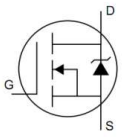
• General Description

This silicon carbide Power MOSFET device has been developed using ZMJ's advanced 1st generation SiC MOSFET technology. The device features a very low RDS(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.

• Product Summary



V_{DS}= 1700V
$R_{DS(ON)}$ = 750mΩ
I_D= 5.3A

• Features

■High Blocking Voltage

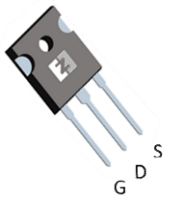
■High Speed Switching With Low Capacitances

■Low $R_{DS(ON)}$ to Minimize Conductive Loss

■Low Gate Charge For Fast Switching

■Low Thermal Resistance

■AEC-Q101 Qualified



TO-247-3

•Application

■Motor Drives

■On Board Charger

■DC-DC

■Auxiliary Drives

•Ordering Information:

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

•Absolute Maximum Ratings (T_A=25°C,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°C	-	5.3	A
	I_D	V_{GS}=18V,T_C=75°C	-	4.4	A
	I_D	V_{GS}=18V,T_C=100°C	-	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	℃
ESD Level (HBM)	CLASS 1C				

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3.3	°C/W
Thermal resistance, junction-ambient	R_{thJA} ②	-	-	40	°C/W
Soldering temperature	Tsold	-	-	260	°C

•Electronic Characteristics (Tj=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	$VGS_{(TH)}$	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
	I_{GSS}	V_{GS}=25V, V_{DS} =0V	-	-	100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=18V, I_D=2A, Tj=25°C	-	750	900	mΩ
		V_{GS}=18V, I_D=2A, Tj=175°C	-	1327	-	mΩ
		V_{GS}=15V, I_D=2A, Tj=25°C	-	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 (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 100KHz, V_{DS}=1000V, V_{GS}=0V	-	167	-	pF
Output capacitance	Coss		-	12.6	-	
Reverse transfer capacitance	Crss		-	1.5	-	
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 Risistance	Rg	f = 1MHz	-	23	-	Ω
Total gate charge	Qg	V_{DD} = 1200V,I_D = 2A, V_{GS} = -4V/18V	-	14.5	-	nC
Gate - Source charge	Qgs		-	2.7	-	
Gate - Drain charge	Qgd		-	9.0	-	
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	Eon		-	83	-	uJ
Turn-Off Energy	Eoff		-	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;Tj=25°C

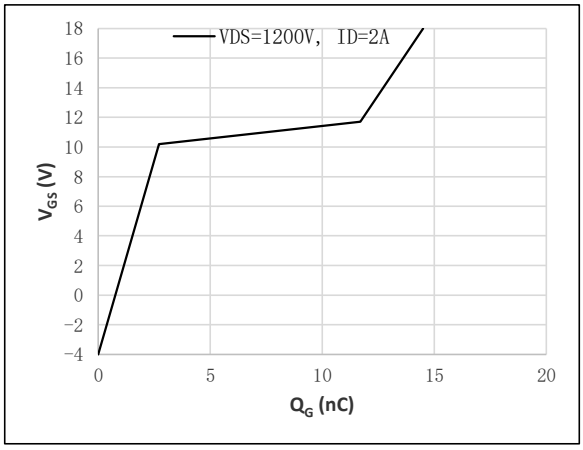


Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage;Typical values;Tj=25°C

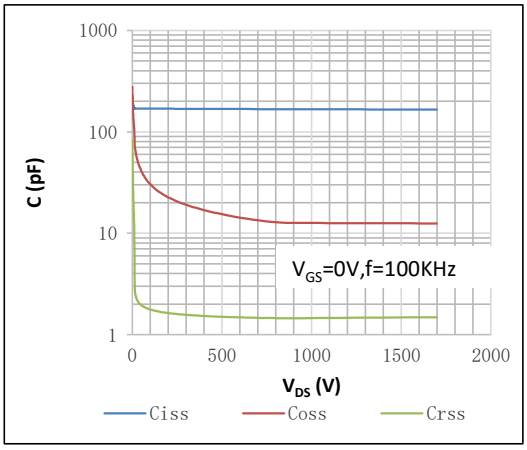


Fig.3 Output characteristics: drain current as a function of drain-source voltage;Typical values; Tj=25°C

