

● General Description

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

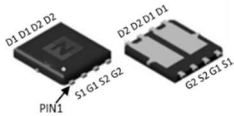
● Features

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

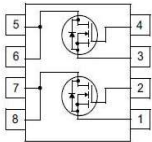
● Application

- BLDC motor driver
- DC-DC
- Load switch

● Product Summary



DFN3*3



$V_{DS}=100V$

$R_{DS(ON)}=63.4mR$

$I_D=17A$



● Ordering Information

Part NO.	ZMD68190M
Marking	68190
Packing information	REEL TAPE
Basic ordering unit (pcs)	5000

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	100	V
Gate-source voltage ^①	V_{GS}		-20	20	V
Continuous drain current	I_D	$V_{GS}=10V, T_C=25^{\circ}C$	-	17	A
	I_D	$V_{GS}=10V, T_C=75^{\circ}C$	-	14	A
	I_D	$V_{GS}=10V, T_C=100^{\circ}C$	-	12	A
Pulsed drain current	I_{DM}	Pulsed; $t_p \leq 10 \mu s; T_C = 25^{\circ}C$	-	51	A
Diode continuous current	I_S	$V_{GS}=0V, T_C=25^{\circ}C$	-	17	A
Diode pulse current	$I_{S,pulse}$	$V_{GS}=0V, Pulsed, t_p \leq 10 \mu s, T_C = 25^{\circ}C$	-	51	A
Total power dissipation	P_D	$T_C=25^{\circ}C$	-	50	W
Total power dissipation	P_D	$T_A=25^{\circ}C$	-	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}	$L=0.1mH, V_{GS}=10V, R_g=25\Omega$	-	0.8	mJ
		$L=0.5mH, V_{GS}=10V, R_g=25\Omega$	-	1.4	mJ

ESD level (HBM)		CLASS 1B
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● Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3	°C/W
Thermal resistance, junction - ambient	$R_{thJA}^{\text{②}}$	-	-	50	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

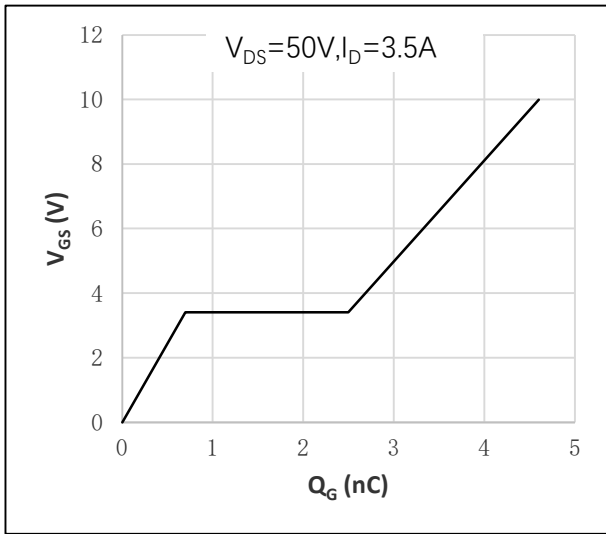
● Electronic Characteristics ($T_j=25^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.3	1.9	2.5	V
Drain-source leakage current	I_{DSS}	$V_{GS}=0V, V_{DS}=100V$	-	-	1	μA
Gate- source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static drain-source on resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.5A, T_j=25^{\circ}\text{C}$	-	63.4	79.3	m Ω
		$V_{GS}=10V, I_D=3.5A, T_j=175^{\circ}\text{C}$	-	138.3	-	m Ω
		$V_{GS}=4.5V, I_D=2A, T_j=25^{\circ}\text{C}$	-	88.2	-	m Ω
Forward transconductance	g_{FS}	$V_{DS}=5V, I_{SD}=10A$	-	6	-	S
Diode forward voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=10A$	-	0.9	1.3	V

