●General Description

This silicon carbide Power MOSFET device has been developed using ZMJ's advanced 1st generation SiC MOSFET technology. The device features a very low $R_{DS(on)}$ over the entire temperature range combined with low capacitances and very high switching operations. It improves application performance in frequency, energy efficiency, system size and weight reduction.

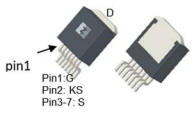
●Features

- ■High blocking voltage
- ■High speed switching with low capacitances
- ■Low $R_{DS(ON)}$ to minimize conductive loss
- ■Low gate charge for fast switching
- ■Low thermal resistance

●Application

- ■Motor drives
- ■On board charger
- ■DC-DC
- ■Auxiliary drives

●Product Summary



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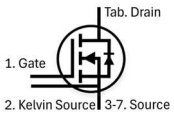


V_{DS}=3300V

$R_{DS(ON)}$ =640mR

I_D=6A

RoHS REACH COMPLIANT HF

●Ordering Information

Part NO.	ZMC100KR330B7
Marking	ZMC100KR330
Packing information	REEL TAPE
Basic ordering unit (pcs)	1000

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	3300	V
Gate-source voltage	V_{GS}	Transient Voltage	-10	25	V
	V_{GS}	Static Voltage	-10	20	V
Recommended turn on gate voltage	$V_{GS(on)}$		20	23	V
Recommended turn off gate voltage	$V_{GS(off)}$		-5	0	V
Continuous drain current	I_D	V_{GS}=18V, T_C=25℃	-	6	A
	I_D	V_{GS}=18V, T_C=75℃	-	5	A
	I_D	V_{GS}=18V, T_C=100℃	-	4	A
Pulsed drain current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C;	-	24	A

Diode continuous current	I_S	V_{GS}=-5V, T_C=25℃	-	6	A
Diode pulsed current	$I_{S,pulse}$	V_{GS}=-5V, Pulsed, t_p ≤ 10 μs, T_C = 25 °C	-	24	A
Total power dissipation	P_D	T_C=25℃	-	75	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	℃

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	2	°C/W
Thermal resistance, junction - ambient	R_{thJA}①	-	-	60	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

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

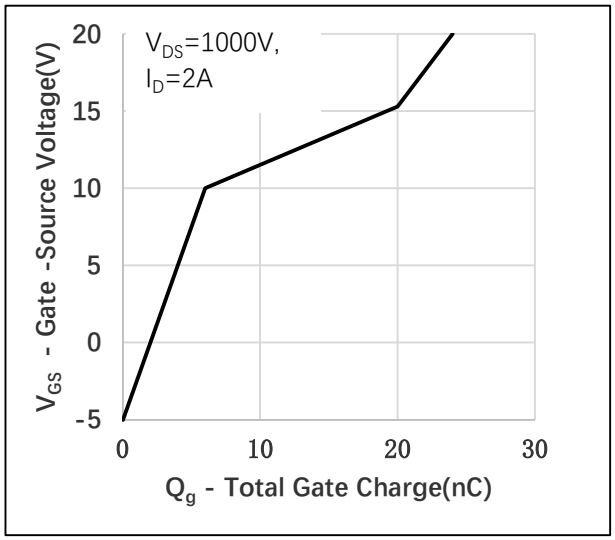
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	3300	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=2mA	3	4.4	5	V
Drain-source leakage current	I_{DSS}	V_{GS}=0V, V_{DS}=3300V	-	-	10	uA
Gate- source leakage current	I_{GSS}	V_{GS}=-10V, V_{DS} =0V	-	-	-100	nA
		V_{GS}=25V, V_{DS} =0V	-	-	100	nA
Static drain-source on resistance	$R_{DS(ON)}$	V_{GS}=20V, I_D=2A, T_j=25℃	-	640	800	mΩ
		V_{GS}=20V, I_D=2A, T_j=175℃	-	1800	-	mΩ
		V_{GS}=18V, I_D=2A, T_j=25℃	-	690	-	mΩ
Forward transconductance	g_{FS}	V_{DS} =10V, I_{SD} = 2A	-	1	-	S
Diode forward voltage	V_{FSD}	V_{GS} =-5V, I_{SD} = 2A	-	3.9	5	V

