

# Optical Sensor LTR-329ALS-01

## 1. Description

The LTR-329ALS-01 is a low voltage I2C digital light sensor [ALS] in a low cost miniature chip lead-free surface mount package. This sensor converts light intensity to a digital output signal capable of direct I<sup>2</sup>C interface. It provides a linear response over a wide dynamic range from 0.01 lux to 64k lux and is well suited to applications under high ambient brightness. There are altogether six gain settings (1X, 2X, 4X, 8X, 48X and 96X) available for user to configure.

This CMOS design and factory-set one time trimming capability ensure minimal sensor-to-sensor variations for ease of manufacturability to the end customers.

## 2. Features

- I2C interface (Fast Mode @ 400kbit/s)
- Ultra-small ChipLED package
- Built-in temperature compensation circuit
- Low active power consumption with standby mode
- Supply voltage range from 2.4V to 3.6V capable of 1.7V logic voltage
- Operating temperature range from -30 °C to +70 °C
- RoHS and Halogen free compliant
- Light Sensor
  - Close to human eye spectral response
  - Immunity to IR / UV Light Source
  - Automatically rejects 50 / 60 Hz lightings flicker
  - 6 dynamic range from 0.01 lux to 64k lux
  - 16-bit effective resolution

## 3. Applications

To control display backlight in

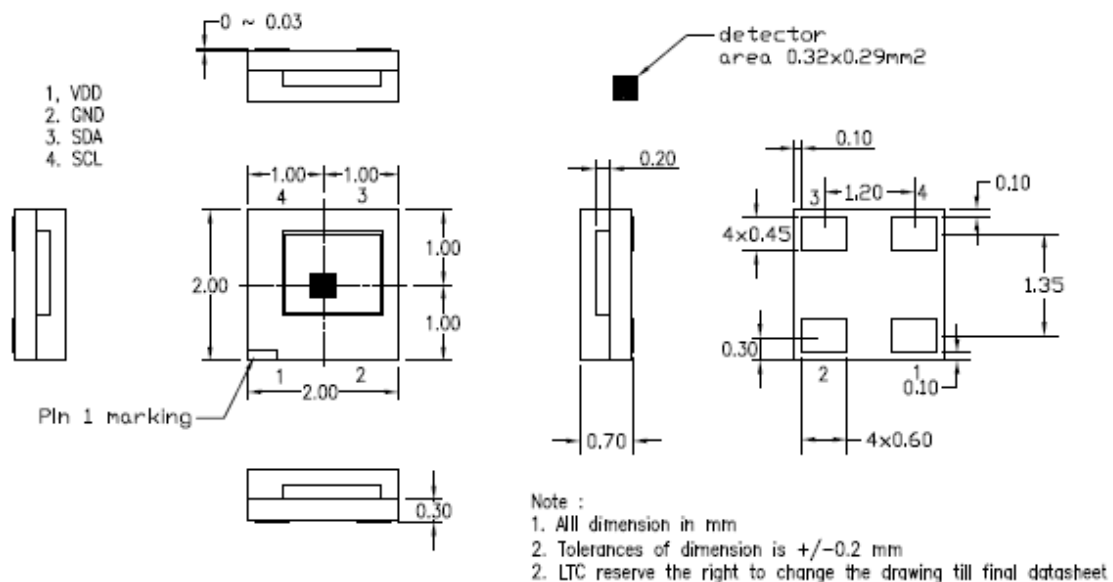
- Mobile Devices: Mobile phone, PDA
- Computing Devices: Notebook PC, Desktop Monitor
- Consumer Devices: LCD/PDP TV backlight systems, Cameras, Personal Navigation Device, Digital Photo Frame
- Dashboard

## Optical Sensor LTR-329ALS-01

### 4. Ordering Information

| Part Number   | Packaging Type | Package                | Quantity |
|---------------|----------------|------------------------|----------|
| LTR-329ALS-01 | Tape and Reel  | 4-pins chipled package | 2500     |

### 5. Outline Dimensions

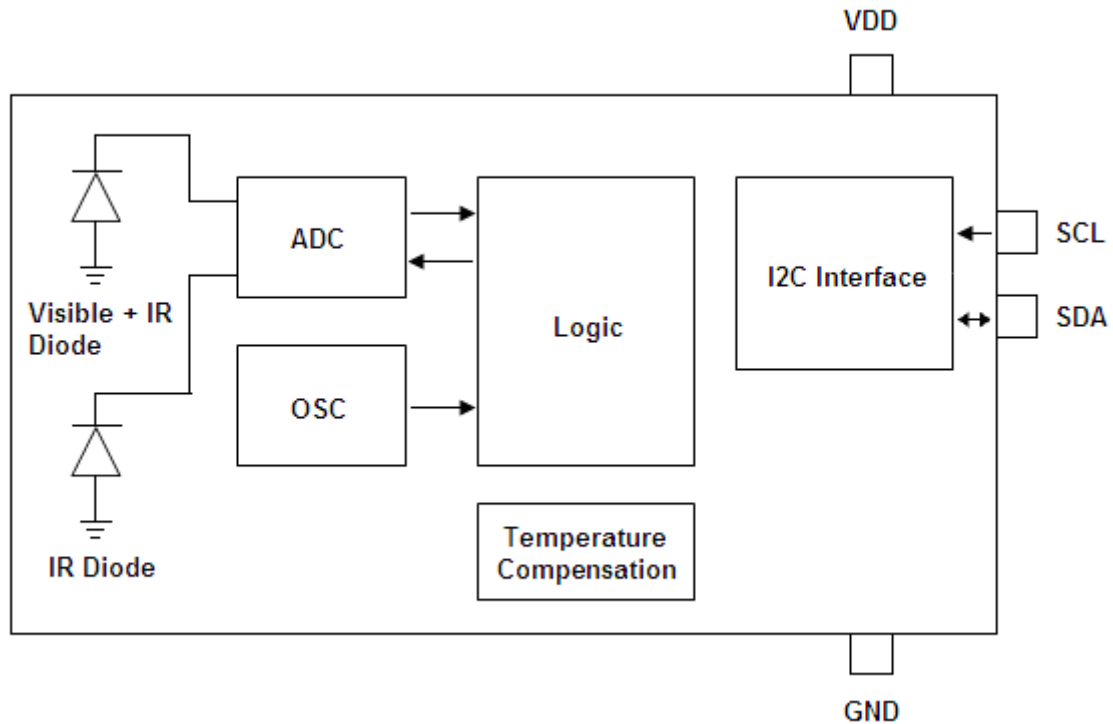


#### Notes :

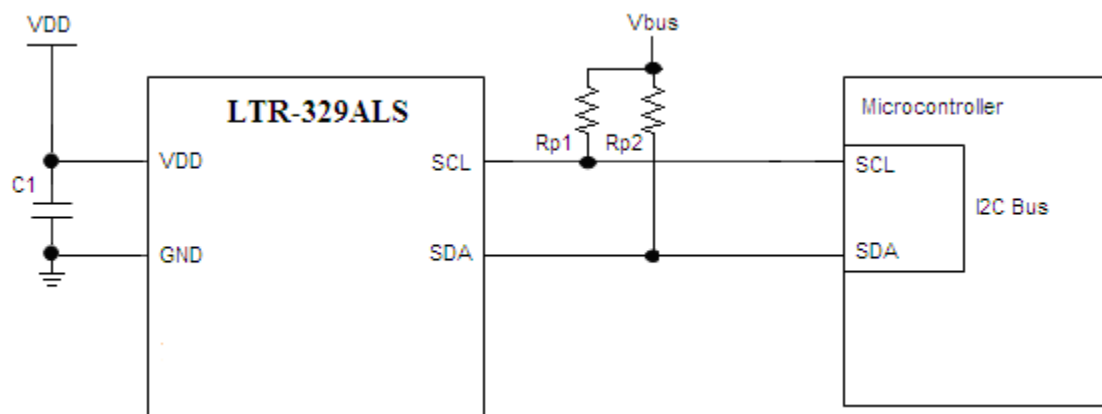
1. All dimensions are in millimeters.

