

Digital Multimeters

4 1/2 Digit DMM Series for Diverse Applications

R6441 Series

- **R6441A: DMM with low-price basic model**
- **R6441B: Multi-functional DMM with Frequency Measurements**
- **R6441C: DMM with Terminals Dedicated for Floating Current Measurement**



(Photo is R6441C)

R6441 Series Digital Multimeters

New R6441 series digital multimeters were designed for diverse applications. The series is provided with a variety of interfaces for use in R&D sections and production lines; it ensures battery operation for field applications. With dual-channel input and dual display, the R6441 series provides a new measurement environment.

The series includes three models: R6441A low-price basic model, R6441B with enhanced AC measurement functions and R6441C with enhanced very small current and floating method current measurement functions.

- **Maximum Display of 199999 (with a Sampling Rate of 2.5 Times/Second) and Maximum Sampling Rate of 80 Times/Second (with Maximum Display of 1999)**
- **AC Voltage and Current Measurement with True RMS (R6441B/6441C), AC + DC Measurement (R6441B) and Frequency Measurement (R6441B)**
- **Standard RS-232C Interface and Optional GPIB Interface and BCD Data Output Units**
- **Memory Card (SRAM Card Conforming to JEIDA**

Ver.4) Ensures Data Compatibility with Personal Computers

- **Various Interfaces Can be Implemented for Automated Measurement**
- **Optional Battery Unit Allows the Use as a High-Performance DMM for Field Measurement**
- **Diverse and Combination Calculation Functions**
- **Memory Function for Panel Settings (Recalls Previous Condition Settings at Power On)**
- **Large Easy-to-Read Electron-Ray Indicator Tube**
- **High-Speed Analog Bar Graph with a Sampling Rate of 80 Times/Second is Available for Instantaneous Trendy Check (R6441A)**
- **Wide Power Range (90 to 250 V)**
- **Input Terminal Dedicated for Floating DC/AC Current (in 2- and 5-A Ranges) (R6441C)**

Specifications

Measurement accuracy: $23 \pm 5^\circ\text{C}$, 85% RH or less (75% or less is guaranteed for 1 year at 20-M and 200-MΩ ranges.) The display value is $\pm\%$ of reading \pm digits.

Temperature coefficient: $0.1 \times (\text{measurement accuracy})/^\circ\text{C}$ at 0 to 50°C . The display value is $(\pm\%$ of reading \pm digits) $^\circ\text{C}$.

DC voltage measurement d:digit

| Range | 20 mV | 200 mV | 2000 mV | 20 V | 200 V | 1000 V |
|-----------------------------------|---------------------------------|--------|------------------------------|------|------------------------------|------------------------------|
| Maximum display | 19999 | | | | | 10999 |
| Resolution | 1 μV | 10 μV | 100 μV | 1 mV | 10 mV | 100 mV |
| Measurement accuracy | $\pm 0.04\% \pm 5d$ | | $\pm 0.04\% \pm 2d$ | | | |
| Input impedance | 1 GΩ or more | | $11.1\text{M}\Omega \pm 1\%$ | | $10.1\text{M}\Omega \pm 1\%$ | $10.0\text{M}\Omega \pm 1\%$ |
| Maximum allowable applied voltage | 1100 V (all ranges, continuous) | | | | | |

DC voltage noise rejection ratio

| Sampling rate | Effective common mode noise rejection ratio (unbalanced impedance of 1 kΩ) | Normal mode noise rejection ratio |
|---------------|--|-----------------------------------|
| | 50/60 Hz $\pm 0.1\%$, DC | 50/60 Hz $\pm 0.1\%$ |
| FAST | Approx. 60 dB | 0 dB |
| MID | Approx. 120 dB | Approx. 60 dB |
| SLOW | | |

