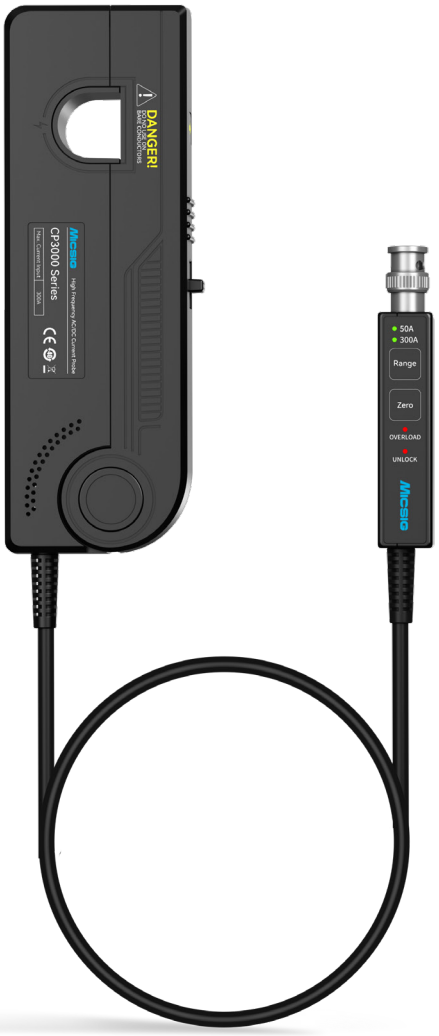
High Frequency AC / DC Current Probe CP Series

User Manual



CP3005 / CP3008 / CP1510

CP1003B / CP503B

Shenzhen Micsig Technology Co., Ltd.
Tel: +86-(0)755-88600880 Email: sales@micsig.com Website: www.micsig.com
Add: 6F, Jinhuanyu Building, No. 56, Tiezai Rd, Bao'an District, Shenzhen, Guangdong, China.

Disclaimer

All information provided in this document is delivered “as is.” Future updates may be obtained by visiting the Micsig official website (www.micsig.com).

To the fullest extent permitted by applicable law, Micsig makes no express or implied warranties with respect to this manual or any of the information contained herein, including but not limited to implied warranties of merchantability or fitness for a particular purpose. Micsig shall not be liable for any errors, incidental or consequential damages arising from the provision, use or application of this document or the information it contains.

If a separate written agreement between Micsig and the user includes warranty terms relating to the contents of this document, and such terms conflict with the provisions herein, the warranty terms in the separate agreement shall prevail.

Warranty

The current probe body is guaranteed for 1 year. During the warranty period of the product, the company will be responsible for providing free maintenance for any faults caused by the quality of the product itself under normal use and has not been dismantled or repaired.

The warranty is invalid in the following cases, but maintenance services are provided, labor costs are waived, and only spare parts are charged:
a. Damage to accessories due to improper use, maintenance, or storage.
b. Damage caused by force majeure factors, such as natural disasters.

In the following cases, the company will refuse to provide maintenance services or provide maintenance services for a fee:
a. Unable to provide product packaging or anti-counterfeiting labels on product packaging.
b. The content of the anti-counterfeiting label has been altered, or is blurred and unrecognizable.
c. It has been dismantled by unauthorized personnel by Micsig (eg: changing wires, dismantling internal components).
d. There is no sales voucher or the content of the sales voucher does not match the product.

Content

General Safety Summary

Please read the following safety precautions carefully to avoid personal injury and prevent damage to this product or any product connected to this product.
To avoid possible danger, be sure to use this product as prescribed.
Only qualified personnel should perform repair procedures.

Avoid fire or personal injury

Connect and disconnect devices properly.

* Do not plug or unplug probes or test leads while they are connected to a voltage source.
* Power off the circuit under test before connecting or disconnecting the current probe.
* Before connecting the probe to the circuit under test, please connect the probe output to the measuring instrument.
* Before connecting the probe input, please connect the probe reference lead to the circuit under test.
* Before disconnecting the probe from the measuring instrument, please disconnect the probe input end and the probe reference lead from the circuit under test.

Observe all terminal ratings. To avoid fire or electric shock, observe all product ratings and markings. Before making connections to the product, please consult the product user manual for details on ratings. Do not connect the current probe to any wire with a voltage exceeding its rating.
Do not disassemble the instrument. Do not use the product for measurements with covers or panels open.
Do not operate the product when it is suspected that the product is malfunctioning.
Keep away from exposed circuits. Do not touch exposed wiring and components while the power is on.
Do not operate in wet environments.
Do not operate in flammable and explosive environments.
Please keep the product surface clean and dry.

Terms in this manual

⚠ WARNING: A "WARNING" statement identifies conditions or actions that could result in personal injury or life-threatening conditions.

⚠ CAUTION: A “CAUTION”statement identifies conditions or actions that could cause damage to this product or other property.

Maintenance Safety

Only qualified service personnel with relevant qualifications should perform service operations. Please read this "Maintenance Safety Summary" and "General Safety Summary" before performing any repair operations.

Do Not Serve Alone: Do not make internal repairs or adjustments to this product unless someone else is on site to provide first aid and resuscitation.

Disconnect Power: To avoid electrical shock, disconnect power to the instrument before disconnecting the main power cord.

Pay attention when repairing with electricity: Hazardous voltages or currents may be present in this product. Disconnect power and test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connectors.

Compliance Information

This section lists the EMC (Electromagnetic Compatibility), safety and environmental standards to which the instrument complies.

Safety Compliance

Equipment Type

Test and Measurement Equipment.

Pollution Degree

The micro-environmental pollution levels used to determine clearances or creepage distances can be classified into 4 levels.

* Pollution degree 1: no pollution or only dry non-conductive pollution.
* Pollution degree 2: In general, there is only non-conductive pollution, and occasional temporary conduction caused by condensation occurs. typical office/home environment. Temporary condensation occurs only when the product is not in use.
* Pollution degree 3: There is conductive pollution, or dry non-conductive pollution becomes conductive due to expected condensation.
* Pollution degree 4: Causes persistent conductive pollution, such as pollution caused by conductive dust or rain and snow.

Pollution Degree

Pollution Degree 2

Overvoltage Class Description

The overvoltage level is divided according to the IEC60664 standard, which is divided into four levels: CAT I, CAT II, CAT III, and CAT IV.