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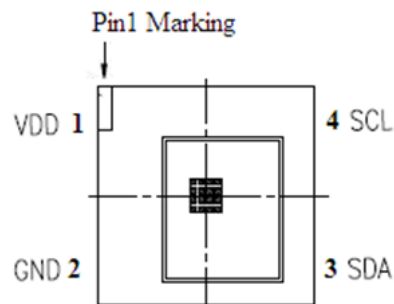
### 6. Functional Block Diagram



### 7. Application Circuit



## Optical Sensor LTR-329ALS-01



I/O Pins Configuration Table

| Pin | I/O Type | Symbol | Description   |
|-----|----------|--------|---|
| 1   |          | VDD    | Power Supply Voltage  |
| 2   |          | GND    | Ground  |
| 3   | I/O      | SDA    | I <sup>2</sup> C serial data. This pin is an open drain input / output. |
| 4   | I        | SCL    | I <sup>2</sup> C serial clock. This pin is an open drain input.         |

Recommended Application Circuit Components

| Component         | Recommended Value     |
|-------------------|-----------------------|
| Rp1, Rp2, Rp3 [1] | 1 kΩ to 10 kΩ         |
| C1, C2            | 1uF ±20%, X7R Ceramic |

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### 8. Ratings and Specifications

#### Absolute Maximum Ratings at Ta = 25°C

| Parameter              | Symbol           | Rating      | Unit |
|------------------------|------------------|-------------|------|
| Supply Voltage         | VDD              | 3.8         | V    |
| Digital Voltage Range  | SCL, SDA, INT    | -0.5 to 3.8 | V    |
| Digital Output Current | SCL, SDA, INT    | -1 to 20    | mA   |
| Storage Temperature    | T <sub>stg</sub> | -40 to 100  | °C   |

Note: Exceeding these ratings could cause damage to the sensor. All voltages are with respect to ground. Currents are positive into, negative out of the specified terminal.

#### Recommended Operating Conditions

| Description                        | Symbol           | Min. | Typ. | Max. | Unit |
|------------------------------------|------------------|------|------|------|------|
| Supply Voltage                     | VDD              | 2.4  |      | 3.6  | V    |
| LED Supply Voltage                 | VLED             | 2.5  |      | 4.35 | V    |
| Interface Bus Power Supply Voltage | V <sub>IO</sub>  | 1.7  |      | 3.6  | V    |
| Operating Temperature              | T <sub>ope</sub> | -30  |      | 70   | °C   |

#### Electrical & Optical Specifications

All specifications are at VDD = 3.0V, T<sub>ope</sub> = 25°C, unless otherwise noted.

| Parameter                | Min. | Typ. | Max. | Unit | Condition                            |
|--------------------------|------|------|------|------|--------------------------------------|
| Active Supply Current    |      |      | 250  | uA   | Active Mode, T <sub>ope</sub> = 25°C |
| Standby Current          |      |      | 5    | uA   | Standby / Sleep Mode                 |
| Initial Startup Time     | 60   | 100  | 1000 | ms   | (Note 1)                             |
| Wakeup Time from Standby |      |      | 10   | ms   | (Note 1)                             |

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### Light Sensor

| Parameter            | Min. | Typ. | Max.  | Unit  | Condition   |
|----------------------|------|------|-------|-------|---|
| Full Scale ADC Count |      |      | 65535 | count | Full Scale ADC Count  |
| Dark ADC Count       | 0    |      | 6     | count | Ch0, Lux = 0  |
|                      | 0    |      | 6     | count | Ch1, Lux = 0  |
| ADC Count (Gain=96)  | 830  | 1550 | count |       | Ch0, Lux = 200 (White LED)  |
|                      |      |      |       |       | Ch1, Lux = 200 (White LED)  |
|                      | 3250 | 6100 | count |       | Integration Time : 50ms   |
|                      |      |      |       |       | Measurement Time : 100ms  |
| ALS Ratio            | 0.15 |      | 0.35  | Ratio | Ratio = $\text{Ch1}/(\text{Ch1} + \text{Ch0})$ ,<br>Lux = 200 (White LED) |

### Typical Performance Curve

All specifications are at VDD = 3.0V, T<sub>ope</sub> = 25°C, unless otherwise noted.

