

● General Description

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

● Features

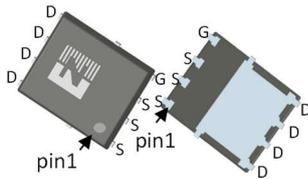
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low thermal resistance
- AEC-Q101 qualified

● Application

- BLDC motor driver
- DC-DC
- Load switch



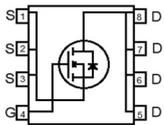
● Product Summary



DFN5\*6

● Ordering Information

Part NO.	ZMSA012N03NC
Marking	ZMS012N03
Packing information	REEL TAPE
Basic ordering unit (pcs)	3000



$V_{DS}=30V$

$R_{DS(ON)}=1.35mR$

$I_D=230A$



● Absolute Maximum Ratings ( $T_A=25^{\circ}C$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	$V_{DS}$		-	30	V
Gate-source voltage <sup>①</sup>	$V_{GS}$		-20	20	V
Continuous drain current	$I_D$	$V_{GS}=10V, T_C=25^{\circ}C$	-	230	A
	$I_D$	$V_{GS}=10V, T_C=75^{\circ}C$	-	188	A
	$I_D$	$V_{GS}=10V, T_C=100^{\circ}C$	-	163	A
Pulsed drain current	$I_{DM}$	Pulsed; $t_p \leq 10 \mu s; T_C = 25^{\circ}C$	-	920	A
Diode continuous current	$I_S$	$V_{GS}=0V, T_C=25^{\circ}C$	-	115	A
Diode pulse current	$I_{S,pulse}$	$V_{GS}=0V, Pulsed, t_p \leq 10 \mu s, T_C = 25^{\circ}C$	-	460	A
Total power dissipation	$P_D$	$T_C=25^{\circ}C$	-	150	W
Total power dissipation	$P_D$	$T_A=25^{\circ}C$	-	3.3	W
Operating junction temperature	$T_J$		-55	175	$^{\circ}C$
Storage temperature	$T_{STG}$		-55	175	$^{\circ}C$
Single pulse avalanche energy	$E_{AS}$	$L=0.1mH, V_{GS}=10V, R_g=25\Omega$	-	140	mJ
		$L=0.5mH, V_{GS}=10V, R_g=25\Omega$	-	252	mJ

ESD level (HBM)		CLASS 2
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● Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	$R_{thJC}$	-	-	1	°C/W
Thermal resistance, junction - ambient	$R_{thJA}^{\circledast}$	-	-	45	°C/W
Soldering temperature	$T_{sold}$	-	-	260	°C

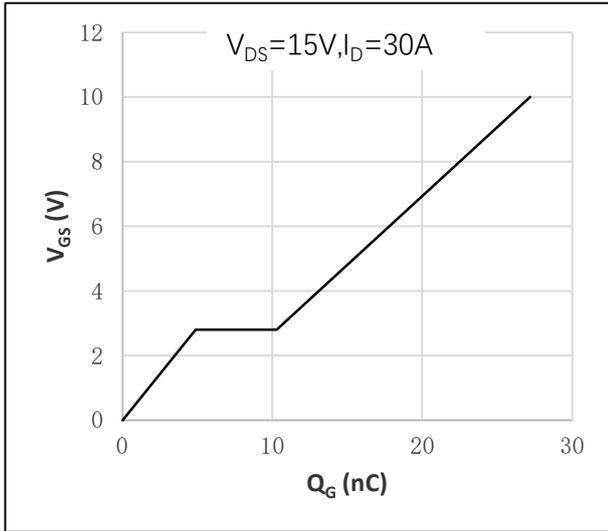
● Electronic Characteristics ( $T_j=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.3	1.7	2.5	V
Drain-source leakage current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=30V$	-	-	1	$\mu A$
Gate- source leakage current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static drain-source on resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A, T_j=25^{\circ}\text{C}$	-	1.3	1.6	m $\Omega$
		$V_{GS}=10V, I_D=30A, T_j=175^{\circ}\text{C}$	-	2.3	-	m $\Omega$
		$V_{GS}=4.5V, I_D=24A, T_j=25^{\circ}\text{C}$	-	2.4	-	m $\Omega$
Forward transconductance	$g_{FS}$	$V_{DS}=5V, I_{SD}=10A$	-	28	-	S
Diode forward voltage	$V_{FSD}$	$V_{GS}=0V, I_{SD}=30A$	-	0.8	1.3	V

