Keysight 14565B Device Characterization Software

with Test Automation for Windows 10

Quick Start Guide



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NOTE

You can contact Keysight Technologies at one of the following telephone numbers for warranty, service, or technical support information. In the United States: (800) 829-4444 In Europe: 31 20 547 2111 In Japan: 0120-421-345 Or use our Web link for information on contacting Keysight in your country or specific location: www.keysight.com/find/assist Or contact your Keysight Technologies Representative.

The web contains the most up to date version of this manual. Go to http://www.keysight.com/find/14565B to get the latest version of the manual.



Item Supplied

• Keysight 14565B Quick Start Guide

This guide provides a Quick overview of the operation of the 14565B Device Characterization Software. For complete operating details, refer to the on-line Help document that can be accessed from within the Keysight 14565B application.

• Software Entitlement Certificate This certificate is only provided with the full or upgrade version of the 14565B software.

Characteristics	- All Models
Computer	Pentium 800 MHz (minimum) with 256 Mbytes RAM
Platforms	 Windows 10¹ ¹Earlier versions of Windows may work, but this is not guaranteed
Interfaces	 Keysight 82350B GPIB Interface Keysight 82357A USB/GPIB Interface Keysight E5810A LAN/GPIB Gateway National Instruments GPIB² card ²Requires NI-488.2 (Win32) version 1.6 or later
Libraries	 Keysight IO Libraries version M.01.01.04 or later National Instruments VISA Run-time Engine version 2.6
Supported dc Source Models	 Keysight 66309B/D³ Keysight 66311A/B/D³ Keysight 66312A/66332A³ Keysight 66319B/D; 66321B/D
	³ Does not support CCDF measurements and long-term data logging.

System Requirements

Description

The Keysight Technologies 14565B Device Characterization Software is an easy-to-use graphical user interface for the Keysight 66300-series dc sources. With it, you can:

- Control output and measurement functions from a single window.
- View output measurements on an oscilloscope-like display.
- Copy, save, or print captured waveforms.
- Recall saved waveforms for on-screen comparison with live waveforms.
- Adjust horizontal and vertical markers to perform measurements on a selected section of the waveform.
- Operate in either simulation mode (no hardware required), or in instrument control mode.
- Long-term voltage and current data logging.¹
- Generate CCDF graphs of battery current drain.¹

¹Available on 66319B/D and 66321B/D dc sources with firmware version A.03.00 or later. Firmware upgrade p/n = 5182-9091.Refer to the on-line help for firmware upgrade instructions.

NOTE

The Keysight 14565B Device Characterization Software does not control instruments other than the supported Keysight dc sources. Drivers for other GPIB instruments are not provided.

Automation Interface

The Keysight 14565B Automation Interface lets you automate or control the Keysight 14565B Device Characterization functions from another program. The Keysight 14565B Automation Interface is supported by programming languages or applications that can use COM components for communication.

The following programming environments are presently supported:

- Keysight Wireless Test Manager (.NET).
- Microsoft Excel.
- National Instruments LabView.
- Visual C++ using MFC.
- Visual Basic 6.0
- Visual C# .NET.
- Visual Basic .NET
- Visual Basic for Applications (VBA)



Refer to the Keysight 14565B Automation Programming Guide and Keysight 14565B WTM Programming Guide for information on using the Keysight 14565B software within the listed programming environments.

Installing and Running the Software

Before running the Keysight 14565B application, you must have installed NOTE and connected the dc source to a computer with the appropriate interface cable. You must also have the appropriate interface card installed and configured. If you are using an Keysight interface card, you must have the appropriate SICL or VISA library drivers installed. 1. Download the Keysight 14565B software application from http://www.keysight.com/find/14565B. 2. Click **Run** to install the Keysight 14656B. 3. Follow the directions on the screen to install the software. The Readme.txt file contains product updates or corrections that are not documented in the on-line help file. Use any text editor to open and read this file. 4. To run the Keysight 14565B application from the Start menu, search for Keysight 14565B. Additional information about the Keysight 14565B application is available in the on-line help document that can be accessed from the application. Configuring the I/O This step is necessary to establish communication with the dc source. Make sure that the dc source is turned on. To configure the I/O, select I/O Configuration command in the Source menu. The I/O configuration screen comes up automatically when you turn Simulation mode off in the Source menu. Note that VISA is the required I/O type for the Data Logging and CCDF functions. Select I/O type. (HP-IB, Serial port only. GPIB, VISA, or serial) 1/O Paran Specifies the comm port on the PC. IO type: HP-IB (HP) Comm Port: CO Serial port only. Dc Instrument Address 5 + Address must match 9600 source must match these setting of instrument. imeout: 5000 📑 msec Parity: 🗛 Baud rate, Parity and

