Time Machine II
User Manual

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1 Introduction

This user manual describes the software and hardware features of the Time Machine II (or Time Machine) a portable kit designed for programming SiTime field programmable (FP) oscillators. The Time Machine supports many SiTime oscillators with specialized socket cards that accommodate different package sizes.

2 Important Notes

- Refer to the disclaimer section for terms and conditions governing the use of the Time Machine II and devices programmed on the Time Machine II.
- After programming, place samples into an antistatic bag clearly marked "Engineering Samples."
- Samples can only be programmed using specific field programmable (FP) parts for a given oscillator family. See the FP Oscillator datasheet for more information on how to select and order FP parts.
- Please contact your SiTime sales representative for large volume production orders.
- The Time Machine II has not been tested for EMC compliance, EMI radiation susceptibility, or any temperature and humidity cycling. The recommended temperature range is 20°C to 35°C.

3 Time Machine II Kit Contents

The Time Machine II kit contains the following items:

1. SiTime programmer (1 pc)
2. Socket cards:

   The Time Machine II comes with three different socket cards. Each adapter board includes two or more sockets for connecting devices in different packages to the main unit for programming. It is possible to remove and insert devices in the socket while the board is connected to the SiTime Programmer.
3. USB cable (1 pc)
4. Quick start guide (Download)
5. Samples kit with several devices

   (The enclosed device types may vary; please contact Sales for additional units)
6. Tweezers for handling small devices

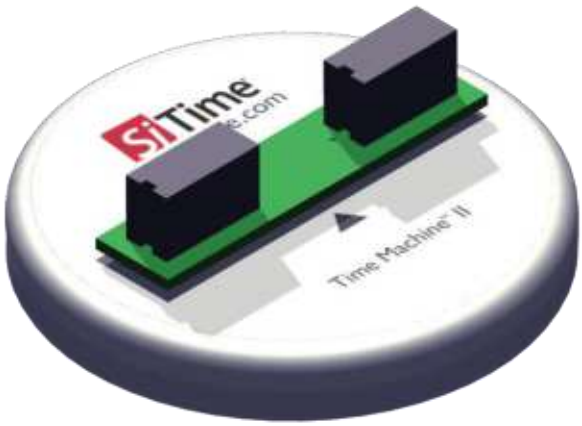


Figure 1. Time Machine II base unit



Figure 2. Time Machine socket card SiT6160DK.
Supports 5.0 mm x 3.2 mm (4-pin and 6-pin) and 7.0 mm x 5.0 mm (4-pin and 6-pin) packages.

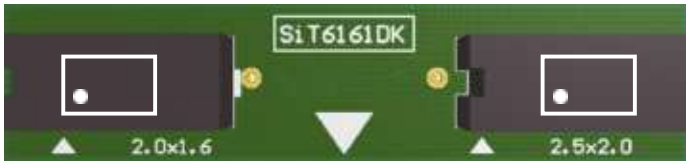


Figure 3. Time Machine socket card SiT6161DK.
Supports 2.0 mm x 1.6 mm (4-pin) and 2.5 mm x 2.0 mm (4-pin) packages.



Figure 4. Time Machine socket card SiT6165DK.
Supports SOT23-5 package (5-pin) and 3.2 mm x 2.5 mm (4-pin and 6-pin) packages.

4 Additional Socket Cards

In addition to the three socket cards SiT6160DK, SIT6161DK and SiT6165DK shipped with the kit, the following socket card is available. Please contact sales support for availability.

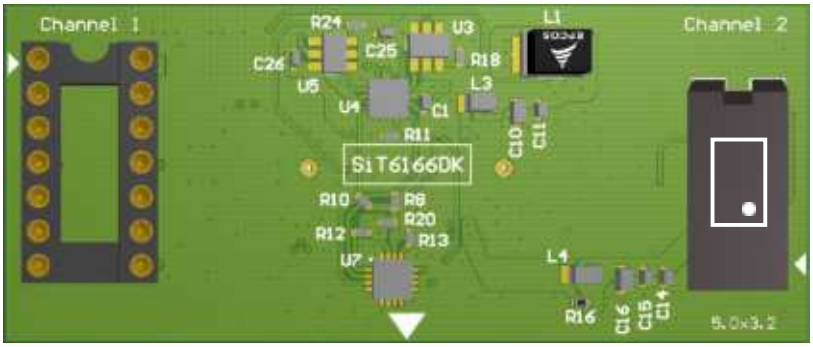


Figure 5. Time Machine socket card SiT6166DK.
Supports 5.0 mm x 3.2 mm (10 pin) package and DIP14 socketed interposers.

