

# Troubleshoot DIMM Memory Issues in UCS

## Contents

[Introduction](#)

[Prerequisites](#)

[Requirements](#)

[Components Used](#)

[Troubleshoot Methodology](#)

[Terms and Acronyms](#)

[Memory Placement](#)

[Memory Errors](#)

[Correctable vs. Uncorrectable Errors](#)

[Troubleshoot DIMM's via UCSM and CLI](#)

[To Check Errors from GUI](#)

[To Check Errors from CLI](#)

[Log Files to Check in Tech Support](#)

[DIMM Blacklisting](#)

[Methods to Clear DIMM Blacklisting Errors](#)

[UCSM GUI](#)

[UCSM CLI](#)

[Related Information](#)

[Notable Bugs](#)

## Introduction

This document describes how to troubleshoot memory modules and related issues in the **Cisco Unified Computing System (UCS)** solution.

## Prerequisites

## Requirements

Cisco recommends knowledge of **Cisco Unified Computing System (Cisco UCS)** .

## Components Used

This document is not restricted to specific software and hardware versions.

However, this document addresses:

- **Cisco UCS B-Series Blade Servers**
- **UCS Manager**
- UCS uses **Dual In-line Memory Module (DIMM)** as RAM modules.

The information in this document was created from the devices in a specific lab environment. All of

the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

## Troubleshoot Methodology

This section covers several parts of UCS memory issues.

- Memory placement
- Troubleshoot DIMMs via UCSM and CLI
- Logs to check in technical support

## Terms and Acronyms

DIMM	Dual In-line Memory Module
ECC	Error Correcting Code
LVDIMM	Low Voltage DIMM
MCA	Machine Check Architecture
MEMBIST	Memory Built-in Self Test
MRC	Memory Reference Code
POST	Power On Self Test
SPD	Serial Presence Detect
DDR	Double Data Rate
RAS	Reliability, Availability and Serviceability

## Memory Placement

Memory placement is one of the most notable physical aspects of the UCS solution.

Typically the server comes with memory pre-populated with a requested amount.

However, when in doubt, refer to the hardware installation guide.

For memory population rules, refer to B-series technical specifications for the specific platform.

B-series technical specifications link:

<https://www.cisco.com/c/en/us/products/servers-unified-computing/ucs-b-series-blade-servers/datasheet-listing.html>

## Memory Errors

- DIMM Error Multibit = Uncorrectable  
POST is mapped by BIOS; OS does not see  
DIMM  
Runtime usually causes OS reboot  
Singlebit = Correctable  
OS continues to see the DIMM
  - ECC (Error Correcting Code) Error
  - Parity Error
  - SPD (Serial Presence Detect) Error

- Configuration Error Not supported DIMMsNot supported DIMM population
  - Unpaired DIMMs
  - Mismatch errors
- Identity unestablishable error
  - Check and update the catalog

## Correctable vs. Uncorrectable Errors

Whether a particular error is correctable or uncorrectable depends on the strength of the ECC code employed within the memory system.

Dedicated hardware is able to fix correctable errors when they occur with no impact on program execution.

The DIMMs with correctable errors are not disabled and are available for the OS to use. The **Total Memory** and **Effective Memory** are the same.

These correctable errors are reported in the UCSM operability state as **Degraded** while overall operability is **Operable** with correctable errors.

Uncorrectable errors make it impossible for the application or operating system to continue execution.

The DIMMs with uncorrectable errors are disabled and OS does not see them. UCSM operState change to **Inoperable** in this case.

## Troubleshoot DIMM's via UCSM and CLI

### To Check Errors from GUI

DIMM Status	UCSM Operability	Logs SEL	Description Comments
Operable	Operable	Check SEL log for DIMM related errors	A DIMM is installed and functional.
Operable	Degraded	Check SEL for ECC errors	A correctable ECC DIMM error is detected during time.
Removed	N/A	No logs	A DIMM is not installed or corrupted SPD data.
Disabled	Operable	Check SEL for Identity unestablishable errors	Check and update capability catalog
Disabled	N/A	Check SEL if another DIMM in failed in the same channel	A DIMM is healthy but disabled because configuration rule could not be maintained by a failed DIMM in same channel.
Disabled	N/A	No logs	Failed memory configuration rule because of missing DIMMs.
Inoperable	Inoperable/Replacement required		UE ECC Error was detected.
Degraded	Inoperable	Check SEL for ECC errors	DIMM status and Operability changed due to ECC errors were detected before host rebooted.
Degraded	Inoperable/Replacement	Check SEL for ECC error during POST/MRC	Uncorrectable ECC error was detected during run DIMM remains available to OS, OS crashes and

required

comes back up but still can use this DIMM. Error occur again later. DIMM must be replaced in most situations.