> For HP-IB cards only. Must match SICL name used in GPIB card's configuration.

Interface Name: hpib

Auto-Detect.

ОК

(HPIB/GPIB only)

Click to automatically search for any dc source on the interface.

Flow control settings.

Flow Control: KONE

Cancel

If there seems to be no communication between the Keysight 14565B application and the dc source, select **Auto Detect** to detect any dc sources connected to your computer. If you still cannot communicate with the dc source and you wish to exit the application, select **Simulation** mode in the IO type field. Then exit the application.

NOTE

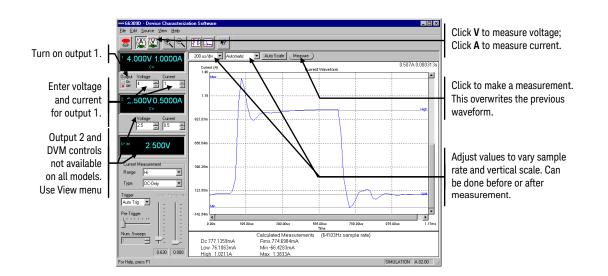
If you program the unit from its front panel while the Keysight 14565B application is running, you must refresh or update the application. Go to the **View** menu and select the **Reread Instrument State** command.

Performing Basic Operations

The **Main** window appears when you run the Keysight 14565B application. From this window you can control the output of the dc source and view output measurements.



Not all controls are displayed when you initially run the Keysight 14565B application. Output 2 controls are only available on Keysight 66309B/D and 66319B/D. DVM controls are only available on Keysight 66311D/66309D and 66319D/66321D.



To display a sample waveform:

- Select the Load Waveform command in the File menu, and then select DemoWaveform1.txt.
- Select **Active Waveform** in the Load Waveform Location dialog box. The waveform should match the one shown in the above figure.

To set the voltage, current, and resistance levels:

- Click in the field labeled **Voltage**, type in the desired output voltage and press Enter.
- Enter a current limit value in the field labeled **Current**.
- For units that have programmable output resistance, enter a resistance value in the field labeled **Resistance**.

To turn on the output:

• Enable the dc source output by moving the slide switch to **ON**. On some models, each output has its own output control. If the message **OVLD** appears in the display, set the Current Measurement control to the Hi Range.

To make a measurement:

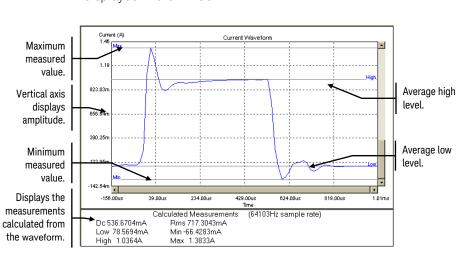
- Click the A button to select current measurements; click the V button to select voltage measurements.
- Click the **Measure** button to make the measurement.
- Adjust the time/div and amps/div fields to adjust the sample rate and vertical scale. Click **Auto Scale** to fit the display to the acquired waveform.

To view the output 2 controls and the DVM display:

- If your dc source has a second output or a DVM input, go to the **View** menu and check the item that you wish to display.
 - ✓ Second Output
 - ✓ Digital Voltmeter

If the item is grayed out, your dc source does not have this feature.

Display Area



The display area displays the output measurement after the Measure button is pressed. Only measurements from the main output can be displayed. The following figure describes the various measurements displayed in the window.

