LIGHT SENSOR –
RoHS Compliant Indoor Illumination Sensor

Indoor Light Sensor for STM 3xy

This Application Note shows a possible realization of an EnOcean Light Sensor based on STM devices with a cyclic sign of life signal and illumination measurement (natural or artificial light).

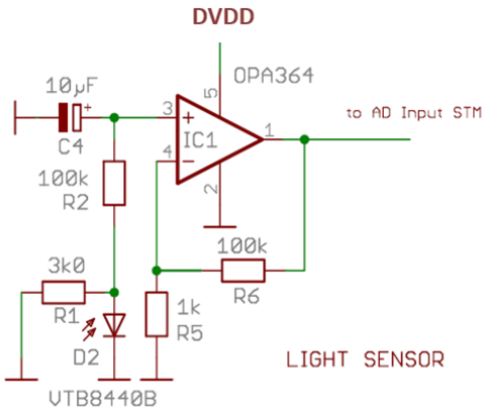
Challenge

Even if not recognized by the human eye, artificial indoor incandescent or fluorescent light flickers with a cycle time of about 10 milliseconds due to the 50/60 Hz frequency of the AC mains power. For energy saving reasons, the STM typical measurement time is just around two milliseconds. That could result in permanently different measurement values depending on the STM sampling time within a mains 10 milliseconds period.

A very simple and effective method for avoidance is measuring via cheap CdS based photo resistor. Due to its inertial behavior, this passive component averages the light fluctuations (response time > 50 milliseconds) and is actually by far the most suited therefore. Unfortunately, CdS photo resistors contain few ppm Cd and therefore are not RoHS compliant. That's why silicon based photo diode has to be used. Silicon photo sensors are RoHS compliant but unfortunately they are too fast for this application (response time in ns range.)

Solution

The circuitry concept showed in the figure uses silicone photo diode D2 (VTB8440B) operated in photovoltaic mode, near to 0 V (here up to 15 mV). The light induced photocurrent (about 5 nA/lux) generates a light dependent voltage on the R1, which is continuously available at the input of the STM module. Its 50/60 Hz fluctuations can be averaged by appropriate RC elements (R2, C4). This voltage will be further conditioned for the STM by the IC1, OPA364. Its gain, about 100 and the R1 value depend on the photodiode type and desired sensor brightness ratio. For the exemplified concept results about 1.5 V for 1000 lx (1.5 mV/ lx). The amplifier must be a low power, low offset Rail-to-Rail type, operating at 1.8 V with a quiescent current < 1 mA and a GBW> 100 kHz. (e.g. settle time < 1 millisecond).



Disclaimer

The information provided in this document is subject to modifications and intended for reference purposes only.
EnOcean assumes no liability either for violation of industrial property or other rights of third parties that stem from this information, nor for errors and / or omissions.
We reserve the right to make changes without prior notice. Make sure that this is the latest version of the document before use. For the latest documentation, visit the EnOcean website at **www.enocean.com**