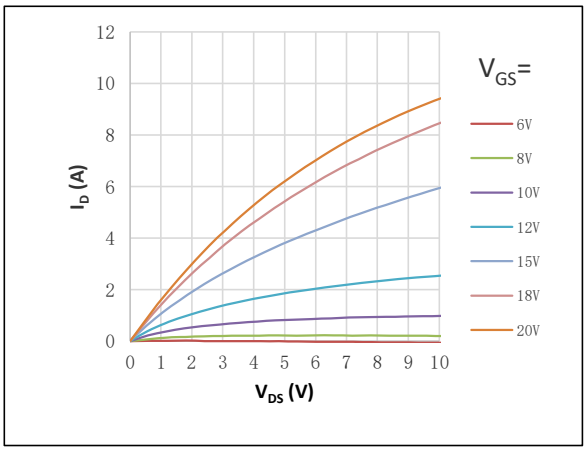


Fig.4 Output characteristics: drain current as a function of drain-source voltage;Typical values:Expanded curve;Tj=25°C

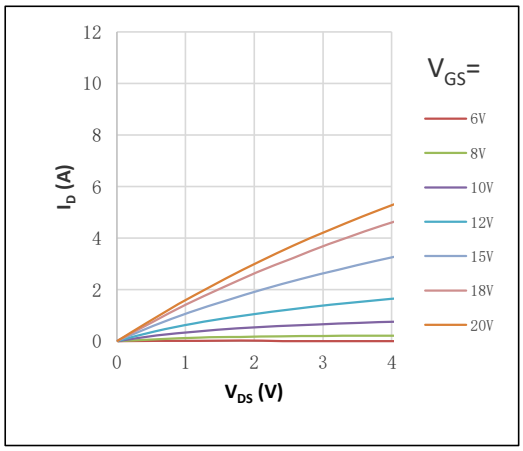


Fig.5 Gate-source threshold voltage as a function of junction temperature;Typical values

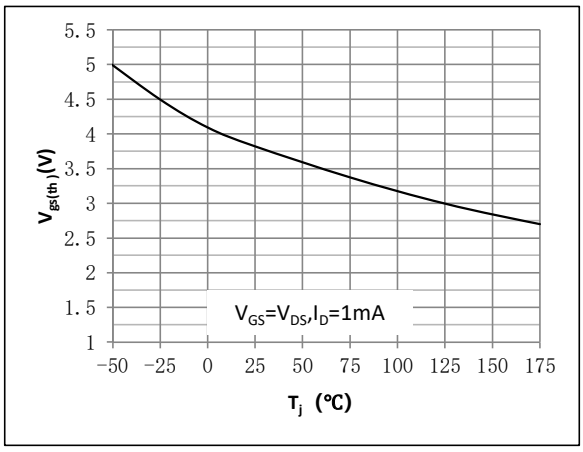


Fig.6 Drain-source on-state resistance as a function of drain current;Typical values;Tj=25°C

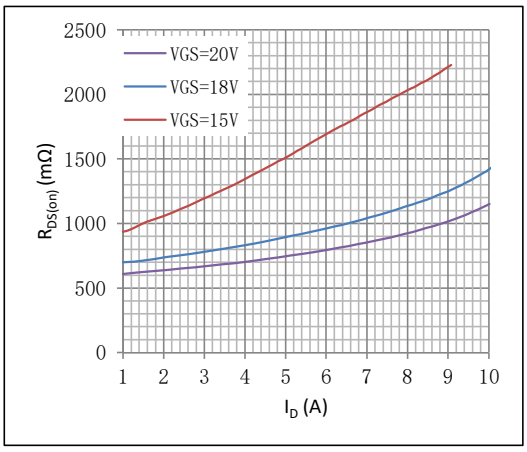
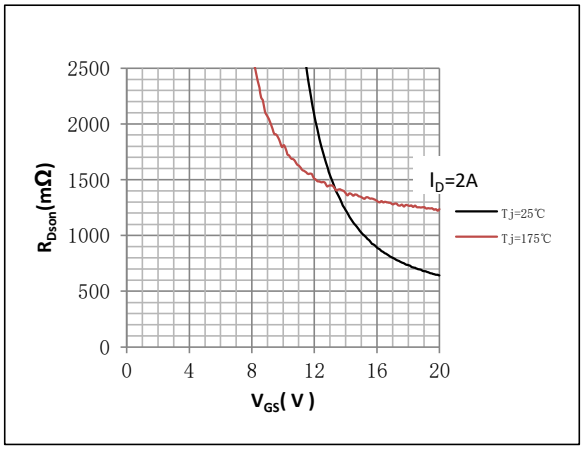


