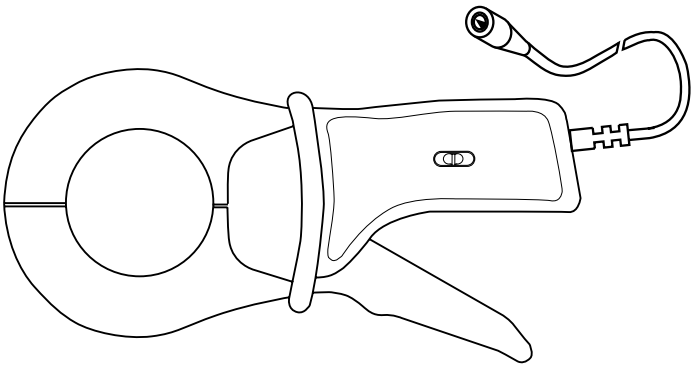
Oscilloscope clamp for AC current
Model C160 (insulated AC current probe)

Current	30 A peak	300 A peak	2000 A peak
Output	100 mV/A	10 mV/A	1 mV/A



Description

This 1,000 A AC clamp can be used for easy display and measurement of current curves. Equipped with a coaxial cable terminated by a BNC connector, it is ideal for use with any oscilloscope. It outputs a signal in mV directly proportional to the current. It offers 3 different sensitivities.

Electrical specifications

Current calibres:
0.1 A AC...10 A AC (30 A peak)
1 A AC...100 A AC (300 A peak)
1 A AC...1000 A AC (2000 A peak)

Output signal:
100 mVAC/A AC (1 V for 10 A)
10 mVAC/A AC (1 V for 100 A)
1 mAAC/A AC (1 V for 1000 A)

Accuracy and phase shift [1]:

■ 10 A calibre

Primary current	0.1 A…0.5 A	0.5 A…2 A	2 A…10 A	10 A…12 A
% Accuracy of output signal	≤ 3 % + 10 mV	≤ 3 % + 10 mV	≤ 3 % + 10 mV	≤ 3 % + 10 mV
Phase shift	not specified	not specified	≤ 15°	≤ 15°

■ 100 A calibre

Primary current	0.1 A…5 A	5 A…20 A	20 A…100 A	100 A…120 A
% Accuracy of output signal	≤ 2 % + 5 mV	≤ 2 % + 5 mV	≤ 2 % + 5 mV	≤ 2 % + 5 mV
Phase shift	not specified	≤ 15°	≤ 10°	≤ 5°

■ 1000 A calibre

Primary current	1 A…50 A	50 A…200 A	200 A…1000 A	1000 A…1200 A
% Accuracy of output signal	≤ 1 % + 1 mV	≤ 1 % + 1 mV	≤ 1 % + 1 mV	≤ 1 % + 1 mV
Phase shift	not specified	≤ 3°	≤ 2°	≤ 1°

Bandwidth:
10 Hz…100 kHz (-3 dB) (depending on current value)

Rise/fall time from 10 % to 90 %:
3.5 μs

10 % delay time:
0.5 μs

Ampere second product:
- 10 A calibre: 3.2 A.s
- 100 A calibre: 26 A.s
- 1000 A calibre: 64 A.s

Maximum currents:
1000 A permanent
1200 A for 40 minutes max. / > 20 minutes shutdown for a frequency ≤ 1 kHz (limitation proportional to the inverse of one third of the frequency beyond that)

Insertion impedance (at 400 Hz / 10 kHz)
- 10 A calibre: < 0.3 mΩ / < 6,6 mΩ
- 100 A calibre: < 0.3 mΩ / < 2 mΩ
- 1000 A calibre: < 0.3 mΩ / < 1.6 mΩ

Output impedance at 1 kHz:
- 10 A calibre: ≤ 515 Ω ± 10 %
- 100 A calibre: ≤ 515 Ω ± 10 %
- 1000 A calibre: ≤ 515 Ω ± 10 %

