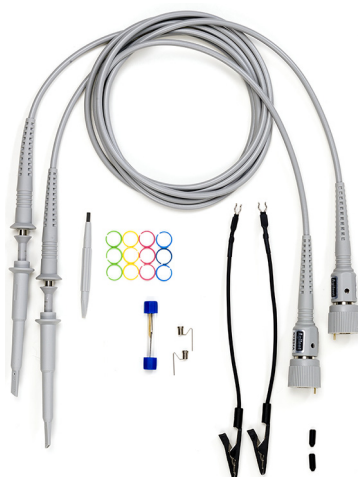


# N2894-60002 Passive Probe

User's  
Guide



# Manual Part Number

N2894-97001

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## Notices

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## Safety Notices

This apparatus has been designed and tested in accordance with IEC 61010-031, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

**CAUTION.** A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

**WARNING.** A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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## Introduction

The N2894-60002 passive probe is compatible with Keysight InfiniiVision and Infiniium Series oscilloscopes with 1 M $\Omega$  input and provides up to 700 MHz bandwidth on DSOX/MSOX 4000A-series oscilloscopes. The product number for replacement probe is N2894A or you may choose any of the N2870A–76A Series for other bandwidth and characteristics.

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**NOTE**

For more information on the single-pack version of N2894-60002, go to [www.keysight.com](http://www.keysight.com) and search on N2894A. Then, click on Manuals, and download the user's guide (with the literature number, N2876-97003). The accessories provided with your N2894A may be a reduced set from that listed in the user's guide. You can also locate the user's guide in the Probe Resource Center (PRC). The PRC is the online documentation that contains manuals, application notes, data sheets, videos, SPICE models, and more for your Keysight oscilloscope probes. Visit <http://www.keysight.com/find/PRC> to access the PRC.

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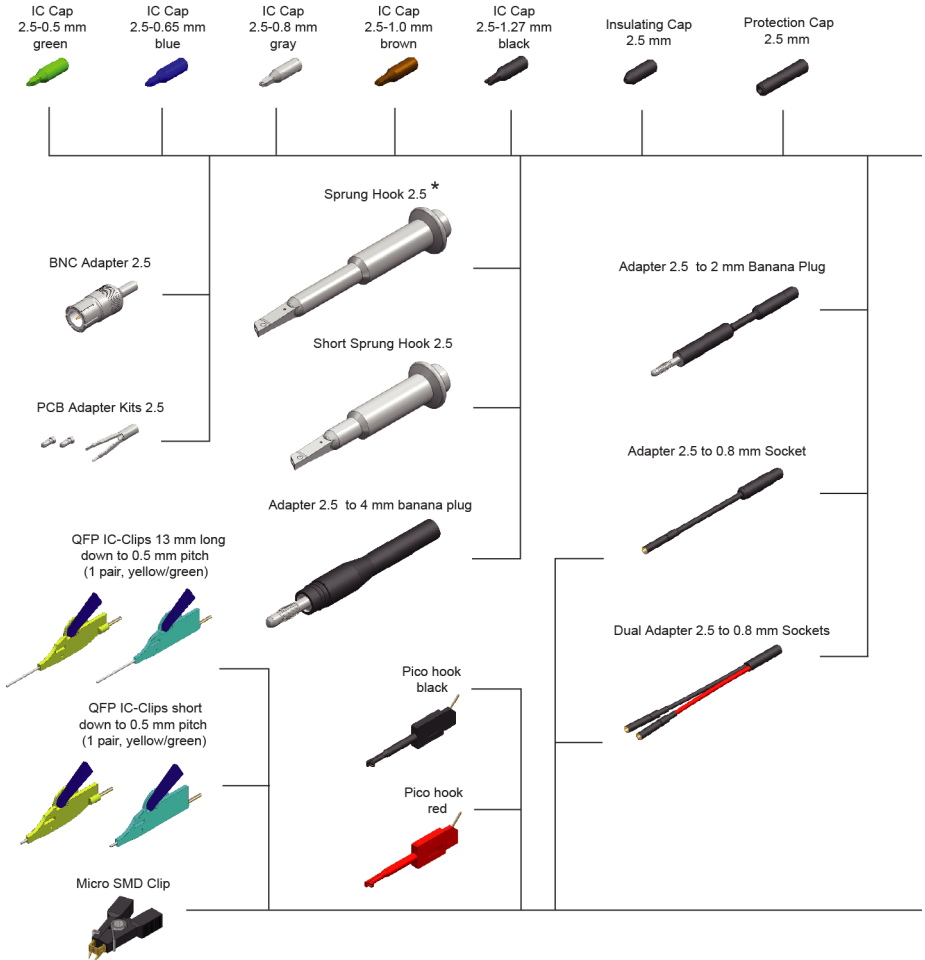
## Supplied Accessories

