# WMS30N300SE

## N-Channel Silicon MOSFET

Rev.02 - 28 June 2024 Product data sheet

## 1. General description

WMS30N300SE is a high performance super logic level N-channel MOSFET in PDFN3.3X3.3 package, which utilizes advanced Trench MOSFET technology to provide low $R_{DS(on)}$ and gate charge. It is designed and qualified in a wide range of industrial and consumer applications.

RoHS Halogen-Free Lead-Free

## 2. Features and benefits

- High ESD sensitivity devices
- Advance High Cell Density Trench Technology
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Switching Losses
- Optimized Gate Charge to Minimize Driver Losses
- 100% UIS Tested
- RoHS Compliant, Halogen Free and Lead Free

## 3. Applications

- DC−DC Converters
- BLDC Motor Control
- Load Switch
- Lithium-ion Battery Protection

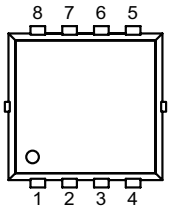
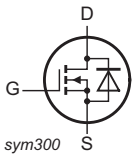
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Notes | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| **Absolute maximum rating** | | | | | | | |
| $V_{DS}$ | drain-source voltage | | | 30 | | | V |
| $V_{GS}$ | gate-source voltage | | | ±12 | | | V |
| $I_D$ | continuous drain current | $V_{GS}$ = 4.5 V; $T_{mb}$ = 25 °C | [1] | 17 | | | A |
| $P_{tot}$ | power dissipation | $T_{mb}$ = 25 °C | | 14 | | | W |
| $T_j$ | junction temperature | | | -55 to 150 | | | °C |
| **Symbol** | **Parameter** | **Conditions** | **Notes** | **Min** | **Typ** | **Max** | **Unit** |
| **Static characteristics** | | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS}$ = 4.5 V, $I_D$ = 14 A | | - | 17 | 30 | mΩ |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 5 A | | - | 25 | 45 | mΩ |
| **Dynamic characteristics** | | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $I_D$ = 14 A; $V_{DS}$ = 15 V; $V_{GS}$ = 4.5 V | | - | 7.4 | - | nC |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1-3 | S | source |  |  |
| 4 | G | gate | | |
| 5-8 | D | drain | | |



## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package Name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|---|---|---|---|---|---|---|
| WMS30N300SE | PDFN3.3X3.3 | WMS30N300SEJ | Reel | 5000 | PDFN3.3X3.3N | 22-Sep-2022 |

