Huawei Atlas 200 Developer Kit

Technical White Paper

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About This Document

Purpose

This document describes the system design, features, specifications of Huawei Atlas 200 Developer Kit (Atlas 200 DK).

Intended Audience

This document is intended for:

- Huawei presales engineers
- Channel partner presales engineers
- Enterprise presales engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
NOTE	Calls attention to important information, best practices, and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Issue	Date	Description
02	2019-07-27	This issue is the second official release.
01	2019-05-10	This issue is the first official release.

Contents

1 Product Introduction

1.1 Overview

The Atlas 200 Developer Kit is a developer board product that uses the Atlas 200 AI accelerator module as the core. Its main function is to open the interfaces of the Atlas 200 for users to quickly and flexibly use the Atlas 200. It is ideal for pre-research and development in many fields such as safe city projects, drones, robots, and video servers.

The Atlas 200 is a high-performance AI compute module. By integrating the HiSilicon Ascend 310 AI processor, the Atlas 200 is ideal for analysis and inferential computing of data such as images and videos. It can be widely used in intelligent surveillance, robots, drones, and video servers.

> **NOTE**
>
> The Ascend 310 is a high-performance and low-power AI chip designed for image recognition, video processing, inference computing, and machine learning. The chip has two built-in AI core chips that support the 128-bit LPDDR4X and a maximum computing capability of 16 TOPS (INT8).

1.2 Appearance

Figure 1-1 shows the appearance of the Atlas 200 DK.

