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.

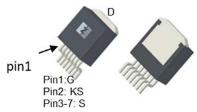
Features

- 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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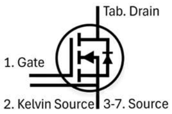


V_{DS}=1700V

$R_{DS(ON)}$ =750mR

I_D=5.9A

RoHS REACH HF

Ordering Information

Part NO.	ZMC100KR170B7
Marking	ZMC100KR170
Packing information	TAPE REEL
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}		-	1700	V
Gate-source voltage①	V_{GS}	Transient Voltage	-10	25	V
	V_{GS}	Static Voltage	-10	24	V
Recommended turn on gate voltage	$V_{GS(on)}$		15	18	V
Recommended turn off gate voltage	$V_{GS(off)}$		-4	0	V
Continuous drain current	I_D	V_{GS}=18V, T_C=25℃	-	5.9	A
	I_D	V_{GS}=18V, T_C=75℃	-	4.8	A
	I_D	V_{GS}=18V, T_C=100℃	-	4.2	A
Pulsed drain current	I_{DM}	Pulsed; $t_p \leq 10$ μs; T_C = 25 °C;	-	23.6	A

Total power dissipation	P_D	T_C=25℃	-	56	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}	-	-	2.7	°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)

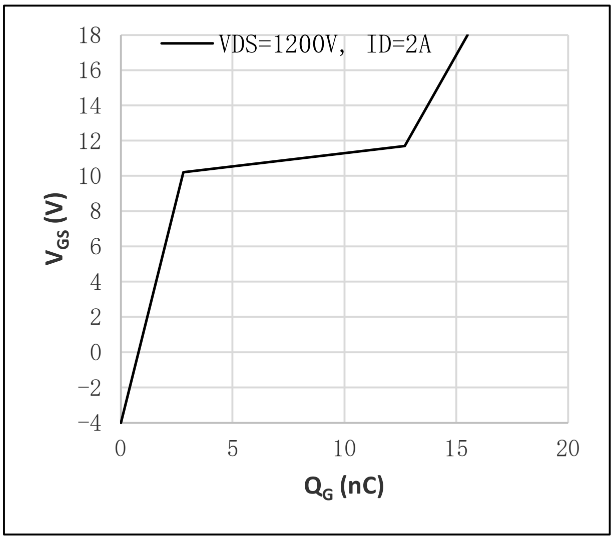
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	1700	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=1mA	3	4	5	V
Drain-source leakage current	I_{DSS}	V_{GS}=0V, V_{DS}=1700V	-	-	10	uA
Gate- source leakage current	I_{GSS}	V_{GS}=-10V, V_{DS} =0V	-	-	-100	nA
		V_{GS}=25V, V_{DS} =0V	-	-	100	nA
Static drain-source on resistance	$R_{DS(ON)}$	V_{GS}=18V, I_D=2A, T_j=25℃	-	750	900	mΩ
		V_{GS}=15V, I_D=1A, T_j=25℃	-	980	-	mΩ
		V_{GS}=18V, I_D=2A, T_j=175℃	-	1327	-	mΩ
Forward transconductance	g_{FS}	V_{DS} =20V, I_{SD} = 2A	-	1.3	-	S
Diode forward voltage	V_{FSD}	V_{GS} =-4V, I_{SD} = 2A	-	3.9	5	V

