How to make a sweep measurement with 2 channel sources

This material shows how to perform a sweep measurement with 2 channel sources through an example of IdVg characterization of FET. Figure 1 illustrates the connection and condition supposed in the example of measuring FET using a member of the B2902A or B2912A.

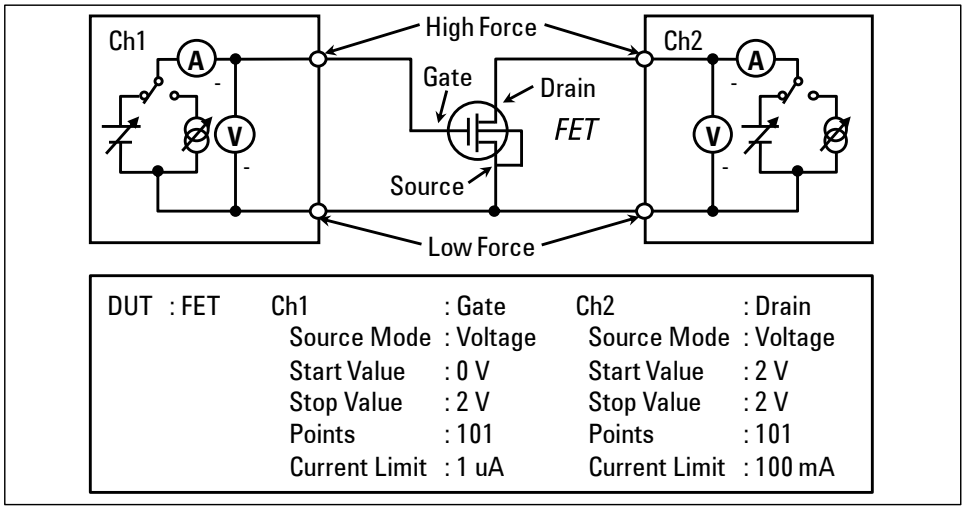
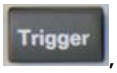


Figure 1. Connection and condition supposed in the example

Figure 2 shows the timing chart for the sweep measurement using 2 channel sources with the front panel operation. The specified source values are sourced immediately after turning on each 

. 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.

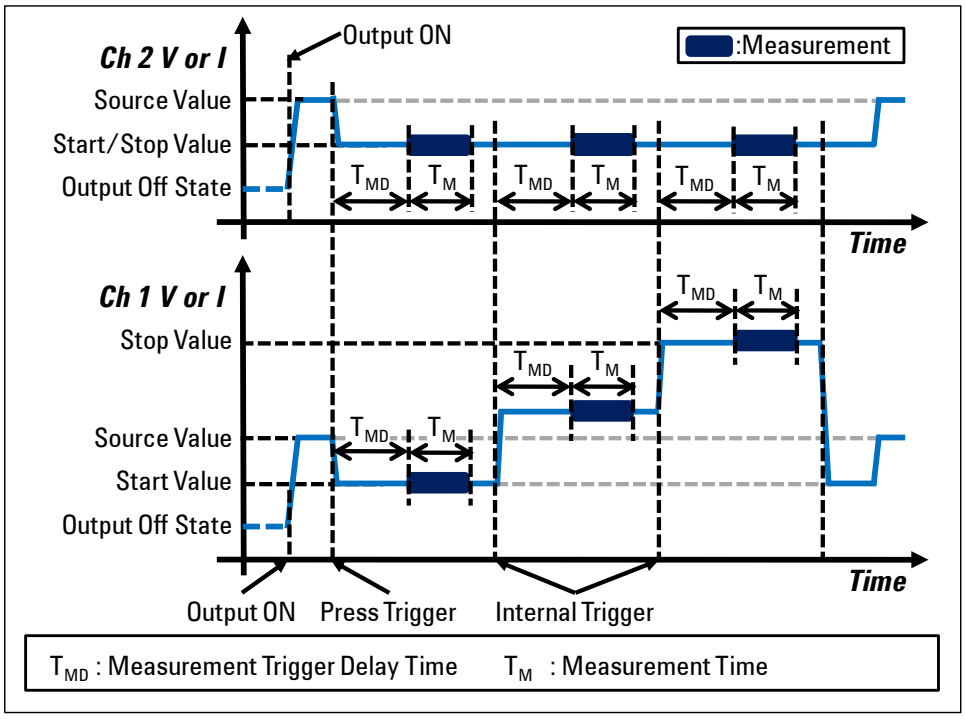


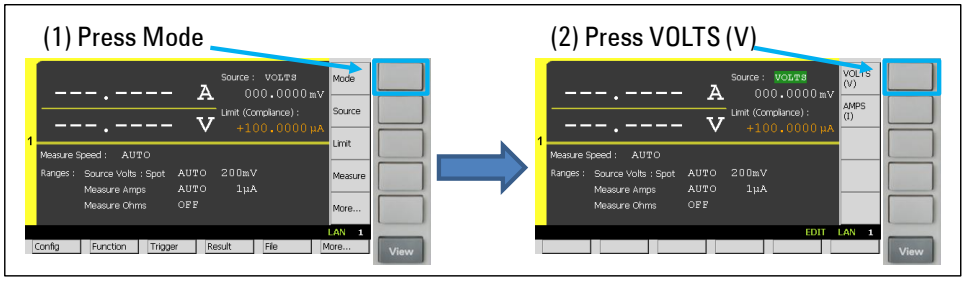
Figure 2. Timing chart for the sweep measurement using 2 channel sources

