General Description

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

Features

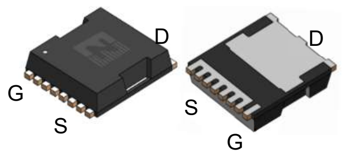
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low thermal resistance
- AEC-Q101 qualified

Application

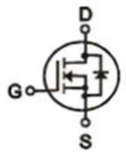
- BLDC motor driver
- DC-DC
- Load switch

ZMJSEMI Automotive

Product Summary



TOLL



V_{DS}=200V

$R_{DS(ON)}$ =9.5mR

I_D=143A

RoHS REACH HF

Ordering Information

Part NO.	ZMSA100N20HR
Marking	ZMS100N20H
Packing information	REEL TAPE
Basic ordering unit (pcs)	2000

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	200	V
Gate-source voltage①	V_{GS}		-20	20	V
Continuous drain current	I_D	V_{GS}=10V, T_C=25℃	-	143	A
	I_D	V_{GS}=10V, T_C=75℃	-	117	A
	I_D	V_{GS}=10V, T_C=100℃	-	101	A
Pulsed drain current ①	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C;	-	572	A
Total power dissipation	P_D	T_C=25℃	-	625	W
Total power dissipation	P_D	T_A=25℃	-	3.8	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,	-	583	mJ
		L=0.5mH, V_{GS}=10V, R_g=25Ω,	-	1049	mJ
ESD level (HBM)			CLASS 2		

Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	0.24	°C/W
Thermal resistance, junction - ambient	R_{thJA} ②	-	-	40	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

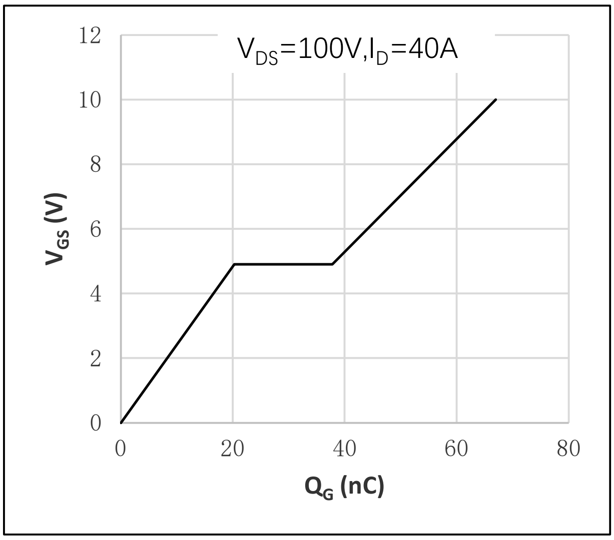
Electronic Characteristics (T_j=25°C, unless otherwise specified)

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=40A, T_j=25℃	-	9.5	11.4	mΩ
		V_{GS}=10V, I_D=40A, T_j=175℃	-	25.1	-	mΩ
Forward transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A	-	31	-	S
Diode forward voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 40A	-	-	1.3	V

