

# ISL97671/2/3/4IRZ-EVAL Quick Start Guide

This quick start guide pertains to the

ISL97671/2/3/4IRZ-EVAL Evaluation Board. This board comes populated with 72 LEDs in a 6P12S configuration to simplify evaluation and testing. Please install the Sunlight ISL97670 GUI from Intersil's website, which will be used to control ISL97671/3/4 parts via I<sup>2</sup>C. Note the slave address on the ISL97671, ISL97673 and ISL97674 is hexadecimal 58; see Figure 1. Please refer to "ISL97671" on page 1, "ISL97672" on page 2, "ISL97673" on page 2 and "ISL97674" on page 3, for jumper settings and power-up instructions.

#### ISL97671

- 1. Jumpers JP7B, JP8B, JP9, JP10, JP11, JP12 and JP13 should be inserted for LED's in 6P12S configuration.
- 2. Jumpers in line 1, plus JP14, JP15, JP16, JP17, JP18 and JP19 should be inserted for LED's in 6P10S configuration.
- 3. Jumper JP5A, JP3A and JP6A are inserted.
- Connect the I<sup>2</sup>C interface board to the ISL97671/2/3/4IRZ-EVAL Evaluation Board as shown in Figure 2 for I<sup>2</sup>C control.

🖣 Sunlight ISL97670 USE			
Slave Address	58		
0x00 PWM Brightness	FF Write 0 Read	Сору	
0x01 Device Control	00 Write 0 Read	Сору	📜 Sunlight ISL97670 USB Interface 📃 🔍
0x02 Fault/Status	00 Write 0 Read	Сору	File
0x03 Identification	B8 Write 0 Read	Сору	SIC CLK Frequency (KHz) (Desired) 50000 (Actual) 50000.0
0x04	00 Write 0 Read	Сору	SIC PW (CLKs) Repeat 0 5 Pulse width 0 5 🔽 STV Enable
0x05	00 Write 0 Read	Сору	Copy SIC Repeat 1 5 Pulse width 1 10 FWMI Enable
0x06	00 Write 0 Read	Сору	Repeat 2 5 Pulse width 2 20 🔽 Serial Enable
0x07	00 Write 0 Read	Сору	PW/MI CLK Frequency (KHz) (Desired) 50000 (Actual) 50000.0
0x08	00 Write 0 Read	Сору	PWMI PW (CLKs) 5 PWMI PW (ns) 100
0x09	00 Write 0 Read	Сору	STV PW (CLKs) 1 STV PW (us) 2.560
0x0A GD	4D Write 0 Read	Сору	STV Frequency (Hz) (Desired) 295.928 (Actual) 295.928
0x0B GB	B3 Write 0 Read	Сору	SCLK/STV CLK Frequency (KHz) (Desired) 390.625 (Actual) 390.625
0x0C DD	00 Write 0 Read	Сору	Copy Repeat CH1 CH2 CH3 CH4 CH5 CH6 CH7 CH8
0x0D DM	00 Write 0 Read	Сору	Serial Block 0 255 255 255 255 255 255 255 255 255 2
0x0E DB	00 Write 0 Read	Сору	Serial Block 1 255 255 255 255 255 255 255 255 255 2
0x0F FD/DC/J	29 Write 0 Read	Сору	Serial Block 2 255 255 255 255 255 255 255 255 255
0x10 Max PWM 6-7	FF Write 0 Read	Сору	Show i2c 0 1 C Z C 0 0 1 C 0 Write Settings Quit
0x11 Max PWM 7-8	FF Write 0 Read	Сору	
0x12 Max PWM 8-9	FF Write 0 Read	Сору	
0x13 Max PWM 9-10	FF Write 0 Read	Сору	
0x14 Max PWM 10-11	FF Write 0 Read	Сору	
0x15 Max PWM 11-12	FF Write 0 Read	Сору	
Close	Write All Read All	Copy All	

