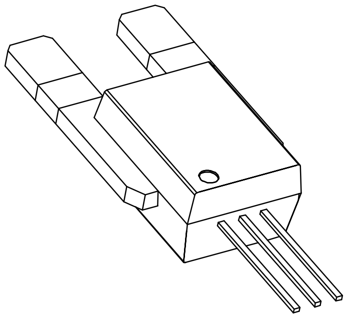
# AN1V PB312

## Current Sensor

### Model Number:

AN1V 50 PB312
AN1V 100 PB312
AN1V 150 PB312
AN1V 200 PB312
AN1V 250 PB312
AN1V 300 PB312



For the electronic measurement of current:DC,AC,pulsed...,with galvanic separation between the primary and the secondary circuit.

## Features

- Open loop current sensor using the Hall effect
- ASIC Technology
- Supply voltage 3.3V
- Galvanic separation between primary and secondary
- Insulating plastic case recognized according to UL 94-V0
- No insertion losses
- Small size
- Standards:
  - IEC 60664-1:2020
  - IEC 61800-5-1:2022
  - IEC 62109-1:2010

## Applications

- AC variable speed
- Uninterruptible Power Supply (UPS)
- Static converters for DC motor drives
- Switch Mode Power Supplies (SMPS)
- Power supply for welding applications
- Battery Management
- Wind energy inverter

## Safety

The sensor must be used according to IEC 61800-5-1.
The sensor must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the following manufacture's operating instructions.

*Caution,risk of electrical shock !*

When operating the sensor, certain parts of the module can carry hazardous voltage (e.g., Primary busbar,power supply).
Ignore this warning can lead to injury and/or cause serious damage.
This sensor is a built-in device, whose conducting parts must be inaccessible after installation. A protective housing or additional shield could be used.
Main supply must be able to be disconnected.

# AN1V PB312

芯森 CHIPSENSE

## Absolute maximum ratings(not operating)

| Parameter | Symbol | Unit | Value |
|---|---|---|---|
| Supply voltage | $V_C$ | V | 6.5 |
| ESD rating, Human Body Model (HBM) | $V_{ESD}$ | V | 8000 |

※ Stresses above these ratings may cause permanent damage.

※ Exposure to absolute maximum ratings for extended periods may degrade reliability.

## Environmental and mechanical characteristics

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| Ambient operating temperature | $T_A$ | ℃ | -40 | | 150 | AN1V 50 PB312 |
| | | | -40 | | 150 | AN1V 100 PB312 |
| | | | -40 | | 125 | AN1V 150 PB312 |
| | | | -40 | | 85 | AN1V 200 PB312 |
| | | | -40 | | 85 | AN1V 250 PB312 |
| | | | -40 | | 85 | AN1V 300 PB312 |
| Ambient storge temperature | $T_S$ | ℃ | -55 | | 150 | |
| Primary resistance value | $R_P$ | μΩ | | 100 | | |
| Mass | $m$ | g | | 5 | | |

## Insulation coordination

| Parameter | Symbol | Unit | Value | Comment |
|---|---|---|---|---|
| Rms voltage for AC insulation test, @50Hz,1min | $V_d$ | kV | 4.8 | According to IEC 60664-1 |
| Plastic case | - | - | UL94-V0 | |
| Comparative traking index | *CTI* | PLC | 2 | |
| Application example | - | - | 475$V_{RMS}$ | Reinforced insulation,According to IEC 61800-5-1, IEC 62109-1CATⅢ， PD2 |
| Application example | - | - | 960$V_{RMS}$ | Basic insulation,According to IEC 61800-5-1, IEC 62109-1CATⅢ， PD2 |