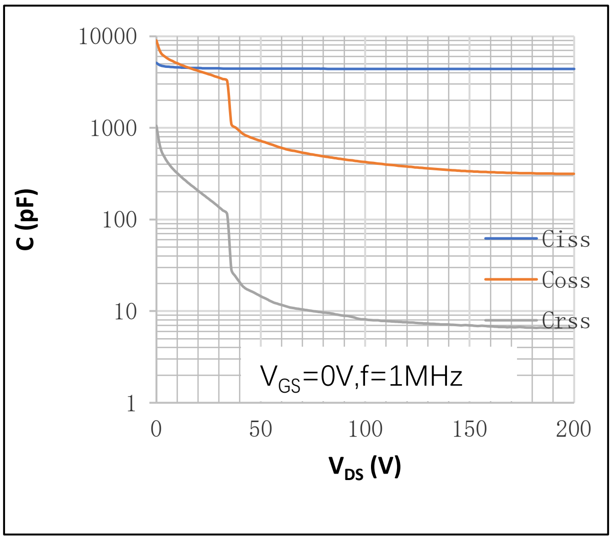
Dynamic characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz, V_{DS}=100V, V_{GS}=0V	-	4408	-	pF
Output capacitance	C_{oss}		-	424	-	pF
Reverse transfer capacitance	C_{rss}		-	8	-	pF
Gate resistance	R_g	f = 1MHz	-	2	-	Ω
Total gate charge	Q_g	V_{DD} = 100V, I_D = 40A, V_{GS} = 10V	-	67	-	nC
Gate-source charge	Q_{gs}		-	20.3	-	nC
Gate-drain charge	Q_{gd}		-	17.5	-	nC
Turn-on delay time	$t_{D(on)}$	V_{GS}=10V, V_{DS}=100V, R_G =3.3Ω, I_D =40A	-	15	-	ns
Turn-on rise time	t_r		-	17	-	ns
Turn-off delay time	$t_{D(off)}$		-	24	-	ns
Turn-off fall time	t_f		-	9	-	ns
Reverse recovery time	t_{rr}	V_{DD}=100V, dI_S/dt = 100A/us, I_S=40A	-	42	-	ns
Reverse recovery charge	Q_{rr}		-	176	-	nC

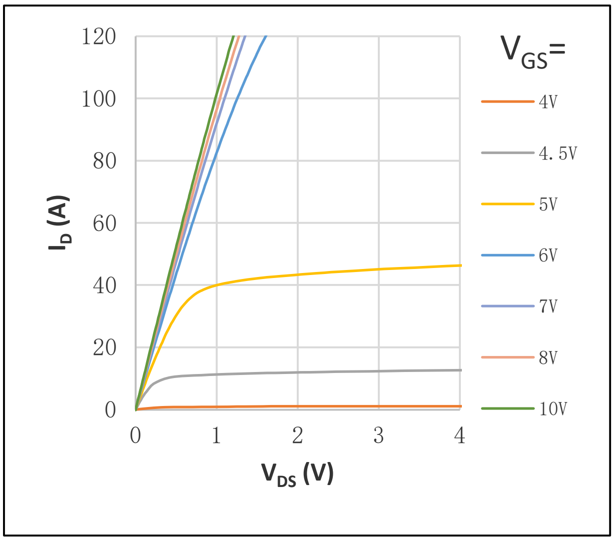
● Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



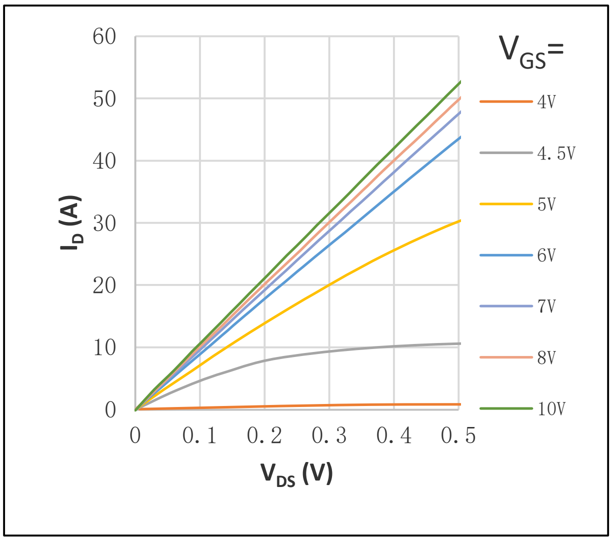
● Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



