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## Application Note 369–4

# Recommending Electronic Manufacturers to Perform Incoming Inspection

## – HP 4284A Precision LCR Meter –

### Introduction

The following types of problems occur in the development and manufacturing stages of electronic instruments.

- Although the components meet manufacturer's specifications, they exhibit different characteristics when they are integrated in a circuit.
- A part from one manufacturer substituted for that of another manufacturer shows different characteristics when it is mounted in a circuit, despite the fact that both parts are supposed to have identical specifications.
- A part that met the design values in the development department shows different characteristics on the production line.

These instances are due to the fact that the conditions of the standard specifications offered by the manufacturer do not correspond to the actual operating conditions under which the part is used. Often characteristics which are not covered in the specifications influence the characteristics of the entire circuit. In addition, the high performance and versatility of recent electronic instruments increase the cost and the amount of work required when malfunctions are turned up by inspections performed after the parts were included in a circuit or an instrument. This situation can be corrected by conducting incoming inspections to select the parts that will exhibit the required characteristics when the parts are integrated into an actual circuit. Such inspections will improve the reliability of the instrument and increase yield figures as well.

### Difficulties and Requirements of Impedance Measurements During Incoming Inspection

The following are some of the difficulties and requirements that accompany incoming inspection of passive components.

1. A great many types of measurements requiring a variety of measuring conditions have to be carried out during incoming inspection. However, as measurement instruments cannot perform all of the measurements required, substitute measurements are made. On the other hand, purchasing all of the necessary measuring equipment would substantially increase capital costs. Since the measuring instruments used differ from those used by the development department, measuring conditions differ and incoming inspection results may not be valid for the actual operating conditions.
2. Test fixtures and other factors influence the reliability of the measurements.
3. A measurement instrument should be able to measure many different types of devices, and it should respond quickly and accurately to frequently changing measurement conditions.
4. Measurement instruments of greater efficiency to cope with the increasing number of samples are required.
5. When a scanner is used, the deviation of the different channels cause discrepancies in measuring values.

Conventional measurement instruments cannot cope with the difficulties or meet the demands outlined above.

### Solutions Offered by the HP 4284A

1. Measurement Conditions that Satisfy a Large Number of Demands
  - Measurements over a wide frequency range from 20 Hz up to 1 MHz.
  - The voltage of the measured signal can be set up to 20 Vrms<sup>1</sup> and the current of the signal up to 200 mArms<sup>2</sup>.
  - The ALC<sup>3</sup> function allows measurements of constant-voltage (10 mV - 10 V)<sup>4</sup> and constant-current (100  $\mu$ A - 100 mA)<sup>5</sup> signals.
  - $\pm$ 40 V DC bias source is built-in<sup>6</sup>.
2. Highly accurate measurements (C: 0.05%, D: 0.0005)<sup>7</sup> and a powerful error compensating functions reduce the influence of test fixtures to a minimum and raises the reliability of the HP 4284A's measurements.
3. A memory card facilitates the chores of setting up the instrument.
4. An built-in comparator that can be set to sort into a maximum of 10 BINs.
5. With a scanner interface<sup>8</sup> that allows channel compensation of up to 128 channels to reduce discrepancies in measurement values for different channels.

### Measurement Example

Figure 1 shows the setup menu displayed on the HP 4284A's large Liquid Crystal Display to facilitate setup. Figure 2 shows an example of selecting capacitors that would be performed during incoming inspection. The limit value is set and distributed by BIN value. Figure 3 shows a conceptual application of the scanner.

