Keysight E2655C Probe Deskew and Performance Verification Kit

User Guide

KEYSIGHT TECHNOLOGIES

Notices

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Manual Part Number

E2655-92004

Edition

Fifth Edition, August 2016

Available in electronic format only

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CAUTION

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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.

Introduction

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Calibrating the InfiniiMax probes (1168B, 1169B, 1130B, 1131B, 1132B, 1134B) and the InfiniiMode differential probes (N2750A, N2751A, N2752A) is done using the E2655C Probe Deskew and Performance Verification Kit. The kit contains the following parts:

- SMA (male) to SMA (male) adapter
- SMA (male) to BNC (female) adapter
- BNC (male) to SMA (male) adapter
- 50 Ω SMA Terminator
- De-skew Fixture

Figure 1 E2655C Probe Deskew and Performance Verification Kit

This document contains procedures showing vertical and skew calibration for the InfiniiMax (1160B series and 1130B series probes) solder-in differential probe head and the differential browser probe head. However, the procedures also apply to all of the different InfiniiMax probe configurations.

For use with the probe calibration and verifications, we highly recommend using the N2787A 3D probe positioner.

Calibration for the Solder-in and Socketed Probe Heads

Calibration of the solder-in and socketed probe heads consists of a vertical calibration and a skew calibration. The vertical calibration should be performed before the skew calibration. Both calibrations should be performed for best probe measurement performance.

NOTE **Before calibrating the probe, verify that the Infiniium oscilloscope has been calibrated recently and that the calibration Δ temperature is within ±5 °C. If this is not the case, calibrate the oscilloscope before calibrating the probe. This information is found in the Infiniium Calibration dialog box.**

Connecting the Probe for Calibration

The calibration procedure requires the following parts.

- BNC (male) to SMA (male) adapter
- Deskew fixture
- 50 Ω SMA terminator

For the following procedure, refer to Figure 2.

1. Connect BNC (male) to SMA (male) adapter to the deskew fixture on the connector closest to the pincher.
2. Connect the 50 Ω SMA terminator to the connector farthest from the pincher.
3. Connect the BNC side of the deskew fixture to the Aux Out BNC of the Infiniium oscilloscope.
4. Connect the probe to an oscilloscope channel.
5. To minimize the wear and tear on the probe head, the probe head should be placed on a support to relieve the strain on the probe head cables.
6. Push down on the back side of the pincher. Insert the probe head resistor lead underneath the center of the pincher and over the center conductor of the deskew fixture. The negative probe head resistor lead or ground lead must be underneath the pincher and over one of the outside copper conductors (ground) of the deskew fixture. Make sure that the probe head is approximately perpendicular to the deskew fixture.

NOTE **For the socketed probe head, insert two properly trimmed 82 Ω resistors into the sockets.**

7. Release the pincher.

NOTE To ensure contact, pull up on the back side of the pincher to ensure good contact between resistor leads and the deskew fixture.

