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# S6SAL211A94SA1001

# 4ch 10W LED Driver Board Operation Guide

Document Number: 002-08727 Rev. *B

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# Preface

This manual explains how to use the evaluation board. Be sure to read this manual before using the product. For this product, please consult with sales representatives or support representatives.

**Handling and Use**

Handling and use of this product and notes regarding its safe use are described in the manuals.

Follow the instructions in the manuals to use this product.

Keep this manual at hand so that you can refer to it anytime during use of this product.

**Notice on this Document**

All information included in this document is current as of the date it is issued. Such information is subject to change without any prior notice.

Please confirm the latest relevant information with the sales representatives.

# Cautions

### Caution of the Products Described in this Document

The following precautions apply to the product described in this manual.

| | |
|---|---|
| ⚠ **WARNING** | Indicates a potentially hazardous situation which could result in death or serious injury and/or a fault in the user's system if the product is not used correctly. |
| ⚠ **WARNING** | Do not look directly at LED. There is a possibility that your eye is hurt. |

| | |
|---|---|
| **Electric shock, Damage** | Before performing any operation described in this manual, turn off all the power supplies to the system. Performing such an operation with the power on may cause an electric shock or device fault. |
| **Electric shock, Damage** | Once the product has been turned on, do not touch any metal part of it. Doing so may cause an electric shock or device fault. |

| | |
|---|---|
| ⚠ **CAUTION** | Indicates the presence of a hazard that may cause a minor or moderate injury, damages to this product or devices connected to it, or may cause to loose software resources and other properties such as data, if the device is not used appropriately. |

| | |
|---|---|
| **Cuts, Damage** | Before moving the product, be sure to turn off all the power supplies and unplug the cables. Watch your step when carrying the product. Do not use the product in an unstable location such as a place exposed to strong vibration or a sloping surface. Doing so may cause the product to fall, resulting in an injury or fault. |
| **Cuts** | The product contains sharp edges that are left unavoidably exposed, such as jumper plugs. Handle the product with due care not to get injured with such pointed parts. |
| **Damage** | Do not place anything on the product or expose the product to physical shocks. Do not carry the product after the power has been turned on. Doing so may cause a malfunction due to overloading or shock. |
| **Damage** | Since the product contains many electronic components, keep it away from direct sunlight, high temperature, and high humidity to prevent condensation. Do not use or store the product where it is exposed to much dust or a strong magnetic or electric field for an extended period of time. Inappropriate operating or storage environments may cause a fault. |
| **Damage** | Use the product within the ranges given in the specifications. Operation over the specified ranges may cause a fault. |
| **Damage** | To prevent electrostatic breakdown, do not let your finger or other object come into contact with the metal parts of any of the connectors. Before handling the product, touch a metal object (such as a door knob) to discharge any static electricity from your body. |
| **Damage** | When turning the power on or off, follow the relevant procedure as described in this document. Before turning the power on, in particular, be sure to finish making all the required connections. Furthermore, be sure to configure and use the product by following the instructions given in this document. Using the product incorrectly or inappropriately may cause a fault. |
| **Damage** | Because the product has no casing, it is recommended that it be stored in the original packaging. Transporting the product may cause a damage or fault. Therefore, keep the packaging materials and use them when re-shipping the product. |

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# 1. Description

S6SAL211A94SA1001 is the starter kit tool for BLE (*1) communication.

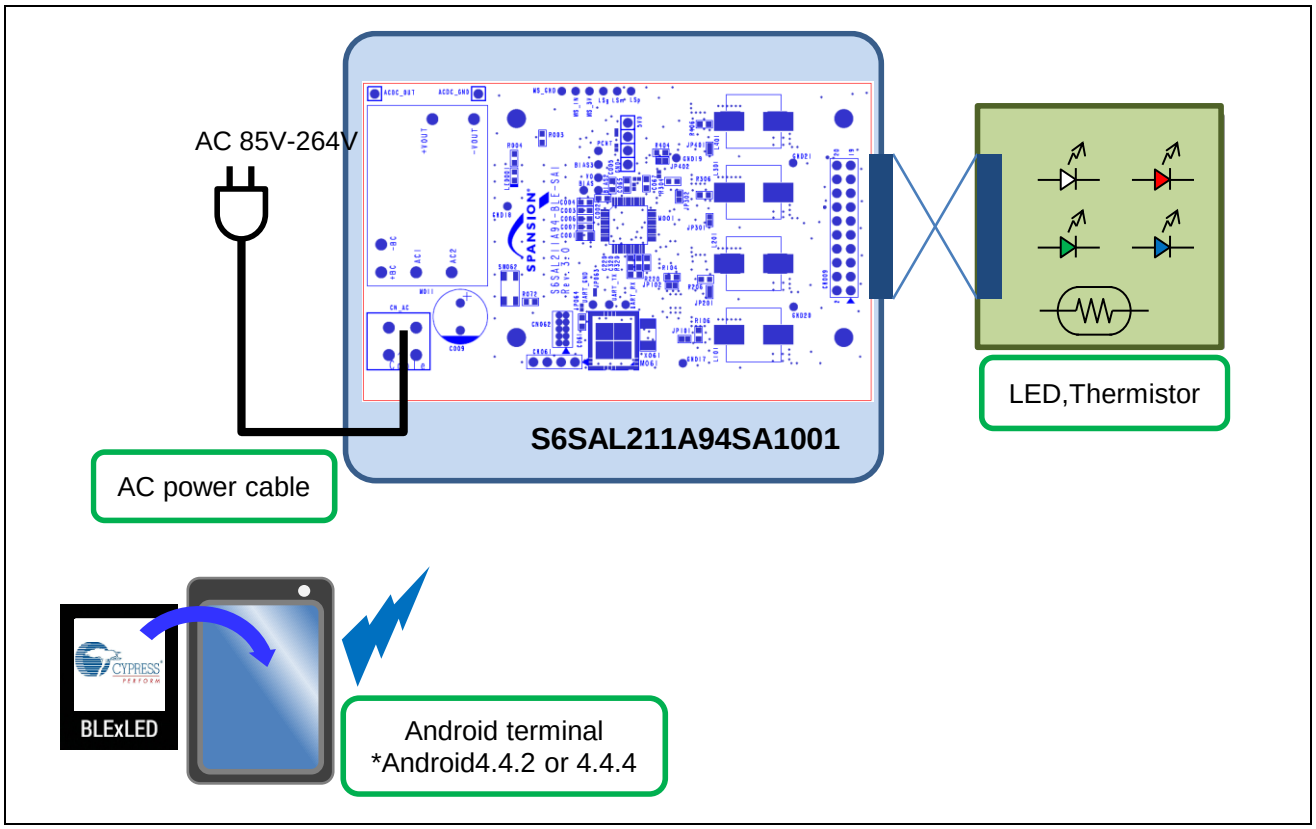
The tool has one evaluation board, this board implements S6AL211A94, and LED driver controlled by BLE communication.

It is necessary to prepare AC power cable, Android terminal (*2), Application software, LED module and connection cable.

*1: BLE: Bluetooth® Low Energy

*2: Prepare an Android terminal with Android OS 4.4.2 or 4.4.4.

Figure 1-1 Board Outline



# 2. Evaluation Board Specification

Figure 2-1 Evaluation Board Specification

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input voltage (with TUHS10F24) | VINAC | 85 | | 264 | VRMS |
| Output LED voltage | VLEDout | 0 | 18 | 24 | V |
| Output LED current | ILEDout(W)<br>ILEDout(R)<br>ILEDout(G)<br>ILEDout(B) | - | - | 290<br>140<br>180<br>90 | mA |
| Board size | - | 58 × 93 | | | mm |

.

# 3. Pin Descriptions

## 3.1 Input/Output Connecter Descriptions

Table 3-1 Input/Output Pin Descriptions

| Connecter Symbol | I/O | Function Description |
|---|---|---|
| CN_AC | I | AC power supply terminal |
| ACDC_OUT | O | 24V AC/DC module output |
| ACDC_GND | - | GND |
| CN009 | I/O | CH1 - CH4 LED , thermistor terminal |
| MS_3V | O | 3V power supply terminal for motion sensor |
| MS_IN | I | Input terminal for motion sensor |
| MS_GND | - | GND terminal for motion sensor |
| LSp | O | 3V power supply terminal for Illumination sensor |
| LSm | I | Input terminal for Illumination sensor |
| LSg | - | GND terminal for Illumination sensor |
| CN061 | I/O | JTAG terminal for BLE module |

## 3.2 Switch Descriptions

Table 3-2 Switch Descriptions

| Switch | Description |
|---|---|
| SW062 | Reset push switch for BLE module |

# 4. Setup and Verification

## 4.1 Contents in a Package

Table 4-1 S6SAL211A94SA1001 Contents List

| No. | Contents | Description | Quantity | Notes |
|---|---|---|---|---|
| 1 | S6SAL211A94-BLE-SA1 | Evaluation board of 4CH 10W with S6AL211A94 | 1 | - |
| 2 | Leaflet | Described startup information | 2 | English, Japanese |

Figure 4-1 Contents Picture




## 4.2 Evaluation with BLE Communication

**Using Items for Evaluation with I²C Control**

- Evaluation board 1pic (*1)
- AC power cable 1pic (*2)
- Android terminal with Android OS 4.4.2 or 4.4.4. 1pic (*2)
- Application software 1pic (*3)
- LED module(5 series × 4ch) 1set (*2)
- Connection cable 1set (*2)

*1: Included in a package.

*2: Please prepare. Refer to 4.2.1 Operation

*3: Please download it from our device home page.

