HIOKI

# New C HiTESTER 3506, 3505
# C HiTESTER 3504, 3504-10

Electronic measuring instruments

**New**
**C HiTESTER 3506**
**(For Low Capacitance)**
Measures at 1 kHz and 1 MHz

**New**
**C HiTESTER 3505**
**(For Low Capacitance)**
Measures at 1 kHz, 100 kHz and 1 MHz

**C HiTESTERs 3504 and 3504-10**
**(For High Capacitance)**
Measures at 120 Hz and 1 kHz

## Full line of C meters for low to high capacitance

## Test high-capacitance MLCCs at their rated voltage
## Measure small-value capacitors with high speed and accuracy

**C HiTESTERs 3506, 3505, 3504** and **3504-10** measure the C value (electrostatic capacitance) of most types of non-electrolytic capacitors. Models **3506** and **3505** provide high accuracy even when measuring small-value capacitance, and are ideal for small-capacitance internationally-recognized standard measurements requiring 1 kHz, 100 kHz and 1 MHz measurement frequencies. Model **3504** can measure large-capacitance MLCC (multi-layer ceramic capacitors) at their rated voltage, so it is most suitable for 120 Hz and 1 kHz measurements of large-value, non-electrolytic capacitors. All of these C HiTESTERs provide measurements as fast as 2 ms, and comparator and Bin functions for easy integration into automated lines. As an economically priced dedicated tester for integration in automatic systems, Model **3504-10** is the same as the 3504 without the BIN function and GP-IB interface.

CE

ISO 9001 JMI-0216
ISO14001 JQA-E-90091

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

C HiTESTER

# Sort values with the Bin function
# Measurements as fast as 2 ms

## Common Features of Models 3506, 3505, 3504 and 3504-10

■ C-Meter measurement frequencies comply with JIS C 5101-1

| Capacitor Type | C Range | Measurement Frequency [Hz] •Indicates recommended frequency | Supporting Models |
|---|---|---|---|
| Non-Electrolytic | C ≤ 1000 pF | 100k ○ 1M ● | 3506(*1) 3505 |
| | 1000 pF < C ≤ 10 µF | 1k ● | |
| | 10 µF < C | 120 ● | 3504 3504-10 |
| Electrolytic | - | 120 ○ | 3511-50 (for ref.) |

(*1) 100 kHz not available in Model 3506

### ■ BIN function*1

C measurement values can be classified into up to 14*2 ranks for easy sorting.

*1 Available in Model 3504, but not Model 3504-10.

*2 Models 3506 and 3505 support up to 13 ranks.

### ■ Comparator function

Upper and lower limits can be specified for first (C) and second (D) parameters. Evaluation results can be indicated by beeper, LED indicators and external output, with the setting values always displayed.


### ■ Memory function

Measurement data is stored in the instrument and can be downloaded via GP-IB or RS-232C.

3505 and 3506 .....1000 measurements

3504 and 3504-10 ....200 measurements

### ■ Intuitive operation with LED indicators

Simply select the desired operation on the front panel. The current measurement configuration settings are indicated by LEDs so you can check your settings at a glance.

### ■ Trigger-synchronous output

The measurement signal is applied to the test sample only when a measurement trigger is applied. Because large current does not flow when making and breaking contact with the sample, contact point wear is minimized.

### ■ Stores 99*3 measurement configurations

Store up to 99 sets of measurement configuration settings for quick recall when switching test sample types on lines with many repeating measurements.

Any measurement configuration can be recalled by EXT I/O.

*3 Models 3506 and 3505 store up to 70 measurement configurations.

## ■ High-speed measurements as fast as 2 ms (1 ms for analog measurements)

High-speed testing such as with taping machines is supported by the 2 ms minimum measurement time (except FAST 120 Hz measurements). Select from FAST, NORMAL and SLOW measurement speeds.