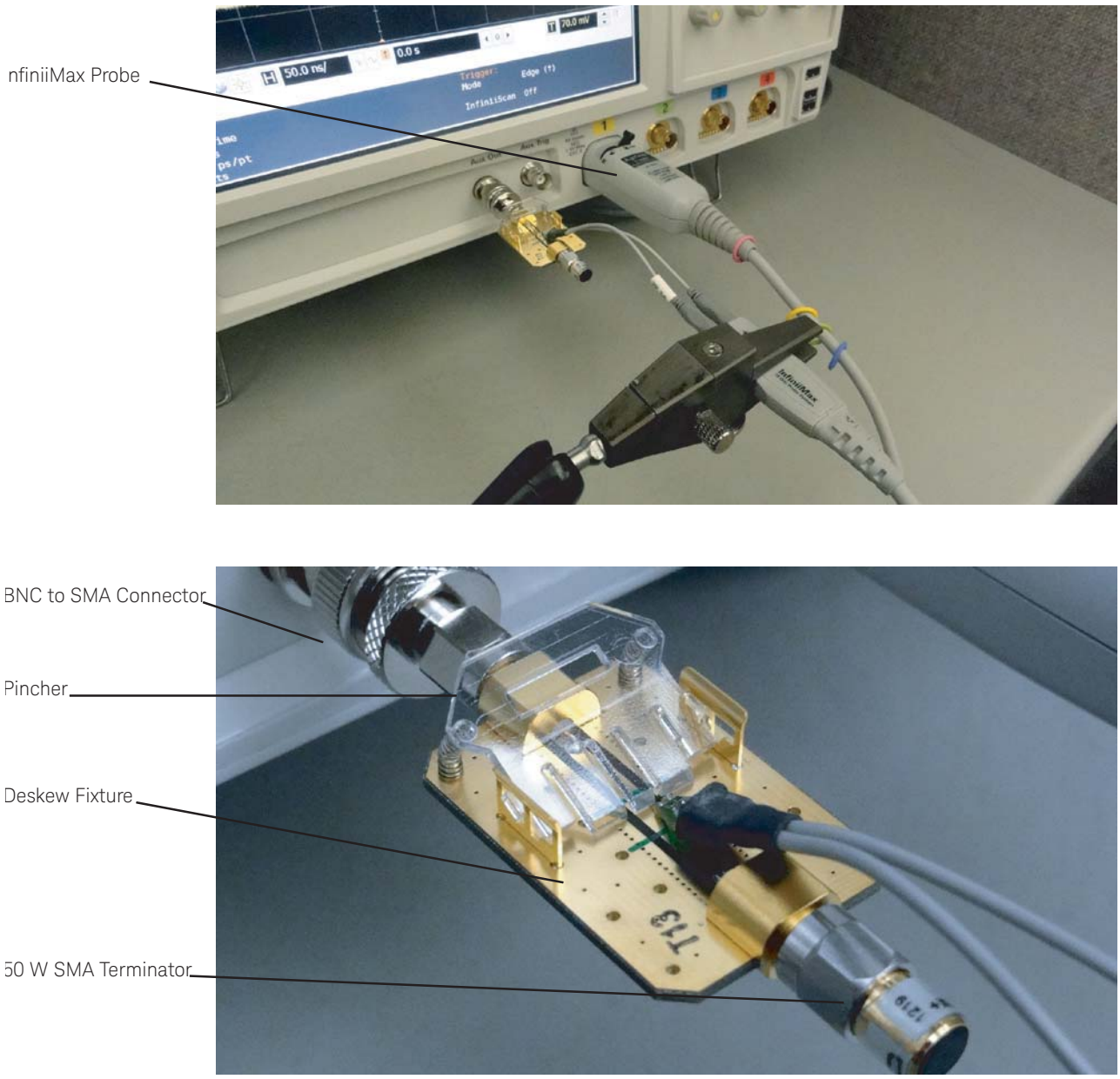

Figure 2 Connecting the Probe for Calibration

Verifying the Connection

1. On the Infiniium oscilloscope, press the **[Auto Scale]** key on the front panel.
2. Set the volts per division to **100 mV/div**.
3. Set the horizontal scale to **1.00 ns/div**.
4. Set the horizontal position to approximately **3 ns**. You should see a waveform similar to that in Figure 3.