URL: http://www.cypress.com/S6AL211A

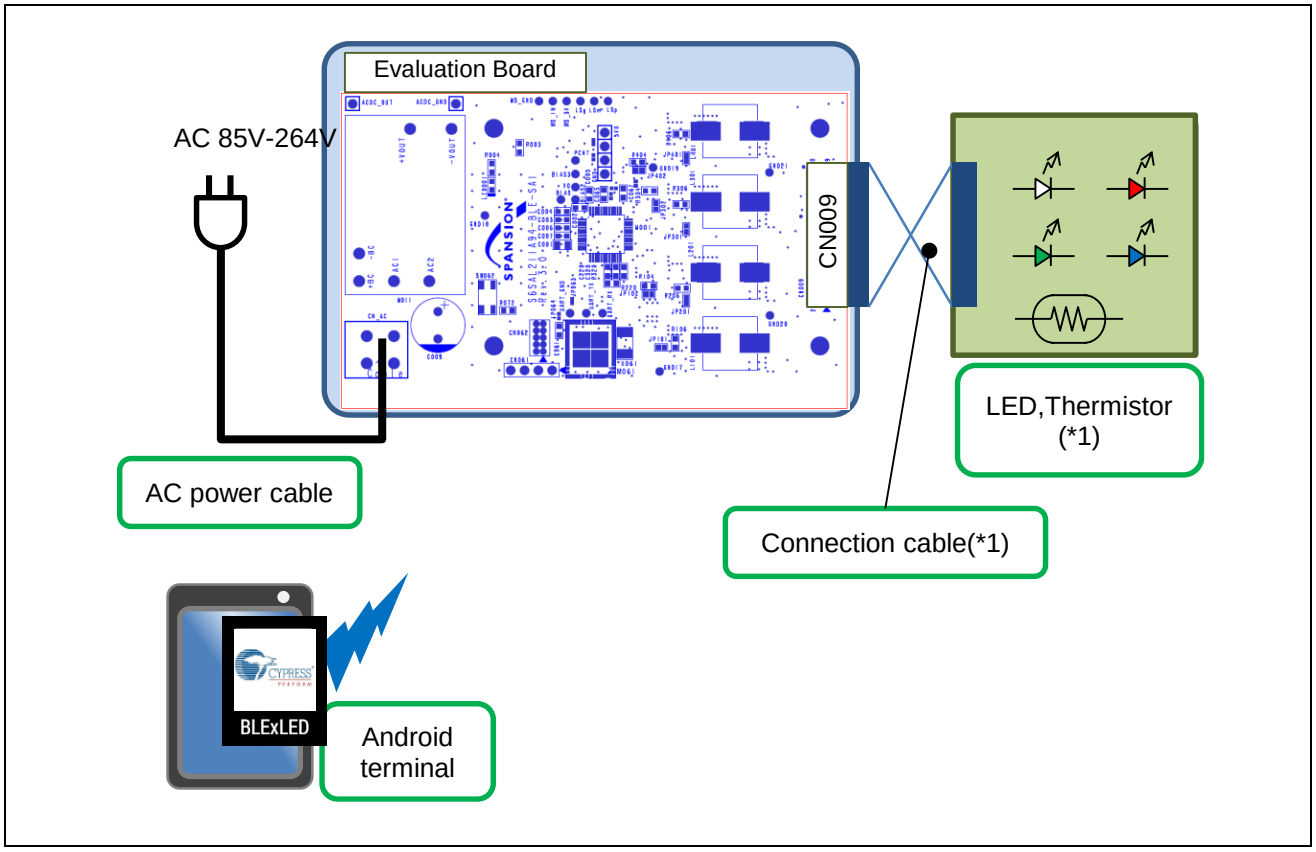
S6AL211A94: BLE Application software file BLExLED.apk in S6AL211_BLExLED.cab

## 4.2.1 Operation

| | |
|---|---|
| ⚠ **WARNING** | Do not look directly at LED. There is a possibility that your eye is hurt. |

1. Connect CN009 of the evaluation board and LED by connection cable. (*1)
2. Set some attributes in the application of Android terminal. (*2)
3. Connect AC plug of the evaluation board to AC power supply.
4. Connect Android terminal to BLE module by BLE communication. (*2)
5. When connection succeeds, it is possible to make them do various movement by application. (*3)
6. When ending operation, make the brightness level of the LED "0" and tap "Disconnect" button of "HOME" tab and cut power supply.

Figure 4-2 Board Connection



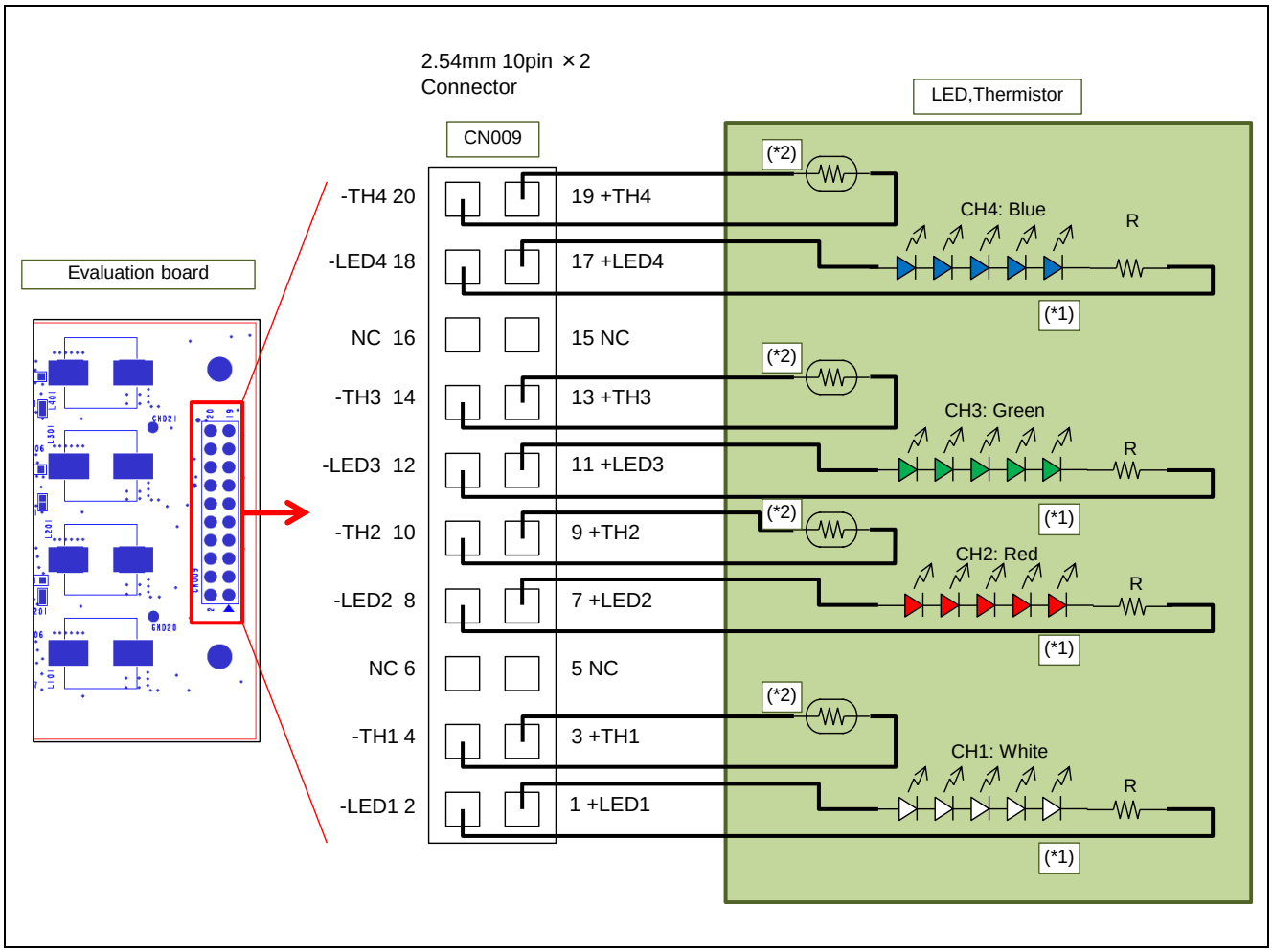

*1: Connect LED to all CH from CN009. Refer to 4.2.1.1 Connection of the Evaluation Board and LED.

*2: Refer to 4.2.1.2 Setup with BLE Communication.

*3: Refer to 4.3 Function of Application.

### 4.2.1.1 *Connection of the Evaluation Board and LED*

Figure 4-3 Connection of the Evaluation Board and LED




*1: Connect LED to CN009.

Driver's output channel and color of LED are fixing by application software.
To indicate correct color, connect each channel exactly.
Specification of LED module and resistor: LED (5-series) + resistor

| | |
|---|---|
| White: IF ≥ 1A, VF ≈ 3 V | Ex: LUW CR7P(OSRAM) |
| Red: IF ≥ 1A, VF ≈ 2.2 V | Ex: LR CP7P(OSRAM) |
| Green: IF ≥ 1A, VF ≈ 3.2 V | Ex: LT CP7P(OSRAM) |
| Blue: IF ≥ 1A, VF ≈ 3.2V | Ex: LB CP7P(OSRAM) |
| R: 10Ω 2W | |

Be careful about polarity.

*2: Thermistor (+TH,-TH) is an option. Even if that isn't connected, a board operates.

