

Compliant with the Partial Discharge Measurement Method Specified by European Safety Standard "EN50178"

Useful in Insulation Degradation Analyses for Electronic Components and Small-sized Equipment and in Detecting Potential Failures in Such Devices!  
Allows Nondestructive Insulation Testing!

## **Partial Discharge Tester KPD2050**

Test voltage output: 0.01kV - 5kV AC rms Charge measurement: 0.1pC - 1000pC  
Capacitance of the device under test: 1000pF or lower  
Benchwork-type tester combining voltage application and measurement features  
and charge calibration capability in a single unit

# The theme is to detect

## Partial Discharge Tester KPD2050 C

### Measurement Method Specified by Eu

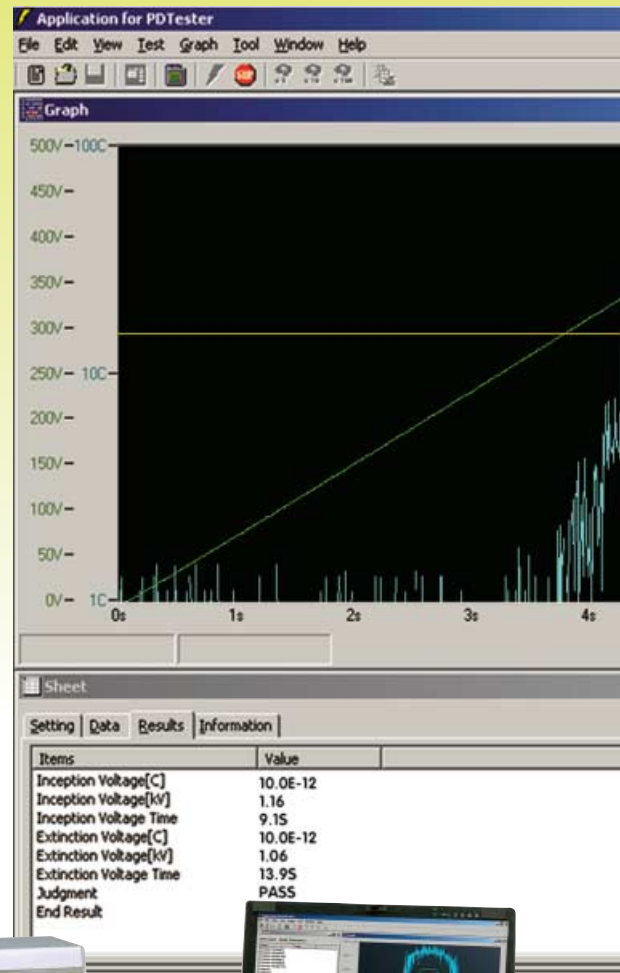
#### Compliance with the Partial Discharge Measurement Method Specified by European Safety Standard "EN50178"

In Europe, the safety standards related to electronic components require conducting partial discharge tests. Standard EN50178 stipulates that insulated parts and elements should be free of partial discharge or be capable of enduring it. KPD2050 is a partial discharge tester that complies with the partial discharge testing method specified by EN50178. This standard test requires that partial discharge become extinct at 1.25 times the rated voltage. The test is just ideal for detecting potential failures without destroying the device under test. The partial discharge tester KPD2050 is an innovative benchwork-type testing unit suitable for performing the test specified by this standard.

#### What is a Partial Discharge Test?

Conventional withstand voltage tests and insulation resistance tests employ a puncture (destruction) testing technique whereby the acceptability of the device under test is judged by whether a dielectric breakdown is detected which leads to an increase in current. This testing method is inconvenient in some respects such as the difficulty in analyzing the test process because the electronic component or insulation material under test is destroyed as its failure is detected, as well as post-shipment insulation failures that are prone to occur since the product is kept under stress as it undergoes repeated pre-shipment tests. It is known that, when exposed to partial discharge, insulation material is not only eroded by the charge directly, but it also suffers insulation degradation as physical or chemical change takes place in the material due to active oxygen, ozone, nitrogen oxide, and/or other substances resulting from the discharge. Observing fine partial discharges makes it possible to detect "potential failures," affecting the degradation and service life of insulation material, which cannot be identified through withstand voltage tests or insulation resistance tests.

