

# Series 2380

# Programmable DC Electronic Loads



Series 2380 programmable DC electronic loads can sink a wide range of voltages and currents. The 200W Model 2380-500-15 can accept up to 500V or 15A. The 250W Model 2380-120-60 can accept up to 120V or 60A. The 750W Model 2380-500-30 can accept up to 500V or 30A. These single-output, stand-alone electronic loads are cost-effective and self-contained.

### Multiple Operating Modes

These DC electronic loads can operate in constant current (CC), constant voltage (CV), constant resistance (CR), or constant power (CP) mode. They can also be configured to provide a dynamically changing load to the DC source with load switching times

- 200W, 250W, and 750W models
- Supports up to 500V or 60A
- Constant current (CC), constant voltage (CV), constant resistance (CR), and constant power (CP) operating modes
- LED simulated load test mode
- Readback voltage and current resolution down to 0.1mV/0.01mA
- Dynamic mode with cycle rate up to 25kHz
- Voltage rise and fall time measurement
- Current monitor function
- List mode
- Battery test mode
- Built-in GPIB, USB, and RS-232 interfaces

as fast as 25kHz. Versatile internal, external, and remote triggering options allow synchronizing the dynamic load behavior with other events.

### Comprehensive Protection

Protection functions built into Series 2380 DC electronic loads ensure the reliability and safety of all tests. These functions include over temperature protection (OTP), over voltage protection (OVP), over current protection (OCP), over power protection (OPP), and local/remote reverse voltage (LRV/RRV) protection. A power-on system self-test ensures the instrument is operating properly.

### Full Complement of Settings and Controls

To maximize testing efficiency, you can save test parameters into any one of 100 memory locations for quick recall. All load parameters, such as voltage, current, slew rate, and dynamic mode time intervals, can be set using the front panel controls or programmed remotely. A numeric keypad and rotary knob allow entering settings quickly and setting parameters to their full resolution easily. USB-TMC, GPIB and RS-232 interfaces are built in for remote control and communication. A current monitor interface simplifies monitoring input current waveforms by providing a connection for an oscilloscope.



Figure 1. Use either the rotary knob or the keypad to quickly enter settings and set parameter values using all the available resolution.

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## Ordering Information

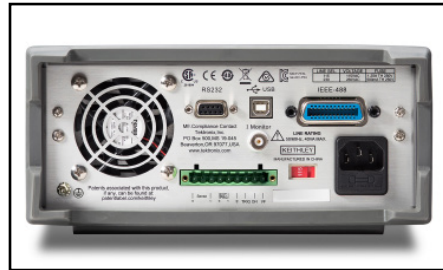
- 2380-500-15  
Programmable DC Electronic Load, 500V, 15A, 200W
- 2380-120-60  
Programmable DC Electronic Load, 120V, 60A, 250W
- 2380-500-30  
Programmable DC Electronic Load, 500V, 30A, 750W
- 2380J-500-15  
Programmable DC Electronic Load, 500V, 15A, 200W-Japan only
- 2380J-120-60  
Programmable DC Electronic Load, 120V, 60A, 250W-Japan only
- 2380J-500-30  
Programmable DC Electronic Load, 500V, 30A, 750W-Japan only

## Accessories Supplied

- Quick Start Guide
- Documentation CD
- Power cord

## APPLICATIONS

- Environmental test, stress test, and accelerated life testing for AC/DC power sources and DC/DC modules
- LED lighting drivers and high power component testing
- Automotive electronics testing
- Battery research and discharge testing
- Production test



Model 2380-500-15 rear panel



Model 2380-500-15 front view showing the safety covers on the input terminals.



