

K-no.: 24511

25 A Current Sensor for 5V- Supply Voltage

Date: 28.01.2013

 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

Customers Part no.:

Page 1 of 2

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

I_{PN}	Primary nominal r.m.s. current	25	A
V_{out}	Output voltage @ I_P	$V_{Ref} \pm (0.625 \cdot I_P / I_{PN})$	V
V_{out}	Output voltage @ $I_P=0, T_A=25^\circ C$	$V_{Ref} \pm 0.005$	V
V_{Ref}	External Reference voltage range	0...4	V
	Internal Reference voltage	2.5 ± 0.005	V
K_N	Turns ratio	1...3 : 2000	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range	±85			
X	Accuracy @ $I_{PN}, T_A=25^\circ C$			0.7	%
ϵ_L	Linearity			0.1	%
$V_{out} - V_{Ref}$	Offset voltage @ $I_P=0, T_A=25^\circ C$			±1.35	mV
$\Delta V_o / V_{Ref} / \Delta T$	Temperature drift of V_{out} @ $I_P=0, V_{Ref}=2,5V, T_A=-40...85^\circ C$	1.4		10	ppm/°C
t_r	Response time @ 90% von I_{PN}		300		ns
$\Delta t (I_{P,max})$	Delay time at $di/dt = 100 A/\mu s$		200		ns
f	Frequency bandwidth	DC...200			kHz

General data

		min.	typ.	max.	Unit
T_A	Ambient operating temperature	-40		+85	°C
T_S	Ambient storage temperature	-40		+85	°C
m	Mass		12		g
V_C	Supply voltage	4.75	5	5.25	V
I_C	Current consumption		15		mA

 Constructed and manufactured and tested in accordance with EN 61800-5-1 (Pin 1 - 6 to Pin 7 – 10)
 Reinforced insulation, Insulation material group 1, Pollution degree 2

S_{clear}	Clearance (component without solder pad)	7.4			mm
S_{creep}	Creepage (component without solder pad)	8.0			mm
V_{sys}	System voltage	overvoltage category 3		RMS	300
V_{work}	Working voltage	(tabel 7 acc. to EN61800-5-1) overvoltage category 2		RMS	650
U_{PD}	Rated discharge voltage	peak value			1320

 Note: "According UL 508: Max. potential difference = 600 V_{AC} "

Date	Name	Issue	Amendment
28.01.13	Le	83	Note added, clearance and creepage from 7 to 7.4 and 7 to 8.0. Temperature drift from typ. 3 of typ. 1.4
			Offset voltage from ±5 to ± 1.35 changed. Mechanical outline / marking with UL-sign. + issue(increased). CN-572

Hrsg.: KB-E editor	Bearb: Le. designer	KB-PM: KRe. check	freig.: HS released
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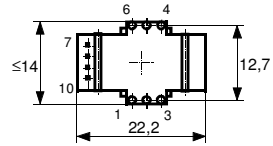
Customers Part no.:

Page 2 of 2

Mechanical outline (mm):

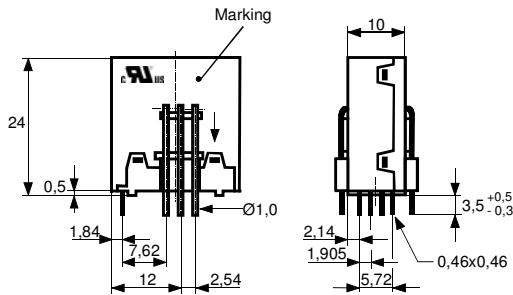
General tolerances DIN ISO 2768-c

Connections:



Tolerances grid distance
±0,2 mm

1...6: Ø 1 mm
7...10: 0,46*0,46 mm



Marking:

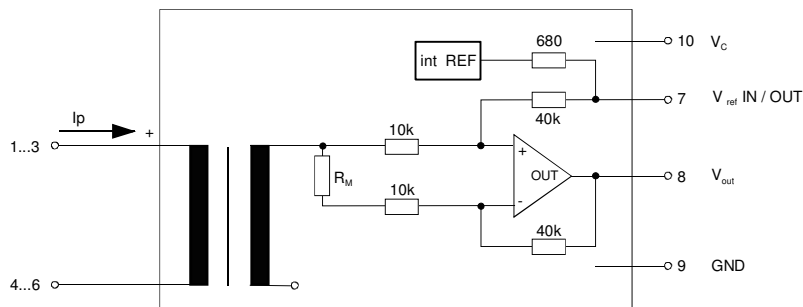
VAC UL-sign
4646X661-83
DC
F

Explanation:

DC = Date Code [Format YWW]

DC = Date Code
F = Factory

Schematic diagram



Possibilities of wiring

(@ TA = 85°C)

primary windings	primary current RMS	primary current maximal	output voltage RMS	turns ratio	primary resistance	wiring
N _P	I _P [A]	I _{P,max} [A]	V _{out} (I _P) [V]	K _N	R _P [mΩ]	
1	25	±85	2.5±0.625	1:2000	0.33	
2	12	±42	2.5±0.600	2:2000	1.5	
3	8	±28	2.5±0.600	3:2000	3	

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

Additional information is obtainable on request.