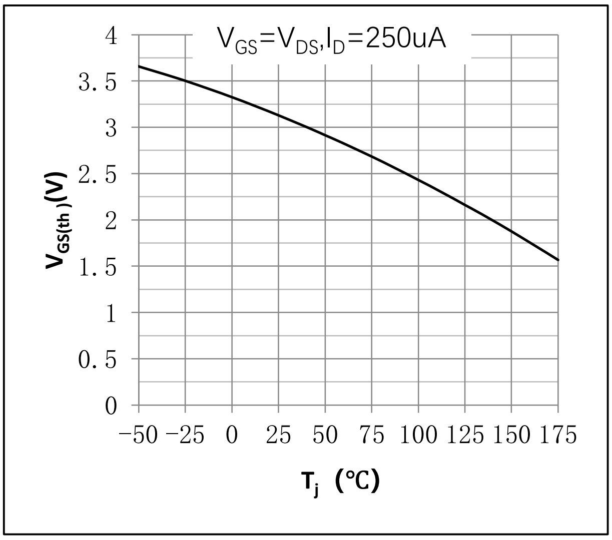
● Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; T_j=25℃



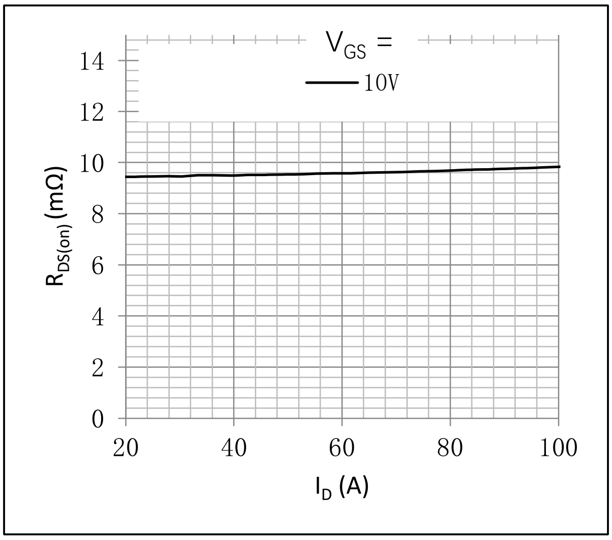
● Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; T_j=25℃



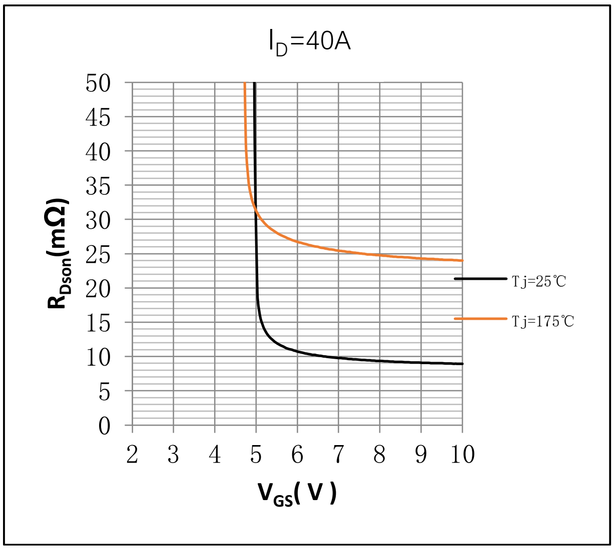
● Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



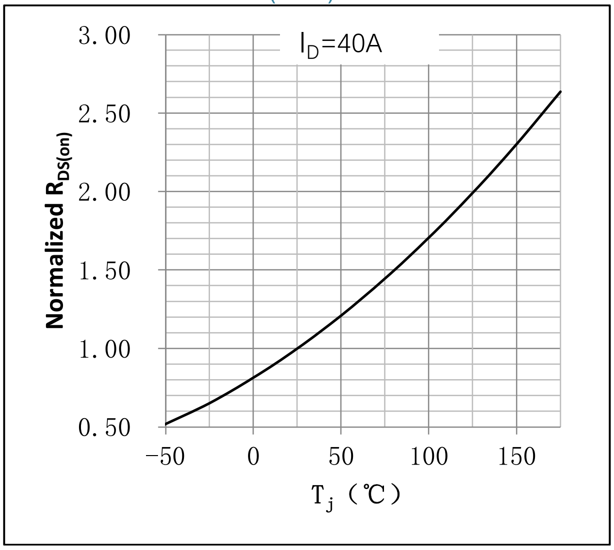
● Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