#### FIGURE 1. EXAMPLE OF GUI INTERFACE



FIGURE 2. I<sup>2</sup>C INTERFACE BOARD CONNECTED TO ISL97671IRZ-EVAL EVALUATION BOARD

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- 5. JP1 should be inserted only if the input fault MOSFET O1 is not used.
- 6. Apply input voltage to the  $V_{IN}$  and GND post on the top left corner of the ISL97671IRZ-EVAL Evaluation Board.
- 7. Jumper JP3 should be in the right position and EN signal from a 2.5V/3.3V logic supply connected to the EN jumper, J5.
- 8. Jumper JP8A should be in the top position and PWM signal from a function generator connected to the PWMI jumper, J6.
- 9. Insert JP5A, JP6A and J3A.
- 10. To enable the board in SMBus mode, write a hex 05 in register 01; by writing a hex 01 in register 01 will enable DPST (see data sheet FN7631 for more details); writing a hex 03 in register 01 will allow PWM dimming only.
- 11. For non-I<sup>2</sup>C control of ISL97671, remove the  $I^2C$ interface board, JP3A and ground J3(SCL post) and J4 (SDA post). The board can now be controlled via the EN and PWMI signal.
- 12. The LED current is calibrated to 20mA/channel, which can be changed by measuring current across JP7B and varying POT  $R_{15}$  by Equation 1:

$$I_{LED} = 401.8/R_{15}$$
 (EQ. 1)

The measured current divided by six is the LED current per channel. For example, 120mA measured current will correspond to 20mA/channel.

13. The PWM dimming frequency is calibrated to 200Hz on this evaluation board but can be adjusted by varying POT  $R_{11}$  by Equation 2:

$$F_{SW} = (6.66 \times 10^7) / R_{11}$$
 (EQ. 2)

14. ISL97671IRZ-EVAL Evaluation Board should be powering 6P10S or 6P12S LED's.

#### ISL97672

- 1. Jumpers JP7B, JP8B, JP9, JP10, JP11, JP12 and JP13 should be inserted for LED's in 6P12S configuration.
- 2. Jumpers in line 1, plus JP14, JP15, JP16, JP17, JP18 and JP19 should be inserted for LED's in 6P10S configuration.
- 3. Jumper JP8A inserted in top position.
- 4. Jumper JP3 should be in the right position.
- JP1 should be inserted only if the input fault MOSFET O1 is not used.
- 6. Apply input voltage to the  $V_{IN}$  and GND post on the top left corner of the ISL97672IRZ-EVAL Evaluation Board.
- 7. Apply a 2.5/3.3V signal to EN jumper, J5.
- 8. Apply a PWM signal from a function generator to PWMI jumper, J6.
- 9. The LED current is calibrated to 20mA/channel which can be changed by measuring current across JP7B and varying POT R<sub>15</sub> by Equation 3: Ч

$$ED = 401.8/R_{15}$$
 (EQ. 3)

The measured current divided by six is the LED current per channel. For example, 120mA measured current will correspond to 20mA/channel.

- 10. The boost switching frequency is calibrated to 600kHz on this evaluation board but can be adjusted by varying POT  $R_{11}$  by Equation 4:  $F_{SW} = (5 \times 10^{10}) / R_{11}$ (EQ. 4)
- 11. At this point, the ISL97672IRZ-EVAL Evaluation Board should be powering 6P10S or 6P12S LED's.

#### ISL97673

- 1. Jumpers JP7B, JP8B, JP9, JP10, JP11, JP12 and JP13 should be inserted for LED's in 6P12S configuration.
- 2. Jumpers in line 1, plus JP14, JP15, JP16, JP17, JP18 and JP19 should be inserted for LED's in 6P10S configuration.
- 3. Jumpers JP3A, JP5A and JP6A are inserted.
- 4. Connect the I<sup>2</sup>C interface board to the ISL97673/4IRZ-EVAL Evaluation Board, as shown in Figure 3.



FIGURE 3. I<sup>2</sup>C INTERFACE BOARD CONNECTED TO ISL97673IRZ-EVAL EVALUATION BOARD

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- 5. JP1 should be inserted only if the input fault MOSFET Q1 is not used.
- 6. Apply input voltage to the  ${\rm V}_{\rm IN}$  and GND post on the top left corner of the ISL97673IRZ-EVAL Evaluation Board.