This specification is no declaration of warranty acc. BGB §443 dar.

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Electrical Data

		min.	typ.	max.	Unit
V_{Ctot}	Maximum supply voltage (without function)			6	V
I_C	Supply Current with primary current	$15mA + I_p \cdot K_N + V_{out}/R_L$			mA
$I_{out,SC}$	Short circuit output current	± 20			mA
R_P	Resistance / primary winding @ $T_A=25^\circ C$	1			m Ω
R_S	Secondary coil resistance @ $T_A=85^\circ C$	67			Ω
$R_{i,Ref}$	Internal resistance of Reference input	670			Ω
$R_{i,(V_{out})}$	Output resistance of V_{out}	1			Ω
R_L	External recommended resistance of V_{out}	1			k Ω
C_L	External recommended capacitance of V_{out}	500			pF
$\Delta X_{Ti} / \Delta T$	Temperature drift of X @ $T_A = -40 \dots +85^\circ C$	40			ppm/K
$\Delta V_0 = \Delta(V_{out} - V_{Ref})$	Sum of any offset drift including:	2			mV
V_{0t}	Longtermdrift of V_0	1			mV
V_{0T}	Temperature drift von V_0 @ $T_A = -40 \dots +85^\circ C$	1			mV
V_{0H}	Hysteresis of V_{out} @ $I_P=0$ (after an overload of $10 \times I_{PN}$)	2			mV
$\Delta V_0 / \Delta V_C$	Supply voltage rejection ratio	1			mV/V
V_{OSS}	Offsetripple (with 1 MHz- filter first order)	30			mV
V_{OSS}	Offsetripple (with 100 kHz- filter first order)	3			mV
V_{OSS}	Offsetripple (with 20 kHz- filter first order)	0.8			mV
C_k	Maximum possible coupling capacity (primary – secondary)	5			pF
	Mechanical stress according to M3209/3	30g			
	Settings: 10 – 2000 Hz, 1 min/Decade, 2 hours				

Inspection (Measurement after temperature balance of the samples at room temperature)

$V_{out} (I_P=I_{PN})$	(V) M3011/6:	Output voltage vs. external reference ($I_P=25A, 40-80Hz$)	$625 \pm 0,7\%$	mV
$V_{out} - V_{Ref} (I_P=0)$	(V) M3226:	Offset voltage	± 0.005	V
V_d	(V) M3014:	Test voltage, rms, 1 s pin 1 – 6 vs. pin 7 – 10	1.5	kV
V_e	(AQL 1/S4)	Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)	1400	V
			1750	V

Type Testing (Pin 1 - 6 to Pin 7 - 10)

V_W	HV transient test according to M3064 (1,2 μs / 50 μs -wave form)	8	kV
V_d	Testing voltage to M3014	(5 s)	3
V_e	Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)	1400	V
		1750	V

Applicable documents

 Current direction: A positive output current appears at point I_S , by primary current in direction of the arrow.
 Housing and bobbin material UL-listed: Flammability class 94V-0.

Enclosures according to IEC529: IP50.

Further standards UL 508 file E317483, category NMTR2 / NMTR8

Datum	Name	Index	Amendment
28.01.13	Le	83	Applicable documents added. CN-572
08.12.10	Le	82	Date changed.

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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 $di_P/dt \geq 100 \text{ A}/\mu\text{s}$.

U_{PD} Rated discharge voltage (recurring peak voltage separated by the insulation) proved with a sinusoidal voltage V_e
 $U_{PD} = \sqrt{2} \cdot V_e / 1,5$

V_{vor} 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
 $V_{vor} = 1,875 \cdot U_{PD} / \sqrt{2}$

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_o : Offset voltage between V_{out} and the rated reference voltage of $V_{ref} = 2,5V$.
 $V_o = V_{out}(0) - 2,5V$

V_{0H} : Zero variation of V_o after overloading with a DC of tenfold the rated value

V_{0t} : Long term drift of V_o after 100 temperature cycles in the range -40 bis 85 °C.

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

$$X = 100 \cdot \left| \frac{V_{out}(I_{PN}) - V_{out}(0)}{0,625V} - 1 \right| \%$$

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

$$X_{ges} = 100 \cdot \left| \frac{V_{out}(I_{PN}) - 2,5V}{0,625V} - 1 \right| \% \quad \text{or} \quad X_{ges} = 100 \cdot \left| \frac{V_{out}(I_{PN}) - V_{ref}}{0,625V} - 1 \right| \%$$

ϵ_L : Linearity fault defined by $\epsilon_L = 100 \cdot \left| \frac{I_P}{I_{PN}} - \frac{V_{out}(I_P) - V_{out}(0)}{V_{out}(I_{PN}) - V_{out}(0)} \right| \%$

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