●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.

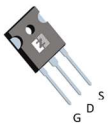
●Features

- ■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
- ■ AEC-Q101 qualified

●Application

- ■Motor drives
- ■Auxiliary power supplies
- ■DC-DC
- ■High voltage capacitive loads

●Product Summary



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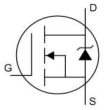


V_{DS}=1700V

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

I_D=5.3A

RoHS REACH COMPLIANT HF

●Ordering Information

Part NO.	ZMCA100KR170C3
Marking	ZMC100KR170
Packing information	TUBE BULK
Basic ordering unit (pcs)	450

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	1700	V
Gate-source voltage	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℃	-	5.3	A
	I_D	V_{GS}=18V, T_C=75℃	-	4.4	A
	I_D	V_{GS}=18V, T_C=100℃	-	3.8	A
Pulsed drain current ①	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C;	-	21.2	A

Total power dissipation	P_D	T_C=25℃	-	45	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	℃

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3.3	°C/W
Thermal resistance, junction - ambient	R_{thJA}①	-	-	40	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

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

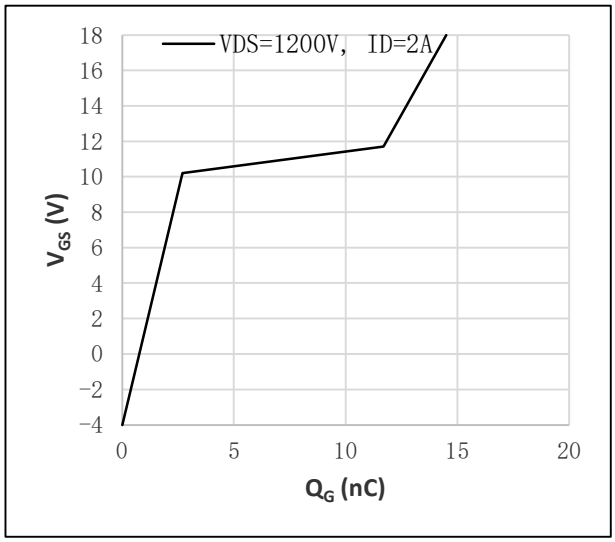
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	1700	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=1mA	3	3.9	5	V
Drain-source leakage current	I_{DSS}	V_{GS}=0V, V_{DS}=1700V	-	-	10	uA
Gate- source leakage current	I_{GSS}	V_{GS}=-10V, 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}=18V, I_D=2A, T_j=175℃	-	1327	-	mΩ
		V_{GS}=15V, I_D=2A, T_j=25℃	-	980	-	mΩ
Forward transconductance	g_{FS}	V_{DS} =20V, I_{SD} = 2A	-	1.2	-	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)

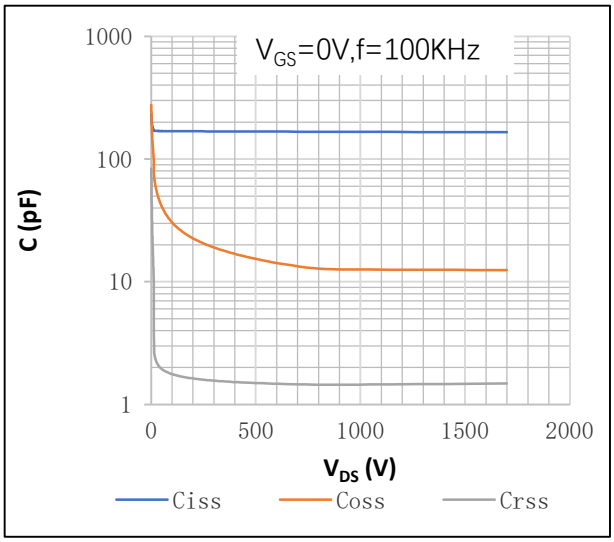
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 100KHz, V_{DS}=1000V, V_{GS}=0V	-	167	-	pF
Output capacitance	C_{oss}		-	12.6	-	pF
Reverse transfer capacitance	C_{rss}		-	1.5	-	pF
Output charge	Q_{oss}	f = 100KHz, V_{GS}=0V, V_{DS}=0V to 1000V	-	20.4	-	nC
Coss stored energy	E_{oss}		-	7.4	-	uJ
Gate resistance	R_g	f = 1MHz	-	23	-	Ω
Total gate charge	Q_g	V_{DD} = 1200V,	-	14.5	-	nC
Gate-source charge	Q_{gs}		-	2.7	-	nC