To obtain statistics navigate to **Equipment > Chassis > Server > Inventory > Memory**, then right-click **Memory** and select **show navigator**.

## To Check Errors from CLI

These commands are useful when troubleshooting errors from CLI.

```
scope server x/y -> show memory detail
scope server x/y -> show memory-array detail
scope server x/y -> scope memory-array x -> show stats history memory-array-env-stats detail
```

From memory array scope, you can also get access to DIMM.

```
scope server X/Y > scope memory-array Z > scope DIMM N
```

From there, then you can obtain per-DIMM statistics or reset the error counters.

```
UCS/chassis/server/memory-array/dimm # reset-errors
UCS /chassis/server/memory-array/dimm* # commit-buffer
UCS /chassis/server/memory-array/dimm # show stats memory-error-state
```

If you see a correctable error that matches this information, the problem can be corrected by resetting the BMC instead of resetting the blade server.

Use these Cisco UCS Manager CLI commands:

(Resetting the BMC does not impact the OS running on the blade.)

To reset memory-error counters on a Cisco UCS C-Series Rack Server operating in standalone mode, run the script on the CLI:

```
UCS-C# scope reset-ecc
UCS-C/reset-ecc # set enabled yes
UCS-C/reset-ecc *# commit
```

For colusa servers:

```
UCS# scope chassis
UCS /chassis # scope server x
UCS /chassis/server # reset-ecc
```

With UCS releases 2.27, and 3.1 and above, the thresholds for memory corrected errors has been removed.

Therefore, memory modules are no longer reported as **Inoperable** or **Degraded** solely due to corrected memory errors.

As per whitepaper <https://www.cisco.com/c/dam/en/us/products/collateral/servers-unified-computing/ucs-manager/whitepaper-c11-736116.pdf>

Industry demands for greater capacity, greater bandwidth, and lower operating voltages lead to increased memory error rates.

Traditionally, the industry has treated correctable errors in the same way as uncorrectable errors, requiring the module to be replaced immediately upon alert.

Given extensive research that correctable errors are not correlated with uncorrectable errors, and that correctable errors do not degrade system performance, the Cisco UCS team recommends against immediate replacement of modules with correctable errors.

Customers who experience a Degraded memory alert for correctable errors are advised to reset the memory error and resume operation.

This recommendation helps to avoid unnecessary server disruption.

Future enhancements to error management distinguish among various types of correctable errors and identify the appropriate actions, if any, needed.

At minimum, use version 2.1(3c) or 2.2(1b) which has enhancement with UCS memory error management

## Log Files to Check in Tech Support

**UCSM\_X\_TechSupport > sam\_techsupportinfo** provides information about DIMM and memory array.

Chassis/server tech support

```
CIMCX_TechSupport\tmp\CIMCX_TechSupport.txt -> Generic tech support information about sever X.  
CIMCX_TechSupport\obfl\obfl-log -> OBFL logs provide an ongoing logs about status and boot of  
server X.  
CIMCX_TechSupport\var\log\sel -> SEL logs for server X.
```

Based on the platform/version, navigate to the files in tech support bundle.

**var/nuova/BIOS > RankMarginTest.txt**

**var/nuova/BIOS > MemoryHob.txt**

**var/nuova/var/nuova/ BIOS > MrcOut\_\*.txt**

These files provide information about memory as seen from BIOS level.

Information there can be cross-referenced again with DIMM states report tables.

Example:

**/var/nuova/BIOS/RankMarginTest.txt**

- Useful for showing the test results from BIOS Training test MEMBIST
- Look for errors
- Look to see if any DIMMs are mapped out

- show DIMM specific information (Vendor/speed/PID)

DIMM	GB	R	MfgDate	Mod ID	DRAM ID	Reg ID	CtW	Tck	CLS	Taa	V	Freq	Part#	
A1	18	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
A2	26	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
B1	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
B2	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
C1	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
C2	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
D1	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
D2	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
E1	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
E2	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
F1	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9
F2	01	8	2	2009W48	Samsung	Samsung 00	Inphi	03	5550	0C	003C	69 0	1333	M393B1K70BH1-CH9

The first column has two values:

DIMM locator (F2)

DIMM status (01)

Here is a brief description for each status:

0x00 // Not Installed (No DIMM)

0x01 // Installed (Working)

//// 0x02-0F (Reserved)

