Orca USB Module
Accelerator Hardware Specification

Ordering Information

Part Number	Description
DG-ORCA12LP-U11G1-X-X	Orca, High Performance, USB module, 1GB DRAM

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Description

The Orca processor provides application developers the ability to create sophisticated and highly functional products at the power and price suitable for the edge. With flexible and efficient compute architecture, Orca supports pruned model processing and fast model multiplexing.

Orca's ability to process pruned models essentially multiplies the compute and bandwidth resources, allowing the processing of larger, more accurate models to enable real-time cloud-like quality applications at the edge.

Support for DRAM allows efficient multiplexing of multiple ML models, enabling developers to service scenarios that go beyond simple single-model applications.

Orca's pruned models processing capability essentially multiplies the compute and bandwidth resources, allowing the processing of larger, more accurate models to enable real-time applications on the edge.

With the available DeGirum PySDK and AI Hub development platform, users can start developing their applications using the Orca accelerator.

Features

- Highly efficient and flexible architecture for edge AI development
- Plug-and-play software stack for seamless integration
- Pruned model support to optimize compute and bandwidth usage
- Flexible operation: supports both DRAM and DRAM-less configurations
- Near-lossless model context switching for multi-model efficiency
- Multi-camera real-time performance for responsive edge applications
- Software interface consistent with xHCI 1.1 Host Mode
- DeGirum development tools for rapid application creation

Hardware Features

- USB 3.1 Gen 2 (10 Gb/s) xHCI-derived peripheral device
- Supports SuperSpeed Plus, SuperSpeed, and Hi-Speed modes
- USB-C connector (powered by host)
- Orca AI accelerator with 4 TOPS performance

Specifications

Physical Specifications	
Form Factor	USB 3.1 Gen 2 (10 Gb/s) xHCI-derived peripheral device
Dimensions[1]	30.00 x 80.00 x 18.00 mm
Weight	50 g
Electrical	
DC Supply	5.0 V ± 5%
Interface	USB 3.1 Gen 2
Power Consumption	2.3 W (typical)
Environmental[2]	
Storage Temperature	-10 °C to +70 °C
Operating Temperature	0 °C to +50 °C [3, 4]

[1] For in-depth mechanical specs, refer to the USB 3.1 Specification.

[2] For indoor use only.

[3] With no airflow.

[4] Extended operating temperature range is possible with airflow.