Performing a sweep measurement with 2 channel sources

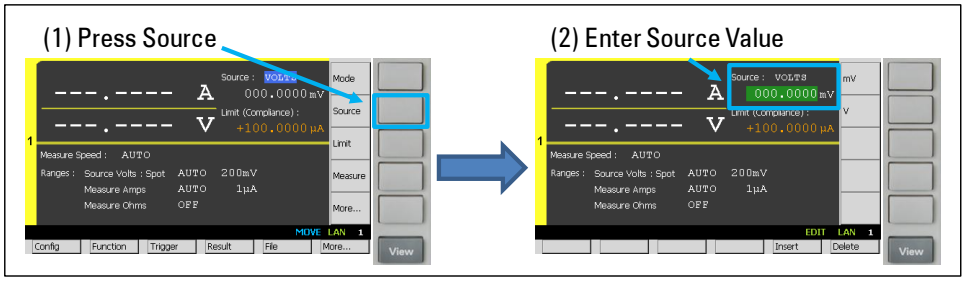
1. Setting up Channel 1

Step 1. Press View repeatedly until Single View for Channel 1 is shown in the display.

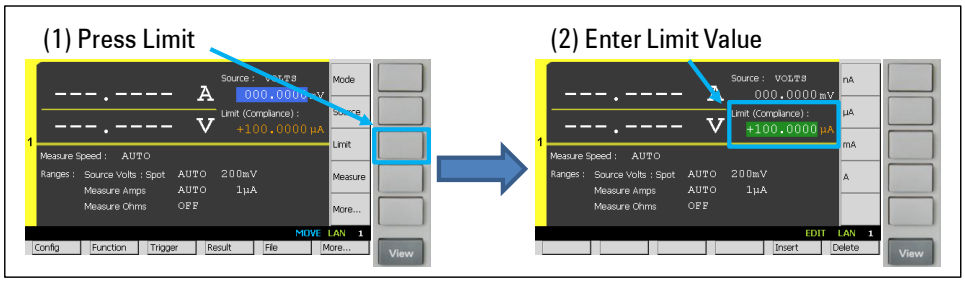
Step 2. Press Mode to edit the channel 1 source function, and then select VOLTS (V) to set it to the voltage source.



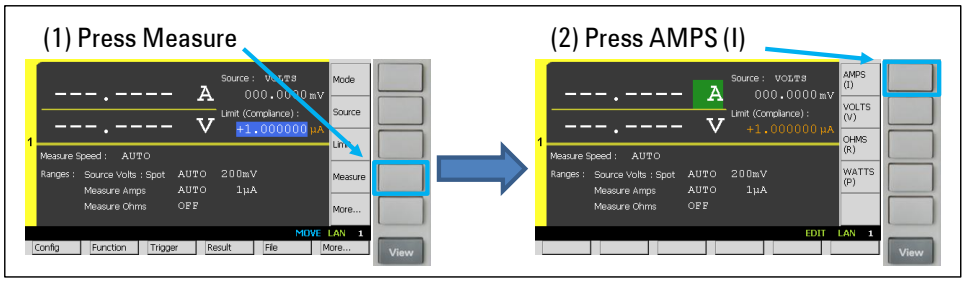
Step 3. Press Source to edit the channel 1 source value, and then enter 0 V to set it to 0 V.



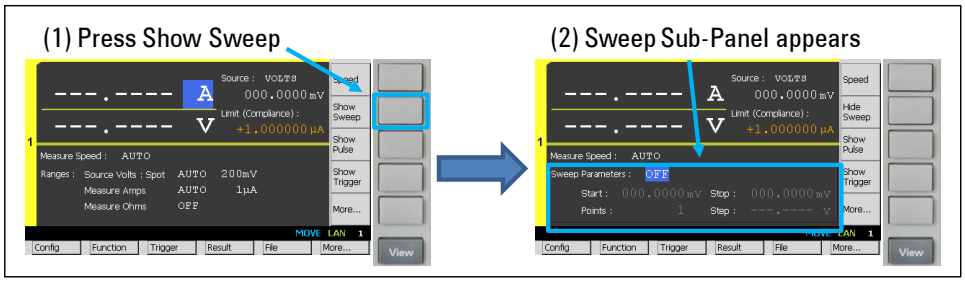
Step 4. Press Limit to edit the channel 1 limit value, and then enter 1 uA to set it to 1 uA.



