

DESCRIPTION

IS32FL3776 is a 36ch LED driver with 36 constant current channels. It also supports from one to six power scan to become a 36ch, 36×2, ...36×5, 36×6 matrix LED driver by control 2~6 external or internal power PMOS. Each channel can be pulse width modulated (PWM) with maximum 16-bit/15-bit/14-bit/12+4-bit/7+7-bit/8-bit/6+2-bit 65536 steps precision for smooth LED brightness control. The maximum output current of each channel is designed to be 60mA, which can be adjusted by 6-bit ×3 global control registers and can be adjusted by three 6-bit global control registers (GCCR for CS0, CS3, CS6 ... CS33, GCCG for CS1, CS4, CS7 ... CS34, and GCCB for CS2, CS5, CS8 ... CS35).

All registers can be programmed via UART (up to 2Mbps) bus or SPI (up to 33MHz) bus. IS32FL3776 supports direct address can assign up to 25 devices by ADDR0 and ADDR1 pin.

Proprietary algorithms are used in IS32FL3776 to minimize power bus noise caused by passive components on the power bus such as MLCC decoupling capacitor. IS32FL3776 can be turned off with minimum current consumption by either pulling the SDB pin low or by using the software shutdown feature.

IS32FL3776 is available in QFN-60, it can work over temperature range from -40°C to +125°C.

QUICK START

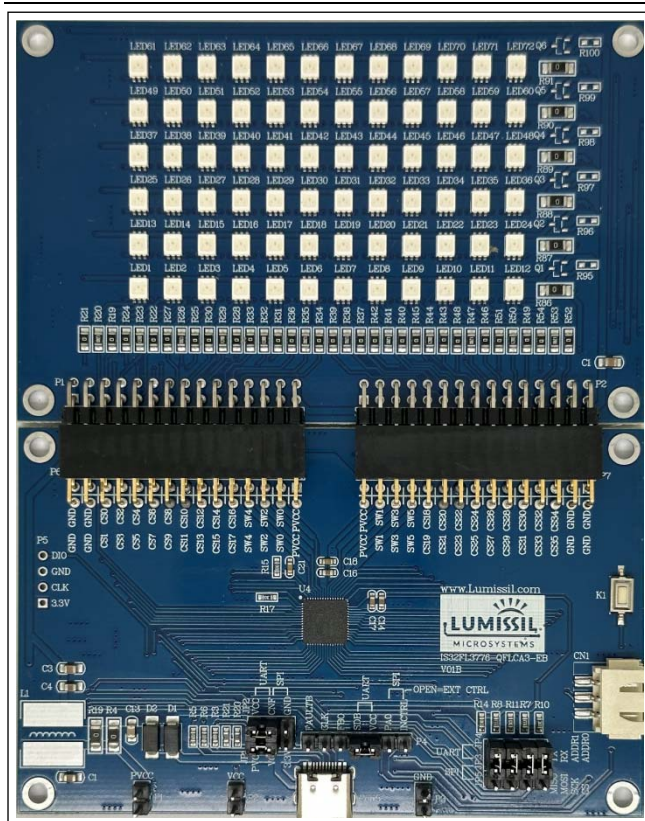


Figure 1 Photo of IS32FL3776 Evaluation Board

FEATURES

- Operating voltage: 3.0V to 5.5V
- Support 36 constant current channels
 - 60mA/channel
 - Channel to channel: 40mA: ±3.5% Max.
 - Device to Device: 40mA: ±5% Max.
 - CS pin headroom voltage of 200mV (Typ.) at 40mA
 - SW pin headroom voltage of 400mV (Typ.) at 800mA (Maximum current for SW pin: 1.4A)
- Support to control the PMOS to become a matrix LED controller support 36ch, 36×2...36×6, SW can be set to internal or to drive external PMOS to control the Power SW timing
- Interface
 - Lumissil's proprietary LumiBus supports UART protocol layer for communication from 100kbps to 2Mbps.
 - SPI (33MHz, daisy chain)
- Direct address can support up to 25 devices (LumiBus only)
- Global Current Control (GCC, 3 × 6-bit)
- Built-in Dot correction: 8-bit/dot
- Individual PWM mode
 - 16-bit /12+4-bit dithering
 - 15-bit /12-bit
 - 14-bit / 7+7-bit dithering
 - 8-bit /6+2-bit dithering
- For matrix scanning operation
 - Built-in de-ghosting circuit for CS pins and SW pins (internal PMOS)
 - Reduced inactive LED reverse bias to improve LED reliability
- DC feedback for DCDC VLED adjustment to optimize system power supply (FBO)
- 6 groups delay minimizing the power ripple
- 180-degree phase delay operation to reduce power noise
- Support spread spectrum on PWM clock to reduce EMI from driver
- Fault detection and protection
 - LED open/short detection: cycle by cycle detection and configurable LED Open, Short thresholds
 - Support thermal shutdown protection
 - Over current protection
 - Under voltage detection
- AEC-Q100 qualification with Temperature Grade 1: -40°C to +125°C in progress
- 10-bit ADC for pin voltage measurement
- Operation temperature range: -40°C to +125°C
- QFN-60 package
- RoHS & Halogen-Free Compliance
- TSCA Compliance

RECOMMENDED EQUIPMENT

- 5.0V, 2A power supply

ABSOLUTE MAXIMUM RATINGS

- ≤ 5.5V power supply

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

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS32FL3776-QFLCA3-EB	-40°C to +125°C (Automotive)	QFN-60, 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.

