

About an instrument for the IV measurement

11/15/2018

[Background]

-- We could not get (useful) information about the probe station & the parameter analyzer in the cleanroom of #3 bldg.

(# Off course, we do not discard this option yet)

-- In parallel with waiting their response, start to think about the alternative way for IV measurement.

-- Probe station in electronics group (info. from Mei)

-- SMU found in the cleanroom. (right photograph)



Photograph : Keithley 2410 SMU, placed inside of a shelf at the clean-room.

Spec. of Keithley 2410 Source Measure Unit (SMU)

From the datasheet of 2400 series

Voltage Accuracy (Local or Remote Sense)							
Model	Range	Programming Resolution	Source ¹ Accuracy (1 Year) 23°C ±5°C ±(% rdg. + volts)	Default Measurement Resolution	Measurement ^{2, 3, 4} Accuracy (1 Year) 23°C ±5°C ±(% rdg. + volts)	Output Slew Rate (±30%)	Source/Sink Limit
2400, 2400-C, 2401	200.000 mV	5 µV	0.02% + 600 µV	1 µV	0.012% + 300 µV		
	2.00000 V	50 µV	0.02% + 600 µV	10 µV	0.012% + 300 µV		±21 V @ ±1.05 A
	20.0000 V	500 µV	0.02% + 2.4 mV	100 µV	0.015% + 1.5 mV	0.08 V/µs	±210 V @ ±105 mA*
2410, 2410-C	200.000 mV	5 µV	0.02% + 600 µV	1 µV	0.012% + 300 µV	0.5 V/µs	
	2.00000 V	50 µV	0.02% + 600 µV	10 µV	0.012% + 300 µV		±21 V @ ±1.05 A
	20.0000 V	500 µV	0.02% + 2.4 mV	100 µV	0.015% + 1 mV	0.15 V/µs	±1100 V @ ±21 mA
	1000.00 V	50 mV	0.02% + 100 mV	10 mV	0.015% + 50 mV	0.5 V/µs	
	200.000 mV	5 µV	0.02% + 600 µV	1 µV	0.012% + 300 µV		
2420, 2420-C	2.00000 V	50 µV	0.02% + 600 µV	10 µV	0.012% + 300 µV		±21 V @ ±3.15 A

Voltage ~ 1kV

Current Accuracy (Local or Remote Sense)							
Model	Range	Programming Resolution	Source ^{1, 3} Accuracy (1 Year) 23°C ±5°C ±(% rdg. + amps)	Default Measurement Resolution	Measurement ^{5, 6, 7} Accuracy (1 Year) 23°C ±5°C ±(% rdg. + amps)	Source/Sink Limit	
2400, 2400-C, 2401	1.00000 µA	50 pA	0.035% + 600 pA	10 pA	0.029% + 300 pA		
	10.0000 µA	500 pA	0.033% + 2 nA	100 pA	0.027% + 700 pA		
	100.000 µA	5 nA	0.031% + 20 nA	1 nA	0.025% + 6 nA		
	1.00000 mA	50 nA	0.034% + 200 nA	10 nA	0.027% + 60 nA	±1.05A @ ±21 V	
	10.0000 mA	500 nA	0.045% + 2 µA	100 nA	0.035% + 600 nA	±105 mA @ ±210 V*	
	100.000 mA	5 µA	0.066% + 20 µA	1 µA	0.055% + 6 µA		
2410, 2410-C	1.00000 A ²	50 µA	0.27 % + 900 µA	10 µA	0.22 % + 570 µA		
	1.00000 µA	50 pA	0.035% + 600 pA	10 pA	0.029% + 300 pA		
	10.0000 µA	500 pA	0.033% + 2 nA	100 pA	0.027% + 700 pA		
	100.000 µA	5 nA	0.031% + 20 nA	1 nA	0.025% + 6 nA		
	1.00000 mA	50 nA	0.034% + 200 nA	10 nA	0.027% + 60 nA	±1.05A @ ±21 V	
	20.0000 mA	500 nA	0.045% + 4 µA	100 nA	0.035% + 1.2 µA	±21 mA @ ±1100 V	
	100.000 mA	5 µA	0.066% + 20 µA	1 µA	0.055% + 6 µA		
1.00000 A ²	50 µA	0.27 % + 900 µA	10 µA	0.22 % + 570 µA			
2420, 2420-C	10.0000 µA	500 pA	0.033% + 2 nA	100 pA	0.027% + 700 pA		
	100.000 µA	5 nA	0.031% + 20 nA	1 nA	0.025% + 6 nA		
	1.00000 mA	50 nA	0.034% + 200 nA	10 nA	0.027% + 60 nA		
	10.0000 mA	500 nA	0.045% + 2 µA	100 nA	0.035% + 600 nA	±3.15A @ ±21 V	

