

Specification for approval

Description (产品类型) : Differential Current Sensor

Customer P/N (客户) : _____

ZETTLER P/N (赛特勒) : APR00T0332WX-003

Revision (版本号) : PD1.6

Drafted (编制) : Yanggui Su

Checked (审核) : Arvin Zou

Approved (批准) : Aaron Chen



PD1.6	2024/07/31	Modify the typical application diagram, electrical specification and figure	Yanggui Su
PD1.5	2024/06/06	Modify the typical application diagram ,electrical specification and figure; add the PCB footprint	Yanggui Su
PD1.4	2024/02/28	Modify the outline drawing and label, update the figure	Yanggui Su
PD1.3	2023/10/26	Modify the electrical specification	Yanggui Su
PD1.2	2023/10/20	Add phosphorus-free logo and organic silicon free logo	Yanggui Su
PD1.1	2023/10/16	Modify the specification and figure	Yanggui Su
PD1.0	2023/08/01	Initial release	Yanggui Su
Rev.	Date	Description	Approved

Approved by Customer (客户确认) : _____

Friendly Reminder: Please help to sign this Spec when approve , and fax to our company . Or else, we will consider you have accepted it and make future order based on this Spec.

友情提示:请在签字确认后,按封面的传真号码回传给赛特勒磁电有限公司.如无回传,则视为默认,后续的相关订单将以按本承认书的规定为技术要求

FEATURES (产品特点)

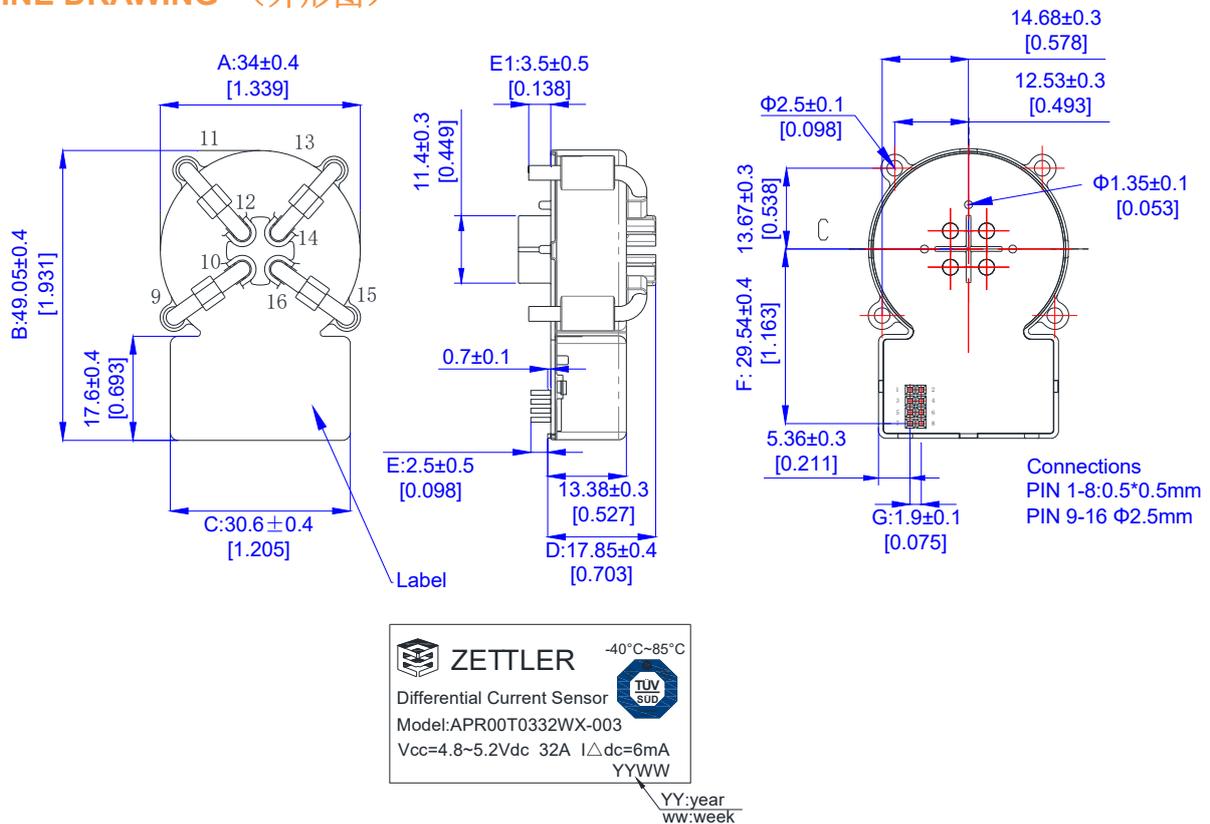
- PCB mounted RCD module
- Excellent accuracy
- Fluxgate current sensor with toroidal core
- Switching open-collector outputs
- Compact design