Influence of temperature:
≤ 150 ppm /k or 0.15 % of output signal per 10 °K

Influence of relative humidity:
< 0.1 % of output signal

Influence of adjacent conductor:
≤ 1 mA/A at 50 Hz

Influence of DC current superimposed on rated current:
< 1 % of output signal for a current ≤ 30 A DC

Influence of conductor position in jaws:
≤ 0.1 % of output signal for frequencies ≤ 400 Hz

Influence of frequency [2]:

■ 10 A calibre:
< 10 % of output signal from 10 Hz to 1 kHz
< 5 % of output signal from 1 kHz to 10 kHz
< 20 % of output signal from 10 kHz to 50 kHz
3 dB of output signal from 50 kHz to 100 kHz

■ 100 A calibre:
< 5 % of output signal from 10 Hz to 1 kHz
< 3 % of output signal from 1 kHz to 10 kHz
< 20 % of output signal from 10 kHz to 50 kHz
3 dB of output signal from 50 kHz to 100 kHz

■ 1000 A calibre:
< 1 % of output signal from 10 Hz to 1 kHz
< 2 % of output signal from 1 kHz to 10 kHz
< 10 % of output signal from 10 kHz to 50 kHz
3 dB of output signal from 50 kHz to 100 kHz

Influence of crest factor:
< 1 % of output signal for crest factor ≤ 6 with current
- 10 A calibre: ≤ 30 A peak
- 100 A calibre: ≤ 300 A peak
- 1000 A calibre: ≤ 3000 A peak

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■ Mechanical specifications

Max. jaw opening:
53 mm

Clamping capacity:
Cable: ∅ max 52 mm
Busbar: 1 busbar of 50 x 5 mm / 4 busbars of 30 x 5 mm

Operating temperature:
-10 °C to +55 °C

Storage temperature:
-40 °C to +70 °C

Relative humidity for operation:
0 to 85 % RH decreasing linearly above 35 °C

Operating altitude:
0 to 2,000 m

Casing protection rating:
IP30 with clamp open (IEC 529)
IP40 with clamp closed (IEC 529)

Drop test:
1 m (IEC 68-2-32)

Shock resistance:
100 g / 6 ms / half-period (IEC 68-2-27)

Protection against impacts:
IK04 0.5 J (EN 50102)

Vibration resistance:
5/15 Hz 1.5 mm peak
15/25 Hz 1 mm peak
25/55 Hz 0.25 mm peak
(IEC 68-2-6)

Self-extinguishing capability:
Casing and jaws: UL94 V0

Dimensions:
216 x 111 x 45 mm

Weight:
550 g

Colours:
Dark grey case with red jaws

Output:
2 m coaxial lead with insulated BNC plug

■ Safety specifications

Electrical safety:
Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
- 600 V category III, pollution degree 2
- 300 V category IV, pollution degree 2

Electromagnetic compatibility (EMC):
EN 50081-1: class B
EN 50082-2:
- Electrostatic discharge: IEC 1000-4-2
  without disturbance: 4 kV class 2
  non-destructive: 15 kV class 4
- Radiated field: IEC 1000-4-3
  without disturbance: 10 V/m performance criterion A
- Fast transients: IEC 1000-4-4
  without disturbance:1 kV class 2
  non-destructive: 2 kV class 3
- Magnetic field at 50/60 Hz: IEC 1000-4-8
  field of 400 A/m at 50 Hz: < 1 A

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sine signal, frequency of 48 Hz to 1000 Hz, distortion factor < 1 % with no DC component, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance: ≥ 1 MΩ and < 100 pF

(2) Out of reference domain

To order	Reference
AC current clamp model **C160** with operating manual	P01120308

