# EM30719 Datasheet

# I²C Interface Digital Proximity and Ambient Light Sensor

Version 1.0

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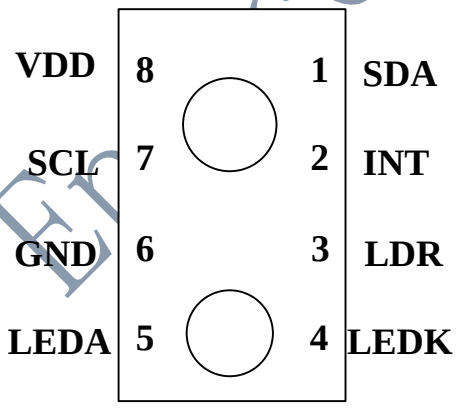
## Description

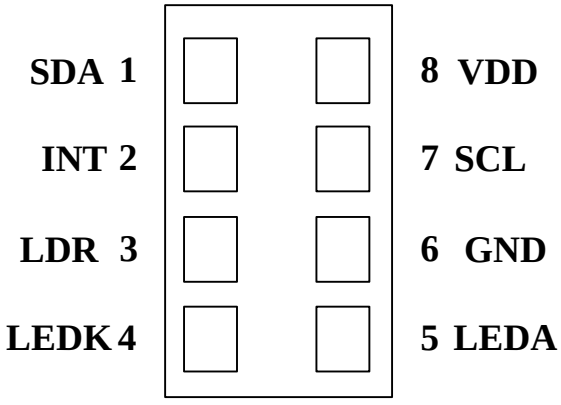
EM30719 is an low-power I²C interface sensor includes Ambient Light Sensor (ALS), Proximity Sensor (PS), and built-in LED driver. It is designed especially for smart phones and tablets with capacitive touch panel. With its ultra-low-power design, it is also useful for proximity wake-up application.

## Features

- Proximity Sensor, Ambient Light Sensor, LED driver and IR LED integrated in a single Optical Module
- Wide Spectrum Response of Ambient Light Sensor (ALS)
- 50Hz/60Hz Flicker Noise Rejection
- Temperature Compensation
- Higher Sensitivity of Proximity Sensing with better SNR design
- Programmable Interrupt for PS and ALS
- Proximity Sensor (PS) Ambient Light Rejection'
- Built-In LED constant current driver high voltage tolerance up to 5.5V
- PS offset adjust for crosstalk calibration
- Enhanced PS dark surface detect flexibility
- Programmable LED driver current
- Average Current ( Operation Current 95μA in low-power mode, Sleep Mode Current 0.5μA )
- Output Type: I²C Bus (ALS/PS) up to 400K Hz
- Operation Voltage 2.5V ~ 3.6V
- Logic Interface Voltage VBUS = 1.8V or VBUS = VDD
- Minimum External Components
- Package: ((4.0mmX2.4mmX1.4mm))
- RoHS package




Top View




Bottom View

# Functional Block Diagram

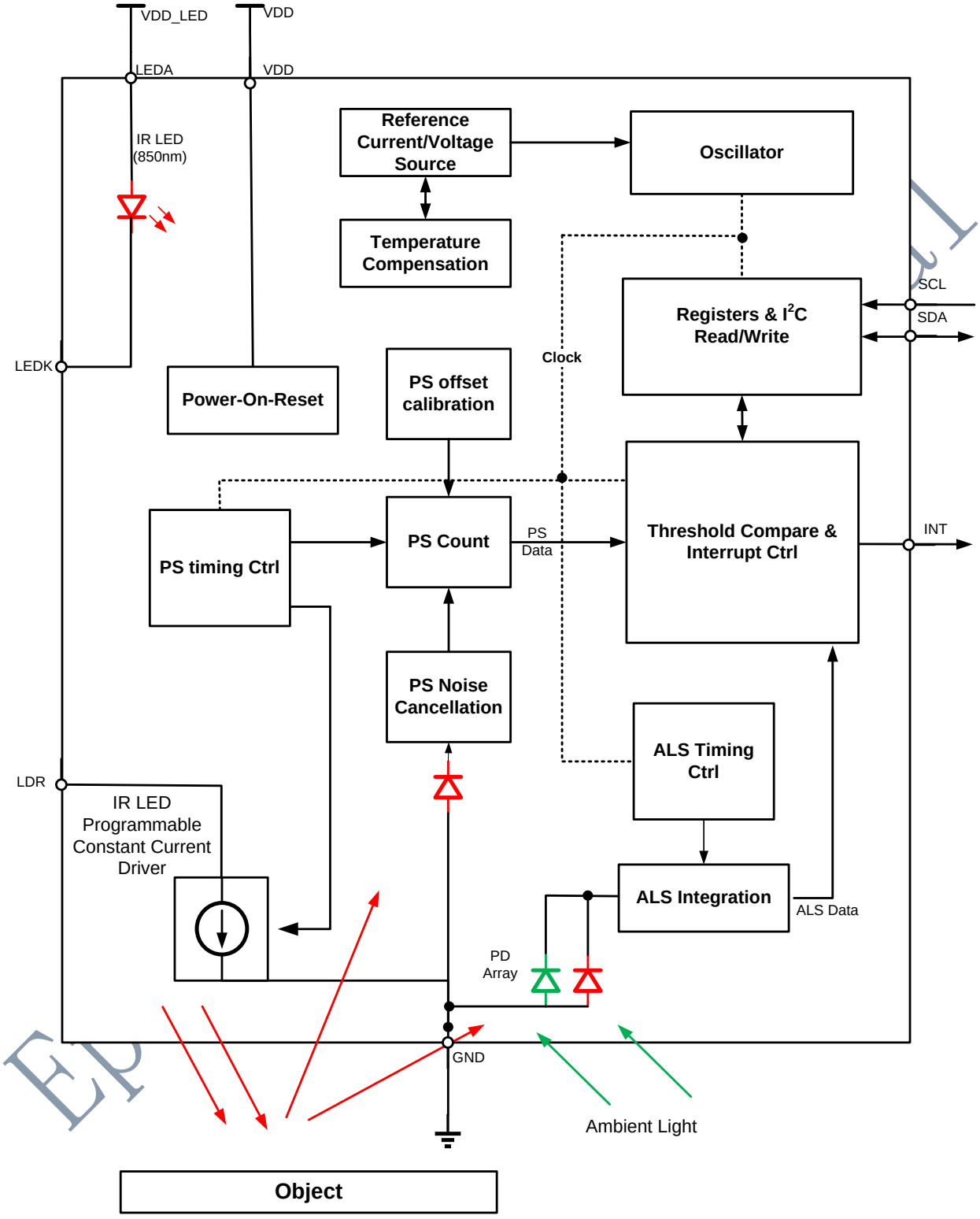



Fig. 1 EM30719 Functional Block Diagram

# PIN Configuration

**Table. 1 Pin Configuration**

| Pin No. | Pin Name | Type | Description |
|---|---|---|---|
| 1 | SDA | I/O(Open Drain) | I²C Serial data I/O terminal -serial data I/O for I²C |
| 2 | INT | O(Open Drain) | Interrupt. |
| 3 | LDR | O(Open Drain) | LED driver for proximity emitter |
| 4 | LEDK | O | LED Cathode, connect to LDR pin in most systems to use internal LED driver circuit |
| 5 | LEDA | I | LED Anode, connect to VDD or VDD_LED on PCB |
| 6 | GND | | Power supply ground. All voltages are referenced to GND |
| 7 | SCL | I(Open Drain) | I²C serial clock input terminal — clock signal for I²C serial data. |
| 8 | VDD | | Power Supply voltage |

# Parameters

**Table. 2 I²C bus timing characteristics**

| Symbol | Parameters | Minimum | Typical | Maximum | Units | Condition |
|---|---|---|---|---|---|---|
| $f_{clk}$ | SCL clock frequency | 10k | | 100k | Hz | Normal Mode |
| | | 10k | | 400k | Hz | Fast Mode |
| $t_{SUDAT}$ | data set up time | 250 | | | ns | Normal Mode |
| | | 100 | | | ns | Fast Mode |
| $t_{HDDAT}$ | data hold time | | | 300 | ns | Normal Mode |
| | | | | 90 | ns | Fast Mode |
| $t_{rise}$ | clock/data rise time | | | 1000 | ns | Normal Mode |
| | | | | 300 | ns | Fast Mode |
| $t_{fall}$ | clock/data fall time | | | 300 | ns | Normal Mode |
| | | | | 300 | ns | Fast Mode |
| $t_{LOW}$ | I2C clock (SCL) low cycle | 4.7 | | | µs | Normal Mode |
| | | 1.3 | | | µs | Fast Mode |
| $t_{HIGH}$ | I2C clock (SCL) high cycle | 4.0 | | | µs | Normal Mode |
| | | 0.6 | | | µs | Fast Mode |
| $t_{BUF}$ | Bus free time between the start and stop state | 4.7 | | | µs | Normal Mode |
| | | 1.3 | | | µs | Fast Mode |

| | | | | | | |
|---|---|---|---|---|---|---|
| $t_{HDSTA}$ | (repeat) started state holding time after this period produce the first clock | 4.0 | | | μs | Normal Mode |
| | | 0.6 | | | μs | Fast Mode |
| $t_{SUSTA}$ | Repeat the start state set up time | 4.7 | | | μs | Normal Mode |
| | | 0.6 | | | μs | Fast Mode |
| $t_{SUSTO}$ | Stop state set up time | 4.0 | | | μs | Normal Mode |
| | | 0.6 | | | μs | Fast Mode |
| $t_{TIMEOUT}$ | Low detection clock/data timeout time | 25 | 35 | | ms | Normal Mode |
| | | | | | ms | Fast Mode |
| $C_{load}$ | The capacitive load for each bus line | | | 400 | pF | |
| $R_{BUS}$ | Pull up resistors SDA and SCL system bus | 1 | | - | KΩ | |
| $t_{VD}$ | Data valid time | | | 0.9 | μs | |
| $t_{VDACK}$ | Data valid acknowledge time | | | 0.9 | μs | |

