Huawei CH121 V5 Compute Node V100R001

White Paper

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About This Document

Purpose

This document describes the appearance, features, technical specifications, and configuration of the new-generation CH121 V5 compute node of the Huawei E9000 server.

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, could result in death or serious 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
04	2018-12-04	This issue is the fourth official release. Modified **1.5 Hardware Structure**.
03	2018-11-28	This issue is the third official release. ● Modified **1.2 Appearance**. ● Modified **1.5 Hardware Structure**. ● Modified **1.6 Logical Structure**. ● Modified **1.7 Technical Specifications**. ● Modified **3 Components**.
02	2018-03-14	This issue is the second official release. The memory installation rules are modified.
01	2017-07-18	This issue is the first official release.

Contents

1 Introduction

1.1 Functions

The CH121 V5 is a half-width compute node with new-generation Intel® Xeon® Scalable CPUs (Purley Skylake CPUs) and high-capacity memory, providing powerful computing and flexible scalability. The CH121 V5 compute nodes are installed in an E9000 chassis and are centrally managed by the management module MM910.

The CH121 V5 provides dense computing and an ultra-large memory. It is optimized for virtualization, cloud computing, high-performance computing, and compute-intensive enterprise applications.

1.2 Appearance

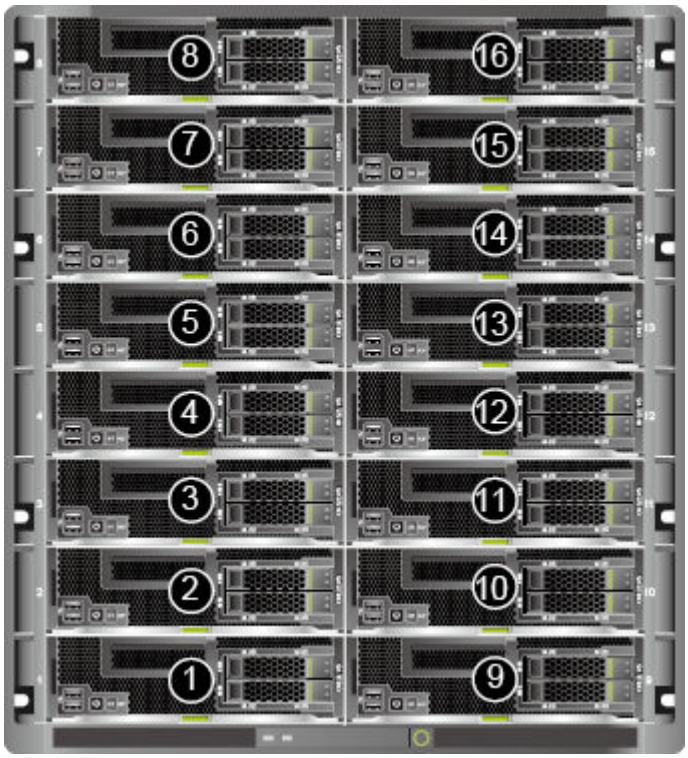
Appearance

Figure 1-1 Appearance

Installation Positions

The CH121 V5 is installed in a half-width slot in the front of the E9000 chassis. A chassis can house at most 16 CH121 V5 compute nodes.

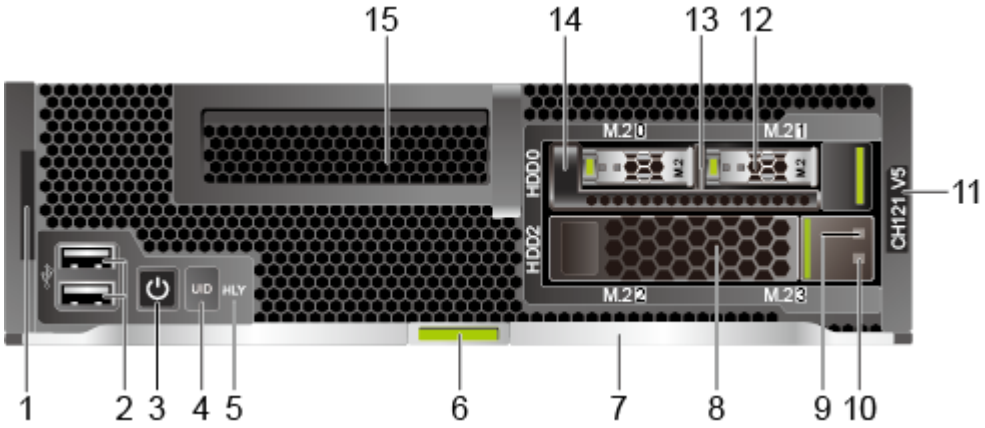
Figure 1-2 Installation positions and slot numbering



Front panel

Each hard drive slot can be installed with one hard disk drive (HDD), SAS/SATA/NVMe solid-state drive (SSD), or M.2 module. The CH221 V5 supports mixed use of HDDs, SSDs, and M.2 modules.

Figure 1-3 Front panel



1	Slide-out label plate (with an ESN label)	2	USB 3.0 ports
3	Power button/indicator	4	Unit Identification (UID) button/indicator

5	HLY indicator	6	Ejector release button
7	Ejector lever	8	2.5-inch drive
9	Hard drive activity indicator	10	Hard drive fault indicator
11	Product model	12	M.2 field replaceable unit (FRU)
13	M.2 adapter	14	M.2 module (consisting of one M.2 adapter and two M.2 FRUs)
15	PCIe panel	-	-

ESN

An Equipment Serial Number (ESN) uniquely identifies a compute node. An ESN is required when you apply for technical support from Huawei.

Figure 1-4 ESN example

Callout No.	Description
1	ESN ID (two characters), which is 21 by default.
2	Material identification code (eight characters), that is, processing code.
3	Vendor code (two characters). The code **10** indicates Huawei, and other values indicate outsourcing vendors.

4	Year and month (two characters). ● The first character indicates the year, where: – Digits 1 to 9 indicate 2001 to 2009, respectively. – Letters A to H indicate 2010 to 2017, respectively. – Letters J to N indicate 2018 to 2022, respectively. – Letters P to Y indicate 2023 to 2032, respectively. **NOTE** The years from 2010 are represented by upper-case letters excluding I, O, and Z because the three letters are similar to digits 1, 0, and 2. ● The second character indicates the month, where: – Digits 1 to 9 indicate January to September, respectively. – Letters A to C indicate October to December, respectively.
5	Serial number (six characters).
6	RoHS compliance (one character). **Y** indicates environmental protection processing.
7	Internal model, that is, product name.