5 Software Installation

Scroll to the bottom of the MEMS Oscillator Programmer webpage to find downloadable software and download the latest version of the Time Machine software. Follow the onscreen instructions.

6 Hardware Connection

Connect the SiTime Programmer to your PC using the USB cable. The power light will illuminate.

The first time the SiTime Programmer is connected, the *Windows Found New Hardware* notification will appear. Please wait until driver installation is completed.

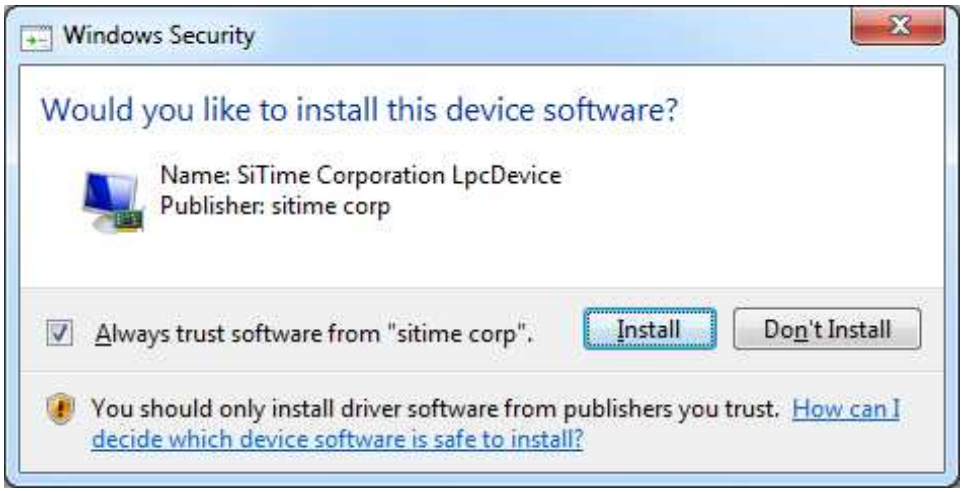


7 Driver Installation

The first time the software is launched, driver installation will be required. Time Machine software will install all required drivers automatically.

