

2. 2 x 2 mm DFN Ordering Guide

Family	DFN OPNs	ALS	UV Index	Proximity (# of LED Drivers)	HRM
Si113x	Si1133-AA00-GMR	Y	Y	—	—

3. Functional Description

The Si1133 is a UV and Ambient Light sensor whose operational state is controlled through registers accessible through the I²C interface. The host can command the Si1133 to initiate on-demand UV or Ambient Light measurement. The host can also place the Si1133 in an autonomous operational state where it performs measurements at set intervals and interrupts the host either after each measurement is completed or whenever a set threshold has been crossed. This results in an overall system power saving allowing the host controller to operate longer in its sleep state instead of polling the Si1133.

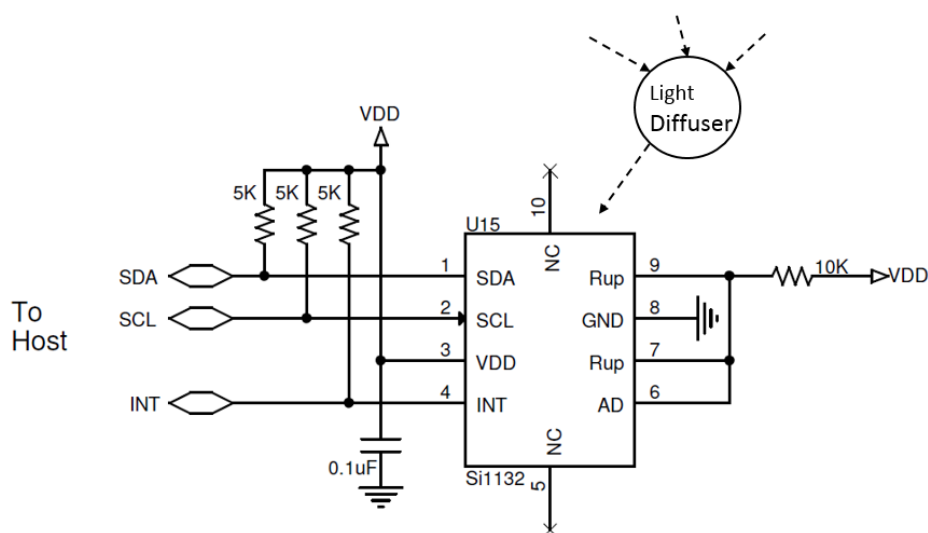


Figure 3.1. Si1133 Basic Application

3.1 Ambient Light Sensing

The Si1133 has photodiodes capable of measuring visible and infrared light. However, the visible photodiode is also influenced by infrared light. The measurement of illuminance requires the same spectral response as the human eye. If an accurate lux measurement is desired, the extra IR response of the visible-light photodiode must be compensated. Therefore, to allow the host to make corrections to the infrared light's influence, the Si1133 reports the infrared light measurement on a separate channel. The separate visible and IR photodiodes lend themselves to a variety of algorithmic solutions. The host can then take these two measurements and run an algorithm to derive an equivalent lux level as perceived by a human eye. Having the IR correction algorithm running in the host allows for the most flexibility in adjusting for system-dependent variables. For example, if the glass used in the system blocks visible light more than infrared light, the IR correction needs to be adjusted.

If the host is not making any infrared corrections, the infrared measurement can be turned off in the `CHAN_LIST` parameter.

By default, the measurement parameters are optimized for indoor ambient light levels, where it is possible to detect low light levels. For operation under direct sunlight, the ADC can be programmed to operate in a high signal operation so that it is possible to measure direct sunlight without overflowing.

For low-light applications, it is possible to increase the ADC integration time. Normally, the integration time is 24.4 μ s. By increasing this integration time, the ADC can detect light levels as low as 100 mlx. The ADC integration time for the Visible Light Ambient measurement can be programmed independently of the ADC integration time of the Infrared Light Ambient measurement. The independent ADC parameters allow operation under glass covers having a higher transmittance to Infrared Light than Visible Light.

When operating in the lower signal range, or when the integration time is increased, it is possible to saturate the ADC when the ambient light suddenly increases. Any overflow condition will have the corresponding data registers report a value of 0xFFddFF for 16-bit mode and 0x7FFFFFFF for 24-bit mode. The host can adjust the ADC sensitivity to avoid an overflow condition. If the light levels return to a range within the capabilities of the ADC, the corresponding data registers begin to operate normally.

The Si1133 can initiate ALS measurements either when explicitly commanded by the host or periodically through an autonomous process. Refer to Section 4. [Operational Modes](#) for additional details.

Two ADCs can be used for simultaneous readings of the visible or UV photodiode and black dark current reference photodiode. When subtracted, these differential measurements remove dark current, reducing noise that enables lower light sensitivity.