Oscilloscope clamp for AC current
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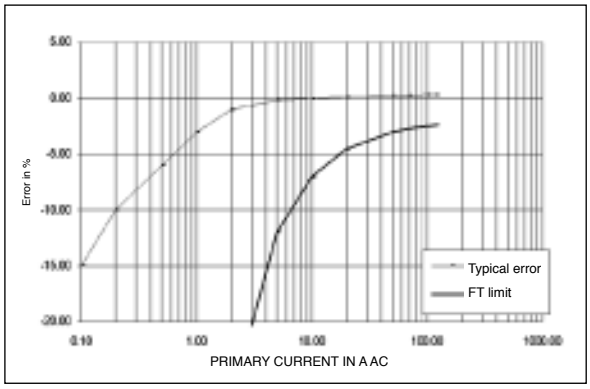
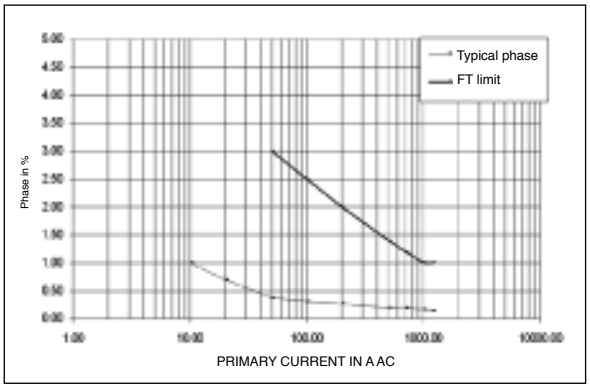
■ Curves at 50 Hz

