U1880A Deskew Fixture

User's Guide

KEYSIGHT TECHNOLOGIES

Notices

© Keysight Technologies, Inc. 2008

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

U1880-97000

Edition

First edition, March 2008

Printed in Malaysia

Published by:
Keysight Technologies, Inc.
1900 Garden of the Gods Road
Colorado Springs, CO 80907 USA

Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Keysight disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Keysight shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Keysight and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Keysight Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Contents

Why Deskew is Important / 7

Estimating Skew Introduced in the Measurement / 9

Connecting the Deskew Fixture and Setting the Switch / 10

Performing Channel Deskew Manually / 12

- 6000 Series and 7000 Series Oscilloscopes / 12
- 8000 Series Oscilloscopes / 17

Environmental Characteristics / 22

Using the Deskew Fixture

Why Deskew is Important / 7
Estimating Skew Introduced in the Measurement / 9
Connecting the Deskew Fixture and Setting the Switch / 10
Performing Channel Deskew Manually / 12
Environmental Characteristics / 22

The U1880A deskew fixture is used to calibrate the time delay between current and voltage probes.

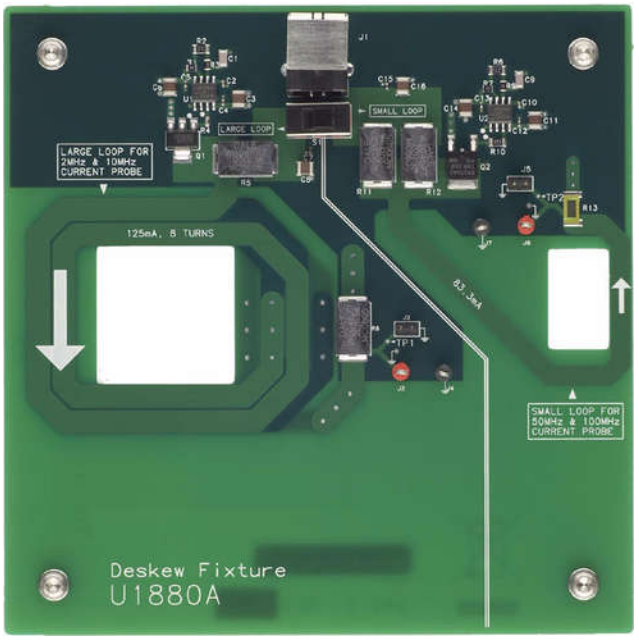


Figure 1 U1880A Deskew Fixture

Why Deskew is Important

To make accurate measurements based on the voltage across and current through (relatively) fast switching devices (for example, instantaneous power measurements), it is important that any skew between the voltage probe and current probe signal paths be corrected. Skew in one direction will make measurements too small, and skew in the other direction will make measurements too high.

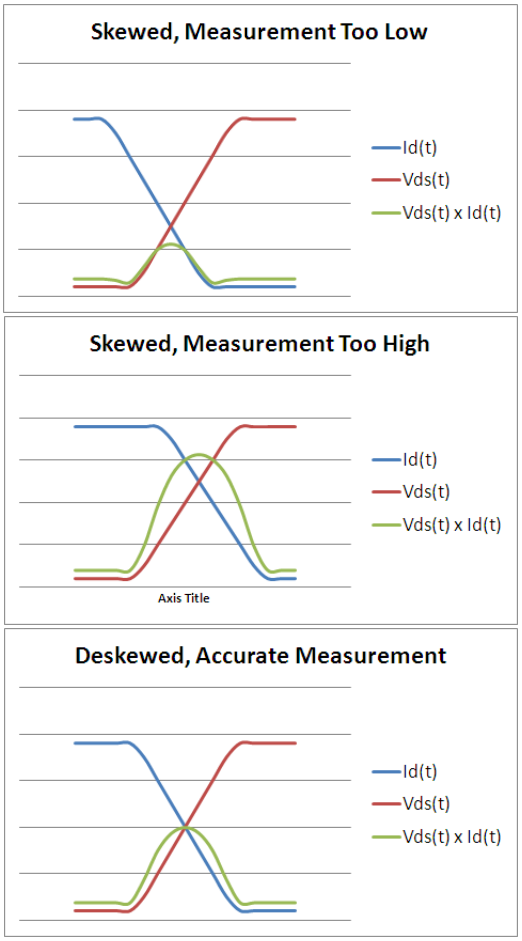


Figure 2 How Skew Affects Power Measurements

The U1880A deskew fixture is designed to help you correct for the skew that may exist in the different voltage probe and current probe signal paths.