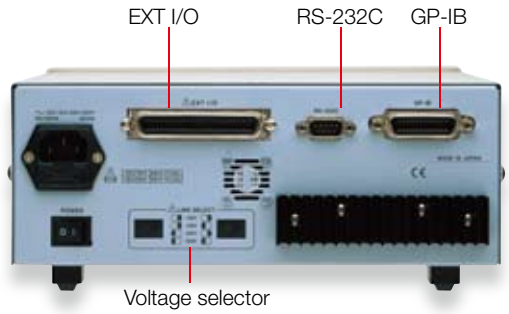
**3506, 3505**

| Measurement Frequency | Output Signal | Measurement Speed FAST | NORMAL | SLOW |
|---|---|---|---|---|
| 1 kHz<br>100 kHz<br>1 MHz | INDEX | 1.1 ms | 4.1 ms | 13.3 ms |
| | EOM | 2 ms | 5 ms | 14 ms |

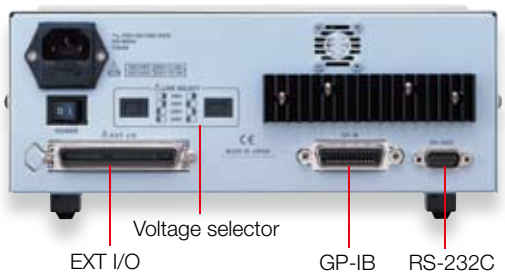
**3504, 3504-10**

| Measurement Frequency | Output Signal | Measurement Speed FAST | NORMAL | SLOW |
|---|---|---|---|---|
| 120 Hz | INDEX | 8.3 ms | 33.3 ms | 133.3 ms |
| | EOM | 10 ms | 37.5 ms | 146 ms |
| 1 kHz | INDEX | 1 ms | 4 ms | 24 ms |
| | EOM | 2 ms | 5.5 ms | 29.5 ms |

**Equipped with standard EXT I/O, RS-232C, and GP-IB*** * GP-IB is not available on Model 3504-10.




C HiTESTER 3506, 3505




C HiTESTER 3504

## ■ EXT I/O

Triggering and loading of measurement conditions can be controlled externally. Capable of external output of comparator results, BIN measurement results, and end-of-measurement signals, the 3504 supports full interfacing with automated devices.

**EXT I/O Features**

**• Inputs**
- External DC power input (+5 to 24 V, may be supplied from external device)
- External trigger signal
- Panel number (Measurement configuration) selection
- Panel-number-valid signal
- Calibration (Models 3505 and 3506)

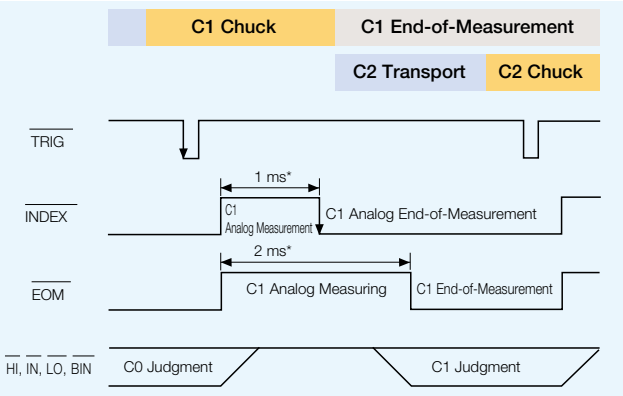
**• Outputs**
- Internal DC power output (+5 V)
- Comparator result output (ANDed first and second parameters)
- Bin measurement judgment output
- Analog End-of-Measurement signal
- End-of-Measurement signal
- Error message output

## ■ RS-232C and GP-IB interface*

Except for turning the instrument's power on and off, all functions for the 3504 can be controlled from a computer. This enables efficient handling when controlling or processing data in batches on a computer or when setting measurement conditions.

* GP-IB is not available on Model 3504-10.

## ■ EXT I/O Timing Chart




* Measurement Speed: FAST used for example. Not applicable for 120-Hz measurements.

**RS-232C interface**
- Transfer method: Start-stop transfer
- Data length: 8 bits
- Stop bit: 1 bit
- Transfer speed: 9600, 19200 bps
- Parity: None
- Delimiter: CR+LF, CR

**GP-IB interface**
- IEEE-488-2 1987 common commands (mandatory) can be used
- Conformance standard: IEEE-488.1 1987
- Reference standard: IEEE-488.2 1987

