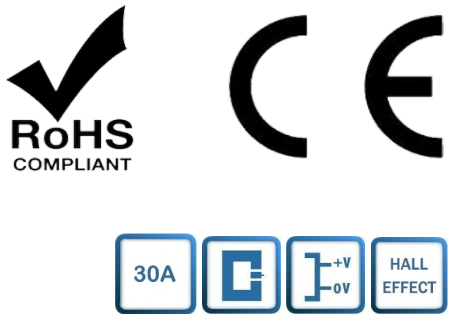
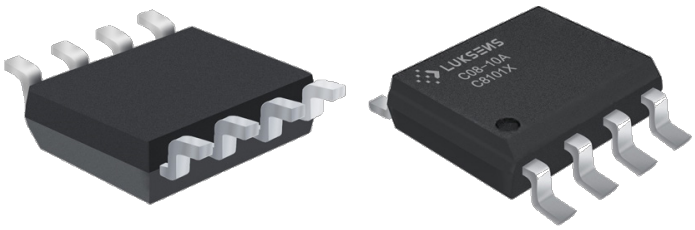
# C08 Series Current Sensor

The C08 series current sensor is a Hall-Effect sensor which is sensitive to the flux density applied orthogonally to the IC surface, and provides an analog output voltage proportional to the applied magnetic flux density. It is particularly adapted for high speed applications such as inverters and converters where fast response time due to fast switching is required.




## Features

- Factory trimmed sensitivity sensor
- Flexible supply voltage with factory selectable 5V or 3.3V mode
- Superior temperature stability and linearity
- Compact size for applications with limited space
- RoHs compliance (Lead-Free)

## Advantages

- Accurately measures AC, DC and pulse currents
- Fast response 4μs, minimal noise output
- No insertion losses
- Improving noise immunity using differential hall technology
- Excellent current overload capacity
- Very low thermal drift for wide temperature range

## Applications

- High voltage traction motor inverter
- 48V boost recuperation inverter
- DCDC converter
- Smart battery junction boxes
- Smart fuse overcurrent detection
- Redundant monitoring of battery management system (BMS)

## Standards

- EN 55014-1: 2017
- EN 55014-2: 2015
- EN 50178: 1998
- EN 61000-4 Series
- IEC 60068-2 Series

# Absolute maximum ratings

| Symbol | Parameter | Min. | Max. | Unit |
|---|---|---|---|---|
| $V_{DD\ max.}$ | Maximum supply voltage (not destructive) | -0.3 | 6.5 | V |
| $I_{Pm}$ | Maximum measuring current | -30 | 30 | A |
| $T_A$ | Ambient operating temperature | -40 | 125 | °C |
| $T_S$ | Storage temperature range | -40 | 150 | °C |
| $V_{ESD-HBM}$ | ESD sensitivity HBM (Human Body Model) | 8 | | kV |

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

# Specifications ($T_A$= 25°C, $V_{DD}$= 3.3V/5.0V)

| Symbol | Parameter | Test condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{DD}$ | Supply voltage | C08-XXA33 | 3 | 3.3 | 3.6 | V |
| | | C08-XXA | 4.5 | 5 | 5.5 | |
| $I_C$ | Current consumption | $I_P$=0A without load, $V_{DD}$=5V | | 12 | 15 | mA |
| | | $I_P$=0A without load, $V_{DD}$=3.3V | | 7.5 | 8 | |
| $I_{Pn}$ | Current nominal measuring range | C08-10A/C08-10A33 | -10 | | 10 | A |
| | | C08-20A/C08-20A33 | -20 | | 20 | |
| | | C08-30A/C08-30A33 | -30 | | 30 | |
| $R_{IP}$ | Primary conductor resistance | $T_A$=25°C | | 1.2 | | MΩ |
| $T_{PO}$ | Power-On time | | | 1 | | ms |
| $I_{SHORT}$ | Output short-circuit current | | | 25 | | mA |
| $R_L$ | Output load resistance | $V_{OUT}$ to GND | 10 | | | kΩ |
| $C_L$ | Output load capacitance | $V_{OUT}$ to GND | | | 10 | nF |
| $V_{REF}$ | Internal reference voltage | $I_P$=0A, $V_{DD}$=5V | 2.49 | 2.5 | 2.51 | V |
| | | $I_P$=0A, $V_{DD}$=3.3V | 1.64 | 1.65 | 1.66 | |