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

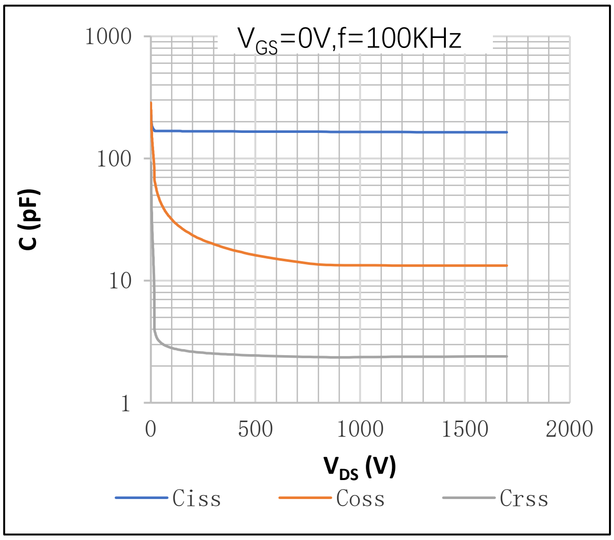
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 100KHz, V_{DS}=1000V, V_{GS}=0V	-	165	-	pF
Output capacitance	C_{oss}		-	13.4	-	pF
Reverse transfer capacitance	C_{rss}		-	2.4	-	pF
Output charge	Q_{oss}	f = 100KHz, V_{GS}=0V, V_{DS}=0V to 1000V	-	21.4	-	nC
Coss stored energy	E_{oss}		-	7.8	-	uJ
Gate resistance	R_g	f = 1MHz	-	25	-	Ω
Total gate charge	Q_g	V_{DD} = 1200V,	-	15.5	-	nC
Gate-source charge	Q_{gs}		-	2.8	-	nC

Gate-drain charge	Q_{gd}	I_D = 2A, V_{GS} = -4V/18V	-	9.9	-	nC
Turn-on delay time	$t_{D(on)}$	V_{GS}=-4V/18V, V_{DS}=1200V, R_G =10Ω, I_D =2A	-	5	-	ns
Turn-on rise time	t_r		-	18	-	ns
Turn-off delay time	$t_{D(off)}$		-	13	-	ns
Turn-off fall time	t_f		-	59	-	ns
Turn-on energy	E_{on}		-	83	-	uJ
Turn-off energy	E_{off}		-	13	-	uJ
Reverse recovery time	t_{rr}	V_{DD}=1200V, dI_S/dt = 1000A/us, I_S=2A	-	28	-	ns
Reverse recovery charge	Q_{rr}		-	29	-	nC

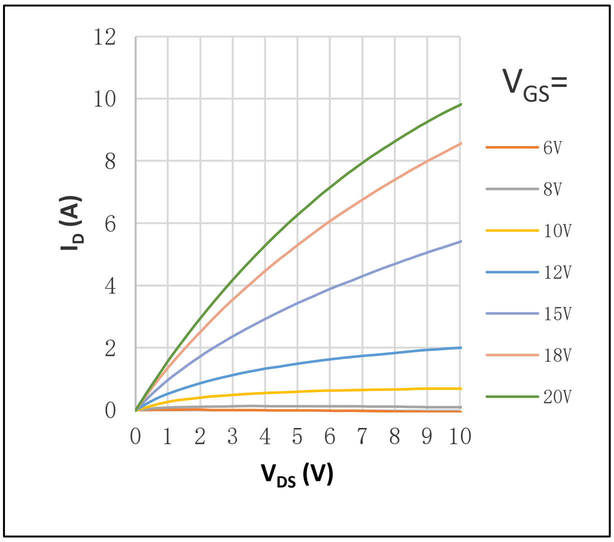
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



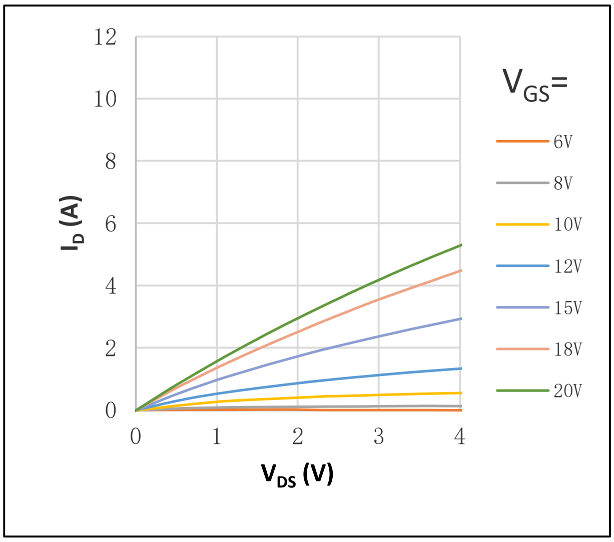
●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