# C HiTESTER 3506, 3505

## Measure small-value capacitors with high accuracy

| Product Line-up by Capacitance | | Measurement Frequencies | | | |
|---|---|---|---|---|---|
| | Range of Measurements (C, D) | 120 Hz | 1 kHz | 100 kHz | 1 MHz |
| 3506 | C: 0.00000 pF to 15.0000 µF<br>D: 0.00001 to 1.99000 | - | ○ | - | ○ |
| 3505 | C: 0.00000 pF to 15.0000 µF<br>D: 0.00001 to 1.99000 | - | ○ | ○ | ○ |

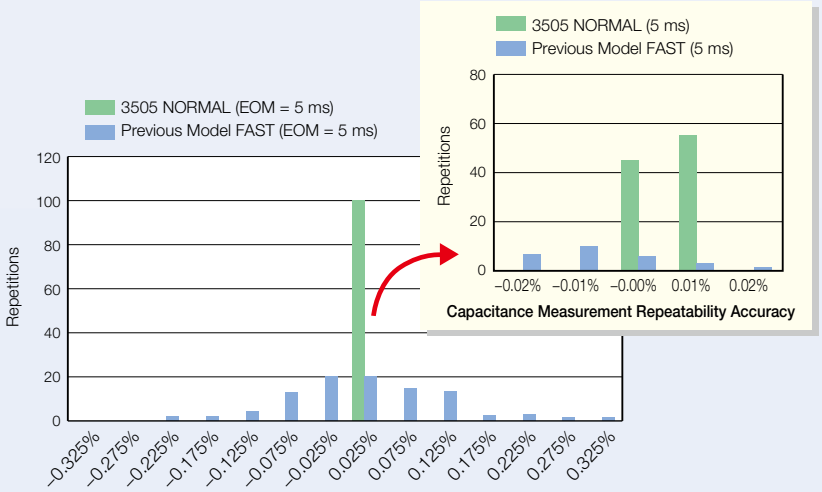
## Features of Models 3506 and 3505 C HiTESTERs

### ■ Enhanced repeat-measurement accuracy

The lowest capacitance range of Models 3506 and 3505 is 220 fF (at 1 MHz), with greatly improved repeatability accuracy for very low-capacitance measurements.

### ■ Enhanced absolute accuracy

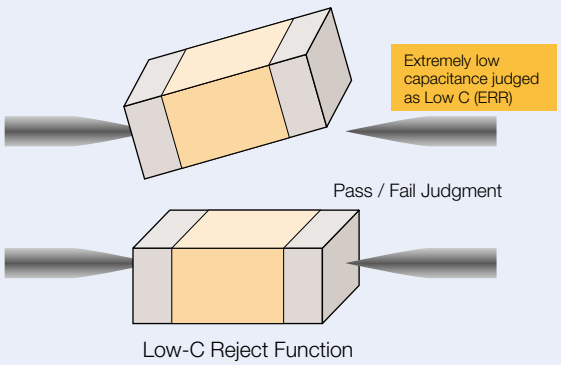
A self-calibration function minimizes variations in measurement values due to changes in ambient temperature. In addition, the cable-length-compensation function minimizes measurement errors when the measurement cable is extended from 1 to 2 meters (using 3C-2V cable).



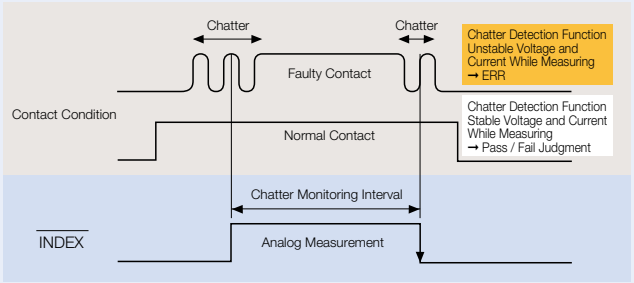

**Capacitance Measurement Repeatability Accuracy**
Measuring 1 pF (at 1 MHz, 1 V)

### ■ Enhanced contact-checking function

Contact errors while measuring can be detected by the Chatter Detection function, Low-C Reject function, Current Detection Circuit Monitoring function and the Applied Voltage Value Monitoring function.
Yield rates are improved by judging measurement-object contact errors as ERR instead of NG (FAIL).