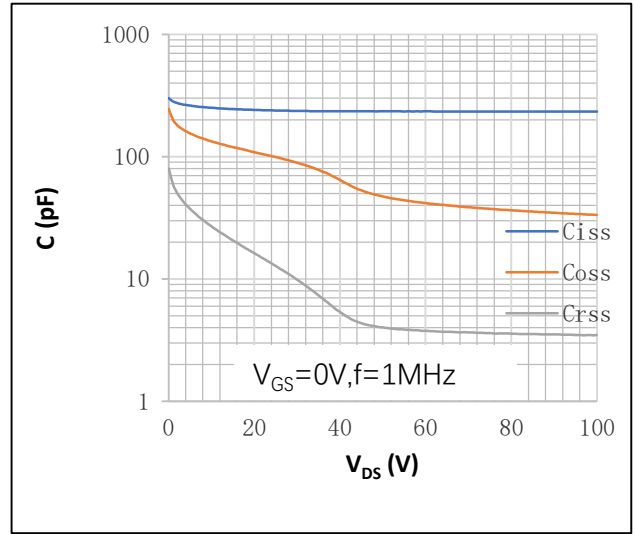
● Dynamic characteristics ($T_j=25^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1\text{MHz}, V_{DS}=50V, V_{GS}=0V$	-	235	-	pF
Output capacitance	C_{oss}		-	47	-	pF
Reverse transfer capacitance	C_{rss}		-	4	-	pF
Gate resistance	R_g	$f=1\text{MHz}$	-	3.8	-	Ω
Total gate charge	Q_g	$V_{DD}=50V, I_D=3.5A, V_{GS}=10V$	-	4.6	-	nC
Total gate charge	$Q_{g(4.5V)}$		-	2.9	-	nC
Gate-source charge	Q_{gs}		-	0.7	-	nC
Gate-drain charge	Q_{gd}		-	1.8	-	nC
Turn-on delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=50V, R_G=3.3\Omega, I_D=3.5A$	-	2	-	ns
Turn-on rise time	t_r		-	2	-	ns
Turn-off delay time	$t_{D(off)}$		-	6	-	ns
Turn-off fall time	t_f		-	1	-	ns
Reverse recovery time	t_{rr}	$V_{DD}=50V, dI_S/dt=100A/\mu s, I_S=3.5A$	-	9	-	ns
Reverse recovery charge	Q_{rr}		-	7	-	nC

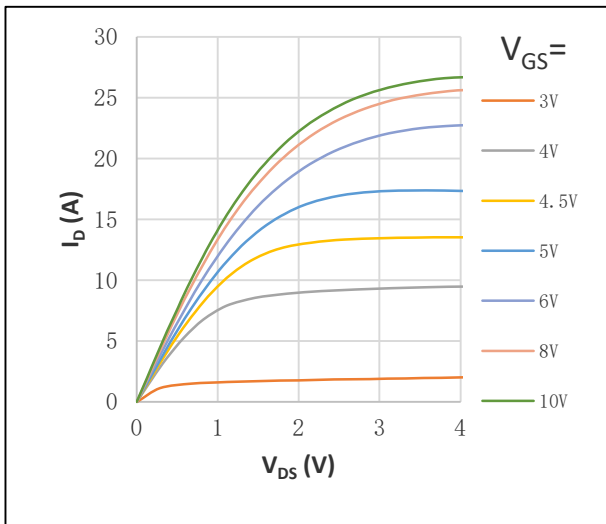
● Fig.1 Gate-source voltage as a function of gate charge; Typical values; $T_j=25^\circ\text{C}$