APPLICATIONS (应用)

Mainly used for stationary and mobile applications:

- Compliance With IEC62955

OUTLINE DRAWING (外形图)



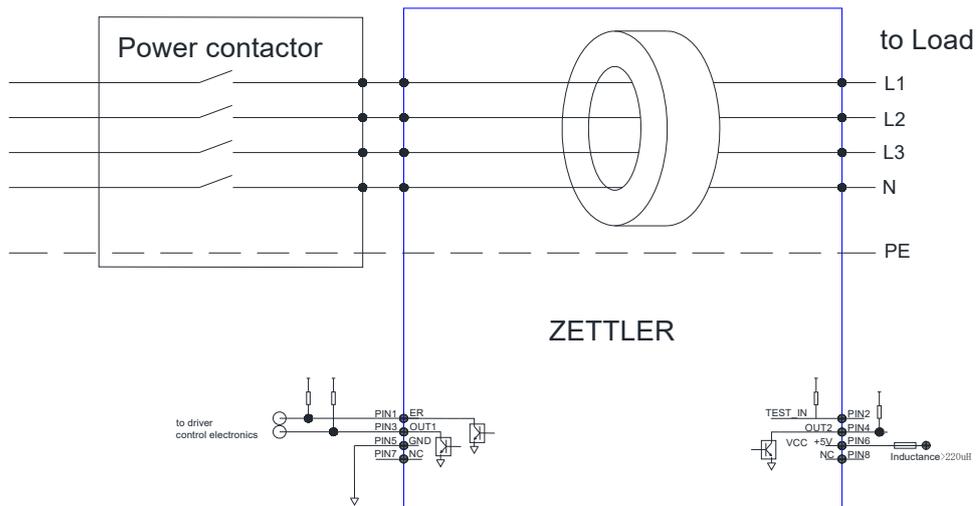
TYPICAL APPLICATION DIAGRAM: (应用图)

General description of sensor function:

The Sensor is sensitive to AC and DC current and can be used for fault current detection in RDC-MD applications.

The Sensor detects AC and DC fault currents according to IEC62955:2018. In the event of a DC fault current, PIN 3 will change its state from a low level (GND) to high impedance state. In the event of an AC fault current, PIN 4 will change state from a low level (GND) to a high impedance state.

Error conditions (e.g. an internal error) are signaled by PIN 1 (ERROR-OUT) which changes state to high impedance state.



OUT1(PIN3)	OUT2(PIN4)	ER(PIN1)	State
GND	GND	GND	Normal condition
High Impedance	GND	GND	$\geq 6\text{mADC}$
GND	High Impedance	GND	$>30\text{mArms}$
High Impedance	High Impedance	High Impedance	ERROR

OUT1 must triggers from $I_d \geq 6\text{mA DC}$ AND may triggers from $I_d \geq 70\text{mA ACrms}$
 OUT2 may triggers from $I_d >30\text{mA ACrms}$ AND must triggers from $I_d \geq 60\text{mA DC}$

