# NOA3302

## Digital Proximity Sensor with Ambient Light Sensor and Interrupt

**Description**

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### Additional Features

### Applications

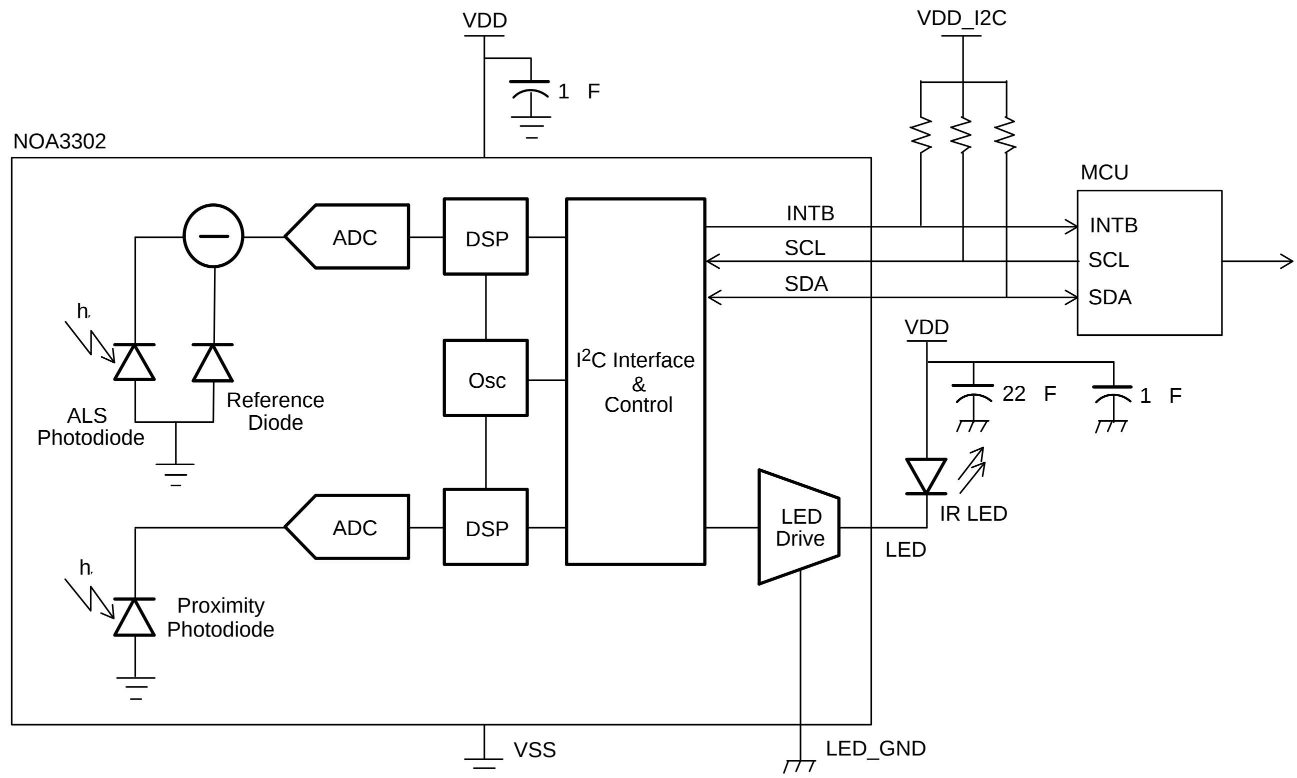



**Figure 1. NOA3302 Application Block Diagram**

**Table 1. PIN FUNCTION DESCRIPTION**

| Pin | Pin Name | Description |
|---|---|---|
| 1 | VDD | Power pin. |
| 2 | VSS | Ground pin. |
| 3 | LED_GND | Ground pin for IR LED driver. |
| 4 | LED | IR LED output pin. |
| 5 | INT | Interrupt output pin, open−drain. |
| 6 | NC | Not connected. |
| 7 | SDA | Bi−directional data signal for communications with the $I^2C$ master. |
| 8 | SCL | External $I^2C$ clock supplied by the $I^2C$ master. |