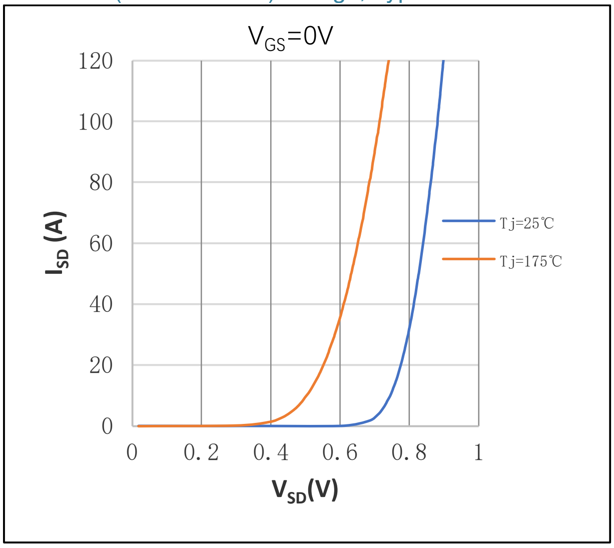
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



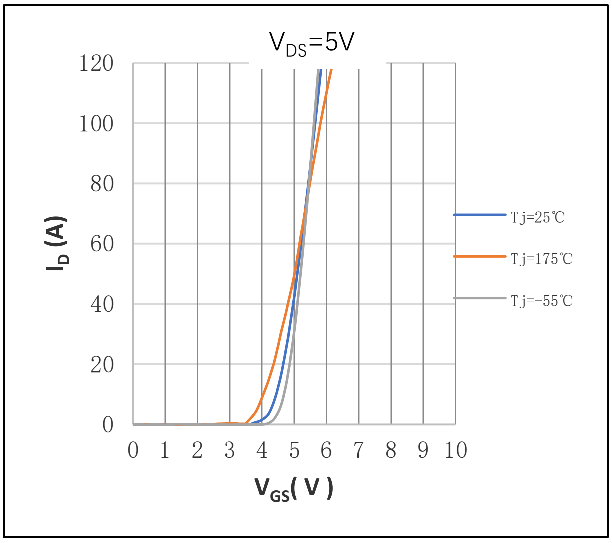
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=$R_{DSon}/R_{DSon}(25℃)$



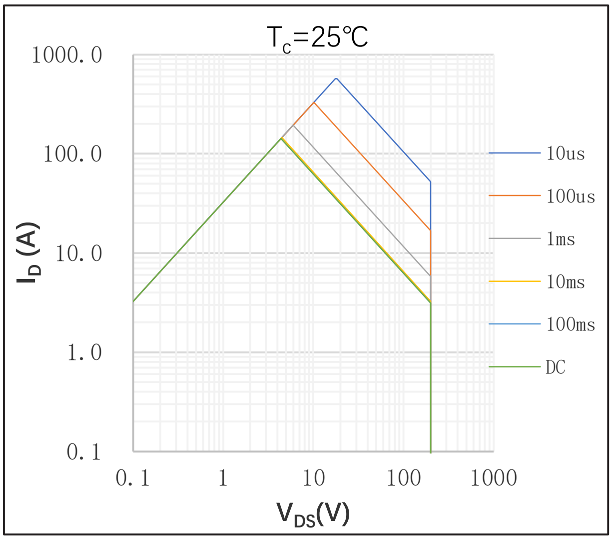
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



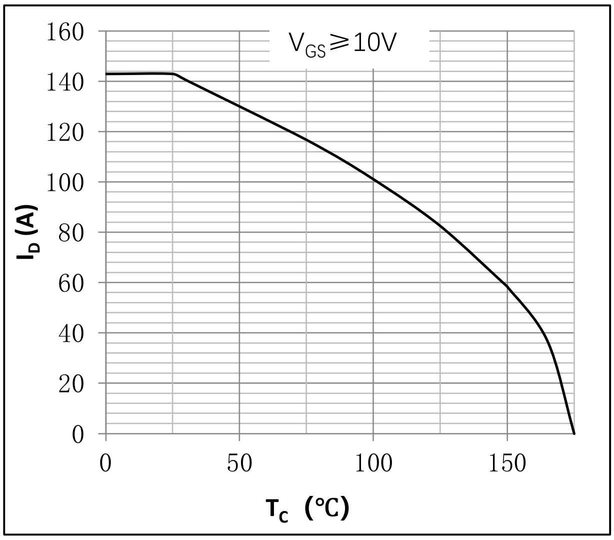
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