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

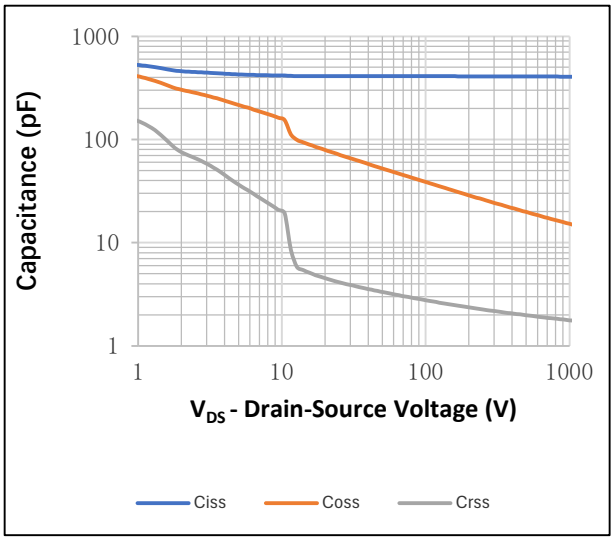
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 100KHz, V_{DS}=1000V, V_{GS}=0V	-	415	-	pF
Output capacitance	C_{oss}		-	11	-	pF
Reverse transfer capacitance	C_{rss}		-	1.8	-	pF
Output charge	Q_{oss}	f = 100KHz, V_{GS}=0V, V_{DS}=0V to 1000V	-	26.4	-	nC
Coss stored energy	E_{oss}		-	9.5	-	uJ

Gate resistance	R_g	f = 1MHz	-	4.8	-	Ω
Total gate charge	Q_g	V_{DD} = 1000V, I_D = 2A, V_{GS} = -5V/20V	-	24	-	nC
Gate-source charge	Q_{gs}		-	6	-	nC
Gate-drain charge	Q_{gd}		-	14	-	nC
Turn-on delay time	$t_{D(on)}$	V_{GS}=-5V/20V, V_{DS}=1000V, R_G =10Ω, I_D =2A, L=505uH	-	19	-	ns
Turn-on rise time	t_r		-	10	-	ns
Turn-off delay time	$t_{D(off)}$		-	41	-	ns
Turn-off fall time	t_f		-	14	-	ns
Turn-on energy	E_{on}		-	1010	-	uJ
Turn-off energy	E_{off}		-	182	-	uJ
Reverse recovery time	t_{rr}	V_{DD}=1000V, dI_S/dt = 100A/us, I_S=2A	-	80	-	ns
Reverse recovery peak current	I_{rrm}		-	16	-	A
Reverse recovery charge	Q_{rr}		-	570	-	nC

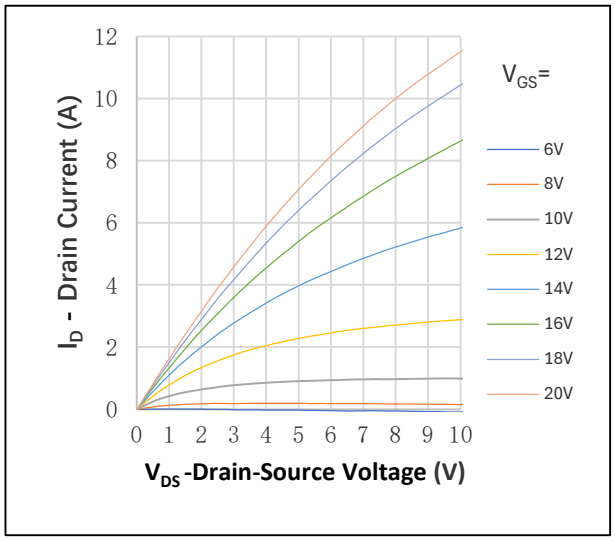
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



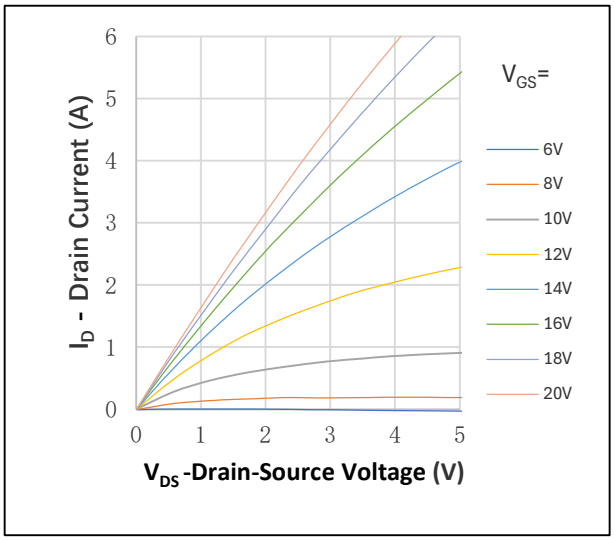
●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



