



These errata apply **ONLY** to Spartan-3 XC3S5000 FPGAs, including both production devices and engineering samples. These errata **DO NOT** apply to any other Spartan-3 FPGA. If using a different Spartan-3 FPGA, check for errata specific to that device.

Thank you for your interest in Spartan-3 XC3S5000 devices. Although Xilinx has made every effort to ensure that these devices are of the highest possible quality, these devices are subject to the limitations described in the following errata. Please review these errata to ensure that XC3S5000 FPGA devices meet your application requirements. Xilinx wants you to know about any known issues that may potentially affect your Spartan-3 application. This notice also includes [advisories](#) on the latest Spartan-3 design practices.

## Obtaining the Most-Recent Errata Version

By its very nature, an errata notification is a living document and is subject to updates based on recent findings. If this document is printed or saved locally in electronic form, please check for the most recent release, available to registered users via the Xilinx web site.

[http://www.xilinx.com/xlnx/xweb/xil\\_publications\\_display.jsp?category=-1210888](http://www.xilinx.com/xlnx/xweb/xil_publications_display.jsp?category=-1210888)

## Devices Affected by This Errata

These errata only apply to the XC3S5000 FPGA as shown in [Table 1](#). Both engineering sample (ES) and production silicon (no ES marking) are affected. The [errata details](#) may further limit the class of devices affected by a specific issue.

Table 1: Spartan-3 XC3S5000 FPGAs Affected by This Errata

Device Types:	XC3S5000
Packages:	All
Speed Grades:	All
Date Codes:	All

## How to Identify an Affected Device

These errata affect all Spartan-3 FPGAs marked with an “XC3S5000” device type. XC3S5000 FPGAs are produced exclusively at the UMC 300 mm wafer facility using 90 nm process technology. Devices using the latest mask set have an “EGQ” mask/fabrication/process code, as shown in [Table 2](#). An earlier revision, “AGQ”, did not support the Readback feature.

Table 2: Spartan-3 Production Facilities, Mask, and Fabrication/Process Codes

Production Facility	Mask Revisions	Fabrication/Process Code	Example Top Mark
UMC 300 mm, 90 nm (12A)	A (earlier) E (latest)	GQ	<a href="#">Figure 1</a>

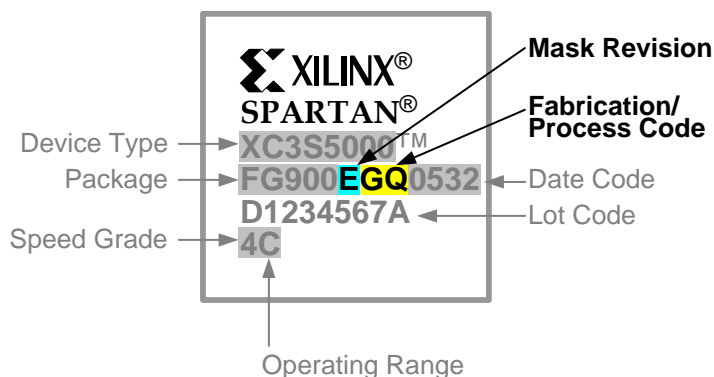


Figure 1: Spartan-3 FPGA from UMC 300 mm facility with “GQ” Fabrication/Process Code Marking

## Hardware Errata Summary

Table 3 summarizes the known hardware issues with the XC3S5000 FPGA. See “[Hardware Errata Details](#)” for a detailed description of each known issue. Table 3 also shows which mask revision is affected by a particular errata item.

Table 3: Hardware Errata Summary

Errata Issue	Mask/Fabrication/Process Code	
	“AGQ”	“EGQ”
<a href="#">Readback Feature Not Available on Devices Built Before Date Code “0532”</a>	Applies	N/A for devices with “0532” date code or later
<i>Mask Revision</i>	Earlier	Latest

## Hardware Errata Details

This section provides a detailed description of each hardware issue known at the release time of this document.