PROCEDURE

The IS32FL3776 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.

UART:

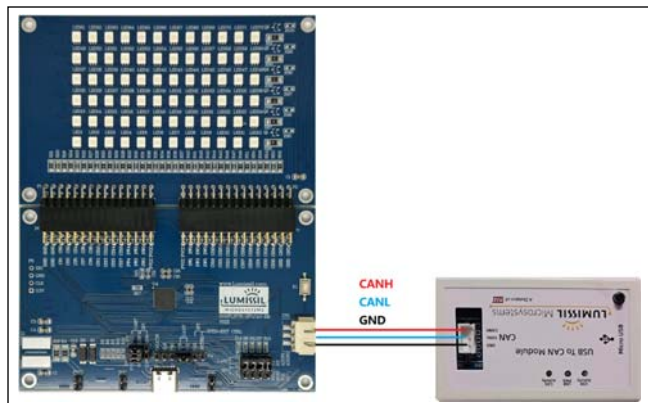


Figure 2 Photo of CAN Module Connected to Evaluation Board

- 1) Short circuit between CNF and VCC of JP2.
- 2) Short circuit between PVCC and VCC of JP1.
- 3) Short circuit between SDB and VCC of P4
- 4) Short JP3 and JP4, TX/RX/ADDR1/ADDR0.
- 5) Connect the DC-5V to P1(PVCC) and P3(GND) or plug in the USB power input to USB Type-C.
- 6) Connect CN1 (CANH, CANL, GND) header to CAN Module CANH, CANL, GND header
- 7) Turn on the power supply, then connect the Micro-USB of the CAN board to the computer. If the EVB no response, please check for circuit fault.

SPI:

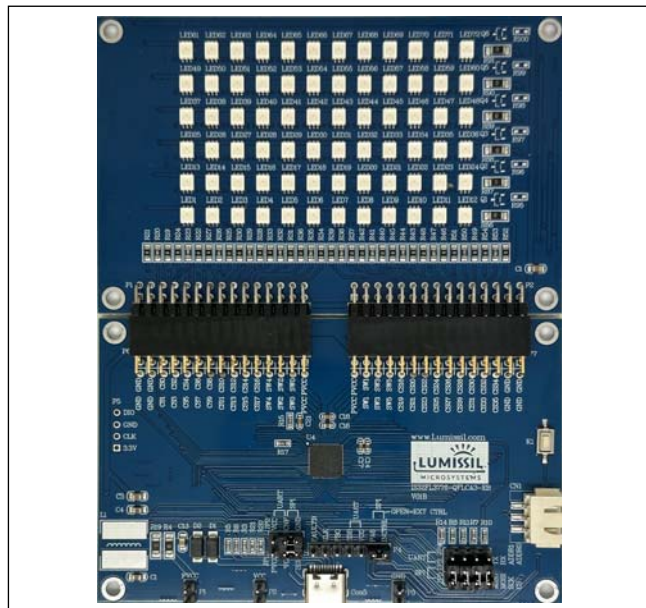


Figure 3 Photo of SPI Module Connected to Evaluation Board

- 1) Short circuit between CNF and GND of JP2.
- 2) Short circuit between 3.3V and VCC of JP1.
- 3) Short circuit between PA0 and INCTRL of P4.
- 4) Short JP3 and JP4, MISO/MOSI/SCK/CS.
- 5) Connect the DC-5V to P1(PVCC) and P3(GND) or plug in the USB power input to USB Type-C.
- 6) Turn on the power supply. If the EVB no response, please check for circuit fault.

EVALUATION BOARD OPERATION

The IS32FL3776 evaluation board has three displays modes. Press button (SPI: K1 of EVB, UART: K1 of CAN board) to switch configurations:

- 1) (Default mode) Rainbow.
- 2) Color fades.
- 3) Breath.