Gate-drain charge	Q_{gd}	I_D = 2A, V_{GS} = -4V/18V	-	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

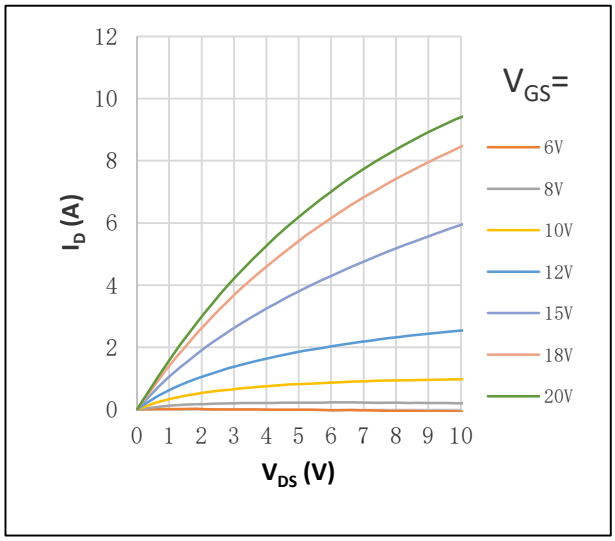
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



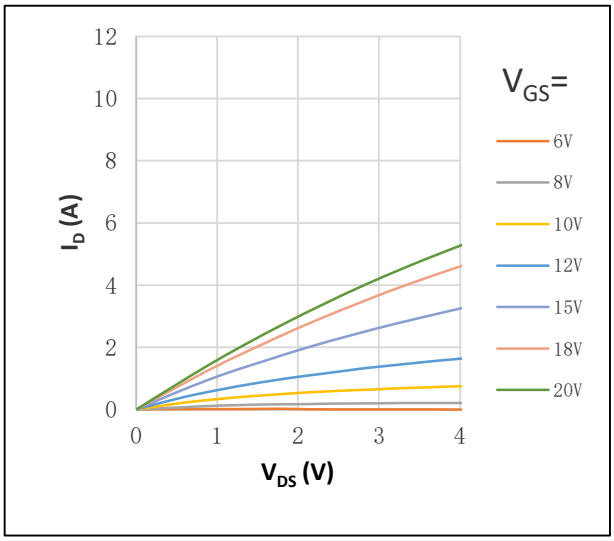
●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



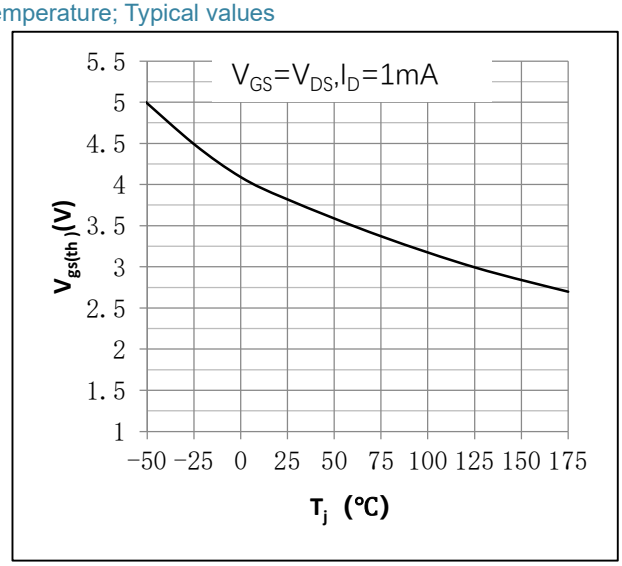
●Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; T_j=25℃



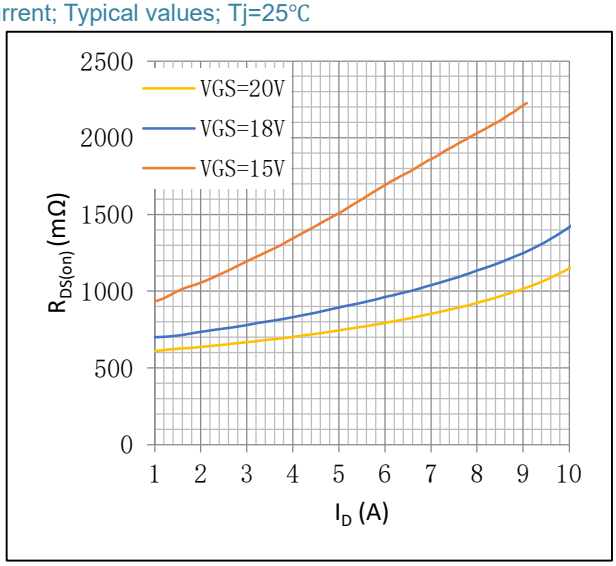
●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; T_j=25℃