It is important that the probes be deskewed in order to make accurate switching loss, safe operating area, and dynamic on resistance measurements.

Estimating Skew Introduced in the Measurement

For switching measurement applications, no skew is introduced into your measurement if the voltage and current probes probe the exact same point (zero electrical length). However, if you are not probing the exact same point, you must estimate the skew that is introduced into the measurement.

To estimate the skew introduced, you need to:

1. Calculate the electrical delay.

   For example FR-4 is approximately 150 ps/inch, and copper wire is approximate 85 ps/inch.

2. Understand which probe is leading and which is lagging.

   For example, in Figure 3, a 4 inch red wire is used to extend the current measurement pick-up point, and the current probe is lagging.

3. Then, subtract the calculated delay from the lagging probe.

   For example, when performing manual channel deskew using the deskew fixture, the lagging probe's signal edge should appear the calculated amount of time before the leading probe's signal edge.

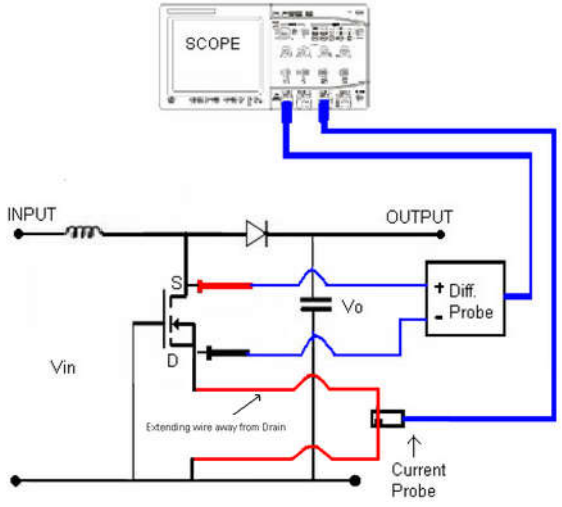


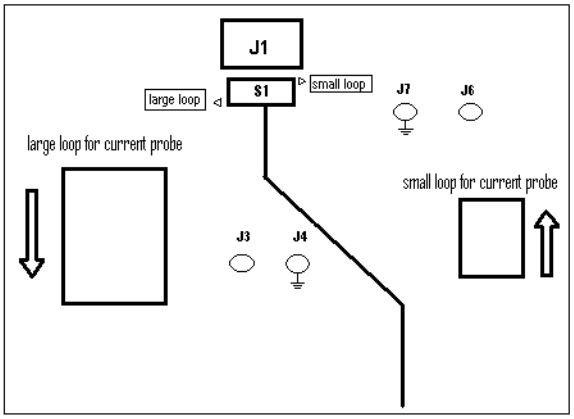
Figure 3 Current Measurement Pick-Up Point Extended with Wire Loop

Connecting the Deskew Fixture and Setting the Switch

1. First, demagnetize and zero-adjust the current probe. Refer to the current probe's documentation for instructions on how to do this.
2. Make connections to the U1880A deskew fixture:

	Small Loop	Large Loop
For current probes:	▪ 1147A (50 MHz, 15A) ▪ N2774A (50 MHz, 15A) ▪ N2782A (50 MHz, 30A) ▪ N2783A (100 MHz, 30A)	▪ N2780A (2 MHz, 500A) ▪ N2781A (10 MHz, 150A)
Connect high-voltage differential probe to either:	▪ J5 (2.54 mm connector) ▪ J6 and J7 (alligator type)	▪ J2 (2.54 mm connector) ▪ J3 and J4 (alligator type)

   a. Connect D+ and D- of the high-voltage differential probe to the deskew fixture.
   b. Connect the current probe to the current loop with the direction of the arrow pointing towards the current flow.



c Make sure the switch on the deskew fixture is set to the appropriate side of the fixture (either "small loop" or "large loop").

d Connect the deskew fixture to a USB port on your oscilloscope or a PC using a USB cable. The USB port supplies power to the deskew fixture.

