

*Active Differential Probe Kit, 200 MHz, 10x Small Signal  $\pm 20V$*   
CT3688A



# CAL TEST ELECTRONICS

## CT3688A Active Differential Probe Kit, User Guide

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Made in Taiwan

## SYMBOLS AND TERMS

The following symbols may appear on the product or in the documentation.



**Caution Symbol (ISO 7000-0434)** – Statements or instructions that must be consulted in order to find out the nature of the potential hazard and any actions which must be taken.



**Caution, possibility of electric shock Symbol (IEC 60402-6042)** - To identify equipment that has the risk of electric shock.

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### CAUTION

A statement calling attention to an operating procedure, practice, or condition, which if not followed correctly, could result in damage to or destruction of parts or the entire product.

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### WARNING

A statement calling attention to an operating procedure, practice, or condition, which if not followed correctly, could result in injury or death to personnel.

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## DEFINITIONS

**POLLUTION (P)** – addition of foreign matter solid, liquid or gaseous (ionized gases), that may product a reduction of dielectric strength or surface resistivity.

- Degree 2 (P2) – only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

**MEASUREMENT CATEGORY (CAT)** – classification of testing and measuring circuit according to the type of mains circuits to which they are intended to be connected.

- **MEASUREMENT CATEGORY other than II, III, or IV:** - measuring circuits that are not directly connected to the mains supplies.

## GENERAL SAFETY INFORMATION

*Safety is compromised if instructions are not read, understood, and followed.*

- *Disconnect from all devices and sources before attaching test leads or adapters.*
- *Check for damage before usage - Do not use if any part is damaged.*
- *Do not use in wet or explosive atmospheres.*



**CAUTION** *Do not install substitute parts or perform any unauthorized modification to the probe.*



**CAUTION** *This probe is not authorized for use in contact with the human body or for use as a component in a life-support device or system.*



**WARNING** *Never exceed the maximum voltage or measurement category of the probe and adapter assembly as configured for usage.*



**WARNING** *Never remove the probe's casing as this may expose you to electric shock. If necessary, disconnect the inputs and outputs of the probe before opening the case.*



**WARNING** *To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.*



**WARNING** *Hazardous voltages may be present in unexpected locations in circuitry being tested when a fault condition in the circuit exists. Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.*



**WARNING** *Do not operate this probe from a power source that applies more than the voltage specified.*



**WARNING** *This probe must be grounded by the shell of the BNC connector through the grounding conductor of the power cord of the measurement instrument. Before making connections make sure the measurement instrument is properly grounded. Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.*

- *If the probe is used in a manner not specified by this user guide, the protections provided may be impaired.*

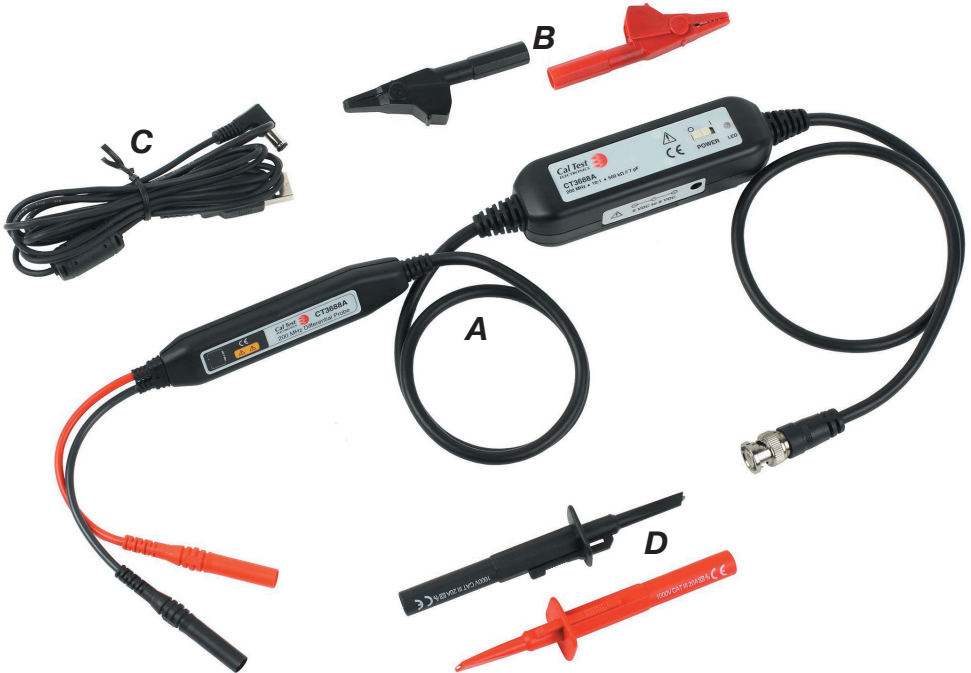
### DESCRIPTION

Differential probes allow safe, accurate measurement between two voltage points where neither point is referenced to ground. The **CT3688A** offers a 200 MHz bandwidth and can test up to  $\pm 60$  V (DC + AC peak). Compatible with oscilloscopes from all major manufacturers, the probe can be battery operated or powered directly from an oscilloscope using the included USB cable.

