



## Low-Dropout (LDO) Linear Regulator Evaluation

### Quick Bench-top Evaluation of ICs and Electronic Components

*Agilent B2900A Series of Precision Source/Measure Units facilitates quick DC evaluation of linear regulator such as LDO.*



B2912A (front view)



B2912A (rear view)

### DC evaluation of Linear Regulators

- A linear regulator keeps the DC output voltage stable even if the input voltage is varying. This is called “line regulation.” Linear regulators also provide a wide range of output current sourcing capability at constant output voltage. This is called “load regulation.” As this document will show, SMUs (Source/Measure Units) are convenient instruments to characterize a linear regulator’s DC specifications.
- This one-pager outlines an example of load regulation characterization for an off-the-shelf LDO linear regulator.

### Measurement example

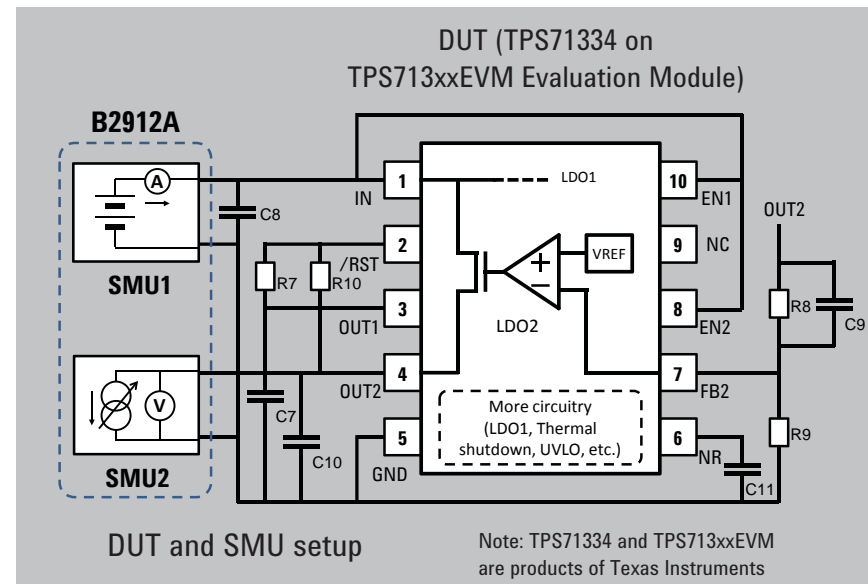
- **Load regulation**  
It is easy to estimate load regulation by measuring output voltage drift while sweeping an output source current over a specified range. A dual-channel SMU such as the B2902A or B2912A is an ideal choice for these types of measurements. In the example shown below, a user-selected constant voltage (2.7 V) is applied to the input using SMU1 while the output current source is being swept from -250 mA to 0 A using SMU2.

**Note:** High Capacitance Mode is ON for SMU1.



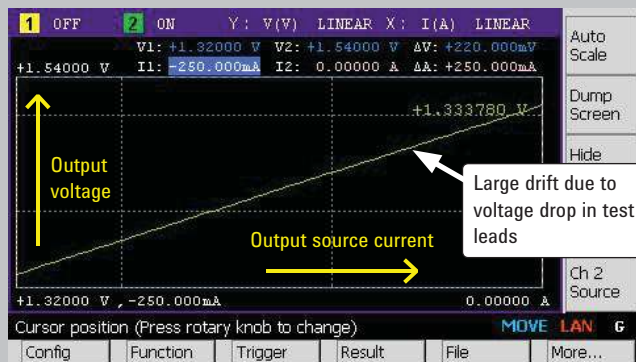
### What is Quick Bench-top Evaluation?

The B2900A series does not require a PC to make measurements on the bench-top. You can view graphical measurement results on the B2900A and save the graphs and data to any USB memory device, thereby improving the efficiency of your bench-top evaluation and debugging. Of course, if you prefer using a PC to control the B2900A then you can download Agilent’s free Quick I/V Measurement Software from our website.



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## Load regulation example: Using 4-wire measurement technique to eliminate voltage drop in the test leads



Measurement result (not using "Sense" connection)

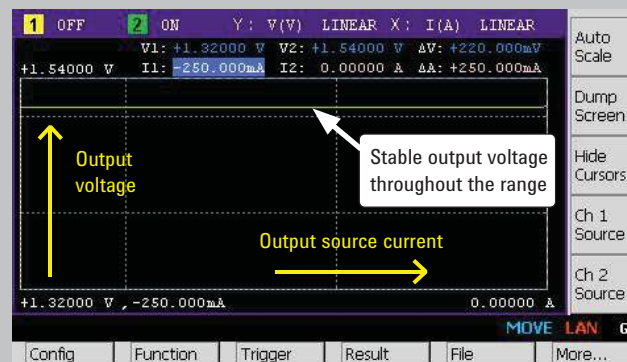
Sweeping from -250 mA to 0 A without connecting the "Sense" terminals results in a large drift at the output. This is due to the voltage drop in the test leads. To eliminate this effect you need to connect both the "Sense" and "Force" leads to the DUT. In this 4-wire measurement case the "Sense" and "Force" leads are shorted together at the test pin of the evaluation module. The "Sense" leads measure the voltage at the tip of leads, thereby eliminating the voltage drop across the "Force" leads.



Sense Force



Measurement setup (4-wire)



Measurement result (using "Sense" connection)

By using the "Sense" leads we can plot the true LDO regulator drift characteristics on the panel of B2912A. This 4-wire measurement technique exhibits a very small drift that is consistent with the device datasheet. This illustrates a general principle that SMU measurements with significant current sourcing or sinking require the use of the "Sense" terminal to obtain correct measurement results.

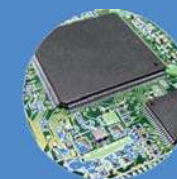
## How broad is the B2900A series capability?

- The specifications below cover most bench-top IC evaluation needs.

Product Number	Number of channels	Max output		Min source resolution	Min measure resolution	Min timing interval	Viewing mode
		DC	Pulse				
B2901A	1	210 V 3.03A	200 V 10.5 A	1 pA 1 $\mu$ V	100 fA 100 nV	20 $\mu$ s	Single graph
B2902A	2	210 V 3.03A	200 V 10.5 A	1 pA 1 $\mu$ V	100 fA 100 nV	20 $\mu$ s	Single, dual, graph
B2911A	1	210 V 3.03A	200 V 10.5 A	10 fA 100 nV	10 fA 100 nV	10 $\mu$ s	Single, graph, roll
B2912A	2	210 V 3.03A	200 V 10.5 A	10 fA 100 nV	10 fA 100 nV	10 $\mu$ s	Single, dual, graph, roll

### Related Applications

- ✓ Opamp (measurement of output source/sink current capabilities)
- ✓ DAC (measurement of output source/sink current capabilities)
- ✓ Voltage reference ICs (measurement of output source/sink current capabilities)
- ✓ Other linear ICs requiring measurement of source/sink current capabilities



### To Learn More...

Please visit our website below:

[www.agilent.com/find/b2900a](http://www.agilent.com/find/b2900a)

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