**Table 2. ABSOLUTE MAXIMUM RATINGS**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Input power supply | VDD | 4.0 | V |
| Input voltage range | $V_{in}$ | −0.3 to VDD + 0.2 | V |
| Output voltage range | $V_{out}$ | −0.3 to VDD + 0.2 | V |
| Maximum Junction Temperature | $T_{J(max)}$ | 100 | °C |
| Storage Temperature | $T_{STG}$ | | |

**Table 4. ELECTRICAL CHARACTERISTICS** (Unless otherwise specified, these specifications apply over 2.3 V < VDD < 3.3 V, 1.7 V < VDD_I2C < 1.9 V, −40°C < $T_A$ < 80°C, 10 pF < Cb < 100 pF) (See Note 4)

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| LED pulse current | $I_{LED\_pulse}$ | 5 | | 160 | mA |
| LED pulse current step size | $I_{LED\_pulse\_step}$ | | 5 | | mA |
| LED pulse current accuracy | $I_{LED\_acc}$ | −20 | | +20 | % |
| Interval Timer Tolerance | $Tol_{f\_timer}$ | −35 | | +35 | % |
| SCL clock frequency | $f_{SCL\_std}$ | 10 | | 100 | kHz |
| | $f_{SCL\_fast}$ | 100 | | 400 | |
| | $f_{SCL\_hs}$ | 100 | | 3400 | |
| Hold time for START condition. After this period, the first clock pulse is generated. | $T_{HD;STA\_std}$ | 4.0 | | – | S |
| | $t_{HD;STA\_fast}$ | 0.6 | | – | |
| | $t_{HD;STA\_hs}$ | 0.160 | | – | |
| Low period of SCL clock | $t_{LOW\_std}$ | 4.7 | | | |

**Table 4. ELECTRICAL CHARACTERISTICS** (Unless otherwise specified, these specifications apply over 2.3 V < VDD < 3.3 V, 1.7 V < VDD_I2C < 1.9 V, −40°C < $T_A$ < 80°C, 10 pF < Cb < 100 pF) (See Note 4) (continued)

