KEYSIGHT TECHNOLOGIES (AGILENT HP)

4140B

The HP 4140B is a high-precision picoammeter and dual DC voltage source designed for measuring extremely low currents and performing quasi-static C-V (capacitance-voltage) characterization of semiconductor devices and materials.

SPECIFICATIONS

General

Interfaces	HP-IB (IEEE-488) (SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0)
Display	3.5-digit LED (current/capacitance), 4.5-digit LED (voltage)

Physical

Power Supply	100/120/220/240 V AC (±10%), 48-66 Hz, ~135 VA
Operating Temperature	0 °C to 40 °C °C
Dimensions (W×H×D)	426 mm × 177 mm × 498 mm mm
Weight	13 kg kg

Current Measurement Performance

Measurement Ranges	±1.000 x 10^-12 A to ±19.99 x 10^-3 A
Maximum Resolution	10^-15 A (1 fA)
DC Current Accuracy	0.5%
Calculated Capacitance Range	0.1 pF to 1999 pF
Capacitance Measurement Ranges	Two ranges
Zero Offset Function	Available
Ranging Modes	Automatic or manual

Voltage Source Specifications

Voltage Source Output Range	±100 V
Voltage Programming Resolution	10 mV (10 V range), 100 mV (100 V range)
Voltage Ramp Rate	0.001 V/s to 1.000 V/s (10 V range), 0.01 V/s to 10.00 V/s (100 V range)
Number of DC Voltage Sources	Two programmable sources
Selectable Source Current Limit	Available

Measurement Speed and Timing

Trigger Modes	INT, EXT, HOLD/MAN
Integration Times	Selectable (short, medium, or long)
Measurement Functions	I-V, C-V, I
Quasi-Static C-V Measurements	Supported
Hold and Step Delay Function	Programmable

Inputs and Outputs

Input Terminal Type	Triaxial
Analog Output	Available for plotting I-V, C-V data

Environmental and Safety Compliance

Self Test Function	Available

Connectivity and Control Interfaces

Parameter Selection and Entry	Manual or programmable

Environmental

Operating Humidity	≤ 70% RH (at 40 °C)
Storage Temperature	-20 °C to +60 °C

Performance

Warm-up Time	30 minutes

Voltage Sources

Voltage Source Accuracy	±(0.5% of setting + 10 mV) on 10V range, ±(0.5% of setting + 100 mV) on 100V range
Voltage Source Output Impedance	< 0.2 Ω
Voltage Source Maximum Current	10 mA

Picoammeter (Current Measurement)

Input Burden Voltage	≤ 10 µV (10^-12 A to 10^-5 A ranges), ≤ 100 µV (10^-4 A to 10^-2 A ranges)

Interfaces

HP-IB Interface Capabilities	SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0

Safety & Protection

Maximum Allowable Input Voltage	100 V

TECHNOLOGY

Semiconductor Characterization / Low-Current Measurement

APPLICATIONS

Picoampere current measurements and Quasi-Static C-V characterization

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