



[Maxim](#) > [Design Support](#) > [Technical Documents](#) > [Application Notes](#) > [Memory](#) > APP 4893

Keywords: non-volatile, memory, NV SRAM

APPLICATION NOTE 4893

# Substitution Rules for Nonvolatile Memory Components

Jan 12, 2011

*Abstract: This article explains basic guidelines for substituting a nonvolatile (NV) memory component in an existing design.*

## Introduction

As part of Maxim's continued support for legacy nonvolatile (NV) memory applications, the Company is simplifying several memory product offerings. Depending on the specific product selected, some customers may have to modify their future purchasing information. Other customers will see no changes.

Many customers have questions about the general guidelines for substituting memory components in an existing design. This article addresses many of those questions. Maxim remains committed to providing suitable replacement components as memory densities and technologies evolve.

## Evolving Memory Technology and Existing Designs

Historically, memory components were procured to meet performance requirements when a system was originally designed and manufactured. As time passed, the performance of those same memory components improved dramatically through IC design and process enhancements. Meanwhile, the performance requirement(s) of the original system probably did not change without a reengineering effort. As a fortunate by-product of the improved memory-chip performance, the newer and faster components will still function properly in older/slower applications.

## Deciphering the Performance Capabilities Identified in an NV SRAM Part Number

### What Does the 1220, 1225, 1230 etc. Mean in a Maxim Part Number?

The numeric characters following the DS in a part number designate the memory density and I/O configuration.

Selection of an improper part number can result in a system malfunction. Use the same part number indicated on the original product or system bill-of-materials (BOM). Do not substitute.

Part number	Memory density	Configuration
DS1220	16kb	2k x 8b
DS1225	64kb	8k x 8b
DS1230 or DS1330	256kb	32k x 8b
DS1245 or DS1345	1024kb	128k x 8b
DS1249	2048kb	256k x 8b
DS1250 or DS1350	4096kb	512k x 8b
DS1265	8192kb	1024k x 8b
DS1270	16384kb	2048k x 8b

### What Do the Y, W, AD, and AB Characters Mean in the Part Numbers (e.g., DS1225Y, DS1230W, DS1245AB)?

The alphabetic character(s) preceding the hyphen in an NV SRAM part number represents the power-supply tolerance, or *operating voltage range*, for the component. Depending upon the specific part number, a 5V  $\pm 10\%$  product will be identified as Y or AD. A 5V  $\pm 5\%$  product will be identified as AB, and the 3.3V product will be identified as W.

Selecting an improper power-supply tolerance can result in a system malfunction. Use the same power-supply tolerance indicated on the original product or system BOM. Do not substitute.

### What Is the Dash Number?

The numeric value following the hyphen in a part number is referred to as the "dash number," or *functional speed*, of that product. The value represents the electrical parameter Read Access Time ( $t_{RC}$ ), which is the maximum time in nanoseconds (ns) from a read request to when the data is presented. A part with a -200, for example, will respond to a read request in no more than 200ns.

Because a "-70" component will respond to a read request in no more than 70ns, this faster speed rating also meets/exceeds the performance requirements for any of the slower (-85, -100, -120, -150, or -200) speed grades (i.e., higher dash numbers).

### What Does the IND Mean?

NV SRAM products that contain the characters IND are rated for the -40°C to +85°C (industrial) temperature operation.

NV SRAM products that do not contain the characters IND are rated for the 0°C to +70°C (commercial) temperature operation.

Since the industrial temperature range is wider and fully encompasses the commercial temperature range, an industrial temperature component can be used in a commercial temperature application.

*Caution:* a commercial-temperature product should never be used in an industrial temperature environment.

### What Do the + or # Characters Mean?

With recent international legislation, the global use of a tin lead alloy for soldering and/or terminal plating is being phased out. Maxim identifies all RoHS-compliant products on the package body and on the

shipping container.

A product containing a plus sign (+) is fully lead-free (no Pb) and is 100% RoHS compliant.

A product containing a pound/hash sign (#) is fully RoHS compliant, but may contain trace amounts of specific materials listed as exempt under the RoHS legislation.

To determine the raw materials content of a device, enter the base part number into the search engine and then select the ordering variant of specific interest. See: [Lookup Lead-Free/RoHS Products and Content Data](#).

## If I Upgrade to a Higher-Density Memory Component, Will My System Performance Improve?

No. A higher-density memory will allow more program and/or data storage, however, the software/firmware will require an upgrade to utilize this additional memory. If no design modifications are made, the component will operate but never access the additional memory space. This upgrade is not as trivial as changing the dynamic memory stick in a PC. Please consult the original equipment manufacturer (OEM) for additional guidance.

## If I Upgrade to a Faster Memory Component, Will My System Run Faster?

No. The system's performance is based upon the microprocessor and system clock rate.