* CAT I is a low-voltage low-energy class with protective devices, generally referring to the internal voltage of electronic equipment.
* CAT II is a low-voltage high-energy level, branched from the main power supply circuit, and the 220V voltage of the home lighting circuit belongs to this category.
* CAT III refers to the high voltage and high energy level, refers to the fixed installation of the main power supply circuit, generally refers to 380V three-phase voltage.
* CAT IV refers to three-phase lines at utility power connections, any outdoor conductors.

Overvoltage Category

CAT II

Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Equipment Recycling: Production of this equipment requires the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

This symbol indicates that this product complies with the relevant requirements of European Union Directives 2002/96/EC and 2006/66/EC on Waste Electronic and Electrical Equipment (WEEE) and Batteries.

Certification complies with the standards

EC Conformity Declaration - Low Voltage:
Low Voltage Directive 2014/35/EU
EN 61010-1:2010 /A1:2019
Safety requirements of electrical equipment for measurement, control, and laboratory use.
EN 61010-2-032:2023
Specific provisions for hand-held current clamps for electrical measurement and test equipment.

Other applicable regulations:
EN 61010-1:2010 /A1:2019
Safety requirements of electrical equipment for measurement, control, and laboratory use.
EN 61010-2-032:2023
Specific provisions for hand-held current clamps for electrical measurement and test equipment.

Main Functions

With up to 100 MHz bandwidth and 300 Arms continuous current, the Micsig CP Series features 1% accuracy and 1 mA resolution for precise waveform capture and reliable measurements.A dual-range design covers both small-signal detection and high-current transient analysis, helping engineers optimize their designs.

Featuring 5 mm and 20 mm jaw options, one-button degauss/auto-zero, and a built-in overcurrent alarm, the CP Series ensures easy operation and safety. The standard BNC interface is compatible with most oscilloscope brands, making it ideal for new energy and industrial electronics testing.

CP3008: DC-8 MHz bandwidth, dual-range 50 A/300 A, 300 Arms continuous, ±1% accuracy, 10 mA resolution.

CP3005: DC-5 MHz bandwidth, 20 mm jaw, 300 Arms continuous, dual-range 50 A/300 A, 10 mA resolution.

CP1510: DC-10 MHz bandwidth, 20 mm jaw, 150 Arms continuous, dual-range 30 A/150 A, 10 mA resolution.

CP1003B: DC-100 MHz bandwidth, 5 mm jaw, dual-range 5 A/30 A, ±1% accuracy, 1 mA resolution.

CP503B: DC-50 MHz bandwidth, 5 mm jaw, dual-range 5 A/30 A, ±1% accuracy, 1 mA resolution.

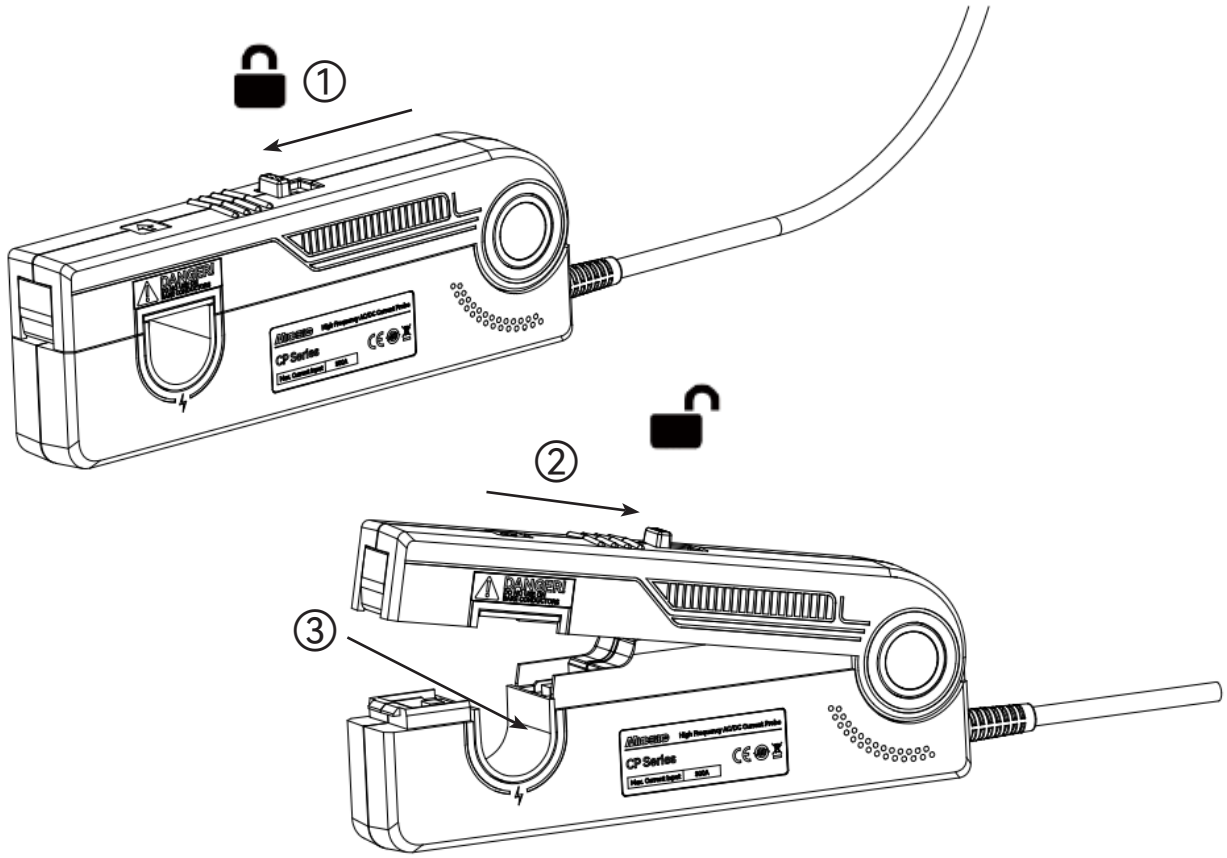
Applications:

* Electric vehicle transportation design
* Switching power supply design
* Experiment of electronic engineering
* Electronic ballast design
* Industrial Control / Consumer Electronics design
* Semiconductor devices design
* Avionics design
* Inverter/Transformer design
* Engine driven design
* Power electronics and electric drive experimental design

