

DC Voltage/Current Generators/Calibrators

4-1/2 Digits 10 W Bipolar Power Supply

R6145

- Maximum 1 A/60 V (Minimum 1 ms) Current/Voltage Pulse Output Function
- 10 μ V/100 nA-Step DC Voltage/Current Output
- Bipolar Output Possible
- Low Noise (3 m Vp-p in the SLOW Mode)
- Equipped with a Memory Function That Allows storage of Settings Up to 500 Points
- Equipped with a Program Function That Allows a Sweep of Up to 16 Patterns to be Set
- Low Noise (3 m Vp-p in the SLOW Mode) for More Reliable Measurements
- Built-In Synchronous Input/Output Signals Suitable for a System Configuration with External Equipment



R6145

Programmable DC Voltage/Current Source

The R6145 Programmable DC Voltage/Current Source is designed to supply power to semiconductor and electronic components, as well as to supply bias power used in DC characteristic tests. It can generate DC voltages from 10 μ V to 60 V and DC currents from 100 nA to 1 A (in the pulse mode). In addition, the limiter (used to protect loads against overvoltage and overcurrent) can be set in a current range of 1 mA to 300 mA and in a voltage range of 10 mV to 60 V.

The R6145's bipolar output ensures load safety by suppressing the generation of overshoot during semiconductor or electronic component testing. In addition, because it suppresses noise to 3 m Vp-p (in the slow mode) to prevent malfunctioning or measurement errors, highly reliable measurements can be made.

Especially in semiconductor or electronic component tests, the R6145 lets you improve testing efficiency and cost-effectiveness by using linear/random sweep, pulse mode, and program functions.

For use with a system, the R6145 includes a GPIB interface as standard. External trigger input and sync signal output can be used with the unit. This lets the unit be synchronized with external DVM and external power supply for quicker measurements.

Specifications

Voltage/Current Generation

Output modes:

DC output Spot/linear sweep/random sweep

Pulse single Spot/linear sweep/random sweep

Pulse repeat Spot

Minimum pulse width: 1 ms

1 pulse width setting range: 1 to 1000 ms

Pulse cycle setting range: 2 to 1000 ms or 1 to 30000 s

Generation range: At a maximum output of 10 W

| Range | Generation range | Setting resolution |
|-------------------------|----------------------|--------------------|
| 300 mV | 0 to ± 300.00 mV | 10 μ V |
| 3 V | 0 to ± 3.0000 V | 100 μ V |
| 30 V | 0 to ± 30.000 V | 1 mV |
| 60 V | 0 to ± 60.000 V | 2 mV |
| 3 mA | 0 to ± 3.0000 mA | 100 nA |
| 30 mA | 0 to ± 30.000 mA | 1 μ A |
| 300 mA | 0 to ± 300.00 mA | 10 μ A |
| 1 A (in the PULSE mode) | 0 to ± 1000.0 mA | 100 μ A |

Overall accuracy: Including calibration accuracy, one-day stability, temperature coefficient and linearity under temperatures of 23°C \pm 5°C and relative humidity of 85% or less (Guaranteed for six months)

| Range | Generation accuracy \pm (% of setting + range error) |
|-------------------------|--|
| 300 mV | 0.05 \pm 50 μ V |
| 3 V | 0.05 \pm 900 μ V |
| 30 V | 0.05 \pm 9 mV |
| 60 V | 0.05 \pm 18 mV |
| 3 mA | 0.05 \pm 900 nA |
| 30 mA | 0.05 \pm 9 μ A |
| 300 mA | 0.05 \pm 90 μ A |
| 1 A (in the PULSE mode) | 0.06 \pm 900 μ A |