### Readback Feature Not Available on Devices Built Before Date Code “0532”

#### Applications Affected by This Issue

This issue only applies to those designs using the Readback feature on the XC3S5000 FPGAs shown in [Table 4](#) with a “AGQ” Fabrication/Process Code marking or a date code prior to “0532”, as shown in [Figure 1](#).

Table 4: Spartan-3 XC3S5000 FPGAs Affected by the Readback Issue

Device Types:	XC3S5000
Mask Revision Codes:	A (any date code) and E with date codes prior to “0532”
Fabrication/Process Codes:	GQ only
Packages:	All
Speed Grades:	All
Date Codes:	All

This issue affects all manifestations of device readback, including Slave Parallel and Master Parallel readback and JTAG readback. Otherwise, the XC3S5000 FPGA functions normally.

**Description of Issue**

The readback feature is not available for the devices indicated in [Table 4](#).

**Correction/Workaround/Resolution**

XC3S5000 FPGAs with an “EGQ” Mask/Fabrication/Process Code marking and with a Date Code of “0532” or later fully support Readback. XC3S5000 FPGAs ordered using the standard part number (without SCD codes) scheduled for delivery after 15-AUG-2005 automatically include the latest mask revision and Readback functionality.

**Advisories**

This section advises designers of any potential software changes that may affect their XC3S5000 FPGA applications. [Table 5](#) summarizes the advisories and indicates which software update will correct the issue.

Table 5: Advisories and Software Update

Advisory	ISE Version
<a href="#">Bitstream Update Required using ISE 6.3i, Service Pack 1 (SP1) or Later</a>	ISE 6.3i, Service Pack 1
<a href="#">New FACTORY_JF Settings Required for Spartan-3 DCMs</a>	ISE 8.2i

**Bitstream Update Required using ISE 6.3i, Service Pack 1 (SP1) or Later**

Spartan-3 block RAM internal timing is controlled by settings in the FPGA configuration bitstream. Through yield analysis, new optimal bitstream settings were identified for specific Spartan-3 device types. These new settings improve the block RAM internal timing margin, which consequently improves overall product yield and availability. **These new settings do not affect any timing in the FPGA application**, only internal timing relationships within the block RAM. The specific improved internal block RAM timing path is the relationship between the write-enable timing and the input latch-enable timing.

These new bitstream settings are now the default settings starting with Xilinx 6.3i, Service Package 1, available for download from the Xilinx web site after September 13, 2004. XC3S5000 FPGAs are tested using these new bitstream settings beginning with date codes “0433”, corresponding to Work Week 33 of 2004. [Figure 2](#) shows an example top marking for a Spartan-3 FPGA. The relevant fields to identify an affected device are highlighted and include the **Device Type** and the **Date Code**.

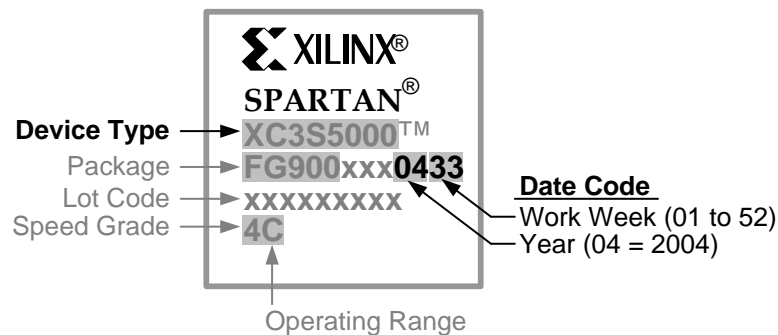


Figure 2: Example Spartan-3 Package Markings

**Please regenerate any Spartan-3 FPGA configuration bitstreams** created using software versions prior to Xilinx ISE 6.3i development software, Service Pack 1. By updating the bitstream, the application can use any existing or future production Spartan-3 FPGA device.

## New FACTORY\_JF Settings Required for Spartan-3 DCMs

### Applications Affected by This Issue

This issue potentially affects applications that use Digital Clock Managers (DCMs). This issue only affects an application if and only if ...

