

# Modern Electrical Safety Tester



# Electrical Safety Test (EST)

# Execute EST Test

- Why do need to execute EST test
  - Execute safety test is meet to the standard requirement of consignee.
  - Execute safety test is quality requirement to oneself.
  - Improve product quality and reliability.
  - Lessen the argument or problem in potentiality may occurred.
  - Specified the standard items of testing, such as electric component.

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# Electrical Safety Test

## Hi-pot

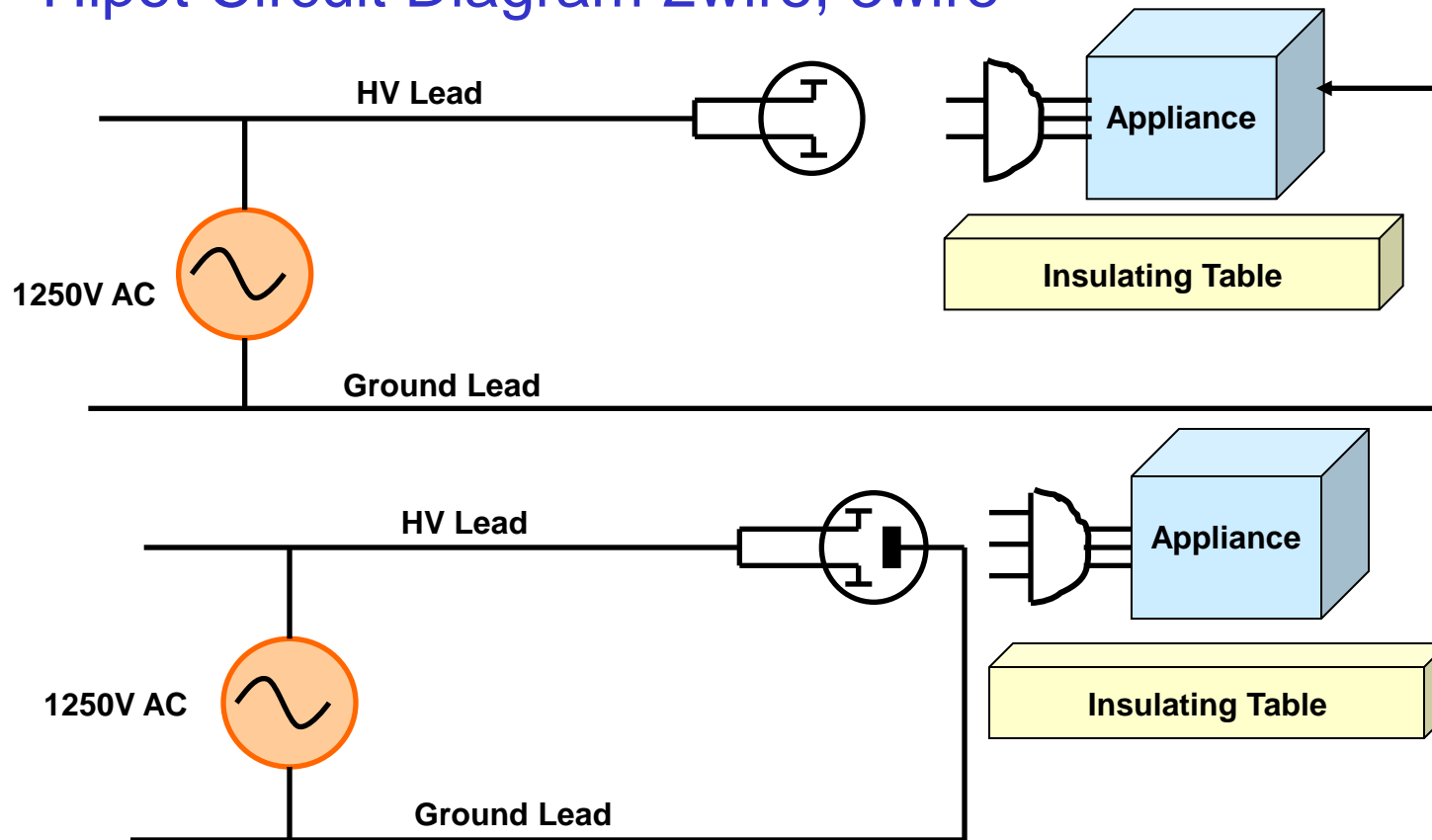
### Stress Test of the Insulation

Generally, it also called “Dielectric Withstand”, “High Potential”, or “Hi-Pot” Test, it is high voltage test of the insulation to UUT. Generally speaking, the voltage when test UUT is always higher normal operation voltage. It is about 1000VAC to add double of normal operation voltage.

