

DESCRIPTION

The IS32LT3136 is a high side output linear programmable current regulator consisting of 32 output channels designed for automotive O/LED lighting applications. It has a UART interface compatible with CANFD PHY for communication with a master microcontroller or ECU. It uses a command and response protocol mastered by the host microcontroller to read and write the registers to and from one or multiple IS32LT3136 devices.

The IS32LT3136 is suitable to drive OLED panel with common cathode. It guarantees up to 22V output driving capability to cover the OLED forward voltage wide spread. Each output can individually support 12-bit PWM dimming and 8-bit DC current adjustment to drive each pixel of the OLED panel independently. The outputs can provide higher current drive capability from 1mA up to 35mA.

For added system reliability, the IS32LT3136 integrates fault detection circuitry for open/short string, single LED short, and over temperature conditions. Faults are recorded in registers which can be accessed by an external MCU. To optimize EMI performance, the IS32LT3136 features spread spectrum on the internal PWM and LED channel outputs have programmable slew rate control to mitigate EMI and power supply inrush current.

The IS32LT3136 is targeted at the automotive market such as interior accent lighting and exterior tail lighting. It is offered in QFN-48 (6mm×6mm) package.

QUICK START

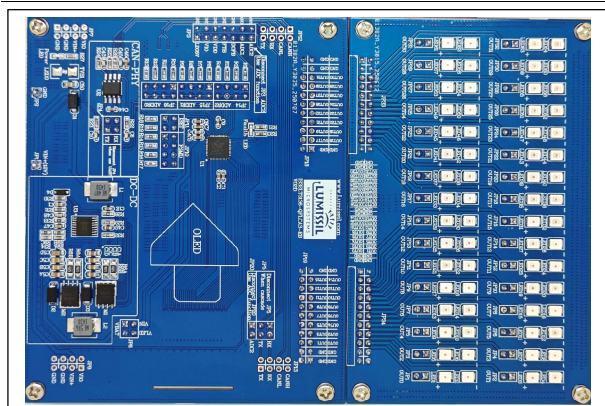


Figure 1 Photo of IS32LT3136 Evaluation Board

FEATURES

- Input VLED voltage tolerates up to 22V, nominal operation voltage between 4.5V to 20V
- UART Communication Interface
 - UART interface compatible with CANFD physical layer, 2MHz maximum (64MHz OSC)
 - UART communication with CRC to ensure robustness of communication
 - Support up to max.64addressable devices
 - Watch dog timer
 - Support Fail safe mode
- 32 channels capable of 35mA each
 - $\pm 4\%$ @ 1mA~35mA bit-to-bit output current mismatch
 - $\pm 4\%$ @ 1mA~35mA device-to-device output current accuracy
- Combined for higher current capability with same current accuracy
 - Minimum headroom voltage of 0.8V(Max.) at 15mA
- Individual PWM dimming to each channel
 - 4096 steps (12-bit) PWM duty cycle setting
 - 12-bit
 - 7+5-bit (with 5bits dithering)
 - 8-bit
 - Phase delay minimizes inrush current (8 groups)
- Slew rate control and spread spectrum optimize EMI performance
- 256 steps (8-bit) global current setting
- Individual 256 steps (8-bit) DC current adjustment to each channel
- Spread spectrum
- DC feedback for automatic DCDC VLED adjustment to optimize system power supply (DCFB)
- Programmable PWM frequency (8bit: 200Hz/300/400/500/700/1k/1.2k/1.4k, 8 options, 1.6kHz/3.2k/6.4k/ 12.8k/25.6k another 5 options, total 13 options)
- 10-bit ADC for pin voltage measurement
- Support on OTP for data storage with fail safe mode1
- Fault protection with reporting
 - Fail safe modes selection
 - LED string open/short detect
 - Single LED short detect
 - Programmable fault reporting delay time
 - Programmable over temperature current roll off
 - Thermal shutdown
 - CRC error detection
 - Overcurrent (ISET pin short to GND)
 - ISET pin open
 - Fault pin pull down fault
 - LED undervoltage
 - PWM loop back detect
 - SCA verification

- AEC-Q100 qualified with Temperature Grade 1: -40°C to 125°C
- Operating temperature range (-40°C ~ +125°C)
- QFN-48 (6mm×6mm) package
- Supports applications with safety requirements up to ASIL B
- RoHS & Halogen-Free Compliance
- TSCA Compliance

RECOMMENDED EQUIPMENT

- 12.0V, 3A power supply

ABSOLUTE MAXIMUM RATINGS

- ≤ 20V power supply

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

PROCEDURE

The IS32LT3136 evaluation board 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.

