

K-No.: 26773

### 25A Current Sensor

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)



Date: 26.07.2017

Customer: Standard type

Customers Part no:

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#### Description

- Closed loop (compensation) Current Sensor with magnetic 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
- Uninterruptable Power Supplies (UPS)

#### Electrical data - Ratings

|           |   |  |   |
|-----------|---|--|---|
| $I_{PN}$  | Primary nominal RMS current                       | 25                                       | A |
| $V_{OUT}$ | Output voltage @ $I_P$                            | $V_{REF} \pm (0.625 \cdot I_P / I_{PN})$ | V |
| $V_{OUT}$ | Output voltage @ $I_P=0A, \vartheta_A=25^\circ C$ | $V_{REF} \pm 0.00135$                    | V |
| $V_{REF}$ | External Reference voltage range                  | 0 ... 4                                  | V |
|           | Internal Reference voltage                        | $2.5 \pm 0.005$                          | V |
| $K_N$     | Transformation ratio                              | 1...3 : 2000                             |   |

#### Accuracy – Dynamic performance data

|                                   |  | min.     | typ. | max.       | Unit            |
|-----------------------------------|--|----------|------|------------|-----------------|
| $I_{P,max}$                       | Max. measuring range   | $\pm 85$ |      |            | A               |
| X                                 | Accuracy @ $I_{PN}, \vartheta_A = 25^\circ C$                        |          |      | 0.7        | %               |
| $\epsilon_L$                      | Linearity  |          |      | 0.1        | %               |
| $V_{OUT}-V_{REF}$                 | Offset voltage @ $I_P = 0A, \vartheta_A = 25^\circ C$                |          |      | $\pm 1.35$ | mV              |
| $\Delta V_O / V_{REF} / \Delta T$ | Temperature drift of $V_{OUT}$ @ $I_P=0A, V_{REF}=2.5V, \vartheta_A$ |          | 1.4  | 10         | ppm/ $^\circ C$ |
| $t_r$                             | Response time  |          | 0.3  |            | $\mu s$         |
| $t_{ra}$                          | Reaction time  |          | 0.2  |            | $\mu s$         |
| $f_{BW}$                          | Frequency bandwidth  | DC..200  |      |            | kHz             |

#### General data

|               |                                     |      |    |      |            |
|---------------|-------------------------------------|------|----|------|------------|
| $\vartheta_A$ | Ambient operation temperature       | -40  |    | 85   | $^\circ C$ |
| $\vartheta_S$ | Ambient storage temperature         | -40  |    | 85   | $^\circ C$ |
| m             | Mass                                |      | 12 |      | g          |
| $V_C$         | Supply voltage                      | 4.75 | 5  | 5.25 | V          |
| $I_C$         | Supply current at $I_P = 0A$ and RT |      | 15 |      | mA         |

|                |   |     |  |      |            |
|----------------|---|-----|--|------|------------|
| $^1)S_{clear}$ | Clearance (component without solder pad)              | 7.4 |  |      | mm         |
| $^1)S_{creep}$ | Creepage (component without solder pad)               | 8.0 |  |      | mm         |
| $^1)U_{sys}$   | System voltage *overvoltage category 3                |     |  | 300  | $V_{RMS}$  |
| $^1)U_{AC}$    | Working voltage *acc. table 7, overvoltage category 2 |     |  | 650  | $V_{RMS}$  |
| $^1)U_{PD}$    | Rated discharge voltage                               |     |  | 1320 | $V_{PEAK}$ |
|                | According to UL 508: max. potential difference        |     |  | 600  | $V_{AC}$   |

- 1) Constructed and manufactured and tested in accordance with EN 61800-5-1:2003 (primary to secondary)  
Reinforced insulation, Insulation material group 1, Pollution degree 2

The current sensor passed the EMI susceptibility tests (vertical and horizontal, one direction) according to the standard 61000-4-3:2010 at 20V/m, 80%AM@1kHz over the frequency range of 80MHz to 1000MHz, level a) with <2% variation of the  $V_{out}$  during the stress.