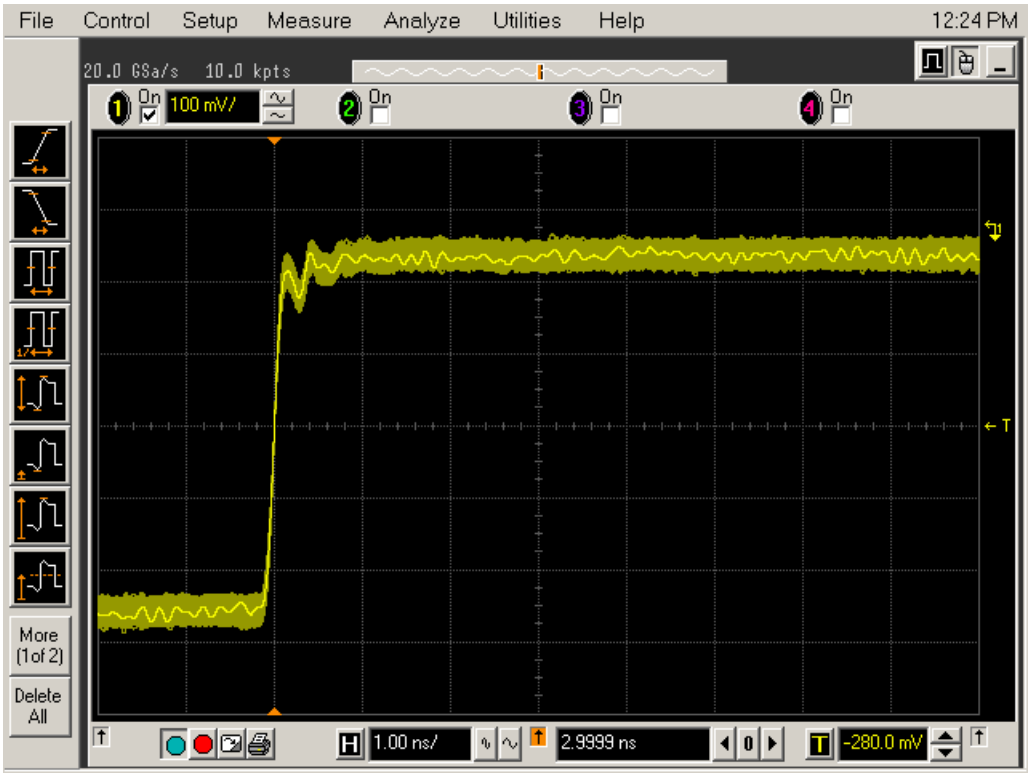

Figure 3 Good Connection

If you see a waveform similar to that of Figure 4 then you have a bad connection and should check all of your probe connections.