**Table 1 Supplied Accessories**

Accessory	Quantity
2.5 mm passive probes	2
Sprung hook tip	2
Trimmer tool	1
Channel identification rings, 3 x 4 colors	1
Spring-loaded probe tips, 0.5 mm	2
Rigid probe tip, 0.5 mm	2
Ground spring 2.5 mm	2
Ground lead 15 cm	2
Insulating cap	2

## Available Accessories

The available accessories shown in this picture are listed in [Table 2](#) with their associated accessory kits.



\* See ratings for the Sprung Hook 2.5 accessory on [page 9](#).

# Available Accessories

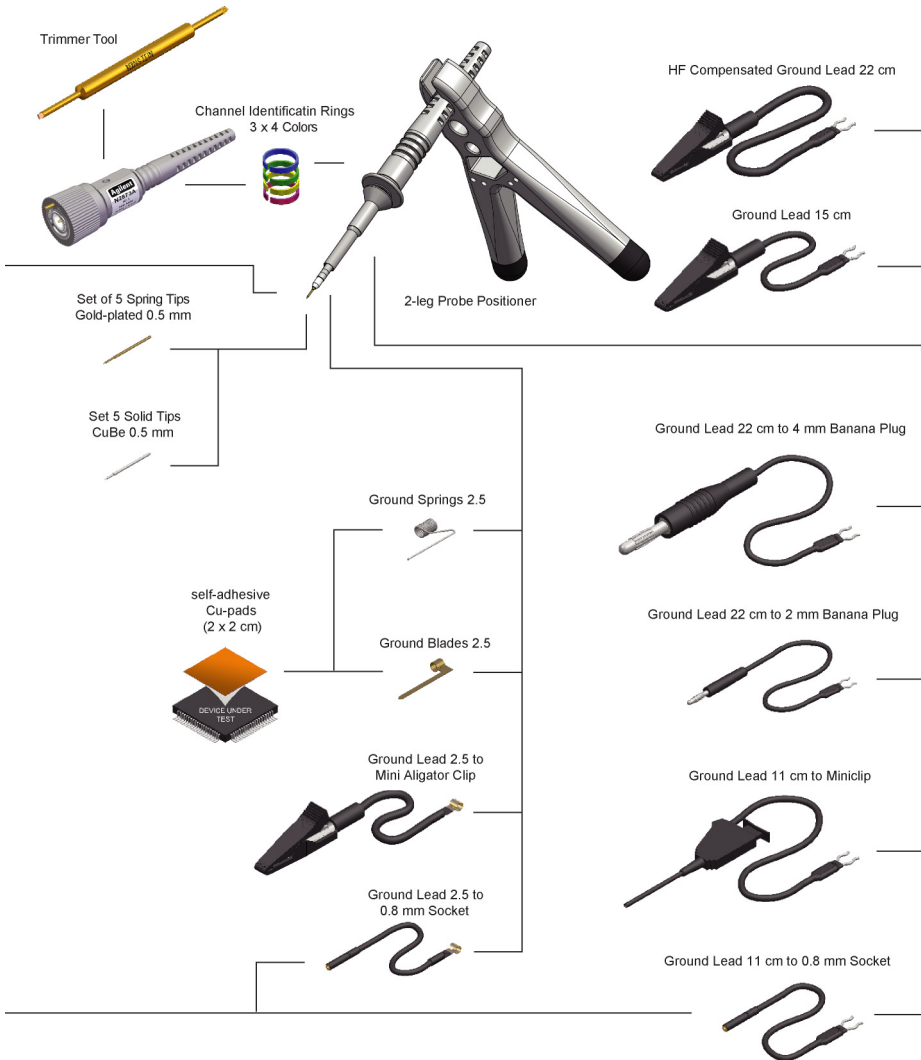


Table 2 Accessory Quantity in Kits (Sheet 1 of 2)