**Table. 3 Electrical Characteristics**

| Symbol | Min | Typ | Max | Units | Introductions |
|---|---|---|---|---|---|
| $V_{DD}$ | 2.6 | | 3.6 | V | Supply voltage |
| $I_{DD}$ | | 95 | 150 | μ A | DC power supply current (with LED turned off) |
| $V_{pull\_up}$ | 1.6 | | 3.6 | V | I²C power supply voltage |
| $I_{DD\_SD}$ | | 500 | | nA | Shut Down Current |
| $T_A$ | -40 | | 85 | °C | Recommended operating temperature |
| $V_{IL}$ | | | 0.54 | V | SCL/SDA Input low voltage |
| $V_{IH}$ | 1.25 | | | V | SCL/SDA Input high voltage |

**Table. 4 Optical Characteristics**

| Parameters | Min | Typ | Max | Units | Descriptions (Ta = +25 ℃) |
|---|---|---|---|---|---|
| Full scale ALS count value | | | 4095 | counts | ALS register maximum count |
| ALS detect range | | | 2000 | lux | ALS detection range |
| Full scale PS ADC count value | | | 1023 | counts | PS ADC maximum count |

| | | | | | |
|---|---|---|---|---|---|
| Full scale PS count value | | | 255 | counts | PS registers the maximum count |
| PS LED drive | 15 | | 200 | mA | PS LED drive current |
| LED duty cycle | | 1:500 | | | LED duty cycle, cycle of PS 100 ms |
| $V_F$ | | 1.45 | 1.60 | V | LED Forward Voltage, $I_F$ =20 mA |
| $V_R$ | 5 | | | V | LED Reverse Voltage, $I_R$ =10 μA |
| Po | 3.0 | | | mW | LED Radiant Power, $I_F$ =20 mA |
| λp | | 850 | | nm | LED Peak Wavelength, $I_F$ =20 mA |
| Δλ | | 50 | | nm | Spectrum Width of Half Value, $I_F$ =20 mA |
| $T_R$ | | 25 | | ns | LED Optical Rise Time, $I_F$ =20 mA |
| $T_F$ | | 13 | | ns | LED Optical Fall Time, $I_F$ =20 mA |

## PS Spectral Response Range

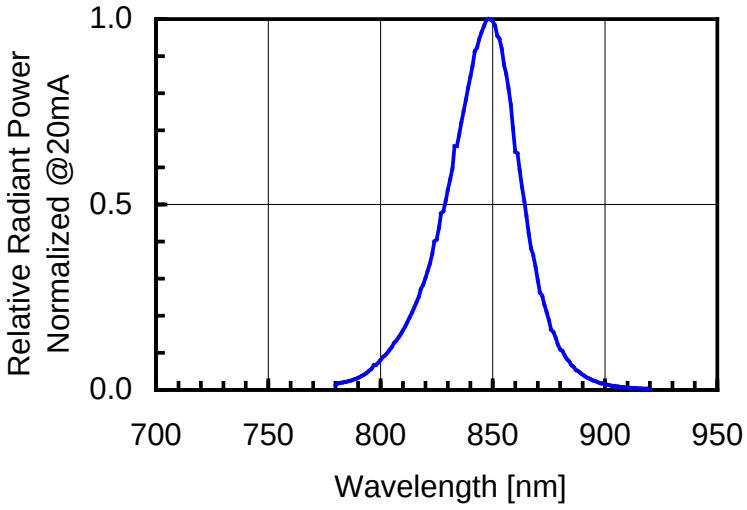



Fig. 2 PS Spectral Response Range

Table. 5 Absolute Maximum Ratings

| Parameters | Symbol | Min. | Max. | Units | Condition |
|---|---|---|---|---|---|
| Storage Temperature | $T_S$ | -40 | 85 | °C | |
| Operation Temperature | $T_A$ | -40 | 85 | °C | |
| Supply Voltage | $V_{DD}$ | -0.5 | 3.6 | V | |
| LED Voltage | VDD_LED | | 5.5 | V | |
| ESD | $V_{ESD}$ | 2K | | V | HBM |

## I²C State Machine

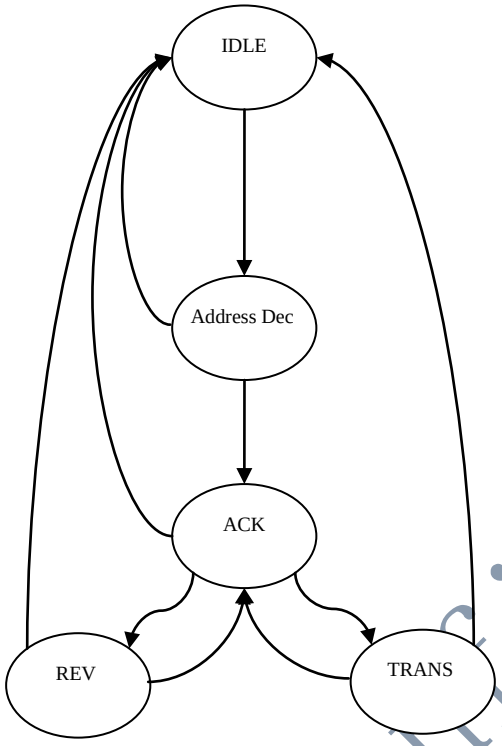



Fig. 3 Slave State Machine

## Timing

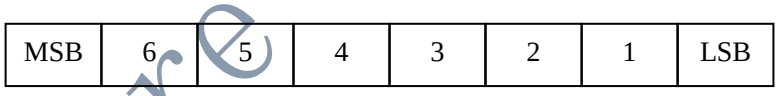



Fig. 4 Data Structure

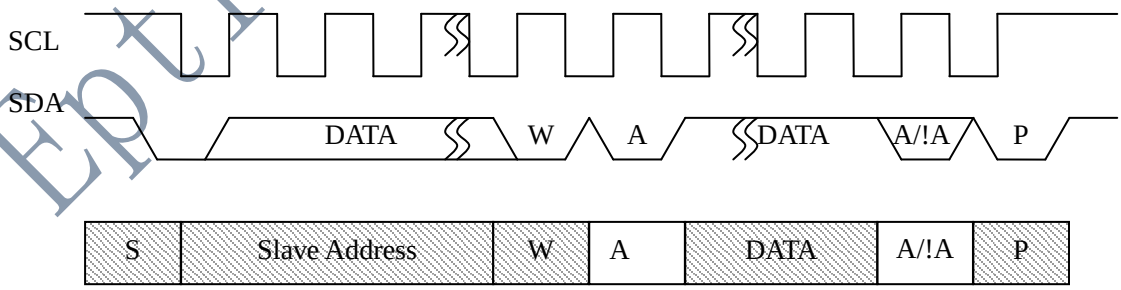



Fig. 5 Write waveform

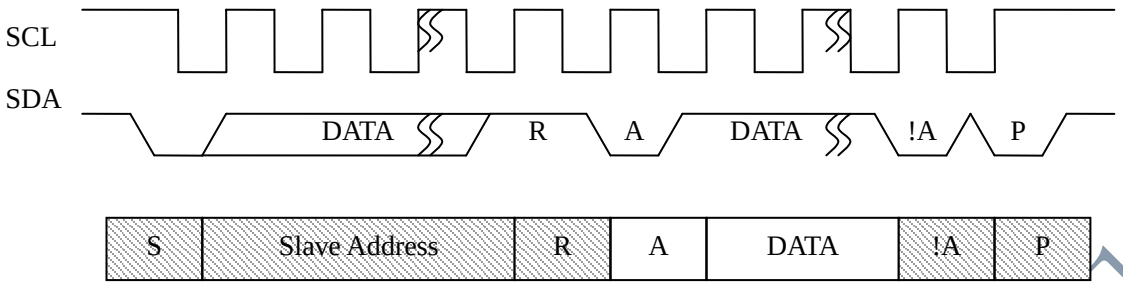



Fig. 6 Read waveform

## Registers Operation


Fig. 7 Register random write operation

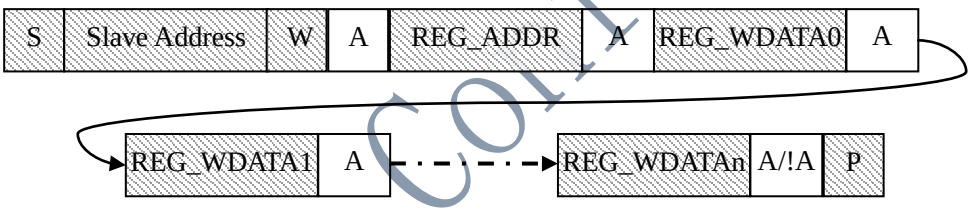



Fig. 8 Register page write operation

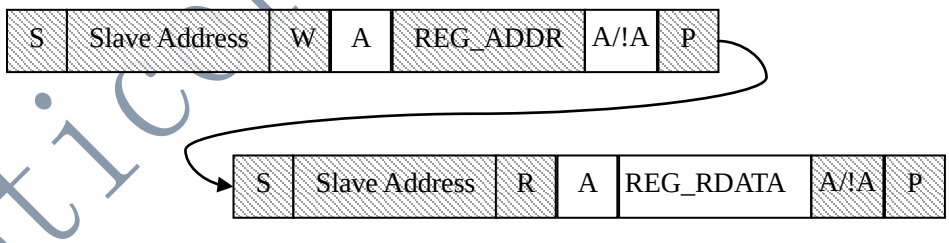



Fig. 9 Register random read operation

## Function Description

EM30719 ALS and PS can work at the same time. ALS detects ambient light in every 100ms, and the detection value is the average of the ambient light during the period of 100 ms; PS can be set one detection in every 100 ms or 800 ms, and its LED driver current is programmable in order to meet requirements of different applications.