## 7. Marking

**Table 4. Marking codes**

| Type number | Marking codes |
|---|---|
| WMS30N300SE | 3N300S |

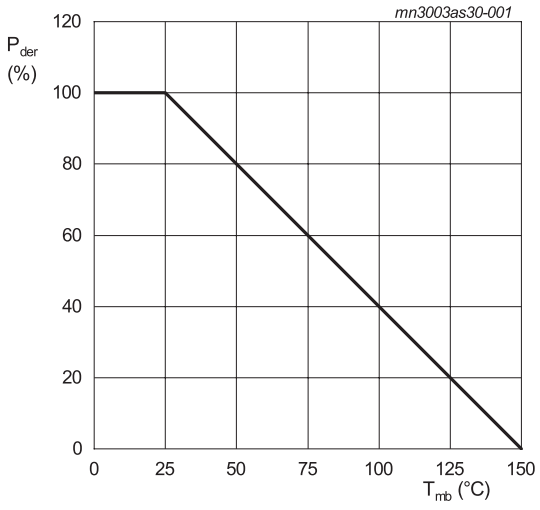
# 8. Limiting values

**Table 5. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

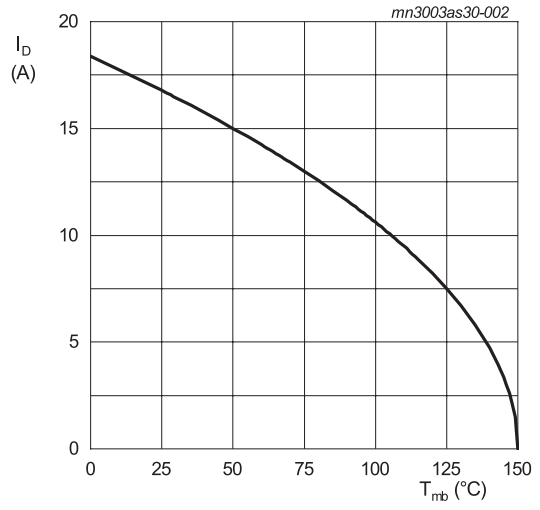
| Symbol | Parameter | Conditions | Notes | Values | Unit |
|---|---|---|---|---|---|
| $V_{DS}$ | drain-source voltage | | | 30 | V |
| $V_{GS}$ | gate-source voltage | | | ±12 | V |
| $I_D$ | continuous drain current | $V_{GS}$ = 4.5 V; $T_{mb}$ = 25 °C | [1] | 17 | A |
| | | $V_{GS}$ = 4.5 V; $T_{mb}$ = 120 °C | | 8.2 | A |
| $I_{DM}$ | pulsed drain current | $t_p$ = 10 µs; $T_{mb}$ = 25 °C | | 68 | A |
| $P_{tot}$ | power dissipation | $T_{mb}$ = 25 °C | | 15 | W |
| $E_{as}$ | single pulse drain−to-source avalanche | $I_{AS}$ = 10 A; L = 0.1 mH; $R_{GS}$ = 25 Ω; $V_{GS}$ = 4.5 V; $T_j$ = 25 °C | | 5 | mJ |
| $T_{stg}$ | storage temperature | | | -55 to 150 | °C |
| $T_j$ | junction temperature | | | -55 to 150 | °C |

[1] Calculated continuous current based on maximum allowable junction temperature. Package current limitation is 14A.




$P_{der} = (P_{tot} / P_{tot(25\,°C)}) \times 100\%$

**Fig. 1. Normalized total power dissipation as a function of mounting base temperature**




$V_{GS}$ = 10 V

**Fig. 2. Continuous Drain Current as a function of mounting base temperature**

# 9. Thermal & Mechanical characteristics

**Table 6. Thermal & Mechanical characteristics**

| Symbol | Parameter | Conditions | Notes | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | | | - | 7 | 9.1 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [2] | - | - | 60 | K/W |

[2] Surface mount on FR4 board of 1 inch$^2$, 1 oz copper.