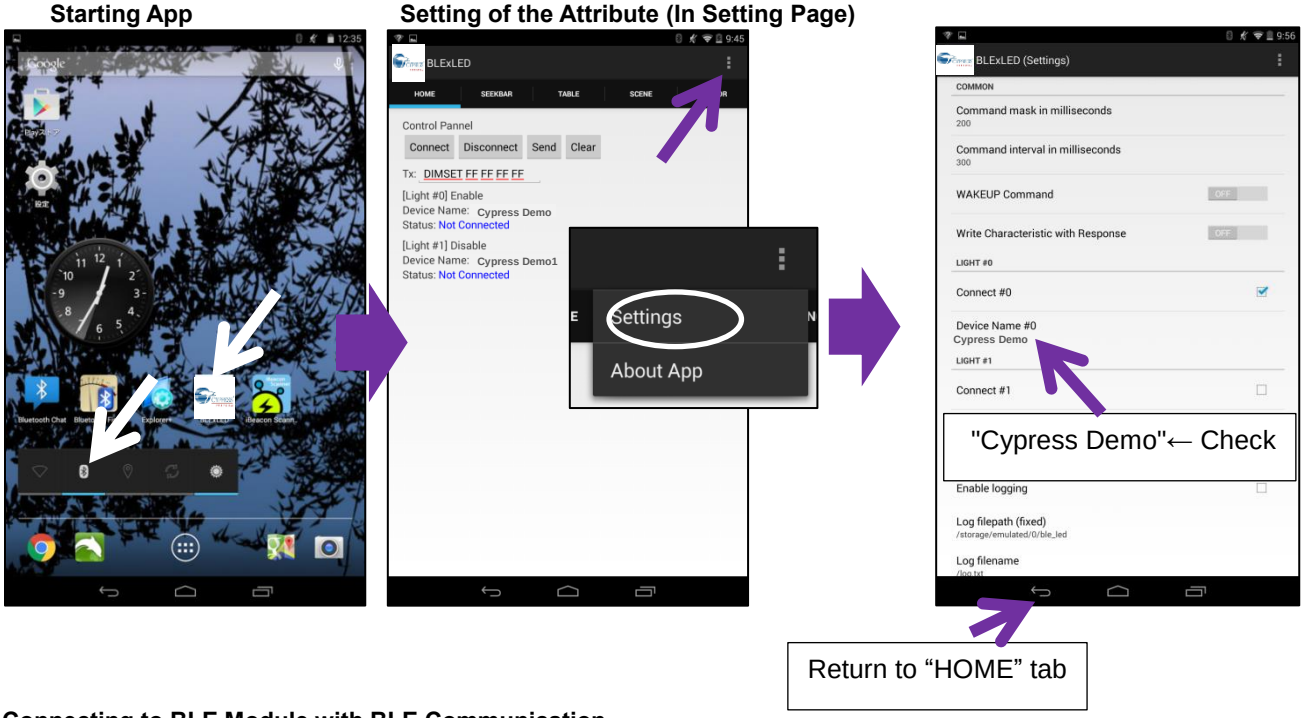
Ex: NTCG104EF104FT1 (TDK)

### *4.2.1.2 Setup with BLE Communication*

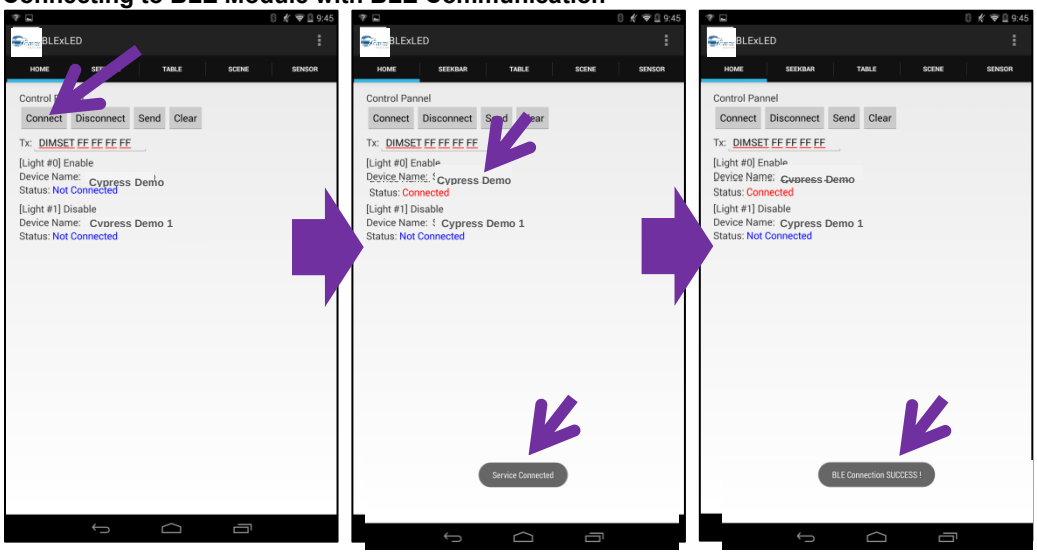
1. Start "BLExLED" by tapping icon in android tablet. (In advance, set on Bluetooth in Android OS)
   Set some attributes in the application. (Device Name #0)
2. Connect AC plug to AC power supply.
3. Tap "Connect" button in "HOME" tab. If connection succeeds, "BLE Connection SUCCESS!" is indicated in the display.
4. Refer to 4.3 Function of Application and operate.

**Starting App**

**Setting of the Attribute (In Setting Page)**

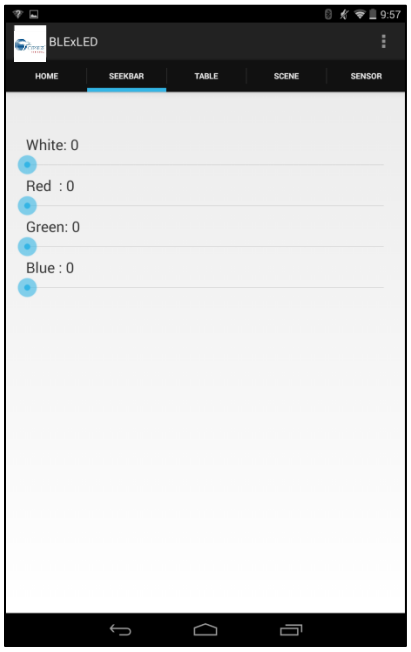



**Connecting to BLE Module with BLE Communication**



## 4.3 Function of Application

### 4.3.1 "SEEKBER" Tab



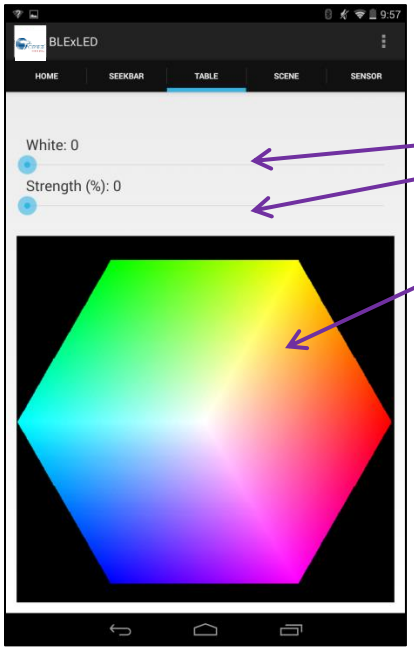

It is possible to change the brightness of each LED by swiping level of seek bar.

When releasing a finger, brightness of LED changes.

Maximum supply power of AC/DC module is 10.8W.Total maximum Output power is over 10W.

When lighting White LED, make the lighting level of RGB LED "0".
When lighting RGB LED, make the lighting level of White LED "0".

### 4.3.2 "TABLE" Tab




It's possible to change the brightness of the White LED by swiping level of White Seek bar.

It's possible to change color brightness of the RGB LED by swiping level of Strength Seek bar.

It's possible to change the color of LED by tapping color table.

When Strength Seek bar level is "0", RGB LED goes out.

Maximum supply power of AC/DC module is 10.8W.Total maximum Output power is over 10W.

When lighting White LED, make the lighting level of RGB LED "0".
When lighting RGB LED, make the lighting level of White LED "0".

### 4.3.3 "SCENE" Tab




"Preset Lighting" is operated by this table.

Reading: Bright white lighting

Dinner: Warm white lighting

CYPRESS: Cypress blue color

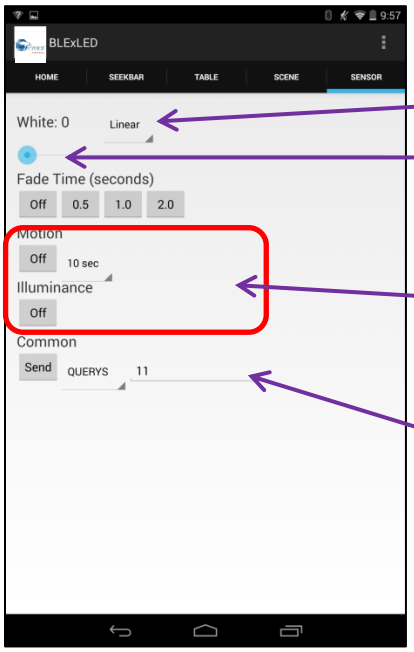
ALERT: Switching white and red (Sequence per second)

Wakeup: gradually brighter (5 seconds sequence)

Rainbow: Automatic color control

Stop: Stop sequence of **"**ALERT**"**, **"**Wake up**"** and **"**Rainbow**"**.

### 4.3.4 "SENSOR" Tab




It's possible to set a sensor setting and dimming curve at this table.
Dimming curve type select "Linear" or "Log"
It's possible to change the brightness of the white LED by swiping level of white seek bar.
Fade Time: Setting of fade time

When installing a sensor, below is used. (*1)
Motion: Motion sensor on/off, stand-by detection time select "10sec" or "5min"
Illuminance: Illuminance sensor on/off (*2)

Common: It's used for setting change. The following item can be chosen by a pulldown.
QUERYS: S6AI211A94 memory reading command (*3)
MEMSET: S6AI211A94 memory writing in command (*3)
BLEGET: BLE module memory reading command (*4)
BLESET: BLE module memory writing in command (*4)

