

# MC-5000 Series

## Component Compatibility Guide

A list of peripheral components suitable for use with the MC-5000 series of computers

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## 1. Introduction

This document lists hardware components that are proven to provide the performance listed in the specification when used with the Moxa MC-5000 series of embedded computers, or computers that share basic design features with the MC-5000 series. Moxa computers come with multiple peripheral options and are engineered to work with components having different hardware specifications. This flexibility could sometimes lead to compatibility issues. When used with the MC-5000 series of embedded computers, peripherals from one manufacturer may not work as well as the ones made by another manufacturer. Moxa provides this list of MC-5000 series-compatible components, so that users can be certain of a reliable performance from the MC-5000 series, when used with the components listed in this document.

## 2. Testing Methods

To validate that a component meets the Moxa standards for quality and performance, the following five key compatibility tests are run:

- Ambient temperature burn-in
- Low temperature hard start
- Heat/humidity burn-in
- Cyclic high-low temperature burn-in
- Vibration test

### **Ambient Temperature Burn-In**

The component is mounted on to an MC-5000 computer and put through a series of stress tests at an ambient temperature of around 25°C, for a specified period of time. The duration of the test is determined based on the class of peripherals being tested.

### **Low Temperature Hard Start**

The component is mounted on to an unpowered MC-5000 computer and then the system is booted up at an extremely low temperature. The designated low temperature value depends on the computer model being tested.

### **Heat/Humidity Burn-In**

The component is mounted on to an MC-5000 computer, placed in a temperature- and humidity-controlled enclosure, and then put through the burn-in test for a specified period of time. The temperature, humidity, and time targets vary depending on the specification of the computer model used in the test.

## **Cyclic High-Low Temperature Burn-In**

The component is mounted on to an MC-5000 computer, placed in a temperature controlled enclosure, and then put through the burn-in test wherein the temperature is cyclically varied from very high to very low and back again, over a specified period of time. The target temperature range and the duration of the test can vary depending on the specification of the computer model used in the test.

## **Vibration Test**

The component is mounted on to an MC-5000 computer that is bound inside an electromagnetic vibrator, and then put through random vibration tests along three orthogonal axes: longitudinal, transverse, and vertical. The vibration tests are compliant with the EN50155/IEC61373 vibration standards.

## **3. Storage Endurance**

Storage media, such as SSDs, CF cards, SD cards, Disk on Module, and Cfast, are composed of different electrical components. The main electrical components in these storage media, the NAND-flash memory and NAND-flash controller, impact the storage endurance and lifespan of the storage media.

### **NAND-Flash Memory Endurance**

NAND-flash memories have a limit on the number of times they can be programmed and erased (P/E). The P/E cycle as well as the erase count of a NAND-flash memory can be used to determine this limit. For example, an SLC (single-level cell) flash memory has a 60,000 P/E cycle, an MLC (multi-level cell) flash memory has a 3,000 P/E cycle, and TLC NAND flash memories have P/E cycle values up to 1,000. Each flash memory type has a different endurance level, which is why the storage lifespan is based on the flash memory type. Storage that uses SLC type flash memory could have the best endurance level compared with the MLC type storage. SLC storage usually comes with a 5-year OEM warranty (the actual warranty period depends on the original manufacturer). MLC storage only comes with a 1- to 3-year warranty. The major differences between SLC and MLC are: (a) The SLC NAND flash has a lifespan that is around 20 times that of an MLC, and (b) The price can differ by a factor of 4 to 5. The SLC type of storage is recommended for systems that are expected to have high reliability, and for applications that need to frequently write data to a storage medium.

