●General Description

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

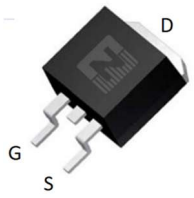
●Features

■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



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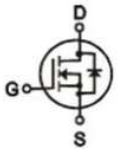


V_{DS}=200V
$R_{DS(ON)}$ =12.5mR
I_D=96A

RoHS REACH HF

●Ordering Information

Part NO.	ZMS140N20HB
Marking	ZMS140N20H
Packing information	REEL TAPE
Basic ordering unit (pcs)	800

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	200	V
Gate-source voltage	V_{GS}		-20	20	V
Continuous drain current	I_D	V_{GS}=10V, T_C=25℃	-	96	A
	I_D	V_{GS}=10V, T_C=75℃	-	78	A
	I_D	V_{GS}=10V, T_C=100℃	-	68	A
Pulsed drain current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C	-	384	A
Diode continuous current	I_S	V_{GS}=0V, T_C=25℃	-	96	A
Diode pulse current	$I_{S,pulse}$	V_{GS}=0V, Pulsed, t_p ≤ 10 μs, T_C = 25 °C	-	384	A
Total power dissipation	P_D	T_C=25℃	-	366	W
Total power dissipation	P_D	T_A=25℃	-	2.4	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	-	336	mJ
		L=0.5mH, V_{GS}=10V, R_g=25Ω	-	605	mJ

ESD level (HBM)		CLASS 2

● Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	0.41	°C/W
Thermal resistance, junction - ambient	R_{thJA} ①	-	-	62	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

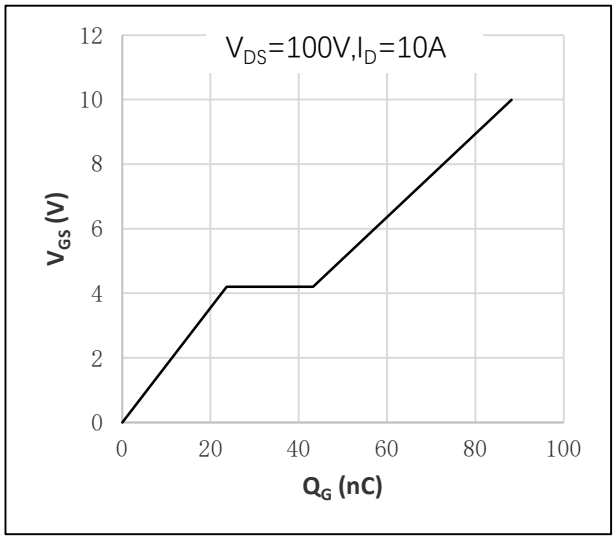
● Electronic Characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	200	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	2	3	4	V
Drain-source leakage current	I_{DSS}	V_{GS}=0V, V_{DS}=200V	-	-	1	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=10A, T_j=25℃	-	12.5	15	mΩ
		V_{GS}=10V, I_D=10A, T_j=175℃	-	33.4	-	mΩ
Forward transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A	-	35	-	S
Diode forward voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 10A	-	0.8	1.3	V

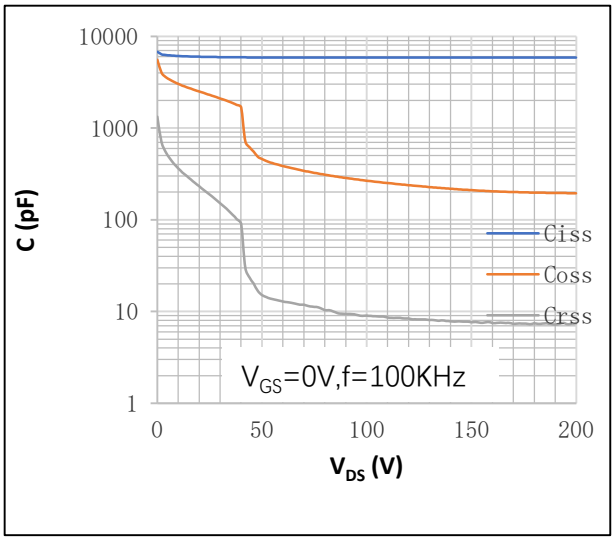
● Dynamic characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz, V_{DS}=100V, V_{GS}=0V	-	5892	-	pF
Output capacitance	C_{oss}		-	266	-	pF
Reverse transfer capacitance	C_{rss}		-	9	-	pF
Gate resistance	R_g	f = 1MHz	-	1.7	-	Ω
Total gate charge	Q_g	V_{DD} = 100V, I_D = 10A, V_{GS} = 10V	-	88.2	-	nC
Gate-source charge	Q_{gs}		-	23.7	-	nC
Gate-drain charge	Q_{gd}		-	19.6	-	nC
Turn-on delay time	$t_{D(on)}$	V_{GS}=10V, V_{DS}=100V, R_G =3.3Ω, I_D =10A	-	11	-	ns
Turn-on rise time	t_r		-	11	-	ns
Turn-off delay time	$t_{D(off)}$		-	18	-	ns
Turn-off fall time	t_f		-	6	-	ns
Reverse recovery time	t_{rr}	V_{DD}=100V, dIs/dt = 100A/us, I_S=10A	-	34	-	ns
Reverse recovery charge	Q_{rr}		-	125	-	nC