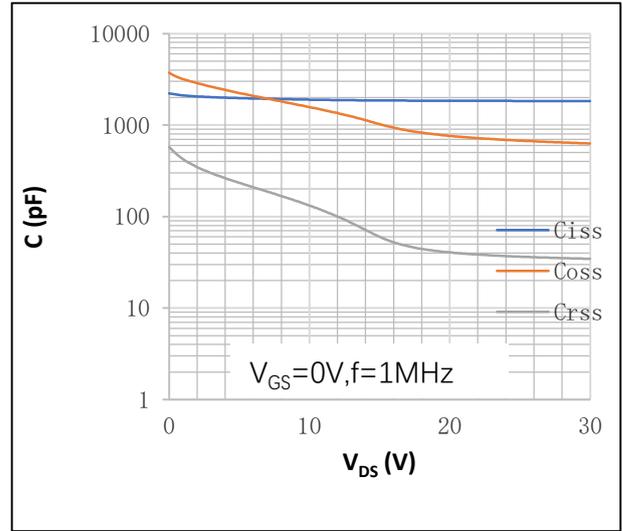
● Dynamic characteristics ( $T_j=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	$C_{iss}$	$f=1\text{MHz}, V_{DS}=15V, V_{GS}=0V$	-	1864	-	pF
Output capacitance	$C_{oss}$		-	1013	-	pF
Reverse transfer capacitance	$C_{rss}$		-	59	-	pF
Gate resistance	$R_g$	$f=1\text{MHz}$	-	2.8	-	$\Omega$
Total gate charge	$Q_g$	$V_{DD}=15V, I_D=30A, V_{GS}=10V$	-	27.2	-	nC
Total gate charge	$Q_{g(4.5V)}$		-	14.3	-	nC
Gate-source charge	$Q_{gs}$		-	4.9	-	nC
Gate-drain charge	$Q_{gd}$		-	5.4	-	nC
Turn-on delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=30A$	-	13	-	ns
Turn-on rise time	$t_r$		-	8	-	ns
Turn-off delay time	$t_{D(off)}$		-	47	-	ns
Turn-off fall time	$t_f$		-	8	-	ns
Reverse recovery time	$t_{rr}$	$V_{DD}=15V, dI_S/dt=100A/\mu s, I_S=30A$	-	22	-	ns
Reverse recovery charge	$Q_{rr}$		-	27	-	nC

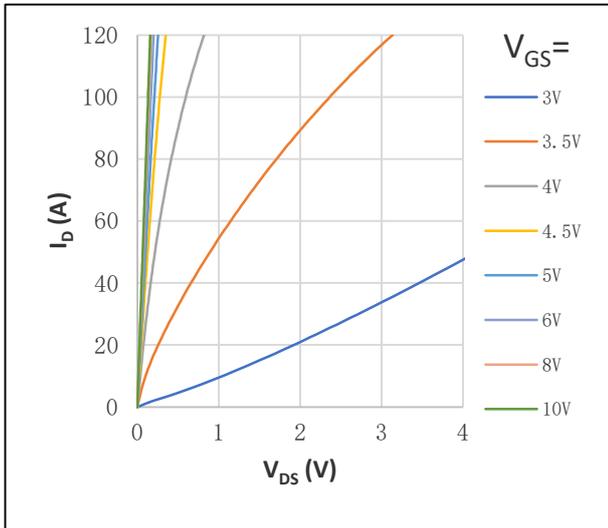
● Fig.1 Gate-source voltage as a function of gate charge; Typical values;  $T_j=25^\circ\text{C}$



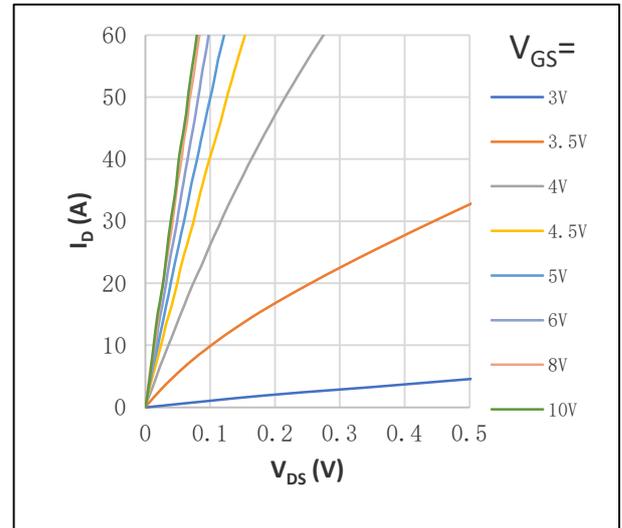
● Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values;  $T_j=25^\circ\text{C}$



