LTR-553ALS

Appendix A

Calculating Lux Reading

LTR-553ALS Ambient Light sensor engine consists of two photodiodes, an integrating analog-to digital converters (ADC) and an ALS Gain control.

The two photodiodes include CH0 diode that is sensitive to both visible and infrared light and CH1 diode that is sensitive only to infrared light.

The signals detected from both photodiodes are being integrated simultaneously through the ADC and upon completion of the conversion cycle, the results will be transferred to the registers ALS_DATA_CH0 and ALS_DATA_CH1 in address 0x88, 0x89, 0x8A and 0x8B.

The ALS integration time and ALS Gain used will have impact on the resolution and sensitivity of the ALS lux reading.

The ALS lux reading is a function of both count data in ALS_DATA_CH0 and ALS_DATA_CH1 registers, ALS Gain in ALS_CONTR register (0x80) and ALS Integration Time in ALS_MEAS_RATE Register (0x85).

The ambient light conversion equation is as shown in the following page.

Please check with Liteon Sales representative if you need customized formula for specific glass/plastic above the device.

Lux Formula :

RATIO = CH1/(CH0+CH1)

IF (RATIO < 0.45)

ALS_LUX = (1.7743 * CH0 + 1.1059 * CH1) * WINFAC / ALS_GAIN / ALS_INT

ELSEIF (RATIO < 0.64 && RATIO >= 0.45)

ALS_LUX = (4.2785 * CH0 – 1.9548 * CH1) * WINFAC / ALS_GAIN / ALS_INT

ELSEIF (RATIO < 0.85 && RATIO >= 0.64)

ALS_LUX = (0.5926 * CH0 + 0.1185 * CH1) * WINFAC / ALS_GAIN / ALS_INT

ELSE

ALS_LUX = 0

END

Where

1. CH0 is the ALS measurement count for CH0 in register ALS_DATA_CH0 (0x8A and 0x8B)

2. CH1 is the ALS measurement count for CH1 in register ALS_DATA_CH1 (0x88 and 0x89)

3. WINFAC is the factor to compensate light loss due to aperture or window above the device
   (Reference Lux / Sensor Lux with window)

4. WINFAC = 1, for device with no aperture/window above the device. (bare die)

5. ALS_GAIN is a constant according to the ALS Gain used in register ALS_CONTR (0x80)

6. ALS_INT is a constant according to the ALS Integration Time used in register ALS_MEAS_RATE
   (0x85).

ALS Gain	ALS_GAIN
x1	1
x2	2
x4	4
x8	8
x48	48
x96	96

ALS Integration Time (ms)	ALS_INT
100	1
150	1.5
200	2
250	2.5
300	3
350	3.5
400	4

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