# Electrical Safety Test

## Hi-pot

□ Hipot Circuit Diagram 2wire, 3wire



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# Electrical Safety Test

## Insulation

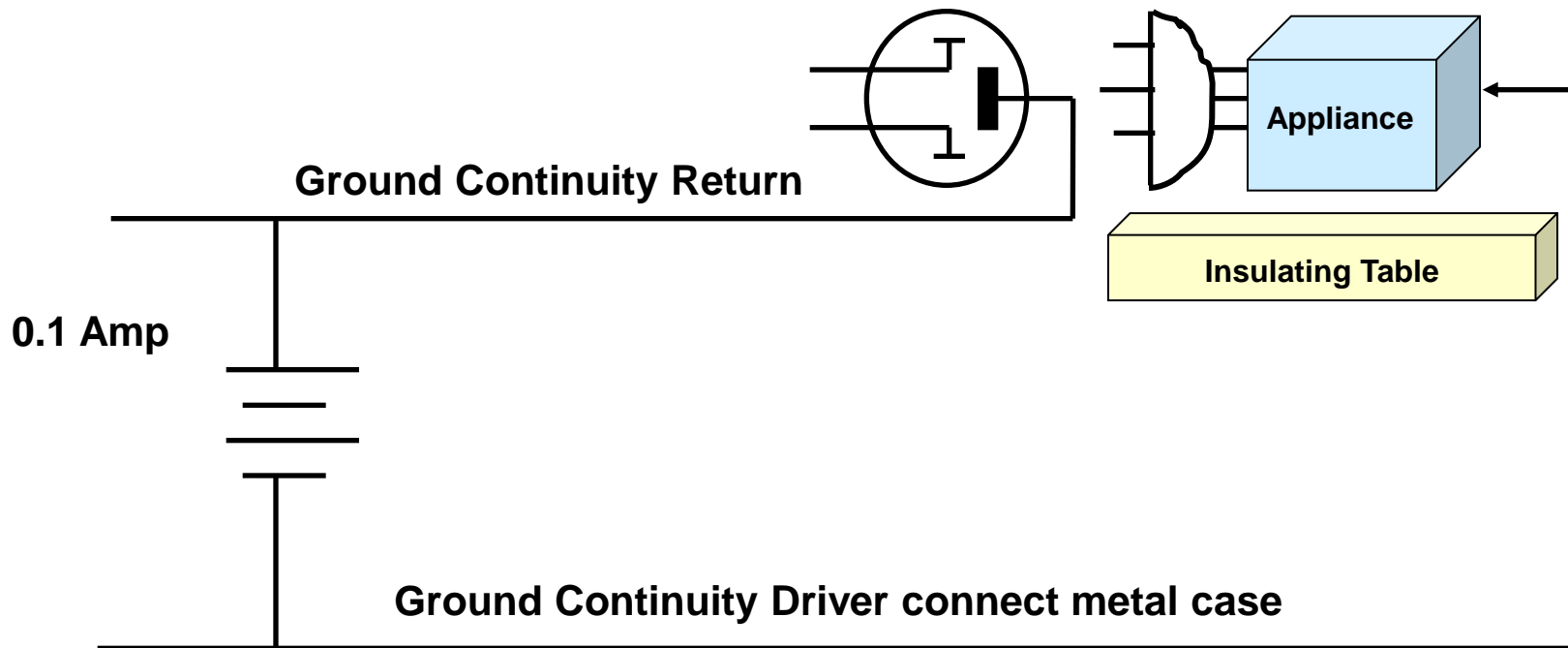
Insulation test is to measure valid insulation material to insulate electric current is occurred for ensure the quality of insulation material.