AC voltage measurement

R6441A (with average measurement and rms value display)

| Range | 200 mV | 2000 mV | 20 V | 200 V | 700 V | |
|-----------------------------------|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| Maximum display | 19999 | | | | 7099 | |
| Resolution | 10 μV | 100 μV | 1 mV | 10 mV | 100 mV | |
| Measurement accuracy | 20 to 45 Hz | $\pm 0.6\% \pm 40d$ | $\pm 0.6\% \pm 35d$ | $\pm 0.6\% \pm 45d$ | $\pm 0.6\% \pm 45d$ | $\pm 0.6\% \pm 35d$ |
| | 45 to 20 kHz | $\pm 0.25\% \pm 35d$ | $\pm 0.25\% \pm 30d$ | $\pm 0.25\% \pm 40d$ | $\pm 0.25\% \pm 40d$ | $\pm 0.25\% \pm 30d$ |
| | 20 to 30 kHz | $\pm 0.8\% \pm 40d$ | $\pm 0.8\% \pm 35d$ | $\pm 0.8\% \pm 45d$ | $\pm 0.8\% \pm 45d$ | $\pm 0.8\% \pm 35d$ |
| | 30 to 100 kHz | $\pm 5\% \pm 50d$ | $\pm 5\% \pm 50d$ | $\pm 5\% \pm 50d$ | $\pm 5\% \pm 50d$ | $\pm 5\% \pm 50d$ |
| Input impedance | 1.1 MΩ $\pm 10\%$, 100 pF or less | | | | | |
| Maximum allowable applied voltage | 800 Vrms, 1100 Vpeak, 10 ⁷ VHz | | | | | |
| Response time | Approx. 4 seconds for VAC voltage and approx. 2 seconds for VAC voltage filter (0.1% or less of the final value in the same range) | | | | | |

* The frequency range of the VAC filter is 300 Hz to 100 kHz.

R6441B (True RMS, AC, AC+DC) / R6441C/6441D (True RMS, AC)

With an input of 5% or more of the full scale

| Range | 200 mV | 2000 mV | 20 V | 200 V | 700 V |
|-----------------------------------|--|---------|------|-------|--------|
| Maximum display | 19999 | | | | 7099 |
| Resolution | 10 μV | 100 μV | 1 mV | 10 mV | 100 mV |
| 20 Hz to 45 Hz | $\pm 0.6\% \pm 35d$ | | | | |
| 45 Hz to 20 kHz | $\pm 0.2\% \pm 30d$ | | | | |
| 20 kHz to 30 kHz | $\pm 0.5\% \pm 30d$ | | | | |
| 30 kHz to 100 kHz | $\pm 4\% \pm 50d$ | | | | |
| Input impedance | 1.1 MΩ $\pm 10\%$, 100 pF or less | | | | |
| Crest factor | 3:1 at the full scale | | | | |
| Maximum allowable applied voltage | 800 Vrms, 1100 Vpeak, 10 ⁷ VHz | | | | |
| Response time | Approx. 1 second (0.1% or less of the final value in the same range) | | | | |

Resistance measurement

| Range | 200 Ω | 2000 Ω | 20 kΩ | 200 kΩ | 2000 kΩ | 20 MΩ | 200 MΩ |
|-----------------------------------|----------------------|---------------------|--------|--------------------|--------------------|---------------------|--------|
| Maximum display | 19999 | | | | | | |
| Resolution | 10 mΩ | 100 mΩ | 1 Ω | 10 Ω | 100 Ω | 1 kΩ | 10 kΩ |
| Measured applied current | 3 mA | 1 mA | 100 μA | 10 μA | 1 μA | 100 nA | 10 nA |
| Measurement accuracy | $\pm 0.07\% \pm 10d$ | $\pm 0.07\% \pm 2d$ | | $\pm 0.1\% \pm 2d$ | $\pm 0.3\% \pm 5d$ | $\pm 3.0\% \pm 10d$ | |
| Open circuit voltage | 7.5 V or less | | | | | | |
| Maximum allowable applied voltage | ± 500 V | | | | | | |

