

Sourcing Clean Voltage Using B2961B/62B

Keysight B2961B/62B 6.5 Digit Low Noise Power Source



Introduction

The Keysight B2961B/62B 6.5 Digit Low Noise Power Source is a bench-top power supply with revolutionary capabilities and functions not previously available. It can source either voltage or current with 6.5 digit of resolution while also monitoring them, which is essential for a variety of measurement applications.

Using optional external filters extremely reduces the noise level of the Keysight B2961B/62B output down to 10 μ Vrms (10 Hz to 20 MHz) at maximum, which satisfies requirements for testing oscillators and oscillating devices such as VCOs, PLLs. It also enables the testing and evaluation of ADC devices that require precise low-noise voltage supplies/sources for proper characterization.

This application note shows excellent low noise output capability of the B2961B/62B Power Source with external filters by monitoring the outputs through the oscilloscope through the lab exercises.

Required Instruments and Accessories

Accessories required for the lab described in this application note, such as filters, an adapter, and BNC cable are provided as a demo kit with a demo unit of the Keysight B2961B/62B. Only an oscilloscope should be prepared separately.



Keysight B2961B/62B 6.5
Digit Low Noise Power Source



Keysight Oscilloscopes
(MSO-X 4000 Series is shown)



N1298B Ultra Low Noise Filter



N1298C Low Noise Filter



Banana-to-BNC Adapter

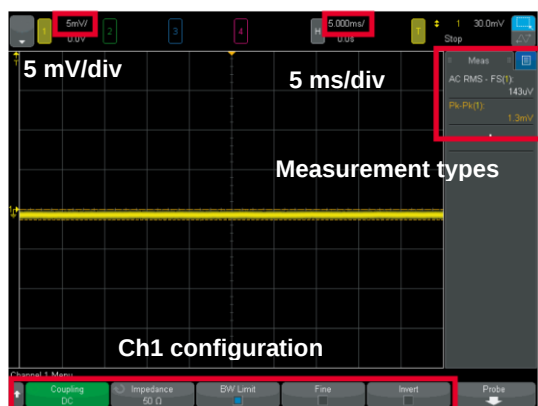


BNC cable

Setup

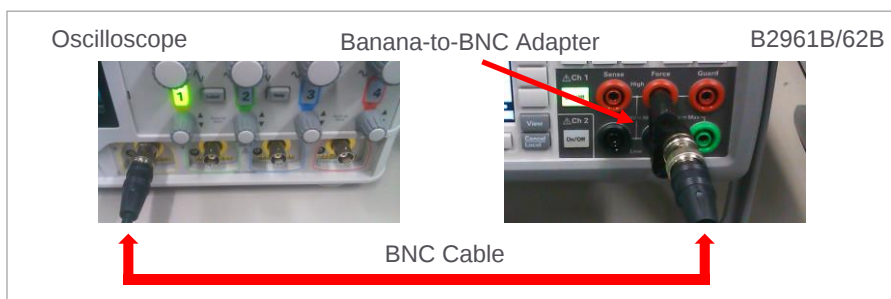
Oscilloscope setup

1. Set vertical scale of Ch1, horizontal scale to **5 mV/div**, **5 ms/div**.
2. Set Ch1 Input Impedance to **50 Ohm** and **BW Limit enabled**.
3. Select “**AC RMS – FS**”, “**Pk-Pk**” as Measurement Type.
4. **Confirm the noise floor** of those Measurement Type on the scope.

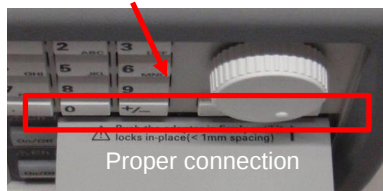


B2961B/62B setup

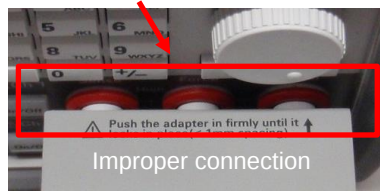
1. Attach a banana-to-BNC adapter to the B2961B/62B's Ch1 High/Low Force Terminals.
2. Connect the scope's Ch1 and BNC terminal of the banana-to-BNC adapter with a BNC cable.



There is no space between the adaptor and the output terminals



There is some space between the adaptor and the output terminals



Note: When the filters are attached to the output terminals later, push them in firmly until it locks in place.

