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**TimeFlash  
Programmer  
User's Guide**

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**Object of Declaration: TimeFlash**

EU Declaration of Conformity

This declaration of conformity is issued by the manufacturer.

The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).

This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at [www.microchip.com](http://www.microchip.com).

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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA.

  
Derek Carlson

VP Development Tools

11-NOV-16  
Date

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**NOTES:**



# TIMEFLASH PROGRAMMER USER'S GUIDE

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## Preface

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### NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site ([www.microchip.com](http://www.microchip.com)) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXA”, where “XXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

## INTRODUCTION

This chapter contains general information that will be useful to know before using the TimeFlash Kit. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [The Microchip Website](#)
- [Customer Support](#)
- [Document Revision History](#)

## DOCUMENT LAYOUT

This document describes how to use the TimeFlash Kit to program a MEMS oscillator device. The manual layout is as follows:

- **Chapter 1. “TimeFlash Kit”** – Provides important information about the TimeFlash Kit.
- **Chapter 2. “Software”** – Provides information on installing the TimeFlash Kit and operating the GUI.
- **Appendix A. “Messages”** – Provides information about the three types of messages provided by the TimeFlash interface.

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## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

Description	Represents	Examples
<b>Arial font:</b>		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u>File</u> > <i>Save</i>
Bold characters	A dialog button	Click <b>OK</b>
	A tab	Click the <b>Power</b> tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
<b>Courier New font:</b>		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets [ ]	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: {   }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

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Microchip provides on-line support via our web site at [www.microchip.com](http://www.microchip.com). This website is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the website contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, on-line discussion groups, Microchip consultant program member listing
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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://support.microchip.com>.

## DOCUMENT REVISION HISTORY

### Revision A (January 2017)

- Converted Micrel version of the TimeFlash Kit guide to Microchip user guide DS50002563A.

# TimeFlash Programmer User's Guide

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**Chapter 1. TimeFlash Kit**

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**1.1 INTRODUCTION**

This is the operation manual for the Microchip TimeFlash product.

**1.2 KIT CONTENTS**

The Microchip TimeFlash kit consists of the following items:

- TimeFlash Programmer
- USB Cable
- Anti-Static Tweezers
- Quick Start Guide
- Installation USB Flash Drive



**FIGURE 1-1:** *TimeFlash Kit.*

**1.3 FUNCTIONS**

The Microchip TimeFlash programmer provides the following functions:

- Identify a Device
- Program the Microchip Family of MEMS Oscillators
- Measure the Frequency of a Programmed Part

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Included in the TimeFlash kit is a USB flash drive with the installation software. Once installed, the Microchip TimeFlash software will automatically download software updates as they become available.

An offline installation package is also included in the flash drive to installation to a PC without Internet access.

Socket Daughter Cards (SDCs) are required for programming oscillators with the Microchip TimeFlash programmer. The SDCs accommodate each of the six form factors by simply providing a PCB extension to the programmer. For added convenience, the socket size is designated at the top of each card.

## Chapter 2. Software

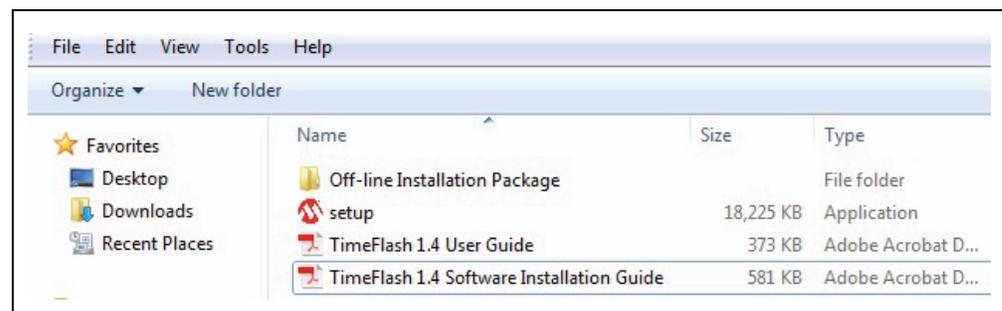
### 2.1 PERSONAL COMPUTER REQUIREMENTS

The installation of the TimeFlash software on a personal computer requires at least the following resources:

- **Operating System:** Windows 7, Windows 8.1, Windows 10.
- **Memory:** A minimum of 512 MB of available RAM.
- **Hard Disk Storage:** 4 MB of HDD storage space must be available for permanent use by TimeFlash.
- **CPU Speed:** 1 GHz CPU is recommended.
- **I/O Ports:** A single USB 2.0 port is required along with Internet access.
- **Screen Resolution:** A minimum screen resolution of 1024 x 768 is recommended.

### 2.2 SOFTWARE INSTALLATION PROCEDURE

Upon inserting the TimeFlash USB drive into a computer, the files seen in [Figure 2-1](#) below are available.



**FIGURE 2-1:** USB Flash Drive Contents.

- If an Internet connection is not available at the time of installation, open the Off-line Installation Package directory and run the Microsoft dotNetFx40\_Full\_x86\_x64 file. Then continue to the next step.
  - If an Internet connection is available, do not open the Off-line Installation Package directory and just continue to the next step.
1. Run `setup.exe` and the screenshots found in [Figure 2-2](#) through [Figure 2-6](#) will appear in sequence. Just follow the steps as indicated by each figure.

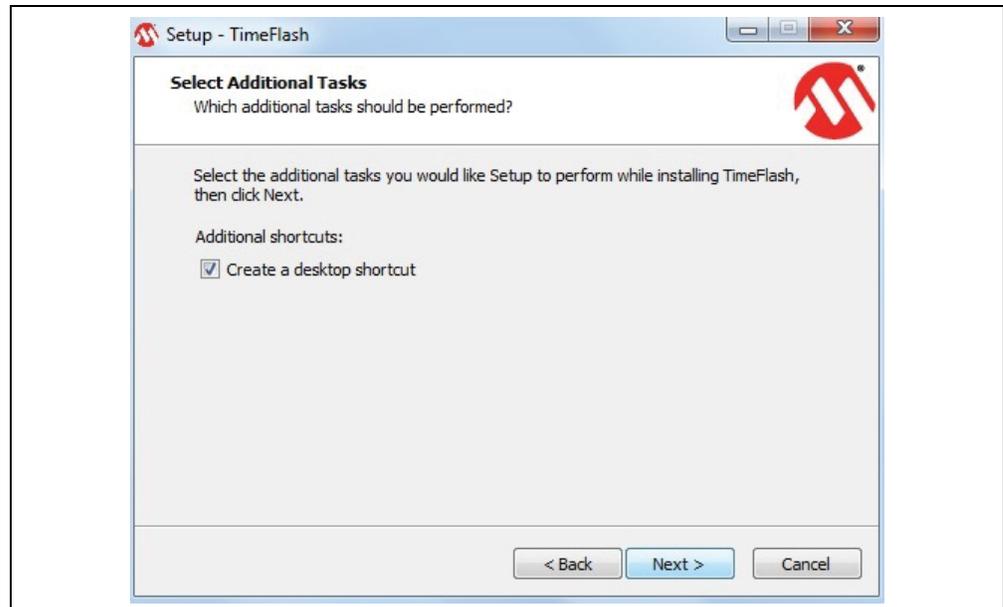
# TimeFlash Programmer User's Guide



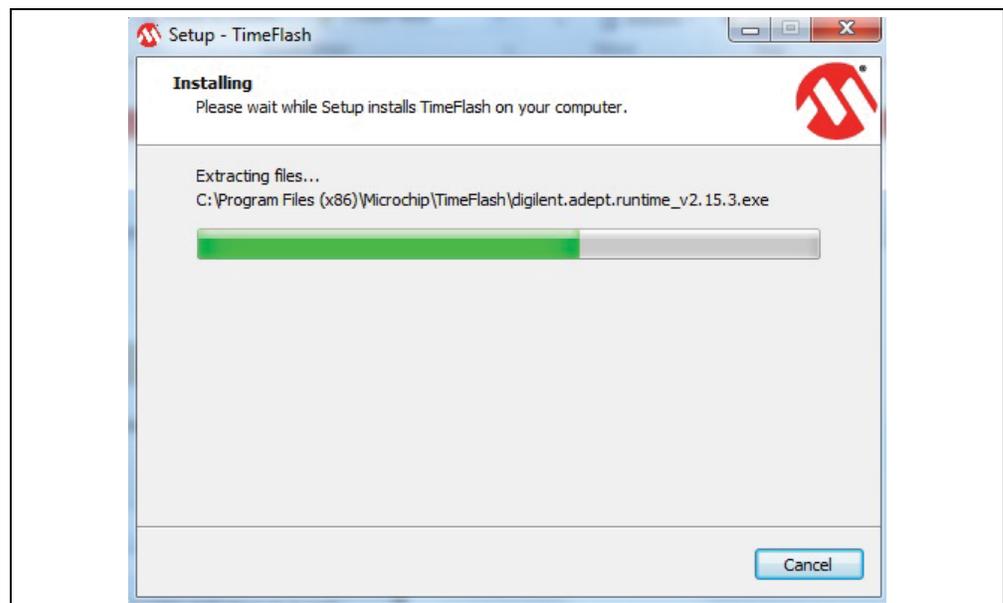
**FIGURE 2-2:** Setup Wizard. Click Next.



**FIGURE 2-3:** License Agreement. Accept the Agreement and Click Next.



**FIGURE 2-4:** *Create Desktop Shortcut, if Desired, and Click Next.*



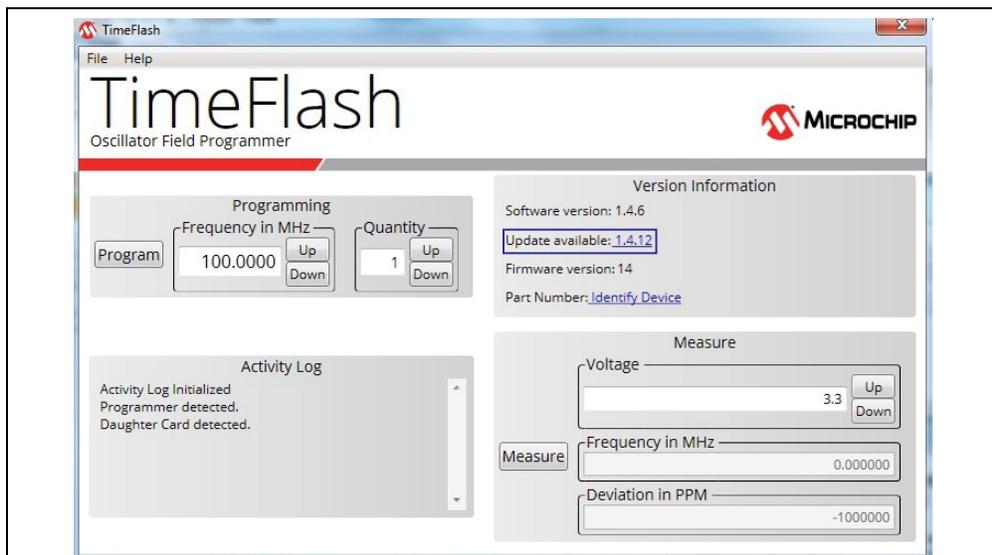
**FIGURE 2-5:** *Installing TimeFlash 1.4.*

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**FIGURE 2-6:** Installation Complete.