1000 A calibre

Error on measurement

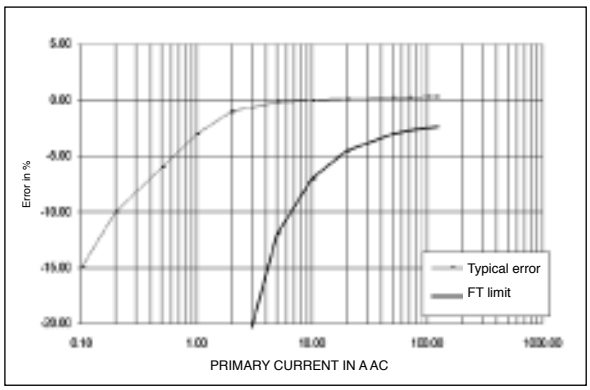


Phase shift

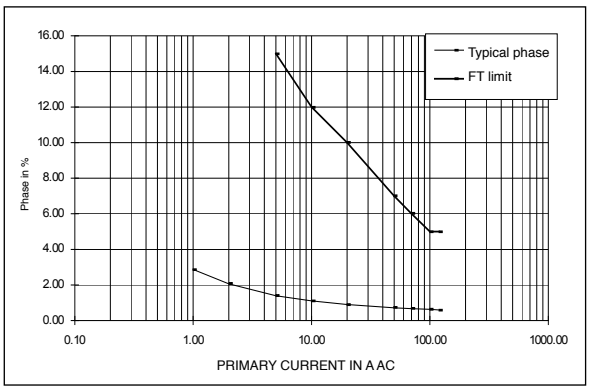


100 A calibre

Error on measurement

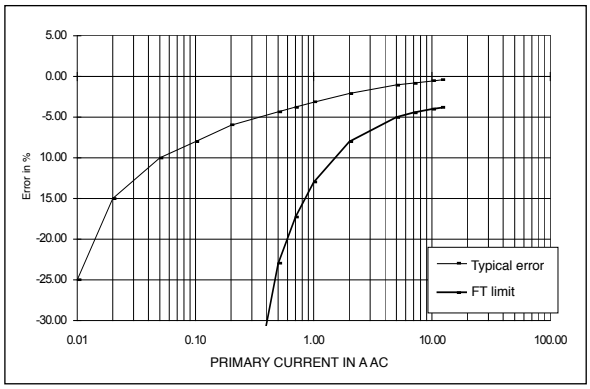


Phase shift

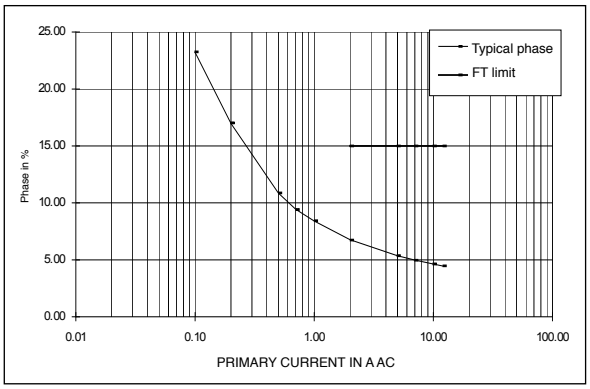


10 A calibre

Error on measurement



Phase shift



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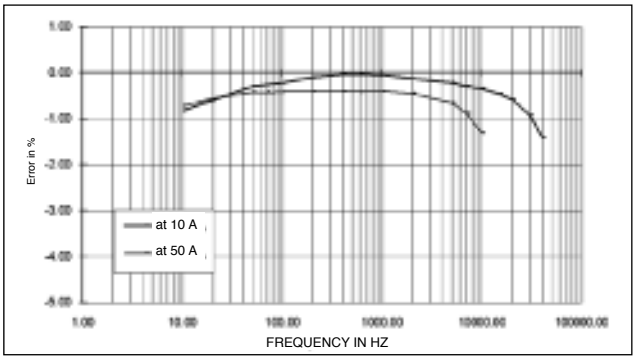
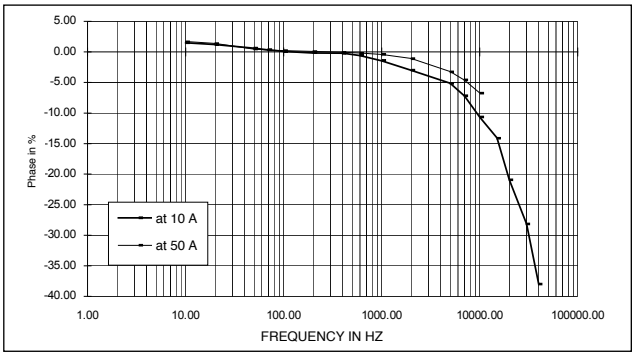
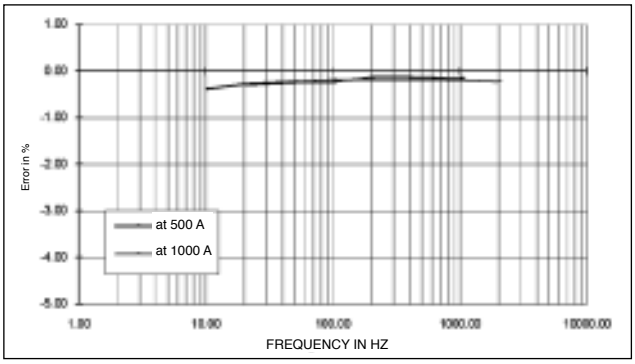
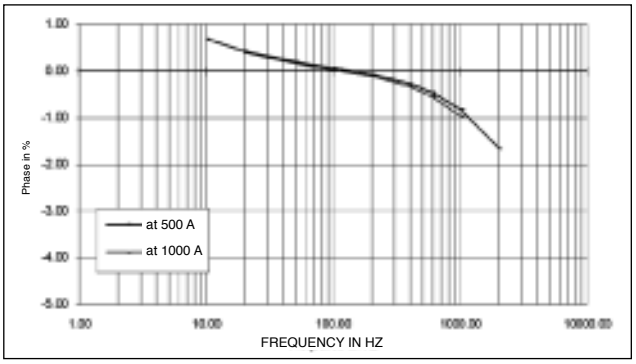
■ Frequency response (cont.)

