# NCE P-Channel Enhancement Mode Power MOSFET

## Description

The NCEA01P35G uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

## Application

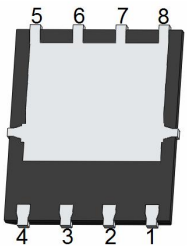
- Automotive application
- Portable equipment and battery powered systems

## General Features

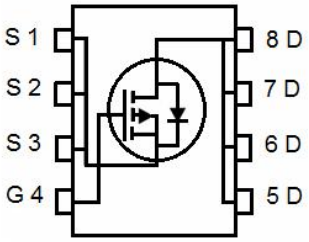
- $V_{DS}$ =-100V,$I_D$ =-35A
  $R_{DS(ON)}$ <40mΩ @ $V_{GS}$=-10V (Typ:30mΩ)
  $R_{DS(ON)}$ <45mΩ @ $V_{GS}$=-4.5V (Typ:32mΩ)
- Super high dense cell design
- Advanced trench process technology
- Reliable and rugged
- High density cell design for ultra low On-Resistance
- 175 °C operating temperature
- 100% UIS tested
- 100% ΔVds tested
- **AEC-Q101 qualified**

**PDFN 5X6-8L**


Top View




Bottom View




Schematic Diagram

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| A01P35G | NCEA01P35G | PDFN5X6-8L | Ø330mm | 12mm | 5000units |

## Absolute Maximum Ratings ($T_C$=25℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | -35 | A |
| Drain Current-Continuous($T_C$=100℃) | $I_D$ (100℃) | -26 | A |
| Pulsed Drain Current | $I_{DM}$ | -140 | A |
| Maximum Power Dissipation | $P_D$ | 120 | W |
| Single pulse avalanche energy (Note 1) | $E_{AS}$ | 145.8 | mJ |
| Derating factor | | 0.8 | W/℃ |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 175 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Case | $R_{\theta JC}$ | 1.25 | ℃/W |
| Thermal Resistance,Junction-to-Ambient (Note 4) | $R_{\theta JA}$ | 50 | ℃/W |

## Electrical Characteristics ($T_C$=25℃unless otherwise noted)

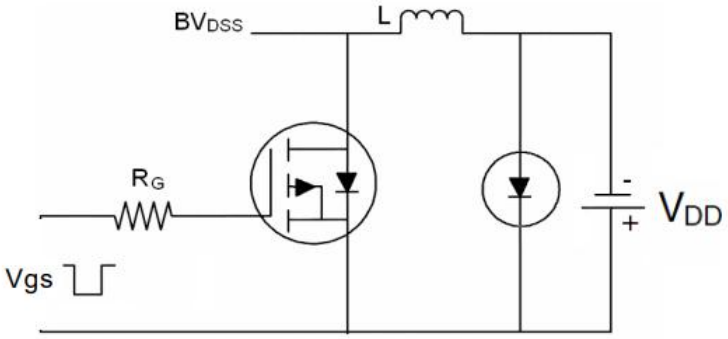
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=-250μA | -100 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-100V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | -1.3 | -1.8 | -2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-20A | - | 30 | 40 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-20A | - | 32 | 45 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=-10V,$I_D$=-20A | - | 50 | - | S |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=-50V,$V_{GS}$=0V, F=1.0MHz | - | 5720 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 190 | - | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 128 | - | pF |
| **Switching Characteristics** (Note 2) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=-50V,$I_D$=-20A $V_{GS}$=-10V,$R_{GEN}$=9.1Ω | - | 17 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 80 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 45 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 65 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-50V,$I_D$=-20A, $V_{GS}$=-10V | - | 118 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 19.8 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 22.2 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V,$I_S$=-20A | - | - | -1.2 | V |
| Diode Forward Current | $I_S$ | - | - | - | -35 | A |
| Reverse Recovery Time | $t_{rr}$ | TJ = 25°C, IF =-20A di/dt = 100A/μs | - | 90 | - | nS |
| Reverse Recovery Charge | Qrr | | - | 145 | - | nC |
| Forward Turn-On Time | $t_{on}$ | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