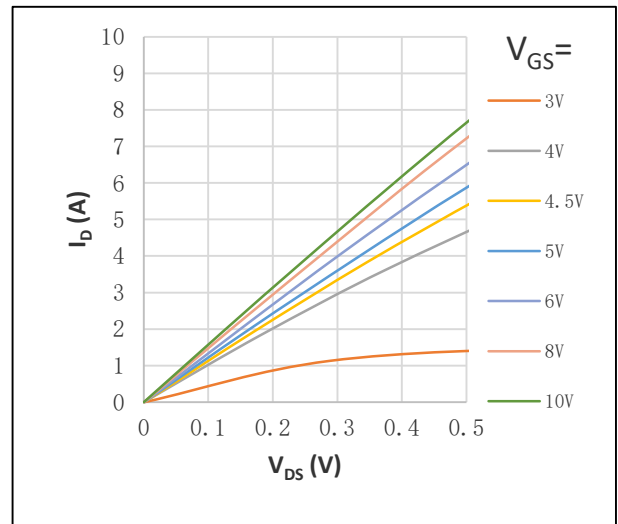
● Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; $T_j=25^\circ\text{C}$



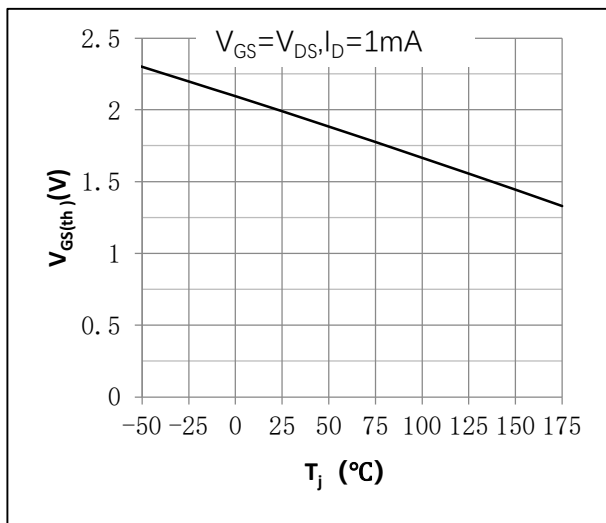
● Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; $T_j=25^\circ\text{C}$



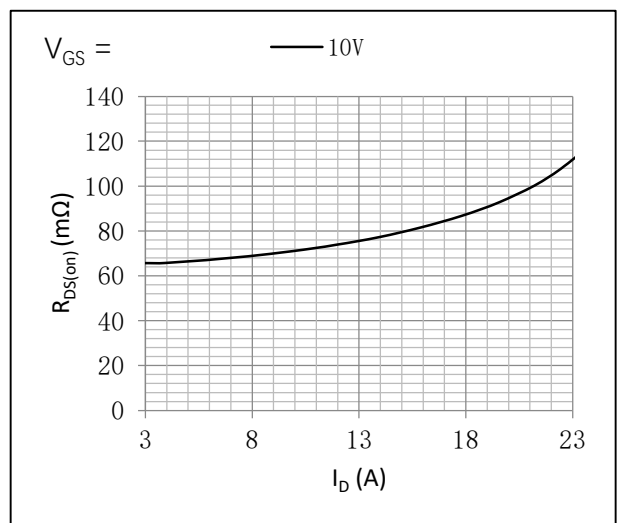
● Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; $T_j=25^\circ\text{C}$



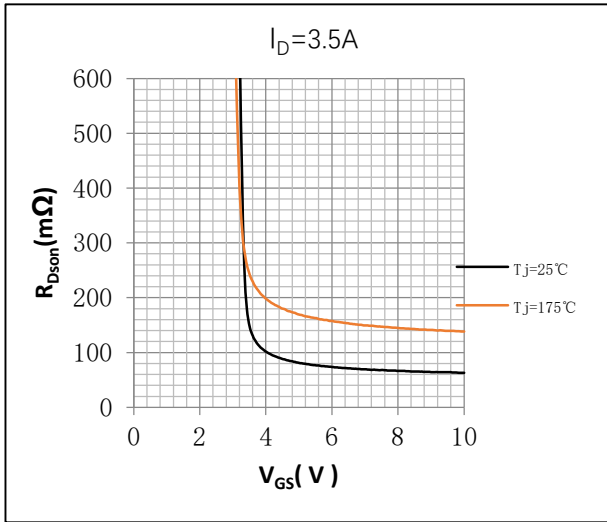
● Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