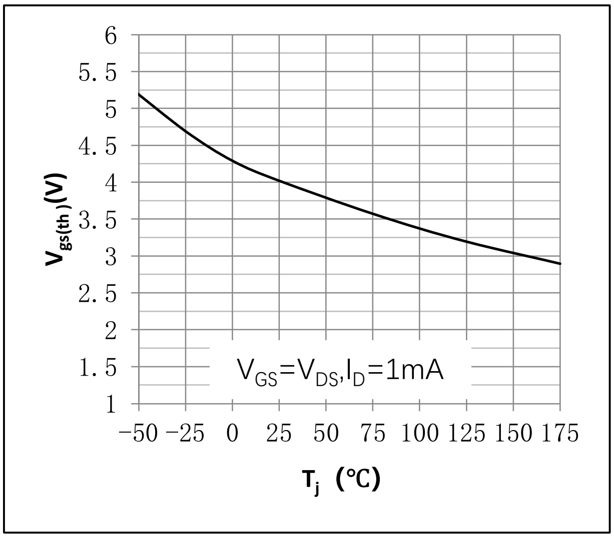
●Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; T_j=25℃



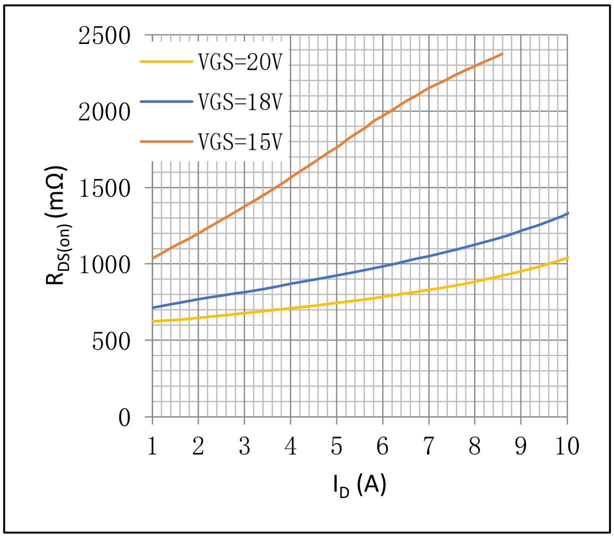
●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; T_j=25℃



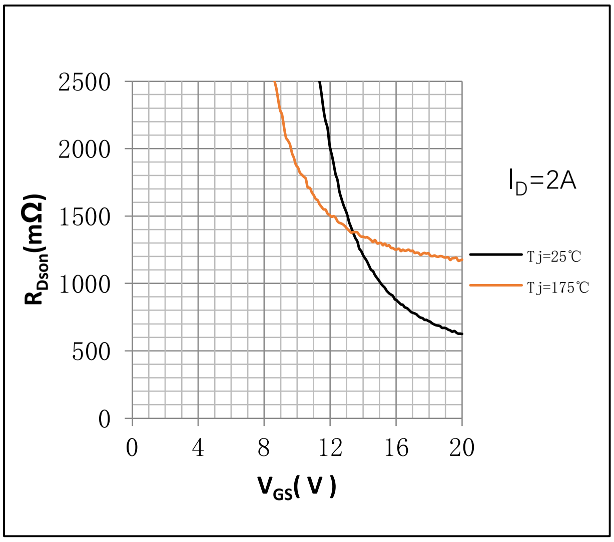
●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



