# N Series Current Sensor

The N Series is a current transducer which operates on the principle of magnetic compensation. It measures DC, AC or pulse currents and their combinations, with galvanic isolation techniques used to separate the primary and secondary circuits.



## Features

- Non-contact measurement of high current
- Close-Loop measurement (compensated)
- Max. measuring range ±200A (DC or AC peak)
- Nearly zero magnetic hysteresis
- Superior Temperature stability and linearity
- High frequency bandwidth type 150kHz
- RoHs Compliance (Lead-Free)

## Advantages

- Accurately measures AC, DC and pulse currents
- Fast response < 0.5μs
- High immunity from external interference
- Excellent current overload capacity

## Applications

- Home appliances
- AC variable speed drives and servo motor drives
- Static converters for DC motor drives
- Battery management systems
- Uninterruptible power supplies (UPS)
- Switched-mode power supplies (SMPS)
- Overcurrent protections
- Short circuit protections

## Standards

- EN 61000-4 Series
- IEC60068-2 Series
- EN 50178: 1998
- IEC62109-1: 2010
- IEC61800-3: 2017
- IEC61800-5-1: 2016

# Absolute maximum ratings

| Symbol | Parameter | Min. | Max. | Unit |
|---|---|---|---|---|
| $V_{DD\ max.}$ | Maximum supply voltage (not destructive) | -15.0 | +15.0 | V |
| $I_{Pm}$ | Maximum measuring current | -200 | +200 | A |
| $T_A$ | Ambient operating temperature | -40 | +85 | °C |
| $T_S$ | Storage temperature range | -40 | +100 | °C |
| $V_{ESD-HBM}$ | ESD sensitivity HBM (Human Body Model) | 4 | 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, $V_{DD}$= ±15.0V )

| Symbol | Parameter | n-50/n-50B | n-502/ n-502B | n-130/ n-130B | n-1302/ n-1302B | Unit |
|---|---|---|---|---|---|---|
| $V_{DD}$ | Supply voltage | ±12.0...15.0 | | | | V |
| $I_C$ | Current consumption @$I_P$=0 without $I_{OE}$ | <10 | | | | mA |
| $I_{Pn}$ | Current nominal measuring range | ±50 | ±50 | ±130 | ±130 | A |
| $I_{Pm}$ | Current maximum measuring range | ±90 | ±150 | ±200 | ±200 | A |
| $K_n$ | Conversion ratio | 1:1,000 | 1:2,000 | 1:1,000 | 1:2,000 | |
| $I_{Sn}$ | Secondary nominal rms current | ±50 | ±25 | ±130 | ±65 | mA |
| $R_S$ | Coil resistance @25 °C | < 43 | < 93 | < 23 | < 63 | Ω |
| $T_{CIOT}$ | Temperature coefficient of $I_{OUT}$ @-40...+85 °C | ±0.30 Type ±0.60 Max. | ±0.15 Type ±0.30 Max. | ±0.30 Type ±0.60 Max. | ±0.15 Type ±0.30 Max. | mA |
| X | Total error @±$I_{Pn}$, $T_A$=25°C | <0.6 | | | | %/$I_{Pn}$ |
| $\varepsilon_L$ | Non-linearity error @±$I_{Pn}$ without offset | <0.1 | | | | %/$I_{Pn}$ |
| $I_{OE}$ | Offset current @$I_P$=0 | ±0.2 | ±0.1 | ±0.2 | ±0.1 | mA |
| $I_{om}$ | Magnetic offset current at $I_P$= 0A → $I_{Pn}$→ 0A | 0.50 | 0.25 | 0.50 | 0.25 | mA |
| $T_{RA}$ | Step response to 10% of $I_{Pn}$ | <0.3 | | | | µs |
| $T_R$ | Step response to 90% of $I_{Pn}$ | <0.5 | | | | µs |
| BW | Frequency bandwidth (-1dB) | 150 | | | | kHz |
| di/dt | di/dt accurately followed | >100 | | | | A/µs |