//// Failed

0x10 // Failed Training

0x11 // Failed Clock Training

//// 0x12-17 (Reserved)

0x18 // Failed MemBIST

//// 0x19-1F (Reserved)

//// Ignored

0x20 // Ignored (Disabled from debug console)

0x21 // Ignored (SPD Error reported by BMC)

0x22 // Ignored (Non-RDIMM)

0x23 // Ignored (Non-ECC)

0x24 // Ignored (Non-x4)

0x25 // Ignored (Other PDIMM in same LDIMM failed)

0x26 // Ignored (Other LDIMM in same channel failed)

0x27 // Ignored (Other channel in LockStep or Mirror failed)

0x28 // Ignored (Invalid PDIMM population)

0x29 // Ignored (PDIMM Organization Mismatch)

0x2A // Ignored (PDIMM Register Vendor Mismatch)

//// 0x2B-7F (Reserved)

### **var/nuova/BIOS > MemoryHob.txt**

shows effective and failed memory installed on the server

```
+++ BEGINNING OF FILE
Memory Speed      = 1067 MHz
Memory Mode       = 00
RAS Modes         = 03
MRC Flags         = 0000000A
Total Memory      = 98304 MB
Effective Memory   = 90112 MB
Failed Memory      = 8192 MB
Ignored Memory     = 0 MB
Redundant Memory   = 0 MB
```

-----				
Memory	Channel	DIMM Status		
Channel	Status	1	2	
-----				
A	01	01	01	
B	01	01	01	
C	01	01	01	
D	01	01	01	
E	01	01	01	
F	01	01	18	
-----				

18h - DIMM status is marked as failed when it fails in MemBist test. Replace with a known good DIMM.

### **DIMM Status Description**

00h Not Installed (No DIMM)

01h Installed (Working)

02h-0Fh Reserved

10h Failed (Training)

11h Failed (Clock training)

12h-17h Reserved

18h Failed (MemBIST)

19h-1Fh Reserved

20h Ignored (Disabled from debug console)

21h Ignored (SPD Error reported by BMC)

22h Ignored (Non-RDIMM)

23h Ignored (Non-ECC)

24h Ignored (Non-x4)

25h Ignored (Other PDIMM in same LDIMM failed)

26h Ignored (Other LDIMM in same channel failed)

27h Ignored (Other channel in LockStep or Mirror)

28h Ignored (Invalid memory population)

29h Ignored (Organization mismatch)

2Ah Ignored (Register vendor mismatch)

2Bh- 7Fh Reserved

80h Ignored ( Workaround -Looping)

81h Ignored (Stuck I2C bus)

82h – FFh Reserved

## **DIMM Blacklisting**

In **Cisco UCS Manager** , the state of the **Dual In-line Memory Module** (DIMM) is based on SEL event records.

When the BIOS encounters a noncorrectable memory error during memory test execution, the DIMM is marked as faulty.

A faulty DIMM is a considered a nonfunctional device.

If you enable DIMM blacklisting, Cisco UCS Manager monitors the memory test execution messages and blacklists any DIMMs that encounter memory errors in the DIMM SPD data.

DIMM Blacklisting was introduced as an optional global policy in UCSM 2.2(2).

Server firmware must be 2.2(1)+ for B-series blades and 2.2(3)+ for C-series rack servers to properly implement this feature.



In UCSM 2.2(4), the DIMM, Blacklisting is enabled.

Open the tech support file .../var/log/DimmBL.log

Open the file /var/nuova/BIOS/MrcOut.txt if it is available

Find the DIMM Status table. Look for "DIMM Status:"

DIMM Blacklisted = 1E

Find the DIMM Status table. Look for "DIMM Status:"

DIMM Status:

00 - Not Installed

01 - Installed

10 - Failed (Training failure)clear

1E - Failed (DIMM Blacklisted by BMC)

1F - Failed (SPD Error)

25 - Disabled (Other DIMM failed in same channel)

