1. Beschreibung

Mit dem Lichtsensor wird die Umgebungshelligkeit erfasst und kann per I²C-Bus ausgelesen werden.
Der Sensor wird in einem ½“ Ölschauglasgehäuse geliefert und kann somit wasserdicht eingebaut werden.

2. Betriebsbedingungen

- Versorgungsspannung 3,3V nom.
- Betriebstemperatur -40 .. +85°C
- max. erfassbare Helligkeit: 992 lux
- Stromaufnahme < 0,3 mA
- Schutzart IP68 (Gehäuse, nicht Stecker)

3. Hardware

3.1. Betriebsdaten

Versorgungsspannung	2,7 .. 3,6 VDC
Stromaufnahme	< 0,3 mA
Datenübergabe	I²C 100/400 kHz

3.2. Anschlussbelegung (Kabellänge 520mm, Lapp Kabel LiYY 4x0,25)

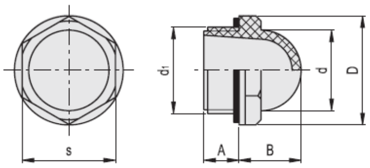
1 SCL

2 SDA

3 GND

4 +3,3V Stecker = JST PH 4-pol.

3.3. Gehäuse



Code	Description	d1	A	B	D	d	s	Tightening torque [Nm]	⚖
10901	HCFE.15-1/2	G 1/2	10.5	16	26	19	22	4÷6	5

4. Software Lichtsensor

4.1. I²C-Bus Adresse: 0010000

4.2. I²C-Bus Protokoll

Write Byte Protocol

S	Slave Address	Wr	A	Register Address=N	A	Data N	A	P

Read Byte Protocol

S	Slave Address	Wr	A	Register Address=N	A

S	Slave Address	Rd	A	Data N	A	P

Write Burst Protocol

S	Slave Address	Wr	A	Register Address=N	A	Data N	A

Data N+1	A	Data N+2	A	......	P

Read Burst Protocol

S	Slave Address	Wr	A	Register Address=N	A

S	Slave Address	Rd	A	Data N	A	Data N+1	A

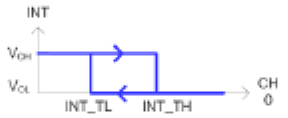
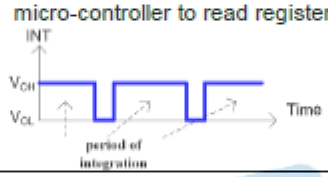
Data N+2	A	Data N+3	A	......	P

Note:

A Acknowledge (this bit position may be 0 for an ACK or **1** for a NACK)
P Stop Condition
Rd Read (bit value of **1**)
S Start Condition
Sr Repeated Start Condition
Wr Write (bit value of **0**)
… Continuation of protocol
☐ Master-to-Slave
■ Slave-to-Master

