Model 4290 Calibration System Specifications

DESCRIPTION

The Model 4290 Calibration System was specifically designed to facilitate calibration and verification of the Keithley Model 4200 Semiconductor Characterization System. In general terms, the Model 4290 is a collection of calibration resistors whose values are known precisely. The resistors are characterized (measured precisely) prior to calibration and verification of the 4200-SCS. After characterization, the calibration resistors are used in conjunction with a precision voltmeter to accurately measure currents ranging from 10^{-15} amps to 1 amp.

The Model 4290 is comprised of a Keithley Model 2002 Digital Multi-Meter, Keithley Model 708A Switching Matrix, and Keithley Model 7177 Reference Card (containing the calibration resistors). The Model 4290 can be configured for multi-channel operation by adding Model 708As and Model 7177s. Each channel consists of a 708A / 7177 pair and is referred to as a System Reference Unit (SRU). Software to characterize the Model 4290 SRUs and calibrate & verify the Model 4200-SCS is included with each Model 4200-SCS.

SPECIFICATION CONDITIONS

Specifications are the performance standards against which each channel of the Model 4290 is tested.

The NOMINAL RESISTANCE, R_N, accuracies are specified at the termination of the supplied output cables, after 4 hour warm-up.

* T = 23C +/-5C
* RH between 5% and 60%, non-condensing.

The CHARACTERIZATION RESISTANCE, R_{CH}, accuracies are specified at the termination of the supplied output cables, after 4 hour warm-up.

* Within 24 hours of the resistor characterization process. Refer to the Keithley Model 4290 User's Manual for more information.
* T = T_{CH} +/-4C, where T_{CH} is the temperature when the resistors were characterized. T must be between 18C and 28C.
* RH = RH_{CH} +/-5%, where RH_{CH} is the relative humidity when the resistors were characterized. RH must be between 5% and 60%, non-condensing.

NOMINAL RESISTANCE, R_N		CHARACTERIZATION RESISTANCE, R_{CH}				CHARACTERIZATION CONDITIONS [3]		LIMITS [4]	
		LOW IMPEDANCE OUTPUTS [1]		HI IMPEDANCE OUTPUTS [2]					
VALUE (OHMS)	ACCURACY +/- (%)	VALUE (OHMS)	ACCURACY +/- (PPM)	VALUE (OHMS)	ACCURACY +/- (PPM)	CURRENT (AMPS)	VOLTAGE (VOLTS)	MAX CURRENT (AMPS)	MAX [5] VOLTAGE (VOLTS)
1	1.00	(Note 6)	200	n/a	unspecified	7.2 mA	7.2 mV	1.7 A	1.7 V
10	1.00	(Note 6)	100	n/a	unspecified	7.2 mA	9.6 mV	540 mA	5.4 V
100	1.00	(Note 6)	80	n/a	unspecified	960 uA	96 mV	170 mA	17 V
1K	0.10	(Note 6)	70	n/a	unspecified	960 uA	96 mV	22 mA	22 V
10K	0.10	(Note 6)	70	n/a	unspecified	96 uA	96 mV	7.1 mA	71 V
100K	0.10	(Note 6)	100	n/a	unspecified	64 uA	6.4 V	2.2 mA	200 V
1M	0.10	n/a	unspecified	(Note 6)	100	6.4 uA	6.4 V	200 uA	200 V
9.99M	0.10	n/a	unspecified	(Note 6)	100	640 nA	6.4 V	20 uA	200 V
100M	1.00	n/a	unspecified	(Note 6)	100	64 nA	6.4 V	2 uA	200 V
1G	1.00	n/a	unspecified	(Note 6)	100	6.4 nA	6.4 V	200 nA	200 V
10G	1.00	n/a	unspecified	(Note 6)	200	640 pA	6.4 V	20 nA	200 V
100G	1.00	n/a	unspecified	(Note 6)	1000	64 pA	6.4 V	2 nA	200 V

Note 1: Bias current drift < 7 pA within 24 hours of characterization, T = T_{CH} +/-4C, RH = RH_{CH} +/-5%. Actual bias current measurement is included with the characterization data.

Note 2: Bias current drift < 3 fA within 24 hours of characterization, T = T_{CH} +/-4C, RH = RH_{CH} +/-5%. Actual bias current measurement is included with the characterization data.

Note 3: Nominal voltage & current levels present on the calibration resistors during the characterization process.

Note 4: MAX CURRENT and MAX VOLTAGE are the specified circuit overload conditions and are not for measurement to the specified accuracy. Exceeding these limits will damage the respective calibration resistor.

Note 5: Internal voltage protection circuitry limits the useable characterization voltage to 7 volts.

Note 6: CHARACTERIZATION RESISTANCE, R_{CH}, values are obtained from the characterization file generated by the Model 4290 control software. Refer to the Keithley Model 4290 User's Manual for more information regarding the operation of this software.

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