- The application uses one or more DCMs
- One of the DCMs uses phase shifting, either fixed or variable mode.
- The phase shift is negative, or very slightly positive (< 600 ps).

Unless a design meets these exact criteria, this issue can be safely ignored.

### Description of Issue

The DCM automatically compensates for process, voltage, and temperature (PVT) changes and consequently it periodically updates its delay tap settings. The rate at which the update occurs is controlled by an internal attribute called FACTORY\_JF. Xilinx has identified an optimal FACTORY\_JF setting value (FACTORY\_JF=8080). Other settings may potentially fail to track properly over process, voltage, and temperature.

Without using the optimal settings, the DCM could potentially, with low probability, fail to assert the LOCKED output, could lose lock, or could produce erroneous clock outputs.

### Correction/Workaround/Resolution

The new optimal settings are applied starting with Xilinx ISE 8.2i. If using an earlier version, modify the new FACTORY\_JF=8080 settings on each DCM instantiated in the design. [Table 6](#) shows the best available options to update the DCM settings, depending on current design status.

**Table 6: Options for Updated FACTORY\_JF DCM Setting**

Method	Design Status	Steps After Editing
<a href="#">FPGA Editor</a>	Design complete, no further edits planned	Rerun Bitstream Generator
<a href="#">Constraints File</a>	Design in progress	Rerun Design Implementation
<a href="#">VHDL</a> or <a href="#">Verilog</a> Source Code	Design in progress	Rerun complete flow

### FPGA Editor

If the design is complete, with no further edits planned, then FPGA Editor offers the easiest method to update the FACTORY\_JF setting.

- Invoke the FPGA Editor. On Windows PCs, select **Start** → **Xilinx ISE 6** → **Accessories** → **FPGA Editor**.
- Select **File** → **Open**. Select the \*.ncd file for the completed design. Set the **Edit Mode** to "Read Write" mode as shown in [Figure 3](#).

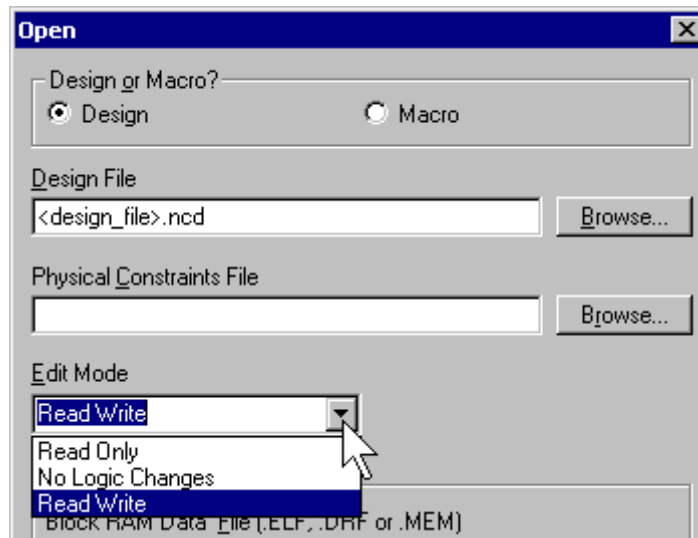


Figure 3: Enable User Editing in FPGA Editor

- For each DCM used in the design ...
  - Select the DCM block using the cursor.
  - Click 'editblock' from the right-most command button bar.
  - Click the Edit Mode button from the icon bar, as shown in [Figure 4](#).



Figure 4: Click "Edit Mode" Button to Change DCM Settings

- Check the two 0X80 options for the FACTORY\_JF DCM attribute, as shown in [Figure 5](#).

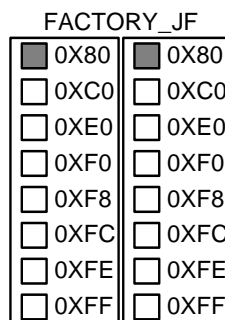


Figure 5: Edit Block View of DCM FACTORY\_JF Settings

- After all DCMs are modified, save the design.
- Re-run the Bitstream Generator.

