Cisco UCS C480 ML M5
Purpose Built Server for
Deep Learning
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The Cisco UCS C480 ML, a purpose-built Server for Deep Learning, is a four-rack-unit (4RU) server supporting Intel® Xeon® processor scalable family CPUs with 8 NVIDIA Tesla V100-32GB Tensor Core GPUs with NVLink Interconnect. It supports up to 3 terabytes (TB) of double-data-rate 4 (DDR4) memory in 24 slots, up to 24 small form factor (SFF) hot-swappable SAS/SATA SSD/HDD, up to 6 PCIe NVMe disk drives and up to two internal M.2 drives.

The latest update includes support for 2nd Generation Intel® Xeon® Scalable Processors, 2933-MHz DDR4 memory, and the new Intel® Optane™ DC Persistent Memory Modules (DCPMMs). With this combination of features, up to 7.5 TB of memory is possible (using 12 x 128 GB DDR4 DIMMs and 12 x 512 GB DCPMMs).

4 PCI Express (PCIe) expansion slots support Cisco UCS C-Series and partner network adapters, with additional I/O provided by two 10Gbase-T LOM ports and one 1GbE dedicated out-of-band (OOB) management port. A separate PCIe slot is reserved inside the chassis for a RAID controller card.

Figure 1   Cisco UCS C480 ML M5 Purpose Built Deep Learning Server
Front View

Rear View
1. A maximum of 3 TB memory is available using 128 GB DIMMs.
2. Hot-swap replacement means that you do not have to precondition or shut down the component in software before you remove it.

DETAILED VIEWS

Chassis Front View

*Figure 2* is a detailed front view of the Cisco UCS C480 ML M5 Deep Learning Rack Server.

**Figure 2** Chassis Front View

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power button/LED</td>
</tr>
<tr>
<td>8</td>
<td>Left bay module (drive bays 1 - 8)</td>
</tr>
<tr>
<td></td>
<td>- All 8 bays supports SAS/SATA drives.</td>
</tr>
<tr>
<td></td>
<td>- Bays 1, 2, 7, 8 also support NVMe drives.</td>
</tr>
<tr>
<td></td>
<td>Identification button/LED</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>System status LED</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fan status LED</td>
</tr>
<tr>
<td>5</td>
<td>Temperature status LED</td>
</tr>
<tr>
<td>6</td>
<td>Power supply status LED</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Network link activity LED</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. For more details on the KVM connector, see [KVM CABLE on page 63](#).
## UCS C480 ML M5 Server Rear Panel Features

_Figure 3_ shows the features of the rear panel.

**Figure 3**  UCS C480 ML M5 Server Rear Panel

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Serial port COM 1 (DB-9 connector)</td>
<td>7 Rear identification button/LED</td>
</tr>
<tr>
<td>2 VGA video port (DB-15 connector)</td>
<td>8 USB 3.0 ports (three)</td>
</tr>
<tr>
<td>3 Not used at this time</td>
<td>9 Power supplies 1-4 (hot-swappable, redundant as 3+1)</td>
</tr>
<tr>
<td>4 1-Gb/10-Gb Ethernet ports (LAN1 upper, LAN2 lower)</td>
<td>10 PCIe slots 11-14 for Network Adapter</td>
</tr>
<tr>
<td>The dual LAN ports can support 1 Gbps and 10 Gbps, depending on the</td>
<td></td>
</tr>
</tbody>
</table>
## BASE SERVER STANDARD CAPABILITIES and FEATURES

*Table 1* lists the capabilities and features of the base server. Details about how to configure the server for a particular feature or capability (for example, number of processors, disk drives, or amount of memory) are provided in *CONFIGURING the SERVER on page 12*.

### Table 1   Capabilities and Features

<table>
<thead>
<tr>
<th>Capability/Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis</td>
<td>Four rack unit (4RU) chassis</td>
</tr>
<tr>
<td>GPUs</td>
<td>8 NVIDIA Tesla V100-32GB Tensor Core GPUs with NVLink Interconnect</td>
</tr>
<tr>
<td>CPU</td>
<td>Two Intel® Xeon® processor scalable family CPUs or 2nd Generation Intel® Xeon® scalable processor family CPUs.</td>
</tr>
<tr>
<td>Chipset</td>
<td>Intel® C620 series chipset</td>
</tr>
<tr>
<td>Memory</td>
<td>24 DIMM slots and support for Intel® Optane™ DC Persistent Memory Modules (DCPMMs)</td>
</tr>
<tr>
<td>Multi-bit error protection</td>
<td>This server supports multi-bit error protection</td>
</tr>
<tr>
<td>Expansion slots</td>
<td>There are 4 full-height full-length PCIe expansion slots:</td>
</tr>
<tr>
<td></td>
<td>- Slot Marked 11: CPU1 controlled, Gen-3 x16, FL, FH, NCSI, VIC</td>
</tr>
<tr>
<td></td>
<td>- Slot Marked 12: CPU1 controlled, Gen-3 x16, FL, FH, NCSI, VIC</td>
</tr>
<tr>
<td></td>
<td>- Slot Marked 13: CPU2 controlled, Gen-3 x16, FL, FH, NCSI, VIC</td>
</tr>
<tr>
<td></td>
<td>- Slot Marked 14: CPU2 controlled, Gen-3 x16, FL, FH, NCSI, VIC</td>
</tr>
</tbody>
</table>

**NOTE:** UCS C480 ML M5 ships with dual CPUs

<table>
<thead>
<tr>
<th>Storage controller</th>
<th>For front-loading drives:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- UCSC-RAID-M5HD is an internally mounted Cisco 12G Modular RAID controller with a 4GB cache with a supercap cache backup (UCSC-SCAP-M5). It is used for controlling the SAS/SATA drives in the front drive bays. It cannot control NVMe drives in the front drive bays.</td>
</tr>
<tr>
<td>RAID backup</td>
<td>The system supports supercap power modules (SCPMs):</td>
</tr>
<tr>
<td></td>
<td>- NVMe drives in the front drive bays are controlled directly from the PCIe interfaces on the CPUs.</td>
</tr>
<tr>
<td>DVD drive option</td>
<td>Front-loading drive bay controller (UCSC-RAID-M5H)—the SCPM mounting bracket is on the chassis wall near the front RAID controller socket.</td>
</tr>
<tr>
<td></td>
<td>Front-loading drive bay 3 can optionally be replaced with a DVD drive module.</td>
</tr>
</tbody>
</table>
## BASE SERVER STANDARD CAPABILITIES and FEATURES

### Internal storage devices
- The server can hold up to 24 2.5-inch drives:
  - Front drive bays are divided across three removable drive bay modules. Each drive bay module has 8 drive bays for a total of 24 front-loading drive bays.
  - All 24 front drive bays support SAS/SATA drives.
  - Each of the three drive bay modules has slots that support NVMe SSDs as well as SAS/SATA drives, for a total of 6 bays that support NVMe SSDs.
  - Drive Bay 1 can have up to 4 NVMe drives while Drive Bay 2 and Drive Bay 3 can have 1 NVMe drive each at designated slots.
- SAS and SATA drives are hot-swappable\(^1\); NVMe drives are hot-pluggable\(^2\)

### Internal removable media
- A mini-storage module connector on the motherboard supports either:
  - An M.2 module with two SATA M.2 SSD slots. Mixing different capacity modules is not supported.
  - An SD card module with two SD card slots. Mixing different capacity SD cards is not supported
- One USB 2.0 port on the chassis motherboard.

### ACPI
- This server supports the advanced configuration and power interface (ACPI) 4.0 standard.

### Video
- Resolution up to 1600 x 1200, 16 bpp at 60 Hz. Up to 256 MB of video memory.

### Interfaces
- **Rear panel**
  - One 10/100/1000 dedicated management Ethernet port
  - Two 10 Base-T Gbps Ethernet ports
  - One RS-232 serial port (DB-9 connector)
  - One VGA video port (DB-15 connector)
  - Three USB 3.0 connectors
- **Front panel**
  - One KVM connector (used with the included KVM cable, which provides two USB, one VGA, and one serial connector)

### Power subsystem
- Power supplies are hot-swappable and rear-accessible. Default to redundant 3+1
- 1600 W AC power supply

---

For more information about your server’s power consumption, use the power calculator accessible at

http://ucspowercalc.cisco.com

---

<table>
<thead>
<tr>
<th>Capability/Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal storage devices</td>
<td>The server can hold up to 24 2.5-inch drives:</td>
</tr>
<tr>
<td></td>
<td>- Front drive bays are divided across three removable drive bay modules. Each drive bay module has 8 drive bays for a total of 24 front-loading drive bays.</td>
</tr>
<tr>
<td></td>
<td>- All 24 front drive bays support SAS/SATA drives.</td>
</tr>
<tr>
<td></td>
<td>- Each of the three drive bay modules has slots that support NVMe SSDs as well as SAS/SATA drives, for a total of 6 bays that support NVMe SSDs.</td>
</tr>
<tr>
<td></td>
<td>- Drive Bay 1 can have up to 4 NVMe drives while Drive Bay 2 and Drive Bay 3 can have 1 NVMe drive each at designated slots.</td>
</tr>
<tr>
<td></td>
<td>SAS and SATA drives are hot-swappable(^1); NVMe drives are hot-pluggable(^2)</td>
</tr>
<tr>
<td>Internal removable media</td>
<td>A mini-storage module connector on the motherboard supports either:</td>
</tr>
<tr>
<td></td>
<td>- An M.2 module with two SATA M.2 SSD slots. Mixing different capacity modules is not supported.</td>
</tr>
<tr>
<td></td>
<td>- An SD card module with two SD card slots. Mixing different capacity SD cards is not supported.</td>
</tr>
<tr>
<td></td>
<td>One USB 2.0 port on the chassis motherboard.</td>
</tr>
<tr>
<td>ACPI</td>
<td>This server supports the advanced configuration and power interface (ACPI) 4.0 standard.</td>
</tr>
<tr>
<td>Video</td>
<td>Resolution up to 1600 x 1200, 16 bpp at 60 Hz. Up to 256 MB of video memory.</td>
</tr>
<tr>
<td>Interfaces</td>
<td><strong>Rear panel</strong></td>
</tr>
<tr>
<td></td>
<td>- One 10/100/1000 dedicated management Ethernet port</td>
</tr>
<tr>
<td></td>
<td>- Two 10 Base-T Gbps Ethernet ports</td>
</tr>
<tr>
<td></td>
<td>- One RS-232 serial port (DB-9 connector)</td>
</tr>
<tr>
<td></td>
<td>- One VGA video port (DB-15 connector)</td>
</tr>
<tr>
<td></td>
<td>- Three USB 3.0 connectors</td>
</tr>
<tr>
<td></td>
<td><strong>Front panel</strong></td>
</tr>
<tr>
<td></td>
<td>- One KVM connector (used with the included KVM cable, which provides two USB, one VGA, and one serial connector)</td>
</tr>
<tr>
<td>Power subsystem</td>
<td>Power supplies are hot-swappable and rear-accessible. Default to redundant 3+1</td>
</tr>
<tr>
<td></td>
<td>1600 W AC power supply</td>
</tr>
</tbody>
</table>
Table 1  Capabilities and Features  (continued)

<table>
<thead>
<tr>
<th>Capability/Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fans</td>
<td>Chassis:&lt;br&gt;■ 4 fans modules with 2 fans each, hot-swappable</td>
</tr>
<tr>
<td></td>
<td>Power supply:&lt;br&gt;■ Each power supply is equipped with a fan.</td>
</tr>
<tr>
<td>Baseboard management</td>
<td>Cisco Integrated Management Controller (Cisco IMC) firmware.</td>
</tr>
<tr>
<td></td>
<td>Depending on your settings, the Cisco IMC can be accessed through the 10/100/1000 dedicated management ports, the 10 GBase-T LOM ports, or a Cisco virtual interface card.</td>
</tr>
<tr>
<td>Integrated management</td>
<td>The built-in Cisco Integrated Management Controller (CIMC) GUI or CLI interface enables you to monitor the server inventory, health, and system event logs.</td>
</tr>
</tbody>
</table>

Notes:
1. Hot-swappable = No preconditioning of the component is required before removal while the server is powered on.
2. Hot-pluggable = The component must be shut down in the operating system before removal while the server is powered on.
CONFIGURING the SERVER

Follow these steps to configure the Cisco UCS C480 ML M5 Purpose Built Deep Learning Server

- STEP 1 VERIFY BASE SKU, page 13
- STEP 2 CHOOSE CPU(S), page 14
- STEP 3 CHOOSE MEMORY, page 16
- STEP 4 CHOOSE DRIVE MODULES and DRIVES (OPTIONAL), page 23
- STEP 5 CHOOSE RAID CONFIGURATION, page 26
- STEP 6 CHOOSE PCIe OPTION CARD(S), page 28
- STEP 7 ORDER OPTICAL DRIVE (OPTIONAL), page 29
- STEP 8 ORDER SECURE DIGITAL CARDS M.2 DEVICES (OPTIONAL), page 30
- STEP 9 ORDER INTERNAL MICRO-SD CARD MODULE (OPTIONAL), page 32
- STEP 10 ORDER POWER SUPPLIES, page 33
- STEP 11 SELECT AC POWER CORD(s), page 34
- STEP 12 ORDER OPTIONAL CABLE MANAGEMENT ARM, page 36
- STEP 13 ORDER SECURITY DEVICES (OPTIONAL), page 37
- STEP 14 SELECT MANAGEMENT CONFIGURATION (OPTIONAL), page 38
- STEP 15 SELECT SERVER BOOT MODE (OPTIONAL), page 39
- STEP 16 CHOOSE OPERATING SYSTEM AND VALUE-ADDED SOFTWARE, page 40
- OPTIONAL STEP - ORDER RACKS on page 48
- OPTIONAL STEP - ORDER PDU on page 49
STEP 1  VERIFY BASE SKU

Verify the product ID (PID) of the base server as shown in Table 2.