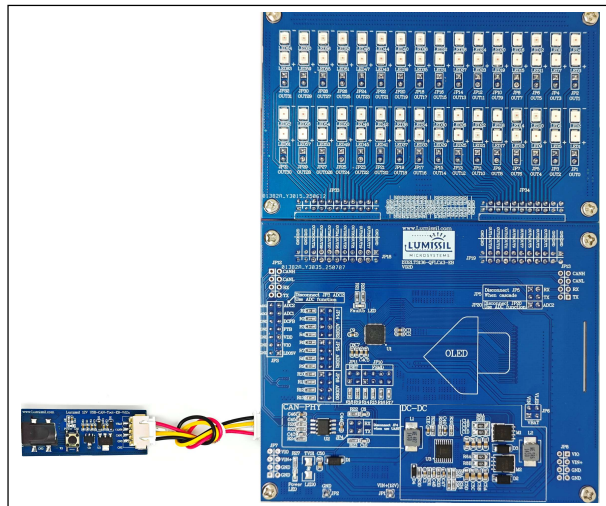


Figure 2 Photo of CAN & Power Module Connected to Evaluation Board

- Short JP14 R1 (ADDR2,10kΩ), JP15 R6 (ADDR1,10kΩ), JP16 R10 (ADDR0,10kΩ) header
- Short JP15, please open it when cascade
- Connect JP18/JP19 to LED board JP33/34 header or connect CN1 to OLED triangle board
- LED board short JP0~JP31 header
- Connect the DC-12V to JP1(12V), GND to JP2(GND) header, or connect CAN & Power Module (VIN+, CANH, CANL, GND) to CN2.
- Turn on the power supply. If the EVB no response, please check for circuit fault.

EVALUATION BOARD OPERATION

The IS32LT3136 ADDR0, ADDR1, ADDR2 for the device address to select jumpers, through different combinations can be set different device addresses, the default device address is 0x80 (R1, R6, R10). ISET is IS32LT3136 current setting item, R19 (33kΩ) corresponding to the channel output maximum 15mA current, R18 (20kΩ) corresponding to the channel output maximum 25mA current, the default connection to R19. FSMD is the IS32LT3136 fail-safe mode selection, the default connection R14 (10kΩ) is normal mode, R15, R16, R17 is different FSMD mode. Short R15 the device will enter fail-safe Mode 1 and the outputs will be determined by OTP (00h~29h) registers. Short R16 the device will enter fail-safe Mode 2 and all outputs will be forced into completely off. Short R17 the device will enter fail-safe Mode 3 and all outputs will be forced into fully on (with 98% PWM duty cycle).

- Short JP3 ADC2, please open it when use ADC function
- Short JP3 VIO to LDO5V
- Short JP4, please open it when use UART
- Short JP6 (VBAT connect VIN, VBAT connect VLED)
- Short JP10 R14 (FSMD,10kΩ) header, short JP11 R19 (ISET,33kΩ) header

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS32LT3136-QFLCA3-EB	-40°C to +125°C (Automotive)	QFN-48, Lead-free

Table 1 Ordering Information

For pricing, delivery, and ordering information, please contacts Lumissil's analog marketing team at analog@Lumissil.com or (408) 969-6600.

