

**MOTOROLA**

Semiconductor Products Sector

Order Number: AN2181/D  
Rev. 0, 8/2001

# **PowerPC™**

## **Application Note MPC860 Revision D PLL Considerations**

*Michael Drozd**NCSG Applications*

The capacitor value of XFC depends on the voltage controlled oscillator (VCO) frequency and the resulting multiplication factor. The larger the capacitor value, the slower the feedback loop. The MPC860 User's Manual (MPC860UM/AD Rev. 1) recommends XFC values depending on the multiplication factor (MF). If the XFC value is below the recommended range, the jitter of the VCO output increases. If the XFC value is larger than the recommended range, the PLL may never achieve lock after system startup.

### **1.1 Device Nomenclature and Current XFC Table**

The formula in table 15-2 on page 15-8 in the MPC860 Users Manual is valid for all revision C silicon and earlier. The revision of the silicon can be derived from last 2 digits of the part number, e.g. XPC860ENZP66C1 is a C revision silicon. XPC860PZP80D4 is a revision D silicon.

### **1.2 Revision D XFC Implementation**

Due to the change of manufacturing technology used for revision D silicon, a revised set of formula must be used to calculate the appropriate XFC value. The XFC values are larger for revision D compared to revision C formula to obtain lower jitter. For systems which are migrating from revision C to revision D, the XFC capacitor value may need to change, to fit within the new calculation ranges. It may be possible to go from a revision C to a revision D MPC860 without changing the XFC value. However, the system must have timing margins of at least 2.0 ns on all propagation delay values of the bus signals, especially of

This document contains information on a new product under development by Motorola.  
Motorola reserves the right to change or discontinue this product without notice.

© Motorola, Inc., 2001. All rights reserved.

**\*Digital DNA™**  
From Motorola

**PRELIMINARY—SUBJECT TO CHANGE WITHOUT NOTICE**

SDRAM signals. Table 1 shows the revised XFC formula for revision D silicon and later.


**Table 1 XFC Capacitor Value for Revision D Silicon and later Based on PLPRCR[MF].**

<b>MF Range</b>	<b>Minimum Capacitance</b>	<b>Maximum Capacitance</b>	<b>Unit</b>
<b>1 &lt;= (MF+1) &lt;= 4</b>	<b><math>XFC = [(MF+1) \times 580] - 100</math></b>	<b><math>XFC = [(MF+1) \times 780] - 140</math></b>	<b>pF</b>
<b>(MF+1) &gt; 4</b>	<b><math>XFC = (MF+1) \times 830</math></b>	<b><math>XFC = (MF+1) \times 1470</math></b>	<b>pF</b>

DigitalDNA is a trademark of Motorola, Inc.

The PowerPC name, the PowerPC logotype, and PowerPC 603e are trademarks of International Business Machines Corporation used by Motorola under license from International Business Machines Corporation.

Information in this document is provided solely to enable system and software implementers to use PowerPC microprocessors. There are no express or implied copyright licenses granted hereunder to design or fabricate PowerPC integrated circuits or integrated circuits based on the information in this document.

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

**HOW TO REACH US:**

**USA/EUROPE/LOCATIONS NOT LISTED:** Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

**JAPAN:** Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1, Minami-Azabu. Minato-ku, Tokyo 106-8573 Japan. 81-3-3440-3569

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong. 852-26668334

**TECHNICAL INFORMATION CENTER:** 1-800-521-6274

**HOME PAGE:** <http://www.motorola.com/semiconductors>

**DOCUMENT COMMENTS:** FAX (512) 933-2625, Attn: RISC Applications Engineering

**WORLD WIDE WEB ADDRESSES:** <http://www.motorola.com/PowerPC>  
<http://www.motorola.com/NetComm>  
<http://www.motorola.com/ColdFire>



**MOTOROLA**

AN2181/D