AC/DC CURRENT SENSOR CT6904

Ultra-High Performance AC/DC Current Sensor

World-Class Accuracy & Measurement Range (40× Conventional Models)

- 500 A (rms) Rated for measurement of large currents
- 4 MHz (±3 dB) Wide measurement frequency range
- ±10 ppm Excellent linearity
- ±0.02% rdg. (±0.007% f.s.) Superior basic measurement accuracy
- 120 dB (100 kHz) High Common-Mode Rejection Ratio (CMRR)
Changing the World of Current Measurement

<table>
<thead>
<tr>
<th>Rating</th>
<th>Measurement Frequency Range</th>
<th>Linearity</th>
<th>Accuracy</th>
<th>CMRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 A (rms)</td>
<td>4 MHz (±3 dB)</td>
<td>±10 ppm</td>
<td>±0.02% rdg. (±0.007% f.s.)</td>
<td>120 dB (100 kHz)</td>
</tr>
</tbody>
</table>

High inverter efficiency and improved power saving technology performance for the power electronics, natural energy, and automotive industries. Responsive to the advanced demands of every industrial field.
Maximum Performance When Combined with
POWER ANALYZER PW6001

Waveform captured by the New CT6904

Waveform captured by legacy sensor
Providing True Current Measurement

4 MHz Measurement Range, 40× Conventional Models

Current sensor performance is maximized with the "Zero Flux (Fluxgate Detection)" measurement method. High frequency current is detected with windings (CT method), and direct to low frequency current is detected with fluxgates. Newly developed opposed split coil technology\(^1\) is used in winding (CT) areas, achieving a wide measurement range from DC to 4 MHz.

\(^1\) Opposed Split Coil: Coil in which divided windings are arranged opposite each other on a magnetic core to broaden the range of current detection

\(^2\) When performing phase compensation with HIOKI POWER ANALYZER PW6001

High Noise Resistance Common-Mode Rejection Ratio (CMRR) of 120 dB or More (100 kHz)

The opposite split coil is completely shielded with a uniquely shaped solid shield, achieving both broad bandwidth and superior noise resistance. This allows accurate measurement without influence from surrounding voltage.

Solid Shield
Aluminum shield machined into a unique shape to eliminate influence on current measurements
Highly Accurate and Highly Stable: ±10 ppm Linearity, ±0.02% rdg. ±0.007% f.s. Basic Accuracy

By using a fluxgate element for DC to low frequency current detection, we have been able to achieve a level of measurement accuracy and temperature stability that is not possible with the Hall element method. Even at high frequencies the conductor position has little effect on measurement values, enabling measurements with high reproducibility.

Linearity (Typical)

Temperature Characteristics (Typical)

Effect of Conductor Position (Typical)

Shaped for Highly Accurate Measurement

The longer the measured conductor, the greater the measurement error due to conductor inductance and parasitic capacitance. To reduce these errors, it is necessary to keep the conductor short. With the CT6904, you can select from a variety of installation methods, allowing you to minimize the length of the measured conductor.

Supports a Variety of Installation Scenarios

Wall Installation

Fastening Bracket (Made to Order)

The output cable can face in any direction.
Example Applications
- Providing True Current Measurement with Unmatched Measurement Range and Noise Resistance -

High-Precision and Efficiency Testing of SiC/GaN Inverters
A wide range and minimal voltage current phase error are essential for the highly precise measurement of switching frequency power during PWM output.

The CT6904, which features flat frequency characteristics over a wide range, provides accurate measurement of not only fundamental wave current but also switching frequency current.
Since the CT6904 achieves both wide-range and highly accurate measurement performance, it can be used in combination with a power analyzer for more precise measurements of inverter input/output power and efficiency than ever before.

CT6904 Measurement Range

<table>
<thead>
<tr>
<th>Measurement Range of Conventional Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Power [W]</strong></td>
</tr>
<tr>
<td><strong>Frequency [Hz]</strong></td>
</tr>
<tr>
<td>1 k</td>
</tr>
<tr>
<td>10 k</td>
</tr>
<tr>
<td>100 k</td>
</tr>
<tr>
<td>1 M</td>
</tr>
<tr>
<td><strong>Fundamental wave and its harmonics</strong></td>
</tr>
<tr>
<td><strong>Switching frequency components and their harmonics</strong></td>
</tr>
</tbody>
</table>

Perform highly accurate measurement of switching frequency components not possible with conventional models.

Reactor/Transformer Loss Analysis
Reactor and transformer loss measurement is becoming increasingly important for furthering the efficiency and miniaturization of power converters.

Switching current, which has been obscured by noise until now, can be measured accurately thanks to the superior noise resistance of the CT6904.
In addition, by using the phase correction function of the POWER ANALYZER PW6001, previously difficult reactor and transformer loss measurements for large currents, high frequencies and low power factors can now be performed easily and quickly.