Once the installation has completed, click **Finish** and the TimeFlash GUI in [Figure 2-7](#) will launch. If an updated version of this software is available, it will be indicated in the Version Information pane, under the Update Available field. Click on it and a new installation will begin. In that instance, follow the steps illustrated in [Figure 2-2](#) through [Figure 2-6](#) again.



**FIGURE 2-7:** TimeFlash GUI.

## 2.3 USING THE TIMEFLASH GUI

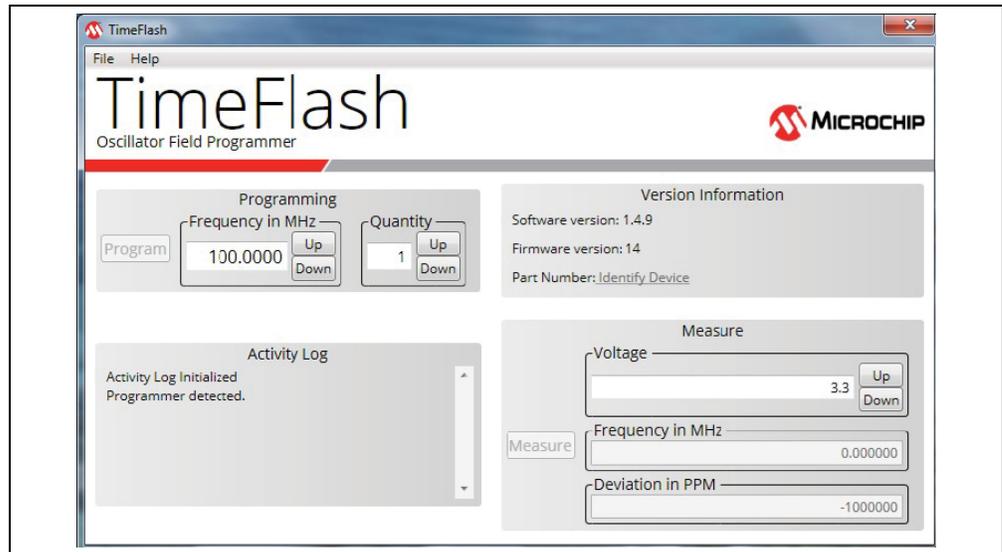
After installing the TimeFlash control software, execute the following steps to launch the application.

Navigate to the installation location of the program `Timeflash.exe` and then double click on the icon. For convenience, a shortcut of this icon in the Start Menu will ease continued use of the software. Initially, the TimeFlash application will display a logo with a transparent background (see [Figure 2-8](#)) as a Windows screen while the application launches.



**FIGURE 2-8:** TimeFlash Logo Screen.

When the software has loaded, the following screen will appear.



**FIGURE 2-9:** TimeFlash GUI.

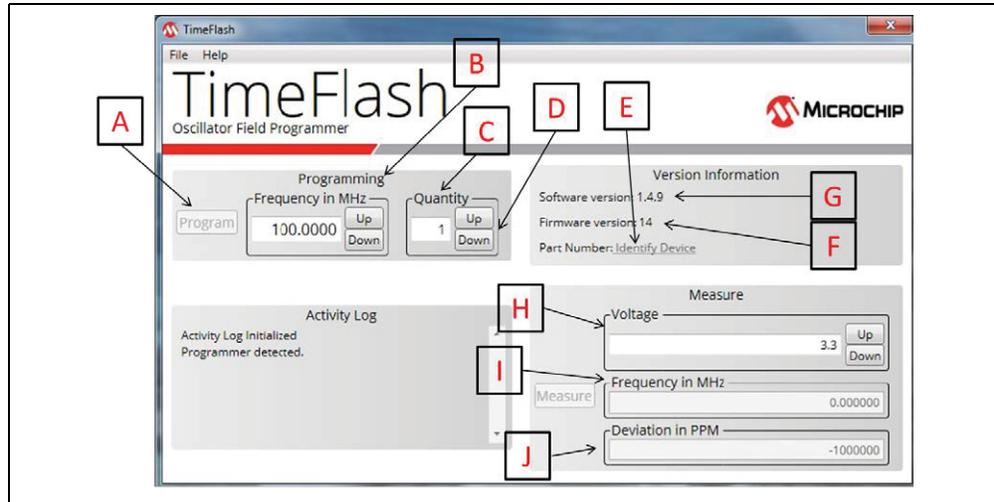
The Version Information pane displays the following information (see [Figure 2-10](#)):

Software Version **[G]** is the version of TimeFlash software that is running on the computer.