1000 A calibre

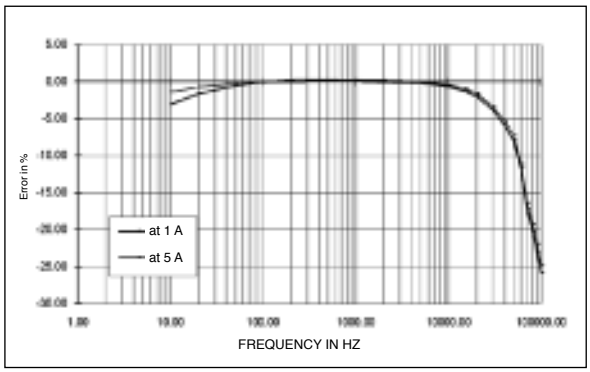


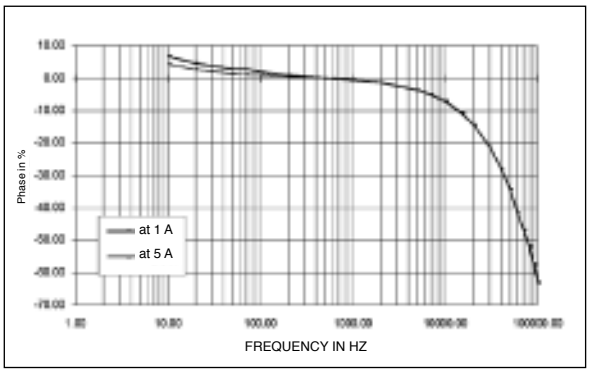


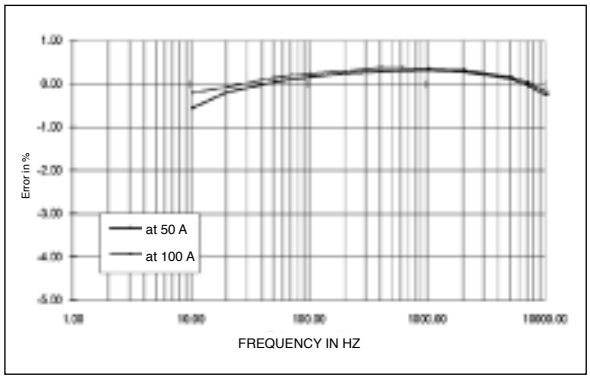


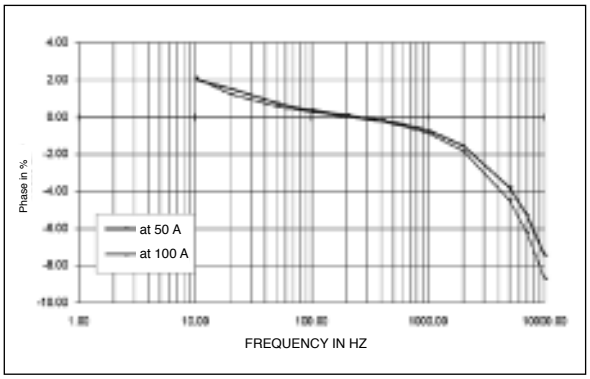


100 A calibre