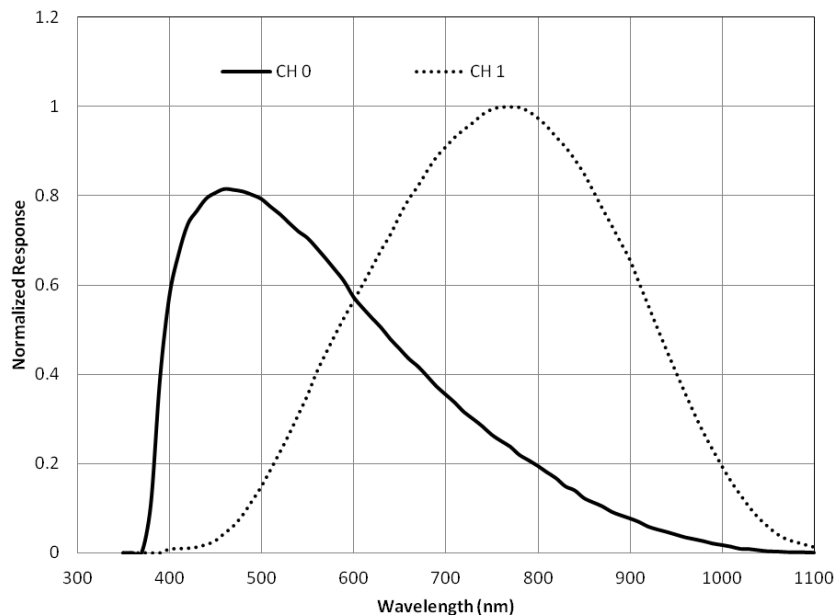


Figure 1: Normalized Spectral Response

# Optical Sensor LTR-329ALS-01

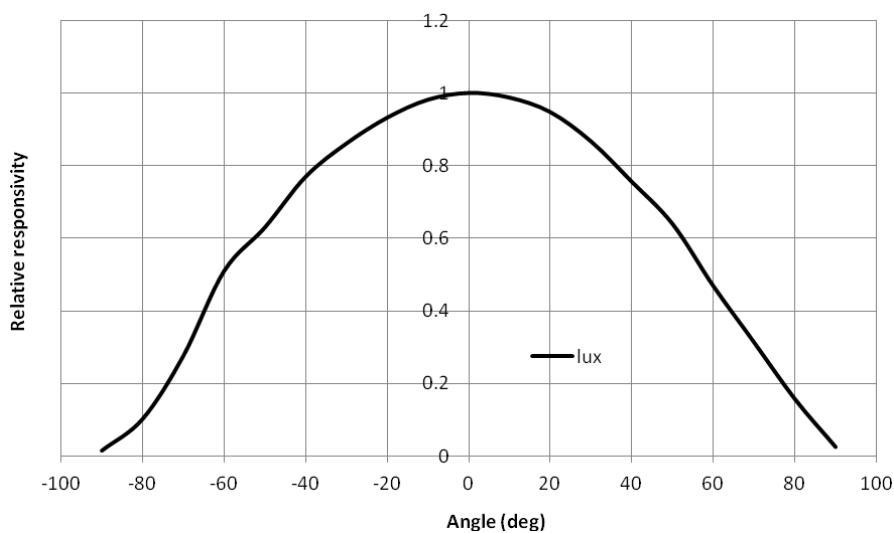


Figure 2 : Viewing angle

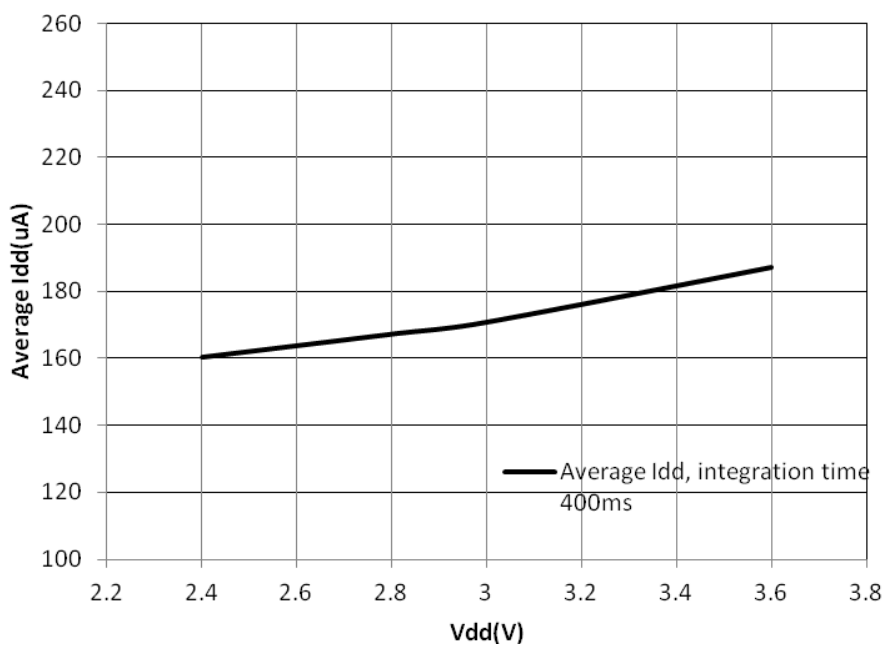


Figure 3 : Vdd versus Average Idd

# Optical Sensor LTR-329ALS-01

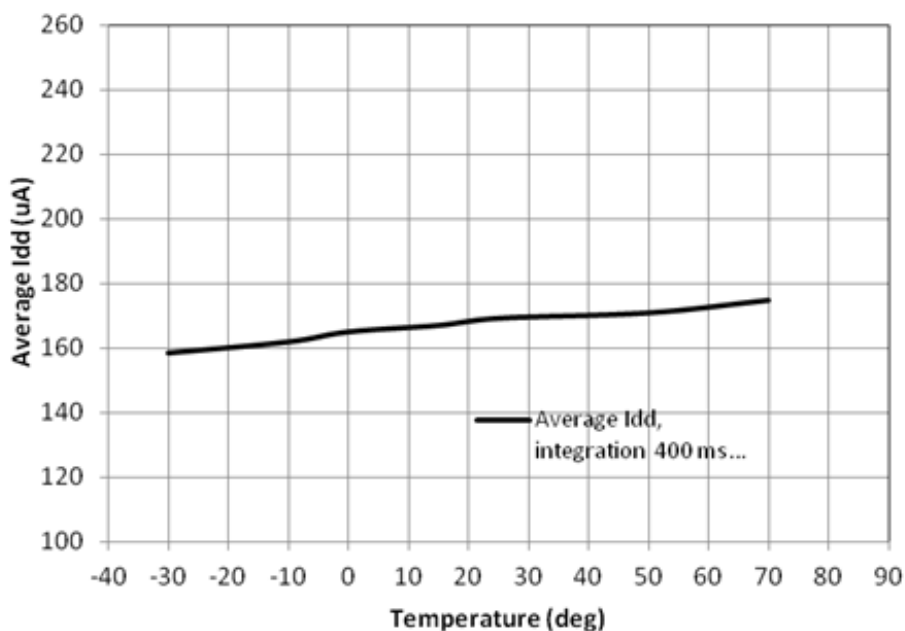


Figure 4 : Average Idd versus temperature

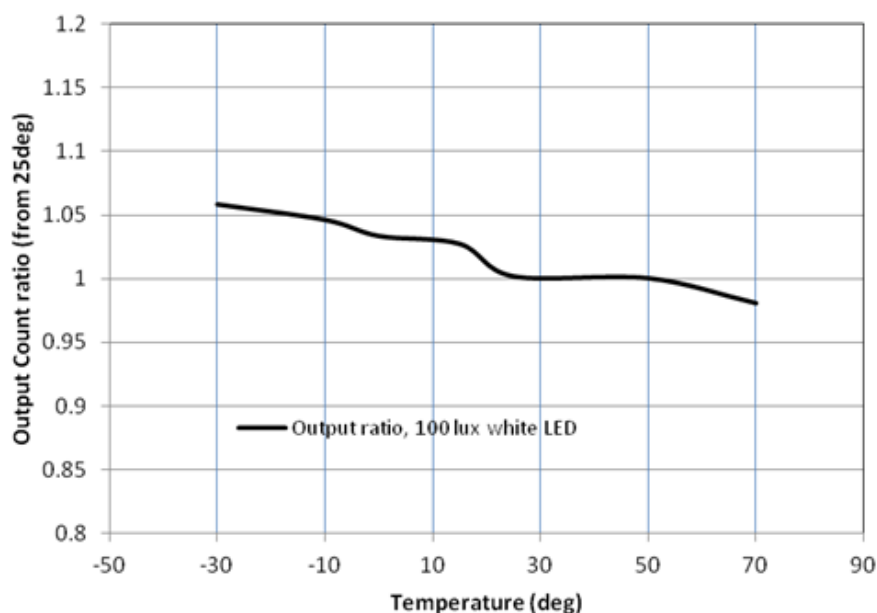


Figure 5 : Output count ratio versus temperature



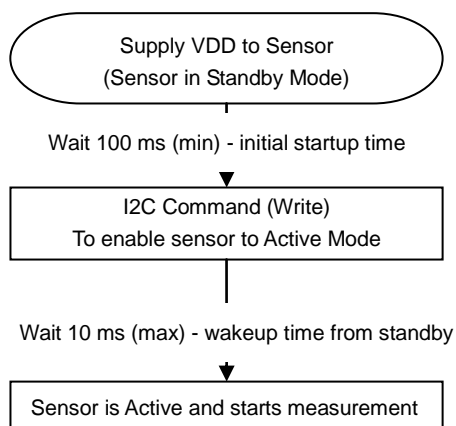
## Optical Sensor LTR-329ALS-01

### Lux Formula

Refer to Appendix A for the lux formula

### Notes:

#### 1. Startup Sequence

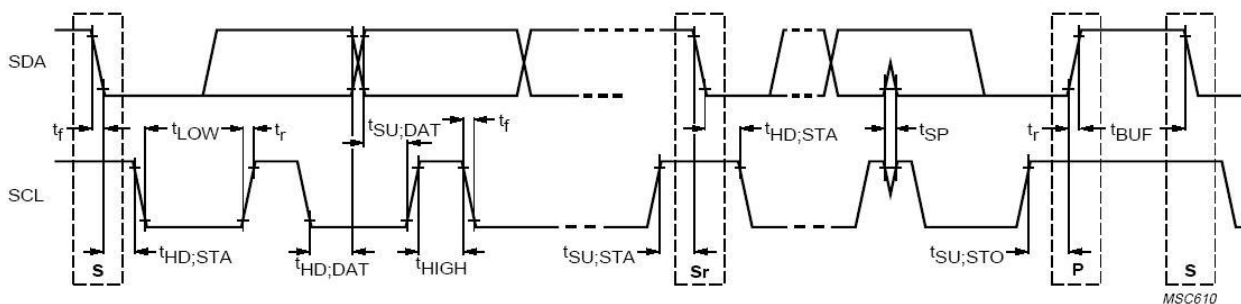


## Optical Sensor LTR-329ALS-01

### AC Electrical Characteristics

All specifications are at VBus = 1.8V, T<sub>ope</sub> = 25°C, unless otherwise noted.