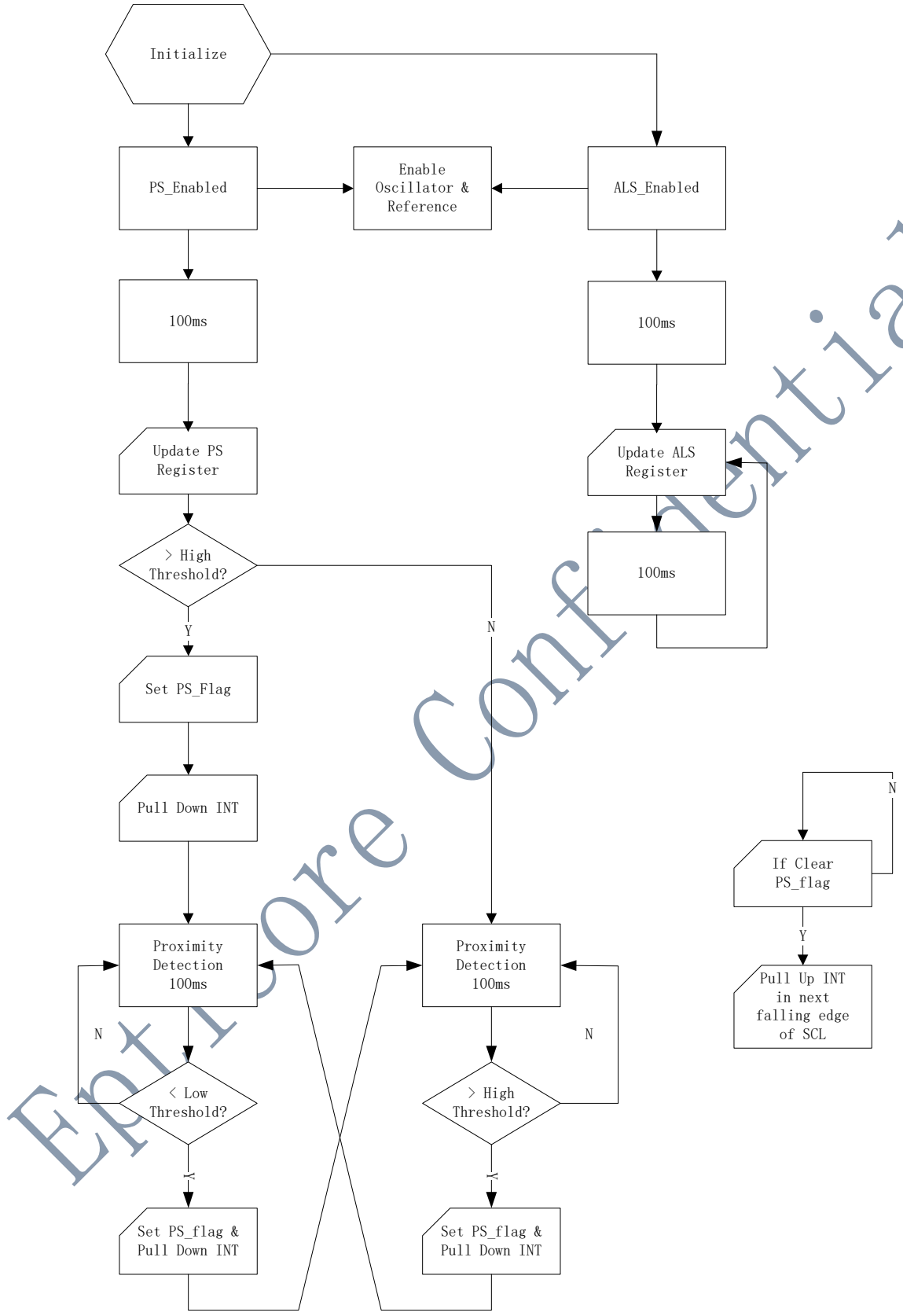





**Fig. 10 Sensor Operation State Machine**

When both the ALS and PS are enabled, it is recommended that the software is operating in ALS Polling (Polling)/PS Interrupt (Interrupt) mode, ie. ALS register is read in every 200 ms, and main controller will adjust the backlight pulse width according to the count of ALS.

After the PS upper and lower threshold initialization is completed, PS count move from lower than low threshold to higher than high threshold, or move from higher thank high threshold to lower than low threshold will trigger and Interrupt. The INT interrupt signals for PS will then call a procedure to turn off CTP or turn on CTP etc. In order to prevent glitch detection caused by PS jitter, the high threshold should be set higher than low threshold by 10 count at least;

Once the interrupt is triggered, the INT pin will be drive to low. It will remain to be "0" level until register 0x02 is cleared to “0x00" with a falling edge of SCLK. In this interrupt mode, threshold values do not need to change in the procedure of Interrupt, and reduces the software's effort.

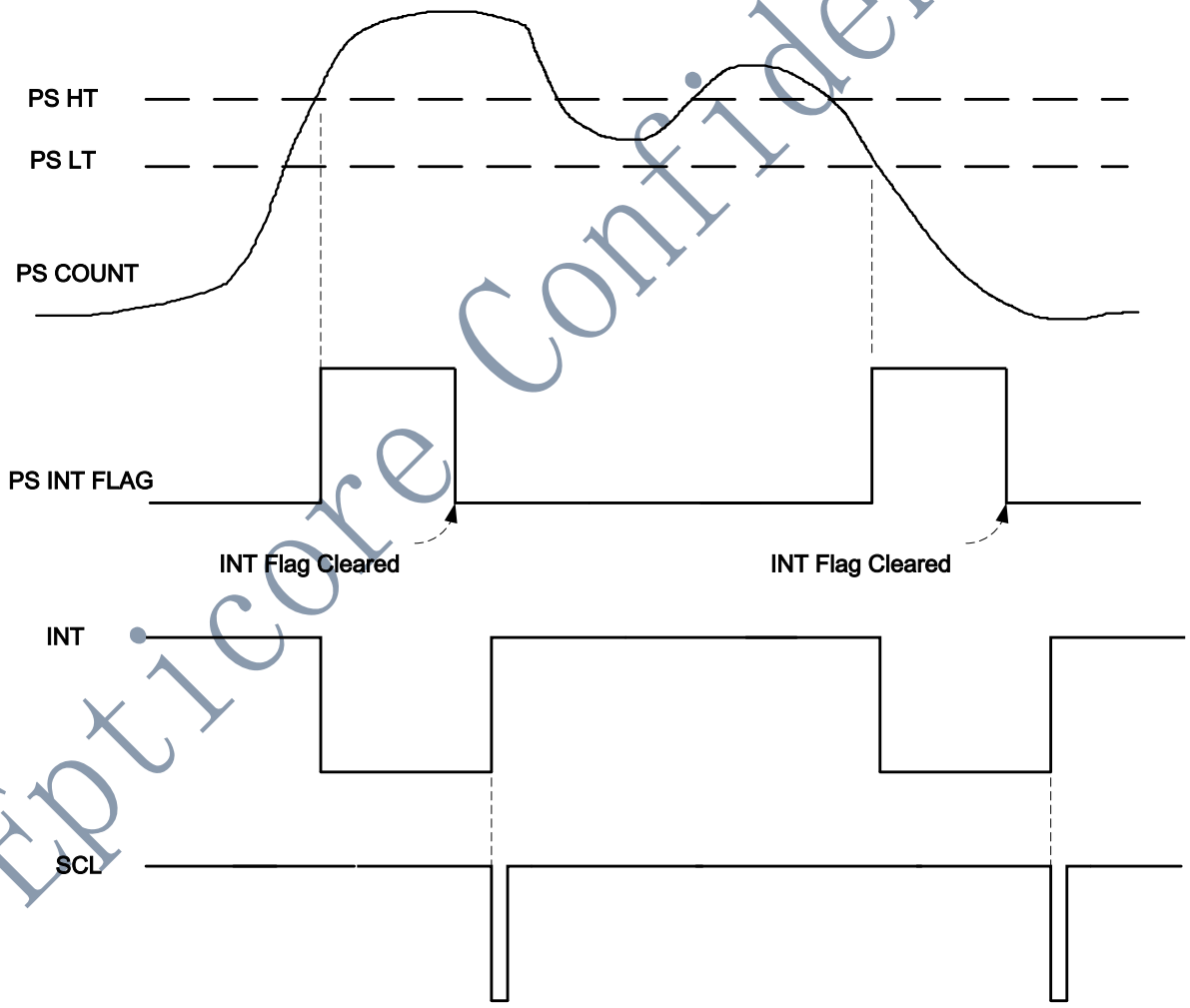



Fig. 11 Transient Interrupt Mode Operation

## Software Initialization Description

EM30719 software on initialization process is recommended as follows:

```
  WriteRegData(1, 0); //Disable and Power down
  WriteRegData(2, 0); //Clear all Interrupt Flag
  WriteRegData(0x0e, 0); //Initialize Reset Register

  uint8 PSLT, PSHT;
  PSLT = 0x40; //64 – PS Low Threshold Value
  PSHT = 0x48; //72 – PS High Threshold Value
  WriteRegData (3, PSLT);
  WriteRegData (4, PSHT);
  WriteRegData(0xf, 0x00); //Initialize PS offset
  //Disable ALS Interrupt
  WriteRegData (5, 0x00);
  WriteRegData (6, 0xf0);
  WriteRegData (7, 0xff);

if(val == 0x03)  //Enable both PS & ALS          {
                        int PSLT=0x40;
                        int PSHT=0x48;

                        i2c_smbus_write_byte_data(this_client, 0x02, 0);
                        i2c_smbus_write_byte_data(this_client, 0x03, PSLT);
                        i2c_smbus_write_byte_data(this_client, 0x04, PSHT);
                        i2c_smbus_write_byte_data(this_client, 0x0F, 0x00;
                        i2c_smbus_write_byte_data(this_client, 0x05, 0x00);
                        i2c_smbus_write_byte_data(this_client, 0x06, 0xF0);
                        i2c_smbus_write_byte_data(this_client, 0x07, 0xFF);
                        i2c_smbus_write_byte_data(this_client, 0x01, 0xBE);
                }
                else if(val& EM30719_PROXIMITY)    //Enable PS only
                {
                        int PSLT =0x40;
                        int PSHT=0x48;
                        i2c_smbus_write_byte_data(this_client, 0x03, PSLT);
                        i2c_smbus_write_byte_data(this_client, 0x04, PSHT);
                        i2c_smbus_write_byte_data(this_client, 0x0F, 0x00);
```

```
        i2c_smbus_write_byte_data(this_client, 0x01, 0xB8);

}
else if(val& EM30719_ALS) //Enable ALS only
{
        i2c_smbus_write_byte_data(this_client, 0x05, 0x00);
        i2c_smbus_write_byte_data(this_client, 0x06, 0xF0);
        i2c_smbus_write_byte_data(this_client, 0x07, 0xFF);
        i2c_smbus_write_byte_data(this_client, 0x01, 0x06);
}
```