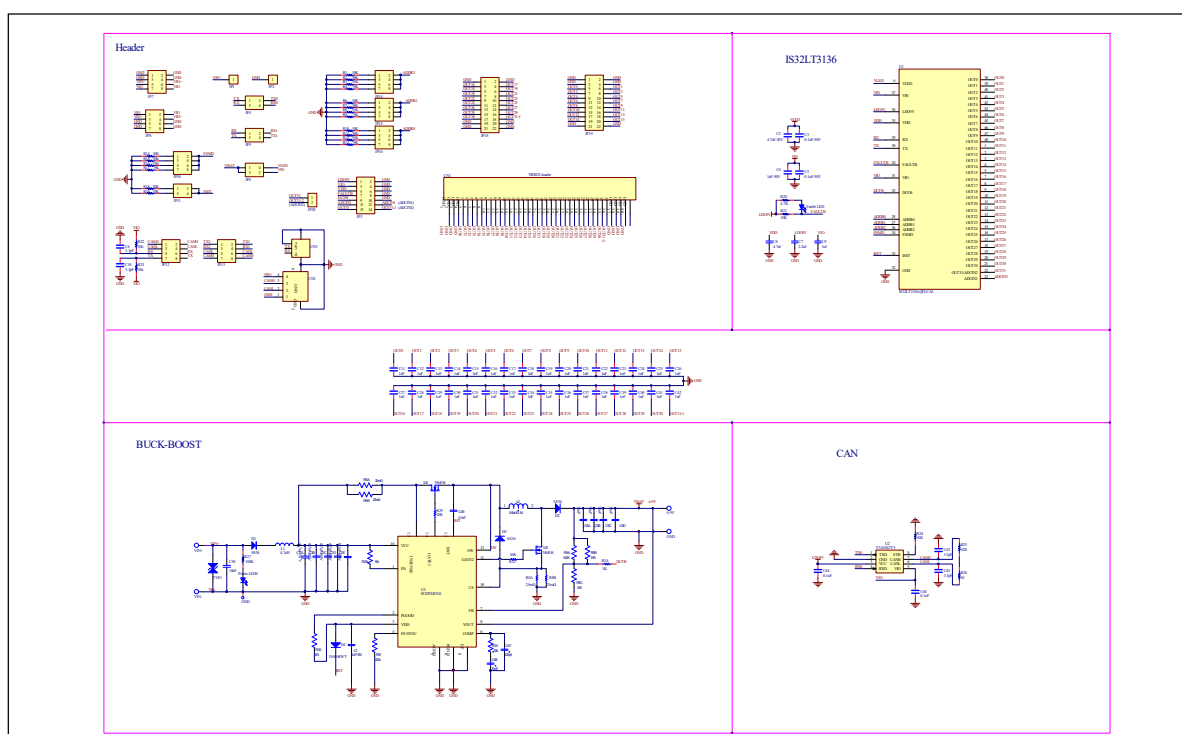


Figure 3 IS32LT3136-QFLCA3 Application Schematic

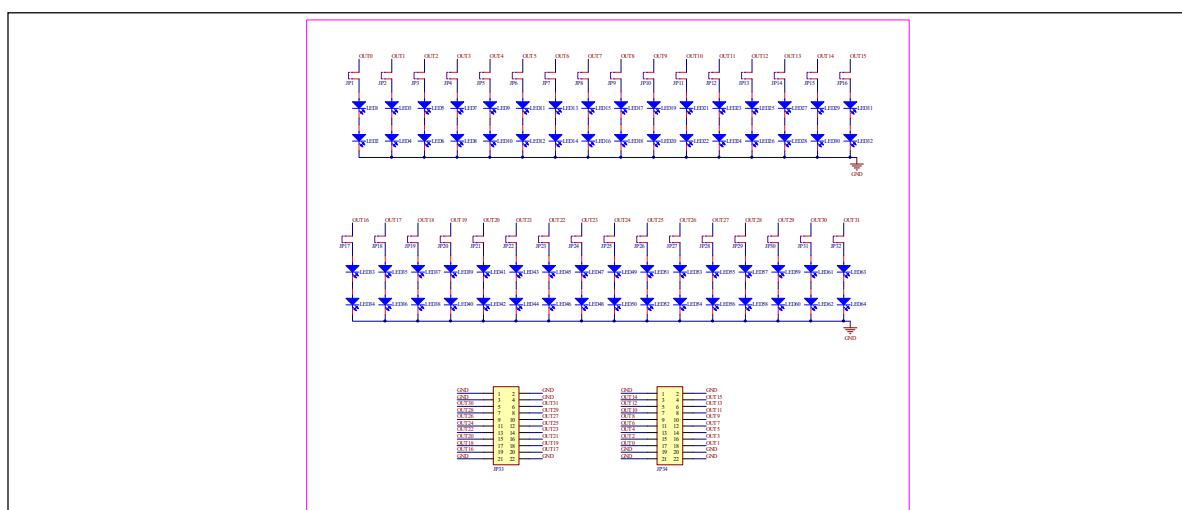


Figure 4 32 Channels LED Application Schematic

BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U1	LED Driver	1	Lumissil	IS32LT3136
CAN Transceiver	U2	Transceiver	1	NXP	TJA1042T/3/1J
DC-DC	U3	DC-DC IC	1	Lumissil	IS32PM3510
Schottky Diodes	D1, D2, D3	Diode,3A,60V, SMA	3	MDD	SS36
Schottky Diodes	D4	Diode,3A,60V, SOD-123	1	MDD	1N4148W
FPC-CONNECTOR	CN1	OLED FPC Connector, SMD, P=0.5mm	1	JS	AFC07-S40ECA-00
Connector	CN2	CAN & Power Connector, XH2.54	1	XUNPU	WAFER-XH2.54-4PWB
Connector	CN3	UART Connector, XH2.54	1	XUNPU	WAFER-XH2.54-3PWB
Inductance	L1	4.7uH	1	Wurth	74437334047
Inductance	L2	5.6uH	1	Wurth	74437334056
MOSFET	M1, M2	48A,60V, NMOS	2	DIODES	DMNH6021SPSQ
Resistor	R6A, R8B	RES,0.05R,1206, $\pm 1\%$, SMD	2	UNI-ROYAL	1206W4F500MT5E
Resistor	R6B	RES,0.1R,1206, $\pm 1\%$, SMD	1	UNI-ROYAL	1206W4F100LT5E
Resistor	R8A	RES,0.5R,1206, $\pm 1\%$, SMD	1	UNI-ROYAL	1206W4F500LT5E
Resistor	R29, R32	RES,10R,0603, $\pm 5\%$, SMD	2	Yageo	RC0603JR-0710RL
