

2×18 MATRIX LED DRIVER

DESCRIPTION

The IS32FL3105 is a general-purpose 2×18 LED Matrix programmed via a Lumissil proprietary bus (LumiBus). Each LED can be dimmed individually with 16-bit/14+2-bit/13+3-bit/8+8-bit PWM data and 6-bit DC scaling data which allows 65536 steps of linear PWM dimming and 64 steps of DC current adjustable level.

The maximum output current of each LED channel (for R, G, B) is 60mA. All registers in the IS32FL3105 can be accessed by CAN communication interface (IS32FL3105A/B) or UART communication interface (IS32FL3105C/D) are used for control and management by a host MCU.

IS32FL3105A/C supports direct address can assign up to 25 devices by ADDR0 and ADDR1 pin. IS32FL3105B/D supports LAA (Location Address Assignment) for random LED driver access without address pins, up to 254 devices can be addressed.

Additionally, each LED open/short state can be detected, IS32FL3105 stores the open information in Open/Short Detect Registers. The Open/Short Detect Registers allow MCU to read out via LumiBus, inform MCU whether there are LEDs open or LEDs short.

The IS32FL3105 operates from 3.0V to 12V for VLED 5V to 28V for VS and features a low shutdown and operational current.

IS32FL3105 is available in WFQFN-32 (5mm×5mm) package. It operates from 3.0V to 12V over the temperature range of -40°C to +125°C.

QUICK START



Figure 1 Photo of IS32FL3105C- Evaluation Board–Top View



Figure 2 Photo of IS32FL3105C- Evaluation Board–Bottom View

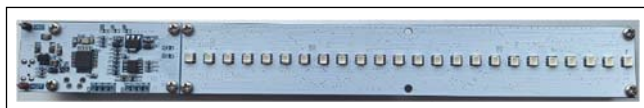


Figure 3 Photo of USB To CAN Module Board Connect to IS32FL3105C Evaluation Board

FEATURES

- VLED operates with a power supply range of 3.0V to 12V for each LED channel
- VS power supply voltage ranges from 5V to 28V, providing normal operation for the IS32FL3105
- Built-in LDO to generate V50 to power on chip logic circuit operation and powering internal CAN PHY
- CAN interface (IS32FL3105A/B) and UART interface (IS32FL3105C/D) with Lumissil's proprietary LumiBus protocol support communication from 100kHz to 2MHz
- Direct address for IS32FL3105A/C, can support up to 25 devices
- LAA (Location Address Assignment) for random IS32FL3105B/D register access without address pins, up to 254 devices can be addressed
- Support 12 LED RGB color dots (2×18 channel)
 - ✓ Each LED channel has 16-bit/14+2-bit/13+3-bit/8+8-bit PWM engines and independent 4-bit Save PWM State on OTP
 - ✓ Independent 6-bit configurable DC configurations ranging from 0 mA to 60 mA
 - ✓ 6-bit global output current adjustment for each RGB group
 - ✓ Inter and intra channel accuracy:
 - Channel to Channel 60mA: ±4%(Max.25°C)
 - Channel to Channel 60mA: ±6%(Max.-40°C~125°C)
- Support on die OTP for fail safe mode
- Provide constant luminance over wide temperature range by temperature compensation algorithm in PWM space for each individual channel
- Support spread spectrum on PWM clock to reduce EMI from driver
- Built-in standard CAN PHY (physical layer)
- Cross fading accelerator
- DC feedback for automatic DCDC VLED adjustment to optimize system power supply (DCFB)
- Fault detection and protection
 - ✓ LED open/short detection: cycle by cycle detection and configure LED short threshold
 - ✓ SW short to VLED detection
 - ✓ SW over-current protection
 - ✓ VLED under-voltage detection
 - ✓ ECC on OTP for error detection
 - ✓ Support thermal shutdown protection and thermal roll-off mechanism
 - ✓ CS loop back and SW loop back detection
 - ✓ IOUT monitor and LED VF monitor detection
 - ✓ Internal PWM clock monitor detection
 - ✓ CRC error detection for communication
 - ✓ Communication watch dog and watch dog timer2 detection

