## ●General Description

It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

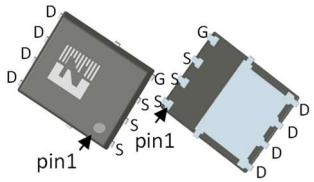
## ●Features

- ■Low $R_{DS(ON)}$ to minimize conductive loss
- ■Low Gate Charge for fast switching
- ■Low thermal resistance
- ■AEC-Q101 qualified

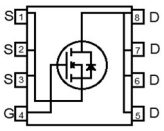
## ●Application

- ■BLDC motor driver
- ■DC-DC
- ■Load switch

## ●Product Summary




DFN5*6




$V_{DS}$=80V

$R_{DS(ON)}$ =1.9mR

$I_D$=272A

RoHS REACH COMPLIANT HF

## ●Ordering Information

| Part NO. | ZMSA019N08HNC |
|---|---|
| Marking | ZMS019N08H |
| Packing information | REEL TAPE |
| Basic ordering unit (pcs) | 3000 |

## ●Absolute Maximum Ratings（$T_A$=25℃,unless otherwise specified）

| Parameter | Symbol | Conditions | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 25℃≤Tj≤175℃ | - | 80 | V |
| Gate-source voltage① | $V_{GS}$ | DC; -55℃≤Tj≤175℃ | -20 | 20 | V |
| Continuous drain current | $I_D$ | $V_{GS}$=10V, $T_C$=25℃ | - | 272 | A |
| | $I_D$ | $V_{GS}$=10V, $T_C$=75℃ | - | 222 | A |
| | $I_D$ | $V_{GS}$=10V, $T_C$=100℃ | - | 193 | A |
| Pulsed drain current | $I_{DM}$ | Pulsed; $t_p$ ≤ 10 μs; $T_C$ = 25 °C; | - | 1088 | A |
| Diode continuous current | $I_S$ | $V_{GS}$=0V, $T_C$=25℃ | - | 272 | A |
| Diode pulse current | $I_{S,pulse}$ | Pulsed; $t_p$ ≤ 10 μs; $T_C$ = 25 °C; | - | 1088 | A |
| Total power dissipation | $P_D$ | $V_{GS}$＞6V, $T_C$=25℃ | - | 375 | W |
| Total power dissipation | $P_D$ | $V_{GS}$＞6V, $T_A$=25℃ | - | 3.3 | W |
| Operating junction temperature | $T_J$ | | -55 | 175 | ℃ |
| Storage temperature | $T_{STG}$ | | -55 | 175 | ℃ |
| Single pulse avalanche energy | $E_{AS}$ | L=0.1mH, $V_{GS}$=10V, $R_g$=25Ω | - | 423 | mJ |

| | | | | | |
|---|---|---|---|---|---|
| Single pulse avalanche energy | $E_{AS}$ | L=0.5mH, $V_{GS}$=10V, $R_g$=25Ω | - | 698 | mJ |
| ESD level (HBM) | | | CLASS 2 | | |

## ●Thermal resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Thermal resistance, junction - case | $R_{thJC}$ | - | - | 0.4 | °C/W |
| Thermal resistance, junction - ambient | $R_{thJA}$② | - | - | 45 | °C/W |
| Soldering temperature | $T_{sold}$ | - | - | 260 | °C |