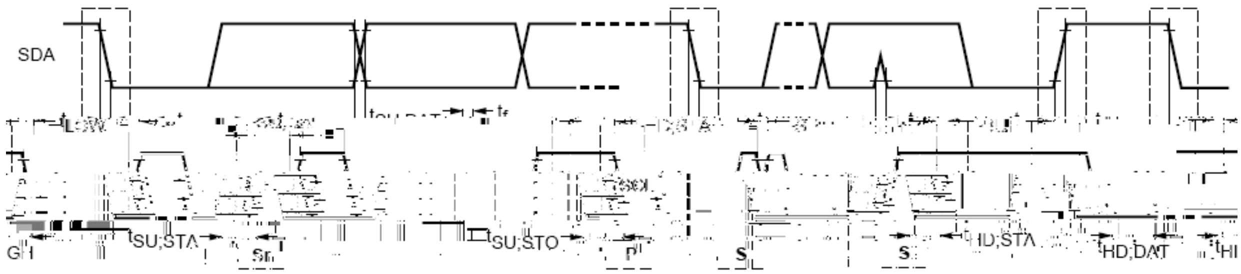



Figure 2. AC Characteristics, Standard and Fast Modes

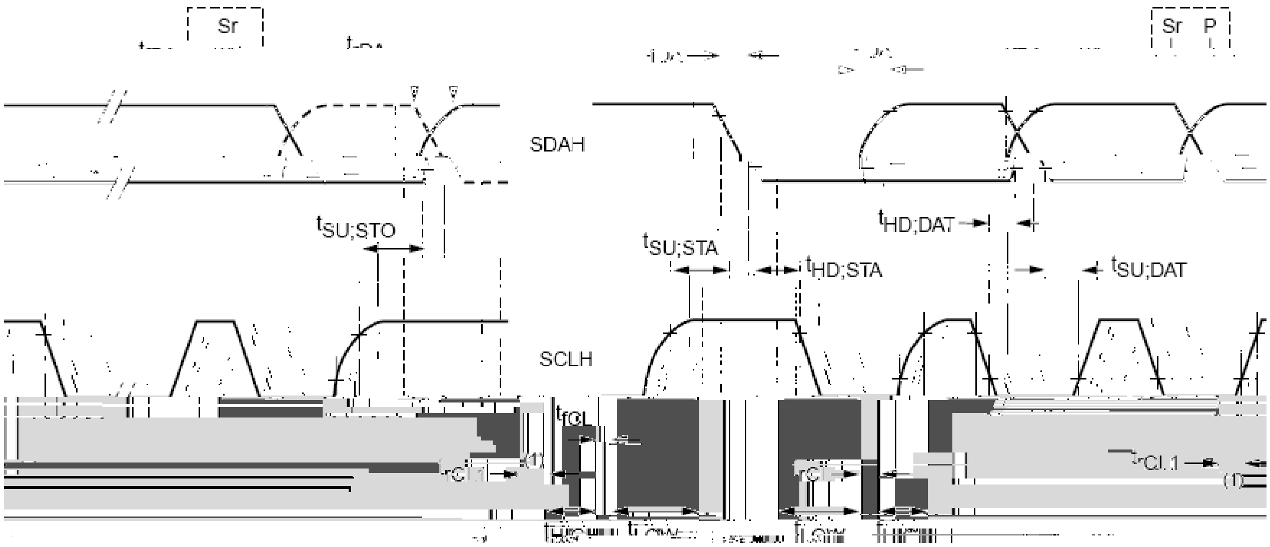



Figure 3. AC Characteristics, High Speed Mode

## TYPICAL CHARACTERISTICS

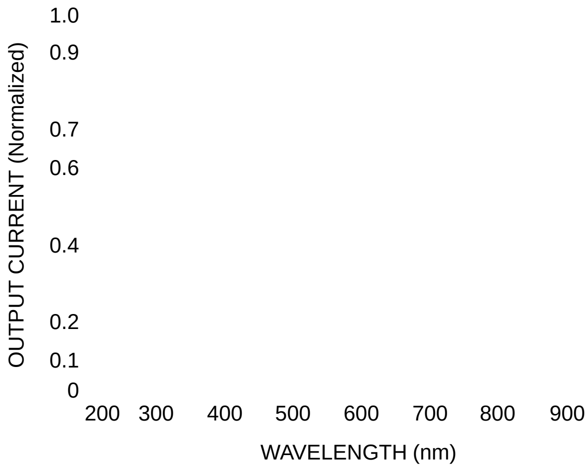



**Figure 4. ALS Spectral Response (Normalized)**

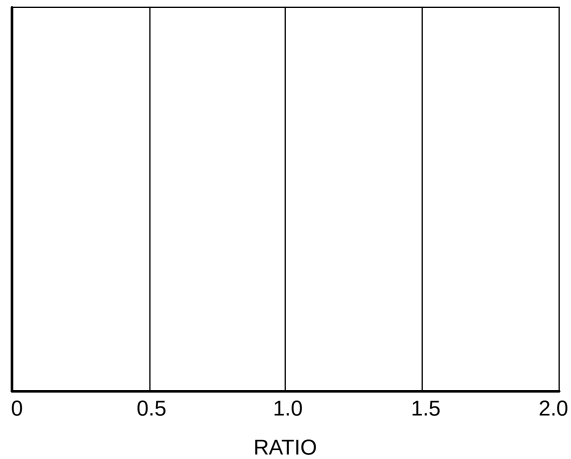



**Figure 5. ALS Light Source Dependency (Normalized to Fluorescent Light)**

**Figure 6. ALS Response to