Table 2  PID of the Base C480 ML M5 Rack Server

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-C480-M5ML8</td>
<td>Chassis w/8GPU, NoPSU, NoRAID/cable, NoHDDmod, NoCPUmod</td>
</tr>
</tbody>
</table>

The base server:

- Includes:
  - 8 NVIDIA Tesla V100-32GB Tensor Core GPUs with NVLink Interconnect
  - Blanking panels for empty drive locations (to maintain cooling air flow)
  - Rail kit

- Does not include:
  - CPUs
  - DIMMs
  - Intel®Optane™ DC Persistent Memory (DCPMMs)
  - Power supplies
  - Hard disk drives (HDDs)
  - Solid-state Drives (SSDs)
  - Plug-in PCIe cards

NOTE: Use the steps on the following pages to configure the server with the components that you want to include.
**STEP 2  CHOOSE CPU(S)**

The standard CPU features are:
- Intel® Xeon® processor Scalable Family CPUs and 2nd Generation Intel® Xeon® scalable processor family CPUs.
- Intel C620 series chipset
- Up to 28 cores per processor, for a total of up to 56 cores per server

Select One CPU Module and Two CPUs

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-C480-CM</td>
<td>UCS C480 ML M5 CPU Module w/o CPU, mem</td>
</tr>
</tbody>
</table>

The available CPUs are listed in **Table 3**.

**Table 3  Available Intel CPUs**

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Clock Freq (GHz)</th>
<th>Power (W)</th>
<th>Cache Size (MB)</th>
<th>Cores</th>
<th>UPI1Links (GT/s)</th>
<th>Highest DDR4 DIMM Clock Support (MHz)²</th>
<th>Processor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-CPU-I6248</td>
<td>2.5</td>
<td>150</td>
<td>27.50</td>
<td>20</td>
<td>3 x 10.4</td>
<td>2993</td>
<td>VDI, Oracle, SQL,</td>
</tr>
<tr>
<td>UCS-CPU-I5218</td>
<td>2.3</td>
<td>125</td>
<td>22.00</td>
<td>16</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Virtualization, Microsoft Azure Stack, Splunk, Data Protection</td>
</tr>
<tr>
<td>UCS-CPU-I6230</td>
<td>2.1</td>
<td>125</td>
<td>27.50</td>
<td>20</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>Big Data, Virtualization</td>
</tr>
<tr>
<td>UCS-CPU-I5220</td>
<td>2.2</td>
<td>125</td>
<td>24.75</td>
<td>18</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>HCI</td>
</tr>
</tbody>
</table>

**8000 Series Processor**

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Clock Freq (GHz)</th>
<th>Power (W)</th>
<th>Cache Size (MB)</th>
<th>Cores</th>
<th>UPI1Links (GT/s)</th>
<th>Highest DDR4 DIMM Clock Support (MHz)²</th>
<th>Processor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-CPU-I8280M</td>
<td>2.7</td>
<td>205</td>
<td>38.50</td>
<td>28</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I8280</td>
<td>2.7</td>
<td>205</td>
<td>38.50</td>
<td>28</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I8260M</td>
<td>2.4</td>
<td>165</td>
<td>35.75</td>
<td>24</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-8180M</td>
<td>2.5</td>
<td>205</td>
<td>38.50</td>
<td>28</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-8180</td>
<td>2.5</td>
<td>205</td>
<td>38.50</td>
<td>28</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-8160</td>
<td>2.1</td>
<td>150</td>
<td>33.00</td>
<td>24</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
</tbody>
</table>

**6000 Series Processor**

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Clock Freq (GHz)</th>
<th>Power (W)</th>
<th>Cache Size (MB)</th>
<th>Cores</th>
<th>UPI1Links (GT/s)</th>
<th>Highest DDR4 DIMM Clock Support (MHz)²</th>
<th>Processor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-CPU-I6254</td>
<td>3.1</td>
<td>200</td>
<td>24.75</td>
<td>18</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I6248</td>
<td>2.5</td>
<td>150</td>
<td>27.50</td>
<td>20</td>
<td>3 x 10.4</td>
<td>2993</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I6244</td>
<td>3.6</td>
<td>150</td>
<td>24.75</td>
<td>8</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I6242</td>
<td>2.8</td>
<td>150</td>
<td>22.00</td>
<td>16</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I6230</td>
<td>2.1</td>
<td>125</td>
<td>27.50</td>
<td>20</td>
<td>3 x 10.4</td>
<td>2933</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
</tbody>
</table>
Table 3  Available Intel CPUs

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Clock Freq (GHz)</th>
<th>Power (W)</th>
<th>Cache Size (MB)</th>
<th>Cores</th>
<th>UPI¹Links (GT/s)</th>
<th>Highest DDR4 DIMM Clock Support (MHz)²</th>
<th>Processor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-CPU-6154</td>
<td>3.0</td>
<td>200</td>
<td>24.75</td>
<td>18</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6152</td>
<td>2.1</td>
<td>140</td>
<td>30.25</td>
<td>22</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6148</td>
<td>2.4</td>
<td>150</td>
<td>27.50</td>
<td>20</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6144</td>
<td>3.5</td>
<td>150</td>
<td>24.75</td>
<td>8</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6142M</td>
<td>2.6</td>
<td>150</td>
<td>22.00</td>
<td>16</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6142</td>
<td>2.6</td>
<td>150</td>
<td>22.00</td>
<td>16</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6138</td>
<td>2.0</td>
<td>125</td>
<td>27.50</td>
<td>20</td>
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<td>Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-6136</td>
<td>3.0</td>
<td>150</td>
<td>24.75</td>
<td>12</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
</tbody>
</table>

5000 Series Processor

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Clock Freq (GHz)</th>
<th>Power (W)</th>
<th>Cache Size (MB)</th>
<th>Cores</th>
<th>UPI¹Links (GT/s)</th>
<th>Highest DDR4 DIMM Clock Support (MHz)²</th>
<th>Processor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-CPU-I5220</td>
<td>2.2</td>
<td>125</td>
<td>24.75</td>
<td>18</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-I5218</td>
<td>2.3</td>
<td>125</td>
<td>22.00</td>
<td>16</td>
<td>3 x 10.4</td>
<td>2666</td>
<td>2nd Gen Intel® Xeon®</td>
</tr>
<tr>
<td>UCS-CPU-5122</td>
<td>3.6</td>
<td>105</td>
<td>16.50</td>
<td>4</td>
<td>2 x 10.4</td>
<td>2666</td>
<td>Intel® Xeon®</td>
</tr>
</tbody>
</table>

4000 Series Processor

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Clock Freq (GHz)</th>
<th>Power (W)</th>
<th>Cache Size (MB)</th>
<th>Cores</th>
<th>UPI¹Links (GT/s)</th>
<th>Highest DDR4 DIMM Clock Support (MHz)²</th>
<th>Processor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-CPU-4116</td>
<td>2.1</td>
<td>85</td>
<td>16.50</td>
<td>12</td>
<td>2 x 9.6</td>
<td>2400</td>
<td>Intel® Xeon®</td>
</tr>
</tbody>
</table>

Notes:
1. UPI = Ultra Path Interconnect
2. If higher or lower speed DIMMs are selected than what is shown in the table for a given CPU, the DIMMs will be clocked at the lowest common denominator of CPU clock and DIMM clock.
3. For details on memory support for processor classes and CPU modes, see Memory Support for CPU Classes and CPU Modes on page 58.
4. For 2nd Generation Intel® Xeon® Scalable Processor, UCSM 4.0(4b) software release is required.

Approved Configurations

(1) Two-CPU Configuration Only

- Must choose two identical CPUs from any one of the rows of Table 3 on page 14
- CPUs 1 and 2 should always will be populated.
**STEP 3  CHOOSE MEMORY**

The standard memory features are:

- Clock speed: 2666 MHz or 2933 MHz depending on CPU type
- Ranks per DIMM: 1, 2, 4, or 8
- Operational voltage: 1.2 V
- Registered ECC DDR4 DIMMs (RDIMMs), Load-reduced DIMMs (LRDIMMs) or Intel® Optane™ DC Persistent Memory Modules (DCPMMs).
- New purchases with 2nd Generation Intel Scalable CPUs need to be configured with 2933-MHz DIMMs.

Memory is organized with six memory channels per CPU, with up to two DIMMs per channel, as shown in *Figure 4*.

![Figure 4](C480 M5 Memory Organization)
Select DIMMs and Memory Mirroring

Select the memory configuration and whether or not you want the memory mirroring option. The supported memory DIMMs and the mirroring option are listed in Table 4.

Table 4 Available DDR4 DIMMs

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
<th>Voltage</th>
<th>Ranks /DIMM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2666-MHz</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-MR-128G8RS-H</td>
<td>128 GB DDR4-2666-MHz TSV-RDIMM/8R/x4</td>
<td>1.2 V</td>
<td>8</td>
</tr>
<tr>
<td>UCS-MR-X64G4RS-H</td>
<td>64 GB DDR4-2666-MHz TSV-RDIMM/4R/x4</td>
<td>1.2 V</td>
<td>4</td>
</tr>
<tr>
<td>UCS-ML-X64G4RS-H</td>
<td>64 GB DDR4-2666-MHz LRDIMM/4R/x4</td>
<td>1.2 V</td>
<td>4</td>
</tr>
<tr>
<td>UCS-MR-X32G2RS-H</td>
<td>32 GB DDR4-2666-MHz RDIMM/2R/x4</td>
<td>1.2 V</td>
<td>2</td>
</tr>
<tr>
<td>UCS-ML-X32G2RS-H</td>
<td>32 GB DDR4-2666-MHz LDIMM/2R/x4</td>
<td>1.2 V</td>
<td>2</td>
</tr>
<tr>
<td>UCS-MR-X16G1RS-H</td>
<td>16 GB DDR4-2666-MHz RDIMM/1R/x4</td>
<td>1.2 V</td>
<td>1</td>
</tr>
<tr>
<td><strong>2933-MHz</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-ML-128G4RT-H</td>
<td>128 GB DDR4-2933-MHz LRDIMM/4Rx4 (16Gb) 1.2v</td>
<td>1.2 V</td>
<td>4</td>
</tr>
<tr>
<td>UCS-ML-X64G4RT-H</td>
<td>64 GB DDR4-2933-MHz LRDIMM/4Rx4 (8Gb) 1.2v</td>
<td>1.2 V</td>
<td>4</td>
</tr>
<tr>
<td>UCS-MR-X64G2RT-H</td>
<td>64 GB DDR4-2933-MHz RDIMM/2Rx4 (16Gb) 1.2v</td>
<td>1.2 V</td>
<td>2</td>
</tr>
<tr>
<td>UCS-MR-X32G2RT-H</td>
<td>32GB DDR4-2933-MHz RDIMM/2Rx4 (8Gb) 1.2v</td>
<td>1.2 V</td>
<td>2</td>
</tr>
<tr>
<td>UCS-MR-X16G1RT-H</td>
<td>16GB DDR4-2933-MHz RDIMM/1Rx4/1.2v</td>
<td>1.2 V</td>
<td>1</td>
</tr>
</tbody>
</table>

**Intel® Optane™ DC Persistent Memory Product**

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-MP-128GS-A0</td>
<td>Intel® Optane™ DC Persistent Memory, 128GB, 2666MHz</td>
</tr>
<tr>
<td>UCS-MP-256GS-A0</td>
<td>Intel® Optane™ DC Persistent Memory, 256GB, 2666MHz</td>
</tr>
</tbody>
</table>

**Intel® Optane™ DC Persistent Memory Product Operational Modes**

<table>
<thead>
<tr>
<th>Product</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-DCPMM-AD</td>
<td>App Direct Mode</td>
</tr>
<tr>
<td>UCS-DCPMM-MM</td>
<td>Memory Mode</td>
</tr>
</tbody>
</table>

**Memory Mirroring Option**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO1-MMIRROR</td>
<td>Memory mirroring option</td>
</tr>
</tbody>
</table>

**DIMM Memory Mirroring**

When memory mirroring is enabled, the memory subsystem simultaneously writes identical data to two adjacent channels. If a memory read from one of the channels returns incorrect data due to an uncorrectable memory error, the system automatically retrieves the data from the other channel. A transient or soft error in one channel does not affect the mirrored data, and operation continues unless there is a simultaneous error in exactly the same location on a DIMM and its mirrored DIMM. Memory
mirroring reduces the amount of memory available to the operating system by 50% because only one of the two populated channels provides data.