## ●Electronic Characteristics ($T_j$=25°C, unless otherwise specified)

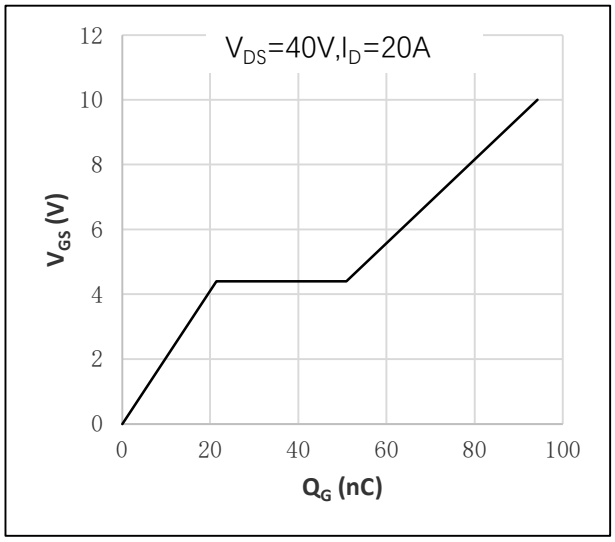
| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$ =0V, $I_D$ =250uA, $T_j$=25℃ | 80 | - | - | V |
| | | $V_{GS}$ =0V, $I_D$ =250uA, $T_j$=-55℃ | 76.2 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$, $I_D$=250uA, $T_j$=25℃ | 2 | 2.9 | 4 | V |
| | | $V_{GS}$=$V_{DS}$, $I_D$=1mA, $T_j$=-55℃ | - | - | 4.6 | V |
| | | $V_{GS}$=$V_{DS}$, $I_D$=1mA, $T_j$=175℃ | 1.2 | - | - | V |
| Drain-source leakage current | $I_{DSS}$ | $V_{GS}$=0V, $V_{DS}$=80V, $T_j$=25℃ | - | - | 1 | uA |
| | | $V_{GS}$=0V, $V_{DS}$=80V, $T_j$=175℃ | - | - | 500 | uA |
| Gate- source leakage current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$ =0V | - | - | ±100 | nA |
| Static drain-source on resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=20A, $T_j$=25℃ | - | 1.9 | 2.4 | mΩ |
| | | $V_{GS}$=10V, $I_D$=20A, $T_j$=175℃ | - | 4 | - | mΩ |
| Forward transconductance | $g_{FS}$ | $V_{DS}$ =5V, $I_{SD}$ = 10A | - | 24 | - | S |
| Diode forward voltage | $V_{FSD}$ | $V_{GS}$ =0V, $I_{SD}$ = 20A | - | 0.8 | 1.3 | V |

## ●Dynamic characteristics ($T_j$=25°C, unless otherwise specified)

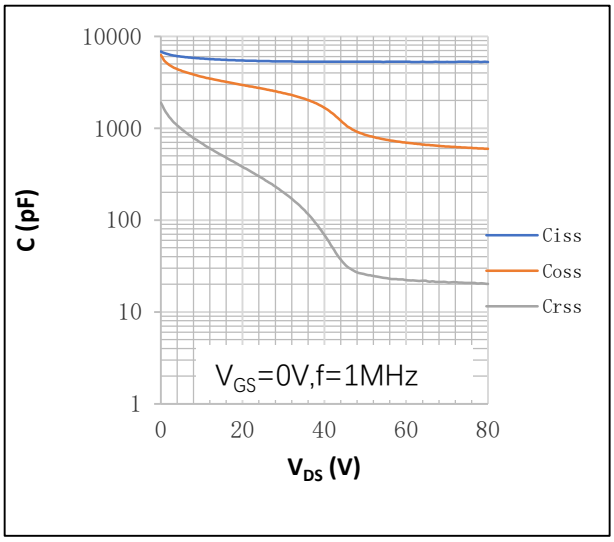
| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | f = 1MHz, $V_{DS}$=40V, $V_{GS}$=0V | - | 5299 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 1630 | - | pF |
| Reverse transfer capacitance | $C_{rss}$ | | - | 65 | - | pF |
| Gate resistance | $R_g$ | f = 1MHz | - | 1.5 | - | Ω |
| Total gate charge | $Q_g$ | $V_{DD}$ = 40V, $I_D$ = 20A, $V_{GS}$ = 10V | - | 94.2 | - | nC |
| Gate-source charge | $Q_{gs}$ | | - | 21.4 | - | nC |
| Gate-drain charge | $Q_{gd}$ | | - | 29.5 | - | nC |

| | | | | | | |
|---|---|---|---|---|---|---|
| Turn-on delay time | $t_{D(on)}$ | $V_{GS}$=10V, $V_{DS}$=40V, $R_G$ =3.3Ω, $I_D$ =20A | - | 17 | - | ns |
| Turn-on rise time | $t_r$ | | - | 12 | - | ns |
| Turn-off delay time | $t_{D(off)}$ | | - | 30 | - | ns |
| Turn-off fall time | $t_f$ | | - | 21 | - | ns |
| Reverse recovery time | $t_{rr}$ | $V_{DD}$=40V, $dI_S/dt$ = 100A/us, $I_S$=20A | - | 87 | - | ns |
| Reverse recovery charge | $Q_{rr}$ | | - | 142 | - | nC |