### Constraints File

An easy option for designs in progress is to apply a user constraint. Edit an existing user constraints file (UCF) or create a new file and add the following constraint for every DCM used in the design.

```
INST <dcm_inst> FACTORY_JF = "8080";
```

### VHDL

When using VHDL, update the FACTORY\_JF values in both the DCM component declaration and in all component instantiations of the DCM. The following code snippet provides an example for XST VHDL. The VHDL source for other logic synthesis packages may vary slightly.

```
component DCM    -- DCM component declaration
  generic(
    . . .
    FACTORY_JF : bit_vector :=  x"8080";
    . . .
  );
. . .

DCM_INST : DCM    -- DCM instantiation
  generic map(
    . . .
    FACTORY_JF => x"8080",
    . . .
  )
```

### Verilog

When using Verilog, update the FACTORY\_JF values as shown in the following XST Verilog code snippet.

```
DCM DCM_INST (
    . . .
);

. . .
// synthesis attribute FACTORY_JF of DCM_INST is "8080"
. . .
// synopsys translate_off
. . .
defparam DCM_INST.FACTORY_JF = 16'h8080;
. . .
// synopsys translate_on
```

### Clock Wizard

The Clock Wizard architecture wizard automatically generates a VHDL or Verilog description of a DCM design based on user input. If using Clock Wizard, update the HDL source as shown in the VHDL or Verilog examples above. Be forewarned that Clock Wizard overwrites the source file each time Clock Wizard is executed.

### Other References

- **Answer Record #21559: What is the correct value for the FACTORY\_JF attribute?**  
[http://www.xilinx.com/xlnx/xil\\_ans\\_display.jsp?getPagePath=21559](http://www.xilinx.com/xlnx/xil_ans_display.jsp?getPagePath=21559)

## Design Software Requirements

The devices covered by these errata require the following Xilinx development software installations to create bitstream programming files.

- Xilinx ISE 8.2i or later  
 (updates are available at the following web link)  
[www.xilinx.com/xlnx/xil\\_sw\\_updates\\_home.jsp](http://www.xilinx.com/xlnx/xil_sw_updates_home.jsp)

## Additional Questions or Clarifications

If additional questions arise regarding these errata, please contact your local Xilinx field application engineer (FAE) or sales representative. Alternatively, please contact Xilinx Technical Support.

[www.xilinx.com/company/contact.htm](http://www.xilinx.com/company/contact.htm)

Alternatively, please visit the Xilinx MySupport web site.

[www.xilinx.com/support/mysupport.htm](http://www.xilinx.com/support/mysupport.htm)

## Revision History

Date	Version No.	Description
20-DEC-2004	2.2	Added <a href="#">VCCINT Supply Sequence</a> issue. Added <a href="#">Readback</a> issue. Added information about the <a href="#">top markings</a> indicating the mask revision, fabrication facility, and process technology for a given Spartan-3 FPGA. Clarified <a href="#">which erratum applies to which mask revision</a> . Added the advisory about the <a href="#">Block RAM Bitstream Change</a> implemented in ISE 6.3i, SP1. Added advisory on <a href="#">New DCM FACTORY JF Settings</a> .
7-JAN-2005	2.3	Updated <a href="#">Table 3</a> as the <a href="#">VCCINT Supply Sequence</a> issue was removed for devices manufactured at the UMC 300 mm, 90 nm facility (12A).
8-AUG-2005	2.4	Updated <a href="#">Table 2</a> and <a href="#">Table 3</a> to add mask revision 'E', which is errata-free for FPGAs with date codes of "0532" or later. Updated <a href="#">Readback</a> because this issue is corrected for mask revision 'E' devices with date codes of "0532" or later. Updated the advisory on <a href="#">New DCM FACTORY JF Settings</a> to clarify the conditions when the new settings are required.
14-DEC-2006	2.5	Updated <a href="#">New DCM FACTORY JF Settings</a> to note that ISE 8.2i automatically includes the new settings.