

ISL97684IRTZEVALZ

ISL97684 LED Driver Evaluation Board

AN1668

Rev 0.00

December 13, 2011

Introduction

The ISL97684 Evaluation Board provides a complete testing platform for ISL97684, a four channel LED driver. Please refer to the product datasheet for detailed information, including pinout, pin function descriptions, electrical specifications and applications related information.

Instructions

Please follow the steps described below to start your evaluation.

1. Set Switch #1 and Switch #2 (SW1 and SW2) to position 3 (left side).
2. For the enable control jumper, JP1, set the shunt to the "ON" position (right side) to connect the EN pin to VIN. When the shunt is in the "OFF" position, it will disable the chip by pulling the EN pin to ground.
3. Connect JP14 so the VIN pin is connected to PVIN.
4. For JP20, connect the shunt to the upper position.
5. Connect WR and JP2-JP6.
6. Apply 1.5V~5.5V PWM signal between the PWMI pin and AGND.
7. Apply 4V~26.5V between PVIN and PGND and the LEDs should be lit. You may start the evaluation.

Note:

- In Step #1 above, the SW1, SW2 position can be adjusted to different positions for different configurations. Details are provided in the following:

TABLE 1.

| SW1 POSITION | SW2 POSITION | DESCRIPTION |
|--------------|--------------|---|
| 1 | 1 | LX switching frequency = 600kHz, PFM CH1-CH4 |
| 3 | 3 | LX switching frequency = 1MHz, PFM CH1-CH4 |
| 3 | 1 | LX switching frequency = 600kHz, No PFM CH1-CH4 |
| 1 | 3 | LX switching frequency = 1MHz, No PFM CH1-CH4 |

- The LED maximum DC current adjustment
For each channel, the maximum DC current is set by resistance connected to the RSET pin. The current for each channel can be calculated as follows:
$$I_LED(mA) = 402 / RSET \langle k\Omega \rangle \quad (EQ. 1)$$

On the board, a potentiometer R5 and a few other resistors are provided for easily adjusting the LED maximum DC current; please refer to the evaluation board schematic on page 2 for more details.
- LED dimming frequency and duty cycle

1. As mentioned in Step #4, when the shunt on JP20 is connected to the upper position and the FPWM/DPWM pin is connected to VDC, the device enters direct PWM mode, which means both the LED dimming frequency and the duty cycle are synchronized with the external PWM signal applied on the PWMI pin.
2. When the shunt on JP20 is connected to the lower position, the FPWM/DPWM pin is connected to a resistor. Under such conditions, the LED dimming frequency of the chip is programmed by the resistance connected on the FPWM/DPWM pin per the following equation:

$$FPWM(Hz) = 12.4 \times 10^7 / R_FPWM(\Omega) \quad (EQ. 2)$$

The duty cycle is still modulated by the external PWM signal applied on the PWMI pin. On board, a potentiometer R11 and a few other resistors are provided for easily adjusting the LED dimming frequency under such configuration.