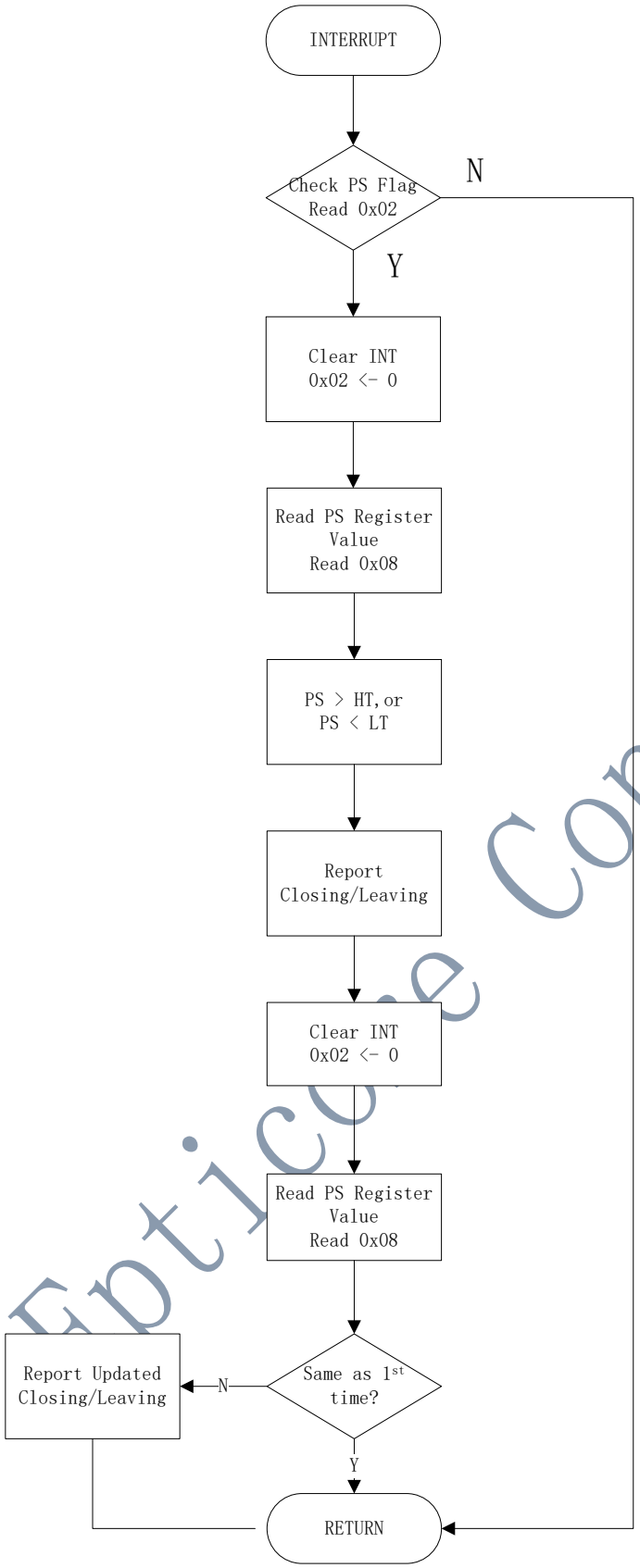



Fig. 12 Recommended Interrupt Procedure Flowchart

# Registers Definition

**Table. 6 Registers and Register bits**

| ADDR | REG NAME | BIT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Default |
| 0x00 | (n/a) | PID | | | | | | | | 0x31 |
| 0x01 | CONFIG | PS EN | PS_SLP | PS_DR[2:0] | | | ALS_EN | ALS_RANGE | ALSIR_MODE | 0xBF |
| 0x02 | INTERRUPT | PS_FLAG | PS_PRST[1:0] | | (write 0) | ALS_FLAG | ALS_PRST[1:0] | | INT_CTRL | 0x00 |
| 0x03 | PS_LT | PS_LT[7:0] | | | | | | | | 0x00 |
| 0x04 | PS_HT | PS_HT[7:0] | | | | | | | | 0xFF |
| 0x05 | ALSIR_TH1 | ALSIR_LT[7:0] | | | | | | | | 0x00 |
| 0x06 | ALSIR_TH2 | ALSIR_HT[3:0] | | | | ALSIR_LT[11:8] | | | | 0XF0 |
| 0x07 | ALSIR_TH3 | ALSIR_HT[11:4] | | | | | | | | 0xFF |
| 0x08 | PS_DATA | PS_DATA[7:0] | | | | | | | | 0x00 |
| 0x09 | ALSIR_DT1 | ALSIR_DATA[7:0] | | | | | | | | 0x00 |
| 0x0A | ALSIR_DT2 | don't use | | | | 0x00 | | | | 0x00 |
| 0x0E | TEST1 | (write 0x00) | | | | | | | | 0x00 |
| 0x0F | TEST2 | (write 0x00) | | | | | | | | 0x00 |

**Table. 7 REGISTER 0x00 (RESERVED)**

| BIT # | ACCESS | Default | Name | FUNCTION/OPERATION |
|---|---|---|---|---|
| 7:0 | RO | 0x31 | PID | Product ID - readable |

**Table. 8 REGISTER 0x01 (CONFIGURE) - PROX/ALS CONFIGURATION**

| BIT # | Read -write | Default | Name | Name/operation description |
|---|---|---|---|---|
| 7 | RW | 1 | PS_EN<br>(PS Enable) | When= 0, proximity sensing is disabled<br>When=1, proximity sensing is enabled. |
| 6 | RW | 0 | PS_SLP(PS Sleep) | When=0, PS IR LED for pulse spacing 100ms, typically used in smart phone/tablet applications;<br><br>When=1, PS IR LED for pulse spacing 800ms, typically used in low-power proximity wake-up applications; |
| 5:3 | RW | 111 | PS_DR<br>(PS Drive) | 111; LED drive current for 200mA;(TBD)<br>110; LED drive current for 100mA; (TBD)<br>101; LED drive current for 50mA; (TBD)<br>100; LED drive current for 25mA; (TBD)<br>011; LED drive current for 120mA; (TBD) |

| | | | | |
|---|---|---|---|---|
| | | | | 010; LED drive current for 60mA; (TBD)<br>001; LED drive current for 30mA; (TBD)<br>000; LED drive current for 15mA; (TBD) |
| 2 | RW | 1 | ALS_EN<br>(ALS Enable) | When=0, ALS/IR sensing is disabled<br>When=1, continuous ALS/IR sensing is enabled with new data ready every 100ms |
| 1 | RW | 1 | ( ALSIR_MODE ) | When=0,N/A<br>When=1, ALS/IR Register stores ambient light detection value |
| 0 | RW | 1 | ALS_RANGE<br>(ALS Range) | 0, ALS in normal mode |

**Table. 9 REGISTER 0x02 (INTERRUPT) - PROX/ALS INTERRUPT CONTROL**

| BIT # | ACCESS | Default | BIT Name | Function/Operation |
|---|---|---|---|---|
| 7 | FLAG | 0 | PS_FLAG | When=0, no prox interrupt event has occurred since power-on or last "clear"<br>When=1,a prox interrupt event occurred. Clearable by writing "0" |
| 6 : 4 | RW | 000 | (Unused) | Unused register bit - write 0 |
| 3 | FLAG | 0 | ALS_FLAG | When = 0, no ALS interrupt event has occurred since power-on or last "clear"<br>When = 1, an ALS interrupt event occurred. Clearable by writing "0" |
| 2:0 | RW | 000 | (Unused) | Unused the register bit -write 0 |

**Table. 10 REGISTER 0x03 (PROX_LT) - INTERRUPT LOW THRESHOLD FOR PROXIMITY SENSOR**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RW | 0x00 | PS_LT (Prox Threshold) | 8-bit interrupt low threshold for proximity sensing |

**Table. 11 REGISTER 0x04 (PROX_HT) - INTERRUPT HIGH THRESHOLD FOR PROXIMITY SENSOR**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RW | 0xFF | PS_HT (Prox Threshold) | 8-bit interrupt high threshold for proximity sensing |

**Table. 12 REGISTER 0x05 (ALSIR_TH1)-INTERRUPT LOW THRESHOLD FOR ALS/IR**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RW | 0x00 | ALSIR_LT[7:0] (ALS/IR Low threshold.) | Lower 8 bits (of 12 bits) for ALS/IR low interrupt threshold |

**Table. 13 REGISTER 0x06 (ALSIR_TH2) INTERRUPT LOW/HIGH THRESHOLDS FOR ALS/IR**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 7:4 | RW | 1111 | ALSIR_HT[3:0] (ALS/IR High Thr) | Lower 4 bits (of 12 bits) for ALS/IR high interrupt threshold |
| 3:0 | RW | 0000 | ALSIR_LT[11:8] (ALS/IR low thr.) | upper 4 bits (of 12 bits) for ALS/IR low interrupt threshold |

**Table. 14 REGISTER 0x07 (ALSIR_TH3) - INTERRUPT HIGH THRESHOLD FOR ALS/IR**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RW | 0xFF | ALSIR_HT[11:4] (ALS/IR High Thr.) | Upper 8 bits (of 12 bits) for ALS/IR high interrupt threshold |

**Table. 15 REGISTER 0x08 (PROX_DATA) - PROXIMITY SENSOR DATA**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RO | 0x00 | PS_DATA (Proximity Data) | Results of 8-bit proximity sensor ADC conversion |

**Table. 16 Register 0x09 (ALSIR_DT1) - ALS/IR sensor data (Lower 8 bits)**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RO | 0x00 | ALSIR_DATA (ALS/IR data) | Lower 8 bits (of 12 bits) from result of ALS/IR sensor conversion |

**Table. 17 Register 0x0A(ALSIR_DT2) - ALS/IR sensor data(upper 4 bits)**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:4 | RO | 0000 | (Unused) | Unused bits. |
| 3:0 | RO | 0000 | ALSIR_DATA (ALS/IR data) | Upper 4 bits (of 12 bits) from result of ALS/IR sensor conversion |

**Table. 18 Register 0x0E (RESET) - Soft Reset**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RO | 0x00 | Write as 0x00 | Soft Reset register. When 0x00, in normal operation |

| BIT # | ACCESS | Default | BIT Name | Name/operation |
|---|---|---|---|---|
| 7 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero unless for soft trigger mode; |
| 6 : 4 | RW | 000 | Test mode | Reserved |
| 3 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero, u unless to soft trigger mode ; |
| 2 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero unless to soft trigger mode ; |
| 1 | RW | 0 | (Unused) | Reserved bits. |
| 0 | RW | 0 | (Unused) | Reserved bits. |