Probe Structure

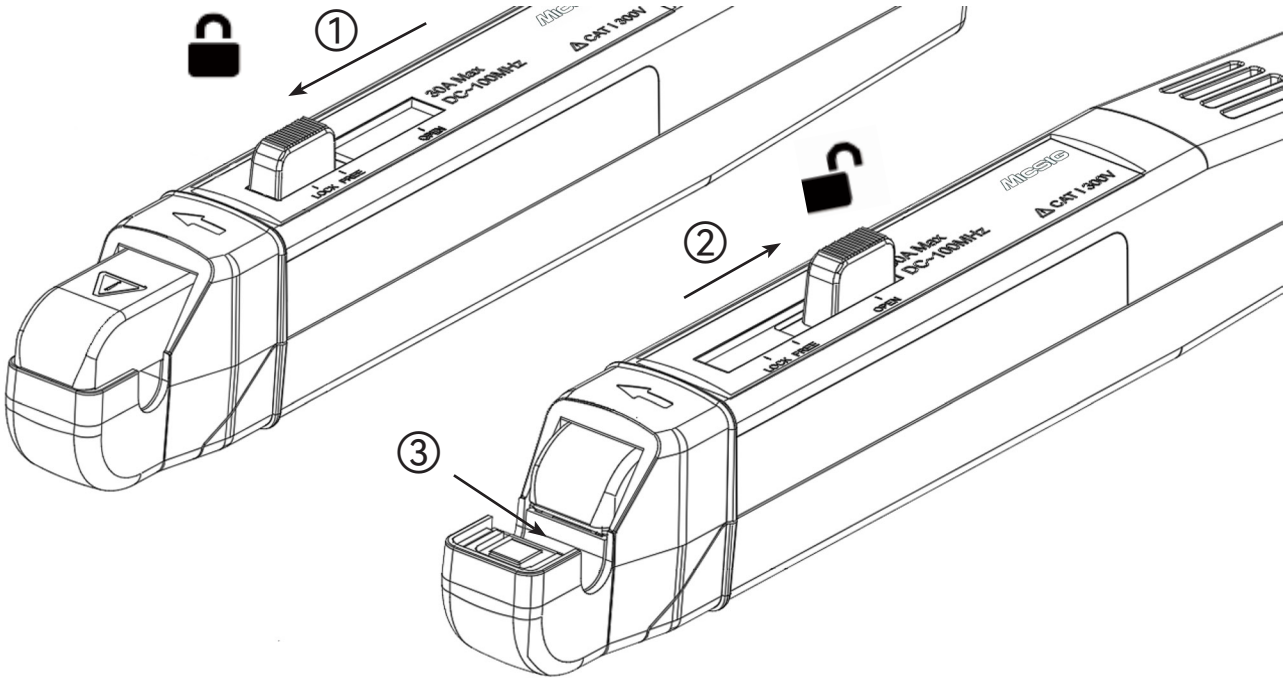
Probe Head

1. CP3008, CP3005, CP1510



① When the slider is in the "LOCK" position, you can degauss the probe and take measurements.
② Move the slider to the "OPEN" unlocked position to insert or remove the wire from the wire clip.
③ The grip will accept wire diameters up to 20mm.

2、CP1003B, CP503B



① When the slider is in the "LOCK" position, you can degauss the probe and take measurements.
② Move the slider to the "OPEN" unlocked position to insert or remove the wire from the wire clip.
③ The grip will accept wire diameters up to 5mm.

⚠ WARNING: Do not force wires exceeding the jaw diameter, it may damage the probe.

⚠ WARNING: To avoid electric shock, do not touch areas within the safe handling area (the area within the dashed line in the diagram) when taking measurements.

⚠ WARNING: Do not drop the probe or subject it to strong shocks, as this may result in damage to the probe.

⚠ WARNING: Do not connect the current probe to any wire whose voltage or current exceeds the probe rating.

Probe Control Module

CP Series function buttons and LED status indicators are located on the probe control module and are described as below:

Function Button

* The Range button is the range switching button, and switches each time by lightly pressed.
* The "Zero" button is the automatic zero-calibration button, single press will automatically degauss and zero-calibration.

Button Status Indicator

* The status indicator of the current range button will always be on to indicate the selected current range.
* "Zero" button long ON, the probe will be degaussed and zeroed, and will turn off after completed, If the button flashes 5 times, it means zero calibration failed.
* Current Overload Indication:
  CP3008, CP3005, and CP1510: Flashing OVERLOAD light with audible alarm.
  CP503B and CP1003B: Corresponding range button's status indicator will flash.

Note

* The probe will automatically go through a degaussing and zeroing procedure every time it is powered on.
* Input current overload will magnetize the probe, please demagnetize the probe after the overload occurs.

*Only CP3008, CP3005, and CP1510 models are equipped with OVERLOAD and UNLOCK indicators.

Range Specifications

CP3008	dual-range 50A/300A, 300A: 0.01V/A, 50A: 0.1V/A
CP3005	dual-range 50A/300A, 300A: 0.01V/A, 50A: 0.1V/A
CP1510	dual-range 30A/150A, 150A: 0.01V/A, 30A: 0.1V/A
CP1003B	dual-range 5A/30A, 30A: 0.1V/A, 5A: 1V/A
CP503B	dual-range 5A/30A, 30A: 0.1V/A, 5A: 1V/A

Connection

⚠ **Caution:** The probe head is a precision part. Do not drop the probe or physically shock it, twist it, or drastically alter its surroundings. Do not insert wires larger than jaw diameter into the probe grip, as this may damage the probe.

Connecting to an oscilloscope

1. Connect the probe BNC cable to the channel interface of the oscilloscope.
2. Power the probe control module with the standard 12V power adapter provided with the probe.

⚠ **CAUTION:** Must use the adapter provided with the probe for power supply, DO NOT use USB port on the oscilloscope.

Degaussing and Zero

⚠ **Note:** Before degaussing and zero the probe, be sure to verify that the probe head is locked. Incomplete closure will result in inaccurate measurements.
CP3008/CP3005/CP1510: Close the jaw completely and slide the lock button forward until the UNLOCK indicator turns off.
CP503B/CP1003B: Close the jaw firmly and push until an audible "click" is heard, confirming it is securely locked.