Insulation voltage use 500Vdc commonly

# Electrical Safety Test

## Grounding

### □ Ground Continuity

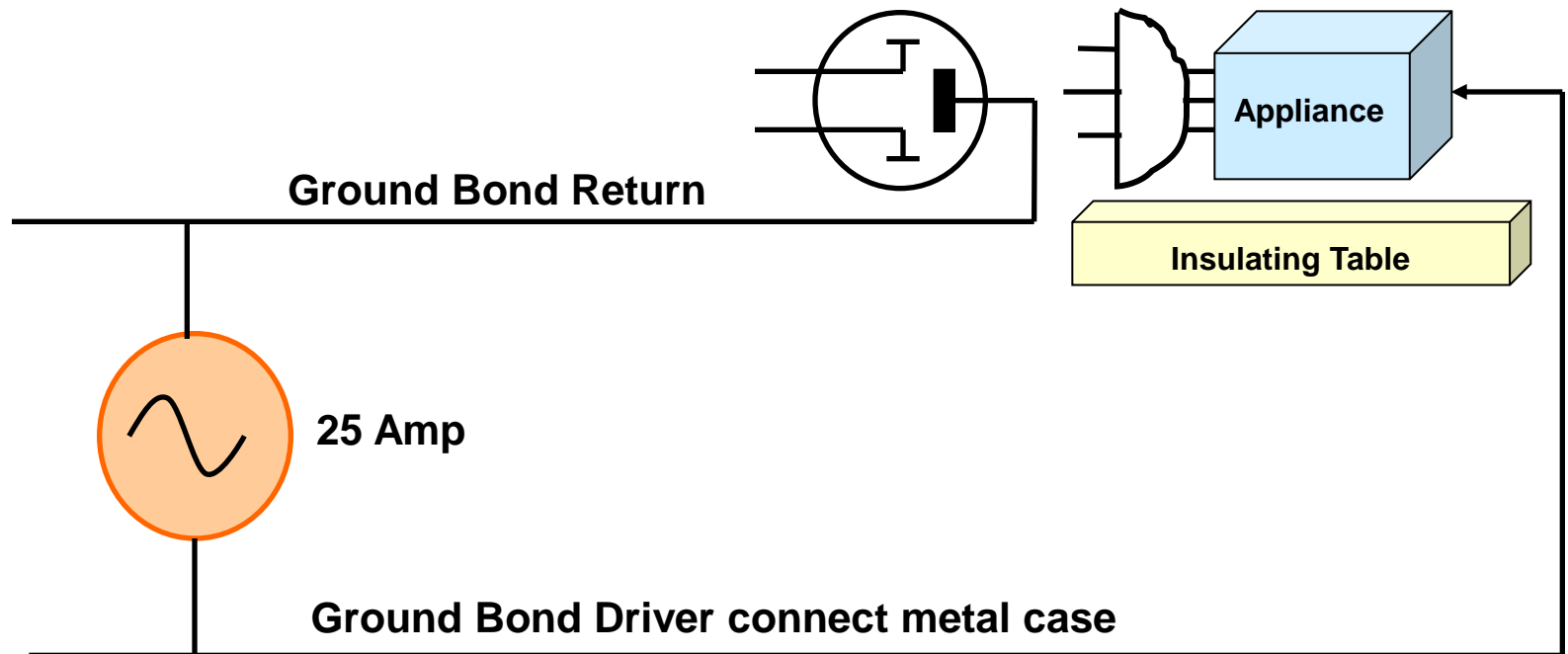


# Electrical Safety Test

## Grounding

### □ Ground Bond

Test Current = 2 x (rated current) or 25A which ever is higher

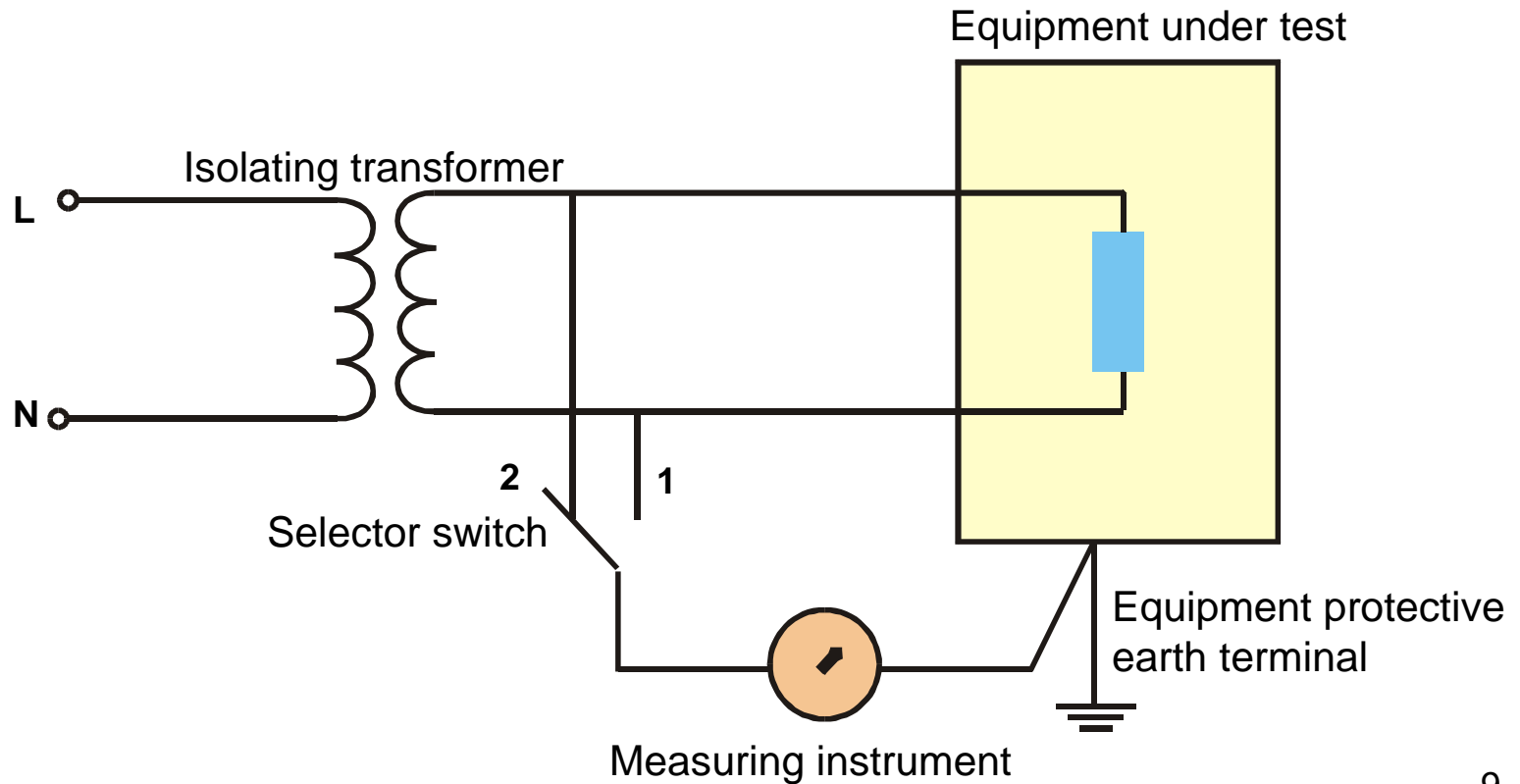




