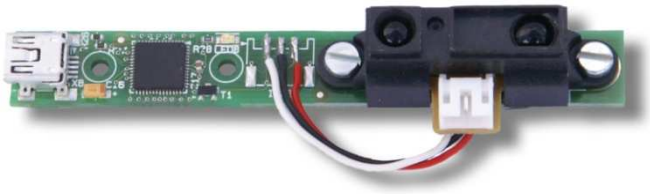
Oak Dist

Infrared Distance Measuring Sensor

Datasheet



Revision history

Date	Doc. Rev.	Changes
21-Jun-2011	Rev. 1.4	Disclaimer Update
14-Jan-2011	Rev. 1.3	Modified sample rate range and resolution
29-Oct-2010	Rev. 1.2	Added Operating Temperature Range
30-Sep-2010	Rev. 1.1	Added USB Vendor ID and Product ID
28-Feb-2008	Rev. 1.0	Minor Edits (section 1.1)
26-June-2007	Rev. 0.9	Preliminary Release

Contents

1. Introduction

The Oak Dist is a USB attached distance measuring sensor. It uses infrared triangulation technology to measure the distance to any surface with a minimum reflectivity.

The Oak Dist 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 using the device not only in fixed installations, but also in mobile applications.

1.1 Reference Documents

Sensor Datasheet:
http://files.toradex.com/Oak/Datasheets/Components/Oak_Distance/Sharp_GP2D12J0000F.pdf

Programming Guide to the Oak Sensor Family

2. Hardware Specifications

2.1 Sensor: Sharp GP2D12J0000F

The GP2D12 is an infrared reflection type sensor to measure distances in the range of 0.10m - 0.80m. Its robust design makes it ideally suited for robotics applications.
The GP2D12 consists of an infrared LED united with a position sensitive device (PSD) and analog signal processing circuitry.

2.2 Measurement Range

Sensor data are provided in linearized form, representing the output characteristics diagram from the datasheet:

Distance 0.10 – 0.80 m
Resolution: 0.001 m

Resolution depends greatly on the alignment of the sensor relative to the target.

(For higher quantities, there is also a version with a 0.04m – 0.30m Range available)

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

2.3 Supported Sensor Features

Read distance

2.4 USB Interface

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

Connector: Standard USB Mini-B

Device Class: HID

Vendor ID: 0x1B67

Product ID: 0x0005

Sampling Rate: 3ms to 65s, user adjustable

Report Rate: 1ms to 65s, user adjustable

2.5 Pitfalls

Sensor accuracy might be affected by the following parameters

- Sensor misalignment (infrared beam opening is only 2°)
- Ambient temperature
- Bright light source shining onto the reflecting surface
- Reflectivity of the surface

2.6 Operating Temperature Range

Minimum Operating Temperature: -10°C

Maximum Operating Temperature: +60°C

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 3.1 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 (Time stamp)	10^{-3}	s
16 Bit	Distance	10^{-4}	m

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

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

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 (Distance)

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

4. Technical Specifications

4.1 Current Consumption

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_q	Operating current				60	mA
I_{Stby}	Standby current	No USB activity			500	µA

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, except the mounting element for the GP2D12J0000F sensing device

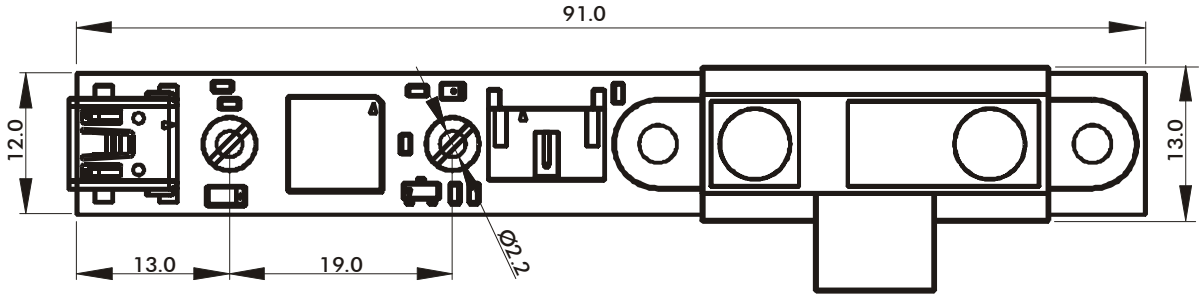


Figure 1: Mechanical dimensions of the Oak Dist sensor (not including cable)

4.3 RoHS Compliance

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