| Parameter   | Symbol       | Min. | Max. | Unit |
|---|--------------|------|------|------|
| SCL clock frequency   | $f_{SCL}$    | 1    | 400  | kHz  |
| Bus free time between a STOP and START condition  | $t_{BUF}$    | 1.3  |      | us   |
| Hold time (repeated) START condition. After this period, the first clock pulse is generated | $t_{HD;STA}$ | 0.6  |      | us   |
| LOW period of the SCL clock   | $t_{LOW}$    | 1.3  |      | us   |
| HIGH period of the SCL clock  | $t_{HIGH}$   | 0.6  |      | us   |
| Set-up time for a repeated START condition  | $t_{SU;STA}$ | 0.6  |      | us   |
| Set-up time for STOP condition  | $t_{SU;STO}$ | 0.6  |      | us   |
| Rise time of both SDA and SCL signals   | $t_r$        | 30   | 300  | ns   |
| Fall time of both SDA and SCL signals   | $t_f$        | 30   | 300  | ns   |
| Data hold time  | $t_{HD;DAT}$ | 0.3  | 0.9  | us   |
| Data setup time   | $t_{SU;DAT}$ | 100  |      | ns   |
| Pulse width of spikes which must be suppressed by the input filter                          | $t_{SP}$     | 0    | 50   | ns   |



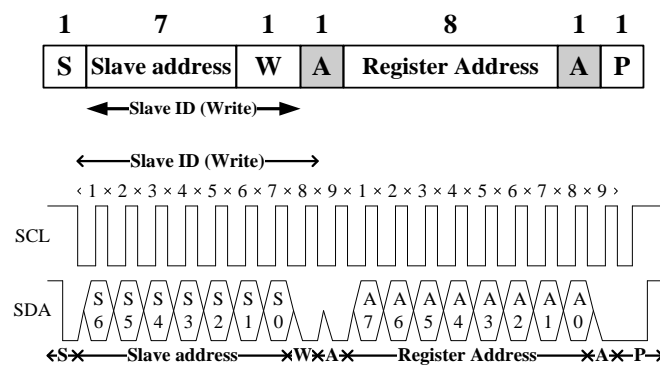
**Definition of timing for I<sup>2</sup>C bus**

## Optical Sensor LTR-329ALS-01

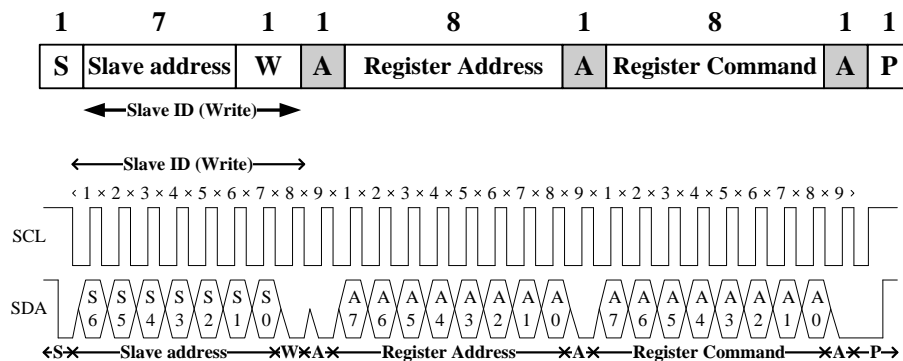
### 9. Principles of Operation

#### I<sup>2</sup>C Protocols

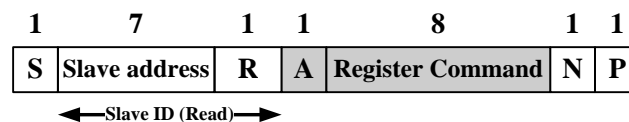
##### • I<sup>2</sup>C Write Protocol (type 1):



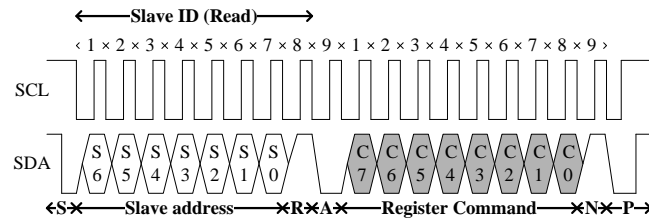
##### • I<sup>2</sup>C Write Protocol (type 2):



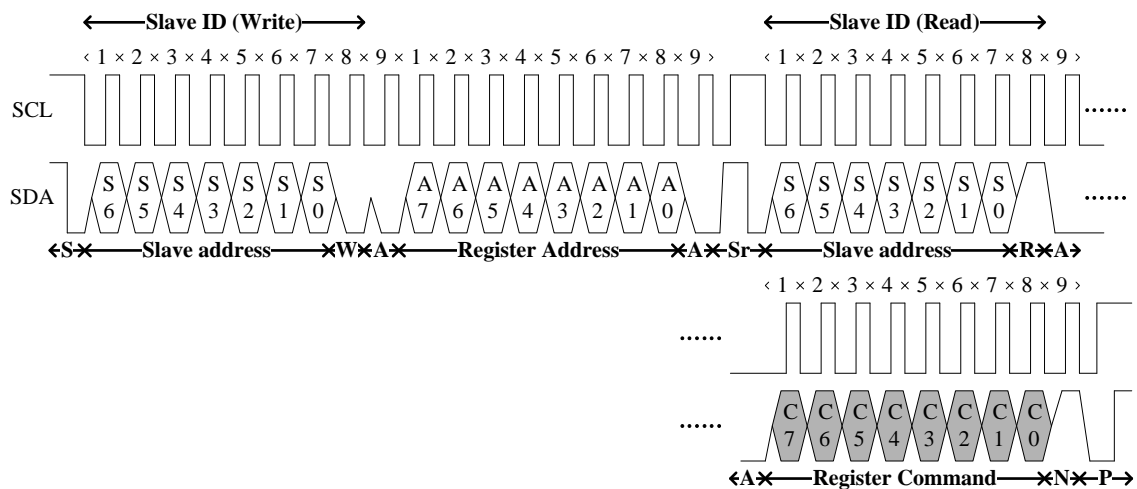
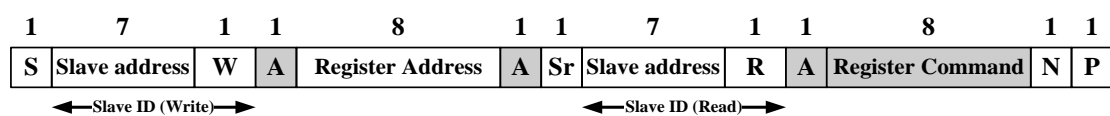
##### • I<sup>2</sup>C Read Protocol:



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### · I<sup>2</sup>C Read (Combined format) Protocol:



**A** Acknowledge (0 for an ACK)

**S** Start condition

**P** Stop condition

**W** Write (0 for writing)

 Slave-to-master

**N** Non-Acknowledge(1 for an NACK)

**Sr** Repeated Start condition

**R** Read (1 for read)

 Master-to-Slave

### I<sup>2</sup>C Slave Address

The 7 bits slave address for this sensor is 0x29H. A read/write bit should be appended to the slave address by the master device to properly communicate with the sensor.