## Electrical data

### AN1V 50 PB312

※ With $T_A$ = 25℃, $V_C$ = 3.3V, $R_L$ = 10kΩ,unless otherwise

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Primary nominal rms current | $I_{PN}$ | A | -50 | | 50 | |
| Supply voltage | $V_C$ | V | 3 | 3.3 | 3.6 | |
| Output voltage | $V_{OUT}$ | V | $V_{OUT}= V_{QOV} +G_{th} \times I_P \times (V_C/3.3)$ | | | |
| Electrical offset voltage | $V_{QOV}$ | V | | $V_{CC}/2$ | | |
| Theoretical sensitivity | $G_{th}$ | mV/A | | 26.4 | | |
| Current consumption | $I_C$ | mA | | 5 | | |
| Load resistance | $R_L$ | kΩ | 5.1 | | | |
| Load capacitor | $C_1$ | nF | | 1 | 10 | |
| Power filter capacitor | $C_2$ | nF | | 100 | | |
| **Performance data** | | | | | | |
| Sensitivity error | $\varepsilon_G$ | % | -1 | | 1 | |
| Temperature of G | $TCG$ | % | -1.5 | | 1.5 | @$T_A$=-40℃~150℃ |
| Electrical offset current | $V_{OE}$ | mV | -10 | ±5 | 10 | @ $V_C$=3.3V also $I_P$=0A |
| Electrical offset error of temperature drift | $TCV_{OE}$ | mV | -10 | | 10 | @$T_A$=-40℃~150℃ |
| Hysteresis offset voltage | $V_{OM}$ | mV | | 4 | | @ $V_C$=3.3V, after ± $I_{PN}$ |
| Linearity error | $\varepsilon_L$ | % of $I_{PN}$ | -1 | | 1 | Exclusive of $V_{OE}$ |
| Accuracy@ $I_{PN}$ | $X$ | % of $I_{PN}$ | -1<br>-2 | | 1<br>2 | @$T_A$=25℃<br>@$T_A$=-40℃~85℃ |
| Response time@ 90% of $I_{PN}$ | $t_r$ | μs | | 2.5 | 5 | @$C_1$=1nF |
| Frequency bandwidth(-3dB) | $BW$ | kHz | | 250 | | @$C_1$=1nF |
| Output noise | $Vno$ | mV | | 2.1 | | @$C_1$=1nF |

## Electrical data

# AN1V 100 PB312

※ With $T_A$ = 25℃, $V_C$ = 3.3V, $R_L$ = 10kΩ,unless otherwise

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Primary nominal rms current | $I_{PN}$ | A | -100 | | 100 | |
| Supply voltage | $V_C$ | V | 3 | 3.3 | 3.6 | |
| Output voltage | $V_{OUT}$ | V | $V_{OUT}= V_{QOV} + G_{th} \times I_P \times (V_C/3.3)$ | | | |
| Electrical offset voltage | $V_{QOV}$ | V | | $V_{CC}/2$ | | |
| Theoretical sensitivity | $G_{th}$ | mV/A | | 13.2 | | |
| Current consumption | $I_C$ | mA | | 5 | | |
| Load resistance | $R_L$ | kΩ | 5.1 | | | |
| Load capacitor | $C_1$ | nF | | 1 | 10 | |
| Power filter capacitor | $C_2$ | nF | | 100 | | |
| **Performance data** | | | | | | |
| Sensitivity error | $\varepsilon_G$ | % | -1 | | 1 | |
| Temperature of G | $TCG$ | % | -1.5 | | 1.5 | @$T_A$=-40℃~150℃ |
| Electrical offset current | $V_{OE}$ | mV | -10 | ±5 | 10 | @ $V_C$=3.3V also $I_P$=0A |
| Electrical offset error of temperature drift | $TCV_{OE}$ | mV | -10 | | 10 | @$T_A$=-40℃~150℃ |
| Hysteresis offset voltage | $V_{OM}$ | mV | | 4 | | @ $V_C$=3.3V, after ± $I_{PN}$ |
| Linearity error | $\varepsilon_L$ | % of $I_{PN}$ | -1 | | 1 | Exclusive of $V_{OE}$ |
| Accuracy@ $I_{PN}$ | $X$ | % of $I_{PN}$ | -1<br>-2 | | 1<br>2 | @$T_A$=25℃<br>@$T_A$=-40℃~85℃ |
| Response time@ 90% of $I_{PN}$ | $t_r$ | μs | | 2.5 | 5 | @$C_1$=1nF |
| Frequency bandwidth(-3dB) | $BW$ | kHz | | 250 | | @$C_1$=1nF |
| Output noise | $Vno$ | mV | | 1.8 | | @$C_1$=1nF |

