



## ELECTRICAL SAFETY ANALYZER

### MODEL 19032/19032-P

#### General Electrical Safety Testing Solution

Electrical safety testing is one of the major items in the electrical product quality tests. All electrical products consisting of adapter, SMPS, charger, house appliance, information technology product and video products are required to perform electrical safety test.

The 19032 series combines Hipot, Insulation Resistance( IR), Ground Bond (GB), Leakage Current (LC)/AC LC/DC LC and Dynamic Function Test. Savings can be up to 50% of production line space, by not purchasing several safety test instruments. The 19032 is able to increase efficiency of electrical safety test during manufacturing and reduce the labor cost on these test.

#### Open/Short Check (OSC)

Patent No. : 254135

All manufacturers have to solve the problems of error connections and unconnected test cables with their production line testers. Chroma's 19032 is equipped with an open/short check function (OSC) for product testing. This eliminates the potential for false failures.

#### Twinport™ Function

USA Patent No.: US6504381

The key factor affecting the efficiency of manufacturing is the efficiency for electrical safety test. The Twinport function reduces the safety test time and can eliminate potential bottlenecks in the production line.

#### Product Application

The 19032 series can be applied to versatile test of electrical products, which include quality assurance sampling inspection test, manufacturing test and development validation.

- Power cord
- House appliances
- Information technology product
- Medical equipment
- Lab/testing equipment
- EMI FILTER
- Electric Vehicles
- Solar, PV inverter

#### EN50191 Floating Output Function

The leakage current of any ground terminal should be lower than 3.5mA when operating Floating output function. This allows the operator near the ground terminal to avoid an electrical hazard.

## Electrical Safety Analyzer

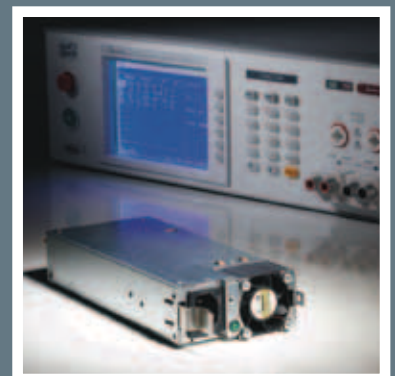
### MODEL 19032/19032-P

#### Key Features - Model 19032

- ACWV/DCWV/IR/GB/LC five instruments in one
- Function test up to 20A
- Programmable voltage output and limit value
- OSC open/short check
- Flashover detection
- Human protection circuit
- Multi-scan device support dynamic leakage current test
- Standard RS232 interface
- Optional GPIB interface
- Large LCD panel
- Front panel lockout function
- Support PC software
- CE certification

#### Key Features - Model 19032-P

- 500VA output
- AC 100mA output
- Ground bond up to 40A
- Floating output, compliance with EN50191
- USB interface, compatible with USB TMC
- GFI human body protection circuit
- CE certification



**Chroma**



## TWINPORT™ HIPOT & GROUND BOND TEST FUNCTIONS

### USA PATENT NO. US6504381

The 19032 electrical safety tester has Twinport™ Technology. This patent and unique feature allows both hipot and ground bond to be tested simultaneously. This idea for production test, as it allows test time be reduced by 50%.

Conventional Safety Analyzer	Ground Bond	Hipot
19032	Ground Bond Hipot	
	2 Sec.	2 Sec.

## FLASHOVER DETECTION

The 19032 has Flashover Detection, as other Chroma test instruments. Flashover is electricity transient or non-sequential discharge generated by the inner or surface of insulation components, which causes DUT's to lose the original insulation feature. Electrically generated carbonation of conductive material can damage the product. Test voltages or shift rate of leakage current is required. Flashover cannot be detected by a leakage current test, which makes the Flashover Detection a valuable tool in High Voltage testing.

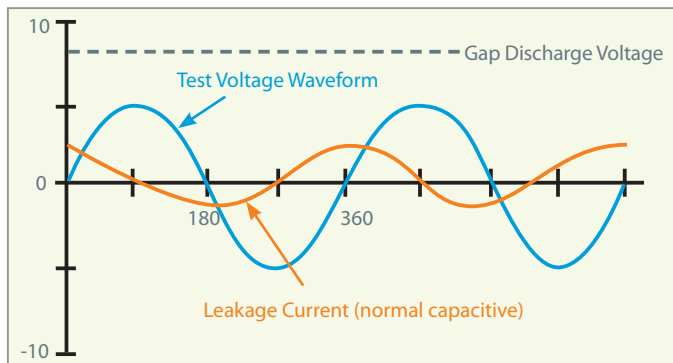


Figure 1 : Normal Leakage Current Waveform

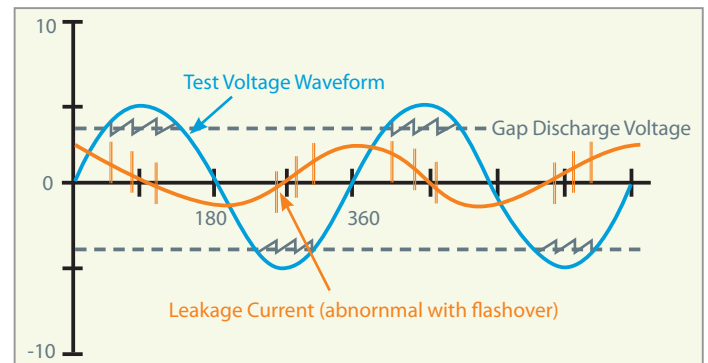


Figure 2 : Leakage Current Waveform when flashover occurred

## OPEN / SHORT CHECK (OSC)

### PATENT NO. 254135

The OSC function is used to check if the connection is open (bad contact) or short (DUT short) during the test procedure. When a circuit is open during EST testing, bad product can pass as good product. When a short occurs during testing, proper screening can reduce the damage on the DUT.