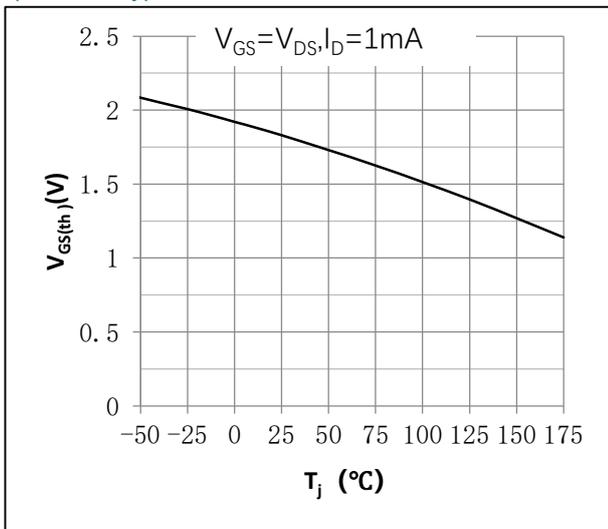
● Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values;  $T_j=25^\circ\text{C}$



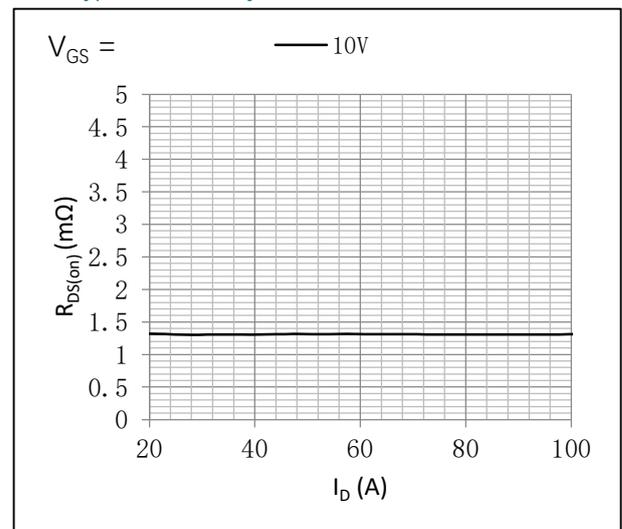
● Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve;  $T_j=25^\circ\text{C}$



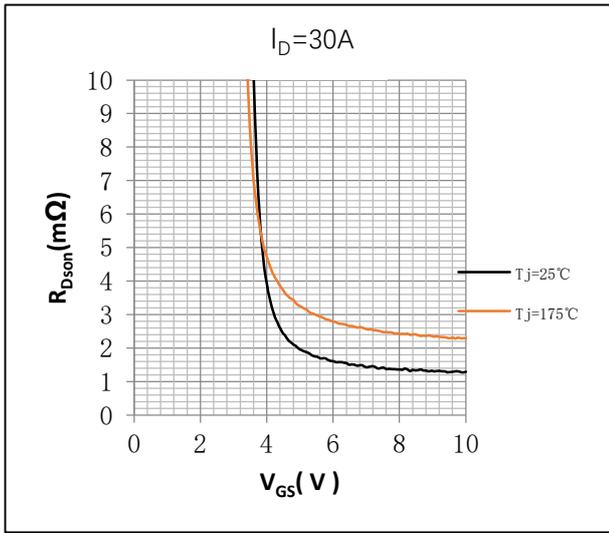
● Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