1.3 Ports

Table 1-1 Panel port description

Port	Quantity	Description
USB port	2	The panel provides two USB 3.0 ports, which are compatible with USB 2.0.

1.4 Indicators

The front panel indicators on the CH121 V5 display its working status.

Table 1-2 Indicators on the front panel

Indicator	Meaning	Color	State Description
PWR 	Power button/ indicator	Yellow or green	● Off: The compute node is not powered on. ● Blinking yellow: The power button is locked. **NOTE** When iBMC is starting during the compute node power-on process, the power button is locked. ● Steady yellow: The compute node is to be powered on. ● Steady green: The compute node is powered on. **NOTE** ● When the server is powered on, pressing the power button should shut down the OS properly, but might cause the server to become unresponsive. ● When the server is powered on, holding down the power button for 6 seconds forcibly powers off the server. ● When the server is ready to be powered on, you can press the power button to do so.
UID	UID button/ indicator	Blue	The Unit Identification (UID) indicator helps locate a compute node in a chassis. ● On: indicates that the compute node has been located. ● Blinking: distinguishes the compute node from multiple compute nodes that have also been located. ● Off: the compute node has not been powered on or is not being located. **NOTE** ● You can remotely control the UID indicator status (off, on, or blinking) by using the MM910. ● Press the UID button to turn on or off the UID indicator. ● Hold down the UID button for 4 to 6 seconds to reset iBMC.

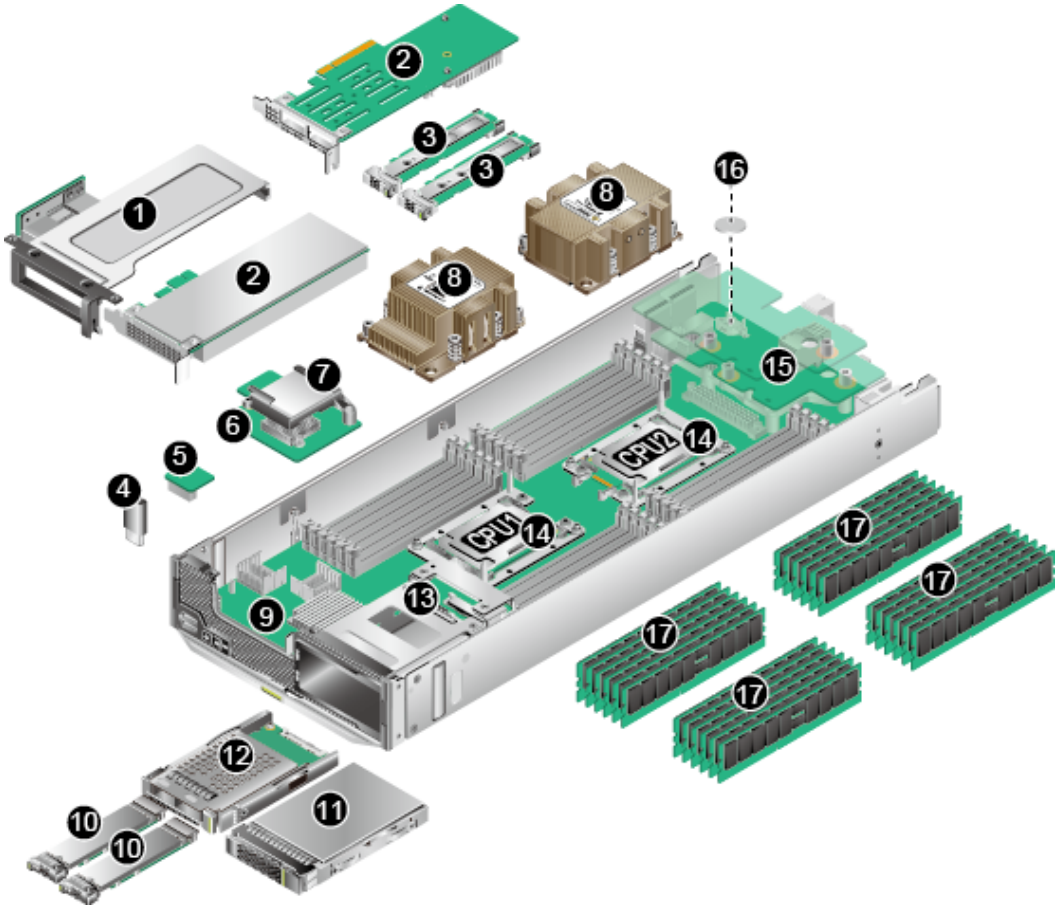
Indicator	Meaning	Color	State Description
HLY	Health status indicator	Red or green	● Off: The compute node is not powered on. ● Steady green: The compute node hardware is operating properly. ● Blinking red (once a second): A major alarm is generated for the compute node. ● Blinking red (five times a second): A critical alarm is generated for the compute node, or the compute node is not securely installed.
	Activity indicator of a hard drive	Green	● Off: The hard drive is faulty or not detected. ● Blinking green: Data is being read from or written to the hard drive, or being synchronized between hard drives. ● Steady green: The hard drive or is inactive.
	Fault indicator of a hard drive	Yellow	● Off: The hard drive is operating properly. ● Blinking yellow: The hard drive is being located, or RAID is being rebuilt. ● Steady yellow: The hard drive is faulty or not detected.

1.5 Hardware Structure

This section describes the components, PCIe devices, and mainboard layout of the CH121 V5.