Low-C Reject Function




**Chatter Detection Function**

## ■ Specifications

| | |
|---|---|
| Measured parameters | C (Capacitance), D (Loss Coefficient tan δ), Q (1/tan δ) |
| Measurement frequencies | 1 kHz, 100 kHz (only Model 3505) and 1 MHz<br>Accuracy: ±0.01% or better Frequency shift: 1 MHz ±1%, ±2% |
| Measurement signal level | Open-circuit terminal voltage: 500 mV or 1 V<br>Signal level accuracy: ±10% ±5 mV<br>Output resistance: Approx. 1Ω (@1 kHz in 2.2 μF and higher ranges; @100 kHz in the 22 nF and higher ranges), approx. 20 Ω (in ranges other than the above) |
| Range of measurements | C: 0.000 fF to 15.0000 μF<br>D: 0.00001 to 1.99999<br>Q: 0.0 to 19999.9 |
| Equivalent circuit mode | Series-Parallel Equivalent Circuit mode (Auto/Manual) |
| Measurement time | Representative value: 2 ms (FAST)<br>(Actual measurement time depends on measurement configuration settings) |
| Measurement speed | FAST, NORMAL and SLOW |
| Averaging function | 1 to 256 |
| Low-C Reject function | Bad Contact Detection (open circuit between terminals) |
| Chatter Detection function | Bad Contact Detection (chatter) |
| Current Detection Circuit Monitoring function | A measurement signal fault is detected when external noise causes measurement levels to be out of tolerance for the measurement range. |
| Applied Voltage Value Monitoring function | An error is detected when voltage monitored across a test sample is outside of the judgment standard. |
| Trigger function | Internal and external triggers can be enabled |
| Trigger Delay function | 0 to 9.999 s |
| Memory function | Up to 1,000 measurement values can be stored in the instrument (Downloadable by GP-IB and RS-232C) |

| | |
|---|---|
| Compensation | Open- and short-circuit compensation, load and cable length compensation, and self calibration |
| Trigger-synchronous output function | Functions to inhibit measurement voltage except while actually measuring |
| Key-lock function | Settings can be made and cancelled by front panel keys |
| Bin measurement | C: 13 ranks, D-NG, OUT OF BINS, Absolute value setting, Δ setting, Δ% setting |
| Comparator | C: HI, IN, LO; D: HI, IN, LO<br>Absolute value setting, Δ setting, Δ% setting |
| Panel save and load | 70 setting configurations can be stored<br>Load method: key operation or external I/O |
| Beeper | Setting the buzzer for comparator judgment results (IN or NG) to ON or OFF is possible |
| Interface | RS-232C, GP-IB and EXT I/O (included as standard) |
| Printer function | Measurement values can be printed (requires Model 9442 or 9444 cable) |
| Display system | LEDs (on/off) |
| Operating temperature and humidity | 0 to 40°C, 80% RH or less (non-condensating) |
| Storage temperature and humidity | -10 to 55°C, 80% RH or less (non-condensating) |
| Operating environment | Indoors, to 2000 m ASL |
| Power source | Selectable 100, 120, 220 or 240 V ±10%, 50/60 Hz |
| Max. power consumption | 40 VA |
| Withstand voltage | Power line to ground: 1.39 kV AC for 15 s |
| Backup battery service life | Approx. 6 years |
| Size | Approx. 260 H × 100 W × 298 D mm (exc. projections) |
| Weight | Approx. 4.8 kg |
| Applicable standards | EMC: EN61326, EN61000-3-2, EN61000-3-3<br>Safety: EN61010-1 |
| Accessories | Power Cord, Grounding Adapter, Spare Fuse |

# Measurement accuracy and range

Temp. and humidity for guaranteed accuracy: 23°C ±5%, 80% RH or less (non-condensating)
Warm-up time: 1 h, with open- and short-circuit compensation, and self calibration set to Auto

## ■ Measurement area: C: 0.001 fF to 15.0000 μF; D: 0.00001 to 1.99999

## ■ Measurement accuracy

Use the following equation to calculatethe measurement accuracy.