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- Developed according to ISO26262 with process complying with ASIL-B Potential applications
- AEC-Q100 Qualified with Temperature Grade 1: -40°C to 125°C
- WFQFN-32 (5mm× 5mm) package
- RoHS & Halogen-Free Compliance
- TSCA Compliance

RECOMMENDED EQUIPMENT

- 12.0V, 3A power supply (If Evaluation board do not connect R25 and R26 Resistor)

ABSOLUTE MAXIMUM RATINGS

- $V_S \leq 28V$ power supply, $V_{LED} \leq 12V$ power supply

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

PROCEDURE

The IS32FL3105C 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.

- 1) Connect USB To CAN Module CAN Port JP1 to IS32FL3105C's JP1 Port.
- 2) Connect USB To CAN Module Micro USB Port to Computer.
- 3) Power Connect: Connect DC 12V power to DC power socket (CN3) of USB To CAN Module.
- 4) Turn on the power supply/Plug in the Power adapter Pay attention to the supply current. If the current exceeds 200mA, please check for circuit fault.

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS32FL3105C-QWLCA3-EB	-40°C to +125°C (Automotive)	WFQFN-32, Lead-free

Table 1 Ordering Information

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

EVALUATION BOARD OPERATION

The IS32FL3105C evaluation board has four display modes. Press USB To CAN Module Key (K1) to switch configurations.

1) Mode1 - Rainbow Bar Pattern: the color of RGB LEDs is changing and moving from LD24 to LD1 all the time.

2) Mode2 - Color Collision and Fusion: the RGB LEDs will first expand from the middle with the same fused color (from LD12 to LD1, and from LD13 to LD24). Then, they will converge from both sides to the middle with different colors (from LD1 to LD12 on the left, and from LD24 to LD13 on the right). After reaching the middle position (LD12 and LD13), they will expand again with the mixed color, repeating this cycle.

3) Mode3 - Global Breathing Pattern: All RGB LEDs have a breathing effect, with colors flowing and switching among red, green, and blue.