Figure 1-1 Appearance of the Atlas 200 DK

Figure 1-2 Atlas 200 DK dimensions
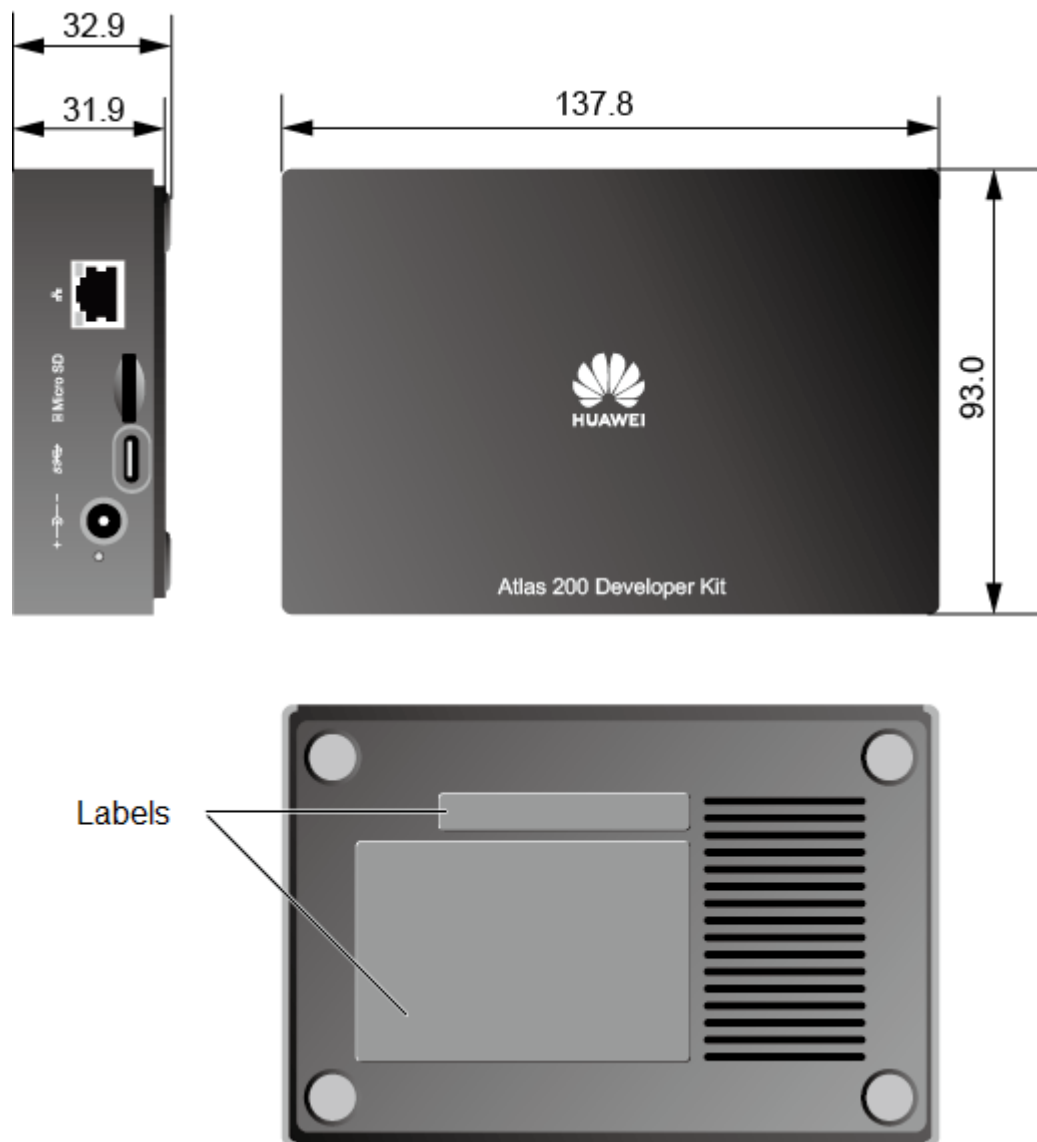
Figure 1-3 Port description
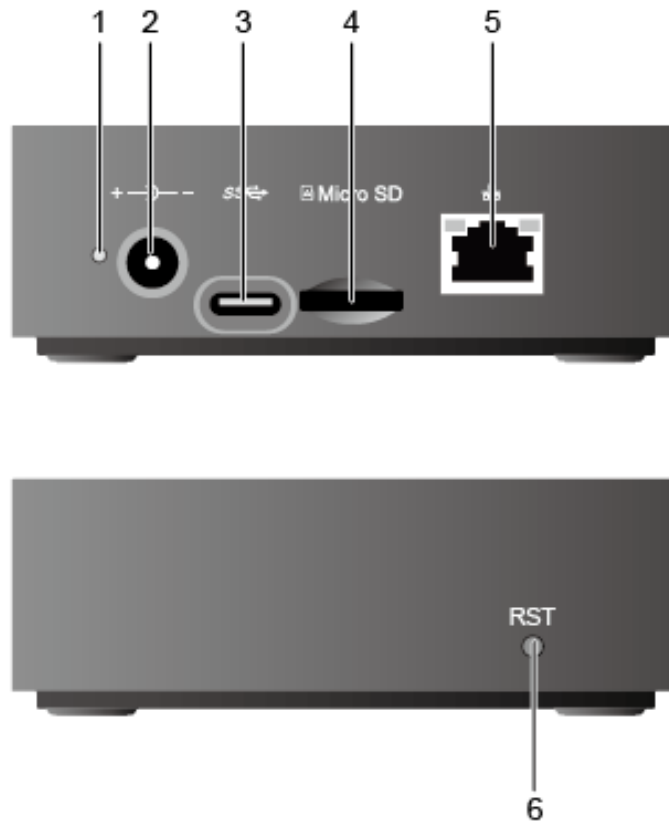
1	Power indicator	2	Power supply port
3	USB	4	Micro SD card
5	Network port	6	Reset button

1.3 System Architecture

The Atlas 200 DK consists of the Atlas 200 AI accelerator module, image/audio interface chip(Hi3559C), and LAN switch. **Figure 1-4** shows the system architecture.