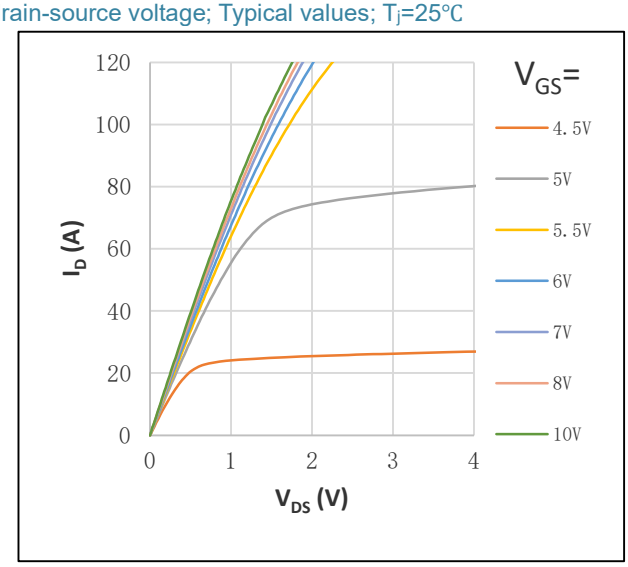
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



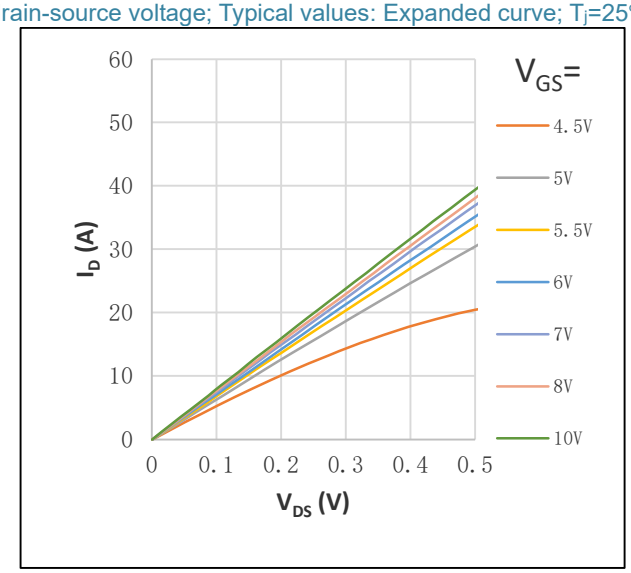
●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



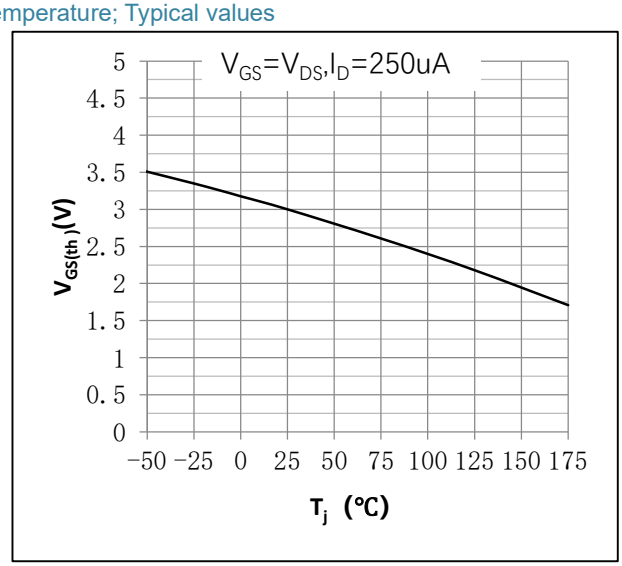
●Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; T_j=25℃