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| I <sup>2</sup> C Slave Address |         |      |      |      |      |      |      |      |       |
|--------------------------------|---------|------|------|------|------|------|------|------|-------|
| Command Type                   | (0x29H) |      |      |      |      |      |      | W/R  | value |
|                                | Bit7    | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |       |
| Write                          | 0       | 1    | 0    | 1    | 0    | 0    | 1    | 0    | 0x52H |
| Read                           | 0       | 1    | 0    | 1    | 0    | 0    | 1    | 1    | 0x53H |

### Register Set

| Addr | R / W | Register Name  | Description                          | Reset Value |
|------|-------|----------------|--------------------------------------|-------------|
| 0x80 | R / W | ALS_CONTR      | ALS operation mode control SW reset  | 0x00        |
| 0x85 | R / W | ALS_MEAS_RATE  | ALS measurement rate in active mode  | 0x03        |
| 0x86 | R     | PART_ID        | Part Number ID and Revision ID       | 0xA0        |
| 0x87 | R     | MANUFAC_ID     | Manufacturer ID                      | 0x05        |
| 0x88 | R     | ALS_DATA_CH1_0 | ALS measurement CH1 data, lower byte | 0x00        |
| 0x89 | R     | ALS_DATA_CH1_1 | ALS measurement CH1 data, upper byte | 0x00        |
| 0x8A | R     | ALS_DATA_CH0_0 | ALS measurement CH0 data, lower byte | 0x00        |
| 0x8B | R     | ALS_DATA_CH0_1 | ALS measurement CH0 data, upper byte | 0x00        |
| 0x8C | R     | ALS_STATUS     | ALS new data status                  | 0x00        |

#### Notes:

- 1) When reading ALS data registers, read sequence should always be from lower address to higher address (E.g. For ALS data, Ch1 data should be read first followed by Ch0 data. Read sequence should be 0x88, 0x89, 0x8A, 0x8B. When 0x8B is read, all four ALS data registers will be populated with new set of data).

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### ALS\_CONTR Register (0x80)

The ALS\_CONTR register controls the ALS Gain setting, ALS operation modes and software (SW) reset for the sensor. The ALS sensor can be set to either standby mode or active mode. At either of these modes, the I<sup>2</sup>C circuitry is always active. The default mode after power up is standby mode. During standby mode, there is no ALS measurement performed but I<sup>2</sup>C communication is allowed to enable read/write to all the registers

| 0x80 | ALS_CONTR (default = 0x00) |    |    |          |    |    |          |          |
|------|----------------------------|----|----|----------|----|----|----------|----------|
|      | B7                         | B6 | B5 | B4       | B3 | B2 | B1       | B0       |
|      | Reserved                   |    |    | ALS Gain |    |    | SW Reset | ALS Mode |

| Field    | Bits | Default | Type | Description |  |
|----------|------|---------|------|-------------|--|
| Reserved | 7:5  | 000     | --   | --          | --   |
| ALS Gain | 4:2  | 000     | RW   | 000         | Gain 1X → 1 lux to 64k lux (default)   |
|          |      |         |      | 001         | Gain 2X → 0.5 lux to 32k lux   |
|          |      |         |      | 010         | Gain 4X → 0.25 lux to 16k lux  |
|          |      |         |      | 011         | Gain 8X → 0.125 lux to 8k lux  |
|          |      |         |      | 100         | Reserved   |
|          |      |         |      | 101         | Reserved   |
|          |      |         |      | 110         | Gain 48X → 0.02 lux to 1.3k lux  |
|          |      |         |      | 111         | Gain 96X → 0.01 lux to 600 lux   |
| SW reset | 1    | 0       | RW   | 0           | Initial start-up procedure is NOT started (default)                              |
|          |      |         |      | 1           | Initial start-up procedure is started, bit has default value of 0 after start-up |
| ALS mode | 0    | 0       | RW   | 0           | Stand-by mode (default)  |
|          |      |         |      | 1           | Active mode  |

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### ALS\_MEAS\_RATE Register (0x85)

The ALS\_MEAS\_RATE register controls the integration time and timing of the periodic measurement of the ALS in active mode. ALS Measurement Repeat Rate is the interval between ALS\_DATA registers update. ALS Integration Time is the measurement time for each ALS cycle. ALS Integration Time must be set to be equal or smaller than the ALS Measurement Repeat Rate. If ALS Integration Time is set to be bigger than ALS Measurement Repeat Rate, it will be automatically reset to be equal to ALS Measurement Repeat Rate by the IC internally.

| 0x85 | ALS_MEAS_RATE (default = 0x03) |    |                      |    |    |                             |    |    |
|------|--------------------------------|----|----------------------|----|----|-----------------------------|----|----|
|      | B7                             | B6 | B5                   | B4 | B3 | B2                          | B1 | B0 |
|      | Reserved                       |    | ALS Integration Time |    |    | ALS Measurement Repeat Rate |    |    |

| Field                | Bits | Default | Type | Description |                 |
|----------------------|------|---------|------|-------------|-----------------|
| Reserved             | 7:6  | 00      | --   | --          | --              |
| ALS integration time | 5:3  | 000     | RW   | 000         | 100ms (default) |
|                      |      |         |      | 001         | 50ms            |
|                      |      |         |      | 010         | 200ms           |
|                      |      |         |      | 011         | 400ms           |
|                      |      |         |      | 100         | 150ms           |
|                      |      |         |      | 101         | 250ms           |
|                      |      |         |      | 110         | 300ms           |
|                      |      |         |      | 111         | 350ms           |
| ALS measurement rate | 2:0  | 011     | RW   | 000         | 50ms            |
|                      |      |         |      | 001         | 100ms           |
|                      |      |         |      | 010         | 200ms           |
|                      |      |         |      | 011         | 500ms (default) |
|                      |      |         |      | 100         | 1000ms          |
|                      |      |         |      | 101         | 2000ms          |
|                      |      |         |      | 110         |                 |
|                      |      |         |      | 111         |                 |

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### PART\_ID Register (0x86) (Read Only)

The PART\_ID register defines the part number and revision identification of the sensor.

| 0x86 | PART_ID (default = 0x92) |    |    |    |             |    |    |    |
|------|--------------------------|----|----|----|-------------|----|----|----|
|      | B7                       | B6 | B5 | B4 | B3          | B2 | B1 | B0 |
|      | Part Number ID           |    |    |    | Revision ID |    |    |    |

| Field          | Bits | Default | Type | Description       |
|----------------|------|---------|------|-------------------|
| Part Number ID | 7:4  | 1010    | R    | Part ID 0x0AH     |
| Revision ID    | 3:0  | 0000    | R    | Revision ID 0x00H |

### MANUFAC\_ID Register (0x87) (Read Only)

The MANUFAC\_ID register defines the manufacturer identification of the sensor.

| 0x87 | MANUFAC_ID (default = 0x05) |    |    |    |    |    |    |    |
|------|-----------------------------|----|----|----|----|----|----|----|
|      | B7                          | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|      | Manufacturer ID             |    |    |    |    |    |    |    |

| Field           | Bits | Default  | Type | Description             |
|-----------------|------|----------|------|-------------------------|
| Manufacturer ID | 7:0  | 00000101 | R    | Manufacturer ID (0x05H) |



## Optical Sensor LTR-329ALS-01

### ALS\_DATA\_CH1 Register (0x88 / 0x89) (Read Only)

The ALS\_DATA registers should be read as a group, with the lower address read back first (i.e. read 0x88 first, then read 0x89). These two registers should also be read before reading channel-0 data (from registers 0x8A, 0x8B). When the I<sup>2</sup>C read operation starts, all four ALS data registers are locked until the I<sup>2</sup>C read operation of register 0x8B is completed. This will ensure that the data in the registers is from the same measurement even if an additional integration cycle ends during the read operation. New measurement data is stored into temporary registers and the ALS\_DATA registers are updated as soon as there is no on-going I<sup>2</sup>C read operation. The ALS ADC channel-1 data is expressed as a 16-bit data spread over two registers. The ALS\_DATA\_CH1\_0 and ALS\_DATA\_CH1\_1 registers provide the lower and upper byte respectively.