Figure 1-4 Atlas 200 DK system architecture
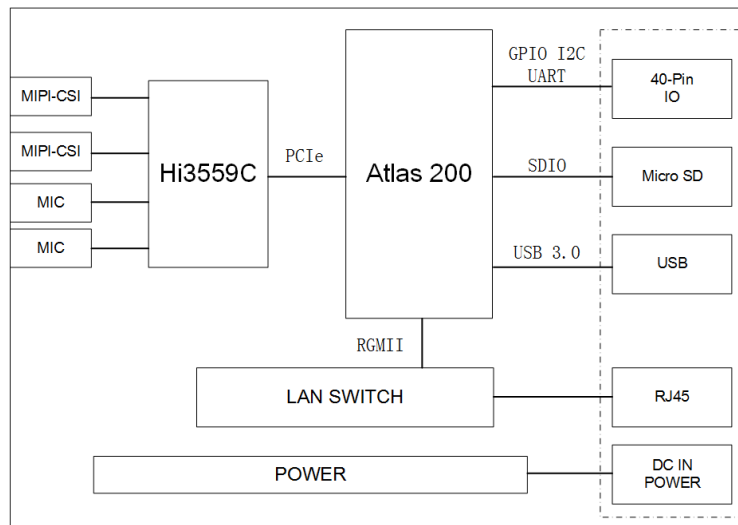
2 Product Features

2.1 Performance

- Peak computing capability of 16 TOPS (INT8).
- 2-channel camera input, 2-channel ISP image processing, and HDR10 high dynamic range technology standards compliance.
- Support for 1000 Mbit/s Ethernet to provide high-speed network connections, delivering strong computing capabilities.
- Universal 40-pin expansion connector (reserved), facilitating product prototype design.
- 5 V to 28 V wide DC power input.

2.2 Maintainability

- Supports in-band online upgrade, facilitating users' routine maintenance.
- Obtains the device information such as temperature and voltage status in-band and out-of-band, simplifying management.

3 Product Specifications

3.1 Basic Specifications

Table 3-1 Hardware specifications of the Atlas 200 DK

Feature	Specification
AI processor	● Two DaVinci AI cores ● CPU: 8-core A55, max 1.6 GHz
AI Computing capability	● Multiply-add computing performance: 8 TFLOPS/FP16, 16 TOPS/INT8
Memory	● 128-bit LPDDR4X ● Capacity: 8 GB/4 GB ● Interface rate: 3200 Mbit/s
Storage	One Micro SD card, which supports SD 3.0 and provides a maximum rate of SDR50 and a maximum capacity of 2 TB
Network port	One GE RJ45
USB port	One USB 3.0 Type C port, which can be used only as a slave device and compatible with USB 2.0
Other interfaces	● One 40-pin I/O connector ● Two 22-pin MIPI connectors ● Two onboard microphones
Power Supply	5 V to 28 V DC. A 12 V 3 A adapter is configured by default
Structure and dimensions	137.8 mm x 93.0 mm x 32.9 mm (4.13 in. x 2.79 in. x 0.99 in.)
Power consumption	20 W

Feature	Specification
Weight	234 g

3.2 Environmental Conditions

Table 3-2 Environment requirements of the Atlas 200 DK

Item	Specification
Operating temperature	0°C to 35°C (32°F to 95°F)
Storage temperature	0°C to 85°C (32°F to 185°F)
Relative humidity (RH, non-condensing)	5% to 90%
Storage humidity (RH, non-condensing)	5% to 95%
Maximum altitude	3000 m (9842.52 ft.) For altitudes above 900 m (2952.72 ft.), the highest operating temperature decreases by 1°C (1.8°F) for every increase of 300 m (984.24 ft.) in altitude.

4 Interface Description

4.1 GE Interface

The Atlas 200 DK provides an external 10/100/1000M Base-T interface, using the RJ45 connector and connecting to a network with a common network cable.

4.2 USB Interface

The Atlas 200 DK provides a USB-C interface, which is compatible with the USB 3.0 (SuperSpeed), USB 2.0 (HighSpeed), and USB 1.1 (FullSpeed) protocols. This interface can be used only in device mode and does not support the master mode. It is used to connect to the debugging host for loading and debugging.