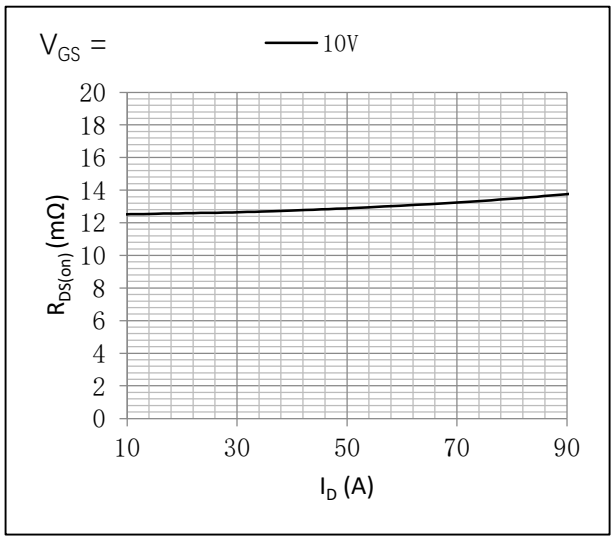
●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; T_j=25℃



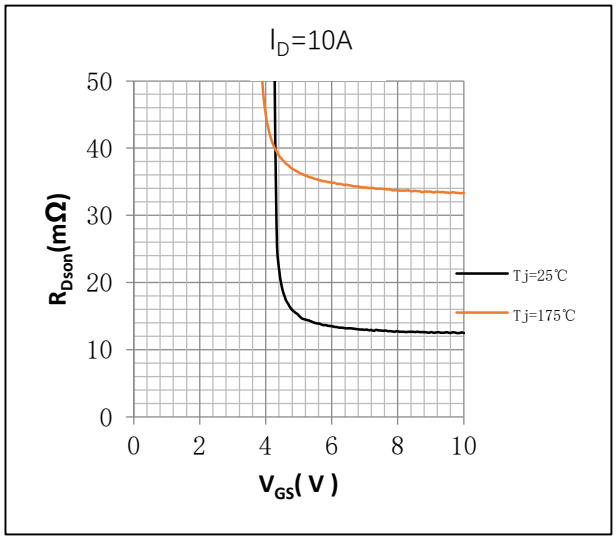
●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



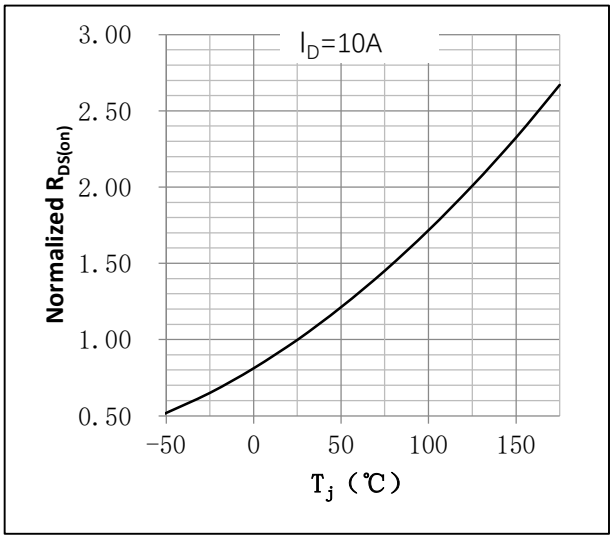
●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



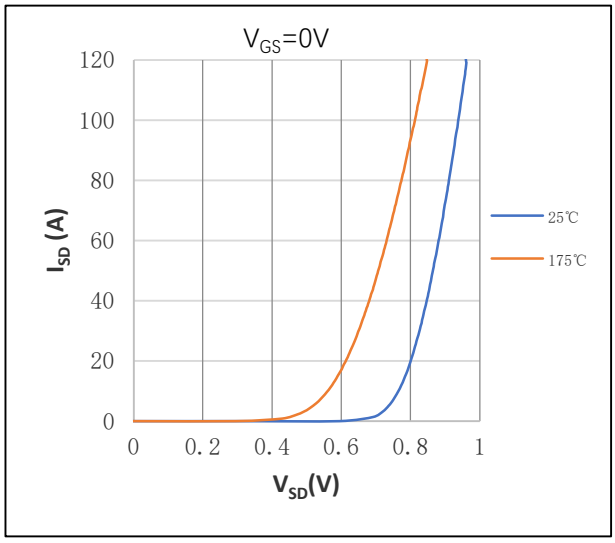
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



