

AC5 Series Current Sensor

Automotive Current Open-Loop Technology

The AC5 Series provides efficient and precise sensor solutions for AC, DC and pulse currents in automotive applications. It covers from low voltage to high voltage, and provides galvanic separation between the primary circuit and the secondary circuit. It consists of three main components: an accurate low-temperature drift linear hall sensor, a flux collector and a current transformer. It offers markedly low resistance, reducing power loss and temperature drift to deliver exceptional performance.



Feature

- Max. sensing range $\pm 900\text{A}$ (DC or AC peak)
- Noncontact measurement of high current
- Nearly zero magnetic hysteresis
- Superior Temperature stability and linearity
- High frequency bandwidth 150 kHz
- Compact size for applications with limited space
- RoHS Compliance (Lead-Free)

Application

- DC/DC Converters
- Starter Generators
- Electrical Power Steering

Advantage

- Accurately measures AC, DC and pulse currents
- Rapid response time $3\mu\text{s}$
- High immunity from ambient temperature
- High ESD sensitivity (Human Body Model) 4kV
- No insertion losses
- Excellent current over-load capacity

Standard

- IEC 60068-2-1:2007
- IEC 60068-2-2:2007
- IEC 60068-2-14:2009
- IEC 60068-2-27:2008
- IEC 60068-2-78 :2001
- ISO 11452-1

Absolute maximum ratings

| Symbol | Parameter | Min. | Max. | Unit |
|---------------|--|------|------|------|
| $V_{DD\ max}$ | Maximum supply voltage (not destructive) | -0.3 | 6.5 | V |
| T_A | Ambient operating temperature | -40 | 125 | °C |
| T_S | Storage temperature range | -40 | 125 | °C |
| $V_{ESD-HBM}$ | ESD sensitivity HBM (Human Body Model) | | 4 | kV |

Stresses above these ratings may cause permanent damage. Exposure to absolute maximum ratings for extended periods may degrade reliability.

Specifications ($T_A = 25^\circ\text{C}$, $V_{DD} = 5.0\text{V}$)

| Symbol | Characteristic | Test condition | Min. | Typ. | Max. | Unit |
|----------|---|--|------------------|------|------|------------|
| V_{DD} | Supply voltage | | 4.75 | 5 | 5.25 | V |
| I_C | Current consumption | $I_P=0\text{A}$ without load | | 13 | 20 | mA |
| V_0 | Zero voltage | $I_P=0\text{A}$, $T_A=25^\circ\text{C}$ | | 2.5 | | V |
| I_{PN} | Current nominal measuring range | AC5-100 | -100 | | 100 | A |
| | | AC5-200 | -200 | | 200 | |
| | | AC5-300 | -300 | | 300 | |
| | | AC5-400 | 400 | | 400 | |
| | | AC5-500 | -500 | | 500 | |
| | | AC5-600 | -600 | | 600 | |
| | | AC5-700 | -700 | | 700 | |
| | | AC5-800 | -800 | | 800 | |
| | | AC5-900 | -900 | | 900 | |
| R_L | Output load resistance | V_{OUT} to GND | 4.7 | 10 | | k Ω |
| C_L | Output load capacitance | V_{OUT} to GND | | | 10 | nF |
| G | Nominal sensitivity (customized available) | $V_{DD}=5.0\text{V}$ | 2000mV@ I_{PN} | | | |
| V_{OE} | Offset voltage | $I_P=0\text{A}$ | -20 | | 20 | mV |

Specifications ($T_A = 25^\circ\text{C}$, $V_{DD} = 5.0\text{V}$)

| Symbol | Characteristic | Test condition | Min. | Typ. | Max. | Unit |
|--------------|--------------------------------------|--|------|-----------|-----------|----------------------------|
| T_{CV0E} | Temperature coefficient of V_{0E} | $T_A = -40^\circ\text{C} \dots 125^\circ\text{C}$ | | ± 0.1 | ± 0.2 | $\text{mV}/^\circ\text{C}$ |
| T_{CVOUT} | Temperature coefficient of V_{OUT} | $T_A = -40^\circ\text{C} \dots 125^\circ\text{C}$ (except T_{CV0E}) | -1 | | 1 | $\text{mV}/^\circ\text{C}$ |
| ϵ_L | Non-linearity error | @ $\pm I_{PN}$ without offset | -1 | | 1 | $\%/I_{PN}$ |
| BW | Frequency bandwidth (-3dB) | | | 150 | | kHz |
| T_R | Step response to 90% I_{PN} | (Design target) | | 3 | | μs |
| V_{om} | Magnetic offset voltage | $I_p = 0\text{A} \rightarrow I_{PN} \rightarrow 0\text{A}$ | | ± 20 | | mV |
| NP2P | Output voltage noise peak-peak | DC to 1MHz | | | 15 | mV |
| ϵ_G | Sensitivity error | | | | ± 0.6 | $\%/I_{PN}$ |

