How to make a sweep measurement

This material shows how to perform a sweep measurement through an example of the LED IV measurement. Figure 1 illustrates the connection and condition supposed in the example of measuring LED using the B290/02/11/12A.

**Figure 1. Connection and condition supposed in the example**

Figure 2 shows the timing chart for the sweep measurement with the front panel operation. In this case, the specified source value is sourced immediately after turning on. Then, when you press the instrument will make a sweep measurement. If it is necessary, you can specify any measurement trigger delay time which is the wait time after sourcing each source value and before making a measurement. The measurement time consists of Measurement Speed and some overhead time. Measurement Speed is the parameter specified by the user. Overhead time includes the time to change the measurement range, etc.

**Figure 2. Timing chart for the sweep measurement**
Performing a sweep measurement

Step 1. Press \[ \text{View} \] repeatedly until Single View for Channel 1 is shown in the display.

Step 2. Press \[ \text{Mode} \] to edit the source function, and then select \[ \text{VOLTS (V)} \] to set the source function to the voltage source.

Step 3. Press \[ \text{Source} \] to edit the source value, and then enter 0 V to set the source value to 0 V.

Step 4. Press \[ \text{Limit} \] to edit the limit value, and then enter 100 mA to set the limit value to 100 mA.

Step 5. Press \[ \text{Measure} \] to configure the measurement parameter, and then select \[ \text{AMPS (I)} \] to set the measurement parameter to the current.
Step 6. Press to change the keys shown in Assist keys, and then press to show Sweep Sub-Panel.

Step 7. Press then press to turn on Single Linear Sweep Mode. After turning on Single Linear Sweep Mode, you can see Source Shape which shows the single linear sweep mode.

Step 8. Rotate to select Channel 1 Sweep Parameters and set them up as below.
(Start: 0 V, Stop: 2 V, Points: 101, Step: 20 mV)

Step 9. Press repeatedly until Graph View is shown in the display.

Step 10. Press to source the voltage, and then press to perform a measurement.
(The status information will show **ARM** during the measurement.)
Step 11. Press \textit{Auto Scale} to adjust the scale of the graph after finishing the measurement. Now you can see the measurement result on the GUI of the B290/02/11/12A as bellow.

\textbf{Configuring the measurement speed}

In the default setting, the instrument selects the appropriate measurement speed and range automatically to get the fine accuracy. However, you can also specify these parameters on the GUI of the B290/02/11/12A to meet a variety of the requirement to the measurement conditions.

For example, let’s try to change the measurement speed to \textit{NORMAL} to make a measurement more carefully. If you select \textit{NORMAL}, the aperture time is set to 1 PLC. Here, PLC stands for power line cycle and the specified number of power line cycles is used per a measurement.

**Step 1.** Press \textit{View} repeatedly until Single View for Channel 1 is shown in the display.

**Step 2.** Press \textit{Speed} to edit the measurement speed, and then select \textit{NORMAL} to set the measurement speed to \textit{NORMAL}. (If you can’t see Speed in Assist keys, press More... to change the keys shown in Assist keys.)
Configuring the measurement range operation

The parameters which configure the measurement range operation can be displayed in Range Sub-panel in Single View, although Sweep Sub-Panel is shown at this moment. In the default setting, the B290/02/11/12A performs the current measurement using 1 uA current minimum measurement range with AUTO range operation. With AUTO range operation, the B290/02/11/12A selects the proper range for the measurement with specified minimum measurement range so that you don’t need to take care about it. To know how to change the measurement range setting, try to configure to use 10 nA current minimum measurement range with AUTO range operation.

Step 1. Press to show Range Sub-Panel. (If you can’t see in Assist keys, press to change the keys shown in Assist keys.)

Step 2. Rotate and press to edit the current minimum measurement range, and then select to set it to 10 nA.

If you’d like to fix the measurement range, you can select FIXED range operation as below.

Step 3. Rotate and press to edit the current measurement range operation. Then Select to set the current measurement range operation to FIXED.
Configuring the measurement trigger delay time

The trigger parameters including the measurement trigger delay time and the trigger period can be displayed in Trigger Sub-panel in Single View, although Range Sub-Panel is shown at this moment. In the default setting, the trigger type is set to the automatic trigger type (AUTO) so that you don’t need to specify these trigger parameters.

If you’d like to specify the measurement trigger delay time, take the following steps.

Step 1. Press to show Trigger Sub-Panel. (If you can’t see in Assist keys, press to change the keys shown in Assist keys.)

Step 2. Press to edit the trigger type, and then select to set the trigger type to MANUAL.

Step 3. Rotate to select Channel 1 Trigger Parameters and set them up as below.

(Source Trigger Count: 101, Measurement Trigger Count: 101, Measurement Trigger Delay Time: 100ms)

Note) Source and Measurement Trigger Count should be the same number as Sweep Points.

Now you’ve configured 100 ms measurement trigger delay time.
**Configuring the trigger period**

If you need to control the source and measurement period strictly, the trigger period is useful to make it. In order to specify the trigger period, take the following steps.

**Step 1.** Rotate and press  to edit the trigger type, and then select TIMER to set the trigger type to TIMER.

![Image of trigger type settings](image)

**Step 2.** Rotate  to select Channel 1 Trigger Parameters and set them up as below.

(Source Trigger Period 400 ms, Measurement Trigger Period: 400 ms)

![Image of trigger parameter settings](image)

Note) Source and Measurement Period should be the same as each other.

Now you’ve configured 400 ms trigger period. However, please note that FIXED current measurement range operation will be used to control the trigger period strictly. The measurement range is selected by Limit value. In this example, 100 mA measurement range will be used. If using AUTO measurement range operation is prior to controlling the trigger period strictly, you may specify MANUAL trigger type with AUTO source and measurement trigger source by the following steps.
Step 3. Press [ ] to edit the trigger type, and then select [ ] to set the trigger type to MANUAL.

Step 4. Rotate [ ] to select Channel 1 Trigger Parameters and set them up as below.

(Source Trigger Source: AUTO, Measurement Trigger Source: AUTO)

Viewing the list of measurement results

The measurement results including the measurement time stamp can be referred by the following steps.

Step 1. If you aren’t on the top of the Function menu, press [ ] repeatedly to return to the top level.
Step 2. If you’d like to see the list of measurement results, press Result then press Measure to open Measure Result dialogue.

Step 3. Rotate and press \hfill \hfill to select Data Type field.

Step 4. Press \hfill \hfill to change the keys shown in Assist keys, and then press \hfill \hfill to select Time as the data type.

Step 5. Rotate and press \hfill \hfill to select Data field. Then rotate \hfill \hfill to scroll the data list.