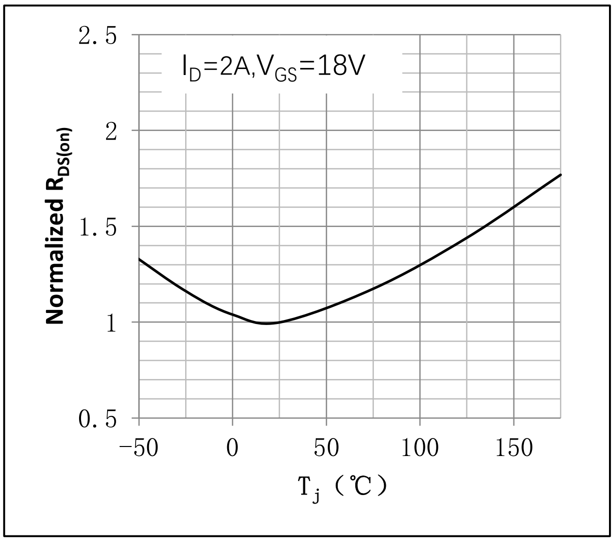
●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



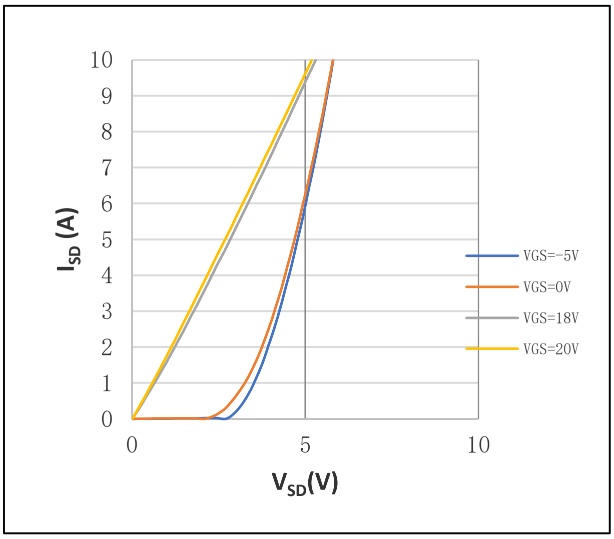
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



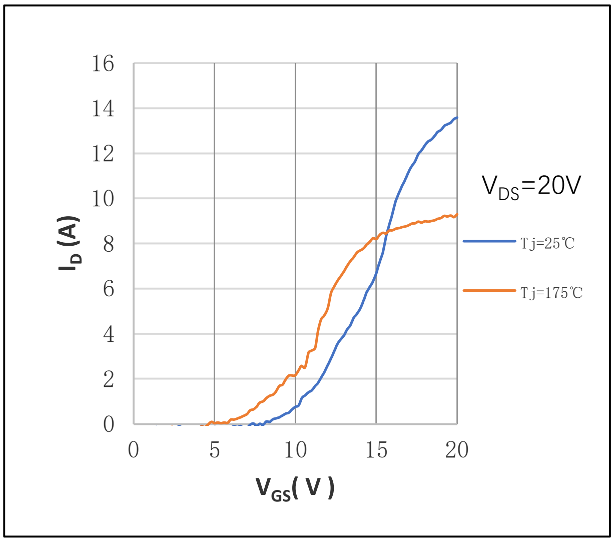
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=R_{DSon}/R_{DSon}(25℃)



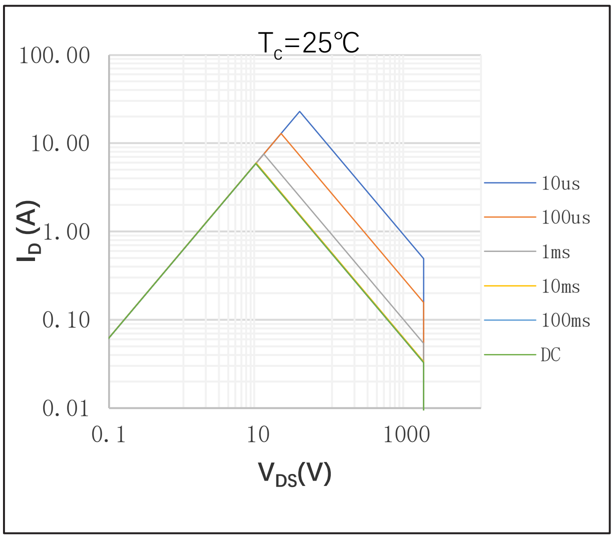
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values; Tj=25℃