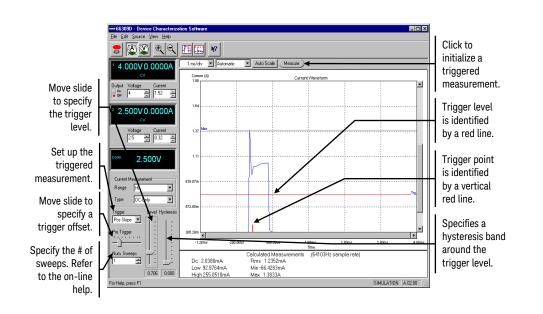
The values in the measurement area at the bottom of the display are calculated from the all of the data that is captured in the display. If horizontal markers have been set, measurements are calculated only from the data between the markers. Refer to Performing Measurements on Waveforms.

Calculated measurements at the bottom of the display may not agree exactly with values shown on the front panel of the instrument if the sample rate of the display differs significantly from the instrument's front panel sample rate.

Making Triggered Measurements

Triggered measurements let you control when the measurement trigger will occur. The following figure describes the various trigger controls.

NOTE If you do not know where to set the trigger level, you can make a measurement with the trigger set to Auto Trig. Then view the measurement to see where to place the trigger level. Set the trigger controls and make another measurement.



- Click the A button to select current measurements; click the V button to select voltage measurements.
- Set the **time/div** control to a value that is appropriate for the load's transient timing.
- Set up the measurement trigger. Choose from Auto, Pos Slope, Neg Slope, or Either Slope. External lets you apply an external trigger signal to the Output Port connector. Refer to the User's Guide for more information.
- Adjust the **Level** slide control until the trigger level is at the point where the trigger should occur. The trigger level is displayed as a red horizontal line on the display.

NOTE The trigger level cannot go negative. Set the trigger control to **Auto Trig** to trigger negative waveforms.

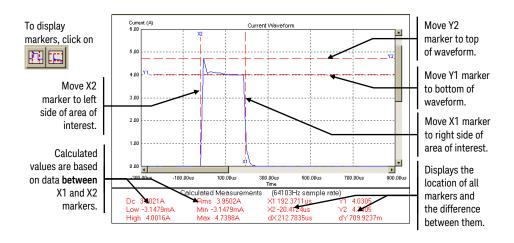
• Use the **Pre-Trigger** control to show pre-trigger waveform information. When this control is used, the trigger point will be displayed as a short vertical red line on the bottom of the waveform display graph.

- Use the **Num. Sweeps** control to more accurately average the High level of multiple current pulses. Refer to the on-line help for more information.
- To prevent signal noise from triggering a measurement, you can adjust the **Hysteresis** slide control to create a hysteresis band around the trigger level. The hysteresis band is shown in yellow. Triggers cannot occur inside the hysteresis band.
- Click the **Measure** button to initiate the triggered measurement. Note that if no trigger signal is received, the unit will eventually time-out.
- The display should now show the voltage or current waveform starting at the trigger level.
- Change the **amps/div** control to adjust the vertical scale or press the **Auto Scale** button to maximize the displayed waveform size.

Performing Measurements on Waveforms

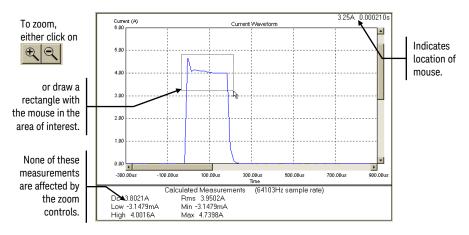
Use the marker controls to make precise waveform measurements.

• To view the horizontal and vertical markers, click on the marker buttons on the toolbar. Use the mouse to position the marker.



You can also zoom in on a specific area of the waveform. Zooming in only re-scales the display, no calculations are performed in the zoom area.

- To zoom in on a specific area on the display, use either the zoom in button on the toolbar or use the mouse to draw a rectangle on the display.
- To zoom out, use either the zoom out button or place the cursor in the display area and right-click on the mouse. Then select **Zoom Out**.



