

## I/O Pins Configuration

| Pin | Name            | Type | Description  |
|-----|-----------------|------|--|
| 1   | SDA             | I/O  | I <sup>2</sup> C serial data I/O terminal - serial data I/O for I <sup>2</sup> C-bus         |
| 2   | INT             | O    | Interrupt - open drain (active low)  |
| 3   | LDR             |      | LED driver input for proximity IR LED, constant current source LED driver                    |
| 4   | LEDK            |      | LED Cathode, connect to LDR pin when using internal LED driver circuit                       |
| 5   | LEDA            |      | LED Anode, connect to V <sub>LEDA</sub> on PCB   |
| 6   | GND             |      | Power supply ground. All voltages are referenced to GND                                      |
| 7   | SCL             | I    | I <sup>2</sup> C serial clock input terminal - clock signal for I <sup>2</sup> C serial data |
| 8   | V <sub>DD</sub> |      | Power supply voltage   |

## Absolute Maximum Ratings over operating free-air temperature range (unless otherwise noted)\*

| Parameter                           | Symbol           | Min  | Max | Units | Conditions |
|-------------------------------------|------------------|------|-----|-------|------------|
| Power supply voltage <sup>[1]</sup> | V <sub>DD</sub>  |      | 3.8 | V     |            |
| Input voltage range                 | V <sub>IN</sub>  | -0.5 | 3.8 | V     |            |
| Output voltage range                | V <sub>OUT</sub> | -0.3 | 3.8 | V     |            |
| Storage temperature range           | T <sub>stg</sub> | -40  | 85  | °C    |            |

\* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Note 1. All voltages are with respect to GND.

## Recommended Operating Conditions

| Parameter   | Symbol            | Min | Typ | Max | Units |
|---|-------------------|-----|-----|-----|-------|
| Operating ambient temperature   | T <sub>A</sub>    | -30 |     | 85  | °C    |
| Power supply voltage  | V <sub>DD</sub>   | 2.4 | 3.0 | 3.6 | V     |
| Supply voltage accuracy, V <sub>DD</sub> total error including transients |                   | -3  |     | +3  | %     |
| LED supply voltage  | V <sub>LEDA</sub> | 3.0 |     | 4.5 | V     |

## Operating Characteristics, V<sub>DD</sub> = 3 V, T<sub>A</sub> = 25 °C (unless otherwise noted)

| Parameter   | Symbol            | Min  | Typ | Max             | Units | Test Conditions  |
|---|-------------------|------|-----|-----------------|-------|--|
| IDD supply current <sup>[1]</sup>                     | I <sub>DD</sub>   |      | 200 | 250             | μA    | Active ALS state<br>PON = AEN = 1, PEN = 0                             |
|   |                   |      | 790 |                 |       | Proximity, LDR pulse ON,<br>PPulse = 8 (I <sub>LDR</sub> not included) |
|   |                   |      | 790 |                 |       | Gesture, LDR pulse ON,<br>GPulse = 8 (I <sub>LDR</sub> not included)   |
|   |                   |      | 38  |                 |       | Wait state<br>PON = 1, AEN = PEN = 0                                   |
|   |                   |      | 1.0 | 10.0            |       | Sleep state <sup>[2]</sup>   |
| V <sub>OL</sub> INT, SDA output low voltage           | V <sub>OL</sub>   | 0    |     | 0.4             | V     | 3 mA sink current  |
| I <sub>LEAK</sub> leakage current, SDA, SCL, INT pins | I <sub>LEAK</sub> | -5   |     | 5               | μA    |  |
| I <sub>LEAK</sub> leakage current, LDR P\pin          | I <sub>LEAK</sub> | -10  |     | 10              | μA    |  |
| SCL, SDA input high voltage, V <sub>IH</sub>          | V <sub>IH</sub>   | 1.26 |     | V <sub>DD</sub> | V     |  |
| SCL, SDA input low voltage, V <sub>IL</sub>           | V <sub>IL</sub>   |      |     | 0.54            | V     |  |

### Notes

- Values are shown at the V<sub>DD</sub> pin and do not include current through the IR LED.
- Sleep state occurs when PON = 0 and I<sup>2</sup>C bus is idle. If Sleep state has been entered as the result of operational flow, SAI = 1, PON will be high.