4.3 Micro SD Card Interface

The Atlas 200 DK provides a Micro SD card slot. The interface type is SD 3.0, which is backward compatible with SD 2.0. Micro SD cards complying with SD 3.0 are recommended. The minimum capacity is 8 GB and the maximum capacity is 2 TB.

☷NOTE

You are advised to use the verified Micro SD cards, for example, Samsung UHS-I U3 CLASS 10 64 GB and Kingston UHS-I U1 CLASS 10 64 GB.

4.4 Power Supply Interface and Reset Button

The power supply interface of the Atlas 200 DK uses a common DC socket. The voltage range of the power supply is 5 V to 28 V, among which the 12 V power supply is recommended. The power must be greater than or equal to 36 W. If the power is lower than 36 W, the instantaneous power supply may be insufficient and the system may be abnormal.

The RST button is used to reset the system. When the system is abnormal, the reset button can be used to restart the system.

4.5 MIPI-CSI Interface

The Atlas 200 DK has two MIPI-CSI interfaces. **Figure 4-1** shows the interface definition.

Figure 4-1 Interface definition
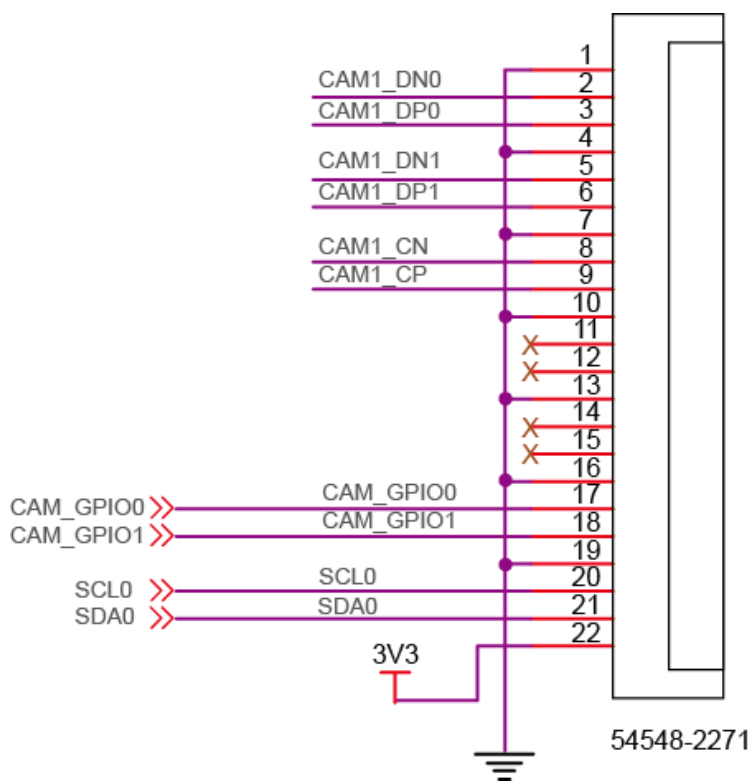
4.6 40-Pin Extended Interface

Table 4-1 Connector definition

Pin	Name	Level	Pin	Name	Level
1	+3.3 V	3.3 V	2	+5.0 V	5 V
3	I^2C2-SDA	3.3 V	4	+5.0 V	5 V