To ensure accurate measurements, degauss the probe under following conditions:

* Turn on the measuring system and allow a 20-minute warm-up time
* Before connecting the probe to the wire
* Whenever there is a current or thermal overload
* Whenever the probe is placed in a strong external magnetic field

Press the button "Zero", the button lights up, probe will conduct degaussing and zero calibration. If the button light flashes 5 times, it means zero calibration failed.

Function Check and Basic Operation

CAUTION: Do not force wires larger than 5.0 mm in diameter into the probe jaws, as this may damage the probe. The mating surface of the probe head transformer is precisely polished and should be handled with care. Dirt on the mating surface of the probe head transformer may reduce measurement accuracy.

Use the following steps to check if the probe is working properly:

1. Connect the probe to any channel of the oscilloscope.
2. Set the oscilloscope impedance to 1MΩ.
3. If the auto-zero calibration fails, press the Zero button to perform zero calibration.
4. Connect the probe to the circuit.
5. Adjust the oscilloscope settings or use the oscilloscope's auto-setup function to display a stable waveform. After seeing a stable waveform, it means that the probe is working normally.

Here are some basic operations that should be noted:

* Before connecting the oscilloscope, please slide the probe slider to the LOCK position to lock the probe, otherwise it will affect the zero calibration accuracy.
* Before connecting the probe to the lead, please check the oscilloscope, if there is a DC offset, please degauss and zero the probe.
* Please do not touch the conductor under test and the sensor head of the probe during measurement.
* Close and lock the probe grip on the wire. For correct polarity readings, connect the probe from positive to negative so that the direction of current flow matches the arrow on the probe clip.

Technical Specifications

The technical specifications in the tables in this section are valid under the following conditions:

* The probe has been calibrated at an ambient temperature of 23° C ±5° C.
* The probe is connected to the host instrument using an input resistance of 1 MΩ.
* The probe must have a warm-up time of at least 20 minutes in an environment that does not exceed the stated limits.

Specifications for the HF AC / DC current probes are divided into three categories: Warranted Characteristics, Typical Characteristics, Nominal Characteristics

Warranted Characteristics

Table 1: Warranted Electrical Characteristics

Warranted characteristics describe performance guaranteed to be achieved within tolerances or required by a particular test type.

Characteristics	CP3008	CP3005	CP1510
Bandwidth	DC-8MHz	DC-5MHz	DC-10MHz
Rise Time	≤ 53ns	≤ 70ns	≤ 46ns
Accuracy (Max continuous current @ DC and 45-66Hz)	±1% ±10mA (50A) ±1% ±100mA (300A)	±1% ±10mA (50A) ±1% ±100mA (300A)	±1% ±10mA (30A) ±1% ±100mA (150A)
Lowest Measurable Current	10mA (50A) 100mA (300A)	10mA (50A) 100mA (300A)	10mA (30A) 100mA (150A)

Characteristics	CP1003B	CP503B
Bandwidth	DC-100MHz	DC-50MHz
Rise Time	≤ 3.5ns	≤ 7ns
Accuracy (Max continuous current @ DC and 45-66Hz)	±1% ±1mA (5A) ±1% ±10mA (30A)	±1% ±1mA (5A) ±1% ±10mA (30A)
Lowest Measurable Current	1mA (5A) 10mA (30A)	1mA (5A) 10mA (30A)

Typical Characteristics

Table 2: Typical Electrical Characteristics

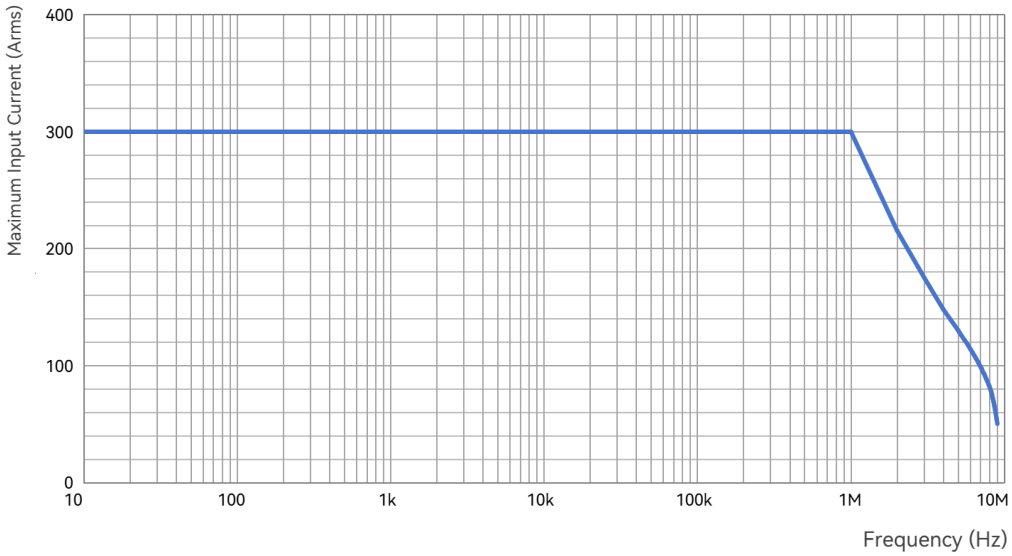
Typical Characteristics describe typical but not guaranteed performance.

Characteristics	CP3008	CP3005	CP1510
Measuring range	50Arms (50A) 300Arms (300A)	50Arms (50A) 300Arms (300A)	30Arms (30A) 150Arms (150A)
Max. measuring current	500Apk, 300Arms	500Apk, 300Arms	300Apk, 150Arms
Noise	<1.5mArms (50A) <12mArms (300A)	<1.5mArms (50A) <12mArms (300A)	<1.5mArms (30A) <10mArms (150A)
Overcurrent Alarm Value	≥ 50Apk (50A) ≥ 300Apk (300A)	≥ 50Apk (50A) ≥ 300Apk (300A)	≥ 30Apk (30A) ≥ 150Apk (150A)
Max. working voltage	CAT II 600V CAT III 300V	CAT II 600V CAT III 300V	CAT II 600V CAT III 300V
Max. floating voltage	CAT II 600V CAT III 300V	CAT II 600V CAT III 300V	CAT II 600V CAT III 300V

