



## 3503 C HiTESTER

Components measuring instruments



## High-speed MLCC Inspection with Constant Voltage

The 3503 C HiTESTER is a capacitance measurement instrument that can measure capacity with constant voltage, making it ideal for testing large-value multilayer ceramic capacitors (MLCCs). The high-speed (4-ms) measurement performance of the standard comparator and phase-synchronous functions are particularly well-suited for high-speed MLCC measurement. Featuring a compact body with easy-to-read LED display, the 3503 allows the user to check settings at a glance, as well as provide easy operation. In addition, the device comes equipped with an RS-232C interface and external I/O as standard features, providing a low-cost means of building automated production lines and reducing production line tact time.



ISO14001  
JQA-E-90091



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# Speedy and compact for greater line efficiency



## ■ Constant voltage measurement

The 3503 can perform constant voltage measurement at 1 V or 500 mV, and supports voltage-dependent measurements. Select from a measurement frequency of 120 Hz or 1 kHz.

## ■ Minimum measurement time of 4 ms

With a minimum measurement time of 4 ms (when frequency is 1 kHz and FAST is selected as the sampling rate), the 3503 provides highly efficient measurement capabilities. Select from three different measurement speeds: FAST, NORMAL, and SLOW.

## ■ Comparator function

The various upper and lower limits can be set for the main parameter (C) and sub-parameter (D). Evaluation results can be signaled by buzzer, LED indication, and external output. Logical ANDing is performed for the output evaluation results of the main and sub parameters.

## ■ Memory for 99 sets of measurement conditions

Up to 99 sets of measurement conditions, including comparator values, can be stored in memory, making it possible to quickly deal with frequent component changes on flexible production lines. These conditions can be changed externally using EXT I/O.

## ■ Phase-synchronous function

When using multiple 3503 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.

## ■ Compact size

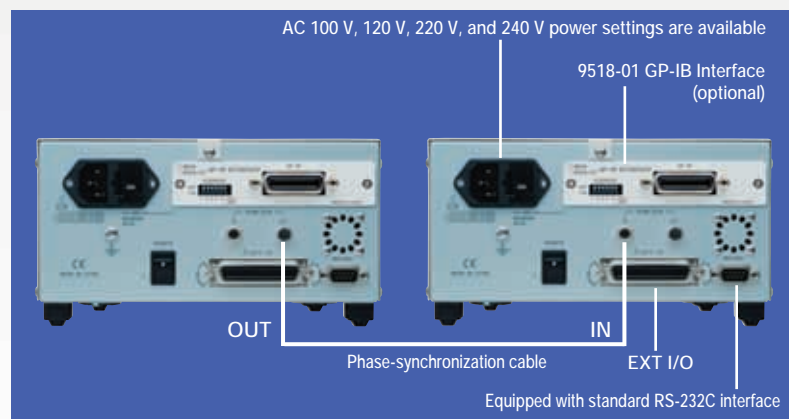
The compact and lightweight 3503 is approximately 210 W x 100 H x 168 D millimeters and weighs only 2.5 kg, requiring only minimal space in production lines.

## ■ Simple operations that are easy to use plus LED indication

3503 operations are easy to use, and can be run just by selecting them from the items displayed on the panel. Measurement conditions set are indicated by LED, allowing you to check setting conditions at a glance. Because measurement values are also indicated by LED, the display is easily visible even when using the device in dark locations.

