

GuideTech, LLC

1300 Memorex Drive

Santa Clara, CA. 95050

Phone: (408) 988-9998

Web: <http://www.guidetech.com/>

GT668 Time Interval Analyzer

New in this Release

1. Added support for Revision 11 of the GT668 boards.
2. Fixed bugs that could cause crash when measuring slow signals (such as 1PPS).
3. Modified LabView code samples LVExr.llb/LVExerciser.vi and Example.vi so that they'll update results while running. Note that the LVExerciser graph display still waits for all results before displaying.
4. Fixed Exerciser bug causing error in Time Interval measurements with prescalers that are not equal to 1.
5. Added LabView support VIs GT668GetRealTimeOutputStatus to help implementation of real time output pulses, and GT668SelfCalibration to allow calibration of the interpolators.
6. Added to the Python support an interface to the GTSYS library (used only in GT9000 systems).
7. Fixed bug in Exerciser that caused sometime wrong measurements when the Prescale was set to Auto.
8. Fixed a bug in the GT658 compatibility library. It now stops measurements when all requested results are done, and it closes the GT668 driver when the GT65XPCI.dll library is unloaded (Windows only).
9. The boolean type '**bool**' was replaced with **GT_Bool**, and the Boolean values '*true*' and '*false*' were replaced with *GT_True* and *GT_False*. The values are the same but this allowed for better portability between different compilers. This was done already but now the documentation reflects it.
10. Fixed bug in the python support package that was causing segmentation faults.
11. Fixed bug that cause crashes when using 32-bit applications on a 64-bit system.
12. Added support for USB based Time Interval Analyzer (only for Windows, must use USB3.0 socket).

NOTE: When using USB please connect the USB cable to the computer before powering on the instrument. If this is not done the instrument may not be identified (disconnecting and reconnecting the cable will fix this).

NOTE: This version will support only the first USB Time Interval Analyzer instrument found in the computer (if more instruments are connected they will be ignored).

13. Added sample program ShowInfo that can be used from command line to provide information about the installed boards (like the “Info” button in the Exerciser program).
14. Support for Linux kernel versions up to 4.3.3.
15. Fixed bug. when Measurements Gate parameter was set to more than 1 the averaging could have errors when running for more than 100 seconds.
16. Fixed bug in kernel driver that could run out of memory after multiple initializations.
17. Corrected handling of timetags in Real Time format.
18. Fixed issues in handling the GT668SetT0Mode options. Changed the default timetags generated to be relative to T0.
19. Added support for increased and improved real time output signal buffers (supported only on rev 8 and above boards with the latest FPGA – the FPGA can be upgraded in the field if needed).
20. Added to LabView support GT668SetT0Mode.vi.
21. Added to LabView support GT668SetRealTime.vi, GT668SetRealTimeStart.vi, GT668SetRealTimeIsDone.vi, GT668SetRealTimeWaitDone.vi.
22. Verified compatibility with Linux Ubuntu 15.10.
23. Removed support for Windows XP and Windows Vista. If you need to use GT668 on these platforms please contact GuideTech.
24. Added to Exerciser a Remap option to map physical board numbers to logical device numbers.

Installation on Windows

The software comes in a self-extracting executable program named *GT668Setup.exe* (for 32-bit Windows 7 or higher), *GT668Setup64.exe* (for 64-bit Windows 7 or higher) and *GT668SetupXP.exe* (for 32-bit Windows XP). Running this program will extract and run the installation process.

Note to users of Windows 7 64-bit:

Some 64-bit Windows 7 (Service Pack 1) systems will generate an error when the board drivers are installed. The error complains about inability to verify the signature of the published. To fix (or avoid) this problem please download and install the Microsoft Security Update KB3033929 (available from the following link):

[KB3033929 Security Update](https://www.microsoft.com/en-us/download/details.aspx?id=46148) (or copy and paste the following link to your browser <https://www.microsoft.com/en-us/download/details.aspx?id=46148>).

Note to users of Windows 8 and Windows 8.1:

Before running the installation you have to do the following steps:

1. Restart the computer (using any power menu) while holding the “Shift” key down.
2. After the computer restarts click on “Troubleshoot”.
3. Click on the “Advanced Options”.
4. Click on “Startup Settings”.
5. Click on the “Restart” button.
6. After the computer restarts again select option 7 “Disable driver signature enforcement”.
7. After the computer restarts run the GT668 installation file.

Installation on Linux

Installing the GT668 software on Linux requires the Linux source code, the GNU C Compiler tools, and the GNU make tool.

The software comes in an compressed archive (tar) file named *GT668Setup.tar.gz* (for 32-bit x86 Linux platforms) and *GT668Setup64.tar.gz* (for 64-bit x86_64 Linux platforms). Un-tar the file to an installation directory, go to the “Setup” subdirectory and run the “setup” script (more details in the manual).

```
<installation_directory>/Setup/setup
```

Note: during the installation you will be prompted for the root password – you must provide it for the installation to succeed.

