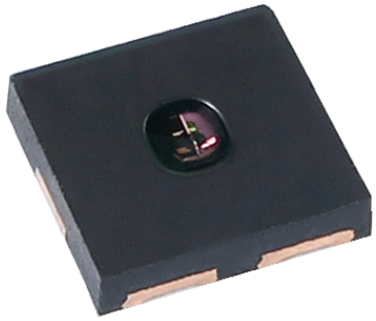
DID YOU KNOW?

VEML6031X00 AUTOMOTIVE ALS SENSORS

The VEML6031X00 Is a Highly Accurate Automotive-Qualified Ambient Light Sensor (ALS) in a Robust Component Package

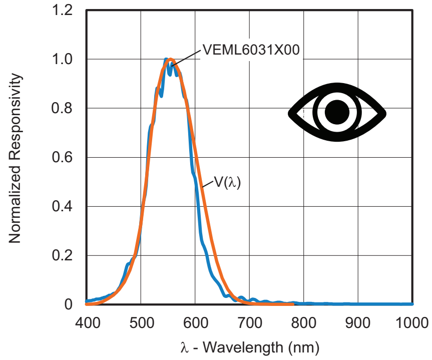


Ambient light sensors (ALS) have many use cases, especially in the automotive market. They are used to detect and react to lighting conditions in the car's interior, and weather conditions outside the car, as well as the amount of light that reaches a PCB hidden away behind a dark panel in the car's center console. Each of these applications requires different sensor capabilities based on sensitivity, total dynamic sensing range, measurement speed, temperature compensation, and robustness in order to function reliability. With these conditions varying with the environment that the car is driven in, these capabilities need to be dynamically adjustable so that what the sensor sees always matches what the human eye sees.

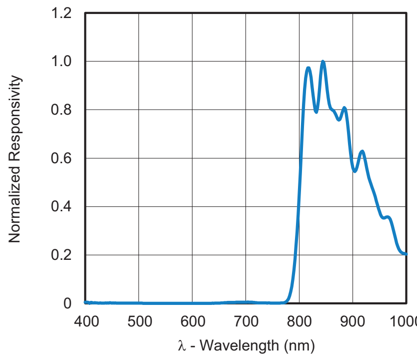
Human Eye Spectral Response (No Infrared (IR) Bump) Includes a Separate IR Channel

The VEML6031X00 has a human eye like spectral response, closely matching the Vlambda curve. Analog ambient light sensors often have an "infrared (IR) bump" so that the filter employed on the ALS die does not fully suppress the near wavelengths. With this digital ALS sensor the response of the ALS channel is close to zero, meaning it will sense only what the eye also sees and does not have its measurements falsified by disturbing light sources. This reduces errors and allows the sensor to also be used under cover glasses that may suppress visible light and allow IR light to pass, as is often the case with materials used in sleek designs.

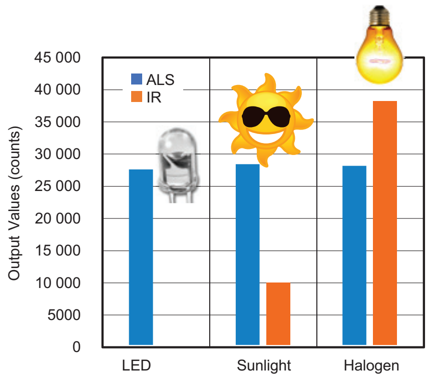
In addition to this, the sensor includes a separate channel sensitive to only near IR light. Both channels are measured in parallel. This allows the sensor to detect what type of light source it is currently exposed to and the given sensitivity can be adjusted to compensate for any lux error across light sources. With sunlight having a high IR content and white LED lighting having a very low IR content, this signal can also be used for further information, i.e. if an ALS sensor in the car's interior is being exposed to sunlight or not.



Normalized ALS Channel Spectral Response



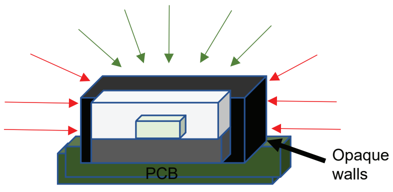
IR Channel Response



ALS and IR Channel - Absolute

AEC-Q100 Qualified Opaque FAM Package Technology

Contrary to previous digital ALS sensors from Vishay, the VEML6031X00 features an opaque package, largely reducing its susceptibility to optical crosstalk on the PCB level. It senses only what its optical window is exposed to, further reducing a source of lux errors and increasing the signal to noise ratio. The package is highly robust, allowing the sensor to have a high temperature rating of 110 °C. This gives designers flexibility with regard to part placement, as no special housing or rubber boot is required.



The DNA of tech.™

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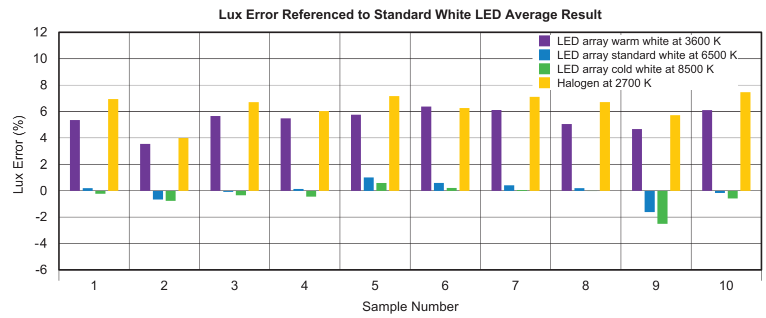
High Dynamic Measurement Range

The VEML6031X00 allows for the adjustment of sensor parameters via an I^2C interface, allowing its capabilities to be optimized for its given operating point. Integration times and gain levels can be set to adjust sensitivity and allow for a fast measurement rate, depending on what the application needs. The part features a wide range of integration times from 3.125 ms to 400 ms, as well as five different gain levels adjusted both by internal ASIC amplification as well as the accumulative size of photodiodes used in the measurement. When the sensor is under a very dark cover glass, with a 1000 lx brightness — which you would encounter in a well-lit room — only 1 lx (0.1 %) of the signal will reach the sensor. The sensor can adjust to this by increasing the integration time and gain, so that resolution is not lost despite the lighting conditions. The same sensor can then be exposed to full sunlight if, for example, it's integrated in a sunlight / tunnel sensor. Also, here the sensitivity can be decreased to allow for full sunlight detection.

In other applications measurement speed may be of key importance — for example, sensing light in the side mirror when driving at high speed, as lighting conditions are changing at a fast rate. With a minimum integration time down to 3.125 ms, the sensor can effectively measure close to 300 meas/sec.

Low Output Tolerances Across Different Light Sources

As the sensitivity is trimmed within the package, the part to part tolerances are very low. As the filter is so close to the human eye, this also means that the tolerances across different light sources are low and were seen to be below 8 % when experimentally measuring under lab conditions, even when a light source with a high IR content was used (halogen). This is of particular importance for sensors situated in the car's interior, i.e. near the window, where the sensor will be exposed to a variety of different mixed light sources. Keeping tolerances low allows for a reliable result regardless of the conditions, allowing the applications to always react as intended.



Tolerances for Different Light Sources