Firmware Version **[F]** is the version of the control software that is currently running in the TimeFlash programming module. If the module is not attached, then this field will be blank.

The Part Number **[E]** is the field that indicates the part number and package size of the blank component currently inserted in the Socket Daughter Card. This field, when clicked, will identify the device.

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**FIGURE 2-10:** TimeFlash GUI Features.

The items indicated in this figure will be referred to in the format of [X] throughout this document to reference their locations on this screen. For example, [E] refers to the **Part Number** item in the **Version Information** pane of this screen

## 2.4 IDENTIFYING, PROGRAMMING, AND MEASUREMENT FUNCTIONALITY

### 2.4.1 Identifying a Device

To identify a device, simply click on the Part Number field (see [E] in Figure 2-10). Note that the field is disabled until a Socket Daughter Card is attached to the programmer.

### 2.4.2 Programming a Device

1. Plug the USB cable into any available USB port on the computer
2. Plug the TimeFlash programming module into the micro USB end of the USB cable.
3. Plug the desired Socket Daughter Card into the TimeFlash programming module. The correct orientation results in the socket of the Socket Daughter Card and LEDs of the programming module being on the same side of the assembled unit. If the Socket Daughter Card is inadvertently connected to the programming module either 180 degrees rotated or offset from the correct alignment, no harm will be done to the unit. Under this condition, [E] on the screen will not display a part number.

Note: Do not unplug components, the Socket Daughter Card, or the USB cable during programming.

4. Launch the TimeFlash software on the computer and note that the Software Version, Firmware Version, and Part Number are displayed. Ensure that the part number is correct for the part you are about to program.
5. Using the supplied anti-static tweezers, place the component into the socket on the Socket Daughter Card.

Note: There is a pin 1 designator printed in the corner of the socket card to assist in correctly aligning the component in the socket. If the component is inserted backwards, this condition will be detected and abort programming. The blank oscillator will not be

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damaged. Successive attempts to program a component that is inserted backwards can lead to degraded performance of the component, so use care when inserting the component into the unit's socket.

6. Select the Frequency in MHz field **[B]** in the Programming pane of the GUI.
7. Enter the desired frequency or click the **Up** and **Down** buttons to make a selection.
8. Check the Quantity **[C]** field to ensure that it displays "1". Operation for quantities greater than one will be discussed in [Section 2.4.3 "Sequential Programming of Multiple Devices"](#).
9. Click the **Program** button **[A]** in this pane.
10. Wait for either the Busy (blue) LED on the programmer to extinguish or the finished message to appear in the Activity Log pane. The device is now programmed.

### 2.4.3 Sequential Programming of Multiple Devices

1. To program multiple devices to the same frequency, the Quantity field **[C]** can be set to a number greater than 1 by entering the desired value or pressing the **Up** and **Down** buttons **[D]**. The user may select a quantity from 1 to 999. When the **Program** button **[A]** is pressed, the TimeFlash will program the part that is in the Daughter Card Socket. When the part is successfully programmed, the counter will be decremented and the system will measure and display the frequency in the Frequency in MHz field **[I]** of the Measure pane.
2. Using the supplied anti-static tweezers, place the next component into the socket on the Socket Daughter Card.
3. Click the **Program** button **[A]** and observe that the counter has decremented.
4. Continue repeating steps 2 and 3 until all devices are programmed.