#### Features:

- Meets IEC 61010-031 safety standard
- Small compact size
- Up to  $\pm 20$  V differential
- High accuracy  $\pm 1\%$
- 200 MHz bandwidth (-3 dB)
- Excellent CMRR
- Kit comes in foam-lined plastic case and contains:
  - Differential probe
  - (2) Sprung hook probes, 1000 V, CAT III, 20 A (black & red)
  - (2) Alligator clips, 300 V, CAT II (black & red)
  - 9 V Battery
  - USB Power Cable

*This probe is tested prior to shipment. It is therefore ready for immediate use upon receipt. An initial physical inspection should be made to ensure that no damage has been sustained during shipment.*



- **A** - Active Differential Probe, 200 MHz, 10x Small Signal  $\pm 20$  V
- **B** - CT4441, Insulated Medium Alligator Clips, 300 V, CAT II Pair (Black & Red)
- **C** - CT4122, USB Power Cable
- **D** - CT4386, Insulated Sprung Hook Probes, 1000 V CAT III, 20 A, Pair (Black & Red)

## SPECIFICATIONS

All specifications apply to the unit after a temperature stabilization time of about 20 minutes over an ambient temperature range of 25 °C ± 5 °C.

<b>ELECTRICAL SPECIFICATIONS</b>	
<i>Bandwidth (-3dB)</i>	200 MHz
<i>Rise Time (10%-90%)</i>	1.75 ns
<i>Attenuation Ratio</i>	10x
<i>Accuracy</i>	±1%
<i>CMRR (typical)</i>	-80 dB @ 100 Hz -50 dB @ 10 MHz
<i>Maximum Differential Input Voltage (DC + AC peak)</i>	±20 V
<i>Maximum Common Mode Input Voltage (DC + AC peak)</i>	±60 V
<i>Absolute Maximum Rated Input Voltage (each side to ground)</i>	40 Vrms CAT I
<i>Input Impedance</i>	500 kΩ // 7 pF (each side to ground)
<i>Output Voltage Swing</i>	±2 V (driving 50 Ω oscilloscope input)
<i>Offset (typical)</i>	±2 mV
<i>Noise (typical)</i>	0.3 mVrms
<i>Source Impedance</i>	50 Ω
<i>Power Supply</i>	CT4122 USB Power Cable (included) or 9 V battery (included)

<b>MECHANICAL SPECIFICATIONS</b>	
<i>Weight</i>	200 g
<i>Dimensions (L x W x H)</i>	111 mm x 22 mm x 14 mm
<i>BNC Cable Length</i>	120 cm
<i>Input Leads Length</i>	15 cm

**ENVIRONMENTAL SPECIFICATIONS**

Operating Temp/Humidity	-10°C to 40°C / Up to 85% RH
Storage Temp/Humidity	-30°C to 70°C / Up to 85% RH
Pollution Degree	Pollution Degree 2
Altitude	Operating: 3,000 m Non-operating: 15,300 m

Specifications are subject to change without notice. To ensure the most current version of this manual, please download the current version from our website: [caltestelectronics.com](http://caltestelectronics.com)

**CE COMPLIANCE**



Low-Voltage Directive (LVD) 2014/35/EU  
Standard EN 61010-031:2015

Reduction of Hazardous Substances Directive (RoHS 2) 2011/65/EU  
+ AMD 2015/863 ANNEX III Exemption 6(c)

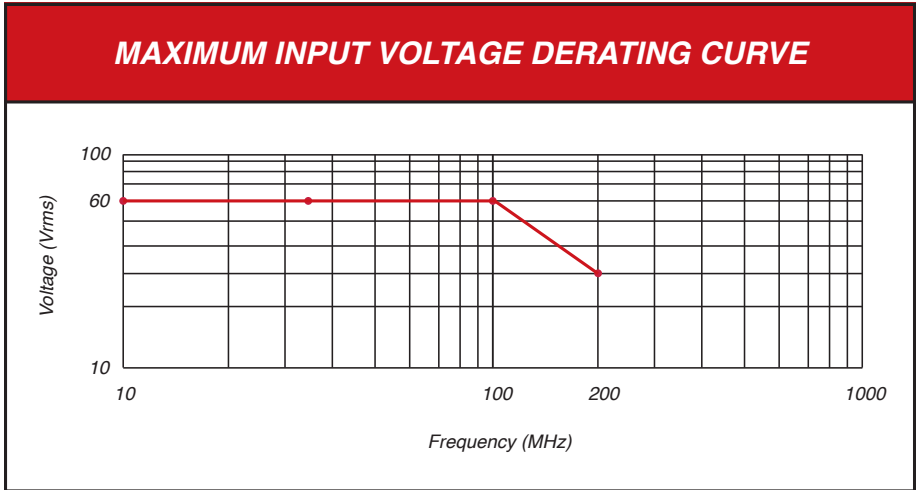
**DISPOSAL OF OLD ELECTRICAL & ELECTRONIC EQUIPMENT**



(Applicable in the European Union and other European countries with separate collection systems). This product is subject to Directive 2012/19/EU of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE), and in jurisdictions adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product and otherwise observe all applicable requirements.

