Specification for approval

Description（产品类型）： **Differential Current Sensor**

Customer P/N（客户）：

ZETTLER P/N（赛特勒）： APE00T0332WX-001

Revision（版本号）： PD1.4

Drafted（编制）： Yanggui.Su

Checked（审核）： Arvin.Zou

Approved（批准）： Aaron.Chen

Organic silicon free Phosphorus-free RoHS COMPLIANT

PD1.4	2024/07/31	Modify the figure, electrical specification and type application diagram.	Yanggui Su
PD1.3	2024/06/06	Modify the figure, electrical specification and type application diagram. add the PCB footprint.	Yanggui Su
PD1.2	2024/03/19	Remove TUV logo	Yanggui Su
PD1.1	2024/02/28	Modify the label and the outline drawing	Yanggui Su
PD1.0	2023/10/20	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

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FEATURES（产品特点）

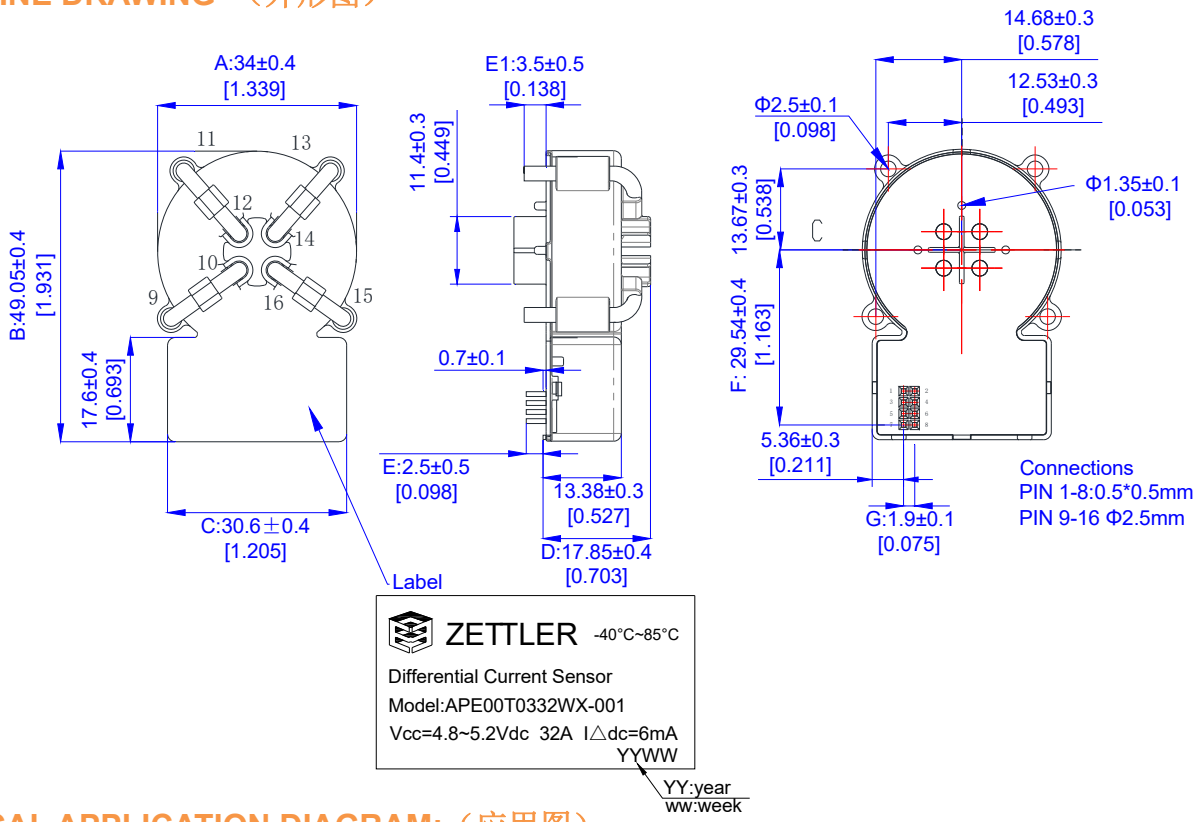
- PCB mounted RCD module
- Excellent accuracy
- Fluxgate current sensor with toroidal core
- Switching open-collector outputs
- Compact design

