VACUUM SCHMELZE

SPECIFICATION

Item no.: T60404-N4646-X651

K-no.: 24507

25 A Current Sensor module for 5V-supply voltage

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

Customer: Standard type

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

Characteristics
• Excellent accuracy
• Very low offset current
• Very low temperature dependency and offset
  current drift
• Very low hysteresis of offset current
• Short response time
• Wide frequency bandwidth
• Compact design
• Reduced offset ripple

Applications
Mainly used for stationary operation in industrial
applications:
• AC variable speed drives and servo motor
  drives
• Static converters for DC motor drives
• Battery supplied applications
• Switched Mode Power Supplies (SMPS)
• Power Supplies for welding applications
• Uninterruptible Power Supplies (UPS)

Electrical data – Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary nominal r.m.s. current</td>
<td>IPN</td>
<td>25</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage @ IP</td>
<td>Vout</td>
<td>2.5 ± (0.625*IP/IPN)</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage @ IP=0, TA=25 °C</td>
<td>Vout</td>
<td>2.5 ± 0.00625</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference voltage</td>
<td>Vref</td>
<td>2.5 ± 0.005</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turns ratio</td>
<td>KN</td>
<td>1…3 : 2000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accuracy – Dynamic performance data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. measuring range</td>
<td>IP,max</td>
<td>±85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy @ IPN, TA= 25 °C</td>
<td>X</td>
<td>0.7</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>εL</td>
<td>0.1</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offset voltage @ IP=0, TA= 25 °C</td>
<td>Vout,-2.5V</td>
<td>±6.25</td>
<td>mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature drift of Vout @ IP=0, TA= -40…85 °C</td>
<td>ΔVout/2.5V/ΔT</td>
<td>13</td>
<td>26</td>
<td>ppm/K</td>
<td></td>
</tr>
<tr>
<td>Response time @ 90% von IPN</td>
<td>t</td>
<td>300</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay time at di/dt = 100 A/μs</td>
<td>Δt (IP,max)</td>
<td>200</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient operating temperature</td>
<td>TA</td>
<td>-40</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient storage temperature</td>
<td>TS</td>
<td>-40</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>m</td>
<td>12</td>
<td>g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>VC</td>
<td>4.75</td>
<td>RMS 5.25</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>IC0</td>
<td>15</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**SPECIFICATION**

**Item no.:** T60404-N4646-X651

**K-no.:** 24507

**25 A Current Sensor module for 5V-supply voltage**

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

**General tolerances DIN ISO 2768-c**

**Tolerances grid distance ±0,2mm**

**DC = Date Code**

**F = Factory**

**Mechanical outline (mm):**

**Connections:**
- 1...6: Ø 1 mm
- 7...9: 0,46"0,46 mm

**Marking:**

![Marking Diagram]

**Schematic diagram**

![Schematic Diagram]

**Possibilities of wiring (@ T_A = 85°C)**

<table>
<thead>
<tr>
<th>primary windings</th>
<th>primary current RMS</th>
<th>primary current maximal</th>
<th>output voltage effective</th>
<th>turns ratio</th>
<th>primary resistance</th>
<th>primary wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_p</td>
<td>I_p [A]</td>
<td>I_p,max [A]</td>
<td>V_out (I_p) [V]</td>
<td>K_N</td>
<td>R_p [mΩ]</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25 ±85</td>
<td>2.5±0.625</td>
<td>1:2000</td>
<td>0.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>12 ±42</td>
<td>2.5±0.600</td>
<td>2:2000</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8 ±28</td>
<td>2.5±0.600</td>
<td>3:2000</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional information is obtainable on request.

Temperature of the primary conductor should not exceed 110°C.

This specification is no declaration of warranty acc. BGB §443 dar.
**25 A Current Sensor Modul for 5V-supply voltage**

