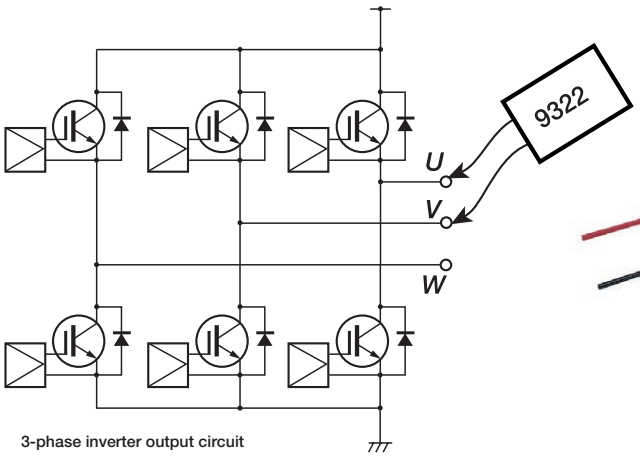
HIOKI

2000

9322 DIFFERENTIAL PROBE

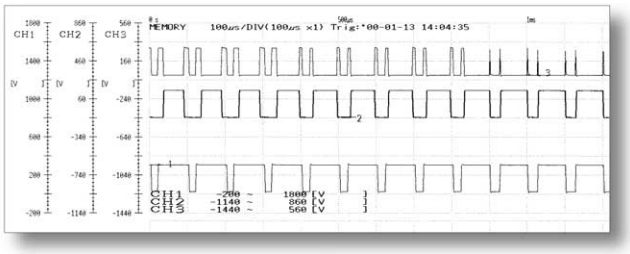
•Floating measurement of high-voltage waveforms
•Detection of power supply surge noise •RMS rectified output

Introducing a new 3-function universal probe



3-phase inverter output circuit
(Floating measurement is essential due to varying emitter potentials of each phase.)

3-phase inverter waveform recording example



❑ Product outline and features

3 kinds of measurement with a single probe

The **9322 DIFFERENTIAL PROBE** provides floating measurement of high voltage waveforms, detection of surge noise on power supply lines, and true RMS rectified output of high voltage AC.

Works with a variety of power supplies, such as an AC adapter or logic terminal

For operation, convenience is the key. Operating power for the **9322 DIFFERENTIAL PROBE** can be supplied from the standard logic terminals of a MEMORY HiCORDER or the clamp sensor input terminals of an **8940 F/V UNIT**, as well as from the probe's own **9418-10 AC ADAPTER**.

Floating measurement of high-voltage waveforms (DC mode)

When measuring the potential difference in signals containing a large common mode voltage component on commercial power lines, an electrocution hazard exists unless measurement is done using an instrument with fully isolated inputs, such as a MEMORY HiCORDER. When measuring signals carrying common mode voltages with a high frequency component (such as those produced by inverter control circuits and switching power supplies), measurements are greatly affected by the rate of common mode elimination at the isolated inputs. Although MEMORY HiCORDERs provide the greatest possible to-ground voltage rating (ordinarily 400 V AC or DC), use of the **9322 DIFFERENTIAL PROBE** raises the rating level to 1500 V AC (CAT Ⅱ), 600 V AC (CAT Ⅲ), allowing measurement of circuits carrying even larger common mode voltages. Potential differences can be measured for input voltages of up to 2000 V DC or 1000 V AC (CAT Ⅱ), 600 V AC/DC (CAT Ⅲ), producing a 1/1000 divided output.

Measurement of power line surge noise (AC mode)

Upon selecting the AC output mode, the AC coupled signal inside the probe is divided by 1000 for output. Since the probe's frequency range is from 1 kHz to 10 MHz, output waveforms are produced only when input voltages contain high frequency components, such as surge noise imposed on 50/60 Hz commercial mains power. The probe can thus serve as either a noise detector or for measurement of wave peaks.

Provides output of true RMS rectified voltages (RMS mode)

Upon selecting the RMS output mode, the input signal is divided by 1000, rectified to obtain the true RMS value, then output as a direct current voltage. True RMS rectification is performed by an analog circuit with a bandwidth of 40 Hz to 100 kHz, allowing true RMS conversion of signals containing high frequency components, such as inverter output waveforms, as well as 50/60 Hz commercial mains.

