

Keysight N678xA

Source/Measure Units

Five simple steps to achieve
optimal performance from your
Keysight N678xA SMU

Configuration Guide

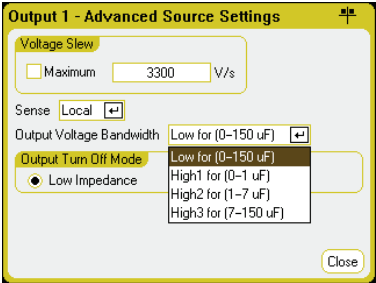
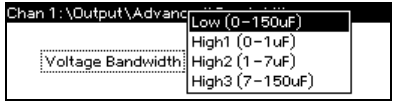
This guide describes five essential configuration steps to help you achieve optimal performance from your Keysight N678xA Source/Measure Units.

Depending on which mainframe is being used, complete operating information is included in the N6705 User's Guide or N6700 User's Guide, which is included on the Product Reference CD-ROM. You can also download the latest versions at www.keysight.com/find/N6705 or www.keysight.com/find/N6700. This guide references the section in the User's Guides where additional information can be found.

1. Select the Correct Output Voltage Bandwidth – Based on Load Capacitance

To avoid output oscillation, ringing, overshoots, and poor transient response, refer to the following table for the correct bandwidth setting. The Low setting is the most stable, but has the slowest response. The High settings provide faster response times for the specified load capacitances. See the User's Guide under "Output Bandwidth".

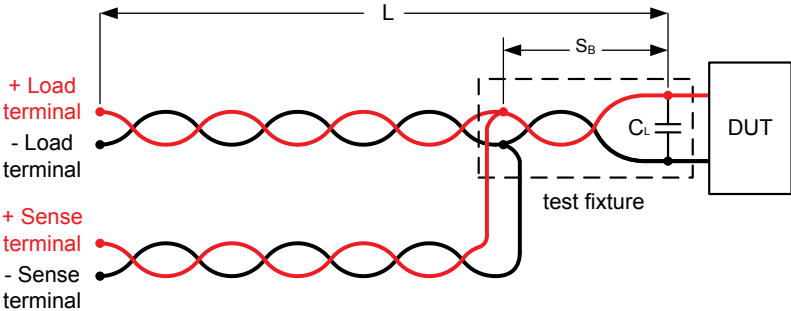
Bandwidth Setting	Sensing	Load Capacitance (C _L)	ESR @100 kHz	Maximum distance from sense point to load capacitance (S _B)
Low	Local or remote	0-150 μF	50 to 200 mΩ	Full lead length
High1	Remote only	0-1 μF	50 to 200 mΩ	15 cm
High2	Remote only	1-7 μF	50 to 200 mΩ	15 cm
High3	Remote only	7-150 μF	50 to 200 mΩ	15 cm

N6705 Front Panel:	N6700 Front Panel:
Press Settings , then Advanced .	Press Menu , then select Output\Advanced\Bandwidth .
	

2. Use the Correct Wire Type and Observe Wire Length Restrictions

To avoid instability and poor transient response, refer to the following table and figure for load wire type and wire length restrictions. These restrictions apply to all bandwidth settings. See the User's Guide under "SMU Wiring Requirements".

Load wire type	Load Wire Length (L) to N6705 binding posts	Load Wire Length (L) to N678xA terminal block	Maximum distance from sense point to load capacitance (S _B)
Twisted-pair	0 - 1 m	0.3 - 1.3 m	15 cm
50 Ω coax (RG-59)	0 - 2 m	0.6 - 3 m	15 cm
10 Ω coax (Molex 10CX-06)	0 - 8 m	2.0 - 10 m	7.5 cm

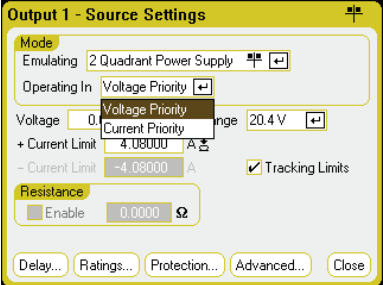
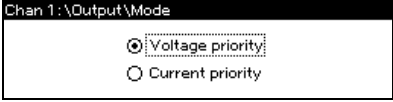


3. Specify the Priority Mode Operation – Based on Your Application

Voltage Priority mode is best suited for constant voltage operation, battery charging, high impedance loads, and loads that are sensitive to voltage overshoots. It maintains the output voltage at its programmed setting – provided the load current stays within its +/- programmed limits. See the User's Guide under “SMU Multi-Quadrant Operation”.

Current Priority mode is best suited for constant current operation and loads that are sensitive to current overshoots. It maintains the output source or sink current at its programmed setting – provided the load voltage stays within its programmed limit.

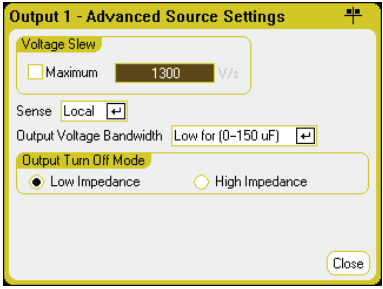
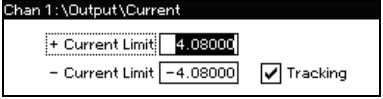

Note that the priority mode is automatically set in many of the N678xA emulating modes.

N6705 Front Panel:	N6700 Front Panel:
Press Settings , then select the priority. 	Press Menu , then select Output\Mode , then select the priority. 

4. Leave Enough Margin When Setting the Output Current Limit


Keep the current limit circuit from engaging unnecessarily when up- or down-voltage programming into capacitive loads by:

- Raising the current limit to compensate for the additional output current required to charge the load capacitor. To determine the additional current use $I_c = C(dV/dt)$.
- Reducing the programmed voltage slew rate to slow the output response (dV/dt).

N6705 Front Panel:	N6700 Front Panel:
For current limit controls, press Settings . For slew rate controls, press Settings , then Advanced . 	For current limit controls, press Menu , then select Output\Current .  For slew rate controls, press Menu , then select Output\Advanced\Slew\Voltage . 

5. Enable Auto-ranging for Best Measurement Accuracy

Enable auto-ranging for best measurement accuracy when measuring a wide range of dynamic currents.

N6705 Front Panel: *	N6700 Front Panel:
Press Scope View , then Properties . Select Auto in the Scope Ranges Current dropdown list. Press Data Log View , then Properties . Select Auto in the Data Log Ranges Current dropdown list. SCPI command: SENS:CURR:RANG:AUTO ON, (@1)	Press Menu , then select Measure\Range . 

* Note that all N6705 measurement functions operate independently.



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