Performing Channel Deskew Manually

Before performing this manual deskew procedure, see "Connecting the Deskew Fixture and Setting the Switch" on page 10.

Once the deskew fixture and probes are connected, follow the deskew procedure steps below that are appropriate for your oscilloscope.

6000 Series and 7000 Series Oscilloscopes

1 Press the **[Save/Recall]** front panel key. Then, select the **Default Setup** softkey.



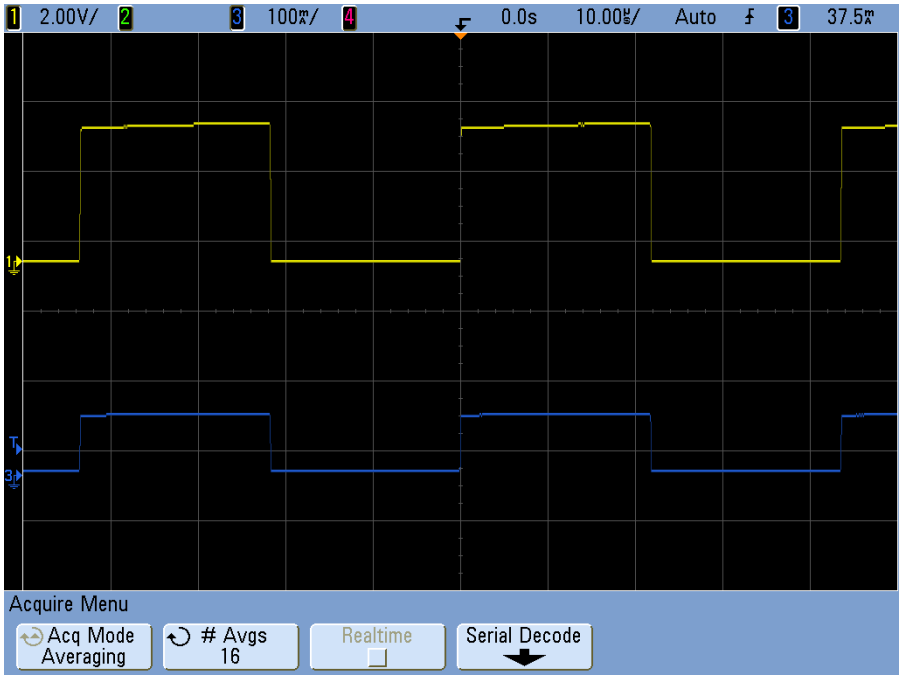
2 Set the appropriate probe attenuation values in the oscilloscope. Press the channel key (**[1]**, **[2]**, **[3]**, or **[4]**). Then, select **Probe**. In the channel's probe menu, select **Probe** and turn the entry knob to select the appropriate value.