Characteristics	CP1003B	CP503B
Measuring range	5Arms (5A) 30Arms (30A)	5Arms (5A) 30Arms (30A)
Max. measuring current	50Apk, 30Arms	50Apk, 30Arms
Noise	< 4mApp (5A) < 30mApp (30A)	< 4mApp (5A) < 30mApp (30A)
Overcurrent Alarm Value	≥ 7Apk (5A) ≥ 50ApK (30A)	≥ 7Apk (5A) ≥ 50ApK (30A)
Max. working voltage	CAT I 300V	CAT I 300V
Max. floating voltage	CAT I 300V	CAT I 300V

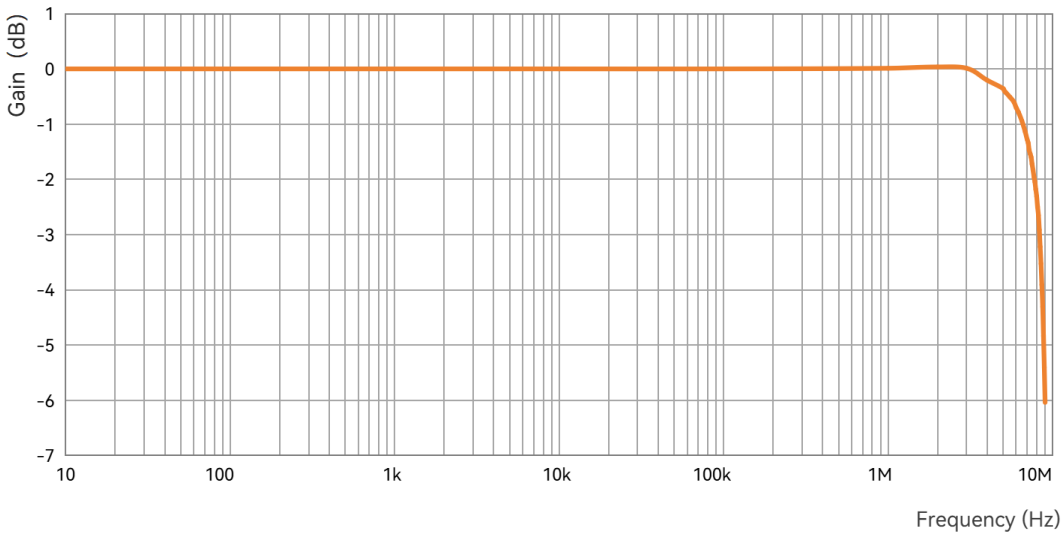
1. CP3008

Figure 1. Maximum Current VS Frequency CP3008



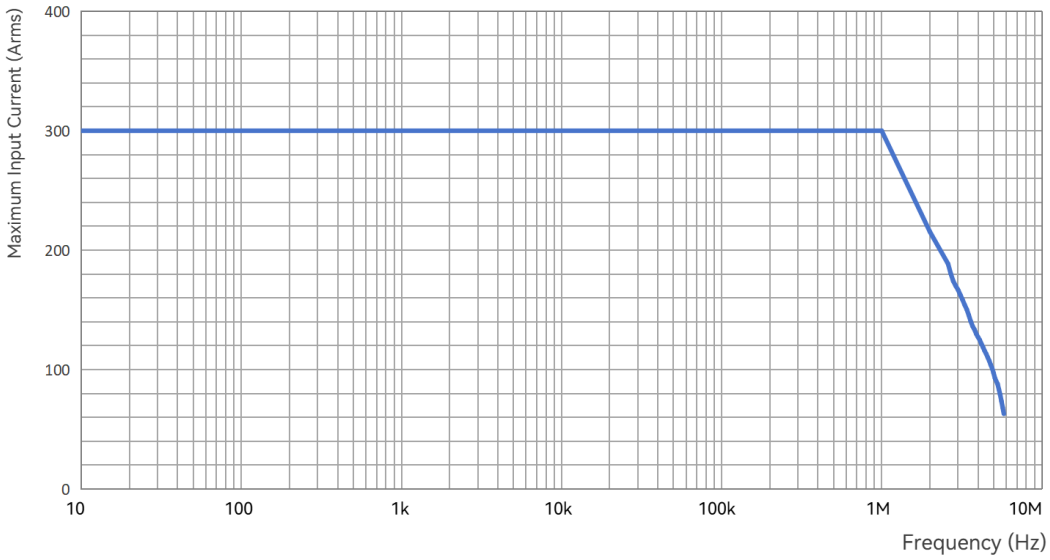
WARNING: When measuring high-frequency current, be careful not to exceed the current value shown in the curve. Use of the maximum continuous current exceeding the curve will cause the probe to burn.

