**Digital Output Ambient Light Sensor**

**(REFERENCE)**

# KOE1023A

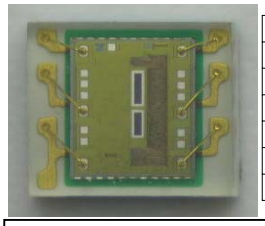
## Description

The KOE1023A is an Ambient Light Sensor with I²C interface which converts light intensity into digital output in controllable time periods and gains.

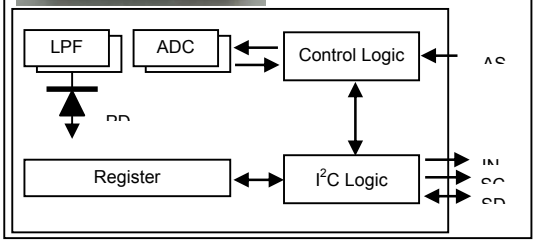
The KOE1023A incorporates photodiodes, low noise amplifiers, and ADCs(Analog to Digital Converter) in a single chip.

The photo diode has the different spectrum response each other.

ADC has the 16 bit resolution from 0 to 65,535 for representing light intensity.



| PIN | CONFIGURATION |
|---|---|
| 1 | VDD |
| 2 | ASL |
| 3 | GND |
| 4 | SCL |
| 5 | INT |
| 6 | SDA |




## Features

- Converters light intensity to digital data format
- 16 bits resolution of light intensity
- Close to Human eye response
- Programmable interrupt function
- 50/60Hz ripple rejection
- I²C protocol interface up to 400 kHz (fast mode)
- Package : COB 6Pin, 2.2 x 2.0 x 0.7 mm3

## Applications

- Mobile Devices : Smart phone, PDA, and GPS
- Computing devices : Notebook, UMPC web pod, Monitor
- Consumer devices : LCD TV, digital picture frame, digital camera
- Other devices : Industrial and medical light sensing

## Absolute Maximum Ratings

[$T_A$ = 25℃ ]

| Parameter | Symbol | Min. | Max. | Max. |
|---|---|---|---|---|
| Supply Votage | $V_{DD}$ | - | 3.8 | V |
| Operating Temperature | Topr. | -30 | 85 | ℃ |
| Storage Temperature | Tstg. | -30 | 85 | ℃ |
| Peak Reflow Soldering Temperature *1 | Tsol | - | 260 | ℃ |

*1. Relfow Soldering Temp. 260℃ (Max 10sec)

(REFERENCE)

# KOE1023A

## Recommended Operating Conditions

[$T_A$ = 25℃ ]

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit. |
|---|---|---|---|---|---|---|
| Supply voltage | $V_{DD}$ | | 2.7 | 3.0 | 3.3 | V |
| $I^2C$ input low voltage | $V_{IL}$ | $V_{DD}$=3.0V | | | 0.8 | V |
| $I^2C$ input high voltage | $V_{IH}$ | $V_{DD}$=3.0V | 2.1 | | | V |
| $I^2C$ operating frequency | $f_{scl}$ | | 10 | | 400 | kHz |

## Electrical & Optical Specifications

[$T_A$ = 25℃ ]

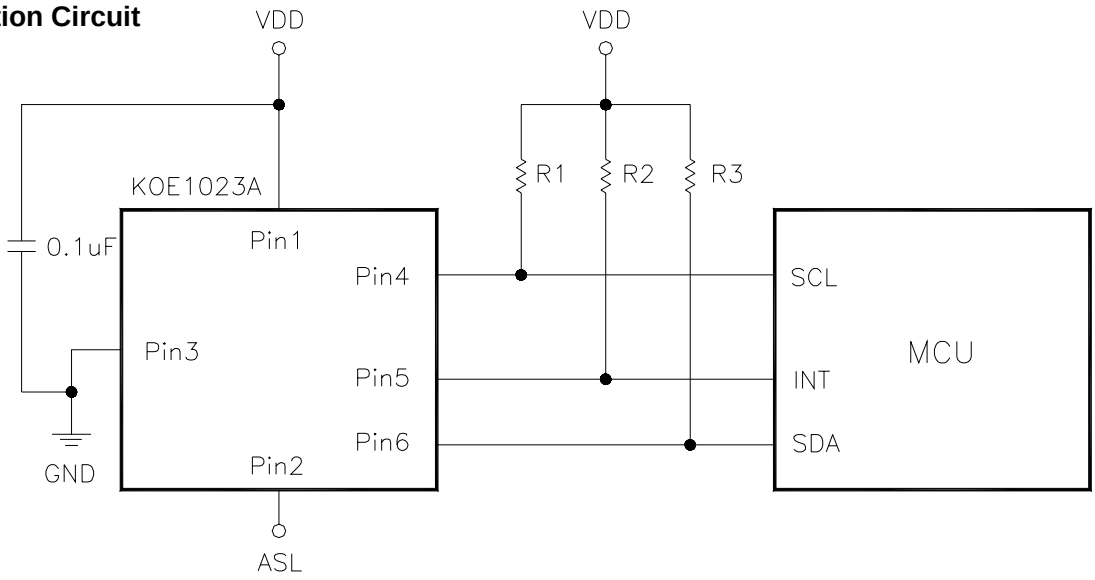
| Parameter | | Symbol | Conditions | Min. | Typ. | Max. | Unit. |
|---|---|---|---|---|---|---|---|
| Peak Sensitivity Wavelength | | λp | | | 550 | | nm |
| $I^2C$ Signal Input | Logic High | $V_{IH}$ | | 0.7*$V_{DD}$ | | | V |
| | Logic Low | $V_{IL}$ | | 0 | | 0.3*VDD | V |
| Output Current | With Load | $I_{SIG}$ | | | | 6 | mA |
| ADC Count Value | Ch0 | | Fluorescent Lamp $V_{DD}$=3V,Ev=1,000lux | | 1886 | | Counts |
| | Ch1 | | | | 505 | | |
| | Ch0 | | TungstenLamp (2856K,d=30cm) $V_{DD}$=3V,Ev=1,000lux | | 15,970 | | |
| | Ch1 | | | | 10,189 | | |
| Gain Scaling(relative to 1X) | | | 16X | 15 | 16 | 17 | X |
| Illuminance Responsivity | Ch0 | $R_V$ | $V_{DD}$=3.0V, Fluorescent Lamp | | 1.89 | | Counts/ Lux |
| | Ch1 | | | | 0.51 | | |
| Maximum Detectable Intensity | | | $V_{DD}$=3.0V, Fluorescent Lamp | | | 40,000 | Lux |
| Oscillator | | $f_{OSC}$ | | 690 | 735 | 780 | kHz |
| Supply Current | | $I_{DD}$ | $V_{DD}$=3.0V | 100 | 200 | 600 | μA |
| Shutdown Current | | $I_{DD}$(SD) | No Light, $V_{DD}$=3V, $V_I$(SD) ≥ ($V_{DD}$-0.5) | | 3 | 10 | μA |