## Electrical data

### AN1V 150 PB312

※ With $T_A$ = 25℃, $V_C$ = 3.3V, $R_L$ = 10kΩ,unless otherwise

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Primary nominal rms current | $I_{PN}$ | A | -150 | | 150 | |
| Supply voltage | $V_C$ | V | 3 | 3.3 | 3.6 | |
| Output voltage | $V_{OUT}$ | V | $V_{OUT}= V_{QOV} + G_{th} \times I_P \times (V_C/3.3)$ | | | |
| Electrical offset voltage | $V_{QOV}$ | V | | $V_{CC}/2$ | | |
| Theoretical sensitivity | $G_{th}$ | mV/A | | 8.8 | | |
| Current consumption | $I_C$ | mA | | 5 | | |
| Load resistance | $R_L$ | kΩ | 5.1 | | | |
| Load capacitor | $C_1$ | nF | | 1 | 10 | |
| Power filter capacitor | $C_2$ | nF | | 100 | | |
| **Performance data** | | | | | | |
| Sensitivity error | $\varepsilon_G$ | % | -1 | | 1 | |
| Temperature of G | $TCG$ | % | -1.5 | | 1.5 | @$T_A$=-40℃~125℃ |
| Electrical offset current | $V_{OE}$ | mV | -10 | ±5 | 10 | @ $V_C$=3.3V also $I_P$=0A |
| Electrical offset error of temperature drift | $TCV_{OE}$ | mV | -10 | | 10 | @$T_A$=-40℃~125℃ |
| Hysteresis offset voltage | $V_{OM}$ | mV | | 4 | | @ $V_C$=3.3V, after ± $I_{PN}$ |
| Linearity error | $\varepsilon_L$ | % of $I_{PN}$ | -1 | | 1 | Exclusive of $V_{OE}$ |
| Accuracy@ $I_{PN}$ | $X$ | % of $I_{PN}$ | -1<br>-2 | | 1<br>2 | @$T_A$=25℃<br>@$T_A$=-40℃~85℃ |
| Response time@ 90% of $I_{PN}$ | $t_r$ | μs | | 2.5 | 5 | @$C_1$=1nF |
| Frequency bandwidth(-3dB) | $BW$ | kHz | | 250 | | @$C_1$=1nF |
| Output noise | $Vno$ | mV | | 1 | | @$C_1$=1nF |

## Electrical data

### AN1V 200 PB312

※ With $T_A$ = 25℃, $V_C$ = 3.3V, $R_L$ = 10kΩ,unless otherwise

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Primary nominal rms current | $I_{PN}$ | A | -200 | | 200 | |
| Supply voltage | $V_C$ | V | 3 | 3.3 | 3.6 | |
| Output voltage | $V_{OUT}$ | V | $V_{OUT}= V_{QOV} + G_{th} \times I_P \times (V_C/3.3)$ | | | |
| Electrical offset voltage | $V_{QOV}$ | V | | $V_{CC}/2$ | | |
| Theoretical sensitivity | $G_{th}$ | mV/A | | 6.6 | | |
| Current consumption | $I_C$ | mA | | 5 | | |
| Load resistance | $R_L$ | kΩ | 5.1 | | | |
| Load capacitor | $C_1$ | nF | | 1 | 10 | |
| Power filter capacitor | $C_2$ | nF | | 100 | | |
| **Performance data** | | | | | | |
| Sensitivity error | $\varepsilon_G$ | % | -1 | | 1 | |
| Temperature of G | $TCG$ | % | -1.5 | | 1.5 | @$T_A$=-40℃~85℃ |
| Electrical offset current | $V_{OE}$ | mV | -10 | ±5 | 10 | @$V_C$=3.3V also $I_P$=0A |
| Electrical offset error of temperature drift | $TCV_{OE}$ | mV | -10 | | 10 | @$T_A$=-40℃~85℃ |
| Hysteresis offset voltage | $V_{OM}$ | mV | | 4 | | @$V_C$=3.3V, after ±$I_{PN}$ |
| Linearity error | $\varepsilon_L$ | % of $I_{PN}$ | -1 | | 1 | Exclusive of $V_{OE}$ |
| Accuracy@ $I_{PN}$ | $X$ | % of $I_{PN}$ | -1<br>-2 | | 1<br>2 | @$T_A$=25℃<br>@$T_A$=-40℃~85℃ |
| Response time@ 90% of $I_{PN}$ | $t_r$ | μs | | 2.5 | 5 | @$C_1$=1nF |
| Frequency bandwidth(-3dB) | $BW$ | kHz | | 250 | | @$C_1$=1nF |
| Output noise | $V_{no}$ | mV | | 0.9 | | @$C_1$=1nF |