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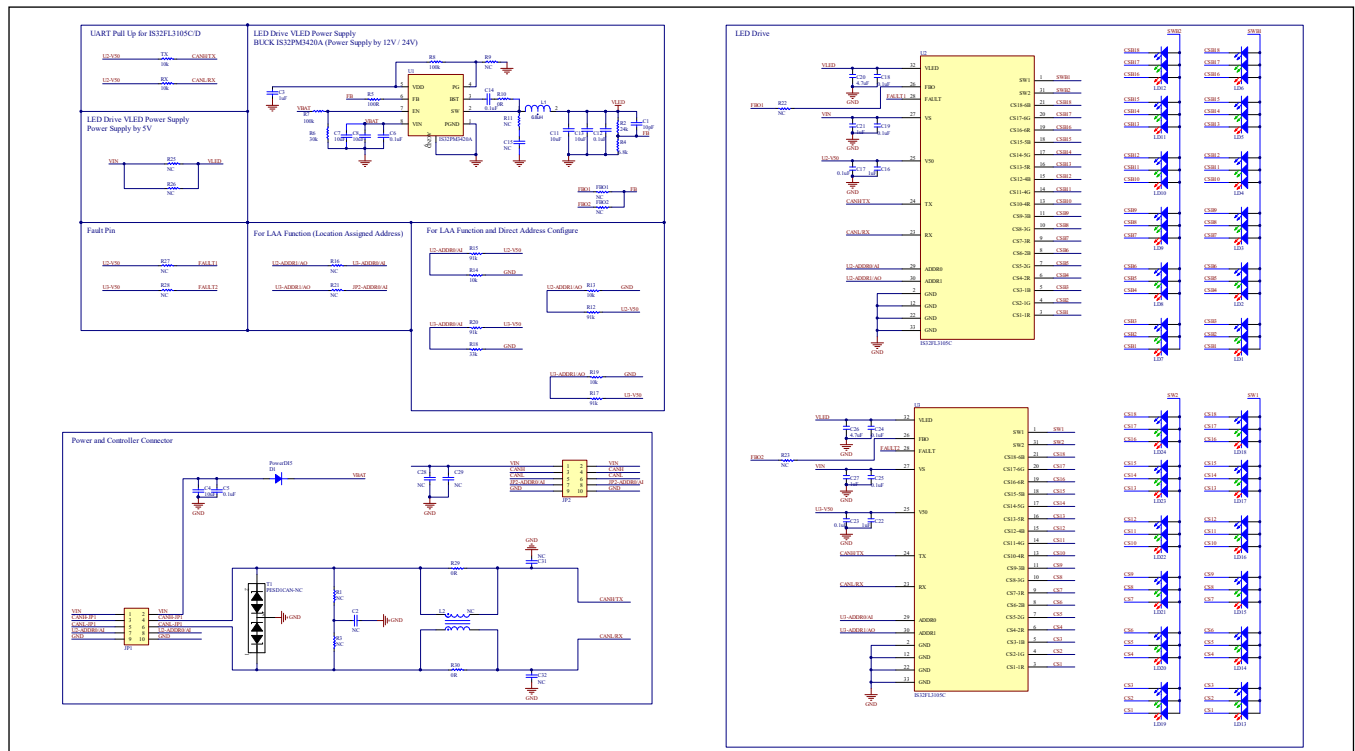


