**Description**
- Closed loop (compensation)
- Current Sensor with magnetic field probe
- Printed circuit board mounting
- Casing and materials UL-listed

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- Excellent accuracy
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  - Switched Mode Power Supplies (SMPS)
  - Power Supplies for welding applications
  - Uninterruptable Power Supplies (UPS)

**Electrical data - Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_{PN} )</td>
<td>Primary nominal r.m.s. current</td>
<td>50 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( R_M )</td>
<td>Measuring resistance</td>
<td>15 ... 200 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_{SN} )</td>
<td>Secondary nominal r.m.s. current</td>
<td>25 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( K_N )</td>
<td>Turns ratio</td>
<td>1 : 2000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accuracy – Dynamic performance data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_{P,max} )</td>
<td>Max. measuring range @ ( R_M = 15 ) Ω</td>
<td>-165</td>
<td>+165</td>
<td>A</td>
</tr>
<tr>
<td>( X^* )</td>
<td>Accuracy @ ( I_{PN}, T_A = 25°C )</td>
<td>0,1</td>
<td>0,5</td>
<td>%</td>
</tr>
<tr>
<td>( \varepsilon_L )</td>
<td>Linearity</td>
<td>0,1</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>( I_0^* )</td>
<td>Offset current @ ( I_{P} = 0, T_A = 25°C )</td>
<td>0,02</td>
<td>0,05</td>
<td>mA</td>
</tr>
<tr>
<td>( t_r )</td>
<td>Response time</td>
<td>3 μs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Delta t (I_{P,max}) )</td>
<td>Delay time at di/dt = 100 A/μs</td>
<td>1 μs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**General data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( T_A )</td>
<td>Ambient operating temperature</td>
<td>-40</td>
<td>+85</td>
<td>°C</td>
</tr>
<tr>
<td>( T_S )</td>
<td>Ambient storage temperature</td>
<td>-40</td>
<td>+85</td>
<td>°C</td>
</tr>
<tr>
<td>( m )</td>
<td>Mass</td>
<td>30</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>( V_C )</td>
<td>Supply voltage</td>
<td>±14,25</td>
<td>±15</td>
<td>±15,75</td>
</tr>
<tr>
<td>( I_C )</td>
<td>Current consumption</td>
<td>18 mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Max. duration of peak currents at defined temperatures**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( T_A )</td>
<td>Ambient operating temperature</td>
<td>50</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>( I_P )</td>
<td></td>
<td>120</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>( I_{P,max} )</td>
<td></td>
<td>165</td>
<td>165</td>
<td>160</td>
</tr>
<tr>
<td>( R_M )</td>
<td></td>
<td>15</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

All data marked with * is verified by final inspection, other values are type tested.
50 A Current Sensor-Module
For the electronic measurement of currents:
DC, AC, pulsed, mixed ..., with a galvanic
isolation between the primary circuit
(high power) and the secondary circuit
(electronic circuit)

Mechanical outline (mm):

![Mechanical outline diagram]

General tolerances DIN ISO 2768-c

Tolerances grid distance ±0,2mm

Connections:

UL-sign
4644-X101
F DC

Marking:

DC=Date Code
F=Factory

Schematic diagram

![Schematic diagram]

Additional indications are obtainable on request.
This specification is no declaration of warranty acc. BGB §443 dar.
**50 A Current Sensor Module**

For the electronic measurement of currents:
- DC, AC, pulsed, mixed ...
- with a galvanic isolation between the primary circuit (high power) and the secondary circuit

**Item No.:** T60404-N4644-X101

**K-No.:**

**50 A Current Sensor Module**

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**Electrical Data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>min.</th>
<th>typ.</th>
<th>max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{C_{tot}})</td>
<td>Maximum supply voltage (without function)</td>
<td>±18</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>(R_s)</td>
<td>Secondary coil resistance @ (T_A=85°C)</td>
<td>120</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>(X_h)</td>
<td>Temperature drift of (X) @ (T_A= -40 \ldots +85 °C)</td>
<td>0,1</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(I_{0_{ges}})</td>
<td>Offset current (including (I_{0t}, I_{0T}))</td>
<td>0,05</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>(I_{0t})</td>
<td>Offset current drift (I_{0t})</td>
<td>0,05</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>(I_{0T})</td>
<td>Offset current temperature drift (I_{0T}) at (T_A= -40 \ldots +85°C)</td>
<td>0,05</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>(I_{0H})</td>
<td>Hysteresis current at (I=0) caused by primary current 3 x (I_{PN})</td>
<td>0,075</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>(I_{0R})</td>
<td>Offset ripple</td>
<td>1</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>(\Delta I_{0}/\Delta V_C)</td>
<td>Supply voltage rejection ratio</td>
<td>0,01</td>
<td>mA/V</td>
<td></td>
</tr>
<tr>
<td>(C_{r})</td>
<td>Maximum possible coupling capacity primary – secondary</td>
<td>9</td>
<td>pF</td>
<td></td>
</tr>
</tbody>
</table>