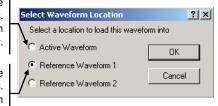
Placing a Waveform on the Display

Up to two reference waveforms can be shown on the display along with the measured or active waveform. This is useful if you want to compare waveform measurements to a "standard" or reference waveform to make a pass/fail determination on the measurement. Waveforms are displayed in different colors, which can be edited by selecting Edit/Preferences. Measurement calculations can only be done on active waveforms, not reference waveforms.

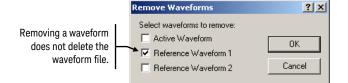
- Select the Load Waveform command in the File menu to load a waveform.
- Enter the filename of the waveform in the Open dialog box. The default location is C:\Program Files (x86)\Keysight\14565B.
- Select Active Waveform in the Select Waveform Location dialog box only if you want to perform measurements on the loaded waveform. Note that data logging and CCDF waveforms cannot be loaded as active waveforms, only reference waveforms.

Marker calculations can only be made on active waveforms. Loading and active waveform overwrites the display.

Marker calculations cannot be made on reference waveforms. Loading a reference waveform does not overwrite the display.



 Use the Remove Waveform command in the File menu to remove a loaded waveform from the display.



Generating CCDF Graphs

NOTE

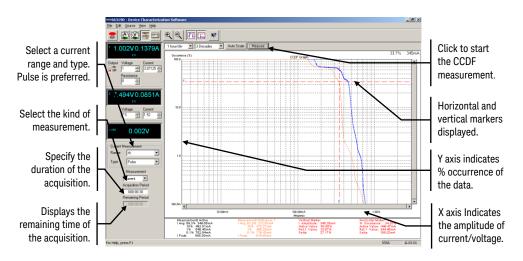
The CCDF measurement capability is only available on Keysight 66319B/D and 66321B/D dc sources that have firmware version A.03.00 and up.

Complimentary Cumulative Distribution Function (CCDF) graphs are used to concisely summarize short and long-term battery drain measurements for analysis and comparison. It is a cumulative distribution of the amplitude versus the frequency (or percent) of occurrence. This is especially useful for analyzing signals that are random over time. CCDF graphs can be made for output 1 voltage, output 1 current, or the DVM input.

Once the measurement is started, the current or voltage is continuously sampled at the desired sampling rate. The software then creates a histogram comprised of 2048 elements or buckets. Each sampled value is placed into one of the buckets according to its amplitude. Each time a measurement sample is placed in a bucket, the value of the bucket is incremented by one. The value in each bucket only represents the number of times a measurement sample that corresponds to the bucket's amplitude has been detected. If any samples fall outside the range of the histogram, the values are clipped and placed in the end buckets.

As the measurement proceeds, all histogram values are normalized, summed, and then reordered from 100% to 0% to generate the CCDF graph.

• Click the İ button to select the CCDF measurement window.



- Select the Measurement mode on the left side of the screen. Select Current, Voltage, or DVM.
- For Current measurements, select a range. Select High, Medium, or Low.
- For Current measurements, also select a Type. The preferred type is Pulse because it provides the best accuracy for waveform

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measurements.

- Select the Acquisition Period (the duration of the CCDF measurement). Enter the time in hours, minutes, and seconds (hhhh:mm:ss). This controls a timer that tells the application when to stop the measurement.
- Click the Measure button to start the CCDF measurement.
- The display will now update periodically until the acquisition period is complete. The Remaining Period field indicates how much time has elapsed since the beginning of the test.

NOTE

If you use the front panel controls on the left side of the window to change any settings during the acquisition, this changes the conditions under which the data is collected and may invalidate the data.

To prevent unauthorized access of the application during long tests, enable the password-protect feature of your computer's screen saver.