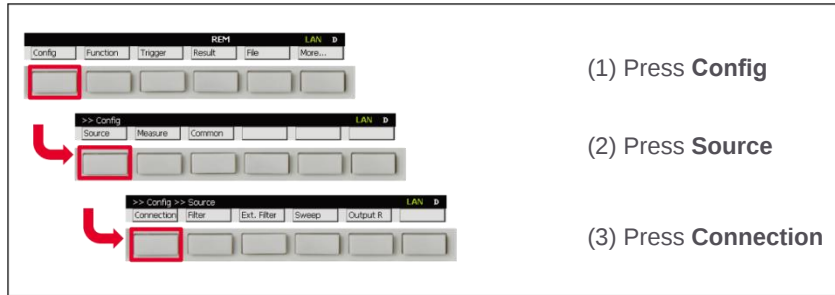
Demonstration

1. Show output noise without external filter

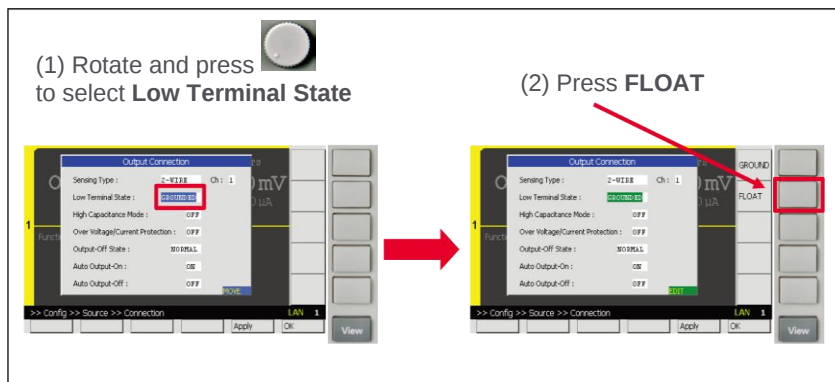
a. Press **View** repeatedly until **Single View** for Channel 1 is shown in the display.



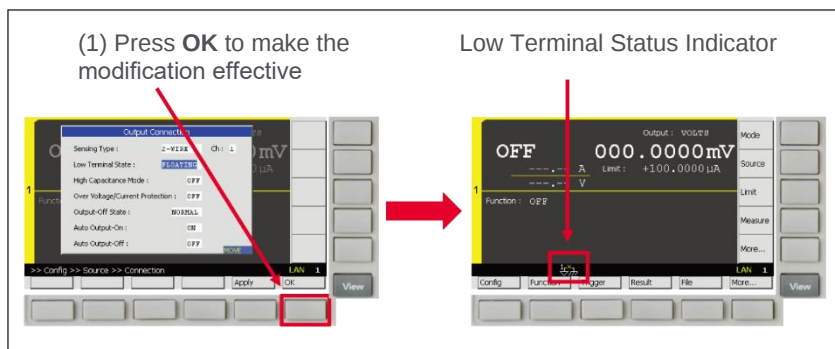
b. Press **Config**, **Source**, and then press **Connection** to open **Output Connection** dialogue.



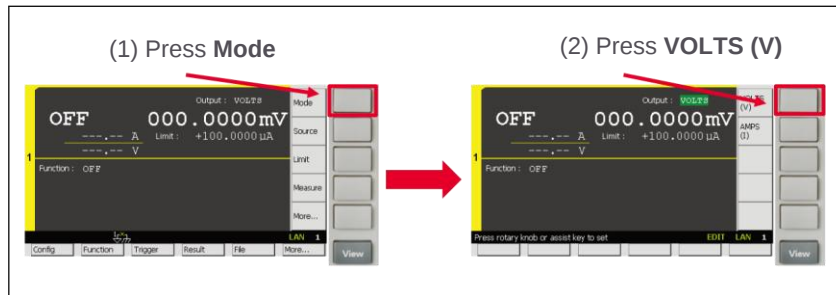
c. Rotate to select **Low terminal state** and press to edit it. Then select **FLOAT** to set **Low terminal state** to **Floating**.



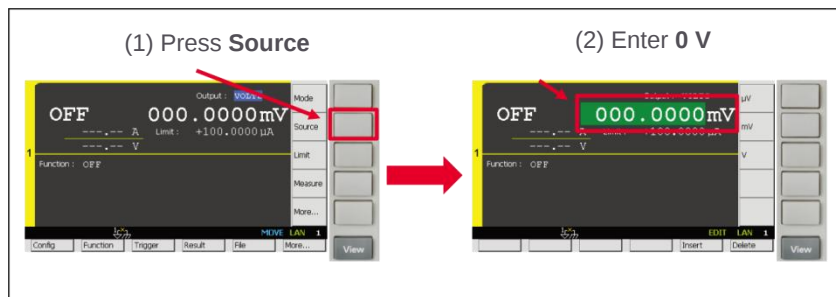
d. Press **OK** to make the modification effective.



