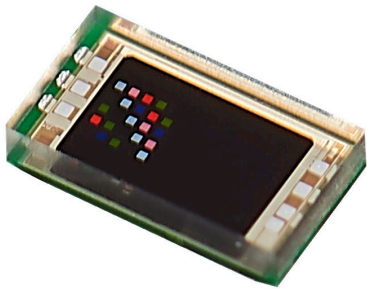
VD6283TAB

Data brief

Hybrid filter multispectral sensor with light flicker engine



RPN	Order code	Product version
VD6283TAB	VD6283TAB 45/1	Red, green, blue, visible, IR, and clear

Features

- Miniature optical module
  - 1.83 x 1.0 x 0.55 mm
  - Optical BGA, 6-balls, reflowable package
  - Operates with phone cover glass on top
- ALS operation with 6 independent channels
  - Advanced hybrid filters with high photocount response
  - Parallel sensing of all channels: red, green, blue, IR, clear, and visible
  - High dynamic range from 7 mLux to 30 klx (green channel)
  - High sensitivity and low noise in low light conditions
- Light flicker extraction
  - Innovative readout architecture to extract AC light flicker signal
  - From 100 Hz to 2 kHz frequency detection, sine or square wave
  - Several extraction modes available (analog or digital)
- Software driver provided by ST
- I²C interface up to 1 Mbit/s (Fast mode plus)
- Perfectly suited for mobile applications
  - 1.8 V power supply
  - Low-power consumption
  - Operating temperature -30 to 85°C

Applications

- True tone color-sensing IC for smartphone and smartwatch screen adjustments, camera white balance color assistance
- Lux and CCT measurement
- Light frequency extraction for flicker correction assistance

Description

The VD6283TAB (1.83 x 1.0 x 0.55 mm) is the new version of ST's ambient light sensors with advanced light flicker extraction. Light measurement is fast and accurate thanks to an individual ADC and a readout for each color channel. The VD6283TAB uses hybrid color filters with precise responses which enhance the accuracy of the correlated color temperature (CCT) and Lux performance. The VD6283TAB can be used to assist camera white-balance in less than 30 ms.

With a patented architecture and a high-performance photodiode design, the VD6283TAB can extract light flickering frequencies to enhance camera experience, and avoid “banding effects” on videos or viewfinder modes. Additionally, the VD6283TAB is the only sensor able to extract different light flicker waveforms, including LED square signals, that can run flicker operations simultaneously with ALS operations.

1 Product overview

Table 1. Technical specifications

Parameter	Value
Package type	Optical module with thin glass – 6 ball BGA
Product size	1.83 x 1.0 x 0.55 mm
Operating voltage	1.8 V typical (1.65 V to 1.95 V)
Operating temperature	-30 to 85°C
6 ALS channels	Red, visible, blue, green, IR, and clear
1 flicker channel	Flicker channel using any single channel from above (user selectable)
I2C	1 MHz Fast mode plus compatible, default address = 0x40h (write)

Figure 1. System block diagram (full options)