Fig.7 Drain-source on-state resistance as a function of gate-source voltage;Typical values

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



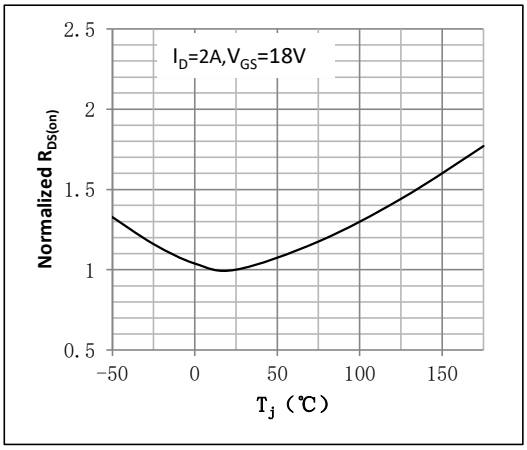
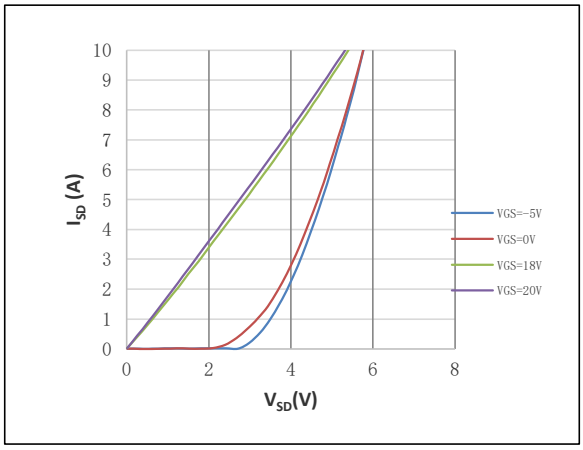


Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage ;Typical values

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



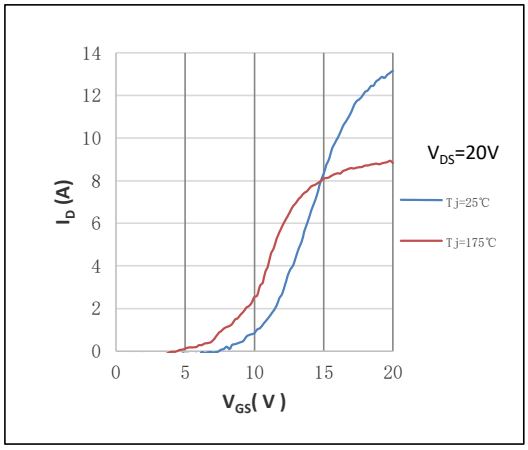
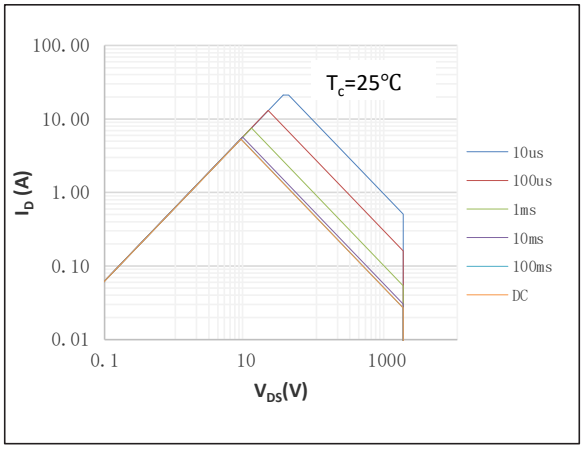


Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage;Calculative values

Fig.12 Continuous drain current as a function of case temperaturease③;Calculative values



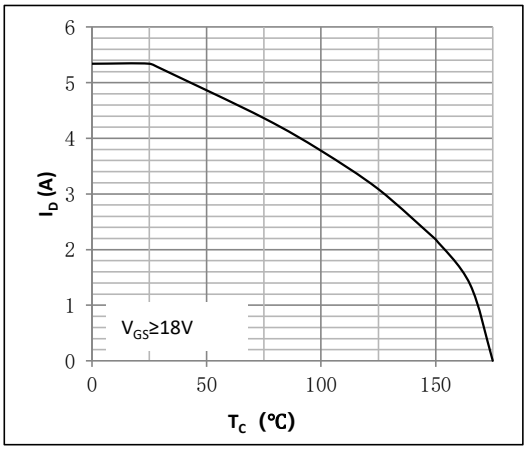


Fig.13 Drain-source breakdown voltage as a function of junction temperature;Typical values
Normalized BVDSS=BVDSS/BVDSS(25°C)

