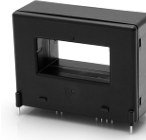


K-No.:30107

### 2A Differential Current Sensor for 5V Supply Voltage

For the electronic measurement of current:  
DC, AC, pulsed ..., with galvanic isolation between the primary and the secondary circuit



Date: 02.07.2020

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 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:

- Solar inverter

#### Electrical data - Ratings

|                            |  |  |   |
|----------------------------|--|--|---|
| $I_{PN}$                   | Primary nominal RMS current                        | 150  | A |
| $I_{\Delta N}$             | Differential rated RMS current                     | 2  | A |
| $V_{OUT}$                  | Output voltage @ $I_{\Delta P}$                    | $V_{REF} \pm (1.32 * I_{\Delta P} / I_{\Delta N})$ | V |
| $V_{OUT(0)}^1$             | Output voltage @ $I_P=0A, \vartheta_A=25^\circ C$  | $V_{REF} \pm 0.015$                                | V |
| $V_{OUT(Error)}$           | in case of error (current sensor) $V_{OUT}$ is set | < 0.5  | V |
| $V_{REF}$                  | internal reference voltage                         | $2.5 \pm 0.005$                                    | V |
|                            | external reference voltage range                   | 1.4...3.5  | V |
| $V_{REF(test\ current)}^2$ | Reference voltage (external)                       | 0 ... 0.1  | V |
| $V_{OUT(test\ current)}^2$ | Output voltage @ $V_{REF} = 0...0.1V$              | $V_{OUT(0)} + 0.2 \pm 0.06$                        | V |
| $K_N$                      | Transformation ratio                               | (1) : 1000   |   |
|                            | Turns count for test winding                       | 20   |   |

<sup>1</sup> with switching on and after "test current" the sensor is degaussed by an internal AC-current for about 110ms. In this time the output is set to  $V_{OUT} < 0.5V$ .

<sup>2</sup> If  $V_{REF}$  is set external to 0...0.1V an internal test current is generated.

#### Accuracy – Dynamic performance data

|                               |   | min.      | typ. | max. | Unit    |
|-------------------------------|---|-----------|------|------|---------|
| $I_{\Delta N,max}$            | Max. measuring range  | $\pm 3$   |      |      | A       |
|                               | Max. measuring range ( $V_{C,min}=4.98V, R_{LOAD}>100k\Omega$ ) | $\pm 3.6$ |      |      | A       |
| X                             | Accuracy @ $I_{PN}, \vartheta_A = 25^\circ C$                   |           |      | 1.5  | %       |
| $\epsilon_L$                  | Linearity   |           |      | 1    | %       |
| $V_O$                         | Offset voltage @ $I_P = 0A, \vartheta_A = 25^\circ C$           | -15       |      | 15   | mV      |
| $\Delta V_O/\Delta \vartheta$ | Temperature drift of $V_{OUT}$ @ $I_P=0A, \vartheta_A$          |           | 0.07 |      | mV/°C   |
| $t_r$                         | Response time @ 90% of $I_{\Delta N}$                           |           | 30   |      | $\mu s$ |
| f                             | Frequency bandwidth   | DC...10   |      |      | kHz     |

#### General data

|                                 |   |      |    |      |            |
|---------------------------------|---|------|----|------|------------|
| $\vartheta_A$                   | Ambient operation temperature               | -40  |    | 85   | °C         |
| $\vartheta_S$                   | Ambient storage temperature (acc. to M3101) | -40  |    | 85   | °C         |
| m                               | Mass  |      | 94 |      | g          |
| $V_C$                           | Supply voltage                              | 4.75 | 5  | 5.25 | V          |
| $I_C$                           | Supply current at $I_P = 0A$ and RT         |      | 15 |      | mA         |
| <sup>1)</sup> $s_{clear}$       | Clearance (component without solder pad)    | 8    |    |      | mm         |
| <sup>1)</sup> $s_{creep}$       | Creepage (component without solder pad)     | 10   |    |      | mm         |
| <sup>1)</sup> $U_{sys, re}$     | System voltage (reinforced insulation)      |      |    | 600  | $V_{RMS}$  |
| <sup>1)</sup> $U_{work, re}$    | Working voltage (reinforced insulation)     |      |    | 1000 | $V_{RMS}$  |
| <sup>1)</sup> $U_{PD}$          | Rated discharge voltage                     |      |    | 1414 | $V_{PEAK}$ |
| <sup>1)</sup> $U_{sys, basic}$  | System voltage (basic insulation)           |      |    | 1000 | $V_{RMS}$  |
| <sup>1)</sup> $U_{work, basic}$ | Working voltage (basic insulation)          |      |    | 2000 | $V_{RMS}$  |

<sup>1)</sup>Constructed and manufactured and tested in accordance with IEC 61800-5-1:2007  
Insulation material group 1, Pollution degree 2, Overvoltage category III