* When the null function is used

In-circuit resistance measurement

| Range | 200 Ω | 2000 Ω | 20 kΩ | 200 kΩ | 2000 kΩ | 20 MΩ |
|-----------------------------------|-----------------------|----------------------|-------|---------------------|---------------------|-------|
| Maximum display | 19999 | | | | | |
| Resolution | 10 mΩ | 100 mΩ | 1 Ω | 10 Ω | 100 Ω | 1 kΩ |
| Measured applied current | 1 mA | 100 μA | 10 μA | 1 μA | 100 nA | 10 nA |
| Measurement accuracy | $\pm 0.07\% \pm 100d$ | $\pm 0.07\% \pm 20d$ | | $\pm 0.1\% \pm 20d$ | $\pm 0.3\% \pm 50d$ | |
| Open circuit voltage | 7.5 V or less | | | | | |
| Maximum allowable applied voltage | ± 500 V | | | | | |

* When the null function is used

DC current measurement

R6441A/6441B

| Range | 20 mA | 200 mA | 2000 mA | 10 A |
|---------------------------|--|--------|--|-------|
| Maximum display | 19999 | | | 10999 |
| Resolution | 1 μA | 10 μA | 100 μA | 1 mA |
| Measurement accuracy | $\pm 0.2\% \pm 5d$ | | $\pm 0.6\% \pm 5d$ | |
| Input terminal resistance | 1.5 Ω or less *1 | | 0.04 Ω or less *1 | |
| Overcurrent protection | 0.5 A/250 V IEC 127 sheet 1 Protected by a quick-blowing fuse | | 15 A/250 V with 10000-A interrupting capacity Protected by a quick-blowing fuse | |

*1 The resistance of the protection fuse is excluded.

R6441C

| Range | 2 μA *1 | 20 μA *1 | 200 μA | 2000 μA | 20 mA | 200 mA | 2000 mA *1 | 5 A *1 |
|---------------------------|--|----------|------------------|---------|----------------|--------|---|------------------|
| Maximum display | 19999 | | | | | | 1999 | 4999 |
| Resolution | 100 pA | 1 nA | 10 nA | 100 nA | 1 μA | 10 μA | 100 μA | 1 mA |
| Measurement accuracy | $\pm 0.2\% \pm 5d$ | | | | | | $\pm 2\% \pm 50d$ | $\pm 2\% \pm 5d$ |
| Input terminal resistance | Approx. 10 kΩ or less *2 | | 102 Ω or less *2 | | 2 Ω or less *2 | | 0.1 Ω or less *2 | |
| Overcurrent protection | 0.5 A/250 V IEC 127 sheet 1 Protected by a quick-blowing fuse | | | | | | 6 A/250 V with 10000-A interrupting capacity Protected by a quick-blowing fuse | |

* When the floating method for 2000-mA and 5-A ranges and the null function are used.

*1 Mounted only on the R6441C.

*2 The resistance of the protection fuse is excluded.

AC current measurement

R6441A (with average measurement and rms value display)

| Range | 200 mA | 10 A |
|---------------------------|--|--|
| Maximum display | 10 μA | 1 mA |
| Resolution | 19999 | 10999 |
| Measurement accuracy | 20 Hz to 1 kHz | $\pm 0.8\% \pm 40d$ |
| accuracy | 1 to 5 kHz | $\pm 5.0\% \pm 40d$ |
| Input terminal resistance | 1.5 Ω or less *1 | 0.04 Ω or less *1 |
| Overcurrent protection | 0.5 A/250 V IEC 127 sheet 1 Protected by a quick-blowing fuse | 15 A/250 V with 10000-A interrupting capacity Protected by a quick-blowing fuse |
| Response time | Approx. 4 seconds for AC current and approx. 2 seconds for AC current filter (0.1% or less of the final value in the same range) | |

* The AC current filter is 300 Hz to 5 kHz. (Display with input switching is not possible when an AC current filter is used.)