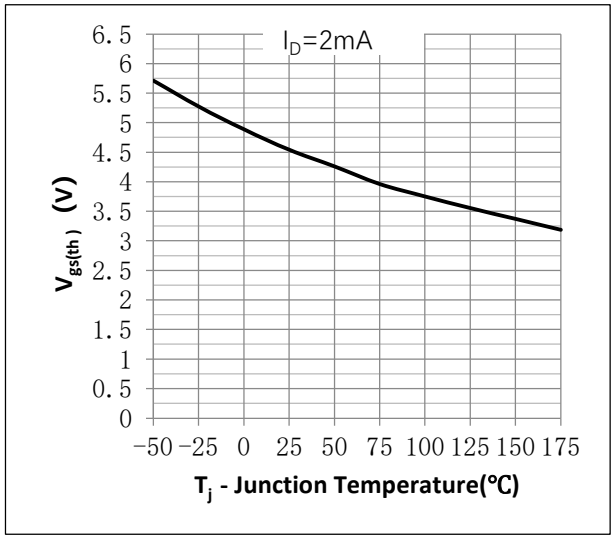
●Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; T_j=25℃



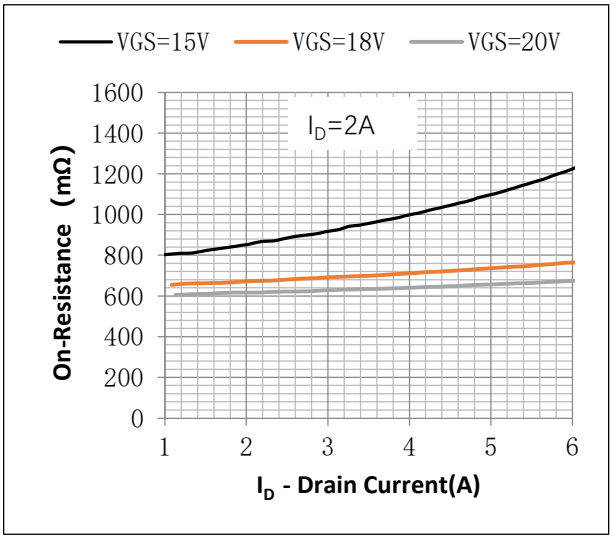
●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; T_j=25℃



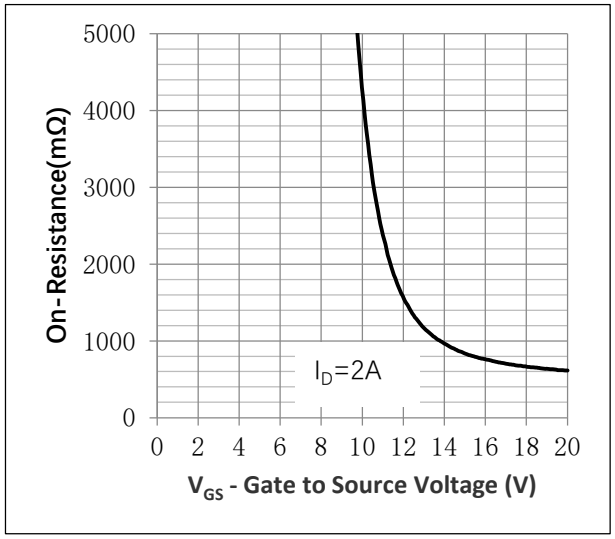
●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



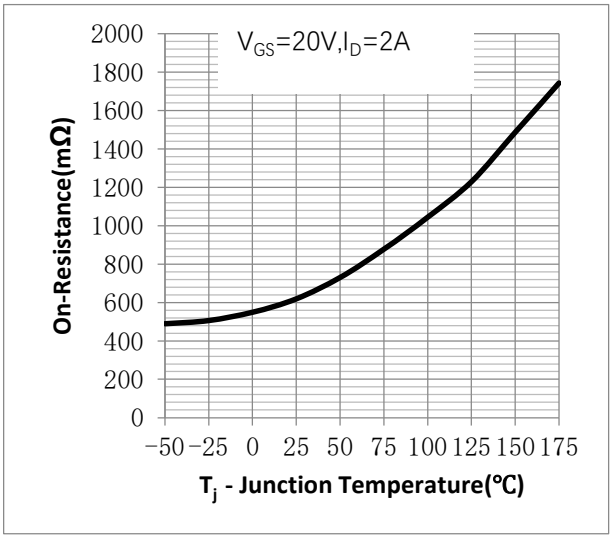
●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