DUT's have capacitive loads ( $C_x$ ) from tens of pF to several  $\mu F$ , in a normal state. A micro capacitance will occur on an open circuit interface once the connection is interrupted (as  $C_c$  in figure 2). In general, the capacitance is lower than 10pF; thus the total capacitance is lower than normal product. The capacitance is far higher than normal when the DUT is short or close to a short. This allows users to judge the short issue by using high/low limit values of capacitance change.

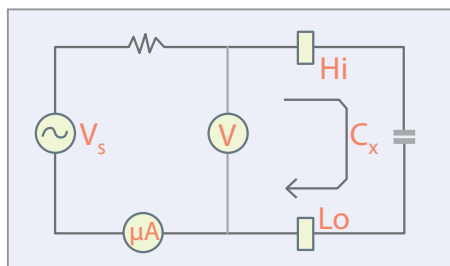


Figure 1 : Normal Connection

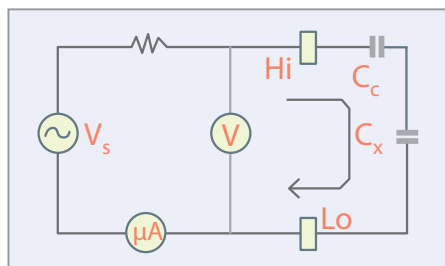


Figure 2 : Connection Open

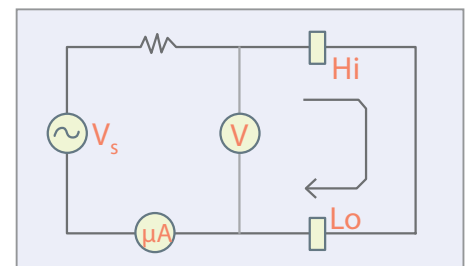


Figure 3 : Connection Short

## CAPABILITY OF CONTROLLING CHROMA AC SOURCE

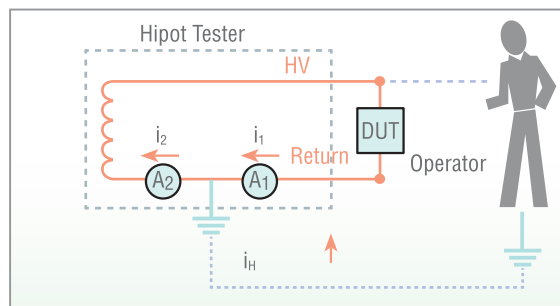
Manufactures apply Chroma's AC source as a power supply to increase the input voltage stability for dynamic leakage current test. The 19032 uses RS232 interface to control the AC source and allows convenience in running the leakage current test.



Chroma 6400/ 6500/ 61500/ 61600 Series

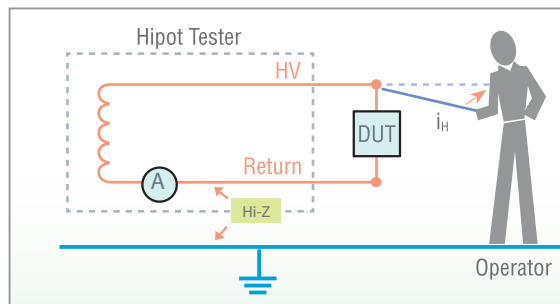
## GFI HUMAN PROTECTION (MODEL 19032-P)

The ultimate purpose of safety testing is to protect users for electrical hazard. The 19032-P has a GFI function to protect the operator. The GFI function can cut-off the power output immediately, while human body is experiencing electric shock. The GFI function detects the current from the Earth (operator) and LOW terminal (device). The voltage output will be cut-off, if the current is over 0.5mA.



## FLOATING CIRCUIT FUNCTION (MODEL 19032-P)

To allow for operator safety, Chroma invented the Floating Circuit, which is based on leading technology. With Floating status, the grounding leakage current will not exceed 3.5mA, no matter what the withstand voltage is. This complies with EN50191 for outputting to ground terminal within current limit and for protecting the operator from electric shock.