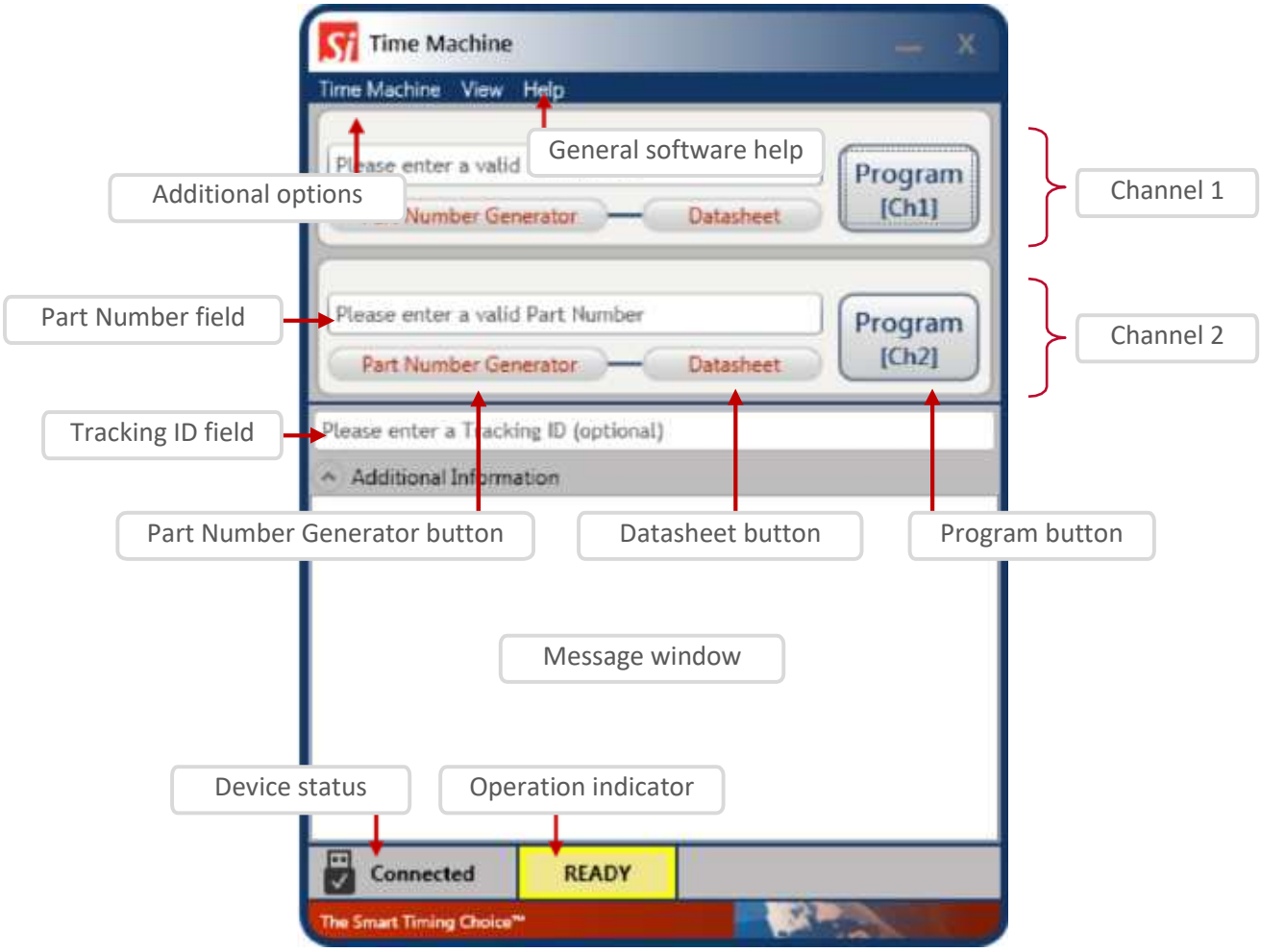


The *Windows Security* notification window will appear. Please check *Always trust software from "sitime corp"* and click the *Install* button.



8 Working with the Time Machine Software

Starting the software launches the main user interface (UI) as shown below.



8.1 User Interface Features

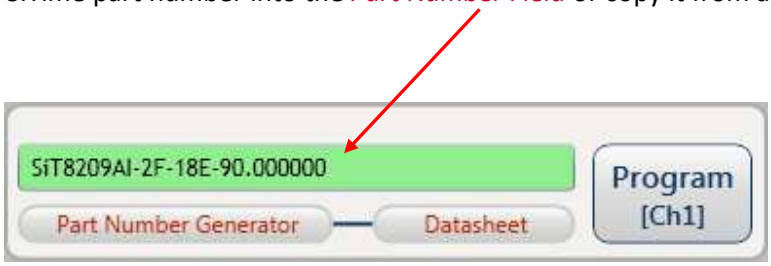
The following features are available in the main UI:

- TimeMachine > View Logs – launches the log viewer
- TimeMachine > Auto Detect – enables/disables parts auto detection mode
- TimeMachine > Settings – launches available part families configuration
- TimeMachine > Exit – quits the software
- Help > View Manual – opens this user manual
- Help > Supported Devices – shows the list of devices supported by the Time Machine
- Help > Get Support – opens your email client with a draft of support request email
- Help > Check for Updates – checks for software updates (requires internet connection)
- Help > About - SW/FW versions,
  only SW version is shown if the SiTime Programmer is not connected
- Device status – shows status of the SiTime Programmer (Connected/Disconnected)
- Operation indicator – indicates operation status and results (READY/BUSY/PASS/FAIL)
- Message Window – reflects operation result and part detection result

The main UI can run with or without the SiTime Programmer connected to the host computer.
This allows you to view the programming log history and get software updates without connecting the base unit.

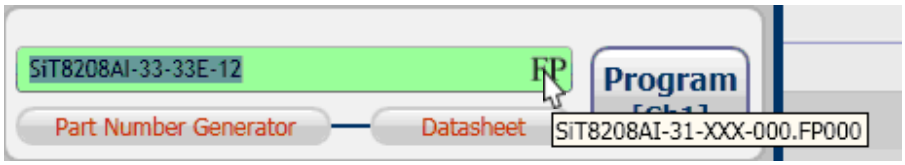
8.2 Entering the Part Number

You may type the SiTime part number into the *Part Number Field* or copy it from another source and paste.



If you enter a valid SiTime Part Number, the background of the *Part Number Field* becomes green. The background will turn red when the part number is invalid. You cannot program the device with an invalid part number.





* Time Machine II software will alert you with this icon if the part you are trying to program contains non-default drive strength.