Optional Accessory	N2877A Deluxe Kit	N2879A Fine Pitch Kit	N2878A General Purpose Kit	N2885A PCB Socket Adapter Kit	Accessory P/N
IC Cap 2.5 - 0.5 mm green	3	3	1	–	0960-2983
IC Cap 2.5 - 0.65 mm blue	3	3	1	–	0960-2984
IC Cap 2.5 - 0.8 mm gray	3	3	1	–	0960-2988
IC Cap 2.5 - 1.0 mm brown	3	3	1	–	0960-2989
IC Cap 2.5 - 1.27 mm black	3	3	1	–	0960-2986
Insulating Cap 2.5 mm	1	1	1	–	0960-2985
Protection Cap 2.5 mm	1	1	1	–	0960-2996
LF Compensation Trimmer Tool	1	–	–	–	–
HF Compensated Ground Lead 22 cm	1	–	–	–	0960-2993
Ground Lead 22 cm to 4 mm banana plug	1	–	–	–	–
Ground Lead 22 cm to 2 mm banana plug	1	–	–	–	–
Ground Lead 11 cm to miniclip	1	–	–	–	0960-2977
Ground Lead 11 cm to 0.8 mm socket	1	–	–	–	0960-2978
Ground Spring 2.5 mm	3	3	–	–	0960-2980
Self-adhesive Cu-pads (2 x 2 cm)	10	10	10	–	0960-2908
Ground Blade 2.5 mm	3	3	1	–	0960-2982
Ground Lead 2.5 to mini Alligator Clip	1	–	–	–	0960-2991
Ground Lead 2.5 to 0.8 mm socket	1	–	–	–	0960-2994
Set of 5 Spring Tips Gold-plated 0.5 mm	1	1	1	–	0960-2981
Set of 5 Solid Tips CuBe 0.5 mm	1	1	1	–	0960-2979
Adapter 2.5 to 2 mm banana plug	1	–	–	–	–

## Available Accessories

**Table 2 Accessory Quantity in Kits (Sheet 2 of 2)**

Optional Accessory	N2877A Deluxe Kit	N2879A Fine Pitch Kit	N2878A General Purpose Kit	N2885A PCB Socket Adapter Kit	Accessory P/N
Adapter 2.5 to 0.8 mm socket	2	–	–	–	0960-2990
Dual Adapter 2.5 to 0.8 mm sockets	2	2	–	–	0960-2898
Sprung Hook 2.5 mm	1	–	1	–	0960-2905
Short Sprung Hook 2.5 mm	1	–	–	–	0960-2907
Adapter 2.5 to 4 mm banana plug	1	–	–	–	–
Pico Hook black	2	2	–	–	–
Pico Hook red	2	2	–	–	–
BNC Adapter 2.5 mm	1	–	–	–	0960-2987
PCB Adapter Kit 2.5 mm	1	10	–	25	–
QFP IC-Clips 13 mm long down to 0.5 mm pitch (1 pair yellow/green)	2	2	–	–	0960-2992
QFP IC-Clips short down to 0.5 mm pitch (1 pair yellow/green)	2	2	–	–	0960-2995
Ground Lead 15 cm	1	–	1	–	0960-2906
Channel Identification Rings, 4 colors	3	–	3	–	–
2-leg Probe Positioner	1	1	–	–	N2786-60001
Micro SMD Clip	1	2	–	–	–



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## Ratings for Sprung Hook 2.5 Accessory

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Maximum Rated Input Voltages, CAT II <sup>a</sup>