## $I^2C$ Timing Characteristics

[Ta=25℃]

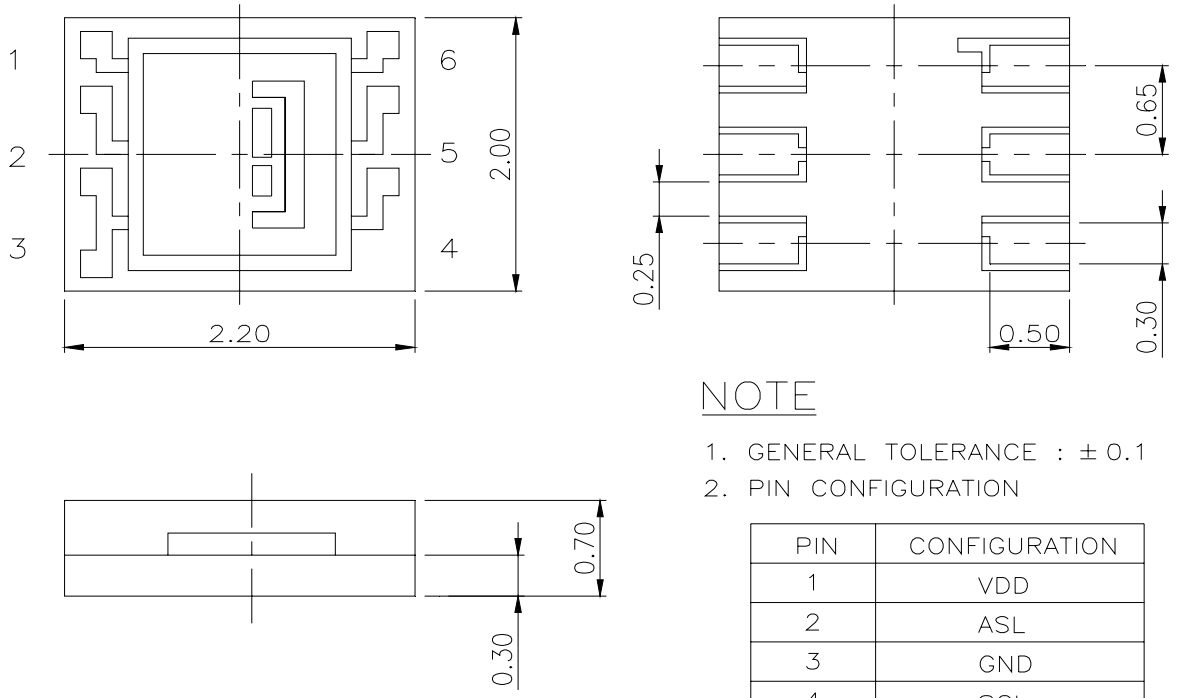
| Parameter | Symbol | Min. | Typ. | Max. | Unit. |
|---|---|---|---|---|---|
| Conversion time | $t_{(CONV)}$ | 1.2 | 100 | 400 | ms |
| Clock frequency | $f_{(SCL)}$ | | | 400 | kHz |
| Bus free time between start and stop condition | $t_{(BUF)}$ | 1.3 | | | μs |
| Hold time after(repeated) start condition. After this period, the first clock is generated. | $t_{(HDSTA)}$ | 0.6 | | | μs |
| Repeated start condition setup time | $t_{(SUSTA)}$ | 0.6 | | | μs |
| Stop condition setup time | $t_{(SUSTO)}$ | 0.6 | | | μs |
| Data hold time | $t_{(HDDAT)}$ | 0 | | 0.9 | μs |
| Data setup time | $t_{(SUDAT)}$ | 100 | | | ns |
| $I^2C$ clock(SCL) low period | $t_{(LOW)}$ | 1.3 | | | μs |
| $I^2C$ clock(SCL) high period | $t_{(HIGH)}$ | 0.6 | | | μs |
| Clock / Data fall time | $t_{(F)}$ | | | 300 | ns |
| Clock / Data rise time | $t_{(R)}$ | | | 300 | ns |

## Application Circuit




## Package Outline Dimensions

(Unit : mm)




NOTE

1. GENERAL TOLERANCE : ± 0.1
2. PIN CONFIGURATION

| PIN | CONFIGURATION |
|---|---|
| 1 | VDD |
| 2 | ASL |
| 3 | GND |
| 4 | SCL |
| 5 | INT |
| 6 | SDA |