

Generation Section**DC voltage generation**

Range	Generation Range	Resolution	Max. Load Current	Accuracy (One Year) ±(% of setting + V + V ¹⁰ /f.s. of the limiter range)	Temperature Coefficient ±(% of setting + V + V ¹⁰ /f.s. of the limiter range)/°C
200 mV	±205.000 mV	1 μV	±3.2 A	0.02 + 200 μV + 80 μV (400 μV)	0.002 + 20 μV + 8 μV (40 μV)
2 V	±2.05000 V	10 μV	±3.2 A	0.02 + 300 μV + 100 μV (500 μV)	0.002 + 30 μV + 10 μV (50 μV)
12 V	±12.0000 V	100 μV	±3.2 A	0.02 + 2 mV + 800 μV (3 mV)	0.002 + 200 μV + 80 μV (300 μV)
20 V	±20.5000 V	100 μV	±2 A	0.02 + 2 mV + 800 μV (5 mV)	0.002 + 200 μV + 80 μV (500 μV)
30 V	±30.000 V	1 mV	±2 A	0.02 + 20 mV + 5 mV (30 mV)	0.002 + 2 mV + 500 μV (3 mV)
60 V	±60.000 V	1 mV	±1 A	0.02 + 20 mV + 6 mV (40 mV)	0.002 + 2 mV + 600 μV (4 mV)
110 V	±110.000 V	1 mV	±0.5 A	0.02 + 20 mV + 8 mV (70 mV)	0.002 + 2 mV + 800 μV (7 mV)

The values inside the parentheses are those when the limiter range is 3 A.

DC current generation

Range	Max. Output	Resolution	Max. Load Voltage	Accuracy (One Year) ±(% of setting + A)	Temperature Coefficient ±(% of setting + A)/°C
20 μA	±20.5000 μA	100 pA	±110 V	0.03 + 50 nA	0.003 + 5 nA
200 μA	±205.000 μA	1 nA	±110 V	0.03 + 300 nA	0.003 + 30 nA
2 mA	±2.05000 mA	10 nA	±110 V	0.03 + 3 μA	0.003 + 300 nA
20 mA	±20.5000 mA	100 nA	±110 V	0.03 + 30 μA	0.003 + 3 μA
200 mA	±205.000 mA	1 μA	±110 V	0.03 + 300 μA	0.003 + 30 μA
0.5 A	±0.50000 A	10 μA	±110 V	0.03 + 5 mA	0.003 + 500 μA
1 A	±1.00000 A	10 μA	±60 V	0.03 + 5 mA	0.003 + 500 μA
2 A	±2.00000 A	10 μA	±30 V	0.03 + 5 mA	0.003 + 500 μA
3 A	±3.20000 A	10 μA	±12 V	0.03 + 5 mA	0.003 + 500 μA

Accuracy: One year accuracy at 23±5 °C

Temperature coefficient: Add the temperature coefficient at 5 to 18 °C and 28 to 40 °C.

Current limiter

Setting *1	Range	Resolution	Min. Setting
0.10 μA ~ 20.000 μA	20 μA	10 nA	10 nA
20.1 μA ~ 200.0 μA	200 μA	100 nA	100 nA
0.201 mA ~ 2.000 mA	2mA	1 μA	1 μA
2.01 mA ~ 20.00 mA	20mA	10 μA	10 μA
20.1 mA ~ 200.0 mA	200mA	100 μA	100 μA
0.201 A ~ 3.20 A	3.2A	1 mA	1 mA

*1 Larger of the two values |Hi| and |Lo| when |Hi limiter| ≠ |Lo limiter|

Voltage limiter

Setting *1	Range	Resolution	Min. Setting
1.0 mV ~ 200.0 mV	200 mV	100 μV	100 μV
0.201 V ~ 2.000 V	2 V	1 mV	1 mV
2.01 V ~ 20.00 V	20 V	10 mV	10 mV
20.1 V ~ 110.0 V	110 V	100 mV	100 mV

Transient response time (Typical)**Voltage generation**

100 μs: Time to reach ±0.1% of final value *1

at 20 V range with the generation and limiter settings at maximum values and under the 25% pure resistive load

*1: In condition of zero voltage base pulse mode, measure delay time to reach ±0.1% of final value
Integration time 250 μs**Current generation**

400 μs: Time to reach ±1% of final value *1

at 20 mA range with the generation and limiter settings at maximum values and under the pure resistive load

*1: In condition of zero current base pulse mode, measure delay time to reach ±1% of final value
Integration time 250 μs**Output Noise (Typical)**8 mVp-p (DC to 20 MHz)
(with generation at 2 V range and limiter at 1 A range)

Measurement Section

Voltage measurement

Range	Integration time 16.6ms/20ms,100ms,200ms				Integration time 4ms,1ms,250 μs			
	Measurement Range	Resolution	Accuracy (One Year) ±(% of reading + V)	Temperature Coefficient ±(% of reading + V) / °C	Measurement Range	Resolution	Accuracy (One Year) ±(% of reading + V)	Temperature Coefficient ±(% of reading + V) / °C
200 mV	±205.000 mV	1 μV	0.02 + 100 μV	0.002 + 10 μV	±205.00 mV	10 μV	0.02 + 200 μV (300 μV)	0.002 + 20 μV (30 μV)
2V	±2.05000 V	10 μV	0.02 + 200 μV	0.002 + 20 μV	±2.0500 V	100 μV	0.02 + 300 μV (500 μV)	0.002 + 30 μV (50 μV)
20 V	±20.5000 V	100 μV	0.02 + 1 mV	0.002 + 100 μV	±20.500 V	1 mV	0.02 + 3 mV (5 mV)	0.002 + 300 μV (500 μV)
110 V	±110.000 V	1 mV	0.02 + 10 mV	0.002 + 1 mV	±110.00 V	10 mV	0.02 + 30 mV (50 mV)	0.002 + 3 mV (5 mV)