White Light vs. Angle**

**Figure 7. ALS Response to IR vs. Angle**

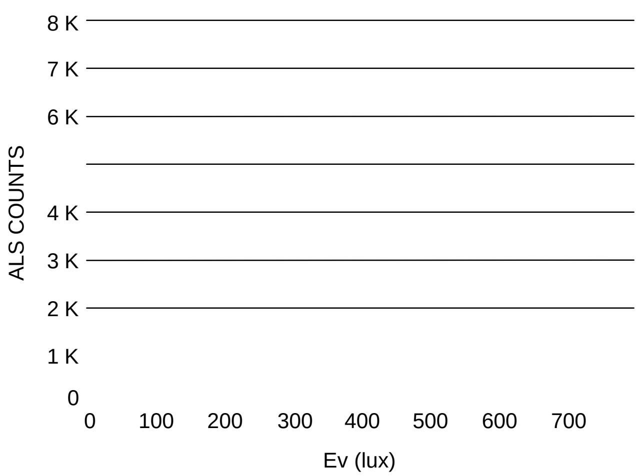



**Figure 8. ALS Linearity 0−700 lux**

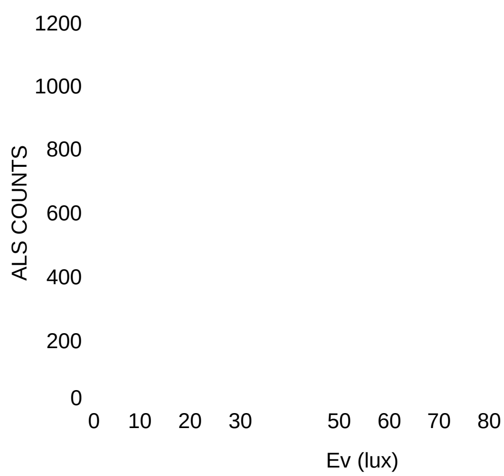



**Figure 9. ALS Linearity 0−100 lux**

## TYPICAL CHARACTERISTICS

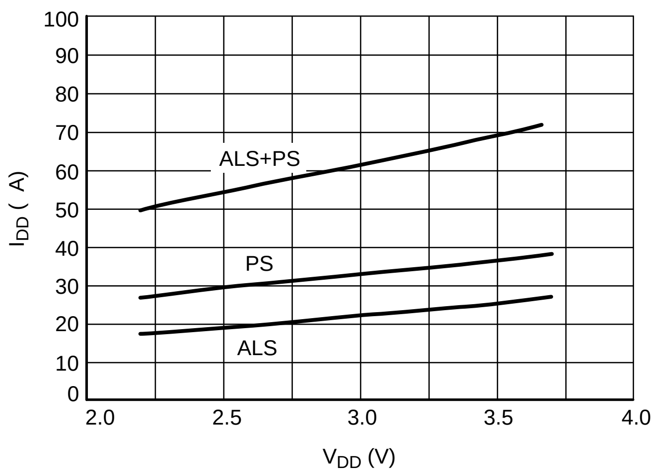
120
100
60
40
20
0
0 1 3 4 6 7 8 10
Ev (lux)

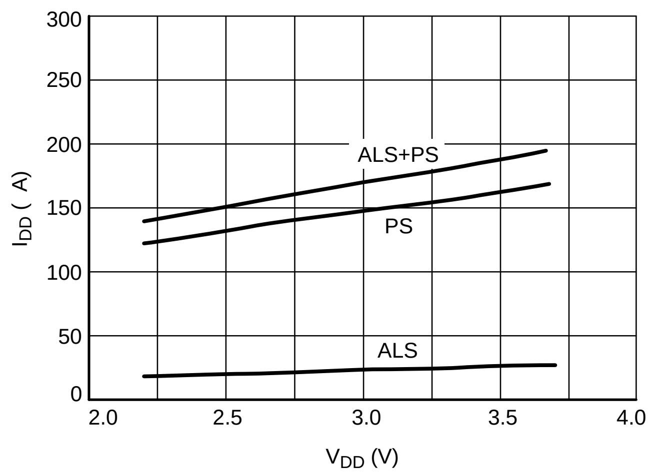
**Figure 10. ALS Linearity 0−10 lux**

0
0 0.5 1.0 1.5 2.0 2.5
Ev (lux)