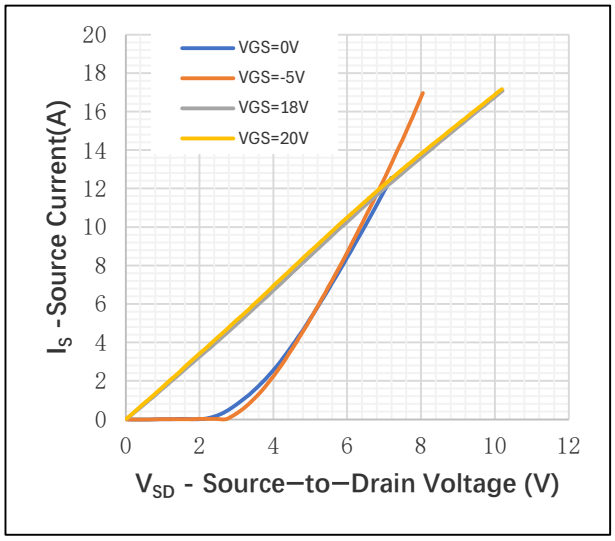
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



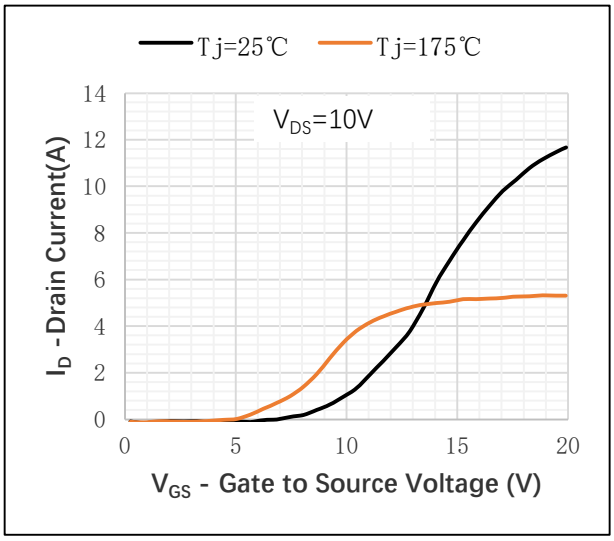
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=R_{DSon}/R_{DSon}(25℃)



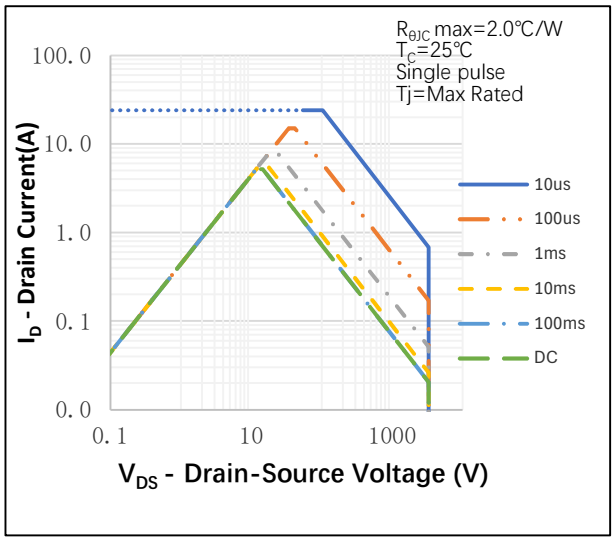
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values; Tj=25℃



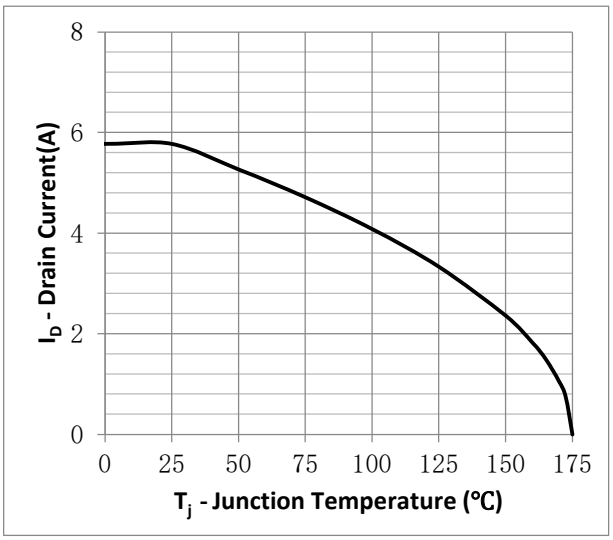
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