# Insulation characteristics

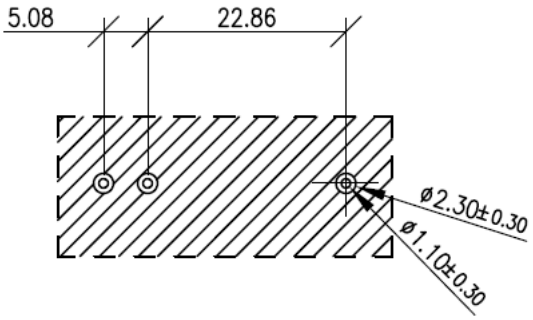
| Symbol | Parameter | Value | Unit | Comment |
|---|---|---|---|---|
| $V_D$ | Insulation voltage for isolation, 50Hz, 1 min | 4,300 | V | |
| $R_{ISO}$ | Isolation Resistance @500VDC | >500 | MΩ | |

# General characteristics

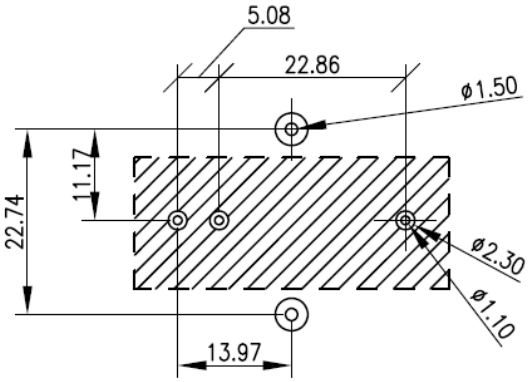
| Symbol | Parameter | Value | Unit | Comment |
|---|---|---|---|---|
| $T_A$ | Ambient Operating temperature | -40...+85 | °C | |
| $T_S$ | Storage temperature | -40...+100 | °C | |
| m-HSE | Housing material | V0 | | Flame retardant UL 94 |
| m-CDT | Conductor material | H62 | | Busbar version |
| m-FC | Flux Collector material | Permalloy | | Superior magnetic permeability |
| m | Mass of N-50, N-130 | <20 | grams | |
| m | Mass of N-502, N-1302 | <25 | grams | |
| m | Mass of N-50B, N-130B | <25 | grams | |
| m | Mass of N-502B, N-1302B | <30 | grams | |

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

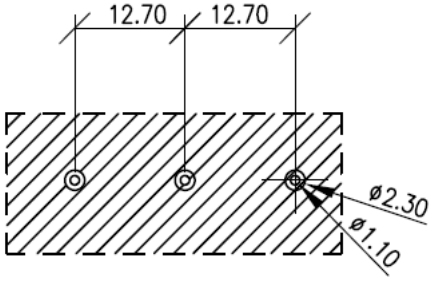
### n-50, n-502



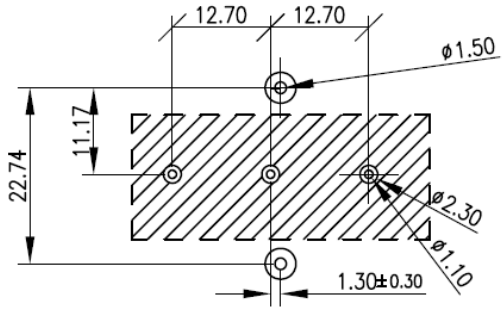

### n-50B, n-502B




### n-130, n-1302




### n-130B, n-1302B



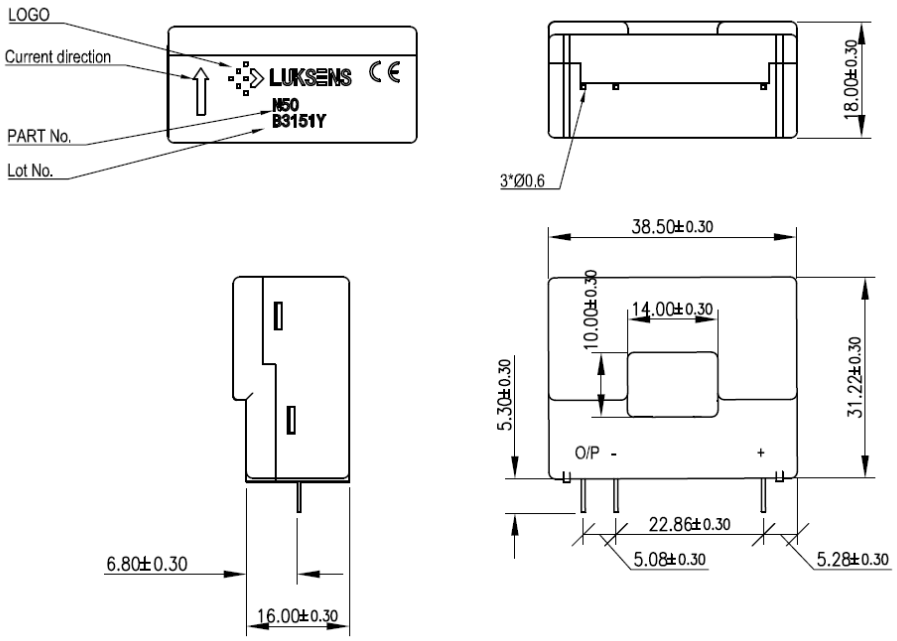

Note:

Maximum soldering temperature 260°C 10s

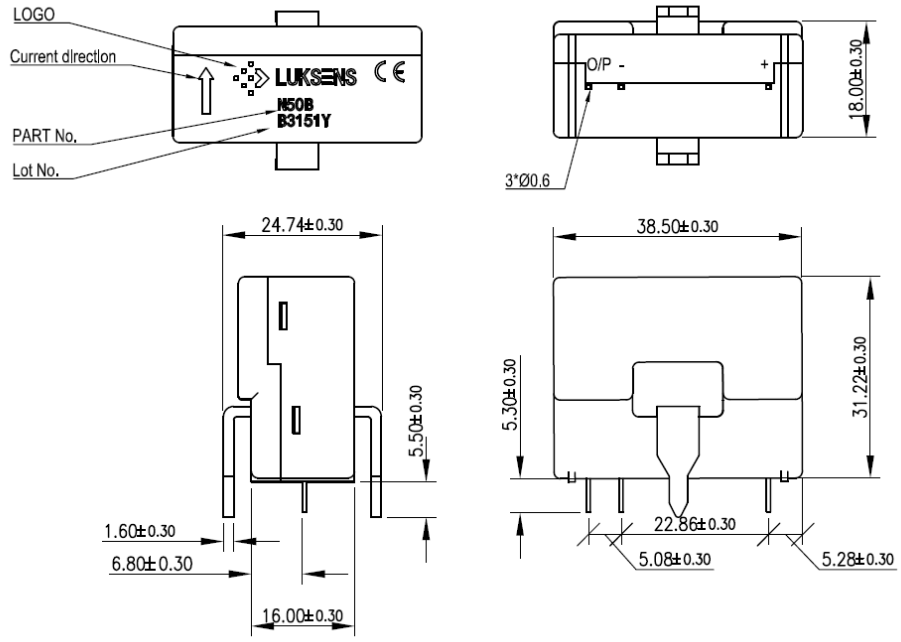
Maximum PCB thickness 2.4mm

# Dimension (mm)

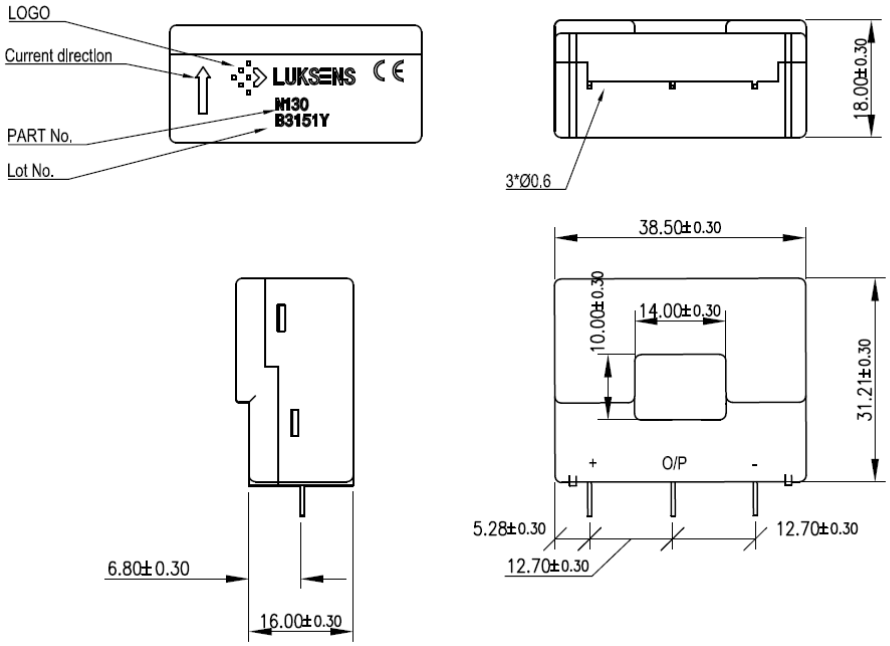
## n-50, n-502



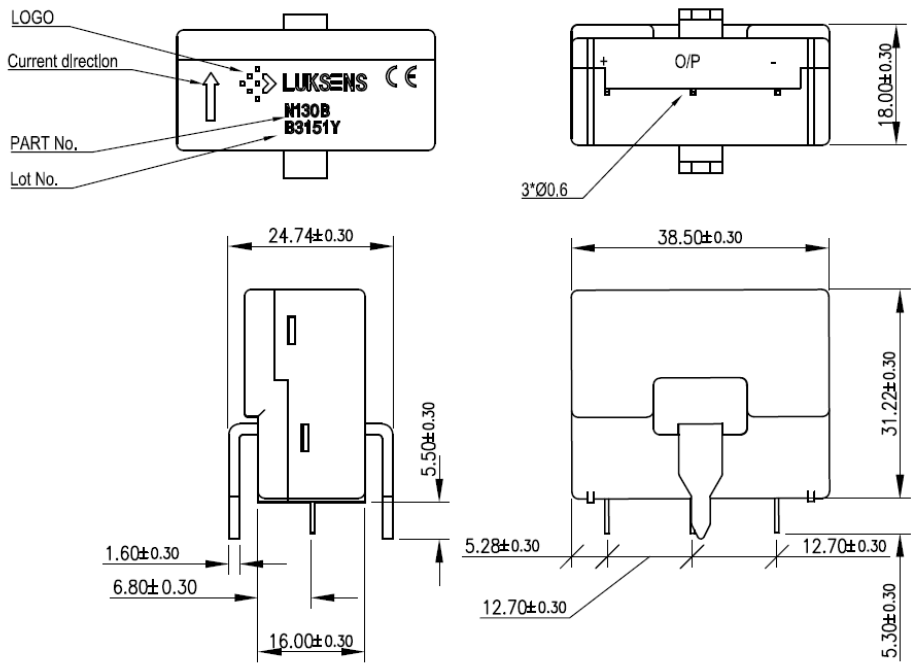

## n-50B, n-502B



## N-130, N-1302




## N-130B, N-1302B



# Name Guide Description

## C03 - 30A X XX XX

**Series**

C03/C05/C06: Open-Loop current sensor

**Nominal range**

010: ± 10A 016: ± 16A 020: ± 20A 030: ±30A
032: ± 32A 040: ±40A 050: ± 50A 100: ±100A

**Dimension**

Null: Standard size
H: Compact size

**Supply voltage**

Null: 5.0V
33: 3.3V

**Sensitivity(C03)**

Null: 27.0mV/A @$I_{PN}$= 30A or 25.0mV/A @$I_{PN}$= 50A
15: 15.5mV/A
40: 40.0mV/A

## LF03 - 150 X XXX X

**Series**

LF01: 0—50A Fluxgate current sensor
LF03: 0—105A Fluxgate current sensor

**Nominal range**

50: ± 50A
100: ± 100A
150: ± 150A

**Output type**

Null: Internal reference and External reference voltage modes
H: Only internal reference voltage

**Power supply**

Null: 5.0V
S12: 12.0V

**Mount type**

Null: Through-Hole PCB mount
B: Busbar PCB mount

## N - 50 X XX

**Series**

N: Close-Loop current sensor

**Nominal range**

50: ± 50A
130: ± 130A

**Output type**

Null: 1 : 1,000
2: 1 : 2,000

**Mount type**

Null: Thru-Hole PCB mount
B: Bus-Bar PCB mount

## Y06 - XXX X

**Series**

Y06: Close-Loop current sensor

**Nominal range**

500: ± 500A

**Connector type**

Q: Molex 39-28-8040
V: Molex 38-00-6293

## K18 D XXX XXX

**Series**

K18: 0—60A Open-Loop current sensor
K03: 0-800A Open-Loop current sensor

**Nominal range**

003: ± 3A 060: ± 60A
005: ± 5A 100: ±100A
010: ± 10A 200: ±200A
015: ± 15A 300: ±300A
020: ± 20A 400: ±400A
025: ± 25A 500: ±500A
030: ± 30A 600: ±600A
040: ± 40A 700: ±700A
050: ± 50A 800: ±800A

**Power supply**

D15: ±15.0V S12: +12.0V
S05: +5.0V

## 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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