## Summary

The dash number in the ordering information represents the Read Access Time (performance rating) of the product.

A faster product (lower Read Access Time = smaller dash number) can be used in place of a slower product (higher Read Access Time = larger dash number).

An industrial temperature product can be used in place of a commercial temperature product.

## Substitution Rules and Examples

- Use the same part number. (i.e., old part number is **DS1230Y-200**).
- Use the same power-supply tolerance. (i.e., DS1230Y-200).
- Use the smallest dash number (best performance) offered on that product. (i.e., DS1230Y-**70+**).
- Use the RoHS-compliant version, if allowable, in your board assembly process. (i.e., DS1230Y-70+).
- An industrial temperature (IND" product can be used in a commercial temperature operation. (i.e., DS1230Y-70**IND+**).

	Original component speed grade					
	-70	-85	-100	-120	-150	-200
OK to substitute using a -70?	Yes	Yes	Yes	Yes	Yes	Yes
OK to substitute using a -85?	No	Yes	Yes	Yes	Yes	Yes
OK to substitute using a -100?	No	No	Yes	Yes	Yes	Yes
OK to substitute using a -120?	No	No	No	Yes	Yes	Yes

OK to substitute using a -150?	No	No	No	No	Yes	Yes
OK to substitute using a -200?	No	No	No	No	No	Yes

Related Parts		
DS1220AB	16k Nonvolatile SRAM	Free Samples
DS1220AD	16k Nonvolatile SRAM	Free Samples
DS1220Y	16K Nonvolatile SRAM	
DS1225AB	64k Nonvolatile SRAM	Free Samples
DS1225AD	64k Nonvolatile SRAM	Free Samples
DS1225Y	64K Nonvolatile SRAM	Free Samples
DS1230AB	256k Nonvolatile SRAM	Free Samples
DS1230W	3.3V 256k Nonvolatile SRAM	Free Samples
DS1230Y	256k Nonvolatile SRAM	Free Samples
DS1245AB	1024k Nonvolatile SRAM	Free Samples
DS1245W	3.3V 1024k Nonvolatile SRAM	Free Samples
DS1245Y	1024k Nonvolatile SRAM	Free Samples
DS1249AB	2048k Nonvolatile SRAM	Free Samples
DS1249W	3.3V 2048kb Nonvolatile SRAM	Free Samples
DS1249Y	2048k Nonvolatile SRAM	Free Samples
DS1250AB	4096k Nonvolatile SRAM	Free Samples
DS1250W	3.3V 4096k Nonvolatile SRAM	Free Samples
DS1250Y	4096k Nonvolatile SRAM	Free Samples
DS1265AB	8M Nonvolatile SRAM	Free Samples
DS1265W	3.3V 8Mb Nonvolatile SRAM	Free Samples
DS1265Y	8M Nonvolatile SRAM	Free Samples
DS1270AB	16M Nonvolatile SRAM	Free Samples
DS1270W	3.3V 16Mb Nonvolatile SRAM	Free Samples
DS1270Y	16M Nonvolatile SRAM	Free Samples
DS1330AB	256k Nonvolatile SRAM with Battery Monitor	Free Samples
DS1330W	3.3V 256k Nonvolatile SRAM with Battery Monitor	Free Samples
DS1330Y	256k Nonvolatile SRAM with Battery Monitor	Free Samples

---

<a href="#">DS1345AB</a>	1024k Nonvolatile SRAM with Battery Monitor	<a href="#">Free Samples</a>
<a href="#">DS1345W</a>	3.3V 1024k Nonvolatile SRAM with Battery Monitor	<a href="#">Free Samples</a>
<a href="#">DS1345Y</a>	1024k Nonvolatile SRAM with Battery Monitor	<a href="#">Free Samples</a>
<a href="#">DS1350AB</a>	4096k Nonvolatile SRAM with Battery Monitor	<a href="#">Free Samples</a>
<a href="#">DS1350W</a>	3.3V 4096K Nonvolatile SRAM with Battery Monitor	<a href="#">Free Samples</a>
<a href="#">DS1350Y</a>	4096k Nonvolatile SRAM with Battery Monitor	<a href="#">Free Samples</a>

---

---

**More Information**

For Technical Support: <http://www.maximintegrated.com/support>

For Samples: <http://www.maximintegrated.com/samples>

Other Questions and Comments: <http://www.maximintegrated.com/contact>

---

Application Note 4893: <http://www.maximintegrated.com/an4893>

APPLICATION NOTE 4893, AN4893, AN 4893, APP4893, Appnote4893, Appnote 4893

Copyright © by Maxim Integrated Products

Additional Legal Notices: <http://www.maximintegrated.com/legal>