**Table. 19 Register 0x0F (OFFSET) - Offset Control of PS**

| BIT # | ACCESS | Default | BIT Name | Function/operation |
|---|---|---|---|---|
| 7:0 | RW | 0x00 | Write as 0x00 | Test mode register. When 0x00, in normal operation |

| BIT # | ACCESS | Default | BIT Name | Name/operation |
|---|---|---|---|---|
| 7 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero unless to soft trigger mode |
| 6 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero unless to soft trigger mode |
| 5 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero unless to soft trigger mode |
| 4:1 | RW | 0000 | Offset_Ctrl | Offset_Ctrl controlled by 0 x0f to register, the default value is 0 x00<br>1111; PS offset value is around -480 counts;<br>1110; PS offset value is around -448 counts;<br>1101; PS offset value is around -416 counts;<br>1100; PS offset value is around -384 counts;<br>1011; PS offset value is around -352 counts;<br>1010; PS offset value is around -320 counts;<br>1001; PS offset value is around -288 counts;<br>1000; PS offset value is around -256 counts;<br>0111; PS offset value is around -224 counts;<br>0110; PS offset value is around -192 counts;<br>0101; PS offset value is around -160 counts;<br>0100; PS offset value is around -128 counts;<br>0011; PS offset value is around -96 counts;<br>0010; PS offset value is around -64 counts;<br>0001; PS offset value is around -32 counts;<br>0000; PS offset value is 0 count; |
| 0 | RW | 0 | Unused (write as 0) | Unused the register bit - write zero unless to soft trigger mode |

**Table. 20 I²C Device address**

| operation | I²C Device address | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | address |
| Write Register | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0x48H |
| Read Register | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0x49H |

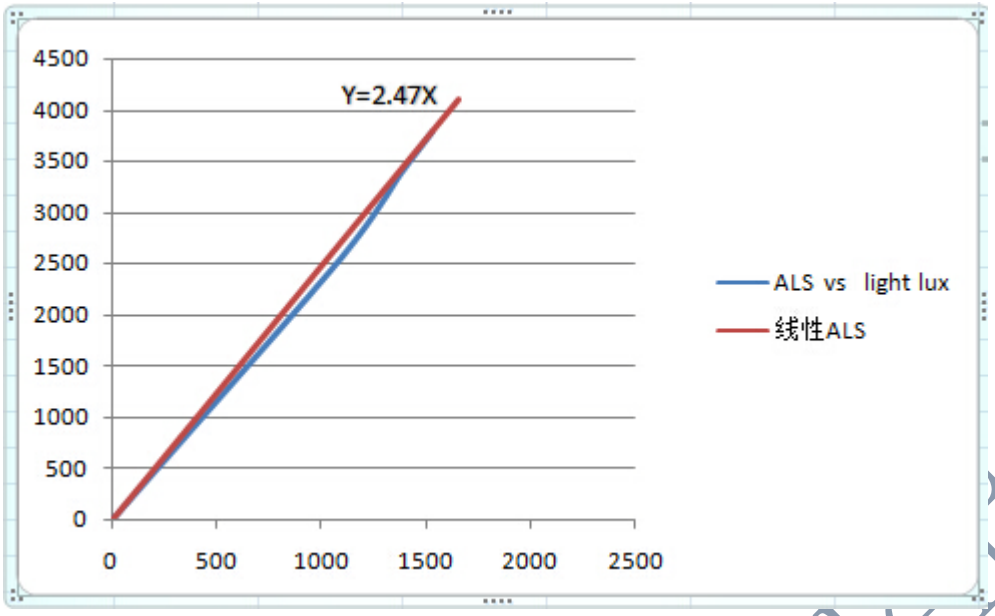



Fig. 13 ALS value vs. ambient light lux

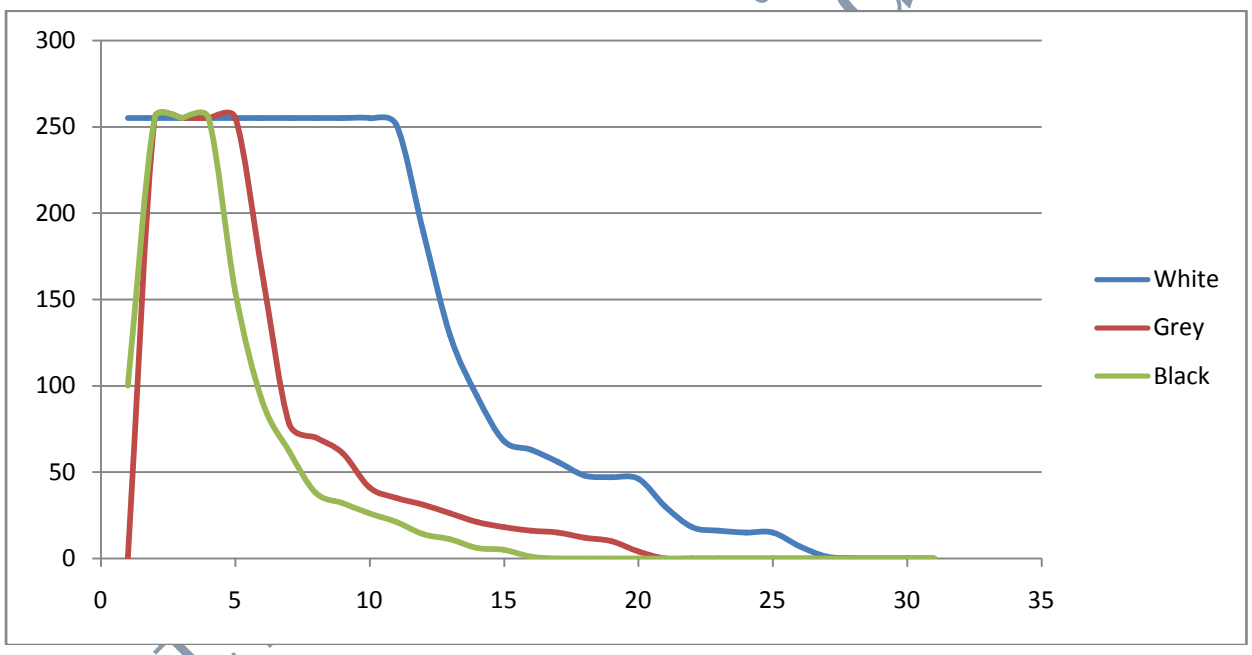



Fig. 14 PS count vs. distance (cm) in different reflecting surface (The grey card is GC1890S with 18% grey)