3 Press **[Autoscale]**.

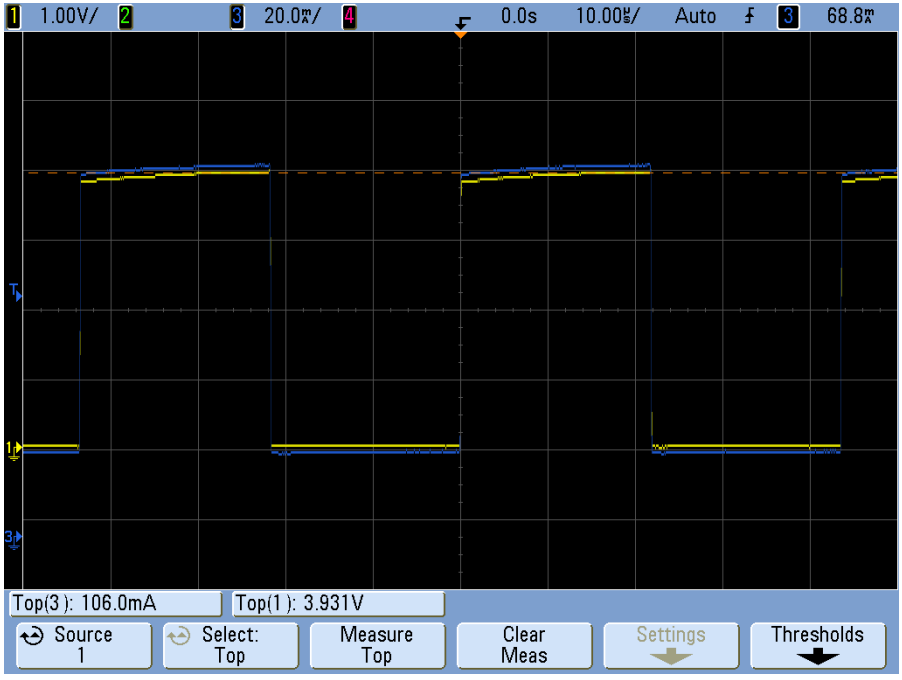
4 Press **[Acquire]**; then, select **Acq Mode** to select the “Averaging” acquisition mode. Select **# Avgs** and turn the ↻ entry knob to select 16 averages.



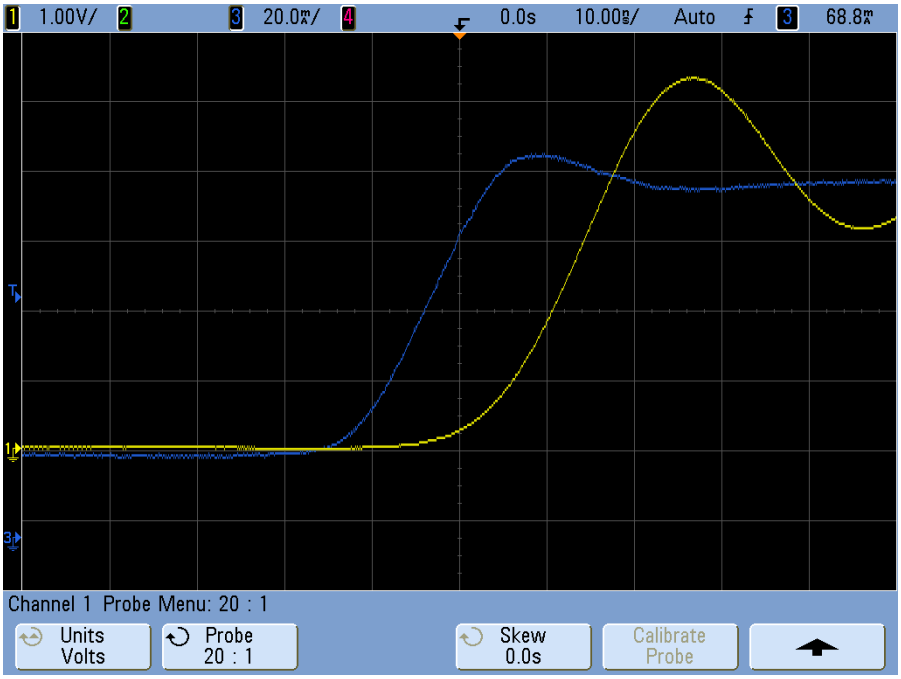
5 Adjust both the current and voltage channels’ vertical scale so that the waveforms are 80% of the screen without being clipped.

You may have to use fine adjustment of the vertical scale. To do this, press either the current channel or voltage channel key (**[1]**, **[2]**, **[3]**, or **[4]**). Then, select **Vernier**. With vernier selected, the vertical scale knob makes fine adjustments.