PIN description:	
PIN no.	Description
PIN 1 --> ERROR-OUT (open collector output)	If no system fault is detected, the output PIN 1 is at low level (GND). If a system fault is detected, PIN is at high impedance state. In this case, PINs 3 and 4 will be set to a high impedance state too.
PIN 2 --> TEST_IN(refer to figure)	A function test is activated if this PIN is connected to GND Attention: During the functional test no differential current shall flow. If a push-pull switch is used, the voltage range must be 0V...5V.
PIN 3 --> OUT1 (open collector output)	If the residual current is below 6mA dc and no system fault occur the output on PIN 3 is a low level (GND). In any other case output PIN 3 is in a high impedance state.
PIN 4 --> OUT2 (open collector output)	If the residual current is below or equal to the 30mA rms. and no system fault occur the output on PIN 4 is a low level (GND).
PIN 5 --> GND	Ground connection
PIN 6 --> VCC	Positive supply voltage (LDO power supply circuit is highly recommended)
PIN 7 --> N.C.	Not Connected
PIN 8 --> N.C.	Not Connected
PIN 9 -- PIN16	For primary wires connection

ELECTRICAL SPECIFICATION (电性能参数)

Symbol	Parameter	Condition	min.	typ.	max.	Unit	remark
I_P	Primary rated current (1phase / 3phase)			32	40	A	
$I_{\Delta N, \max}$	Measuring range (peak)		-300		300	mA	
f_{BW}	Frequency range		DC		1	KHz	
$I_{\Delta N1}$	Rated residual operating current 1		3.5	4.2	6	mA DC	
$I_{\Delta N2}$	Rated residual operating current 2		$>30^{(1)}$		$420^{(2)}$	mA RMS	(1) f = DC to 150Hz (2) f = 150Hz to 1kHz
T_r	Non-operating time	AC: $I_n=1 \cdot I_{\Delta N2}$	no tripping			ms	Interrupting Time according to IEC62955:2018 Table 2 + 3
		AC: $I_n=2 \cdot I_{\Delta N2}$	300				
		AC: $I_n=5 \cdot I_{\Delta N2}$	80				
	Response time	DC: $I_n=1 \cdot I_{\Delta N1}$		600	10000		
		DC: $I_n=10 \cdot I_{\Delta N1}$		100	300		
		DC: $I_n=33 \cdot I_{\Delta N1}$		2	100		
$I_{\Delta R1}$	Hysteresis recovery current level for $I_{\Delta N1}$ (absolute value dc)			2.5		mA	OUT1 will remain in their states until I_{Δ} is below the recovery threshold $I_{\Delta R1}$
$I_{\Delta R2}$	Hysteresis recovery current level for $I_{\Delta N2}$ (absolute value rms)			10		mA	OUT2 will remain in their states until I_{Δ} is below the recovery threshold $I_{\Delta R2}$
V_{CC}	Supply voltage		4.8	5	5.2	V	
I_{CC}	Consumption current			10	30	mA	
T_A	Ambient operation temperature		-40		85	°C	

Absolute maximum ratings

Symbol	Parameter	Condition	min.	typ.	max.	Unit	remark
V_{CE}	Collector-Emitter voltage (PINs 1, 3 and 4)				40	V	
I_C	Collector current (PINs 1, 3 and 4)				50	mA	
U_{MAX}	Maximum rated voltage of primary conductors				440	V	

PCB Footprint:

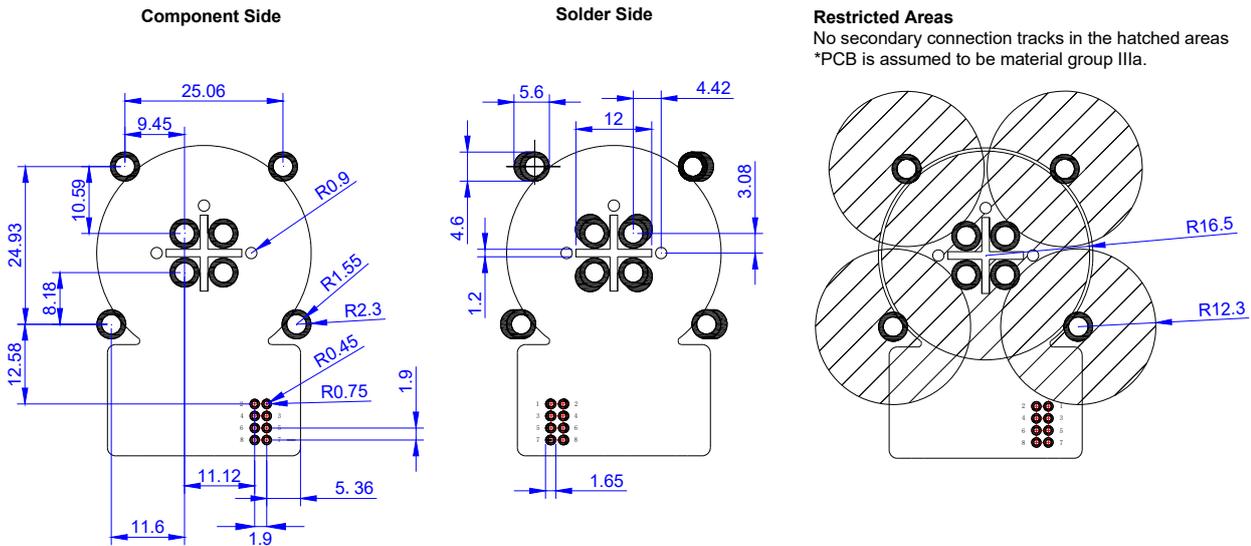
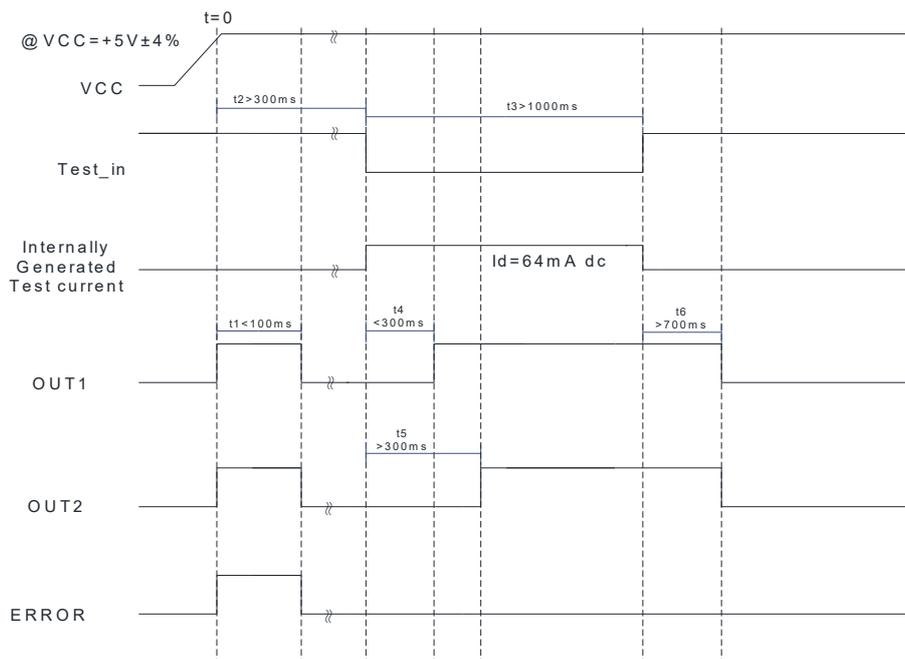


Figure:

After activating the test sequence, the end product has to monitor the correct state of the switching outputs being used at the following points in time.



Item	Description	Notes	Timing(ms)		
			Min.	Typ.	Max.
t1	Initialization time	Error PIN should be detected at this point	-	70	100
t2	Delay before self-test		300	-	-
t3	Self-test duration		1000	-	-
t4	response time	the response time to self-test current of OUT1	-	100	300
t5	response time	the response time to self-test current of OUT2	300	750	-
t6	Delay time	Response delay after removing the self-test current	700	900	-