Current measurement

Range	Integration time 16.6ms/20ms,100ms,200ms				Integration time 4ms,1ms,250 μs			
	Measurement Range	Resolution	Accuracy (One Year) ±(% of reading + A)	Temperature Coefficient ±(% of reading + A) / °C	Measurement Range	Resolution	Accuracy (One Year) ±(% of reading + A)	Temperature Coefficient ±(% of reading + A) / °C
20 μA	±20.5000 μA	100 pA	0.03 + 50 nA	0.003 + 5 nA	±20.500 μA	1 nA	0.03 + 70 nA (80 nA)	0.003 + 7 nA (8 nA)
200 μA	±205.000 μA	1 nA	0.03 + 300 nA	0.003 + 30 nA	±205.00 μA	10 nA	0.03 + 350 nA (400 nA)	0.003 + 35 nA (40 nA)
2 mA	±2.05000 mA	10 nA	0.03 + 3 μA	0.003 + 300 nA	±2.0500 mA	100 nA	0.03 + 3.5 μA (4 μA)	0.003 + 350 nA (400 nA)
20 mA	±20.5000 mA	100 nA	0.03 + 30 μA	0.003 + 3 μA	±20.500 mA	1 μA	0.03 + 35 μA (40 μA)	0.003 + 3.5 μA (4 μA)
200 mA	±205.000 mA	1 μA	0.03 + 300 μA	0.003 + 30 μA	±205.00 mA	10 μA	0.03 + 350 μA (400 μA)	0.003 + 35 μA (40 μA)
3 A	±3.20000 A	10 μA	0.03 + 5 mA	0.003 + 500 μA	±3.2000 A	100 μA	0.03 + 5.5 mA (6 mA)	0.003 + 550 μA (600 μA)

Accuracy: One year accuracy at 23±5 °C Auto zero ON.
 Temperature coefficient: Add the temperature coefficient at 5 to 18 °C and 28 to 40 °C.
 Values inside the parentheses are those when the integration time is 1 ms or 250 μs.

Function

Generation

Generation function: Voltage or current

Generation mode: DC or pulse

Sweep mode: Linear, logarithmic, or program (up to 65535 steps)

Measurement

Measurement function: Voltage, current, and resistance

Measurement data storage: Up to 65535 data points

Average: Block average or moving average
 (Specified count: 2 to 256)

Trigger

Trigger mode: Internal, external, and immediate

Time setting

Pulse width: 100 μs to 3600 s 1 μs resolution

Period time: 1 ms to 3600 s 1 μs resolution
 (during source and measure operation)

100 μs to 3600 s 1 μs resolution
 (during source-only operation)

Source delay: 1 μs to 3600 s 1 μs resolution

Measurement delay: 1 μs to 3600 s 1 μs resolution

Integration time: 250 μs, 1 ms, 4 ms, 16.6 ms/20 ms, 100 ms, 200 ms
 (auto detect from the power supply frequency
 when the power is turned ON for 16.6 ms/20 ms)

Computation function

Operators: +[addition], -[subtraction], *[multiplication], /
 [division], and ^ [exponentiation]

Functions: ABS(), EXP(), LN(), LOG(), SQRT(), SIN(), COS(),
 TAN(), ASIN(), ACOS(), ATAN(), SINH(), COSH(),
 TANH(), RAND()

Resistance calculation

Calculated from measured voltage/generated current or generated voltage/
 measured current.

External Input/Output

Synchronization signal input/output section (TRIG/SWEEP/CTRL IN and OUT)

Connector type BNC connector

I/O level TTL

I/O logic format Negative logic, falling edge

Minimum pulse width 10 μs or greater

External input/output section

Connector type D-Sub 15-pin

I/O level TTL

I/O logic format Negative logic, falling edge

Minimum pulse width 10 μs or greater

GP-IB interface

Electrical and mechanical specifications
 Conforms to IEEE St'd 488-1987

Functional specifications SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
 Protocol Conforms to IEEE St'd 488.2-1987
 Address 0 to 30

RS-232 interface

Connector type D-Sub 9-pin

Electrical specifications Conforms to EIA RS-232

Connection format Point-to-point

Transmission mode Full-duplex

Synchronization mode Start-stop synchronization

Baud rate 9600, 14400, 19200, 38400, 57600, or 115200 bps

USB interface

Number of ports 1

Connector type Type B connector (receptacle)

Electrical and mechanical specifications
 Conforms to USB Rev. 1.1

Ethernet interface (optional)

Number of communication ports 1

Connector type RJ-45 connector

Electrical and mechanical specifications
 Conforms to IEEE 802.3.

Transmission system 100BASE-TX/10BASE-T

Data rate 100 Mbps/10 Mbps

General Specifications

Display: 256 x 64 dots vacuum fluorescent display

Internal memory:
 ROM: 4MB Area for storing setup and output pattern files
 RAM: 4MB Area for storing the measured results
 (cleared when the power is turned OFF)

Warm-up time: At least 60 minutes

Operating conditions: 5 to 40 °C, 20 to 80% RH

Rated supply voltage:
 100 to 120 VAC or 220 to 240 VAC (automatic switching)

Rated supply frequency: 50/60 Hz

Maximum power consumption:
 Approx. 200 VA

Max. common-mode voltage:
 ±250 Vpeak between the generation
 (measurement)
 terminal and case

Max. Output/ input voltage:
 110 V between High and Low terminal.
 1 V between Output and Sense terminal.

Weight: Approx. 7 kg

External dimensions: Approx. 213 (W) × 132 (H) × 400 (D) mm
 (excluding projections)