Figure 2: Amplitude-frequency characteristic curve CP3008



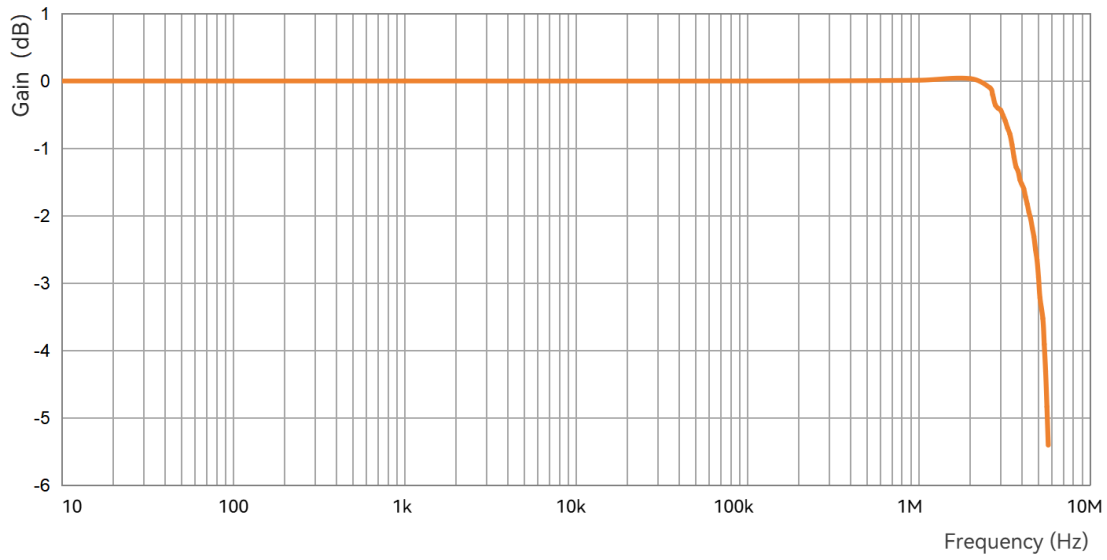
2. CP3005

Figure 3: Maximum Current VS Frequency CP3005



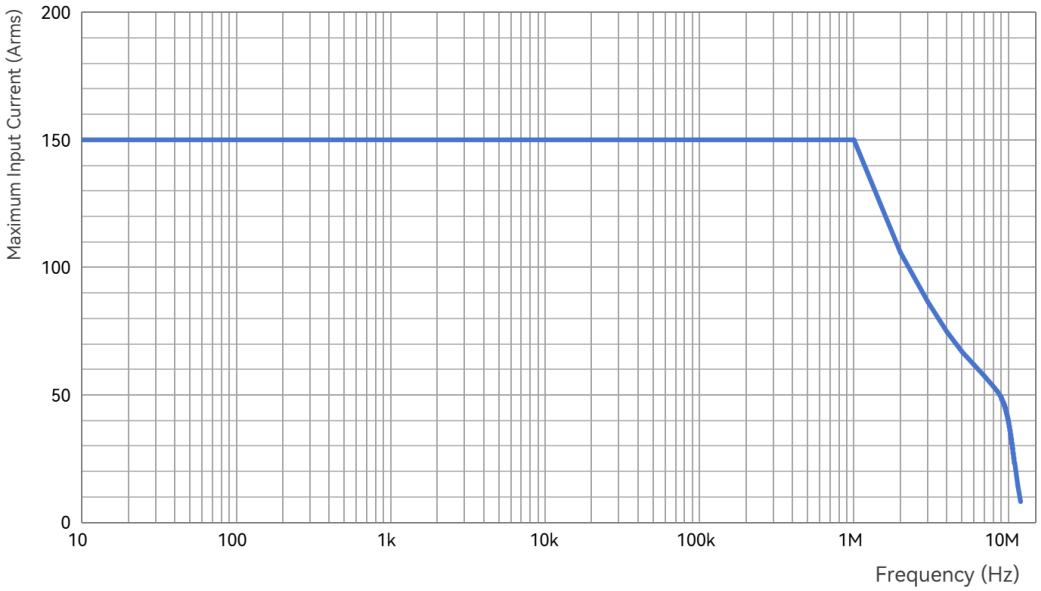
⚠ **WARNING:** When measuring high-frequency current, be careful not to exceed the current value shown in the curve. Use of the maximum continuous current exceeding the curve will cause the probe to burn.

Figure 4: Amplitude-frequency characteristic curve CP3005



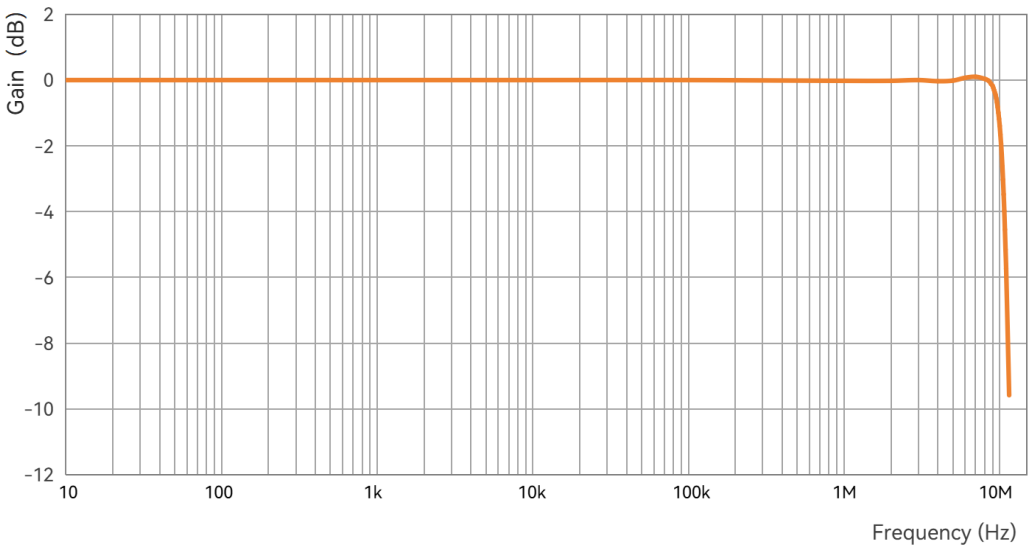
3. CP1510

Figure 5. Maximum Current VS Frequency CP1510



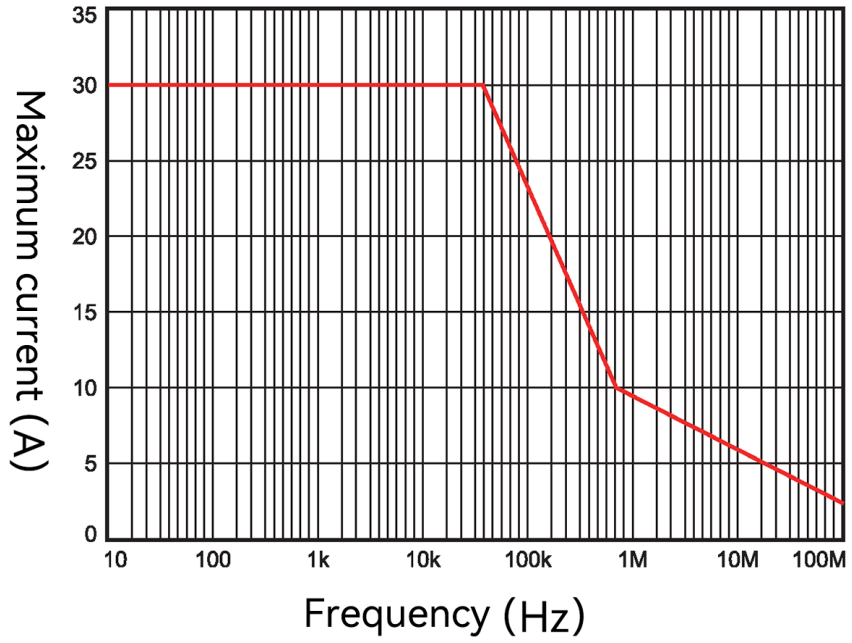
WARNING: When measuring high-frequency current, be careful not to exceed the current value shown in the curve. Use of the maximum continuous current exceeding the curve will cause the probe to burn.