Main Applications

- Measurement of potential differences included in common mode voltages, such as IGBT
- Measurement of commercial power line waveforms, such as on 400V power lines
- Measurement of high voltage surge noise waveforms
- Measurement of the RMS value of inverter outputs, etc.

INTERNET HIOKI Website http://www.hioki.co.jp/

HIOKI company overview, new products, environmental considerations and other information are available on our website.

■ Specifications

(Precision at 23 ±5 °C/ 73 ±9 °F, 30 minutes after power on; precision guaranteed for 1 year)

Dimensions : Approx. 70 W × 150 H × 25 D mm, (2.76 W × 5.91 H × 0.98 D inch)
Mass : Approx. 350 g (12.3 oz)
Primary cord length : Approx. 460 mm (18.11 inch)
Secondary cord length : Approx. 1.3 m (4.27 feet)

Basic specifications

Measurement functions	(1) DC mode, (2) AC mode, (3) RMS mode
Input type	Balanced differential input
Voltage division ratio	1/1000
Input resistance, capacity	H–L: 9 MΩ, approx 10 pF (C at 100 kHz) H, L–case: 4.5 MΩ, approx 20 pF (C at 100 kHz)
Output	BNC terminal (DC/AC/RMS 3-mode selectable output)
Maximum input voltage	2000 V DC, 1000 V AC (CAT Ⅱ), 600 V AC/DC (CAT Ⅲ)
Maximum rated to-ground voltage	When using grabber clip: 1500 V AC/DC (CAT Ⅱ), 600 V AC/DC (CAT Ⅲ) When using alligator clip: 1000 V AC/DC (CAT Ⅱ), 600 V AC/DC (CAT Ⅲ)
Common mode elimination ratio	10000:1 or better (input/output ratio at 50/60 Hz with input shorted) 1000:1 or better (input/output ratio at 100 kHz or 1 MHz with input shorted)
Power supply	(1) **9418-10 AC ADAPTER** (DC 12 V±10%)*1 (2) Power supply through **9324 POWER CORD** connected to logic connector on MEMORY HiCORDER.*2 (3) Power supply through **9325 POWER CORD** connected to sensor connector on **8940 F/V UNIT**.*3 *1 Operating voltage range: +5 to +12 V, less than 300 mA. DC jack OD 5.5 mm, ID 2.1 mm *2 Power jack on probe connects to logic connector on MEMORY HiCORDER through the **9324 POWER CORD**. Up to 4 power cords can be connected to the **8826 MEMORY HiCORDER**, but only one cord can be connected to the **8841**, **8842**, **8835**, or **8835-01 MEMORY HiCORDER**. With the **8841**, **8842**, **8835**, and **8835-01**, the **9322 DIFFERENTIAL PROBE** cannot be used in combination with the **9320** and **9321 LOGIC PROBEs**. With the **8826**, the **9322** can be used with the **9320/9321** in the following combinations. **9324** × 4 with no **9320/9321**; **9324** × 3 and **9320/9321** × 4; **9324** × 2 and **9320/9321** × 6; **9324** × 1 and **9320/9321** × 7 *3 Power jack on probe connects to sensor connector on the **8940 F/V UNIT** through the **9325 POWER CORD**. Up to six **9325 POWER CORDs** can be used with the **8826**, **8841**, and **8842**, **MEMORY HiCORDERs**, and up to four can be used with the **8835-01 MEMORY HiCORDER**. When used in combination with the **3273** or **9270 CLAMP SENSORs**, up to six cords can be used in combination with the **8826** and up to four cords can be used in combination with the **8841**, **8842**, and **8835-01**.