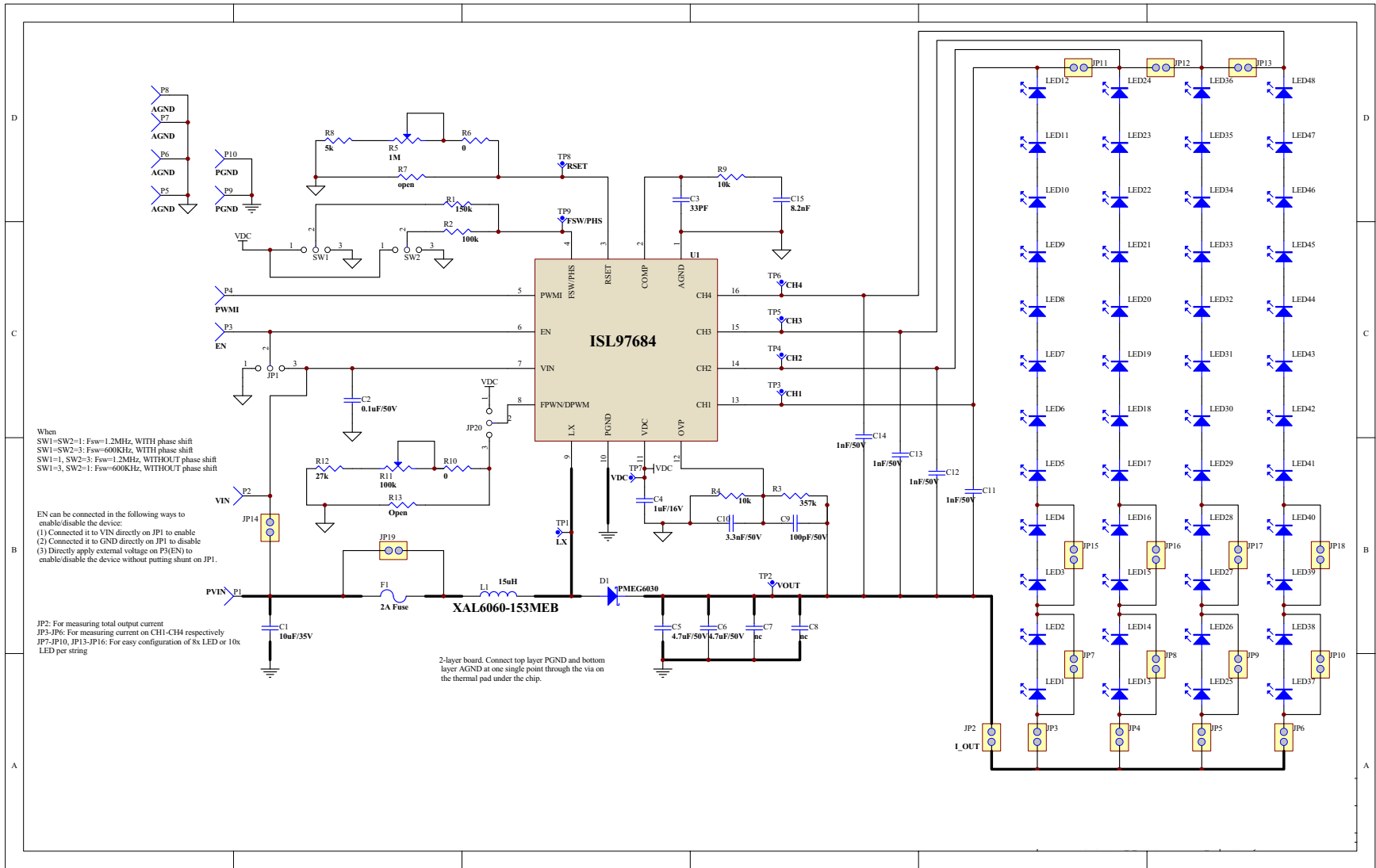


FIGURE 1. EVALUATION BOARD SCHEMATIC

PCB Layout