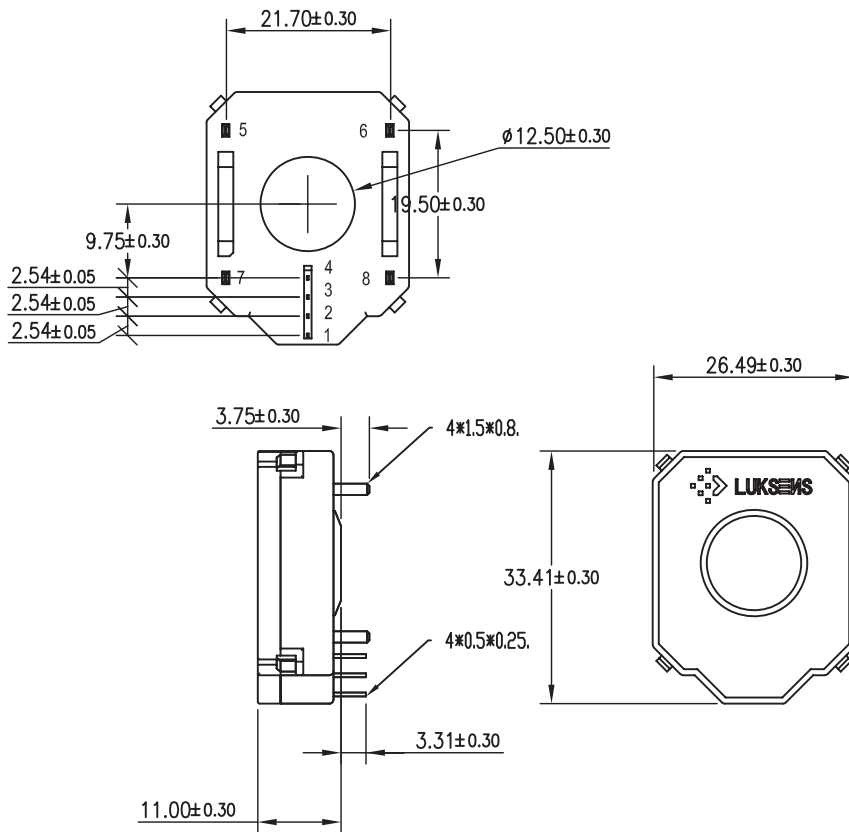
Insulation characteristics

| Symbol | Characteristic | Value | Unit | Comment |
|--------------|---|-------|------------------|----------------|
| V_D | Insulation voltage for isolation, 50Hz, 1 min | 2500 | V | |
| R_{ISO} | Isolation Resistance @500VDC | >500 | $\text{M}\Omega$ | |
| D-CLE | Clearance | 2.95 | mm | Normal Version |
| D-CRD | Creepage distance | 2.95 | mm | Normal Version |

General characteristics

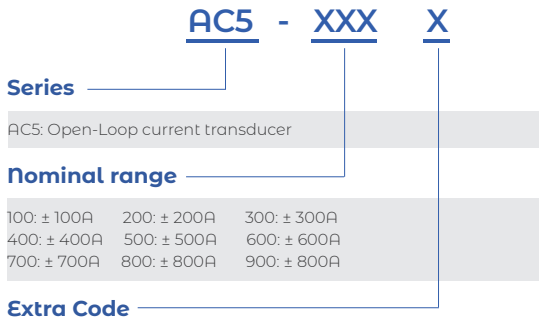
| Symbol | Characteristic | Value | Unit | Comment |
|--------------|-------------------------|------------------------|------|--------------------------------|
| m-HSE | Housing material | V0 | | Flame retardant UL 94 |
| m-FC | Flux Collector material | Oriented Silicon Steel | | Superior magnetic permeability |

Dimension (mm)



| Pin | Symbol |
|-----------|-----------|
| 1 | V_{REF} |
| 2 | V_{OUT} |
| 3,5,6,7,8 | GND |
| 4 | V_{DD} |

Name Guide Description



Notes

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Safety and Environment



The product is to be installed by manufacturer trained personnel or competent person trained in accordance with manufacturer installation instructions.

With respect to applicable standards IEC 61010-1/ EN 61010-1 *safety requirements for electrical equipment for measurement, control and laboratory use part 1 general requirements*, the product should be used in limited energy secondary circuits.



Risk of electrical shock

Certain parts of the module can carry hazardous voltage during the operation process of the product because hazardous live voltage of primary conductor, power supply occurs, injury and/or serious damage will be caused if this warning is ignored.

Conducting parts must be inaccessible after installation of the product. Additional protection including shield or protective housing could be used according to IEC 60664 Insulation coordination for equipment within low-voltage supply systems.

Disconnection of the main supply will protect against possible injury and serious damage.



ESD protection

Damage from an ESD event will occur if the personnel is not well grounded when handling.

Important notice

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