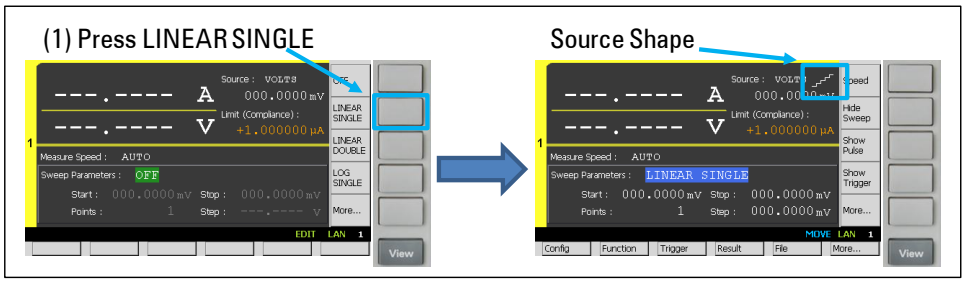
Step 5. Press Measure to configure the channel 1 measurement parameter, and then select AMPS (I) to set it to the current.



Step 6. Press More... to change the keys shown in Assist keys, and then press Show Sweep to show Sweep Sub-Panel.

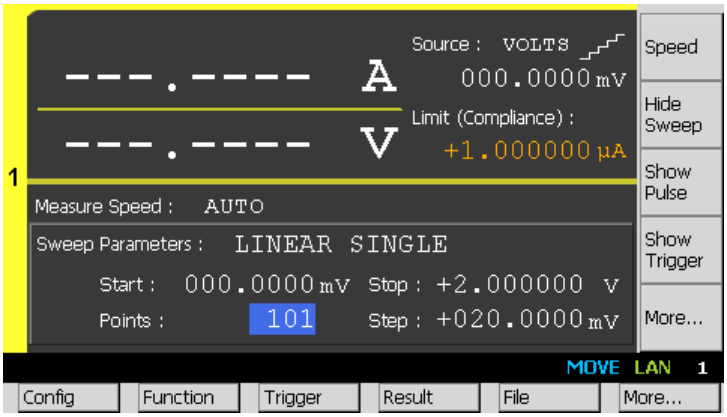


Step 7. Press  , then press LINEAR SINGLE to turn on Single Linear Sweep Mode. After turning on Single Linear Sweep Mode, you can see Source Shape which shows the single linear sweep mode.



Step 8. Rotate  to select Channel 1 Sweep Parameters and set them up as below.

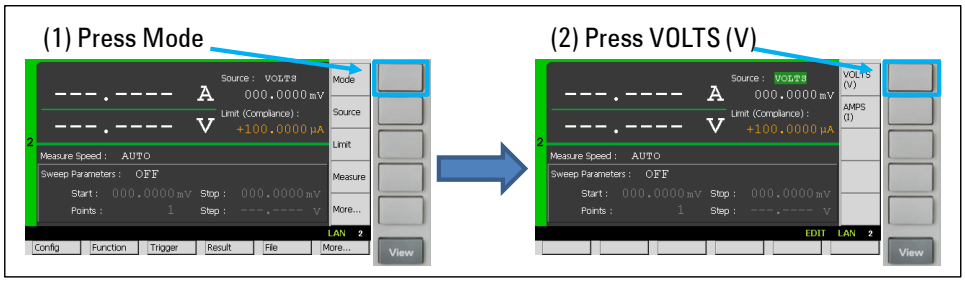
(Start: 0 V, Stop: 2 V, Points: 101, Step: 20 mV)



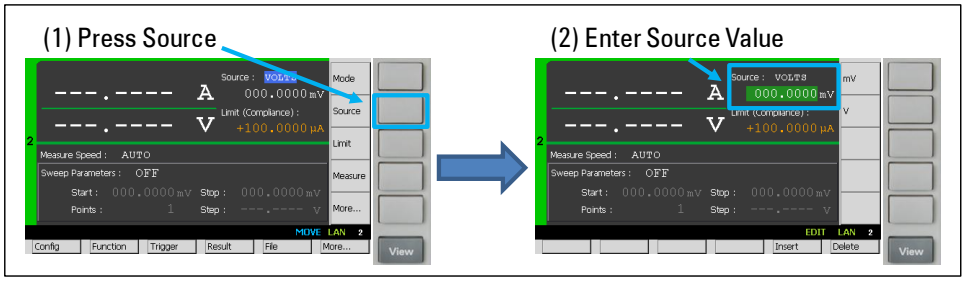
2. Setting up Channel 2

Step 1. Press View to show Single View for Channel 2.