# Electrical Safety Test

## Leakage Current

### □ Isolating Transformer

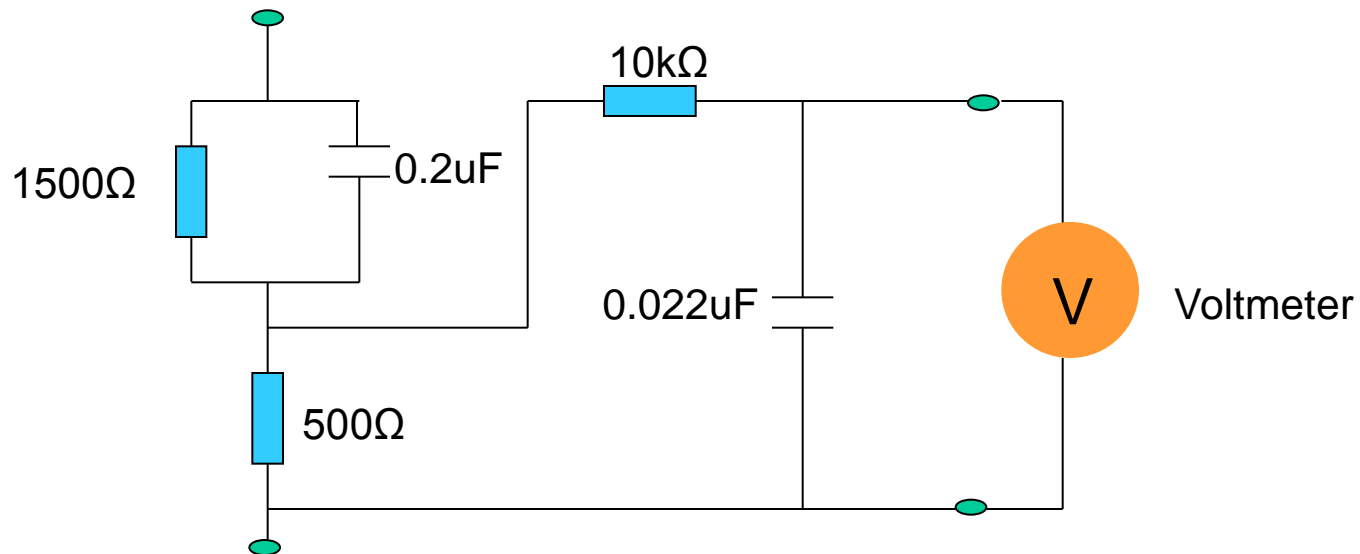


# Electrical Safety Test

## Leakage Current

### Leakage Current Meter

Power actual working frequency up to several ten thousand Hz, safety requirement using simulation human body impedance to proceed Earth Leakage Current measurement.