**CPU Configuration Without Memory Mirroring**

Select from 4, 6, 8, or 12 DIMMs per CPU (DIMMs for all four CPUs must be configured identically). The DIMMs will be placed in each CPU module by the factory as shown in the following tables.

<table>
<thead>
<tr>
<th>#DIMMs</th>
<th>CPU 1/3 DIMM Placement in Channels (for identically ranked DIMMs)</th>
<th>CPU 2/4 DIMM Placement in Channels (for identically ranked DIMMs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(A1, B1); (D1, E1)</td>
<td>(G1, H1); (K1, L1)</td>
</tr>
<tr>
<td>6</td>
<td>(A1, B1, C1); (D1, E1, F1)</td>
<td>(G1, H1, J1); (K1, L1, M1)</td>
</tr>
<tr>
<td>8</td>
<td>(A1, A2, B1, B2); (D1, D2, E1, E2)</td>
<td>(G1, G2, H1, H2); (K1, K2, L1, L2)</td>
</tr>
<tr>
<td>12</td>
<td>(A1, A2, B1, B2, C1, C2); (D1, D2, E1, E2, F1, F2)</td>
<td>(G1, G2, H1, H2, J1, J2); (K1, K2, L1, L2, M1, M2)</td>
</tr>
</tbody>
</table>

**CPU Configuration With Memory Mirroring**

Select from 4, 6, 8, or 12 DIMMs per CPU (DIMMs for all four CPUs must be configured identically). In addition, the memory mirroring option (N01-MMIRROR) as shown in Table 4 on page 17 must be selected.

The DIMMs will be placed by the factory as shown in the following tables.

<table>
<thead>
<tr>
<th>#DIMMs</th>
<th>CPU 1/3 DIMM Placement in Channels (for identical ranked DIMMs)</th>
<th>CPU 2/4 DIMM Placement in Channels (for identical ranked DIMMs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>(A1,B1); (D1,E1)</td>
<td>(G1, H1); (K1, L1)</td>
</tr>
<tr>
<td>12</td>
<td>(A1, B1, C1); (D1, E1, F1)</td>
<td>(G1, H1, J1); (K1, L1, M1)</td>
</tr>
<tr>
<td>16</td>
<td>(A1, A2, B1, B2); (D1, D2, E1, E2)</td>
<td>(G1, G2, H1, H2); (K1, K2, L1, L2)</td>
</tr>
<tr>
<td>24</td>
<td>(A1, A2, B1, B2, C1, C2); (D1, D2, E1, E2, F1, F2)</td>
<td>(G1, G2, H1, H2, J1, J2); (K1, K2, L1, L2, M1, M2)</td>
</tr>
</tbody>
</table>

**NOTE:** System performance is optimized when the DIMM type and quantity are equal for both CPUs, and when all channels are filled equally across the CPUs in the server.
System Speeds

System speed is dependent on how many DIMMs are populated per channel and the CPU DIMM speed support. See Table 5 for details.

Table 5 2666-MHz DIMM Memory Speeds with Different Intel® Xeon® Scalable Processors

<table>
<thead>
<tr>
<th>DIMM and CPU Frequencies (MHz)</th>
<th>DPC</th>
<th>TSV-RDIMM (8Rx4) - 128 GB (MHz)</th>
<th>TSV-RDIMM (4Rx4) - 64 GB (MHz)</th>
<th>LRDIMM (4Rx4) - 64 GB (MHz)</th>
<th>RDIMM (2Rx4) - 32 GB (MHz)</th>
<th>LRDIMM (2Rx4) - 32 GB (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMM = 2666 CPU = 2666</td>
<td>1DPC</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
</tr>
<tr>
<td>DIMM = 2666 CPU = 2400</td>
<td>1DPC</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
</tr>
<tr>
<td>DIMM = 2666 CPU = 2133</td>
<td>1DPC</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
</tr>
</tbody>
</table>

Table 6 2933-MHz DIMM Memory Speeds with Different 2nd Generation Intel® Xeon® Scalable Processors

<table>
<thead>
<tr>
<th>DIMM and CPU Frequencies (MHz)</th>
<th>DPC</th>
<th>LRDIMM (4Rx4) - 128 GB (MHz)</th>
<th>LRDIMM (4Rx4) - 64 GB (MHz)</th>
<th>RDIMM (2Rx4) - 32 GB (MHz)</th>
<th>RDIMM (2Rx4) - 32 GB (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMM = 2933 CPU = 2933</td>
<td>1DPC</td>
<td>2933</td>
<td>2933</td>
<td>2933</td>
<td>2933</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2933</td>
<td>2933</td>
<td>2933</td>
<td>2933</td>
</tr>
<tr>
<td>DIMM = 2933 CPU = 2666</td>
<td>1DPC</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
<td>2666</td>
</tr>
<tr>
<td>DIMM = 2933 CPU = 2400</td>
<td>1DPC</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
<td>2400</td>
</tr>
<tr>
<td>DIMM = 2933 CPU = 2133</td>
<td>1DPC</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
</tr>
<tr>
<td></td>
<td>2DPC</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
<td>2133</td>
</tr>
</tbody>
</table>


Memory Configurations and Modes

DIMM Guidelines

- System speed is dependent on the CPU DIMM speed support. Refer to Table 4 on page 17 for DIMM Speeds
- The C480 M5 server supports four different memory reliability, availability, and serviceability (RAS) modes:
  - Independent Channel Mode
  - Mirrored Channel Mode
  - Lockstep Channel Mode
  - Rank Sparing Mode

**NOTE:** Mixing of Non-Mirrored and Mirrored mode is not allowed.

- Do not mix RDIMMs, LRDIMMs, and TSV-RDIMMs.
- Single-rank DIMMs can be mixed with dual-rank DIMMs in the same channel
- For best performance, observe the following:
  - DIMMs with different timing parameters can be installed on different slots within the same channel, but only timings that support the slowest DIMM will be applied to all. As a consequence, faster DIMMs will be operated at timings supported by the slowest DIMM populated.
  - When one DIMM is used, it must be populated in DIMM slot 1 (farthest away from the CPU) of a given channel.
  - When single or dual rank DIMMs are populated for 2DPC, always populate the higher number rank DIMM first (starting from the farthest slot). For a 2DPC example, first populate with dual rank DIMMs in the DIMM slot 1. Then single-rank DIMMs in the DIMM 2 slot.
- DIMMs for all four CPUs must always be configured identically.
- Cisco memory from previous generation servers (DDR3 and DDR4) is not compatible with UCS C480 M5 server.

**NOTE:** System performance is optimized when the DIMM type and quantity are equal for both CPUs, and when all channels are filled equally across the CPUs in the server.

- Memory can be configured in any number of DIMMs as pairs, though for optimal performance, refer to the C480 Memory Guide at Cisco.com.
DCPMM Guidelines

- DCPMMs require second generation Intel Xeon Scalable Family processors. First generation Xeon Scalable processors do not support DCPMMs.
- All installed DCPMMs must be the same size. Mixing DCPMMs of different capacities is not supported.
- The use of 1Rx8 DIMMs with DCPMMs is not supported.
- DCPMMs and DIMMs must be populated as shown in Table 7 (6 DIMMs per CPU with 2, 4, or 6 DCPMMs per CPU, as shown).

Table 7 2nd Generation Intel® Xeon® Scalable Processor DIMM and DCPMM1 Physical Configurations (quad socket)

<table>
<thead>
<tr>
<th>DIMM to DCPMM Count</th>
<th>iMC1</th>
<th>iMC0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Channel 2</td>
<td>Channel 1</td>
</tr>
<tr>
<td>F2</td>
<td>DIMM</td>
<td>DIMM</td>
</tr>
<tr>
<td>F1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>DIMM</td>
<td>DIMM</td>
</tr>
<tr>
<td>B1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DIMM</td>
<td>DIMM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. All systems must be fully populated with four CPUs when using DCPMMs at this time.

- Two CPUs must be installed in each CPU module when using DCPMMs.
- For Memory Mode, install a minimum of 2 DCPMMs and 6 DIMMs per CPU
- For App Direct Mode, install a minimum of 2 DCPMMs and 6 DIMMs per CPU
- When either Memory Mode or Mixed Mode is used, the ratio of DIMM capacity to DCPMM capacity per CPU must be between 1:16 and 1:4, and the recommended ratio is 1:4 for the best performance. For example, 6x 16GB DIMMs + 2x 256GB DCPMMs is a ratio of 1:5.33 (96GB:512GB). In Mixed Mode, the ratio is between memory and only the volatile portion of the DCPMMs. This ratio requirement does not apply to App Direct mode. See Table 8 for DCCPM memory modes.
**Table 8 Intel® Optane™ DC Persistent Memory Modes**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>App Direct Mode:</td>
<td>DCPMM operates as a solid-state disk storage device. Data is saved and is non-volatile. Both DCPMM and DIMM capacity counts towards CPU tiering (both DCPMM and DIMM capacities count towards the CPU capacity limit)</td>
</tr>
<tr>
<td>Memory Mode:*</td>
<td>DCPMM operates as a 100% memory module. Data is volatile and DRAM acts as a cache for DCPMMs. Only DCPMM capacity counts towards CPU tiering (only the DCPMM capacity counts towards the CPU capacity limit). This is the factory default mode.</td>
</tr>
<tr>
<td>Mix Mode:</td>
<td>DRAM as cache. Only DCPMM capacity counts towards CPU tiering (only the DCPMM capacity counts towards the CPU capacity limit).</td>
</tr>
</tbody>
</table>

**Notes:**
1. For Memory Mode, the Intel-recommended DIMM to DCPMM capacity ratio in the same CPU socket is from 1:4 to 1:16.

- For each memory channel with both a DCPMM and a DIMM installed, the DCPMM is installed in channel slot 2 (closest) and the DIMM is installed in channel slot 1.
- To maximize performance, balance all memory channels.
- In configurations with DCPMMs installed, memory mirroring is supported, with two restrictions:
  - Mirroring is only enabled on the DIMMs installed in the server; The DCPMMs themselves do not support mirroring.
  - Only App Direct mode is supported. Memory mirroring cannot be enabled when DCPMMs are in Memory Mode or Mixed Mode.
- Memory sparing is not supported with DCPMMs installed

For detailed Intel DCPMM configurations, refer to the following link:

*Cisco UCS C480 M5 ML Server Installation and Service Guide*
**STEP 4**  CHOOSE DRIVE MODULES and DRIVES (OPTIONAL)

Table 9  Intel® Optane™ DC Persistent Memory Modes

<table>
<thead>
<tr>
<th>Intel® Optane™ DC Persistent Memory Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>App Direct Mode: DCPMM operates as a solid-state disk storage device. Data is saved and is non-volatile. Both DCPMM and DIMM capacity counts towards CPU tiering (both DCPMM and DIMM capacities count towards the CPU capacity limit)</td>
</tr>
<tr>
<td>Memory Mode: DCPMM operates as a 100% memory module. Data is volatile and DRAM acts as a cache for DCPMMs. Only DCPMM capacity counts towards CPU tiering (only the DCPMM capacity counts towards the CPU capacity limit). This is the factory default mode.</td>
</tr>
<tr>
<td>Mix Mode: DRAM as cache. Only DCPMM capacity counts towards CPU tiering (only the DCPMM capacity counts towards the CPU capacity limit).</td>
</tr>
</tbody>
</table>

Notes:
1. For Memory Mode, the Intel-recommended DIMM to DCPMM capacity ratio in the same CPU socket is from 1:4 to 1:16. So if you use a 128 GB DIMM in a channel, you could use a 512 GB DCPMM for a 1:4 capacity ratio. If you use a 32 GB DIMM in a channel, you could use a 512 GB DCPMM for a 1:16 capacity ration. There are several other combinations possible.

Choose Drive Modules

You can choose the following drive modules:

- Up to three Drive Modules. This is a front-mounting drive cage that accommodates 8 drives as follows:
  - Up to 8 SAS/SATA HDDs or SSDs per module
  - Up to four NVMe drives for left module and one NVMe drive each for rest of the other two modules.
- Up to three drive modules for 6 x NVMe. This is a front-mounting drive cage accommodating up to 6 NVMe

The available drive cages are listed in Table 10.

Table 10  Available Drive Modules

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-C480-8HDD</td>
<td>UCS C480 M5 Drive Module for 8x HDD (standard cage front facing)</td>
</tr>
</tbody>
</table>

Approved Configurations

- The NVMe drives in the left most Module are restricted to the first two and last two slots only
- The NVMe drives in the middle and right most Modules are restricted to the first slot only.
Choose HDDs and SSDs

The standard hard disk drive (HDD) and solid-state drive (SSD) features are:

- 2.5-inch small form factor
- Hot-swappable
- Sled-mounted

The available drives are listed in Table 11.