## Notes:

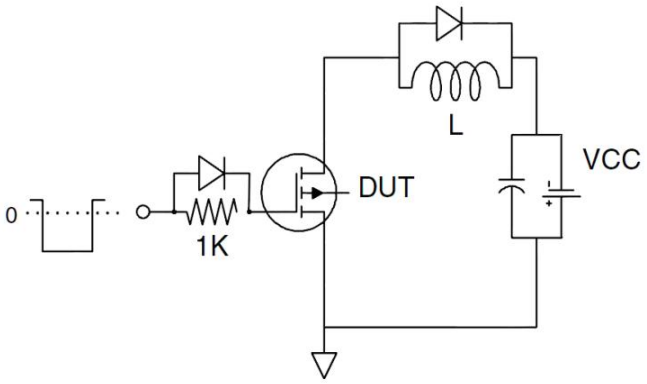
1. EAS condition : Tj=25℃,$V_{DD}$=-50V,$V_G$=-10V,L=0.5mH,Rg=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C. The SOA curve provides a single pulse rating.
4. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25° C. The maximum allowed junction temperature of 175° C. The value in any given application depends on the user's specific board design.

## Test Circuit

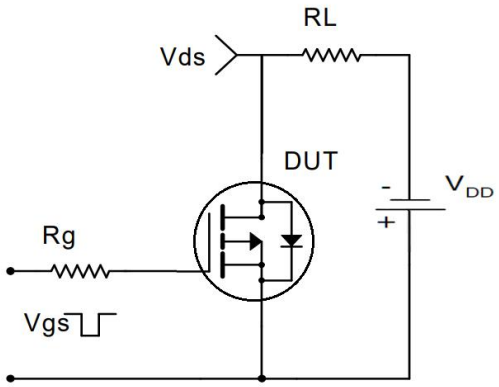
### 1）$E_{AS}$ test Circuit




### 2）Gate charge test Circuit




### 3）Switch Time Test Circuit



## Typical Electrical and Thermal Characteristics (Curves)

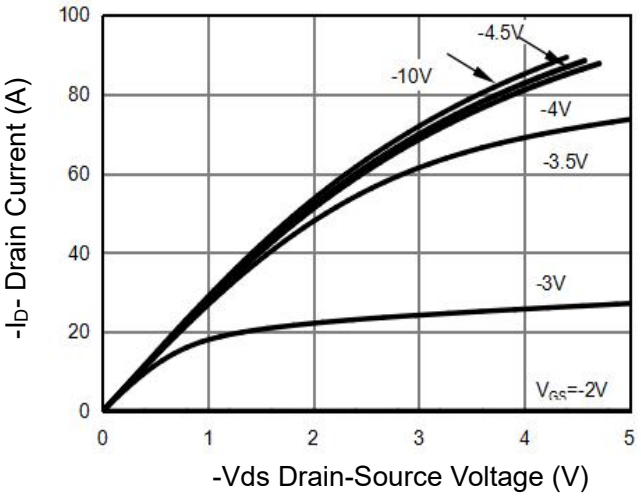