Long-Term Data Logging

NOTE	The long-term data logging capability is only available on Keysight 66319B/D and 66321B/D dc sources that have firmware version A.03 and up.	.00
	Long-term data logging, for hours to days, of the current and voltage of the device under test is fundamental in measuring its power consumption and determining its battery operating time. Long-term data logging measurements can be made for output 1 current, output 1 current and voltage, or output 1 current and DVM input.	!
	Once the measurement is started, the current or voltage is continuously integrated over the acquisition period. Current measurements are captured over a 5-millisecond to 1-second integration time at a 15.6 microsecond sampling rate. Three values are returned - dc, maximum, and minimum. The dc value is calculated by averaging all samples taken over the duration of the integration period. The highest sample is the maximum value; the lowest sample is the minimum value. If selected, voltage measurements are also taken at regular intervals during the acquisition period. Data acquisition is continuous - unless it is stopped or until the end of the measurement period is reached.	
	 The graph displays three separate current waveforms; maximum, minimum and dc, each in a different color. If Grey Band is selected as the current graph type, the graph displays the minimum and maximum values as a gray band behind a red line. The red line indicates the dc value. If selected, voltage values are displayed as a blue line on the top of the display. The data appears as the measurements are made. When the data fills the display, the display is resized to a larger resolution to allow more room for the data to be displayed. Click the button to access the Data Logging measurement window. 	
Select a current range and type. Pulse is preferred.	Image: Control of the sector of the secto	
Select the kind of measurement.	Tentures 1.80 3.822V-0.0005A 1.80 Voltage	
Specify the duration of the acquisition.	Image: Section of the section of t	
Displays the remaining time of the acquisition.	DC current.	
Select which measurements to graph.	Concerning Type All Statem Al	

- Select the Measurement mode on the left side of the screen. Select Current, Voltage + Current, or DVM + Current.
- Select the Current Measurement Range. Select High, Medium, or Low.
- Select the Current Measurement Type. The preferred type is Pulse because it provides the best accuracy for waveform measurements.
- Select the Acquisition Period (the duration of the data logging). Enter the time in hours, minutes, and seconds (hhh:mm:ss). This controls a timer that tells the application when to stop the measurement. The timer has a minimum resolution of 3 seconds.
- Select which current measurements to graph. Select Max, DC, Min, or Gray Band. (Max, Dc, and Min. shown).
- Press the Measure button to start the data logging.
- The display will now update periodically until the acquisition period is complete. The Remaining Period field indicates how much time has elapsed since the beginning of the test. When the test completes, you are prompted to specify a filename in which to save the data in binary format.

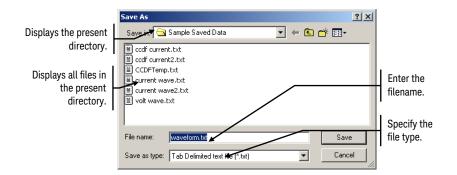
NOTE

If you use the front panel controls on the left side of the window to change any settings during the acquisition, this changes the conditions under which the data is collected and may invalidate the data.

To prevent unauthorized access of the application during long tests, enable the password-protect feature of your computer's screen saver.

Saving and Printing Measurement Data

Use the **Save Waveform to ASCII** command in the File menu to save the voltage or current measurement data to an ASCII text file that you specify in the **Save As** dialog box.



Voltage or current waveforms are saved in a 2-column Time/Voltage or Time/Current format. CCDF measurements are saved in a 2-column Amplitude and %Occurrence format. This text information can be imported into a database or spreadsheet, or edited by a text editor.

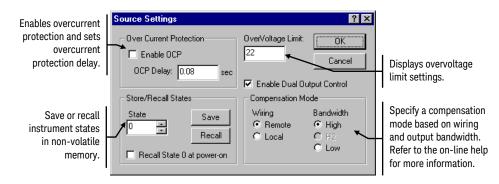
Data logging entries are saved in a binary file while the data logger is running. When the data is saved to an ASCII file, it is first partitioned and averaged to fit into the maximum of 4096 entries for ASCII files. ASCII data is saved in a 5-column format: Time, CurrentMax, CurrentDC, CurrentMin, and Voltage.

The Keysight 14565B application supports printing and print previewing of the display. Use the **Print Preview** command in the File menu to preview the display. Use the **Print** command to print the display to your default printer.

Advanced Controls

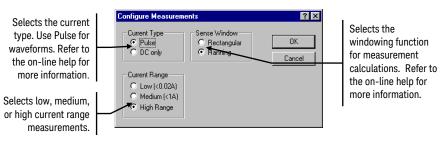
To configure the protection settings of the dc source:

• Select the **Source Settings** command in the Source menu.