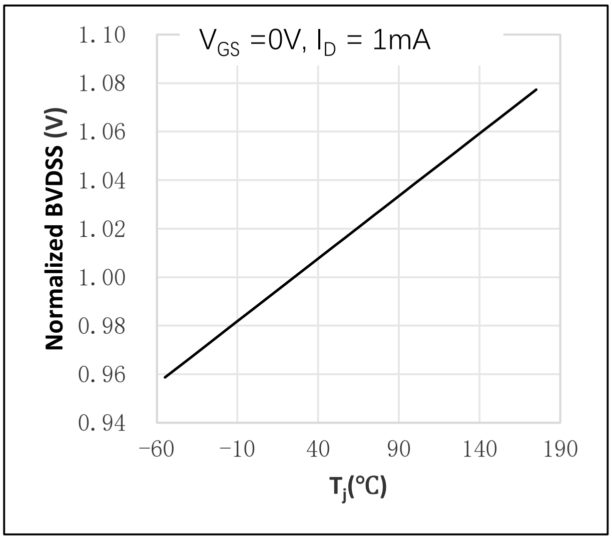
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



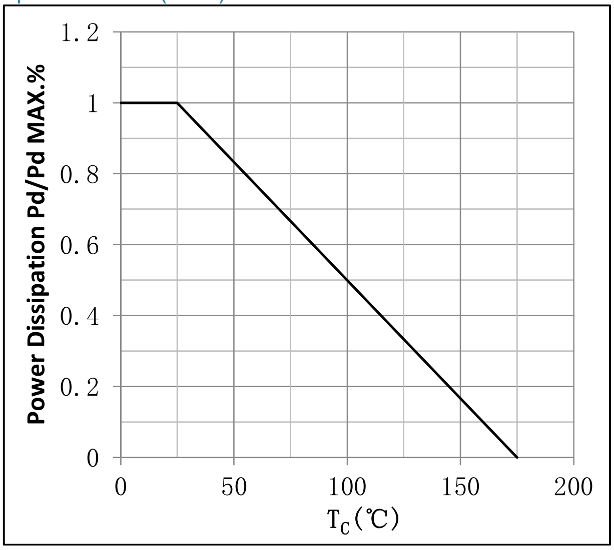
●Fig.12 Continuous drain current as a function of case temperature[3];Calculative values