Model 2380-500-30 rear panel

## ACCESSORIES AVAILABLE

- 2380-001 9-pin Rear Panel Mating Connector
- 2380-002 DUT Connection Protective Cover
- 7007-2 Double-Shielded Premium IEEE-488 Interface Cable, 2m (6.5 ft)
- KP-CL-488LPA IEEE-488.2 Interface Board for the PCI Bus
- USB-B-1 USB Cable, Type A Connector to Type B Connector, 1m (3.3 ft)

## RACK MOUNT KITS FOR THE 2380-500-15 AND THE 2380-120-60

- 4299-7 Universal Fixed Rack Mount Kit
- RMU2U Fixed Rack Mount Kit
- 386759800 RMU2U Rack Mount Cosmetic Filler Panel

## RACK MOUNT KIT FOR THE 2380-500-30

- 2380-RM Full-Rack-Width Instrument Fixed Rack Mount Kit

## SERVICES AVAILABLE

- Model Number\*-1-EW  
3-year factory warranty from date of shipment extended 1 additional year
- Model Number\*-5Y-EW  
3-year factory warranty from date of shipment extended to 5 years
- C/Model Number\*-3Y-STD  
KeithleyCare 3 YR STD Calibration Plan
- C/Model Number\*-3Y-DAT  
KeithleyCare 3 YR Calibration w/Data Plan
- C/Model Number\*-5Y-STD  
KeithleyCare 5 YR STD Calibration Plan
- C/Model Number\*-5Y-DAT  
KeithleyCare 5 YR Calibration w/Data Plan

\* Replace the specific power supply model number in place of Model Number to generate the appropriate model number for a service item. Example for a 2380-500-15, a 1-year extended warranty model number would be 2380-500-15-EW.

## Specifications

## Model 2380-500-15/2380J-500-15

|                                       |                        | Low Range                    | High Range           |
|---------------------------------------|------------------------|------------------------------|----------------------|
| Rated Value<br>(0°–40°C)              | Input Voltage          | 0–500 V                      | 0–500 V              |
|                                       | Input Current          | 0–3 A                        | 0–15 A               |
|                                       | Input Power            | 200 W                        | 200 W                |
|                                       | Min. Operating Voltage | 0.6 V at 3 A (maximum 0.9 V) | 4.5 V at 15 A        |
| Constant Voltage Mode                 | Range                  | 0.1–50 V                     | 0.1–500 V            |
|                                       | Resolution             | 1 mV                         | 10 mV                |
|                                       | Accuracy               | ±(0.05% + 0.025% FS)         | ±(0.05% + 0.025% FS) |
| Constant Current Mode                 | Range                  | 0–3 A                        | 0–15 A               |
|                                       | Resolution             | 0.1 mA                       | 1 mA                 |
|                                       | Accuracy               | ±(0.05% + 0.05% FS)          | ±(0.05% + 0.05% FS)  |
| Constant Resistance Mode <sup>1</sup> | Range                  | 0.3 Ω–10 Ω                   | 10 Ω–7.5 kΩ          |
|                                       | Resolution             | 0.001 Ω                      | 0.1 Ω                |
|                                       | Accuracy <sup>2</sup>  | 0.01% + 0.08 S               | 0.01% + 0.0008 S     |
| Constant Power Mode <sup>3</sup>      | Range                  | 200 W                        | 200 W                |
|                                       | Resolution             | 10 mW                        | 10 mW                |
|                                       | Accuracy               | 0.1% + 0.1% FS               | 0.1% + 0.1% FS       |

## Dynamic Mode

|         |                                         |                         |                         |
|---------|-----------------------------------------|-------------------------|-------------------------|
| CC Mode | T1 & T2                                 | 20 μs–3600 s; Res: 1 μs | 20 μs–3600 s; Res: 1 μs |
|         | Accuracy                                | 5 μs ± 100 ppm          | 5 μs ± 100 ppm          |
|         | Ascending/Descending Slope <sup>4</sup> | 0.0001–0.1 A/μs         | 0.001–1 A/μs            |
|         | Minimum Rise Time <sup>5</sup>          | ~10 μs                  | ~10 μs                  |

## Measuring Range

|                  |            |                       |                       |
|------------------|------------|-----------------------|-----------------------|
| Readback Voltage | Range      | 0–50 V                | 0–500 V               |
|                  | Resolution | 1 mV                  | 10 mV                 |
|                  | Accuracy   | ±(0.025% + 0.025% FS) | ±(0.025% + 0.025% FS) |
| Readback Current | Range      | 0–3 A                 | 0–15 A                |
|                  | Resolution | 0.01 mA               | 0.1 mA                |
|                  | Accuracy   | ±(0.05% + 0.05% FS)   | ±(0.05% + 0.05% FS)   |
| Readback Power   | Range      | 200 W                 | 200 W                 |
|                  | Resolution | 10 mW                 | 10 mW                 |
|                  | Accuracy   | ±(0.1% + 0.1% FS)     | ±(0.1% + 0.1% FS)     |