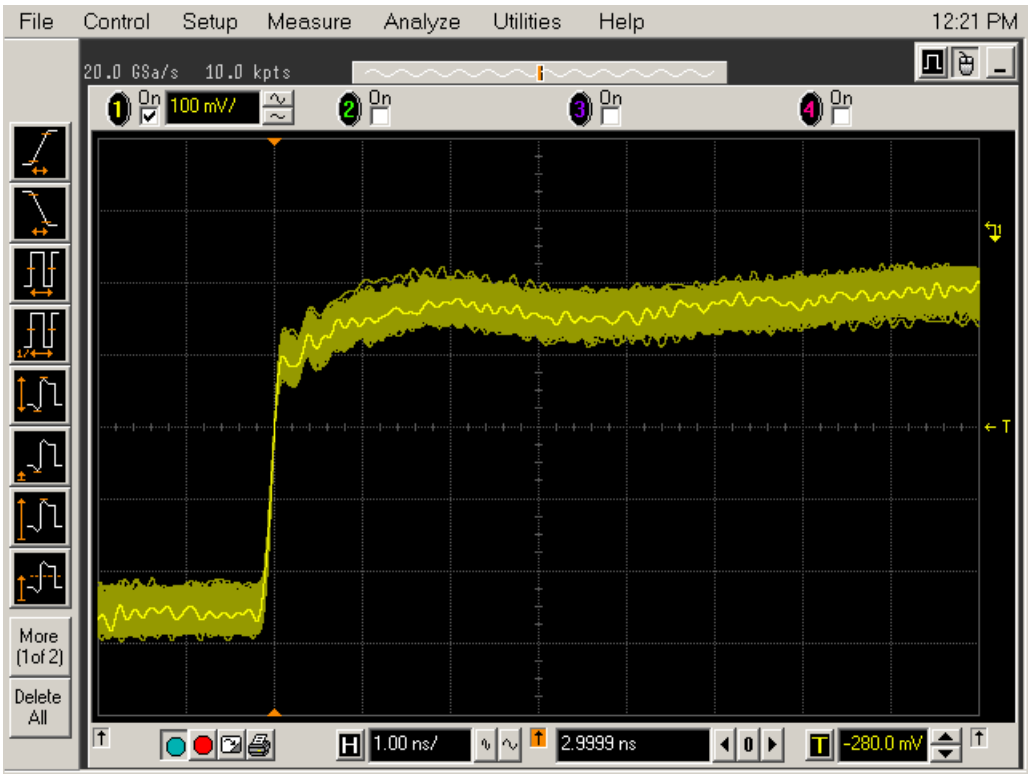

Figure 4 Bad Connection

Running the Probe Calibration and Deskew

1. On the Infiniium oscilloscope in the Setup menu, select the channel connected to the probe.
2. In the Channel Setup dialog box, select the **Probe Config...** button.
3. Select the Probe head model from the drop-down menu.
4. In the Probe Configuration dialog box, select the **Calibrate Probe...** button.
5. In the Probe Calibration dialog box, select the **Start Atten/Offset Calibration...** button and follow the on-screen instructions for the vertical calibration procedure.
6. Once the vertical calibration has successfully completed, select the **Start Skew Calibration...** button and follow the on-screen instructions for the skew calibration.

   At the end of each calibration the oscilloscope will inform you if the calibration was or was not successful.

Verifying the Probe Calibration

If you have just successfully calibrated the probe, it is not necessary to perform this verification. However, if want to verify the probe was properly calibrated, the following procedure will help you verify the calibration.

The calibration procedure requires the following parts.

- BNC (male) to SMA (male) adapter
- SMA (male) to BNC (female) adapter
- BNC (male) to BNC (male) 12 inch cable such as the Keysight 8120-1838 (not included in this kit)
- Keysight 54855-61620 calibration cable (Infiniium oscilloscopes with bandwidths of 6 GHz and greater only)
- Keysight 54855-67604 precision 3.5 mm adapters (Infiniium oscilloscopes with bandwidths of 6 GHz and greater only)
- Deskew fixture

For the following procedure, refer to Figure 5.

1. Connect BNC (male) to SMA (male) adapter to the deskew fixture on the connector closest to the pincher.
2. Connect the SMA (male) to BNC (female) to the connector farthest from the pincher.
3. Connect the BNC (male) to BNC (male) cable to the BNC connector on the deskew fixture to one of the unused oscilloscope channels. For Infiniium oscilloscopes with bandwidths of 6 GHz and greater, use the 54855-61620 calibration cable and the two 54855-67604 precision 3.5 mm adapters.
4. Connect the BNC side of the deskew fixture to the Aux Out BNC of the Infiniium oscilloscope.
5. Connect the probe to an oscilloscope channel.
6. To minimize the wear and tear on the probe head, the probe head should be placed on a support to relieve the strain on the probe head cables.

   We recommend the Keysight N2787A 3D probe positioner for this.
7. Push down on the back side of the pincher. Insert the probe head resistor lead underneath the center of the pincher and over the center conductor of the deskew fixture. The negative probe head resistor lead or ground lead must be underneath the pincher and over one of the outside copper conductors (ground) of the deskew fixture. Make sure that the probe head is approximately perpendicular to the deskew fixture.

NOTE For the socketed probe head, insert two properly trimmed 82 Ω resistors into the sockets.

8 Release the pincher.

NOTE To ensure contact, pull up on the back side of the pincher to ensure good contact between resistor leads and the deskew fixture.