Table 11  Supported HDDs and NVMe SSDs

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
<th>Drive Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HDDs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HDDs (15K RPM)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-HD900G15K12N</td>
<td>900 GB 12G SAS 15K RPM SFF HDD</td>
<td>SAS</td>
<td>900 GB</td>
</tr>
<tr>
<td><strong>HDDs (10K RPM)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-HD12TB10K12N</td>
<td>1.2 TB 12G SAS 10K RPM SFF HDD</td>
<td>SAS</td>
<td>1.2 TB</td>
</tr>
<tr>
<td>UCS-HD18TB10K4KN</td>
<td>1.8 TB 12G SAS 10K RPM SFF HDD (4K)</td>
<td>SAS</td>
<td>1.8 TB</td>
</tr>
<tr>
<td><strong>HDDs (7K RPM)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-HD2T7K12N</td>
<td>2.0 TB 12G SAS 7.2K RPM SFF HDD</td>
<td>SAS</td>
<td>2.0 TB</td>
</tr>
<tr>
<td><strong>SAS/SATA SSDs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Enterprise Performance SSDs (High endurance, supports up to 10X or 3X DWPD (drive writes per day))</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SAS SSDs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-SD16T123X-EP</td>
<td>1.6 TB 2.5 inch Enterprise performance 12G SAS SSD (3X endurance)</td>
<td>SAS</td>
<td>1.6 TB</td>
</tr>
<tr>
<td>UCS-SD32T123X-EP</td>
<td>3.2 TB 2.5 inch Enterprise performance 12G SAS SSD (3X endurance)</td>
<td>SAS</td>
<td>3.2 TB</td>
</tr>
<tr>
<td><strong>Enterprise Value SSDs (Supports up to 1X DWPD (drive writes per day))</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SATA SSDs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCS-SD120GM1X-EV</td>
<td>120 GB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>120 GB</td>
</tr>
<tr>
<td>UCS-SD240GM1X-EV</td>
<td>240 GB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>240 GB</td>
</tr>
<tr>
<td>UCS-SD480GM1X-EV</td>
<td>480 GB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>480 GB</td>
</tr>
<tr>
<td>UCS-SD960GM1X-EV</td>
<td>960 GB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>960 GB</td>
</tr>
<tr>
<td>UCS-SD16TM1X-EV</td>
<td>1.6 TB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>1.6 TB</td>
</tr>
<tr>
<td>UCS-SD19TM1X-EV</td>
<td>1.9 TB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>1.9 TB</td>
</tr>
<tr>
<td>UCS-SD38TM1X-EV</td>
<td>3.8 TB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>3.8 TB</td>
</tr>
<tr>
<td>UCS-SD76TM1X-EV</td>
<td>7.6 TB 2.5 inch Enterprise Value 6G SATA SSD (Micron 5100 ECO)</td>
<td>SATA</td>
<td>7.6 TB</td>
</tr>
<tr>
<td><strong>PCIe/NVMe</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCSC-NVMEHW-H3200</td>
<td>3.2 TB 2.5in U.2 HGST SN200 NVMe High Perf. High Endurance</td>
<td>NVMe</td>
<td>3.2 TB</td>
</tr>
</tbody>
</table>
Many configurations are possible. Some will be shown here.

(1) Three Drive Modules for 8x HDD

- **Option 1:** Fill all three drive modules with all SAS/SATA HDDs or SSDs for a total of 24 drives.
- **Option 2:** Fill first drive module (left most) with 4 NVMe and 2 SAS/SATA HDDs or SSDs and the other two with 8 SAS/SATA HDDs/SSDs. You will then have 20 SAS/SATA drives and 4 NVMe drives.
- **Option 3:** Fill first drive module (left most) with 4 NVMe and 2 SAS/SATA HDDs or SSDs and the other two with 7 SAS/SATA HDDs/SSDs and 1 NVMe drive. You will then have 18 SAS/SATA drives and 6 NVMe drives.

Caveats

- You can mix SAS/SATA drives. You can also mix HDD and SSD drives, as long as all the HDDs are in the same RAID volume and all the SSDs are in the same RAID volume.
- SSDs and HDDs should not be mixed in the same RAID volume.
- You can mix SAS/SATA and NVMe drives in the front facing HDD drive module.
STEP 5  CHOOSE RAID CONFIGURATION

The C480 ML M5 server accommodates any one of the following RAID controllers for internal drives:

- Cisco 12G Modular RAID controller with 4GB cache

The C480 ML M5 chassis contains three front drive modules, each housing up to 8 HDD/SSD drives.

Cisco can provide factory-configured RAID 0, 1, 5, 6, and 10 systems depending on the RAID implementation chosen, the RAID controller chosen, and the number of drives ordered. Factory-configured RAID options are listed at the end of Table 12. Note that RAID levels 50 and 60 are supported on the Cisco 12G SAS Modular 12-port RAID controller, but are not factory configurable.

SSD and HDD requires a RAID controller.

Choose Internal Drive RAID Controller

Choose one internal RAID controller with a desired RAID configuration option from Table 12.

Table 12  Available Internal Drive RAID Options

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID Controllers</td>
<td>Cisco 12G Modular RAID controller with 4GB cache (RAID 0, 1, 5, 6, 10, 50, 60 supported)</td>
</tr>
<tr>
<td>UCSC-RAID-M5HD</td>
<td>Plugs into a dedicated PCIe slot on the server motherboard</td>
</tr>
<tr>
<td></td>
<td>Supports from 1 to 24 internal SAS or SATA drives.</td>
</tr>
<tr>
<td></td>
<td>Must be ordered with a UCSC-SCAP-M5 supercap cache backup.</td>
</tr>
<tr>
<td></td>
<td>Factory-configured RAID options: RAID 0, 1, 5, 6, 10 (see the RAID PIDs section in this table).</td>
</tr>
<tr>
<td></td>
<td>This RAID controller supports only SAS/SATA drives in the front-facing HDD card cages.</td>
</tr>
<tr>
<td>RAID Configuration</td>
<td>Factory pre-configured RAID striping option</td>
</tr>
<tr>
<td>R2XX-RAID0</td>
<td>Enable RAID 0 Setting. Requires a minimum of 1 hard drive.</td>
</tr>
<tr>
<td>R2XX-RAID1</td>
<td>Factory pre-configured RAID mirroring option</td>
</tr>
<tr>
<td></td>
<td>Enable RAID 1 Setting. Requires exactly 2 drives, with same size, speed, capacity.</td>
</tr>
<tr>
<td>R2XX-RAID5</td>
<td>Factory pre-configured RAID option</td>
</tr>
<tr>
<td></td>
<td>Enable RAID 5 Setting. Requires minimum 3 drives of same size, speed, capacity.</td>
</tr>
<tr>
<td>R2XX-RAID6</td>
<td>Factory pre-configured RAID option</td>
</tr>
<tr>
<td></td>
<td>Enable RAID 6 Setting. Requires minimum 4 drives of same size, speed, capacity.</td>
</tr>
</tbody>
</table>
Table 12 Available Internal Drive RAID Options (continued)

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
</table>
| R2XX-RAID10      | Factory pre-configured RAID option  
                 | Enable RAID 10 Setting. Requires an even number of drives (minimum 4 drives) of same size, speed, capacity. |

NOTE:  
- No RAID option can be chosen if you have one of the following configurations:  
  - A mix of SAS and SATA drives  
  - No drives

Approved Configurations

(1) One RAID controller card for drive module for 8x HDD SAS/SATA drives

- Choose the UCSC-RAID-M5HD Cisco 12G Modular RAID controller with 4GB cache if you have SAS/SATA drives mounted in any drive module for 8x HDD.

NOTE: NVMe drives in either of the front facing cage options are controlled directly from the PCIe interfaces on the CPUs.

Caveats

- You can choose an optional RAID configuration for the internal drive SAS/SATA RAID controller (RAID 0, 1, 5, 6, or 10), which is pre-configured at the factory. If you do not choose a RAID configuration, the disks will be configured as a JBOD.
STEP 6  CHOOSE PCIe OPTION CARD(S)

The standard PCIe card offerings are:

- Virtual Interface Cards (VIC)
- Network Interface Cards (NICs)

Choose PCIe Option Cards

The available PCIe option cards are listed in Table 13.

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
<th>Card Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-PCIE-C25Q-04</td>
<td>Cisco UCS VIC 1455 Quad Port 10/25G SFP28 CNA PCIE</td>
<td>HHHL*</td>
</tr>
<tr>
<td>UCSC-PCIE-C100-04</td>
<td>Cisco UCS VIC 1495 Dual Port 100G QSFP28 CNA PCIe</td>
<td>HHHL*</td>
</tr>
<tr>
<td>UCSC-PCIE-QS100GF</td>
<td>Qlogic QLE45611HLCU single port 100G NIC</td>
<td>HHHL*</td>
</tr>
</tbody>
</table>

*Caveats*

- Cisco VIC card is installed in PCIe slot marked 11, 12, 13, 14
  - Only one Cisco VIC can be used for both UCSM management and data traffic in the C480 ML M5 server
  - The Cisco VIC in slot 11 handles management and data traffic.
  - Only two VICs total are supported in UCSM mode
- All PCIe slots are standard-height and require a standard-height mounting bracket on the PCIe card.
- To help ensure that your operating system is compatible with the cards you have selected, please check the Hardware Compatibility List at this URL:

STEP 7 ORDER OPTICAL DRIVE (OPTIONAL)

You can order an optional front facing optical drive (DVDRW). If you do, it displaces drive bay module 3 in the front facing drive cage.

Select Optical Drive

The available optical drive is listed in Table 14.

Table 14 Available Optical Drive

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-C480-DVD</td>
<td>UCS C480 M5 Optional DVD drive</td>
</tr>
</tbody>
</table>
CONFIGURING the SERVER

STEP 8 ORDER SECURE DIGITAL CARDS M.2 DEVICES (OPTIONAL)

A mini-storage module connector is provided on the motherboard. There are two choices of mini-storage modules that fit in the connector on the motherboard.

1. Module with two SD HC sockets that accommodate up to two SDHC cards
2. Module with two M.2 sockets that accommodate up to two M.2 devices

The SDHC card ordering information is listed in Table 15.

Table 15 PIDs for Secure Digital Card(s)

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-SD-64G-S</td>
<td>64GB SD Card for UCS servers</td>
</tr>
<tr>
<td>UCS-SD-128G</td>
<td>128GB SD Card for UCS servers</td>
</tr>
<tr>
<td>UCS-MSTOR-SD1</td>
<td>Modular adapter for SD card</td>
</tr>
</tbody>
</table>

Notes:
1. PID UCS-MSTOR-SD is auto included in CCW, not selectable.

Supported Configurations

1. Select one or two Cisco secure digital cards
   - Select up to two 64, or 128 GB SD cards
2. Do not mix SD cards
3. If you select SDHC cards, you cannot select M.2 SATA SSD

The SATA M.2 card ordering information is listed in Table 16.

Table 16 Supported SATA M.2 Cards

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
<th>Mirroring</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-M2-240GB</td>
<td>240 GB M.2 SATA SSD</td>
<td>Supported via SW RAID on Intel PCH</td>
</tr>
<tr>
<td>UCS-M2-960GB</td>
<td>960 GB M.2 SATA SSD</td>
<td>Supported via SW RAID on Intel PCH</td>
</tr>
<tr>
<td>UCS-MSTOR-M21</td>
<td>M.2 module card</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. PID UCS-MSTOR-M2 is auto included in CCW, not selectable.
Supported Configurations

(1) Select either one or two SATA M.2 cards. Do not mix M.2.

(2) If you select M.2 SATA SSDs, you cannot select SDHC cards.

(3) VMware does not support SW RAID. Drive can still be used as a boot device without mirroring.
**STEP 9  ORDER INTERNAL MICRO-SD CARD MODULE (OPTIONAL)**

Order a 32 GB micro-SD card. The micro-SD card serves as a dedicated local resource for utilities such as HUU. Images can be pulled from a file store (NFS/CIFS) and uploaded to the cards for future use.

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS-MSD-32G</td>
<td>32GB Micro-SD Card for UCS servers</td>
</tr>
</tbody>
</table>
**STEP 10 ORDER POWER SUPPLIES**

The available power supplies are listed in *Table 18*.

Table 18  Power Supplies

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-PSU1-1600W</td>
<td>Cisco UCS 1600W AC Power Supply for Rack Server</td>
</tr>
</tbody>
</table>

**Caveats**

- All four power supplies are required
**STEP 11 SELECT AC POWER CORD(s)**

Select the appropriate AC power cords listed in Table 19. You may select a minimum of no power cords and a maximum of two power cords. If you select the option R2XX-DMYMPWRCORD, no power cord is shipped with the server.