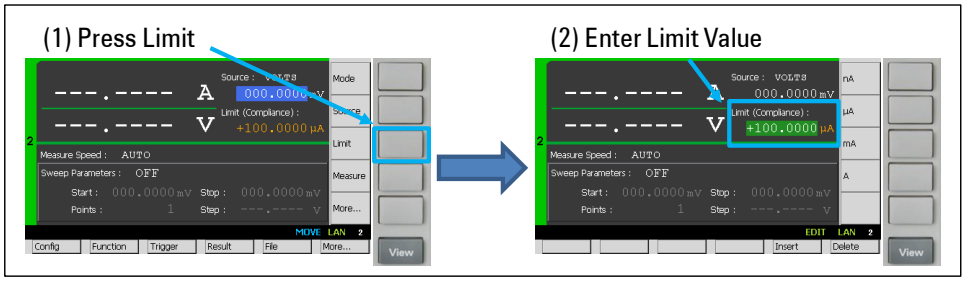
Step 2. Press Mode to edit the channel 2 source function, and then select VOLTS (V) to set it to the voltage source.



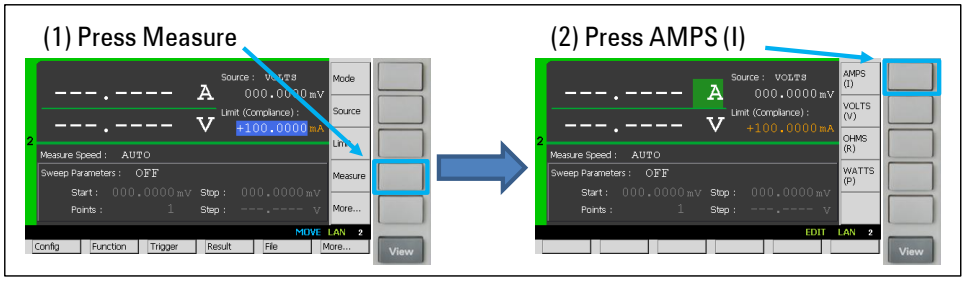
Step 3. Press Source to edit the channel 2 source value, and then enter 0 V to set it to 0 V.



Step 4. Press Limit to edit the channel 2 limit value, and then enter 100 mA to set it to 100 mA.

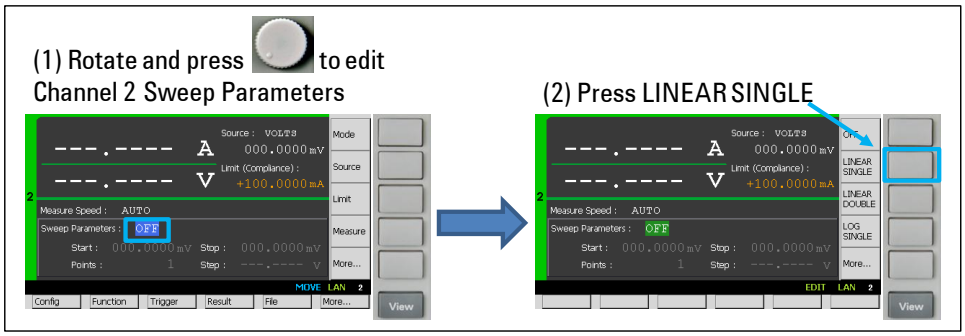


Step 5. Press Measure to configure the channel 2 measurement parameter, and then select AMPS (I) to set it to the current.



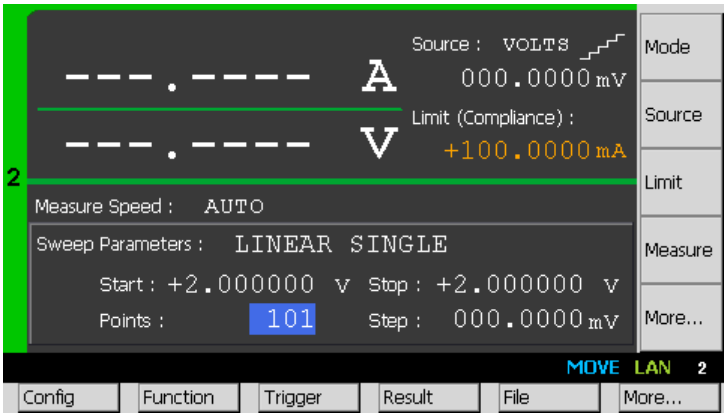
Step 6. Rotate and press  to edit the channel 2 sweep parameters. Then press 

to turn on Single Linear Sweep Mode.

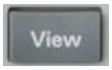


Step 7. Rotate  to select Channel 2 Sweep Parameters and set them up as below.