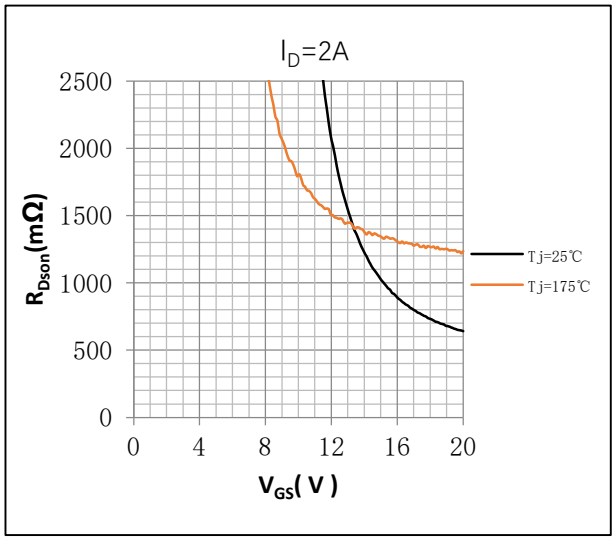
●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



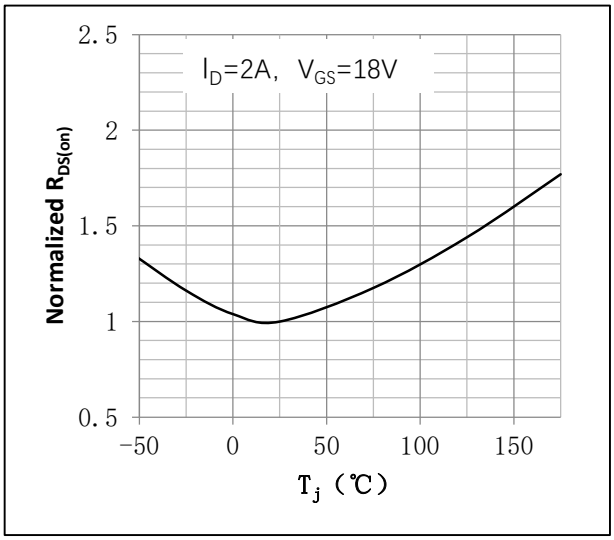
●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



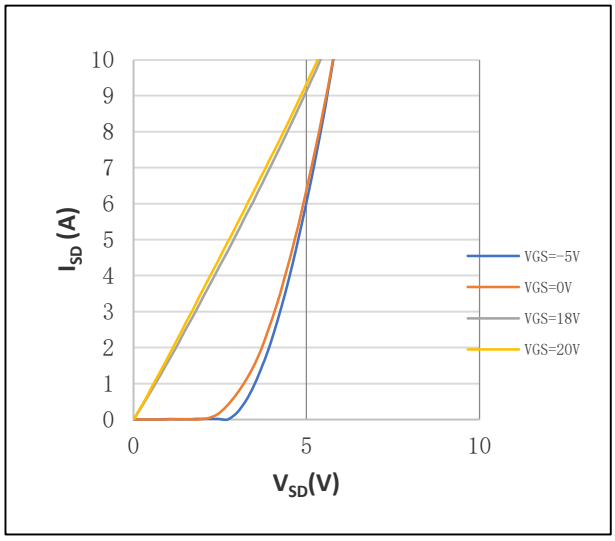
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



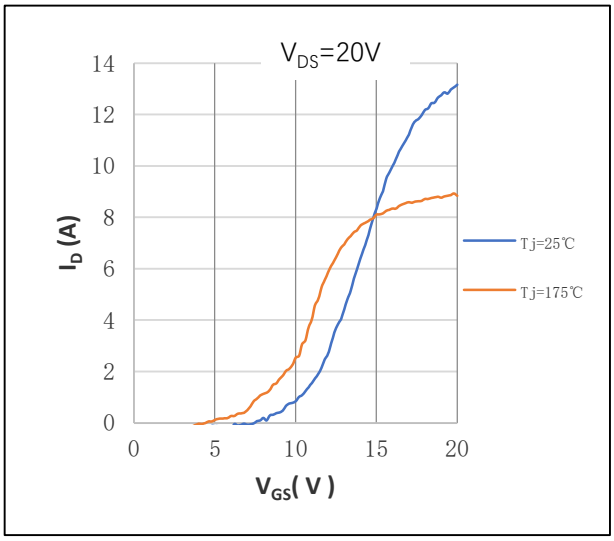
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=R_{DSon}/R_{DSon}(25℃)