Resistor	R25, R26	RES,62R, 0603, $\pm 5\%$, SMD	2	Yageo	RC0603JR-0762RL
Resistor	R34	RES,1k,0603, $\pm 5\%$, SMD	1	Yageo	RC0603JR-0701KL
Resistor	R20	RES,4.7k, 0603, $\pm 5\%$, SMD	1	Yageo	RC0603JR-074K7KL
Resistor	R1, R6, R9C, R10, R14, R21, R22, R23, R24, R28	RES,10k,0603, $\pm 5\%$, SMD	10	Yageo	RC0603JR-0710KL
Resistor	R18	RES,20k,0603, $\pm 1\%$, SMD	1	Yageo	RC0603JR-0720KL
Resistor	R2, R7, R11, R15	RES,30k, 0603, $\pm 1\%$, SMD	4	Yageo	RC0603JR-0730KL
Resistor	R19, R33	RES,33k, 0603, $\pm 1\%$, SMD	2	Yageo	RC0603JR-0733KL
Resistor	R30	RES,47k,0603, $\pm 1\%$, SMD	1	Yageo	RC0603JR-0747KL
Resistor	R3, R8, R12, R16	RES,51k, 0603, $\pm 1\%$, SMD	4	Yageo	RC0603JR-0751KL
Resistor	R4, R9, R13, R17	RES,75k,0603, $\pm 1\%$, SMD	4	Yageo	RC0603JR-0775KL
Resistor	R9B	RES,91k,0603, $\pm 1\%$, SMD	1	Yageo	RC0603JR-0791KL
Resistor	R9A, R27	RES,100k,0603, $\pm 1\%$, SMD	2	Yageo	RC0603JR-0775KL
Resistor	R31	RES,120k,0603, $\pm 1\%$, SMD	1	Yageo	RC0603JR-0775KL
Capacitor	C6, C10, C43, C45	CAP,3.3pF,50V,0603, $\pm 8\%$, SMD	4	Yageo	CQ0603CRNPO9BN3R3