Figure 4 IS32FL3105C EVB Schematic

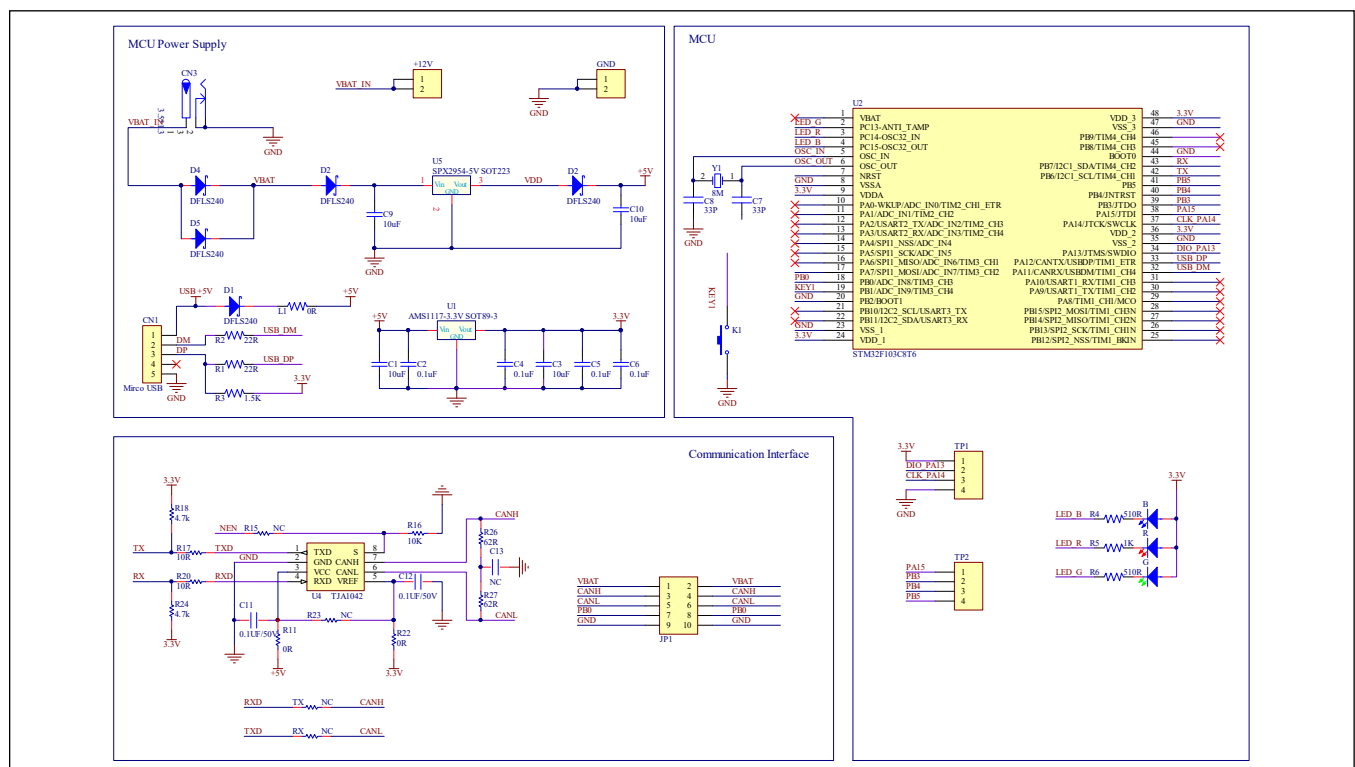


Figure 5 IS32FL3105C MCU EVB Schematic

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BILL OF MATERIALS

IS32FL3105C EVB Schematic

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U2, U3	2 x18 Matrix LED Driver	2	Lumissil	IS32FL3105C
Regulator	U1	3.8V to 36V, 3A, 400kHz, Synchronous Step-down Regulator	1	Lumissil	IS32PM3420A
Diode	D1	Diode, SMD	1	DIODES	PDS5100
Resistor	R25, R26,R9,R11, FBO1,FBO2,R22, R23,R27,R28,R1, R3,R29,R30,R16, R21	NC	0	-	-
Resistor	R10	RES,0R,1/10W,±5%,SMD	1	Yageo	RC0603JR-070RL
Resistor	R5	RES,100R,1/10W,±5%,SMD	1	Yageo	RC0603FR-07100RL
Resistor	R4	RES,6.8k,1/10W,±5%,SMD	1	Yageo	RC0603FR-076K8L
Resistor	R13,R14,R19 TX,RX	RES,10k,1/10W,±5%,SMD	5	Yageo	RC0603FR-0710KL
Resistor	R2	RES,24k,1/10W,±5%,SMD	1	Yageo	RC0603FR-0724KL
Resistor	R6	RES,30k,1/10W,±5%,SMD	1	Yageo	RC0603FR-0730KL
Resistor	R18	RES,33k,1/10W,±5%,SMD	1	Yageo	RC0603FR-0733KL
Resistor	R12,R15, R17,R20	RES,91k,1/10W,±1%,SMD	4	Yageo	RC0603FR-0791KL
Resistor	R7,R8,	RES,100k,1/10W,±1%,SMD	6	Yageo	RC0603FR-07100KL
Capacitor	C15,C28,C29, C31,C33,C2	NC	0	-	-
Capacitor	C4,C7,C8, C11,C13	CAP,10µF,50V,±10%,SMD	5	Yageo	CC1206KKX5R9BB106
Capacitor	C5,C6,C12,C14, C17,C18,C19,C23, C24,C25	CAP,0.1µF,50V,±10%,SMD	10	Yageo	CC0603KRX7R9BB104
Capacitor	C3,C16,C21,C20 C22,C27,C26	CAP,1µF,50V,±10%,SMD	7	Yageo	CC0603KRX7R9BB105
Capacitor	C20,C22	CAP,4.7µF,50V,±10%,SMD	2	Yageo	CC0603KRX7R9BB475
Capacitor	C1	CAP,10pF,50V,±10%,SMD	1	Yageo	CC0603C0G100J500NT
Inductor	L1	6.8µH	1	WURTH	78439346068
Inductor	L2	NC	1	-	-
T1	TVS	NC	1	-	-
Connector	JP1	Pin Header: 2x5P, Spacing: 2.54mm, SMD	1	HCTL	PZ254-2-05-WS
Connector	JP2	Busbar: 2x5P, Spacing:2.54mm, SMD	1	HANXIA	HX PM2.54-2x5P WT
LED	LD1~LD24	RGB LED	24	OSRAM	LRTB GVSG-UEVE-24+AMAAQ-29+SCUC-HR

