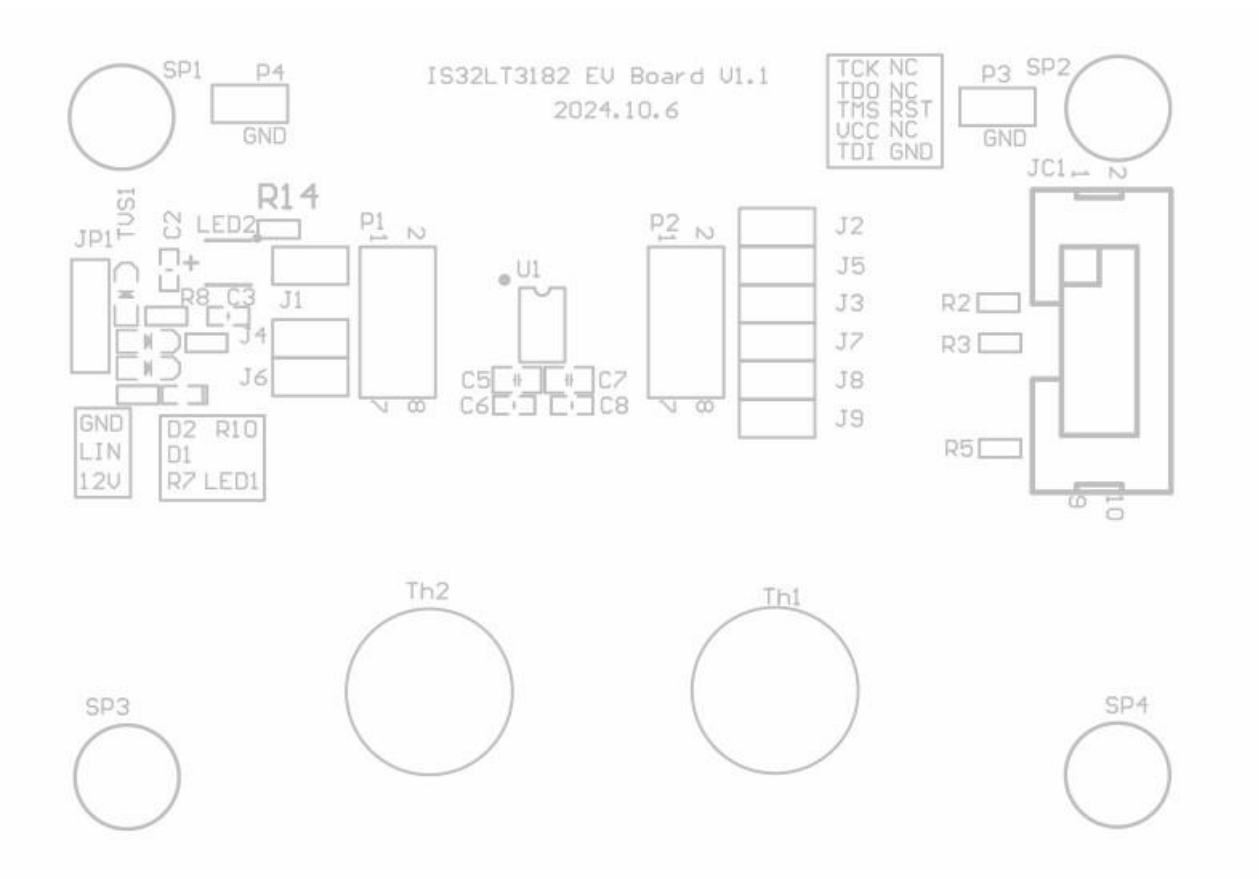


Figure 6: IS32LT3181 EVB Component Placement Guide - Top Layer

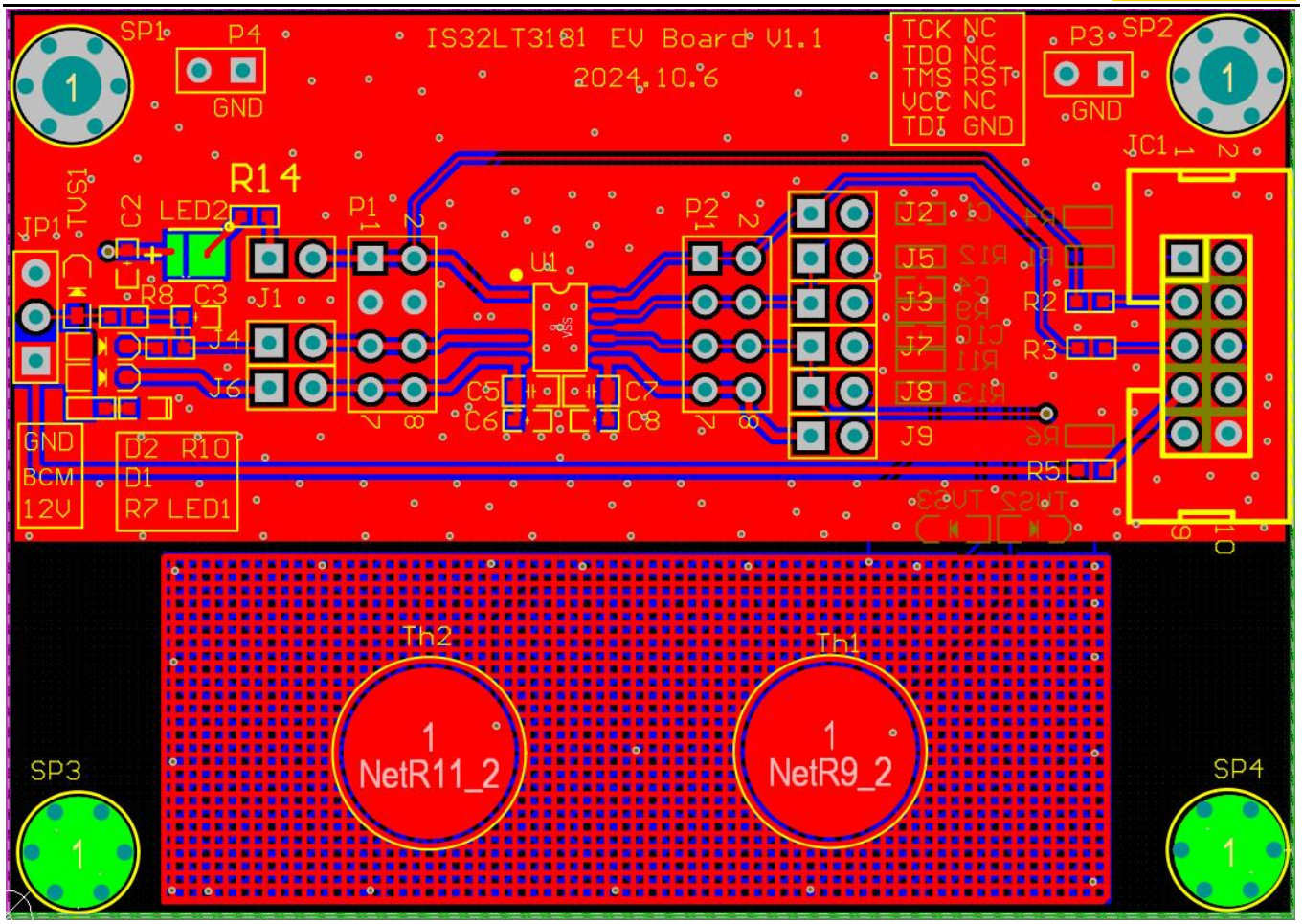


Figure 7: IS32LT3181 EVB PCB Layout - Top Layer

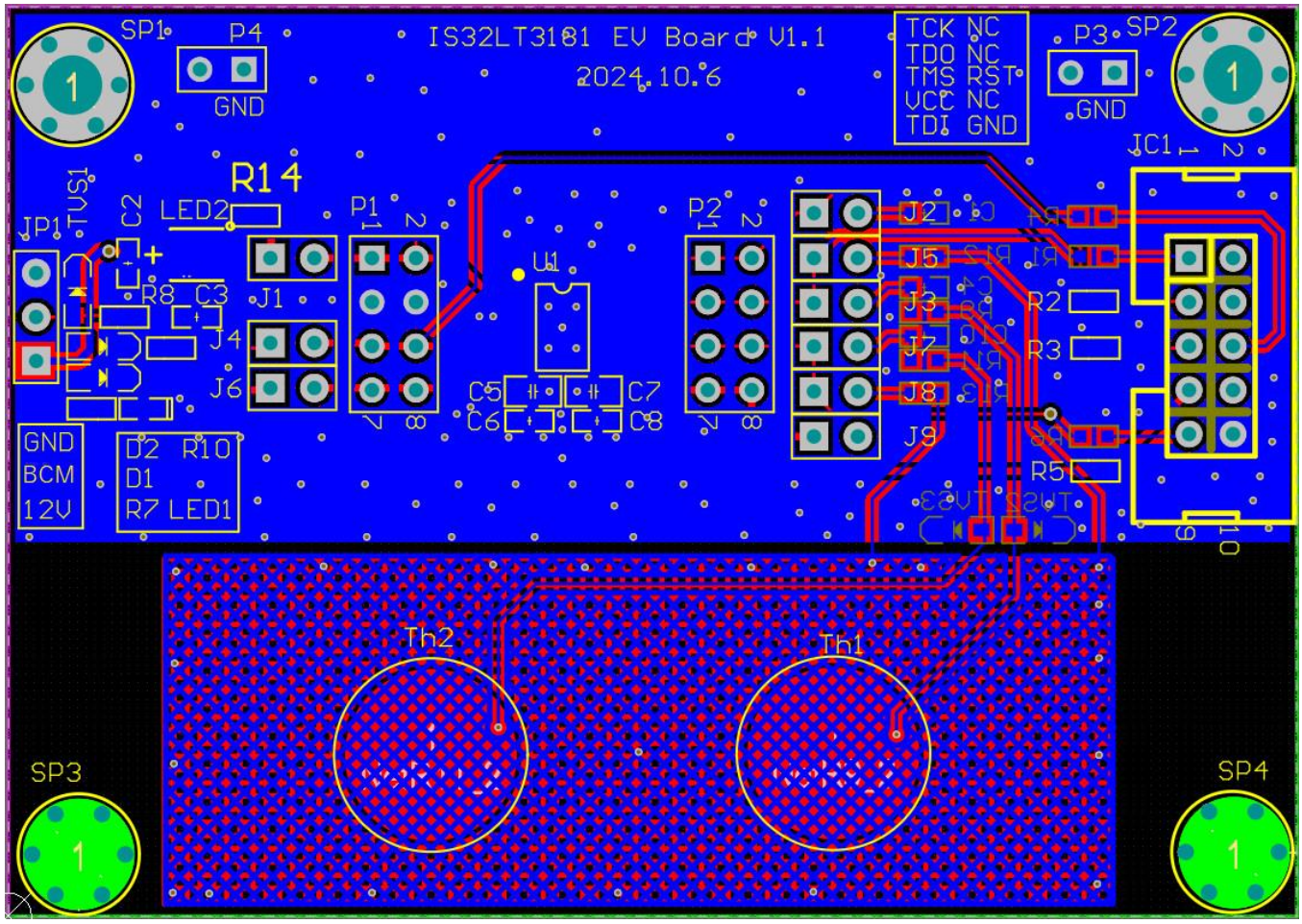


Figure 8: IS32LT3181 EVB PCB Layout - Bottom Layer

REVISIONS

Revision	Detailed Information	Date
A	Initial release	2024.11.11
B	Update ordering information	2025.06.14

Copyright © 2025 Lumissil Microsystems. All rights reserved. Lumissil Microsystems reserves the right to make changes to this specification and its products at any time without notice. Lumissil Microsystems assumes no liability arising out of the application or use of any information, products or services described herein. Customers are advised to obtain the latest version of this device specification before relying on any published information and before placing orders for products.
Lumissil Microsystems does not recommend the use of any of its products in life support applications where the failure or malfunction of the product can reasonably be expected to cause failure of the life support system or to significantly affect its safety or effectiveness. Products are not authorized for use in such applications unless Lumissil Microsystems receives written assurance to its satisfaction, that:
a.) the risk of injury or damage has been minimized;
b.) the user assumes all such risks; and
c.) potential liability of Lumissil Microsystems is adequately protected under the circumstances.