For PWMI dimming, only go to Step 7; for SMBus dimming go to Step 8; for direct PWM go to Step 9; for DC current adjustment go to Step 10.

- JP7A in the bottom position corresponds to SEL2 pin being high, which corresponds to fixed delay; floating JP7A corresponds to float on SEL2 pin, which corresponds to equal phase shift; inserting JP7A in the top position, corresponds to no delay.
- 8. JP5 inserted in the bottom position
- 9. Insert JP5A in top position and JP7A in the top position.
- 10. Insert JP5 in the top position
- 11. Jumper JP3 should be in the left position and EN/PWM signal from function generator connected to PWMI jumper, J6.
- 12. To enable the board in SMBUS dimming, write a hex 05 in register 01; writing a hex 01 in register 01 will enable DPST (see data sheet <u>FN7633</u> for more detail); writing a hex 03 in register 01 will only allow external PWM signal for dimming.

13. The LED current is calibrated to 20mA/channel which can be changed by measuring current across JP7B and varying POT  $R_{15}$  by Equation 5:

$$I_{LED} = 401.8/R_{15}$$
 (EQ. 5)

The measured current divided by six is the LED current per channel. For example, 120mA measured current will correspond to 20mA/channel.

14. The PWM dimming frequency is calibrated to 200Hz on this evaluation board but can be adjusted by varying POT  $\rm R_{11}$  by Equation 6:

$$F_{SW} = (6.66 \times 10^7) / R_{11}$$
 (EQ. 6)

15. At this point, the ISL97673IRZ-EVAL Evaluation Board should be powering 6P10S or 6P12S LED's.

#### ISL97674

- 1. Jumpers JP7B, JP8B, JP9, JP10, JP11, JP12 and JP13 should be inserted for LED's in 6P12S configuration.
- 2. Jumpers in line 1, plus JP14, JP15, JP16, JP17, JP18 and JP19 should be inserted for LED's in 6P10S configuration.
- 3. Insert jumpers JP3A, JP5A and JP6A.
- 4. Connect the  $\rm I^2C$  interface board to the ISL97674IRZ-EVAL Evaluation Board, as shown in Figure 4.



FIGURE 4. I<sup>2</sup>C INTERFACE BOARD CONNECTED TO ISL97674IRZ-EVAL EVALUATION BOARD

- 5. Jumper JP3 should be in the left position and En/PWM signal from function generator connected to PWMI jumper, J6.
- 6. JP1 should be inserted only if the input fault MOSFET Q1 is not used.
- 7. Apply input voltage to the  ${\rm V}_{\rm IN}$  and GND post on the top left corner of the ISL97674IRZ-EVAL Evaluation Board.
- 8. Insert JP8A in the bottom position and apply a 60Hz  $V_{SYNC}$  signal to  $V_{SYNC}$  post, J7.
- 9. To enable the board in SMBUS control dimming, write a hex 05 in register 01; for PWM dimming control, write a hex 03 in register 01.

10. The LED current is calibrated to 20mA/channel which can be changed by measuring current across JP7B and varying POT  $R_{15}$  by Equation 7:

$$LED = 401.8/R_{15}$$
 (EQ. 7)

The measured current divided by six is the LED current per channel. For example, 120mA measured current will correspond to 20mA/channel.

- 11. The boost switching frequency can be programmed to either 600kHz or 1.2MHz by writing a '1' or a '0' in hex register 08, Bit 2. See ISL97674 data sheet, <u>FN7634</u>, Table 2B for more details.
- 12. At this point, the ISL97674IRZ-EVAL Evaluation Board should be powering 6P10S or 6P12S LED's.



# **ISL97671/2/3/4IRZ-EVAL Evaluation Board Schematic**

### ISL97671/2/3/4IRZ-EVAL Evaluation Board Layout



FIGURE 5. TOP LAYER

# ISL97671/2/3/4IRZ-EVAL Evaluation Board Layout (Continued)



**FIGURE 6. BOTTOM LAYER** 

Intersil Corporation reserves the right to make changes in circuit design, software and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that the Application Note or Technical Brief is current before proceeding.

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