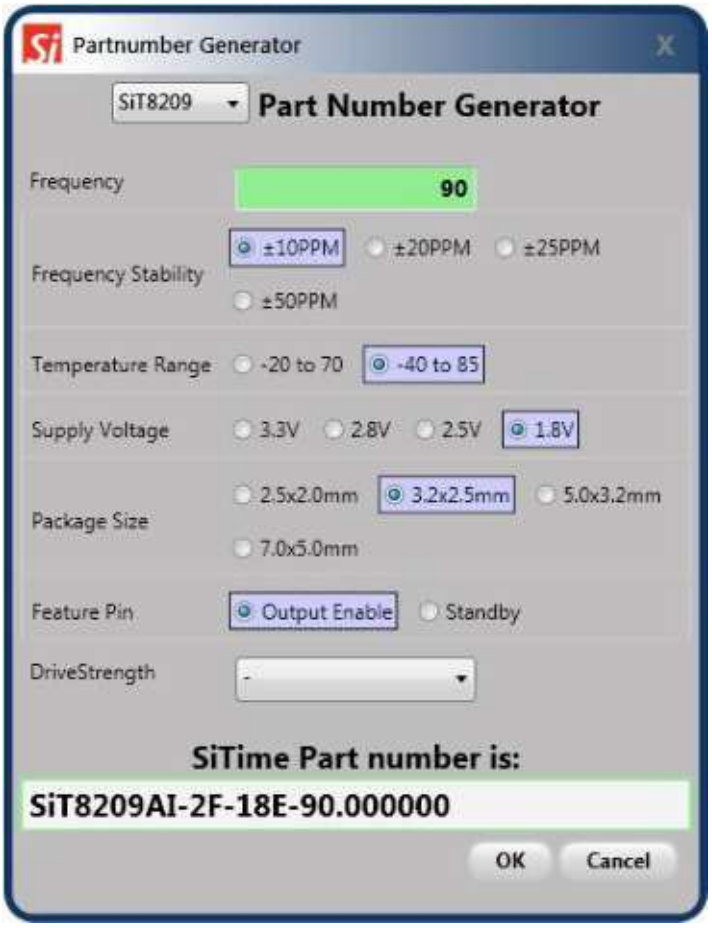
** With the correct part number in the *Part Number Field,* Time Machine II software will automatically detect which FP (field programmable or "blank") device you will need to use to program that part number. If you hover over the FP icon, a box with the blank part number will appear. More details on FP parts may be found in the FP Oscillator datasheet.

8.3 Part Number Generator

The *Part Number Generator* provides an option for generating SiTime part numbers.

Click the *Part Number Generator* button on the appropriate channel.

Note that you should have a valid FP part in the specific channel socket where you enter the part number. The PN generator window will appear.



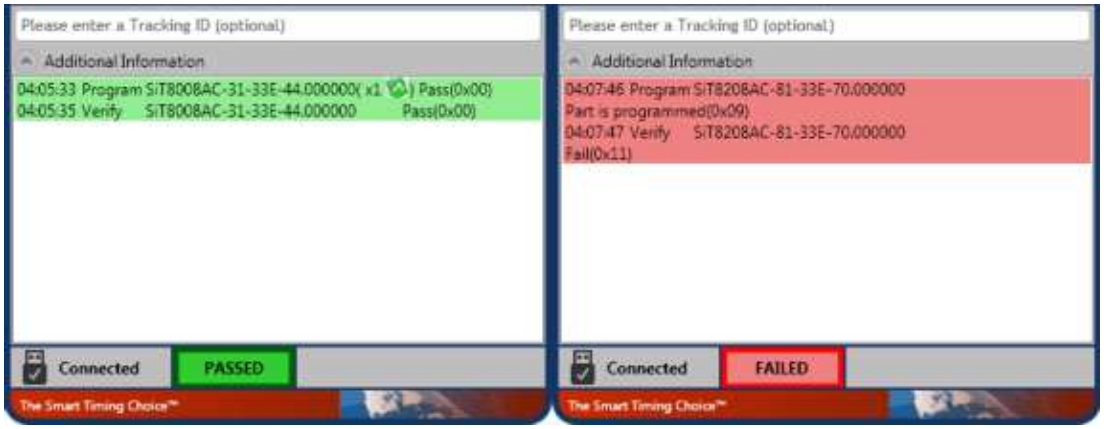
Select the desired part family from the drop down list at the top of the *Part Number Generator* window.

Specify the desired frequency and other configuration parameters and click *OK*.

The generated part number will be automatically pasted into the *Part Number* field of the appropriate Channel. The *Cancel* button returns you to the Channel view without updating the *Part Number* field.

8.4 Part Programming

Once you have entered a valid part number, click the *Program* button to program the part. The programming process result will be reflected in the output window as shown below.



If part programming is successful, the operation indicator field will show a green PASSED indicator. If the part programming fails, the operation indicator field will show a red FAILED indicator. In this case, see the "Programming generates a FAIL message" section of this manual for information on how to proceed. Part verification is done automatically following any programming operation.