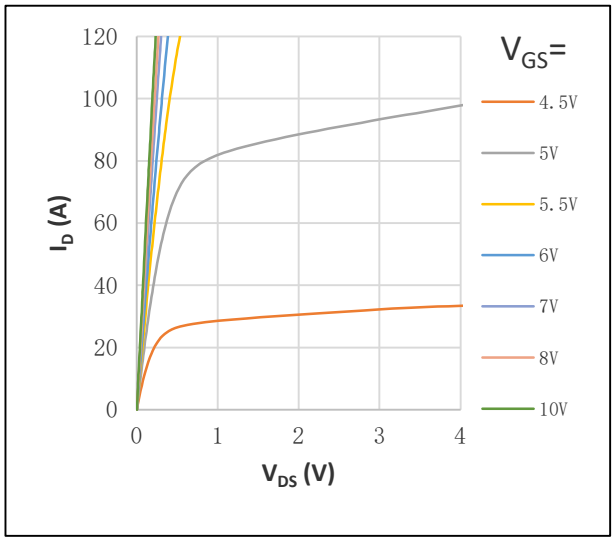
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; $T_j$=25℃



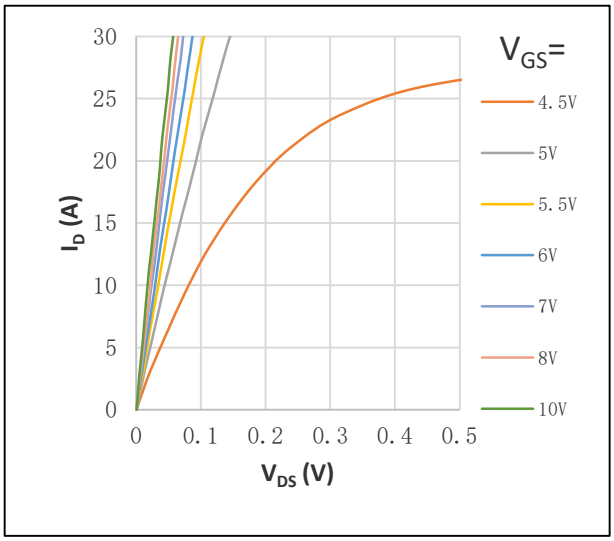

●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; $T_j$=25℃



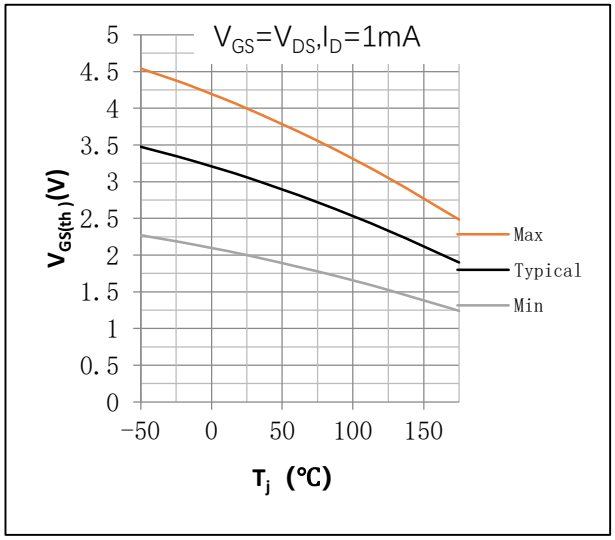

●Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; $T_j$=25℃



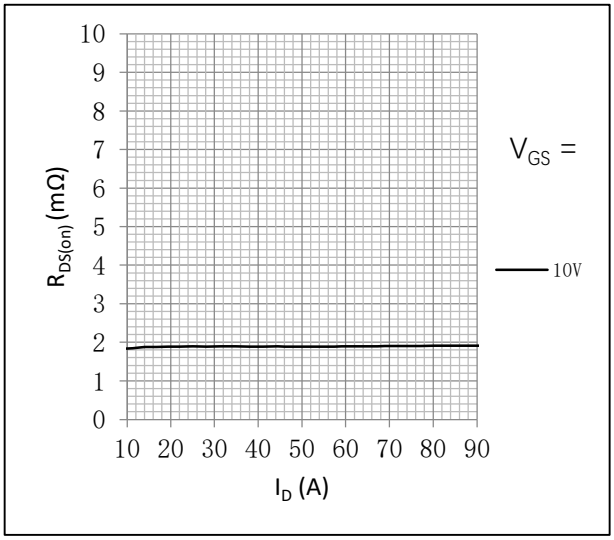