Pollution Degree: 2

Measurement Category II: 300 V CAT II

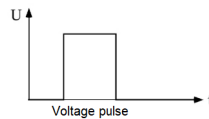
Maximum Rated Input Voltages, No Measurement Category, not in CAT II, III, IV <sup>a</sup>

Pollution Degree: 2

No Measurement Category: 400 V / 1650 V peak

Maximum Pulse Rating, No Measurement Category, not in CAT II, III, IV <sup>a</sup>

$U_{\text{pulse}}^b = 1650 \text{ V}$  (Step 0 V to 1650 V)



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a) As defined in IEC 61010-031. See definitions explained on [page 18](#).

b) No overshoot permitted

## Characteristics and Specifications

This section lists the characteristics and specifications for the probes. The probe and oscilloscope should be warmed up for at least 20 minutes before any testing and the environmental conditions should not exceed the probe's specified limits.

**Table 3 Electrical and Mechanical Characteristics**

Description	Characteristic
Attenuation ratio	10:1
Bandwidth (-3 dB)	700 MHz <sup>a</sup>
Probe Risetime (10%-90%)	500 ps
Maximum Rated Input Voltage	400 V mains isolated <sup>b, c</sup> , 300 V CAT II <sup>d</sup>
Input Resistance (scope + probe)	10 MΩ
Input Capacitance (system)	9.5 pF
Compensation Range	10 - 25 pF
Input Coupling of the Measuring Instrument	1 MΩ
Weight (probe only)	48 g
Cable Length	1.3 m
Probe Barrel Diameter	2.5 mm

a.700 MHz BW only available on DSOX/MSOX 4000A-series oscilloscopes with 1 GHz or 1.5 GHz bandwidth

b.300 Vrms, 400 V (DC + peak AC) mains isolated; 0 V transient overvoltage with InfiniiVision 6000X

c.Maximum pulse rating = 1,650 V (step 0 V to 1,650 V), mains isolated, no overshoot permitted, connected to oscilloscope with an input impedance of 1 MΩ ± 1%, not applicable with InfiniiVision 6000X.

d.Measurement Category II

**Table 4 Safety Specifications**

Specification
CEI/IEC 61010-031

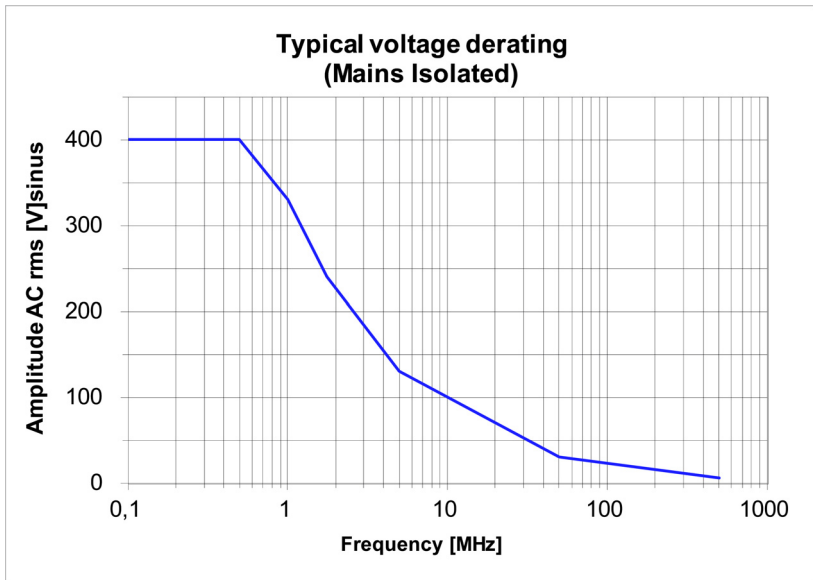
**Table 5 Environmental Specifications**

Description	Specification
Temperature	Operating: 0 °C to +50 °C Nonoperating: -40 °C to +70 °C
Altitude	Operating: 2,000 m (6,561 ft) Nonoperating: 15,000 m (49,212 ft)
Humidity	Operating: 80% room humidity for temperatures up to 31 °C, decreasing linearly to 40% at 50 °C Nonoperating: 95% room humidity for temperatures up to 40 °C
Pollution Degree	Pollution Degree 2

Typical Voltage Derating (Mains Isolated)

**WARNING**

The maximum input voltage rating of the probe decreases as the frequency of the applied signal increases.