## Protection Range

|                             |        |         |
|-----------------------------|--------|---------|
| Overpower Protection        | ~210 W | ~210 W  |
| Overcurrent Protection      | ~3.3 A | ~16.5 A |
| Overvoltage Protection      | ~530 V | ~530 V  |
| Over Temperature Protection | ~85°C  | ~85°C   |

## Specification

|                          |                                   |            |              |
|--------------------------|-----------------------------------|------------|--------------|
| Short Circuit            | Current (CC)                      | ~3.3 / 3 A | ~16.5 / 15 A |
|                          | Voltage (CV)                      | ~0 V       | ~0 V         |
|                          | Resistance (CR)                   | ~300 mΩ    | ~300 mΩ      |
| Input Terminal Impedance | ~1 MΩ                             | ~1 MΩ      |              |
| Dimensions               | 214.81 mm × 104.24 mm × 397.03 mm |            |              |

## Model 2380-120-60/2380J-120-60

|                                       |                        | Low Range            | High Range           |
|---------------------------------------|------------------------|----------------------|----------------------|
| Rated Value<br>(0°–40°C)              | Input Voltage          | 0–120 V              | 0–120 V              |
|                                       | Input Current          | 0–6 A                | 0–60 A               |
|                                       | Input Power            | 250 W                | 250 W                |
|                                       | Min. Operating Voltage | 0.18 V at 6 A        | 1.8 V at 60 A        |
| Constant Voltage Mode                 | Range                  | 0–18 V               | 0–120 V              |
|                                       | Resolution             | 1 mV                 | 10 mV                |
|                                       | Accuracy               | ±(0.05% + 0.025% FS) | ±(0.05% + 0.025% FS) |
| Constant Current Mode                 | Range                  | 0–6 A                | 0–60 A               |
|                                       | Resolution             | 0.1 mA               | 1 mA                 |
|                                       | Accuracy               | ±(0.05% + 0.1% FS)   | ±(0.05% + 0.1% FS)   |
| Constant Resistance Mode <sup>1</sup> | Range                  | 0.05 Ω–10 Ω          | 10 Ω–7.5 kΩ          |
|                                       | Resolution             | 0.001 Ω              | 0.1 Ω                |
|                                       | Accuracy <sup>2</sup>  | 0.01% + 0.08 S       | 0.01% + 0.0008 S     |
| Constant Power Mode <sup>3</sup>      | Range                  | 250 W                | 250 W                |
|                                       | Resolution             | 10 mW                | 10 mW                |
|                                       | Accuracy               | 0.2% + 0.2% FS       | 0.2% + 0.2% FS       |

## Dynamic Mode

|         |                                         |                         |                         |
|---------|-----------------------------------------|-------------------------|-------------------------|
| CC Mode | T1 & T2                                 | 20 μs–3600 s; Res: 1 μs | 20 μs–3600 s; Res: 1 μs |
|         | Accuracy                                | 5 μs ± 100 ppm          | 5 μs ± 100 ppm          |
|         | Ascending/Descending Slope <sup>4</sup> | 0.0001–0.25 A/μs        | 0.001–2.5 A/μs          |
|         | Minimum Rise Time <sup>5</sup>          | ~20 μs                  | ~20 μs                  |

## Measuring Range

|                  |            |                       |                       |
|------------------|------------|-----------------------|-----------------------|
| Readback Voltage | Range      | 0–18 V                | 0–120 V               |
|                  | Resolution | 0.1 mV                | 1 mV                  |
|                  | Accuracy   | ±(0.025% + 0.025% FS) | ±(0.025% + 0.025% FS) |
| Readback Current | Range      | 0–6 A                 | 0–60 A                |
|                  | Resolution | 0.1 mA                | 1 mA                  |
|                  | Accuracy   | ±(0.05% + 0.1% FS)    | ±(0.05% + 0.1% FS)    |
| Readback Power   | Range      | 250 W                 | 250 W                 |
|                  | Resolution | 10 mW                 | 10 mW                 |
|                  | Accuracy   | ±(0.2% + 0.2% FS)     | ±(0.2% + 0.2% FS)     |