●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; $T_j$=25℃



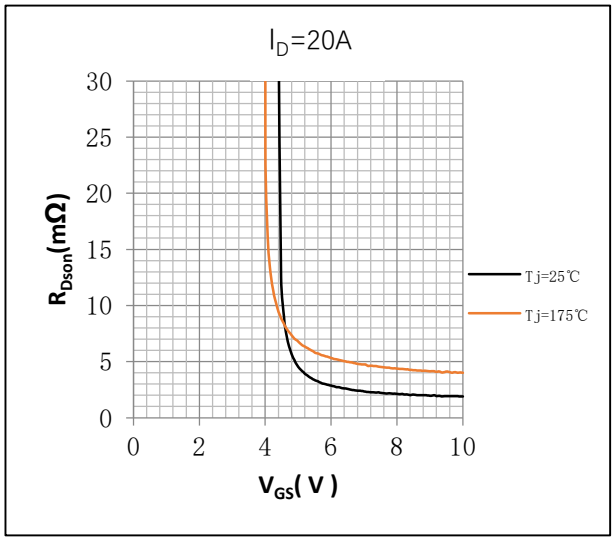

●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical/Min/Max values



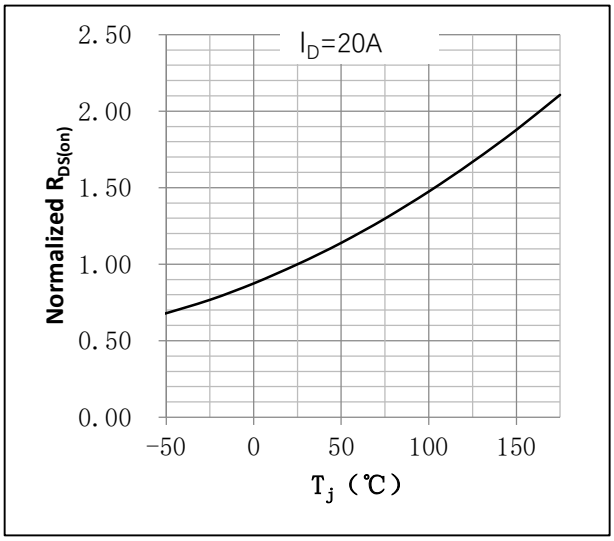

●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



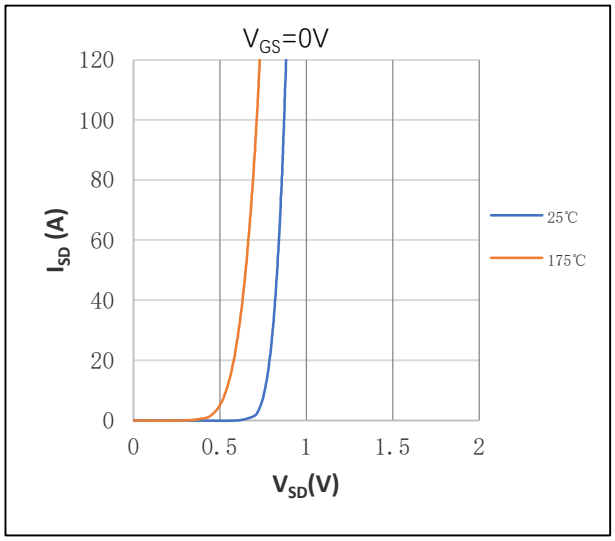
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



