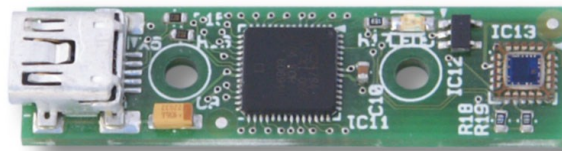


# Oak RGB

## RGB Color Sensor

# Datasheet



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# 1. Introduction

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The Oak RGB can be integrated in a custom application very easily. The operating power as well as real time sensor data and uncritical sensor configuration data are all transferred through a simple USB cable. The very low power consumption, including automatic entering into sleep mode, allows to use the device not only in fixed installations, but also in mobile applications.

## 1.1 Reference Documents

Sensor Datasheet:

<http://www.avagotech.com/products/product-detail.jsp?navId=H0,C1,C4992,P94665>

Programming Guide to the Oak Sensor Family

(This document is still under construction)



## 2. Hardware Specifications

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### 2.1 Sensor: Avago ADJD-S313-QR999

The ADJD-S313-QR999 is a cost effective, CMOS digital output RGB color sensor in miniature surface-mount package. The IC comes with integrated RGB filters, an analog-to-digital converter and a digital core for communication and sensitivity control. The output allows direct interface to micro-controller or other logic control for further signal processing without the need of any additional components.

### 2.2 Measurement Range

Color:           Red    0 – 191  
                  Green 0 – 191  
                  Blue  0 – 191

For more details, please refer to the sensor datasheet (link in chapter 1.1)

### 2.3 Supported Sensor Features

Read RGB value

Photodiode Size (configurable)

Integration time (configurable)

Sample rate adjustable

### 2.4 USB Interface

Interface:       USB 2.0 Full Speed (12Mbit/s)

Connector:     Standard USB Mini-B

Device Class:  HID

Sampling Rate: 10ms to 65s, user adjustable

Report Rate:   1 ms to 65s, user adjustable



### 3. Software Specifications

All Oak Sensors are implemented as HID devices. Thus driver support is built into all major operating systems.

Captured sensor Data is transmitted through an INTERRUPT IN reports. Therefore real time processing can be guaranteed. This data can be received by the host using regular file read operations. Chapter 0 describes the contents of this report.

On an independent communication channel, sensor configuration is done using FEATURE reports that are 32 Bytes in length. Special operating system calls exist to transmit / receive feature reports. Chapter 0 shows the structure of a feature report for each supported command.

Please refer also to the document “Programming Guide to the Oak Sensor Family” for more details.

#### 3.1 INTERRUPT IN Report Contents (Real time data)

16 Bit	Frame Number	10 <sup>-3</sup>	s
16 Bit	Red		[no unit],
16 Bit	Green		[no unit],
16 Bit	Blue		[no unit],

#### 3.2 FEATURE Report Commands

##### 3.2.1 Report Mode

Byte#	0	1	2	3	4	5
Content	GnS	Tgt	0x01	0x00	0x00	RPTMODE

GnS: 0 = Set  
1 = Get

Tgt 0 = RAM  
1 = Flash

RPTMODE: 0 = After Sampling (Factory Default)  
1 = After Change  
2 = Fixed Rate

##### 3.2.2 LED Mode

Byte#	0	1	2	3	4	5
Content	GnS	Tgt	0x01	0x01	0x00	LEDMODE

GnS: 0 = Set  
1 = Get



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Tgt            0 = RAM  
                  1 = Flash

LEDMODE:    0 = Off (Factory Default)  
                  1 = On  
                  2 = Blink Slowly  
                  3 = Blink Fast  
                  4 = Blink 4 pulses

### 3.2.3 Report Rate

Number of milliseconds between two IN reports. This parameter will only be regarded if Report Mode = 2 (fixed rate)

Byte#	0	1	2	3	4	5	6
Content	GnS	Tgt	0x02	0x00	0x00	RptRate LSB	RptRate MSB

GnS:            0 = Set  
                  1 = Get

Tgt            0 = RAM  
                  1 = Flash

RptRate:       Report Rate [ms]

### 3.2.4 Sample Rate

This is the actual sample rate the sensor is working on. If Report Mode = 0 (After Sampling) this is also the rate at which the device reports values to the host PC.