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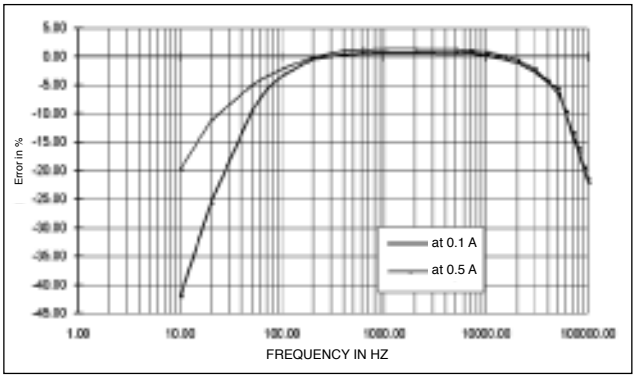
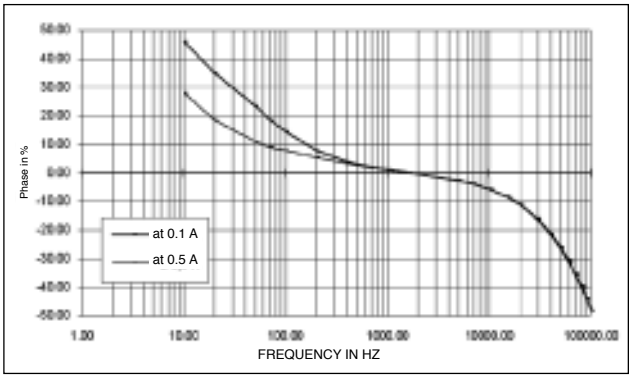
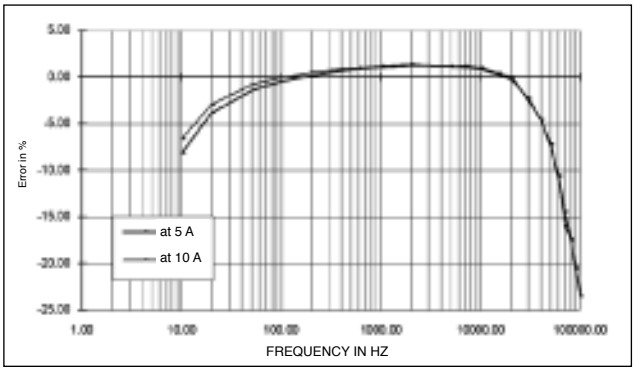
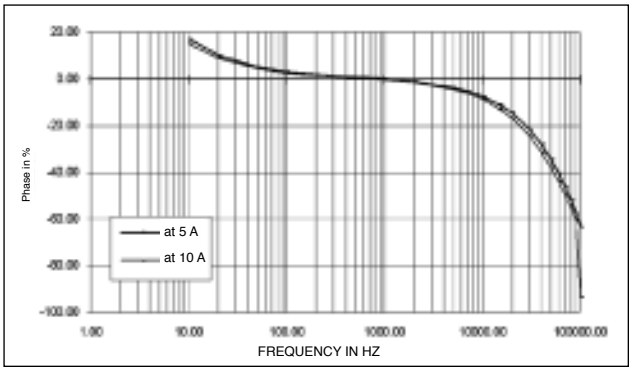
■ Frequency response (cont.)