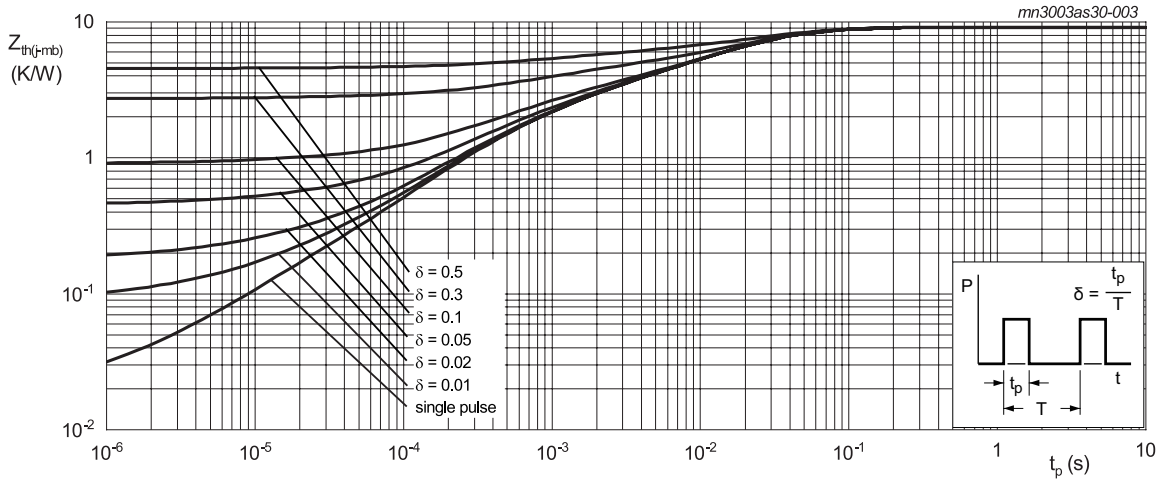



**Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse duration**

# 10. Characteristics

**Table 7. Characteristics**

$T_j$ = 25 °C unless otherwise noted

| Symbol | Parameter | Conditions | Notes | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D$ = 250 µA; $V_{GS}$ = 0 V | | 30 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $I_D$ = 250 µA; $V_{DS}$ = $V_{GS}$ | | 0.6 | 0.9 | 1.5 | V |
| $I_{DSS}$ | drain leakage current | $V_{DS}$ = 30 V; $V_{GS}$ = 0 V | | - | - | 1 | µA |
| | | $V_{DS}$ = 30 V; $V_{GS}$ = 0 V; $T_j$ = 125 °C | | - | - | 10 | µA |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = ±12 V; $V_{DS}$ = 0 V | | - | - | ±100 | nA |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS}$ = 4.5 V; $I_D$ = 14 A | | - | 17 | 30 | mΩ |
| | | $V_{GS}$ = 2.5 V; $I_D$ = 5 A | | - | 25 | 45 | mΩ |
| $R_G$ | gate resistance | f = 1 MHz | | - | 2.4 | - | Ω |
| **Dynamic characteristics** | | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $I_D$ = 14 A; $V_{DS}$ = 15 V; $V_{GS}$ = 4.5 V | | - | 7.4 | - | nC |
| $Q_{GS}$ | gate-source charge | | | - | 1.5 | - | nC |
| $Q_{GD}$ | gate-drain charge | | | - | 2.1 | - | nC |
| $C_{iss}$ | input capacitance | $V_{DS}$ = 15 V; $V_{GS}$ = 0 V; f = 1 MHz | | - | 735 | - | pF |
| $C_{oss}$ | output capacitance | | | - | 67 | - | pF |
| $C_{rss}$ | reverse transfer capacitance | | | - | 54 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS}$ = 15 V; $V_{GS}$ = 4.5 V; $R_G$ = 6 Ω; $I_D$ = 14 A | | - | 10 | - | ns |
| $t_r$ | rise time | | | - | 16 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | | - | 29 | - | ns |
| $t_f$ | fall time | | | - | 11 | - | ns |
| **Source-drain diode** | | | | | | | |
| $V_{SD}$ | source-drain voltage | $V_{GS}$ = 0 V; $I_S$ = 1 A | | - | 0.71 | 1 | V |
| | | $V_{GS}$ = 0 V; $I_S$ = 1 A; $T_j$ = 125 °C | | - | 0.57 | - | V |
| $I_S$ | body-diode continuous current | $T_{mb}$ = 25 °C | | - | - | 16 | A |
| $t_{rr}$ | reverse recovery time | $V_{GS}$ = 0 V; $I_S$ = 14 A; di/dt = 100 A/µs | | - | 12 | - | ns |
| $Q_{rr}$ | reverse recovered charge | | | - | 5.0 | - | nC |
| $I_{rrm}$ | reverse recovery current | | | - | 0.7 | - | A |