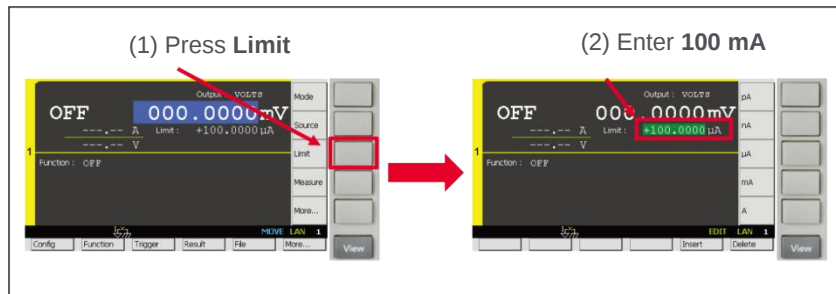
e. Press **Mode** to edit **Source function**, and then select **VOLTS (V)** to set **Source function** to **Voltage source**.



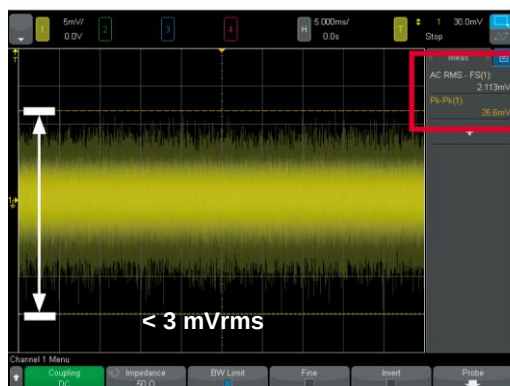
f. Press **Source** to edit **Source value**, and then enter **0 V** to set **Source value** to **0 V**.



g. Press **Limit** to edit **Limit value**, and then enter **100 mA** to set **Limit value** to **100 mA**.



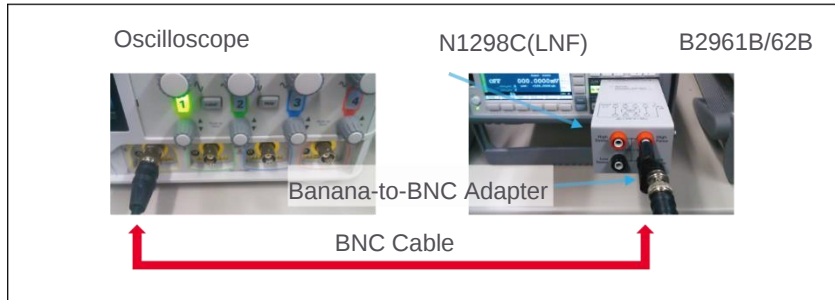
h. Press **On/Off** to source the voltage and monitor output via the scope.



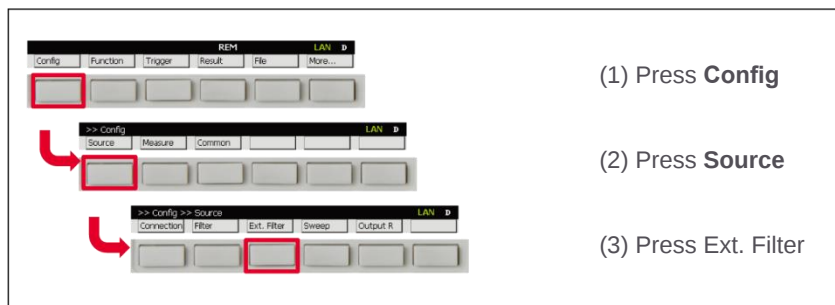
RMS Voltage Noise should be less than 3 mVrms

2. Show output noise via Low Noise Filter

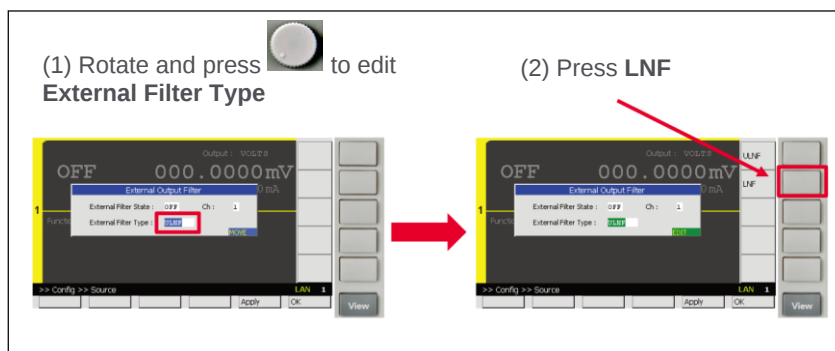
- Press  to turn off the output.
- Attach LNF and make a connection between its outputs and the scope.