## ■ 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.



## ■ Printer output

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

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

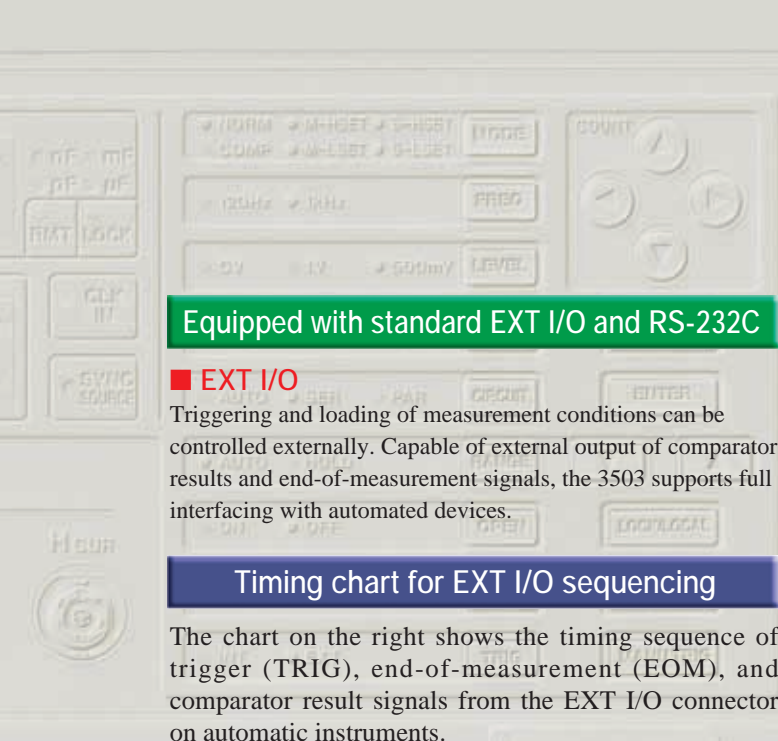


### Print sample

C	984.16n	F	D	0.0017		
C	984.14n	F	D	0.0017		
C	984.10n	F	D	0.0017		
C	984.20n	F	D	0.0034		
C	983.91n	F	LO	D	0.0052	HI
C	983.89n	F	LO	D	0.0034	IN
C	984.03n	F	IN	D	0.0017	LO
C	983.89n	F	LO	D	0.0052	HI
C	983.95n	F	LO	D	0.0034	IN
C	983.95n	F	LO	D	0.0052	HI

## ■ 9442 Printer specifications

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



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

**EXT I/O**

Triggering and loading of measurement conditions can be controlled externally. Capable of external output of comparator results and end-of-measurement signals, the 3503 supports full interfacing with automated devices.

**Timing chart for EXT I/O sequencing**

The chart on the right shows the timing sequence of trigger (TRIG), end-of-measurement (EOM), and comparator result signals from the EXT I/O connector on automatic instruments.

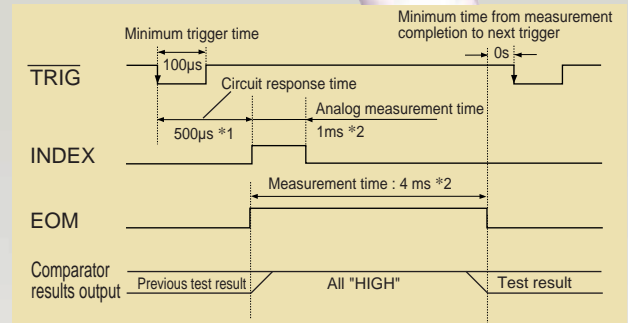
EXT I/O signals	
<ul style="list-style-type: none"> <li>● <b>Output signals</b></li> <li>● Internal DC power supply (+5 V output)</li> <li>● Comparator result output signal (main and sub parameter and ANDED output signals)</li> <li>● End-of-analog-measurement signal</li> <li>● End-of-measurement signal</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Input signals</b></li> <li>● External DC power supply (+5 to 24 V can be provided by an external source)</li> <li>● External trigger signal</li> <li>● Signals for selected measurement conditions (including comparator conditions)</li> </ul>

**RS-232C interface**

Except for turning the instrument's power on and off, all other functions for the 3503 can be controlled from a computer. This allows efficient handling when controlling or processing data in batches on a computer or when setting measurement conditions. The GP-IB interface can be installed as an option.

**3503 specifications**

Measurement items	: C (capacitance), D (loss coefficient tanδ)
Measurement frequency	: 120 Hz or 1kHz Accuracy : ±0.01% or less
Measurement signal level	: 1 V or 500 mV CV 1 V measurement range : Range up to 17 μF (1kHz) Range up to 145 μF(120Hz) CV 500 mV measurement range : Range up to 170 μF(1kHz) Range up to 1.45 mF(120Hz) Accuracy : ±10% ±5mV
Measurement range	: C : 0.940 pF to 14.500 mF (5-digit display) D : 0.0001 to 1.9900
Equivalent circuit mode	: Straight/parallel equivalent circuit mode, Auto/Manual
Measurement time	: Nominal 4 ms ±1 ms (1kHz, FAST) (The measurement period 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.
Trigger-synchronous output function	: A measurement signal can be applied only when performing measurement.
Comparator	: The various upper and lower limits can be set for the main parameter (C) and sub parameter (D).
Panel Save and Load	: Up to 99 sets of measurement conditions can be saved. Load method : Front panel key operation, external I/O.



\*1. The response time when reading a new panel number using the panel load function is approximately one second.

\*2. Measurement frequency: 1 kHz, measurement speed: Reference value when the sampling rate is set to "FAST"

**RS-232C interface specifications**

- Transfer method: Start-stop transfer
- Data length: 8 bits
- Stop bit: 1 bit
- Handshaking: Hardware
- Connector configuration: 9-pin D-sub (male)
- Connection cable: Cross-wired
- Transfer speed: 9600 bps
- Parity: None
- Delimiter: CR+LF