Components

Figure 1-5 Components of the CH121 V5



1	(Optional) Half-height half-length PCIe riser card	2	(Optional) Half-height, half-length standard PCIe card
3	(Optional) M.2 SSDs	4	(Optional) USB flash drive
5	(Optional) TPM card	6	RAID controller card
7	(Optional) Supercapacitor	8	Heat sinks
9	Mainboard	10	(Optional) M.2 FRUs
11	Drive	12	(Optional) M.2 adapter
13	Drive cage	14	CPUs
15	Mezzanine cards	16	BIOS battery
17	DIMMs	-	-

Table 1-3 Component description

No.	Name	Description
1	(Optional) Half-height half-length PCIe riser card	The PCIe riser card provides one PCIe 3.0 x16 slot.
2	(Optional) Half-height, half-length standard PCIe card	The standard PCIe card (half-height and half-length) can be a PCIe SSD card with 800 GB, 1.2 TB, 1.6 TB, 3.2 TB, or 6.4 TB capacity. An Avago SAS 3004iMR (M.2 RAID PCIe card) can be configured. It can be used together with the M.2 SSD and supports RAID 0 and RAID 1. The interface is PCIe 3.0 x16.
3	(Optional) M.2 SSD	When an Avago SAS 3004iMR is used as the half-height half-length standard PCIe card, it supports two M.2 SSDs and hot swap of each M.2 SSD.
4	(Optional) USB flash drive	The mainboard has a built-in USB port for connecting to a USB 3.0 device with dimensions 33.9 mm x 14.5 mm x 7.12 mm (H x W x D).
5	(Optional) TPM card	TPM 2.0 is supported. TPM is a security card which complies with Trusted Computing Group (TCG) standards. It enhances platform security by preventing viruses or unauthorized operations.
6	RAID controller card	The RAID controller card connects to external hard drives to expand the storage capacity of the compute node. The RAID controller card provides two SAS/SATA ports to connect to external hard drives. The CH121 V5 supports the LSI SAS 3008, LSI SAS 3108, Avago SAS 3408, and Avago SAS 3508 RAID controller cards and the Avago SAS 3004iMR RAID PCIe card. For details, use the **Huawei Server Compatibility Checker**. ● The LSI SAS 3008 supports RAID 0 and RAID 1. ● The LSI SAS 3108 supports RAID 0, 1, 5, 6, 10, 50, and 60. When configured on the CH121 V5, it supports only RAID 0 and 1. ● The Avago SAS 3408 supports RAID 0 and RAID 1. ● The Avago SAS 3508 supports RAID 0, 1, 5, 6, 10, 50, and 60. When configured on the CH121 V5, it supports only RAID 0 and 1. ● The Avago SAS 3004iMR supports RAID 0 and RAID 1.
7	(Optional) Supercapacitor	Protects cache data from power failures for the RAID controller card.

No.	Name	Description
8	Heat sink	A heat sink cools a CPU. Each CPU is configured with one heat sink. If CPU power consumption is less than or equal to 165 W, the heat sink of CPU 2 is higher than that of CPU 1. If CPU power consumption is greater than 165 W, the two heat sinks are of the same height, but the heat sink of CPU 2 has a higher fin density than that of CPU 1.
9	Mainboard	The mainboard holds the CPUs, DIMMs, hard drive interface module, power control module, intelligent baseboard management controller (iBMC), logic module, chipset, LOM, and display adapter. The compute node chipset is the Platform Controller Hub (PCH) using the Intel® C622 chip. The Hi1710 chip of iBMC has an integrated video chip with 32 MB display memory. The maximum resolution is 1600 x 1200 at 60 Hz with 16 M colors.
10	(Optional) M.2 FRU	● An M.2 SSD with a SATA 3.0 interface is a high-speed, compact storage device with high stability. ● The CH221 V5 supports the M.2 FRUs of the following specifications: – **2280**: 22 mm x 80 mm (0.86 in. x 3.15 in.) – **2242**: 22 mm x 42 mm (0.86 in. x 1.65 in.) ● Each 2.5-inch drive slot can hold two M.2 FRUs and one M.2 adapter. A drive slot does not support mixed configuration of a drive and an M.2 FRU. A maximum of four M.2 FRUs can be configured. ● Each M.2 FRU is hot-swappable and can be independently installed and removed.
11	Drive	The compute node supports at most two 2.5-inch HDDs or SSDs (SAS, SATA, or NVMe SSDs). Mixed configuration of HDDs and SSDs is supported. Each HDD or SSD is hot-swappable and can be installed and removed separately. **NOTE** If the BIOS is in Legacy mode, 4K native (4Kn) drives are not supported.
12	(Optional) M.2 adapter	Provides two SATA 3.0 ports for connecting to the two M.2 FRUs in a 2.5-inch drive slot.
13	Hard drive tray	Houses hard drives.

No.	Name	Description
14	CPU	The mainboard supports one or two CPUs. ● Intel® Xeon® Scalable full-series CPUs (Bronze 3100, Silver 4100, Gold 5100/6100, and Platinum 8100) with up to 28 cores. ● Each CPU is integrated with memory controllers and supports six DDR4 memory channels. Each channel supports two DDR4 DIMMs at 2400 or 2666 MT/s. ● Each CPU integrates a PCIe controller with 48 lanes and supports PCIe 3.0. ● Every two CPUs are interconnected through two Ultra Path Interconnect (UPI) links, with each link delivering up to 10.4 GT/s. ● The CPUs support a maximum core frequency of 3.6 GHz.
15	Mezzanine card	The mainboard provides two mezzanine card connectors to connect to the switch or pass-through modules through the midplane. ● The upper mezzanine card is Mezz 1, and the lower one is Mezz 2. ● Socket CPU 1 provides PCIe 3.0 x16 bandwidth for connecting to Mezz 1, and socket CPU 2 provides PCIe 3.0 x16 bandwidth for connecting to Mezz 2. **Figure 1-7** shows the connections between mezzanine cards and CPUs. ● Mezz 1 connects to slots 2X and 3X at the rear of the E9000 chassis. ● Mezz 2 connects to slots 1E and 4E at the rear of the E9000 chassis.
16	BIOS battery	When the compute node is not powered on, the BIOS battery supplies power to the real time clock (RTC).
17	DIMM	Up to 24 DIMM slots for installing DIMMs (12 DIMMs for each CPU). ● Maximum memory speed: 2666 MT/s. ● Memory protection technology for reliability, availability, serviceability (RAS): advanced error checking and correcting (ECC), memory mirroring, SDDC, and memory sparing. ● DIMM type: registered DIMM (RDIMM) and load-reduced DIMM (LRDIMM).

PCIe Devices

Table 1-4 describes the mapping between PCIe slots and CPUs, and the PCIe specifications of the CH121 V5.