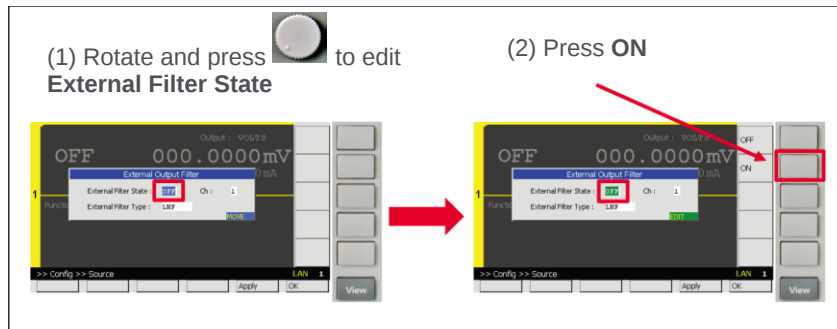
- Press , , and then press  to open **External Output Filter** dialogue.



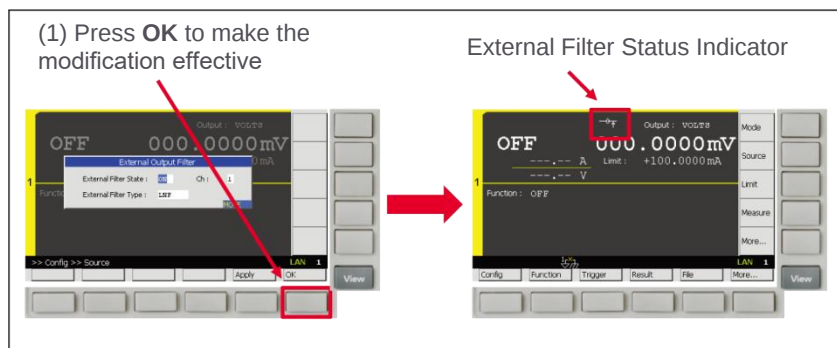
- Rotate  to select **External filter type** and press  to edit it. Then press  to select **Low Noise Filter**.



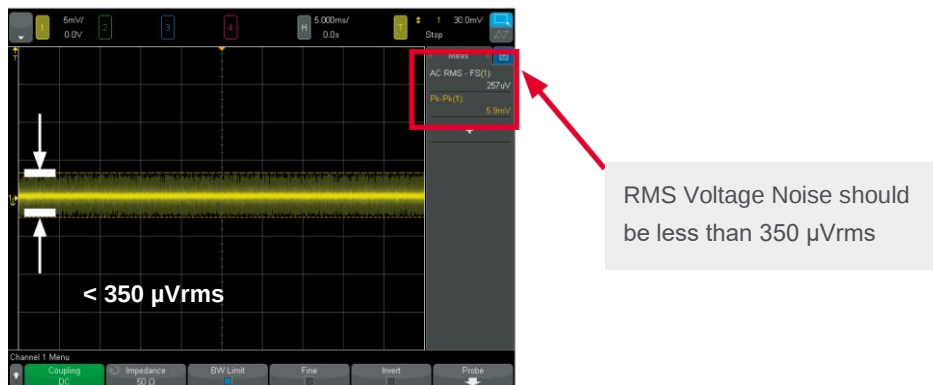
e. Rotate  to select **External filter state** and press  to edit it. Then press  to set it on.



f. Press  to make the modification effective.



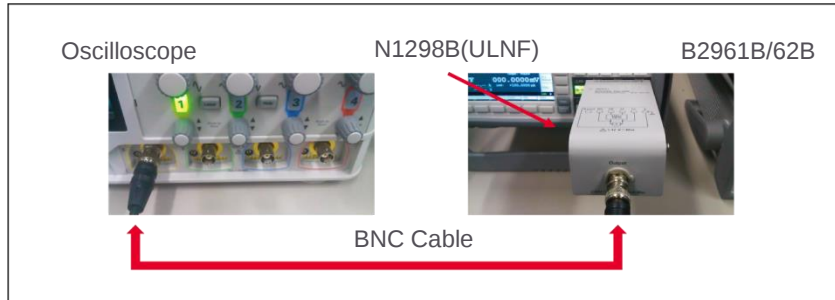
g. Press  to source the voltage and monitor it via the scope.