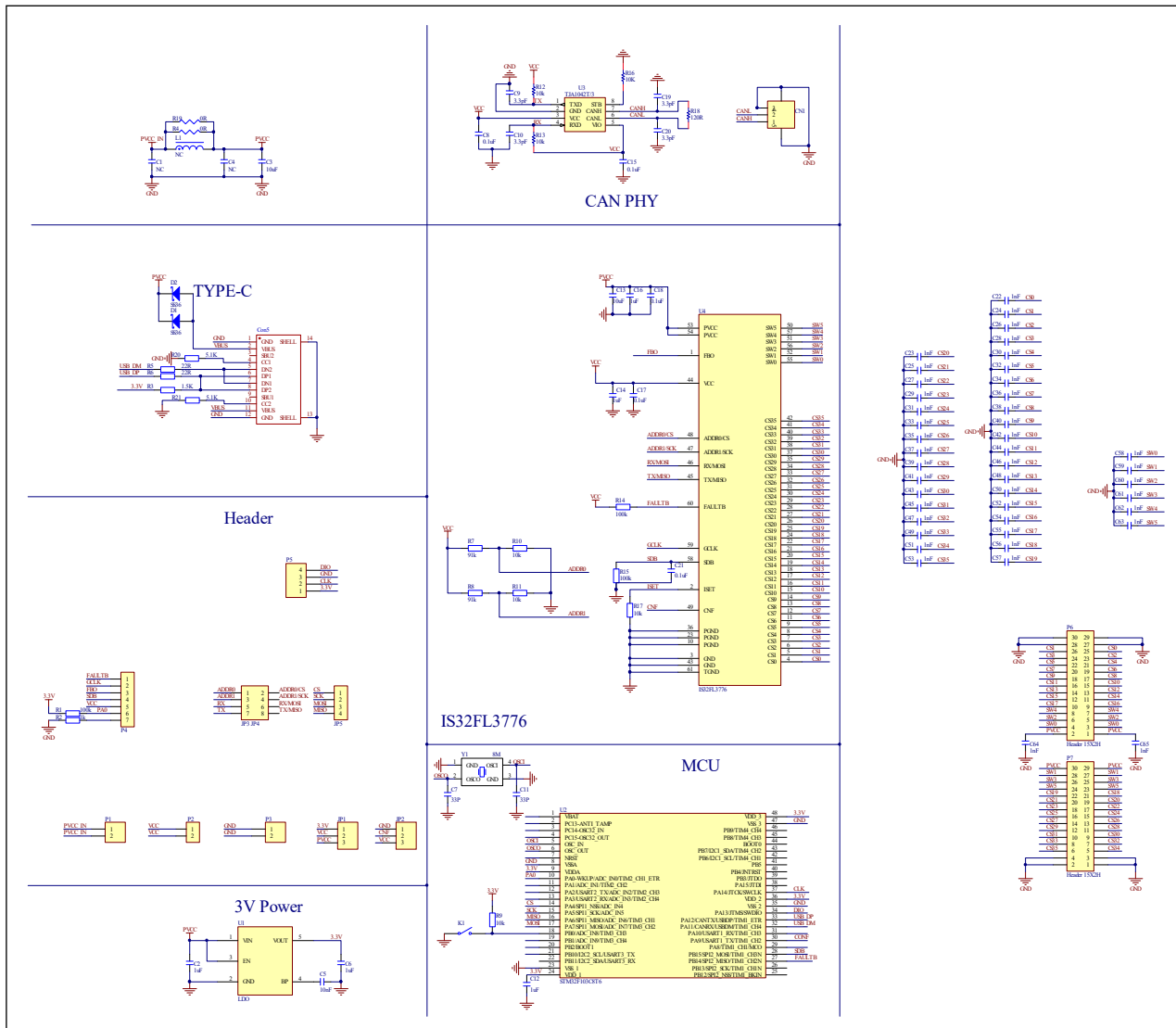


Figure 4 IS32FL3776-QFLCA3 Application Schematic

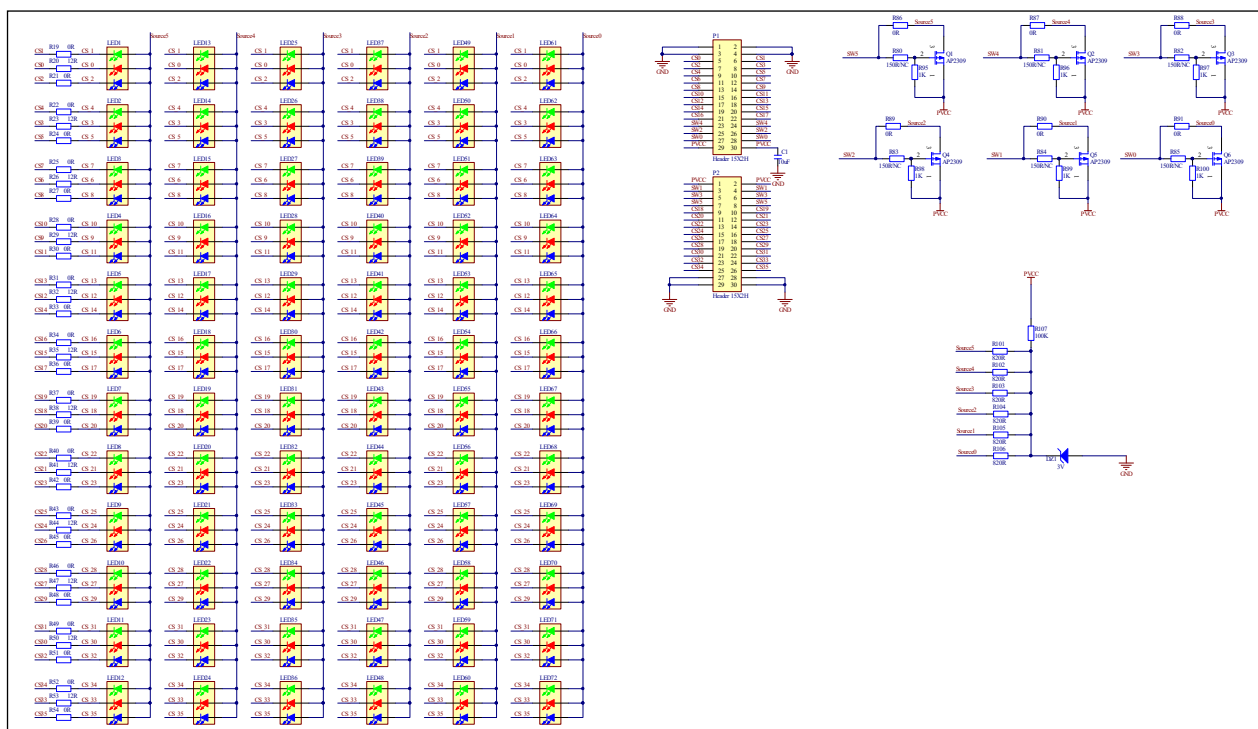


Figure 5 72 RGB LED Application Schematic

BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
LDO	U1	Reduced voltage	1	SGMICRO	SGM2019-3.3V
MCU	U2	Microcontroller	1	STM	STM32F103C8T6
CAN Transceiver	U3	Transceiver	1	NXP	TJA1042T/3/1J
LED Driver	U4	LED Driver	1	Lumissil	IS32FL3776
Schottky Diodes	D1, D2	Diode, 3A, 60V	2	TWGMC	SS36
Crystal	Y1	Crystal, 8MHz	1	JB	HC-49S
Connector	CN1	CAN Connector, XH2.54	1	XUNPU	WAFER-XH2.54-3PWB
SMD Inductor	L1	NC			
Button	K1	Button SMD	1		
Resistor	R1, R14, R15	RES, 100k, 1/16W, $\pm 5\%$, SMD	3	Yageo	RC0603JR-07100KL
Resistor	R2	RES, 1k, 1/16W, $\pm 5\%$, SMD	1	Yageo	RC0603JR-071KL
Resistor	R3	RES, 1.5k, 1/16W, $\pm 5\%$, SMD	1	Yageo	RC0603JR-071K5L
Resistor	R4, R19	RES, 0R, 1/10W, $\pm 1\%$, SMD	2	Yageo	RC1206FR-070RL
Resistor	R5, R6	RES, 22R, 1/16W, $\pm 5\%$, SMD	2	Yageo	RC0603JR-0722RL