APPLICATIONS（应用）

Mainly used for stationary and mobile applications:

- IC-CPD acc. to IEC62752

OUTLINE DRAWING （外形图）

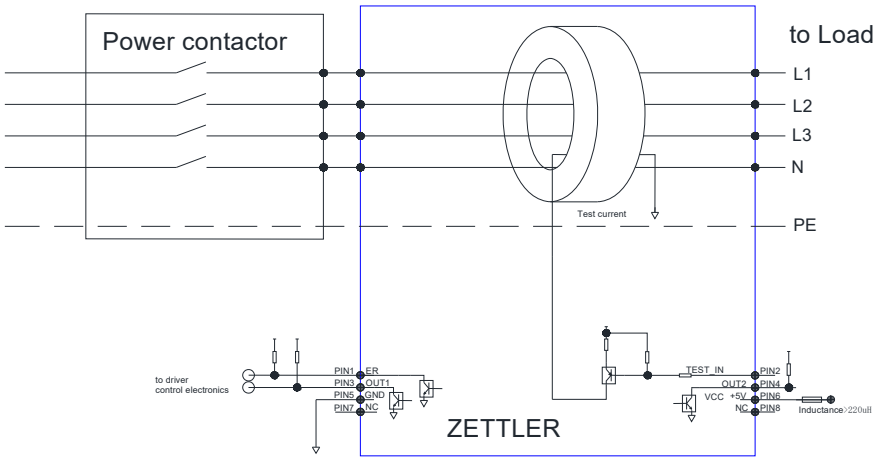


TYPICAL APPLICATION DIAGRAM:（应用图）

General description of sensor function:

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

The Sensor detects AC and DC fault currents according to IEC62752:2016. 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, PINs 3 and 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	≥6mADC
High Impedance	High Impedance	GND	≥30mArms
High Impedance	High Impedance	High Impedance	ERROR
OUT1 must triggers from Id >= 6mA DC AND >= 30mA ACrms OUT2 must triggers from Id >= 30mA ACrms AND may triggers from Id> 30mA 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. If PIN 4 is high impedance, PIN 3 will also be set to high impedance.
PIN 4 --> OUT2 (open collector output)	If the residual current is below the 30mA rms. and no system fault occur the output on PIN 4 is a low level (GND). In any other case PINs 3 and 4 are in a high impedance state.
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		20	25	30(1)/ 420(2)	mA RMS	(1)f = DC to 150Hz (2) f = 150Hz to 1kHz
Tr	Response time	AC: In=1*IΔN2		50	300	ms	Interrupting Time according to IEC62752 (E)-1:2016 Table 2 + 3
		AC: In=2*IΔN2		10	150		
		AC: In=5*IΔN2		5	40		
		DC: In=1*IΔN1		600	10000		
		DC: In=10*IΔN1		10	300		
		DC: In=50*IΔN1		2	40		
$I_{\Delta RI1}$	Hysteresis recovery current level for IΔN1 (absolute value dc)			2.5		mA	OUT1 will remain in their states until IΔ is below the recovery threshold IΔRI1
$I_{\Delta RI2}$	Hysteresis recovery current level for IΔN2 (absolute value rms)			10		mA	OUT2 will remain in their states until IΔ is below the recovery threshold IΔRI2
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:

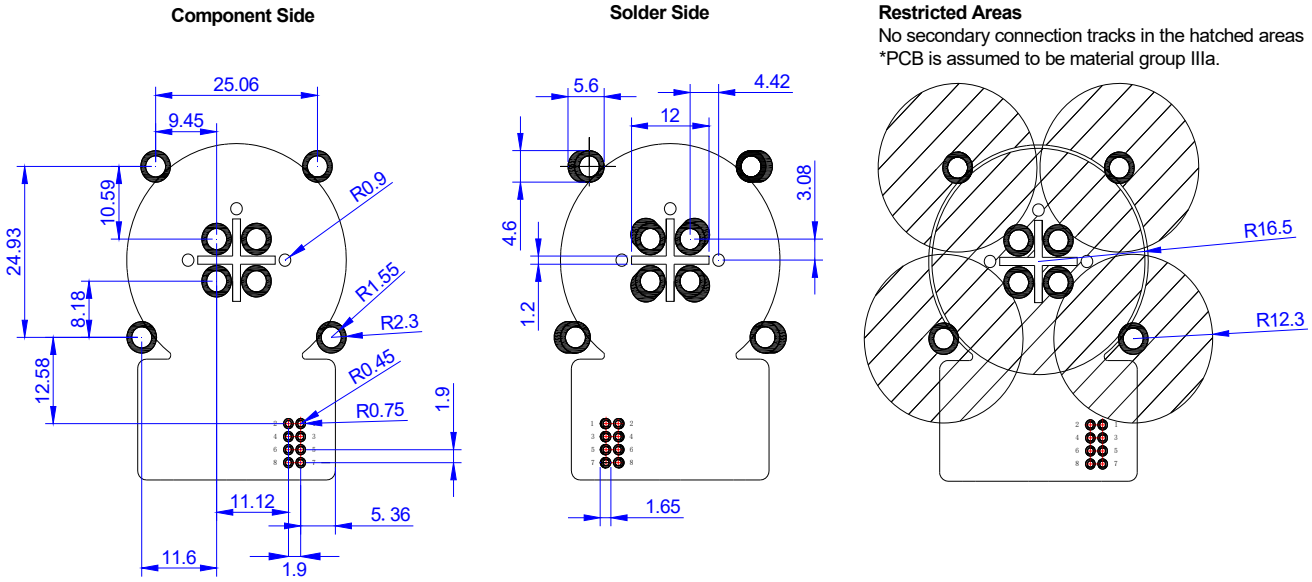
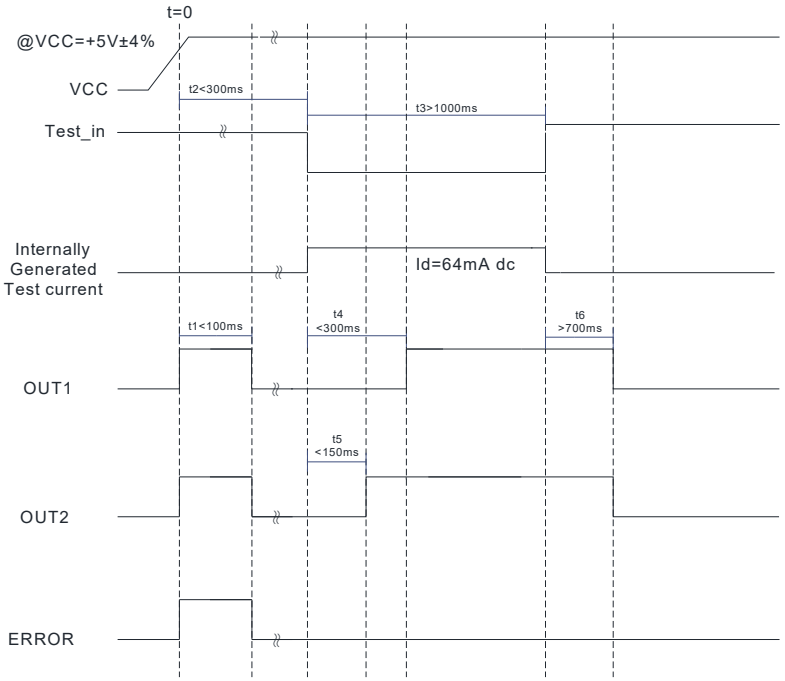


Figure:

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	-	10	300
t5	response time	the response time to self-test current of OUT2	-	10	150
t6	Delay time	Response delay after removing the self-test current	700	900	-