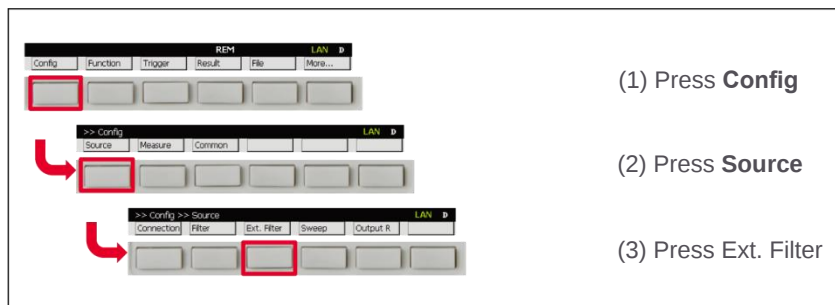
3. Show output noise via Ultra Low Noise Filter

a. Press  to turn off the output.

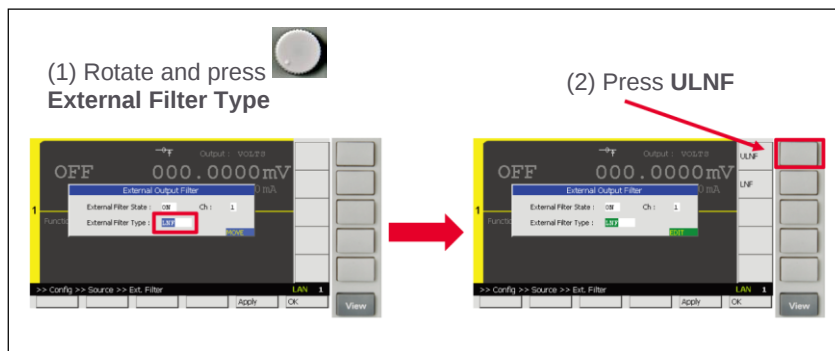
b. Attach ULNF and make a connection between its outputs and the scope.



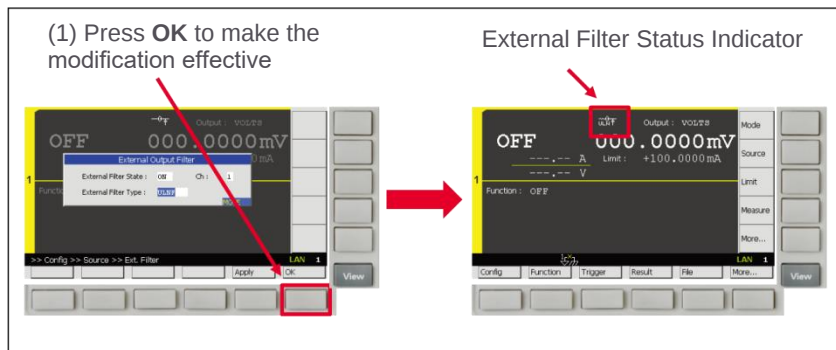
c. Press , , and then press  to open **External Output Filter** dialogue.



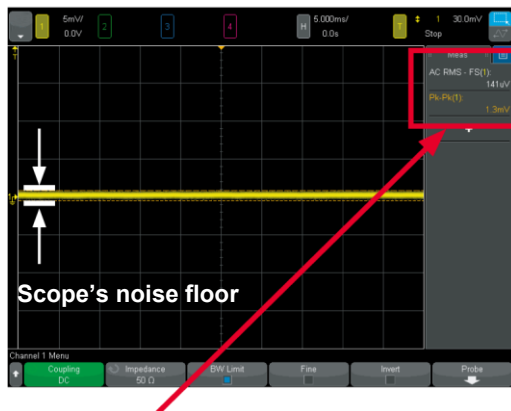
d. Rotate  to select **External filter type** and press  to edit it. Then press  to select **Ultra Low Noise Filter**.



e. Press **OK** to make the modification effective.



f. Press **On/Off** to source the voltage.



RMS Voltage Noise should be same as the noise floor of the scope.

ULNF dramatically reduces the noise to the level too small for the scope to capture it.

Summary

The Keysight B2961B/B2962B 6.5 Digit Low Noise Power Source is a new bench-top power supply/source with revolutionary capabilities and functions not previously available. Its unique features include bipolar current sourcing and sinking, a programmable output resistance feature, and a time-domain waveform viewer supported in the graphical user interface (GUI).

For applications requiring ultra-low noise performance, the B2961B/B2962B supports three external filter options. Their best-in-class noise performance unlocks the true characteristics of your devices and samples.

B2900 Precision Instrument Family

The B2900 family contains products that perform both precision sourcing and precision measurement.



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