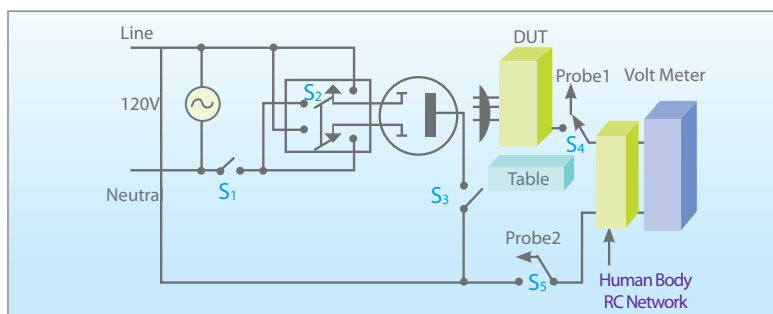


## SUPPORT TOUCH CURRENT / LEAKAGE CURRENT TEST

The current brimmed after flow through insulation resistance, is called Leakage Current. When the leakage current goes through the human body, the current flows to Earth via the human body. The leakage current is testing under an operating state. The human body RC network will be added to leakage current in real conditions.

The leakage current has different testing modes and standards in accordance with the different safety test and test points. The most common test are Earth Leakage Current, Patient Leakage Current and Patient Slave Leakage Current.

The 19032 is used with different dynamic leakage current modules and human body simulation, equivalent circuit for the requirements of various safety modules. It can apply to Electrical Safety Testing for Household Appliances, Video Product, Medical Equipment and etc.



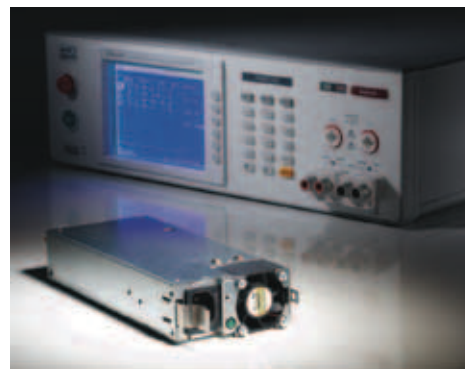
<p>Input Hi</p> <p>Input Lo</p>	<p>Input Hi</p> <p>Input Lo</p>	<p>Input Hi</p> <p>Input Lo</p>	<p>Input Hi</p> <p>Input Lo</p>	<p>Input Hi</p> <p>Input Lo</p>	<p>Input Hi</p> <p>Input Lo</p>
UL 544 NON PATIENT	UL 544 PATIENT CARE	UL 1563 IEC 60335-1 IEC 601-1	UL 2601-1 IEC 60601-1	UL 1950 UL 3101-1 IEC 60950 IEC 1010 IEC 60990 / Fig4 Reaction	UL 1950 U1 IEC 60990 Fig3 Unweighted

## 500VA HIPOT TEST (MODEL 19032-P)

The High Limit of Hipot test currently ranges from 5 -10mA. However, there are other DUT's such as Safety Integrated Analyzer of EMI Filter or large motors requiring a large amount of power. The 19032-P enhances the power of the 19032 to equip the capabilities of outputting and measuring AC 100mA/DC 25mA.

This is used to integrate the high charge current for other safety test, as any integrated analyzer for use with high leakage current or large-sized electrical safety equipment. This maximizes the efficiency of the production line and quality assurance.

The design of the 500VA complies with the requirement of IEC/UL output power to add the selection function of “no protection for trip circuit under short current 200mA and 100mA” .



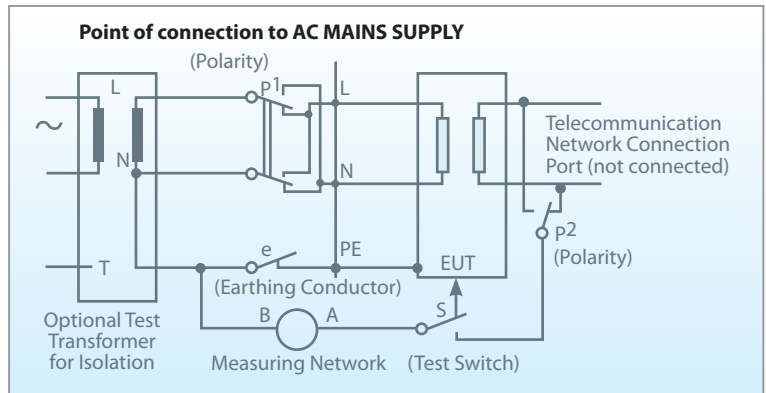
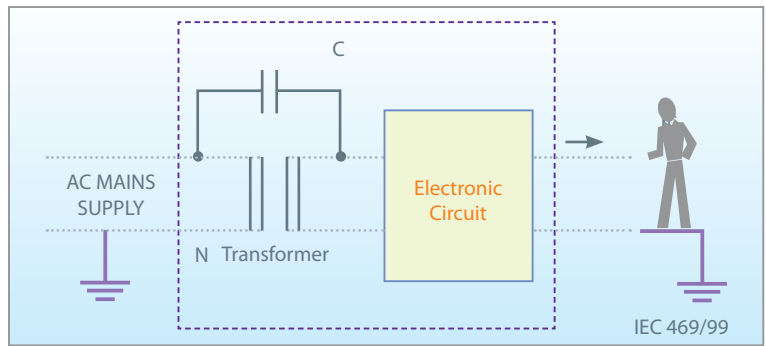
## SAFETY TEST OF INFORMATION TECHNOLOGY PRODUCT (IEC 60950)

Information technology is a big part of our daily life. Desktop, notebook, LCD monitor, UPS, printer and projector are the products that we use in our everyday lives. To ensure proper safety, all products should have electrical safety test performed. The 19032 offers all functions of safety test and Normal/Reverse as well as Single Fault switch function (LC Test) to increase manufacturing efficiency.