4.3. Register Table

<table>
<tr><th>Addr.</th><th>Bits</th><th>Type</th><th>Default</th><th>Name</th><th>Register Function</th></tr>
<tr><td>0x00</td><td>[7:0]</td><td>RO</td><td>0x26</td><td>PNO_LB</td><td>Product number, Low Byte</td></tr>
<tr><td>0x01</td><td>[7:0]</td><td>RO</td><td>0x11</td><td>PNO_HB</td><td>Product number, High Byte</td></tr>
<tr><td>0x02</td><td>-</td><td>-</td><td>-</td><td>-</td><td>Reserved</td></tr>
<tr><td rowspan="6">0x03</td><td>[7:0]</td><td>RW</td><td>0x04</td><td>OP_MODE</td><td>Operation mode</td></tr>
<tr><td>[7:4]</td><td>RW</td><td>0</td><td>-</td><td>Reserved. The field is always 0.</td></tr>
<tr><td>[3]</td><td>RW</td><td>0</td><td>-</td><td>Must set to 0</td></tr>
<tr><td>[2]</td><td>RW</td><td>1</td><td>-</td><td>Must set to 1</td></tr>
<tr><td>[1]</td><td>RW</td><td>0</td><td>PD</td><td>Power down control
0: chip active
1: chip power down</td></tr>
<tr><td>[0]</td><td>RW</td><td>0</td><td>-</td><td>Must set to 0</td></tr>
<tr><td>0x04</td><td>[7:0]</td><td>RW</td><td>0x94</td><td>TIG_SEL</td><td>Integration time (TIG) is selected by TIG_SEL. The standard value with default setting is as following.
<table>
<tr><th>Integration time (TIG)</th><th>TIG_SEL Value</th></tr>
<tr><td>1T = 2.7ms (Typical)</td><td>0x01</td></tr>
<tr><td>2T = 5.4ms (Typical)</td><td>0x02</td></tr>
<tr><td>19T = 51.3ms (Typical)</td><td>0x13</td></tr>
<tr><td>37T = 99.9ms (Typical)</td><td>0x25</td></tr>
<tr><td>74T = 199.8ms (Typical)</td><td>0x4A</td></tr>
<tr><td>148T = 399.6ms (Typical)</td><td>0x94</td></tr>
<tr><td>255T = 688.5ms (Typical)</td><td>0xFF</td></tr>
</table></td></tr>
<tr><td>0x05</td><td>[7:0]</td><td>RW</td><td>0xFF</td><td>CGAIN</td><td>Current gain, CGAIN used to increase low light sensitivity
<table>
<tr><th>Current gain (CG)</th><th>CGAIN Value</th></tr>
<tr><td>x1</td><td>0x11</td></tr>
<tr><td>x2</td><td>0x22</td></tr>
<tr><td>x3</td><td>0x33</td></tr>
<tr><td>.
.
.
..</td><td>.
.
.
..</td></tr>
<tr><td>x15</td><td>0xFF</td></tr>
</table></td></tr>
<tr><td>0x06</td><td>-</td><td>-</td><td>-</td><td>-</td><td>Reserved</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>Reserved</td></tr>
<tr><td>0x0F</td><td></td><td></td><td></td><td></td><td>Reserved</td></tr>
</table>