**Figure 1. Typical Voltage Derating Plot (mains isolated)**

## Characteristics and Specifications

**CAUTION** Refer to the oscilloscope documentation for the oscilloscope's acceptable input range and do not exceed this limit when using the probes.

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### Typical Voltage Derating (CAT II)

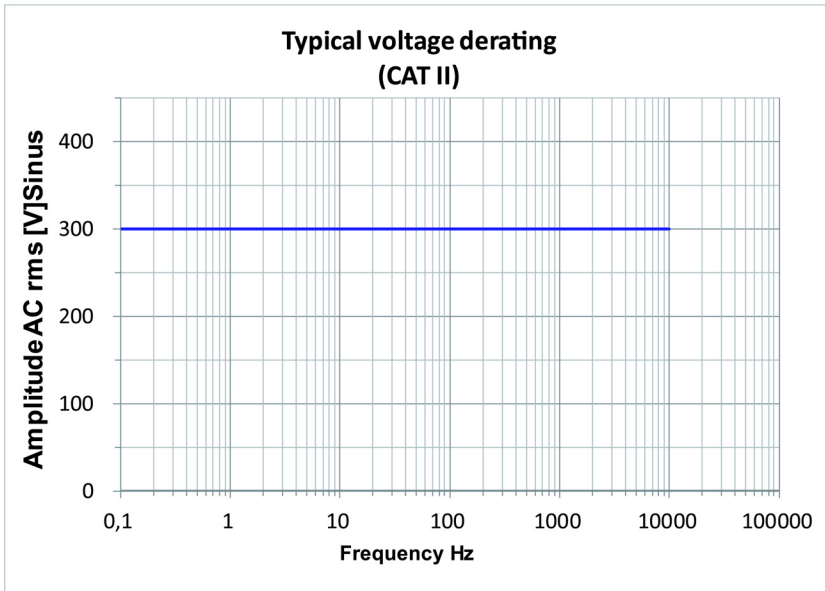


Figure 2. Typical Voltage Derating Plot (CAT II)

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### Typical Input Impedance

**CAUTION** The input impedance of the probe decreases as the frequency of the applied signal increases.

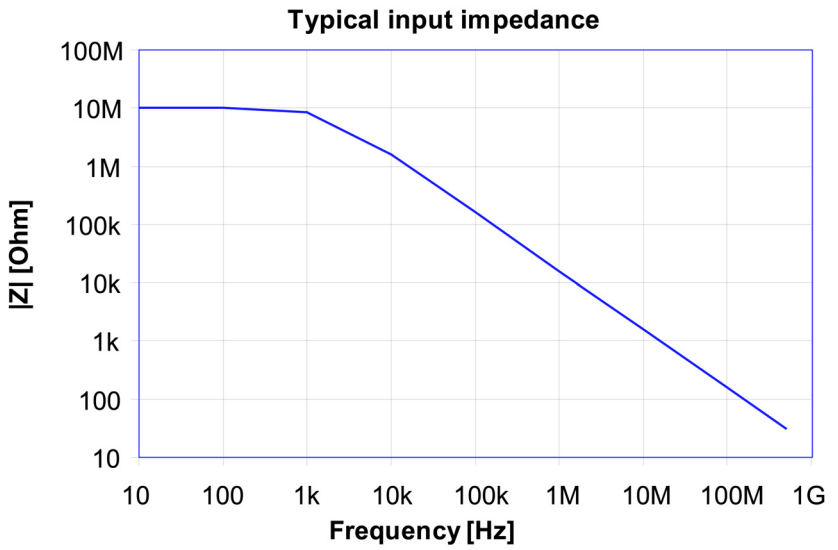


Figure 3. Typical Input Impedance

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## Safety Information

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**WARNING** To avoid personal injury and to prevent fire or damage to this product or products connected to it, review and comply with the following safety precautions. Be aware that if you use this probe assembly in a manner not specified, the protection this product provides may be impaired.