| 0x88 | ALS_DATA_CH1_0 (default = 0x00) |    |    |    |    |    |    |    |
|------|---------------------------------|----|----|----|----|----|----|----|
|      | B7                              | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|      | <i>ALS Data Ch1 Low</i>         |    |    |    |    |    |    |    |

| 0x89 | ALS_DATA_CH1_1 (default = 0x00) |    |    |    |    |    |    |    |
|------|---------------------------------|----|----|----|----|----|----|----|
|      | B7                              | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|      | <i>ALS Data Ch1 High</i>        |    |    |    |    |    |    |    |

| Field             | Address | Bits | Default  | Type | Description                       |
|-------------------|---------|------|----------|------|-----------------------------------|
| ALS Data Ch1 Low  | 0x88    | 7:0  | 00000000 | R    | ALS ADC channel 1 lower byte data |
| ALS Data Ch1 High | 0x89    | 7:0  | 00000000 | R    | ALS ADC channel 1 upper byte data |

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### ALS\_DATA\_CH0 Register (0x8A / 0x8B) (Read Only)

These two registers should be read after reading channel-1 data (from registers 0x88, 0x89). Lower address register should be read first (i.e read 0x8A first, then read 0x8B). See ALS\_DATA\_CH1 register information above. The ALS ADC channel-0 data is expressed as a 16-bit data spread over two registers. The ALS\_DATA\_CH0\_0 and ALS\_DATA\_CH0\_1 registers provide the lower and upper byte respectively.

| 0x8A | ALS_DATA_CH0_0 (default = 0x00) |    |    |    |    |    |    |    |
|------|---------------------------------|----|----|----|----|----|----|----|
|      | B7                              | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|      | ALS Data Ch0 Low                |    |    |    |    |    |    |    |

| 0x8B | ALS_DATA_CH0_1 (default = 0x00) |    |    |    |    |    |    |    |
|------|---------------------------------|----|----|----|----|----|----|----|
|      | B7                              | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|      | ALS Data Ch0 High               |    |    |    |    |    |    |    |

| Field             | Address | Bits | Default  | Type | Description                       |
|-------------------|---------|------|----------|------|-----------------------------------|
| ALS Data Ch0 Low  | 0x8A    | 7:0  | 00000000 | R    | ALS ADC channel 0 lower byte data |
| ALS Data Ch0 High | 0x8B    | 7:0  | 00000000 | R    | ALS ADC channel 0 upper byte data |

### ALS\_STATUS Register (0x8C) (Read Only)

The ALS\_STATUS register stores the information about ALS data status. New data means data has not been read yet. When the measurement is completed and data is written to the data register, the data status bit will be set to logic 1. When the data register is read, the data status bit will be set to logic 0.

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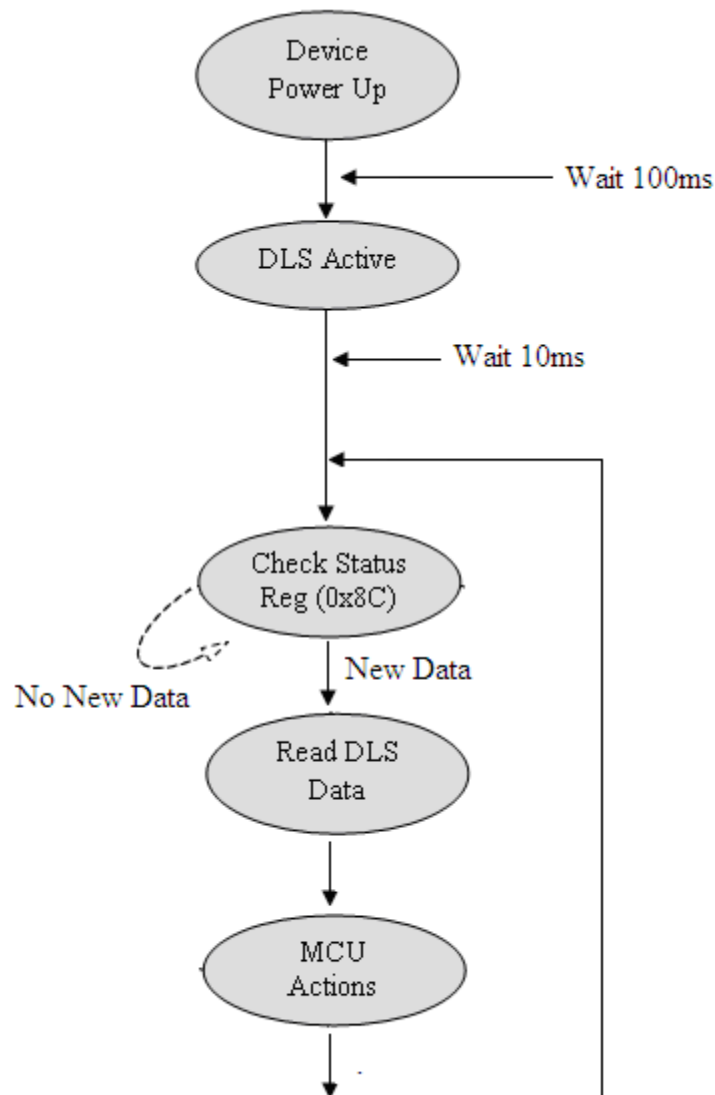
| 0x8C | ALS_PS_STATUS (default = 0x00) |          |    |    |                      |                 |          |    |
|------|--------------------------------|----------|----|----|----------------------|-----------------|----------|----|
|      | B7                             | B6       | B5 | B4 | B3                   | B2              | B1       | B0 |
|      | ALS Data Valid                 | ALS Gain |    |    | ALS Interrupt Status | ALS Data Status | Reserved |    |

| Field               | Bits | Default | Type | Description |  |
|---------------------|------|---------|------|-------------|--|
| ALS Data Valid      | 7    | 0       | R    | 0           | ALS Data is Valid (default)              |
|                     |      |         |      | 1           | ALS Data is Invalid                      |
| ALS Data Gain Range | 6:4  | 000     | R    | 000         | ALS measured data in Gain 1X (default)   |
|                     |      |         |      | 001         | ALS measured data in Gain 2X             |
|                     |      |         |      | 010         | ALS measured data in Gain 4X             |
|                     |      |         |      | 011         | ALS measured data in Gain 8X             |
|                     |      |         |      | 100         | Invalid                                  |
|                     |      |         |      | 101         | Invalid                                  |
|                     |      |         |      | 110         | ALS measured data in Gain 48X            |
|                     |      |         |      | 111         | ALS measured data in Gain 96X            |
| Reserved            | 3    | 0       | R    | 0           | Don't care                               |
| ALS data status     | 2    | 0       | R    | 0           | OLD data (data already read), (default)  |
|                     |      |         |      | 1           | NEW data (first time data is being read) |
| Reserved            | 1:0  | 00      | R    | --          | Don't care                               |

## Optical Sensor LTR-329ALS-01

### 10. Device Operation(using Interrupt)

Below flow diagram illustrates the LTR-329ALS operation.



## Optical Sensor LTR-329ALS-01

### 11. Pseudo Codes Examples

#### Control Registers

// The Control Register defines the operating modes and gain settings of the ALS of LTR-329.  
// Default settings is 0x00 (in Standby mode).