*1 The resistance of the protection fuse is excluded.

R6441B (True RMS, AC, AC+DC)

With an input of 5% or more of the full scale

| Range | 200 mA | 10 A |
|---------------------------|--|--|
| Maximum display | 10 μA | 1 mA |
| Resolution | 19999 | 10999 |
| Measurement accuracy | 20 Hz to 1 kHz | $\pm 0.8\% \pm 40d$ |
| accuracy | 1 kHz to 5 kHz | $\pm 5.0\% \pm 40d$ |
| Crest factor | 3:1 at the full scale | |
| Input terminal resistance | 1.5 Ω or less *1 | 0.04 Ω or less *1 |
| Overcurrent protection | 0.5 A/250 V IEC 127 sheet 1 Protected by a quick-blowing fuse | 15 A/250 V with 10000-A interrupting capacity Protected by a quick-blowing fuse |
| Response time | Approx. 1 second (0.1% or less of the final value in the same range) | |

*1 The resistance of the protection fuse is excluded.

Digital Multimeters

Data Sharing with Personal Computers via Memory Cards

R6441 Series (Continued From Previous Page)

R6441C (True RMS, AC)

With an input of 5% or more of the full scale

| | | | | | | | |
|---------------------------|--|--------------|-----------------------------------|------------|---|-------------------|------|
| Range | 200 μ A | 2000 μ A | 20 mA | 200 mA | 2000 mA* | 5 A* ¹ | |
| Maximum display | 19999 | | | | | 19999 | 4999 |
| Resolution | 10 nA | 100 nA | 1 μ A | 10 μ A | 100 μ A | 1 mA | |
| Measurement accuracy | 20Hz to 500Hz | | $\pm 0.8\% \pm 40d$ | | $\pm 2\% \pm 40d$ | | |
| | 500Hz to 5kHz | | $\pm 5.0\% \pm 40d$ | | | | |
| Crest factor | 3:1 at the full scale | | | | | | |
| Input terminal resistance | Approx. 102 Ω or less * ² | | 2 Ω or less * ² | | 0.1 Ω or less * ² | | |
| Overcurrent protection | 0.5 A/250 V IEC 127 sheet 1 Protected by a quick-blowing fuse | | | | 6 A/250 V with 10000-A interrupting capacity Protected by a quick-blowing fuse | | |
| Response time | Approx. 1 second (0.1% or less of the final value in the same range) | | | | | | |

*¹ Floating method is used for 200mA and 5A ranges.

*² The resistance of the protection fuse is excluded.

Frequency measurement

R6441B

| | | | | | |
|----------------------|---------------------|--------|---------|--------|---------|
| Range | 20 Hz | 200 Hz | 2 kHz | 20 kHz | 200 kHz |
| Maximum display | 19999 | | | | |
| Measurement accuracy | 1 mHz | 10 mHz | 100 mHz | 1 Hz | 10 Hz |
| Measurement time | $\pm 0.02\% \pm 2d$ | | | | |

* Waveform : Sine, square

Duty ratio : 3 or less

Measurement time

Sampling mode: Free-run

| Function | Measurement time | | |
|--------------------------------------|------------------|-------------|--------------|
| | FAST (3 1/2) | MID (4 1/2) | SLOW (4 1/2) |
| DC voltage measurement | 12.5 (80) | 100 (10) | 400 (2.5) |
| AC voltage measurement (AC coupling) | 12.5 (80) | 100 (10) | 400 (2.5) |
| Resistance measurement | 12.5 (80) | 100 (10) | 400 (2.5) |
| DC current measurement | 12.5 (80) | 100 (10) | 400 (2.5) |
| AC current measurement | 12.5 (80) | 100 (10) | 400 (2.5) |
| Frequency measurement (R6441B) | 210 (4.7) | 300 (3.3) | 600 (1.5) |
| Conductive measurement | 12.5 (80) | 100 (10) | 400 (2.5) |
| Diode measurement | 12.5 (80) | 100 (10) | 400 (2.5) |

Unit [ms] (times/second)

Conductive measurement: Measurement range of 200 Ω and continuity judgment value of 20 Ω

Other specifications are the same as those for the 200 Ω range for resistance measurement.