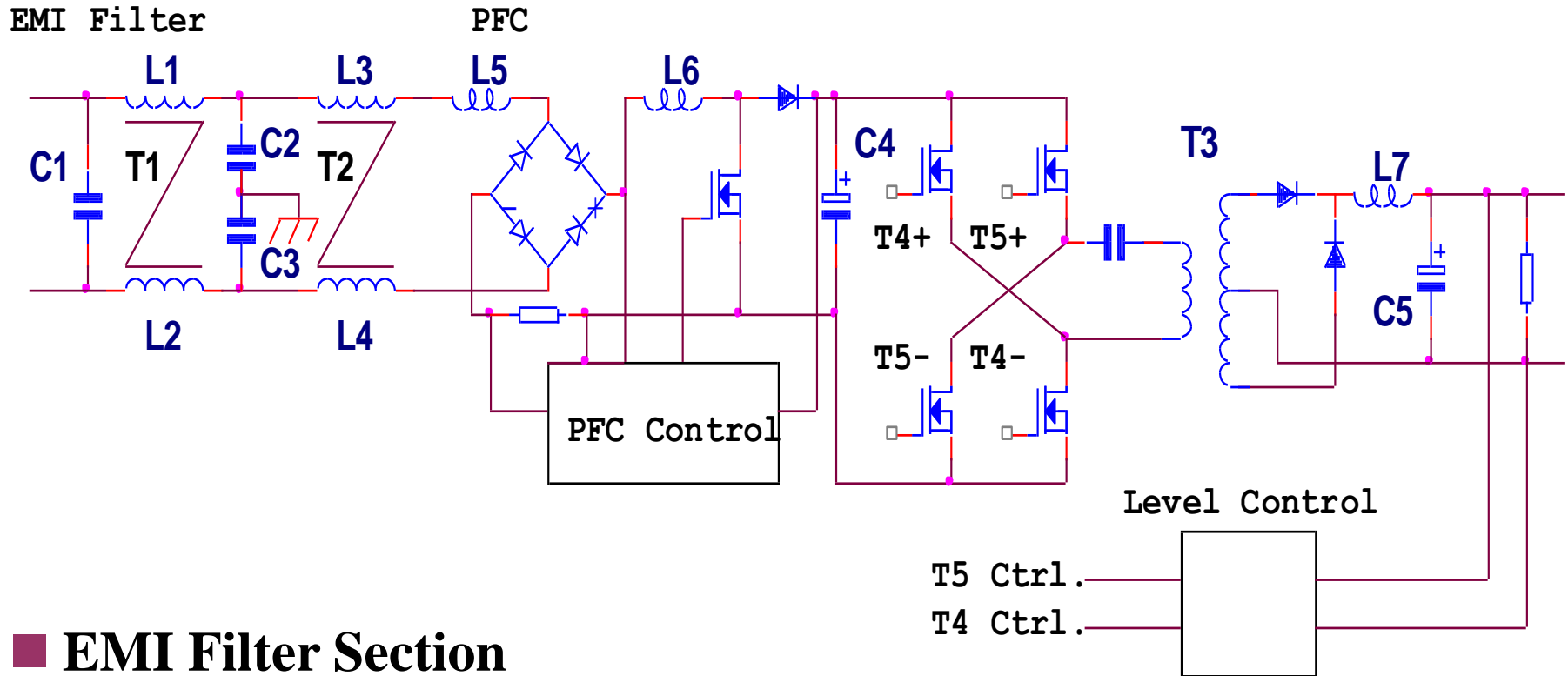
Measuring circuits for d.c and for a.c with sinusoidal frequencies up to 1MHz

# EST in SMPS & EMI Filters

# SMPS Module

- ❑ No Floating Ground (standard). Test items are
  - ❑ Ground Bond
  - ❑ P (L+N)-Case
- ❑ With Grounded output and Floating Ground output simultaneously.
  - ❑ Ground Bond
  - ❑ P-Case+S (grounded)
  - ❑ P-S (Floating ground)
  - ❑ S (floating)-C





- **EMI Filter Section**
- **PFC (Power Factor Correction) Section**
- **DC to DC Converter Section**