32 CHANNELS, LINEAR LED DRIVER

Capacitor	C47	CAP,33pF,50V, 0603, ±8%, SMD	1	Yageo	CQ0603CRNPO9BN3R3
Capacitor	C11~C42, C48	CAP,1nF,16V, 0603, ±5%, SMD	33	Yageo	CC0603JRX7R7BB102
Capacitor	C1E, C3, C5, C44, C46, C49	CAP,0.1μF,16V, 0603, ±20%, SMD	6	Yageo	CC0603MRX7R7BB104
Capacitor	C1, C4, C9	CAP,1μF,16V, 0603, ±20%, SMD	3	Yageo	CC0603MRX7R7BB104
Capacitor	C7	CAP,2.2μF,16V, 0603, ±20%, SMD	1	Yageo	CC0603MRX7R7BB104
Capacitor	C2, C8	CAP,4.7μF,50V, 0603, ±20%, SMD	2	Yageo	CC0603KKX5R9BB475
Capacitor	C1A, C1B, C1C, C1D	CAP,4.7μF,50V, 0805, ±20%, SMD	4	Yageo	CC0805KKX5R9BB475
Capacitor	C50, C5A, C5B, C5C, C5D	CAP,10μF,50V, 0805, ±20%, SMD	5	Yageo	CC0805MRX7R7BB105
LED	FAULTB LED	Diode, LED Red, SMD	1	Everlight	19-213/R6C-AN2Q1B/3T
LED	Power LED	Diode, LED Blue, SMD	1	Everlight	19-213/GHC-YR1S2M/3T
TVS	TVS1	NC			

Bill of Materials, refer to Figure 3 above.

FxLED 2×32 NUM ARRAY

Name	Symbol	Description	Qty	Supplier	Part No.
LED	LED1~LED64	Diode, 2835, Yellow, SMD	64	CHIPLED	GTG2835UYC-0.5W

Bill of Materials, refer to Figure 4 above.