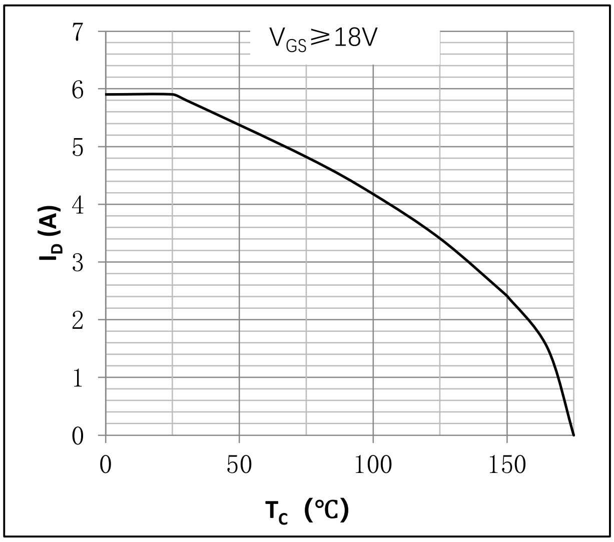
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



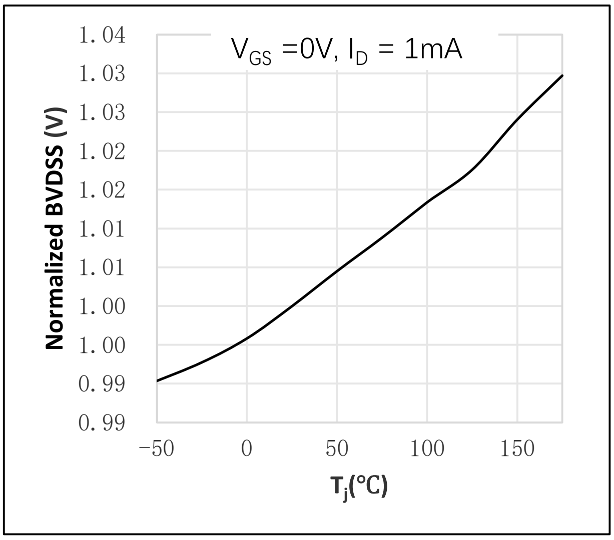
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



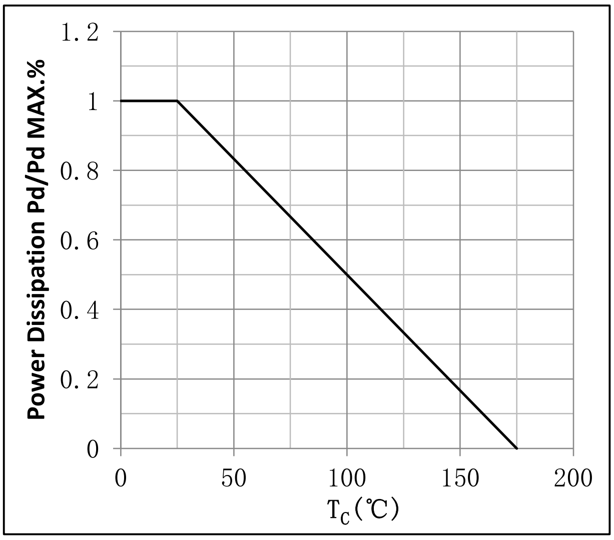
●Fig.12 Continuous drain current as a function of case temperature②;Calculative values