DC Voltage/Current Generators/Calibrators

4-1/2 Digits 10 W Bipolar Power Supply

R6145

Specifications

Voltage generation noise, ripple: With no load, full load

| Voltage range | Response | DC to 100 Hz | DC to 10 kHz | 20 Hz to 20 MHz |
|---------------|----------|----------------|--------------|-----------------|
| 300 mV | FAST | 60 μ Vp-p | 1 mVp-p | 10 mVp-p |
| | SLOW | 60 μ Vp-p | 1 mVp-p | 3 mVp-p |
| 3 V | FAST | 150 μ Vp-p | 1 mVp-p | 10 mVp-p |
| | SLOW | 150 μ Vp-p | 1 mVp-p | 3 mVp-p |
| 30 V | FAST | 500 μ Vp-p | 2 mVp-p | 10 mVp-p |
| | SLOW | 500 μ Vp-p | 2 mVp-p | 4 mVp-p |
| 60 V | FAST | 1 mVp-p | 3 mVp-p | 10 mVp-p |
| | SLOW | 1 mVp-p | 3 mVp-p | 4 mVp-p |

Current generation noise, ripple: With no load, full load

| Voltage range | Response | DC to 100 Hz | DC to 10 kHz | 20 Hz to 20 MHz |
|---------------|----------|----------------|----------------|-----------------|
| 3 mA | FAST | 200 nAp-p | 5 μ Ap-p | 10 μ Ap-p |
| | SLOW | 100 nAp-p | 2 μ Ap-p | 10 μ Ap-p |
| 30 mA | FAST | 2 μ Ap-p | 20 μ Ap-p | 60 μ Ap-p |
| | SLOW | 1 μ Ap-p | 10 μ Ap-p | 30 μ Ap-p |
| 300 mA | FAST | 20 μ Ap-p | 20 μ Ap-p | 200 μ Ap-p |
| | SLOW | 10 μ Ap-p | 10 μ Ap-p | 100 μ Ap-p |
| 1 A | FAST | 200 μ Ap-p | 200 μ Ap-p | 2 mAp-p |
| | SLOW | 100 μ Ap-p | 100 μ Ap-p | 1 mAp-p |

Line regulation: At 100 VAC \pm 10 %

\pm 0.003 % of range or less

Load regulation: At maximum load in each range when 4-wire connected

\pm 0.004 % of range or less

Maximum output current and compliance voltage:

| Range | DC mode | | Pulse mode | |
|--------|--------------------------|--------------------------|-----------------------|-----------------------|
| | Source | Sink | Source | Sink |
| 300 mV | 300 mA | 300 mA | 300 mA | 300 mA |
| 3 V | 300 mA | 300 mA | 300 mA | 300 mA |
| 30 V | 300 mA | 300 mA | 300 mA | 300 mA |
| 60 V | (10 W/Vo)A ⁻¹ | (10 W/Vo)A ⁻¹ | 300 mA ⁻¹³ | 300 mA ⁻¹³ |
| 3 mA | 60 V | 60 V | 60 V | 60 V |
| 30 mA | 60 V | 60 V | 60 V | 60 V |
| 300 mA | (10 W/Io)A ⁻² | (10 W/Io)A ⁻² | 60 V ⁻⁴ | 60 V ⁻⁴ |
| 1 A | — | — | 60 V ⁻⁵ | 60 V ⁻⁵ |

Vo = Output voltage; Io = Output current

^{*1} 300 mA when Vo \leq 33 V

^{*2} 60 V when Io \leq 16 A

^{*3} Note that the pulse duty (D) is as follows:

$$D = \frac{10 \text{ W}}{V_o \times I_L} \quad \begin{array}{l} V_o : \text{Output voltage set value} \\ I_L : \text{Limit current set value} \end{array}$$

^{*4} Note that the pulse duty (D) is as follows:

$$D = \frac{10 \text{ W}}{I_o \times V_L} \quad \begin{array}{l} I_o : \text{Output current measured value} \\ V_L : \text{Limit voltage set value} \end{array}$$

^{*5} Note that the pulse width (P) and pulse duty (D) are as follows:

$$P \leq 25 \text{ ms} \\ D = \frac{10 \text{ W}}{I_o \times V_L} \quad \begin{array}{l} I_o : \text{Output current measured value} \\ V_L : \text{Limit voltage set value} \end{array}$$