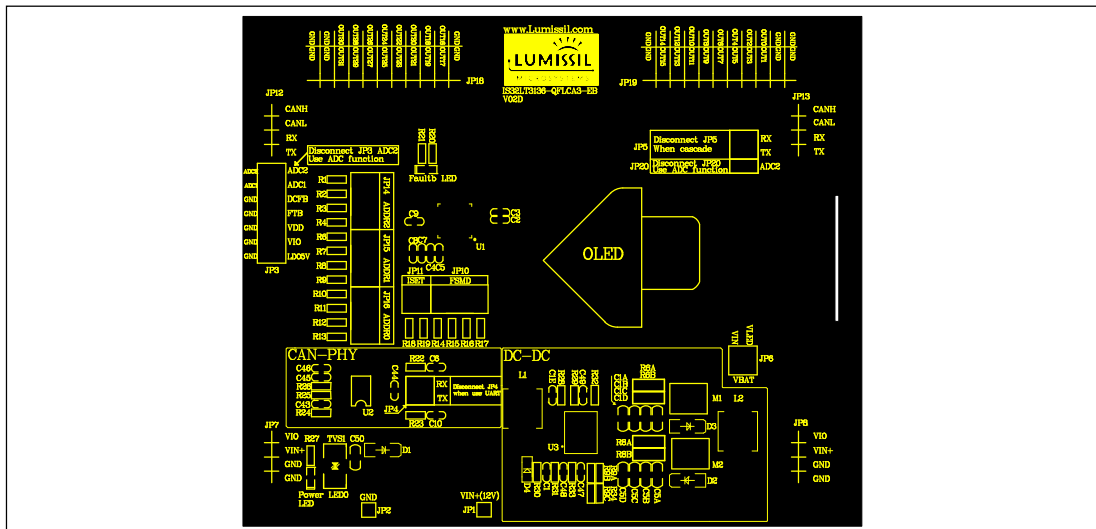


Figure 5 Board Component Placement Guide - Top Layer

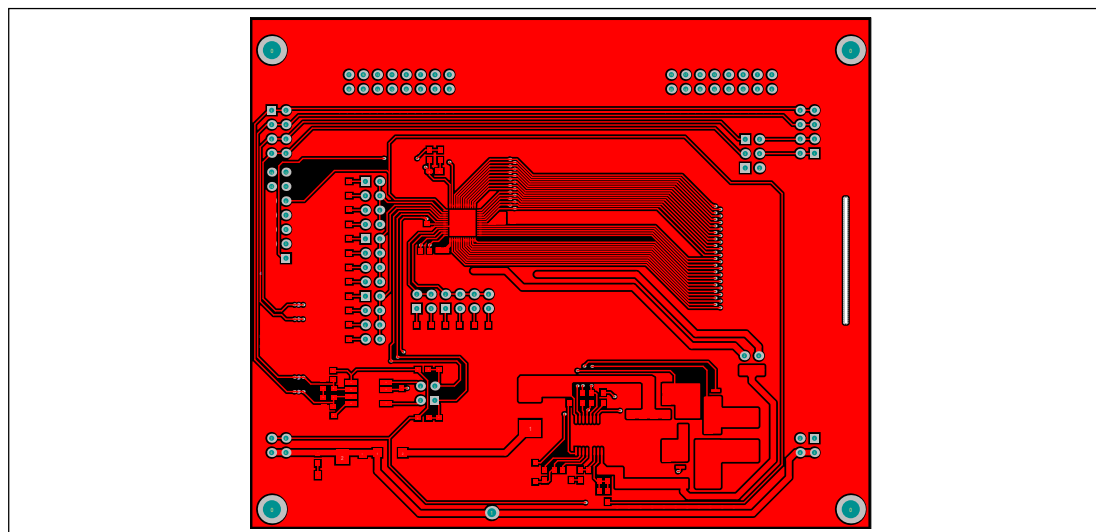


Figure 6 Board PCB Layout - Top Layer

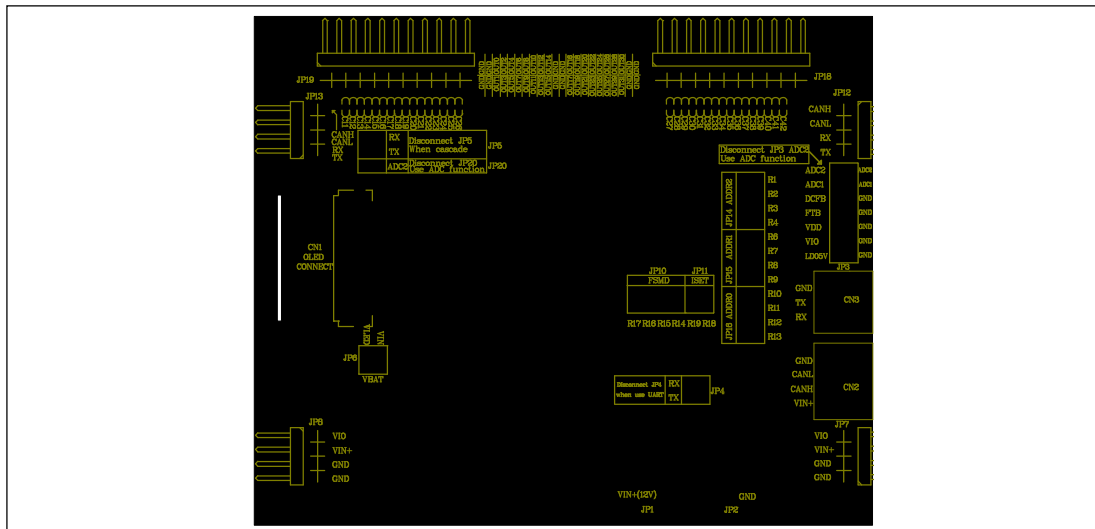