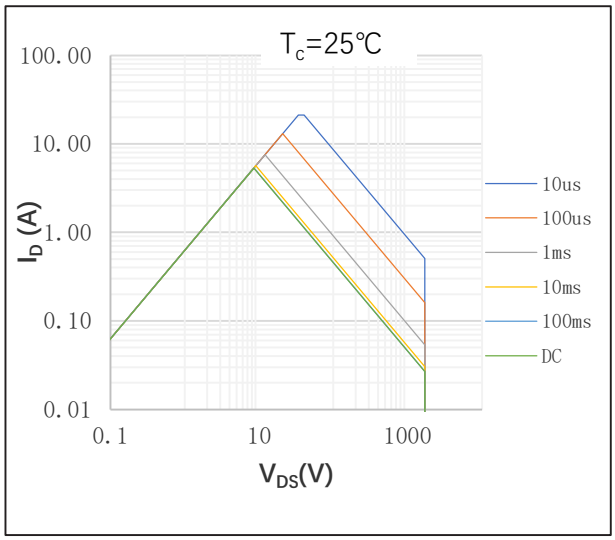
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values; Tj=25℃



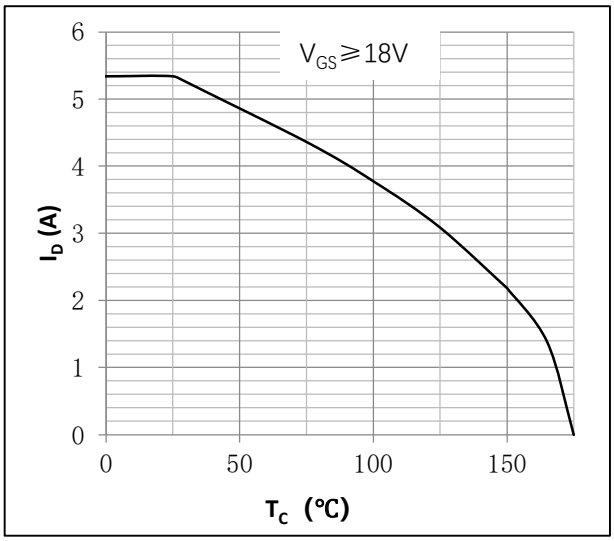
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



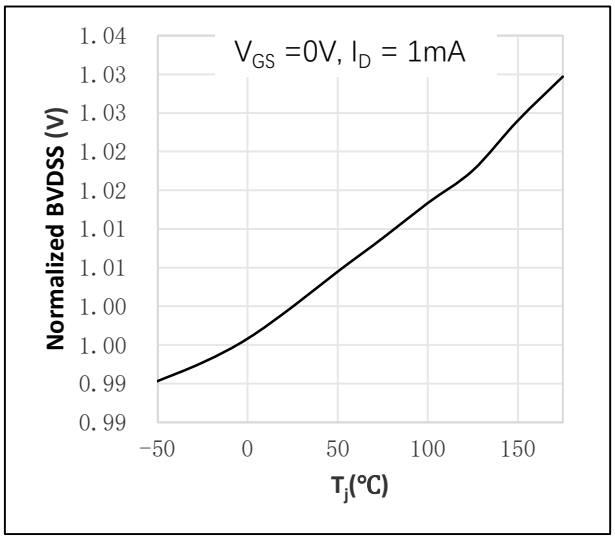
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



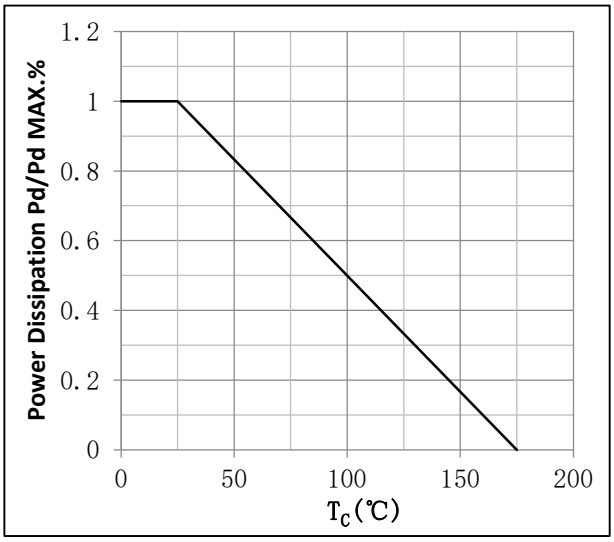
●Fig.12 Continuous drain current as a function of case temperature[2];Calculative values