The output floating of Telecommunication Network in IEC 60950 to perform dynamic leakage current test is required. The equivalent stray capacitance will also be generated on an isolation transformer, even if it is a floating circuit. The stray capacitance results in leakage current and electric shock to the users. The 19032, along with the 6000-05/07/08 leakage current scanner, have P1/P2 measurement function which is able to measure dynamic leakage current on output terminals. It is the best solution for testing information technology products.

### MAIN TEST ITEM

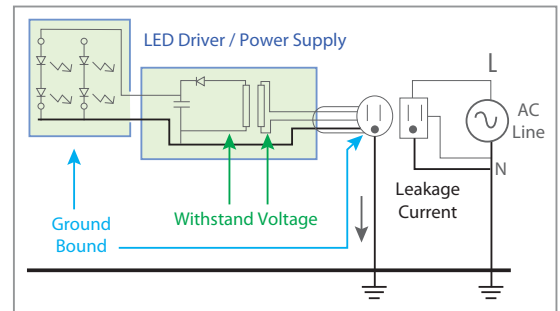
- Open Short Check
- Ground Bond
- AC/DC Hipot Test
- Earth Leakage Current Test
- Output Leakage Current Test



## LIGHTING INDUSTRY AND LED RELATED ELECTRICAL SAFETY TEST(IEC61347-1)

LED in the lighting industry is widespread and are being used in a variety of products. Each LED and power product needs to be tested for withstand voltage, insulation, grounding resistance and leakage current, for protection from personnel electric shock.

Test Item	Test Condition	
Leakage Current Test	IEC 60990, Measure network Figure 4, Configuration Figure 6	
Withstanding Voltage Test	Working voltage < DC42V	WV Test Voltage 500V
	Working voltage $\geq$ DC42V	WV Test Voltage (2U+1000)V
Ground Bonding Test	Current from AC source of 25A passed for 1min between earthing terminal and each of the accessible metal parts(IEC 61347-1)	



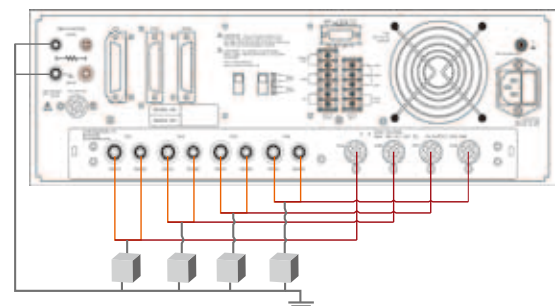
## POWER SUPPLIES(SMPS), ADAPTER AND CHARGER SAFETY TESTING

Power supplies of electronic products, including SMPS, Adapter and chargers, need to perform electrical safety test. According to various power design methods and test conditions, the 19032 offers programmable edit and solution, allowing the operator to complete all test at one time.

A number of power products designs have the insulation capability of input terminal (Primary) to output terminal (Secondary) required to protect the damage inside the component. Thus, the output terminal of Floating needs to perform Hipot test. The 19032 provides an isolation test point with high voltage which allow you not to change the fixture or cable manually, but perform P-S Hipot test directly after P-G Hipot test.

If there is danger in making contact with the output terminal (Secondary), dynamic leakage current test also need to be performed.

Test item	Open & Short (OSC)	Ground Bonding	Withstanding voltage from primary to Ground	Withstanding voltage from primary to Secondary	Leakage Current
Power supply sources					
Three-wire power supply class 1 (Secondary Floating)	V	V	V	V	V
Three-wire power supply class 1	V	V	V	-	V
Two-wire power supply class 2	V	-	-	V	V



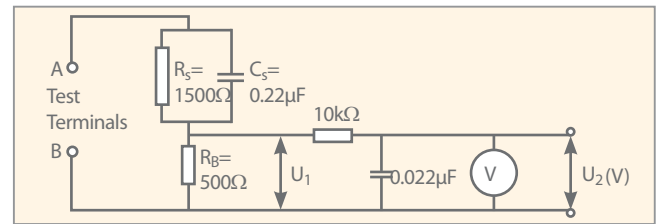
Chroma19032 with 4HV/4GC Scanner

## SAFETY TEST OF VIDEO PRODUCT (IEC 60065)

Video products include DVD recorders, LCD's, TV's, audio amplifiers, stereos and etc. These products have mass power output with separate safety standards. The main circuit design of mass power is a signal output terminal, not to mention an increase in temperature and heat dissipation of electronic component. Open voltage of some video products are over 35Vac peak or 60Vdc peak; this allows for U1 dynamic leakage current test as required. A U1 measurement circuit is added to the 19032 and P1/P2 measurement point is provided to comply with the requirement of safety standard test.