Bill of Materials, Refer to Figure 4 above.

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IS32FL3105C MCU EVB Schematic

Name	Symbol	Description	Qty	Supplier	Part No.
MCU	U2	STM32F103C8T6	1	ST	STM32F103C8T6
Capacitor	C13	NC	0	-	-
Capacitor	C1,C3,C9,C10	CAP,10μF,50V,±10%,SMD	4	Yageo	CC0805KKX7R9BB106
Capacitor	C2,C4,C5, C6,C11,C12	CAP,1μF,50V,±10%,SMD	6	Yageo	CC0603KRX7R9BB105
Capacitor	C7,C8	CAP,33pF,50V,±10%,SMD	2	Yageo	CC0603JRNPO9BN330
Resistor	R22,R11	RES,0R,1/10W,±5%,SMD	2	Yageo	RC0603JR-070RL
Resistor	L1	RES,0R,1/10W,±5%,SMD	1	Yageo	RC0805JR-070RL
Resistor	R1,R2	RES,22R,1/10W,±5%,SMD	2	Yageo	RC0603JR-0722RL
Resistor	R4, R6	RES,510R,1/10W,±5%,SMD	2	Yageo	RC0603JR-07510RL
Resistor	R5	RES,1k,1/10W,±5%,SMD	1	Yageo	RC0603JR-071KL
Resistor	R3	RES,1.5k,1/10W,±5%,SMD	1	Yageo	RC0603JR-071K5L
Resistor	R16	RES,10k,1/10W,±5%,SMD	3	Yageo	RC0603JR-0710KL
Resistor	R17,R20	RES,10R,1/10W,±5%,SMD	2	Yageo	RC0603JR-0710RL
Resistor	R26,R27	RES,62R,1/10W,±5%,SMD	2	Yageo	RC0603JR-0762RL
Resistor	R15,R21,R18, R24,R23, TX,RX,LAA	NC	0	-	-
Diode	D1,D2,D3, D4,D5	Diode, SMD	5	DIODES	DFLS240
LED	B	LED, SMD	1	TONYU	DY-0603UGC-L-SMG
LED	R	LED, SMD	1	XINGLIGHT	XL-1608SURC-06
LED	G	LED, SMD	1	MEIHUA	MHT192DUGCT
LDO	U5	5V LDO, SMD	1	MaxLinear	SPX2954AM3-L-5-0/TR
LDO	U1	3.3V LDO, SMD	1	MSKSEMI	AMS1117-3.3V
CANPHY	U4	CANPHY, SMD	1	NXP	TJA1042
Oscillator	Y1	8MHz, SMD	1	HLX	HC-49S
Key	K1	Side Push	1	-	-

Bill of Materials, Refer to Figure 5 above.