**Table 19 Available Power Cords**

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
<th>Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2XX-DMYMPWRCORD</td>
<td>No power cord (dummy PID to allow for a no power cord option)</td>
<td></td>
</tr>
<tr>
<td>CAB-C13-C14-2M</td>
<td>CABASY, WIRE, JUMPER CORD, PWR, 2 Meter, C13/C14, 10A/250V</td>
<td></td>
</tr>
<tr>
<td>CAB-250V-10A-AR</td>
<td>Power Cord, SFS, 250V, 10A, Argentina</td>
<td></td>
</tr>
<tr>
<td>CAB-9K10A-AU</td>
<td>Power Cord, 250VAC 10A 3112 Plug, Australia</td>
<td></td>
</tr>
<tr>
<td>CAB-250V-10A-CN</td>
<td>AC Power Cord - 250V, 10A - PRC</td>
<td></td>
</tr>
<tr>
<td>CAB-9K10A-EU</td>
<td>Power Cord, 250VAC 10A CEE 7/7 Plug, EU</td>
<td></td>
</tr>
<tr>
<td>CAB-250V-10A-ID</td>
<td>Power Cord, SFS, 250V, 10A, India</td>
<td></td>
</tr>
</tbody>
</table>
### Table 19 Available Power Cords

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
<th>Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAB-250V-10A-1S</td>
<td>Power Cord, SFS, 250V, 10A, Israel</td>
<td><img src="image1.png" alt="Ilesa" /></td>
</tr>
<tr>
<td>CAB-9K10A-IT</td>
<td>Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy</td>
<td><img src="image2.png" alt="Ilesa" /></td>
</tr>
<tr>
<td>CAB-9K10A-SW</td>
<td>Power Cord, 250VAC 10A MP232 Plug, Switzerland</td>
<td><img src="image3.png" alt="Ilesa" /></td>
</tr>
<tr>
<td>CAB-9K10A-UK</td>
<td>Power Cord, 250VAC 10A BS1363 Plug (13 A fuse), UK</td>
<td><img src="image4.png" alt="Ilesa" /></td>
</tr>
<tr>
<td>CAB-AC-L620-C13</td>
<td>AC Power Cord, NEMA L6-20 - C13, 2M/6.5ft</td>
<td><img src="image5.png" alt="Ilesa" /></td>
</tr>
<tr>
<td>CAB-250V-10A-BR</td>
<td>Power Cord - 250V, 10A - Brazil</td>
<td><img src="image6.png" alt="Ilesa" /></td>
</tr>
<tr>
<td>CAB-C13-C14-2M-JP</td>
<td>Power Cord C13-C14, 2M/6.5ft Japan PSE mark</td>
<td>images not available</td>
</tr>
<tr>
<td>CAB-C19-C20-3M-JP</td>
<td>Power Cord C19-C20, 3M/10ft Japan PSE mark</td>
<td>images not available</td>
</tr>
<tr>
<td>CAB-N5K6A-NA</td>
<td>Power Cord 200/240V 6A North America</td>
<td>images not available</td>
</tr>
</tbody>
</table>
**STEP 12 ORDER OPTIONAL CABLE MANAGEMENT ARM**

A cable management arm is available for the tool-less slide rail kit (PID UCSC-RAIL-4U-M5). The cable management arm attaches to the left and right slide rails at the rear of the server and is used for cable management. You can order the cable management arm listed in *Table 20*.

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-CMA-4U-M5</td>
<td>Cable Management Arm for UCS C480 ML</td>
</tr>
</tbody>
</table>
STEP 13  ORDER SECURITY DEVICES (OPTIONAL)

Trusted Platform Module (TPM) is a computer chip (microcontroller) that can securely store artifacts used to authenticate the platform (server). These artifacts can include passwords, certificates, or encryption keys. A TPM can also be used to store platform measurements that help ensure that the platform remains trustworthy. Authentication (ensuring that the platform can prove that it is what it claims to be) and attestation (a process helping to prove that a platform is trustworthy and has not been breached) are necessary steps to ensure safer computing in all environments.

A safety intrusion switch gives a notification of any unauthorized mechanical access into the server.

The security device ordering information listed in Table 21.

Table 21  Security Devices

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSX-TPM2-002</td>
<td>Trusted Platform Module 2.0 for UCS servers</td>
</tr>
<tr>
<td>UCS-C480-INT-SW</td>
<td>UCS C480 Safety Intrusion Switch</td>
</tr>
</tbody>
</table>

NOTE: The module used in this server conforms to TPM v2.0, as defined by the Trusted Computing Group (TCG).
STEP 14 SELECT MANAGEMENT CONFIGURATION (OPTIONAL)

By default, the C480 ML M5 server NIC mode is configured to be Shared LOM Extended. This NIC mode allows any LOM port or adapter card port to be used to access the Cisco Integrated Management Controller (CIMC). The Cisco VIC card must be installed in a slot with NCSI support.

To change the default NIC mode to Dedicated, select the UCSC-DLOM-01 PID shown in Table 22. In Dedicated NIC mode, the CIMC can be accessed only through the dedicated management port. See UCS C480 ML M5 Server Rear Panel on page 8 for the location of the management port.

To change the default NIC mode to Cisco Card Mode, select the UCSC-CCARD-01 PID shown in Table 22. In this mode, you can assign an IP address to the CIMC using DHCP and from there you can fully automate your deployment.

For more details on all the NIC mode settings, see http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/sw/gui/config/guide/2-0/b_Cisco_UCS_C-series_GUI_Configuration_Guide_201.pdf

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-DLOM-01</td>
<td>Dedicated Mode BIOS setting for C-Series Servers</td>
</tr>
<tr>
<td>UCSC-CCARD-01</td>
<td>Cisco Card Mode BIOS setting for C-Series Servers</td>
</tr>
</tbody>
</table>
STEP 15 SELECT SERVER BOOT MODE (OPTIONAL)

By default, the C480 ML M5 server will ship with UEFI as the default boot mode. To have a server shipped with the Legacy BIOS mode (which was standard on M4 and previous generation servers), select the Legacy BIOS PID.

Table 23 Server Boot Mode Ordering Information

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-LBIOS-01</td>
<td>Legacy Boot Mode BIOS setting for C-Series Servers</td>
</tr>
</tbody>
</table>
**STEP 16 CHOOSE OPERATING SYSTEM AND VALUE-ADDED SOFTWARE**

Several software programs are available. Select as desired from *Table 24*

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microsoft</strong></td>
<td></td>
</tr>
<tr>
<td>MSWS-19-ST16C</td>
<td>Windows Server 2019 Standard (16 Cores/2 VMs)</td>
</tr>
<tr>
<td>MSWS-19-ST16C-NS</td>
<td>Windows Server 2019 Standard (16 Cores/2 VMs) - No Cisco SVC</td>
</tr>
<tr>
<td>MSWS-19-DC16C</td>
<td>Windows Server 2019 Data Center (16 Cores/Unlimited VMs)</td>
</tr>
<tr>
<td>MSWS-19-DC16C-NS</td>
<td>Windows Server 2019 DC (16 Cores/Unlim VMs) - No Cisco SVC</td>
</tr>
<tr>
<td><strong>Red Hat</strong></td>
<td></td>
</tr>
<tr>
<td>RHEL-2S2V-3A</td>
<td>Red Hat Enterprise Linux (1-2 CPU,1-2 VN); 3-Yr Support Req</td>
</tr>
<tr>
<td>RHEL-2S2V-5A</td>
<td>Red Hat Enterprise Linux (1-2 CPU,1-2 VN); 5-Yr Support Req</td>
</tr>
<tr>
<td>RHEL-VDC-2SUV-1A</td>
<td>RHEL for Virt Datacenters (1-2 CPU, Unlim VN) 1 Yr Supp Req</td>
</tr>
<tr>
<td>RHEL-VDC-2SUV-3A</td>
<td>RHEL for Virt Datacenters (1-2 CPU, Unlim VN) 3 Yr Supp Req</td>
</tr>
<tr>
<td>RHEL-VDC-2SUV-5A</td>
<td>RHEL for Virt Datacenters (1-2 CPU, Unlim VN) 5 Yr Supp Req</td>
</tr>
<tr>
<td>RHEL-2S2V-1A</td>
<td>Red Hat Enterprise Linux (1-2 CPU,1-2 VN); 1-Yr Support Req</td>
</tr>
<tr>
<td>RHEL-2S2V-1S</td>
<td>Red Hat Enterprise Linux (1-2 CPU,1-2 VN); Prem 1Yr SnS Req</td>
</tr>
<tr>
<td>RHEL-2S2V-3S</td>
<td>Red Hat Enterprise Linux (1-2 CPU,1-2 VN); Prem 3Yr SnS Req</td>
</tr>
<tr>
<td>RHEL-2S-HA-1S</td>
<td>RHEL High Availability (1-2 CPU); Premium 1-yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-2S-HA-3S</td>
<td>RHEL High Availability (1-2 CPU); Premium 3-yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-2S-RS-1S</td>
<td>RHEL Resilient Storage (1-2 CPU); Premium 1-yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-2S-RS-3S</td>
<td>RHEL Resilient Storage (1-2 CPU); Premium 3-yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-2S-SFS-1S</td>
<td>RHEL Scalable File System (1-2 CPU); Premium 1-yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-2S-SFS-3S</td>
<td>RHEL Scalable File System (1-2 CPU); Premium 3-yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-VDC-2SUV-1S</td>
<td>RHEL for Virt Datacenters (1-2 CPU, Unlim VN) 1 Yr SnS Reqd</td>
</tr>
<tr>
<td>RHEL-VDC-2SUV-3S</td>
<td>RHEL for Virt Datacenters (1-2 CPU, Unlim VN) 3 Yr SnS Reqd</td>
</tr>
<tr>
<td><strong>VMware</strong></td>
<td></td>
</tr>
<tr>
<td>VMW-VSP-EPL-5A</td>
<td>VMware vSphere 6 Ent Plus (1 CPU), 5-yr, Support Required</td>
</tr>
<tr>
<td>VMW-VSP-STD-1A</td>
<td>VMware vSphere 6 Standard (1 CPU), 1-yr, Support Required</td>
</tr>
<tr>
<td>VMW-VSP-STD-3A</td>
<td>VMware vSphere 6 Standard (1 CPU), 3-yr, Support Required</td>
</tr>
</tbody>
</table>
Table 24  OSs and value added software

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMW-VSP-EPL-3A</td>
<td>VMware vSphere 6 Ent Plus (1 CPU), 3-yr, Support Required</td>
</tr>
<tr>
<td>VMW-VSP-EPL-1A</td>
<td>VMware vSphere 6 Ent Plus (1 CPU), 1-yr, Support Required</td>
</tr>
<tr>
<td>VMW-VSP-STD-5A</td>
<td>VMware vSphere 6 Standard (1 CPU), 5-yr, Support Required</td>
</tr>
<tr>
<td>SLES-2S2V-1A</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, 1-2 VM); 1-Yr Support Req</td>
</tr>
<tr>
<td>SLES-2SUV-1A</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, Unl VM); 1-Yr Support Req</td>
</tr>
<tr>
<td>SLES-2S2V-3A</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, 1-2 VM); 3-Yr Support Req</td>
</tr>
<tr>
<td>SLES-2SUV-3A</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, Unl VM); 3-Yr Support Req</td>
</tr>
<tr>
<td>SLES-2S2V-5A</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, 1-2 VM); 5-Yr Support Req</td>
</tr>
<tr>
<td>SLES-2SUV-5A</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, Unl VM); 5-Yr Support Req</td>
</tr>
<tr>
<td>SLES-2S2V-1S</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, 1-2 VM); Prio 1-Yr SnS</td>
</tr>
<tr>
<td>SLES-2SUV-1S</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, Unl VM); Prio 1-Yr SnS</td>
</tr>
<tr>
<td>SLES-2S2V-3S</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, 1-2 VM); Prio 3-Yr SnS</td>
</tr>
<tr>
<td>SLES-2SUV-3S</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, Unl VM); Prio 3-Yr SnS</td>
</tr>
<tr>
<td>SLES-2S2V-5S</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, 1-2 VM); Prio 5-Yr SnS</td>
</tr>
<tr>
<td>SLES-2SUV-5S</td>
<td>SUSE Linux Enterprise Svr (1-2 CPU, Unl VM); Prio 5-Yr SnS</td>
</tr>
<tr>
<td>SLES-2S-HA-1S</td>
<td>SUSE Linux High Availability Ext (1-2 CPU); 1yr SnS</td>
</tr>
<tr>
<td>SLES-2S-HA-3S</td>
<td>SUSE Linux High Availability Ext (1-2 CPU); 3yr SnS</td>
</tr>
<tr>
<td>SLES-2S-HA-5S</td>
<td>SUSE Linux High Availability Ext (1-2 CPU); 5yr SnS</td>
</tr>
<tr>
<td>SLES-2S-GC-1S</td>
<td>SUSE Linux GEO Clustering for HA (1-2 CPU); 1yr Sns</td>
</tr>
<tr>
<td>SLES-2S-GC-3S</td>
<td>SUSE Linux GEO Clustering for HA (1-2 CPU); 3yr Sns</td>
</tr>
<tr>
<td>SLES-2S-GC-5S</td>
<td>SUSE Linux GEO Clustering for HA (1-2 CPU); 5yr Sns</td>
</tr>
<tr>
<td>SLES-2S-LP-1S</td>
<td>SUSE Linux Live Patching Add-on (1-2 CPU); 1yr Sns Required</td>
</tr>
<tr>
<td>SLES-2S-LP-3S</td>
<td>SUSE Linux Live Patching Add-on (1-2 CPU); 3yr Sns Required</td>
</tr>
<tr>
<td>SLES-2S-LP-1A</td>
<td>SUSE Linux Live Patching Add-on (1-2 CPU); 1yr Support Req</td>
</tr>
<tr>
<td>SLES-2S-LP-3A</td>
<td>SUSE Linux Live Patching Add-on (1-2 CPU); 3yr Support Req</td>
</tr>
</tbody>
</table>

Nvidia NGC Support
Table 24 OSs and vale added software

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NV-NGC-S-1YR</td>
<td>Nvidia NGC Support Services For C480 ML; 1 Year</td>
</tr>
<tr>
<td>NV-NGC-S-3YR</td>
<td>Nvidia NGC Support Services For C480 ML; 3 Year</td>
</tr>
<tr>
<td>NV-NGC-S-5YR</td>
<td>Nvidia NGC Support Services For C480 ML; 5 Year</td>
</tr>
<tr>
<td>NV-NGC-S-R-1YR</td>
<td>Nvidia NGC Support Services For C480 ML; 1 Year, RENEW</td>
</tr>
</tbody>
</table>
STEP 17 SELECT SERVICE and SUPPORT LEVEL

A variety of service options are available, as described in this section.