### MAIN TEST ITEM

- Open Short Check
- Ground Bond
- AC/DC Hipot Test
- Earth Leakage Current Test
- Output LC Test



## SAFETY TEST OF HOUSEHOLD APPLIANCE (IEC 60335)

Household appliances consist of ovens, refrigerators, televisions, juicers and coffee machines that may come in contact with a person. To ensure the safety of users, all products should preform electrical safety test. Except for the basic hipot test, dynamic leakage current has various test regulations by different ground modes and operation methods. The regulations are as listed in the table below.

### MAIN TEST ITEM

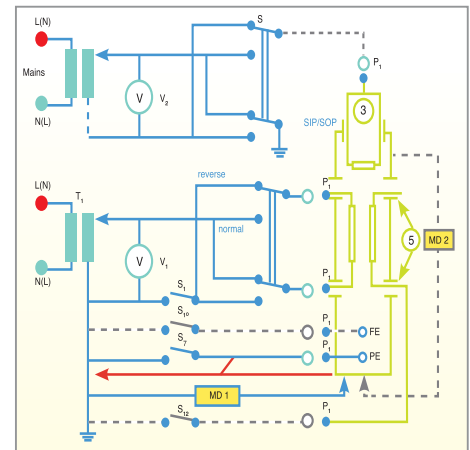
- Open Short Check
- Ground Bond
- AC/DC Hipot Test
- Earth Leakage Current Test

Class II appliances	0.25mA
Class 0, Class 01 and Class III appliances	0.5mA
Portable Class appliances	0.75mA
Stationary Class Moto-Operated appliances	3.5mA
Stationary Class Heating appliances	0.75mA or 0.75mA per kW rated power input of the appliances with a maximum of 5 mA, whichever is higher

## SAFETY TEST OF MEDICAL EQUIPMENT (IEC 60601)

The 19032 + 6000-08 is a solution for electrical safety and function test of medical equipment. The safety standard of medical equipment is very strict. Since the medical equipment comes in contact with the patient and hospital personnel, the instrument preforms various electrical safety test. The leakage current test has become one of the most important test in preforming electrical safety test.

The safety standard of medical equipment has various types of leakage current test. Also, normal/reverse/single fault normal/single fault reverse four powers and earth switch, make the safety test difficult and complex. The basic measuring circuit for the enclosure leakage current is as in the figure. It shows here measurement Type BF and CF is a special requirement for medical equipment. DC leakage current should be isolated separately and limited within 50uA limited, which is mentioned in the medical safety standard. This function has already been added to the 6000-08 LC scanner. The Chroma 19032 + 6000-08 offer programmable editing and software support. This allows you to test medical products without missing a procedure, as it saves the test data directly, providing the best test solution.



Refer to UL 60601-1 fig. 18 Measuring circuit for the Enclosure Leakage Current

### MAIN TEST ITEM

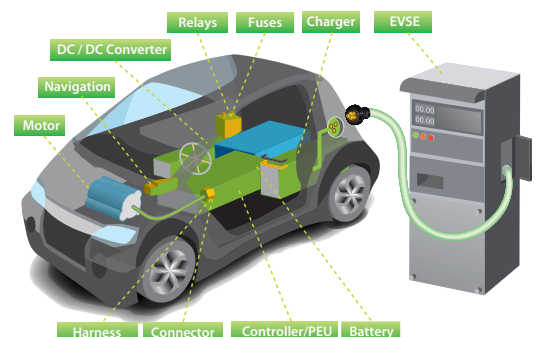
- Open Short Check
- Ground Bond
- AC/DC Hipot Test
- Earth Leakage Current Test
- Enclosure LC
- Patient LC
- Patient Auxiliary LC

## ELECTRIC VEHICLE SAFETY TEST

The Automotive industry has switch focus from internal combustion engine power to electric power. Because the voltage of electric vehicle will be a maximum of up to 600V when in operation, it is a safety issue. To avoid electrical injury, the Chroma 19032 is the best solution for electrical safety test of wire and connectors of electrical vehicles, adapters, batteries and the charging system.

### MAIN TEST ITEM

- Withstand Voltage Test : Various insulation terminals, primary and uncharged metal, withstand voltage between primary and secondary.
  - Leakage Current: All metallic parts can be touched on the system required to test earth leakage current during dynamic operation.
  - Ground Test: Ground protection connection should use 25A/60Hz current to test resistance, it cannot be higher than 100mΩ.
- References : IEC 62196-1,61815 UL 2594, 2202,2251





## LEAKAGE CURRENT SCANNER

Different safety standards have various leakage current requirements which include test method and max. current output. Chroma 19032/19032-P is able to combine different scanners for safety needs. As the table list below.