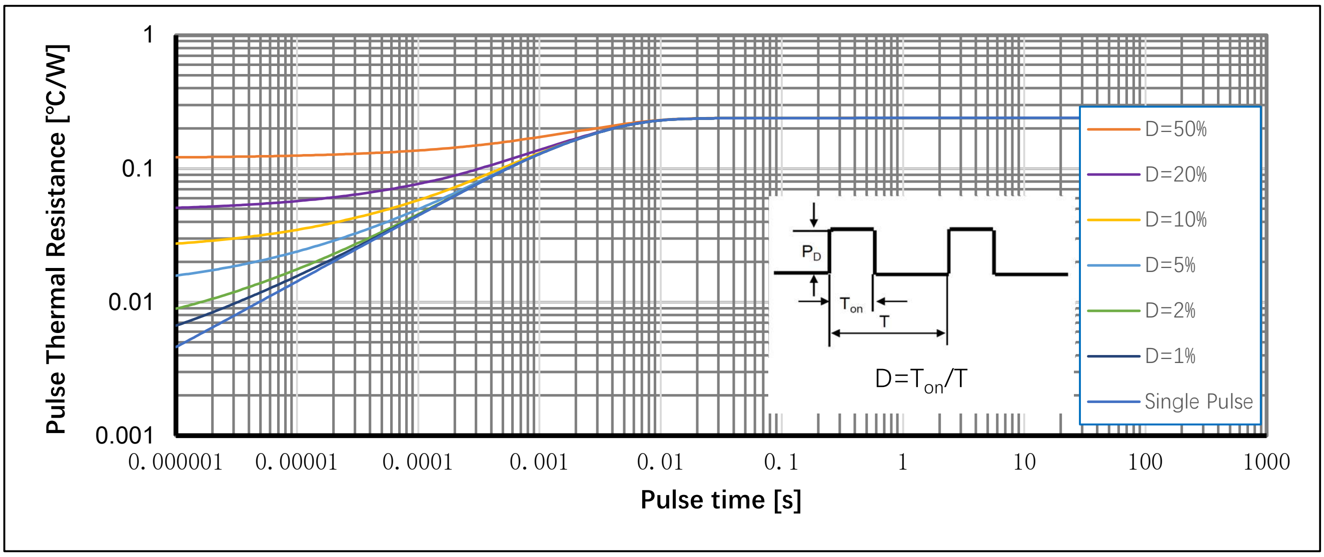
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized $BV_{DSS} = BV_{DSS}/BV_{DSS}(25℃)$



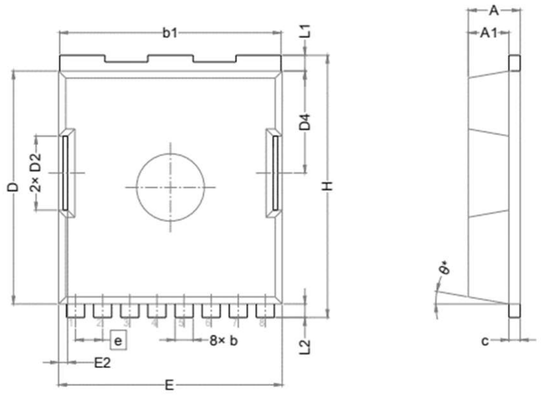
●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation $=P_d/P_d(25℃)$

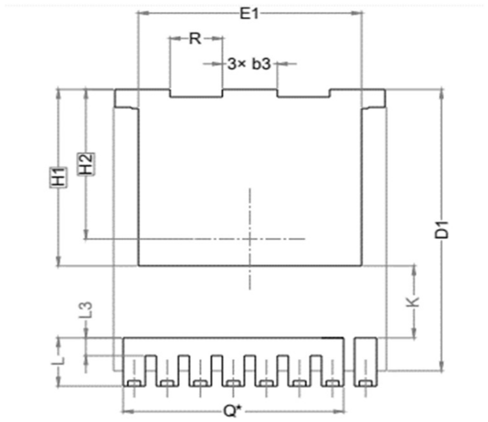


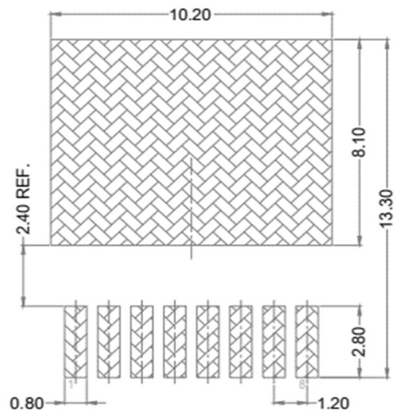
●Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



Package Outline







SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b3	1.90	2.00	2.10
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D4	4.45	4.55	4.65
E	9.80	9.90	10.00
E1	8.00	8.10	8.20
E2	0.30	0.40	0.50
e	1.20 BSC		
H	11.58	11.68	11.78
H1	6.95 BSC		
H2	5.89 BSC		
i	0.10 REF.		
j	0.46 REF.		
K	2.80 REF.		
L	1.60	1.90	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.60	0.70	0.80
N	8		
Q	6.80 REF.		
R	1.80	1.90	2.00
θ	10° REF.		

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

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	2025/7/1	New