### **Terabytes Written (TBW)**

TBW is the unit used to evaluate SSD endurance. In actual applications, storage is used for routine operations and data access. Therefore the physical P/E cycle is not appropriate for describing the total rewritable data capacity. The management efficiency of the storage controller also affects the

total rewritable data capacity result. For these reasons, Joint Electron Device Engineering Council (JEDEC) has defined a standard for SSD endurance evaluation called JESD218, which uses TBW to measure the endurance of the storage memory. By referring to this TBW value, users can easily estimate the storage specification and select a suitable storage for real-life use cases. For example, when routine operations need a maximum of 20 GB and the expected storage lifespan is 3 years, the total rewritable data demand would be 21.9 TBW (20 GB x 365 x 3). In this case, a storage that has more than 21.9 TBW will meet the requirement. We recommend selecting a storage media with a TBW that is greater than the calculated value.

## 4. Declaration for Liability Exclusion

The specifications, warranty terms, and liability of items listed in this guide are the sole responsibility of the original manufacturers. Moxa does not take any responsibility in this regard. Please visit the manufacturers' official websites for up-to-date product information before purchasing the components.

## 5. Compatible Components

Peripheral components that have been tested and found suitable for use with the MC-5000 series of computers are listed in this section. The following table lists the Test Codes and their descriptions:

Test Code	Description
A	The component has passed the ambient temperature verification test
B	The component has passed the low temperature verification test
C	The component has passed the heat/humidity verification test
D	The component has passed the cyclic high-low temperature verification test
E	The component has not been tested, but is similar to another component that has been tested in terms of its material and design.
F	The component has passed the vibration verification test

**DRAM**

Vendor	Memory Size	Moxa's PN	Vendor's PN	Interface	Chip Brand	Speed	Test Codes
Apacer	2 GB	N/A	75.A83E4.G010C	DDR3	Micron	1600 MHz	A
Apacer	2 GB	N/A	78.A2GD9.4010C	DDR3	Samsung	1600 MHz	A
DSL	2 GB	1352110022020	D3SH56081XH18AB	DDR3	Hynix	1066 MHz	B, C, D
DSL	2 GB	13521100220B0	D3SP56081XL12BAI	DDR3L	ProMOS	1600 MHz	B, C
DSL	4 GB	1352110042093	D3SS56082XH18AC	DDR3	Samsung	1066 MHz	B, C
DSL	4 GB	1352110042030	D3SH56082XH18AB	DDR3	Hynix	1066 MHz	B, C, D
InnoDisk	2 GB	N/A	M3SW-2GHJCC0C-E	DDR3	Hynix	1600 MHz	B, C, D
Transcend	2 GB	N/A	TS256MSK64V3N-I	DDR3	Samsung	1333 MHz	E
Transcend	2 GB	N/A	TS256MSK64V6N	DDR3	Samsung	1600 MHz	E
Transcend	4 GB	N/A	TS512MSK64V3N-I	DDR3	Samsung	1333 MHz	A
Transcend	4 GB	N/A	TS512MSK64V6N	DDR3	Samsung	1600 MHz	A
Unigen	2 GB	N/A	UG25U6400M8SU-ACA	DDR3	Hynix	1333 MHz	B, C, D