During the programming and verification procedures, the active channel window will dim and all controls in the channel dialog boxes will be disabled. The operation indicator will read BUSY as shown below.



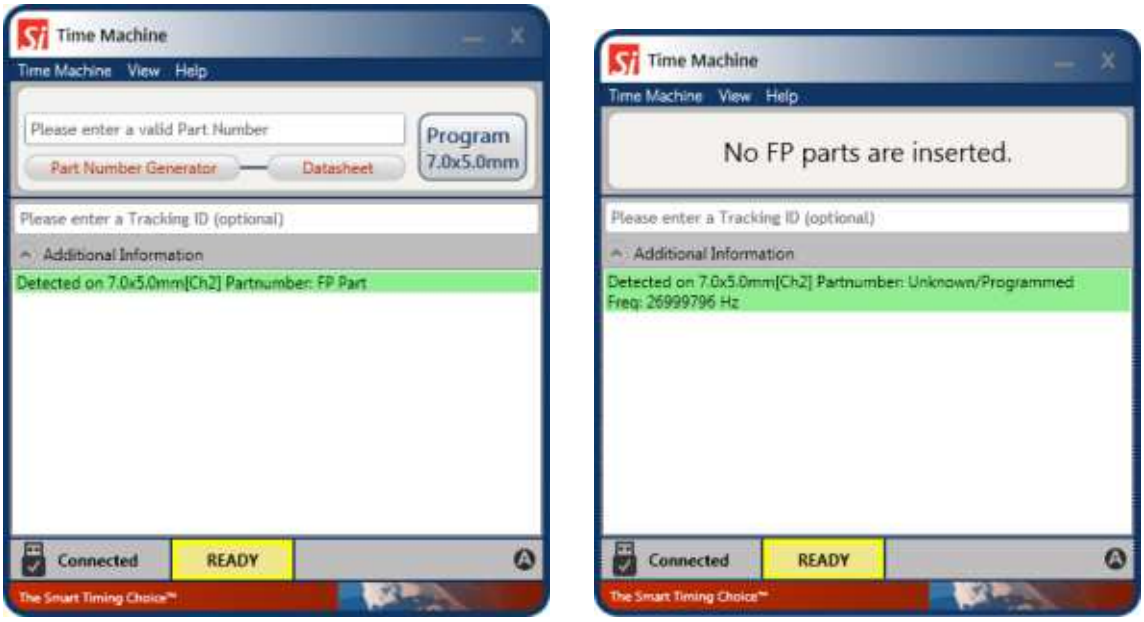
8.5 Tracking ID

The main UI includes an optional *Tracking ID* field to help you track programming history. After entering the part number but before programming, you may enter a text string to be associated with the part. This *Tracking ID* will then be displayed after programming in the *Logs viewer* window.

8.6 Auto Detect Mode

To enable auto detect mode, click TimeMachine > Auto Detect. The check mark will be displayed indicating that auto detect mode is enabled. In auto detect mode with the SiTime programmer connected, the software will automatically check for the presence of a part in each channel and display an individual channel view for the appropriate channel. An appropriate message will be displayed in the *Message Window* whenever an FP part is detected.

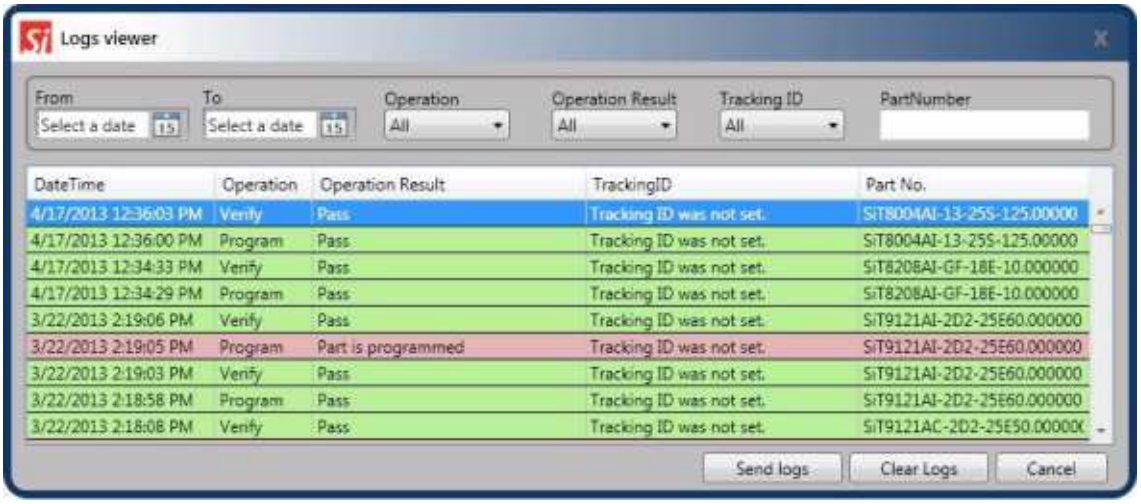
Auto detect mode can be used for part frequency estimation. If an already programmed part is inserted in the socket, the message will display the estimated part frequency.