**Figure 1 Output Characteristics**

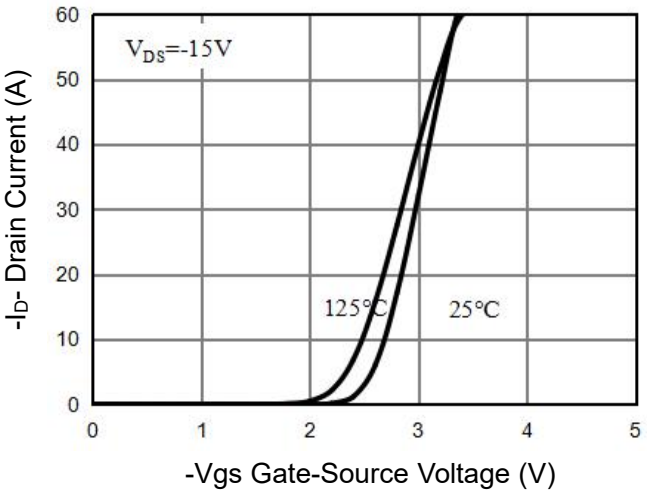



**Figure 2 Transfer Characteristics**

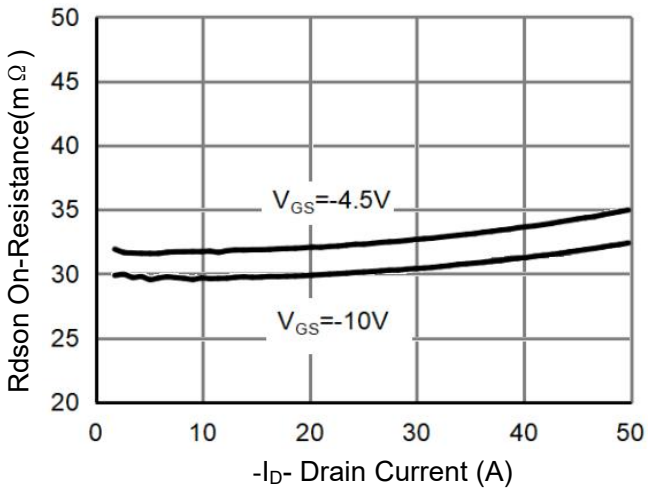



**Figure 3 Rdson- Drain Current**

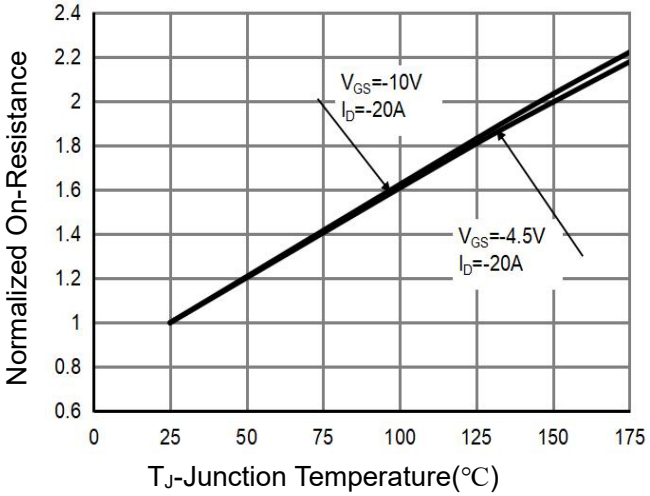



**Figure 4 Rdson-JunctionTemperature**

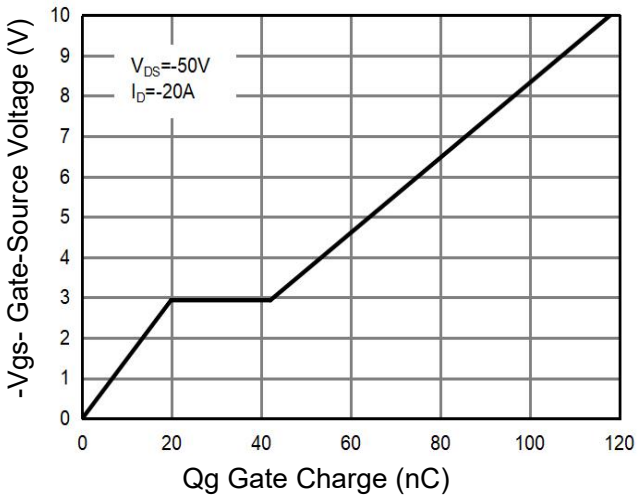



**Figure 5 Gate Charge**

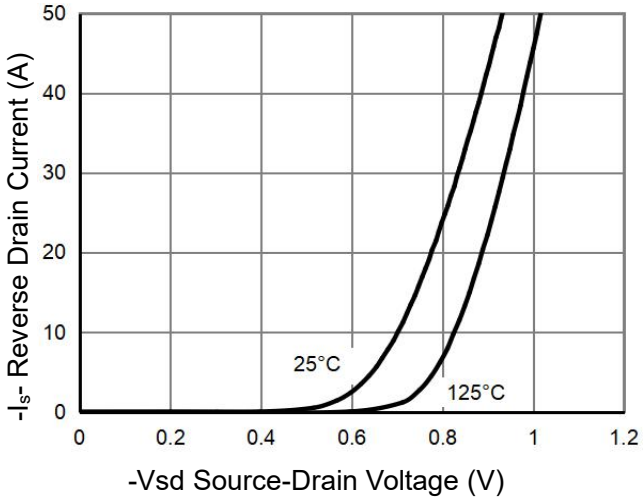



**Figure 6 Source- Drain Diode Forward**

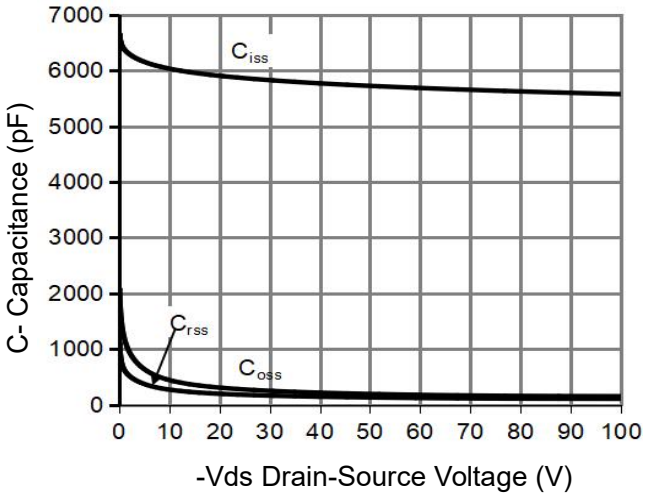



**Figure 7 Capacitance vs Vds**

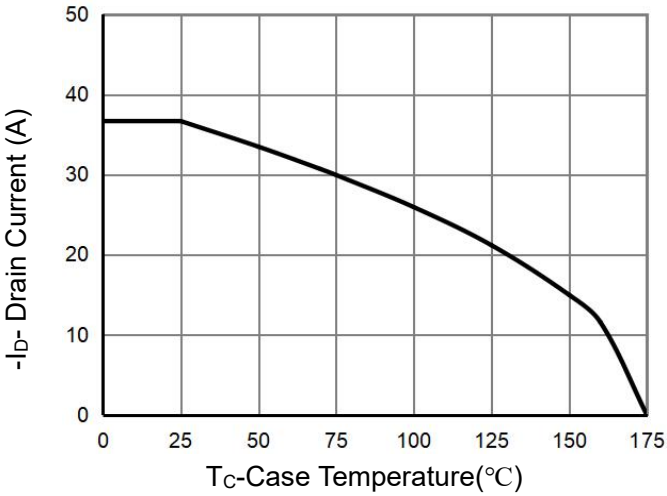



**Figure 9 Drain Current vs Case Temperature**

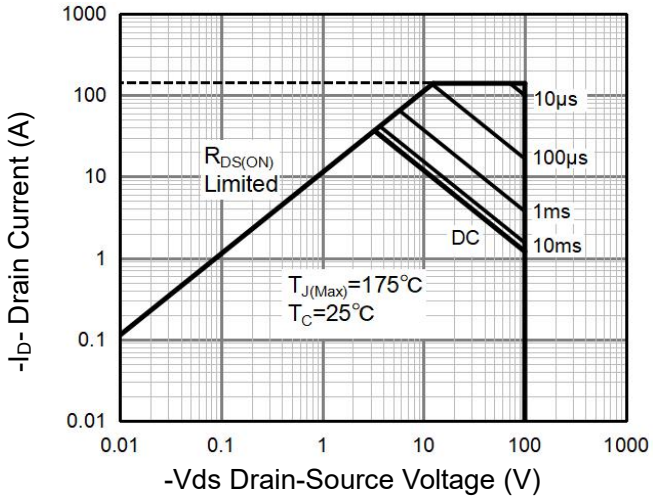