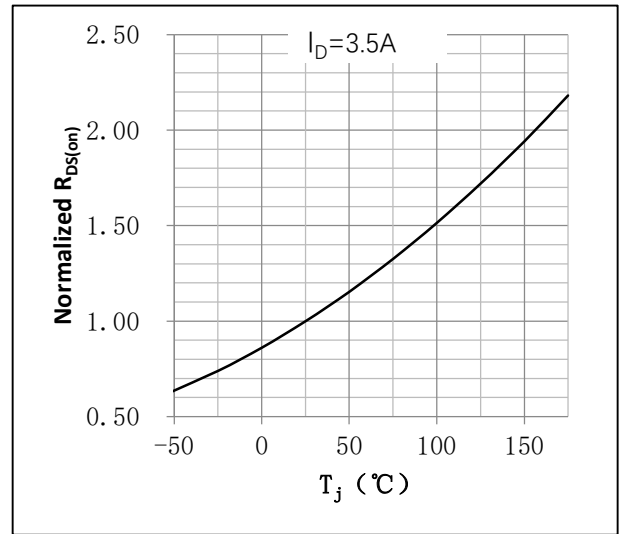
● Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; $T_j=25^\circ\text{C}$



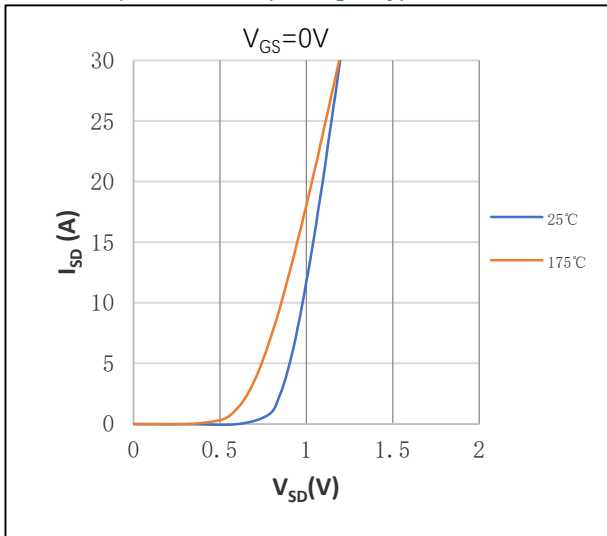
● Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



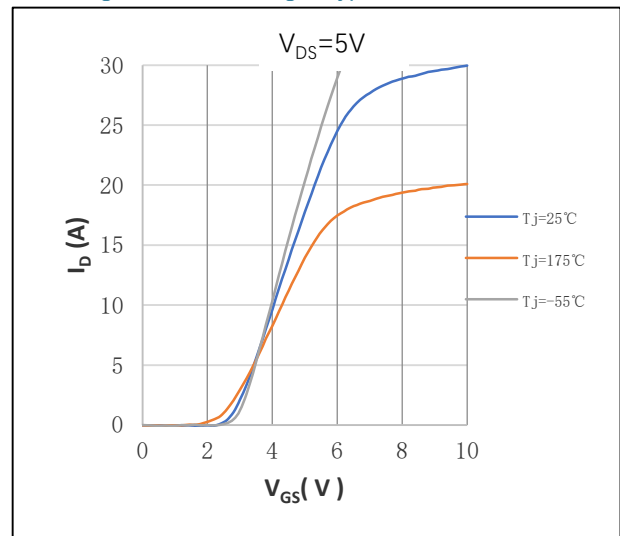
● Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance = $R_{DS(on)}/R_{DS(on)}(25^{\circ}\text{C})$