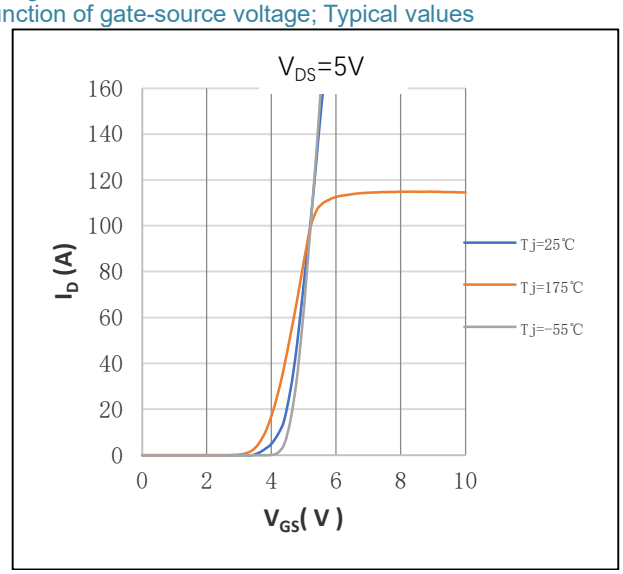
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=R_{DSon}/R_{DSon}(25℃)



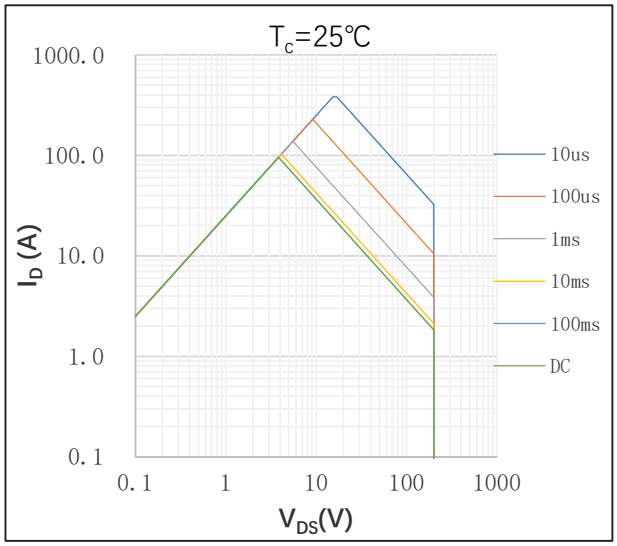
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



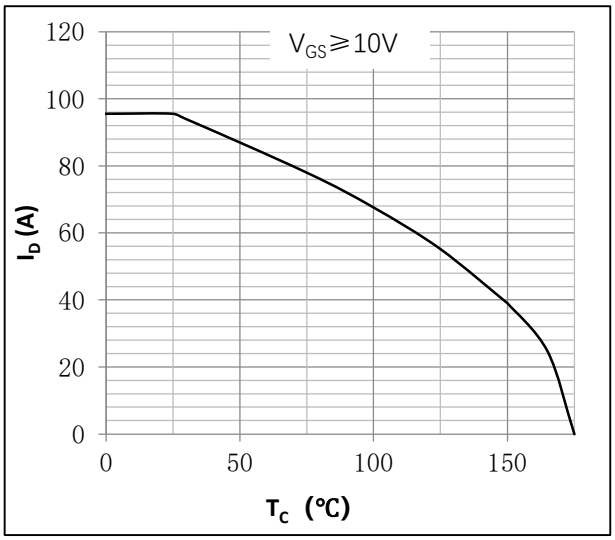
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



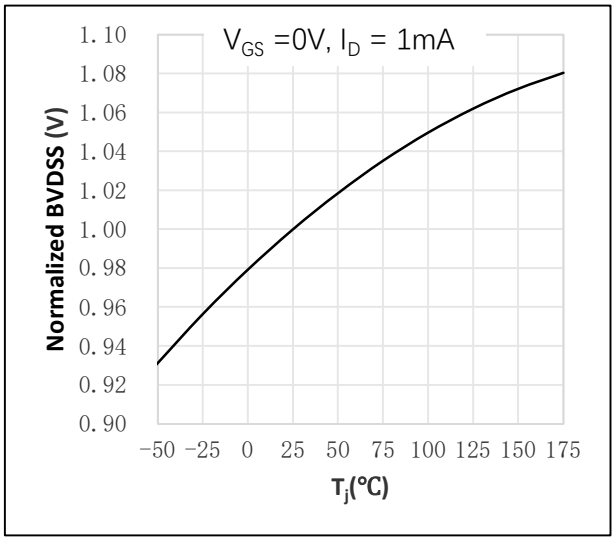
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