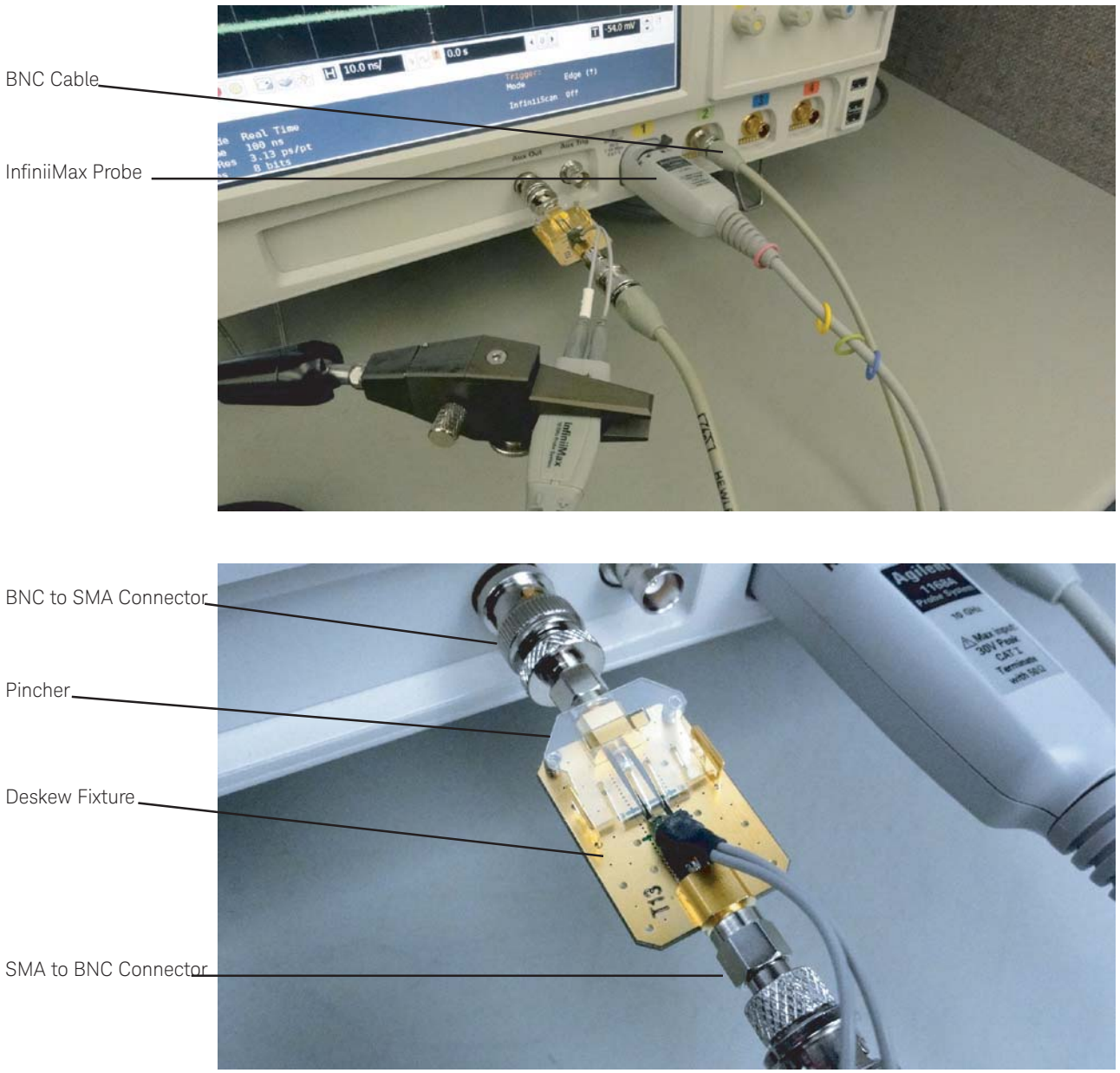

Figure 5 Connection setup for verifying the probe calibration

9 On the oscilloscope, press the **[Auto Scale]** key on the front panel.

10 Select Setup menu and choose the channel connected to the BNC cable from the pull-down menu.

11 Select the **Probes...** button.

12 Select the **Configure Probe System** button.

13 Select **User Defined Probe** from the pull-down menu.

14 Select the **Calibrate Probe...** button.

15 Once the skew calibration is completed, close all dialog boxes.

16 Select the **Start Skew Calibration...** button and follow the on-screen instructions.

17 Set the vertical scale for the displayed channels to **100 mV/div**.

18 Set the horizontal range to **1.00 ns/div**.

19 Set the horizontal position to approximately **3 ns**.

20 Change the vertical position knobs of both channels until the waveforms overlap each other.

21 Select the Setup menu choose **Acquisition...** from the pull-down menu.

22 In the Acquisition Setup dialog box enable averaging. When you close the dialog box, you should see waveforms similar to that in Figure 6.