Note: Auto detect estimated frequency measurement result should not be used to determine part performance.

8.7 Viewing Operation Logs

The Time Machine stores records of all parts programmed. You can access records at any time to view programming history. To launch the *Log Viewer,* select TimeMachine > View Logs on the main UI.

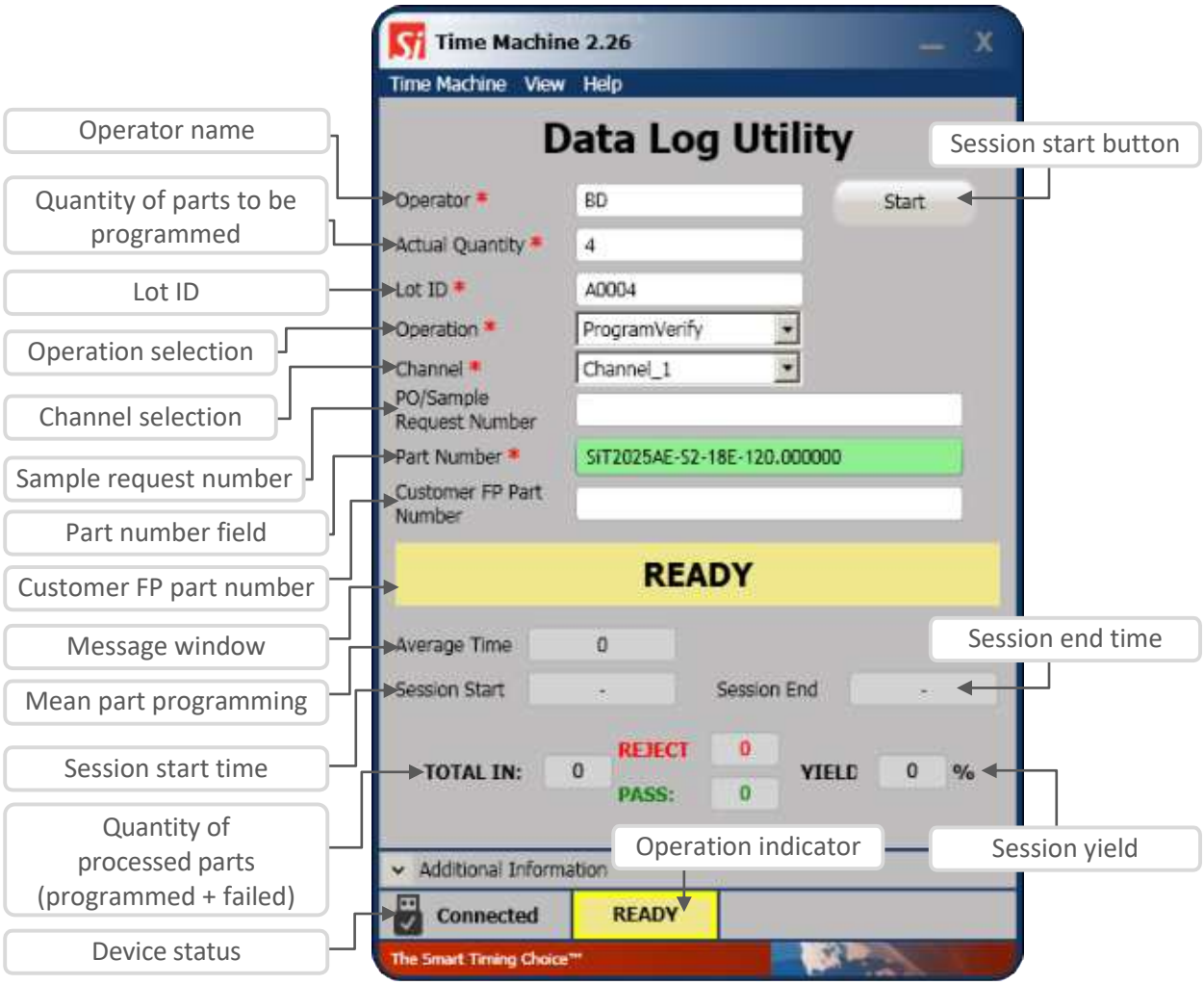


8.8 Data Log Mode

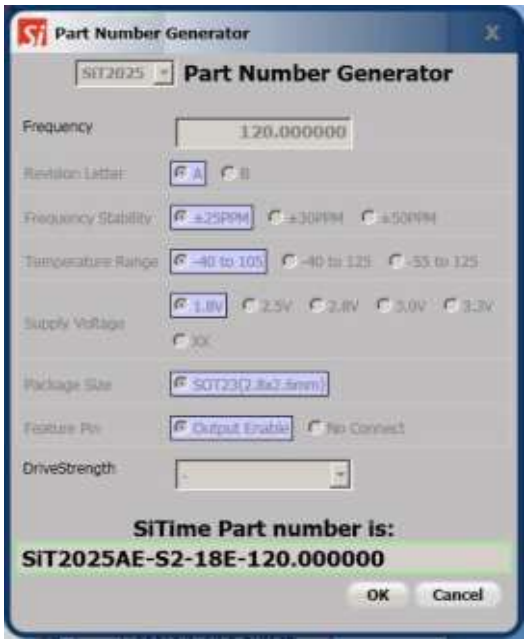
Data log mode allows storing additional information about programmed parts and order during batch programming. To switch to the data log mode, select View > Data Log as shown in the figure below.



The *Data Log Utility* has fields for entering ordering information, operator lot information, and part number. Fields marked with a red asterisk are mandatory. Once required information is entered, it is possible to start a programming session.



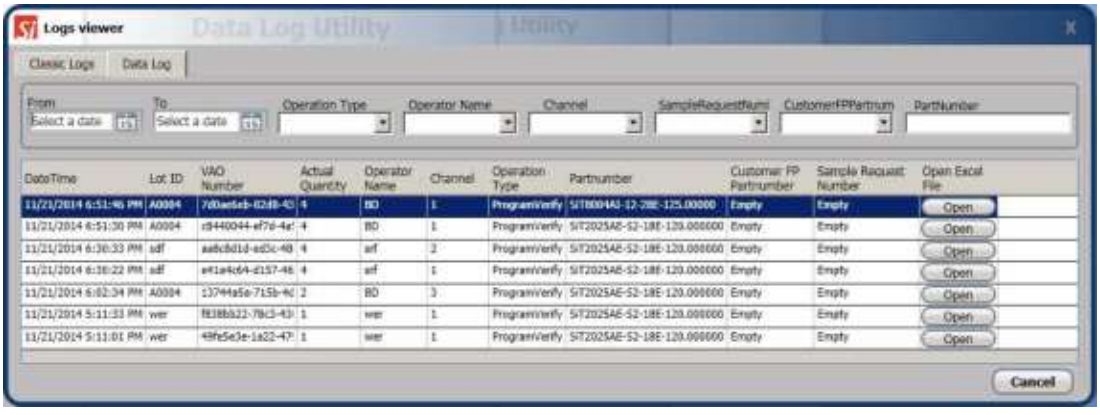