Note: To make the kernel mode driver load after every boot add the following line to your boot script file (a script file such as /etc/rc.d/boot.local):

```
<installation_directory>/Setup/start
```

Known Problems

AUX Clock

When passing clock between boards through the AUX bus (ribbon cable) it may introduce a shift of a clock period (exactly 10 nsec) between the time tags of the board receiving the clock relative to the source of the clock. If such a shift is found – it will stay constant and may be subtracted out.

Peaks Measurements at High Frequency

Peak measurement (and therefore threshold setting by percent) does not work at frequencies above 800MHz.

GT65X Compatibility

The regular GT668 software is not backwards compatible with GT65X family devices. However, the instrument architecture is compatible so that porting of existing applications written for GT65X should be quite easy. However -

A new library named GT65XPCI was added to this release for Windows that makes the GT668 compatible at the binary code level with applications built for the GT668. To use it copy the file GT65XPCI.dll from the GT668 installation directory to the \Windows\System32 directory or to the directory of the GT658 application you want to run. Windows 64-bit installations have in addition to the 64-bit version of this library also a 32-bit version in the BIN32 subdirectory.

For users of master-slave board pairs of the GT658 instrument the release contains also a library named GT65XSUP.dll, the same name as the supplemental library for the GT658 master-slave boards. Only 32-bit applications are supported by this library.

Note: Running a GT658 board and a GT668 board on the same computer may create confusion as the GT668 compatibility library for GT658 applications is named the same as the driver library of the GT658.

The GT668 software will NOT run on a GT658 board.

Multiple Threads

The GT668 software now supports running each board in a multi-board system on a separate thread. A new example called *mthread* demonstrates this on two boards. This feature applies to both Windows and Linux platforms.

Note: The multi-threading support is per board and NOT per channel.

Release Contents (Windows)

After installation your disk will contain the following files and directories (under the installation directory you have selected):

<i>ReadMe.pdf</i>	This file.
<i>GT668Manual.pdf</i>	Manual for the GT668.
<i>Exerciser.exe</i>	A Front Panel program to run the GT668 instrument interactively.
<i>GTDriver.sys</i>	Kernel-mode device driver to allow control of the instrument.
<i>GTDriver_driver.inf</i>	Configuration file for the device driver.
<i>GTDriver_device.inf</i>	Configuration file for the device driver.
<i>wdapi1160.dll</i>	Library used to access the kernel-mode driver.
<i>wdreg.exe</i>	Utility used to install and uninstall the kernel-mode driver.
GT65XPCI.dll	Library that emulates a GT658 board on the GT668.

BIN32 In 64-bit installations this directory contains 32-bit programs.

Gtpci.dll Driver interface library that allows running 32-bit applications in 64-bit Windows (it's also installed in the system directory \Windows\SysWOW64).

Exerciser.exe A 32-bit version of the exerciser program.

GT65XPCI.dll GT658 compatibility library for 32-bit applications on 64-bit Windows.

Include Directory with C/C++ header files for programs using the GT668.

Lib Directory with library to link into C/C++ programs.

Gt668.lib library to link into C/C++ programs.

Support Directory for additional support software.

LabView Directory for LabView support (compatible with version 8.2 or later).

GT668.llb Library of VI's.

LabView12 Directory for LabView support (compatible with version 12.0 or later).

GT668.llb Library of VI's.

Vb.Net Directory for Visual Basic.Net support.

GT668Def.vb Visual Basic.Net declarations of functions and constants.

Vb6.0 Directory for Visual Basic 6.0 support.

GT668Def.bas Visual Basic 6.0 declarations of functions and constants.

Java Directory for Java Support.

Documentation Java Support documentation directory.

Index.html Java Support documentation root.

GT668.jar Library of Java Support.

Python Directory for Python Support.

Documentation Python Support documentation directory.

Index.html Python Support documentation root.

GT668Driver.py Library of Python Support.

<i>Samples\</i>	Directory for sample programs.
<i>BIN\</i>	Directory for compiled sample programs.
<i>mthread.exe</i>	
<i>Phase.exe</i>	
<i>Prescale.exe</i>	
<i>Present.exe</i>	
<i>ShowData.exe</i>	
<i>ShowInfo.exe</i>	
<i>Skew2Brd.exe</i>	
<i>SlowSig.exe</i>	
<i>LabView\</i>	Directory for LabView sample programs (compatible with version 8.2 or later).
<i>Example.vi</i>	A simple VI example that initializes the GT668, and when the user clicks the “Run” button configures the instrument, takes a block of time tags and displays it.
<i>LVExr.llb</i>	A full instrument exerciser example stored in a library. The exerciser starts from the LVExerciser VI.
<i>LabView12\</i>	Directory for LabView sample programs (compatible with version 12.0 or later).
<i>Example.vi</i>	A simple VI example that initializes the GT668, and when the user clicks the “Run” button configures the instrument, takes a block of time tags and displays it.
<i>LVExr.llb</i>	A full instrument exerciser example stored in a library. The exerciser starts from the LVExerciser VI.
<i>mthread\</i>	A C program that runs two GT668 boards from command line using two threads. It measures a signal on channel A of each board.
<i>Phase\</i>	A C program that runs the GT668 from command line. It measures the phase of a signal on either channel into a file for a specified number of measurements.
<i>Prescale\</i>	A C program that runs the GT668 from command line with user specified prescaling.