Pin	Name	Level	Pin	Name	Level
5	I^{2}C2-SCL	3.3 V	6	GND	-
7	GPIO0	3.3 V	8	TXD0	3.3 V
9	GND	-	10	RXD0	3.3 V
11	GPIO1	3.3 V	12	NC	-
13	NC	-	14	GND	-
15	GPIO2	3.3 V	16	TXD1	3.3 V
17	+3.3V	3.3 V	18	RXD1	3.3 V
19	SPI-MOSI	3.3 V	20	GND	-
21	SPI-MISO	3.3 V	22	NC	-
23	SPI-CLK	3.3 V	24	SPI-CS	3.3 V
25	GND	-	26	NC	-
27	CAN-H	-	28	CAN-L	-
29	GPIO3	3.3 V	30	GND	-
31	GPIO4	3.3 V	32	NC	-
33	GPIO5	3.3 V	34	GND	-
35	GPIO6	3.3 V	36	+1.8 V	1.8 V
37	GPIO7	3.3 V	38	TXD-3559	3.3 V
39	GND	-	40	RXD-3559	3.3 V

📖**NOTE**

- The NC pin has no connection on the board.

- The maximum output current of 1.8 V is 500 mA, the maximum output current of 3.3 V is 500 mA, and the maximum output current of 5 V is 1 A.

## 4.6.1 UART

UART 0 is an 8-pin or 10-pin interface used for the default debugging serial port (console) of the Ascend 310. The baud rate is 115200 bit/s.

UART 1 is a 16-pin or 18-pin interface used for expansion and communication with other modules.

UART-Hi3559 is an 38-pin and 40-pin interface used for the MIPI-CSI interface to access and debug the chip Hi3559. The baud rate is 115200 bit/s.

Figure 4-2 Debugging serial port

4.6.2 SPI

The SPI-CS0, SPI-CLK, SPI-MISO, and SPI-MOSI four-wire SPI interfaces can connect to various sensors and support only the master mode.

4.6.3 I^{2}C

I^{2}C2-SCL and I^{2}C2-SDA form an I^{2}C2 interface for connecting to an external sensor to communicate with other modules. The maximum rate is 400 KHz.

▣**NOTE**

> The I^{2}C1 interface is an internal interface and is not open to external systems.

4.6.4 CAN (Reserved)

CAN-H and CAN-L form a CAN bus interface, which has a built-in MAX3051 CAN transceiver and can be directly connected to the CAN bus.

▣**NOTE**

> CAN is not recommended.

4.6.5 GPIO

Eight independent GPIO pins can be used.

> **NOTICE**
>
> The GPIO0, GPIO1, and GPIO2 pins are output pins. External pull-up resistors must be connected to increase the drive capability. It is recommended that the pull-up resistor be set to 1 to 10 kΩ.

4.7 LED

The Atlas 200 DK developer board has four LED status indicator, as shown in **Figure 4-3**.

Figure 4-3 LED positions
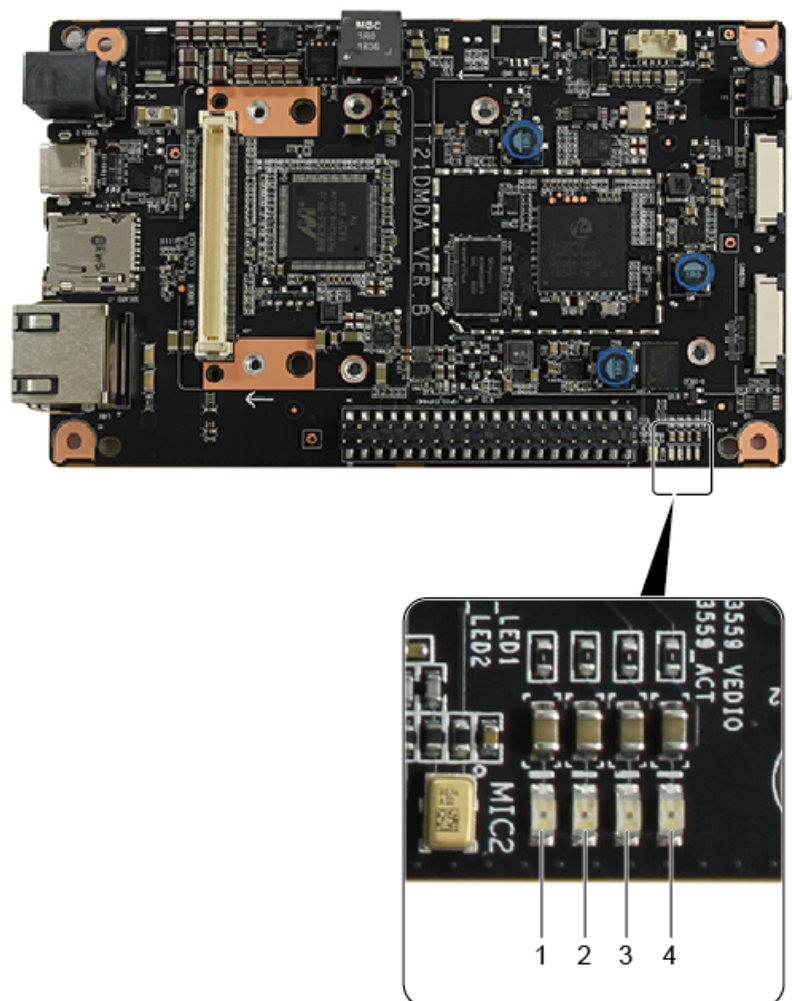
Table 4-2 State description of LED 1 and LED 2