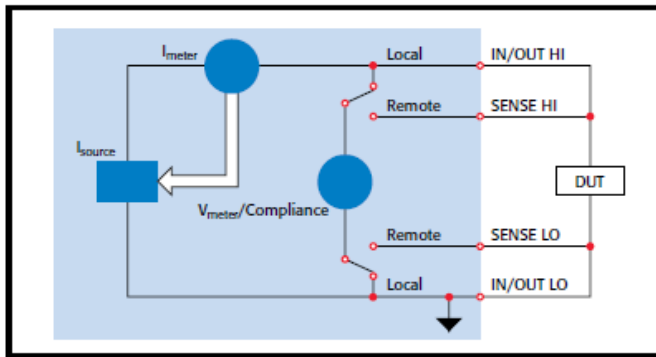
Current : accuracy might be just fine, need to change the range frequently.

But , Connection is a matter . . .

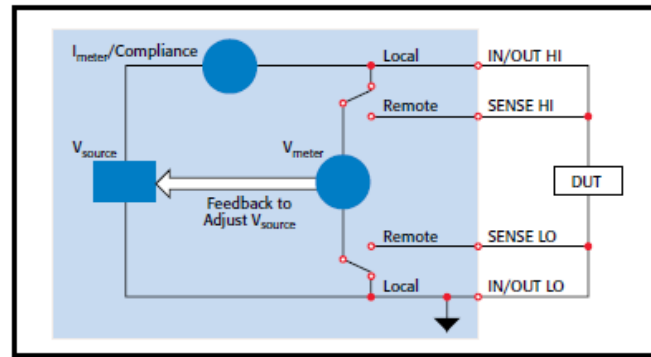
2410 only supports banana jack inputs (not tri-axial or co-axial)

I-V Characteristics

All SourceMeter SMU instruments provide four-quadrant operation. In the first and third quadrants they operate as a source, delivering power to a load. In the second and fourth quadrants they operate as a sink, dissipating power internally. Voltage, current, and resistance can be measured during source or sink operation.



Source I-Measure V, I, or Ω configuration



Source V-Measure I, V, or Ω configuration



Reference :
Banana-jack <-->
tri-axial cable



Model 237-BAN-3A

Three-Slot Triaxial to Banana Plug Cable

Keithley Instruments, Inc.
28775 Aurora Road
Cleveland, Ohio 44139
1-888-KEITHLEY
<http://www.keithley.com>

Description

The Keithley Instruments Model 237-BAN-3A connects instruments and switching products that have three-lug triaxial connectors to fixtures and instruments that have safety banana jack terminals.

Figure 1: Model 237-BAN-3A



NOTE

The item shipped may vary from model pictured here.

Electrical characteristics

Safety standard: EN 61010-1

Installation category: CAT O pollution degree 2

Working voltage: 600 V peak center conductor to inner shield; 1,000 V peak center conductor and inner shield to outer shell

Current: 1 A maximum

Operating environment: 22 °F to 142 °F (0 °C to 50 °C), up to 70 percent relative humidity at $\leq 95\text{ °F}$ (35 °C)

Comments

- Better to have a look the connection of the probe station in a electronics group.
- If there is another option/possibilities, that would be good.