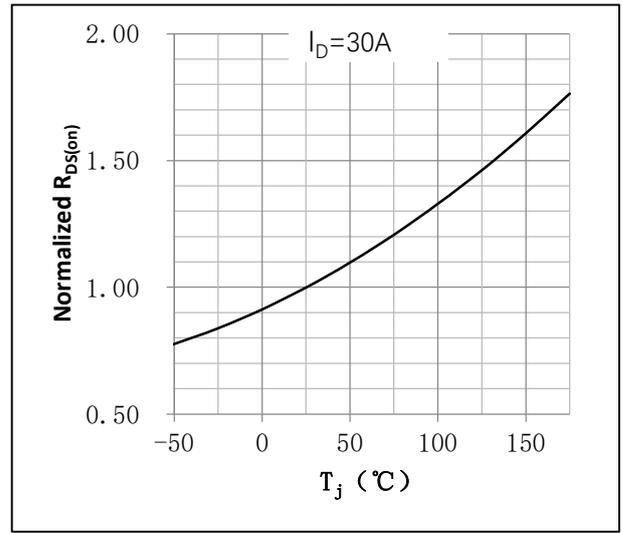
● Fig.6 Drain-source on-state resistance as a function of drain current; Typical values;  $T_j=25^\circ\text{C}$



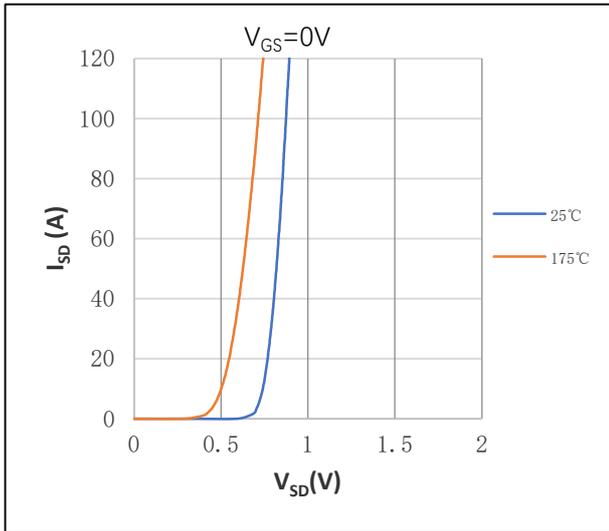
● Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



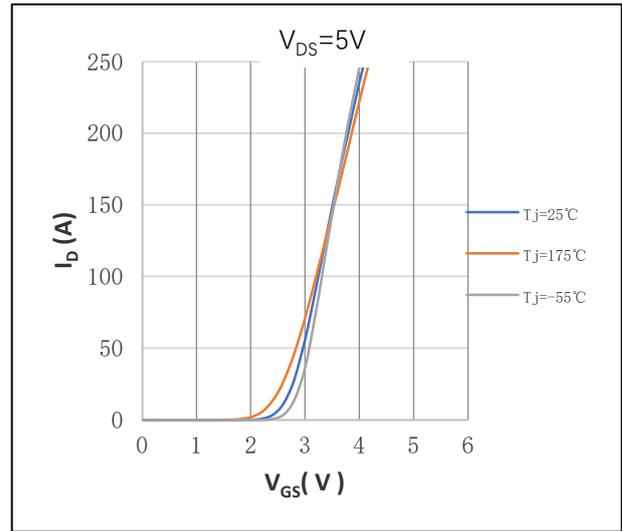
● Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance =  $R_{DS(on)}/R_{DS(on)}(25^{\circ}\text{C})$



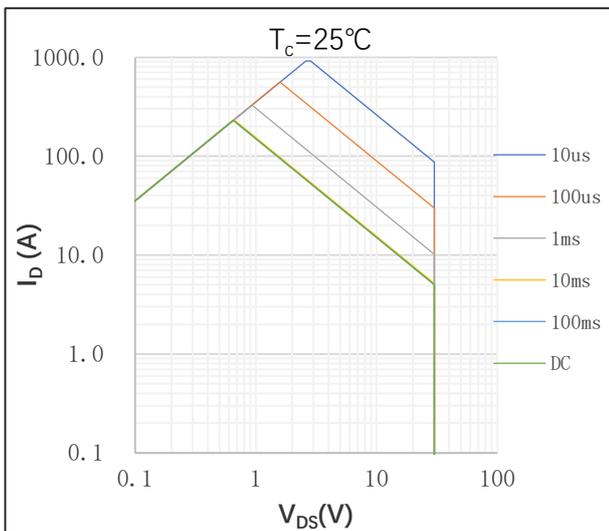
● Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