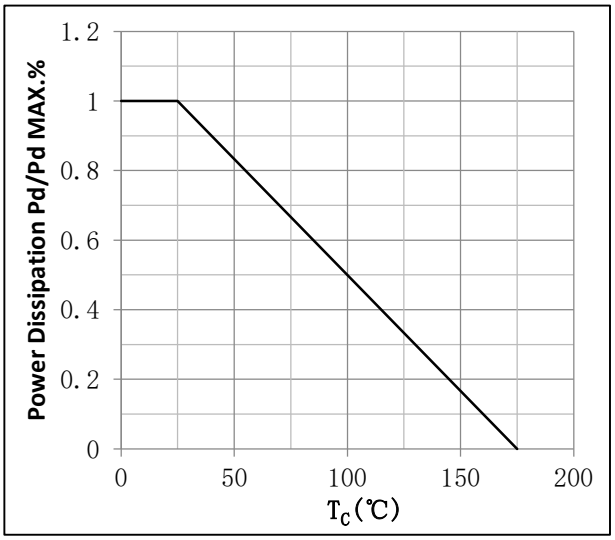
●Fig.12 Continuous drain current as a function of case temperature[2];Calculative values



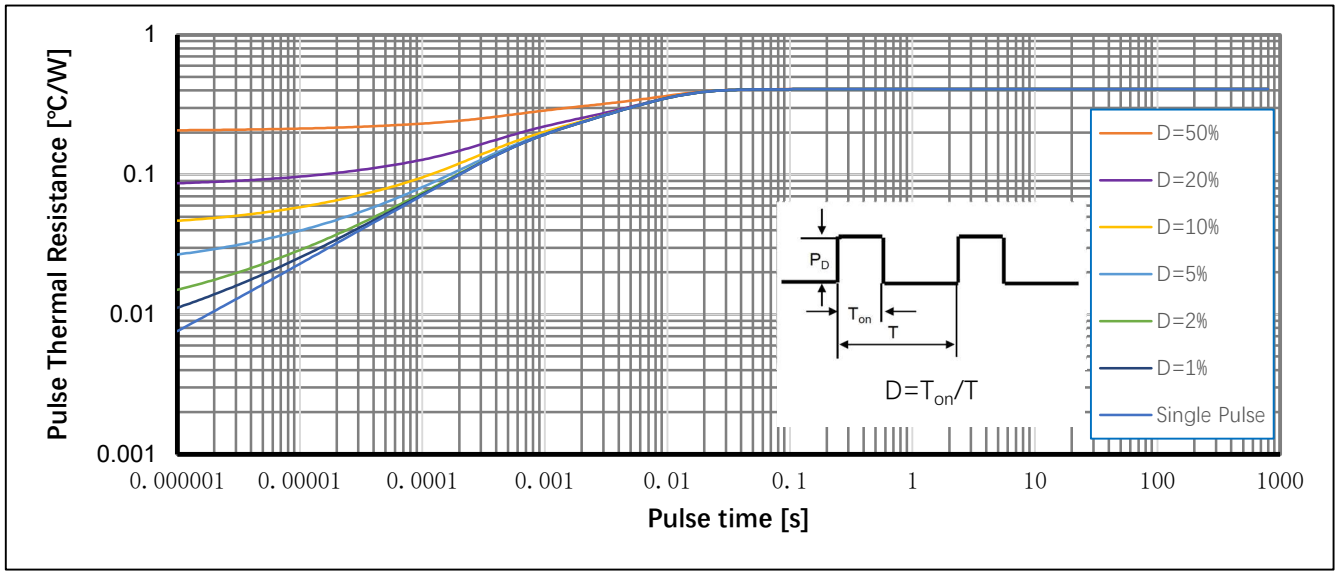
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized BV_{DSS} =BV_{DSS}/BV_{DSS}(25℃)