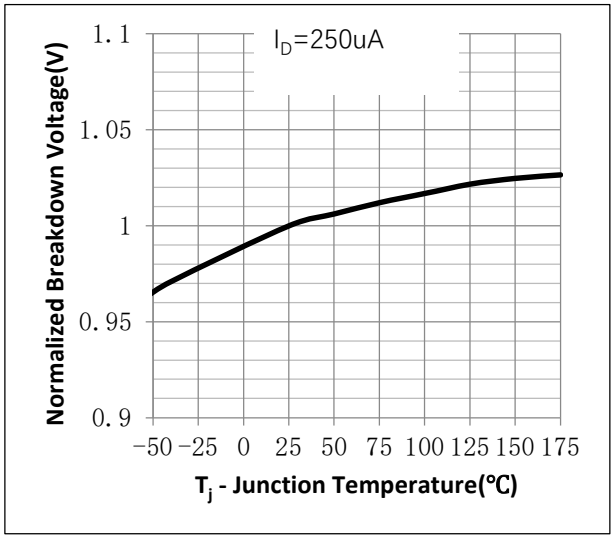
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



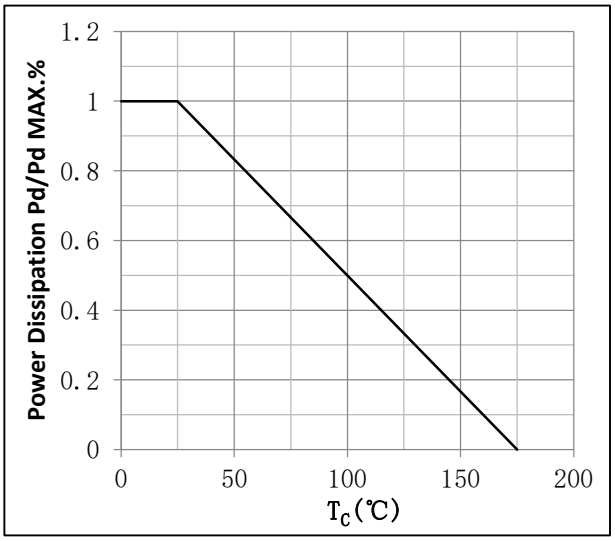
●Fig.12 Continuous drain current as a function of case temperature[2];Calculative values



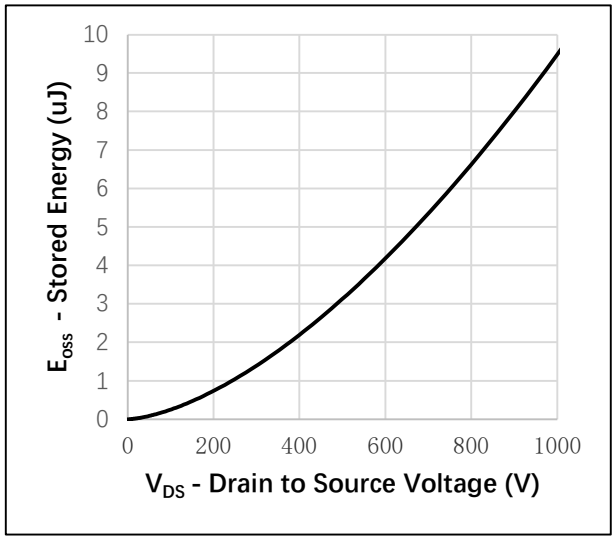
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized BV_{DSS} =BV_{DSS}/BV_{DSS}(25℃)