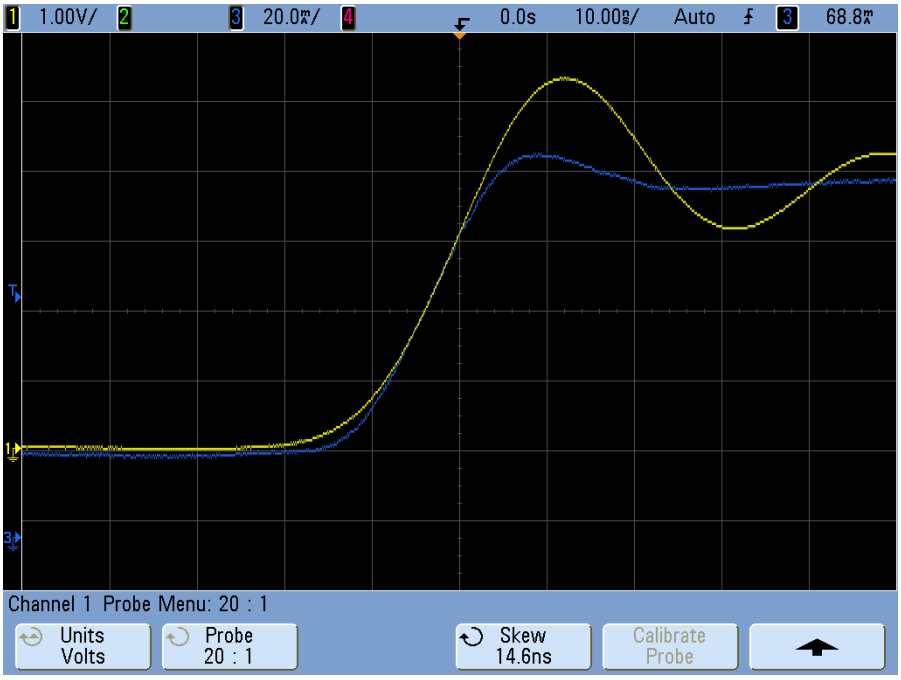
6 For both the current and voltage channels, measure the midpoint ((Vtop - Vbase)/2), and align the midpoint to the center of the screen.