(Start: 2 V, Stop: 2 V, Points: 101, Step: 0 mV)

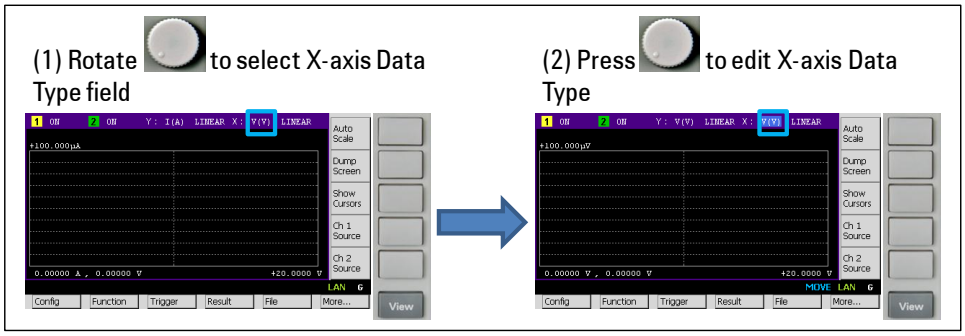


3. Setting up Graph View

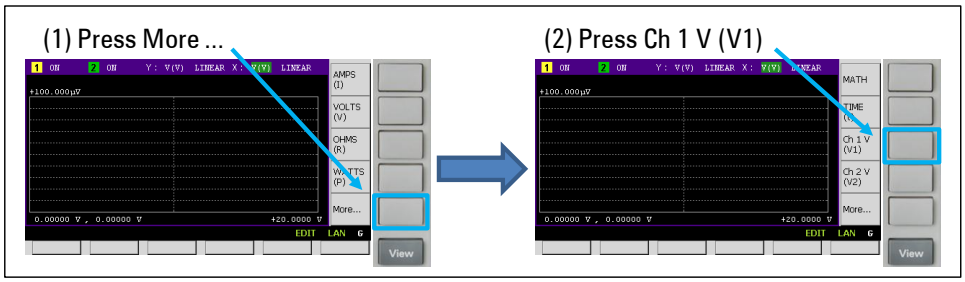
Step 1. Press 

to show Graph View

Step 2. Rotate and press  to edit the X-axis data type



Step 3. Press More..., and then select Ch 1 V (V1) to set the X-axis data type to the channel 1 voltage.

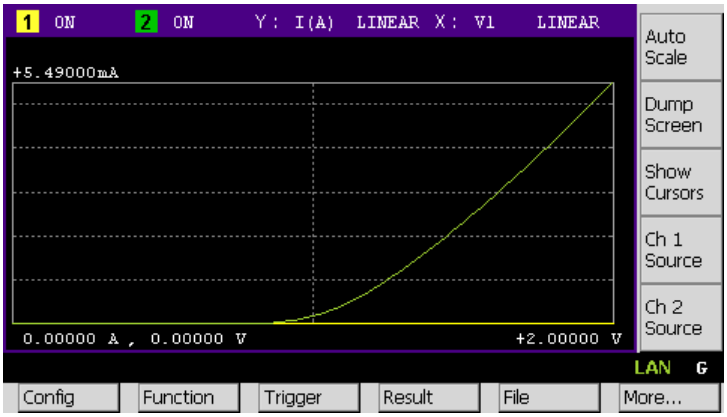


4. Performing measurement

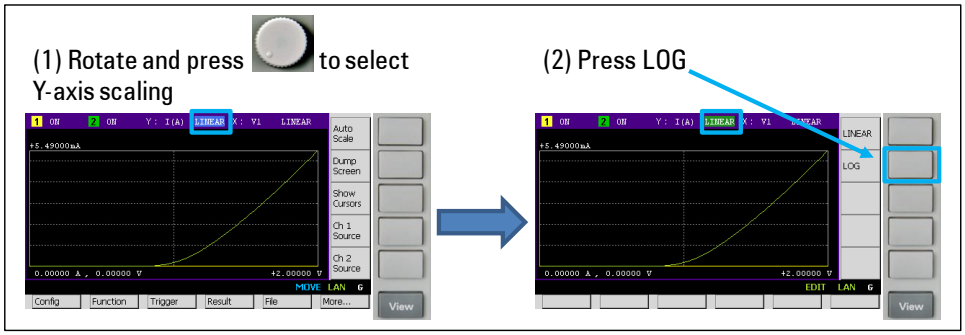
Step 1. Press On/Off for both channels to source the voltage, and then press Trigger to perform a measurement.

(The status information will show ARM during the measurement.)

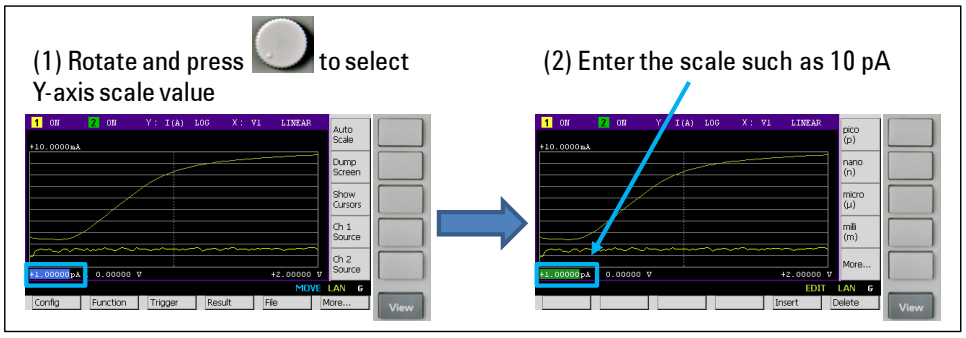
Step 2. Press Auto Scale to adjust the scale of the graph after finishing the measurement. Now you can see the measurement result on the GUI of the B2902/12A as bellow.