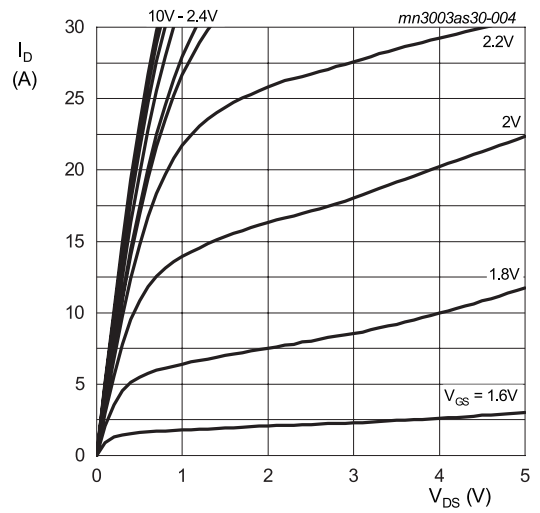
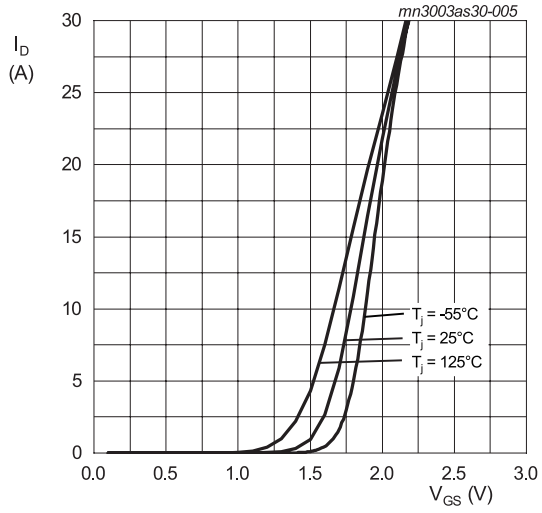
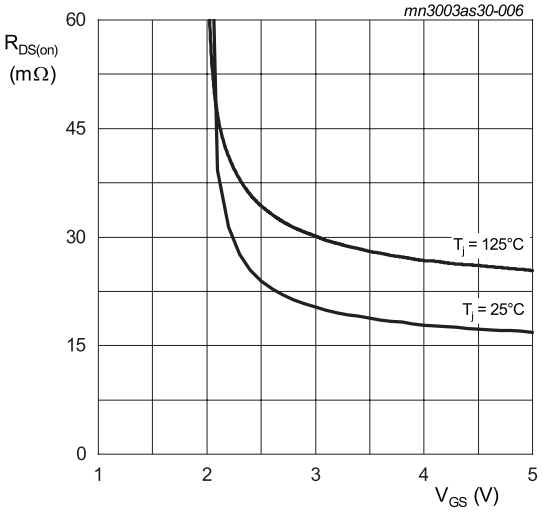



**Fig. 4. Drain current as a function of drain-source voltage; typical values**




$V_{DS}$ = 5 V

**Fig. 5. Drain current as a function of gate-source voltage; typical values**




$I_D$ = 14 A

**Fig. 6. Drain-source on-state resistance as a function of gate-source voltage; typical values**

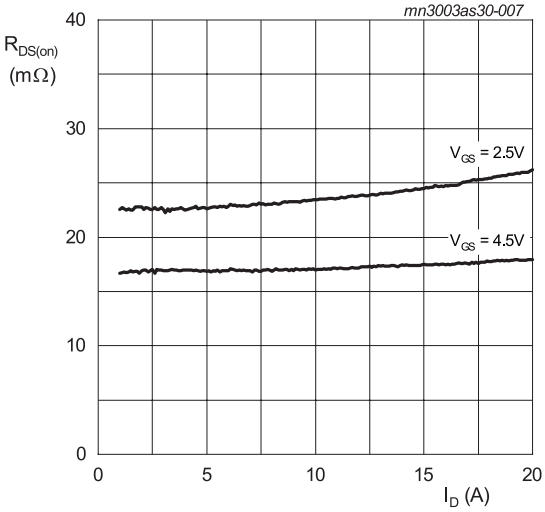
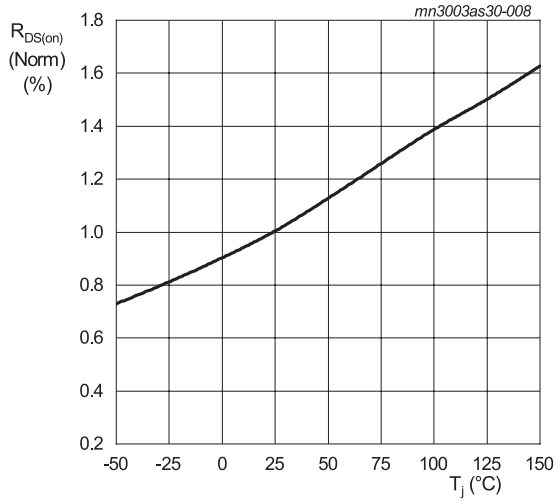
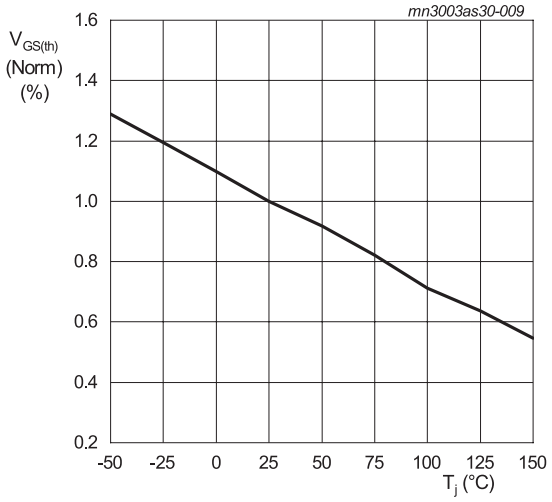