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

Hrg.: R&D-PD NPI D  
editor

Bearb.: DJ  
designer

MC-PM: NSch.  
check

freig.: SB  
released

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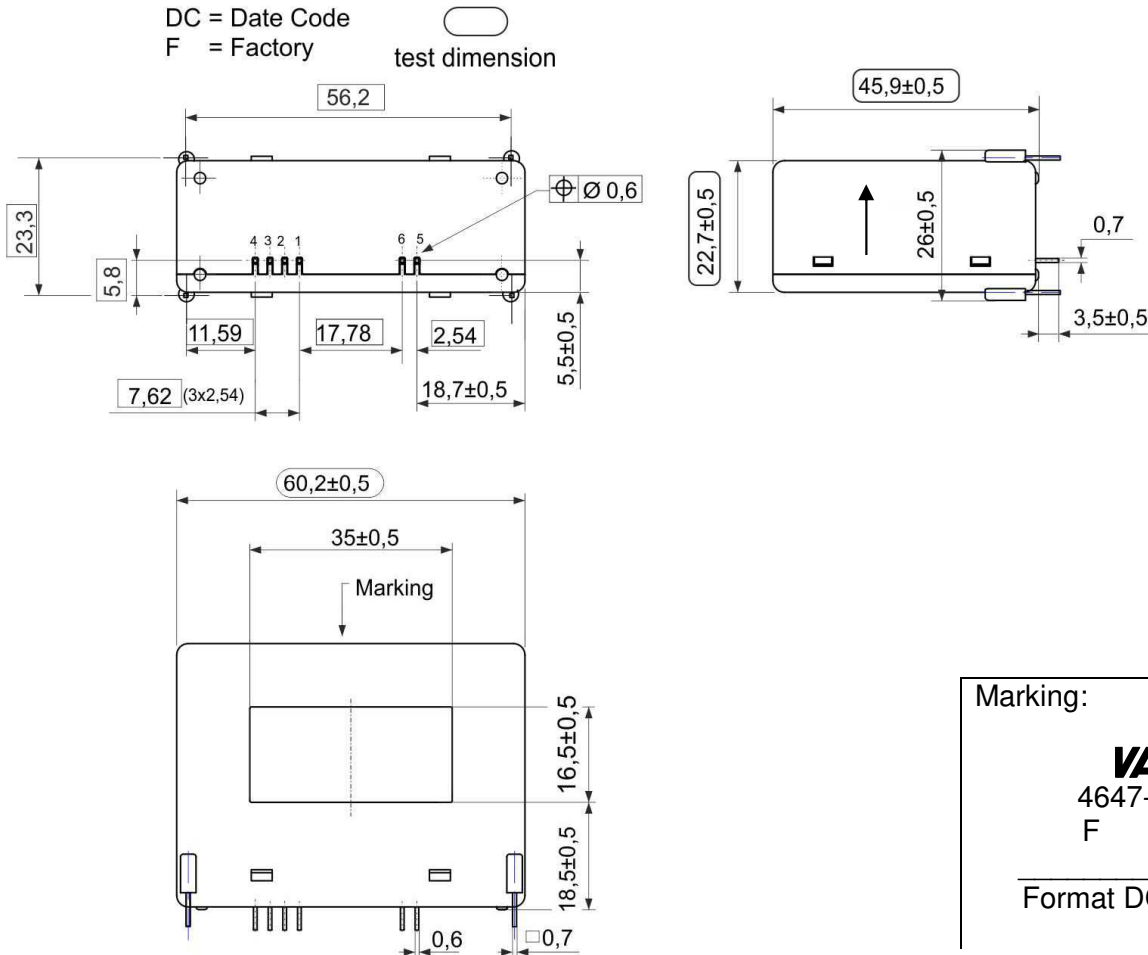
Customer: Standard Type

Customers Part no:

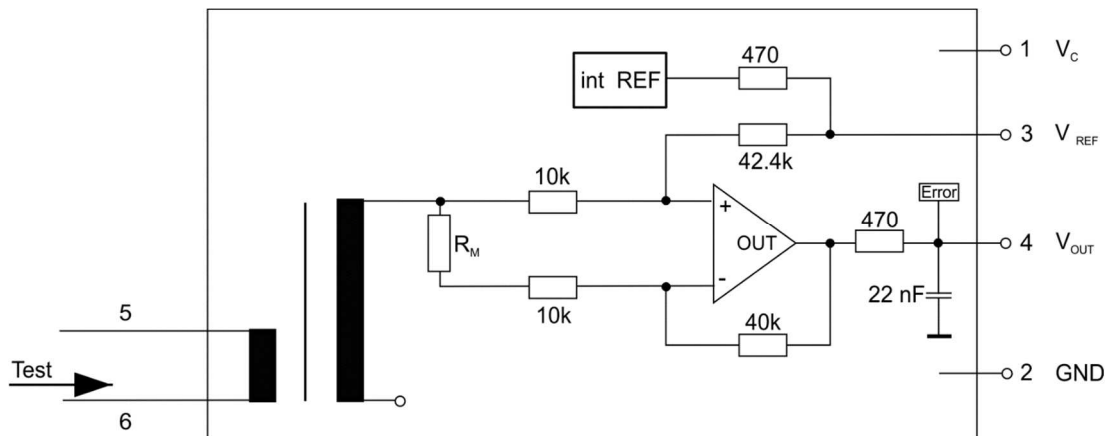
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#### Mechanical outline (mm):