#### ▼Example of measurement result display



#### What is a Partial Discharge Test Intended for?

Standard EN50178 requires that a partial discharge test be performed on the components and elements listed below that are typically used for the protection and separation of electric circuits. As they become increasingly small in size, these components and elements can no longer secure sufficient clearance or creepage distance for insulation and need to rely on molds or other insulation materials to achieve an insulation effect. Therefore, a partial discharge test is conducted to evaluate the partial discharge properties of molds and other reinforced insulations.

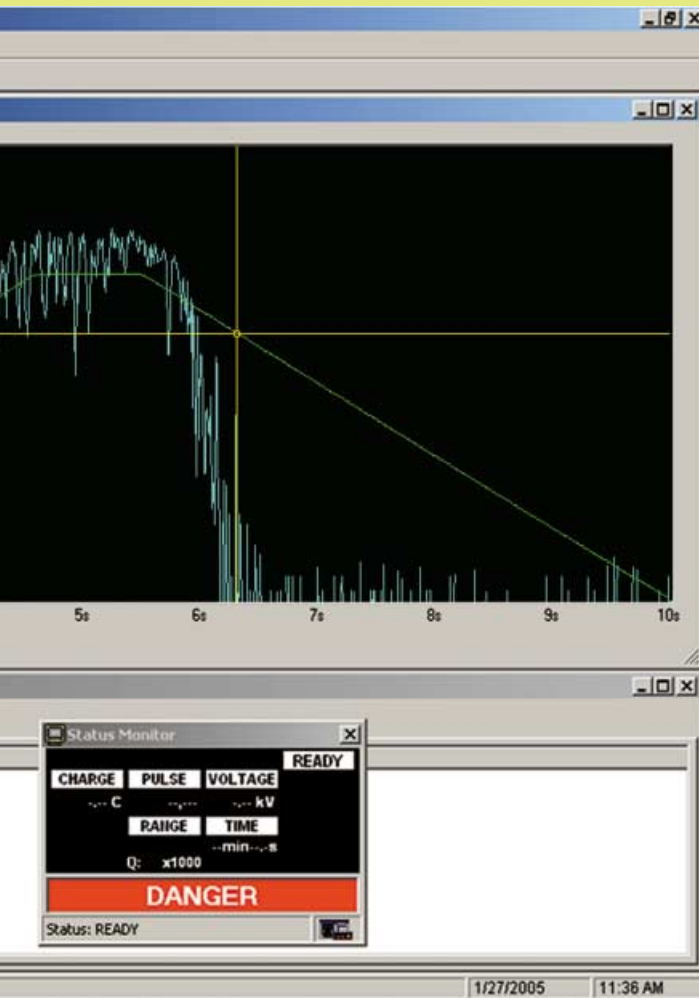
- Coil elements (switching transformers, etc.)
- Switching devices and electric mechanical parts (switches, relays, etc.)
- Semiconductors and their components (photocouplers, etc.)
- Connectors and terminal blocks
- Printed circuit boards and multilayer wiring boards