**Optical Characteristics,  $V_{DD} = 3\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$ ,  $\text{AGAIN} = 16\times$ ,  $\text{AEN} = 1$  (unless otherwise noted)**

| Parameter                   | Red Channel |     | Green Channel |     | Blue Channel |     | Units | Test Conditions                 |
|-----------------------------|-------------|-----|---------------|-----|--------------|-----|-------|---------------------------------|
|                             | Min         | Max | Min           | Max | Min          | Max |       |                                 |
| Irradiance responsivity [1] | 0           | 15  | 10            | 42  | 57           | 100 | %     | $\lambda_D = 465\text{ nm}$ [2] |
|                             | 4           | 25  | 54            | 85  | 10           | 45  |       | $\lambda_D = 525\text{ nm}$ [3] |
|                             | 64          | 120 | 0             | 14  | 3            | 29  |       | $\lambda_D = 625\text{ nm}$ [4] |

Notes:

- The percentage shown represents the ratio of the respective red, green, or blue channel value to the clear channel value.
- The 465 nm input irradiance is supplied by an InGaN light-emitting diode with the following characteristics: dominant wavelength  $\lambda_D = 465\text{ nm}$ , spectral halfwidth  $\Delta\lambda_{1/2} = 22\text{ nm}$ .
- The 525 nm input irradiance is supplied by an InGaN light-emitting diode with the following characteristics: dominant wavelength  $\lambda_D = 525\text{ nm}$ , spectral halfwidth  $\Delta\lambda_{1/2} = 35\text{ nm}$ .
- The 625 nm input irradiance is supplied by a AlInGaP light-emitting diode with the following characteristics: dominant wavelength  $\lambda_D = 625\text{ nm}$ , spectral halfwidth  $\Delta\lambda_{1/2} = 15\text{ nm}$ .

**RGBC Characteristics,  $V_{DD} = 3\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$ ,  $\text{AGAIN} = 16\times$ ,  $\text{AEN} = 1$  (unless otherwise noted)**

| Parameter  | Min   | Typ   | Max   | Units                               | Test Conditions  |
|--|-------|-------|-------|-------------------------------------|--|
| Dark ALS count value                             |       | 0     | 3     | counts                              | $E_e = 0$ , $\text{AGAIN} = 64\times$ , $\text{ATIME} = 0\times\text{DB}$ (100 ms) |
| ADC integration time step size                   |       | 2.78  |       | ms                                  | $\text{ATIME} = 0\times\text{FF}$  |
| ADC number of integration steps                  | 1     |       | 256   | steps                               |  |
| Full scale ADC counts per step                   |       |       | 1025  | counts                              |  |
| Full scale ADC count value                       |       |       | 65535 | counts                              | $\text{ATIME} = 0\times\text{C0}$ (175 ms)   |
| Gain scaling, relative to $1\times$ gain setting | 3.6   | 4     | 4.4   |                                     | 4x   |
|  | 14.4  | 16    | 17.6  |                                     | 16x  |
|  | 57.6  | 64    | 70.4  |                                     | 64x  |
| Clear channel irradiance responsivity            | 18.88 | 23.60 | 28.32 | counts/ $(\mu\text{W}/\text{cm}^2)$ | Neutral white LED, $\lambda = 560\text{ nm}$                                       |

**Proximity Characteristics,  $V_{DD} = 3\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$ ,  $\text{PEN} = 1$  (unless otherwise noted)**

| Parameter                                | Min | Typ   | Max | Units         | Test Conditions  |
|--|-----|-------|-----|---------------|--|
| ADC conversion time step size            |     | 696.6 |     | $\mu\text{s}$ |  |
| ADC number of integration steps          |     | 1     |     | steps         |  |
| Full scale ADC counts                    |     |       | 255 | counts        |  |
| LED pulse count [1]                      | 1   |       | 64  | pulses        |  |
| LED pulse width – LED on time [2]        |     | 4     |     | $\mu\text{s}$ | $\text{PPLEN} = 0$   |
|  |     | 8     |     |               | $\text{PPLEN} = 1$   |
|  |     | 16    |     |               | $\text{PPLEN} = 2$   |
|  |     | 32    |     |               | $\text{PPLEN} = 3$   |
| LED drive current [3]                    |     | 100   |     | mA            | $\text{LDRIVE} = 0$  |
|  |     | 50    |     |               | $\text{LDRIVE} = 1$  |
|  |     | 25    |     |               | $\text{LDRIVE} = 2$  |
|  |     | 12.5  |     |               | $\text{LDRIVE} = 3$  |
| LED boost [3]                            |     | 100   |     | %             | $\text{LED\_BOOST} = 0$  |
|  |     | 150   |     |               | $\text{LED\_BOOST} = 1$  |
|  |     | 200   |     |               | $\text{LED\_BOOST} = 2$  |
|  |     | 300   |     |               | $\text{LED\_BOOST} = 3$  |
| Proximity ADC count value, no object [4] |     | 10    | 25  | counts        | $V_{\text{LEDA}} = 3\text{ V}$ , $\text{LDRIVE} = 100\text{ mA}$ , $\text{PPULSE} = 8$ , $\text{PGAIN} = 4\times$ , $\text{PPLEN} = 8\text{ } \mu\text{s}$ , $\text{LED\_BOOST} = 100\%$ , open view (no glass) and no reflective object above the module. |

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