Figure 7 Board Component Placement Guide - Bottom Layer

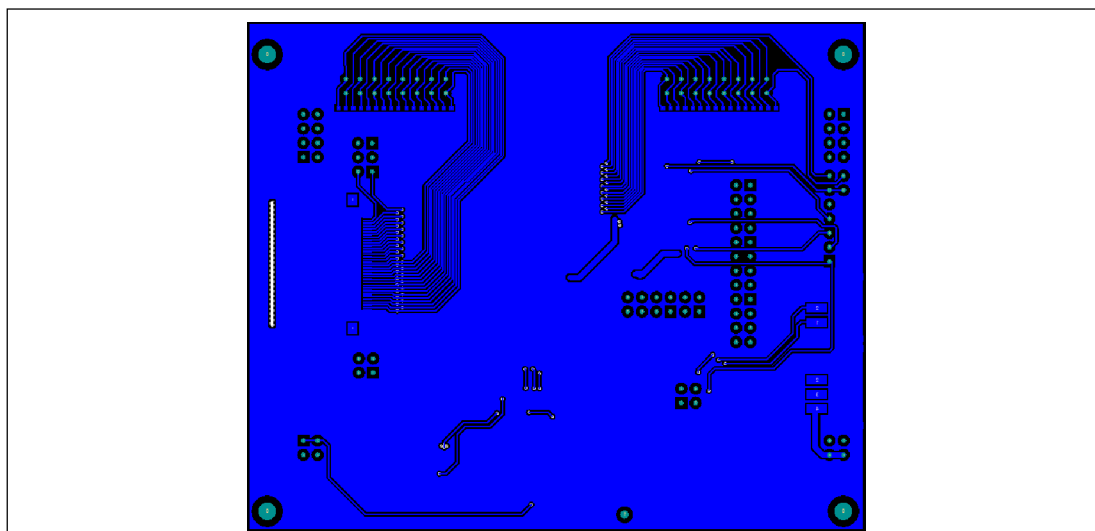
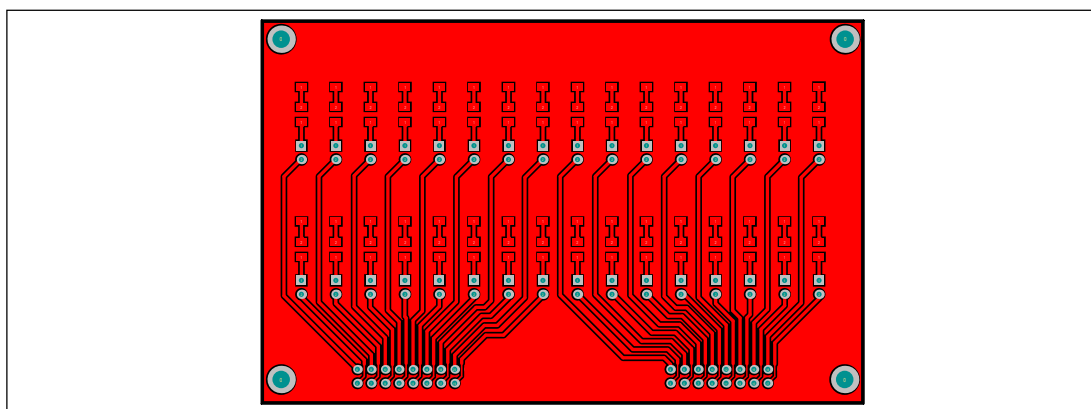
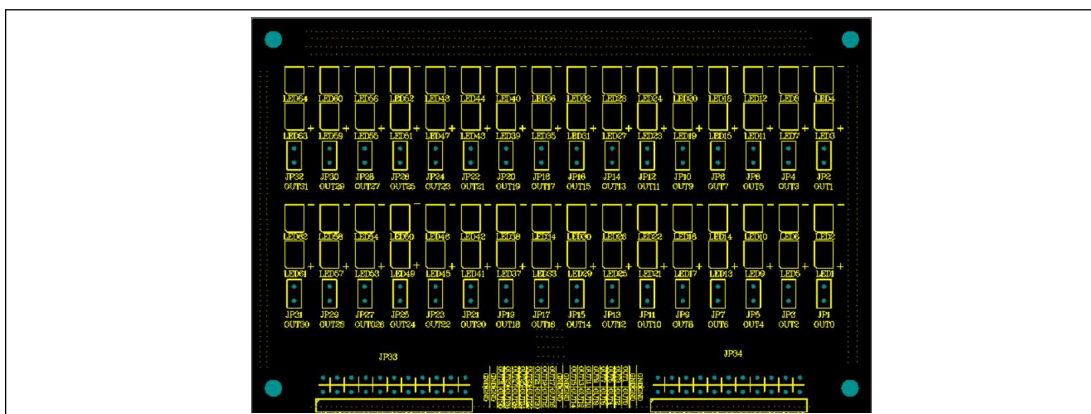