Resistor	R7, R8	RES, 91k, 1/16W, $\pm 5\%$, SMD	2	Yageo	RC0603JR-0791KL
Resistor	R9, R10, R11, R12, R13, R16, R17	RES, 10k, 1/16W, $\pm 5\%$, SMD	7	Yageo	RC0603JR-0710KL
Resistor	R18	RES, 120R, 1/16W, $\pm 5\%$, SMD	1	Yageo	RC0603JR-07120RL
Resistor	R20, R21	RES, 5.1k, 1/16W, $\pm 5\%$, SMD	2	Yageo	RC0603JR-075K1L
Capacitor	C1, C4	CAP, 4.7 μ F, 16V, $\pm 20\%$, SMD	2	Yageo	CC0805MRX5R7BB475
Capacitor	C2, C6, C12, C14, C16	CAP, 1 μ F, 16V, $\pm 20\%$, SMD	5	Yageo	CC0603MRX5R7BB105
Capacitor	C3, C13	CAP, 10 μ F, 16V, $\pm 20\%$, SMD	2	Yageo	CC0805MRX5R7BB106
Capacitor	C5	CAP, 10nF, 16V, $\pm 20\%$, SMD	1	Yageo	CC0603MRX5R7BB103
Capacitor	C7, C11	CAP, 33pF, 50V, $\pm 5\%$, SMD	2	Yageo	CQ0603JRNPO9BN330
Capacitor	C8, C15, C17, C18, C21	CAP, 100nF, 16V, $\pm 20\%$, SMD	5	Yageo	CC0603MRX5R7BB104
Capacitor	C9, C10, C19, C20	CAP, 3.3pF, 50V, $\pm 8\%$, SMD	4	Yageo	CQ0603CRNPO9BN3R3
Capacitor	C22~C65	NC, CAP, 1nF, 16V, $\pm 5\%$, SMD	44	Yageo	CC0603JRX7R7BB102

Bill of Materials, refer to Figure 4 above.