Figure 6: Amplitude-frequency characteristic curve CP1510



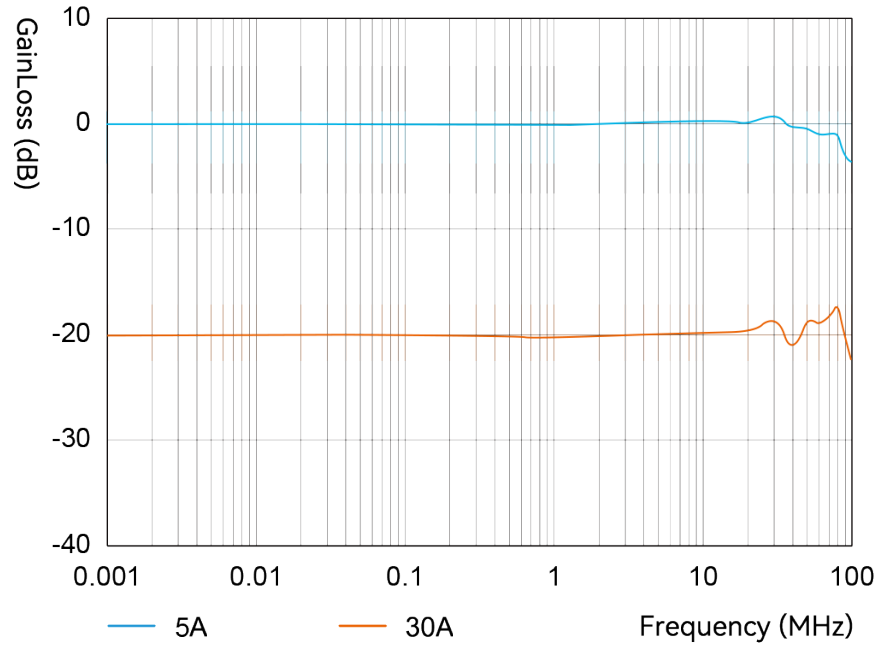
4. CP1003B

Figure 7: Maximum Current VS Frequency CP1003B



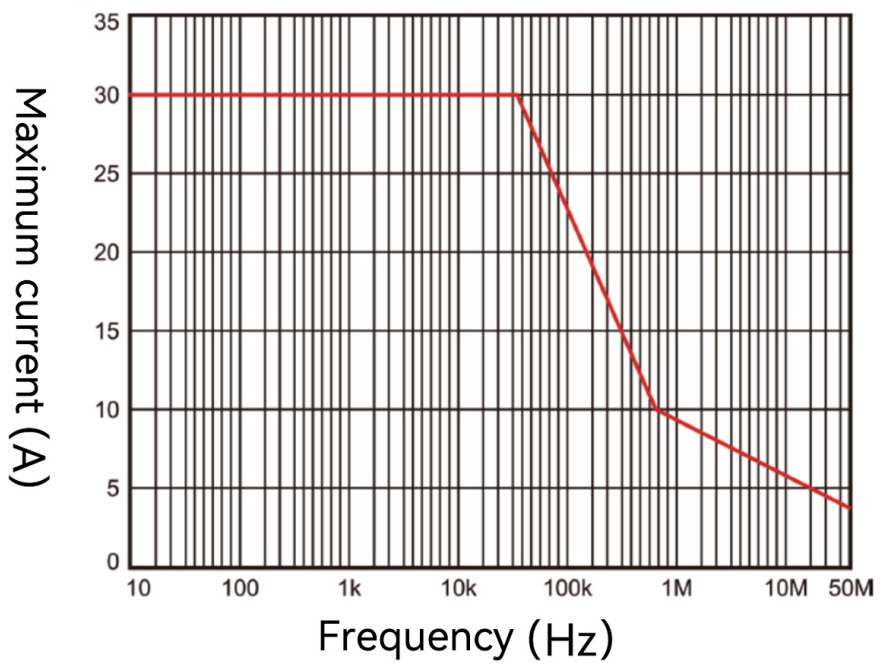
WARNING: When measuring high-frequency current, be careful not to exceed the current value shown in the curve. Use of the maximum continuous current exceeding the curve will cause the probe to burn.

Figure 8: Amplitude-frequency characteristic curve CP1003B



5. CP503B

Figure 9. Maximum Current VS Frequency CP503B



WARNING: When measuring high-frequency current, be careful not to exceed the current value shown in the curve. Use of the maximum continuous current exceeding the curve will cause the probe to burn.

Figure 10: Amplitude-frequency characteristic curve CP503B

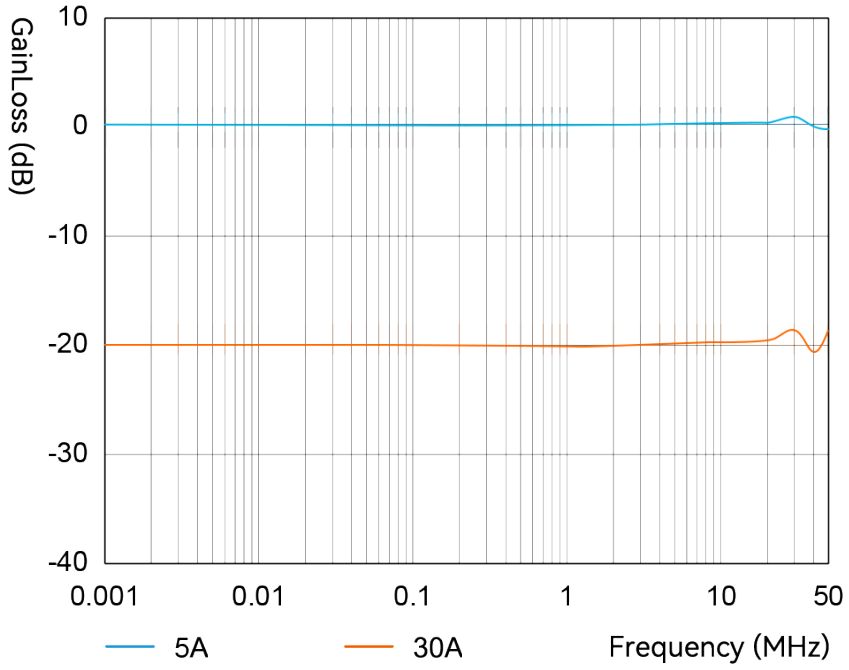


Table 3: Environmental Characteristics

Features	CP3008, CP3005, CP1510, CP503B, CP1003B
Operating temperature	0~50℃
Storage temperature	-20℃ ~80℃
Operating humidity	5%~95% (0~40℃ , non-condensing) 5%~65% (40℃ ~50℃ , non-condensing)
Working height	≤ 3000m
Storage height	≤ 12000m