Option			HIPOT		GB		LC					
No	Name	General Application	Ports	Voltage Max	Ports	Current Max	Power Output	LC Probe	Earth LC	Touch LC	Patient LC	Patient Aux LC
A190301	9030A (Ext.)	customized	8 ports	5KVac 6KVdc	-	-	-	-	-	-	-	-
A190336	9030AG	customized	8 ports		8 ports	40A	-	-	-	-	-	-
A190302	6000-01	customized	5 ports		3 ports	30A	-	-	-	-	-	-
A190303	6000-02	customized	3 ports		5 ports	30A	-	-	-	-	-	-
A190304	6000-03	customized	8 ports		-	-	-	-	-	-	-	-
A190305	6000-04	IT product House appliance	L+N to E P to S		-	-	300V/10A	-	●	-	-	-
A190306	6000-05	Lab/TN			-	-	300V/10A	P1&P2	●	●	●	●
A190308	6000-07	Medical equipment			-	-	300V/20A	P1&P2	●	●	●	●
A190350	6000-08*	Special Medical Audio & Video			-	-	300V/20A	P1&P2	●	●	●	●
A190353	6000-11	Customized			4 ports	4 ports	40A	-	-	-	-	-

## OPTIONAL FIXTURES

Chroma provides related optional test optional fixtures for different test requirements .

- Isolation Transformer : The isolation transformer is an auxiliary and the DUT floating is connected while performing leakage current test. The above are described in the safety standard.
- Dummy Load : The main function of the fixture is to confirm the normality of the instrument before daily power on.
- Bar-code Scanner : It can connect with 19032/19032-P directly.
- Current Transformer : It is able to rise ground bond test to 40A or 60A. (Model 19032 only)
- Universal Corded Product Adapter : Using this adapter can perform test directly for various types of plug in different countries.



Isolation Transformer



Dummy Load



Current Transformer

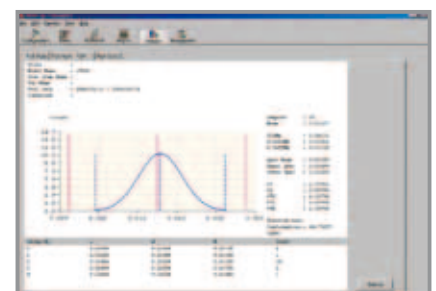
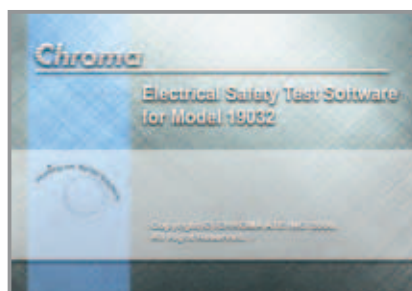


Universal Corded Product Adapter

## EST SOFTWARE

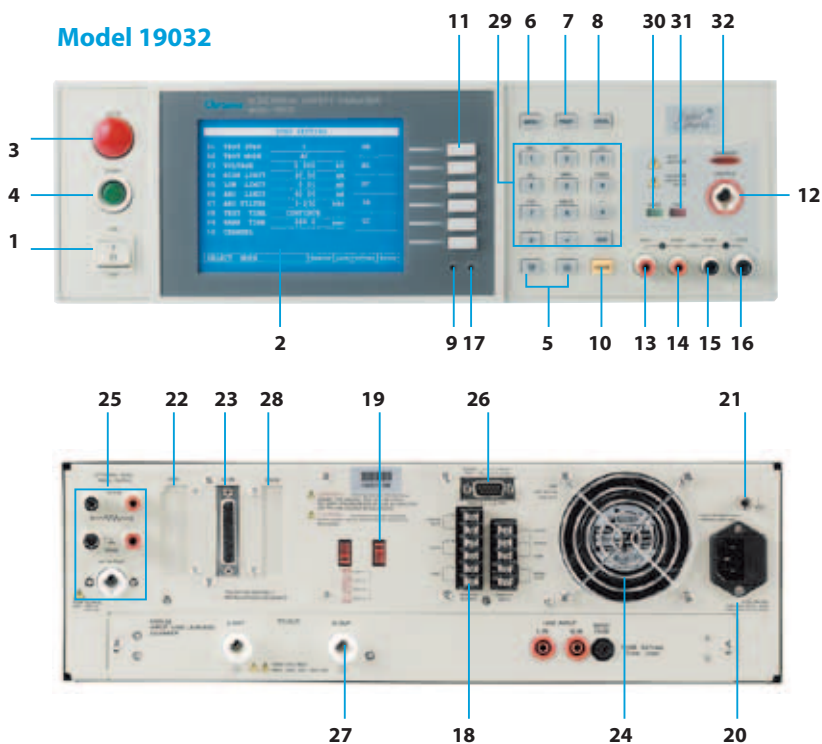
EST software can control Chroma 19032/19032-P to perform electrical safety integrated test. Having EST software, you can save the test procedure and data directly as well as converting them to EXCEL file for the convenience of management and statistical analysis.