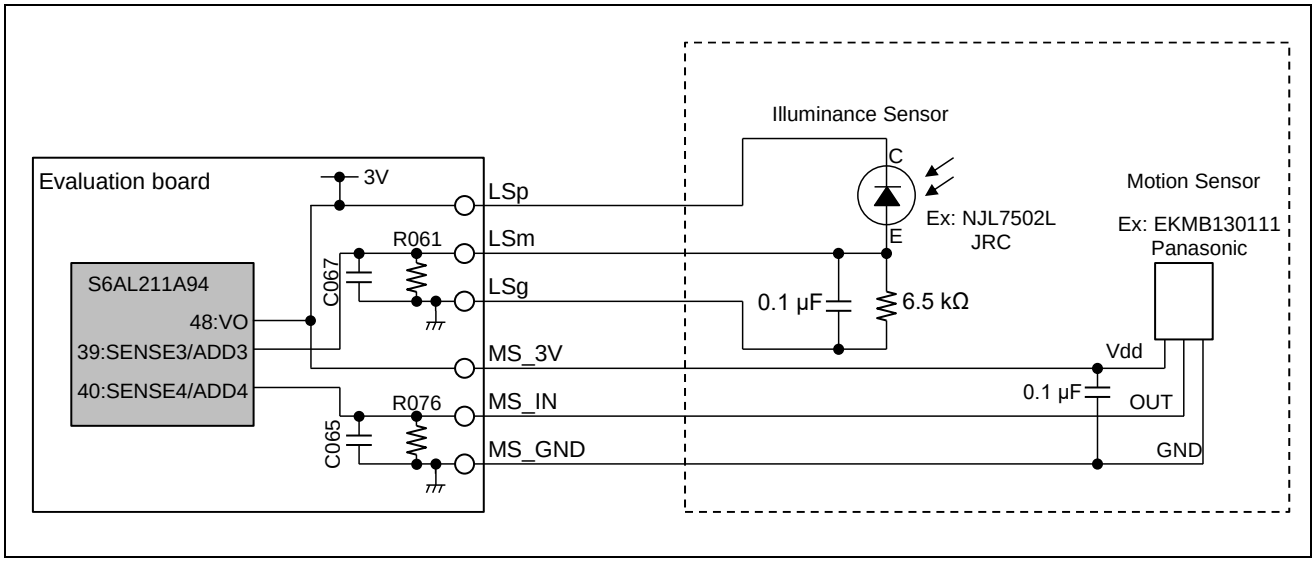
*1: Refer to 4.3.4.1. Example of Sensor Use
*2: When using a motion sensor, illumination sensor can not be used.
*3: Refer to 4.3.4.2. S6AI211A94 Control Command
*4: Refer to 4.3.4.3. BLE Module Control Command

### 4.3.4.1 Example of Sensor Use

When using the sensor function of the application, prepare the outside sensor parts.

The recommended parts are as follows.

Figure 4-4 Example of Sensor Use



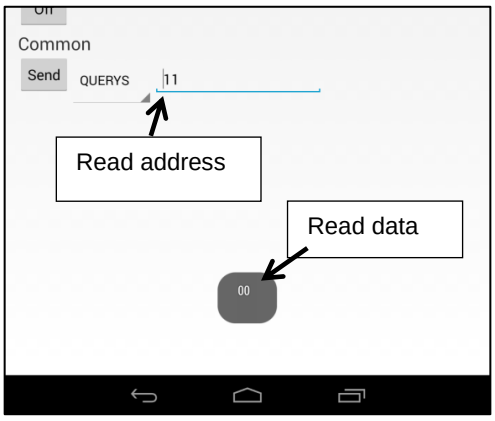

### 4.3.4.2 S6Al211A94 Control Command

QUERYS: "1st argument: read address" is input, and "Send" button is pushed.
Data or "TRUE" or "FALSE" of memory is indicated.

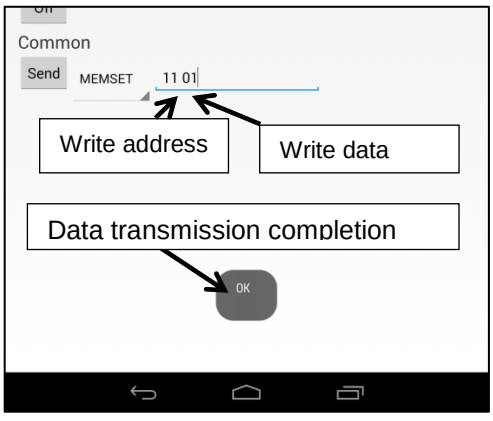
MEMSET: "1st argument: write address" and "2nd argument: write data" is input, and "Send" button is pushed.
"OK" is indicated.

Note: Refer to hardware manual of S6AL211A94 for details of the address and write data.

Ex: QUERYS




Ex: MEMSET



### *4.3.4.3 BLE Module Control Command*

Table 4-2 BLEGET Command

| Command | 1st Argument Address | 2nd Argument Data | Function | Response | Initial Value |
|---|---|---|---|---|---|
| BLEGET | 00 | 00 | Turning on the lights threshold reading of illumination sensor | HH LL<CR><LF> (*1) | 00 02 |
| | | 01 | Turning off the lights threshold reading of illumination sensor | | 00 08 |
| | 01 | - | Reply interval time reading of illumination sensor | HH LL<CR><LF> (*2) | 00 05 |

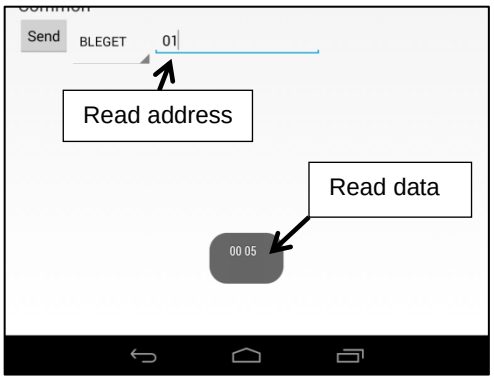
Table 4-3 BLESET Command

| Command | 1st Argument Address | 2nd Argument Address/Data | 3rd Argument Data | 4th Argument Data | Function | Response |
|---|---|---|---|---|---|---|
| BLESET | 00 | 00 | HH (*1) | LL (*1) | Turning on the lights threshold writing of illumination sensor | OK<CR><LF> |
| | | 01 | | | Turning off the lights threshold writing of illumination sensor | |
| | 01 | HH (*2) | LL (*2) | - | Reply interval time writing of illumination sensor | OK<CR><LF> |

*1: Threshold (hexadecimal number). HH: Upper 2bit data, LL: Lower 8bit data
Only lower rank 2bit is effective for HH data.
Set Turning on the lights threshold smaller than Turning off the lights threshold.

*2: Reply interval time (hexadecimal number). HH: Upper 2bit data, LL: Lower 8bit data
Unit: 0.1 ms, Setting area: 0.1 ms to 6553.5 ms

Ex: BLEGET




Ex: BLESET



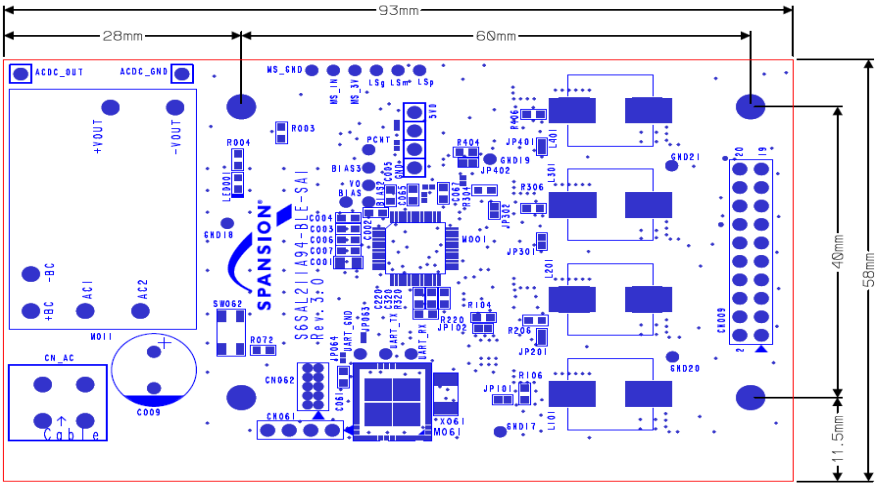
## 4.4 How to Do When LED Lighting can not be Controlled.

1. Pull out AC plug
2. Exit "BLExLED" application
3. Turn off Bluetooth indicator in Android OS.
4. Turn on Bluetooth indicator in Android OS.
5. Connect AC plug to electrical outlet.
6. Start "BLExLED". (Continue as above-mentioned)