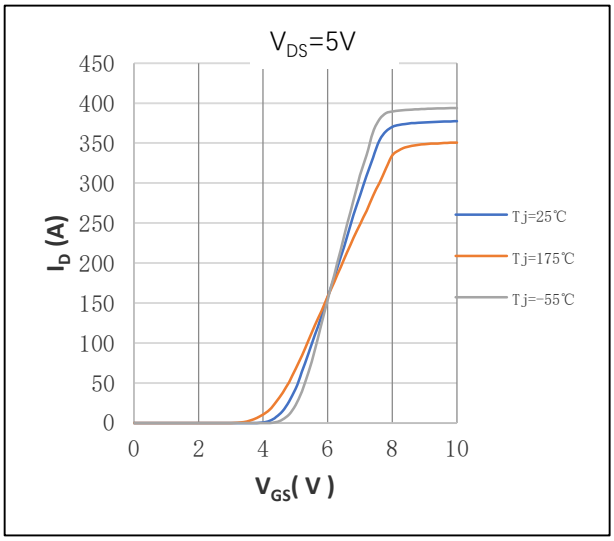

●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=$R_{DSon}$/$R_{DSon}$(25℃)



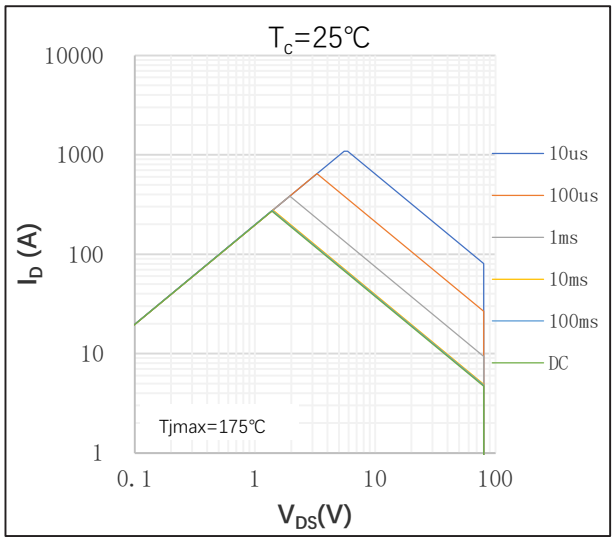

●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



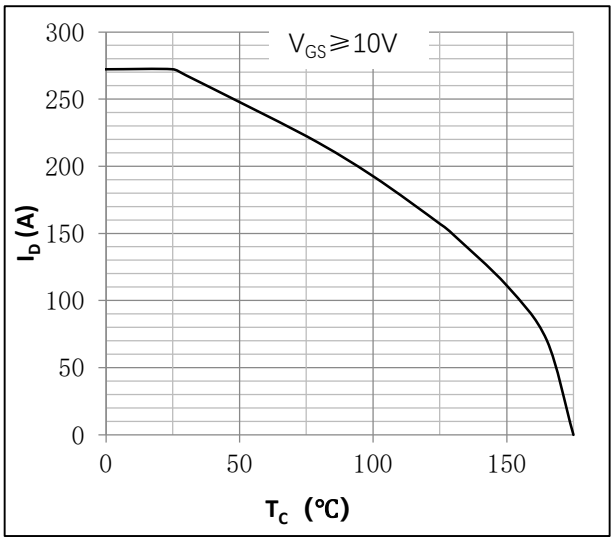

●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