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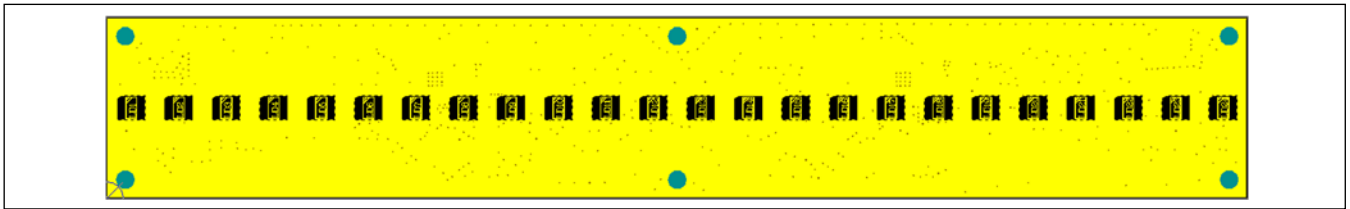


Figure 6 Board Component Placement Guide - Top Layer

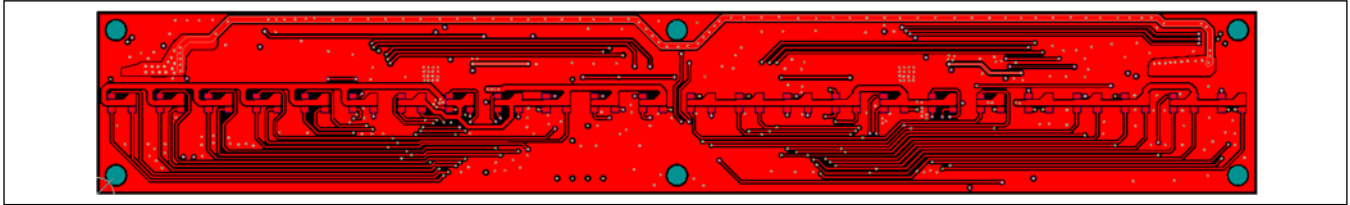


Figure 7 Board PCB Layout - Top Layer

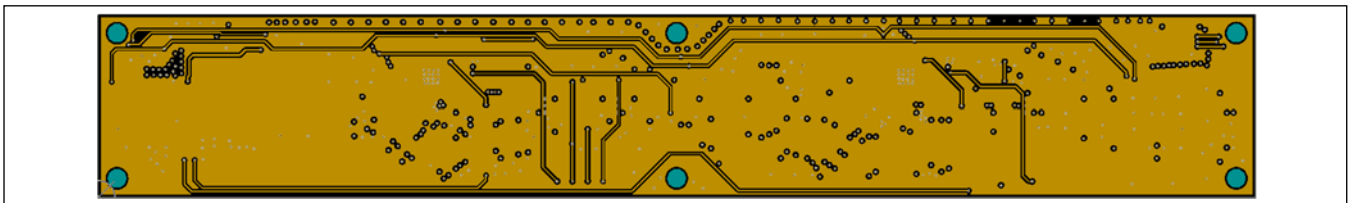


Figure 8 Board PCB Layout - Mid Layer1

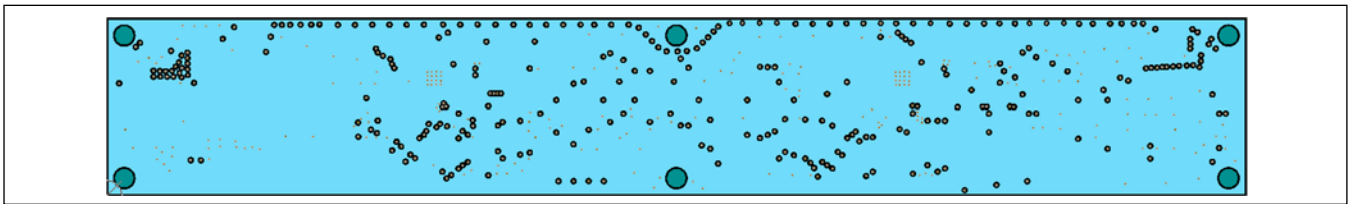


Figure 9 Board PCB Layout - Mid Layer2

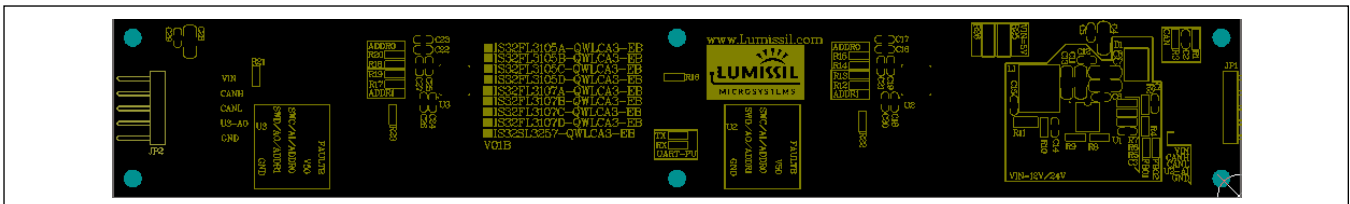


Figure 10 Board Component Placement Guide - Bottom Layer

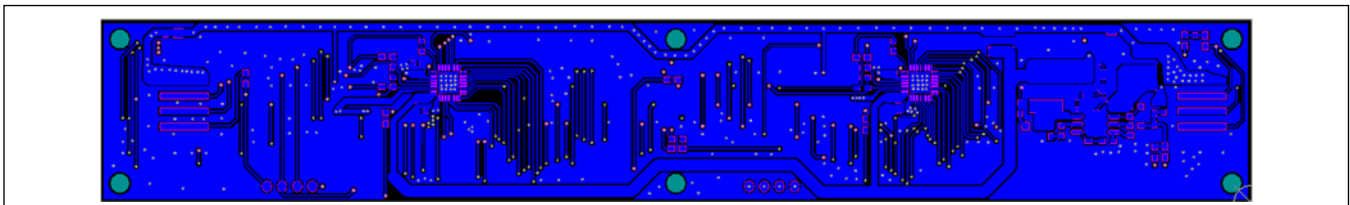


Figure 11 Board PCB Layout - Bottom Layer

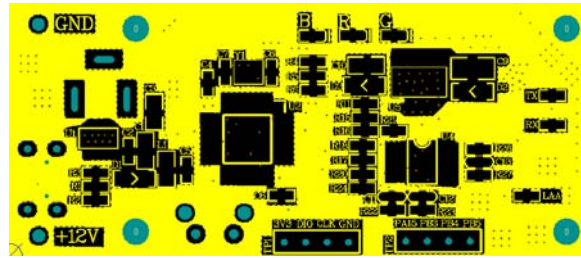