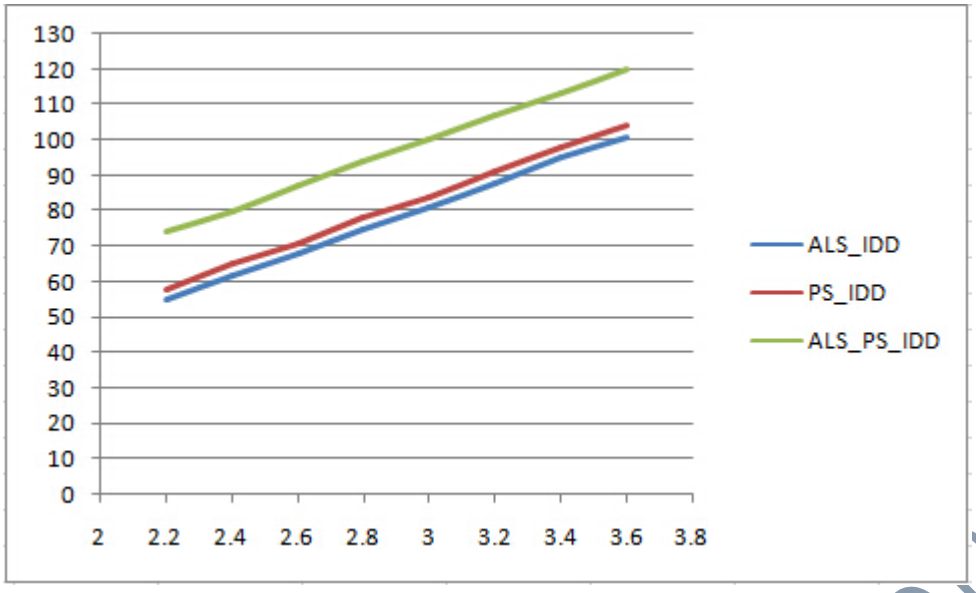



Fig. 15 Operation current vs. supply voltage

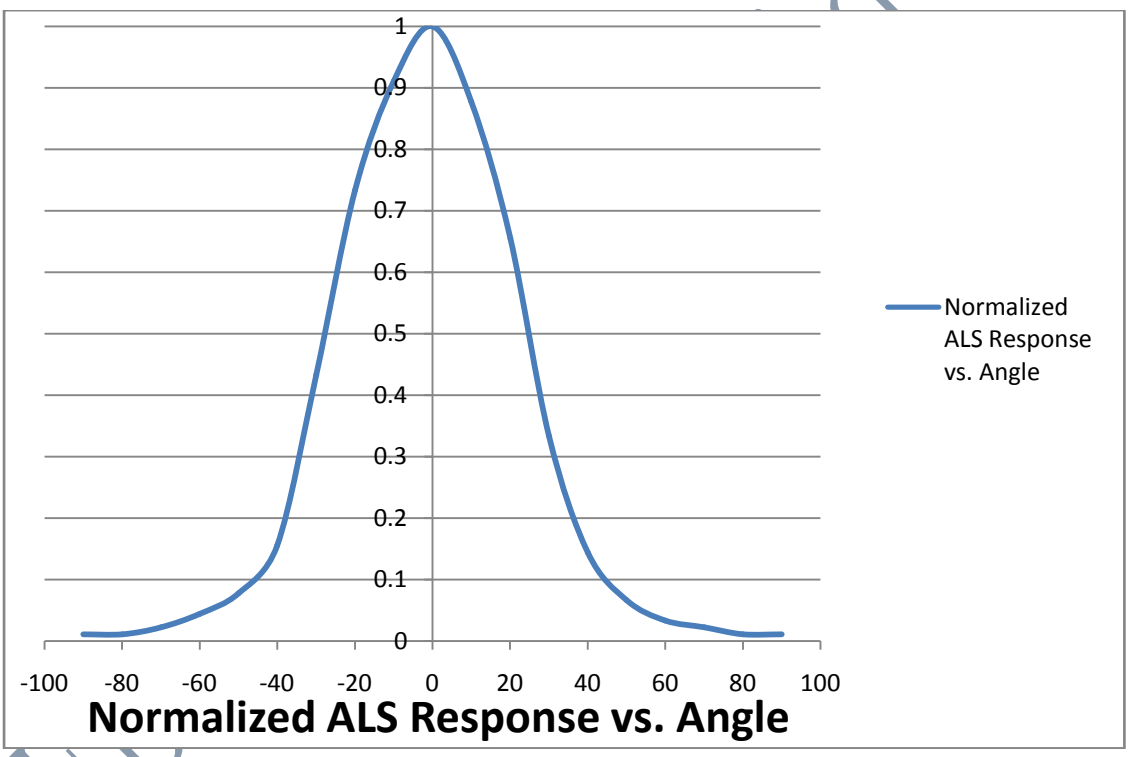



Fig. 16 Normalized ALS Response vs. Angle

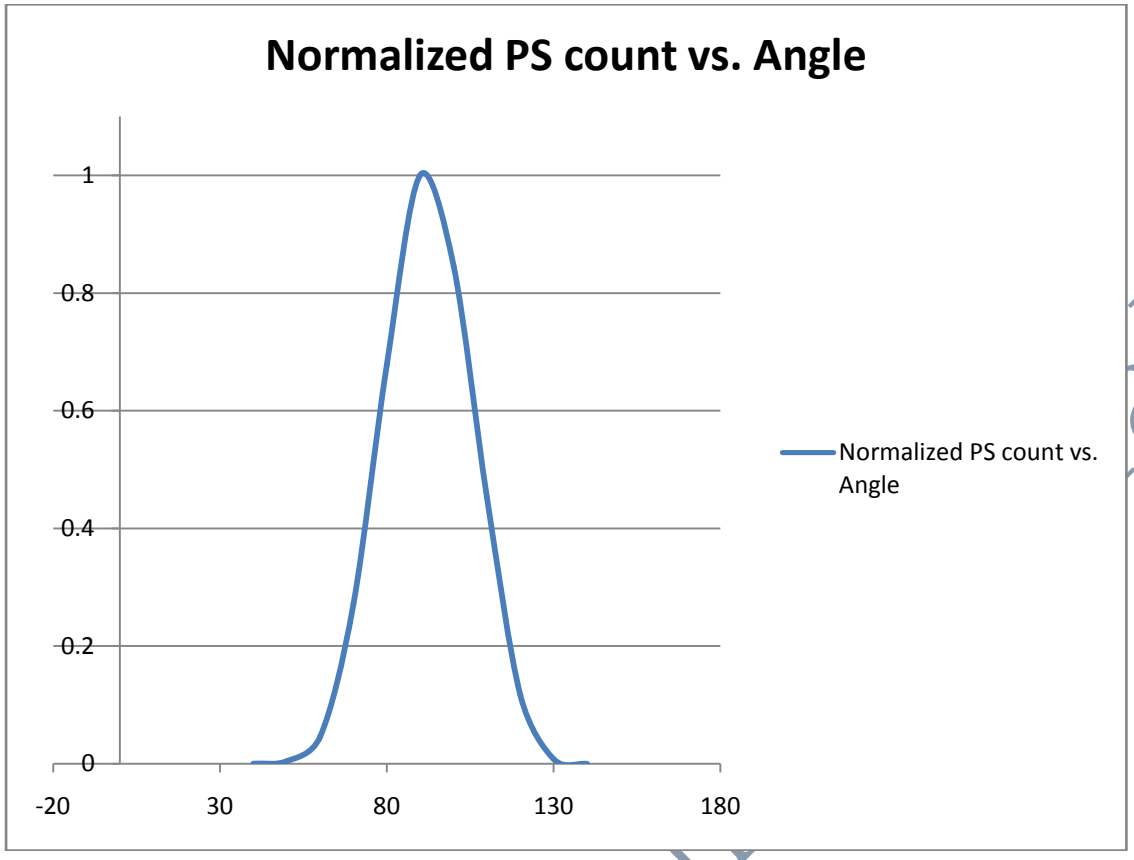



Fig. 17 Normalized PS response vs. Angle

## Sample Application

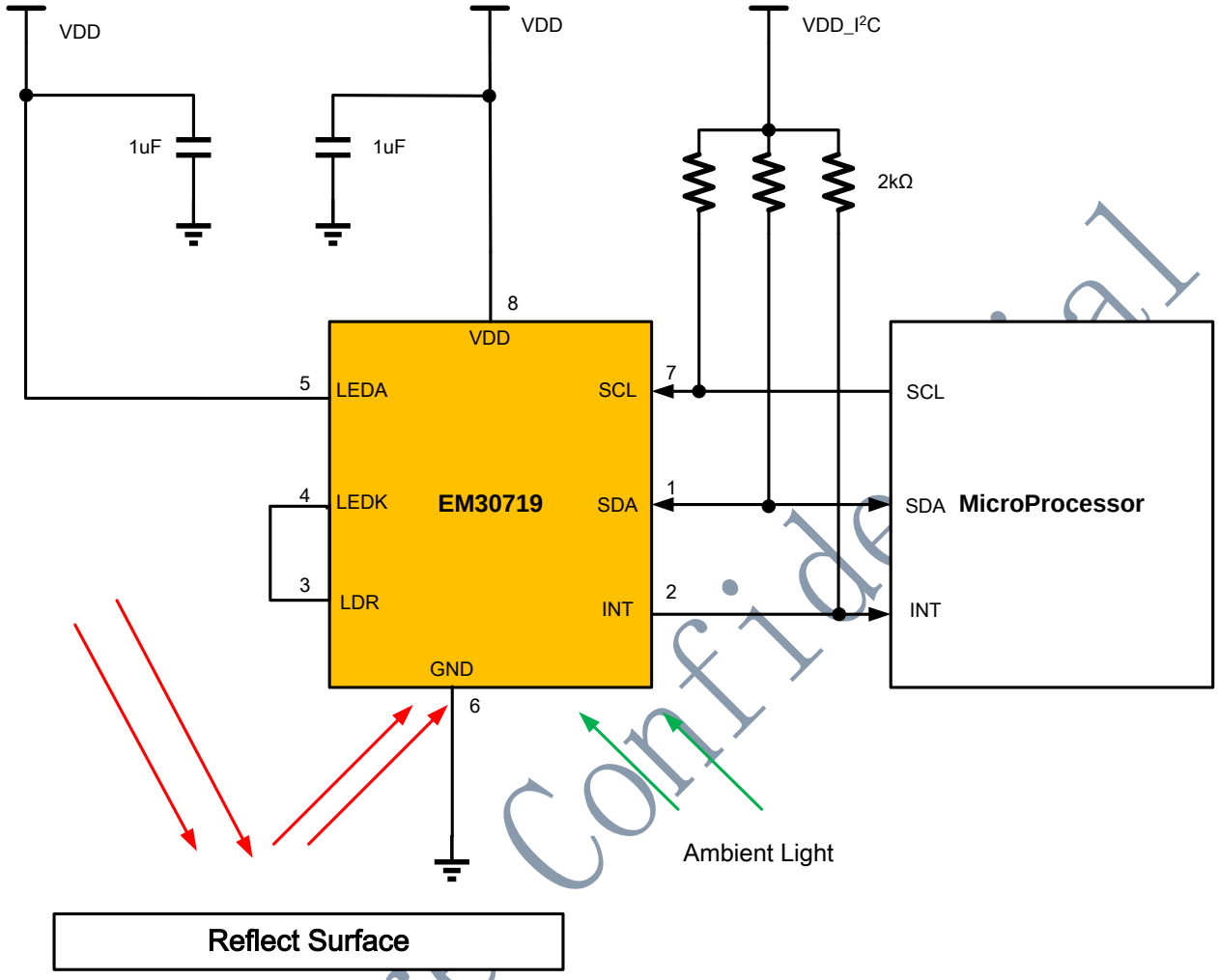



Fig. 18 Typical Application Circuit of EM30719

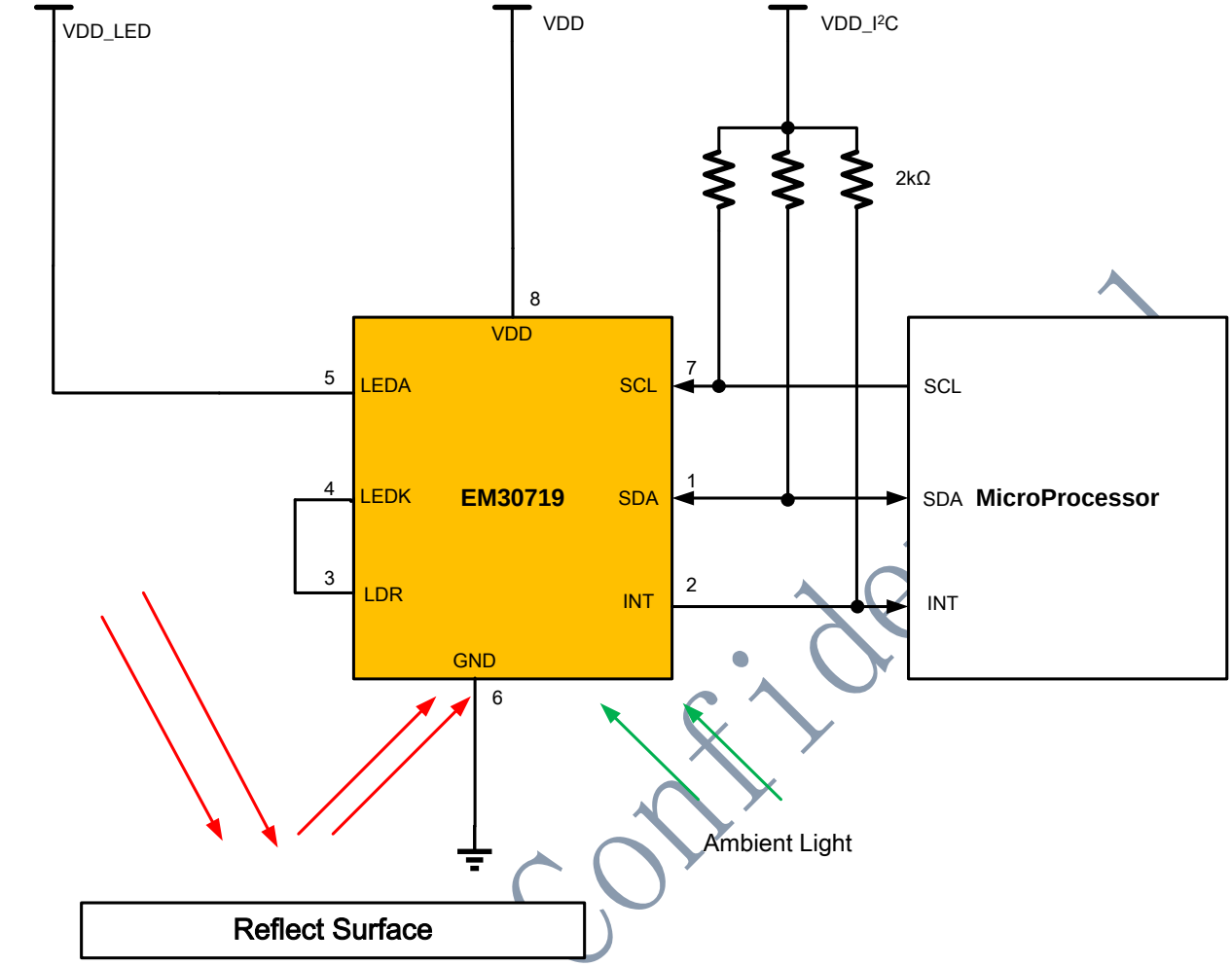



Fig. 19 Typical Application Circuit of EM30719 in cases of LEDA connect to VBAT directly.