**Mechanical Stress according to M3209/3**

- Settings: 10 – 2000 Hz, 1 min/Oktave, 2 hours
- 2g

**Inspection**

- Measurement after temperature balance of the samples at room temperature

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(K_{0} (N1/N2)^{*})</td>
<td>(V)</td>
</tr>
<tr>
<td>(I_{0}^*)</td>
<td>(V)</td>
</tr>
<tr>
<td>(V_a^*)</td>
<td>(V)</td>
</tr>
</tbody>
</table>

**Type Testing**

<table>
<thead>
<tr>
<th>Test</th>
<th>Settings</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV transient test according to M3064</td>
<td>(V_d_{max}= 8) kV, (R_i= 60) Ω, 1,2 μs / 50 μs-waveform</td>
<td></td>
</tr>
<tr>
<td>Test voltage and partial discharge voltage according to M3024</td>
<td>(V_a= 4,4) kV, 60s</td>
<td></td>
</tr>
</tbody>
</table>

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**50 A Current Sensor Module**

For the electronic measurement of currents:
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**Additional Information**

**Item No.:** T60404-N4644-X101

**K-No.:**

50 A Current Sensor Module

**Date:** 24.02.2014

**Customer:**

**Customers Part No.:**

**Page** 2 of 3

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**Limit curve of measurable current \( I_p(R_m) \)**

@ temperature of the component ≤ 85 °C turns ratio 1 : 2000

- \( V_c = \pm 15V \)
- \( N \cdot I_p \)
- \( R_m \)

**Maximum measuring range (µs-range)**

Pulse behaviour at pulse duration= 500µs

The value for \( I_p,max \) indicated in the Specification is valid for currents from a few ms on. For shorter duration (e.g. short circuit current) the currents are transformed directly and can therefore be higher than \( I_p,max \). This will curtail the accuracy but can be used for kick-offs.

**Example: A variable Offset ripple reduction means a low pass**

The offset ripple can be reduced by an external low pass. Therefore a capacitance \( C_a \) must be switched parallel to \( R_m \). The diagram shows the remaining value of the offset ripple \( (i_{oss}(R_m \cdot C_a)) \) relative to the value without external capacitance \( (i_{oss}) \). In this case the response time is lengthened. It is calculated for:

\[
t_r' \leq t_r + 2.5 \cdot R_m \cdot C_a \text{ bzw. } f_g = \frac{1}{2\pi \cdot R_m \cdot C_a}
\]

**Applicable documents**

- Current direction: A positive output current appears at point \( I_s \), by primary current in direction of the arrow.
- Constructed, manufactured and tested in accordance with EN 50178 (VDE 0160) and agrees with the standards.
- Enclosures according to IEC529: IP50.
- UL - file E169271, category XORU2 (transformers, construction only - component), UL 508
Explanation of several of the terms used in the tablets (in alphabetical order)

\( X_{\text{ges}}(I_{\text{PN}}) \): The sum of all possible errors over the temperature range by measuring a current \( I_{\text{PN}} \):
\[
X_{\text{ges}} = 100 \cdot \frac{I_{\text{PN}}}{K_{\text{SN}}} - 1
\]

\( X \): Permissible measurement error in the final inspection at RT, defined by
\[
X = 100 \cdot \frac{I_{\text{SB}}}{I_{\text{SN}}} - 1
\]
where \( I_{\text{SB}} \) is the output DC value of an input DC current of the same magnitude as the (positive) rated current \( (I_o = 0) \)

\( \varepsilon_L \): Linearity fault defined by
\[
\varepsilon_L = 100 \cdot \left| \frac{I_{\text{P}}}{I_{\text{PN}}} - \frac{I_{\text{SN}}}{I_{\text{SN}}} \right|
\]
Where \( I_{\text{P}} \) is any input DC and \( I_{\text{SN}} \) the corresponding output term. \( I_{\text{SN}} \): see notes of \( \varepsilon_L \) \( (I_o = 0) \).

\( X_{\text{T}} \): Temperature drift of the rated value orientated output term. \( I_{\text{SN}} \) (cf. Notes on \( \varepsilon_L \)) in a specified temperature range, obtained by:
\[
X_{\text{T}} = 100 \cdot \frac{I_{\text{SB} \left( T_{A2} \right)} - I_{\text{SB} \left( T_{A1} \right)}}{I_{\text{SN}}}
\]

\( I_{0H} \): Zero variation after overloading with a DC of fourfold the rated value \( (R_m = R_{MN}) \)

\( I_{0t} \): Long term drift of \( I_o \) after 100 temperature cycles in the range -40 bis 85 °C.

\( t_r \): Response time, measured as delay time at \( I_{\text{P}} = 0,9 \cdot I_{\text{Pmax}} \) between a rectangular current and the output current.

\( \Delta t \left( I_{\text{Pmax}} \right) \): Delay time between \( I_{\text{Pmax}} \) and the output current \( I_o \) with a primary current rise of \( \frac{\text{di}}{\text{dt}} = 100 \text{ A}/\mu\text{s} \).

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