10 A calibre



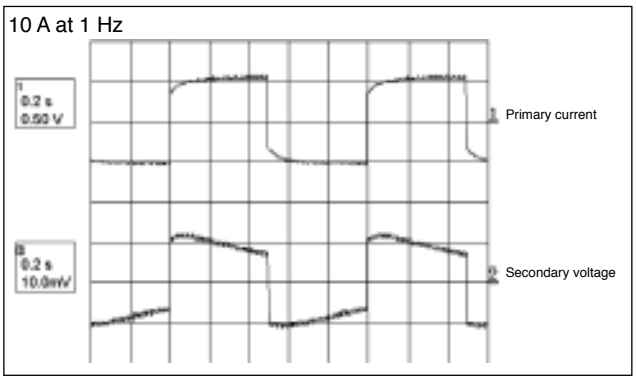


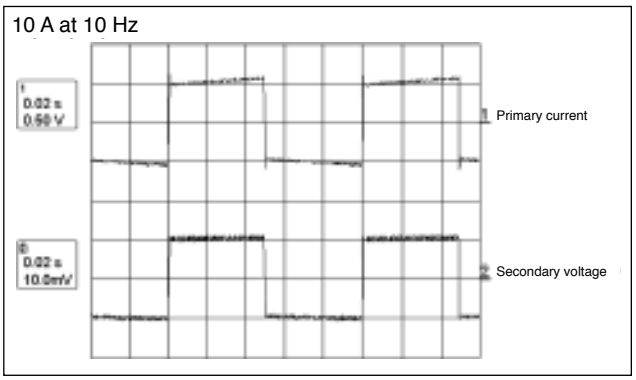


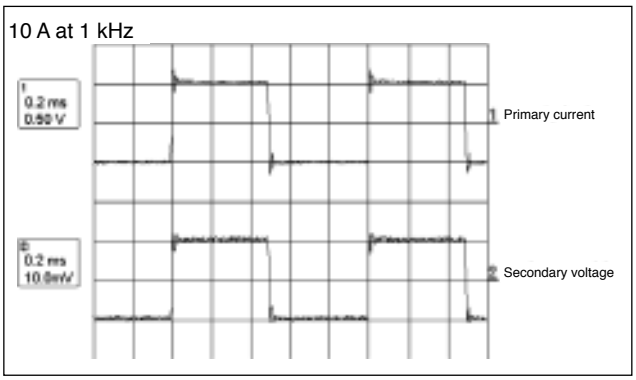


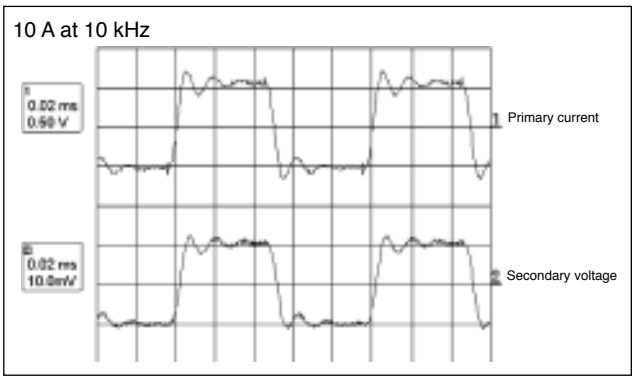
■ Response to a square signal

1000 A calibre









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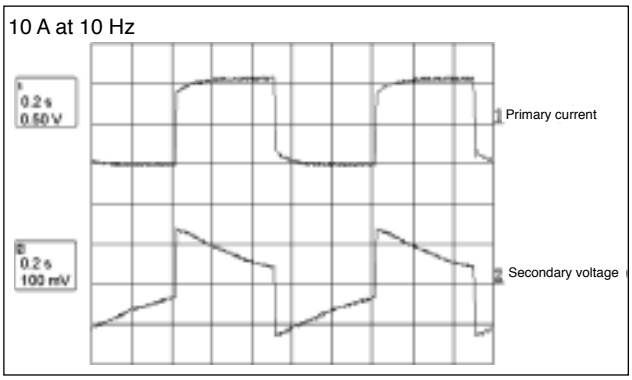
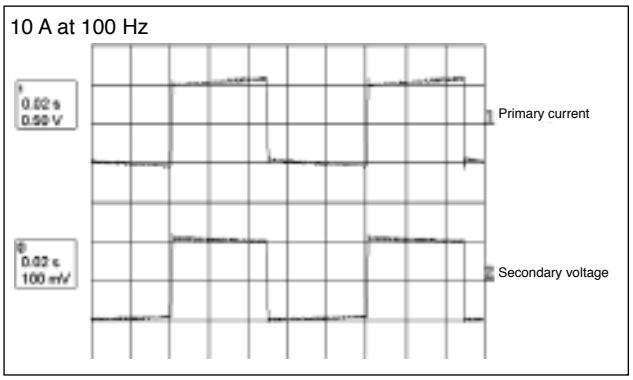
■ Response to a square signal (cont.)