FxLED 6×12 NUM ARRAY

Name	Symbol	Description	Qty	Supplier	Part No.
LED	LED1~LED72	Diode, LED Yellow, SMD	72	LITEON	LTST-G683GEBW-P2
Capacitor	C1	CAP,10μF,16V, ±20%, SMD	1	Yageo	CC0805MRX5R7BB106
Zener Diode	DZ1	Zener Diode,3V, SMD	1	BORN	BZT52C3V0S
MOSFET	Q1~Q6	NC, P-Channel MOSFET, SMD	6	APEC	AP2309GEN
Resistor	R19, R21, R22, R24, R25, R27, R28, R30, R31, R33, R34, R36, R37, R39, R40, R42, R43, R45, R46, R48, R49, R51, R52, R54	RES,0R,1/10W, ±5%, SMD	24	Yageo	RC0805JR-070RL
Resistor	R20, R23, R26, R29, R32, R35, R38, R41, R44, R47, R50, R53	RES,12R,1/10W, ±5%, SMD	12	Yageo	RC0805JR-0712RL
Resistor	R80, R81, R82, R83, R84, R85	NC, RES,150R,1/10W, ±5%, SMD	6	Yageo	RC0603JR-07150RL
Resistor	R86, R87, R88, R89, R90, R91	NC, RES, 0R,1/10W, ±5%, SMD	6	Yageo	RC1206JR-070RL
Resistor	R95, R96, R97, R98, R99, R100	NC, RES, 1k,1/10W, ±5%, SMD	6	Yageo	RC0603JR-071KL
Resistor	R101, R102, R103, R104, R105, R106	NC, RES, 820R,1/10W, ±5%, SMD	6	Yageo	RC0603JR-07820RL
Resistor	R107	NC, RES, 100k,1/10W, ±5%, SMD	1	Yageo	RC0603JR-07100KL

Bill of Materials, refer to Figure 5 above.

