

K-No.: 30325

### 250A 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: 06.08.2024

Customer: Standard Type

Customers Part no:

Page 1 of 3

#### 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	250	A
$V_{OUT}$	Output voltage	$V_{REF} \pm (0.625 \cdot I_P / I_{PN})$	V
$V_{OUT}$	Output voltage @ $I_P=0A$ , $\vartheta_A=25^\circ C$	$V_{REF} \pm 0.0007$	V
$V_{REF}$	External Reference voltage range	0 ... 4	V
	Internal Reference voltage @ $I_P=0A$	$2.5 \pm 0.005$	V
$K_N$	Transformation ratio	(1) : 1400	

#### Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range @ $V_C=5V$	$\pm 600$			A
X	Accuracy @ $I_{PN}$ , $\vartheta_A=25^\circ C$			0.7	%
$\epsilon_L$	Linearity			0.1	%
$V_{OUT}-V_{REF}$	Offset voltage @ $I_P=0A$ , $\vartheta_A=25^\circ C$			0.7	mV
$\Delta V_O / V_{REF} / \Delta \vartheta$	Temperature drift of $V_{OUT}$ @ $I_P=0A$ , $V_{REF}=2.5V$ , $\vartheta_A$		3	6	ppm/ $^\circ C$
$t_{ra}$	Reaction time		<1		$\mu s$
$f_{BW}$	Frequency bandwidth (small signal)	DC ... 200			kHz

#### General data

$\vartheta_A$	Ambient operation temperature	-40		85	$^\circ C$
$\vartheta_S$	Ambient storage temperature (acc. to M3101)	-40		105	$^\circ C$
m	Mass		64		g
$V_C$	Supply voltage	4.75	5	5.25	V
$I_C$	Supply current @ $I_P=0A$ and RT		17		mA

$^1)S_{clear}$	Clearance (component without solder pad)	17			mm
$^1)S_{creep}$	Creepage (component without solder pad)	17			mm
$^1)U_{sys, re}$	System voltage (reinforced insulation)			1000	$V_{RMS}$
$^1)U_{work, re}$	Working voltage (reinforced insulation)			1000	$V_{RMS}$
$^1)U_{PD}$	Rated discharge voltage			1414	$V_{PEAK}$
$^1)U_{sys, basic}$	System voltage (basic insulation)			1800	$V_{RMS}$
$^1)U_{work, basic}$	Working voltage (basic insulation)			2800	$V_{RMS}$
	According to UL 508: max. potential difference			600	$V_{RMS}$

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

Date	Name	Issue	Amendment
06.08.2024	DJ	81	UL sign added. CN-24-073

Editor: R&D-PD NPI D

Designer: DJ

MC-PM: FS

Released: SB

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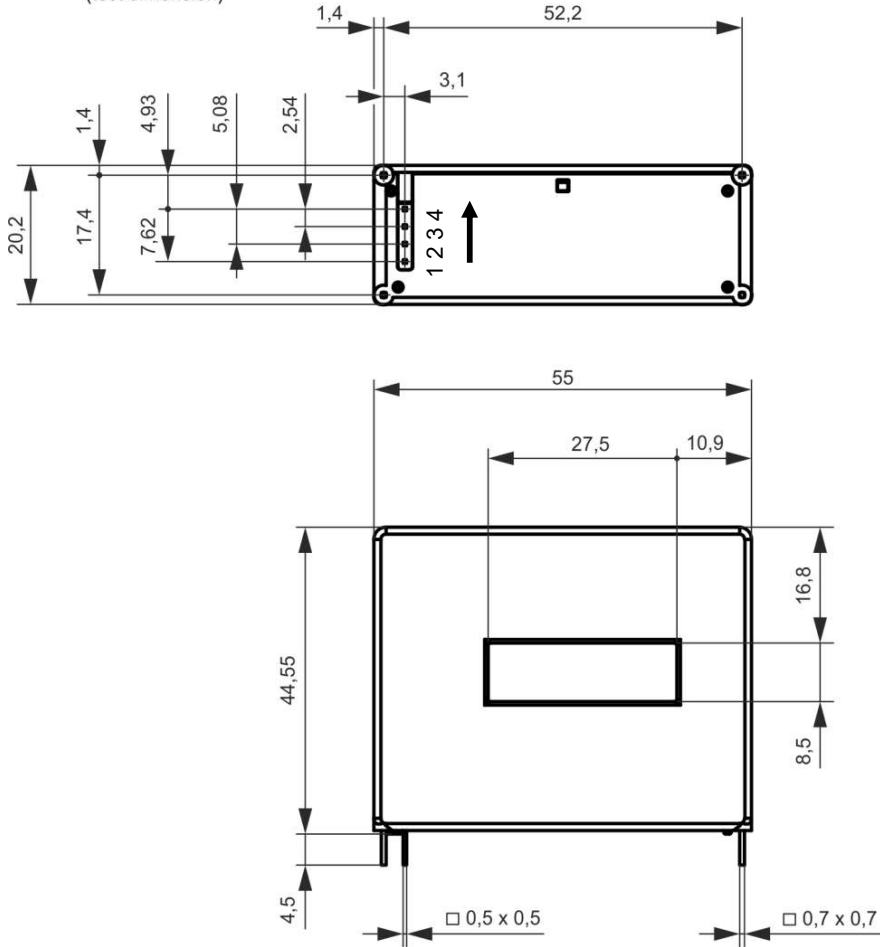
Customers Part no:

Page 2 of 3

#### Mechanical outline (mm):

General tolerances DIN ISO 2768-c

○ Prüfmaß  
(test dimension)



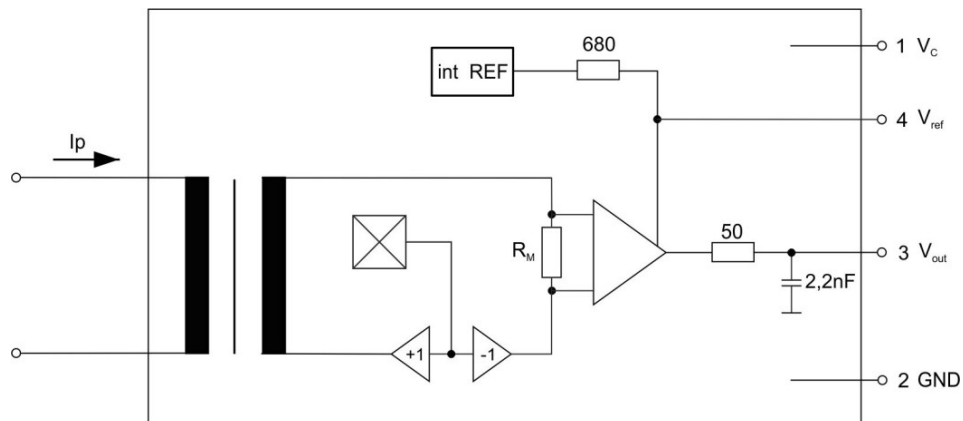
Marking:

VAC  
UL-sign 4647-P282  
F DC

F: Factory  
DC: Date code

Date code format: YYWW

#### Schematic diagram:



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Page 3 of 3

#### Electrical data: (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	17mA+ $I_P \cdot K_N + V_{OUT}/R_L$			mA
$I_{OUT,SC}$	Short circuit output current			$\pm 20$	mA
$R_S$	Secondary coil resistance @ $\vartheta_A = 85^\circ\text{C}$			10	$\Omega$
$R_{i,REF}$	Internal resistance of Reference output		680		$\Omega$
$R_{i,Vout}$	Output resistance of $V_{OUT}$		50		$\Omega$
$R_L$	External recommended resistance of $V_{OUT}$	1			k $\Omega$
$C_L$	External recommended capacitance of $V_{OUT}$		no limit		pF
$X_{Ti} / \Delta\vartheta$	Temperature drift of X @ $\vartheta_A = -40^\circ\text{C} \dots 85^\circ\text{C}$			40	ppm/ $^\circ\text{C}$
$\Delta V_O = \Delta(V_{OUT} - V_{REF})$	Sum of any offset drift including:			1	mV
$V_{Ot}$	Long term drift of $V_O$		0.3		mV
$V_{OT}$	Temperature drift of $V_O$ @ $\vartheta_A = -40^\circ\text{C} \dots 85^\circ\text{C}$		0.4		mV
$V_{OH}$	Hysteresis of $V_{OUT}$ @ $I_P = 0\text{A}$ (caused by $I_P = 10 \times I_{PN}$ )		0.5		mV
$\Delta V_O / \Delta V_C$	Supply voltage rejection ratio		0.05		mV/V
$V_{OSS}$	Offsetripple (with 1 MHz-Filter, first order)		3.5		mV <sub>PP</sub>
$V_{OSS}$	Offsetripple (with 100 kHz-Filter, first order)		1.5		mV <sub>PP</sub>
$V_{OSS}$	Offsetripple (with 20 kHz-Filter, first order)		0.8		mV <sub>PP</sub>
$C_k$	Coupling capacity (primary - secondary)		4		pF
	Mechanical stress according to M3209/3 Settings: 10-2000Hz, 1min/oct, 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	620.625 ... 629.375	mV
$V_{OUT} - V_{REF}$	(100%) M3226:	Offset voltage	$\pm 0.7$	mV
$U_d$	(100%) M3014:	Test voltage, 1s	2.2	kV <sub>RMS</sub>
$U_{PDE}$	(AQL 1/S4) M3024:	Partial discharge voltage (extinction)	1.875	kV <sub>RMS</sub>
$U_{PD}$			1.5	

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

$\hat{U}_W$	HV transient test acc. to M3064 (1.2 $\mu\text{s}$ / 50 $\mu\text{s}$ ) 5 pulses -> polarity +, 5 pulses -> polarity -	12	kV <sub>PEAK</sub>
$U_d$	Test voltage acc. to M3014, 60s	4.4	kV <sub>RMS</sub>
$U_{PDE}$	Partial discharge voltage (extinction) acc. to M3024	1.875	kV <sub>RMS</sub>
$U_{PD}$		1.5	

#### 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 sign on Sensor package.
- Temperature of the primary conductor should not exceed 105 $^\circ\text{C}$ .
- Housing and bobbin material UL-listed: Flammability class 94V-0.
- Housing without red phosphorous.
- The color of the plastic material is not specified and the current sensor can be supplied in different colors (e.g. brown, black, white, natural). This has no effect on the specifications or UL approval.
- Further standards: UL 508 file E317483, category NMTR2 / NMTR8

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