Audible buzzer	: The buzzer can be set on or off according to the comparator evaluation result ("IN" or "NG").
Interface	: RS-232C and EXT I/O (standard) GP-IB (optional)
Phase-synchronous function	: Phase-synchronous measurement is possible when using multiple units.
Printer function	: Measurement values can be printed. (The 9442 Printer and optional 9444 Connection Cable 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	: Indoor, 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	: 40 VA max.
Dimensions and mass	: Approx. 210 H×100 W×168 D mm, 2.5 kg
Conformance standards	: E M C : EN61326-1 : 1997+A1 : 1998 EN61000-3-2 : 1995+A1 : 1998+A2 : 1998 EN61000-3-3 : 1995 Safety : EN61010-1 : 1993+A2 : 1995 Power Supply : Pollution Degree 2, Overvoltage Category II (anticipated transient overvoltage 2500 V)
Supplied accessories	: Power cord, spare fuse



## Measurement accuracy and range

Measurement area: C: 0.940 pF to 14.500 mF; D: 0.0001 to 1.9900

### ■ Basic accuracy (when $\leq D 0.1$ )

Conditions: Measurement speed: SLOW, measurement signal level: 1 V, after open/short compensation is performed, cable length: 0 m (CL: capacitance of component (pF))

Range No.	Measurement range		Output impedance		Accuracy		
	120 Hz	1k Hz	500 mV	1 V	Parameter	120 Hz	1 kHz
1	145 pF	17 pF	0.1Ω or less	0.1Ω or less	C	$\pm (1.70 + 250 / CL) \%$	$\pm (1.70 + 30 / CL) \%$
					D	$\pm (0.0120 + 2 / CL)$	$\pm (0.0120 + 0.25 / CL)$
2	1.45 nF	170 pF			C	$\pm (0.17 + 250 / CL) \%$	$\pm (0.17 + 30 / CL) \%$
					D	$\pm (0.0020 + 2.2 / CL)$	$\pm (0.0020 + 0.265 / CL)$
3	14.5 nF	1.7 nF			C	$\pm 0.34 \%$	$\pm 0.34 \%$
					D	$\pm 0.0036$	$\pm 0.0036$
4	145 nF	17 nF			C	$\pm 0.16 \%$	$\pm 0.16 \%$
					D	$\pm 0.0020$	$\pm 0.0020$
5	1.45 μF	170 nF			C	$\pm 0.15 \%$	$\pm 0.15 \%$
					D	$\pm 0.0016$	$\pm 0.0016$
6	14.5 μF	1.7 μF			C	$\pm 0.15 \%$	$\pm 0.10 \%$
					D	$\pm 0.0020$	$\pm 0.0016$
7	145 μF	17 μF			C	$\pm 0.40 \%$	$\pm 0.20 \%$
					D	$\pm 0.0035$	$\pm 0.0030$
8	1.45 mF	170 μF		5±1Ω	C	$\pm 1.50 \%$	$\pm 1.00 \%$
					D	$\pm 0.0060$	$\pm 0.0050$
9	14.5 mF	1.7 mF	5±1Ω		C	$\pm 2.50 \%$	$\pm 2.10 \%$
					D	$\pm 0.0200$	$\pm 0.0180$

### Options to broaden the utility range of the 3503 C HiTESTER

\* The cable length for the 9140, 9143, and 9261 is 1 m.



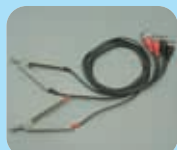
9261 TEST FIXTURE  
DC to 5 MHz



9263 SMD TEST FIXTURE  
DC to 5 MHz



9268 DC BIAS VOLTAGE UNIT  
Maximum applied voltage: DC±40 V



9140 FOUR-TERMINAL PROBE  
DC to 100 kHz



9143 PINCHER PROBE  
DC to 5 MHz



9262 TEST FIXTURE  
DC to 5 MHz



9677 SMD TEST FIXTURE  
DC to 120 MHz



9679 CONNECTION CABLE  
Cable length: 50 cm

## 3503 C HiTESTER

The test fixture is not supplied with the unit. Please purchase the optional test fixture.

### ■ Options

9140 FOUR-TERMINAL PROBE

9143 PINCHER PROBE

9261 TEST FIXTURE

9262 TEST FIXTURE (direct connection type)

9263 SMD TEST FIXTURE (direct connection type)

9677 SMD TEST FIXTURE (direct connection type)

9268 DC BIAS VOLTAGE UNIT

9165 CONNECTION CORD (for 9268/9269; BNC to BNC; 1.5 m)

9166 CONNECTION CORD (for 9268/9269; BNC to clips; 1.5 m)

9679 CONNECTION CABLE (phase-synchronization cable; 50 cm)

9518-01 GP-IB INTERFACE

9151-02 GP-IB CONNECTION CABLE (2 m)

9151-04 GP-IB CONNECTION CABLE (4 m)

9442 PRINTER

9443-01 AC ADAPTER (for 9442, Japan)

9443-02 AC ADAPTER (for 9442, EU)

9443-03 AC ADAPTER (for 9442, USA)

9444 CONNECTION CABLE (for 9442 / 1.5 m/59.05")

1196 RECORDING PAPER (for 9442 / 25 m/984.25", 10 rolls)

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