Figure 12 Board Component Placement Guide - Top Layer

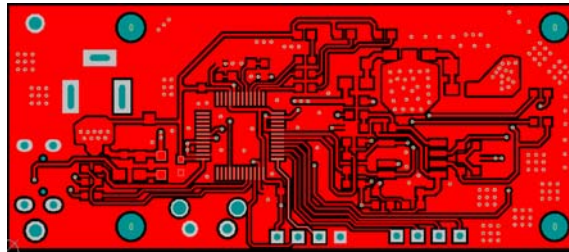


Figure 13 Board PCB Layout - Top Layer



Figure 14 Board Component Placement Guide - Bottom Layer

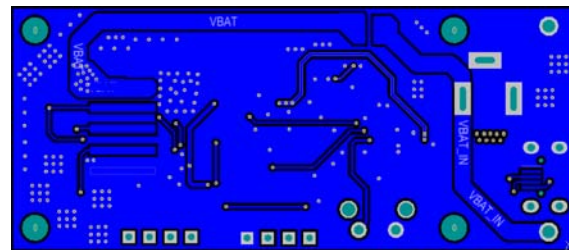


Figure 15 Board PCB Layout - Bottom Layer

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- the user assume all such risks; and
- potential liability of Lumissil Microsystems is adequately protected under the circumstances

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REVISION HISTORY

Revision	Detail Information	Date
A	Initial release	2026.05.09