Step 3. If you'd like to change the graph scaling of Y-axis from LINEAR to LOG, rotate and press  to select Y-axis scaling.



Step 4. If you'd like to change the graph scale value of Y-axis, rotate and press  to modify Y-axis scale value.



Configuring the measurement speed

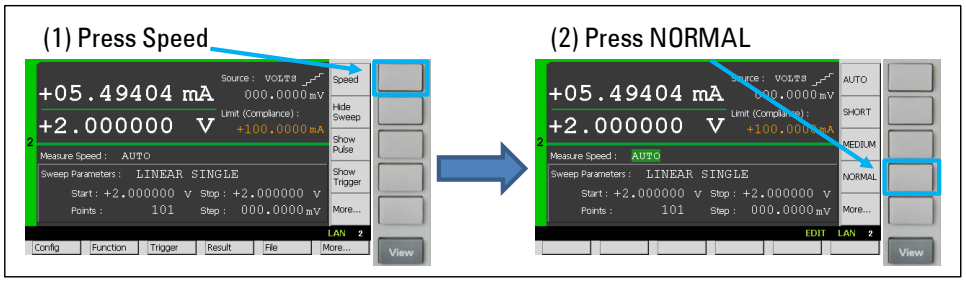
In the default setting, the instrument selects the appropriate measurement speed and range automatically to get the fine accuracy. However, you can also specify these parameters on the GUI of the B2902/12A to meet a variety of the requirement to the measurement conditions.

For example, let's try to change the measurement speed to NORMAL to make a measurement more carefully. If you select 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 View repeatedly until Single View for Channel 2 is shown in the display.

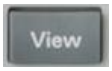
Step 2. Press Speed to edit the channel 2 measurement speed, and then select NORMAL to set it to NORMAL.

(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 B2902/12A performs the current measurement using 1 uA current minimum measurement range with AUTO range operation. With AUTO range operation, the B2902/12A 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 

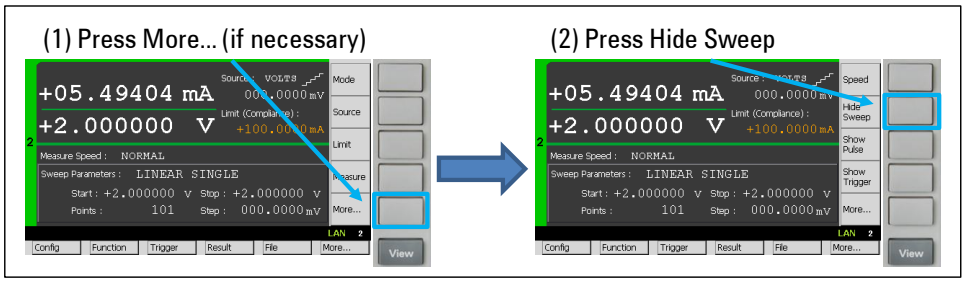
repeatedly until Single View for Channel 2 is shown in the display.

Step 2. Press 

to show Range Sub-Panel. (If you can't see 

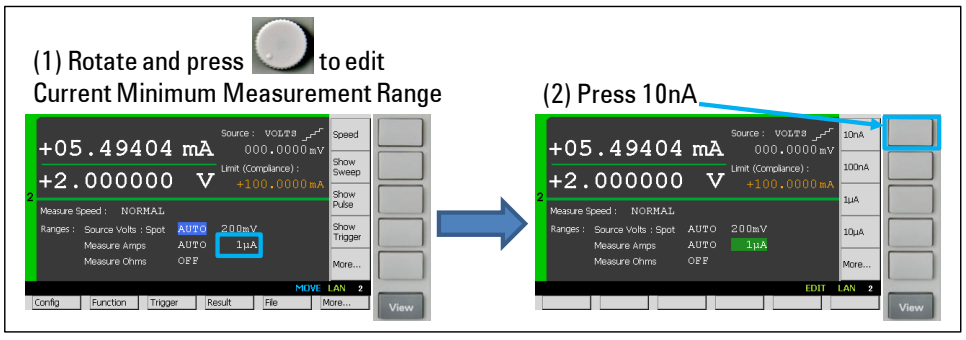
in Assist keys, press 

to change the keys shown in Assist keys.)