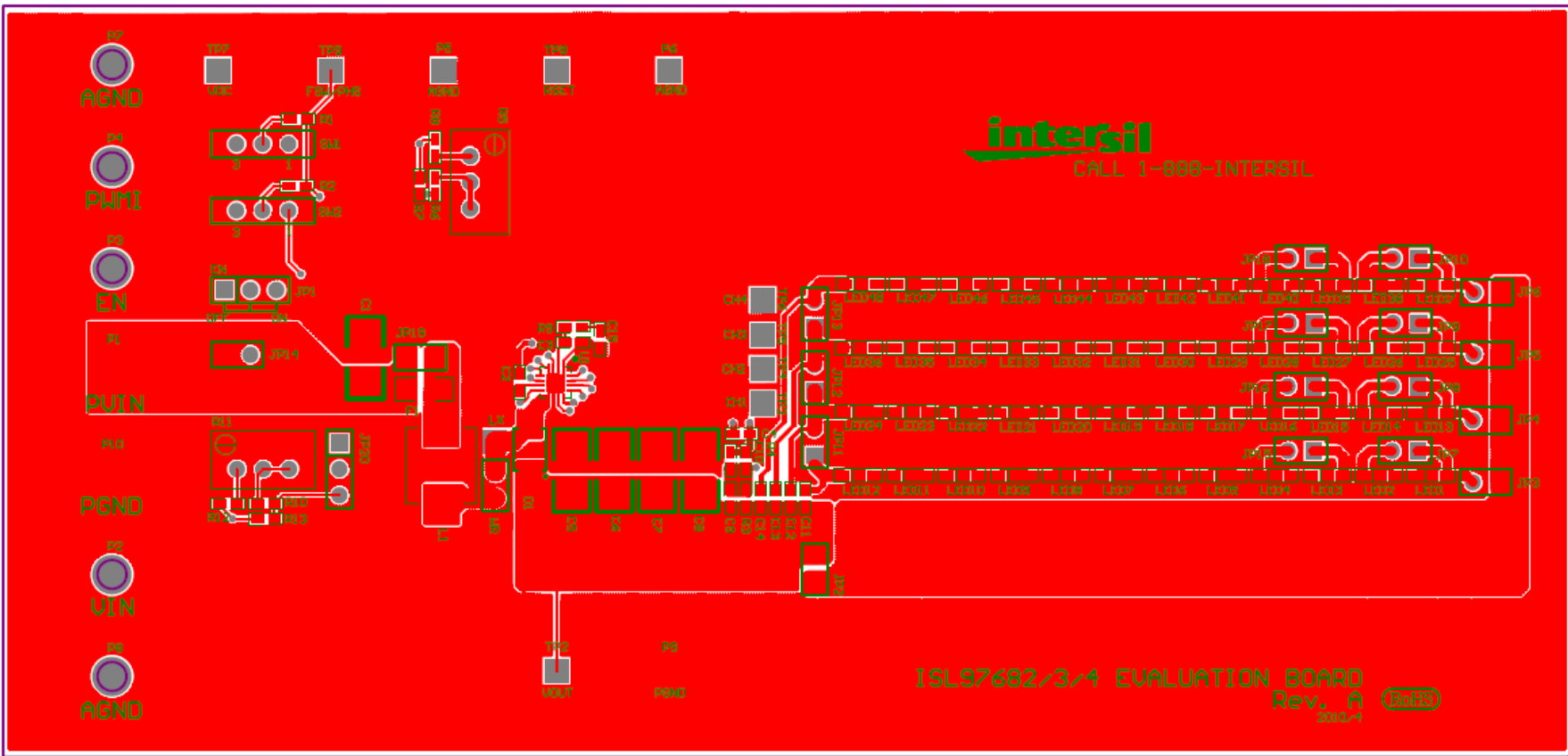


FIGURE 2. TOP SILKSCREEN LAYER AND TOP LAYER

PCB Layout (Continued)