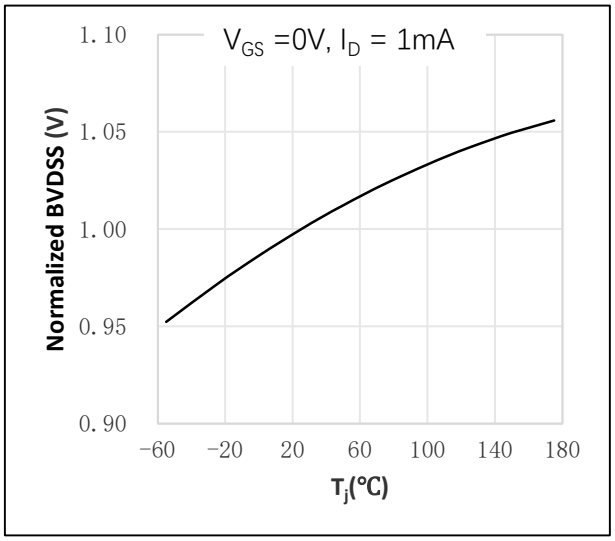

●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



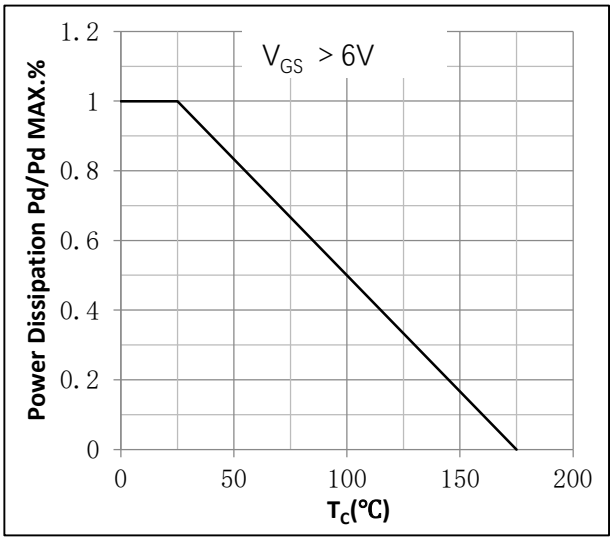

●Fig.12 Continuous drain current as a function of case temperature③;Calculative values



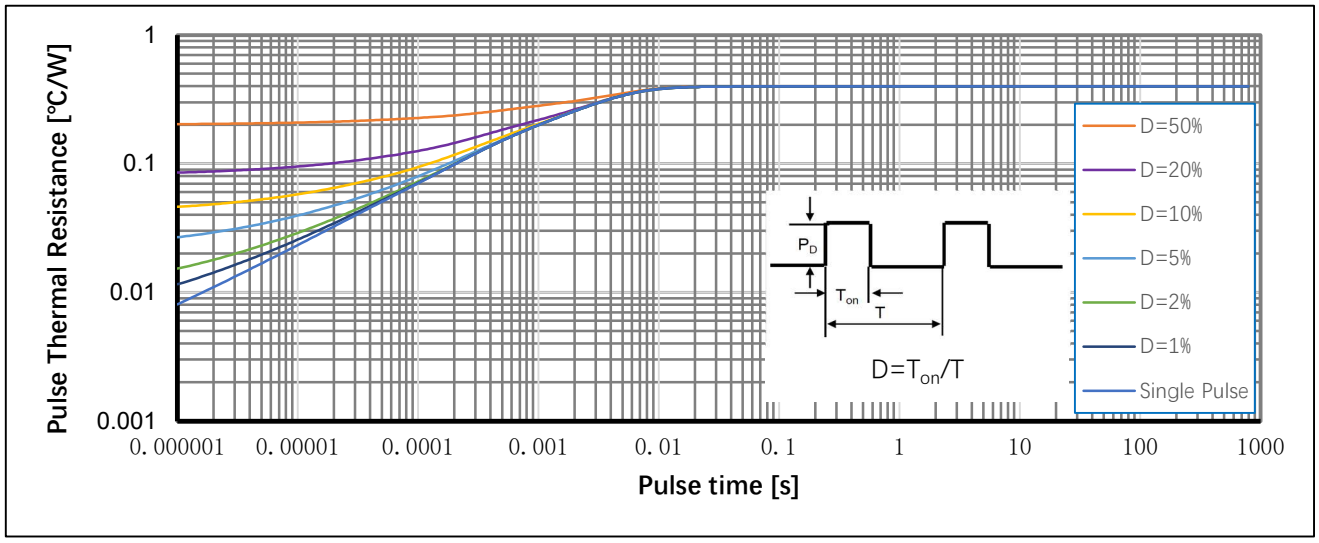
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Min values