#### [Functions of KPD2050]

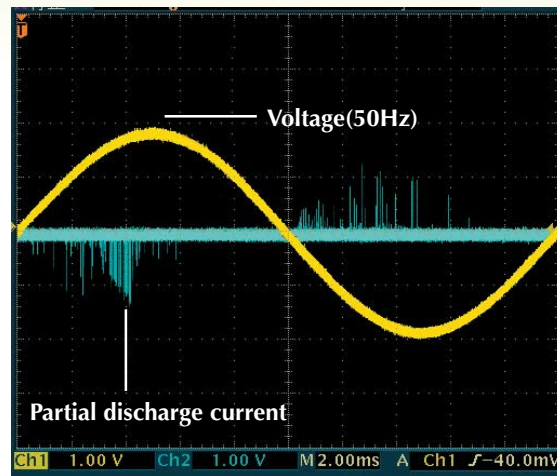
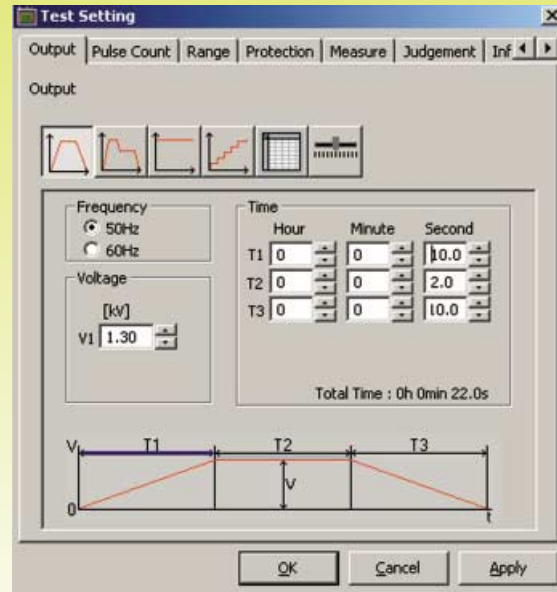
- Applied AC voltage: 0.01kV - 5kV AC rms  
(Voltage change: Manual/auto)
- Automatic voltage change patterns: 3 basic patterns
- Charge measurement: 0.1 - 1000pC
- Configuration: KPD2050 + PC  
(OS: Windows 95/98/Me/2000 Professional/XP)
- Data storage format: CSV  
(Can be read with Microsoft Excel97/2000/2002)

# t "potential failures."

omplies with the Partial Discharge  
uropean Safety Standard "EN50178."



▼Example of measurement result display



▲Voltage pattern setting dialog

## Partial Discharge Tester KPD2050

- Dedicated software, A/D board, and connection cable included.
- \*Note that a PC is not included

### <Tips>

#### [European Standard "EN50178"]

European Safety Standard EN50178 has replaced DIN VDE0160 as the standard that applies to electric equipment (EE) for use in power installations. This is a common standard formulated in line with the Low Voltage Directive 73/23/EEC. Its DOW (Date Of Withdrawal) is 2003/8/1 (as of June 2001). The standard also applies to switching power supplies intended for use in industrial equipment. What makes EN50178 different from VDE0160 is that it covers an added test of partial discharge. With the addition of the partial discharge test, the standard offers a greater level of equipment safety.

#### [Rated voltage]

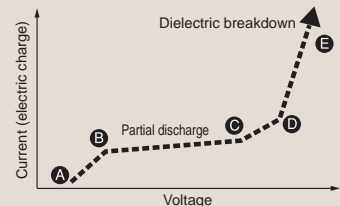
As the rated voltage for the partial discharge test, EN50178 uses the sum of maximum repeated peak voltages that respectively appear in two insulated circuits when they are actually used in a stationary state.

### Rationale behind the partial discharge test

A pair of electrodes with insulation material held between them can physically be considered a capacitor. If the insulation material has an uneven composition for some reason (void, deficiency, material irregularity, etc.), it can be regarded as an aggregate of capacitors having varying capacitances. A void is typically a bubble of air or other type of gas. Because a void is extremely small in size, its capacitance is small as well. Applying a voltage between the electrodes results in higher voltages being developed where voids with smaller capacitances are present. While those voids with shorter insulation distances begin to discharge at relatively lower voltages, the resultant discharges are not so strong as to short-circuit the electrodes, because of the insulation material. Discharges from voids and other sources in the insulation material that fail to bridge the entire space between the two electrodes are called partial discharges. The partial discharge tester detects and measures the movement of electric charge that takes place during such discharges.

#### [Partial discharge voltage - Conceptual diagram of current characteristics]

- A: Partial discharge begins
- B - C: Partial discharge is stabilized
- C - D: Partial discharge surges
- D - E: Partial discharge changes to arc discharge
- E: Arc discharge is sustained