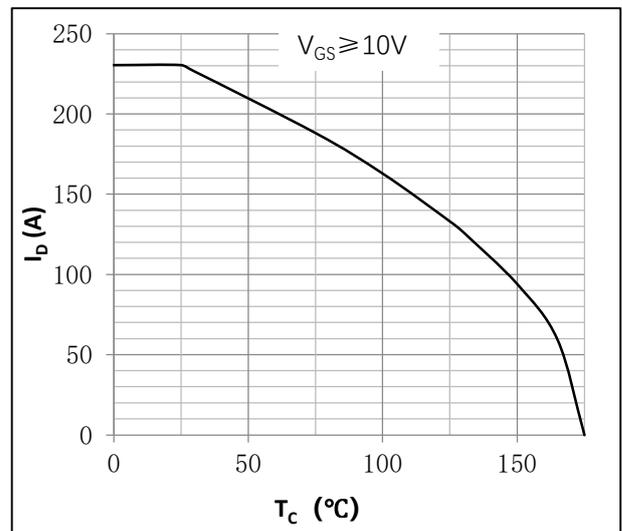
● Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



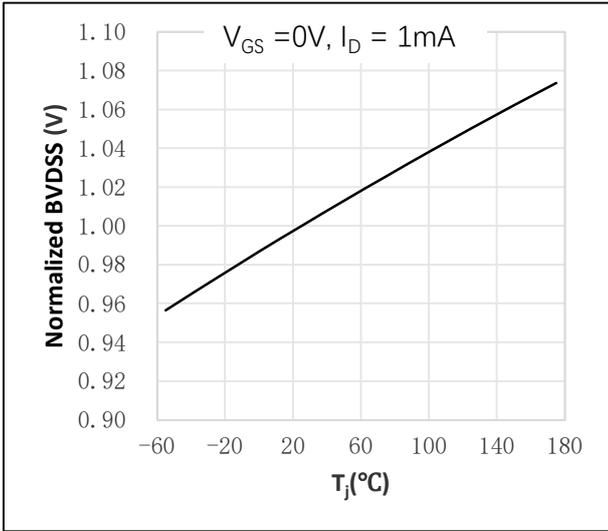
● Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



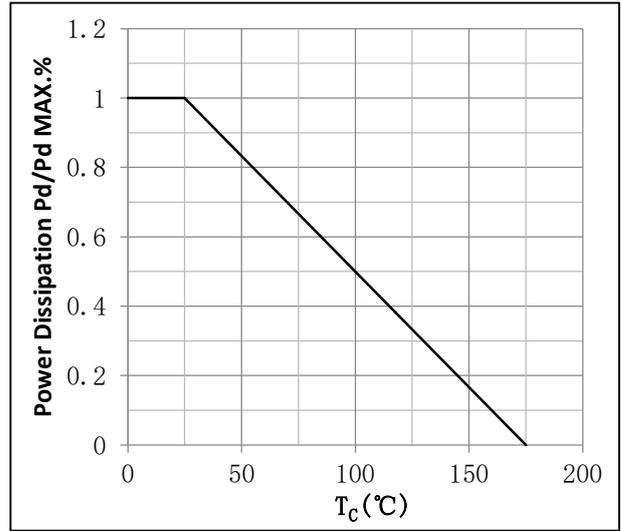
● Fig.12 Continuous drain current as a function of case temperature<sup>3</sup>; Calculative values