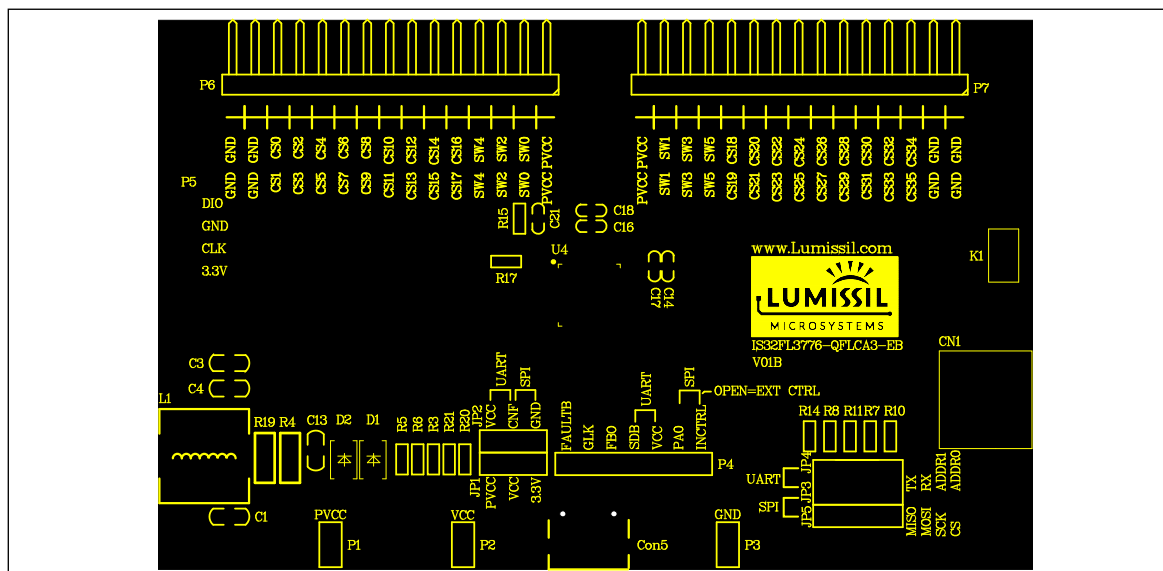


Figure 6 Board Component Placement Guide - Top Layer

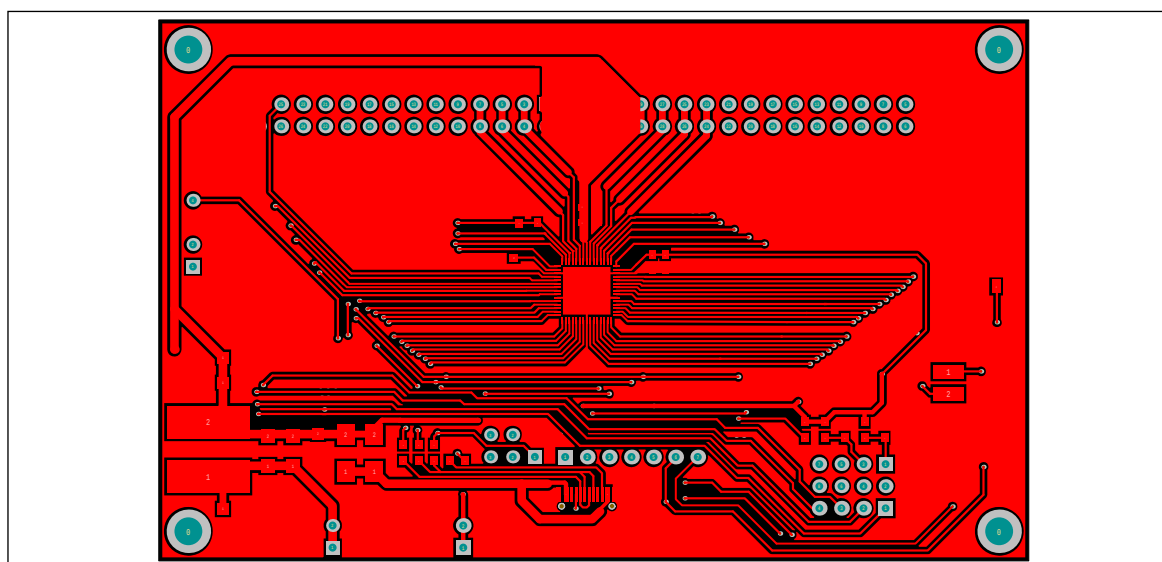
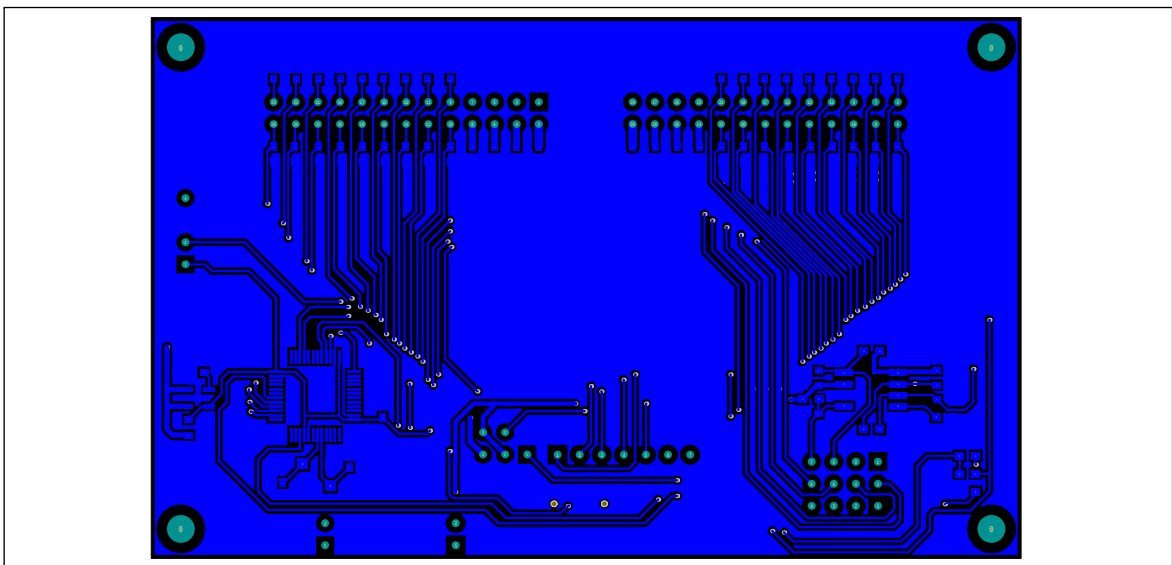
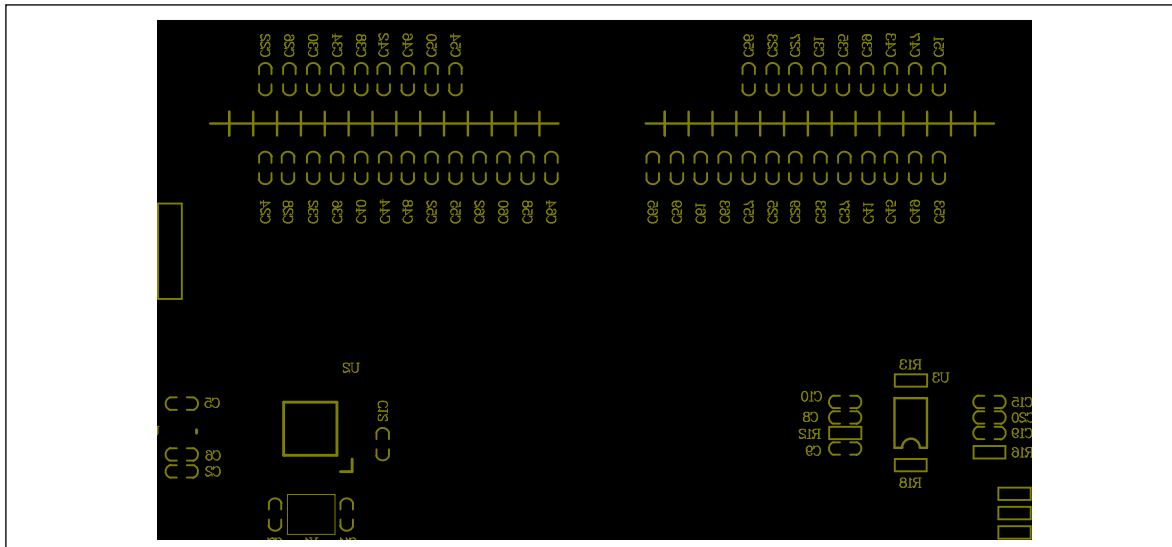