7 Adjust the horizontal scale to fit both current and voltage rising edge (20% to 80%) 80% of screen.

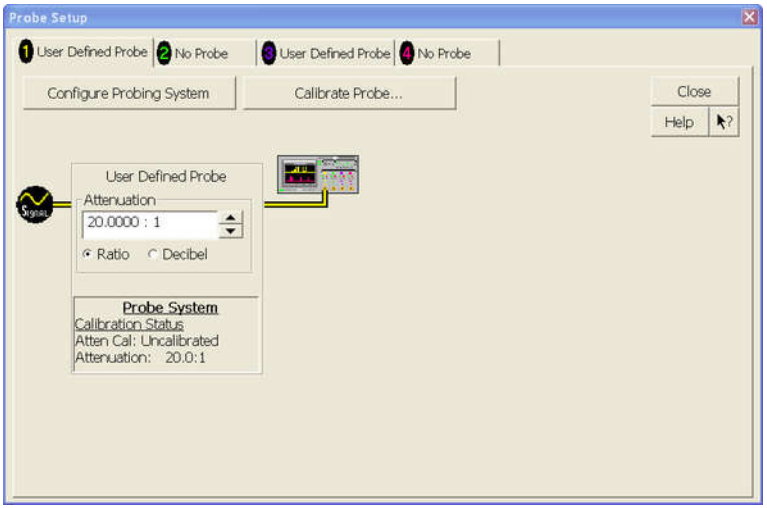


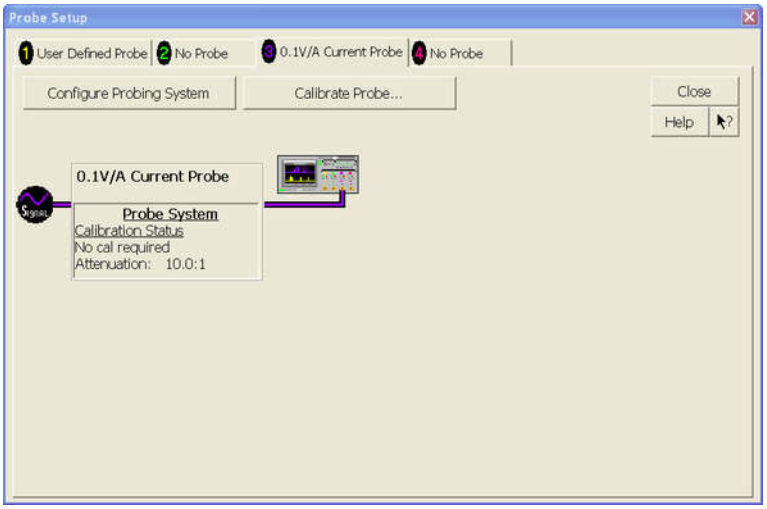
8 For the channel whose edge is not the trigger, press the channel key (**[1]**, **[2]**, **[3]**, or **[4]**). Then, select **Probe**. In the channel's Probe Menu, select **Skew** and turn the ↻ entry knob to adjust the skew so that the voltage and current waveforms intersect at the vertical midpoint (center of the screen as aligned to earlier).



8000 Series Oscilloscopes

1. Press the **[Default Setup]** front panel key.
2. Set the appropriate probe attenuation values in the oscilloscope. Click the channel setup button (**1**, **2**, **3**, or **4**). In the Channel Setup dialog, click **Probes...**. In the Probe Setup dialog, enter the appropriate **Attenuation** value.



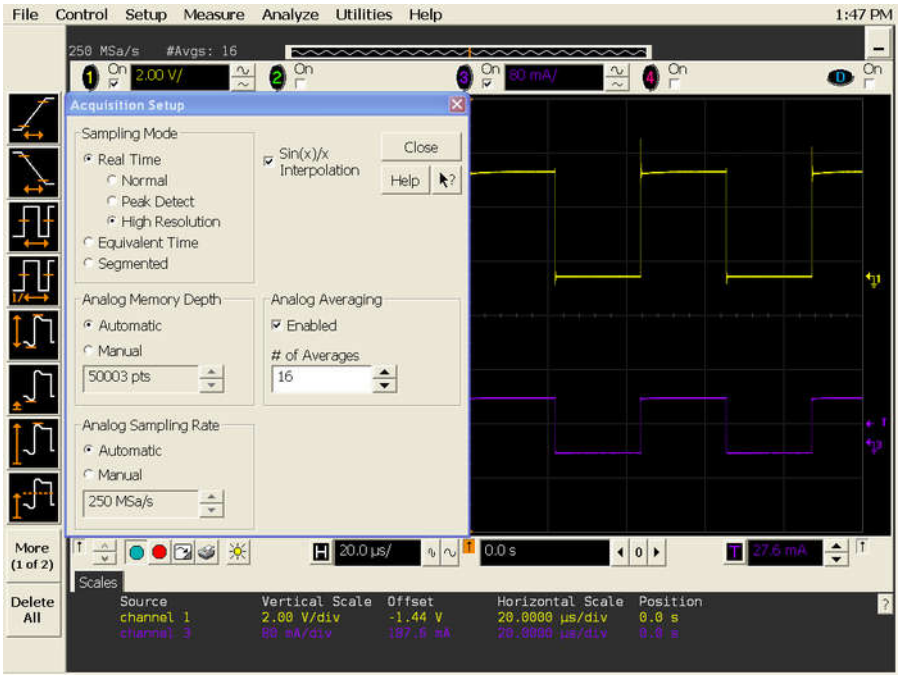


Click **Close** to close the open dialogs.