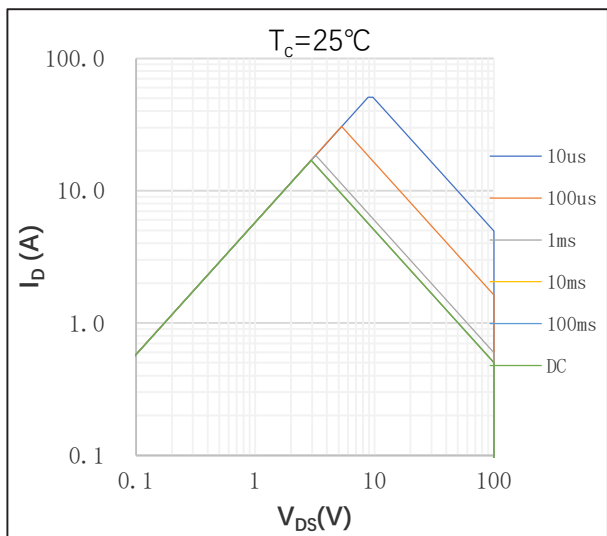
● Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



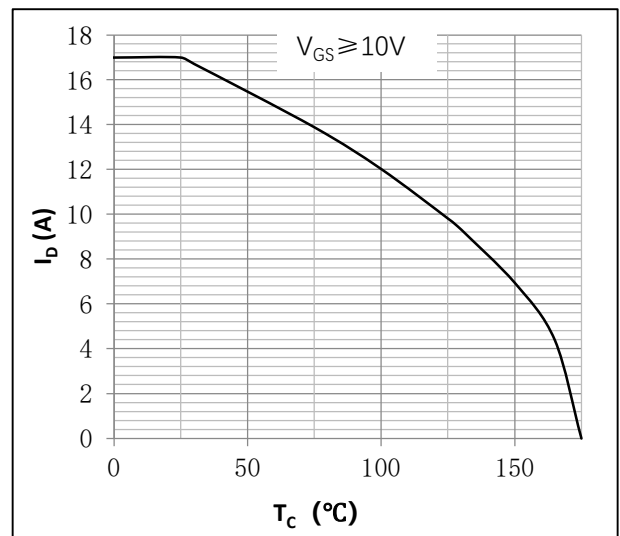
● Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



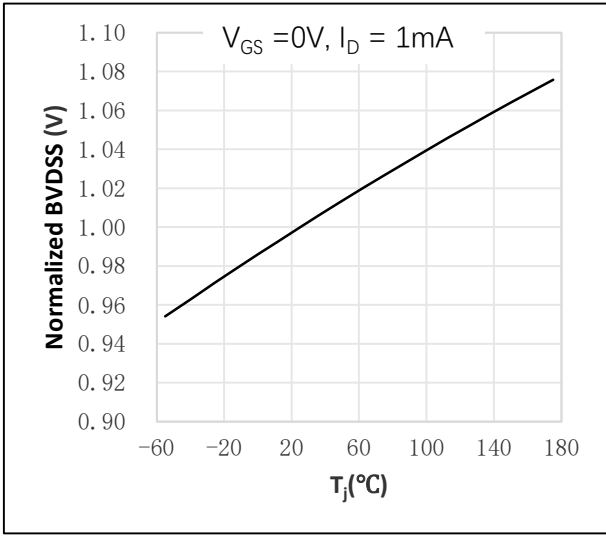
● Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