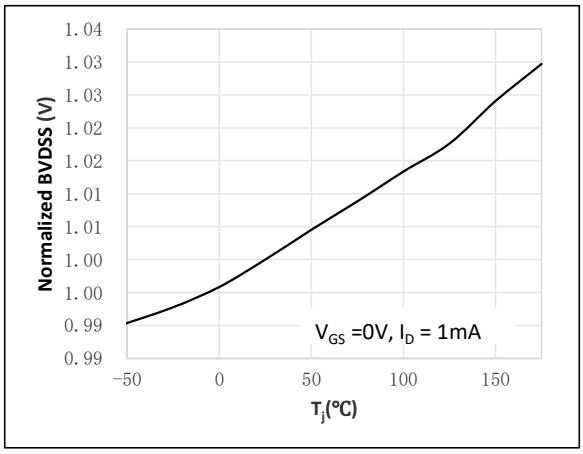


Fig.14 Normalized total power dissipation as a function of case temperature;Calculative values
Normalized Power Dissipation=Pd/Pd(25°C)

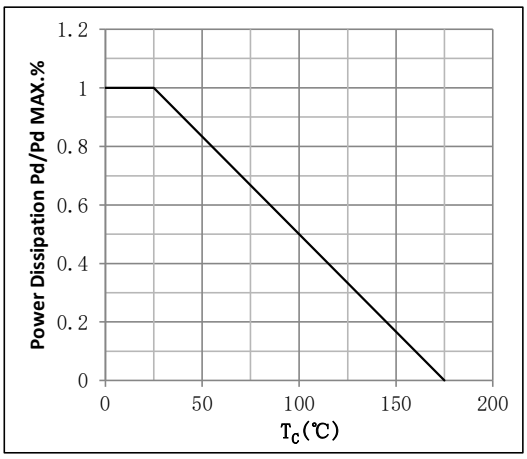


Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values

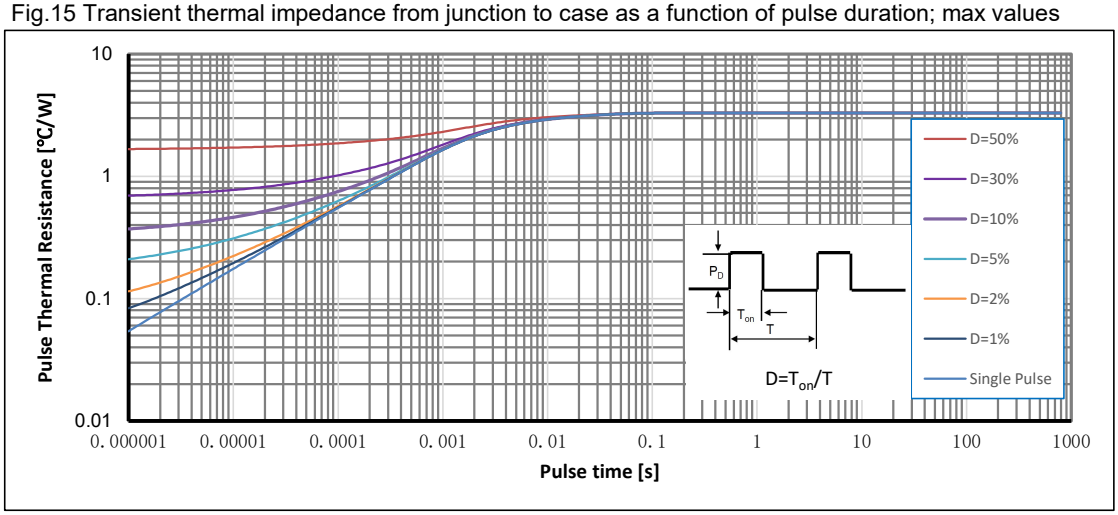
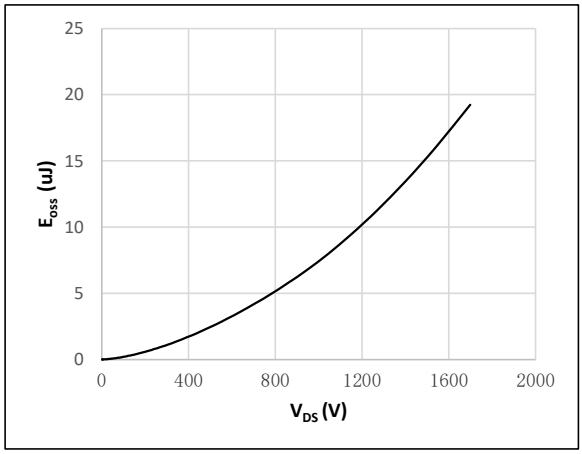
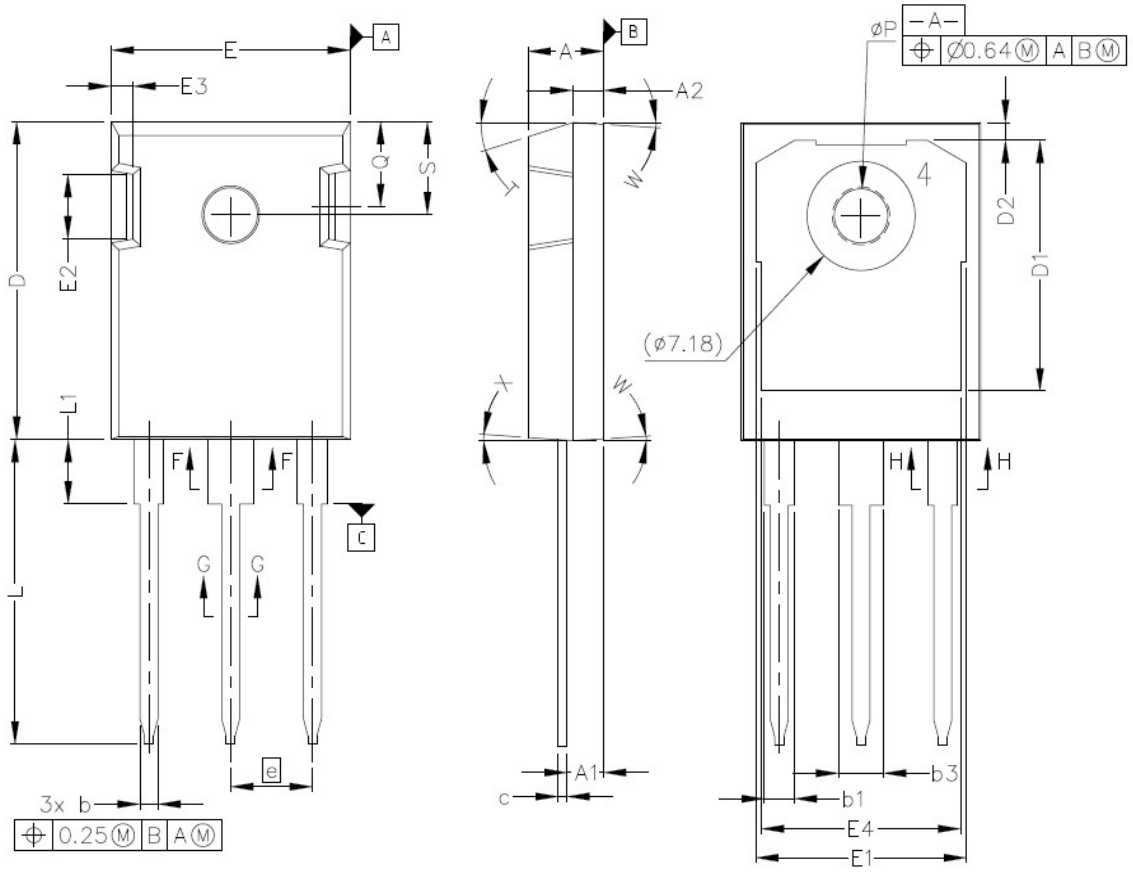


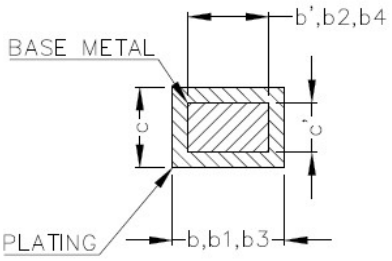
Fig.16 Output capacitor stored energy as a function of drain-source voltage;Typical values;
Tj=25°C



●TO-247-3 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:

① The value of RθJA is measured with the device in a still environment with TA=25℃

②Practically the current will be limited by PCB, thermal design and operating temperature. VGS=18V.

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Version	Date	Change
A	2025/5/27	New