100 A calibre

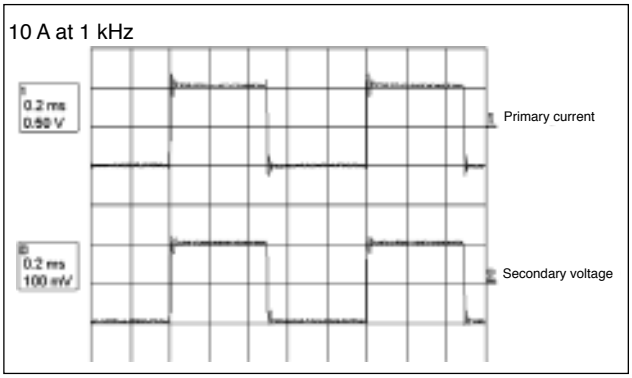
10 A at 10 Hz



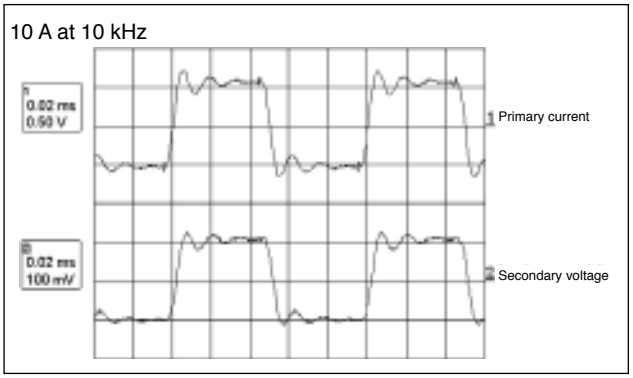
10 A at 100 Hz



10 A at 1 kHz

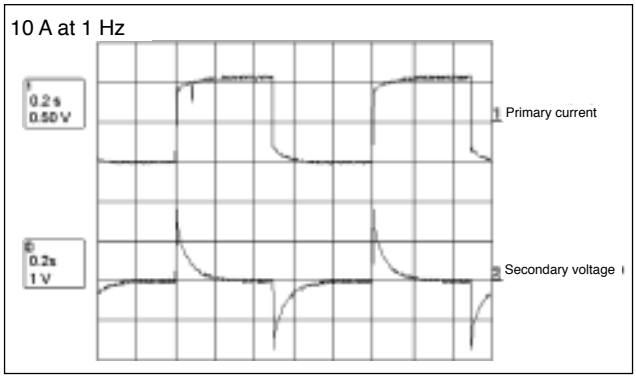


10 A at 10 kHz

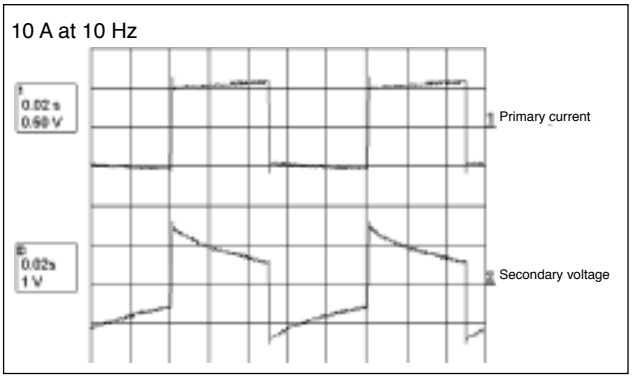


10 A calibre

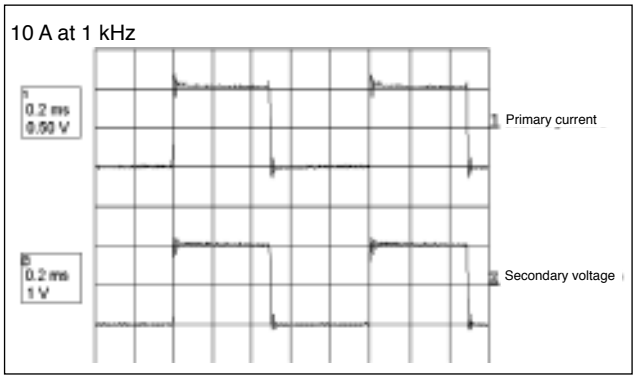
10 A at 1 Hz



10 A at 10 Hz



10 A at 1 kHz



10 A at 10 kHz