Example

DIMM Status:

|=====|

| Memory | DIMM Status |

| Channel | 1 2 3 |

|=====|

| A | 25 1F 25 |

| B | 01 01 01 |

| C | 1F 25 25 |

| D | 01 01 01 |

| E | 01 01 01 |

| F | 25 25 1E |

| G | 01 01 01 |

| H | 01 01 01 |

|=====|

## DIMM Status:

01 - Installed

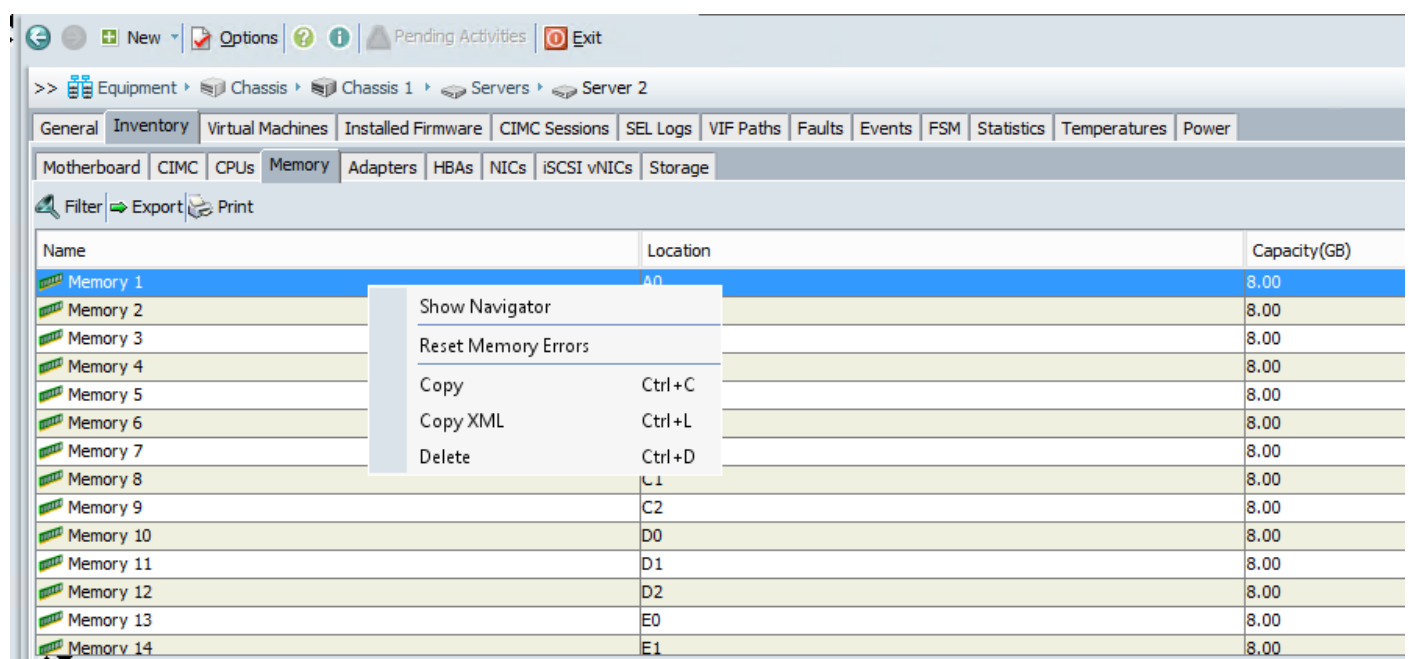
1E - Failed (DIMM Blacklisted by BMC)

1F - Failed (SPD Error)

25 - Disabled (Other DIMM failed in same channel)

# Methods to Clear DIMM Blacklisting Errors

## UCSM GUI



## UCSM CLI

UCS-B/chassis/server # reset-all-memory-errors

## Related Information

- [https://www.cisco.com/c/en/us/td/docs/unified\\_computing/ucs/sw/gui/config/guide/2-2/b\\_UCSM\\_GUI\\_Configuration\\_Guide\\_2\\_2/configuring\\_server\\_related\\_policies.html](https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/sw/gui/config/guide/2-2/b_UCSM_GUI_Configuration_Guide_2_2/configuring_server_related_policies.html)
- <https://www.cisco.com/c/dam/en/us/support/docs/servers-unified-computing/ucs-b-series-blade-servers/CiscoUCSEnhancedMemoryErrorManagementTechNoteFeb42015.pdf>
- <https://www.cisco.com/c/en/us/support/docs/field-notices/636/fn63651.html>

## Notable Bugs

Cisco bug ID [CSCug93076](#) B200M3-DDR voltage regulator has excessive noise under light load

Cisco bug ID [CSCup07488](#) IPMI DIMM fault sensor is setting Dimm Degraded with no error count.

Cisco bug ID [CSCud22620](#) Improved accuracy at identifying Degraded DIMMs

Cisco bug ID [CSCuw44524](#) C460M4, B260M4 or B460M4 IVB clear CMOS can cause memory UECC Error

Cisco bug ID [CSCur19705](#) ECC/UECC Errors observed on B200M3

Cisco bug ID [CSCvm88447](#) Reset ECC steps documentation are missing for Standalone Colusa Servers