**Measurement accuracy = basic accuracy × B × C × D × E**

**[B: Measurement signal level coefficient]**
1 V: 1, 500 mV: 2

**[C: Measurement speed coefficient]**
FAST: 1.5, NORMAL: 1.2,
SLOW: 1

**[D: Cable length coefficient] (using 3C-2V cable)**
0 m: 1, 1 m: 1.5, 2 m: 2

**[E: Temperature coefficient]**
1+0.1× |t-23|
t = operating temperature (°C)

## ■ Basic accuracy [Guaranteed accuracy: 6 months when D ≤ 0.1 D]

| C range | Parameter | Accuracy 1 kHz |
|---|---|---|
| 100 pF | C | 0.12%rdg+0.2%rdgx(Cr/Cx) |
| | D | 0.002+0.001×(Cr/Cx) |
| 220 pF | C | 0.12%rdg+0.08%rdgx(Cr/Cx) |
| | D | 0.0012+0.0004×(Cr/Cx) |
| 470 pF | C | 0.12%rdg+0.04%rdgx(Cr/Cx) |
| | D | 0.0012+0.0003×(Cr/Cx) |
| 1 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0012+0.0003×(Cr/Cx) |
| 2.2 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0012+0.0003×(Cr/Cx) |
| 4.7 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 10 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 22 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 47 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 100 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 220 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 470 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 1 μF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 2.2 μF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 4.7 μF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 10 μF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |

| C range | Parameter | Accuracy 100 kHz (only Model 3505) |
|---|---|---|
| 1 pF | C | 0.5%rdg+0.5%rdgx(Cr/Cx) |
| | D | 0.004+0.004×(Cr/Cx) |
| 2.2 pF | C | 0.3%rdg+0.2%rdgx(Cr/Cx) |
| | D | 0.004+0.003×(Cr/Cx) |
| 4.7 pF | C | 0.25%rdg+0.15%rdgx(Cr/Cx) |
| | D | 0.004+0.002×(Cr/Cx) |
| 10 pF | C | 0.25%rdg+0.1%rdgx(Cr/Cx) |
| | D | 0.004+0.002×(Cr/Cx) |
| 22 pF | C | 0.25%rdg+0.06%rdgx(Cr/Cx) |
| | D | 0.003+0.0015×(Cr/Cx) |
| 47 pF | C | 0.25%rdg+0.06%rdgx(Cr/Cx) |
| | D | 0.0025+0.0015×(Cr/Cx) |
| 100 pF | C | 0.15%rdg+0.06%rdgx(Cr/Cx) |
| | D | 0.0015+0.001×(Cr/Cx) |
| 220 pF | C | 0.15%rdg+0.04%rdgx(Cr/Cx) |
| | D | 0.0015+0.0005×(Cr/Cx) |
| 470 pF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 1 nF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 2.2 nF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 4.7 nF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 10 nF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 22 nF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 47 nF | C | 0.15%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0015+0.0003×(Cr/Cx) |
| 100 nF | C | 0.2%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.002+0.0003×(Cr/Cx) |

| C range | Parameter | Accuracy 1 MHz |
|---|---|---|
| 220 fF | C | 0.2%rdg+1%rdgx(Cr/Cx) |
| | D | 0.004+0.002×(Cr/Cx) |
| 470 fF | C | 0.15%rdg+0.3%rdgx(Cr/Cx) |
| | D | 0.003+0.001×(Cr/Cx) |
| 1 pF | C | 0.12%rdg+0.16%rdgx(Cr/Cx) |
| | D | 0.002+0.001×(Cr/Cx) |
| 2.2 pF | C | 0.12%rdg+0.08%rdgx(Cr/Cx) |
| | D | 0.0012+0.0004×(Cr/Cx) |
| 4.7 pF | C | 0.12%rdg+0.04%rdgx(Cr/Cx) |
| | D | 0.0012+0.0003×(Cr/Cx) |
| 10 pF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.0012+0.0003×(Cr/Cx) |
| 22 pF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 47 pF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 100 pF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 220 pF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 470 pF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |
| 1 nF | C | 0.12%rdg+0.02%rdgx(Cr/Cx) |
| | D | 0.001+0.0003×(Cr/Cx) |

[Cx : the electrical capacity of the sample / Cr : the electrical capacity of the measurement range]

# C HiTESTER 3504, 3504-10

# Inspect even Large Capacity MLCCs with Constant Voltage at High Speeds

| Product Line-up by Capacitance | | Measurement Frequencies | | | |
|---|---|---|---|---|---|
| | Range of Measurements (C, D) | 120 Hz | 1 kHz | 100 kHz | 1 MHz |
| 3504<br>3504-10 | C: 0.9400 pF to 20.0000 mF<br>D: 0.00001 to 1.99000 | ○ | ○ | - | - |

## Features of Model 3504 and 3504-10 C HiTESTERs

### ■ Constant voltage measurement (CV)

The 3504 can perform constant voltage measurement at 1V or 500 mV, and supports voltage dependent capacitance measurement. Select from a measurement frequency of 120 Hz or 1 kHz.