# 5. Layout

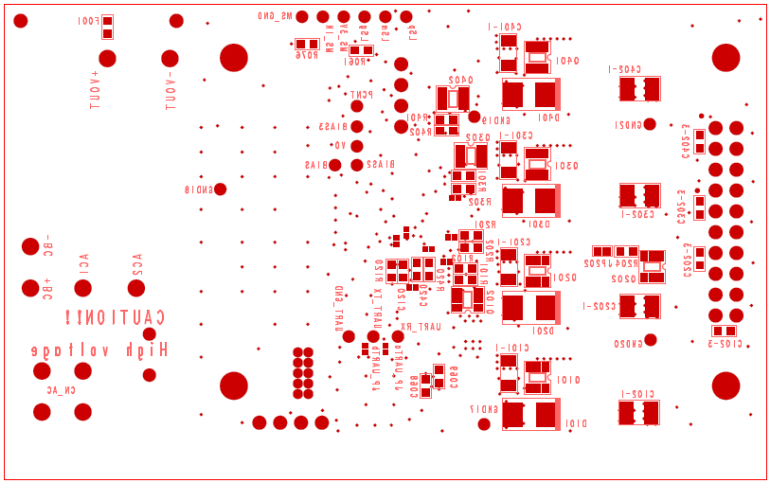
## 5.1 Component Layout

Figure 5-1 Evaluation Board Component Layout




**Board size of 10W LED driver: 58mm x 93mm**

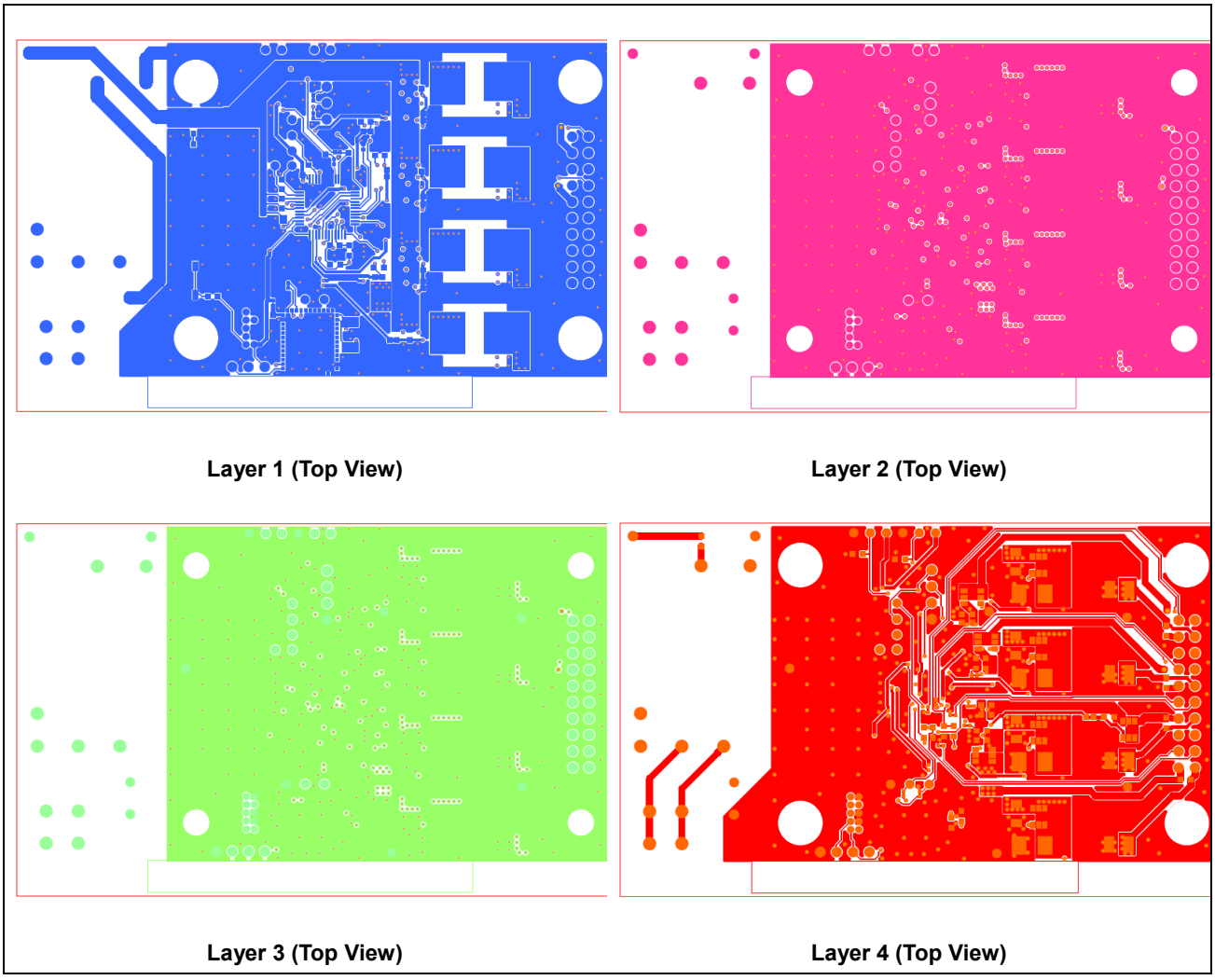
**Layer1 (Top View)**




**Layer4 (Top View)**

## 5.2 Wiring Layout

Figure 5-2 Evaluation Board Wiring Layout



# 6. Circuit Schematic

Figure 6-1 Evaluation Board Circuit Schematic

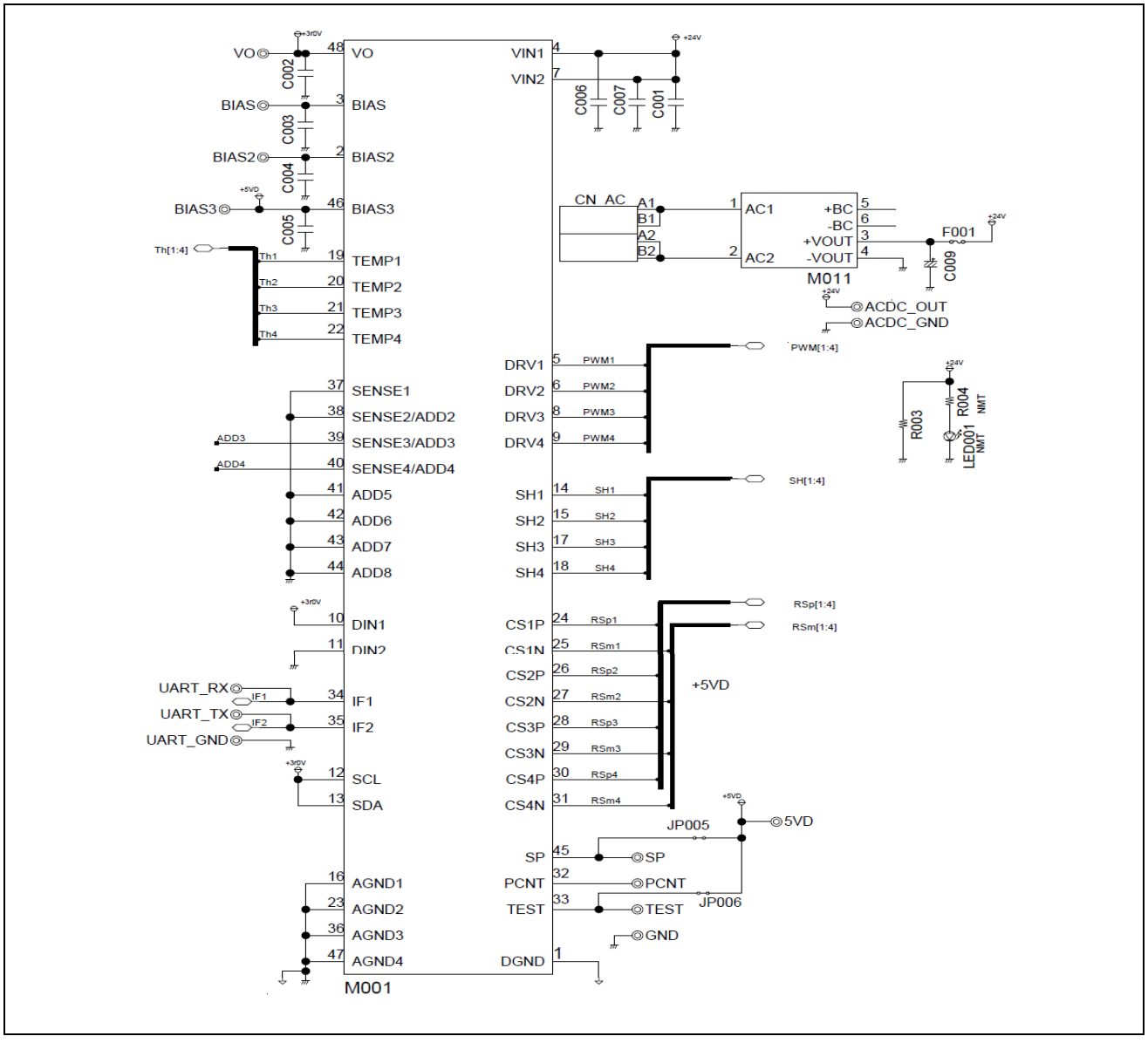


Figure 6-2 Evaluation Board Circuit Schematic

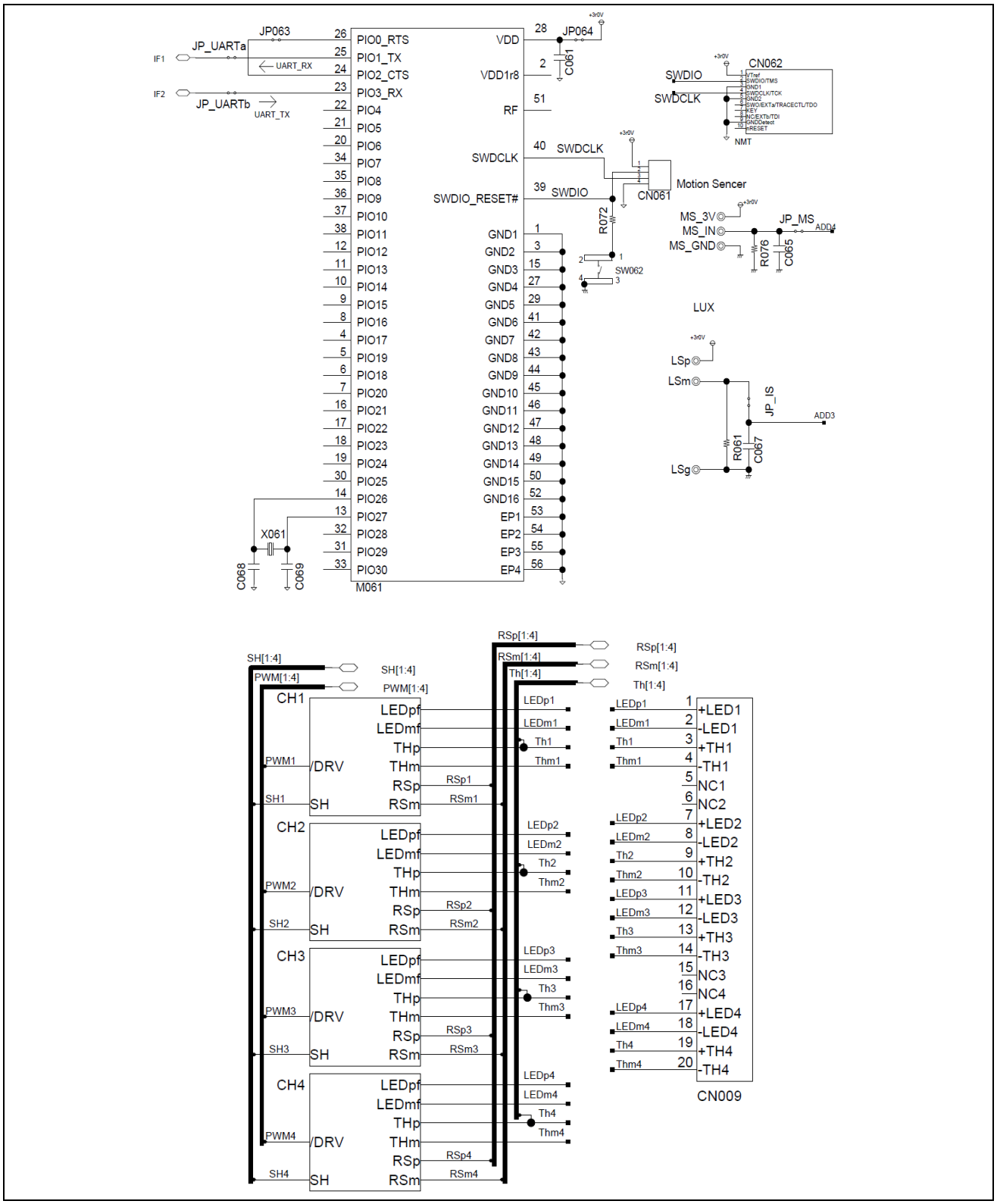
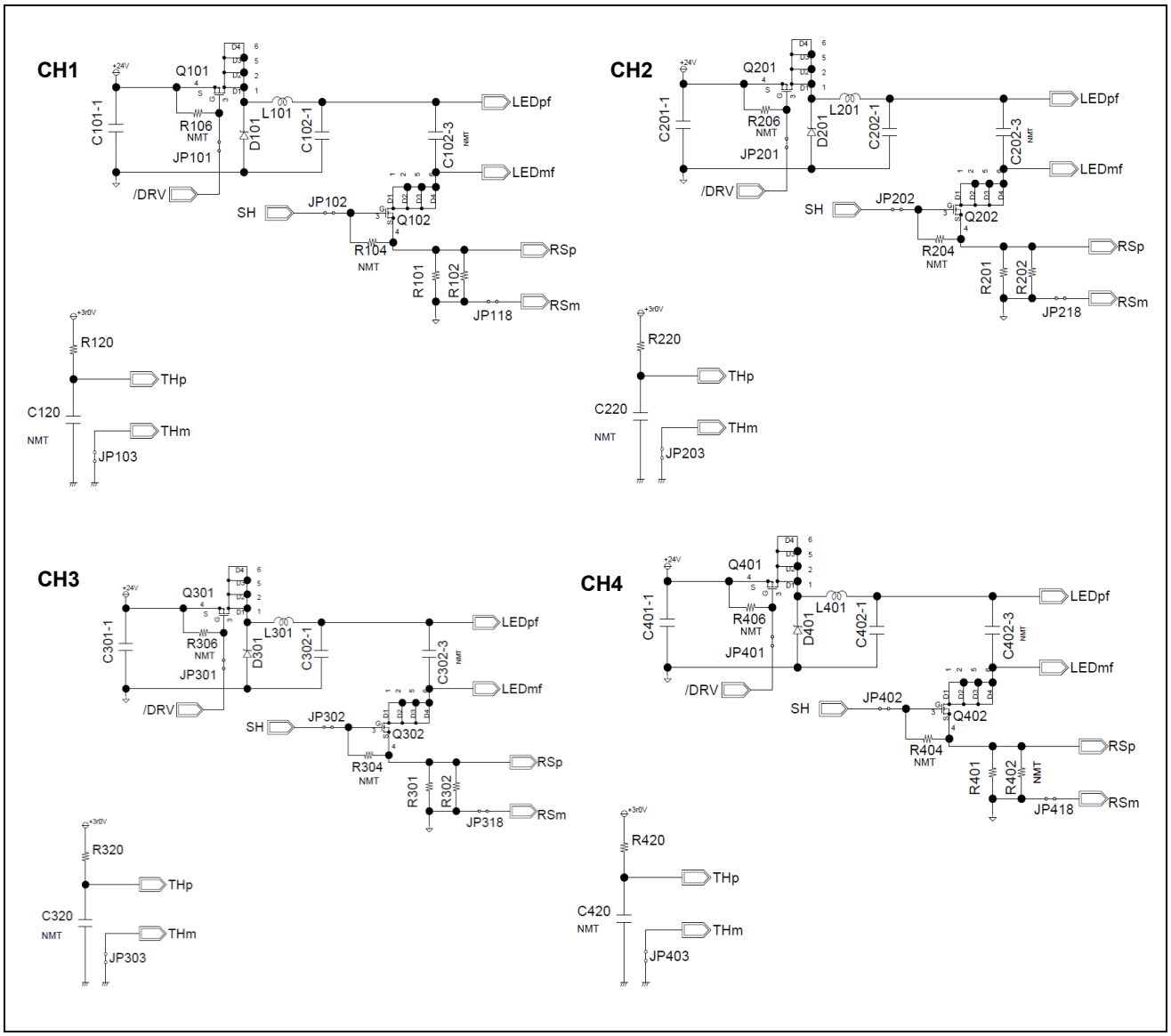


Figure 6-3 Evaluation Board Circuit Schematic



# 7. Component List

Table 7-1 Evaluation Board Component List

| No. | Component | Parts Number | Vendor | Value | Rated Voltage(V) | Rated Current(A) | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | C001 | C2012X5R1V106K125AC | TDK | 10 µF | 35 | - | - |
| 2 | C002 | C1608X5R1V475K | TDK | 4.7 µF | 35 | - | - |
| 3 | C003 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | - |
| 4 | C004 | C1608X5R1V475K | TDK | 4.7 µF | 35 | - | - |
| 5 | C005 | C1608X5R1V475K | TDK | 4.7 µF | 35 | - | - |
| 6 | C006 | C1608CH1H101J | TDK | 100 pF | 50 | - | - |
| 7 | C007 | C1608CH1H101J | TDK | 100 pF | 50 | - | - |
| 8 | C009 | EKMG350ELL471MJ16S | NIPPON-CHEMI-CON | 470 µF | 35 | - | - |
| 9 | C061 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | - |
| 10 | C065 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | NMT |
| 11 | C067 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | - |
| 12 | C068 | C1608CH1H010C | TDK | 1 pF | 50 | - | - |
| 13 | C069 | C1608CH1H010C | TDK | 1 pF | 50 | - | - |
| 14 | C101-1 | C3216X5R1V475K160AB | TDK | 4.7 µF | 35 | - | - |
| 15 | C102-1 | C3225X5R1H106K | TDK | 10 µF | 50 | - | - |
| 16 | C102-3 | C1608CH1H102J | TDK | 0.001 µF | 50 | - | NMT |
| 17 | C120 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | NMT |
| 18 | C201-1 | C3216X5R1V475K160AB | TDK | 4.7 µF | 35 | - | - |
| 19 | C202-1 | C3225X5R1H106K | TDK | 10 µF | 50 | - | - |
| 20 | C202-3 | C1608CH1H102J | TDK | 0.001 µF | 50 | - | NMT |
| 21 | C220 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | NMT |
| 22 | C301-1 | C3216X5R1V475K160AB | TDK | 4.7 µF | 35 | - | - |
| 23 | C302-1 | C3225X5R1H106K | TDK | 10 µF | 50 | - | - |
| 24 | C302-3 | C1608CH1H102J | TDK | 0.001 µF | 50 | - | NMT |
| 25 | C320 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | NMT |
| 26 | C401-1 | C3216X5R1V475K160AB | TDK | 4.7 µF | 35 | - | - |
| 27 | C402-1 | C3225X5R1H106K | TDK | 10 µF | 50 | - | - |
| 28 | C402-3 | C1608CH1H102J | TDK | 0.001 µF | 50 | - | NMT |
| 29 | C420 | C1608X5R1H104K080AA | TDK | 0.1 µF | 50 | - | NMT |