**VOLTAGE DERATING CURVE**

The derating curve of the absolute maximum input voltage (either input to ground) is shown as follows:





## USING THE PROBE

### Power Connection

Connect the USB power cable to the USB interface on the front of the oscilloscope and then to the input on the probe. See figure below.



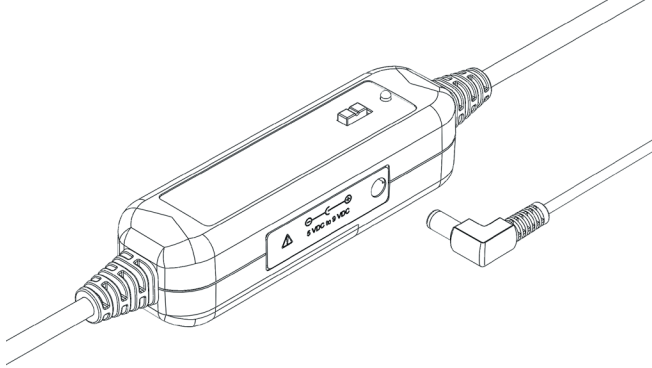
#### CAUTION

Only use center pin positive supply, USB cable included or optional 9 VDC/300 mA AC wall adapter (CT3723 not included).

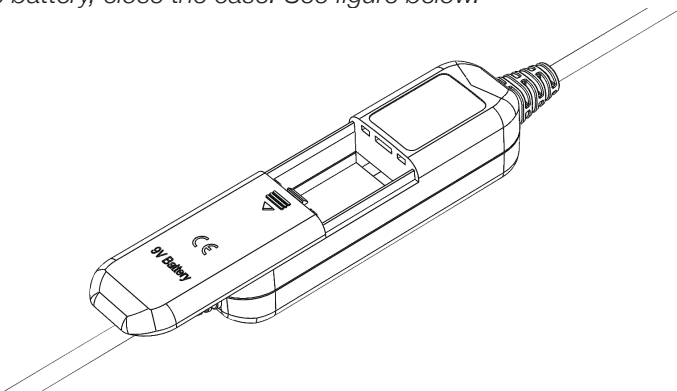


#### WARNING

At the time of powering on the probe, the input leads must not be connected to the device under test (DUT). Never operate the probe with the case open.



If powering by 9 V battery, slide the cover off the back of the battery box and plug the battery in, making sure to position the battery for proper polarity. After inserting the battery, close the case. See figure below.



When the battery is low, the power indicator will start to flicker and dim.

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### INSPECTION PROCEDURE

1. Connect the BNC output connector to the vertical input of the oscilloscope.
2. Power on the probe.
3. Set the oscilloscope input to DC coupling and 1V/div. Center the trace on the display.
4. Set the attenuation setting on the oscilloscope to match the probe (10x).
5. Connect the hook probes to the leads.
6. Connect the black hook probe to the ground connection on the oscilloscope and the red hook probe to the test signal on the oscilloscope (1 kHz for example).
7. A wave matching the test signal displayed on the screen of the oscilloscope means the probe is working properly.

### MAKING MEASUREMENTS

1. Connect the hook probes or alligator clips as needed to the leads.
2. Connect the probe to the oscilloscope with the BNC cable.
3. Switch the probe "ON."
4. Set the attenuation setting on the oscilloscope to match the probe (10x).
5. Set the input impedance setting on the oscilloscope to match the probe (50 $\Omega$ )
6. Connect to the circuit to be tested.



#### CAUTION

*This probe is used to carry out differential measurements between two points on the circuit under test. This probe is not for electrically insulating the circuit under test and the measuring instrument.*

### CLEANING

*Clean probe and accessories with cloth lightly moistened with water only. Dry thoroughly before use.*

**SERVICE & WARRANTY INFORMATION****Limited One-Year Warranty**

*Cal Test Electronics warrants this product to be free from defective material or workmanship for a period of 1 year from the date of original purchase. Under this warranty, Cal Test Electronics is limited to repairing the defective device when returned to the factory, shipping charges prepaid, within the warranty period.*

*Units returned to Cal Test Electronics that have been subject to abuse, misuse, damage or accident, or have been connected, installed or adjusted contrary to the instructions furnished by Cal Test Electronics, or that have been repaired by unauthorized persons, will not be covered by this warranty.*

*Cal Test Electronics reserves the right to discontinue models, change specifications, price, or design of this device at any time without notice and without incurring any obligation whatsoever.*

*The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees, or agents.*

*This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Cal Test Electronics is authorized to assume any other obligation in connection with the sale and purchase of this device.*

**Service**

*If you have a need for calibration or repair services, technical or sales support, please contact us:*

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