3 Press **[Autoscale]**.

4 From the oscilloscope's menu, choose **Setup > Acquisition...**. In the Acquisition Setup dialog, **Enable** averaging, and enter "16" averages.

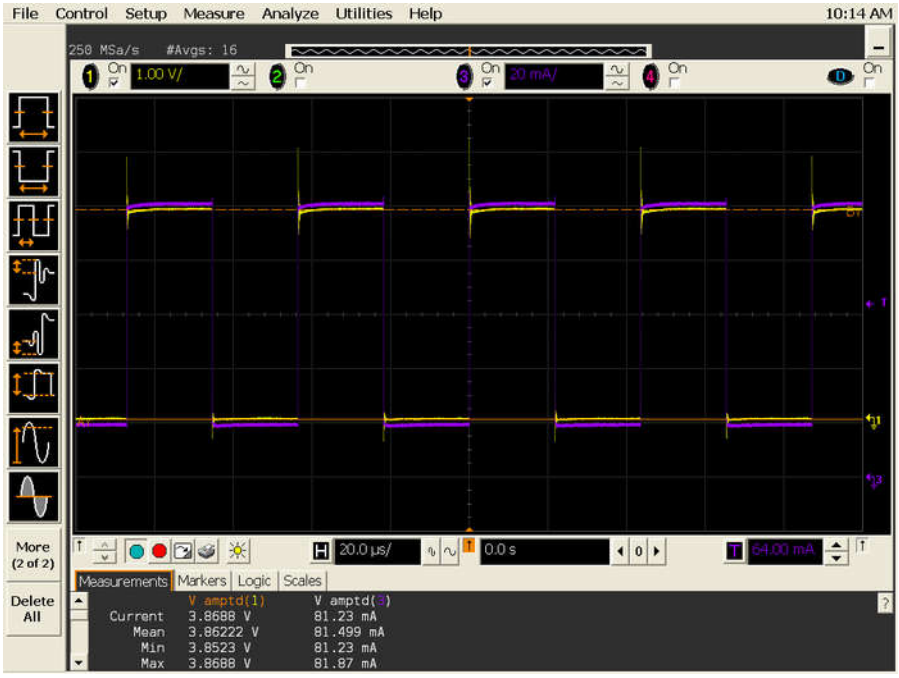
5 Also in the Acquisition Setup dialog, select the **High Resolution** real-time sampling mode.



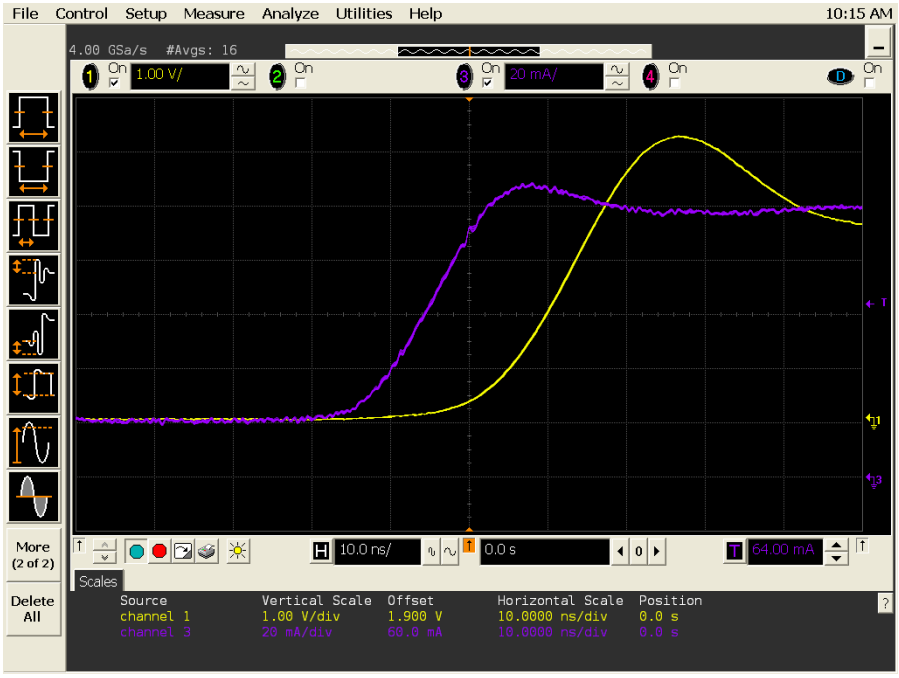
Click **Close** to close the dialog.