Diode measurement: Measurement range of 2000 mV

Other specifications are the same as those for the 2000 Ω range for resistance measurement.

| | | | |
|---------------------------------------|------|-----|------|
| Sampling rate | FAST | MID | SLOW |
| Number of measurements (times/second) | 80 | 10 | 2.5 |

Calculation function: Null, smoothing, dB/dBm, scaling, MAX/MIN, comparator

General specifications

Measurement method: Integrating type

Input method: Floating type

Range switching: Auto and manual

Data display: 5-digit decimal, 7-segment electron ray indicator tube

Overinput indication: "OL" is displayed for inputs out of the rated measurement range.

Low-battery indication: If the battery power voltage drops to below the rated voltage, a low-battery mark is indicated in the display section.

Dielectric strength: Withstands 450 V continuously applied between the COM terminal and chassis and between the Com terminal and AC power line.

Operating environment:

Operating temperature: 0 to 50°C

(0 to 40°C when the battery is mounted)

Operating humidity: 85% RH or less

Storage temperature: -25 to 70°C

(-20 to 50°C when the battery is mounted)

Power consumption: 15 VA or less

AC power: Specified at time of ordering.

| | | | | |
|-------------------|-----------|------------|------------|------------|
| Option No. | Standard | 32 | 42 | 44 |
| Power voltage (V) | 90 to 110 | 103 to 132 | 198 to 242 | 207 to 250 |

DC power supply: 6-hour continuous operation is possible by means of the R15807(optional) battery unit.

Dimensions: Approx. 212 (W) \times 88 (H) \times 310 (D) mm

Mass: 2.2 kg maximum (main unit), 3.5 kg maximum (with options)

Accessories:

| | | |
|--------------|-------------|----------------|
| Model | A01402 | A01034 |
| Product name | Power cable | Input cable x1 |

Standard accessories: RS-232C, baud rate of 9600, 4800, 2400, 1200, 600, and 300

Optional accessories

A08316 Alligator clip adapter

A08317 Miniature clip adapter

A01001 Input cable

A01265 RS-232C cable (For 1 m, 250- and 9-pin (DMM))

A09507 SRAM card (64 kbytes)

TR1116 DC high-voltage probe

TR1111 Terminal adapter

A02464 EIA rack mount kit (twin)

A02463 EIA rack mount kit

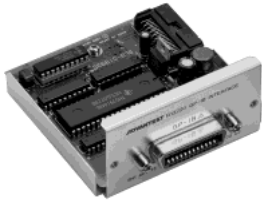
A02264 JIS rack mount kit (twin)

A02263 JIS rack mount kit

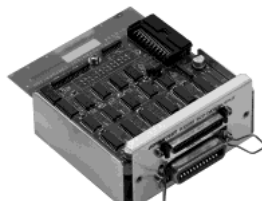
R16215 Carrying bag

R15807 Battery unit

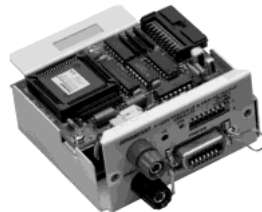
R13220, R13015, R13223, R13016, R13221, R15807, R13222



R13220
GPIB Interface Unit



R13015
BCD Data Output Unit



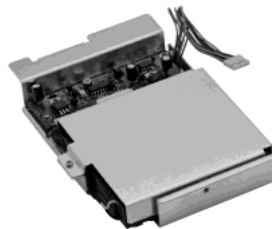
R13223
Printer I/F & Analog Output Unit



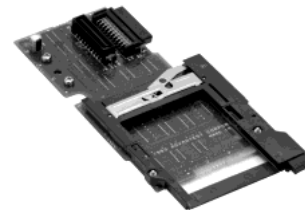
R13016
Digital Comparator Unit



R13221
Printer Interface Unit



R15807
Battery Unit



R13222
Memory Card Interface Unit

R13220 GPIB Interface Unit

Electrical specifications: Conforms to IEEE488-1978 and IEC625-1.