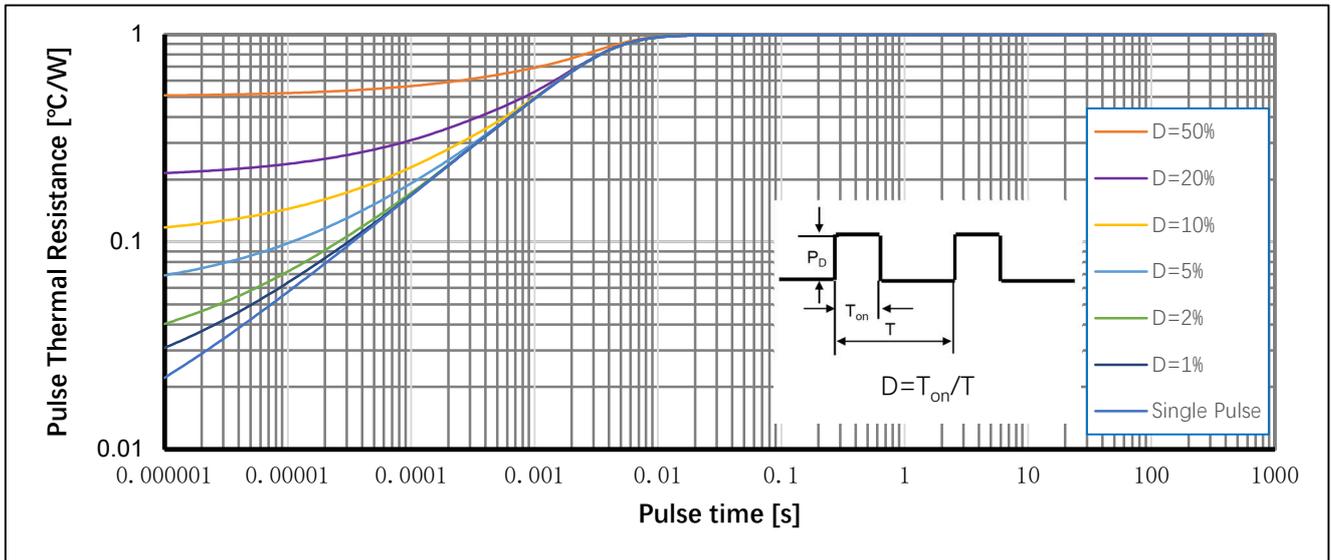
● Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized  $BV_{DSS} = BV_{DSS} / BV_{DSS}(25^\circ\text{C})$



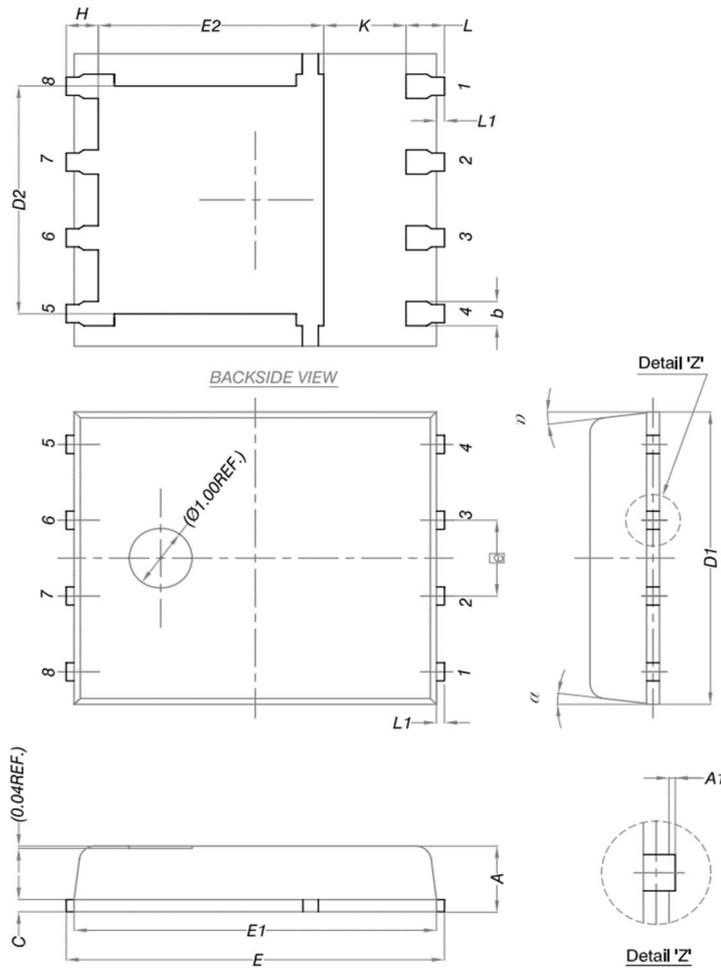
● Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation  $= P_d / P_d(25^\circ\text{C})$



● 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
<span style="border: 1px solid black; padding: 2px;">e</span>	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
$\alpha$	0°	-	12°

## ● Note

- ① Pulse :  $V_{GS}=+20V/-20V$ , Duty cycle=50%,  $T_j=175^{\circ}C$ ,  $t=1000$  hours; For DC , the following test conditions can be passed:  $V_{GS}=+20V/-10V$ ,  $T_j=175^{\circ}C$ ,  $t=1000$  hours;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ③ Practically 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	2026.1.22	New