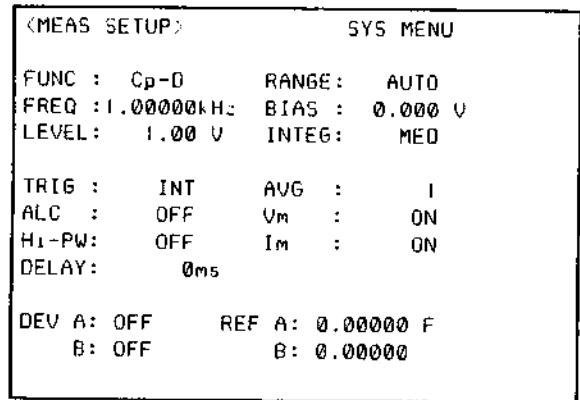


Figure 1. Setup Menu

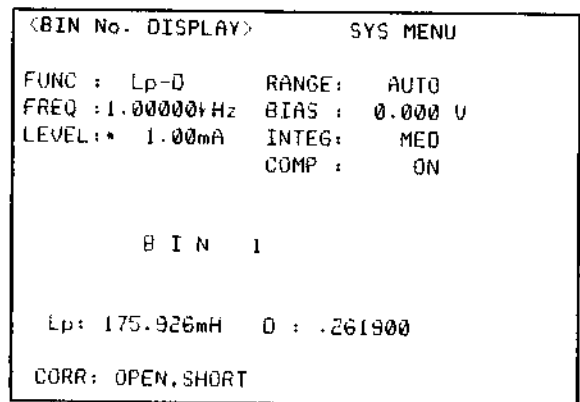


Figure 2. Measurement Using the built-in Comparator

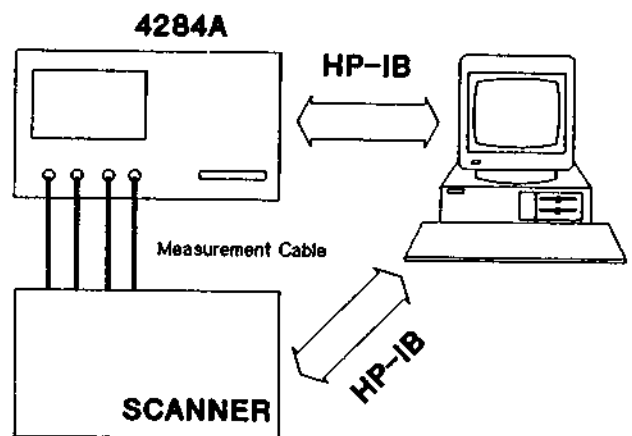


Figure 3. Concept Drawing Showing Scanner in Use

## Conclusion

The HP 4284A Precision LCR Meter features a wide measuring frequency range and signal sources to enable measurements under actual conditions. This, in combination with its ease of operation, and its high reliability, makes it the measurement instrument that satisfies all the varying demands of impedance measurements performed by electronics manufacturer during incoming inspection.

<sup>1, 2</sup>, When Option 001 is used.

<sup>3</sup> Automatic level control

<sup>4, 5, 6</sup> When option 001 is used.

<sup>7</sup> At measurement frequencies above 50 Hz.

<sup>8</sup> When option 301 is used.



For more information, call your local HP sales office listed in the telephone directory white pages. Ask for the Electronic Instrument Department, or write to Hewlett-Packard. **U.S.A.** - P.O. Box 10301, Palo Alto, CA 94303-0890. **Europe** - Hewlett-Packard S.A., P.O. Box 529, 1180 AM Amstelveen, The Netherlands. **Canada** - 6877 Goreway Drive, Mississauga, L4V 1M8, Ontario. **Japan** - Yokogawa-Hewlett-Packard Ltd., 3-29-21, Takaide-Higashi, Suginami-ku, Tokyo 168. **Far East** - Hewlett-Packard Asia Headquarters, 47/F China Resources Building, 26 Harbour Road, Wanchai Hong Kong. **Australasia** - Hewlett-Packard Australia Ltd., 31-41 Joseph Street, Blackburn, Victoria 3130 Australia. **Latin America** - Hewlett-Packard Latin America Headquarters, 3495 Deer Creek Rd., Palo Alto, CA 94304. For all other areas, please write to: Hewlett-Packard Intercontinental Headquarters, 3495 Deer Creek Rd., Palo Alto, CA 94304.

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