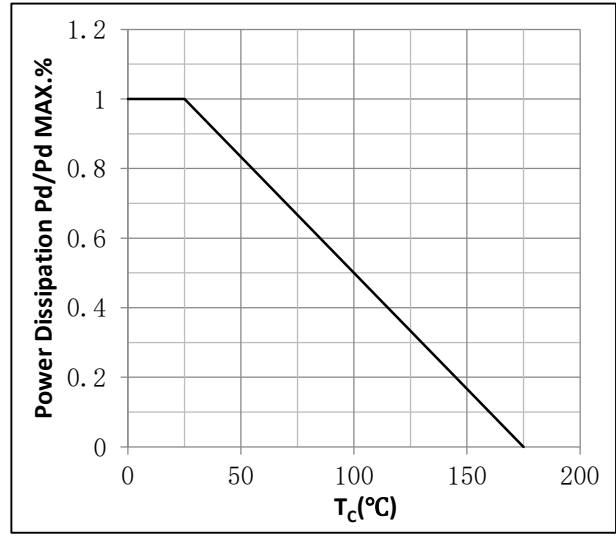
● Fig.12 Continuous drain current as a function of case temperature²; Calculative values



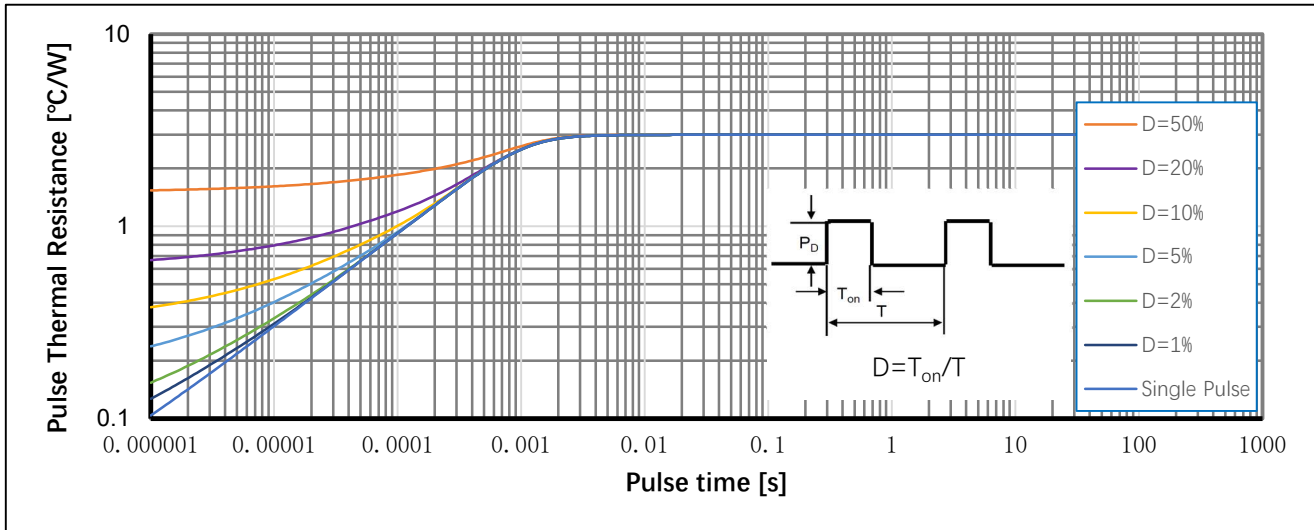
● Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized $BV_{DSS} = BV_{DSS} / BV_{DSS}(25^{\circ}C)$