Step 3. Rotate and press 
to edit the channel 2 current minimum measurement range, and then select 

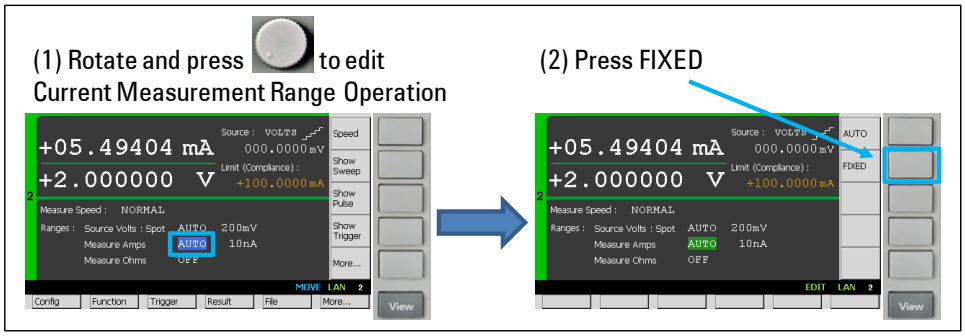
to set it to 10 nA.



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

Step 4. Rotate and press  to edit the channel 2 current measurement range operation. Then Select 

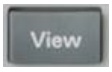
to set it to FIXED.



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 

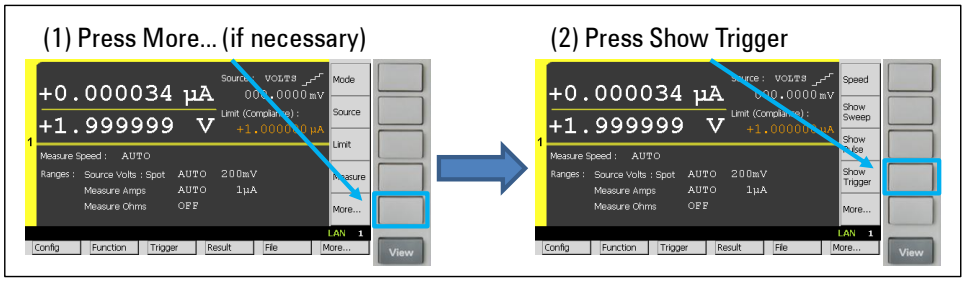
repeatedly until Single View for Channel 1 is shown in the display.

Step 2. Press 

to show Trigger Sub-Panel. (If you can't see 

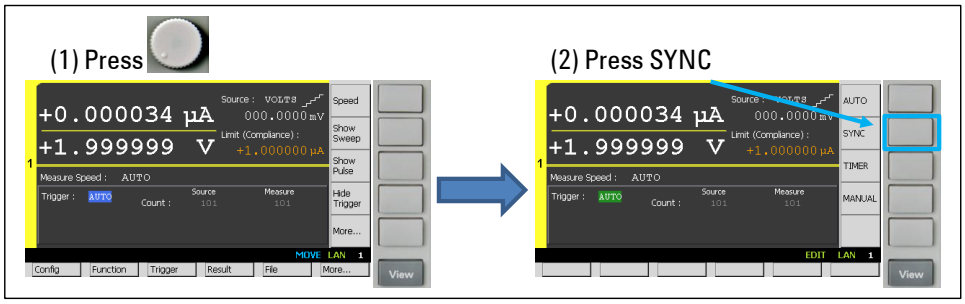
in Assist keys, press 

to change the keys shown in Assist keys.)



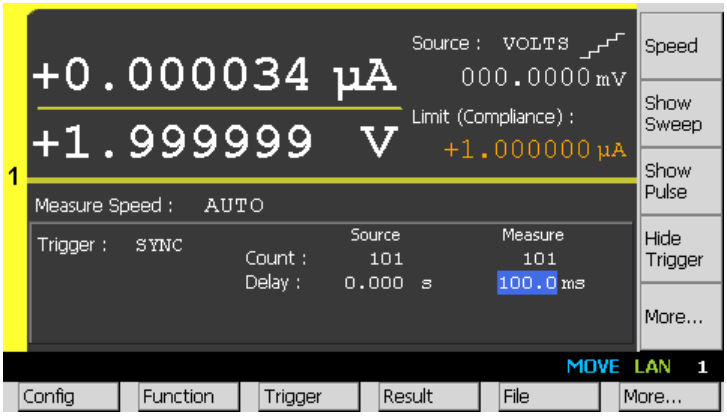
Step 3. Press  to edit the channel 1 trigger type, and then select 

to set it to SYNC.

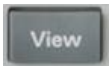


Step 4. Rotate  to select Channel 1 Trigger Parameters and set them up as below.

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



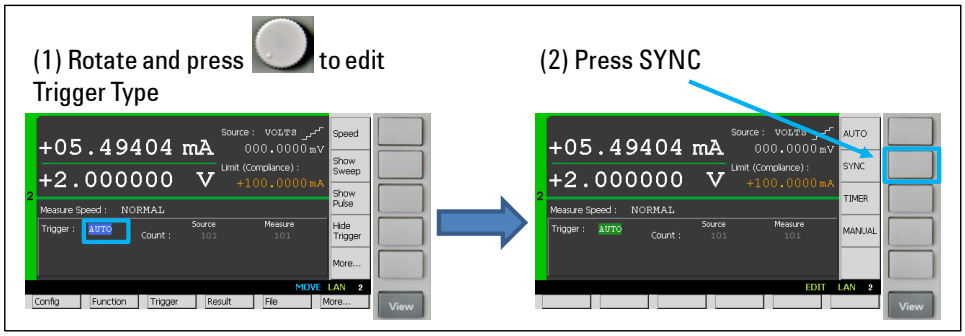
Note) Source and Measurement Trigger Count should be the same number as Sweep Points.