General tolerances DIN ISO 2768-c



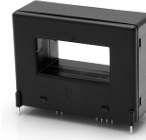
#### Schematic diagram:



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#### Electrical data: (investigate by a type checking)

|   |   | min.                                      | typ. | max.     | Unit             |
|---|---|---|------|----------|------------------|
| $V_{C,max}$                             | maximum supply voltage (without function)   |   |      | 6        | V                |
| $I_c$                                   | Supply current with primary current   | $16mA + I_{\Delta P} * K_N + V_{OUT}/R_L$ |      |          | mA               |
| $I_{OUT,SC}$                            | Short circuit output current  |   |      | $\pm 15$ | mA               |
| $R_s$                                   | Secondary coil resistance @ $\vartheta_A = 85^\circ C$                              |   | 80   |          | $\Omega$         |
| $R_{i,REF}$                             | Internal resistance of reference input  |   | 470  |          | $\Omega$         |
| $R_{i,OUT}$                             | Output resistance of $V_{OUT}$  |   | 470  |          | $\Omega$         |
| $\Delta X_{\vartheta}/\Delta \vartheta$ | Temperature drift of X @ $\vartheta_A = -40^\circ C \dots 85^\circ C$               |   |      | 400      | ppm/K            |
| $\Delta V_{REF}/\Delta \vartheta$       | Temperature drift of $V_{REF}$ @ $\vartheta_A = -40^\circ C \dots 85^\circ C$       |   | 5    | 50       | ppm/K            |
| $V_{Ot}$                                | Long term drift of $V_O$  |   | 7    |          | mV               |
| $V_{O\vartheta}$                        | Temperature drift of $V_O$ @ $\vartheta_A = -40^\circ C \dots 85^\circ C$           |   | 8    |          | mV               |
| $\Delta V_O/\Delta V_C$                 | Supply voltage rejection ratio  |   | 4    |          | mV/V             |
| $V_{OH}$                                | Hysteresis of $V_{OUT}$ @ $I_P = 0$ (after an overload of $800x I_{\Delta N}$ )     |   |      | 70       | mV               |
| $V_{OH, Demag}$                         | Hysteresis after Degaussing   |   |      | 20       | mV               |
| $V_{OSS}$                               | Offsetripple (without external filter)  |   | 40   | 60       | mV <sub>PP</sub> |
| $V_{OSS}$                               | Offsetripple (with 20 kHz-Filter, first order)                                      |   | 10   |          | mV <sub>PP</sub> |
| $V_{OSS}$                               | Offsetripple (with 1.6 kHz-Filter, first order)                                     |   | 1    |          | mV <sub>PP</sub> |
|   | Mechanical stress according to M3209/3<br>Settings: 10-2000Hz, 1min/Octave, 2 hours |   | 2    |          | g                |

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

|                               |                  |  |  |               |                   |
|-------------------------------|------------------|--|--|---------------|-------------------|
| $V_{OUT}$ (SC)                | (100%) M3011/6   | Output voltage                         |  | 1301 ... 1339 | mV                |
| $V_O$                         | (100%) M3226     | Offset voltage                         |  | $\pm 15$      | mV                |
| $U_d$                         | (100%) M3014     | Test voltage, 1s                       |  | 1.8           | kV <sub>RMS</sub> |
| $U_{PDE}$<br>$U_{PD} * 1.875$ | (AQL 1/S4) M3024 | Partial discharge voltage (extinction) |  | 1.5<br>1.875  | kV <sub>RMS</sub> |

#### Type Tests: (Precondition acc. M3236)

|                               |       |   |  |              |                   |
|-------------------------------|-------|---|--|--------------|-------------------|
| $\hat{U}_W$                   | M3064 | HV Impulse voltage (1.2 $\mu$ s/50 $\mu$ s wave form)<br>5 pulses -> polarity +, 5 pulses -> polarity - |  | 8            | kV                |
| $U_d$                         | M3014 | Test voltage, 60s   |  | 3.6          | kV <sub>RMS</sub> |
| $U_{PDE}$<br>$U_{PD} * 1.875$ | M3024 | Partial discharge voltage (extinction)  |  | 1.5<br>1.875 | kV <sub>RMS</sub> |

#### Other instructions

- A positive output voltage appears at point  $V_{OUT}$  vs.  $V_{REF}$ , if primary current flows in direction of the arrow.
- Temperature of the primary conductor should not exceed  $105^\circ C$ .
- Housing and bobbin material UL-listed: Flammability class 94V-0.
- Housing without red phosphorous.