Figure 8 Board PCB Layout - Bottom Layer



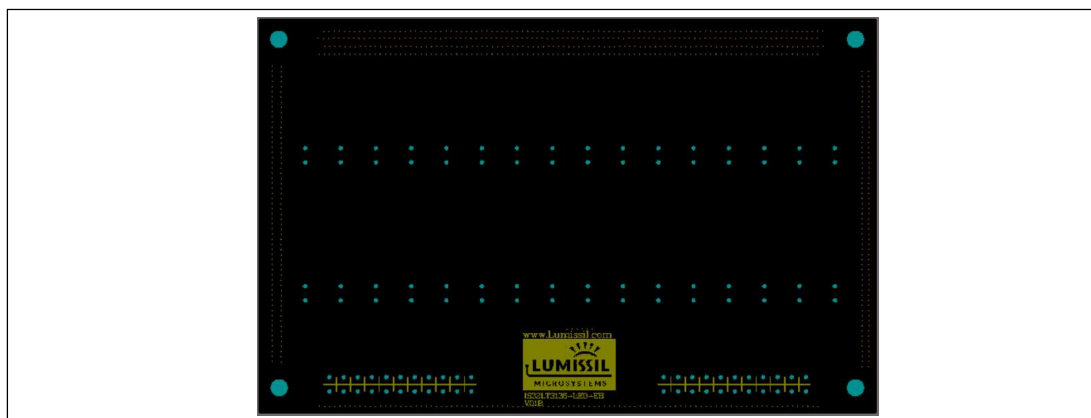


Figure 11 LED Board Component Placement Guide - Bottom Layer

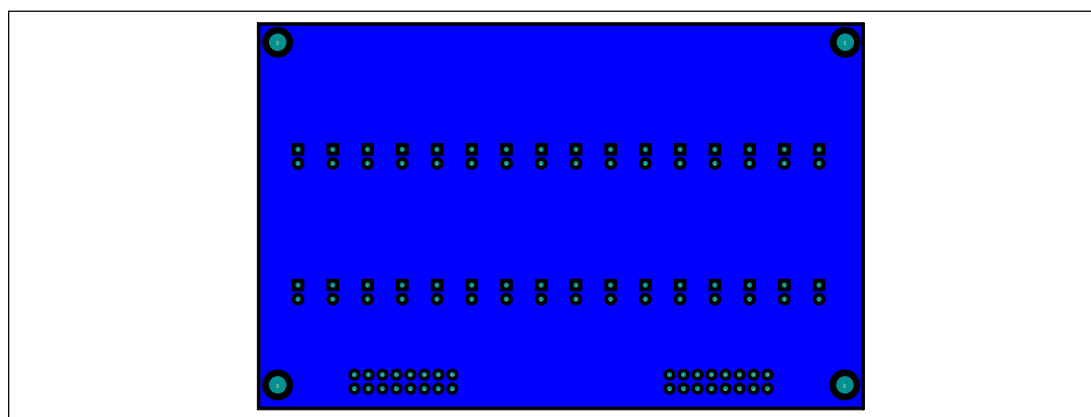


Figure 12 LED Board PCB Layout - Bottom Layer

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- b.) the user assume all such risks;
- c.) potential liability of Lumissil Microsystems is adequately protected under the circumstances

REVISION HISTORY

Revision	Detail Information	Date
A	Initial release	2025.07.29