## KPD2050 specifications

[Supported test standard] .....	EN50178:1997 (Clause 9.4.5.3, Partial discharge test)
[Device under test]	
Capacitance .....	1000pF or less (See Note1.)
Measurement space .....	170W 70H 100Dmm (including electrodeleads)
[Test voltage output]	
Voltage range .....	1000pF or less (See Note1.)
Frequency .....	170W 70H 100Dmm (including electrode leads)
[Charge measurement]	
Range .....	0.1 - 1000pC
Resolution .....	0.1pC (10pC/100pCrange), 1pC (1000pC)
Accuracy .....	±1pC (10pCrange) ±5%FSL(100pC/1000pCrange)
Measurement interval .....	Per applied voltage cycle
Charge calibration .....	Equipped with a built-in calibration signal generator.
[Voltage measurement]	
Digital .....	Average value response/RMS value display
(PC monitor display) .....	Full scale:5kVrms Resolution:0.01kV Accuracy:±1.5% of the full scale
Analog .....	Average value response/RMS value graduation
(Voltmeter reading) .....	Full scale:5kVrms Instrument class:JIS 2.5
[Monitor output] .....	Applied voltage, partial discharge charge, partial discharge current
[Control] .....	Connect the tester to a PC equipped with an A/D board and use dedicated software for control.The tester comes standard with an A/Dboard and dedicated software. (See Notes 2 and 3.)
[General]	
Input voltage range .....	90 to 110 VAC/180 to 220 VAC (Can be selected with a switch.)
Power supply frequency .....	50Hz/60Hz
Input apparent power .....	100VA or less
Operating temperature/humidity ranges .....	23°C±5°C, 20% to 80%RH (No condensation allowed)
Storage temperature/humidity ranges .....	-10°C to +60°C, 10% to 80%RH (No condensation allowed)
Dimensions .....	430W X150H X 400Dmm (excluding protruding parts)
Weight .....	Approx.22kg
Accessories .....	Operation manual, cables (high voltage, low voltage, calibration), calibration capacitor box, power cord (The high voltage low voltage cables are about 10cm long.)

Note 1: It may not be possible to measure non-linear elements or those with resistant components even if the capacitance of the device under test is less than 1000pF.

Note 2: When placing an order, select one of the A/D (DAQ) boards shown below.

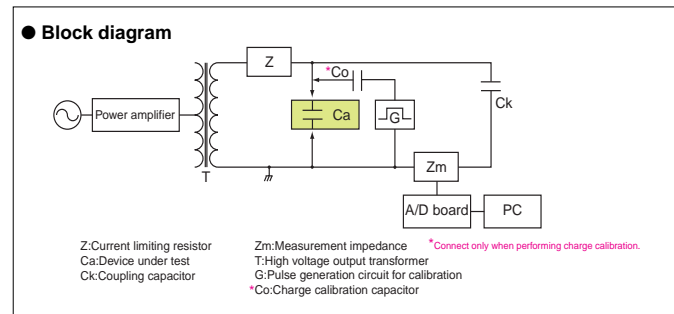
Type	PC bus	A/D (DAQ) board	Connection cable
(1)Notebook type	PCMCIA	DAQCard-1200	Type PR-50F 1m
(2)Desktop type	PCI	PCI-1200	Type NB1 50p 1m

The model name of the tester is "KPD2050 with PCMCIA" for the A/D board type in (1) above and "KPD2050 with PCI" for (2)

\* The A/D boards are those manufactured by National Instruments Corp. To operate the A/D board requires installing the accompanying software driver NI-DAQ ver6.9.

Note 3: To use KPD2050, you need to have a personal computer to control the tester.  
 ●Personal computer: Pentium 166 MHz or higher, 32 MB or more memory (64 MB or more recommended), 3.5-inch FDD, CD-ROM drive, 20 MB or more HDD free space (100 MB or more recommended) ●OS:Windows 95/98/Me/2000 Professional/XP,Software:Microsoft Excel(for data analysis)

\* A variety of optional accessories, including a large-size safety cover, are available. Please contact our sales representatives.



### [Other partial discharge testers]

In addition to KPD2050, the following partial discharge testers are available from us. Please consider purchasing any of these testers to fulfill your purpose.

### KPD2050VS Price:Please contact us.

●Partial discharge tester compliant with DIN VDE0884 ●Intended for use on production lines of photocouplers or other optoelectronic couple devices

### SPEC80051 Price:Please contact us.

●Capacitance of the device under test:10000 pF or less ●Output: 0.05 - 4 kVAC (withstand voltage tester TOS9200 used) ●Charge measurement:10nC max. (3 ranges - 0.1nC, 1nC, and 10nC) ●Charge judgment function ●Intended for use on production lines of SWPS transformers, MGs, batteries, and many other types of electronic components (PC not required).

●Distributor:



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