At the beginning of a programming session, the *Part Number Generator* appears showing the decoded part number. After clicking *OK* in the *Part Number Generator* window, programming of the first part starts. When part programming is complete, the operator should place a new FP part into the socket and click the *Program Next* button. The programming session ends when number of programmed parts reaches the *Actual Quantity* entered or the *Stop* button is clicked. Programming information is recorded and stored in the log at the end of the programming session.





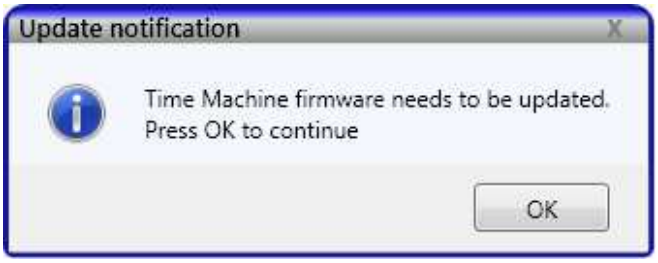
8.9 Viewing Data Logs

Data logs can be displayed by opening the *Log Viewer* (TimeMachine > View Logs) and selecting the *Data Log* tab.



9 Firmware Updates

The Time Machine may require a firmware update. You will be prompted to apply it during the software launch or when you connect the device.



It is strongly recommended that you perform an update immediately.

Do not close the application until the update process is complete. The FW update process will start after clicking *OK*.