**Smart Net Total Care**

For support of the C480 ML Server, Cisco offers the Cisco Smart Net Total Care Service. This service provides expert software and hardware support to help sustain performance and high availability of the unified computing environment. Access to Cisco Technical Assistance Center (TAC) is provided around the clock, from anywhere in the world.

For systems that include Unified Computing System Manager, the support service includes downloads of UCSM upgrades. The Cisco Smart Net Total Care for UCS Service includes flexible hardware replacement options, including replacement in as little as two hours. There is also access to Cisco's extensive online technical resources to help maintain optimal efficiency and uptime of the unified computing environment. For more information please refer to the following url: [http://www.cisco.com/c/en/us/services/technical/smart-net-total-care.html M5?stickynav=1](http://www.cisco.com/c/en/us/services/technical/smart-net-total-care.html M5?stickynav=1)

You can choose a desired service listed in *Table 25*.

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level GSP</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-3OSP-480M5ML8</td>
<td>3C4P</td>
<td>Yes</td>
<td>3YR SNTC 24x7x4OS</td>
</tr>
<tr>
<td>CON-PREM-480M5ML8</td>
<td>C2P</td>
<td>Yes</td>
<td>SNTC 24x7x2OS</td>
</tr>
<tr>
<td>CON-UCSD8-480M5ML8</td>
<td>UCSD8</td>
<td>Yes</td>
<td>UC SUPP DR 24x7x2OS*</td>
</tr>
<tr>
<td>CON-C2PL-480M5ML8</td>
<td>C2PL</td>
<td>Yes</td>
<td>LL 24x7x2OS**</td>
</tr>
<tr>
<td>CON-OSP-480M5ML8</td>
<td>C4P</td>
<td>Yes</td>
<td>SNTC 24x7x4OS</td>
</tr>
<tr>
<td>CON-UCSD7-480M5ML8</td>
<td>UCSD7</td>
<td>Yes</td>
<td>UCS DR 24x7x4OS*</td>
</tr>
<tr>
<td>CON-C4PL-480M5ML8</td>
<td>C4PL</td>
<td>Yes</td>
<td>LL 24x7x4OS**</td>
</tr>
<tr>
<td>CON-USD7L-480M5ML8</td>
<td>USD7L</td>
<td>Yes</td>
<td>LLUCS HW DR 24x7x4OS***</td>
</tr>
<tr>
<td>CON-OSE-480M5ML8</td>
<td>C4S</td>
<td>Yes</td>
<td>SNTC 8x5x4OS</td>
</tr>
<tr>
<td>CON-UCSD6-480M5ML8</td>
<td>UCSD6</td>
<td>Yes</td>
<td>UC SUPP DR 8x5x4OS*</td>
</tr>
<tr>
<td>CON-SNCO-480M5ML8</td>
<td>SNCO</td>
<td>Yes</td>
<td>SNTC 8x7xNCDOS***</td>
</tr>
<tr>
<td>CON-OS-480M5ML8</td>
<td>CS</td>
<td>Yes</td>
<td>SNTC 8x5xNBDOS</td>
</tr>
<tr>
<td>CON-UCSD5-480M5ML8</td>
<td>UCSD5</td>
<td>Yes</td>
<td>UCS DR 8x5xNBDOS*</td>
</tr>
</tbody>
</table>

*Includes Drive Retention (see below for full description)

**Includes Local Language Support (see below for full description) – Only available in China and Japan

***Includes Local Language Support and Drive Retention – Only available in China and Japan

****Available in China Only
Smart Net Total Care with Onsite Troubleshooting Service

An enhanced offer over traditional Smart Net Total Care which provides onsite-troubleshooting expertise to aid in the diagnostics and isolation of hardware issue within our customers’ Cisco Unified Computing System (UCS) environment. It is delivered by a Cisco Certified field engineer (FE) in collaboration with remote TAC engineer and Virtual Internet working Support Engineer (VISE). You can choose a desired service listed in Table 26.

Table 26  SNTC With UCS Onsite Troubleshooting Service (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level GSP</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-OSPT-480M5ML8</td>
<td>OSPT</td>
<td>Yes</td>
<td>24X7X4OS Trblshtg</td>
</tr>
<tr>
<td>CON-OSPTD-480M5ML8</td>
<td>OSPTD</td>
<td>Yes</td>
<td>24X7X4OS TrblshtgDR*</td>
</tr>
<tr>
<td>CON-OSPTL-480M5ML8</td>
<td>OSPTL</td>
<td>Yes</td>
<td>24X7X4OS TrblshtgLL**</td>
</tr>
<tr>
<td>CON-OPTLD-480M5ML8</td>
<td>OPTLD</td>
<td>Yes</td>
<td>24X7X4OS TrblshtgLLD***</td>
</tr>
</tbody>
</table>

*Includes Drive Retention (see below for full description)

**Includes Local Language Support (see below for full description) – Only available in China and Japan

***Includes Local Language Support and Drive Retention – Only available in China and Japan

Solution Support

Solution Support includes both Cisco product support and solution-level support, resolving complex issues in multivendor environments, on average, 43% more quickly than product support alone. Solution Support is a critical element in data center administration, to help rapidly resolve any issue encountered, while maintaining performance, reliability, and return on investment.

This service centralizes support across your multivendor Cisco environment for both our products and solution partner products you’ve deployed in your ecosystem. Whether there is an issue with a Cisco or solution partner product, just call us. Our experts are the primary point of contact and own the case from first call to resolution. For more information please refer to the following url:


You can choose a desired service listed in Table 27.

Table 27  Solution Support Service (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level GSP</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-SCSC2P-480M5ML8</td>
<td>SSC2P</td>
<td>Yes</td>
<td>SOLN SUPP 24X7X2OS</td>
</tr>
<tr>
<td>CON-SCSC4P-480M5ML8</td>
<td>SSC4P</td>
<td>Yes</td>
<td>SOLN SUPP 24X7X4OS</td>
</tr>
<tr>
<td>CON-SCSC4S-480M5ML8</td>
<td>SSC4S</td>
<td>Yes</td>
<td>SOLN SUPP 8X5X4OS</td>
</tr>
<tr>
<td>CON-SCSSC-480M5ML8</td>
<td>SSCS</td>
<td>Yes</td>
<td>SOLN SUPP 8X5XNBDOS</td>
</tr>
</tbody>
</table>
Cisco UCS C480 ML Purpose Built Deep Learning Server

Partner Support Service for UCS

Cisco Partner Support Service (PSS) is a Cisco Collaborative Services service offering that is designed for partners to deliver their own branded support and managed services to enterprise customers. Cisco PSS provides partners with access to Cisco's support infrastructure and assets to help them:

- Expand their service portfolios to support the most complex network environments
- Lower delivery costs
- Deliver services that increase customer loyalty

PSS options enable eligible Cisco partners to develop and consistently deliver high-value technical support that capitalizes on Cisco intellectual assets. This helps partners to realize higher margins and expand their practice.

PSS is available to all Cisco PSS partners.

PSS provides hardware and software support, including triage support for third party software, backed by Cisco technical resources and level three support. You can choose a desired service listed in Table 29.

Table 27 Solution Support Service (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-SSDR7-480M5ML8</td>
<td>SSDR7</td>
<td>Yes</td>
<td>SSPT DR 24X7X4OS*</td>
</tr>
<tr>
<td>CON-SSDR5-480M5ML8</td>
<td>SSDR5</td>
<td>Yes</td>
<td>SSPT DR 8X5XNBDO*</td>
</tr>
</tbody>
</table>

Includes Drive Retention (see below for description)

**Available in China only

Table 28 Solution Support Service provider Service (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-SSC2P-480M5ML8</td>
<td>SSC2P</td>
<td>Yes</td>
<td>SOLN SUPP 24X7X2OS</td>
</tr>
<tr>
<td>SP-SSC4P-480M5ML8</td>
<td>SSC4P</td>
<td>Yes</td>
<td>SOLN SUPP 24X7X4OS</td>
</tr>
<tr>
<td>SP-SSC4S-480M5ML8</td>
<td>SSC4S</td>
<td>Yes</td>
<td>SOLN SUPP 8X5X4OS</td>
</tr>
<tr>
<td>SP-SSCS-480M5ML8</td>
<td>SSCS</td>
<td>Yes</td>
<td>SOLN SUPP 8X5XNBDO*</td>
</tr>
</tbody>
</table>

Table 29 PSS (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-PSJ8-480M5ML8</td>
<td>PSJ8</td>
<td>Yes</td>
<td>UCS PSS 24X7X2 OS</td>
</tr>
<tr>
<td>CON-PSJ7-480M5ML8</td>
<td>PSJ7</td>
<td>Yes</td>
<td>UCS PSS 24X7X4 OS</td>
</tr>
<tr>
<td>CON-PSJD7-480M5ML8</td>
<td>PSJD7</td>
<td>Yes</td>
<td>UCS PSS 24X7X4 DR*</td>
</tr>
<tr>
<td>CON-PSJ6-480M5ML8</td>
<td>PSJ6</td>
<td>Yes</td>
<td>UCS PSS 8X5X4 OS</td>
</tr>
<tr>
<td>CON-PSJD6-480M5ML8</td>
<td>PSJD6</td>
<td>Yes</td>
<td>UCS PSS 8X5X4 DR*</td>
</tr>
</tbody>
</table>
CONFIGURING the SERVER

Table 29  PSS (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level GSP</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-NCF2P-480M5ML8</td>
<td>NCF2P</td>
<td>Yes</td>
<td>CMB SVC 24X7X2OS</td>
</tr>
<tr>
<td>CON-NCF4P-480M5ML8</td>
<td>NCF4P</td>
<td>Yes</td>
<td>CMB SVC 24X7X4OS</td>
</tr>
<tr>
<td>CON-NCF4S-480M5ML8</td>
<td>NCF4S</td>
<td>Yes</td>
<td>CMB SVC 8X5X4OS</td>
</tr>
<tr>
<td>CON-NCFC5S-480M5ML8</td>
<td>NCFCS</td>
<td>Yes</td>
<td>CMB SVC 8X5XNBDOS</td>
</tr>
</tbody>
</table>

*Includes Drive Retention (see below for description)

Combined Support Service

Combined Services makes it easier to purchase and manage required services under one contract. The more benefits you realize from the Cisco UCS environment, the more important the technology becomes to your business. These services allow you to:

- Optimize the uptime, performance, and efficiency of your UCS
- Protect your vital business applications by rapidly identifying and addressing issues
- Strengthen in-house expertise through knowledge transfer and mentoring
- Improve operational efficiency by allowing UCS experts to augment your internal staff resources
- Enhance business agility by diagnosing potential issues before they affect your operations

You can choose a desired service listed in Table 30

Table 30 Combined Support Service for UCS (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level GSP</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-NCF2P-480M5ML8</td>
<td>NCF2P</td>
<td>Yes</td>
<td>CMB SVC 24X7X2OS</td>
</tr>
<tr>
<td>CON-NCF4P-480M5ML8</td>
<td>NCF4P</td>
<td>Yes</td>
<td>CMB SVC 24X7X4OS</td>
</tr>
<tr>
<td>CON-NCF4S-480M5ML8</td>
<td>NCF4S</td>
<td>Yes</td>
<td>CMB SVC 8X5X4OS</td>
</tr>
<tr>
<td>CON-NCFC5S-480M5ML8</td>
<td>NCFCS</td>
<td>Yes</td>
<td>CMB SVC 8X5XNBDOS</td>
</tr>
</tbody>
</table>

SP Base Service

Cisco SP Base is Cisco’s core foundational product support offer for service provider customers. This device-level service helps reduce downtime with fast, expert technical support and flexible hardware coverage provided by the Cisco Technical Assistance Center (TAC). It also offers integrated smart capabilities, providing current information about installed base, contracts, and security alerts to enhance the efficiency of support workflows. You can choose a service listed in Table 30.