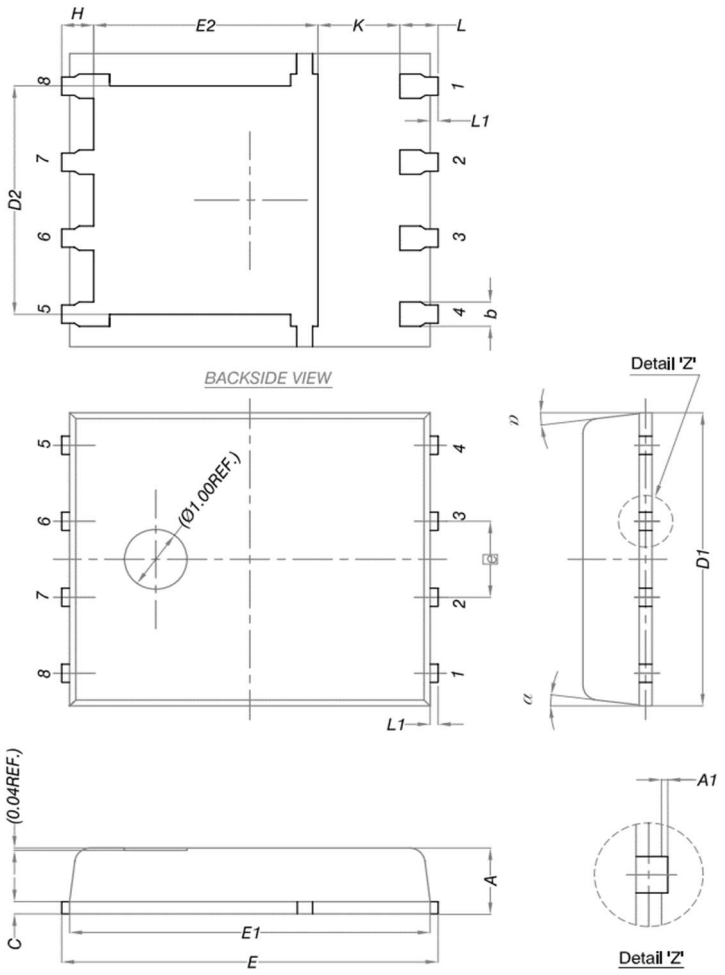

●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =$P_d/P_d$(25℃)




●Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



## ●Package Outline




| DIM. | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0 | - | 0.05 |
| b | 0.33 | 0.41 | 0.51 |
| C | 0.20 | 0.25 | 0.30 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 3.61 | 3.81 | 3.96 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 5.70 | 5.75 | 5.80 |
| E2 | 3.38 | 3.58 | 3.78 |
| e | 1.27 BSC | | |
| H | 0.41 | 0.51 | 0.61 |
| K | 1.10 | - | - |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.06 | 0.13 | 0.20 |
| α | 0° | - | 12° |

## ●Note

① Pulse : $V_{GS}$=+20V/-20V, Duty cycle=50%,$T_j$=175℃, t=1000 hours; For DC， the following test conditions can be passed: $V_{GS}$=+20V/-10V, $T_j$=175℃, t=1000 hours;

② Device mounted on 1 square inch FR-4 substrate PCB, 1oz copper, minimum footprint, tested in a still air environment with $T_A$=25℃;

③Practically the current will be limited by PCB, thermal design and operating temperature. $V_{GS}$=10V.

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## ●Revision History

| Version | Date | Change |
|---|---|---|
| A | 2024/5/10 | New |
| B | 2025/4/2 | Update Cxss condition and value. |
| C | 2026/7/2 | Apply new datasheet format. |
| | | |
| | | |
| | | |
| | | |