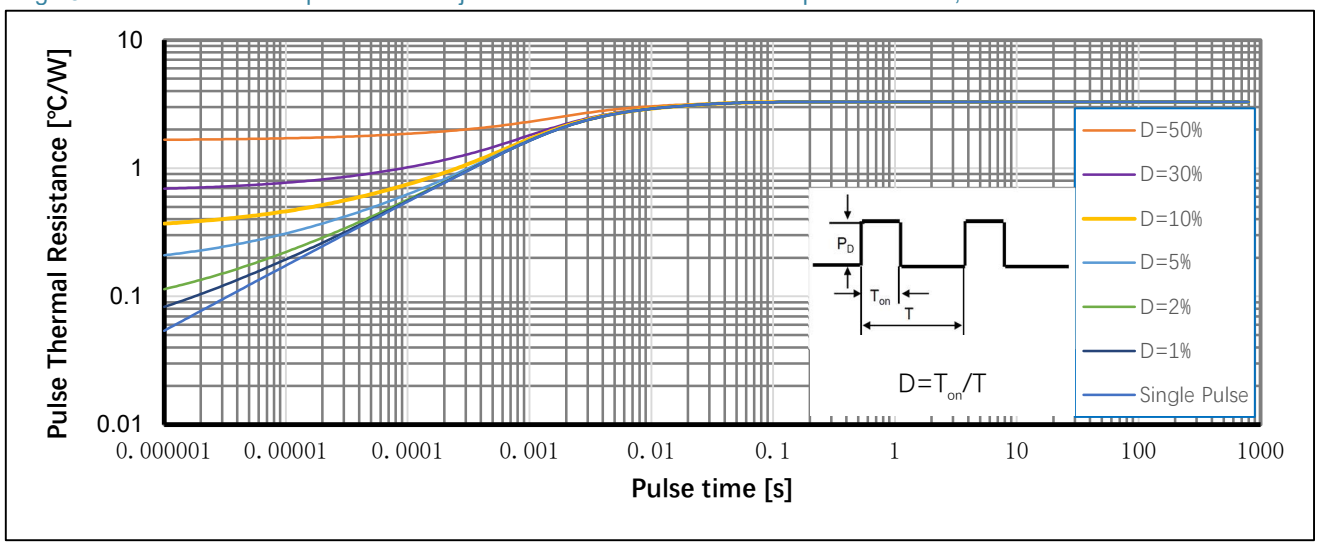
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized BV_{DSS} =BV_{DSS}/BV_{DSS}(25℃)



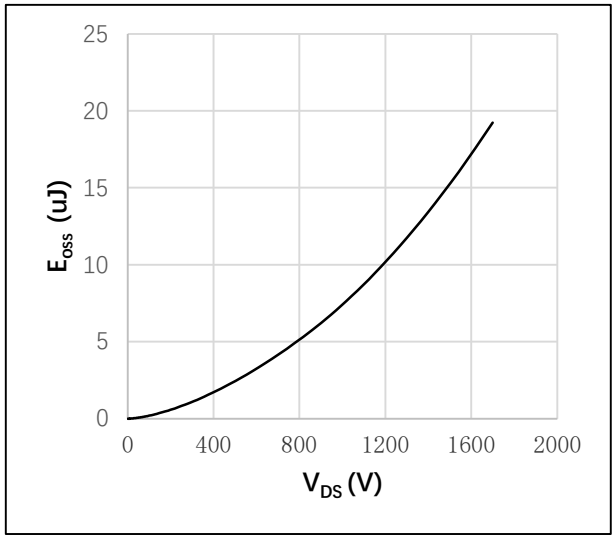
●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =P_d/P_d(25℃)