## PCB Design

The soldering pad is Ni/Pd/Au plating with thickness as following table.

Table. 21 Plating Thickness

| | Spec |
|---|---|
| Au Thickness(Top) | 0.07~0.15μm |
| Au Thickness(Bot) | 0.07~0.15μm |
| Ni Thickness(Top) | Min 5μm |
| Ni Thickness(Bot) | Min 5μm |
| Pd Thickness | 0.06~0.14μm |

Suggested PCB pad layout guidelines for the Dual Flat No-Lead surface mount package are shown below.

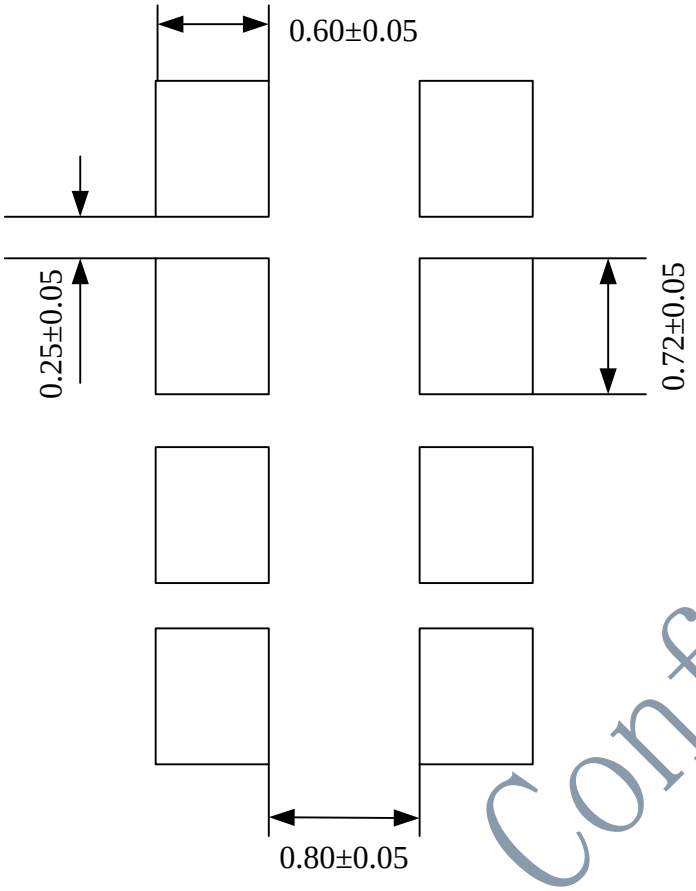



Fig. 20 PCB layout design guide (all linear dimensions are in mm)