## Electrical data

### AN1V 250 PB312

※ With $T_A$ = 25℃, $V_C$ = 3.3V, $R_L$ = 10kΩ,unless otherwise

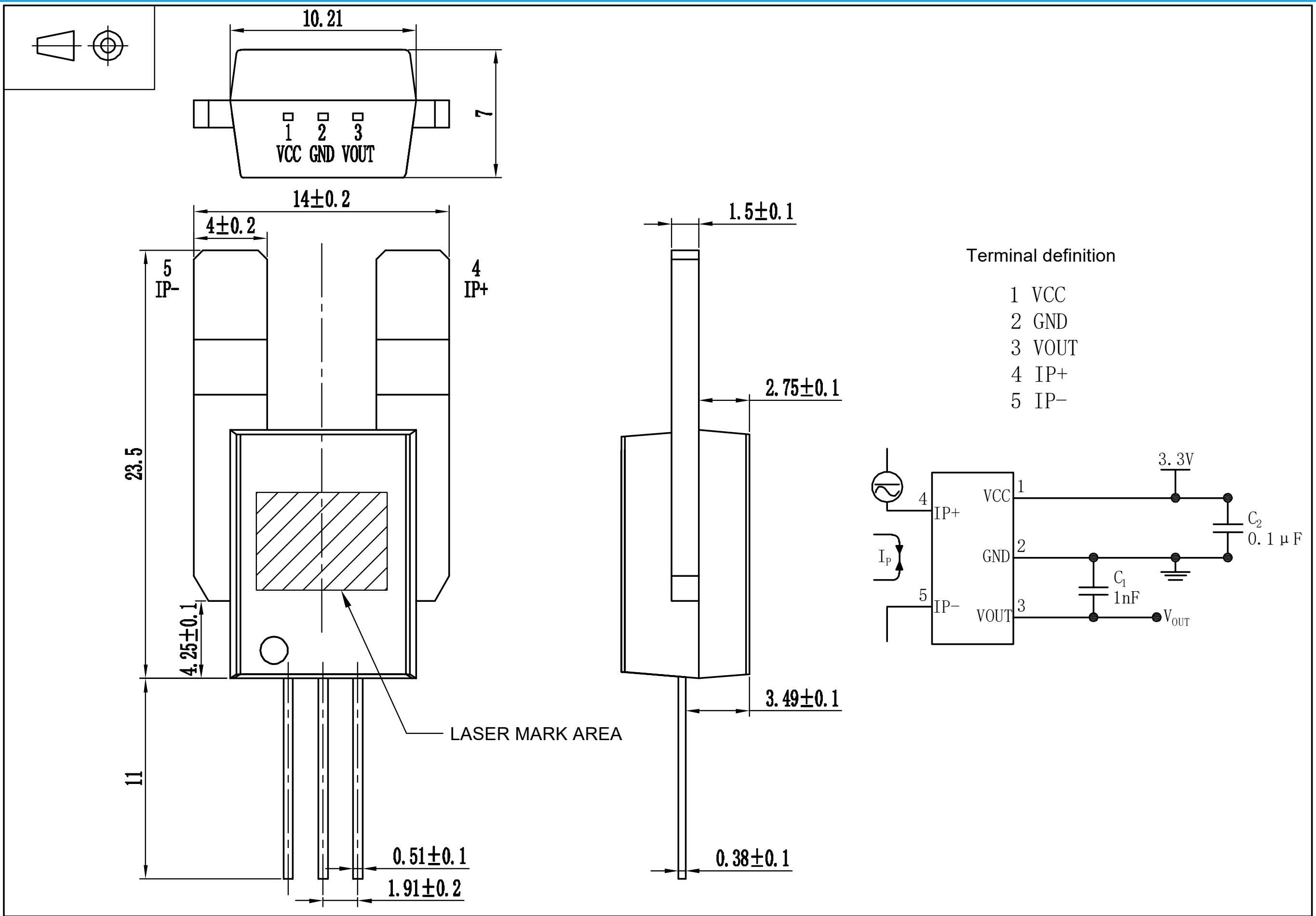
| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Primary nominal rms current | $I_{PN}$ | A | -250 | | 250 | |
| Supply voltage | $V_C$ | V | 3 | 3.3 | 3.6 | |
| Output voltage | $V_{OUT}$ | V | $V_{OUT}= V_{QOV} + G_{th} \times I_P \times (V_C/3.3)$ | | | |
| Electrical offset voltage | $V_{QOV}$ | V | | $V_{CC}/2$ | | |
| Theoretical sensitivity | $G_{th}$ | mV/A | | 5.28 | | |
| Current consumption | $I_C$ | mA | | 5 | | |
| Load resistance | $R_L$ | kΩ | 5.1 | | | |
| Load capacitor | $C_1$ | nF | | 1 | 10 | |
| Power filter capacitor | $C_2$ | nF | | 100 | | |
| **Performance data** | | | | | | |
| Sensitivity error | $\varepsilon_G$ | % | -1 | | 1 | |
| Temperature of G | $TCG$ | % | -1.5 | | 1.5 | @$T_A$=-40℃~85℃ |
| Electrical offset current | $V_{OE}$ | mV | -10 | ±5 | 10 | @$V_C$=3.3V also $I_P$=0A |
| Electrical offset error of temperature drift | $TCV_{OE}$ | mV | -10 | | 10 | @$T_A$=-40℃~85℃ |
| Hysteresis offset voltage | $V_{OM}$ | mV | | 4 | | @$V_C$=3.3V, after ±$I_{PN}$ |
| Linearity error | $\varepsilon_L$ | % of $I_{PN}$ | -1 | | 1 | Exclusive of $V_{OE}$ |
| Accuracy@ $I_{PN}$ | $X$ | % of $I_{PN}$ | -1<br>-2 | | 1<br>2 | @$T_A$=25℃<br>@$T_A$=-40℃~85℃ |
| Response time@ 90% of $I_{PN}$ | $t_r$ | μs | | 2.5 | 5 | @$C_1$=1nF |
| Frequency bandwidth(-3dB) | $BW$ | kHz | | 250 | | @$C_1$=1nF |
| Output noise | $Vno$ | mV | | 0.8 | | @$C_1$=1nF |