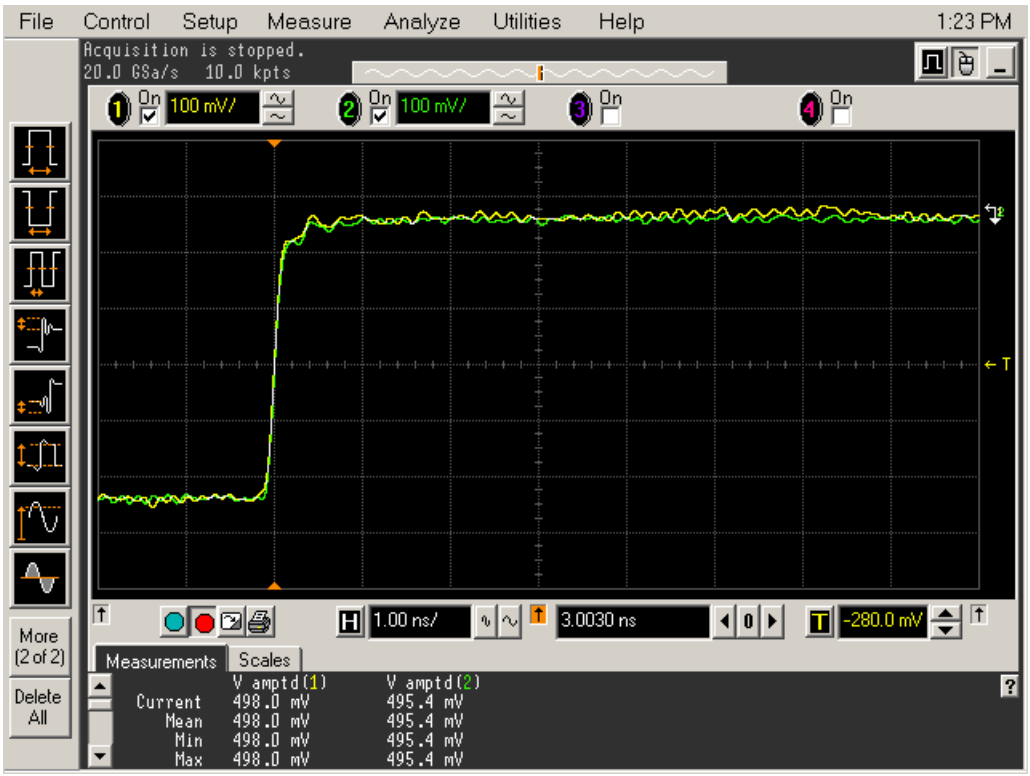

Figure 6 Overlapping Waveforms

Calibration for Hand-held Browser Probe Heads

Calibration of the hand-held browser probe heads consists of a vertical calibration and a skew calibration. The vertical calibration should be performed before the skew calibration. Both calibrations should be performed for best probe measurement performance.

NOTE **Before calibrating the probe, verify that the Infiniium oscilloscope has been calibrated recently and that the calibration Δ temperature is within ±5 °C. If this is not the case, calibrate the oscilloscope before calibrating the probe. This information is found in the Infiniium Calibration dialog box.**

Calibration Setup

The calibration procedure requires the following parts.

- BNC (male) to SMA (male) adapter
- Deskew fixture
- 50 Ω SMA terminator

For the following procedure, refer to Figure 7.

1. Connect BNC (male) to SMA (male) adapter to the deskew fixture on the connector closest to the pincher.
2. Connect the 50 Ω SMA terminator to the connector farthest from the pincher.
3. Connect the BNC side of the deskew fixture to the Aux Out of the Infiniium oscilloscope.
4. Connect the probe to an oscilloscope channel.
5. Place the positive resistor tip of the browser on the center conductor of the deskew fixture between the green line and front end of the pincher. The negative resistor tip or ground pin of the browser must be on either of the two outside conductors (ground) of the deskew fixture.
6. On the Infiniium oscilloscope in the Setup menu, select the channel connected to the probe.
7. In the Channel Setup dialog box select the **Probe Config...** button.
8. In the Probe Configuration dialog box select the **Calibrate Probe...** button.
9. Select the **Start Atten/Offset Calibration...** button and follow the on-screen instructions for the vertical calibration procedure.
10. Once the vertical calibration has successfully completed, select the **Calibrated Skew...** button.
11. Select the **Start Skew Calibration...** button and follow the on-screen instructions for the skew calibration.