NOTE

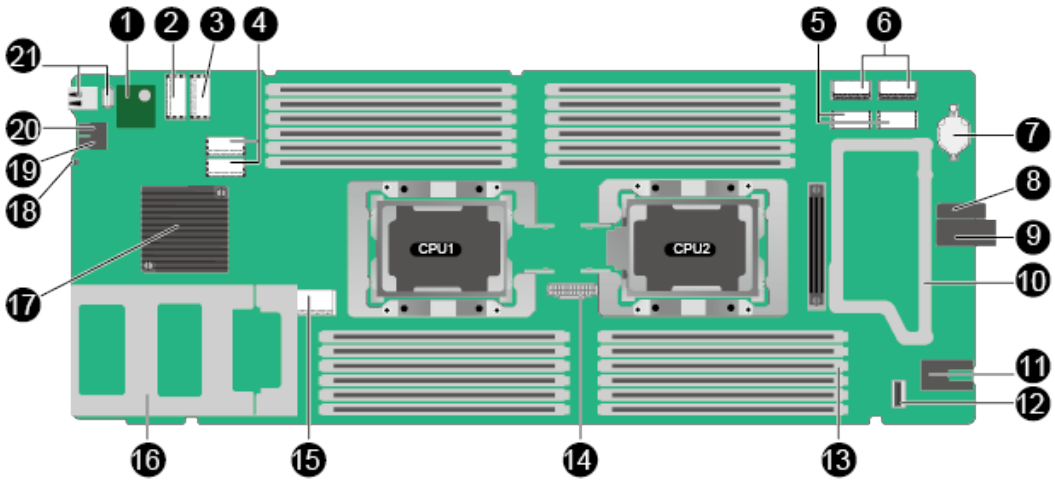
If socket CPU 2 is vacant, its corresponding PCIe devices do not work.

Table 1-4 PCIe devices

PCIe Device	Device Name on the BMC	CPU	PCIe Standard	Connector Bandwidth	Bus Width	Port	Device Size
RAID controller card	\	CPU 1	PCIe 3.0	x8	x8	Port 1A	Non-standard device
Mezz 1	\	CPU 1	PCIe 3.0	x16 or (x8 + x8)	x16 or (x8 + x8)	Port 2A or (Port 2A + Port 2C)	Non-standard device
Mezz 2	\	CPU 2	PCIe 3.0	x16 or (x8 + x8)	x16 or (x8 + x8)	Port 2A or (Port 2A + Port 2C)	Non-standard device
PCIe Riser 1	PCIe riser card 1	CPU 1	PCIe 3.0	x16	x16	Port 3A	Half-height half-length
NVMe SSD 0	disk 0	CPU 2	PCIe 3.0	x4	x4	Port 1C	2.5-inch drive
NVMe SSD 2	disk 2	CPU 2	PCIe 3.0	x4	x4	Port 1D	2.5-inch drive

Mainboard Layout

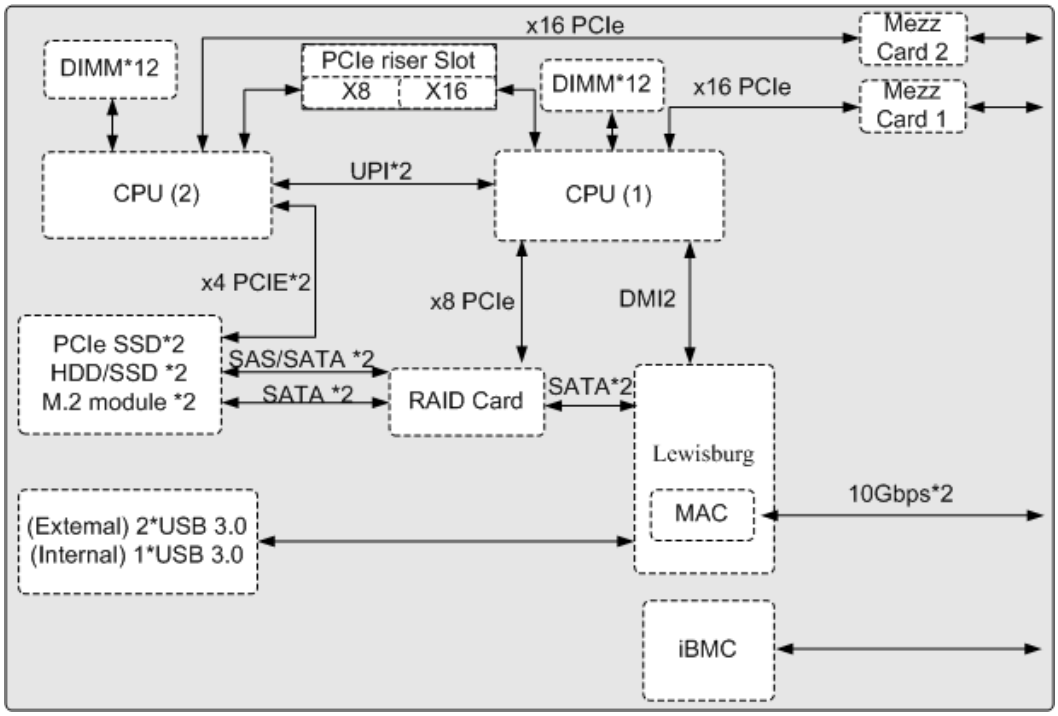
Figure 1-6 Positions of connectors and other components



1	TPM card connector	2	PCIe riser card connector (PCIe 3.0 x16)
3	PCIe riser card connector (x8)	4	RAID controller card connectors
5	Mezzanine card 2 connectors	6	Mezzanine card 1 connectors
7	BIOS battery	8	Positioning sleeve
9	Midplane signal connector	10	Mezzanine card tray
11	Power connector	12	SoftRAID key connector
13	DIMM slots	14	CPU2 OPA sideband signal interface
15	Drive backplane connector	16	Drive cage
17	Platform Controller Hub (PCH)	18	HLY indicator
19	UID button/indicator	20	Power button/indicator
21	USB 3.0 ports	-	-

1.6 Logical Structure

Figure 1-7 Logical structure of the CH121 V5



The CH121 V5 uses Intel® Xeon® Scalable new-generation CPUs. Each CPU supports 12 DIMMs. The CPUs are interconnected through UPI links carrying up to 10.4 GT/s. CPU 1 connects to the Lewisburg chip through the DMI2 link at a speed of 8 GT/s. Through PCIe links, both CPUs connect to mezzanine cards that provide service ports.

The Lewisburg PCH is a next-generation Intel® southbridge chip used on server platforms. It supports external I/O interfaces and bus expansion, and is integrated with two MAC chips to provide two 10 Gbit/s interfaces.