### ■ Compatible with taping machine assemblies

Model 3504-10 provides ideal speed and cost-performance for taping machine assemblies.

### ■ Phase-synchronous function (special option)

When using multiple 3504 devices together, phase synchronization of measurement signals is possible. When measuring components that are placed close together, this function reduces oscillation due to interference, enabling stable measurement values. Phase synchronization is a custom-order option available upon request.

**Phase-synchronous cable 9679**

## ■ Specifications

| | |
|---|---|
| Measurement items | C (capacitance), D (dissipation factor tan δ) |
| Measurement frequency | 120 Hz or 1 kHz<br>Accuracy: ±0.01% or less |
| Measurement signal level | (1) Constant voltage mode: 500 mV or 1 V<br>CV 1V measurement range: Range up to 70 μF (1 kHz)<br>Range up to 700 μF (120 Hz)<br>CV 500 mV measurement range: Range up to 170 μF (1 kHz)<br>Range up to 1.45 mF (120 Hz)<br>Signal level accuracy: ±10% ±5 mV<br>(2) Open terminal voltage mode: 500 mV or 1 V<br>Measurement range: Other than the above<br>Output resistance: 5Ω ±1Ω<br>Signal level accuracy: ±10% ±5 mV |
| Measurement range | C; 0.9400 pF to 20.0000 mF<br>D; 0.00001 to 1.99000 |
| Equivalent circuit mode | Straight/parallel equivalent circuit mode (Auto/Manual) |
| Measurement time | Nominal 2 ms (1 kHz, FAST)<br>(The measurement time differs depending on the measurement frequency and measurement speed that are set.) |
| Measurement speed | FAST / NORMAL / SLOW |
| Trigger function | Internal and external trigger sources can be selected. |
| Zero compensation | Open and short circuit compensation |
| Trigger-synchronous output function | Function to apply a measurement signal only when performing measurement. |
| Key lock function | The key lock can be set and cancelled by key operation on the front panel |
| BIN measurement<br>(Not available on the 3504-10) | C; 14 ranks, D-NG, OUT OF BINS<br>Absolute value setting, Δ% setting |
| Load compensation | Function to measure a reference component and compensate the measured value |
| Memory function | Up to 200 measurement values can be stored in the instrument (Downloadable by GP-IB and RS-232C) |

| | |
|---|---|
| Comparator | C; HI / IN / LO, D: HI / IN / LO<br>Absolute value setting, Δ% setting |
| Panel save and load | Up to 99 sets of measurement conditions can be saved.<br>Load method: Key operation, external I/O. |
| Audible buzzer | The buzzer can be set on or off according to the comparator evaluation result ("IN" or "NG") and BIN decision result. |
| Interface | 3504; RS-232C, GP-IB, EXT I/O (standard)<br>3504-10; RS-232C, EXT I/O (standard) |
| Printer function | Measurement values can be printed (The Printer 9442 and optional Connection Cable 9444 are required.) |
| Display device | LED |
| Operating temperature and humidity | 0 to 40°C, 80% RH or less (no condensation) |
| Storage temperature and humidity | -10 to 55°C, 80% RH or less (no condensation) |
| Operating environment | Indoors, up to 2000 m ASL |
| Power supply | AC 100 V, 120 V, 220 V, or 240 V±10% (selectable), 50/60 Hz |
| Maximum rated power | 100 VA max. |
| Dielectric withstand voltage | Input to ground, AC 1.69 kV, 15 sec. |
| Backup battery life | Approx. 6 years |
| Dimensions | Approx. 260 (H) × 100 (W) × 220 (D) mm (excluding protrusions) |
| Weight | Approx. 3.8 kg |
| Applicable standards | EMC: EN61326, EN61000-3-2, EN61000-3-3<br>Safety: EN61010-1 |
| Supplied accessories | Power cord, grounding adapter, spare fuse |

## Measurement accuracy and range

Temp. and humidity for guaranteed accuracy: 23°C ±5%, 80% RH or less (non-condensating)
Warm-up time: 1 h, with open- and short-circuit compensation

■ **Measurement area:** C: 0.9400 pF to 20.0000 mF; D: 0.00001 to 1.99000

### ■ Measurement accuracy

Use the following equation to calculate the measurement accuracy.