Slave\_Addr = 0x29 // Slave address of LTR-329 device

#### // Enable ALS

Register\_Addr = 0x80 // ALS\_CONTR register  
Command = 0x01 // For Gain X1  
// For Gain X96, Command = 0x1D  
WriteByte(Slave\_Addr, Register\_Addr, Command)

#### ALS Measurement Rate

// The ALS\_MEAS\_RATE register controls the ALS integration time and measurement rate.  
// Default setting of the register is 0x03 (integration time 100ms, repeat rate 500ms)

Slave\_Addr = 0x29 // Slave address of LTR-329 device

#### // Set ALS Integration Time 200ms, Repeat Rate 200ms

Register\_Addr = 0x85 // ALS\_MEAS\_RATE register  
Command = 0x12 // Int time = 200ms, Meas rate = 200ms  
// For Int time = 400ms, Meas rate = 500ms, Command = 0x1B  
WriteByte(Slave\_Addr, Register\_Addr, Command)

#### ALS Data Registers (Read Only)

// The ALS Data Registers contain the ADC output data for the respective channel.  
// These registers should be read as a group, with the lower address being read first.

Slave\_Addr = 0x29 // Slave address of LTR-329 device

#### // Read back ALS\_DATA\_CH1

Register\_Addr = 0x88 // ALS\_DATA\_CH1 low byte address  
ReadByte(Slave\_Addr, Register\_Addr, Data0)  
Register\_Addr = 0x89 // ALS\_DATA\_CH1 high byte address  
ReadByte(Slave\_Addr, Register\_Addr, Data1)

#### // Read back ALS\_DATA\_CH0

Register\_Addr = 0x8A // ALS\_DATA\_CH0 low byte address  
ReadByte(Slave\_Addr, Register\_Addr, Data2)  
Register\_Addr = 0x8B // ALS\_DATA\_CH0 high byte address  
ReadByte(Slave\_Addr, Register\_Addr, Data3)

ALS\_CH1\_ADC\_Data = (Data1 << 8) | Data0 // Combining lower and upper bytes to give 16-bit Ch1 data  
ALS\_CH0\_ADC\_Data = (Data3 << 8) | Data2 // Combining lower and upper bytes to give 16-bit Ch0 data

### Optical Sensor LTR-329ALS-01

#### ALS Status Register (Read only)

// The ALS\_STATUS Register contains the information on ALS data availability status.  
// This register is read only.

Slave\_Addr = 0x29

// Slave address of LTR-329 device

#### // Read back Register

Register\_Addr = 0x8C

// ALS\_STATUS register address

ReadByte(Slave\_Addr, Register\_Addr, Data)

NewData\_Status = Data & 0x04

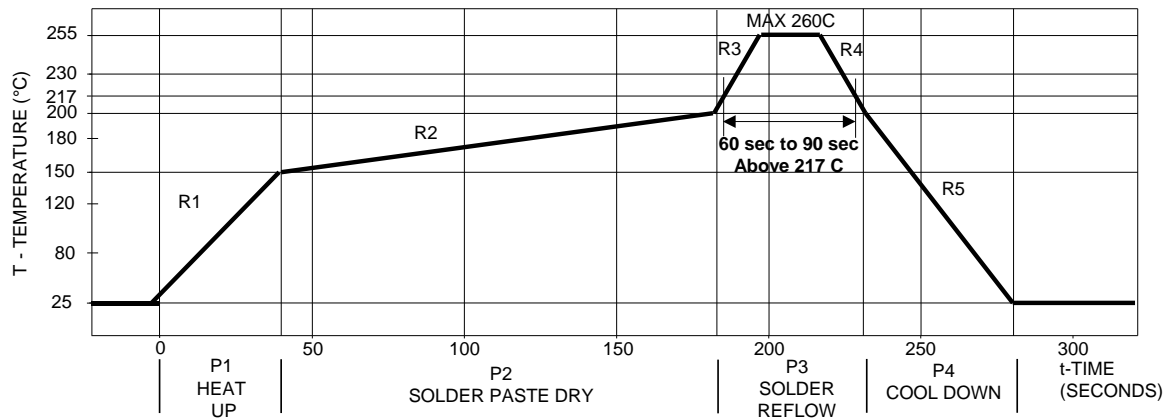
// NewData\_Status = 4(decimal) → ALS New Data

// ALS\_Data\_Valid = 0x00 → ALS New Data is valid (usable)

// ALS\_Data\_Valid = 0x80 → ALS New Data is invalid, discard and wait for new ALS data

## Optical Sensor LTR-329ALS-01

### 12. Recommended Leadfree Reflow Profile



It is recommended to perform reflow soldering no more than twice.

**Optical Sensor  
LTR-329ALS-01****13. Moisture Proof Packaging**

All LTR-329ALS-01 are shipped in moisture proof package. Once opened, moisture absorption begins. This part is compliant to JEDEC J-STD-033A Level 3.

**Time from Unsealing to Soldering**

After removal from the moisture barrier bag, the parts should be stored at the recommended storage conditions and soldered within seven days. When the moisture barrier bag is opened and the parts are exposed to the recommended storage conditions for more than seven days, the parts must be baked before reflow to prevent damage to the parts.

**Recommended Storage Conditions**

|                            |              |
|----------------------------|--------------|
| <b>Storage Temperature</b> | 10°C to 30°C |
| <b>Relative Humidity</b>   | Below 60% RH |

**Baking Conditions**

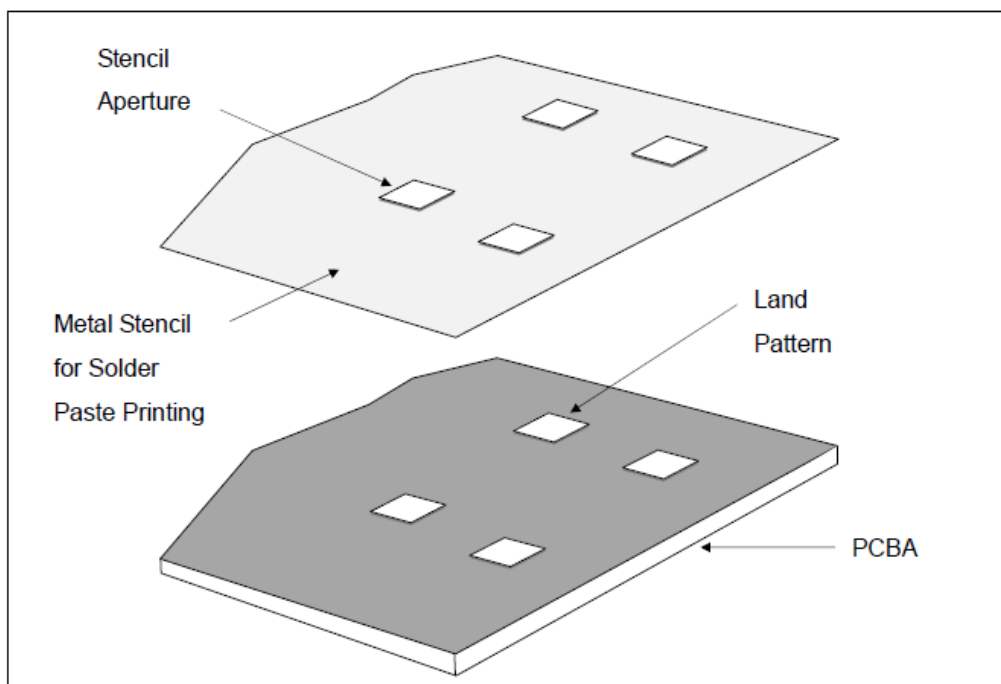
| <b>Package</b> | <b>Temperature</b> | <b>Time</b> |
|----------------|--------------------|-------------|
| In Reels       | 60°C               | 48 hours    |
| In Bulk        | 100°C              | 4 hours     |

Baking should only be done once.