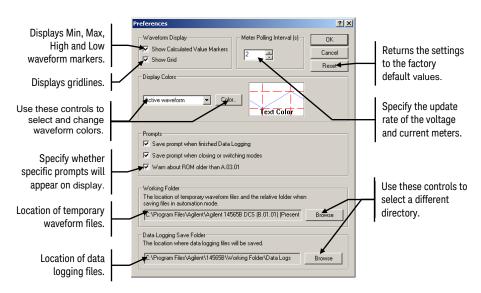


To configure output measurements:

Select the Measurement Settings command in the Source menu.



To configure display preferences:



• Select the **Preferences** command in the Edit menu.

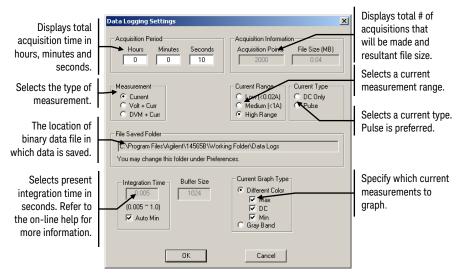
To configure CCDF settings:

Displays total CCDF settings × Displays the present acquisition time in sample point for Acquisition Period Acquisition Information hours, minutes which data is being Minutes 10 Seconds Capture # Hours 30 and seconds. collected. Selects the Current Range Current Type Selects a current measurement input. Current Voltage Cov (<0.82A) DC Onl measurement range. Pulse C DVM High Range Displays the Selects a current type. sample time in ample Time (sec) Histogram Size Low Limit (A) High Limit (A) Pulse is preferred. seconds. 3.071 The high and low Displays the initial limit of the current OK Cancel histogram size. range.

 Select the CCDF Settings command in the Source menu. All parameters can also be set in the CCDF measurement window.

To configure Data Logging settings:

• Select the **Data Logging Settings** command in the Source menu. All parameters except the integration time and the file saved directory can also be set in the Data Logging measurement window.



To create data logging event tags for specific areas of the data log:

• Select the **Data Logging Event Tags** command in the Source menu. This command is active only when the Measure Data Logging command or icon has been selected.

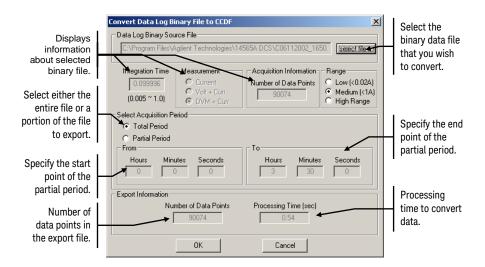


• Select Add to add a new event tag.



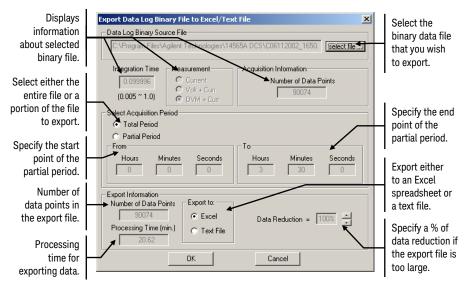
To convert data log binary files to CCDF graphs:

• Select the **Convert Data Log to CCDF** command in the File menu. This is useful for using the CCDF graph to analyze all or a specific portion of a previously captured data log binary file. Note that this command is only active when the application is in CCDF graph mode.



To export data log binary files to a Microsoft Excel or a text file:

• Select the **Export Data Log to Excel/Text** command in the File menu. This is useful if you need to export the binary data from this application to other software applications.



Sample Waveforms

Several sample waveforms are provided with the Keysight 14565B application. If you do not have a dc source connected to your computer, you can still become familiar with the application by trying out the various display functions using the sample waveforms. Use the Load Waveform command in the File menu to load one of the sample waveforms.

DemoWaveform1.txt

This waveform is a single transmit current pulse from a cellular phone. It clearly shows the location of the Max, High, Min, and Low measurement points.

