



C HiTESTER 3504, 3504-10

Electronic Measuring Instruments



Capable of Classifying Up to 14 Ranks with a Maximum Measurement Speed of 2 ms.

High-speed, Large-capacitance MLCC Inspection with Constant Voltage

The C HiTESTER 3504 is a capacitance measurement instrument that can measure capacitance with constant voltage, making it ideal for testing large-capacitance multilayer ceramic capacitors (MLCCs). The high-speed (2ms) measurement performance of the standard comparator and BIN functions are particularly well-suited for high-speed MLCC measurement. Featuring a compact body with easy-to-read LED display, the 3504 allows the user to check settings at a glance, and provides easy operation. In addition, the device comes equipped with an RS-232C interface, GP-IB interface, and external I/O as standard features, making it easy to build automated production lines. The C HiTESTER 3504-10 is simplified, low-cost, automated-machine version of the C HiTESTER 3504 with BIN function and GP-IB interface omitted.



ISO 9001
JMI-0216



ISO 14001
JQA-E-90091



<http://www.hioki.co.jp/>

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

BIN function provides classification into a maximum of 14 ranks



Main Features

■ 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.

■ Comparator function

The upper and lower limits can be set for the primary parameter (C) and secondary parameter (D). Evaluation results can be signaled by buzzer, indicated by LED, and output externally. Setting values are always displayed.



■ BIN function*

Measured capacitance values can be classified into up to 14 ranks according to a pre-set range, and sorting is easy.

* Available only with Model 3504.

■ Compact size

The compact and lightweight 3504 is approximately 260 (W) × 100 (H) × 220 (D) millimeters and weighs only 3.8 kg, requiring only minimum space in production lines.

■ Fastest tact time of 2 ms

(analog measurement time of 1 ms)

With a minimum measurement time of 2 ms (when frequency is 1 kHz and FAST is selected as the sample rate), the 3504 provides highly efficient measurement capabilities suitable, for example, for measuring taping machines. Select from three different measurement speeds: FAST, NORMAL, and SLOW.

■ Intuitive operation plus LED indication

3504 operations are easy to use, and can be run just by selecting them from the items displayed on the panel. The set measurement conditions are indicated by LED, allowing you to check setting conditions at a glance.

■ Trigger-synchronous output function

The measurement signal is output and applied to the component only when the trigger is applied for measurement. Since large currents do not flow when contact is made with components, wear on contact points is reduced.

■ Memory for 99 sets of measurement conditions

Up to 99 sets of measurement conditions can be stored in memory, making it possible to deal quickly with frequent component changes on flexible production lines. Any measurement condition can be loaded by integrating the EXT I/O interface.

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 9697



Printer output

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.



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

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

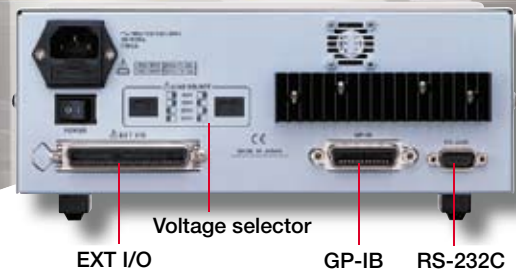
■ Printer 9442 specifications

●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

High-speed measurement time of up to 2 ms is ideal for measuring MLCC taping machines

Equipped with standard EXT I/O, RS-232C, and GP-IB*

* Only the 3504 comes standard with GP-IB.



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.

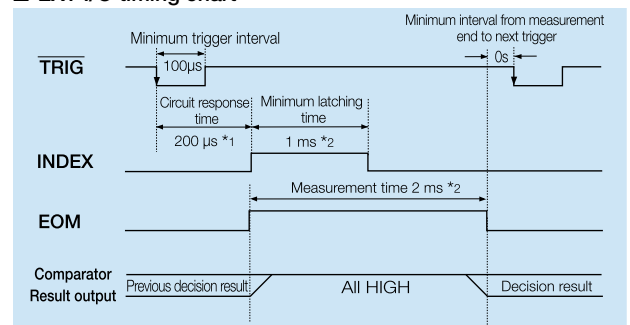
EXT I/O signals	
● Input signals <ul style="list-style-type: none"> External DC power supply (can be provided by an external source) External trigger signal Signals for selected panel number (measurement conditions) Valid panel number signal 	● Output signals <ul style="list-style-type: none"> Internal DC power supply (+5 V output) Comparator result output signal (primary and secondary parameter and AND output signals) BIN measurement result output signal End-of-analog-measurement signal End-of-measurement signal

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 interface available only with Model 3504.

EXT I/O timing chart



*1. The response time is approx. 1 sec. when loading a new panel number using the panel load function.

*2. The reference value for a 1 kHz measurement frequency when measurement speed is set to FAST

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

Specifications

Measurement items	C (capacitance), D (dissipation factor tanδ)
Measurement frequency	120 Hz or 1 kHz
	Accuracy: ±0.01% or less
Measurement signal level	(1) Constant voltage mode: 500 mV or 1 V
	CV 1V measurement range: Range up to 70 µF (1 kHz)
	Range up to 700 µF (120 Hz)
	CV 500 mV measurement range: Range up to 170 µF (1 kHz)
	Range up to 1.45 mF (120 Hz)
	Signal level accuracy: ±10% ±5 mV
	(2) Open terminal voltage mode: 500 mV or 1 V
	Measurement range: Other than the above
	Output resistance: 5Ω ±1Ω
	Signal level accuracy: ±10% ±5 mV
Measurement range	C; 0.9400 pF to 20.0000 mF
	D; 0.00001 to 1.99000
Equivalent circuit mode	Straight/parallel equivalent circuit mode (Auto/Manual)
Measurement time	Nominal 2 ms (1 kHz, FAST)
	(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	C; 14 ranks, D-NG, OUT OF BINS
(*Only possible for the 3504)	Absolute value setting, Δ% setting

Load compensation: Function to measure a reference component and compensate the measured value

Comparator: C; HI / IN / LO, D: HI / IN / LO

Absolute value setting, Δ% setting

Panel save and load: Up to 99 sets of measurement conditions can be saved.

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)

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

Conformance standards: EMC; EN61326: 1997+A1:1998+A2:2001+A3:2003 Class A

EN61000-3-2:2000

EN61000-3-3:1995+A1:2001

Safety; EN61010-1:2001, pollution degree 2

Supplied accessories: Power cord, grounding adapter, spare fuse

Measurement accuracy and range

Guaranteed accuracy for temperature and humidity ranges:
23 ±5°C, 80% RH or less (no condensation)

Warm-up time: 1 hour

■ **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.

$$\text{Measurement accuracy} = \text{basic accuracy} \times \mathbf{B} \times \mathbf{C} \times \mathbf{D} \times \mathbf{E}$$

[B: Measurement signal level coefficient]

1V: 1, 500 mV: 1

[C: Measurement speed coefficient]

FAST: 1.5, NORMAL: 1.2,

SLOW: 1

[D: Cable length coefficient]

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		Parameter	Basic accuracy		CV operation
	120Hz	1kHz		120Hz	1kHz	
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) 1.45 mF(500 mV)	70 μF(1V) 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)]

Options for a wide range of applications

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



FOUR-TERMINAL PROBE 9140
DC to 100 kHz



PINCHER PROBE 9143
DC to 5 MHz



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



TEST FIXTURE 9261
DC to 5 MHz



TEST FIXTURE 9262
DC to 5 MHz



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



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

■ Ordering information

C HiTESTER 3504

C HiTESTER 3504-10

● 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)

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

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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