The hard drive interface module consists of a RAID card and a hard drive backplane (2 x HDD/SSD/M.2 module in the preceding figure). The hard drive interface module connects to the CPUs through PCIe.

iBMC provides device management functions, such as compute node power control, slot ID query, power supply monitoring, and KVM over IP.

1.7 Technical Specifications

Table 1-5 Technical Specifications

Category	Feature	Specifications
Physical specifications	Dimensions (H x W x D)	60.46 mm x 210 mm x 537.2 mm (2.4 in. x 8.26 in. x 21.14 in.)
	Color	● Front panel: black ● Cover: silver
	Weight	● Net: 6.5 kg (14.33 lb) ● Packing materials: 2.3 kg (5.07 lb)
Environmental specifications	Temperature	● Operating temperature: 5°C to 40°C (41°F to 104°F) (ASHRAE Class A3 compliant) ● Storage temperature: -40°C to +65°C (-40°F to +149°F) ● Temperature change rate: < 20°C/h (36°F/h) **NOTE** If Intel® Xeon® Platinum 8180, Platinum 8180M, Platinum 8168, Gold 6144, Gold 6146, or Gold 6154 CPUs are used, the maximum operating temperature is 35°C (95°F).
	Humidity	● Operating humidity: 5% RH to 85% RH (non-condensing) ● Storage humidity: 5% RH to 95% RH (non-condensing) ● Humidity change rate: < 20% RH/h
	Altitude	At an altitude of 900 m (2952.72 ft.), the maximum operating temperature is 40°C (104°F). At altitudes from 900 m (2952.72 ft.) to 5000 m (16404 ft.), the maximum operating temperature decreases by 1°C (1.8°F) for each 300 m (984.24 ft.) increase in altitude. HDDs cannot be configured if the altitude is higher than 3000 m (9842.5 ft).

Category	Feature	Specifications
	Corrosive gases	● Corrosion rate of the copper test piece: < 300 Å/month (in compliance with the ANSI/ISA-71.04-2013 gaseous corrosion level G1) ● Corrosion rate of the silver test piece: < 200 Å/month
	Airborne particulates	● The ISO14664-1 Class 8 requirements are met. You are advised to use a professional organization to monitor airborne particulate matter in the equipment room. ● There is no explosive, conductive, magnetic, or corrosive dust in the equipment room.
Input power supply	Rated input voltage	12 V DC
Power consumption	Maximum power consumption	730 W Configurations used for testing the maximum power consumption are as follows: ● CPU: two 8168 CPUs ● Memory: 24 x 64 GB PC4 2666 MT/s ● Drive: two SATA SSDs ● RAID controller card: LSI SAS3008 ● NIC: – Mezz 1: MZ710 – Mezz 2: MZ620 ● PCIe card: ES3000 V3

2 Features

Performance and Scalability

- Each Intel® Xeon® Scalable CPU (Bronze 3100, Silver 4100, Gold 5100/6100, or Platinum 8100) ensures high system performance by providing up to 28 cores, 3.6 GHz frequency, 38.5 MB L3 cache, and two 10.4 GT/s UPI links.
- Each compute node supports two CPUs, 56 cores, and 112 threads to maximize the concurrent execution of multithreaded applications.
- Intel® Turbo Boost Technology 2.0 provides intelligent adaptation, enabling the CPU cores to run at maximum capacity during peak workload by temporarily exceeding the CPU thermal design power (TDP).
- Intel® Hyper-Threading Technology boosts performance for multithreaded applications by allowing each core to concurrently process up to two threads.
- Intel® virtualization technology integrates hardware-level virtualization functions, allowing OS vendors to better use hardware to address virtualization workload.
- Intel® advanced vector extensions (AVX) improves floating-point computing performance for compute-intensive applications.
- A total of 24 load-reduced DIMMs (LRDIMMs) provide quick speed, high availability, and a maximum memory capacity of 3 TB.
- Two Intel® Xeon® Scalable CPUs provide a theoretical maximum memory bandwidth of 256 GB/s (64 bits/8 x 2666 MHz x 6 channels x 2), 66.7% higher than the previous generation.
- The I/O performance (IOPS) of a system configured solely with SSDs is 100 times that of a system configured solely with HDDs, and mixed configuration systems are between these.
- The compute node supports 96-lane PCIe 3.0 (8 GT/s per lane), 20% more than the maximum bandwidth of the previous 80-lane PCIe generation.
- Intel® integrated I/O technology enables the PCIe 3.0 controller to be integrated into Intel® Xeon® Scalable CPUs, shortening I/O latency and enhancing overall system performance.
- Compute nodes support multiple network ports and mezzanine cards.
- Compute nodes support standard PCIe SSDs.
- A LOM with two 10GE ports is supported.

Availability and Serviceability

- Compute nodes provide memory mirroring and backup to avoid system shutdown caused by uncorrectable memory errors.
- A compute node supports hot-swappable hard drives for configuring RAID properties, protecting data and prolonging system life.
- The UID and HLY indicators on the panel and the key component status displayed on the iBMC WebUI help technical support personnel quickly locate faulty components. This simplifies maintenance, shortens troubleshooting time, and improves system availability.
- The compute node supports SSDs, which provide higher reliability than HDDs and prolong system life.
- The integrated iBMC module continuously monitors system parameters, triggers alarms, and performs recovery actions to minimize system downtime.

Manageability and Security

- The iBMC module monitors the compute node operating status and provides remote management.
- An integrated industry-standard unified extensible firmware interface (UEFI) increases setting, configuring, and updating efficiency, and simplifies error handling.
- The optional TPM 2.0 provides advanced encryption functions, such as digital signatures and remote authentication.
- The advanced encryption standard–new instruction (AES NI) algorithm implements stronger encryption more quickly.
- Intel® Execute Disable Bit (EDB) works with supported OSs to prevent certain malicious buffer overflow attacks.
- Intel® Trusted Execution technology enhances security by using hardware-based resistance against malicious software attacks, isolating applications to prevent interference from other applications.