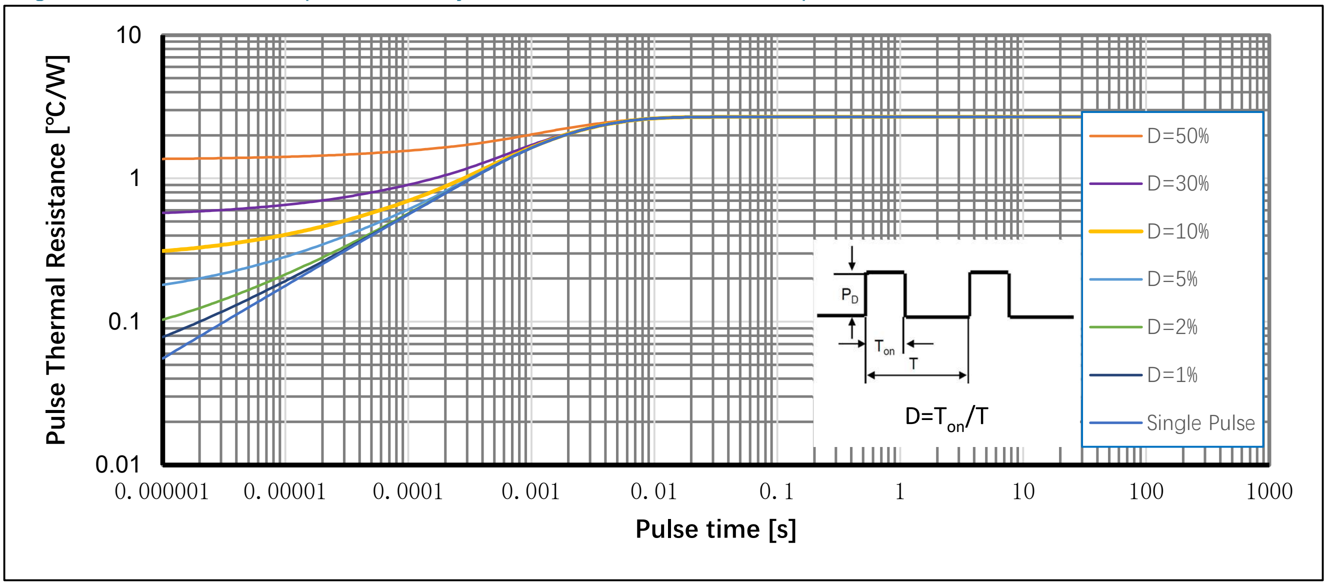
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized $BV_{DSS} = BV_{DSS}/BV_{DSS}(25℃)$



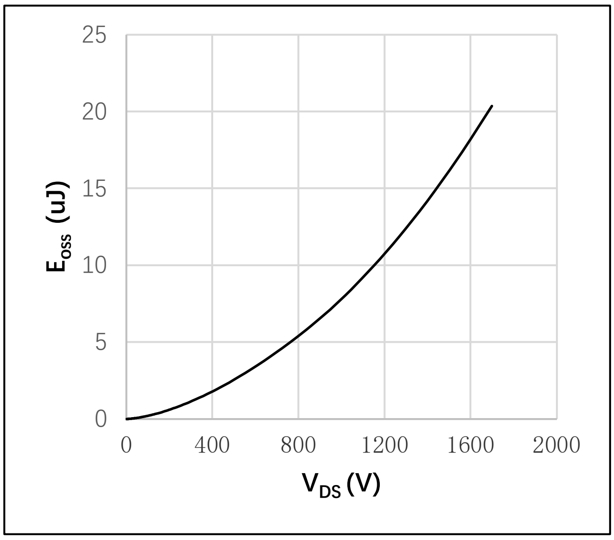
●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation $=P_d/P_d(25℃)$