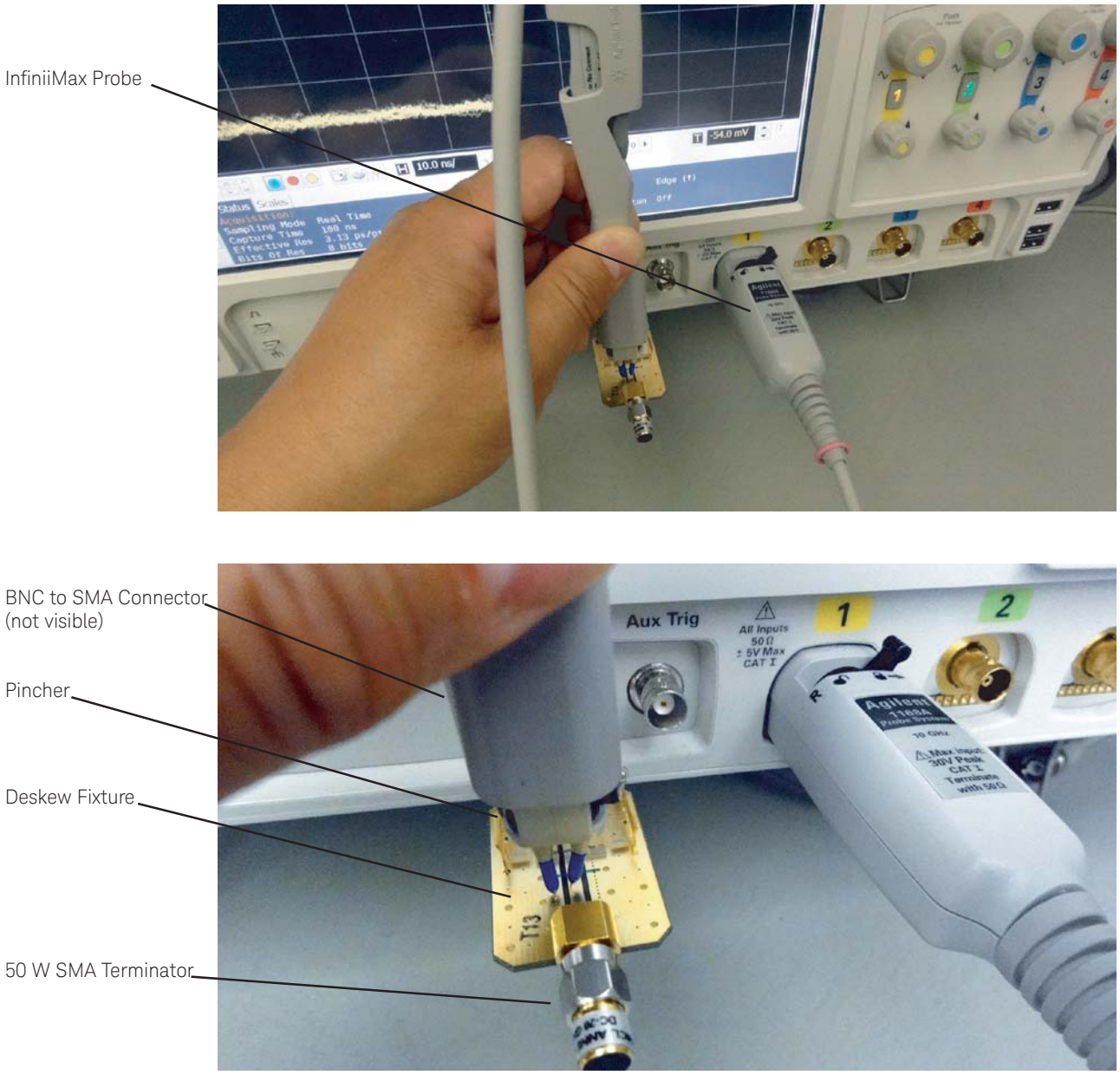

Figure 7 Calibration setup

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Edition 5 August 2016

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