Mechanical specifications: Conforms to IEEE488-1978.

Connector: 24-pin Amphenol

Interface specifications: SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0, and E2

Code system: ASCII code

Address designation: 31 talker/listener addresses can be set from the front panel of the main unit.

R13015 BCD Data Output Unit

Output data: BCD parallel code

Output data contents: Measured data, decimal point, polarity and unit (output only at first display unit)

Print command signal output: TTL-level positive logic (with a pulse width of approx. 1 ms)

External start signal:

A (Data output): TTL-level positive logic (with a pulse width of 100 μ s to 10 ms)

B (Remote control input): TTL-level negative logic (with a pulse width of 100 μ s to 10 ms), Input impedance of approx. 10 k Ω

External control: Function, range, buzzer on/off, sampling mode, sampling rate, null calculation and comparator calculation

Connector: Data output DHA-RC50 DDK
Remote input 57-40240 DDK

R13223 Printer I/F & Analog Output Unit

Printer I/F section: Same as the R13221.

Analog output section

Output voltage: 0 V to +0.999 V (+1 V output at the time of IVFS calibration)

Number of conversion digits: 8 to 9 types of digits can be selected by means of the DIP switch on the accessory panel (rear panel of the main unit)

Conversion output: Can be selected from NORMAL, OFFSET NORMAL, ABSOLUTE, or OFFSET ABSOLUTE.

Conversion accuracy: $\pm 0.2\%$ of the full scale (0°C to 50°C), 85% RH or less, for 1 year)

Output impedance: Approx. 180 Ω

Output terminal: Binding post

R13016 Digital Comparator Unit

Comparison level: Upper and lower limits (HIGH LIMIT/LOW LIMIT)

Determination condition:

HIGH Measured data > HIGH LIMIT

PASS HIGH LIMIT \geq Measured data \geq LOW LIMIT

LOW Measured data < LOW LIMIT

Level setting: Set from the front panel of the main unit.

END signal: TTL-level, negative logic (with a pulse width of approx. 1 ms)

Contact output: Optical MOS relay HI, PASS, LO

Contact capacity: Allowable switching voltage of 50 V and allowable switching current of 0.1 A

Dielectric strength: 200 V (between input/output signal and chassis)

Transistor output: Open-collector output

Maximum collector voltage/current of 50 V/0.3A

Buzzer output: Generated when the comparison result is HIGH, PASS, LOW or HIGH/LOW.

Connector: 57-40140 DDK

R13221 Printer Interface Unit

Output code: Centronics

Output data contents: Measured data, decimal point, polarity and unit

Printing interval: Continuous, 5 seconds to 4 hours

Setting: Set from the main unit panel.

Connector: 57-40140 DDK

R15807 Battery Unit

Built-in battery : 12 V lead storage battery

Capacity : 1.8 Ah

Charging method : Fully charged for approx. 12 hours with the main unit power turned off and power supply connected.

Low-battery indication : Displayed on the front panel of the main unit. Goes on for a remaining time of 2 hours. Does not affect main unit specifications.

Weight : 1 kg maximum

R13222 Memory Card Interface Unit

Available card : A09507 (64 kbytes): SRAM card conforming to JEIDA ver.4 (with attribute information)

Memory contents : Measured data and panel settings are stored with DOS format. (Up to 128 files and up to 4000 data items are stored.)