Energy Efficiency

- The Intel® Xeon® Scalable Platinum 8100 CPUs provide significantly better performance than the previous generation. The maximum CPU TDP supported by the compute node is increased by 60 W.
- Intel® intelligent power capability reduces power consumption by powering on or off each CPU based on the site requirements.
- Low-voltage Intel® Xeon® CPUs are more energy efficient, meeting requirements for power- and thermal-constrained data centers and telecommunication environments.
- Low-voltage 1.2 V DDR4 registered DIMMs (RDIMMs) consume 20% to 30% less power than 1.35 V DDR3 RDIMMs.
- An SSD consumes 80% less power than an HDD.
- Compute nodes have hexagonal ventilation holes, which provide better ventilation than round holes, significantly increasing system cooling efficiency.
- The efficient voltage regulator down (VRD) PSUs reduce the loss in mainboard DC power conversion.
- Power capping and power control are supported.

3 Components

This section describes the software and hardware supported by the CH121 V5.

For more details, use the **Huawei Server Compatibility Checker**.

CPU

The mainboard supports one or two CPUs.

- Intel® Xeon® Scalable full-series CPUs are all supported (Bronze 3100, Silver 4100, Gold 5100/6100, and Platinum 8100), with up to 28 cores.
- Each CPU is integrated with memory controllers and supports six DDR4 memory channels. Each channel supports two DDR4 DIMMs at 2400 or 2666 MT/s frequency.
- Each CPU integrates a PCIe controller with 48 lanes and supports PCIe 3.0.
- Every two CPUs are interconnected through two UPI links, with each link delivering up to 10.4 GT/s.
- The CPUs support a maximum core frequency of 3.6 GHz.

Memory

The mainboard provides up to 24 DIMM slots for installing DIMMs (12 DIMMs for each CPU). You must configure at least one DIMM.

DIMM Configuration Rules

Observe the following rules to configure DIMMs:

- The CH121 V5 supports DIMMs with 8 GB, 16 GB, 32 GB, 64 GB, or 128 GB capacity. A compute node provides a maximum memory capacity of 3 TB when DIMMs are fully configured.
- The maximum number of DIMMs supported by a compute node depends on the CPU type, DIMM type, and rank quantity. See **Maximum number of DIMMs** in **Table 3-1**.

  NOTE

  - CPU 1 must be configured with DIMMs. If DIMMs are configured only for CPU 2, the compute node cannot be powered on. **Figure 1-6** shows the positions of CPUs 1 and 2.
  - Note the following rule:

    Maximum number of DIMMs per channel ≤ Maximum number of ranks per channel/Number of ranks per DIMM

- Mixed use of RDIMMs or LRDIMMs of different capacities is supported during capacity expansion but may affect the DIMM RAS feature.

  DIMM mixing complies with the following rules:

  - RDIMMs and LRIMMs cannot be mixed.
  - 128 GB DIMMs cannot be used with DIMMs of other capacities.
  - To install DIMMs with different rank quantities in the same channel, install those with more ranks in slots farther away from the CPU. For example, to install single-rank and dual-rank DIMMs in slots 1A1 and 1A2, install the dual-rank DIMM in slot 1A1 and the single-rank DIMM in slot 1A2.
  - DIMMs of different speeds can be mixed in any way. In this case, the lowest speed among the configured DIMMs is used as the system memory speed.
  - If x4 DIMMs and x8 DIMMs are used together, they do not support certain RAS features, such as memory mirroring, SDDC, SDDC+1, and DDDC.

- The speed of any DIMM is the smaller of the following values:
  - Memory speed supported by the connected CPU.
  - Lowest maximum operating speed of a specific memory configuration. See **Maximum operating speed** in **Table 3-1**.

Table 3-1 DIMM configuration rules for Intel® Xeon® Scalable CPUs

Parameter		**DIMM**		
Rank		Dual rank	Quad rank	Octal rank
Rated speed (MT/s)		2666	2666	2400
Rated voltage (V)		1.2	1.2	1.2
Operating voltage (V)		1.2	1.2	1.2
Maximum number of DIMMs[a]		24	24	24[b]
Maximum capacity per DIMM (GB)		32	64	128
Maximum memory capacity[b] (GB)		768	1536	3072[b]
Maximum memory capacity at the maximum operating speed (GB)		768	1536	3072[b]
Maximum operating speed (MT/s)	One DIMM per channel	2666	2666	2400
	Two DIMMs per channel	2666	2666	2400

Parameter	DIMM
a: The maximum numbers of DIMMs are based on the two-CPU configuration. If only one CPU is installed, the maximum numbers of DIMMs are half the values given in this table. b: Each Intel® Core® M processor supports up to 1.5 TB memory, while each non-M processor supports up to 768 GB memory. The maximum number of 128 GB DIMMs varies according to the CPU type. This table is for reference only. For details about available components, consult a Huawei sales representative.	

DIMM Slot Configuration Rules

For details about DIMM slot configuration rules, see **Huawei Server Product Memory Configuration Assistant**.

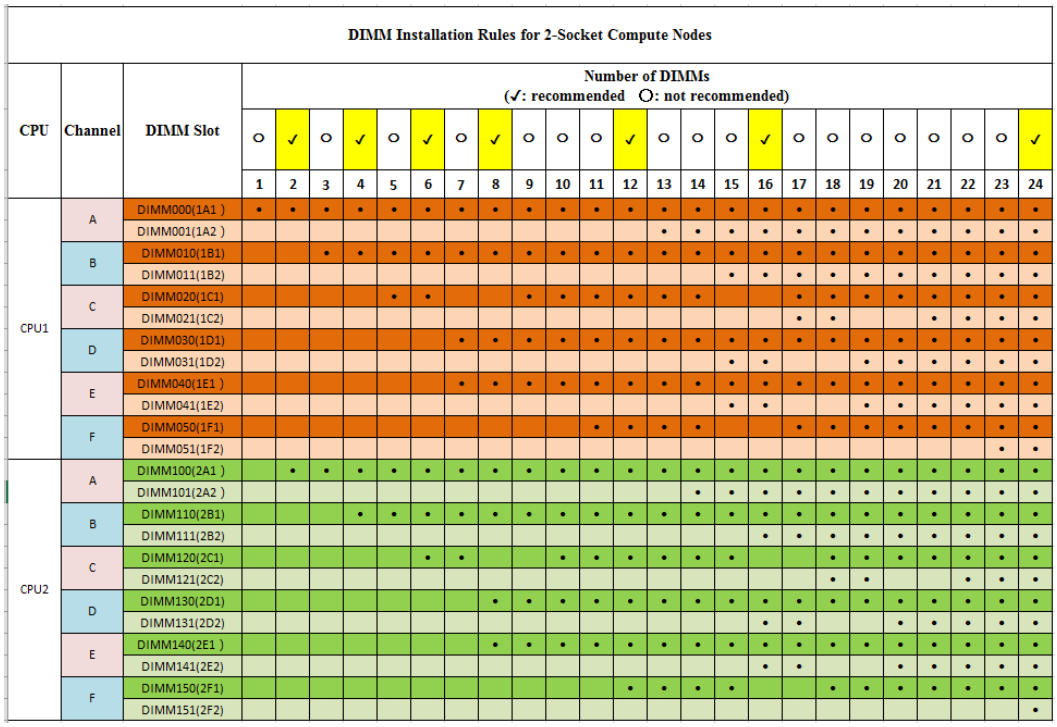
Figure 3-1 and **Figure 3-2** list the DIMM slot installation rule. For details about the DIMM slot numbers, see **Figure 1-6**.