DemoWaveform2.txt

This waveform is also a single transmit current pulse from a cellular phone. Its main features are the multiple low-level signals. Note that the High and Low levels of the waveform are based on the two portions of the measurement (out of a total of 1024 equally divided portions), that have the most high or low points – and that include at least 1.25% of the total measurement points.

DemoWaveform3.txt

This waveform includes three transmit current pulses from a cellular phone. Note that in this case, the High and Max values are the same. This is because no portion of the measurement above the 50% point includes at least 1.25% of the total measurement points.

DemoWaveform4.txt

This waveform is a sample CCDF measurement. The step in the middle of the graph indicates the point in which a shift occurs – from listen mode to talk mode, for example.

DemoWaveform5.txt

This waveform is a sample data logging measurement. Three current levels are shown; maximum, dc, and minimum. The voltage amplitude is also shown.

Data Log(30 seconds).bin

This waveform is a 30 second sample data logging measurement. It illustrates the current waveforms of a cell phone being used manually.

Licensing

A software license is associated with a single Keysight 663xx power supply, not your computer. The licenses can be stored on your local PC or a network drive. This allows you to install the Keysight 14565B software on multiple PCs and be able to connect each PC to the Keysight 663xx power supply.

Obtaining the License:

- 1. To obtain an Keysight 14565B license for an Keysight 663xx power supply you will need: Check that the emergency stop switch is pulled up.
 - a. A 14565B Full-version or 14565U Upgrade-version of the software. Purchasing one of these software versions entitles you to obtain a license.
 - b. The serial number of the Keysight 663xx power supply that you will be controlling with the software. The serial number is a 10-character string in the format MY12345678. There are various ways to retrieve the serial number:
 - Query the power supply with the *IDN? Command.
 - On the front panel, press Address and scroll to the SN: item.
 - From the Keysight 14565B application, select **Help** then **Licensing**.
 - c. Your email address.
 - d. Your Order number and Certificate number. These appear in the upper right corner of the Software Entitlement Certificate.
- To get the license file go to: http://www.keysight.com/find/softwarelicense and follow the on-screen directions.
 - a. Enter the Order number and Certificate number. Click Next.
 - b. Under **Request License(s) for**, check the box labeled "A single product on one or more instruments or host computers".
 - c. Under **Please Choose a Product**, select "14565B" for the Full-version or "14565U" for the Upgrade-version. Click Next.
 - d. Enter the model number and serial number of the Keysight 663xx power supply you wish to license for the Keysight 14565B software. Click Add, then Next.
 - e. Review your selections. Click Next.
 - f. Enter your e-mail address, confirm and Submit.

After finishing the license request procedure, a license file will be emailed to you shortly. Follow the instructions under "Installing the License".

Installing the License:

A license file was emailed to you after you completed the procedure under "Obtaining the License". The email attachment is the license file.

- To Save the attached file (*.lic) in your 14565B licenses folder. The default location for this folder is C:\Program Files (x86)\Keysight\14565B\Licenses. You may use any folder including a network folder to store 14565B licenses.
- 2. Run the Keysight 14565B software and try connecting to the power supply you purchased the license for. The License Main window should appear and give you the status of the license. To access the License Main window at any time, click on the Licensing command in the Help menu. If a license for the Keysight 663xx power supply was not found, continue with the next steps.
- 3. If the folder that you saved the license file in is not part of the Keysight 14565B license search folders, you need to add the folder to the license search folders.
 - a. Click the License Manager button in the License Main window.
 - b. In the License Manager, click the Add Folder button. Locate and add the folder in which you saved the license file.
 - c. You should now see the serial number of the licensed Keysight 663xx power supply in the Licenses Found list.

Documentation

The following documentation files can be accessible from C:\Program Files (x86)\Keysight\14565B\Documentation.

14565B Orientation Guide.pdf

14565B Quick Start Guide.pdf

14565B Programming Guide.pdf

14565B WTM Programming Guide.pdf

14565B Help.chm – Help file

14565B Automation Interface.chm – Help file

Keysight.WTM.ag14565BMoM.chm – Help file



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