- Program edit and GO/NG control
- Data bank
- Report function
- Statistical analysis function
- Authority management function

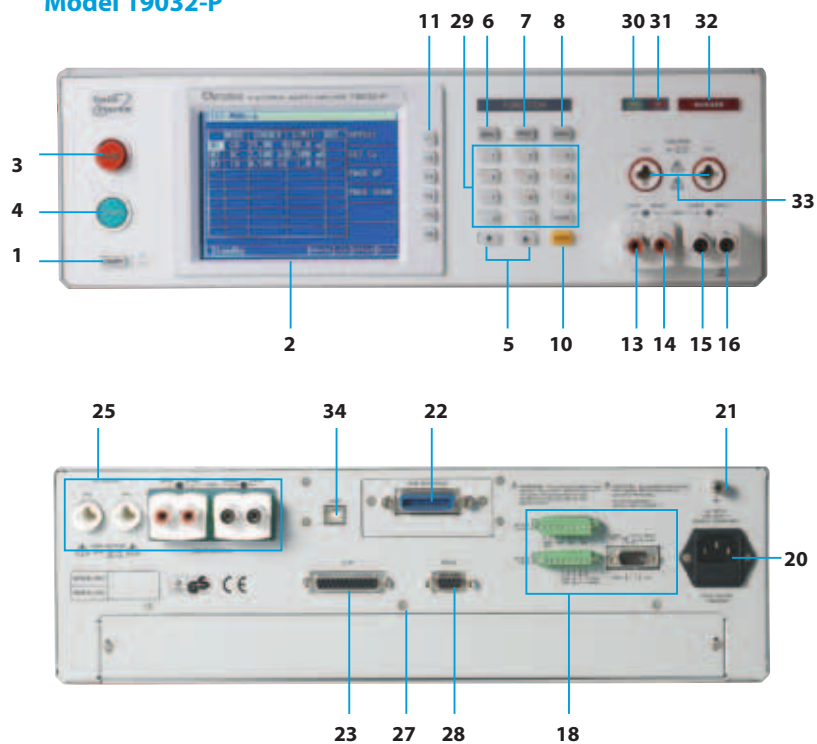


## PANEL DESCRIPTION

### Model 19032



### Model 19032-P



1. Power Switch
2. LCD Display
3. Stop Key
4. Start Key
5. Cursor Keys
6. TEST Key
7. PRINT Key
8. SYSTEM Key
9. Cal-Enable (19032)
10. DATA Entry Key
11. Function Key
12. HV Output
13. DRIVE+
14. SENSE+
15. SENSE-
16. DRIVE-
17. Update Enable (19032)
18. Remote I/O
19. Line Voltage Selector
20. Power Cord Receptacle
21. GND Terminal
22. GPIB Interface
23. SCAN Interface
24. Fan
25. Rear Panel Output
26. I/O Control (9 pin)
27. Scan Box
28. RS232 Interface
29. Data Entry Keys/Program Keys
30. PASS Indicator
31. FAIL Indicator
32. DANGER Indicator
33. Floating Output (19032-P)
34. USB Interface (19032-P)

## SPECIFICATIONS

Model	19032	19032-P
Mode	ACWV/DCWV/ IR/ GB/ LC	
Withstanding Voltage Test		
Output Voltage	DC : 0.05 ~ 6kV, AC : 0.05 ~ 5kV	
Load Regulation	± (1% of reading +5V)	± (2% of setting +0.1% of full scale)
Voltage Regulation	2V	
Voltage Accuracy	± (1% of reading+0.1% of full scale)	± (2% of setting +0.1% of ull scale)
Cutoff Current	DC : 12mA , AC : 40mA	DC : 25mA , AC : 100mA
Current Resolution	0.1 µA DC ; 1 µA AC	
Current Accuracy	± (1% of reading +0.2% of full scale)	± (2% of reading +0.5% of range)
Output Frequency	50Hz / 60Hz	
Test Time	0.3 ~ 999 sec , continue	
Ramp Time	0.1 ~ 999 sec, Off	
Fall Time	0.1 ~ 999 sec, Off	
Waveform	Sine wave	
Insulation Resistance Test		
Output Voltage	DC : 0.05 ~ 1kV	
Voltage Resolution	2V	
Voltage Accuracy	± (2% of reading + 0.5% of full scale)	± (2% of reading + 0.5% of full scale)
IR Range	0.1MΩ ~ 50GΩ	
Resistance Resolution	0.1MΩ	
Resistance Accuracy	5% typical	
Ground Bond Test		
Output Current	AC : 1 ~ 30A	AC : 3 ~ 40A
Current Accuracy	± (1% of setting + 1% of full scale)	± (2% of setting + 0.1% of full scale)
GR Range	10mΩ ~ 510mΩ	
Resistance Resolution	0.1mΩ	
Resistance Accuracy	± (1% of reading + 0.1% of full scale)	± (1% of reading + 0.1% of full scale)
Test Method	4 wires	
Flashover Detection		
Setting Mode	Programmable setting	
Detection Current	AC, DC : 1~30mA	AC : 20mA, DC : 10mA
Secure Protection Function		
Ground Fault Interrupt	-	0.5mA ±0.25mA AC
Floating Output to ground	-	<3mA, front output only (meet EN50191)
Panel Operation Lock	Present password	
Interlock	YES	
GO/NG Judgment Window		
Indication,Alarm	GO : Short sound,Green LED NG : Long sound, Red LED	
Data Hold	Least tests data memories	
Memory Storage	50 setups with up to 100 groups recall	
Interface		
Interface	9pin D-sub I/O control / RS-232 / GPIB (Optional)	
General		
Operation Environment	Temperature : 0°C ~ 40°C, Humidity : 20 % ~ 80 % RH	
Power Consumption	No load : < 100 W With rated load : 800 W	No load : < 100W Rated load : 1000W Maximum load : 1200W
Power Requirements	90~132Vac or 180~264Vac, 47~63Hz	
Dimension (H x W x D)	133 x 430 x 470 mm / 5.24 x 16.93 x 18.66 inch	133 x 430 x 500 mm / 5.22 x 16.93 x 19.69 inch
Weight	25.5 kg / 56.17 lbs	24 kg / 52.86 lbs
Cetification	CE	CE