Unbalanced memory configuration is not recommended.

Figure 3-1 DIMM installation guidelines (one CPU)

CPU	Channel	DIMM Slot	Number of DIMMs (✓: recommended ○: not recommended)											
			✓	✓	✓	✓	○	✓	○	✓	○	○	○	✓
			1	2	3	4	5	6	7	8	9	10	11	12
CPU1	A	DIMM000(1A1)	•	•	•	•	•	•	•	•	•	•	•	•
		DIMM001(1A2)							•	•	•	•	•	•
	B	DIMM010(1B1)		•	•	•	•	•	•	•	•	•	•	•
		DIMM011(1B2)								•	•	•	•	•
	C	DIMM020(1C1)			•		•	•	•		•	•	•	•
		DIMM021(1C2)									•		•	•
	D	DIMM030(1D1)				•	•	•	•	•	•	•	•	•
		DIMM031(1D2)								•		•	•	•
	E	DIMM040(1E1)				•	•	•	•	•	•	•	•	•
		DIMM041(1E2)								•		•	•	•
	F	DIMM050(1F1)						•	•		•	•	•	•
		DIMM051(1F2)												•

Figure 3-2 DIMM installation guidelines (two CPUs)



The CH121 V5 provides 24 DDR4 DIMM slots. Each CPU integrates six memory channels. The six memory channels for CPU 1 are 1A–1F, and those for CPU 2 are 2A–2F. **Table 3-2** lists the memory channels for each CPU.

Slots 1A1 – 1F1 and 2A1 – 2F1 are the primary slots for channels 1A–1F and 1A–1F, respectively. When installing DIMMs in a channel, choose the primary slot first. If a primary slot has no DIMM, the DIMM in the standby slot cannot work.

Table 3-2 Memory channels for each CPU

Channel Location	Memory Channel	DIMM Slot
CPU 1	1A	DIMM000 (1A1)
		DIMM001 (1A2)
	1B	DIMM010 (1B1)
		DIMM011 (1B2)
	1C	DIMM020 (1C1)
		DIMM021 (1C2)
	1D	DIMM030 (1D1)
		DIMM031 (1D2)
	1E	DIMM040 (1E1)
		DIMM041 (1E2)

Channel Location	Memory Channel	DIMM Slot
	1F	DIMM050 (1F1)
		DIMM051 (1F2)
CPU 2	2A	DIMM100 (2A1)
		DIMM101 (2A2)
	2B	DIMM110 (2B1)
		DIMM111 (2B2)
	2C	DIMM120 (2C1)
		DIMM121 (2C2)
	2D	DIMM130 (2D1)
		DIMM131 (2D2)
	2E	DIMM140 (2E1)
		DIMM141 (2E2)
	2F	DIMM150 (2F1)
		DIMM151 (2F2)

Storage

The CH121 V5 supports two 2.5-inch HDDs or SSDs and allows mixed configuration of an HDD and an SSD. Each HDD or SSD is hot-swappable and can be independently installed and removed.

In the half-height half-length PCIe slot, an Avago SAS 3004iMR (M.2 RAID PCIe card) can be installed, supporting up to two M.2 SSDs for storage expansion.Each M.2 SSD is hot-swappable and can be independently installed and removed.

NOTE

After the OS is installed on a hard drive, do not move the hard drive to another compute node. Otherwise, you may be unable to mount a virtual floppy drive or a virtual CD/DVD drive on the KVM screen.

The CH121 V5 supports the LSI SAS 3008, LSI SAS 3108, Avago SAS 3408, and Avago SAS 3508 RAID controller cards and the Avago SAS 3004iMR RAID PCIe card. For details, use the **Huawei Server Compatibility Checker**.

- The LSI SAS 3008 supports RAID 0 and RAID 1.
- The LSI SAS 3108 supports RAID 0, 1, 5, 6, 10, 50, and 60. When configured on the CH121 V5, it supports only RAID 0 and 1.
- The Avago SAS 3408 supports RAID 0 and RAID 1.
- The Avago SAS 3508 supports RAID 0, 1, 5, 6, 10, 50, and 60. When configured on the CH121 V5, it supports only RAID 0 and 1.

- The Avago SAS 3004iMR supports RAID 0 and RAID 1.

Table 3-3 RAID level comparison

RAID Level	Reliability	Read Performance	Write Performance	Minimum Number of Hard Drives	Hard Drive Utilization
RAID 0	Low	High	High	2	100%
RAID 1	High	Low	Low	2	50%

I/O Expansion

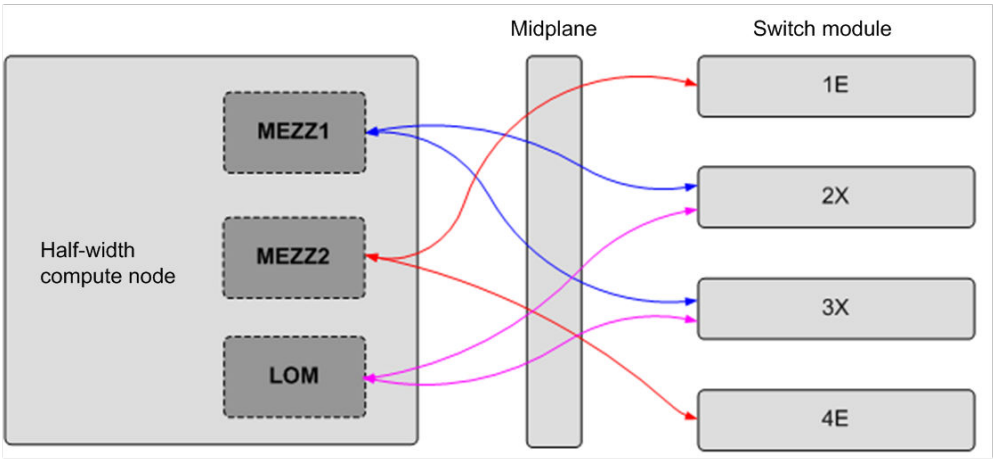
The CH121 V5 supports the following types of PCIe mezzanine cards for connecting to switch modules through the midplane. You can choose a mezzanine card based on the I/O card type and rate requirements.