## Protection Range

|                             |        |        |
|-----------------------------|--------|--------|
| Overpower Protection        | ~260 W | ~260 W |
| Overcurrent Protection      | ~6.6 A | ~66 A  |
| Overvoltage Protection      | ~130 V | ~130 V |
| Over Temperature Protection | ~85°C  | ~85°C  |

## Specification

|                          |                                   |            |            |
|--------------------------|-----------------------------------|------------|------------|
| Short Circuit            | Current (CC)                      | ~6.6 / 6 A | ~66 / 60 A |
|                          | Voltage (CV)                      | 0 V        | 0 V        |
|                          | Resistance (CR)                   | ~30 mΩ     | ~30 mΩ     |
| Input Terminal Impedance | ~300 kΩ                           | ~300 kΩ    |            |
| Dimensions               | 214.81 mm × 104.24 mm × 397.03 mm |            |            |

## NOTES\*

1. The voltage/current input is no less than 10% FS (FS indicates the full scale). Accuracy is defined as: % of reading + % of full scale.
2. The range of read-back resistance is between  $(1/(1/R + (1/R)*0.01% + 0.08)\Omega)$  and  $(1/(1/R - (1/R)*0.01% - 0.08)\Omega)$ .
3. The voltage/current input is no less than 10% FS.
4. Ascending/descending slope: 10%–90% current ascending slope from 0 to maximum current.
5. Minimum rise time: 10%–90% current rise time.

\*Specifications are subject to change without notice.

## Model 2380-500-30/2380J-500-30

|                                       | Low Range              | High Range           |                      |
|---------------------------------------|------------------------|----------------------|----------------------|
| Rated Value<br>(0°–40°C)              | Input Voltage          | 0–500 V              | 0–500 V              |
|                                       | Input Current          | 0–3 A                | 0–30 A               |
|                                       | Input Power            | 750 W                | 750 W                |
|                                       | Min. Operating Voltage | 0.36 V / 3 A         | 3.6 V / 30 A         |
| Constant Voltage Mode                 | Range                  | 0–50 V               | 0–500 V              |
|                                       | Resolution             | 1 mV                 | 10 mV                |
|                                       | Accuracy               | ±(0.025% + 0.05% FS) | ±(0.025% + 0.05% FS) |
| Constant Current Mode                 | Range                  | 0–3 A                | 0–30 A               |
|                                       | Resolution             | 0.1 mA               | 1 mA                 |
|                                       | Accuracy               | ±(0.05% + 0.05% FS)  | ±(0.05% + 0.05% FS)  |
| Constant Resistance Mode <sup>1</sup> | Range                  | 0.15 Ω–10 Ω          | 10 Ω–7.5 kΩ          |
|                                       | Resolution             | 0.001 Ω              | 0.1 Ω                |
|                                       | Accuracy <sup>2</sup>  | 0.01% + 0.08 S       | 0.01% + 0.0008 S     |
| Constant Power Mode <sup>3</sup>      | Range                  | 750 W                | 750 W                |
|                                       | Resolution             | 10 mW                | 10 mW                |
|                                       | Accuracy               | 0.2% + 0.2% FS       | 0.2% + 0.2% FS       |

| Dynamic Mode |                                             |                         |                         |
|--------------|---------------------------------------------|-------------------------|-------------------------|
| CC Mode      | T1 & T2                                     | 20 μs–3600 s; Res: 1 μs | 20 μs–3600 s; Res: 1 μs |
|              | Accuracy                                    | 5 μs ± 100 ppm          | 5 μs ± 100 ppm          |
| CC Mode      | Ascending/<br>Descending Slope <sup>4</sup> | 0.0001–0.1 A/μs         | 0.001–1 A/μs            |
|              | Minimum Rise Time <sup>5</sup>              | ~20 μs                  | ~20 μs                  |

| Measuring Range  |            |                       |                       |
|------------------|------------|-----------------------|-----------------------|
| Readback Voltage | Range      | 0–50 V                | 0–500 V               |
|                  | Resolution | 1 mV                  | 10 mV                 |
|                  | Accuracy   | ±(0.025% + 0.025% FS) | ±(0.025% + 0.025% FS) |
| Readback Current | Range      | 0–3 A                 | 0–30 A                |
|                  | Resolution | 0.1 mA                | 1 mA                  |
|                  | Accuracy   | ±(0.05% + 0.05% FS)   | ±(0.05% + 0.05% FS)   |
| Readback Power   | Range      | 750 W                 | 750 W                 |
|                  | Resolution | 10 mW                 | 10 mW                 |
|                  | Accuracy   | ±(0.2% + 0.2% FS)     | ±(0.2% + 0.2% FS)     |

