

K-no.: 24507

25 A Current Sensor modul 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)

Date: 10.12.2010

Customer: Standard type

Customers Part no.:
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Description	Characteristics	Applications
<ul style="list-style-type: none"> Closed loop (compensation) Current Sensor with magnetic field probe Printed circuit board mounting Casing and materials UL-listed 	<ul style="list-style-type: none"> 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 	Mainly used for stationary operation in industrial applications: <ul style="list-style-type: none"> 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	$2.5 \pm (0.625 * I_P / I_{PN})$	V
V_{out}	Output voltage @ $I_P=0, T_A=25^\circ C$	2.5 ± 0.015	V
V_{Ref}	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		%
$V_{out} -2,5V$	Offset voltage @ $I_P=0, T_A= 25^\circ C$		± 15		mV
$\Delta V_{out}/2,5V/\Delta T$	Temperature drift of V_{out} @ $I_P=0, T_A= -40...85^\circ C$	13	26		ppm/K
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...100			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_{CO}	Current consumption		15		mA

Constructed and manufactured and tested in accordance with EN 61800-5-1 (Pin 1 - 6 to Pin 7 – 9)
Reinforced insulation, Insulation material group 1, Pollution degree 2

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

Date	Name	Issue	Amendment
10.12.10	Ga.	82	Mechanical outline: Pin length, tolerance changed from 3,5 +/-0,5mm auf 3,5 -0,3 / +0,5mm. ÄA-959
08.04.08	Le	82	"Preliminary" delete.
Hrsg.: KB-E editor	Bearb: Le designer	KB-PM: KRe check	freig.: HS released

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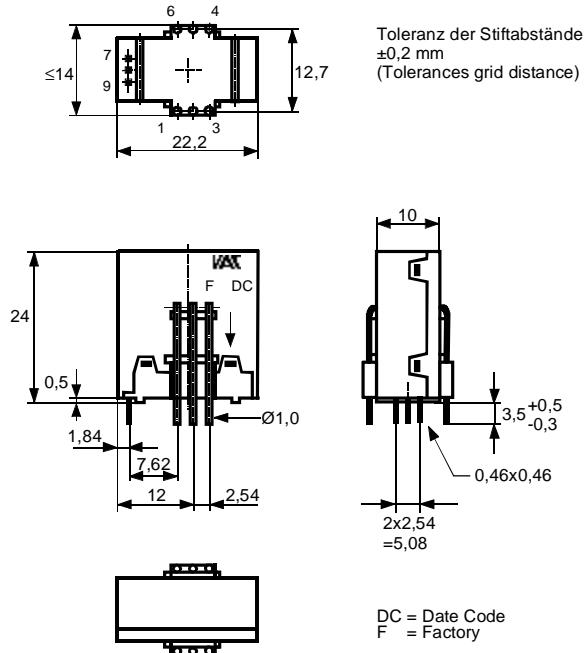
Date: 10.12.2010

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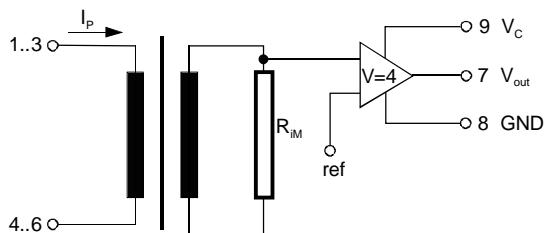
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Mechanical outline (mm):

General tolerances DIN ISO 2768-c


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

Marking:
VAC
 4646X651
 F DC

Schematic diagram

Possibilities of wiring (@ T_A = 85°C)

primary windings	primary current RMS	primary current maximal	output voltage effective	turns ratio	primary resistance	wiring
N _P	I _P [A]	I _{P,max} [A]	V _{out} (I _{P,N}) [V]	K _N	R _P [mW]	
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	

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.

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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		$15\text{mA} + I_p \cdot K_N + V_{out}/R_L$		mA
$I_{out,SC}$	Short circuit output current		± 20		mA
R_P	Resistance / primary winding @ $T_A=25^\circ\text{C}$		1		$\text{m}\Omega$
R_S	Secondary coil resistance @ $T_A=85^\circ\text{C}$			67	Ω
$R_i, (V_{out})$	Output resistance of V_{out}			1	Ω
R_L	External recommended resistance of V_{out}	1			$\text{k}\Omega$
C_L	External recommended capacitance of V_{out}			500	pF
$\Delta X_{Ti}/\Delta T$	Temperature drift of X @ $T_A = -40 \dots +85^\circ\text{C}$			40	ppm/K
$\Delta V_0 = \Delta(V_{out} - 2.5\text{V})$	Sum of any offset drift including:	5	10		mV
V_{0t}	Long term drift of V_0	1			mV
V_{0T}	Temperature drift von V_0 @ $T_A = -40 \dots +85^\circ\text{C}$	4			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)			60	mV
V_{oss}	Offsetripple (with 100 kHz- filter first order)	5	8		mV
V_{oss}	Offsetripple (with 20 kHz- filter first order)	1	2		mV
C_k	Maximum possible coupling capacity (primary – secondary)	5	10		pF
	Mechanical stress according to M3209/3				
	Settings: 10 – 2000 Hz, 1 min/Decade, 2 hours			30g	

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

$V_{out} (I_P=I_{PN})$	(V)	M3011/6:	Output voltage vs. internal reference ($I_P=25\text{A}$, 40-80Hz)	$625 \pm 0.7\%$	mV
$V_{out}-2.5\text{V} (I_P=0)$	(V)	M3226:	Offset voltage	± 0.015	V
V_d	(V)	M3014:	Test voltage, rms, 1 s pin 1 – 6 vs. pin 7 – 9	1,5	kV
V_e	(AQL 1/S4)		Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)	1400 1750	V

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

Designed according standard EN 50178 with insulation material group 1

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	kV
V_e	Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)		1400 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.

Datum	Name	Index	Änderung
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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
 $U_{PD} = \sqrt{2} * V_e / 1,5$

V_{vor} Defined voltage is the RMS value of a sinusoidal voltage with peak value of $1,875 * U_{PD}$ required for partial discharge test in IEC 61800-5-1

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

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_{0H} : Zero variation of V_0 after overloading with a DC of tenfold the rated value

V_{ot} : 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

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

$X_{ges}(I_{PN})$: 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 $e_L = 100 \cdot \left| \frac{I_p}{I_{PN}} - \frac{V_{out}(I_p) - V_{out}(0)}{V_{out}(I_{PN}) - V_{out}(0)} \right| \%$

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

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