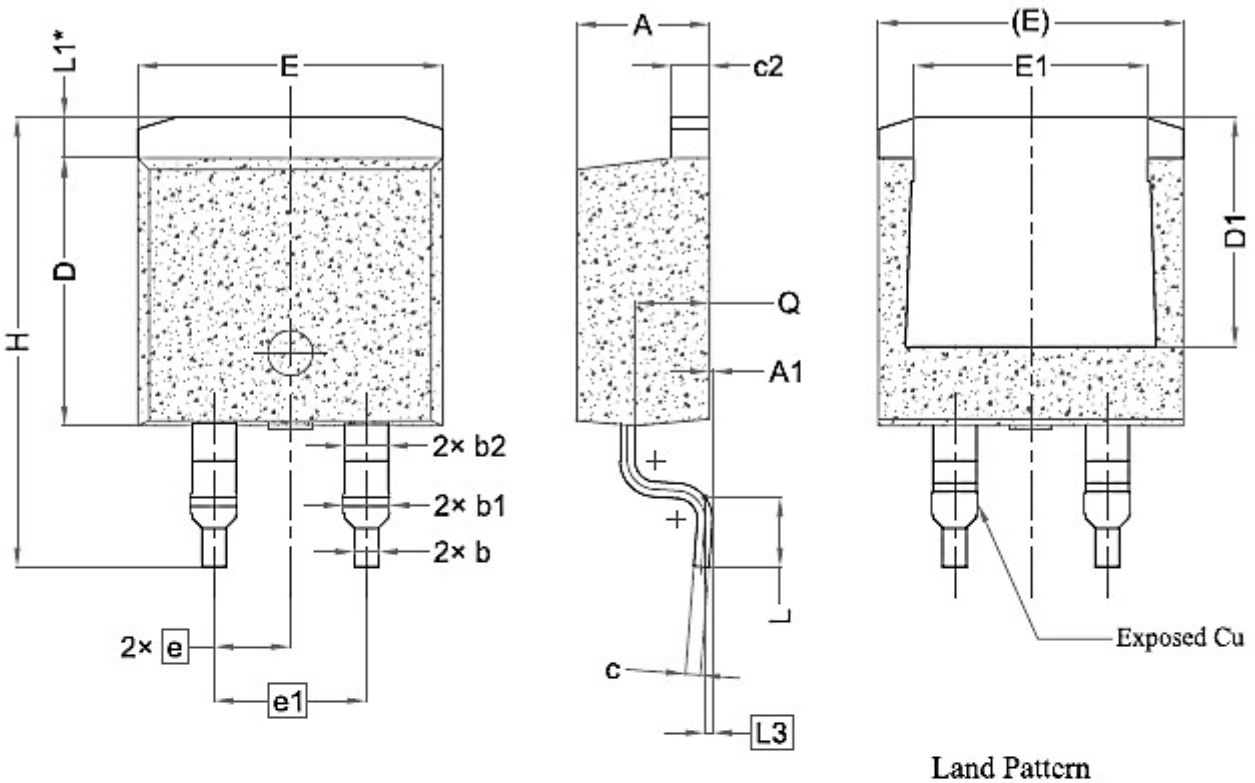
●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =P_d/P_d(25℃)

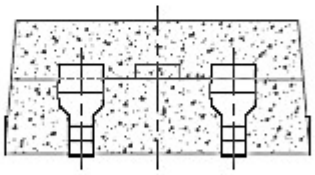


●Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values

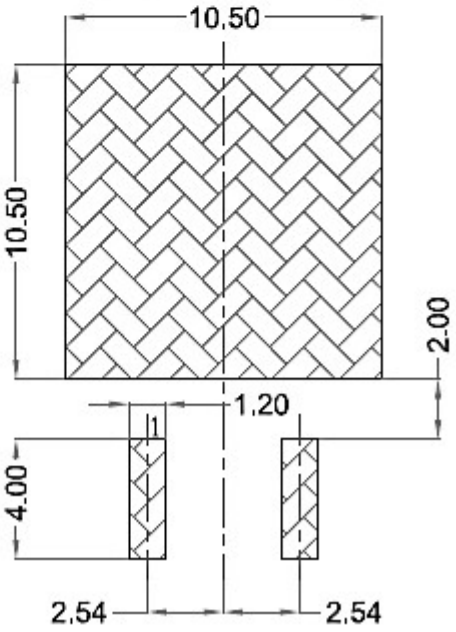


●Package Outline





Land Pattern
(Only for Reference)



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	—
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	2.54 BSC		
e1	5.08 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

●Note

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

②Practically 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	2026/1/15	New