TCS3701

ALS/Color and Proximity Sensor for Use Behind OLED Displays

General Description

The TCS3701 features ambient light and color (RGB) sensing in parallel with proximity detection. The device comes in a low-profile and small footprint, L2.5mm x W2.0mm x H0.5mm package.

The Ambient Light and Color Sensing function provides five concurrent ambient light sensing channels: Red, Green, Blue, Clear, and Wideband. The RGB and Clear channels have a UV/IR blocking filter. This architecture accurately measures ambient light and enables the calculation of illuminance, chromaticity, and color temperature to manage display appearance.
The Proximity function synchronizes IR emission and detection to sense nearby objects. The internal IR LED driver needs to be connected to an external emitter. The architecture of the engine features self-maximizing dynamic range, ambient light subtraction, advanced crosstalk cancelation, 14-bit data output and interrupt-driven I^2C communication. Sensitivity, power consumption, and noise can be optimized with adjustable IR LED timing and power. The proximity engine recognizes detect/release events and produces a configurable interrupt whenever the proximity result crosses upper or lower threshold settings.

Key Benefits & Features

The benefits and features of TCS3701 are listed below:

Figure 1:
Added Value of Using TCS3701

Benefits	Features

• Invisible ALS and color sensing under any glass type	• Configurable, high sensitivity
	  • Programmable gain and integration time
	  • 1024x dynamic range by gain adjustment only
	  • 1mlux minimum detectable illuminance (100ms)
	• Tailored ALS and color response
	  • UV/IR blocking filter for RGBC channels
	  • Wideband reference channel without filters
	• ALS/color interrupt with thresholds

• Invisible proximity detection behind OLED displays	• Capable to drive external IR emitter LED or VCSEL • Crosstalk and threshold calibration on chip • Programmable timings and sensitivity • Calibrated LED output power
• Low power consumption and minimum I^2C traffic	• $1.8V_{DD}$ operation • Configurable sleep mode • Interrupt-driven device • On-chip self-calibration of ALS and proximity functions
• Integrated status checking for all functions	• Digital and analog ALS saturation flags • Proximity saturation flag

Applications

TCS3701 integrates multiple applications within one device. The applications for TCS3701 include:

- Brightness management for displays
- Color management for displays
- Proximity detection
- Touch screen disable

Block Diagram

The functional blocks of this device are shown below:

Figure 2:
Functional Blocks of TCS3701