Step 5. Press 

to show Single View for Channel 2 is shown in the display.

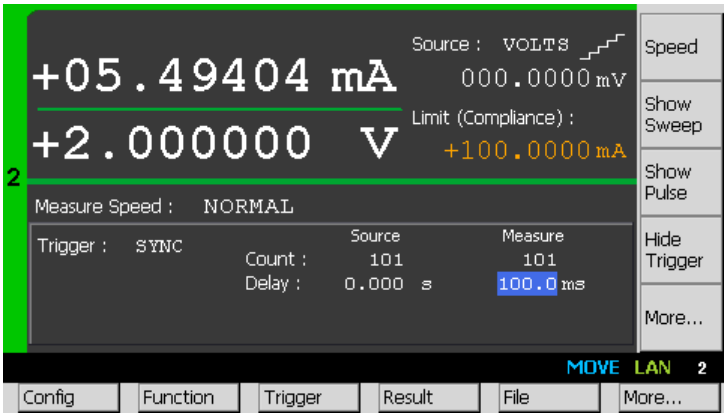
Step 6. Rotate and press  to edit the channel 2 trigger type, and then select 

to set it to SYNC.



Step 7. Rotate  to select Channel 2 Trigger Parameters and set them up as below.

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



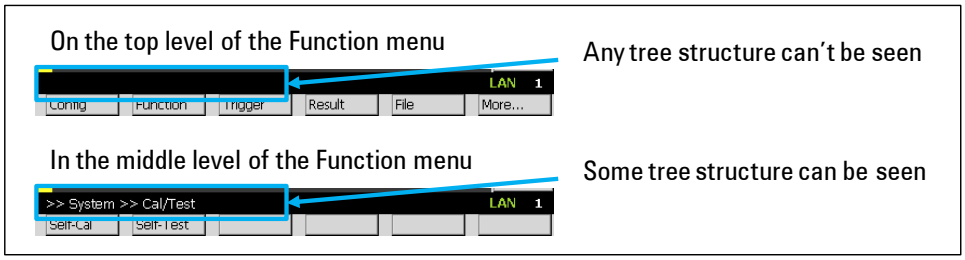
Note) Source and Measurement Trigger Count should be the same number as Sweep Points.

Now you've configured 100 ms measurement trigger delay time.

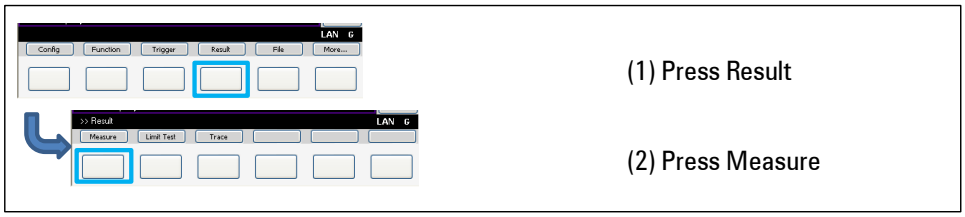
Viewing the list of measurement results

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

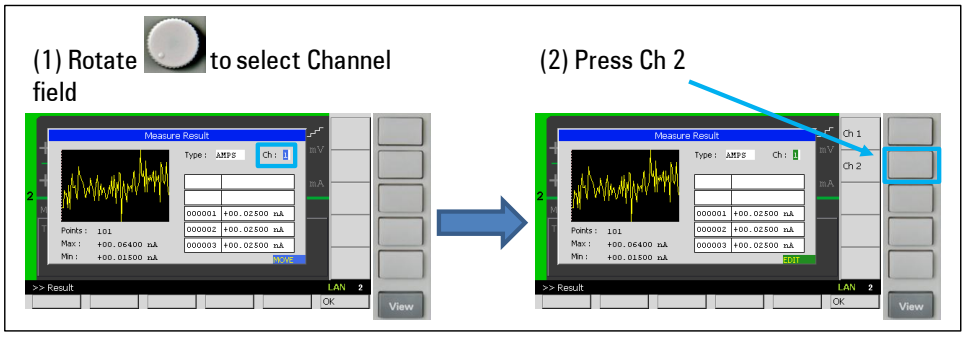
Step 1. If you aren't on the top of the Function menu, press Cancel Local repeatedly to return to the top level.



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 to select Channel field. Then press Ch 2 to select Channel 2.



Step 4. Rotate and press to select Data field. Then rotate to scroll the data list.