**SMPS Block Diagram**

# EMI Filter Section

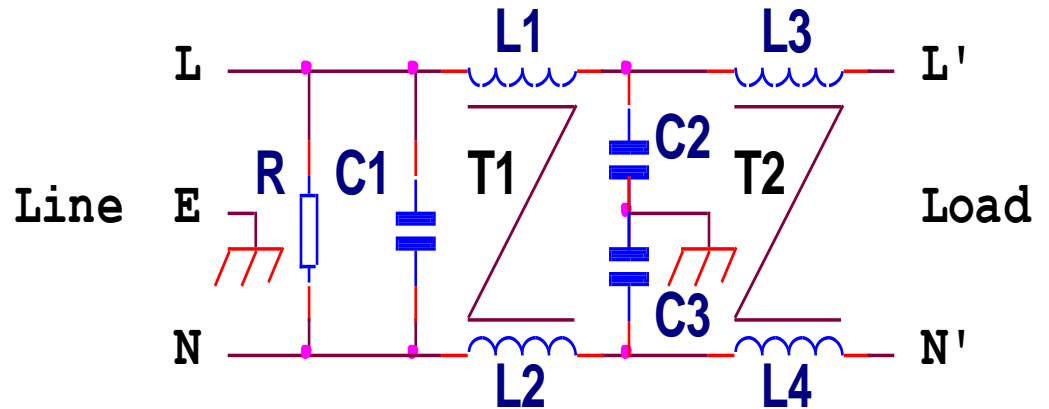
**T1,T2 :**

**Hi-pot (WVac or WVdc)**

**L1 to L2**

**C1, C2, C3 :**

**Hi-pot**

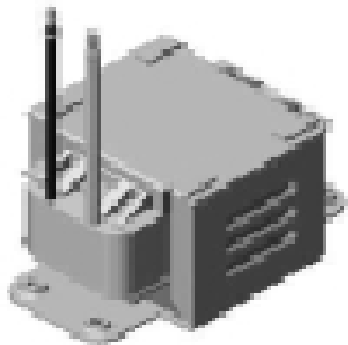
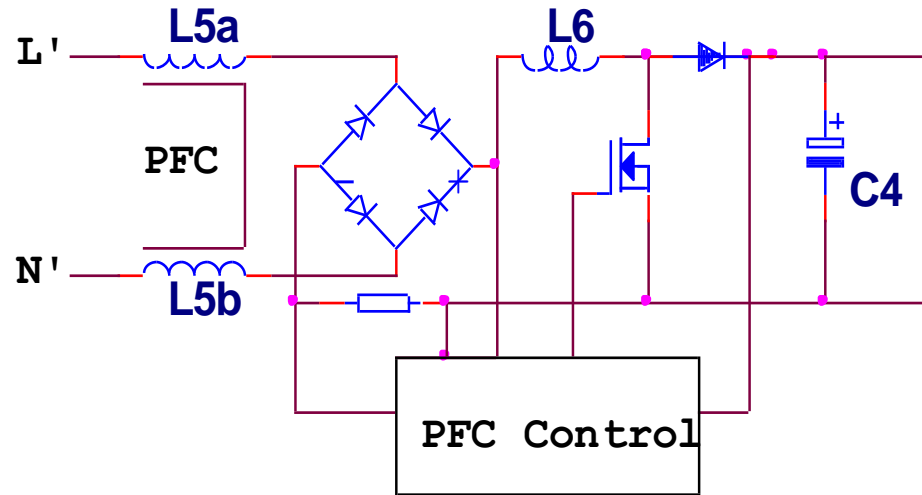


19073 Hipot Tester

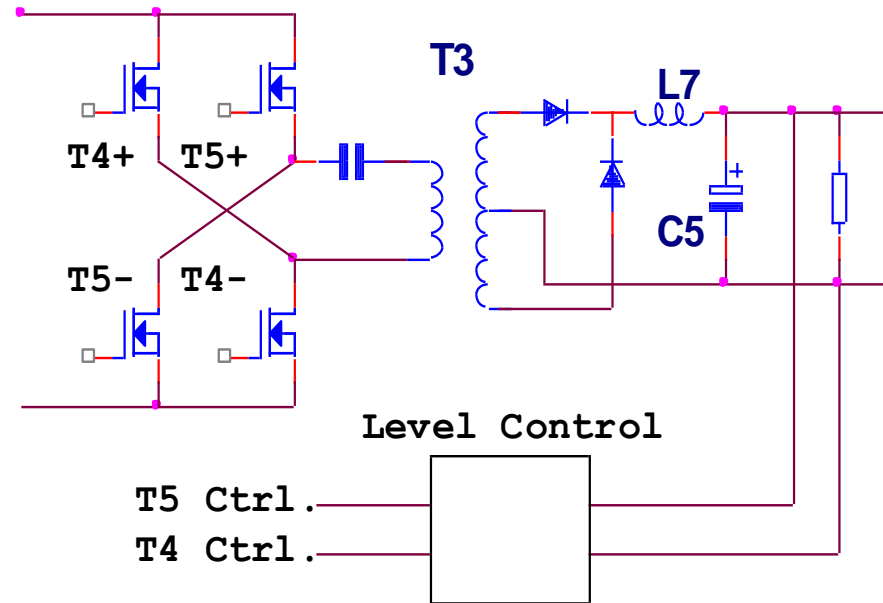
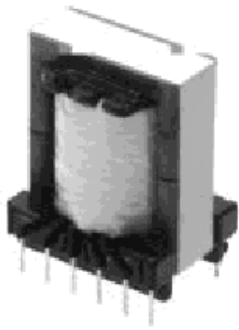
# PFC Section