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**WARNING** Handle Probe Tips / Accessories Carefully. Some of the probe tips / accessories are very sharp (the spring tips and ground spring, for example). You should handle these with care to avoid personal injury.

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**WARNING** Use Only Grounded Instruments. Do not connect the probe's ground lead to a potential other than earth ground. Always make sure the probe and the oscilloscope are grounded properly.

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**WARNING** Connect and Disconnect Properly. Connect the probe to the oscilloscope and connect the ground lead to earth ground before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground lead from the circuit under test before disconnecting the probe from the oscilloscope.

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**WARNING** Observe Probe Ratings. Do not apply any electrical potential to the probe input which exceeds the maximum rating of the probe. Make sure to comply with the voltage versus frequency derating curves in this manual.

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**WARNING** The applicable measurement category of a probe assembly and an accessory is the lower of the measurement category of the probe assembly and the accessory.

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**WARNING** Keep Away From Live Circuits. Avoid open circuitry. Do not touch connections or components when power is present.

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**WARNING** Indoor Use Only. Do not operate in wet/damp environments. Keep product surfaces dry and clean.

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**CAUTION** Periodically inspect the probe and probe wires to check for any damage. Do Not Operate With Visible or Suspected Failures. If you suspect there is damage, have it inspected by a Keysight authorized service personnel.

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**WARNING** Do Not Operate in an Explosive Environment.

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**WARNING**

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When the insulation of the probe's cable deteriorates, the wear indicator becomes visible. Do not use the probe, when the wear indicator is visible through the cable jacket. Using a product with a worn cable may result in electric shock, fire, or equipment failure.

### Cleaning the Probe

Disconnect the probe from the oscilloscope and clean the probe with a soft cloth dampened with a mild soap and water solution. Make sure that the probe is completely dry before reconnecting it to an oscilloscope.



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## Instrument Markings and Safety Symbols



This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a “Monitoring and Control instrumentation” product. Do not dispose in domestic household. To return unwanted products, contact your local Keysight office, or refer to [www.keysight.com](http://www.keysight.com) for more information.



This symbol indicates the Environmental Protection Use Period (EPUP) for the product's toxic substances for the China RoHS requirements.



Recycle marking.



Instruction manual symbol: The product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product or personal injury.

# IEC Measurement Category Definitions and Examples

Definitions and Examples (Clause 6.5.2).

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## Mains Isolated

Mains isolated is for measurements performed on circuits not directly connected to a mains supply.

**Example.** Measurements in circuits not derived from a mains supply and specially protected (internal) circuits derived from a mains supply. In the latter case, transient stresses are variable. For that reason, it is required that the transient withstand capability of the equipment is made known to the user.

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## Measurement Category II (CAT II)

Measurement category II is for measurements performed on circuits directly connected to the low voltage installation.

**Example.** Household appliances, portable tools, and similar equipment.

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## Measurement Category III (CAT III)

Measurement category III is for measurements performed in the building installation.

**Example.** Measurements on distribution boards, circuit breakers, wiring including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation and equipment for industrial use like, for example, stationary motors with permanent connections to the fixed installation.

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## Measurement Category IV (CAT IV)

Measurement category IV is for measurements performed at the source of the low-voltage installation.

**Example.** Electricity meters and measurements on primary over-current protection devices and ripple control units.

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## IEC Pollution Degrees

Definitions (Clause 3.5.6).

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### Pollution Degree 1

No POLLUTION or only dry, non-conductive POLLUTION. NOTE: The POLLUTION has no influence.

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### Pollution Degree 2

Only non-conductive POLLUTION. Occasionally, however, a temporary conductivity caused by condensation must be accepted.

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### Pollution Degree 3

Conductive POLLUTION occurs or dry, non-conductive POLLUTION occurs which becomes conductive due to condensation which is to be expected.

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