| 30 | CN009 | M20-9981045 | Harwin Inc | 2×10 pin | - | 3 | - |

| No. | Component | Parts Number | Vendor | Value | Rated Voltage(V) | Rated Current(A) | Remarks |
|---|---|---|---|---|---|---|---|
| 31 | CN061 | TSW-104-14-L-S | Samtec | - | 550 | 7.6 | - |
| 32 | CN062 | FTSH-105-01-F-D-K-ND | Samtec | - | - | - | NMT |
| 33 | CN_AC | ML-2100-2P | SATOPARTS | - | 300 | 7 | - |
| 34 | D101 | SS23 | FAIRCHILD | - | 30 | 2 | - |
| 35 | D201 | SS23 | FAIRCHILD | - | 30 | 2 | - |
| 36 | D301 | SS23 | FAIRCHILD | - | 30 | 2 | - |
| 37 | D401 | SS23 | FAIRCHILD | - | 30 | 2 | - |
| 38 | F001 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 39 | L101 | CLF10040T-221M | TDK | 220 µH | - | 700 m | - |
| 40 | L201 | CLF10040T-221M | TDK | 220 µH | - | 700 m | - |
| 41 | L301 | CLF10040T-221M | TDK | 220 µH | - | 700 m | - |
| 42 | L401 | CLF10040T-221M | TDK | 220 µH | - | 700 m | - |
| 43 | LED001 | OSHR1608C1A | OptoSupply | - | - | 30 m | NMT |
| 44 | M001 | S6AL211A94 | Cypress | - | - | - | - |
| 45 | M011 | TUHS10F24 | COSEL | 24 V | - | - | - |
| 46 | M061 | MBH7BTZ02 | FUJITSU | - | - | - | - |
| 47 | Q101 | FDC658AP | FAIRCHILD | - | 30 | 4 | - |
| 48 | Q102 | FDC8886 | FAIRCHILD | - | 30 | 6.5 | - |
| 49 | Q201 | FDC658AP | FAIRCHILD | - | 30 | 4 | - |
| 50 | Q202 | FDC8886 | FAIRCHILD | - | 30 | 6.5 | - |
| 51 | Q301 | FDC658AP | FAIRCHILD | - | 30 | 4 | - |
| 52 | Q302 | FDC8886 | FAIRCHILD | - | 30 | 6.5 | - |
| 53 | Q401 | FDC658AP | FAIRCHILD | - | 30 | 4 | - |
| 54 | Q402 | FDC8886 | FAIRCHILD | - | 30 | 6.5 | - |
| 55 | R003 | RR0816P-104-D | SSM | 100 kΩ | - | - | - |
| 56 | R004 | RR0816P-123-D | SSM | 12 kΩ | - | - | NMT |
| 57 | R072 | RR0816P-101-D | SSM | 100Ω | - | - | - |
| 58 | R076 | RR0816P-274-D | SSM | 270 kΩ | - | - | - |
| 59 | R101 | RK73H1JTTD2R20F | KOA | 2.2Ω | - | - | - |
| 60 | R102 | RK73H1JTTD1R00F | KOA | 1Ω | - | - | - |
| 61 | R103 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 62 | R104 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 63 | R106 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 64 | R107 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 65 | R120 | RR0816P-752-D | SSM | 7.5 kΩ | - | - | - |
| 66 | R201 | RK73H1JTTD2R20F | KOA | 2.2Ω | - | - | - |
| 67 | R202 | RK73H1JTTD3R90F | KOA | 3.9Ω | - | - | - |
| 68 | R203 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 69 | R204 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 70 | R206 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 71 | R207 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 72 | R220 | RR0816P-752-D | SSM | 7.5 kΩ | - | - | - |
| 73 | R301 | RK73H1JTTD2R20F | KOA | 2.2Ω | - | - | - |
| 74 | R302 | RK73H1JTTD2R20F | KOA | 2.2Ω | - | - | - |