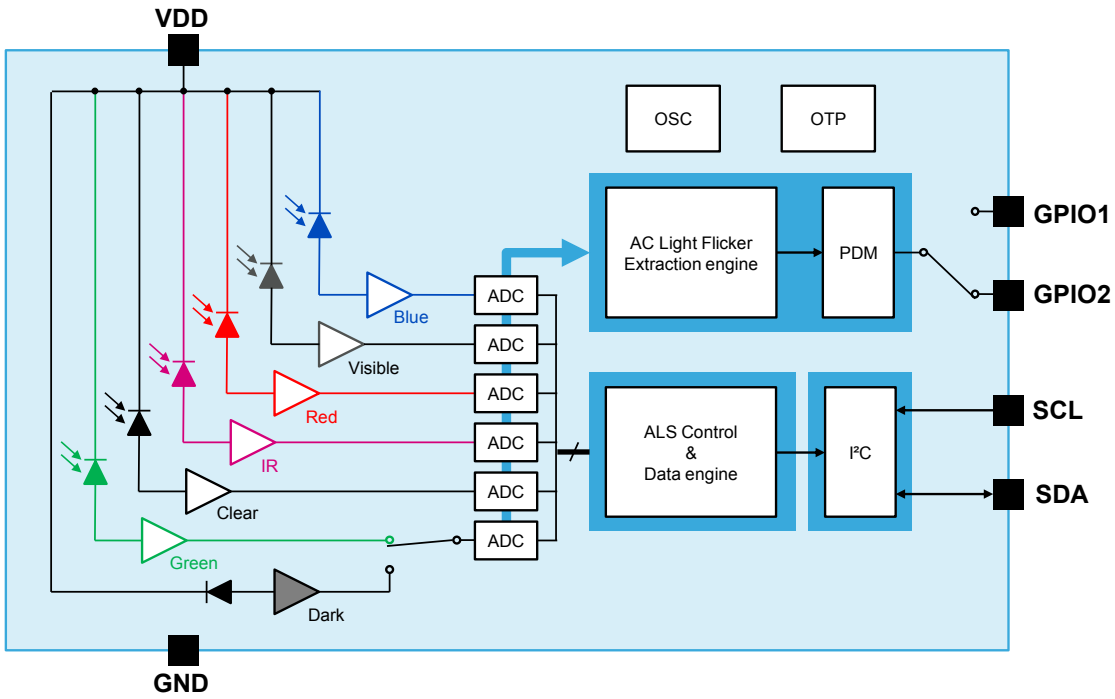


Table 2. VD6283TB45/1 channel affectation

Channel number	Filter color
Channel 1	Red
Channel 2	Visible
Channel 3	Blue
Channel 4	Green
Channel 5	IR
Channel 6	Clear

Table 3. Key functional parameters

Parameter	Value
I2C	Fast mode (400 kHz) and Fast mode plus (1 MHz) Programmable I2C address
Channels	6 color channels with independent, parallel reading for ALS or flicker operations: red, visible, blue, green, IR, and clear. 1 dedicated fast channel for light flicker measurement 1 internal dark channel
ADC type	24 bit (16 bit + 8 bit, for high accuracy under low light)
Exposure time (EXTIME)	Integration time step size: 1.6 ms typical Number of integration steps: 1 to 1024 (1.6 ms to 1.6 s)
Readout time	ALS readout: 6 ms typical (fixed) for all channels together. This must be added to EXTIME for overall sensing operations. For example, EXTIME 24 ms and readout 6 ms -> 30 ms overall operation (33 Hz). AC flicker frequency: raw signal (PDM) is output continuously through GPIO1 or GPIO2.
Analog gain	15 programmable gains for high-dynamic range: 66x, 50x, 33x, 25x, 16x, 10x, 7.1x, 5x, 3.33x, 2.5x, 1.67x, 1.25x, 1x, 0.83x, 0.71x. Independent and selectable per channel
Inter measurement period	256 steps of 20 ms (from 0 ms to 5.12 s)
Light flicker detection	Minimum frequency detection: 100 Hz
	Maximum frequency detection: 2 kHz
	Output modes: Mode 1 = digital PDM (pulse density modulation): in this mode, the host must input a master clock into GPIO2 to synchronize the data stream. Mode 2 = analog format: in this mode, the PDM signal is routed out of GPIO2 and filtered by an external RC filter to get a continuous analogue signal.
	FFT (Fast Fourier Transform) computation required at host level for highest frequency detection accuracy. This is recommended for better screening of the light fundamental and harmonic extraction, especially with respect to multi tone frequencies (combined light sources).

2 Package information

To meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions, and product status are available at: www.st.com. ECOPACK is an ST trademark.

Revision history

Table 4. **Document revision history**

Date	Version	Changes
06-Nov-2025	1	Initial release

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice.

In the event of any conflict between the provisions of this document and the provisions of any contractual arrangement in force between the purchasers and ST, the provisions of such contractual arrangement shall prevail.

The purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

The purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of the purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

If the purchasers identify an ST product that meets their functional and performance requirements but that is not designated for the purchasers' market segment, the purchasers shall contact ST for more information.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.