Table 31 SP Base Service (PID UCSC-C480-M5ML8)

<table>
<thead>
<tr>
<th>Service SKU</th>
<th>Service Level GSP</th>
<th>On Site?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-OS4-480M5ML8</td>
<td>SPC2P</td>
<td>Yes</td>
<td>SP Base 24X7X2OS</td>
</tr>
<tr>
<td>SP-OS3-480M5ML8</td>
<td>SPC4P</td>
<td>Yes</td>
<td>SP Base 24X7X4OS</td>
</tr>
<tr>
<td>SP-OS2-480M5ML8</td>
<td>SPC4S</td>
<td>Yes</td>
<td>SP Base 8X5X4OS</td>
</tr>
<tr>
<td>SP-OS1-480M5ML8</td>
<td>SPCS</td>
<td>Yes</td>
<td>SP Base 8X5XNBDOS</td>
</tr>
</tbody>
</table>
UCS Drive Retention Service

With the Cisco Drive Retention Service, you can obtain a new disk drive in exchange for a faulty drive without returning the faulty drive.

Sophisticated data recovery techniques have made classified, proprietary, and confidential information vulnerable, even on malfunctioning disk drives. The Drive Retention service enables you to retain your drives and ensures that the sensitive data on those drives is not compromised, which reduces the risk of any potential liabilities. This service also enables you to comply with regulatory, local, and federal requirements.

If your company has a need to control confidential, classified, sensitive, or proprietary data, you might want to consider one of the Drive Retention Services listed in the above tables (where available)

---

NOTE: Cisco does not offer a certified drive destruction service as part of this service.

---

Local Language Technical Support for UCS

Where available, and subject to an additional fee, local language support for calls on all assigned severity levels may be available for specific product(s) - see tables above.

For a complete listing of available services for Cisco Unified Computing System, see the following URL:

## OPTIONAL STEP - ORDER RACKS

The optional R42612 rack is available from Cisco for the C-Series servers, including the C480 ML M5 server. This rack is a standard 19-inch rack and can be ordered with a variety of options, as listed in Table 32. Racks are shipped separately from the C480 ML M5 server.

### Table 32  Racks and Rack Options

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RACK2-UCS</td>
<td>Cisco R42612 expansion rack, no side panels. This type of rack is used for multiple-rack deployments.</td>
</tr>
<tr>
<td>RACK2-UCS2</td>
<td>Cisco R42612 static (standard) rack, with side panels. This type of rack is used for single-rack and end of row deployments. Side panels are needed for racks at the ends of multiple-rack deployments. For example, when configuring a row of 5 racks, order 1 standard rack plus 4 expansion racks. Apply the side panels from the standard rack to the racks at each end of the row.</td>
</tr>
<tr>
<td>RACK-BLANK-001</td>
<td>Blanking panels (qty 12), 1U, plastic, toolless. Recommended to ensure proper airflow. Fill all empty RU spaces in the front of the rack. Because each blanking panel PID includes 12 panels, use the following calculation: 42RU - occupied RU = available RU. Divide available RU by 12 to determine PID order quantity.</td>
</tr>
<tr>
<td>RACK-CBLMGT-001</td>
<td>Cable mgt D rings (qty 10), metal. Use the D rings to bundle system cables to ensure proper airflow.</td>
</tr>
<tr>
<td>RACK-CBLMGT-003</td>
<td>Brush strip (qty 1), 1 U. The brush strip promotes proper airflow while allowing cables to be passed from the front to the rear of the rack.</td>
</tr>
<tr>
<td>RACK-CBLMGT-011</td>
<td>Cable mgt straps (qty 10), Velcro. Use the Velcro straps to bundle system cables to ensure proper airflow.</td>
</tr>
<tr>
<td>RACK-FASTEN-001</td>
<td>Mounting screws (qty 100), M6. The rack ships with nuts and screws, but extras may be ordered.</td>
</tr>
<tr>
<td>RACK-FASTEN-002</td>
<td>Cage nuts (qty 50), M6. The rack ships with nuts and screws, but extras may be ordered.</td>
</tr>
<tr>
<td>RACK2-JOIN-001</td>
<td>Rack joining kit. Use the kit to connect adjacent racks within a row. Order 1 unit less than the number of racks in the row.</td>
</tr>
<tr>
<td>RACK2-GRND-001</td>
<td>Cisco R42612 grounding kit</td>
</tr>
</tbody>
</table>

For more information about the R42612 rack, see RACKS on page 60.
OPTIONAL STEP - ORDER PDU

An optional power distribution unit (PDU) is available from Cisco for the C-Series rack servers. This PDU is available in a zero rack unit (RU) style or horizontal PDU style.

see Cisco RP-Series Rack and Rack PDU specification for more details at:

An internal view of the C480 ML M5 chassis with the top cover removed is shown in Figure 5.

Figure 5 C480 ML M5 With Top Cover Removed

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RAID controller card for front-loading SAS/SATA drives. (not visible in this view; position is near chassis floor under the CPU module)</td>
</tr>
<tr>
<td>2</td>
<td>Supercap (RAID backup) for front RAID controller (not visible in this view; mounting bracket position is on chassis wall under the CPU module)</td>
</tr>
<tr>
<td>3</td>
<td>Fan modules (four modules with two fans each; hot-swappable)</td>
</tr>
<tr>
<td>4</td>
<td>NVIDIA V100 SXM2 GPUs and heatsinks (eight), Each GPU socket provides a x16 PCIe lane. <strong>Note:</strong> The GPUs are not customer serviceable. Contact Cisco Support if you need service for the GPUs or their heatsinks.</td>
</tr>
<tr>
<td>5</td>
<td>PCIe slots 13 and 14 (Gen-3 x16)</td>
</tr>
<tr>
<td>6</td>
<td>Power supplies 1-4 (hot-swappable, redundant as 2+2 (default) or 3+1)</td>
</tr>
</tbody>
</table>
| 7 | PCIe slots 11 and 12 (Gen-3 x16)  
  - Slots 11 and 12 support standby power.  
  - Slot 11 is the primary slot for a Cisco UCS VIC card, slot 12 is the secondary slot |
| 8 | Internal, vertical USB 2.0 socket on motherboard |
| 9 | Trusted platform module socket (TPM) on motherboard |
## Serviceable Component Locations Inside the Main Chassis

**Figure 6** Serviceable Component Locations Inside the Main Chassis (Front and Rear Views)

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
</table>
| 10       | CPU module bay 2 (blank with filler module)  
There must be a blank filler module in upper bay 2 or the system will not boot |
| 14       | Right bay module, supports either:  
- Optional DVD drive module  
- Drive bays 17 - 24 (shown)  
  - All 8 bays supports SAS/SATA drives.  
  - Bay 17 also supports NVMe drives. |
| 11       | CPU module bay 1  
The system must have one CPU module in lower bay 1 to boot |
| 15       | PCIe slots 11 through 14, rear panel openings |
### Left bay module (drive bays 1 - 8)
- All 8 bays support SAS/SATA drives.
- Bays 1, 2, 7, 8 also support NVMe drives

### Center bay module (drive bays 9 - 16)
- All 8 bays support SAS/SATA drives.
- Bay 9 also supports NVMe drives

### I/O module

**Note:** The I/O module is not field replaceable, nor can you move an I/O module from one chassis to another. This module contains a security chip that requires it to stay with the PCIe module in the same chassis, as shipped from the factory.

### Power supplies 1-4 (hot-swappable, redundant as 2+2 (default) or 3+1)
All power supplies in the system must be identical (no mixing).
Serviceable Components Inside a CPU Module

Figure 7  Serviceable Component Locations Inside a CPU Module

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CPU 2</td>
</tr>
<tr>
<td>2</td>
<td>DIMM sockets controlled by CPU 2 (channels G, H, J, K, L, M.)</td>
</tr>
<tr>
<td></td>
<td>See <a href="#">Memory Population Rules on page 56</a> for DIMM slot numbering</td>
</tr>
<tr>
<td>3</td>
<td>CPU 1</td>
</tr>
<tr>
<td>4</td>
<td>DIMM sockets controlled by CPU 1 (channels A, B, C, D, E, F.)</td>
</tr>
<tr>
<td>5</td>
<td>Release levers for module (two each module)</td>
</tr>
</tbody>
</table>
### Serviceable Components Inside an I/O Module

#### Figure 8   Serviceable Component Locations Inside a I/O Module

<table>
<thead>
<tr>
<th></th>
<th>Component Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Micro SD card socket</td>
</tr>
</tbody>
</table>
| 2 | Mini storage module connector  
   | Supports either an SD card carrier with two SD card slots or an M.2 SSD carrier   |
|   | with two SATA M.2 SSD slots                                                      |
| 3 | RTC battery vertical socket                                                       |
**CPUs and DIMMs**

**Physical Layout**

Each CPU has six DIMM channels:

- CPU1 has channels A, B, C, D, E, and F
- CPU2 has channels G, H, J, K, L, and M

Each DIMM channel has two slots: slot 1 and slot 2. The blue-colored DIMM slots are for slot 1 and the black slots for slot 2.

As an example, DIMM slots A1, B1, C1, D1, E1, and F1 belong to slot 1, while A2, B2, C2, D2, E2, and F2 belong to slot 2.

*Figure 9* shows how slots and channels are physically laid out on the motherboard. The DIMM slots on the right half of the motherboard (channels A, B, C, D, E, and F) are associated with CPU 1, while the DIMM slots on the left half of the motherboard (channels G, H, J, K, L, and M) are associated with CPU 2. The slot 1 (blue) DIMM slots are always located farther away from a CPU than the corresponding slot 2 (black) slots.

*Figure 9*       **Physical Layout of CPU DIMM Channels and Slots**

Memory Population Rules

When considering the memory configuration of your server, consider the following items:

- Each channel has two DIMM slots (for example, channel A = slots A1 and A2).
  - A channel can operate with one or two DIMMs installed.
- Populate the DIMM slots of each CPU identically.
  - Fill black slots in the channels second: C2, F2, B2, E2, A2, D2

Table 33 DIMM Rules for C480 ML M5 Servers

<table>
<thead>
<tr>
<th>DIMM Parameter</th>
<th>DIMMs in the Same Channel</th>
<th>DIMM in the Same Slot&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIMM Capacity</strong></td>
<td>DIMMs in the same channel (for example, A1 and A2) can have different capacities.</td>
<td>For best performance, DIMMs in the same slot (for example, A1, B1, C1, D1, E1, F1) should have the same capacity.</td>
</tr>
<tr>
<td>RDIMM = 8, 16, 32, 64, or 128 GB</td>
<td>Do not mix TSV-RDIMMS with LRDIMMs nor RDIMMs</td>
<td>Do not mix TSV-RDIMMS with LRDIMMs nor RDIMMs</td>
</tr>
<tr>
<td>LRDIMM = 64 GB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSV-RDIMM = 64 GB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIMM Speed</th>
<th>DIMMs will run at the lowest speed of the CPU installed</th>
<th>DIMMs will run at the lowest speed of the CPU installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2666-MHz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIMM Type</th>
<th>Do not mix DIMM types in a channel</th>
<th>Do not mix DIMM types in a slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSV-RDIMMS, RDIMMs, or LRDIMMs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIMMs per Channel (DPC)</th>
<th>1 DPC or 2 DPC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ensure valid LRDIMM and RDIMM 1 DPC and 2 DPC memory configurations</td>
</tr>
</tbody>
</table>

Notes:
1. Although different DIMM capacities can exist in the same slot, this will result in less than optimal performance. For optimal performance, all DIMMs in the same slot should be identical.
Memory Mirroring

When Memory Mirroring PID (N01-MMIRROR) is selected in **STEP 3 CHOOSE MEMORY**, the DIMMS will be placed as shown in the below table by the factory.

- Select 4, 6, 8, 12 identical DIMMS per CPU.

(1) 1 CPU config for memory mirroring:

<table>
<thead>
<tr>
<th>CPU 1 DIMM Placement in Channels (for identical ranked DIMMs)</th>
<th>CPU 2 DIMM Placement in Channels (for identical ranked DIMMs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU 1</strong></td>
<td><strong>CPU 2</strong></td>
</tr>
<tr>
<td>8 (A1, B1); (D1, E1)</td>
<td>(G1, H1); (K1, L1)</td>
</tr>
<tr>
<td>12 (A1, B1, C1); (D1, E1, F1)</td>
<td>(G1, H1, J1); (K1, L1, M1)</td>
</tr>
<tr>
<td>16 (A1, A2, B1, B2); (D1, D2, E1, E2)</td>
<td>(G1, G2, H1, H2); (K1, K2, L1, L2)</td>
</tr>
<tr>
<td>24 (A1, A2, B1, B2, C1, C2); (D1, D2, E1, E2, F1, F2)</td>
<td>(G1, G2, H1, H2, J1, J2); (K1, K2, L1, L2, M1, M2)</td>
</tr>
</tbody>
</table>

(2) 4 CPU Config for Memory Mirroring - duplicate table above for 2 CPU Config in second Compute Module.
Memory Support for CPU Classes and CPU Modes

For 2nd Generation Intel® Xeon® Scalable Processors:

- DIMMs and DCPMMs are supported
- CPU PIDs ending in “M” support up to a limit of 2048 GB per CPU
- CPU PIDs ending in “L” support up to a limit of 4608 GB per CPU
- All other CPU PIDs support up to a limit of 1024 GB per CPU
- For the App Direct Mode, both DCPMM and DIMM capacities count towards the CPU capacity limit
- For the Memory Mode and Mixed Mode only the DCPMM capacity counts towards the CPU capacity limit

For Configurations Using Only DIMMs

- CPU PIDs ending in “M” support DIMM capacities up to 1536 GB per CPU (using 12 x 128 GB DIMMs) and DIMM capacities up to 2048 GB per CPU (using 8 x 256 GB DIMMs).
- CPU PIDs ending in “L” support DIMM capacities up to 1536 GB per CPU (using 12 x 128 GB DIMMs) and DIMM capacities up to 3072 GB per CPU (using 12 x 256 GB DIMMs). The 4608 GB limit cannot be reached with these capacity DIMMs.
- CPU PIDs not ending in “L” or “M” support DIMM capacities up to 1024 GB per CPU (using 8 x 128 GB DIMMs or 4 x 256 GB DIMMs).