- GE expansion card
- 10GE expansion card
- 40GE expansion card
- FC or FCoE expansion card
- RoCE expansion card
- IB expansion card

I/O Modules Supported by the LOM

The LOM can connect to I/O modules (switch modules). The following figure shows the connections between the I/O modules and the LOM on a half-width compute node.

Figure 3-3 Connections between the I/O modules and the LOM on a half-width compute node



Mezzanine cards on the compute node connect to switch modules. Mezzanine card 1 connects to Fabric ports of switch module slots 2X and 3X; mezzanine card 2 connects to Fabric ports of switch module slots 1E and 4E.

The LOM is an NIC integrated in the PCH and provides two 10GE ports to connect to the Base ports of slots 2X and 3X.

NOTE

- Before enabling the flow control function of the LOM ports, enable the flow control function of the corresponding Base plane ports of switch modules.
- Forcibly powering off the compute node disables the WOL function of the LOM ports.

Table 3-4 I/O modules supported by the LOM

I/O Module	I/O Slot	LOM	Remarks
CX916	2X/3X	√	N/A
	1E/4E	×	The LOM cannot communicate with I/O modules in slots 1E and 4E.
CX920	2X/3X	√	N/A
	1E/4E	×	The LOM cannot communicate with I/O modules in slots 1E and 4E.

Power Supply

The CH121 V5 is powered solely by the PSUs in the E9000 chassis.

Peripherals

The CH121 V5 supports peripherals such as a USB DVD drive.

OSs and Software

For details about the OSs and virtualization software supported by the CH121 V5, see **Huawei Server Compatibility Checker**.

4 Management

Huawei iBMC, a remote management system for servers, is integrated on E9000 compute nodes. It reliably monitors and manages hardware, seamlessly communicates with chassis management modules, and complies with IPMI V2.0 standards. The management modules can also be used to manage compute nodes in a chassis.

iBMC supports the followings:

- KVM and text console redirection
- Remote virtual media
- IPMI V2.0
- Common information model (CIM)
- Web-based browser login

Table 4-1 iBMC specifications

Feature	Description
Management interface	Supports various management interfaces for system integration. It can be integrated with any standard management system through the following interfaces: ● IPMI V2.0 ● CLI ● HTTPS ● Redfish ● SNMP
Fault detection	Helps detect and accurately locates hardware faults.
System watchdog	Supports BIOS POST, OS watchdog, and automatic system reset after fault timeout. You can enable or disable these features individually.
Boot device configuration	Supports out-of-band configuration for boot devices.

Feature	Description
Alarm management	To ensure that the compute node runs properly without interruption, iBMC supports alarm management, reports alarms in various formats (such as SMTP), and supports syslog service.
Integrated KVM	Allows remote troubleshooting and maintenance using KVM or KVM over IP. The maximum resolution is 1600 x 1200.
Integrated virtual media	Virtualizes local media devices or images for remote compute nodes to facilitate OS installation. The virtual DVD drive supports a transmission rate of up to 8 MB/s.
WebUI	The browser-based WebUI allows quick configuration and information queries. The following web browsers are supported: ● Internet Explorer 8.0 ● Firefox 9.0 ● Chrome 13.0 ● Safari
Fault reproduction	Reproduces faults to help diagnose them quickly.
Screenshots and videos	iBMC allows you to view screenshots and videos without login, facilitating preventive maintenance inspection (PMI).
Black Box	Allows you to enable or disable the black box function and download black box data.
DNS/LDAP	Supports domain management and directory services, significantly simplifying network and configuration management.
Dual-image backup	If iBMC software fails, it starts again from a backup image.
Asset management	Provides intelligent asset management.
Intelligent power management	Supports power capping to increase deployment density and uses dynamic energy saving technology to lower OPEX.

5 Warranty

According to the *Huawei Warranty Policy for Servers & Storage Products* (*Warranty Policy* for short), Huawei provides a three-year warranty for the server, a one-year warranty for DVD-RW drives and batteries, and a three-month warranty for software media. The *Warranty Policy* stipulates warranty terms and conditions, including the available services, response time, terms of service, and disclaimer.

The warranty terms and conditions may vary by country, and some services and/or parts may not be available in all countries. For more information about warranty services in your country, contact Huawei technical support or a local Huawei representative office.

6 Certifications

This section describes the certifications that the E9000 has passed.

Table 6-1 Certifications

Country /Region	Certification	Standard
Europe	WEEE	2002/96/EC, 2012/19/EU
Europe	RoHS	2002/95/EC, 2011/65/EU, EN 50581: 2012
Europe	REACH	EC NO. 1907/2006
Europe	CE	Safety: EN 60950-1: 2006+A11: 2009+A1: 2010+A12: 2011 EMC: ● EN 55022: 2010 ● CISPR 22: 2008 ● EN 55024: 2010 ● CISPR 24: 2010 ● ETSI EN 300 386 V1.6.1: 2012 ● ETSI ES 201 468 V1.3.1: 2005
China	RoHS	SJ/T-11363-20006 SJ/T-11364-20006 GB/T 26572-2011
China	China Environmental Labeling	GB/T24024: 2001 idt ISO14024: 1999 HJ 2507-2011
Australia	C-tick	AS/NZS CISPR22: 2009
America	UL	UL 60950-1
America	FCC	FCC Part 15 (Class A)

Country /Region	Certification	Standard
America	NTRL-UL	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No.60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment-Safety-Part 1: General Requirements)
Canada	IC	ICES-003 Class A
Nigeria	SONCAP	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011
Kingdom of Saudi Arabia (KSA)	SASO	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011
Global	CB	IEC 60950-1
Japan	VCCI	VCCI V-4: 2012