DC mode

Application	Waveform monitor output
Frequency characteristic	DC to 10 MHz, ±3 dB
DC amplitude accuracy	±1 % f.s. (1000 V DC or less) ±3 % f.s. (2000 V DC or less) f.s.=2000 V DC

AC Mode

Application	Detection of power line surge noise
Frequency response	1 kHz to 10 MHz ±3 dB

RMS mode

Application	Rectified RMS output of DC and AC voltages
Frequency response Output accuracy	DC, 40 Hz to 1 kHz : ±1 % f.s. 1 kHz to 100 kHz : ±4 % f.s. f.s.=1000 V AC
Response speed	200 ms or less (400 V AC)

Other

CE mark compliance	Safety: EN61010-1: 1990 +A1: 1992 +A2: 1995, EN61010-2-031: 1993 EMC: EN61326: 1997 +A1: 1998
Supplied accessories	Alligator clips (2), Grabber clips (2), **3853 CARRYING CASE** (1)

(1) Power supply from logic probe terminal

(2) Power supply from sensor connector on 8940

(3) Power supply from AC adapter

Ordering information

9322 DIFFERENTIAL PROBE (1 input channel)

- The **9322 DIFFERENTIAL PROBE** cannot be used by itself. Please use it in combination with a **HIOKI MEMORY HiCORDER**.
- The **9322 DIFFERENTIAL PROBE** requires a power supply. This can be provided by the **9418-10 AC ADAPTER**, or drawn from the logic probe terminal of a MEMORY HiCORDER or the clamp sensor input terminal of an **8940 F/V UNIT** by using the optional **9324** or **9325 POWER CORD**.

● Usable MEMORY HiCORDERs

8804, 8805 MEMORY HiCORDER (Equipped with input unit as standard feature) (Requires a commercially available BNC connector on the receiving side and a banana plug type adapter on the output side.) (Power supply from AC adapter only.)
8806 MEMORY HiCORDER (Equipped with input unit as standard feature) (Power supply from AC adapter only.)
8806-01 MEMORY HiCORDER (Equipped with input unit as standard feature) (Power supply from AC adapter only.)
8807-01 MEMORY HiCORDER (Equipped with input unit as standard feature) (Power supply from AC adapter only.)
8808-01 MEMORY HiCORDER (Equipped with input unit as standard feature) (Power supply from AC adapter only.)
8825 MEMORY HiCORDER (Input unit sold separately) (Requires a commercially available BNC connector on the receiving side and a banana plug type adapter on the output side.)
8826 MEMORY HiCORDER (Input unit sold separately)
8835 MEMORY HiCORDER (Input unit sold separately)
8835-01 MEMORY HiCORDER (Input unit sold separately)
8840, 8840-01 MEMORY HiCORDER (Input unit sold separately) (Requires a commercially available BNC connector on the receiving side and a banana plug type adapter on the output side.)
8841 MEMORY HiCORDER (Input unit sold separately)
8842 MEMORY HiCORDER (Input unit sold separately)
8845 MEMORY HiCORDER (Input unit sold separately) (When using the **8916**, **8917**, or **8919** input unit, requires a commercially available BNC connector on the receiving side and a banana plug type adapter on the output side.)
8846 MEMORY HiCORDER (Input unit sold separately) (When using the **8916**, **8917**, or **8919** input unit, requires a commercially available BNC connector on the receiving side and a banana plug type adapter on the output side.)
8852 MEMORY HiCORDER (Equipped with input unit as standard feature)
8852-01 MEMORY HiCORDER (Equipped with input unit as standard feature)
8853 MEMORY HiCORDER (Input unit sold separately) (Requires a commercially available BNC connector on the receiving side and a banana plug type adapter on the output side.)
8720 VISUAL HiCORDER (Main unit only)

● Options

9324 POWER CORD (Power supply from logic connector)
9325 POWER CORD (Power supply from **8940** sensor connector)
9418-10 AC ADAPTER (Universal power supply for AC 100 to 200 V commercial mains; outputs DC 12 V/2.5 A.)

HIOKI
HIOKI E. E. CORPORATION

DISTRIBUTED BY

HEAD OFFICE :
81 Koizumi, Ueda, Nagano, 386-1192, Japan
TEL +81-268-28-0562 / FAX +81-268-28-0568
E-mail: os-com@hioki.co.jp

HIOKI USA CORPORATION :
6 Corporate Drive, Cranbury, NJ 08512 USA
TEL +1-609-409-9109 / FAX +1-609-409-9108
E-mail: hioki@hiokiusa.com