Byte#	0	1	2	3	4	5	6
Content	GnS	Tgt	0x02	0x01	0x00	SampRate LSB	SampRate MSB

GnS:            0 = Set  
                  1 = Get

Tgt            0 = RAM  
                  1 = Flash

SampRate:      Sample Rate [ms]

### 3.2.5 User Device Name

Byte#	0	1	2	3	4	5-25
Content	GnS	Tgt	0x15	0x00	0x00	UsrDevName

GnS:            0 = Set  
                  1 = Get

Tgt            0 = RAM  
                  1 = Flash



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UsrDevName: User defined name for the whole device  
Null-terminated string, max. 20+1 characters

### 3.2.6 User Channel Name

Byte#	0	1	2	3	4	5-25
Content	GnS	Tgt	0x15	ChP1	0x00	UsrChName

GnS: 0 = Set  
1 = Get

Tgt 0 = RAM  
1 = Flash

ChP1 1 = Channel 0 (Frame Number)  
2 = Channel 1 (Illuminance)

UsrChName: User defined name for the channel  
Null-terminated string, max. 20+1 characters

### 3.2.7 Photodiode Size

Byte#	0	1	2	3	4	5
Content	GnS	0x03	0x01	ADDR	0x00	PDAS

GnS: 0 = Set  
1 = Get

ADDR: 0x0B = PDASR  
0x0A = PDASG  
0x09 = PDASB

PDAS 0x01 =  $\frac{1}{4}$   
0x03 =  $\frac{1}{2}$   
0x07 =  $\frac{3}{4}$  (reset value)  
0x0F = Full

For more details refer to the sensor datasheet, linked in chapter 1.1.

### 3.2.8 Integration Time

Byte#	0	1	2	3	4	5
Content	GnS	0x03	0x01	ADDR	0x00	TINT

GnS: 0 = Set  
1 = Get

ADDR: 0x11 = TINTR  
0x10 = TINTG  
0x0F = TINTB

TINT 0x00 = Integration Time Slot = 1  
0x01 = Integration Time Slot = 2

...



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0x07 = Integration Time Slot = 8 (reset value)

...

0x0E = Integration Time Slot = 15

0x0F = Integration Time Slot = 16

For more details refer to the sensor datasheet, linked in chapter 1.1.





## 4. Technical Specifications

### 4.1 Electrical Specifications

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_q^{1)}$	Operating current				20	mA
$I_{Stby}$	Standby current	No USB activity			500	$\mu$ A

<sup>1)</sup> The maximum operating current is mainly influenced by the on board LED.

### 4.2 Mechanical Dimensions

The PCB is designed to be mounted using two standard M2 screws. There are no components on the back side of the pcb.

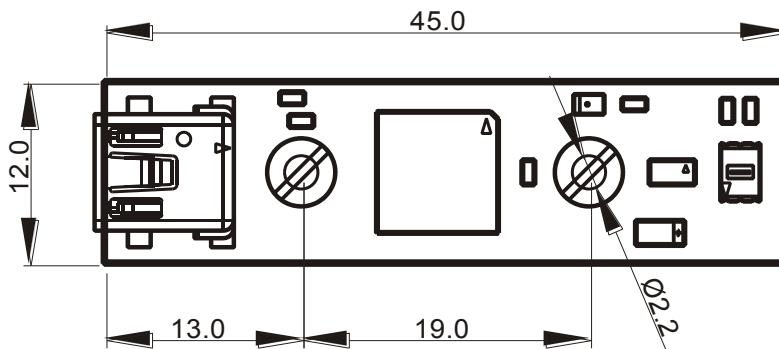


Figure 1: Mechanical dimensions of the Oak RGB sensor (Assembly drawing shows a different sensor)

### 4.3 RoHS Compliance

Unless otherwise stated, all Toradex products comply with the European Union's Directive 2002/95/EC: "Restrictions of Hazardous Substances".



**Revision history**

Date	Doc. Rev.	Changes
26-Jun-2007	Rev. 0.9	Preliminary Release

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