6 Adjust both the current and voltage channels' vertical scale so that the waveforms are 80% of the screen without being clipped.

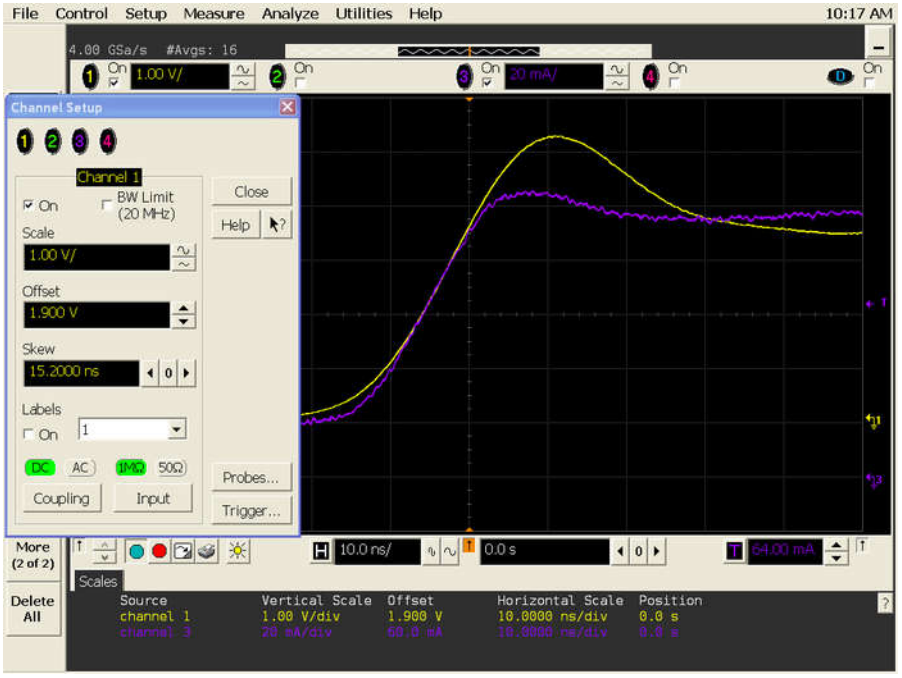
7 For both the current and voltage channels, measure the midpoint ((Vtop - Vbase)/2), and align the midpoint to the center of the screen.



8 Adjust the horizontal scale to fit both the current and voltage rising edges (20% to 80%) 80% of screen.



9 For the channel whose edge is not the trigger, click the channel setup button (**1**, **2**, **3**, or **4**). Then, in the Channel Setup dialog, adjust the **Skew** so that the voltage and current waveforms intersect at the vertical midpoint (center of the screen as aligned to earlier).



NOTE For accurate measurements, we highly recommend you use automated de-skew software to eliminate human measurement error. For example, the U1881A/U1882A Power Measurement Application software automates channel deskew.

Environmental Characteristics

Table 1 U1880A Deskew Fixture Environmental Characteristics

Temperature	Operating: –10 °C to +55 °C Non-operating: –20 °C to +60 °C
Humidity	Operating: 95% RH at 40 °C for 24 hr Non-operating: 90% RH at 65 °C for 24 hr
Altitude	Operating: to 4,570 m (15,000 ft) Non-operating: to 15,244 m (50,000 ft)
Indoor use	Rated for indoor use only

This information is subject to change without notice.

© Keysight Technologies, Inc. 2008

Printed in Malaysia
First edition, March 2008

U1880-97000
www.keysight.com

KEYSIGHT TECHNOLOGIES