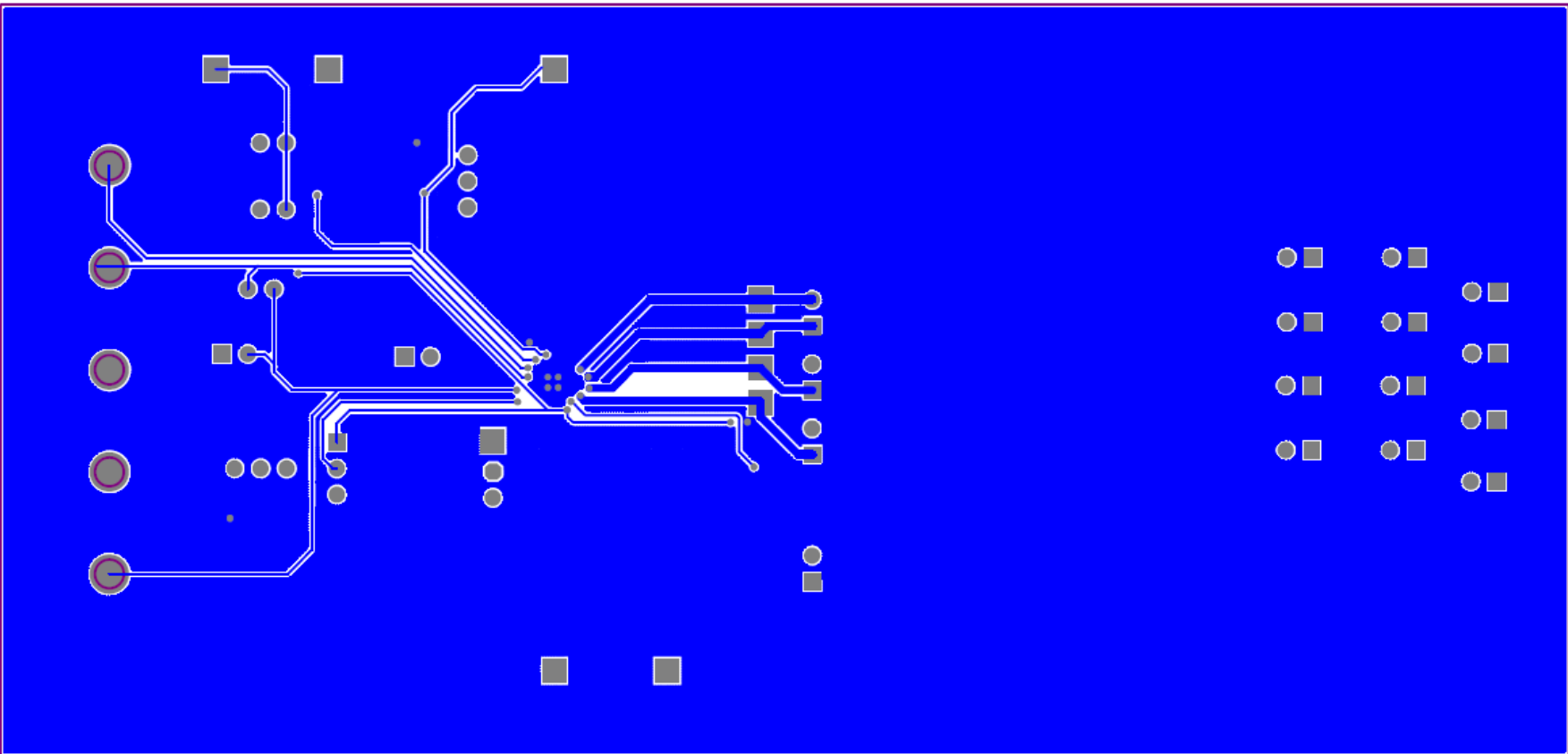


FIGURE 3. BOTTOM LAYER

Bill of Materials

| DESIGNATOR | PART TYPE | FOOTPRINT | PART MANUFACTURER/NUMBER |
|------------------|-----------------|-------------|----------------------------|
| R1 | 150k | 603 | 1% SMD Resistor |
| R2 | 100k | 603 | General purpose |
| R3 | 357k | 603 | |
| R4 | 10k | 603 | |
| R5 | 1M | VRES | |
| R6 | 0 | 603 | |
| R7 | Open | 603 | |
| R8 | 5k | 603 | |
| R9 | 10k | 603 | |
| R10 | 0 | 603 | |
| R11 | 100k | VRES | |
| R12 | 0 | 603 | |
| R13 | Open | 603 | |
| L1 | 15 μ H | | CoilCraft (XAL6060-153MEB) |
| D1 | PMEG6030 | | |
| C1 | 10 μ F/35V | 1210 | General purpose |
| C2 | 0.1 μ F/50V | 603 | Ceramic X5R/X7R capacitors |
| C3 | 33pF | 603 | |
| C4 | 1 μ F/16V | 603 | |
| C5 | 4.7 μ F/50V | 1210 | Murata, GRM32ER71H475KA88L |
| C6 | 4.7 μ F/50V | 1210 | |
| C7 | Place Holder | 1210 | Not Populated |
| C8 | Place Holder | 1210 | |
| C9 | 100pF/50V | 603 | General purpose |
| C10 | 3.3nF/50V | 603 | Ceramic X5R/X7R capacitors |
| C11 | 1nF/50V | 603 | |
| C12 | 1nF/50V | 603 | |
| C13 | 1nF/50V | 603 | |
| C14 | 1nF/50V | 603 | |
| C15 | 8.2nF | 603 | |
| F1 | 2A Fuse | 1206 | Bel Fuse Inc, C1Q 2 |
| U1 | | QFN16 3MM | Intersil, ISL97682/3/4 |
| JP2-JP19 | JUMPER-2PIN | JUMPER-2PIN | FCI |
| WR | JUMPER-2PIN | JUMPER-2PIN | 68000-236HLF-1x2 |
| JP1 | JUMPER-3PIN | JUMPER-3PIN | FCI |
| JP20 | JUMPER-3PIN | JUMPER-3PIN | 68000-236HLF-1x3 |
| LED1-12 LED25-36 | LED-SMT | LW_Y87C | |
| TP1 | LX | TEST POINT | Keystone Electronics |
| TP2 | VOUT | TEST POINT | 5010 |

Bill of Materials (Continued)

| DESIGNATOR | PART TYPE | FOOTPRINT | PART MANUFACTURER/NUMBER |
|------------|-----------|-------------------|--------------------------|
| TP3 | CH1 | TEST POINT | |
| TP4 | CH2 | TEST POINT | |
| TP5 | CH3 | TEST POINT | |
| TP6 | CH4 | TEST POINT | |
| TP7 | VDC | TEST POINT | |
| TP8 | RSET | TEST POINT | |
| TP9 | FSW/PHS | TEST POINT | |
| P5 | AGND | TEST POINT | Keystone Electronics |
| P6 | AGND | TEST POINT | 5011 |
| P9 | PGND | TEST POINT | |
| P1 | PVIN | POWERPOST | Mill Max |
| P2 | VIN | POWERPOST | 3156-1-00-00-00-00-08-0 |
| P3 | EN | POWERPOST | |
| P4 | PWMI | POWERPOST | |
| P7 | AGND | POWERPOST | |
| P8 | AGND | POWERPOST | |
| P10 | PGND | POWERPOST | |
| SW2 | SPDT | SWITCH-SLIDE-SPDT | EAO |
| SW1 | SPDT | SWITCH-SLIDE-SPDT | 09.03201.02 |

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