## Package Outline Dimensions

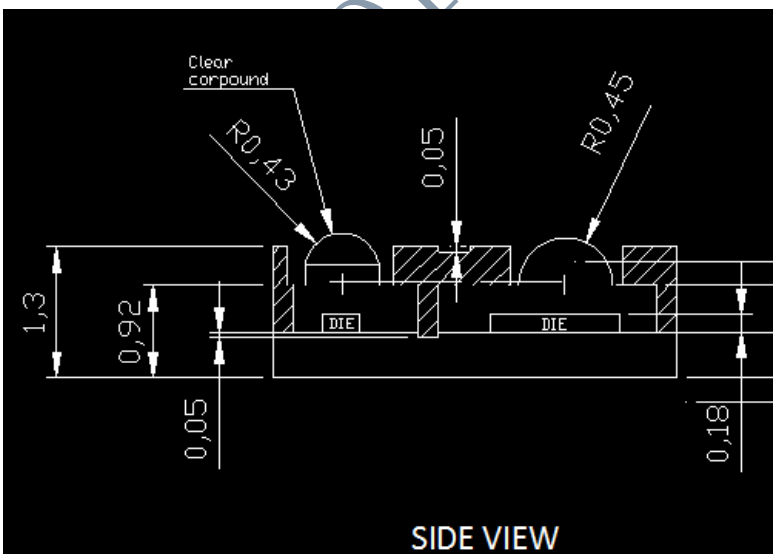



Fig. 21 Side view of package

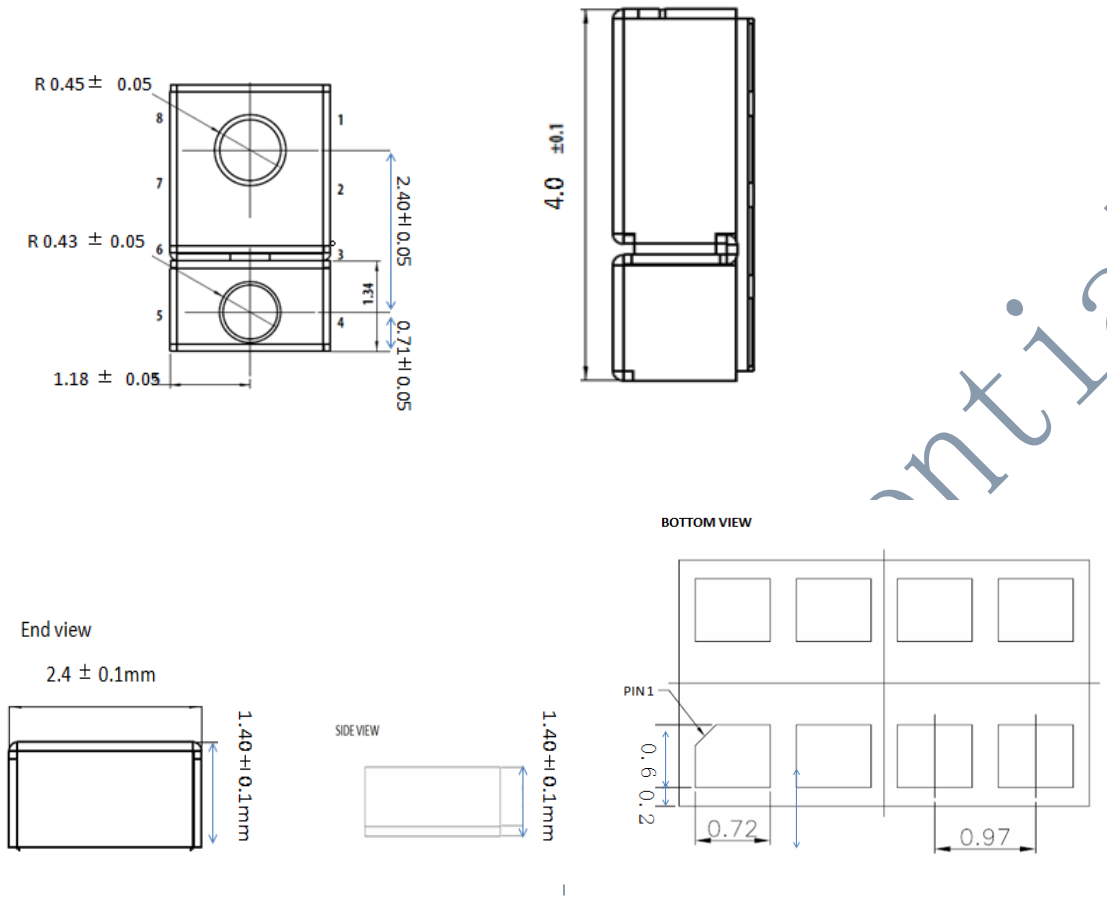



Fig. 22 Package Outline Dimensions

# Recommended Structure Design

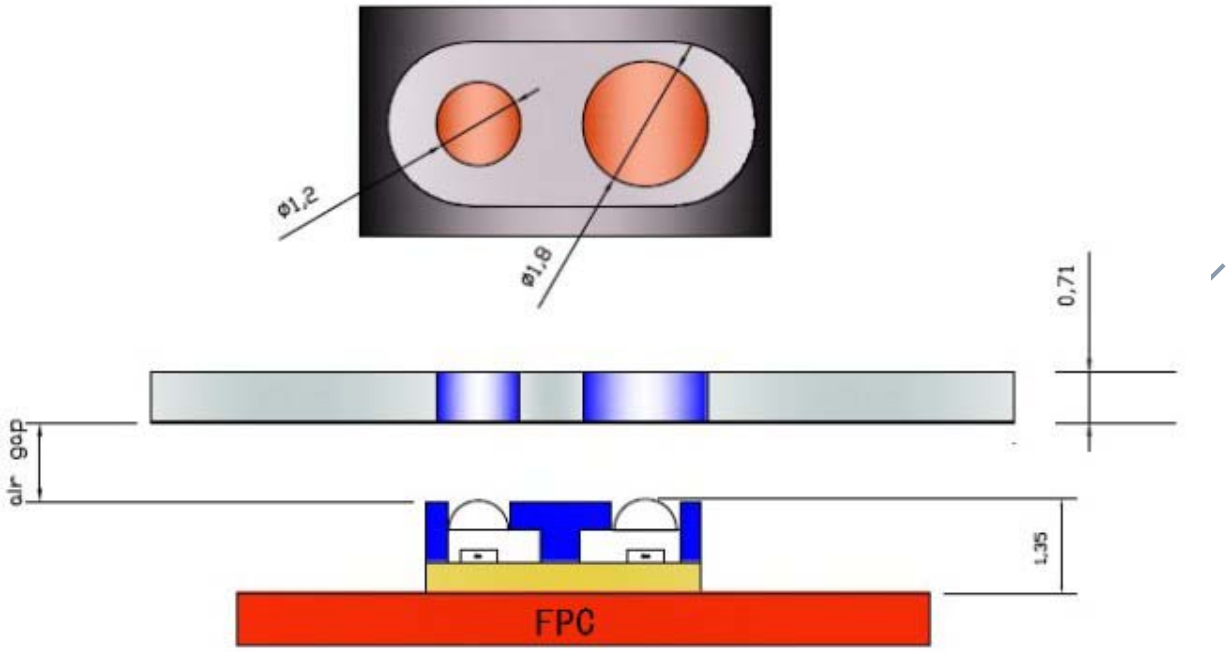



Fig. 23 Recommended in case of Air gap <= 1.0mm, without rubber

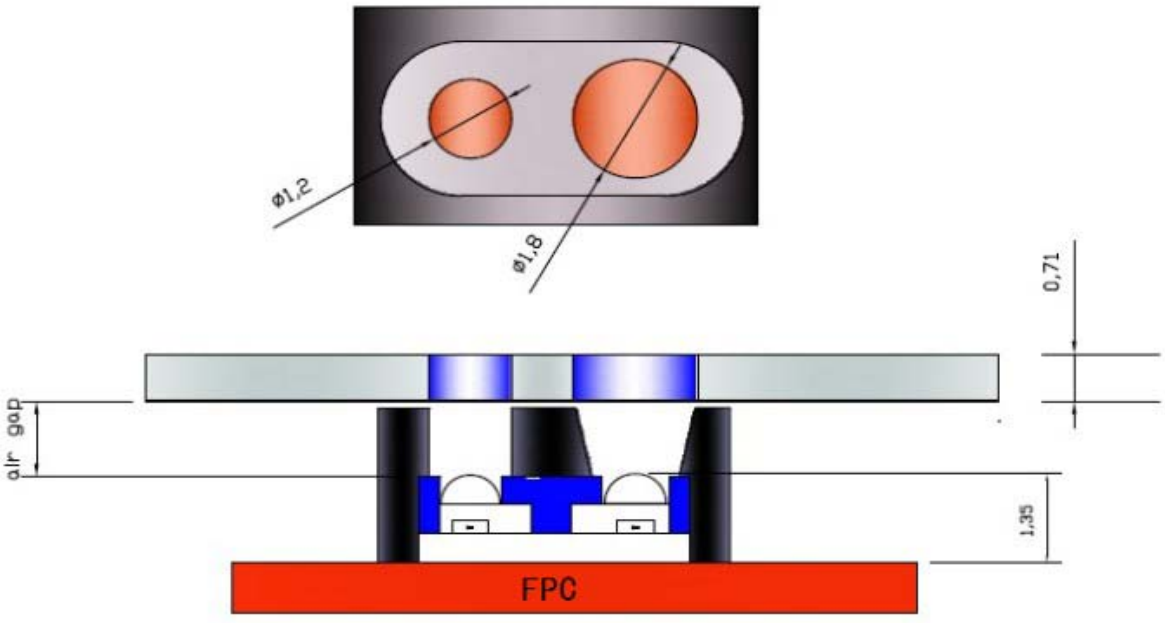
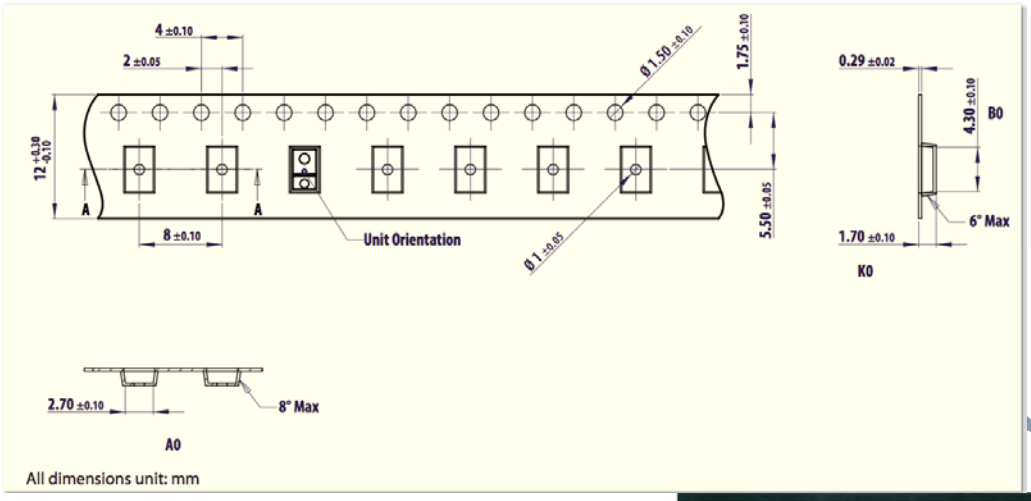



Fig. 24 Recommended in case of Air gap > 1.0mm, with rubber added

# Packing

Tape and reel dimensions is compliant to JEDEC MSL 3





| Ordering Information | Q'TY/REEL | Q'TY/inside box | Q'TY/outside box | Remark |
|---|---|---|---|---|
| EM30719 (7' reel) | 1000EA | 2000EA | 20000EA | MBB/Label/Temperature Card/Silica gel |

**Fig. 25 Tape & Reel Information**

## Recommended Reflow Profile

| PARAMETER | REFERENCE | DEVICE |
|---|---|---|
| Average temperature gradient in preheating | | 2.5°C/sec |
| Soak time | $t_{soak}$ | 2 to 3 minutes |
| Time above 217°C($T_1$) | $T_1$ | Max 60 sec |
| Time above 230°C($T_2$) | $T_2$ | Max 50 sec |
| Time above $T_{peak}$-10°C($T_3$) | $T_3$ | Max 10 sec |
| Peak temperature in reflow | $T_{peak}$ | 260°C |
| Temperature gradient in cooling | | Max-5°C/sec |

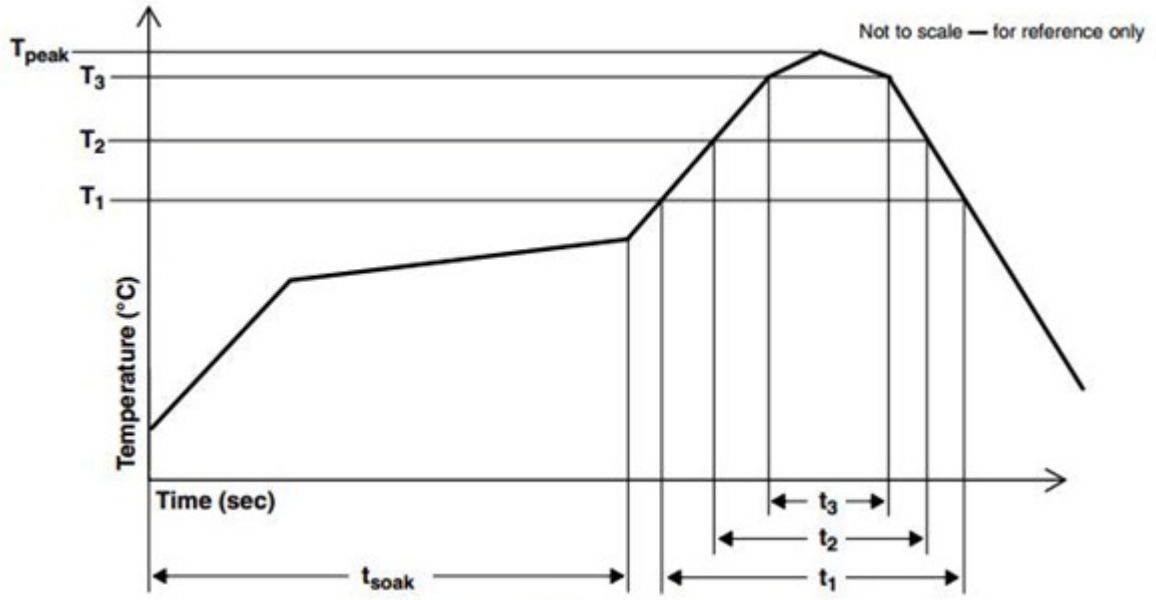
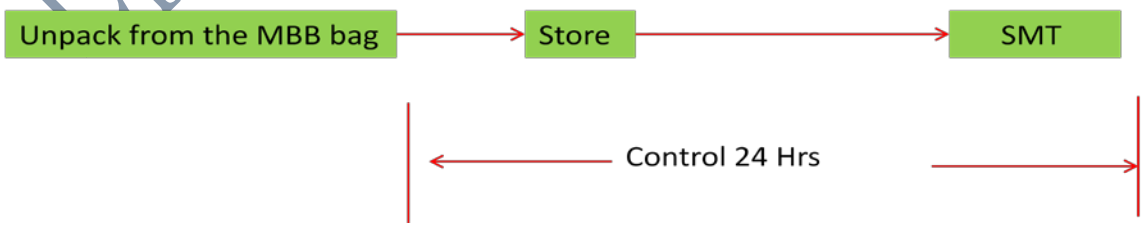



Fig. 26 Recommended Reflow Profile for SMT

The product require to control strictly to prevent moisture absorption into unit. The recommend control is as following. Rebaking of the reel will be required if the devices is unpack from the MBB bag more than 24 hours. If rebaking is required, it should be done at 50°C for 12 hours.



# NOTICE:

*1. The information here contained could be changed without notice owing to product and/or technical improvements. Please make sure before using the product that the information you are referring to is up-to-date.*

*2. No responsibilities are assumed by us for any consequence resulting from any wrong or improper operation, etc. of the product.*



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