**Fig. 7. Drain-source on-state resistance as a function of drain current; typical values**



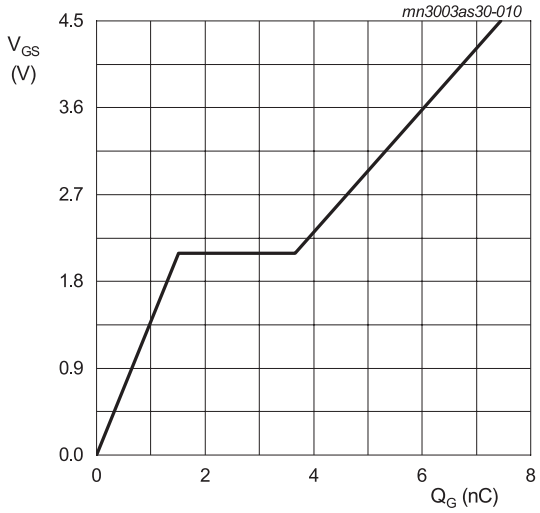

$V_{GS}$ = 4.5 V; $I_D$ = 14 A

**Fig. 8. Normalized drain-source on-state resistance as a function of junction temperature**



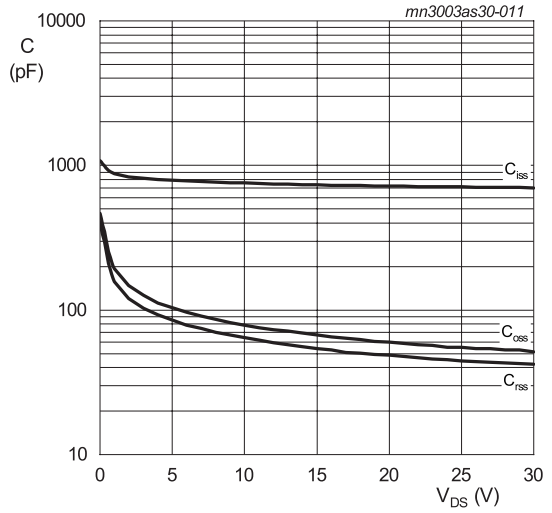

$V_{DS}$ = $V_{GS}$; $I_D$ = 250 µA

**Fig. 9. Normalized gate-source threshold voltage as a function of junction temperature**



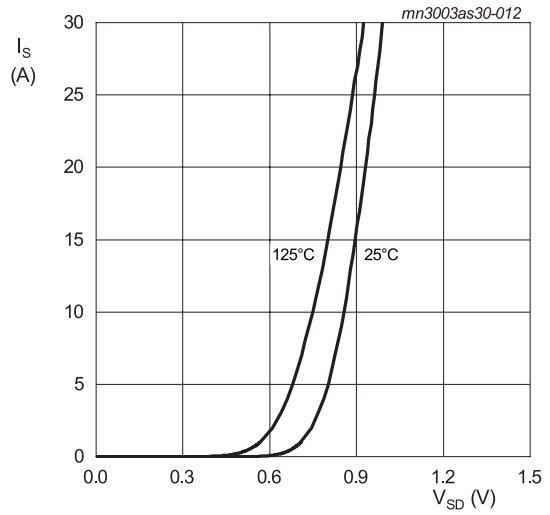

$I_D$ = 14 A; $V_{DS}$ = 15 V

**Fig. 10. Gate-source voltage as a function of gate charge; typical values**



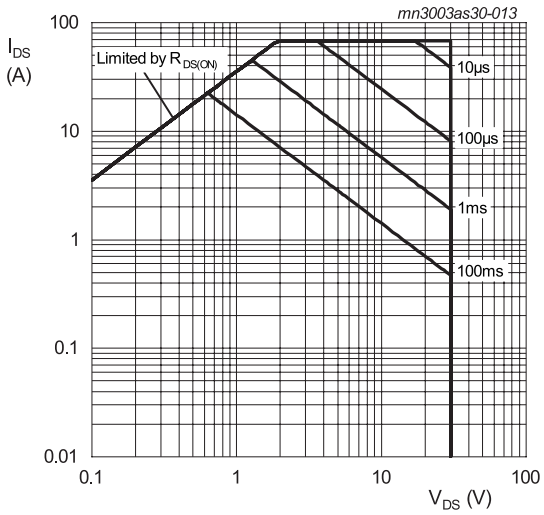

$V_{GS}$ = 0 V; f = 1 MHz

**Fig 11. Capacitances as a function of drain-source voltage; typical values**




$V_{GS}$ = 0 V