Model	A190305~A190350 * (6000-04~08)
Support Mode	ACWV/DCWV/IR/LC
DUT Input Power Capacity	AC : 300V / 10A / 20A max.
Short Protection	20A, 250V fuse for DUT shorted.
Measurement Mode	
Input Characteristic	DC ~ 1MHz Input Impedance : 1M//20pF
Measurement Mode	Normal, Reverse, Single Fault Normal, Single Fault Reverse
Measurement Devices (Five measure device)	UL 544 NP, UL 544 P, UL 1563, UL 60601-1, IEC60601-1, UL 3101-1, UL/ IEC 60950, UL 1950-U1*, UL 2601-U1*, IEC60990
Probe Connection	Line to Ground, Line to P2, P1 to P2
HI-LO Limit	
LC HI-LO Limit	0 ~ 9.99mA, 1 µA resolution
Current HI-LO Limit	0 ~ 19.99Amp*
VA HI-LO Limit	0 ~ 4400VA
VA Resolution	0.1VA

\*Different options have different specification

Model	A190350 (6000-08)
Special Functions	LC DC Measurement U1, U2 (UL-1950) Hot Swap

## ORDERING INFORMATION

**19032-P** : Electrical Safety Analyzer 500VA  
**19032** : Electrical Safety Analyzer  
**A190301** : 8HV Scanning Box  
**A190302** : 5HV/3GC Scanner  
**A190303** : 3HV/5GC Scanner  
**A190304** : 8HV Scanner  
**A190305** : Line Leakage Current Scanner (generally)  
**A190306** : Hipot/Line Leakage/Probe Scanner (10A)  
**A190307** : L-N Scanner & Leakage Current Scanner  
**A190308** : Hipot/Line Leakage/Probe Scanner (20A)  
**A190313** : 500VA Isolation Transformer  
**A190314** : 1000VA Isolation Transformer  
**A190316** : Dummy Load  
**A190317** : Bar Code Scanner  
**A190334** : Ground Bond 40A (19032)  
**A190336** : 8HV/8GB Scanning Box  
**A190337** : Ground Bond 60A (19032)  
**A190338** : 19001 EST Software  
**A190343** : 19" Rack Mounting Kit (19032)  
**A190344** : HV Gun  
**A190349** : Universal Corded Product Adapter  
**A190350** : HV/LC/LAC/DC Probe Scanner (20A)  
**A190353** : 4HV/4GC Scanner  
**A190355** : 19" Rack Mounting Kit (19032-P)  
**A190356** : GPIB Interface (19032-P)  
**A190508** : GPIB Interface (19032)  
**A190708** : ARC Verification Fixture

Developed and Manufactured by :

**CHROMA ATE INC.**  
 致茂電子股份有限公司  
**HEADQUARTERS**  
 66 Hwaya 1st Rd., Kueishan  
 Hwaya Technology Park,  
 Taoyuan County 33383,  
 Taiwan  
 Tel: +886-3-327-9999  
 Fax: +886-3-327-8898  
 http://www.chromaate.com  
 E-mail: info@chromaate.com

**CHINA**  
**CHROMA ELECTRONICS**  
**(SHENZHEN) CO., LTD.**  
 8F, No.4, Nanyou Tian An  
 Industrial Estate, Shenzhen,  
 China PC: 518052  
 Tel: +86-755-2664-4598  
 Fax: +86-755-2641-9620

**JAPAN**  
**CHROMA JAPAN CORP.**  
 472 Nippa-cho, Kouhoku-ku,  
 Yokohama-shi, Kanagawa,  
 223-0057 Japan  
 Tel: +81-45-542-1118  
 Fax: +81-45-542-1080  
 http://www.chroma.co.jp  
 E-mail: info@chromaate.com

**U.S.A.**  
**CHROMA SYSTEMS**  
**SOLUTIONS, INC.**  
 19772 Pauling,  
 Foothill Ranch, CA 92610  
 Tel: +1-949-600-6400  
 Fax: +1-949-600-6401  
 http://www.chromausa.com  
 E-mail: sales@chromausa.com

**EUROPE**  
**CHROMA ATE EUROPE B.V.**  
 Morsestraat 32, 6716 AH Ede,  
 The Netherlands  
 Tel: +31-318-648282  
 Fax: +31-318-648288  
 http://www.chroma.eu.com  
 E-mail: sales@chroma.eu.com

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