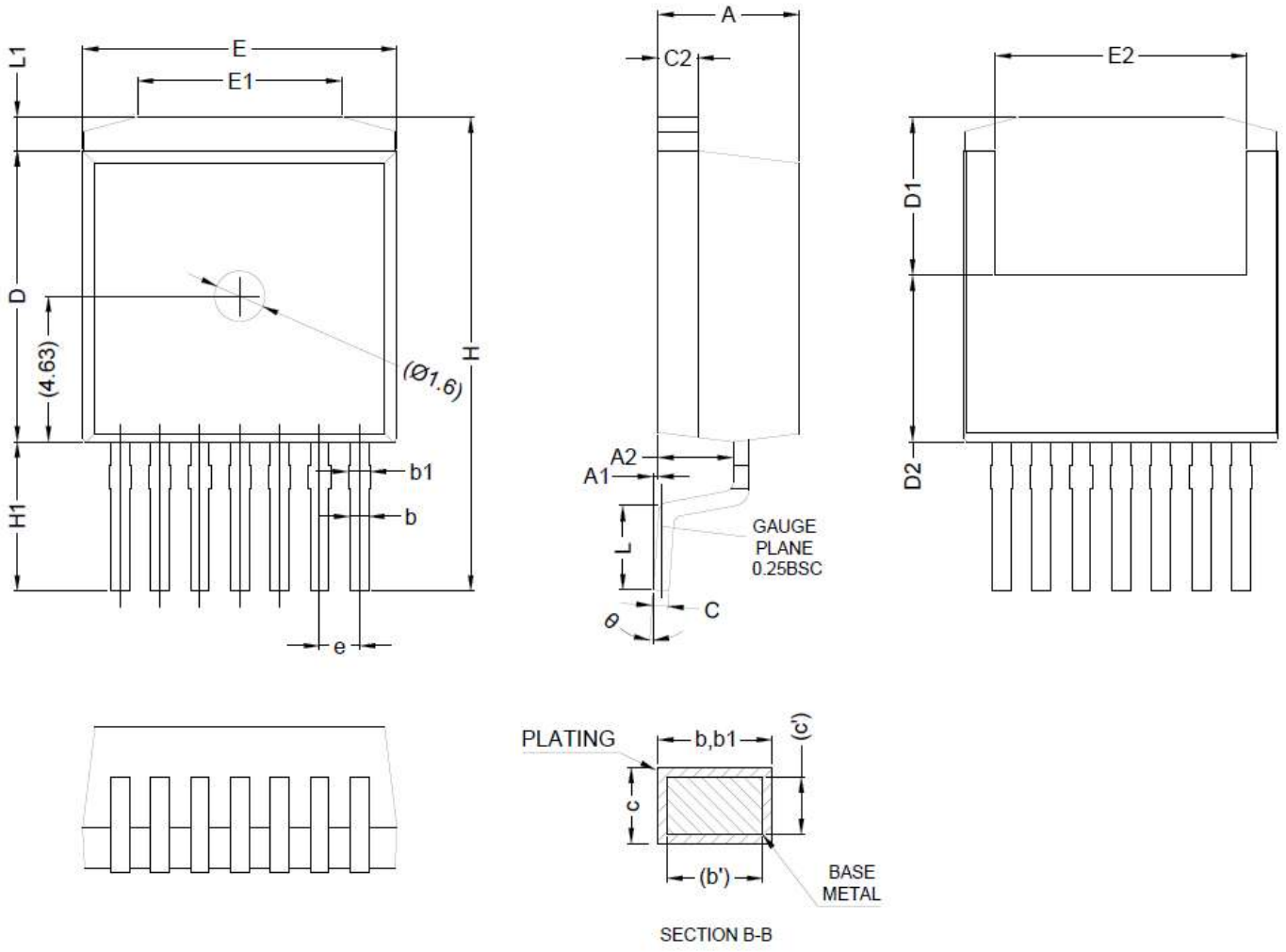
●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =P_d/P_d(25℃)



●Fig.15 Output capacitor stored energy as a function of drain-source voltage; Typical values; Tj=25℃



Package Outline



Items	Min	Max	Items	Min	Max
A	4.30	4.70	D2	5.30REF.	
A1	-	0.25	E	9.80	10.20
A2	2.20	2.60	E1	6.30	6.70
b	0.52	0.72	E2	7.80	8.20
b'	0.50	0.70	e	1.27 BSC	
b1	0.60	0.80	L	2.48	2.88
c	0.42	0.62	L1	0.87	1.27
c'	0.40	0.60	H	14.87	15.27
c2	1.07	1.47	H1	4.55	4.95
D	9.05	9.45	θ	0°	8°
D1	5.02				

Note

①The value of $R_{\theta JA}$ is measured with the device in a still environment with T_A=25℃;

②Practically the current will be limited by PCB, thermal design and operating temperature. V_{GS}=20V.

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●Revision History

Version	Date	Change
A	2024/11/20	New
B	2025/10/15	Apply new datasheet format.