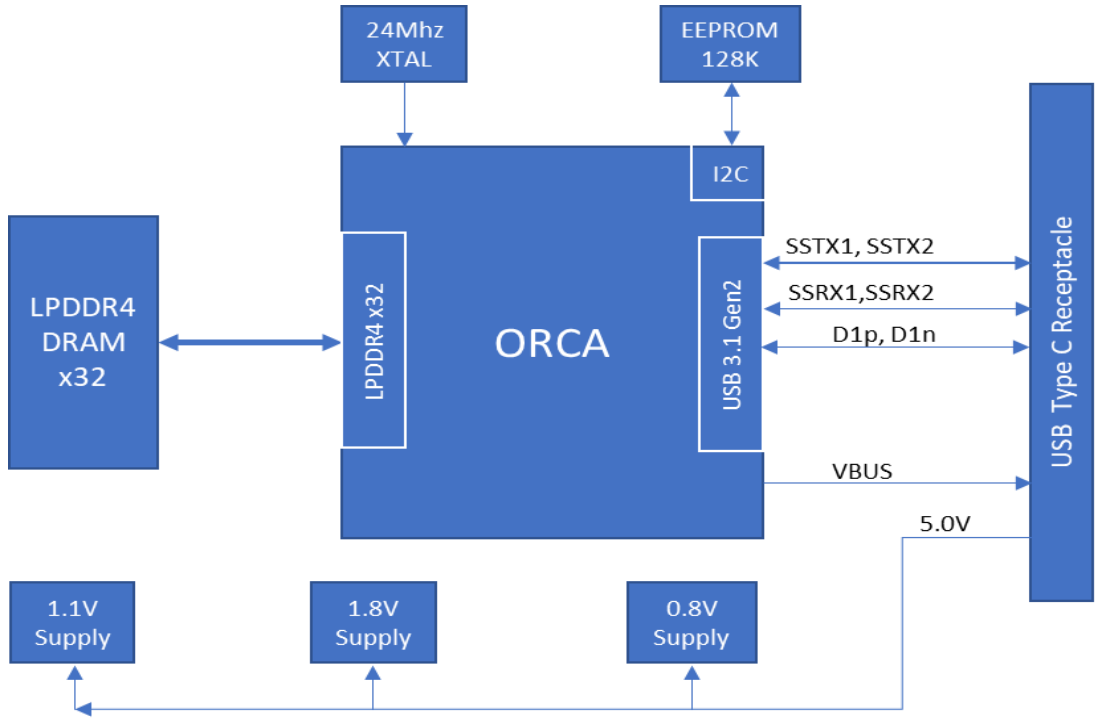
USB Connector Pinout

Pins A	Side A	Side B	Pins B
A1	GND	GND	B12
A2	SSTX1p	SSRX1p	B11
A3	SSTX1n	SSRX1n	B10
A4	VBUS	VBUS	B9
A5	CC1	SBU2	B8
A6	D1p	D2n	B7
A7	D1n	D2p	B6
A8	SBU1	CC2	B5
A9	VBUS	VBUS	B4
A10	SSRX2n	SSTX2n	B3
A11	SSRX2p	SSTX2p	B2

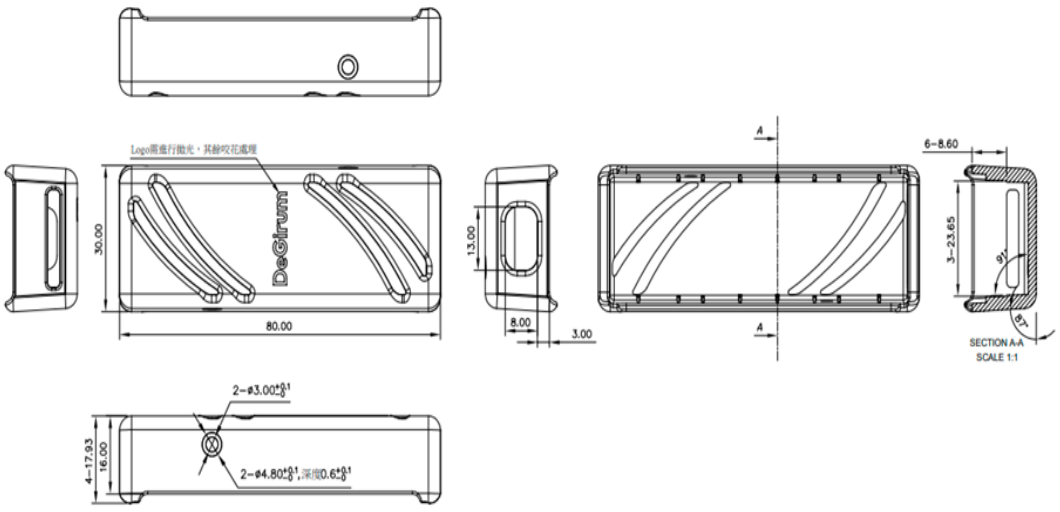
A12	GND	GND	B1

System Block Diagram and Module Dimensions

The following diagram shows the major components of Orca USB Module:



The following diagram shows in-depth mechanical specs, refer to the Orca dongle:



Power / Performance

Power consumption varies with workload requirements. The maximum power consumed by the module is 4 W (or 0.8 A current at 5 V). The table below shows examples of sustained power consumption at different workloads at 25° C ambient temperature.

Example:

Workload Configuration	FPS[1]	Power Consumption
yolov8n_rul6_person--640x640	63 fps	1.6 W
efficientnet_em_imagenet--240x240	82 fps	2.0 W

[1] Measured using AMD Ryzen 5 8500G host system. Results may vary with different hosts.

Thermal Management Considerations

The Orca USB dongle has been tested to operate in ambient temperatures between 0° C and 50° C.

Overheating Protection

To guard against accidental overheating of the Orca chip, the operating frequency is reduced to allow the chip temperature to drop to a safe level. Ensure ambient temperature is within specified operating range.

System Requirements

The table below lists operating systems, CPU architectures, and Python versions supported by the latest released PySDK version.

Operating System	Supported CPU Architectures	Supported Python Versions
Ubuntu Linux 20.04, 22.04, 24.04	x86-64	3.8 ... 3.11
Ubuntu Linux 20.04, 22.04, 24.04	ARM AArch64	3.8 ... 3.11
Raspberry Pi OS (64-bit)	ARM AArch64	3.9
Windows 10/11	x86-64	3.8 ... 3.11
macOS 12	x86-64	3.9
macOS 12	ARM AArch64	3.9

Compliance Requirements

Units are shipped as a component. Final system level certification/compliance to be done by the customer.

Installation and Troubleshooting

- Orca USB Setup
- PySDK Installation

Revision History

Version	Date	Description of Changes
1.0	4/7/25	Initial release of the datasheet.
1.1	4/24/25	Updated environmental specificiations.

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