**L5, L6:**

Hi-pot test winding to chassis, between windings for double



# DC-DC Convert Section

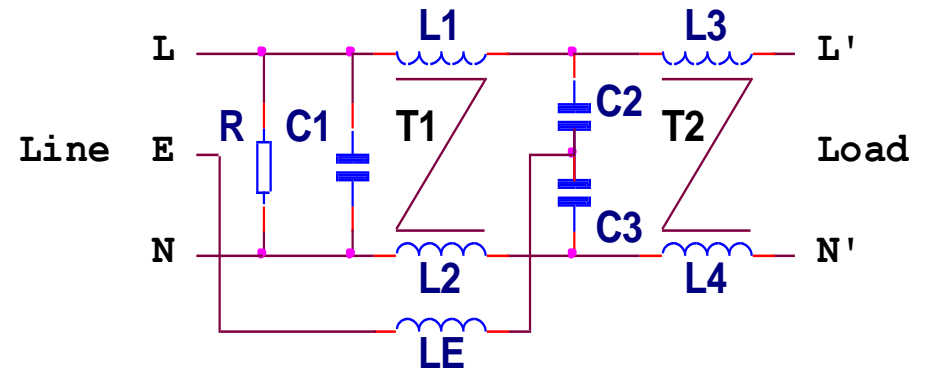


**T3, T4, T5:**

**Hi-pot, IR test between windings, windings to chassis**



# EMI Filter



## Safety Test

**Step 1 : Hi-pot test L to N**

**Step 2 : Hi-pot test L+N to E**



# Electrical Safety Analyzer -- 19032



- **5 in 1 Tester : AC, DC, IR, GB, LC**
- **Simultaneous Twin Ports™ output capability**
- **Arc detection with programmable limit and 4 pulse width**
- **Ground floating function optional**
- **Ground Fault Interrupters (GFI)**
- **Meet UL, CAS, TUV, VDE, CE ... safety requirements**
- **Fast cut-off time : 0.4 ms, fast discharge time : < 0.2 sec**
- **99 internal instrument setups with 99 steps per setup**
- **Hipot/Line Leakage/Probe Scanner (6000-05)**
- **Optional GP-IB, SCANNER, RS232, PRINTER interface**

# Hipot Tester with Scanner -- 19053



- AC/DC/IR Hipot Tester
- WAC 5KV/30mA, WDC 6kV/10mA
- Current Resolution AC 1uA, DC 0.1uA
- Real or Total Current Measurement
- Insulation Resistance up to 50G Ohm
- Built-in 8 Channel Scanner
- Ground Continuity Check with 1 Ohm Limit
- Ground Fault Interrupters (GFI)
- Arc Detection with Programmable Limit
- 99 steps or 99 groups for total 500

# Economical Hipot Tester -- 19071

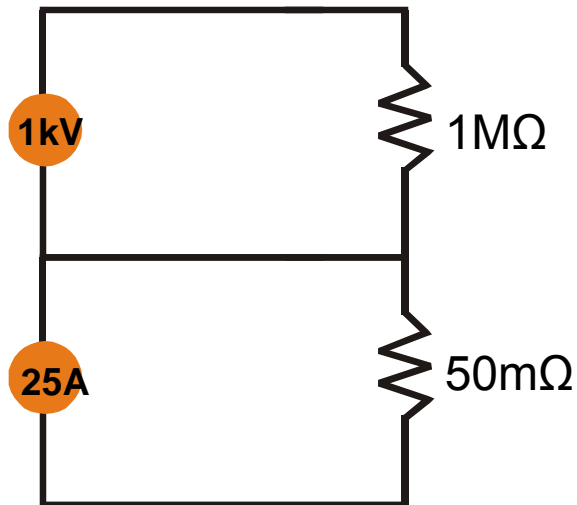


- DC/ AC/ IR Hipot Tester
- Trip Current Programmable to 15mAac and 7.5mAac
- Ground Continuity Check Function
- Ground Fault Interrupters (GFI)
- TUV Approved and CE Certified
- Arc Detection with Programmable Limit
- Zero Offset

# Maintenance

## □ Daily Check

- The necessity of production line daily check.
- Generally use simulation load on daily check



# Maintenance

## □ Calibration



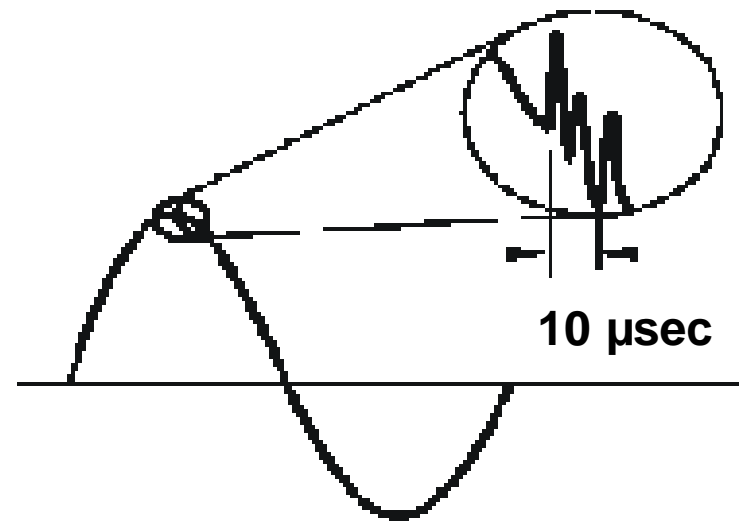
9102 Hipot Calibrator

# Smart Safety Test

## Arcing

ARC is electrical character occurred by voltage or current quickly change. At the same time, it may happen short or zapping sound.