Table 4: Mechanical Characteristics

Features	CP3008, CP3005, CP1510
Probe head size	17.7*6.4*2.7cm
Probe Control Module Dimensions	9.6*4*1.7cm
Maximum conductor diameter	20mm
Cable Length	2m
Net weight	460g

Features	CP1003B, CP503B
Probe head size	17.5x2x2.9cm
Probe Control Module Dimensions	7×4×1.7cm
Maximum conductor diameter	5mm
Cable Length	1m
Net weight	190g

Nominal Characteristics

Table 5: Nominal Characteristics

Nominal characteristics describe guaranteed characteristics, but these characteristics are not subject to tolerance limits.

Features	CP3008, CP3005, CP1510, CP503B, CP1003B
Input coupling	DC
Power supply	DC 12V
Connection	Connect the output to 1MΩ
Compatibility	Compatible with any BNC interface oscilloscopes

Precautions

This section includes common problems need attention during the use of the probe.

* Please confirm that the oscilloscope's input impedance is set to 1MΩ, not 50Ω, otherwise it will not measure correctly.

* When measuring, be sure to push the clamp head slider to the "LOCK" position and hear a "click" to ensure that the probe clamp head is securely locked. If it is not fully closed, accurate measurement results will not be obtained.

* Do not exceed the maximum measurable current of the probe. In case of current overload, the probe indicator light will flash an alarm, please immediately disconnect the power supply. Current overload will magnetize the probe, please demagnetize the probe after overload.

* To ensure test accuracy, please warm up the probe for at least 20 minutes before use.

* In Figure 1 and Figure 4, the maximum current VS frequency curves, the maximum current is the recommended value for sinusoidal input under standard conditions. When the ambient temperature increases or the measured current contains other frequency components, self-heating will increase. Therefore, even if the current probe works under conditions below the maximum current and frequency corresponding to the chart, it may also be damaged due to self-heating.

* Based on the amplitude and frequency of the measured current, the sensor head may produce resonance noise. Resonance noise may also occur during the demagnetization process, which is a normal phenomenon.

* Please use the cleaning method described in this manual to remove all foreign objects from the clamp head tooth surface before measuring. If there are foreign objects on the clamp head tooth surface, a small gap will be generated between the upper and lower layers of the current sensor, causing the probe to produce resonance noise.

* To ensure test accuracy, connect the measured conductor to the center of the clamp hole of the probe clamp head.

* When there is a strong magnetic field around the probe (such as near transformers and high current conductors) or a strong electromagnetic field (such as near radio transmitters), it may affect the measurement results.

* Make sure the measured current does not exceed the maximum measurable current of the probe. Exceeding the rated value, the core will be saturated, causing part of the waveform to be cut off during the saturation process. An excessive impact current may even cause the core to be unable to demagnetize correctly, requiring re-zeroing.

* When the frequency is high, common mode noise may affect the measurement of the high voltage end of the circuit. In this case, please connect the probe to the low voltage end of the circuit, or reduce the frequency range of the signal source.

* When continuously inputting a current exceeding the maximum input range, the probe may start an internal protection function due to heat, and become unable to output normally. Please stop inputting the current, wait for it to cool down sufficiently, re-demagnetize and zero, and then enter the next normal measurement.

* When measuring small currents, please demagnetize and zero precisely. After zeroing, do not move the probe position arbitrarily. In order to better observe the waveform, limit the oscilloscope bandwidth to 20MHz to exclude unnecessary noise interference. When measuring small currents of a few mA, you can wrap the measured conductor in the clamp mouth of the probe for several turns, and the result divided by the corresponding number of turns is the actual current value.

Maintenance

This section provides maintenance information for the probe.

Troubleshooting

LED status lights on the probe can indicate the current probe status or errors. If the probe LED status light does not glow as expected, or if some function of the probe is not working properly, there may be an error. See the table below.

Table 6: Probe Troubleshooting

Malfunctions	Possible Cause
Degaussing and auto-zero failed	The wire claw is not locked; The probe is clamped on the working circuit under test when the probe is degaussing and zero.
Unable to measure DC signal	Check whether the probe is powered properly; Check the oscilloscope coupling method.
The amplitude of the measurement signal is too small.	Check whether the input impedance of the oscilloscope is 50Ω. Please adjust it to 1MΩ to work properly.
LED status light does not glow	The oscilloscope channel may be damaged, please try to replace other channels or other oscilloscopes. if the probe works normally on other channels or oscilloscopes, it is considered to be caused by the oscilloscope channel and has nothing to do with the probe; If the probe does not work on other channels or on the oscilloscope, the probe may be defective, please contact the Micsig after-sales department for repair.

Cleaning

Do not expose the probe to harsh weather conditions, the probe is not waterproof.

⚠ **CAUTION:** To prevent damage to the probe, do not expose it to sprays, liquids or solvents. When cleaning the outside of the probe, avoid wetting the inside, the probe is not waterproof.

Do not wipe the probe with chemical cleaners, they may damage the probe. Avoid chemicals containing gasoline, benzene, toluene, xylene, acetone, or similar solvents.

Clean the outside of the probe with a soft, dry, lint-free cloth or a soft bristle brush. If dirt remains, clean with a soft cloth or cotton swab dipped in 75% isopropyl alcohol solution and rinse with deionized water. Cotton swabs can be used to clean the tight spaces of the probe with any solution that can dampen the swab or soft cloth.

Do not use abrasives on any part of the probe.

Shenzhen Micsig Technology Co., Ltd.

Tel: +86-(0)755-88600880 Email: sales@micsig.com Website: www.micsig.com

Add: 6F, Jinhuanyu Building, No. 56, Tiezai Rd, Bao'an District, Shenzhen, Guangdong, China.