**Figure 11. ALS Linearity 0−2 lux**

## TYPICAL CHARACTERISTICS



## NOA3302 Data Registers

**Table 6. NOA3302 DATA REGISTERS**

| Address | Type | Name | Description |
|---|---|---|---|
| 0x00 | R | PART_ID | NOA3302 part number and revision IDs |
| 0x01 | RW | RESET | Software reset control |
| 0x02 | RW | INT_C:5 refBT8dG0.84 612.36 .85.36 ref59.76 6112.36 .84 2 .833997 refBT8 0 0 8 266.04 617.76 Tm.0172 Tc(R00TjETI)9 | |

### RESET Register (0x01)

**Table 8. RESET REGISTER (0x01)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Field | NA | | | | | | | SW_reset |

| Field | Bit | Default | Description |
|---|---|---|---|
| NA | 7:1 | XXXXXXX | Don’t care |
| SW_reset | 0 | 0 | Software reset to startup state |

### INT_CONFIG Register (0x02)

**Table 9. INT_CONFIG REGISTER (0x02)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|

**Table 11. PS_TH_UP REGISTERS (0x10 – 0x11)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Field | PS_TH_UP_MSB(0x10), PS_TH_UP_LSB(0x11) | | | | | | | |

| Field | Bit | Default | Description |
|---|---|---|---|
| PS_TH_UP_MSB | | | |

**PS_INTERVAL Register (0x16)**

**Table 18. ALS_TH_LO REGISTERS (0x22 – 0x23)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **Field** | ALS_TH_LO_MSB(0x22), ALS_TH_LO_LSB(0x23) | | | | | | | |

| Field | Bit | Default | Description |
|---|---|---|---|
| ALS_TH_LO_MSB | 7:0 | 0x00 | Lower threshold for ALS detection, MSB |
| ALS_TH_LO_LSB | 7:0 | 0x00 | Lower threshold for ALS detection, LSB |

### ALS_CONFIG Register (0x25)

**Table 19. ALS_CONFIG REGISTER (0x25)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **Field** | NA | | hyst_enable | hyst_trigger | reserved | integration_time | | |

| Field | Bit | Default | Description | |
|---|---|---|---|---|
| NA | 7:6 | XX | Don’t Care | |
| hyst_enable | 5 | 0 | 0 | Disables hysteresis |
| | | | 1 | Enables hysteresis |
| hyst_trigger | 4 | 0 | 0 | Lower threshold with hysteresis |
| | | | 1 | Upper threshold with hysteresis |
| reserved | 3 | 0 | Must be set to 0 | |
| integration_time | 2:0 | 100 | 000 | 6.25 ms integration time |
| | | | 001 | 12.5 ms integration time |
| | | | 010 | 25 ms integration time |
| | | | 011 | 50 ms integration time |
| | | | 100 | 100 ms integration time |
| | | | 101 | 200 ms integration time |
| | | | 110 | 400 ms integration time |
| | | | 111 | 800 ms integration time |

### ALS_INTERVAL Register (0x26)

**Table 20. ALS_INTERVAL REGISTER (0x26)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **Field** | NA | | interval | | | | | |

| Field | Bit | Default | Description |
|---|---|---|---|
| interval | 5:0 | 0x0A | Interval time between ALS measurement cycles |

**ALS_CONTROL Register (0x27)**

### ALS_DATA Registers (0x43 – 0x44)

**Table 24. ALS_DATA REGISTERS (0x43 – 0x44)**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Field | ALS_DATA_MSB(0x43), ALS_DATA_LSB(0x44) | | | | | | | |

| Field | Bit | Default | Description |
|---|---|---|---|
| ALS_DATA_MSB | 7:0 | 0x00 | ALS measurement data, MSB |
| ALS_DATA_LSB | 7:0 | 0x00 | ALS measurement data, LSB |

