VACUUMSCHMELZE	**SPECIFICATION**	**Item no.:** **T60404-N4646-X763**

K-no.: 26077	**6A Current Sensor 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: 11.01.2019

Customer: Standard type	Customers Part no.:	Page 1 of 4

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	6	A
V_{out}	Output voltage @ I_P	V_{Ref} ± (0.625*I_P/I_{PN})	V
V_{out}	Output voltage @ I_P=0, T_A=25°C	V_{Ref} ± 0.0056	V
V_{Ref}	External Reference voltage range	0…4	V
	Internal Reference voltage	2.5 ± 0.005	V
K_N	Turns ratio	1…4 : 2000	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range	±20			
X	Accuracy @ I_{PN}, T_A= 25°C			0.7	%
ε_L	Linearity			0.1	%
V_{out} - V_{Ref}	Offset voltage @ I_P=0, T_A= 25°C			±5.3	mV
ΔV_o / V_{Ref} / ΔT	Temperature drift of V_{out} @ I_P=0, V_{Ref} =2,5V, T_A= -40…85°C		6	30	ppm/°C
t_r	Response time @ 90% von I_{PN}		300		ns
Δt ($I_{P,max}$)	Delay time at di/dt = 100 A/µs		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		+105	°C
m	Mass		12		g
V_C	Supply voltage	4.75	5	5.25	V
I_C	Current consumption		15		mA

Constructed and manufactored and tested in accordance with EN 61800-5-1 (Pin 1 – 4 to Pin 5 – 12)
Reinforced insulation, Insulation material group 1, Pollution degree 2

S_{clear}	Clearance (component without solder pad)	9.6		mm
S_{creep}	Creepage (component without solder pad)	10.6		mm
V_{sys}	System voltage overvoltage category 3	RMS	600	V
V_{work}	Working voltage	RMS	1060	V
U_{PD}	Rated discharge voltage	peak value	1320	V

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

Date	Name	Issue	Amendment
11.01.19	DJ	83	Typo: sheet 2, changed current maximal (Np = 4) from +/-6,7 to +/-5,0. Minor change.
05.02.14	Ga.	83	Marking changed acc to UL-specification. 4646X763-82 ➔ 4646-X763-83. CN-924

Hrsg.: R&D-PD NPI D editor	Bearb: Le designer		KB-PM: Ga. check			freig.: SB released

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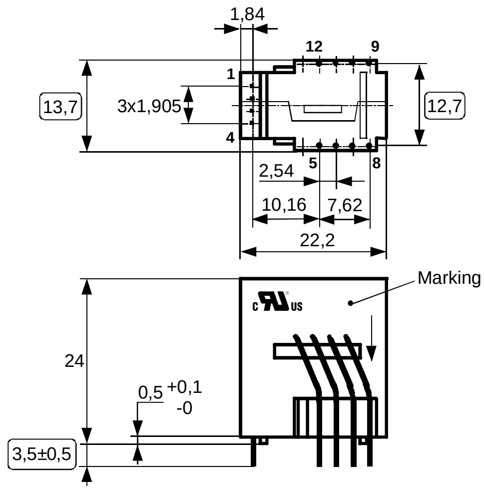
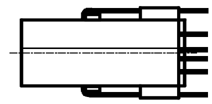
Mechanical outline (mm): General tolerances DIN ISO 2768-c





test dimension

Tolerances grid distance ±0,25mm

DC= Date Code
F = Factory

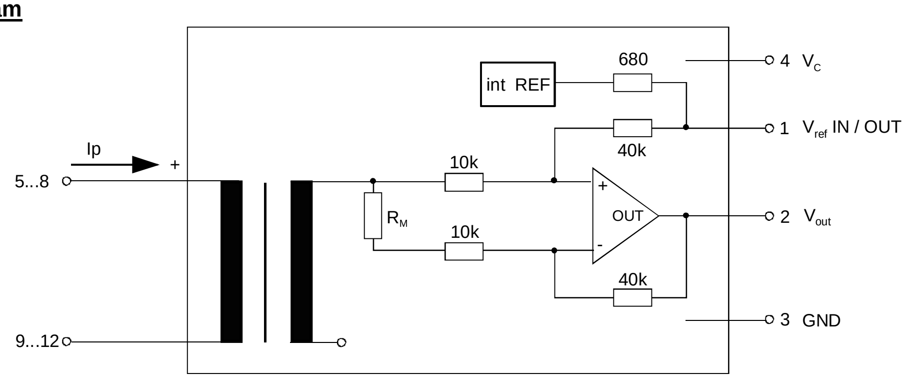
Connections:

1...4: 0,46*0,46 mm
5..12: ∅ 1 mm

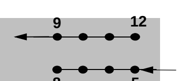
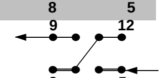
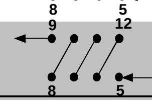
Marking:

VAC UL-sign
4646-X763-83
F DC

Schematic diagram



Possibilities of wiring (@ T_A = 85°C)

primary windings N_P	primary current RMS I_P [A]	primary current maximal $\hat{I}_{P,max}$ [A]	output voltage RMS $V_{out}(I_{PN})$ [V]	turns ratio K_N	primary resistance R_P [mΩ]	wiring
1	6	±20	2.5±0.625	1:2000	0.25	
2	3	±10	2.5±0.625	2:2000	1.0	
4	1.5	±5	2.5±0.625	4:2000	4	

Hrsg.: R&D-PD NPI D editor	Bearb: Le designer		KB-PM: Ga. check			freig.: SB released

Electrical Data

		min.	typ.	max.	Unit
V_{Ctot}	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		±20		mA
R_P	Resistance / primary winding @ T_A=25°C		1		mΩ
R_S	Secondary coil resistance @ T_A=85°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			kΩ
C_L	External recommended capacitance of V_{out}			500	pF
$\Delta X_{Ti} / \Delta T$	Temperature drift of X @ T_A = -40 ... +85 °C			40	ppm/K
$\Delta V_0 = \Delta(V_{out} - V_{Ref})$	Sum of any offset drift including:		5	15	mV
V_{0t}	Longtermdrift of V_0		3		mV
V_{0T}	Temperature drift von V_0 @ T_A = -40 ...+85°C		3		mV
V_{0H}	Hysteresis of V_{out} @ I_P=0 (after an overload of 10 x I_{PN})			7.5	mV
$\Delta V_0/\Delta V_C$	Supply voltage rejection ratio			1	mV/V
v_{oss}	Offsetripple (with 1 MHz- filter first order)			55	mV
v_{oss}	Offsetripple (with 100 kHz- filter first order)		9	15	mV
v_{oss}	Offsetripple (with 20 kHz- filter first order)		2.5	4	mV
C_k	Maximum possible coupling capacity (primary – secondary)		5	10	pF
	Mechanical stress according to M3209/3 Settings: 10 – 2000 Hz, 1 min/Oktave, 2 hours			30	g

Inspection (Measurement after temperature balance of the samples at room temperature; SC = significant characteristic)

V_{out}	(V)	M3011/6:	Output voltage	625±0,7%	mV (SC)
$V_{out}-V_{Ref}$	(V)	M3226:	Offset voltage	± 5.3	mV
V_d	(V)	M3014:	Test voltage, 1 s pin 1 – 4 vs. pin 5 – 12	1.8	kV
V_e	(AQL 1/S4)		Partial discharge voltage acc.M3024 with V_{vor}	1400 1750	V_{RMS} V_{RMS}

Type Testing (Pin 1 - 4 to Pin 5 - 12)

V_W	HV transient test according to M3064 (1,2 µs / 50 µs-wave form) 5 pulses -> pol. +, 5 pulses -> pol. -		8	kV
V_d	Testing voltage to M3014	(5 s)	3.6	kV_{RMS}
V_e	Partial discharge voltage acc.M3024 with V_{vor}		1400 1750	V_{RMS} V_{RMS}

Applicable documents

Current direction: A positive output voltage appears at point V_{OUT}, by primary current in direction of the arrow.
Further standards UL 508 file E317483, category NMTR2 / NMTR8
Operating temperature of the current sensor and the primary conductor must not exceed 105°C.

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)

Δt (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 $di_P/dt \geq 100$ A/µs.

V_0: Offset voltage between V_{out} and the rated reference voltage of V_{ref} = 2,5V.
$V_o = V_{out}(0) - 2{,}5V$

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 valve 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_{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

$$\varepsilon_L = 100 \cdot \left| \frac{I_P}{I_{PN}} - \frac{V_{out}(I_P) - V_{out}(0)}{V_{out}(I_{PN}) - V_{out}(0)} \right| \%$$