# Specifications ($T_A$= 25°C, $V_{DD}$= 3.3V/5.0V)

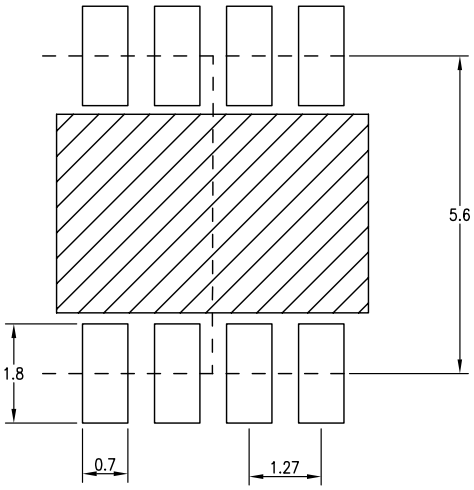
| Symbol | Parameter | Test condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_o$ | $V_{OUT}$(@$I_P$=0A) | $I_P$=0A | | $V_{DD}$/2 | | V |
| $V_{OE}$ | Offset voltage | $I_P$=0A | -10 | ±6 | 10 | mV |
| $T_{CVO}$ | Temperature coefficient of $V_o$ @$I_P$=0A $T_A$=-40°C ...125°C | | -12 | | 12 | mV |
| G | Nominal sensitivity (customized available) | C08-10A | | 200 | | mV/A |
| | | C08-20A | | 100 | | |
| | | C08-30A | | 66.67 | | |
| | | C08-10A33 | | 132 | | |
| | | C08-20A33 | | 66 | | |
| | | C08-30A33 | | 44 | | |
| $T_{CG}$ | Temperature coefficient of G | $T_A$ = -40°C ...125°C | | ±2.5 | | % |
| $\varepsilon_L$ | Non-linearity error | ±$I_{PN}$ without offset | | ±0.2 | | %/$I_{PN}$ |
| BW | Frequency bandwidth (-3dB) | | | 400 | | kHz |
| $T_R$ | Step response to 90% $I_{PN}$ | (Design target) | | 4 | | µs |

# Insulation characteristics

| Symbol | Parameter | Value | Unit | Comment |
|---|---|---|---|---|
| $V_{SURGE}$ | Dielectric surge voltage | 6000 | V | In compliance to IEC 61000-4-5 1.2 µs (rise) / 50 µs (width) |
| $R_{ISO}$ | Isolation resistance @500VDC | 3000 | Vrms | solation resistance test for 60 seconds in compliance to UL 62368-1; production-tested at 3.6kV for 1 second; partial discharge verification less than 5pC |
| $V_{IOWBI}$ | Working voltage for basic isolation | 424 | Vrms | Maximum approved working voltage for basic (single) isolation according to UL 60950-1 and UL 62368-1 |
| | | 600 | $V_{DC}$ | |
| CMTI | Common mode field rejection | >100 | V/ns | |
| D-CLE | Clearance | 4 | mm | Shortest distance through air |
| D-CRD | Creepage distance | 4 | mm | Shortest distance through body |

