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 tests.

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.
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 (Cx) from tens of pF to several uF, in a normal state. A micro capacitance will occur on an open circuit interface once the connection is interrupted (as Cc 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.

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.

OPEN / SHORT CHECK (OSC)

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CAPABILITY OF CONTROLLING CHROMA AC SOURCE

Manufacturers 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.
**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.

**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 preformed. 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.

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Test Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage Current Test</td>
<td>IEC 60990, Measure network Figure 4, Configuration Figure 6</td>
</tr>
<tr>
<td>Withstanding Voltage Test</td>
<td>Working voltage &lt; DC42V WV Test Voltage 500V</td>
</tr>
<tr>
<td></td>
<td>Working voltage &gt; DC42V WV Test Voltage (2U+1000)V</td>
</tr>
<tr>
<td>Ground Bonding Test</td>
<td>Current from AC source of 25A passed for 1min between earthing terminal and each of the accessible metal parts (IEC 61347-1)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Power supply sources</th>
<th>Test item</th>
<th>Open &amp; Short (OSC)</th>
<th>Ground Bonding</th>
<th>Withstanding voltage from primary to Ground</th>
<th>Withstanding voltage from primary to Secondary</th>
<th>Leakage Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-wire power supply class 1 (Secondary Floating)</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Three-wire power supply class 1</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>-</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Two-wire power supply class 2</td>
<td>V</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>
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 perform 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.

<table>
<thead>
<tr>
<th>Class II appliances</th>
<th>0.25mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 0, Class 01 and Class III appliances</td>
<td>0.5mA</td>
</tr>
<tr>
<td>Portable Class appliances</td>
<td>0.75mA</td>
</tr>
<tr>
<td>Stationary Class Moto-Operated appliances</td>
<td>3.5mA</td>
</tr>
<tr>
<td>Stationary Class Heating appliances</td>
<td>0.75mA or 0.75mA per kW rated power input of the appliances with a maximum of 5 mA, whichever is higher</td>
</tr>
</tbody>
</table>

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 performs various electrical safety tests. The leakage current test has become one of the most important tests in performing electrical safety tests.

The safety standard of medical equipment has various types of leakage current tests. 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.

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 switched 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.

<table>
<thead>
<tr>
<th>Option</th>
<th>HIPOT</th>
<th>GB</th>
<th>LC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Name</td>
<td>General Application</td>
<td>Ports</td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
<td>----------------------</td>
<td>-------</td>
</tr>
<tr>
<td>A190301</td>
<td>9030A(Ext.)</td>
<td>customized</td>
<td>8 ports</td>
</tr>
<tr>
<td>A190302</td>
<td>9030AG</td>
<td>customized</td>
<td>8 ports</td>
</tr>
<tr>
<td>A190303</td>
<td>6000-02</td>
<td>customized</td>
<td>3 ports</td>
</tr>
<tr>
<td>A190304</td>
<td>6000-03</td>
<td>customized</td>
<td>8 ports</td>
</tr>
<tr>
<td>A190306</td>
<td>6000-05</td>
<td>Lab/TN</td>
<td>-</td>
</tr>
<tr>
<td>A190307</td>
<td>6000-06</td>
<td>Medical equipment</td>
<td>-</td>
</tr>
<tr>
<td>A190308</td>
<td>6000-07</td>
<td>Special Medical Audio &amp; Video</td>
<td>-</td>
</tr>
<tr>
<td>A190350</td>
<td>6000-08*</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A190353</td>
<td>6000-11</td>
<td>Customized</td>
<td>4 ports</td>
</tr>
</tbody>
</table>

**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.

**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
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**

#### 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 full scale)
- **Cutoff Current**: DC: 12mA, AC: 40mA DC: 25mA, AC: 100mA

#### 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**: 0.1M ~ 50G
- **Resistance Resolution**: 0.1MΩ
- **Resistance Accuracy**: ±5% typical

#### Ground Bond Test
- **Output Current**: AC: 1 ~ 30A, DC: 1 ~ 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

#### Secure Protection Function
- **Ground Fault Interrupt**: - 0.5mA ± 0.25mA AC
- **Floating Output to ground**: <3mA, front output only (meet ENS0191)
- **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
- **Interfance**: 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: < 100W With rated load: 800W
- **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
- **Weight**: 25.5 kg / 56.17 lbs / 24 kg / 52.86 lbs
- **Certification**: CE, ACWV/DCWV/IR/GC/GB/LC

#### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model</th>
<th>A190305<del>A190350 * (6000-04</del>08)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support Mode</strong></td>
<td>ACWV/DCWV/IR/LC</td>
</tr>
<tr>
<td><strong>DUT Input Power Capacity</strong></td>
<td>AC: 300V / 10A / 20A max.</td>
</tr>
<tr>
<td><strong>Short Protection</strong></td>
<td>20A, 250V fuse for DUT shorted.</td>
</tr>
<tr>
<td><strong>Measurement Mode</strong></td>
<td>DC ~ 1MHz, Input Impedance: 1M/20pF</td>
</tr>
<tr>
<td><strong>Measurement Devices</strong></td>
<td>Normal, Reverse, Single Fault Normal, Single Fault Reverse</td>
</tr>
<tr>
<td><strong>Measurement Devices (Five measure device)</strong></td>
<td>UL 544 NP, UL 544 P, UL 1563, UL 66001-1, IEC60601-1, UL 3101-1, UL IEC 60950, UL 1950-U1*, UL 2601-U1*, IEC60990</td>
</tr>
<tr>
<td><strong>Probe Connection</strong></td>
<td>Line to Ground, Line to P2, P1 to P2</td>
</tr>
<tr>
<td><strong>Hi-LO Limit</strong></td>
<td>LC HI-LO Limit: 0 ~ 9.99mA, 1 μA resolution</td>
</tr>
<tr>
<td><strong>Current HI-LO Limit</strong></td>
<td>0 ~ 19.99mA*</td>
</tr>
<tr>
<td><strong>VA HI-LO Limit</strong></td>
<td>0 ~ 4400VA</td>
</tr>
<tr>
<td><strong>VA Resolution</strong></td>
<td>0.1VA</td>
</tr>
</tbody>
</table>

*Different options have different specification

**Model**
- **19032-P**: Electrical Safety Analyzer 500VA
- **19032**: Electrical Safety Analyzer
- **A190301**: 8HV Scanning Box
- **A190302**: SHV/3GC Scanner
- **A190303**: SHV/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/8GC 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

**ORDERING INFORMATION**

- **9pin D-sub I/O control / RS-232 / GPIB (Optional)**

**19032**: Electrical Safety Analyzer

19032-P: Electrical Safety Analyzer 500VA

**A190301**: 8HV Scanning Box

**A190302**: SHV/3GC Scanner

**A190303**: SHV/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)

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**A190314**: 1000VA Isolation Transformer

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**A190317**: Bar Code Scanner

**A190334**: Ground Bond 40A (19032)

**A190336**: 8HV/8GC 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

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**A190355**: 19” Rack Mounting Kit (19032-P)

**A190356**: GPIB Interface (19032-P)

**A190508**: GPIB Interface (19032)

**A190708**: ARC Verification Fixture

**A190313**: 500VA Isolation Transformer

**A190314**: 1000VA Isolation Transformer

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**A190317**: Bar Code Scanner

**A190334**: Ground Bond 40A (19032)

**A190336**: 8HV/8GC 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)

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**A190508**: GPIB Interface (19032)

**A190708**: ARC Verification Fixture