Figure 7 Board PCB Layout - Top Layer



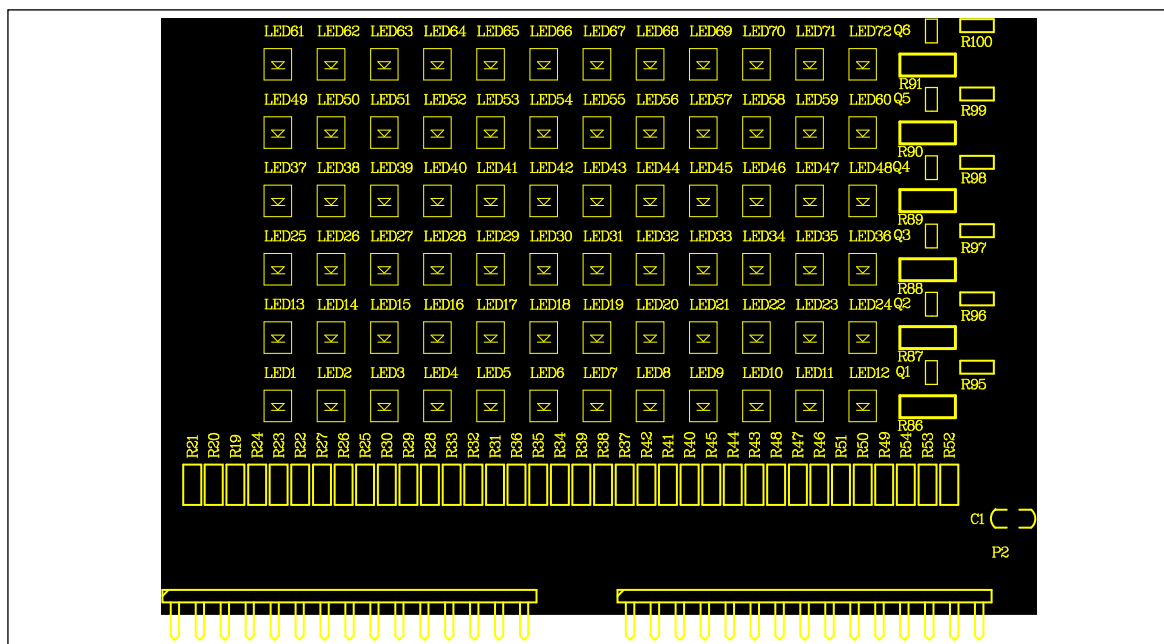


Figure 10 LED Board Component Placement Guide - Top Layer

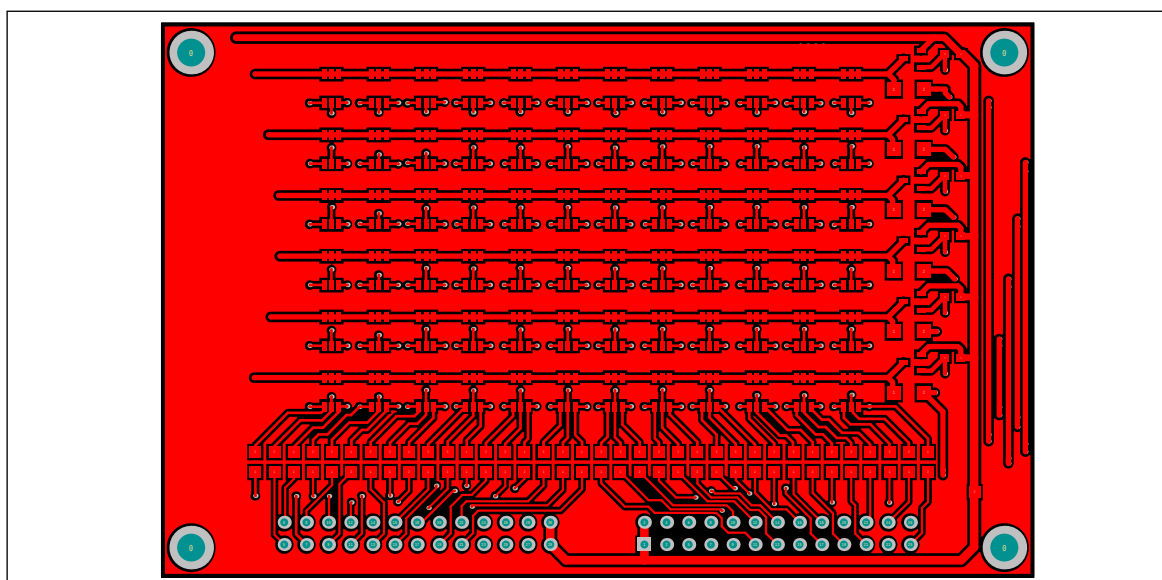


Figure 11 LED Board PCB Layout - Top Layer

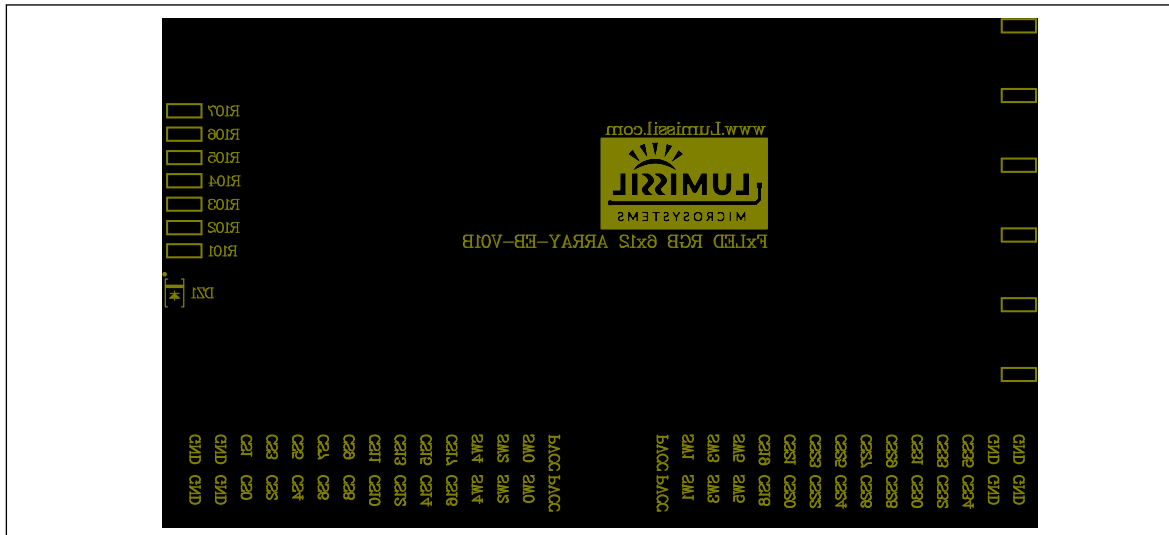


Figure 12 LED Board Component Placement Guide - Bottom Layer

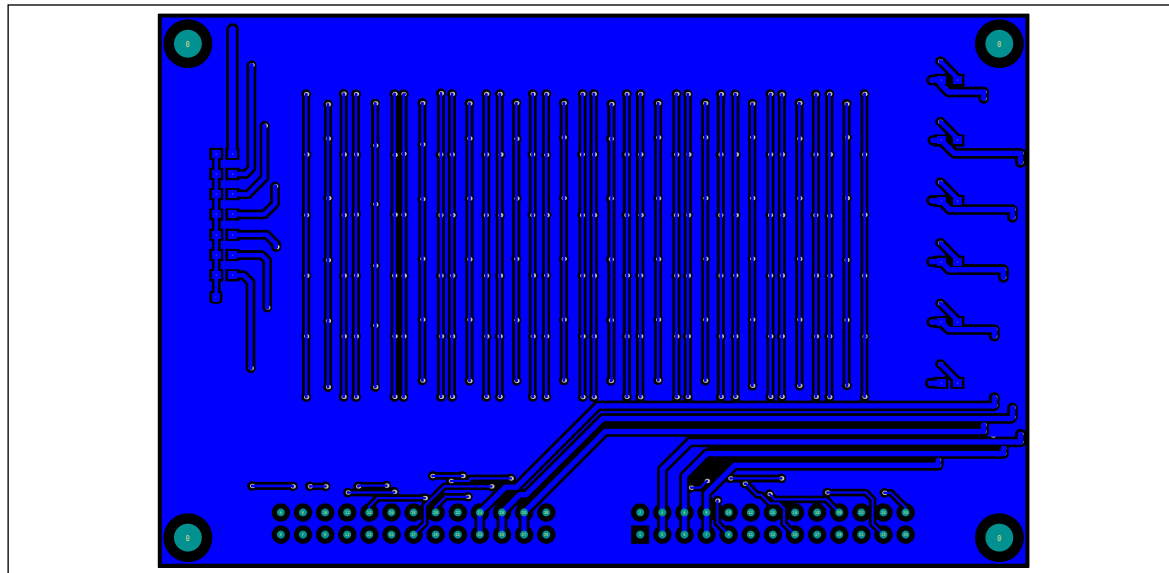


Figure 13 LED Board PCB Layout - Bottom Layer

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- potential liability of Lumissil Microsystems is adequately protected under the circumstances

REVISION HISTORY

Revision	Detail Information	Date
A	Initial release	2025.06.27
B	1. Update schematic and PCB 2. Update the features	2025.11.04