| Date | Name | Issue | Amendment |
|------|------|-------|-----------|
|      |      | 81    |           |

|                         |                     |                  |                      |
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| Hrg.: R&D-PD NPI editor | Bearb.: DJ designer | MC-PM: Su. check | freig.: BEF released |
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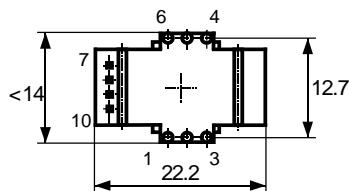
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#### Mechanical outline (mm):

General tolerances DIN ISO 2768-c

Connections:

Pin Nr. 1-6: Ø1mm  
Pin Nr. 7-10: 0.46 x 0.46mm

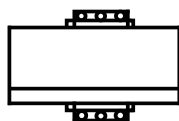
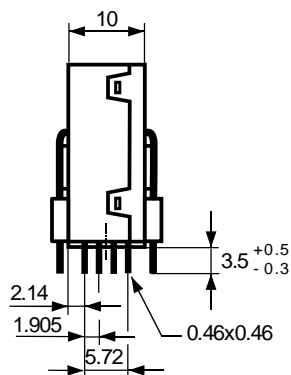
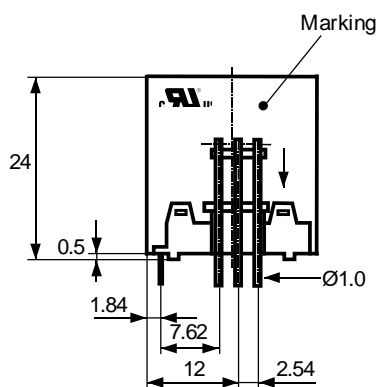


Tolerances grid distance  
±0.2 mm

Marking:

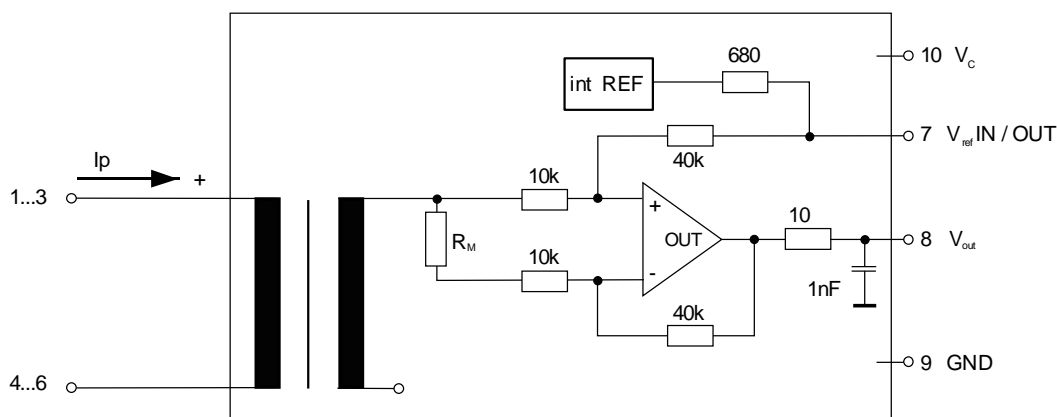



UL-sign 4647-X661  
F DC



DC = Date Code [Format YWW]  
F = Factory

#### Schematic diagram:



|              |   |  |                  |
|--------------|---|--|------------------|
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| <b>Electrical data:</b> (investigate by a type checking) |   | min. | typ.                             | max. | Unit             |
|--|---|------|----------------------------------|------|------------------|
| $V_{C,tot}$  | maximum supply voltage (without function)   |      |                                  | 7    | V                |
| $I_C$  | Supply Current with primary current   |      | $15mA + I_P * K_N + V_{OUT}/R_L$ |      | mA               |
| $I_{OUT,SC}$   | Short circuit output current  |      | $\pm 20$                         |      | mA               |
| $R_P$  | Resistance per primary winding @ $\vartheta_A = 25^\circ C$                       |      | 1                                |      | m $\Omega$       |
| $R_S$  | Secondary coil resistance @ $\vartheta_A = 85^\circ C$                            |      |                                  | 67   | $\Omega$         |
| $R_{i,REF}$  | Internal resistance of Reference output   |      | 680                              |      | $\Omega$         |
| $R_{i,Vout}$   | Output resistance of $V_{OUT}$  |      | 10                               |      | $\Omega$         |
| $R_L$  | External recommended resistance of $V_{OUT}$                                      | 1    |                                  |      | k $\Omega$       |
| $C_L$  | External recommended capacitance of $V_{OUT}$                                     |      |                                  | 1    | nF               |
| $X_{Ti} / \Delta T$                                      | Temperature drift of X @ $\vartheta_A = -40^\circ C \dots 85^\circ C$             |      |                                  | 40   | ppm/K            |
| $\Delta V_O = \Delta(V_{OUT} - V_{REF})$                 | Sum of any offset drift including:  |      | 2                                | 6    | mV               |
| $V_{Ot}$   | Long term drift of $V_O$  |      | 1                                |      | mV               |
| $V_{OT}$   | Temperature drift of $V_O$ @ $\vartheta_A = -40^\circ C \dots 85^\circ C$         |      | 1                                |      | mV               |
| $V_{OH}$   | Hysteresis of $V_{OUT}$ @ $I_P = 0A$<br>(caused by $I_P = 10 \times I_{PN}$ )     |      |                                  | 2    | mV               |
| $\Delta V_O / \Delta V_C$                                | Supply voltage rejection ratio  |      |                                  | 1    | mV/V             |
| $V_{OSS}$  | Offsetripple (with 1 MHz-Filter, first order)                                     |      |                                  | 25   | mV <sub>PP</sub> |
| $V_{OSS}$  | Offsetripple (with 100 kHz-Filter, first order)                                   |      | 4                                | 6    | mV <sub>PP</sub> |
| $V_{OSS}$  | Offsetripple (with 20 kHz-Filter, first order)                                    |      | 2                                | 4    | mV <sub>PP</sub> |
| $C_k$  | Maximum possible coupling capacity<br>(primary - secondary)                       |      |                                  | 10   | pF               |
|  | Mechanical stress according to M3209/3<br>Settings: 10-2000Hz, 1min/oct., 2 hours |      |                                  | 30   | g                |

**Routine Tests:** (Measurement after temperature balance of the samples at room temperature, SC=significant characteristic)

| Parameter         | Condition       | Test Description                       | Value           | Unit              |
|-------------------|-----------------|--|-----------------|-------------------|
| $V_{OUT} (SC)$    | (100%) M3011/6: | Output voltage                         | $625 \pm 0.7\%$ | mV                |
| $V_O$             | (100%) M3226:   | Offset voltage                         | $\pm 1.35$      | mV                |
| $U_d$             | (100%) M3014:   | Test voltage, 1s                       | 1.5             | kV <sub>RMS</sub> |
| $U_{PDE}$         | (AQL 1/S4)      | Partial discharge voltage (extinction) | 1.4             | kV <sub>RMS</sub> |
| $U_{PDE} * 1.875$ | M3024           |  | 1.75            |                   |

**Type testing:** (Precondition acc. to M3236)

| Parameter         | Condition | Test Description                                    | Value | Unit              |
|-------------------|-----------|---|-------|-------------------|
| $\hat{U}_W$       | M3064     | HV transient test 1,2 $\mu$ s / 50 $\mu$ s-Waveform | 6     | kV                |
| $U_d$             | M3014     | Test voltage (5s)                                   | 3     | kV <sub>RMS</sub> |
| $U_{PDE}$         | M3024     | Partial discharge voltage (extinction)              | 1.4   | kV <sub>RMS</sub> |
| $U_{PDE} * 1.875$ |           |   | 1.75  |                   |

**Other instructions:**

- Current direction: A positive output voltage vs.  $V_{REF}$  appears at point  $V_{OUT}$ , if primary current flows in direction of the arrow.
- Constructed, manufactured and tested in accordance with IEC 61800-5-1:2007
- Temperature of the primary conductor should not exceed 105°C.
- Housing and bobbin material UL-listed: Flammability class 94V-0.

|                         |                     |                  |                      |
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