| No. | Component | Parts Number | Vendor | Value | Rated Voltage(V) | Rated Current(A) | Remarks |
|---|---|---|---|---|---|---|---|
| 75 | R303 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 76 | R304 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 77 | R306 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 78 | R307 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 79 | R320 | RR0816P-752-D | SSM | 7.5 kΩ | - | - | - |
| 80 | R401 | RK73H1JTTD2R20F | KOA | 2.2Ω | - | - | - |
| 81 | R402 | RK73H1JTTD2R20F | KOA | 2.2Ω | - | - | NMT |
| 82 | R403 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 83 | R404 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 84 | R406 | RK73H1JTTD1004F | KOA | 1 MΩ | - | - | NMT |
| 85 | R407 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 86 | R420 | RR0816P-752-D | SSM | 7.5 kΩ | - | - | - |
| 87 | R421 | RK73Z1J | KOA | 0Ω | - | 1 | - |
| 88 | SW062 | SKRPACE010 | ALPS | - | - | 50 m | - |
| 89 | X061 | ABS10-32r768kHz | ABRACON | 32.768 kHz | - | - | - |

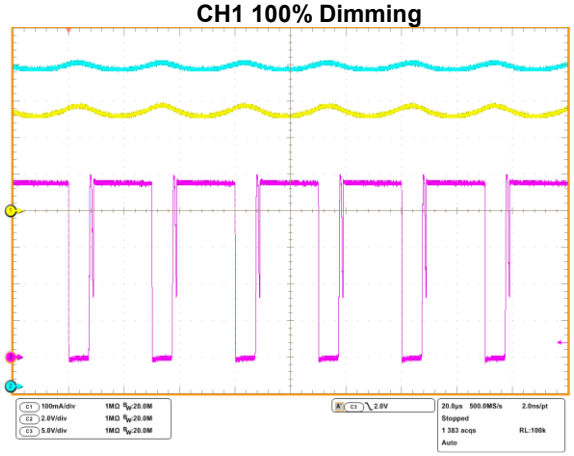
TDK : TDK Corporation
NIPPON-CHEMI-CON : Nippon Chemi-Con Corporation
Harwin Inc : Harwin Inc
Samtec : Samtec, Inc.
SATOPARTS : SATO PARTS CO.,LTD
FAIRCHILD : Fairchild Semiconductor International, Inc.
KOA : KOA Corporation
SSM : Susumu Co., Ltd
OptoSupply : OptoSupply Limited
Cypress : Cypress Semiconductor Corp
COSEL : COSEL CO., LTD.
FUJITSU : FUJITSU COMPONENT LIMITED
ALPS : Alps Electric Co., Ltd.
ABRACON : Abracon Corporation

NMT: No mount.
These components are compliant with RoHS, and please ask each vendor for details if necessary.

# 8. Property Data

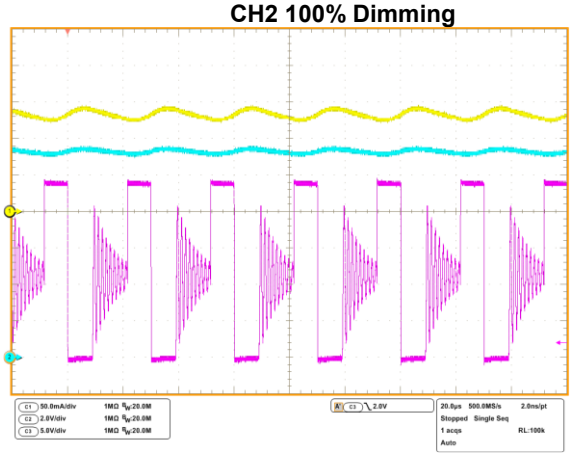
Figure 8-1 Switching Waveform

**CH1 100% Dimming**



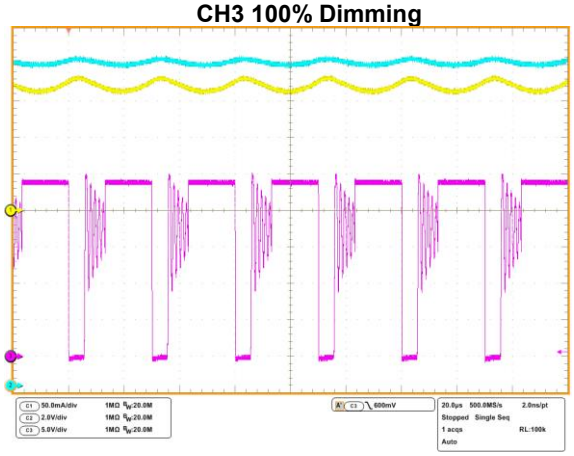
VINAC =100VRMS, ILEDout(W) = 290 mA
LED: LUW CR7P (5 series + 10Ω)
ACTUAL LEVEL = 255(Line)
CH1: LED current (ILEDout(W)), 100 mA/div
CH2: LEDp voltage (VLEDout(W)), 2V/div
CH3: Switching node voltage(W), 5V/div

**CH2 100% Dimming**



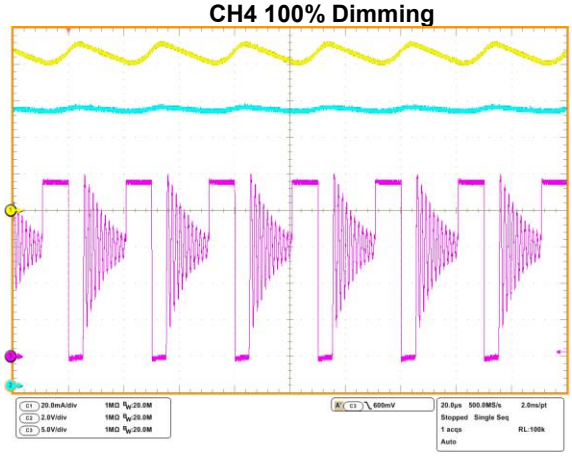
VINAC =100VRMS, ILEDout(R) = 140 mA
LED: LR CP7P (5 series + 10Ω)
ACTUAL LEVEL = 255(Line)
CH1: LED current (ILEDout(R)), 50 mA/div
CH2: LEDp voltage (VLEDout(R)), 2V/div
CH3: Switching node voltage(R), 5V/div

**CH3 100% Dimming**



VINAC =100VRMS, ILEDout(G) = 180 mA
LED: LT CP7P (5 series + 10Ω)
ACTUAL LEVEL = 255(Line)
CH1: LED current (ILEDout(G)), 50 mA/div
CH2: LEDp voltage (VLEDout(G)), 2V/div
CH3: Switching node voltage(G), 5V/div

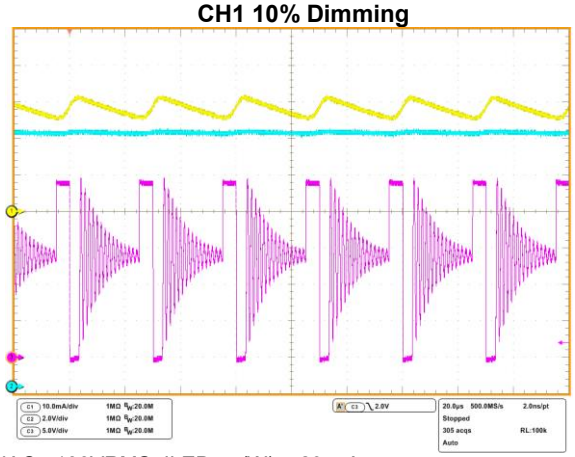
**CH4 100% Dimming**



VINAC =100VRMS, ILEDout(B) = 90 mA
LED: LB CP7P (5 series + 10Ω)
ACTUAL LEVEL = 255(Line)
CH1: LED current (ILEDout(B)), 20 mA/div
CH2: LEDp voltage (VLEDout(B)), 2V/div
CH3: Switching node voltage(B), 5V/div

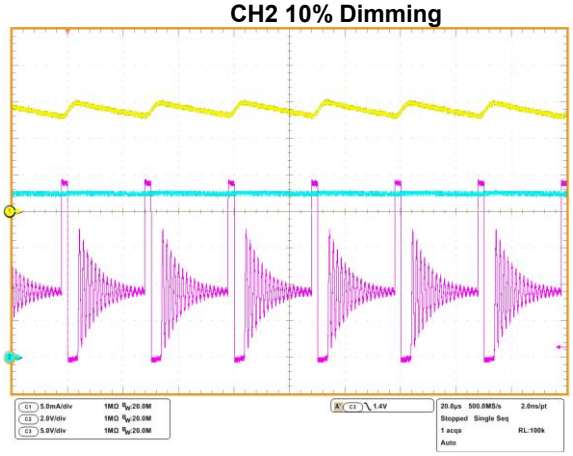
Figure 8-2 Switching Waveform

**CH1 10% Dimming**



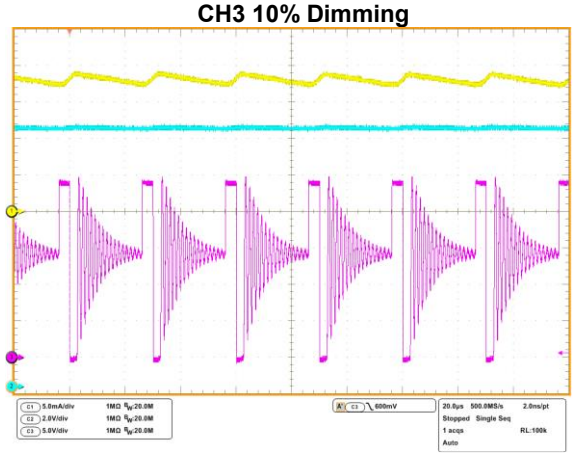
VINAC =100VRMS, ILEDout(W) = 29 mA
LED: LUW CR7P (5 series + 10Ω)
ACTUAL LEVEL = 26(Line)
CH1: LED current (ILEDout(W)), 10 mA/div
CH2: LEDp voltage (VLEDout(W)), 2V/div
CH3: Switching node voltage(W), 5V/div