**Measurement accuracy = basic accuracy × B × C × D × E**

**[B: Measurement signal level coefficient]**
1 V: 1, 500 mV: 1

**[C: Measurement speed coefficient]**
FAST: 1.5, NORMAL: 1.2,
SLOW: 1

**[D: Cable length coefficient] (using 3C-2V cable)**
0 m: 1, 1 m: 1.5

**[E: Temperature coefficient]**
1+0.1× |t-23|
t = operating temperature (°C)

### ■ Basic accuracy [Guaranteed accuracy: 6 months when D ≤ 0.1 D]

| Range No. | C range | | Basic accuracy | | | CV operation |
|---|---|---|---|---|---|---|
| | 120 Hz | 1 kHz | Parameter | 120 Hz | 1 kHz | |
| 1 | 200 pF | 20 pF | C | ±0.20%rdg.±300dgt. | ±0.20%rdg.±300dgt. | ❍ |
| | | | D | ±0.0120±2/CL | ±0.0120±0.25/CL | |
| 2 | 2 nF | 200 pF | C | ±0.20%rdg.±60dgt. | ±0.20%rdg.±60dgt. | ❍ |
| | | | D | ±0.0020±2.2/CL | ±0.0020±0.265/CL | |
| 3 | 20 nF | 2 nF | C | ±0.16%rdg.±20dgt. | ±0.14%rdg.±20dgt. | ❍ |
| | | | D | ±0.0036 | ±0.0036 | |
| 4 | 200 nF | 20 nF | C | ±0.15%rdg.±15dgt. | ±0.13%rdg.±15dgt. | ❍ |
| | | | D | ±0.0020 | ±0.0020 | |
| 5 | 2 μF | 200 nF | C | ±0.15%rdg.±15dgt. | ±0.13%rdg.±15dgt. | ❍ |
| | | | D | ±0.0016 | ±0.0016 | |
| 6 | 20 μF | 2 μF | C | ±0.15%rdg.±15dgt. | ±0.09%rdg.±10dgt. | ❍ |
| | | | D | ±0.0020 | ±0.0016 | |
| 7 | 200 μF | 20 μF | C | ±0.25%rdg.±20dgt. | ±0.13%rdg.±15dgt. | ❍ |
| | | | D | ±0.0035 | ±0.0030 | |
| 8 | 700 μF(1V)<br>1.45 mF(500 mV) | 70 μF(1V)<br>170 μF(500 mV) | C | ±1.2%rdg.±50dgt. | ±0.7%rdg.±40dgt. | ❍ |
| | | | D | ±0.0060 | ±0.0050 | |
| 9 | 2 mF | 200 μF | C | ±1.2%rdg.±50dgt. | ±0.7%rdg.±40dgt. | × |
| | | | D | ±0.0060 | ±0.0050 | |
| 10 | 20 mF | 2 mF | C | ±2.5%rdg.±50dgt. | ±2.0%rdg.±40dgt. | × |
| | | | D | ±0.0200±0.008×CH | ±0.0180±0.08×CH | |

[CL: Capacitance of component (pF), CH: Capacitance of component (mF)]

## LCR meter for electrolytic capacitors

### LCR HiTESTER 3511-50 CE

- High speed measurement: 5 ms (1 kHz) or 13 ms (120 Hz)
- Built-in high-speed comparator function ideal for measuring at the production line
- Source frequency: 120 Hz or 1 kHz
- Print measurement values and judgment results with the optional Printer 9442

Measurement leads are not included. Purchase the appropriate lead option for your application separately.