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

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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>$V_{Ctot}$</td>
<td>7 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_C$</td>
<td>15mA +$I_P*K_N+V_{out}/R_L$</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{out,SC}$</td>
<td>+20 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_e$</td>
<td>1 mΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_s$</td>
<td>67 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_{in}(V_{out})$</td>
<td>1 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_L$</td>
<td>1 kΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$C_L$</td>
<td>500 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta X_{I}/\Delta T$</td>
<td>40 ppm/K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta V_0 = \Delta (V_{out} - 2.5V)$</td>
<td>Sum of any offset drift including:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{xt}$</td>
<td>10 mV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{OT}$</td>
<td>1 mV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{OH}$</td>
<td>2 mV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta V_0/\Delta V_C$</td>
<td>Supply voltage rejection ratio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{oss}$</td>
<td>1 mV/V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{oss}$</td>
<td>60 mV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{oss}$</td>
<td>5 mV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$C_{max}$</td>
<td>5 pF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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>$V_{out}(I=I_{PN}$</td>
<td>625 ± 0.7% mV</td>
</tr>
<tr>
<td>$V_{out}-2.5V (I_P=0)$</td>
<td>± 0.00625 V</td>
</tr>
<tr>
<td>$V_a$</td>
<td>1.5 kV</td>
</tr>
<tr>
<td>$V_e$</td>
<td>1400 V</td>
</tr>
</tbody>
</table>

**Type Testing** (Pin 1 - 6 to Pin 7 - 9)

- Designed according standard EN 50178 with insulation material group 1
- HV transient test according to M3064 (1,2 µs / 50 µs-wave form)
- Testing voltage to M3014
- Partial discharge voltage acc.M3024 (RMS)
- Partial discharge voltage acc. M3024 (RMS)

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**Applicable documents**

Current direction: A positive output current appears at point $I_s$, by primary current in direction of the arrow.

Enclosures according to IEC529: IP50.

Further standards UL 508, file E317483, category NMTR2 / NMTR8
**Additional Information**

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Customer: Customers Part No.: Page 2 of 2

**Explanation of several of the terms used in the tablets (in alphabetical order)**

- $t_r$: Response time (describe the dynamic performance for the specified measurement range), measured as delay time at $I_P = 0.9 \cdot I_{PN}$ between a rectangular current and the output voltage $V_{OUT}(I_p)$.

- $\Delta t(I_{Pmax})$: Delay time (describe the dynamic performance for the rapid current pulse rate e.g. short circuit current) measured between $I_{Pmax}$ and the output voltage $V_{OUT}(I_{Pmax})$ with a primary current rise of $\frac{dI_P}{dt} \geq 100$ A/µs.

- $U_{PD}$: Rated discharge voltage (recurring peak voltage separated by the insulation) proved with a sinusoidal voltage $V_e$.

$$U_{PD} = 2 \cdot V_e / 1,5$$

- $V_{var}$: Defined voltage is the RMS value of a sinusoidal voltage with peak value of $1.875 \cdot U_{PD}$ required for partial discharge test in IEC 61800-5-1.

$$V_{var} = 1.875 \cdot U_{PD} / \sqrt{2}$$

- $V_{sys}$: System voltage - RMS value of rated voltage according to IEC 61800-5-1

- $V_{work}$: Working voltage - voltage according to IEC 61800-5-1 which occurs by design in a circuit or across insulation.

- $V_0$: Offset voltage between $V_{OUT}$ and the rated reference voltage of $V_{ref} = 2,5V$.

$$V_0 = V_{OUT}(0) - 2,5V$$

- $V_{DH}$: Zero variation of $V_0$ after overloading with a DC of tenfold the rated value.

- $V_{DL}$: Long term drift of $V_0$ after 100 temperature cycles in the range -40 bis 85 °C.

- $X$: Permissible measurement error in the final inspection at RT, defined by

$$X = 100 \cdot \frac{V_{OUT}(I_{PN}) - V_{OUT}(0)}{0.625V} - 1 \ %$$

- $X_{ges}(I_{PN})$: Permissible measurement error including any drifts over the temperature range by the current measurement $I_{PN}$

$$X_{ges} = 100 \cdot \frac{V_{OUT}(I_{PN}) - 2.5V}{0.625V} - 1 \ % \ or \ X_{ges} = 100 \cdot \frac{V_{OUT}(I_{PN}) - V_{ref}}{0.625V} - 1 \ %$$

- $\varepsilon_L$: Linearity fault defined by

$$\varepsilon_L = 100 \cdot \left| \frac{I_P - V_{OUT}(I_P) - V_{OUT}(0)}{V_{OUT}(I_{PN}) - V_{OUT}(0)} \right| \ %$$

This "Additional information" is no declaration of warranty according BGB §443.

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Hrsg.: KB-E
Bearb.: Le
KB-PM IA: KRe.
Freig.: HS
editor
designer
check
released

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