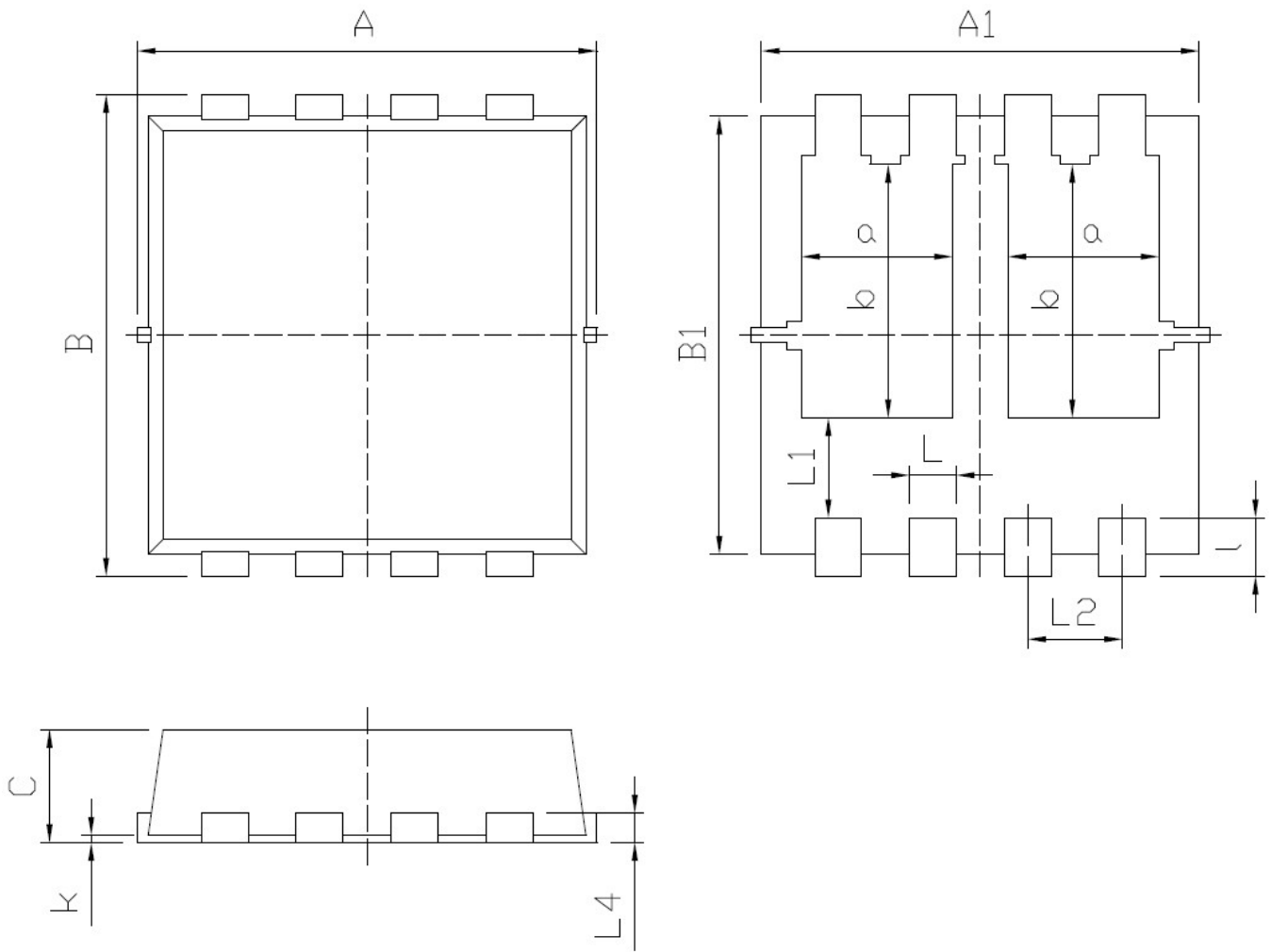
● Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation = $P_d / P_d(25^{\circ}C)$



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



● Package Outline



Dimensions In Millimeterer			
Symbol	MIN	TYP	MAX
A	3.20	3.30	3.40
A1	3.10	3.15	3.20
B	3.20	3.30	3.40
B1	2.95	3.00	3.05
C	0.75	0.80	0.85
L	0.25	0.30	0.35
L1	-	-	0.75
L2	0.55	0.65	0.75
L4	0.14	0.15	0.20
a	0.935	1.035	1.135
b	1.635	1.735	1.835
k	0.00	-	0.05
l	0.30	0.40	0.50

● Note

① Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

② 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	2026.3.13	New