LED 1	LED 2	Status of the Atlas 200 DK Developer Board	Precautions
Off	Off	Atlas 200 DK Developer Board Booting	You can power off or restart the Atlas 200 DK.
Off	On	Booting the Ascend 310	You can power off or restart the Atlas 200 DK except during version upgrade.
Blinking	Blinking	Upgrading the firmware	Do not power off or restart the Atlas 200 DK. Otherwise, the firmware upgrade may be incomplete and the board may be damaged. The firmware upgrade process is a part of the version upgrade. The upgrade takes about 15 minutes.

LED 1	LED 2	Status of the Atlas 200 DK Developer Board	Precautions
On	On	Atlas 200 DK Developer Board Boot finished	You can power off or restart the Atlas 200 DK.

Table 4-3 State description of LED 3 and LED 4

LED 3	LED 4	Status of the Atlas 200 DK Developer Board	Precautions
Off	Off	The Hi3559C is not started.	-
Off	On	The Hi3559C is being started.	-
On	On	The Hi3559C has been started.	-

5 Certifications

Table 5-1 Certifications.

No.	Country/Region	Certification	Standard
1	Europe	CE	Safety: - IEC 60950-1:2005(2nd Edition)+A1:2009 +A2:2013 - EN 60950-1:2006+A11:2 009+A1:2010+A12:2 011+A2:2013 EMC: - EN 55032:2012/AC: 2013 - CISPR 32:2012 - EN 55032:2015 - CISPR 32:2015 - EN 55024:2010 - CISPR 24:2010 - EN 55024:2010+A1:2015 - CISPR 24:2010+A1:2015 - ETSI EN 300 386 V1.6.1:2012 - ETSI EN 300 386 V2.1.1:2016 - EN61000-3-2:2014 - EN61000-3-3:2013 - EN61000-6-2:2005

No.	Country/Region	Certification	Standard
			● EN61000-6-4:2006+ A1:2010
2	Europe	RoHS	EN 50581: 2012
3	Japan	VCCI	VCCI 32-1

6 Warranty

For details, see the **Maintenance & Warranty**.

A Acronyms and Abbreviations

A

AI   Artificial Intelligence

B

BTB   Board to Board Connector

C

CAN   Controller Area Network

D

DK   Developer Kit

F

FLOPS   Floating-point Operations Per Second

H

HDR   High Dynamic Range

I

I^{2}C   Inter-integrated Circuit

ISP   Image Signal Processing

L

LAN   Local Area Network

S

SPI   Serial Peripheral Interface

T

TFLOPS   teraFLOPS

TOPS   Tera Operations Per Second

U

USB   Universal Serial Bus

UART   Universal Asynchronous Receiver/transmitter