**Fig 12. Source current as a function of source-drain voltage; typical values**

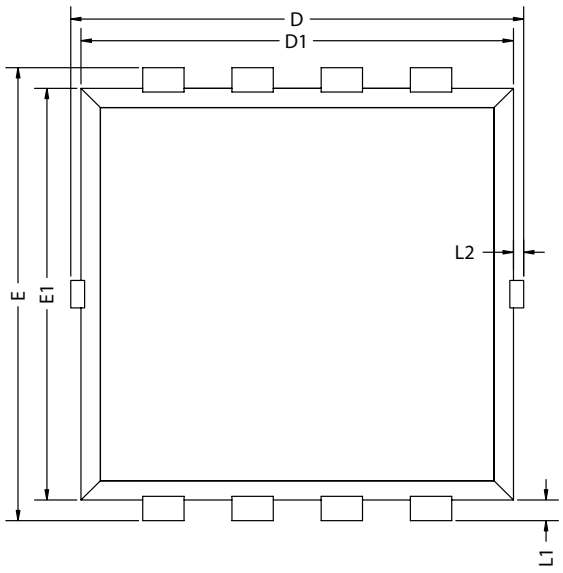



$T_{mb}$ = 25 °C

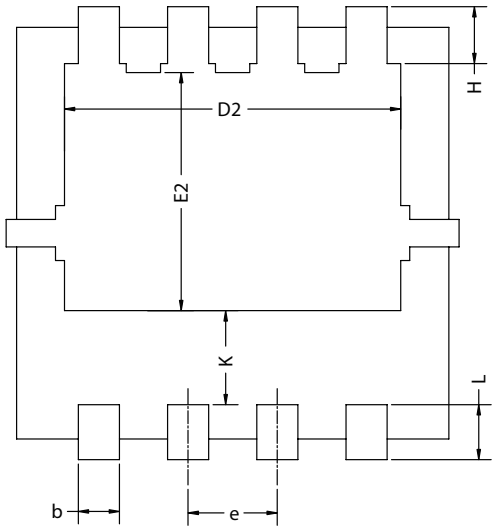
**Fig. 13. Safe operating area**

## 11. Package outline

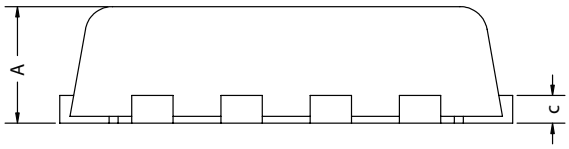
PDFN3.3X3.3




TOP VIEW




BOTTOM VIEW




SIDE VIEW

| Unit | | A | b | c | D | D1 | D2 | E | E1 | E2 | e | H | K | L | L1 | L2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MM | min | 0.70 | 0.20 | 0.14 | 3.10 | 3.05 | 2.35 | 3.10 | 2.90 | 1.64 | 0.55 | 0.32 | 0.59 | 0.25 | 0.10 | |
| | max | 0.90 | 0.35 | 0.22 | 3.50 | 3.25 | 2.55 | 3.50 | 3.10 | 1.84 | 0.75 | 0.52 | 0.79 | 0.55 | 0.20 | 0.15 |

Note:

1. All dimensions don't include mold flash and metal protrusion.

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|---|---|---|
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