**CH2 10% Dimming**



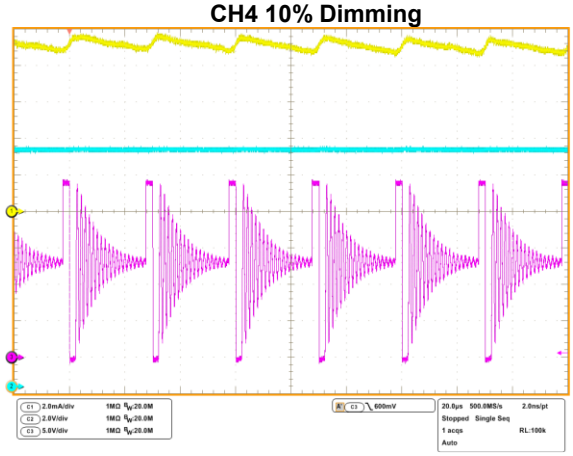
VINAC =100VRMS, ILEDout(R) = 14 mA
LED: LR CP7P (5 series + 10Ω)
ACTUAL LEVEL = 26(Line)
CH1: LED current (ILEDout(R)), 5 mA/div
CH2: LEDp voltage (VLEDout(R)), 2V/div
CH3: Switching node voltage(R), 5V/div

**CH3 10% Dimming**



VINAC =100VRMS, ILEDout(G) = 18 mA
LED: LT CP7P (5 series + 10Ω)
ACTUAL LEVEL = 26(Line)
CH1: LED current (ILEDout(G)), 5 mA/div
CH2: LEDp voltage (VLEDout(G)), 2V/div
CH3: Switching node voltage(G), 5V/div

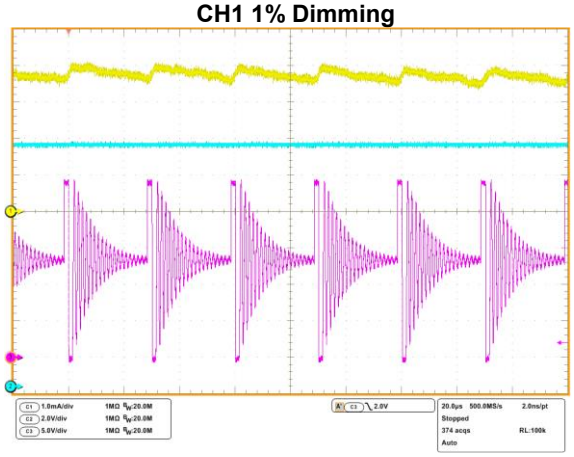
**CH4 10% Dimming**



VINAC =100VRMS, ILEDout(B) = 9 mA
LED: LB CP7P (5 series + 10Ω)
ACTUAL LEVEL = 26(Line)
CH1: LED current (ILEDout(B)), 2 mA/div
CH2: LEDp voltage (VLEDout(B)), 2V/div
CH3: Switching node voltage(B), 5V/div

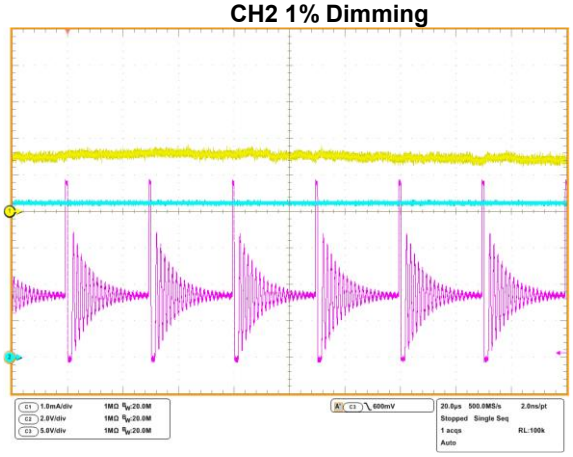
Figure 8-3 Switching Waveform

**CH1 1% Dimming**



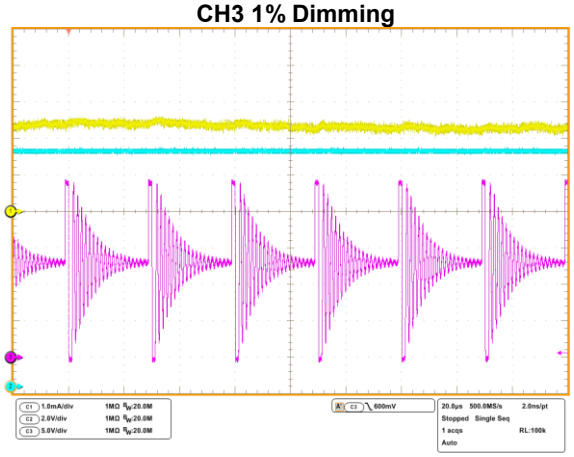
VINAC =100VRMS, ILEDout(W) = 2.9 mA
LED: LUW CR7P (5 series + 10Ω)
ACTUAL LEVEL = 2(Line)
CH1: LED current (ILEDout(W)), 1 mA/div
CH2: LEDp voltage (VLEDout(W)), 2V/div
CH3: Switching node voltage(W), 5V/div

**CH2 1% Dimming**



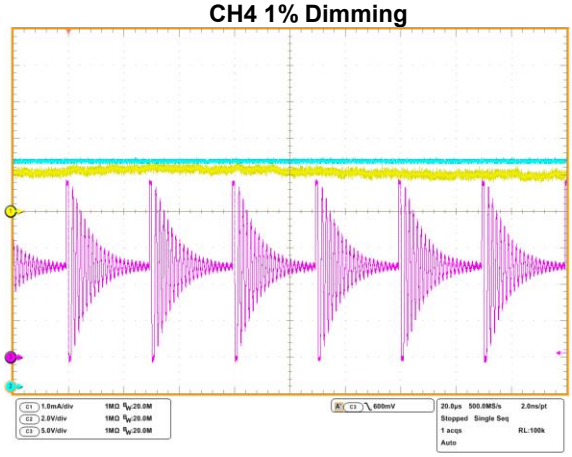
VINAC =100VRMS, ILEDout(R) = 1.4 mA
LED: LR CP7P (5 series + 10Ω)
ACTUAL LEVEL = 2(Line)
CH1: LED current (ILEDout(R)), 1 mA/div
CH2: LEDp voltage (VLEDout(R)), 2V/div
CH3: Switching node voltage(R), 5V/div

**CH3 1% Dimming**



VINAC =100VRMS, ILEDout(G) = 1.8 mA
LED: LT CP7P (5 series + 10Ω)
ACTUAL LEVEL = 2(Line)
CH1: LED current (ILEDout(G)), 1 mA/div
CH2: LEDp voltage (VLEDout(G)), 2V/div
CH3: Switching node voltage(G), 5V/div

**CH4 1% Dimming**



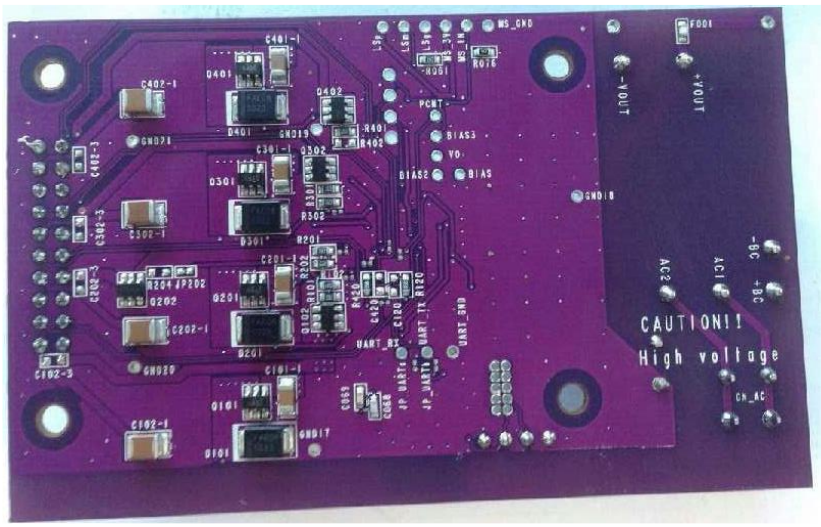
VINAC =100VRMS, ILEDout(B) = 0.9 mA
LED: LB CP7P (5 series + 10Ω)
ACTUAL LEVEL = 2(Line)
CH1: LED current (ILEDout(B)), 1 mA/div
CH2: LEDp voltage (VLEDout(B)), 2V/div
CH3: Switching node voltage(B), 5V/div

# 9. Board Picture

Figure 9-1 Evaluation Board Picture




**(Top View)**




**(Bottom View)**

# 10. Ordering Information

Table 10-1 Ordering Information

| Part Number | EVB Revision | Note |
|---|---|---|
| S6SAL211A94SA1001 | S6SAL211A94-BLE-SA1 Rev3.0 | - |

# Revision History

| Document Title: S6SAL211A94SA1001 4ch 10W LED Driver Board Operation Guide<br>Document Number: 002-08727 | | | |
|---|---|---|---|
| **Revision** | **Issue Date** | **Origin of Change** | **Description of Change** |
| ** | 06/12/2015 | HSAT | Initial release |
| *A | 04/25/2016 | HSAT | Migrated Spansion Guide from S6SAL211A94SA1001_SS901-00039-1v0-E,to Cypress format |
| *B | 06/03/2019 | ATTS | Udpated template |