**Figure 8 Safe Operation Area** (Note3)

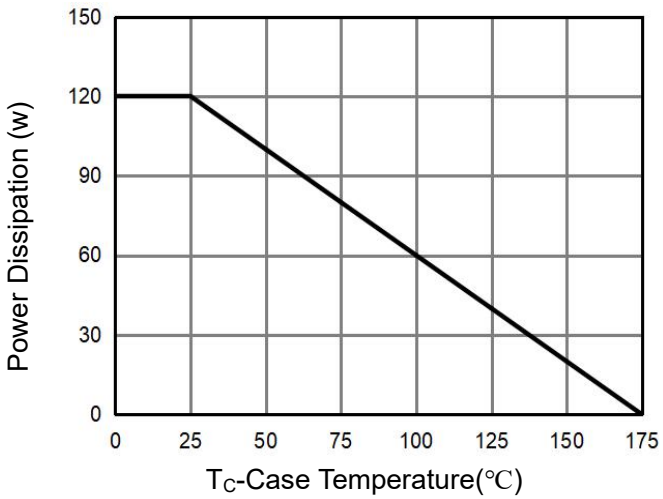



**Figure 10 Power De-rating**

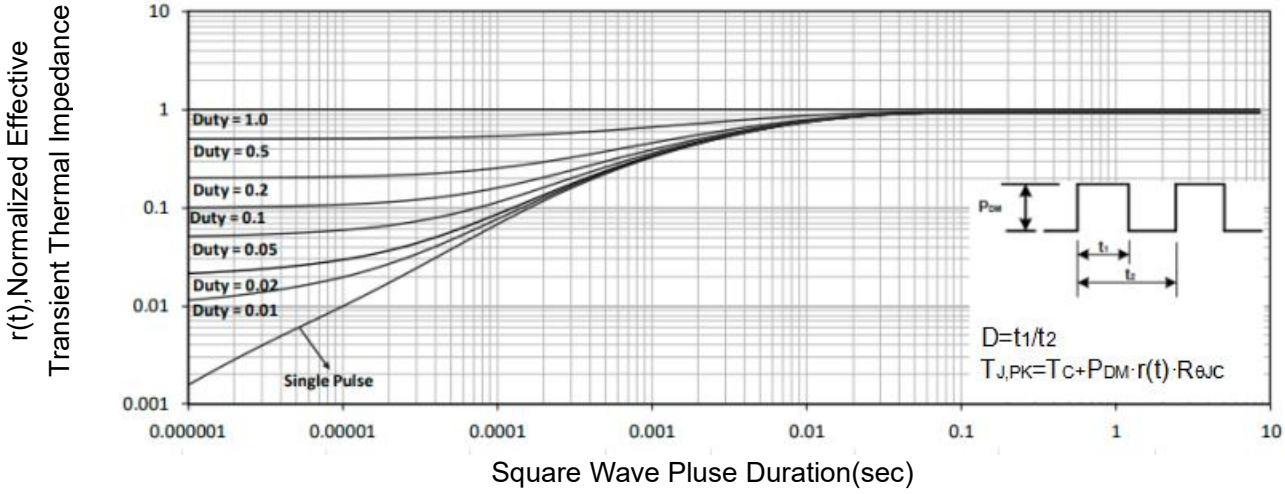
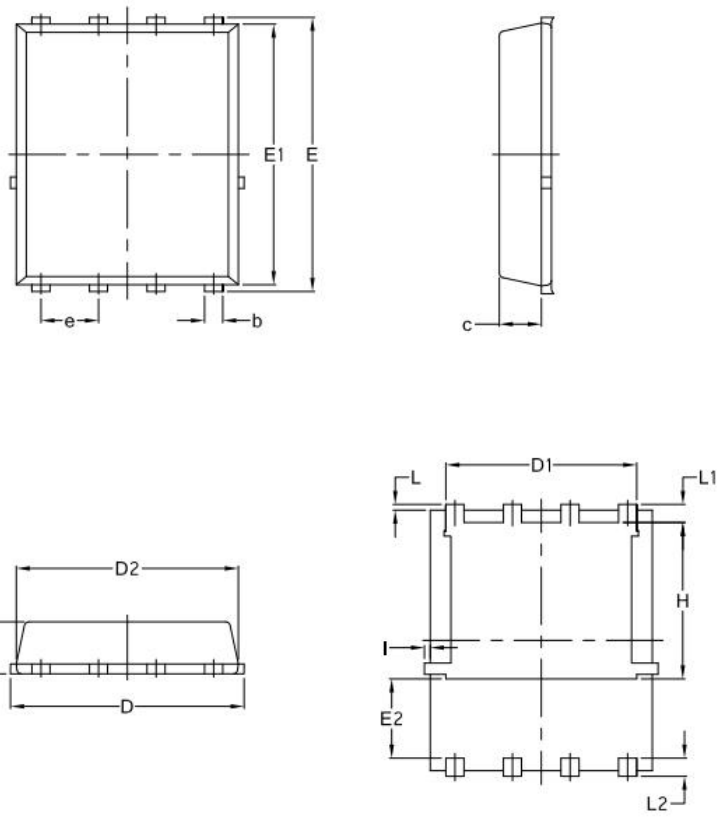



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## PDFN5X6-8L Package Information




| | SYMBOL | COMMON | | | |
|---|---|---|---|---|---|
| | | MM | | INCH | |
| | | MIN. | MAX. | MIN. | MAX. |
| | A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| | b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| | c | 0.824 | 0.970 | 0.0324 | 0.0382 |
| 3 | D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| | D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| 3 | D2 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| | E | 5.95 | 6.15 | 0.2343 | 0.2421 |
| | E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| | E2 | 1.60 | — | 0.0630 | — |
| | e | 1.27 BSC | | 0.05 BSC | |
| 3 | L | 0.05 | 0.25 | 0.0020 | 0.0098 |
| | L1 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| | L2 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| 4 | H | 3.30 | 3.50 | 0.1299 | 0.1378 |
| | I | — | 0.18 | — | 0.0070 |

## Revision History

| Revision | Date | Subjects |
|---|---|---|
| V1.0 | 2025.08.11 | Product data sheet |

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