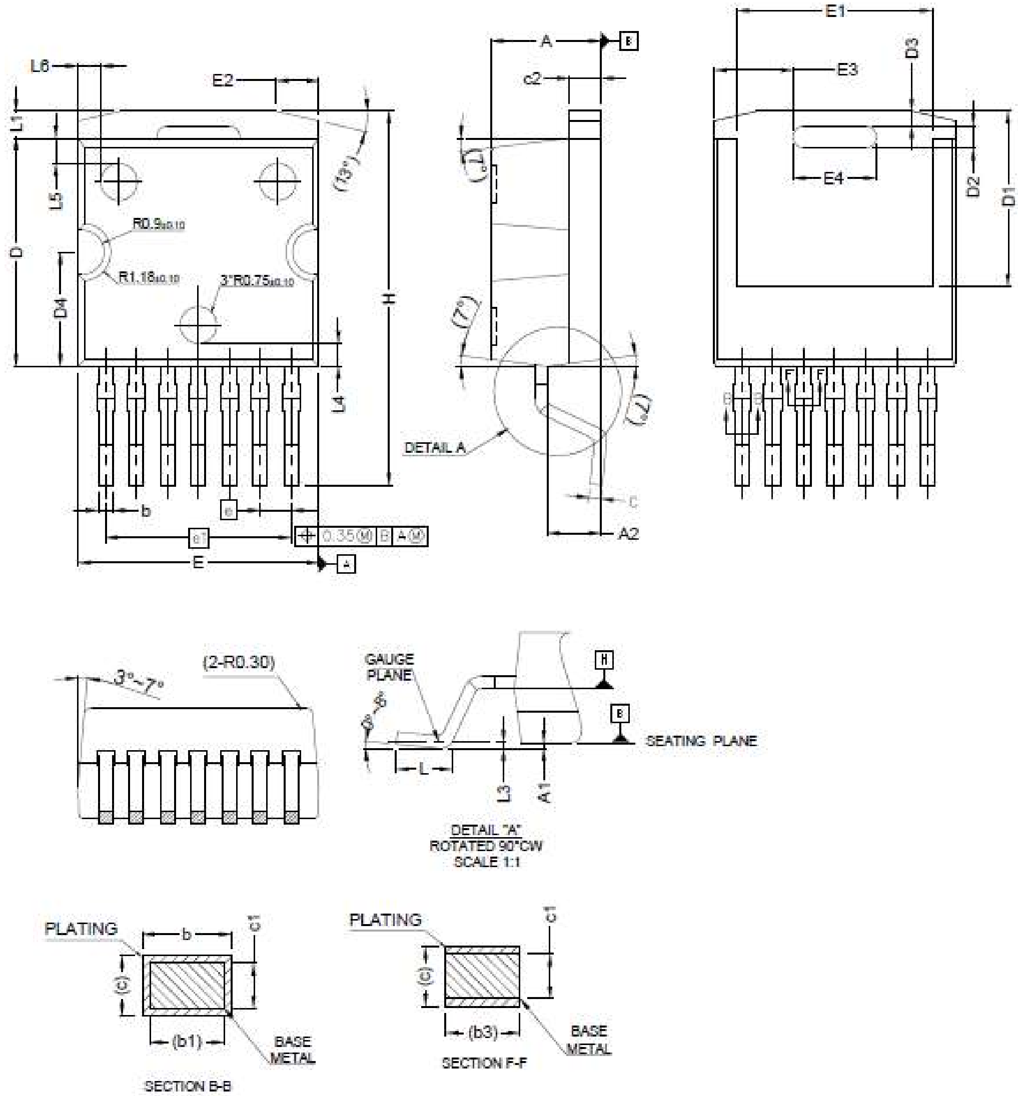
●Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



●Fig.16 Output capacitor stored energy as a function of drain-source voltage; Typical values; Tj=25℃



Package Outline



SYMBOL	MIN	MAX
A	4.30	4.70
A1	-	0.25
A2	2.02	2.42
b	0.50	0.70
b1	0.50	0.65
b3	0.60	0.75
c	0.45	0.60
c1	0.45	0.55
c2	1.25	1.40
D	9.10	9.50
D1	6.86	7.42
D2	0.72	1.12
D3	0.40	0.80
D4	4.45	4.85
E	9.68	10.08
E1	7.70	8.30
E2	1.55	1.95
E3	3.04	3.44
E4	3.21	3.61
e	1.27 BSC	
e1	7.62 BSC	

SYMBOL	MIN	MAX
L	1.78	2.79
L1	-	1.60
L3	0.25BSC	
L4	0.93BSC	
L5	1.04BSC	
L6	0.93BSC	
H	14.61	15.88

●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}=18V.

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Revision History

Version	Date	Change
A	2025/9/19	New
B	2025/9/23	Apply new datasheet format.