| Protection Range            |        |        |
|-----------------------------|--------|--------|
| Overpower Protection        | ~760 W | ~760 W |
| Overcurrent Protection      | ~3.3 A | ~33 A  |
| Overvoltage Protection      | ~530 V | ~530 V |
| Over Temperature Protection | ~85°C  | ~85°C  |

| Specification            |                         |            |             |
|--------------------------|-------------------------|------------|-------------|
| Short Circuit            | Current (CC)            | ~3.3 / 3 A | ~3.3 / 30 A |
|                          | Voltage (CV)            | 0 V        | 0 V         |
|                          | Resistance (CR)         | ~120 mΩ    | ~120 mΩ     |
| Input Terminal Impedance | 1 MΩ                    | 1 MΩ       |             |
| Dimensions               | 482mm × 131.4mm × 580mm |            |             |

## NOTES\*

- The voltage/current input is no less than 10% FS (FS indicates the full scale). Accuracy is defined as: % of reading + % of full scale.
- The range of read-back resistance is between  $1/(1/R + (1/R)*0.01% + 0.08) \Omega$  and  $1/(1/R - (1/R)*0.01% - 0.08) \Omega$ .
- The voltage/current input is no less than 10% FS.
- Ascending/descending slope: 10%–90% current ascending slope from 0 to maximum current.
- Minimum rise time: 10%–90% current rise time.

\*Specifications are subject to change without notice.

## General

**Memory Capacity:** 100 sets of measurements and selectable parameters.

**Signal Connections:**

**Front Panel:** Input: Stud and threaded knob terminals for lug connectors (200W and 250W versions).

**Rear Panel:**

**Input:** Terminal Bars (750W version).

**Current Monitor Output:** BNC.

**Remote Sense, Analog Input, External Trigger, Voltage Fault:** 9-pin terminal block.

**Communications:**

**USB:** USB2.0 device, type B, USB-TMC compliant.

**RS-232:** DB-9 connector.

**GPIO:** IEEE-488.2 compliant.

**Cooling Method:** Fan.**Fan Speed vs. Internal temperature:**

| Temperature | 40°C       | 50°C        | 70°C       | 85°C                                              |
|-------------|------------|-------------|------------|---------------------------------------------------|
| Fan status  | First gear | Second gear | Third gear | Temperature protection (OH) and load is shut off. |

**Power Source:**

**AC Input:** Switchable between 120VAC nominal and 240VAC nominal.

**“J” versions:** 100VAC, nominal.

**Frequency:** 50/60Hz.**Power Consumption:**

**2380-500-15:** 40VA.

**2380-120-60:** 40VA.

**2380-500-30:** 150VA.

**EMC:** Conforms to European Union EMC Directive.

**Safety:**

**Canadian Certification:** CSA listed to UL Std. No. 61010-1(3rd Edition) and Can/CSA-C22.2 No. 61010-1-12.

**European Union Compliance:** Conforms to European Union Low Voltage Directive.

**Environment:**

**Altitude:** Operating: 2000m, (6562 ft) above sea level.

**Temperature and Relative Humidity:**

**Operating:** 0° to 40°C full accuracy with 80% relative humidity at up to 35°C, non-condensing.

**Storage:** –20° to 70°C, 10% to 85% relative humidity up to 40°C, 5% to 60% relative humidity above 40°C.

**Net Weight:**

**200W/250W Model:** 4.65kg.

**750W Model:** 24.95kg.

**Shipping Weight:**

**200W/250W Model:** 7kg.

**750W Model:** 31.75kg.

**Recommended calibration frequency:** 1 time/year.

**Warranty:** 3 years.

## Contact Information:

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Rev 0415

### For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Visit [www.tektronix.com](http://www.tektronix.com) or [www.keithley.com](http://www.keithley.com).

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**KEITHLEY**  
A Tektronix Company



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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