# PCB footprint (mm, general tolerance: ±0.05mm)

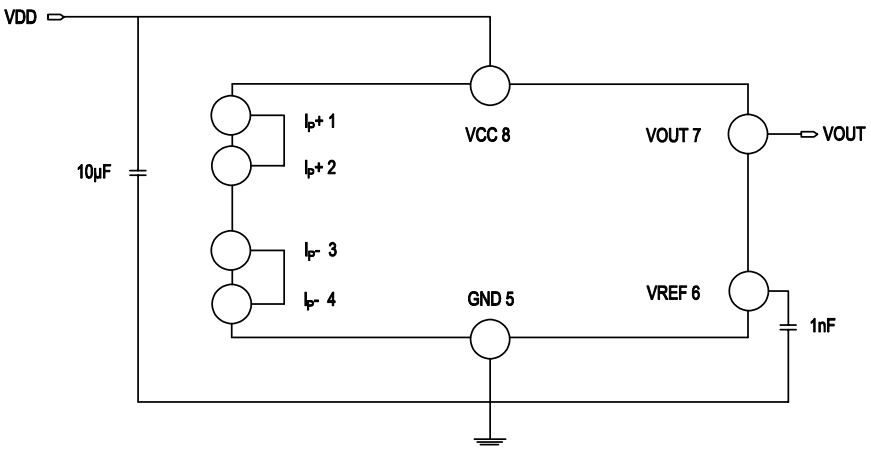
PCB Layout



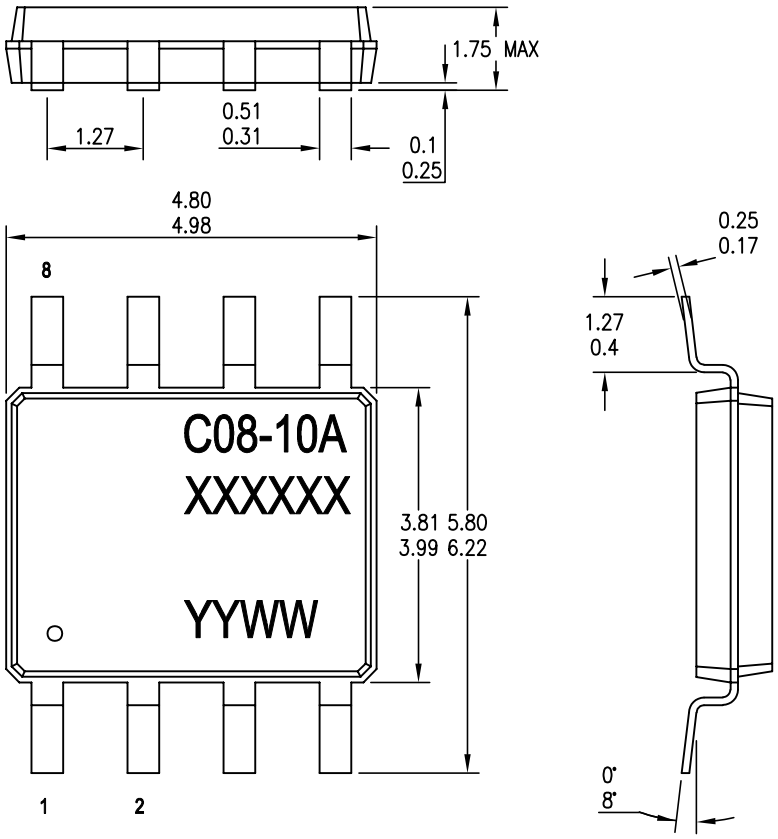

Note:

Maximum soldering temperature 260°C 10s

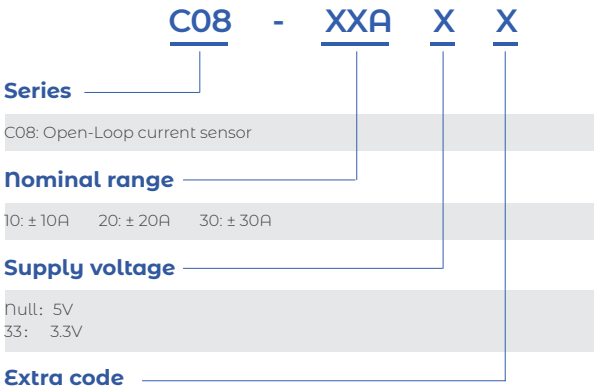
Maximum PCB thickness 2.4mm



# Dimension (mm)



# 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.

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