Note:

The *Windows Found New Hardware* notification may appear during the firmware update. In this case, wait until driver installation is complete.

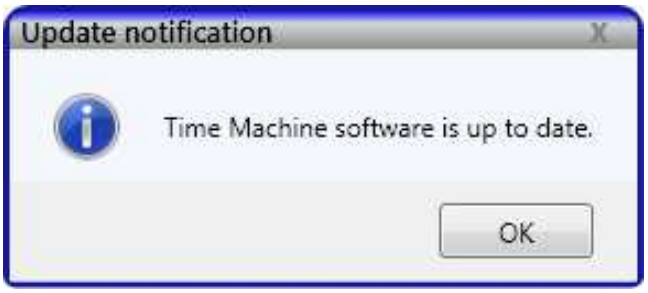


10 Software Updates

The software will occasionally check for availability of a new software version. This feature requires an internet connection. You can check for updates manually at any time by clicking Help > Check for Updates under the menu.



If a software update is available, click *Yes* to download the update. The installation will start automatically after finishing the download process. You will also be notified if your Time Machine software is up to date.



11 Troubleshooting

Several common issues may occur while using the Time Machine. This section describes how to address these issues.

11.1 The Time Machine Fails to Start

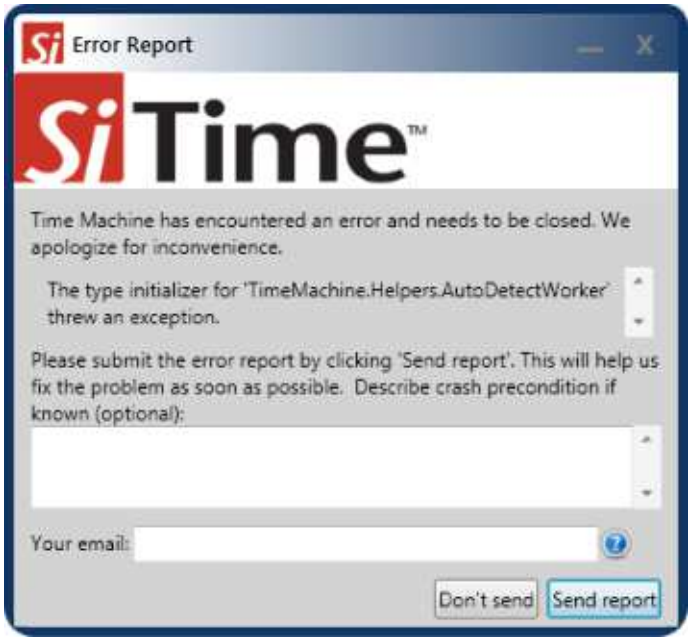
Download the Time Machine software from the SiTime web site: Time Machine II webpage and reinstall the software.

11.2 Programming Generates a FAIL Message

Make sure you are using an appropriate Field Programmable (FP) part in the correct socket and that part has not been programmed already. If these conditions are met and programming fails, try replacing the device.

12 Reporting a Bug

Time Machine has an automatic crash report sending feature. If the system crashes, please send a report to SiTime and provide any additional information to help us to analyze and resolve the issue.



If you find a bug that does not cause the program to crash or have other feedback, please contact SiTime at TimeMachineSupport@sitime.com. Please follow the troubleshooting recommendations in this section before reporting an issue.

13 Disclaimer

1. The Time Machine II Programmer and associated hardware (henceforth Platform) are intended for use only with SiTime's MEMS oscillators. This Platform will not program any other manufacturer's programmable oscillators and no attempt to do so should be made.
2. The Platform is intended for use for engineering development and evaluation of SiTime's MEMS oscillators. SiTime does not guarantee or warranty the devices that are programmed on this Platform for qualification or production purposes.
3. The Platform should be used in static free environment with good engineering practices.
4. This Platform does not fall under the scope of the European Union directives regarding electromagnetic compatibly, FCC, CE or UL and therefore may not meet the technical requirements of these directives.
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6. The user assumes all responsibility and liability for [the] proper and safe handling of the Platform and the associated programmed MEMS oscillators.
7. The user indemnifies SiTime from all claims arising from the handling or use of this Platform and the associated field programmable devices.
8. Please contact a SiTime representative if you have any issues or problems with using this Platform.

Table 1. Revision History

Version	Release Date	Change Summary
2.12	07/24/2019	Added SiT6166DK socket card information Other miscellaneous edits for clarity

SiTime Corporation, 5451 Patrick Henry Drive, Santa Clara, CA 95054, USA | **Phone:** +1-408-328-4400 | **Fax:** +1-408-328-4439

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