## Resistance tester for continuity testing of 3 terminal capacitors

### RESISTANCE HiTESTER 3541 CE

- **Wide Measurement Range**
  0.1 μΩ (20 mΩ ranges) to 110.000 MΩ
- **High Speed & High Precision Measurements**
  As fast as 0.6 ms with 70 ppm precision (in the 2 kΩ to 110 kΩ range)
- **Two types of Temperature Correction**
  Correction by Pt sensor or Infrared Thermometer
- **Low-Power Measurement Function**
  Essential for DCR measurements of chip inductors and connector contacts
- **Equipped with EXT I/O, GP-IB and RS-232C interfaces**
  Easily integrates into automated production lines
- **Data Printing**
  Print out measurement values and calculation results (with optional Printer 9670)

# Options for a wide range of applications

## • For 3504, 3504-10

**FOUR-TERMINAL PROBE 9140**
DC to 100 kHz

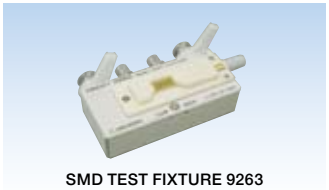
**PINCHER PROBE 9143**
DC to 5 MHz

**TEST FIXTURE 9261**
DC to 5 MHz

* 9140, 9143, 9261 cable lengths are 1 m (39.37").

## • For 3506, 3505, 3504, 3504-10

**TEST FIXTURE 9262**
DC to 5 MHz



**SMD TEST FIXTURE 9263**
DC to 5 MHz
Test sample dimensions: 1 to 10 mm

**SMD TEST FIXTURE 9677**
DC to 120 MHz
Test sample dimensions: 3.5 ± 0.5 mm

**SMD TEST FIXTURE 9699**
DC to 120 MHz
Test sample dimensions: 1.0 to 4.0 mm wide, maximum 1.5 mm high

### PRINTER 9442

Measurement values, comparator results, and BIN measurement results can be printed out on the optional Printer 9442 via the standard RS-232C interface. This is convenient if you want to attach inspection results to printed data.

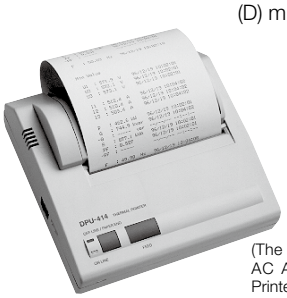
**Print sample**

```
C  198.416n F     D  0.00173
C  198.414n F     D  0.00171
C  198.410n F     D  0.00174
C  198.420n F     D  0.00347

C  198.391n F  LO  D  0.00527     HI
C  198.389n F  LO  D  0.00344     IN
C  198.403n F  IN  D  0.00175     IN
C  198.389n F  LO  D  0.00521     HI
C  198.395n F  LO  D  0.00345     IN
C  198.395n F  LO  D  0.00523     HI
```

### ■ Printer 9442 specifications

- Printing method: Thermal serial dot printer
- Paper width: 112 mm
- Print speed:52.5 cps
- Power supply: AC Adapter 9443 or supplied NiMH battery (prints 3000 lines after full charge using 9443)
- Dimensions and weight: Approx. 160 (W) × 66.5 (H) × 170 (D) mm, 580 g



(The optional Connection Cable 9444 and AC Adapter are required to connect the Printer 9442.)

## ■ Ordering infomation

**C HiTESTER 3505**
**C HiTESTER 3506**
**C HiTESTER 3504**
**C HiTESTER 3504-10**

**Probe and test fixtures are not supplied with the unit. Select an optional probe and test fixture when ordering.**

## • Optional accessories

FOUR-TERMINAL PROBE **9140**
PINCHER PROBE **9143**
TEST FIXTURE **9261**
TEST FIXTURE **9262** (direct connection type)
SMD TEST FIXTURE **9263** (direct connection type)
SMD TEST FIXTURE **9677** (direct connection type)
SMD TEST FIXTURE **9699** (direct connection type)
GP-IB CONNECTION CABLE **9151-02** (2 m/ 78.74")
GP-IB CONNECTION CABLE **9151-04** (4 m/ 157.48")
PRINTER **9442**
AC ADAPTER **9443-01** (for 9442, Japan)
AC ADAPTER **9443-02** (for 9442, EU)
AC ADAPTER **9443-03** (for 9442, USA)
CONNECTION CABLE **9444** (for 9442)
RECORDING PAPER **1196** (for 9442 / 25 m/ 984.25", 10 rolls)

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All information correct as of Oct. 17, 2007. All specifications are subject to change without notice.

3506E1-7XM-00H Printed in Japan