- Spike discharge
- Ionization
- Corona
- Power loss
- Short time on high voltage, normal working on low voltage



# Smart Safety Test

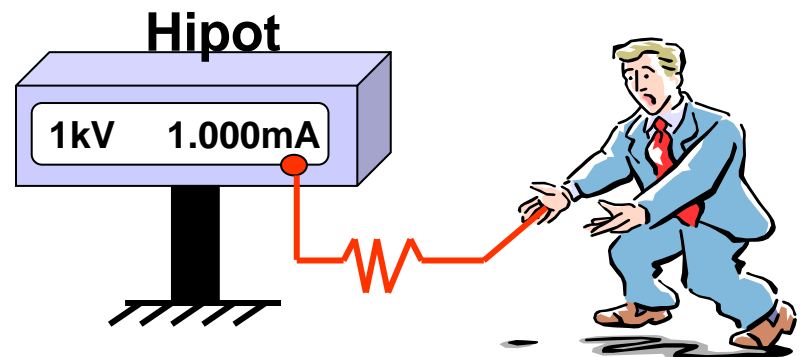
## Ground Fault Interrupt (GFI)

### □ GFI current value (GFI Level)

- 0.5mA or 5mA is enough current value of GFI, the hardware cut down circuit, can cut down high voltage output in short time for preventing shock.

### □ Delay Time

- Non delay time is the item GFI need to consider, therefore DC Hipot can't guarantee this function is effective.





# Factory Automatic Solutions

- ❑ Control interface
  - ❑ GP-IB, RS-232, RS-422, RS-485
- ❑ Application Software
  - ❑ Smart-Link
- ❑ Bar code reader
  - ❑ 19032 can link with bar code reader
  - ❑ Printing test report



# EST Products Selection Guide

Chroma	19032 9032C	9055	9056	1905X 905X	9012	902	1907X 907XA 907XS	19570 9570	702A 705
<b>Main Function</b>	WAC,WDC,I R,GB,LC	WAC	WDC,IR	WAC,WDC,I R,SCAN	WAC,WDC,I R	WAC,WDC	WAC,WDC,I R	GB	IR
<b>AC Volt</b>	0.05~5kV	0.1~10kV		0.05~5kV	0.05~5kV	0~5kV	0.05~5kV 0.1~5kV		
<b>DC Volt</b>	0.05~6kV		0.1~12/20kV	0.05~6kV	0.05~6kV	0~5kV	0.05~6kV 0.1~6kV		
<b>Accuracy</b>	1%+5counts	1%+10count	1%+5counts	1%+5counts	1%+5counts	1%+2counts	1%+5counts		
<b>Trip Current</b>	40mAac 20mAdc	20mAac	10mAdc	30mAac 15mAdc	100mAac 20mAdc	100mAac 25mAdc	15mAac 7.5mAdc		
<b>Arc Detect</b>	V	V	V	V	V	V	V		
<b>IR</b>	1000V/50GΩ		1000V/50GΩ	1000V/50GΩ	1000V/50GΩ		1000V/10GΩ		1000V/100TΩ, 1090V/200TΩ
<b>Continuity</b>				1905X			1907X		
<b>Adj. Ramp</b>	V	V	V	V	V		V		
<b>Ground Bond</b>	30A/0.2mΩ							30A/0.2mΩ	
<b>Line Leakage</b>	300V/6mAAC								
<b>DC Discharge</b>	V			V	V		V		
<b>GFI</b>	19032			1905X			1907X		
<b>Scanner</b>	V	V	V	V	V				
<b>RS-232</b>	V	V	V	V	V				
<b>GP-IB</b>	V	V	V	V	V				
<b>Printer</b>	V	V	V	V	V				
<b>Twin Port</b>	19032								
<b>Electrical Safety Test Applications for UL,TUV,IEC.</b>	Medical	Component	Component	Information	Information	Information	Information	Information	Component  26
	Information			Household	Household	Household	Household	Household	
	Household			Transformer	Transformer	Transformer	Transformer	Transformer	
	Transformer			Motor	Motor	Motor	Motor	Motor	
	Motor								