

# Keysight 16380C Capacitance Standard Set



NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to [www.keysight.com](http://www.keysight.com).



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## Manual Printing History

The manual's printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates that are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

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November 2000	Edition 4 (part number: 16380-90211)
June 2001	Edition 5 (part number: 16380-90221)
February 2015	Edition 6 (part number: 16380-90221)

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## Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

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### NOTE

16380C comply with INSTALLATION CATEGORY I and POLLUTION DEGREE 2 in IEC61010-1. 16380C are INDOOR USE product.

- DO NOT Substitute Parts Or Modify Instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Keysight Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

- Dangerous Procedure Warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

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## Safety Symbol

General definitions of safety symbols used on the instrument or in manuals are listed below.



Instruction Manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instrument manual.

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### WARNING

**This warning sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.**

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### CAUTION

This Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

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### NOTE

Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

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## Certification

Keysight Technologies certifies that this product met its published specifications at the time of shipment from the factory. Keysight Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility, or to the calibration facilities of other International Standards Organization members.

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## Warranty

This Keysight Technologies instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its

component products. Instruments are warranted for a period of one year. Fixtures and adapters are warranted for a period of 90 days. During the warranty period, Keysight Technologies Company will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Keysight Technologies. Buyer shall prepay shipping charges to Keysight Technologies and Keysight Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Keysight Technologies from another country.

Keysight Technologies warrants that its software and firmware designated by Keysight Technologies for use with an instrument will execute its programming instruction when properly installed on that instrument. Keysight Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

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## Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

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### IMPORTANT

No other warranty is expressed or implied. Keysight Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

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## Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Keysight Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

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## Assistance

Product maintenance agreements and other customer assistance agreements are available for Keysight Technologies products.

For any assistance, contact your nearest Keysight Technologies Sales and Service Office. Addresses are provided at the back of this manual.

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# **General Information**

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**Description**

The Keysight 16380C Capacitance Standard Set consists of three precision capacitors 0.01  $\mu\text{F}$  (16385A), 0.1  $\mu\text{F}$  (16386A), and 1  $\mu\text{F}$  (16387A). One precision capacitor 10  $\mu\text{F}$  (16388A) is also added with the option. All four capacitors have high capacitance stability and are virtually unaffected by changes in environmental temperature, ensuring measurement repeatability and reliability.

The 16380C was designed for use in calibrating precision impedance measuring instruments (such as LCR meters, impedance analyzers, etc.) that have capacitance ranges between 0.01  $\mu\text{F}$  and 10  $\mu\text{F}$ . The 16380C can be used to directly certify capacitance measurement accuracy over the 0.01  $\mu\text{F}$  to 10  $\mu\text{F}$  range.

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**Contents**

The 16380C contents are listed in Table 1-1.

**Table 1-1**

<b>Description</b>	<b>Keysight Part No.</b>	<b>Qty.</b>
16385A (0.01 $\mu\text{F}$ )	Not Assigned	1
16386A (0.1 $\mu\text{F}$ )	Not Assigned	1
16387A (1 $\mu\text{F}$ )	Not Assigned	1
16388A (10 $\mu\text{F}$ ) (option 001)	Not Assigned	1
BNC(f)-(f) Adapters	1250-0080	4
Case	16380-85104	1
Calibration Report	Not Assigned	1
Operating Note (This Manual)	16380-90221	1

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**Initial Inspection**

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically. The contents of the shipment should be as shown in Table 1-1. If the shipment is incomplete, or if there is mechanical damage or defects, notify the nearest Keysight office. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as the Keysight office. Keep the shipping materials for carrier's inspection. The Keysight office will arrange for repair or replacement at Keysight Option, without waiting for claim settlement.

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## **Specifications and Supplemental Performance Characteristics**

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## Specifications

**Table 2-1**

Model	16385A	16386A	16387A	16388A (opt.001)
Nominal Value <sup>*1</sup>	0.01 $\mu$ F	0.1 $\mu$ F	1 $\mu$ F	10 $\mu$ F
Nominal Accuracy <sup>*1</sup>	$\pm 0.1\%$			$\pm 0.05\%$
Dissipation Factor <sup>*1</sup>	$\leq 4 \times 10^{-4}$	$\leq 5 \times 10^{-4}$	$\leq 7 \times 10^{-4}$	$\leq 5 \times 10^{-4}$

\*1. Specified at 1kHz under the following ambient conditions:  
Temperature:  $23 \pm 5^\circ\text{C}$

### Operating Conditions

Ambient Temperature:  $23 \pm 5^\circ\text{C}$

Relative Humidity: Less than 70% RH

### Dimensions

16385A, 16386A, 16387A, and 16388A (opt.001): 142(W)  $\times$  88(D)  $\times$  112(H) mm

Carrying Case: 355(W)  $\times$  340(D)  $\times$  170(H) mm

### Weight

16385A, 16386A, and 16387A: approximately 1.3 kg each

16388A (opt.001): approximately 1.7 kg

Total: approximately 7.0 kg

(Includes three capacitance standards, a carrying case, and four BNC adapters)

approximately 8.7 kg

(Includes four capacitance standards, a carrying case, and four BNC adapters)

### Accessories Furnished

BNC (f)-(f) Adapters, 4ea: PN 1250-0080

Carrying Case, 1ea.: PN 16380-85104

Operating Note, 1ea.: PN 16380-90221

## Supplemental Performance Characteristics

### Capacitance Temperature Coefficient

16385A, 16386A, 16387A, and 16388A (opt.001): -20 to 35 ppm/°C

### Capacitance Stability

16385A, 16386A, 16387A, and 16388A (opt.001): <50ppm/year @ 1kHz, 23±5°C

### Maximum Allowable Voltage/Current

16385A, 16386A, 16387A, and 16388A (opt.001): 40 V peak (ac+dc)/100 mA rms

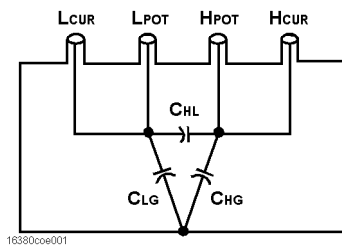
### Residual Capacitance

**Table 2-2**

	16385A	16386A	16387A	16388A (opt.001)
$C_{HG}^{*1}$	<20 pF	<20 pF	<35 pF	<50 pF
$C_{LG}^{*1}$	<20 pF	<20 pF	<35 pF	<50 pF

\*1.: See figure below.

**Figure 2-1**



$C_{HL}$ : 4 terminal capacitance

$C_{HG}$ ,  $C_{LG}$ : Stray capacitance to guard

### Storage Conditions

Temperature: -10°C to +55°C

Relative Humidity: Less than 85% RH at 40°C

Specifications and Supplemental Performance Characteristics  
**Supplemental Performance Characteristics**

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**3 Service**

## **Calibration**

Keysight will calibrate the 16380C. For complete information (price, time required, etc.) on how to have the 16380C calibrated, contact the nearest Keysight Sales and Service Office.

## **Recommended Calibration Cycle**

The 16380C should be calibrated at least once a year. More frequent calibration may be required if the 16380C is used in very hot or very cold environments.

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## **Repair**

The 16380C contains no replaceable components. If one of the capacitors becomes damaged, or if its capacitance value is outside specified Limits, the capacitor must be replaced. For complete information on service, contact the nearest Keysight Sales and Service Office.



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