**SSD**

Vendor	Storage Size	Moxa's PN	Vendor's PN	Flash Memory Brand	Flash Memory Spec	Controller	Firmware	Warranty	Warranty Exclusion	Test Codes
Apacer	64 GB	N/A	AP64GAS510SB	N/A	MLC	N/A	N/A	2 years	Endurance > 3,000	A
InnoDisk	128 GB	1352031282115	DGS25-A28D81SWAQN	Micron	MLC	N/A	N/A	2 years	Endurance > 3,000	B, C
InnoDisk	64 GB	1352030642170	DGS25-64GD81SWAQN	Micron	MLC	N/A	N/A	2 years	Endurance > 3,000	B, C
Memoright	32 GB	N/A	MRSAJ9A032GTT25C00	Toshiba	MLC	JMF667	MRV1.71b	3 years	Endurance > 3,000	B, C, D
Memoright	32 GB	N/A	MRSAJ6C032GC125S00	Micron	MLC	JMF612	MRV1.1.5	3 years	Endurance > 3,000	E
Memoright	32 GB	N/A	MRSAJ6C032GC125C00	Micron	MLC	JMF612	MRV1.1.5	3 years	Endurance > 3,000	E
Memoright	60 GB	N/A	MRSAD4B060GC225C00	Samsung	MLC	N/A	N/A	3 years	Endurance > 3,000	B, C, D
Memoright	60 GB	N/A	MRSAD4B060GC225S00	N/A	MLC	N/A	N/A	3 years	Endurance > 3,000	E
Memoright	60 GB	N/A	MRSAD4B060GC225S00	N/A	MLC	N/A	N/A	3 years	Endurance > 3,000	E
Memoright	64 GB	N/A	MRSAJ6C064GC125C00	Micron	MLC	JMF612	MRV1.1.5	3 years	Endurance > 3,000	B, C, D
Memoright	64 GB	N/A	MRSAJ6C064GC125S00	Samsung	MLC	N/A	N/A	3 years	Endurance > 3,000	B, C, D
Memoright	64 GB	N/A	MRSAJAA064GTW25C00	Toshiba	MLC	JMF667	MRV1.71b	3 years	Endurance > 3,000	B, C, D
Memoright	120 GB	N/A	MRSAD4B120GC325S00	Micron	MLC	SF2281	MRV 1.50S	3 years	Endurance > 3,000	B, C, D
Memoright	120 GB	N/A	MRSAD4B120GC325S00	Micron	MLC	SF2281	MRV 1.50S	3 years	Endurance > 3,000	E
Memoright	128 GB	N/A	MRSAJ6C128GC225S00	Micron	MLC	JMF612	MRV1.1.5	3 years	Endurance > 3,000	B, C, D
Memoright	128 GB	N/A	MRSAJ6C128GC225C00	Micron	MLC	JMF612	MRV1.1.5	3 years	Endurance > 3,000	B, C, D
Memoright	128 GB	N/A	MRSAJAA128GTW25C00	Toshiba	MLC	JMF667	MRV1.71b	3 years	Endurance > 3,000	B, C, D
Memoright	240 GB	N/A	MRSAD4B240GC325S00	Micron	MLC	SF2281	MRV1.5.0	3 years	Endurance > 3,000	B, C, D
Transcend	16 GB	N/A	TS16GSSD500	Samsung	SLC	JM616	120820	2 years	N/A	E
Transcend	32 GB	N/A	TS32GSSD500	Samsung	SLC	JM616	120820	2 years	N/A	E
Transcend	64 GB	N/A	TS64GSSD320	SanDisk/ Micron	MLC	SF2281	N/A	2 years	N/A	E
Transcend	64 GB	N/A	TS64GSSD500	Samsung	SLC	JM616	120820	2 years	N/A	A
Transcend	128 GB	N/A	TS128GSSD320	SanDisk/ Micron	MLC	SF2281	N/A	2 years	N/A	E
Transcend	256 GB	N/A	TS256GSSD320	SanDisk/ Micron	MLC	SF2281	N/A	2 years	N/A	A

<b>HDD</b>						
<b>Vendor</b>	<b>Size</b>	<b>Moxa's PN</b>	<b>Vendor's PN</b>	<b>Controller</b>	<b>Firmware</b>	<b>Test Code</b>
HGST	500 GB	N/A	HTS725050A7E630 / 0J38075	N/A	N/A	A
HGST	1 TB	N/A	HTS721010A9E630 / 0J22423	N/A	N/A	A
HGST	1 TB	N/A	HCC541010A9E680	N/A	N/A	A
HGST	1 TB	N/A	HTS541010A9E680	N/A	N/A	A
Samsung	2 TB	N/A	ST2000LM003	N/A	N/A	A
WD	750 GB	N/A	WD7500BPKT	N/A	N/A	A
WD	1 TB	N/A	WD10JUCT	N/A	N/A	A
WD	1 TB	N/A	WD10JPVT	N/A	N/A	A
WD	1 TB	N/A	WD10SPCX	N/A	N/A	A