Comparison of Measured Waveforms for CT6904 versus Conventional Sensor

Example of Measured Waveforms for Switching Current at 100kHz
(Measured with HIOKI PW6001)
Specifications

1. Basic Specifications

- Rated primary current: 500 A AC/DC
- Diameter of measurable conductors: ≤ 32 mm (1.26 in) or less
- Maximum input current: 4 mA
- Maximum rated voltage to ground: 1000 V CAT III (Expected transient overvoltage: 8000 V)
- Linearity: ±10 ppm Typical (23°C (73°F))
- Offset voltage: ±10 ppm Typical (23°C (73°F), no input)

2. Accuracy Specifications

- Guaranteed accuracy period after adjustment made by Hioki: 1 year
- Guaranteed accuracy period: 1 year
- Offset voltage: ±0.005% f.s./°C
- Phase: ±0.01°/℃
- Within the range of -10°C to 18°C (14°F to 64°F) or 28°C to 50°C (82°F to 122°F)
- Distance between feed-through window and cable output terminal: 7.4 kV AC (sensed current of 1 mA), 50 Hz/60 Hz: 1 min
- Operating environment: Indoors, Pollution Degree 2, altitude up to 2000 m (6562.20 ft)
- Operating temperature and humidity range: -10°C to 50°C (14°F to 122°F), and 80% RH or less (no condensation)
- Storage temperature and humidity range: -20°C to 60°C (4°F to 140°F), and 80% RH or less (no condensation)
- Dielectric withstand voltage: 7.4 kV AC (sensed current of 1 mA), 50 Hz/60 Hz 1 min Distance between feed-through window and cable output terminal
- Power supply consumption: 7 VA (500 A/55 Hz measurement, with a power supply of ±12 V)
- Power supply: Power supplied from PW6001, PW3390, and CT9555
- Max. power consumption: 7 VA (500 A/55 Hz measurement, with a power supply of ±12 V)
- Dimensions: Approx. 139 mm (5.47 in) W × 120 mm (4.72 in) H × 52 mm (2.05 in) D
- Interface: Dedicated interface (ME15W)
- Product warranty period: 3 years
- Accessories: - Instruction manual
- Carrying case
- Color labels (for channel identification)

1. POWER ANALYZER PW6001

- Combined Accuracy

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Current</th>
<th>Power</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>±0.05% rdg. ±0.02% f.s.</td>
<td>±0.05% rdg. ±0.02% f.s.</td>
<td>±0.05% rdg. ±0.02% f.s.</td>
</tr>
<tr>
<td>45 Hz ≤ f ≤ 65 Hz</td>
<td>±0.04% rdg. ±0.02% f.s.</td>
<td>±0.04% rdg. ±0.02% f.s.</td>
<td></td>
</tr>
<tr>
<td>Bandwidths</td>
<td>PW6001 accuracy + CT9555 accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PW6001 accuracy + CT9555 accuracy</td>
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</tbody>
</table>

- For other measurement parameters, add the PW6001 accuracy and the sensor accuracy (and consider the sensor rating when calculating the f.s. error).

2. POWER ANALYZER PW3390

- Combined Accuracy

- Add the power analyzer accuracy and the sensor accuracy (and consider the sensor rating when calculating f.s. error).

3. SENSOR UNIT CT9555

- Combined Accuracy

- Sensor accuracy x 1.5 (when the output coaxial cable is no longer than 1.6 m (5.25 ft))

General Specifications

- For the specifications for an output cable length of 10 m (32.81 ft) (made to order), a frequency range of 1 MHz (±3 dB Typical).

Derating Characteristics

- Derating Characteristics

- For the specifications for an output cable length of 10 m (32.81 ft) (made to order), a frequency range of 1 MHz (±3 dB Typical).

- Measurement Specifications

<table>
<thead>
<tr>
<th>Frequency [Hz]</th>
<th>DC</th>
<th>16 Hz</th>
<th>50 Hz</th>
<th>1 kHz</th>
<th>10 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>±0.0% rdg. ±0.02% f.s.</td>
<td>±0.1% rdg. ±0.01% f.s.</td>
<td>±0.1% rdg. ±0.01% f.s.</td>
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</tr>
<tr>
<td>45 Hz ≤ f ≤ 65 Hz</td>
<td>±0.04% rdg. ±0.02% f.s.</td>
<td>±0.04% rdg. ±0.02% f.s.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>65 Hz ≤ f ≤ 850 Hz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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</tr>
<tr>
<td>850 Hz ≤ f ≤ 1.13 MHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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</tr>
<tr>
<td>1 kHz ≤ f ≤ 15.6 kHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>5 kHz ≤ f ≤ 10 kHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>10 kHz ≤ f ≤ 50 kHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>50 kHz ≤ f ≤ 100 kHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>100 kHz ≤ f ≤ 300 kHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>300 kHz ≤ f ≤ 1 MHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>1 MHz ≤ f ≤ 3 MHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>3 MHz ≤ f ≤ 10 MHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>10 MHz ≤ f ≤ 100 MHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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</tr>
<tr>
<td>100 MHz ≤ f ≤ 1 GHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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</tr>
<tr>
<td>1 GHz ≤ f ≤ 10 GHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<tr>
<td>10 GHz ≤ f ≤ 100 GHz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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</tr>
<tr>
<td>100 GHz ≤ f ≤ 1 THz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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<td></td>
</tr>
<tr>
<td>1 THz ≤ f ≤ 10 THz</td>
<td>±0.0% rdg. ±0.02% f.s.</td>
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- For the specifications for an output cable length of 10 m (32.81 ft) (made to order), a frequency range of 1 MHz (±3 dB Typical).
Model: AC/DC CURRENT SENSOR  CT6904

Model No. (Order Code)  (Specifications)
CT6904  For PW6001 and others, ME15W terminal

Accessories: Instruction manual x 1, Carrying case x 1, Color labels (for channel identification) x 1

* Made-To-Order Options for the CT6904
Model No. (Order Code)  (Specifications)
--  10 m (32.81 ft) Output Cable Specifications
--  Fastening Bracket

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