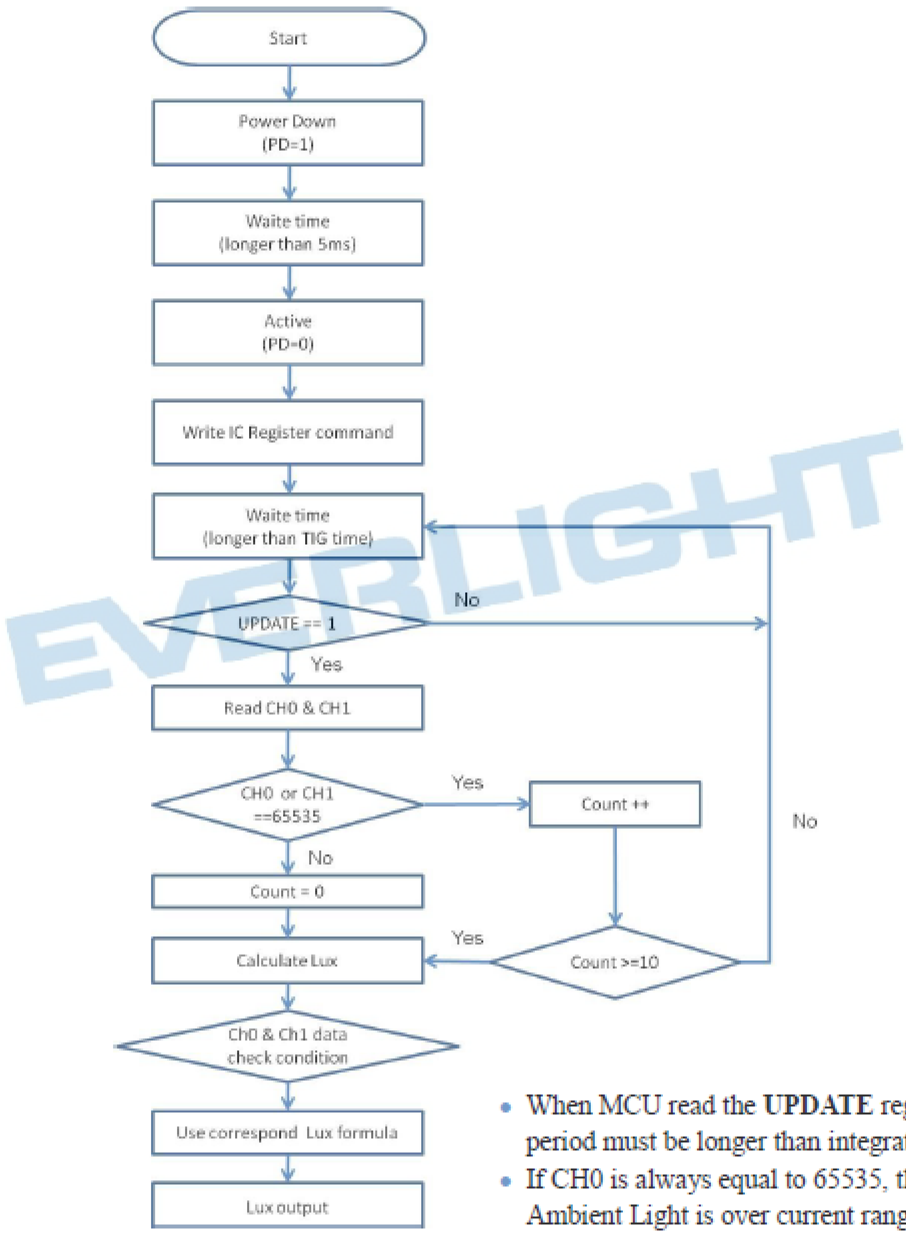
0x10	[7:0]	RW	0x00	*INT_CTL*	Interrupt control
	[7:5]	RW	0	-	Reserved. The field is always 0.
	[4:3]	RW	0	*INT_MOD*	Interrupt mode Interrupt's source is CH0, and has 4 interrupt mode: **0: Hysteresis interrupt**  1: Reserved 2: Level interrupt When **CH0**[15:0] <= **INT_TL**[15:0], interrupt occurs. And user should write **INT_CLR** to clear it. 3: Pulse interrupt The interrupt flag occurs on no-integrated period to inform micro-controller to read register 0x20~0x24, so it occurs periodically. 
	2	RW	0	*INT_PO*	Interrupt pole **0: Active low** 1: Active high
	1	RW	0	*INT_ENH*	Interrupt disable /enable **0: Disable** 1: Enable
	0	RW	0	*INT_CLR*	Interrupt clear, only works on mode2 (level interrupt) of **INT_MOD**.
0x11	[7:0]	RW	0xD0	*INT_THL*	Interrupt high threshold, Low byte
0x12	[7:0]	RW	0x07	*INT_THH*	Interrupt high threshold, High byte
0x13	[7:0]	RW	0xE8	*INT_TLL*	Interrupt low threshold, Low byte
0x14	[7:0]	RW	0x03	*INT_TLH*	Interrupt low threshold, High byte
0x20	[0]	RO	-	*UPDATE*	User should read this register first for updating following register 0x21~0x24. When micro-controller read this register, the shortest period must be longer than integration time (TIG').
0x21	[7:0]	RO	-	*CH0_LB*	ADC channel 0, Low byte
0x22	[7:0]	RO	-	*CH0_HB*	ADC channel 0, High byte
0x23	[7:0]	RO	-	*CH1_LB*	ADC channel 1, Low byte
0x24	[7:0]	RO	-	*CH1_HB*	ADC channel 1, High byte

Note: RO = Read Only; RW = Read/Write. Reserved bytes must not be accessed otherwise unpredictable results may occur.

4.4. Flussdiagramm

Basic Operation

After starting the device, user first write *PD*=1 to power down the device. User could set the device to active mode by writing *PD*=0. To operate the device in active mode, issue a command to access the *UPDATE* register. User should read this register first for updating following register 0x21~0x24. When micro-controller read the *UPDATE* register, the shortest period must be longer than integration time (TIG'). The integration time is 400ms (default value). After 400 ms, the conversion results will be available in the *CH0* (register 0x21~0x22) and *CH1* (register 0x23~0x24).



- When MCU read the **UPDATE** register, the shortest period must be longer than integration time(TIG').
- If CH0 is always equal to 65535, that means the Ambient Light is over current range.

4.5. Wandlung in Lux

Lux Calculating

User could calculate lux value by using the following equation (for white LED)

- if ***CH0*** > ***CH1***, Lux = (***CH0*** - ***CH1***) x (15 / ***CG***) x (148 / ***TIG***) x **K**
- else if (***CH0*** >(***CH1*** * **CH1K**) , Lux = (***CH0*** -(***CH1*** * **CH1K**)x (15 / ***CG***) x (148 / ***TIG***) x **K**
- else Lux = (***CH0***)x (15 / ***CG***) x (148 / ***TIG***) x **CH0K**

Recommend Calibrate value ： K = 0.009, CH1K=0.93, CH0K =0.0013