Output resistance: At OUTPUT terminal when 2-wire connected

| Range | Output resistance |
|--------|---------------------------------------|
| 300 mV | 10 m Ω or less at maximum load |
| 3 V | 10 m Ω or less at maximum load |
| 30 V | 10 m Ω or less at maximum load |
| 60 V | 10 m Ω or less at maximum load |
| 3 mA | 10 ⁸ Ω or more |
| 30 mA | 10 ⁷ Ω or more |
| 300 mA | 10 ⁶ Ω or more |
| 1 A | 10 ⁵ Ω or more |

Voltage/Current Limiter

Setting range:

| Range | Setting range | Setting resolution |
|--------|-----------------------|--------------------|
| 3 V | 0.01 to \pm 3.000 V | 2 mV |
| 60 V | 0.1 to \pm 60.00 V | 50 mV |
| 300 mA | 1 to \pm 300.0 V | 200 μ A |

Overall accuracy: At 23°C \pm 5°C and 85% RH or lower (guaranteed for six months)

| Range | Limiter accuracy \pm (% of setting + X) | |
|--------|---|----------------|
| | Source | Sink |
| 3 V | 1 \pm 6 mV | 4 \pm 50 mV |
| 60 V | 1 \pm 300 mV | 4 \pm 500 mV |
| 300 mA | 1 \pm 1.6 mA | 4 \pm 5 mA |

Execution Speed

Response time: The duration when output begins to fluctuate when it becomes \pm 0.05% of full scale in all ranges. Note that the limiter set value is at full scale for each limiter range.

FAST 1 ms or less (VS), 2 ms or less (IS)

SLOW 50 ms or less (Vs, 1A, 300 mA, 30 mA range)

100 ms or less (3 mA range)

Execution time: The duration when the program code is received until the output begins to fluctuate when using the Hewlett-Packard 9000 Series Model 216. Approx. 5 ms (Typical value)

Memory and Sweep Functions

Generated data memory capacity: 500 data entries (when used in the random sweep mode)

Sweep modes: Normal Linear sweep/random sweep

Reverse Linear sweep/random sweep

Sweep trigger: Automatic trigger/external trigger

Sweep cycle time: 2 to 1000 ms/1 to 30000 s (when used with automatic trigger)

Minimum sweep step time: 1 ms

Program Function

Maximum number of program steps: 16 steps

Program interval time setting: 1 to 30000 s

Program parameters: Program interval time, output mode (DC/pulse), pulse period, pulse width, pulse trigger mode (single/repeat), sweep mode, sweep trigger, sweep cycle, sweep start, sweep stop, sweep step (linear sweep)

Input/Output Functions

Output method: Floating bipolar output

Output terminal:

Front Binding post (Hi output, Hi sense, Lo output, Lo sense, Guard)

Maximum applied voltage between terminals:

| Terminal | Maximum applied voltage |
|-----------------------|-------------------------|
| Between Hi and Lo | 60 V peak |
| Between Lo and Guard | 50 V peak |
| Guard to outer casing | 500 V peak |

Maximum remote sensing voltage: Including voltage drop due to cable resistance between Hi/Lo output and sense 0.5 V

Remote sensing method: 4-wire (4W)/2-wire (2W) methods set by switch

GPIO interface: Based on IEEE STD488-1978

SH1, AH1, T6, L4, SR1, RL1, PR0, DC1, DT1, C0, E1

Single-wire signal:

Trigger input At pulse generation in pulse and single modes, sweep stop in sweep auto trigger, sweep step-up in sweep external trigger

TTL negative pulse 100 μ s or more

General Specifications

Operating environment: 0°C to +40°C, relative humidity 85% or less

Storage temperature range: -25°C to +70°C

Power requirement: Please specify when ordering

| Option No. | Standard | Opt. 31 | Opt. 32 | Opt. 42 | Opt. 43 |
|--------------|-----------|------------|------------|------------|------------|
| Line voltage | 90 to 110 | 103 to 127 | 108 to 132 | 198 to 242 | 207 to 250 |

Power supply frequency: 48 Hz to 66 Hz

Power consumption: 57 VA or less

Dimensions: Approx. 424 (W) \times 88 (H) \times 350 (D) mm

Mass: 7.5 kg max.