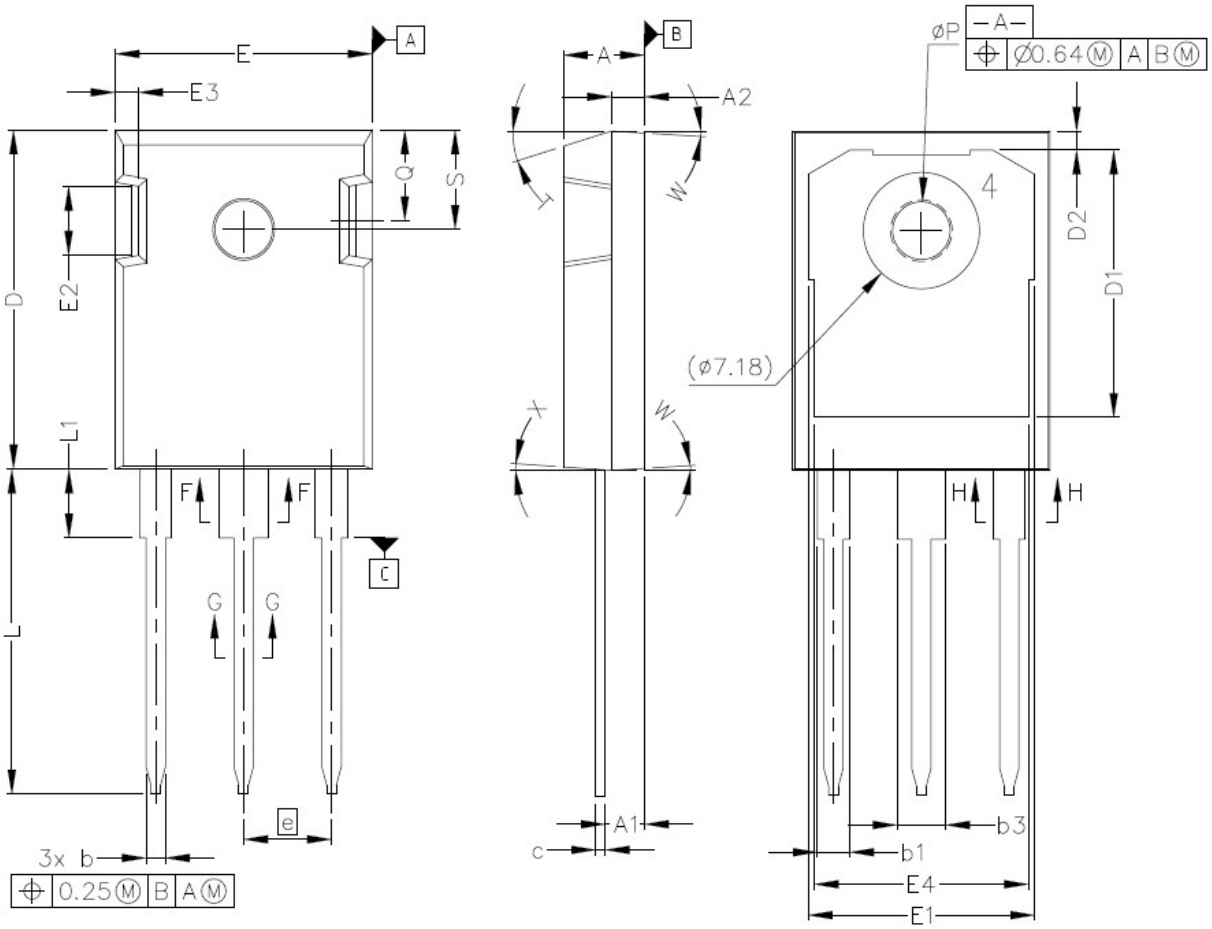
●Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



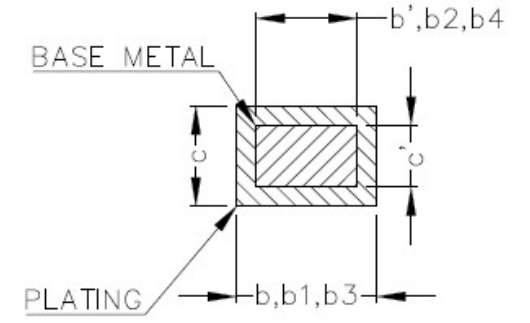
●Fig.16 Output capacitor stored energy as a function of drain-source voltage; Typical values; Tj=25℃



Package Outline



SYMBOL	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	1.91	2.41
b2	1.91	2.16
b3	2.87	3.38
b4	2.87	3.13
c'	0.55	0.65
c	0.55	0.68
D	20.80	21.10
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	5.44 BSC	
N	3	
L	19.81	20.32
L1	4.10	4.40
øP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	



SECTION "F−F", "G−G" AND "H−H"
SCALE: NONE

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	2025/5/27	New
B	2025/9/23	Apply new datasheet format.