<i>Present\</i>	A C program that runs the GT668 from command line, detects signal on all connectors and display frequency and/or amplitude information.
<i>ShowData\</i>	A C program that runs the GT668 from command line and display some timetag data read from the board.
<i>ShowInfo\</i>	A C program displays information about installed boards.
<i>Skew2Brd\</i>	A C program that runs two GT668 boards from command line and measures skew between signal on Channel A of each.
<i>SlowSig\</i>	This C program demonstrates continuous measurements.
<i>Java\</i>	This directory contains a few Java programs that demonstrate the use of the Java Support package.
<i>Python\</i>	This directory contains a few Python programs that demonstrate the use of the Python Support package.

Take the time to browse through the sample programs and try running them to see the results. The C programs were compiled with the Microsoft Visual Studio 2010.

Release Contents (Linux)

After installation your disk will contains the following files and directories (under the installation directory you have selected):

<i>ReadMe.pdf</i>	This file.
<i>GT668Manual.pdf</i>	Manual for the GT668.
<i>mthread</i>	compiled version of the 'mthread' sample below.
<i>phase</i>	compiled version of the 'phase' sample below.
<i>prescale</i>	compiled version of the 'prescale' sample below.
<i>present</i>	compiled version of the 'present' sample below.
<i>showdata</i>	compiled version of the 'showdata' sample below.
<i>showinfo</i>	compiled version of the 'showinfo' sample below.
<i>skew2brd</i>	compiled version of the 'skew2brd' sample below.
<i>slowsig</i>	compiled version of the 'slowsig' sample below.
<i>Include/</i>	Directory with C/C++ header files for programs using the GT668.
<i>Lib/</i>	Directory with library to link into C/C++ programs. Symbolic links to these libraries were added to /usr/lib or /usr/lib64.

<i>libgt668.so</i>	library to link into C/C++ programs.
<i>libgtpci.so</i>	library used by libgt668.so.
<i>libJNIGT668.so</i>	library used by Java Support library.
<i>libPyGT668.so</i>	library used by Python Support library.
<i>libwdapi1160.so</i>	library used by libgtpci.so.
<i>Samples/</i>	Directory for sample programs.
<i>mthread/</i>	A C program that runs two GT668 boards from command line using two threads. It measures a signal on channel A of each board.
<i>phase/</i>	A C program that runs the GT668 from command line. It measures the phase of a signal on either channel into a file for a specified number of measurements.
<i>prescale/</i>	A simple C program measures a signal one channel with selectable prescale.
<i>present/</i>	This C program monitor all four SMA connector, reports minimum and maximum voltage values, and for inputs A & B it also reports the signal frequency.
<i>showdata/</i>	This C program takes some measurements and reports time tags and time intervals.
<i>showinfo/</i>	A C program that displays information about installed boards.
<i>skew2brd/</i>	A C program that runs two GT668 boards and measures skew between signal on Channel A of each.
<i>slowsig/</i>	This C program demonstrates the “wrap” mode that allow measuring signals continuously.
<i>Java/</i>	This directory contains a few Java programs that demonstrate the use of the Java Support package.
<i>Python/</i>	This directory contains a few Python programs that demonstrate the use of the Python Support package.
<i>Support/</i>	Directory for Support packages.
<i>Java/</i>	Directory for Java Support library.
<i>GT668.jar</i>	Java Support library.
<i>libJNIGT668.so</i>	Interface between the Java Support library and the GT668 driver library.
<i>Documentation/</i>	Directory for the documentation of the Java Support library.
<i>Index.html</i>	Root of the Java documentation.

<i>Python/</i>	Directory for Python Support library.
<i>GT668Driver.py</i>	Python Support library.
<i>libPyGT668.so</i>	Interface between the Python Support library and the GT668 driver library.
<i>Documentation/</i>	Directory for the documentation of the Python Support library.
	<i>Index.html</i> Root of the Python documentation.
<i>Setup/</i>	Directory for building and installing the kernel mode driver for the installed kernel version, the GT668 driver, and the needed libraries.
<i>setup</i>	Script that builds and installs the drivers and libraries.
<i>start</i>	Script created by running the <i>setup</i> script. It is used to start the driver after boot