## AN1V 300 PB312

※ With $T_A$ = 25℃, $V_C$ = 3.3V, $R_L$ = 10kΩ,unless otherwise

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Primary nominal rms current | $I_{PN}$ | A | -300 | | 300 | |
| Supply voltage | $V_C$ | V | 3 | 3.3 | 3.6 | |
| Output voltage | $V_{OUT}$ | V | $V_{OUT}= V_{QOV} + G_{th} \times I_P \times (V_C/3.3)$ | | | |
| Electrical offset voltage | $V_{QOV}$ | V | | $V_{CC}/2$ | | |
| Theoretical sensitivity | $G_{th}$ | mV/A | | 4.4 | | |
| Current consumption | $I_C$ | mA | | 5 | | |
| Load resistance | $R_L$ | kΩ | 5.1 | | | |
| Load capacitor | $C_1$ | nF | | 1 | 10 | |
| Power filter capacitor | $C_2$ | nF | | 100 | | |
| **Performance data** | | | | | | |
| Sensitivity error | $\varepsilon_G$ | % | -1 | | 1 | |
| Temperature of G | $TCG$ | % | -1.5 | | 1.5 | @$T_A$=-40℃~85℃ |
| Electrical offset current | $V_{OE}$ | mV | -10 | ±5 | 10 | @ $V_C$=3.3V also $I_P$=0A |
| Electrical offset error of temperature drift | $TCV_{OE}$ | mV | -10 | | 10 | @$T_A$=-40℃~85℃ |
| Hysteresis offset voltage | $V_{OM}$ | mV | | 4 | | @ $V_C$=3.3V, after ±$I_{PN}$ |
| Linearity error | $\varepsilon_L$ | % of $I_{PN}$ | -1 | | 1 | Exclusive of $V_{OE}$ |
| Accuracy@ $I_{PN}$ | $X$ | % of $I_{PN}$ | -1<br>-2 | | 1<br>2 | @$T_A$=25℃<br>@$T_A$=-40℃~85℃ |
| Response time@ 90% of $I_{PN}$ | $t_r$ | μs | | 2.5 | 5 | @$C_1$=1nF |
| Frequency bandwidth(-3dB) | $BW$ | kHz | | 250 | | @$C_1$=1nF |
| Output noise | $Vno$ | mV | | 0.8 | | @$C_1$=1nF |

## Dimensions(Unit mm)




## Mechanical characteristics

| | |
|---|---|
| ✧ General tolerance | ±0.3 mm |
| ✧ Conductor and pin material | Red copper with tin plating |

## Remarks

✧ When $I_P$ flows in the direction of pin4 to pin5， $V_{out}$ increase.