For Configurations Using DIMMs and DCPMMs in App Direct Mode

- CPU PIDs ending in “M” support capacities up to 1792 GB per CPU (using 6 x 128 GB DIMMS and 2 x 512 GB DCPMMs or 4 x 256 GB DCPMMs) or up to 2048 GB per CPU (using 6 x 256 GB DIMMs and 2 x 256 GB DCPMMs or 6 x 256 GB DIMMs and 4 x 128 GB DCPMMs)
- CPU PIDs ending in “L” support capacities up to 3840 GB per CPU (using 6 x 128 GB DIMMs and 6 x 512 GB DCPMMs) or up to 4608 GB per CPU (using 6 x 256 GB DIMMs and 6 x 512 GB DCPMMs)
- CPU PIDs not ending in “L” or “M” support capacities up to 1024 GB per CPU (using 6 x 128 GB DIMMs and 2 x 128 GB DCPMMs).

For Configurations Using DIMMs and DCPMMs in Memory or Mixed Mode

- CPU PIDs ending in “M” support capacities up to 2816 GB per CPU (using 6 x 128 GB DIMMs and 4 x 512 GB DCPMMs) or up to 3584 GB per CPU (using 6 x 256 GB DIMMs and 4 x 512 GB DCPMMs)
- CPU PIDs ending in “L” support capacities up to 3840 GB (using 6 x 128 GB DIMMs and 6 x 512 GB DCPMMs) or up to 4608 GB per CPU (using 6 x 256 GB DIMMs and 6 x 512 GB DCPMMs). The allowable 4608 limit for DCPMM capacity is not reached in this case.
- CPU PIDs not ending in “L” or “M” support capacities up to 1024 GB per CPU (using 6 x 128 GB DIMMs and 2 x 128 GB DCPMMs).
For Intel® Xeon® Scalable Processors:

- DIMMs are supported; DCPMMs are not supported
- CPU PIDs ending in “M” support DIMM capacities up to 1536 GB per CPU (using 12 x 128 GB DIMMs).
- All other CPU PIDs support DIMM capacities up to 768 GB per CPU (using 6 x 128 GB DIMMs or 12 x 64 GB DIMMs)

**DIMM Population Order**

Populate the DIMMs for a CPU according to Table 34.

**Table 34  DIMM Population Order**

<table>
<thead>
<tr>
<th>Populate CPU 1 or CPU 3 Slot</th>
<th>Populate CPU 2 or CPU 4 Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue #1 Slots</td>
<td>Black #2 Slots</td>
</tr>
<tr>
<td>1</td>
<td>(A1)</td>
</tr>
<tr>
<td>2</td>
<td>(A1, B1)</td>
</tr>
<tr>
<td>3</td>
<td>(A1, B1, C1)</td>
</tr>
<tr>
<td>4</td>
<td>(A1, B1); (D1, E1)</td>
</tr>
<tr>
<td>8</td>
<td>(A1, B1); (D1, E1)</td>
</tr>
<tr>
<td>12</td>
<td>(A1, B1); (C1, D1); (E1, F1)</td>
</tr>
</tbody>
</table>
RACKS

The Cisco R42612 rack (see Figure 10 on page 61) is certified for Cisco UCS installation at customer sites and is suitable for the following equipment:

- Cisco UCS B-Series servers and fabric interconnects
- Cisco UCS C-Series and select Nexus switches

The rack is compatible with hardware designed for EIA-standard 19-inch racks. Rack specifications are listed in Table 35.

Table 35  R42612 Specifications

<table>
<thead>
<tr>
<th>Cisco R42612 Rack</th>
<th>Standard (Static with side panels)</th>
<th>Expansion (Static without Side Panels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (H x W x D)</td>
<td>79.25 x 23.50 x 49.84 in. (2013 x 597 x 1266 mm)</td>
<td>79.25 x 23.50 x 49.84 in. (2013 x 597 x 1266 mm)</td>
</tr>
<tr>
<td>Dimensions (H x W x D) with packaging</td>
<td>84.25 x 32 x 54.84 in. (2140 x 813 x 1393 mm)</td>
<td>84.25 x 32 x 54.84 in. (2140 x 813 x 1393 mm)</td>
</tr>
<tr>
<td>Distance from front mounting rail to rear mounting rail</td>
<td>29.19 in. (741.5 mm)</td>
<td>29.19 in. (741.5 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>339.51 lb (154 kg)</td>
<td>264.55 lb (120 kg)</td>
</tr>
<tr>
<td>Weight with packaging</td>
<td>410.06 lb (186 kg)</td>
<td>335.10 lb (152 kg)</td>
</tr>
<tr>
<td>Side panels included</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Equipment mounting capacity</td>
<td>42 RU</td>
<td>42 RU</td>
</tr>
<tr>
<td>Static load capacity</td>
<td>2700 lb (1224.7 kg)</td>
<td>2700 lb (1224.7 kg)</td>
</tr>
<tr>
<td>Dynamic load capacity</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Figure 10   Cisco R42612 Rack

Front View

Rear View
PDUs

Cisco RP Series Power Distribution Units (PDUs) offer power distribution with branch circuit protection.

Cisco RP Series PDU models distribute power to up to 42 outlets. The architecture organizes power distribution, simplifies cable management, and enables you to move, add, and change rack equipment without an electrician.

With a Cisco RP Series PDU in the rack, you can replace up to two dozen input power cords with just one. The fixed input cord connects to the power source from overhead or under-floor distribution. Your IT equipment is then powered by PDU outlets in the rack using short, easy-to-manage power cords.

The C-series servers accept the zero-rack-unit (0RU) or horizontal PDU. See Figure 11 for one example of a zero rack unit PDU.

Figure 11   RP208-30M1P-6-36 PDU

1 = Ground
2 = 20 A circuit breakers
3 = IEC 60320 C13 outlets
4 = EC 60320 C19 outlets
5 = NEMA L6-30P plug
KVM CABLE

The KVM cable provides a connection into the server, providing a DB9 serial connector, a VGA connector for a monitor, and dual USB 2.0 ports for a keyboard and mouse. With this cable, you can create a direct connection to the operating system and the BIOS running on the server.

The KVM cable ordering information is listed in Table 36.

Table 36  KVM Cable

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N20-BKVM</td>
<td>KVM cable for server console port</td>
</tr>
</tbody>
</table>

Figure 12  KVM Cable

<table>
<thead>
<tr>
<th></th>
<th>Connector (to server front panel)</th>
<th></th>
<th>VGA connector (for a monitor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connector (to server front panel)</td>
<td>3</td>
<td>Two-port USB 2.0 connector (for a mouse and keyboard)</td>
</tr>
<tr>
<td>2</td>
<td>DB-9 serial connector</td>
<td>4</td>
<td>Two-port USB 2.0 connector (for a mouse and keyboard)</td>
</tr>
</tbody>
</table>
Below is the list of parts were previously available for this product and are no longer sold. Please refer to the EOL Bulletin Links via the Table 37 below to determine if still supported.

### Table 37  EOL Products

<table>
<thead>
<tr>
<th>EOS option PID</th>
<th>Description</th>
<th>EOL bulletin link</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEMORY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVMe</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Microsoft Windows server</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## TECHNICAL SPECIFICATIONS

### Dimensions and Weight

Table 38  UCS C480 ML M5 Dimensions and Weight\(^1\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>6.9 in. (176 mm)</td>
</tr>
<tr>
<td>Width</td>
<td>19.0 in. (483 mm)</td>
</tr>
<tr>
<td>Length (including front handles and power supplies)</td>
<td>32.7 in. (830 mm)</td>
</tr>
<tr>
<td>Front Clearance</td>
<td>3 in. (7.62 cm)</td>
</tr>
<tr>
<td>Side Clearance</td>
<td>1 in. (25.4 mm)</td>
</tr>
<tr>
<td>Rear Clearance</td>
<td>6 in. (152.4 mm)</td>
</tr>
<tr>
<td>Weight (maximum configuration, including slide rail brackets and cable management arm)</td>
<td>146 lbs (66.3kg)</td>
</tr>
</tbody>
</table>

**Notes:**

1. The system weight given here is an estimate for a fully configured system and will vary depending on the number of peripheral devices and power supplies.
TECHNICAL SPECIFICATIONS

Power Specifications

Table 39  Power Supplies

<table>
<thead>
<tr>
<th>Product ID (PID)</th>
<th>PID Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSC-PSU1-1600W</td>
<td>Cisco UCS 1600W AC Power Supply for Rack Server</td>
</tr>
</tbody>
</table>

The general power specifications for the C480 ML M5 server are listed in Table 40.

Table 40  UCS C480 ML M5 1600 W (AC) Power Supply Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC input voltage</td>
<td>Voltage Range 180 - 264 VAC</td>
</tr>
<tr>
<td>AC input frequency</td>
<td>50 to 60 Hz nominal (range: 47 to 63 Hz)</td>
</tr>
<tr>
<td>Max AC Input current</td>
<td>&lt; 9.5 A maximum at 200 VAC</td>
</tr>
<tr>
<td>Maximum Input VA</td>
<td>1600 VA @200 VAC</td>
</tr>
<tr>
<td>Maximum output power per power supply</td>
<td>In the 180-265 VAC range the maximum rated output power is 1600 W, not including the standby 12V power.</td>
</tr>
<tr>
<td>Maximum inrush current</td>
<td>&lt; 30A Peak at +35 degrees C (charging current for EMI-X capacitors is not considered to be inrush current)</td>
</tr>
<tr>
<td>Maximum hold up time</td>
<td>Greater than 12 ms with 2,200 uF of load capacitance</td>
</tr>
<tr>
<td>Power supply output voltage</td>
<td>12 VDC</td>
</tr>
<tr>
<td>Power supply standby voltage</td>
<td>12 VDC</td>
</tr>
<tr>
<td>Efficiency rating</td>
<td>Climate Savers Platinum Efficiency (80Plus Platinum Certified)</td>
</tr>
<tr>
<td>Form Factor</td>
<td>RSP2</td>
</tr>
<tr>
<td>Input connector</td>
<td>IEC60320 C14 type connector</td>
</tr>
</tbody>
</table>

For configuration-specific power specifications, use the Cisco UCS Power Calculator at:

http://ucspowercalc.cisco.com
**Environmental Specifications**

The power specifications for the C480 ML M5 server are listed in *Table 41*.

*Table 41  UCS C480 ML M5 Environmental Specifications*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature operating</td>
<td>10°C to 35°C (50°F to 95°F)</td>
</tr>
<tr>
<td>Temperature non-operating</td>
<td>-40°C to 70°C (-40°F to 158°F)</td>
</tr>
<tr>
<td>Altitude</td>
<td>-30 m to 1500 m (-100 ft to 5000 ft)</td>
</tr>
<tr>
<td>Humidity non-operating</td>
<td>95%, noncondensing at temperatures of 25°C (77°F) to 30°C (86°F)</td>
</tr>
</tbody>
</table>
Compliance Requirements

The regulatory compliance requirements for C-Series servers are listed in Table 42.

Table 42  UCS C-Series Regulatory Compliance Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Compliance</td>
<td>Products should comply with CE Markings per directives 2004/108/EC and 2006/95/EC</td>
</tr>
</tbody>
</table>
| Safety           | UL 60950-1 Second Edition  
|                  | CAN/CSA-C22.2 No. 60950-1 Second Edition  
|                  | EN 60950-1 Second Edition  
|                  | IEC 60950-1 Second Edition  
|                  | AS/NZS 60950-1  
|                  | GB4943 2001  |
| EMC - Emissions  | 47CFR Part 15 (CFR 47) Class A  
|                  | AS/NZS CISPR22 Class A  
|                  | CISPR22 Class A  
|                  | EN55022 Class A  
|                  | ICES003 Class A  
|                  | VCCI Class A  
|                  | EN61000-3-2  
|                  | EN61000-3-3  
|                  | KN22 Class A  
|                  | CNS13438 Class A  |
| EMC - Immunity   | EN55024  
|                  | CISPR24  
|                  | EN300386  
|                  | KN24  |