If the device does not program, an error message will appear in the Activity Log and the counter will not be decremented.

### 2.4.4 Measuring the Frequency of a Programmed Device

1. Either type in the desired operating voltage for the programmed part or use the **Up** and **Down** buttons to adjust the Voltage value **[H]**. Using the buttons will select from the standard voltages (1.8V, 2.5V, 2.8V, 3.0V and 3.3V). Typing in an absolute value permits any voltage from 1.8V to 3.3V in 10 mV increments. Using this method, the frequency can be measured across the desired operating voltage range (margining).
2. Read the actual measured Frequency in MHz **[I]** and Deviation in PPM offset **[J]** from the appropriate fields in the Measure pane.

Note: The PPM offset value in the Measure pane uses the frequency value displayed in the Programming pane as its 0 ppm reference point.

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**Appendix A. Messages**

**A.1 MESSAGES**

The following tables display the TimeFlash application messages based on three classifications on severity: Information Only, Warning, and Error.

**TABLE A-1: INFORMATION ONLY MESSAGES**

Message Text	Location	Pre-Condition
Downloading installer	Activity Log	Update link pressed by user.
Installer was successfully downloaded	Activity Log	Downloading installer pointed by version.xml successful.
Burn started	Activity Log	User clicked <b>Burn</b> .
Burn complete	Activity Log	Programming was successful.
Measurement started	Activity Log	User clicked <b>Measure</b> .
Measurement successful	Activity Log	Measurement was successful.
Programmer detected	Activity Log	TimeFlash was connected and initialized successfully.
Daughter Card detected	Activity Log	A supported daughter card was connected.
Daughter Card removed	Activity Log	A daughter card was removed.
Programmer removed	Activity Log	TimeFlash was removed.
Please replace the part with a blank one and press OK	Pop-up Dialog	When the quantity field is > 1 and programming an oscillator was successful, this dialog gives the user a chance to insert a new part.
Attempting to identify part	Activity Log	The programmer is now trying to determine the exact part number of the oscillator in the socket.

**TABLE A-2: WARNING MESSAGES**

Message Text	Location	Pre-Condition
Testing programmed part failed. Try doing a measurement.	Activity Log	Communication failure with the programmer while trying to measure the frequency of the oscillator after programming and power-cycle.
This Socket Daughter Card does not support...	Activity Log	Legacy daughter cards do not support all oscillator families and all operations. Use the universal socket daughter cards or a different oscillator.

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**TABLE A-2: WARNING MESSAGES (CONTINUED)**

Message Text	Location	Pre-Condition
Not supported Daughter Card detected, check for application updates.	Activity Log	An unsupported daughter card was connected.

**TABLE A-3: ERROR MESSAGES**

Message Text	Location	Pre-Condition
Could not download the installer.	Activity Log	Downloading installer pointed by version.xml failed.
Could not locate the installer. Update failed.	Activity Log	The installer pointed by version.xml was not found or cannot be accessed.
Part inserted backwards.	Activity Log	An overcurrent condition was detected, probably because the oscillator was inserted backwards.
No programmable part present.	Activity Log	Communication failure with the oscillator while trying to calibrate the frequency.
Burn failed, still programmable, re-burn same part.	Activity Log	Communication failure with the oscillator while trying to measure the calibrated frequency.
Burn failed, still programmable, re-burn same part.	Activity Log	The deviation between the target and measured frequency is > 1000 ppm.
Burn failed, discard part.	Activity Log	OTP programming failed. Part most likely not re-usable.
Could not cycle power. Unplug the programmer and reconnect.	Activity Log	Turning power off/on failed.
Measurement failed.	Activity Log	Communication failure with the programmer while trying to measure the frequency.
No oscillator was detected in socket.	Activity Log	Communication failure with the oscillator. Most probably no oscillator in socket or not properly inserted.
Identification failed.	Activity Log	Communication failure while attempting to identify the exact part number of the oscillator in the socket.



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