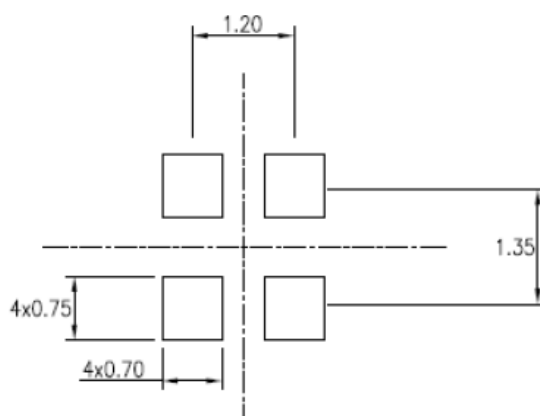


## Optical Sensor LTR-329ALS-01

### 14. Recommended Land Pattern and Metal Stencil Aperture



#### Recommended Land Pattern



Note:

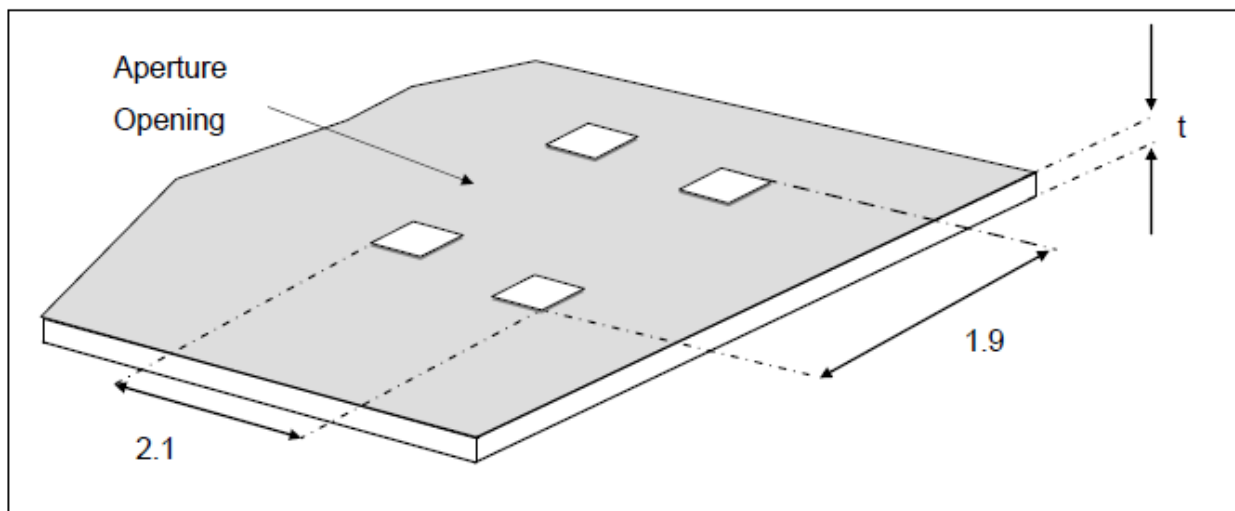
1. All dimensions are in millimeters

## Optical Sensor LTR-329ALS-01

### Recommended Metal Stencil Aperture

It is recommended that the metal stencil used for solder paste printing has a thickness (t) of 0.11mm (0.004 inches / 4 mils) or 0.127mm (0.005 inches / 5 mils).

The stencil aperture opening is recommended to be 0.72mm x 0.60mm which has the same dimension as the land pattern. This is to ensure adequate printed solder paste volume and yet no shorting.

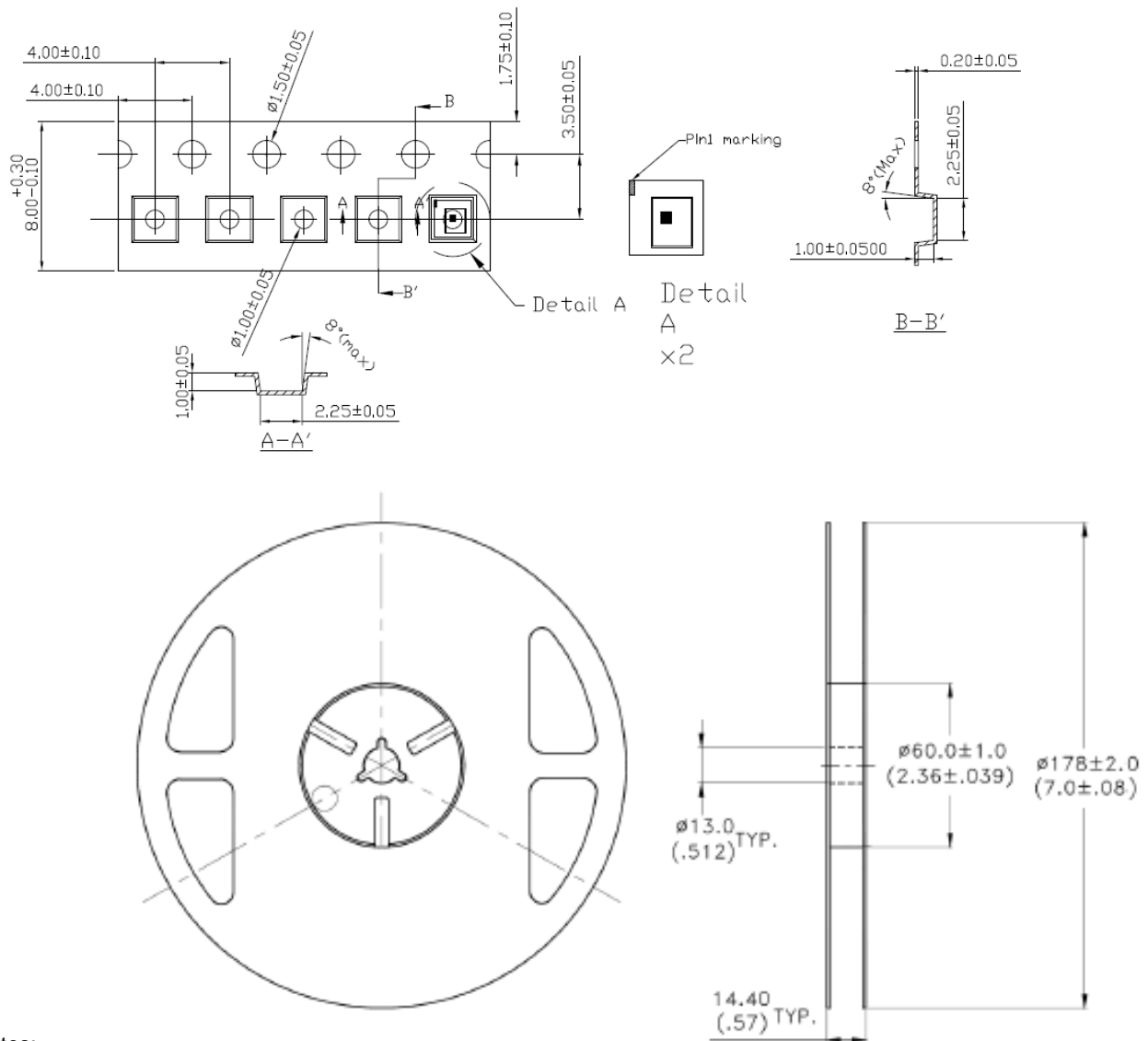


Note:

1. All dimensions are in millimeters

# Optical Sensor LTR-329ALS-01

## 15. Package Dimension for Tape and Reel



Notes:

1. All dimensions are in millimeters (inches)
2. Empty component pockets sealed with top cover tape
3. 7 inch reel - 2500 pieces per reel
4. In accordance with ANSI/EIA 481-1-A-1994 specifications.