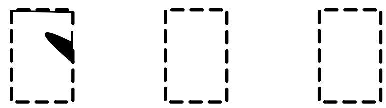
### Proximity Sensor Operation

### Ambient Light Sensor Operation

**Example Programming Sequence**

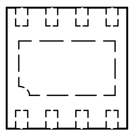
```
external subroutine I2C_Read_Byte (I2C_Address, Data_Address);
external subroutine I2C_Read_Block (I2C_Address, Data_Start_Address, Count, Memory_Map);
external subroutine I2C_Write_Byte (I2C_Address, Data_Address, Data);
external subroutine I2C_Write_Block (I2C_Address, Data_Start_Address, Count, Memory_Map);
subroutine Initialize_PS () {
 MemBuf[0x02] = 0x02;   // INT_CONFIG assert interrupt until cleared
 MemBuf[0x0F] = 0x09;   // PS_LED_CURRENT 50mA
 MemBuf[0x10] = 0x8F;   // PS_TH_UP_MSB
 MemBuf[0x11] = 0xFF;   // PS_TH_UP_LSB
 MemBuf[0x12] = 0x70;   // PS_TH_LO_MSB
 MemBuf[0x13] = 0x00;   // PS_TH_LO_LSB
 MemBuf[0x14] = 0x11;   // PS_FILTER_CONFIG turn off filtering
 MemBuf[0x15] = 0x01;   // PS_CONFIG 300us integration time
 MemBuf[0x16] = 0x0A;   // PS_INTERVAL 50ms wait
 MemBuf[0x17] = 0x02;   // PS_CONTROL enable continuous PS measurements
 MemBuf[0x20] = 0xFF;   // ALS_TH_UP_MSB
 MemBuf[0x21] = 0xFF;   // ALS_TH_UP_LSB
 MemBuf[0x22] = 0x00;   // ALS_TH_LO_MSB
 MemBuf[0x23] = 0x00;   // ALS_TH_LO_LSB
 MemBuf[0x25] = 0x04;   // ALS_CONFIG 100ms integration time
 MemBuf[0x26] = 0x00;   // ALS_INTERVAL continuous measurement mode
 MemBuf[0x27] = 0x02;   // ALS_CONTROL enable continuous ALS measurements
 I2C_Write_Block (I2CAddr, 0x02, 37, MemBuf);
}
subroutine I2C_Interupt_Handler () {
 // Verify this is a PS interrupt
 INT = I2C_Read_Byte (I2CAddr, 0x40);
 if (INT == 0x11 || INT == 0x12) {
  // Retrieve and store the PS data
  PS_Data_MSB = I2C_Read_Byte (I2CAddr, 0x41);
  PS_Data_LSB = I2C_Read_Byte (I2CAddr, 0x42);
  NewPS = 0x01;
  }
 }
subroutine main_loop () {
 I2CAddr = 0x37;
 NewPS = 0x00;
 Initialize_PS ();
 loop {
  // Do some other polling operations
  if (NewPS == 0x01) {
   NewPS = 0x00;
   // Do some operations with PS_Data
   }
  }
 }
```

**Physical Location of Photodiode Sensors**

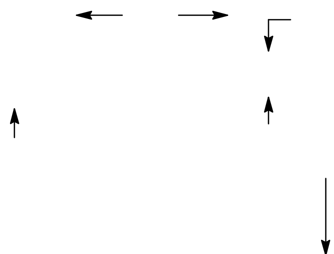


## PACKAGE DIMENSIONS

**CWDFN8, 2x2, 0.5P**
CASE 505AJ
ISSUE O



**MOUNTING FOOTPRINT***



DIMENSIONS: MILLIMETERS

*For